

## Odonatological Abstract Service (OAS)

Ausgaben 1 bis 73 in einem pdf

Editions 1 to 73 compiled in one pdf

### **Wichtiger Hinweis – bitte beachten!**

Von 1998 bis 2016 wertete Martin Schorr – unterstützt durch verschiedene Kollegen – zahllose odonatologische Publikationen (einschließlich "grauer Literatur", also unveröffentlichte Berichte, wissenschaftliche Abschlussarbeiten etc.) aus und stellte diese als Zitate, in den meisten Fällen mit Zusammenfassung, in Form des "ODONATOLOGICAL ABSTRACT SERVICE" (OAS) als Veröffentlichung des INTERNATIONAL DRAGONFLY FUND e.V. (IDF) in Kooperation mit der WORLDWIDE DRAGONFLY ASSOCIATION (WDA) zusammen. Nach der Doppelnummer 45/46 im Mai 2016 wurde der Service vorübergehend eingestellt. Seit Juli 2021 hat Martin Schorr den OAS wiederbelebt. Das vorliegende pdf enthält alle Ausgaben bis zur Nummer 73 (Dezember 2023). Es enthält 22.609 Quellen auf 4.347 Seiten.

Durch Suche nach Stichworten kann diese Datei sehr komfortabel für Literaturrecherchen genutzt werden.

Es erscheinen stets neue Ausgaben – diese finden sie unter <https://dragonflyfund.org/oas/>

Wenn Sie mit Hilfe von OAS odonatologische Literatur recherchieren, bitten wir Sie darum, dieses in Ihren eigenen Berichten oder Publikationen zu vermerken. Dieses kann beispielsweise in der Danksagung in folgender oder ähnlicher Form geschehen: **"Bei der Literaturrecherche wurde der Odonatological Abstract Service (OAS) des INTERNATIONAL DRAGONFLY FUND e.V. (IDF) herangezogen (<https://dragonflyfund.org/oas/>)."**

Der IDF ist ein gemeinnütziger Verein, dessen Ziel die Förderung von Projekten zur Erforschung und zum Schutz der Libellen unserer Erde und ihrer Lebensräume ist. **Spenden, die vollständig in Projekte des IDF fließen, sind daher willkommen. Spendenquittungen können ausgestellt werden.**

International Dragonfly Fund e.V.

Schulstr. 7B, D-54314 Zerf

IBAN: DE22 5855 0130 0003 6999 49

SWIFT/BIC: TRISDE55XXX

### **Important information – please note!**

From 1998 to 2016, Martin Schorr – supported by several colleagues – acquired and analysed countless odonatological papers (including "grey literature", i.e. unpublished reports, scientific theses, etc.) and presented them as citations, in most cases with summaries, as "ODONATOLOGICAL ABSTRACT SERVICE" (OAS), a publication of INTERNATIONAL DRAGONFLY FUND e.V. (IDF) in co-operation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA). After the double issue 45/46 in May 2016, the service was temporarily discontinued. Martin Schorr has revived the OAS since July 2021. This pdf contains all issues up to number 73 (December 2023). It contains 22,609 sources on 4,347 pages.

By searching for keywords, this file can be used very conveniently for literature research.

New issues are constantly being published - you can find them at <https://dragonflyfund.org/oas/>

If you research odonatological literature with the help of OAS, we ask you to make a note of this in your own reports or publications. This can be done, for example, in the acknowledgements in the following or similar form: **'The Odonatological Abstract Service (OAS) of the INTERNATIONAL DRAGONFLY FUND e.V. (IDF) was used for the literature search (<https://dragonflyfund.org/oas/>).'**

The IDF is a non-profit organisation whose aim is to promote projects to research and protect the dragonflies of our planet and their habitats. **Donations that are fully channelled into IDF projects are therefore welcome. Donation receipts can be issued.**

International Dragonfly Fund e.V.

Schulstr. 7B, D-54314 Zerf

IBAN: DE22 5855 0130 0003 6999 49

SWIFT/BIC: TRISDE55XXX

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Wolfstr. 6, D-72119 Ammerbuch, Germany. Tel. ++49 (0) 7073 5262; e-mail: Lindeboom@aol.com and Martin Schorr, Waldfrieden 25, D-54314 Zerf, Germany. Tel. ++49(0)6587 1025; e-mail: FOEATrier@aol.com

The ©ODONATOLOGICAL ABSTRACT SERVICE is a supplement to AGRION, the Newsletter of the Worldwide Dragonfly Association.

Anadu, D.I.; Anaso, H.U. and O.N.D. Onyeka 1996: Acute toxicity of the insect larvicide Abate (Temephos) on the fish *Tilapia melanopleura* and the dragonfly larvae *Neurocordulia virginienensis*. *Journal of Environmental Science and Health, Part B: Pesticides, Food, Contaminants and Agricultural Wastes* 31(6): 1363-1375

[*"Acute bioassay tests on the toxic effects of the insect larvicide Abate(R) (temephos) on the mouth brooder cichlid fish Tilapia melanopleura and the dragonfly larvae (Odonata) Neurocordulia virginienensis were conducted in static non renewal toxicity test set ups. ...The dragonfly larvae were 15 times more susceptible to the larvicide than the tilapia. ... The estimated 'safe' concentration of the pesticide to the fish was 3.0 mg/L and 0.2 mg/L for insect larvae. These figures are far above the concentrations approved for use in the control of mosquito larvae (0.0004-0.01 mg/L)."*]

Anholt, B.R.; Skelly, D.K. and E.E. Werner 1996: Factors modifying antipredator behavior in larval toads. *Herpetologica* 52(3): 301-313

[*"This study examines the behavioral responses of larvae of the American toad, Bufo americanus, to the presence of an invertebrate predator, larvae of the dragonfly Anax junius. ... Toad larvae did avoid predators, but the level of avoidance could not be shown to vary with predator density, food availability, or body size."*]

Arikawa, K.; Ozaki, K.; Tsuda, T.; Kitamoto, J. and Y. Mishina 1996: Two visual pigment opsins, one expressed in the dorsal region and another in the dorsal and the ventral regions, of the compound eye of a dragonfly, *Sympetrum frequens* (vol 1, pg 33, 1995). *Invertebrate neuroscience* 2(3): 209 (Correction/Addition)

Bayerisches Landesamt für Wasserwirtschaft (Hrsg.) (1996): *Ökologische Typisierung der aquatischen Makrofauna. Informationsberichte des bayerischen Landesamtes für Wasserwirtschaft* 4/96: 543 pp. DM 49,- + p. u. p.

Adress: Wasserwirtschaftsamt Deggendorf, PF 2060, D-94460 Deggendorf, Germany.

[*checklist of most of the German species of macrozoobenthos including Odonata; extensive species-wise descriptions of habitats and biology/ecology; well documented handbook*]

Debano, S.J. 1996: Male mate searching and female availability in the dragonfly, *Libellula saturata*: relationships in time and space. *Southwestern Naturalist* 41 (3): 293-298

[*"Sexual selection theory proposes that mate-locating tactics will be driven by the temporal and spatial patterns of receptive females. I tested this hypothesis in the libellulid dragonfly, Libellula saturata, by examining two predictions: 1) that male densities should be highest at times when the probability of encountering receptive females is the greatest, and*

*2) that densities of males should be highest at places where females prefer to oviposit."*]

Dieter, C.D.; Duffy, W.G. and L.D. Flake 1996: The effect of phorate on wetland macroinvertebrates. *Environmental Toxicology and Chemistry* 15(3): 308-312

[*"The effects of phorate, an organophosphorus insecticide, on aquatic macroinvertebrates was studied in littoral mesocosms in South Dakota wetlands. ...Macroinvertebrate taxa that were sensitive to phorate included: Odonata, Hemiptera, Culicidae, Heliidae, Ephemeroptera, Acarina, Coleoptera, Stratiomyidae, and Hydracarina. Taxa that were tolerant to phorate included: Hirudinea, Gastropoda, Oligochaeta, and Ostracoda."*]

Gasse, M.; Kröger, C. (1996): Schlüpfende Großlibelle (Anisoptera: Aeshnidae) als Beute der sozialen Faltenwespe *Vespula vulgaris* L. (Hymenoptera: Vespidae). *Libellula* 15(1/2): 45-55 (in German, with Engl. summary)

[*predation; Hymenoptera; Aeshna cyanea; emergence*]

Grether, G.F. and R.M. Grey 1996: Novel cost of a sexually selected trait in the rubyspot damselfly *Hetaerina americana*: Conspicuousness to prey. *Behavioral Ecology* 7(4): 465-473

[*"Conspicuousness to predators frequently has been invoked as a cost of sexually selected traits, but conspicuousness to prey has not. We tested for the latter using rubyspot damselflies (Hetaerina americana) as the predator."*]

Gustafson, K. 1996: Biological dynamical subsystems of hovering flight. *Mathematics and Computers in Simulation* 40(3-4): 397-410

[*Dragonfly, Hummingbird; Aerodynamics*]

Helsdingen, P. van; Willemse, L.; Speight, M.C.D. (1996): Background information on invertebrates of the Habitat Directive and the Bern Convention. Part II - Mantodea, Odonata, Orthoptera and Arachnida (pp: 219-398). *Nature and environment* 80.

Adress: Council of Europe Publishing, Council of Europe, F-67075 Strasbourg Cedex, France

[*review; biology; range; status; threats; key sites; priority actions; future research efforts; Coenagrion hylas; C. mercuriale; Sympecma paedisca; Aeshna viridis; Gomphus graslini; Stylurus flavipes; Ophiogomphus cecilia; Lindenia tetrphylla; Cordulegaster trinacriae; Macromia splendens; Oxygastra curtisii; Leucorrhinia albifrons; L. caudalis; L. pectoralis*]

Jellyman, D.J. 1996: Diet of longfinned eels, *Anguilla dieffenbachii*, in Lake Rotoiti, Nelson Lakes, New Zealand. *New Zealand Journal of Marine and Freshwater Research* 30(3): 365-369

[*"The diet of 72 longfinned eels, Anguilla dieffenbachii, from Lake Rotoiti, Nelson Lakes National Park,*



New Zealand, was numerically dominated by snails, especially *Lymnaea*. Larvae of the dragonfly, *Procordulia grayi*, were extensively eaten as they migrated towards the shore for emergence.”]

Johansson, F. 1996: The influence of cannibalism and prey density on growth in the damselfly *Coenagrion hastulatum*. *Archiv für Hydrobiologie* 137(4): 523-535

[“The effects of prey density and cannibalism on individual growth rate in similar sized *Coenagrion hastulatum* (Zygoptera) larvae were studied in a 66 day laboratory experiment. The frequency of cannibalism decreased with increasing alternative prey densities.”]

Jordan, F. and A.C. McCreary 1996: Effects of an odonate predator and habitat complexity on survival of the flagfish *Jordanella floridae*. *Wetlands* 16 (4): 583-586

[“Dragonfly larvae reduced survival of flagfish by 40% during a ten-day experiment. Survival rates did not differ between simple and complex habitats. These results suggest that predatory insects could play an important role in regulating populations of small fishes in marsh systems that lack larger predatory fishes.”]

Kielbaso, M.A. and M.F. O'Brien 1996: Discovery of an isolated population of *Anax longipes* in Michigan (Odonata, Aeshnidae). *Great Lakes Entomologist* 29(3): 161-164

Louton, J., Gelhaus, J. and R. Bouchard 1996: The aquatic macrofauna of water-filled bamboo (Poaceae: Bambusoideae: *Guadua*) internodes in a Peruvian lowland tropical forest. *Biotropica* 28(2): 228-242

[“In the lowland tropical forest at Pakitza, Peru, bamboo (*Guadua weberbaueri* Pilger) internodes with lateral perforations contain a diverse aquatic fauna. We found a community of 29 species dominated by Diptera, primarily mosquitoes, and an undescribed helicopter damselfly (*Mecistogaster*).”]

Marchant, R. and C.M. Yule 1996: A method for estimating larval life spans of aseasonal aquatic insects from streams on Bougainville Island, Papua New Guinea. *Freshwater Biology* 35(1): 101-107 [Liefertinckia kimminsii]

Marten, G.G.; Suarez, M.F. and R. Astaeza 1996: An ecological survey of *Anopheles albimanus* larval habitats in Colombia. *Journal of Vector Ecology* 21(2): 122-131

[“The flora and fauna of 69 aquatic sites in Colombia were surveyed to identify ecological conditions that favor production of *Anopheles albimanus*... *A. albimanus* production was negatively associated with a complete cover of *Lemna*, fish, hydrometrid nymphs, large species of cyclopoid copepods, and dragonfly or mayfly nymphs.”]

Martinet, S.C.G. and L.F.V. Diez 1996: The community of odonata and aquatic heteroptera (Gerronormorpha and Nepomorpha) in a rehabilitated wetland: The Laguna de la Nava (Palencia, Spain). *Archiv für Hydrobiologie* 136 (1): 89-104

McCollum, S.A. and J. Van Buskirk 1996: Costs and benefits of a predator-induced polyphenism in the gray treefrog *Hyla chrysoscelis*. *Evolution* 50(2): 583-593

[“The phenotypes of gray treefrog (*Hyla chrysoscelis*) tadpoles vary depending on whether predators are present in the pond. Tadpoles reared in ponds with predatory dragonfly larvae are relatively inactive compared with tadpoles in predator-free ponds,

and have relatively large, brightly colored tailfins with dark spots along the margins.”]

Mesterton-Gibbons, M.; Marden, J.H. and L.A. Dugatkin 1996: On wars of attrition without assessment. *Journal of Theoretical Biology* 181(1): 65-83 [Data from *Calopteryx maculata*]

Mogi, M. and T. Sota 1996: Physical and biological attributes of water channels utilized by *Culex pipiens pallens* immatures in Saga City, Southwest Japan. *Journal of the American Mosquito Control Association* 12(2 PART 1): 206-214

[“Physical and biological attributes of water channels utilized by immatures of *Culex pipiens pallens* were studied in Saga City, Japan. Water in mosquito-productive segments generally was stagnant or slowly running (mean < 5 cm/sec), with low and fluctuating dissolved oxygen concentrations and high electric conductivity. ... Adult Odonata were more diverse in segments with emergent vegetation irrespective of physical attributes of channel water.”]

Nystrom, P.; Bronmark, C. and W. Graneli 1996: Patterns in benthic food webs: A role for omnivorous crayfish? *Freshwater Biology* 36(3): 631-646 [Fish Predation, Gastropoda, Odonata, Biomass]

Okamoto, M.; Yasuda, K. and A. Azuma 1996: Aerodynamic characteristics of the wings and body of a dragonfly. *Journal of Experimental Biology* 199 (2): 281-294

[“The aerodynamic characteristics of the wings and body of a dragonfly and of artificial wing models were studied by conducting two types of wind-tunnel tests and a number of free-flight tests of gliders made using dragonfly wings.”]

Phillips, E.C. 1996: Habitat preference of large predatory aquatic insects (Megaloptera and Odonata) in Ozark streams of Arkansas. *Texas Journal of Science* 48(4): 255-260

Pritchard, G. 1996: The life history of a tropical dragonfly: *Cora marina* (Odonata: Polythoridae) in Guanacaste, Costa Rica. *Journal of Tropical Ecology* 12(4): 573-581

[“The life history of *Cora marina* was followed for one year in two permanent streams at 600 m elevation in Guanacaste National Park, Costa Rica. In both streams, *C. marina* was univoltine. Adults first appeared at the beginning of May and the flight period coincided with the wet season. ... Oviposition in logs above the stream and the ability to live in the low oxygen conditions of the hyporheic zone probably allow eggs and small larvae to survive wet season spates.”]

Prot, J.M. (1996): Tératologie chez *Orthetrum albistylum* (Selys, 1848) (Odonata, Anisoptera, Libellulidae). *Martinia* 12(1): 3-4 (in French) [teratology; France]

Reinhard, K.; Möller, S. (1996): Libellen als Beute von Eidechsen: eine Übersicht. *Libellula* 15(3/4): 93-101. [predation; reptiles; food of lizards; stomach samples; faecal analysis]

Samways, M.J. and N.S. Steytler 1996: Dragonfly (odonata) distribution patterns in urban and forest landscapes, and recommendations for riparian management. *Biological Conservation* 78 (3): 279-288  
Sanborn, A.F. 1996: The cicada *Diceroprocta delicata* (Homoptera: Cicadidae) as prey for the dragonfly *Erythemis simplicicollis* (Anisoptera: Libellulidae). *Florida Entomologist* 79(1): 69-70

- Schaefer, P.W.; Barth, S.E. and H.B. White 1996: Incidental capture of male *Epiaeschna heros* (Odonata: Aeshnidae) in traps designed for arboreal *Calosoma sycophanta* (Coleoptera: Carabidae). *Entomological News* 107(5): 261-266  
 ["Ten male *Epiaeschna heros*, the largest dragonfly in the northeastern US, were caught unexpectedly in traps designed to catch *Calosoma sycophanta*, a carabid beetle that feeds on the larvae of the gypsy moth, *Lymantria dispar* (Lepidoptera: Lymantriidae), and other lepidopterans. ...Modification of the traps might enhance their selectivity for aeshnid dragonflies."]
- Schaefer, P.W.; Barth, S.E. and H.B. White 1996: Predation by *Enallagma civile* (Odonata: Coenagrionidae) on adult sweetpotato whitefly, *Bemisia tabaci* (Homoptera: Aleyrodidae). *Entomological News* 107(5): 275-276
- Snyder, S.D. and J. Janovy 1996: Behavioral basis of second intermediate host specificity among four species of *Haematoloechus* (Digenea: Haematoloechidae). *Journal of Parasitology* 82(1): 94-99  
 ["Cercarial behavior patterns were examined in 4 species of frog lung flukes (*Haematoloechus* spp.). ...Cercariae of *H. longiplexus* attached to experimental hosts in approximately the same numbers as *H. complexus*, but *H. longiplexus* penetrated only damselfly naiads, and only at the base of the zygopteran caudal gills. Cercariae of *H. complexus*, a second intermediate host generalist, were able to penetrate and enter several arthropod species at the intersegmental membranes. ..."]
- Wagner, T.; Neinhuis, C. and W. Barthlott 1996: Wettability and contaminability of insect wings as a function of their surface sculptures. *Acta Zoologica (Stockholm)* 77(3): 213-225  
 ["The wing surfaces of 97 insect species from virtually all relevant major groups were examined by high resolution scanning-electron-microscopy, in order to identify the relationships between the wing microstructures, their wettability with water and their behaviour under the influence of contamination. ... Some insects with very unwettable wings show a highly significant "self-cleaning" effect under the influence of rain or dew. Detailed analysis revealed that there is a correlation between the wettability and the "SM Index" (quotient of wing surface/body mass)(0.67) with values ranging from 2.42 to 57.0. Furthermore, there is a correlation between the "self-cleaning" effect and the SM Index, meaning that taxa with a high SM Index. e.g. "large-winged" Ephemeroptera, Odonata, Planipennia, and many Lepidoptera, have very unwettable wings and show high particle removal due to dripping water drops."]
- Wetzel, E.J. and G.W. Esch 1996: Influence of odonate intermediate host ecology on the infection dynamics of *Halipegus* spp., *Haematoloechus longiplexus*, and *Haematoloechus complexus* (Trematoda: Digenea). *Journal of the Helminthological Society of Washington* 63(1): 1-7  
 ["The prevalences and relative densities of *Halipegus* spp., *Haematoloechus longiplexus*, and *Haematoloechus complexus* metacercarial infections in anisopteran (dragonfly) and zygopteran (damselfly) odonate intermediate hosts were examined."]
- Yule, C.M. and R.G. Pearson 1996: Aseasonality of benthic invertebrates in a tropical stream on Bougainville Island, Papua New Guinea. *Archiv für Hydrobiologie* 137(1): 95-117  
 [*Lieftinckia kimminsii*]
- Yule, C.M. 1996: Trophic relationships and food webs of the benthic invertebrate fauna of two aseasonal tropical streams on Bougainville Island, Papua New Guinea. *Journal of Tropical Ecology* 12(4): 517-534
- Zeng, L.J., Matsumoto, H. and K. Kawachi 1996: Two colour compensation method for measuring unsteady vertical force of an insect in a wind tunnel. *Measurement Science and Technology*, 7(4): 515-519
- Zeng, L.J., Matsumoto, H. and K. Kawachi 1996: A fringe shadow method for measuring flapping angle and torsional angle of a dragonfly wing. *Measurement Science and Technology*, 7(5): 776-781
- Zeng, L.J.; Matsumoto, H. and K. Kawachi 1996: Simultaneous measurement of the shape and thickness of a dragonfly wing. *Measurement Science and Technology* 7(12): 1728-1732.
- Zeng, L.J., Matsumoto, H. and K. Kawachi 1996: Angle compensation sensor for measuring the shape of a dragonfly wing. *Sensors and Actuators. A Physical.* (ISSN 0924-4247) 55(2-3): 87-90
- Zeng, L.J.; Matsumoto, H. and K. Kawachi 1996: Scanning beam collimation method for measuring dynamic angle variations using an acousto optic deflector. *Optical Engineering* 35(6): 1662-1667
- Zeng, L.J., Matsumoto, H.; Sunada, S. and K. Kawachi 1996: High resolution method for measuring the torsional deformation of a dragonfly wing by combining a displacement probe with an acousto optic deflector. *Optical Engineering* 35(2): 507-513
- Ali, D.W. 1997: The aminergic and peptidergic innervation of insect salivary glands. *Journal of Experimental Biology* 20(14): 1941-1949  
 ["Insect salivary glands are glands associated with nutrient intake whose secretions are generally involved in the digestion and lubrication of food. They are under the control of neuroactive substances and may be innervated from several sources including the suboesophageal ganglion, the stomatogastric nervous system and the unpaired median nerves. ... Serotonin and dopamine appear to be the most prominent amines associated with insect salivary glands. Either one or both of these amines are found associated with the salivary glands of the locust, stick insect, cockroach, cricket, dragonfly, mosquito, adult moth and kissing bug."]
- Anders, U. and G. Ruppell 1997: Relationships of some European Calopteryx species suggested by time analysis of courtship flights (Odonata, Calopterygidae). *Entomologia Generalis* 21(4): 253-264  
 ["The courtship flights of males of *Calopteryx virgo* (Linnaeus 1758), *C. splendens* (Harris 1782), *C. xanthostoma* (Charpentier 1825) and *C. haemorrhoidalis* (Vander Linden 1825) were filmed with a slow motion camera in N' Germany and S' France. ... With respect to the studied parameter, there is no difference between *C. splendens* and *C. xanthostoma*, in contrast to *C. haemorrhoidalis* and *C. virgo*, which are different to each other and to the first two."]
- Asahina, S. 1997: Records of the northern Vietnamese Odonata taken by the expedition members from the National Science Museum, Tokyo. 5. Coenagrionidae, Protoneuridae and Platycnemidae. *Bulletin of the National Science Museum Series A (Zoology)* 23(1): 17-34  
 ["In total twenty-four species of northern Vietnamese damselflies referable to three zygopterid families are recorded in the fifth part of this series. Many of them seem to be rather common lowland species, but special attention is paid to the family Platycnemididae, of which three *Calicnemia* are illustrated

including one new species and six of the seven *Coelliccia* species are described as being new to science.”]

Asahina, S. 1997: Records of the northern Vietnamese odonata taken by the expedition members from the National Science Museum, Tokyo. 6. Platystictidae, Megapodagrionidae, Lestidae and Synlestidae. Bulletin of the National Science Museum Series A (Zoology) 23(2): 107-113

[“Seven species of northern Vietnamese damselflies are classified into four families, Platystictidae (1 new species and 1 new subspecies), Megapodagrionidae (1 new species and 1 species previously known from Lower Burma and Laos), Lestidae (1 common South Asiatic species), and Synlestidae (2 species previously known from Southwest China, etc.).”]

Baird, J.M. and M.L. May 1997: Foraging behavior of *Pachydiplax longipennis* (Odonata: Libellulidae). Journal of Insect Behavior 10 (5): 655-678

[“Food intake, prey availability, and prey capture behavior at feeding areas were quantified in the dragonfly *Pachydiplax longipennis* by observing focal individuals on artificial perches, where they exhibited marked short-term site fidelity.”]

Bland, K.P. 1997: A precisely timed case of nocturnal migration by *Aeshna cyanea* (Mueller) (Odonata: Aeshnidae). Entomologist's Record and Journal of Variation 109(5-6): 154-155

Brock, I.; Hoffmann, J.; Kühnast, O.; Piper, W.; Voß, K. (1997): Atlas der Libellen Schleswig-Holsteins. Landesamt für Natur und Umwelt Schleswig-Holstein (Hrsg.). ISBN 3-923339-39-9: 176 pp. (in German, with Engl. and Danish summaries)  
Adress: Landesamt für Natur- und Umwelt SH, Hamburger Chaussee 25, D-24220 Flintbek, Germany  
[distribution; biogeographical regions; UTM-squares; Schleswig-Holstein, north of Germany]

Bulankova, E. 1997: Dragonflies (Odonata) as bio-indicator of environment quality. Biologia (Bratislava) 52(2): 177-180  
[Danube river, Morava river, Rudava river, Czech Republic]

Burbach, K.; Winterholler, M. (1997): Die Invasion von *Hemianax ephippiger* (Burmeister) in Mittel- und Nordeuropa 1995/1996 (Anisoptera: Aeshidae). Libellula 16(1/2): 33-59. (in German with Engl. summary)  
[invasion; Central- and North Europe; previously unpublished records; Czech Republik; Poland; Austria; Switzerland]

Clauswalker, D.B.; Crowley, P.H. and F. Johansson 1997: Fish predation, cannibalism, and larval development in the dragonfly *Eitheca cynosura*. Canadian Journal of Zoology 75(5): 687-696  
[“We manipulated the risk of fish predation and cannibalism in semi field and laboratory experiments with larvae of the dragonfly *Eitheca cynosura*.”]

Cordero, A.; Andres, J.A. (1996): Colour polymorphism in odonates: females that mimic males?. J. Br. Dragonfly soc. 12(2): 50 - 60.  
[female colour polymorphism; polychromatic species]

Currie, R.S.; Fairchild, W.L. and D.C.G. Muir 1997: Remobilization and export of cadmium from lake sediments by emerging insects. Environmental Toxicology and Chemistry 16(11): 2333-2338

[“Emerging insects including, Diptera, Odonata, Ephemeroptera, and Trichoptera were collected from Lake 382 (L382) in 1991 and 1992 to estimate quantitatively the export of Cd by aquatic insects from a natural system having elevated Cd concentrations in the water and sediment. L382 is a Canadian Shield lake, located within the Experimental Lakes Area in northwestern Ontario, that received experimental additions of Cd from 1987 to 1992. ... Approximately 0.05 to 0.17% of the whole-lake Cd load in L382 sediments was exported annually or 0.12 to 0.39% of the epilimnion Cd sediment load.”]

Didion, A.; Trockur, B.; Schorr, M. (1997): Rote Liste der im Saarland gefährdeten Libellenarten (2. Fassung: 1997). Aus Natur und Landschaft im Saarland, Sonderband 7: 9-36. (in German, with French summary)  
[red list; region in the south-west of Germany near the border to France and Luxembourg]

Dolmen, D. 1997: "Freshwater prawns" and other invertebrates: A faunistic report from the lakes Redalsvannet and Landvikvannet, Grimstad. Fauna (Oslo) 50(1): 36-42 (Norwegian, with English summary)

[“In June and July 1992 and June and August 1996, numerous "freshwater prawns" *Palaemonetes varians* were recorded in three brackish-water lakes at Grimstad, ... This is the first reliable record of the species in Norway, at least for many decades. The remaining fauna consisted of both limnic and marine animals, and included rare species like *Brachytron pratense* (Odonata) and *Gyrinus caspius* (Coleoptera).”]

Ferreras-Romero, M. 1997: The life history of *Boyeria irene* (Fonscolombe, 1838) (Odonata: Aeshnidae) in the Sierra Morena Mountains (southern Spain). Hydrobiologia 345(2-3): 109-116  
[“The life history of *Boyeria irene* is inferred from size-frequency analyses of sweep-net samples taken during five years in a permanent stream in the Sierra Morena Mountains. There the species is apparently mainly semivoltine, although a few larvae require three years to complete development.”]

Fincke, O.M. 1997: Conflict resolution in the odonata: implications for understanding female mating patterns and female choice. Biological Journal of the Linnean Society 60(2): 201-220  
[“With reference to the Odonata, a taxon in which mating requires cooperation of the female, the active role that females play in mating decisions is often ignored, leading to the premature conclusion that male coercion of Females is common. A critical review of the outcome of sexual conflict among odonates leads me to alternative explanations of female mating patterns that need to be refuted before concluding that males coerce matings.”]

Fincke, O.M.; Yanoviak, S.P. and R.D. Hanschu 1997: Predation by odonates depresses mosquito abundance in water-filled tree holes in Panama. Oecologia 112(2): 244-253  
[“In the lowland moist forest of Barro Colorado Island, Panama, larvae of four common species of odonates, a mosquito, and a tadpole are the major predators in water-filled tree holes. Mosquito larvae are their most common prey. Holes colonized naturally by predators and prey had lower densities of mosquitoes if odonates were present than if they were absent. Using artificial tree holes placed in the field, we tested the effects of odonates on their mosquito prey while controlling for the quantity and species of predator, hole volume, and nutrient input. In large and small holes with low nutrient input, odonates depressed the number of mosquitoes pre-



sent and the number that survived to pupation. Increasing nutrient input (and consequently, mosquito abundance) to abnormally high levels dampened the effect of predation when odonates were relatively small."

Fitzhugh G.H. and J.H. Mardsen 1997: Maturation changes in troponin T expression, Ca-2+-sensitivity and twitch contraction kinetics in dragonfly flight muscle. *Journal of Experimental Biology* 200 (10): 1473-1482

["Maximum lift production and the thermal sensitivity of lift production increase dramatically during adult maturation of *Libellula pulchella* dragonflies. Here, we report that the mechanistic basis for this transition appears to involve a developmental change in protein expression, which alters the Ca-2+-sensitivity of muscle activation and twitch contraction kinetics."]

Fliedner, H. (1997): Die Bedeutung der wissenschaftlichen Namen europäischer Libellen. *Libellula*, Suppl. 1: 111 pp. (in German, with short Engl. summary)

Adress: GdO, Gelderner Str. 39; D-41189 Mönchengladbach, Germany. (DM 20,- + p. u. p.)

[meanings of the scientific names of the European dragonflies; etymology; elements of names; short histories of odonatists]

Forbes, M.R.; Schalk, G.; Miller, J.G. and J.M.L. Richardson 1997: Male-female morph interactions in the damselfly *Nehalennia irene* (Hagen). *Canadian Journal of Zoology* 75(2): 253-260

["Several hypotheses concerning factors that favour coexistence of female morphs in damselflies (Zygoptera: Odonata) invoke differential attraction to (or harassment of) female morphs from mate-searching males. We designed experiments to determine whether males were differentially attracted to either of two discrete female morphs in a damselfly, *Nehalennia irene* (Hagen)."]

Gorb, S.N. 1997: Porous channels in the cuticle of the head-arrester system in dragon/damselflies (Insecta: Odonata). *Microscopy Research and Technique* 37(5-6): 583-591

["The ultrastructure of the porous channels (PC) of the postcervical sclerite (SPC), which provides additional head fixation to the neck in adult odonates, was studied using TEM and high resolution SEM microscopy. ... The porous channel system of the odonate arrester is interpreted as a device transporting adhesive excretions from the epidermal cells to the cuticular surface."]

Goutner, V. and R.W. Furness 1997: Mercury in feathers of little egret *Egretta garzetta* and night heron *Nycticorax nycticorax* chicks and in their prey in the Axios delta, Greece. *Archives of Environmental Contamination and Toxicology* 32(2): 211-216

["Mercury concentrations were measured in feathers of little egret and night heron chicks and in their prey in the Aries Delta, Greece. ... Diets differed considerably between the two species due to use of different foraging habitats and this seems responsible for different mercury contents of feathers. Mercury concentrations in the pumpkinseed sunfish *Lepomis gibbosus*, goldfish *Carrassius auratus*, and in dragonfly Odonata larvae were the highest among the prey categories. ... Night heron chick feathers, freshwater fish and dragonfly larvae could be used to monitor mercury contamination in this region, but use of bird feathers alone could give misleading results if changes in diet occurred."]

Grand, D. (1997): *Somatochlora meridionalis* Nielsen, 1935 (Odonata, Anisoptera). Analyse bibliographique et compléments biologiques. *Martinia*

13(3): 67 - 86. (in French, with short Engl. summary) [review of published data; distribution; emergence; copulation; status; France]

Hämäläinen, M. (1997): Forgotten names in the nomenclature of European Calopteryx species (Odonata: Calopterygidae). *Opusc. zool. flumin.* 158: 1 - 5.

Hämäläinen, M.; Valtonen, P. (1997): Trollslänornas utbredning i de naturhistoriska provinserna i Finland. *Nordic Odonatological Society Newsletter* 3(1): 10 - 11. [biogeographical provinces; distribution; checklists]

Hawking, J.H. 1997: The conservation status of dragonflies (Odonata) from south-eastern Australia. *Memoirs of the Museum of Victoria* 56(2): 537-542 [One hundred and seven species are recorded from South Australia, Victoria, Tasmania and southern New South Wales. No species is considered endangered, but nine species have high conservation priority. These species are endemic to Australia and all have restricted distributions. The vulnerability of the larval habitats is discussed and suggestions for their conservation and management are made."]

Hooper, R.E. and M.T. Siva-Jothy 1997: "Flybys": A prereproductive remote assessment behavior of female *Calopteryx splendens xanthostoma* (Odonata: Calopterygidae). *Journal of Insect Behavior* 10(2): 165-175

["Before reproductive events, female *Calopteryx splendens xanthostoma* show a distinctive flight behavior over patches of oviposition substrate guarded by territorial males. We term such flights 'flybys.' ... The results suggest that one function of flybys is to allow females to assess remotely potential male interference at oviposition sites."]

Horwitz P 1997: Comparative endemism and richness of the aquatic invertebrate fauna in peatlands and shrublands of far south-western Australia. *Memoirs of the Museum of Victoria* 56(2): 313-321

["Samples of surface water, interstitial water and crayfish burrow water were analysed from about 45 sites and in each season over a twelve month period in 1993. Six groups of aquatic invertebrates were chosen for more detailed analyses (mites, oligochaetes, isopods, decapods, dipterans, and odonates) and resolved to species level."]

Jacob, J.; Raab, G. and U. Hoppe 1997: Surface lipids of the silverfish (*Lepisma saccharina* L.). *Zeitschrift für Naturforschung, Section C, Journal of Biosciences* 52(1-2): 109-113.

["The cuticular lipid composition of silverfish resembles that of other more primitive arthropod forms such as stoneflies and dragonflies."]

Kasuya, E.; Edanami, K. and I. Ohno 1997: Territorial conflicts in males of the dragonfly, *Orthetrum japonicum* (Odonata: Libellulidae): The role of body size. *Zoological Science* 14(3): 505-509

["The relationship between body size and the results of territorial conflicts was studied in males of the dragonfly, *Orthetrum japonicum japonicum*. ... The results of territorial conflicts were more strongly affected by the role of the opponents (resident or intruder) than by the difference in their body sizes."]

Laurila, A.; Kujasalo, J. and E. Ranta 1997: Different antipredator behaviour in two anuran tadpoles: effects of predator diet. *Behavioral Ecology and Sociobiology* 40 (5): 329-336

["Recent investigations have indicated that animals are able to use chemical cues of predators to as-



sess the magnitude of predation risk. ... Tadpoles of the common toad (*Bufo bufo*) are unpalatable to most vertebrate predators and have an alarm substance. Tadpoles of the common frog (*Rana temporaria*) lack both these characters. We experimentally studied how predator diet, previous experience of predators and body size affect antipredator behaviour in these two tadpole species. Late instar larvae of the dragonfly *Aeshna juncea* were used as predators. The dragonfly larvae were fed a diet exclusively of insects, *R. temporaria* tadpoles or *B. bufo* tadpoles. *R. temporaria* tadpoles modified their behaviour according to the perceived predation risk.”]

Legrand, J. 1996 (1997): The larva of *Idomacromia proavita* Karsch, 1896 (Odonata, Anisoptera, Corduliidae). *Revue Francaise d'Entomologie* (N.S.) 18(4): 134. (French, with English summary) [Gabon, Guinea, Africa]

Lelouarn, H. and A. Cloarec 1997: Insect predation on pike fry. *Journal of Fish Biology* 50(2): 366-370 [“Laboratory tests evaluated the predatory impact of the macroinvertebrates *Erythromma najas* larvae (Odonata: Coenagrionidae), *Notonecta glauca* (Heteroptera: Notonectidae), *Ilyocoris cimicoides* (Heteroptera: Naucoridae), *Libellula depressa* larvae (Odonata: Libellulidae), *Dytiscus marginalis* larvae (Coleoptera: Dytiscidae) and *Anax imperator* larvae (Odonata: Aeshnidae) on 3, 12, 21 and 30 day old pike fry *Esox lucius*.”]

Lempert, J. (1997): Die Einwanderung von *Symptetrum fonscolombii* (Selys) nach Mitteleuropa im Jahre 1996 (Anisoptera: Libellulidae). *Libellula* 16 (3/4): 143-168. (German, with Engl. summary) [invasion; migration; Central Europe; chronology of invasion; previously unpublished data for France, Belgium, Switzerland, Austria, Czech Republic]

Leung, B. and M.R. Forbes 1997: Fluctuating asymmetry in relation to indices of quality and fitness in the damselfly, *Enallagma ebrium* (Hagen). *Oecologia* (Berlin) 110(4): 472-477 [“We used wet mass of an individual as a measure of its quality and longevity as a measure of its fitness. Contrary to predictions, we found no relation between FA and quality or fitness, even after we controlled for possible confounding factors, such as measurement error and inadequate sample size.”]

Lindeboom, M. (1997): Die Libellenbeobachtungen des Fischers Leonhard Baldner (1612 - 1694). *International Dragonfly Fund - Report 2*: 18 - 24. [history of odonatology; early illustrations of dragonflies; metamorphosis; *Calopteryx splendens*; *Onychogomphus forcipatus*]

Madsen, H.O.R. and A. Nel 1997: Two new fossil species of *Gomphaeschna* Selys, 1871 in the paleocene/eocene of Denmark (Odonata: Aeshnoidea). *Annales de la Societe Entomologique de France* 33 (3): 285-293 [“*Gomphaeschna paleocenica*, sp. n.; *Gomphaeschna* (?) *danica*, sp. n.”]

May, M.L. 1997: The status of some species of *Enallagma* (Odonata, Zygoptera, Coenagrionidae). *Entomological News* 108 (2): 77-91. [“I have investigated the identity and generic placement of five little known species of coenagrionid damselflies usually assigned to *Enallagma*.”]-[*Enallagma camerunense*, *E. kauderni*, *E. melanotum*, *E. pseudalongatum*, *E. strouhalii*]

McPeck, M.A. 1997: Measuring phenotypic selection on an adaptation: Lamellae of damselflies experiencing dragonfly predation. *Evolution* 51(2): 459-466

[“Previous studies suggest that the evolution of increased caudal lamellae size to increase swimming speed was an adaptation of *Enallagma* damselflies for coexisting with large, predatory dragonflies in fishless lakes. ... In cages where dragonflies were free to forage on damselflies, surviving *E. boreale* larvae had lamellae that were larger in lateral surface area, and that were wider relative to their length, as compared with larvae recovered from treatments in which dragonflies were not permitted to forage on damselflies.”]

Mittelstaedt, H. 1997: Interaction of eye-, head-, and trunk-bound information in spatial perception and control. *J. Vestib. Res.* 7(4): 283-302

[“This article reviews the author's investigations on the perception and control of spatial relations if the carriers of the relevant sense organs are mobile and controlled independently of each other. In the dragonfly, head rotation is controlled by the head's inertia, as well as by cervicocollic, optokinetic, and dorsal light reflexes and, in turn, controls trunk rotation by means of neck reflexes on the wings. In humans, ...”]

Moore, N.W. (1997): Status survey and conservation action plan. Dragonflies. IUCN/SSC Odonata Specialist Group. Cambridge. 28 pp. £ 8,50 (p.p. incl.)

Address: IUCN Publ. Serv. Unit., 219c Huntingdon Road, Cambridge CB3 0DK, United Kingdom [strategy for conserving dragonflies; priorities; taxonomic isolation; species of monotypic genera; endemic species; red list; action plan]

Muzlanov, Y.A. 1997: Estimation of the state of natural populations by homeostasis of development as demonstrated by analysis of the distribution of wing venation anomalies in *Calopteryx splendens* Harr. *Russian Journal of Ecology* 28(6): 393-397

[“The applicability of morphological methods to the investigation of mechanisms responsible for the stability of ontogeny in intrapopulation groups is demonstrated by analyzing the distribution of anomalies in the structure of transverse wing veins in damselflies *Calopteryx splendens* Harr. It was shown that the distribution of the total number of anomalies follows the Poisson law of rare events.”]

Papazian, M. 1997: A morphological anomaly with gynandromorphic aspect in *Gynacantha kirbyi* Kruger, 1898 (Odonata, Aeshnidae). *Bulletin de la Societe Entomologique de France* 102(2): 103-109. (French, with English summary) [*Gynacantha kirbyi* female, Gynandromorphism, second abdominal segment with oreillets]

Papazin, M. (1997): *Onychogomphus forcipatus* unguiculatus (Vander Linden, 1820) victime du frelon (*Vespa crabro* L., 1758) (Odonata, Anisoptera, Gomphidae; Hymenoptera, Apocrita, Vespidae). *Martinia* 13(4): 123-125. (French, with Engl. summary) [predators; Hymenoptera; France]

Peacor, S.D. and E.E. Werner 1997: Trait-mediated indirect interactions in a simple aquatic food web. *Ecology* (Washington D C) 78(4): 1146-1156 [“We examined the survival and growth response of small bullfrog (*Rana catesbeiana*) and small green frog (*Rana clamitans*) tadpoles in the presence and absence of a competitor (large bullfrogs), the lethal presence of the larval odonate predator *Tramea lacerata*, and the nonlethal (caged) presence of the larval odonate predators *Anax junius* and *Anax longipes*.”]

Pritchard, G. and A. Kortello 1997: Roosting, perching, and habitat selection in *Argia vivida* Hagen

and *Amphiagrion abbreviatum* (Selys) (Odonata: Coenagrionidae), two damselflies inhabiting geothermal springs. *Canadian Entomologist* 129(4): 733-743

Ramirez, A. 1997: Checklist of Costa Rican Odonatan species (Insecta) for which the naiad is known. *Revista de Biología Tropical* 44(3): 225-232

[*"There are almost 280 species of Odonata in Costa Rica, of which 142 have their naiad described. ... A checklist of all those species with the description of the naiad is presented, along with the bibliographic reference."*]

Richardson, J.M.L. and R.L. Baker 1997: Effect of body size and feeding on fecundity in the damselfly *Ischnura verticalis* (Odonata: Coenagrionidae). *Oikos* 79(3): 477-483

[*"We looked for relationships between number of eggs and the independent factors of food availability and body size in lab-reared females of the damselfly Ischnura verticalis. ... There was no relationship between body size (wing length or head width) at maturity and number of eggs in the abdomen. ... Field data of gut weights suggest that animals in the field frequently have empty guts and we infer that food availability may be an important determinant of realized fecundity. ..."*]

Richter, B.D.; Braun, D.P.; Mendelson, M.A. and L.L. Master 1997: Threats to imperiled freshwater fauna. *Conservation Biology* 11(5): 1081-1093

[*"Threats to imperiled freshwater fauna in the U.S. were assessed through an experts survey addressing anthropogenic stressors and their sources. Specifically, causes of historic declines and current limits to recovery were identified for 135 imperiled freshwater species of fishes, crayfishes, dragonflies and damselflies, mussels, and amphibians."*]

Rolff, J. and A. Martens 1997: Completing the life cycle: detachment of an aquatic parasite (*Arrenurus cuspidator*, Hydrachnellae) from an aerial host (*Coenagrion puella*, Odonata). *Canadian Journal of Zoology* 75(4): 655-659

[*"Water mites are very important parasites of aerial stages of aquatic insects. Their larvae parasitize semiaquatic hosts and must detach while the host is in a suitable habitat for reproduction of parasite and host. ... Different stimuli were tested experimentally in the host-parasite system Coenagrion puella Arrenurus cuspidator in outdoor cages; this method provides exact data on the initial intensity of mite larvae per host."*]

Russell, R.W. and J.W. Wilson 1997: Radar observed fine lines in the optically clear boundary layer: reflectivity contributions from aerial plankton and its predators. *Boundary Layer Meteorology* 82(2): 235-262

[*"Sensitive Doppler radars regularly detect fine lines of enhanced reflectivity in mesoscale boundary layer convergence zones. Recent studies have concluded that these 'fine lines' are attributable primarily to backscatter from concentrations of small, weakly flying insects ('aerial plankton') entrained in the convergence zones. ... Visual counts of birds and dragonflies in convergence zones, together with simultaneous remote radar observations during the CAPE project in Florida, indicated that aerial predators usually contributed little to fine line reflectivity (median contribution approximate to 2%)."*]

Sarkar, N.K. 1997: Observations on three new and one known species of cephaline gregarines (Apicomplexa: Sporozoa: Eugregarinida: Septatina) from the Odonates of Mahananda Forest, West Bengal, India. *Archiv für Protistenkunde* 148(1-2): 209-213

[*"Three new species of actinocephalid gregarines (Apicomplexa: Sporozoa: Eugregarinida: Septatina), Actinocephalus longus sp. n., Mukundaella vannus sp. n., and Odonaticola truncatus sp. n. from the midguts of Enallagma pervum Selys, Onychogorgia atrociana Selys and Pseudagrion decorum Rambur respectively, are described."*]

Sato, M. and A. Azuma 1997: The flight performance of a damselfly *Ceriagrion melanurum* Selys. *Journal of Experimental Biology* 200(12): 1765-1779 [The local circulation method was applied to the free forward flight of the damselfly *Ceriagrion melanurum* Selys. ... However, the phase shift between the fore- and hindwings agreed with none of the previously reported patterns for damselflies: the forewings lead the hindwings by approximately a quarter-period. ... The muscle-mass-specific power was between 40 and 80 W kg<sup>-1</sup>.]

Sauman, I. and F. Sehnal 1997: Immunohistochemistry of the products of male accessory glands in several hemimetabolous insects and the control of their secretion in *Pyrrhocoris apterus* (Heteroptera: Pyrrhocoridae). *European Journal of Entomology* 94(3): 349-360

[*"Three antibodies against secretions of the male accessory glands of Tenebrio molitor react with specific regions of the male reproductive system in a damselfly, cockroach, cricket and the bug Pyrrhocoris apterus. Immunoreactivity was used to assess maturation of the system in the reproducing and diapausing P. apterus."*]

Schiel, F.-J.; Rademacher, A.; Heitz, A.; Heitz, S. (1997): *Leucorrhinia caudalis* (Charpentier) (Anisoptera: Libellulidae) in der mittleren Oberrheinebene - Habitat, Bestandsentwicklung, Gefährdung. *Libellula* 16(3/4): 85-110 (in German with Engl. summary) [habitat analysis; relationship to fishes; population trends; threat; emergence]

Schneider, W. (1997): Die Libellensammlung Johann Jakob Kaups. Informationen aus dem Hessischen Landesmuseum Darmstadt 2/97: 21 - 23 (in German) [Short report about the whereabouts of the lost-believed collection of Kaup. Fig. of the holotype of *Neurobasis kaupi* Brauer, 1867]

Schneider, W.; Katbeh-Bader, A. (1997): Ein atypisches Weibchen von *Pseudagrion syriacum* Selys 1887 aus Jordanien (Odonata: Zygoptera: Coenagrionidae). *Ent. Zeits.* 107(9): 391-394 (in German with Engl. summary) [atypical pronotum; Jordan]

Schütte, C.; Suhling, F. (1997): Beobachtungen zum Fortpflanzungsverhalten von *Macromia splendens* (Pictet) (Anisoptera: Corduliidae). *Libellula* 16(1/2): 81 - 84. [reproductive behaviour; oviposition; patrol flight; France]

Soldan, T. (1997): Mayflies (Ephemeroptera): One of the earliest insect groups known to man. In: Landlot, P. & M. Sartori (Eds.): *Ephemeroptera & Plecoptera: Biology - Ecology - Systematics*. Mauron + Tinguely + Lachat SA. Fribourg. ISBN 2-940 187-01-0. pp. 511 - 513. [*Mortongenesia mesopotamica* (Morton, 1921) (Ephemeroptera) is identified as *buru.id.da* (Sumerian name). An earlier identification of the „river locust“ as a dragonfly is considered incorrect.]

Stoks, R.; Santens, M. (1997): Opwarmingstrategieën van tenerale *Aeshna mixta*. *Gomphus* 13(1-2): 50 - 55.

[thermoregulation; warm-up]

Stoks, R. and L. De Bruyn 1997: Intensive feeding of the robberfly *Eutolmus rufibarbis* (Diptera Asilidae) on the damselflies *Enallagma cyathigerum* and *Lestes sponsa* (Odonata). *Bulletin & Annales de la Societe Royale Belge d'Entomologie* 132(4): 427-431

["During a population study of the damselfly *Lestes sponsa* at a fen in northern Belgium several predatory acts of *Eutolmus rufibarbis* on the damselfly species *Enallagma cyathigerum* and *L. sponsa* were reported. Despite the sporadic nature of our observations we noted 44 damselflies killed by this robber fly. All animals were caught in flight."]

Stoks, R.; De Bruyn, L. and E. Matthysen 1997: The adaptiveness of intense contact mate guarding by males of the Emerald Damselfly, *Lestes sponsa* (Odonata, Lestidae): The male's perspective. *Journal of Insect Behavior* 10(2): 289-298

["Our findings support the predictions made by Alcock (1994) about the occurrence of intense mate guarding: (1) a high female receptivity after copulation, (2) a high male capacity to resist takeovers, (3) sperm precedence, (4) a high operational sex ratio, (5) a high male density, (6) high access by rivals to mated females, (7) low energy expenditure, (8) a low risk of guarding, and (9) a short interval between copula and oviposition."]

Switzer, P.V. 1997: Factors affecting site fidelity in a territorial animal, *Perithemis tenera*. *Animal Behaviour* 53(4): 865-877

["This study investigated the factors affecting the site fidelity of the eastern amberwing dragonfly, *Perithemis tenera* (Odonata: Anisoptera), following the framework and testing the predictions of a theoretical model (Switzer 1993; *Evol. Ecol.* 7, 533-555)."]

Switzer, P.V. 1997: Past reproductive success affects future habitat selection. *Behavioral Ecology and Sociobiology* 40 (5): 307-312

["Correlational studies have shown that an individual's past reproductive success often increases its breeding site fidelity (i.e., the tendency to return to a previously occupied location), suggesting that individuals use their reproductive experience to assess habitat quality. ... In a field experiment, the effect of mating success on site fidelity was isolated from potential confounding variables in a territorial dragonfly, the eastern amber wing (*Perithemis tenera*)."]

Tennessen, K.J. 1997: The rate of species descriptions in Odonata. *Entomological News* 108(2): 122-126.

["The rate of new species descriptions of Odonata over the last 150 years yields an essentially straight line, indicating that many species are yet to be discovered within the Order. More than 5,300 species are now known, and the rates of description in the suborders Anisoptera and Zygoptera have been relatively equal. However, a decline in the number of new species appearing in the three largest families over the last six decades, despite an increasing number of authors, indicates that the Odonata are now at least half known and that fewer than 10,000 species exist worldwide."]

Whiting, M.F.; Carpenter, J.C.; Wheeler Q.D. and W.C. Wheeler 1997: The strepsiptera problem: phylogeny of the holometabolous insect Orders inferred from 18s and 28s ribosomal dna sequences and Morphology. *Systematic Biology* 46(1): 1-68

["Phylogenetic relationships among the holometabolous insect orders were inferred from cladistic analysis of nucleotide sequences of 18S ribosomal DNA (rDNA) (85 exemplars) and 28S rDNA (52 ex-

emplars) and morphological characters. Exemplar outgroup taxa were *Collembola* (1 sequence), *Archaeognatha* (1), *Ephemerida* (1), *Odonata* (2), ..."]

Williamson, D.L.; Adams, J.R.; Whitcomb, R.F.; Tully, J.G.; Carle, P.; Konai, M.; Bove, J.M. and R. B. Henegar 1997: *Spiroplasma platyhelix* sp. nov., a new mollicute with unusual morphology and genome size from the dragonfly *Pachydiplax longipennis*. *International Journal of Systematic Bacteriology* 47(3): 763-766

["*Spiroplasma* strain PALS-1-T from the gut of the dragonfly *Pachydiplax longipennis* was shown to be distinct from other species, groups, and subgroups of the genus *Spiroplasma* as determined by reciprocal serological metabolism inhibition and deformation tests."]

Wolf, L.L., Waltz, E.C., Klockowski, D. and K. Wakeley 1997: Influences on variation in territorial tenures of male white-faced dragonflies (*Leucorrhinia intacta*) (Odonata: Libellulidae). *Journal of Insect Behavior* 10(1): 31-47

["Length of occupancy of mating territories among males in a local population of white-faced dragonflies (*Leucorrhinia intacta*) varied from more than 6 h to 15 min or less. Males with short tenures often established territories in several locations on the pond during a day. Several hypotheses have been proposed to explain shifting territorial sites rather than remaining in a single site during one bout of territoriality."]

Wudkevich, K.; Wisenden, B.D.; Chivers, D.P. and R.J.F. Smith 1997: Reactions of *Gammarus lacustris* to chemical stimuli from natural predators and injured conspecifics. *Journal of Chemical Ecology* 23 (4): 1163-1173

["We exposed the freshwater amphipod *Gammarus lacustris*, to chemical stimuli from injured conspecifics and to chemical stimuli from two types of natural predators: dragonfly larvae (*Aeshna eremita*) and northern pike (*Esox lucius*). Exposure to all three stimuli caused *G. lacustris* to reduce significantly its level of activity relative to activity recorded in response to a distilled water control."]

Yoon, J.H.; Park, H.C. 1997: Amino acid composition of 13 odonatan species from Korea. *Korean Journal of Entomology* 27(1): 63-71. (Korean, with English summary)



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Wolfstr. 6, D-72119 Ammerbuch, Germany. Tel. ++49 (0) 7073 5262; e-mail: Lindeboom@aol.com and Martin Schorr, Waldfrieden 25, D-54314 Zerf, Germany. Tel. ++49(0)6587 1025; e-mail: FOEATrier@aol.com

The ©ODONATOLOGICAL ABSTRACT SERVICE is a supplement to AGRION, the Newsletter of the Worldwide Dragonfly Association.

## 1997

1. **Abbott, J.C.; Stewart, K.W. & S.R. Moulton (1997):** Aquatic insects of the Big Thicket region of East Texas. *Texas Journal of Science* 49(3 SUPPL.): 35-50.

[*"A survey of the aquatic insect orders Ephemeroptera, Odonata, Plecoptera and Trichoptera from the Big Thicket National Preserve and surrounding region of south-east Texas is presented. This area exhibits a diverse fauna of at least 249 resident species which includes 18 mayflies, 77 dragonflies, 34 damselflies, 18 stoneflies and 102 caddisflies. The dragonfly Somatochlora margarita and the caddisfly Phylocentropus harrisi are listed by the U.S. Fish and Wildlife Service as "species of concern."*]  
Address: Dep. Biol. Sci., Univ. N. Texas, Denton, TX 76203, USA

2. **Andrew, R.J. & D.B. Tembhare (1997):** The development and structure of the ovaries in the dragonfly, *Traema virginia* (Rambur) (Libellulidae: Odonata). *Journal of Advanced Zoology* 18 (2): 86-95.

[*Panoistic ovarioles, terminal filament, germarium, vitellarium, oviduct, mesodermal and ectodermal origin*]  
Address: Tembhare, D.B., Nagpur Univ., Dept. Zool. Nagpur 440010, Maharashtra, India

3. **Baarspul, A.N. & J.-P. de Krijger (1997):** The role of damselflies and dragonflies and other insects in the chick-diet of Black tern (*Chilonias niger*) (in Dutch. with Engl. summary). *Brachytron* 1(1): 6-10.

Address: Baarspul, A., W.A. Scholtenstraat 10, NL-9712 KW Groningen, The Netherlands

4. **Bayerisches Landesamt für Umweltschutz (1997):** Gräben - Lebensadern der Kulturlandschaft - Lebensraum Graben - naturschonend erhalten und entwickeln.

[*Bavaria, general guidelines for the management of ditches*]  
Address: LfU, Postfach 810129, D-81901 München, Germany

5. **Bazzanti, M., Chiavarini, S., Cremisini C. & P. Soldati (1997):** Distribution of PCB congeners in aquatic ecosystems: A case study. *Environment International* 23 (6): 799-813.

[*"Polychlorinated biphenyls (PCB) congeners were determined in water samples, sediments and animal species in the frame of a survey of the River Arrone (Central Italy, near Rome) after a major contamination episode. ... Concentrations in macroinvertebrates (Calopteryx splendens and Anax imperator) ranged from 60 to 400 µg/kg dry weight, showing significantly different species to species patterns. ..."*]  
Address: Dep. Human Animal Biol., Univ. "La Sapienza", 00185 Rome, Italy

6. **Bedê, L.C., Weber, M., Resende, S.R.O., Piper, W. & W. Schulte (1997):** Manual para mapeamento de biótopos no Brasil: base para um planejamento ambiental eficiente. 2. ed. rev.. Fundacao Alexander Brandt. Belo Horizonte. 146 pp.

[*handbook for mapping habitats in urban settlements including a small paragraph on Odonata*]

Address: Fundacao Alexander Brandt, Rua Sta. Rita Durao, 321/1410, CEP 30140-110, Belo Horizonte, MG, Brazil

7. **Bischof, A. (1997):** Libellenbeobachtungen im Domleschg und Heinzenberg, Graubünden, Schweiz (Odonata). *Mitt. ent. Ges. Basel* 47(4): 139-146.

[*29 (17 autochthonous) species of the region of the Domleschg and Heinzenberg in Switzerland including records from 1977 - 1996 are reported, a comparison with the Odonata-fauna of the man-made nature reserve Monté near Cazis (Graubünden) is made*]

Address: Bischof, A., Heckenweg 4, CH-7000 Chur, Switzerland

8. **Chovanec, A. & R. Raab (1997):** Dragonflies (Insecta, Odonata) and the ecological status of newly created wetlands - examples for long-term bioindication programmes. *Limnologica* 27(3-4): 381-392.

[*dragonflies as bioindicators of man-made waters in Austria (Tritonwasser, Marchfeldkanal), Odonata as long-term indicators to monitor the efficiency of planning and construction of artificial waters, documentation of the colonisation of those waters by dragonflies, trade-offs between development of structural habitat parameters and dragonfly fauna*]

Address: Chovanec, A., Umweltbundesamt, Abt. Aquatische Ökologie, Spittelauer Lände 5, A-1090 Wien, Austria

9. **Dauids, C. (1997):** Water-mites as parasites on dragonflies (in Dutch, with Engl. summary). *Brachytron* 1 (2): 51-55.

[*review, Ischnura elegans*]

Address: Dauids, K., Aquatische Oecotoxicologie, Univ. Amsterdam, Kruislaan 320, NL-1098 SM Amsterdam, The Netherlands

10. **De Knijf, G., Anselin, A. & H. Demolder (1997):** The odonatofauna of the Damvallei (East-Flanders, Belgium): past glory or still worthwhile? *Biol. Jaarb. Dodonaea* 64 (1996): 75-91.

Address: Inst. Nature Conserv., Kliniekstraat 25, B-1070 Brussels, Belgium

11. **De Marmels, J. (1997):** Hallazgo de Odonata nuevos para Venezuela o poco conocidos. 9. *Bol. entomol. Venez. N.S.* (12(2): 151-152.

[*new or little known Odonata of Venezuela, Phyllocycla sordida, Phyllogomphoides pedunculus, Zonophora nobilis, Aeshna nubigena, Coryphaeschna diapyra, Neuraeschna harpya, Micrathyria dictynna, Lestes bipupillatus, Palaemnema brevignoni, Junix elumbis, Inpabasis machadoi, Leptobasis yanomami, Mesoleptobasis inca*]

Address: De Marmels, J., Inst. Zool. Agrícola, Fac. Agronomía, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela

12. **Dijkstra, K.D. & M. van der Weide (1997):** The Red-veined Darter (*Symeptum fonscolombii* (Selys)) in the



Netherlands in 1996 (in Dutch, with Engl. summary). *Brachytron* 1(1): 16-21.

Address: Dijkstra, K.D., Oude Rijnsburgerweg 38, NL-2342 BC Oegstgeest, The Netherlands

13. **Dingemans, N.L. & V.J. Kalkman (1997):** Separating adult *Aeshna subarctica* Walker from *Aeshna juncea* (L.) in The Netherlands. Review and evaluation of field characters. *Brachytron* 1(2): 35-39.

Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands

14. **Dobruskina, I.A., Ponomarenko, A.G. & A.P. Rasnitsyn (1997):** Fossil insects found in Israel. *Paleontologicheskii Zhurnal* 5: 91-95 (Russian with english summary).

[*"Fossil insects found in the Cretaceous of Israel are figured, discussed and, in part, described. Lower Cretaceous (Hauterivian-Barremian) Tayasir volcanites have yielded the beetle *Cretosperchus medievalis* Ponomarenko, sp. nov. related to species described from the Lower Cretaceous of Transbaikalia, a cockroach and a dragonfly nymph...."*]

Address: Heb. Univ. Jerus., Jerusalem, Israel

15. **Edelaar, P. (1997):** Flight recognition of Emperor dragonflies (*Anax* Leach). *Brachytron* 1(2): 56-59.

Address: Edelaar, P., In de Potvis, De Dageraad 3, NL-1797 SK Den Hoorn, The Netherlands

16. **Fischer, A. & U. Heink (1997):** Auswertung der libellenkundlichen Daten des Niedersächsischen Tierarten-erfassungsprogramms und deren Verwendung im Rahmen eines regionalisierten Zielartenkonzeptes. Dipl. Arb. am Institut für Landschaftspflege und Naturschutz der Technischen Universität Hannover. 191 pp, XIV pp., Anhänge

[*A well documented thesis reorganising data from the Bundesland Lower Saxony species inventory (Odonata Recording Scheme) for conservation purposes. The authors present a method of pinpointing shelter (key) species among Odonata which will enable conservationists to focus action plans for dragonflies on a regional basis. The end product of the thesis is a map with hot spots essential for dragonfly conservation in Lower Saxony, particularly in the lowland region of the Aller and Weser river systems.*]

Address: Fischer, A., Türkstr. 7a; D-30167 Hannover, Germany

17. **Fischer, K. (1997):** Fauna und Flora des Westerwaldes. Zur naturschutzfachlichen Bedeutung einer Mittelgebirgsregion. *Pollichia*-Buch 35: 21-35.

[*short list of endangered Odonata of the Westerwald region in Rhineland-Palatinate*]

Address: Fischer, K., An der Hofwiese 6, D-56457 Westerbürg, Germany

18. **Grabow, K. Korb, J., Martens, A. & M.-O. Rödel (1997):** The use of termite mounds by the dragonfly *Crocothemis divisa* Karsch 1898 during the pre-reproductive period (Odonata Libellulidae). *Tropical zoology* 10: 1-10.

Address: K. Grabow, Univ. Würzburg, Lehrstuhl Zool. III, Am Hubland, D-97074 Würzburg, Germany

19. **Grysk, A.D. & W.A. Hubert (1997):** Observations on the reproduction, sources of mortality, and diet of the Kendall Warm Springs dace. *Great Basin Naturalist* 57(4): 338-342.

[*"The life history of the endangered Kendall Warm Springs dace (*Rhinichthys osculus thermalis*) is largely unknown.... We observed 2 sources of mortality: (1) emigration from the warm spring stream over a waterfall into the Green River and (2) predation on larvae by dragonfly (*Libellula saturata*) nymphs. ..."*]

Address: Wyo. Coop. Fish Wildl. Res. Unit, Univ. Wyo., Laramie, WY 82071-3166, USA

20. **Hermans, J.T. (1997):** Op weg naar een Atlas van de Limburgse Libellen. *Natuurhist. Maandbl.* 86: 61.

[*short report on the status of the scheduled atlas of the dragonfly fauna of the province Limburg (The Netherlands), 12 "white spots" in the province lacking dragonfly records are figured and listed, it is intended to finish work on the manuscript within two years*]

Address: Hermans, J.T.; Hertestraat 21, NL-6067 ER Linne, The Netherlands;

21. **Heymer, A. (1997):** Réflexion sur la signification phylogénétique des stratégies reproductrices et de l'investissement mâle chez les libellules (Hexapodes, Palaeoptères). *Vie et milieu* 47(3): 229-246.

[*"...In the Calopterygidae and Chlorocyphidae this development (of territorial behaviour patterns) implies synchronization between males and females for mating. These behavioural strategies seem to mirror an evolutionary trend - at least in Zygoptera - which is in accordance with the morpho-phylogenesis. ... To ensure optimal reproductive success, males guard females during egg-laying, hence, egg-laying with male coupled to female in tandem position is the most secure proceeding. This behaviour may lead to non-contact guarding, a pattern generally found in the Calopterygidae and Chlorocyphidae, and a few territorial species of Anisoptera. The ancestral Lestes-Sympecma-Type seems to have developed independently in Zygoptera and Anisoptera: thus, this type must be seen as analogous; it does not allow a cladogenetic interpretation..."*]

Address: Heymer, A., Muséum National d'Histoire Naturelle, Laboratoire d'Ecologie Générale, 4 avenue du Petit Château, F-91800 Brunoy, France;

22. **Holusa, J. & O. Holusa (1997):** The results of a faunistic research of dragonflies (Odonata), grasshoppers (Caelifera), crickets (Ensifera) and cockroaches (Dictyoptera: Blattodea) of the Slavkovsky les Mts. *Klapalekiana* 33: 29-36.

[*checklist of 25 Odonata species including *Somatochlora alpestris* and *S. arctica**]

Address: Holusa, O., Muzeum Beskyd, prirodovedné oddeleni, Zámecké náměstí 1264, CZ-738 01 Frydek-Místek

23. **Holusa, O. (1997):** New records of the genus *Somatochlora* in the territory of the former Czechoslovakia (Odonata: Corduliidae). *Klapalekiana* 33: 23-28.

[*"New faunistic records from the period 1995-1996 of dragonflies of the genus *Somatochlora* Sélys, 1871 in the territory of Bohemia, Moravia, Silesia and Slovakia are presented. Oviposition of *S. flavomaculata*... was observed. New localities of *S. alpestris*... and *S. arctica*... in mountainous areas are given." *S. metallica* was found at 9 new localities and confirmed at 4 localities.*]

Address: Holusa, O., Muzeum Beskyd, prirodovedné oddeleni, Zámecké náměstí 1264, CZ-738 01 Frydek-Místek

24. **Holusa, O. (1997):** The occurrence of dragonfly *Hemianax ephippiger* (Odonata: Aeshnidae) in the Czech Republic. *Klapalekiana* 33: 17-21.

[*Faunistic records on occurrence in 1995 of *H. ephippiger* in Czech Republic are provided. "Some aspects of its biology are considered. At some localities a large number of specimens was observed in territorial dispersion, and the mating and egg-laying behaviour are also recorded", and described in some detail.*]

Address: Holusa, O., Muzeum Beskyd, prirodovedné oddeleni, Zámecké náměstí 1264, CZ-738 01 Frydek-Místek

25. **Inden-Lohmar, C. (1997):** Sukzession, Struktur und Dynamik von Libellenpopulationen an Kleingewässern, unter besonderer Berücksichtigung der Ökologie von *Aeshna cyanea* (Müller, 1764). Dissertation Math.-naturwiss. Fakultät Rheinische Friedrich-Wilhelms-Universität Bonn. 310 pp.

[*study of the colonisation of 4 artificially created ponds in Nordrhein-Westfalen (Germany) by dragonflies in the period between 1989 and 1996, interchange between*

ponds, population dynamics, dominance of *Pyrrhosoma nymphula* and *Aeshna cyanea*, larvae of *A. cyanea* are the top predators in the ponds, effects of starvation on larval cohort-classes, interspecific competition of larval *A. cyanea*, co-existence of larval *P. nymphula* and *A. cyanea*, effects of Odonata on amphibians (*Rana temporaria* and *R. dalmatica*), emergence pattern, dispersal: passive drift in *P. nymphula* during maturation period, active dispersal in *A. cyanea* both in maturation period and after maturation, correlation between site fidelity, presence, biometric characters of males of *A. cyanea* and mating success, discussion on individual learning and mating success]

Address: Inden-Lohmar, C., Bachstr. 5., D-53797 Lohmar, Germany

26. **Jueg, U. (1997):** Die Entomofauna des LSG "Schloßpark Ludwigslust" Teil I (Insecta außer Coleoptera und Lepidoptera). Virgo, Mitt.bl. ent. Ver. Mecklenburg 1: 27-49.

[Mecklenburg-Vorpommern, list of 22 Odonata]

Address: Jueg, U., Johannes-Gillhoff-Str. 7, D-19288 Ludwigslust, Germany

27. **Ketelaar, R. & M. van der Weide (1997):** Monitoring of dragonflies in The Netherlands (in Dutch, with Engl. summary). Brachytron 1(2): 44-50.

Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands

28. **Kipping, J. (1997):** Zur Situation der Kleinen Königslibelle, *Anax parthenope*, (Insecta, Odonata) in Thüringen. Mauritiania 16(2): 462-464.

[*A. parthenope* in Thuringia, Germany, range extension, competition with *A. imperator*]

Address: Kipping, J., Ringstr. 5/6, D-04600 Altenburg, Germany

29. **Kognietzki, S. & S. Hielscher (1997):** Libellenkartierung im Landkreis Hildburghausen (Insecta: Odonata). Thüringer faunistische Abhandlungen 4: 64-79.

[*Thuringia*, district Hildburghausen, *Coenagrion mercuriale*, first record of *Gomphus pulchellus* in Thuringia, "... Referring to the whole area of Thuringia, the percentage of non-specialized species was higher in Hildburghausen district which is mainly due to the lack of natural habitats..."]

Address: Kognietzki, S., Betzensteiner Str. 8, D-90411 Nürnberg, Germany

30. **Land, M.F. (1997):** The resolution of insect compound eyes. Israel Journal of Plant Sciences 45(2-3): 79-91.

[*"The spatial resolution of compound eyes is determined by their interommatidial angles, by the optical quality and rhabdom dimensions of the ommatidia, and by illumination level. Among insects, interommatidial angles vary from tens of degrees in Apterygota, to as little as 0.24 degree in dragonflies. Resolution better than this is not attainable in compound eyes of realistic size, because of the limit imposed by diffraction. ..."*]

Address: Land, M.F., School Biol. Sci., Univ. Sussex, Brighton BN1 9QG, UK

31. **Legrand, J. (1997):** *Zygonyx geminunca* sp. n., new Zygonychinae from Nimba Mounts, Western Africa (Odonata, Anisoptera, Libellulidae). Revue Française d'Entomologie (Nouvelle Serie) 19(1-2): 73-76.

[*French, with English summary. "A new Zygonyx, Z. geminunca sp. n., is described and illustrated on male and female specimens from Nimba Mounts in Guinea (West Africa), formerly collected by Professor Pierre Aguesse and more recently by the author. The main discriminant character of this species is the presence of two hooks on the anterior lamina of the male genitalia. ..."*]

Address: Legrand, J., Lab. Entomol., Museum Natl. Hist. Nat., 45 rue Buffon, F-75005 Paris, France

32. **Liebherr, J.K. & D.A. Polhemus (1997):** Compari-

sons to the century before: The legacy of R. C. L. Perkins and Fauna Hawaiiensis as the basis for a long-term ecological monitoring program. Pacific Science 51(4): 490-504.

[*"As one means of assessing the impact of the past 100 yr of development and biological alteration in Hawai'i, the damselfly (Odonata: Coenagrionidae) and carabid beetle (Coleoptera: Carabidae) collections of R. C. L. Perkins made in the 1890s are compared with similar collections made one century later during the 1990s. Two islands that have experienced very different histories of development are compared: O'ahu and Moloka'i. Of eight native damselfly species originally inhabiting O'ahu, one has been extirpated from the island, another is now reduced to a single population, and three more are at risk. Of the eight species originally found on Moloka'i, by contrast, there is only one species that has not been rediscovered, although there is reasonable probability that it has simply eluded capture because of inherent rarity, whereas the remaining species retain large and stable populations. ..."*]

Address: Dep. Entomol., Comstock Hall, Cornell Univ., Ithaca, NY 14853-0901, USA

33. **Lins, L.V., Machado, A.B.M., Costa, C.M.R. & G. Herrmann (1997):** Roteiro metodológico para elaboração de listas de espécies Ameracadas de extincao (Contendo a lista Oficial da Fauna Ameacada de Extincao de Minas Gerais). Publicacoes avulsas da fundacao biodiversitas 1.

[*manual for preparing lists of endangered species (fauna and flora) in Brazil, includes IUCN categories and detailed criteria for assessing the threats to species, very few dragonflies are listed as endangered in Minas Gerais: Heteragrion dorsale (proposed for official list), H. petiense, H. obsoletum, Aeshna eduardoi, Castoraeschna margarethae (official list of Minas Gerais)*]

Address: Fundacao Biodiversitas, Av. Cotorno, 9155 11° andar Prado, 30110-130 Belo Horizonte MG, Brasil, e-mail: cdcb@gold.horizontes.com.br

34. **Lockwood, J.L.; Fenn, K.H.; Curnutt, J.L.; Rosenthal, D.; Balent K.L. & A.L. Mayer (1997):** Life history of the endangered Cape Sable Seaside Sparrow. Wilson Bulletin 109(4): 720-731.

[*"Cape Sable Seaside Sparrows (Ammodramus maritimus mirabilis) breeding within eastern Everglades National Park were philopatric and moved only short distances between clutches. Nestlings were fed spiders and insects, primarily Orthoptera, Lepidoptera, and Odonata. ..."*]

Address: Lockwood, J.L., Univ. Tennessee, Dept. Ecol. and Evolutionary Biol., Knoxville, TN 37996, USA

35. **Lombardo, P. (1997):** Predation by *Enallagma* nymphs (Odonata, Zygoptera) under different conditions of spatial heterogeneity. Hydrobiologia 356: 1-9.

[*"... Enallagma significantly reduced the amphipod and the turbellarian populations and the prey assemblage as a whole, but did not have any statistically significant impact on the snail populations, which increased their absolute and relative abundance in the presence of the odonate. Numerical losses by Enallagma predation (if any) were not related to macrophyte architecture, suggesting that prey vulnerability to Enallagma predation is species-specific rather than habitat-determined. ..."*]

Address: Lombardo, P., Kent State Univ., Dept. Biol. Sci., Kent, OH 44242, USA

36. **Martens, A. & W. Wimmer (1997):** Die Pokaljungfer *Cercion lindenii* (Selys) im nördlichen Vorharz (Odonata: Coenagrionidae). Braunschw. naturkd. Schr. 5 (2): 343-352.

[*Between the years 1993 and 1996 Cercion lindenii was recorded from six localities north of the Harz Mountains, Lower Saxony. This is clearly a range extension for the species in that the region had been well covered in the previous years. The authors predict further dispersal of C. lindenii over the next few years. Most of the watery*

habitats are in gravel pits or in open-cast mining areals. Oviposition was concentrated in spots with submerged vegetation (e.g. *Ranunculus aquatilis*, *Myriophyllum heterophyllum*). Ovipositing tandems were regularly attacked by *Gerris paludum* Fabr. (Insecta: Heteroptera).] Address: Martens, A., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

37. **Mauersberger, R. & F. Petzold (1997)**: Nachweise der Frühen Heidelibelle, *Sympetrum fonscolombi* (Selys), im östlichen Deutschland (Odonata, Libellulidae). Ent. Nachr. Ber. 41(3): 173-177. Address: Petzold, F., Pappelallee 69, D-10437 Berlin, Germany

38. **Menke, N. (1997)**: Untersuchungen zur Libellenfauna im östlichen Stadtgebiet von Münster. Diplomarbeit an der Westfälischen Wilhelms-Universität Münster: 103 pp. Address: Menke, Norbert, Stephansweg 15, D-48155 Münster, Germany

39. **Mursch, A. & A.W. Steffan (1997)**: Subfossile Gliederfüßer von Salzsee-Ufern im nördlichen Namibia (Arthropoda: Solifugae, Scorpiones, Chilopoda, Diplopoda, Insecta). Verh. Westd. Entom. Tag 1996: 197-211. [thanatocoenosis of subfossile arthropoda including *Anax tristis* in a saltlake in Namibia, Africa] Address: Seffan, Prof. Dr. A.W., Abt. Zool. & Ökol., Ruhr-Universität Bochum, D-44780 Bochum, Germany

40. **Naujeck, A. (1997)**: Untersuchung der Makrofauna des Scheubaches bei Nassau/Lahn. Flora Fauna Rheinland-Pfalz Beiheft 22: 199-208. [macrozoobenthos of the Scheubach in Rhineland-Palatinate including a record of *Thecagaster bidentata*] Address: Naujeck, Anja, Deepenstöcken 6, D-22529 Hamburg, Germany

41. **Nel, A., Arillo, A. & V.M. Ortuno (1997)**: New Western Palaeartic Cenozoic Odonata (Zygoptera and Anisoptera). Bulletin de la Societe Entomologique de France 102(3): 265-270. [Five new Cenozoic Odonata are described or revised from Spain and France, including a new *Coenagrionoides*, *Hispanocoenagrion inexpectum* n. gen., n. sp. ...] Address: Nel, A., Lab. Entomol., Mus. Natl. Hist. Nat., 45 rue Buffon, F-75005 Paris, France

42. **Nel, A.; Martinez Delclos, X.; Papier, F. and J. Oudard (1997)**: New tertiary fossil odonata from France (Sieblosiidae, Lestidae, Coenagrionidae, Megapodagrionidae, Libellulidae). Deutsche Entomologische Zeitschrift 44(2): 231-258. [Thanatophilosina *menatensis* gen. n., sp. n. (Zygoptera: Megapodagrionidae) is described from the Palaeocene of France. Two new species of *Stenolestes* (Zygoptera: Sieblosiidae) and a new specimen of *Stenolestes fischeri* Nel, 1986 are described from the Oligocene of France. Three unnamed new Coenagrionidae, a lestid, *Lestes brisaci* sp. n., and a libellulid, *Caussanelia papaziani* gen. n., sp. n. are described from the Upper Oligocene of south-east France. An unnamed new species of Coenagrionidae is described from the Upper Miocene of central France. ...] Address: Nel, A., Museum Natl. Hist. Nat., Entomol. Lab., 45 Rue Buffon, F-75005 Paris, France

43. **Orr, A.G. & P.S. Cranston (1997)**: Hitchhiker or parasite? A ceratopogonid midge and its odonate host. Journal of Natural History 31(12): 1849-1858. [The ceratopogonid genus *Forcipomyia* Meigen (Diptera: Ceratopogonidae) contains species with a wide range of adult biologies. Species of the subgenus *Pterobosca Macfie* are phoretic and apparently parasitic on the wing veins of other insects, notably odonates and sometimes lacewings. We describe *F. (Pterobosca) debenhamae* from Brunei as new to science, taking the authorship of Cranston, tabulate the morphological diversity of the subgenus, and speculate on the phylogeny. The behaviour of

adult female midges, which have been found only upon the thorax of hosts predominantly of *Libellago hyalina* (Odonata: Chlorocyphidae), appears to deleteriously impact on the quality and duration of territory holding of the host.] Address: Orr, A.G., Biol. Dep., Univ. Brunei Darussalam, Bandar Seri Begawan, Negara Brunei

44. **Petzold, F. (1997)**: Zur Libellenfauna (Insecta, Odonata) des Altkreises Schleiz - ein Arbeitsbericht. Thüringer faunistische Abhandlungen 4: 56-63. [survey of the former district of Schleiz (Thuringia), survey of 214 waterbodies, record of 37 species, ... "For every species the frequency on the examined waterbodies is specified. Fish ponds, which are not intensively used, are of great importance for the dragonfly fauna of the area."] Address: Petzold, F., Pappelallee 69, D-10437 Berlin, Germany

45. **Polhemus, D.A. (1997)**: Phylogenetic analysis of the Hawaiian damselfly genus *Megalagrion* (Odonata: Coenagrionidae): Implications for biogeography, ecology, and conservation biology. Pacific Science 51(4): 395-412. [A phylogeny of the 22 species currently recognized in the genus *Megalagrion*, endemic to the Hawaiian Islands, is presented based on an analysis of 23 morphological and ecological characters. ...] Address: Polhemus, D.A., Dep. Entomol., MRC 105, Natl. Mus. Nat. Hist., Smithsonian Inst., Washington, DC 20560, USA

46. **Raab, R. (1997)**: Die Besiedlung des Marchfeldkanals (Niederösterreich, Wien) durch Libellen (Insecta: Odonata). Diplomarbeit Naturwiss. Fak. Univ. Wien. 125 pp, 23 pp. [colonisation of a canal, Austria] Address: Rainer Raab, Anton-Brucknergasse 272, A-2232 Deutsch-Wagram, Austria

47. **Raab, R. & E. Chwala (1997)**: Rote Listen ausgewählter Tiergruppen Niederösterreichs - Libellen (Insecta: Odonata), 1. Fassung 1995. Amt der NÖ Landesregierung, Abteilung Naturschutz, Wien, 91 Seiten. (in German). [Red lists of selected groups of animal of Lower Austria - Odonata] Source of supply: Amt der Niederösterreichischen Landesregierung, Abt. Naturschutz, Herrngasse 13, 1014 Wien, Austria; (öS 120,-)

48. **Reinhardt, K. (1997)**: Buchbesprechung: Jödicke, R. (1997): Die Binsenjungfern und Winterlibellen Europas. Lestidae. Neue Brehm-Bücherei 631. Ent. Nachr. Ber. 41(3): 171-172. [book review] Address: Reinhardt, K., Hauptstr. 38, D-09244 Oberlichtenau, Germany

49. **Renker, C. (1997)**: Faunistischer Jahresbericht 1995/96 für den Regierungsbezirk Koblenz. Flora Fauna Rheinland-Pfalz Beiheft 22: 115-168. [faunistic records, Rhineland-Palatinate] Address: Renker, C., Martin-Luther-Str. 91, D-56112 Lahnstein, Germany

50. **Rosemond, A.D., Pringle, C.M. & A. Ramirez (1998)**: Macroconsumer effects on insect detritivores and detritus processing in a tropical stream. Freshwater biology 39: 515-523. [The authors used an underwater electric field to prevent macroconsumers such as fishes and shrimps from feeding in and on leaf packs in a lowland stream in Costa Rica and thus to determine their effects on the density of insects detritivores and decay rates of leaves. Exclusion of macroconsumers resulted in significantly higher densities of small invertebrates inhabiting leaf packs. Despite the increase in invertebrate density, decay rates of leaves were not statistically different. A passing reference on Odonata larvae which were always found in low abundance (<5 ind./leaf pack) is made.]



Address: Pringle, Catherine M., Inst. Ecol., Univ. Georgia, Athens, GA 30602, USA

51. **Rolff, J. (1997):** Better hosts dive: Detachment of ectoparasitic water mites (Hydrachnellae: Arrenuridae) from damselflies (Odonata: Coenagrionidae). *Journal of Insect Behavior* 10(6): 819-827.

["In this paper I present experimental data for the detachment rate of water mite larvae (*Arrenurus cuspidator*) from different host species, *Coenagrion hastulatum* and *C. puella*, in relation to the host's oviposition behavior. *C. hastulatum* oviposits submerged, whereas *C. puella* oviposits at the water surface and aggregates with conspecifics. It was found that mite larvae detach at a significantly higher ratio from hosts with submerged oviposition. Experimental tests showed that this is not a species-specific effect. It is caused mainly by the oviposition behavior. The results are discussed in the light of different oviposition systems in damselflies."]

Address: Rolff, J., Techn. Univ. Braunschweig, Inst. Zool., Fasanenstr. 3, D-38092 Braunschweig, Germany

52. **Sandberg, E. (1997):** Benthic predator-prey relationships and abiotic stress. The effects of physical disturbance and oxygen deficiency. *Acta Academiae Aboensis, Ser. B (Mathematica et Physica)* 56(2): 1-42.

["Potential competition for food between predators of different ecological origin in the Baltic Sea was evident as the marine isopod, *Saduria entomon* (L.), and the limnic dragonfly larva, *Libellula quadrimaculata* (L.), exhibited similar prey choice and similar predation efficiency in a series of aquarium experiments. ..."]

Address: Sandberg, E., Kaskisgatan 2 C 14, FIN-20700 Abo, Finland

53. **Schneider, W. & H.J. Dumont (1997):** The dragonflies and damselflies (Insecta: Odonata) of Oman. An updated and annotated checklist. *Fauna of Saudi Arabia* 16: 89-110.

["The results of two field trips to the Sultanate of Oman are put on record. In addition, all specimens in the holdings of the Oman Natural History Museum (Muscat) are listed. Two species, *Agriocnemis pygmaea* and *Anax tristis*, are new for Oman and the Arabian Peninsula. An annotated checklist is given for the 40 species so far recorded from Oman territory."]

Address: Schneider, W., Hess. Landesmus., Zool. Abt., Friedensplatz 1, D-64283 Darmstadt, Germany

54. **Shaw, M.R. & R.R. Askew (1997):** Obituary: Andrew Rodger Waterston O.B.E. (1912-1996). *J. Br. dragonfly soc.* 13(2): 48-50.

Address: Askew, R.R., 5 Beeston Hall Mews, Beeston, Tarporely, Cheshire CW6 9TZ, UK

55. **Skale, A. & A. Weigel (1997):** Die Insektenfauna (Coleoptera, Lepidoptera, Saltatoria, Odonata, Trichoptera et Heteroptera) des NSG "Tannbach-Klingelfelsen" (Saale-Orla-Kreis, Thüringen). *Thüringer faunistische Abhandlungen* 4: 139-172.

["Thuringia, list of 11 dragonfly species"]

Address: Skale, A., Blücher Str. 38., D-95030 Hof, Germany

56. **Slaats, J. & H. Ramackers (1997):** Observations of *Lestes barbarus* at the Meinweg and Groote Peel areas (in Dutch, with Engl. summary). *Natuurhist. Maandbl.* 86(3): 55-57.

["In 1995, *L. barbarus* was observed in small numbers ... The species had not been found there during the previous decades, despite extensive earlier census studies at the Meinweg." The authors suppose a migration from the south of Europe to the region. The article briefly discusses the specific habitat of *L. barbarus*, and the importance of the newly created ponds in the province Limburg for the species.]

Address: Slaats, J., Astenseweg 6, NL-5768 PD Meijel, The Netherlands

57. **Solimini, A.G.; Tarallo, G.A. & G. Carchini (1997):**

Life history and species composition of the damselfly assemblage along the urban tract of a river in central Italy. *Hydrobiologia* 356: 21-32.

["The species composition of the damselfly assemblage and the life history patterns of two *Coenagrionidae* (*Ischnura elegans* and *Cercion lindenii*) were investigated along the urban tract of a river characterized by increasing organic pollution.... A longer reproductive period, absence of diapause, and tolerance of low oxygen concentration appear to be key factors that allow generalist species *I. elegans* and *C. lindenii* to predominate at the polluted sites."]

Address: Solimini, A.G., Univ. Roma Tor Vergata, Dept. Biol., Via Ric Sci., I-00133 Rome, Italy

58. **Tennessen, K.J. (1997):** *Lestes jerrelli*, n. sp. (Zygoptera: Lestidae), a new damselfly from Ecuador. *Proceedings of the Entomological Society of Washington* 99(4): 661-665.

["*Lestes jerrelli*, n. sp., is described and illustrated from 13 males and 8 females (holotype male, allotype female, in copula: Ecuador, Napo Prov., pond 12.3 km W of Coca, elev. 250 m, 13 June 1995). It is related to *L. jurzitzi* Muzon and *L. poulistus* Calvert from Brazil, but is distinct in thoracic color pattern and shape of male paraprocts."]

Address: Tennessen, K.J., 1949 Hickory Ave., Florence, AL 35630, USA

59. **Trockur, B. (1997):** Libellenfauna der größeren Stillgewässer in der Gemeinde Rehlingen-Siersburg. Unveröffentlichtes Gutachten im Auftrag der Gemeinde Rehlingen-Siersburg. 34 pp., Anhang.

["Unpublished odonatological assessment of 12 water bodies in the federal state Saarland near the French-German border. In total 32 (8-30 per site) species were recorded. Of special regional interest are *Cercion lindenii*, *Erythromma najas*, *Anax parthenope*, *Epitheca bimaculata*, *Libellula fulva*, and *Crocothemis erythraea*. An action plan to conserve the dragonfly fauna is presented."]

Source of supply: Gemeinde Rehlingen-Siersburg, Umweltamt, Bahnhofstr. 23, D-66780 Rehlingen-Siersburg, Germany

60. **Van Buskirk, J., McCollum, S.A. & E.E. Werner (1997):** Natural selection for environmentally induced phenotypes in tadpoles. *Evolution* 51(6): 1983-1992.

["... We measured selection in the presence of predators by exposing groups of 10 *Pseudacris triseriata* tadpoles to *Anax* in overnight predation trials and regressing the average phenotype of survivors against the number of tadpoles killed. ... In the presence of *Anax*, tadpoles with shallow and narrow body, deep tail fin, and wide tail muscle survived best. In the absence of free predators, tadpoles with narrow tail muscle grew significantly faster, and those with shallow tail fin and deep body grew somewhat faster. ... These results suggest that phenotypic plasticity in some morphological traits, such as tail depth and tail muscle width, has evolved under intermittent selection by dragonflies. Other traits that undergo selection by dragonflies, such as body morphology, appear developmentally rigid, perhaps because of historically strong opposing selection in nature or other constraints."]

Address: Van Buskirk, J., Univ. Zürich, Inst. Zool., Winterthurerstr. 190, CH-8057 Zürich, Switzerland

61. **van Tol, J. (1997):** The genus *Procordulia* Martin in western Malesia (Odonata, Corduliidae). Descriptions and records of Malesian Odonata, 4. *Tijdschrift voor Entomologie* 140(1): 133-146.

["The species of the genus *Procordulia* occurring in Malaysia, the Philippines and Indonesia, excl. New Guinea, are discussed and a key to the species is provided. *P. papandayanensis* is described from Java, and *P. lompobatang* and *P. rantemario* from SW Sulawesi. These new species all belong to the *P. sambawana* group of species."]

Address: van Tol, J., Natl. Museum Natural History, P.O. Box 9517, 2300 RA Leiden, Netherlands



62. **Verbeek, P.J.M. & J.T. Hermans (1997):** Dragonflies of the Lilbosch area (in Dutch). *Natuurhist. Maandbl.* 86(4): 93-97.

[In the agricultural area around Lilbosch Abbey many ponds were created with the intention to increase the natural value of the area. The shallow ponds are not fenced against cattle, but grazing impact is very low (one cow or horse on 2 or 3 ha). Cattle grazings seems to have positive effects on the dragonfly fauna of at least 6 ponds. 29 species were recorded of which at least 20 species have colonized this area since construction of the ponds. The article discusses the management effects on ponds and compares the dragonfly fauna of ponds with relatively steep slopes and those with gentle slopes.]

Address: Hermans, J.T.; Hertestraat 21, NL-6067 ER Linne, The Netherlands

63. **Wakkie, B. & J.T. Hermans (1997):** The Northern Emerald (*Somatochlora arctica*) in The Netherlands. *Brachytron* 1(2): 40-43.

Address: Hermans, J.T., Hertestraat 21, NL-6067 ER Linne, The Netherlands

64. **Weiber, B. & H. Komnick (1997):** Digestion of phosphatidylcholines, absorption, and esterification of lipolytic products by *Aeshna cyanea* larvae as studied in vivo and in vitro. *Archives of Insect Biochemistry and Physiology* 36(4): 273-293.

[Digestion and absorption of phosphatidylcholine by *A. cyanea* larvae were studied in vivo and in vitro with the isolated digestive juice and isolated midgut. ...]

Address: Komnick, Prof. Dr. H., Univ. Bonn, Inst. Cell Biol., Ulrich-Haberland-Str. 61a, 53121 Bonn, Germany

65. **Weipert, J. (1997):** Die Schutzgebiete der Landeshauptstadt Erfurt Teil II: Zur Fauna des GLB "Feuchtwiesen und Kleingewässer am Strohbergtümpel" und des oberen Peterbachtals (Stadt Erfurt und Landkreis Weimarer Land/Thüringen). *Thüringer faunistische Abhandlungen* 4: 173-196.

[list of 7 common dragonfly species]

Address: Weige, J., Mittelfeldstr. 17, D-98693 Ilmenau, Germany

66. **Wenz, I. (1997):** Schutzwürdigkeit der Naheae im Bereich "Mittelwörth-Woog". *Flora Fauna Rheinland-Pfalz Beiheft* 22: 209-226.

[assessment for conservation purposes of the floodplain of the River Nahe in Rhineland-Palatinate, short checklist of Odonata]

Address: Wenz, Iris, Breitzte Str. 2b, D-37077 Göttingen, Germany

67. **Wiedenbrug, S., Nolte, U., & N.L. Würdig (1997):** Macrozoobenthos of a coastal lake in southern Brazil. *Arch. Hydrobiol.* 140(4): 533-548.

[Odonata are treated family-wise]

Address: Wiedenbrug, S., Zoologische Staatssammlung, Münchhausenstr. 21, D-81247 München, Germany

68. **Zessin, W. (1997):** Die Libellenfauna des NSG "Warnowtal bei Karnin" in Mecklenburg-Vorpommern. *Virgo, Mitt.bl. ent. Ver. Mecklenburg* 1: 19-24.

[checklist of the Odonata and their abundance along the River Warnow, Mecklenburg-Vorpommern]

Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany

## 1998

69. **Abro, A. (1998):** Structure and development of sperm bundles in the dragonfly *Aeshna juncea* L. (Odonata). *Journal of Morphology* 235(3): 239-247.

[A re-examination of the origin and development of sperm bundles in aeshnid dragonflies (Odonata, Anisoptera) was carried out using light and electron microscopy....The spermatodesmata are large sperm aggregates that constitute efficient vehicles for transmission of amounts of filamentous sperm to the female.]

Address: Abro, A., Univ. Bergen, Inst. Anat., Arstadveien 19, N-5009 Bergen, Norway

70. **Askew, R.R., Prosser, R. & P.S. Corbet (1998):** Odonata of the Cayman Islands: a review. *Bulletin of American Odonatology* 5(2): 27-32.

[checklist, new records]

Address: Askew, R., 5 Beeston Hall Mews, Beeston, Tarporley, Cheshire CW6 9TZ, UK

71. **Batty, P. (1998):** *Brachytron pratense* (Müller) in Mid-Argyll. *J. Br. Dragonfly Soc.* 14(1): 21-28.

[emergence period between 1991 and 1996, "Generally over 50% of the population emerge in the first four days of emergence.", maturation period lasts 2-3 weeks, males are strongly territorial, oviposition predominantly takes place in rotten detritus of *Typha spec.*, *Equisetum spec.* and rotting wood, larvae "were near the surface amongst trapped detritus, often clinging upside down to the underside of it."]

Address: Batty, Patricia, Kirnan Farm, Kilmichael Glen, Lochgilphead, Argyll PA31 8QL, UK

72. **Beckemeyer, R. (1998):** A brief history of the Plains Emerald - *Somatochlora ensigera*. *Argia* 10(1): 17-20.

[up to date summary by literature data and personal communications of the little-known *Somatochlora ensigera*]

Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203, USA

73. **Beynon, T.G. (1998):** Behaviour of immigrant *Symptetrum flaveolum* (L.) at breeding sites in 1995 and subsequent proof of breeding in 1996. *J. Br. Dragonfly Soc.* 14(1): 6-11.

[Staffordshire, detailed description of oviposition behaviour in 1995, (poor) colonisation success in 1996 and 1997, this is explained by the fact that winter rain didn't flood the chosen oviposition sites in most cases]

Address: Beynon, T.G., 34 Church Lane, Checkley, Stokes-on-Trent, ST10 4NJ, UK

74. **Beynon, T.G. (1998):** Inverted emergence; a cautionary note. *J. Br. Dragonfly Soc.* 14(1): 20-21.

[emergence place of *Leucorrhinia dubia*; "Inversion was almost certainly caused by a severe thunderstorm..."]

Address: Beynon, T.G., 34 Church Lane, Checkley, Stokes-on-Trent ST10 4NJ, UK

75. **Bowen, K.L., Kaushik, N.K., & A.M. Gordon (1998):** Macroinvertebrate communities and biofilm chlorophyll on woody debris in two Canadian oligotrophic lakes. *Arch. Hydrobiol.* 141(3): 257-281.

[Submerged coarse woody debris may be a valuable contributor of littoral invertebrate production in the two Algonquin lakes, especially for those taxa which require high levels of dissolved oxygen and do not survive in loose detritus. Upon submerged, fresh woody debris was rapidly colonized by biofilm algae and invertebrates, particularly early instar chironomids. Although influenced by the emergence of dault insects, invertebrate density tended to increase over the one year duration of the experiment. Naturally occurring coarse woody debris, which was usually more decayed and lacked bark and small twigs, generally supported a smaller but more diverse invertebrate community." Invertebrate densities and taxa richness on both introduced and natural substrates tended to be greater on complex surfaces. Density of Odonata was very low: 0,01 and 0,11% (introduced substrates) and 0,15 and 0,41% (natural substrates) of the total biomass of macrobenthos. This represents only 1 or 2-5 individuals. Reference is made on *Cordulia*, *Neurocordulia*, *Aeshna* and *Boyeria* on the genus level, and on *Coenagrionidae*.]

Address: Kaushik, N.K., Dept Environ. Biol., Univ. of Gueph, Guelph, Ontario, N1G 2W1, Canada

76. **Brodersen, K.P., Dall, P.C. & C. Lindegaard (1998):** The fauna in the upper stony littoral of Danish lakes: macroinvertebrates as trophic indicators. *Freshwater biology* 39: 577-592.

[39 Danish lakes were examined by multivariate numerical methods. The data were derived from 125 semi-quantitative samples and a species list of 126 taxa. Coenagrionidae (16 ind. in total) were present on 7 lakes, Zygoptera (5 ind. in total) were present on 2 lakes.]

Address: Dall, P.C., Freshwater Biological Laboratory, University of Copenhagen, 51 Helsingorsgade, DK-3400 Hillerod, Denmark

77. **Brown, G.R. & G. Theischinger (1998):** *Huonia melvillensis* spec. nov., a new dragonfly from Australia (Anisoptera: Libellulidae). *Odonatologica* 27(1): 99-103. Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

78. **Butler, S.G. (1998):** The larvae of the European Aeshnidae (Anisoptera). *Odonatologica* 27(1): 1-23. [final instar exuviae, field key] Address: Butler S.G., Red Willow, All Stretton, Shropshire SY6 GHN, UK

79. **Caldwell, J.P. & M.C. de Araujo (1998):** Cannibalistic interactions resulting from indiscriminate predatory behavior in tadpoles of poison frogs (Anura: Dendrobatidae). *Biotropica* 30 (1) : 92-103.

[Poison frogs in the genus *Dendrobates* have very small clutch sizes (2-6 eggs among species for which there are data) and typically transport their tadpoles singly to small phytotelmata, such as bromeliad tanks, leaf axils, fallen fruit capsules, and treeholes. Tadpoles of many species are predaceous, consuming larvae of insects that use the same microhabitat for breeding, such as giant damselflies and mosquitoes. ...]

Address: Caldwell, J.P., Univ. Oklahoma, Dept. Zool., Norman, OK 73019, USA

80. **Catling, P.M. (1998):** Evidence for a recent northward spread of *Enallagma civile* in New York State. *Argia* 10(1): 16.

Address: Catling, P.M.; 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA

81. **Chovanec, A. (1998):** The composition of the dragonfly community (Insecta: Odonata) of a small artificial pond in Mödling (Lower Austria): seasonal variation and aspects of bioindication. *Lauterbornia* 32: 1-14.

[26 field trips were conducted to set up a complete species inventory and to investigate seasonal variations in the composition of the community of Odonata, comparison of the present species inventory to a "target list" established on the basis of historical data, classification of species in dragonfly associations]

Address: Chovanec, A., Umweltbundesamt, Abt. Aquatische Ökologie, Spittelauer Lände 5, A-1090 Wien, Austria

82. **Cordero, A.; Carbone, S.S. & C. Utzeri (1998):** Mating opportunities and mating costs are reduced in androchrome female damselflies, *Ischnura elegans* (Odonata). *Animal Behaviour* 55(1): 185-197.

[Female colour polymorphism is a perplexing characteristic of many damselfly species. In *Ischnura elegans* three female phenotypes occur, one of which has the same blue coloration as the male (androchromes) whilst the others are inconspicuous brown gynochromes (*infuscans* and *infuscans-obsolata* morphs). By marking a natural population near Rome, Italy, we found that all female phenotypes have similar survivorship, but they differ in mating frequency. Androchromes represented 55% of females but were involved in 43% of matings, whereas *infuscans* females represented 27% of females and 40% of matings and the *infuscans-obsolata* phenotype 18% of females and 17% of matings. Old androchromes stored significantly less sperm in their spermatheca than old gynochromes, suggesting that they had mated less often. ... Our results indicate that androchrome females mate less often than gynochromes, which could be a means of avoiding unnecessary and costly matings, but some androchrome females failed to reproduce (mate or oviposit) probably because they were unable to mate at all.]

Address: Cordero, A., Euet Forestal, Area Ecologia, Campus Univ., Pontevedra 36005, Spain

83. **d'Aguilar, J. & J.-L. Dommaget (1998):** Guide des libellules d'Europe et d'Afrique du nord. Delachaux et Niestlé. Lausanne. ISBN 2-603-00566-9. 463 pp.

[This book is the new and totally revised edition of the well known field guide from 1985. 20 plates present information on habitats, ecology or ethology, and 28 plates with figures and photos of most of the European species will help to identify most of the European or North-African Odonata. Compared with the 1985 edition, some of these plates are new, e.g. the plates with photographs of most of the European and North-African species or subspecies of the family Cordulegastridae. All species, including the species non figured, are described in detail, but not keyed. This remains a serious disadvantage of the book. Without consulting of the original figures and descriptions some of the species, e.g. in the genus *Cordulegaster*, identification will be extremely difficult. The quality of some of the plates, e.g. plate 2 with the *Lestidae* is not adequate in some species, as no details are to be recognized. In some of the plates colours are too intensive, and will mislead people not common with European Odonata (e.g. plate 21). Even compared with the first edition the printing quality of plates differs considerably: in some cases contrast is so intensive that details of coloration disappear (e.g. plate 18). The distribution maps are new; they contain a lot of interesting information, even on the distribution of most of the subspecies. Also new is a key of the European Odonata larvae or exuviae on genus level (prepared in cooperation with H. Heidemann, Bruchsal). This book is a supplement to Askew's "The Dragonflies of Europe" which will remain the standard book on European Odonata. Despite the abstractor's critical remarks the "Guide des libellules ..." is a very good tool to study European Odonata, and should not be missing in any odonatological library. (M. Sch.)]

84. **Davies, D.A.L. (1998):** *Rhipidolestes yangbingi* spec. nov., a new species with some unusual features, from Sichuan, China (Zygoptera: Megapodagrionidae). *Odonatologica* 27(1): 105-109.

Address: Davies, D.A.L., 23 Cedar Court, Hills Road, Cambridge, CB2 2QJ, UK

85. **Donnelly, N. (1998):** *Enallagma cyathigerum* and *vernale*: species, subspecies, hybrids, all of the above, or none of the above? You be the judge. *Argia* 10(1): 20-22. Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA

86. **Donnelly, N. (1998):** Resting dragonflies eating crawling ants! *Argia* 10(1): 12-13.

Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA

87. **Dosdall, L.M. & D.W. Parker (1998):** First report of a symphoretic association between *Nanocladius branchicolus* Saether (Diptera: Chironomidae) and *Argia moesta* (Hagen) (Odonata: Coenagrionidae). *American Midland Naturalist* 139(1): 181-185.

[In Cartier Creek, a small stream in southeastern Ontario, larvae of the chironomid *Nanocladius branchicolus* Saether were found associated symphoretically with nymphs of the damselfly *Argia moesta* (Hagen). This is the first report of a symphoretic association involving *A. moesta*; however, *N. branchicolus* was previously found associated symphoretically with nymphs of stoneflies in the families *Perlidae* and *Pteronarcyidae*. ... Approximately 22% of the population of *A. moesta* harboured symphoretic chironomids. ...]

Address: Dosdall, L.M., Alberta Res. Council, POB 4000, Vegreville, AB T9C1T4, Canada

88. **Dunkle, S. (1998):** Another *Orthemis discolor* record from Texas. *Argia* 10(1): 7-8.

Address: Dunkle, S., Biol. Dept, Collin County Community College, 2800 E, Spring Creek Parkway, Plano, TX 75074, USA



89. **Feldmann, R.M.; Vega, F.J.; Applegate, S.P. & G.A. Bishop (1998):** Early Cretaceous arthropods from the Tlayua Formation at Tepexi de Rodriguez, Puebla, Mexico. *Journal of Paleontology* 72(1): 79-90  
 ["The arthropod macrofauna from the Middle Member of the lithographic limestones of the Tlayua Formation, in quarries at Tepexi, Mexico, is comprised of marine and nonmarine components. ... Remains of an arachnid and an odonate nymph represent nonmarine constituents ..."]  
 Address: Dep. Geol., Kent State Univ., Kent, OH 44242, USA
90. **Gambles, R.M., Moore, N.W., Hämäläinen, M. & E.D.C. Prendergast (1998):** Dragonflies from the Gambia: an annotated list of records up to the end of 1980. *Odonatologica* 27(1): 25-44.  
 Address: Prendergast, E.D.V., Manor House, Bagber, Sturminster Newton, Dorset DT10 2EY, UK
91. **Garbutt, A. (1998):** Hornet predation on a dragonfly. *J. Br. Dragonfly Soc.* 14(1): 30-31.  
 [predation of *Vespa crabro* L. (*Hymenoptera*) on a female *Aeshna cyanea*, process of devouring is described]  
 Address: Garbutt, A., 9 The Causeway, Godmanchester, Huntingdon, Cambridgeshire PE18 8HA, UK;
92. **Geißler-Strobel, S., Bugner, J., Feldmann, R., Günther, K., Gras, J., Herbst, F. & K. Seluga (1998):** Bergbaufolgelandschaft in Ostdeutschland - durch Sanierung bedrohte Sekundärlebensräume. *Naturschutz und Landschaftsplanung* 30(4): 106-114.  
 [restoration of former coal-mining landscapes in East-Germany, endangered secondary habitats, e.g. of *Odonata*]  
 Address: Feldmann, Dr. R., Umweltforschungszentrum Leipzig-Halle, Permoserstr. 15, D-04318 Leipzig, Germany
93. **Hilfert-Rüppell, D. (1998):** Temperature dependence of flight activity of odonata by ponds. *Odonatologica* 27(1): 45-59.  
 [onset and flight activity, warm-up strategies, thresholds for flight, influence of body colour on heat gain, energy-saving flight, thermoregulation through perch choice, thermal adaptations]  
 Address: Hilfert-Rüppell, D., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany
94. **Hutchings, G. (1998):** New record of *Tramea lacerata* (Hagen), the Black-mantled Glider, in western Canada. *Argia* 10(1): 9-10.  
 Address: Hutchings, G., Box 15, Saturna Island, BC, V0N 2Y0, Canada
95. **Iles, I.S. (1998):** An investigation into the affects of bank collapse and cattle trample on Odonata species at Okehurst on the River Arun, West Sussex. *J. Br. Dragonfly Soc.* 14(1): 14-20.  
 ["It appears that those sections of the bank (of the River Arun) that have collapsed have a higher biomasse of *Odonata* than those sections that have not." In the course of flood preservation measures the areas that flood (sections of collapsed river banks) are targeted for dredging and banking up. "By comparing *Odonata* numbers with the degree of trample only regardless of water body, a more convincing increase in activity at higher levels of disturbance at the water margins may be detected."]  
 Address: Iles, I.S., 52 Cook Road, Horsham, West Sussex RH12 5GG, UK
96. **Ivarsson, T. (1998):** "*Sympetrum nigrescens*" found in Sweden (in Swed., with short Engl. summary). *Nordic Odonat. Soc. Newsletter* 4: 6.  
 ["nigrescens-like" specimens of *Sympetrum striolatum* were found in Dalsland (west of Sweden) in August 1996. See also Hämäläinen (1985), *Notulae Entomol.* 65: 68.]  
 Address: Ivarsson, T., Geografigränd 6A, S-90732 Umea, Sweden
97. **Ivarsson, T. (1998):** Note on the hot weather behaviour of darter dragonflies (*Sympetrum*) in Sweden (in Swed., with Engl. summary). *Nordic Odonat. Soc. Newsletter* 4: 7.  
 [thermoregulation behaviour ("obelisk" posture on hot days, horizontally position on cooler days) of *Sympetrum flaveolum* and *S. danae* in Sweden is described.]  
 Address: Ivarsson, T., Geografigränd 6A, S-90732 Umea, Sweden
98. **Ivarsson, T. (1998):** Some new distribution records of Swedish dragonflies (in Swed., with Engl. summary). *Nordic Odonat. Soc. Newsletter* 4: 5.  
 [new county records of 12 species including *Coenagrion johanssoni*, *Epitheca bimaculata*, *Leucorrhinia caudalis*, *L. albifrons*, and *Sympetrum vulgatum*]  
 Address: Ivarsson, T., Geografigränd 6A, S-90732 Umea, Sweden
99. **Jenkins, D.K. (1998):** A population study of *Coenagrion mercuriale* (Charpentier) in the New Forest. Part 7. Mark/recapture used to determine the extent of local movement. *J. Br. Dragonfly Soc.* 14(1): 1-4.  
 ["... it extraordinarily reluctant to move from its home location, even across a short open area. However it has been observed on several occasions that numbers of male *C. mercuriale* can be found at 0.5 km or more from the nearest site after emergence and initial dispersal. Poor colonisation of nearby areas would therefore result only if females do not disperse far after emergence. The fact that none have been found well away from emergence site may support this, or simply reflect the difficulty of seeing them when not attached to males.]  
 Address: Jenkins, D.K., 7 Lakewood Road, Ashurst, Hants S040 7 DH, UK;
100. **Koperski, P. (1998):** Predator-prey interactions between larval damselflies and mining larvae of *Glyptotendipes gripekoveni* (Chrionomidae): reduction in feeding activity as an induced defence. *Freshwater biology* 39: 317-324.  
 ["feeding methods and intensity of predation by larvae of *Erythromma najas* on *G. gripekoveni* were examined in artificial habitats... The experiments assessed the influence of chemical stimuli from the predator, light and the concentration of suspended food on the feeding activity of *G. grip.* inside and outside of the mine. *E. najas* preyed upon *G. grip.* as the latter grazed outside mines. When the food concentration for the chironomid was high, it significantly reduced both filtering activity and activity outside mines in response to the kairomone produced by *E. najas*. Feeding activity did not change when food was scarce... The predator can detect and catch mining prey in either the light (visually) or dark (mechanically). This may explain the lack of diel periodicity in the chemically induced differences in prey activity. Reduced feeding activity of the mining larvae in the chemically simulated presence of a larval damselfly can be explained as an induced antipredator behaviour ..."]  
 Address: Kopersiki, P., Dept Hydrobiol., Univ. Warsaw, Banacha 2, PL-02 097 Warsaw, Poland
101. **Kossenko, S.M. & C.H. Fry (1998):** Competition and coexistence of the European bee-eater *Merops apiaster* and the blue-cheeked bee-eater *Merops persicus* in Asia. *Ibis* 140(1): 3-13.  
 ["Studies were conducted over a 10-year period on the supposedly similar European Bee-eater *Merops apiaster* and Blue-cheeked Bee-eater *Merops persicus* breeding in mixed and separate colonies in four Asiatic countries.... Diets were qualitatively similar at insect family level but different at the species level, partly because of local variation in availability and partly because of distinct preferences of *M. apiaster* for small beetles, ants and termites and of *M. persicus* for large dragonflies and cicadas. ..."]  
 Address: Kossenko, S.M., Nat. Reserve Bryanski Les., Stn. Nerussa, Suzemski Rayon 242180, Bryanskaya Obla, Russia

102. **Kullingsjö, O. (1998):** Trollslände-dikt (in Swed.). Nordic Odonat. Soc. Newsletter 4: 18.  
[dragonfly poem in Swedish]  
Address: authors address not stated
103. **Lofall, B.P. (1998):** On the dragonfly-season 1997 in Ostfold. (in Norw., with Engl. summary). Nordic Odonat. Soc. Newsletter 4: 14-15.  
[A checklist of species for 18 localities in the region of Ostfold is presented. The data presented are prior and after 1960. In 1997, *Somatochlora flavomaculata* and *Leucorrhinia albifrons* were discovered in one new locality while *Sympetrum sanguineum* and *S. vulgatum* were recorded in several new localities]  
Address: Lofall, B.P., Aslivn 18B, N-1890 Rakkestad, Norway
104. **Martinez, B., Velasco, J., Suaárez, L. & R. Vidal-Abarca (1998):** Benthic organic matter dynamics in an intermittent stream in South-East Spain. Arch. Hydrobiol. 141(3): 303-320.  
[ "...Habitat-specific variables.. determined the production, retention and storage of the different benthic particulate organic matter - fractions in the streambed. Shredders were absent from the stream due to scarcity of their food. No significant correlations were found between the densities of the detritivorous feeding groups and their presumed food resources. This lack of correlation may reflect an over-abundance of detritus in the stream." At four sampling sites (2 pools, 2 runs) of the stream Chicamo the macrozoobenthos including 6 Odonata (*Coenagrion scitulum*, *Orthetrum brunneum*, *O. chrysostigma*, *Sympetrum fonscolombii*, *Crocothemis erythraea*, *Anax parthenope*) was collected. The mean density (ind/m<sup>2</sup>) for each species and collection site is presented in tab. 7.]  
Address: Martinez, B., Dept Ecol. Hydrol., Fac. Biol., Univ. of Murcia, Campus de Espinardo, ES-30100, Spain
105. **May, M. (1998):** Another migration report, for those of you who came in late. Argia 10(1): 10-12.  
Address: May, M.L., Dept Entom. & Econ. Zool., Cook College, Rutgers Univ., New Brunswick, NJ 08903
106. **McPeck, M. (1998):** Comments on *Enallagma cyathigerum* and *vernale*. Argia 10(1): 22-23.  
[Mark McPeck regards *E. vernale* and *E. cyathigerum* as two distinct species. "My working hypothesis for the boreale/cyathigerum/vernale relationships are as follows: (1) Sometime very recently (probably <<350 000 year ago if the molecular clock is right), a lineage of an *Enallagma* species in the fish lake habitat was established in a dragonfly lake. This founder population quickly adapted to living with dragonfly predators instead of fish predators... This was the progenitor species of boreale, cyathigerum and vernale. (2) A subsequent speciation event occurred to give rise to boreale and cyathigerum somewhere in the northeastern part of North America (this is from considering the biogeography of species along with our phylogeny) (3) then another speciation event associated with a habitat shift from dragonfly lakes back into fish lakes occurred in the cyathigerum lineage to form *E. vernale*." Mark McPeck reports on a project of Jenifer Mitchell, who compared the larval morphology and behaviour of boreale and vernale. Both species are indistinguishable in the size and shape of caudal lamellae, abdomen and labium. However, they are very different in behaviour.]  
Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA
107. **McPeck, M. (1998):** The consequences of changing the top predator in a food web: a comparative experimental approach. Ecological monographs 68(1): 1-23.  
[*Enallagma*, *Ischnura*, coexistence, community structure, density dependence, food limitation, food web predation, resource competition, trade-offs, trophic structure]  
Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA
108. **Müller, J.M. (1998):** *Nehalennia irene* in Alaska. Argia 10(1): 9.  
Address: authors address not stated
109. **Murdoch, D. (1998):** The size of the 1995 influx of *Sympetrum flaveolum* (L.). J. Br. Dragonfly Soc. 14(1): 11-12.  
[discussion of the minimum numbers of immigrating *S. flaveolum* into the British Isles in summer 1995]  
Address: Murdoch, D., Dept. Medical Microbiology, Southmead Hospital, Bristol BS10 5NB, UK
110. **Nielsen, O.F. (1998):** Dragonfly-news from Denmark 1997 (in Danish, with Engl. summary). Nordic Odonat. Soc. Newsletter 4: 4.  
[*Anax imperator* seems to be established in southwestern Jylland, *Somatochlora arctica* was discovered near Ry (this is the second Danish record of the species), *Aeshna viridis* was found in southwestern Denmark, *Nehalennia speciosa* was confirmed at its only known locality in Denmark, further remarks are made referring *Aeshna mixta*, *Lestes dryas*, and *Sympetrum flaveolum*.]  
Address: Nielsen, O.F., Sokildevej 87, DK-8680 Ry, Denmark
111. **Olsvik, H. (1998):** *Calopteryx virgo* and *Leucorrhinia rubicunda* in More and Romsdal, western Norway. (in Norw., with Engl. summary). Nordic Odonat. Soc. Newsletter 4: 8.  
[new records from July 1997 for the western Norwegian counties More and Romsdal]  
Address: Olsvik, H., N-6598 Foldfjorden, Norway
112. **Olsvik, H. (1998):** Dragonflies in More and Romsdal, status per 1997, with a red list. (in Norw., with Engl. summary). Nordic Odonat. Soc. Newsletter 4: 16-17.  
[The red list of the region of both More and Romsdal based on 542 investigated localities during the last 25 years. *Calopteryx virgo* and *Erythromma najas* seem to be endangered, *Coenagrion armatum*, *Aeshna subarctica* and *Cordulegaster boltonii* vulnerable, *C. johanssoni* concerning demanding, *Somatochlora flaveolum* and *Leucorrhinia rubicunda* indeterminate, and the status of *Sympetrum striolatum* is insufficiently known. *Sympetrum nigrescens* is treated as common, but its occurrence "possibly could be of special responsibility in western Norway".]  
Address: Olsvik, H., N-6598 Foldfjorden, Norway
113. **Olsvik, H. (1998):** Nye norske insekt-frimerker (in Norw.). Nordic Odonat. Soc. Newsletter 4: 18.  
[A stamp with a picture of *Aeshna cyanea*, released on 2 Jan., 1998 in Norway is reproduced. Annotation of M. Sch.: I believe Hans Olsvik's identification of the species is not correct; the species is a little bit "free styled" *Aeshna juncea*.]  
Address: Olsvik, H., N-6598 Foldfjorden, Norway
114. **Olsvik, H. (1998):** Nytt fra Norge og Sverige 1997. (in Norw.). Nordic Odonat. Soc. Newsletter 4: 13.  
[*Orthetrum cancellatum* was found 1997 in Norway. *Hemianax ephippiger* and *Sympetrum fonscolombii* were recorded in Öland (Sweden). The notice is illustrated by two pictures of *O. cancellatum* and *S. fonscolombii* taken May 1996 in Thassos (Greece).]  
Address: Olsvik, H., N-6598 Foldfjorden, Norway
115. **Olsvik, H. (1998):** Smastykker (in Norw.). Nordic Odonat. Soc. Newsletter 4: 13.  
[The deformation of the abdomen of *Pyrrhosoma nymphula* is pictured; the photograph was taken near Ry in Denmark on 16 June, 1996.]  
Address: Olsvik, H., N-6598 Foldfjorden, Norway
116. **Olsvik, H. (1998):** *Sympetrum "nigrescens"*. Nordic Odonat. Soc. Newsletter 4: 18.



[two photographs of the typical thorax of *Sympetrum "nigrescens"* are reproduced showing specimens from Norway]

Address: Olsvik, H., N-6598 Foldfjorden, Norway

117. **Olsvik, H. (1998):** The distribution of Odonata in Finmark. (in Norw., with Engl. summary). Nordic Odonat. Soc. Newsletter 4: 10-13.

[The distribution of the 16 species of dragonflies in Finmark, northern Norway, is shown by 50x50 km EIS-squares. The distribution maps include published and unpublished records provided by different odonatists. *Coenagrion hastulatum*, *C. armatum*, *C. johanssonii*, *Aeshna subarctica*, and *A. grandis* are new to Finmark.]

Address: Olsvik, H., N-6598 Foldfjorden, Norway

118. **Orr, R. (1998):** A bit of 1997 migratory *Anax junius* data from Maryland. *Argia* 10(1): 13-14.

Address: Orr, R.L., 5215 Durham Road East, Columbia, MD 21044-4444

119. **Orr, R. (1998):** The odonata of Sideling Hill Creek. *Argia* 10(1): 14-15.

Address: Orr, R.L., 5215 Durham Road East, Columbia, MD 21044-4444

120. **Paine, A. (1998):** Notes and observations. *J. Br. Dragonfly Soc.* 14(1): 31-32.

[items: mistaken identity? (*Libellula depressa*, *Vespa crabro*), Food for a Sparrowhawk?, Emergence from hard mud (*Sympetrum striolatum*), Feeding whilst mating (*Cordulegaster boltonii*), Range extension of *Cordulegaster boltonii* and *Brachytron pratense*, Unusual markings (*Calopteryx virgo*, *Libellula quadrimaculata* var. *praenubiola*)]

Address: Paine, A., 3a Burnham Close, Trimley St. Mary, Suffolk IO11 0XJ, United Kingdom

121. **Painter, D. (1998):** Effects of ditch management patterns on Odonata at Wicken Fen, Cambridgeshire, UK. *Biol. Conservation* 84: 189-195.

[Patterns of adult and larval Odonata distribution in relation to ditch management cycles were studied... Newley excavated sites with little shading from bankside vegetation are favoured by territorial males and ovipositing females; densely reeded sites are rarely used by adults. However, ditches with abundant submerged and floating macrophytic growth support more larvae than newley excavated or deeply shaded sites with poor plant development. Rotational clearance of ditches allows good displays of adult Odonata and breeding success to be achieved simultaneously on a reserve. Management implications for the conservation of Odonata are discussed.] (Personal note of M. Sch.: It is quite astonishing to see that e.g. the extensive German literature on effects of ditch management on Odonata has been ignored totally in the discussion.)

Address: Painter, D., Consultants in Environmental Sciences, Sackville, Place, Magdalen Street, Norwich NR3 1JU, UK

122. **Paulson, D. (1998):** An early record of *Neoneura amella* (Amelia's Threadtail) from Texas. *Argia* 10(1): 8.

Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA

123. **Paulson, D. (1998):** *Orthemis discolor* (Orange-bellied Skimmer), a new species for the U.S.. *Argia* 10(1): 7.

Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA

124. **Peters, G. (1998):** Taxonomic and population studies of British Columbia *Aeshna* species. *Bulletin of American Odonatology* 5(2): 33-42.

[mass emergence, transfer of matter and energy from aquatic to terrestrial ecosystems, larval competition, confirmation of species rank, both of *A. septentrionalis* and *A. caerulea*, identification by wing characters]

Address: Peters, Prof. Dr. G., Museum für Naturkunde; Inst. Syst. Zool., Invalidenstr. 43, D-10115 Berlin, Germany

125. **Pilon, J.-G., Pilon, S.; Pilon, L. & D. Lagacé (1998):** Structure des communautés odonatologiques adultes de la zone subarctique du Québec, Canada. *Odonatologica* 27(1): 61-70.

[species composition, species diversity, dendrogram of species association]

Address: Pilon J.-G., Département des Sciences biologiques, Université de Montréal, C.P.6128, Montréal, Québec, H3C 3J7, Canada

126. **Pringle, C.M. & A. Ramirez (1998):** Use of both benthic and drift sampling techniques to assess tropical stream invertebrate communities along an altitudinal gradient, Costa Rica. *Freshwater biology* 39: 359-373.

[ "... Diptera (*Chironomidae*) and *Ephemeroptera* were the dominant insect groups in all sites. Disturbed streams draining banana plantations were dominated by *Chironomidae* and had lower taxon richness and diversity than other sites. While data from benthic samples indicated that insects were the major faunal component (>90%) at all sites, drift samples were dominated by larval shrimps (>50%) at the 30 m and 50 m sites... ", short list of Odonata on different systematic levels]

Address: Pringle, Catherine M., Inst. Ecol., Univ. Georgia, Athens, GA 30602, USA

127. **Rebhahn, H. & S. Albrecht (1998):** Kleingewässer in einer Karstlandschaft und ihre Bedeutung für den Naturschutz. *Berichte der Akademie für Naturschutz Laufen* 20(1996): 229-238.

[small (temporal) water bodies in the karst of the "Nördliche Frankenalb", Bavaria, *Lestes dryas*, *Sympetrum flavolum*, *Coenagrion hastulatum*]

Address: Rebhahn, H., Regierung von Oberfranken, Ludwigstr. 20, D-95444 Bayreuth, Germany

128. **Reder, G. (1998):** Adulte Molche (Urodela: Salamandridae) und Wolfsspinnen (Araneida: Lycosidae) als Unterwasser-Ansitzjäger mit dem Beutespektrum eierlegende Kleinlibellen (Odonata: Zygoptera). *Fauna Flora Rheinland-Pfalz* 8(4): 1207-1216.

[adult newts and spiders as underwater predators of ovipositing female Zygoptera]

Address: Reder, Gerd, Am Pfortengarten 37, D-67592 Flörsheim-Dalsheim, Germany

129. **Samways, M.J., Carchini, G., Di Domenico, M. & G. Whiteley (1998):** Description of the last instar larva of *Rhyothemis semihyalina* (Desjardins, 1832) (Anisoptera: Libellulidae). *Odonatologica* 27(1): 111-116.

Address: Carchini, Prof. Dr. G., Dipartimento di Biologia, Università "Tor Vergata", Viale della Ricerca Scientifica, I-00133 Roma, Italy

130. **Saugestad, T. (1998):** *Leucorrhinia pectoralis* (Charpentier, 1825) found in Hordaland, West Norway. (in Norw., with Engl. summary). *Nordic Odonat. Soc. Newsletter* 4: 9.

[The odonata mapping project in Hordaland results in the westernmost record of *L. pectoralis* in Norway. In addition a map of the actual distribution of the species in western and southwestern Norway is presented. Further species briefly are mentioned include *nigrescens*-like specimens of *Sympetrum striolatum*.]

Address: Saugestad, T., Gamle Kalvedalsvei 12B, N-5019 Bergen, Norway

131. **Schöll, F. & I. Balzer (1998):** Das Makrozoobenthos der deutschen Elbe 1992-1997. *Lauterbornia* 32: 113-129.

[checklist of 370 macroinvertebrate species or higher taxa of the River Elbe from collections between 1992 and 1997, including the rare species *Stylurus flavipes* and *Ophiogomphus cecilia*]

Address: Schöll, F., Bundesanstalt für Gewässerkunde, Kaiserin-Augusta-Anlagen 15-17, D-56068 Koblenz, Germany

132. **Schütte, C., Schridde, P. & F. Suhling (1998):** Life history patterns of *Onychogomphus uncatatus* (Charpentier) (Anisoptera: Gomphidae). *Odonatologica* 27 (1): 71-86.

[4-year study, surber-samples of 3 running waters in southern France, field enclosure experiments, egg development, emergence, hight mortality of final instar larvae during winter]

Address: Schütte C., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

133. **Seki, T. & K. Vogt (1998):** Evolutionary aspects of the diversity of visual pigment chromophores in the class Insecta. *Comparative Biochemistry and Physiology B (Biochemistry and Molecular Biology)* 119(1): 53-64.

[In the class Insecta, three retinal congeners are used as the chromophore of visual pigments: retinal, (3R)-3-hydroxyretinal and (3S)-3-hydroxyretinal. The distribution of retinal and 3-hydroxyretinal superimposed on the phyletic tree of insects indicates that the original chromophore of visual pigments was retinal, and that some insects arose around the end of the Carboniferous period acquired the ability to use 3-hydroxyretinal. ... On investigating the absolute structure of 3-hydroxyretinal in insect compound eyes, using a chiral column, the orders Odonata, Hemiptera, Neuroptera, Coleoptera, and Lepidoptera, and suborders Nematocera and Brachycera of the Diptera were found to have only (3R)-3-hydroxyretinal. ...]

Address: Seki, T., Osaka Kyoiku Univ., Div. Health Science, 4-698-1 Asahigaoka, Osaka 582, Japan

134. **Smith, P.H. (1998):** Dispersion or migration of *Symptetrum danae* (Sulzer) in South Lancashire. *J. Br. Dragonfly Soc.* 14(1): 12-14.

Address: Smith, P.H., 2 Highfield Grove, Lostock Hall Preston, Lancashire PR5 5YB, UK

135. **Steinwarz, D. (1998):** Beiträge zur Ökologie und Faunistik ausgewählter Insektengruppen (Insecta: Hymenoptera [Formicidae], Lepidoptera, Orthoptera, Odonata) des Eulenbergs bei Hennef. *Decheniana, Beih.* 34: 54-69.

[Odonata of a quarry in Nordrhein-Westfalen, Germany]

Address: Steinwarz, D., Apolloniaweg 6, D-53773 Hennef, Germany

136. **Stephan, U. (1998):** Untersuchungen zur Habitatbindung der Quelljungferarten *Cordulegaster boltoni* (Donovan 1897) und *Cordulegaster bidentata* (Selys 1843) in Waldbächen des Mittleren Schwarzwaldes unter besonderer Berücksichtigung der Larvalökologie. Diplomarbeit am Lehrstuhl für Geobotanik, Fakultät für Biologie der Albert-Ludwigs-Universität Freiburg/Breisgau. 110 pp, Anhänge.

[comprehensive and detailed study of the larval ecology of *Cordulegaster boltonii* and *Thecagaster bidentata* with regard to allopatric and sympatric populations in the Black Forest region, southwestern Germany. Special emphasis is given to the influence of water chemistry on larval habitat selection (no influence), the influence of light and tree cover on larval habitats (insignificant), the influence of colour of substrate (significant, very important cue factor for oviposition site-selection by females), distance from spring (significant factor in separating the species), temperature of water (insignificant), drought resistance of *C. boltonii* (minimum: 24 days, maximum 57 days), larval interactions (cannibalism in *C. boltonii*), mean larval density (7 - 172 larvae / m<sup>2</sup> in dependence of age of the larvae), mean range of larvae (*T. bidentata*: 2,3 m<sup>2</sup>, *C. boltonii*: 1,4 m<sup>2</sup>), emergence, difference in habitats of male and female imagines]

Address: Stephan, Ulrike, Unterer Mühlenweg 73, D-79114 Freiburg, Germany

137. **Stolzenwald, T. & R. Schmidt-Brücken (1998):**

Das Makrozoobenthos des Schwabach und Trubach (Regnitz/Main). *Lauterbornia* 32: 131-149.

[Investigation of water quality of both rivers between Sept. 1994 and Sept. 1995, Bavaria, chemical and physical parameters, list of macrozoobenthos includes 16 species of Odonata, e.g. *Ophiogomphus cecilia*]

Address: Stolzenwald, Tatjana, Marktplatz 10a, D-90542 Eckental, Germany

138. **Stone, M.K. & J.B. Wallace (1998):** Long-term recovery of a mountain stream from clearcut logging: the effects of forest succession on benthic invertebrate community structure. *Freshwater biology* 39: 151-169.

[Odonata (*Lanthus*, *Cordulegaster*) are briefly mentioned, USA, North Carolina]

Address: Stone, M.K., Dept Entomol., Univ. Georgia, Athens, Georgia 30602, USA

139. **Swisher, B.J., Soluk, D.A. & D.H. Wahl (1998):** Non-additive predation in littoral habitats: influences of habitat complexity. *Oikos* 81(1): 30-37.

[... We examined the combined consumption of a common prey by two predators across a gradient of three habitat complexities. In microcosm experiments consumption of larval mayfly prey (*Cloeon cognatum*) by juvenile bluegill sunfish (*Lepomis macrochirus*) and libellulid dragonfly larvae (*Erythemis simplicicollis*) exceeded additivity at low habitat complexity, but were additive at higher levels of complexity. ...]

Address: Swisher, B.J., Illinois Nat. Hist Survey, Ctr. Aquat. Ecol., 607 E Peabody Dr., Champaign, IL 61820, USA

140. **Terzani, F. & B. Carletti (1998):** *Enallagma captuavis* spec. nov. and other odonate records from Ethiopia (Zygoptera: Coenagrionidae). *Odonatologica* 27 (1): 117-120.

Address: Terzani, F., Mus. Nat. Hist. of the University of Florence, Zool. Sect. "La Specola", Via Romana 17, I-50125 Florence, Italy

141. **Thomas, M. (1998):** *Somatochlora williamsoni* in Connecticut. *Argia* 10(1): 8-9.

Address: Thomas, M.C., 206 Skyview Drive, Cromwell, CT 06416, USA

142. **Vick, G.S. (1998):** Notes on some damselfly larvae from Cameroon (Zygoptera: Perilestidae, Amphipterygidae, Platynemididae). *Odonatologica* 27(1): 87-98.

[description of the larvae of *Nubiolestes diotima*, *Stenocnemis pachystigma*, *Pentaplebia stahli*]

Address: Vick G.S., Crossfields, Little London, Tadley, Hants RG26 5ET, UK

143. **Waring, E. (1998):** Further sites for *Coenagrion pulchellum* (Vander Linden). *J. Br. Dragonfly Soc.* 14(1): 4-5.

[additional records from Great Britain (period 1991-1997): Wales and Shropshire, Southwest Scotland, East Anglia, Southern England]

Address: Waring, E., 7 Amberlands Close, Blackwell, Bristol BS48 3 LW, UK

144. **Wong, A.H.K., Williams, D.D., McQueen, D.J., Demers, E. & C.W. Ramcharan (1998):** Macroinvertebrate abundance in two lakes with contrasting fish communities. *Arch. Hydrobiol.* 141(3): 283-302.

[Can fish abundance influence benthic macroinvertebrate numbers, biomasses and species composition? Two lakes with similar physical and chemical characteristics in south-central Ontario (Canada) but contrasting fish communities were studied from June to August 1992. Ranger Lake was dominated by piscivorous bass and had low populations of small-bodied planktivore-benthivores (e.g. yellow perch, golden shiners). Mouse Lake had no obligate piscivores and very large populations of small-bodied planktivore-benthivores. The two lakes had similar populations of large-bodied, benthivorous white suckers. Comparison of depth-stratified samples of benthic macroinvertebrates collected monthly suggested that in the

shallow water zone (<1 depth) Ranger Lake supported significantly higher benthic densities, biomasses, and taxon richness. In these shallow water zones, consumption of benthic invertebrates by fish, revealed that the small-bodied planktivore-benthivores in Mouse Lake exerted more than twice as much predation pressure on the benthos as they did in the lake with fish. In the deeper water (>1m depth) there were no between-lake differences in the macroinvertebrate communities." Prey consumption by white suckers (generally distributed in >1m depth) was similar in the two lakes. The authors conclude that high rates of prey consumption by the small-bodied planktivores-benthivores could have accounted for the lower inshore biomasses found in Mouse Lake. 13 Odonata are listed on the species (*Gomphus exilis*, *Hagenius brevistylus*, *Celithemis eponina*, *Didymops transversa*, *Basiaeschna janata*, *Libellula julia*, *Pachydiplax longipennis* and *Cordulia shurtelffi*) or genus level (*Ischnura*, *Somatochlora*, *Cordulia*, *Leucorrhinia*, *Sympetrum*). Odonata are analyzed on the order level with reference to their density, biomass, wet weight, and preference as fish diet.]

Address: McQueen, D.J., Dept Biology, York Univ., 4700 Keele Street, Toronto, Ontario, M3J 1P3, Canada

145. **Zhu, H.-q. & Z.-d. Yang (1998):** *Rhipidolestes bastiaani* spec. nov., a new damselfly from Shaanxi, China (Zygoptera: Megapodagrionidae). *Odonatologica* 27(1): 121-123.

Address: Zhu H.-q., Dept Biol., Shanxi University 42-38, Taiyuan 030006, Shanxi, China



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Wolfstr. 6, D-72119 Ammerbuch, Germany. Tel. ++49 (0) 7073 5262; e-mail: Lindeboom@aol.com and Martin Schorr, Waldfrieden 25, D-54314 Zerf, Germany. Tel. ++49(0)6587 1025; e-mail: FOEATrier@aol.com

The ©ODONATOLOGICAL ABSTRACT SERVICE is a supplement to AGRION, the Newsletter of the Worldwide Dragonfly Association. Published in Rheinfelden, Germany and printed in Tübingen, Germany.

ISSN 1438-0269

## 1997

146. **Abbingh, G. (1997):** Op zoek naar de Noordse glazemaker in Drenthe. Nieuwsbrief, Mededelingen van de Nederlandse Vereniging voor Libellenstudie 1(3): 3. (in Dutch).

[rediscovery of *Aeshna subarctica elisabethae* in the province of Drenthe (The Netherlands)]

Address: Abbingh, G., Muddegoorn 78, NL-9403 NK Assen, The Netherlands.

147. **Anderson, C.; Wilson, R. (1997):** Reports from Coastal stations: Minsmere RSPB Reserve, Suffolk. *Atropos* 2: 76-77. (in English).

[14 species were observed in 1996; *Sympetrum flaveolum*, *S. sanguineum*, *S. striolatum*, *Pyrrhosoma nymphula*, *Brachytron pratense*, *Aeshna cyanea*, *Orthetrum cancellatum* are dealt with]

Address: not stated.

148. **Attridge, W. (1997):** The dragonflies of the Dungeness Bird Observation recording area - 1996. *Atropos* 2: 49-51. (in English).

[commented list of 14 Odonata species including *Sympetrum fonscolombei* and *Erythromma najas*]

Address: Attridge, W., Dungeness, Bird Observatory, Dungeness, Romney Marsh, Kent TN29 9NA, UK.

149. **Bechly, G. (1997):** New fossil odonates from the Upper Triassic of Italy with a redescription of *Italophlebia gervasuttii* Whalley, and a reclassification of triassic dragonflies. *Riv. Mus. civ. Nat. "E. Caffi" Bergamo* 19: 31-70. (in English with Italian summary).

["The odonate fauna of the Upper Triassic of Bergamo is revised. *Italomyrmeleon bergomensis* gen. et spec. nov. is described as first Protomyrmeleontidae from the Triassic of Europe. A tiny fossil odonate which belongs to a new genus and species is described but not named because it is a poorly preserved specimen. *Italophlebia gervasuttii* is redescribed and a new species of the same genus, *Italophlebia paganoniae* spec. nov., is described. The phylogenetic position of *Italophlebia* is discussed and the genus is shown to be one of the oldest known stem-group representatives of Anisoptera, and is therefore transferred from Zygoptera - Hemiphlebioidea to "Anisozygoptera" - Isophlebioptera. Within Isophlebioptera a new clade Parazygoptera is proposed and a phylogenetic system of its subgroups is introduced. *Italophlebiidae* is regarded as junior subjective synonym of *Triassothemistini* stat. nov., and *Progonophlebiidae* is regarded as junior subjective synonym of *Mesophlebiinae*. *Triassoneuridae* is regarded as junior subjective synonym of *Triassoletidae*, and *Oreopteridae* is regarded as junior sub-

jective synonym of *Asiopteridae*. A new genus *Pseudotriassothemis* gen. nov. (type genus of *Pseudotriassothemistinae* subfam. nov.) is erected for the three Japanese Triassic species "*Triassoneura*" *okafujii*, "*Triassothemis nipponensis*" and "*Triassothemis*" *minensis*. *Afrotriassothemis* subgen. nov. is proposed as new subgenus in *Triassothemis* for the two South African Triassic species *T. heidia* and *T. regularis*, that were previously classified in the genus *Triassoneura*. "*Triassoneura*" *primitiva* is transferred from *Triassoneuridae* to *Archizygoptera* - *Batkeniidae* in a new genus *Paratriassoneura* gen. nov.. "*Sogdoteron*" *legibile* is transferred from *Asiopteridae* to *Triassoletini*. *Sogjutella mollis* is transferred from *Asiopteridae* to *Cyclothemistidae*. *Sphenophlebia*, *Mesoepiophlebia* and *Ensphingophlebia* are transferred from *Euthemistidae* and *Epiophlebiidae* to a new family *Sphenophlebiidae* fam. nov. which is regarded as most basal group of *Parazygoptera*. *Proeuthemis pritykinae* is preliminarily transferred from *Euthemistidae* to the new family *Sphenophlebiidae* too, although it might also be the sister-group of *Asiopteridae*. "*Sphenophlebia*" *pommerana* is transferred to the genus *Turanopteron* in *Asiopteridae*. *Triadotypus guillaumei* is recognised as junior subjective synonym of *Reisia gelasii* and *Reisia nana* spec. nov. is described from the Triassic of France. Consequently *Triadotypus sogdianus* is changed to *Reisia sogdianus* comb. nov.. *Reisia* (= *Triadotypus*) and *Triassologus* are both transferred from "*Protodonata*" to *Triadophlebioptera*, so that there are no Triassic protodonates known any longer. *Thuringopteryx gimmi* is transferred from "*Protodonata*" to *Palaeodictyoptera*, as the first known Triassic representative of this group.]"

Address: Bechly, G., Institut und Museum für Geologie und Paläontologie, Geowissenschaftliche Fakultät der Eberhard-Karls-Universität, Sigwartstr. 10, D-72076 Tübingen, Germany.

150. **Böhmer, J.; Rahmann, H. (1997):** Steinbrüche und Naturschutz Teil II. Faunistische Aspekte der Sukzession, der Rekultivierung und des Naturschutzes in Steinbrüchen Südwestdeutschlands. 4.2.6 Libellen. *ecomod. Landsberg*. ISBN 3-609-69370-3: 407-412. (in German). [commented checklist of 10 Odonata species in three quarries in southwestern Germany (Baden-Württemberg), the occurrence of *Coenagrion pulchellum* is of some interest]

Address: not stated.

151. **Bößneck, U.; Weipert, J. (1997):** Die Schutzgebiete der Landeshauptstadt Erfurt (Thüringen). Teil I: Flora und Fauna des GLB "Kalkhügel und Fasanenjagdgebiet".

Veröffentlichungen des Naturkundemuseum Erfurt 17: 37-70. (in German).

[Thuringia, Germany; checklist of 22 species of Odonata; the records of *Lestes virens* and *Anaciaeschna isosceles* are of special interest]

Address: Bößneck, A., Stadtverwaltung Erfurt, Umwelt- und Naturschutzamt, Stauffenbergallee 18, D-99084 Erfurt, Germany

152. **Bouma, H.; Witte, R. (1997):** Een libel uit de oude doos. Nieuwsbrief, Mededelingen van de Nederlandse Vereniging voor Libellenstudie 1(3): 3. (in Dutch).

[report on an old record of *Cordulgeaster boltonii* in The Netherlands]

Address: not stated.

153. **Breinl, K.; Coburger, K.; Leo, F. (1997):** Zum Kenntnisstand der Verbreitung von Libellen (Odonata) und Heuschrecken (Saltatoria) im Landkreis Greiz und der Stadt Gera. Veröff. Museum Naturkunde Stadt Gera, Naturwiss. Reihe 24: 5-93. (in Germany with short English summary).

[extensively commented checklist of the Odonata of eastern Thuringia, Germany; colour photo, distribution map, and detailed documentation of frequency of each species; attempt to assess population trends of all species and recent status of the populations; short chapter on dispersal and metapopulation of *Calopteryx virgo* and *C. splendens*]

Address: Coburger, Dr. Karli, Am Kleinen Zieger 23, D-07973 Gera, Germany.

154. **Brunelle, P. (1997):** Distribution of dragonflies and damselflies of the Atlantic Provinces, Canada. *North-eastern naturalis* 4(2): 61-82. (in English with French summary).

[commented checklist of the Odonata of 6 regions (in the provinces of Nova Scotia, Prince Edward Island, New Brunswick, Newfoundland) in eastern Canada; *Aeshna tuberculifera*, *Dorocordulia libera*, *Lestes viligax*, *Libellula pulchella*, and an unnamed *Conagrionidae* are illustrated with colour pictures]

Address: Brunelle, P.-M., 2460 John Street, Halifax, Nova Scotia, B3K 4K7, Canada.

155. **Buchwald, R. (1997):** Artenhilfsprogramm für die Große Moosjungfer (*Leucorrhinia pectoralis*) ins Leben gerufen! Naturschutzinformation der Schutzgemeinschaft Libellen in Baden-Württemberg 2: 1. (in German).

[Report on a conservation action plan for *L. pectoralis* in Baden-Württemberg, Germany, supported for the period of 1997-2000 by the European Community.]

Address: Buchwald, R., INU, Hochschule Vechta, Driverstr. 22, D-49377 Vechta, Germany.

156. **Buczynski, P. (1997):** Wazki (Odonata) terenów źródłowych Polski - stan poznania i perspektywy dalszych badan. Wyzsza Szkola Pedagogiczna w Olsztynie, Instytut Biologii i Ochrony Srodowiska, Zaklad Ekologii i Ochrony Srodowiska. Zrodla Polski. Stan Badan, Monitoring i ochrona. Olsztyn, 10-12 pazdziernika 1997: 10-11. (in Polish).

[Dragonflies of spring-habitats in Poland: status of exploration and perspectives for future work; *Thecagaster bidentata*]

Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PO-20-033 Lublin, Poland

157. **Buczynski, P.; Tonczyk, G. (1997):** Analiza zgrupowan wazek (Odonata) Wód Biezacych Polski. Materiały zjazdowe. 17zjazd hydrobiologów Polskich. Polskie Towarzystwo Hydrobiologiczne. Oddzial w Poznaniu. Poznan, 8-11. wrzesnia 1995 : 95. (in Polish).

[Analysis of the dragonfly communities of the running waters in Poland]

Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PO-20-033 Lublin, Poland.

158. **Bulletin of the Hokkaido Odonatological Society** Vol. 9 (July 31, 1997) (1997): 1-27.

[Contents:1. Hiratuka, K.: Two dragonfly species new to Shiribeshi District. pp.: 1; 2. Anzai, M.: A record of *Aeshna mixta soneharai* in Kamikawa District. pp.: 2; 3. Akaishi, S.: Dragonflies of Asahikawa city. pp.: 3-6; 4. Yokoyama, T.: Records of *Sympetrum parvulum* in Tomakomai city and Chitose city. pp. 7; 5. Harauchiand, Y. & Y. Joh: Emergence process of *Epiophlebia superstes* in laboratory. pp.: 8-9; 6. Hirose, Y.: A record of *Coenagrion ecornutum* representing its southern limit. pp.: 10; 7. Yokoyama, T. & Y. Hirose: Habitat and ecology of *Planaeschna milnei* in Kikonai town. pp. 11; 8. Sato, M.: Phenology of *Sympetrum frequens* in Obihiro city. pp.: 16; 9. Wataji, M., Maruyama, F., Taguchi, M., Kano, M. & T. Yoshinuma Species composition and collection records of the dragonflies inhabiting Tonneusu Pond. pp.: 20-23; 10. Hori, S.: *Aeschnophlebia longistigma* recorded from Lake Utona. pp.: 24; 11 Ubukata, H.: Review of Odonatological literature (articles). pp.: 25-26; 12 Ubukata, H.: Internet home pages authored by members of H.O.S. pp.: 27; 13 Wataji, M.: *Somatochlora japonica* (a photograph): front cover]

Address: Ubukata, H., Hokkaido University of Education at Kushiro, Kushiro, 085 Japan.

159. **Collingwood, N. (1997):** The Dragonflies of Staffordshire. ISBN 1 874414 22 X. 79 pp. (in English).

[A guide to the 26 species of Odonata that are found in Staffordshire; how to identify them; where to find them; when to go and look; how to catch or photograph them and what the future may hold for them. (J. Silsby)]

Address: Staffordshire Local Record Centre, Stoke-on-Trent City Museum & Art Gallery, Stoke-on-Trents, Staffordshire, UK.

160. **Deliry, C. (1997):** Atlas des libellules de la region Rhône-Alpes. Premier volet: Les espèces rares et menacées des départements des Alpes du Nord Francais I-sère-Savoie-Haute Savoie. Deuxième partie: Les zygoptères. *Sympetrum* 13: without pagination. (in French).

[species sheets and distribution maps]

Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France.

161. **Deliry, C. (1997):** Atlas des libellules de la region Rhône-Alpes. Premier volet: Les espèces rares et menacées des départements des Alpes du Nord Francais I-sère-Savoie-Haute Savoie. Troisième partie: Les Anisoptères. *Sympetrum* 14: without pagination. (in French).

[species sheets and distribution maps]

Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France.

162. **Deliry, C. (1997):** Nouveaux articles ou études concernant les libellules dans la region Rhône-Alpes. *Sympetrum piémontais* 35: 5-10. (in French).

Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France

163. **Deliry, C. (1997):** Nouveaux articles ou études concernant des libellules dans la région Rhône-Alpes. *Symptetrum piémontais* 36: 4-6. (in French).

Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France.

164. **Deliry, C. (1997):** Nouveaux articles ou études concernant les libellules dans la région Rhône-Alpes. *Symptetrum piémontais* 37: 2-3. (in French).

Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France.

165. **Dijkstra, K.-D.; Edelaar, P.; Goudsmits, K.; Kalkman, V.; Ketelaar, R.; Wasscher, M. (1997):** Van heros naar hylas. Libellen in Slovenie en Oostenrijk. Nieuwsbrief, Mededelingen van de Nederlandse Vereniging voor Libellenstudie 1(3): 8-9. (in Dutch).

[report on some dragonfly excursions in Slovenia and Austria; of special interest are *Ophiogomphus cecilia*, *Somatochlora metallica*, *Coenagrion scitulum*, *Cordulegaster heros* and *Leucorrhinia pectoralis* (Slovenia), and the extremely rare European damselfly *Coenagrion hylas*, and *Nehalennia speciosa* (Austria)]

Address: Dijkstra, K.D., Oude Rijnburgerweg 38, NL-2342 BC Oegstgeest, The Netherlands.

166. **Donnelly, N. (1997):** Farangpo 96. Thailand revisited and Vietnam added to our list. *Malangpo* 14: 117-122. (in English).

[reports on records of dragonflies of the *Siriphium* waterfall near Chiang Mai (Thailand) including e.g. *Leptogomphus gestroi*, *Amphigomphus somnuki* and an undescribed *Chlorogomphus*; the locality in Vietnam is Tam Dao "which is a few hours drive north of Hanoi"; among other *Devadatta ducatrix*, *Chlorogomphus nastus satoi*, *Indoncemis n.sp.* and *Rhidolestes sp.* are of special interest; a checklist of all species caught in 1996 is given]

Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA.

167. **Donnelly, N. (1997):** Through darkest Borneo (and Malaysia) with net and camera. *Malangpo* 14: 123-128. (in English).

[see *Argia* 9(3), the contribution in Malangpo is broadened by a commented checklist of all species caught during the trip]

Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA.

168. **Edelaar, P. (1997):** Het Internationale Libellensymposium Maribor, Slovenie, juli 1997. Nieuwsbrief, Mededelingen van de Nederlandse Vereniging voor Libellenstudie 1(3): 7. (in Dutch).

[report and Dutch view of the International Odonatological Symposium in Maribor, July 1997]

Address: Edelaar, P., In de Potvis, De Dageraad 3, NL-1797 SK Den Hoorn, The Netherlands, e-mail: edelaar@nioz.nl.

169. **Fairhurst, J. (1997):** Vagrant Emperor Hemianax ephippiger on the Calf of Man, July 1995. *Atropos* 2: 61. (in English).

[record of *Anax ephippiger* on the Isle of Man, UK on 13 July 1995]

Address: not stated.

170. **Federschmidt, A. (1997):** Die Libellen des Kühnauer Sees. *Naturwiss. Beitr. Museum Dessau, Sonderheft* 1997: 78-84. (in German).

[Sachsen-Anhalt, Germany; checklist of 26 species; of some regional interest are the records of *Anax parthenope* and *Aeshna affinis*]

Address: Federschmidt, A., LPR Landschaftsplanung Dr. Reichhoff GmbH, Außenstelle Magdeburg, Am Vogelgesang 2a, D-39124 Magdeburg, Germany.

171. **Fitzhugh, G.H.; Marden, J.H. (1997):** Maturational changes in troponin T expression,  $Ca^{2+}$ -sensitivity and twitch contraction kinetics in dragonfly flight muscle. *Jour. exp. biol.* 200(10): 1473-1482. (in English).

[ "Maximum lift production and the thermal sensitivity of lift production increase dramatically during adult maturation of *Libellula pulchella* dragonflies. Here, we report that the mechanistic basis for this transition appears to involve a developmental change in protein expression, which alters the  $Ca^{2+}$ -sensitivity of muscle activation and twitch contraction kinetics. The alternatively spliced  $Ca^{2+}$  regulatory protein troponin T (TnT) undergoes an isoform shift during adult maturation. Skinned (demembrated) fibers of mature flight muscle are up to 13 times more sensitive to activation by  $Ca^{2+}$  than skinned fibers from teneral (newly emerged adult) flight muscle, and their  $Ca^{2+}$ -sensitivity is more strongly affected by temperature. Intact muscle from mature individuals has a shorter time to peak tension and longer time to half-relaxation during twitch contractions, which is consistent with a greater  $Ca^{2+}$ -sensitivity of mature muscle. Because it becomes activated more quickly and relaxes more slowly, mature flight muscle is able to generate, with each twitch, more force per unit area than teneral muscle; this difference in force becomes greater at high temperatures. There do not appear to be any age-related differences in actomyosin crossbridge properties, since teneral and mature flight muscles do not differ in shortening velocity, tetanic tension or instantaneous power output during isotonic contraction. Thus, variation in TnT expression appears to affect the temperature-dependent  $Ca^{2+}$ -sensitivity of muscle activation, which in turn affects the kinetics and force production of the twitch contractions used by dragonflies during flight. This cascade of effects suggests that maturational changes in the expression of TnT isoforms may be a key determinant of overall muscle and organismal performance." (Authors)]

Address: Marden, J.H., Dept Biol., Pennsylvania St. University, University Park, PA 16802, USA.

172. **Follet, P. (1997):** Dragonflies of Surrey. Surrey Wildlife Trust. ISBN 0 9526065 1 8. 87 pp. (in English).

Address: source of supply: Surrey Wildlife Trust, School Lane, Pirbright, Woking, Surrey GU24 0JN, UK.

173. **Gatter, W. (1997):** Birds of Liberia. Aula-Verlag. Wiesbaden. ISBN 3-89104-615-4. 320 pp. (in English).

[colour picture of Little Bee-eater *Merops pusillus* with a nisopteran prey]

Address: not stated

174. **Geissen, H.-P. (1997):** Die Asiatische Keiljungfer *Gomphus flavipes* Charpentier - Larvenfund im Mittelrhein bei Koblenz (*Insecta: Odonata*). *Flora Fauna Rheinland-Pfalz Beiheft* 22: 171-176. (in German with English summary).

[third recent record of (a larval) *Stylurus flavipes* in 1997 in the River Rhine near Koblenz, Rhineland-Palatinate]



Address: Geissen, H.-P., Brunnenstr. 34, D-56075 Koblenz, Germany.

175. **Gladwin, T.W. (1997):** A review of the species of dragonflies (Odonata) recorded as having been observed in Hertfordshire. Transactions of the Hertfordshire Natural History Society 33: 56-61. (in English).

[up to date checklist of the Hertfordshire Odonata; discussion and critical comments on published records; for addition to this paper see: Sage, B. (1998); A Hertfordshire record of the Small Red Damselfly *Ceragrion tenellum* (Villers). J. Br. Dragonfly Soc. 14(2): 60]  
Address: Gladwin, T., Wingletang, 99 Warren Way, Digswell, Welyn, Hertfordshire AL6 0DL, UK.

176. **Goffart, P. (1997):** Compte-rendu de l'excursion dans la Fagne de Spa-Machamps, le samedi 6 septembre 1997. Gomphus 13(4): 102-104. (in French).

[report on a trip to a peat bog near Spa-Machamps, Belgium on 6 September, 1997; records of birds, grasshoppers, butterflies, spiders, and a few common dragonflies species]

Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. e-mail: goffart@ecol.ucl.ac.be.

177. **Goffart, P. (1997):** Recenser les libellules dans le cadre du programme d'Inventaire et Surveillance de la biodiversité (ISB) en Wallonie. Gomphus 13(4): 95-98. (in French).

[short status report on the Odonata-Atlas-Project; see also: <http://www.rw.be/mrw/-dgrne/sibw/>]

Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. e-mail: goffart@ecol.ucl.ac.be.

178. **Griffioen, R.; Uilhoorn, K. (1997):** Herontdekking van een populatie Noordse winterjuffers in de Weerribben. Nieuwsbrief, Mededelingen van de Nederlandse Vereniging voor Libellenstudie 1(3): 4-5. (in Dutch).

[report on the population of *Sympetma paedisca* in the Weerribben-region (The Netherlands)]

Address: Griffioen, Rolf & Karin Uilhoorn, Trekker 82, NL-8447 BZ Heerenveen, The Netherlands.

179. **Hämäläinen, M. (1997):** Phu Kradung - a marvelous dragonfly site. Malango 14: 111-115. (in English).

[report on a survey made in 1996 in the sandstone mountain of Phu Kradung in north-eastern Thailand; brief history of dragonfly records in the region; special evidence is given to *Rhinocypha arguta* Hämäläinen & Divasiri, 1997; checklist of the Odonata known to occur at Phu Kradung]

Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland.

180. **Hibberd, G. (1997):** Red-veined Darter *Sympetrum fonscolombei* (Selys) at Holme Dunes NNR, Norfolk. Atropos 2: 48-49. (in English).

Address: Hibberd, G., The Firs, Broadwater Road, Holme-next-the-Sea, Hunstanton, Norfolk, PE36 6LQ, UK.

181. **Hill, P. (1997):** Migrant Hawker *Aeshna mixta* in Cheshire. Atropos 3: 66. (in English).

[list of the known records in Cheshire after the first discovery of *A. mixta* in 1993]

Address: Hill, P., 1 Clive Cottage, London Road, Allostock, Cheshire WA16 9LT, UK.

182. **Holusa, O. (1997):** Faunistic records from the Slovak Republic: Odonata, Libellulidae. Entomofauna carpathica 9: 60. (in Czech/English).

[second published record of *Libellula fulva* in Slovakia]

Address: Holusa, O., Muzeum Beskyd, prirodovedné oddeleni, Zámecké náměstí 1264, CZ-738 01 Frydek-Mistekl.

183. **Holusa, O. (1997):** Scarce chaser (*Libellula fulva*), a rare species in the Czech Republic and Slovak Republic. Ochrana Přírody 52(8): 240-241. (in Czech with English summary).

[record of two males of *L. fulva* on a pond near the village Brzotin, Slovakia; it is the third record for the Slovak Republic, all of which are documented; figures of the species are provided; photograph of the biotope; another 9 odonata species are recorded from the habitat including *Erythromma viridulum*, *Anax parthenope*, and *Crocothemis erythraea*.]

Address: Holusa, O., Muzeum Beskyd, prirodovedné oddeleni, Zámecké náměstí 1264, CZ-738 01 Frydek-Mistekl.

184. **Holusa, O. (1997):** The dragonflies (Odonata) of the broad surroundings of Lednice in Moravia. Sbornik Přírodovedného klubu v Uh. Hradisti 2: 93-108. (in Czech with English summary).

[In the broad surroundings of Lednice on Moravia (Czech Republic. Moravia, geomorphological unit Dolnomoravský úval, elevation 152-168 m above sea level) 30 species of dragonflies were found, i.e. 41 % of the number of species on the check list according to Teyrovský (1977) for the former Czechoslovakia. Some species were found for the first time: *Aeshna grandis*, *Anax parthenope*, *Somatochlora metallica*, *Orthetrum albistylum*, *Crocothemis erythraea*. The total number of species established in the surroundings of Lednice is 34. According to the zoogeographical characteristics the species diversity is represented by: Holopalaeartic (7 species, i.e. 20,59 %), European-Siberian (7 species, i.e. 20,59 %) and Holomediterranean (7 species, i.e. 20,59 %) elements. 6 European-Mediterranean species form 17,65 %, Holarctic. European and Mediterranean-Afrotropical species occur rarely, each of this group has up to 2 species (i.e. 5,88 %). 1 species represents the Afrotropical-Mediterranean group (i.e. 2,94 %). On this territory stagnicolous species are dominant (76,47 %), reophilous species are represented by 2 species (i.e. 5,88 %) and among euryoecious species 6 species (i.e. 17,65 %) can be found. The superiority of stagnicolous species is a consequence of the character of the investigated territory, the number of reophilic biotopes is limited, therefore the number of reophilous species will not increase in the future. The most diverse localities according to the author's records are small ponds and remain of oxbows of the river Dyje without dense trees vegetation on the shore, which are not very deep and with a thick water vegetation. The highest number of species was found on Pouzdrany pond (together 17 species), Allah I. pond and near pools at Podivín. Few species occurred on big ponds with Typha, Phragmites vegetation zone on shallow places. The difference in the number of species between the author's and Perutik's (1955) records on these ponds is probably the consequence of stagnation of the water column and water vegetation on shallow places. At the time of the research the water reached to the basin of the vertical shore and there were not any shallow places with other water vegetation suitable for the occurrence of dragonflies. Most of species have permanent populations in

this territory, but some species which migrate from the south - *Hemianax ephippiger* and *Crocothemis erythraea*. *H. ephippiger* can reproduce here (PERUTIK 1955). The existence of permanent populations of *C. erythraea* is possible. The species diversity of the surroundings of Lednice is relatively stable as is evident from the comparison of the author's and Perutik's (PERUTIK 1955) records (tab. 2). The absence of some species of the genera *Sympetma* and *Lestes* is probably caused by the low population density of these species. The situation with new species is similar - *Aeshna grandis*, *Somatochlora metallica*. More specimens of *Anax parthenope* were found only in one locality where a permanent population of this species is supposed. So far no research on dragonflies was carried out in this locality and that might be the reason of missing records. *Orthetrum albistylum* was probably penetrated into this territory not long ago, according to the first record by WERNEROVÁ (1958) of its occurrence in Moravia from the lower part of the river Morava. *C. erythraea* specimens were considered migratory." (Author)]

Address: Holusa, O., Muzeum Beskyd, prirodovedné oddelení, Zámecké náměstí 1264, CZ-738 01 Frydek-Místek.

185. **Holusa, O.** (1997): The occurrence of dragonfly *Aeshna subarctica* Walker, 1908 (Odonata: Aeshnidae) in the Hrubý Jeseník Mts. (Czech Republic). *Cas. Slez. Muz. Opava (A)*. 46: 287-288. (in Czech with English summary).

[Altogether 5 males, 1 female and 2 exuviae of *Aeshna subarctica* Walker, 1908 were collected by the author on 8. IX. 1997 at peaty lake Malé mechové jezírko on the moorland Rejvíz (745 m above sea level, Hrubý Jeseník Mrs., north-western Silesia in Czech Republic). One oviposition in *Eriophorum* sp. along the margin of the lake and frequent hunting by *Aeshna subarctica* of tandems of *Sympetrum*-species were observed. There is only one old record of a male in August 1956 in the Rejvíz peat-bog (Teyrovský & Perutik 1958). Thus Rejvíz is the only known locality of *Aeshna subarctica* within the territory of Moravia and Silesia." Note in prove: *A. subarctica* Walker does not occur in (Central) Europe; *A. subarctica* elisabethae Djakonov, 1922 is the correct name for western Palearctic populations. (M. Sch.)]

Address: Holusa, O., Muzeum Beskyd, prirodovedné oddelení, Zámecké náměstí 1264, CZ-738 01 Frydek-Místek.

186. **Hudoklin, A.; Sovinc, A.** (1997): New life for deserted clay pits. *Proteus*, Ljubljana 60(3): 104 - 110. (In Slovene with English summary).

[brief outline on the usual fate of clay and gravel pits; report on the action plan to restore the gravel pits at Zalog near Nova Mesto, Slovenia for nature conservation purposes; *Lestes sponsa*, *L. dryas*, *L. virens*, *Aeshna mixta*, *S. fonscolombi*, *S. striolatum*, and *S. sanguineum* are mentioned]

Address: Sovinc, A., Vodnogospodarski institut, PP 3401, Hajdrihova 28, SI-1115 Ljubljana, Slovenia

187. **Lombardo, P.** (1997): Predation by *Enallagma* nymphs (Odonata, Zygoptera) under different conditions of spatial heterogeneity. *Hydrobiologia* 356: 1-9. (in English).

["Odonate nymphs are sometimes associated with complex leaf macrophytes. Because of their wide prey spectrum, colonization of spatially heterogeneous macrophyte habitats may be due to a higher predation suc-

cess in such a habitat rather than to the presence of particular prey species. Odonate (*Enallagma* sp.) nymph predation success was tested under conditions of high (complex leaf *Ceratophyllum demersum* L. leaf packs) and low (simple leaf *Potamogeton illinoensis* Morong leaf packs) spatial heterogeneity. Prey species included two pulmonate gastropods, an amphipod, and a turbellarian that were common in the natural habitat of *Enallagma*. *Enallagma* significantly reduced the amphipod and the turbellarian populations and the prey assemblage as a whole, but did not have any statistically significant impact on the snail populations, which increased their absolute and relative abundance in the presence of the odonate. Numerical losses by *Enallagma* predation (if any) were not related to macrophyte architecture, suggesting that prey vulnerability to *Enallagma* predation is species-specific rather than habitat-determined. *Enallagma*'s preferential distribution in spatially heterogeneous macrophyte habitats, when occurring, may be due to other factors such as a refuge from fish predation and/or a generally greater prey availability and diversity in complex leaf than in simple leaf macrophyte habitats." (Author) ]

Address: Lombardo, Paola, Dept Biol. Sci. & Water Res. Research Inst., Kent State University, Kent, OH 44242, USA. e-mail: plombard@kent.edu.

188. **Maile, W.** (1997): Bewertung von Fließgewässer-Biozönosen im Bereich von Ausleitungskraftwerken (Schwerpunkt Makrozoobenthos). *Berichte des Lehrstuhls für Wasserbau und Wasserwirtschaft und der Versuchsanstalt für Wasserbau in Oberrach, Oskar v. Miller-Institut der Technischen Universität München* 80: 1-245. (in German with English summary).

["Assessment of biotic communities in running water at diversion-type hydropower plant sites (main emphasis: benthic macroinvertebrates): The biotic community in watercourses is governed by extremely complex interactions between numerous factors. An insufficient flow of water along the river bed of a diversion-type hydropower plant thus has a noticeable effect on the ecology of the river courses concerned. In order to represent the effects of a reduced discharge in the residual flow reaches of hydropower plants, existing relationships between the benthic macroinvertebrates present in a watercourse and the abiotic factors were investigated. The present paper arose from the research project "Residual flow" at the Technische Universität München (Chair of Hydraulic Structures and Water Resources under Dr.-Ing. Theodor Strobl). Extensive investigations of biological, hydraulic, morphological, chemical and physical parameters were carried out at 20 hydroelectric power-plant sites on 10 Bavarian rivers (design capacity of the plants: < 1300 kW). The studies were carried out at representative cross-sections of residual flow reaches and also of virtually unaffected reference reaches. To record the maximum impact, the samplings were carried out during summer weather and at existing discharge levels. The benthic organisms were collected in a quantitative and qualitative manner by means of a Surber-sampler. For the purpose of describing the flow behaviour, flow velocities were measured using a micro-flowmeter with a vane diameter of 9,7 mm, and using FST hemispheres. A horizontoscope was employed to determine the exposition of the water courses to solar radiation during the course of the day (reference point: 21st June). In order to take account of different radiation intensities at different times of the day, the measurements were weighted and processed to the parameter "effective irradiation EI". The total taxa count of the benthic macroinvertebrates ( $Taxa_{ges}$ ) was split (ac-

cording to their dependence on water flow-rate) into the classes R (rheotypical:  $Taxa_{rheo}$ ), L- (limno-typical;  $Taxa_{lim}$ ) and U (ubiquitous or unknown preference;  $Taxa_{au}$ ). From these, the parameters  $Taxa_{rheo \geq 2}$  and  $Taxa_{lim \geq 2}$  were derived which indicate the taxa counts without coincidental collection. The results indicate that the impacts of different discharge levels are far better represented by analyzing cross-sections of the watercourse than by individual sampling areas. For the purpose of describing the near-bed flow characteristics, the hydraulic flowmeter proved to be more suitable than the FST hemispheres. The correlations between the near-bed flow conditions and various parameters of the benthic macroinvertebrates (total and specific density of organisms, diversity, evenness, turnover of species, rhithron feeding-type index) showed very different levels of significance. In many cases these parameters were affected by further factors (mostly by the food situation and the extent of debris transport). The rhithron feeding-type index (RETI) was improved by a modified  $RETI_m$ . The parameters  $Taxa_{ges}$  and  $Taxa_{rheo \geq 2}$  also showed variable correlations with the near-bed flow conditions. The saprobic index (= measure of organic pollution) and the limnotypical variety of species ( $Taxa_{lim}$  and  $Taxa_{lim \geq 2}$ ) were not found to be suitable methods for describing the ecological impacts of power plants. At all rivers studied, the rheotypical variety of species ( $Taxa_{rheo}$ , concerning cross-sections) proved to be a meaningful parameter to quantify the ecological effects of different discharge levels. The value of  $Taxa_{rheo}$  increases with rising near-bed velocities up to a saturation value, which was attained at mean near-bed velocities ( $v_{sohl}$  of 0,15 to 0,30 m/s). As the relationships between  $Taxa_{rheo}$  and  $v_{sohl}$  are mainly determined by the discharge level, these correlations were taken as the basis for a model for determining the ecologically-required minimum discharge level. With the aid of the newly-developed MEFI-model (Munich ecological flow investigations), the individual situations at the different power plant sites can be taken into account. The results indicate that the rheotypical variety of species is limited by the residual discharge level; the limnotypical variety, however, is affected by the high-water events. Studies of fish biology, the ecosystems of gravel banks and the situation in winter round off this thesis. The statements of this report are mainly valid for upper and middle reaches of mountain and low mountain rivers. Further studies are needed to examine whether these results can be extrapolated to other types of stretches of water." (Author)]

Address: Maile, W., Lehrstuhl für Wasserbau und Wasserwirtschaft im Institut für Wasserwesen der Tech. Univ. München, Arcisstr. 21, D-80290 München, Germany.

189. **Malkmus, R. (1997):** Zur Verbreitung der Amphibien, Reptilien und Libellen (Odonata) in den Ostalpen. Nachr. naturwiss. Ver. Aschaffenburg 104: 109-120. [eastern Alps in Austria (Schobergruppe, Kreuzeckgruppe, Reißeckgruppe); *Somatochlora alpestris*, *Aeshna juncea*, *A. caerulea*, *Coenagrion puella*]  
Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany.

190. **Martin, R. (1997):** Contribución al conocimiento de la fauna de libélulas (Insecta: Odonata) del Alto Ampurdán (Gerona). Boln Asoc. esp. ent. 21(3/4): 269-274. (in Spanish with English summary). [checklist of the Odonata of Alto Ampurdán, Gerona, Spain; presentation of data obtained during 1993 - 96; compilation of data from literature]

Address: Martin, R., Avda Martí Pujol 250, 3' 4a, ES-08911 Badalona, Barcelona, Spain.

191. **Martin-Casacuberta, R.M. (1997):** Presencia de *Coenagrion hastulatum* (Charpentier, 1825) en la Península Ibérica (Odonata: Coenagrionidae). Boln Asoc. esp. ent. 21(1/2): 101. (in Spanish).

[discovery of *C. hastulatum* on the southern range of its distribution in the Pyreneans of Gerona, Spain (UTM 31TDH00); the record is considered the 5th on the Iberian peninsula; additional information on the community of Odonata of the locality are given]

Address: Martin-Casacuberta, R.M., Avda Martí Pujol 250, 3' 4a, ES-08911 Badalona, Barcelona, Spain.

192. **Muzón, J.; von Ellenrieder, N. (1997):** Description of the last instar *Sympetrum villosum* Ris (Odonata: Libellulidae). Neotropica 43(109/110): 43-45. (in English with Spanish summary).

["The last larval instar of *S. villosum* Ris is described for the first time, based on south Chilean specimens. A brief diagnosis, including a comparison with its allies, is given. *S. villosum* can be distinguished from *S. gilvum*, the geographically closest species of the genus, by the presence of lateral spines in abdominal segments VIII and IX and minor differences on the number of setae of prementum and color pattern." (Author)]

Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina.

193. **Muzón, J.; Ellenrieder, N. von (1997):** Estadios larvales de Odonata de la Patagonia. 1. Descripción de *Aeshna variegata* (Odonata: Aeshnidae). Revta soc. ent. argent. 56: 143-146. (in Spanish with English summary).

[Larvae of *A. variegata* (reared from specimens from Patagonia) are described and compared with larvae of *A. diffinis*, *A. absoluta*, *A. bonariensis* and *A. elsia*; in addition the specific status of the larva of *A. peralta* is reviewed and its morphology is compared with that of *A. variegata*]

Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina.

194. **Muzón, J. (1997):** Odonata (Insecta) from Patagonia: species richness and distributional patterns. Biogeographica 73(3): 123-133. (in English with French summary).

["The order Odonata is represented in Patagonia by at least 35 species, almost 50% of which are endemics. Based on its distribution they can be divided into two groups: subantarctic and widespread neotropical. Patagonia exhibits two main biomes: temperate forest, which shows the highest diversity and species richness, and the large shrub steppe. The steppe displays remarkable levels of species richness at two localities, Choele Choele and Somuncurá plateau, which presumably represent an ecotonal zone and a relict of pre-tertiary subtropical biota respectively. The Andean mountains do not seem to represent an effective geographic barrier for Odonata; however these mountains strongly influence precipitation patterns which, in turn, affect the distribution of Odonata." (Author)]

Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina.

195. **Muzón, J. (1997):** Redescrípción de *Lestes auritus* y *L. paulistus* y descripción del último estadio larval de *L. undulatus* (Odonata: Lestidae). Revta soc. ent. argent. 56: 159-166. (in Spanish with English summary).



[Rediscription of the male *Lestes auritus* and designation of the specimen as lectotypus; description of female *L. auritus*, *L. paulistus*, and the last larval instar of *L. undulatus*; *L. auritus* and *L. paulistus* are recorded for the first time in Argentina and Uruguay]

Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina.

196. **Ott, J. (1997):** Erster Bodenständigkeitsnachweis der Südlichen Mosaikjungfer - *Aeshna affinis* Vander Linden, 1823 - (Insecta: Odonata) für Rheinland-Pfalz. *Fauna Flora Rheinland-Pfalz* 8: 863-871. (in German with Engl. summary).

[development of the Mediterranean *A. affinis* in Rheinland-Palatinate (Germany)]

Address: Ott, J., Am Moosberg 10, D-67705 Stelzenberg, Germany.

197. **Parr, A. (1997):** Migrant dragonflies in 1996. *Atropos* 2: 15-17. (in English).

[*Anax parthenope*, *Anax ephippiger*, *Sympetrum flaveolum*, and others]

Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK.

198. **Parr, A. (1997):** Migrant dragonflies in 1997. *Atropos* 4: 69-72. (in English).

[report on the immigrants and (possible) range extensions of British species are compiled for 1997; the following species are treated: *Aeshna mixta*, *A. isosceles*, *Anax parthenope*, *Crocothemis erythraea*, *Sympetrum striolatum*, *S. fonscolombei*, *S. flaveolum*, *S. sanguineum*, and *S. danae*.]

Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK.

199. **Parr, A. (1997):** Migrant dragonfly field guide: a request for help. *Atropos* 3: 51-52. (in English).

[request for good colour pictures of possible migrant dragonflies in Britain]

Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK.

200. **Parr, A. (1997):** The 1996 Red-veined Darter *Sympetrum fonscolombei* (Selys) influx into Britain. *Atropos* 2: 44-46. (in English).

[detailed presentation with phenological diagram of observation dates and map with localities of observation]

Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK.

201. **Phillips, J. (1997):** Lesser Emperor Dragonfly *Anax parthenope* (Selys) in Gloucestershire; the first British record. *Atropos* 2: 40-41. (in English).

Address: Phillips, J., Yorkleigh Cottage, Pope's Hill, Newnham-on-Severn, Gloucester GL1 4LD.

202. **Raab, R.; Chwala, E. (1997):** Rote Liste ausgewählter Tiergruppen Niederösterreichs - Libellen (Insecta: Odonata), 1. Fass. 1995. Hrsg.: Amt der Niederösterreichischen Landesregierung, Abteilung Naturschutz, Wien. ISBN 3-901542-07-8. 91 pp. (in German).

[red list of the endangered Odonata of the federal state 'Niederösterreich' (NÖ), Austria; dragonflies as bioindicators; history of dragonfly research in NÖ; altitudinal distribution of Odonata in NÖ; checklist; red list - categories and criteria; species wise treatment according to the categories of the red list: distribution, recent situation, habitat, risk, action plan, literature, in most cases colour pho-

tographs and distribution map of the species; extensive bibliography of the NÖ Odonata; index; this booklet is a very sound fundament for dragonfly research and conservation in Austria]

Source of supply: Amt der NÖ Landesregierung, Abteilung Naturschutz, Landhausplatz 1; Haus 16, A-3109 St. Pölten, Austria. öS 120,-; approx. 10 US\$.

203. **Reeve, K.; Reeve, P. (1997):** County focus - Odonata in Warwickshire (V.C.68). *Atropos* 3: 22-28. (in English).

[commented checklist of the Warwickshire Odonata (10 Zygoptera, 15 Anisoptera including the new regional discovery *Gomphus vulgatissimus*); some remarks on the factors responsible for the present distribution of Odonata in the region as loss of ancient fish and stock ponds, runoff from urban areas, rarity of acid water habitats etc.]

Address: Reeve, P., The Outspan, Leamington Hastings, Near Rugby CV23 8DZ, UK.

204. **Reinhart, U.; Orendt, C. (1997):** 3.3.8 Waldbäche in der Dübener Heide. In: Feldmann, R., K. Henle, H. Auge, J. Flachowsky, S. Klotz & R. Krönert (Eds.): *Regeneration und nachhaltige Landnutzung. Konzepte für belastete Regionen*. Springer. ISBN 3-540-62876-2. 130-136. (in German).

[survey of the macroinvertebrates of 6 brooks in the Dübener Heide-region (Sachsen, Sachsen-Anhalt; Germany); relationships between water chemistry and macrozobenthos incl. *Cordulegaster boltonii* are outlined]

Address: not stated.

205. **Röske, W.; Stephan, U. (1997):** EU-Projekt genehmigt! Naturschutzinformation der Schutzgemeinschaft Libellen in Baden-Württemberg 1: 1. (in German).

[Report on a conservation action plan for *Coenagrion mercuriale* in Baden-Württemberg, Germany, supported for the period of 1997-2000 by the European Community.]

Address: Röske, W., Kandelstr. 26, D-79106 Freiburg, Germany.

206. **Rolff, J. (1997):** Better hosts dive: Detachment of ectoparasitic water mites (Hydrachnellae: Arrenuridae) from damselflies (Odonata: Coenagrionidae). *Jour. insect behav.* 10(6): 819-827. (in English).

["... In this paper I present experimental data for the detachment rate of water mite larvae (*Arrenurus cuspidator*) from different host species, *Coenagrion hastulatum* and *C. puella*, in relation to the host's oviposition behaviour. ... It was found that mite larvae detach at a significant higher ratio from hosts with submerged oviposition (*C. hastulatum*). Experimental tests showed that this is not a species-species effect. It is caused mainly by the oviposition behaviour. The results are discussed in the light of different oviposition systems in damselflies." (Author). study site: 15 km east of Braunschweig, Lower-Saxony, Germany, 52°18'20" N, 10°46'20"E.]

Address: Rolff, J., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany.

207. **Sato, M.; Azuma, A. (1997):** The flight performance of a damselfly *Ceriagrion melanurum* Selys. *Jour. exp. biol.* 200: 1765-1779. (in English).

["The local circulation method was applied to the free forward flight of the damselfly *Ceriagrion melanurum* Selys. The kinematic data used in the calculations were obtained by analyzing video-taped images of damselflies in free flight in a transparent container. The inclination of the

stroke plane was smaller and the flapping amplitude was larger than those of dragonflies reported in other studies on odonate flight. However, the phase shift between the fore- and hindwings agreed with none of the previously reported patterns for damselflies: the forewings lead the hindwings by approximately a quarter-period. The calculated forces were within the expected range of error. The muscle-mass-specific power was between 40 and 80 W kg<sup>-1</sup>. The vorticity distribution of trailing and shed vortices in the wake was also analyzed. Strong trailing vortices were observed at the wing tips, whereas shed vortices were concentrated near the wing root as the stroke switched direction." (Authors)]

Address: Machiko Sato, Tokyo Institute of Polytechnics, 1583 Iiyama, Atsugi 243-02, Japan;- Akira Azuma University of Tokyo, 37-3 Miyako-cho, Saiwai-ku, Kawasaki 210, Japan.

208. **Schrack, M. (1997):** Moorwälder und Waldmoore am Pechfluß in der Laußnitzer Heide. Veröff. Mus. Westlausitz Kamenz Sonderheft: 112 pp. (in German).

[monograph on the forests and peatbogs of the Laußnitzer Heide (Sachsen, Germany); geology, hydrology, vegetation, mammals, birds, reptils, amphibs, dragonflies, other insects, action plan for conservation; numerous good maps and colour pictures including some dragonflies; in the period 1994-1994, 29 species of Odonata were recorded, including *Anax ephippiger*]

Address: Schrack, M., Eugen-Hoffmann-Str. 7, D-01219 Dresden, Germany.

209. **Spuris, Z. (1997):** Some observations on the water insect fauna in Latvia 1996 (Insecta, Odonata, Trichoptera, Heteroptera). Acta hydroentomologica latvica 4: 21-28. (in Latvian with English summary).

[23 species of Odonata including *Ophiogomphus ceclia*, *Aeshna viridis*, and *Sympetma paedisca* are recorded from several localities in Latvia;]

Address: Spuris, Z., Miera iela 19-6, LV-2169 Salaspils, Latvija.

210. **Stoks, R. (1997):** Verslag van de excursie naar het Groot Schietveld de Brecht op 25 mei 1997. Gomphus 13(4): 99-101. (in Dutch).

[report on a trip to the "Groot Schietveld" near Brecht, Belgium on 25 May, 1997; records of birds, plants, reptiles, butterflies, and dragonflies; among these, the records of *Coenagrion lunulatum* and *Leucorrhinia rubicunda* are of some interest]

Address: Stoks, R., Evolutionary Biology Group, Department of Biology, University of Antwerpen (RUCA), B-2020 Antwerpen, Belgium.

211. **Sutibut, S. (1997):** 'Malaeng por' wating for beginner. You don't even need to leave town to find these colourful creatures. Malangpo 14: 129. (in English).

[contribution in a popular style to motivate people to watch dragonflies near around their homes; the Thai names of some of the very common species as *Crocothemis servillia*, *Neurobasis chinensis*, and *Tholymis tillarga* are dealt with; published in the Newspaper Bangkok Post, Outlook section, Sept. 11, 1997]

Address: not stated.

212. **Thapa, V.K. (1997):** An inventory of Nepal's insects. Volume I (Protura-Odonata). IUCN Nepal Biodiversity Publication Series 1: 98 pp. (in English).

[The Odonata are dealt with on pages 67-88. The aim of the book is "to generate proper knowledge and infor-

mation on insects in order to enable the government and people of Nepal to provide protection to Nepalese insects". "This work is aimed to provide a comprehensive record of insects occurring in Nepal". 17 insect orders are treated as commented checklists, the latter mainly based on published records. The data are organized as follows: name of species, localities in Nepal and surrounding countries, altitudinal distribution, abundance in Nepal, flight season. The chapter closes with selected references on Nepalese dragonflies, but the list of references lacks e.g. in the very important publication of 'Vick, G.S. (1989): List of the dragonflies from Nepal with a summary of their altitudinal distribution (Odonata). Opusc. zool. flumin. 43:1-21'. It is also very regrettable that some of the newly described species of Nepal as *Macromia sombui* Vick, 1988 are missing in the checklist. Altogether V.K. Thapa considers 147 species autochthonous in Nepal while Vick lists 172 species for Nepal; Clausnitzer & Wesche added another three species to this list (Opusc. zool. flum. 147, 1996). There is also a remarkable discrepancy between the two lists. Of course everybody interested in Nepalese Odonata should use the publication of G.S. Vick as fundament of odonatological research. (M. Sch.)]

Source of supply: IUCN Nepal, P.O. Box 3923, Kathmandu, Nepal, 15 US \$.

213. **Theischinger, G. (1997):** A new species of *Austrosticta* Tillyard from Australia (Insecta: Odonata: Zygoptera: Isostictidae). Linzer biol. Beitr. 29(2): 807-810. (in English).

[The description of *Austrosticta frater* sp. n. is based on 2 males from Queensland, Australia, and compared with *A. fieldi* Tillyard and *A. soror* Sjöstedt.]

Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia.

214. **Theischinger, G. (1997):** The *Pseudagrion ignifer* complex from Australia (Odonata: Zygoptera: Coenagrionidae). Linzer biol. Beitr. 29(2): 799-805. (in English).

[*Pseudagrion ignifer* is found to be complex. It includes three morphologically distinct groups of populations. These groups of populations are considered as two species with one of them comprising two subspecies. One species, *Pseudagrion lucifer*, and one subspecies, *Pseudagrion ignifer aureum*, are described as new." (Author)]

Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia.

215. **Thomas, R. (1997):** Lesser Emperor Dragonfly *Anax parthenope* (Selys) in Cambridgeshire. The third British record. Atropos 3: 55-56. (in English).

[record of *A. parthenope* on 21 July 1997 on a small lake in the Cambridge Science Park, UK]

Address: Thomas, R., 59 Coolidge Gardens, Cottenham, Cambridge CB4 4RQ, UK.

216. **Wakeling, J.M.; Ellington, C.P. (1997):** Dragonfly flight. 1. Gliding flight and steady state aerodynamic forces. J. exp. biol. 200(3): 543-556. (in English).

[*"The free gliding flight of the dragonfly *Sympetrum sanguineum* was filmed in a large flight enclosure. Reconstruction of the glide paths showed the flights to involve accelerations. Where the acceleration could be considered constant, the lift and drag forces acting on the dragonfly were calculated. The maximum lift coefficient (C<sub>L</sub>) recorded from these glides was 0.93; however, this is not necessarily the maximum possible from the wings. Lift and drag forces were additionally measured from isolated*

wings and bodies of *S. sanguineum* and the damselfly *Calopteryx splendens* in a steady air flow at Reynolds numbers of 700-2400 for the wings and 2500-15 000 for the bodies. The maximum lift coefficients ( $C_{L, max}$ ) were 1.07 for *S. sanguineum* and 1.15 for *C. splendens*, which are greater than those recorded for all other insects except the locust. The drag coefficient at zero angle of attack ranged between 0.07 and 0.14, being little more than the *Blassius* value predicted for flat plates. Dragonfly wings thus show exceptional steady-state aerodynamic properties in comparison with the wings of other insects. A resolved-flow model was tested on the body drag data. The parasite drag is significantly affected by viscous forces normal to the longitudinal body axis. The linear dependence of drag on velocity must thus be included in models to predict the parasite drag on dragonflies at non-zero body angles." (Authors)]

Address: Wakeling, J.M., Dept Zoology, Univ. Cambridge, Downing Street, Cambridge, CB2 3EJ, UK.

217. **Wakeling, J.M.; Ellington, C.P. (1997):** Dragonfly flight. 2. Velocities, accelerations and kinematics of flapping flight. *J. exp. biol.* 200(3): 557-582. (in English).

["The free flapping flight of the dragonfly *Sympetrum sanguineum* and the damselfly *Calopteryx splendens* was filmed in a large flight enclosure at 3000 frames s<sup>-1</sup>. The wingtip kinematics are described for these flights. Despite the two species being similar in size, the damselfly flew with wingbeat frequencies half those of the dragonfly. The damselfly could perform a clap and fling, and the proximity to which the wings approached each other during this manoeuvre correlated with the total force produced during the wingstroke. The dragonfly beat its wings with a set inclination of the stroke planes with respect to the longitudinal body axis; the damselfly, in contrast, showed a greater variation in this angle. Both species aligned their stroke planes to be nearly normal to the direction of the resultant force, the thrust. In order to achieve this, the dragonfly body alignment correlated with the direction of thrust. However, the damselfly body alignment was independent of the thrust direction. Velocities and accelerations were greater for the dragonfly than for the damselfly. However, non-dimensional velocities and accelerations normalised by the wingbeat periods were greater for the damselfly." (Authors)]

Address: Wakeling, J.M., Dept Zoology, Univ. Cambridge, Downing Street, Cambridge, CB2 3EJ, UK

218. **Wakeling, J.M.; Ellington, C.P. (1997):** Dragonfly flight. 3. Lift and power requirements. *J. exp. biol.* 200(3): 583-600. (in English).

["A mean lift coefficient quasi-steady analysis has been applied to the free flight of the dragonfly *Sympetrum sanguineum* and the damselfly *Calopteryx splendens*. The analysis accommodated the yaw and accelerations involved in free flight. For any given velocity or resultant aerodynamic force (thrust), the damselfly mean lift coefficient was higher than that for the dragonfly because of its clap and fling. For both species, the maximum mean lift coefficient  $C_L$  was higher than the steady  $C_{L, max}$ . Both species aligned their strokes planes to be nearly normal to the thrust, a strategy that reduces the  $C_L$  required for flight and which is different from the previously published hovering and slow dragonfly flights with stroke planes steeply inclined to the horizontal. Owing to the relatively low costs of accelerating the wing, the aerodynamic power required for flight represents the mechanical power output from the muscles. The maximum muscle mass-specific power was estimated at 156 and 166Wkg<sup>-1</sup> for *S.*

*sanguineum* and *C. splendens*, respectively. Measurements of heat production immediately after flight resulted in mechanical efficiency estimates of 13 % and 9 % for *S. sanguineum* and *C. splendens* muscles, respectively." (Authors)]

Address: Wakeling, J.M., Dept Zoology, Univ. Cambridge, Downing Street, Cambridge, CB2 3EJ, UK.

219. **Wilson, K. (1997):** Reports from Coastal stations: Gibraltar Point NNR, Lincolnshire. *Atropos* 2: 78-79. (in English).

[14 species were recorded in 1996; most of them are commented in short with special evidence on *Sympetrum flaveolum*]

Address: not stated.

220. **Xylander, W.; Stephan, R. (1997):** Zur Generationsfolge von *Sympetrum fonscolombei* und *Ischnura pumilio* (Odonata) in einem Braunkohletagebauegebiet in der Oberlausitz (Ostsachsen). *Verh. dt. zool. Ges.* 90(1): 401. (in German).

[generation sequence of *S. fonscolombei* and *I. pumilio* in a brown coal mining site in Upper Lusatia (eastern Saxonia, Germany); the observations seem to indicate that the 2 species have two generations per annum]

Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany.

221. **Zahn, A, Schirlitz, F.; Schirlitz, T. (1997):** Galloways als Landschaftspfleger. *Deutsches Galloway-Journal* 6: 109-111. (in German).

[Bavaria (Germany); assessment of grazing impact of Galloway cattle on vegetation and fauna; Galloways seem to have a positive effect on the dragonfly fauna; trampling and grazing of Galloways caused some gentle slopes in a small, heavily vegetated book which enabled *Orthetrum brunneum* and *Ischnura pumilio* to oviposit]

Address: Zahn, A., Hermann-Löns-Str. 4, D-84478 Waldkraiburg, Germany.

222. **Zollhöfer, J.M. (1997):** Quellen, die unbekanntes Biotop im Schweizer Jura und Mittelland. *Bristol-Schriftenreihe* 6. ISBN 3-905209-05-5. 150 pp. (in German).

[very detailed study of the fauna of springs in two regions in Switzerland; *Cordulegaster boltonii* and *Thecagaster bidentata* were used as bioindicators to assess the ecological situation of springs]

Source of supply: Internationale Buchhandlung, CH-9053 Teufen, Switzerland.

## 1998

223. **Abbott, J.C.; Stewart, K.W. (1998):** Odonata of the south central Nearctic region, including northeastern Mexico. *Entomological News* 109(3): 201-212. (in English).

[There has not been a concerted effort to document the extent of biodiversity, distribution and geographic affinities of the Odonata of the south central United States and northeastern Mexico. The area is an important boundary for some species representing eastern Nearctic and subtropical faunas, and a mixing zone or dispersal corridor for other species. ... Here we list 228 species for this region (196 in Texas), indicate their distributions by biotic province, and discuss the regional biogeography and importance of rare species.]

Address: Abbott J.C., Univ. N. Texas, Dept. Biol. Sci., Denton; TX 76203, USA.



224. **Anderson, C.; Wilson, R. (1998):** Minsmere RSPB reserve, Suffolk. *Atropos* 4: 59-60. (in English).  
[16 Odonata species were recorded in 1997, some of which are discussed very briefly]  
Address: not stated.
225. **Andres, J.A.; Cordero, A. (1998):** Effects of water mites on the damselfly *Ceriagrion tenellum*. *Ecological Entomology* 23(2): 103-109. (in English).  
[1. Water mite parasitism is expected to have an important effect on damselfly survivorship and reproductive success, because mites drain considerable amounts of body fluids from their hosts. This study tests the effect of water mite parasitism in a marked population of the damselfly *Ceriagrion tenellum* during 1995 (individuals marked as mature adults) and 1996 (individuals marked as teneral). ... 5. These results indicate that water mite parasitism does not reduce damselfly survivorship, but it could reduce male mating success in some circumstances. Further long-term studies are needed, especially in populations with a lower incidence of parasitism.]  
Address: Andres, J.A., Univ. Vigo; Dept. Ecol. and Biol. Anim., Euet Forestal, Campus Univ.; Pontevedra 36005; Spain.
226. **Andress, R. (1998):** Description of the larva of *Petalura ingentissima* Tillyard, 1907 (Anisoptera: Petaluridae). *Odonatologica* 27(3): 353-359. (in English).  
[description of a female exuviae from Australia, Queensland, Bluewater Range, 45 km WNW of Townsville]  
Address: Andress, R., 38 Capel Close, Whetstone, London, N20 0QU, United Kingdom.
227. **Anholt B.R.; Werner, E.E. (1998):** Predictable changes in predation mortality as a consequence of changes in food availability and predation risk. *Evolutionary Ecology* 12(6): 729-738. (in English).  
["Theory predicts that animals will have lower activity levels when either the risk of predation is high or the availability of resources in the environment is high. ... In a factorial experiment, we tested whether predation mortality of larval wood frogs, *Rana sylvatica*, caused by a single larval dragonfly, *Anax junius*, was affected by the presence of additional caged predators and elevated resource levels. Observations were consistent with predictions."]  
Address: Anholt, B.R.; Univ. Victoria, Dept. Biol., POB 3020, Victoria, BC V8W 3N5, Canada.
228. **Arnquist, G.; Johansson, F. (1998):** Ontogenetic reaction norms of predator-induced defensive morphology in dragonfly larvae. *Ecology* 79(6): 1847-1858. (in English).  
["The study of phenotypic plasticity, one of the most important mechanisms of phenotypic adaptation, is by tradition focused on differences in ontogenetically static phenotypic expression in different environments. Ontogenetic reaction norms, in contrast, describe how phenotypes unfold during growth in different environments. We studied the ontogenetic reaction norms of the morphological shape of a series of defensive abdominal spines in dragonfly larvae, both in the laboratory and in a number of natural populations. In a laboratory rearing experiment, we demonstrated that these spines grew more solid and elongated when waterborne environmental cues of fish predators were present: this is evidence of phenotypic plasticity in defensive spine morphology. The ontogenetic reaction norms of defensive spines were also found to differ in natural populations with and without fish. A detailed analysis of the growth trajectories showed that this differentiation
- was primarily due to ontogenetic acceleration in environments with fish, leading to relatively exaggerated spine shape in these environments. However, while the ontogenetic trajectories of shape in some spines diverged at the onset of ontogeny in the two environments, those of others remained parallel until a given phase of ontogeny. Hence, the timing of the developmental divergence of these phenotypically integrated traits differed, suggesting differences in the underlying regulatory mechanisms. Our results illustrate that a conceptual integration of environmental and ontogenetic approaches to the study of phenotypic differentiation can significantly promote our understanding of the ecology and evolution of adaptive phenotypic plasticity." (Authors)]  
Address: Johansson, F., Dept Animal Ecology, University of Umea, S-90187 Umea, Sweden.
229. **Asahina, S. (1998):** Further notes on Odonata from Northern Vietnam 1. *Cordulegasteridae*. *Bulletin of the National Science Museum (Series A, Zoology)* 24(1): 11-16. (in English).  
[On the basis of the collection made by the expeditions by the National Science Museum in 1997, collecting records are given for three northern Vietnamese dragonflies of the family Cordulegasteridae, *Anotogaster klossi* Fraser, *Chlorogomphus auratus* Martin and *Ch. takakuwai* Karube.]  
Address: Asahina, S., Takadanobaba 4-4-24, Shinjuku-ku, Tokyo 169-0075, Japan.
230. **Bal, B. (1998):** Prospections odonatologiques en Haute-Savoie. Bilan du debut de l'année 1996. *Symptetrum* 11: 3-5. (in French).  
[new records or confirmations for the Departement Haute-Savoie of e.g. the following species: *Brachytron pratense*, *Ophiogomphus cecilia*, *Boyeria irene*, *Aeshna affinis*, *Coenagrion mercuriale*]  
Address: Bal, B., APEGE, Cité Administrative, F-74040 Annecy cedex, France.
231. **Bal, D. (1998):** De rol van libellen in het Nederlandse natuurbeleid. *Brachytron* 2(1): 10-15. (in Dutch).  
[The role of dragonflies in the Dutch nature policy: "The Dutch nature policy is based on general nature conservation in defined areas and concrete policy for 'target-species'. Those target-species are selected with the criteria 'international importance of the Dutch population', 'negative trend in occurrence' and 'rarity'. In 1995 the first target-species list of dragonflies was published. Because of the extended information received through the Atlas-project, it was possible to make a Red List of endangered dragonflies in the The Netherlands. This list will be published in 1998. With this information a new target-species list will be made, which probably will be published in 1999. In this article those three lists are given and compared. A discussion is started in what way the target species can be used in the (practical) policy."]  
Address: Bal, D., Informatie- en KennisCentrum Natuurbeheer van het Ministerie van Landbouw, Natuurbeheer en Visserij, Postbus 30, NL-6700 AA Wageningen, The Netherlands. E-mail: d.bal@ikcn.agro.nl.
232. **Barthold, K.; Cölln, K. (1998):** Untersuchungen zur Libellenfauna ausgewählter Stillgewässer in der Verbandsgemeinde Obere Kyll (Landkreis Daun, Eifel). *Dendrocopos* 25: 110-140. (in German with short English summary).  
[survey of the dragonfly fauna of 7 water bodies in the Eifel-region (northern low mountain range in Rhineland-

Palatinate, Germany); 23 species are reported, and discussed species-wise with reference to their habitat choice (mostly compiled from the literature) and the regional rarity of the species; the most interesting species are *Coenagrion hastulatum*, *Erythromma najas*, *Aeshna juncea* and *Leucorrhinia dubia*]

Address: Barthold, Katja, Zoologisches Institut, Universität Köln, Albertus-Magnus-Platz, D-50923 Köln, Germany.

**233. Bechly, G.; Nel, A.; Martínez-Delclòs, X.; Fleck, G. (1998):** Four new dragonflies from the Upper Jurassic of Germany and the Lower Cretaceous of Mongolia (Anisoptera: Hemeroscopidae, Sonidae, and Proterogomphidae fam. nov.). *Odonatologica* 27(2): 149-187. (in English).

["*Prohemeroscopus jurassicus* gen. et sp. nov. and *P. kuehnepfeli* sp. nov. are described as first Hemeroscopidae from the Upper Jurassic of Germany (Solnhofen Lithographic Limestone). The monophyly of Hemeroscopidae is discussed and preliminarily advocated. The Mesozoic Hemeroscopidae are recognized as potential stem-group representatives of extant Chlorogomphoidea within Anisoptera - Cavilabiata. The status of the alleged hemeroscopid larvae is discussed and they are preliminarily transferred as new (unnamed) species to Sonidae. The family Sonidae is restricted to the referring larvae. The adult fossil dragonflies from the Lower Cretaceous of Mongolia that were previously attributed to *Sona nectes* (Sonidae) are ... classified as a new taxon, *Proterogomphus krauseorum* gen. et sp. nov. (Proterogomphidae fam. nov.) within the monophylum Gomphides, as sister-group of Hageniidae. A new species, *Proterogomphus renatae* sp. nov. is described from the Upper Jurassic of Germany. [...] A numerical cladistic analysis of Anisoptera could neither convincingly resolve the phylogenetic relationships within Hemeroscopidae, nor the phylogenetic positions of Gomphides and Proterogomphidae fam. nov., because of their lack of wing venational apomorphies, but otherwise confirmed the phylogenetic reclassification of dragonflies by BECHLY (1996, *Pelalura* [Special Vol.] 2: 342-402)." (Authors)]

Address: Bechly, G., Institut und Museum für Geologie und Paläontologie, Geowissenschaftliche Fakultät der Eberhard-Karls-Universität, Sigwartstr. 10, D-72076 Tübingen, Germany.

**234. Bechly, G. (1998):** New fossil damselflies from Baltic amber with description of a new species, a redescription of *Litheuphaea carpenteri* Fraser, and a discussion on the phylogeny of Epallagidae (Zygoptera: Caloptera). *International Journal of Odonatology* 1(1): 33-63. (in English).

["*Litheuphaea ludwigi* sp. n. is described as first representative of Epallagidae from Baltic amber. The holotype of *Litheuphaea carpenteri* Fraser, 1955 is redescribed, the phylogenetic position of all fossil Epallagidae is discussed, and a new phylogenetic classification is proposed. The authorship of Selys (1853) for the family-group name Euphaeidae is rejected, since the "legion Euphaea" proposed by Selys is neither a noun in the nominative plural, nor ending in a latinized suffix. Consequently, the correct family name must be Epallagidae Needham, 1903, since Euphaeidae were first established by Jacobson & Bianchi (1905) and thus have to be considered as a junior subjective synonym. Similarly, all the other "legions" proposed by Selys are rejected as available family-group taxa, so that the next available family-group name has to be used, e.g. *Heliocharitidae* Tillyard & Fraser,

1939 instead of *Dicteriadidae* Montgomery, 1959 (nec Selys, 1853). *Parazacallitinae* Nel, 1988 is considered as junior subjective synonym of *Eodichromatinae* Cockerell, 1923 which is regarded as an extinct subfamily of Epallagidae, comprising the sister-tribes *Litheuphaeini* Bechly, 1996 and *Eodichromatini* stat. nov. for the sister-genera *Eodichroma* Cockerell, 1923 and *Parazacallites* Nel, 1988. *Zacallitidae* Cockerell, 1928 is restored as a distinct family and preliminarily regarded as the sister-group of Epallagidae. A unique fossil odonate is briefly described, which represents a damselfly in Baltic amber that is just emerging from the exuvia (probably *Platystictidae* or *Megapodagrionidae*). An annotated new catalogue of all known odonates in amber is provided, including 46 specimens from Lebanon, Dominican, Baltic and Saxonian amber, of which 3 specimens are adult Anisoptera and 5 specimens are exuviae. A lectotype for *Plutyenemis? antiqua* (Pictet & Hagen, 1856) is designated and illustrated." (Author)]

Address: Bechly, G., Institut und Museum für Geologie und Paläontologie, Geowissenschaftliche Fakultät der Eberhard-Karls-Universität, Sigwartstr. 10, D-72076 Tübingen, Germany.

**235. Beckemeyer, R. (1998):** 1998 Dragonfly Society of the Americas Annual collecting meeting in Valentine, Nebraska. *Argia* 10(1): 4-5. (in English).

Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA

**236. Beckemeyer, R.; Hummel, S. (1998):** Could Valentine, Nebraska be Odonata heaven? The 1998 DSA annual meeting. *Argia* 10(3): 4-6. (in English).

[report on the 1998 annual meeting of DSA. In the framework of the meeting 76 species were caught including 7 new for Nebraska, USA.]

Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA.

**237. Bernard, R. (1998):** The present knowledge about the distribution and ecology of *Nehalennia speciosa* (Charpentier, 1840) (Odonata: Coenagrionidae) in Poland. *Roczniki naukowe Polskiego towarzystwa ochrony przyrody "Salamandra"* 2: 67-93. (in Polish with extensive English summary).

["Literature data on *Nehalennia speciosa* (Charpentier) in Poland are summarized and reviewed. New localities are described with special emphasis to the zone inhabited by the species. Distribution in Poland and Europe is given and characterized and its strong regressive tendencies are stressed. The habitat of *N. speciosa* in central Europe is analysed and its probably the most important (critical) conditions are suggested with focus on vegetation. The extreme stenotopy and strong relations to preferred vegetation are emphasized" (Author)]

Address: Bernard, R., Zakład Zoologii Ogólnej, Uniwersytet im. A. Mickiewicza, ul. Fredry 10, PL-61-702 Poznań, Poland; e-mail: rbernard@main.amu.edu.pl.

**238. Beukema, J.J. (1998):** Wat is de functie van de monstrenen van het achter lichtje door mannetjes van beekjuffers (Calopteryx)? *Brachytron* 2(1): 18-22. (in Dutch).

[The possible functions of the tail-tip display in male *Calopteryx*: "Suggested functions of the "tail-tip" or "water" display in males of the European species of *Calopteryx* are discussed, using literature data on various species and own observations on *C. haemorrhoidalis*. Courting males show the light-coloured ventral side of the last

three abdominal segments ... in a conspicuous way by curling up the tip of the abdomen and spreading the dark-coloured wings as a contrasting background while hovering just above or floating on the water surface. This display is shown in the centre of the territory, both during initial courtship and after copulation. As a signal to the female, the display might indicate both the ownership and location of an oviposition site as well as its quality... Moreover, it might give some indication of the quality of the male. In the present paper, it is argued that indication of the exact oviposition site appears to be the most important among these possible functions."]

Address: Beukema, J.J., Linieweg 19, NL-1783 BA Den Helder, The Netherlands, E-mail: jsr@nioz.nl.

239. **Beynon, T.G. (1998):** *Leucorrhinia dubia* (Vander Linden) at Chartley Moss NNR, Staffordshire, in 1997: a postscript. *J. Br. Dragonfly Soc.* 14(2): 61-62. (in English).

[comments on phenology, emergence, maiden flight, copulation, oviposition, and predation]

Address: Beynon, T.G.; 34 Church Lane, Checkley, Stoke-on-Trent ST10 4NJ, United Kingdom.

240. **Biggs, K. (1998):** More on rearing dragonflies in ponds. *Argia* 10(3): 17. (in English).

[listing of Odonata in a pond]

Address: not stated.

241. **Borcherding, J.; Barthold, K.; Becker, J. (1998):** Entwicklungsnachweis für *Brachytron pratense*, *Epitheca bimaculata*, *Libellula fulva* und *L. quadrimaculata* (Odonata) in der Stopfenreuther Donauaue (Niederösterreich). *Lauterbornia* 33: 13-18. (in German with English summary).

[In May 1997 14 Odonata species were recorded from the Roßkopf oxbow lake in the Danube floodplains near Stopfenreuth (Austria). The records of many exuviae of *B. pratense*, *E. bimaculata*, *L. fulva*, and *L. quadrimaculata* prove the autochthony of this species.]

Address: Borcherding, J., Zool. Institut, Universität Köln, 50923 Köln, Germany.

242. **Brinkmann, R. (1998):** Berücksichtigung faunistisch-tierökologischer Belange in der Landschaftsplanung. *Informationsdienst Naturschutz Niedersachsen* 4/98: 58-127. (in German).

[the potential of Odonata for landscape planning is dealt with on pages 102-103]

Source of supply: Niedersächsisches Landesamt für Ökologie, Abt. Naturschutz, Postfach 101062, D-31110 Hildesheim, Germany. e-mail: poststelle@hi.nloe.landni.dbp.de. (free of charge)

243. **Brockhaus, T. (1998):** *Aeshna juncea* (L.) and *A. subarctica elisabethae* Djak. in the Rokytecka Slat, Sumava, Czech Republic (Anisoptera: Aeshnidae). *Notul. odonat.* 5(2): 19. (in English).

Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany.

244. **Brockhaus, T. (1998):** Terrestrische Eiablage durch *Sympetrum vulgatum* (Linnaeus) (Anisoptera: Libellulidae). *Libellula* 17(1/2): 103-105. (in German with English summary).

[A tandem deposited eggs 1,5 m away from the water into the grass for more than 3 minutes. This terrestrial oviposition will be initiated by hydrotactil stimuli of the female.]

Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany.

245. **Brownett, A. (1998):** Predation of adult *Anax imperator* Leach by the Hobby (*Falco subbuteo* L.) - how frequently does this occur? *J. Br. Dragonfly Soc.* 14(2): 45-52. (in English).

246. [compilation and listing of Hobby predation on Odonata; discussion of distribution patterns in UK of Hobby and *A. imperator*; discussion of the low frequency predation of Hobby on *A. imperator*: (1) nocturnal emergence and pre-sunrise maiden-flight as a predator-avoidance strategie, (2) territorial behaviour which causes low density of *A. imperator* on a pond: "A low steady density must be less likely to attract predators than a free-for-all.", (3) phenological reasons: the peak period of territorial/ sexual activity of *A. imperator* coincides with the nesting period of the Hobby, when the diet switches from insect to bird.]

Address: Brownett, A.; 28 Colesbourne Road, Brookside, Bloxham, Banbury, Oxfordshire OX15 4TB, UK.

247. **Brunelle, P. (1998):** 1998 DSA northeastern group meeting in southern Maine. *Argia* 10(1): 3-4.

Address: Brunelle, P.-M., 2460 John Street, Halifax, Nova Scotia, B3K 4K7, Canada.

248. **Brunelle, P. (1998):** Idyll on Cape Breton Island. *Argia* 10(3): 8-10. (in English).

[Report on a collecting trip to Cape Breton Island, Nova Scotia, Canada with some stress on the Somatochloras including *S. septentrionalis*, *S. minor*, *S. cingulata*, and *S. albicincta* (new to Nova Scotia).]

Address: Brunelle, P.-M., 2460 John Street, Halifax, Nova Scotia, B3K 4K7, Canada.

249. **Brunelle, P. (1998):** Odonata seminar at Humboldt Field Research Institute, Steuben, Maine. *Argia* 10(3): 18-20. (in English).

[Report on a 5-day introductory seminar on Odonata with some usefull information and advise how to teach beginners in dragonflies.]

Address: Brunelle, P.-M., 2460 John Street, Halifax, Nova Scotia, B3K 4K7, Canada.

250. **Buck, K. (1998):** Odonatological notes from three trips to New South Wales, Australia. *Notul. odonatol.* 5(1): 7-8. (in English).

Address: Buck, K., Johann-Meyer-Str. 3A, D-25554 Wilster, Germany.

251. **Buczynski, P. (1998):** Dragonflies (Odonata) of the "Peatbog at Czarne Lake" nature reserve and environs (Leczna-Wlodawa lake District). *Parki Narodowe i Rezerwaty Przyrody* 17(2): 87-96. (in Polish with English summary).

[34 species were collected in 1995 and 1997 including *Sympetrum pedemontanum* which was new for the Podlasie region (Poland); discussion of the present fauna of the reserve and its changes in the past thirty years; "The region underwent significant changes in the past thirty years. The allochthonous water from the Wieprz-Krzna Canal was moved into Czame Lake; the trophy of this lake has changed (from dystrophy to eutrophy), the peatbog in the reserve has been overgrown by trees and has partly changed its character. These changes have reduced and modified the dragonfly fauna. No peat species exist in the lake. Dragonflies don't develop in the greater part of the peatbog. In the remaining biotops with dra-



gongfly populations, fauna typical for fens dominate among peat dragonflies. The constancy of the changes and the possibility of restoring the previous character of the reserve's environment are also discussed." (Author)]

Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PO-20-033 Lublin, Poland.

252. **Buczynski, P.; Staniec, B. (1998):** Environmental evaluation of the conservation worth Krugle Bagno peatbog (the Leczynsko-Włodawski Lake District) based on the selected elements of its fauna. *Rocz. nauk. Pol. Tow. Ochr. Przyr. "Salamandra"* 2: 95-107. (in Polish with English summary).

[This paper presents an environmental evaluation of the Krugle Bagno peatbog (the Leczynsko-Włodawskie Lake District, buffer-zone of the Poleski National Park) on the grounds of selected elements of its fauna. The topographical, hydrological and floristic preliminary descriptions are also provided. Collected 121 species represent the following higher taxa: Aranei, Chilopoda, Insecta (Odonata; Orthoptera; Heteroptera aquatica; Coleoptera: Hydrophiloidea, Dytiscidae, Haliplidae, Gyrinidae, Staphylinidae, Scarabaeidae, Chrysomelidae, Curculionidae; Lepidoptera), Pisces, Amphibia and Reptilia. The studies focused on Odonata and Staphylinidae. The recorded taxa are divided according to their environmental preferences. Particular attention was paid to (specific) indicator species for the examined biotope: tyrphobionts, tyrphophiles (Heteroptera aquatica, Odonata, Coleoptera aquatica), sphagnophilous stenotopic species (Staphylinidae). Their significant predominance in respect of number of species and individuals collected (among Odonata - 39.3% of all species. 56.4% of all larvae and exuviae; among Staphylinidae - about 75% of all individuals collected) attests to high environmental quality of the peatbog. It is connected with high and stable water-level. Such a situation is favourable for the existence of many rare species, which are sensitive to overdrying of environment, as well as instability of water-level and humidity. Due to this situation, species rare in Poland occur here, such as: *Nehalennia speciosa*, *Aeshna subarctica* (Odonata), *Acylophorus wagenschieberi* (57% of all rove beetles collected) and *Atanygnathus terminalis* (Staphylinidae). Out of recorded taxa, 8 are protected by law, among them noteworthy is the lake minnow (Morocco percunurus). Regarding the above data, it has been suggested that Krugle Bagno should be protected as a partial reserve. It is also proposed to use good account of the obtained data as a point of reference in evaluation of the state of the natural environment of other lowland peatbogs in south-eastern Poland." (Authors). 28 Odonata species are listed; of special Central European faunistic interest are in addition to the above mentioned species *Coenagrion armatum*, *Sympecma paedisca*, *Leucorrhinia albifrons*, and *L. pectoralis*.]

Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PO-20-033 Lublin, Poland.

253. **Buczynski, P. (1998):** *Somatochlora arctica* (Zett.) in the Janowski Forests (Lasy Janowskie), SE Poland (Anisoptera: Corduliidae). *Notul. odonatol.* 5(1): 8-9. (in English).

[second confirmed Polish lowland breeding locality of *S. arctica*; characterization of the larval habitat; short notice to the drought resistance of larvae]

Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PO-20-033 Lublin, Poland.

254. **Butler, A.; Butler, E. (1998):** Scarlet Darter *Crocothemis erythraea* (Brullé) on the Isle of Wight - The second British record. *Atropos* 4: 13-14. (in English).

Address: Butler, A., Downside, Down Lane, Ventnor, Isle of Wight PO38 1AH, UK.

255. **Buttstedt, L.; Jentzsch, M. (1998):** Zur Flora, Fauna und Gebietsausstattung des Naturschutzgebietes "Hackpfüffler See" und seiner Umgebung. *Naturschutz im Land Sachsen-Anhalt*: 3-8. (in German).

[general review on the Odonata of the Nature Reserve "Hackpfüffler See" and its environments in Sachsen-Anhalt, Germany; 19 species are listed; *Anaciaeschna isosceles* is of regional interest]

Address: Jentzsch, M., Stollenweg 21, D-06179 Langenbogen, Germany.

256. **Carletti, B.; Terzani, F. (1998):** Dragonflies from Zomea Forest, Central African Republic. *Notul. odonatol.* 5(2): 13-24. (in English).

[15 spp. are listed. *Pseudagrion serrulatum*, *P. coerulescens*, *P. kibalense*, *Agrionemis exilis*, *Chlorocypha vicioriae*, *C. aphrodite*, *Sapho puella*, *Tetrathemis sulci*, *Notiothemis robertsi*, *Hadrothemis versuta*, *Trithemis nuptialis* are new to the Central African Republic. Some structural details of *T. sulci* and *N. robertsi* are illustrated." (Authors)]

Address: Terzani, F., Mus. Nat. Hist. of the University of Florence, Zool. Sect. "La Specola", Via Romana 17, I-50125 Florence, Italy.

257. **Carpenter, G. (1998):** *Nehalennia integracollis* in Rhode Island. *Argia* 10(3): 20. (in English).

[description of the habitat of *N. integracollis* in Rhode Island, USA; additional information on some *Enallagma* spp. including a notice on *Enallagma pictum*.]

Address: Carpenter, V.A., 504 Pinewood Drive, Esmond, RI 02917, USA. e-mail:vcarpenter@tnc.org.

258. **Carpenter, G. (1998):** Notes from Rhode Island. *Argia* 10(2): 8. (in English).

259. Address: Carpenter, V.A., 504 Pinewood Drive, Esmond, RI 02917, USA. e-mail:vcarpenter@tnc.org.

260. **Caspers, N. (1998):** Biologische Effekte von Hexachlorbenzol (HCB) in aquatischen Modellökosystemen. *Zeitschrift für Umweltchemie und Ökotoxikologie* 19(4): 205-213. (in German with English summary).

[A long-term study [sic!] (08.05 - 14.11.1995) was performed on the fate and effects of hexachlorobenzene (HCB) in aquatic mesocosms. Discontinuous dosing of the sparingly soluble test substance up to the limit of its water solubility (5 µg/l at 20°C) did not cause any significant effects on the aquatic communities. From this point of view, a quality objective of 5 µg/l is considered to maintain the structures and functions of aquatic communities on a long-term scale." (Author) The experimental ponds are located on the properties of the Bayer AG plant in Leverkusen, Germany. Dragonflies considered not be affected by HCB were the common *Sympetrum striolatum* and *Libellula* sp., the only species occurring in the experimental ponds.]

Address: Caspers, N., Bayer AG, Institut für Umweltanalyse, Gebäude W 15, D-51368 Leverkusen, Germany.

261. **Cattaneo, A.; Galanti, G.; Gentinetta, S.; Romo, S. (1998):** Epiphytic algae and macroinvertebrates on submerged and floating-leaved macrophytes in an Italian lake. *Freshwater biology* 39: 725-740. (in English).

[test of effects of different host architecture of submerged and floated-leaved vegetation on epiphytic algae and invertebrates; epiphyton development was significantly higher on submerged plants than on floating-leaved; "The taxonomic composition of epiphytic algae and invertebrates was similar on the different plants. The more varied morphology of the floating-leaved *Trapa natans* resulted in a higher diversity of epiphytic algae, however, but not of macroinvertebrates." Replacement of floating-leaved by submerged plants would increase the total biomass of epiphytic algae and invertebrates; *Lestes* sp. and *Orthetrum* sp. are listed in Appendix 2]

Address: Galanti, G.; CNR, Istituto Italiano di Idrobiologia, Largo Tonolli 50, I-28048 Pallanza, Italy.

262. **Cerff, D. (1998):** Die Pokal-Azurjungfer (*Cercion lindenii*) – eine neue Libellenart in Thüringen. *Landchaftspflege und Naturschutz in Thüringen* 35(3): 92-93. (in German)

[record of *C. lindenii* on August 5, 1997, near Aschenhaus, Thuringia, Germany; brief discussion of the recent range extension of the species in Central Europe]

Address: Cerff, D., Naturschutzzentrum Mittelmühle, Ortsstr. 5, D-98593 Kleinschmalkalden, Germany.

263. **Charvet, St.; Kosmala, A.; Statzner, B. (1998):** Biomonitoring through biological traits of benthic macroinvertebrates: perspectives for a general tool in stream management. *Arch. Hydrobiol.* 142(4): 415-432. (in English).

["Although benthic stream macroinvertebrates have been widely used in bio-monitoring, further developments towards more general biomonitoring tools are timely. Therefore, we compared traditional ways of biomonitoring such as diversity, biotic indices and community structure with a new approach using biological traits such as reproduction, life duration, and feeding habits. These approaches were applied to a typical biomonitoring scenario, i.e. for two sites being upstream and downstream of the effluent from a waste water treatment plant. Physico-chemical variables did not discriminate between upstream and downstream site. Among eight tested biological indices, only Margalefs and Shannon's index and the French Biotic Index "indice biologique global normalise" (IBGN) significantly separated the upstream from the downstream site. However, biomonitoring through these three indices depended significantly on the sampling effort, which was not the case for the community structure or biological traits. Community structure in terms of taxa abundances separated the upstream from the downstream site (17.9 % of discrimination). Biological traits weighted by taxa abundances better separated the upstream from the downstream site (23.1 % of discrimination). The biological traits showed that the functional structure at the upstream site was characteristic for organisms using the strategy of resilience in more variable but less adverse environments. In contrast, the functional structure observed at the downstream site was characteristic for organisms using the strategy of resistance in less variable but more adverse environments. Thus, the functional approach to indicate pollution effects in streams through biological traits may provide a tool for future stream management which is robust, general and based on current concepts of ecological theory." (Authors) Odonata recorded in the River Chalaronne

(France) were *Platynemis* spec., *Calopteryx splendens*, and *C. virgo*.]

Address: Statzner, B., CNR, Ecologie des Eaux Douces et des Grands Fleuves, Université Lyon I, F-69622 Villeurbanne Cedex, France.

264. **Chippendale, P.T.; Whitmore, D.H.; Davé, V.K.; Valencia, T.G.; Robison, J.V. (1998):** Effective procedures for the extraction, amplification and sequencing of Odonata DNA. *Odonatologica* 27(4): 415-424. (in English).

["The methods of specimen preservation, DNA extraction, DNA amplification, choice of primers, and DNA sequencing are described. These are primarily adaptations of those developed by other workers, but the Authors describe modifications that they have found to be optimal when working with odonates. It is likely that some of the described protocols will have more general applications to other arthropods as well." (Authors)]

Address: Chippendale, P.T., Department of Biology, Box 19498, University of Texas at Arlington, Arlington, TX 76019, United States.

265. **Clausnitzer, V. (1998):** Territorial behaviour of a rainforest dragonfly *Notiothemis robertsi* (Odonata: Libellulidae): proposed functions of specific behavioural patterns. *J. Zool., London* 245: 121-127. (in English).

["The behaviour of this rainforest dragonfly was studied in the Kakamega Forest, West Kenya. Seven different activities were distinguished: perching, sun-flights, patrolling, inspection, interspecific, intra-specific, and sexual flights. Two-act sequences of these behaviours were analysed and quantified to determine significant transition probabilities. Sun-flights into the tree canopies were the most common flight activity and followed any other behaviour significantly more often than expected. Coming back from a sun-flight, the males preferentially perched or patrolled; after patrolling males typically perched. Most of the time the males spent perching in their territory (32% of total time in territory). Proposed functions of these territorial behavioural activities in *Notiothemis roberisi* are deduced from these results."]

Address: Clausnitzer, Viola, Zum Lahnweg 14, D-35032 Marburg, Germany.

266. **Clausnitzer, V.; Lempert, J. (1998):** Preliminary comparative approach of the reproductive behaviour of African Tetratheminae (Anisoptera: Libellulidae). *J. Afr. zool.* 112: 103-107. (in English with French summary).

["Ecological and ethological aspects of a selection of African Tetratheminae dragonflies (14) are compared. Species belonging to this subfamily mainly inhabit tropical rainforests, where they breed in small pools and running waters. In every species observed for that behaviour males are localized and territorial over long periods. Mode of oviposition differs strongly between genera."]

Address: Lempert, J., Vereinsstr. 41, D-20357 Hamburg, Germany.

267. **Conniff, R. (1998):** Juwelen im Anflug. *Geo* 6/1998: 82-96. (in German).

[popular account on dragonflies with some focus on dragonfly hunting techniques, based on mainly US-dragonfly literature, illustrated with first class colour pictures from Gilles Martin (France)]

Source of supply: Gruner + Jahr AG & Co, Am Baumwall 11, D-20459 Hamburg, Germany.

268. **Cuveland, J. de (1998):** Libellen lassen die Hüllen fallen. Hamburger Abendblatt Nr. 151/1998: 8. (in German).

[report on the ecdysis of *Aeshna cyanea* in a German newspaper]

Address: not stated.

269. **Czachorowski, S; Buczynski, P.; Alexandrovitch, O; Stryjecki, R.; Kurzatowska, A (1998):** Material required for knowledge of insects and arachnids of the "Warminski Forest" nature reserve (The Olsztyn Lake District). *Parki Narodowe i Rezerваты Przyrody* 17(2): 75-86. (in Polish with English summary).

["The Lyna River, various streams, springs, 4 lakes and small pools were investigated in 1995, and 1996 in the "Wannifski Forest" nature reserve with particular stress on caddisflies (Trichoptera). 112 species of water invertebrates (Insecta: Odonata) ... (19 species including *Ophiogomphus cecilia* and *Leucorrhinia pectoralis*) ... Trichoptera; Heteroptera; Arachnida: Hydracarina) and also 24 species of inland beetles (Coleoptera: Carabidae, Staphylinidae, Lucanidae, Elateridae, Notidulidae, Ciidae, Erotylidae) were caught, including three species protected by law. The Lyna River valley and Jelgun and Gaik lakes are the most valuable for biodiversity protection. The reserve area is also proposed as one for continuous research."]

Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PO-20-033 Lublin, Poland.

270. **Czachorowski, S.; Buczynski, P. (1998):** Preliminary evaluation of the specificity of aquatic insects of Polesie based on dragonflies (Odonata) and caddis flies (Trichoptera). *Tezisy dokladov. Mezhdunarodnoy nauchnoy konferentsii. "Souremennye proylemy izucheniya, ispol'zovani' i okhrany prirodnykh kompleksov polesya". Sektsiya 3: Sokhranie landshchaftnogo i biologicheskogo razanoobraziya poles'ya.* 22-25 September 1998, Minsk, Respublika Belarus'. Belszns. Minsk: 204. (in English).

[Polesie is an extremely interesting region in Europe because of its unique water and wetlands habitats. Among areas in Eastern Europe, it has one of the highest numbers of wetlands. Specificity of aquatic fauna originating from various geographical regions probably occurs there and is likely the meeting of fauna from Siberia and Eastern Europe with west-European fauna, as well as northern and southern elements. Extensive drainage in recent years has caused great changes in swamp and water habitats and has probably affected the distribution of insects. The effect on aquatic insects is interesting. Additionally, it is significant that peat-bog habitats are deteriorating in western and central Europe, causing fauna living in these habitats to approach extinction. Polesie is probably the last sizable place where these species occur and where they may be protected. The aquatic insects of Polesie, a region occurring partially in Poland, Belarus and the Ukraine, are very poorly known. There are only a few data about caddis flies from Polish and Belarusian Polesie, and no information from the Ukrainian part of the region. Dragonflies are known only from the Polish and Ukrainian part of Polesie. Odonata and Trichoptera were collected in Lublin Polesie (western Polesie) in lakes, pools, rivers, ponds and ditches. Trichoptera were collected in three places of Polesie in Belarus: in the vicinity of Brzesc, the vicinity of Olmany (mid-Polesie) and in the Chernobyl region. Fifty-one species of caddis flies are known in the region, including 36 in Poland and 23 in Belarus. The total number of Trichoptera of Polesie will probably

be about 70-100. Twenty-seven species were found in lakes, nine in peat-bog ponds, 13 in ditches, 14 in old river beds and 16 in rivers. Fifty-eight species of Odonata (79% of the species occurring in Poland) were found in the Polish part of Polesie. and 31 in Ukrainian part. These species probably also occur in all of Polesie. The species *Gomphus flavipes*, *Orthetrum coerulescens* and *Sympetrum striolatum* also occur in Polesie. Twenty-nine species of dragon flies were caught in rivers, 35 in ditches, 41 in dystrophic lakes, 35 in eutrophic lakes, and 49 in peatbogs. In Polesie, fauna typical for swampy and peat-bog habitats is very common. Some of the interesting species occurring there are rare or rare in Europe. Polesie may be a very important area for the protection of these species. It is very interesting that river fauna is relatively poor. Earlier investigations of aquatic insects in the Biebrza River, which has acidic and dystrophic waters from adjacent swamps and peat-bogs in the Biebrza Valley, have also shown very poor fauna. So. it is also a possibility that rivers in Polesie have specific and poor aquatic-insect fauna. This possibility strongly needs to be checked by field investigations. Many species that are rare in Europe (tyrphobionts and tyrphophilous) occur in Polesie, but these species are in danger of extinction. The specific and unique insect fauna of Polesie strongly need active protection, may be through the creation of a national park or euroregion. Aquatic insects are very poorly known and more investigations are needed. We are currently looking for interesting parts from Belarus and the Ukraine for common field investigations (expeditions) and for scientific co-operation. (Verbatim)]

Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PO-20-033 Lublin, Poland.

271. **Czaplak, D. (1998):** *Leucorrhinia glacialis* in West Virginia. *Argia* 10(3): 23. (in English).

Address: not stated.

272. **Czaplak, D. (1998):** *Orthemis ferruginea* in Washington D.C.? *Argia* 10(3): 23-24. (in English).

Address: not stated.

273. **Daigle, J. (1998):** The use of odonates to assess lake quality in Florida. *Argia* 10(2): 4. (in English).

Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. e-mail: daiglej@dep.state.fl.us.

274. **Daigle, J.J. (1998):** *Megalagrion* and *Heteragrion* - two notes. *Argia* 10(2): 14-15. (in English).

Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. e-mail: daiglej@dep.state.fl.us.

275. **D'Antonio, C. (1998):** *Lindenia* 28: 117-122. (in Italian).

[LINDENIA. Notiziario dell'Ufficio Nazionale Italiano della Società Odonatologica Internazionale, Napoli, n° 28: 117-122 (21 June 1998). - (c/o Dr. Costantino D'Antonio, Via A. Falcone 386/b, 1-80127 Napoli). Contents: Utzeri, C.: LINDENIA cambia redattore (pp. 117-118). ["LINDENIA changes editor"; Dr. Costantino D'Antonio becomes new editor of LINDENIA] -D'Antonio, C.: LINDENIA cambia data di uscita (p. 118). ["LINDENIA changes date of issue"; in the future, LINDENIA will be issued on 21 June and 22 December each year.]. - Kiauta, B.: ODONATOLOGICA nei Current Contents (pp. 118-119). ["ODONATOLOGICA in Current Contents"; as of vol. 27(1), 1998 ODONATOLOGICA will be indexed in Current Contents.]. - D'Antonio, C.: Archivio Hemianax (p. 119). ["Hemianax



archive"; four recent observations of *Hemianax ephippiger* in Italy (Roma, Portovenere, Anacapri, Capri, all 1998) are communicated, and a map with all records since 1867 is provided.]. - D'Antonio, C. ' Distribuzione regionale degli Odonati in Italia: aggiornamento (pp. 119-120). ["Regional distribution of Odonata in Italy: an update"; 23 (nos 109-131) titles are added to the latest (1994) list of regional records.]. - D'Antonio, C.: Elenco aggiornato dei soci di LINDENIA (pp. 121-122). ["Updated list of LINDENIA members"; the Addresses of the 30 members of the Italian regional group are given.] - D'Antonio, C.: La S.I.O. sul WEB (p. 122). ["The S.I.O. on the Web"; introduction to and information on the S.I.O. home page.] (W. Schneider)]  
Address: D'Antonio, C., Via A. Falcone 386/b, I-80127 Napoli, Italy. E-mail: lindeniam@freemail.it.

276. **D'Antonio, C. (1998):** Contribution à la connaissance des odonates de L'île de Ponza, Mer Tyrrhénienne, Italie. *Notul. odonatol.* 5(1): 9. (in French).  
[short commented list of Odonata from 3 localities at the volcanic Island of Ponza, Tyrrhenian Sea; short notice to predation of *Argiope bruennichi* and *A. lobata* (Araneae) on *Sympetrum fonscolombi* and *Anax ephippiger*]  
Address: D'Antonio, C., Via A. Falcone 386/b, I-80127 Napoli, Italy.

277. **Davies, D.A.L. (1998):** The genus *Petalura*: Field observations, habits and conservation status (Anisoptera: Petaluridae). *Odonatologica* 27(3): 287-305. (in English).  
[compilation from the literature including all historical notes of the knowledge of the Australian species of the genus *Petalura*; report on and assessment of the authors surveys in the 90th with special emphasize on the actual distribution, habitats, and conservation status of *Petalura gigantea*, *P. ingentissima*, *P. pulcherrima*, and *P. hesperia*.]  
Address: Davies, D.A.L., 23 Cedar Court, Hills Road, Cambridge, CB2 2QJ, United Kingdom.

278. **De Marco, P. (1998):** The amazonian Campina dragonfly assemblage: patterns in microhabitat use and behaviour in a foraging habitat (Anisoptera). *Odonatologica* 27(2): 239-248. (in English).  
["The Amazonian Campina is a woodland with emergent trees of about 10 m found in patches in the Amazonian rain forest. It usually has open areas with a white sand soil directly exposed to sun, and shaded areas with a more dense vegetation. I sampled the dragonfly assemblage in this system counting every dragonfly at pre-determined points, at 5 min intervals, between 7:00 and 18:00 h. *Erythrodiplax lativittata*, *Miathyria marcella* and *Erythemis vesiculosa* were the most abundant spp. The frequency data by point revealed an association of *E. lativittata* (percher) with shaded habitats, and *M. marcella* and *E. vesiculosa* (fliers) with open habitats. The characteristics of thermoregulation of fliers and perchers seem to explain this microhabitat selection. Due to high productivity and density of small insects, the Campina is probably an excellent habitat for foraging. It is suggested that in these foraging habitats the spatial species arrangement is mostly determined by behavioural-physiological traits, which may help to explain the community faunal composition." (Author) study area: Suframa-INPA reserve, Brazil; 15 Libellulidae and 1 Corduliidae were observed; mean front wing size of 11 species is given; figure with mean perch or flight height]  
Address: De Marco, P., Departamento de Biologia Geral, Universidade Federal de Viçosa, Minas Gerais, Brazil.

279. **De Marmels, J. (1998):** A five year survey of an odonate community inhabiting a north Venezuelan mountain stream. *Odonatologica* 27(2): 189-199. (in English).  
["Monthly counts of adult Odonata were carried out along a transect following a forested mountain stream, "Quebrada Pasaquire". 17 of the 41 spp. recorded were considered for evaluation. The average monthly abundance curve of spp. such as *Euthore fasciata* Sel., *Archilestes grandis* (Ramb.), *Philogenia cassandra* Sel., *Progomphus abbreviatus* Belle, *Brechmorhoga rapax* Calv. and *Libellula herculea* Karsch matches the climogram of the study area, e.g. these spp. are markedly seasonal with high adult abundances in the wet season, and low numbers in the dry season. On the other hand the presence of adult *Hetaerina capitalis* Sel. and *H. cruentata* (Ramb.) did not seem to be correlated with season. *Macrothemis pseudimitans* Calv. and *Micrathyria venezuelae* De Marmels appeared to be more common in the dryer months, but their population sizes were always low. Based upon the data of this survey it can be stated that the odon. community studied has a persistent structure, relatively low variabilities of population densities, and is stable. The evidence includes persistence of the dominant taxa over at least 5 generations, typical standard deviations of the logarithm of population sizes, as well as high and significant year-to-year rank concordance. *Cannaphila vibex* (Hag.) and *Progomphus abbreviatus* became more common during this survey, while *Andaeschna rufipes* (Ris) shifted towards local extinction. However, 5 yr may not be sufficient to show such trends to be irreversible: in almost all species at least one trend reversal occurred during the survey. Some of the potential ecological mechanisms underlying the constancy and stability of this odonate community are discussed and it is suggested that abiotic factors, such as periodical floods in this lotic habitat, may be of some concern." (Author)]  
Address: De Marmels, J., Inst. Zool. Agrícola, Fac. Agronomía, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela.

280. **Dees, A. (1998):** Excursieverslag Encigroeve. NVL-Nieuwsbrief. Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie 3(2): 8. (in Dutch).  
[Report on the trip to Encigroeve: Records of some southern elements in the Netherlands dragonfly fauna from a locality near Maastricht including species as *Cercion lindenii*, *Orthetrum brunneum*, *Ischnura pumilio*, *Crocothemis erythraea*, and *Anax parthenope*.]  
Address: not stated.

281. **Delft, J.J.C.W. van (1998):** De Bandheidelibel *Sympetrum pedemontanum* (Allioni) in Nederland. *Brachytron* 2(1): 3-9. (in Dutch with English summary).  
["... In the Netherlands it now has one proven reproduction site and one site at which reproduction is assumed. Both are situated in the south of the country. At other localities it is encountered in variable densities, but reproduction is either uncertain or absent. The sites where larger numbers have been seen, are discussed in detail. It appears that *S. pedemontanum* is continuing to extend its range in The Netherlands and it may soon establish populations in the north. It is stated that, in the north-western part of its range, this dragonfly is a pioneer of bare, running waters."]  
Address: Delft, J. van, Gladuluslaan 22, NL-5582 CD Waalre, The Netherlands. E-mail: jvdelft@sci.kun.nl.

282. **Deliry, C. (1998):** Nouveaux articles ou études concernant des libellules dans la région Rhône-Alpes. *Sympetrum piémontais* 38: 2-3. (in French).  
Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France.
283. **Deliry, C. (1998):** Compte-rendu d'étude: les libellules de la chute de Brégnier-Cordon (Isère, Ain et Savoie). *Sympetrum* 11: 47-75. (in French).  
[data from 1972 to 1995 of 40 localities are locally-wise presented, 39 species are dealt with]  
Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France.
284. **Deliry, C. (1998):** Matériel pour une liste rouge des libellules du Département de l'Ain. *Sympetrum* 11: 25-33. (in French).  
[Red data list of Odonata of the Département Ain, France, including an odonatological bibliography of the département]  
Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France
285. **DeMarco, P.; Santos-DeMarco, T. (1998):** *Anax concolor* Brauer predation on dragonfly aggregations at a Restinga habitat in southeastern Brazil (Anisoptera: Aeshnidae). *Notul. odonotol.* 5(1): 2-3. (in English).  
["2 attacks of *A. concolor* were observed in large groups, mainly composed of *Pantala flavescens* and *Miathyria marcella*. *P. flavescens* responded to these attacks by pursuing *A. concolor*. The behaviour of *P. flavescens* in the aggregations under attack suggests that due to a decrease in the chance of predation, the smaller spp. could gain an extra advantage in these groups."]  
Address: DeMarco, P., Departamento de Biologia Geral, Universidade Federal de Vicosa, BR-39571-000 Vicosa, MG, Brazil.
286. **Dijkstra, K.-D. (1998):** Invasie Zuidelijke keizerlibel (*Anax parthenope*)? NVL-Nieuwsbrief. Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie 3(2): 3. (in Dutch).  
[Invasion of *Anax parthenope*?: short notice on some records of *A. parthenope* in The Netherlands and France]  
Address: Dijkstra, K.D., Oude Rijnsburgerweg 38, NL-2342 BC Oegstgeest, The Netherlands.
287. **Dijkstra, K.-D.; Kalkman, V. (1998):** Kleine kansen op grootse daden. Nieuwsbrief, Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie 2(2): 5-6. (in Dutch).  
[short assessment of the recent status of rare Dutch dragonflies and in the adjoining regions in Belgium and Germany; special attention is given to *Coenagrion armatum*, *C. mercuriale*, *C. ornatum*, *C. scitulum*, *Stylurus flavipes*, and *Onychogomphus forcipatus*]  
Address: Dijkstra, K.D., Oude Rijnsburgerweg 38, NL-2342 BC Oegstgeest, The Netherlands.
288. **Dijkstra, K.-D. (1998):** Langs Franse stromen. Deel 1. NVL-Nieuwsbrief. Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie 3(2): 4-5. (in Dutch).  
[Following French rivers. Part 1: Report on the Odonata of Loire, Indre, Changeon, and Alzo observed in June/July 1997]  
Address: Dijkstra, K.D., Oude Rijnsburgerweg 38, NL-2342 BC Oegstgeest, The Netherlands.
289. **Dijkstra, K.-D. (1998):** Opvallende waarnemingen. NVL-Nieuwsbrief. Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie 3(2): 3-4. (in Dutch).  
[Noteworthy records: *Ischnura pumilio*, *Lestes barbarus*, *L. viridis*, *Sympetrum vulgatum*, and *Erythromma viridulum*]  
Address: Dijkstra, K.D., Oude Rijnsburgerweg 38, NL-2342 BC Oegstgeest, The Netherlands.
290. **Dijkstra, K.-D.B.; Groenendijk, D.; Kalkman, V.J. (1998):** Voorpost van het zuiden: De libellen van de Nederlandse St. Pietersberg. *Brachytron* 2(1): 23-27. (in Dutch with English summary).  
["Odonata of the Dutch St. Pietersberg: 33 species recorded from ... St. Pietersberg (Limburg) are listed. Suitable breeding habitats are present in the Encigroeve, a marlquarry which is still in production. Two distinct habitat types can be distinguished here; seepage areas with shallow ponds and small streams and clear well-vegetated lakes. The fauna has remarkable southern affinities with reproduction of *Sympetma fusca*, *Cercion lindenii* and *Crocothemis erythraea* in the lakes and *Ischnura pumilio*, *Orthetrum brunneum*, *O. coerulescens* and *Sympetrum fonscolombi* in the seepages. *Sympetrum striolatum* is particularly abundant. The exploitation of the quarry and its physical features provide the continuing presence of pioneer habitats for the seepage species whilst most of the lakes will be conserved."]  
Address: Dijkstra, K.D., Oude Rijnsburgerweg 38, NL-2342 BC Oegstgeest, The Netherlands.
291. **Dole-Olivier, M.-J. (1998):** Surface water-groundwater exchanges in three dimensions on a backwater of the Rhône River. *Freshwater biology* 40: 93-109. (in English).  
["1. Hydrological exchange between the surface stream and the hyporheic zone is well documented in the main channel of rivers, especially at the reach scale. Hydrological processes of advection/convection occur at different scales, and in secondary channels of large rivers little is known about these exchanges in the hyporheic zone on a broad scale (i.e. kilometres). This work studied exchanges of water and biota in a secondary channel on a large scale (4 km), using a three-dimensional framework. 2. The exchanges of water were described using physico-chemical indicators of surface and groundwaters. Samples of water and biota were taken in three dimensions: (i) vertically from benthic (i.e. 0.20 m below the surface of the substratum) to hyporheic (0.50 m) and deep interstitial (1.0 m) zones; (ii) laterally from the right to the left bank (i.e. right, middle and left positions); and (iii) longitudinally from upstream to downstream (seven stations regularly distributed along the channel). 3. The physico-chemical indicators clearly revealed hydrological heterogeneity in the longitudinal and vertical dimensions, whereas lateral variability was not significant. 4. Spatial distribution of biota exhibited strong longitudinal variations that were not gradual as predicted by an upstream/downstream continuum, but patchy and discontinuous. No significant differences were found between the three positions across the channel. 5. Analyses, of both physicochemical and faunal data sets produced matched ordination of samples and stations, indicating that interstitial-surface flow relationships appear to be an important governing factor in the distribution of interstitial biota at this broad scale. 6. Results are discussed in relation to the hypothetical three-dimensional models of the hyporheic zone in rivers. Contrasting with other observations on the

main channel (where advection/convection patterns are dominated by morphological changes of the river-bed morphology), it is proposed that water exchanges in backwaters are more likely to be related to local modifications of stream-bed porosity." (Author) "Coenagrionidae (young stages)" were used in the faunal analysis.]

Address: Dole-Oliver, M.-J., Freshwater and River Ecology Unit, Université Claude Bernard Lyon, 1-43 Bd du 11 Novembre 1918, F-69622 Villeurbanne cedex, France.

292. **Dommanget, J.-L. (1998):** Analyse et commentaire relatifs au "Catalogue des libellulidées des environs de Besançon" de M. Léandre Pidancet (1856). *Martinia* 14 (1): 31-36. (in French with English summary).

[The author analyzes and comments on the difficulties to work with old odonatological papers. In the example used, the publication of Pidancet (1856) is documented as annex: Some of the taxa occurring at that time in the Département Doubs, France were not still described, and the odonatological "must" of that time Selys-Longchamps & Hagen's "Revue des Odonates ou Libellules d'Europe" (1850) and Charpentier's "Libellulidae europaeae. Descriptae ac depictae" (1840) were unknown to resp. not used by Pidancet. Dommanget presents a very useful checklist for checking old publications in relation to verify them and make them comparable to modern papers. Two new taxa were introduced by Pidancet to science. Dommanget considers *Aeshna justii* Pidancet (1856), a synonym unknown to most of the odontists incl. Bridges, for *Aeshna juncea* (Linnaeus, 1758). The identity of the likewise obscure *Libellula bruandi* Pidancet (1856), probable a *Orthetrum* (*coerulescens?*), remains unsolved.]

Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France.

293. **Dommanget, J.-L. (1998):** Les libellules et leurs habitats. Caractéristiques générales, éléments de gestion et de restauration. Société Française d'Odonatologie. ISBN 2-9507291-2-6. 20 pp. (in French).

Address: Société Française d'Odonatologie, 7, rue Lamartine, F-78390 Bois-d'Arcy, France.

294. **Dommanget, J.-L. (1998):** Microhabitats refuges pour les larves d'*Aeshna cyanea* (Müller, 1764) lors de l'assèchement du milieu (Odonata, Anisoptera, Aeshnidae). *Martinia* 14(2): 56. (in French).

[short notice on the habitat conditions of larval communities of *Aeshna cyanea* (and *Thecagaster bidentata*) in French rivers before drying out, and the strategies to survive under this conditions]

Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France.

295. **Dommanget, J.-L.; Kohn, A.; Verbeck, B. (1998):** Trois nouvelles espèces d'Odonates pour le Bois de Bajoulet (Commune de Forges-les-Bains, département de l'Essonne). *Martinia* 14(1): 31-32. (in French).

[additions to the paper published in *Martinia* 13(1): 23-43; *Lestes barbarus*, *Ceriaton tenellum*, *Coenagrion scitulum*; *Leucorrhinia caudalis* starts its emergence in 1997 in mid April, and in 1998 in the beginning of May]

Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France.

296. **Donnelly, N. (1998):** 1999 Annual meeting - The Adirondacks. *Argia* 10(3): 2-3. (in English).

[announcement of the DSA annual meeting scheduled for 8 - 11 July 1999]

Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA.

297. **Donnelly, N. (1998):** Back to Thailand and Malaysia - Farangpo 98. *Malangpo* 15: 137-142. (in English).

[report on a trip in May 1998 to Thailand and Malaysia; locally wise check lists of the species; 9 localities in Thailand and 15 localities in Malaysia with exact geographic coordinates (longitude/latitude)]

Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA.

298. **Donnelly, N. (1998):** Back to Thailand and Malaysia - Farangpo 98. *Argia* 10(2): 10-13. (in English).

Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA.

299. **Donnelly, N. (1998):** Face colors of *Sympetrum internum* - and wing colors of *rubicundulum*. *Argia* 10(3): 13-14. (in English).

[N. Donnelly takes *Sympetrum janae* Carle 1993 for a (colour) form of *S. internum*; he distinguishes the forms according to the colour of their faces, and asks for further information deriving from collections etc. to get insight in the overlapping zone of the forms. He also is interested in the cline of the orange wing bases of *S. rubicundulum*.]

Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA.

300. **Donnelly, N. (1998):** History of Odonata study: E.B. Williamson. *Argia* 10(3): 10-13. (in English).

Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA.

301. **Donnelly, N. (1998):** Northeastern meeting in Maine - Good bugs in spite of the weather! *Argia* 10(2): 2-3. (in English).

Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA.

302. **Donnelly, N. (1998):** The history of Odonata: The fourth phase. *Argia* 10(2): 5-8. (in English).

[William Forest Kirby (1754-1850) ([sic]) (the correct data should be read: 1844-1912), Robert McLachlan (1837-1904), Philip P. Calvert (1871-1961), Friedrich Ris (1867-1931)]

Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA.

303. **Dosdall, L.M.; Parker, D.W. (1998):** First Report of a symphoretic association between *Nanocladius branchicolus* Saether (Diptera: Chironomidae) and *Argia moesta* (Hagen) (Odonata: Coenagrionidae). *Am. Midl. Nat.* 139: 181-185. (in English).

[In Carrier Creek, a small stream in southeastern Ontario, larvae of the chironomid *Nanocladius branchicolus* Saether were found associated symphoretically with nymphs of *A. moesta*. The attachment site of the chironomid was most frequently along the abdomen and metathorax of the host. Approximately 22% of the population of *A. moesta* harbored symphoretic chironomids.]

Address: Dosdall, L.M., Alberta Research Council, P.O. Bag 4000, Vegreville, Alberta T9C 1T4, Canada.

304. **Dudley, S. (1998):** Large numbers of Common Darter *Sympetrum striolatum* in Great Yarmouth Cemetery, Norfolk. *Atropos* 4: 37. (in English).

[immigration of approximately 800 - 1000 specimens of *S. striolatum* on 6 September 1997 in UK]



Address: Dudley, S., PO Box 17, Thetford, Norfolk IP24 3ES, UK.

305. **Dudley, S. (1998):** My best day. *Atropos* 4: 33-34. (in English).

[report on a trip in 1997 to the Scottish Highlands with special emphasize to *Somatochlora arctica*, *Sympetrum nigrescens*, and *Aeshna caerulea*]

Address: Dudley, S., PO Box 17, Thetford, Norfolk IP24 3ES, UK.

306. **Dunkle, S. (1998):** DSA 1998 business meeting minutes. *Argia* 10(3): 6-8. (in English).

Address: Dunkle, S., Biol. Dept, Collin County Community College, 2800 E, Spring Creek Parkway, Plano, TX 75074, USA.

307. **Edelaar, P. (1988):** Het beoordelen van waarnemingen van zeldsame libellen. *Nieuwsbrief, Mededelingenorgan van de Nederlandse Vereniging voor Libellenstudie* 2(2): 4. (in Dutch).

[short report of the Dutch Commission for the valuation of records of rare Dragonflies]

Address: Edelaar, P., In de Potvis, De Dageraad 3, NL-1797 SK Den Hoorn, The Netherlands, e-mail: edelaar@nioz.nl.

308. **Edelaar, P. (1998):** Oproep tot bevestiging van mogelijke populaties van zeldsame libellen. *Nieuwsbrief, Mededelingenorgan van de Nederlandse Vereniging voor Libellenstudie* 2(2): 3. (in Dutch).

[appeal for confirmation of populations of rare dragonflies on special Netherlands localities; of special interest are *Sympetma fusca*, *S. paedisca*, *Cercion lindenii*, *Aeshna affinis*, *A. viridis*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Cordulegaster boltonii*, *Leucorrhinia albifrons*, *L. pectoralis*, *Orthetrum coerulescens*, *Sympetrum depressiusculum*, *S. fonscolombii*, *S. pedemontanum*]

Address: Edelaar, P., In de Potvis, De Dageraad 3, NL-1797 SK Den Hoorn, The Netherlands, e-mail: edelaar@nioz.nl.

309. **Elder, J.-F.; Fouillet, P. (1998):** Inventaire des odonates du département de la Manche. *Martinia* 14(2): 57-74. (in French with English summary).

[survey of the Odonata of the Département Manche, northwestern France; commented checklist of 49 species] Address: Elder, J.-F., Réserve Naturelle de Beauguillot, F-50480 Sainte-Marie-du-Mont, France.

310. **Elsby, K. (1998):** My best day. *Atropos* 5: 33-35. (in English).

[report on observations on dragonflies, butterflies, and birds in the New Forest region, UK]

Address: Elsby, K., Chapel House, Bridge Road, Colby, Norfolk NR11 7EA, UK.

311. **Engel, M.S. (1998):** *Megatypus parvus* spec. nov., a new giant dragonfly from the Lower Permian of Kansas (Protodonata: Meganeuridae). *Odonatologica* 27(3): 361-364. (in English).

[The new species from the Lower Permian (Wellington Shales, Elmo, Kansas, United States) is described and figured (holotype in MCZ, Harvard Univ., Cambridge, MS). It is differentiated from other *Megatypus* species by the termination of ScP before the wing apex, the smaller wing length, and the relative positions of SCP, RA and RP. A key is presented for the meganeurid genera (n = 3)

of North America and for the known species (n = 4) of the genus *Megatypus*.]

Address: Engel, M.S., Dept of Entomology, Comstock Hall, Cornell University, Ithaca, New York 14853, United States.

312. **Englund, R (1998):** Response of the orangeblack Hawaiian damselfly (*Megalagrion xanthomelas*), a candidate threatened species, to increases in stream flow. *Bishop Museum Occasional Papers* 56: 19-24. (in English).

Address: Englund, R., Hawaii Biol. Survey, Bishop Mus., 1525 Bernice St., Honolulu, HI 96817, USA.

313. **Evans, M.; Preddy, S. (1998):** County focus - The Bristol District. *Atropos* 5: 45-54. (in English).

[general description of the region with special emphasize on butterflies, moth, dragonflies, habitats, and distribution of the species]

Address: Preddy, S., 32 Raphael Court, Somerset St, Redcliffe, Bristol, BS1 6FF. e-mail: Steve.Preddy@cableinet.co.uk.

314. **Eversham, B.C.; Cooper, J.M. (1998):** Dragonfly species-richness and temperature: National patterns and latitude trends in Britain. *Odonatologica* 27(3): 307-316. (in English).

["The pattern of Odonata species-richness in Britain is mapped at 10 km resolution. This is strongly correlated with mean air temperatures. The relationship with seasonal and monthly mean temperatures is explored: summer temperatures are better predictors, of overall dragonfly richness than are winter temperatures. However, there appears to be some latitude variation in the relationship. Thus, in northern Britain, increasing Odonata richness is correlated with increasing summer temperatures for non-boreal species, and with decreasing winter temperatures for predominantly-boreal species; physiological adaptations of individual species are proposed as a possible explanation."]

Address: Eversham, B.C., Biological Records Centre, NERC Institute of Terrestrial Ecology, Monks Wood, Abbots Ripton, Huntingdon, Cambs PE17 2LS, United Kingdom.

315. **Faton, J.-M. (1998):** Les libellules (Odonata) de la Réserve naturelle des Ramières du Val de Drôme. *Inventaire et suivi des peuplements. Sympetrum* 11: 35-45. (in French).

[commented checklist of 36 Odonata known to occur in the Natural Biological Reserve of Val de Ramières, France]

Address: Faton, J.-M., Réserve Naturelle des Ramières, Maison des Ramières, F-26400 Alex, France.

316. **Faton, J.-M.; Villaret, J.-C., Deliry, C. (1998):** Observations complémentaires dans le Hautes-Alpes découverte de *Coenagrion caerulescens* (Fonscolombe, 1838) sur ce Département. *Sympetrum* 11: 11-16. (in French).

[checklist of the Odonata of 17 localities in the Département Hautes-Alpes, France, 2 males of *C. caerulescens* were discovered at an altitude of 1070m]

Address: Faton, J.-M., Réserve Naturelle des Ramières, Maison des Ramières, F-26400 Alex, France.

317. **Finck, P. (1998):** Der Einfluß von Probenahmezeitpunkt und -häufigkeit auf die Erfassung der Makroinver-

tebraten in Mittelgebirgsbächen. *Lauterbornia* 34: 245-254. (in German with English summary).

[The influence of sample timing and frequency on the recording of the macroinvertebrates in mountain brooks: The extent of recording of macroinvertebrates was studied in two brooks in the Eifel mountains in Northrhine-Westfalia, Germany, with timing and frequency of sampling varying. Additionally, the dominance structures of the biocoenosis indicating different habitat requirements were analysed. Recommendations are given for a minimum standard to guarantee the relevance and validity of the results for physical planning: not less than 4 samples per annum, obligatory in March, May, June, and September. *Calopteryx virgo* and *C. splendens* are recorded for the watercourses of Ahbach and Klausenbach.]

Address: Finck, P., Bundesamt für Naturschutz, Abt. Biotopschutz und Landschaftsökologie, Konstantinstr. 110, D-53179 Bonn, Germany.

318. **Fliedner, H. (1998):** Johann Franz Christian Heyer (1777-1864) und sein Beitrag zur Kenntnis der Libellen. 1. Teil. *Libellula* 17(1/2): 71-90. (in German with summaries in Latin and English).

["Recently, letters have turned up which Heyer, a low rank town officer of the city of Lüneburg, Germany, wrote to H.A. Hagen. Based on those letters a chapter of history of odonatology will be presented concerning that period in which more than half of the European Odonata taxa was described. Trading extensively with insects amateur entomologist, Heyer came into contact with many important entomologists. He discovered 4 species of Zygoptera; he gave reliable information about the regional odonate fauna of Lüneburg to scientists; due to his connections to certain scientists he was able to contribute to the eradication of the intricate synonymy of dragonflies; furthermore, he observed the behaviour of some species of dragonflies. The results of his observations were published by Hagen. The paper is completed by some notes on Heyers trade with insects."]

Address: Fliedner, H., Louis-Seegelken Str., D-28717 Bremen, Germany.

319. **Förster, S. (1998):** Oviposition high above water in *Micrathyrina dictynna* Ris (Anisoptera: Libellulidae). *Odonatologica* 27(3): 365-369. (in English).

[A female of *Micrathyrina dictynna* was observed to attach eggs onto the underside of a leaf hanging more than 2 m above the water level of a small rainforest stream in Costa Rica (La Selva Biological Station, Puerto Viejo de Sarapiquí). "It was found that the eggs usually remain in this position until the larvae hatch. This type of oviposition, the first recorded in a member of the subfamily Brachydiplactinae, is similar to that of some Old World Tetratheminae and it is suggested to be a case of convergence due to similar environmental conditions. Its adaptive significance is discussed briefly." The author takes the minimizing of predation risk by fishes for the relevant factor for the reproductive strategy of *M. dictynna*. "This hypothesis is supported by the occurrence of many small fishes in the stream which were observed to react quickly to all objects dropping onto the water surface. Under this high potential predatory pressure the multi-layered egg mass of *M. dictynna* could be advantageous because of different developmental stages of the eggs and their different hatching times."]

Address: Förster, S., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany.

320. **Fossati, O.; Vallier, P.; Mosseron, M. (1998):** Macroinvertebrate assemblages in rivers of Nuku-Hiva, French Polynesia, before and after antisimulid treatments. *Arch. Hydrobiol.* 142(2): 229-240. (in English).

["Macroinvertebrate communities were observed in the rivers of Nuku-Hiva (Marquesas Islands, French Polynesia). Two sampling excursions were undertaken during hydrologically stable periods: April-May 1991 (before treatments) and March 1994 (one year after antisimulid applications using Abate to all the running waters on the island). Results from 55 hand-net samples (10 min each) revealed an altitudinal continuum and the effects of eutrophication. Effects of antisimulid treatments were not perceptible at this scale of observation." Odonata are treated on the family level. "Lestidae" were more abundant during 1991, and Coenagrionidae had similar abundances during 1991 and 1994.]

Address: Fossati, Odile, Museum National d'Histoire Naturelle, Antenne ORSTOM/Laboratoire d'Ichtyologie, 43, rue Cuvier, F-75231 Paris Cedex 05, France.

321. **Gaston, K.J.; Quinn, R.M.; Blackburn, T.M.; Eversham, B.C. (1998):** Species-range size distributions in Britain. *Ecography* 21(4): 361-370.

[The detailed forms of species-range size distributions in Britain are determined and contrasted for ten taxonomic assemblages (liverworts, vascular plants, molluscs [aquatic and terrestrial], dragonflies, macro-moths, butterflies, birds [breeding and wintering], mammals).]

Address: Gaston, K.J., Univ. Sheffield, Dept. Anim. and Plant Sci., Sheffield S10 2TN; Yorkshire, England.

322. **Gavory, L.; Dommanget, J.-L. (1998):** Redécouverte de *Leucorrhinia rubicunda* (L., 1758) en France (Odonata, Anisoptera, Libellulidae). *Martinia* 14(2): 47-52. (in French with English summary).

[(1) report on the discovery of a specimen in the Picardie region (Département Somme) in May 1998; a reproduction of the species at the discovery site is very unlikely because of unsuitable habitat; (2) discussion of possible records of *L. rubicunda* in 19. century in France]

Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France.

323. **Gerken, R. (1998):** Reproduktionsnachweis der Grünen Keiljungfer (*Ophiogomphus cecilia* Fourcroy 1785) am Unterlauf der Aller. *Beiträge zur Naturkunde Niedersachsens* 51: 155-157. (in German).

[report on the occurrence of *O. cecilia* in the River Aller (Administration district Verden, Lower Saxony, Germany); exuviae were found in 1992 and 1996]

Address: Gerken, R., Birkenweg 4, D-38678 Clausthal-Zellerfeld, Germany.

324. **Gibbins, C.N.; Moxon, J.B. (1998):** *Calopteryx splendens* (Harris) at edge of range sites in North-East England. *J. Br. Dragonfly Soc.* 14(2): 33-45. (in English).

[A survey of adult *Calopteryx splendens* (Harris) in the middle section of the River Wear, County Durham, UK was undertaken over the summers of 1994-96. The species was found in one new 10km square in the county and the survey confirmed its regular presence in another two. Flows in the Wear are regulated by inter-basin water transfers and pumped minewater releases, both of which result in considerable short-term flow change. Several sites occupied by *C. splendens* were also found to suffer water quality problems associated with sewage treatment works and contamination from minewaters. *C. splendens* may be more widespread in Durham than previously]

thought and there is increasing evidence that it is present on many suitably slow-flowing rivers in north-east England. However, the species' presence at some sites on the Wear with relatively poor water quality and variable daily flow patterns remains puzzling. Detailed results are presented to water quality (physico-chemical characteristics, metals and nutrients) and sediment contamination, and its effects on *C. splendens*.]

Address: Division of Geography and Environmental Management, University of Northumbria, Newcastle upon Tyne NE1 8ST, UK.

325. **Glotzhober, R.C.; Riggs, D. (1998):** Adapting the Townes Malaise trap for collecting live Odonata. *Bull. American Odonat.* 5(3): 43-48. (in English).

Address: Glotzhober, R., Ohio Natural history society, 1982 Velma Ave., Columbus OH 43211-2497, USA.

326. **Görner, M. (1998):** Das Flächennaturdenkmal "Hautsee" in Thüringen. *Artenschutzreport* 7(1997): 63-64. (in German).

[preliminary checklist (11 Odonata) of the peat bog on the swimming island of the Lake Haut, Thuringia, Germany; a systematic survey of the lake started in 1998]

Address: Görner, M., Thymianweg 25, D-07745 Jena, Germany.

327. **Gorb, S.N. (1998):** Visual cues in mate recognition by males of the damselfly, *Coenagrion puella* (L) (Odonata: Coenagrionidae). *Journal of Insect Behavior* 11(1): 73-92. (in English).

[*Coenagrion puella* males search actively for mates and are not aggressive to other males. To study the role of visual cues in male-female discrimination, four types of models were used: (1) bodies of intact insects, (2) models of painted males, (3) models of male-female chimerae, and (4) models of female body parts. Abdomen coloration pattern and presence of wings were the most important cues for sexual recognition by males. Step-by-step elimination of male coloration pattern leads to an increase in the tandem response rate. ... The results indicate that *C. puella* males can distinguish males from females visually by morphological structures and coloration pattern. This study was financially supported by the International Dragonfly Fund.]

Address: Gorb, S.N., Inst. spez. Zool. und Evolutionsbiol., Univ. Jena, Erbertstr. 1, D-07743 Jena, Germany - E-mail: b6gost@pan.zoo.uni-jena.de.

328. **Goudsmits, K. (1998):** De Rivierrombout (*Gomphus flavipes*) terug in Nederland. *NVL-Nieuwsbrief. Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie* 3(2): 2. (in Dutch).

[Return of *Gomphus flavipes* to the Netherlands: report on the 1998 discovery of *Gomphus flavipes* in the surrounding of Nijmegen]

Address: Goudsmits, K., Eerste Dorpstraat 7a, NL-3701 HA Zeist, The Netherlands.

329. **Grand, D. (1998):** *Calopteryx haemorrhoidalis* & *Oxygastra curtisii* dans Le Rhône suite d'autres observations sur ce département. *Sympetrum* 11: 7-10. (in French).

[comments to, or new records in the Département Rhône, France of *Calopteryx haemorrhoidalis*, *Oxygastra curtisii*, *Gomphus vulgatissimus*, *Coenagrion mercuriale*, *C. scitulum* and *Sympetrum fonscolombei*]

Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mt d'or, France.

330. **Grand, D. (1998):** Confirmation de la reproduction de *Trithemis annulata* en France & observations odonotologiques diverses. *Sympetrum* 11: 17-23. (in French).

[interspecific copulations; high altitude records of *Gomphus pulchellus* and *Lestes barbarus*; emergence distance of larval *Aeshna cyanea*; *O. cancellatum*; confirmation of reproduction of *Trithemis annulata* in the Département Pyrénées-Orientales]

Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mt d'or, France.

331. **Grimm, K. (1998):** Eine kleine Libellen-Sammlung vom südlichen Bodenseegebiet, Kt. Thurgau, Schweiz. *Notul. odonatol.* 5(1): 9-10. (in German).

[list of 16 species, *Sympeca paedisca*, Switzerland]

Address: Grimm, K., Fruthwilerstr. 65d, CH-8272 Ermattingen, Switzerland.

332. **Günzel, W. R. (1998):** Akrobaten über dem Wasser. *Stadt Gottes* 6/98: 36-38. (in German).

[popular account on dragonflies in a well known German religious monthly, some nice colour photographs]

Address: not stated.

333. **Hämäläinen, M. (1998):** Additions to the Thai gomphid fauna. *Malangpo* 15: 133-136. (in English).

[16 species of Gomphidae which were not listed in Dr. S. Asahina's compilation on Thai Odonata (A list of the Odonata from Thailand. 1993. Bangkok) are treated. *Burmagomphus arthuri*, *Heliogomphus* sp. and *Nihonogomphus pulcherrima* are recorded from Thailand for the first time.]

Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; e-mail: matti.hamalainen@helsinki.fi.

334. **Hämäläinen, M.; Yeh, W.C. (1998):** *Aristocypha baibarana* (Matsumura, 1931), a good endemic species of Taiwan (Zygoptera: Chlorocyphidae). *Odonatologica* 27(3): 371-374. (in English).

[The taxon is considered clearly distinct from *Aristocypha* (*Rhinocypha*) *fenestrella* (Rambur, 1842). It is endemic to Taiwan and apparently restricted to the lower mountain zone in the central part of the island. A detailed description of the female, and additional remarks on distribution and habitat are given.]

Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; e-mail: matti.hamalainen@helsinki.fi.

335. **Hämäläinen, M. (1998):** *Rhinocypha pelops* and other gems of the Thai Caloptera fauna. *Malangpo* 15: 132-133. (in English).

[*Rhinocypha pelops*, *Libellago stigmatizans*, *Anisopleura subplatystyla* and *Philoganga montana* are recorded as new to Thailand.]

Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; e-mail: matti.hamalainen@helsinki.fi.

336. **Haritonov, A.YU.; Malikova, E.I. (1998):** Odonata of the Russian far East: A summary. *Odonatologica* 27(3): 375-381. (in English).

[The history of dragonfly research in the Russian Far East is traced from 1856, and an annotated checklist is given of the 92 hitherto recorded regional species. The biogeographical affinities of the Far-Eastern Odonata - differentiated for 10 regions and 5 subregions - are briefly pointed out.]



Address: Haritonov, A.YU.; Laboratory of Insect Ecology, Biological Institute of the Siberian Branch of the Academy of Sciences, Frunze str. 11, RUS-630091 Novosibirsk, Russia.

337. **Heijden, A. van der (1998)**: Verslag van de lezingen van de Libellenstudiedag 1998 te Utrecht. Nieuwsbrief, Mededelingenorgan van de Nederlandse Vereniging voor Libellenstudie 2(2): 6-7. (in Dutch).

[report of the meeting of the Dutch odonatologists in Utrecht March 14, 1998; report on the dragonflies of Zeeland; turn-over of the dragonfly fauna of the bog of Fochteloeren; report on rare dragonflies near the Dutch - German border]

Address: not stated.

338. **Heise, S.; Schrack, M. (1998)**: Nachweis der Arktischen Smaragdlibelle (*Somatochlora arctica*) in der Radeburger Heide nördlich Dresden. Artenschutzreport 7 (1997): 37-39. (in German).

[status quo report on the distribution of *Somatochlora arctica* in the eastern Bundesländer of Germany; detailed description of the larval and imaginal habitat in the Radeburger Heide (Sachsen, Germany)]

Address: Heise, S., Bahnhofstr. 10, D-01471 Bärnsdorf, Germany.

339. **Held, J. (1998)**: Peregrines eating dragonflies. *Argia* 10(3): 16. (in English).

[At Montauk Point (Federal State?), USA, 18 *Falco peregrinus* (Aves) were observed eating - perched in trees - *Anax junius*.]

Address: Held, J.R., 639 West End Ave., New York, NY 10025, USA.

340. **Hermans, J. (1998)**: Oprichting Libellenstudiegroep van het Natuurhistorisch Genootschap. Nieuwsbrief, Mededelingenorgan van de Nederlandse Vereniging voor Libellenstudie 2(2): 1. (in Dutch).

[short report - illustrated with a map of the distribution of *Ichnura elegans* - on the status of the dragonfly record scheme in the province of Limburg (The Netherlands)]

Address: Hermans, J.T.; Hertestraat 21, NL-6067 ER Linne, The Netherlands.

341. **Hill, P. (1998)**: Insects reported during January - June 1998. *Atropos* 5: 62-65. (in English).

[comments on observation dates of 10 Odonata species including *Sympetrum fonscolombeii* and *Anax parthenope* from UK]

Address: Hill, P.M.; 1 Clive Cottage, London Road, Allostock, Knutsford, Cheshire WA16 9LT, UK.

342. **Hill, P.M. (1998)**: Migrant Hawker *Aeshna mixta* in Cheshire. *Atropos* 4: 37. (in English).

[range extension of *A. mixta* in Cheshire, UK]

Address: Hill, P.M.; 1 Clive Cottage, London Road, Allostock, Knutsford, Cheshire WA16 9LT, UK.

343. **Hoefnagel, W.-J. (1998)**: Libellenfenologie in 1998. NVL-Nieuwsbrief. Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie 3(2): 6-7. (in Dutch).

[Phenology of Odonata in 1998: listing offirst records, recorder, and locality of specimens in The Netherlands in 1998]

Address: Hoefnagel, W.-J., Kreekelmeent 72, NL 1218 ED Hilversum, The Netherlands.

344. **Holusa, O. (1998)**: An interesting gleaning behaviour by *Lestes virens* (Charp.) (Zygoptera: Lestidae). *Notul. odonat.* 5(2): 19-20.

[observation of taking a leafhopper (Homoptera) from a spider's net]

Address: Holusa, O., Muzeum Beskyd, prirodovedné oddeleni, Zámecké náměstí 1264, CZ-738 01 Frydek-Mistek.

345. **Holusa, O. (1998)**: The occurrence of groups of *Hemianax ephippiger* (Burm.) on the eastern coast of continental Greece (Anisoptera: Aeshnidae). *Notul. odonatol.* 5(1): 10. (in English).

Address: Holusa, O., Muzeum Beskyd, prirodovedné oddeleni, Zámecké náměstí 1264, CZ-738 01 Frydek-Mistek.

346. **Hong, S.J.; Ahn, J.H.; Woo, H.C. (1998)**: *Plagiorchis muris*: recovery, growth and development in albino rats. *Journal of Helminthology* 72(3): 251-256. (in English).

[*Metacercariae* of *Plagiorchis muris* (Plathelminthes: Digenea) were obtained from naturally infected dragonflies, *Sympetrum eroticum* (= second intermediate host)]

Address: Hong, S.J., Chung Ang Univ., Coll. Med., Dept. Parasitol., TONGJAK GU; Seoul 156756; South Korea.

347. **Horvath, G.; Bernath, B.; Molnar, G. (1998)**: Dragonflies find crude oil visually more attractive than water: Multiple-choice experiments on dragonfly polarotaxis. *Naturwissenschaften* 85(6): 292-297. (in English).

Address: Horvath, G., Dept. Biol. Phys., Eotvos Univ., Puskin U. 5-7, H-1088 Budapest, Hungary.

348. **Hunger, H.; Schiel, F.-J.; Röske, W. (1998)**: Die Gebänderte Heidelibelle - der Schmetterling unter unseren Libellen! *Naturschutzinformation der Schutzgemeinschaft Libellen in Baden-Württemberg* 4: 1. (in German).

[Compilation of data on the distribution of *S. pedemontanum* in Baden-Württemberg, Germany with notes on the habitat.]

Address: Röske, W., Kandelstr. 26, D-79106 Freiburg, Germany.

349. **Ishizawa, N. (1998)**: Thermoregulation in *Sympetrum frequens* (Selys) with notes on other *Sympetrum* species (Anisoptera: Libellulidae). *Odonatologica* 27(3): 317-334. (in English).

[Thermoregulation in *S. frequens* was investigated throughout its adult life, from emergence to reproduction. Data were analyzed by the least squares method. Body temperature was highly correlated to ambient temperature in the sun in the teneral stage and as the life stage advanced the correlation of body temperature to ambient temperature was lowered. Sexual differences were confirmed on thermoregulation; in the male the correlation decreased, whereas, in the female it decreased less. Males have lower body temperatures at high ambient temperatures than the females, and when ambient temperatures were low at the reproductive period in autumn, they maintained high body temperatures. The sexual difference of body temperatures ranged 2.5-3.4°C. This seem to be due to the sexual difference in body size. Females have smaller thorax and are likely to be influenced by ambient temperature. Because of the small thorax, females seem to be tolerant of high ambient temperature. High body temperature in ovipositing males were not caused by metabolic heat production at the tandem flight, but by the elevation of it during copulation. At low ambient tem-

peratures males were seen warming up at the last stage of copulation. Body temperature in non-contact ovipositing females approximated to that of ovipositing males in tandem and the duration of the former was shorter than that of the latter. *S. frequens*, in spite of small size and disadvantage for warm-up, is a periodic endotherm." Additional data are presented for *S. darwinianum*, *S. parvulum*, *S. eroticum*, *S. infuscatum*, and *Anotogaster sieboldii*.]

Address: Ischizawa, N., Yamaguchi 1644-15, Tokorozawa, Saitama 359-1145, Japan.

350. **Jacobsen, D.; Encalada, A. (1998):** The macroinvertebrate fauna of Ecuadorian highland streams in the wet and dry season. *Arch. Hydrobiol.* 142(1): 53-70. (in English).

[examination of the community structure and functional feeding groups of the macroinvertebrate fauna; "The abiotic environment of the streams was highly unstable with great variability in discharge during the wet season, but relatively constant during the short dry season. Overall, the number of individuals and species were significantly higher in the dry season than in the wet season. In all streams the composition of the fauna differed markedly between the two seasons, but no consistent change in the community structure and proportions of functional feeding groups was found ... Collector-browsers were the most numerous organisms while filterers, predators and shredders were much less important. Maximum stream temperature was the single environmental parameter that best explained the variability in community structure among the streams ... The instability of these tropical Andes streams is probably the main feature structuring the invertebrate fauna. The streams may be alternating between a stochastic community structure during the wet season and early successional stages dominated by organisms with a fast growth and high colonisation capacity during the dry season." 'Aeshnidae' are reported for 3 streams.]

Address: Jacobson, D.; Freshwater Biological Laboratory, University of Copenhagen, 51 Helsingorsgade, DK-3400 Hillerød, Denmark.

351. **Jarzembowski, E.A.; Martinez Delclos X.; Bechly, G.; Nel, A.; Coram R.; Escuillie, F. (1998):** The Mesozoic non-calopterygoid Zygoptera: description of new genera and species from the Lower Cretaceous of England and Brazil and their phylogenetic significance (Odonata, Zygoptera, Coenagrionoidea, Hemiphlebioidea, Lestoidea). *Cretaceous Research* 19 (3-4): 403-444. (in English).

[The earliest fossils which belong to the Coenagrionoidea (or Hemiphlebioidea), *Parahemiphlebia cretacea* gen. nov., sp. nov., and *P. allendaviesi* sp. nov., from the Lower Cretaceous of Brazil and southern England respectively, have non-petiolated wings. Consequently, a long wing petiolation may result from evolutionary convergence between different superfamilies of Zygoptera: Calopterygoidea, Lestoidea, Coenagrionoidea and (to a lesser degree) ... The phylogenetic position of the Lower Cretaceous genus *Cretacoenagrion* Jarzembowski 1990 from the Wealden of the Weald is discussed and several new genera and species of Wealden Zygoptera are described from southern England, viz. *Cretarchistigma greenwoodi* gen. nov., sp. nov. (questionably placed in the subfamily Euarchistigmatinae), *Cretahemiphlebia rossi* gen. nov., sp. nov. (family undetermined) and *Cretalestes martinae* gen. nov., sp. nov. (lestoid?)]

Address: Jarzembowski, E.A., Maidstone Museum and Art Gallery, Maidstone ME14 1IH, Kent, England.

352. **Jennions, M.D. (1998):** Tibial coloration, fluctuating asymmetry and female choice behaviour in the damselfly *Platycypha caligata*. *Animal Behaviour* 55(6): 1517-1528. (in English).

[The territorial damselfly *Platycypha caligata* (Odonata: Chlorocyphidae) has a courtship behaviour where males wave the white anterior surface of all six laterally enlarged tibiae at females. I experimentally altered this white tibial surface using black paint to determine the effect on male behaviour of a 25% reduction in area, or an increase in asymmetry between the left and right side of the body. I collected behavioural data on courtship, mating and fighting for males already holding territories. Neither a reduction in the area nor an increase in asymmetry of tibial whiteness affected male mating rate, courtship rate or fighting behaviour. ... However, the natural area of tibial whiteness was significantly positively related to both mean male mating rate and copulation duration for territorial males. This result suggests that a phenotypic correlate of area of tibial whiteness, probably body size, is sexually selected through female choice among males that already hold territories.]

Address: Jennions, M.D., Smithsonian Tropical Res. Inst., Unit 0948, APO AA 34002-0948, USA.

353. **Jödicke, R. (1998):** Autumnal dragonfly records from the Alanya region, Turkey. *Notul. odonatol.* 5(1): 10-11. (in English).

[6 localities in the foothills of the Taurus Mts were visited in second half of September; a list of 12 species including *Pantala flavescens* which is considered the westernmost record in Turkey, is presented]

Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany.

354. **Jödicke, R. (1998):** Extraordinary flight dates of *Ceagriion tenellum* (De Vill.) in NW Germany (Zygoptera: Coenagrionoidea). *Notul. odonat.* 5(2): 20-21. (in English).

[phenologic data mostly from Lower Saxony, Germany]

Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany.

355. **Jödicke, R. (1998):** Indizien für gelegentliches Abtauchen weiblicher *Lestes virens vestalis* Rambur bei der Eiablage (Zygoptera: Lestidae). *Libellula* 17(1/2): 107-108. (in German with English summary).

[Indication of occasionally submerged oviposition in female *L. virens* is evidenced by the fact that body and wings were completely coated with thin layer of damp mud, while the tandem males indicated no trace of mud.]

Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany.

356. **Johnson, J. (1998):** *Stylurus olivaceus* in Washington and Oregon. *Argia* 10(3): 20-22. (in English).

["During late summer of 1997, the known distribution of *S. olivaceus* in the Pacific Northwest changed significantly with discoveries of healthy populations along the lower Columbia River in Clark and Cowlitz Counties, Washington, and Multnomah County, Oregon", USA. (Author)]

Address: not stated.

357. **Johnson, J., Paulson, D. (1998):** *Enallagma civile* recorded in Oregon. *Argia* 10(3): 22-23. (in English).

Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA.

358. **Jurzitza, G. (1998):** Obituary: Luis Peña Guzman. *Notul. odonat.* 5(2): 22-23. (in English).  
Address: Jurzitza, G., Reimuthstr. 27, D-76187 Karlsruhe, Germany.

359. **Kalkman, V. (1998):** Nieuwe voortplantingsplaats Bandheidelibel (*Sympetrum pedemontanum*). NVL-Nieuwsbrief. Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie 3(2): 3. (in Dutch).  
[New reproduction locality of *S. pedemontanum*: report on the record of the species in the Netherlands region of Kempen]  
Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands.

360. **Kiauta, B. (1998):** An interesting old observation on dragonfly behaviour at the seaside, Indonesia. *Notul. odonat.* 5(2): 21. (in English).  
[note on behaviour of undetermined dragonflies of Pulu Panggang Island (Pulau Seribu Island, Java Sea, NW of Jakarta) from the beginning of the 20th century]  
Address: Kiauta, B., P.O. Box 256, NL-3720 AG Bilthoven, The Netherlands.

361. **Klass, K.D. (1998):** The proventriculus of the Dicondylia with comments on evolution and phylogeny in Dictyoptera and Odonata (Insecta). *Zoologischer Anzeiger* 237(1): 15-42. (in English).  
[Striking similarities in the proventriculi (gizzards) of Lepismatidae (*Zygentoma*), Blattellidae (Dictyoptera), and nymphal Corduliidae (Odonata) permit the reconstruction of the ground-plan of Dicondylia: Six major plicae, each with a large denticle-bearing sclerite anteriorly and a smaller pulvillus posteriorly, are present in a hexaradial arrangement. ... Within Odonata, Corduliidae are closest to the ground-plan, but the unpaired plicae are reduced. In the derived condition the proventriculus of Odonata has a tetradial symmetry with the bilateral symmetry lost. ... This study gives also insights into the evolution of symmetry relations and reveals some unusual aspects of serial homology. Many homoplasies were found in the evolution of the proventriculus of Dictyoptera and Odonata.]  
Address: Klass, K.D., Ludwigs Maximilian Univ., Inst Zool., Karlstr 23, D-80333 Munich; Germany.

362. **Klein, J.-P.; Berchtold, J.-P. (1998):** Les odonates des réserves naturelle rhénanes d'Erstein, d'Offendorf et de Rhinau (Bas-Rhin, France): statute et menaces. *Martinia* 14(1): 3-18. (in French with English summary).  
[commented checklist of the dragonfly fauna from 3 localities in the north-eastern most Département in France; between 1993 and 1996 44 species were recorded; 24 species listed in red data lists document the importance of the Rhine floodplain for dragonflies; the discovery of a population of *Leucorrhinia caudalis*, one of the most threatened dragonfly species in Europe, is of very special interest]  
Address: Klein, J.-P., Centre d'Analyses et de Recherches, Département d'Hydrologie et d'Environnement, Université Louis Pasteur, 76, route du Rhin, F-67400 Illkirch-Graffenstaden.

363. **Kleine-Büning, J.; Sander, U.; Koch-Siepe, M. (1998):** Naturschutzgroßprojekt Hammeniederung, Niedersachsen. *Natur und Landschaft* 73(7/8): 312-319. (in German with English summary).

["As part of the Teufelsmoor the 'Hammeniederung' is one of the last large-scale wetlands of northwest Germany. Due to extensive flooding in winter the area is important for northern migrating birds. In spring it provides an important breeding site for rare grassland birds. Since 1995, 2715 ha of the 'Hammeniederung' have been included in the Federal program for the establishment and protection of valuable natural areas and landscapes of national importance..."] *Aeshna viridis* is one of the 33 species of Odonata in this region.]  
Address: Kleine-Büning, J., c/o Landkreis Osterholz, Planungs- und Naturschutzamt, Osterholzer Str. 23, D-27711 Osterholz-Scharmbeck, Germany.

364. **Knitter, H. (1998):** In situ fixation of intact tandem linkages of Zygoptera in the field. *Odonatologica* 27(3): 383-390. (in English).  
["By means of the fixation of different copulation stages of 17 European species (16 Zygoptera, 1 Anisoptera) the possible use and limitation of a new fixation method, using chloroethane, is described. Only in 2 spp. did the fixation attempts fail. In 15 cases the contact points of the tandem linkage could be analysed. The best phase for fixation is the wheel position; only in *Lestes* and some *Coenagrionidae* is the postcopulatory tandem suitable as well. If both the inferior and superior male appendages act like forceps, as in *Calopteryx*, only a few attempts are necessary to yield fixations of high quality. In other species up to ten pairs are required to achieve satisfactory results to evaluate the contact points of the tandem linkage." (Author) Tandem linkages of *Platycnemis latipes*, *Lestes barbarus*, *Lestes virens* and *Coenagrion mercuriale* are pictured.]  
Address: Knitter, H., Institut für Ökologie und Evolutionsbiologie, Universität Bremen, Postfach 330440, D-28334 Bremen, Germany.

365. **Koperski, P. (1998):** Feeding in epiphytic, carnivorous insects: resource partitioning and the avoidance of intraguild predation. *Arch. Hydrobiol.* 142(4): 467-483. (in English).  
["The gut contents of larval *Enallagma cyathigerum* (Zygoptera: Odonata), *Cymus flavidus* (Polycentropodidae: Trichoptera) and *Ablabesmyia monilis* (Tanyptodinae: Chironomidae) feeding in nature and in experimental aquaria, were analysed. The diet of *C. flavidus* overlapped greater with the diet of *A. monilis* than with the diet of *E. cyathigerum*. Feeding intensity and diet composition in *C. flavidus* and *A. monilis* were different in experimental aquaria with and without *E. cyathigerum*. Weights of their food and mean weights of their prey were lower in the presence of the latter when compared with the control, while the number of prey items was not. The proportions of active prey items in diets of *C. flavidus* and *A. monilis* were higher in the presence of *E. cyathigerum* but the numbers of such prey items were higher in the diet of *C. flavidus* only. These differences are probably caused by reduced predator mobility during feeding, not by a behavioural response from prey. Induced changes in feeding activity are considered an effect of a behavioural defence mechanism reducing the risk of intraguild predation." (Author) Study site: Lake Ros in northern Poland]  
Address: Koperski, P., Dept Hydrobiol., Univ. Warsaw, Banacha 2, PL-02 097 Warsaw, Poland.

366. **Kuhn, J. (1998):** Ein neuer Fund von *Lestes macrostigma* (Eversmann) in Bayern (Zygoptera: Lestidae). *Libellula* 17(1/2): 97-101. (in German).



["A mature male was found in the Nature Reserve 'Murnauer Moos' in southern Bavaria on 14 August 1997, which is the first record in Germany since 1954. The site is characterized ecologically and its dragonfly fauna is listed. The Murnau-Garmisch-Mittenwald-Weilheim region is particularly rich in records of southern and eastern dragonfly species. Possible migration routes are briefly discussed."]

Address: Kuhn, Joachim, Umweltforschungszentrum Leizig-Halle, Permoser Str. 15, D-04318 Leipzig, Germany.

367. **Lasswell, J.L.; Mitchell, F.L.; Bjork, C. (1998):** Historical collection of Odonata from the Navasota river drainage in southeast Texas. *Southwestern-Entomologist* 23(2): 189-198.

[List of 46 dragonfly (Odonata: Anisoptera) and 22 damselfly (Odonata: Zygoptera) species collected from 65 sites throughout the Navasota River Drainage (8 families, 33 genera, and 68 species of Odonata).]

Address: Lasswell, J.L., Texas A and M Univ., Agric. Res. Extension Cent., Rt. 2 Box 00, Stephenville, TX 76402, USA.

368. **Laurent, S.; Papazian, M. (1998):** Les odonates de lagunes de l'île de Porquerolles (Département du Var). *Martinia* 14(2): 53-55. (in French with English summary).

[Due to the creation of water clearing basins in 1980 on the Island of Porquerolles in the Mediterranean Sea southeast of Toulon (France), 12 species of Odonata could be observed in the meantime. 11 of them are considered to find suitable breeding conditions in these basins, while prior the creation of the basins only one species was known (one record dated in 1977).]

Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France.

369. **Le Calvez, V.; Bernier, C. (1998):** Observation d'Odonates lors des VIIèmes rencontres internationales des clubs CPN (Frouville, département du Cal-d'Oise). *Martinia* 14(1): 22. (in French).

[report of the meeting with more than 400 participants of the French youth society "Connaître et Protéger la Nature"; between 21 and 25 August 1997; 14 species were recorded of which *Aeshna grandis*, *Cordulegaster boltonii*, and *Sympetrum danae* are considered of special interest for the region Île de France]

Address: Le Calvez, V., 3, allée Bullant, F-93290 Tremblay-en-France, France.

370. **Lederer, P. (1998):** New dragonfly records for New York. *Argia* 10(1): 10. (in English).

[*Erythrodiplax minuscula*, *Pantala hymenaea*, *Tramea abdominalis*]

Address: not stated.

371. **Leeper, D.A.; Taylor, B.E. (1998):** Insect emergence from a South Carolina (USA) temporary wetland pond with emphasis on the Chironomidae (Diptera). *Journal of the North American Benthological Society* 17 (1): 54-72. (in English).

[At Rainbow Bay, a 1.5 ha temporary wetland pond in South Carolina, 115 taxa of aquatic and semi-aquatic insects from 29 families representing 7 orders (Diptera, Coleoptera, Hemiptera, Trichoptera, Megaloptera, Odonata, Ephemeroptera) were collected using emergence traps from March 1992 through June 1993, a period including 2 hydroperiod cycles.]

Address: Leeper, D.A., Southwest Fla. Water Management District, 2379 Broad Street, Brooksville, FL 34609-6899, USA.

372. **Lempert, J. (1998):** *Erythromma viridulum* (Charpentier) und *Sympetrum fonscolombii* (Selys) auf Helgoland (Zygoptera: Coenagrionidae; Anisoptera: Libellulidae). *Libellula* 17(1/2): 109-112. (in German).

[northmost record of *E. viridulum*; northmost breeding record of *S. fonscolombii*; roosting behaviour (dormitories) of *E. viridulum*; checklist of 10 species based on a short visit from 31 July to 1 August 1997 on Helgoland (North Sea)]

Address: Lempert, J., Vereinsstr. 41, D-20357 Hamburg, Germany.

373. **Lempert, J. (1998):** Zum Fortpflanzungsverhalten von Libellen (Odonata) im Tropischen Regenwald von Liberia. In: Gaida, K.G. (Ed.): *Zeitvertreib. Wo sind WIR stehengeblieben*. Band II. Salon Verlag, ISBN 3-932189-63-9: 71-79. (in German).

[16 black and white photographs (mostly) demonstrating reproductive behaviour of Odonata from the tropical cloud forest in Liberia (Africa): *Prodasineura villersi*, *Chlorocnemis elongata*, *Chlorocypha glauca*, *C. selysi*, *C. dispar*, *Allorrhizucha klingi*, *Porpax bipunctulatus*, *Tetrathemis godiardi*, *Malgassophlebia bispina*]

Address: Lempert, J., Vereinsstr. 41, D-20357 Hamburg, Germany.

374. **Macklin, R. (1998):** Numbers of Yellow-winged Darter *Sympetrum flaveolum* at North Warren and Aldringham Walks RSPB reserve, Suffolk in 1995-1997. *Atropos* 4: 37-38. (in English).

Address: Macklin, R., Race Walk, Priory Road, Snape, Saxmundham, Suffolk IP17 1SD, UK.

375. **Male-Malherbe, E. (1998):** Confirmation de la présence d'une population d'*Epithea bimaculata* (Charpentier, 1825) dans le département de l'Indre (Odonata, Anisoptera, Corduliidae). *Martinia* 14(1): 30. (in French).

Address: Male-Malherbe, E., 38, La Gabrière, F-36220 Lingé, France.

376. **Malkmus, R. (1998):** Frühjahrsbeobachtungen von Libellen in Portugal. *Libellula* 17(1/2): 91-96. (in German).

[checklist of 26 species observed between 24 March and 15 April 1997 at 30 localities in southern and central Portugal; records of *Lestes macrostigma* or *Macromia splendens* are of some biogeographical resp. faunistical interest]

Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany.

377. **Manteifel, Y.B.; Zhushev, A.V. (1998):** Behavioural reactions of the tadpoles of four anuran species to chemical stimuli from predators. *Zhurnal Obshchei Biologii* 59(2): 192-208. (in Russian).

[Behavioural reactions of single tadpoles of 4 anuran species inhabiting Moscow region (*Bufo bufo* L., *Rana arvalis* Nilss., *R. lessonae* Cameron and *R. temporaria* L.) to 11 natural chemical stimuli were studied using the choice between test-stimulus and clean water (the control). These stimuli were excretions of potential predators (fish *Rutilus rutilus*, *Perca fluviatilis*, *Gymnocephalus cernuus*, *Perccottus glenii*, larvae of dragonfly *Aeshna grandis* or crayfish *Astacus astacus*), on alarm signal (extract of crushed conspecific tadpole), excretions of nonpredatory mollusc *Limnaea stagnalis* and conspecific tadpoles,

tadpoles, or, for comparison, potentially food stimuli (extract of the silt from native pool and extract of boiled nettle *Urtica dioica*). It was shown that tadpoles avoided most of stimuli, especially excretions produced by potentially predators (fish *R. rutilus*, *P. fluviatilis* and *P. glenii*, dragonfly larvae) as well as an alarm signal.]

Address: Manteifel, Y.B., Russian Acad. Sci., An. Severtsov Inst. Ecol. and Evolut., Leninsky Pr. 33, Moscow 117071, Russia.

**378. Marden, J.H.; Fitzhugh, G.H.; Wolf, M.R. (1998):** From molecules to mating success: Integrative biology of muscle maturation in a dragonfly. *American Zoologist* 38 (3): 528-544.

[Here we present an overview of a wide-ranging study of dragonfly muscle maturation that reveals i) ecological changes in the need for efficient versus high-performance flight, ii) organism-level changes in performance, thermal physiology, locomotor mechanics, and energy efficiency, iii) tissue-level changes in muscle ultrastructure and sensitivity to activation by calcium, and iv) molecular-level changes in the isoform composition of a calcium regulatory protein in flight muscle (troponin-T).]

Address: Marden, J.H., Dept. Biology, 208 Mueller Laboratory, Pa. State Univ., University Park, PA 16802, USA.

**379. Matura, T.; Nomura, K.; Kamatsu, K. (1998):** Ecological studies of odonate larvae living in artificial ponds in an urban area: Occurrence of larval *Sympetrum striolatum imitoides* and its life history in primary school swimming pools. *Japanese Journal of Ecology (Tokyo)* 48(1): 27-36. (in Japanese with English Summary).

[As a part of a research program on the ecology of odonate larvae inhabiting artificial ponds, we surveyed outdoor swimming pools of primary schools in Kyoto City every late spring. During a 4 year period, 11 species of odonate larvae (Libellulidae, Aeshnidae, Gomphidae and Coenagrionidae : 7, 1, 1 and 2 species, respectively) were collected. ...]

Address: Matura, T.; Nomura, K.: Dept. Biol., Kyoto Univ. Educ., Fushimi-ku, Kyoto 612-0863, Japan.

**380. Mauersberger, R. (1998):** Naturschutzprojekt Uckermärkische Seen, Brandenburg. *Natur und Landschaft* 73(7/8): 320-326. (in German with English summary).

["The central feature of the nature conservation project 'Uckermärkische Seen' in NE Germany is a glacially formed landscape containing many lakes, bogs and swamps of various types and several endangered Europe species of plants and animals ... The strategy of the project is to purchase areas which include ecosystems and habitats of national importance or these regions which have a bearing on it. One of the main problems for the project has been that state-owned properties have been sold to private persons or corporations in the eastern part of Germany with no regard for state-controlled and financed nature conservation projects." Among the most noteworthy Odonata of the region are *Nehalennia speciosa*, *Aeshna viridis*, *Gomphus vulgatissimus*, *Leucorrhinia pectoralis*, *L. albifrons* and *L. caudalis*.]

Address: Mauersberger, R., c/o Förderverein Feldberg-Uckermärkische Seenlandschaft e.V., Am Markt 12, D-17268 Templin, Germany.

**381. Mauffray, B. (1998):** Another new record for the U.S. from Arizona. *Argia* 10(3): 24. (in English).

[*Brechmorhoga pertinax*]

Address: Mauffray, B., 3906 N.W. 32nd Pl., Gainesville, FL 32606, USA. e-mail: iori@afn.org.

**382. Mauffray, B. (1998):** Some new Georgia Odonata records. *Argia* 10(3): 24. (in English).

[Additions to the Georgia Odonata list in prep.; 8 previously unrecorded species are listed: *Gomphus apoymius*, *G. diminutus*, *Ophiogomphus edmundo*, *O. mainensis*, *Helocordulia uhleri*, *Neurocordulia obsoleta*, and *Soma-tochlora tenebrosa*]

Address: Mauffray, B., 3906 N.W. 32nd Pl., Gainesville, FL 32606, USA. e-mail: iori@afn.org.

**383. May, M. (1998):** Comments on *Enallagma* problems. *Argia* 10(1): 24. (in English).

Address: May, M.L., Dept Entom. & Econ. Zool., Cook College, Rutgers Univ., New Brunswick, NJ 08903.

**384. May, M. (1998):** Erratum: New Jersey list. *Argia* 10(1): 26. (in English).

Address: May, M.L., Dept Entom. & Econ. Zool., Cook College, Rutgers Univ., New Brunswick, NJ 08903.

**385. May, M.L. (1998):** Body temperature regulation in a late-season dragonfly, *Sympetrum vicinum* (Odonata: Libellulidae). *International Journal of Odonatology* 1(1): 1-13. (in English).

["Body temperature regulation and behavioral responses to temperature variation in the field were investigated in *Sympetrum vicinum*, a common North American libellulid that is most abundant as a mature adult in autumn. Because of its late flight season, this species is faced regularly with cooler environmental temperatures than most dragonflies investigated heretofore. By virtue of postural adjustments and perch selection, individuals are able to maintain both thoracic and head temperatures within a relatively narrow range even at ambient temperature as low as 10 °C. Physiological adaptations, including relatively low minimum temperature for effective flight and relatively rapid digestive function at low temperature, also enhance their ability to cope with cool conditions. Copulation and tandem oviposition and mate guarding interfere with the ability to regulate body temperature, although oviposition was observed at air temperature as low as 14°C." (Author) study sites: various locations in Middlesex County, New Jersey, USA]

Address: May, M.L., Dept Entom. & Econ. Zool., Cook College, Rutgers Univ., New Brunswick, NJ 08903.

**386. Mayhew, P.J. (1998):** Daily activity rhythms in adult Odonata examined with a dynamic programming model. *Netherlands Journal of Zoology* 48(2): 101-119. (in English).

[I parameterize for adult male Odonata a published dynamic programming model which solves for optimal diurnal activity rhythms. ... The model makes explicit some general principles about the factors governing odonate activities and illustrates how some dynamic models may be applicable to a variety of biological systems.]

Address: Mayhew, P.J., Inst. Evol. Ecol. Sci., Kaiserstr. 63, P.O. Box 9516, 2300 RA Leiden, Netherlands.

**387. McLean, I.F.G. (1998):** Changes to the list of Protected Invertebrates in Britain. *Atropos* 5: 72-73. (in English).

[species included in lists of protected invertebrates in Britain are *Coenagrion mercuriale*, and - as addition by the Editors of *Atropos* - *Aeshna isosceles*. "It is illegal to collect, harm or disturb them in any of their stages"]

Address: McLean, I.F.G., JNCC, Monkstone House, City Road, Peterborough PE1 1JY. e-mail: mcleani@jncc.gov.uk.

388. **McPeck, M.A.; Peckarsky, B.L. (1998):** Life histories and the strengths of species interactions: Combining mortality, growth and fecundity effects. *Ecology* 79(3): 867-879. (in English).

[Here we develop a demographic model describing the life history of a hemimetabolous insect to evaluate the relative importance of predator effects on mortality and growth of damselflies (*Enallagma boreale*) in fishless ponds and mayflies (*Baetis bicaudatus*) in trout streams. Previous experiments have shown that dragonfly predators in fishless ponds inflict direct mortality and cause reduced growth rates in *Enallagma* damselflies.]

Address: McPeck, M.A. Dept. Biol. Sci., Dartmouth Coll., Hanover, NH 03755, USA.

389. **Mielewcyk, S. (1998):** Materials to the knowledge of the water entomofauna (Odonata, Heteroptera, Coleoptera) of the fishponds near Siedlce as the proposed nature reserve "Rybakówka". *Rocznik naukowy Polskiego towarzystwa ochrony przyrody "Salamandra"* 2: 109-118. (in Polish with English summary).

[The studies were carried out in the late spring and early autumn of 1997 in the fish ponds "Rybakówka" bordering the Siedlce town (eastern Poland). 15 species of Odonata, 15 of Heteroptera, and 30 of Coleoptera (water A-dephaga and Hydrophilidae) were recorded. A numerous occurrence of *Sympetma braueri* and larvae of *Orthetrum albistylum* is a characteristic feature of odonate fauna of these ponds. For *Orthetrum albistylum* is the northernmost locality in Europe. Predominating species among Coleoptera - *Halplus flavicollis* and *Laccophilus hyalinus* show cleanness of water and a low degree of eutrophy. From a quantitative point of view, entomofauna is fairly poor because it stays under feeding pressure from fish and water birds. Besides, because shore waters are densely overgrown with *Typha angustifolia* and *Phragmites communis*, unfavourable conditions for water insects are created. However, despite these elements, fauna of these ponds is interesting and needs further studies. The richness of flora and avifauna as well as species composition of water insects under study are the main arguments for postulating, a setting, up of a floristic-faunistic reserve of didactic nature." (Author)]

Address: Mielewcyk, S., Polska Akademia Nauk, Zakład Badan Środowiska Rolniczego i Lesnego, ul. Bukowska 19, PL-60-809 Poznan, Poland.

390. **Mitchell, R. (1998):** The behavior of *Arrenurus* larvae (Acari: Hydrachnidea) parasitizing diptera. *Acarologia* 39(1): 49-55. (in English).

[In order to parasitize an adult fly, larval water mites must be pulled through the surface film of the water by the fly as it emerges from the pupal skin. ... *Arrenurus* larvae attacking Odonata show a very different set of traits because they do not have to penetrate the surface of the water, and have minutes, rather than seconds, to selectively attach to hosts that can support hundreds, rather than tens of larval mites.]

Address: Mitchell, R., Acarol. Lab., Museum Biodiversity, 1315 Kinnear Road, Columbus, OH 43212, USA.

391. **Mochizuki, A. (1998):** Characteristics of digestive proteases in the gut of some insect orders. *Applied Entomology and Zoology* 33(3): 401-407.

[Gut proteases of 20 species from 13 insect orders were characterized by activity staining after polyacrylamide gel electrophoresis and the effect of class-specific protease inhibitors on their zymogram. Species in Orthoptera, Dictyoptera, Lepidoptera and Hymenoptera mainly had serine proteases in their gut. Those in Ephemeroptera, Odonata, Plecoptera and Hemiptera had cysteine proteases. Those in Coleoptera, Neuroptera, Mecoptera and Diptera had both serine and cysteine proteases in their gut. The protease class of each species tended to reflect phylogenetic relationship rather than feeding habit.]

Address: Mochizuki, A, Tohoku Natl. Agr. Exptl. Stn., Aki-ta 0140102; Japan.

392. **Mochizuki H.; Masuda, K.; Komaki, H. (1998):** Flow measurement around flapping dragonflies. *Memoirs of the Faculty of Agriculture (Kagoshima University)* 34 (43): 123-134.

[Flow patterns generated by the flapping of dragonflies (*Sympetrum frequens* and *Pantala flavescens*) were investigated in the wind tunnel]

Address: Mochizuki H.; Masuda, K.: Lab. Agric. Phys., Fac. Agric., Kagoshima Univ., Kagoshima, Japan.

393. **Moulton, K. (1998):** Dragonflies observed during hawk watch - Kestrels reveal how they catch them! *Argia* 10(3): 15-16. (in English).

[(1) Report on a dragonfly migration 15 miles north of Doylestone and in North Wales, Pennsylvania, USA. (2) Observation of a Kestrel who picked off 20 dragonflies within 15 minutes. "The capture technique was to come in front of rear, swoop underneath the dragonfly, flip upside down, talons up and extended, and capture the dragonfly from the belly side."]

Address: only e-mail stated: kirk.moulton@unisys.com.

394. **Müller, F.; Kolb, K.-H. (1998):** Das Birkhuhn (*Tetrao tetrix*) - Leitart der offenen Kulturlandschaft in der Hohen Rhön. *Artenschutzreport* 7(1997): 29-37. (in German).

[description of the habitat of *Tetrao tetrix* (Aves); documentation of the bioindication value of *T. tetrix* as shelter species for many highly endangered species including some Odonata; short checklist of Odonata including *Somatochlora arctica* and *Leucorrhinia pectoralis* from the nature protection reserve "Rotes Moor" (Bayern, Hessen, Germany)]

Address: Kolb, K.-H., Biosphärenreservat Rhön, Marktstr. 41, D-97656 Oberelsbach, Germany.

395. **Muzón, J.; Ellenrieder, N. von (1998):** Odonata. In Morrone, J.-J. & S. Coscarón (Eds.): *Biodiversidad de Artrópodos Argentinos. Una perspectiva Biotaxonómica*. Ediciones SUR: 14-25. (in Spanish with short English summary).

[This chapter on Odonata presents short but most recent information on current research on Odonata with special reference to the Argentine Odonata. In a more general part it documents current phylogenetic discussion on the Order Odonata, gives a general introduction in morphology and biology, and the economic and aesthetic importance of dragonflies. In the special Argentine part a short overview on odonatological history including surveys and collections is given. Some emphasis is given to systematics including a commented checklist of the 261 species so far known to Argentina (Appendix). Some remarks are made to biogeography, cytogenetics, and ecology of the Argentine Odonata. An extensive bibliography, including



the main literature closes this contribution on Argentine dragonflies.]

Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina.

396. **Nel, A.; Jarzembowski, E.A. (1998):** New protomyrmeleontid dragonflies from the Lower Cretaceous of southern England (Insecta, Odonata, Archizygoptera). *Cretaceous Research* 19 (3-4): 393-402. (in English).

[*Protomyrmeleon cretacicus* sp. nov.; *Saxomyrmeleon keatingei* gen. et sp. nov.; and a *Protomyrmeleontidae* gen. et sp. Indet.]

Address: Nel, A, Museum Natl. Hist. Nat., Entomol. Lab., 45 Rue de Buffon, F-75005 Paris, France.

397. **Nelson, S. (1998):** Dragonfly attacks Goldfinch! *Argia* 10(3): 15. (in English).

[Observation of an attack of (probably) *Libellula saturata* on two American Goldfinches (*Aves*) in a desert oasis in Harney County, Oregon, USA.]

Address: only e-mail of Sally Nelson stated: nelson4245@worldnet.att.net.

398. **Niedringhaus, R.; Zander, B. (1998):** Die Kleingewässer der Ostfriesischen Inseln. Zustandsanalyse und ökologische Bewertung anhand der Flora/Vegetation und der Wirbellosenfauna. Schriftenreihe Nationalpark Niedersächsisches Wattenmeer 3: 270 pp. (in German).

[detailed and extensively documented study on the Mollusca, Odonata, Coleoptera and Heteroptera of the pools in the Lower-saxony waddensea - Islands; Odonata are mentioned throughout the book, but mainly dealt with in chapter 6.12 (37 species)]

Source of supply: Bezirksregierung Weser-Ems, Nationalparkverwaltung, Virchowstr. 1, 26382 Wilhelmshaven, Germany.

399. **Nielsen, O.F. (1998):** De danske guldsmede. Danmarks Dyreliv 8. ISBN 87-88757-21-8. 279 pp. (in Danish).

[monographic book on the Danish Odonata throughout with colour pictures; introduction with brief historical notes on the investigation of Danish dragonflies, evolution of the order and notes on the systematic of Odonata including two pictures of fossil Danish Odonata, general notes on life cycle, short chapters on larvae, ecology (habitats), predation on dragonflies, and how to study and photograph dragonflies; the 53 (54) Danish species are treated as following: introductory remarks, morphology, habitat, biology, phenology, distribution in Denmark, southern Scandinavia and northern Germany; each monographic chapter provides pictures of male and female, of the habitat, and a distribution map; the monographic treatments follow a systematically ordered checklist including the vernacular names of the Danish dragonflies, an identification key for imagines and larvae, a short bibliography, Latin nomenclature of the mentioned vernacular names of plants, some addresses of regional dragonfly societies, and the register; the book on Danish dragonflies is in any sense up to date, for you can find a chapter on the most recent discovery of *Sympetrum fonscolombei* dated 3 September 1998; Abstracter's note: This book is a very sound and amazing one which should not be missing in the library of European odonatologists; there is only one disadvantage: it is written throughout in Danish, but the pictures are as intrusive as possible, so everyone at least may profit from this book from an aesthetic point of view. This makes it also very interesting for "the rest of the

world". The price is less than 50 EURO (< 100,- DM, < 60 \$, < 40 £. (M. Sch.).]

Address: Source of supply: Apollo books, Kirkeby Sand 19, DK-5771 Stenstrup, Denmark.

400. **Nikula, B. (1998):** *Sympetrum corruptum* on Cape Cod. *Argia* 10(3): 20. (in English).

["This is the first Massachusetts (and New England?) record in at least a couple of decades."]

Address: Nikula, B., 2 Gilbert Lane, Harwich Port, MA 02646, USA. e-mail: odenews@capecod.net.

401. **O'Brien, M. (1998):** Notes from Michigan. *Argia* 10(2): 8-9. (in English).

[*Somatochlora walshi*, *Nannothemis bella*, *Cordulegaster maculata*, *C. diastatops*, *Epitheca canis*]

Address: not stated.

402. **Osborn, R. (1998):** Odonata of Arlington, Texas. *Argia* 10(3): 16-17. (in English).

[Description of effects of algae and the aquatic macrophyte *Ludwigia peploides* on dominance and abundance of Odonata in the Trading Horse Creek.]

Address: not stated.

403. **Ott, J; Piper, W. (1998):** Rote Liste der Libellen (Odonata). Schriftenreihe für Landschaftspflege und Naturschutz 55: 260-263. (in German).

[Red list of the German dragonflies]

Address: Ott, J., Am Moosberg 10, D-67705 Stelzenberg, Germany.

404. **Ott, J. (1998):** Feuerlibelle erobert die Pfalz. Die Rheinpfalz 218/1998 (19. Sept. 1998): (in German).

[report in a regional newspaper on the successive invasion of *Crocothemis erythraea* to Rhineland-Palatinate which is attributed to climatic change; 1967 *C. erythraea* was for the first time recorded in the region, but can now be observed in many parts of Rhineland-Palatinate]

Address: Ott, J., Am Moosberg 10, D-67705 Stelzenberg, Germany.

405. **Papazian, M. (1998):** Chronique de l'insolite: (1 ère note) *Crocothemis erythraea* (Brullé, 1832) et la chenille, *Sympetrum striolatum* (Charpentier, 1840) et la pluie. *Martinia* 14(2): 75-76. (in French with English summary).

[*C. erythraea* caught a caterpillar of *Scrobipalpa salinella* (Zeller, 1847) (Lepidoptera: Gelechiidae); *S. striolatum* oviposited into a hole of a road after a sudden shower]

Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France.

406. **Papazian, M.(1998):** Unusual refusal behavior of a female of *Platycnemis pennipes* (Pallas, 1771) (Odonata, Platycnemididae). *Entomologiste* 54(1): 27-32. (in French with English summary).

Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France.

407. **Parr, A. (1998):** Lesser Emperor *Anax parthenope* in Britain during early 1998. *Atropos* 5: 66. (in English).

[1998 discoveries from Cornwall and Suffolk, and the Netherlands are dealt with]

Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK.

408. **Parr, A. (1998):** New Odonata Records Committee. *Atropos* 5: 72. (in English).

[information on the establishment of the British Odonata Rarities Committee, its task is to check and verify observations of immigrants to UK]

Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK.

409. **Parr, A. (1998):** Potential new dragonflies for the British list: 1. The possible occurrence of nearctic species in western Europe. *Atropos* 4: 18-21. (in English).

[descriptions and colour pictures of possible transatlantic immigrants from the North American continent to western Europe; detailed comparison of morphological key features of the European *Anax imperator* and the North American *Anax junius*]

Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK.

410. **Parr, A. (1998):** Red-veined Darter *Sympetrum fonscolombei* in Britain during early 1998. *Atropos* 5: 67. (in English).

[reports of sightings from Cornwall, London, Dorset, Norfolk, and Isle of Man; short information on autochthonous populations of *S. fonscolombei* in UK]

Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK.

411. **Parr, A. (1998):** Winter dragonfly sightings in Britain during early 1998. *Atropos* 5: 13-16. (in English).

[compilation of the winter dragonfly sightings in 1998: 10 January - 18 March; due to unexperience of recorders or unsuitable observation conditions it was in most cases impossible to identify the specimens; it is speculated that the identity in most cases will be that of *Anax ephippiger*, but other species should also have been involved in this immigration; a list of records with the known observations of *Anax ephippiger* is attached]

Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK.

412. **Parr, A.J. (1998):** Migrant and dispersive dragonflies in Britain during 1997. *J. Br. Dragonfly Soc.* 14(2): 52-58. (in English).

[reports are made to the following species: *Aeshna mixta*, *Aeshna* (*Anaciaeschna*) *isosceles*, *Anax parthenope*, *Libellula depressa*, *L. quadrimaculata*, *Orthemis cancellatum*, *Crocothemis erythraea*, *Sympetrum striolatum*, *S. vulgatum*, *S. fonscolombei*, *S. flaveolum*, *S. sanguineum*, *S. danae*]

Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK.

413. **Paulson, D. (1998):** Blue eye color and acetone. *Argia* 10(1): 25. (in English).

Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA.

414. **Paulson, D. (1998):** New common names for U.S. Odonata. *Argia* 10(1): 8. (in English).

[*Orthemis discolor* is named "Orange-bellied Skimmer"]

Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA.

415. **Paulson, D. (1998):** The distribution and relative abundance of the sibling species *Orthemis ferruginea* (Fabricius, 1775) and *O. discolor* (Burmeister, 1839) in North and Middle America (Anisoptera: Libellulidae). *International Journal of Odonatology* 1(1): 89-93. (in English).

[discussion of the morphological differences between the two sibling species; detailed examination by locality of the specimens in the D.R. Paulson collection with emphasis on Mexico and Costa Rica; figure of seasonal distribution of both species in the Guanacaste Province, Costa Rica based on the specimens in the D.R. Paulson collection; the author points out the importance of collections for solving zoogeographical problems concerning the two species]

Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA.

416. **Paulson, D. (1998):** What a difference a depth makes. *Argia* 10(3): 14-15. (in English).

[The different abundance and species richness on two different water bodies (shallow storm-water retention pond and Square Lake) in Kitsap County, Washington, USA is explained by absence of fish predators and water temperature in the shallow pond. The cold water in the lake hampered development of larvae.]

Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA.

417. **Paulson, D.R. (1998):** Possible morphological and behavioral male mimicry in a libellulid dragonfly *Erythrodiplax umbrata* (L.) (Anisoptera: Libellulidae). *Odonatologica* 27(2): 249-252. (in English).

[study site: Cancún, Quintana Roo, Mexico, on 17 November 1983]

Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA.

418. **Paulson, D.R. (1998):** Variation in head spines in female *Ophiogomphus* with a possible example of reproductive character displacement (Anisoptera: Gomphidae). *Bull. American Odonat.* 5(3): 55-58. (in English).

["Females of at least 8 of the 19 species of *Ophiogomphus* in North America vary in presence or absence, as well as size and shape, of spines on the occiput or rear of the head. In most cases spines that may be absent are only poorly developed when present, but in *O. morrisoni* Selys, females are either spineless or have welldeveloped occipital spines. At one locality intermediate specimens occur, but at another the population is dimorphic, either spineless or spined. The presence of both continuous variation and discrete polymorphism in different populations of a species has not been reported in dragonflies and is considered quite unusual in animals. The spined females occur only in the part of the range of *morrisoni* that overlaps that of *O. severus* Hagen, the only consistently spineless species of the genus, and they may represent an example of reproductive character displacement, also rarely reported for dragonflies and other animals." (Author)]

Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA.

419. **Pinratana, A. (1998):** *Malangpo* 15, Editorial. *Malangpo* 15: 131. (in English).

[The present number of members of the Thai National Office of the Societas Internationalis Odonatologica is eight. Bro. A. Pinratana lists the foreign odonatologists who contributed to the newsletter *Malangpo* in the past years; without their help "we would not have sufficient materials for the publication of our newsletter". He also invites odonatologists to visit Thailand especially in the rainy season for many new Thai records, and even new species are still to be expected.]

Address: Pinratana, Bro Amnuay, Saint Gabriel's College, Bangkok 10300, Thailand.

420. **Pither J.; Taylor, P.D. (1998):** An experimental assessment of landscape connectivity. *Oikos* 83(1): 166-174. (in English).

[We experimentally assess the relative movement abilities of two sympatric, ecologically similar species of damselfly, *Calopteryx maculata* and *Calopteryx aequabilis* (Odonata: Calopterygidae) within two structurally dissimilar habitat types, forest and pasture]

Address: Taylor, PD, Acadia Univ., Atlantic Cooperat. Wildlife Ecol. Res. Network, Dept. Biol, Wolfville, NS B0P 1X0, Canada.

421. **Plomer, W. (1998):** Dragonfly love. *Argia* 10(1): 29-30.

[see: Corbet, P. (1998): Correction: authorship of poem in previous issue. *Argia* 10(2): 15]

422. **Prendergast, E.D.V. (1998):** A few Odonata from Ethiopia. *International Journal of Odonatology* 1(1): 94-96. (in English).

[A few specimens of Odonata were caught in the framework of a scientific expedition with bats as research objects. Most interesting are two records of *Anaciaeschna triangulifera* and *Brachythemis leucosticta* in mist nets which indicate a crepuscular behaviour of the species. Aberrant ante-nodal crossveins of forewings of the rare Ethiopian *Orthetrum kristensi* are figured.]

Address: Prendergast E.D.V., Manor House, Bagber, Sturminster Newton, Dorset DT10 2EY, United Kingdom.

423. **Proess, R.; Baden, R. (1998):** Die Libellen der Fließgewässer Luxemburgs. Teil 2: Süden und Osten des Landes (Insecta, Odonata). *Bull. soc. nat. luxemb.* 99: 119-132. (in German with English summary).

[In 1996 the northern part of Luxembourg was investigated from Odonata of running waters. In 1997 this investigation was completed in the south of the country. 28 localities in 10 brooks were surveyed. Habitat parameter of *Calopteryx virgo*, *Platycnemis pennipes*, and *Pyrrhosoma nympha* are treated with some detail.]

Address: Proess, R., 1, rue du Moulin, L-7423 Dondelange, Luxembourg.

424. **Proess, R. (1998):** Erstnachweis von *Leucorrhinia caudalis* (Charpentier, 1840) (Zierliche Moosjungfer) in Luxemburg (Insecta, Odonata). *Bull. soc. nat. luxemb.* 99: 133-135. (in German with English summary).

[9 June 1997 the very rare dragonfly species *Leucorrhinia caudalis* has been reported for the first time in Luxembourg: Goepsweier (6°60'E, 49°39' N).]

Address: Proess, R., 1, rue du Moulin, L-7423 Dondelange, Luxembourg.

425. **Proess, R.; Gerend, R. (1998):** Rote Liste der Libellen Luxemburgs (2. Fassung: Stand 1998) (Insecta, Odonata). *Bull. soc. nat. luxemb.* 99: 137-148. (in German with English summary).

[“A Red Data List considering 61 species is elaborated for the dragonfly fauna of Luxembourg. Each species is attributed to one of 8 categories according to the criteria defined by Schnittler & Ludwig (1996)”, *Schriftenreihe für Vegetationskunde* 28: 709-739.” The actual status is compared to that of the nineteen-fifties (Hoffmann 1960), although 11 species had not previously been mentioned by this author. 13 species (21 %) are considered to be extinct and only 17 (28 %) may be considered safe (un-

threatened). Further more a list of the 10 most important dragonfly sites of Luxembourg is presented along with an account of their odonate fauna.” (Authors)]

Address: Proess, R., 1, rue du Moulin, L-7423 Dondelange, Luxembourg.

426. **Prot, J.-M. (1998):** Reproduction d'*Hemianax ephippiger* (Burmeister, 1839) dans le département du Jura (Odonata, Anisoptera, Aeshnidae). *Martinia* 14(1): 19-22. (in French with English summary).

Address: Prot, J.-M., 10, rue du Binveau, F-70210 Vauvilliers, France.

427. **Pudwill, R. (1998):** Fluß- und Quelljungfern (Anisoptera: Gomphidae und Cordulegastridae) im Raum Gifhorn (Ost-Niedersachsen). *Braunschweiger naturkundliche Schriften* 5(3): 541-549. (in German with English summary).

[The distribution of Gomphidae and Cordulegastridae was mapped along the streams in the area of Gifhorn in Lower Saxony, Germany. *Gomphus vulgatissimus*, *Gomphus pulchellus*, *Ophiogomphus cecilia* and *Cordulegaster boltonii* are present in the investigated streams. The emergence and effects of stream maintenance are discussed. Highest abundance of species was in brooks without stream maintenance.]

Address: Pudwill, R., Böttcherstr. 3, D-38518 Gifhorn, Germany.

428. **Reder, G. (1998):** Herbstfunde von *Somatochlora metallica* (Vander Linden) (Anisoptera: Corduliidae). *Libellula* 17(1/2): 113-115. (in German).

[phenology, extended flight period in October, Rhineland-Palatinate]

Address: Reder, Gerd, Am Pfortengarten 37, D-67592 Flörsheim-Dalsheim, Germany.

429. **Reinhardt, K. (1998):** Reproductive behaviour of *Leucorrhinia albifrons* (Burmeister) in a non-territorial situation (Anisoptera: Libellulidae). *Odonatologica* 27(2): 201-211. (in English).

[“The reproductive behaviour in a high-density situation of the sp. was investigated in northern Poland in 1993 and 1995. Because of their high density, males were non-territorial. After a very brief tandem flight copulations took place either on the ground or in the surrounding pine trees and lasted, on average, 640 s. Afterwards the male guarded the female while she was on post-copulatory rest (PCR). During PCR [...] the male bent his abdomen tip up to the basal segments after a mean time of 81 s. This behaviour was interpreted as intra-male sperm translocation. Oviposition took place over open water. During the time of mating, from 10:00 h to about 17:00 CEST, almost none of the observed ovipositions was completed undisturbed. Outside this time, half of the ovipositions observed were completed undisturbed. The latter lasted 34 s, in which the female had an average frequency of 0.6 to 1.9 dips per s. Eleven hand-held ovipositions revealed a mean egg number of 327 eggs per female and a mean egg flow rate of 4.6 eggs s<sup>-1</sup>. It is concluded that the mating system of *L. albifrons* is best described as a combination of resource limitation and female control. Some known effects of high male density on the reproductive behaviour of the Libellulidae are discussed.” (Author)]

Address: Reinhardt, K., Hauptstr. 38, D-09244 Oberlichtenau, Germany.



430. **Rith-Najarian, J.C. (1998):** The influence of forest vegetation variables on the distribution and diversity of dragonflies in a northern Minnesota forest landscape: a preliminary study (Anisoptera). *Odonatologica* 27(3): 335-351. (in English).

["Dragonfly communities were surveyed at 24 sites in 2 adjacent study regions, during the summer of 1994. In each of the 2 regions, 12 sites were grouped into 3 different study areas based on forest status. Forest status was determined by stand age and time since last logging disturbance, resulting in study areas defined as old-growth forest, mature second-growth forest, or recently clear-cut areas. Study sites within each forest-status study area included stream, pond, lake, and bog/swamp habitats. Recently-cleared forest areas exhibited the lowest species number and species diversity, while the greatest species number and diversity were found in the old-growth study areas. These differences were correlated with different vegetation structure variables characteristic of each forest-status study area. Furthermore, Beta-diversity, indicating changes in species composition across the forest-status gradient in each study area, was greater between the sites adjacent to the smallest old-growth forest "habitat island". These findings may be of importance in understanding dragonfly response to forest disturbance in the northern Minnesota landscape mosaic."]

Address: Rith-Najarian, J.C., River's Edge Geographics, P.O. Box 453, Bemidji, MN 56619, United States.

431. **Röske, W. (1998):** Das Artenhilfsprogramm Helm-Azurjungfer. Schutzgemeinschaft Libellen in Baden-Württemberg (Hrsg.): Wiesenbäche und -gräben - Ökologie, Bedeutung und Unterhaltung. Referate und Ergebnisse der Tagung der Schutzgemeinschaft Libellen in Baden-Württemberg am 28. und 29. April 1998 in Umkirch: 5-6. (in German).

[summary of the results of an action plan to protect *Coenagrion mercuriale* and their habitats in Baden-Württemberg (Germany), special emphasize is given to the importance of ditch management on the populations of *C. mercuriale*]

Address: Röske, W., IFÖ, Kandelstr. 26, D-79106 Freiburg, Germany.

432. **Ruddek, J. (1998):** 17. Jahrestagung der GdO in Bremen. 20.-22. März 1988. Tagungsband. Hefte der Bremer Libellengruppe 5: 1. (in German or English).

[Booklet with the abstracts of posters and papers read at the 17th meeting of the Association of the German-speaking odonatologists: H. Fliedner: Die Lüneburger Libellenfauna vor 150 Jahren; - J. Müller: Neuigkeiten zum Vorkommen von *Gomphus flavipes* und *Ophiogomphus cecilia* in Elbe und Weser; - C. Schütte: Diapause bei *Gomphus flavipes* und *Ophiogomphus cecilia* im Eistadium; - J. Adena & K. Handke: Zur Libellenfauna neu angelegter Gewässer im Bereich des Niedervielandes in Bremen; - H. Wildermuth: Wie finden Vierfleck und Plattbauch zum Rendezvous?; - F. Perl: Eine ehemalige Sandgrube im Kreis Celle: Lebensraum für die Späte Adonislibelle *Ceriatagrion tenellum*; - K.G. Leipelt & M. Gasse: Das Verhalten von *Aeshna affinis* in Norddeutschland; - C. Zeiss: Was kann der Mann? *Coenagrion puella* Männchen als Prädationsschutz für die Weibchen bei der Eiablage; - M. Lindeboom: Territorialverhalten der Gebänderten Prachlibelle *Calopteryx splendens*; - R. Buchwald, N. Böhler & A. Schmidt: Welche Faktoren bestimmen die allo- und syntopen Vorkommen der Prachlibellen am Oberrhein (Baden-Württemberg, Elsaß)? - S.

Klostermann: Ethoökologische Untersuchungen an *Oncygomphus forcipatus*; - S. Werzinger: Biotoppräferenzen von Imagines der Grünen Keiljungfer *Ophiogomphus cecilia* im engeren und weiteren Umfeld kleiner Flüsse und Bäche des NW Mittelfranken; - R. Stoks: Long-term costs of lamellae loss in a damselfly; - B. Trockur: Stand der Libellenerfassung im Saarland; - F. Weihrach: Die Emergenz von *Orthetrum coerulescens* an einem Entwässerungsgraben des Flughafens München im Frühsommer 1997; - H. Klugkist: Ergebnisse mehrjähriger Emergenzuntersuchungen an *Aeshna viridis* und *Aeshna grandis* im Hollerland (Bremen); - E. Schmidt: Invasionsarten (*Sympetrum* [*Tarnetrum*] *fonscolombii*, *S. flaveolum*, *Lestes barbarus*) auf Amrum 1996/97; - H. Knitter: Der Zangengriff als Merkmal der Systematik und Phylogenie von Kleinlibellen; - H. van Gossum, R. Stoks & L. de Bruyn: Colour poly-morphismus to the females of the damselfly *Ischnura elegans*; - C. Willigalla: Beitrag zur Ökologie von *Lestes dryas*; - J. Kuhn: Libellen im Mauermauer Moos (Oberbayern): Lebensräume und Naturschutzprobleme; - F.J. Schiel: Aktuelle Verbreitung, ökologische Ansprüche und Artenschutzprogramm von *Leucorrhinia pectoralis* im baden-württembergischen Alpenvorland; - M. Winterholler: Bestandsentwicklung ausgewählter, südlicher Libellenarten in Bayern; - R. Stephan: Untersuchungen im Tagebau Berzdorf; - Mauersberger, R.: Versuch zur anthropogenen Populationsgründung bei *Nehalennia speciosa*; - Martens, A.: Schließt sich die große Lücke? - Die derzeitigen Verbreitungsgrenzen von *Cercion lindenii* in Deutschland; Martens, A. & M. Gasse: *Aeshna affinis* in Deutschland - Wie soll man die Funde interpretieren?; - Greenen, S., K. Jordaens, - R. Stoks & L. De Bruyn: Morphological and genetical differences between populations of *Lestes viridis*; - Vlack, F., R. Stoks & L. De Bruyn: A mark-recapture study of imaginal *Sympetrum striolatum*]

Address: Ruddek, J., Butendiek 34, D-28865 Lilienthal, Germany.

433. **Ruddek, J. (1998):** Dragonflies exhibited in the Zoological Museum, St. Petersburg, Russia. *Notul. odonat.* 5(2): 21-22. (in English).

Address: Ruddek, J., Butendiek 34, D-28865 Lilienthal, Germany.

434. **Ruddek, J. (1998):** *Leucorrhinia albifrons* (Burm.) in coastal W France (Anisoptera: Libellulidae). *Notul. odonatol.* 5(1): 11. (in English).

[record from the westernmost limit of the known range of *L. albifrons* 25 km S of the Gironde mouth (18 July 1993)]  
Address: Ruddek, J., Butendiek 34, D-28865 Lilienthal, Germany.

435. **Ruddek, J. (1998):** *Macrodiplax cora* (Br.) new for Lombok, Indonesia (Anisoptera: Libellulidae). *Notul. odonatol.* 5(1): 11. (in English).

Address: Ruddek, J., Butendiek 34, D-28865 Lilienthal, Germany.

436. **Ryazanova, G.I.; Mazokhin-Porshnyakov, G.A. (1998):** Cannibalism of predatory insects: Selecting conspecific prey in Odonata larvae. *Zoologicheskoy Zhurnal* 77(2): 191-195. (in Russian).

Address: Ryazanova, G.I., Dept. Entomol., Fac. Biol., Mosc. State Univ., Moscow, Russia.

437. **Ryazanova, G.I. (1998):** Territorial competition as the cannibalism suppression mechanism in larval odona-

tes. Vestnik Moskovskogo Universiteta (Seriya XVI Biologiya) 1998 (2): 30-35. (in Russian with English summary). [Laboratory experiments with larvae of *Calopteryx splendens*]

Address: Ryazanova, G.I., Dept. Entomol., Fac. Biol., Mosc. State Univ., Moscow, Russia.

438. **Sage, B. (1998)**: A Hertfordshire record of the Small Red Damselfly *Ceragrion tenellum* (Villers). J. Br. Dragonfly Soc. 14(2): 60. (in English).

[correction of a wrong interpretation of the Hertfordshire record of *C. tenellum* from 1959 done by Gladwine (1997), Trans. Hertfordshire nat. hist. soc. 33: 56-61]

Address: Sage, B., Waverney House, Waverney Close, Wells-next-the-Sea, Norfolk NR23 1HU, UK.

439. **Samu, S. (1998)**: Zum Habitatschema der Mond-Azurjungfer (*Coenagrion lunulatum*) in Nordwest-Mecklenburg. Artenschutzreport 7(1997): 15-20. (in German).

[very detailed and well documented description of the habitat of *Coenagrion lunulatum* in northwestern Mecklenburg-Vorpommern, Germany; special emphasize is given on oviposition and the importance of vegetation in the (oviposition-) habitat of *C. lunulatum*; checklist of co-occurring Odonata (25 specimens); protection measures are proposed for this rare species]

Address: Samu, S., Gärtner Str. 5, 10245 Berlin, Germany.

440. **Samways, M.J. (1998)**: Establishment of resident Odonata populations on the formerly waterless Cousine Island, Seychelles: an island biogeography theory (IBT) perspective. *Odonatologica* 27(2): 253-258. (in English).

Address: Samways M.J., Invertebrate Conservation Research Centre, Dept Zool. & Entomol., University of Natal, P/Bag X01, Scottsville 3209, Pietermaritzburg, South Africa.

441. **Sawada, K. (1998)**: Sperm precedence in the damselfly *Ischnura senegalensis* (Rambur): is prolonged copulation advantageous to sperm precedence? (*Zygoptera*: *Coenagrionidae*). *Odonatologica* 27(4): 425-431. (in English).

[To understand the relationship between copulation duration and sperm precedence in *I. senegalensis*, which mate for several hours, laboratory experiments and field observation were conducted. By irradiated male techniques, P2 value (sperm precedence of the last male to mate) was measured. P2 value was almost 100 % until 2 days after copulations regardless of the copulation duration. The interval between copulations in a female was about 2.3 days in the field. It is suggested that the last male to mate gains advantages in sperm precedence regardless of the copulation duration in the field. And complete sperm mixing (the point when the P2 value was 50 %) occurred 6 days after copulation." (Author)]

Address: Sawada, K.; Kashii High School, 2-9-1, Kashii, Hiagashi-ku, Fukuoka, 813-0011, Japan.

442. **Schiel, F.-J.; Buchwald, R. (1998)**: Aktuelle Verbreitung, ökologische Ansprüche und Artenschutzprogramm von *Leucorrhinia pectoralis* (Charpentier) (Anisoptera: Libellulidae) im baden-württembergischen Alpenvorland. *Libellula* 17(1/2): 25-44. (in German with English summary).

[Survey of *L. pectoralis* in the prealpine zone of the Federal State Baden-Württemberg (Germany) with special emphasize on distribution, habitat, threats, and conservation measures, "With one exception, all larval habitats are

meso- to slightly eutrophic peat diggings. The open water surface of the larval habitats is covered by various vertical and horizontal vegetation structures to an extent of 10-80%, that of 'optimal' habitats to an extent of 20-60%." The main threat-factor is "natural succession of vegetation" in the larval habitats, predominantly caused by wash-out of fertilizers from adjacent meadows.]

Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Friesenheimer Hauptstr. 20, 77948 Friesenheim, Germany.

443. **Schiel, F.-J.; Hunger, H.; Röske, W. (1998)**: Die Frühe Heidelibelle - eine bodenständige Art in Baden-Württemberg? *Naturschutzinformation der Schutzgemeinschaft Libellen in Baden-Württemberg* 5: 1. (in German).

[Compilation of data on the distribution of *S. fonscolombei* in Baden-Württemberg, Germany with notes on the habitat. It is likely that the population is dependent from sources south(west) of Baden-Württemberg.]

Address: Röske, W., Kandelstr. 26, D-79106 Freiburg, Germany.

444. **Schnack, J.A., Muzón, J.; Perez Goodwyn, P. J. (1998)**: Belostomatidae (Heteroptera) en el área de influencia de la Central Nuclear Atucha. *Inventario y estudio poblacional*. *Aquatec* 5: 53-57. (in Spanish with English summary).

[Belostomatidae (Heteroptera) in the area influenced by the Atucha Nuclear Plant. Inventory and population study. "The present work is a preliminary inform about population dynamics and species inventory of Belostomatidae (Heteroptera) and [...] Odonata present in the influence area of the Nuclear Power Plant Atucha. The studies were carried out from 12/1994 to 11/1995 at three different sites. The Belostomatidae and Odonata taxocenosis were composed of 10 (2 genera) and 17 species (3 families, 12 genera) respectively. Reproductive trends and structure of a population of *Belostoma oxyurum* were analyzed based primarily on the recorded values of potential (mean number of mature eggs per female) and actual (mean number of fertilized eggs per carrier male) fecundities, sex ratio and life cycle." (Authors). 17 species of Odonata, in most cases identified to species level, are listed.]

Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina.

445. **Schneider, W.; Dumont, H.J. (1998)**: Checklist of the dragonflies and damselflies of Soqotra Island (Insecta: Odonata). *Proceedings of the First International Symposium on Soqotra Island: Present and Future*, Aden 1996. Dumont, H.J. (Ed.): *Conservation and Sustainable Use of Biodiversity of Soqotra Archipelago*, Technical Series, Vol. 1: 219-231. (in English).

["So far, 18 species of Odonata (four Zygoptera, 14 Anisoptera) have been recorded from Soqotra Island. All but one (*Enallagma granti*) are known from Yemen and/or from E-Africa (Somalia, Eritrea, Ethiopia). The predominance of Afrotropical species (11) indicates a strong African influence on the dragonfly fauna of Soqotra. Due to its geographical position, its physiography, and the number of species recorded from neighbouring countries (Somalia: 55, Yemen: 33) it can be expected that intensive collecting will increase the list of Soqotran Odonata. The odonatological results of a short field trip to Soqotra in March 1996 are put on record."]

Address: Schneider, W., Hess. Landesmus., Zool. Abt., Friedensplatz 1, D-64283 Darmstadt, Germany.

446. **Schorr, M.; Schneider, W.; Dumont, H. (1998):** Ecology and distribution of *Lindenia tetraphylla* (Insecta, Odonata, Gomphidae): a review. *International Journal of Odonatology* 1(1): 65-88. (in English).  
[review of published and unpublished information on ecology, phenology, and geographical distribution of *L. tetraphylla*; all available records are listed in a table and mapped; the species is considered endangered because of increasing tourism, irrigation and oil/gas exploitation]  
Address: Schorr, M., Waldfrieden 25, D-54314 Zerf, Germany. e-mail: foeatrier@aol.com.
447. **Schütte, C. (1998):** Überwinterung der Eier von *Gomphus flavipes* (Charpentier) und *Ophiogomphus cecilia* (Fourcroy) (Anisoptera: Gomphidae). *Libellula* 17 (1/2): 59-70. (in German with English summary).  
["Egg development of both species was monitored at different temperatures and daylight regimes in the laboratory and under field conditions from August 1996 to June 1997. The eggs of *O. cecilia* developed directly and hatched throughout the winter whereas in *G. flavipes* diapause lasted from November to at least February at temperatures below 16°C, no matter what daylength was employed. This is interpreted as an oligopause. The differences in life-styles of both species are discussed."]  
Address: Schütte C., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany.
448. **Silsby, J. (1998):** *Tetrathemis polleni*, its reproductive behaviour and preferred habitat. *International Journal of Odonatology* 1(1): 96-97. (in English).  
[report on the diel periodicity of *T. polleni* with stress on oviposition; study site: pond at the Sabie River at Hazyview in Eastern Transvaal, South Africa]  
Address: Silsby, J., 1, Haydn Avenue, Purley, Surrey, CR8 4AG, UK. e-mail: jsilsby1@aol.com.
449. **Siva-Jothy, M.T.; Tsubaki, Y.; Hooper, R.E. (1998):** Decreased immune response as a proximate cost of copulation and oviposition in a damselfly. *Physiological Entomology* 23 (3): 274-277. (in English).  
[Males and females of *Matrona basilaris japonica* showed a reduction in immune system function (encapsulation response) after reproductive activity (copulation or oviposition).]  
Address: Siva-Jothy, MT, Dept. of Animal & Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. e-mail: M.Siva-Jothy@sheffield.ac.uk.
450. **Smentowski, J. (1998):** In response to your question in *Argia* "Stocking ponds with Odonata". *Argia* 10(3): 17. (in English).  
[Report on gardenponds and dragonflies in St. Louis, Missouri, USA. Some advice is given on size and depth of ponds, and the importance of fishes in the ecosystem of ponds, and on dragonflies is outlined.]  
Address: not stated.
451. **Smiley, E.S.; Tessier, A.J. (1998):** Environmental gradients and the horizontal distribution of microcrustaceans in lakes. *Freshwater biology* 39: 397-409. (in English).  
["1. The assemblage of suspension-feeding microcrustaceans in lakes changes along a habitat gradient from nearshore to offshore. This gradient of microcrustaceans was explored in relation to differences in macrophytes and the associated changes in water chemistry, food resources and types of predators. 2. Some microcrustacean species were littoral or limnetic specialists, while others changed their distribution along this horizontal habitat gradient on a diel or seasonal basis. Distribution patterns were similar in a lake and a pond which differed in extent of macrophyte habitat. 3. There was a large shift in the composition of sestonic food, indicating heterotrophic seston nearshore and more autotrophic seston offshore. Sit-and-wait predators of microcrustaceans (e.g. *Enallagma* spp.) dominated nearshore and cruising predators (e.g. *Leptodora kindtii* Focke) were more common offshore. 4. A reciprocal transplant experiment revealed that littoral specialists could survive equally well when fed littoral or limnetic seston, while limnetic specialists performed poorly when fed littoral seston. Food resources may be important in determining where some microcrustacean species live along this horizontal habitat gradient." (Authors). Other invertebrate predators in low numbers include dragonfly larvae (*Libellulidae*) and damselfly larvae (*Lestes* spp.). The study site was Lower Crooked lake in south-west Michigan, US.]  
Address: Smiley, Elizabeth, W.K. Kellogg Biological Station, Department of Zoology, Michigan State University, Hickory Corners, MI 49060, USA.
452. **Smith, E.M.; Smith, R.W.J.; Batty, P.M. (1998):** Breeding of Southern Hawker *Aeshna cyanea* (Müller) in rock pools. *J. Br. Dragonfly Soc.* 14(2): 58-59. (in English).  
[discovery of a larva of *A. cyanea* from a rock pool on the Island of Mull, Scotland, UK]  
Address: Smith, E.M., 33 Hunter Terrace, Loanhead, Midlothian EH20 9SJ, UK.
453. **Spence, B. (1998):** Spurn Bird Observatory, East Yorkshire. *Atropos* 4: 62-63. (in English).  
[records of e.g. *Sympetrum fonscolombei* and *S. flaveolum*; an influx of at least 350 *S. striolatum* was observed on 7 September 1997]  
Address: not stated.
454. **Sternberg, K. (1998):** The postglacial colonization of Central Europe by dragonflies with special reference to southwestern Germany (Insecta, Odonata). *Journal of Biogeography* 25(2): 319-337. (in German with English summary).  
[The migratory routes along which the Central European species of dragonflies probably immigrated from their periglacial refuges into Central Europe are reconstructed. ... The very different recent distribution patterns of the Central European dragonflies can only be understood if all the climate history, landscape morphology, the thermal requirements of the species, their origin (refugial areas) and history of colonization are considered.]  
Address: Sternberg, K., Schillerstr 15, D-76297 Stutensee, Germany.
455. **Stewart, D.A.B.; Samways, M.J. (1998):** Conserving dragonfly (Odonata) assemblages relative to river dynamics in an African Savanna Game Reserve. *Conservation Biology* 12(3): 683-692. (in English).  
[Adult male dragonflies were sampled from 42 sites on four variously disturbed rivers and three reservoirs in Kruger National Park, South Africa. Fifty-one species and 2671 individuals were recorded]  
Address: Samways, M.J., Invertebrate Conservation Res. Centre, Dept. Zool. Entomol., Univ. Natal, P/Bag X01, Scottsville 3209, South Africa.
456. **Stoks, R. (1998):** Indirect monitoring of agonistic encounters in larvae of *Lestes viridis* (Odonata: Lestidae)



- using exuviae lamellae status. *Aquatic Insects* 20(3): 173-180. (in English).  
 [Differences in interference competition between larvae of the damselfly *Lestes viridis* (Vander Linden) were examined using caudal lamellae status of exuviae. Exuviae from a small temporary fishless pond near Antwerp (Belgium) where *L. viridis* was the only odonate present were studied. No lamellae loss during emergence was seen. Therefore, the lamellae status of the exuviae reflects the lamellae status of the final instar larvae. The deviations of the distribution of the number of missing lamellae per individual from a binomial distribution suggested that lamellae are not always lost separately or that some animals are more prone to agonistic encounters]  
 Address: Stoks, R., Evolutionary Biology Group, Department of Biology, University of Antwerpen (RUCA), Groenenborgerlaan 171, B-2020 Antwerpen, Belgium.
457. **Stoks, R.; De Bruyn, L. (1998):** Unusual reproductive associations of *Ischnura elegans* (Vander Linden) males (Zygoptera: Coenagrionidae). *Notul. odonatol.* 5 (1): 3-7. (in English).  
 [Belgium, tripple connection, mixed tandems, male-female association with genital contact only, male-male conspecific tandem; "The reduced discrimination by males which leads to these associations may be adaptive to low density populations. This may invalidate the sexual cannibalism hypothes of C. Utzeri (1980, *Notul. odonatol.* 1: 100-102). It is suggested that sex-biased cannibalism within the genus *Ischnura* is mainly the result of a combination of a female's higher energy demand combined with a high level of female aggregation."]  
 Address: Stoks, R., Evolutionary Biology Group, Department of Biology, University of Antwerpen (RUCA), B-2020 Antwerpen, Belgium.
458. **Storck, F. (1998):** Étude odonatologique de l'espace naturel de la plaine de Sorques: saison 1997 (Département de la Seine-et-Marne). *Martinia* 14(1): 23-29. (in French with English summary).  
 [commented checklist of the dragonfly fauna (32 species) in the Nature reserve "La Plaine de Sorques"; the author considers *Coenagrion scitulum*, *Aeshna grandis* and *Sympetrum flaveolum* as the most remarkable species]  
 Address: Storck, F., 36 bis, route de Gandelles, F-77167 Bagneaux-sur-Loing, France.
459. **Sunada, S.; Zeng, L.; Kawachi, K. (1998):** The relationship between dragonfly wing structure and torsional deformation. *Journal of Theoretical Biology* 193 (1): 39-45. (in English).  
 [The effect of wing corrugation on torsional deformation was investigated for dragonfly wings. Wing corrugation dramatically increases the warping rigidity without significantly increasing the torsional rigidity. ... The corrugation prevents unusually large deformation induced by resonance of the wing]  
 Address: Sunada, S., Kawachi Millibioflight Project, Exploratory Res. Advanced Technol., JST, Park Build. 3F, 4-7-6 Komaba, Meguro, Tokyo 153, Japan.
460. **Suri Babu, B. (1998):** Description of the larva of *Pseudagrion decorum* (Rambur, 1842) from central India (Zygoptera: Coenagrionidae). *Odonatologica* 27(4): 473-477. (in English).  
 Address: Suri Babu, B., Forensic Science Laboratory, Police Control Room, Jagdalpur-494001 (M.P.), India.
461. **Tenessen, K.; Krotzer, S. (1998):** Georgia meeting: SE meeting in Chatsworth. *Argia* 10(1): 2-3. (in English).  
 Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA.
462. **Tenessen, K. (1998):** Results of the southeastern DSA meeting in Georgia, May 15-17, 1998. *Argia* 10(2): 1-2. (in English).  
 Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA.
463. **Tenessen, K. (1998):** When is an ovipositor not an ovipositor? *Argia* 10(3): 14. (in English).  
 [Observation on a female *Calopteryx maculata* devouring an Ephemeroptera. "The mayfly was fairly large and strong, and when it shook virgously trying to free itself, the female *C. maculata* arched its abdomen upward at the middle and pressed the tip against the leaf."]  
 Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA.
464. **Tenessen, K. (1998):** Will the real *Enallagma vernale* please stand out? *Argia* 10(1): 23-24. (in English).  
 Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA.
465. **Terzani, F.; Carletti, B. (1998):** *Protosticta damacornu* spec. nov. and other odonate records from north-eastern India (Zygoptera: Platystictidae). *Odonatologica* 27(4): 479-485. (in English).  
 ["The new sp. is described from 1 male (holotype male: NE India. Meghalaya, East Khasi Hills, Umrang, 33 km N of Shillong, alt. 800 m; 29-VI/2-VII-1995; deposited at "La Specola"). Also provided is a list of 27 spp., collected in 1995 with notes on *Ceriagrion fallax* Ris, 1914. *Copera vittata assamensis* Laidaw, 1914, *Dysphaea gloriosa* (Fraser, 1938), and *Burmagomphus* sp." (Authors)]  
 Address: Terzani, F.; Zoological Section "La Specola", Museum of Natural History of the University of Florence, Via Romana 17, I-50125 Florence, Italy.
466. **Theischinger, G. (1998):** A new species of *Eusynthemis* Förster from Australia (Odonata: Synthemiidae). *Linzer biol. Beitr.* 30(1): 143-146. (in English).  
 [*Eusynthemis ursula* sp. n. (male holotype: Chichester State Forest, springs of Telegraphy River, New South Wales, Australia) is described, illustrated and compared with the other Australian species of *Eusynthemis* Förster: *E. barbarae*, *E. guttata*, *E. tillyardi*, *E. brevistyla*, *E. deniseae*, *E. aurolineata*, *E. nigra*, and *E. virgula* (figures of male anal appendages).]  
 Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia.
467. **Theischinger, G. (1998):** A new species of *Griseargiolestes* Theischinger from Australia (Odonata: Zygoptera: Megapodagrionidae). *Stapfia* 55: 623-627. (in English).  
 [*Griseargiolestes bucki* sp. n. is described from New South Wales, Australia, and compared with its congeners *G. fontanus*, *G. metallicus*, *G. griseus*, *G. eboracus*, *G. albescens*, and *G. intermedius* (figures of thorax, lateral aspect, and anal appendages, dorsal aspect).]  
 Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia.
468. **Theischinger, G. (1998):** Obituary: Professor A.F. O'Farrell. *Notul. odonat.* 5(2): 23-24. (in English).

Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia.

469. **Theischinger, G. (1998):** Supra-specific diversity in Australian "Argiolestes" (Odonata: Zygoptera: Megapodagrionidae). *Stapfia* 55: 613-621. (in English).

["What was hitherto referred to as *Argiolestes* Selys from Australia is divided into three genera. They are *Archiargiolestes* Kennedy, formerly considered as a junior synonym of *Argiolestes* Selys, and *Griseargiolestes* and *Miniargiolestes*, both described as new. Revised diagnoses including adult and larval characters are presented for those genera and for *Austroargiolestes* Kennedy. A key is given to the final instar larvae of the megapodagrionid genera known from Australia." (Author)]

Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia.

470. **Theischinger, G. (1998):** The *Eusynthemis guttata* (Selys) group of species from Australia (Odonata, Synthemistidae) - Part 2. *Linzer biol. Beitr.* 30(1): 147-153. (in English).

[*Eusynthemis rentziana* sp. n. is described (both sexes of adult and larva) and compared with other species of the *Eusynthemis guttata* group (*E. tillyardi*, *E. guttata*, *E. aurilineata*).]

Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia.

471. **Theischinger, G. (1998):** The larvae of the Australian Gomphidae (Anisoptera). *Odonatologica* 27(4): 433-465. (in English).

["The descriptive information available on the larvae of the Australian Gomphidae is summarized. On the evidence of larval characters it is suggested that *Odontogomphus longipositor* Watson should provisionally be placed in the subgenus *Zephyrogomphus* of the genus *Austrogomphus*. The larvae of *Ictinogomphus dobsoni*, *Hemigomphus comitatus*, *H. coloola*, *H. theischingeri*, *Antipodogomphus hodgkini*, *Austrogomphus arbustorum*, *A. melaleuca*, *A. amphiclitus*, *A. bifurcatus* and *A. longipositor* are described, most of them also figured, for the first time; the larvae of the remaining spp. are redescribed and illustrated in similar detail." (Author) A key to the genera, subgenera and species of the known final instar gomphid larvae and exuviae of Australia is given.]

Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia.

472. **Theischinger, G. (1998):** *Tonyosynthemis*, a new dragonfly genus from Australia (Insecta: Odonata: Synthemistidae). *Linzer biol. Beitr.* 30(1): 139-142. (in English).

[*Tonyosynthemis* (type species: *Synthemis claviculata* Tillyard) is established on characters of adults and larvae. The author considers *Choristhemis-Eusynthemis* pair and *Austrosynthemis-Tonyosynthemis* pair as each others sister groups.]

Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia.

473. **Thomas, R.; Thomas, S. (1998):** Late Northern Emerald *Somatochlora arctica*. *Atropos* 4: 36-37. (in English).

[observation of *S. arctica* on 28 and 29 August 1997 in north-west Scotland]

Address: Thomas, R., 59 Coolidge Gardens, Cottenham, Cambridge CB4 4RQ, UK.

474. **Thompson, D.J. (1998):** On the biology of the damselfly *Euphaea ameeke* van Tol & Norma-Rashid in Borneo (Zygoptera: Euphaeidae). *Odonatologica* 27(2): 259-265. (in English).

["The habitat and the territorial and reproductive behaviours of this [...] euphaeid damselfly are described. It breeds in narrow shady streams in lowland forest in northern Borneo. Territories are defended vigorously against conspecific males. Some flights take the form of head to head contests during which the combatants can fly high into the forest canopy. Males show considerable site tenacity and return day after day to the same small section of stream. Females climb underwater down protruding branches to oviposit into decaying twigs or leaves. Males remain perched above the oviposition site during the early part of the oviposition bout, but increasingly towards the end, return regularly to their preferred territorial perches." (Author) study site: Brunei, upper Belait river (4°9'21"N, 114°42'56"E) ]

Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK.

475. **Tingley, S. (1998):** ADIP meeting in New Brunswick. *Argia* 10(3): 8. (in English).

[9 members of the Atlantic Dragonfly Inventory Project met on August 8-10 in northern New Brunswick to explore some localities. In all about 40 species of odonata were recorded, including the very rare *Somatochlora brevicincta*.]

Address: Tingley, S., General Delivery, Shediac Bridge, NB, Canada E0A 3H0. e-mail: tingley@nbnet.nb.ca.

476. **Tingley, S. (1998):** More *Somatochlora brevicincta*. *Argia* 10(2): 8. (in English).

Address: Tingley, S., General Delivery, Shediac Bridge, NB, Canada E0A 3H0. e-mail: tingley@nbnet.nb.ca.

477. **Tonczyk, G. (1998) (Ed.):** I. Krajowe Seminarium Odonatologiczne. Materiały zjazdowe. Bromierzyk, 17. - 19. kwietnia 1998. Lodz. 23 pp. (in Polish).

[The following lectures and posters are documented in the booklet of the I. Krajowe Seminarium Odonatologiczne. With one exception all papers are written in Polish without English summaries or translation of the titles. *Lectures:* R. Bernard: Changes in the knowledge on Odonata of Poland as a result of studies carried out in the years 1990-1997. Key words: odonatologists, publications, new faunistical records, rare species, migrants, exploration of regions, exploration of habitats, life cycles; P. Buczynski: The dragonflies (Odonata) of the middle-eastern Poland: the state of reserach, specify and threats. Key words: middle-eastern Poland, faunistical analysis, diversity of fauna, human impact, the most valuable areas, *Sympecma paedisca*, *Orthetrum albistylum*; S. Mielewczyk: History of Odonatological studies in Poland. Key words: Poland, history of studies, scientists, research trends; G. Torczyk: Occurrence of rare dragonfly species (Odonata) in Central Poland. Key words: habitat diversity, state of research, faunistical review, northern -, southern -, eastern -, migrant -, rare species, human impact; *Posters:* J. Szymanski: Analysis of a zonal distribution of dragonflies (Odonata) in the „Krzywie” ponds near Lodz; G. Tonczyk, M. Klukowska, K. Gotdyn: Dragonflies (Odonata) of small pools and canals in the south-western part of the Kampinoski National Park. Key words: Poland, Kampinoski National Park, small pools, canals, wood-

land, rare species, faunistics, species diversity. (P. Buczynski).

Address: Tonczyk, G., Department of Limnology, University of Lodz, Ba-nacha 12/16, PO-90-237 Lodz. Poland.

478. **Truscott, L. (1998)**: Lesser Emporor Dragonfly *Anax parthenope* (Sélys) in East Cornwall in July 1998. *J. Br. Dragonfly Soc.* 14(2): 63. (in English).

[report on 18 July 1998 discovery in UK of the extremely rare *A. parthenope*]

Address: Truscott, L., 59 Cremyll Road, Torpoint, Cornwall PL11 2DZ, UK.

479. **Valley, S. (1998)**: Notes from Oregon. *Argia* 10(2): 9. (in English).

[*Libellula lydia*; "hot spring dragonflies": *Libellula subornata*, *L. composita*, *L. nodisticta*; global warming/range extension: *Libellula luctuosa*, *L. saturata*]  
Address: not stated.

480. **Vetter, J.; Schulze, T.; Alf, A. (1998)**: Untersuchungen zur Wiederbesiedlung eines renaturierten Flußabschnittes des Mains. *Lauterbornia* 33: 109-119. (in German with English summary).

[Bavaria, Germany; "In connection with the reconstruction and extension of the shipping lane of the River Main several types of bays and groyne were established between the kilometres 241.81 and 243.17, situated NNW of Würzburg. The development of these compensatory measures is monitored in this study. The results show that already after two years, from an ecological point of view, the newly established biotopes are in a significantly better state than the untreated areas of the river bank. However, after merely two years of development the newly established biotopes are not yet ecologically stable and, therefore, no conclusions with regard to the final impact of these compensatory measures can yet be drawn." The following Odonata are listed: *Platycnemis pennipes*, *Calopteryx splendens*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Orthetrum brunneum*.]  
Address: Alf, Prof. Dr. Axel, Fachhochschule Weihenstephan, Abt. Triesdorf (Umweltsicherung), D-91746 Triesdorf, Germany.

481. **Viessmann, R. (1998)**: Libellen - Odonata. Pflanzen und Tiere in Rheinland-Pfalz 8: 167-179. (in German).

[species-wise enumeration of records in Rhineland-Palatinate from the year 1997; of some interest are the records of *Coenagrion pulchellum*, *Brachytron pratense*, *Aeshna affinis*, *Anax parthenope*, *Crocothemis erythraea*, *Orthetrum brunneum*, and *Sympetrum flaveolum*]  
Address: Viessmann, R., Gängelstockweg 8, D-67295 Bolanden, Germany.

482. **Walter, S. (1998)**: *Enallagma weewa* in Long Island. *Argia* 10(3): 23. (in English).

[addition to the New York State Odonata list]  
Address: www.members aol.com/nyodes.

483. **Wasscher, M.T. (1998)**: *Metaleptobasis cyanolineata* spec. nov., a new damselfly from Surinam (Zygoptera: Coenagrionidae). *Odonatologica* 27(4): 487-490. (in English).

[The new sp. (holotype male, allotype female: Surinam, Mungotapoe, Marowijne distr., 20-IX-1948, D.C. Geijskes leg., deposited at RMNH, Leiden, The Netherlands) is described and compared with its congeners. It can easily be distinguished by light blue antehumeral stripes and by

the presence of 2 horns, in the middle of the posterior pronotal margin.]

Address: Wasscher, M.T., Minstraat 15 bis, NL-3582 CA Utrecht, The Netherlands

484. **Wasscher, M.; Goutbeek, E. (1998)**: *Tropische Neurothemis fluctuans* (Fabricius) in Nederlandse plantenkas. *Brachytron* 2(1): 16-17. (in Dutch).

[Tropical *Neurothemis fluctuans* in a Dutch greenhouse: "In September 1997 two adults of the Southeast Asiatic *N. fluctuans* were collected in a greenhouse in Emmen Zoo, The Netherlands. The greenhouse is part of a permanent exhibition of tropical flora, including waterplants which had recently imported from Thailand. The individuals have undoubtedly been transported with these plants as larvae. A short review of records of exotic dragonflies in the Netherlands, Europe and elsewhere is given."]

Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: wasscher@xs-4all.nl.

485. **Watanabe, M.; Taguchi, M.; Ohsawa, N. (1998)**: Population structure of the damselfly *Calopteryx japonica* Selys in an isolated small habitat in a cool temperate zone of Japan (Zygoptera: Calopterygidae). *Odonatologica* 27(2): 213-324. (in English).

["The population structure was studied in a small stream in a cool temperate zone of Japan in 1989 and 1990. using a mark-release-recapture method. The estimated daily number of males was 500 (1989) and 150 (1990), while that of females was 450 (1989) and 100 (1990). The operational sex ratio in each year was probably unity. The daily estimate number of immigrants in each year was ca. 10% of the population, and the daily survival rate was more than 80%. Therefore, the populations in both years were considered to be closed. The distribution of each individual perching was surveyed. The perching site of the damselfly depended upon the sunlit area on the bank of the stream. Accordingly, they concentrated on the west bank during the morning, and the east bank during the afternoon. However, along the bank the perching sites of males was shown to be a regular distribution, due to territorial behaviour. There were many small insects that could be prey for the damselflies along the stream and the edge of the paddy fields nearby. Dipteran insects were dominant the potential prey in this habitat. Since the habitat of the damselfly is surrounded by paddy fields and lakes, the maintenance of the population probably depends on the abundance of substrate for oviposition and the larval habitat." (Authors)]

Address: Watanabe, M., Dept of Biology, Fac. of Education, Mie University, Tsu 514-8507, Japan.

486. **Westfall, M.J. (1998)**: Description of the true larva of *Tauriphila australis* (Hagen, 1867) from Limoncocha, Ecuador (Anisoptera: Libellulidae). *Odonatologica* 27(4): 491-494. (in English).

["The final instar is described from reared material. The photograph in figure 335 of J.G. Needham & M.J. Westfall (1955, A manual of the dragonflies of North America, Univ. Calif. Press, Berkeley) is said to be of a *Dythemis* species, probably *nigrescens* Calvert, 1899, not of *Tauriphila australis*." (Author)]

Address: Westfall, M.J., 2235 Old Hamilton Place, 600A, Gainesville, Georgia 30507, United States.

487. **Wieland, A. (1998)**: Ei-afzet van Bloedrode heidelibel (*Sympetrum sanguineum*) in buitendijks brakwater. *Nieuwsbrief, Mededelingenorgan van de Nederlandse Vereniging voor Libellenstudie* 2(2): 8. (in Dutch).



[oviposition of *Sympetrum sanguineum* in brackish water in the waddensea of The Netherlands]

Address: Wieland, A., IJsbanaanstraat 9, NL-4573 PH Terneuzen, The Netherlands.

488. **Wildermuth, H.; Knapp, E. (1998):** Die Libellen der Alp Flix (GR); ein Beitrag zur Odonatenfauna an der Waldgrenze. Mitt. ent. Ges. Basel 48(1): 2-24. (in German with English summary).

["The dragonflies of Alp Flix (Graubünden, Switzerland). The dragonflies ... of a small alpine plateau at the tree line in the Central Alps were surveyed from 1989 to 1997 and their habitat characterized. Of the 18 recorded species 5 spp. were permanently and 4 spp. temporarily indigenous. The remaining 9 spp. are considered migrants. 19 larval habitats differing in structure and ecology are described. The upper limit of the vertical distribution of all recorded dragonflies, especially of the alpine spp., is discussed with respect to climatic conditions and habitat availability. *Lestes dryas* and *Sympetrum flavolum* are of special interest because of their habitat requirements, and so are three *Somatochlora* spp. in respect to their co-existence at the tree line."]

Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. e-mail: wildermuth@swissonline.ch.

489. **Wildermuth, H. (1998):** Dragonflies recognize the water of rendezvous and oviposition sites by horizontally polarized light: A behavioural field test. *Naturwissenschaften* 85 (6): 297-302. (in English).

Address: Wildermuth, H.: Haltbergstr. 43, CH-8630 Rüti, Switzerland.

490. **Wildermuth, H. (1998):** Ethologische und ökologische Beobachtungen an Larven von *Cordulia aenea* (Linnaeus) (Anisoptera: Corduliidae). *Libellula* 17(1/2): 1-24. (in German with English summary).

[Environmental adaption of larval *Cordulia aenea* is presented in a combined field and laboratory study; description of macro- and microhabitats, success of emergence at water bodies of different localities; "Behavioural details on walking, swimming, digging, feeding, cleaning, reaction towards disturbance and emergence were studied in an aquarium.", *C. aenea* is characterized as "sit-and-wait"-species with a "slow lifestyle" according Johnson (1991), *Trends in Ecology and Evolution* 6: 8-13. "... their antipredator behaviour is less perfect than in other syntopic cordulid species". The results are discussed with regard to conservation measures.]

Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. e-mail: wildermuth@swissonline.ch.

491. **Wildermuth, H. (1998):** Terrestrial and aquatic mating territories in *Somatochlora flavomaculata* (Vander Linden) (Anisoptera: Corduliidae). *Odonatologica* 27(2): 225-237. (in English).

["In search of receptive females, the males of many cordulid species patrol over open water. Additionally, some species exhibit localized patrol flights also over terrestrial sites. In open fen habitats, *Somatochlora flavomaculata* may be an extreme case in this respect, as it conspicuously patrols often away from water. In consideration of its possible function, the terrestrial patrol flights were investigated in a descriptive and experimental field study and compared with those at aquatic sites. Typically, the males patrolled close to vertical structures such as trees and bushes or over footpaths in glades of reedbeds. No relevant differences between the patrol flights at aquatic and terrestrial localities were found. Both types of flight

were territorial in function as conspecific males were vigorously driven away. It is speculated that the males establish territories away from ponds because the occurrence of females is unpredictable, the preferred oviposition sites (shallow and largely overgrown puddles) being scattered over large areas. Hence, the best strategy for males for intercepting mates would be to patrol near vertical structures serving as landmarks and guidelines for arriving females." (Author) Further information is given e.g. to "flight altitude", "flight velocity", "feeding during patrol flights", "reactions towards flying non-prey objects", "conspecific encounters", and "sperm vesicle contents".] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. e-mail: wildermuth@swissonline.ch.

492. **Wildermuth, H. (1998):** Verlängerte Flugzeiten von *Somatochlora flavomaculata* (Vander Linden) und *S. arctica* (Zetterstedt): Folge ungewöhnlicher Wetterverhältnisse? (Anisoptera: Corduliidae). *Libellula* 17(1/2): 45-58. (in German).

["A systematic field study near Zürich (Switzerland) showed that in 1997 the flight periods of either spp. ended in the first decade of October, thus lasting ca 3 weeks longer than usual. The findings are based on more than 200 data for a period from August to October in *S. flavomaculata* and a single record of *S. arctica* in early October respectively. The extension of the flight periods are connected with the special weather conditions from spring to autumn of the year: wet and few sunshine in June and July; dry, sunny and warm late summer and autumn." Fig 2 demonstrates flight periods of *S. flavomaculata* and *S. arctica* according to general literature and regional or local faunistic studies from regions comparably close situated to Wildermuth's study area. Some remarks on longevity of *S. flavomaculata* are made.]

Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. e-mail: wildermuth@swissonline.ch.

493. **Wilson, K. (1998):** Gibraltar Point NNR, Lincolnshire. *Atropos* 4: 61-62. (in English).

[16 Odonata species were recorded in 1997; 12 of them are considered autochthonous; On 9 September 1997 an influx of approximately 2000 *Sympetrum striolatum* was observed]

Address: not stated.

494. **Wilson, K.D.P. (1998):** *Macromias* from Guangxi Province, China with description of *M. fulgidifrons* spec. nov. (Anisoptera: Corduliidae). *Odonatologica* 27(4): 467-472. (in English).

[*Macromia fulgidifrons* sp. n. is described from Guangxi (holotype male, Shi Wan Da Shan, Guangxi, 10-V-1997). The female of *M. hamifera* Lieftinck is described and figured for the first time. *M. moorei* malayana Laidlaw and *M. hamifera* Lieftinck are new records for Guangxi.] Address: Wilson, K.D.P., 6F, 25 Borrett Rd, Mid Levels, Hong Kong, China.

495. **Winsland, D. (?) (1998):** White-faced Darter *Leucorrhinia dubia* hanging on at Thursley. *Atropos* 4: 36. (in English).

[discussion of a record of *L. dubia* on its most southern British locality]

Address: Winsland, D., 2 Stourfield Road, Bournemouth BH5 2AR, UK.

496. **Wootton, R.J.; Kukalova-Peck, J.; Newman, D.J.S.; Muzon, J. (1998):** Smart engineering in the mid-

Carboniferous: How well could Palaeozoic dragonflies fly? *Science* 282 (5389): 749-751. (in English).

[The wings of archaic Odonatoidea from the mid-Carboniferous of Argentina show features analogous to "smart" mechanisms in modern dragonflies that are associated with the agile, versatile flight necessary to catch prey in flight. ... The presence of similar features suggests that the earliest known, odonatoids were already becoming adapted for high-performance flight in association with a predatory habit.]

Address: Wootton, R.J.: Univ. Exeter; Dept. Biol. Sci., Exeter EX4 4PS; Devon, England.

497. **Wranik, W. (1998):** Faunistic notes on Soqotra Island. *Proc. First Internat. Symp. on Soqotra Island: Present and Future*. 1. ISBN 90-804341-1-6: 135-198. (in English).

[brief overview on the natural history of Soqotra Island (Yemen) with special consideration of its fauna; colour picture of the endemic *Enallagma granti*]

Address: Wranik, W., Universität Rostock/FB Biologie, Freiligrathstr. 7/8, D-18051 Rostock, Germany.

498. **Xylander, W.; Stephan, R.; Franke, R. (1998):** Erstnachweise und Wiedernachweise von Libellen (Odonata) für den Freistaat Sachsen und die Oberlausitz. *Abh. Ber. Naturkundemus. Görlitz* 70(1): 33-42. (in German).

[Between 1992 und 1997 the dragonfly fauna of the Görlitz-region (Sachsen, Germany) was surveyed. *Crocothemis erythraea* was recorded for the first time in Sachsen. *Erythromma viridulum*, *Brachytron pratense*, *Hemianax ephippiger*, *Libellula fulva*, *Orthetrum brunneum*, *Sympetrum fonscolombei* are new for the region of Upper Lusatia. In addition *Lestes barbarus*, *Coenagrion lunulatum*, *Ophiogomphus ceclia*, *Anaciaeschna isosceles*, *Aeshna affinis*, and *Sympetrum striolatum* are of some faunistic relevance.]

Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany.

499. **Xylander, W.E.; Stephan, R. (1998):** Age dependence of habitat selection and behaviour in *Aeshna mixta* (Odonata, Aeshnidae). *Zoology* 101 (Suppl. 1): 86. (in English).

[*A. mixta* was surveyed in the former brown coal mining area at Berzdorf, southern Saxonia, Germany in 1996 and 1997. "During July and early August, the specimens were observed only on sunny SW or SE exposed pathways and meadows in reforested areas. The places ("mid-summer habitats") were at least 400 m away from the ponds where they later mated and reproduced. Mid-summer habitats are rather small areas (e.g. 15 x 400 m) in which large numbers of specimens aggregated (up to 250) without interspecific aggression, whereas interspecific reactions with *Aeshna cyanea* were observed. At this time *A. mixta* could not be found at its later reproduction sites. All specimens showed a premature colouration and

the groups consisted of both sexes in rather aequivalent proportion.... From mid-August until the end of the life span of the imaginal phase *A. mixta* was found in these localities only in low numbers, few significant lower and rested on vegetation closer to the ground (mainly < 2 m). At this time ... the vast majority of the specimens was observed at open ponds either without or with only few trees in their periphery ("reproduction habitat"). About 80% of the specimens observed at these sites were males..." (Authors)]

Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany.

500. **Yousuf, M.; Khaliq, A.; Najam, M.A. (1998):** Population and feeding capacity of dragonflies on insect pests of rice in Pakistan (Anisoptera: Libellulidae). *Notul. odonatol.* 5(2): 17-19. (in English).

["The quantity of rice pests consumed by 4 spp. in a day (12 h) was determined by forced feeding. Adult *Orthetrum sabina* devoured, on an average, 4.8, 4.2, 5.1, 3.8, 32.1 and 68.0, *Crocothemis s. servilia* 3.9, 3.4, 4.0, 3.0, 20.3 and 39.0, *C. erythraea* 3.5, 3.0, 3.8, 2.7, 15.2 and 22.8 while *Pantala flavescens* 2.9, 2.6, 3.3, 2.2, 9.1 and 15.2 white stem-borers (*Scirpophaga innotata*), yellow stem-borers (*S. incertulas*), leaf-folders (*Cnaphalocrocis medinalis*), white leafhoppers (*Cofana spectra*), green leafhoppers (*Nephotettix* spp.) and white-backed planthoppers (*Sogatella furcifera*), respectively. The females of all the species consumed higher number of pests as compared with their males. The number of insect pests taken by each sp. ranked in the following order according to the size of insects: *C. spectra* < *S. incertulas* < *S. innotata* < *C. medinalis* < *Nephotettix* sp. < *S. furcifera*." (Authors)]

Address: Yousuf, M., Department of Agricultural Entomology, University of Agriculture, Faisalabad, Pakistan.

501. **Zessin, W. (1998):** Beobachtungen an Baumfalken und Vierflecklibellen im Donau-Delta, Rumänien. *Virgo* 2(1): 36-38. (in German).

[report on the feeding of the Hobby (*Falco subbuteo*) on dragonflies (*Libellula quadrimaculata*) in May 1979 in Romania]

Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany.

502. **Zessin, W. (1998):** Gartenteiche und Libellen. *Virgo* 2(1): 43-49. (in German).

[checklist of the 24 Odonata of a garden pond in Jasnitz, Mecklenburg-Vorpommern, Germany; comparison with the Odonata of garden ponds in Bonn (Nordrhein-Westfalen) and Luckau (Brandenburg)]

Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany.

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Wolfstr. 6, D-72119 Ammerbuch, Germany. Tel. ++49 (0) 7073 5262; e-mail: Lindeboom@aol.com and Martin Schorr, Waldfrieden 25, D-54314 Zerf, Germany. Tel. ++49(0)6587 1025; e-mail: FOEATrier@aol.com

The ©ODONATOLOGICAL ABSTRACT SERVICE is a supplement to AGRION, the Newsletter of the Worldwide Dragonfly Association. Published in Rheinfelden, Germany and printed in Tübingen, Germany.

ISSN 1438-0269

---

## 1997

503. **Abbott, J.C.; Stewart, K.W.; Moulton, S.R. (1997):** Aquatic insects of the Big Thicket region of East Texas. *Texas Journal of Sciences* 49(3/Suppl.): 35-50. (in English)

[111 species of Odonata are listed. *Somatochlora margarita* is listed by the U.S. Fish and Wildlife Service as "species of concern". Distribution maps of *S. margarita*, *Gomphus exilis*, and *Celithemis amanda* in eastern Texas, USA are given.]

Address: Abbott, J.C., Dept Biol. Sciences, University of North Texas, Denton, Texas 76203, USA

504. **Bankuti, K.; Devai, G.; Miskolczi, M. (1997):** Faunistical data on dragonfly (Odonata) exuvia from the active floodplain of River Tisza between Tiszabercel and Gávavencsellő (NE-Hungary). *Studia odonatologica Hungarica* 3: 43-47. (in Hungarian, with English summary).

Address: Bankuti, M., Gyöngyös, Kossuth u. 40, 3200, Hungary

505. **Bulánková, E. (1997):** Dragonflies (Odonata) as bioindicators of environment quality. *Biologia, Bratislava* 52(3): 177-180. (in English).

[In 1993-1994, larvae and imagines of Odonata were collected in 10 branches of the river Danube. Odonata larvae were also collected during the hydrobiological research of the Morava river basin in 1990-1993. Following the method of hierarchical classification, based on the presence of dragonfly species at selected localities, we distinguished the characteristic biotopes, as follows: 1) lentic biotopes renewed and newly formed, with undercurrents and rippling inhabited by rheophilous dragonflies, *Calopteryx splendens*, *Platycnemis pennipes* and the pioneer species, *Anax imperator*; 2) drying, unstable, eutrophic biotopes are inhabited by the coenosis *Lestes-Sympetrum* sp.; 3) original stagnant waters inhabited by the coenosis *Orthetrum-Libellula depressa* and *Erythromma-Anax imperator*; 4) original localities with larger areas inhabited by the coenosis *Lestes-Sympetrum-Aeshna* sp.; 5) lotic biotopes of the river Rudava with the coenosis *Cordulegaster-Ophiogomphus cecilia*, comprising the rare species, *Ophiogomphus cecilia*." (Author)]

Address: Bulankova, Eva, Institute of Ecology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B-II, SK-84215 Bratislava., Slovakia; tel.+ 421-7-728 922, e-mail: uzoo@fns.uniba.sk

506. **Bulánková, E.; Halgos, J. (1997):** The influence of flowing water on the occurring of dragonflies and blackflies in the Danube and the Morava River basin. 32. Konferenz der IAD, Wien - Österreich. Wissenschaftliche Referate: 293-295. (in English).

[results of a long-term study in the Danubian lowland after damming of the Danube River and in the course of the revitalisation of the Morava River and its branches with special reference to the rate of water flow and its influence to Odonata and Diptera [...] *Gomphus vulgaticornis* and *Stylurus flavipes* were recorded in the Morava River only; according to the authors the extremely low water quality of Danube River is responsible for the absence of the two Odonata species. *Calopteryx splendens* and *Platycnemis pennipes* were "dominant elements in places with stagnant water [...].resp.] in places with the underflow and in branches [of Morava River] ..."]

Address: Bulankova, Eva, Institute of Ecology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B-II, SK-84215 Bratislava., Slovakia; tel.+ 421-7-728 922, e-mail: Bulankova@nic.fns.uniba.sk

507. **Cannings, S.G.; Cannings, R.A. (1997):** Dragonflies (Odonata) of the Yukon. In: Danks, H.V. & Downes, J.A. (Eds.): *Insects of the Yukon. Biol. Surv. Can. Monogr. 2.* 1034 pp: 169-200. (in English).

[The paper covers The Yukon as a dragonfly habitat; describes the faunal elements (nearctic, holarctic, Palearctic); gives a checklist of Yukon Odonata; a very comprehensive annotated list of species (33 species known from the Yukon); and extremely useful distribution maps. (Jill Silsby)]

Address: Cannings, S., A68, BC Cons. Data Ctr., Resource Inven. Branch, P.P. Box 9344, Stn Prov. Govt, Victoria BC V8W 9M1, Canada

508. **Catling, P.M.; Brownell, V.R. (1997):** Damselflies (Zygoptera) in Ontario from 1900 to 1952: An atlas of E.M. Walker's distributional data for monitoring, and biodiversity and biogeography studies. 53 pp.

[Available for \$10 CDN from the authors at: 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario, CANADA K0A 2P0.]

509. **Chang, Y.-J.; Wang, L.-j. (1997):** [Dragonflies of Yangminshan National Park]. Yangminshan National Park Administration Office, Taiwan. *Illustrated Series of Books on Yangminshan National Park* 6. ISBN 957-00-9368-4: 263 pp. (in Chinese).



[“An attractive, well organised and nicely produced field guide [...] Out of the 142 (known Taiwanese spp., 90 are treated here. - In the introductory chapters (pp. 12-59), the adult morphology is briefly outlined, but the main emphasis is given to the ecology and behaviour (pp. 18-55). A simple pictorial key is introducing the reader to the concise species narratives, which constitute the main part of the book (pp. 60-243). These are richly illustrated with col. field phot. (adults & larvae). The family (species) coverage is as follows: Calopterygidae (4 spp.), Chlorocyphidae (2), Euphaeidae (2), Synlestidae (1), Lestidae (1), Megapodagrionidae (1), Platyneuridae (4), Protoneuridae (1), Coenagrionidae (10), Cordulegastridae (3), Gomphidae (12), Aeshnidae (10), Corduliidae (2) and Libellulidae (37). A chapter on dragonfly conservation is added. [...] Two minor errors should be corrected: the bottom phot. on p. 130 shows a *Chlorogomphus brevistigma* rather than *C. risi* and, according to the information from the second Author, the phot. on p. 159 is probably referable to an undescribed *Oligoaeschna* sp.. (OA 11559).]

Address: Wang, L.-J., Lab. Insect Conserv., Dept Plant Pathol. & Ent., Natn. Taiwan Univ., Taipei, Taiwan, ROC Source of supply: Natur in Buch und Kunst, Dieter Prestel, Hammerather Str. 9, D-53819 Neunkirchen-Seelscheid, Germany; DM 48,-

510. **Collingwood, N. (1997)**: The dragonflies of Staffordshire. Staffordshire Biological Scheme Publication 18. ISBN 1 874414 22 X: 79 pp. (in English). [price £5.95 + 50 pence p+p]

Source of supply: Potteries Museum & Art Gallery, Hanley, Stoke-on-Trent ST1 3 DW. e-mail: museums@stoke01.stoke-cc.gov.uk

511. **Devai, G.; Miskolczi, M. (1997)**: Ecological state assessment and qualification of the active floodplain of River Tisza between Tiszabercel and Gávavencsellő (NE-Hungary) on the basis of dragonfly (Odonata) fauna. *Studia odonologica Hungarica* 3: 63-81. (in Hungarian, with English summary).

Address: Devai, G., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

512. **Devai, G.; Miskolczi, M.; Katai, J. (1997)**: Faunistic data on adult dragonflies (Odonata) from the active floodplain of River Tisza between Tiszabercel and Gávavencsellő (NE-Hungary). *Studia odonologica Hungarica* 3: 39-61. (in Hungarian, with English summary).

Address: Miskolczi, Margit, Department of Ecology, Kossuth L. University, P.O. Box 71, H-4010 Debrecen, Hungary

513. **Devai, G.; Devai, I.; Tothmeresz, B.; Miskolczi, M. (1997)**: Methodological problems in the evaluation of faunistic data taking dragonflies (Odonata) as an illustrative example. Part 2: Collection and evaluation of basic reference. *Studia odonologica Hungarica* 3: 5-20. (in Hungarian, with extensive English summary).

Address: Devai, G., Department of Ecology, Kossuth L. University, P.O. Box 71, H-4010 Debrecen, Hungary

514. **Devai, G. (1997)**: Proposal for the quantitative surveying of dragonfly adults (Odonata). *Studia odonologica Hungarica* 3: 21-33. (in Hungarian, with extensive English summary).

Address: Devai, G., Department of Ecology, Kossuth L. University, P.O. Box 71, H-4010 Debrecen, Hungary

515. **Donath, H. (1997)**: Erstnachweis der Südlichen Mosaikjungfer (*Aeshna affinis* Vander Linden, 1823) in der nordwestdeutschen Niederlausitz. *Biol. Studien Luckau* 26: 73-74. (in German).

[record of a single male on 10 August 1996 in a brown coal mining site (NSG Wanninchen) in the Federal state Brandenburg, Germany]

Address: Donath, H., Hauptstr. 36, D-15926 Luckau, Germany

516. **Egyed, M.; Krupinskzi, L. (1997)**: Faunistic data on adult dragonflies (Odonata) from the active and ancient floodplain of River Tisza between Tiszabercel and Gávavencsellő (NE-Hungary). *Studia odonologica Hungarica* 3: 35-41. (in Hungarian, with English summary).

Address: Egyed, M., Laktanya u. 10, H-4028 Debrecen, Hungary

517. **Holder, M. (1997)**: Searching for underwater Odonata. *Ontario Insects*. 2(3): 54-55.

[not available for abstracting]

518. **Janský, V.; David, S. (1997)**: The dragonflies (Insecta: Odonata) from Orava and Orava's peat bogs (northwestern Slovakia). *Entomofauna carpathica* 9: 48-53. (in Slovak, with English summary).

[19 species were recorded from 7 localities between 1993 and 1995. Among the characteristic peatbog-species of higher altitudes as *Coenagrion hastulatum*, *Aeshna juncea*, and *Leucorrhinia dubia*, of special interest are *Aeshna subarctica elisabethae*, and *Leucorrhinia rubicunda*. The latter was recorded in Slovakia for the first time in June 1993 and confirmed in July 1994.]

Address: David, S., Tekovske Muz., P.O. Box 69, SK-93469 Levice, Slovakia

519. **Krach, J.E.; Wilms, W. (1997)**: Die Libellen des Schuttereinzugsgebietes. *Sammelblatt des Historischen Vereins Ingolstadt* 106: 21-121. (in German).

[detailed survey of the catchment of the Schutter, left tributary of the River Danube in the Ingolstadt region (Bavaria, Germany); the distribution of the species is mapped, and discussed in some detail; several tabs with checklists of 48 species or different habitats as ditches, temporary waters, heavily polluted waters etc. are provided; the importance of these waters for Odonata is discussed in most cases on the species level; several colour photos]

Address: Wilms, Walburga, Schulweg 4a, 85139 Wettstetten, Germany

520. **Laister, G. (1997)**: Leitbild-Libellen, Donau-Traun-Krems-Auen. *Naturk. Jahrbuch Stadt Linz* 42/43: 181-196. (in German, with English summary).

[on the basis of old maps (Franziscäisches Kataster, 1826), the potential dragonfly fauna of the floodplains of the river system of Donau, Traun and Krems is reconstructed. The recent dragonfly fauna is compared with an assumed dragonfly fauna for unregulated rivers in the past century. The missing of species is explained by the absence of special habitats or the loss of special structures of vegetation (zonation). Abstracters note: This is a very remarkable publication with reference to dragonfly conservation, and building up guidelines for habitat development focussing on landscape ecology. A very similar attempt was exemplified for the River Mosel, Rhineland-Palatinate, and prepared by M. Schorr in 1996 for the German Bundesanstalt für Gewässer- und

de, Koblenz: Schorr, M. (1996): Flußauenlibellen der Mosel und ihre Indikatorfunktion. Teil I: Aut- und Etho-ökologie ausgewählter Arten. Teil II: Möglichkeiten ihrer Förderung im Rahmen von Kompensationsmaßnahmen. Unveröffentlichtes Gutachten der Faunistisch-Ökologischen Arbeitsgemeinschaft im Auftrag der Bundesanstalt für Gewässerkunde / Ref. U3 (Tierökologie), Koblenz. 119 pp, Anhang. + 40 pp, Anhang.]  
Address: Laister, G., Naturkundliche Station, Neues Rathaus, Hauptstr. 1-5, A-4041 Linz, Austria

521. **Nilsson, A. (1997):** Aquatic insects of North Europe, Vol. 2, Introduction. In: Nilsson, A. (Ed.): Aquatic insects of North Europe, a taxonomic handbook. Vol. 2. Apollo Books. Stenstrup: 9-12. (in English).  
[corrections and additions to Vol. 1 of the Aquatic insects of North Europe; tab. with the number of taxa on the family level including Odonata known from Denmark, Norway, Sweden, Finland, Fennoscandian parts of Russia (Karelia), Iceland (1 species), Faroes (no species), and North Europe]  
Address: Apollo books, Kirkeby Sand 19, DK-5771 Stenstrup, Denmark

522. **Norling, U.; Sahlén, G. (1997):** Odonata, Dragonflies and Damselflies. In: Nilsson, A. (Ed.): Aquatic insects of North Europe, a taxonomic handbook. Vol. 2. Apollo Books. Stenstrup: 13-65. (in English).  
[detailed keys to the Skandinavian larvae and imagoes of Odonata with original black and white illustrations; introductory chapter with information on life cycles and phenology, habitats, trophic relationships within the food chain, state of knowledge of Odonata, morphology (eggs, larvae, adults, methods (collecting, rearing, and preparation and conservation for / in collections). Most of the illustrations are made by Ulf Norling (larvae) and Göran Sahlén (imagoes) from Skandinavian material. This is a very interesting aspect of this key: due to geographic variation in the morphology of some species, some of the keys to larvae or exuviae (e.g. Heidemann/Seidenbusch) in some cases do not match the material to be identified because the illustrations are based on specimens from regions far away from the actual collecting side. This is - in my opinion - the best reason to use the book resp. the publication of Norling/Sahlen if you have to deal with Skandinavian Odonata: It works with autochthonous Skandinavian specimens, and it provides illustrations of species as *Somatochlora sahlbergi* or *Aeshna ossiliensis* you will hardly find in any other book of such quality. (M. Schorr)]  
Address: Apollo Books, Kirkeby Sand 19, DK-5771 Stenstrup, Denmark

523. **Rapeau, A. (1997):** Contribution à la connaissance des odonates du Mazou. Nature Nièvre 5: 21-27. (in French).  
[survey of the Odonata from the River Mazou (river system of Loire), France; records of 22 species with classification of their abundance; *Coenagrion mercuriale*, *Ceragrion tenellum*, *Ophiogomphus cecilia*, *Onychogomphus uncutus*, and *O. forcipatus* are discussed]  
Address: Rapeau, A., Congy, F-58150 Sainte-Andelain, France

524. **Solimini, A.G.; Tarallo, G.A.; Carchini, G. (1997):** Life history and species composition of the damselfly assemblage along the urban tract of a river in central Italy. *Hydrobiologia* 356: 21-32. (in English).

["The species composition of the damselfly assemblage and the life history patterns of two *Coenagrionidae* (*Ischnura elegans* and *Cercion lindenii*) were investigated along the urban tract of a river (Tiber, Roma, Italy) characterized by increasing organic pollution. The assemblage was dominated by generalist species, usually recorded in lentic habitats, rather than by typical riverine species and the proportion of the latter decrease at the most polluted sites. At the end of winter, the mean size and instar distribution were different between the sampling sites showing that the life history of both species examined were influenced by a degradation of the environmental quality. A longer reproductive period, absence of diapause, and tolerance of low oxygen concentration appear to be key factors that allow generalist species *I. elegans* and *C. lindenii* to predominate at the polluted sites." (Authors)]  
Address: Carchini, G., Dipartimento di Biologia, Università "Tor Vergata", Viale della Ricerca Scientifica, I-00133 Roma, Italy. e-mail: carchini@utovrm.it

525. **Stoks, R.; De Block, M. (1997):** Successful reproduction in Belgium of the damselfly *Lestes barbarus* (Fabricius, 1798) (Odonata: Lestidae). *Bull. annls r. belge ent.* 133: 303-308. (in English).  
["*L. barbarus* (Odonata: Zygoptera) completes its life cycle in Belgium. Formerly, this species was thought to wander from Southern France to Belgium every year. For three consecutive years small populations were present at Merchtem and Wilrijk. The species was found ovipositing in *Juncus effusus*. During a larval survey in June 1996 several ultimate and penultimate instars were found at both sites. These observations raise the number of Lestidae reproducing successfully in Belgium to five. Although *Lestes* larvae seem unable to coexist with fish, our results show that coexistence with newts is possible. A limiting factor in the larval distribution of *L. barbarus* may be competition with *L. sponsa*. The emergence pattern suggests a latitudinal temporal gradient in emergence, as in *L. sponsa* where emergence begins earlier in warmer southern areas." (Authors)]  
Address: Stoks, R., Evolutionary Biology Group, Department of Biology, University of Antwerpen (RUCA), B-2020 Antwerpen, Belgium

526. **Stoks, R.; De Bruyn, L. de; Matthysen, E. (1997):** The adaptiveness of intense contact mate guarding by males of the Emerald damselfly, *Lestes sponsa* (Odonata: Lestidae): the male's perspective. *J. Insect Behav.* 10(2): 289-298. (in English).  
["We studied the mating system of the emerald damselfly *Lestes sponsa*. All males showed intense contact mate guarding by holding the female in tandem during the entire oviposition period. Our findings support the predictions made by Alcock (1994) about the occurrence of intense mate guarding: (1) a high female receptivity after copulation, (2) a high male capacity to resist takeovers, (3) sperm precedence, (4) a high operational sex ratio, (5) a high male density, (6) high access by rivals to mated females, (7) low energy expenditure, (8) a low risk of guarding, and (9) a short interval between copula and oviposition. This indicates a positive cost-benefit balance for this behavior, at least in males. A comparison within the genus *Lestes* suggests that the male-biased sex ratios and the ease with which mated females are detected have been strong selection pressures in the evolution of intense contact mate guarding." (Authors)]

Address: Stoks, R., Evolutionary Biology Group, Department of Biology, University of Antwerpen (RUCA), Groenenborgerlaan 171, B-2020 Antwerpen, Belgium

527. **Tappenbeck, L. (1997):** Die Entwicklung der aquatischen Lebensgemeinschaft in der Bode nach industrieller und natürlicher Aufsalzung im Bereich der Ortschaft Staßfurt 1992-1995 im Landkreis Aschersleben - Staßfurt / Sachsen-Anhalt (Deutschland). *Limnologica* 27(1): 129-142. (in German, with English summary).

[the development of the aquatic biotopes in the River Bode after industrial and natural salinization in the area of the community of Staßfurt from 1992 till 1995 - District Aschersleben - Staßfurt/Federal State Sachsen-Anhalt (Germany); detailed documentation of species composition and process of restoration of fauna after reduction of chlorid emission in the Bode river system; *Calopteryx splendens* and *Ischnura elegans* seem to be more tolerable against chlorid concentration, and resettled the river quite early after reduction of chlorid concentration; *Calopteryx virgo*, *Coenagrion puella*, and *Chalolestes viridis* seem to be less tolerant against chlorid concentration; these species reestablished later than the former species did.]

Address: Tappenbeck, L., Staatliches Amt für Umweltschutz Magdeburg, Umweltlabor, Dez. Biologie, Governmentsberg 1, D-39104 Magdeburg, Germany

528. **Tol, J. van (1997):** The genus *Procordulia* Martin in western Malesia (Odonata, Corduliidae). Descriptions and records of Malesian Odonata, 4. *Tijdschrift voor Entomologie* 140: 133-146. (in English).

["The species of the genus *Procordulia* occurring in Malaysia, the Philippines and Indonesia, excl. New Guinea, are discussed and a key to the species is provided. *P. papandayanensis* is described from Java, and *P. lompobatang* and *P. rantemario* from SW Sulawesi. These new species all belong to the *P. sambawana* group of species." (Author)]

Address: Tol, J. van, National Museum of Natural History, P. O. Box 9517, 2300 RA Leiden, The Netherlands.

529. **Walton, D. (1997(?)):** Common dragonflies of the northeast. VHS-Video. 30 min.

[Common Dragonflies of the Northeast presents stunning footage of our region's common species. This unique video covers the identification, behavior, and habitats of adult dragonflies. Because this group has received limited coverage in traditional field guides, even common dragonflies remain virtually unknown to many naturalists. Now, this video provides the means to recognize and appreciate these fascinating insects. Over 40 species are presented including males and females. Species list: American Emerald, *Cordulia shurtleffi*; Beaverpond Baskettail, *Epiheca canis*; Black Saddlebags, *Tramea lacerata*; Black-shouldered Spinyleg, *Dromogomphus spinosus*; Blue Dasher, *Pachydiplax longipennis*; Calico Pennant; *Celithemis elisa*; Canada Darner, *Aeshna canadensis*; Carolina Saddlebags, *Tramea carolina*; Cerry-faced Meadowhawk; *Symptetrum internum?*; Chalk-fronted Corporal; *Libellula julia*; Common Baskettail, *Epiheca cynosura*; Common Green Darner, *Anax junius*; Common Whitetail, *Libellula lydia*; Delta-spotted Spiketail, *Cordulegaster diastatops*; Dot-tailed Whiteface, *Leucorrhinia intacta*; Dragonhunter, *Hagenius brevistylus*; Eastern Amberwing, *Perithemis tenera*; Eastern Pondhawk, *Erythemis simplicicollis*; Elf Skimmer, *Nannothemis bella*; Fawn Darner, *Boye-*

*ria vinosa*; Four-spotted Skimmer, *Libellula quadrimaculata*; Frosted Whiteface, *Leucorrhinia frigida*; Halloween Pennant, *Celithemis eponina*; Harlequin Darner, *Gomphaeschna furcillata*; Lance-tipped Darner, *Aeshna constricta*; Lancet Clubtail, *Gomphis exilis*; Least Clubtail, *Stylogomphus albistylus*; Mottled Darner, *Aeshna clepsydra*; Petite Emerald, *Dorocordulia lepida*; Prince Baskettail, *Epiheca princeps*; Racket-tailed Emerald, *Dorocordulia libera*; Ringed Boghaunter, *Williamsonia lintneri*; Seaside Dragonlet; *Erythrodiplax berenice*; Shadow Darner, *Aeshna umbrosa*; Slaty Skimmer, *Libellula incesta*; Spangled Skimmer, *Libellula cyanea*; Spot-winged Glider, *Pantala hymenaea*; Springtime Darner, *Basiaeschna janata*; Stream Cruiser, *Didymops tansversa*; Twelve-spotted Skimmer, *Libellula pulchella*; Twin-spotted Spiketail, *Cordulegaster maculata*; Unicorn Clubtail, *Ariogomphus villosipes*; Widow Skimmer, *Libellula luctuosa*; Yellow-legged Meadowhawk, *Symptetrum vicinum*.

Orders: \$24.95 plus \$5.00 S & H. Checks to NHS; mail to NHS, 7 Concord Greene #8, Concord, MA 01742. MA residents add 5% tax. For more information, e-mail Dick Walton at [dick@concord.org](mailto:dick@concord.org) Wholesale lots available in quantities of 6 or more (\$12.95/copy) (Bill Mauffrey, taken from Internet)]

530. **Willigalla, C. (1997):** Untersuchungen zur Libellenfauna ausgewählter Artenschutzgewässer der Gemeinde Ostbevern / Kreis Warendorf - mit einem Beitrag zur Ökologie von *Lestes dryas* Kirby, 1849. Diplomarbeit, Universität Münster: 70 pp. (in German).

[survey of the odonate fauna (31 species) of 19 water bodies created early in the 90's of this century (Ostbevern, Nordrhein-Westfalen, Germany); special attention is given to *Lestes dryas*]

Address: Willigalla, Chr., Brock 45, D-48346 Ostbevern, Germany

531. **Wilson, K.D.P. (1997):** An annotated checklist of the Hong Kong dragonflies with recommendations for their conservation. *Mem. Hong Kong nat. hist. soc.* 21: 1-68. (in English).

["One hundred and seven odonates from Hong Kong are listed with synonymic notes of relevant published records and new material detailed. The origins and distribution pattern of the Hong Kong species are discussed. Twenty-three wetland areas are identified for their odonate conservation importance and recommendations are made for the protection of key sites and species vulnerable to collection." (Author) Of some special interest is tab. IV which lists the Hong Kong endemic Odonata (7 species; 1 subspecies), and the number of localities for these taxa presently known. E.g. *Rhipidolestes janetae* is known from a single locality (this species is documented in both sexes with colour pictures together with another five species)]

Address: Wilson, K.D.P., 6F, 25 Borrett Rd, Mid Levels, Hong Kong, China

## 1998

532. **Anholt, B.R.; Werner, E.E. (1998):** Predictable changes in predation mortality as a consequence of changes in food availability and predation risk. *Evolutionary Ecology* 12(6): 729-738.

[Theory predicts that animals will have lower activity levels when either the risk of predation is high or the availability of resources in the environment is high. If en-



counter rates with predators are proportional to activity level, then we might expect predation mortality to be affected by resource availability and predator density independent of the number of effective predators. In a factorial experiment, we tested whether predation mortality of larval wood frogs, *Rana sylvatica*, caused by a single larval dragonfly, *Anax junius*, was affected by the presence of additional caged predators and elevated resource levels. Observations were consistent with predictions. The survival rate of the tadpoles increased when additional caged predators were present and when additional resources were provided. ...]

Address: Anholt, B.R., Univ. Victoria, Dept. Biol., POB 3020, Victoria, BC V8W 3N5, Canada

533. **Anselin, A. (1998):** Compte-rendu de la réunion Gomphus du 18 novembre 1998 à Bruxelles (résumé). *Gomphus* 14(1): 37-38. (in French).

[documentation of the results of the meeting of the Belgian Dragonfly recorders: main subjects of the report are the status of the distribution atlas of Belgian Odonata and the scheduled contributions in the coming issues of the journal *Gomphus* ]

Address: Anselin, Anny, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussels, Belgium

534. **Arnaboldi, F. (1998):** Les odonates d'une mare de platière nouvellement restaurée. *Martinia* 14(3): 103-114. (in French, with English summary).

[the colonisation of dragonfly species following a restoration of a pond is described]

Address: Arnaboldi, F., ONF-Sylvétude, Cellule d'Appui Ecologique, Boulevard de Constance, F-77300 Fontainebleau, France

535. **Beamish, F.W.H.; Noakes, D.L.G.; Rossiter, A. (1998):** Feeding ecology of juvenile Lake Sturgeon, *Acipenser fulvescens*, in Northern Ontario. *Canadian Field Naturalist* 112 (3): 459-468.

["Dietary analyses of juvenile Lake Sturgeon in a resource-poor habitat showed them to be a general predator. Cladocera dominated numerically the prey taxa, but were recorded in only four of the individual sturgeon examined and therefore excluded from stomach content analyses. Mayfly larvae (Ephemeroptera), primarily *Hexagenia*, were numerically the next most abundant (34% of all prey items) and the most widely taken (75% of all sturgeon) of the 10 prey categories. Others were Odonata, Annelida, Mollusca, Diptera and Trichoptera, each at 5-8% of all prey items. ..."]

Address: Noakes, D.L.G., Univ. Guelph; Dept. Zool.; Guelph; ON N1G 2W1; Canada

536. **Beckemeyer, R. (1998):** Nebraska and South Dakota Odonata - a compilation of collecting reports related to the July, 1998 Valentine, Nebraska Annual Meeting of the Dragonfly Society of the Americas. *Argia* 10 (4): 27-28. (in English).

Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA

537. **Beckemeyer, R. (1998):** Some Kansas State and County Odonata records for 1998. *Argia* 10(4): 26. (in English).

[State records: *Argia immunda*, *Erythrodiplax umbrata*]

Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA

538. **Beckemeyer, R. (1998):** Some miscellaneous Odonata collected in the Midwest in 1998. *Argia* 10(4): 26-27. (in English).

Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA

539. **Beckemeyer, R. (1998):** *Tramea*. *Argia* 10(4): 33-44. (in English).

[news and notes from internet; e-mail addresses of members of Dragonfly society of the Americas (DSA); snail mail addresses of members of DSA]

Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA

540. **Beckemeyer, R. (1998):** *Tramea calverti* collected in Missouri. *Argia* 10(4): 13. (in English).

Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA

541. **Beckemeyer, R.; Hummel, S. (1998):** Two notes on *Somatochlora ensigera*, the Plains Emerald. *Argia* 10(4): 28-30. (in English).

[county dot map depicting distribution of *S. ensigera*: <http://www2.southwind.net/~royb/somens.jpg>; note on the impact of intensive collecting pressure on *S. ensigera*: "... the fairly heavy collecting pressure that occurred during the period of the meeting harmed neither the habitat nor the breeding behaviour of this species."]

Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA

542. **Bedjanic, M. (1998):** [Bloke Plateau, the moor pearl of Inner Carniola]. *Slovene Odonatol. soc.*, Ljubljana: 8 pp. (in Slovene).

[folding brochure with colour pictures of characteristic members of the fauna (including *Aeshna juncea* and *Calopteryx virgo*) and the flora of the area. ]

Address: Bedjanic, M., Fram 117/A, SI-2313 Fram, Slovenia. e-mail: matjaz-bedjanic@guest.arnes.si

543. **Bedjanic, M. (1998):** Poskus analize favne kacijh pastirjev Sri Lanke (Insecta: Odonata). *Diplomska Naloga*: 90 pp. (in Slovene, with English summary).

["An attempt of the analysis of the dragonfly fauna of Sri Lanka (Insecta: Odonata)": M.s. thesis. "In the introduction an overview of research into odonate fauna of Sri Lanka is presented. All published information on each particular dragonfly taxon are systematically gathered in the Synopsis of the odonate fauna of Sri Lanka and a list of 115 species and subspecies which occur on the island is compiled. The results of the author's research of dragonfly fauna of Sri Lanka in January and February 1995 are also presented. Altogether 52 taxa, 17 endemic ones, were recorded at 22 localities between 15.I.1995 and 08.II.1995. Of special interest are the records of *Elatoneura bigemmata*, with first description of the female, and of *Epopthalmia vittata cyanocephala*, with description of the larval skin. For all dragonfly species listed for the island phenology of occurrence of adult animals is presented and a comparison to the author's research is made. Zoogeographical analysis of the odonate fauna of Sri Lanka shows similarity with that of South India, however 53 or 46,5% of taxa are confined to the island. An overview and analysis of the present knowledge on the odonate fauna of Sri Lanka show that it is still very incomplete. The odonate fauna of Sri Lanka is endangered and the main reasons for this are given. In addition, the significance of dragonflies for Sri Lanka biodiversity is discussed."]

(Author). M. Bedjanic made available an extended German summary resp. comments to different chapters or tabs. With the help of this, there is no problem to study and understand the thesis in its central aspects.]

Address: Bedjanic, M., Fram 117/A, SI-2313 Fram, Slovenia. e-mail: matjaz-bedjanic@guest.arnes.si

544. **Behrstock, R.A. (1998)**: Notes on the first record of Turquoise-tipped Darner (*Aeshna psilus*) in Arizona. *Argia* 10(4): 11-12. (in English).

Address: Behrstock, R.A., 9707 S. Gessner #3506, Houston, TX, 77071-1032

545. **Biggs, K. (1998)**: A productive first year in California. *Argia* 10(4): 23-24. (in English).

[confirm <http://www.sonic.net/~bigsnest/Pond/Lists/dragons.html>]

Address: Biggs, Kathy, 308 Bloomfield Road, Sebastopol, CA, 95472, USA

546. **Blank, M.; Diehl, D.; Kolmet, C. (1998)**: *Gomphus flavipes* (Charpentier) am Rhein bei Köln (Anisoptera: Gomphidae). *Libellula* 17(3/4): 239-242. (in German, with English summary).

["*Gomphus flavipes* (Charpentier) at the Rhine near Cologne, Germany (Anisoptera: Gomphidae). - On 25-VI-1998, near Cologne-Porz a freshly emerged male was recorded. This is the first record in North Rhine-Westphalia after more than 89 years." (Authors)]

Address: Blank, M., Dierath 157b, D-51399 Burscheid, Germany

547. **Blischke, H.; Brauns, C.; Kuck, K. (1998)**: Die Libellenfauna unterschiedlicher Gewässertypen des mittleren Allier im LIFE-Gebiet Joze-Maringues, Frankreich. *Libellula* 17(3/4): 117-147. (in German with English summary).

["The dragonfly fauna of different water habitats in the middle reaches of the River Allier in the LIFE-area Joze-Maringues, France - From 1993 to 1995, in a section of the Allier near Clermont-Ferrand in central France, a total of 45 Odonata species were recorded. According to their spatial patterns the spp. were grouped into 9 dragonfly assemblages. Being a largely intact and unaltered area with a great variety of habitats, this river section is invaluable for the dragonfly fauna." (Authors); documentation of the dragonfly assemblages in relation to main biotope parameters of a river as, velocity, vegetation, sedimentation, and insolation]

Address: Blischke, H., Im Krümmen Sieke 54, D-30419 Hannover, Germany

548. **Bonte, D. (1998)**: Een populatie van *Sympecma fusca* (Vander Linden, 1820) in de Franse kustduinen te Bray-Dunes: een mogelijke verklaring voor de waarnemingen langs de Vlaamse Westkust? *Gomphus* 14(1): 32-34. (in Dutch, with English and French summaries).

["A vital population of *Sympecma fusca* was discovered in the coastal dunes of Bray Dunes (France), at approximately 500 m from the Belgian border. The habitat can be described as a shallow dune-lake with a dominance of *Chara* species in the water vegetation. The possible function of this population as a source for the observations in the Belgian dune area is briefly discussed." (Author)]

Address: Bonte, D., Leopold-II-laan 44a, B-9000 Gent, Belgium

549. **Boudot, J.-P. (1998)**: Differences in male colour patterns between *Boyeria cretensis* Peters, 1991 and *B. irene* (Fonscolombe, 1838) (Odonata: Aeshnidae). *O-pusc. zool. flumin.* 161: 1-3. (in English).

[colour patterns support and reinforce the species rank of *Boyeria cretensis*]

Address: Boudot, J.-P., Centre de Pédologie Biologique, 17, rue Note-Dame de Pauvres, B.P. 5, F-54501 Vandoeuvre-lès-Nancy, France. e-mail: boudot@cpb.cnrs-nancy.fr

550. **Boudot, J.-P.; Prot, J.-M.; Dommange, J.-L. (1998)**: Rectification à l'article intitulé: Analyse et commentaires relatifs au "Catalogue des Libellulidées des environs de Besançon" de M. Léandre Pidancet (1856) par Jean-Louis Dommange (Martinia 14(1): 31-36). *Martinia* 14(4): 136-

[The contribution contains some corrections and additions to the paper mentioned. The synonymy of *Aeshna justii* (sic) with *Aeshna juncea* is confirmed on the basis of further historical sources (Barbiche: Bull. soc. hist. nat. Metz 1887), and the synonymy of *Libellula bruandi* Pidancet, 1856 is cleared: it is *Orthetrum brunneum* (after Barbiche 1887)]

Address: Boudot, J.-P., Centre de Pédologie Biologique, 17, rue Note-Dame de Pauvres, B.P. 5, F-54501 Vandoeuvre-lès-Nancy, France. e-mail: boudot@cpb.cnrs-nancy.fr

551. **British Dragonfly Association (1998)**: Members Code of Practice on collecting dragonflies. 4 pp. (in English).

[BDS's viewpoint on collecting dragonflies; appendix with IUCN Red List of threatened animals, and the British Red Data Book]

Address: BDS, c/o Bill Wain, The Haywain, Hollywater Road, Bordon, Hants GU35 0AD, UK

552. **Brockhaus, T. (1998)**: Die Winterlibelle *Sympecma fusca* (Vander Linden, 1820) in der Region Chemnitz-Erzgebirge (Odonata). *Ent. Nachr. Ber.* 42(4): 231-234. (in German, with English summary).

[compilation of own and unpublished data on distribution and occurrence of *S. fusca* in the Chemnitz-region, Saxony (Germany); there is an obvious correlation between winter temperatures and population density (number of records); survival of populations is highest after warm winters; temperature in winter is discussed as an ultimate factor in survival of populations; habitat quality seem to be less important; but it is mandatory for long term survival of populations to have good habitats in climatically favourable regions such as floodplains]

Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. e-mail: T.Brockhaus@t-online.de

553. **Brockhaus, T. (1998)**: Gemeinsame Vorkommen der Smaragdlibellen *Somatochlora alpestris* (Selys, 1840) und *Somatochlora arctica* (Zetterstedt, 1840) im Erzgebirge (Odonata: Corduliidae). *Veröff. Museum für Naturkunde Chemnitz* 21: 79-82. (in German).

[documentation of records, and discussion of syntopic localities of both species in the "Große Kranichsee" and "Mothäuser Heide" in Saxonia, Germany near the Czech border]

Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. e-mail: T.Brockhaus@t-online.de

554. **Brockhaus, T. (1998):** Libellenbeobachtungen in der Dahlemer Heide (Insecta: Odonata). *Mitteilungen Sächsischer Entomologen* 42: 17. (in German). [results of a short excursion on 26 July 1998 to the odonatological unexplored Dahlemer Heide in Saxonia, Germany; of some faunistic interest is the record of *Orthetrum coerulescens* on a small iron water.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. e-mail: T.Brockhaus@t-online.de
555. **Buczynski, P.; Czachorowski, S. (1998):** Contribution to the cognition of dragonflies (Insecta: Odonata) of lake districts in the north-eastern Poland. *Przeglad Przyrodniczy* 9(3): 45-55. (in Polish, with English summary). [new records of the odonate fauna of the Masurian Lake District and the eastern part of the Pomerian Lake District (NE Poland); *Chalcolestes viridis* is new for the region; the rare *Sympecma paedisca*, *Ophiogomphus cecilia*, and *Aeshna viridis* are confirmed; a total of 41 species (historical and recent records) are listed in tabs, and classified according to their habitat requirements] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PO-20-033 Lublin, Poland
556. **Buczynski, P. (1998):** Drying out of Sphagnum fens and the occurrence of dragonfly larvae (Odonata): observations from Lasy Janowskie (SE Poland). *Wiad entomol.* 17 (Suppl.): 160-161. (in Polish, with German translation of the paper (available from M. Schorr). [result of instable hydrological fens is a loss of species diversity: compared with undisturbed fens the odonate fauna is quite poor; depending on the duration of a stable water situation, *Somatochlora arctica* was the only larval Odonata found in fens drying out in June of a year; fens drying out in July had a richer odonate fauna composed of species of the genera *Lestes* and *Sympetrum*; in years with stable water levels the odonate fauna of drying out fens resembles the fauna of undisturbed fens; the author stresses the importance of core populations in the metapopulation of fen dragonfly communities] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PO-20-033 Lublin, Poland
557. **Bulletin of the Hokkaido Odonatological Society** Vol. 10 (March 31, 1998) (1998): 1. (in Japanese).
558. [Contents: 1. Hiratuka, K.: Behaviour of some dragonflies of genus *Sympetrum* at Lake Harutori. pp. 1-9; 2. Fujibayahsi, T.: *Aeshna mixta soneharai* collected from Goryo-ike (Hamamasu-mura, Ishikari District) and Nishioka water reservoir (Sapporo). p.: 10; 3. Fujibayahsi, T.: *Aeschnophlebia longistigma* collected from Nishinopporo, Ebetsu city. pp.: 11; 4. Yokoyama, T. & T. Fujibayahsi: Dragonflies of Ebetsu city (I): Mizubashouen park at Nishinopporo. pp.: 12-15; 5. Hirata, M.: Some dragonflies collected from Hong Kong in the spring of 1997. pp.: 16-17; 6. Ubukata, H.: Distribution table of dragonflies in each district of Hokkaido (11). pp.: 18-20; 7. Ubukata, H.: Distribution table of dragonflies in the neighbouring islets of Hokkaido (11). pp.: 21-23; 8. Nishih, S.: About Annual Meeting of "Hyogo Odonatological Society". p.: 24; 9. Yokoyama, T.: Review of Odonatological literature (articles). p.: 25; 10. Harauchi, Y.: *Epiprolebia superstes* (a photograph): front cover]
- Address: Ubukata, H., Hokkaido University of Education at Kushiro, Kushiro, 085 Japan
559. **Burbach, K.; Werzinger, J. (1998):** Fortpflanzungsnachweise der Schabrackenlibelle (*Hemianax ephippiger*) und Herbstschlupf von Kleiner Königslibelle (*Anax parthenope*) und Becher-Azurjungfer (*Enallagma cyathigerum*) in Bayern. *Hagenia* 16: 15. (in German). [observation of emergence of *Anax ephippiger* in Bavaria, Germany in September 1998: this is the first record of autochthony in Bavaria; records of a probably second generation of *Anax parthenope* and *Enallagma cyathigerum*] Address: Werzinger, J., Zwernberger Weg 29, D-90449 Nürnberg, Germany
560. **Burbach, K. (1998):** Sibirische Azurjungfer (*Coenagrion hylas*). *Hagenia* 16: 15-16. (in German). [report on the current situation of *C. hylas* on its most important European locality] Address: Burbach, K., Griesfeldstr. 5a, D-85354 Freising, Germany
561. **Busetto, A. (1998):** Disegno: *Stylurus flavipes* (Charpentier, 1825). *Lindenia* 29: 125. (in Italian). [*S. flavipes* was discovered in August 1995 near Collecchio (Province of Parma) near the River Taro] Address: not stated
562. **Cannings, S. (1998):** Dragonflying in the mountains. *Argia* 10(4): 13-14. (in English). [records from British Columbia, Canada; of special interest are *Somatochlora forcipata*, *Lestes forcipatus*, and *Gomphus graslinellus*] Address: Cannings, S., A68, BC Cons. Data Ctr., Resource Inven. Branch, P.P. Box 9344, Stn Prov. Govt, Victoria BC V8W 9M1, Canada
563. **Cannon, R.J.C. (1998):** The implications of predicted climate change for insect pests in the UK, with emphasis on non-indigenous species. *Global Change Biology* 4(7): 785-796. (in English). ["Recent estimates for global warming predict increases in global mean surface air temperatures (relative to 1990) of between 1 and 3.5 degrees C, by 2100. [...] Climate change is also considered from the perspective of changes in the distribution and abundance of species and communities. Marked changes in the distribution of well-documented species - including Odonata, Orthoptera and Lepidoptera - in northwestern Europe, in response to unusually hot summers, provide useful indications of the potential effects of climate change. ..."] (Author)] Address: Cannon, R.J.C., MAFF, Cent. Sci. Lab., York YO41 1LZ, N Yorkshire, UK
564. **Carbone, J.; Keller, W.; Griffiths, R.W. (1998):** Effects of changes in acidity on aquatic insects in rocky littoral habitats of lakes near Sudbury, Ontario. *Restoration Ecology* 6(4): 376-389. (in English). ["Benthic aquatic insects were collected from rocky nearshore areas (<1 m deep) of 17 lakes near Sudbury, Ontario, with a pH range of 4.7-7.3 and a size range of less than 10 ha to over 10,000 ha. ... Declines in abundances of several taxa of Ephemeroptera at pH below 5.5 were attributable to acid toxicity, while increases in the abundances of Odonata and Diptera at pH below 5.5 were associated with the absence of fish predators and other indirect effects of acidity. The communities of



two experimentally neutralized lakes restructured rapidly within 5 years, approaching but not achieving community structures typical of our near-neutral survey lakes. Neutralization led to recolonization or increased abundance of the acid-sensitive mayfly, *Stenacron interpunctatum*, and the dragonfly, *Boyeria grafiana*; [...] Consistent with results for the survey lakes, declines in the abundances of the dragonflies *Aeshna interrupta*, *Aeshna eremita*, and *Leucorrhinia glacialis* in the neutralized lakes were associated with reintroductions of *Salvelinus fontinalis* (aurora trout) and increased fish predation pressure, ..."]

Address: Carbone, J., Ontario Minist. Environm., Suite 1101, 199 Larch St, Sudbury; ON P3E 5P9, Canada

565. **Carpenter, G.; Legler, K. (1998):** *Williamsonia lintneri* in Wisconsin! and with flechteri! *Argia* 10(4): 11. (in English).

Address: not stated

566. **Catling, P.M.; Brownell, V.R. (1998):** Migratory concentrations of dragonflies on the north shore of Lake Ontario, and northward extension of migratory species. *Argia* 10(4): 19-22. (in English).

["Aggregations of several thousand dragonflies within an area of 5 acres have been noted at several sites along the north shore of Lake Ontario in late August and early September. The larger species of dragonflies in these aggregations are usually in the late teneral or early adult stage and the aggregations are believed to be a result of an arrested movement in a southerly direction, and are thus migratory. In 1998 at Sandbanks Provincial Park, eastern Lake Ontario, *Anax junius* was the most abundant species but other species including *Tramea lacerata*, *Pantala flavescens*, and *P. hymenaea* were also recorded. Tandem pairs of *Sympetrum vicinum* were also observed moving in a southerly direction. *Tramea lacerata* has been reported north of the Carolinian zone only once, and observations by the authors of 12 individuals at the northeastern end of Lake Ontario indicate the possibility of a recent expansion of range northward. Both a gradual warming trend and the unusually warm spring and summer of 1998 may have been contributing factors. Northward expansion of migratory species may make migratory stopover areas along Lake Ontario increasingly important for dragonflies." (Authors)]

Address: Catling, P.M. & Brownell, V.R., 2326 Scrivens Drive, R.R. 3; Metcalfe, Ontario K0A 2P0, Canada; e-mail: Brownell@achilles.net

567. **Chessman, B.C.; McEvoy, P.K. (1998):** Towards diagnostic biotic indices for river macroinvertebrates. *Hydrobiologia* 364(2): 169-182. (in English).

["The construction of biotic indices that use macroinvertebrates to assess pollution and other anthropogenic disturbances of rivers and streams often requires that each taxon be assigned a number indicating its level of sensitivity. ... Gastropod molluscs (family Thiaridae) were tolerant of dam effects but sensitive to sewage and metals, whereas coenagrionid damselfly nymphs, elmids beetles and ostracods were most tolerant of sewage. Corydalid alderfly larvae, leptophlebiid mayfly nymphs, lepid damselfly nymphs, libellulid dragonfly nymphs and scirtid beetle larvae were most tolerant of metals. [...] We conclude that the approach has merit but requires considerable further development and testing, as well as consideration of the levels of specificity and di-

agnostic strength that are appropriate or achievable." (Author)]

Address: Chessman, B.C., Dept. Land and Water Conservat., POB 3720, Parramatta, NSW 2124, Australia

568. **Corbet, P.S.; Hoess, R. (1998):** Sex ratio of Odonata at emergence. *International Journal of Odonatology* 1(2): 99-118. (in English).

["Final-instar exuviae left at the emergence site by Odonata can provide information of high quality for measuring sex ratio, especially of Anisoptera. Criteria are listed according to which counts of such exuviae are acceptable for this purpose. Records of sex ratio of Odonata, published and unpublished, are critically reviewed, and 194 that meet the listed criteria are presented and analysed. Variability of sex ratio differs widely among taxa but is less in large (N >299) than in small (N = 100-199) collections. Large collections indicate that the proportion of males is greater in Zygoptera than in Anisoptera (respectively 65 and 21% of records featuring >50% males). Because the sex-determination mechanism in Odonata predicts a sex ratio of unity in the zygote, variability and imbalance of sex ratio detected at emergence can plausibly be attributed to differential mortality of eggs and/or larvae and therefore, probably, to differential predation on larvae. The effect, if any, of sex ratio at emergence on reproductive potential of the adult population is unlikely to be significant, except perhaps when, rarely, the number of females is unusually low, thus reducing the size of the next generation." (Authors)]

Address: Hoess, R., University of Berne, Institute of Zoology, Division of Population Biology, Baltzerstrasse 3, 3012 Berne, Switzerland

569. **Cruden, R.W.; Gode, O.J. (1998):** Iowa's Odonata: declining and/or changing? *J. Iowa acad. sci.* 105(2): 67-81. (in English).

["We undertook a comprehensive survey of the Order Odonata in Iowa. ... We collected throughout the state (more than 500 sites in 94 counties), throughout the flight season (late May-early October), and tried to visit several habitats in each county. ... A comparison of our data with that collected early in the century suggests considerable change in the odonate fauna. ... Our study of Iowa's dragonflies and damselflies was initiated to document what species presently occur in the state, their distributional ranges, habitats, and flight periods. Two likely results would be the identification of imperiled species and species-rich habitats." (Authors)]

Address: Cruden, R.W., Dep. Biol. Sci., Univ. Iowa, Iowa City, IA 52242, USA

570. **Czech, T.; Irmiler, U.; Kassebeer, C.; Pichinot, V. (1998):** 10.14 Libellen (Odonata), Heuschrecken (Saltatoria), Schnabelkerfen (Rhynchota) und Schmetterlinge (Lepidoptera). In: Irmiler, U., K. Müller & J. Eigner (Hrsg.): *Das Dosenmoor. Ökologie eines regenerierten Hochmoores*. ISBN 3-00-003517-6. 283 pp.

[shortly commented list of 15 species of Odonata recorded in the Dosenmoor, N of Neumünster, Schleswig-Holstein, Germany. No reference is made to: Blancke, C.; Stöckl, H.; Schlorf, M.; Lutz, K. (1981): *Dosenmoor 1981. Naturkundliche Beiträge des Deutschen Jugendbund für Naturbeobachtung* 8: 25-32. The common *Ischnura elegans* will have to be added to the list of Czech et al.]

571. **Daigle, J.J. (1998):** Membership donates to Corbet book. *Argia* 10(4): 32-33. (in English).  
Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. e-mail: daiglej@dep.state.fl.us
572. **Daigle, J.J. (1998):** Visit to Sabino Canyon. *Argia* 10(4): 22-23. (in English).  
[short report of a trip to Sabino Canyon, Arizona, USA with records of *Argia sabino*, *A. munda*, *A. pima*, and others]  
Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. e-mail: daiglej@dep.state.fl.us
573. **D'Antonio, C. (1998):** Archivio Hemianax. *Lindenia* 29: 124. (in Italian).  
[additions to the Italian Hemianax ephippiger archives]  
Address: D'Antonio, C., Via A. Falcone 386/b, I-80127 Napoli, Italy. e-mail: lindeniam@freemail.it
574. **D'Antonio, C. (1998):** Checklist delle "Libellule" nella ... Letteratura Italiana. *Lindenia* 29: 127-128. (in Italian).  
[documentation of poems in Italian language with dragonflies as subject]  
Address: D'Antonio, C., Via A. Falcone 386/b, I-80127 Napoli, Italy. e-mail: lindeniam@freemail.it
575. **D'Antonio, C. (1998):** Distribuzione regionale degli odonati in Italia: aggiornamento. *Lindenia* 29: 124-125. (in Italian).  
[additions to the regional Italian bibliography of Odonata]  
Address: D'Antonio, C., Via A. Falcone 386/b, I-80127 Napoli, Italy. e-mail: lindeniam@freemail.it
576. **D'Antonio, C. (1998):** La famiglia Cordulegasteridae Banks, 1892 in Italia. *Lindenia* 29: 125-127. (in Italian).  
[distributional notes and maps of the Italian taxa of the family Cordulegasteridae: *Cordulegaster boltonii*, *C. trinacriae*, *C. picta*, *Thecagaster bidentata*]  
Address: D'Antonio, C., Via A. Falcone 386/b, I-80127 Napoli, Italy. e-mail: lindeniam@freemail.it
577. **David, S; Jansky, V. (1998):** The dragonflies (Insecta: Odonata) from Východoslovenská rovina plain (southeastern Slovakia). *Entomofauna carpatica* 10: 10-21. (in Slovak, with English summary).  
[Between 1987 and 1995 the dragonfly fauna of 28 localities in the Východoslovenská rovina plain with special emphasize to the protected area "Preserved Landscape Area Latorica" was studied. 35 species were recorded including the rare Slovakian species *Anaciaeschna isosceles*, *Brachytron pratense*, *Epiptera bimaculata*, *Erythromma najas*, *E. viridulum*, and *Stylurus flavipes*. 10 species were new for the region mentioned above. The species composition of the localities was analysed according their community structure: 'Gomphus-Calopteryx splendens', 'Erythromma najas-Anax-Aeshna', 'Lestes-Sympetrum-Aeshna', and 'Orthetrum-Libellula depressa' dragonfly communities could be identified.]  
Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. e-mail: david@pribina.savba.sk
578. **David, S. (1998):** Record of *Libellula fulva* larva (Odonata: Libellulidae) from Slovakia. *Entomofauna carpatica* 10: 91-95. (in Slovak, with English summary).  
[Report on the discovery of larval *Libellula fulva* in Slovakia; discussion of distribution, ecology, and threat in Central Europe; key to the larval stages of *L. fulva*, *L. depressa*, and *L. quadrimaculata*]  
Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. e-mail: david@pribina.savba.sk
579. **Diehl, U.; Linder, S.; Güttinger, H.-R. (1998):** Das Wassergrabensystem des Landstuhler Bruchs, ein Lebensraum für Insekten. *Pfälzer Heimat* 49(4): 138-140. (in German).  
[*Ischnura elegans*, *Chalcolestes viridis*, *Pyrrhosoma nymphula*, and *Libellula depressa* are recorded in the system of ditches and peaty waters of the Landstuhl Bruch-region (Rhineland-Palatinate, Germany).]  
Address: Güttinger, H.-R., Universität Kaiserslautern, Abt. Biologie, D-67663 Kaiserslautern, Germany
580. **Dierschke, V. (1998):** Zum Vorkommen von Libellen auf der Ostseeinsel Hiddensee. *Libellula* 17(3/4): 229-235. (in German with English summary).  
["Odonata on the island of Hiddensee, Baltic Sea, Germany - In 1997, 19 species were recorded, with *Lestes barbarus*, *Coenagrion hastulatum*, and *Erythromma najas* observed for the first time. The occurrence at a total of 36 ponds was analysed. Out of 13 species reproducing on the island nearly all needed ponds with reeds. At least 6 species proved to reproduce in ponds with contact to brackish water of the Baltic Sea [...]."  
(Author)]  
Address: Dierschke, V., Institut für Vogelforschung "Vogelwarte Helgoland", Inselstation Helgoland, Postfach 1220, D-27494 Helgoland, Germany
581. **Dommanget, J.-L.; Chalmel, R. (1998):** Rubrique bibliographique. *Martinia* 14(4): 145-150. (in French).  
[French odonatological bibliography covering 1994 to 1998]  
Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France
582. **Donnelly, N. (1998):** *Anax junius* in England? *Argia* 10(4): 6. (in English).  
[short notice on a newspaper report (The Independent) on the "Giant bird-eating dragonflies cross the Atlantic"]  
Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA
583. **Donnelly, N. (1998):** Common name for *Gomphus adephus* emended. *Argia* 10(4): 32. (in English).  
[amendment of common name from "Moustached Clubtail" to "Mustached Clubtail"]  
Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA
584. **Donnelly, N. (1998):** Documenting rare odonates - a nice problem to have but a problem none the less. *Argia* 10(4): 10-11. (in English).  
[reflections about the scientific value of sightings or photos of unexpected species; the author appeals to odonatists to net specimens, and to examine them with a hand lens. "Even a close look followed by releasing the specimen is better than an observation or even an excellent photo."  
Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA
585. **Donnelly, N. (1998):** More about *Anax junius* crossing the ocean. *Argia* 10(4): 6-7. (in English).

[short outline of observations of *Anax guttatus* and *Anax junius* over the open sea; report from a catch of a couple of *A. junius* in Hawaii with "abnormal" morphological proportions: "the abdomens were too short (or perhaps the wings were too long)". Measuring abdomen and hind wings from Hawaiian collections, it is suggested that *A. junius* must have reached Hawaii a long time ago from the North-American continent because there is some likelihood for a little genetically drift of Hawaiian *A. junius* which are a little distinct from continental *A. junius*.]

Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA

586. **Donnelly, N. (1998):** New name for *Zoniagrion exclamatoris*. *Argia* 10(4): 32. (in English).

[the common name of *Z. exclamatoris* was changed from "Sierra Damselfly" to "Exclamation Damselfly"]

Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA

587. **Dumont, H.; Heidari, H. (1998):** The genus *Pseudagrion* (Odonata: Zygoptera) in Iran. *International Journal of Odonatology* 1(2): 159-163. (in English).

[two species of *Pseudagrion* are reported from Baluchistan-Seistan, South-East Iran. *P. decorum* is an Oriental, and *P. cf. laidlawi* a south-east Palaearctic species with Oriental affinities. The species are figured, and compared with *P. spencei*.]

Address: Dumont, H., Laboratory of Animal Ecology, University of Gent, Ledeganckstraat, 35, B-9000 Gent. Heidari, H., Plant Pests and Diseases Research Institute, Chamran Park Way, Tehran 19395, Iran.

588. **Englund, R. (1998):** Response of the orangeblack Hawaiian damselfly (*Megalagrion xanthomelas*), a candidate threatened species, to increases in stream flow. *Bishop Museum Occasional Papers* 56: 19-24. (in English).

Address: Englund, R., Hawaii Biol. Survey, Bishop Mus., 1525 Bernice St., Honolulu, HI 96817, USA

589. **Fischer, U. (1998):** Der Dobrabach nordöstlich Kalkreuth - ein weiteres Vorkommensgebiet der Gemeinen Keiljungfer (*Gomphus vulgatissimus* Linnaeus, 1758) in Sachsen. *Mitteilungen Sächsischer Entomologen* 42: 7. (in German).

[observations in 1997 and 1998 of the very rare *G. vulgatissimus*; this seems to be the second record in Saxonia, Germany]

Address: Fischer, U., Anton-Günther-Str. 12, D-08340 Schwarzberg, Germany

590. **Fliedner, H. (1998):** Die Namengeber der europäischen Libellen. *Hefte der Bremer Libellengruppe* 6: 56 pp. (in German).

[the authors of the names of European dragonflies: Biographical information are supplied concerning the authors of the names of European Odonata taxa. In addition a list of the scientific names of European dragonflies in chronological order is given.]

Address: Fliedner, H., Louis-Seegelken Str., D-28717 Bremen, Germany

591. **Fliedner, H. (1998):** Johann Franz Christian Heyer (1777-1864) und sein Beitrag zur Kenntnis der Libellen. 2. Teil. *Libellula* 17(3/4): 195-228. (in German).

[for part 1 see OAS 3 no. 318]

Address: Fliedner, H., Louis-Seegelken Str., D-28717 Bremen, Germany

592. **Freyhof, J.; Steinmann, I.; Krause, T. (1998):** Weitere Funde von *Gomphus flavipes* (Charpentier) im Rhein (Anisoptera: Gomphidae). *Libellula* 17(3/4): 247-252. (in German with English summary).

[ "Additional records of *Gomphus flavipes* (Charpentier) in the River Rhine, Germany (Anisoptera: Gomphidae).

- In 1998, larvae and exuviae of *G. flavipes* were recorded at 15 different localities of the Middle and Lower Rhine between Cologne and Bingen and at the coolwater intake of the nuclear power plant of Mülheim-Kärlich. These records suggest an established population and a wide distribution along the Rhine. *G. flavipes* seems to be dependent on fine sediment habitats" a habitat also for other endangered potamal species. Larval habitats are highly endangered by intensive shipping." (Authors)]

Address: Freyhof, J., Zool. Forschungsinst. und Museum Alexander König, Adenauerallee 160, D-53113 Bonn, Germany

593. **Futter, S.; Futter, K. (1998):** The status of the Highland/Common Darter *Sympetrum nigrescens/striolatum* in Dunbartonshire. *Glasgow Naturalist* 23(3): 63. (in English).

Address: Futter, S. and K., 81 Oxhill Place, Dumbarton G82 4EX, UK

594. **Giles, G.B. (1998):** An illustrated checklist of the damselflies and dragonflies of the United Arab Emirates. *Tribulus, Bulletin of the Emirates Natural History Group* 8(2): 9-15.

[all 20 confirmed species present in the United Arab Emirates are illustrated by 30 colour photographs of somewhat variable quality. In most species both male and female are depicted. The accompanying brief notes give status, behaviour and preferred habitat, together with some useful distinguishing features. A further nine species found in northern Oman, which could occur in the UAE, are also briefly described. (Jill Silsby)]

595. **Gorb, S.N. (1998):** Origin and pathway of the epidermal secretion in the damselfly head-arresting system (Insecta: Odonata). *Journal of Insect Physiology* 44 (11): 1053-1061. (in English).

[ "In damselflies, the arrester system is responsible for an additional attachment of the head to the neck. It consists of a pair of mobile postcervical sclerites (SPC) covered by microtrichia. In their lateral position, SPCs can fixate the head on fields of microtrichia on the back surface of the head. The intact surface of microtrichia of the SPC is usually covered by a lipid-containing secretion. The present study provides ultrastructural data on the secretory epidermis and pore channels adapted to transport the secretion to the cuticle surface. ... It seems that the secretion reaches the epicuticle through terminal channels and diffuses through the epicuticle without any channel structures.]

Address: Stanislav Gorb, Max-Planck-Institut fuer Entwicklungsbiologie, Spemannstr. 35, D-72076 Tuebingen, Germany. e-Mail: stas.gorb@tuebingen.mpg.de

596. **Grand, D. (1998):** Les odonates de Lyon (département du Rhône). *Martinia* 14(3): 85-93. (in French, with English summary).

[compilation of historical and actual odonatological sources to list the Odonata fauna of the city of Lyon



(410 000 habitants, 8962 habitants / km<sup>2</sup>) including its 9 arrondissements; in total 42 species could be listed of which 27 can be observed regularly or occasionally in the 90th of this century.]

Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mt d'or, France

597. **Gubbels, R. (1998):** Waarneming van een bronlibel (*Cordulegaster boltonii*) langs de Grensmaas. *Natuurhistorisch Maandblad* 87: 212. (in Dutch).

[record of the rare Netherlands *C. boltonii* in 1998 flying along the Netherland-Belgian border river Maas]

Address: not stated

598. **Hall, B.D.; Rosenberg, D.M.; Wiens, A.P. (1998):** Methyl mercury in aquatic insects from an experimental reservoir. *Canadian Journal of Fisheries and Aquatic Sciences* 55(9): 2036-2047.

["Our objective was to study the effects of experimental flooding of a small wetland lake on the methyl mercury (MeHg) concentrations in aquatic insects and to compare MeHg concentrations in insects with those in water and fish from the same system. [...] Odonata, Corixidae, Gerridae, Gyrinidae, and Phryganeidae/Polycentropodidae exhibited increases in MeHg concentrations in response to flooding. ..."] (Author)]

Address: Hall, B.D., Univ. Alberta, Dept. Biol. Sci., Edmonton, AB T6G 2E9, Canada

599. **Hampe, A. (1998):** Libellen an Ober- und Mittellauf eines südspanischen Flusses: ein ökologischer Vergleich. *Libellula* 17(3/4): 163-172. (in German with English summary).

["Odonata of the upper and middle reach of a southern Spanish river: an ecological comparison - The odonates of the upper and middle reach of the Rio Barbate, approximately 40 km north of Gibraltar (Andalusia, Spain), were surveyed between May and September 1997, and their flight phenology and larval development were compared. Faunistic similarity was very low. No sp. reproduced at both upper and middle reach. More spp. were recorded at the middle reach. The flight phenologies showed similar patterns. Semi-voltine spp. occurred only at the upper reach whereas bi- and polyvoltine spp. formed an important fraction of 77 % at the middle reach." (Authors)]

Address: Hampe, A., Institut für Vogelforschung "Vogelwarte Helgoland", An der Vogelwarte 21, D-26386 Wilhelmshaven, Germany

600. **Harrison, J.F.; Lighton, J.R.B. (1998):** Oxygen-sensitive flight metabolism in the dragonfly *Erythemis simplicicollis*. *Journal of Experimental Biology* 201(11): 1739-1744. (in English).

["Insect flight metabolism is completely aerobic, and insect resting metabolism is quite insensitive to atmospheric oxygen level, suggesting a large safety margin in the capacity of the tracheal system to deliver oxygen during flight. We tested the sensitivity of flight initiation and metabolism to atmospheric oxygen level in the libellulid dragonfly *Erythemis (Mesothemis) simplicicollis* using flow-through respirometric measurements of the rate of CO<sub>2</sub> emission (VCO<sub>2</sub>). ... These are the first data to show oxygen-limitation of flight metabolism in a free-flying insect. A low safety margin for oxygen delivery during dragonfly flight is consistent with a previous hypothesis that atmospheric hyperoxia facilitated gigantism in Paleozoic protodonates." (Author)]

Address: Harrison, J.F., Dept. Biol., Arizona State Univ., Tempe, AZ 85287-1501, USA

601. **Hermans, J.; Ketelaar, R. (1998):** De Libellenstudiegroep: een nieuwe studiegroep in oprichting van het Natuurhistorisch Genootschap. *Natuurhistorisch Maandblad* 87: 74-76. (in Dutch).

[report on the instalation of a Odonata study task group in the province of Limburg/The Netherlands; some examples (*Libellula depressa*, *Pyrrhosoma nymphula*, records after 1990) of the present knowledge of the distribution of Odonata in the province are presented]

Address: Hermans, J.T.; Hertestraat 21, NL-6067 ER Linne, The Netherlands

602. **Hero, J.-M.; Gascon, C.; Magnusson, W.E. (1998):** Direct and indirect effects of predation on tadpole community structure in the Amazon rainforest. *Australian Journal of Ecology* 23(5): 474-482. (in English).

["The relationship between the distribution of predators (fish, odonates and water beetles) and prey assemblages (amphibian larvae) was investigated in the tropical rainforest of central Amazonas, Brasil. [...] Predators in this system include fish in streams and streamside ponds, and invertebrates (primarily odonate naiads and beetles) in forest ponds. ..."] (Author)]

Address: Hero, J.-M., Sch. Applied Sci., Cooperative Res. Centre Tropical Rainforest Ecol. and Management, Griffith Univ. Gold Coast, PMB 50 Gold Coast MC, Queensland 9726, Australia

603. **Hill, B. (1998):** Die Huteweiden der Save-Auen im Naturpark Lonjsko Polje, Kroatien, als Lebensraum für Libellen (Odonata). Diplomarbeit am Fachbereich Biologie der Philipps-Universität Marburg - Fachgebiet Naturschutz: 119 pp, Anhang. (in German).

[survey of the importance of pastures and temporary waters in the floodplain of the River Save (Croatia) as a habitat for dragonflies; special emphasize is given to *Lestes barbarus* (*Ischnura pumilio*, and *Aeshna affinis*); drought resistance of larvae]

Address: Hill, B., Höhlsgasse 3, D-35039 Marburg. e-mail: bioplan.marburg@t-online.de

604. **Hinkelmann, C.; Schröder, W. (1998):** Arabuko-Sokoke-Wald und Mida Creek. Ein naturkundlicher Führer. NABU-Deutschland: 61 pp. (in German).

[German version of the "Arabuko-Sokoke-Forest and Mida Creek - Official Guide" published by the Kenya Indigenous Forest Conservation Programme; on pages 33/34 there are a few, general notes on the Odonata of the reserve; the guide is produced throughout with colour photos and fine black-and-white drawings; birds are the main content of the guide]

Address: Source of supply: Schröder, W., Flachskamp 47, D-33824 Werther, Germany (DM 15,-)

605. **Hoffmann, J. (1998):** Pantala und der Taxifahrer. *Hagenia* 16: 17-19. (in German).

[short story from a trip to Peru: how to use a taxi-driver for detecting promising dragonfly-localities, or how does a good locality smell?]

Address: Hoffmann, J., Eidelstedter Weg 15, D-20255 Hamburg, Germany

606. **Hogerwerf, G.; Ovaa, A.; Gerats, R. (1998):** Heidebeheer of de Hamert: de rol van fauna in het verle-

den en in the toekomst. *Natuurhistorisch Maandblad* 87: 194-201. (in Dutch, with English summary).

["Moorland management at "De Hamert" National Park: The role of fauna in past, present and future: "In the mid-1980s, very high nitrogen depositions had led to the disappearance of 255 of the original 300 hectares of heath vegetation. Of the remaining 45 hectares, only 12 had vital heath. The remaining area had become overgrown by Wavy hair-grass, Purple moor-grass and Bramble. In the mid-1980s, large parts of the area's topsoil were mechanically removed in order to restore the heath vegetation. In addition, the area was fairly intensively grazed by sheep, goats, cattle and horses. As a result, the heath coverage has grown considerably. The importance of moorland as a biotope is mainly due to its rich fauna. De Hamert has always housed large numbers of species specifically associated with moorland biotopes. Unfortunately, the large-scale management measures at De Hamert have not restored the habitat of the typical moorland fauna; in fact, the fauna seems to have deteriorated in many places. The reason is that much of the structural variation in the vegetation cover, which is a key aspect of the habitat, has been lost. The article discusses a number of prominent moorland species to illustrate the importance of the fauna in moorland management. On the basis of biotope preference, the moorland fauna can be classified into a number of groups. A few representatives of each group are discussed (Sand lizard, *Lacerta agilis*; Small red damselfly, *Ceriongia tenellum*; Moorfrog, *Rana arvalis*; Silver-studded blue, *Plebejus argus*; Nightjar, *Caprimulgus europaeus*), indicating the management measures which would preserve and develop the habitat for the fauna. Finally, the article discusses some moorland management options which could restore the lost structural variation to the vegetation at De Hamert; these include extensive grazing, small-scale management and expanding and linking the isolated moorland patches." (Authors)]

Address: Ova, A., Stichting Het Limburgs Landchap, Postbus 4301, NL-5944 ZG Arcen, The Netherlands

607. **Honig, B. (1998):** Sight and photo records for odonates from Houston, Texas. *Argia* 10(4): 25-26.

[*Libellula saturata*, *Libellula croceipennis*, *Brachymesia furcata*, *Anax longipes*]

Address: Honig, R., 3803 Purdue, Houston, TX, 77005-1129, USA

608. **Jacobsen, D. (1998):** The effect of organic pollution on the macroinvertebrate fauna of Ecuadorian highland streams. *Arch. Hydrobiol.* 143(2): 179-195. (in English).

["The effect of organic pollution on macroinvertebrate communities was studied in five small streams located at 2600 to 3100 meters above sea level in the Andes of Ecuador. Sampling of invertebrates and measurements of physico-chemical parameters were performed at the end of the rainy season and at the end of the dry season at upstream unpolluted sites and at adjacent downstream polluted sites. At all upstream sites, more taxa were collected in the dry season, while at the polluted downstream sites, more taxa were collected in the wet season. Also values of two biotic indices (BMWP and ASPT) tended to increase at the upstream sites and decrease at the downstream sites in the dry season. Thus, the effect of organic pollution was most pronounced during the dry season. In addition, both biotic indices were highly correlated to minimum oxygen satu-

ration and phosphate concentration in the dry season, while correlations were much weaker in the wet season. Overall, the shift in faunal composition with organic pollution resembled that described from temperate streams at higher latitudes. However, the main shift in the tropical highland fauna occurred abruptly at about 80 % oxygen air saturation, but because of the low partial pressure of oxygen at an altitude of 3000 meters, this corresponds to no more than 56 % of the oxygen partial pressure of air saturated water at sea level. I propose that tropical highland streams are more sensitive to further lowering of oxygen levels through organic pollution than their temperate counterparts." (Author). "Aeshnidae" are listed for two localities.]

Address: Jacobsen, D., Freshwater Biological Laboratory, University of Copenhagen, 51 Helsingorsgade, DK-3400 Hillerod, Denmark

609. **Jacquemin, G. (1998):** Hemianx ephippiger (Burmeister, 1839) dans le Roussillon en août 1997 (Odonata, Anisoptera, Aeshnidae). *Martinia* 14(3): 93. (in French).

Address: Jacquemin, G., Biologie des Insectes, Université H. Poincaré, Nancy 1, BP 239, F-54506 Vandœuvre-lès-Nancy, France

610. **Joest, R. (1998):** Libellen in der Klostermersch. *ABU-Info* 22(1) (Arbeitsgemeinschaft Biologischer Umweltschutz im Kreis Soest): 12-15. (in German).

[report from a monitoring project in the floodplain of River Lippe near the town Lippstadt, Nordrhein-Westfalen, Germany; the vegetation is grazed by aurochs (re-bred cattle "Heckrind"); between 1991 and 1997, 25 species were recorded]

Address: not stated

611. **Johnson, J. (1998):** *Somatochlora walshii* recorded in Oregon. *Argia* 10(4): 25. (in English).

Address: Johnson, J., 6303 SE Ramona Street, Portland, OR, 97206-5930, USA

612. **Jolivet, S.; Vaillant, F. (1998):** Inventaire préliminaire des odonates du département des Deux-Sèvres. *Martinia* 14(4): 119-136. (in French, with English summary).

[49 species are shortly discussed, and their distribution in the Département Deux-Sèvres is mapped]

Address: Jolivet, S., 8, Parc Vatonne, F-91190 Gif sur Yvette, France

613. **Jourde, P. (1998):** Inventaire des espèces animales de la directive habitats présentes en Charente-Maritime. *Annales de la société des sciences naturelles de la Charente-Maritime* 8(7): 841-854(?). (in French).

[compilation of the presence in the French Département Charente-Maritime of the species listed in the annex to the European Fauna-Flora-Habitat Directive: *Coenagrion mercuriale*, *Gomphus graslini*, *Oxygastra curtisii*]

Address: Jourde, P., LPO, La Corderie Royale, BP 263, F-17305 Rochefort Cedex, France

614. **Kappes, W.; Kappes, E. (1998):** 1.) Neusiedler See. Frühling im Seewinkel. 15. - 23.5.1998. Reisetagebuch; Artenlisten: Säugetiere, Vögel, Libellen, Tagfalter, Farbfotos. 2.) Winter im Seewinkel. 27.12.1995 - 6.1.1996. Reisetagebuch; Artenliste: Vögel, Farbfotos. *Naturkundliche Reiseberichte* 12: 49 pp. (in German).

[Odonata: pp 20-26; checklists of 18 species (incl. *Epi-theca bimaculata* and *Leucorrhinia pectoralis*) with in-

formation on abundance of species, dates and localities; colour pictures of *Anaciaeschna isosceles* and *L. pectoralis*.]

Address: Kappes, W., Winsbergring 5, D-22525 Hamburg, Germany (DM 20,-)

615. **Kappes, W. (Hrsg.) (1998):** Äthiopien. Naturkundliche Reisenotizen 20.12.1997 - 4.1.1998. Reisetagebuch; Artenlisten: Säugetiere, Vögel, Libellen, Tagfalter, Pflanzen; Gedanken zur Artbildung; Farbfototeil. Naturkundliche Reiseberichte 11: 125 pp. (in German).

[extensively and well documented diary of a journey to Ethiopia, including an odonatological part on pages 109-114; 17 species are listed; further specimens are documented on 4 plates with colour pictures waiting - in some cases - for identification]

Address: Kappes, W., Winsbergring, D-22525 Hamburg, Germany. (DM 48,-)

616. **Kesel, A.B.; Philippi, U.; Nachtigall, W. (1998):** Biomechanical aspects of the insect wing: an analysis using the finite element method. *Computers in Biology and Medicine* 28(4): 423-437. (in English).

["Insect wings appear as highly functional and largely optimized mechanical constructions. A series of stabilizing constructional elements have been 'designed' to cope with loading during flight. ... To quantify the quality of material distribution, models of a dragonfly wing and of a fly wing were calculated using the finite element method (FEM)."] (Authors)]

Address: Kesel, A.B., Univ. Saarland, Dept. Zool., D-66041 Saarbrücken, Germany

617. **Kettrup, M. (1998):** Effizienzkontrolle im Gewässerrenaturierungsprogramm Nordrhein-Westfalen. *Berichte der Niedersächsischen Naturschutz Akademie* 11(1): 71-75. (in German).

[Odonata as monitoring organisms for assessment of river restoration]

Address: Kettrup, M., LÖLB NRW, Leibnitzstr. 10, D-45659 Recklinghausen, Germany

618. **Kipping, J. (1998):** Ein Beitrag zur Libellenfauna (Odonata) Rumäniens. *Mauritiana* 16(3): 527-538. (in German, with short English summary).

[a survey of 33 localities in the River Mures-system (Central Roumainia) between 1994 and 1997 resulted in records of 46 species. All species are classified according to their biogeographical position, and treated species-wise with exact data to the records. Of special interest are the records of *Cordulegaster heros*, *Anax ephippiger*, *Cercion lindenii*, and *Coenagrion ornatum*.]

Address: Kipping, J., Ringstr. 5/6, D-04600 Altenburg, Germany

**Klima, M.; Klima, F. (1998):** Aquatische Wirbellose (Makrozoobenthos) im Gebiet der Krümmen Lake/Grünau unter besonderer Berücksichtigung der Trichoptera (Köcherfliegen). *Novius* 24: 591-597. (in German).

[6 common species of Odonata are listed; Berlin, Germany]

Address: Klima, Martina, Bauernheideweg 40, D-12589 Berlin, Germany

619. **Knjif, G. de; Anselin, A. (1998):** Beschrijving en evaluatie van de natuur in Vlaanderen: de rol van libellen in het natuurbehoud. *Gomphus* 14(1): 3-31. (in Dutch, with English and French summaries).

["This article gives a review of the status of the Odonatofauna in Flanders based on data collected by the Odonata Working Group 'Gomphus'. The review has been written in the framework of the 'Nature Report' drawn up by the Institute of Nature Conservation by order of the Flemish government. First data sources are given and the method described used to identify hot spots (5x5 km squares rich in species). The next chapter deals with species richness and historical changes in distribution status. For the various Flemish ecoregions a summary is given of total species number and number of Red List Species. In the Campine ecoregion all Flemish species (58) are present, as well as all Red List species (29). On the other hand, the Dune and Polder regions count the lowest number of species (res. 23 and 25) and possess only one Red List species. An analysis of Red List species hot spots shows that with the exception of the Damvallei near Gent, the most important hotspots can be found in the Campine ecoregion. Characteristic species for each ecoregion are described in detail. Legal conservation of dragonflies and the international value of certain species are dealt with. Finally, characteristic species of three important biotopes (running water, oligotrophic fens and mesotrophic waterbodies) are described and the various causes of changes in the Odonatofauna discussed."] (Authors)]

Address: Knjif, Geert de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium

620. **Krach, J.E. (1998):** Die Libellen des Naturparks Altmühltal und der angrenzenden Donauniederung. *Weihnachtsschrift 1998 der Vereinigung der Freunde des Willibald-Gymnasiums Eichstätt*: 160 pp. (in German).

[comprehensive study of the Odonata of the valley of the River Altmühl and the adjacent floodplain of the River Danube (Bavaria, Germany); monographic treatment of the 54 species; colour pictures and distribution maps of all species; note: the colour picture on p. 56 shows a *Lestes dryas* rather than a female of *Calopteryx virgo*; the book is available from the author for DM 10,- + pp]

Address: Krach, E., Katholische Universität Eichstätt, Biologie und Chemie, Ostenstr. 26, D-85071 Eichstätt, Germany

621. **Kretzschmar, W.; Pimpl, F. (1998):** Libellen (Odonata) - Vorläufige Verbreitungskarten des gemeldeten Erfassungsstandes von 1996 für die Zeit 1990 bis 1996. *Mitteilungen Sächsischer Entomologen* 40: 3-32. (in German).

[distribution maps of the Saxonian Odonata (55 species)]

Address: Kretzschmar, W., Hauptstr. 28, D-01640 Coswig, Germany; Pimpl, F., Niederzwönitzer Str. 83, D-08297 Zwönitz, Germany. e-mail: arctica@aol.com

622. **Kuhn, J. (1998):** Life-history-Analysen, Verhaltens- und Populationsökologie im Naturschutz: die Notwendigkeit von Langzeitstudien. *Schriftenreihe für Landschaftspflege und Naturschutz* 58: 93-113. (in German, with English summary).

[Life history analyses, behavioural and population ecology as a basis for conservation: the necessity of long-term studies: Some examples are presented that demonstrate the necessity of long-term studies for behavioural and population ecology as well as analyses of life histories to make up reliable foundations for conser-



vation. The following propositions are illustrated: • Long-term studies may avoid misinterpretations of phenomena in the field of evolutionary ecology. (Example: *Bufo bufo*, Amphibia) • Long-term studies may avoid underestimation of reproductive flexibility as well as plasticity in habitat selection, and may preclude misjudgement of habitat quality. (Examples *Bufo bufo*, Amphibia; *Acrocephalus scirpaceus*, Aves) • Conservation measures run the risk of being inefficient or even counter-productive unless based on a sound comprehension of species' life history and population ecology - which normally requires long term studies (especially in perennial species). (Example: *Bufo bufo*, Amphibia) • Only continuous long-term monitoring allows of separating fluctuations from real trends. • Monitoring in intervals of several years often is misleading. • Long-term studies help to identify stock size determinants as well as the influence of phenological factors on stock development. • Long-term data sets may be reminiscent of experiments. • Short-term knowledge of an area may cause false estimations of its conservation potential. (Examples: *Rana dalmatica*, *Hyla arborea*, Amphibia; *Sympetrum flaveolum*, Odonata; 'Vegetation') (Author)] Address: Kuhn, J., Max-Planck-Institut für Verhaltensphysiologie, Abt. Wickler, D-82319 Seewiesen, Germany

623. **Kuhn, K.; Burbach, K. (1998):** Libellen in Bayern. 333 pp. Ulmer. Stuttgart. ISBN 3-8001-3495-0.

This is really a well organized and extremely informative book on the dragonflies of Bavaria, Germany. Introductory information is given on natural history situation, and the history of dragonfly research in Bavaria. The main topic of the book is the publication of the results of the Bavarian species mapping programme, started in the late 80's (92000 records from 14500 localities). These results are presented in a monographic way: Colour photographs of each species, distribution and status, habitat and habits, distribution maps (Europe, Bavaria), altitudinal distribution, and phenology.

In Chapter 7, 20 different habitat types characterised from the are odonatological point of view. For each of these habitats the main regional resp. geographic distribution in Bavaria is outlined, the Odonata characteristic of these habitats are listed, black and white drawings illustrate characteristic features of the habitat and the microhabitats of key species, the main threats are analysed, and measures for species conservation are proposed.

In Chapter 8, 13 ecoregions ('Naturräume') are odonatologically characterised. The reader will find comparisons between older and new data on the odonate fauna of these ecoregions, and the development of their odonate fauna in this century.

Chapter 9 outlines the possibilities for the conservation of Odonata in Bavaria, including legal, and the variety of Bavarian action programmes for habitat and species conservation. These actions programmes are assessed for dragonfly conservation purposes, and action plans for threatened Odonata in Bavaria are outlined.

The book ends with general information on dragonfly research from the conservationist's point of view, and with a remarkably comprehensive bibliography on odonatological literature in Bavaria.

For people not familiar with the German language it might be a disadvantage that the entire text is written in German. But there is a way to solve this problem: This

excellent book on Bavarian Odonata could give the reason to fresh up or even to learn German.

I consider the book of Klaus Kuhn and Klaus Burbach, and their numerous contributors (!) the most informative book on German Odonata, especially in the conservationist's point of view, you can purchase at present. It also is an excellent example how to present a regional dragonfly fauna in book form.

Please note a small mistake on page 110: The colour photograph depicts *Gomphus simillimus* (not *G. pulchellus*), a species not found in Bavaria. (M. Schorr)

624. **Laurent, S. (1998):** Chronologie du peuplement odonatologique d'une ripisylve du Rhône. *Martinia* 14(3): 79-84. (in French, with English summary).

[survey of Odonata north of Arles (Département Bouches-du-Rhône, France); 17 species were recorded; their diversity was compared using different indexes as Shannon and Menhinick]

Address: Laurent, S., 14, rue Edmond Michelet, F-84000 Avignon, France

625. **Le Calvez, V. (1998):** Les odonates de la forêt domaniale de Notre-Dame (Départements du Val-de-Marne et de Seine-et-Marne). *Martinia* 14(4): 137-145. (in French, with English summary).

[Notre-Dame forest is situated in an urban area approximately 20 km from Paris. This forest is scattered with hundreds of small ponds. 31 Odonata species could be recorded between 1993 and 1998. They are shortly commented on.]

Address: Le Calvez, V., 3, allée Bullant, F-93290 Tremblay-en-France

626. **Lefort, F.; Catling, P.M. (1998):** A survey of damselfly adults at urban and non-urban streams at Ottawa, Ontario. *Argia* 10(4): 17-19. (in English).

["Sixteen species of adult damselflies were recorded at 23 stream sites, but only 9 were found at 3 or more sites. The most frequent species were *Enallagma exsulans* and *Ischnura verticalis*. Numbers of species and numbers of individuals were significantly less at streams inside the city than at streams outside, which are probably less polluted, suggesting that the numbers of species and individuals may prove useful in assessing water quality. Species with over 75% of their sites, and over 95% of their numbers on non-urban streams, including *Argia moesta*, *Calopteryx aequabilis*, *Enallagma antennatum*, and *E. exsulans*, may serve as useful specific indicators of good water quality. The relatively rare species, *Chromagrion conditum*, may also prove to be a useful indicator of good water quality."] (Authors)]

Address: Lefort, F., 6415 Wellington Avenue, West Vancouver, British Columbia, V7W 2H7, Canada

627. **Legler, K.; Legler, D.; Westover, D. (1998):** Color guide to common dragonflies of Wisconsin. Revised Edition 1998.

[Table of contents: Introduction, Life History of dragonflies, About this guide, Key to text frames, Identification of families, Summary of the dragonfly families, The dragonfly guide (Species 1-106), Summary of the dragonfly families, Part of a dragonfly, Sex differences, Bibliography, Wisconsin dragonfly checklist, Photo credits, Indexes of scientific and English names. 103 species of Anisoptera and 3 species of Zygoptera (Chalopterygidae) are covered with - in most cases - good photographs. Information on how to spot a species are very

convenient for the beginners, or e.g. for an European visiting Wisconsin for collecting dragonflies. The price of the book is US \$ 18.95 plus p+p.]  
Address: Legler, Karl, 429 Franklin St., Sauk City, WI 53583. e-mail: karlindot@bankpds.com

628. **Lett, J.-M. (1998):** Synopsis des odonates de la Sologne de Loir-et-Cher et de ses environs. (in French). [commented synopsis of the 61 species of Odonata known to occur in the Sologne (Département Loir-et-Cher, France)]  
Address: Lett, J.-M., 1, les Cosses, F-41320 Saint-Loup-sur-Cher, France

629. **Lindeboom, M. (1998):** Post-copulatory behaviour in Calopteryx females (Insecta, Odonata, Calopterygidae). International Journal of Odonatology 1(2): 175-184. (in English).

[The post-copulatory behaviour of Calopteryx splendens females was studied under field and laboratory conditions. After termination of copulation females usually perch and bend the abdomen so that its apex touches the ground (post-copulatory posture). The post-copulatory posture is a consequence of sperm removal by males. Male and female microstructures (spines and scales) interact to move previous sperm from the female sperm storage organs to the outside during copulation stage I, after which moved sperm is located on the ovipositor. After termination of copulation females require an average of 45 seconds to brush off this sperm (N=21). The post-copulatory behaviour of females may also allow males to chase rival males before the females start to oviposit (prevention of disturbances). The present study shows no evidence of cryptic female choice in *C. splendens*." (Author)]  
Address: Lindeboom, M., Wolfstr. 6, D-72119 Ammerbuch, Germany

630. **Manach, A. (1998):** Prolifération de *Sympetrum danae* (Sulzer, 1776) dans une tourbière du Finistère (Odonata, Anisoptera, Libellulidae). Martinia 14(3): 94. (in French).  
[the abundance of *S. danae* in the bog which covered 25 ha, was estimated with 250 - 500000 individuals ]  
Address: Manach, A., 11, rue d'Ouessant, F-29200 Brest, France

631. **Manolis, T.; Rehn, A. (1998):** First records of *Leucorrhinia proxima*, *Aeshna canadensis*, and *Sympetrum vicinum* for California. Argia 10(4): 24. (in English).  
Address: Manolis, T., 808 El Encino Way, Sacramento, CA, 95864, USA

632. **Maridet, L.; Wasson, J.-G.; Philippe, M.; Amoros, C.; Naiman, R.J. (1998):** Trophic structure of three streams with contrasting riparian vegetation and geomorphology. Arch. Hydrobiol. 144(1): 61-85. (in English).  
[The relative influence of riparian vegetation and geomorphology on trophic structure was examined at three streams in adjacent catchments of the French Massif Central mountains. The study sites differed mainly by the degree of anthropogenic alteration of riparian and watershed vegetation, and by valley geomorphology. Fishes, benthic macroinvertebrates (grouped into functional feeding groups), macrophytes and periphyton were sampled seasonally between July 1991 and April 1992. At the riffle-pool (10 m) scale, instream morpho-

logical units appear to control the spatial partitioning of trophic resources and their consumers. [...] At the reach-segment scale (10 to 100 m), valley morphology was the primary factor controlling the stream ecosystem, but anthropogenic alteration of riparian vegetation seems to override geomorphological controls on the trophic structure. [...] Overall, the results emphasize the importance of riparian vegetation on the trophic structure of streams, especially when anthropogenic alteration of riparian vegetation is severe. We conclude that there is a need to better integrate riparian vegetation into European stream management practices in order to maintain the vitality of these systems over the long-term." (Authors). "Calopterygidae" and "Cordulegasteridae" are listed in tab. 2.]

Address: Wasson, J.-G., Mission OSTROM en Bolivie, Institute de Ecologia, CP 9214, La Paz, Bolivia

633. **Marie, A. (1998):** Les odonates des Hautes-Alpes et du Haut-Dauphiné. Martinia 14(3): 95-102. (in French, with English summary).

[54 species of Odonata derived from different sources are listed for the region in southeastern France.]  
Address: Marie, A., Parc national des Ecrins, F-05290 Vallouise, France

634. **May, M.L. (1998):** *Macrothemis fallax*, a new species of dragonfly from Central America (Anisoptera: Libellulidae), with a key to male *Macrothemis*. International Journal of Odonatology 1(2): 137-153. (in English).

[*M. fallax* sp. n. is described and figured from males collected in Belize and Panama]  
Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA

635. **Mitra, A. (1998):** Notes on the emergence behaviour of *Trithemis festiva* (Rambur) (Odonata: Anisoptera) under laboratory condition. Annales of foresty, Dehra Dun (India) 6(1): 72-78. (in English).

[The behaviour of emergence of *Trithemis festiva* under the laboratory condition was studied during January to March, 1997. Time of emergence, sex-ratio, average height of the exuviae from the water level, average length of the exuviae, the length of their rapturing area, substrate utilization for emergence and percentage of emergence were also recorded. The different stages of ecdysis were carefully observed." (Author)]  
Address: Mitra, A., Northern Regional Station, Zoological Survey of India, 218 Kaulagarh Roads, Dehra Dun - 248195, India

636. **Moravec, F.; Skorikova, B. (1998):** Amphibians and larvae of aquatic insects as new paratenic hosts of *Anguillicola crassus* (Nematoda: Dracunculoidea), a swimbladder parasite of eels. Diseases of Aquatic Organisms 34 (3): 217-222. (in English).

[Amphibians (tadpoles of the frog *Bombina orientalis* (L.) and the newt *Triturus vulgaris* (L.) and aquatic insects (larvae of the alder fly *Sialis lutaria* (L.) [Megalo- ptera], dragonflies *Sympetrum sanguineum* (Müller) and *Coenagrion puella* (L.) [Odonata], and the caddisfly *Oligotrichia striati* (L.) [Trichoptera]) were found to serve as paratenic hosts for the third-stage larvae (L-3) of the nematode *Anguillicola crassus* Kuwahara, Niimi et Itagaki, 1974, a pathogenic swimbladder parasite of the eel *Anguilla anguilla* (L.) in Europe and elsewhere. This is the first evidence that, in addition to prey fishes and some aquatic snails, amphibians and aquatic insects

can serve as paratenic hosts for this nematode parasite. *A. crassus* third-stage larvae were found, largely unencapsulated (encapsulated only in *S. lutaria*), mostly in the body cavity, on the gut surface and, less often, in the liver and in the subcutaneous tissue of legs in amphibians, and in the body cavity and on the gut surface in insect larvae ..."]

Address: Moravec, F., Acad. Sci. Czech. Republ., Inst. Parasitol., Branisovska 31, CR-37005 Ceske Budejovice; Czech Republic. e-Mail: Moravec, F.: moravec@paru.cas.cz

637. **Müller, J.; Steglich, R. (1998):** Neues von der Elbe bzw. aus dem Elbetal 1998. - 2. Gemeine Keiljungfer *Gomphus vulgatissimus* nun auch in der Elbe. Halophila, Staßfurt 36: 2-3. (in German).

[record of *G. vulgatissimus* on the River Elbe near the mouth of River Saale (Federal State of Sachsen-Anhalt, Germany)]

Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany

638. **Novelo-Gutierrez, R. (1998):** Description of the larva of *Remartinia secreta* and notes on the larva of *Remartinia luteipennis florida* (Odonata: Aeshnidae). Canadian entomologist 130(6): 893-897.

Address: Novelo-Gutierrez, R., Instituto de Ecologia A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico

639. **O'Brien, M. (1998):** 1998 Season summary for the Michigan Odonata Survey. *Argia* 10(4): 15-17. (in English).

[report from current activities of the MOS; additions to the checklist of Michigan Odonata]

Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA

640. **O'Brien, M.F. (1998):** *Enallagma basidens* (Odonata: Coenagrionidae) expands its range into Michigan. Great Lakes Entomol. 30(4): 181-183. (in English).

Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA

641. **Orendt, C. (1998):** Macroinvertebrates and diatoms as indicators of acidification in forest spring brooks in a region of eastern Germany (Leipzig-Halle-Bitterfeld) highly impacted by industrial activities. Arch. Hydrobiol. 143(4): 435-467. (in English).

["Benthic macroinvertebrates and epilithic diatoms were surveyed in six forest spring brooks of Saxonia-Anhalt and Saxonia (eastern Germany). The aquatic communities changed from acid-sensitive to acid-tolerant along a gradient of acidity within the sampling area. The acidity states of the brooks were assessed by indicator species and pH values measured weekly. Waters close to industrial emitters showed lower acidity states than those farther from them. The different assessment methods used tended to yield corresponding results. In some cases, however, the results were not congruent, particularly when macroinvertebrates were used. Possible modifications of acidity-indication evaluation systems are discussed which may lead to improved assessments." (Author). 6 species of Odonata are listed. *Cordulegaster boltonii* is the most dominant species and represented at most localities independent of pH average.]

Address: 1. Hildegardstr. 13, D-80539 Munich. 2. Technical University of Brandenburg Cottbus, Chair of Water Conservation, Research Station Bad Saarow, Seestr. 45, D-15526 Bad Saarow

642. **Orr, R. (1998):** *Anax junius* 1998 spring migration data from Maryland's PWRC. *Argia* 10(4): 7-8. (in English).

[first migrating *A. junius* were seen on 27 March 1998. "By April 16, the migration was in full swing ..."]

Address: Orr, R.L., 5215 Durham Road East, Columbia, MD 21044-4444, USA

643. **Orr, R. (1998):** Gomphid emergence times along the Little Patuxent River, Maryland. *Argia* 10(4): 8. (in English).

[exuviae of the following species were collected: *Gomphus exilis*, *G. lividus*, *G. rogersi*, *Ophiogomphus incurvatus*, *Hagenius brevistylus*, *Progomphus obscurus*, *Stylogomphus albistylus*, *Stylurus laurae*, and *S. spiniceps*]

Address: Orr, R.L., 5215 Durham Road East, Columbia, MD 21044-4444, USA

644. **Parr, A. (1998):** Dragonflies. *British wildlife* 10(2): 123-124. (in English).

[short report on some spectacular findings of Odonata in United Kingdom in 1998, among them the first record of *Anax junius* in Europe (September 1998) and a winter influx of *Anax ephippiger* (January - March 1998). Additional notes are made to further migrant species, the influence of global warming on the dragonfly fauna of UK, and the possible range extensions of e.g. *Erythronema viridulum*.]

Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

645. **Perepelov, E.A.; Bugrov, A.G.; Warchalowska-Sliwa, E. (1998):** C-banded karyotypes of some dragonfly species from Russia. *Folia biologica*, Krakow 46 (3/4): 137-142.

["The C-stained karyotypes of *Calopteryx splendens* (Harris, 1782) (2n male=25, X0, m), *Aeshna viridis* Eversmann, 1836 (2n male=26, neo-XY, m), *Ophiogomphus cecilia* (Fourcroy, 1785) (2n male=23, X0), *Cordulia aenea* (Linnaeus, 1758) (2n male=25, X0), *Libellula depressa* Linnaeus, 1758 (2n male=25, X0, m), *Libellula quadrimaculata* Linnaeus, 1758 (2n male=25, X0, m), *Orthetrum albistylum* Selys, 1848 (2n male=25, X0, m), *Orthetrum brunneum* (Fonscolombe, 1837) (2n male=25, X0, m) and *Sympetrum pedemontanum* (Allioni, 1766) (2n male=25, X0, m) from Siberia and the Northern Caucasus have been analysed. ..."]

Address: Perepelov, E.A., Novosibirsk State Univ., Dept Nat. Sci., 2 Pirogov St, Novosibirsk 630090, Russia. e-mail: Bugrov, A.G.: bugrov@fen.nsu.ru; Warchalowska-Sliwa, E.: warchalowska@isez.pan.krakow.pl

646. **Phoenix, J. (1998):** Nachweis der Gemeinen Keiljungfer *Gomphus vulgatissimus* (Linnaeus, 1758) an der Oberelbe (Odonata). *Mitt. Sächsischer Entomol.* 43: 15. (in German).

[record of an exuvia of the in Saxonia very rare *G. vulgatissimus* in River Elbe near Krippen (Landkreis Sächsische Schweiz)]

Address: Phoenix, J., Schandauer Str. 28, D-01924 Königstein, Germany



647. **Pilon, J.-G.; Lagace, D. (1998):** Les Odonates du Québec. Entomofaune du Québec Inc., 637, Boulevard Talbot, Suite 108, Chicoutimi, Québec G7H 6A4 CANADA: 367 pp. (in French).

[LES ODONATES DU QUÉBEC by Jean-Guy Pilon and Denise Lagace, reviewed by Nick Donnelly: Verbatim, taken from *Argia* 10(4): 31-32: "This long awaited book fills a substantial gap in our knowledge of the odonate fauna of northeastern North America. It makes available the extensive collecting results and careful studies (including extensive larval studies) of Jean-Guy Pilon, who has been studying Odonates for several decades from his base in Montreal and his many students. This book is in French and attempts, in the words of the authors, to make the subject available to a large francophone audience of "beginning naturalists and amateurs". The book fills a large need, because the excellent book by Fr. Adrien Robert (*Les Libellules du Québec*, 1963) has been sadly unavailable for many years. The book begins a recapitulation of the history of Odonata study in Québec (which began with Abbé Léon Provancher in the late 1800's). A discussion of species which should be sought in Quebec is especially useful; all too often regional guides omit this essential information. There is a discussion of Odonata biology, morphology, and conservation. The main part of the first half of the book is an extensively illustrated key to adult odonates, which follows the useful earlier format of Robert's book rather closely. Neither book, unfortunately, keys or even illustrates the larval forms. Because a large number of the "beginning naturalists" may be associated with fresh-water studies related to problems of conservation of streams and other wetlands, this seems an unfortunate omission. The second half of the book begins with a discussion of Odonata habitats in Québec, arranging them into biologic zones. The main part of this half is a recapitulation of the distribution for each species. Happily there are dot maps for each species, because the long text references (a locality and a bibliographic reference is included for each and every occurrence!) are very exhausting to follow. The dot map scheme is wisely not based on political subdivisions of the Province, which are irregular in shape and quite variable in size, but by arranging them in blocks of about 27 km in the north-south direction, and 37 km in the east-west direction. This is a very sensible scheme which makes the distribution very clear at a glance. The dot maps merit careful inspection. I was very interested to find that there are more than twice as many blocks in which *Somatochlora franklini* occurs, for example, than for *Libellula luctuosa*. And nearly as many for *Somatochlora brevicincta* and *Aeshna septentrionalis*. All readers will be impressed also by the very sparse dots for the entire northern three quarters of the province. This is a very difficult province to survey, and Pilon and his students deserve high praise for their results. One departure from Robert's book is the absence of any discussion of habitat for individual species. There is also no discussion of taxonomic problems, although these are hinted at in the key by assigning some taxa to "formes" pending further revisionary study. The book will be an important work for all northeastern Odonata workers to include in their libraries. Even a glance at the extensive locality information that this book makes available will impress even the most devoted worker with the major effort that Pilon and his many students have devoted to finding and understanding Odonata in this province. I expect that this book will reach its intended audience, and that there will be a resurgence of interest among younger

people in eastern Canada. It certainly stands as a monument to Pilon's vast labors."]

Address: Pilon J.-G., Département des Sciences biologiques, Université de Montréal, C.P.6128, Montréal, Québec, H3C 3J7, Canada

648. **Pimpl, F.; Kretzschmar, W. (1998):** Projekt Entomofauna Saxonica II. Stand der Bearbeitung: Odonata. Mitt. Sächsischer Entomol. 39: 16-17. (in German).

[status of the Odonata record scheme in Saxonia, Germany in 1996]

Address: Pimpl, F., Niederzöwitzer Str. 83, D-08297 Zöwnitz, Germany

649. **Postler, E.; Postler, W. (1998):** Entwicklung von *Gomphus vulgatissimus* (L.) im Dortmund-Ems-Kanal (Anisoptera: Gomphidae). *Libellula* 17(3/4): 254. (in German).

[emergence of *G. vulgatissimus* in May 1998 at a canal in Nordrhein-Westfalen, Germany]

Address: Postler, E. u. W.; Hammerstr. 39, D-59174 Kamen, Germany

650. **Prendergast, E.D.V. (1998):** The Gambia: additions to the list of Odonata, and further distribution records. *International Journal of Odonatology* 1(2): 165-174. (in English).

[commented list (new records, distribution in each of the 162 10 km square in Gambia) of species of Odonata collected during the British Dragonfly Society expedition to Gambia in Oct/Nov 1996; 13 species were added to the 62 previously recorded]

Address: Prendergast E.D.V., Manor House, Bagber, Sturminster Newton, Dorset DT10 2EY, UK

651. **Prevost, O. (1998):** Découverte de *Gomphus flavipes* (Charpentier, 1825) dans le département de la Vienne (Odonata, Anisoptera, Gomphidae). *Martinia* 14 (3): 115-116. (in French, with English summary).

[discovery of exuviae of *Stylurus flavipes* at the confluence of River Creuse and River Vienne]

Address: Prevost, O., 28, rue de Poitiers, F-86130 Jau-nay-Clan, France

652. **Purger, J.J. (1998):** Diet of Red-footed Falcon *Falco vespertinus* nestlings from hatching to fledging. *Ornis Fennica* 75 (4): 185-191.

["The diet of Red-footed Falcon *Falco vespertinus* nestlings was studied continually from their hatching to fledging in four nests during 1991, near the village Melenci in the province of Voivodina, Yugoslavia. [...] Remains of an average of 2.72 prey items per day were found, from which 302 prey items were identified. These included 17 (6%) vertebrate items, while the remaining 285 (94%) were insects. Sixty percent of the insect food were orthopteran species (Orthoptera), 36% were beetles (Coleoptera), and 4% were dragonflies (Odonata). [...] Orthopterans and beetles dominated the diet. The role of dragonflies in the feeding of the nestlings grew as a function of nestling age, while vertebrates played a role in the feeding of nestlings only in the downy and pin feathered stages.]

Address: Purger, J.J., Univ. Pecs, Dept. Ecol. & Zoogeog., Ifjusag Utja 6; H-7061 Pecs, Hungary

653. **Rothmund, D.; Hahn, U. (1998):** Beitrag zur Kenntnis der Libellenfauna eines Hochwasserrückhaltebeckens im Landkreis Göppingen (Baden-Württem-

berg). Mitt. entomol. Ver. Stuttgart 33: 124-130. (in German).

[13 species of Odonata were observed in 1997; the odonatological importance of the water is assessed as quite low]

Address: Rothmund, D., Rupert-Mayer-Str. 20, D-73765 Neuhausen, Germany

654. **Ruddek, J. (1998):** Gomphus flavipes (Charpentier) neu fur Bremen (Anisoptera: Gomphidae). Libellula 17(3/4): 237-238. (in German with English summary).

["First record of Gomphus flavipes (Charpentier) for Bremen, Germany (Anisoptera: Gomphidae) - One exuvia was recorded at the river Weser in Bremen on 21-VI-1998. The number of Odonata species recorded in Bremen increased to 46 species." (Author)]

Address: Ruddek, J., Butendiek 34, D-28865 Lilienthal, Germany

655. **SaintOurs, F. (1998):** North River, Massachusetts Odonata survey. Argia 10(4): 14. (in English).

[including a notice on the discovery of the crepuscular Neurocordulia obsoleta]

Address: <http://mothra.bio.umb.edu/Fred.html>

656. **Samraoui, B.; Bouzid, S.; Boulahbal, R.; Corbet, P.S. (1998):** Postponed reproductive maturation in upland refuges maintains life-cycle continuity during the hot, dry season in Algerian dragonflies (Anisoptera). International Journal of Odonatology 1(2): 118-135. (in English).

["Anisoptera were monitored or sampled regularly at lowland and nearby upland sites in northeastern Algeria during 1992 and 1993. After emerging in lowlands at about sea level in May and June, adults disappeared from lowlands and were then soon encountered in nearby hills at ca 500-1000 m a.s.l. where they aestivated in woodland for about three and a half months (Sympetrum meridionale) or more than four months (Aeshna mixta, Sympetrum striolatum). During aestivation adults foraged, gradually changed colour and achieved reproductive maturity. Aestivation ended with the onset of heavy rain in late September or early October when mature adults reappeared at lowland sites where they promptly exhibited reproductive behaviour. Although no adults marked in lowlands were recaptured in uplands, the inference that individual adults made two-way flights between lowlands and uplands is compelling. Postponed reproductive maturation in upland refuges maintains continuity of the life cycle in habitats inimical to survival of the aquatic stages during the protracted hot, dry season. This type of life cycle can be expected to occur in populations of European Odonata near the southern limit of their geographic distribution where they encounter a Mediterranean climate. The implications of such a life cycle for habitat conservation are discussed." (Authors)]

Address: Samraoui, B., University of Annaba, 4 rue Hassi-Beida, Annaba, Algeria

657. **Samu, S. (1998):** Zur Populations- und Verhaltensökologie von Coenagrion lunulatum (Charpentier) (Zygoptera: Coenagrionidae). Libellula 17(3/4): 173-193. (in German with English summary).

["On the population and behavioural ecology of Coenagrion lunulatum (Charpentier) (Zygoptera: Coenagrionidae) - At a small field-pond close to Schwerin, NE Germany, the emergence period started on 5-V-1995 and lasted 35 days. The EM50 of 11 days was quite low

but the emergence curve shows two approximately similar sized peaks. So, C. lunulatum can not be described as a typical spring species, because the emergence curve missed the typical course of a mass emergence. - Exuviae were found on an average of 5.2 cm above waterlevel. Most of the individuals emerged in shallow areas with a water depth between 6 to 25 cm. - The reproductive period lasted 23 days, though the main flight period with high numbers of adult damselflies covered only 9 days. The maturation period was estimated to be 9-10 days. The average adult life-span was 8.3 days. - For oviposition the tandem pair submerged for a mean of 13.03 min. Oviposition above the waterlevel was not observed. The tandem pairs did not aggregate." (Author)]

Address: Samu, S., Gärtnerstr. 22, D-10245 Berlin, Germany

658. **Samways, M.J.; Osborn, R. (1998):** Divergence in a transoceanic circumtropical dragonfly on a remote island. Journal of Biogeography 25 (5): 935-946. (in English).

["One terrestrial invertebrate that naturally spans the globe and travels vast distances is the dragonfly Pantala flavescens (Fabricius) (Odonata: Libellulidae). [...] The variation and differences in morphology and behaviour of an African continental (Pietermaritzburg, South Africa) and a remote island population (Easter Island) of P. flavescens was investigated to determine whether the island population was panmictic with the migrant population, or whether it was a founder population. [...] The fact that P. flavescens is the only species of dragonfly on Easter Island, and the great distance of the island from any mainland, suggests infrequent arrival of migrants arriving on the island, with resultant reduced genetic variation. The morphological and behavioural differences between the two populations suggests divergence is occurring."]

Address: Samways M.J., Invertebrate Conservation Research Centre, Dept Zool. & Entomol., University of Natal, P/Bag X01, Scottsville 3209, Pietermaritzburg, South Africa. e-mail: samways@zoology.unp.ac.za

659. **Savage, A.A.; Mathews, J.H.; Beaumont, D.L. (1998):** Community development in the benthic macroinvertebrate fauna of a lowland lake, Oak Mere, from 1994 to 1996. Arch. Hydrobiol. 143(3): 295-05362. (in English).

["Data are given on the morphometry, substrata of the littoral zone, water quality, vegetation and benthic macroinvertebrate assemblages of Oak Mere ... In 1994, vegetation was confined to a sparse marginal zone containing very few individuals of macroinvertebrates with a community structure characterised by high diversity and maximum equitability. By 1996, this marginal zone had increased in area and a new submerged vegetation zone had developed. The new and substantial macroinvertebrate assemblages of these two 1996 zones were closely similar in species composition, species richness, diversity and equitability. In both sampling years the macroinvertebrate assemblages of a niche provided by the undersides of stones remained similar in all respects. The development of marginal and submerged vegetation zones, providing niches for macroinvertebrates, is attributed to a stable water level between the two sampling years." (Authors). Coenagrion puella was sampled in 1996 both in the marginal and submerged vegetation.]

Address: Department of Biological Sciences, Keele University, Staffordshire, ST5 5BG, U.K

660. **Schneider, W.; Parr, M.J. (1998):** *Orthetrum julia* falsum Longfield 1955, new to the dragonfly fauna of Yemen and the Arabian Peninsula (Anisoptera: Libellulidae). *International Journal of Odonatology* 1(2): 155-158. (in English).

["*Orthetrum julia* (Kirby 1900), subspecies falsum Longfield 1955, is reported for the first time from Yemen and the Arabian Peninsula (1 male, Wadi al-Ahjar, 15°27'53"N 43°52'32"E). The specimen is described and compared with specimens from Africa; taxonomically relevant structures are figured. The total number of species known from Yemen is raised to 37, from the Arabian Peninsula to 61." (Authors)]

Address: Schneider, W., Hess. Landesmus., Zool. Abt., Friedensplatz 1, D-64283 Darmstadt, Germany; Parr, M.J., Little Island House, Stembidge, Martock, Somerset TA12 6BW, United Kingdom

661. **Seidenbusch, R. (1998):** Annotations on the structure of the valvifer and the postocellar ridge in females of *Gomphus* and its importance for determination. *Sulzbach-Rosenberger Libellenrundbriefe* 7: 5-7. (in English).

[*Gomphus schneideri*, *G. pulchellus*, *G. vulgatissimus*, *G. epoptalmus*, *G. schneideri transcaspicus*, *G. similimus*, *G. similimus maroccanus*, *G. davidi*, *G. graslini*, *G. lucasi*, *Stylurus flavipes*]

Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany

662. **Seidenbusch, R. (1998):** Manifestierte Degeneration von Fließgewässergräben, Aussickerungsarealen und Waldkleinstbiotopen in der Region Sulzbach-Rosenberg. *Sulzbach-Rosenberger Libellenrundbriefe* 8: 1-17. (in German).

[survey and discussion of the dragonfly fauna of ditches in the Rosenberg-Sulzbach-region, and the environmental impacts on the habitats from a historical view; of special interest are - now extinct - species as *Leucorhinia albifrons*, *L. pectoralis*, *Coenagrion mercuriale*, *C. ornatum*, and *Ceriagrion tenellum*]

Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany

663. **Seidenbusch, R. (1998):** The importance of ratios within larval descriptions. *Sulzbach-Rosenberger Libellenrundbriefe* 7: 1-4. (in English).

[descriptions and comparison of larval *Aeshna juncea* / *A. subarctica* and *Coenagrion lunulatum* / *C. armatum* / *C. hastulatum*]

Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany

664. **Sobczyk, T.; Schnabel, H. (1998):** Bemerkenswerte Libellenfunde aus der nordwestlichen Oberlausitz. *Veröff. Mus. Westlausitz Kamenz* 20: 107-110. (in German).

[new records of *Ophiogomphus cecilia* and *Gomphus vulgatissimus* in Saxony, Germany]

Address: Sobczyk, T., Am Bahndamm 13, D-02977 Hoyerswerda, Germany

665. **Sobczyk, T. (1998):** Zur Entomofauna einer Gasstrasse in der Knappenroder Heide südöstlich von Hoyerswerda. *Mitt. Sächs. Entomol.* 43: 11-12. (in German). [*Ophiogomphus cecilia*; Saxonia, Germany ]

Address: Sobczyk, T., Am Bahndamm 13, D-02977 Hoyerswerda, Germany

665. **Soriano, E.G.; Gutierrez, R.N. (1998):** *Oplonaeschna magna* sp. nov. (Odonata : Aeshnidae), from Mexico with a description of its larva. *Revista de Biología Tropical* 46(3): 705-715. (in English).

["*Oplonaeschna magna* sp. nov. (Odonata: Aeshnidae) (holotype male and allotype female deposited at CNIN UNAM-MEX., Mexico, D. F) is described and illustrated from specimens collected in the states of Estado de Mexico, Guerrero, Hidalgo, and Morelos, Mexico. This is the second species of the genus *Oplonaeschna*. ..."]

Address: Soriano, E.G., Univ. Nacl. Autonoma Mexico, Dept. Zool., Apdo Postal 70-153, Mexico City 04510, DF, Mexico. E-Mail: Soriano, E.G.: esoriano@mail.ibiologia.unam.mx; Gutierrez, R.N.: novelor@sun.ienco.conacyt.mx

666. **Spedding, G.R.; Lissaman, P.B.S. (1998):** Technical aspects of microscale flight systems. *Journal of Avian Biology* 29 (4): 458-468. (in English).

["Micro Air Vehicles (MAVs) have excellent potential utility as flight platforms for optical, acoustic, electronic and chemical sensors for operation in hazardous sites with aerial access. The dimensions and performance specifications call for a 100 g take-off mass with 100-200 mm wingspan ... The ThrustWing is a configuration derivative of the dragonfly, with characteristics lying between a helicopter and an ornithopter. ..."]

Address: Spedding, GR; Univ So Calif; Dept Aerosp Engr; Los Angeles; CA 90089; USA. e-Mail: Spedding, G.R.: Geoff@ostrich.usc.edu

667. **Steele, M. (1998):** Beginner strikes it rich! *Argia* 10(4): 30-31. (in English).

[records from Stewart County, Tennessee, and Trigg County, Kentucky]

Address: not stated

668. **Steffens, W.P. (1998):** New distribution records of *Somatochlora hineana* (Odonata: Corduliidae). *Great Lakes Entomologist* 31(1): 25-26. (in English).

Address: Steffens, W.P., P.O. Box 16593, Duluth, MN 55816, USA.

669. **Stoks, R. (1998):** Effect of lamellae autotomy on survival and foraging success of the damselfly *Lestes sponsa* (Odonata: Lestidae). *Oecologia* 117: 443-448. (in English).

["Damselfly larvae can autotomize their caudal lamellae to escape predation. Costs of caudal lamellae autotomy were investigated by directly manipulating lamellae condition of *Lestes sponsa* in laboratory experiments. Larvae without lamellae had higher predation mortality in the presence of *Notonecta*. Both lamellae loss and larval density increased the probability of being cannibalized. The results suggest that the increased vulnerability after lamellae loss resulted from a reduced escape performance. Larvae were less mobile after lamellae loss or in the presence of a predator, but the decrease was no longer significant when both factors were combined. This indicates that larvae compensate for the increased predation risk with a fixed response. Both lamellae loss and predator presence reduced hunting success, but the decrease after lamellae loss was only significant in the absence of a predator. The fitness consequences of these effects for both the larval and adult stages are discussed. In general, the data strongly suggest that



lamellae autotomy plays a role in population regulation of damselflies." (Author)]

Address: Stoks, R., Evolutionary Biology Group, Department of Biology, University of Antwerpen (RUCA), Groenenborgerlaan 171, B-2020 Antwerpen, Belgium. e-mail: stoks@ruca.ua.ac.be

670. **Suhling, F.; Schütte, C.; Leipelt, K.-G. (1998):** Erneute Schlupfnachweise von *Aeshna affinis* Vander Linden im niedersächsischen Drömling (Anisoptera: Aeshnidae). *Libellula* 17(3/4): 253. (in German).

[new breeding records (June 1998) of *A. affinis* in Lower Saxony, Germany]

Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

671. **Tennessen, K. (1998):** The return of Butch Cassidy and the Sundance Kid. *Argia* 10(4): 3-6. (in English).

[collecting report from a travel to Bolivia in November 1998]

Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA

672. **Thoß, S. (1998):** Vorkommen der Alpen-Smaragdlibelle (*Somatochlora alpestris* Selys, 1840) im NSG "Jägersgrüner Hochmoor" (Region VL). *Mitt. Sächsischer Entomol.* 43: 14. (in German).

[one of the most recent recoveries of the species in Saxonia, Germany]

Address: Thoß, S., Ellefelder Weg 2, D-08209 Auerbach / V., Germany

673. **Tol, J. van (1998):** The Odonata of Sulawesi and adjacent islands. Part 4. A new genus and species of Chlorocyphidae from South-East Sulawesi. *Zool. Verh. Leiden* 323: 441-448. (in English).

["A new genus and species of Chlorocyphidae (Insecta: Odonata: Zygoptera), *Watuwila* vervoorti, from SE Sulawesi (Indonesia) is described. A preliminary phylogenetic analysis of the genera of the family indicates that the genus represents a relatively old lineage." (Author)]

Address: Tol, J. van, National Museum of Natural History, Dept. of Entomology, P.O. Box 9517, 2300 RA Leiden, The Netherlands.

674. **Van Buskirk, J.; Yurewicz, K.L. (1998):** Effects of predators on prey growth rate: Relative contributions of thinning and reduced activity. *Oikos* 82(1): 20-28. (in English).

[1100 litre outdoor artificial ponds; prey: *Rana sylvatica* tadpoles; predator: caged *Anax* dragonfly larvae]

Address: Van Buskirk, J., Univ. Zürich, Inst. Zool., Winterthurerstr 190., CH-8057 Zürich, Switzerland. e-mail: Van Buskirk, J.: jvb@zool.unizh.ch

675. **Vanderhaeghe, F. (1998):** Victorie! *Coenagrion scitulum* (Rambur, 1842) is Belgie binnengedrongen. *Gomphus* 14(1): 35-36. (in Dutch, with French summary).

[in 1998 *C. scitulum* was rediscovered in southern Belgium near the French border. All known records are documented.]

Address: Vanderhaeghe, F., Lijsterstraat 20, B-8800 Roeselare, Belgium

676. **Waltz, R.D. (1998):** Gleaning on Coreidae (Heteroptera) by *Tachopteryx thoreyi* (Odonata : Petaluridae).

*Great Lakes Entomologist* 31(3-4): 209-210. (in English).

Address: Waltz, RD, IDNR, Div. Entomol. & Plant Pathol., 402 W Washington, Room W-290, Indianapolis, IN 46204, USA.

677. **Weide, M. van der; Ketelaar, R.; Kleukers, R. (1998):** Stuur libellenwaarnemingen naar de NVL! NVL Nieuwsbrief, Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie: 3-4. (in Dutch).

[appeal to report the 1998 dragonfly records for the mapping project of the Dutch society of odonatology; figure depicting the increase of records between 1990 and 1997; map of dragonfly records in 1997 in the Netherlands on the basis of squares with records and "white areas" to survey in the future; figure with population trends of *Erythromma viridulum* and *Calopteryx virgo* between 1950 and 1995]

Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands

678. **Weihrauch, F. (1998):** Die Entwicklung von *Gomphus vulgatissimus* (L.) in Kiesgrubengewässern: seltene Ausnahme oder lediglich übersehen? (Anisoptera: Gomphidae). *Libellula* 17(3/4): 149-161. (in German with English summary).

["The development of *G. vulgatissimus* (L.) in gravel pit waters: rare exception or simply overlooked? (Anisoptera: Gomphidae) - Based on the collection of 47 exuviae of *G. vulgatissimus* in May 1997 from a small, wind-sheltered gravel pit lake near Geisenfeld, Upper Bavaria, Germany, the paper discusses the conditions regarding the development of this running-water species in stagnant waters. It is stated that the successful development of *G. vulgatissimus* in man-made ponds or lakes devoid of wave-beaten shores occurs more frequently than so far published, provided a certain influence of ground water and good water quality is given. This lack of information is possibly only due to a recording gap." (Author)]

Address: Weihrauch, F., Hengelerstr. 9, D-80637 München, Germany

679. **Werzinger, S.; Werzinger, J. (1998):** *Gomphus flavipes* (Charpentier) zurück in Bayern (Anisoptera: Gomphidae). *Libellula* 17(3/4): 243-245. (in German with English summary).

["*G. flavipes* (Charpentier) back to Bavaria, Germany (Anisoptera: Gomphidae) - On 18-VII-1998 a male exuvia of *G. flavipes* was collected at the River Regnitz near Hausen, Bavaria. This is the first record in Bavaria for more than 100 years." (Authors)]

Address: Werzinger, J. u. S., Zwernberger Weg 29, D-90449 Nürnberg, Germany

680. **White, H. (1998):** DSA meeting in Valentine - reflections on odonate conservation. *Argia* 10(4): 9-10. (in English).

[reflections on impact of amateur collectors on dragonfly populations; "From the ethical and aesthetic point of view, shouldn't we use nets and acetone less and binoculars and cameras more?"]

Address: halwhite@udel.edu

681. **Witten, J.L.; Truman, J.W. (1998):** Distribution of GABA-like immunoreactive neurons in insects suggests lineage homology. *Journal of Comparative Neurology* 398(4): 515-528. (in English).

[Gamma-Aminobutyric acid (GABA) = important inhibitory neurotransmitter in vertebrates and invertebrates; 9 orders of insects were surveyed and compared: Thysanura, Odonata, Orthoptera, Isoptera, Hemiptera, Coleoptera, Diptera, Lepidoptera, and Hymenoptera]  
Address: Witten, J.L., Dept. Biol. Sci., P.O. Box 413, Univ. Wis.-Milwaukee, Milwaukee, WI 53201, USA

682. **Zelmer, D.A.; Esch, G.W. 1998:** Bridging the GAP: The odonate NAIAD as a paratenic host for *Halipegus occidentalis* (Trematoda: Hemiuridae). *Journal of Parasitology* 84(1): 94-96. (in English).

["The temporal and spatial dynamics of the recruitment of *Halipegus occidentalis* by the green frog, *Rana clamitans*, suggest that infections are acquired through predation on odonates, which become infected by feeding on ostracods. Discrepancies in the literature regarding the life cycle of *H. occidentalis* prompted the investigation of the status of the odonate naiad as an obligate third intermediate host. ..."]

Address: Zelmer, D.A., Dep. Biol., Wake Forest Univ., Winston-Salem, NC 27109, USA

#### 1999

683. **Anderson, C. (1999):** Reports from Coastal Stations - 1998: Minsmere RSPB Nature Reserve, Suffolk. *Atropos* 6: 58-59. (in English).

[transect count of *Coenagrion pulchellum*; phenological dates (first and latest record) of some species]

Address: not stated

684. **Andjus, L. (1999):** Obituary: Zivko R. Adamovic. *Odonatologica* 28(1): 87-91. (in English).

Address: Andjus, L., Natural History Museum of Serbia, Njegosheva 51, P.O. Box 401, YU-11000 Beograd, Serbia/Yugoslavia

685. **Andres, C. (1999):** Entwicklung der Libellenfauna nach den Renaturierungsmaßnahmen an der Liese bei Wadersloh-Diestedde. *Flora und Fauna im Kreis Warendorf - Beiträge zur Naturkunde* 9: 16-24. (in German).

[documentation of the development of the dragonfly fauna before and after the renaturation of the brook Liese (Nordrhein-Westfalen, Germany). 1992 (before renaturation) 4 species including one species autochthonous in the Liese could be observed. After renaturation in 1996, 12 (9 autochthonous), and in 1997, 20 (14 autochthonous) species could be observed. Of special interest is the discovery in 1997 of a male of *Coenagrion mercuriale*: The next known localities are situated in distances of 45 km and 25 km as the crow flies! In 1998 6 males of *C. mercuriale* could be observed; there should have established an autochthonous population of the very rare German damselfly after renaturation of the brook.]

Address: Andres, C., Vor der Laakenbreite 24a, D-37075 Göttingen, Germany

686. **Andrews, S.J. (1999):** Observations on the use of Yellow Flag (*Iris pseudacorus*) as a support for emerging zygopteran larvae. *Journal of the British Dragonfly Society* 15(1): 12-17. (in English).

["A total of 60 exuviae of *E. cyathigerum* was examined, 34 during 1996. It is noteworthy that a small but significant number of larvae appeared to bypass the irises and emerge on other vegetation including the nettles

behind the mud/shingle bank. These alternative supports for emergence appeared to be used more often during the early part of the emergence period (data not shown). [...] The average height climbed by larvae in this study for emergence was 42cm (range 10-100cm). Together with additional data collected during the emergence periods for 1994 and 1996, it can be seen that most larvae climb at least two-thirds of the total height of the Iris for emergence but not necessarily right up to the very top (Fig. 1). [...] As a general observation, the average width of any single iris leaf does not vary considerably throughout most of its length, the overall width tending to increase with increasing length (age) of the leaf. The average leaf width at the position of emergence was 14mm (range 5 to 25mm). [...] An equal number of exuviae were recovered from both sides of the Iris leaves. 41 % of larvae chose a position whereby both sets of legs could clasp both edges of the leaf whilst 53 % chose an alternative position utilizing the mid-rib vein as an alternative to one of the leaf edges (Table 2)."] (Author) study site: Wraysburg, UK

Address: Andrews, S.J., 39 Guildford Street, Staines, Middlesex TW18 2EQ, UK

687. **Arensberger, G.; Peitzner, P. (1999):** Libellendias ausgewählter europäischer Arten. *Anax, Wien* 2(1): 45-46. (in German).

[summary of a slide show with some spectacular pictures e.g. of *Aeshna mixta*]

Address: Arensberger, G., Habermannstr. 6, D-21031 Hamburg, Germany

688. **Artiss, T. (1999):** Molecular systematics and the evolution of genitalia in libellulid dragonflies. *IDF-Report* 2(1): 33-36. (in English).

[Request for funding of a study: "Toward this end, my research provides one of the few, rigorous phylogenetic surveys of an odonate genus using molecular data. Moreover, my research will provide one of the first studies in odonatology to use a phylogeny to test hypotheses regarding the evolution and possible coevolution of the male and female genitalia. The funds requested herein will enable me to use scanning electron microscopy to identify and quantify characters associated with the genitalia of male and female dragonflies in the genus *Libellula*."]

Address: Artiss, T., Department of Biology, Clark University, 950 Main Street, Worcester, MA 01610-1477, USA

689. **Bedjanic, M. (1999):** The "Dry season" aspect of the odonate fauna of Sri Lanka. *Anax, Wien* 2(1): 45. (in English).

[see OAS 543]

Address: Bedjanic, M., Fram 117/A, SI-2313 Fram, Slovenia. e-mail: matjaz-bedjanic@guest.arnes.si

690. **Beynon, T.G. (1999):** An unusual mismatch. *Journal of the British Dragonfly Society* 15(1): 17. (in English).

[A female *Anax imperator* "was perched on a horizontal leaf of Hare's-tail Cottongrass (*Eriophorum vaginatum*) lying along the surface in the marginals on the northern edge, and ovipositing into it. A male [...] *Enallagma cyathigerum* [...] approached and settled on the *Anax* at the wing bases on the thorax. It curled its abdomen round and under and attempted to grasp the *Anax*. It lifted off briefly, settled again, and tried once more to grasp the *Anax*. The *Anax* paid no attention to the *Enal-*

lagma, but then flew off a little way, dislodging the Enalagma, and began ovipositing near the original site." (Author)]  
Address: Beynon, T.G., 34 Church Lane, Checkley, Stoke-on-Trent ST10 4NJ, UK

691. **Brockhaus, T. (1999):** Populationsökologische Untersuchungen an der Federlibelle *Platycnemis pennipes* (Pallas, 1771) an einer regionalen Verbreitungsgrenze (Odonata: Platycnemididae). Dissertation, Fakultät für Biowissenschaften, Pharmazie und Psychologie der Universität Leipzig. ISBN 3-00-004013-7: 134 pp, Anhang. (in German).  
[study site: River Zschopau, north of Chemnitz, Saxonia, Germany; mark-recapture study, habitat selection, population density, larval cohorts, dispersion, migration, maturation, reproductive behaviour]  
Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. e-mail: T.Brockhaus@t-online.de

692. **Buczynski, P. (1999):** New record of *Sympetrum fonscolombii* (Sélys, 1840) (Odonata: Libellulidae) from the Pomeranian Lakeland. *Wiad. entomol.* 18(1): 56. (in Polish, German translation of the paper is available from the author).  
[new larval record of *S. fonscolombii* near the village Zalom (53°06N 16°01E), Poland; discussion of the known Polish records, and the range extension in Poland]  
Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PO-20-033 Lublin, Poland

693. **Burbach, K.; Winterholler, M. (1999):** The Bavarian Dragonfly-Atlas: Conception, database and stand of working. *Anax, Wien* 2(1): 44. (in English).  
[status quo report on the Bavarian Odonata mapping project in 1996; the results of this project are published in the meantime: See OAS 623]  
Address: Burbach, K., Griesfeldstr. 5a, D-85354 Freising, Germany

694. **Burbach, K.; Winterholler, M. (1999):** The occurrence of the Vagrant Emperor (*Hemianax ephippiger*) in Middle Europe 1995. *Anax, Wien* 2(1): 43. (in English).  
[compilation of records from the 1995 invasion of *Anax ephippiger* to the central part of Europe with special emphasize to Bavaria, Germany]  
Address: Winterholler, M., Bayerisches Landesamt für Umweltschutz, Rosenkavalierplatz 10, 81925 München, Germany

695. **Che Salmah, M.R.; Hassan, S.T.S.; Ali, A.; Abu Hassan, A. (1999):** Life history of *Neurothemis tullia* (Drury) in a tropical rainfed rice field (Anisoptera: Libellulidae). *Odonatologica* 28(1): 1-11. (in English).  
[The study was performed from June 1993 through April 1995 in a rainfed rice field of Bandar Baru District in Kedah, Peninsular Malaysia. "Larval growth was more uniform during early instars. Increasing variations of growth were obvious during the later instars, especially in the final instar. [...] Larval development was asynchronous and a maximum of 8 larval instars was found on one sampling occasion. 4 emergences were observed in 1994, in March, May, July and October. In general emergence was relatively synchronized. The E50 values were achieved within the first 38%, 9% and 16% of the total duration of emergences 2, 3, and 4 respective-

ly. A relatively short life cycle, continual breeding and oviposition, synchronous emergence and immediate reproduction after a dry period ensure survival of *N. tullia* in the unpredictable rainfed rice ecosystem." (Authors)]  
Address: Hassan, S.T.S., Department of Biology, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia

696. **Chippindale, P.T.; Dave, V.K.; Whitmore, D.H.; Robinson, J.V. (1999):** Phylogenetic relationships of North American damselflies of the genus *Ischnura* (Odonata: Zygoptera: Coenagrionidae) based on sequences of three mitochondrial genes. *Molecular Phylogenetics and Evolution* 11(1): 110-121. (in English).  
["Relationships of North American damselflies of the genus *Ischnura* (Odonata: Zygoptera: Coenagrionidae) were investigated using a total of 1205 bp from portions of three mitochondrial genes: cytochrome b, cytochrome oxidase II, and 12S ribosomal DNA. Parsimony and neighbour joining analyses reveal a monophyletic group consisting of *I. damula*, *I. demorsa*, *I. perparva*, *I. posita posita*, *I. posita atezca*, *I. verticalis*, and probably *I. denticollis*, likely reflecting a recent radiation in North America. *Ischnura kellicotti*, *I. barberi*, *I. prognata*, *I. hastata*, *I. ramburri*, and *I. capreola* appear to represent much earlier divergences in the group. Many previous hypotheses of relationships among North American species of *Ischnura* are not supported by the molecular-based analyses. However, there is agreement in many respects between the results of the molecular phylogenetic analyses and the morphologically based conclusions of Kennedy (1919, 'The Phylogeny of the Zygoptera', Ph.D. Dissertation, Cornell University, Ithaca)." (Authors)]  
Address: Chippindale, P.T., Univ. Texas, SW Med. Sch., 5323 Harry Hines Blvd, Dallas, TX 75235, USA

697. **Chovanec, A. (1999):** Libellenkundliche (Insecta: Odonata) Erhebungen als Grundlage für die Bewertung eines Niedermoores in Niederösterreich. *Lauterbornia* 35: 13-19. (in German, with English summary).  
["Investigation of the dragonfly fauna (Insecta: Odonata) as a basis for the assessment of a fen in Lower Austria: Permanent and temporary waters of a wetland area in Lower Austria were characterised and evaluated by investigations of the dragonfly fauna in 1997. 36 species were found, which corresponds to 46 % of the species known from Austria. The results show the ecological importance of even small wetland areas with high structural heterogeneity within an agriculturally intensively used region as refuge for a dragonfly fauna rich in species and characterised by a high portion of endangered species." (Author)]  
Address: Chovanec, A., Umweltbundesamt, Abt. Aquatische Ökologie, Spittelauer Lände 5, A-1090 Wien, Austria

698. **Chovanec, A. (1999):** Methoden für die Erhebung und Bewertung der Libellenfauna (Insecta: Odonata) - eine Arbeitsanleitung. *Anax, Wien* 2(1): 1-22. (in German, with English summary).  
["This paper provides an overview of methods for the sampling of dragonfly imagines and exuviae. Approaches for the assessment of water bodies based on dragonfly surveys are also presented. Thus, the paper should contribute to a harmonisation of methods and help make results obtained by the investigation of the dragonfly fauna more comparable." (Author)]



Address: Chovanec, A., Umweltbundesamt Wien, Spittelauer Lände 5, A-1090 Wien, Austria

699. **Chovanec, A. (1999):** Nachweis von *Lestes barbarus* (Fabricius) (Odonata; Zygoptera) in der Ost-Steiermark (Österreich). *Anax*, Wien 2(1): 23-26. (in German, with English summary).

[in 1996 a population of the rare Austrian *L. barbarus* was observed near Pöllau (eastern Styria)]

Address: Chovanec, A., Umweltbundesamt Wien, Spittelauer Lände 5, A-1090 Wien, Austria

700. **Clancy, S.; Walker, D. (1999):** Reports from Coastal Stations - 1998: Dungeness area. Kent. *Atropos* 6: 53-54. (in English).

[*Sympetrum fonscolombei*; *Anax parthenope* was caught in a Helgioland trap]

Address: not stated

701. **Clements, D.K. (1999):** The Hornet Roberfly *Asilus crabroniformis* L. (Diptera, Asilidae): interactions with Odonata. *Journal of the British Dragonfly Society* 15(1): 18-19. (in English).

Address: Clements, D.K.; 7 Vista Rise, Llandaff, Cardiff CF5 2SD, UK

702. **Collinson, M. (1999):** Highland Darters *Sympetrum nigrescens* in south-east Scotland. *Atropos* 6: 33. (in English).

["It is possible, of course, that no expansion of established *nigrescens* populations has occurred, and that the observed Highland Darters represent a colour aberration of *S. striolatum* in response to northern microhabitats. However, I believe this to be less likely than the alternative explanation that *S. nigrescens* populations have expanded eastwards and contacted a small but increasing population of *S. striolatum* in the Lothians. West Lothian in particular may therefore be a new contact zone between the two forms/species and this must be of interest to anyone who studies the interactions between the two and their consequent specific status." (Author)]

Address: Collinson, M., 22 Tippet Knowes Park, Winchburgh, West Lothian EH52 6UJ, UK

703. **Colston, A. (1999):** Site guide: Wicken Fen National Nature Reserve, Cambridgeshire. *Atropos* 7: 3-6. (in English).

[commented checklist of the Odonata of Wicken Fen, UK]

Address: Colston, A., Property Manager, The National Trust, Wicken Fen, Lode Lane, Wicken, Ely, Cambs, CB7 5XP, UK

704. **Costa, J.M.; Santos, T.C.; Telles, A.M. (1999):** *Phyllogomphoides annectens* (Selys): description of the last instar with a key to the South American species (Anisoptera: Gomphidae). *Odonatologica* 28(1): 79-82.

Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, BR-20942-040 Rio de Janeiro, Brazil. e-mail: jcosta@unisys.com.br

705. **Craine, G.D.; Wormwell, C.J. (1999):** Reports from Coastal Stations - 1998: Isle of Man. *Atropos* 6: 64-65. (in English).

[*Lestes sponsa*, *Sympetrum fonscolombei*, *Aeshna mixta*]

Address: not stated

706. **Davey, P. (1999):** Weather conditions leading to the 1998 Green Darner *Anax junius* (Drury) influx. *Atropos* 6: 8-12. (in English).

Address: Davey, P., The Cottage, 2 Woodcuts Lane, Gaunts Common, nr Wimborne, Dorset BH21 4JL, UK

707. **De Bock, M.; Stoks, R. (1999):** De libellenfauna van een geïsoleerde amfibieenpoel te Merchtem. *Gomphus* 15(1): 3-11. (in Dutch, with English and French summaries).

["The dragonfly fauna of an isolated pond in Merchtem (Vlaams-Brabant). We report on the monitoring of dragonflies of a newly excavated, isolated pool for amphibians at Merchtem. The pool is situated in an agricultural landscape, and rather small and shallow. During the first year, six species were seen at the pool. Over the first four years, a total of 13 species has been observed. Compared to the adjacent 10 x 10 km squares, this is a reasonable number. Striking is the absence of local populations of *Lestes sponsa* and *L. viridis* despite their occurrence in nearby squares and the suitability of the habitat. Interesting is the yearly occurrence of a local population of *L. barbarus* (the first proof of successful reproduction for Belgium) and occasional sightings of *L. dryas* and *Aeshna affinis*. Despite the absence of any populations of species listed in the Red List of Flanders, the observations show the importance of such pools for local odonata richness." (Authors)]

Address: Marjan De Block & Robby Stoks, Universiteit Antwerpen (RUCA) Departement Biologie, Evolutionaire Biologie, Groenenborgerlaan 171, B-2020 Antwerpen, Belgium

708. **De Knijf, G. (1999):** Verslag van de excursie naar de moerassen in de omgeving van Laôn (Frankrijk) op zondag 13 juni 1998. *Gomphus* 15(1): 36-38. (in Dutch, with French summary).

[report from an excursion to the marshes in the surrounding of Laôn (France) (Camp militaire de Sisonne) on Sunday 13 June 1998: 17 species were observed, among them *Leucorrhinia caudalis* (!) and *L. pectoralis*; the list of species includes also some very rare European butterflies]

Address: Knijf, Geert de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. e-mail: geert.de.knijf@instnat.be

709. **De Knijf, G. (1999):** Verslag van de excursie naar Gaume op zaterdag 4 juli 1998. *Gomphus* 15(1): 33-36. (in Dutch, with French summary).

[report of an excursion to Gaume (Belgium) on Saturday 4 July, 1998: 20 species could be observed, among them *Ischnura pumilio*, *Onychogomphus forcipatus*, *Somatochlora flavomaculata*, *Crocothemis erythraea*, and *Orthetrum brunneum*]

Address: Knijf, Geert de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. e-mail: geert.de.knijf@instnat.be

710. **De Schoot, P. van; De Knijf, G. (1999):** Verslag van de excursie naar de Visbeek-Kindernouw te Lille-Wechelderzande op zaterdag 1 augustus 1998. *Gomphus* 15(1): 31-33. (in Dutch, with French summary).

[report of an excursion to the valley of Visbeek-Kindernouw near Lille-Wechelderzande (Belgium) on Saturday 1 August, 1998: Despite of unfavourable weather conditions 21 species could be observed, among them

*Lestes barbarus*, *Ceriagrion tenellum*, *Cercion lindenii*, and *Aeshna juncea*]

Address: Knijf, Geert de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. e-mail: geert.de.knijf@instnat.be

711. **Dell'Anna, L.; Utzeri, C.; De Matthaëis, E.; Colli, M. (1999):** Biological differentiation and reproductive isolation of syntopic central Italian populations of *Chalcolestes viridis* (Vander L.) and *C. parvidens* (Artobol.) (Zygoptera: Lestidae). *Anax*, Wien 2(1): 41-46. (in English).

[specific status of the two taxa recognized on the basis of electrophoretic assays; difference in emergence period; sex-ratios; duration of prereproductive period (8 weeks in *C. parvidens*, and 5 in *C. viridis*)]

Address: Utzeri, C., Dipartimento di Biologia Animale e dell'Uomo, Università di Roma "La Sapienza", Viale dell'Università 32, I-00185 Roma, Italy

**Demolder, H. (1999):** Verslag van de excursie naar de moerassen naar Vloetenveld op zaterdag 28 juni 1998. *Gomphus* 15(1): 38-41. (in Dutch, with French summary).

[report on an excursion to Vloetenveld on Saturday 28 June 1998: records were made in the military training area Vloetenveld near Brugge, and include *Cercion lindenii*, *Erythromma najas*, and *Cordulia aenea* (very rare in Flanders)]

Address: not stated

712. **Dewick, S. (1999):** Reports from Coastal Stations - 1998: Curry Farm, Bradwell-on-Sea, Essex. *Atropos* 6: 56-57. (in English).

[short assessment of the dragonfly season 1998]

Address: not stated

713. **Dudgeon, D. (1999):** Patterns of variation in secondary production in a tropical stream. *Arch. Hydrobiol.* 144(3): 271-281. (in English).

["Secondary production of insects in a Hong Kong stream was measured over two years when the intensity of monsoonal rains (influencing stream discharge) showed marked inter-year variation. Data for 19 species (Ephemeroptera, Odonata Trichoptera and Coleoptera) revealed considerable variation in production between years by some species. A hypothesis that these fluctuations reflected microhabitat occupancy was tested and supported by the data. Production by rheophilic species living in coarse substrates increased during the year with higher stream discharge while that of species living in depositional habitats declined. The opposite trend was observed during the year with low rainfall. Despite variation in annual production of individual species, where data were available for an entire functional feeding group (e.g. filter-feeders), production estimates were rather constant between years." (Author). Secondary production of: *Euphaea decorata* was relatively consistent between the years 1977-1978 and 1978-1979.]

Address: Dudgeon, D., Department of Ecology & Biodiversity, The University of Hong Kong, Pokfulam Road, Hong Kong SAR

714. **Fauth, J.E. (1999):** Identifying potential keystone species from field data - an example from temporary ponds. *Ecology Letters* 2(1): 36-43. (in English).

["Identifying keystone species is essential for understanding community dynamics and preserving spe-

cies richness. ...Larval dragonflies (*Tamea carolina*, ...) were identified as weak, context-dependent keystones in South Carolina, supporting anuran richness in isolated ponds with very low pH. The results suggest that the identity of keystone species varies, even in similar habitats within a physiographic region."]

Address: Fauth, J.E.; Coll. Univ. Charleston; Dept. Biol., 66 George St, Charleston; SC 29424; USA. e-mail: Fauth, J.E: fauthj@cofc.edu

715. **Ferreras-Romero, M.; Atienzar, M.D.; Corbet, P.S. (1999):** The life cycle of *Onychogomphus uncatatus* (Charpentier, 1840) (Odonata: Gomphidae) in the Sierra Morena Mountains (southern Spain): an example of protracted larval development in the Mediterranean basin. *Arch. Hydrobiol.* 144(2): 215-228. (in English).

["The life cycle of the dragonfly *Onychogomphus uncatatus* was studied for three consecutive years, mainly by systematic sampling of larvae, in a permanent upland stream in southern Spain, towards the southern part of this species' range. During larval development a hatching cohort divides into 'fast' and 'slow' components which respectively complete development in two and three years and correspond in their mode of seasonal regulation to summer and spring species (sensu CORBET 1954). In these respects the life cycle resembles closely that of certain other Odonata near the northern limit of their distribution in the United Kingdom and Sweden. Advanced metamorphosis (in the last larval instar) and emergence were confined to spring and summer respectively, but unusually low autumn temperatures correlated with the appearance in autumn, rather than in winter or spring, of intrastadial changes foreshadowing metamorphosis." (Authors)]

Address: Ferreras-Romero, M., Departamento de Biología Animal (Zoología), Facultad de Ciencias, Universidad de Córdoba, Avda. San Alberto Magno s/n, ES-14004 Córdoba, Spain

716. **Fincke, O.M. (1999):** Organization of predator assemblages in Neotropical tree holes: effects of abiotic factors and priority. *Ecological Entomology* 24(1): 13-23. (in English).

["Water-filled tree holes in a lowland forest in Panama harbour an assemblage of large predators consisting of the larvae of five common species of Odonata, the mosquito *Toxorhynchites theobaldi*, and tadpoles of *Dendrobates auratus*."; odonate genera: *Gynacantha*; *Mecistogaster*; *Megaloprepus*; *Triacanthagyna*]

Address: Fincke, O.M., Univ. Oklahoma, Dept. Zool.; Norman, OK 73019, USA. e-mail: fincke@ou.edu

717. **Gade, G.; Kellner, R. (1999):** Dragonfly *Erythemis simplicicollis* contains a novel adipokinetic neuropeptide. *Archives of Insect Biochemistry and Physiology* 40 (2): 99-106.

["We have isolated a novel member of the adipokinetic hormone family of peptides from a methanolic extract of corpora cardiaca of the libellulid dragonfly *Erythemis simplicicollis* by using a single-step reversed-phase high performance liquid chromatography method and monitoring biological activity in various heterologous bioassays and a homologous one. The sequence, as determined by Edman degradation and mass spectrometry, was of an uncharged blocked octapeptide: pGlu-Leu-Asn-Phe-Thr-Pro-Ser-Trp amide. ... Since lipids are apparently used as substrate for muscle contraction during flight of *Erythemis simplicicollis* and the native pep-

tide induces lipid mobilization, this novel peptide is denoted Ers-AKH."]

Address: Gade, G.; Univ. Cape Town; Dept. Zool., ZA-7701 Rondebosch, South Africa. e-mail: ggade@bot-zoo.uct.ac.za

718. **Geeson, J.; Geeson, J. (1999):** Our Mid-Norfolk garden. *Atropos* 7: 35-38. (in English).

[report on the dragonflies of a garden pond created five years ago]

Address: Geeson, J.+J., 22 Hillside, Barnham Broom, Norfolk NR9 4 DF, UK

719. **Gerken, B.; Sternberg, K. (1999):** Die Exuvien europäischer Libellen. - The Exuviae of European Dragonflies. ISBN 3-9805700-4-4. 354 pp. (in German/English).

[bilingual (German/English) key for identification of exuvia of the European Odonata; chapters on "Collection, preparation and preservation of exuviae", "Where to find exuviae", general introduction in "Characteristics for the identification of odonate exuviae", "Glossary" of morphological features, "Technical terms German-English", "List of (European) species"]

Source of supply: Gerken, B., Universität/Gesamthochschule Paderborn, Abt. Höxter, Fachbereich 7, Landespflanze, Tierökologie, An der Wilhelmshöhe 44, D-37671 Höxter, Germany. e-mail: gerken.bernd@hx.uni-paderborn.de. DM 38,50 + pp

720. **Göcking, C. (1999):** Zum Vorkommen der Helm-Azurjungfer (*Coenagrion mercuriale*) in der Emsaue bei Warendorf. *Flora und Fauna im Kreis Warendorf - Beiträge zur Naturkunde* 9: 69-70. (in German).

[confirmation of an old locality of *Coenagrion mercuriale*, and detection of new localities in River Ems with annotations to abundance at all localities on 20 July 1998. Nordrhein-Westfalen (Landkreise Warendorf and Gütersloh).]

Address: Göcking, C., Zum Hiltruper See 9, D-48165 Münster, Germany

721. **Goffart, P. (1999):** Un premier cas de reproduction effective de *Sympetrum fonscolombe* Selys, 1840 en Wallonie. *Gomphus* 15(1): 12-17. (in French, with Dutch and English summaries).

["A successful reproduction of the Red-veined Darter (*Sympetrum fonscolombe* Selys, 1840) in Walloon Region (Southern Belgium). This note account for the observation of a minimum of four males and two females of *Sympetrum fonscolombe*, all teneral, at the end of September 1998, near a pond in Southern Belgium, in Gaume. It is the first reported case of successful reproduction of this southern species in Walloon Region. These recently emerged adults had descended probably from the development of eggs laid by migrants during spring 1998. Observations of that species seem more and more regular in Southern Belgium, from 1993 (at least) till now. Since that date, indeed, several data were recorded each year, relating sometimes to little groups (up to about twenty individuals) and egg-laying has sometimes been observed. Occasional effective reproduction was therefore expected." (Authors)]

Address: Goffart, P., Unite d'Ecologie et de Biogeographie (UCL) 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. e-mail: goffart@ecol.ucl.ac.be

722. **Gonzalez-Soriano, E. (1999):** *Brechmohoga latialata* spec. nov. from Mexico (Anisoptera: Libellulidae). *Odonatologica* 28(1): 83-86.

Address: Gonzalez-Soriano, E., Depto Zoologia, Inst. Biol., Universidad Autonoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico

723. **Gorb, S.N. (1999):** Evolution of the dragonfly head-arrester system. *Proceedings of the Royal Society of London, Series B - Biological Sciences* 266 (1418): 525-535. (in English).

["The arrester or fixation system of the head in adult Odonata is unique among arthropods. This system involves the organs of two body segments: the head and the neck. It consists of a skeleton-muscle apparatus that sets the arrester parts in motion. The parts comprise formations covered with complicated microstructures-fields of microtrichia on the rear surface of the head and post-cervical sclerites of the neck. The arrester immobilizes the head during feeding or when the dragonfly is in tandem flight. Thus, it may serve as an adaptation to save the head from violent mechanical disturbance and to stabilize gaze in a variety of behavioural situations. This study shows the evolutionary trend of the arrester in the order Odonata by using scanning electron microscopy and measurements of arrester structures in 227 species from 26 odonate families. The arrester design occurring in the Epiophlebiidae, Gomphidae, Neopetaliidae, Petaluridae and Chlorogomphinae is suggested to be the basic one. Two convergent pathways of head-arrester evolution among Zygoptera and Anisoptera are proposed. The possible functional significance of the arrester system is discussed." (Author)]

Address: Gorb, S., Max-Planck-Institut für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. e-mail: stas.gorb@tuebingen.mpg.de

724. **Gorb, S.N. (1999):** The role of visual cues in mate recognition in the damselfly *Coenagrion puella* (L.). *IDF-Report* 2(1): 3-8. (in English).

["Abdomen coloration pattern and presence of wings were the most important cues for sexual recognition by males. Step-by-step elimination of male coloration pattern leads to an increase of the tandem response rate [...] A female model painted as a male repelled males like the intact male model. Absence of either the head or thorax slightly decreased the number of tandem responses, but models without both the head and thorax were not recognized as a mate [...]. Using Principal Component Analysis it is shown that models repelling males usually were those containing intact male abdomen or female abdomen painted with blue. The results indicate that *C. puella* males can distinguish males from females visually by morphological structures and coloration pattern."(Author)]

Address: Gorb, S.N., Institut für Spezielle Zoologie und Evolutionsbiologie, Universität Jena, Erberstr. 1, D-07743 Jena, Germany

725. **Gossum, H. van.; Stoks, R.; De Bruyn, L. (1999):** Small outdoor insectaries as a tool for lifetime studies on damselflies. *Belg. J. Zool.* 129: 317-324. (in English).

["Damselflies are suitable subjects for examination of a variety of biological questions, but most research has been carried out in the field. Several questions are hard to test because of the uncontrolled conditions inherent in field studies. This can be circumvented by studying



populations in semi-natural outdoor insectaries. We assessed the suitability of such insectaries by comparing the survival and adult behaviour of *Ischnura elegans* (Vander Linden) in insectaries and in the field. Our results showed that damselflies behaved differently under experimental conditions. Nevertheless, outdoor insectaries can be regarded as a valuable tool to elucidate questions concerning life history traits since they offer the possibility to eliminate predation, emi- and immigration and hidden life." (Authors)]

Address: Stoks, R., Evolutionary Biology Group, Department of Biology, University of Antwerpen (RUCA), Groenenborgerlaan 171, B-2020 Antwerpen, Belgium. e-mail: hvgoossum@ruca.ua.ac.be

726. **Hale, J.; Hicks, M. (1999):** Reports from Coastal Stations - 1998: St. Agnes, Isles of Scilly. *Atropos* 6: 46-47. (in English).

[record of *Anax junius* on 10 September 1998]

Address: not stated

727. **Henson, S. (1999):** First & last dates for 1998. *Newsletter of the British Dragonfly Society* 35: 12-14. (in English).

[some phenological data from UK's 1998 Odonata]

Address: Henson, S., 10 Shotesham Road, Poringland, Norwich NR14 7LE, UK

728. **Jakob, C.; Suhling, F. (1999):** Risky times? Mortality during emergence in two species of dragonflies (Odonata: Gomphidae, Libellulidae). *Aquatic Insects* 21 (1): 1-10. (in English).

["Mortality during emergence in two species of dragonfly, *Onychogomphus uncutus* and *Orthetrum coerulescens*, was studied at a mediterranean irrigation canal in France. Overall mortality was 5.2% (n=1901) and 5.7% (n=611), respectively. ... Besides data on mortality the emergence curves of both species are provided." (Authors)]

Address: Suhling, F., Techn. Univ. Braunschweig, Inst. Zool., Fasanenstr. 3, D-38092 Braunschweig, Germany. e-mail: f.suhling@tu-bs.de

729. **Jödicke, R. (1999):** Im Reich der *Macromia sibirica*. *Libellennachrichten* 1: 10-12. (in German).

[report on a journey to Dr. A. Haritonov, USSR, with interesting information on *Sympetrum "decoloratum"*, and other species; some remarks on the current situation of odonatologists in former USSR are of special interest]

Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany

730. **Kalkman, V.; Ketelaar, R. (1999):** Interessante Libellenwaarnemingen in 1998 (Odonata). *Nederlandse faunistische mededelingen* 8: 85-88. (in Dutch, with English summary).

[interesting new records of Odonata in the Netherlands in 1998: Records of the following species in are dealt with: *Calopteryx virgo*, *Sympetma paedisca*, *Coenagrion hastulatum*, *Stylurus flavipes*, *Gomphus vulgatisimus*, *Anax parthenope*, *Cordulegaster boltonii*, *Sympetrum pedemontanum*, *Sympetrum depressiusculum*]

Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands

731. **Kay, W.R.; Smith, M.J.; Finder, A.M.; McRae, J.M.; Davis, J.A.; Halse, S.A. (1999):** Patterns of distribution of macroinvertebrate families in rivers of north-

western Australia. *Freshwater biology* 41: 299-316. (in English).

["1. The northern half of Western Australia is a large, sparsely populated area with a climate that ranges from monsoonal in the Kimberley to arid in the Gascoyne and Pilbara regions. The aquatic invertebrate fauna is poorly known. 2. Fifty-one sites located on 14 river systems were sampled three times between August 1994 and October 1995. A total of 90 taxa, most identified to family level, were collected. The fauna was dominated by insects, which constituted 74% of the total number of taxa collected. 3. Major habitats at each site were sampled separately and sites with more habitats tended to have a richer fauna. All habitats showed significant differences in taxonomic richness between regions. Family richness decreased with increasing latitude, being highest in the Kimberley region and lowest in the Gascoyne. 4. Despite the differences in taxon richness between regions, community composition of the aquatic invertebrate fauna at the family level did not differ greatly. Four major groups of sites were identified by cluster analysis, based on the invertebrate families present at each site, but differences between groups were small. 5. Significant temporal variation in taxon richness was found in channel habitat but not the three other habitats sampled (riffle, macrophyte, pool-rocks). Community composition in channel habitat varied temporally among groups of sites identified by cluster analysis but the pattern was not consistent." (Authors) The Odonata (8 families) are listed for the sampled 51 river sites in appendix 1.]

Address: Kay, W.R., Department of Conservation and Land Management, Wildlife Research Centre, PO Box 51, Wanneroo, WA 6065, Australia. e-mail: winston@calm.wa.gov.au

732. **Knaus, P. (1999):** Untersuchungen zur Emergenz, zur Mobilität und zum Paarungssystem an einer Metapopulation von *Somatochlora alpestris* (Selys, 1840) in den Zentralalpen (Anisoptera: Corduliidae). *Diplomarbeit, Zool. Inst., Wildforschung und Naturschutzökologie, Universität Zürich*: 65 pp. (in German).

[very detailed mark-recapture study of the ecology of *Somatochlora alpestris* with emphasize on locality and phenology of emergence, maturation, population ecology, reproductive behaviour, feeding behaviour, diel periodicity, side fidelity, mobility, metapopulation structure; study localities: 27 water bodies, subalpine zone, Bärenseewen, Prätigau, Switzerland.]

Address: Knauss, P., Pflanzschulstr. 49, CH-8004 Zürich, Switzerland. e-mail: pknkaus@hotmail.com

733. **Kofler, A. (1999):** Nachtrag zur Libellenfauna Osttirols (Odonata). *Anax, Wien* 2(1): 27-31. (in German, with English summary).

[additions to the list of the Odonata of East Tyrolia, Austria from 1973 - 1993; new for the region are *Chalcolestes viridis*, *Aeshna grandis*, *Sympetrum striolatum*, *S. fonscolombeii*, and *S. sanguineum*.]

Address: Kofler, A., Meranerstr. 3, A-9900 Lienz/Osttirol, Austria

734. **Kuhn, J. (1999):** Die Libellen des Murnauer Moores und der Loisachmoore (Oberbayern): Fauna - Lebensräume - Naturschutz. *Berichte der Akademie für Naturschutz Laufen* 21 (1997): 111-147. (in German).

[comprehensive and well documented study on the dragonflies of two bogs in Bavaria; distribution map of selected species; (commented) checklist of 55 species

with annotations to the status between 1993 and 1997, Red Data Book information, assessment of the present importance of the populations from the local to the European scale; discussion of problems as hydrologic impacts on the bogs, fishing in water bodies, hunting, and further recreational activities on vegetation, and habitats of Odonata, importance of litter meadows as habitats of Odonata; detailed characterisation of water bodies; appendix with (1) characterisation of all water bodies surveyed in this study, and (2) general characterisation of habitats of all species]  
Address: Kuhn, J., Marktstr. 26, D-89143 Blaubeuren, Germany

735. **Lehmann, G. (1999):** Gomphiden im Bergland - Zum Vorkommen von *Gomphus vulgatissimus* und *Oryctogomphus forcipatus* im Bezirk Kufstein, N-Tirol. *Anax*, Wien 28(1): 43-44. (in German).

[discussion on factors responsible for the rarity of Gomphidae in the high range mountains in N-Tyrolia, Austria]

Address: Lehmann, G., Haunfeldstr. 14, A-6330 Kufstein, Austria

736. **Leung, B.; Baker, R.L.; Forbes, M.R. (1999):** Grooming decisions by damselflies, age-specific colonisation by water mites, and the probability of successful parasitism. *International Journal for Parasitology* 29(3): 397-402. (in English).

["We examined whether host damselflies (*Ischnura verticalis*) in different stages of development were differentially susceptible to parasitism by larval water mites (*Arrenurus pseudosuperior*). We found that mites were successful in reaching the parasitic phase more often if they colonised hosts closer to emergence." (Authors)]

Address: Baker, R.L., Univ. Toronto, Dept. Zool., Mississauga, ON L5L 1C6, Canada. e-mail: rbaker@credit.erin.utoronto.ca

737. **Leyshon, O. (1999):** An influx of red-veined darters at Dungeness RSPB reserve in 1998. *Newsletter of the British Dragonfly Society* 35: 14. (in English).

[Dungeness, Kent, UK]

Address: Leyshon, O., Romney Resource Centre, Mountfield Road, New Romney, Romney Marsh, Kent TN28 8LH, UK

738. **Lindeboom, M. (1999):** Supported projects 1997 - 1999. *IDF-Report* 2(1): 1-2. (in English).

[List of odonatological projects supported by the International Dragonfly Fund between 1997 and early 1999]

Address: Lindeboom, M., Wolfstr. 6, D-72119 Ammerbuch, Germany

739. **Lüderitz, V.; Hentschel, P. (1999):** Umgestaltung des Landeskulturgrabens bei Dessau. Ein Beispiel für den Umgang mit anthropogenen Fließgewässern. *Naturschutz und Landschaftsplanung* 31(1): 18-23. (in German with English summary).

["Recultivation of the 'Landeskulturgraben' in Dessau as an example of the treatment of anthropogenic water bodies. The 'Landeskulturgraben' is a small canal in the Biosphere Reserve 'Mittlere Elbe', the ecology of which had been severely disturbed. In 1994 the canal bed structures were ecologically enhanced by different measures. By creating meanders, stillwater coves, course widenings, separated ponds and shallow banks the eco-morphological grade increased from 4.5 to 2.5. Water quality improved from class II-III (critically loaded) in

1994 to class II (moderately loaded) in 1995/1996. The number of macroinvertebrate species increased from 38 to 85. the number of water and amphibic plant species grew by 27." (Authors). 13 species of Odonata are listed: 4 species in 1993, and 13 in 1996/97. Most of the (regional) typical Odonata of ditches could be recorded, a good indication of the success of the measures.]

Address: Hentschel, P., Rosenburger Str. 103, D-06846 Dessau, Germany; Lüderitz, V., Fachhochschule Magdeburg, Fachbereich Wasserwirtschaft, Am Krökentor 8, D-39104 Magdeburg, Germany

740. **Marchant, R.; Hirst, A.; Norris, R.; Metzeling, L. (1999):** Classification of macroinvertebrate communities across drainage basins in Victoria, Australia: consequences of sampling on a broad spatial scale for predictive modelling. *Freshwater biology* 41: 253-268. (in English).

["Spatial scale may influence the interpretation of environmental gradients that underlie classification and ordination analyses of lotic macroinvertebrate communities. This could have important consequences for the spatial scale over which predictive models derived from these multivariate analyses can be applied. 2. Macroinvertebrate community data (identified to genus or species) from edge and main-channel habitats were obtained for sites on rivers from 25 of the 29 drainage basins in Victoria. Trends in community similarity were analysed by carrying out separate multivariate analyses on data from the edge habitats (199 sites) and the main-channel habitats (163 sites). 3. Hierarchical classification (UPGMA) showed that the edge data could be placed into 11 site groups and the main-channel data into 12 site groups. 4. Ordination analysis (hybrid multidimensional scaling) showed no sharp disjunctions between site groups in either habitat; overlap was frequent. Correlation of the ordination patterns with environmental variables showed that edge communities varied, longitudinally within a drainage basin and from the east to the west of Victoria. These two trends were superimposed on one another to form a single gradient on the ordination. The taxon richness of edge communities was also related to the species richness of macrophytes at a site. Main-channel communities also displayed a longitudinal and a geographic gradient, but these two gradients were uncorrelated on the ordination. 5. Community similarity only weakly reflected geographic proximity in either habitat. A preliminary subdivision of Victoria into a series of biogeographic regions did not match the pattern of distribution of site groups for the edge habitat, illustrating the difficulties of applying to lotic communities a priori regionalizations based on terrestrial features of the landscape. 6. The longitudinal gradients in the two data sets were commonly observed in data gathered at smaller spatial scales in Victoria. The other gradients (geographic, macrophyte), however, were either not consistently repeated or not evident at smaller spatial scales. At small spatial scales (i.e. within a single drainage basin) gradients were related to variables that varied over restricted ranges, e.g. mean particle size of the substratum. 7. Species richness was very variable when plotted against river slope or distance of site from source; both of these are measures of position on the longitudinal gradients. In contrast to suggestions in the literature, species richness did not show a unimodal trend on these gradients, or any other trend. 8. Environmental gradients (apart from longitudinal gradients) that underlie predictive models of macroinvertebrate distribution are reflections of the spatial

scale on which the model has been constructed and cannot be extrapolated to different scales. Models must be suited to the spatial scale over which predictions are required." (Authors). At the species level *Ischnura heterosticta* was classified as edge taxon, and *Austroaeschna pulchra* and *Notoaeschna sagittata* als main-channel taxa.]

Address: Marchant, R. Museum of Victoria, 71 Victoria Crescent, Abbotsford, VIC 3067, Australia. e-mail: rmarsh@mov.vic.gov.au

741. **Meuris, L. (1999):** Libellenmonitoring in Vlaanderen: de eerste resultaten van een proefproject op de Kalmthoutse Heide (Antwerpen) in 1998. *Gomphus* 15 (1): 18-28. (in Dutch, with English and French summaries).

["Dragonfly census in Flanders: the first results of a pilot project in the "Kalmthoutse Heide" (Antwerp) in 1998. In order to follow and evaluate the long-term evolution of the odonatofauna in Flanders, a monitoring scheme is necessary. In Flanders, such a project has not yet started, but it has been decided to start a pilot project at several sites, e.g. in the 'Kalmthoutse Heide' (province of Antwerp). The first results are given here. Seven fens have been visited regularly during the flying season. The same transect has been followed and adults and exuviae have been counted over a strip of 3 meters wide. A total of 24 species have been detected, 6 of them 'Red List' species: *Coenagrion lunulatum*, *Cordulia aenea*, *Leucorrhinia dubia*, *Lestes virens*, *Ceragrion tenellum*, and *Aeshna juncea*. For next year, it has been proposed to count two transects of 5 fens each instead of one transect of 7 fens." (Author)]

Address: Meuris, L., A Van Bockstaelestraat, B-9050 Gent, Belgium

742. **Müller, R. (1999):** Die Odonaten von Micronesien (Pazifik). *Anax*, Wien 2(1): 46. (in German).

[very short summary on the dragonfly fauna of Micronesia]

Address: Müller, R., Rehetobelstr. 99, CH-9016 St. Gallen, Switzerland

743. **Müller, R.; Hämäläinen, M. (1999):** Philippinen, odonatologische Feldforschung im Tropenwald. *Anax*, Wien 2(1): 45. (in German).

[general introduction to the Philippines, its landscapes, climates, seasonality, the distribution of Odonata, conservation aspects, problems of odonatological research in tropical countries, methods, how to protect your specimens from getting prey of ants etc.]

Address: Müller, R., Rehetobelstr. 99, CH-9016 St. Gallen, Switzerland

744. **Mungenast, F. (1999):** Über das gehäufte Vorkommen von *Sympetrum fonscolombii* (Selys, 1840) bei Imst, Nordtirol, im Frühsommer 1996. *Anax*, Wien 2(1): 32-36. (in German).

[in early summer 1996 *S. fonscolombii* reached high abundances in North Tyrol, Austria]

Address: Mungenast, F., Stadtplatz 12, A-6460 Imst/Tirol, Austria

745. **Nasrollahzadeh, A. (1999):** Zur Süßwasserfauna des Gilan (Iran). *Zoology in the Middle East* 17: 91-98. (in German).

["A report is presented on freshwater animals collected in 1993 in the Sefid Rud catchment area and the basin of Anzali (Gilan, Iran). Some species are recorded for

the first time for Iran. There is a considerable number of species of North American origin (neophytes, neozans), e.g. *Gambusia holbrooki*, *Rhithropanopeus harrisi*, and *Azolla* sp." (Author) "Odonata gen sp." larvae are mentioned for Ciah Derwish-an (49°30'E 37°30'N).] Address: Nasrollahzadeh, Akbar, Institut Pardis Anzali, University Gilan, Pasdaranstr., Anzali, Iran

746. **Nel, A.; Gand, G.; Garric, J. (1999):** A new family of Odonatoptera from the continental Upper Permian: The Lapeyriidae (Lodeve Basin, France). *Geobios* 32 (1): 63-72. (in English).

["The new family Lapeyriidae of Odonatoptera, based on a new genus and species from the Upper Permian of Lodevois (France) is the sister group of Nodialata. ..."] (Authors)]

Address: Nel, A., Museum Natl. Hist. Nat., Entomol. Lab., 45 Rue Buffon, F-75005 Paris, France. e-mail: anel@mnhn.fr

747. **Odin, N. (1999):** Reports from Coastal Stations - 1998: Landguard Bird Observatory, Suffolk. *Atropos* 6: 58. (in English).

[documentation of three first records (*Coenagrion puella*, *Libellula depressa*, *Sympetrum danae*) for the locality of the observatory]

Address: not stated

748. **O'Neill, G. (1999):** Studies of a dragonfly biodiversity gradient in Ghana, West Africa. *IDF-Report* 2(1): 13-32. (in English).

["Collections were made at 8 localities throughout Ghana during the summer of 1997. Seventy-one species were collected, 25 of which are new species for the country. This brings the national list to 118 species. Three main regions were sampled: coastal savanna, wooded savanna and rainforest. *Trithemis dejouxi* Pinhey 1978 is raised to specific rank. Detailed records are given for this collection as well as the following others: FRASER, 1947; NEVILLE, 1960; LINDLEY, 1974; MARSHALL & GAMBLES, 1977. Aspects of Odonata biodiversity and biogeography of these regions are discussed." (Author)]

Address: O'Neill, G., University of Puget Sound, Tacoma, WA 98416, United States

749. **Painter, D. (1999):** Macroinvertebrate distributions and the conservation value of aquatic Coleoptera, Mollusca and Odonata in the ditches of traditionally managed and grazing fen at Wicken Fen, UK. *Journal of applied ecology* 36: 33-48. (in English).

["1. Water-filled ditches are an important ecological feature of lowland Britain. Originally dug to facilitate wetland drainage, ditches often provide refuges for aquatic flora and fauna of high conservation value. 2. The ditches, ponds and major waterways of a traditionally managed undrained fen and the ditches of a previously drained cattle-grazed fen meadow were sampled at Wicken Fen National Nature Reserve for Coleoptera, Mollusca and Odonata, and for physical, chemical and biological variables. 3. Multivariate analysis showed a clear division between ditches on the two fens, and between larger and smaller waterbodies. 4. Individual ditches possessed distinctive faunas. Ditch age and bank profile were important factors influencing faunal species composition. 5. Invertebrate distributions were shown to be significantly correlated with macrophyte distribution. 6. Waterbodies were ranked in terms of their species quality, using a point-scoring system; there was no cor-



relation between rankings for the three invertebrate groups; only ditch age and detritus levels were correlated with species quality score (for Coleoptera). 7. Ditch management recommendations are discussed in the light of these results." (Author); 14 odonate taxa are listed]

Address: Painter, D., Land Use Consultants, 43 Chalton Street, London NW1 1JD, UK

750. **Parr, A. (1999):** Late season records of Emperor Dragonfly *Anax imperator*. *Atropos* 6: 33-34. (in English).

[in 1998 in the UK, *A. imperator* was on the wing late in September and early in October, and fresh exuviae were found in September. "The autumn records described above, and in particular the fresh exuviae found in September, clearly do not fit this pattern (of *A. imperator* as a 'spring species'). It is possible that some individuals encounter conditions which overcome their diapause and allow an autumn emergence. A more likely explanation is that autumn Emperors are the progeny of immigrants from Mediterranean Europe or North Africa, where the species may be adapted to conditions which favour more rapid development, or where no larval diapause is necessary. The Green Darner *Anax junius*, which is the commonest *Anax* species in North America, is known to have a migrant form which produces an autumn generation of adults from eggs laid by migrants in early summer (Trottier 1971), and perhaps immigrant Emperors can also follow this strategy. It is of interest that the September exuviae of the Emperor that have been found in recent years have all come from areas where Red-veined Darter *Sympetrum fonscolombei* were also breeding at the time. This supports the immigrant hypothesis, and may give some hints as to the possible origins of any incoming spring adults. It is of course possible that some of the autumn Emperors may themselves be primary immigrants." (Author)]

Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

751. **Parr, A. (1999):** Migrant dragonflies in 1998 including recent decisions and comments by the Odonata Records Committee. *Atropos* 6: 69-72. (in English).

[detailed documentation and listing of immigrant species (including some colour plates of *Anax junius*): *Aeshna mixta*, *Anax imperator*, *A. parthenope*, *A. junius*, *A. ephippiger*, *Libellula quadrimaculata*, *Crocothemis erythraea*, *Sympetrum striolatum*, *S. fonscolombei*, and *S. flaveolum*]

Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

752. **Parr, A. (1999):** Odonata Records Committee news. *Atropos* 7: 51. (in English).

[report on the formal acceptance (and rejections) of records of *Anax parthenope* and *Anax junius* in UK]

Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

753. **Parslow, R. (1999):** Colour change in the Tresco Green Darner *Anax junius*. *Atropos* 7: 54. (in English).

["On 1 October 1998, my husband and I observed the homeochromic female Green Darner *Anax junius* on Tresco, Isles of Scilly, for a period of 40-45 minutes. It was discovered the previous day and had remained perched in the same position since discovery. Notes taken at the time describe an interesting sequence of events. My initial observations describe an insect with

pale blue either side of the brown central line on the abdomen. The impression of a pale grey-blue and dull dragonfly was disappointing as I had seen [a colour picture in the periodical; M. Sch.] *Atropos* and was expecting something more spectacular! Notes on a later sketch indicate brown eyes, leaf green thorax, brown wing-base and blue-green on the abdomen as opposed to the pale grey-blue noted earlier. There were blue/green spots on the last segments above the anal appendages. In the last few seconds before it flew, the blue suddenly became a brighter turquoise colour, contrasting with the chocolate-brown central line. With a flash of metallic blue/green it was gone. The impression was that earlier colour changes had been subtle as the day became warmer, and the final changes were very sudden and marked. We watched the insect for a long time and if I hadn't been watching the whole time, I would have been adamant that there were two insects." (Verbatim)]

Address: Rosemary Parslow 15 Lode Lane, Wicken, Ely, Cambs CB7 5XP

754. **Pedersen, H. (1999):** Cannibalism in dragonflies exemplified by the species *Anax imperator* Leach and *A. parthenope* (Sélys). *Journal of the British Dragonfly Society* 15(1): 20. (in English).

[observations on predation of *Anax* spp. on *Crocothemis erythraea* and *Sympetrum pedemontanum* in a clay pit in Hungary from 23 July 1991. *C. erythraea* was the preferred prey, but flight velocity seems not to be the factor responsible for being prey or not.]

Address: Pedersen, H., Mellemvej 15, DK-8800 Viborg, Denmark. e-mail: henning-pedersen@post12.tele.dk

755. **Pellow, K. (1999):** An influx of Green Darner *Anax junius* (Drury) into Cornwall and the Isles of Scilly - The first European records. *Atropos* 6: 3-7. (in English).

[detailed report on the *Anax junius* influx into UK; detailed description of identification features of *A. junius*]

Address: Pellow, K., Mount Pleasant Bungalow, Botus Fleming, Cornwall PL12 6NQ, UK

756. **Pellow, K. (1999):** Common Green Darner *Anax junius* (Drury) in Cornwall and Isles of Scilly - The first British and European records. *Journal of the British Dragonfly Society* 15(1): 21-22. (in English).

[detailed documentation of the British records from the influx of *A. junius* in September 1998]

Address: Pellow, K., Mount Pleasant Bungalow, Botus Fleming, Saltash, Cornwall PL12 6NQ, UK

757. **Pellow, K. (1999):** Red-veined Darter *Sympetrum fonscolombei* breeding in large numbers in south-east Cornwall during 1998. *Atropos* 6: 35. (in English).

Address: Pellow, K., Mount Pleasant Bungalow, Botus Fleming, Cornwall PL12 6NQ, UK

758. **Pellow, K. (1999):** Some observations of a breeding population of Red-veined Darter *Sympetrum fonscolombei* (Sélys) in Cornwall during 1998. *Journal of the British Dragonfly Society* 15(1): 23-30. (in English).

[main topics: emergence, temperature during emergence, factors of mortality during emergence, maiden flight, absolute population size, predation by birds (*Falco subbuteo*), wasps and spiders, dispersal]

Address: Pellow, K., Mount Pleasant Bungalow, Botus Fleming, Saltash, Cornwall PL12 6NQ, UK

759. **Pennington, M.; Rogers, T. (1999):** Reports from Coastal Stations - 1998: Shetland. *Atropos* 6: 62-63. (in English).

[second Shetland record of *Libellula quadrimaculata*]

Address: not stated

760. **Philips, J.; Philips, V. (1999):** A sighting of *Coenagrion pulchellum* (Vander Linden) in Gloucestershire. *Journal of the British Dragonfly Society* 15(1): 10-11. (in English).

Address: Phillips, J. & V., Yorkleigh Cottage, Pope's Hill, Newham-on-Severn, Gloucestershire GL14 1LD, UK

761. **Raab, R.; Chwala, E. (1999):** The Red List of dragonflies in Lower Austria. *Anax*, Wien 2(1): 46. (in English).

Address: Raab, R., Anton Bruckner-Gasse 2/2, A-2232 Deutsch-Wagram, Austria

762. **Reeve, K.; Reeve, P. (1999):** Club-tailed dragonfly *Gomphus vulgatissimus* breeding in Warwickshire. *Atropos* 7: 55-56. (in English).

Address: Reeve, K. + P., The Outspan, Leamington Hastings, Near Rugby CV23 8DZ, UK

763. **Röske, W. (1999):** Pflege- und Entwicklungsplan Weberalten. IDF-Report 2(1): 9-12. (in German).

[abstract of a conservation action plan for the odonate fauna of a gravel pit near the Swiss/German border (Rheinfeld, Baden-Württemberg); the habitat is of special interest for pioneer-species among Odonata: The ecological conditions of the habitat are characterised by a permanent (!) pioneer-stadium of waters and vegetation; it is further worth to note from the faunistic point of view that four species of the genus *Orthetrum* (*albistylum*, *brunneum*, *cancellatum*, *coerulescens*) are co-occurring at this locality.]

Address: Röske, W., Kandelstr. 26, D-79106 Freiburg, Germany

764. **Rudolph, R. (Hrsg.) (1999):** 18. Jahrestagung der GdO in Münster. 19.-21. März 1999. Tagungsband. 28 pp. (in German).

[abstracts of the following lectures: A. Fronck: Die Libellenfauna Münsters. • K.-J. Conz: Arbeitskreis zum Schutz und zur Kartierung der Libellen in Nordrhein-Westfalen - AK Libellen NRW. • C. Artmeyer: Zur Entwicklungsdauer von *Gomphus vulgatissimus* an der Ems. • R. Mauersberger: Die Abrenzung des Teilareals der Sibirischen Winterlibelle (*Sympecma paedisca* (Brauer)) im Nordosten Deutschlands. • J. Kuhn: Langzeitbeobachtungen zur Ökologie von *Lestes dryas* und *Sympetrum flaveolum*. • R. Jödicke: Rätselraten um *Sympetrum "decoloratum"* - Stationen einer taxonomischen Recherche. • H. Wildermuth: Die Paarung von *Somatochlora alpestris* - Spermienkonkurrenz bei *Corduliiden*. • A. Martens: Fortpflanzungsverhalten von *Zygonyx torridus*. • G. Rüppell und D. Rüppell-Hilfert: Alternative Paarungsstrategien bei Prachtlibellen. • T. Benken: Anmerkungen zum Paarungssystem von *Lestes macrostigma*. • M. Lindeboom: Was Sie schon immer über Libellensex wissen wollten, aber nie zu fragen wagten. • W. Zessin: Neue Befunde zur Morphologie der ältesten Libellen. • P. Jahn: Aspekte der Ontogenese und Variation der Abdominaldornen und Kopfhöcker von Libellenlarven. • P. Buczynski: Libellen von Sandgrubengewässern im südöstlichen Polen. • E. Schmidt: Zur Odonatenfauna eines Ton-Flachweihers im West-

münsterland (NSG Plümerfeld Süd bei Lüdinghausen). • F. Suhling: Libellen-Lebensgemeinschaften in südeuropäischen Reisfeldern: Lebenszyklen und Einflußfaktoren. • M. Häusler: Präditionseffekte der Larven von *Anax parthenope*, *Sympetrum fonscolombii* und *Orthetrum cancellatum*. • K. Burbach und J. Werzinger: Fortpflanzungserfolge "mediterraner" Libellen in Bayern. • P. Knaus: Populationsbiologie von *Somatochlora alpestris* in den Zentralalpen. • J. Müller & R. Steglich: Weitere Gomphiden-Nachweise in großen mitteleuropäischen Flüssen. • Poster: J. Ruddek: Gomphidenfunde an der Weser bei Bremen. • G. Devai & M. Miskolczi: Ein Beitrag zu den Charakterisierungsmöglichkeiten der Libellenfauna. • B. Hill, B. Beinlich & H. Plachter: Der Einfluß traditioneller Hütehaltung auf die Habitatnutzung von *Lestes barbarus* (Fabricius, 1798) (Odonata, Lestidae) im Naturpark Lonjsko Polje (Kroatien). • D. Kempke & K. Reinhardt: Libellenbeobachtungen in Nordostpolen. • F. Eislöffel: Das Atlasprojekt "Die Libellen in Rheinland-Pfalz".]

Address: Rudolph, R., Zum Emstal 12 B, D-48231 Warendorf, Germany

765. **Samways, M. (1999):** Diversity and conservation status of South African dragonflies (Odonata). *Odonatologica* 28(1): 13-62. (in English).

["To date, 155 spp. have been recorded in South Africa; 29 spp. (18.7%) are endemic. *Metacnemis angusta* and *Paragomphus dicksoni* are only known from female specimens and are of doubtful taxonomic status. *Chlorolestes apricans*, *C. draconica*, *Ecchlorolestes nylephtha*, *E. peringueyi*, *Metacnemis valida*, *Pseudagrion inopinatum*, *P. unsingaziense*, *Enallagma polychromaticum*, *Ceratogomphus triceraticus*, *Syncordulia gracilis*, *S. venator*, *Orthetrum rubens* and *Urothemis luciana* are ecologically threatened. *Chlorolestes apricans* and *U. luciana* are of particular concern. *C. apricans*, whose populations have declined in recent years, appears not to occur in any protected area. [...] Not all anthropogenic disturbance is harmful to Odonata. Small dams play an important role in geographically increasing the overall density of many lentic spp. Similarly, the aquatic weed *Pistia* enhances local species richness in the Krüger National Park. Most major human disturbances however, are harmful to population levels. Exotic tree plantations within 30m of the river's edge reduce species richness. The rainbow trout is implicated in causing range retraction of the very rare and threatened *E. peringueyi*, while removal of natural forest in the southern Cape has eliminated populations of the equally rare *E. nylephtha*. Cattle grazing, resulting in bank vegetation destruction, and black wattle infestations along Eastern Cape river banks have had a major adverse impact on *C. apricans*. These factors are synergistic with lowered water levels in causing population fragmentation. [...] Presence of rare species in nature reserves does not necessarily guarantee their survival." (Author) ]

Address: Samways M.J., Invertebrate Conservation Research Centre, Dept Zool. & Entomol., University of Natal, P/Bag X01, Scottsville 3209, Pietermaritzburg, South Africa. e-mail: samways@zoology.unp.ac.za

766. **Sawabe, K.; Higashi, K.; Kanda, K.; Nagase, K. (1999):** Genetic variability and differentiation in isozymes in *Mnais damselflies* of Fukuoka in Japan (Zygoptera: Calopterygidae). *Odonatologica* 28(1): 63-78. (in English).

["To analyze the genetic differences, *M. pruinosa* and *M. nawai* were collected in 2 localities of Fukuoka Pref. Kyushu, Japan. In the Hisayama area, 2 forms of *M. pruinosa* males occur, viz. orange winged f. *esakii* and clear winged f. *strigata*, and one female form with clear wings f. *sieboldi*. In the Kami-ishigama area, *M. pruinosa* and *M. nawai* both occur and the forms of *M. pruinosa* also f. *esakii*, f. *strigata* and f. *sieboldi*. 2 forms of *M. nawai* males are also found, the orange winged f. *nawai* and the pale-orange winged f. *sahoi*, and one female form with pale-orange wings f. female -*nawai*. The genetic differences among the samples collected in the areas were assessed by electrophoretic analysis. 21 protein loci of 10 proteins were analyzed by 5 % polyacrylamide gel electrophoresis; 2 of the 21 loci were monomorphic. [...] Conclusion: (1) For the male strains, two polymorphic forms of *M. pruinosa*, f. *esakii* and f. *strigata*, and also two forms of *M. nawai*, f. *nawai* and f. *sahoi*, belong to single species, respectively. (2) The males of *M. pruinosa* and *M. nawai* belong to separate species. (3) All the females are genetically close to each other, though they include those of two different species, *M. pruinosa* and *M. nawai*." (Authors)]  
Address: Higashi, K., Department of Applied Biological Sciences, Faculty of Agriculture, Saga University, Saga 840, Japan. Fax: +81-952-28-8792. e-mail: higashik@cc.saga-u.ac.jp

767. **Schweighofer, W. (1999):** Hochgelegene Libellennachweise (Odonata) aus Niederösterreich. *Anax*, Wien 2(1): 37-40. (in German).  
[high altitudinal records of 11 odonate taxa from the Hochstadelberg (1281m NN) and Feldwies (1400 m NN) are presented]  
Address: Schweighofer, W., Schulstr. 20/8, A-3253 Erlauf, Austria

768. **Seidenbusch, R. (1999):** Choosing best ratios. *Sulzbach-Rosenberger Libellenrundbriefe* 10: 12-13. (in English).  
[An example is given how to interpret and handle "absolute measures in view of choosing out for ratios" between morphological structures in odonate larvae.]  
Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany

769. **Seidenbusch, R. (1999):** Description of three last instar larvae of the south Turkish area: *Brachythemis fuscopallata* Selys, 1887 (Anisoptera: Libellulidae), *Sympetrum haritonovi* Borisov, 1983 (Anisoptera: Libellulidae), *Onychogomphus assimilis* Schneider, 1845 (Anisoptera: Gomphidae). *Sulzbach-Rosenberger Libellenrundbriefe* 10: 1-11. (in English).  
Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany

**Seidenbusch, R. (1999):** Verfall zweier seltener Biotope im Gemeindebereich Hahnbach (Lks Amberg-Sulzbach) als Folgeerscheinung menschlicher Eingriffe. *Sulzbach-Rosenberger Libellenrundbriefe* 9: 1-16. (in German).  
[discussion of necessary measures from the hydrological and odonatological points of view to renature a bog in the community of Hahnbach (Bavaria)]  
Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany

770. **Shardlow, M.E.A. (1999):** The RSPB and Odonata conservation. *Atropos* 7: 10-15. (in English).

[some topics: causes of threats to the British dragonfly fauna as afforestation in Scotland or wetland loss; dragonflies occurring on RSPB Reserves; actions for Odonata on RSPB Nature Reserves (planning, monitoring, management; where to see dragonflies on RSPB Reserves]

Address: Shardlow, M., RSPB, Stalham House, 65 Thorpe Road, Norwich NR1 1UD, UK

771. **Smith, E.M.; Smith, R.W.J. (1999):** The status of *Coenagrion hastulatum* (Charpentier) in Scotland, with notes on larval sampling. *Journal of the British Dragonfly Society* 15(1): 1-9. (in English).  
[results are presented for the following subjects: distribution, habitat, breeding behaviour, oviposition, flying period, larval identification, larval measurements of last four instars, status and conservation. The authors take *C. hastulatum* for a "boreo-alpine species" (and probably a relict one in Scotland) what definitely is not correct for continental Europe.]  
Address: Smith, E.M. + R.W.J., 33 Hunter Terrace, Loanhead, Midlothian EH20 9SJ, UK

772. **Soors, J. (1999):** Verslag Gaume-driedaagse van 4 tot 6 juli 1998. *Gomphus* 15(1): 41-45. (in Dutch, with French summary).  
[3 day trip to Gaume (4-6 July 1998): the list of species includes *Coenagrion scitulum* (!)]  
Address: not stated

773. **Spence, B. (1999):** Reports from Coastal Stations - 1998: Spurn Bird Observatory, East Yorkshire. *Atropos* 6: 61-62. (in English).  
[emergence of *Sympetrum fonscolombi* on 22 May 1998]  
Address: not stated

774. **Stoks, R. (1999):** The effect of lamellae autotomy and sexual size dimorphism on startle-response performance in larvae of a leetid damselfly (Odonata). *Journal of Zoology* 247: 269-273. (in English).  
["Swimming is the most important escape mechanism in leetid damselflies. The effect of lamellae autotomy and sexual size dimorphism on startle-response performance was studied experimentally in larvae of the leetid damselfly *Lestes sponsa*. In contrast with the prediction of McNeill (1960) that lamellae loss would not affect swimming speed in fast swimmers such as *Lestes* larvae, swimming performance decreased in a quadratic way with the removal of subsequent lamellae. Lamellae autotomy therefore will considerably reduce the probability of escape from a predator. Larger larvae swim faster than smaller ones of the same instar. This may contribute to a higher survival of larger larvae compared with smaller ones when confronted with both conspecific and heterospecific predators. Despite larvae showing sexual size dimorphism, with females being larger, no difference in swimming speed between the sexes was found." (Author)]  
Address: Stoks, R., Evolutionary Biology Group, Department of Biology, University of Antwerpen (RUCA), Groenenborgerlaan 171, B-2020 Antwerpen, Belgium. e-mail: stoks@ruca.ua.ac.be

775. **Suhling, F. (1999):** Effects of fish on the micro-distribution of different larval size groups of *Onychogomphus uncatus* (Odonata: Gomphidae). *Arch. Hydrobiol.* 144(2): 229-244.



["Four types of field experiments were carried out in order to study the effects of fish predation on different size groups of burrowing larval dragonflies *Onychogomphus uncatatus* (CHARP.). (1) The effects of the bottom feeding fish *Barbatula (Nemacheilus) barbatula* (L.) on three size groups of *O. uncatatus* in three types of substrate: sand, gravel and stones, were recorded using field enclosure cages. The densities of small sized larvae inhabiting cages with stones and gravel were reduced in the presence of fish compared with fish-free controls. No effects due to fish presence were found in larger larvae. (2) The colonisation of sand, gravel and stones in the field by different size groups of *O. uncatatus* was studied using frames filled with substrates. Substrate as well as size specific effects were found. The low density of small larvae in coarse substrates is interpreted mainly as a direct effect of predation by *B. barbatula* which exclusively colonised these substrates. (3) To test the effect of exclusion of all fish on colonisation of *O. uncatatus*, frames filled with stones were exposed in a running water and half of these were protected by cages. The densities of very small and medium sized larvae in the protected substrates were higher than in those without cages. (4) In cages with a wide mesh size, which allowed a free exchange of dragonfly larvae and *B. barbatula* but prevented predation by large fish, the density of small larvae of *O. uncatatus* was reduced. *B. barbatula* were found exclusively inside the cages. It is suggested that predation by *B. barbatula* using the cages as a shelter against predation by large fish was responsible for this reduction." (Author)]  
Address: Suhling, F., Zool. Institut, Technische Universität Braunschweig, Fasanenstraße 3, 38092 Braunschweig, Germany, E-mail: f.suhling@tu-bs.de

776. **Temaat, T. (1999):** Ontdekking van een populatie van *Coenagrion mercuriale* (Charpentier, 1840) nabij Virton. *Gomphus* 15(1): 29-30. (in Dutch, with English and French summaries).  
["Discovery of a population of *Coenagrion mercuriale* (Charpentier, 1840) near Virton: In June 1998, a small population of *C. mercuriale* has been discovered in the Gaume, near the village of Villers-la-Loue (province of Luxembourg). A total of three males and one female were captured near a small, fast running brook with a sandy floor. This is the second population for Belgium known after 1980 and the first observation of *C. mercuriale* in the Gaume." (Author)]  
Address: Temaet, T., Rijnsteeg 8 10-A, NI-6708 PP Wageningen, The Netherlands

777. **Tockner, K.; Schiemer, F.; Baumgartner, C.; Kum, G.; Weigand, E.; Zweimüller, I.; Ward, J.V. (1999):** The Danube restoration project: Species diversity patterns across connectivity gradients in the floodplain system. *Regulated Rivers Research and Management* 15(1-3): 245-258. (in English).  
["The relationship between hydrological connectivity and species diversity patterns (alpha and beta diversity) of macrophytes, molluscs, odonates and amphibians was investigated in a semi-natural floodplain segment in the 'Alluvial Zone National Park' of the Danube River in Austria. ..." (Authors)]  
Address: Tockner, K., ETH Zurich, Swiss Inst. Environm. Sci. & Technol., Überlandstr 133, CH-8600 Dübendorf, Switzerland

778. **Troake, P. (1999):** Reports from Coastal Stations - 1998: Rye Harbour, East Sussex. *Atropos* 6: 51-53. (in English).  
[*Sympetrum fonscolombeii*, *Anax parthenope*]  
Address: not stated

779. **Tunmore, M. (1999):** Late Broad-bodied Chaser *Libellula depressa*. *Atropos* 6: 34-35. (in English).  
[on 21 September 1998 (an immigrant) *L. depressa* was observed in Cornwall, UK.]  
Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK

780. **Tunmore, M. (1999):** Norfolk Hawker *Aeshna isosceles* record from the Breck district. *Atropos* 6: 33. (in English).  
[it is not clear if the specimen observed was an immigrant, or was translocated with live stems of Common Reed (*Phragmites australis*) from a reedbed creation project.]  
Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK

781. **Tunmore, M. (1999):** Reports from Coastal Stations - 1998: The Lizard peninsula, Cornwall. *Atropos* 6: 48-49. (in English).  
[remarkable immigrants are *Anax parthenope*, *A. ephippiger*, *A. junius*, and *Sympetrum fonscolombeii*]  
Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK

782. **Wasscher, M. (1999):** Identification of small Red-eyed damselfly *Erythromma viridulum* (Charp.). *Atropos* 7: 7-9. (in English).  
["During the past few decades, numbers of Small Red-eyed Damselfly *Erythromma viridulum* have been increasing over large parts of continental north-western Europe. Perhaps this species has not yet crossed the channel, but it is possible that it has been overlooked in Britain. In this article some physical and behavioural characters are described which should help to separate this species from its close relative, the Red-eyed Damselfly *E. najas*. The spread of *E. viridulum* across The Netherlands is also examined." (Author)]  
Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: wasscher@xs-4all.nl

783. **Whitehouse, S.M. (1999):** Red-veined darter *Sympetrum fonscolombeii* breeding in the Midlands. *Atropos* 6: 35-36. (in English).  
[documentation of records in 1998 in the Midlands, UK]  
Address: Whitehouse, S.M., 6 Skipton Crescent, Berkeley Pendlesham, Worcester WR4 0LG, UK

784. **Wildermuth, H. (1999):** Niche overlap, niche segregation and habitat selection in *Somatochlora arctica* (Zett.) and *S. alpestris* (Sel.) in Switzerland (Anisoptera: Corduliidae). *Anax*, Wien 2(1): 42. (in English).  
[summary of a study from 90 localities with populations of *S. arctica*, and more than 300 localities with populations of *S. alpestris*]  
Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland

785. **Willigalla, C. (1999):** Die Libellen im Kreis Warendorf - eine vorläufige Zusammenstellung. *Flora und Fauna im Kreis Warendorf - Beiträge zur Naturkunde* 9: 31-41. (in German).

[commented checklist of the dragonfly fauna of the county (Landkreis) Warendorf, Nordrhein-Westfalen, Germany]  
Address: Willigalla, C., Brock 45, D-48346 Ostbevern, Germany





# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: Lindeboom@aol.com and Martin Schorr, Waldfrieden 25, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: FOETrier@aol.com

The ©ODONATOLOGICAL ABSTRACT SERVICE is a supplement to AGRION, the Newsletter of the Worldwide Dragonfly Association. Published in Rheinfelden, Germany and printed in Tübingen, Germany.

ISSN 1438-0269

## 1997

786. **Andretzke, H.; Zöckler, C. (1997):** Reaktionen ausgewählter Faunengruppen (Libellen, Laufkäfer, Heuschrecken und Tagfalter) auf Flußrenaturierungsmaßnahmen an der Wümme. Bremer Beiträge für Naturkunde und Naturschutz 3: 129-142. (in German). [discussion of the positive effects of River (Wümme) restoration on Odonata; the abundance of the rare *Ophiogomphus cecilia* increased with the creation of suitable habitats, especially submerged sand-bars] Address: BIOS, Lindenstr. 40, D-27711 Osterholz-Scharmbeck, Germany
787. **Bechly, G. (1997):** Dragonflies from the Lower Cretaceous of Brazil. *Meganeura* 1: 27-28. Address: Bechly, G., Institut und Museum für Geologie und Paläontologie, Geowissenschaftliche Fakultät der Eberhard-Karls-Universität, Sigwartstr. 10, D-72076 Tübingen, Germany. E-mail: GBechly@aol.com
788. **Belle, J. (1997):** The genus *Lestes* (Odonata: Lestidae) Leach, 1815, in Surinam. *Zool. Meded.* 71 (11): 89-103. (in English). ["The species of *Lestes* from Surinam are treated. *L. basidens* spec. nov. (male holotype: Distr. Nickerie, Sipaliwini, near airstrip), *L. curvatus* spec. nov. (male holotype: Distr. Suriname, Coropina creek, Republiek), *L. edentatus* spec. nov. (male holotype: Distr. Marowijne, Nassau mountain range) and *L. trichonus* spec. nov. (female holotype: Distr. Nickerie, Sipaliwini, near airstrip) are described and illustrated. The types are deposited in the National Museum of Natural History, Leiden. *L. mediorufus* Calvert and *L. tenuatus* Rambur are illustrated and a lectotype for the latter species is designated. The holotype of *L. sublatus* Hagen in Selys is redescribed and illustrated. *L. forficula* Rambur, known from the surrounding countries of Surinam, is also illustrated. A key to the Surinam species of *Lestes* is provided." (Author)] Address: Belle, J., Onder de Beumkes 35, NL-6883 HC Velp, The Netherlands
789. **Hawking, J.H.; Smith, F.J. (1997):** Colour guide to invertebrates of Australian inland waters. Identification guide No. 8. Cooperative Research Centre for Freshwater Ecology, Ellis Street, Thurgoona, Albury, NSW 2640, Australia: 213 pp. (in English). [Odonata are exemplified on pages 88 to 106. The larvae of the following species are shown: *Ischnura aurora* Brauer 1865, *Rhadinosticta simplex* (Martin, 1901), *Austroargiolestes icteromelas* (Selys 1862), *Diphlebia lestoides* (Selys 1853), *Antipodogomphus neophytus* Fraser, 1958, *Austrogomphus ochraceus* (Selys, 1869), *Hemigomphus gouldii* (Selys 1854), *Ictinogomphus australis* (Selys 1873), *Hemianax papuensis* (Burmeister 1839), *Notoaeschna sagittata* (Martin 1901), *Austroaeschna inermis* Martin 1901, *Austrocordulia territoria* Theischinger & Watson, 1978, *Synthemis eustalacta* (Burmeister 1839), *Hemicordulia tau* Selys 1871, *Pentathemis membranulata* Karsch, 1890, *Austrothemis nigrescens* (Martin 1901), *Orthetrum caledonicum* (Brauer 1865), *Crocothemis nigrifrons* (Kirby 1894), *Pantala flavescens* (Fabricius 1798), *Austropetalia tonzana* Theischinger 1995] Address: Hawking, J.H., Murray-Darling Freshwater Research Centre, Cooperative Research Centre for Freshwater Ecology, P.O. Box 921, Albury, NSW 2640, Australia
790. **Karube, H. (1997):** A new record of *Agrionoptera sanguinolenta* Lieftinck from Japan. *Aeschna* 34: 1-4. (in Japanese, with English summary). ["An Eastern Carolinese dragonfly, *A. sanguinolenta*, was recorded from Haha-jima Island of Bonin Islands in 1989. This species is new to Japanese dragonfly fauna. Bonin Islands are about 2600 km far from Eastern Caroline Islands." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan
791. **Karube, H. (1997):** A new species of the genus *Oligoaeschna* (Odonata, Aeschnidae) from Sumatra. *Bull. Kanagawa prefect. Mus. (Nat. Sci.)* 26: 47-49. (in English, with Japanese summary). [*Oligoaeschna pseudosumatrana* n.sp. is described from Pini Island (west coast of Sumatra). It is closely related to *O. sumatrana* Lieftinck, 1953.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan
792. **Karube, H. (1997):** Research data of the dragonflies from Nakanoshima Island, Tokara Group, in 1989 and 1993. *Aeschna* 34: 25-28. (in Japanese, with English summary). [In 1989 and 1993, 12 species of Odonata were recorded. Prior 1981 23 Odonata were known from the Island (see Asahina, S., 1956, Odonata of the Ryukyu Archipelago, part II. Odonata from the island of the Tokara group. *Publ. Osaka munic. Mus. nat. hist.* 9: 23-26). Aquatic fauna including Odonata was heavily damaged by application of antisimulid and anticeratopogonid (anti Diptera) insecticides after 1981.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan

793. **Krechel, R.; Scholz-Lambotte, S.A. (1997):** Beitrag zur Libellenfauna des Kreises Mettmann. Jber. naturwiss. Ver. Wuppertal 50: 133-148. (in German, with English summary). [Between 1993-1994 the dragonfly fauna from 46 representative biotopes within the district of Mettmann (Northrhine-Westphalia, Germany) has been investigated. In addition, a critical evaluation of scientific papers by others is provided. The list includes a total number of 44 species found in this century which can be attributed to the high diversity of suitable dragonfly habitats in the district. From the 44 species, 23 are listed as endangered within Northrhine-Westphalia. There were 4 species which were last seen prior to 1915 and therefore should be considered extinct in the district, due to the destruction of their preferred habitats. The frequency and distribution of the other dragonfly species of the district are discussed. According to an appendix to the paper, *Anaciaeschna isoceles* should be added to the list of the Odonata of district of Mettmann.] Address: Krechel, R., IVÖR, Volmerswerther Str. 80, D-4021 Düsseldorf, Germany
794. **Kucklantz, V.; von Brandt, I.; Bohl, E.; Singer, D. (1997):** Entwicklung von Biozönosen in einem neu geschaffenen Stillgewässer bei Gut Deixfurt (Gemeinde Tutzing). Umwelt & Entwicklung Bayern, Materialien 133: 117 pp. (in German). [Documentation of the succession resp. colonisation of the fauna including Odonata in a waterbody created in 1989 for conservation purposes; 22 taxa (as imago or exuvia) are listed for the 1991-1994.] Source of supply: Bayerisches Staatsministerium für Landesentwicklung und Umweltfragen, Rosenkavalierplatz 2, D-81925 München, Germany
795. **Meyer, S.; Rahmel, U. (1997):** Flachwassersee "Polder Bramel" als Beitrag zur Revitalisierung der Geestniederung (Landkreis Cuxhaven). Bremer Beiträge für Naturkunde und Naturschutz 3: 93-101. (in German). [checklist of 9 Odonata from a newly flooded artificial lake (polder) along the course of the brook Geeste (Niedersachsen, Germany)] Address: Meyer & Rahmel GbR, Hasberger Dorfstr. 50, D-27751 Delmenhorst, Germany
796. **Mocek, B. (1997):** Dragonflies (Odonata) in the locality Hradec Králové, "Na Plachte" (eastern Bohemia, Czech Republic). Acta musei reginaehradecensis (A)25: 79-88. (in Czech, with English summary). [32 species are recorded including *Lestes barbarus*, *Somatochlora flavomaculata*, *Aeshna affinis*, *Ophiogomphus cecilia*, *Leucorrhinia dubia*, and *L. pectoralis*. The habitat is described and figured in detail in Mocek (1997): Results of the botanical and zoological researches in the locality Hradec Králové, "Na Plachte" (eastern Bohemia, Czech Republic), Acta musei reginaehradecensis (A)25: 3-20.] Address: Mocek, B., Regional Museum of Eastern Bohemia, Dept Natural History, Eliscino Nábřeží 465, CZ-50001 Hradec Králové, Czech Republic. E-mail: mvc@mvc.anet.cz
797. **Möckel, R. (1997):** Die Libellen der Calauer Schweiz mit "angeschlossenen Teichlandschaften". Natur und Landschaft in der Niederlausitz 18: 16-36. (in German). [commented checklist of Odonata of a brown coal mining region (Brandenburg, Germany) including habitats als high bogs, standing waters and brooks; 1993 and 1994 34 species could be recorded.] Address: Möckel, R., Buchwalder Str. 13, D-01968 Klein koschen, Germany
798. **Polhemus, D.A. (1997):** Phylogenetic Analysis of the Hawaiian Damselfly Genus *Megalagrion* (Odonata: Coenagrionidae): Implications for Biogeography, Ecology, and Conservation Biology. Pacific Science 51 (4): 395-412. (in English). ["A phylogeny of the 22 species currently recognized in the genus *Megalagrion*, endemic to the Hawaiian Islands, is presented based on an analysis of 23 morphological and ecological characters. After the exclusion of *M. williamsoni*, known from only a single male, and inclusion of subspecies within their nominate taxa, a single resolved tree of length 85 was obtained; this tree has a consistency index of 0.56 and a retention index of 0.72. Based on this phylogeny, it appears that the major clades within *Megalagrion* differentiated on Kaua'i or an antecedent high island. These clades subsequently colonized the younger islands in the chain in an independent and sequential fashion. The phylogeny also implies an ecological progression from ancestral breeding sites in ponds or slow stream pools to breeding on seeps, with the latter habitat having given rise on one hand to a clade of species breeding in phytotelmata or terrestrially, and on the other hand to a clade breeding in rushing midstream waters. The latter ecological progression also indicates a transformation series in larval gill structure from foliate to saccate and eventually to lanceolate. Most species of current conservation concern are shown to be clustered in particular clades, indicating an inherent phylogenetic vulnerability of certain taxon clusters to novel ecological perturbations; the additional species at risk not present in the above clades are endemics confined to the island of O'ahu and have declined because of their geographic provenance." (Author)] Address: Polhemus, D.A., Department of Entomology, MRC 105, National Museum of Natural History, Smithsonian Institution, Washington, D.C.20560, USA
799. **Samways, M.J.; Whiteley, G. (1997):** Dragonflies of the Natal Drakensberg. Univ. of Natal Press. ISBN 0 86980 476 6: 78 pp. (in English). [This is a field guide to the Odonata of the South African Drakensberg: Introduction, Odonate species of the Drakensberg, Guidelines for rapid identification of adult males, Key to adult males, Descriptions of adult males, Identification of larvae, Key to larvae, Descriptions of larvae, Plates. All species are treated in a monographic way. The reader will find a description of the adult, information on habitat, behaviour, distribution in the Drakensberg, remarks on species easily be misidentified, and a plate with a colour photo of each species.] Address: University of Natal Press, Private Bag Xo1, Scottsville, 3209 Natal, South Africa
800. **Scholle, J. (1997):** Die Makrozoobenthon-Entwicklung in einem neuangelegten Nebenarm der Wümme. Bremer Beiträge für Naturkunde und Naturschutz 3: 117-127. (in German). [development of the macrozoobenthos in a newly created tributary of the River Wümme (Bremen, Niedersachsen, Germany) between 1989 and 1994. 5 odonate taxa are listed; dominant species is *Calopteryx splendens*] Address: Scholle, J., Bioconsult Umweltplanung und Gewässerkunde, Lesumstr. 10, D-28759 Bremen, Germany
801. **Scholle, J.; Schuchardt, B. (1997):** Übersicht über die Benthon-Taxozönosen im limnischen Abschnitt der Unterweser und in seinen Zuflüssen. Bremer Beiträge für Naturkunde und Naturschutz 3: 7-24. (in German). [characterisation of the hydroecological situation,

and checklists of 18 Odonata from the lower course of the River Weser and its tributaries (Federal states Bremen and Niedersachsen, Germany)] Address: Scholle, J.; Schuchardt, B., Bioconsult Umweltplanung und Gewässerkunde, Lesumstr. 10, D-28759 Bremen, Germany

802. **Schoppenhorst, A.; Handke, U.; Carius, W.; Hellbernd, L. (1997):** Huchtinger Ochtum: Zwischenbilanz einer fünfjährigen Untersuchung über die Ansiedlungserfolge verschiedener Tiergruppen an einem neu angelegten Flußlauf in Bremen. Bremer Beiträge für Naturkunde und Naturschutz 3: 165-176. (in German). [documentation of the colonisation success of the odonate fauna along a new created river; tab, with records of 1990, 1992, and 1994 (species, abundance, habitat / locality); dominance of quite ubiquitous species as *Ischnura elegans*, *Orthetrum cancellatum*, *Sympetrum vulgatum*, and the taxa *Coenagrion puella/pulchellum*] Address: Schoppenhorst, A., ÖKOLOGIS, Ostertorsteinweg 25-26, D-28209 Bremen, Germany

803. **Siebeneicher, H.-W. (1997):** Labor- und Freilanduntersuchungen zur Biologie von *Libellula fulva* (Odonata: Libellulidae). Diplomarbeit. Heinrich-Heine-Universität Düsseldorf, Fachbereich Biologie: 62 pp. (in German). [survey of *L. fulva* in the Littardkuhle (Mittlere Niederheinische Tiefland, Nordrhein-Westfalen, Germany) in 1996; short description of the larval biotope and the emergence habitats; maturation period: approx. 15 days; documentation of the result of a mark-recapture-study; activity patterns along the shores of the Littardkuhle are documented for June 17, 1996; dispersal of the species is shortly outlined on page 28f; roosting sites of *L. fulva*; predation; copulation; oviposition; structure of eggshell; histology of eggs; structure of female and male genitalia.] Address: To obtain copies of this M. Sc. thesis, please contact Edgar Bairl, Neisser Str. 3, D-40880 Ratingen, Germany

804. **Trueman, J.W.H. (1997):** Wings over Wingecaribee. National Parks Journal, August 1997: 10, 11. (in English). [report on efforts for conservation of *Petalura gigantea* in Australia] Address: Trueman, J., Research School of Biol. Sciences, Australian National University, Canberra, ACT 0200, Australia. E-mail: trueman@rsbs.anu.edu.au

#### 1998

805. **Bechly, G. (1998):** A revision of the fossil dragonfly genus *Urogomphus*, with description of a new species (Insecta: Odonata: Pananisoptera: Aeschniidae). Stuttgarter Beiträge zur Naturkunde Ser. B., 270: 1-47. (in English, with German summary). ["The dragonfly genus *Urogomphus* from the Upper Jurassic of Germany is revised and its position in Aeschniidae is confirmed. *Urogomphus giganteus* and *U. eximius* are redescribed, and a lectotype for *U. eximius* is designated. *Lithoaeschnidium viohli* is considered as a synonym of *U. eximius*. A new species *Urogomphus nusplingensis* n. sp. is described from the Upper Jurassic Lithographic Limestone of Nusplingen, while the 20 other known specimens of this genus have been found in the Solnhofen Lithographic Limestone. *Urogomphus abscissus* is considered as conspecific with *Bergeriaeschnidia inexpectata*, and the holotype of the latter species is designated as neotype of *U. abscissus*, so

that its valid name is now *Bergeriaeschnidia abscissa* comb. nov. The phylogenetic position of *Urogomphus* and Aeschniidae is discussed, a new taxon *Neonanisoptera* is introduced, and an explanation for the extinction of Aeschniidae is proposed." (Author)] Address: Bechly, G., Institut und Museum für Geologie und Paläontologie, Geowissenschaftliche Fakultät der Eberhard-Karls-Universität, Sigwartstr. 10, D-72076 Tübingen, Germany. E-mail: GBechly@aol.com

806. **Bechly, G. (1998):** *Juracordulia schiemenzi* gen. et sp. nov., Eine neue Libelle aus den Solnhofener Plattenkalken (Insecta: Odonata: Anisoptera). *Archaeopteryx* 16: 29-36. (in German, with English summary). [*J. schiemenzi* gen. et sp. nov. is described from the Solnhofen limestone (Upper Jurassic, Southern Germany). The analysis of the wing venation reveals that this new species belongs to the stem-group of *Eurypalpida* (Libelluloidea auct.). It is the first certain record of *Eurypalpida* from this locality and the first Jurassic and thus oldest record of this taxon at all.] Address: Bechly, G., Institut und Museum für Geologie und Paläontologie, Geowissenschaftliche Fakultät der Eberhard-Karls-Universität, Sigwartstr. 10, D-72076 Tübingen, Germany. E-mail: Gbechly@aol.com

807. **Bechly, G. (1998):** New fossil dragonflies from the Lower Cretaceous Crato Formation of north-east Brazil (Insecta: Odonata). *Stuttgarter Beiträge zur Naturkunde Ser. B*, 264: 1-66. (in English, with German summary). ["An overview of the fossil odonate fauna of the Crato Formation from the Lower Cretaceous of Brazil is given. Currently 351 specimens (241 adults and 110 larvae) in 12 families and 32 species are known to science. More than half of the adult and larval fossil odonates belong to the gomphid clade (= Gomphides), especially to the Cordulagomphinae which supports the hypothesis of an allochthonous origin of the aquatic insects. Six new species are described: *Araripegomphus andreli* n. sp. (Araripegomphidae), *Cordulagomphus (Procordulagomphus) stat. nov.* *senckenbergi* n. sp. (Proterogomphidae - Cordulagomphinae), *Araripephlebia mirabilis* n. gen. et n. sp. (Araripephlebiidae n. fam.), *Cratocordulia borschukewitzi* n. gen. et n. sp. (Araripephlebiidae), *Cretarchistigma (?) essweini* n. sp. (Zygoptera incertae sedis), and *Parahemiphlebia mickoleiti* n. sp. (Hemiphlebidae). With a wing length of only 9 mm the latter new species represents one of the smallest odonates of all times. *Araripephlebia mirabilis* n. gen. et n. sp. is classified in a new family Araripephlebiidae n. fam. which probably represents the sister-group of extant Chlorogomphoidea. A still unnamed new genus and species represents the first fossil record and the first New World record for Chlorogomphoidea s. str. Four further new species are illustrated, but not yet described. The phylogenetic relationship of several known species is discussed, and some diagnoses are amended or corrected. Giant dragonfly larvae of up to 70 mm length are described, regarded as older stages of *Nothomacromia sensibilis* (CARLE & WIGHTON, 1990), and considered as larval Aeschniidae. Consequently, the family-group taxa Sonidae PRITYKINA, 1986 and Nothomacromiidae CARLE, 1995 (= "Pseudomacromiidae" sensu CARLE & WIGHTON, 1990) are here regarded as junior subjective synonyms of Aeschniidae NEEDHAM, 1903. The position of Araripegomphidae in the stem-group of Gomphides rather than *Eurypalpida* (= Libelluloidea auct.) is advocated (contra LOHMANN 1996). The former genus *Procordu-*



lagomphus NEL & ESCUILLIÉ, 1994 is down-ranked to a subgenus of *Cordulagomphus*. "*Cordulagomphus*" *santanensis* CARLE & WIGHTON, 1990 is recognized as earwig and thus transferred from Odonata - *Cordulagomphinae* to *Dermaptera incertae sedis*. A comparison with the odonate fauna of the Upper Jurassic Solnhofen limestones reveals several remarkable differences. Because of the absence of typical Mesozoic odonate groups, such as "anisozygopteres", Archizygoptera and Steleopteridae, as well as the presence of extant families of Zygoptera, the odonate fauna of the Crato Formation appears to be significantly more advanced." (Author)] Address: Bechly, G., Institut und Museum für Geologie und Paläontologie, Geowissenschaftliche Fakultät der Eberhard-Karls-Universität, Sigwartstr. 10, D-72076 Tübingen, Germany. E-mail: GBechly@aol.com

808. **Bechly, G. (1998):** Santana - Die Schatzkammer fossiler Insekten aus der Unterkreide Brasiliens. Fossilien 2: 95-99. Address: Bechly, G., Institut und Museum für Geologie und Paläontologie, Geowissenschaftliche Fakultät der Eberhard-Karls-Universität, Sigwartstr. 10, D-72076 Tübingen, Germany. E-mail: GBechly@aol.com

809. **Bechly, G. (1998):** Santana - Die Schatzkammer fossiler Insekten aus der Unterkreide Brasiliens (2). Fossilien 3: 148-156. Address: Bechly, G., Institut und Museum für Geologie und Paläontologie, Geowissenschaftliche Fakultät der Eberhard-Karls-Universität, Sigwartstr. 10, D-72076 Tübingen, Germany. E-mail: GBechly@aol.com

810. **Bedjanic, M. (1998):** Pisanti svet kacjih pastirjev. GEA 7(2): 42-45, Poster in the middle of the issue. (in Slovene). [These is a popular account on the Slovene dragonfly fauna with many very intrusive, and first class colour pictures of some common and several rare European species. Of special interest for many odonatologists is the picture of *Cordulegaster heros*, a species obviously restricted to Slovenia, Greece and Austria. The Kushiro Appeal for protection of World Odonata is documented in Slovene language.] Address: GEA, Zivljenje sveta, Mladinska knjiga Založba, d.d. Slovenska 29, Ljubljana, Slovenia; Bedjanic, M., Fram 117/A, SI-2313 Fram, Slovenia. E-mail: matjaz.bedjanic@guest.arnes.si

811. **Belle, J. (1998):** Synopsis of the neotropical genus *Rhodopygia* Kirby, 1889 (Odonata, Libellulidae). Zool. Meded., Leiden 72(1): 1-13. (in English). ["A synopsis of the genus *Rhodopygia* Kirby is given. Its species are discussed and their diagnostic morphological characters elucidated by figures. The hitherto unknown females of *R. hinei* Calvert and *R. pruinosa* Buchholz are described. A key to the species is provided." (Author)] Address: Belle, J., Onder de Beumkes 35, NL-6883 HC Velp, The Netherlands

812. **Brunelle, P.-M. (1998):** The status of *Somatochlora brevicincta* Robert 1954 (Odonata, Anisoptera, Cordulidae) in Nova Scotia. Report on study under a 1998 Nova Scotia Museum Research Grant. Unpubl. Report November 1998: 27 pp. (in English). ["*Somatochlora brevicincta*, the Quebec Emerald, is a rare Dragonfly of international conservation concern, IUCN 1996 Red List included, which had previously been known from a very limited range in mid-northern Quebec. Pilon and Lagace (1998) show 7 sites in Quebec for the species [...]. It

for the species [...]. It had recently been discovered to have been collected in the Cape Breton Island Highlands in the early 1980's, and in 1997 was taken in New Brunswick. The CBI range extension is approximately 1050 km, indicating both that the species has a substantially greater range than previously thought, and that it is very elusive throughout much of that range. In June of 1998 an abundant population of the species was found by Stuart Tingley at a small quaking bog on Highway 108 in mid-northern New Brunswick. This unexpected discovery indicated that our assumptions of habitat type and flight period, based upon knowledge of the species in Quebec, do not necessarily hold true for the Maritime Provinces. As a result, the sampling program undertaken by Brunelle in the summer of 1998 did not serve to address the habitat-specific characteristics of the species during what is now thought to be the appropriate season (June-July), although appropriate habitat was located which will assist in the search for breeding populations during 1999. Notwithstanding this, a female of the species was taken in Cumberland County in August. This collection is the furthest to the south that the species has yet been taken and the first record for the Nova Scotian mainland. In addition to its principal objective, the sampling program was intended to increase our knowledge of peatlands Dragonflies and Damselflies, and of general Odonate distribution in rarely-sampled areas of the province. A number of significant range extensions of species rare in the Province were discovered during the course of the work [...]. Due to the relatively low specific return of the survey, I have decided to present in this report detailed information on the overall distribution of the order in the Province. Such a review has not been done since Walker (1942), although general distribution was presented in Brunelle (1997). [...]. The report [...] is comprised of Section 1: Highlights of 1998 Survey Discoveries (*Somatochlora brevicincta*, *Aeshna subarctica*, *Enallagma aspersum*, *Aeshna sitchensis*, *Ophiogomphus aspersus*, *Somatochlora albicincta*, *S. incurvata*, *S. septentrionalis*, *S. tenebrosa*, *Nannothemis bella*, and *Pantala hymenaea* are treated in detail with colour picture of the species and habitats, and distribution maps), Section 2: Synthesis of Existing Knowledge: Figure 1: 186 Distribution Maps of Regional Odonata; Table 1: Distribution by County of Nova Scotian Odonata, and Table 2: Flight Periods of Nova Scotian Odonata." (Author). The study of P.-M. Brunelle was also funded by the INTERNATIONAL DRAGONFLY FUND.] Address: Brunelle, P.-M., 2460 John Street, Halifax, Nova Scotia, B3K 4K7, Canada

813. **Buczynski, P.; Kseniak, M.; Martysiuk, B.; Piotrowski, W.; Rózycki, A.; Słtys, M. (1998):** Poleski Park Narodowy. Przewodnik. Historia-Przyroda-Turystyka. ISBN 83-908003-7-3. To be ordered from: Wydawnictwo "Promotor", Ul. Zarnowiecka 7/42, Lublin, Poland: 64 pp. (in Polish). [booklet on the Narodow Park in eastern Poland; detailed information on flora and vegetation, and an overview on the fauna with some remarks on Odonata; many fine colour pictures of landscape, flora, fauna, and some typical buildings; information on the culture and traditional life of people in the region] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PO-20-033 Lublin, Poland

814. **Carbone, J.; Keller, W.; Griffiths, R.W. (1998):** Effects of changes in acidity on aquatic insects in rocky littoral habitats of lakes near Sudbury, Ontario. Resto-

ration ecology 6(4): 376-389. (in English). ["Benthic aquatic insects were collected from rocky nearshore areas (<1 m deep) of 17 lakes near Sudbury, Ontario, with a pH range of 4.7-7.3 and a size range of less than 10 ha to over 10,000 ha. These insect communities were composed of taxa common to lake soft-sediments and streams. Direct and indirect effects of lake acidity appeared to be major controls on the structure of these communities, implying that several factors may be involved in restructuring during acidification or recovery. Declines in abundances of several taxa of Ephemeroptera at pH below 5.5 were attributable to acid toxicity, while increases in the abundances of Odonata and Diptera at pH below 5.5 were associated with the absence of fish predators and other indirect effects of acidity. The communities of two experimentally neutralized lakes restructured rapidly within 5 years, approaching but not achieving community structures typical of our near-neutral survey lakes. Neutralization led to recolonization or increased abundance of the acid-sensitive mayfly, *Stenacron interpunctatum*, and the dragonfly, *Boyeria grafiana*; however, recolonization by other taxa expected to be present in near-neutral lakes (*Stenonema femoratum*, *Eurylophella*, and *Basiaesha janata*) was not observed. Consistent with results for the survey lakes, declines in the abundances of the dragonflies *Aeshna interrupta*, *Aeshna eremita*, and *Leucorrhinia glacialis* in the neutralized lakes were associated with reintroductions of *Salvelinus fontinalis* (aurora trout) and increased fish predation pressure, while reduced abundances of the dipterans *Ceratopogonidae*, *Psectrocladius*, and *Stackelbergina* may be related to indirect effects of acidity other than fish predation. Although community composition varied greatly across the acidity gradient, total species richness and abundance were not correlated with lake chemistry or number of fish species." (Authors) ] Address: Carbone, J; Ontario Minist. Environm., Suite 1101,199 Larch St; Sudbury ON P3E 5P9; Canada

815. **Erjavecia 6 (1998)**: Newsletter of the Slovene Odonatological Society, Ljubljana. ISSN 1409-8185: 36 pp. (in Slovene). [The issue contains a facsimile reproduction of the section "Odonata" and plates from I. A. Scopoli's 1763 *Entomologia carniolica*, 2 ethnographic notes (I. Geister, A. Saluinun), various reports, announcements and detailed descriptions of the 1999 research projects of the Society. Also included are the obituary-cum-bibliography for Dr Z.R. Adamovic, and an update of the Slovene odonatol. bibliography (Nos 233-246). (translation of the Slovene contents taken from OA 12261)] Address: Bedjanic, M., Fram 117/a, SI-2313 Fram

816. **Gorb, S. (1998)**: Functional morphology of the head arrester system in Odonata. *Zoologica* 148; ISBN 3-510-55035-8: 132 pp. [The arrester, a functional system which includes co-opted organs of neck and head, is an autapomorphy of Odonata. The publication contains the following topics: 1. Fixation systems in Arthropoda; 2. Neck-head articulation in Odonata and nomenclature of the neck sclerites; 3. Skeleton-muscle organization of the arrester system; 4. Inner morphology of the arrester; 5. Flight reflexes connected to the arrester system; 6. Sensory equipment of the arrester system; 7. Comparative morphology of characters of the arrester system (26 families); 8. Evolution of the arrester system. 132 pages, with 92 figures, 9 tables, and 2 appendices.] Address: Gorb, S., Max-Planck-Institut

für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. E-mail: stas.gorb@tuebingen.mpg.de

817. **Griffioen, R.H.W.; Uilhoorn, H.M.G. (1998)**: *Sympecma paedisca* (Brauer) in the Weerribben and the Kuinderplas. *Brachytron* 2(2): 35-43. (in Dutch, with English summary). ["Two populations of *Sympecma paedisca* [...] were discovered in 1997 and 1998 in the Weerribben (province of Overijssel) and the Kuinderplas (Flevoland). It was the first time in more than 20 years that populations of this species were found in the Netherlands. The populations are present in a lake created by sanding (Kuinderplas) and a lowland mire (the Weerribben). Similarities between the two Dutch locations are a forested environment and non-acidic, clear water with reed-beds. The reed-beds are characterised by an open vegetation structure and locally dead floating plant material. The fact that the species only survived here is somewhat surprising as both habitat-types were not mentioned in the Dutch literature as favoured habitats. In both areas neither groundwater nor water-level fluctuations play a major role. This is also in contrast with habitat information in foreign literature. The last two years *S. paedisca* was found from half August onwards into autumn. In the spring of 1998 the species was observed from the beginning of May until the beginning of June. Most reproductive activity took place during a warm spell in the beginning of May. The flight period in spring was later than expected on account of historical observations. The choice of substrate for oviposition was restricted, in both areas nearly only dead floating plant material was used (especially stalks of reed and reed-mace). The question why *S. paedisca* only survived here and its habitat requirements are discussed. The answer on the first question is rather speculative. Perhaps the acidification of the balks ('legakkers') and the intensity of haymaking during the summer are important factors. The habitat requirements are largely unclear. The Dutch populations survived under conditions which lacked elements that were thought to be essential. Minimal requirements for reproduction are non-acidic water which is available during the summer and is partly overgrown with water vegetation. For adult survival certain structural conditions must be met." (Authors)] Address: Griffioen, R., Uilhoorn, Karin, Trekker 82, NL-8447 BZ Heerenveen, The Netherlands. E-mail: uilhoorn@tip.nl

818. **Hardersen, S.; Wratten, S.D. (1998)**: The effects of carbaryl exposure of the penultimate larval instar of *Xanthocnemis zealandica* (Odonata: Zygoptera) on emergence and fluctuating asymmetry. *Ecotoxicology* 7: 1-8. (in English). ["The occurrence of pesticide residues in freshwater systems has become a concern in recent decades. In order to establish biomonitoring programs it is vital to investigate the response of organisms to varying concentrations of pesticides. Levels of pollutants fluctuate in freshwater systems and thus only some instars of aquatic insects may be exposed to pollution stress. Therefore it is important to investigate the effects of exposing selected instars of potential bioindicator species. In a laboratory experiment damselfly larvae of the penultimate instar were exposed to three concentrations of carbaryl (100 ppb, 10 ppb, 1 ppb) plus controls until the adult damselflies emerged. Carbaryl at 100 ppb reduced emergence by more than 90%. The lower carbaryl concentrations did not affect emergence success but increased the developmental speed slightly. The adult damselflies from the highest

concentration which did not affect emergence success (10 ppb) were analyzed for their level of fluctuating asymmetry (FA), deviation from bilateral symmetry, and compared with those from controls. The level of FA in cell patterns in wings was increased whereas the level of FA for wing length did not show any differences." (Authors)] Address: Hardersen, S., Lincoln Univ., Div. Plant Soil & Ecol. Sci., POB 84; Canterbury; New Zealand. E-mail: Framptoc@lincoln.ac.nz

819. **Kalkman, V.J.; Ketelaar, R.; Reemer, M. (1998):** Libellen van de Rode lijst in Gelderland. Rapportnummer VS98.23: 51 pp. (in Dutch). [detailed study of the dragonfly fauna of the Province Gelderland, The Netherlands. Each of the species listed in the Red list of extinct or endangered Odonata of the The Netherlands is outlined in detail. 24 species are mapped, their biotops are characterised, and the distribution in the The Netherlands and in the Province of Gelderland is discussed. In figure 2. the responsibility of the Province for the protection of 16 odonate species is shown. For example 100% of all Netherlands records of *Stylurus flavipes* or more than 25% of *Gomphus vulgatissimus* are resulting from Gelderland. In chapter 5 trends of population development of selected species are outlined. Chapter 6 presents the odonatological core habitats in the Province of Gelderland.] Address: De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen. E-mail: Vlinders@bos.nl

820. **Kannegieser, B. (1998):** Erhalt und Wiederherstellung wertvoller Landschaftsteile in den von Tagebaubetrieben beeinflussten Randbereichen und ihre Bedeutung für die Wiedernutzbarmachung. In: Pflug, W. (Hrsg.): Braunkohletagebau und Rekultivierung. Landschaftsökologie - Folgenutzung - Naturschutz. Springer. Berlin. Heidelberg. New York. ISBN 3-540-60092-2: 748-760. (in German). [report on problems and solutions of protection and restauration of natural and cultural heritage in the brown coal mining area in the region of Cottbus, Brandenburg, Germany. Some ubiquitous dragonflies are mentioned.] Address: not stated

821. **Karube, H. (1998):** A new species of the genus *Oligoaeschna* (Odonata, Aeschnidae) from northern India. Bull. Kanagawa prefect. Mus. (Nat. Sci.) 27: 81-83. (in English, with Japanese summary). [*Oligoaeschna speciosa* n. sp. is described from a male collected in Darjeeling, NE India on 20. VI.1993. It resembles to *O. martini* (Laidlaw, 1921)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan

822. **Karube, H. (1998):** A new species of the genus *Oligoaeschna* (Odonata, Aeshnidae) from northern Vietnam. Gekkan-Mushi 330: 2-5. (in Japanese and English). [*Oligoaeschna niisatoi* n.sp. is described from a male collected on Mt. Piaoac, Cao Bang Province, North Vietnam in May 1998. It is considered related to *O. kashiana* from Khasia hills, NE India.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan

823. **Karube, H. (1998):** [*Lestes japonicus* in Kanagawa Prefecture]. Kanagawa-Chūhō 122: 1-5. (in Japanese). Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan

824. **Ketelaar, R.; & Wal, B.G. van der (1998):** Return and habitat preference of *Gomphus vulgatissimus* in the eastern part of The Netherlands. *Brachytron* 2(2): 44-51. (in Dutch, with English summary). ["At the beginning of the 20th century, *G. vulgatissimus* was a moderately common species in The Netherlands. A sudden decrease occurred and the last specimen in the eastern part of The Netherlands was seen in 1925. In 1994, *G. vulgatissimus* was rediscovered along the Buurserbeek. More new localities were found in subsequent years (Overijsselse Vecht, Dinkel, Berkel and Slinge). The population of the Buurserbeek is probably the largest in The Netherlands. *G. vulgatissimus* inhabits larger streams and rivers, with a relatively high temperature and low water velocity. Most populated streams are canalised. Previous conclusions of *G. vulgatissimus* being a species of natural streams must be rejected. It is concluded that the recent improvement of the water quality positively influenced the expansion, of the species. Furthermore, the possible but largely unknown influence of the recent warm summers is discussed." (Authors)] Address: Ketelaar, P., p/a De Vlinderstichting, Postb. 506, NL-6700 AM Wageningen, The Netherlands. E-mail: whydah@wxs.nl

825. **Kettrup, M. (1998):** Effizienzkontrolle im Gewässerrenaturierungsprogramm Nordrhein-Westfalen. *Berichte der Niedersächsischen Naturschutz Akademie* 11(1): 71-75. (in German). [In 1990 in Nordrhein-Westfalen, Germany a program was started to renaturate some watercourses and their floodplains. A monitoring program was also set up, to control the effects on biotic restoration of the measures undertaken. The improvement of habitat resp. substrate diversity had significant and positive effects on macrozoobenthos including Odonata. The abundance of *Calopteryx splendens*, *Platycnemis pennipes*, and *Gomphus vulgatissimus* in dependence of some habitat parameters is presented in a tab.] Address: Kettrup, M., LÖLB NRW, Leibnitzstr. 10, 45659 Recklinghausen, Germany

826. **Klaus, D. (1998):** Spezielle naturschutzfachliche Aspekte. In: Pflug, W. (Hrsg.): Braunkohletagebau und Rekultivierung. Landschaftsökologie - Folgenutzung - Naturschutz. Springer. Berlin. Heidelberg. New York. ISBN 3-540-60092-2: 900-915. (in German). [General outline on the importance of brown coal mining areas for nature conservation purposes. Odonatological data derived from literature are compiled in tab. 2.] Address: not stated

827. **Kleukers, R. M. J. C.; Reemer, M. (1998):** The return of the Yellow-legged Dragonfly [*Gomphus flavipes* (Charpentier)] to the Netherlands. *Brachytron* 2(2): 52-59. (in Dutch, with English summary). ["Until a few years ago *G. flavipes* was thought to be extinct in the Netherlands. The last records dated from 1902. The discovery of a larva of this species in the cooling-water filters of a powerstation in 1996 indicated that *G. flavipes* might have returned to the Netherlands. In 1998 more larvae were found at the powerstation and several fieldtrips were undertaken to confirm the return of the species. At eight localities along the river Waal (lower course of the Rhine) near Nijmegen in the eastern part of the Netherlands, teneral adults and/or exuviae were found. This proves that *G. flavipes* has returned as a breeding species in the Dutch riversystem. The recent return of *G. flavipes* corresponds with the expansion in Germany. The causes of the expansion are not clear. In



search for *G. flavipes* along the river Waal, several e-xuviae of *G. vulgatissimus* were found as well. This species had also not been recorded in large Dutch rivers for a long time." (Authors)] Address: R. Kleukers & M. Reemer, p/a European Invertebrate Survey - Nederland Postbus 9517 2300 RA Leiden. E-mail: kleukers@naturalis.nnm.nl

828. **Krummsdorf, A.; Höser, N.; Sykora, W. (1998):** Naturschutzgebiet Tagebau Zechau im Kreis Altenburg in Thüringen. In: Pflug, W. (Hrsg.): Braunkohletagebau und Rekultivierung. Landschaftsökologie - Folgenutzung - Naturschutz. Springer. Berlin. Heidelberg. New York. ISBN 3-540-60092-2: 916-925. (in German). [Historical account of the development of a brown coal mining field to a nature conservation reserve near Altenburg, Thuringia, Germany. The development of the odonate fauna (31 species) according to the status of succession of vegetation is documented in a tab. comprising the years 1980 (2 species recorded) to 1993 (25 species recorded).] Address: not stated

829. **Lackmann, A. (1998):** Vergleichende limnologische Untersuchungen dreier Tagebauseen unter Berücksichtigung des Artenschutzaspektes. In: Pflug, W. (Hrsg.): Braunkohletagebau und Rekultivierung. Landschaftsökologie - Folgenutzung - Naturschutz. Springer. Berlin. Heidelberg. New York. ISBN 3-540-60092-2: 379-396. (in German). [Between March 1990 and March 1991 three brown coal mining areas southwest of Cologne, Germany were limnologically surveyed. Task of the study was to assess the nature conservation value of the waters. 26 species of Odonata were recorded and arranged in a tab. according to their relationships to different types of vegetation. Of some faunistic interest are *Cercion lindenii*, *Ischnura pumilio*, *Brachytron pratense*, and *Somatochlora flavomaculata*.] Address: not stated

830. **Laurila, A.; Kujasalo, J.; Ranta, E. (1998):** Predator-induced changes in life history in two anuran tadpoles: effects of predator diet. *Oikos* 83(2): 307-317. (in English). ["We studied effects of the non-lethal presence of a predator on behaviour and larval life history of two species of anuran tadpoles, common frog, *Rana temporaria*, and common toad, *Bufo bufo*. ... Tadpoles of both species were raised at two food levels either in the absence of the predator or in the presence of an insect-, frog- or toad-fed larval dragonfly *Aeshna juncea*." (Authors)] Address: Laurila, A., Univ. Helsinki, Dept. Ecol. and Systemat., Div. Populat. Biol., POB 17, FIN-00014 Helsinki, Finland

831. **Maine damselfly and dragonfly survey (Brunelle, P.) (1998):** The Maine damselfly and dragonfly survey. Leaflet/poster: (in English). [This is a poster with colour illustrations throughout with the aim to help with the identification of some major groups of Maine Odonata.] Address: MDDS, Endangered Species Group, Maine Inland Fisheries and Wildlife, 650 State Street, Bangor, Maine 04401, USA

832. **Marin, S.L.; Grant, W.E.; Dronen, N.O. (1998):** Simulation of population dynamics of the parasite *Haematoloechus coloradensis* in its three host species: effects of environmental temperature and precipitation. *Ecological Modelling* 105(2-3): 185-211. (in English). [We describe the development and evaluation of a simulation model representing the life cycle of the parasite

*Haematoloechus coloradensis*, and use this model to examine effects of variation in temperature and precipitation on parasite population dynamics. The model consists of four submodels representing: (1) dynamics of parasite eggs in the environment; and infection, parasite development within, and resulting population dynamics of (2) snail, (3) odonate, and (4) frog hosts.] Address: Grant, W.E., Texas A&M Univ., Dept. Wildlife and Fisheries Sci., College STN, TX 77843, USA

833. **Mocek, B. (1998):** Contribution to the knowledge of the dragonflies (Odonata) in Eastern Bohemia with the finding of the species *Crocothemis erythraea* (Brullé). *Acta Musei Reginae radecensis* (A) 26: 27-37. (in Czech, with English summary). [16 rare Bohemian species (*Lestes barbarus*, *L. virens*, *Coenagrion hastulatum*, *Erythromma viridulum*, *Aeshna affinis*, *Anax ephippiger*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Cordulegaster boltonii*, *Thecagaster bidentata*, *Somatochlora alpestris*, *S. flavomaculata*, *Crocothemis erythraea*, *Sympetrum striolatum*, *Leucorrhinia dubia*, *L. pectoralis*) are treated in detail. *C. erythraea* is recorded for the second time in Bohemia.] Address: Mocek, B., Regional Museum of Eastern Bohemia, Dept Natural History, Eliscino Nábřeží 465, CZ-50001 Hradec Králové, Czech Republic. E-mail: mvc@mvc.anet.cz

834. **Moravec, F.; Skorikova, B. (1998):** Amphibians and larvae of aquatic insects as new paratenic hosts of *Anguillicola crassus* (Nematoda: Dracunculoidea), a swimbladder parasite of eels. *Diseases of aquatic organisms* 34(3): 217-222. (in English). ["Amphibians (tadpoles of the frog *Bombina orientalis* [L.] and the new *Triturus vulgaris* [L.]) and aquatic insects (larvae of the alderfly *Sialis lutaria* [L.] [Megaloptera], dragonflies *Sympetrum sanguineum* [Muller] and *Coenagrion puella* [L.] [Odonata], and the caddisfly *Oligotrichia striati* [L.] [Trichoptera]) were found to serve as paratenic hosts for the third-stage larvae (L-3) Of the nematode *Anguillicola crassus* Kuwahara, Niimi et Itagaki, 1974, a pathogenic swimbladder parasite of the eel *Anguilla anguilla* (L.) in Europe and elsewhere. This is the first evidence that, in addition to prey fishes and some aquatic snails, amphibians and aquatic insects can serve as paratenic hosts for this nematode parasite. A. crassus third-stage larvae were found, largely unencapsulated (encapsulated only in *S. lutaria*), mostly in the body cavity, on the gut surface and, less often, in the liver and in the subcutaneous tissue of legs in amphibians, and in the body cavity and on the gut surface in insect larvae; they could survive for at least 49 d in *T. vulgaris* and 69 d in *S. lutaria*. The capability of these larvae from *S. lutaria* (69 d post-infection) to infect the definitive host (eel) was confirmed by experimental infection of an eel." (Authors)] Address: Moravec, F., Acad. Sci. Czech Republic, Inst. Parasitol., Branisovska 31, CR-37005 Ceske Budejovice; Czech Republic. E-mail: moravec@paru.cas.cz

835. **Mostert, K. (1998):** Dragonflies (Odonata) in the agricultural landscape of South Holland. *Levende Natuur* 99(4): 142-149. (in Dutch, with English summary). ["Between 1994-1997 information on numbers and distribution of dragonflies was systematically collected in the province South Holland. Dragonflies were counted throughout summer in linear transects with a length of 50 m along various water bodies, after which numbers were extrapolated to the number of individuals per kilometer (table 2); all flying and resting dragonflies a-

long the neighbouring half of the water were included. Habitats were divided in meadows, arable land, nature reserves, recreational areas and urban areas (table 3). Water transparency was noted in six classes (varying from very turbid to very clear), width of the water was noted in four classes (table 1). Transects were randomly selected and are representative of the area. Only eight species made up 98% of the total number of individuals sighted. In 40% of the transects with Dragonflies the Blue-tailed Damselfly (*Ischnura elegans*) was the only species recorded. Numbers and densities of dragonflies in nature reserves were five times higher than those in areas with arable land and meadows; species variety was also much higher in nature areas than anywhere else. Furthermore, numbers near watercourses in urban areas were higher on average than those in agricultural areas. Numbers as well as densities are higher above water with high transparency. Moreover wide edge of vegetation and numbers of dragonflies are strongly correlated. Lowest densities were found near water with duck-weed (*Lemnaceae* and *Azolla filiculoides*) and, although less obvious, with sheetpiling. Numbers at eutrophic water are comparably low. It is concluded that small nature reserves created in agricultural areas will be beneficial for numbers and densities of dragonflies as well as for species diversity, as preliminary results have already shown." (Author)] Address: Mostert, K., Palamedesstraat 74, 2612 XS Delft, The Netherlands

836. **Nachtigall, W.; Kesel, A.; Kreuz, P. (1998):** The dragonfly wing as a static construction: bending by aerodynamic forces (Odonata: Anisoptera). *Entomologia Generalis* 23(1-2): 139-148. ["Using a high speed shutter camcorder changes of shape (twisting, camber and especially bending) of the wings of *Aeshna cyanea* [Müller 1764] and *Sympetrum vulgatum* [Linné 1758] were recorded in a natural environment during hovering, acceleration from hovering and fast vertical starting from a watching position. ... The nodus is an element that allows for a certain local bending between the distal and basal wing part. It is working even at lower aerodynamical loading. Its morphology is functionally interpreted. Wing bending is simulated with Finite Element calculations and compared to the field observations."] Address: Nachtigall, W., Univ. Saarland, Inst. Zool., D-66041 Saarbrücken, Germany

837. **Novelo-Gutiérrez, R.; Ramírez, A. (1998):** The larva of *Macrothemis inacuta* (Odonata: Libellulidae). *Entomol. news* 109(5): 301-306. (in English). ["A detailed description and illustrations of the larva of *Macrothemis inacuta* are provided. Larva is similar to *M. celeno* but can be distinguished by stouter movable hook, and larger lateral spines and dorsal portuberances on abdominal segments 8-9. Larvae were found living in lentic environments, in muddy areas close to the shore, where emerging and floating vegetation was present." (Authors)] Address: Ramírez, A., Inst. of Ecol., Univ. Georgia, Athens GA 30602, USA. E-mail: aramirez@arches.uga.cc.uga.edu

838. **Nowak, H. (1998):** Nach Sülldorf ins Sülzetal. Wanderungen in ein salziges Land. Available free of charge from: Bördekreis, Postfach 1229, D-39382 Oschersleben. 57 pp. (in German). [Detailed account on the natural history of a region in Sachsen-Anhalt, Germany with a halophile flora and fauna. *Lestes barbarus*

is the only Odonata mentioned in the booklet, said to be characteristic for the habitats with halophile vegetation.]

839. **O'Brien, M.F.; Pratt, P.D (1998):** *Enallagma anna*, a damselfly new to the Great Lakes region (Odonata: Coenagrionidae). *Great Lakes Entomologist* 31(3-4): 211-213. (in English). ["*E. anna*, a predominantly western North America damselfly, is now recorded from southwestern Michigan and southwestern Ontario for the first time." (Authors)] Address: O'Brien, M.F., Univ Michigan, Museum Zool, Ann Arbor, MI 48109, USA . E-mail: O'Brien: mfobrien@umich.edu; Pratt: prairie@net-core.ca

840. **Olias, M.; Serbedija, M. (1998):** Zur Faunistik und Ökologie der Libellen der Kvarner-Insel Krk (Kroatien). Diplomarbeit am Fachbereich 2 "Landschaftsnutzung und Naturschutz" der Fachhochschule Eberswalde: 148 pp, 2 Anhänge. (in German). [This is a very sound M.Sc.-thesis on the Odonata of the Island of Krk, Croatia. In 1997 and 1998, 45 water bodies were surveyed for Odonata. Each of these water bodies is described and mapped in detail (Annex 1). Prior to 1997, 27 taxa were known from published or personally communicated data (documented in tab. 3). 14 species could be traced for the first time after March 1997. Three species (*Coenagrion ornatum*, *Orthetrum albistylum*, *Selysiotthemis nigra*) remain without present-day record. Expressed as presence on a water body, the rarity of the species is shown in fig. 12. In Chapter 7 dragonfly zoenoses are worked out. Chapter 8 (species monographs) contains very interesting details on the odonate fauna of Krk: Distribution in Croatia and on the Island of Krk, phenology, ecology/biology, and in the cases of *Calopteryx splendens*, *Chalcolestes viridis* / *C. parvidens*, *Onychogomphus forcipatus*, *Somatochlora meridionalis*, and *Orthetrum coerulescens* / *O. anceps* remarks on taxonomic and morphological problems. Of special interest is the documentation of hybrids between *C. viridis* and *C. parvidens*. In a final chapter the water bodies are assessed for nature conservation purposes. Annex 2 provides distribution maps of all species on the Island of Krk.] Address: Olias, M., Schönberger Str. 51, D-08393 Meerane, Germany

841. **Pathak, S.C. (1998):** Insect trappings in Arabian Sea with special reference to west coast of India. *Indian Journal of Marine Sciences* 27(3-4): 482-485. (in English). ["Live and dead insects were collected during cruise # 238 of Research Vessel Gaveshani during October-November 1993. ... Odonata was represented by 11 specimens of a single species *Pantala flavescens* Fabr. which not only remained hovering over the Ship throughout the cruise, it also showed the peculiar behaviour of flying along side the country boats that ferried the scientists between various islands in the Lakshadweep group and the mother ship."] Address: Pathak, S.C., Rani Durgavati Univ, Dept Biol Sci, Jabalpur 482001, India

842. **Pavey, C.R.; Burwell, C.J. (1998):** Predation on diurnal insects by the eastern horseshoe bat, *Rhinolophus megaphyllus* Gray (Chiroptera: Rhinolophidae). *Memoirs of the Queensland Museum* 42(2): 555-558. (in English). ["Insectivorous bats exhibit crepuscular activity despite being very vulnerable to predation by diurnal birds at such times. ... This study established that the Eastern Horseshoe Bat, *Rhinolophus megaphyllus*, captured diurnal insects from three orders; butterflies

(Lepidoptera), dragonflies (Odonata) and cicadas (Hemiptera), during crepuscular activity." Address: Pavey, C.R. 64 Arafura Street, Upper Mt. Gravatt, Queensland 4122, Australia

843. **Pavlyuk, R. (1998):** Eine Bestandsaufnahme der Parasitenfauna der Odonaten in der Ukraine (Odonata; - Sporozoa, Trematoda, Cestoda, Nematoda, Acari). Opusc. zool. flumin. 164: 1-23. (in German, with English summary). ["An annotated review is presented of the parasite fauna, identified during 1965-1992 in 18160 adult and 500 immature Zygoptera and Anisoptera individuals. The extent, the average and the maximal intensity of infestation are stilled, and host specificity is tentatively indicated, where appropriate. The endoparasitic Gregarinidae (Sporozoa) and the ectoparasitic Arrenuridae (Acari) seem to be rather peculiar to certain odonate groups, while the host-parasite specificity appears poorly developed in the 5 evidenced families of the endoparasitic Trematoda." (Author)] Address: Pavlyuk, R., Zoologisches Museum, Biologische Fakultät, Staatsuniversität Lwow, ul. Grushevskogo 4, UKR-290005 Lwow, Ukraine

844. **Petranka, J.; Hayes, L. (1998):** Chemically mediated avoidance of a predatory odonate (*Anax junius*) by American toad (*Bufo americanus*) and wood frog (*Rana sylvatica*) tadpoles. Behavioral Ecology and Sociobiology 42(4): 263-271. ["We examined behavioural responses of wood frog (*Rana sylvatica*) and American toad (*Bufo americanus*) tadpoles to both direct and indirect chemical signals associated with a predatory odonate (*Anax junius*). In laboratory trials, tadpoles of both species responded strongly to water conditioned with *Anax* nymphs by decreasing foraging rates, becoming immobile, and moving away from the stimulus. ... In a field experiment, the responses of *R. sylvatica* tadpoles to *Anax* chemicals were similar to those of tadpoles observed in the laboratory. Collectively, our data indicate that tadpoles of both species use chemical cues to assess predation risk from other community members."] Address: Petranka, J.: Dept. Biol., Univ. N.C., Asheville, NC 28804-3299, USA

845. **Pratt, P.D.; Catling, P.M. (1998):** Distribution of *Hetaerina titia* (Odonata: Calopterygidae) in the eastern Great Lakes region. Great Lakes Entomologist 31(3-4): 205-208. (in English). ["The lower Thames and Sydenham Rivers in southwestern Ontario have well established populations of *Hetaerina titia* that represent the northern range limit of the species. Although first discovered in 1985, these populations are not necessarily recently established. Adults appear from mid-August to early September and are most often seen around trees and shrubs overhanging moving water." (Authors)] Address: Pratt, P.D., 7100 Matchette Rd, LaSalle, ON N9J 2S3, Canada

846. **Robert, V.; Awono Ambene, H.P.; Thioulouse, J. (1998):** Ecology of larval mosquitoes, with special reference to *Anopheles arabiensis* (Diptera: Culicidae) in market-garden wells in urban Dakar, Senegal. Journal of Medical Entomology 35(6): 948-955. (in English). ["The urban area of Dakar, Senegal, contains >5,000 market-garden wells that provide permanent sites for mosquito larvae, in particular *Anopheles arabiensis* Patton, the major vector of malaria. ... To identify factors that determine the abundance of larvae in these wells, a co-inertia (multivariate) analysis was carried out. ...

The conditions associated with abundant *An. arabiensis* were warm temperature (28 - 30°C), clear and not too deep water (<0.5 m), elevated concentrations of HCO<sub>3</sub><sup>-</sup> and CO<sub>3</sub><sup>2-</sup>, low concentrations of NO<sub>3</sub><sup>-</sup> and NaCl low populations of larvivorous fish and invertebrate predators (notably odonates), the presence of water lettuce, and an absence of *Lemna*."] Address: Robert, V., O.R.S.T.O.M., Lab. Paludol, POB 1386, Dakar, Senegal

847. **Rothmund, D.; Hahn, U.; Zintz, K. (1998):** Untersuchungen der Libellenfauna eines württembergischen Hochwasserrückhaltebeckens (Herrenbachsee, Landkreis Göppingen). Wasserwirtschaft 88(6): 290-296. (in German, with English summary). [Between 1992 and 1996, 20 dragonfly species were observed at Lake Herrenbach (near Göppingen, Baden-Württemberg, SW-Germany). Twelve species are autochthonous, including two species listed in the regional "Red Data Book". Six of the species are classified as common species, four as pioneer species, and two prefer lakes with surrounding bushes and trees. Only seven of the 20 species observed between 1992 and 1996 could be observed in every year. Only one species reproduces every year. The odonate fauna was not negatively affected by draining and mud clearing of the reservoir. "Lake Herrenbach is not very important for the conservation of the dragonfly fauna, but it may serve as a resting place or a stepping stone habitat."] Address: Rothmund, D., R.-Mayer-Str. 20, D-73765 Neuhausen Germany

848. **Roush, S.A.; Bumbarger, D.J. (1998):** Odonata of the Beaver Creek Wetlands, Greene County, Ohio: A preliminary survey. Ohio Journal of Science 98(3): 59-60. (in English). ["A species list for the wetlands was built and data were entered into the Ohio Odonate Survey database. Thirty-six species (22 Anisoptera; 15 Zygoptera) were collected including 11 new county records bringing the Greene county list from 43 to 54."] Address: Roush, S.A., Wright State Univ., Dept Biol. Sci. Dayton, OH 45435, USA

849. Rudolph, R. (1998): Südliche Libellenarten in Westfalen. Natur- und Landschaftskunde 34: 114-116. (in German). [generell discussion of range extensions of southern species; detailed discussion of distribution patterns in Westphalia, and range extensions of *Erythromma viridulum*, *Anax parthenope*, *Cercion lindenii*, *Gomphus pulchellus*, *Aeshna affinis*, *Crocothemis erythraea*, *Sympetrum pedomontanum*, and others.] Address: Rudolph, R., Zum Emstal 12b, D-48231 Warendorf, Germany

850. **Russell, R.W.; May, M.L.; Soltesz, K.L.; Fitzpatrick, J.W. (1998):** Massive swarm migrations of dragonflies (Odonata) in eastern North America. American Midland Naturalist 140(2): 325-342. ["We describe massive autumn migrations of dragonflies (Odonata) which occurred at Chicago, Illinois (14 September 1978), Cape May, New Jersey (11 September 1992), and Crescent Beach, Florida (3-5 September 1993). Estimated numbers of migrant dragonflies involved in these flights were approximately 1.2 million, >400,000, and 200,000, respectively. ..."] Address: Russell, R.W., Louisiana State Univ., Museum Nat. Sci., 119 Foster Hall, Baton Rouge, LA 70803, USA



851. **Salmah, M.R.C.; Hassan, S.T.S.; Abu-Hassan, A.; Ali, A.B. (1998):** Influence of physical and chemical factors on the larval abundance of *Neurothemis tullia* (Drury) (Odonata : Libellulidae) in a rain fed rice field. *Hydrobiologia* 389: 193-202. (in English). ["The influence of physical and chemical factors such as pH, temperature, conductivity, dissolved oxygen, nitrate, phosphate and chlorophyll a on larval populations of *Neurothemis tullia* (Drury) (Odonata:Libellulidae) were studied in a rain-fed rice field by collecting larvae and water samples weekly over two seasons of rice planting. Water availability was the main factor determining the presence or absence of larvae in the rice field. The larvae were most abundant during extended periods of continuously plentiful water supply except during flooding. Rapid larval population build-ups were observed soon after chemical applications or spells of dry periods reflecting continual oviposition and hatching of eggs. Pesticides and fertilizer applications resulted in low population densities due to direct or indirect mortality. A stepwise multiple regression showed that within its range, none of the physical and chemical factors measured in this study affected the abundance of *N. tullia*." (Authors)] Address: Salmah, M.R.C., Univ. Sains Malaysia; School Biol. Sci., Minden 11800; Penang; Malaysia
852. **Schorr, M. (1998):** Flußauenlibellen der Mosel und ihre Indikatorfunktion. Aut- und Ethoökologie ausgewählter Arten. Gutachten der Faunistisch-Ökologischen Arbeitsgemeinschaft, Trier im Auftrag der Bundesanstalt für Gewässerkunde / Ref. U3 (Tierökologie), Koblenz. 132 pp. (in German). [detailed compilation of literature data on *Ophiogomphus cecilia*, *Gomphus vulgatissimus*, *Stylurus flavipes*, *Calopteryx splendens*, *Cercion lindenii*, *Erythromma najas*, *Coenagrion mercuriale*, *Orthetrum brunneum*, and *Leucorrhinia caudalis* (larvae and imago); all species are treated according to the following items: Regional Distribution, (potential) occurrence in the River Mosel (Rheinland-Pfalz, Germany), general characterisation of the habitat, aut- and ethoecology of the species, threats, quite extensive bibliography; this compilation is based in most cases on unpublished theses, and provides detailed and unpublished observations; the bibliography comprises 1759 titles; available for DM 30,- plus shipping from the author] Address: IDF, c/o Martin Schorr, Waldfrieden 25, D-54314 Zerf, Germany
853. **Sonnenburg, H.; Dense, C. (1998):** Die Gebänderte Heidelibelle *Sympetrum pedemontanum* (ALLIONI, 1766) in Nordwest-Deutschland - Stand der Ausbreitung und Beschreibung neuer Fortpflanzungsgewässer (Odonata, Libellulidae). *Mitt. ArbGem. ostwestf.-lipp. Ent.* 14(3): 63-80. (in German, with English summary). ["The present distribution of *Sympetrum pedemontanum* (ALLIONI) in western Lower Saxony and the adjacent parts of Westphalia is described and mapped. The spatial and temporal process of the species' spreading is analysed. It is pointed out that the new records in the western part of the discussed area can obviously be traced back to populations in eastern Lower Saxony and the northern part of Westphalia, which were established in the seventies and eighties." The northwesternmost records are from Zeeland (The Netherlands).] Address: Dense, C., Süsterstr. 20, D-49074 Osnabrück, Germany
854. **Spedding, G.R.; Lissaman, P.B.S. (1998):** Technical aspects of microscale flight systems. *Journal of avian biology* 29(4): 458-468. (in English). ["Micro Air Vehicles (MAVs) have excellent potential utility as flight platforms for optical, acoustic, electronic and chemical sensors for operation in hazardous sites with aerial access. The dimensions and performance specifications call for a 100 g take-off mass with 100-200 mm wingspan that must fly at 5-20 m/s for approximately 30 minutes. Owing to the low operating Reynolds number ( $Re$ ), the aerodynamic performance of all lifting surfaces is degraded. The small scales and speeds also mean that atmospheric turbulence has a severe effect, and small thermal cycle engines that could profit from the high energy densities of fossil fuels are unavailable. It is thus difficult to obtain good performance. Studies have been made of vying plus propeller systems, rotor systems and napping wing systems. In all cases, L/D is in the range of 5-10. Flapping is about as efficient as propeller motion at this  $Re$ , but more complicated mechanically. The ThrustWing is a configuration derivative of the dragonfly, with characteristics lying between a helicopter and an ornithopter. It has both zero and forward flight capabilities, and appears to have good potential as a MAV configuration. Finally, the effects of atmospheric turbulence are described and shown to fall into four qualitatively different categories as turbulence intensity increases. Due to favourable scaling, the stresses in MAVs will be very low, and although turbulence will cause large G loads on the MAV, no structural damage will result." (Authors)] Address: Spedding, G.R., Univ. So. Calif., Dept Aerosp. Engrg, Los Angeles CA 90089 USA. E-mail: Geoff@ostrich.usc.edu
855. **Tani, J.; Qiu, J.; Yamaguchi, E (1998):** Emergence of the rhythmic movement of a dragonfly wing model. *ISME international journal series (C), Mechanical systems, machine elements and manufacturing* 41(4): 689-694. (in English). ["Living things have the ability to adapt themselves to various environmental conditions and keep the whole system functioning even if a part of it is out of order. Recently, biological systems of living things which can be modeled as autonomous distributed systems have become the focus of attention. In this paper the modeling of the rhythmic movement generating mechanism of dragonfly wings using nonlinear oscillators is described. A wing is approximately modeled as a 1-DOF or 2-DOF beam and the equations of motion are derived. The central pattern generators (CPG) which generate the rhythmic movement of wings are modeled as a set of Van der Pol nonlinear oscillators. By solving the equations of motion of the wing and the equations of oscillators simultaneously, the rhythmic movement of a dragonfly wing model is obtained. The synchronization of multiple wings is obtained by the interconnection of oscillators. It is found that various autonomous vibrations of dragonfly wings can be reproduced using this model." (Authors)] Address: Tani, J., Tohoku Univ., Inst. Fluid Sci., Katahira 2-1-1; Sendai; Miyagi 9808577; Japan
856. **Van Buskirk, J.; Relyea, R.A (1998):** Selection for phenotypic plasticity in *Rana sylvatica* tadpoles. *Biological Journal of the Linnean Society* 65(3): 301-328. (in English). ["First we reared tadpoles in artificial ponds for 18 days, in either the presence or absence of *Anax* dragonfly larvae (confined within cages to prevent them from killing the tadpoles). These conditioning treatments produced dramatic differences in size and shape: tadpoles from ponds with predators were smaller and had relatively short bodies and deep tail fins. We

estimated selection by *Anax* on the two kinds of tadpoles by testing for non-random mortality in overnight predation trials. Dragonflies imposed strong selection by preferentially killing individuals with relatively shallow and short tail fins, and narrow tail muscles. ... These results indicate that selection is currently promoting morphological plasticity in *R. sylvatica*, and support the hypothesis that plasticity represents an adaptation to variable predator environments." ] Address: Van Buskirk, J., Univ. Zürich, Inst. Zool., Winterthurerstr 190., CH-8057 Zürich, Switzerland. E-mail: Van Buskirk, J.: jvb@zool.unizh.ch

857. **Wasscher M. (1998):** The Green Darner (*Anax junius*) in England; a new dragonfly species for Europe. *Brachytron* 2(2): 60-62. (in Dutch, with English summary). ["The sightings of *A. junius* in southwestern Great Britain in September 1998 are discussed in the light of weather influences, earlier sightings of Nearctic Odonata in Europe and the prospects for the species in The Netherlands. For this purpose the identification of *A. junius* in comparison with *A. imperator* is clarified and illustrated." (Author)] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: m.wasscher@broekhuis.nl

858. **Yoshida, M.; Yagi, T; Odonatological Society of Osaka (1998):** Dragonflies and Damselflies (Insecta: Odonata) of Shiga Prefecture, Honshu, Japan. Research Report of the Lake Biwa Museum 10: 284 pp. [Verbatim: Summary Outline of the study: Dragonflies and damselflies (Insecta: Odonata) were collected from Shiga Prefecture, western Honshu, Japan, at ca. 3,000 stations on ca. 700 days from 1985 through 1997 (total: ca. 30,000 occurrence records), mostly by the members of the Odonatological Society of Osaka. Number of species: From Shiga Prefecture 98 species of Odonata are recorded. This figure is one of the highest among Japanese prefectures. The mean number of species found in each of the 50 "Shi-Cho-Son" (city, town or village) districts in Shiga Prefecture is 70. This figure is higher than in any other Japanese prefecture. The number of Odonata species recorded from Otsu-shi is 96, the highest figure in all the Japanese Shi-Cho-Son districts. The reasons for the high species diversity: The great range of freshwater environments including Lake Biwa, rivers flowing into the lake, lakeside ponds etc. is certainly the most important reason for the high species diversity of Odonata in Shiga Prefecture. Another factor may be the low density of human population in Shiga in comparison with the Kyoto-Osaka-Kobe District. Distribution pattern: Distribution patterns of Odonata species in Shiga Prefecture may be classified into five types: a1) inhabiting all or most areas of Shiga, a2) inhabiting Lake Biwa and the lakeside, b1) temporary occurrence by overseas dispersal from the south, b2) temporary occurrence by overseas dispersal from the north and b3) other patterns of temporary occurrence. Distribution of rare species: Rare species of Odonata in lentic habitats of Shiga Prefecture are *Ceriagrion nipponicum*, *Aeschnophlebia anisoptera*, *Somatochlora clavata*, *Libellula angelina*, *Sympetrum maculatum* and *S. uniforme*. They also exhibit restricted distributions in neighboring prefectures, whereas *Sympetrum baccha matutinum* is common in the latter prefectures, but rare in Shiga. In lotic habitats of Shiga Prefecture, rare species of Odonata, *Calopteryx japonica*, *Platycnemis foliacea sasakii*, *Sinogomphus flavolimbatus*, *Davidius moiwanus taruii* and *Macromia daimoji*, tend to occur in the

western part of the prefecture and never occur in the eastern part. This may be attributed to the frequent lack of surface flow in the lower reaches of most rivers in the east. Odonata Fauna of Lake Biwa: The origin of the Odonata fauna of Lake Biwa may be compared with that of the freshwater fishes. A large part of the freshwater fish fauna of Japan is said to have originated in the fishes that inhabited the Second Setouchi Lakes (from Pliocene to middle Pleistocene) including Paleolake Biwa. The same history may also apply to the origin of the Odonata species with weak dispersal ability, such as *Trigomphus citimus tabei*, *T. interruptus*, *T. ogumai*, *Sympetrum gracile* etc. A group of freshwater fishes adapted to large rivers and large shallow lakes (Cyprinidae: Xenocyprinae and Cultrinae) were once (Pliocene) common in Japan, but are now almost extinct there. The history of the dragonfly genus *Stylurus* may be similar to that of these fishes. *Onychogomphus viridicostus* usually occurs in rivers with a gravel bottom, but it is also found on the rocky shore of Lake Biwa, where a characteristic fish fauna is known. Description of each species (pp. 21-118): The distribution, range of adult dispersal, habitat, life cycle, ecology-behavior and other characteristics of all 98 species are described. Two graphs showing the seasons of occurrence of the nymph (top of the respective page) and the adult (middle), and a map of the distribution in Shiga Prefecture (bottom), are presented for each species. Environment destruction: Means of destroying the habitats of Odonata through human modification of the environment are reviewed. Several examples of such destruction observed in the course of this field study are described. Original occurrence records (pp. 136-248): All of the occurrence records obtained in this study are listed. For each, the date is written in the order of "year-month-day", the locality includes the name of the Shi-Cho-Son and the name of the smaller "Ô-aza" district involved, and the seven-digit number refers to the distribution map's grid. Occurrence records from literature (pp. 249-281): Records of Odonata from Shiga Prefecture were compiled from ca. 100 papers, excluding those with doubtful identifications. Because of this exclusion, *Cordulia aenea amurensis* and *Stylogomphus ryukyuanus ryukyuanus* are no longer listed among the Odonata fauna of Shiga Prefecture. (Authors: pp.7-20, Masazumi YOSHIDA; pp.21-120, Takahiko YAGI; the other pages, the Odonatological Society of Osaka) (Translated by Shigekazu UCHIDA with linguistic help of Mark J. GRYGIER, Lake Biwa Museum) ] Address: Published by the Lake Biwa Museum Oroshimo 1091, Kusatsu Shiga 525-0001. Japan Phone: +81-77-568-4811 Fax.: +81-77-568-4850

## 1999

859. **Ábro, A. (1999):** Reactions to leg excision in larvae of *Enallagma cyathigerum* (Charpentier) (Zygoptera: Coenagrionidae). *Odonatologica* 28(2): 117-125. (in English). ["Soon after amputation of a leg from a final instar larva, granular haemocytes, supported by strands of clotted haemolymph plasma, form a thin cap over the wound, providing the initial wound closure. Cut nerves also appear to attract granular haemocytes and promote organization of a cell sheet covering the wound. Gradually, congregating cells transform the original sheet of cells into a sealing haemocytic plug. Within and across the plug, granular cells form a densely-packed, primary layer like a diaphragm that soon becomes melanized.

This is followed later by one or more deeper, secondary layers which also melanize, but to a lesser extent. The primary, melanized layer serves as a pseudocuticle. Its position appears to be determined by the reorganizing epidermis at the wound edge. Presumably the melanized cell layers reduce leakage of haemolymph plasma from the wound and establish barriers against intruding microbes and other foreign bodies. It is suggested that the sequence of cellular events is similar in all kinds of lesions caused to the zygopteran integument, whether by ectoparasitic invasion or physical damage. It is likely that a resultant alteration in the properties of the subepidermal basement membrane will elicit the haemocytic response." (Author)] Address: Åbro, A., Department of Anatomy, University of Bergen, Årstadveien 19, N-5009 Bergen, Norway

860. **Åbro, A. (1999):** The size range of sperm bundles in aeshnid dragonflies (Anisoptera: Aeshnidae). *Odonatologica* 28(3): 273-277. (in English). [Aeshna cyanea, A. grandis, A. juncea; "Sperm bundles of alternative size and number of sperm cells are regularly found in the spermiducts of aeshnid dragonflies. This arrangement can be traced to earlier stages of spermatogenesis, where the number of generations of spermatogonia does not appear strictly determined. This is considered an archaic feature of the order Odonata. Dragonfly spermatogenesis is discussed." (Author)] Address: Åbro, A., Inst. Anat., Univ. Bergen, Årstadveien 19, N-5009 Bergen, Norway

861. **Achterkamp, G. (1999):** Populatieschatting van de Bandheidlibel *Sympetrum pedemontanum* in De Maat (Belgie). NVL Nieuwsbrief. Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie 3 (3): 6-7. (in Dutch). [estimation of population number of *Sympetrum pedemontanum* in De Maat (Belgium)] Address: E-mail: 97007147@st.hhs.na

862. **Aguero-Pelegrin, M.; Ferreras-Romero, M.; Corbet, P.S. (1999):** The life cycle of *Lestes viridis* (Odonata : Lestidae) in two seasonal streams of the Sierra Morena Mountains (southern Spain). *Aquatic insects* 21(3): 187-196. (in English). ["The life cycle of the zygopteran odonate *Lestes viridis* in two seasonal streams in the Sierra Morena Mountains is inferred from size-frequency analyses of handnet samples of larvae and records of presence and reproductive activity of adults during three consecutive years. The egg stage (duration 5-6 months) overwinters, larval development is brief (6-8 weeks) and adults undergo a protracted, prereproductive, summer diapause (up to 3 months) before mating and ovipositing in late September, about one week after the first appreciable fall of rain, but before surface water reappears in the streams after having been absent for about four months during the hot, dry summer. Comparison between this life cycle and those of more northerly populations reveals a latitude-correlated difference in phenology resembling that found in some other northern hemisphere odonates that, like *L. viridis*, maintain an obligatorily univoltine life cycle at different latitudes." (Authors)] Address: Ferreras-Romero, M., Departamento de Biología Animal (Zoología), Facultad de Ciencias, Universidad de Córdoba, Avda. San Alberto Magno s/n, ES-14004 Córdoba, Spain

863. **Allen, P. (1999):** Gomphids near Georgetown, Gambia. *W.D.A.'s Agrion* 3(1): 14. (in English). [Report on the discovering of *Neurogomphus featheri* with short

outline on the importance to have taken it as a voucher specimen, and to have photographed it!] Address: Allen, P., Little Tatch, North Gorley, Fordingbridge, Hants SP6 2PE, UK

864. **Alzmann, N.; Kohler, B.; Maier, G. (1999):** Spatial distribution, food and activity of *Gomphus pulchellus* SELYS 1840 (Insecta; Odonata; Gomphidae) from a still water habitat. *Int. Revue für Hydrobiologie* 84(3): 299-313. (in English). ["Distribution patterns of *Gomphus pulchellus* larvae in different sediments with different density of prey organisms were studied in the field in a small gravel pit lake in the south of Germany. Larval burrowing behaviour at different temperatures as well as food preference, consumption rates and activity were studied in laboratory experiments. In the study lake *G. pulchellus* larvae lived exclusively in places where macrophytes were present and in fine sediments (mean grain size <3 mm) with detritus cover. There was a significant positive correlation between larval density and density of food organisms suggesting that abundance of food is one of the determinants of larval distribution. In late autumn larvae migrated to deeper places probably to survive the winter. Low temperatures simulated in laboratory experiments did not induce larvae to burrow deeper. Larvae were always found in a sediment depth of 0.59-0.74 cm. Experiments with mixed prey showed that *G. pulchellus* larvae preferred tubificid worms and chironomid larvae over gammarids and ephemeropterid larvae. However, chironomid larvae which stayed in their tubes had a higher survival rate than those outside of tubes. Single-prey experiments showed that *G. pulchellus* larvae can prey not only on benthic species but also on *Daphnia* from the open water. Functional-response experiments showed that one *G. pulchellus* larva consumes a maximum of 2 to 3 tubificid worms or chironomid larvae per day, which corresponds to a maximum biomass (freshweight) of 5 to 30 mg per day. Video recordings of activity showed that *G. pulchellus* larvae cover long distances of up to 52 m per night on the substrate surface and that activity on the substrate surface started after midnight and ceased before sunrise. Consumption of zooplankton prey and high activity above the substrate is interpreted as an adaptation of *G. pulchellus* larvae to the life in still water habitats." (Authors)] Address: Maier, G; Univ Ulm; Dept Biol Ecol & Morphol Anim 3; Albert Einstein Allee 11; D-89069 Ulm; Germany

865. **Andjus, L. (1999):** Obituary: Dr. Zivko R. Adamovic, 1923-1998. *W.D.A.'s Agrion* 3(1): 18. (in English). Address: Dr. Ljiljana Andjus, Natural History Museum, Njegoseva 51, 11000 Beograd, Yugoslavia - Serbia

866. **Andres, J.A.; Cordero, A. (1999):** The inheritance of female colour morphs in the damselfly *Ceragrion tenellum* (Odonata, Coenagrionidae). *Heredity* 82(3): 328-335. (in English). ["Female-limited polychromatism is found in many species of Odonata. In *Ceragrion tenellum* (Coenagrionidae) one of the morphs is red-coloured, like the conspecific male (androchrome, erythrogastrum morph), whereas most females are red and black (typica morph) or black (melanogastrum morph). Virgin females of this species were mated in the laboratory and their progeny reared (13 crosses). Results of these crosses indicate that colour morphs are controlled by one autosomal locus with female-limited expression. A second laboratory generation (two



crosses) confirmed this inheritance system. This locus has three alleles (one per phenotype) and a hierarchy of dominance: *typica* > *melanogastrum* > *erythrogastrum*. The dominance relationships of andro/gynochrome alleles in polymorphic damselflies so far studied are discussed. The frequencies of female morphs in natural populations are highly variable, but in all cases *typica* females are the commonest." (Authors)] Address: Andres, J.A., Univ Vigo; EUET Forestal; Campus Univ; Dept Ecol & Biol Anim, Pontevedra 36005; Spain. E-mail: jaandres@uvigo.es

867. **Anonymus (1999):** List of publications by Philip S. Corbet including observations on Odonata. *International Journal of Odonatology* 2(1): 5-15. (in English). [compilation of P.S. Corbet's odonatological publications; contrary to the compilers list, P.S. Corbet started his odonatological career in 1949: The publication date of the publication listed for 1946 is 1986.] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

868. **Aoki, T. (1999):** Larval development, emergence and seasonal regulation in *Asiagomphus pryeri* (Selys) (Odonata: Gomphidae). *Hydrobiologia* 394: 179-192. (in English). ["Larval development and seasonal regulation in a spring-emerging gomphid dragonfly, *Asiagomphus pryeri* (Selys), was investigated mainly by repeated sampling in the field and also by laboratory experiments. Eggs exhibited direct development. Larval duration was usually 3 or 4 years. Larvae in the penultimate instar (i.e. F-1) that entered the final instar (F-0) synchronously in their third autumn emerged in the following spring but F-1 of the same age-cohort that failed to enter F-0 in the autumn did not emerge in the following spring (i.e. cohort splitting); they had a smaller head width, underwent a supernumerary ecdysis and entered F-0 in the following autumn together with a cohort one year younger. Reduction of temporal variation in emergence, which lasted about 3 weeks, from late May to mid June, was achieved by synchronized entry to F-0 in the previous autumn. No additional synchronisation was detected in the overwintering F-0 population. Long-day photoperiod (LD 15:9; corresponding to the summer solstice) induced in F-1 intense diapause which was terminated by intermediate photoperiod (LD 13:11; the equinox). In nature, such photoperiodic responses apparently mediate the synchronous entry to F-0 in autumn. Discussion on the mechanisms of seasonal regulation is made." (Author)] Address: Aoki, T; Rokko Island High School, Higashinada Ku., Naka 4 Chome, Koyo Cho; Kobe; 658-0032, Japan. E-mail: taoki@ma3.justnet.ne.jp

869. **Aoki, T.; Kondoh, S. (1999):** A note on reproductive behaviour of *Sympetrum striolatum imitoides* BARTENEF in Kobe. *Aeschna* 35: 37-40. (Japanese, with English summary). ["Reproductive behaviour of *Sympetrum striolatum imitoides* Bart. was observed at an artificial pond for birdwatching in Kobe [...] 4 times from 12 October to 16 November, 1997. It was similar to those which were reported by Matsura et. al. (1995) in *S. s. imitoides* and by Ottolenghi (1987) in *S. s. striolatum* in Italy. A characteristic precopulatory behaviour of the male, which is hardly seen in other Japanese *Sympetrum* species except *S. uniforme*, was a continuous hovering flight above the water. It began just before females coming to the water for oviposition (about

10:30 J.S.T.), and lasted for about an hour. There is, however, another group of males which waited for females by perching around the pond. Depending on their situation or other conditions, two tactics might be used for mating." (Authors)]. Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinadaku, Kobe, 658-0032, Japan. E-mail: t\_aoki@ma3.justnet.ne.jp

870. **Arlt, J.; Ruddek, J. (1999):** Bestimmungsschlüssel für Exuvien der Libellen Griechenlands. *Libellula Suppl.* 2: 3-15. (in German, with short English summary). ["The key included the quintessential indications for the whole dragonfly fauna of Greece. In short cues and figures the important characters were described." (Authors). This key is a didactically very interesting attempt to allow an easy determination of exuviae.] Address: Ruddek, J., Butendiek 34, D-28865 Lilienthal, Germany

871. **Arlt, J. (1999):** Entwicklungsnachweis von *Pantala flavescens* (Fabricius) in der Türkei (Anisoptera: Libellulidae). *Libellula* 18(1/2): 95-96. (in German, with English summary). ["One exuviae as well as freshly emerged specimens were recorded in the Göksu Delta and at a watertank near Gözcü in southern Turkey in June 1998. This seems to be the first breeding record in Turkey. The localities are described and notes to co-occurring species are given." (Author)] Address: Arlt, J., Braker Str. 4, D-27751 Delmenhorst, Germany

872. **Aspöck, H. (1999):** Beschreibung und Abbildung von Mantispiden in der frühen entomologischen Literatur und Österreichs Beitrag zur Erforschung der Fanghafte (Neuropterida: Neuroptera: Mantispidae). *Stapfia* 60: 209-244. (in German). [facsimile of a plate from de Villers (1789) with two Odonata; pictures of the famous Austrian odonatologist Friedrich Moritz Brauer (1832-1904)] Address: Aspöck, H., Abt. Med. Parasitologie, Klinisches Institut für Hygiene der Universität, Kinderspitalstr. 15, A-1095 Wien, Austria

873. **Azevedo-Ramos, C.; Magnusson, W.E. (1999):** Tropical tadpole vulnerability to predation: Association between laboratory results and prey distribution in an Amazonian savanna. *Copeia* 1999(1): 58-67. (in English). ["We tested concordance between patterns of tadpole assemblage structure seen in the field and in laboratory experiments to infer causal relationships. Based on a previous study that showed predators as the main proximal factor associated with tadpole distributions in an Amazonian savanna, we investigated interspecific patterns of vulnerability of six common tadpole species in relation to the distribution of predators in the field. The predators used were hydrophilid larvae (Coleoptera), libellulid naiads (Odonata), and adult *Gophagus* gr. *altifrons* (Cichlidae). Forty riverside aquatic sites were searched for predators and tadpoles during 28 months in a savanna area at the border of the Tapajos River, Central Amazonia. Tadpole species were tested for their vulnerability to predators in individual and choice tests. Prey unpalatable to fishes (*Bufo marinus*, *B. granulatus*, and *Hyla wavrini*) were palatable to invertebrates, *Leptodactylus macrosternum* and *Scinax rubra* were vulnerable to fish and invertebrate predators. *Lysapsus limellus* was not tested with fish, but it was vulnerable to naiads. Eggs had low vulnerability to predation, but there was generally little ontogenetic change in tadpole vulnerability. The vulnerability of tad-

poles in choice tests was significantly related to vulnerability in individual tests. A tadpole vulnerability index based on tadpole survivorship with different predators was significantly related to the distribution of predators in the field, indicating that it is possible to predict the coexistence of prey and predators in the field by screening species with simple laboratory predation experiments. In this study area, both vertebrate and invertebrate predators may potentially limit the distribution and the relative abundance of tadpole species through differential predation." (Authors) ] Address: Azevedo-Ramos, C; UNICAMP, Inst Ciencias Biol, Dept Zool, ; Inst Pesquisas Amazonia, Coordenacao Pesquisas & Ecol, BR-69011970 Manaus, Amazonas, Brazil. E-mail: cramos@amazon.com.br

874. **Baker, L.; Elkin, C.M.; Brennan, H.A. (1999):** Aggressive interactions and risk of fish predation for larval damselflies. *Jour. Insect behav.* 12(2): 213-223. (in English). ["Larval damselflies frequently engage in aggressive interactions that may increase their risk of fish predation. To test this we analyzed the behavior of larval *Ischnura verticalis* exposed to both conspecifics and fish predators. Larvae in the presence of conspecifics oriented, struck, and swam more but crawled less compared to solitary larvae; the presence of fish reduced, or tended to reduce, all behaviors. Fish struck more at interacting larvae compared to noninteracting larvae. Increased attack rate by fish likely reflects the increase in the very active swimming behavior by larvae and suggests a conflict between antipredator behaviors. Swimming is an appropriate response to avoid predation by odonate larvae which normally ambush prey but is clearly dangerous when fast-swimming fish that cue in on movement are nearby." (Authors)] Address: Baker, RL; Univ Toronto; Dept Zool; Mississauga; ON L5L 1C6; Canada

875. **Baumgärtner, D. (1999):** Bibliographie der DJN-Jahrbücher und der Naturkundlichen Beiträge Heft 1 (1978) bis Heft 33 (1999). *Naturkundliche Beiträge des Deutschen Jugendbund für Naturbeobachtung* 33: 39-71. (in German). [bibliography of the contributions in publications of the German Youth Association for nature observation including the odonatological papers; this organisation was of central importance for the development of odonatology in Germany in the past thirty years] Address: Baumgärtner, D., Cherysstr. 16, 78467 Konstanz, Germany

876. **Baumgärtner, M. (1999):** Meilenstein für Schutz: Südbaden ist die deutsche Region mit den meisten bedrohten Arten bei Heuschrecken und Libellen. *Dreiland-Zeitung* vom 8. Oktober 1999: 6. (in German). [report on the new books "The grasshoppers of Baden-Württemberg" and "The dragonflies of Baden-Württemberg", published by Ulmer, Stuttgart; some faunistic "high-lights" of the odonate and the orthoptera fauna are presented, including an interview with Dr. Klaus Sternberg, the editor of the Book on Odonata.] Address: not stated

877. **Beamish, F.W.H.; Noakes, D.L.G.; Rossiter, A. (1999):** Feeding ecology of juvenile Lake Sturgeon, *Acipenser fulvescens*, in Northern Ontario. *Canadian field naturalist* 112(3): 459-468. (in English). ["Dietary analyses of juvenile Lake Sturgeon in a resource-poor habitat showed them to be a general predator. Cladocera dominated numerically the prey taxa, but were recor-

ded in only four of the individual sturgeon examined and therefore excluded from stomach content analyses. Mayfly larvae (Ephemeroptera), primarily *Hexagenia*, were numerically the next most abundant (34% of all prey items) and the most widely taken (75% of all sturgeon) of the 10 prey categories. Others were Odonata, Annelida, Mollusca, Diptera and Trichoptera, each at 5-8% of all prey items. The remaining dietary categories represented < 3% of all prey items. No dietary partitioning was found over the length range of juvenile sturgeon, suggesting that fish throughout this size range are almost certainly competing for food. Lake Sturgeon diet did not differ from that for suckers, Lake Whitefish and, to some extent, Burbot, but was different from that for Northern Pike and Walleye. Extremely low invertebrate densities (95 individuals x m<sup>-2</sup>) and occurrence of all benthic species in the diet of juvenile Lake Sturgeon and several of the other dominant fishes suggests niche breadth to be wide and thus competition for food to be severe. The low food abundance is reflected in the comparatively slow growth rate of sturgeon in our study area. Apparently sturgeon are at survival threshold in this area. Further depletion of their food base likely would have serious repercussions for their growth and survival." (Authors)] Address: Noakes, D.L.G., Univ Guelph; Dept Zool., Guelph; ON N1G 2W1; Canada

878. **Beckemeyer, R. (1999):** 1999 DSA meeting in the Adirondacks at Paul Smith's College and environs. *Argia* 11(3): 2-3. (in English). [personal report from the July 1999 DSA meeting at Paul Smith's College, New York, USA] Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA

879. **Beckemeyer, R. (1999):** Dragonflies, lice, and "Schwartz's law of Odonatology". *Argia* 11(1): 30. (in English). [Mann, M. (1920): The occurrence of Mallophaga on a dragonfly (Odon.): *Ent. news* 31: 252. Reference to a paper referring to Mallophaga on the Colombian *Ischnogomphus jessei* (= *Agriogomphus jessei* (Williamson 1918)).] Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA

880. **Beckemeyer, R. (1999):** *Ischnura barberi* Currie, 1903 - "A Salty Fork-Tale". *Argia* 11(1): 22-23. (in English). [discussion on records from Kansas and Nebraska, USA; discussion on tolerance of salinity and brackish water habitats by *Ischnura barberi* and *Erythrodiplax berenice*.] Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA

881. **Becnel, J.J.; Johnson, M.A. (1999):** Pathogenicity tests on nine mosquito species and several non-target organisms with *Strelkovimermis spiculatus* (Nematoda mermithidae). *Journal of Nematology* 30(4): 411-414. (in English). ["Nine species of mosquitoes and several species of non-target aquatic organisms were tested for susceptibility to the mermithid nematode, *Strelkovimermis spiculatus*. All species of *Anopheles*, *Aedes*, *Culex*, and *Toxorhynchites* exposed to *S. spiculatus* were susceptible. Of the nine mosquito species tested, *C. pipiens quinquefasciatus* had the greatest tolerance to initial invasion and the highest percent infection of those that survived. High levels of infection were also achieved with *Aedes taeniorhynchus* and *A. albopictus*, but these mosquitoes were significantly less tolerant to parasitism than *C. pipiens quinquefasciatus*. *Strelkovimermis spiculatus* did not infect or develop in any of the non-target hosts tested" (incl. Odonata).

(Authors)] Address: Becnel, J.J., USDA ARS; Ctr Med. Agr. & Vet. Entomol., POB 14565; Gainesville; FL 32604. E-mail: jbecnel@gainesville.usda.ufl.edu

882. **Bedell, P.; Chazal, A. (1999):** *Dythemis velox*, a new species for Virginia. *Argia* 11(3): 4-5. (in English). Address: Bedell, P., 10120 Silverleaf Terrace, Richmond, VA, 23236, USA. E-mail: pbedell@aeols.com

883. **Bedjanic, M.; Salamun, A. (1999):** Contribution to the knowledge of the odonate fauna of Sicily, with some additional data from Basilicata, southern Italy. *Opusc. zool. flum.* 169: 1-14. (in English). ["An annotated list is presented of 26 spp. collected between 7/18-VIII-1996 at 16 localities in Sicily and Basilicata. The records of *Lestes v. virens* (Charp.), *Aeshna mixta* Latr., *A. cyanea* (Müll.), *Onychogomphus uncatus* (Charp.) and *Orthetrum trinacria* (Sel.) from Sicily and *O. f. forcipatus* (L.) from Basilicata are of special regional interest. The breeding of *O. uncatus* and *A. cyanea* in Sicily could be confirmed for the first time. A list of 45 taxa known from the island with certainty is compiled and the late summer aspect of the fauna is briefly discussed." (Authors)] Address: Bedjanic, M., Fram 117/A, SI-2313 Fram, Slovenia. E-mail: matjaz.bedjanic@guest.arnes.si

884. **Behrstock, R.A.; Eubanks, T.L.; Miliotis, P. (1999):** Bar-sided Darner (*Gynacantha mexicana*) Selys, 1868 (Odonata: Aeshnidae), a new dragonfly for the U.S.. *Argia* 11(2): 12-14. (in English). [On 25 October 1998, photographers at two locations documented male darners of the species - confirmed by Sid Dunkle - at Santa Ana National Wildlife Refuge, Hidalgo County, Texas, USA. The authors discuss the question of the origin of the specimens: hurricane Mitch, or a northward dispersal in response to Mexico's drought conditions during the early summer in 1998.] Address: Behrstock, R.A., 9707 S. Gessner #3506, Houston, TX, 77071-1032, USA

885. **Behrstock, R.A. (1999):** First Texas record of the Bar-winged Skimmer (*Libellula axilenia*, Westwood). *Argia* 11(3): 5-6. (in English). [record of 20 June 1999, Tyler County, Texas, USA] Address: Behrstock, R.A., 9707 S. Gessner # 3506, Houston, TX, 77071-1032, USA. E-mail: rbehrstock@aol.com

886. **Bertram, G.; Haacks, M. (1999):** Beobachtungen von windverdrifteten Libellen auf der Kurischen Nehrung im September 1998. *Libellula* 18(1/2): 89-94. (in German, with English summary). ["At the Biological Station Rybachy on the Curonian Spit (Russia) during nine days 14 dragonfly species were recorded in birdtraps. The record of two specimens of *Anax parthenope* Selys is of special interest. The dominance of individuals of the genus *Sympetrum*, compared to those of the genus *Aeshna*, increased as eastwind conditions became prevailing. In *Sympetrum* the adult sex ratio was male biased. There was a close relationship between the number of specimens and the increasing NE winds." (Authors)] Address: Bertram, Gisela, Herderstr. 6, D-22085 Hamburg, Germany

887. **Beynon, T. (1999):** First emergence for White-faced darter *Leucorrhinia dubia* and Four-spotted Chaser *Libellula quadrimaculata* 1994-1999 at Chartley Moss NNR, Staffordshire. *Atropos* 8: 52-53. (in Eng-

lish). Address: Beynon, T.G.; 34 Church Lane, Checkley, Stoke-on-Trent ST10 4NJ, United Kingdom

888. **Blessing, J.; Randler, C. (1999):** Vorkommen der Kleinen Zangenlibelle *Onychogomphus forcipatus* (Linnaeus, 1758) bei Mühlhausen/Enz. *Fachdienst Naturschutz - Naturschutz und Landschaftspflege Baden-Württemberg* 73: 271-275. (in German). [generalised distribution map of *O. forcipatus* in Baden-Württemberg, Germany; report on some new localities for the rare species; discussion on some conservation measures] Address: Blessing, J., Vaihinger, Str. 7, D-71665 Vaihingen-Enzweihingen, Germany

889. **Blischke, H. (1999):** Schlupf von *Lestes viridis* (Vander Linden) abseits vom Gewässer (Zygoptera: Lestidae). *Libellula* 18(1/2): 55-58. (in German, with English summary). ["In July 1997 several exuviae of *L. viridis* were recorded in a lawn adjacent to a ditch in the marsh west of the Jade bay near Sande (Friesland, Germany). One specimen emerge 5.60 m distant from the shore." (Author)] Address: Blischke, H., Sanderahm 6, D-26452 Sande, Germany

890. **Borchers, R. (1999):** Untersuchungen zur Autoökologie von *Aeshna subarctica elisabethae* Djakonov, 1922. Diplomarbeit am Zoologischen Institut der Universität Hamburg: 86 pp, Annex 1-12. (in German). [A Calluna-bog (Schwarzes Moor) near Schneverdingen, Niedersachsen, Germany was surveyed for the species. The habitat (*Sphagnum-Eriophorum*-quagmire) is described in some detail (climatic conditions, vegetation, water chemistry, [dragonfly] fauna). Differences in the morphological structures between *A. subarctica elisabethae* and *A. juncea* are presented in detail. Many of original observations on larval habitat and emergence of the species are documented. Predation behaviour of larvae was observed under laboratory conditions. The population ecology of *A. subarctica* is studied, with some emphasis on its competition with *A. juncea*. This very interesting M.Sc. thesis can be obtained from the author for DM 40,-.] Address: Borchers, R., Rotdornallee 18, D-29640 Schneverdingen, Germany

891. **Botschuyver, A. (1999):** Blijde Duin berichten: Steeds meer witsnuitlibellen in de Hollandse duinen. *NVL Nieuwsbrief. Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie* 3(3): 10. (in Dutch). [More and more *Leucorrhinia*'s in the dutch dunes; records from the end of the 90ies of *Leucorrhinia dubia*, *L. rubicunda*, and *L. pectoralis*] Address: Botschuyver, Annelies, E-mail: a.botschuyver@gw.amsterdam.nl

892. **Boudot, J.-P. (1999):** Rectification à l'article intitulé: Redécouverte de *Leucorrhinia rubicunda* (L., 1758) en France (Odonata, Anisoptera, Libellulidae). *Par Laurent Gavory et Jean-Louis Dommange (Martinia* 1998, tome 14, fascicule 2 (juin): 47-52). *Martinia* 15(2): 54. (in French). [Jean-Pierre Boudot states more precisely his personal comment in the above mentioned paper: there are no other extant localities for *L. rubicunda* known in France. The most nearest localities (observations) are near the French/Swiss and the Luxembourg/French borders.] Address: Boudot, J.-P., Centre de Pédologie Biologique, 17, rue Note-Dame de Pauvres, B.P. 5, F-54501 Vandoeuvre-lès-Nancy, France. E-mail: boudot@cpb.cnrs-nancy.fr



893. **Bouguessa, S.; Bouguessa, L.; Bouneb, H.; Khelifa, F. Z. (1999):** Les odonates zygoptères de l'Oued de la Meskiana (Algérie). *Martinia* 15(2): 22. (in French). [list of 9 taxa including *Coenagrion hastulatum* and *C. pulchellum*; abstracter's note: both species should be confirmed by experienced odonatologists, because it is doubtful that the range of these species reaches North-Africa. The identity of other taxa listed is doubtful as well.] Address: Bouguessa, S., Centre Universitaire de Tebessa, Département de Biologie, Route de Constantine, 12000 Tebessa, Algeria
894. **Brewer, S.K.; Atchison, G.J. (1999):** The effects of chlorpyrifos on cholinesterase activity and foraging behavior in the dragonfly, *Anax junius* (Odonata). *Hydrobiologia* 394: 201-208. (in English). ["We examined head capsule cholinesterase (ChE) and foraging behavior in nymphs of the dragonfly, *Anax junius*, exposed for 24 h to 0.2, 0.6 and 1.0  $\mu\text{g l}^{-1}$  of the organophosphorus (OP) insecticide, chlorpyrifos [O,O-diethyl O-(3,5,6-trichloro-2-pyridyl) phosphorothioate]. The invertebrate community is an important component of the structure and function of wetland ecosystems, yet the potential effects of insecticides on wetland ecosystems are largely unknown. Our objectives were to determine if exposure to environmentally realistic concentrations of chlorpyrifos affected foraging behavior and ChE activity in head capsules of dragonfly nymphs. Nymphs were exposed to different concentrations of chlorpyrifos and different prey densities in a factorial design. ChE activities and foraging behaviors of treated nymphs were not statistically different ( $p$  greater than or equal to 0.05) from control groups. Prey density effects exerted a greater effect on dragonfly foraging than toxicant exposures. Nymphs offered higher prey densities exhibited more foraging behaviors but also missed their prey more often. High variability in ChE activities within the control group and across treated groups precluded determination of relationships between ChE and foraging behaviors. It appears that *A. junius* is relatively tolerant of chlorpyrifos, although the concentrations we tested have been shown in other work to adversely affect the prey base; therefore the introduction of this insecticide may have indirect adverse effects on top invertebrate predators such as Odonata." (Authors)] Address: Brewer, S.K., US Geol. Survey; Columbia Environm. Res. Ctr; Columbia; MO 65201; USA
895. **Bright, E. (1999):** An interesting new larval morphology of *Argia*. *Argia* 11(1): 11-13. (in English). [detailed description of an unidentified member of the *Argia extranea - vivida* group from Nevada, USA] Address: Bright, E., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA
896. **Brockhaus, T.; Kretzschmar, W. (1999):** Weitere Bearbeitung der Libellen in Sachsen. *Mitt. Sächs. Entomol.* 45: 31. (in German). [announcement of a meeting of the Saxonian dragonfly workers on 5./6 Nov. 1999 in Bad Schandau, Germany, to discuss further work on the dragonfly fauna of Saxonia] Address: Brockhaus, T., An der Morgensterne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de
897. **Brugière, D. (1999):** Pré-inventaire des odonates du département de la Loire. *Martinia* 15(2): 47-53. (in French, with English summary). [shortly commented checklist of the Odonata of the French Département Loire] Address: Brugière, D., 39, rue Sidi-Brahim, F-03200 Vichy, France
898. **Brunelle, P.-M. (1999):** A course on larval damselflies and dragonflies of the northeast. *Argia* 11(2): 11. (in English). [may 16-22, 1999 at Humboldt Field Research Institute in Steuben, Maine, USA] Address: Brunelle, P.-M., 2460 John Street, Halifax, Nova Scotia, B3K 4K7, Canada
899. **Buczynski, P. (1999):** 18. Zjazd Towarzystwa Odonatologów Niemieckojezycznych, Münster (Niemcy), 19-21 III 1999. *Wiad. entomol.* 18(2): 129-130. (in Polish, a German translation of the paper is available from IDF). [detailed report on the 18. Annual Meeting of the Society of the German Speaking Odonatologists] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PO-20-033 Lublin, Poland
900. **Buczynski, P.; Labeledzki, A.; Tonczyk, G. (1999):** Libellen (Odonata) der Moore Polens: Gefährdungen und Schutzmaßnahmen. In: *Polski Towarzystwo Entomologiczne & Instytut Ochrony Przyrody PAN (Eds.): Konferencja Naukowa. "Ochrona owadów w Polsce u progu integracji z Unia Europejska"*, Kraków, 23-24 wrzesnia 1999. ISBN 83-01-08125-2. [Conservation of insects on the threshold of the integration of Poland into the European Community] (German translations of the odonatological papers are available from P. Buczynski or IDF): 24. (in Polish). [General outline on the importance of Polish bogs and the importance of bogs for (specialised) Odonata. The situation of Polish odonate fauna of the bogs is assessed as quite good compared with other central European countries. But there is an increasing pressure on some bogs, and some have been destroyed irreversibly. Of special interest are the populations of the extremely rare *Nehalennia speciosa*. Some observations indicate that collectors have caused serious impact on the populations of this species.] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PO-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl
901. **Buczynski, P. (1999):** Recenzje - Reviews: Jödicke, R., 1997: Die Binsenjungfern und Winterlibellen Europas. *Lestidae*. Westarp Wissenschaften, Magdeburg. 227 ss. (Die Neue Brehm-Bücherei; Bd. 631): ISBN 3-89432-460-0. *Wiadomosci entomologiczne* 18 (1): 51-52. (in Polish; a German translation of the review is available from the author or IDF). [detailed book review; some criticism on the distribution maps with special reference to the situation of the species in the central-eastern part of Europe] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PO-20-033 Lublin, Poland
902. **Bulánková, E. (1999):** Changes in the dragonfly fauna of the Danubian lowland in the last thirty years. *Entomofauna carpathica* 11: 1-5. (in Slovakian, with English summary). [comparison of data obtained in the period 1938-1968 with data from 1990-1997; in the first period 50, and in the second period 37 Odonata species were recorded; rheophilous species are the group of Odonata most affected by the environmental changes in the last years; some of these species have to be considered as locally extinct; a further group with species preferring reed vegetation and other vegetation-

rich water bodies are also affected negatively; species as *Epithea bimaculata*, *Orthetrum brunneum*, *Somatochlora metallica*, and *Sympetrum pedemontanum* were observed for the first time since 1990; *Crocothemis erythraea* is expanding its range in the Danubian lowlands] Address: Bulankova, Eva, Institute of Ecology, Fac. of Natural Sciences, Comenius University, Mlynská dolina B-II, SK-84215 Bratislava., Slovakia; tel.+ 421-7-728 922, E-mail: Bulankova@nic.fns.uniba.sk

903. **Caldwell, B.A. (1999):** *Archilestes grandis* (Odonata: Lestidae) from Georgia: new state record. *Argia* 11(2): 9-10. (in English). [detailed documentation of a record of a single larva of *A. grandis* from Hall county, Georgia (34.29N 83.42.34W)] Address: Caldwell, B.A., 1035 Lewis Ridge Circle, Lawrenceville, GA 30045-8899, USA

904. **Carpenter, G. (1999):** Big news from Rhode Island. *Argia* 11(3): 7. (in English). [*Epithea canis*, *Gomphus spicatus*, *Lanthus vernalis*, *Cordulegaster obliqua*, *Nasiaeschna pentacantha*, *Somatochlora georgiana*, and *Enallagma pictum*] Address: Carpenter, V.A., The Nature Conservancy, 159 Waterman Avenue, Providence, RI 02906, USA. E-mail: vcarpenter@tnc.org

905. **Carvalho, A.L. (1999):** Dragonflies in Origami. *Odonatologica* 28(2): 151-157. (in English). ["16 origami projects (folding paper instructions) representing dragonflies are registered and studied. Both technical and representational aspects are described for each folded model. A basic geometric outline of a dragonfly is defined based on these sculptures." (Author)] Address: Carvalho, A.L. Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista s/n°, Sao Cristóvão, BR-20940-040 Rio de Janeiro, RJ, Brazil

906. **Cashett, T. (1999):** New Hine's Emerald (*Somatochlora hineana*) dragonfly sites found in 1999. *Argia* 11(3): 3-4. (in English). [new localities of *S. hineana* in Missouri, Wisconsin, Michigan, Illinois, USA] Address: Cashett, E.D., Illinois State Museum, 1920 10 1/2 St., Springfield, IL 62703, USA. E-mail: cashett@museum.state.il.us

907. **Cating, P.; Cating, C.H. (1999):** Laura's Clubtail (*Stylurus laurae*) new to Canada. *Argia* 11(3): 10-11. (in English). [Record of *S. laurae* on Big Otter Creek, Elgin County, Ontario, Canada; description of the habitat; morphological comparison of *Stylurus laurae* and *S. amnicola*] Address: Catling, P.M.; 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net

908. **Cating, P.; Brownell, V. (1999):** Maine Snake-tail (*Ophiogomphus mainensis*), new to Ontario. *Argia* 11 (3): 9. (in English). [Larval *O. mainensis* were discovered on 18 July 1999 in Pautois Creek and Aumond Creek near Mattawa, Ontario, Canada] Address: Catling, P.M.; 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA

909. **Cating, P.; Brownell, V. (1999):** Riverine Club-tail (*Stylurus amnicola*) new to Ontario. *Argia* 11(3): 9-10. (in English). [record of *S. amnicola* on Big Otter Creek, Elgin County, Ontario, Canada; detailed descrip-

tion of the habitat] Address: Catling, P.M.; 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net

910. **Catling, P.M. (1999):** Notes on *Enallagma travium* westfalli in Ontario. *Argia* 11(1): 26-27. (in English). Address: Catling, P.M.; 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA

911. **Cham, S. (1999):** Roosting behaviour of some British Odonata with notes on the Scarce Chaser *Libellula fulva* Müller. *J. Br. Dragonfly Soc.* 15(2): 58-60. (in English). [summary of observations made over a twenty-year period; "By roosting low down in relatively dense vegetation, *L. fulva* avoids potential predation and disturbance but is also sheltered from adverse weather conditions."] Address: Cham, S., 45 Weltmore Road, Luton, Bedfordshire LU3 2TN, UK

912. **Chelmick, D.G. (1999):** Larvae of the genus *Anax* in Africa (Anisoptera: Aeshnidae). *Odonatologica* 28(3): 209-218. (in English). [11 spp. of the genus *Anax* have been recorded from Africa and its offshore islands. The larvae of 7 of these are compared in this paper, and *A. chloramelas* Ris and *A. congoliath* Fraser are believed to be described for the first time. A simplified key is provided to assist in the identification of the known African species.] Address: Chelmick, D.G., 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK

913. **Chippindale, P.T.; Dave, V.K.; Whitmore, D.H.; Robinson, J.V. (1999):** Phylogenetic relationships of North American damselflies of the genus *Ischnura* (Odonata: Zygoptera: Coenagrionidae) based on sequences of three mitochondrial genes. *Molecular phylogenetics and evolution* 11(1): 110-121. (in English). ["Relationships of North American damselflies of the genus *Ischnura* (Odonata: Zygoptera: Coenagrionidae) were investigated using a total of 1205 bp from portions of three mitochondrial genes: cytochrome b, cytochrome oxidase II, and 12S ribosomal DNA, Parsimony and neighbor joining analyses reveal a monophyletic group consisting of *I. damula*, *I. demorsa*, *I. parva*, *I. posita posita*, *I. posita atezca*, *I. verticalis*, and probably *I. denticollis*, likely reflecting a recent radiation in North America. *Ischnura kellicotti*, *I. barberi*, *I. prognata*, *I. hastata*, *I. ramburi*, and *I. capreola* appear to represent much earlier divergences in the group. Many previous hypotheses of relationships among North American species of *Ischnura* are not supported by the molecular-based analyses. However, there is agreement in many respects between the results of the molecular phylogenetic analyses and the morphologically based conclusions of Kennedy (1919, "The Phylogeny of the Zygoptera," Ph.D. Dissertation, Cornell University, Ithaca). Although results of single-gene phylogenetic analyses often differ, there are very few cases in which there is strong support for conflicting relationships using different partitions of the data. Combined analysis of all three genes yields trees with stronger support overall than the single-gene analyses, and the combined data trees that result from diverse data treatments are congruent with one another in most respects." (Authors)] Address: Chippindale, P.T., Univ. Texas, SW Med. Sch., 5323 Harry Hines Blvd, Dallas TX 75235; USA

914. **Clarke, D. (1999):** The outpost populations of the Banded Demoiselle *Calopteryx splendens* (Harris) in the Solway Firth area, Cumbria: historical perspective and recent developments. *J. Br. Dragonfly Soc.* 15(2): 33-38. (in English). ["The Solway plain of Cumbria holds the most north-westerly populations of this species in Britain [...]. These occupy an extremely isolated position and, strangely, the species seems never to have been recorded in more southerly parts of the county. [...] The nearest colonies on the west of the Pennines are some 120km to the south of the Solway [...]. 1996, individuals were noted up to 20 km east of the known breeding areas on the river Waver. The following years yielded new records, and populations settled by the 1996 dispersal got strong populations of *C. splendens*.] Address: David Clarke, Tullie House Museum & Art Gallery, Carlisle CA3 8TP
915. **Clausnitzer, H.-J. (1999):** Bedeutung von Primärhabitaten für die mitteleuropäische Fauna. Schutz von Primär- oder Sekundärhabitaten?. *Naturschutz und Landschaftsplanung* 31(9): 261-266. (in German, with English summary). ["Importance of Primary Habitats for the Central-European Fauna - Conservation of Primary or Secondary Habitats? In the cultural landscape many animal species occur in secondary habitats and therefore depend on regular management measures. Some species develop a very high abundance rate, with these anthropogenic habitats being their optimum habitat. On the other hand, if land-use and hence the type of impact change, many of these species disappear. With specific management measures nature conservation imitates the former land-use in order to conserve the biodiversity of these secondary habitats. Some animal species still occur in primary habitats without human intervention, although these primary habitats may not necessarily be optimum habitats. Only if known primary habitats exist in sufficient size and number can management measures be reduced. It is therefore necessary that nature conservation should manage both optimum secondary habitats and protect primary habitats where they are of sufficient size." (Author) The requirements of *Orthetrum coerulescens* and *Ceragrion tenellum* on primary habitats are outlined in short.] Address: Clausnitzer, H.-J., Eichenstr. 11, D-29348 Eschede, Germany
916. **Clausnitzer, H.-J.; Clausnitzer, V. (1999):** Dragonflies of the Meru National Park (Kenya). *W.D.A.'s Agrion* 3(1): 7-9. (in English). [ecological and odonatological characterization of the Meru National Park with special emphasis on the riverine Odonata; checklist of 47 species from six localities] Address: Clausnitzer, Viola, Zum Lahnverg 14, D-35032 Marburg, Germany
917. **Clausnitzer, V. (1999):** Description of the final-instar larva of *Notiothemis robertsi* Fraser, 1944 (Anisoptera: Libellulidae). *International Journal of Odonatology* 2(1): 72-82. (in English). ["The final-instar larva is described from exuviae collected in the Kakamega Forest/West Kenya, and is compared with that of *Notiothemis jonesi*. A short description of one exuviae of *Tetrathemis corduliformis* collected at the same locality is given. The genus *Notiothemis* is compared with three other African *Tetrathemistinae*: *Tetrathemis corduliformis*, *T. longfieldae*, *Malgassophlebia aequatoris*. Notes on the habitat of *Notiothemis* and *Tetrathemis corduliformis* are added." (Author)] Address: Clausnitzer, Viola, Zum Lahnverg 14, D-35032 Marburg, Germany
918. **Corbet, P.S. (1999):** An afro-tropical marvel: *Zygonyx natalensis* (R. Martin). *W.D.A.'s Agrion* 3(1): 10. (in English). [This is a wonderful tessera of African odonatology; Philip Corbet describes his personal adventures in the torrential parts of watercourses with *Z. natalensis*. Can Nile crocodiles affect the collection of exuviae?] Address: Corbet, P.S., Crean Mill, St. Buryan, Penzance, Cornwall, UK
919. **Corbet, P.S. (1999):** Dragonflies. Behaviour and Ecology of Odonata. Harley Books. Colchester. ISBN 0 946589 64 X: 829 pp. (in English). [This outstanding book complements and updates "A Biology of Dragonflies", Philip Corbet's highly acclaimed work of over thirty years ago. In the present work, the author provides a critical review of information, both published and unpublished, worldwide, on the behaviour and ecology of Odonata in all stages of the life cycle for both physical and biotic environments. The author integrates information about tropical and temperate species in functional and evolutionary contexts, and reviews facts and ideas in the perspective of current biological thinking. The treatment emphasizes diversity as well as broad patterns of behaviour and should help focus attention on potentially fruitful lines of future enquiry, within and beyond the Odonata. The book can be expected to be uniquely authoritative for decades and an invaluable resource for anyone working in this field.]
920. **Cordero, A. (1999):** Forced copulations and female contact guarding at a high male density in a calopterygid damselfly. *Jour. Insect Behav.* 12(1): 27-37. (in English). ["Territorial males of *Calopteryx damselfly* court females on territories that contain oviposition substrates. Nonterritorial males try to mate without courtship but very rarely obtain matings because females fail to bring up their abdomen to engage genitalia. Here I report the results of observations made on a very high-density population of *Calopteryx haemorrhoidalis* in central Italy. Mating activity was intense, and during 40 h of observation in an 8 m section of the stream, 209 matings were recorded (a maximum of 17 matings h<sup>-1</sup>). Males were continuously disturbing ovipositing females and tried to achieve tandem forcibly. Of 84 cases, males achieved forced tandem in 53, and 49 ended with copulation. Forced tandems were the most common method to obtain a mating in this population (55% of 65 matings). Males guarded females after forced or courtship copulations and, in some cases, maintained physical contact with their mate, by perching on her wings. Confusion was common and males guarded nonmates frequently, which suggests that they were unable to recognize their mate individually." (Author)] Address: Cordero, A., Univ. Vigo, Dept Ecol. & Biol. Anim., Campus Univ., Pontevedra 36005; Spain. E-mail: acordero@u-vigo.es
921. **Cordero Rivera, A.; Andrés Abad, J.A. (1999):** Lifetime mating success, survivorship and synchronized reproduction in the damselfly *Ischnura pumilio* (Odonata: Coenagrionidae). *International Journal of Odonatology* 2(1): 105-114. (in English). ["A small population of *I. pumilio* in NW Spain was studied by marking and resighting in August-September 1996. A total of 142 males and 100 females were captured. Adults of *I. pumilio* appeared in two clear groups, starting on 31 August and 10 September. Population size was estimated about 1-2 individuals from 14 to 30 August but suddenly increased to 30-50 males and 40-120 females from 31



August to 13 September. A large fraction of males (43.6%) were never seen to mate, but only 13 females were never seen in copula. Androchrome females were rare (14 females) and did not differ from gynochrome females in fitness correlates. Copulation duration ranged from 1 to 5 h, and was dependent on time of day. The analysis of survival and recapture rates indicates that males and females have similar survivorship, but sex had a significant effect on recapture probability." (Authors)] Address: Adolfo Cordero Rivera; Jose Angel Andrés Abad, Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, ES-36005 Pontevedra, Spain. E-mail: acordero@uvigo.es; jaandres@uvigo.es

922. **Cordero-Rivera, A.; Utzeri, C.; Santolamazza Carbone, S. (1999):** Emergence and adult behaviour of *Macromia splendens* (Pictet) in Galicia, northwestern Spain (Anisoptera: Corduliidae). *Odonatologica* 28(4): 333-342. (in English). ["Exuviae were found in sheltered places, most commonly in small cavities under the river banks. The species is able to breed in hydroelectric reservoirs that show marked changes in water level and where riverine vegetation is completely absent. At these places exuviae were found on dead trunks and big rocks, usually in a horizontal up-side-down position. In the laboratory, emergence followed the typical aeshnid sequence. Adult, full coloured males showed no yellow spots on abdominal segments 5 and 6, while the spots on segments 4 and 7 were widely variable. 37 adult males of a natural population at the river Lérez were marked. Of these, 12 were resighted 1 to 14 days after marking. Males patrolled over 50-150 m of the river, usually flying straight about 30 cm above the water. Females were observed at the river on 21 occasions, and in 19 cases oviposited as soon as they arrived at water. However, mating was recorded only once during 52 h of observation over 18 days. Two more matings were obtained with a tethered female. Since matings at the Oviposition sites seem to be rare, it is suggested that copulation is performed mainly at the feeding places. Eggs were scattered by the unaccompanied female by dipping the abdomen 3-10 times for no more than 2 min, in spots of the river as far as 1 m from each other. The importance of forested areas for conservation of this species is discussed." (Authors)]. Address: Utzeri, C., Dipartimento di Biologia Animale e dell'Uomo, Università "La Sapienza", Viale dell'Università 32, I-00185 Roma. Italy.

923. **Cordoba-Aguilar, A. (1999):** Male copulatory sensory stimulation induces female ejection of rival sperm in a damselfly. *Proc. Roy. Soc. London, Ser. B, Biol. Sci.* 266(1421): 779-784. (in English). ["Male damselflies possess very specialized genitalia. Females mate multiply and store sperm in two sperm storage organs, the bursa copulatrix and the spermatheca. During copulation, males physically remove the sperm stored in these organs using their genitalia. I document a novel mechanism by which males gain access to the spermatheca in *Calopteryx haemorrhoidalis asturica*. The mechanism is based on male stimulation of the female sensory system that controls egg fertilization and laying. During copulation, the aedeagus (a male genitalic structure indirectly involved in sperm transfer) distorts the cuticular plates in the female genital tract that bear mechanoreceptive sensilla. This stimulation results in sperm ejection from the spermatheca. Aedeagus width is positively correlated with the amount of sperm ejection.

I propose that males have exploited a pre-existing female sensory bias to gain access to otherwise physically unreachable sperm. These results shed light on the issue of the origin of female preferences in current models of sexual selection and on the evolution of genitalia via sexual selection. It is postulated that females might use this process as a form of post-copulatory sexual selection on the basis of males' genitalia." (Author)] Address: Cordoba-Aguilar, A., Univ. Sheffield; Dept Anim. & Plant Sci., Sheffield S10 2TN; S Yorkshire, UK. E-mail: sclab@sheffield.ac.uk

924. **Czachorowski, S.; Buczynski, P. (1999):** Gefährdungen und die Notwendigkeit eines Schutzes der Wasserinsekten in Polen. In: *Polski Towarzystwo Entomologiczne & Instytut Ochrony Przyrody PAN (Eds.): Konferencja Naukowa. "Ochrona owadów w Polsce u progu integracji z Unia Europejska"*, Kraków, 23-24 wrzesnia 1999. ISBN 83-01-08125-2. [Conservation of insects on the threshold of the integration of Poland into the European Community]: 9-10. (in Polish). [German translation of the Polish paper: An assessment is quite difficult due to the lack of up-to-date information on Polish insects. The authors tried to compile all available data from different sources. Compared with the situation in more industrialized countries there seem to be less danger for insects in aquatic habitats. On the basis of the species lists some key stone species for nature (species) conservation purposes were derived (but not presented in the paper).] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PO-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

925. **Czachorowski, S.; Buczynski, P. (1999):** [Koeffizient der Biozönosenatürlichkeit - ein potentielles Instrument zur Bewertung des ökologischen Zustandes der Moore in Polen, am Beispiel der Odonata und Trichoptera]. *Akademia Polnicza w Lublinie, Pleski Park Narodowy, Polski Towarzystwo Hydrobiologiczne: Problemy aktywnej ochrony ekosystemów wodnych i forowiskowych w polskich parkach narodowych (materiały międzynarodowej konferencji)*. 8-9 października 1999 roku. Okuninka n/Jeziorem Białym Włodawskim. ISBN 83-7259-008-7: 16-17. (in Polish). [To assess bog habitats in Poland the authors developed an coefficient of naturality. It intends to provide information on the situation of bogs for nature conservation purposes with special emphasis on Odonata and Trichoptera. A German translation of the paper is available from the author or IDF (address see above).] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PO-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

926. **Czaplak, D. (1999):** *Ophiogomphus colubrinus* on the Ausable River. *Argia* 11(3): 11. (in English). [report on discovery of *O. colubrinus* in the framework of the 1999 DSA meeting] Address: Czaplak, D.S., 13641 Ambassador Drive, Germantown, MD 20874, USA. E-mail: dma3@aol.com

927. **Dahl, J.; Greenberg, L. (1999):** Effects of prey dispersal on predator-prey interactions in streams. *Freshwater biology* 41(4): 771-780. (in English). ["1. We studied the effect of mesh size (6 and 3 mm) on interactions between brown trout (*Salmo trutta*) and benthic invertebrates in enclosures placed in a stream in southern Sweden. We also compared how different prey

exchange rates affected interactions between trout and invertebrates. 2. Trout had strong impacts on some benthic taxa, and different mesh sizes produced different patterns. Trout affected the abundance of 10 of the 21 taxa examined, six in enclosures with 3 mm mesh and six in enclosures with 6 mm mesh. The abundance of nine of the prey taxa was lower in the presence of trout, only leptocerids were more numerous in the presence of trout. 3. Our measurements of prey immigration/emigration, together with trout diet data, suggest that direct consumption by trout, rather than avoidance behaviour by prey, explains most decreases in prey abundance. There was avoidance behaviour by only two of the twenty-one prey taxa, with trout inducing emigration of the mayflies *Baetis rhodani* and *Paraleptophlebia* sp. 4. Trout indirectly increased periphyton biomass in both 3 and 6 mm enclosures. The effect of trout on periphyton was probably due to strong effects of trout on the grazer, *Baetis rhodani*, *Heptagenia* sp. and *Paraleptophlebia* sp. 5. Our results suggest that mesh size, through its effects on exchange rates of prey, may affect interactions between predators and prey in running waters, but that the effects of dispersal and predation on invertebrates are taxon specific." (Authors) A few remarks are made on *Calopteryx* sp. consumed by the trout, and the effects of mesh size on the immigration of invertebrates including *Calopteryx* sp. into enclosures.] Address: Dahl, J., Department of Entomology, Cornell University, Ithaca, NY, 14853, USA. E-mail: jd76@cornell.edu

928. **Daigle, J.J. (1999):** Say's Spiketail from Florida. *Argia* 11(2): 14. (in English). [records from two localities in Florida of the rare American *Cordulegaster sayi*] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: daiglej@dep.state.fl.us

929. **Damme, K. van; Dumont, H. (1999):** A drought-resistant larva of *Pantala flavescens* (Fabricius, 1798) (Odonata: Libellulidae) in the Lençóis Maranhenses NE-Brazil. *International Journal of Odonatology* 2(1): 69-76. (in English). ["A single male of *Pantala flavescens* was collected by chance with dry mud in the bed of a pond in the Lençóis Maranhenses (N-E Brazil) which had been dry for several months. It was noticed as a larva in an aquarium about seven days after the mud first had been wetted and it was then reared to the imaginal stage. Fifteen measurements were taken on three larval skins that could be recovered. These were fitted to literature data on larval development that had first been converted to exponential growth curves, in an effort to determine whether the drought-resistant stage had been an egg or a larva. It was found that that a drought-resistant egg was improbable, and that the larva had probably survived drought as an early instar (2-4). It is argued that early larval tolerance to drought may be common in *Pantala*, and may contribute as much to its success in semiarid environments as its rapid larval development." (Author)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

930. **D'Aquilar, J. (1999):** Les description originales des Odonates d'Europe 1. Les espèces linnéennes. *Martinia* 15(1): 30-40. (in French, with English summary). [the original descriptions of Odonata done by C. Linné are documented as facsimile] Address: d'Aquilar, J., 7, rue Adrien Lejeune, F-93170 Bagnolet, France

931. **D'Aquilar, J. (1999):** Les description originales des Odonates d'Europe 2. Les espèces et les genres de Fabricius. *Martinia* 15(2): 55-68. (in French, with English summary). [the original descriptions are documented as facsimile; explanations are given about terminology or the written form of the genera *Agrion* and *Aeshna*] Address: d'Aquilar, J., 7, rue Adrien Lejeune, F-93170 Bagnolet, France

932. **d'Aquilar, J. (1999):** Les description originales des Odonates d'Europe. 3. Fourcroy, Antoine François de (1755-1809). *Martinia* 15(3): 99-103. (in French, with English summary). [documentation of the original description of *Ophiogomphus cecilia*; some biographic information on Fourcroy] Address: d'Aquilar, J., 7, rue Adrien Lejeune, F-93170 Bagnolet, France

933. **David, S. (1999):** Structure of the communities of dragonflies (Insecta: Odonata) and their biotops in the inundation of the Hron river potamal (SW Slovakia). *Krajinnöekologické plánovanie na Prahu. 3. tisícročia. 10.-11. maj 1999, Smolenice.* (Hrnciarová, T. & Z. Izakovicová (Eds.): 161-170. (in Slovakian, with English summary). ["Odonatological investigations were carried out in the Hron river basin in the lower part, a 75 km long section. We selected 26 stationary sites in the inundation of the study area (river, dead channels, gravel pits). The investigations were based on a total of 1564 individuals belonging to 33 species, which represents 48.83% of the dragonfly fauna of the Slovak Republic. The structure of the communities was analysed on the basis of the coenological characteristics established in view of the method used. These characteristics were in particular: species composition, species dominance and frequency, diversity and equitability. The degree of similarity of the aquatic biotopes similarity was estimated by Wishart's induce. The data were evaluated by cluster analysis (using the NCLAS programme with the complete linkage method). The structure of dragonfly communities was discriminated on the basis of their species composition. 4 groups of biotopes were separated on the first level of division. The same method was used to classify the odonate communities. Three cenoses could be separated: *Gomphus* - *Calopteryx splendens*, *Orthetrum* - *Libellula depressa*, and *Lestes* - *Sympetrum* - *Aeshna* (affinis, mixta) - cenosis." (Author)] Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. E-mail: david@pribina.savba.sk

934. **De Marco, P.; Latini, A.O.; Reis A.P. (1999):** Environmental determination of dragonfly assemblage in aquaculture ponds. *Aquaculture Research* 30(5): 357-364. (in English). ["Odonate larvae are important components of aquatic environments in tropical areas. They also develop in aquaculture ponds, where they can cause economic losses. In this study, we have tried to describe the general community patterns in aquaculture ponds in Vicosá, south-eastern Brazil. Our aim is to evaluate how environmental and bionomic factors can determine their composition and species richness. We identified two groups of species (plants and bottom-dwellers) based on larval microhabitat preferences. Vegetation determines the occurrence of some species whose adults select certain plants for oviposition. The ponds with more extreme conditions (extensive cover of plants or vegetation absent) showed lower species richness than those with intermediate conditions, *Coryph-*

aeshna adnexa and Brachymesia furcata were of larger size but had low abundance or were only collected accidentally. Species of intermediate size (*Tramea cophysa*, *Micrathyria* spp., *Orthemis discolor* and *Erythrodiplax fusca*) were more abundant and are considered as potential predators of fish fry." (Authors)] Address: De Marco, P., Univ Fed. Vicosa, Dept Biol. Geral., BR-36571000 Vicosa; MG; Brazil

935. **De Marmels, J. (1999):** Rare Venezuelan dragonflies (Odonata) evaluated for their possible inclusion in the national Red Data Book. *International Journal of Odonatology* 2(1): 55-67. (in English). ["Of the 480 species and subspecies listed from Venezuela up to December 1996, 113 are "rare", i.e. with three or less individual records, or are known from three or less localities. Thirty-eight of them are distributed north and northwest of the Orinoco where 90% of the human population lives and, hence, negative impact on the ecosystems is more evident. The status of conservation of these species was assessed by applying the criteria published by the World Conservation Union (IUCN), in 1994. Sixteen species and subspecies are proposed for inclusion in the Venezuelan Red Data Book, viz. four Polythoridae, four Megapodagrionidae, one Lestidae, one Pseudostigmatidae, four Gomphidae, one Aeshnidae and one Libellulidae. Of the evaluated taxa, one genus and seven species are Venezuelan endemics. Forest fires, deforestation, pollution, water catchment constructions and human invasion of protected areas are some of the main factors which threaten these taxa." (Author) The following species are commented: *Heteragrion macilentum* Hagen in Selys, 1862; *Palaemnema nathalia* Selys 1886; *Leptagrion siqueirai* Santos 1968; *Progomphus polygonus* Selys, 1879; *Brechmorhoga innupta* Racenis 1954; *Cora inca* Selys 1873; *Cora xanthostoma* Ris 1918; *Euthore fastigiata* (Selys 1859); *Polythore terminata* Fraser 1946; *Phyllogomphoides brunneus* Belle 1981; *Andaeschna timotocuica* De Marmels, 1994; *Sympetrum evanescens* De Marmels, 1992; *Mecistogaster modesta* Selys 1860; *Agriogomphus jessei* (Williamson 1918); *Erpetogomphus sabaeticus* Williamson 1918; *Phyllogomphoides semicircularis* (Selys, 1854); *Archilestes tuberalatus* (Williamson, 1921); *Philogenia ferox* Racenis 1959; *Philogenia polyxena* Calvert 1924; *Sciotropis cyclanthorum* Racenis 1959; *Sciotropis lattkei* De Marmels 1994] Address: De Marmels, J., Instituto de Zoologia Agricola, Facultad de Agronomia, Universidad Central de Venezuela, Apartado 4579, Maracay 2101-A, Venezuela.

936. **Decocq, O.; Pieron, J. (1999):** Des larves de *Cordulegaster boltoni* (Insecta: Odonata) sous épicéa (*Picea abies*) dans le Parc naturel Viroin-Hermeton. *Gomphus* 15(2): 63-68. (in French, with English and Flemish summary). ["In three different small streams of the Belgian Ardennes (Viroinval, Namur province), larvae of *C. boltoni* were found between small plantations of spruce (*Picea abies*) surrounded by deciduous woodland. So, the question of larval development of that species under conifers is renewed; they might have a greater influence on imagines (egg laying, hunting, "patrolling" flights), or for emergence [...] Some favourable management measures in forest areas are proposed." (Authors)] Address: Decocq, O., Centre Marie-Victorin, rue des Ecoles 21, B - 5670 Vierves-sur-Viroin, Belgium; Pieron, J., rue Vandervelde 74, B - 6182 Souvret, Belgium

937. **Delft, J. van; Goudsmits, K. (1999):** *Gomphus vulgatissimus* in the basin of the Dommel in 1998. *Brachytron* 3(1): 12-14. (in Dutch, with English summary). ["The status and habitat of a poorly known population of *G. vulgatissimus* south of Eindhoven in the province of Noord-Brabant is discussed. It is found in a typical lowland stream with clear, unpolluted water and with a characteristic assembly of brook inhabiting plants, insects and fish. The population appears to have grown, possibly as a result of a structural restoration of the stream in 1994. An unequal sex-ratio, 58% of 102 collected exuviae was male, is possibly explained by the early search dates (10 to 23 May 1998)." (Authors)] Address: Goudsmits, K., Eerste Dorpstraat 7a, NL-3701 HA Zeist, The Netherlands

938. **Dijkstra, K.-D.; Dingemanse, N.L. (1999):** Flying Goldfish - An impression from Kibale Forest, Uganda. *W.D.A.'s Agrion* 3(1): 13. (in English). ["...impression of how two European dragonflywatchers introduced themselves to an odonatological new world."] Address: Dijkstra, K.D., Oude Rijnburgerweg 38, NL-2342 BC Oegstgeest, The Netherlands

939. **Dijkstra, K.-D. (1999):** Langs Franse stromen (2). *NVL Nieuwsbrief. Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie* 3(1): 7-8. (in Dutch). [second part of a report from a odonatological trip to French rivers (Gardon, Vidourle, Tarn); special emphasize was given to *Oxygastra curtisii*, *Gomphus graslinii*, and *Thecagaster bidentata*] Address: Dijkstra, K.D., Oude Rijnburgerweg 38, NL-2342 BC Oegstgeest, The Netherlands

940. **Dijkstra, K.-D.B.; Mostert, K.; Velzen, J.-W. van; Witte, R.H. (1999):** Recent developments in the dragonfly fauna of the dunes of Holland and Zeeland. *Brachytron* 3(1): 15-29. (in Dutch, with English summary). ["The coastal dunes are isolated from the species-rich habitats on sandy soils inland by a belt of relatively inhospitable polders with peaty and clay soils. They also form an almost unbroken natural corridor through which dragonfly migration is possible, whilst the sea is a barrier that forces migrants from the east to settle. Remarkable invasions, colonizations and vagrancies by Odonata during the last five years along the Dutch coast, excluding the Wadden Sea islands, are listed. There were large invasions of *Lestes barbarus*, *Aeshna affinis*, *Sympetrum danae*, *S. flaveolum* and *S. fonscolombii*, all of which reproduced in the area subsequently. *Sympecma fusca*, *Lestes dryas*, *Ischnura pumilio*, *Pyrrhosoma nymphula*, *Brachytron pratense*, *Aeshna isocetes*, *Libellula depressa*, *Crocothemis erythraea* and *Leucorrhinia rubicunda* bred successfully. All of these species were either new in this sense, or had been absent for many years. *Calopteryx splendens*, *Lestes virens*, *Hemianax ephippiger*, *Gomphus vulgatissimus*, *Somatochlora metallica* and *Leucorrhinia pectoralis* reached the region as vagrants, thus proving they are capable of reaching new habitats when these are created. Habitat restoration, increasing observation intensity, prevailing weather and expanding ranges are discussed as factors to explain the new records. Most of the treated species appear to have reached the area with the help of easterly winds and fine weather. Habitat restoration has principally created opportunities for pioneer species and those adapted to fluctuating water levels. It is suggested that permanent, mesotrophic lakes should be restored in order to bring back species that



are extinct in the dunes, like *Cordulia aenea* and *L. pectoralis*." (Authors)] Address: Dijkstra, K.D., Oude Rijnburgerweg 38, NL-2342 BC Oegstgeest, The Netherlands

941. **Dommanget, J.-L. (1999):** 3ième séminaire: Inventaire et cartographie des invertébrés comme contribution à la gestion des milieux naturels français, Besançon, juillet 1999. Aspects généraux et odonatologiques. *Martinia* 15(3): 89-98. (in French, with English summary). [134 people gathered the meeting in Besançon, France to discuss about mapping and management of invertebrates. The Société Française d'Odonatologie presented itself as society, and four posters with the following items: "Rémi Chalmel: Les basins de rétention: des milieux aquatiques complémentaires?", "Samuel Jolivet: Intérêt de l'échantillonnage des exuvies pour l'étude et la gestion conservatoire des odonates", "Thomas Williamson: La micro-gestion, une solution pour la préservation des invertébrés aquatiques", and "Jean-Louis Dommanget: L'inventaire cartographique des odonates de France: situation actuelle".] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

942. **Dommanget, J.-L.; Williamson, T. (1999):** Réactions de quelques odonates en forêt de Rambouillet lors de l'éclipse de soleil due le 11 août 1999 (Département des Yvelines). *Martinia* 15(3): 79-82. (in French, with English summary). [The behaviour of *Ceragrion tenellum* (1m, 1f), *Orthetrum coerulescens* (2f), and *Sympetrum sanguineum* (1f, imm.) was observed before, during, and after the eclipse.] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

943. **Donnelly, N. (1999):** 1999 has been a bumper year in New York. *Argia* 11(3): 13-14. (in English). [New York, (Wyoming), USA, *Somatochlora kennedyi* Walker 1918, *Neurocordulia yamaskanensis* (Provancher, 1875), *Somatochlora tenebrosa* (Say 1839), *Somatochlora walshii* (Scudder, 1866), *Somatochlora williamsoni* Walker 1907, *Argia apicalis* (Say 1839), *Enallagma basidens* Calvert 1902, *Boyeria grafiana* Williamson, 1907, *Cordulegaster erronea* Selys 1878, *Gomphus fraternus* (Say 1839), *Gomphus vastus* Walsh, 1862, *Ophiogomphus anomalus* Harvey, 1898, *Ophiogomphus howei* Bromley 1924] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

944. **Donnelly, N. (1999):** A short Texas collecting trip. *Argia* 11(2): 10- [report on a trip in April 1999 including records of *Pseudoleon superbus*, *Erythemis pleja*, *Macromia costalis*, and *Epithea costalis*; special notice is given to the problem for distinguishing *E. costalis* and *E. semiaquea*] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

945. **Donnelly, N. (1999):** *Argia* 11(1). *Argia* 11(1): 40 pp. (in English). [a lot of additional information, not reviewed separately in this issue of OAS on meetings, book announcements, etc.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA

946. **Donnelly, N. (1999):** Back to Borneo. *Argia* 11(1): 8-11. (in English). [rainy season trip to Borneo with annotations to *Macromia euterpe* Laidlaw 1915, *Neurobasis cyaneipennis* (Förster 1897), *Rhinoneura*

*villosipes* Laidlaw 1915, *Vestalis beryllae* Laidlaw 1915, *Euphaea* spp., *Rhinagrion elopuræ* (McLachlan in Selys, 1886), *Rhinocypha humeralis* Selys 1873, *Rhinocypha cucullata* Selys 1873, *Rhinocypha biseriata* Selys 1859, *Stenagrion dubium* (Laidlaw 1912)] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA

947. **Donnelly, N. (1999):** Dot-map project update. *Argia* 11(1): 30-31. (in English). [compilation of current work on dot-maps for USA Odonata, and Canada] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA

948. **Donnelly, N. (1999):** History of Odonata study in north America - James G. Needham. *Argia* 11(1): 24-26. (in English). [many interesting information on Needham and American odonatology. Enjoy the paragraphs on the 'Dragonets': "These stalwart ladies didn't hesitate to collect the more elusive gomphids with a shotgun!", and early females in odonatology.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA

949. **Donnelly, N. (1999):** Migration of dragonflies: a moving topic in 1999. *Argia* 11(3): 17-19. (in English). [compilation of E-mails with notices on migrating Odonata in USA; in most cases referring to *Sympetrum corruptum*] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. tdonnel@binghamton.edu

950. **Donnelly, N. (1999):** Odonatists in the news. *Argia* 11(3): 20. (in English). [brief compilation of two reports in Canadian Geographic on Paul Brunelle, and in the Hartford (Connecticut) Courant on Dave Wagner] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. tdonnel@binghamton.edu

951. **Dortel, F. (1999):** Étude odonatologique et floristique de la vallée de la Chézine (Nantes, St. Herblain, département de la Loire-Atlantique). *Martinia* 15(3): 104. (in French). [In 1998, 23 species could be observed, of which *Calopteryx virgo meridionalis*, *Orthetrum brunneum*, and *O. albistylum* are mentioned. The latter is very rare in the Département.] Address: Dortel, F., 5, Avenue du Docteur Touaille, F-44100 Nantes, France

952. **Dortel, F.; Branger, F. (1999):** Nouvelles observations d'*Epithea bimaculata* (Charpentier, 1825) dans le département de l'Indre. *Martinia* 15(3): 88. (in French). [discovery of an exuvia and an imago on May 23, 1999 of *E. bimaculata* on the Étang de la Gabrière, municipality of Lingé.] Address: Dortel, F., 5, avenue du Docteur Touaille, F-44100 Nantes, France

953. **Dudgeon, D. (1999):** Tropical Asian streams. Zoobenthos, ecology and Conservation. Hong Kong University Press. ISBN 962 209 469 4: 830 pp. (in English). [Everyone interested in Asian (macro-) zoobenthos, and stream ecology should be enthusiastic about this book. It is a compendium of the current knowledge on the subject. The compilation of a 160 pages - bibliography make the book to a cornerstone in the world freshwater biology. 8 chapters will give you an overview on the ecological conditions in Asia, provides introductory chapters on the orders of (macro-)zoobenthos including Odonata on pages 291-310, will enable you to key out the zoobenthos on the family le-

vel, and will give you good drawings of some larvae on the species level. You will get excellent information on anthropogenic threats on the Asian rivers, will get advice on experimental design and detection of anthropogenic impacts in streams, and process-oriented studies in stream ecology. Some concluding remarks are followed by an excessive bibliography, and indexes to subjects and organisms. The Odonata larvae pictured are: *Euphaea decorata*, *Protosticta taipokauensis*, *Philoganga velusta*, *Rhinocypha perforata*, *Mnais mnome*, *Tetracanthagyna* sp., *Ophiogomphus sinicus*, *Helio-gomphus scorio*, *Ictinogomphus pertinax*, and *Zygonyx iris*.] Address: Hong Kong University Press, 14/F Hing Wai Centre, 7 Tin Wan Praya Road, Aberdeen, Hong Kong

954. **Dunkle, S. (1999):** Odonata of Pyramid Lake, Nevada. *Argia* 11(1): 23-24. (in English). [documentation of a list of Odonata from a book on fishes and fishery of Nevada from 1962] Address: Dunkle, S., Biol. Dept, Collin County Community College, 2800 E, Spring Creek Parkway, Plano, TX 75074, USA

955. **Edelaar, P.; Niesen, H. (1999):** De Maanwaterjuffer *Coenagrion lunulatum* in de Noord-Hollandse duinen. *NVL Nieuwsbrief. Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie* 3(3): 3-4. (in Dutch). [Coenagrion lunulatum in the dunes of northern Netherland; detailed documentation of the 1999 records] Address: Edelaar, P., In de Potvis, De Dageraad 3, NL-1797 SK Den Hoorn (Texel), The Netherlands. E-mail: edelaar@nioz.nl

956. **Ellenrieder, N. von; Muzón, J. (1999):** The Argentinean species of the genus *Perithemis* Hagen (Anisoptera: Libellulidae). *Odonatologica* 28(4): 385-398. (in English). ["The present work has two aims: to give an updated revision of the genus in Argentina, including a key, and to propose specific characters not included in previous revisions. *Perithemis waltheri* Ris is considered as a junior synonym of *P. icteroptera* (Selys). The first description of the last larval instar of *P. icteroptera*, and a redescription of the last larval instar of *P. mooma* from Argentina are included." (Authors) *Perithemis* *lais*, *P. thais*] Address: Muzon, J., Instituto de Limnología "Dr. Raul A. Ringuelet", C.C. 712, 1900 La Plata. Argentina E-mail: muzon@ilpla.edu.ar

957. **Endersby, I. (1999):** Disturbing news from "Downunder". *W.D.A.'s Agrion* 3(2): 23. (in English). [reports on the damage of Wingecarribee Swamp in New South Wales, the southmost locality for *Petalura gigantea*, on 8th August 1998, and the habitats of *Hemiphysalia mirabilis* at Wilson's Promontory suffered by a serious drought. "Over the centuries the species must have survived many periods of drought and we must hope it will survive the present one"] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@werple.net.au

958. **Ewers, M. (1999):** Die Libellen zwischen Weser und Ems. *Schriftenreihe des Staatlichen Museums für Naturkunde und Vorgeschichte Oldenburg* 12: 112 pp. (in German). [detailed account on the odonate fauna of the northwestern part of Germany; all species (61) were treated monographically with information on diagnostic morphological structures, phenology, habitat, threat, map of distribution, and colour picture. On pages 8 to 38 some introductory information on general biology

of Odonata, and on typical dragonflies of different habitat types are given.] Address: Isensee Verlag, Haarenstr. 20, D-26122 Oldenburg, Germany

959. **Ezenwaji, H.M.G. (1999):** The abundance and trophic biology of *Clarias albopunctatus* Nichols and LaMonte, 1953 (Osteichthyes: Clariidae) in a tropical floodriver basin. *Hydrobiologia* 392(2): 159-168. (in English). ["The abundance, food and feeding biology of *Clarias albopunctatus* was studied over a period of 17 months in the lower River Anambra, Nigeria. The catfish was more abundant in late dry season (January-March) and early rainy season (April-June) than in other periods of the year in the small-sized Akwu pond than in other habitats. Feeding intensity was higher at night and at dawn (20.00-05.00 h) than during the day (08.00-17.00 h) in the 151-200 mm TL size class and during the rainy season (April-September). There was no sex-dependent variation in feeding intensity. Insects were the predominant food, followed by crustaceans. Of primary importance were Chironomidae (mainly *Chironomus* spp. and *Tanytus* sp.), Odonata nymphs, *Dytiscus* sp., mosquito larvae and pupae, *Gyrinus* sp., *Daphnia* sp., Ostracoda and *Tilapia* fry. Qualitative food composition and food richness were size, but not sex- or season-dependent. Diet breadth increased with catfish size and during the rainy season. The feeding behaviour of the catfish include foraging, shovelling and surface feeding. Abundant food and ability to switch to more available items enable *C. albopunctatus* to maintain its abundance in the River Anambra." (Author)] Address: Ezenwaji, H.M.G., Univ. Nigeria; Dept Zool., Fisheries & Hydrobiol Res Unit, POB 3140; Nsukka; Nigeria

960. **Ferreras-Romero, M. (1999):** Biodiversity of rheophilous Odonata in southern Spain. *Odonatologica* 28(4): 417-420. (in English). ["Biodiversity is a complex issue, frequently simplified by equating it with species richness. In this paper an assessment of river systems biodiversity in southern Spain is carried out. Four systems here analysed run through mountains of medium altitude and they are remarkable for their acceptable species richness, high proportion of spp. with a restricted western Mediterranean distribution and low ratio of spp. per genus. Species distinctness was estimated according the schemes of R.I. Vane-Wright et al. (1991, *Biol. Conserv.* 55: 235-254) and R.M. May (1990, *Nature*. Lund. 347: 129-130), based on the information content of the topology of a hierarchical classification. (Author)] Address: Ferreras-Romero, M., Departamento de Biología Animal (Zoología), Facultad de Ciencias, Universidad de Córdoba, Avda. San Alberto Magno s/n, ES-14004 Córdoba, Spain

961. **Förster, S. (1999):** The Dragonflies of Central America, exclusive of Mexico and West Indies. A guide to their identification. *Odonatological monographs* 2 (ISBN 3-9804366-0-8): 141 pp. (in English). ["This is a collection of up to date identification keys to the more than 370 species of dragonflies known to occur on the mainland of Central America. The keys are supplemented with drawings as well as brief descriptions of general appearance, behavior, and ecology of most of the genera. Plates introducing to dragonfly morphology, a checklist of species, glossary, bibliography, and an index are also included." (Author). The printing of this key was promoted by the INTERNATIONAL DRAGONFLY FUND.]

Address: Orders should be directed to: Steffen Förster, c/o Marina Cords, PO Box 2579, Kakamega, Kenya

962. **Forbes, M.R.; Muma, K.E.; Smith, B.P. (1999):** Parasitism of *Sympetrum* dragonflies by *Arrenurus planus* mites: maintenance of resistance particular to one species. *Int. jour. parasitology* 29(7): 991-999. (in English). ["Using field surveys and histological methods, we show that a dragonfly species (*Sympetrum internum*) has an effective resistance, not seen previously in other odonates, to a mite parasite (*Arrenurus planus*). This mite is a generalist parasite known to effectively engorge on several other odonate species. We argue that selection is likely weak, favouring counter adaptations of *Arrenurus planus* to *Sympetrum internum*, in part because other host species are available. We further argue that this pattern is possibly linked to the fact that the mode of resistance is relatively novel, and because *Sympetrum internum* is rare compared to another host species, *Sympetrum obtusum* at our study site. Although resistance of *Sympetrum internum* is quite effective against *Arrenurus planus*, *Arrenurus planus* larvae still attach to this species, but less often than they attach to *Sympetrum obtusum*. Attachment to unsuitable hosts may reflect constraints operating on *Arrenurus planus* larvae during host discovery. Such factors influencing the evolution of resistance, when several potential host species exist, have not received much attention." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

963. **Fuhrmann, K. (1999):** Libellenbeobachtungen in Nordvorpommern und angrenzenden Gebieten. *Libellula* 18(1/2): 49-53. (in German, with English summary). ["From 1994 to 1996, 39 dragonfly species were recorded at 28 different localities in the northeastern part of Mecklenburg-Vorpommern, Germany. Emphasis is given to the northernmost occurrence of *Erythromma viridulum* in Europe, *Anax imperator* and *Sympecma fusca* on Baltic islands, as well as a locality with a large population of *Leucorrhinia albifrons*." (Author)] Address: Fuhrmann, K., Elritzenweg 23a, D-26127 Oldenburg, Germany. E-mail: kay.fuhrmann@t-online.de

964. **Garrison, R.W. (1999):** The genus *Neoneura*, with keys and description of a new species, *Neoneura jurzitzi* spec. nov. (Zygoptera: Protoneuridae). *Odonatologica* 28(4): 343-375. (in English). ["A synopsis of all 23 spp. includes keys to both sexes, based primarily on caudal appendage morphology in males and morphology of the hind lobe of the prothorax in females, diagnoses, distributional notes and diagnostic illustrations. *N. jurzitzi* sp.n. (holotype male: Brazil, Santa Catarina state. Nova Teutonia, 5-XI-1942, in UMMZ) is described, and the male and female of *N. rufithorax* Selys are described based on specimens from Peru." (Author)]. Address: Garrison, R.W., Research Associate, Natural History Museum of Los Angeles County. 900 Exposition Blvd., Los Angeles, CA 90007, United States

965. **Godreau, V.; Bornette, G.; Frochot, B.; Amoros, C.; Castella, E.; Oertli, B.; Chambaud, F.; Obersti, D.; Craney, E. (1999):** Biodiversity in the floodplain of Saone: a global approach. *Biodiversity and Conservation* 8(6): 839-864. (in English). ["Biodiversity of European floodplains is seriously threatened mainly due to

(1) modifications of river courses such as channelisation or embankments, and (2) changes in traditional agricultural practices (i.e. usually pastures), into intensive production using drainage and fertilisation. An upstream-downstream survey of the Saone floodplain (France) has been done to identify the contribution of habitats to the floodplain biodiversity. Selected taxa were aquatic and terrestrial vegetation, Odonata, Coleoptera, Amphibians, and birds. The taxa were sampled in different habitat types that were: forests, grasslands and aquatic habitats. Tributary confluences with the river and cut-off channels contributed greatly to the floodplain diversity according to their invertebrates and aquatic vegetation communities. The abundance of rare species (benefitting of a national or regional protection status) was the highest in hygrophilous grasslands. Moreover, we demonstrated that diversity of breeding bird communities was correlated with the size of these habitats. We demonstrated also that alluvial forests contributed to maintain some particular species as Middle-spotted Woodpecker (*Dendrocopus medius*), while new plantations were colonized by openland bird communities sensible to the edge effect. Grassland fragmentation for agriculture appeared to be a major cause in biodiversity loss. Any alteration of the floodplain dynamics must be avoided to preserve the present diversity of riverine wetlands." (Authors)] Address: Godreau, V., Univ Bourgogne; Lab. Ecol. Evolut., Batiment Gabriel; F-21000 Dijon; France. E-mail: vgodreau@u-bourgogne.fr

966. **Goffart, P. (1999):** Compte-rendu de la Journée de rencontre et d'étude sur le thème "Libellules de Belgique", du dimanche 14 mars 1999, à Louvain-la-Neuve. *Gomphus* 15(2): 96-98. (in French). [report on the meeting of the Belgian odonatologists; the lectures are shortly summarized: • Do Zygoptera behave like lizards (Autotomie among Odonata) (Marijan de Block & Robby Stoks) • The dragonflies of the swamps of Harchies-Hensies-Pommeroeul (Thierry Paternoster) • Sexual selection in *Sympetrum striolatum* (Famke Valck & Robby Stoks) • Actual situation of the Odonata of the bogs of Wallonia (Phillip Goffart) • One year of monitoring Odonata in the Kalmthoutse Heide (Luk Meuris) • Dragonflies of the valley of the River Samme and the River Senette: results of the inventarisation and measures for conservation (Roland de Schaetzen) • Sperm competition in *Lestes sponsa*: will be the final the first? (Kris Lauwers) • Slide show: The stars among the dragonflies, and the attraction for photographers (Geert De Knijf & Phillip Goffart)] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvai-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

967. **Goffart, P. (1999):** Compte-rendu de l'excursion aux mares de Ben-Ahin (vallée de la Meuse) du 28 juin 1997. *Gomphus* 15(2): 98-99. [report on a trip to the lakes of Ben-Ahin (Wallonia, Belgium) with checklist of the species observed, e.g. *Coenagrion pulchellum*, *Ceragrion tenellum*, *Libellula fulva*, and *Brachytron pratense*] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvai-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

968. **Goffart, P. (1999):** Compte-rendu des observations d'espèces prioritaires d'Odonates en Wallonie durant la saison 1998, dans le cadre du programme d'Inventaire et Surveillance de la Biodiversité (ISB). *Gomphus* 15(2): 86-95. (in French, with English and



Flemish summary). ["This report gives an account of observations made in 1998 by the Gomphus Working Group collaborators on Odonata priority species, pointed out in the "Biodiversity Survey and Monitoring" programme in Wallonia because of their great rarity and/or decline. It also presents collected information dealing with rare southern species, expanding to the north, during the same flight-season. New reproductive populations were discovered for the following species: *Coenagrion mercuriale*, *Onychogomphus forcipatus*, *Aeshna subarctica*, *Oxygastra curtisii*, and *Orthetrum coerulescens*." (Author). In addition, *Sympecma fusca*, *Lestes dryas*, *L. barbarus*, *Coenagrion hastulatum*, *C. scitulum*, *C. pullchellum*, *Gomphus vulgatissimus*, *Brachytron pratense*, *Anax parthenope*, *Thecagaster bidentata*, *Somatochlora arctica*, *S. flavomaculata*, *Libellula fulva*, *Crocothemis erythraea*, *Orthetrum brunneum*, and *Sympetrum fonscolombii* are treated in some detail.] Address: Goffart, P., Unité d'Ecologie et de Biogéographie (UCL) 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

969. **Goffart, P. (1999):** Participer au programme d'Inventaire et de Surveillance de la Biodiversité (ISB) en Wallonie. *Gomphus* 15(2): 100-104. (in French). [the possibilities to contribute to the inventarisation of biodiversity in Wallonia (Belgium) are outlined in detail; a list of habitats (zones humides de grand intérêt biologique) and of special odonatological value, is annexed] Address: Goffart, P., Unité d'Ecologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

970. **Goodwin, F. (1999):** An on-going study of the relationships between ants, birds, and dragonflies during the phenomenon of swarms at Massachusetts Audubon Society's Ipswich River Wildlife Sanctuary. *Argia* 11(2): 14-15. (in English). ["In the summer of 1997 I was given the challenge to identify and to photograph species of birds and dragonflies involved in swarm feeding on small flying insects emerging from the soil. [...] The area of activity was on grass fields and lawns near the top of the drumlin at the Ipswich River Wildlife Sanctuary (IRWS) from mid-afternoon to dusk. The swarms mainly consisted of 30 to over 200 dragonflies with the swallows and swifts mixing in. [...] The first swarm of 1998 was observed on August 6 at 16:00 hrs. with over 100 dragonflies mixing in with swallows and swifts, feeding about 150 feet over a field forming the edge of the drumlin. [...] The swarm phenomenon at IRWS occurs only when certain weather conditions exist; heat, fairly high humidity, and moist soil. These are the conditions needed for the ants to leave the nest for their mating flights. The moist soil seems to be the main key. The queens need the soil to be softened for re-entry. The males (if they make it back to the ground) die. Two species of ants involved as prey in the feeding swarms have been identified as *Lasius neoniger*, the Labor Day Ant and, *Solenopsis molesta*, a species of fire ant. Two different species of subterranean ants were also caught. [...] The last swarm was observed on September 27, 1998. 30 to 50 dragonflies were flying just above our front lawn feeding on a flight of ants. I was able to net ten: 5 were *Aeshna umbrosa*, (all males); 4 were *A. clepsydra*, (3 males 1 female), and 1 was *A. verticalis*, (male). All were in rough shape with torn wings and missing body parts. During the 1998 season I recorded 16 swarms and netted 223 dragonflies: *Aeshna canadensis*, *A. clepsydra*, *A. constricta*, *A. tu-*

*berculifera*, *A. umbrosa*, *A. verticalis*, *A. junius*, *Somatochlora williamsoni*. Also I observed 2 *Pantallas* within the swarms, no species identification was made. Although the *Pantallas* feed with the other species they are not readily accepted. Several times one of the other species made a pass as if to attack. The *Pantallas* would turn on their afterburner and loop away, but did not leave the area of the swarm. The intensity of the dragonflies while feeding is hard to believe. Neither weather or several people swinging a net can deter them. One evening while working a large swarm, a cold front arrived with rain, thunder, and lightning. The dragonflies flew well into the storm until all the ants were either caught or had ceased flying. The time period from mid-August to Labor Day seems to be the peak of the ant mating season. If conditions are right several flights can erupt during the same evening. During this period the dragonfly numbers also peak. After Labor Day the numbers start to decrease and soon the swifts and swallows migrate south. [...]"] (Author)] Address: Goodwin, F., Massachusetts Audubon Society, Ipswich River Wildlife Sanctuary, 87 Perldns Row, Topsfield, MA 01983, USA. E-mail fgoodwin@massed.net

971. **Goodwin, F. (1999):** Massachusetts *Tremea calverti*. *Argia* 11(3): 8. (in English). [record without dates from Appleton Farm, Ipswich, Massachusetts, USA] Address: Goodwin, F.P., 87 Perkins Row, Topsfield, MA 01983, USA.

972. **Gorb, S.N. (1999):** Visual cues in mate recognition in the damselfly *Ischnura elegans* Vander Linden (Zygoptera: Coenagrionidae). *International Journal of Odonatology* 2(1): 83-93. (in English). ["Of the three recognised female morphs of *I. elegans*, only two occurred in Jagotin, Kiev Province, Ukraine. Andromorphs and infuscans together constituted 99.8% of females in the population, and only 0.2 % were infuscans-*obsoleta*. The present paper is an experimental study testing male responses to female and male models. Three questions were asked: (1) Is the colour of the model an important cue in mate recognition by males? (2) What is the area of male field of view, responsible for mate recognition? (3) Which is the preferred direction, from which each model elicits the maximal rate of copulatory responses? All colour forms of females regularly occurred in copula with males throughout the day. The violacea and andromorph female models were preferred by males. However, the manner of model presentation strongly influenced male response: copulatory responses were rare when models were presented above the male. Copulatory behaviour with a male model resulted in nearly 70% of cases when the approach was from behind, which was significantly more frequent than with female models. Among female models, the andromorph and grey-green females of the form *infuscans* were recognised as a female more frequently from behind than the violacea and brown females of *infuscans*. The role of different visual cues in mate recognition is discussed." (Author)] Address: Gorb, S.N., Max-Planck-Institut fuer Entwicklungsbiologie, Spemannstr. 35, D-72076 Tuebingen, Germany. e-Mail: stas.gorb@tuebingen.mpg.de

973. **Graves, T. (1999):** East African Odonata. *W.D.A.'s Agrion* 3(1): 15-16. [report on Ugandan Odonata including the waterfall dweller *Zygonyx regisalberti*; some notes on Odonata from Shenelle River (Afgoye, Somalia)] Address: Graves, T., Thopson Rigg

Farm, Langdale End, Scarborough, N. Yorks YO13 0LN, UK.

974. **Günther, A.; Mauersberger, R. (1999):** Verhaltensbeobachtungen an *Anax ephippiger* (Burmeister) 1995/1996 in Brandenburg (Anisoptera: Aeshnidae). *Libellula* 18(1/2): 1-14. (in German, with English summary). ["During the large invasion of *Anax ephippiger* to Northern and Central Europe the sp. was firstly recorded from Brandenburg. Reproductive behaviour was studied in a gravel pit near Cottbus, where *A. ephippiger* was abundant. Males patrolled and fed in corridors above emergent vegetation. They searched for females in the dense vegetation with a slow flight and many hovering phases. In the evening individuals formed feeding aggregations. Oviposition was always performed in tandem. In some cases tandem-males took an upright tandem-position without using their legs which is unusual in Anisoptera." (Authors)] Address: Günther, A., Naturschutzinstitut Freiberg, Waisenhausstr. 10, D-09599 Freiberg, Germany

975. **Hacker, F. (1999):** Beobachtungen zur Lebensweise von *Caliaeschna microstigma* (Schneider) an einem Bach in Nordost-Griechenland (Anisoptera: Aeshnidae). *Libellula Suppl.* 2: 17-31. (in German, with English summary). ["Males performed patrol flight in the afternoon and crepuscular feeding flight during sunset. Females appeared at the brook for copulation and oviposition exclusively. One male was recaptured after 30 days. Larvae live in dense tufts of water moss. Based on analysis of larval length in April and August 1993 it is suggested that a part of the eggs hatches before hibernation. The life cycle most probably is finished within one year." (Author)] Address: Hacker, F., An der Korkmühle 4, D-23896 Panten-Hammer, Germany

976. **Hämäläinen, M. (1999):** *Drepanosticta jurzitzi* spec. nov., a new damselfly from southeastern Thailand (Zygoptera: Platystictidae). *Odonatologica* 28(4): 421-423. (in English). ["The new species (holotype male: Thailand, Chanthaburi prov., Krathin waterfall, 4-V-1993) is described and illustrated. From its closest regional congeners it is readily distinguished by its pale-coloured pterostigma." (Author)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

977. **Hämäläinen, M.; Pinratana, A. (1999):** Atlas of the dragonflies of Thailand. Distribution maps by provinces. Publisher: Brothers of St. Gabriel in Thailand, 565 Samsen Road, Bangkok 10300. ISBN 974-87004-5-3: VI, 176 pp, incl. 28 pages of colour photographs- ["The book provides an up-dated checklist and distribution maps by provinces (76 provinces in Thailand) of the 315 dragonfly species known from Thailand up to 1st April 1999. In the connection of each specific map (3 maps / page), some references and brief comments on the distribution, frequency and flight season are given. In addition, of 47 species additional taxonomic and faunistic notes are given in a separate chapter. A brief history of dragonfly studies in Thailand is presented. Reference list contains 125 titles. Index of scientific names is provided. In the 28 colour pages (printed on high quality paper) a total of 153 dragonfly photographs are presented. Most of them have been taken in natural conditions. They illustrate 124 species (69 Zygoptera and 55 Anisoptera); many of which have not been pho-

tographed earlier. Besides photos taken by the authors, also those by Thomas W. Donnelly, Pisuth Ek-Amnuay, Rosser W. Garrison, Jarujin Nabhitabhata, Hans Olsvik and Ken-ichi Watanabe are included. Price: 30 US\$ (+ postage). Please send orders to: Bro. Amnuay Pinratana, St. Gabriel's College, Samsen Road, Bangkok 10300, Thailand. Fax: + 66 2 2432150, E-mail: thani@sg.ac.th The invoice will be sent with the book. Payments (by International Postal Money Order only) are due within 30 days (airmail) or 70 days (surface mail) after date of invoice. Goods supplied remains the property of Brothers of St. Gabriel until paid in full. Please, specify whether you want the book to be sent by airmail or by surface." (Hans Olsvik, taken from the Nord. Odonat. Soc., Newsl. 5(1))]

978. **Halloway, L.G. (1999):** The dragonflies and damselflies of Pagham Harbour Local Nature Reserve. Available from the author at Wigeon Cottage, 30 Fernhurst Gardens, Aldwick, Bognor Regis PO21 4AZ, UK: 44 pp. (in English).

979. **Handke, U.; Kock, B.; Kundel, W.; Riesner-Kabus, M.; Schreiber, K.-F. (1999):** Grabenräumprogramm in der Bremer Flussmarsch. Ergebnisse vegetationskundlicher und faunistischer Begleituntersuchungen. *Naturschutz und Landschaftsplanung* 31(9): 267-274. ["Ditch Clearance Programme in the River Marsh in Bremen - Results of Floristic and Faunistic Investigations. Regular ditch clearance in areas of extensively cultivated meadows is a prerequisite for the preservation of species diversity and for the existence of rare species in the 'ditch' biotope type. The ditch system in the River Marshlands in Bremen ('Niedervieland') extends to approximately 200 km and is of high value for nature conservation. The ecologically orientated ditch clearance programme was implemented for five years and was accompanied by floristic and faunistic investigations. Generally, vegetation recovered very quickly after clearance. However, the Water Soldier (*Stratiodes aloides*), which is of particular significance for highly endangered species of dragonflies and damselflies in the area, did not readily regenerate. The transplantation of individuals, on the other hand, was successful. Fauna of low mobility, such as snails, were able to reach the original density quickly compared with species which have a development cycle of several years, such as dragonflies. From the survey results conclusions were drawn for future ditch maintenance." (Author) Special emphasize is given to *Aeshna viridis* and *Anaciaeschna isocetes*. A graph shows the effects of the ditch clearance technique on emergence rate of *A. viridis*, *A. isocetes*, and *Brachytron pratense*.] Address: Handke, K., Dehnestr. 28, D-27777 Ganderkesse, Germany

980. **Hardersen, S.; Wratten, S.D.; Frampton, C.M. (1999):** Does carbaryl increase fluctuating asymmetry in damselflies under field conditions? A mesocosm experiment with *Xanthocnemis zealandica* (Odonata: Zygoptera). *Journal of applied ecology* 36: 534-543. (in English). ["1. Previous laboratory experiments have shown that the insecticide carbaryl reduces emergence success and increases fluctuating asymmetry in cell patterns of damselfly wings. These effects were validated using mesocosms. Twenty artificial ponds, each containing *Xanthocnemis zealandica*, were exposed to three replicated (n = 5) concentrations of carbaryl contamination plus controls. Emergence success, level of fluctuating asymmetry in meristic and metric traits of the

wings, and average size of the damselflies were measured. 2. The degradation of carbaryl was relatively constant for the first 5 weeks but later increased considerably, probably because of enhanced biodegradation. 3. Carbaryl at 100 p.p.b. (nominal concentration) reduced emergence success 10 days after application, whereas carbaryl at 10 p.p.b. and 1 p.p.b. had no effect. 4. To investigate how the level of fluctuating asymmetry and size were affected by carbaryl, damselflies from ponds with the highest concentration where emergence success was not affected (10 p.p.b.) were analysed over four time periods. Fluctuating asymmetry of the wings increased during the season but was not affected by carbaryl at 10 p.p.b. 5. Size, measured as average length of the front wings, was affected by date of emergence but not by exposure to carbaryl at 10 p.p.b. 6. Three main reasons for the absence of increased levels of fluctuating asymmetry as a result of carbaryl exposure are suggested." (Authors)] Address: Hardersen, S. Ecology and Entomology Group, Division of Plant, Soil and Ecological Sciences. PO Box 84, Lincoln University, Canterbury, New Zealand

981. **Hardersen, S.; Frampton, C.M. (1999):** Effects of short term pollution on the level of fluctuating asymmetry - a case study using damselflies. *Entomologia experimentalis et applicata* 92(1): 1-7. (in English). ["Fluctuating asymmetry (FA), a measure of developmental stability, has been suggested as a monitoring tool for environmental pollution. However, there have been few investigations into the effects of short term pollution on the level of FA. This paper explores effects of exposing late instar larvae to short term pollution on the level of FA in the wings of adult damselflies. In these insects FA in wing length and in cell patterns have different 'windows of opportunity' in relation to environmental stress. If increased environmental stress is applied after the 'window of opportunity' of one trait had closed, while the window of the other trait was still open then the level of FA of the first trait should not be altered whereas that of the latter should increase. If short term pollution killed part of a population, symmetrical individuals (low FA) should survive better than highly asymmetrical ones, because FA reflects the overall ability of an individual to cope with stress. If the pollution event occurred at a time when the level of FA was already fixed, the level of FA of the remaining population should be lower than that in controls. An experiment was carried out, using 10 artificial ponds, each holding a population of larvae of the damselfly *Xanthocnemis zealandica* (McLachlan). Damselfly larvae were exposed to carbaryl at a nominal concentration of 100  $\mu$ g l<sup>-1</sup>, which reduced emergence success after 10-20 days by ca. 50%. Based on laboratory experiments, it was assumed that despite the high mortality, the short exposure to carbaryl late in the last instar would ensure that the wing cell patterns of the damselflies were not altered by the increased stress. The level of FA in wing length increased in the damselflies surviving the exposure to carbaryl but the level of FA in cell patterns did not differ significantly between the treatment and the control. The effects of differential mortality, as well as the effects of pollution, on the level of FA in traits with different 'windows of opportunity' need further investigation." (Authors)] Address: Hardersen, S., Lincoln Univ., Div. Plant Soil & Ecol. Sci., POB 84; Canterbury; New Zealand. E-mail: Frampton@lincoln.ac.nz

982. **Hawking, J.; Theischinger, G. (1999):** Dragonfly larvae (Odonata). A guide to the identification of larvae of Australian families and to the identification and ecology of larvae from New South Wales. AWT Identification Guide No. 4, CRCFE Guide No. 24 (Australian Water Technologies Pty Ltd, West Ryde, Cooperative Research Centre for Freshwater Ecology, Thurgoona: I-IV-218 pp. (in English). [general information: Terminology, Distribution and Glossary; keys to the families (larvae); checklist; monography presentation of the species of 20 odonate families: each species is treated the following way: Previous description information, Dimensions, Diagnostic description, Remarks, Notes on ecology, Distribution in Australia, and dot map of distribution in New South Wales. You will find a lot of black and white illustrations and some colour plates with larvae or adults]

983. **Hawking, J.H. (1999):** An evaluation of the current conservation status of Australian dragonflies (Odonata). In: Ponder, W. & D. Lunney (Eds.): *The Other 99%: The conservation and biodiversity of invertebrates*. Transactions of the Royal zoological society of New South Wales. Mosman 2088: 354-360. (in English). ["The conservation status of the Australian dragonfly fauna was evaluated against the 1996 IUCN Red List categories. Each species was assigned to one of six categories as follows: one species as Critically Endangered, 12 species as Endangered, 24 species as Vulnerable, 39 species as Near Threatened, 84 species as Data Deficient and the remaining 154 species as Least Concern. This highlights three major conservation concerns: (1) the high proportion of species which satisfy the IUCN guidelines as being of conservation concern, (2) the large number of priority species and (3) the lack of available information on which to adequately evaluate the status of many species. The unique Australian dragonfly fauna, with its high proportion of endemics, Gondwanan species and species with unusual biological characteristics is rightly deserving of formal protection." (Author)] Address: Hawking, J.H., Co-operative Research Centre for Freshwater Ecology, Murray-Darling Freshwater Research Centre, P.O. Box 921, Albury, New South Wales 2640

984. **Hawking, J.H.; New, T.R. (1999):** The distribution patterns of dragonflies (Insecta: Odonata) along the Kiewa River, Australia, and their relevance in conservation assessment. *Hydrobiologia* 392: 249-260. ["Sampling of larval and adult Odonata from 16 sites along the Kiewa River, Victoria, yielded 34 species: 10 Zygoptera, 24 Anisoptera. Patterns of larval and adult incidence were appraised, and showed that most species were restricted in incidence to several consecutive sites along the river, and that there is clear distinction also between the faunas of the potamon, rhithron and eucrenon regions. Different species of some genera of Anisoptera displayed different zonal distributions, and patterns of incidence and relative abundance of larvae and adults confirmed zonal occupancy. For larvae, these distribution patterns transcended the mode of collection, although many species were found most abundantly in one microhabitat or by one of several sampling methods employed at each site. Sampling of the two stages separately showed considerable concurrence of distributional patterns, so that either stage alone may provide data of value in faunal and conservation assessment." (Authors)] Address: New, T.R.,



Department of Zoology, La Trobe University, Bundoora, Vic. 3083, Australia

985. **Heath, P. (1999):** The past and present status of Norfolk Hawker *Aeshna isosceles* Müll. in Britain. *Atropos* 8: 13-21. (in English). [very detailed compilation of the status of *A. isosceles* including a lot of unpublished studies; discussion on the records of the Dale collection; detailed discussion on the trade off between *Stratiodes aloides* (Water Soldier) (ultimate egg-laying substratum of *A. isosceles*), the clearance of ditches and its effects on population of *S. aloides*, and the effects of modern drainage systems to keep dry grazing marshes on the possibilities of Water Soldier recolonising recently cleared dykes; a modern population increase, and dispersal of the species are described: "it probably has a wider distribution now than at any time over the last couple of hundred years". But the amount of suitable breeding habitats has been significantly reduced. Some fundamentals for reintroduction and population management of *A. isosceles* are discussed. ] Address: Heath, P., The Broads Authority, 18 Colegate, Norwich NR3 1BQ, UK

986. **Heidemann, H. (1999):** Professor Dr Gerhard Jurzitza: A short biographic sketch and bibliography. *Odonatologica* 28(4): 321-332. (in English). ["A brief biography and appreciation of the work of Dr G. Jurzitza (born 30 Nov. 1929), Professor Emeritus of the University of Karlsruhe, Charter Member of *Societas Internationalis Odonatologica* and one of the leading European odonatologists, is followed by his Odonatological bibliography (1959-1998; 139 titles). Most of his works are related to the European and South American fauna, mostly in the fields of faunistics, taxonomy, ecology and behaviour. The list of taxa he has introduced in Odonata, and a bibliography of his odonatological photographic work are also included." (Author)]. Address: Heidemann, H., Au in den Buchen 66, D-76645 Bruchsal, Germany

987. **Heise, S.; Schrack, M. (1999):** Nachweis der Östlichen Moosjungfer (*Leucorrhinia albifrons* [Burmeister, 1839]) in der Radeburger Heide nördlich von Dresden (Insecta: Odonata: Libellulidae). *Faun. Abh. Staatl. Mus. Tierkunde Dresden* 21(13): 215-220. (in German, with English summary). [1995 and 1996 *L. albifrons* was first recorded in the district of Dresden, Saxonia, Germany; review of the distribution in Germany with special reference to Saxonia, and documentation of some further unpublished Saxonian records; characterisation in detail of the habitat (water chemistry, vegetation); detailed documentation of the phenology of emergence (records of exuviae).] Address: Schrack, M., Hauptstr. 48a, D-01471 Radeburg-Großdittmannsdorf, Germany

988. **Henson, S. (1999):** The newsletter of the British Dragonfly Society No. 35. 20 pp. (in English). [newsletter of BDS with a wealth of information on society business, activities of members, book reviews, "First and last dates for 1998"] Address: Henson, S., 10 Shotesham Road, Poringland, Norwich NR14 7LE, UK

989. **Hill, B.T.; Beinlich, B.; Plachter, H. (1999):** Habitat preference of *Lestes barbarus* (FABRICIUS, 1798) (Odonata, Lestidae) on a low-intensity cattle pasture in the Sava floodplain (Croatia). *Verhandlungen der Gesellschaft für Ökologie* 29: 539-545. (in English).

[In the European Community large-scale grazing schemes are being discussed as an alternative to conventional agriculture in those areas that are at risk of being abandoned. However, in Central Europe the data base regarding the effects of large-scale grazing systems is scarce, since this land use practice has almost vanished. Especially in traditionally used floodplains grazing systems are the predominant land use. Due to inundation or high groundwater level they also provide patches of limnic habitats. There are indications that low-intensity grazing may prove beneficial for species communities of these limnic and semi-terrestrial habitats. We investigated a communal pasture of 78 ha (»Allmende«) in the Sava floodplain (Croatia) to test this hypothesis using the example of the damselfly *L. barbarus*. Based on mark-recapture data, we studied the habitat preference and movement of the life-history stages of *L. barbarus*. After emergence, most damselflies quickly move to hedges surrounding the pasture. They stay close to these hedges for the entire maturation period. Damselflies have to cover distances of up to 880 m to reach the hedges. Some mature *L. barbarus* directly returned to the pond where they had emerged. However, many females turned to ungrazed areas and fallows, before engaging in reproductive activity. Suitability of hedges as maturation habitat significantly depends on their width and the width of adjacent margins. Densely vegetated pond habitats with vegetation heights between 20 and 50 cm are preferred reproduction sites for *L. barbarus*." (Authors)] Address: Hill, B., Fakultät für Biologie, Naturschutz, Phillips Universität Marburg, D-35032 Marburg, Germany

990. **Hill, P.M. (1999):** Early emergence of White-faced Darter *Leucorrhinia dubia* in Cheshire in 1999. *Atropos* 8: 53. (in English). Address: Hill, P.M.; 1 Clive Cottage, London Road, Allstock, Knutsford, Cheshire WA16 9LT, UK

991. **Hill, P.M. (1999):** Migrant insects reported during the first half of 1999. *Atropos* 8: 35-36. (in English). [*Anax parthenope* in Cornwall and Kent, *Anaciaeschna isosceles* "in the Broads", *Gomphus vulgatissimus* on the Thames] Address: Hill, P.M.; 1 Clive Cottage, London Road, Allstock, Knutsford, Cheshire WA16 9LT, UK

992. **Hirvonen, H. (1999):** Shifts in foraging tactics of larval damselflies: effects of prey density. *Oikos* 86(3): 443-452. (in English). ["I studied search activity and attack tactics of larval damselflies, *Lestes sponsa*, feeding on cladocerans, *Daphnia magna*, at nine densities ranging from 2 to 640 per 1.5 l. Search activity increased from low to intermediate densities (40 *Daphnia*) and declined again at higher prey densities, as has been predicted by theories on optimal tactics for energy maximising foragers. Similarly, frequency of pursuit attacks first increased and then decreased as prey density increased. Frequency of ambush attacks increased with a decelerating rate with prey availability. Thus the proportion of pursuit attacks decreased linearly as prey density increased. Profitability of pursuing increased faster than ambush profitability at low prey densities and remained higher up to 40 prey. At higher prey densities the profitabilities reversed. Relative profitability of pursuits proportioned to prey density peaked with 5 *Daphnia*. At other prey densities than 5, frequency of pursuit attacks decreased towards the end of the trials. This change in foraging mode accounted for accelerating proportional prey mortality to an intermediate D.

magna density and thus the potential for a dampening effect on the prey population. Adjusting foraging tactics in response to prey availability may be adaptive for the predator, and may also contribute to density dependence in the predator-prey relationship through effects on functional response." (Authors)] Address: Hirvonen, H.; Univ. Helsinki; Integrat. Ecol. Unit; Div. Populat Biol., Dept Systematv & Ecology, POB 17; FIN-00014 Helsinki; Finland. E-mail: heikki.hirvonen@helsinki.fi

993. **Hoess, R. (1999):** Erstnachweis einer zweiten Jahresgeneration von *Ischnura elegans* (Vander Linden) in der Schweiz (Zygoptera: Coenagrionidae). *Libellula* 18(1/2): 63-68. (in German, with English summary). ["On 17 July, 1997 four immature adults and seven exuviae were found at a newly set up pool near Bern. The pool was created on 17 March, 1997. From several possibilities of import or colonization only oviposition into the vegetation of the pool by allochthonous female(s) in spring 1997 proved to be probable." (Author)] Address: Hoess, R., University of Bern, Institute of Zoology, Division of Population Biology, Baltzerstr. 3, 3012 Bern, Switzerland

994. **Hoess, R.; Kohler, H.-U.; Berger, H.; Bieri, G. (1999):** Libellenbeobachtungen auf Rhodos, Griechenland, 1990 bis 1993. *Libellula Suppl.* 2: 33-40. (in German, with English summary). ["19 spp. were recorded from 15 localities in May 1990, May 1992, June and July 1993. Oldest records are evidenced for seven taxa, viz. *Ischnura elegans elegans*, *Anax imperator*, *A. parthenope*, *Orthetrum cancellatum*, *O. chrysostigma*, *Sympetrum fonscolombii*, and *Selysiothemis nigra*." (Authors)] Address: Hoess, R., University of Bern, Institute of Zoology, Division of Population Biology, Baltzerstr. 3, 3012 Bern, Switzerland

995. **Homes, V.; Hering, D.; Reich, M. (1999):** The distribution and macrofauna of ponds in stretches of an alpine floodplain differently impacted by hydrological engineering. *Regulated rivers research and management* 15(5): 405-417. (in English). ["The purpose of this study was to describe the impact of hydrological engineering on distribution, morphology and macrofaunal community composition of ponds in an alpine floodplain. The study was conducted in 1995 with the study sites being located on the Isar floodplain (Bavaria, Germany). The density of ponds was highest in a bypassed section of the floodplain with a residual flow regime and unrestricted peak floods (up to 40 ponds per river kilometre). In a channelized section and downstream of a reservoir, density was much lower. In 1995, about one third of the ponds were removed by floods or dried out in summer. About the same fraction was generated as a result of flood events. The composition of the macroinvertebrate and vertebrate faunas of 59 ponds was investigated. Cluster analysis classified the ponds into four groups. One of the faunal types was limited to ponds generated by the 1995 floods, where only a few predominantly rheophilic species occurred. The other types represented older successional stages and were inhabited by more species-rich faunas composed mainly of Odonata, Heteroptera and Coleoptera. In the channelized stretch of the Isar floodplain, and downstream of the reservoir only a single pond was generated by the 1995 floods; this caused a lower abundance and diversity of pond types." (Authors)] Address: Hering, D; Univ Essen; Inst Ecol; D-45117 Essen; Germany. E-mail: daniel.hering@uni-essen.de

996. **Horstkotte, J. (1999):** Bibliographie der Naturkundlichen Mitteilungen des DJN-Distrikts Hamburg - 1960-77 und 1987-88. *Naturkundliche Beiträge des Deutschen Jugendbund für Naturbeobachtung* 33: 72-76. (in German). [bibliography of the contributions of the German youth association for nature observation published in the *Naturkundliche Mitteilungen*, DJN-Distrikt Hamburg; the Hamburg-district was and is one of the most active parts of the DJN, and has contributed very important papers to the knowledge of Odonata around the world (see the journal *Naturkundliche Reiseberichte*), and especially in Germany and Austria] Address: Horstkotte, J., Am Schulwald 21, 22415 Hamburg, Germany

997. **Hospers, M.; Hospers, A. (1999):** Opnieuw Beekrumbout Gomphus vulgatissimus langs de Overijssels Vecht. *NVL Nieuwsbrief. Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie* 3(3): 4-5. (in Dutch). [detailed documentation of the records of *Gomphus vulgatissimus* on five localities along the brook Vecht for 1997 and 1999 (4 localities in The Netherlands, 1 in Nordrhein-Westfalen, Germany)] Address: mhospers@dds.nl

998. **Hubert, S. (1999):** Présence de *Gomphus graslinii* (Rambur, 1842) dans le département de la Sarthe. *Martinia* 15(3): 79-80. (in French, with English summary). [In 1963 on the river Loir, *G. graslinii* could be recorded in the Département for the last time. Now, the species was rediscovered in 1998 near the same river, and near the municipality of Luché-Pringé. This record is of some interest because M.P. Rambur described 1842 this species after a male specimen caught by Adolphe Graslin in the forest of Bercé in the environments of Château-du-Loir. This locality is situated 30 km as the crow flies from the new locality.] Address: Hubert, S., 8 ter, rue de Monaco, F-72000 Le Mans, France

999. **Hummel, S. (1999):** A twenty-six year old record for *Tramea calverti* in Iowa. *Argia* 11(1): 29. (in English). [Hummel on August 15, 1972 discovered a specimen - at that time - the farthest north of the species.] Address: Hummel, S., P.O. Box 121, Lake View, IA, 51450, USA

1000. **Hummel, S. (1999):** *Argia lugens* from South Dakota. *Argia* 11(1): 27-28. (in English). Address: Hummel, S., P.O. Box 121, Lake View, IA, 51450, USA

1001. **Hutchinson, R.; Ménard, B. (1999):** Odonatological news from Québec, Canada: the marvelous world of Québec dragonflies. 1. Searing for signs of *Stylurus notatus*, *Gomphus fraternus* and *Gomphus vastus* in the Ottawa River. *Argia* 11(2): 3-4. (in English). [records of the above mentioned species (imagos and exuviae) at Luskville, Québec, Canada in 1996 and 1997; a further 20 odonate species were taken including *Ophiogomphus rupinsulensis* and *O. colubrinus* in a small tributary of the Ottawa river] Address: Hutchinson, R., 12, chemin de la Savane, apt. 12, Gatineau (Québec), Canada, J8T 1P7

1002. **Hutchinson, R.; Ménard, B. (1999):** Odonatological news from Québec, Canada: the marvelous world of Québec dragonflies. 2. Two new Québec localities for *Williamsonia fletcheri*. *Argia* 11(2): 4-5. (in English). [records from and description of habitats from two

two sites from the "fen-bog-marsh-swamp complex of Alfred in eastern Ontario and a small section of a swamp-marsh area covered with sphagnum north of Ste-Cecile-de-Masham in Québec", and two new localities: fen near lake Danford, an a fen near the village of Poltimore (both Québec)] Address: Hutchinson, R., 12, chemin de la Savane, apt. 12, Gatineau (Québec), Canada, J8T 1P7

1003. **Hutchinson, R.; Ménard, B. (1999):** Random odonatological observations from Québec, Canada. 1. Protecting emerging *Stylurus notatus* from ant attacks (1996-1997). *Argia* 11(2): 5-6. (in English). [the authors protected the rare *S. notatus* from the Ottawa river from being prey of ants] Address: Hutchinson, R., 12, chemin de la Savane, apt. 12, Gatineau (Québec), Canada, J8T 1P7

1004. **Hutchinson, R.; Ménard, B. (1999):** Random odonatological observations from Québec, Canada. 2. An unusual observation: a *Cicindela longilabris* (Coleoptera) larva trying to drag a male *Leucorrhinia glacialis* into its burrow. *Argia* 11(2): 6. [additional information are given on *C. longilabris* preying *L. intacta* in the 1980s in the same locality (lake Port-au-Saumon); see also: Laroche, A. (1976): *Odonata* as prey and predators of Tiger beetles. *Cordulia* 2(4): 157 - 158] Address: Hutchinson, R., 12, chemin de la Savane, apt. 12, Gatineau (Québec), Canada, J8T 1P7

1005. **Hutchinson, R.; Ménard, B. (1999):** Random odonatological observations from Québec, Canada. 3. Adult *Leucorrhinia* captured by the insectivorous plant, *Drosera rotundifolia*. *Argia* 11(2): 6. (in English). [records from three sites with (serious) trapping of *Leucorrhinia* and *Enallagma* by *Drosera*. Abstracters note: a small bibliography of *Odonata* captured from insectivorous *Drosera* is available from IDF; anybody interested should send us 2 US\$ in cash to receive the bibliography.] Address: Hutchinson, R., 12, chemin de la Savane, apt. 12, Gatineau (Québec), Canada, J8T 1P7

1006. **Hutchinson, R.; Ménard, B. (1999):** Random odonatological observations from Québec, Canada. 4. Feeding *Williamsonia* larvae in the lab. *Argia* 11(2): 6. (in English). [request for information on the prey of larval *W. fletcheri*] Address: Hutchinson, R., 12, chemin de la Savane, apt. 12, Gatineau (Québec), Canada, J8T 1P7

1007. **Hutchinson, R.; Ménard, B. (1999):** Random odonatological observations from Québec, Canada. 5. A tiny spider subduing a *Leucorrhinia glacialis* many times its size. *Argia* 11(2): 6-7. (in English). [*L. glacialis* was preyed by *Misumena vatia* ] Address: Hutchinson, R., 12, chemin de la Savane, apt. 12, Gatineau (Québec), Canada, J8T 1P7

1008. **Hutchinson, R.; Ménard, B. (1999):** Random odonatological observations from Québec, Canada. 6. *Aeshna umbrosa* larvae found in extremely shallow water. *Argia* 11(2): 7. (in English). [ditches as habitat of *A. umbrosa*, *Cordulegaster maculata*, and *Amphiagrion saucium*; drought resistance of larvae] Address: Hutchinson, R., 12, chemin de la Savane, apt. 12, Gatineau (Québec), Canada, J8T 1P7

1009. **Hutchinson, R.; Ménard, B. (1999):** Random odonatological observations from Québec, Canada. 7. The *Lanthus parvulus* enigma at Port-au-Saumon. *Argia* 11(2): 7-8. (in English). [emergence and larval habitats are described; the phenomenon of the drifting system of the Port-au-Saumon river including *L. parvulus* is said to be worth to be studied in detail] Address: Hutchinson, R., 12, chemin de la Savane, apt. 12, Gatineau (Québec), Canada, J8T 1P7

1010. **International Odonatological Foundation (1999?):** International Odonatological Foundation S.I.O. Leaflet. 4 pp. (in English). [presentation of scope and aims of the Int. Odonat. Found.] Address: Kiauta, M., P.O. Box 256, NL-3720 AG Bilthoven, The Netherlands

1011. **Irineu de Souza, L.O.; Costa, J.M.; Santos, T.C. (1999):** Description of the larva of *Planiplax phoenicura* Ris, from Pantanal Sul-Matogrossense, Brazil (Anisoptera: Libellulidae). *Odonatologica* 28(2): 159-163. ["The ultimate instar larva is for the first time described and illustrated. A key to the larvae of Libellulidae with dorsal hooks on abdominal segments III - IX and lateral spines on abdominal segments VIII - IX is appended." (Author)] Address: Irineu de Souza, L.O., Departamento de Biologia, Universidade Federal de Mato Grosso do Sul, MS, Brazil. Costa, J.M. & Santos, T.C.; Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro Quinta da Boa Vista, BR - 20.940-040, Rio de Janeiro, Brazil

1012. **Jacquemin, G. (1999):** Three years watching *Odonata* in Morocco. *W.D.A.'s Agrion* 3(1): 5-6. (in English). [short report on discovering dragonflies in Morocco; very interesting (for European odonatologists) is the record of *Oxygastra curtisii*; the results of the research will be published as Supplement to *Martinia*. (see also Erratum: *W.D.A.'s Agrion* 3(2): 29)] Address: Jacquemin, G., Biologie des Insectes, Université H. Poincaré, Nancy 1, BP 239, F-54506 Vandoeuvre-lès-Nancy, France

1013. **Jödicke, R. (1999):** isoceles oder isosceles?. *Libellennachrichten* 2: 15-16. (in German). [According to the rules of the International Code of zoological nomenclature, the correct name should read *A. isoceles*.] Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany

1014. **Jödicke, R. (1999):** Libellenbeobachtungen in Podlasie, Nordost-Polen. *Libellula* 18(1/2): 31-48. (in German, with English summary). [In June/July 1998, 46 species were evidenced at 36 "localities in the lowlands of Biebrza and Narew as well in the surroundings of the Biatowieza Forest. Our records of *Orthetrum albistylum* and *O. brunneum* mark the hitherto northernmost records within their ranges of distribution. Also the sightings of *Erythromma viridulum*, *Nehalennia speciosa*, *Aeshna isoceles*, *Somatochlora arctica*, *Libellula fulva*, and *Sympetrum depressiusculum* are noteworthy. The subspecific status of *Calopteryx splendens* from this region is discussed." (Author)] Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany

1015. **Jödicke, R. (1999):** Paul Münchberg verstorben. *Libellennachrichten* 2: 14-15. (in German). [short notice on the death of the well known German odonatologist who died July 23, 1999] Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany



1016. **Johansson, F.; Rowe, L. (1999):** Life history and behavioral responses to time constraints in a damselfly. *Ecology* 80(4): 1242-1252. (in English). [Time constraints, imposed by seasonality, are common to life histories. Recent theory in evolutionary ecology predicts independent behavioral and life history responses to such constraints, but this theory remains largely untested. In our two experiments on the damselfly *Lestes congener* we experimentally alter individual's perception of their proximity to a time constraint and ask whether their behavior and life history respond in the directions predicted by theory. We altered larval perception of their position in the season with light regime. In one group, we hatched larvae from winter diapausing eggs in a light regime that mimics a relatively early time in the season. In the other group we hatched larvae in a light regime that mimics a late time in the season. In the late (time constrained) group, larvae would have very little time to complete development and reach a large size so that they could attain their full reproductive potential prior to winter. In the first experiment, the behaviors we assess are activity rate, which is an indicator of foraging effort and willingness to take risks, and cannibalism, which is a component of the mortality risk of foraging. As predicted, time-constrained larvae increased their activity rates, perhaps in an attempt to increase weight gain, and as a result they suffered higher rates of cannibalism. In the second experiment, we measured development rate as the rate of molting and age at maturity. As predicted, time-constrained larvae accelerated development rate and thereby matured at a significantly earlier age and smaller size. Our analysis demonstrates that the behavioral and life history responses of these larvae were independent, in the sense that the life history responses did not result from the behavioral responses." (Authors)] Address: Rowe, L., Univ. Toronto; Dept Zool., 25 Harbord St; Toronto; ON M5S 1A1; Canada

1017. **Johansson, F.; Ivarsson, T. (1999):** The Distribution of Darter dragonflies (*Sympetrum*: Odonata) in central Norrland, Sweden. *Nord. Odonat. Soc. Newsl.* 5 (1): 4-5. [The occurrence and distribution of the *Sympetrum* dragonflies in central Norrland, Sweden is presented in 25x25 km square maps (*S. danae*, *S. vulgatum*, *S. flaveolum*), or discussed (*S. striolatum*, *S. sanguineum*).] Address: Johansson, Frank & Tobias Ivarsson, Ekologisk Zoologi, Umea Universitet, S-90187 Umea, Sweden

1018. **Johnson, J.; Paulson, D. (1999):** Spineless *E-pitheca spinigera*: a cautionary note. *Argia* 11(1): 30. (in English). [discussion of the value of the spine as a determination cue for *E. spinigera*] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA

1019. **Johnston, T.A.; Cunjak, R.A. (1999):** Dry mass-length relationships for benthic insects: a review with new data from Catamaran Brook, New Brunswick, Canada. *Freshwater biology* 41(4): 653-674. (in English). ["1. We summarized previously published mass-length relationships for aquatic insects, and determined the relationship between dry body mass and body length for eight genera and seven families of benthic insects from Catamaran Brook, New Brunswick, Canada." In appendix 1 the relations between mass and linear measurements for 8 odonate species published

hed by Pavlov & Zubina (1990), *Hydrobiological Journal* 26: 99-103, and for *Pyrrhosoma nymphula* (Lawton, 1971, *Jour. anim. ecol.* 40: 385-423) are listed. "2. A power function was the most commonly used model in the earlier studies and best described the observed mass-length relationship for taxa from Catamaran Brook. 3. Predicted mass at length was highly variable (coefficient of variation > 25%) among models developed in different studies for the same family group. This variability presumably resulted from both variation in the methods used to construct the models, and in the natural spatio-temporal and taxonomic variation in mass at length, although the relative contributions of these two sources cannot be determined from existing data. 4. Several recommendations are made for the development and application of mass-length equations in future studies." (Authors)] Address: Johnston, T.A., Department of Fisheries and Oceans, Central and Arctic Region, Freshwater Institute, 501 University Cr., Winnipeg, Manitoba R3T 2N6, Canada; Cunjak, R.A., Department of Biology, University of New Brunswick, Bag Service 45111, Fredericton, New Brunswick E3B 6E1, Canada

1020. **Jolivet, S.; Vaillant, F.; Gruwier, X. (1999):** Développement larvaire de *Sympetrum fonscolombii* (Sélys, 1840) constaté en Île-de-France (Réserve Naturelle de Saint-Quentin-en-Yvelines) (Odonata, Anisoptera, Libellulidae). *Martinia* 15(1): 15. (in French). [possible development of *S. fonscolombii* in a muddy pool created by a wild pig (*Sus scrofa*)] Address: Jolivet, S., 8 parc Vatonne, F-91190 Gif-sur-Yvette, France

1021. **Jourde, P.; Allenou, Caupenne, M.; Thirion, J.-M. (1999):** Inventaire des odonates de Charente-Maritime. *Martinia* 15(3): 71-78. (in French, with English summary). [In the framework of the French Odonate mapping scheme, 59 odonate species could be recorded in the Département Charente-Maritime. Compared with literature data, five species were found for the first time: *Calopteryx haemorrhoidalis*, *Anax parthenope*, *Anax ephippiger*, *Gomphus graslinii*, and *Leucorrhinia albifrons*. *Onychogomphus forcipatus*, *Somatochlora flavomaculata*, *S. metallica*, *Cordulia aenea*, and *Orthetrum brunneum* could not be recorded after 1959, and were now rediscovered.] Address: Jourde, P. La Grande Métairie, 20 rue de Charnay, F-17250 Pont-L'Abbé-D'Arnoult, France

1022. **Jourde, P.; Thirion, J.-M. (1999):** Nouvelles mentions d'*Hemianax ephippiger* (Burmeister, 1839) et données précoces pour quelques odonates en Charente-Maritime. *Martinia* 15(2): 46. (in French). [discovery of a fragment of *Anax ephippiger* on 31 January 1999; short notice on the discovery of *A. ephippiger*, *A. parthenope*, *Aeshna affinis*, and *Lestes macrostigma* in May 1999; phenological data from several species in the spring of 1999] Address: Jourde, P., 20 rue de Charnay, F-17250 Pont l'Abbé d'Arout, France

1023. **Jung (1999):** Excursieverslag Zuid-Limburg. Een eerste keer ..... op stap met de NVL. NVL Nieuwsbrief. Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie 3(3): 5-6. [report of an excursion to Zuid-Limburg, The Netherlands on 26/27 June, 1999; notices on some Odonata e.g. *Crocothemis erythraea*, *Anax parthenope*, *Orthetrum brunneum*, and *Cercion lindenii*]. Address: not stated.

1024. **Kambhampati, S.; Charlton, R.E. (1999):** Phylogenetic relationship among *Libellula*, *Ladona* and *Plathemis* (Odonata: Libellulidae) based on DNA sequence of mitochondrial 16S rRNA gene. *Systematic entomology* 24(1): 37-49. (in English). ["The type genus for the dragonfly family Libellulidae is *Libellula*. At present, *Libellula* s.l. includes twenty-nine species, whose distribution is largely Nearctic. Whether two other libellulid taxa, *Ladona* and *Plathemis*, should be considered synonyms of *Libellula*, subgenera of *Libellula*, or separate genera, has been a subject of intermittent debate for over a century. Earlier proposals concerning *Ladona* and *Plathemis* were based on a limited number of morphological characters and lacked rigorous phylogenetic analyses. Therefore, we used the DNA sequence of a portion of the mitochondrial 16S rRNA gene and parsimony, maximum likelihood and neighbour-joining analyses to explore whether *Ladona* and *Plathemis* are monophyletic lineages distinct from *Libellula*. We obtained approximate to 415 bp of DNA sequence from twenty-three taxa including thirteen species of *Libellula* s.s., all three recognized species of *Ladona*, the two species of *Plathemis* and representatives of four other libellulid genera. *Tetragoneuria williamsoni* (Odonata: Corduliidae) was included as the outgroup. Parsimony analysis suggested that *Ladona* and *Plathemis* are monophyletic lineages distinct from *Libellula* s.s. with a sister group relationship between *Libellula* and *Ladona*. The monophyly of *Ladona*, *Plathemis* and *Libellula* was supported in > 90% of bootstrap replications and in trees five to ten steps longer than the most parsimonious trees. Relationships inferred from maximum likelihood and neighbour-joining analyses also supported the monophyly of *Ladona* and *Plathemis*. The four other libellulid genera included in the study formed a monophyletic clade distinct from *Libellula*, *Ladona* and *Plathemis*. Based on our analysis, we propose that *Ladona* and *Plathemis* be considered either genera or subgenera within Libellulidae." (Authors)] Address: Kambhampati, S., Kansas State Univ; Dept Entomol. Manhattan KS 66506; USA. E-mail: srini@ksu.edu
1025. **Karube, H. (1999):** A new species of the genus *Petaliaeschna* (Odonata, Aeshnidae) from Northern Vietnam. *Gekkan-Mushi* 338: 6-7. (in Japanese and English). [*Petaliaeschna flavipes* n. sp. is described from a male from Mt. Piaoac, Cao Bang Province, Northern Vietnam (May 1998). The new species is closely related to *P. corneliae* Asahina, 1982.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan
1026. **Karube, H. (1999):** *Planaeschna cucphuongensis* spec. nov., a new dragonfly from northern Vietnam (Anisoptera: Aeshnidae). *Odonatologica* 28(3): 279-282. (in English). ["The new sp. is described and illustrated from a single male (holotype: Hoa Binh prov., Cue Phuong National Park, 2-VI-1998; deposited at Kanagawa Prefectural Mus. Nat. Hist., Odawara, Japan). It is similar to *P. chiengmaiensis* Asahina, from Thailand, from which it is distinguished by more slender and strongly bent superior appendages and by a different shape of the inferior appendages." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan
1027. **Kirfel, G.; Komnick, H. (1999):** Differential absorption and esterification of dietary long-chain fatty acids by larvae of the dragonfly, *Aeshna cyanea*. *Archives of insect biochemistry and physiology* 40(4): 183-193. (in English). ["In order to evaluate whether dietary long-chain fatty acids were differentially absorbed, *Aeshna cyanea* larvae received 5  $\mu$ l oral doses containing combinations of two radiolabeled fatty acids at nearly equal radioactive and nmolar concentrations: (1) H-3-oleic and C-14-palmitic acids; (2) H-3-oleic and C-14-stearic acids; and (3) H-3-palmitic and C-14-stearic acids. After 3 h or 1 day, hemolymph samples, midgut tissue, midgut contents and fat body tissue were collected and assayed for labeled fatty acids. The H-3/C-14 ratios indicated that there was a preference for absorption of the monounsaturated oleic acid over both saturated palmitic and stearic acids and that the shorter palmitic acid was absorbed at a higher rate than the longer stearic acid. There were also differences in the H-3/C-14 ratios of the various lipid classes of the midgut wall, hemolymph, and fat body that reflected differential esterifications and transport of these fatty acids. *Arch. Insect Biochem, Physiol*, 40:183-193, 1999." (Authors)] Address: Komnick, H.; Univ. Bonn; Inst. Cell Biol., Ulrich Haberland Str 61A; D-53121 Bonn; Germany. E-mail: komnick@uni-bonn.de
1028. **Klapkarek, N.; Beutler, H. (1999):** Die Libellenfauna (Odonata) des NSG "Lieberoser Endmoräne" (Brandenburg). *Märkische entomologische Nachrichten* 1: 21-38. (in German, with English summary). [55 odonate species could be recorded in one of the most important German dragonfly habitats; some of the habitats are undisturbed by any anthropogenic influence. The extraordinary odonate conservatory value e.g. of Lake Drusche can be exemplified by the sympatric occurrence of all European species of the genus *Leucorrhinia*. Of special interest are *Nehalennia speciosa*, *Epithea bimaculata*, *Leucorrhinia albifrons*, *L. caudalis*, *Onychogomphus forcipatus*, *Gomphus vulgatissimus* (lake-population of these species of running waters), and *Cercion lindenii*. Some more species are discussed in some detail.] Address: Beutler, H., Kirschallee 3b, 15848 Stemmen, Germany; Klapkarek, N., Inst. Ökol. und Naturschutz, Coppistr. 1-3, 16227 Eberswalde, Germany. E-mail: q4961625@bonsai.fernuni-hagen.de
1029. **Klein, J.-P.; Vanderpoorten, A. (1999):** Étude écosystématique d'une gravière de l'ancien lit majeur du Rhin (Krafft-Erstein, Bas-Rhin, France). *Martinia* 15 (1): 3-13. (in French, with English summary). ["An integrated survey of a gravel pit located in the former alluvial floodplain of the Rhine was carried out between 1994 and 1997. The gravel pit is fed by groundwater and its water level is controlled by the floodpulse of the Rhine. The quality of the water was monitored monthly between 1995 and 1997 and was found to be alkaline, oligomesotrophic, moderately mineralised, calcareous and chloridic. Data dealing with adults and exuviae were compared with the quality of the water and the aquatic and riverine phytocenosis. In this man-made biotope, 24 species of Odonata were recorded. *Enallagma cyathigerum*, *Libellula fulva*, *Crocothemis erythraea*, *Ischnura elegans*, *Orthetrum cancellatum*, *Anax imperator*, and *A. parthenope* are the most common ones. Two species are protected at the national level, 3 are included within the French red list and 11 within the Baden-Württemberg red list, 3 within the red list of the European Council and 2 within the European list for Habitat directive. The dragonfly diversity in this recent gravel pit is similar to that of the oldest ones in this region and is not depressed as a cause of large populations of fish

and the low diversity of the phytocenosis. Nevertheless, the latter caused a low density in species such as *Platycnemis pennipes* and *Cercion lindenii*. The diversity of the dragonfly assemblage in this gravel pit is linked to water quality, and also to its status of pioneer area acting as a refuge resembling the former side channels of the Rhine river before canalisation. This study can be used for future surveys to compare and evaluate the impact and consequences of the artificial flooding of the riverine landscape of the Erstein area owing to the later retention of the Rhine highflow." (Author)] Address: Klein, J.-P., Laboratoire d'Analyses et de Biologie Médicales Aubert, 22, rue des Carmes, F-54063 Nancy, France

1030. **Klein, J.-P. (1999):** Les odonates des forêts rhénanes de Strasbourg, Bas-Rhin, France. *Opusc. zool. flumin* 168: 1-28. (in French, with English summary). ["During 1995-1996, 34 spp. were evidenced, including the locally rare *Calopteryx virgo*, *Coenagrion mercuriale*, *C. pulchellum*, *Aeshna grandis*, *Gomphus pulchellus*, *G. vulgatissimus* and *Onychogomphus forcipatus*. The habitats are briefly described in terms of their respective vegetation, and the odonate applicability in the wetland biological assessment is demonstrated. A comparison of the current status with the records of the early 1960s indicates the vulnerability of various spp. The present work renders a contribution towards the setting up of guidelines for the conservation and ecological management of aquatic habitats of the Strasbourg alluvial forests." (Author)] Address: Klein, J.-P., Laboratoire Aubert, Analyses médicales et biologiques, Département environnement et santé, 22, rue des Carmes, B.P. 664, F-54063 Nancy, France

1031. **Kohl, S. (1999):** Libellenbeobachtungen auf der griechischen Insel Samos. *Libellula Suppl.* 2: 41-42. (in German, with English summary). ["In September 1996, 14 species were recorded. *Anax ephippiger* is new for the fauna of Samos." (Author)] Address: Kohl, S., Seestr. 107, CH-8610 Uster, Switzerland

1032. **Kopij, G. (1999):** Food of the Cattle Egret (*Bubulcus ibis*) in South African grassland. *Vogelwarte* 40: 98-109. (in English). ["The study is based on stomach content and boli analyses originated from chicks and adult birds living in South African grassland. Most of the Cattle Egrets' diet consisted of insects (69% of total dry mass), other arthropods constitute 2% and vertebrates 28%. Insect prey consisted mainly of Orthoptera (47%, mainly Acrididae) and Isoptera (12%, exclusively *Hodotermes mossambicus*). Coleoptera, Lepidoptera and Diptera constituted only a supplementary insect ingredient. In the diet of the chicks, a two-fold higher proportion of vertebrates and a lower proportion of insects was shown in comparison with the adult diet. In the same colony, during the 1976/1977 breeding season (with higher rainfall) the proportion of invertebrates and vertebrates was similar, while during the 1993/1994 breeding season (lower rainfall), the proportion of invertebrates was much higher than that of vertebrates. In summer (September - March) most of the adult diet consisted of insects, whereas in winter (June - August) it consisted mainly of vertebrates. The proportion of invertebrates increased and that of vertebrates decreased in the diet of chicks, as they grow." (Author). The food composition is expressed as "percentage of food samples in which the category was recorded". For Odonata in total the frequency (sample size: n = 330) is 7,3 in the chicks: Aeshnidae: 3.0; Coenagrionidae: 4.2;

Libellulidae: 6.7. Odonata could be recorded 31 times in the boli of chicks of Cattle Egret (dry mass: 1.4%) in 1976/1977, and only once in 1993/1994.] Address: Kopij, G., Department of Biology, National University of Lesotho. P. O. Roma 180, Lesotho

1033. **Kornijów, R.; Scibior, R. (1999):** Seasonal changes in macrofaunal feeding groups associated with *Nuphar lutea* (L.) Sm. leaves in a small eutrophic lake. *Polish journal of ecology* 47(2): 135-143. (in English). ["The epiphytic invertebrates associated with leaves of *Nuphar lutea* in a shallow small eutrophic Lake Glebokie (Lecznawodawa Lake District, eastern Poland) were pooled into one of three feeding groups: 1. algae-detritus feeders (25 taxa, average density 111 ind x 100 cm<sup>-2</sup>), 2. vascular plant feeders (3 taxa, average density 64 ind. x 100 cm<sup>-2</sup>), 3. predators (10 taxa, 4 ind.x 100 cm<sup>-2</sup>). The fauna feeding assemblages underwent clearly marked seasonal changes in their relative abundance, dominance structure and densities. The discussed mechanisms responsible for these changes included trophic conditions (development of periphytic and planktonic algae, nutritive value of the macrophytic tissue, amount of detritus originating from decomposing leaves), so called "dilution effect" (caused by fast increase in the colonizable leaf surface during summer), and the interactions between algae-detritus feeders and predatory invertebrates." (Authors) Odonate predators are: *Enallagma cyathigerum*, *Ischnura elegans*, *Coenagrion puella*, and *Coenagrionidae* n. det.] Address: Kornijów, R., Department of Hydrobiology and Ichthyobiology, E-mail: rkorn@ursus.ar.lublin.pl; Scibior, R., Department of Zoology, E-mail: radeks@ursus.ar.lublin.pl. University of Agriculture, Akademicka 13, 20-950 Lublin, Poland

1034. **Kovachev, S.; Stoichev, S. (1999):** Hydrofaunistic investigations of the Karla Lake, Central Greece. *Lauterbornia* 36: 71-73. (in English). [Hydrofaunistic research of Karla Lake (south-east part of the Thessalia plain); the frequency on 6 sites, and dominance of the 27 zoobenthos species including *Calopteryx virgo* and *Ischnura pumilio* is given] Address: Kovachev, S., Sofia University, Biological Faculty, Boul. Dragan Tsankov 8, BG-1421 Sofia, Bulgaria

1035. **Krawutschke, A.; Kruse, M. (1999):** *Gomphus flavipes* (Charpentier) an der Unteren Havel (Anisoptera: Gomphidae). *Libellula* 18(1/2): 71-77. (in German, with English summary). ["In 1996 and 1997, *G. flavipes* was recorded along the river Havel between Pritzerbe and the mouth of the Alte Dosse (Brandenburg, Germany). The species lives at sandy bights, eroded banks and shallow berths of fishing boats. Details on emergence and location of exuviae are given." (Author) A few remarks on dormitories of *G. flavipes* are made.] Address: Krawutschke, Anne, Zool. Mus. Univ. Hamburg, AG Prof. J. Parzefall, Naturschutz, Martin-Luther-King-Platz 3, D-20146 Hamburg, Germany. E-mail: fb7y082@public.uni-hamburg.de

1036. **Krawutschke, A. (1999):** Zur Ökologie und Biologie ausgewählter Aeshniden-Arten (Odonata: Anisoptera) im Naturpark Westhavelland. Diplomarbeit am Fachbereich Biologie, Zoologisches Institut und Museum der Universität Hamburg: 120 pp., Anhänge. (in German). [*Brachytron pratense*, *Anaciaeschna isoceles*, *Aeshna viridis*, *A. grandis*, *A. mixta*, *Anax imperator*, and *A. parthenope* were surveyed in 1998 in the



Nature park Westhavelland, Federal State Brandenburg, Germany. Results are obtained on development of larvae, emergence, intra- and interspecific competition, coexistence, phenology, and habitats. A final chapter deals with conservation measures with special emphasis on the *Statiodes aloides* ditches. There is a bundle of primary, highly interesting results on ecology and coexistence of the Aeshnidae in Central Europe.] Address: Krawutschke, Anne, Timm-Kröger-Weg 26a, D-22926 Ahrensburg, Germany

1037. **Krotzer, R.S.; Krotzer, M.J. (1999):** Dragonflies and damselflies (Odonata) of the National Forests in Alabama. *Ent. news* 110(3): 153-161. (in English). ["Odonate surveys were conducted on National Forest lands in Alabama between 1994 and 1997. We collected 124 species representing all ten families and 71% of the species known to occur in the state. The number of species collected in any one National Forest ranged from 62 to 88. Seventy new county records were documented during this survey. National Forest lands in Alabama may serve as a refugium for odonate species with specialized larval habitat requirements or that are sensitive to habitat disturbances." (Authors)] Address: Krotzer, S., 6010 Woodvale Drive, Helena, AL 35080, USA.

1038. **Kunsthau - Barlachhalle K. Hamburg (1999):** Jochen Lempert: 365 Tafeln zur Naturgeschichte: 1.6.-11.7.1999. triennale der photographie. hamburg 1999: leaflet. (in German). [announcement of an exhibition of the well known German odonatologist and artist Jochen Lempert] Address: Kunsthau. Barlach HALLE K, Klosterwall 14, D-20095 Hamburg, Germany

1039. **Labeledzki, A.; Buczynski, P.; Tonczyk, G. (1999):** Gefährdung und Schutz der Libellen (Odonata) in Polen. In: Polski Towarzystwo Entomologiczne & Instytut Ochrony Przyrody PAN (Eds.): Konferncja Naukowa. "Ochrona owadów w Polsce u progę integracji z Unia Europejska", Kraków, 23-24 wrzesnia 1999. ISBN 83-01-08125-2. [Conservation of insects on the treshold of the integration of Poland into the European Community]: 21-23. (in Polish). [Poster presentation on the threat und conservation measures of Polish Odonata. Compared with the Red lists of countries of the European Community, the situation in Poland ist much better: 31% of the Polish Odonata species are listed in the Red List, compared with e.g. Germany, were 66% or Luxembourg with 59%. Key species for some habitat types are defined. The Polish colleagues assess the influence of colleting of dragonflies as a quite serious problem or dragonfly conservation. The necessity of further and detailed studies on the Polish odonate fauna is stressed.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PO-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

1040. **Lecomte, T. (1999):** Les Odonates du Marais Vernier (Département de l'Eure). *Martinia* 15(2): 15-22. (in French, with English summary). ["The Vernier marsh is an extended peaty area situated in the Eure department, in Normandy. The analysis of the three existing publications concerning High-Normandy region, as well as the observations by the author, sum up to 39 species whose today presence or absence is commented. Since a few years the management in the «Courtils de Bouquelon» Voluntary Nature Reserve has significantly

favoured the development of the odonatological fauna of this site." (Author)] Address: Lecomte, T., R.N.V. des Courtils Bouquelon, « La Courtilière » La Vallée, F-27500 Bouquelon, France

1041. **Leipelt, K.G. (1999):** *Cordulegaster bidentata* SELYS und *Cordulegaster boltonii* (DONOVAN) (Odonata: Cordulegastridae) im nördlichen Harzvorland. *Braunschw. naturkd. Schr.* 5(4): 849-856. (in German, with English summary). [Niedersachsen, Germany; "In 1997 and 1998, in headwaters north of the Harz Mountains *Cordulegaster bidentata* SELYS, 1843 was recorded at eight sites. The distribution pattern at the edge of the range is discussed. Besides, at three running waters which belong to the systems of the river Innerste and the river Fuhse, *C. boltonii* (DONOVAN, 1807) was recorded. During intense surveys at the river Innerste in 1980 the species was not observed. Therefore this population seems to be newly established." (Author)] Address: Leipelt, K.G., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

1042. **Leipelt, K.G.; Jökel, I.; Schrimpf, T.; Schütte, C.; Suhling, F. (1999):** Untersuchungen zur Habitatwahl der Larven von *Macromia splendens* (Pictet) (Anisoptera: Macromiidae). *Libellula* 18(1/2): 15-30. (in German, with English summary). ["In July 1998 we studied larval habitats and behaviour of *Macromia splendens* at the Garden de Mialet (France). Penultimate instar larvae were found in deep, calm sections of the river close to large rocks. In each case the bottom substratum was sand sometimes covered with leaf debris. Despite of intensive search, the habitats of smaller instars remained unknown to us. In substratum selection experiments the larvae preferred leaf detritus on sand rather than bare sand or stones on sand, and shaded substrata rather than those exposed to the sun. In the experiments the larvae were inactive during the day whereas they changed their places during the night. Substratum selection, low activity and burrowing behaviour are interpreted as anti-predator behaviour." (Authors)] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

1043. **Lempert, J. (1999):** *Gynacantha corbeti* spec. nov., a new dragonfly from West Malaysia (Anisoptera: Aeshnidae). *International Journal of Odonatology* 2(1): 17-21. (in English). Address: Lempert, J., Vereinsstr. 41, D-20357 Hamburg, Germany

1044. **Lencioni, F.A.A. (1999):** The genus *Phasmoneura*, with description of *Forcepsioneura* gen. nov. and two new species (Zygoptera: Protoneuridae). *Odonatologica* 28(2): 127-137. (in English). ["The genus *Phasmoneura* is reviewed with the description of *Phasmoneura janirae* sp. n. (holotype male, allotype female: Brazil: Mato Grosso, Sinop, X-1976: in MNRJ). *Forcepsioneura* gen. n. is established for *Forcepsioneura garrisoni* sp. n. (generotype and holotype male: Brasil, Sao Paulo, Iguape. 22-IV-1995, in coll. Lencioni) and includes three previously described spp., viz. *Phasmoneura ephippigera* (Selys, 1886), *P. ciganae* Santos, 1968 and *P. itatiaiae* Santos, 1970. Keys and illustrations are given for all members of both genera." (Author)] Address: Lencioni, F.A.A., Rua dos Ferroviarios 55, Jardim Mesquilha, BR-12300-000 Jacarei, S.P. Brazil. E-mail: odonata@iconet.com.br

1045. **Leung, B.; Baker, R.L.; Forbes, M.R. (1999):** Grooming decisions by damselflies, age-specific colonisation by water mites, and the probability of successful parasitism. *Int. Jour. Parsitology* 29(3): 397-402. (in English). ["We examined whether host damselflies (*Ischnura verticalis*) in different stages of development were differentially susceptible to parasitism by larval water mites (*Arrenurus pseudosuperior*). We found that mites were successful in reaching the parasitic phase more often if they colonised hosts closer to emergence. Thus, we predicted that more mites should colonise damselflies closer to emergence and damselflies closer to emergence should spend more time defending against mites. We found that mites colonised damselflies closer to emergence in one of two experiments, but that damselflies in different stages of development did not differ in time spent defending against mites." (Authors)] Address: Baker, R.L., Dept Zoo], Erindale Coll., Univ. Toronto, Mississauga, ON, L6L 2C6. Canada. E-mail: rbaker@credit.erin.utoronto.ca

1046. **Leysjon, O. (1999):** An influx of red-veined darters at Dungeness RSPB reserve in 1998. The newsletter of the British Dragonfly Society No. 35: 14. (in English). [Short documentation of the occurrence of *Sympetrum fonscolombii* in the Dungeness Reserve, Kent, UK in July and August 1998] Address: Leysjon, O., Romney Marsh Countyside Project, Romney Resource Centre, Mountfield Road, New Romney, Romney Marsh, Kent TN28 8LH, UK

1047. **Logan, J.A. (1999):** Extraction, polymerase chain reaction, and sequencing of a 440 base pair region of the mitochondrial cytochrome oxidase I gene from two species of acetone-preserved damselflies (Odonata: Coenagrionidae). *Environmental entomology* 28(2): 143-147. (in English). ["Preserved insects are an important data source for many molecular systematics projects. This study investigates the use of acetone-preserved specimens in molecular DNA research. Two species of damselflies, *Enallagma civile* (Hagen) and *Hetaerina americana* (F.), were soaked in acetone before drying. Total genomic DNA was successfully extracted, amplified, and sequenced from the acetone-preserved damselflies with no noticeable effect from either the acetone or preservation time. Nucleotide sequences of a 440 bp region of the mitochondrial cytochrome oxidase I gene are presented for *E. civile* and *H. americana*. These 2 species have reached a saturated divergence level and it seems that the COI gene will not be useful for developing phylogenies at this taxonomic level." (Authors)] Address: Logan, J.A., Univ. Calif. Davis; Dept Ecol. & Evolut., Davis CA 95616; USA

1048. **Lopau, W. (1999):** Bemerkenswerte Libellenfunde aus Griechenland. *Libellula Suppl.* 2: 63-66. (in German, with English summary). ["In 1997, the first reliable Greek record of *Lestes sponsa* was made at the river Strimonas. *Pyrrhosma nymphula elisabethae* was rediscovered on the Peloponnese. *Lindenia tetraphylla* was recorded breeding in a river. *Coenagrion ornatum* is new for the Peloponnese and *Cordulegaster bidentata* is new for Thracia." (Author)] Address: Lopau, W., Kuhstedtermoor 26, D-27442 Gnarrenburg, Germany

1049. **Lopau, W. (1999):** Die Libellenfauna der griechischen Inseln Thásos, Samothráki und Límnos. *Libellula Suppl.* 2: 43-61. (in German, with English summary). ["Records in 1996 and 1997 have been combi-

ned with published and unpublished data known from the islands. Altogether, 30 spp. have been recorded. The checklist is discussed in terms of taxonomy, behaviour and habitat preferences." (Author) Remarks on the drought resistance of larvae of *Epallage fatime*, estimation of the population density of *Lestes macrostigma* on lake Chortárolimni (100.000.000 individuals!), the ranges of *Onychogomphus forcipatus forcipatus* and *O. f. albotibialis* are more precisely defined, description of morphological details of *Cordulegaster picta*, details of the colour of the eyes of *Cordulegaster insignis*, description of the differences of emerging substrate of *Cordulegaster insignis* (green leaves) and *Sonjagaster helladica* (rocks)] Address: Lopau, W., Kuhstedtermoor 26, D-27442 Gnarrenburg, Germany

1050. **Lopau, W. (1999):** Die Libellenfauna der Insel Évia (Euböa), Griechenland. *Libellula Suppl.* 2: 67-76. (in German, with English summary). ["Based on field trips in 1996, 1997, and 1998, and on literature data a review of the dragonfly fauna of Évia is given. At 41 localities 28 species were observed, 12 of them are new for the island. Altogether 31 species are recorded for Évia." (Author)] Address: Lopau, W., Kuhstedtermoor 26, D-27442 Gnarrenburg, Germany

1051. **Lutz, H. (1999):** Die unteroligozäne Insekten-Taphozönose von Sieblos/Rhön - ein Schlüssel für die Rekonstruktion des aquatischen Paläoenvironments. *Geol. Abhandl. Hessen* 104: 101-114. (in German, with English summary). ["This is an up to date summary of the insect taphocoenosis from Sieblos/Rhön. The specimens belong to two different facies types, 1) dysodils and 2) laminated carbonates. The present paper focuses on aspects of taphonomy. An analysis based on the terrestrial insect component of the taphocoenoses from 36 other aquatic paleoenvironments is of fundamental importance for an interpretation of the taphonomical phenomena from Sieblos. The effects of post-mortem surface drifting and sinking, i.e. the length of transport and the water-density affect the composition of local taphocoenoses within a single lagerstätte. This allows for horizons of the same age at the same lagerstätte to differentiate between near-shore and off-shore sites. In addition, the average contents of electrolytes can be determined by correlating the specific density with the sodium-chloridic salinity of marine paleoenvironments. It should be kept in mind however, that both low water-temperatures and contents of suspended matter may also raise the water-density. Nevertheless, the analysis allows for the recognition of normal (non-saline) lakes on the one hand, and brackish-marine to hyperhaline paleoenvironments on the other. Locally restricted lagerstätten of volcanic and/or tectonic origin like Sieblos and Maar-lakes, where many components of the aquatic flora and fauna indicate the predominance of freshwater, while others seem to point to an input of saline water, have been meromictic (salinity stratified) lakes with a high content of electrolytes in the monimolimnion. In these lakes storms or other events episodically caused partial turnovers that led to a more or less intensive increase of the contents of electrolytes within the lacustrine to oligohaline mixolimnion. Especially after periods of more intensive evaporation these partial turnovers may have caused mass mortalities among the stenohaline freshwater organisms. The comparison of the taphocoenoses of different facies or of single horizons within a lagerstätte makes changes of the specific density during the sedimentation of these facies or horizons obvious. Finally, on the basis of these tapho-

nomical informations, a dynamic model is given for the Sieblos-lake, that takes into account hydrological mid paleoclimatological changes during the sedimentation of the fossil bearing facies." (Author). Odonata dominate the insect-taphocoenosis of Sieblos (57,14% of all taxa in the facies of laminated carbonates; 0% in the facies of dysolids; 41,24% of both the facies). The Odonata of Sieblos are treated e.g. by Hagen, H.A. (1858): Zwei Libellen aus der Braunkohle von Sieblos. Palaeontographica 5, or Martini, E. (1971): Neue Insektenfunde aus dem Unter-Oligozän von Sieblos/Rhön. Senckenbergiana lethaea 52(4).] Address: Lutz, H., Naturhistorisches Museum / Landessammlung für Naturkunde Rheinland-Pfalz, Reichklaraste. 10., D-55116 Mainz, Germany.

1052. **Mader, D. (1999):** Geologische und biologische Entomökologie der rezenten Seidenbiene *Colletes* - Entomökologie der Nestbauten und Nistsubstrate der Seidenbiene *Colletes daviesanus* und anderer rezenter solitärer Wildbienen und Wespen in Buntsandstein, Rotliegend, Keuper, Lias, Dogger, Tertiär und Quartär. 2.8.11 Die Libellen Orthetrum und Anotogaster (Odonata). Bd 1. Logabook. Köln: 807 pp. (in German). [predation of Odonata on *Colletes* species (Hymenoptera)]

1053. **Mauffray, B. (1999):** *Aphylla angustifolia* Garrison from Mississippi. *Argia* 11(1): 27. (in English). [range extension of *A. angustifolia*] Address: Mauffray, B., 3906 N.W. 32nd Pl., Gainesville, FL 32606, USA. E-mail: iori@afn.org

1054. **Mauffray, B. (1999):** Georgia Odonata update. *Argia* 11(1): 29. (in English). [list of contributors to the Georgia Odonata check list] Address: Mauffray, B., 3906 N.W. 32nd Pl., Gainesville, FL 32606, USA. E-mail: iori@afn.org

1055. **Mauffray, B. (1999):** Louisiana Odonata update (1998). *Argia* 11(1): 29. (in English). [additions to the Louisiana Odonata checklist] Address: Mauffray, B., 3906 N.W. 32nd Pl., Gainesville, FL 32606, USA. E-mail: iori@afn.org

1056. **Mauffray, W.F. (1999):** *Oxyagrion tennesse* spec. nov from Ecuador (Zygoptera: Coenagrionidae). *Odonatologica* 28(2): 165-170. (in English). ["The new sp. is described and illustrated from the Ecuadorian Andes (holotype male, allotype female: Napo prov., Baeza, 26-V11-1996; deposited at FSCA, Gainesville). It is similar to *O. terminale* Sel. and *O. bruchi* Navas, from which it is differentiated by the shape of the cerci and the coloration on abdominal segments 8-10." (Author)] Address: Mauffray, W.F. International Odonata Research Institute, D.P.I., P.O. Box 147100, Gainesville FL 32614-7100, USA

1057. **McCarty, J.P.; Winkler, D.W. (1999):** Foraging ecology and diet selectivity of tree swallows feeding nestlings. *Condor* 101(2): 246-254. (in English). ["We studied the foraging ecology of a population of Tree Swallows (*Tachycineta bicolor*) breeding in New York State over a period of 5 years. While feeding nestlings, adult Tree Swallows tended to spend most of their time within sight of their nest box and less than 12 m above the ground. Major insect taxa captured include Diptera, Hemiptera and Odonata, ranging in length from mainly 0-10 mm, with some individuals up to 60 mm. The sex of the parent delivering the food had no significant effect on diet composition. Selection for or against food

categories was determined by comparing the proportion of insects of different types in the diet of Tree Swallows to the proportions available in the air column. Tree Swallows showed consistent selection for insects larger than 3 mm and against smaller insects, especially Diptera in the suborder Nematocera. Only minor differences in diet were observed among years, and the effects of the abundance of food available were generally small. The patterns of selectivity found in this population were consistent with those found in previous studies on this species carried out in other locations, and these patterns are likely the result of differences in the profitability or visibility of prey types." (Authors)] Address: McCarty, J.P., Univ. Maryland; Dept Biol., College Pk, MD 20742; USA. E-mail: jm395@umail.umd.edu

1058. **Ménard, B.; Hutchinson, R. (1999):** *Williamsonia fletcheri* Williamson (Odonata: Corduliidae) au Québec: nouvelles récoltes, habitats et notes biologiques. *Faberies* 24(2/3): 25-32. (in French, with English summary). ["The authors report two new records of *W. fletcheri* Williamson for the province of Québec. This species remains rarely found everywhere in its range. They present their observations on the habitats and the unique microhabitat of this odonate. They also summarize available natural history data and illustrate the larva." (Authors)]. Address: Ménard, B., 56, rue Smith, Gati-neau (Québec) J8T 3A1, Canada

1059. **Meskin, I. (1999):** A farm in Africa. *W.D.A.'s Agrion* 3(1): 12. (in English). [Personal account on the dragonflies of a favourite spot in the northern part of South Africa.] Address: Meskin, I., 14 Frederick Street, Observatory, Johannesburg 2198, Gauteng, South Africa

1060. **Meurgey, F. (1999):** Quelques observations sur les émergences d'odonates sur les ponts d'une rivière (Département de Charente-Maritime). *Martinia* 15(2): 23-29. (in French, with English summary). [*Boyeria irene*, *Onychogomphus uncatus*, *Cordulegaster boltonii*.] Address: Meurgey, F., 19, rue Miséricorde, F-44000 Nantes, France

1061. **Misof, B.; Rickert, A. (1999):** Molekulare Untersuchungen zur phylogenetischen Position der Odonata. Leaflet. 1pp. (in German). Address: ari-ckert@evolution.uni-bonn.de

1062. **Mocek, B.; Rejl, J. (1999):** Dragonfly *Aeshna isosceles* (Müller, 1767) (Odonata) in Eastern Bohemia. *Acta Musei Reginae iradecensis* (A) 27: 121-124. (in Czech, with English summary). [Three records of *Anaciaeschna isosceles* are documented: one road kill, and two records from the floodplain of River Labe. The habitats are pictured and the odonate fauna of the localities is listed in a tab.] Address: Mocek, B., Regional Museum of Eastern Bohemia, Dept Natural History, Eliscino Nábřezí 465, CZ-50001 Hradec Králové, Czech Republic. E-mail: mvc@mvc.anet.cz

1063. **Müller, J. (1999):** *Ophiogomphus cecilia* (Fourcroy) in der Donau bei Deggendorf, Niederbayern (Anisoptera: Gomphidae). *Libellula* 18(1/2): 69-70. (in German, with English summary). [record of an emerging female from 18 July, 1998] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: jmuel-ler@MU.LSA-NET.dbp.de



1064. **Nel, A.; Gand, G.; Garric, J. (1999):** A new family of Odonoptera from the continental Upper Permian: The Lapeyriidae (Lodeve Basin, France). *Geobis* 32(1): 63-72. (in English). ["The new family Lapeyriidae of Odonoptera, based on a new genus and species from the Upper Permian of Lodevois (France) is the sister group of Nodialata. It represents an evolutionary link between the venation type of the Paleozoic Meganisoptera and that of Odonata. Even if the present discovery demonstrates that the fossil record of the Odonoptera remains imperfectly known, the present state of knowledge shows that this super order survived the mass extinction at the Permo-Triassic boundary." (Authors) ] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr
1065. **Nel, A.; Jarzembowski, E.A. (1999):** Fossil damselflies and dragonflies (Insecta: Odonata) from the late Upper Eocene of southern England. *Proc. geologist's ass.* 111(3): 193-201. (in English). ["Fossil dragonflies (sensu late) from the Bembridge Marls are discussed and five additional species are described: *Lestes* aff. *regina* Theobald, 1937 (Zygoptera: Lestidae); two new coenagrionoids; a corduliid and an enigmatic form of uncertain affinity. The palaeoenvironmental implications are considered." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr
1066. **Nielsen, D.L.; Hillman, T.J.; Smith, F.J. (1999):** Effects of hydrological variation and planktivorous competition on macroinvertebrate community structure in experimental billabongs. *Freshwater biology* 42: 427-444. (in English). ["1. To study two factors which are predicted as causing changes to community structure in cut-off meanders (colloquially known in Australia as billabongs, a term of aboriginal origin), 16 experimental billabongs were constructed. These were designed to test two hypotheses: (a) that the structure of macrophyte and invertebrate communities within billabongs is altered by changing the pattern of flooding; and (b) that the presence of small planktivorous fish alters invertebrate community structure and diversity within billabongs. 2. An increase in the duration of flooding seems to favour animals better adapted to a greater availability of macrophyte habitat. Changing the seasonality of flooding resulted in prolonging of the time water was available over the summer months. 3. The presence of a planktivorous fish appears to affect macroinvertebrate communities through competition with other planktivores. Variable top-down pressure may create differing successional patterns and ultimately different communities at lower trophic levels." (Authors) Odonate taxa mentioned as follows: "immature damselflies", "*Ischnura* sp.", and "*Diplacodes* sp.". *Ischnura* sp. "may reflect duration of flooding and macrophyte availability.", and "Increasing numbers in the absence of fish. Effect increasing over duration of experiment.". *Diplacodes* sp.: "Seasonal effect. Numbers increase in the absence of fish during summer month, decreases in the winter month."] Address: Nielsen, D.L., Cooperative Research Centre for Freshwater Ecology, (Murray-Darling Freshwater Research Centre), PO Box 921, Albury 2640, New South Wales, Australia. E-mail: dazza@mdfrc.canberra.edu.au
1067. **Nielsen, O.F. (1999):** Dragonfly-news from Denmark 1998. *Nord. Odonat.Soc., Newsl.* 5 (1): 3. (in Danish, with English summary). ["Because of the bad weather in Denmark, 1998 became one of the poorest dragonfly-seasons for years. Still, many interesting records were made. Two new species were found, a female of *Sympetrum pedemontanum* at Langeland, and a female of *Sympetrum fonscolombei* at Bornholm. *Anax imperator* was discovered at Fyn, and successful breeding in Denmark was proved, as exuviae were found both here and at southern Jylland. *Somatochlora arctica* was present in good numbers at the locality at central Jylland. Near Ry, Jylland, two localities with the rare *Ischnura pumilio* were discovered. *Aeshna mixta* was found scattered at Jylland, but not as numerous as in the two previous seasons. In particular the species of *Lestes*, *Aeshna* and *Sympetrum* appeared in very low numbers this year." (Author)] Address: Nielsen, O.F., Sokildevej 87, DK-8680 Ry, Denmark
1068. **Nikula, B. (1999):** Another *Somatochlora georgiana* record of Massachusetts. *Argia* 11(3): 7-8. (in English). [Essex County, Massachusetts, USA] Address: Nikula, B., 2 Gilbert Lane, Harwich Port, MA 02646, USA. E-mail: odenews@capecod.net
1069. **Nikula, B. (1999):** The *Somatochlora* swat team visits Maine. *Argia* 11(3): 11-12. (in English). [first record of *Somatochlora brevicincta* in USA; some more species of Corduliidae and Gomphidae are also mentioned including a "yet-to-be-described *Neurocordulia*"] Address: Nikula, B., 2 Gilbert Lane, Harwich Port, MA 02646, USA. E-mail: odenews@capecod.net
1070. **Nikula, B. (1999):** The Swat Team goes canoeing. *Argia* 11(3): 12-13. (in English). [Maine, USA; *Neurocordulia yamaskanensis* (Provancher, 1875), *Gomphus ventricosus* Walsh, 1863, *Lanthus vernalis* Carle 1980, *Gomphus abbreviatus* Hagen in Selys, 1878, *Gomphus vastus* Walsh, 1862] Address: Nikula, B., 2 Gilbert Lane, Harwich Port, MA 02646, USA. E-mail: odenews@capecod.net
1071. **Norma-Rashid, Y. (1999):** Behavioural ecology of *Tyriobapta torrida* Kirby at the breeding and resting sites (Anisoptera: Libellulidae). *Odonatologica* 28(2): 139-150. (in English). ["*T. torrida* showed territoriality at the water bodies where breeding occurs and also site fidelity at the resting sites on tree trunks away from the water. At the latter, residentiality is very localised not only to a specific tree but to a narrow range of height on the tree. Activity patterns at the breeding sites commenced with the male arrival. The density and activity reached an initial peak during mid-morning which coincided with the high day temperature. Aggression peaked at this time although pursued only for brief periods. The duration for perching behaviour was low during reproductive periods which otherwise had longer bouts." (Author)] Address: Norma-Rashid, Y., Department of Zoology, Faculty of Science, University of Malaya, 59100 Kuala Lumpur, Malaysia
1072. **Novelo-Gutiérrez, R.; Garrison, R.W. (1999):** *Erpetogomphus erici* spec. nov. from Mexico, and a description of the male of *E. agkistrodon* Garrison (Anisoptera: Gomphidae). *Odonatologica* 28(2): 171-179. (in English). ["*E. erici* is described and figured from: El Muro, km 16 Rte 131, Altotonga-Tiapacoyan, Veracruz State, Mexico, and from Pemuxtitia, Rio Zacuala, and Molango, Laguna de Atezca (stream), both in Hidalgo State, Mexico. The allotype male of *E. agkistrodon* is described and illustrated from: Coatepec, Rio La Marina, Veracruz State, Mexico. Both are most closely rela-

ted to *E. schausi* Calvert, but differ in details of the appendages and occiput." (Author)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Institute de Ecología, A.C., Apartado Postal 63. MX-91000 Xalapa, Veracruz, Mexico; Garrison, R.W., Research Associate, Natural History Museum of Los Angeles County, 900 Exposition Blvd. Los Angeles, California, 90007, USA

1073. **O'Brien, M. (1999):** *Williamsonia* wandering. *Argia* 11(2): 3. (in English). [W. lintneri was found in May 1999 in Mecosta Co., Michigan, USA in a bog; additional records of *W. flechteri* are recorded too] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: O'Brien: mfobrien@umich.edu

1074. **Oehme, H. (1999):** Jagderfolg und Jagdtaktik bei *Sympetrum striolatum* (Charpentier) (Anisoptera: Libellulidae). *Libellula* 18(1/2): 79-87. (in German, with English summary). ["Flight activities starting from several perches around a small artificial pond and foraging success of an individually recognizable male *S. striolatum* were observed during 14 days between 8 July, and 5 September, 1998. The results are discussed in comparison with other libellulid species. Remarkable deviations of hunting behaviour from wide-spread views are ascertained and discussed." (Author)] Address: Oehme, H., Marzahner Chausee 161, D-12681 Berlin, Germany

1075. **Olsvik, H. (1999):** Bokanmeldelse: Ole Fogh Nielsen. De danske guldsmede. Apollo books. ISBN 87-88757-21-8. *Nord. Odonat. Soc., Newsletter* 5(1): 9. (in Norwegian). [review of Nielsen's book on the Danish dragonflies] Address: Olsvik, H., N-6598 Foldfjorden, Norway

1076. **Olsvik, H. (1999):** From the 4th nordic Odonatological meeting at Konnevesi, Finland 26-28 June 1998. *Nord. Odonat. Soc. Newsl.* 5 (1): 6. (in Norwegian, with very short English summary). [brief report from the meeting, including a species list from the fieldtrip in Konnevesi, Finland] Address: Olsvik, H., N-6598 Foldfjorden, Norway

1077. **Olsvik, H. (1999):** Odonata in Aure. *Nord. Odonat. Soc. Newsl.* 5 (1): 16. (in Norwegian, with English summary). ["18 species are found in Aure municipality, central Norway during the last 24 years, 19 if *Sympetrum nigrescens*" is considered as a separate species." (Author). *Aeshna juncea* is the most frequent, and *Coenagrion armatum* and *Sympetrum striolatum* (excl. *S. nigrescens*) are the most rare species.] Address: Olsvik, H., N-6598 Foldfjorden, Norway

1078. **Olsvik, H. (1999):** Odonata-impressions from Minnesota. *Nord. Odonat. Soc. Newsl.* 5 (1): 18-19. (in Norwegian, with English summary). ["44 odonate species were collected at a dozen localities, mostly in the "North Shore"-area of Minnesota, in July - August 1991 and May 1992. Three species seem to be new to the state, *Enallagma vesperum*, *Chromagrion conditum* and *Somatochlora cingulata*, and also nineteen new county records." (Author)] Address: Olsvik, H., N-6598 Foldfjorden, Norway

1079. **Olsvik, H. (1999):** Om larve- / exuvia-kjenne-tegn på *Somatochlora arctica*. *Nord. Odonat. Soc., Newsletter* 5(1): 8. (in Norwegian, with English summary). ["Two asymmetrical larvae of *Somatochlora arctica*

were found among a total of 28 larvae found 4 May 1998 in Aure, Norway. The recognizing mark or sclerite at the underside of segment 7 was present at one side, lacking on the other." (Author); 1 fig.] Address: Olsvik, H., N-6598 Foldfjorden, Norway

1080. **Olsvik, H. (1999):** Proposed regional red lists for Odonata. *Nord. Odonat. Soc., Newsletter* 5(1): 10-11. (in Norwegian, with English summary). ["This is the first draft of a complete set of regional red lists for Odonata in Norway, a tool for the environmental authorities both local and national." (Author)] Address: Olsvik, H., N-6598 Foldfjorden, Norway

1081. **Olsvik, H. (1999):** Småstykker. *Nord. Odonat. Soc., Newsletter* 5(1): 12-13. (in Norwegian). [news and short accounts on several odonatological subjects such as • Odonatological news from More and Romsdal, 1998 with records of *Coenagrion armatum* and *Calopteryx virgo* • *Anax junius* in England • Odonatological symposium in Siberia, USSR, 2001 • Water skiing as a tool to catch fast flying dragonflies • Catching dragonflies using pump guns • Odonatological activities in the internet • New dragonfly books on Thai and Danish Odonata] Address: Olsvik, H., N-6598 Foldfjorden, Norway

1082. **Olsvik, H.; Nielsen, O.F. (1999):** *Sympetrum nigrescens* "Lucas, 1912 in Denmark. *Nord. Odonat. Soc. Newsl.* 5 (1): 7. (in Danish, with English summary). ["The specimens of "*Sympetrum striolatum*" (Charp., 1840) found in Jylland, Denmark have appeared very dark, very similar to Norwegian material that shows the signs of Lucas' and Gardner's *S. nigrescens*." (Authors)] Address: Olsvik, H., N-6598 Foldfjorden, Norway

1083. **Olsvik, H. (1999):** Welcome to the 5th annual summer meeting of the nordic Odonatological society, at Aure, Nordmoere, central Norway 6-8. August 1999. *Nord. Odonat. Soc. Newsl.* 5 (1): 17. (in Norwegian and English). [announcement of the 5th annual meeting of the nordic odonatological society] Address: Olsvik, H., N-6598 Foldfjorden, Norway

1084. **Orr, A.G. (1999):** *Sundacypha striata* spec. nov., a new damselfly from Borneo (Zygoptera: Chlorocyphidae). *Odonatologica* 28(2): 181-185. (in English). ["Both sexes of *S. striata* sp. n. are described from Brunei (holotype male: Belait distr., Sungei Lumut, 16-XII-1995; deposited in RMNH. Leiden), and notes on its ecology and behaviour are provided. This is the second species of the hitherto monobasic genus, widespread in Sundaland." (Author)] Address: Orr, A.G., CRC-TREM, Griffith University, Nathan, Q4111, Australia

1085. **Papazian, M. (1999):** Odonates nouveaux pour la Guyane Française (Odonata, Libellulidae). *Martinia* 15(2): 43-45. (in French, with English summary). [15 new species are added to the list of Odonata of French Guyana] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France

1086. **Papendieck, M. (1999):** Die Pokaljungfer *Cercion lindenii* (SELYS) an ihrer östlichen Verbreitungsgrenze in Niedersachsen (Odonata: Coenagrionidae). *Braunschw. naturkd. Schr.* 5(4): 959-963. (in German, with English summary). ["In August 1998, for the first time the damselfly *Cercion lindenii* (SELYS, 1840) was recorded at the nature reserve "Okeraue", close to the

borderline of Lower Saxony and Saxony-Anhalt, 30 km south of Braunschweig. It was found at one of four ponds, which were formerly used as gravel mines. They are located nearby the eastern banks of the Oker river." (Author) These records are the most eastern one's in Niedersachsen, Germany.] Address: Papendieck, M., Schmidekamp 19, D-38690 Vienenburg, Germany

1087. **Parr, A. (1999):** Norfolk Damselfly *Coenagrion armatum* rediscovered in The Netherlands. *Atropos* 8: 52. (in English). [record from May 9, 1999 in the "boggy Weerribben region", the same region in which *C. armatum* was seen for the last time in 1956 in The Netherlands; it therefore is supposed that the species never disappeared from The Netherlands, but simply was overlooked; the habitat is described in short] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

1088. **Parr, A. (1999):** Odonata Records Committee News. *Atropos* 8: 53. (in English). [two new acceptations of *A. parthenope* by the Committee for May 1997, and August 1998 ; up to date status of accepted records of *Anax parthenope* in UK: eleven records with 12 individuals.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

1089. **Parr, A. (1999):** Potential new Odonata for the British list: 2. The possibility of vagrant or colonist damselflies. *Atropos* 8: 21-25. (in English). [Four further candidates to enlarge the number of British dragonfly fauna are *Sympetma fusca*, *Chalcolestes viridis*, *Lestes barbarus*, and *L. virens*. These species are described, compared with other species easily to confused, and presented on colour plates.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

1090. **Parr, A.J. (1999):** Migrant and dispersive dragonflies in Britain and Ireland during 1998. *J. Br. Dragonfly Soc.* 15(2): 51-57. (in English). [Information on the following species is provided: *Aeshna cyanea*, *A. mixta*, *Anax ephippiger*, *A. imperator*, *A. parthenope*, *A. junius*, *Libellula quadrimaculata*, *Crocothemis erythraea*, *Sympetrum striolatum*, *Sympetrum fonscolombii*, *Sympetrum flaveolum*, and *Sympetrum sanguineum*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

1091. **Parr, M. (1999):** "And then I arrive home and find the very Lady waiting for me". *W.D.A.'s Agrion* 3(1): 7. (in English). [Report on a personal contact with Robert Gambles, the discovery of the female of *Nesiothemis farinosa*, the synonymy of *Limnetothemis erythra* with *N. forinosa*, and some additional information on the latter species.] Address: Parr, M., Little Island, Stembridge, Martock, Somerset TA12 6BW, UK. E-mail: mmc@parr37.freeseerve.co.uk

1092. **Parr, M. (1999):** Dragonfly enthusiasts in Madagascar. *W.D.A.'s Agrion* 3(2): 26. (in English). [report on an expedition in April 1999 to Madagascar; this paper seems to be an appetizer for a forthcoming paper on the results of the trip.] Address: Parr, M., Little Island, Stembridge, Martock, Somerset TA12 6BW, UK. E-mail: mmc@parr37.freeseerve.co.uk

1093. **Parr, M.J. (1999):** Philip Steven Corbet, b 21 May, 1929. *International Journal of Odonatology* 2(1):

1-4. (in English). [biographical appreciation of Prof. Dr. P.S. Corbet in recognition of his 70th birthday] Address: Parr, M., Little Island, Stembridge, Martock, Somerset TA12 6BW, UK. E-mail: mmc@parr37.freeseerve.co.uk

1094. **Parr, M.J. (1999):** The terminology of female polymorphs of *Ischnura* (Zygoptera: Coenagrionidae). *International Journal of Odonatology* 2(1): 95-99. (in English). ["It is suggested that the current range of terminology employed to name the polymorphs of *Ischnura elegans* (Vander Linden) should be simplified and standardised in order to avoid confusion. [...] It is proposed that the plethora of inaccurate, complex and confusing names for female polymorphs of *I. elegans* should be reduced in accordance with the following: Adult forms: andromorph, infuscans and rufescens-obsolata (previously infuscans-obsolata). Immature stages: violacea and rufescens. Rejected names and terms used to describe polymorphs of *I. elegans* and closely related species include: type, typica, androchrome, androchromatypic, homeochrome, heterochrome, heteromorphic, gynochrome, gynochromatypic, infuscans-obsolata, usual, normal." (Author)] Address: Parr, M., Little Island, Stembridge, Martock, Somerset TA12 6BW, UK. E-mail: mmc@parr37.freeseerve.co.uk

1095. **Paulson, D. (1999):** Dragonflies down under. *Argia* 11(1): 5-8. (in English). [report from a odonatological trip to Australia from Dec. 1998 to Jan. 1999; you will find notes on the following species: *Austropetalia patricia* (Tillyard 1910), *Eusynthemis tillyardi* Theischinger 1995, *Choristhemis flavoterminalata* Martin, 1901, *Hemigomphus comitatus* (Tillyard 1909), *Pseudagrion aureofrons* Tillyard 1906, *Pseudagrion ignifer* Tillyard 1906, *Pseudagrion microcephalum* (Rambur 1842), *Nososticta solida* Hagen in Selys 1860, *Diphebia nymphoides* Tillyard 1912, *Diphebia euphaeoides* Tillyard 1907, *Austrolestes minjerriba* Watson 1979, *Orthetrum boumiera* Watson & Arhington, 1978, *Traema eurybia* Selys 1878, *Ischnura aurora* Brauer 1865, *Petalura gigantea* Leach 1815, *Petalura ingentissima* Tillyard 1908, *Nannophya australis* Brauer 1865, *Agriocnemis argentea* Tillyard 1906, *Choristhemis olivei* (Tillyard 1909), *Eusynthemis netta* n.sp. (see OAS 1158) *Tonyosynthemis ofarrelli* (Theischinger & Watson, 1986), *Camacinia othello* Tillyard, 1908] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA

1096. **Paulson, D. (1999):** Dragonfly questions out of Africa. *W.D.A.'s Agrion* 3(1): 14-15. (in English). [a lot of very interesting subjects for people who don't know what about to write their M.Sc.- or Ph.D.-thesis] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA

1097. **Paulson, D.; Hukari, M.; Krotzer, S.; Krotzer, M.J. (1999):** New county records of South Dakota Odonata, with five new species for the state. *Argia* 11(1): 28-29. (in English). [new to South Dakota are *Argomphus cornutus* (Tough 1900), *Stylurus amnicola* (Walsh 1862), *Stylurus notatus* (Rambur 1842), *Leucorrhinia hudsonica* (Selys 1850), and *Sympetrum rubicundulum* (Say 1839).] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA

1098. **Paulson, D. (1999):** Odonata gleanings - dragons eating dragons. *Argia* 11(2): 15-16. (in English).



[discussion, and list of Anisoptera recorded preying on Odonata] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA

1099. **Paulson, D. (1999):** Odonata gleanings - phylogeny and perching behaviour. *Argia* 11(3): 14-15. (in English). [discussion on perching behaviour and its potential importance in constructing a phylogeny of the Libellula group] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA

1100. **Paulson, D. (1999):** Photo files for odonate records. *Argia* 11(3): 19-20. (in English). [state of art report on building up a photo record documentation of US Odonata] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA

1101. **Pedersen, H. (1999):** Records of rare and new dragonfly species in Denmark 1997 - 1998. Contribution No. 1 from "Gomphus - the Danish mapping project". *Nord.Odonat.Soc.Newsl.* 5 (1): 14-15. (in Danish). ["The Danish mapping project - Gomphus, has now put together all Odonata-records from Denmark since 1887, altogether more than 100.000 records. Both museum collections and hundreds of private contributions are recorded in a database linked to electronic distribution maps. *Sympecma fusca* was found new to Denmark in south Jylland in 1998. A second locality for *Nehalennia speciosa* is also noteworthy. *Epitheca bimaculata* and *Leucorrhinia albifrons* were rediscovered in 1998 after 30-40 years without records." Records of other rare species (*Platycnemis pennipes*, *Ischnura pumilio*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Aeshna viridis*, *Anaciaeschna isocetes*, *Cordulegaster boltonii*, *Somatochlora arctica*, *Orthetrum coerulescens*, and *Leucorrhinia pectoralis*) are referred to. "A critical review of the new Danish Odonata book "De danske guldsmede" (O. F. Nielsen 1998) is also included." (Author)] Address: Pedersen, H., Møllevej 15, DK - 8800 Viborg, Danmark, E-mail: henning.pedersen@post12.tele.dk

1102. **Pelt, G.J. van (1999):** On dragonflies from Greece in the RMNH collection, Leiden, The Netherlands. *Libellula Suppl.* 2: 77-90. (in English, with German summary). ["Material of 41 species from 99 localities on the mainland of Greece (1984, 1995), and the islands of Samos and Icaria (1996, 1997) is reported upon. *Somatochlora metallica meridionalis* is reported from the Pelopónissos for the first time. From the island of Icaria 16 species are reported, among which *Calopteryx splendens*, *Enallagma cyathigerum*, *Anax immaculifrons* and *Cordulegaster insignis* are of particular interest." (Author)] Address: Pelt, G.J. van, Naturalis, P.O. 9517, NL-2300 RA Leiden, The Netherlands

1103. **Perrin, V.L. (1999):** Mixed pairing of Libellula species. *J. Br. Dragonfly Soc.* 15(2): 61. (in English). [mixed pair of a male *L. fulva* and a female *L. quadrimaculata*] Address: Perrin, V.L., 13 Pettits Lane, Dry Drayton, Cambridgeshire CB3 8BT, UK

1104. **Perrin, V.L. (1999):** Observations on the distribution, ecology and behaviour of the Hairy Dragonfly *Brachytron pratense* (Müller). *J. Br. Dragonfly Soc.* 15 (2): 39-45. (in English). ["This paper draws together information from many sources on the Hairy Dragonfly *Brachytron pratense*, collected as part of the recent Collective Knowledge Project of the British Dragonfly Society (BDS). Many of the observations have not been

published previously. It is intended to act as an overview of the species and to serve as a baseline of current knowledge. Additionally it is hoped that the paper may stimulate comment and further research work on this species which has as yet not been systematically studied over an extended period." (Author) Territorial and feeding behaviour, mating, oviposition aquatic habitat of larva and larval development, emergence, phenology.] Address: V. L. Perrin, 13 Pettits Lane, Dry Drayton, Cambridgeshire CB3 8BT, UK

1105. **Petrulevicius, J.F.; Nel, A.; Muzon, J. (1999):** A new libelluloid family from the upper Paleocene of Argentina. *Palaeontology* 42(4): 677-682. (in English). ["A new family of dragonflies, Palaeomacromiidae, based on *Palaeomacromia multicellulata* gen. et sp. nov., is described from the Late Paleocene Maiz Gordo Formation of north-western Argentina. The present discovery demonstrates that the present knowledge of the Early Cenozoic insect fauna of the Neotropical region remains very poor." (Authors)] Address: Petrulevicius, JF; Museo La Plata; Dept Cient Paleozool Invertebrados; Paseo Bosque S-N; RA-1900 La Plata; Argentina. E-mail: levicius@netverk.com.ar

1106. **Piper, W.; Krüner, U. (Eds.) (1999):** Libellen-nachrichten 2. 20 pp. (in German). [Newsletter of the Society of the German speaking Odonatologists with reports of its 18. meeting in Münster, (book) reviews, requests for cooperation, a report of the International Congress of Odonatology in Hamilton/USA in 1999, presentation of WDA, and some additions to "Dragonflies and literature"] Address: Piper, W., Kollenhof 31, D-22527 Hamburg, Germany

1107. **Plaistow, S.; Siva-Jothy, M.T. (1999):** The ontogenetic switch between odonate life history stages: effects on fitness when time and food are limited. *Animal behaviour* 58(3): 659-667. (in English). ["During the course of ontogeny, odonates switch from being aquatic larvae to being terrestrial adults. Ontogenetic niche shift theory proposes that such shifts are adaptive and have evolved to maximize a growth rate (size) to mortality rate ratio. Individuals should therefore switch from one niche to the other at an optimal size or state. Since the majority of odonates are seasonal breeders, the extent to which the switch is optimal will depend upon the time and the resources available during postembryonic development. We collected a cohort of larvae that varied in how close they were to eclosion and reared them on either a high-nutrition or a low-nutrition diet. We then determined the relative influence of both time and nutritional constraints on survival and development rate, as well as the body size, size-corrected flight muscle mass and fat reserves of individuals at eclosion. Damselflies in both high- and low-nutrition treatments responded to a short development period by developing faster and reducing their body size, but did not change their proportional investment in fat reserves and flight muscle. Reduced larval nutrition resulted in decreased body size, flight muscle mass and fat reserves at eclosion. However, it had no effect on survival to eclosion, or development rate. We discuss these results in terms of the influence that time and nutritional constraints have on odonate development patterns and fitness." (Authors)] Address: Plaistow, S., Univ Sheffield, Dept Anim. & Plant Sci., Sheffield S10 2TN, S Yorkshire, England

1108. **Powell, D. (1999):** A guide to the dragonflies of Great Britain. Arlequin Press. Chelmsford. ISBN 1 900159 01 5: 127 pp. (in English). [To me, this is a really outstanding book. Throughout with (water) colour pictures, you will find a lot of information in a somewhat free style, but nonetheless with exact scientific information. There is hardly any picture which don't express a very special mood: often the dragonfly within its habitat is portrayed - a very intrusive example for this is the chapter on *Aeshna caerulea*. In a monographic style, on finds information on morphological details useful for identification, on species which could be confused, on special behaviour, on conditions favourable to observe to see the species you want to see, what habitat is promising... One may say, this book is one for the beginner, but it equally is one for the advanced or professional odonatologist, because the pictures are directed to your soul. Hardly any book with photographs of dragonflies can express this wonderful harmony between landscape, dragonfly, and observer as is done by the colour pictures of Dan Powell. (M. Sch.)] Address: Arlequin Press, 26 Broomfield Road, Chelmsford, Essex CM1 1SW, UK

1109. **Pratt, P.D. (1999):** 1998 summary for southwestern Ontario. *Argia* 11(1): 26. (in English). [Information on *Stylurus notatus* (Rambur 1842), *Sympetrum vicinum* (Hagen 1861), *Enallagma anna* Williamson 1900, *Enallagma traviatum* Selys 1876, *Lestes eurinus* Say 1839, and *Enallagma basidens* Calvert 1902 are presented.] Address: Pratt, P.D., 7100 Matchette Rd, La Salle, ON, Canada, N9C 2S3. E-mail: prairie@netcore.ca

1110. **Prendergast, E. (1999):** Tanzania calling. W.D.A.'s *Agrion* 3(1): 16. (in English). [short report on some dragonflies of the Rufiji River, some 80 km by air from Dar es Salaam] Address: Prendergast E.D.V., Manor House, Bagber, Sturminster Newton, Dorset DT10 2EY, United Kingdom

1111. **Pryce, D.J. (1999):** The 1998 Cameroon dragonfly project expedition. W.D.A.'s *Agrion* 3(2): 24-25. (in English). [report of a 1998 trip to Cameroun, Africa with notes on the dragonfly fauna of some localities in the WWF-Mount Kupe Forest Project; *Aeshna scotias* Pinhey 1952, *Olpogastra lugubris* Karsch 1895, and *Phyllomacromia caneri* (Gauthier 1987) are some species among others mentioned] Address: Pryce, D.J., Moneybrook Lodge, Herford Rd, Meole Brace, Shrewsbury, SY3 9LB, UK

1112. **Radford, A.P. (1999):** Prolonged partial immersion of abdomen by male *Anax imperator* Leach. *J. Br. Dragonfly Soc.* 15(2): 60. (in English). [discussion on an *A. imperator* inserting the posterior third of the abdomen into the water] Address: Radford, A.P., Crossways Cottage, West Bagborough, Taunton, Somerset TA4 3EG, UK

1113. **Ramirez, A.; Paaby, P.; Pringle, C.M.; Aguero, G. (1999):** Effect of habitat type on benthic macroinvertebrates in two lowland tropical streams, Costa Rica. *Revista de biologia tropical* 46(Suppl. 6): 201-213. (in English). ["Benthic macroinvertebrate community structure was studied with respect to stream habitat type in two lowland tropical streams. Three reaches along the Carbon river and two within the Gandoca stream were chosen as study sites in Talamanca, Costa Rica. Ma-

croinvertebrates were collected from four habitat types: leaf packs in riffles, cobble in rimes, areas of sand in pools, and areas of gravel in pools. Communities were dominated by insects in the orders Ephemeroptera (*Thraulodes*, *Baetis*?), Diptera (*Chironomidae*, *Tipulidae*), Trichoptera (*Hydropsychidae*, *Glossosomatidae*, *Hydroptilidae*, *Calamoceratidae*), and Odonata (*Progomphus*, *Hetaerina*). Noninsect macroinvertebrates were dominated by shrimps (*Macrobrachium*) and snails (*Gastropoda*). Functional feeding group composition was dominated by collector-gatherers. In most reaches, both habitat types in rimes supported higher macroinvertebrate abundance and biomass than did habitats in pools. Leaf packs in rimes represent an important habitat that is present year-round in these aseasonal tropical systems. Community composition and diversity were similar to that reported for other areas of Central America." (Authors)] Address: Ramirez, A., Univ Georgia; Inst. Ecol., Athens; GA 30602; USA. E-mail: aramirez@arches.uga.edu

1114. **Ramirez, A.; Novelo-Gutierrez, R. (1999):** The Neotropical dragonfly genus *Macrothemis*: new larval descriptions and an evaluation of its generic status based on larval stages (Odonata: Libellulidae). *Jour. North-American benthol. soc.* 18(1): 67-73. (in English). ["The larvae of *Macrothemis aurimaculata* and *M. inequinguis* are described and illustrated. A redescription of *M. celeno* is also provided. *Macrothemis aurimaculata* can be separated from other species in the genus because it has reduced or vestigial dorsal protuberances on abdominal segments VII-IX. *Macrothemis inequinguis* can be differentiated by the presence of 7 setae on the labial palp, in contrast to less than or equal to 6 in other species. Both species inhabit streams in areas with slow-moving water. *Macrothemis celeno* closely resembles *M. inacuta* and *M. pseudimitans*. Some features to separate larvae of *Macrothemis* from its close relative *Brechmorhoga* are given. A key for identification of all the described larvae of *Macrothemis* is provided." (Authors)] Address: Ramirez, A., Univ Georgia; Inst. Ecol., Athens; GA 30602; USA. E-mail: aramirez@arches.uga.edu

1115. **Ramos Hernandez, J.M. (1999):** List of the Odonata (Insects; Odonata) from Cayo Caguanes and Cayo Palma, Sancti-Spiritus Province, central Cuba. *Argia* 11(3): 15-17. (in English). [checklist of 23 taxa] Address: Ramos Hernandez, J.M., Ap. Post. 2204, Sancti-Spiritus, CUBA Cp. 60100

1116. **Reder, G. (1999):** Wolfsspinnen (Araneae: Lycosidae) als Beutegreifer einer schlüpfenden Großlibelle (Anisoptera: Gomphidae). *Libellula* 18(1/2): 59-62. (in German, with English summary). ["Three individuals of *Pardosa amentata* (Clerck) attacked an emerging female of *Gomphus pulchellus* Selys successfully. The observation is briefly discussed." (Author)] Address: Reder, G., Am Pfortengarten 37, D-67592 Flörsheim-Dalsheim, Germany

1117. **Rehfeldt, G. (1999):** Massenentwicklung von *Sympetrum fonscolombii* (Selys) in Südfrankreich 1996 (Anisoptera: Libellulidae). *Libellula* 18(1/2): 103-106. (in German, with English summary). ["At the beginning of July 1996 *S. fonscolombii* showed mass development at rice fields of the Camargue. Relations with the immigration of the species in Central Europe are discussed." (Author)] Address: Rehfeldt, G., Zool. Inst. TU

Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: G.Rehfeldt@tu-bs.de

1118. **Reinhardt, K.; Seidenbusch, R. (1999):** Zur Libellenfauna des Ili-Gebietes, Kasachstan (Insecta: Odonata). Faunistische Abhandlungen, Staatliches Museum für Tierkunde Dresden 21(14): 221-228. (in German, with English summary). ["A field trip into the basin of the river Ili, SE Kazakhstan, yielded a total of 19 dragonfly species including new records for *Ischnura aralensis*, *Erythromma najas* and *Selysiothemis nigra*. The dragonfly fauna of the region between Lake Balkhash and the Tien Shan mountains as derived from a literature review now comprises 44 species, at least five of which appear doubtful. *Sympetrum tibiale* has not been recorded for nearly 100 years. Factors contributing to the probable underestimation of dragonfly species richness in that area are discussed." (Authors) Short remarks on the daily activities of *Sympecma paedisca*, predation by *Falco subbuteo*, *Merops superciliosus*, and missing of predation by *Motacilla flava feldegg* (Aves) on Odonata, the description of aggregations of *Libellula quadrimaculata* on dormitories, and notes on the morphology of *L. quadrimaculata* are of some interest.] Address: Reinhardt, K., Hauptstr. 38, D-09244 Oberlichtenau, Germany. E-mail: b5klre@pluto.rz.uni-jena.de

1119. **Reinhardt, R. (1999):** Kurzfassung und Auszüge aus dem Abschlußbericht des F/E-Projektes: Landesweit repräsentative, ortsgenaue Erfassung ausgewählter, Naturschutzrelevanter Insektengruppen sowie Benennung von Gebieten mit besonderer Bedeutung für die Entomofauna in Sachsen (Entomofauna Saxonica II). Mitt. Sächs. Entomol. 45: 2-29. (in German). [Status quo - report on the distribution of the Odonata of the federal state Sachsen, Germany (dot map of records on the basis of TK 25); check list with record resp. locality frequency of each of the 60 species presently known from Sachsen; further 7 species are assumed to be extinct; after 1990 four species (*Sympecma paedisca*, *Stylurus flavipes*, *Anax ephippiger*, and *Crocothemis erythraea*) were reported new for Sachsen; *Aeshna affinis*, and *Sympetrum fonscolombii* have been rediscovered in the 90th; 15 species can only be observed at less than 15 localities in the federal state] Address: Reinhardt, R., Burgstädter Str. 80a, D-09648 Mittweida, Germany

1120. **Relyea, R.A.; Werner, E.E. (1999):** Quantifying the relation between predator-induced behavior and growth performance in larval anurans. *Ecology* 80(6): 2117-2124. (in English). ["Because the nature and magnitude of species interactions are functions of the traits that species possess, understanding how individual traits affect performance is important to our understanding of community structure. To examine the relation between species traits and performance, we first assessed behavioral responses of two larval anurans to three predator species in the laboratory. We then correlated these responses with growth performance of the two anurans when they competed in the field. In the laboratory experiment, larval bullfrogs (*Rana catesbeiana*) and green frogs (*R. clamitans*) exhibited no reduction in activity or spatial avoidance to bluegill sunfish (*Lepomis macrochirus*), moderate reductions in activity and spatial avoidance of mudminnows (*Umbra limi*), and large reductions in activity and spatial avoidance of larval dragonflies (*Anax* spp.). In the field experiment,

these behavioral responses were directly related to corresponding reductions in growth of the anuran larvae. Thus, for both species, changes in growth in the field could be correlated to the behavioral responses observed in the laboratory. Further, proportional changes in behavior in the presence of the different predators appeared to be related to changes in competitive relations in the field." (Authors)] Address: Werner, E.E., Department of Biology, University of Michigan, Ann Arbor, Michigan 48109, USA

1121. **Rith, J. (1999):** Minnesota dragonfly survey project. *Argia* 11(1): 31-32. (in English). [report on the project, and discussion of some open questions on *Aeshna eremita*, *Pachydiplax longipennis*, *Cordulegaster obliqua*, *Aeshna subarctica*, and *Ophiogomphus susbechcha*.] Address: Rith-Najarian, J.C., River's Edge Geographics, P.O. Box 453, Bemidji, MN 56619, United States

1122. **Roberts, S.P.; Harrison, J.F. (1999):** Mechanisms of thermal stability during flight in the honeybee *Apis mellifera*. *Jour. exp. biol.* 202(11): 1523-1533. (in English). ["Thermoregulation of the thorax allows honeybees (*Apis mellifera*) to maintain the flight muscle temperatures necessary to meet the power requirements for flight and to remain active outside the hive across a wide range of air temperatures (T-a). To determine the heat-exchange pathways through which flying honeybees achieve thermal stability, we measured body temperatures and rates of carbon dioxide production and water vapor loss between T-a values of 21 and 45 degrees C for honeybees flying in a respirometry chamber. Body temperatures were not significantly affected by continuous flight duration in the respirometer, indicating that flying bees were at thermal equilibrium. Thorax temperatures (T-th) during flight were relatively stable, with a slope of T-th on T-a of 0.39. Metabolic heat production, calculated from rates of carbon dioxide production, decreased linearly by 43 % as T-a rose from 21 to 45 degrees C. Evaporative heat loss increased nonlinearly by over 50%, with evaporation rising rapidly at T-a values above 33 degrees C. At T-a values above 43 degrees C, head temperature dropped below T-a by approximately 1-2 degrees C, indicating that substantial evaporation from the head was occurring at very high T-a values. The water flux of flying honeybees was positive at T-a values below 31 degrees C, but increasingly negative at higher T-a values. At all T-a values, flying honeybees experienced a net radiative heat loss. Since the honeybees were in thermal equilibrium, convective heat loss was calculated as the amount of heat necessary to balance metabolic heat gain against evaporative and radiative heat loss. Convective heat loss decreased strongly as T-a rose because of the decrease in the elevation of body temperature above T-a rather than the variation in the convection coefficient. In conclusion, variation in metabolic heat production is the dominant mechanism of maintaining thermal stability during flight between T-a values of 21 and 33 degrees C, but variations in metabolic heat production and evaporative heat loss are equally important to the prevention of overheating during flight at T-a values between 33 and 45 degrees C." (Authors) ] Address: Roberts, SP; Univ. Chicago; Dept Organismal. Biol. & Anat., 1027 E 57Th St; Chicago IL 60637; USA. E-mail: sroberts@midway.uchicago.edu



1123. **Rödel, M.O. (1999):** Predation on tadpoles by hatchlings of the freshwater turtle *Pelomedusa subrufa*. *Amphibia-Reptilia* 20(2): 173-183. (in English). ["Experiments with *Pelomedusa subrufa*, a widespread African freshwater turtle, showed that this species consumed large quantities of tadpoles. Tadpoles preyed upon, comprised between 0.05 and 21.55% of the turtle's biomass. This demonstrated that *Pelomedusa subrufa* was neither gape limited nor did it ignore very small prey. Tadpoles with an ovoid body shape (*Hemismus marmoratus*, *Hyperolius nitidulus*, *Ptychadena macrathyensis*), which shared, under natural conditions, the pond bottom microhabitat with the turtles, were more threatened than the robust tall-finned *Kassina* tadpoles that lived in the middle of the water column. The translucent, slow swimming *Phrynomantis microps* tadpole occurred in larger ponds and preferred the upper water column in deeper parts of the pond. This species was especially at risk in ponds with reduced water levels. Turtles, in contrast to fish or dragonfly larvae, are capable of migrating to other ponds. They therefore might have a profound regional influence on tadpole communities in ephemeral savanna ponds." (Authors)] Address: Rödel, M.O., Lehrstuhl Tierökologie & Tropenbiologie, Theodor Boveri Inst., Am Hubland, D-97074 Würzburg; Germany. E-mail: roedel@biozentrum.uni-wuerzburg.de

1124. **Röske, W. (1999):** Gräben - ein Lebensraum der Helm-Azurjungfer. Faltblatt. Schutzgemeinschaft Libellen in Baden-Württemberg (SGL) (Hrsg.). Freiburg: 2 pp. (in German). [leaflet with detailed description of ditch-management measures for *Coenagrion mercuriale*] Address: Röske, W., Kandelstr. 26, D-79106 Freiburg, Germany

1125. **Ruffini, I. (1999):** Wo sich die Südliche Mosaikjungfer gerne niederlässt. *Pollichia-Kurier* 15(4): 29-30. (in German). [report from an excursion to several odonate habitats in the Donnersbergkreis, Rheinland-Pfalz, Germany] Address: not stated

1126. **Rutten, A.; Kalkman, V. (1999):** Eerste bewezen voortplanting van de Kempense heidelibel (*Sympetrum depressiusculum* (Selys)) in Nederland. *Brachytron* 3(1): 29-30. (in Dutch). [First proof of a reproduction of *Sympetrum depressiusculum* in The Netherlands: On August 14, 1998 in the province of Noord-Brabant freshly emerged females, and exuviae were discovered. The habitat is described in short. Additional records from Belgium are documented.] Address: Rutten, Anne & Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands

1127. **Sahlén, G.; Olsvik, H. (1999):** Det andre WDA (World Dragonfly Association) internasjonale symposium i odonatologi i Svergie i 2001. *Nord. Odonat. Soc., Newsletter* 5(1): 8. (in Norwegian). [announcement of the WDA International Odonatological Symposium in Sweden in 2001] Address: Olsvik, H., N-6598 Foldfjorden, Norway

1128. **Samraoui, B. (1999):** A short trip to Senegal and Mauritania. *W.D.A.'s Agrion* 3(1): 15. (in English). [report on some common, nonetheless fascinating African dragonflies] Address: Samraoui, B., University of Annaba, 4 rue Hassi-Beida, Annaba, Algeria

1129. **Schaffner, A.K.; Anholt, B.R. (1999):** Influence of predator presence and prey density on behavior and growth of damselfly larvae (*Ischnura elegans*) (Odonata: Zygoptera). *Jour. insect behav.* 11(6): 793-809. (in English). ["Foraging behavior is often determined by the conflicting benefits of energy gain and the risk of mortality from predation or other causes. Theory predicts that animals should have lower activity levels when either the risk of predation or the availability of resources in the environment is high. We investigated the adjustment of the behavior of *I. elegans* larvae to predator presence (*Anax imperator*) and prey density (*Daphnia* sp.) and their interaction in a completely crossed factorial experiment in the lab and the effect of behavior oil growth. The foraging activity of the *I. elegans* larvae was significantly reduced in the presence of a free-swimming predator but not a caged predator. Abdominal movements were significantly reduced at a low prey density, Growth was significantly reduced by the presence of a free swimming predator and low prey densities. These results provide evidence that these damselfly larvae adjust their behavior to the presence of predators to increase their survival at the expense of reduced growth and development." (Authors)] Address: Anholt, B.R., Univ Victoria, Dept Biol., POB 1700; Victoria; BC V8W 3N5; Canada

1130. **Santos, T.C.; Costa, J.M. (1999):** Description of the last instar larva of *Brechmorhoga travassosi* Santos and comparison with other *Brechmorhoga* species (Anisoptera: Libellulidae). *Odonatologica* 28(4): 425-428. (in English). ["The ultimate instar larva from streams of Ilha da Marambaia, Rio de Janeiro, is described, illustrated and compared with other known *Brechmorhoga* larvae, from which it is separated by the presence of erect dorsal abdominal spines on segments 2-9. A key to *Brechmorhoga* larvae is appended." (Author)] Address: Santos, T.C. & J.C. Costa, Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisys.com.br

1131. **Scharf, R.; Braasch, D. (1999):** Die sensiblen Fließgewässer des Landes Brandenburg - 4. Beitrag zu ihrer Erfassung und Bewertung - Die Landkreise Potsdam-Mittelmark und Teltow-Fläming, Landeshauptstadt Potsdam und kreisfreie Stadt Brandenburg. *Naturschutz und Landschaftspflege in Brandenburg* 8(2): 44-53. (in German). [assessment of the importance of nature conservation for the running waters in the Federal state Brandenburg, Germany on the basis of an inventarisation of the macrozoobenthos; criteria of sensibility are (1) the diversity of rheophilous species and (2) occurrence of endangered species; odonatologically of special interest are records of *Ophiogomphus cecilia*, and *Coenagrion mercuriale*.] Address: Scharf, R.; Herzberger Str. 14, D-03048 Cottbus, Germany

1132. **Schneider, W. (1999):** Soqotra - The island of dragon's blood. *W.D.A.'s Agrion* 3(2): 27-28. (in English). [detailed report on a trip to Yemen and the island of Soqotra; information is given on the discovery of the endemic *Aeshna yemenensis* in Yemen, and the endemic *Enallaga granti* on Soqotra; some detailed information is given on the general and natural history of Soqotra including anotations on some habitats and their odonate fauna.] Address: Schneider, W., Hess. Landesmus., Zool. Abt., Friedensplatz 1, D-64283 Darm-

stadt, Germany. E-mail: w.schneider@hlmd.tu-darmstadt.de

1133. **Schrack, M.; Heise, S. (1999):** Zoogeographische und ökologische Analyse der Libellenfauna der Waldmoore in der Radeburger und Laußnitzer Heide bei Großdittmannsdorf und Medingen. Veröff. Mus. Westlausitz, Kamenz, Tagungsband: 95-113. (in German). [32 species are grouped according to their zoogeographical ranges: 15 species have an Euro-Siberian, eight a Mediterranean, and nine an intermediate range; in Tab. 2 the species are clustered according to their habitat preferences; the importance of mesotrophic waters with Sphagnum-vegetation is outlined in the light of the importance of the habitat for dragonfly conservation in Sachsen, Germany; a lot of colour pictures underline the nature conservation value of the habitat] Address: Schrack, M., Hauptstr. 48a, D-01471 Radeburg-Großdittmannsdorf, Germany

1134. **Schütte, C.; Ott, C.; Hünken, A. (1999):** Vergleich der Larvalentwicklung von *Calopteryx splendens* (HARRIS, 1782) und *Calopteryx virgo* (L., 1758) (Odonata: Calopterygidae) in zwei Fließgewässern in Niedersachsen. Braunschweiger naturkl. Schr. 5(4): 857-867. (in German, with English summary). [Niedersachsen, Germany; "The larval development of *Calopteryx splendens* was monitored from 1995 to 1998 in the river Oker and compared to that of *Calopteryx virgo* in the stream Lutter. Numbers and sizes of larval instars are given for both species. Larval development of *C. splendens* took one year, whereas *C. virgo* needed two years. Differences were discussed in terms of temperature, food and specific activity levels." (Authors)] Address: Schütte, C., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

1135. **Shieh, S.-H. B.; Kondratieff, C.; Ward, J. V.; Rice, D. A. (1999):** The relationship of macroinvertebrate assemblages to water chemistry in a polluted Colorado plains stream. Arch. Hydrobiol. 145(4): 405-432. (in English). ["Macroinvertebrate assemblages and 27 water chemistry variables were investigated at 8 sampling sites over a 4-year period (1992-1995) in the plains section of the Cache la Poudre River, north central Colorado, USA, influenced by urbanization and agricultural activities. Relationships between macroinvertebrate assemblages and water chemistry variables were examined along a longitudinal chemical gradient using ordination techniques [...]. Principal component analysis ordination diagrams provide a reasonable two-dimensional representation of both the macroinvertebrate and environmental data. Concentrations of cations (e.g. Ca, Mg, Na, and K ions) exhibited the strongest relationship with macroinvertebrate assemblages along the river section. The inorganic nutrients (e.g. ammonia, total Kjeldahl nitrogen, and total phosphorus), suspended solids, and turbidity were also associated with macroinvertebrate assemblage structure. Temporal trends of macroinvertebrate assemblages, investigated using Detrended Canonical Correspondance Analysis, showed that interannual and seasonal variations of macro-invertebrate assemblages were related to increases in concentrations of heavy metals and to decreases in concentrations of inorganic nutrients, suspended solids, and turbidity. Interannual variations were less important than seasonal changes in explaining temporal patterns of macroinvertebrate assemblages [...]."] (Authors). Appendix 1 lists the taxa collected at

the sampling sites. Coenagrionidae and Ophiogomphus severus are the only Odonata mentioned.] Address: Shieh, S.-H., Department of Biology, Colorado State University, Fort Collins, CO 80523, USA

1136. **Sibley, F. (1999):** A beginners random observations on winter dragonflies. Argia 11(1): 13-15. (in English). [observations on late October egg-laying *Sympetrum vicinum*(?); individuals in Naugatuck, Connecticut till December 16.] Address: Sibley, F.C., 25 Shirley Street, Naugatuck, CT, 06770, USA

1137. **Sibley, F. (1999):** Further comments on collecting limits. Argia 11(1): 33. (in English). Address: Sibley, F.C., 25 Shirley Street, Naugatuck, CT, 06770, USA

1138. **Sibley, F. (1999):** List of dragonflies from Gadeloupe, West Indies. Argia 11(1): 21-22. (in English). [12 species (14 taxa) could be observed from 23-30 July, 1998] Address: Sibley, F.C., 25 Shirley Street, Naugatuck, CT, 06770, USA

1139. **Sibley, F. (1999):** Unusual invasion of dragonflies on Guana Island, British Virgin Islands. Argia 11(1): 16-19. (in English). [*Orthemis ferruginea* (Fabricius 1775), *Erythrodiplax umbrata* (Linnaeus 1758), and *Ischnura ramburii* (Selys 1850), which were recorded in 1997 and 1998, were taken for the "normal residents" on Guana Island, a habitat quite unsuitable for Odonata. The abundance of species was quite low. On October 12, 1997 the wind shifted to the SW as part of a major storm system bringing moisture out of the Pacific across Panama to the Caribbean. Successively the number of species increased on Guan; the number of specimens from *Tamea abdominalis*, *T. calverti*, and *Pantala hymenaea* shot up dramatically on 16th and 17th Oct. The total of observed Odonata in 1997 was ten species. Sibley discusses the phenomenon of mass invasion of Odonata in the Lesser Antilles, and compiles some other examples for (a)periodic colonisation of other Islands such as the Galapagos Islands.] Address: Sibley, F.C., 25 Shirley Street, Naugatuck, CT, 06770, USA

1140. **Silsby, J. (1999):** In search of *Anax tristis*. W.D.A.'s Agrion 3(1): 10-12. (in English). [some personal adventures of Jill and Ronnie Silsby with the "Sad Emperor" *Anax tristis* in South Africa, and the circumstances of Peter Allen's catch of *A. tristis* in Gambia on the occasion of the BDS tour to this country in October 1996] Address: Silsby, J., 1, Haydn Avenue, Purley, Surrey, CR8 4AG, UK. E-mail: jsilsby1@aol.com

1141. **Silsby, J. (1999):** The newsletter of the Worldwide Dragonfly Association. W.D.A.'s Agrion 3(1): 20 pp. (in English). [news from WDA, and WDA-member's activities, minutes of the WDA board meeting, announcements of upcoming meetings, new members, and numerous contributions on African dragonflies] Address: Silsby, J., 1, Haydn Avenue, Purley, Surrey, CR8 4AG, UK. E-mail: jsilsby1@aol.com

1142. **Silsby, J. (Ed.) (1999):** W.D.A.'s Agrion 3(2). The newsletter of the Worldwide Dragonfly Association. W.D.A.'s Agrion 3(2): 21-32. (in English). [The reader find many small papers (see this issue of OAS) and news from the WDA including membership activities, Changes in Constitution and Bylaws etc.] Address:

Silsby, J., 1, Haydn Avenue, Purley, Surrey, CR8 4AG, UK. E-mail: jsilsby1@aol.com

Address: Solem, R.P., 10617 Graeloch Rd., Laurel, MD 20723, USA. E-mail: odenata@msn.com

1143. **Smith, G.R.; Rettig, J.W.; Mittelbach, G.G.; Valiulis, J.L.; Schaack, S.R. (1999):** The effects of fish on assemblages of amphibians in ponds: a field experiment. *Freshwater biology* 41(4): 829-837. (in English). ["1. Bluegill sunfish (*Lepomis macrochirus*) dominate fish assemblages of small lakes and ponds throughout the eastern United States and may play a major role in structuring aquatic communities. We examined the impact of adult bluegill on amphibian density by stocking bluegill at a range of densities into partitions of an experimental pond in which amphibians were free to colonize. 2. Adult bluegill had a major impact on the amphibian assemblage. By the end of the experiment, gray treefrog (*Hyla versicolor*) tadpoles were nine times less abundant, and red-spotted newt (*Notophthalmus viridescens*) adults were three times less abundant in the presence of adult bluegill than in their absence. In contrast, bullfrog (*Rana catesbeiana*) tadpoles tended to increase in the presence of adult bluegill. Adult bluegill also had a negative effect on the abundance of predaceous aquatic insects. [... Larval odonates (Aeshnidae and Libellulidae) were the most common insect predators in the pond, accounting for > 90% of all predaceous insects collected. The abundance of both of these odonate groups declined significantly with adult bluegill density ...] 3. There was no indication that interactions among amphibians were significant in determining the above patterns. We suggest that the strong impact of adult bluegill resulted from a combination of direct and indirect effects on amphibian larvae and predaceous aquatic insects." (Authors)] Address: Smith, G.R.; Dept Zool., University of Florida, Gainesville, FL 32611, USA. E-mail: smith@william.jewell.edu

1144. **Smolka, G.E.; Stewart, P.M.; Swinford, T.O. (1999):** Distribution of odonates (dragonflies and damselflies) in the Indiana Dunes National Lakeshore and nearby lands. *Natural areas journal* 19(2): 132-141. (in English). ["From 1993 to 1997, 60 species of Anisoptera (dragonflies) and Zygoptera (damselflies) were found in Lake and Porter Counties, Indiana, including Indiana Dunes National Lakeshore, in contrast to 34 species that were recorded historically from this region. We added 17 new species to Lake County's odonate records and 39 new species to the 5 previously recorded in Porter County. Several regionally rare species were collected: *Aeshna clepsydra*, *Enallagma cyathigerum*, and *Leucorrhina frigida*. Nine species listed in the historical records were missing from our collections: *Hetaerina americana*, *Calopteryx aequabilis*, *Nehalennia irene*, *Arigomphus furcifer*, *Argia fumipennis violacea*, *Gomphus spicatus*, *Epithea princeps*, *Libellula exusta*, and *Sympetrum semicinctum*. These nine species have either declined in the area or they may be found in other habitats after further study. Because few odonate surveys were conducted in northwest Indiana in the past, a poor baseline exists for comparisons of temporal trends in odonate diversity." (Authors)] Address: Stewart, P.M., US Geol. Survey, Biol. Resources Div., 1100 N Mineral Springs Rd, Porter IN 46304, USA

1145. **Solem, P.P.; Solem, J.K. (1999):** First Maryland record of *Orthemis ferruginea* (Odonata: Libellulidae). *Argia* 11(3): 6-7. (in English). [record of *O. ferruginea* on 18 July, 1999 in Howard County, Maryland, USA]

1146. **stc (1999):** Tümpel im Soonwald sind ein wahres Eldorado für Libellen. *Allgemeine Zeitung* (Bad Kreuznach) vom 23. Juli 1999. (in German). [report on the odonatological work of the well known odonatologist Frank Eislöffel in the eastern part of the middle range mountain Hunsrück, Rheinland-Pfalz, Germany] Address: not stated

1147. **Steffens, W. (1999):** Deformed dragonflies: a clarification. *Argia* 11(2): 12. (in English). [response on reports (not known to the abstracter) on abnormalities found in Odonata from polluted rivers (Mississippi, Rainy River, USA): "Most of the abnormalities that we saw were of a relatively "minor", yet easily noticeable nature. There were no extra limbs or eyes, or legs and organs hideously growing out of places that they shouldn't be growing ..."] Address: not stated

1148. **Steiner, W.E.; Flint, O.S. (1999):** Dragonflies on Navassa Island. *Argia* 11(1): 19-21. (in English). [Navassa Island is situated between Hispaniola, Jamaica and Cuba. In 1998 *Erythrodiplax umbrata*, *Pantala flavescens*, and *Orthemis* sp. cf. *ferruginea* were recorded.] Address: Steiner, W.E., Dept Entomology, NHB-165, Smithsonian Institution, Washington DC 20560, USA. E-mail: steiner.warren@nmnh.si.edu

1149. **Sternberg, K. & R. Buchwald (Eds) (1999):** Die Libellen Baden-Württembergs. Band 1. Verlag Eugen Ulmer, Stuttgart. ISBN 8001-3508-6. (approx. 50,- Euro): 468 pp. (in German). [This is the first part of a two-volume work on the Odonata of the region in the southwestern part of Germany. It presents a general but detailed account of the Odonata (Checklist, Fossile Odonata in Baden-Württemberg, Regional faunistics, Field methods, Threats and legal protection, Regionalised Red List, "Umbrella Species Concept", Habitats and management of waters, Systematics and evolution of Odonata, Functional morphology, Some aspects of biology of Odonata, Population ecology and dispersal, Reproduction behaviour, Man and dragonfly, Odonata as bioindicators, and Glossarium). The general introduction on Odonata is followed by a monographic treatment of the 26 species of Zygoptera recorded from Baden-Württemberg. The bibliography will appear in volume two, which also will cover 49 species of Anisoptera. For each zygopteran, there is a very detailed account encompassing global range of the species, distribution within Baden-Württemberg (including a distribution map), annual and diurnal phenology, larval habitat (including vegetation and physical and chemical properties of the water), the biotypes occupied by the adult at various stages of its life (feeding, breeding, roosting), a comprehensive section on the biology of the larva and adult and, finally, records of parasitism. The editors obviously intended to produce more than a standard regional study of dragonflies. It is a beautifully produced book, illustrated by marvellous photography. A more detailed critical review will be prepared after publication of volume two. This high quality book should not be missing in any odonatological library. (Martin Schorr, partly on the basis of R. Askew's review in the *J. Br. Dragonfly Soc.* 15: 64)]

1150. **Stoks, R.; De Block, M.; Van Gossun, H.; Valck, F.; Lauwers, K.; Verhagen, R; Matthysen, E;**



**De Bruyn, (1999):** Lethal and sublethal costs of autotomy and predator presence in damselfly larvae. *Oecologia* 120(1): 87-91. (in English). ["We studied the costs of lamellae autotomy with respect to growth and survival of *Lestes sponsa* damselfly larvae in field experiments. We manipulated predation risk by *Aeshna cyanea* dragonfly larvae and lamellae status of *L. sponsa* larvae in field enclosures and compared differences in numbers, size and mass of survivors among treatments. In the absence of a free-ranging *A. cyanea* larva, about 29% of the *L. sponsa* larvae died. This was probably due to cannibalism. The presence of a free-ranging *A. cyanea* reduced larval survival by 68% compared to treatments in which it was absent or not permitted to forage on *L. sponsa* damselflies. Across all predator treatments, lamellae autotomy reduced survival by about 20%. The mean head width and mass of survivors was lower in the enclosures with a free-ranging *A. cyanea* compared to the other two predator treatments. This suggested that larvae grew less in the presence of a free-ranging predator, indicating that increased antipredator behaviours were more important in shaping growth responses than reduced population density. Mass, but not head width, of survivors was also reduced after autotomy. The fitness consequences of these effects for the adults may be pronounced. In general, these field data strongly suggest that lamellae autotomy affects population regulation of damselflies." (Authors)] Address: Stoks, R., Evolutionary Biology Group, Department of Biology, University of Antwerpen (RUCA), Groenenborgerlaan 171, B-2020 Antwerpen, Belgium. E-mail: stoks@ruca.ua.ac.be

1151. **Strub-Siegenthaler, I. (1999):** Kind und Libelle: Rückschau auf meine Arbeit in der Schule. *Odonatologica* 28(4): 429-432. (in German, with English summary). ["In canton Berne, Switzerland, the primary school children, aged 6-8, are conscious of dragonflies even before the subject is treated in school. At this age, the child's imaginative faculty attributes to the dragonfly certain physical features, behavioural propensities, and an imaginary role in nature, which all are to be utilized by the teacher in the process of creating a realistic, simple and to the child comprehensible biological image of the insect. In the Berne school program, dragonflies are dealt with in the framework of the broader instructional topic, "Water". The steps in the instruction program, as developed by the Author during her 40 yr of teaching experience, are briefly outlined, and the scope and depth of the child's final knowledge on the dragonfly world are stated." (Author)] Address: Strub-Siegenthaler, I., Seestrasse 26J, CH-3600 Thun, Switzerland.

1152. **Summers, K. (1999):** The effects of cannibalism on Amazonian poison frog egg and tadpole deposition and survivorship in *Heliconia* axil pools. *Oecologia* 119: 557-564. (in English). ["This study investigated the influence of cannibalism on egg and larval mortality, and on the deposition strategies of adults, in a tropical anuran breeding in very small leaf axil pools. Patterns of egg and tadpole deposition and mortality in the Amazonian poison frog, *Dendrobates ventrimaculatus*, were monitored in rainforest near Pompeya in Sucumbios Province, Ecuador. Oviposition and tadpole deposition typically occurred in leaf axils of *Heliconia* plants. Pools typically received more than one oviposition. Egg survivorship was low, and significantly lower when eggs were deposited in pools with large tadpoles, indicating that cannibalism is an important source of mortality. Tadpole

survivorship was also associated with the presence of other tadpoles: most pools ended with only one surviving tadpole, regardless of the number of tadpoles deposited in the pool. Egg deposition was significantly less likely for pools that had a tadpole in them, suggesting that adults can detect the presence of tadpoles and avoid ovipositing in pools that contain them. This hypothesis was tested with a series of pool choice experiments, which revealed that *D. ventrimaculatus* avoid placing either eggs or tadpoles into a pool which contains a large tadpole. Several hypotheses which could explain multiple deposition in this species are discussed. [...] A diverse community of adult and larval vertebrates and invertebrates inhabits the *Heliconia* pools, and yet predators on *D. ventrimaculatus* eggs or tadpoles seem to be rare. since there was no association between egg or tadpole mortality and the presence of any of the other pool denizens. Perhaps most surprising was the absence of any odonate larvae, which are known predators of poison frog tadpoles (Fincke 1994). One dead odonate larva was found in an axil pool during the course of the study, whereas well over 500 pools were searched on and off the study site. The reason for this low prevalence is unknown, although it may be associated with the small size and generally low nutrient quality of the *Heliconia* pools." (Author)] Address: Summers, kyle, Department of Biology, East Carolina University, Greenville, NC 27858, USA. E-mail: summersk@mail.ecu.edu; Tel.: +1-919-3286725

1153. **Switzer, P.V.; Walters, W. (1999):** Choice of lookout posts by territorial amberwing dragonflies, *Perithemis tenera* (Anisoptera: Libellulidae). *Jour. insect behav.* 12(3): 385-398. (in English). ["Many territorial insects use specific perches, or lookout posts, from which they perceive and react to conspecific males and females. We investigated the lookout post choice of territorial male amberwing dragonflies (*Perithemis tenera*). An observational study indicated that males rarely perched directly at their oviposition site; rather they perched farther out from shore than, and within 2 m from, their oviposition site. In an experimental study, we provided an array of perches at different distances from the shore and oviposition site to eliminate perch limitation as a factor in perch choice. The results of the experimental study confirmed the patterns evident in the observational study; males perched farther from shore than their oviposition site was located. interestingly, in both the observational and the experimental study, when neighbors were close, a male perched away from his closest neighbor; which usually resulted in his oviposition site being closer to his neighbor than he was. Thus, male amberwings apparently alter their perch choice within their territories in response to the location of other males. These lookout post locations may provide the best opportunity for the territorial male to perceive passing females and intruding males, while minimizing conflict with their neighbors." (Authors)] Address: Switzer, P.V., Eastern Illinois Univ., Dept Biol. Sci., Charleston IL 61920; USA. E-mail: cfvps@eiu.edu

1154. **Tennessee, K. (1999):** Hagenius *brevistylus* perching. *Argia* 11(3): 15. (in English). ["Perhaps the ability to utilize a wider variety of perches allows males of *H. brevistylus* to occupy areas away from other males and to use them as vantage points to scan for approaching females" (Author)] Address: Tennessee, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktennessen@aol.com

1155. **Tennessen, K. (1999):** West Tennessee Regional meeting: a success. *Argia* 11(3): 1-2. (in English). [short report on the meeting held in mid May, 1999; new state record of *Ischnura kellicotti*, and confirmation of *Gomphus apomyius*; spectacular catch of *Arigomphus villosipes*] Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA
1156. **Theischinger, G. (1999):** A new gomphid species from the Kimberleys in north-western Australia (Insecta: Odonata). *Linzer biol. Beitr.* 31(1): 369-372. (in English). ["*Austrogomphus mouldsorum* sp. n. (female holotype: Western Australia, E Kimberley, Emma Gorge, El Questro Station) is described, illustrated, diagnosed and discussed." (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia
1157. **Theischinger, G. (1999):** A new species of *Petalura* LEACH from south-eastern Queensland (Odonata: Petaluridae). *Linzer biol. Beitr.* 31(1): 159-166. (in English). ["*Petalura litorea* sp. n. (male holotype: Queensland, North Stradbroke Island, Brown Lake, S end) is described, illustrated and compared with *Petalura gigantea* LEACH." (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia
1158. **Theischinger, G. (1999):** New and little-known Synthemiidae from Australia (Insecta: Odonata). *Linzer biol. Beitr.* 31(1): 373-379. (in English). ["Two new species of Australian Synthemiidae, *Eusynthemis neta* (holotype male: Queensland, streams on Mt Lewis, NW Julatten, 3000 ft) and *Eusynthemis ursa* (holotype male: New South Wales, Barrington Tops, Dilgry River), are described. Also presented are illustrations of *Choristhemis olivei* (TILLYARD) and illustrated descriptions of the hitherto unknown females of *Eusynthemis ursula* THEISCHINGER and *Tonyosynthemis ofarrelli* (THEISCHINGER & WATSON). (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia
1159. **Theischinger, G. (1999):** Regions of taxonomic disjunction in Australian Odonata and other freshwater insects: first addendum, with description of *Austrocordulia refracta jurzitizai* ssp. nov. (Anisoptera: Corduliidae). *Odonatologica* 28(4): 377-384. (in English). [The information on taxonomic disjunction along the Hunter Valley (New South Wales) of mostly species-pairs of Odonata is updated and discussed. The taxa involved are: *Argiolestes alpinus*, *Argiolestes calcaris*, *Synlestes tillyardi*, *Diphlebia lestoides*, *Austroaeschna sigma* vs *A. obscura*, *Austroaeschna subapicalis*, *Notoaeschna geminata* vs *N. sagittata*, *Eusynthemis guttata*, *Eusynthemis brevistyla*, and *Austrocordulia refracta*. The holotype male of *A. refracta jurzitizai* ssp. n. comes from New South Wales, Heathcote (bred 21-XI-1916), deposited in ANIC, Canberra.] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia
1160. **Thompson, D.J.; Purse, B.V. (1999):** A search for long-distance dispersal in the Southern damselfly *Coenagrion mercuriale* (Charpentier). *J. Br. Dragonfly Soc.* 15(2): 46-50. (in English). [A total of 1245 individuals of *C. mercuriale* were marked in 11 days in 1998 on Crockford stream, New Forest, Hampshire, UK. To spott dispersing individuals 27 volunteers were stationed on all known sites for *C. mercuriale* in distances between 200 m and 3.3 km. "One marked animal had clearly moved from a site at which it was searching for mates to another over 1km away at which it found one. The extent of its movement was similar to the one long-distance disperser reported by Hopkins & Day (1997). Indeed, it ended up in the same place. In order to get there it must either have crossed a considerable expanse of dry heath and a road, or followed the stream downstream through unsuitable habitat, including woodland or some combination of the two. Jenkins (1998) reported that *C. mercuriale* was extraordinarily reluctant to move from its home location even across a short open area. The absence of marked individuals at the sites closest to the marking site supports this view. However, *C. mercuriale* clearly has some potential to make relatively long movements after reaching maturity." (Author)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK
1161. **Thüringer Ministerium für Landwirtschaft, Naturschutz und Umwelt (1999):** Umsetzung der FFH-Richtlinie in Thüringen. Available free of charge from: Thüringer Ministerium für Landwirtschaft, Naturschutz und Umwelt, Öffentlichkeitsarbeit, Beethovenplatz 3, D-99096 Erfurt, Germany: 130 pp. (in German). [This is a handbook for the application of the European Fauna-Flora-Habitats-Directive in action plans (e.g. the coherent European network Natura 2000), and the impact assessment pursuant to the EU Habitats Directive. All Thuringean habitats and species of the Directive are characterized, by text and pictures, including the Odonata *Coenagrion mercuriale*, *Leucorrhinia pectoralis*, and *Ophiogomphus cecilia*.]
1162. **Tingley, S. (1999):** *Leucorrhinia patricia* in New Brunswick. *Argia* 11(3): 8. (in English). [discovery of the species on 31 May 1999 in a bog in Restigouche County, New Brunswick, USA] Address: Tingley, S., General Delivery, Shediac Bridge, NB, Canada E0A 3H0. E-mail: tingley@nbnet.nb.ca
1163. **Tonczyk, G.; Buczynski, P.; Labedzki, A. (1999):** Gefährdung und Schutznotwendigkeit der polnischen Fließwasserlibellen. In: *Polski Towarzystwo Entomologiczne & Instytut Ochrony Przyrody PAN* (Eds.): *Konferencja Naukowa. "Ochrona owadów w Polsce u progu integracji z Unia Europejska"*, Kraków, 23-24 wrzesnia 1999. ISBN 83-01-08125-2. [Conservation of insects on the threshold of the integration of Poland into the European Community]: 23. (in Polish). [The threat and the necessity for protection of the habitats of the odonate species of running waters in Poland is outlined. Two antagonistic amendments of the situation of the Odonata are described: the populations of the formerly rare species of streams and rivers as *Stylurus flavipes* are getting stronger in the last years, whereas the situation of the species of brooks and ditches is getting worse more and more. Reasons for that are the improvement of water quality in the streams and rivers on the one side, and the regulation of brooks, heavy environmental impacts on the running waters, and lowering of groundwater table on the other.] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PO-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

1164. **Trueman, J. (1999):** An update on the above situation. *W.D.A.'s Agrion* 3(2): 23-24. (in English). [With reference to Ian Endersby's contribution "Disturbing news from "Downunder", the author outlines, that the habitat of *Petalura gigantea* was not affected by the 1998 collapse of Wingecarribee Swamp, Australia. A few individuals including an ovipositing female could be observed in January 1999. Now, a management plan is developed, e.g. to prevent the lasting rests of the swamp from drying out and getting invaded by "nasty foreign weeds".] Address: Trueman, J., Research School of Biol. Sciences, Australian National University, Canberra, ACT 0200, Australia. E-mail: trueman@rsbs.anu.edu.au
1165. **Truscott, L. (1999):** The Hornet Robberfly *Asilus crabroniformis* L. (Diptera, Asilidae): Odonata as prey. *J. Br. Dragonfly Soc.* 15(2): 50. (in English). [new observations from UK on *Enallagma cyathigerum* as prey of *A. crabroniformis*] Address: Truscott, L., 59 Cremyll Road, Torpoint, Cornwall PL11 2DZ, UK
1166. **Tunmore, M. (1999):** *Atropos* 8: From the editor's trap. *Atropos* 8: 1-2. (in English). ["Once again there was the seemingly annual occurrence of several *Anax parthenope* [in UK], and *Sympetrum fonscolombii* maintained their position in at least some breeding colonies": (Author)] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK
1167. **Van Buskirk, J.; McCollum, S.A. (1999):** Plasticity and selection explain variation in tadpole phenotype between ponds with different predator composition. *Oikos* 85(1): 31-39. (in English). ["Experiments demonstrate the existence of phenotypic plasticity in many organisms, and suggest that it can affect interactions among species. Put rarely do we know whether naturally occurring phenotypic variation results primarily from plasticity, as assumed by the experiments, or also from processes such as local adaptation and viability selection. The data on predator-induced plasticity in amphibians are virtually all from artificial pond or laboratory experiments, so we sampled tadpoles of *Hyla versicolor* in two ponds with different numbers of predators, in southern Michigan, USA. Cornfield Pond had few predators, while Tinkle's Marsh (300 m away) had many predatory insects (11.4/m<sup>2</sup>) and *Ambystoma salamanders* (1.0/m<sup>2</sup>). Tadpoles from Tinkle's Marsh had shorter and shallower bodies than those from Cornfield Pond. and relatively long, deep, and brightly colored tails. We then asked whether the phenotypic difference could be predicted from experimental studies of plastic responses to the presence or absence of caged *Anax* dragonflies in cattle tanks, and of selection imposed by feeding *Anax* and in predator-free ponds. Plasticity accurately predicted observed population differences in traits such as tail color, tail depth, and body length. However, for some other traits, such as tail length and body depth, naturally occurring phenotypic variation was more likely produced by selection for divergent traits in the two ponds. We also collected tadpoles from both ponds and subjected them to free-ranging *Anax* in a short-term predation trial. Tadpoles from Tinkle's Marsh, where predators were common, survived 16% better, suggesting that naturally occurring phenotypic variation is associated with changing vulnerability to predation: as has been found for experimentally reared tadpoles. Our results show how experimental studies of plasticity and selection can be combined to predict phenotypic variation in nature, and phenotypic variation in nature, and suggest that such variation can modify species interactions." (Authors)] Address: Van Buskirk, J., Univ Michigan, Dept Biol, Ann Arbor, MI 48109 USA
1168. **Van Gossum, H.; Stoks, R.; Matthysen, E.; Valck, F.; De Bruyn, L. (1999):** Male choice for female colour morphs in *Ischnura elegans* (Odonata, Coenagrionidae): testing the hypotheses. *Animal behaviour* 57(6): 1229-1232. (in English). ["The occurrence of different conspecific female colour morphs, with one of the morphs resembling the male, is supposed to have consequences for mate choice. There are two hypotheses linking mate choice and female colour polymorphism. First, males may mate predominantly with female morphs that differ from the male because they do not recognize androchrome females as females (male mimic hypothesis). Second, males may be more attracted to the most common morph in the population (habituation hypothesis). We tested these hypotheses in five populations of the same species, *Ischnura elegans*, with a range of androchrome frequencies. In each population we performed binary choice experiments in small cages. Males did not consistently prefer gynochrome females but mated predominantly with the most common morph in the population. Moreover, a reanalysis of the available damselfly data in the literature also supported the habituation hypothesis" (Authors)] Address: Van Gossum, H., Evolut Biol Grp, Univ. Antwerpen Ruca, Groenenborgerlaan 175, B-2020 Antwerpen, Belgium. E-mail: hvgossum@ruca.ua.ac.be
1169. **van Konijnenburg-van Cittert, J.H.A.; Schmeissner, S (1999):** Fossil insect eggs on Lower Jurassic plant remains from Bavaria (Germany) . *Palaeography - Palaeoclimatology - Palaeoecology* 152 (3-4): 215-223. (in English). ["Imprints of fossil insect eggs (oviposition slits of endophytic eggs) on Lower Jurassic plants from Franconia (Bavaria, Germany) are described. Two forms can be distinguished. Form A (2.5-3 mm long, 0.5-0.7 mm wide) is comparable to *Hysterites friesii* Nathorst 1876, who described it on *Podozamites* leaves (Coniferales) and considered it to be fungal remains. The present oviposition slits are, however, all on *Schmeissneria microstachys* leaves (Ginkgoales), and are therefore not considered to be conspecific with Nathorst's species. Form B (ca. 2 mm long, 0.7 mm wide) is more rare, and has only been found on *Podozamites distans* leaves but cannot be identical with Nathorst's material because they demonstrate a different shape. Form A has been deposited by dragonflies (Odonata); the insects that deposited form B may also have belonged to this group but this cannot be said with certainty. Comparison with other fossil insect egg/plant relationships are made, e.g. with comparable eggs on Triassic material of *Equisetites arenaceus*. The parent plants must have lived in an aquatic, or more probably semi-aquatic environment." (Authors)] Address: van Konijnenburg-van Cittert, J.H.A.; Palaeobot. & Palynol. Lab., Budapestlaan 4; NL-3584 CD Utrecht; Netherlands . E-mail: j.ha.vanKonijnenburg@bio.uu.nl
1170. **Vanderhaeghe, F. (1999):** Een beknopt overzicht van de huidige verspreiding en status van *Coenagrion scitulum* (Rambur, 1842) in België en Noord-Frankrijk. *Gomphus* 15(2): 69-85. (in Flemish, with English and French summaries). ["Present distribution and status of *C. scitulum* in Belgium and Northern France.



France. In 1998 *C. scitulum* was observed for the first time in Belgium since 1973. This article gives an overview of these recent Belgian findings together with an account of recent data from the North of France. Data are interpreted for Belgium together with a discussion about habitat. Conclusion is that the species will probably penetrate Belgium in other regions, although likely the species will not be common. It proves to be clear that at least some individuals do show vagrant behaviour. These might be seen in any habitat. Therefore it seems convenient to watch out for this species everywhere. The most likely regions are cited." (Author)] Address: Vanderhaeghe, Floris, Lijsterstraat 20, B-8800 Roeselare, Belgium; E-mail: Floris.Vanderhaeghe@rug.ac.be

1171. **Verbeek, P.J.M. (1999):** The habitat of *Symptetrum depressiusculum* in North-western Europe and its future in The Netherlands. *Brachytron* 3(1): 3-11. (in Dutch, with English summary). ["The habitat preferences of *S. depressiusculum* in the north-west of its range are discussed on the basis of the literature and personal observations. The most important characteristics are listed. An extensive zone of shallow water must be present. This zone should be vegetated, but not too densely. The water level must be stable or lowered between the time of oviposition and emergence of the larvae. The zone may even be completely dry during winter. The waters generally are not very eutrophic or acidic. The presence of a well-structured imaginal habitat is also important. The principal factor appears to be the stable or lowered water level in winter. [...] Most waters in the region have a raised water level in winter and are therefore unsuitable for the species. Most localities where the species occurs therefore have an artificially controlled water level. The reason why this winter drought is so important remains unclear. Freezing of the eggs, as suggested by earlier authors, appears to be of no importance as the species occurs in Mediterranean rice-fields and cooling-water ponds of factories in Belgium. The absence of dragonflies with multi-annual life cycles (that could be caused by drought or freezing) as competitors for food seems unimportant too, as they have been found with *S. depressiusculum*. The described hydrological factors result in high water temperatures in spring. This, and the resulting high availability of prey, might speed up larval and egg development to the level required for survival. It is suggested that the species evolved in conditions with relatively high water temperatures in spring. The high habitat specificity makes *S. depressiusculum* a rare and vulnerable species in the north-west of its range. Changed management and eutrophication forms a direct threat to populations, which are dependent of the maintenance of artificial conditions for their survival. Besides this vulnerability the species disperses rather weakly, as compared to its relatives. Individuals are generally not found more than 20 km away from source populations. Almost all recent Dutch records are probably the result of dispersal from populations in Belgium, not far from the border. Although reproduction was proven for the first time in The Netherlands (RUTTEN & KALKMAN, 1999) in 1998 (in atypical habitat) it is expected that the only chance for the species would be if suitable habitat is created or restored by man." (Author)] Address: Verbeek, P.J.M., Zeelandse straat 56, NL-6566 DJ Millingen aan de Rijn, The Netherlands

1172. **Vick, G.S. (1999):** A checklist of the Odonata of the south-west province of Cameroon, with description of *Phyllogomphus corbetae* spec. nov. (Anisoptera: Gomphidae). *Odonatologica* 28(3): 219-256. (in English). ["A checklist of the dragonflies of the South-West Province of Cameroon, based upon field work undertaken between 1995 and 1998, and a survey of historical records, is given. Notes on seasonal occurrence, habitat requirements and taxonomy are provided. As new is described: *P. corbetae* sp.n. (holotype male. Kumba, outlet stream from Barombi Mbo, 20-IX-1997; allotype female: Limbe, Bimbia, Elephant River, 4-VII-1996)." (Author)] Address: Vick G.S., Crossfields, Little London, Tadley, Hants RG26 5ET, United Kingdom

1173. **Viessmann, R. (1999):** Berichtsjahr 1998. Libellen - Odonata. Pflanzen und Tiere in Rheinland-Pfalz 9: 176-188. (in German). [documentation of faunistic odonate records in 1998 in Rheinland-Pfalz, Germany; *Lestes barbarus*, *Aeshna affinis*, *Crocothemis erythraea*, *Orthetrum brunneum*, and *Coenagrion pulchellum* are of some interest] Address: Viessmann, R., Gängelstockweg 8, D-67295 Bolanden, Germany

1174. **Vos, R.; Werven, D. van (1999):** *Bonslibel Oxygastra curtisii* bij de Our op de Luxemburg - Duitse grens. *NVL Nieuwsbrief. Mededelingenorgaan van de Nederlandse Vereniging voor Libellenstudie* 3(3): 7-8. (in Dutch). [spectacular rediscovery of *Oxygastra curtisii* in Germany (believed extinct since the 40th), and first record of the species in Luxembourg in July 1999 in the border river Our.] Address: Vos, R., F-Zernikestraat 209, NL-7553 EC Hengelo, The Netherlands, E-mail: rudolf.vos@student.utwente.nl

1175. **Wagner, D.L.; Thomas, M.C. (1999):** The Odonata fauna of Connecticut. *Bulletin of American Odonatology* 5(4): 59-85. [35 species and 471 county records are added to Garman's inventory "The Odonata or dragonflies of Connecticut. *Geol. and Nat. Hist. Surv. Bull.* 39: 331 pp., 1927, bringing the total number of Odonata documented from Connecticut to 147 species (48 damselflies, 99 dragonflies). An annotated checklist of this fauna - based on a database of over 6000 occurrence records is presented: Each species account includes county records, the range of observation dates, an assessment of the species' conservation status, and brief biological notes. A State Heritage Program rank is proposed for each taxon; we estimate that 21.7% of Connecticut's odonate fauna can be regarded as rare. Issues pertinent to the conservation of dragonflies and damselflies in Connecticut are discussed briefly.] Address: Thomas, M.C., 206 Skyview Drive, Cromwell, CT 06416, USA. E-mail: gomphid@compuserve.com

1176. **Walter, S. (1999):** North American late date. *Argia* 11(1): 35. (in English). [Telebasis byersi was recorded at Loxahatchee National Wildlife Refuge in Palm Beach county, Florida, USA on 22 November 1998.] Address: Walter, S., 69-21 Springfield Boulevard, Bay-side, NY, 11364-2616, USA

1177. **Walter, S. (1999):** Which falcon catches dragonflies? *Argia* 11(1): 35. (in English). [with reference to Held, J. (1998): Peregrines eating dragonflies. *Argia* 10(3): 16, Steve Walter outlines that it is quite unlikely to have dragonfly-eating Peregrin falcons. Likely is that Merlins have caught dragonflies.] Address: Walter, S.,

69-21 Springfield Boulevard, Bayside NY, 11364-2616, USA.

1178. **Waltz, R.D. (1999):** Gleaning on Coreidae (Heteroptera) by *Tachopteryx thoreyi* (Odonata: Petaluridae). Great lakes entomologist 31(3-4): 209-210. (in English). Address: Waltz, R.D., IDNR, Div. Entomol. & Plant Pathol., 402 W Washington, Room W-290, Indianapolis IN 46204; USA

1179. **Wazalwar, S.M.; Tembhare, D.B. (1999):** Mouthpart sensilla in the dragonfly, *Brachythemis contaminata* (Fabricius) (Anisoptera: Libellulidae). Odonatologica 28(3): 257-271. (in English). ["The mouthpart sensilla in *B. contaminata* comprise trichoid sensilla, acanthae, basiconic sensilla, campaniform sensilla, microtrichia, papillae, sensory pegs and spines. There are various types of trichoid sensilla: 8 labral, 7 mandibular, 14 hypopharyngeal, 8 maxillary and 17 labial. They differ in size and distribution from one another. The acanthae are of 2 types, the labral in the adult and the mandibular in the larva. The basiconic sensilla are found on the labrum of the adult only. The campaniform sensilla are present on the maxillae and labium of the adult and are lacking in the larva. There are 7 types of microtrichia evident on the labrum, hypopharynx and maxillae of the larva and on the hypopharynx and maxillae of the adult. The papillae are present on the inner surface of the labrum in both the larva and the adult. The sensory pegs are confined to the labium of the adult. The spines are located on the labium of the larva and are lacking in the adult. This study is based on SHM and neuro-anatomical staining techniques." (Authors)] Address: Tembhare, D.B., Dept of Zoology, Nagpur University Campus, Amaravati Road, Nagpur 440 010, India.

1180. **Weihrauch, F. (1999):** Larven von *Gomphus vulgatissimus* (L.) als Substrat der Wandermuschel *Dreissena polymorpha* (Pallas) (Anisoptera: Gomphidae; Bivalvia: Dreissenidae). Libellula 18(1/2): 97-102. (in German, with English summary). ["In May 1998, three exuviae of *G. vulgatissimus*, each carrying a specimen of *D. polymorpha* tightly attached to the dorsum of the abdomen, were collected at a small gravel pit lake near Geisenfeld, Upper Bavaria, Germany." (Author)] Address: Weihrauch, F., Hengelerstr. 9, D-80637 München, Germany. E-mail: Weihrauch@lbp.bayern.de

1181. **Westover, D. (1999):** Observations on the possibility of overwintering larvae of *Anax junius* in Wisconsin. Argia 11(1): 15-16. (in English). [records from Rocky Run Creek State Fishery Area, western Columbia County, southern Wisconsin, USA; emerging *A. junius* on 25 May 1998, which "could hardly be the offspring of a pair of migrants, as the 3 months of larval development would take it back to late February"] Address: Westover, D., 324 B North Monroe Street, Waterloo, WI, 53594, USA

1182. **White, H. (1999):** "What do you do with 'EM'?" Argia 11(1): 33-34. (in English). [further contribution to the USA discussion on collecting Odonata] Address: White, H., 103 Radcliffe Drive, Newark, DE, 19711, USA. E-mail: halwhite@udel.edu

1183. **Whiteley, G.; Samways, M.J.; Di Domenico, M.; Carchini, G. (1999):** Description of the last instar larva of *Hemistigma albipuncta* (Rambur, 1842) and comparison with other Brachyidplactinae (Anisoptera:

Libellulidae). Odonatologica 28(4): 433-437. (in English). ["The morphology of the last instar larva of the African *H. albipuncta* is illustrated and described. A comparison is then made with the South American *Elga leptostyla* and *Nephepeltia phryne*. (Authors)] Address: Whiteley, G., Conservation Research Centre, School of Botany and Zoology, University of Natal, Private Bag X01, Scottsville 3209, South Africa.

1184. **Wildermuth, H. (1999):** Verbreitung und Habitate von *Aeshna caerulea* (Ström, 1783) in den Schweizer Alpen (Odonata, Anisoptera: Aeshnidae). Opus. zool. flumin. 166: 1-18. (in German, with English summary). ["44 localities with occurrence of *A. caerulea* were surveyed in the alpine region of Switzerland and new records integrated in an actualized distribution map. Imaginal and larval habitats of the sp. are described incl. structural, phytosociological and hydrochemical characteristics of the breeding sites. The ecological factors limiting the upper and lower vertical distribution are discussed and conservation measures for the endangered sp. are suggested." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland

1185. **Wildermuth, H. (1999):** *Somatochlora alpestris* (Selys, 1840) in den Schweizer Alpen: Eine Verbreitungs- und Habitatanalyse (Anisoptera: Corduliidae). Odonatologica 28(4): 399-416. (German, with English summary). ["150 sites with occurrence of *S. alpestris* were surveyed in Switzerland and new records integrated in an actualized distribution map comprising 322 localities. The sp. only occurs in the alpine region and is not found in the Jura mountains. The data on the vertical distribution are summarized in altitude and climatic categories, differentiated with respect to records of adults and findings of exuviae. Imaginal and larval habitats of the sp. are described incl. structural, phytosociological and hydrochemical characteristics of the breeding sites. Possible ecological factors limiting the upper and lower vertical distribution are discussed. The status of the sp. in Switzerland is assessed and conservation measures are suggested." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland

1186. **Williamson, S. (1999):** Bittern catches dragonfly. Argia 11(2): 14. (in English). [record of a North American Bittern (*Botaurus lentiginosus*) catching *Anax junius* (?) at Blue Ridge Parkway, southwest Virginia, USA] Address: not stated

1187. **Williamson, T. (1999):** *Ophiogomphus cecilia* (Geoffroy in Fourcroy, 1785) et *Gomphus flavipes* (Charpentier): espèces nouvelles pour la Loire-Atlantique (Odonata, Anisoptera, Gomphidae). Martinia 15(3): 85-87. (in French, with English summary). [In 1998, both species were recorded new for the Département near Oudon at the river Loire. An additional record of *O. cecilia* is given for Champtoceaux (Département Maine-et-Loire).] Address: Williamson, T., 13, impasse du Moulin, F-49270 Champtoceaux, France

1188. **Wilson, K.D.P. (1999):** Dragonflies (Odonata) of Dinghu Shan Biosphere Reserve, Guangdong Province, China. International Journal of Odonatology 2(1): 23-53. (in English). [76 species of Odonata are recorded from Dinghu Shan Biosphere Reserve, Guangdong Province, China, following surveys completed during 1992-1998. *Cephalaeschna dinghuensis* spec. nov. (Aeshnidae) and *Philosina alba* spec. nov. (Megapo-

dagrionidae) are described and illustrated. "The previously unknown female of *Stylurus nanningensis* Liu (Gomphidae) is also described. *Asiagomphus septimus* (not of Needham) from Hong Kong is synonymised with *Asiagomphus hainanensis* Chao. *Aciagrion tillyardi* Laidlaw (Coenagrionidae) is recorded from Chinese territory for the first time. *Zygonyx takasago* Asahina (Libellulidae) previously considered a Taiwanese endemic, is recorded from continental China. A key is provided to separate the three Chinese species of *Zygonyx*. A total of twenty-eight taxa are recorded from Guangdong Province for the first time. The odonate fauna of Dinghu Shan is compared with neighbouring Hong Kong and Taiwan." (Author)] Address: Wilson, K.D.P., Agriculture and Fisheries Department, 6F, 25 Borrett Rd, Mid Levels, Hong Kong, China. E-mail: wislonhk@hk.super.net





# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: Lindeboom@aol.com and Martin Schorr, Waldfrieden 25, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: FOEATrier@aol.com

Published in Rheinfelden, Germany and printed in Tübingen, Germany.  
ISSN 1438-0269

## 1997

1189. **Ali, D.W. (1997):** The aminergic and peptidergic innervation of insect salivary glands. *Journal of Experimental Biology* 20(14): 1941-1949. (in English). ["Insect salivary glands are glands associated with nutrient intake whose secretions are generally involved in the digestion and lubrication of food. They are under the control of neuroactive substances and may be innervated from several sources including the suboesophageal ganglion, the stomatogastric nervous system and the unpaired median nerves. Both amines and peptides have been suggested to play roles in the control of insect salivation, as indicated by their association with terminals on salivary glands, their effects in salivary gland bioassays and their ability to alter second messenger levels and ion channel conformations. Serotonin and dopamine appear to be the most prominent amines associated with insect salivary glands. Either one or both of these amines are found associated with the salivary glands of the locust, stick insect, cockroach, cricket, dragonfly, mosquito, adult moth and kissing bug. Their roles, although not fully elucidated, appear to be in the control of salivary secretion. Several peptides, including members of the FMRFamide-related family of peptides, are also found associated with insect salivary glands. Sources of peptidergic innervation are as varied as those for aminergic innervation, but information regarding the physiological role of these peptides is lacking. The relevance of the different levels of complexity of salivary gland innervation, which range from the absence of innervation in some species (blowfly) to the presence of several distinct sources in others (locust, cockroach), is not well understood. This review serves to consolidate what is known of the phenotype of salivary neurones in relation to the control of salivation." (Author)] Address: Ali, D.W., Institution Montreal Gen. Hosp. Res. Inst., 1650 Cedar Ave., Montreal, PQ H3G 1A4, Canada

1190. **Andrew, R.J.; Tembhare, D.B. (1997):** The development and structure of the ovaries in the dragonfly *Tramea virginia* (Rambur) (Libellulidae: Odonata). *Journal of Advanced Zoology* 18(2): 86-95. (in English). ["In *Tramea virginia*, the ovary is composed of numerous strings of panoistic ovarioles. Each ovariole is differentiated into four regions the apical terminal filament, germarium, vitellarium and the distal pedicel. In the ultimate nymph, the terminal filament comprises a thick strand of germinal tissue. The germarium is filled with the primary and secondary oogonia and primary oocytes. The vitellarium is filled with pre-vitellogenic oocytes

while the pedicel is in the form of compact mass of mesodermal cells. Vitellogenesis is evident in mature adults and it passes through the successive early vitellogenic, midvitellogenic, late-vitellogenic and maturation stages. The lateral oviducts are mesodermal in origin and initially run along the outer margin of the ovaries. The median oviduct is short and its anterior region is mesodermal while posterior region is ectodermal in origin." (Authors)] Address: Tembhare, D.B., Post-Grad. Dep. Zool., Nagpur Univ. Campus, Nagpur 440 010, India

1191. **Anselin, A.; Knijf, G. de (1997):** The Belgian Dragonfly Working Group. *Levende Natuur* 98(5): 184-188. (in Dutch). ["The Belgian Dragonfly Working Group Gomphus, a volunteer organization, was founded in 1983. The main goal was to promote studies in dragonfly faunistics and increase protection measures. One major activity from the start was the organization of an atlas project of Odonata distribution in Belgium. This project is now in its last phase. A special effort has been made to achieve a good coverage of the territory during the last five years. These data will form a base for future comparison. As a result of the atlas project, an increasing number of people have carried out detailed faunistical surveys in smaller regions. The Gomphus database has been used for the composition of the Red list of Dragonflies in Flanders, a project of the Institute of Nature Conservation. Gomphus is also active in the field of nature protection and gives advice for dragonfly-friendly management of wetlands. It takes part in a monitoring project in Wallonia and is currently examining the possibilities of setting up a similar scheme in the Flemish part of the country." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussels, Belgium. E-mail: geert.de.knijf@institnat.be

1192. **Bazzanti, M.; Chiavarini, S.; Cremisini, C.; Soldati, P. (1997):** Distribution of PCB congeners in aquatic ecosystems: A case study. *Environment International* 23(6): 799-813. (in English). ["Polychlorinated biphenyls (PCB) congeners were determined in water samples, sediments and animal species in the frame of a survey of the River Arrone (Central Italy, near Rome) after a major contamination episode. Animal species were selected on the basis of their living and feeding habits and evaluated as candidate bioindicators of PCB pollution in this lotic ecosystem. Total PCB concentrations in water were found to be low (ng/L level), and in sediments, ranged from about 10 to 200 mug/kg dry weight, depending on the distance from the contamina-

tion source. PCB patterns in sediments showed a prevalence of higher chlorinated congeners over time. Concentrations in macroinvertebrates (*Calopteryx splendens* and *Anax imperator*) ranged from 60 to 400 mug/kg dry weight, showing significantly different species to species patterns. PCB concentrations were almost parallel in sediments for different sampling stations, while differences in patterns among species can be explained in terms of bioaccumulation/excretion mechanisms. Freshwater shrimps (*Palaemonetes antennarius*) were not found close to the contamination source, as a consequence of their extreme sensitivity to chemicals, and showed a peculiar pattern (almost exclusively determined by congeners 153, 138, and 180) probably originating from biodegradation mechanisms. Fish samples (*Rutilus erythrophthalmus*) showed the highest concentrations, as a combination of feeding habit, lipid content and, probably, less effective biodegradation /excretion pathways. Congener patterns closely match those of Aroclor 1260, which originates from the contamination source. This study confirms that congener physical and chemical parameters, different degradation rates, feeding habits, and mobility of the analysed aquatic organisms, metabolism, and excretion mechanisms, are to be considered to explain the distinctive PCB patterns of different samples." (Authors)] Address: Bazzanti, M., Dep. Human Animal Biol., Univ. "La Sapienza", 00185 Rome, Italy

1193. **Beccaloni, G.W. (1997):** Ecology, natural history and behaviour of ithomiine butterflies and their mimics in Ecuador (Lepidoptera: Nymphalidae: Ithomiinae). *Tropical Lepidoptera* 8(2): 103-124. (in English). ["The ithomiine butterfly species (Nymphalidae: Ithomiinae) which occur at Jatun Sacha Biological Station, Napo Province, Ecuador were found to participate in eight discrete mimicry complexes. These complexes involve a total of 124 insect species: 55 ithomiine species, 34 species which belong to other butterfly families or subfamilies, 34 moth species, and 1 species of damselfly. All species are illustrated and identified, and aspects of their behaviour are discussed. Literature on the chemical defences of the species is reviewed and a study of their ultraviolet reflectance patterns is presented. Data from a mark-release-recapture study show that the majority of individuals in the mimicry complexes studied were ithomiines. Hypotheses to explain polymorphism in Batesian and Mullerian mimics are discussed, in view of the finding that seven species of ithomiines, five other butterfly species, and the single damselfly species were polymorphic at Jatun Sacha." (Author)] Address: Beccaloni, G.W., Dep. Entomol., Natural History Museum, Cromwell Road, London SW7 5BD UK

1194. **Chung, M.G.; Kang, S.S.; Yeeh, Y. (1997):** Genetic diversity and structure in Korean populations of *Sympetrum darwinianum* and *S. eroticum eroticum* (Odonata: Libellulidae). *Jap. J. Ent.* 65(2): 427-435. (in English). ["The levels of genetic diversity and structure in Korean populations of *Sympetrum darwinianum* (Selys, 1883) and *S. eroticum eroticum* (Selys, 1883) were examined. Starch gel electrophoresis was conducted on 343 individuals in eight populations of the two species. Electrophoretic data revealed that the two species exhibit considerably higher levels of genetic variation than those of most other insects. Expected mean population heterozygosity (He, 0.361 vs. 0.333) and percent polymorphic loci (P, 81.5% vs. 87.2%) found in *S. dar-*

*winianum* were very comparable to those for *S. eroticum eroticum*. Analyses of WRIGHT's fixation indices, calculated for all polymorphic loci across populations in each species, indicated that, overall, a near conformance of genotype frequencies to Hardy-Weinberg expectations, suggesting that mating was nearly panmictic. The results indicated that the two species might have very similar phylogenetic histories, and/or ecological and life history traits." (Authors)] Address: Chung Myong Gi Institution Dep. Biol., Gyeongsang Natl. Univ., Chinju 660-701, South Korea

1195. **Clarke, D.; Hewitt, S. (1997):** Vagrant Emperor Dragonfly, *Hemianax ephippiger* (Burmeister) at Caerlaverock, Dumfriesshire. *Glasgow Naturalist* 23(2): 58. (in English). [1 male was observed on 3 November 1996] Address: Clarke, D., Institution Tullie House Mus., Castle St., Carlisle CA3 8TP, UK.

1196. **Currie, R.S.; Fairchild, W.L.; Muir, D.C. (1997):** Remobilization and export of cadmium from lake sediments by emerging insects. *Environmental Toxicology & Chemistry* 16(11): 2333-2338. (in English). ["Emerging insects including, Diptera, Odonata, Ephemeroptera, and Trichoptera were collected from Lake 382 (L382) in 1991 and 1992 to estimate quantitatively the export of Cd by aquatic insects from a natural system having elevated Cd concentrations in the water and sediment. L382 is a Canadian Shield lake, located within the Experimental Lakes Area in northwestern Ontario, that received experimental additions of Cd from 1987 to 1992. Emerging Diptera (mostly Chironomidae), Odonata, and Ephemeroptera had mean Cd concentrations of 1.41, 0.11, and 0.30 mug/g wet weight, respectively. An estimated 1.32 to 3.90 g of Cd per year were exported from the sediments of L382 depending on the estimate of production rates used for these groups of insects. Approximately 0.05 to 0.17% of the whole-lake Cd load in L382 sediments was exported annually or 0.12 to 0.39% of the epilimnion Cd sediment load. Insect emergence may have resulted in greater Cd export from L382 relative to losses via the outflow. Cadmium exported from the sediments by insects may be remobilized and become more available to aquatic organisms or enter the terrestrial ecosystem and become available to insectivores." (Authors)] Address: Fairchild, W.L., Gulf Fisheries Centre, Fisheries Ocean Canada, P.O. Box 5030, Moncton, NB E1C 9B6, Canada

1197. **Dobruskina, I.A.; Ponomarenko, A.G.; Rasnitsyn, A. P. (1997):** Fossil insects found in Israel. *Paleontologicheskii Zhurnal* 5: 91-95. (in Russian). ["Fossil insects found in the Cretaceous of Israel are figured, discussed and, in part, described. Lower Cretaceous (Hauterivian-Barremian) Tayasir volcanites have yielded the beetle *Cretosperchus medievalis* Ponomarenko, sp. nov. related to species described from the Lower Cretaceous of Transbaikalia, a cockroach and a dragonfly nymph. In the Upper Cretaceous (Turonian) Ora Formation there are found the ant-lion *Samsonileon fragmentatus* Ponomarenko, sp. nov., a beetle elytra possibly belonging to *Dytiscidae*, two roach elytra (one assignable to *Blattellidae*), and not identifiable wing. The insects found show Laurasian rather than Gondwanian affinities." (Authors)] Address: Dobruskina, I. A., Heb. Univ. Jerus., Jerusalem, Israel

1198. **Dörfler, G.; Hartmann, G. (1997):** Zur Kenntnis der Libellenfauna des Harzes und seines näheren nörd-



lichen Vorlandes: Fundortliste, Korrekturen und Ergänzungen. Mitt. naturwiss. Verein Goslar 5: 151-154. (in German). [Harz Mountains region, Niedersachsen and Sachsen-Anhalt, Germany; records of 13 species previously unpublished are listed and shortly commented] Address: Hartmann, G., Werenbergstr. 26, D-38640 Goslar, Germany

1199. **Dolmen, D. (1997):** "Freshwater prawns" and other invertebrates: A faunistic report from the lakes Reddalsvannet and Landvikvannet, Grimstad. Fauna (Oslo) 50(1): 36-42. (in Norwegian). ["In June and July 1992 and June and August 1996, numerous "freshwater prawns" *Palaemonetes varians* were recorded in three brackish-water lakes at Grimstad, Aust-Agder county: Reddalsvannet, Landvikvannet, and lakelet north of Inntjore. This is the first reliable record of the species in Norway, at least for many decades. The remaining fauna consisted of both limnic and marine animals, and included rare species like *Brachytron pratense* (Odonata) and *Gyrinus caspius* (Coleoptera)."] (Author)] Address: Dolmen, D., Institution NTNU Vitenskapsmuseet, N-7004 Trondheim, Norway

1200. **Ferreras-Romero, M. (1997):** The life history of *Boyeria irene* (Fonscolombe, 1838) (Odonata: Aeshnidae) in the Sierra Morena mountains (southern Spain). Hydrobiologia 345: 109-116. (in English). ["The life history of *Boyeria irene* is inferred from size-frequency analyses of sweep-net samples taken during five years in a permanent stream in the Sierra Morena Mountains. There the species is apparently mainly semivoltine, although a few larvae require three years to complete development. The instar distribution during winter is that of a 'summer species' (sensu Corbet, 1954). Metamorphosis is confined to spring and there is a long flying season. Similarities between *B. irene* and congeneric species in North America are discussed."] (Author)] Address: Ferreras-Romero, M., Departamento de Biología Animal (Zoología), Facultad de Ciencias, Universidad de Córdoba, Avda. San Alberto Magno s/n, E-14004 Córdoba, Spain

1201. **Fincke, O. (1997):** Conflict resolution in the Odonata: implications for understanding female mating patterns and female choice. Biological Journal of the Linnean Society 60(2): 201-220. (in English). ["Predictions of mating patterns in animals have focused on males and how they compete for fertilizations by controlling females. With reference to the Odonata, a taxon in which mating requires cooperation of the female, the active role that females play in mating decisions is often ignored, leading to the premature conclusion that male coercion of females is common. A critical review of the outcome of sexual conflict among odonates leads me to alternative explanations of female mating patterns that need, to be refuted before concluding that males coerce matings. Because Anisoptera males have greater control over tandem formation, they have a greater potential for coercion than Zygoptera males. However, Anisoptera females may simply be willing to remate more often if they receive insufficient sperm to fertilize an entire egg clutch. Contrary to prior assumptions, in both suborders, male defence of oviposition sites does not preclude females from choosing among sites or among males. I find that the evolution of non-aggressive sexual signals by males is a reliable indication that sexual conflict has been resolved in favour of female interests. Although I predict that the benefits to females of choice of male phenotype should rarely exceed the cost of such

such discrimination in Odonata, female choice is most likely to evolve in territorial species whose males must endure high physiological stress in order to mate, and when site quality is not a reliable predictor of the genetic quality of a potential mate."] (Author)] Address: Finke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA

1202. **Fincke, O.M.; Waage, J.K.; Koenig, W.D. (1997):** Natural and sexual selection components of odonate mating patterns. In: Choe, J.C. & B.J. Crespi (Eds.): The evolution of mating systems in insects and arachnids. Cambridge Univ. Press. Cambridge: 58-74. (in English). ["Traditionally, students of odonate reproductive behavior have focussed on how males compete for access to mates and fertilizations. This tendency has yielded considerable information on male reproductive strategies and on the proximate and ultimate mechanisms involved in male-male competition, but has left numerous gaps in our knowledge of other aspects of odonate mating systems. We review relevant aspects of odonate biology and examine the extent to which current data on mating patterns support predictions arising from sexual selection theory. Although long-term studies offer some such support, they also indicate that natural selection for longevity and stochastic factors such as weather play critical roles in influencing reproductive success. Relatively little of the variance in male reproductive success in odonates has been traced to variance in male phenotype. We emphasize the role of females as determinants of odonate mating patterns and discuss sexual conflicts of interest over mating, fertilization, and oviposition decisions. Finally, we explore ways in which natural selection underlies female mating decisions and how larval and adult ecology interact to influence adult reproductive behavior."] (Authors)] Address: Finke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA

1203. **Gee, J.; Smith, B.D.; Lee, K.M.; Griffiths, S. W. (1997):** The ecological basis of freshwater pond management for biodiversity. Aquatic Conservation 7(2): 91-104. (in English). ["1. Macrophyte and macroinvertebrate species richness, and the extent of aquatic vegetation, were surveyed in 51 newly created or renovated ponds in mid and west Wales, together with a range of environmental variables. These data are analysed in relation to management issues including pond size, rate of development, planting for oxygenation, stocking with fish and shading by riparian trees. 2. Richness of both plants and invertebrates increases with vegetated area, but the relationships are weak. Similarities among assemblages in ponds are low and not related to the proximity of the ponds. It is likely that two small ponds would together support more species than a single large pond. 3. New ponds are colonized rapidly by plants and invertebrates. There is no relationship between age and the number of species in ponds that were at least one year old, except for invertebrates in ponds that were isolated from other wetland. As expected, the extent of aquatic vegetation increases with age. 4. Minimum dissolved oxygen levels decrease with the cover of floating plants and with extent of vegetation in relation to pond size. 5. There is no evidence that stocking with fish (mainly salmonids at low densities) influences the total number of species of either macrophytes or macroinvertebrates. However, the number of anisopteran (Insecta: Odonata) species is lower in stocked ponds and the number of trichopteran (Insecta) species is high-

her. 6. Macrophyte species richness increases with the percentage of the margin shaded by trees to a peak between 22% (emergent species) and 30% (submerged and floating species), and then declines. The number of species of invertebrates with short-lived flying adults (Odonata, Ephemeroptera, Trichoptera) decreases with the extent of riparian trees. Other invertebrates are unaffected. 7. The relationship between the survey results and existing management recommendations is discussed, emphasizing the need for field experiments to provide empirical support." (Authors)] Address: Gee, J., Inst. Biol. Sci., Univ. Wales, Aberystwyth, Ceredigion SY23 3DA, UK

1204. **Gorb, S.N. (1997):** Ultrastructural architecture of the microtrichia of the insect cuticle. *Journal of Morphology* 234(1): 1-10. (in English). ["The ultrastructure of the microtrichia (MT) of the insect cuticle was studied using scanning electron microscopy (SEM). After dissolving the protein matrix of chitin-protein microfibrils with NaOH, the orientation of the axial chitin fibers was three-dimensionally demonstrated. Microfibrils of the outermost exocuticular lamella lie parallel to the slope of the cone surface of the MT and rotate slightly on the top of the MT. Microfibrils of the external lamella of the transitional area between planar cuticle and conical cuticle of the MT corresponded to the shape of the surface within one lamella and preferred directions of MT's microfibrils in the successive lamella rotated. In the deeper layers of the cuticle, the rotation of both the microfibrils and successive lamella results in the twisted straw architecture of the microfibrils' composition within the MT. The deepest microfibrils that are located close to the axis of the MT form compact clusters of fibrils (1.0-1.5  $\mu$ -m length). The twisted-straw architecture of microfibrils in the MT is derived from principles of development of extracellular fibrous composites. It is suggested, however, that this architecture has an additional functional significance as a strategic design with particular mechanical properties." (Author)] Address: Gorb, S., Max-Planck-Institut für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. E-mail: stas.gorb@tuebingen.mpg.de

1205. **Gryska, A.D.; Hubert, W.A. (1997):** Observations on the reproduction, sources of mortality, and diet of the Kendall Warm Springs dace. *Great Basin Naturalist* 57(4): 338-342. (in English). [Wyoming, USA; life history study of the endangered Kendall Warm Springs dace (*Rhinichthys osculus thermalis*); "We observed 2 sources of mortality: (1) emigration from the warm spring stream over a waterfall into the Green River and (2) predation on larvae by dragonfly (*Libellula saturata*) nymphs." (Authors)] Address: Gryska, A., Institution Wyo. Coop. Fish Wildl. Res. Unit, Univ. Wyo., Laramie, WY 82071-3166, USA.

1206. **Habdija, I.; Radanovic, I.; Primc-Habdija, B. (1997):** Longitudinal distribution of predatory benthic macroinvertebrates in a karstic river. *Archiv für Hydrobiologie* 139(4): 527-546. (in English). ["The longitudinal distribution of predatory macroinvertebrates and their diversity were investigated on boulder, cobble and gravel substrates along the River Kupa, a karstic river in the NW Dinarid area (Croatia). Depending on substrate type and river section, the predator biomass constituted 6.9% to 20.2% of the total macroinvertebrate biomass. In the headwater streams more than 80% of predator biomass was represented by rhyacophilid, perlid and perlodid larvae. In the upper river section Hirudinea

species, rhyacophilids and the dipteran larva, *Atherix ibis*, constituted approximately equal percentages of total predators. In the lower river section Hirudinea species, Odonata larvae, tanipod and ceratopogonid larvae were the most dominant predators. Along the river gradient the increase of predator biomass corresponded with the increase of scraper, collector-gatherer and filterer biomass. The Shannon index of diversity showed that the diversity of predators increased from the area to the downstream reaches. A significant and positive association was found between diversity of predators and diversity of collector-gatherers. This positive relationship between predators and collector-gatherers may be interpreted as the diversity response of predators to the diversity of prey." (Authors) In tab. 2 the mean annual biomass (mg wet biomass  $m^2$ ) of *Platycnemis* sp., *Cordulidae* not det., *Gomphus vulgatissimus*, and *Onychogomphus* sp. is listed.] Address: Habdija, I., Department of Zoology, Faculty of Science, University of Zagreb, Rooseveltov trg 6, CRO-10000 Zagreb, Croatia

1207. **Hassan, S.T. (1997):** Action thresholds of wet rice arthropods for pest management decision-making in Malaysia. *Pertanika Journal of Tropical Agricultural Science* 20(1): 65-74. (in English). ["Action thresholds to aid pest population management decision-making of 11 categories of wet rice arthropods are suggested in terms of mean population density per hill ( $x$ ) and proportion of infestation ( $P(I)$ ) of the field sampling units. The thresholds are the ( $x$ ) and  $P(I)$  values at the point of saturation of a polynomial regression curve obtained by plotting ( $x$ ) against  $P(I)$  for each arthropod category. The respective values for pests are: 3.38, 0.92 (*Nephotettix* spp.), 6.28, 1.00 (*Nilaparvata lugens*), 1.37, 0.72 (*Cnaphalocrocis medinalis*-*Pyralidae*), 2.42, 0.90 (*Recilia dorsalis*), 3.81, 0.97 (*Sogatella furcifera*), and for predators are: 3.89, 0.98 (*Cyrtorhinus lividipennis*), 2.39, 0.85 (*Anatrichus pygmaeus*-*Diptera*), 2.02, 0.82 (*Odonata*), 1.65, 0.81 (*Casnoidea* spp), 1.61, 0.64 (*Paederus fuscipes*), and 1.60, 0.69 (spiders).  $P(I)$  is significantly ( $P < 0.001$ ) affected by arthropod category and growth stage of the crop. The observed  $P(I)$  indicated high fits (most  $r^2 > 0.90$ ) to clumped- and Poisson-based distribution models." (Authors)] Address: Hassan, S.T.S., Dep. Biol., Fac. Sci. Environ. Studies, Univ. Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia

1208. **Hassan, S.T.; Rashid, M.M. (1997):** Presence/absence sequential plans for pest management decision-making for arthropods of wet rice ecosystem in Malaysia. *Pertanika Journal of Tropical Agricultural Science* 20(1): 51-63. (in English). ["Presence-absence sequential sampling plans are presented for 11 arthropod categories to assist in management of their populations in the multipest-infested rice crop in Malaysia. Data from visual inspection of 204 samples with 40 and 100 hills per sample, were used to develop the plans. Action threshold for each of the 11 (5 pests 6 predators) arthropod categories was obtained through a fourth-order polynomial regression of proportion of infestation against mean population densities, at the point of saturation of infestation. The pest species are: *Nephotettix* spp., *Nilaparvata lugens*, *Recilia dorsalis*, *Sogatella furcifera* and *Cnaphalocrocis medinalis* (*Pyralidae*), and the predators: *Cyrtorhinus lividipennis*, *Anatrichus pygmaeus* (*Diptera*), spiders, *Odonata*, *Paederus fuscipes* and *Casnoidea* spp. Risk levels of Type I ( $\alpha$ ) and Type II error ( $\beta$ ) were prefixed at 0.3, since lower levels

entail taking a larger number of samples. The sequential plans were then generated using the SEQUAN computer program of Talerico and Chapman (1970). During field operation on not more than 50 ha at a time, it is suggested that at least ten hills should be examined visually before recommending any pest management action. Simultaneous sampling of pests and predators enables status of predators' populations to be considered before recommending any decision." (Authors)] Address: Hassan, S.T.S., Dep. Biol., Fac. Sci. Environ. Studies, Univ. Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia

1209. **Hawking, J.H. (1997):** The conservation status of dragonflies (Odonata) from south-eastern Australia. Mem. mus. Victoria 56(2): 537-542. (in English). ["The conservation status of the dragonflies from south-eastern Australia is documented and the species with limited distributions and/or larval habitats which are vulnerable are discussed. One hundred and seven species are recorded from South Australia, Victoria, Tasmania and southern New South Wales. No species is considered endangered, but nine species have high conservation priority. These species are endemic to Australia and all have restricted distributions. The vulnerability of the larval habitats is discussed and suggestions for their conservation and management are made." (Author)] Address: Hawking, J.H., Murray-Darling Freshwater Research Centre, Cooperative Research Centre for Freshwater Ecology, P.O. Box 921, Albury, NSW 2640, Australia

1210. **Hooper, R.E.; Siva-Jothy, M.T. (1997):** "Flybys": A prereproductive remote assessment behavior of female *Calopteryx splendens xanthostoma* (Odonata: Calopterygidae). Journal of Insect Behavior 10(2): 165-175. (in English). ["Before reproductive events, female *Calopteryx splendens xanthostoma* show a distinctive flight behavior over patches of oviposition substrate guarded by territorial males. We term such flights 'flybys.' Since females fly most frequently (and nonrandomly) over the site which they eventually utilize, the flight type appears to be related to the female's selection of a reproduction site. When males were experimentally excluded females made flybys over more sites than when males were present. We manipulated the levels of agonistic interactions between males to determine the effect of fighting on flybys. The frequency of flybys by females over each patch did not change with different levels of male agonistic activity, but females landed and copulated on patches where fighting between males was lowest. Moreover, when females secured access to an oviposition site without copulating with the reholding male, they made flybys over more sites than when they secured access to a site by copulating with the territorial male. The results suggest that one function of flybys is to allow females to assess remotely potential male interference at oviposition sites." (Authors)] Address: Hooper, R.E., Lab. Wildlife Conservation, National Inst. Environmental Studies, Tsukuba 305, Japan

1211. **Horwitz, P. (1997):** Comparative endemism and richness of the aquatic invertebrate fauna in peatlands and shrublands of far south-western Australia. Mem. Mus. Victoria 56(2): 313-321. (in English). ["A study of the peatlands and shrublands in far south-western Australia was undertaken to examine patterns of endemism and richness in aquatic invertebrate faunas. Samples of surface water, interstitial water and

crayfish burrow water were analysed from about 45 sites and in each season over a twelve month period in 1993. Six groups of aquatic invertebrates were chosen for more detailed analyses (mites, oligochaetes, isopods, decapods, dipterans, and odonats) and resolved to species level. For each species an assessment was made of its distributional status as either widespread and common, regionally endemic (to the southwest), or locally restricted to within the study region. Sites with high levels of local endemism were plotted geographically and their characteristics compared to other sites. The data are related to existing hypotheses concerning the depauperate nature of the freshwater fauna of the south-western part of the continent. It was found that such hypotheses need to be tempered by the role of salt in flowing systems, and the occurrence of hot spots of local endemism for freshwater fauna in the extreme south-west in non-flowing waters (and often subterranean habitats) where groups of non-insect invertebrate fauna show apparently elevated species richness." (Author) *Miniargiolestes minimus* (Tillyard, 1908), *Austrogomphus collaris* Hagen in Selys, 1854, *Austroaeschna anacantha* Tillyard 1908, *Procordulia affinis* (Selys 1871), *Austrosynthemis cyanitincta* (Tillyard, 1908)] Address: Horwitz, P., Institution Dep. Environmental Management, Edith Cowan Univ., Joondalup Drive, Joondalup, WA 6027, Australia

1212. **Hudoklin, A.; Sovinc, A. (1997):** New life for deserted clay pits. *Proteus*, Ljubljana 60(3): 104-110. (in Slovene with English summary). ["The life of man-made biotopes, such as clay and gravel pits, is usually brief. Most frequently they end as waste dumps, eventually to be buried; under the best of circumstances they become ponds for intensive aquaculture. Only rarely are secondary biotopes returned to nature. Just this is now happening at Zalog by Novo Mesto, where re-introduction of plants and animals is leading to an exceptional site. We are attempting to maintain it as a secondary biotope after restoration." (Authors) *Lestes sponsa*, *L. dryas*, *L. virens*, *Aeshna mixta*, *Sympetrum fonscolombii*, *S. striolatum*, and *S. sanguineum* are listed for the locality.] Address: Solvinc, A., Vodnogospodarski institut, PP 3401, Hajdrihova 28, SI-1115 Ljubljana, Slovenia

1213. **Iwasaki, K.; Otsuka, T.; Nakayama, K. (1997):** Middle- and large-sized aquatic animal assemblages associated with submerged riparian plants in the Kamo River, Kyoto. *Japanese Journal of Limnology*. 58(3): 277-291. (in Japanese with English summary). ["Middle- and large-sized aquatic animal assemblages associated with the submersed leaves, stems and roots of the reed *Phragmites japonica* and other riparian plants were studied in the Kamo River, Kyoto with a focus on the faunal differences in both longitudinal and seasonal distribution. At the upper and middle sites, mayfly larvae inhabiting slow riffles and shallow pools were dominant in winter and spring. Several lentic hemipteran insect species such as water scorpions and back swimmers associated chiefly with hydrophytes in ponds and marshes were also found in summer or autumn within the stands of monocotyledonous plants on the wide gravel bar of the middle site. At the lower site within the Kyoto city limits, water slaters, leeches and snails were abundant from spring through autumn. In addition, many larvae of calopterygid and coenagrionid dragonflies were collected in spring and summer, respectively. Juvenile fishes of dark chub and lizard go-



by were abundant in summer and autumn at all three sites. Riparian plants were thus suggested to increase species diversity of lotic fauna, providing habitats not only for lotic invertebrates but also for lentic insects and juvenile fishes." (Authors)] Address: Iwasaki, K., Inst. Natural Sci., Nara Univ., 1500 Misasagi-chou, Nara 631, Japan

1214. **Jacob, J.; Raab, G.; Hoppe, U. (1997):** Surface lipids of the silverfish (*Lepisma saccharina* L.). *Zeitschrift für Naturforschung (C)* 52(1-2): 109-113. (in English). ["Surface lipids obtained from the silverfish by short-term solvent extraction contain aliphatic hydrocarbons, monoester waxes, cholesteryl esters, triglycerides, free cholesterol, and free fatty acids. [...] The cuticular lipid composition of silverfish resembles that of other more primitive arthropod forms such as stoneflies and dragonflies." (Authors)] Address: Jacob, J., Biochemisches Institut Umweltcarcinogene, Lurup 4, D-22927 Grosshansdorf, Germany

1215. **Kasuya, E.; Edanami, K.; Ohno, I. (1997):** Selection and reproductive success in males of the dragonfly *Orthetrum japonicum* (Odonata: Libellulidae). *Res. popul. ecol.* 39(2): 113-119. (in English). ["Reproductive success, copulation success, and mating success were measured for a population of male dragonflies, *Orthetrum japonicum*. Copulation success explained the greatest variation in reproductive success. The proportion of copulations followed by oviposition was positively correlated with the number of oviposited eggs per mating. Directional selection on four morphological characters was estimated. The effect of selection on correlated traits was comparable to that of direct selection. Directional selection varied between traits and between episodes in a single trait. The probability that the observed directional selection on the four morphological traits was expected under the condition of the selective neutrality of traits was not smaller than 5%." (Authors)] Address: Kasuya, E., Dep. Biol., Fac. Sci., Kyushu Univ., 812-81 Fukuoka Japan

1216. **Kim, T. H. (1997):** A proposal for protection of *Nannophya pygmaea* Rambur (Odonata) and its habitat in Korea. *Korean Journal of Applied Entomology* 36(3): 283-285. (in Korean). [*N. pygmaea* was found breeding at an altitude of 940m, Mt. Chiri, Republic of Korea. The species is strictly limited to bogs at high altitudes, therefore necessary protection measures for the species and its habitat are proposed.] Address: Kim Tae Heung, Fac. Biol. Resources Sci., Coll. Agric., KIBIO, Chonbuk Natl. Univ., Chonju 561-756, Chonbuk, South Korea

1217. **Land, M.F. (1997):** The resolution of insect compound eyes. *Israel Journal of Plant Sciences* 45(2): 79-91. (in English). ["The spatial resolution of compound eyes is determined by their interommatidial angles, by the optical quality and rhabdom dimensions of the ommatidia, and by illumination level. Among insects, interommatidial angles vary from tens of degrees in Apterygota, to as little as 0.24 degree in dragonflies. Resolution better than this is not attainable in compound eyes of realistic size, because of the limit imposed by diffraction. The smaller the interommatidial angle, the greater the distance at which objects-prey, predators, foliage, or flowers-can be resolved. Insects with different lifestyles have contrasting patterns of interommatidial angle distribution, related to forward flight, capture on the wing, and predation on horizontal surfa-

ces." (Author)] Address: Land, M.F., School Biol. Sci., Univ. Sussex, Brighton BN1 9QG, UK

1218. **Larson, D. (1997):** Habitat and community patterns of tropical Australian hydradephagan water beetles (Coleoptera: Dytiscidae, Gyrinidae, Noteridae). *Australian Journal of Entomology* 36(3): 269-285. (in English). [A study was undertaken to describe patterns of water beetle co-occurrence in a tropical environment and to compare these with water beetle community structure in temperate regions. Dytiscidae, Noteridae, and Gyrinidae were sampled quantitatively and qualitatively from a variety of habitats in the Atherton Tableland region of tropical Queensland from September 1990 to February 1991. [...] Quantitative samples from rice fields and a temporary pond demonstrated that a suite of species were quick to colonize and breed in newly formed habitat. Many of these species breed before other predators such as fish or Odonata become established."] Address: Larson, D., Institution Dep. Biol., Memorial Univ., St. John's, Newfoundland A1B 3X9, Canada

1219. **Lasswell, J.L.; Mitchell, F.L. (1997):** Survey of dragonflies (Odonata: Anisoptera) in ponds of central Texas. *Journal of the Kansas Entomological Society* 70 (1): 52-63. (in English). [Anisoptera "were collected for five quarters, from October 1994 through December 1995, from 12 ponds located in Erath County, Texas. Nymphs were collected from each of the ponds quarterly, while adults were taken whenever possible. Other collection records from Erath County are also noted. A total of 38 dragonfly species were identified. Nymphs of 28 species were collected from the ponds, while the remaining 10 species were determined from adult collections. Thirty-six species of adults were collected. Two species were found as nymphs, but not collected as adults. Peak dragonfly abundance in ponds occurred during the third quarter - July through September." (Authors)] Address: Lasswell, J.L., Institution Texas Agric. Exp. Stn., Route 2 Box 00, Stephenville, TX 76401, USA.

1220. **Laurila, A.; Kujasalo, J.; Ranta, E. (1997):** Different antipredator behaviour in two anuran tadpoles: effects of predator diet. *Behav. Ecol. Sociobiol.* 40(5): 329-336. (in English). ["Recent investigations have indicated that animals are able to use chemical cues of predators to assess the magnitude of predation risk. One possible of such cues is predator diet. Chemical cues may also be important in the development of antipredator behaviour, especially in animals that possess chemical alarm substances. Tadpoles of the common toad (*Bufo bufo*) are unpalatable to most vertebrate predators and have an alarm substance. Tadpoles of the common frog (*Rana temporaria*) lack both these characters. We experimentally studied how predator diet, previous experience of predators and body size affect antipredator behaviour in these two tadpole species. Late-instar larvae of the dragonfly *Aeshna juncea* were used as predators. The dragonfly larvae were fed a diet exclusively of insects, *R. temporaria* tadpoles or *B. bufo* tadpoles. *R. temporaria* tadpoles modified their behaviour according to the perceived predation risk. Depending on predator diet, the tadpoles responded with weak antipredatory behaviour (triggered by insect-fed predators) or strong behaviour (triggered by tadpole-fed predators) with distinct spatial avoidance and lowered activity level. The behaviour of *B. bufo* in predator diet treatments was indistinguishable from that in the control

treatment. This lack of antipredator behaviour is probably related to the effective post-encounter defenses and more intense competitive regime experienced by *B. bufo*. The behaviour of both tadpole species was dependent on body size, but this was not related to predator treatments. Our results also indicate that antipredator behaviour is largely innate in tadpoles of both species and is not modified by a brief exposure to predators." (Authors)] Address: Laurila, A., Integrative Ecol. Unit, Div. Population Biol., Dep. Ecol. Systematics, P.O. Box 17, FIN-00014 Univ. Helsinki, Finland

1221. **Liebherr, J.K.; Polhemus, D.A. (1997):** Comparison to the century before: the legacy of R.C.L. Perkins and Fauna hawaiiensis as the basis for a long-term ecological monitoring program. *Pacif. Sci.* 51(4): 490-504. (in English). ["As one means of assessing the impact of the past 100 yr of development and biological alteration in Hawai'i, the damselfly (Odonata: Coenagrionidae) and carabid beetle (Coleoptera: Carabidae) collections of R. C. L. Perkins made in the 1890s are compared with similar collections made one century later during the 1990s. Two islands that have experienced very different histories of development are compared: O'ahu and Moloka'i. Of eight native damselfly species originally inhabiting O'ahu, one has been extirpated from the island, another is now reduced to a single population, and three more are at risk. Of the eight species originally found on Moloka'i, by contrast, there is only one species that has not been rediscovered, although there is reasonable probability that it has simply eluded capture because of inherent rarity, whereas the remaining species retain large and stable populations. Capture frequencies (based on specimens collected per decade) are lower now than in the preceding century for most species on O'ahu, even allowing for modern collectors retaining fewer specimens. The only species on O'ahu for which captures have increased between the 1890s and the 1990s are those that breed away from lotic and lentic habitats, indicating a severe negative impact from introduced aquatic biota for species that breed in such freshwater situations. On Moloka'i, all damselfly species except one have higher capture rates now than in the 1890s, explainable in large part to improved access to previously remote terrain. [...]. "(Authors)] Address: Liebherr, J.K., Dep. Entomol., Comstock Hall, Cornell Univ., Ithaca, NY 14853-0901, USA

1222. **Limbert, M. (1997):** The white-faced dragonfly *Leucorrhinia dubia* (Vander L.) on Thorne Moors. *Naturalist* (Doncaster). 122(1022): 88-92. (in English). Address: Limbert, M., Mus. and Art Gallery, Chequer Road, Doncaster DN1 2AE, UK

1223. **Lockwood, J.L.; Fenn, K.H.; Curnutt, J.L.; Rosenthal, D.; Balent, K.L.; Mayer, A.L. (1997):** A Life history of the endangered Cape Sable Seaside Sparrow. *Wilson Bulletin* 109(4): 720-731. (in English). ["Cape Sable Seaside Sparrows (*Ammodramus maritimus mirabilis*) breeding within eastern Everglades National Park were philopatric and moved only short distances between clutches. Incubation required 12 days, nestlings fledged at 9.2 days, and fledgling care ranged from eight to 20 days. The total nest cycle encompassed 34-44 days. Nestlings were fed spiders and insects, primarily Orthoptera, Lepidoptera, and Odonata. Diet varied between years and study sites. With the onset of summer rains, predation rate increased, and nest success decreased. Breeding activity diminished through-

hout June, coinciding with rising water in nest areas. Our results indicated that the lack of breeding habitat and the onset of summer flooding limit the breeding potential of Cape Sable Seaside Sparrows."(Authors)] Address: Lockwood, Julie, Dep. Ecol. and Evol. Biol., Univ. Tenn., Knoxville, TN 37996, USA

1224. **Martin, R.; Pibernat, J. (1997):** Dos nuevas citas de *Ischnura graellsii* (Rambur 1842) en la provincia de Gerona. *Navasia* 6: 3-5. (in Spanish). [*I. graellsii* - rare in the Province Gerona, Spain - was sympatric with *I. elegans* in 1994 and 1995.] Address: Martin, R., Avda Martí Pujol 250, 3' 4a, ES-08911 Badalona, Barcelona, Spain

1225. **Müller, J. (1997):** "FFH-Libellen". *Pedemontanum*, Magdeburg 1: 2-3. (in German). [The odonate species of the FFH-Directive of the European Union occurring in Sachsen-Anhalt are listed; these species should be surveyed with priority] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de

1226. **Müller, J. (1997):** Asiatische Keiljungfer *Stylurus flavipes* (Needham, 1897) oder *Gomphus flavipes* (Charpentier, 1825)?. *Pedemontanum*, Magdeburg 1: 2. (in German). [Some taxonomic annotations to *S. flavipes*] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de

1227. **Müller, J. (1997):** Editorial zum Mitteilungsblatt der AG Odonatenfauna Sachsen-Anhalt der Entomologen-Vereinigung Sachsen-Anhalt e.V. "pedemontanum". *Pedemontanum*, Magdeburg 1: 1. (in German). [Outline of the development and the tasks of the working group Odonata within the Association to the Entomologists of Sachsen-Anhalt, and some remarks on the name of the leaflet "pedemontanum"] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de

1228. **Müller, J. (1997):** Kleine Königslibelle *Anax parthenope* (Selys, 1839). *Pedemontanum*, Magdeburg 1: 2. (in German). [Short note on the most recent distribution patterns of *A. parthenope* in Sachsen-Anhalt and the bordering Federal State Niedersachsen, Germany] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de

1229. **Müller, J. (1997):** Literatur: Odonatenfauna Sachsens-Anhalts. *Pedemontanum*, Magdeburg 1: 3-4. (in German). [27 odonatological titles covering 1993-1996 are listed] Address: Müller, J., Frankefelde 3, D-39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de

1230. **Müller, J. (1997):** Südliche Mosaikjungfer *Aeshna affinis* Vander Linden, 1820. *Pedemontanum*, Magdeburg 1: 2. (in German). [The 1995 invasion of *A. affinis* to Sachsen-Anhalt, Germany seems to have been successful; in 1996 the species could be observed on several habitats discovered in 1995] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de

1231. **Nel, A.; Arillo, A.; Ortuno, V.M. (1997):** New Western Palaearctic Cenozoic Odonata (Zygoptera and Anisoptera). *Bull. soc. ent. Fr.* 102(3): 265-270. (in French with English summary). [Five new Cenozoic Odonata are described or revised from Spain and France, including a new *Coenagrionoidea*, *Hispanocoenagrion inexpectum* n. gen., n. sp.] Address: Nel, A.,

Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

1232. **Niedringhaus, R. (1997):** Die Limnofauna (Mollusken, Libellen, Köcherfliegen, Wasserkäfer, Wasservanzen) eines durch Ausbau und Agrarnutzung stark gestörten Gewässersystems in Nordwestdeutschland. Abh. westf. Mus. Naturkunde 59(4): 209-236. (in German). [In the framework of a project to restore an intensively used agricultural landscape situated near the town of Lingen, Niedersachsen, Germany, the limnofauna - including Odonata - of a system of ditches and further water bodies was studied. Between 1989 and 1994 24 odonate species were recorded. The abundance and reproductive status of the species for each of the water bodies is presented in a tab. Most characteristic species are Calopteryx splendens, Lestes sponsa, Chaloclestes viridis, Coenagrion puella, Aeshna cyanea, and Libellula depressa. Pyrrhosoma nympha and Ischnura elegans are the dominant species of the periodic water bodies.] Address: Niedringhaus, R., Carl-von-Ossietzky-Universität Oldenburg, Fachbereich Biologie, Postfach 2503, D-26111 Oldenburg, Germany

1233. **Novelo Gutiérrez, R. (1997):** Clave para la determinación de familias y géneros de las náyades de odonata de Mexico. Parte I. Zygoptera. Dugesiana 4(1): 1-10. (in Spanish). [Illustrated key to the families and genera of the larval stages of the Mexican zygopteran Odonata] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@sun.ieco.conacyt.mx

1234. **Novelo-Gutiérrez, R. (1997):** Clave para la determinación de familias y géneros de las náyades de odonata de Mexico. Parte II. Anisoptera. Dugesiana 4(2): 31-40. (in Spanish). [Illustrated key to the families and genera of the larval stages of the Mexican anisopteran Odonata] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@sun.ieco.conacyt.mx

1235. **Novelo-Gutierrez, R. (1997):** Primer registro de la familia Pseudostigmatitae (Odonata: Zygoptera) para el estado de Morelos, Mexico. Folia ent. mex. 96 (1996): 109-110. (in Spanish). [On 24-10-1996 Mecistogaster ornata was caught along Río Sabinos in the Jardins de Xochitepec, town of Xochitepec, Mexico] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico

1236. **Orr, A.G.; Cranston, P.S. (1997):** Hitchhiker or parasite? A ceratopogonid midge and its odonate host. J. nat. hist. 31: 1849-1858. (in English). ["The ceratopogonid genus Forcipomyia Meijyen (Diptera: Ceratopogonidae) contains species with a wide range of adult biologies. Species of the subgenus Pterobosca Macfie are phoretic and apparently parasitic on the wing veins of other insects, notably odonates and sometimes lacewings. We describe F. (Pterobosca) debenhamae from Brunei as new to science, taking the authorship of Cranston, tabulate the morphological diversity of the subgenus, and speculate on the phylogeny. The behaviour of adult female midges, which have been found only upon the thorax of hosts predominantly of Libella-

go hyalina (Odonata: Chlorocyphidae), appears to deleteriously impact on the quality and duration of territory holding of the host. The lack of any confirmation of host feeding leads us to speculate on the nature of the association." (Authors)] Address: Cranston, P.S., Biol. Dep., Univ. Brunei Darussalam, Bandar Seri Begawan, Negara, Brunei

1237. **Ottvall, R. (1997):** The dragonflies Hemianax ephippiger and Sympetrum fonscolombei (Odonata: Aeshnidae and Libellulidae) found on the Baltic island of Oland. Entomologisk Tidskrift, Stockholm 118(4): 193-196. (in Swedish with English summary). [The first Swedish records of the dragonflies Anax ephippiger and Sympetrum fonscolombii are reported. Three males and 3 females of A. ephippiger "were accidentally caught in a trap designed for migrating birds at Ottenby Bird Observatory at the southern point of the Baltic island of Oland, June 25 and 26 1995. This record of several individuals, and reports of unusual occurrences in central Europe, suggests an "invasion" reaching at least as far north as the Baltic Sea region. Warm, easterly winds in late May probably carried the dragonflies to Sweden. It is probable that during the unusually hot summer, the species was breeding in Sweden and larval development may have succeeded to emergence. In the same trap 3 males and 1 female of S. fonscolombii were trapped between July 7 and 21 1997. Extremely warm and moist air with high temperatures in southern Sweden in early July could explain the occurrence which is the first record of this species in Scandinavia."] Address: Ottvall, R., Ottoson, Dag Hammarskjolds vag 5G, S-224 64, Lund, Sweden

1238. **Papazin, M. (1997):** Anomalie morphologique à caractère gyandromorphique chez Gynacantha kirbyi Krüger, 1898 (Odonata, Aeshnidae). Bull. soc. ent. Fr. 102(2): 103-108. (in French with English summary). [Some general annotations of gynandromorphism on Odonata are presented; the female specimen of G. kirbyi has oreillets on the second abdominal segment similar to the male ones.] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France

1239. **Peacor, S.D.; Werner, E.E. (1997):** Trait-mediated indirect interactions in a simple aquatic food web. Ecology 78(4): 1146-1156. (in English). ["This investigation examines the role of trait-mediated indirect interactions in a simple aquatic food web. We conducted the experiments in cattle watering tanks in order to establish whether competitive and predator-prey interactions between two species are affected by other species in the system; i.e., are pairwise interaction strengths affected by the background species assemblage? We examined the survival and growth response of small bullfrog (Rana catesbeiana) and small green frog (Rana clamitans) tadpoles in the presence and absence of a competitor (large bullfrogs), the lethal presence of the larval odonate predator Tramea lacerata, and the nonlethal (caged) presence of the larval odonate predators Anax junius and Anax longipes. We demonstrate that large bullfrog competitors and caged Anax affect traits (foraging activity level) of small bullfrog and small green frog tadpoles and that these changes in traits, in turn, affect interactions of the small tadpole species with each other and with the other species. In particular, the following four trait-mediated indirect interactions were evident: (1) Presence of large bullfrog competitors increased the predation rate of



Traumea on small green frogs and small bullfrogs. (2) Presence of nonlethal Anax reduced the predation rate of Traumea on small green frogs. (3) Presence of nonlethal Anax increased the competitive advantage of bullfrogs over green frogs. (4) Presence of nonlethal Anax facilitated midge invasion of the experimental units. The proposed mechanisms (changes in small tadpole activity) involved in these trait-mediated indirect interactions were supported by observational data on tadpole activity and levels in the experimental units, and in laboratory experiments examining tadpole activity responses to predators. The occurrence of strong trait-mediated indirect interactions in this simple food web underscores the potential importance of such interactions in animal communities." (Authors)] Address: Werner, E.E., Dep. Biol., Univ. Michigan, Ann Arbor, MI 48109, USA

1240. **Richter, B.D.; Braun, D.P.; Mendelson, M.A.; Master, L.L. (1997):** Threats to imperiled freshwater fauna. *Conservation Biology* 11(5): 1081-1093. (in English). ["Threats to imperiled freshwater fauna in the U.S. were assessed through an experts survey addressing anthropogenic stressors and their sources. Specifically, causes of historic declines and current limits to recovery were identified for 135 imperiled freshwater species of fishes, crayfishes, dragonflies and damselflies, mussels, and amphibians. The survey was designed to identify threats with sufficient specificity to inform remanagers and regulators faced with translating information about predominant biological threats into specific, responsive actions. The findings point to altered sediment loads and nutrient inputs from agricultural nonpoint pollution; interference from exotic species; and altered hydrologic regimes associated with impoundment operations as the three leading threats nationwide, accompanied by many lesser but still significant threats. Variations in threats among regions and among taxa were also evident. Eastern species are most commonly affected by altered sediment loads from agricultural activities, exotic species, habitat removal/damage, and altered hydrologic regimes predominate in the West. Altered sediment loading from agricultural activities and exotic species are dominant problems for both eastern mussels and fishes. However, eastern fishes also appear to be suffering from municipal nonpoint pollution (nutrients and sediments), whereas eastern mussels appear to be more severely affected by altered nutrient impacts from hydroelectric impoundments and agricultural runoff. Our findings suggest that control of nonpoint pollution associated with agriculture activities should be a very high priority for agricultural producers and governmental support programs. Additionally, the large number of hydropower dams in the US. subject to federal re-licensing in coming years suggests a significant opportunity to restore natural hydrologic regimes in the affected rivers." (Authors)] Address: Richter, B.D., Biohydrology Program, Nature Conservancy, P.O. Box 430, Hayden, CO 816399, USA

1241. **Rödel, M.-O.; Lensenmair, K.E. (1997):** Predator-induced swarms in the tadpoles of an African savanna frog, *Phrynomantis microps*. *Ethology* 103(11): 902-914. ["Aggregations in tadpoles of the West African savanna frog *Phrynomantis microps* were often observed in their breeding ponds in our study area, situated in Comoe National Park, Ivory Coast. Experiments under seminatural conditions demonstrated that this be-

haviour was only shown while predators were present. The tadpoles reacted differently to different predators. Factors inducing swarm behaviour were optical (the predator) and/or chemical (liquid from injured tadpoles). Alarm substances are not species-specific. Kinship seems not to play a role in swarm formation." (Author). Odonate predators tested are *Traumea basilaris*, *Pantala flavescens*, and *Anax imperator*. Swarm formation was induced solely via visual stimuli, for odonate larvae with their labium amputated induced swarm formation as well. "... Our results showed that swarms considerably outlived the removal of predators (*Traumea*). In 160 controls during 50 h following the removal of the predator we found 41 swarms in those containers where the dragonfly larvae had successfully hunted and 19 swarms in those with dragonfly larvae with amputated labium. Median duration of swarm persistence was 6 h when predation had really happened and 1 h in those trials with manipulated dragonfly larvae. In both cases however, the range of swarm persistence duration was 1-48h after the removal of the predators. Thus differences between the two experiments were not significant. After 50 h all swarms had dissolved."] Address: Rödel, M.-O., Lehrstuhl Tierökologie, Theodor-Boveri-Inst. Biowissenschaften, Am Hubland, D-97074 Würzburg, Germany. E-mail: roedel@biozentrum.uni-wuerzburg.de

1242. **Rogelio, D.-L.; Rodriguez, M.H.; Arrendondo-Jimenez, J.I.; Hernandez-Avila, M.; Mallorca, C. (1997):** Aquatic insects associated with *Anopheles albimanus* (Diptera: Culicidae) breeding sites in southern Mexico. *Environmental Entomology* 26(4): 828-838. (in English). ["Aquatic Coleoptera, Hemiptera, and Odonata associated with *Anopheles albimanus* Wiedemann larval habitats (defined by dominant plant vegetation) were investigated in various hydrological types along the coastal plain of southern Chiapas, Mexico. Aquatic insects were sampled by manual dragging nets, and mosquito larvae were sampled with standard dippers. Aquatic Coleoptera were the most abundant and diverse group, represented by 20 genera, followed by Hemiptera and Odonata, each with 16 genera. Aquatic insects were more abundant in permanent and temporary lagoons in *Hymenachne amplexicaulis* (Rudge) Nees and *Lippia nodosa* (L.) Michx. habitats, whereas mosquito larvae were most abundant in *Ceratophyllum demersum* L. and *Crinum erubescens* Soland. habitats, where aquatic insects were moderately abundant. Significant association in regression models with the addition of quadratic terms were found in aquatic Coleoptera and Odonata with respect to mosquito larvae. However, adjusted models that included environmental parameters proved these associations to be nonsignificant." (Authors)] Address: Danis-Lozano, R., Centro Investigacion Paludismo, Inst. Nac. Salud Publica, P.O. Box 537, Tapachula, Chiapas 30700, Mexico

1243. **Rolff, J.; Martens, A. (1997):** Completing the life cycle detachment of an aquatic parasite (*Arrenurus cuspidator*, Hydrachnellae) from an aerial host (*Coenagrion puella*, Odonata). *Canadian Journal of Zoology* 75(4): 655-659. (in English). ["Water mites are very important parasites of aerial stages of aquatic insects. Their larvae parasitize semiaquatic hosts and must detach while the host is in a suitable habitat for reproduction of parasite and host. Therefore, water mites should respond to stimuli indicating this situation. Different stimuli were tested experimentally in the host-parasite

system *Coenagrion puella* - *Arrenurus cuspidator* in outdoor cages; this method provides exact data on the initial intensity of mite larvae per host. It was found that mites detach during tandem oviposition by the host. The detachment rate does not correlate with the host's sex or with the intensity of mite larvae per host. Ectoparasitic water mites are apparently influenced by the host's condition because mites did not detach from dead hosts even in water. Proximity to water also seems to have an impact: mites exposed at a height of 10 mm above water detached, whereas mites exposed at 25 mm or higher did not. We suggest that detachment of mite larvae is triggered by a group of stimuli associated with the egg-deposition behaviour of the host." (Authors)] Address: Rolff, J., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

1244. **Sandberg, E. (1997):** Benthic predator-prey relationships and abiotic stress. The effects of physical disturbance and oxygen deficiency. *Acta Academiae Aboensis Ser. B Mathematica et Physica - Matematik Naturvetenskaper Teknik* 56(2): 1-42. (in English). ["Potential competition for food between predators of different ecological origin in the Baltic Sea was evident as the marine isopod, *Saduria entomon* (L.), and the limnic dragonfly larva, *Libellula quadrimaculata* (L.), exhibited similar prey choice and similar predation efficiency in a series of aquarium experiments. Despite the potential for the predators to affect a specific prey population no effect on the total community was seen in a field enclosure experiment. To examine these contradictory results from aquarium and field experiments the relative importance of direct predation, sediment stability (sediment resuspension) and sediment quality (sand and mud) was studied separately and combined using *S. entomon* as predator and juvenile bivalves, *Macoma balthica* (L.) as prey. Direct predation, sediment stability and quality had little effect on the survival of juvenile clams. The combined effect of these factors significantly increased the mortality of the clams as the combination of predation and sediment resuspension demonstrated synergistic negative effects on *M. balthica* survival. [...] As a secondary effect of eutrophication, the risk for exposure to oxygen deficiency (hypoxia) of benthic communities is increasing and important biotic couplings might be altered. [...] These results show that important structuring functions, such as predator-prey interactions, are altered already at sublethal oxygen levels, which consequently affect the benthic community structure before the system shows numerical signs of changes beyond background variation." (Author)] Address: Sandberg, Eva, Kaskisgatan 2 C 14, FIN-20700 Abo Finland

1245. **Sandhu, R.; Walia, G.K. (1997):** Chromosome analysis of *Ischnura inarmata* (Coenagrionidae: Zygoptera: Odonata). *Chromosome Science* 1(2-3): 115-116. (in English). ["The results of chromosomal studies on a cytogenetically new species *Ischnura inarmata* have been described and illustrated. These include behaviour of chromosomes in cell cycle, chromosome number, karyotype and m: X ratio. The karyological description of this species is  $2n = 27$  m with XO sex determining mechanism." (Author)] Address: Sandhu, R., Dep. Zool., Punjabi Univ., Patiala-147 002, Punjab, India

1246. **Sarkar, N.K. (1997):** Observations of three new and one known species of cephaline gregarines (Apicomplexa: Sporozoa: Eugregarinida: Septatina) from

the odonates of Mahananda Forest, West Bengal, India. *Archiv für Protistenkunde* 148(1-2): 209-213. (in English). ["Three new species of actinogregarid gregarines (Apicomplexa: Sporozoa: Eugregarinida: Septatina), *Actinocephalus longus* sp. n., *Mukundaella vananus* sp. n. and *Odonaticola truncatus* sp.n. from the midguts of *Enallagma pervum* Selys [???], *Onychargia atrocyana* Selys, and *Pseudagrion decorum* Rambur respectively, are described. One known species, *Hoshidea polyhamatus* (Hoshide, 1977) Sarkar, 1995 is reported from a new locality, i.e. the Mahananda Forest of West Bengal, India." (Author)] Address: Sarkar, N.K., Institution Dep. Zool., Rishi Bankim Chandra Coll., Naihati 743165, West Bengal, India

1247. **Sauman, V.F.S. (1997):** Immunohistochemistry of the products of male accessory glands in several hemimetabolous insects and the control of their secretion in *Pyrrhocoris apterus* (Heteroptera: Pyrrhocoridae). *European Journal of Entomology* 94(3): 349-360. (in English). ["Three antibodies against secretions of the male accessory glands of *Tenebrio molitor* react with specific regions of the male reproductive system in a damselfly, cockroach, cricket and the bug *Pyrrhocoris apterus*. [...]"] (Author)] Address: Sauman, V., Inst. Entomol., Acad. Sci., Fac. Biol. Sci., Univ. South Bohemia, Branisovska 31, 370 05 Ceske Budejovice, Czech Republic

1248. **Scheuhammer, A.M.; McNicol, D.K.; Mallory, M.L.; Kerekes, J J. (1997):** Relationships between lake chemistry and calcium and trace metal concentrations of aquatic invertebrates eaten by breeding insectivorous waterfowl. *Environmental Pollution* 96(2): 235-247. (in English). ["Ca, P, Al, and trace metal (Cu, Ni, Zn, Cd, and Pb) concentrations were measured in several aquatic invertebrate taxa used as food by breeding insectivorous waterfowl, sampled from three sites in eastern Canada with widely varying water chemistry. Ca concentrations were highest in molluscs (snails and clams), averaging 200-300mg g<sup>-1</sup> (shells included). Aquatic insects of varying sizes, life stages and habits (caddisfly larvae, dragonfly larvae, adult backswimmers, waterstriders, and whirligig beetles) had much lower mean Ca concentrations, ranging from about 0.6 mg g<sup>-1</sup> (beetles) to 1.8 mg g<sup>-1</sup> (caddisflies). Invertebrate-Ca concentrations decreased with increasing body mass for several taxa with smaller and larger individuals providing similar absolute amounts of Ca. Ca concentrations in most aquatic insects (but not molluscs) were reduced under acidic, low Ca, high Al, low dissolved organic carbon (DOC) and/or low total phosphorus (TP) conditions. In stepwise multiple regressions, pH was consistently the main factor explaining variability in invertebrate-Ca, after controlling for the negative relationship between invertebrate-Ca and body mass for some taxa. Molluscs were absent from lakes below pH 5.3. In general, concentrations of P and metals in invertebrate taxa were not significantly correlated with lake pH. Levels of Al, Cd, or Pb were not sufficiently high to be considered toxic to potential consumers of these organisms. For waterfowl and other birds breeding in acid-stressed habitats and relying on aquatic invertebrates as a of food, a reduced availability of dietary Ca is more likely than an increased exposure to toxic metals to negatively affect reproductive success, especially when other adverse effects of acidification (lower diversity of prey) are considered." (Authors)] Address: Scheuhammer, A.M., Canadian Wildlife Serv., Natl.

Wildlife Res. Cent., 100 Gamelin Blvd., Hull, Quebec K1A 0H3 Canada

1249. **Skevington, J.; Carmichael, I. (1997):** Dragonflies and damselflies (Odonata) of Bosanquet (North Lambton County, Ontario). *Proceedings of the Entomological Society of Ontario* 128: 3-12. (in English). ["The odonate fauna of Bosanquet (North Lambton County, Ontario) is surveyed. Sixty-two species of Odonata are recorded for Bosanquet, bringing the Lambton County odonate total to 66 species. Thirty-five species are added as new to Lambton County. *Enallagma travium* is new to Canada and the record of *Enallagma basidens* signifies that this species is continuing to expand its range northward. *Pachydiplax longipennis* is discovered on the Lake Huron shoreline for the first time, away from its regular haunts along Lakes Erie and Ontario. *Libellula quadrimaculata* and *Nannothemis bella* were recorded in Lambton County by Walker and Corbet (1973) but were not discovered in our study. They are presumed to be extirpated." (Authors)] Address: Skevington, J.; Dep. Entomol., Univ. Queensland, Brisbane, QLD 4072, Australia

1250. **Switzer, P.V. (1997):** Past reproductive success affects future habitat selection. *Behavioral Ecology & Sociobiology* 40(5): 307-312. (in English). ["Correlational studies have shown that an individual's past reproductive success often increases its breeding site fidelity (i.e., the tendency to return to a previously occupied location), suggesting that individuals use their reproductive experience to assess habitat quality. However, the causality of the relationship between reproductive success and site fidelity is still uncertain. In a field experiment, the effect of mating success on site fidelity was isolated from potential confounding variables in a territorial dragonfly, the eastern amberwing (*Perithemis tenera*). The experiment controlled for site quality, intrinsic characteristics of males, previous territorial experience at the site, arrival order, and territorial evictions. Males that were prevented from mating were much more likely to change sites the following day than control males that were allowed to mate. This result was not affected by age, the amount of time a male spent on the site, or mortality. These results imply that individuals use their own reproductive success to assess the quality of the habitat. The benefit to an individual of using its reproductive success to determine habitat quality is discussed relative to other sources of information." (Author)] Address: Switzer, P.V., Eastern Illinois Univ., Dept Biol, Sci., Charleston IL 61920; Usa. E-mail: cfpvs@eiu.edu

1251. **Thorp, A.G.; Jones, R.C.; Kelso, D.P. (1997):** A comparison of water-column macroinvertebrate communities in beds of differing submersed aquatic vegetation in the tidal freshwater Potomac River. *Estuaries* 20(1): 86-95. (in English). ["Macroinvertebrates are a major food for fish species and macrophyte beds are hypothesized to harbor a rich community of these organisms. Macroinvertebrates inhabiting the water column in two macrophyte beds and an adjacent open area were sampled in a small embayment of the tidal freshwater Potomac River. One macrophyte bed consisted of an almost complete monoculture of *Hydrilla verticillata*, while the second community was a more diverse mixture of plant species. In samples with substantial amounts of submersed aquatic vegetation (SAV), macroinvertebrate density was two orders of magnitude higher than and substantially more taxa were found than at the

open water site. Total macroinvertebrate abundance was significantly greater at the *H. verticillata* site than at the mixed site in July, but no significant difference was observed in August. Taxa richness did not vary between the two vegetated sites in July but was higher in the mixed bed in August. While the two vegetated sites shared similar taxa, they differed in their abundance. The *H. verticillata* site harbored more hydrobiid snails, and the mixed site was characterized by more chironomids and hydroptilid caddisflies. Differences between July and August collections were even greater than between sites. Numbers of hydroptilid caddisflies, baetid mayflies, and coenagrionid damselflies were substantially higher in August, while oligochaetes, hydrobiids, and chironomids were reduced. Results support the hypothesis that water-column macroinvertebrates are greatly enhanced in the presence of macrophytes. The ecological significance of the less substantial differences in macroinvertebrates between macrophyte beds requires further study." (Authors)] Address: Jones, R.C., Dep. Biol., George Mason Univ., 4400 University Dr., Fairfax, VA 22030, USA

1252. **Tsubaki, Y.; Hooper, R.E.; Siva-Jothy, M.T. (1997):** Differences in adult and reproductive lifespan in two male forms of *Mnais pruinosa costalis* Selys (Odonata: Calopterygidae). *Researches on Population Ecology* 39(2): 149-155. (in English). [Males of *Mnais pruinosa costalis* are dimorphic, existing as clear-winged - non-territorial 'sneakers'- and orange-winged territorial 'fighters'. "Here we report the results of population census data and behavioural observations in the field and laboratory, and present estimates of emergence period, reproductive period, total lifespan, and reproductive success of each morph. Clear-winged males are smaller and have lower daily reproductive success than orange-winged males, but live for longer in the field and laboratory. We accounted for the difference in the 'operational reproductive life' of the two morphs and estimated lifetime reproductive success: there was no difference between clear-winged and orange-winged males. We discuss possible mechanisms for the maintenance of the two forms." (Authors)] Address: Siva-Jothy, M.T., Department of Animal and Plant Sciences, University of Sheffield, Sheffield, S10 2TN, UK

1253. **Van Buskirk, J.; McCollum, S.A.; Werner, E.E. (1997):** Natural selection for environmentally induced phenotypes in tadpoles. *Evolution* 51(6): 1983-1992. (in English). ["Models suggest that phenotypic plasticity is maintained in situations where the optimal phenotype differs through time or space, so that selection acts in different directions in different environments. Some empirical work supports the general premise of this prediction because phenotypes induced by a particular environment sometimes perform better than other phenotypes when tested in that environment. We have extended these results by estimating the targets of selection in *Pseudacris triseriata* tadpoles in environments without predators and with larval *Anax* dragonflies. Tadpoles displayed significant behavioral and morphological plasticity when reared in the presence and absence of nonlethal dragonflies for 32 days in cattle tanks. We measured selection in the absence of free predators by regressing growth and survival in the tanks against activity and several measures of tail and body shape. We measured selection in the presence of predators by exposing groups of 10 tadpoles to *Anax* in overnight predation trials and regressing the average



phenotype of survivors against the number of tadpoles killed. Selection in the two environments acted in opposite directions on both tail and body shape, although the affected fitness components were different. In the presence of *Anax*, tadpoles with shallow and narrow body, deep tail fin, and wide tail muscle survived best. In the absence of free predators, tadpoles with narrow tail muscle grew significantly faster, and those with shallow tail fin and deep body grew somewhat faster. Activity was unrelated to survival or growth in either environment. Developmental plasticity in tail shape closely paralleled selection, because tail fin depth increased after long-term exposure to *Anax* and tail muscle width tended to increase. In contrast, there was no plasticity in body shape in spite of strong selection for decreasing body depth. Thus, when confronted with a dragonfly predator, *P. triseriata* tadpoles adjusted their tail shape (but not body shape) almost exactly in the direction of selection imposed by *Anax*. These results suggest that phenotypic plasticity in some morphological traits, such as tail depth and tail muscle width, has evolved under intermittent selection by dragonflies. Other traits that undergo selection by dragonflies, such as body morphology, appear developmentally rigid, perhaps because of historically strong opposing selection in nature or other constraints." (Authors)] Address: Van Buskirk, J., Inst. Zool., Univ. Zürich, CH-8057 Zürich Switzerland

1254. **Weiber, B.; Komnick, H. (1997):** Digestion of phosphatidylcholines, absorption and esterification of lipolytic products by *Aeshna cyanea* larvae as studied in vivo and in vitro. *Arch. Insect Biochem. Physiol.* 36(4): 273-293. (in English). ["Digestion and absorption of phosphatidylcholine by *Aeshna cyanea* larvae were studied in vivo and in vitro with the isolated digestive juice and isolated midgut. The experiments were performed with stable ether analogues (1-alkyl-2-acyl-1,2-dialkyl phosphatidylcholine, and 1-monoalkyl-lysophosphatidylcholine) with radioactive 1,2-diacylphosphatidylcholine alternatively labelled in the acyl- and choline moieties, and with several phosphatidylcholine derivatives (1-(1-<sup>14</sup>C)acyl- and 1-(3H)alkyl-lysophosphatidylcholine, (1-<sup>14</sup>C)oleic acid, (2-<sup>14</sup>C)glycerol, phosphoryl (methyl-<sup>14</sup>C)choline, and (methyl-<sup>14</sup>C)choline). Chromatographic analyses of the digestion products revealed that phosphatidylcholine was degraded via two interconnected hydrolytic pathways involving phospholipase C, phospholipase A2, lipase, and alkaline phosphatase. Complete hydrolysis by these pathways yielded the same four end products: free fatty acid, glycerol, choline, and Pi, which were absorbed by the midgut enterocytes. Of the intermediate hydrolysates, lysophosphatidylcholine, monoacylglycerol, and possibly phosphorylcholine were also absorbed. Radiolabelled oleic acid, glycerol, lysophosphatidylcholine and monoacylglycerol (as judged from monoalkylglycerol absorption) were incorporated into phospholipids and acylglycerols of the midgut enterocytes and were released into the haemolymph primarily in the form of diacylglycerols. In the case of glycerol ingestion, a small fraction of haemolymph radioactivity was associated with free glycerol and glycerolphosphate. After absorption by the enterocytes, radiolabelled choline was partly oxidized to betaine, partly phosphorylated, and partly incorporated into lyso- and phosphatidylcholine. It was recovered from the haemolymph predominantly as free choline, phosphorylcholine, and betaine." (Authors)] Address: Komnick, H., Univ. Bonn, Inst. Cell Biol., Ulrich-Haberland-Str. 61a, 53121 Bonn, Germany

1255. **Whiting, M.F.; Carpenter, J.C.; Wheeler, Q.D.; Wheeler, W.C. (1997):** The strepsiptera problem: Phylogeny of the holometabolous insect orders inferred from 18S and 28S ribosomal DNA sequences and morphology. *Systematic Biology* 46(1): 1-68. (in English). [Phylogenetic relationships among the holometabolous insect orders were inferred from cladistic analysis of nucleotide sequences of 18S ribosomal DNA (rDNA) (85 exemplars) and 28S rDNA (52 exemplars) and morphological characters. Odonata were used as out-group taxa.] Address: Whiting, M.F., Dep. Zool., M.L. Bean Life Sci. Museum, Brigham Young Univ., Provo, UT 84602 USA.

1256. **Wolf, L.L.; Waltz, E.C.; Klockowski, D.; Wakeley, K. (1997):** Influence on variation in territorial tenures of male white-faced dragonflies (*Leucorrhinia intacta*) (Odonata: Libellulidae). *Journal of Insect Behavior* 10(1): 31-47. (in English). ["Some individuals in species with extended periods of territorial occupancy may change territory locations within a single bout of territorial activity. Length of occupancy of mating territories among males in a local population of white-faced dragonflies (*Leucorrhinia intacta*) varied from more than 6 h to 15 min or less. Males with short tenures often established territories in several locations on the pond during a day. Several hypotheses have been proposed to explain shifting territorial sites rather than remaining in a single site during one bout of territoriality. We attempted to test the hypothesis that males shift to leave low-quality sites. Site quality may be affected by costs of defense in relation to intruder rate and the mating benefits of holding the territory. To test whether variation in these possible effects of benefits and costs of territoriality influenced tenure, we manipulated local quality of oviposition substrate and perch density. The quality of oviposition substrate, but not perch density, influenced both potential benefits and costs of territoriality. Female density was higher in areas with good substrate, but so were rates of males intruding into the territories, rates of chasing by territorial males, and local density of territorial males. More matings occurred in areas with good substrate, but among males with tenures of 15 min or more, mating success per male and tenure lengths did not differ statistically among treatments. Defense costs were low for all treatments and perhaps were not an important influence on tenure duration. Territorial males in this population probably adjusted local density to expected mating success by initial choice of site rather than by varying tenure length. Variation in tenure length at a site resulted, in part, from stochastic external factors, such as predation attempts." (Authors)] Address: Wolf, L., Institution Dep. Biol., Syracuse Univ., Syracuse, New York 13244-1270, USA

## 1998

1257. **Abro, A. (1998):** Structure and development of sperm bundles in the dragonfly *Aeshna juncea* L. (Odonata). *J. Morphol.* 235: 239-247. (in English). ["A re-examination of the origin and development of sperm bundles in aeshnid dragonflies (Odonata, Anisoptera) was carried out using light and electron microscopy. During their elongation, intracyst spermatids of the testis of the dragonfly *A. juncea* form a slender cytoplasmic protrusion, the acrosomal conicoid, beyond the nucleus and acrosome rodlet. Gathering and paral-

lel alignment of the transforming spermatids into a tight bundle take place inside the cyst. The original, rigid spermatid foreparts eventually associate, initially by becoming adhesive and swelling progressively to intertwine, and thus come to constitute a cap that binds together all sperm heads within a cyst in a spermatodesma. The development of the spermatodesma seems to occur disjunct from somatic cyst cells. Bundled in this form, the sperms are transferred to the intratestis canal and moved down the spermiduct to the seminal vesicle. They are then forwarded to the male copulatory apparatus, from which they are transmitted to the female. Individual, fully formed sperms are seen to be liberated from the bundle when in the female receptaculum seminis. The remnant of the cytoplasmic acrosomal conicoid, which is considered an envelope of the acrosome rodlet, is then dissolved. The spermatodesmata are large sperm aggregates that constitute efficient vehicles for transmission of amounts of filamentous sperm to the female." (Author)] Address: Åbro, A., Inst. Anat., Univ. Bergen, Årstadveien 19, N-5009 Bergen, Norway

1258. **Adelman, T.L ; Oliver, T.A.; Olberg, R.M. (1998):** Multiunit recordings of descending visual interneurons in dragonflies. Society for Neuroscience Abstracts 24(1-2): 2113. (in English). [Cervical nerve cord: nervous system; visual interneurons: nervous system, receptive field] Address: Adelman, T., Cornell Univ., Ithaca, NY 14850, USA

1259. **Agüero-Pelegrín, M.; Herrera-Grao, A.F.; Ferreras-Romero, M. (1998):** Plecópteros y odonatos de la parte superior de la cuenca del río Hozgarganta. Almoraima 19: 241-248. (in Spanish with English summary). [24 Odonate species from the headwater region of the Rio Hozgarganta catchment (Spain, north of Gibraltar) are listed and commented. The records of *Oxygastra curtisii* and *Macromia splendens* are of special interest.] Address: Ferreras-Romero, M., Departamento de Biología Animal (Zoología), Facultad de Ciencias, Universidad de Córdoba, Avda. San Alberto Magno s/n, ES-14004 Córdoba, Spain

1260. **Ambrus, A.; Bánkuti, K.; Kovács, T. (1998):** Data to the Odonata fauna of the Kisalföld and the West-Hungarian marginal zone II. Odonata - stadium larvale 2: 9-16. (in English). [87 localities were odonatologically surveyed between 03.05.1997 and 25.08.1998. 48 species (34 as larva and exuvium, 45 as imago) were recorded. *Coenagrion ornatum*, *C. scitulum*, *C. pulchellum*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Cordulegaster heros*, *Epitheca bimaculata*, and *Leucorrhinia pectoralis* are of some faunistic interest] Address: Ambrus, A., Hortobágy National Park, Directorate, Thematic Information Centre of Nature Conservation, H-9495 Kópháza, Jurisich M. u. 16, Hungary

1261. **Ambrus, A.; Bánkuti, K.; Csóka, G.; Kovács, T. (1998):** Faunistic data to the Odonata fauna of the Körös-Maros National Park. Odonata - stadium larvale 2: 53-60. (in English). [45 odonate species of 43 sites visited between 03.07.1987 and 23.07.1996 are documented. *Erythromma najas*, *Coenagrion scitulum*, *Anax ephippiger*, *Ophiogomphus cecilia*, *Cordulia aenea*, and *Sympetrum pedemontanum* are new to the fauna of the National Park.] Address: Ambrus, A., Hortobágy National Park, Directorate, Thematic Information Centre of Nature Conservation, H-9495 Kópháza, Jurisich M. u. 16, Hungary

1262. **Ambrus, A.; Bánkuti, K.; Kovács, T. (1998):** Larval and adult data on the Odonata fauna of Burgenland (Austria) II. Odonata - stadium larvale 2: 5-8. (in English). [17 localities in Burgenland, Austria were surveyed for the Odonata between 13.05.1998 and 21.09.1998. 22 species were recorded, 19 of these as larvae and exuvia, and 12 species as imago. *Chalcolestes viridis*, *Coenagrion scitulum*, *Enallagma cyathigerum*, *Ischnura pumilio*, *Libellula quadrimaculata*, *Orthetrum albistylum*, and *Orthetrum coerulescens* were recorded for the first time in the larval stage or as exuvia.] Address: Ambrus, A., Hortobágy National Park, Directorate, Thematic Information Centre of Nature Conservation, H-9495 Kópháza, Jurisich M. u. 16, Hungary

1263. **Ambrus, A.; Bánkuti, K.; Csányi, B.; Juhász, P.; Kovács, T. (1998):** Larval data to the Odonata fauna of Hungary. Odonata - stadium larvale 2: 41-52. (in English). [The authors publish the data of Odonata collected between 07.09.1987 and 28.11.1997 for the Water Resources Research Centre, Budapest, Hungary. The material comprises the major Hungarian geographical regions (147 UTM squares). 38 species (1026 larval and 10 exuvial data) were gathered from 284 sites, in most cases running waters. This results in a considerable addition to the knowledge of the distribution of Gomphid species in Hungary.] Address: Ambrus, A., Hortobágy National Park, Directorate, Thematic Information Centre of Nature Conservation, H-9495 Kópháza, Jurisich M. u. 16, Hungary

1264. **Ambrus, A.; Bánkuti, K.; Kovács, T. (1998):** The Odonata fauna of the Szigetköz. Odonata - stadium larvale 2: 17-39. (in English). [65 localities in the Szigetköz region resulted in 51 odonate, of which 5 (*Lestes macrostigma*, *Coenagrion ornatum*, *Anax ephippiger*, *Orthetrum coerulescens*, *Leucorrhinia pectoralis*) are new compared with previous studies. A total of 55 species is known in this region, 54 as imago and 48 as larva and exuvium.] Address: Ambrus, A., Hortobágy National Park, Directorate, Thematic Information Centre of Nature Conservation, H-9495 Kópháza, Jurisich M. u. 16, Hungary

1265. **Banning, M. (1998):** Auswirkungen des Aufstaus größerer Flüsse auf das Makrozoobenthos - dargestellt am Beispiel der Donau. Essener Ökologische Schriften 9: 285 pp, Appendices. (in German). [Impact of dams on macrozoobenthos of the River Danube, Bavaria, Germany; Odonata are quite rare in the Danube; the following species are listed: *Calopteryx splendens*, *Platycnemis pennipes*, *Somatochlora metallica*, *Orthetrum cancellatum*, *Ophiogomphus cecilia*, and *Gomphus vulgatissimus*; the population development of *G. vulgatissimus* is said - due to improved water quality - to be positive.] Address: Banning, Mechtild, c/o Bundesanstalt für Gewässerkunde, Postfach 309, D-56003 Koblenz, Germany

1266. **Barrett, M.D.; Williams, M.R. (1998):** Distribution of the Western Petalura dragonfly *Petalura hesperia* Watson in Western Australia. Pacific Conservation Biology 4(2): 149-154. (in English). ["A comprehensive survey of the Western Petalura dragonfly *Petalura hesperia* Watson was conducted in December 1995 and January 1996 during the annual flight period. This represents the first systematic survey of the distribution of this dragonfly, which is restricted to the south-west of Western Australia. Survey effort was concentrated a-

round the headwaters of permanent streams with the aim of identifying those habitats most important for the long-term survival of the species. Twelve individuals representing six isolated populations were recorded, raising the total number of recorded localities to 19, although one population (at the type locality) is believed extinct and a further four are under threat from urbanization. The populations are scattered along the eastern fringe of the Darling scarp, between 31 degree and 32 degree S latitude and 115 degree and 116 degree E longitude." (Authors)] Address: Barrett, Michelle Diane, P.O. Box 395, Werribee, Victoria 3030, Australia

1267. **Bauer, S. (1998):** Libellenbeobachtungen im westlichen Allgäu. Mitteilungen der Arbeitsgemeinschaft Naturschutz Wengen Allgäu 5: 104-112. (in German). [Baden-Württemberg, Germany; 32 habitats were odonatologically surveyed in the early 90th. 41 species could be observed including *Sympecma paedisca*, *Coenagrion pulchellum*, *Nehalennia speciosa*, *Anaciaeschna isosceles*, *Anax parthenope*, *Brachytron pratense*, *Epitheca bimaculata*, *Somatochlora arctica*, *Crocothemis erythraea*, *Leucorrhinia pectoralis*, and *Symptetrum fonscolombii*.] Address: not stated

1268. **Becnel, J.J.; Johnson, M.A. (1998):** Pathogenicity tests on nine mosquito species and several non-target organisms with *Strelkovimermis spiculatus* (Nematoda Mermithidae). *Journal of Nematology* 30(4): 411-414. (in English). ["Nine species of mosquitoes and several species of non-target aquatic organisms were tested for susceptibility to the mermithid nematode, *Strelkovimermis spiculatus*. All species of *Anopheles*, *Aedes*, *Culex*, and *Toxorhynchites* exposed to *S. spiculatus* were susceptible. Of the nine mosquito species tested, *C. pipiens quinquefasciatus* had the greatest tolerance to initial invasion and the highest percent infection of those that survived. High levels of infection were also achieved with *Aedes taeniorhynchus* and *A. albopictus*, but these mosquitoes were significantly less tolerant to parasitism than *C. pipiens quinquefasciatus*. *Strelkovimermis spiculatus* did not infect or develop in any of the non-target hosts tested." (Authors) Target species: "damselfly and dragonfly larvae"] Address: Becnel, J.J., Center for Medical, Agricultural and Veterinary Entomology, USDA ARS, Gainesville, FL, 32604 USA

1269. **Buschendorf, J. (1998):** Zur Bedeutung von UVP für die Odonaten-Faunistik. *Pedemontanum*, Magdeburg 2: 5-6. (in German). [The relevance of odonatological data in environment impact studies for a regional faunistic record scheme is discussed; Sachsen-Anhalt, Germany] Address: Buschendorf, J., Ahornring 61, 06184 Zwintschöna, Germany

1270. **Caldwell, J.P.; De Araujo, M.C. (1998):** Cannibalistic interactions resulting from indiscriminate predatory behavior in tadpoles in poison frogs (Anura: Dendrobatidae). *Biotropica* 30(1): 92-103. (in English). ["Poison frogs in the genus *Dendrobates* have very small clutch sizes (2-6 eggs among species for which there are data) and typically transport their tadpoles singly to small phytotelmata [...]. Tadpoles of many species are predaceous, consuming larvae of insects that use the same microhabitat for breeding, such as giant damselflies and mosquitoes. Previous studies and observations on the behavior of poison frog tadpoles led us to question whether tadpoles might be cannibalistic. We studied a population of *Dendrobates castane-*

*oticus* in lowland rainforest in Para, Brazil; additional data were collected on *Dendrobates auratus* in Nicaragua. At the study site in Brazil, we established a grid of 40 Brazil nut capsules, the microhabitat used by *D. castaneoticus* for tadpole deposition. Of 42 tadpoles deposited during the 55 days of the study, 20 were killed or died; 16 of these were presumably killed by conspecific tadpoles. Growth rate and time to metamorphosis was higher among tadpoles that consumed three or more tadpoles or relatively large larvae of the mosquito *Trichoprosopon digitatum*, a colonist of newly opened Brazil nut capsules. We propose that selection has favored the development of predatory behavior in poison frog tadpoles primarily as a mechanism to eliminate predators from the small phytotelmata in which they develop and that cannibalism is a secondary outcome of this behavior. Predatory behavior also provides tadpoles with food, which is frequently limited in these microhabitats. Additional studies of the biology of tadpoles of other species of *Dendrobates* are needed to determine the evolution of predatory and cannibalistic behavior in the clade." (Authors)] Address: Caldwell, Janalee, Dep. Zool., Oklahoma Mus. Natural History, Univ. Oklahoma, Norman, OK 73019 USA

1271. **Dannelid, E.; Berglund, H. (1998):** Scarce Chaser *Libellula fulva* found in Botkyrka kommun, new provincial record for Södermanland. *Entomologisk Tidskrift* 119(3-4): 149-150. (in Swedish). [*Libellula fulva* is rare in Sweden, in recent years thought to be limited to Eman in Småland in SE Sweden. It has now been observed and collected on a locality in Botkyrka kommun S of Stockholm, where it was recorded both in 1997 and 1998 and appears to be rather common. This is the northernmost locality for the species in Sweden.] Address: Dannelid, E., Zoologiska Institutionen, Stockholms Universitet, 106 91, Stockholm Sweden

1272. **Eda, S. (1998):** A review on the migration of *Anax guttatus* to the main-lands of Japan. *Tombo* 41: 4. (in Japanese with English translation of the title). [List of published records of *A. guttatus* in Japan] Address: Eda, S., Matsumoto Dental University, Gobara, Hirooka, Shiojiri, Nagano 399-0781, Japan

1273. **Eda, S. (1998):** Welcome visitors of a southern species, *Anax guttatus*, to Nagano Pref. in autumn of 1998. *Tombo* 41: 2-3. (in Japanese with English summary). [Between September 19 and 26, 1998, *A. guttatus* was captured at a small pond in Miasa in Nagano Pref., Japan at 800 m above sea-level. Average length of 23 males and one female was measured. Tandem oviposition took place on October 3.] Address: Eda, S., Matsumoto Dental University, Gobara, Hirooka, Shiojiri, Nagano 399-0781, Japan

1274. **Feldmann, R.M.; Vega, F.J.; Applegate, S.P.; Bishop, G.A. (1998):** Early Cretaceous arthropods from the Tlayua Formation at Tepexi de Rodriguez, Puebla, Mexico. *Journal of Paleontology* 72(1): 79-90. (in English). ["The arthropod macrofauna from the Middle Member of the lithographic limestones of the Tlayua Formation, in quarries at Tepexi, Mexico, is comprised of marine and nonmarine components. [...]. Remains of an arachnid and an odonate nymph represent nonmarine constituents. [...]" Address: Feldmann, R.M., Dep. Geol., Kent State Univ., Kent, OH 44242 USA.

1275. **France, R.L. (1998):** Density-weighted delta<sup>13</sup>C analysis of detritivory and algivory in littoral macroinvertebrate communities of boreal headwater lakes.



Annales Zoologici Fennici 35(3): 187-193. (in English). ["Investigations of the incorporation of terrestrial detritus into aquatic macroinvertebrates through delta13C analysis are becoming frequent for streams and wetlands, but comparatively little information exists for forest-fringed oligotrophic lakes. Although the most accurate assessment of community patterns in carbon dependency will be made through an organism density-weighted analysis of delta13C, this has never previously been undertaken for any freshwater system. Littoral macroinvertebrates (predominantly amphipods, ephemeropterans and dipterans, as well as odonates and trichopteran) from boreal lakes in northwestern Ontario, Canada displayed ranges of 6 per mill to 9 per mill in delta13C, all centred about -26 per mill. The closer agreement between the density-weighted delta13C distribution for these macroinvertebrates to tree rather than epilithon values, suggests that these organisms may be relying more substantially upon allochthonous detritivory than upon autochthonous algalivory for energy sustenance. This finding therefore challenges the precept in some timber management guidelines that dismisses riparian trees as an important energy for lake foodwebs." (Author)] Address: France, R.L., Harvard Univ., Graduate Sch. Design, 48 Quincy St., Cambridge, MA 02138, USA

1276. **Fuhrmann, M. (1998):** Untersuchungen zur Libellenfauna (Odonata) der Neyetalsperre im Oberbergischen Kreis (NRW). *Bucklige Welt*, Wiehl 2: 48-60. (in German). [Transect study of the Odonata of the damed brook Neye, Nordrhein-Westfalen, Germany; 19 species were recorded; dominance of species is presented for each of the four transects] Address: Fuhrmann, M., Zum Großen Wald 19, D-57223 Kreuztal, Germany

1277. **Fuller, R.M.; Groom, G.B.; Mugisha, S.; Ipulet, P.; Pomeroy, D.; Katende, A.; Bailey, R.; Ogotu-Ohwayo, R. (1998):** The integration of field survey and remote sensing for biodiversity assessment: A case study in the tropical forests and wetlands of Sango Bay, Uganda. *Biological Conservation* 86(3): 379-391. (in English). ["Field surveys of plants and animals were combined with satellite remote sensing of broad vegetation types to map biodiversity and thereby help plan conservation in the Sango Bay area, some 30 by 100 km bordering Lake Victoria in Uganda. A statistical classifier applied to satellite images identified 14 land-cover classes including water, swamp, dry grasslands, degraded woody vegetation, semi-natural forest classes and intensive land uses. Validation, using 240 sample sites, recorded 86% correspondence between field and map data. Intensive land use makes up 23% of the area, water and swamps 27%, dry grasslands 29%, woody vegetation 21% with semi-natural forests covering 15% of the area. The species data from sample-based field surveys included flowering plant species, dragonflies, butterflies, fish, amphibians, reptiles, birds and mammals. The species data were used to generate biodiversity ratings, based on species 'richness' and 'rarity', which could be related to the vegetation cover. This inter-relation helped to generate a biodiversity map of the Sango Bay area which has since been used to aid conservation planning." (Authors)] Address: Fuller, R.M., Inst. Terrestrial Ecol., Monks Wood, Huntingdon, Cambridgeshire PE17 2LS, UK

1278. **Futahashi, R.; Araki, Y. (1998):** New records of *Anax guttatus* from Toyama Pref. *Tombo* 41: 6-8. (in Japanese with English summary). [At 76 areas in Toy-

ama Pref., Japan between August and November 1998 many adult of the species were collected.] Address: not stated

1279. **Geister, I. (1998):** A list of Slovene dragonfly names. *Exuviae* 5(1): 1-5. (in Slovenian with English summary). ["The Slovene standard nomenclature is presented for the families, genera and species known or expected to occur in Slovenia and adjacent regions. The names are artificial rather than based on the available folk appellations. They were constructed with reference to the peculiarities in general appearance, colour, behaviour, habitat and phenology of the taxa concerned. Family and generic names are uninominal, species-group names are binominal, the infraspecific taxa are not considered. This nomenclature was in experimental use since 1992, and becomes compulsory with the present publication." (Author)] Address: Geister, I., Kocjancici 18, SI-6276 Pobegi, Slovenia

1280. **Glaser, B. (1998):** Besiedlung von neugeschaffenen Gewässern in der Chemnitztaue bei Heinersdorf durch Libellen, Fische und Lurche. *Veröffentlichungen des Museums für Naturkunde Chemnitz* 21: 131-138. (in German). [Documentation of colonisation by Odonata, Amphibia, and Pisces of six newly created water bodies near Chemnitz, Saxonia, Germany; 27 odonate species could be recorded three years after finishing work on the water bodies; of some regional faunistic interest are *Erythromma viridulum*, *Ischnura pumilio*, *Lestes barbarus*, *L. dryas*, *Sympecma fusca*, and *Sympetrum pedemontanum*.] Address: Glaser, E., Alfred-Neubert-Str. 8, D-09123 Chemnitz, Germany

1281. **González Soriano, E.; Novelo-Gutiérrez, R. (1998):** *Oplonaeschna magna* sp. nov. (Odonata: Aeshnidae), from Mexico with a description of its larva. *Rev. biol. trop.* 46(3): 705-715. (in English). ["*Oplonaeschna magna* sp. nov. (Odonata: Aeshnidae) (holotype male and allotype female deposited at CNIN UNAM-MEX., Mexico, D. F.) is described and illustrated from specimens collected in the states of Estado de Mexico, Guerrero, Hidalgo, and Morelos, Mexico. This is the second species of the genus *Oplonaeschna*. Adults of *O. magna* can be separated from those of *O. armata* (Hagen, 1861) by their larger size and broader thoracic stripes. The larva of the new species is also easily distinguished from that of *O. armata* by its larger size and longer prementum, and by structural differences of palpal lobes and epiproct. The larva of *O. armata* is briefly redescribed, illustrated and compared to that of *O. magna*. Notes on the biology of the new species are provided." (Authors)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@sun.ieco.conacyt.mx

1282. **Hutchinson, R. (1998):** Observations de quelques émergences de *Lanthus parvulus* (Sélys) (Odonata: Gomphidae) à Port-au-Saumon (Charlevoix-Est) et les environs. *Faberies* 23: 117-119. (in French with English summary). ["The author reports the discovery of twenty emergences of individuals of *Lanthus parvulus* (Selys) at Port-au-Saumon (Quebec) on June 6 and 7, 1998. He compares his observations with data from the literature and records these emergences as the earliest to date for the species in Quebec." (Author)] Address: Hutchinson, R., 12, chemin de la Savane, apt. 12, Gati-neau (Québec), Canada, J8T 1P7

1283. **Huth, J.; Oelerich, H.-M.; Reuter, M. (1998):** Zur faunistischen Charakterisierung der Biotoptypen in der Braunkohlefolgelandschaft Sachsen-Anhalts. Berichte des Landesamtes für Umweltschutz Sachsen-Anhalt, Sonderheft 1: 32-41. (in German). [The presentation of the results of the odonatological survey is quite identical to Al Hussein, I. et al (1999) (see OAS 1325)] Address: Huth, J., OEKOKART GmbH, Georg-Cantor-Str. 31, D-06108 Halle/Saale, Germany
1284. **Inoue, K.; Piper, W.; Tabata, O. (1998):** Small observation records of *Zygomma obtusum* in Iriomote Island, Okinawa Prefecture. Tombo 41: 37-40. (in Japanese with English summary). [Crepuscular behaviour of *Z. obtusum* in the afternoon and in the morning hours, and the reproductive flight are described. "Females oviposited beating their tips of abdomens against the surface of floating dead branch, then immediately turn round, beat, turn round. A female continued this [beat-turn round] sequence 80 times in 40 seconds. The oviposition surface of dead branch was covered layer by layer by red brown eggs forming a hard rubber like mass (Fig. 1). Males flew rapidly circulating around the floating branch in search of females (Fig. 2), and they form tandems when finding females. Soon they copulate, fly about above water for some seconds, then separate and females start oviposition."] Address: Piper, W., Kollenhof 31, D-22527 Hamburg, Germany
1285. **Jiang, Y.-H. (1998):** A new species of the genus *Epopthalmia* (Odonata: Corduliidae) from China. Chinese Journal of Entomology 18: 231-234. (in English). [*Epopthalmia kuani* n. sp. (Corduliidae), Yuntai Mountain, northern Jiangsu Province, China.] Address: Jiang, Yao-Hua, Lianyungang City Yuntaixiang Diversified Management Office, Jiangsu, 222064 China
1286. **Lange, L. (1998):** Beitrag zur Libellenfauna des einstweilig sichergestellten NSG "Plauer Stadtwald". Naturschutzarbeit in Mecklenburg-Vorpommern 41(1/2): 72-74. (in German). [Mecklenburg-Vorpommern, Germany; documentation of an odonatological survey in 1996 and 1997; 33 (including 24 reproducing) species could be recorded in different habitats (high bogs, meadows, lakes)] Address: Lange, L., Deichreihe 21, D-25599 Wewelsfleth, Germany
1287. **Lepori, F.; Maddalena, T.; Moretti, M.; Patocchi, N.; Maibach, A. (1998):** Inventario odonatologico delle zone umide di importanza nazionale del canton Ticino (Svizzera): stato della banca-dati e primi risultati. Boll. soc. tician. sci. nat. 86: 43-46. (in Italian with English summary). [De Marmels & Schiess (1977) surveyed more than 600 sites throughout the canton Ticino (Southern part of Switzerland) in the 70th. Since then, only a few local studies have been carried out there. Therefore an up date of the odontological data is considered necessary. The Gruppo di lavoro "Libellule Ticino" started in 1996 to collect the available data concerning Odonata with the purpose to set up a new data base which would be the first step of a new inventory of the odonate fauna in the south of the Swiss Alps. This paper presents a check-list of the odonate fauna of the canton Ticino and gives an outlook on the inventory for the period 1997-1999.] Address: Maibach Sàrl, A., Études en environnement, La Croix Rte de Moudon, CH-1610 Oron-la-Ville, Switzerland
1288. **Lotzing, K. (1998):** Kurzübersicht einiger Odonatenfunde im ehemaligen Landkreis Staßfurt für den Zeitraum 1980 bis 1996. Pedemontanum, Magdeburg 2: 2-3. (in German). [Checklist of Odonata of the Landkreis (County) Staßfurt, Sachsen-Anhalt, Germany; the frequency of settled localities for each species is given] Address: Lotzing, K., Straße der Deutschen Einheit 7, D-39418 Staßfurt, Germany
1289. **Martens, A. (1998):** Aktuelle Funde von *Cercion lindenii* in Salzgitter - nur 15 km von der Landesgrenze Sachsen-Anhalts entfernt. Pedemontanum, Magdeburg 2: 1. (in German). [Short summary of the results published in Martens, A. & W. Wimmer, 1997, Braunsch. naturk. Schr. 5(2): 343-352.] Address: Martens, A., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany
1290. **Matsuda, I. (1998):** *Anax guttatus* collected at Oizumi-Ryokuchi, Sakai City, Osaka Pref.. Tombo 41: 12. (in Japanese with English summary). [Two specimens were caught on 12 July and 1 August, 1998, prior a typhoon.] Address: not stated
1291. **Merceron, E. (1998):** Observations sur la Riviera française (Coleoptera, Lepidoptera, Odonata, Hymenoptera, Homoptera, Heteroptera, Diptera). Entomologiste 54(2): 55. (in French). [*Calopteryx haemorrhoidalis*; "Sur le Paillon de la Grave, avant Blausasc"; France] Address: Merceron, E., les Glaieuls, 16 Avenue Scuderi, F-06100 Nice, France
1292. **Ministerium für Landwirtschaft, Naturschutz und Umwelt Thüringen (1998):** Besonders geschützte Biotope in Thüringen. 2., unveränderte Auflage: 84 pp. (free of charge). (in German). [§ 18 of the "Vorläufige Thüringer Gesetz über Naturschutz und Landschaftspflege" defines habitats of special protection purposes. In this book, each of the habitats is characterized with a short text contribution and colour photographs of the habitat, some typical plants, and typical animals including Odonata.] Address: Ministerium für Landwirtschaft, Naturschutz und Umwelt Thüringen, Öffentlichkeitsarbeit, Beethovenplatz 3, 99096 Erfurt, Germany
1293. **Müller, J.; Steglich, R. (1998):** *Aeshna affinis* hat 1996 / 1997 erfolgreich überwintert. Pedemontanum, Magdeburg 2: 4-5. (in German). [Confirmation of the autochthonous status of *A. affinis* in the floodplains of River Elbe, Sachsen-Anhalt, Germany, in 1997] Address: Müller, J., Frankfelde 3, 39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de
1294. **Müller, J. (1998):** Aufruf zur Mitarbeit: *Anax parthenope* in Sachsen-Anhalt. Pedemontanum, Magdeburg 2: 5. (in German). [Data on the distribution of *A. parthenope* in Sachsen-Anhalt, Germany are required for a compilation of all records of the species for the mid-eastern part of Germany] Address: Müller, J., Frankfelde 3, 39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de
1295. **Müller, J.; Steglich, R. (1998):** Die Flußjungfern *Gomphus flavipes* und *Ophiogomphus cecilia* in Donau und Nebenflüssen 1998. Halophila 36: 3. (in German). [Records of the species from different localities along the River Danube in Hungaria, Slovakia, Austria, and Germany (Bayern)] Address: Müller, J., Frankfelde 3, 39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de
1296. **Müller, J. (1998):** Editorial. Pedemontanum, Magdeburg 2: 1. (in German). [Special attention should given to species with range extension due to global warming, and species which could re-establish itself in

waters with improved water quality] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de

1297. **Müller, J.; Steglich, R. (1998):** Ergebnis der "Aktion flavipes 1997". Pedemontanum, Magdeburg 2: 3-4. (in German). [In 1996 and 1997 the River Elbe systematically was surveyed for *Stylurus flavipes*; numerous autochthonous subpopulations along the river could be traced; the threat for River Elbe and its bio-coenosis by the scheduled impoundment and removal of the groynes, and the importance of *S. flavipes* as bioindicator are outlined] Address: Müller, J., Frankefelde 3, D-39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de

1298. **Müller, J.; Steglich, R. (1998):** Libellen- und Heuschrecken-Funde im NSG "Untere Mulde". Halophila 36: 3. (in German). [Ophiogomphus cecilia] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de

1299. **Müller, J. (1998):** Literatur. Pedemontanum, Magdeburg 2: 6-8. (in German). [Titles No. 28-50 of the bibliography of Odonata of Sachsen-Anhalt, Germany are listed] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de

1300. **Müller, J.; Steglich, R. (1998):** Neues von der Elbe bzw. aus dem Elbetal 1998. 2. Gemeine Keiljungfer Gomphus vulgatissimus nun auch an der Elbe. Halophila 36: 2. (in German). [*G. vulgatissimus* was traced between several groynes in River Elbe in May 1998; Sachsen-Anhalt, Germany] Address: Müller, J., Frankefelde 3, D-39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de

1301. **Müller, J.; Steglich, R. (1998):** Neues von der Elbe bzw. aus dem Elbetal 1998. 3. Weitere Nachweise von Ophiogomphus cecilia und Gomphus flavipes. Halophila 36: 2. (in German). [Records of the species between several groynes in River Elbe in May 1998; Sachsen-Anhalt, Germany] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de

1302. **Olajos, P.; Kiss, B.; Juhász, P. (1998):** Faunistical research on the dragonfly (Odonata) fauna of the Körös-Maros National Park. Odonata - stadium larvae 2: 61-70. (in Hungarian with English summary). [Odonata were collected in the South-East-Plain of Hungary, Körös-Maros National Park. A total of 41 species, 29 species as larva, 19 species as exuvia and 36 as adult, was recorded at 61 localities. The species frequency plotted against the localities is as follows: 1 species is very frequent, 18 are frequent, 11 are less frequent, 6 are rare, and 5 are sporadic. *Leucorrhinia pectoralis* is new to the region. It is stressed that *Epi-theca bimaculata* is of special regional importance.] Address: Olajos, P., Hortobágy Nemzeti Park, Igaz-gatószág, H-4024 Debrecen, Sumen u.2, Hungary

1303. **Onore, G.; Cevallos, V. (1998):** Massive movement in *Panoquina sylvicola* in southern Ecuador (Lepidoptera: Hesperidae). Tropical Lepidoptera 9(1): 28. (in English). ["A large mass of *Panoquina sylvicola* (*Herrich-Schäffer*) (Lepidoptera: Hesperidae), accompanied by limited numbers of *Siproeta epaphus* Latreille (Nymphalidae) and an unidentified species of Aeshnidae [...], were observed moving west to east near Loja,

Ecuador, on 18 April 1992. Approximately 100-150 butterflies per minute were counted over a road at 3100 m, flying about 18 km per hour against a wind speed of 12 km per hour." (Authors)] Address: Onore, G., Dep. Biol., Pontificia Univ. Catol. Ecuador, 12 de Octubre y Roca, Quito Ecuador

1304. **Papazian, M. (1998):** Les odonates et les plantes épizochores. Entomologiste 54(5): 193-196. (in French with English summary). [In Camargue, France, *Orthetrum cancellatum*, *Crocothemis erythraea*, and *Sympetrum fonscolombii* are potential victims of the epizochoric plant *Setaria verticillata*, which is used as perch when the wind blows strong. In this situation the wings of specimens are immobilized by the numerous spikelets.] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France

1305. **Perron, J.-M.; Ruel, Y. (1998):** Deux gomphides rares, *Stylurus amnicola* (Walsh) et *Stylurus spiniceps* (Walsh) (Odonata, Gomphidae) à l'anse du Moulin Banal, Saint-Augustin-de-Desmaures, Québec. Fabries 23(374): 131-133. (in French with English summary). [New data on the geographical distribution in Quebec of *S. amnicola* and *S. spiniceps*. The species have been discovered recently at Anse du Moulin Banal, Saint-Augustin-de-Desmaures.] Address: Perron, J.-M., 963, rue Grandjean, app. 506, Sainte-Foy, Québec G1X 4P9, Canada. E-mail: collections@coll.ulaval.ca

1306. **Polyanovskii, A.D. (1998):** Phototransduction in insects: Two strategies of calcium homeostasis? Sensornye Sistemy 12(3): 245-254. (in Russian). ["In rhabdomeral photoreceptors of arthropods, light causes steep elevation of cytosolic free calcium concentration. The consensus model of the phosphoinositide signaling cascade attributes this phenomenon to the inositol 1,4,5-trisphosphate (InsP3)-mediated calcium release from the intracellular stores, submicrovillar endoplasmic cisternae (SMC). It is generally accepted that the depletion of SMC is an indispensable step in photoexcitation. This paradigm appears to fit most of insects with a fused-type rhabdom (Hymenoptera, Orthoptera, Odonata, Blattodea), whose photoreceptors contain large SMC able to actively accumulate calcium and release it upon illumination through the InsP3- and ryanodine-sensitive mechanisms. However those with an open-type rhabdoms (Diptera, some Hemiptera and Coleoptera) conflict with the paradigm. Studies on *Drosophila* suggest that in open-rhabdom eyes the calcium homeostasis is mediated via a co-operation of at least three distinct mechanisms: (1) extracellular ommatidial cavity represents a principal calcium store responsible for a light-induced calcium influx; (2) specialized cytosolic domain containing a novel calcium-binding protein, calphotin, might function as a calcium-buffering "sponge"; (3) heavily reduced SMC do not express an InsP3-sensitive calcium release mechanism and do not participate in phototransduction directly. Hence the same task of the transformation of light into a receptor signal seems to be resolved in insects." (Authors)] Address: Polyakovskii, A.D., I. M. Sechenov Inst. Evol. Physiol. Biochem., Russ. Acad. Sci., pr. M. Toreza 44, St. Petersburg 194223, Russia

1307. **Ramirez, J.; Vogt, R.C.; Villarreal-Benitez, J.-L. (1998):** Population biology of a neotropical frog (*Rana vaillanti*). Journal of Herpetology 32(3): 338-344. (in English). ["We studied the population dynamics, food habits, and growth of a population of *Rana vaillanti* in a



permanent lake in Southern Veracruz, Mexico from April 1984 through March 1985. [...] *Rana vaillanti* is a sit and wait predator with a diverse diet including birds, fish, and conpecifics. They consume a higher proportion of invertebrates than vertebrates, principally insects (Coleoptera and Odonata) and spiders." (Authors)] Address: Vogt, R.C., Estacion Biol. Tropical "Los Tuxtlas", Inst. Biol.-U.N.A.M., A.P. 91, San Andres Tuxtla, Veracruz, C.P. 95700 Mexico

1308. **Roehrdanz, R.L.; Degrugillier, M.E. (1998):** Long sections of mitochondrial DNA amplified from fourteen orders of insects using conserved polymerase chain reaction primers. *Annals of the Entomological Society of America* 91(6): 771-778. (in English). ["The combination of highly conserved or universal polymerase chain reaction (PCR) primers with techniques that allow for the amplification of PCR products greater than a few thousand base pairs (long PCR) makes it possible to amplify the complete mitochondrial genome of virtually any insect as a small number of overlapping segments. Twelve conserved primers from 7 mitochondrial genes were used in 17 pair combinations. The size of the amplified segments ranged from 3.3 to 14.1 kb. Total genomic DNA from 33 insect species representing 14 orders served as the template. In most instances, 2 fragments sufficed to include the whole mitochondrial DNA (mtDNA). Less frequently 3 or more fragments were required to cover the complete mtDNA. Fragments that combined contain all of the mtDNA were amplified from 26 of 33 species. For the remaining species, >67% of the mtDNA was amplified. Any of the large amplicons are convenient for restriction fragment comparisons and they are also suitable as a template for nucleotide sequencing of either small mtDNA regions or the complete mtDNA of diverse taxa in conjunction with population or phylogenetic investigations. The procedures described here can be used to amplify the A+T or control region as part of a larger fragment and provides an opportunity for a more detailed analysis of this region." (Authors)] Address: Roehrdanz, R.L., Institution Biosci. Res. Lab., USDA-ARS, P.O. Box 5674, Fargo, ND 58105, USA

1309. **Schaffner, A.K.; Anholt, B.R. (1998):** Influence of predator presence and prey density on behavior and growth of damselfly larvae (*Ischnura elegans*) (Odonata: Zygoptera). *Journal of Insect Behavior* 11(6): 793-809. (in English). ["Foraging behaviour is often determined by the conflicting benefits of energy gain and the risk of mortality from predation or other causes. Theory predicts that animals should have lower activity levels when either the risk of predation or the availability of resources in the environment is high. We investigated the adjustment of the behaviour of *I. elegans* larvae to predator presence (*Anax imperator*) and prey density (*Daphnia* sp.) and their interaction in a completely crossed factorial experiment in the lab and the effect of behaviour on growth. The foraging activity of the *I. elegans* larvae was significantly reduced in the presence of a free-swimming predator but not a caged predator. Abdominal movements were significantly reduced at a low prey density. Growth was significantly reduced by the presence of a free swimming predator and low prey densities. These results provide evidence that these damselfly larvae adjust their behaviour to the presence of predators to increase their survival at the expense of reduced growth and development." (Authors)] Address: Anholt, B.R., Dept Biology, Univer-

sity of Victoria, PO Box 3020, Victoria, BC, V8W 3N5, Canada; E-mail: banholt@uvic.ca

1310. **Schmidt, E. (1998):** Aphorismen zur Odonatenfauna der Ruhraue bei Mühlheim. *Verh. West. Entomol. Tag 1997*: 205-212. (in German). [Checklist of the odonate fauna of the alluvion of Ruhr, Nordrhein-Westfalen, Germany; detailed discussion of factors determining the odonate habitat suitability in the region incl. interesting observations on the (negative) influence of *Branta canadensis* (Aves) on habitat of *Cercion lindenii* and *Erythromma viridulum*; of special faunistic interest are records of *Libellula fulva*, *Sympetrum pedemontanum*, and *Coenagrion pulchellum*] Address: Schmidt, E., Biologie und ihre Didaktik, FB9/S05, Universität GH Essen, D-45117 Essen, Germany

1311. **Schmidt, E. (1998):** Die ökologische Nische von *Sympetrum flaveolum* (L., 1758) und die Problematik von Artenschutz und Einstufung in Rote Listen bei Odonaten mit temporärer Habitat-Besiedlung (Odonata: Libellulidae). *Entomologia Generalis* 23(1-2): 129-138. (in German). ["[...] The ecological niche of *Sympetrum flaveolum* has the following key stone factors: • Water regime, which fits only in certain years, thus breeding only temporarily can be successful and dispersal is necessary for a new colonisation. • Good weather conditions during spring for the larval development and during the flying season as well for reproductive behaviour as for dispersal. • Microclimate: The microhabitats have a more continental microclimate compared with the surroundings. This fits to the rather northern distribution across the Euro-Siberian continent and preference of mountain regions in the southern parts of the distribution area. In NW-Germany temporarily floated areas at running waters, lakes and swamps decreased strongly. So the species lost most breeding habitats except some few places (mainly under nature conservancy or in sand dune valleys on the wadden sea islands). The vegetation structure preferred under natural conditions is favoured by poor soil, and so it suffered very much from fertilization everywhere. Special water and vegetation management in swamps may help for saving breeding habitats. [...] Red Data Books do not have an adequate category for species like *S. flaveolum* confined to only temporarily fitting breeding microhabitats." (Author)] Address: Schmidt, E.G., Univ. Essen (GHS), FB 9 S05, D-45117 Essen, Germany

1312. **Schmude, K.L.; Jennings, M.J.; Otis, K.J.; Piette, R.R. (1998):** Effects of habitat complexity on macroinvertebrate colonization of artificial substrates in north temperate lakes. *Journal of the North American Benthological Society* 17(1): 73-80. (in English). ["The purpose of this study was to determine the effects of substrate complexity on community structure of macroinvertebrates in littoral zones of lakes. Artificial substrates were used to simulate characteristics of structures commonly placed on the lake bed along shorelines. Cement balls in a wire basket simulated rock riprap, whereas concrete patio blocks simulated retaining walls; the samplers had nearly equal surface areas. Samplers were placed in the littoral zones of 3 dissimilar lakes in Wisconsin, and in front of 3 types of shorelines: rock riprap, vertical retaining wall, and natural shorelines. Colonization periods were 40-45 d starting immediately after ice-out. Significantly greater numbers of organisms colonized basket samplers ( $1947 \pm 155/m^2$ , mean  $\pm 1$  SE) than block samplers ( $951 \pm 73/m^2$ ). Taxa richness was significantly higher on baskets ( $31 \pm 1$ )

versus blocks ( $22 \pm 1$ ). Hydra, Turbellaria, Oligochaeta, Crustacea, Ephemeroptera, and Odonata were significantly more abundant on baskets than on blocks. [...] Neither abundance nor richness differed significantly among shoreline types, but a trend of higher values for both variables was observed along rock riprap. The results were consistent with the hypothesis that the more complex, 3-dimensional artificial substrate with its greater substrate heterogeneity, surface complexity, and interstitial space, will support a more diverse and abundant macroinvertebrate community in lakes compared to the less complex, 2-dimensional artificial substrate. Shoreline management practices that reduce habitat complexity may reduce local invertebrate diversity." (Authors)] Address: Schmude, K.L., Lake Superior Res. Inst., Univ. Wis.-Superior, Superior, WI 54880, USA

1313. **Seki, T.; Vogt, K. (1998):** Evolutionary aspects of the diversity of visual pigment chromophores in the class Insecta. *Comparative Biochemistry & Physiology - B: Comparative Biochemistry* 119(1): 53-64. (in English). ["In the class Insecta, three retinal congeners are used as the chromophore of visual pigments: retinal, (3R)-3-hydroxyretinal and (3S)-3-hydroxyretinal. The distribution of retinal and 3-hydroxyretinal superimposed on the phyletic tree of insects indicates that the original chromophore of visual pigments was retinal, and that some insects arose around the end of the Carboniferous period acquired the ability to use 3-hydroxyretinal. Xanthophylls possessing 3-hydroxy-beta-ring have been considered to be precursors of 3-hydroxyretinal, and the "oxygen pulse" in the late Paleozoic era is discussed as a possible contributory factor in obtaining the ability to use 3-hydroxyretinal as the visual pigment chromophore. Xanthophylls possessing 3-hydroxy-beta-ring produced by plants and bacteria have only the (3R)-beta-ring, so the 3-hydroxyretinal produced directly from such xanthophylls is expected to be (3R)-3-hydroxyretinal. On investigating the absolute structure of 3-hydroxyretinal in insect compound eyes, using a chiral column, the orders Odonata, Hemiptera, Neuroptera, Coleoptera, and Lepidoptera, and suborders Nematocera and Brachycera of the Diptera were found to have only (3R)-3-hydroxyretinal. The members of the dipteran suborder Cyclorrhapha, however, were found to contain a mixture of both the (3R)- and (3S)-enantiomers of all-trans 3-hydroxyretinal and (3S)-11-cis 3-hydroxyretinal. The Cyclorrhapha, which arose in the Jurassic period, have obtained the ability to produce (3S)-3-hydroxyretinal, but the metabolic pathway by which these "higher flies" form (3S)-3-hydroxyretinal has yet to be clarified." (Authors)] Address: Seki T., Div. Health Sci., Osaka Kyoiku Univ., 4-698-1, Asahigaoka, Kashiwara, Osaka 582 Japan

1314. **Swisher, B.J.; Soluk, D.A.; Wahl, D.H. (1998):** Non-additive predation in littoral habitats: influence of habitat complexity. *Oikos* 81(1): 30-37. (in English). ["The combined effects of predators on prey in structurally complex habitats may not always be described by additive models. Changes in habitat complexity can affect the rates of consumption by individual predators as well as alter the interactive, combined effects of predators with contrasting foraging styles. We examined the combined consumption of a common prey by two predators across a gradient of three habitat complexities. In microcosm experiments, consumption of larval mayfly prey (*Cloeon cognatum*) by juvenile bluegill sunfish (*Lepomis macrochirus*) and libellulid dragonfly larvae

(*Erythemis simplicicollis*) exceeded additivity at low habitat complexity, but were additive at higher levels of complexity. Prey capture by odonates was unaffected by fish presence during both day and night. At low stem density, fish capture more mayfly larvae than expected in the presence of dragonflies than in their absence, while consumption by dragonflies is unchanged in the presence of fish. Both the behavioral attributes of predators and prey as well as structural complexity of their habitat affect encounter rates, and thus their net interaction." (Authors)] Address: Swisher, B., Institution Cent. Aquatic Ecol., Ill. Natural History Survey, 607 E. Peabody Dr., Champaign, IL 61820, USA

1315. **Tóth, S. (1998):** Data to the dragonfly fauna of the Duna-Dráva National Park, South Hungary (Odonata). *Dunántúli Dolg. Term. tud. Sorozat* 9: 135-150. (in Hungarian with English and German summaries). [55 species were traced between 1992 and 1997 in the Duna-Dráva NP. Of special faunistic interest are according to the author *Calopteryx virgo virgo*, *Pyrrhosoma nymphula interposita* Varga, *Aeshna grandis*, *A. viridis*, *Epitheca bimaculata*, *Stylurus flavipes*, *Leucorrhinia caudalis*, and *L. pectoralis*. In addition the following species should be mentioned: *Coenagrion ornatum*, *C. scitulum*, *Brachytron pratense*, and *Sympetrum pedemontanum*.] Address: Toth, S., Széchenyi u. 2, H-8420 Zirc, Hungaria. E-mail: flycatcher@freemail.hu

1316. **Velasco, J.; Millan, A. (1998):** Feeding habits of two large insects from a desert stream: *Abedus herberti* (Hemiptera: Belostomatidae) and *Thermonectus marmoratus* (Coleoptera: Dytiscidae). *Aquatic Insects* 20(2): 85-96. (in English). ["Feeding preference experiments were conducted to determine the feeding habits of *Abedus herberti* (Heteroptera, Belostomatidae) and *Thermonectus marmoratus* (Coleoptera, Dytiscidae), two large insects in Sycamore Creek, an intermittent Sonoran desert stream, Arizona, U.S.A. Numbers of live versus dead prey consumed were tested between and across three prey sizes. Five prey species were offered simultaneously (5 live and 5 dead specimens) in each size class. We found that *A. herberti* preferred live prey of small and medium size, but it chose mainly dead prey in the large size class. These results fitted the model of size-selective predation (Zaret, 1980). Size dependent predators selected prey of increased size, according to their visibility, but only up to where difficulty in handling and probability of escape affect successful consumption. Snails were the most preferred prey of *A. herberti*. By contrast, *T. marmoratus* consumed only dead prey of all sizes, but it preferred soft organisms with thin cuticle, such as immature larvae of some mayflies, beetles, dragonflies or fishes." (Authors)] Address: Velasco, J., Institution Dep. Ecol. Hidrol., Univ. Murcia, Campus Univ. Espinardo, E-30100 Murcia, Spain

1317. **Wada, S. (1998):** Observation on *Anax guttatus* in Fukui Pref., 1998. *Tombo* 41: 9-11. (in Japanese with English translation of the title). Address: not stated

1318. **Williams, D.D.; Williams, N.E. (1998):** Freshwater invertebrates from the Bermuda Islands and their zoogeographical affinities. *Tropical Zoology* 11(2): 353-369. (in English). ["The Bermuda Islands lie in the western Atlantic Ocean with the closest mainland being North Carolina, some 965 km to the west. [...] Because of the proximity of many sites to the coast, this survey reports some species with brackishwater tolerance, and

also, as in the case of the mites, species that were riparian in distribution. The samples revealed a total of 51 fresh/brackish water species with 24 of these being recorded from the islands for the first time. Predominant amongst this fauna were oligochaetes, gastropods, microcrustaceans, peracarids, odonates, corixids, hydrophilid beetles, and chironomid, ceratopogonid and ephydrid dipterans. ..." (Authors)] Address: Williams, D.D., Univ. Toronto, Div. Life Sci., 1265 Mil Trail, Scarborough; ON M1C 1A4; Canada

1319. **Williams, P.H.; Gaston, K.J. (1998):** Biodiversity indicators: Graphical techniques, smoothing and searching for what makes relationships work. *Ecography* 21(5): 551-560. (in English). ["Knowledge of the distribution of biodiversity remains poor. This situation might more readily be resolved if the species richness of certain groups of organisms indicated the richness of other, less well known groups. A spatially explicit exploration of the pattern in the predictive power that one taxon (a potential 'indicator group') might have for the diversity of another has been performed previously. In this paper we respond to three important points that have been raised. First, we describe an additional graphical technique for visualizing spatial aspects of indicator relationships. Second, we examine some of the consequences of smoothing species richness data on observed indicator relationships. Third, we consider some of the factors that may contribute to strong indicator relationships." (Authors)] Address: Williams, P.H., Biogeography Conservation Lab., Natural Hist. Museum, London SW7 5BD, UK

1320. **Yokoyama, T.; Hirose, Y. (1998):** Records of *Somatochlora alpestris* from the lowest altitude at Dai-setsu Mts. Tombo 41: 40. (in Japanese). Address: not stated

1321. **Zhou, W. (1998):** A new species of the genus *Anotogaster* from China (Odonata: Cordulegastridae). *Wuyi Sci. Jour.* 14: 16-17. (in Chinese with English summary). [*Anotogaster chaoi* n.sp.; holotype: male, Ruili, Yunnan Prov. 6 May 1984; the species is allied to *Anotogaster gregoryi* Fraser 1924] Address: Zhou Wen-bao, Department of Entomology, Zhejiang Museum of Natural History, Jiaokonglou 10, Hang Zhou - 310012, China

1322. **Zhou, W. (1998):** A report on *Petaliaeschna corneliae*. *Wuyi Sci. Jour.* 14: 1-2. (in Chinese with English translation of the title). [A female *P. corneliae* is figured] Address: Zhou Wen-bao, Department of Entomology, Zhejiang Museum of Natural History, Jiaokonglou 10, Hang Zhou - 310012, China

#### 1999

1323. **Abbingh, G. (1999):** Larvenhuidjesdag "gevoorderden" 6 februari 1999. *Mededelingen van de Nederlandse Vereniging voor Libellenstudie* 3(4): 5. (in Dutch). [Meeting of some experienced experts to identify dragonfly exuviae; new identification characters of genitalia of *Aeshna subarctica elisabethae* and *A. juncea* are figured and outlined] Address: Abbingh, G., Muddegoorn 78, NL-9403 NK Assen, The Netherlands. E-mail: G.Abbingh@SoftHome.net

1324. **Abbingh, G. (1999):** Verslag NVL-Excursie Appelscha, na 2 jaar dan toch .... *Mededelingen van de*

*Nederlandse Vereniging voor Libellenstudie* 3(4): 5-6. (in Dutch). [Report on a trip to Appelscha/Smilde (Drenthe, The Netherlands) on 28 August 1999; 17 species were recorded including *Lestes barbarus*, *Ceragrion tenellum*, and *Aeshna subarctica elisabethae*] Address: Abbingh, G., Muddegoorn 78, NL-9403 NK Assen, The Netherlands. E-mail: G.Abbingh@SoftHome.net

1325. **Al Hussein, I.; Bergmann, S.; Funke, T.; Huth, J.; Oelerich, H.-M.; Reuter, M.; Tietze, F.; Witsack, W. (1999):** Die Tierwelt der Bergbaufolgelandschaften. *Naturschutz im Land Sachsen-Anhalt* 36 (Sonderheft): 23-40. (in German). [The former brown coal mining regions in Germany developed to important regions for nature conservation purposes. In Sachsen-Anhalt (and further regions) the ecology of these habitats is surveyed intensively. The odonate fauna of 75 water bodies was studied by Jörg Huth. He traced 46 species. In this publication only the key stone species are listed according to the main habitat types. The succession of the vegetation and odonate fauna in brown coal mining water bodies is outlined in short. *Leucorrhinia pectoralis*, a species of the appendix of the FFH Directive, settles on 7 water bodies.] Address: not stated

1326. **Altmoos, M. (1999):** Netzwerke von Vorrangflächen - Ein methodischer Rahmen zur Planung und Optimierung von Gebietssystemen für den Naturschutz. *Naturschutz und Landschaftsplanung* 31(12): 357-367. (in German with English summary). ["Networks of Priority Areas - A Methodological Framework for Planning and Optimisation of Areal systems for Nature Conservation: A network (i.e. area system) for nature conservation includes a minimum number of priority areas which in their entity secure nature conservation aims in a larger context. This makes it necessary to integrate flexibility, different categories of areas, minimum sizes and a habitat network. A methodological framework has been worked out to implement these requirements. [...] *Ischnura pumilio*, *Orthetrum brunneum*, *O. coerulescens*, and *Sympetrum pedemontanum* are used as keystone species to assess brown coal mining regions near Leipzig, Sachsen, Germany for nature conservation needs.] Address: Altmoos, M., Umweltforschungszentrum Leipzig-Halle, Projektbereich Naturnahe Landschaften und Ländliche Räume, Permoserstr. 15, D-04318 Leipzig, Germany. E-mail: altmoos@pro.ufz.de

1327. **Anonymus (1999):** Ergebnisse der Insektenaufnahme während der 9. Landesoffenen Entomologentagung 3.9. - 5.9.1999 in Ronney (Anhalt-Zerbst). *Entomol. Mitt. Sachsen-Anhalt* 7(2): 42-43. (in German). [*Aeshna mixta*, *Stylurus flavipes*, and *Sympetrum sanguineum* are recorded from the floodplains of the near River Elbe (51.92N 11.94)] Address: not stated

1328. **Ansorge, J. (1999):** *Heterophlebia buckmani* (Brodie 1845) (Odonata: "Anisozygoptera") - das erste Insekt aus dem untertoarcischen Posidonienschiefer von Holzmaden (Württemberg, SW Deutschland). *Stuttgarter Beiträge zur Naturkunde Serie B (Geologie und Paläontologie)*. 275: 1-9. (in German with English summary). ["The first insect from the Lower Toarcian Posidonienschiefer ("Posidonia Shale") of Holzmaden (Württemberg, SW Germany), a fore wing of *Heterophlebia buckmani* (BRODIE 1845) (Odonata: "Anisozygoptera"), is described from the "Unterer Stein" ("Lower Stone"), a concretion-like carbonate layer. The holotypes of the Upper Liassic *Heterophlebia dobertinensis*



Handlirsch 1939, *Heterophlebia gracilis* Handlirsch 1939, *Systellothemis reticulata* Handlirsch 1939 from Dobbertin (Mecklenburg), and *Heterophlebia proxima* Bode 1905 from the Brunswick area (Lower Saxony) are revised and considered younger synonyms of *H. buckmani*. Besides a collecting bias, the rarity of insects in the Posidonia Shale of Holzmaden probably results from a larger distance of the sedimentation area to the Vindelician mainland." (Author)] Address: Ansorge, J., Institut für Geologische Wissenschaften der Ernst-Moritz-Arndt-Universität, Friedrich-Ludwig-Jahn-Straße 17a, D-17489, Greifswald Germany

1329. **Artmeyer, C. (1999):** Aktuelle Verbreitung, Habitatansprüche und Entwicklungsdauer von *Gomphus vulgatissimus* (Linnaeus) in der Ems im Kreis Steinfurt, Nordrhein-Westfalen (Anisoptera: Gomphidae). *Libellula* 18(3/4): 133-146. (in German with English summary). ["In 1997, the sp. was recorded emerging in 95 % of the one-kilometer-sections along approximately 58 km of the course of the river. In most cases the species occurred in sections with an unnatural regulated profile. Almost 50 % of the emergence sites were characterized by a high or very high cover of stones in the river bed. The question of the exact habitat of the larvae in the river Ems as well as the reason for the recent expansion of the species in this river are discussed. From regularly taken size measurements of the larvae it is suggested that larval development takes two years." (Author)] Address: Artmeyer, C., Philippstraße 16, 48149 Münster, Germany. E-mail: artmeyc@uni-muenster.de

1330. **Austin, A.D. (1999):** Use of Odonata as prey by sand wasps, *Bembix* spp. (Hymenoptera: Sphecidae). *Australian Entomologist* 26(3.): 77-82. (in English). ["The sphecid wasp *Bembix minya* Evans & Matthews from southern South Australia is recorded for the first time as preying on damselflies (Odonata). Details of its nest structure and prey range are presented, as is a discussion of the evolutionary transition within the genus to utilising prey other than Diptera." (Author)] Address: Austin, A.D., Department of Applied and Molecular Ecology, Waite Campus, The University of Adelaide, PO Glen Osmond, SA 5064, Australia; E-mail: aaustin@waite.adelaide.edu.au

1331. **Bechly, G. (1999):** Epallagidae versus Euphaeidae revisited. *International Journal of Odonatology* 2(2): 137-139. (in English). ["The author's previous rejection of Selys' legions as available family-group taxa is restated and elaborated, strictly based on the provisions of the International Rules of Zoological Nomenclature (4th ed.)." (Author)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

1332. **Bedjanic, M.; Pirnat, A.; Salamun, A. (1999):** A contribution to the knowledge of dragonfly fauna of broader area along Drava River between Ptuj and Sfrdiscne ob Dravi, northeastern Slovenia (Insecta: Odonata). *Natura Sloveniae* 1(1): 45-70. (in Slovene with extensive English summary). ["The results of the work of the Odonatological group on the Student Biology Research Camp Sredisce ob Dravi '97 are presented. Between 24-31 July 1997 a total of 40 dragonfly species were recorded at 97 localities. A review of all known published and unpublished dragonfly records for the investigated area has shown that in the 1992-1998 period 128 localities were investigated and a list of 49 dragonfly species was compiled. Altogether 12 species

viz. *Lestes virens vestalis* (Ramb.), *Lestes dryas* Kirb., *Sympecma fusca* (Vander Lind.), *Anaciaeschna isosceles* (Mull.), *Brachytron pratense* (Mull.), *Gomphus vulgatissimus* (L.), *Cordulia aenea* (L.), *Somatochlora flavomaculata* (Vander Lind.), *Epitheca bimaculata* (Charp.), *Libellula fulva* Müll., *Sympetrum fonscolombii* (Sel.), and *Sympetrum depressiusculum* (Sel.) are new for the investigated area. The records of endangered species *Ophiogomphus cecilia* (Fourc.) in Drava R. and of *Leucorrhinia pectoralis* (Charp.) in fishponds near Ptuj deserve special interest from the nature conservation point of view. The inclusion of *Anaciaeschna isosceles* in the Red data list of endangered dragonflies (Odonata) of Slovenia as a vulnerable species is suggested." (Authors)] Address: Pirnat, Alja, Vosnjakova 4/a, SI-1000 Ljubljana, Slovenia. E-mail: alja.pirnat@guest.arnes.si

1333. **Bedjanic, M. (1999):** *Aeshna subarctica elisabethae* Djakonov 1922, new for the odonate fauna of Slovenia (Anisoptera: Aeshnidae). *Exuviae* 6: 7-10. (in English with Slovenian summary). ["Several exuviae and a teneral female of the species were collected at the Sijec peat-bog (Pokljuka plateau, NW Slovenia) on 25-VI-1999 and 27-VI-1999. New record lies on the southern border of the species range in Europe and is zoogeographically interesting. The species is declared as critically endangered. Therefore, detailed population studies and its inclusion in the Red list of the dragonflies of Slovenia are proposed." (Author)] Address: Bedjanic, M., Fram 117/A, SI-2313 Fram, Slovenia. E-mail: matjaz.bedjanic@guest.arnes.si

1334. **Bedjanic, M. (1999):** Dragonflies - A colorful life between the water and the sky. *Proteus* 62(1): 8-17. (in Slovene with English summary). [General account on the 73 Slovene dragonflies; some of the typical or rare species of Slovenia as *Cordulegaster heros* and *Leucorrhinia caudalis* and their habits are documented with brilliant colour pictures. In addition, information is given to the author, the Slovene Dragonfly Association, and Bastiaan Kiauta, one of the leading odonatologists in the 70th and 80th of the past century.] Address: Bedjanic, M., Fram 117/A, SI-2313 Fram, Slovenia. E-mail: matjaz.bedjanic@guest.arnes.si

1335. **Bedjanic, M. (1999):** New records of *Hemianax ephippiger* (Burmeister, 1839) in Slovenia (Anisoptera: Aeshnidae). *Exuviae* 6: 14-18. (in English with Slovenian summary). ["The development of the species was confirmed at two localities in the vicinity of Maribor, northeastern Slovenia. Known records for Slovenia are mapped and a short discussion on the threat status of the species in Slovenia is added." (Author)] Address: Bedjanic, M., Fram 117/A, SI-2313 Fram, Slovenia. E-mail: matjaz.bedjanic@guest.arnes.si

1336. **Bedjanic, M. (1999):** The creature of the month in September: the dragonfly *Sympetrum depressiusculum*. *Proteus* 62(1): 36-38. (in Slovene). [Presentation of *S. depressiusculum* as the Animal of the Month including three colour pictures and a determination key of the Slovene *Sympetrum*-species] Address: Bedjanic, M., Fram 117/A, SI-2313 Fram, Slovenia. E-mail: matjaz.bedjanic@guest.arnes.si

1337. **Benke, A.C.; Huryn, A.D.; Smock, L.A.; Wallace, J. B.. (1999):** Length-mass relationships for freshwater macroinvertebrates in North America with particular reference to the southeastern United States. *Journal of the North American Benthological Society*.

18(3): 308-343. (in English). ["Estimation of invertebrate biomass is a critical step in addressing many ecological questions in aquatic environments. Length-dry mass regressions are the most widely used approach for estimating benthic invertebrate biomass because they are faster and more precise than other methods. A compilation and analysis of length-mass regressions using the power model,  $M$  (mass) =  $a L$  (length) $b$ , are presented from 30 y of data collected by the authors, primarily from the southeastern USA, along with published regressions from the rest of North America. A total of 442 new and published regressions are presented, mostly for genus or species, based on total body length or other linear measurements. The regressions include 64 families of aquatic insects and 12 families of other invertebrate groups (mostly molluscs and crustaceans). Regressions were obtained for 134 insect genera (155 species) and 153 total invertebrate genera (184 species). Regressions are provided for both body length and head width for some taxa. In some cases, regressions are provided from multiple localities for single taxa. When using body length in the equations, there were no significant differences in the mean value of the exponent  $b$  among 8 insect orders or Amphipoda. The mean value of  $b$  for insects was 2.79, ranging from only 2.69 to 2.91 among orders. The mean value of  $b$  for Decapoda (3.63), however, was significantly higher than all insects orders and amphipods. Mean values of  $a$  were not significantly different among the 8 insect orders and Amphipoda, reflecting considerable variability within orders. Reasons for potential differences in  $b$  among taxa are explained with hypothetical examples showing how  $b$  responds to changes in linear dimensions and specific gravity. When using head width as the linear dimension in the power model, the mean value of  $b$  was higher (3.11) than for body length and more variable among orders (2.8-3.3). Values of  $b$  for Ephemeroptera (3.3) were significantly higher than those for Odonata, Megaloptera, and Diptera. For those equations in which ash-free dry mass was used, % ash varied considerably among functional feeding groups (3.3-12.4%). Percent ash varied from 4.0% to 8.5% among major insect orders, but was 18.9% for snails (without shells). Family-level regressions also are presented so that they can be used when generic equations are unavailable or when organisms are only identified to the family level. It is our intention that these regressions be used by others in estimating mass from linear dimensions, but potential errors must be recognized." (Authors)] Address: Benke, A., Aquatic Biology Program, Department of Biological Sciences, University of Alabama, Tuscaloosa, AL, USA

1338. **Bönsel, A. (1999):** Der Einfluss von Rothirsch (*Cervus elaphus*) und Wildschwein (*Sus scrofa*) auf die Entwicklung der Habitate von *Aeshna subarctica* Walker in wiedervernässten Regenmooren (Anisoptera: Aeshnidae). *Libellula* 18(3/4): 163-168. (in German with English summary). ["In two rewetted bogs in Mecklenburg-Vorpommern, Germany, vegetation has developed so fast that after already 4 years areas of *Sphagnum cuspidatum* have been replaced by the next stadium of succession swing grass areas. Because of this the potential breeding places of *A. subarctica* disappeared. But those are constantly being recreated by red deer and wild pig. Therefore these mammals play an important role for the survival of *A. subarctica* in these areas." (Author)] Address: Bönsel, A., Vasenbusch 15, D-18337 Gresenhorst, Germany

1339. **Bohonak, A.J. (1999):** Effect of insect-mediated dispersal on the genetic structure of postglacial water mite populations. *Heredity* 82(4): 451-461. (in English). ["Assaying population structure in species that differ in dispersal ability can help to determine whether population differentiation is dependent on the movement of individuals between populations. Here, allozyme variation is analysed in over 1100 individuals from nine species and two species complexes of *Arrenurus* water mites collected throughout north-eastern North America. As larvae, eight taxa are obligate parasites of winged adult insects that provide the primary opportunity for dispersal. Three additional species have lost the ability to parasitize insects and do not disperse in this manner. Consistent with the glaciated history of the region, very low allozyme heterozygosity was found in these taxa ( $H_o = 0.00-0.12$ ), near panmixia in five out of seven species for which population differentiation was calculated and no patterns of isolation by distance over spatial scales up to several hundred kilometres. Nonetheless, in two out of three comparisons between sister species with and without parasitic larvae, parasitism was significantly associated with higher heterozygosity. Population differentiation could also be contrasted for two of these sister pairs; in each case, lower estimates of  $F_{ST}$  were found in the mites able to disperse on insects. The statistical significance of these contrasts was dependent on the method used to estimate variance. At the scale of the genus, behavioural differences among insect vectors allows for broader hypothesis that relate water mite genetic diversity to dispersal ability. For the genus, rank correlations of dispersal ability with direct count heterozygosity ( $n = 11$ ) and population differentiation ( $n = 7$ ) were not significantly different from zero. These results are consistent with the hypothesis that allozyme population structure is primarily the result of historical patterns in these regions. However, comparisons between sister species suggest a limited role for dispersal in homogenizing populations genetically, even when drift-gene flow equilibrium has not been achieved." (Author)] Address: Bohonak, A., Center for Conservation Research and Training, University of Hawaii, Honolulu, HI, 96822, USA

1340. **Brockhaus, T. (1999):** 2. Sächsische Libellentagung in Bad Schandau. *Mitt. Sächsischer Entomol.* 48: 28-29. (in German). [Report on the meeting held on 5/6 November 1999; main topic was the present status of the survey of the Saxonian odonate fauna and the scheduled distribution atlas] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

1341. **Brockhaus, T. (1999):** Die Libellenfauna des unteren Zschopautals. *Mitt. Sächs. Entomologen* 47: 26-28. (in German). [The odonate fauna before and after the closing of a system of ditches used by a drinking water plant is analysed. The drying out of the ditches caused a large decline of the fauna from 17 reproductive species to 6 species. The loss of habitats for ditch specialists as *Sympetrum pedomontanum* is of serious importance for nature conservation.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

1342. **Brockhaus, T. (1999):** Ein Nachweis von *Aeshna subarctica elisabethae* Djakonov, 1922 und *Somatochlora alpestris* (Selys, 1840) im Hochmoor Sijec auf der Pokljuka, NW Slowenien (Anisoptera: Aeshnidae, Corduliidae). *Exuviae* 6: 11-13. (in German with English

and Slovenian summaries). ["Single males of both species were found at the locality on 30-VII-1999. For *A. subarctica elisabethae*, which has only recently been discovered as new for the odonate fauna of Slovenia, the Sijec peat-bog represents the only known locality in the country. During last years *S. alpestris* was thought to be extinct in Slovenia, however with present record it has been rediscovered after more than 35 years." (Author)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

1343. **Brunelle, P. (1999):** Distribution of damselflies and dragonflies of Maine, United States. *Northeastern Naturalist* 6(2): 95-118. ["This paper provides details of the distribution and study of Odonata in the state of Maine, based on a comprehensive review of literature, public collections, private holdings, and the results of recent surveys. It is the first summary of the subject in over fifty years, and its data provide the baseline for the planned 5-year volunteer field survey of odonates in Maine. As a result of the review 11 species are added to the state list: the damselfly *Enallagma recurvatum*, and the dragonflies *Aeshna mutata*, *Nasiaesha pentacantha*, *Argomphus furcifer*, *Gomphus descriptus*, *G. quadricolor*, *G. vastus*, *Stylurus amnicola*, *S. notatus*, *Neurocordulia* sp. nov. (= *N. michaeli* Brunelle, 2000; see OAS 1478) and *Perithemis tenera*, bringing that list up to 155 species. Distribution to township level and flight periods for all species, and geographical and seasonal distribution of past survey effort in the state are reviewed. Illustrations and notes on 26 currently state-listed species are appended." (Author)] Address: Brunelle, P.-M., 2460 John Street, Halifax, Nova Scotia, B3K 4K7, Canada

1344. **Brunelle, P.-M. (1999):** Additions to the lists of dragonflies (Odonata: Anisoptera) of the Atlantic Provinces, Canada. *Northeastern Naturalist* 6(1): 35-38. (in English). ["*Somatochlora brevicincta* is added to the Atlantic Provinces list; *Aeshna juncea* and *S. brevicincta* to the Maritime Provinces; *A. juncea*, *A. subarctica*, *S. brevicincta* and *S. septentrionalis* to New Brunswick; *S. albicincta*, *S. brevicincta* and *Pantala flavescens* to Nova Scotia; *A. subarctica*, *Epithea spinigera*, *S. cingulata*, *S. franklini*, *Leucorrhinia frigida* and *P. flavescens* to Prince Edward Island." (Author)] Address: Brunelle, P.-M., 2460 John Street, Halifax, Nova Scotia, B3K 4K7, Canada

1345. **Buczynski, P. (1999):** The checklist and the "Red list" of the dragonflies (Insecta: Odonata) of the Lublin Province. In: *Instytut Ochrony Przyrody Polskiej Akademii Nauk* (Ed.): *Chronmy Przyrody Ojczyzna*. *Dwumiesięcznik*. R. LV (55) - 1999 - Zeszyt 6 (Listopad-Grudzien). Kraków: 23-39. (in Polish with extensive English summary). [Checklist of the Odonata of the southeastern part of Poland including vernacular and Latin names and an assessment of the threat of the species according to the IUCN categories] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PO-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

1346. **Buczynski, P. (1999):** Dragonflies (Odonata) of spring areas in Poland - state of research and proposes of further study. *Zródła Polski*. Stan badan, monitoring i ochrona. *Wyzsza Szkola Pedagogiczna*. Olsztyn: 31-36. (in Polish with English summary). [List of odonate species known to develop in Polish mountain regions

(n=5) and lowland regions (n=3) spring habitats; additional information is given on the species of flush systems (natural drainage systems) of the peat bogs (*Somatochlora arctica*, *Leucorrhinia albifrons*); the author stresses the lack of data on the odonate fauna of springs in Poland] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PO-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

1347. **Buttstedt, L.; Zimmermann, W. (1999):** Die Vogel-Azurjungfer (*Coenagrion ornatum*) im Grenzraum von Sachsen-Anhalt und Thüringen. *Pedemontanum* 3: 6-9. (in German). [In 1995 *C. ornatum* was recorded at some ditches near Wallhausen, Sachsen-Anhalt, Germany. In 1998 in subsequent ditches of the Helme floodplain (Thüringen) some more local, in most cases small, populations of the species could be detected. 10 populations are known now. In all cases *C. mercuriale* co-occurs.] Address: Zimmermann, W., von-Hoff-Str. 31, D-99867 Gotha, Germany

1348. **Calil, E.R.; Carvalho, A.L. do (1999):** Descriptions of the last instar larvae and the adult of *Triacanthagyna septima* (Selys, 1857) (Odonata, Aeshnidae) with notes about the biology of the species. *Revista Brasileira de Entomologia* 43(1-2): 73-83. (in Portuguese). [The last instar larva and the adult of *T. septima* are described and illustrated. The rarely being collected larvae develop occasionally in temporary and unstable ponds, and marshes. A key to the larvae of the four hitherto described larvae of the genus is provided. The last instar larva of *T. septima* can be distinguished by the length of the cerci, distinctly shorter than the e-piproct. The adults of *T. septima* occur during all the year in the southeastern Brazil, being more common in the winter. They are crepuscular in activity and sometimes assemble in collective flights adopting migratory behaviour.] Address: Calil, E.R., Departamento de Zoologia, Instituto de Biologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro, RJ Brazil

1349. **Chalmel, R.; Dommanget, J.-L. (1999):** Rubrique bibliographique. *Martinia* 15(4): 131-135. (in French). [Additions to the French odontological bibliography] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

1350. **Clausen, W. (1999):** *Gomphus flavipes* (Charpentier) in der Aller, Niedersachsen (Anisoptera: Gomphidae). *Libellula* 18(3/4): 187-188. (in German with English summary). ["On 14-VII-1999, one exuvia was recorded at the Aller near Eilte 12 km SSW Walsrode, Germany" (Author).] Address: Clausen, W., Zur Bockwindmühle 60, D-32351 Stemwede-Oppenwehe, Germany

1351. **Clausnitzer, V. (1999):** A checklist of the dragonflies (Odonata) of Kenya. *African Journal of Ecology* 37: 400-418. (in English). ["A checklist of Odonata has been compiled for Kenya. It is based on an inventory of museum material, publications and personal observations made between 1978 and 1997. Changes of scientific names and synonyms are documented. The list contains 194 valid dragonfly species recorded for Kenya." (Author)] Address: Clausnitzer, Viola, Zum Lahnverg 14, D-35032 Marburg, Germany

1352. **Conrad, K.F.; Willson, K.H.; Harvey, I.F.; Thomas, C.J.; Sherratt, T.N. (1999):** Dispersal characteristics of seven odonate species in an agricultural



landscape. *Ecography* 22(5): 524-531. (in English). ["Dispersal is an ecological phenomenon which is of fundamental importance to population biology. While dispersal behaviour of many orders of winged insects has received a great deal of attention, the dispersal characteristics of odonates have been poorly documented. We used capture-mark-recapture techniques to study dispersal behaviour of seven species of odonates breeding on a network of 11 small ponds in Cheshire, U.K. The ponds ranged in size from 615 to 1300 m<sup>2</sup> and varied from 30 to 860 m apart. We found surprisingly high rates of dispersal between ponds with 10-47% per species of recaptured individuals moving from their natal pond. The mean probability of dispersal differed significantly among species but the relationship between the probability of dispersal and distance moved consistently followed a simple negative exponential curve for all species. Most individuals stayed at their natal pond, but a few moved long distances. Neither the age at which an individual was marked (teneral vs sexually mature) nor its sex significantly affected its tendency to disperse. The negative exponential relationship suggests that dispersal should be relatively easy to incorporate in more complex models of odonate spatio-temporal dynamics. To our knowledge, this is the first large-scale, multi-species study to assess dispersal behaviour of odonates by direct observation." (Authors) The following species were surveyed: *Ischnura elegans*, *Coenagrion puella*, *C. pulchellum*, *Lestes sponsa*, *E-nallagma cyathigerum*, *Pyrrosoma nymphula*, and *Sympetrum sanguineum*] Address: Thomas, C.J., Dept of Biological Sciences, Durham University, Durham, DH1 3LE, UK

1353. **Czachorowski, S.; Buczynski, P. (1999):** Biocenosis naturality index - a prospective instrument in the evaluation of the ecological state of Polish peat-bogs, as exemplified by Odonata and Trichoptera. In: Radwana, S. & R. Kornijowa (Rds.): *Problemy aktywnej ochrony ekosystemów wodnych i torfowiskowych w Polskich Parkach Narodowych*. Wydawnictwo Uniwersytetu Marii Curie-Skłodowskiej. Lublin: 153-158. (in Polish with English summary. A German translation of the paper is available from the author or IDF). [Fischer's (1996) "biocenosis naturality indexes" (Fischer, J.: *Beurteilungsverfahren zur Quellfauna*. *Crunoecia* 5: 227-240), in the modification of Czachorowski (1998), are proposed for assessing and biomonitoring peat-bogs. Index values for 26 Polish peat-bogs and fens in mountain and lowland ranges are calculated, analysed and discussed. In Tab. 1 the indices are developed on a cline of typical to a-typical species for each peat bog and fens. Some sphagnum peat-bog indexes calculated for dragonfly species are higher for fen species than for sphagnum peat-bog species. In the case of caddisflies some fens are characterised by a sphagnophilous fauna. These results are interpreted as follows: (1) The biotops are impacted by factors not yet visible. (2) Fen-fauna is very dispersive and able to settle in peat-bogs too, which may be suboptimal habitats (3) The classification of species based on their known habitat requirements is not precise yet. The "biocenosis naturality indexes" are considered to be a good tool for assessment conservation priorities for the specific fauna of bogs.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PO-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

1354. **Czczuga, B.; Godlewska, A.; Mrozek, E. (1999):** Zoosporic fungi growing on dead dragonflies (Odonata). *International Journal of Odonatology* 2(2): 187-197. (in English). ["The mycoflora developing on dead specimens of 11 species of dragonfly, collected while floating on the water surface, was investigated under laboratory conditions. Sixty-six zoosporic fungus species were found to grow on the fragments of dragonfly investigated, including 15 Chytridiomycetes and 51 Oomycetes. Of these 66 species, 18 are known as parasites or necrotrophs of fish. Three fungus species were recorded for the first time from Poland." (Authors)] Address: Bazyli Czczuga, Anna Godlewska & Edyta Mrozek, Department of General Biology, Medical University, Kilinskiego 1, 15-230 Białystok 8, Poland. E-mail: Dzia/Nau@AMB.AC.Bialystok.PL

1355. **Czerniawska-Kusza, I. (1999):** Macroinvertebrate communities of streams in the Glubczycki plateau. *Zródła Polski. Stan badan, monitoring i ochrona*. *Wyzsza Szkola Pedagogiczna. Olsztyn*: 73-80. (in Polish with English summary). [In 1997, the fauna of seven rivers in the Odra catchment SW of Opole was surveyed. 37 taxa were recorded including "Corduliidae" in the river Psina. ] Address: Czerniawska-Kusza, Izabela, Instytut Biologii i Ochrony Srodowiska, Uniwersytet O-polski, ul. Oleska 48, 45-052 Opole, Poland

1356. **Dantart, J.; Martín, R. (1999):** *Somatochlora metallica* (Vander Linden, 1825) (Odonata: Corduliidae) y *Leucorrhinia pectoralis* (Charpentier, 1825) (Odonata: Libellulidae), dos nuevas especies de libélulas para la Península Ibérica. *Boln asoc. esp. ent.* 23(1-2): 147. (in Spanish). [*Somatochlora metallica*: Pleta de Saboredo, Valle del Ruda (Valle de Arán, Lérida), UTM 31TCH3221, 2.100 m; 1 male, 2 female; 19-VII-86. (J. Dantart leg., det) and Lago Carlit (Pirineo francés), UTM 31TDH11, 2.200 m; 1 male; 8-IX-84. (J. Dantart leg., det.). *Leucorrhinia pectoralis*: Lago Bassiver, m-cizo de Beret (Lérida), UTM 31TCH3429, 2.120 m; 1 female; 10-VII-92. (J. Dantart leg., det.).] Address: Martín, R., Avda. Martí Pijol, 250, 3°, 4a, E-08911 Badalona (Barcelona), Spain

1357. **D'Antonio, C. (1999):** *Lindenia*. *Lindenia* 31: 133-134. (in Italian). [Announcements of the WDA meetings in Darmstadt, Germany (7-9 July 2000) and Gällivare, Sweden (22-27 Juli, 2001), and the SIO meeting in Novosibirsk, Russia (10-14 July, 2001); addition of 3 titles to the bibliography of Italian odonatological literature] Address: D'Antonio, C., Via A. Falcone 386/b, I-80127 Napoli, Italy. E-mail: lindenial@freemail.it

1358. **Donath, H. (1999):** Die Kleine Königslibelle (*Anax parthenope* (Selys 1839)) in der Schlabendorfer Bergfolgelandschaft. *Biologische Studien, Luckau* 28: 100-104. [Detailed documentation of records of *A. parthenope* after 1995 in the Schlabendorf brown coal mining restoration region (51.81N 13.82E). On 26/6/1999 for the first time exuviae of the species could be detected; the habitat and the succession of the odonate fauna of the habitat (lake Stoßendorf) is described] Address: Donath, H., Caule Nr. 1, D-15926 Zieckau, Germany

1359. **Duscoulier, F.; Paillisson, J.-M.; Bernier, C. (1999):** Étude faunistique des odonates du lac de Grand-Lieu (Département de Loire-Atlantique). *Martinia* 15(4): 107-120. (in French with English summary). [Detailed account (1985-1998) on the dragonfly fauna of the Grand-Lieu lake with commented list of 42 species.]

Address: Duscoulier, F., Club C.P.N. des Sittelles, 8, rue des Martins, F-44230 Saint-Sébastien-sur-Loire, France

1360. **Eigenhuis, K.J.; Groenendijk, D. (1999):** De betekenis van de insectennaam Rombout. *Brachytron* 3(2): 28-30. (in Dutch). [The Dutch name of the genus *Gomphus* "Rombout" is analysed. The authors suppose that the element "rom" of the name came from ronken (snoring). The element "bout" is explained as an expression of a metall pole or stick.] Address: Eigenhuis, K.J., Rietgorsstraat 1, NL 1431 VT Aalsmeer, The Netherlands

1361. **Englund, R.A. (1999):** The impacts of introduced poeciliid fish and Odonata on the endemic *Megalagrion* (Odonata) damselflies of Oahu Island, Hawaii. *Journal of Insect Conservation* 3(3): 225-243. (in English). ["Since the beginning of this century there have been substantial declines in the distribution and abundance of native *Megalagrion* damselflies on the Hawaiian Island of Oahu. Native damselflies have also vanished from most low elevation areas on other Hawaiian Islands, although historically, lotic and wetland dwelling damselfly species were once common throughout the archipelago. It is hypothesized that poeciliid fish introduced for biological control have caused the decline of four stream-breeding damselfly species on Oahu, and the extinction or near-extinction of two other species in Hawaii. This study documents the presence of remnant *Megalagrion* populations in Oahu streams, wetlands and estuaries, and records the elevational distributions of introduced sh in each waterbody surveyed. The distributions of introduced Odonata are also recorded, because the seven species of damselflies and dragonflies introduced to Oahu since 1936 present another potential threat to native Hawaiian damselflies. Native damselfly and introduced poeciliid fish distributions were mutually exclusive on Oahu, and it is concluded that this is probably due to predation by the introduced fish. By contrast, even the rarest native *Megalagrion* damselflies were found in areas containing introduced damselflies and dragonflies." (Author)] Address: Englund, R.A., Natural Sciences Department, Bishop Museum, 1525 Bernice Street, Honolulu, HI, 96817 USA.

1362. **Ezenwaji, H. (1999):** The abundance and trophic biology of *Clarias albopunctatus* Nichols & La-Monte, 1953 (Osteichthyes: Clariidae) in a tropical floodriver basin. *Hydrobiologia* 392: 159-168. (in English). [The abundance, food and feeding biology of *Clarias albopunctatus* was studied over a period of 17 months in the lower River Anambra, Nigeria. Insects were the predominant food, followed by crustaceans. Of primary importance were Chironomidae (mainly *Chironomus* spp. and *Tanytus* sp.), Odonata nymphs, *Dytiscus* sp., mosquito larvae and pupae, *Gyrinus* sp., *Daphnia* sp., Ostracoda and *Tilapia fry*.] Address: Ezenwaji, H., Fisheries and Hydrobiology Research Unit, Department of Zoology, University of Nigeria, Nsukka Nigeria

1363. **Fromhage, L. (1999):** Erstnachweis der Arktischen Smaragdlibelle *Somatochlora arctica* (Zetterstedt, 1840) im Regierungsbezirk Koblenz. *Fauna Flora Rheinland-Pfalz* 9: 341-345. (in German with short English summary). [First record of *S. arctica* in the Hunsrück mountains in Rheinland-Pfalz, Germany; the larva was collected (1997 and 1998) in a hollow of a

Sphagnum layer developend on a swampy trail.] Address: Fromhage, L., St. Sebastiansstr. 6, D-55128 Mainz, Germany

1364. **Gaino, E.; Rebor, M. (1999):** Larval antennal sensilla in water-living insects. *Microscopy research and technique* 47: 440-457. (in English). ["An overview of larval antennal sensilla in hemimetabolous and holometabolous water-living insects is given by updating current knowledge on the fine structure of these, sensory systems. In the absence of successful electrophysiological studies, the possible function of sensilla is deduced from their architecture. Various kinds of sensilla are described in hemimetabolous insects such as "Odonata (*Libellula depressa*) and "holometabolous insects [...]. Their possible function in responding to stimuli from the freshwater environment is illustrated and discussed. The importance of sensilla as taxonomic and phylogenetic traits is reported in Baetidae (Ephemeroptera) and in Diptera Nematocera. [...]. Particular features, such as cuticle without pores in chemosensory sensilla and naked perikarya, are so far found exclusively in some water-living arthropods, thus reflecting a possible adaptation to the aquatic habitat. The structure of sensilla and chloride cells, which have a similar external morphology, is presented and discussed in various insect groups, considering the possible derivation of the chloride cells from sensilla." (Authors)] Address: Gaino, Elda & Manuela Rebor, University of Perugia, Dipartimento di Biologia Animata ed Ecologia, Via Elce di Sotto, I-06123 Perugia, Italy. E-mail: gaino@unipg.it

1365. **Göcking, C. (1999):** Lebenszyklus von *Platycnemis pennipes* (Pallas) und *Calopteryx splendens* (Harris) in zwei Fließgewässern Brandenburgs (Zygoptera: Platycnemididae, Calopterygidae). *Libellula* 18 (3/4): 147-162. (in German with English summary). ["The larval development of both spp. was monitored in two different running waters in Brandenburg, Germany from Mai to September 1995. For *C. splendens* a two-year life cycle is suggested, *P. pennipes* seems to be univoltine." (Author)] Address: Christian Göcking, Zum Hiltruper See 9, D-48165 Münster, E-mail: gockinc@uni-muenster.de

1366. **Grandstaff, E.D.; Bulow, F.J (1999):** The claw sampler - A macroinvertebrate sampler for scuba divers. *North American Journal of Fisheries Management* 19(1): 219-220. (in English). ["A device is described that can be used by scuba divers to obtain quantitative macroinvertebrate samples from flat surfaces. Called the "claw sampler," it was designed to collect macroinvertebrates colonizing spawning benches in Tennessee reservoirs. The spawning benches, 3.0-m X 25-cm wood slabs attached to 30-cm concrete blocks, were used to simulate logs under which smallmouth bass *Micropterus dolomieu* spawn. The claw sampler effectively collected quantitative samples of coleopterans, dipterans, ephemeropterans, odonates, trichopterans, cladocerans, and gastropods that colonized the spawning benches and provided a readily available food supply for age-0 smallmouth bass other fishes." (Authors)] Address: not available

1367. **Groot, T. de; Wasscher, M. (1999):** Has *Leucorrhinia pectoralis* shifted its habitat in The Netherlands? *Brachytron* 3(2): 18-25. (in Dutch with English summary). ["At the moment *L. pectoralis* is a rare and declining species in the Netherlands. The species is listed as "threatened" in the Dutch Red List. During the

first half of the century large numbers were found in several kinds of habitats, such as marshland near rivers, and also coastal dune lakes. Usually these habitats were mesotrophic with a well-developed riparian vegetation. Nowadays there are two main habitats: small mesotrophic waters on sandy soils and peat marshes. Numbers on sandy soils have decreased dramatically and the species is now only recorded sporadically there. On the other hand, large numbers (up to 40 individuals on a 150 m stretch of ditch) have been found in De Wieden and Weerribben, two peat marsh areas in the northwestern part of the province of Overijssel, in the last few years. It is not clear whether these populations had been overlooked in the past, or whether this species has only recently developed higher numbers here. Currently, the region supports one of the largest populations in northwestern Europe." (Authors)] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: m.wasscher@broekhuis.nl

1368. **Groot, T. de (1999):** The dragonflies of five peat mires. *Levende Natuur* 100(4): 112-117. (in Dutch). ["In The Netherlands the presence of dragonflies in five large peat mires of Natuurmonumenten has been studied. The study is focussed on characteristic peat mire species and one peat mire specialist and includes five species of the Red List. This paper deals with differences and similarities between the dragonfly populations in these five areas. All known peat mire dragonflies can be found in two of the areas (De Wieden and De Vechtplassen). Moreover large numbers of *Aeshna viridis* and *Leucorrhinia pectoralis* have been found in De Wieden. In great parts of Western-Europe six out of seven peat mire dragonflies are being threatened. This paper stresses the importance of the Dutch populations of these dragonflies and also their habitats in peat mires. Protection of habitats is needed, specifically for the threatened dragonflies which are dependant on certain stages of succession in peat mires. In order to start new succession of the vegetation new peat holes are being dugged the last few years. This can be of great importance for the dragonflies." (Author)] Address: Groot, T. de, Simon Bolivarstraat 89, NL 3573 ZK Utrecht, The Netherlands

1369. **Haden, G.A.; Blinn, D.W.; Shannon, J.P.; Wilson, K.P. (1999):** Driftwood: An alternative habitat for macroinvertebrates in a large desert river. *Hydrobiologia* 397: 179-186. (in English). ["*Argia* sp." was represented in the July sampling period, and "*Odonata*" in the October sampling period.] Address: Haden, G.A., Northern Arizona University, Dept Biology, P.P. Box 5640, Flagstaff, AZ 86011, USA

1370. **Heidemann, H. (1999):** Analyse d'ouvrages. *Martinia* 15(4): 136-144. (in French). [extensive review of the books abstracted in OAS 623 and 1149] Address: Heidemann, H., Au in den Buchen 66, D-76646 Bruchsal, Germany

1371. **Heijden, A. van der (1999):** Donkere waterjuffer herontdekt tijdens Weerribbenexcursie. *Mededelingen van de Nederlandse Vereniging voor Libellenstudie* 3(4): 4-5. (in Dutch). [A trip (8 May 1999) of some Dutch odonatologists to the Weerribbe region (The Netherlands) resulted in the rediscovery of *Coenagrion armatum* which for the last time was seen in 1956 in the Netherlands; additional interesting species in the region are *Coenagrion pulchellum*, *Sympetma paedisca*, *Cor-*

*ulia aenea*, *Leucorrhinia rubicunda*, and *L. pectoralis*] Address: Heijden, Antoine van der. io335601@student.io.tudelft.nl

1372. **Hennig, R. (1999):** Zur Odonatenfauna des Landkreises Wittenberg. *Pedemontanum* 3: 1-6. (in German). [51 odonate species are known from the Landkreis Wittenberg, Sachsen-Anhalt, Germany in 1998; the records are listed in a tab; characteristic species of different habitat types are outlined. The listing of *Aeshna viridis* remains a little bit obscure.] Address: Hennig, R., Neustr. 10a, D-06886 Wittenberg-Lutherstadt, Germany

1373. **Hilfert-Rüppel, D.; Rüppel, G.; Suhling, F. (1999):** *Onychogomphus uncatatus* (Charp.) and *Oxygastra curtisii* (Dale) in southern Morocco in April (Anisoptera: Gomphidae, Corduliidae). *Notul. odonatol.* 5(4): 50. (in English). [Observations from the stream Tamrhakht, 50 km NE of Agadir situated in the western foothills of the Haut Atlas on 8 April 1999; additional information on *Gomphus simillimus maroccanus* is given] Address: Suhling, F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

1374. **Hilfert-Rüppel, D. (1999):** To stay or not to stay: decision-making during territorial behaviour of *Calopteryx haemorrhoidalis* and *Calopteryx splendens splendens* (Zygoptera: Calopterygidae). *International Journal of Odonatology* 2(2): 167-175. (in English). ["The effect of copulation and presence of predators on territorial behaviour of male *Calopteryx haemorrhoidalis* (in southern France) and of male *C. splendens splendens* (in northern Germany) was studied in nature. A male obtaining a copulation early in the day often secured more copulations later that day than did males not obtaining an early copulation. Predators such as Green frogs, *Rana esculenta*, and water spiders, *Dolomedes* sp., affected subsequent behaviour of male *Calopteryx* that they attacked but failed to catch. A male *C. haemorrhoidalis* that had only recently occupied a territory when attacked by a spider, vacated the territory immediately, whereas a male first attacked after having occupied a territory for more than three hours and that had already courted females there remained, while avoiding the predator's immediate location. Results are discussed in the context of the value of the territory as a resource."(Author)] Address: Hilfert-Rüppel D., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: d.hilfert@tu-bs.de

1375. **Holusa, O. (1999):** The first record of *Orthemtrum coerulescens anceps* (Schneider, 1845) in Slovenia (Anisoptera: Libellulidae). *Exuviae* 5(1): 13-16. (in English with Slovene summary). [On 16-VII-1997 a tandem of the taxa was caught near the village of Boreci, NE Slovenia] Address: Holusa, O., Muzeum Beskyd, prirodovedné oddeleni, Zámecké náměstí 1264, CZ-738 01 Frydek-Místek. E-mail: holusao@post.cz

1376. **Hong Sung-Jong; Woo Ho-Chun; Lee Soo-Ung; Huh Sun (1999):** Infection status of dragonflies with *Plagiogorchis muris metacercariae* in Korea. *Korean Journal of Parasitology* 37(2): 65-70. (in English). ["*Plagiogorchis muris* has been found in both house and field rats as well as in humans. The infection status of the second intermediate hosts of *P. muris* is prerequisite in understanding their biological features in an ecosystem. Six species of dragonflies were caught in a wide range of areas in Korea; and they were *Sympetrum darwinianum*, *S. eroticum*, *S. pedomontanum*, *S. infuscatum*,



*Pantala flavoscens*, *Calopteryx atrata*, and *Orthetrum albistylum speciosum*. The occurrence of *P. muris* metacercariae in dragonflies was nationwide with various infection rates. The metacercarial burden of *P. muris* in the surveyed areas was the highest in *S. eroticum* followed by *S. darwinianum*, *S. pedomontanum*, and *C. atrata*. The highest infection rate by *P. muris* metacercariae was found in *S. darwinianum* followed by *S. eroticum*. The metacercarial burden was particularly heavy in the dragonflies found in Hamyang-gun and Kosong-gun, Kyongsangnam-do. It is, therefore, likely that dragonflies play a significant role as the second intermediate host in the life cycle of *P. muris* in Korea." (Authors)] Address: not available

1377. **Hooper, R.E.; Tsubaki, Y.; Siva-Jothy, M.T. (1999):** Expression of a costly, plastic secondary sexual trait is correlated with age and condition in a damselfly with two male morphs. *Physiological Entomology* 24(4): 364-369. (in English). ["Males of the damselfly *Mnais costalis* Selys [...] are morphologically and behaviourally polymorphic, typically existing as clear-winged non-territorial 'sneaks' and orange-winged territorial 'fighters'. The amount of orange pigment in the wing, as measured with a chromameter, varied between individuals, and decreased as the reproductive season progressed. Young individuals maintained in the laboratory on high or low nutrient diets differed in the amount of pigment that developed in the wing. Males in the high nutrient group developed darker wings faster than those in the low nutrient group. Young adults of both sexes and morphs were fed <sup>14</sup>C-radiolabelled tryptophan or tyrosine (precursors of the pigments ommochrome and melanin, respectively). Ommochrome was restricted to the pseudoptero stigma of the males of both morphs and was not present in females. The presence of tyrosine in the wing cells of orange males, but not of clear males, indicated that the orange pigment is at least partly constituted from melanin. These data show that at least some pigment levels must be maintained continuously in the wings of orange males, and that maintenance is costly as it is compromised at low nutrient levels." (Authors)] Address: Hooper, R.E., Laboratory for Wildlife Conservation, National Institute for Environmental Studies, Tsukuba, 305-0053 Japan

1378. **Hornig, U. (1999):** Bericht über die Tagung Sächsischer Entomologen am 18. September 1999 in Königswartha/OL. *Mitt. Sächsischer Entomol.* 48: 25-26. (in German). [Report on a meeting of Saxonian entomologists including a short notice on a lecture of Thomas Brockhaus on dispersal in Odonata] Address: Hornig, U., Lindenberger Str. 24, D-02736 Oppach/OL, Germany

1379. **Hunger, H.; Schiel, F.-J. (1999):** Massenentwicklung von *Sympetrum fonscolombii* (Selys) und Entwicklungsnachweis von *Anax ephippiger* (Burmeister) in Überschwemmungsflächen am südlichen Oberrhein (Anisoptera: Libellulidae, Aeshnidae). *Libellula* 18(3/4): 189-195. (in German with English summary). ["In 1999, *Sympetrum fonscolombii* emerged in four and *Anax ephippiger* in two gravel pits. In one area that was inundated for 10 to 12 weeks between middle of May and end of July 1999, a mass reproduction with several 100,000 individuals of *S. fonscolombii* occurred. In years without exceptionally high and prolonged ground water level, this area is completely dry. It was observed that larvae of *S. fonscolombii* are able to survive for at least two weeks after their larval habitat has dried up. In the

dried up. In the same area, a summer generation of *Ischnura pumilio* developed successfully." (Authors)] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), Am Pfahlgraben 8, D-79276 Reute, Germany

1380. **Jacquemin, G.; Boudot, J.-P. (1999):** Les libellules (Odonates) du Maroc. Société Française d'Odonatologie. ISBN 2-9507291-3-4: 150 pp. (in French with English summary). ["This work synthesise all the available faunistic data already published, dealing with Moroccan Damselflies and Dragonflies, and adds a lot of new unpublished data. It can be used within the limits of Morocco, Algeria and Tunisia, and is the first modern book dealing with the Odonata of the Maghreb. A general part gives the most useful informations about the past faunistic research in Morocco and on the biology and ecology of the Dragonflies in the Maghreb. A detailed and illustrated key allows the identification of all species of Odonata known from Morocco, Algeria and Tunisia. A commented list provides for each Moroccan Dragonfly: its local status, the previously and newly known localities where it has been observed, the most useful information on its distribution (including a map), as well as biological and ecological notes (particularly the flight period), and, when necessary, a taxonomic discussion. Chorological considerations and a discussion on nature preservation are also approached. A detailed bibliographic section with more than 150 references ends the text part of this book. A number of high quality colour photographic plates illustrate the most representative habitats and all species of dragonflies living in Morocco (males and many of the females). The plates are complemented by pterographies showing the precise wing venation of each species." (taken from the announcing leaflet)] Address: Jacquemin, G., Biologie des Insectes, Université H. Poincaré, Nancy 1, BP 239, F-54506 Vandoeuvre-lès-Nancy, France

1381. **Jödicke, R. (1999):** Nachweis einjähriger Entwicklung bei *Aeshna cyanea* (Müller) (Anisoptera: Aeshnidae). *Libellula* 18(3/4): 169-174. (in German with English summary). ["At a newly setup garden pond near Cloppenburg, NW Germany, a part of the larval population emerged in the year after oviposition. Another part started a hibernation dormancy in the last four stages. Next year the emergence started in late May." (Author)] Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany. E-mail: r.joedicke@t-online.de

1382. **Jong, T.H. de (1999):** Aantal vleugelcellen tegenover het pterostigma bij de Houtpantserjuffer (*Lestes viridis*). *Brachytron* 3(2): 26-27. (in Dutch). [In June 1998 near Beziers, France, specimens of *Chalcolestes viridis* were traced with more than two cells behind the pterostigma. To avoid confusion with *Lestes macrostigma*, which has 3-4 cells behind the pterostigma, the frequency distribution of cells behind the pterostigma of *C. viridis* was studied: In more than 30% at least one of the wings of *C. viridis* has more than 2 cells behind the pterostigma.] Address: Jong, T.H. de, Rijnlaan 25, NL-4105 GS Culemborg, The Netherlands. E-mail: theo.marijke@wxs.nl

1383. **Jong, T.H. de (1999):** *Aeshna viridis* in the province of Utrecht (NL). *Brachytron* 3(2): 11-17. (in Dutch with English summary). ["In 1998 localities with *Stratiotes aloides* (mostly ditches in agricultural land) in the province of Utrecht were surveyed for *A. viridis*. The species was found at 29 of the 56 visited sites. Oviposi-

tion was recorded at nineteen locations. The total number of individuals seen was 75. The maximum number of specimens found at a single locality was eleven. Vegetations with *A. viridis* were on average more extensive, the water was deeper and the cover of *Azolla filiculoides*, *Elodea nutallii* and green algae was less. Homogeneous *Stratiotes* vegetations with a surface of 400 m<sup>2</sup> or more and only a slight cover of *Lemna spec.*, *Azolla filiculoides* and *Etoda nutallii*, were preferred for oviposition. At such sites, the density of *Stratiotes* is about 20 plants per m<sup>2</sup> with leaves protruding at least 15 cm above the water surface. It was observed that females oviposit in all accessible leaves of a single plant before moving on to another plant. They seemed to prefer plants with withered, brown leaf tips. It is suggested that such plants have narrower leaves, which makes them easier to grasp for the female. Besides *A. viridis* twelve other species of Odonata were seen at the *Stratiotes* vegetations. *Lestes sponsa* and *Coenagrion pulchellum* appear to show a similar habitat preference to *A. viridis*. In contrast however *Erythromma viridulum* and *Orthetrum cancellatum* seem to avoid such localities. Although the leaves of *Stratiotes* are thought to protect the larvae against predators, fish larger than 10 cm were often found in open spots in the vegetations and fish smaller than 10 cm were even seen between the plants." (Author)] Address: Jong, T.H. de, Rijnlaan 25, NL-4105 GS Culemborg, The Netherlands. E-mail: theo.marijke@wxs.nl

1384. **Julka, J.M.; Vasisht, H.S.; Bala, B. (1999):** Distribution of aquatic insects in a small stream in northwest Himalaya, India. *Journal of the Bombay Natural History Society* 96(1): 55-63. (in English). [species composition, annual variability, microhabitat preference and species diversity index of aquatic insects in a perennial stream in northwest Himalaya, during 1989-91. A total of 62 morphospecies belonging to Ephemeroptera, Odonata, Plecoptera, Hemiptera, Megaloptera, Coleoptera, Trichoptera, and Diptera were caught in the samples] Address: Julka, J.M., Zoological Survey of India, Solan, HP, 173212, India

1385. **Kalkman, V. (1999):** Recensies: De danske guldsmede. Apollo books. 280 pp. ISBN: 87-88757-21-8. *Brachytron* 3(2): 30. (in Dutch). [Review of the book of Ole Fogh Nielsen; see OAS 399] Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands

1386. **Kern, D. (1999):** Langzeituntersuchungen zur Populationsentwicklung und zum Lebenszyklus von *Gomphus vulgatissimus* (Linnaeus) an einem nordwestdeutschen Fließgewässer (Anisoptera: Gomphidae). *Libellula* 18(3/4): 107-132. (in German with English summary). ["From 1989 to 1999 larvae were collected in a draining ditch in the Kreis Diepholz (Germany) and quantitative investigations of emergence were made. Based on biometric data of more than 8000 larvae, a three to four years development is suggested. The annual collections of exuviae featured an average emergence periode of 21 days and an EM50 of 6-7 days. A mean of 467 exuviae per year was collected in a 800 m section. Generally, the females were predominant with a mean of 52.7 %. The time of emergence seemed to be dependent on the actual lowest and highest daily water temperature. Some aspects of the larval development and the emergence are discussed in comparison to the results on *G. vulgatissimus* from the large ri-

ver Oder." (Author)] Address: Kern, D., Taxusweg 2, D-27232 Sulingen, Germany

1387. **Kido, M.H.; Heacock, D.E.; Asquith, A. (1999):** Alien rainbow trout (*Oncorhynchus mykiss*) (Salmoniformes: Salmonidae) diet in Hawaiian streams. *Pacific Science* 53(3): 242-251. (in English). ["Diet of rainbow trout, *Oncorhynchus mykiss* (Walbaum), introduced by the State of Hawai'i into tropical headwater streams of the Waimea River in the Koke'e area of the Hawaiian island of Kaua'i, was examined in this study through gut content analysis. In Wai'alae Stream, rainbow trout were found to be opportunistic general predators efficient at feeding on invertebrate drift. Foods eaten ranged from juvenile trout, to terrestrial and aquatic arthropods, to algae and aquatic mosses. Native aquatic species, particularly dragonfly (*Anax strennus*) and damselfly (*Megalagrion heterogamias*) naiads, lymnaeid snails (*Erinna aulacospira*), and atyid shrimp (*Atyoida bisulcata*), were determined to be major foods for alien trout. Terrestrial invertebrates (primarily arthropods), however, provided a substantial (albeit unpredictable) additional food supply. Based on results of the study, it is cautioned that large numbers of rainbow trout indiscriminantly released into lower- to middle-elevation reaches of Hawaiian streams could do substantial damage to populations of native aquatic species through predation, competition, and/or habitat alteration." (Authors)] Address: Kido, M.H., Hawai'i Stream Research Center, University of Hawai'i, 7370A Kuamo'o Road, Kapa'a, HI, 96746, USA

1388. **Kotarac, M. (1999):** Additional note about androchrome females in *Crocothemis erythraea* (Brulle, 1832). *Exuviae* 6: 19-20. (in English with Slovenian summary). [Kotarac (1996) reported bright red coloured females of *C. erythraea*. "Since then additional information on the subject has been collected and is presented here. On 31-VII-1996 three red females were observed [...] S of the village Skofije near port of Koper at the Slovenian Littoral (UTM VL04, alt. 5m). All individuals were mature, but in no way old. The red colour was nearly as bright as in males. [...] Mr U. Cervek (Maribor, Slovenia; pers. comm.) reported sightings of red *C. erythraea* females at a gravelpit near Sredisce ob Dravi (NE Slovenia) in August 1996. Additionally Dr M. Pavesi (Milano, Italy; pers. comm.) provided information about red coloured females observed in SE Italy (Puglia, Gallipoli) and E Turkey (area of Diyarbakir). He stated, however, that in his opinion they were older individuals and that red coloration was a sign of maturation. [...] In July and August 1997 a good population of *C. erythraea* with red coloured females was discovered at Blato, 3 kilometers S of town Korcula on the island Korcula, S Croatia. [...]"] (Author)] Address: Kotarac, M., Centre for Cartography of Fauna and Flora, Antoliceva 1, SI-2204 Miklavz na Dravskem polju, Slovenia. E-mail: mladen.kotarac@ckff.si

1389. **Krno, I.; Sporka, F.; Matis, D.; Tirjakova, E.; Halgos, J.; Kosel, V.; Bulankova, E.; Illesova, D. (1999):** Development of zoobenthos in the Slovak Danube inundation area after the Gabčíkovo hydropower structures began operating. Gabčíkovo part of the Hydroelectric Power Projekt - Environmental impact review. Faculty of natural Sciences, Comenius University, Bratislava, Slovakia: 175-200. (in English). [Tab. 4 documents the odonate fauna of the Slovakian part of the River Danube.] Address: Bulankova, Eva, Institute of Ecology, Faculty of Natural Sciences, Comenius Uni-

versity, Mlynská dolina B-II, SK-84215 Bratislava., Slovakia; tel.+ 421-7-728 922, E-mail: Bulankova@nic.fns.uniba.sk

1390. **Küttner, R.; Brockhaus, T.; Lässig, A. (1999):** Spezialistenlager Insektenkunde 1999 in der Naturschutzstation Weidnitz bei Rochlitz. Mitt. Sächsischer Entomol. 48: 29-30. (in German). [*Aeshna cyanea*, and *A. mixta* were observed in the framework of the meeting; the publication of the complete species lists is in preparation] Address: Küttner, R., Dorfstr. 26a, 09326 Schweikershain, Germany

1391. **Laurent, S. (1999):** Discussion sur la variabilité morphométrique de *Cercion lindenii* (Odonata, Coenagrionidae). *Martinia* 15(4): 125-130. (in French with English summary). [The emergence patterns of *Cercion lindenii* were monitored at a pond near Barbentane (Bouches du Rhône, France) and on the banks of the Rhône river at Aramon (Gard, France). Size and color patterns of abdomen, thorax, and wings of the emerging population depend on temperature factors and bivoltinism phenomena.] Address: Laurent, S., 14, Rue Edmond Michelet, F-84000 Avignon, France

1392. **Laurila, A.; Kujasalo, J. (1999):** Habitat duration, predation risk and phenotypic plasticity in common frog (*Rana temporaria*) tadpoles. *Journal of Animal Ecology* 68(6): 1123-1132. (in English). [1. Common frogs (*Rana temporaria*) breed readily in small pools and thus expose their offspring to catastrophic mortality by desiccation. Amphibian larvae exhibit considerable phenotypic plasticity in metamorphic traits, and some species respond to environmental uncertainty by metamorphosing earlier and at smaller size. In a factorial laboratory experiment, we studied whether common frog tadpoles possess this ability. 2. We also studied the interaction between pool drying and predation risk, because in a previous study the presence of a predatory dragonfly larva delayed metamorphosis of the tadpoles. 3. We gradually removed water from half the experimental containers, while in the other half the water volume was kept constant. In the laboratory it was possible to remove the effect of increased water temperature in the decreasing volume treatment by using fluorescent lights. Tadpoles responded to decreasing volume by metamorphosing earlier and at smaller size. A greater proportion of the tadpoles metamorphosed in the decreasing volume treatment. 4. Tadpoles were less active at decreasing water level and there were significant positive correlations between activity late in the experiment and metamorphic size. This suggests that the metamorphic response to habitat drying is behaviourally mediated. 6. Early in the experiment, tadpoles developed slower in the presence of predators. At metamorphosis presence of a dragonfly larva had no effect in the whole data set, but when the constant volume treatment was analysed separately, larval period was longer in the presence of a predator. 7. Our results indicate that common frog larvae are able to respond to pond-drying adaptively by speeding up their development, and that temperature advantage is not needed to induce this adaptive plasticity. Furthermore, pond-drying seems to be a more important determinant of development rate than the presence of odonate predators." (Authors)] Address: Laurila, A., Department of Population Biology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18d, S-752 36, Uppsala, Sweden

1393. **Logan, J.A. (1999):** Extraction, polymerase chain reaction, and sequencing of a 440 base pair region of the mitochondrial cytochrome oxidase I gene from two species of acetone-preserved damselflies (Odonata: Coenagrionidae, Agrionidae). *Environmental Entomology* 28(2): 143-147. (in English). ["Preserved insects are an important data for many molecular systematics projects. This study investigates the use of acetone-preserved specimens in molecular DNA research. Two species of damselflies, *Enallagma civile* (Hagen) and *Hetaerina americana* (F.), were soaked in acetone before drying. Total genomic DNA was successfully extracted, amplified, and sequenced from the acetone-preserved damselflies with no noticeable effect from either the acetone or preservation time. Nucleotide sequences of a 440 bp region of the mitochondrial cytochrome oxidase I gene are presented for *E. civile* and *H. americana*. These 2 species have reached a saturated divergence level and it seems that the COI gene will not be useful for developing phylogenies at this taxonomic level." (Author)] Address: not available

1394. **Manneville, O. et al. (1999):** Le monde des tourbières et des marais - France, Suisse, Belgique et Luxembourg. Delachaux et Niestlé. Lausanne. Paris: 320 pp-Odonata: 152-154. (in French). [A general outline to the dragonflies of peat-bogs, fens and marshes can be found on pages 152-154. Some remarks to the biology and ecology of Odonata are exemplified with characteristic species of bogs and marshes. The geographic and altitudinal distribution of some species is shortly mentioned. 29 species are listed in Appendix 6 with information on their status and the preferred habitat. (We are very grateful to Werner Clausen who provided a German translation of the Chapter with information on Odonata. Persons interested in this translation may contact W. Clausen, Zur Bockwindmühle 60, Oppenwehe, D-32351 Stemwede, Germany)]

1395. **Martens, A. (1999):** Buchbesprechungen: Corbet, P.S. (1999): *Dragonflies: Behaviour and Ecology of Odonata*. *Lauterbornia* 37: 247. (in German). [Review of P.S. Corbet's book, see OAS 1566] Address: Martens, A., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

1396. **Martín, R. (1999):** La Odonatofauna (Insecta: Odonata) del Parque Natural del Montseny (Cataluña, NE Península Ibérica). *Boln asoc. esp. ent.* 23(1-2): 171-193. (in Spanish with English summary). [Based on published data and own records taken from 1993 to 1998, 42 odonate species are known to occur in the Nature Reserve of Montseny, Spain. 12 species are only known from prior 1930. 7 species including *Oxygastra curtisii* were traced as new after 1987.] Address: Martín, R., Avda Martí Pujol 250, 3<sup>a</sup> 4a, E-08911 Badalona, Barcelona, Spain

1397. **Martins-Neto, R.G. (1999):** Present knowledge of the Brazilian paleontological fauna. *Revista de la Sociedad Entomológica Argentina* 58(1-2): 71-85. (in Spanish). ["[...] The first mention about fossil insects was made by the Brazilian researcher Eusebio Oliveira, in the beginning of the century. Later, was described the first Brazilian form, *Phylloblatta oliveirai* Carpenter, a paleozoic Blattoptera from Parana Basin, named in honour to E. Oliveira. The insect record is well documented in Paleozoic Era, being the Parana Basin the responsible by the greater number of references, principally of Blattoptera, but including the orders Neuropte-



ra, Coleoptera, Ensifera, Grylloblattida, Plecoptera, Auchenorrhyncha, Hemiptera, Megasecoptera and Mecoptera. In the Triassic Period the record is poor: just the orders Auchenorrhyncha and Blattoptera are represented until now. In the Cenozoic Era, Blattoptera, Hemiptera, Auchenorrhyncha, Coleoptera, Trichoptera, Lepidoptera, Diptera, Isoptera and Hymenoptera are represented. The greater diversification, however, are present in the Araripe Basin (Lower Cretaceous, Northeast Brazilian) with the following orders: Ephemeroptera, Odonata, Ensifera, Caelifera, Phasmatoptera, Blattoptera, Isoptera, Dermaptera, Hemiptera, Auchenorrhyncha, Neuroptera, Megaloptera, Raphidioptera, Coleoptera, Trichoptera, Lepidoptera, Mecoptera, Diptera and Hymenoptera." (Author)] Address: not available

1398. **Mauersberger, R. (1999):** Wiederfunde von *Anax parthenope* Selys und *Leucorrhinia caudalis* (Charpentier) in Mecklenburg-Vorpommern (Anisoptera: Aeshnidae, Libellulidae). *Libellula* 18(3/4): 197-199. (in German with English summary). ["In 1999, single adults of *A. parthenope* were observed at 2 clear-water lakes in the Müritzer National Park. A number of *L. caudalis* was recorded at a small shallow lake near Feldberg. Both species are well established in adjacent regions of Brandenburg." (Author)] Address: Mauersberger, R., Waldstraße 4, D-16278 Steinhofel

1399. **Mochizuki, H.; Morita, M.; Masuda, K; Kusamichi, I. (1999):** Flow mechanism around a dragonfly. *Memoirs of the Faculty of Agriculture Kagoshima University*. 35(43): 17-24. ["The flapping of the wing of the dragonfly and the flow generated by the flapping at full speed were observed by the high-speed video camera and the film camera. As the result, the relation between the movement of the wing and the flow was analyzed and clarified. The wings of the dragonfly move one cycle drawing a letter of "8" from the beginning of the downstroke to the end of the upstroke. Moreover, the gradient of the downstroke becomes larger than that of the upstroke, fetching larger velocity of the wing tip for the downstroke in comparison with the upstroke. The wakes generated by such flappings let their flow states the horizontal-, downward- and upward downstream directions depending on the horizontal-, upward- and downward flights. Almost all the amount of the air which enters into the region around the body and the wing is sucked from the upper side of the wing to compensate the air which has been exhausted by flapping. The edge of the wake generated by the flapping proceeds more downstream at faster velocity than that of the uniform flow. In this way, it can be confirmed that the thrust and the lift are generated by the flappings of the wings." (Authors)] Address: Masuda, K., Lab. Agric. Phys., Fac. Agric., Kagoshima Univ., Kagoshima, Japan

1400. **Mogi, M.; Sunahara, T.; Selomo, M. (1999):** Mosquito and aquatic predator communities in ground pools on lands deforested for rice field development in Central Sulawesi, Indonesia. *Journal of the American Mosquito Control Association*. 15(2): 92-97. (in English). [study area: Toili, Kabupaten Luwu-Banggai, eastern peninsula of Central Sulawesi; "Aquatic habitats, mosquitoes, and larvivorous predators were studied on deforested lands in Central Sulawesi, Indonesia. Open ground pools, mainly in depressions made by the treads of bulldozers and other heavy equipment, were numerous but because of their small size, comprised ca. 1% or less of the total area of the deforested

lands studied. The dominant mosquitoes in these pools were *Anopheles vagus*, *Culex vishnui*, *Culex tritaeniorhynchus*, and *Culex gelidus*. The 1st 2 species were dominant in clear pools, whereas the latter 2 species were dominant in turbid pools. The dominant metazoans other than mosquitoes were Crustacea, Ephemeroptera, and Chironomidae. Both aquatic and surface predators were abundant. Dominant among aquatic predators were Anisoptera and Zygoptera nymphs, Dytiscidae, and Notonectidae. These results are discussed in relation to mosquito control on deforested lands that transitionally but inevitably appear during the course of rice field development projects in Indonesia." (Authors)] Address: Mogi, M., Division of Parasitology, Department of Microbiology, Saga Medical School, Nabeshima 5-1-1, Saga 849-8501, Japan

1401. **Müller, J. (1999):** Editorial: *Pedemontanum* 3. *Pedemontanum* 3: 1. (in German). [Some critical remarks on the validity of odonatological research resulting from expertises of persons not specialized in Odonata and the regional odonate fauna; readers of *Pedemontanum* are urged to use the nomenclatorially updated checklist of Odonata occurring in Germany prepared by R. Jödicke (1992)] Address: Müller, J., Frankefelde 3, D-39116 Magdeburg, Germany. E-mail: [jmueller@MU.LSA-NET.dbp.de](mailto:jmueller@MU.LSA-NET.dbp.de)

1402. **Müller, J. (1999):** Literatur. *Pedemontanum* 3: 10-12. (in German). [Compilation of the titles No. 51 - 81 of odonatological publications with relevance to the Federal State Sachsen-Anhalt, Germany] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: [jmueller@MU.LSA-NET.dbp.de](mailto:jmueller@MU.LSA-NET.dbp.de)

1403. **Müller, J.; Steglich, R. (1999):** Neues von der Elbe bzw. aus dem Elbetal 1998. 1. UNESCO-Biosphärenreservat Flußlandschaft Elbe anerkannt. 2. *Aeshna affinis*-Reproduktionsgewässer fast ausgetrocknet. 3. Weitere Gomphidenfunde in der Elbe. *Pedemontanum* 3: 10. (in German). [22 April 1998 the Floodplain of River Elbe was recognized as Biosphere-reserve by UNESCO. 2 September 1998 *A. affinis* was recorded north of Magdeburg; new records of *Stylurus flavipes*, *Ophiogomphus cecilia*, and *Gomphus vulgatissimus* along the River Elbe] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: [jmueller@MU.LSA-NET.dbp.de](mailto:jmueller@MU.LSA-NET.dbp.de)

1404. **Müller, J.; Steglich, R. (1999):** Weitere Gompiden-Nachweise in großen mitteleuropäischen Flüssen. *Pedemontanum* 3: 9. (in German). [Records of *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, and *Stylurus flavipes* from Germany (Sachsen-Anhalt, Bayern), Hungaria, and Slovakia] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: [jmueller@MU.LSA-NET.dbp.de](mailto:jmueller@MU.LSA-NET.dbp.de)

1405. **Müller, J. (1999):** Zur Naturschutz-Bedeutung der Elbe und ihrer Retentionsflächen auf der Grundlage stenöker lebensraumtypischer Libellenarten (Insecta, Odonata). *Abhandlungen und Berichte für Naturkunde, Magdeburg* 21: 3-24. (in German with English summary). [Based on detailed surveys of the author and a comprehensive study of literature and unpublished expertises, 52 odonate species are recognized as indigenous for the flood plain of River Elbe, Sachsen-Anhalt, Germany. This represents 65 % of the German Odonata fauna and 82,5 % of that of Sachsen-Anhalt. 31 of this species are of Mediterranean origin. This is caused by the specific climatic conditions in the Elbe valley with

higher summer-temperatures than in the surrounding area. The occurrences of *Gomphus vulgatissimus*, *Stylurus flavipes* and *Ophiogomphus cecilia* in the river and of *Lestes barbarus*, *Erythromma viridulum*, *Aeshna affinis*, *A. viridis*, *Anax parthenope*, and *Epitheca bimaculata* in the oxbow lakes and the temporary waters of the flood plain are of superregional importance. The responsibility of Sachsen-Anhalt for the protection of these species in Germany is stressed.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: [jmueller@MU.LSA-NET.dbp.de](mailto:jmueller@MU.LSA-NET.dbp.de)

1406. **Murphy, D.H. (1999):** Odonata biodiversity in the Nature Reserves of Singapore. *Gardens' Bulletin (Singapore)* 49(2) (1997): 333-352. (in English). ["An account is given of Odonata collected during the survey of the Nature Reserves. Most of the species described from Singapore material in A.R. Wallace's collection in 1856 still occur. A total of 79 species have been recorded within the Nature Reserves, including an endemic damselfly, *Drepanosticta quadrata*. Eight species are known only from Nee Soon Swamp Forest." (Author)] Address: Murphy, D.H., Department of Biological Sciences, National University of Singapore, Kent Ridge, Singapore, 119260, Singapore

1407. **Muzon, J.; Ellenrieder, N. von (1999):** Status and distribution of Odonata (Insecta) within natural protected areas in Argentina. *Biogeographica* 75(3): 119-128. (in English). ["This paper is an initial study of Odonata occurring in protected areas of Argentina. Of the 264 species reported in the country 189 (71.59%) have been recorded from at least one natural protected area in the last three years. Information gathered from surveys of 16 protected areas is presented in relation to biogeography and taxonomy (to family level). Species recorded only from Argentina are indicated." (Authors)] Address: von Ellenrieder, Natalia, Instituto de Limnología "Dr. Raul A. Ringuelet", 1900, La Plata, Argentina

1408. **Nelson, B. (1999):** The status and habitat of the Irish damselfly *Coenagrion lunulatum* (Charpentier) (Odonata) in Northern Ireland. *Entomologist's Monthly Magazine* 135: 59-68. (in English). ["The N. Ireland population of *Coenagrion lunulatum* was surveyed in 1996. The main findings were: 1, the species was thought to be present at 23 sites in N. Ireland. Of these only 17 can now be regarded as definite. Albeit that 6 colonies were presumed on insubstantial evidence, 6 have disappeared. In other words a quarter of the known UK colonies have disappeared. 2, the size of individual colonies is smaller than previously suggested; only two colonies support large numbers. 3, the colonies are found on mesotrophic lakes and large bog pools. Habitat change caused by eutrophication is seen as the major threat to the species." (Author)] Address: Nelson, B.; Zoology Department, Ulster Museum, Botanic Gardens, Belfast, BT9 5AB, UK

1409. **Nessimian, J.L.; Sanseverino, A.M.; Oliveira, A.L.H. de (1999):** Trophic relationships of Chironomidae larvae (Diptera) and its importance on the food-webs in a sand dune marsh on the littoral of Rio de Janeiro State. *Revista Brasileira de Entomologia* 43(1-2): 47-53. (in Portuguese). ["A Food web study was carried out, based on direct observations and gut content analysis of macroinvertebrates sampled from Jan. 1987 to Feb. 1988, in Brejo-canal de Itaipuacu marsh, Marica, whose structure and composition have changed seasonally. Chironomid larvae and microcrustaceans were

the main taxa among the macroinvertebrates, being keystone prey groups in the trophic system. [...] The whole group showed an approximated mean of 14 trophic links per species against the medium value of 9 links per species for all macroinvertebrates sampled. The main alimentary items observed for chironomid larvae were chlorophytes, desmids diatoms, cladocerans, copepods, oligochaetes and chironomid larvae, besides poriferans, mites and vegetal fibers. On the other hand, chironomid larvae were constant items in Odonata, Hemiptera and Coleoptera diets. The variation in the number of interactions was due to the water column, the macrophyte and algae life cycles. Spring and summer observations showed the biggest number of links. The consequent changes in the availability of alimentary items was reflected, at least relatively, on the diversity of chironomid diet." (Authors)] Address: Nessimian, J. L. , Departamento de Zoologia, Instituto de Biologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro, RJ, Brazil

1410. **Palmer, M.A. (1999):** The application of biogeographical zonation and biodiversity assessment to the conservation of freshwater habitats in Great Britain. *Aquatic Conservation: Marine and freshwater ecosystems* 9(2): 179-208. (in English). ["1. Twelve biogeographical zones for freshwater habitats in Great Britain were derived, using detrended canonical correspondence analysis of data on climate, relief, geology, soils and land use, in conjunction with occurrence data for more than 300 native freshwater species. 2. The taxonomic groups used were aquatic macrophytes, dragonflies (Tab. 6), freshwater molluscs, amphibians and selected leeches, water beetles and crustaceans. The computer database of the Institute of Terrestrial Ecology's Biological Records Centre was used as the principal of species data. 3. Within each of the 12 biogeographical zones, 10 X 10 km square 'hotspots' for species richness and rarity were identified. 4. The significance of this work for the conservation of freshwater habitats and species in Great Britain is discussed." (Author)] Address: Palmer, Margaret, Apple Barn Cottage, Fotheringhay, Peterborough, PE8 5JB, UK.

1411. **Paoletti, M.G.; Dunxiao, H.; Patrik, M.; Ningxing, H.; Wenliang, W.; Chunru, H.; Jiahai, H.; Liwan, C. (1999):** Arthropods as bioindicators in agroecosystems of Jiang Han Plain, Qianjiang City, Hubei China. *Critical Reviews in Plant Sciences*. 18(3): 457-465. (in English). [Arthropods on the soil surface and on vegetation were periodically surveyed in two villages on the Jiang Han Plain from April to September 1994. Odonata are mentioned in Tab. 4 without further discussion.] Address: Hu Dunxiao, China Agricultural University, Beijing, P.R. China

1412. **Parker, A.R. (1999):** Reflected glory: the key to insect colours. *Biologist* 46(5): 206-210. (in English). ["There are basically three categories of structures that cause colour in insects: (i) elements which cause scattering, (ii) diffraction gratings and (iii) single- and multi-layer reflectors. The last two mechanisms cause specular (directional) reflections, and therefore often appear relatively bright and 'metallic', whereas the first provides on omnidirectional reflectance. Generally within all of the categories, only transparent materials are involved in producing colour. [...] Scattering - blue: [...] A gradation from blue to white scattering ('small' to 'large' particles) occurs on the wings of the dragonfly *Libellula pulchella* (Mason, 1926). Blues resulting from this 'Ray-

leigh' scattering can also be found in other dragonflies and damselflies [...] In some, the epidermal cells contain minute colourless granules, which scatter the short wavelengths, and a dark base. These granules are absent in the females of the species. The males of some other species produce a waxy secretion that scatters light over their dark cuticle. The green of the female *Aeshna cyanea* is the combined result of Rayleigh scattering and a yellow pigment, both within the epidermal cells (degradation of the yellow pigment turns a dead dragonfly blue) [...] (Fox and Vevers, 1960)." (Author)] Address: Parker, A., Dept Zoology, University of Oxford, South Parks Road, Oxford OX1 3PS, UK

1413. **Petrulevicius, J.F. (1999):** Cenozoic insects from Argentina. *Revista de la Sociedad Entomologica Argentina* 58(1-2): 95-103. (in Spanish with English summary). ["A review of the information about cenozoic insects is presented. Paleogene insects are mentioned from different regions and formations. The *Siricinae Urocerus patagonicus* Fidalgo & Smith, 1987 is the unique nominated species from Laguna del Hunco Formation (Paleocene-Eocene; Chubut Province). This subfamily has at present a North Hemisphere distribution. The *Formicidae Polanskiella smekali* Rossi de Garcia, 1983 and the *Myrmecinae Ameghinoia piatnitzkyi* Viana & Haedo Rossi, 1957 are the two nominated species from Ventana Formation (Eocene-early Oligocene; Chubut Province), together with other (aquatic and terrestrial) insects. The *Myrmecinae* have at present an Australian distribution. Insects (*Curculionoidea*, *Elate-roidea* and *Formicidae*) are cited for the first time from Canadon Hondo Formation (Eocene; Chubut Province), as well as isolated elitra of *Coleoptera* from Olmedo Formation (lower Paleocene; Jujuy Province). Maiz Gordo Formation (upper Paleocene; northwestern Argentina) provided 37 species of *Orthoptera*, *Dermaptera*, *Hemiptera* (*Homoptera* and *Heteroptera*), *Trichoptera* and *Coleoptera*. Since 1993, new findings were carried out by the author in these insect layers. Thus far, representatives of six orders and several families have been found, including *Blattaria*, *Odonata*, *Mecoptera*, *Neuroptera*, *Diptera*, *Hymenoptera*, *Tettigoniidae* and *Lygaeidae*. Isolated tegmina of *Grylloidea* and elitra of *Coleoptera* (*Curculionoidea*) are known from *Lumbrera* Formation (lower Eocene; northwestern Argentina). Pleistocene insects are cited from two outcrops in Buenos Aires Province: puparia moulds of *Calliphoridae* in association with an articulated skeleton of *Carnivora* from the "Ensenadense", and an insect assemblage from Santa Clara Formation. The migratory subspecies *Schistocerca cancellata paranensis* (Burmeister, 1861) was found in an archaeological Holocene site in Tucuman Province." (Author)] Address: Petrulevicius, JF; Museo La Plata; Dept Cient Paleozool Invertebrados; Paseo Bosque S-N; RA-1900 La Plata; Argentina. E-mail: levicius@netverk.com.ar

1414. **Pirnat, A. (1999):** Study of emergence in *Pyrrosoma nymphula* (Sulzer) (*Zygoptera*: *Coenagrionidae*). *Exuviae* 5(1): 6-12. (in English with Slovene summary). ["From 21-IV to 12-V-1994 the emergence of *Pyrrosoma nymphula* was studied at a small forest pond in Ljubljana, central Slovenia. A total of 798 exuviae were collected and the daily emergence rate, synchronization of emergence and sex ratio were studied. A short note on mortality and predation [by Spiders, ants, lizards, and birds] during emergence is also appended." (Author)] Address: Pirnat, Alja, Biological Insti-

tute ZRC SAZU, Novi trg 5, SI-1000 Ljubljana, Slovenia. E-mail: alja.pirnat@guest.arnes.si

1415. **Polyanovskii, A.D. (1999):** Phototransduction in insects: Two strategies for calcium homeostasis? *Sensory Systems* 12(3): 181-187. (in English). [This is the English version of the paper abstracted as OAS 1306] Address: Polyanovskii, A.D., I. M. Sechenov Institute of Evolutionary Physiology and Biochemistry, Russian Academy of Sciences, 44 M Torez Prospekt, 194223 St. Petersburg

1416. **Reinhardt, K. (1999):** The reproductive activity of two *Pseudagrion* species in the same habitat (*Odonata*: *Coenagrionidae*). *African Entomology* 7(2): 225-232. (in English). ["The reproductive activity of two closely related species, *Pseudagrion massaicum* Sjöstedt and *P. salisburyense* Ris was examined relative to environmental factors. The abundance of both species was positively correlated, suggesting a weak influence of interspecific competition. The most important abiotic factor influencing the activity of the two species was cloud cover. Males of the two species showed a strong spatial separation in perching position relative to vegetation type, perch height and distance to the banks. The proportion of males actively engaged in reproduction rose significantly with time of day but was independent of total male density and the relative importance of either patrolling or perching behaviour. Males of both species were found to be non-territorial, which is exceptional for the genus *Pseudagrion*. This is discussed relative to high territory retention costs at high dragonfly densities." (Author)] Address: Reinhardt, K., Hauptstr. 38, D-09244 Oberlichtenau, Germany. E-mail: b5klre@pluto.rz.uni-jena.de

1417. **Reinhardt, K.; Kempke, D. (1999):** Thoracic temperatures in four libellulid dragonflies (*Anisoptera*: *Libellulidae*). *Notul. odonatol.* 5(4): 41-43. (in English). ["The thoracic temperatures in *Orthetrum cf. caffrum*, *Trithemis arteriosa*, *T. dorsalis* and *Palpopleura lucia* were measured in the field. All spp. belong to the percher type. Their thoracic temperatures were between 0.7 and 10.5°C above ambient temperature. The pale blue *O. cf. caffrum* had a higher body temperature than the dark blue *T. dorsalis*. The thorax temperature was positively correlated to abdomen length but not forewing length between species with a similar trend within *T. dorsalis*." (Authors)] Address: Reinhardt, K., Hauptstr. 38, D-09244 Oberlichtenau, Germany. E-mail: b5klre@pluto.rz.uni-jena.de

1418. **Reinhardt, R.; Pimpl, F. (1999):** Beitrag zur Insektenfauna des Landkreises Mittweida. *Mitt. Sächs. Entomologen* 47: 8-17. (in German). [Checklist of 11 odonate species of the county Mittweida, Saxony, Germany] Address: Reinhardt, R., Burgstädter Str. 80a, D-09648 Mittweida, Germany

1419. **Rolff, J. (1999):** Parasitism increases offspring size in a damselfly: Experimental evidence for parasite-mediated maternal effects. *Animal Behaviour* 58(5): 1105-1108. (in English). ["The effects of parasites on host fitness and the fitness effects of maternal effects are widely discussed. In this study, I conducted an experiment linking both aspects. I manipulated the ectoparasite load (*Acari*: *Arrenurus cuspidator*) of damselflies, *Coenagrion puella*, and found that larvae from mothers with high parasite loads were larger (assessed by head width) than larvae from mothers with low parasite loads. Furthermore, there was a negative correlati-



on between the number of eggs laid and parasite load. Parasitized mothers thus seemed to have fewer, but probably better, offspring. The ecological significance of these parasite-mediated maternal effects remains to be tested. However, size-dependent cannibalism almost certainly has important consequences for population dynamics." (Author)] Address: Rolff, J., Zoologisches Institut, AG Ökologie, Technische Universität Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

1420. **Ruddek, J. (1999):** *Gomphus vulgatissimus* (Linnaeus) in der Weser bei Bremen (Anisoptera: Gomphidae). *Libellula* 18(3/4): 201-203. (in German with English summary). ["Exuviae and adults of *G. vulgatissimus* were found in May and June 1999. The number of Odonata species recorded in the federal state of Bremen increased to 47 species." (Author)] Address: Ruddek, R., Butendiek 34, D-28865 Lilienthal, Germany. E-mail: juergen.ruddek@telekom.de

1421. **Ruiter, E. (1999):** Een Aeshna'tje meer of minder .... Mededelingen van de Nederlandse Vereniging voor Libellenstudie 3(4): 9. (in Dutch). [In the estate of De Horte near Zwolle, The Netherlands, more than 70 exuviae of *Aeshna cyanea* and 1 of *Sympetrum vulgatum* were collected. The abundance was calculated with 5 ind./m<sup>2</sup>] Address: Ruiter, E., Cornelis Houtmanstraat 10, NL-8023 EA Zwolle, the Netherlands

1422. **Ruiter, E. (1999):** Late waarneming van een Gewone oeverlibel *Orthetrum cancellatum*. Mededelingen van de Nederlandse Vereniging voor Libellenstudie 3(4): 9. (in Dutch). [Phenological date from a late record of *O. cancellatum*, and *Sympetrum vulgatum* and *Aeshna mixta* (Zwolle, The Netherlands)] Address: Ruiter, E., Cornelis Houtmanstraat 10, NL-8023 EA Zwolle, the Netherlands

1423. **Sahlén, G. (1999):** The impact of forestry on dragonfly diversity in central Sweden. *International Journal of Odonatology* 2(2): 177-186. (in English). ["A survey of 32 lakes for dragonfly larvae, aquatic plants and forestry regime in the surrounding boreal forests was performed. The highest diversity was found in undisturbed forests. Lakes rich in aquatic plants were shown also to be rich in dragonflies. A rich plant community is proposed to provide a wider range of microhabitats thereby increasing dragonfly biodiversity. If the forest surrounding a lake has been logged, a decrease in the species-richness of dragonflies with partivoltine life-cycles can be observed after a 5 year "lag phase." Increased fluctuations in water temperature and leakage of nutrients into the water are two possible causes. Univoltine species are not affected and appear to be less dependent on constant water conditions. The water plant community is only moderately affected, but a slight decrease in the number of species can be observed. A return to more species-rich conditions can be observed after more than 15 years, but whether the original community is restored or replaced with more "trivial" species is an open question." (Author)] Address: Sahlén, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, S-752 36 Uppsala, Sweden. E-mail: goran.sahlen@zoologi.uu.se

1424. **Samraoui, B.; Menai, R. (1999):** A contribution to the study of Algerian Odonata. *International Journal of Odonatology* 2(2): 145-165. (in English). ["A survey of the dragonflies of Algeria, spanning nine years, has yielded 53 species. Past records of another 10 species

are believed to be genuine, making up a total of 63 species for the country. We try to clarify the status of these supplementary species and also provide information on the current distribution and present status of all recorded species." (Authors)] Address: Boudjema Samraoui & Rachid Menai' Laboratoire de Recherche des Zones Humides, Université d'Annaba, 4 rue Hassi-Beida, Annaba, Algeria. E-mail: bsamraoui@hotmail.com

1425. **Samraoui, B.; Jödicke, R. (1999):** Mise au point concernait l'article "Les Odonates Zygoptères de l'oued de la Meskiana (Algérie). Premier bilan des observations" (*Martinia*, 15 (1): 22). *Martinia* 15(4): 121-123. (in French with English summary). ["The authors rectify the check-list reported by Bouguessa et al., in a short note (*Martinia*, 15(1): 22). Out of the nine listed species, only two, *Cercion lindenii* and *Coenagrion mercuriale*, may have been correctly identified. The present communication provides a list of the Zygoptera recorded so far, in Oued Meskiana and the surroundings."] Address: Samraoui, B., Laboratoire de Recherche des Zones Humides, 4, rue Hassi-BeTda, Annaba, Algeria; Jödicke, R., Grossenging 14, D-49699 Lindern, Germany

1426. **Sanders, M.D. (1999):** Common aquatic invertebrate taxa vary in susceptibility to capture by Black Stilt chicks. *Notornis* 46(2): 311-318. (in English). ["I tested the ability of captive Black Stilt chicks (*Himantopus novaezelandiae*) to capture and consume common aquatic invertebrates. Waterboatmen (*Sigara* sp.), segmented worms (*Oligochaeta*), and larvae of a damselfly (*Xanthocnemis zealandica*), midge (*Chironomus zealandicus*), mayfly (*Deleatidium* spp.), and caddisfly (*Aoteapsyche colonica*) were captured and consumed quickly and easily by chicks of all ages (2 - 30 days). They were also consumed in the greatest contrast, two aquatic snails (*Physa acuta* and *Lymnaea tomentosa*), and larvae of two cased caddisflies (*Triplectides* sp. and *Hudsonema amabilis*) were captured and consumed with difficulty and in low numbers by young chicks (< 7 days). Young chicks appeared to take longer than older chicks to capture prey, to spend more time manipulating prey in their bills before swallowing, and to drop prey frequently. In contrast, 21 - 30 day old chicks appeared to capture, manipulate and swallow most types of prey efficiently and quickly. These results augmented biomass as a measure of the value of aquatic invertebrate food supplies in wetlands." (Author). Most *Xanthocnemis zealandica* were consumed in most trials, and it was pecked at more rapidly than oligochaetes, molluscs and cased caddisflies. "Larvae of *X. zealandica* struggled vigorously when captured, and were sometimes able to escape from 2-3 day old chicks, by 'flicking' their abdomens while the chicks were manipulating them in their bills. [...] *X. zealandica* is likely to be easily captured and consumed in the wild, as it was in the experiment." (Author)] Address: Sanders, M., Department of Conservation, Private Bag, Twizel, New Zealand

1427. **Sandhu, R.; Walia, G.K. (1999):** Karyology of male and female *Pseudoagrion rubriceps* (Zygoptera : Coenagrionidae). *Bionature* 19(1): 1-5. (in English). ["Chromosomal analysis has been carried out on male and female individuals of *Pseudoagrion rubriceps* collected from the states of Jammu and Kashmir, Punjab, Assam and Meghalaya in India. Majority of mitotic and meiotic stages possess the diploid numbers 27 in males and 28 in females with XO - XX sex determining me-

chanism. The autosomes include a tiny pair of m chromosome in both sexes. Numerous plates showing autosomal fragmentations in different meiotic stages of the same individual have been observed. In these, diploid numbers vary from 27 to more than 45. Female karyotype and autosomal fragmentations have been reported for the first time in this damselfly." (Authors)] Address: Sandhu, R., Dep. Zool., Punjabi Univ., Patiala-147 002, Punjab, India

1428. **Sawada, K. (1999):** Female sexual receptivity and male copula guarding during prolonged copulations in the damselfly *Ischnura senegalensis* (Odonata: Coenagrionidae). *Journal of Ethology* 17(1): 25-31. (in English). ["Laboratory experiments were conducted to clarify the relationship between female sexual receptivity and male copula guarding in *I. senegalensis*, a species that copulates for several hours. In insectaries, most copulations were initiated early in the morning, and terminated relatively synchronously between 11 00 and 13 00. Females refused males with wing-flutter display and oviposited alone in the afternoon regardless of copulation events of that morning. Females could sexually receive males only in the morning. Males copulated for several hours until 12 00 after which females could oviposit. To determine whether copulations that last for hours function as male copula guarding or only of sperm displacement, emerged males were kept at various densities and permitted to copulate with virgin and mated females in insectaries. Both with virgin and mated females, "social" (not solitary; 2-4 males / insectary) males initiated copulations early in the morning and always terminated at around 12 00. However, both with virgin and mated females, solitary (one male / insectary) males terminated copulations in the morning. In both cases, duration of copulations did not significantly differ for virgin females and mated females. Therefore, long (several hour) copulation is more likely to function as male copula guarding than as sperm displacement, and duration of copulations is predicted to be shortened when male density is very low." (Author)] Address: Sawada, K., Kashii High School, 2-9-1, Kashii, Higashi-ku, Fukuoka, 813-0011, Japan

1429. **Schiel, F.-J.; Rademacher, M. (1999):** Wiederrunde von *Gomphus flavipes* (Charpentier) am Oberrhein in Baden-Württemberg (Anisoptera: Gomphidae). *Libellula* 18(3/4): 181-185. (in German with English summary). ["As a result of a systematic survey between 20 and 29-VII-1999, two exuviae of *G. flavipes* were found at two sites at the Upper Rhine south of Karlsruhe and south of Kehl, respectively. The habitat is briefly described and the circumstances of the records are shortly discussed. Remarkable is the record of one exuviae of *Ophiogomphus cecilia* at the main course of the Upper Rhine north of Karlsruhe." (Authors)] Address: Schiel, F.-J., Rademacher, M., Institut für Naturschutz und Landschaftsanalyse (INULA), Friesenheimer Hauptstraße 20, D-77948 Friesenheim, Germany. E-mail: michael.rademacher@t-online.de

1430. **Schiller, R. (1999):** Der Leipziger Auwald - ein Gebiet mit besonderer Bedeutung für die Entomofauna Sachsens. *Mitt. Sächs. Entomologen* 47: 3-7. (in German). [Reference to some odonatological studies with reference to the floodplain forests of Leipzig, Saxony, Germany; the following species are listed: *Lestes barbarus*, *Anaciaeschna isosceles*, *Anax parthenope*, and *Brachytron pratense*] Address: Schiller, R., Naturkun-

demuseum Leipzig, Lortzingstr. 3, D-04105 Leipzig, Germany

1431. **Schmid, U. (1999):** Unser Neuzugang in Sachen Bernstein: Dr. Günter Bechly. *Museum - Naturkundemuseum Stuttgart* 6/99: without pagination. (in German). [The famous amber collection in the Naturkundemuseum Stuttgart will be managed in the future by Dr. G. Bechly, a well known German odonatologist with special interest in odonate palaeontology and phylogeny. Bechly's odonatological vitae is shortly outlined, and some annotations on highlights of the amber collection and its doyen Dr. Dieter Schlee are made.] Address: Staatliches Museum für Naturkunde Stuttgart, Rosenstein 1, D-70191 Stuttgart, Germany

1432. **Schulz, R.; Berenzen, N.; Hünken, A.; Wendt, H. (1999):** Auswirkungen von Unterhaltungsmaßnahmen an Gewässern der Uckerniederung nördlich von Prenzlau und ihre Bedeutung aus Naturschutzsicht. *Naturschutz und Landschaftspflege in Brandenburg* 8(4): 148-154. (in German). [Brandenburg, Germany; effects of ditch management patterns on fauna are studied in detail; rotational clearance of ditches allows best displays of fauna; *Ischnura elegans* is the single odonate species mentioned] Address: Schulz, R., Zool. Inst. TU Braunschweig, Fasanenstr. 3, 38092 Braunschweig, Germany. E-mail: r.schulz@tu-bs.de

1433. **Shieh, Sen-Her; Yang, Ping-Shih (1999):** Colonization patterns of aquatic insects on artificial substrates in a Taiwan stream. *Zhonghua Kunchong* 19(1): 27-50. (in English). ["Experiments on colonization patterns of artificial substrates by aquatic insects were conducted in the upper Chingmei Stream, Taiwan. Artificial substrates were colonized by aquatic insects for periods of 3, 6, 12, 21, 30, and 42 days from 15 Dec. 1990 to 26 Jan. 1991 at 2 sites: a polluted site caused by coal mining activities (Site 1) and a recovery site further downstream of the polluted site (Site 2). Total numbers of individuals and taxa were significantly affected by exposure period of experimental substrates and sites, indicating the occurrence of succession and the detrimental effect of coal mining activities on aquatic insect communities. At Site 1, only *Caenis* sp., *Euphaea* sp., and *Chironomidae* occurred on all sampling dates and were abundant. The other taxa may have just continued to drift away from the site. The chironomid larvae were most abundant. They accounted for over 90% of the colonizing individuals from day 12 to day 42. At Site 2, *Baetis* spp. and *Chironomidae* were most abundant. They accounted for over 80% of individuals during the experiment, except on day 21. The relative abundance shifted from *Baetis* spp. to *Chironomidae* with an increase in colonization time. A large number of positive correlation was found within the functional groups of filter-feeders and predators at Site 2. Taxa within the two groups tended to overlap in their distribution among baskets. The lognormal distribution was a better fit at Site 1 than at Site 2, suggesting that it is easier for a community to attain a state of equilibrium in a stressed environment than in a less-polluted environment. Mechanisms determining the colonization patterns of aquatic insects were reflected by the susceptibility of organisms to mining activities at Site 1, and the influence of biological interactions and disturbance caused by high discharges at Site 2 during the experimental period." (Authors)] Address: Shieh, Sen-Her, department of Entomology, National Taiwan University, Taipei, 106, Taiwan

1434. **Southcott, R.V. (1999):** Larvae of *Leptus* (Acarina: Erythraeidae), free-living or ectoparasitic on arachnids and lower insects of Australia and Papua New Guinea with descriptions of reared post-larval instars. *Zoological Journal of the Linnean Society* 127(2): 113-276. (in English). [*Leptus* larvae (Acarina: Erythraeidae) of Australia and New Guinea, collected either free-living or ectoparasitic on Arachnida or lower Insecta, are comprehensively reviewed. For Australia new species are described from Scorpionida: 8, from Araneae:1, from Insecta (Archaeognatha: 1, Blattodea: 1, Phasmatodea: 1, Orthoptera, Acridoidea: 7, Hemiptera: 5), and free-living only: 2. From Papua New Guinea new species are described parasiting on Acridoidea: 1, Orthoptera: 1, and free-living: 3. Additional host and other records are given for previously described species, originally described as ectoparasites of Insecta (from Australia) and from Papua New Guinea including *L. draco* Southcott (Odonata, Acridoidea, Tettigoniodea, Phasmatodea, Hemiptera).] Address: Southcott, R.V., 2 Taylors Road, Mitcham, SA, 5062 Australia.

1435. **Sovinc, A. (1999):** Restoration ecology. *Proteus, Ljubljana* 62(4): 152-160. (in Slovene with English summary). ["Restoration Ecology is an emerging profession within the Ecology; it is an attempt to reverse the human induced ecological changes and to stimulate the natural or semi-natural processes in habitats, ecosystems, and landscapes. The article discusses different terms in the restoration processes, such as habitat rehabilitation, reconstruction, enhancement, re-creation, transplantation and creation, mitigation, and others, and provides a set of basic considerations when planning and implementing restoration measures. These include: a) the line up to which nature should be 'helped' has to be carefully considered; restoration should, in principle, only encourage, accelerate, allow or imitate natural processes; b) nature restoration projects should never be undertaken in indigenous areas with a high conservation or biodiversity value; c) nature restoration projects should never be used to justify environmentally damaging developments. Examples of already implemented wetland restoration projects include the creation of substitute habitats along the Ljubljanica river during the construction of a new motorway, including habitat creation for amphibians, the construction of small ponds, revitalisation of oxbows and floodplains. Other examples include the creation of wetland habitats during the dredging of the Zbilje reservoir, the construction of a pond at Trzin and a restoration of a section of the Bicje river near Grosuplje." (Author). *Orthetrum brunneum* is the single odonate species mentioned in the article.] Address: Sovinc, A., Pod Kostanji 44, SI-1000 Ljubljana, Slovenia

1436. **Stav, G.; Blaustein, L.; Margalith, J. (1999):** Experimental evidence for predation risk sensitive oviposition by a mosquito, *Culiseta longiareolata*. *Ecological Entomology* 24(2): 202-207. (in English). ["1. Females should choose to oviposit in habitats where risk of predation and competition are low. The ovipositional responses of a mosquito, *Culiseta longiareolata*, to a predator and to species sharing the same trophic level as this mosquito (controphic species) were assessed experimentally in outdoor artificial pools. 2. The predator, larval *Anax imperator*, which strongly reduced larval *C. longiareolata* survival, resulted in a 52% reduction of *C. longiareolata* egg rafts. The controphic species (primarily *Daphnia magna*), which had a small but statisti-

cally significant negative effect on the survival of *C. longiareolata* larvae, did not have a statistically significant influence on the number of egg rafts. 3. Laboratory trials indicated that only a small fraction of the reduced number of egg rafts seen in predator pools may be due to consumption of the egg rafts by *A. imperator*. 4. The experimental evidence indicates that the reduced number of *C. longiareolata* egg rafts found in the presence of *A. imperator* is due largely to oviposition habitat selection, i.e. *C. longiareolata* females choose pools with low risk of predation for their offspring." (Authors)] Address: Blaustein, L., Laboratory for Community Ecology, Institute of Evolution, University of Haifa, Haifa, 31905, Israel

1437. **Steenis, W. van (1999):** Vondst Gewone bronlibel *Cordulegaster boltonii* in de stad Utrecht. *Mededelingen van de Nederlandse Vereniging voor Libellenstudie* 3(4): 7-9. (in Dutch). [On 8 August 1999 *C. boltonii* was discovered in Utrecht, the Netherlands. On the occasion of the discovery the known Dutch records are compiled, mapped and discussed] Address: Wouter van Steenis, W.vanSteenis@Natuurmonumenten.nl

1438. **Steglich, R.; Müller, J. (1999):** Artenliste der Funde von Heuschrecken (Saltatoria) und Libellen (Odonata) in ausgewählten Biotopen am Neusiedler See und Umgebung sowie der Donau-Niederung in Ungarn, Österreich und der Slowakei 1997 und 1998. *Halophila* 38: 3-5. (in German). [Shortly commented compilation of faunistic data of Odonata from Austria, Hungaria, and Slovakia. *Thecagaster bidentata*, *Stylurus flavipes*, and *Ophiogomphus cecilia* are of some interest] Address: Steglich, Rosmarie, Quittenweg 53, 39118 Magdeburg, Germany

1439. **Stoks, R. (1999):** Autotomy shapes the trade-off between seeking cover and foraging in larval damselflies. *Behavioral Ecology and Sociobiology* 47(1/2): 70-75. (in English). ["Animals commonly choose between microhabitats that differ in foraging return and mortality hazard. I studied the influence of autotomy, the amputation of a body part, on the way larvae of the damselfly *Lestes sponsa* deal with the trade-off between foraging or seeking cover. Survival of *Lestes* larvae when confronted with the odonate predator *Aeshna cyanea* was higher in a complex than in a simple microhabitat, indicating that this more complex microhabitat was safer. Within the simple microhabitat, larvae without lamellae had a higher risk for mortality by predation than larvae with lamellae, showing a long-term cost of autotomy. When varying the foraging value (food present or absent) and predation risk (encaged predator or no predator) in the simple microhabitat, larvae with and without lamellae responded differentially to the imposed trade-off. All larvae spent more time in the simple microhabitat when food was present than when food was absent. Larvae without lamellae, however, only sporadically left the safe microhabitat, irrespective of the presence of the predator. In contrast, larvae with lamellae shifted more frequently towards the risky microhabitat than those without lamellae, and more often in the absence than in the presence of the predator. These decisions affected the foraging rates of the animals. I show for the first time that refuge use is higher after autotomy and that this is associated with the cost of reduced foraging success. The different microhabitat preferences for larvae with and without lamellae are consistent with their different vulnerabilities to predation and demonstrate the importance of intrinsic fac-



tors in establishing trade-offs." (Author)] Address: Stoks, R., Evolutionary Biology Group, Department of Biology, University of Antwerpen (RUCA), Groenenborgerlaan 171, B-2020 Antwerpen, Belgium. E-mail: stoks@ruca.ua.ac.be

1440. **Suhling, F. (1999):** Dragonfly records from El Valle, Republic of Panama. *Notul. odonatol.* 5(4): 51. (in English). [List of 13 odonate species collected in March 1998 in the surroundings of El Valle (8.35N 80.7W), Panama.] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

1441. **Suhling, F.; Schütte, C. (1999):** Sternberg, K.; Buchwald, R. (Eds.) (1999): *Die Libellen Baden-Württembergs. Band 1. Lauterbornia* 37: 248-249. (in German). [Review of the book, see OAS 1149] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

1442. **Tembhare, D.B. (1999):** The 5th South Asian Symposium of Odonatology, Nagpur, India; 20-21 December 1998: A report. *Notul. odonatol.* 5(4): 51-52. (in English). [Short report on the South Asian Sym. Odonat.] Address: Tembhare, D.B., Dept Zool., Nagpur Univ. Campus, Amravati Road, Nagpur-440010, Maharashtra, India

1443. **Terzani, F. (1999):** Odonati dell'alto Appennino Mutino-Pistoiese, Emilia-Romagna e Toscana Italia centrosettentrionale (Odonata). *Opuscula Zoologica Fluminensia* 170: 1-7. (in Italian with English summary). ["11 spp. are listed from 13 localities. *Chalcolestes viridis*, *Lestes dryas*, *Platycnemis pennipes*, *Pyrrhosoma nymphula*, *Coenagrion puella*, *Enallagma cyathigerum*, *Aeshna cyanea*, *Cordulegaster b. boltonii*, *Libellula quadrimaculata*, and *Platetrum depressum* were collected for the first time in this geographic area." (Author)] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, FI, Italy. E-mail: terzani@www.specola.unifi.it

1444. **Terzani, F.; Carfi, S. (1999):** Ricerche odonologiche in Toscana, Italia centrale. 6. *Padule di fucechio* (Odonata). *Opuscula Zoologica Fluminensia* 170: 9-23. (in Italian with English summary). ["Some 27 spp. are listed from 23 localities, *Fucechio Marsh*, lower *Valdarno*. *Calopteryx haemorrhoidalis*, *Lestes barbarus*, *Erythromma viridulum*, *Coenagrion pulchellum mediterraneum* Schmidt, *Aeshna mixta*, *Anaciaeschna isosceles*, *Libellula quadrimaculata*, *Orthetrum b. brunneum*, *O. c. coerulescens*, *Crocothemis erythraea*, *Sympetrum sanguineum*, and *Trithemis annulata* were collected for the first time in this geographic area." (Authors)] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, FI, Italy. E-mail: terzani@www.specola.unifi.it

1445. **Trilar, T.; Bedjanic, M. (1999):** Contribution to the knowledge of the dragonfly fauna of Lastovo island, Dalmatia, southern Croatia. *Exuviae* 6: 1-6. (in English with Slovenian summary). ["A list of 7 dragonfly species recorded on the island in June and July 1998 is given. *Cordulia aenea* (L.) is new for the odonate fauna of Dalmatia. Its distribution in southern Europe is outlined and commented." (Authors) The rare *Coenagrion scitulum* is listed from two localities.] Address: Trilar, T., Slovenian Museum of Natural History, Presernova 20, P. O.

Box 290, SI-1000 Ljubljana, Slovenia. E-mail: trilar@pms-lj.si

1446. **Trockur, B.; Didion, A. (1999):** Fortpflanzungsnachweise der Zierlichen Moosjungfer, *Leucorrhinia caudalis* CHARPENTIER, 1840 im Moseltal. *Abhandlungen der Delattinia* 25: 57-66. (in German with English summary). [Adult males of *L. caudalis* were recorded in gravel pits in the Mosel valley near Nennig (Saarland, Germany) and near Remich (Haff Remich, Luxembourg) between 1996 and 1999. Reproduction could be recorded in May 1999 (3 exuviae with one freshly emerged female). High transparency of the water is as typical for the localities as rich submerged or floating vegetation. All localities in the gravel pit area of Nennig and Remich with records of *L. caudalis* are described in some detail with emphasis to the vegetation and the associated odonate species. The regional status in France (Lorraine), Luxembourg and Saarland is discussed with reference to the core habitats of the regional metapopulation of *L. caudalis*.] Address: Trockur, B., Schulstr. 4, 66636 Tholey-Scheuern, Germany

1447. **Trueman, J.W.H. (1999):** The family-group names based on Selys's Légions. *International Journal of Odonatology* 2(2): 141-144. (in English). ["It recently was suggested that family-group names derived from the names of Selys' legions are not valid. I state why I believe this view is mistaken and I argue that, even if it were not, nomenclatural stability in Odonata can be better served by the preservation of these names than by their overturn." (Author)] Address: Trueman, J., Research School of Biol. Sciences, Australian National University, Canberra, ACT 0200, Australia. E-mail: trueman@rsbs.anu.edu.au

1448. **Unruh, M. (1999):** Zum Vorkommen von *Anax parthenope* (Selys, 1839) im südlichen Sachsen-Anhalt (BRD) und Gedanken zum Schutz der Kleinen Königslibelle (Anisoptera: Aeshnidae). *Entomol. Mitt. Sachsen-Anhalt* 7(2): 29-34. (in German with English summary). [List of known habitats of the species in Sachsen-Anhalt, Germany; discussion of habitat factors necessary for establishing populations; the author assumes that only so-called "Klarwasserseen" (oligotrophic lakes with Chara-vegetation) in succession to dymesotrophic waterbodies with little floating plants (hydrophyts), but Phragmites-reed beds along the shore side are optimal habitats for the species in Sachsen-Anhalt. In addition some muddy parts on the lake bed und few fish predators are favourable.] Address: Unruh, M., Schmale Str. 29, D-06712 Großsosa, Germany

1449. **Utzeri, C.; Di Giovanna, M.V.; Goretti, E.; Terzani, F.; Speziale, A.; Mei, M.; Santolamazza Carbone, S.; Cordero, A. (1999):** Updated information on the distribution of *Somatochlora meridionalis* Nielsen, 1935, in central Italy (Anisoptera: Corduliidae). *Notul. odonatol.* 5(4): 43-47. (in English). ["A list and a map are given of the central Italian sites in which the presence of *S. meridionalis* has been verified in the past and recent years. Information on the 24-26 odonate spp. associated with *S. meridionalis* is provided for each site. Water parameters are also given for some Umbrian sites in which larvae were found. The latter are the first on record for the region of Umbria." (Authors)] Address: Utzeri, C., Dipartimento di Biologia Animale e dell'Uomo, Università di Roma "La Sapienza", Viale dell'Università 32, I-00185 Roma, Italy

1450. **Vines, G. (1999):** Local heroes. *New Scientist* 161(2175): 34-39. (in English). [A more general account on the importance of ponds for biodiversity of landscapes; British Isles] Address: not stated
1451. **Wain, W.H.; Wain, C.B.; Lambert, T. (1999):** Odonata of North Island, Seychelles archipelago. *Notul. odonatol.* 5(4): 47-50. (in English). ["A 6-hr visit in November 1997 established the presence of 9 spp., all of which showed some evidence of breeding. The paucity of previous Odonata records from North Island undoubtedly reflects the dearth of observers and it is probable that the present visit was the first entomological one since Vesey-Fitzgerald in November 1952." (Authors)] The following species are listed and discussed: *Ceragrion glabrum*, *Ischnura senegalensis*, *Anax guttatus*, *Diplacodes trivialis*, *Orthetrum stemmale wrightii*, *Pantala flavescens*, *Rhyothemis semihyalina*, *Tholymis tillarga*, and *Tramea limbata*.] Address: Wain, W.H. & C.B., The Haywain, Hollywater Road, Bordon, Hants, GU35 OAD, United Kingdom
1452. **Wasscher, M. (Ed.) (1999):** NVL Nieuwsbrief. Mededelingen van de Nederlandse Vereniging voor Libellenstudie 3(4): 10 pp. (in Dutch). [Newsletter of the Dutch Society of Odonatology; some technical papers as announcements of meetings, and faunistical papers (see this issue of OAS)] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: m.wasscher@broekhuis.nl
1453. **Weipert, J.; Bößneck, U. (1999):** Die Schutzgebiete der Landeshauptstadt Erfurt (Thüringen) Teil IV.: Flora und Fauna des GLB "Lohfinkensee" und dessen Umgebung. Veröffentlichungen des Naturkundemuseum Erfurt 19: 93-108. (in German). [*Libellula depressa* is the only dragonfly species mentioned] Address: Bößneck, U., Stadtverwaltung Erfurt, Umwelt- und Naturschutzamt, Staffenbergallee 18, D-99085 Erfurt, Germany
1454. **Werzinger, S.; Werzinger, J. (1999):** *Gomphus flavipes* (Charpentier) in Bayern: 1999 erstmals am Main, weitere Funde an der Regnitz (Anisoptera: Gomphidae). *Libellula* 18(3/4): 205-208. (in German with English summary). ["On 6-VII-1999 an exuvia of a male was collected at the river Main near Kreuzwertheim, Germany. At the river Regnitz, a tributary of the Main, five exuviae were recorded at a study section 3,000 m in length between 29-VI-1999 and 25-VH-1999." (Authors)] Address: Sabine und Joachim Werzinger, Zwernberger Weg 29, D-90449 Nürnberg, Germany
1455. **Westhus, W.; Klaus, S.; Fritzlar, F. (1999):** Schutz und Pflege Thüringer Hochmoore durch gemeinsames Handeln von Forst- und Naturschutzverwaltung. Landschaftspflege und Naturschutz in Thüringen 36(3): 98-100. (in German). [Picture of the rare Thuringian *Somatochlora alpestris*; some accounts on present activities of well known Thuringian odonatologist Dr. Wolfgang Zimmermann] Address: Westhus, W., Thüringer Landesanstalt für Umwelt, Abt. Ökologie und Naturschutz, Prüssingstr. 25, D-07745 Jena, Germany
1456. **Willigalla, C. (1999):** Zur Tagesaktivität von *Lestes dryas* Kirby (Zygoptera: Lestidae). *Libellula* 18(3/4): 175-180. (in German with English summary). ["At a pond near Ostbevern in Westfalia, Germany, the flight activity of *Lestes dryas* was recorded on one sunny day in August 1997. The activity started at 9:00 h (summer time) with only a few individuals, had the maximum at 13:30 h (approx. solar noon) and stopped in the evening at 20:00 h. The influence of light intensity, position of the sun and temperature is discussed." (Author)] Address: Willigalla, C., Brock 45, D-48346 Ostbevern, E-mail: c.willigalla@t-online.de
1457. **Wilson, K. (1999):** Reports from Coastal Stations - 1998: Gibraltar Point, Lincolnshire. *Atropos* 6: 61. (in English). [Some dragonfly records including *Brachytron pratense*] Address: not stated
1458. **Winterholler, M.; Leinsinger, H. (1999):** *Gomphus flavipes* (Charpentier) bodenständig am Oberrhein in Hessen und Rheinland-Pfalz (Anisoptera: Gomphidae). *Libellula* 18(3/4): 209-211. (in German with English summary). ["In July 1999, exuviae were collected near Worms. These are the first breeding records for the Upper Rhine of Hessen and Rheinland-Pfalz, Germany." (Authors)] Address: Herwig Leinsinger, Oderweg 2, D-69226 Nußloch, Germany
1459. **Witte, R.H.; Groenendijk, D. (1999):** The occurrence of dragonfly larvae in the Dutch Delta in relation to salinity. *Brachytron* 3(2): 3-10. (in Dutch with English summary). [(Promille-Zeichen fehlt im Lidos) "[...] At about 225 localities in the mostly brackish Dutch Delta area dragonfly larvae were caught (or exuviae were collected) and salinity values were measured simultaneously. [...] Results showed that only *Ischnura elegans* was found to be able to breed successfully in polyhaline waters. However, numbers decreased strongly when ion concentrations exceeded 4.5 . *Aeshna mixta* (larvae) was found regularly in mesohaline waters with an average ion content of 4.3 , temporarily increasing during summer to a maximum value of 6.8 . A maximum of only 2 was formerly known for this species in The Netherlands. *Aeshna cyanea* larvae were found in oligohaline waters, in which the salt concentration increased up to 18 during a short period in summer. This observation is highly congruent with results from Denmark, where larvae of *Orthetrum cancellatum* occurred in brackish waters with an ion content of 13 . It seems that larvae of several dragonfly species can survive during short periods of high salinity. However, it is highly likely that larval development will be inhibited during these temporary situations. Oviposition in mesohaline waters was recorded for *Erythromma viridulum* and *Enallagma cyathigerum*. However, no successful reproduction could be proven. In Canada *E. cyathigerum* larvae have been found in brackish waters, as well as *Sympetrum danae* larvae. Several *Sympetrum* species are known to be tolerant for brackish water conditions and in the Delta area egg-laying behaviour was even recorded in polyhaline waters during some occasions. In addition, exuviae of *Lestes sponsa* and *L. barbarus* were found in oligohaline waters. Larvae of several *Sympetrum* species and *E. viridulum* were recorded here also. No other dragonfly species in the Delta area could be traced in brackish waters, although some other species were found in brackish waters elsewhere in Europe." (Authors)] Address: Witte, R., Parelplein 36, NL-4337 MS Middelburg, The Netherlands. E-mail: Richard.Phoenix@planet.nl
1460. **Witte, R.H. (1999):** Voorkomen van Libellen in Zeeland, met de nadruk op de periode 1995-1998. *De Zeeuwse Prikkebeen* 7(2): 5-12. (in Dutch). [List of the

Odonata (n=36) of the province Zeeland, The Netherlands differed for 6 areas; *Lestes barbarus*, *Sympetma fusca*, *Erythromma viridulum*, *Aeshna affinis*, *Crocothemis erythraea*, and *Sympetrum fonscolombii* are discussed in some detail] Address: Witte, R., Parelplein 36, NL-4337 MS Middelburg, The Netherlands. E-mail: Richard.Phoenix@planet.nl

1461. **Yeh, W.-C. (1999):** Description of *Petaliaeschna pinratana* spec. nov. from northern Thailand (Anisoptera: Aeshnidae). *Odonatologica* 28(3): 283-288. (in English). ["The new species (holotype male: Doi Inthanon, Chiang Mai prov., 5-V-1988; deposited in Coll. Pinratana, St Gabriel's College, Bangkok) is described and compared with its congeners. Considering the male paddle-shaped cerci, it appears closely related to the Chinese rather than to the Himalayan congeners." (Author)] Address: Yeh, W.-C., Division of Forest Protection, Taiwan Forestry Research Institute, 53 Nanhai Road, Taipei, Taiwan, R.O.C. E-mail: wcyeh@serv.ffri.gov.tw

1462. **Zeiss, C.; Martens, A.; Rolff, J. (1999):** Male mate guarding increases females' predation risk? A case study on tandem oviposition in the damselfly *Coenagrion puella* (Insecta: Odonata). *Canadian Journal of Zoology* 77(6): 1013-1016. (in English). ["To estimate whether male mate guarding alters the predation risk for females, we conducted experiments in field cages with the damselfly *Coenagrion puella*. We experimentally compared the risk for females ovipositing solitarily versus in tandem with the male. The backswimmer *Notonecta glauca* was used as a predator. Owing to the oviposition behaviour of the damselflies, *N. glauca* only preys on females, therefore it was possible to determine whether the presence of males decreases or increases females' predation risk. Females in tandem were more frequently touched and grasped by *N. glauca* than solitary females. In most tandem pairs, the female showed the first reaction to the attack and the male responded subsequently. After an attack, most solitary females left the oviposition site but most tandem females stayed. Once grasped by the predator, more solitary females were killed." (Authors)] Address: Zeiss, C., Zool. Institut der Technischen Universität Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

1463. **Zhu, H.-q.; Zhang, X.x. (1999):** *Somatochlora shanxiensis* spec. nov., a new dragonfly from Shanxi, China (Anisoptera: Cordulidae). *Odonatologica* 28(3): 289-292. ["The new species (holotype male and allotype female: Mang-he river bank, Yangcheng Co., Shanxi, China. 27/28-VIII-1991; deposited at Shanxi University, Taiyuan, Shanxi, China) is described and illustrated. It is compared with *S. graeseri* and *S. uchidai*." (Authors)] Address: Zhu, H.-q., 42-38. Shanxi University, Taiyuan 030006. Shanxi. China Zhang, X.x., Shanxi Academy of Agricultural Science. Taiyuan 030006. Shanxi, China

1464. **Zipfel, C. (1999):** Zoogeographie und Verbreitungsmuster der Pokal-Azurjungfer *Cercion lindenii* (Odonata, Coenagrionidae). - Vergleichende Untersuchungen mit morphologischen und Isoenzym-PAGE-Methoden. Diplomarbeit. Fakultät für Biowissenschaften, Pharmazie und Psychologie, Inst. für Zoologie, Universität Leipzig: 93 pp. (in German). [*C. lindenii* occurs in Germany with at least two isolated populations that are considered to represent different subspecies.

*C. lindenii* has been increasing its geographical distribution significantly since the early eighties and the isolation may be overcome within the next years. In this investigation, therefore, 117 adult specimens from five localities have been investigated regarding their wing morphometry and protein differences in electrophoresis: two each from southwestern (Giessen, Hessen; St. Leon, Baden-Württemberg) and central (Rheine, Nordrhein-Westfalen; Hameln, Niedersachsen), and one from eastern Germany (Großer Schwansee, Brandenburg). Wing morphometry showed significant differences (euclidian distance and UPGMA) between the eastern and all other populations. The males of the eastern population had larger wings whereas there was no significant difference between the females. This corresponds to earlier results (Beutler, H., 1985, Faun. Abh. Staatl. Mus. Tierk. Dresden 49, 82) but may, however, not definitively indicate the occurrence of an eastern subspecies, whereas odonate populations from colder regions tend to have larger wings (Carius, W., 1993, Dissertation, Univ. Bremen). 5 of 21 enzymes tested were polymorphic (IDH, esterases, PGM, GPD, diaphorase); in all cases but one the less frequent allele(s) occurred only in heterozygotes. Specimens from central Germany showed the highest heterozygosity (up to half of the population in IDH) whereas all other locations tested showed very high frequencies of one allele and low frequencies of all others or were homozygote. Also similarities between distant populations are often higher than to those from nearer locations. Regarding the isoenzyme patterns found, the German *C. lindenii* populations appear to be biochemically rather uniform and the variability is too low for postulating two subspecies. The evaluation of the total protein spectrum, however, showed that two groups can be differentiated: one group comprising all western populations investigated (Hameln, Rheine, Giessen, St. Leon) showed a homogeneous pattern of protein bands (within and between populations). The protein samples from the Schwansee population, however, differed significantly. The similarity between the Schwansee and the other populations decreased continuously from north to south. (Slightly modified from the Abstract submitted to *Zoology* 103, Suppl. II; Proc. of the 93 th Annual Meeting of the Deutsche Zoologische Gesellschaft, Abstract 92.1, 2000; Zipfel, A. & W.E.R. Xylander)] Address: Xylander, W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany

1465. **Zwick, P. (1999):** Historische Dokumente zur Fauna der Elbe bei Dresden vor hundert Jahren. *Lauterbornia* 37: 97-112. (in German with English summary). [35 plates with drawings and water colour paintings by Karl G. Schiller (author of the plates in Rostock & Kolbe, 1888: *Neuroptera germanica*. Die Netzflügler Deutschlands. Zwickau.) left by the late Joachim Illies show various invertebrates, including Odonata. The following species are documented on colour plates: *Lestes dryas*, *Erythromma najas*, and *Sympetrum sanguineum*. Not documented are the plates with *Ischnura elegans*, *Enallagma cyathigerum*, *Coenagrion hastulatum*, *C. puella*, *Ophiogomphus cecilia*, and *Aeshna* (cf. mixta). The plates provide evidence for the past occurrence of several species of water insects in the river Elbe at Dresden between 1883 and 1906, some that are today no longer found in Saxony. This refers not to Odonata. P. Zwick outlines the circumstances on the discovery of the colour plates, the evaluation of the identifications of the species, and the entomological "life



history" of Karl Schiller.] Address: Zwick, P., Limnologische Fluß-Station des Max-Planck-Instituts für Limnologie, PF 260, D-36105 Schlitz. E-mail: pzwick@mpil-schlitz.mpg.de

## 2000

1466. **Åbro, A. (2000):** Sperm clusters in Zygoptera (Coenagrionidae, Lestidae, Calopterygidae). *Odonatologica* 29(1): 51-56. (in English). ["When within the testicular cyst, individual, immature sperm of *Lestes sponsa* acquire a cap of periacrosomal material. During passage through the spermiducts and vas deferens, the caps of individual sperm coalesce, producing clusters of sperm under a common cap. In *Calopteryx virgo*, entire sperm cells become embedded in an extracellular homogeneous substance. The joining substance in both species appear to be derived from decomposed surplus cytoplasm sloughed off from developing spermatids. The epithelial lining of the spermiducts adds secretions to this. Clustering of sperm cells was not demonstrated in species of the Coenagrionidae." (Author) Species examined are: *Calopteryx virgo*, *Lestes sponsa*, *Coenagrion hastulatum*, *Enallagma cyathigerum*, and *Pyrrhosoma nymphula*.] Address: Åbro, A., Inst. Anat., Univ. Bergen, Årstadveien 19, N-5009 Bergen, Norway

1467. **Anonymus (2000):** Gummigelänke machen Libellen zu wendigen Jägern. *National Geographic, Deutschland* 4/2000: 189. (in German). [Short summary on the work of S. Gorb on functional morphology of dragonfly wings] Address: NG, Deutschland, Stadthausbrücke 1-3, D-20355 Hamburg, Germany

1468. **Assis, J.C.F.; Carvalho, A.L.; Dorvillé, L.F.M. (2000):** Aspects of larval development of *Limntron debile* (Karsch), in a mountain stream of Rio de Janeiro State, Brazil (Anisoptera: Aeshnidae). *Odonatologica* 29(2): 151-155. (in English). ["Quantitative and qualitative samplings performed in a first order mountain stream [...] provided 121 larval specimens in the 6 last instars. The total number of larval instars estimated, using Dyar's rule, is 13, based on head width measurements. There was no significant difference between the number of males and females." (Authors)] Address: Assis, J.C.F., Departamento de Zoologia, Instituto de Biologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil. E-mail: juassis@aol.com.br

1469. **Beckemeyer, R. (2000):** Kids & Dragonflies. *W.D.A.'s Agrion* 4(1): 10-11. (in English). [Narrative on the use of a high speed video camera for filming insects in flight, and the opportunity to introduce and inspire children for dragonflies] Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA

1470. **Bedê, L.C.; Piper, W. (2000):** A new record of *Remartinia restricta* Carvalho and the southernmost record of *Gynacantha nervosa* Rambur in South America (Anisoptera: Aeshnidae). *Notul. odonatol.* 5(5): 63-64. (in English). [*G. nervosa* is recorded from 3 localities in Minas Gerais, Brazil. A male *R. restricta* was collected at Conselheiro Mata, Serra do Espinhaço, Minas Gerais, Brazil, 23/4/1998.] Address: Piper, W., Kollenhof 31, D-22527 Hamburg, Germany. E-mail: werner.piper@t-online.de

1471. **Bedjanic, M. (2000):** Description of the last larval instar of *Epophthalmia vittata cyanocephala* Hagen,

1867 (Anisoptera: Corduliidae). *Odonatologica* 29(1): 57-61. (in English). [The specimen was collected near Anuradhapura, Sri Lanka. The present knowledge of the larval forms of the genus is briefly discussed.] Address: Bedjanic, M., Fram 117/A, SI-2313 Fram, Slovenia. E-mail: matjaz.bedjanic@guest.arnes.si

1472. **Bernard, R.; Samol, J. (2000):** An interesting record of *Crocothemis erythraea* (Brullé) in mid-western Poland (Anisoptera: Libellulidae). *Notul. odonatol.* 5(5): 64-65. (in English). [On 26/8/1999 the species was recorded in a gravel pit near Bielice (52.21N 14.58E). The habitat is characterized, and all hitherto Polish records are discussed in brief.] Address: Bernard, R., Zakład Zoologii Ogólnej, Uniwersytet im. A. Mickiewicza, ul. Fredry 10, PL-61-702 Poznan, Poland. E-mail: rbernard@main.amu.edu.pl

1473. **Bernard, R. (2000):** On the occurrence of *Cercion lindenii* (Sélys, 1840) in Poland (Odonata: Coenagrionidae). *Opusc. zool. flumin.* 177: 1-11. (in English). [The known Polish localities (30) - restricted to the midwestern part of the country - are listed, and the strength of the respective local populations is estimated. It is suggested that the variation in the latter is due to the weather conditions prevailing in particular years. The Polish (i.e. the northeastern-most) part of the species range is described and defined in terms of the local climatology (early spring, long summer, short and mild winter, relatively small annual air temperature amplitudes, wind sheltered - lake - biotops) and topography (larger and medium-sized rivers) and against the species situation in central Europe.] Address: Bernard, R., Zakład Zoologii Ogólnej, Uniwersytet im. A. Mickiewicza, ul. Fredry 10, PL-61-702 Poznan, Poland; E-mail: rbernard@main.amu.edu.pl

1474. **Bos, F. (2000):** Mogelijke Nederlandse namen voor Zuid- en Oosteuropese libellen. Inclusief Rhodos en de Canarische Eilanden. *Mededelingen van de Nederlandse Vereniging voor Libellenstudie* 4(1): 13. (in Dutch). [Proposal for a Dutch name of the Odonata of South- and East-Europe including the Greek Island Rhodos and the Canarian Islands.] Address: Bos, F., Havenstraat 17, NL-6701 CK Wageningen, The Netherlands. E-mail: frank@bos.nl

1475. **Brockhaus, T. (2000):** Aktualisierte und korrigierte Fassung des kommentierten Verzeichnisses der Libellen (Odonata) des Freistaates Sachsen. *Mitteilungen Sächsischer Entomologen* 49: 8-14. (in German). [Up dated and commented checklist of the Odonata of Saxonia, Germany incl. an extensive regional bibliography; very useful are comments on species which are in need for conservation action plans] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

1476. **Brockhaus, T. (2000):** Zur Geschichte der sächsischen Libellenkunde. *Mitteilungen Sächsischer Entomologen* 49: 15-21. (in German). [Detailed contribution to the origins and the development of the odonatological activities in Saxonia, Germany; nice maps with information on the historical hot spots of odonatological work; interesting search for traces of *Thecagaster bidentata* in old Saxonian publications on the opportunity of the so called first record in 1994: we have to suppose that it was known to Saxonian entomologists already 140 years ago!] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

1477. **Brunelle, P.M. (2000):** A new species of *Neurocordulia* (Odonata: Anisoptera: Corduliidae) from eastern North America. *Canadian Entomologist* 132(1): 39-48. (in English with French summary). [*Neurocordulia michaeli* sp. nov. from New Brunswick (Canada) and Maine (USA) differs from other northeastern species in the genus (*Neurocordulia molesta* (Walsh 1863), *Neurocordulia obsoleta* (Say 1839), and *Neurocordulia yamaskanensis* (Provancher, 1875)) in its short mesotibial keel and from all congeners in the great width of its abdomen. "The species is obligate crepuscular and can be locally abundant at its riverine habitat. Larvae of the species have the lowest dorsal spines in the genus and cling to the underside of rocks in rapids."] Address: Brunelle, P.-M., 2460 John Street, Halifax, Nova Scotia, B3K 4K7, Canada
1478. **Buczynski, P. (2000):** On the occurrence of *Coenagrion armatum* (Charpentier, 1840) in Poland (Odonata: Coenagrionidae). *Opusc. zool. flumin.* 179: 1-10. (in English). ["All Polish localities (38, incl. 6 new) are listed, their grid references are stated whenever possible, and the respective habitats are briefly characterized. The distribution of the sp. in Poland is mapped, and its occurrence and habitat choice are briefly discussed and compared with those in other regions of central and eastern Europe." (Author)] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PO-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl
1479. **Cham, S. (2000):** Discovery of a 'new' population of the Scarce Chaser *Libellula fulva* Müller on the River Stour in the Dedham Vale. *J. Br. Dragonfly Society* 16(1): 17-19. (in English). [In July 1997 (near Nayland) and July 1998 (near Burnes) males of *L. fulva* were observed along the River Stour. During July 1999, further reconnaissance along much of the river revealed a sizeable population between Bures and Nayland. In addition, adult *L. fulva* were observed at Earls Colne on the nearby River Colne in North Essex during 1999. Such observations suggest that the River Stour population may have already started to colonize the River Colne. These records are discussed with emphasize to improvement of water quality in the past years. Additional notes are made to the strong increase of the populations of *Platycnemis pennipes* and *Erythromma najas* in the same area.] Address: Cham, S., 45 Weltmore Road, Luton, Bedfordshire LU3 2TN
1480. **Chovanec, A.; Schiemer, F.; Cabela, A.; Gressler, S.; Grotzer, C.; Pascher, K.; Raab, R.; Teufel, H.; Wimmer, R. (2000):** Constructed inshore zones as river corridors through urban areas - The Danube in Vienna: Preliminary results. *Regulated rivers research and management* 16(2): 175-187. (in English). ["Over the last 125 years, river regulation has considerably changed the ecological conditions of the Austrian Danube and its floodplains such that the system is now very fragmented. Within the municipal area of Vienna, these changes have been particularly severe: river embankments and a bypass channel (the 'New Danube'), separated from the main river by an artificial island ('Danube Island'), are the key elements of flood control, and river levels are controlled by the Vienna hydroelectric power plant ('Freudenau'). During construction of the hydroelectric power plant, the previously straight shoreline of the 21 km long Danube island with its steep embankments, was restructured by creating shallow water areas, gravel banks, small permanent backwaters and temporary waters. This paper describes the scheme and the results from the first year of a 4-year monitoring programme ('Danube Island Monitoring Programme', DIMP) investigating the colonization and successional processes of these areas by monitoring relevant indicator groups (vegetation, dragonflies, amphibians, reptiles, waterfowl)." (Authors)] Address: Chovanec, A.; Univ. Wien, Inst. Zool., Dept Limnologie, Althanstr 14; A-1090 Wien Austria
1481. **Clancy, S. (2000):** Reports from Coastal Stations - 1999: Dungeness area, Kent. *Atropos* 9: 65-67. (in English). [*Sympetrum fonscolombii*; *Anax parthenope*, "poor year"] Address: not stated
1482. **Corbet, P.S. (2000):** Book review: A Guide to the Dragonflies of Great Britain, Arlequin Press, Chelmsford, Essex CM1 1SW, England (1999) 21 x 15cm, 128pp.; £15.95 incl. post and packing (softback). ISBN 1 900159 01 5. Illustrated by Dan Powell; with text by Dan Powell and Colin Twist; edited by Colin Twist. *J. Br. Dragonfly Society* 16(1): 31-32. (in English). Address: Corbet, P.S., Crean Mill, St. Buryan, Penzance, Cornwall, UK
1483. **Costa, J.M.; Irineu de Souza, L.O.; Santos, T.C. (2000):** Two new species of *Oxyagrion* Selys, 1876 with a description of five new larvae (Zygoptera: Coenagrionidae). *Odonatologica* 29(1): 1-15. (in English). ["*O. pseudocardinale* sp. n. (holotype male: Brazil. Minas Gerais, Fazenda da Cachoeira F.F. de Souza. 13-11-1990) and *O. sulmatogrossense* sp. n. (holotype male: Brazil, Mato Grosso do Sul, Campo Grande, Campus UFMS. 24-XII-1997) are described and illustrated. The larvae of *O. basale* Selys, 1876, *O. haematinum* Selys, 1876, *O. pavidum* Selys, 1876, *O. santosi* Murtins, 1967, and *O. sulinum* Costa, 1978 are described and illustrated for the first time. Keys are provided for the known *Oxyagrion* spp. and for the known larvae." (Author)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisy.com.br
1484. **Costa, J.M.; Santos, T.C. (2000):** Two new species of *Santosia* Costa & Santos, 1992 with a description of five new corduliid larvae (Anisoptera: Corduliidae). *Odonatologica* 29(2): 95-111. (in English). ["*S. machadoi* sp.n. (holotype male: Parque Nacional da Serra da Bocaina, Sao Paulo, Brazil; 25-11-1977) and *S. newtoni* sp.n. (holotype male: Brejo da Lapa, Itatiaia, Rio de Janeiro, Brazil; 19-II-1974) are described and illustrated along with their exuviae. The exuviae of *Aeschnosoma marizae* Santos, *Neocordulia androgynis* (Sel.) and *N. setifera* (Hag.) are also described and illustrated for the first time. The known *Santosia* spp. and the neotropical corduliid larvae are keyed." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisy.com.br
1485. **Craine, G.D. (2000):** Reports from Coastal Stations - 1999: Isle of Man. *Atropos* 9: 77-78. (in English). [First *Libellula depressa* for the Isle of Man, *Lestes sponsa*, *Sympetrum striolatum*] Address: not stated
1486. **Daigle, J.J. (2000):** The distribution of the Odonata of Hawaii. *Bulletin of American Odonatology*

6(1): 1-5. (in English). [The distribution of 37 species is recorded by island for the 6 main islands in the State of Hawaii, USA. Each of the species is shortly commented with reference to habitat, recent status, and in some cases to circumstances of (re)-discovery.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: daiglej@dep.state.fl.us

1487. **De Marmels, J. (2000):** The larva of *Allopetalia pustulosa* Selys, 1873 (Anisoptera: Aeshnidae) with notes on aeshnoid evolution and biogeography. *Odonatologica* 29(2): 113-128. (in English). ["The larva is described and illustrated from four ultimate instar exuviae (2 males reared) and from a younger larva, all from Venezuela. Main characters are a pointed epiproct and spinous mesial carinae of paraprocts. There is some general similarity with larvae of *Boyeria* McL., but the latter have angled occipital lobes, longer labium and, in some species, a bifid epiproct. Penis is strikingly similar in *Allopetalia* and *Boyeria*, the "comua" coming closer to those found in *Gomphaeschna* Sel. than to the "flagella" as found in the brachytrine *Spinaeschna* Theisch. and in the austropetaliine *Rheopetalia* Carle. - The "pyeri-group" of *Oligoaeschna* Sel. is ascribed to *Gomphaeschna* Lohmann (1996, *Enl. Z.*, Essen 106: 209-252), while the "poeciloptera-group" is considered a representative of the archaic *Gynacanthini* (Aeshnata). Biogeographical problems of Anisoptera, especially those of *Gomphaeschnini* and *Gynacanthini*, and of *Euphaeida* (Zygoptera) are discussed, considering the Pangaea-model and panbiogeographic criteria. Maps and a glossary of some panbiogeographic terms are added." (Author)] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuelae

1488. **Dewick, S. (2000):** Reports from Coastal Stations - 1999: Curry Farm, Bradwell-on-Sea, Essex. *Atropos* 9: 68-70. (in English). [Assessment of the dragonfly season 1999 including records of 15 species; it was an average year for *Sympetrum striolatum* and a good season for *S. sanguineum*, but "with an interesting clustering of [19] night-time records indicating periods of migration."] Address: Dewick, S.; Curry Farm, Bradwell-on-Sea, Southminster, Essex, CM0 7NL, UK

1489. **Dewick, S.; Gerussi, R. (2000):** Small Red-eyed Damselfly *Erythromma viridulum* (Charpentier) found breeding in Essex - The first British records. *Atropos* 9: 3-4. (in English). [On 17 July 1999 the first specimen of *E. viridulum* and a colony of the species were detected in "an area of unspoilt countryside in Essex", UK. Nearby situated a second - strong - population was discovered on 15 August.] Address: Dewick, S.; Curry Farm, Bradwell-on-Sea, Southminster, Essex, CM0 7NL, UK

1490. **Dey, D. (2000):** County focus: The Odonata of Sussex. *Atropos* 10: 15-18. (in English). [Odonatological facts referring landscape and habitats of Sussex, UK are shortly outlined; recent records of 32 species are commented with special emphasize on the migrant species] Address: Dey, D., 26 Manor Avenue, Hassocks, West Sussex, BN9 8NG, UK

1491. **Diesel, R.; Schubart, C.D. (2000):** Die außergewöhnliche Evolutionsgeschichte jamaikanischer Felskrabben. *Biologie in unserer Zeit* 30(3): 136-147. (in German with English summary). [The exiting evolution of the life history of Jamaican crabs: The Decapoda are

among the animal groups that most recently colonised land. This important evolutionary step occurred several times independently in the tropics and subtropics and produced convergent adaptations in the life history [...] With a further advancement into terrestrial habitats, the crabs colonised habitats with small aggregations of water that became nurseries for larvae and juveniles, for example the shells of large land snails and leaf axils of bromeliad plants filled with rainwater. The larvae thereby develop in the vicinity of the mother. High predation risk, scarce food resources, and unfavourable abiotic conditions for the larvae and the young triggered in species like [...] the bromeliad crab, *Metopaulias depressus*, the evolution of an outstanding parental care. The bromeliad crab mother, for example, does control and manipulate the acidity and calcium content of the water in the leaf axil with the brood. Bromeliad crabs live most of their life on a single bromeliad plant, and the characteristics of such a life supported a remarkable social organisation, comparable with cooperative breeding vertebrates." (Author) On page 143 a short notice on the maternal care from odonate predation is made. This refers to the results of a study published in *Animal Behaviour* 43: 803-812: Diesel, R. (1992): Maternal care in the bromeliad crab, *Metopaulias depressus*: protection of larvae from predation by damselfly nymphs: "*Metopaulias depressus* (Decapoda, Grapsidae) is a crab that breeds in water-storing leaf axils of large Jamaican bromeliads. This study examined whether and how maternal care protects crab larvae from predation by damselfly nymphs. The nymph of the bromeliad-breeding damselfly, *Diceratobasis macrogaster*, is the major predator on bromeliad crab larvae. Laboratory tests revealed that a nymph kills on average five larvae per day. Both the damselfly and the bromeliad crabs prefer the bromeliad *Aechmea paniculigera* as a breeding site. Nymphs were abundant: 87% of the *A. paniculigera* held 1-16 nymphs. Bromeliad crabs release on average 50 larvae into a prepared nursery axil where they develop for 9-10 days into young crabs. In field experiments maternal care reduced larval mortality from predation by 60%. A calculation based on predator abundance and killing potential suggests that female brood desertion would lead to 54-100% loss of their reproductive investment, depending on the female's body size and age (egg number is positively correlated with body size). Protected broods showed on average only 22% mortality during the larval period. In the bromeliad crab, predation on larvae exerts strong selection on the maintenance of maternal care for larvae." Address: Diesel, R., Max-Planck-Institut für Verhaltensphysiologie, Abt. Winckler, D-82305 Seewiesen, Germany

1492. **Dieterich, M.; Anderson, N.H. (2000):** The invertebrate fauna of summer-dry streams in western Oregon. *Archiv für Hydrobiologie* 147(3): 273-295. (in English). [Report on invertebrate communities and habitat associations of species in summer-dry streams of western Oregon, USA: 202 aquatic and semi-aquatic species, including at least 13 previously undescribed taxa. "Species richness in temporary forest streams (>125 species) exceeded that in a permanent headwater (100 species). Richness in ephemeral streams was 35 species or less. Duration of flow. exposure (shaded or open), riffle-pool structure and summer-drought conditions were key factors shaping community composition between and within stream types. We conclude that the potential of summer-dry streams with respect to habitat function is still widely underestimated." (Authors).



In Appendix 1 *Cordulegaster dorsalis* is characterised as a species obligate - facultative for permanent streams and obligate for forest streams.] Address: Dieterich, M., Philipps-Universität-Marburg, Fachbereich Biologie, AG Tierökologie, D-35032 Marburg, Germany

1493. **Dijkstra, K.-D. (2000):** Libellen in Wit-Rusland. Mededelingen van de Nederlandse Vereniging voor Libellenstudie 4(1): 11-12. (in Dutch). [In 1999 Netherlands and Belo-russian hydrobiologists surveyed the Odonata of the Svinavod region and the Hvojensk region in the southern part of the floodplains / marshes of the river Pripjat, Belo-Russia. 43 species including species of the EU Habitat Directive as *Sympecma paedisca*, *Leucorrhinia pectoralis*, *L. albifrons*, and *Aeshna viridis* could be recorded. *Coenagrion armatum*, *C. pulchellum*, *Erythromma najas*, *Nehalennia speciosa*, *Anaciaeschna isosceles*, *Aeshna subarctica elisabethae*, *Epitheca bimaculata*, *Somatochlora flavomaculata*, and *S. arctica* should be mentioned too.] Address: Dijkstra, K.D., Oude Rijnburgerweg 38, NL-2342 BC Oegstgeest, The Netherlands

1494. **Dunkle, S. (2000):** The many joys of dragonfly-ing. *American Butterflies* 8(2): 26-32. (in English). [Sid Dunkle particularly contrasts dragonflies with butterflies. The paper contains 10 colour photos of North American odonates.] Address: American Butterfly Association, 4 Delaware Rd., Morristown, NJ, USA 07960

1495. **Āervek, U.; Sameja, M. (2000):** *Orthetrum coerulescens anceps* (Schneider) as a prey of larval Mantis religiosa (L.) Anisoptera: Libellulidae; Dictyoptera: Mantodea. *Notul. odonatol.* 5(5): 65. (in English). [Near Zadar, Croatia on 23 July, 1998 *M. religiosa* was observed devouring an adult *O. coerulescens anceps*.] Address: Āervek, U., Ul. Veljka Vlahovića 35, SI-2000 Maribor, Slovenia

1496. **Ellenrieder, N. van (2000):** Additions to the description of *Gomphomacromia nodisticta* Ris, 1928 (Anisoptera: Corduliidae). *Bulletin of American Odonatology* 6(1): 7-11. (in English). [*Gomphomacromia nodisticta* Ris 1928, not found since its original description, was recorded in an Andean locality of NW Argentina. The structure of the penis is described, and some additional measurements and illustrations of diagnostic value are provided, as well as a comparison with the other species of the genus *G. paradoxa*, *G. etcheveryi*, *G. chilensis*, *G. fallax*, and *G. mexicana*.] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C. 712, AR-1900, La Plata, Argentina. E-mail: ellenr@ilpla.edu.ar

1497. **Ellenrieder, N. von (2000):** Species composition and temporal variation of odonate assemblages in the subtropical-pampasic ecotone, Buenos Aires, Argentina. *Odonatologica* 29(1): 17-30. (in English). ["Odonata assemblages present in the ecotone between subtropical forest and pampasic grassland in Punta Lara were characterized and compared. Four pools, one in the forest, two in grassland (one within a protected area) and one at the limit of both environments, were sampled during July 1996-June 1998. For each sampling station species richness and diversity were calculated, and were compared through two similarity coefficients (Jaccard and Winer). The highest species richness and diversity were registered in the forest, and the lowest in the protected grassland. Cluster analysis showed different schemes according to the similarity coefficient considered; a greater similarity between the

forest and intermediate pools (Jaccard coefficient), or a greater similarity between grassland areas (Winer coefficient). Some biogeographical implications are discussed." (Author)] Address: Ellenrieder, N. von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina. E-mail: ellenr@ilpla.edu.ar

1498. **Gennard, D. (2000):** Post-symposium tour to the Adirondacks, 17-20 July 1999. *WDA's Agrion* 4(1): 7. (in English). [Personal report on the WDA Post-symposium Tour to the famous Adirondacks, New York, USA] Address: Gennard, Dorothy, 3 West End Rd., Ulceby, N. Lincs., DN39 6TC, UK

1499. **Goudsmits, K.; Wasscher, M. (2000):** Is er voorkeur bij de eiafzetplek van de Houtpantserjuffer *Lestes viridis*? Mededelingen van de Nederlandse Vereniging voor Libellenstudie 4(1): 8. (in Dutch). [Is there any preference in oviposition substratum in *Lestes viridis*? *Fraxinus excelsior* and *Alnus glutinosa* are preferred oviposition substrates for *C. viridis* near the estate Rijwijk, The Netherlands. In general, trees with smooth bark seems to be preferred for oviposition.] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: m.wasscher@broekhuis.nl

1500. **Hämäläinen, M. (2000):** Ten species added to the list of Peninsular Malaysian Odonata. *Notul. odonatol.* 5(5): 53-55. (in English). [First records are the following species: *Amphicnemis ecornuta*, *A. sp.*, *A. gracilis*, *Lestes praecellens*, *Podolestes buwaldai*, *Oligoaeschna foliacea*, *Burmagomphus arthuri*, *Orchithemis pruinans*, *Tyriobapta kuekenhali*, and *Zyxomma obtusum*.] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

1501. **Hill, P.M. (2000):** Migrant Hawker *Aeshna mixta* using Buddleia Bush as a Feeding Station. *Atropos* 10: 57. (in English). [In early September 1999 *Aeshna mixta* was patrolling around a Buddleia and "periodically attempting to prey upon the various butterflies present, mainly Peacock *Inachis io* and Red Admiral *Vanessa atalanta*. Although the dragonfly was present for two or three days, I never actually saw it take a butterfly. Presumably it was successful otherwise it would have given up its vigil. Interestingly, a Robin (*Erithacus rubecula*, Aves) was also in attendance on several evenings, feeding on moths attracted to the Buddleia bush, flycatcher-fashion."] Address: Hill, P.M., 1 Clive Cottage, London Road, Allostock, Kniitsford, Cheshire WA16 9LT, UK

1502. **Jödicke, R. (2000):** Reiseberichte: Tunesien. *Libellennachrichten* 3: 18-19. (in German). [Report on the more recent activities in surveying the Odonata of Tunisia with some remarks on new additions to the checklist of the Tunesian Odonata, and voltinism of some species.] Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany. E-mail: r.joedicke@t-online.de

1503. **Johansson, F. (2000):** The slow-fast life style characteristics in a suite of six species of odonate larvae. *Freshwater Biology* 43: 149-159. (in English). ["1. The validity of the slow-fast lifestyle dichotomy proposed by Sih (1987) was tested in a suite of six odonate species from a restricted geographical area. Data on activity and microhabitat use were obtained in a laboratory study. Further necessary information on life history, macrohabitat (ephemeral-permanent) use and vulnera-

bility to fish predation was provided by a literature survey. 2. Activity was estimated as number of moves and distance moved for the six odonate larvae. *Aeshna juncea*, *Lestes sponsa* and *Sympetrum danae* were categorised as high-active species, whereas *Coenagrion hastulatum*, *Cordulia aenea* and *Leucorhinia dubia* were categorised as low-active species. 3. *C. hastulatum* and *L. sponsa* exploited microhabitats close to the water surface, *C. aenea* and *L. dubia* close to the bottom, and *A. juncea* and *S. danae* were intermediate in their water depth utilisation. 4. A principal component analysis of the data from the laboratory experiment and the literature survey supported the slow-fast life style dichotomy since the variables activity, macrohabitat use, life cycle length and sensitivity to fish predators were highly correlated." (Author)] Address: Johansson, F., Department of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Limed, Sweden. E-mail: frank.johansson@eg.umu.se

1504. **Jones, S.P. (2000):** First proof of successful breeding by the Lesser Emperor *Anax parthenope* (Sélys) in Britain. *J. Br. Dragonfly Society* 16(1): 20-23. (in English). ["*A. parthenope* has been proven to breed successfully in Britain for the first time by the discovery of a male exuvia on the Lizard peninsula on 31 July 1999. Additional exuviae discovered approximately 75 km to the northeast at Bake Farm Pools shortly afterwards allow the possibility that the species may have established itself over a wide area of Cornwall, especially as adults were noted at two other sites in the county during 1999. Current knowledge of the larval development time for *A. parthenope* indicates that, in Europe, larval development is likely to take two years (Robert, 1958), suggesting that the original oviposition would have occurred during the summer of 1997. However it is not inconceivable that in the right conditions, such as the shallow pools of the Lizard site where there is a high degree of exposure to sunshine, *A. parthenope* could complete its larval development in one year (P.S. Corbet, pers. comm.). If so, it is possible that oviposition could have occurred during the summer of 1998, when there were numerous sightings of adult *A. parthenope* in Cornwall." (Author) Morphological characters of male exuviae of *A. parthenope* and *A. imperator* for separating the species are discussed in detail.] Address: Jones, S., Hyfield, Chapel Hill, Brea, Cornwall TR14 9BP, UK

1505. **Jonsen, I. D.; Taylor, P. D. (2000):** Fine-scale movement behaviors of calopterygid damselflies are influenced by landscape structure: an experimental manipulation. *Oikos* 88: 553-562. (in English). ["We explore the effect of differences in landscape structure, arising from habitat loss, on the fine-scale movement behaviors of two congeneric damselflies - *Calopteryx aequabilis* and *C. maculata*. Both species require streams for breeding and naiad development and both often use forest for foraging. We compare movement behaviors across three types of landscape: forested landscapes, where stream and forest habitat are adjacent; partially forested landscapes, where streams and forest habitat are disjunct, and non-forested landscapes, where little to no forest habitat is available. We employ a reciprocal transplant experiment to determine the extent to which movement along and away from streams is influenced by landscape structure and historical behavior or morphological adaptations. For both species, we show that both the propensity to move away from streams and

and rates of net displacement differ among landscape types. Both species move away from streams on landscapes with high or moderate levels of forest cover but neither moves away from streams on landscapes with little or no forest. Furthermore, *C. maculata* native to predominantly forested landscapes are more likely to move away from streams, regardless of the landscape structure they encounter, than are individuals native to moderately forested or non-forested landscapes. There was no effect of natal landscape on *C. aequabilis*. Comparisons with microlandscape studies suggest that there may be some general similarities among the different systems but these are clouded by uncertainty regarding the similarity of the underlying processes responsible for observed behavioral responses to landscape structure. Despite this uncertainty, animal movement behaviors are contingent upon the structure of the broader landscape, regardless of the absolute scale of the landscape." (Authors)] Address: Jonsen, D.I., Lethbridge Research Centre, Agriculture & Agri-Food Canada, P.O. Box 3000, Lethbridge, AB, Canada T1J 4B1. E-mail: jonseni@em.agr.ca

1506. **Jurzitza, G. (2000):** Obituary: Dr. Paul Münchberg (1905-1999). *Notul. odonatol.* 5(5): 66. (in German). [P. Münchberg born on 16 September 1905 in Trebisch near Landsberg (Warthe), Poland departed on 23 July 1999. His odonatological vita is credited in *Odonatologica* 4(3): 125-128.] Address: Jurzitza, G., Reimuthstr. 27, D-76187 Karlsruhe, Germany

1507. **Karube, H. (2000):** *Microgomphus jurzitzae* spec. nov., a new dragonfly from southern Vietnam (Anisoptera: Gomphidae). *Odonatologica* 29(1): 63-65. (in English). ["The new sp. is described and illustrated from 2 males. Holotype male: Lamdong prov., Bao Lok to Ho-Chi-minh Rd, 15-VI-1996; deposited in Author's institution. It is similar to *M. loogali* Fraser, from northern Burma, from which it is easily distinguished by the longer inner superior appendages, and by strongly bent, bifid inferior appendages. This is the first member of the genus recorded from Vietnam." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan

1508. **Ketelaar, R. (2000):** European Reports 1999: The Netherlands: Odonata. *Atropos* 10: 47-49. (in English). [Compilation of new records from the Netherlands and recent range extension of *Coenagrion lunulatum*, *Erythromma viridulum*, *Lestes barbarus*, *L. virens*, *Sympetma fusca*, *Stylurus flavipes*, *Aeshna affinis*, *A. mixta*, *Anax parthenope*, *Sympetrum fonsolombii*, *S. flaveolum*, and *S. danae*] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands

1509. **Klärner, D. (2000):** Technische Biologie: Kopffixierung bei Libellen. *Naturwissenschaftliche Rundschau* 53(1): 35-36. (in German). [Review of the paper abstracted as OAS 723] Address: not stated

1510. **Knill-Jones, S. (2000):** Reports from Coastal Station - 1999: Isle of Wight. *Atropos* 9: 62. (in English). [First record of *Cordulia aenea* on the Island, *Anax parthenope* on 4 September] Address: not stated

1511. **Kosterin, O. E. (2000):** Observation on an intergeneric copulation between a male *Cordulia aenea* (L.) and a female *Epitheca bimaculata* (Charp.) (Anisoptera: Corduliidae). *Notul. odonatol.* 5(5): 55-56. (in English). [The copula is briefly described and documen-

ted by a photograph. It took place on 13-VI-1994, at an oxbow in Berd' River, near Legostaevo, Iskitim distr., Novosibirsk prov., Russia. A statement on the prezygotic mating barriers in dragonflies is made.] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

1512. **Kuhn, J. (2000):** Libellen (Odonata) im Murnauer Moos, Oberbayern: Fauna und Naturschutzprobleme. Verh. Westd. Entom. Tag 1998: 141-146. (in German with English summary). ["Murnauer Moos" is a large bog and fen complex in southern Bavaria, Germany. In this paper the dragonfly fauna (55 species) is listed and its conservation problems are summarized."] Address: Kuhn, J., Max-Planck-Institut für Verhaltensphysiologie, Abt. Winckler, D-82319 Seewiesen. E-mail: kuhn@mpi-seewiesen.mpg.d

1513. **Littlewood, N. (2000):** Reports from Coastal Stations - 1999: South Walney Nature Reserve, Cumbria. Atropos 9: 76-77. (in English). [Odonata are rare in general on the reserve, *Sympetrum striolatum*, *Aeshna mixta* c.f.] Address: not stated

1514. **Long, R.; Long, M. (2000):** Non-British Damselflies in Jersey. Atropos 9: 95-96. (in English). [The current status of *Sympecma fusca*, *Chalcolestes viridis*, *Lestes barbarus*, and *Crocothemis erythraea* on Jersey is briefly commented] Address: Long, R., Ozard, St. John, Jersey, Channel Islands JE3 4FP, UK

1515. **Long, R. (2000):** Southern Migrant Hawker *Aeshna affinis* in Jersey, Channel Islands. Atropos 9: 81. (in English). [Second British record from 17 July 1998 at Rosel Manor, St. Martin, Jersey] Address: Long, R., Ozard, St. John, Jersey, Channel Islands JE3 4FP, UK

1516. **Marsh, P. (2000):** Odonata at Heysham Industrial Estate, Lancashire. Atropos 9: 81-82. (in English). ["site in an old industrial area in desperate need of bio-remediation due to unpleasant chemicals lingering underground or in the substrate in the wetland area"; 13 odonate species could be recorded including freshly emerged *Sympetrum flaveolum*] Address: Marsh, P., 17 Albion Street, Lancaster, Lancashire LA1 1DY, UK

1517. **Mauersberger, R. (2000):** *Coenagrion johansoni* (Wallengren), *Aeshna crenata* Hagen and *A. subarctica elisabethae* Djakonov found in Belarus (Zygoptera: Coenagrionidae; Anisoptera: Aeshnidae). Notul. odonatol. 5(5): 56-57. (in English). [7 spp. were recorded in a peat bog near Polozk in northern Belarus, July 1996. *Aeshna crenata* and *A. subarctica* are new additions to the fauna of the country.] Address: Mauersberger, R., Waldstr. 4, D-16278 Steinhöfel, Germany

1518. **McPeck, M.A.; Brown, J.M. (2000):** Building a regional species pool: diversification of the *Enallagma* damselflies in eastern North America. Ecology 81(84): 904-920. (in English). ["We use a phylogeny of the North American *Enallagma* damselflies, derived from molecular and morphological data, to examine how the patterns of local and regional assemblage structure developed in this taxon across eastern North America. The two primary clades in the genus have nearly identical numbers of extant species, but the centers of diversity and the diversification rates for the two clades are quite different. One clade has its center of diversity in

New England and radiated very recently from three species to give the current 18. Although most of this radiation involved the creation of new species in the ancestral fish-lake habitat, at least two independent lineages invaded and adapted to a new habitat: ponds and lakes lacking fish but supporting large numbers of large predatory dragonflies. The other clade with greatest diversity in the southeastern United States, contains species that inhabit only water bodies that support fish populations. This "south-eastern" clade diversified at a much slower and more steady pace within the fish-lake habitat than the "New England" clade, but four speciation events in this clade appear to have occurred at the same time as the northern radiation. Combined with our current understanding of local community structure in fish and fishless lakes, these results indicate that most of the species in this regional assemblage were created by speciation mechanisms other than filling empty niches, which have resulted in many locally coexisting species that are very similar in their ecological characteristics. Damselflies in eastern North American ponds and lakes appear to exemplify features of both a regulated component of the littoral food web (i.e., a functional group) and an assemblage whose local community composition is influenced by nonadaptive macroevolutionary processes that have operated on a much larger regional scale." (Authors)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

1519. **Misof, B.; Anderson, C.L.; Hadrys, H. (2000):** A phylogeny of the damselfly genus *Calopteryx* (Odonata) using mitochondrial 16S rDNA markers. Molecular phylogenetics and evolution 15(1): 5-14. (in English). ["[...] In this study, we concentrate on establishing phylogenetic information from parts of the 16S rDNA gene, which we sequenced for nine *Calopteryx* species and five outgroup species. The mt 16S rDNA data set did not show signs of saturated variation for ingroup taxa, and phylogenetic reconstructions were insensitive to variation of outgroup taxa. Parsimony, neighbor-joining, and maximum-likelihood reconstructions agreed on parts of the tree. A consensus tree summarizes the significant results and indicates problematic nodes. The 16S rDNA sequences support monophyly of the genera *Mnais*, *Matrona*, and *Calopteryx*. However, the genus *Calopteryx* may not be monophyletic, since *Matrona basilaris* and *Calopteryx atrata* are sister taxa under every parameter setting. The North American and European taxa each appear as monophyletic clades, while the Asian *Calopteryx atrata* and *Calopteryx cornelia* are not monophyletic. Our data implies a different paleobiogeographic history of the Eurasian and North American species with extant Eurasian species complexes shaped by glacial periods, in contrast to extant North American species groups." (Authors)] Address: Misof, B., Institute for Evolutionary Biology and Ecology, Universität Bonn, An der Immenburg 1, D-53121 Bonn, Germany

1520. **Mitra, A. (2000):** Annotated Odonata inventory of the Asan reservoir, Dehra Dun, India. Notul. odonatol. 5(5): 57-60. (in English). ["44 spp. are listed, of which *Anax p. parthenope* (Sel.) is new for the Doon Valley. 13 spp. have been found to breed exclusively in the Reservoir, 8 spp. breed in the adjacent streams, while the remaining 23 spp. are common in both the habitats." (Author)] Address: Mitra, A., D/6, Government Quarters, 10 M.B. Road, Calcutta-700 083, India



1521. **Mitra, T.R. (2000):** A note on an Odonata collection from Orissa, India. *Notul. odonatol.* 5(5): 60-61. (in English). [69 spp. are so far known from the state Orissa, eastern India. No locality data were published for 11 of these (Mitra, 1994, *Rec. zool. Surv. India, Occ. pap.*, 166: 1-40); they are listed here, and the complete regional bibliography is provided. "Note on *Enallagma insula* Fraser: This enigmatic species has been described from a single female specimen, from the Chilka Lake, Ganjam district (FRASER, 1920). The type is apparently lost. Zoological Survey of India has undertaken several faunistic surveys, especially in the district of Ganjam, but no party was ever successful in collecting further specimens of this species. The authenticity and the status of *E. insula* remain uncertain."] Address: Mitra, T.R., Zoological Survey of India, M-Block, New Alipore, Calcutta-700 053, India
1522. **Müller, J.; Steglich, R. (2000):** Zur Verbreitung der Südlichen Mosaikjungfer *Aeshna affinis* (Odonata) in Sachsen-Anhalt in den Jahren 1993 bis 1999. *Entomol. Mitt. Sachsen-Anhalt* 8(1): 22-32. (in German). [Documentation of all known records (n = 92) of *A. affinis* in Sachsen-Anhalt, Germany; *A. affinis* prefers the floodplains of River Elbe with thermically favoured periodic water bodies with reed vegetation; in 17 cases *A. affinis* was associated with *Lestes barbarus*] Address: Müller, J., Frankelfelde 3, 39116 Magdeburg, Germany. E-mail: jmueller@MU.LSA-NET.dbp.de
1523. **Naraoka, H. (2000):** Obituary: Professor Dr Kazuo Saitoh (1927-1998). *Notul. odonatol.* 5(5): 66-68. (in English). [10-2-1927 - 25-11-1998] Address: Naraoka, H., 36-71, Motoizumi, Fukunoda, Itayanagi, Kitagun, Aomori, 038-3661, Japan
1524. **Neboiss, A. (2000):** Obituary for Dr. Zandis Spuris. *W.D.A.'s Agrion* 4(1): 11-12. (in English). [Obituary for the famous Latvian zoologist Dr. Zandis Spuris who died on 15 November 1998. The odonatological bibliography (compiled by M. Schorr) comprises nearly 40 titles.] Address: Neboiss, A., 8 Andrew St., Forest Hill, Victoria Australia 3131
1525. **N.N. (2000):** Reports from Coastal Stations - 1999: Minsmere RSPB Reserve, Suffolk. *Atropos* 9: 71. (in English). [Late record of *Sympetrum striolatum* from 2 December] Address: not stated
1526. **Novelo-Gutiérrez, R. (2000):** Description of the larva of *Hetaerina infecta* Calvert (Odonata: Calopterygidae). *Proc. ent. soc. Washington* 102(1): 99-104. (in English with Spanish summary). [The larva is described and illustrated based on two exuviae of reared final instar larvae, and six F-1 instar larvae. It is compared to its close relative *H. capitalis*. Data on distribution, habitat and habits, as well as a key to larvae for the Mexican species of *Hetaerina* are provided.] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico
1527. **Odin, N. (2000):** Reports from Coastal Stations - 1999: Landguard Bird Observatory, Suffolk. *Atropos* 9: 70-71. (in English). [*Coenagrion puella*] Address: not stated
1528. **Olberg, R.M.; Worthington, A.H.; Venator, K.R. (2000):** Prey pursuit and interception in dragonflies. *Jour. comp. physiol. (A), Sensory, neural and behavioral physiology* 186(2): 155-162. (in English). ["Perching dragonflies (Libellulidae; Odonata) are sit-and-wait predators, which take off and pursue small flying insects. To investigate their prey pursuit strategy, we videotaped 36 prey-capture flights of male dragonflies, *Erythemis simplicicollis* and *Leucorrhinia intacta*, for frame-by-frame analysis. We found that dragonflies fly directly toward the point of prey interception by steering to minimize the movement of the prey's image on the retina. This behavior could be guided by target-selective descending interneurons which show directionally selective visual responses to small object movement. We investigated how dragonflies discriminate distance of potential prey. We found a peak in angular velocity of the prey shortly before take-off which might cue the dragonfly to nearby flying targets. Parallax information from head movements was not required for successful prey pursuit." (Authors)] Address: Olberg, R.M., Union Coll, Dept Biol. Sci., Schenectady, NY 12308 USA; Siena Coll, Dept Biol, Loudonville, NY 12222 USA. E-mail: olbergr@union.edu
1529. **Parr, A. (2000):** Blue Dasher *Pachidiplax longipennis* (Burmeister) on an oil rig in the north sea. *Atropos* 10: 3-5. (in English). [On the occasion of the first European record of *P. longipennis* in Sept. 1999 on the Sedco 706 oil rig at 60°38'N, 1°39'E in the North Sea, off the Shetland Isles, by Mr. P. Burr, the species is characterized incl. two excellent colour photos. The possibility of an accidental introduction by air or by sea direct from the Houston area, USA, and the possibility of the dragonfly being a genuine vagrant are discussed in some detail.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK
1530. **Parr, A. (2000):** Migrant dragonflies in 1999 including recent decisions and comments by The Odonata Record Committee. *Atropos* 9: 21-25. (in English). [The following species are treated: *Calopteryx splendens*, *Erythromma viridulum*, *Aeshna mixta*, *A. affinis*, *Anax parthenope*, *A. ephippiger*, *Sympetrum striolatum*, *S. fonscolombii*, *S. flaveolum*, *S. sanguineum*, *S. danae*, and *Pachydiplax longipennis*(!). The latter is a new addition to the European odonate fauna. The female specimen was detected dead on 6 September 1999 on the Sedco 706 oil rig in the Dunbar field on the east of Shetland.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK
1531. **Parr, A. (2000):** Odonata Records Committee News. *Atropos* 10: 58. (in English). [Reports on *Anax parthenope*, and *Pachydiplax longipennis*] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK
1532. **Parr, A. (2000):** Review: Dragonflies. Behaviour and Ecology of Odonata by Philip S. Corbet. 1999 Harley Books. Colchester. ISBN 0 946589 64 X. 829 pp. *Atropos* 9: 92. (in English). [Review of P.S. Corbet's book, see OAS 1566] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK
1533. **Parr, A. (2000):** Southern Migrant Hawker *Aeshna affinis* Vander Linden: a guide to identification. *Atropos* 10: 26-28. (in English). [*A. affinis* is a quite rare migrant odonate species in UK. To trace possible specimens and to separate them from *A. mixta*, the paper provides detailed information on *A. affinis*. Brilliant colour photos and information on habitat and behaviour will help to spot *A. affinis* among the *A. mixta*.] Address:

Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

1534. **Parr, M.; Corbet, P.S. (2000):** The 1999 International Congress of Odonatology. WDA's Agrion 4(1): 5-6. (in English). [Report on the WDA meeting held on 11 through 16 July at Colgate University, Hamilton, New York, USA; it gives some general information on the participants and the atmosphere among participants, and short summaries of the lectures held in different sessions] Address: Parr, M., Little Island, Stembidge, Martock, Somerset TA12 6BW, UK. E-mail: mmcz@parr37.freeseve.co.uk

1535. **Pellow, K. (2000):** Lesser Emperor Dragonfly *Anax parthenope* (Selys) breeding in Cornwall. *Atropos* 9: 28-29. (in English). [Exuviae of the species were secured at Trerulefoot, Cornwall on 16 August 1999; male exuviae of *Anax parthenope* are compared with exuviae of *A. imperator*; the female of *A. parthenope* is described in detail] Address: Pellow, K., Mount Pleasant Bungalow, Botus Flening, Cornwall PL12 6NQ, UK

1536. **Pellow, K. (2000):** Observations of the Red-veined Darter *Sympetrum fonscolombi* (Selys) at Bake Lakes in Cornwall during 1999. *J. Br. Dragonfly Society* 16(1): 29-30. (in English). [The paper presents further observations on the persistence of a population of *S. fonscolombii* that may be in the early stages of colonizing Britain.] Address: Pellow, K., Mount Pleasant Bungalow, Botus Fleming, Cornwall PL12 6NQ, UK

1537. **Piper, W.; Krüner, U. (2000):** Libellennachrichten. *Libellennachrichten* 3: 1-20. (in German). [Volume 3 contains a lot of information on recent activities of the Society of German speaking odonatologists, announcement of meetings, reviews of odonatalogical publications and CD-ROM's, new theses on Odonata, calls for cooperation ...] Address: Piper, W., Kollenhof 31, D-22527 Hamburg, Germany

1538. **Piper, W. (2000):** *Perithemis mooma* Kirby emerge in a cave (Anisoptera: Libellulidae). *Notul. odonatol.* 5(5): 65-66. (in English with Portuguese summary). [The cave „Gruta do Padre" is situated NE of Santa Maria de Vitoria, in the direction of Santana dos Brejos, Bahia, Brazil. A river runs through ca 10 km of the cave. On 9-11-1996, some 3 km off the cave entrance a female *P. mooma* was sitting on the helmet of the author. On the 10th, another member of the party detected another female on his helmet, at about the same section of the river. The two dragonflies were freshly emerged with very soft wings and bodies. Apparently, the larvae drifted into the cave during the rainy season.] Address: Piper, W., Kollenhof 31, D-22527 Hamburg, Germany. E-mail: werner.piper@t-online.de

1539. **Poepperl, R. (2000):** Benthic secondary production and biomass of insects emerging from a northern German temperate stream. *Freshwater Biology* 44(2): 199-211. (in English). [“1. Secondary production and emergence of aquatic insects were examined in the outlet of Lake Belau, Northern Germany, by means of benthic samples and emergence traps. 2. At three stream sections annual larval secondary production varied between 4.9 and 10.8 gDM (dry mass) m<sup>-2</sup> year<sup>-1</sup>. Insects contributed with 3.4, 8.9, and 8.7% to the total macroinvertebrate production [...]. Emerged biomass was between 1.0 and 2.0 gDM m<sup>-2</sup> year<sup>-1</sup>. At all three stream sections Diptera dominated [...] followed by Trichoptera [...] and Ephemeroptera . 3. Average larval

production amounted to 9.0 gDM n<sup>-2</sup> year<sup>-1</sup> and emerged biomass to 1.7 gDM m<sup>-2</sup> year<sup>-1</sup>. Larvae of insects amounted to 7.0% of total macroinvertebrate production. 4. The ratio of annual emerged biomass to secondary production (E/P) varied among individual taxa. At the stream sections the ratio ranged from 15.9% to 20.1% with an average of 18.3% for the stream. [...].” (Author) *Pyrrhosoma nymphula*, *Ischnura elegans*, *Aeshna cyanea*] Address: Poepperl, R., Ökologie-Zentrum, Christian-Albrechts-Universität Kiel, Schauenburgerstr. 112, D-24118 Kiel, Germany. E-mail: rainer@pz-oekosys.uni-kiel.de

1540. **Pretschner, P. (2000):** Neue Bücher: Sternberg, Klaus & Buchwald, Rainer: *Die Libellen Baden-Württembergs*. Band 1. Stuttgart: Eugen Ulmer Verlag, 1999. 468 S. - 98 DM. ISBN 3-8001-35098. *Natur und Landschaft* 75(5): 233. (in German). [book review, see OAS 1149] Address: Pretschner, P., c/o Bundesamt für Naturschutz, Konstantinstr. 110, 53179 Bonn, Germany

1541. **Reinhardt, K.; Seidenbusch, R.; Foitzik, O.; Roth, S. (2000):** A small dragonfly collection from Turkmenistan. *Notul. odonatol.* 5(5): 61-63. (in English). [7 spp. were recorded from southern Turkmenistan of which *Gomphus schneideri* is new to the fauna of Turkmenistan.] Address: Reinhardt, K., Hauptstr. 38, D-09244 Oberlichtenau, Germany. E-mail: b5kltre@pluto.rz.uni-jena.de

1542. **Reinhardt, K. (2000):** Aspects of the dragonfly fauna of eastern Kazakstan. *IDF-Report* 2(2): 1-11. (in English). [Detailed report on the results of an expedition to Kazakstan in May 1999; 17 sites were surveyed, 17 species could be identified; reproductive behaviour, oviposition, and egg parasitic wasps of *Sympecma paedisca* were investigated] Address: Reinhardt, K., Hauptstr. 38, D-09244 Oberlichtenau, Germany. E-mail: b5kltre@pluto.rz.uni-jena.de

1543. **Schorr, M. (2000):** Bilder aus dem Leben des Odonatologen Dr. Erich Schmidt (1890 - 1969). *IDF-Report* 2(2): 12-33. (in German). [Short introduction to a leaflet of W. Kanzler circulated on the opportunity of Erich Schmidt's 70th birthday; this "Festschrift" documents in black and white sketches some stations of the odonatalogical life of Dr. E. Schmidt, giving some intimate insight into the personality of the famous odonatologist] Address: Schorr, M., Waldfrieden 25, D-54314 Zerf. E-mail: foeatrier@aol.com

1544. **Silsby, J. (2000):** A social look at the symposium. WDA's Agrion 4(1): 6-7. (in English). [report on the WDA meeting held on 11 through 16 July at Colgate University, Hamilton, New York, USA; it gives some personal impression on the warmth of atmosphere among the participants, and the things happening around the scientific part of the meeting] Address: Silsby, J., 1, Haydn Avenue, Purley, Surrey, CR8 4AG, UK. E-mail: jsilsby1@aol.com

1545. **Silsby, J. (2000):** W.D.A.'s Agrion. W.D.A.'s Agrion 4(1): 16 pp. (in English). [A large variety of information is presented in this issue, including the minutes of the first WDA Biennial General Meeting on 13 July 1999 at Colgate University, NY, USA, reports from the Colgate symposium (Mike Parr & Philip Corbet) and the post-symposium tour (Dorothy Gennard), news from members, universities, and museums, new members, announcement of the 2nd International Symposium of W.D.A. in Sweden in 2001, etc.] Address: Silsby, J., 1,

Haydn Avenue, Purley, Surrey, CR8 4AG, UK. E-mail: jsilsby1@aol.com

1546. **Slaughter, L.; Best, L. (2000):** A late Southern Hawker *Aeshna cyanea* and other observations. *Atropos* 9: 87. (in English). [A. cyanea was recorded on 21 November 1999 in Par Beach Dunes, south Cornwall; *Sympetrum striolatum* were also on the wing] Address: Slaughter, L., P.O. Box 16, St. Austell, Cornwall, PL25 5LY, UK

1547. **Solly, F. (2000):** Reports from Coastal Station - 1999: Isle of Thanet, Kent. *Atropos* 9: 67-68. (in English). [Good year; there are no waterbodies in the recording area, so all records are thought to refer to dispersal/migration: *Aeshna mixta*, *A. cyanea*, *Libellula quadrimaculata*, *Orthetrum cancellatum*, *Sympetrum striolatum*, *S. sanguineum*, *S. flaveolum*, and *S. danae*] Address: not stated

1548. **Spence, B. (2000):** Reports from Coastal Stations - 1999: Spurn Bird Observatory, East Yorkshire. *Atropos* 9: 73-74. (in English). ["very disappointing year", few records of *Sympetrum fonscolombii* and *S. danae*] Address: not stated

1549. **Steglich, R. (2000):** Zum Vorkommen der "FFH-Libellen" *Ophiogomphus cecilia* und *Gomphus (Stylurus) flavipes* sowie von *Gomphus vulgatissimus* (Odonata, Gomphidae) in der "Magdeburger Strom-Elbe". *Entomol. Mitt. Sachsen-Anhalt* 8(1): 3-6. (in German). [Detailed documentation of records on River Elbe in the area of the town Magdeburg, Sachsen-Anhalt, Germany] Address: Steglich, Rosmarie, Quittenweg 53, 39118 Magdeburg, Germany

1550. **Steigner, W. (2000):** Naturkundliche Wanderung im LSG Höcherberg-Westrich. *Pollichia-Kurier* 16(1): 26-27. (in German). [Report of an excursion with natural history purposes in the district of Kusel, Rheinland-Pfalz, Germany; among the traced Odonata mentioned are *Orthetrum coerulescens*, and *Ceragrion tenellum*; the observer and odonatologist Siegmund Ohlinger corrected the record to *Pyrrhosoma nymphula*.] Address: not stated

1551. **Stevani, C.V.; Porto, J.S.; Trindade, D.J.; Bechara, E.J.H. (2000):** Automotive clearcoat damage due to oviposition of dragonflies. *Journal of applied polymer science* 75: 1632-1639. (in English). ["Automotive industries are increasingly interested in learning how to pro-long the clearcoat resin lifetime and avoid its thermal, photochemical, and chemical degradation. While chemical degradation by acid rain has been well known since the beginning of the decade and the subject of many studies, chemical degradation of the automotive clearcoat by living organisms (except by bird droppings) is a newly recognized problem. In this work, we report the chemical degradation of the automotive clearcoat caused by oviposition of dragonflies. These insects, very common in Brazil, are attracted by the reflecting surface of cars exposed in the sun and lay eggs on them. We observed that the eggs, at the high temperatures (50-92°C) of the car surface, can cause damage similar to that of acid rain. In experiments on resin-coated plates, we excluded the involvement of H<sub>2</sub>O<sub>2</sub>- or hydroquinone-derived radicals, of enzyme-catalyzed hydrolysis, and of photosensitizer-induced damage. The damage was very similar, however, to that produced by the sulfur-containing amino acids, cysteine and cystine, at high temperature. Due to this similarity, and because

the eggs are rich in sulfur amino acids, we propose a mechanism involving cysteine and cystine residues in the clearcoat damage." (Authors) *Miathyria* sp., *Tauriphila* sp., *Erythemis* sp.] Address: Bechara, E.J.H., Instituto de Química, Universidade de São Paulo, C.P. 26077, 05599-970, São Paulo, SP, Brazil. E-mail: ebechara@quim.iq.usp.br

1552. **Stevani, C.V.; Faria, D.L.A. de; Porto, J.S.; Trindade, D.J.; Bechara, E.J.H. (2000):** Mechanism of automotive clearcoat damage by dragonfly eggs investigated by surface enhanced Raman scattering. *Polymer Degradation and Stability* 68: 61-66. (in English). ["Dragonflies are attracted by the reflection of sunlight on car surfaces and lay their eggs on the clearcoat resin. Considering that the surface can reach up to 93°C and that during the egg hardening process (sclerotization) H<sub>2</sub>O<sub>2</sub> is released, cysteine and cystine residues present in the egg protein can be oxidized to sulfinic and sulfonic acids. These are strong acids which, like acid rain, can hydrolyze the acrylic/melamine resin causing damage where the eggs were laid. Confocal Raman spectroscopy revealed that the spectra obtained from damaged and intact portions of the clearcoat were similar, in agreement with infrared absorption spectroscopy data. These data demonstrate that the attack by eggs, H<sub>2</sub>SO<sub>4</sub> and cysteine/H<sub>2</sub>O<sub>2</sub> only promotes solubilization of resin through acid hydrolysis of the resin ester and amide moieties. Furthermore, surface enhanced Raman scattering (SERS) spectra obtained from dragonfly eggs and cysteine/H<sub>2</sub>O<sub>2</sub> reaction products treated with a silver colloid were very similar, thus confirming the presence of sulfinic and sulfonic acids. [...] Conclusion: Altogether the data support the proposition that the damage caused by dragonfly eggs to acrylic/melamine resins is due to acid hydrolysis. [...] As the sulfinic/sulfonic acids putatively formed are attached to the protein structure of the eggs, only damage in the contacted area between eggs and resin takes place. Contrarily, in the case of either acid rain or "acid solutions" tested in the laboratory, the acids are free in solution and can extend the damage to a greater surface area as well as to inner layers of the clearcoat. Once inner layers are destroyed, significant changes in the structure of the polymeric material can thereafter occur." (Authors)] Address: Bechara, E.J.H., Instituto de Química, Universidade de São Paulo, C.P. 26077, 05599-970, São Paulo, SP, Brazil. E-mail: ebechara@quim.iq.usp.br

1553. **Stoks, R.; De Block, M. (2000):** The influence of predator species and prey age on the immediate survival value of antipredator behaviours in a damselfly. *Archiv für Hydrobiologie* 147(4): 417-430. (in English). ["The efficacy of antipredator behaviours may depend on both intrinsic and extrinsic factors. We experimentally studied the effects of predator species and prey age on the immediate survival value of swimming and lamellae loss in larval damselflies. Four predators: two invertebrates (the notonectid, *Notonecta viridis* and the dragonfly larva *Aeshna cyanea*), and two vertebrates (the three-spined stickleback *Gasterosteus aculeatus* and the sunfish *Lepomis gibbosus*) were tested with all combinations of two instars of the damselfly *Lestes sponsa* (F-0 and F-2). The number of escapes by swimming away were much lower when larvae were attacked by the two fishes than by the two invertebrates. Moreover *Lepomis* never removed lamellae and killed all larvae. The instars did not differ in the number of escapes by swimming, but F-0 instars were caught more



at the lamellae than F-2 instars. All larvae that survived a capture were caught at the lamellae and the majority (90 %) did so by autotomy. The ontogenetic increase in the immediate survival value of this antipredator behaviour was dependent upon the predator species. It was highest in captures by the *Notonecta* (40 %), and lower when larvae were caught by the *Aeshna* or *Gastrophysus* (ca. 17 %). This was probably because the biological relevance of the magnitude of the speed difference between damselfly instars depends upon the predator's attack performance. We discuss the consequences of these findings for the macrohabitat distribution of the larvae and for the multicomponent antipredator behaviours prey may use." (Authors)] Address: Stoks, R., Evolutionary Biology Group, Department of Biology, University of Antwerpen (RUCA), Groenenborgerlaan 171, B-2020 Antwerpen, Belgium. E-mail: stoks@ruca.ua.ac.be

1554. **Switzer, P.V.; Schultz, J.K. (2000):** The male-male tandem: a novel form of mate guarding in *Perrithemis tenera* (Say) (Anisoptera: Libellulidae). *Odonatologica* 29(2): 157-161. (in English). ["Observations on male-male tandems are reported; these tandems occur at very low frequency during mate guarding sequences. When initiating a tandem, a male territory resident grabs an intruding male behind the head and flies with him. This behavior is similar to the tandem formation more usually associated with male-female pairs. Because the male-male tandems occurred during mate-guarding and because tandems do not follow courtship of the intruder by the resident, this rare behavior is interpreted as a form of mate guarding rather than misdirected mating behavior." (Authors)] Address: Switzer, P.V. & J.K. Schultz, Department of Biological Sciences, Eastern Illinois University, Charleston, IL 61920, USA. E-mail: cfpvs@eiu.edu

1555. **Tenessen, K.J. (2000):** *Micrathyria sympriona* spec. nov., a new dragonfly from Ecuador and Peru (Anisoptera: Libellulidae). *Odonatologica* 29(1): 67-73. (in English). ["The new sp. (holotype male, allotype female: Ecuador, Zamora Chinchipe prov., grassy marsh 5.5 km SE of Zamora, ca 3000 ft, 4°10'S, 78°56'W, 5-XI-1997; deposited at FSCA, Gainesville, FL, USA) is described and compared with *M. hypodidyma* Calvert. *M. sympriona* differs in the low, laterally rounded transverse ridge on the venter of abdominal segment 1 which bears 0 to 3 widely spaced black denticles on each side of the median depression, the tips of the outer arms of the hamules surpassing the anterior laminae, and segment 9 all black. Females have abdominal segment 9 sternite convex instead of flat as in *M. hypodidyma*." (Author)] Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA. ktennessen@aol.com

1556. **Troake, P. (2000):** Reports from Coastal Station - 1999: Rye Harbour SSSI, East Sussex. *Atropos* 9: 63-64. (in English). [The usual variety of resident dragonfly species were recorded including *Brachytron pratense* and *Coenagrion pulchellum*] Address: not stated

1557. **Tunmore, M. (2000):** Reports from Coastal Station - 1999: The Lizard, Cornwall. *Atropos* 9: 58-60. (in English). [*Pyrrhosoma nymphula*, exuvia of *Anax parthenope* (first proof of breeding in UK), *Sympetrum fonscolombii*, *Orthetrum coerulescens*, late season records of *Anax imperator* and *Sympetrum striolatum*]

Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK

1558. **Tunmore, M. (2000):** Review: Dragonflies and Damselflies of Great Britain. - A video guide. Produced by C.R. Casey, J. Parker and M. Lote; narration by R. Campey. Otus Video. 1999. Running time approx 80 minutes. £14.99. . *Atropos* 9: 92-93. (in English). [Review of a video with British odonate species excluding the Irish *Coenagrion lunulatum*] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK

1559. **Voigt, H.; Göhlert, T. (2000):** Erstnachweis von *Gomphus flavipes* (Charpentier, 1825) in der Dresdener Elbtalweitung (Odonata). *Entomologische Nachrichten und Berichte* 44(1): 50. (in German). [Records of *Stylurus flavipes* (near Dresden-Gohlis, 8/1999) and *Ophiogomphus cecilia* (near Dresden-Loschwitz, 1997) along the River Elbe in Saxony, Germany] Address: Voigt, H., Grundstr. 152, D-01324 Dresden, Germany

1560. **Ward-Smith, A.J.; Sussex, D.J.; Cham, S.A. (2000):** Flight characteristics of the Brilliant Emerald *Somatochlora metallica* (Vander Linden) in south-east England. *J. Br. Dragonfly Society* 16(1): 24-28. (in English). [The three different forms of flight styles of male *S. metallica* observed at woodland ponds near Bracknell in South-east Berkshire, UK are described and discussed: Flight style I: This flight style is typically at a height of about 1 m above the water and close to the edge. It takes the dragonfly beneath overhanging vegetation, where it is prone to loiter with spells of hovering, and into regions of shade. The male appears to be searching for ovipositing females that use water margins for egg-laying. Flight style II: In this style the male patrols back and forth along a regular beat in the sunshine with a slow, controlled flight, occasionally punctuated by hovering. [...] Typically the flight is about 2-3 m above the water, but where the pond has steeply sloping banks the dragonfly will occupy airspace as high as 6 m above the water level. Over small ponds (up to about 20 m diameter) the dragonfly occupies an area above the centre of the pond. but in larger ponds the flight is typically within an airspace about 4-6 m from the edge. When several males are present, as happens on rare occasions, they space out, each patrolling over different parts of the pool. This flight style may represent general territorial behaviour. Flight style III: In this style the dragonfly upon visiting a site flies around it on an irregular flight path. These visits typically last 1-2 minutes, but may be as short as 20 seconds, sometimes longer than 2 minutes. During this brief period *S. metallica* maintains a sense of urgency, flying faster than in the first two flight styles. Its height above the water varies. *S. metallica* appears to be carrying out a general reconnaissance of a site. The observations are discussed with reference to the energy consumption during flight. "It is conjectured that the slow, controlled flight adopted by *S. metallica* during FS I and FS II is the equivalent of the minimum-power speed of aircraft flight" (Ward-Smith, 1984). "At this flight speed, the dragonfly is able to remain airborne whilst adopting an energy-conservation strategy."] Address: Ward-Smith, A., The Ridgeway, Bracknell, Berkshire RG12 9QU, UK

1561. **Wasscher, M.; Hoeffnagel, W.-J. (2000):** Opmerkelijk veel vroege waarnemingen in 1999. Mededelingen van de Nederlandse Vereniging voor Libellen-

studie 4(1): 9-10. (in Dutch). [In 1999 many odonate species started flying season very early in the year. The phenological data of *Orthetrum cancellatum*, *Leucorrhinia rubicunda*, *Libellula depressa*, *Ischnura elegans*, *I. pumilio*, *Coenagrion hastulatum*, *Platycnemis pennipes*, *Anax imperator*, *Ceriagrion tenellum*, *Orthetrum coerulescens*, *Aeshna mixta*, and *Sympetrum flaveolum* are documented and discussed with reference to data of 1997 and 1998] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: m.wasscher@broekhuis.nl

1562. **Wasscher, M. (Ed.) (2000):** NVL Nieuwsbrief Februari 2000. Mededelingen van de Nederlandse Vereniging voor Libellenstudie 3(4): 14 pp. (in Dutch). [A lot of information on activities of the Dutch odonatologists is given, including a report on the financial year 1999 and planned activities in 2000. Some of the papers are abstracted separately in this issue of OAS.] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: m.wasscher@broekhuis.nl

1563. **Wasscher, M.T; Bos, F.G. (2000):** The European dragonflies: notes on the checklist and on species diversity. *Odonatologica* 29(1): 31-43. (in English). ["Casing natural geographical boundaries, 130 spp. can be considered as European, though when broader political borders are followed this number rises to 136. In addition 20 exotic spp. have been recorded as a result of accidental importation. The highest diversity, defined by the number of spp. per standard area of 250x250 km<sup>2</sup>, is found in the Alps, while the lowest diversity occurs in the northern parts of mainland Europe and on some islands. Surprisingly, the Mediterranean region is not as rich in spp. as the central part of Europe. When compared with other continents, it is clear that Europe has the lowest number of spp. However, when compared specifically with areas at the same latitude, the odonate diversity in Europe is relatively average: somewhat higher than expected in the northern regions, somewhat lower than expected in southern regions." (Authors)] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: m.wasscher@broekhuis.nl

1564. **Westman, A.; Johansson, F.; Nilsson, A.N. (2000):** The phylogeny of the genus *Leucorrhinia* and the evolution of larval spines (Anisoptera: Libellulidae). *Odonatologica* 29(2): 129-136. (in English). ["A cladistic analysis of the genus *Leucorrhinia*, based on adult morphological characters, found one most parsimonious tree with a consistency index of 0.35. The evolution of large dorsal larval spines was mapped on the resulting tree. This mapping suggests that the presence of spines is the primitive state within *Leucorrhinia* and that they have disappeared on five different occasions, or have disappeared twice on lower branches and reappeared three times higher up in the tree." (Authors)] Address: Johansson, F., Department of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Limed, Sweden. E-mail: frank.johansson@eg.umu.se

1565. **Wildermuth, H. (2000):** Buchbesprechung: Corbet, P.S. 1999. *Dragonflies. Behaviour and Ecology of Odonata*. 829 pages, 252 figures, 16 colour plates and 189 tables. Harley Books, Colchester, U.K., ca. Fr. 160.-, ISBN 0 946589 64 X.. *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich*: (in German).

[Book review submitted in November 1999 to *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich*. [In German]. The English translation that follows has been approved by the author of the review.

Dragonflies date from the Lower Permian. During their more than 250 million years' existence their body plan has remained remarkably conservative, although they show striking diversity of ecology and behaviour. Among the insects in the order one sees displayed a range of specializations: the aquatic larva possesses a feeding mechanism equipped with pincers that can be protracted explosively, and a multifunctional hindgut (rectum) that serves for nutrient intake, respiration, ionic regulation, energy storage and jet propulsion. Adult dragonflies are impressive as astonishingly agile and enduring flyers. Their gigantic compound eyes form a morphological and physiological mosaic, the highly developed perception encompassing a high flicker threshold and resolving power, and colour and polarization receptors with a corresponding capability for image processing in the nervous system. Unique for all dragonflies is the typical copulation wheel, and associated with this a variety of strategies for mating and egg-laying. A model organisms, dragonflies have been studied to investigate biological principles and processes. For several decades they have been among the front-runners in zoological research in the fields of behavioural ecology, ecophysiology, reproductive biology and neurobiology. The principles of territoriality and sperm displacement during copulation, widespread in many animal groups, were first described for insects in dragonflies. To an increasing extent dragonflies also feature in applied ecology, especially in land management and nature conservation: Because they exhibit many habitat specializations, dragonflies provide local species-spectra by which the quality of aquatic habitats can be assessed. In Philip S. Corbet's "Dragonflies" a monumental work on the biology of dragonflies has appeared, for which the international readership has waited impatiently for almost twenty years. From the standpoint of knowledge at the end of the 20th Century, the book treats all current fields of ecology and behaviour with reference to the global fauna, comprising some 5000 species. Information is presented throughout in an evolutionary context; yet the book is more than a compendium on behavioural ecology as this discipline is currently perceived. Besides addressing causal (proximate) and functional (ultimate) aspects of behaviour, the book gives ample attention to descriptive biology in its variety at the species level, providing an important foundation for posing questions in future. "Dragonflies" is arranged according to the dragonfly life cycle and begins with habitat selection, egg-laying and developmental biology. More chapters follow on larval biology with especial reference to respiration, feeding, biotic and abiotic factors, growth, metamorphosis and emergence, in which predation and parasitism are duly treated. About half the text is devoted to the adult stage. Such general themes as maturation, activity patterns, thermoregulation, foraging and dispersal are treated in detail. Most space is devoted to the field of odonatology that has made special progress in the last two decades: reproductive biology. The last chapter, entitled "Dragonflies and people" focuses mainly on aspects of nature conservation. Despite the book's unassuming subtitle, Corbet does not confine himself to behaviour and ecology. Wherever an opportunity offers to improve overall understanding of ecological and behavioural principles, corresponding knowledge from the neighbouring

disciplines of physiology and functional morphology is presented. For example the foraging behaviour of adult dragonflies is discussed in the context of flight performance, compound eyes and the nervous system. This approach offers a more comprehensive view than if prey capture were to be treated in isolation. Likewise, correlations are shown between reproductive behaviour and both sperm competition and microscopic anatomy, as well as between behavioural ecology of larvae and their respiration and osmoregulation. Corbet's strength lies in synthesis. He has succeeded in ordering an immense body of information, put in a clear general context and in a challenging way that leads one to a total view, provided not least by the information-rich tables in the text and the appendix. How much labour this entailed is evident from the cited references: the bibliography includes some 4,000 entries. In addition to works cited in English are those in German, Japanese and various other languages. Thus "Dragonflies" represents an extraordinarily comprehensive biology of dragonflies, the significance of which extends far beyond this animal group. The new "Corbet" will indubitably belong among the classic organism-based texts of the 20th Century, like its predecessor from 1962, "A Biology of Dragonflies" - certainly the most often cited publication in odonatology. A final remark about the illustrations: all 96 colour photographs are biologically documented, and complement the text in an excellent way. Obviously the fundamental criteria for selection and compilation were their morphological, ecological and behavioural merits rather than their technical or aesthetic quality. Thus one has to accept a certain lack of uniformity in some plates. Most diagrams and drawings derive from original publications, inevitably causing a mish-mash of styles and also resulting in places in poor resolution of detail. However, new illustrations would have resulted in a higher price and further delay in the book's appearance. The small shortcomings are therefore pardonable. It is superfluous to say that these minor blemishes hardly detract from an otherwise very carefully edited work. Thus it is that "Dragonflies" belongs in the library of every researcher and committed teacher. (Hansruedi Wildermuth)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: wildermuth@swissonline.ch

1566. **Wilson, K.; Evans, S. (2000):** Reports from Coastal Stations - 1999: Gibraltar Point NNR, Lincolnshire. *Atropos* 9: 72-73. (in English). [14 species were seen in 1999, most of them are shortly commented] Address: not stated

1567. **Wilson, K.D.P. (2000):** Distributional notes on the genus *Rhipidolestes* with descriptions of two new species from South China (Zygoptera: Megapodagrionidae). *Odonatologica* 29(1): 45-50. (in English). ["*R. aleni* sp. n. (holotype male: Da Ming Shan, Guangxi) and *R. cyanoflavus* sp. n. (holotype male: Bai Yong, Guangdong) are described from South China. A table and map is provided detailing the distribution of all known *Rhipidolestes* species and subspecies." (Author)] Address: Wilson, K.D.P., Agriculture and Fisheries Department, 6F, 25 Borrett Rd, Mid Levels, Hong Kong, China. E-mail: wislonhk@hk.super.net

1568. **Wootton, R.J.; Kukalova-Peck, J. (2000):** Flight adaptations in Palaeozoic Palaeoptera (Insecta). Biological reviews of the Cambridge philosophical society 75(1): 129-167. (in English). ["The use of available morphological characters in the interpretation of the

flight of insects known only as fossils is reviewed, and the principles are then applied to elucidating the flight performance and techniques of Palaeozoic palaeopteran insects. Wing-loadings and pterothorax mass/total mass ratios are estimated and aspect ratios and shape-descriptors are derived for a selection of species, and the functional significance of wing characters discussed. Carboniferous and Permian ephemeropteroids ('mayflies') show major differences from modern forms in morphology and presumed flight ability, whereas Palaeozoic odonatoids ('dragonflies') show early adaptation to aerial predation on a wide size-range of prey, closely paralleling modern dragonflies and damselflies in shape and wing design but lacking some performance-related structural refinements. The extensive adaptive radiation in form and flight technique in the haustellate orders Palaeodictyoptera, Megasecoptera, Diaphanopteroidea and Permothemistida is examined and discussed in the context of Palaeozoic ecology." (Authors)] Address: Wootton, R.J.; Univ. Exeter; Sch. Biol. Sci. Exeter EX4 4PS; Devon; England

1569. **Yeh, W.C.; Chen, Y.M. (2000):** Descriptions of two new species of the genus *Oligoaeschna* from northern Taiwan with notes on the status of the pryeri-group (Anisoptera: Aeshnidae). *Odonatologica* 29(2): 137-150. (in English). ["2 syntopic new sp. of the pryeri-group *Oligoaeschna*, *O. lieni* sp. n. (holotype male: Tsaopi bog, 850m, Yuanshan, Ilan county, northern Taiwan, II-V-1997) and *O. tsaopiensis* sp. n. (holotype male: Tsaopi bog, 850m, Yuanshan, Ilan county, northern Taiwan, II-V-1997) collected from northern Taiwan are named, described and diagnosed. Relationship amongst the members of eastern Asian pryeri-group is discussed and inferred mainly from their male penile structure. With regard to male penile glans structure, the pryeri-group is considered to be the extant sister-group of the nearctic genus *Gomphaeschna*." (Authors)] Some additional information is given on *O. pyanan* [Asahina 1951] Address: Yeh, W.C. & Y.M. Chen, Division of Forest Protection, Taiwan Forestry Research Institute (TFRI), 53 Nanhai Rd, Taipei, Taiwan, R. O. C.

1570. **Zhu, H.-q.; Han, F.-y. (2000):** *Cercion yunnanensis* spec. nov., a new damselfly from Yunnan, China (Zygoptera: Coenagrionidae). *Odonatologica* 29(2): 163-166. (in English). ["Both sexes are described, illustrated and the new sp. is compared with *Coenagrion impar* Needham. Holotype male, allotype female: China. Yunnan prov., Zong-dian, 29-VII-1998, deposited at Shanxi University; paratypes of both sexes from same locality and date, deposited at Dali Teachers Training School, Dali, Yunnan, China. This is the eighth member of the genus known from China. The transfer of *Coenagrion impar* Needham to *Cercion* is suggested." (Authors)] Address: ZHU, H.q. and F.-y. HAN, Shanxi University. Department of Life Sciences, Taiyuan 030006, Shanxi, China

1571. **Zorina, O.V.; Ivanov, P.Yu.; Storozhenko, S.Yu.; Kholin, S.K. (2000):** To the knowledge of insects of Putyatyn Island (South Primorye). The North Pacific Islands Biological Researches 3: 1-11. (in Russian with English summary). [The following odonate species are shortly commented and listed for Putyatyn Island (42.50N 132.29E, SE Wladiwostok): *Lestes sponsa*, *L. temporalis*, *Coenagrion johanssoni*, *C. ecornutum*, *C. lanceolatum*, *Cercion v-nigrum*), *Erythromma humeral*, *Nehalennia speciosa*, *Aeshna crenata*, *A. caerulea*, *Cordulia aenea*, *Epithea bimaculata*, *Somatoch-*



lora metallica exuberata, *S. graeseri*, *Leucorrhinia orientalis*, *Libellula quadrimaculata*, *Orthetrum albistylum*, *Sympetrum cordulegaster*, and *S. eroticum*.] (Address: Ivanov, P.Yu., Laboratory of Hydrobiology, Institute of Biology and Soil Sciences, Far East Branch of the Russian Academy of Sciences, Vladivostok, 690022, Russia. E-mail: [zoology@eastnet.febras.ru](mailto:zoology@eastnet.febras.ru) (P.Yu.Ivanov)



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: Lindeboom@aol.com and Martin Schorr, Waldfrieden 25, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: FOEATrier@aol.com

Published in Rheinfelden, Germany and printed in Tübingen, Germany.  
ISSN 1438-0269

## 1997

1572. Aida, M. (1997): Two cases of ovipositing *Sympetrum frequens* (Selys). *Gekkan-Mushi* 320: 40-41. (in Japanese). [S. *frequens* usually lay eggs at the open space of puddles dipping in the mud or sometimes in the water. The following observations seem exceptional: 1. Oviposition in the bush of reed. 2. Oviposition on the gravel in a slow running stream. (taken from DJOSC No. 6)] Address: Aida, Masahito, 1-7-15, Sakae, Ichinomiya City, Aichi Pref., 491, Japan

1573. Andrew, R.J.; Tembhare, D.B. (1997): Collection of Odonata from Nagpur City, Maharashtra State, India. *Fraseria* (N.S.) 4: 1-4. (in English). ["A total of 43 species and subspecies of Odonata were collected from the city of Nagpur, India. Among these, 12 are recorded for the first time from Central India and two are new records for the state of Maharashtra. A list of species caught at night around electric light and the physico-chemical parameters of local water bodies are appended." (Authors)] Address: Tembhare, D.B., Dept Zool., Nagpur Univ. Campus, Amravati Road, Nagpur-440010, Maharashtra, India

1574. Arai, Y.; Kita, H. (1997): Ecological notes on *Gynacantha japonica* Bartenef at the paddy fields (I). *Gekkan-Mushi* 320: 8-12. (in Japanese). [The following items are treated: occurrence of larvae and emergence of adults from paddy fields; period of emergence and adult season; behaviour of teneral; feeding behaviour of mature adults; seasonal change of adult behaviour; u-lined searching flight; hovering flight; copulation; oviposition (taken from DJOSC 7)] Address: Arai, Y., 1233-2, Oaza Sueno, Yorii-machi, Osato-gun, Saitama Pref., 369-12, Japan. Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan.

1575. Arai, Y. (1997): Some ecological observations on *Sympetrum pedemontanum elatum* Selys. *Tombo* 40: 15-20. (in Japanese with English summary). ["During a period from 1996 to 1997, some ecological observations on *Sympetrum pedemontanum elatum* Selys were carried out at Yatsuda and its vicinity in Yorii-machi, Saitama Prefecture. The results are summarized as follows: 1. Although the emergences were seen in one rice field, no emergences were observed in the other adjacent rice field. The cause of this difference is thought to be water condition meaning whether the field dried up or not even temporarily during the period of larvae. 2. In the rice field the emergences began in the beginning of July and ended in the beginning of Sep-

tember, but in the flume to the field the emergences started in the latter part of August and finished in the end of September. The difference will come from the fact that the water temperature of the flume is lower than that of the rice field. 3. The teneral or immature dragonflies used to remain near the site of emergence, and after getting mature they dispersed. 4. The male insect did not make his territory, but when he found the female under both in flying and sitting conditions he caught her and copulated. 5. They usually laid eggs to the slow-running water of the flume and small stream by striking the surface with the tip of female's abdomen in tandem, but occasionally to the still water and rarely to the wet mud." (Author)] Address: Arai, Y., 1233-2, Oaza Sueno, Yorii-machi, Osato-gun, Saitama Pref., 369-12, Japan.

1576. Artmeyer, C. (1997): Ökologische Untersuchungen zur Libellenfauna der Ems und ausgewählter Auenengewässer im Kreis Steinfurt unter besonderer Berücksichtigung von *Gomphus vulgatissimus* (Linné, 1758). Diplomarbeit am Institut für Landschaftsökologie der Universität Münster. 104 pp, Anhänge. (in German). [For published odonatological details of the M.Sc. thesis see OAS 1329 and 1788] Address: Artmeyer, C., Philip-pistraße 16, D-48149 Münster, Germany. E-mail: artmeyer@uni-muenster.de

1577. Asahina, S. (1997): On the breeding habitat of the halophilous damselfly *Mortonagrion Hirosei* Asahina. *Tombo* 40: 34. (in Japanese with English translation of the title). Address: Asahina, S., 4-4-24 Takadanobaba, Shinjuku-ku, Tokyo 169, Japan

1578. Asahina, S. (1997): Records of six Chinese dragonfly species. *Tombo* 40: 2-5. (in Japanese with English summary and description of the new species). [*Enallagma* sp., *Somatochlora dido*, *Palpopleura sexmaculata*, *Orthetrum brunneum neglectum*, *Sympetrum commixtum*, and *Sympetrum nomurai* sp. nov. are recorded from western China (29.IX.1996, Sewurong Yidui, Dichi Shan Mts., Kangding Xian, 3300m). *S. nomurai* spec. nov. and *S. commixtum* are figured.] Address: Asahina, S., 4-4-24 Takadanobaba, Shinjuku-ku, Tokyo 169, Japan

1579. Asahina, S.; Togame, S. (1997): The insect of the month: *Aeschna nigroflava* (text by Dr. S. Asahina, photo by S. Togame). *Insectarium* 34 (9): 291. [General introduction into the distribution of *A. nigroflava*, and comparison with *A. mixta* (taken from DJOSC 6, see



page 54).] Address: Asahina, S., 4-4-24, Takadanobaba, Shinjuku-ku, Tokyo, 160, Japan

1580. Bland, K.P. (1997): A precisely timed case of nocturnal migration by *Aeshna cyanea* (Müller) (Odonata: Aeshnidae). Ent. Rec. J. Var. 109(5/6): 154-155. (in English). ["During the night of 2-3 August 1996, I was running a mains-operated m.v. moth-trap in a garden on a housing estate in the village of Tarvin in Cheshire, VC58 (OS Grid reference SJ 4S66). [...] At precisely 03.40 hrs, I was suddenly awakened by a vigorous scraping and rustling sound coming from the vicinity of the light-trap some three metres away. Investigation revealed a fine female Southern Hawker *Aeshna cyanea* Müller, 1764), rattling against the illuminated asbestos wall immediately behind the light-trap. As the trap was more than a mile from the nearest open water it is probable that this individual was pulled into the light while actively migrating at this early hour. However, none of the 64 species of moth in the trap next morning were particularly indicative that a long-distance migration of other insects was in progress." (Verbatim)] Address: Bland, K.P., 35 Charterhall Road, Edinburgh EH9, 3HS, UK

1581. Eda, S (1997): A female of *Libellula quadrimaculata asahinai*, forma praenubila from Nagano Prefecture. Tombo 40: 31. (in Japanese with English summary). ["Although forma praenubila of *Libellula q. quadrimaculata* Linne is common in Europe, the forma of Japanese subspecies, *L. quadrimaculata asahinai* is extremely rare. On July 6, 1997, a female of forma praenubila was captured in Nagano Prefecture." (Author)] Address: Eda, S., Matsumoto Dental University, Gobara, Hirooka, Shiojiri, Nagano 399-0781, Japan

1582. Eda, S. (1997): Annual meeting of the Japanese Society of Odonatology in 1997. Tombo 40: 47. (in Japanese with English translation of the title).] Address: Eda, S., Matsumoto Dental University, Gobara, Hirooka, Shiojiri, Nagano 399-0781, Japan

1583. Eda, S. (1997): Division of Nature Conservation in Japanese Society of Odonatology will start in next year. Tombo 40: 46. (in Japanese with English translation of the title).] Address: Eda, S., Matsumoto Dental University, Gobara, Hirooka, Shiojiri, Nagano 399-0781, Japan

1584. Eda, S. (1997): Dragonflies on stamps in the world. 13th report. Tombo 40: 38-43. (in Japanese with English translation of the title).] Address: Eda, S., Matsumoto Dental University, Gobara, Hirooka, Shiojiri, Nagano 399-0781, Japan

1585. Eda, S. (1997): Heterospecific connection of *Sympetrum frequens* male and *S. infuscatum* female. Tombo 40: 37. (in Japanese with English summary). ["On October 10, 1997, it was observed at a pond in Miasa, Nagano Pref. that a heterospecific tandem of *Sympetrum frequens* Selys male and *S. infuscatum* Selys female adhered to thread of a spider. Just after only one picture [...] was taken they got free from the thread and separated each other; then flew away." (Author)] Address: Eda, S., Matsumoto Dental University, Gobara, Hirooka, Shiojiri, Nagano 399-0781, Japan

1586. Eda, S. (1997): The 40th Anniversary of the Japanese Society of Odonatology. Tombo 40: 36. (in Japanese with English translation of the title). [Docu-

mentation of the signatures of the participants of the 10th, 20th, and 30th anniversaries of the Japanese Society of Odonatology.] Address: Eda, S., Matsumoto Dental University, Gobara, Hirooka, Shiojiri, Nagano 399-0781, Japan

1587. Fukui, M. (1997): Record of *Sympetrum cordulegaster* from Shizuoka Pref.. Tombo 40: 14. (in Japanese with English translation of the title)] Address: not stated

1588. Hacet, N.; Aktac, N. (1997): Odonata fauna of Istranca Mountains. Turkish Journal of Zoology 21(3): 275-289. (in Turkish with English summary). [The odonate fauna of Istranca Mountains, (European part of Turkey) has been investigated in 1992-1993. 19 species are recorded from 39 localities. *Pyrrhosoma nymphula* and *Aeshna cyanea* are considered new for Turkey. Of some interest are the records of *Epallage fatime*, *Coenagrion scitulum*, *Brachytron pratense*, *Cordulegaster picta*, and *Somatochlora metallica* (?), *S. meridionalis*?)] Address: Hacet, N., Institution Trakya Univ., Fen-Edebiyat Fak., Biyol. Bolumu, Edime, Turkey

1589. Hara, T. (1997): *Mortonagrion hirosei*, its new distribution and homoeochromatic female from Ube. Yamaguchi Pref.. Tombo 40: 21-24. (in Japanese with English summary). [On July 8, 1995, a new habitat of *Mortonagrion hirosei* at Takenokojima in Ube, Yamaguchi Prefecture was discovered. This locality is the westernmost of Honshu. One week later 2 homeochromatic females were found in the same habitat.] Address: not stated

1590. Inoue, K. (1997): Report and information on the SIO. Tombo 40: 44-45. (in Japanese with English translation of the title). Address: Inoue, K., 5-9 Fuminosato 4-chome, Abeno-ku, Osaka 545, Japan

1591. Ishida, M. (1997): *Epitheca marginata* and *E. bimaculata sibirica* inhabit together in Hokuragawa lake. Tombo 40: 25-26. (in Japanese with English summary). Niigata Pref., Japan] Address: not stated

1592. Ishizawa, N. (1997): A drop of haemolymph in the forewing of a female *Anax parthenope julius*. Gekkan-Mushi 320: 39-40. (in Japanese). [On December 8, 1996, I caught a larva of *Anax parthenope julius* at Omori flood controlling pond at Miyadera, Iruma City, Saitama Prefecture, which is a spring pond, and bred it indoors. From the larva, a female emerged on January 9, 1997. I kept the dragonfly covered with a basket overturned on a table. When I saw it on January 22, it was still alive and a light green drop of haemolymph was seen near the tip of the right forewing [...]. As the dragonfly perched hanging from the top of the basket with its wings hanging down perpendicularly, haemolymph seemed to be accumulated in the wing. When I moved the dragonfly into the warm room out of the basket, it unfolded the wings and warmed up, and in around ten minutes the drop disappeared, absorbed into the body. I returned the dragonfly to the basket, and the phenomenon was seen on the next day too. Circulatory flow of haemolymph into wings was experimentally proved by Münchberg (1966), and the wings are said to be easily broken by the lack of the haemolymph flow into the wings (Wigglesworth, 1950). (taken from DJOSC 6)] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozava City, Saitama Pref., Japan

1593. Ishizawa, N. (1997): Record of a male of *Sympetrum depressiusculum* from Saitama Prefecture. Tombo 40: 33. (in Japanese with English summary). ["A male of *Sympetrum depressiusculum* Selys was captured at a spring in Iruma City, Saitama Prefecture on October 29, 1997. This is the first record from the Kanto district. The abdominal length is 23.3 mm, thoracic height: 5.6 mm. hind wing: 27.2 mm. This specimen lacks the right hind wing from outer side of the node. Its face was rather whitish, and pterostigmas were dark brown. The ratio of the thoracic height to the length of hind wing was 0.206, which coincides with that (0.20) calculated from Naraoka's data, and is significantly different from that of *Sympetrum frequens* (0.23)." (Author)] Address: see above.
1594. Kita, H. (1997): Four cases of unusual copulation and/or connection in dragonflies. Tombo 40: 27-28. (in Japanese with English summary). [In 1997 four cases of abnormal copulation and/or connections in dragonflies were observed as follows: "1. Heterospecific copulation: *Leucorrhinia dubia orientalis* Selys male x *Sympetrum frequens* Selys female. 2. Heterospecific connection: *Cercion sexlineatum* Selys male - *Cercion plagiolum* Needham female. 3. Oviposition in triple-connection of *Sympetrum frequens* Selys male - male - female (Type A) 4. Male-male tandem: *Mnais p. pruinos*a Selys male - male. In this position the first male transferred sperm to his sperm bursa, and the second male bended his abdomen like a female." (Author)] Address: not stated
1595. Kunz, B.; Nowak, A. (1997): Die Libellen des Landkreises Schwäbisch Hall. Jahresbericht 95/96 der Arbeitsgemeinschaft Libellen im Landkreis Schwäbisch Hall. 39 pp. (in German). [Baden-Württemberg, Germany; general introduction into the activities of the working group; detailed comments on records of new or formerly known species of the region: *Coenagrion ornatum*, *Crocothemis erythraea*, and *Sympetrum depressiusculum*, and the dragonflies of river Jagst; 49 odonate species are shortly commented and mapped.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@gmx.de
1596. Lien, J. C.; Watanabe, K. (1997): A female of *Anotogaster sieboldii* carrying a corbicula on her ovipositor. Tombo 40: 20. (in Japanese with English summary). [On July 19, 1975, a female of *A. sieboldii* carrying a *Corbicula fluminea* on the tip of abdomen was resting on a branch at Taipei, Taiwan. It is considered that during the female laying eggs into the muddy bottom the ovipositor accidentally inserted into the open mouth of the shell.] Address: not stated
1597. Nakamoto, O.; Kagimoto, B. (1997): An observation on *Orthetrum p. poecilops* at Nam-chung, Hong Kong. Tombo 40: 29-31. (in Japanese with English summary). ["During a survey of Nam-chung. Hong Kong, June 10 - 11, 1977, we observed the behavior of *Orthetrum poecilops poecilops* and their habitat. Comparing with the Japanese subspecies *O. p. miyajimensis*, their behaviours and habitats are very similar to each other, but *O. p. poecilops* seems to be more prompt." (Verbatim)] Address: not stated
1598. Naraoka, H. (1997): A list of dragonflies in Hoto-kenuma marsh, Aomori Prefecture (Insecta, Odonata). The Journal of The Natural History of Aomori 7: 19-21. [Of special interest are *Mortonagrion seleni*, *Nehalennia speciosa*, *Lyriothemis pachygastra*, and *Sympetrum kunkeli* which are rare in Aomori Prefecture, Japan. A total of 34 species was observed in 1994 and 1995. (taken from DJOSC 8)] Address: Naraoka, H., 36-71, Aza-Motoizumi, Fukunoda, Itayanagi-cho, Kita-gun, Aomori Prefecture, 038-3661, Japan
1599. Naraoka, H. (1997): Reproductive Behavior of *Sympetma paedisca paedisca* (Odonata, Libellulidae). New Entomol. 46 (1/2): 20-25. (in Japanese with English summary). ["The reproductive behaviour of *S. p. paedisca* was studied at a small pond in Shiura village, Kita-gun, Aomori-Pref., northern Japan, from May to August, 1996. Hibernated adults appeared at the pond side from mid May, and a few adults remained until early August. Reproductive behavior was observed on fine and warm days from late May to mid July. The peak was the first half of June [...]. A male seized a female without courtship and display immediately after he found her. Sperm transfer ( $x=60.8$  seconds) was carried out just after the tandem was formed at a perching place. Copulations were observed between 7:30 and 14:30 with the peak from 9:00 to 10:00, and it was divided into three stages, in each of which the characteristic pumping was seen [...]. Duration of copulation was 15 minutes 47 seconds in average (Stage 1 : 14 m 42 s., n : 93.4 s., E: 10.3 s.). Sperm displacement was recognized by comparing the volumes of female's sperm storage organ collected at precopula, copula and postcopula [...]. Tandem ovipositions were done soon after copulation to the leaves of the reed *Phragmites communis* above the water during 8:00 to 16:00 with the peak from 10:00 to 12:00 [...]. Interspecific tandem concerned to this species was observed in 3 cases." (Author) (taken from DJOSC 7)] Address: Naraoka, H., 36-71, Aza-Motoizumi, Fukunoda, Itayanagi-cho, Kita-gun, Aomori Prefecture, 038-3661, Japan
1600. Pangelian, A.A. (1997): Demography and life history of the orangeblack hawaiian damselfly (*Megalagrion xanthomelas*) (Selys-Longchamps, 1876) on Oahu, Hawaii. Masters Thesis. University of Guam: Not available for abstracting.]
1601. Rai, T.; Asahina, S. (1997): Observations on *Sympetrum frequens* at Chiba and Tokyo in 1997. Tombo 40: 35-36. (in Japanese with English translation of the title.) Address: Asahina, S., 4-4-24 Takadanobaba, Shinjuku-ku, Tokyo 169, Japan
1602. Rupperecht, R. (1997): Sanierungskonzept Lahn. 6. Gewässerökologie II "Makrozoobenthos, Fischfauna, Ufervegetation". Sanierungsprojekt Lahn, Rheinland-Pfalz 2: 167-232. (in German). [Based on the status quo - analysis published in the first preliminary report (see OAS 1603) in the second report (status 1994) the results of macrozoobenthos samples including Odonata are presented and shortly discussed. *Calopteryx splendens*, *C. virgo*, *Gomphus pulchellus*, *G. vulgatissimus*, and *Ischnura elegans* are listed in Tab. 6.4.] Address: Landesamt für Wasserwirtschaft Rheinland-Pfalz, Am Zollhafen 9, D-55118 Mainz, Germany
1603. Rupperecht, R. (1997): Sanierungskonzept Lahn. 6. Gewässerökologie II "Makrozoobenthos, Fischfauna, Ufervegetation". Sanierungsprojekt Lahn, Rheinland-Pfalz 1: 96-120. (in German). [Preliminary report (status 1993) on the fauna of the River Lahn, Rheinland-Pfalz, Germany. In Tab. 3 data from literature or reports are compiled. Due to long lasting and heavy pollution of the

river Lahn, there are only few sources available with data on the fauna. But the list of literature used for this compilation is not complete. *Calopteryx splendens*, *C. virgo*, *Ischnura elegans*, *Platycnemis pennipes*, and "Coenagrionidae" are considered.] Address: Landesamt für Wasserwirtschaft Rheinland-Pfalz, Am Zollhafen 9, D-55118 Mainz, Germany

1604. Sonehara, I.; Ubukata, H. (1997): Life history of *Agrion terue* Asahina (2). Tombo 40: 6-11. (in Japanese with English summary). ["Life history of *Agrion* (=Coenagrion) *terue* Asahina was studied by field observation and rearing experiment. (1) Adult emergence occurred from mid May to mid April. (2) Pre-reproductive period was estimated as 9-12 days (males) and 15-18 days (females). (3) Reproductive period was from the end of May to the beginning of September. (4) The widths of eggs laid in plant tissues were larger than those of mature eggs in the ovaries. (5) The portion near the apex of the laid egg had prominent reddish yellow color from the second day after oviposition to the date of hatching. (6) Rearing experiment showed that the larva has fourteen instars excluding prolarva. (7) Larval growth period was two years under the rearing conditions. But this result should be compared with a future survey of larval growth in the habitat, because the pond temperatures were lower than the rearing temperatures." (Authors)] Address: Ubukata, H., Hokkaido University of Education at Kushiro, Dept Science Education, Shiroyama 1-15-55, Kushiro, 085, Japan

1605. Srivastava, V.K.; Suri Babu, B. (1997): Annotations to the damselfly collection from Sagar, Central India. *Fraseria* (N.S.) 4: 13-15. (in English). ["24 spp. belonging to 12 genera of damselflies from the city of Sagar and its surrounding areas are listed. This is the first report on the zygopteran odonates inhabiting this region." (Authors)] Address: Srivastava, V.K., Department of Zoology, C.M.P.College, Allahabad 211002 India

1606. Subranabian, M.A.; Reni Prabha, A.; Varadaraj, G. (1997): Effect of tannery effluent on biochemistry of larvae of the dragonfly *Pantala flavescens* (Fabricius) (*Libellula*: Anisoptera). *Fraseria* (N.S.) 4: 5-8. (in English). ["By static bioassays, the 96 hr LC 50 value of the tannery effluent of the antepenultimate larvae of *P. flavescens* was found to be 15%. The larvae required 36 days to become adult. The moulting is arrested in the larvae treated to sublethal concentrations of the effluent and all of them died between 30-36 days. Various biochemical constituents in the tissues decreased significantly. However, lactic acid accumulated in all the tissues implying the shifting of metabolism towards anaerobic side to meet excess energy under the stress of tannery effluent. The diminution of organic compounds and accumulation of lactic acid could be the casuative factor for the mortality of effluent - treated larvae." (Authors)] Address: Subramanian, M.A.; P.O. and Research Department of Zoology Chikkaiah Naicker College, Erode - 638 004, Tamil Nadu, India.

1607. Suzuki, K.-J., Saitoh, K.; Sawano, J. (1997): Male germ-line chromosomes of *Davidius moiwanus taruii* Asahina et Inoue (Anisoptera: Gomphidae). Tombo 40: 12-14. (in Japanese with English summary). ["Using three immature males of *Davidius moiwanus taruii* Asahina et Inoue, 1973, obtained in Kamisaibara-son of Okayama Prefecture, germ-line chromosomes were examined by conventionally air-dried and Giemsa-

stained testis-preparations. The spermatogonial diploid complements comprise 23 chromosomes, including a single X and a pair of m chromosomes. The X is the largest in size in the complement. The m is much smaller in size than the rest. In the first and second divisions in spermatocytes, the haploid complements consist of twelve chromosomes. The parallel arrangement of sister chromatids is apparent in the X at diakinesis. At early anaphase II, the undivided, rod-shaped X is easily distinguishable from the rest of dumbbell-like shape. The male is therefore the heterogametic sex. Each of the n, 13 complements observed in the first division in the male (No. 3) includes a minute univalent which is smaller in size than the m. This element might be a B chromosome." (Authors)] Address: Suzuki, K., Toyama University, Dept of Biology, Faculty of Sciences, 3190 Gofuku, Toyama, 930, Japan

1608. Ubukata, H. (1997): An introduction to Worldwide Dragonfly Society (W.D.A.). Tombo 40: 45-46. (in Japanese with English translation of the title).] Address: Ubukata, H., Hokkaido University of Education at Kushiro, Dept Science Education, Shiroyama 1-15-55, Kushiro, 085, Japan

1609. Uono, K.; Takasaki, Y. (1997): Morphological diagnosis on the seasonal types of a damselfly: *Acia-grion migratum* (Selys). *Gekkan-Mushi* 313: 20-23. (in Japanese). [Detailed morphological descriptions (measurements and figures) of the summer and winter types of *A. migratum*. ["Conclusion: The most useful marking for distinction of the seasonal types is the difference of the black spot on the mid leg, but in teneral it is not clear. As to the color of pterostigma, both types had exceptions. In adults the difference of the black spotted part and the width of the black stripe on the frontal thorax are available for distinction, and in teneral only the black stripe on the frontal thorax. The black stripe on the frontal thorax is the most available for distinction throughout seasons." (taken from DJOSC 6)] Address: Uono, Kiyofumi, 1-14-47, Mitake, Togo-cho, Aichi-gun, Aichi Pref., 470-01, Japan. Takasaki, Yasuo, 1-14, Fujimori, Meito-ku, Nagoya City, 465, Japan.

1610. Wada, S. (1997): Unusual 'Sitting-oviposition into the water' of *Onychogomphus viridicostus*. Tombo 40: 32. (in Japanese with English summary). ["The oviposition of *Onychogomphus viridicostus* (Oguma) is usually 'Non-contact flying-oviposition' and occasionally 'Flying-oviposition into the water' (Arai, 1975). On August 26, 1997, I observed and took the picture of "sitting-oviposition into the water" [...], at Kidonouchi-cho. Fukui, Fukui Prefecture. This method is unusual, and is considered due to two reasons: avoiding interruption by the male of the same species and other ones such as *Boyeria maclachlani*, and being too tired to fly." (Author)] Address: not stated

1611. Watanabe, Y. (1997): Observation on embryonic development and morphological characteristic of first instar larva in the dragonfly, *Libellula angelina*. *Nature and Insects* 32(7): 23-26. (in Japanese). (taken from DJOSC 6)] Address: Watanabe, Yoko, 4-14 Nishida-cho, Nishinomiya City, Hyogo Prefecture, 662, Japan.



1612. Ambrus, A.; Bankuti, K.; Csanyi, B.; Gulyas, P.; Juhasz, P.; Kovacs, T. (1998): Faunistical data on dragonflies (Odonata) from the floodplain area of River Tisza between Tiszabercel and Balsa (HNBM Programme, Pilot Project. *Studia odonatologica hungarica* 4: 65-72. (in Hungarian with English summary). ["The paper presents faunistical data on dragonflies (larvae and adults) collected in 1996 in the "Pilot Project" study area of the Hungarian National Biodiversity Monitoring (HNBM) Programme. Collections were carried out in water bodies [...] situated in the floodplain area (active and ancient floodplain) of River Tisza along both sides between settlements Tiszabercel and Balsa. [...] Collections were made on 14 localities. "20 dragonfly species [...] were found throughout the area, representing the following classes of country-wide occurrence frequency: 1 very frequent, 10 frequent, 6 less frequent, 2 rare and 1 sporadic." (Authors)] Address: Ambrus, A., Hortobágy National Park, Directorate, Thematic Information Centre of Nature Conservation, H-9495 Kópháza, Jurisich M. u. 16, Hungary
1613. Anderson, T.M.; Anderson, N. H. (1998): The life history of *Arrenurus hamrumi*, a water mite from rangeland springs in central Oregon, USA. In: Botosaneanu, L. (Ed.): *Studies in crenobiology: The biology of springs and springbrooks*. ISBN 90-73348-04-8.: 63-74. (in English). ["Water mites, which have both predatory and parasitic life stages, make an important contribution to the biodiversity and trophic dynamics of spring ecosystems. We studied the life history of the water mite, *Arrenurus hamrumi* Anderson & Smith (Hydrachnida: Arrenuridae) and its damselfly host, *Argia vivida* Hagen (Odonata: Coenagrionidae), which occur in small springs in rangeland habitats in central Oregon, USA. A common feature of these springs is the dominance of emergent vegetation, while hydrologic and thermal regimes are quite variable. Through field collections and laboratory observations we associated all life stages of *A. hamrumi* and documented its interaction with *A. vivida*. Adult mites occur in the springs throughout the year where they feed on ostracods. In the field sex ratios favour females, but equal numbers of males and females emerged in the laboratory. Mite larvae locate hosts in the benthic habitat and become phoretic under their wingpads until the damselfly emerges and the mites then become parasitic. Phoretic mite larvae occur year-round in the springs, while the parasitic stage is limited to the flight season of the damselfly. The extended period of phoresy by the larvae prior to becoming parasitic seems to facilitate synchronization of the life cycles of the water mite and its host, which has a two-year life cycle. The occurrence of deutonymphs begins after the first parasitic larvae of the season detach and transform (usually in early May), and lasts well into the fall. Features of the life history of *A. hamrumi* seem to be directed toward successfully parasitizing its host, *A. vivida*, rather than being adaptations specific to existence in spring environments. The trophic structure of these habitats is detritus-driven and favors abundance of ostracods and Chironomidae, which are the primary food resources for the predatory stages of the two species that we studied." (Authors)] Address: Anderson, Tracey, Institution Dep. Entomol., Oregon State Univ., Corvallis, OR 97331, USA
1614. Aoki, T.; Azuma, T. (1998): A report from Hyogo Prefecture on the reduction of population size of *Sympetrum maculatum* Oguma. *Nature and Insects* 33(10): 18-20. (in Japanese). ["Description of habitat; life history, ecology; possible impact of insecticide spraying on the species; the importance of pine forests in the habitat of the species is discussed (see DJOSC 10).] Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: taoki@ma3.justnet.ne.jp
1615. Arai, Y. (1998): Records of the activities of Conservation committees: "Other dragonfly" group. *Tombo* 41: 60-61. (in Japanese with English translation of the title.) Address: Arai, Y., 1233-2, Oaza Sueno, Yorii-machi, Osato-gun, Saitama Pref., 369-12, Japan.
1616. Arunachalam, A.; Subramanian, M.A. (1998): Tannery induced alterations on total haemocyte counts in the larvae of dragonfly, *Pantala flavescens* (Fabricius) (Anisoptera: Libellulidae). *Fraseria* (N.S.) 5: 19-21. (in English). ["When the last three larval instars of *P. flavescens* were reared in sublethal concentrations of tannery effluent, there was no moulting at all in the larvae throughout the experimental period. They died between day 30 and 36. In various concentrations of the effluent, the number of haemocytes in the blood of the larvae were found to decrease leading to leucopenia. This pathological condition, in turn, could have increased the toxicity of the effluent on the larvae resulting in mortality. The reduction in number of haemocytes could possibly cause a restricted transport of moulting hormone from the site of secretion to the tissues. This might also be the probable cause for the death of the effluent-treated larvae without undergoing moulting and metamorphosis." (Authors)] Address: Arunachalam, A. & M. A. Subramanian, P. G. & Research Department of Zoology, Chikkaiah Naicker College, Erode - 638 004, India
1617. Asahina, S. (1998): Reminiscences of an odonatologist. *Tombo* 41: 52-54. (in Japanese with English translation of the title.) Address: Asahina, S., 4-4-24 Takadanobaba, Shinjuku-ku, Tokyo 160, Japan
1618. Bhawane, G.P.; Gaikwad, A.R.; Nikam, D.S. (1998): Thoracic muscle trehalase the larvae and adults of *Pantala flavescens* (Anisoptera: Libellulidae). *Fraseria* (N.S.) 5: 23-28. (in English). ["The optimal pH, the optimal temperature and Km of the enzyme trehalase of thoracic muscle in the last instar larvae and adults of *Pantala flavescens* were determined. The pH of 5.6 and the temperature of 40°C was optimum for thoracic muscle trehalase of larvae and male dragonfly. The Km for the muscle trehalase of larvae was  $1.7621 \times 10^3$  M of trehalose. The half life period for thoracic muscle trehalase at 50°C was 29 minutes. A period of 60 minutes was fit for the linear activity of thoracic muscle trehalase. Both, NaCl and KCl accelerate the enzyme activity even at the concentration of 0.01 M in reaction mixture. The specific enzyme activity is more in the larvae as compared to the adults." (Authors)] Address: Bhawane, G.P., Department of Zoology, Shivaji University, Kolhapur 416 004, India
1619. Bönsel, A. (1998): Verbreitung und Bestandsabschätzung der Hochmoor-Mosaikjungfer - *Aeshna subarctica* (Walker 1908) in Mecklenburg-Vorpommern. *Naturschutzarbeit in Mecklenburg-Vorpommern* 41: 32-38. (in German). [Documentation of the present status of *Aeshna subarctica elisabethae* Djakonov, 1922 in six

bogs in Mecklenburg-Vorpommern, Germany. In Tab. 1 the associated odonate species are listed.] Address: Bönsel, A., Vasenbusch 15, D-18337 Gresenhorst, Germany

1620. Chandler, C.R.; Lindemann, S.A.; Kinsey, A.A.; Shuford, R. (1998): Late-summer congregation of swallow-tailed kites in southeast Georgia. *Oriole* 62(3-4): 29-34. (in English). [Altamaha River (Tattnall County, Georgia, USA); late-summer congregation; "By late July, dragonflies (tentatively identified as *Pantala flavescens* and *Tramea carolina*) were more apparent around the field and among the insects on which kites were feeding."] Address: Chandler, C.R., Institution Dep. Biol., Ga. South. Univ., Statesboro, GA 30460, USA

1621. Dévai, G.; Miskolczi, M.; Olajos, P. (1998): Faunistical data on dragonflies (Odonata) from the floodplain area of River Tisza between Tiszabercel and Balsa (HNBM Programme, Pilot Project). *Studia odonologica hungarica* 4: 73-82. (in Hungarian with English summary). [Observations and collections were carried out 1996 in a part of the active floodplain of River Tisza along the left side, over the administrative area of the settlement Gávavencsello (3 localities), Hungary. 33 species were found to occur in the area.] Address: Devai, G., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

1622. Dévai, G.; Miskolczi, M. (1998): Faunistical data on dragonflies (Odonata) from the geographical region Tisza-Bodrog-Köze (NE-Hungary). *Studia odonologica hungarica* 4: 5-10. (in Hungarian with English summary). [23 species including *Leucorrhinia caudalis* and *L. pectoralis* could be recorded between 1970 and 1987 in this region.] Address: Devai, G., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

1623. Dévai, G.; Miskolczi, M. (1998): Previous faunistical data on dragonflies (Odonata) from the floodplain area of River Tisza between Tiszabercel and Balsa (HNBM Programme, Pilot Project). *Studia odonologica hungarica* 4: 53-63. (in Hungarian with English summary). [24 species are listed from the River Tisza between Tiszabercel and Balsa.] Address: Devai, G., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

1624. Dévai, G.; Szilagyi, G.; Kiss, B.; Olajos, P. (1998): Proposal for the unification of locality names in the floodplain area (HNBM Programme, Pilot Project) of River Tisza between Tiszabercel and Balsa (NE-Hungary). *Studia odonologica hungarica* 4: 99-110. (in Hungarian with English summary). ["A proposal in order to unify the usage of locality names during the preparatory works of the biotic data collection in the Pilot Project area of the Hungarian National Biodiversity Monitoring (HNBM) Programme is introduced. Experiences of the development of the Natural Wildlife Information System as well as that of the Hungarian Odonatological Database and the National Biodiversity-monitoring System have proven, that besides the identification of sampling sites by geo-coordinates it is necessary to indicate the topographical names of them as well. [...]."] (Authors) Address: Devai, G., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

1625. Eda, S. (1998): Annual meeting of the Japanese Society for Odonatology in 1998. *Tombo* 41: 63. (in Japanese with English translation of the title.) Address: Eda, S., Matsumoto Dental University, Gobara, Hirooka, Shiojiri, Nagano 399-0781, Japan

1626. Eda, S. (1998): Dragonflies on stamps in the world, 14th report. *Tombo* 41: 55-58. (in Japanese with English translation of the title.) Address: Eda, S., Matsumoto Dental University, Gobara, Hirooka, Shiojiri, Nagano 399-0781, Japan

1627. Englund, R. (1998): Response of the orangeblack Hawaiian damselfly (*Megalagrion xanthomelas*), a candidate threatened species, to increases in stream flow. *Bishop Museum Occasional Papers* 56: 19-24. (in English). [Although formerly one of the most common damselflies in the Hawaiian Islands, USA the O'ahu populations of *M. xanthomelas* have been reduced to little more than 95 m of stream habitat located within the Tripler Army Medical Center (TAMC). Because of continued stable stream flow, the damselfly numbers increased from May 1997 (17 males and two females) to a total in February 1998 of 162 damselflies (123 males and 39 females). Besides drying up of the channel, introduced fishes are the major threat for *M. xanthomelas*.] Address: Englund, R., Hawaii Biol. Survey, Bishop Mus., 1525 Bernice St., Honolulu, HI 96817, USA

1628. Fischer, J.; Fischer, F.; Schnabel, S.; Wagner, R.; Bohle, H.W. (1998): Die Quellfauna der Hessischen Mittelgebirgsregion. Besiedlungsstruktur, Anpassungsmechanismen und Habitatbindung der Makroinvertebraten am Beispiel von Quellen aus dem Rheinischen Schiefergebirge und der osthessischen Buntsandsteinlandschaft. In: Botsaneau, L. (Ed.): *Studies in Crenobiology*. Backhuys Publishers. Leiden: 181-199. (in German with English summary). [*Thecagaster bidentata* is recorded from the spring of the brook Ohe, a secondary tribute of the middle range of River Lahn (Hessen, Germany).] Address: Bohle, H.-W., Fachbereich Biologie - Zoologie, Karl-von-Frisch-Str., D-35032 Marburg, Germany.

1629. Futahashi, R.; Araki, Y. (1998): Successive invasion and colonization of Odonate species into reclaimed land Koshino-kata. Shinminato City. Toyama Pref. (Addition). *Tombo* 41: 32. (in Japanese with English summary). [*Indolestes peregrinus* (Ris, 1916), *Anax nigrofasciatus nigrofasciatus* Oguma, 1995, *Anax guttatus* (Burmeister, 1839), *Epithea marginata* (Selys, 1883), *Sympetrum pedemontanum elatum* (Selys, 1872), *Sympetrum risi risi* Barteneff, 1914, and *Sympetrum croceolum croceolum* (Selys, 1883) were newly added to the fauna of the reclaimed land Koshino-kata, Shinminato City, Toyama Pref. A total of 38 species have been recorded from this land since 1988.] Address: not stated

1630. Gupta, A.; Gupta, S. (1998): Sensilla on the antenna and leg of the larvae of *Crocothemis servilia* (Drury) (Anisoptera: Libellulidae). *Fraseria* (N.S.) 5: 29-32. (in English). ["Major sensillar types on the antenna and leg of the larva of *Crocothemis servilia* [...] are described with the help of scanning electron microscopy. The 7-segmented antenna has sensilla campaniformia, sensilla trichoidea and hemispheroidal cuticular protuberances. The coxa and trochanter of each leg have hairplate proprioceptive sensilla some of which

may be bimodal in function. The 'tibial comb' comprises polydentate sensilla chaetica, which are also present along the outer tarsal margin. Besides, the tarsus also has sensilla trichoidea of two distinct types." (Authors)] Address: Gupta, A., Department of Ecology, Assam University, Silchar, 788 011, India

1631. Hayford, B.; Herrmann, S.J. (1998): Migration patterns of four macroinvertebrates along a thermal spring rheocrene. In: Botosaneanu, L. (Ed.): Studies in crenobiology: The biology of springs and springbrooks. Backhuy Publishers. Leiden. ISBN 90-73348-04-8.: 75-83. (in English). ["We studied migration patterns of *Argia vivida* [...], *Hyalella azteca* Saussure (Crustacea, Amphipoda), *Paracymus* sp. (Coleoptera, Hydrophilidae), and *Chimarra utahensis* Ross (Trichoptera, Philopotamidae) along the thermal gradient of Poncha Hot Spring (T48N, R8E, S15), Colorado, U. S. A. Samples were taken once each month from September 1991 through February 1992. Chemical analyses revealed moderate ion concentrations for a thermal spring, with little variation along the rheocrene. Conductivity remained relatively constant, while pH ranged from 7.9 to 8.5. Temperatures ranged from 22 °C to 42 °C over the six month period. Two-way ANOVAs were used to determine migration. *Argia vivida*, *H. azteca*, and *Paracymus* sp. migrated" [towards the spring source, but no clear pattern of movement and no apparent temperature preference along the rheocrene; "However, decreasing water temperatures below the study area represented an environmental pressure pushing *A. vivida* upstream"] "for a portion of the study period. There was only marginal evidence that *C. utahensis* migrated. Migration patterns were interpreted as a form of behavioural thermoregulation." (Authors)] Address: Hayford, Barbara, Kansas Biol. Survey, 2041 Constant Ave., Lawrence, KS 66045, USA

1632. Hiratsuka, K. (1998): An ethological study on the genus *Sympetrum* at Harutori lake, Kushiro City. Bulletin of the Hokkaido Odonatological Society 10: 1-9. (in Japanese). [*Sympetrum striolatum* imitoides, *S. frequens*, *S. flaveolum*, *S. danae*; maturation period; interspecific relations during the immature period; searching for females and mating; oviposition; post-reproduction period. (taken from DJOSC 9)] Address: Hiratsuka, K., 2-20-113, Honcho 2 jo-9, Higashi-ku, Sapporo City, 065-0042, Japan

1633. Hunger, H. (1998): Biozöologische Untersuchungen zum Habitatschema der Pokal-Azurjungfer (*Cercion lindenii* Selys 1840) in der südlichen Oberrheinebene. Naturschutz am südlichen Oberrhein 2: 159-166. (in German, with English summary). ["[...] In the study area, *C. lindenii* is a common damselfly species occurring predominantly in quite large waters characterized by ground water influence or slow current. These waters usually display buffered seasonal and diurnal changes of water temperature. The water temperature, however, always reaches high values in shallow regions during the summer. In the southern Upper Rhine plains, *C. lindenii* is a typical species of gravel pits on the one hand and river arms and oxbows on the other hand. It has the ability to utilize parts of helophytes or floating debris for oviposition when hydrophyte vegetation misses or is very scarce. Submerged parts of hydrophytes can become available for oviposition because of the female's ability to lay their eggs under water. Therefore, it can thrive in young gravel pits as well

as in angling ponds kept almost free of water vegetation. In such waters, single water plants may play an important role for oviposition. *C. lindenii* tolerates stronger wave action than *Erythromma viridulum*. This might be explained by a relatively lower risk during emergence owing to *C. lindenii*'s preference for vertical structures for emergence. However, the species is also capable of emerging horizontally." (Author)] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), Am Pfahlgraben 8, D-79276 Reute, Germany

1634. Hunger, H. (1998): Biozöologische Untersuchungen zum Habitatschema des Kleinen Granatauges (*Erythromma viridulum* Charpentier 1840) in der südlichen Oberrheinebene. Naturschutz am südlichen Oberrhein 2: 149-158. (in German, with English summary). ["[...] In the study area, *E. viridulum* inhabits different types of stagnant waters such as ponds and gravel pits as well as areas of oxbows with slowed water movement. Waters suitable for reproduction have to be furnished with fine-leaved submerged vegetation which is probably required as larval habitat. These hydrophytes have to reach the surface at least partly and during a certain period of time in order to be available as substrates for oviposition and as emergence sites. Hydrophytes with swimming leaves can occur in addition, whereas pure waterlily vegetation is not sufficient. Other limiting factors for colonization of waters by this holomediterranean damselfly species are insufficient warming of the water during the summer, strong inflow of ground water or surface water, and wave action. Waters which are ice-free during the winter are usually too cool during the summer to be used as reproduction habitats by *E. viridulum*. Protection of the water vegetation - threatened by strong fishing or leisure activities (swimming, boating) is the most important measure for protection of *E. viridulum*." (Author). Baden-Württemberg, Germany] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), Am Pfahlgraben 8, D-79276 Reute, Germany

1635. Inoue, K.; Aiura, M. (1998): Distribution of the dragonflies of Tsushima Island, Nagasaki Prefecture, Part 6. Tombo 41: 46-48. (in Japanese with English summary). ["Many immature males and females of *Sympetrum depressiusculum* and *S. cordulegaster* have been found in Tsushima Island during June 6 to September 27, 1998 rather successively. This fact strongly suggests that these northern species emerged there, though neither larvae nor exuviae have been found. Three males and four females of the latter species collected by Aiura on September 20 were sent in cool condition to Inoue, and they started to fly when placed at the room temperature. They were photographed and measured, and revealed to be of the normal size: not so large as those bred from eggs by the late Dr Obana in Osaka Pref. (Obana and Inoue, 1982). The problem why such postponed emergence occurred is left to be discussed. On the other hand, southern species *Anax guttatus* and *Tramea transmarina euryale* were found. It is to be noted that many fresh insects of the former species were found even on September 1 and 3, 1998." (Authors)] Address: Inoue, K., 5-9 Fuminosato 4-chome, Abeno-ku, Osaka 545, Japan

1636. Inoue, K. (1998): Information on the S.I.O.. Tombo 41: 62. (in Japanese with English translation of the title.) Address: Inoue, K., 5-9 Fuminosato 4-chome, Abeno-ku, Osaka 545, Japan



1637. Ishizawa, N. (1998): Adaptability of male *Anax guttatus* to the environment of Honshu in autumn. *Tombo* 41: 13-16. (in Japanese with English summary). [Twenty males of *A. guttatus* were collected at Omori pond in Iruma City, Saitama Prefecture, Japan in the middle of October. 1998. The mean weight of the dragonfly was  $1.18 \pm 0.07$  g. The thoracic length, and lengths of abdomen, forewing and hindwing were longer than that of *A. parthenope julius*. The relative wing loading of *A. guttatus* was larger than that of *A. parthenope julius*. Therefore, *A. guttatus* flew faster without gliding, while sympatric *A. parthenope julius* often glided during flying. The warm-up rate was  $2.1^\circ\text{C}/\text{min}$ , less than half of that of *Anax concolor*. The body temperature of the initiation of flight was  $35.5^\circ\text{C}$ , which was lower than that of *A. junius*. Mean body temperature of patrolling *A. guttatus* was  $40.4 \pm 1.1^\circ\text{C}$ , higher than air temperature by about  $14^\circ\text{C}$ . The high body temperature in flight seems to be due to the large relative wing load and the lower air temperature in the temperate zone. Males of *A. guttatus* showed a reversible colour change, controlled by temperature. The blue of the dorsal parts of the second and third abdominal segments changed to dark blue with decreasing temperature, and the reverse colour change occurred when temperature increased. Based upon these facts it is considered that *A. guttatus* seems to be able to adapt to the environment of Honshu in autumn.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozavva City, Saitama Pref., Japan
1638. Johnson, P. (1998): Scissor-tailed flycatcher in Peach County, Georgia. *Oriole* 62(3-4) (1997): 46-47. (in English). [The bird perched on a power line above a small horse pasture and "caught a variety of insects, including some dragonflies."] Address: Johnson, P., 901 Santa Fe Trail, Macon, GA 31220, USA
1639. Kagimoto, B. (1998): Some observations on the two cases of heterospecific tandem between *Orthetrum albistylum speciosum* male and *O. poecilops miyajimaense* female. *Tombo* 41: 50-51. (in Japanese with English translation of the title.) Address: not stated
1640. Kalaskar, K.; Kalaskar, A.S. (1998): Odonate wealth of Pench National Park, Maharashtra State, India. *Fraseria* (N.S.) 5: 33-35. (in English). [The Pench National Park is rich in odonate fauna. Large number of spp belong to only two families, Coenagrionidae with 7 spp and Libellulidae with 13 spp. *Ceriagrion coromandelianum*, *Ischnura aurora*, *Orthetrum sabina*, *Crocothemis servilia*, and *Diplocodus trivialis* occur regularly throughout the year. Identification of odonates of other families is in progress.] Address: Kalaskar, A.S., Divisional Forest Officer, Maharashtra Forest Department, Chandrapur Maharashtra State, India
1641. Kanou, K.; Miyahata, T.; Okazaki, K.; Kobayashi, F. (1998): Sperm transference by *Chlorogomphus brunneus costalis* Asahina before tandem formation. *Gekkan-Mushi* 333: 39-40. 10-VI-1997, Materiya, Amami-oshima Island, Japan] Address: Kanou, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan
1642. Kato, S. (1998): A fresh female of *Lyriothemis pachygastra* wateched at Tochigi Pref. in late autumn. *Tombo* 41: 58. (in Japanese with English translation of the title.) Address: not stated
1643. Kato, T. (1998): New record of *Sympetrum fonscolombei* from Aichi Prefecture. *Tombo* 41: 18. (in Japanese with English translation of the title). Address: not stated
1644. Knott, B.; Jasinska, E.J. (1998): Mound springs of Australia. In: Botosaneanu, L. (Ed.): *Studies in Crenobiology. The biology of springs and springbrooks*. Backhuys Publishers. Leiden. ISBN 90-73348-04-8: 23-38. (in English). ["The present state of knowledge of mound springs in Australia is reviewed. Points of groundwater discharge, characterised by mounds of peat or calcarenite about the spring boil, they function as mesic refuges for plants and animals in an arid landscape. [...] In terms of the mound spring fauna, results of distributional surveys and physiological tolerance tests of a number of fish and hydrobiid molluscs show that even species endemic to springs with nearly constant physicochemistry tolerate a wide range of temperatures and salinities. The origins and mechanisms of dispersal of the fish and hydrobiid snails from the springs are also addressed. [...] The Ellenbrook mound springs are raised peat structures and occur only in a restricted area but comprise discrete plant and animal communities which include endemic species and northern outlier populations of mesic species which now occur only in the wetter southwest of Western Australia. The conservation of all Australian mound springs is under threat from three principal causes: groundwater abstraction from their source aquifers; physical destruction either by land-clearing or cattle-grazing; and invasion of exotic plant and animal species." (Authors) Odonata are listed in Tab. 1 on the family level as a spring fauna (Lake Eyre Supergroup) of high vagility which also occurs in temporary waters.] Address: Knott, B., Jasinska, Edyta, Department of Zoology, The University of Western Australia, Nedlands, Western Australia 6907
1645. Kohl, S. (1998): Odonata. Anisoptera-Exuvien (Großlibellen-Larvenhäute) Europas. Bestimmungsschlüssel. Privately published. 27 pp. (in German). [This is a well organised determination key for the exuviae of most of the anisopteran Odonata of Europe; species not included in this key are listed on page 7. It compiles the relevant European literature up to 1998 on the morphology of the anisopteran exuviae, and provides a binomical key with figures of the morphological structures. Identifications are made easy by the arrangement of discriminative characters on one page opposite to each other. This synthesis of the work of many experienced odonatologists is definitely the most useful and cheapest determination key on the European anisopteran exuviae at present on the market.] Address: Kohl, S., Seestr. 107, CH-8610 Uster, Switzerland
1646. Kumar, A.; Mitra, A. (1998): Odonate diversity at Sahstradhara (Sulphur springs) Dehra Dun, India with a note on their habitat ecology. *Fraseria* (N.S.) 5: 37-45. (in English). ["A detailed study on the Odonate diversity at Sahastradhara (Sulphur Springs, alt 700 m), a perennial hill stream situated 13 km away from the city, has been made during the years 1996-98. An annotated list of 50 species from the area has been provided along with their habitat ecology. *Lestes praemorsus*, *Anormogomphus heteropterus*, *Nepogomphus modestus*, *Orthetrum b. brunneum*, *O. glaucum*, *O. japonicum internum* Mac Lachlan, and *Neurothemis intermedia* more recently listed by Singh & Prasad and Prasad

- & Singh, and *Gynacanthaeschna sikkima* (Karsch) recorded by Hämäläinen from this locality, could not be recorded during the present study. This may probably be due to their habitat degradation/loss by the increasing anthropogenic pressures the excessive influx of tourists and creation of hotels and tea shops in vicinity of the stream. However, *Ceriagrion fallax cerinomelas* Lieftinck, *Onychogomphus biforceps* (Selys) and *Anax nigrofasdatus nigrolineatus* Fraser are the 3 species recorded for the first time not only from this locality but also from the Dehra Dun Valley itself, whereas *Copera vittata serapica* (Selys), although previously reported from Dehra Dun Valley, is recorded for the first time from this locality." (Authors)] Address: Kumar, A. & A. Mitra, Northern Regional Station, Zoological Survey of India, Dehra Dun - 248 195, India
1647. Lahiri, A.R. (1998): New records of Odonata (Insecta) from little Andaman Island. *Fraseria* (N.S.) 5: 57-59. (in English). [*Vestalis gracilis gracilis*, *Prodasineura verticalis andamanensis*, *Copera marginipes*, *Ceriagrion cerinorubellum*, *Crocothemis servilia servilia*, *Lathrecista asiatica asiatica*, *Neurothemis fluctuans*, *Pantala flavescens*, *Potamarcha congener*, *Trithemis aurora*, and *T. festiva* have been reported for the first time from Little Andaman Island.] Address: Lahiri, A.R., Zoological Survey of India, "M" Block New Alipur, Calcutta - 700 053, India
1648. Lahiri, A.R.; Walia, G. (1998): On the status of female *Palpopleura sexmaculata* (Fabricius) (Anisoptera: Libellulidae) marked by preapical spot in hindwing. *Fraseria* (N.S.) 5: 61-62. (in English). [It is suggested that the rare varieties of dwarf, melanotic female of *P. sexmaculata* may not represent regular heterochromous female of the species.] Address: Lahiri, A.R., Zoological Survey of India, "M" Block New Alipur, Calcutta - 700 053, India
1649. Leroy, T. (1998): Les odonates de l'étang de Farges (Puy-de-Dôme). *Arvernensis. Bull. ass. ent. d'Auvergne* 10: 3-10. (in French). [Commented checklist of 28 odonate species recorded from an artificial lake in 740 m a.s.l. near Combrailles, France.] Address: Leroy, T., Le Bourg, F-63210 Heume-L'Église, France
1650. Matsuki, K. (1998): Description of the larva of *Neurothemis tullia tullia* obtained from Taiwan (Libellulidae). *Tombo* 41: 29-31. (in Japanese with English summary). [Detailed description of *N. tullia*; comparison with *N. stigmatizans braminea*] Address: Matsuki, K., 1575-14, Funabashi, Japan
1651. Matsuki, K. (1998): Records of the activities of Conservation committees: "*Libellula angelina*" group. *Tombo* 41: 59-60. (in Japanese with English translation of the title.) Address: Matsuki, K., 1575-14, Funabashi, Japan
1652. Matsuki, K. (1998): Threatened dragonfly species in Japan. *Nature and Insects* 33(10): 2-3. (in Japanese). [General introduction into the current activities in Japan to protect dragonflies. *Mortonagrion Hirosei*, *Libellula angelina*, and *Mnais pruinosa costalis-forma edai* (the latter threatened by over-collecting!) are commented shortly. In a tab. Japanese species listed in the Red Data Book of Odonata are compiled. *Sympetrum maculatum* will be added to the Red Data Book. (see *DJOSC* 10).] Address: Matsuki, K., 3-1575-14, Hazama, Funabashi City, Chiba Pref., 274-0822, Japan
1653. Mitra, T.R. (1998): Development of Indian Odonatology. *Fraseria* (N.S.) 5: 9-14. (in English). ["The first Odonata species based on Indian materials was *Rhyothemis variegata* (Linné). It was recorded from East India in 1768 by Johannson. Since 1768 till date 494 species and subspecies have been recorded from India (political area). In 1933, 1934 and 1936 F.C. Fraser published three volumes of Fauna of British India, including Ceylon and Burma. In post-Independent India, taxonomy, morphology, anatomy, ecology, neuroendocrinology, reproductive biology, physiology, cytology and various aspects of behaviour and applied significance are being studied. In advancement of Indian Odonatology, Zoological Survey of India played a pioneer role all the while. The SIOROSA (Societas Internationalis Odonatologica, Regional Office South Asia) is indeed, a source of communication, transaction and inspiration." (Author)] Address: Mitra, Tridib Ranjan, Zoological survey of India, 18/L Dakshin Para Road, Calcutta 700 028, India
1654. Nakahara, M. (1998): The difference of the larval period of *Oligoaeschna pryeri*, hatched from eggs of the same female. *Tombo* 41: 48-49. (in Japanese with English summary). ["In May, 1992, I got about 400 eggs laid by a female of *Oligoaeschna pryeri* (Martin) into wet paper in a vessel." During a period between 40 and 65 days after oviposition, 184 larvae hatched. After rearing in the laboratory, only 2 adults emerged in May, 1993, and 7 adults emerged in April, 1994. ["It seems to be very interesting that there is a difference in the larval period, one year and two years, among the larvae hatched from eggs laid by the same female even in a laboratory condition." (Author)] Address: not stated
1655. Naruse, K.; Eda, S. (1998): The first record of *Aeshna nigroflava* from Chiba Pref.. *Tombo* 41: 43. (in Japanese with English summary). [Record of this - in Japan - alpine distributed species at Ichikawa city adjacent to the Tokyo metropolis on 21 August, 1998] Address: Eda, S., Matsumoto Dental University, Gohara, Hirooka, Shiojiri, Nagano 399-0781, Japan.
1656. Ogata, Y. (1998): An investigation on *Calopteryx atrata* in the Yonezawa basin, Yamagata Pref., by a citizens' activity. *Tombo* 41: 41-43. (in Japanese with English translation of the title.) Address: not stated
1657. Olsvik, H.; Hungnes, T. (1998): *Kongeoyensikker* (Odonata) funnet på Vestlandet. *Insekt-Nytt* 15(3): 3-4. (in Norwegian). [Norway, *Cordulegaster boltonii*] Address: Olsvik, H., N-6694 Foldfjorden, Norway. E-mail: haolsvik@frisurf.no
1658. Paulson, D.R.; Minakawa, N.; Gara, R.I. (1998): Recent collections of Odonata from the Kuril Islands. *Species diversity* 3: 75-80. (in English). ["17 species of Odonata were collected in 1994-1996 from 21 localities in the Kuril Islands. *Mnais pruinosa*, *Aeshna nigroflava*, *Cordulia aenea*, and *Pseudothemis zonata* are first records from the archipelago, and the last species represents a significant range extension from Honshu. *Enallagma belyshevi* is synonymized with *E. circumlatum*, which is considered a valid species rather than a subspecies of *E. boreale*." (Authors) *Libellula quadrimaculata asahinai* Schmidt, 1957 is considered a poorly differentiated subspecies.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

1659. Pirnat, A. (1998): Fauna and ecology of dragonflies (Odonata) at Ljubljana Moor. M.Sc. Thesis, University of Ljubljana, Biotehniška Fakulteta, Oddelek za Biologijo: 92 pp. (in Slovene with English summary). [The odonate fauna of the Ljubljana Moor, situated in central Slovenia, was surveyed in detail. At 126 localities 32 species were recorded of which 27 species are reproducing successfully. The odonate fauna of each of the localities is documented in detail. The species are detailed in a monographic way, the odonate communities of the drainage ditch system are analysed, the conservation value of the Odonata of the region is assessed, and management measures of the ditch system are suggested.] Address: Pirnat, Alja, Vosnjakova 4a, SI-1000 Ljubljana, Slovenia. E-mail: alja.pirnat@guest.arnes.si
1660. Plantinga, J.-E. (Red.) (1998): De Südheide in vogelvlucht. Waarnemingen van de Lüneburg kampen 1998. *Amoeba*, Amsterdam 72(3): 140-146. (in Dutch). [19 localities of the heathlands in the Lüneburg-region (Niedersachsen, Germany) were surveyed for different groups of flora and fauna including Odonata. Antoine van der Heyden and Laurens Sparrius traced 38 species including *Ceriagrion tenellum*, *Ophiogomphus cecilia*, *Somatochlora arctica*, *S. flavomaculata*, *Orthetrum brunneum*, *O. coerulescens*, and *Sympetrum depressiusculum*.] Address: Sparrius, L., Kongsbergstraat 1, NL-2804 XV Gouda, The Netherlands
1661. Rai, T. (1998): 1998 observations on the emergence-season of *Sympetrum frequens* at Narashino, Chiba Pref.. *Tombo* 41: 51. (in Japanese with English translation of the title.) Address: not stated
1662. Roy, S.P. (1998): Energetics and trophic biology of larval odonates with special reference to their role in the management of aquatic ecosystem. *Fraseria* (N.S.) 5: 47-56. (in English). ["The present paper deals with the seasonal variations in the energy contents, productivity in terms of grams/m<sup>2</sup>/day/month/year, food and feeding biology and foraging ratio (FR) of *Mesogomphus lineatus*, *Cordulegaster* sp., and *Ischnura* sp. of a fish pond of Bhagalpur (Bihar, India). The maximum calorific values of *M. lineatus* Selys and *Cordulegaster* sp. (5.487 ± 0.003 Kcal/gram dry weight and 5.430 ± 0.00 Kcal/gram ash-free dry weight) was recorded in September. However, the minimum calorific value (4.133 ± 0.09 Kcal/gram dry weight) was recorded in January. The calorific values of *Ischnura* sp. (3.706 ± 0.032 Kcal/gram dry weight and 3.470 ± 0.034 Kcal/gram ash-free dry weight) was measured. It was investigated that the calorific values of these larvae varied from instar to instar, month to month and upon the physiological state of the animals. The annual productivity was measured as 2.414 g. dry wt./cub. met/year with monthly productivity being 0.210 g. dry wt./cub. met/ month. The gut content analysis of the larval odonates revealed that the Rotifera, Cladocera, Rhizopoda and aquatic insects form the maximum percentage of food items in *Ischnura* sp. but in *M. lineatus* Selys and *Cordulegaster* sp. Rhizopoda were recorded in very small quantity and other food items such as Rotifera, Cladocera, Copepoda, aquatic insects and other animal tissues were found in maximum percentage in the foregut. Due to the utilization of food present at various trophic levels of the food chains, they have regulatory impact in the management of the aquatic ecosystems as well as their mere presence indicates healthy and non-contaminated environments." (Author)] Address: Roy, S.P., University Department of Zoology, T. M. Bhagalpur University, Bhagalpur - 812 007, India
1663. Sawano, J.; Itani, Y.; Zhi-Hui Su; Osawa, S. (1998): Evolutionary distance between *Orthetrum poecilops poecilops* and its subspecies *O. p. miyajimaense*. *Tombo* 41: 28. (in Japanese with English summary). ["The difference of mitochondrial COI gene sequence between *Orthetrum poecilops poecilops* Ris from Hongkong, China and *O. p. miyajimaense* Yuki et Doi from Miyajima, Japan was very small, suggesting that the Miyajima population is a relic of what invaded Japan from south-east China fairly recently." (Authors)] Address: not stated
1664. Schiel, F.-J. (1998): Zur Habitatbindung der Becher-Azurjungfer (*Enallagma cyathigerum* Charpentier 1840) (Odonata: Zygoptera) am südlichen Oberrhein. *Naturschutz am südlichen Oberrhein* 2: 139-147. (in German, with English summary). ["In 1994 and 1995 the habitat requirements of *E. cyathigerum* were investigated at 28 water bodies located in the Upper Rhine valley and additionally in the northern Black Forest (South-west Germany). In the investigated area, *E. cyathigerum* breeds exclusively in still waters at an early stage of succession. 42 % of the examined waters are distinguished by hydrophyte vegetation typical for oligo- to mesotrophic conditions (e.g. *Utricularietum australis*, *Charetum hispidae*, *Eleocharitetum acicularis*). In a quarter of the investigated localities submerged vegetation is missing completely and in the last third eutrophic hydrophytes only cover small ranges. In only a few water bodies floating vegetation (e.g. *Nuphar lutea*) is developed to a very small extent. Though *E. cyathigerum* does not depend on a special type of reed vegetation, a minimum coverage of vertical vegetation structures on the shoreline is regarded as an essential habitat element for this species. *E. cyathigerum* needs a certain minimum size of open water; the smallest water body bearing a large population has a size of 80 m<sup>2</sup>. All other measured morphological, physical and hydrochemical parameters do not influence the occurrence of the species. In most waters fish are abundant." (Author)] Address: Schiel, F.-J., Institut für Naturschutz und Landschaftsanalyse (INULA), Friesenheimer Hauptstr. 20, D-77948 Friesenheim, Germany
1665. Schiel, F.-J. (1998): Zur Habitatbindung des Großen Granatauges (*Erythromma najas* Hansemann 1823) (Zygoptera: Coenagrionidae) am südlichen Oberrhein. *Naturschutz am südlichen Oberrhein* 2: 129-138. (in German, with English summary). ["In 1994 and 1995 the ecological requirements of *E. najas* were studied at 24 waters located in the Upper Rhine valley. Floating water vegetation (*Nuphar lutea* and/or *Nymphaea alba*) provides the most important structural resources for *E. najas*, because the single leaves of the water lilies are preferred as perches by the males and the blossom stalks by the females for oviposition. If there exists a submerged vegetation layer, which can be utilized for oviposition, water lily-leaves can be replaced structurally by freely floating pleustophytes such as *Hydrocharis morsus-ranae*. Other plants play a minor role for *E. najas*, despite a minimum of reed vegetation in the border line is needed. The minimum size of the investigated standing waters covers 100 m<sup>2</sup>. All waters are shallow with maximum depths between 2 and 4 meters and a mostly mighty muddy ground. Most breeding sites are



- oxbows located within or very close to forest. In 1994 and 1995 the observed changes in water levels were up to 2.3 meters high. Hydrochemically the waters are characterized by pH-values between 7.2 and 8.3, a total hardness between 8.8 and 17.6°dH and a conductivity between 280 and 705 µS / cm. Remarkably high is the nymph's tolerance to low oxygen levels (down to a 2 % concentration measured at the water surface). Habitat requirements, threats and protection are discussed. (Author)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Friesenheimer Hauptstr. 20, D-77948 Friesenheim, Germany. E-mail: Jupp@INULA.de
1666. Someya, T. (1998): Records of the activities of Conservation committees: "Mortonagrion Hiroseii" group. Tombo 41: 60. (in Japanese with English translation of the title.) Address: not stated
1667. Someya, T. (1998): The present state of the damselfly, *Mortonagrion Hiroseii*. Nature and Insects 33(10): 4-8. (in Japanese). [Introduction, and causes to protect *M. Hiroseii*; description of the habitat; status of the species in Japan. (taken from DJOSC 10)] Address: Someya, T., 2-4313-9, Ishikavva-cho, Mito City, 3 10-0904, Japan
1668. Sparrius, L.; Heyden, A. van der (1998): Libellen in de Reeuwijkse Hout. Amoeba, Amsterdam 72(3): 150-151. (in Dutch). [Commented list of the odonate fauna of the recreation area Reeuwijkse Hout in the southern Netherlands. 17 species could be observed in 1998. Special emphasize is given to the water bodies with *Stratiotes aloides* and *Aeshna viridis*.] Address: Sparrius, L., Kongsbergstraat 1, NL-2804 XV Gouda, The Netherlands
1669. Srivastava, B.K. (1998): The marvellous Odonata. *Fraseria* (N.S.) 5: 1-8. (in English). ["Origin, evolution, wing and flight, eyes, predation, feeding behaviour and reproduction (organs, mechanism and behaviour) all these aspects of their biology are very fascinating and often strongly convincing to call them 'the marvellous Odonata'." (Author) A short note on current research is made to use *Anax immaculifrons* larvae to suppress mosquito larvae.] Address: Srivastava, B.K., Department of Zoology, Sagar University, Sagar - 470 003, India
1670. Suzuki, K.; Miyachi, K. (1998): Body size variation in *Mnais costalis* Selys (Zygoptera, Calopterygidae) - Miscellaneous notes on the Japanese *Mnais* (8). Tombo 41: 24-27. (in Japanese with English summary). ["Intraspecific body size variation in *Mnais costalis* Selys, 1869 was statistically analyzed for 21 local populations (demes) from Hokkaido Island and Niigata Prefecture (Tôhoku District, Honshu, Japan). Colored-winged males are significantly larger in body size than hyaline-winged ones in the populations from both Hokkaido Is. and Niigata Pref." (Authors)] Address: Suzuki, K., Toyama University, Dept of Biology, Faculty of Sciences, 3190 Gofuku, Toyama, 930, Japan
1671. Suzuki, K.; Miyachi, K. (1998): Sexual difference of body size in *Mnais nawai* Yamamoto and *M. sp.* (Zygoptera, Calopterygidae) from Toyama Prefecture, Honshu, Japan - Miscellaneous notes on the Japanese *Mnais* (6). Tombo 41: 21-22. (in Japanese with English summary). ["Sexual difference in body size was statistically analyzed for two *Mnais* species, *M. nawai* Yamamoto, 1956 (Chûbû Group) and *M. sp.* (undescribed: Suzuki, in preparation) (Zygoptera, Calopterygidae) from Toyama Prefecture, Honshu, Japan." (Authors)] Address: Suzuki, K., Toyama University, Dept of Biology, Faculty of Sciences, 3190 Gofuku, Toyama, 930, Japan
1672. Suzuki, K.; Miyachi, K. (1998): The relationship between adult body size and emergence time in *Mnais nawai* Yamamoto and *M. sp.* (Zygoptera, Calopterygidae) from Toyama Prefecture, Honshu, Japan. Tombo 41: 19-21. (in Japanese with English summary). ["Seasonal body size variation in the Chûbû Group of *Mnais nawai* Yamamoto, 1956 and *M. sp.* (undescribed: Suzuki, in preparation) was examined for two local populations (demes) from Toyama Prefecture, Honshu, Japan. Negative correlation was recognized between adult body size and occurrence time in males of both species but not in females." (Authors)] Address: Suzuki, K., Toyama University, Dept of Biology, Faculty of Sciences, 3190 Gofuku, Toyama, 930, Japan
1673. Suzuki, K.; Miyachi, K. (1998): The relationship between body size and the number of times of mating in males of *Mnais nawai* Yamamoto and *M. sp.* (Zygoptera, Calopterygidae) from Toyama Prefecture, Honshu, Japan - Miscellaneous notes on the Japanese *Mnais* (7). Tombo 41: 23-24. (in Japanese with English summary). ["The relationship between body size and the number of times of mating in males of the Chûbû Group of *Mnais nawai* Yamamoto, 1956 and *M. sp.* (undescribed: Suzuki, in preparation) was examined for two local populations (demes) from Toyama Prefecture, Honshu, Japan. Positive correlation was recognized between body size and the number of times of mating in males of both " (Authors)] Address: Suzuki, K., Toyama University, Dept of Biology, Faculty of Sciences, 3190 Gofuku, Toyama, 930, Japan
1674. Takasaki, Y. (1998): A male *Crocothemis servilia mariannae* Kiauta with glittery wings. *Gekkan-Mushi* 334: 11. (in Japanese). [A male at Okazaki factory yard of Yunuchika, Meihoku-cho, Okazaki City, Aichi Pref., on July 6, 1998 occupied its territory in the pond of the yard for several days. The dragonfly was not different from normal ones, but it had strong glittering on the surface of the wings, though it was mature. When it was flying the wings looked white. This glittering of the wings did not change even when the wings were treated in acetone or metanol, and this may be caused by physically rough surface. (taken from DJOSC 10)] Address: Takasaki, Y., 1-14, Fujimori, Myoto-ku, Nagoya City, 465-0026, Japan
1675. Takasaki, Y. (1998): Dragonflies of the projected site of the exposition at Seto City, Aichi. *Kakocho* 50(195): 33-42. (in Japanese). [Assessment of the dragonfly fauna of the area the EXPO 2005 is scheduled to be realised. 66 species correspond to app. 70% of the species so far observed in Aichi Prefecture. (for more details see DJOSC 10).] Address: Takasaki, Y., 1-14, Fujimori, Myoto-ku, Nagoya City, 465-0026, Japan
1676. Tembhare, D.B. (1998): Odonate ovary and vitellogenesis. *Fraseria* (N.S.) 5: 15-18. (in English). ["The female reproductive system in Odonata consists of a pair of ovaries and a post ovarian genital complex. The system is well-developed in the newly emerged adult female. Each ovary consists of large number of panoistic type of ovarioles. Oogenesis is initiated in the larval stage while vitellogenesis starts after the emergence of adult female. The process of vitellogenesis

passes through five consecutive stages, pre-vitellogenic, early-vitellogenic, mid-vitellogenic, late-vitellogenic and maturation. Yolk deposition starts from the early to late vitellogenic stages while the egg-membranes are formed during the late-vitellogenic and maturation stages. During vitellogenesis, the developing oocytes grow gradually and the follicular epithelium shows cytological modifications. The yolk material is composed of protein, carbohydrate and lipid. It is transported from haemolymph into the vitellogenic oocytes. The egg membranes are secreted by the follicular epithelium. The medial A neurosecretory cells of the brain and the corpora allata play important role during vitellogenesis. The histochemical evidence of steroidogenesis in odonate ovary producing ovarian hormone is quite obvious. Hormonal control of vitellogenesis has been discussed." (Author)] Address: Tembhare, D.B., Dept Zool., Nagpur Univ. Campus, Amravati Road, Nagpur-440010, Maharashtra, India

1677. Tembhare, D.B. (1998): Vth South Asian Symposium of Odonatology (December 20-21, 1998. *Fraseria* (N.S.) 5: I-III. (in English). [Short report on the Vth South Asian Symposium of Odonatology including a list of the 21 lectures held.] Address: Tembhare, D.B., Dept Zool., Nagpur Univ. Campus, Amravati Road, Nagpur-440010, Maharashtra, India

1678. Tóth, S. (1998): Data on the dragonfly (Odonata) fauna from the surrounding area of River Tisza according to my collections by December 31, 1987. *Studia odonologica hungarica* 4: 11-44. (in Hungarian with English summary). [Collections in the surrounding area of River Tisza, Hungary were made from 53 localities throughout the area. The sites are situated in 30 grids according to the 10 by 10 km UTM grid map. Between 1960 and 1986 41 species were found to occur in the area. 1 species is very frequent, 19 are frequent, 14 are less frequent, 6 are rare, and 1, *Stylurus flavipes*, is listed in the Appendix to the European Habitat-Directive.] Address: Toth, S., Széchenyi u. 2, H-8420 Zirc, Hungaria. E-mail: flycatcher@freemail.hu

1679. Vass, I. (1998): Data on the dragonfly (Odonata) fauna of Hungary according to my scatter-collections by December 31, 1987. *Studia odonologica hungarica* 4: 45-51. (in Hungarian with English summary). [From 22 localities, in most cases situated in the north-eastern part of the Great Hungarian Plain, between 1979 and 1987 40 species were recorded. *Coenagrion scitulum*, *Stylurus flavipes*, and *Leucorrhinia pectoralis* are of special interest.] Address: Vass, I., 4400 Nyíregyháza, Ferenc krt. 14., IV/1, Hungary

1680. Wada, S. (1998): A blackish aberrant form of *Orthetrum triangulare melania* found in Fukui Pref.. *Tombo* 41: 31. (in Japanese with English translation of the title). Address: not stated

1681. Wada, S.; Wada, Y. (1998): An unusual occurrence of *Hemianax ephippiger* in Fuki Pref.. *Tombo* 41: 17-18. (in Japanese with English translation of the title.) Address: not stated

1682. Walia, G.K.; Sandhu, R. (1998): Female karyotypic study of four species of family Libellulidae (Anisoptera: Odonata). *Fraseria* (N.S.) 5: 63-67. (in English). [Germ cell complements of both the sexes of *Aciosoma panorpoides*, *Brachythemis contaminata*, *Crocothemis servilia* and *Pantala flavescens* have been

studied and illustrated. ["These have been collected from North and North-Eastern states of India. All the species possess diploid chromosome number  $2n M = 25m$ ,  $2nF = 26 m$  with  $xo - xx$  sex determining mechanism. The structure and behaviour of chromosomes during mitosis and meiosis have been observed. The study of female karyotype is new to cytology." (Authors)] Address: Sandhu, R.; Department of Zoology, Punjabi University, Patiala - 147002, India

1683. Xylander, W.E.R.; Stephan, R. (1998): Die Libellen des Braunkohletagebauebiets Berzdorf. *Abh. Ber. Naturkundemus. Görlitz* 70(2): 65-80. (in German with English summary). ["During investigations of the brown coal mining site Berzdorf (south of Görlitz, Saxonia) 48 dragonfly species could be found from May 1996 to August 1998 and documented in the collection of the Staatliches Museum für Naturkunde. 31 of these species are included in the Red List for Saxonia, five of which are threatened by extinction (*Coenagrion lunulatum*, *Ophiogomphus cecilia*, *Aeshna isosceles*, *Brachytron pratense* and *Orthetrum brunneum*). Five groups of ponds and a brook, significantly differing in age, structure and physico-chemical characters, and their dragonfly coenoses are described. The number of dragonfly species in Berzdorf is extraordinarily high for such a secondary biotope (so far known the highest in Saxonia). The recultivation must allow for the maintenance and development of the ponds and their dragonfly coenoses." (Authors) The records of *Aeshna affinis*, *Crocothemis erythraea*, *Leucorrhinia pectoralis*, and *Symptetrum depressisculum* should be noticed too. The record of 48 odonate species indicates that the region is an odonatological hot spot in Germany.] Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany. E-mail: Naturmuseum.GR.Dr.Xylander@t-online.de

1684. Yamaguchi, M. (1998): Dragonflies appeared to an artificial pond in Metropolis. *Tombo* 41: 45. (in Japanese with English summary). Japan, [*Polycanthagyna melanictera*, *Anaciaeschna martini*] Address: not stated

1685. Yokoyama, T. (1998): The northernmost record of *Planaeschna mitnei* (Selys). *Tombo* 41: 36. (in Japanese with English translation of the title.) Address: not stated

1686. Yosef, R.; Deyrup, M.A. (1998): Effects of fertilizer-induced reduction of invertebrates on reproductive success of Loggerhead Shrikes (*Lanius ludovicianus*). *Journal für Ornithologie* 139: 307-312. (in English with German summary). ["We examined the effect of spraying the common fertilizer, sodium ammonium nitrate, on cattle pastures in central Florida. Shrikes are considered good indicators of habitat quality. [...] The eight treatment pairs [with sprayed territories] expanded their territories significantly by 138.5% on average, and the smaller their initial territory, the greater the change. The total number of insects collected in the sprayed pasture in the first three weeks was extremely low compared to the number in the unsprayed pasture. In the control pairs no loss of eggs, young, or adults owing to abiotic causes was observed. However, in the treatment pairs seven eggs, two nestlings, and eight fledglings disappeared, or died from causes attributed to the spraying. [...]"] (Authors). Odonata occurred only in unsprayed pastures.] Address: Yosef, R. and M.A. Deyrup, Areh-

bold Biological Station, P. O. Box 2057, Lake Placid, PL 33852, USA

1687. Yoshino, Y. (1998): Odonata from Nij-jima, in the Izu Islands (2). Tombo 41: 44-45. (in Japanese with English summary). *Anotogaster sieboldii*, *Polycanthagyna melanictera*, *Orthetrum albistylum speciosum*, *Pseudothemis zonata*, and *Pantala flavescens* are recorded in 1998 from the Nij-jima Islands.] Address: not stated

## 1999

1688. Akaishi, S.; Yokoyama, T. (1999): A record of the forty first odonate species at Nishioka reservoir, Sapporo city. Bulletin of the Hokkaido Odonatological Society 11: 9. (in Japanese). [*Somatochlora viridiaenea*] Address: not translated

1689. Artiss, T. (1999): Molecular phylogenetic analyses of the odonate genera *Libellula*, *Ladona* and *Plathemis*. *Argia* 11(4): 8-12. (in English). ["There are three important conclusions from this study. (1) The genus *Orthemis* is traditionally distinguished from *Libellula* on wing venation characters. However, my results indicate that the monophyly of *Libellula* was not supported, and *Orthemis ferruginea* was found to be part of *Libellula* s.l.. I employed statistical tests to determine whether this tree was significantly different from trees where *Orthemis* was constrained to be an outgroup to *Libellula* s.l.. There were no significant differences in these trees. Given the indecisiveness of the molecular data on this point, I suggest that, because it is conventionally favored by morphological data, we should continue to accept the current hypothesis of *Libellula* monophyly and a corresponding outgroup position for *O. ferruginea*. However, I caution that traditional classification of these taxa may be based on potentially homoplastic (similarities not due to common ancestry) characters, and suggest that further research is needed to assess the natural delineations of taxa in these groups. (2) The results of my study indicate that *Plathemis* and *Ladona* are distinct monophyletic lineages within *Libellula* s.l.. My results indicate that *Plathemis* forms the basal sister group to the remainder of *Libellula* s.l., and that *Ladona* is the next most basal clade within the *Libellula* lineage. All three analytical approaches supported the monophyly of *Plathemis* and *Ladona*, and there was strong quantitative support (bootstrap values >90%) for these groups. Bootstrap values indicate the percent support for clades based on the randomization tests (a bootstrap value of 100 indicates that clade was supported in 100% of randomization tests). These results therefore support the original classification proposed by Needham (1897) in regard to the delineation of natural groups, with the exception that *Libellula depressa* and *Libellula fulva* would both need to be included within *Ladona* s.l. were it accorded generic or subgeneric status. Based on my results, I propose that the separate generic or subgeneric ranks be adopted for *Plathemis* and *Ladona* within *Libellulidae*; a conclusion that was supported by a previous molecular phylogenetic study on these groups (Kambhampati and Charlton 1999). (3) Phylogenetic relationships within *Libellula* s.s. generally supported the subgeneric classifications of Kennedy (1922 a,b). While Kennedy proposed that *L. angelina*,

*semifasciata* and *quadrifasciata* were separate subgenera, I found strong support for these species forming a monophyletic clade. I also found support for the subgenera *Neotetrum* (*forensis*, *pulchella*, *nodistica*), *Belonia* (*foliata*, *saturata*, *croceipennis*), and *Holotania* (*axilena*, *composita*, *jesseana*, *flavida*, *auripennis*, *luciosa*, *cyanea*, *comanche*, *incesta*, *vibrans*). The only exception to Kennedy's classification was *L. composita* which he assigned to *Holotania*, but I found to be part of, or sister taxon to *Belonia*." (Author)] Address: Artiss, T., Dept of Biology, Clark University, 950 Main Street, Worcester, MA, 01610-1477, USA. E-mail: tartiss@black.clarku.edu

1690. Batzer, D.P.; Rader, R.B.; Wissinger, S.A. (Eds) (1999): Invertebrates in Freshwater Wetlands of North America. John Wiley & Sons, New York. ISBN 0-471-29258-3: 1100 pp. (in English). ["This volume provides an excellent overview of the different wetland types of North America and their characteristic invertebrate communities. It is the most comprehensive book in existence on this topic, consisting of 41 chapters, written by 87 authors, who collectively address a range of different wetland types. The book covers marshes, peatlands, wetland forests and restored/man-made wetlands, with the main focus on marshes and temporary pools and ponds. Although the book is entitled 'Invertebrates in freshwater Wetlands of North America', it primarily deals with wetlands in the conterminous U.S.A. Alaska's wetlands are not considered, although they make up 62% of the present wetlands of the U.S.A. Canada has about three times the area of wetlands found in the lower 48 states, with most of the area covered by peatlands. One chapter on Canadian springs, two chapters on peatlands, and three chapters on the well-studied Delta-Marsh in Manitoba cover Canadian wetlands. [...] As many of the wetlands discussed are temporary, specific attention is devoted to life history and colonization strategies of invertebrates (e.g. chapters 14 and 15). It was shown that species richness normally increases with the duration of the hydroperiod, but an extended inundation period can also be a disturbance to some wetland invertebrates, as demonstrated for limesink wetlands in southeast U.S.A. (chapter 9). In addition, the invertebrate communities in floodplain pools differ from those in seasonal wetland pools, as fish have access to them during flooding (chapter 29). The large variety of invertebrate and vertebrate predators makes many wetlands unique among freshwater ecosystems (e.g. the Everglades, chapter 2). Most chapters discuss conservation issues and management schemes for individual wetland types and the potential role of invertebrates therein. The book's 41 chapters are organized into six parts that mainly correspond to different geographic regions across North America. It starts with an introductory chapter that provides an overview of North American wetlands, their physicochemical properties, and their characteristic plant and invertebrate communities. Part 1 (chapters 2-11) discusses marshes and swamps of the southeast, ranging from the Florida Everglades [...] to the fascinating life in pitcher plant wetlands. Part 2 introduces woodland ponds, peatlands and marshes of the north and northeast (chapters 12-20). Part 3 presents selected wetlands of the central prairies and the Mississippi River basin (chapters 21-29). Part 4 introduces wetlands of the western mountains, deserts and valleys, including springs and California ricelands (chapters 30-35). Part 5 gives an overview of coastal freshwater wet-



lands, in particular, the bayous of the Gulf of Mexico and coastal wetlands of the Great Lakes. In part 6, Wissinger summarizes the different aspects discussed in the previous chapters, and provides general conceptual models that can help to understand wetland ecosystems better. [...]" (Klement Tockner, *Freshwater Biology* 45(1): 103-104). Odonates are mentioned in many chapters of the book. Odonatologist should pay special attention to the chapters 6 (Okefenokee Swamp, Georgia and Florida), 8 (Carolina Bays, North and South Carolina), 10 (Beaver-impounded wetlands of the southeastern coastal plain, Alabama), 15 (Beaver pond wetlands in northwestern Pennsylvania), 17 (Canadian peatlands), 21 (Wetlands of the prairie Pothole region (southern Canada and northern USA), 26 (Playas of the Southern High Plains, Texas), 30 (Wetlands of Grand Teton and Yellowstone National Parks, Wyoming), and 31 (Subalpine Wetlands in Colorado: Habitat Permanence, salamander predation, and invertebrate communities).]

1691. Beckemeyer, R.J. (1999): Measurements of total fresh mass for some species of Odonata from the Great Plains of the United States. *Notul. odonatol.* 5 (3): 35-36. (in English). [Kansas, Nebraska; the weight of the following taxa is published: *Calopteryx aequabilis*, *C. maculata*, *Hetaerina americana*, *Enallagma exsulans*, *Aeshna multicolor*, *Anax junius*, *Nasiaeschna pentacantha*, *Gomphus externus*, *Ophiogomphus severus*, *Stylurus plagiatus*, *Somatochlora ensigera*, *Celithemis eponina*, *Leucorrhinia intacta*, and *Amphiagrion* spp.] Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

1692. Belgische Libellenonderzoekers (1999): *Gomphus*. *Gomphus* 15(3): 109-155. (in French or Dutch). [Papers of scientific interest are abstracted in this issue of OAS. The Belgian society of Dragonfly recorders provides some more information in *Gomphus* 15(3) such as the agenda of the 20th Belgian odonatalogical symposium on March 26, 2000, information on the book on the Moroccan Odonata by Gilles Jacquemin and Jean-Pierre Boudot, the scheduled reprint of P.-A. Robert's "Les Libellules", the Atlas-project, and internet activities of the society.] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

1693. Buczynski, P. (1999): Dragonflies (Odonata) of sandpits in south-eastern Poland. *Acta Hydrobiol.*, *Cracow* 41: 219-230. (in English). ["Dragonflies of sandpits and their succession were studied in 10 sand mines in south-eastern Poland in the years 1996-1998, based mainly on larval communities. 41 species were collected, of which 28 were autochthonous, and 6 probably autochthonous. A rapid succession of larval communities was observed. Many Mediterranean species occurred in the sandpits, of which the most interesting were: *Lestes barbarus*, *Aeshna affinis*, *Hemianax ephippiger*, *Anax imperator*, *Sympetrum fonscolombii*, and *S. meridionale*. Dragonflies inhabiting sand- and gravelpits in Central Europe, and the importance of these secondary biotopes for protection of the endangered dragonflies are briefly discussed." (Author)] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

1694. Butler, M.A. (1999): Is evolution in the color vision system of Hawaiian damselflies adaptive or neutral? *American Zoologist* 39(5): 33A. (in English). [visual pigment; body coloration; color vision system: evolution; environmental light stimuli; spectral sensitivities] Address: Butler, M.A., Institute of Statistical Mathematics, Tokyo Japan

1695. Butler, S.G. (1999): Further additions to the knowledge of the fauna of the island of Corfu, Greece. *Notul. odonatol.* 5(3): 25-27. (in English). [In June 1998, 19 species were recorded including *Chalcolestes viridis*, *Anaciaeschna isosceles*, *Anax parthenope*, *Brachytron pratense*, and *Sympetrum meridionale* as new additions to the fauna of the island. The records of *Pyrrosoma elisabethae* Schmidt 1948, *Coenagrion pulchellum*, and *Gomphus schneiderii* should be mentioned too.] Address: Butler, S.G., Red Willow, All Stretton, Shropshire SY6 6HN, UK

1696. Costa, J.M.; De Souza-Franco, G.M.; Takeda, A.M. (1999): Description of the larva of *Diastatops intensa* Montgomery, 1940 and morphology of different instars (Odonata: Libellulidae). *Boletim Museu Nacional Rio de Janeiro, Zoologia* 410: 1-14. (in Portuguese with English summary). [80 males and 40 females "of different instars of *D. intensa* were collected monthly from associations with *Eichornia azurea* and *E. crassipes* at three habitats (Rio Ivinheima Lagoa dos Patos e Lagoa do Guarana), from March 1992 to February 1993. The larvae from Rio Ivinheima, associated with *E. azurea* were used in this study. Sex identification was observed after the 7th instar. Two specimens of the ultimate instar larvae were identified as *D. intensa* through structure of wing pads and by presence of the adults at the same place. Five adults (3 males and 2 females) were collected on only one day during every period and identified as *D. intensa*. The immature form collected in Rio Ivinheima is presented in various stages of growth of the instars including the ultimate instar, from June 1992 to December 1993. The presence of 11 instars was confirmed. Differences observed among the several instars and descriptions of the ultimate instar are presented and compared with the larvae of *D. obscura*." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisys.com.br

1697. Daigle, J.; Behrstock, B.; Krotzer, S.; Mauffray, B. (1999): Arizona adventures! *Argia* 11(4): 4-6. (in English). [Report from a trip to several habitats in Arizona (and New Mexico), USA. Among a lot of interesting species found, *Argia lacrimans* was found west of Sierra Vista; the locality may be the only one for the Mexican adventive species in USA.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: daiglej@dep.state.fl.us

1698. Davies, D.A.L.; Fliedner, H. (1999): Entomological etymology, a correction (Zygoptera: Megapodagrionidae, Rhipidolestes). *Notul. odonatol.* 5(3): 36-37. (in English). [Discussion of the meaning of the name *Rhipidolestes* Ris 1912; the name was chosen by F. Ris after the Greek rhiphidion (= fan).] Address: Davies, D.A.L., 23 Cedar Court, Hills Road, Cambridge, CB2 2QJ, United Kingdom; Fliedner, H., Louis-Seegelken Str., D-28717 Bremen, Germany

1699. De Souza, L.; Costa, J.M.; Santos, T.C. (1999): Redescription of the larva of the *Tremea calverti* Muttkowski, 1910 with key to the identification of the known larvae of the genus (Odonata: Libellulidae). *Boletim Museu Nacional Rio de Janeiro Zoologia* 409: 1-7. (in Portuguese with English summary). ["The ultimate instar larva of *Tremea calverti* Muttkowski, 1910, from the Pantanal of Mato Grosso do Sul, Brazil is redescribed, and illustrated. Notes on other larvae of the genus are presented. A key to the larvae of the known species of *Tremea* Hagen, 1861 is appended." (Authors)] Address: De Souza, L., Departamento de Biologia, Universidade Federal do Mato Grosso do Sul, Mato Grosso do Sul, Brazil
1700. Defoort, T. (1999): Verslag van de excursie naar de Eendenputten te Beernem op 6 juni 1999. *Gomphus* 15(3): 133-134. (in Dutch). [Report from an excursion to a bog near Beernem, Belgium. *Enallagma cythigerium* and *Coenagrion puella* were recorded.] Address: not stated
1701. Dijk, D.E. van; Geertsema, H. (1999): Permian Insects from the Beaufort Group of Natal, South Africa. *Annals of the Natal Museum* 40: 137-171. (in English). ["An account is given of the fossil insects of the Beaufort Group (Late Permian) investigated since the last publication by Riek (1976). The Odonata and Trichoptera are reported for the first time; specimens are assigned to three known genera not previously recorded in South Africa; eight new species are described, two in new genera [...]" (Authors)] Address: Dijk, D.E. van, Department of Zoology, University of Stellenbosch, Matieland, 7602 South Africa
1702. Donnelly, N. (1999): History of American Odonata: Clarence Kennedy (1879-1952). *Argia* 11(4): 12-15. (in English). [Quite few is known about the (early) years of C.H. Kennedy who was one of the "giants of American Odonata study", and who was an outstanding illustrator of Odonata. This paper compiles the most essential odonatological stations in Kennedy's life.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. [tdonnel@binghamton.edu](mailto:tdonnel@binghamton.edu)
1703. Donnelly, N. (1999): Juanda Bick: 1919-1999. *Argia* 11(4): 2-4. (in English). [Obituary] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. [tdonnel@binghamton.edu](mailto:tdonnel@binghamton.edu)
1704. DuBois, R.B.; Johnson, R.; Puiz, S. (1999): *Aeshna subarctica* (Odonata: Aeshnidae) in northwestern Wisconsin. *Great Lake Entomologist* 32(1/2): 29-31. (in English). ["Nine adult specimens of *A. subarctica*, a boreal dragonfly typically associated with muskeg wetlands, were collected from Black Lake and Breitzman Lake in northwestern Wisconsin (Douglas County). Viable populations likely exist in both lakes. Oviposition by three females is described. This represents the first published report of *A. subarctica* for the state of Wisconsin. Because Black Lake lies on the border of Wisconsin and Minnesota, *A. subarctica* likely occurs in Minnesota as well. Further sampling of acidic peatland habitats for aquatic macroinvertebrates is recommended to document populations of northern species at the southern periphery of their ranges. These species could function as indicators of climate change." (Authors)] Address: DuBois, R.B., Bureau of Integrated Science Services, Department of Natural Resources, 6250 South Ranger Road, Brule, WI 54820, USA. E-mail: [duboir@dnr.state.wi.us](mailto:duboir@dnr.state.wi.us)
1705. Eklov, P.; Werner, E.E. (1999): Multiple predator effects on size-dependent behavior and mortality of two species of anuran larvae. *Oikos* 88(2): 250-258. (in English). ["This study examined the effects of multiple predators on size-specific behavior and mortality of two species of anuran larvae. Particularly, we focused on how trait changes in predators and prey may be transmitted to other species in the food web. In laboratory experiments, we examined the effects of bluegill sunfish, *Lepomis macrochirus*, and the odonate larva *Anax junius* on behavior and mortality of tadpoles of the bullfrog, *Rana catesbeiana*, and the green frog *R. clamitans*. Experiments were conducted with predators alone and together to assess effects on behavior and mortality of the tadpoles. The experiments were replicated on five size classes of the tadpoles to evaluate how responses varied with body size. Predation rates by *Anax* were higher on bullfrogs than on green frogs, and both bullfrogs and green frogs suffered greater mortality from *Anax* than from bluegill. Bluegill only consumed green frogs. Predation rates by both predators decreased with increasing tadpole size and decreased in the non-lethal (caged) presence of the other predator. Both anuran larvae decreased activity when exposed to predators. Bullfrogs, however, decreased activity more in the presence of *Anax* than in the presence of bluegill, whereas green frogs decreased activity similarly in the presence of both predators. The largest size class of green frogs, but not of bullfrogs, exhibited spatial avoidance of bluegill. These responses were directly related to the risk posed by the different predators to each anuran species. *Anax* activity (speed and move frequency) also was higher when alone than in the non-lethal presence of bluegill. We observed decreased predation rate of each predator in the non-lethal presence of the other, apparently caused by two different mechanisms. Bluegill decreased *Anax* mortality on tadpoles by restricting the *Anax* activity. In contrast, *Anax* decreased bluegill mortality on tadpoles by reducing tadpole activity. We discuss how the activity and spatial responses of the tadpoles interact with palatability and body size to create different mortality patterns in the prey species and the implications of these results to direct and indirect interactions in this system." (Authors)] Address: Eklov, P., Dept of Ecology and Environmental Science, Animal Ecology, Umea Univ., SE-901 87, Umea, Sweden
1706. Ellenrieder, N. von (1999): Description of the last larval instar of *Aeshna* (*Hesperaeschna*) *cornigera planaltica* (Odonata: Aeshnidae). *Revista de la Sociedad Entomologica Argentina* 58(3-4): 151-156. (in English with Spanish summary). ["The last larval instar of *Aeshna* (*Hesperaeschna*) *cornigera planaltica* Calvert, 1952 (Odonata: Aeshnidae) is here described and compared to its closest allies and other known larvae of this genus from Argentina. It differs from them mainly in the prementum ratio width/length, the shape of prothoracic processes and the relative length of the abdominal lateral spines." (Author)] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C. 712, AR-1900, La Plata, Argentina. E-mail: [ellenr@iipla.edu.ar](mailto:ellenr@iipla.edu.ar)
1707. Englund, R. (1999): New records and range extensions of native Odonata (Coenagrionidae) and intro-

duced aquatic species in the Hawaiian islands. Bishop Museum Occasional Papers 59: 15-19. (in English). [Record of *Megalagrion pacificum* believed extirpated from Hawai'i Island in a tributary of Ma'ili Stream without introduced fishes in 1998; probably due to two introduced fish species the damselfly didn't dwell the main stream. *Orthemis ferruginea* was first recorded in 1977 at Hale'iwa, O'ahu; it now appears to be established throughout the Hawaiian Archipelago. The records of the species on Hawai'i are documented.] Address: Englund, R., Hawaii Biol. Survey, Bishop Mus., 1525 Bernice St., Honolulu, HI 96817, USA

1708. Englund, R.A.; Filbert, R.B. (1999): Flow restoration and persistence of introduced species in Waikele Stream, O'ahu. *Micronesica* 32(1): 143-154. (in English). ["Unintentional stream flow restoration in Waikele Stream, O'ahu, Hawai'i resulted from the demise of sugar cane cultivation on O'ahu and subsequent cessation of direct surface water diversions in 1989. Previous artificial stream studies in Hawai'i have suggested that increases in the base flow of a diverted stream would displace or reduce introduced fish populations. Surveys of Waikele Stream, conducted in 1993 and 1997-1998 from the Waikele Springs area downstream to the beginning of the tidal reach found that despite an increase in stream flow, introduced fish remained abundant and native species appeared to have declined. In fact, two new introduced aquatic taxa, a dragonfly and a shrimp, had appeared. These results indicate that although restoring hydrological conditions is an important first step in overall restoration of degraded aquatic ecosystems, flow restoration alone is not a panacea, especially in O'ahu streams with naturally low discharge rates. For stream and wetland restoration to fully succeed, introduced fish and other alien aquatic species must be eradicated by methods other than simply increasing stream base flows. [...] Introduced dragonflies and damselflies dominated the aquatic insect fauna of Waikele Stream. All damselfly species were introduced (Table 2). Native *Megalagrion* damselflies were not observed in lower Waikele Stream in 1993 or 1998. The indigenous dragonfly *Anax junius* was common around Waikele Springs, and the introduced dragonfly *Crocothemis servilia* was absent in 1993, but common in 1998." (Authors) Dates of introduction: 1936: *Ischnura posita*, *Enallagma civile*; 1973: *Ischnura ramburii*; 1977: *Orthemis ferruginea*; 1994: *Crocothemis servilia*.] Address: Englund, R.A.; Filbert, R.B., Hawai'i Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, HI, 96817, USA

1709. Ferreras-Romero, M.; Corbet, P.S. (1999): The life cycle of *Cordulegaster boltonii* (Donovan, 1807) (Odonata: Cordulegastridae) in the Sierra Morena Mountains (southern Spain). *Hydrobiologia* 405: 39-48. (in English). ["The life cycle of the dragonfly *Cordulegaster boltonii* was studied for five consecutive years, mainly by systematic sampling of larvae, in a permanent upland stream in southern Spain, towards the southern part of this species' range. The instar distribution during winter is that of a 'spring species' (Corbet, 1964) in which larvae destined to emerge in the next spring are predominantly in the final instar. During larval development a hatching cohort divides into "slow" and "fast" components which respectively complete development in three and two years, the former component predominating. Signs of advanced metamorphosis (in the last larval instar) are confined to late winter and spring. E-

mergence is protracted, there being a long "tail" after most of" the population has emerged, resulting in a long flying season." (Authors)] Address: Ferreras-Romero, M., Departamento de Biología Animal (Zoología), Facultad de Ciencias, Universidad de Córdoba, Avda. San Alberto Magno s/n, E-14004 Córdoba, Spain

1710. Fleck, G.; Nel, A.; Martinez-Delclos, X. (1999): The oldest record of libellulid dragonflies from the Upper Cretaceous of Kazakhstan (Insecta: Odonata, Anisoptera). *Cretaceous Research* 20(5): 655-658. (in English). ["*Palaeolibellula zherikhini* gen. nov., sp. nov. ... is the oldest record of the dragonfly family Libellulidae. This discovery extends the stratigraphic range of the family about 60 my into the past, hence emphasizing the incompleteness of present knowledge of the Mesozoic insect fauna." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

1711. Fuchs, H.-J.; Kistner, A. (1999): Die Wüstung Pferdsfeld im Soonwald nach 20 Jahren: eine landschaftsökologische Bestandsaufnahme, Bewertung und Konzeption einer sozial-ökologischen Inwertsetzung. *Mitt. Pollichia* 86: 35-68. (in German with English and French summaries). [The abandoned settlement of Pferdsfeld in the Soonwald after 20 years: an ecological analysis, evaluation and conception for a socio-ecological implementation. - Due to the serious noise impact of the Bundeswehr-airfield Pferdsfeld, Rheinland-Pfalz, Germany, 400 inhabitants decided to resettle voluntarily in 1979, and the village Pferdsfeld closely located to the runway was immediately flattened completely. After the transfer of the phantom-fighter group and the closing of the military airfield of Pferdsfeld in 1997, the abandoned settlement gained in significance. During the last 20 years, a number of outstanding, biologically valuable areas with a very interesting flora and fauna have developed at the place of the former village. These areas have been mapped, characterised and evaluated in the course of an ecological analysis. A detailed concept for a future use of the Pferdsfeld area was worked out. Some common central European Odonata are mentioned.] Address: Fuchs, H.-J., Geographisches Institut, Johannes Gutenberg-Universität Mainz, 55099 Mainz, Germany

1712. Fudalewicz-Niemczyk, W.; Petryszak, A.; Rosciszewska, M. (1999): Cuticular sensory organs of the mouthparts of larvae of the dragonfly *Libellula* (Odonata: Libellulidae). *Acta Biologica Cracoviensia Series Zoologia* 41: 25-33. ["The following types of sense organs were found ...: sensilla trichodea, s. chaetica, s. coeloconica, s. papillacea, s. campaniformia, s. canaliculata, and hair plates. The occurrence and arrangement of sensilla were compared between the larva and imago of the dragonfly. It is suggested that sensilla can be helpful in determining the homology of modified appendages." (Authors)] Address: Fudalewicz-Niemczyk, Wladyslawa, Department of Zoology and Ecology, Agricultural University, Al Mickiewicza 24/28, 30-059, Cracow, Poland

1713. Gassmann, D. (1999): Taxonomy and distribution of the inornata species-group of the Papuan genus *Idiocnemis* Selys (Odonata: Zygoptera: Platycnemididae). *Invertebrate Taxonomy* 13: 977-1005. (in English). ["The inornata species-group, a presumed monophyletic assemblage of species of the Papuan damsel-



damselfly genus *Idiocnemis* Selys, 1878, is revised with special regard to phylogenetically relevant morphological characters and the distribution of its species. Diagnoses of all nine previously described species are presented together with the description of two new species, *I. adelbertensis*, sp. nov. from northeast New Guinea and *I. australis*, sp. nov. from southern central New Guinea. Keys to males and females are provided. The male ligulae of all species were examined by using scanning electron microscopy. A diagnosis of the genus and a nomenclatural note on the family-group name *Calicnemiinae* Fraser, 1957 is included." (Author). *Idiocnemis inornata* Selys 1878, *I. strumidens* Lieftinck 1958, *I. huonensis* Lieftinck 1958, *I. kimminsi* Lieftinck 1958, *I. louisadensis* Lieftinck 1958, *I. leonardi* Lieftinck 1958, *I. zebrina* Lieftinck 1958] Address: Gassmann, D., Institute of Evolutionary and Ecological Sciences, Leiden University, c/o Naturalis (National Museum of Natural History), P.O. Box 9517, NL-2300 RA Leiden, The Netherlands

1714. Geenen, S.; Jordaens, K.; De Block, M.; Stoks, R.; Gossum, H. van; De Bruyn, L. (1999): Een nieuwe voortplantingsplaats van *Sympecma fusca* (Vander Linden, 1820) in Vlaanderen. *Gomphus* 15(3): 111-117. (in Dutch with English summary). ["A new reproduction site of *Sympecma fusca* (Vander Linden, 1820) in Flanders, Belgium. During a population genetic study on *Lestes viridis*, we discovered a population of *S. fusca* in a pond located at the University of Antwerp (UIA, Wilrijk). This population is a new site in Flanders where the species reproduces since we were able to capture 30 larvae. Recent data indicate that *S. fusca* is possibly recovering from a strong decline since 1950. The warm summers of the recent years possibly enables this holomediterranean species to reproduce in our regions. This study further shows that molecular techniques are a useful tool to discriminate between morphologically highly similar species." (Authors) In a tab. the "Nei genetics distances" (Nei, M., 1978, *Genetics* 89: 583-590) between different investigated populations of *Sympecma fusca* and *Chalcolestes viridis* are presented.] Address: Geenen, Sofie, Koninklijk Belgisch Instituut voor Natuurwetenschappen, Vautierstraat 29, 1000 Brussel, Belgium

1715. Goffart, P. (1999): Compte-rendu de l'excursion sur l'Ourthe moyenne, de Hotton à Noisieux du dimanche 27 juin 1999. *Gomphus* 15(3): 139-141. (in French with Dutch summary). [The river Ourthe, Belgium famous for its population of *Oxygastra curtisii* was surveyed using canoes. *Calopteryx splendens*, *C. virgo*, *Platynemis pennips*, *Onychogomphus forcipatus*, and *Gomphus pulchellus* could be observed. *O. curtisii* was extremely rare this day.] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

1716. Gorb, S.N. (1999): Serial elastic elements in the damselfly wing: Mobile vein joints contain resilin. *Naturwissenschaften* 86(11): 552-555. (in English). ["Two main types of joints occur in the damselfly wing: mobile and immobile. Some longitudinal veins (RP2<sup>-</sup>, RP3&4<sup>-</sup>, and MP<sup>-</sup>) are elastically joined with cross veins, whereas other longitudinal veins (1R1<sup>+</sup>, 1R2<sup>+</sup>, MA<sup>+</sup>, CuA<sup>+</sup>) are firmly joined with cross veins. In this study we mapped the distribution of serial elastic elements in the wing. The occurrence of resilin, a rubberlike protein, in

mobile joints suggests that the automatic twisting mechanism of the leading edge by aerodynamic force works not by flexibility but by the elasticity of these joints. First, it should result in elastic energy storage in the distal areas of the wing. Second, serial elastic elements of wing presumably act as dampers of an aerodynamic force, which are responsible for gradual twisting of the leading edge." (Author) *Enallagma cyathigerum*] Address: Gorb, S., Max-Planck-Institut für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. E-mail: stas.gorb@tuebingen.mpg.de

1717. Guiliazova, E.V. (1999): Effects of environmental pollution on the nestling diet of Pied Flycatcher *Ficedula hypoleuca* on the Kola Peninsula, Russia. *Vogelwelt* 120, Suppl.: 371-374. (in English). [Nesting diet differed between the two surveyed sites (heavy and less polluted). Odonata were not preyed but were present in random samples of invertebrates available as potential prey to Pied Flycatchers in frequencies between 1.12 to 3.23 %.] Address: Guiliazova, Elena, Lapland Biosphere Reserve, Zeleny, 8, 184280 Monchegorsk, Murmansk reg., Russia. E-mail: root@zap.mgus.murmansk.su

1718. Hämäläinen, M.; Prashanth-Mohanraj, Veenukumari, K. (1999): Additions to the odonate fauna of the Andaman and Nicobar Islands, Indian Ocean. *Notul. odonatol.* 5(3): 27-29. (in English). [Nine species are recorded for the first time from the Andaman and Nicobar islands, of which *Neurothemis r. ramburii* and *Zyxomma obtusum* are new for the fauna of the territories of the Indian Union. New species for the fauna of each of the 2 island groups are also presented.] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

1719. Harthun, M. (1999): Der Einfluss des europäischen Bibers (*Castor fiber albus*) auf die Biodiversität (Odonata, Mollusca, Trichoptera, Ephemeroptera, Diptera) hessischer Bäche. *Limnologica* 29(4): 449-464. (in German with English summary). ["Due to the return of the beaver an increasing number of brooks become restored to a natural condition. It is characterized by an alternation of flowing and standing sectors. In the summer of 1995, different groups of organisms (Odonata, Mollusca, Trichoptera, Ephemeroptera, Diptera) of two brooks in the Spessart mountains (Hesse, Germany) were studied to compare the composition of invertebrates in beaver homeranges and in the non-influenced sectors above. The new living conditions resulted in the disappearance of some species (*Drusus anulatus*, *Trich.*, *Sericostoma personatum*, *Trich.*, *Radix peregra*, *Gastr.*). Nevertheless the beaver homeranges accommodate a significant higher number of species of dragonflies and damselflies, molluscs and caddisflies than the brooks above the homeranges. The heterogeneity of natural river systems make a coexistence of running water and silent water organisms possible. The examinations result in a significant higher group dominance of ephemeras (i.p. *Cloeon dipterum*) in a beaver pond than in lenitic sectors conditioned by the gradient without beaver influence. Here the dominance of chironomids was much higher. High current sectors with their characteristic organisms are also present in the beaver homeranges. The higher number of insects is the basis of nourishment for predatory insects and fishes. The potential effects of beaver ponds on fishes are discus-

sed." (Author)] Address: Harthun, M., Landesverband Hessen e.V., Naturschutzbund Deutschland (NABU), D-35531 Wetzlar, Germany

1720. Hiratsuka, K. (1999): Odonata of Horonobe-cho, north of Rumoi District. Bulletin of the Hokkaido Odonatological Society 11: 2-4. (in Japanese). [Ten odonate taxa are reported from four localities in Horonobe-cho, Japan. *Nehalennia speciosa*, *Aeshna nigroflava*, *Coenagrion lanceolatum*, *C. ecornutum*, *Cordulia aenea amurensis*, *Lestes dryas*, *L. sponsa*, *Sympetrum risi*, *Cercion calamorum*, *Enallagma boreale circulatum*] Address: not translated

1721. Hiratsuka, K. (1999): *Sympetrum frequens* caught at Mt. Hachiken-zan, Sapporo. Bulletin of the Hokkaido Odonatological Society 11: 1. (in Japanese). [A specimen of *S. frequens* in which the black stripes on the lateral sides of pterothorax looks like those of *Sympetrum danae* is figured] Address: not translated

1722. Hochkirch, A. (1999): Libellen und Heuschrecken eines Militärgeländes bei Bremen (Tanklager Farge). Abhandlungen des Naturwissenschaftlichen Vereins von Bremen 44(2-3): 803-818. (in German with English summary). ["During summer 1997 Odonata and Orthoptera were mapped at an army site in Bremen ("Tanklager Farge"). Thirty Odonata species and eight Orthoptera species were found. Twenty-three of the Odonata species were indigenous, five more were assumably indigenous, too. Two species were only recorded by single specimens. Ten of the Odonata species are listed in the red data book for Bremen and Lower Saxony. Species of peat bogs, heath pods and pioneer species have a high value for conservation efforts. The waters "Farger Heidetümpel" (25 species) and fire protection pond 4 (26 species) have the highest importance for those Odonata. [...]"] (Author)] Address: Hochkirch, A., Abt Evolutionsbiologie, FB 2: Biologie/Chemie, Institut für Ökologie und Evolutionsbiologie, Universität Bremen, D - 28334 Bremen, Germany. E-mail: axelhoch@uni-bremen.de

1723. Hoekstra, J.D.; Smith, R.L. (1999): Descriptions of the final instar larvae of *Argia sabino* Garrison and *Argia pima* Garrison (Odonata: Coenagrionidae). Proc. entomol. soc. Washington 101(84): 887-896. (in English). ["We illustrate and describe the final instar larvae of *Argia sabino* Garrison 1994 and *Argia pima* Garrison 1994 based on preserved exuviae and larvae from Sabino Creek, Arizona, U.S.A. A dichotomous key is provided to integrate *A. sabino* and *A. pima* into an existing larval key to North American *Argia* spp." (Authors)] Address: Smith, R.L., Department of Entomology, University of Arizona, Tucson, AZ 85721, USA. E-mail: bob.smith@ag.arizona.edu

1724. Hoekstra, J.D.; Garrison, R.W. (1999): Range extension of *Palaemnema domina* Calvert (Odonata: Platystictidae) to southeastern Arizona, U.S.A.: a new odonate family for the United States. Proc. entomol. Soc. Washington 101(4): 756-759. (in English). ["The occurrence of a population of *Palaemnema domina* Calvert in south-eastern Arizona, U.S.A. extends the known northern range limit of this species from Chihuahua, Mexico. It is the first record of the Platystictidae for the United States. Notes on adult perching habits" in humid, dark, cave-like riparian roosting sites "and a brief habitat description are provided." (Authors)] Address: Hoekstra, J.D., Illinois Natural History Survey,

Center for Aquatic Ecology, 607 E. Peabody Dr., Champaign, IL 61820, U.S.A. E-mail: hoekstra@inail.inhs.uiuc.edu

1725. Ichijo, N.; Takahashi, T.; Izumiura, H.; Ohta, A.; Kawamura, E.; Takiuchi, S. (1999): Larval assemblage of Odonata in an artificial pond near Lake Harutori, Kushiro City. Sylvicola 17: 13-17. (in Japanese with English translation of the title). A total of 1163 larvae of twenty odonate species were collected from 1994 to 1999, among them *Aeshna nigroflava* and *Epiheca bimaculata* were most abundant. Possible influence of (fish) predators and vegetation structure are briefly discussed] Address: Kushiro Koryo Senior High School, Midorigaoka, Kushiro, 085, Japan

1726. Kano, K.; Hirose, Y. (1999): *Orthetrum triangulare melania* (Selys) inhabiting spas of the northern district. Gekkan-Mushi 341: 16-17. (in Japanese). [*Orthetrum triangulare melania* is distributed widely in Japan, but in Hokkaido the species occurs on the northern limit of its distribution. ["We found that the localities surveyed in Hokkaido were all located at spas" (hot springs). (taken from DJOSC 10)] Address: Kanou, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

1727. Kenner, R.D. (1999): First Canadian breeding record for *Tanypteryx hageni*. Argia 11(4): 15-16. (in English). [Cypress Provincial Park, West Vancouver, September 1, 1999] Address: Kenner, R., Spencer Entomological Museum, Dept Zoology, University of British Columbia, Vancouver, BC, Canada V6T 1Z4. E-mail: kenner@zoology.ubc.ca

1728. Knijf, G. de (1999): Invasie van *Anax parthenope* (Selys) in België in 1999. Gomphus 15(3): 119-129. (in Dutch with English and French summary). ["Invasion of *Anax parthenope* (Selys) in Belgium in 1999. - With a total of 16 observations from 8 different localities, an invasion of *A. parthenope* was recorded in 1999 in Belgium. An overview of all data from *A. parthenope* in Belgium is given. In 1999 two influx can be distinguished. A first one occurred at the end of May / beginning of June and a second in the first weeks of July. The first individuals were observed two days earlier in the southern, Walloon part than in Flanders. As in previous years nearly no females were seen in 1999. All Belgium localities are medium to big sized ponds well exposed to the sun and sheltered from wind. Nearly all localities are situated along the border with France. On two localities, species were observed in 1998 and in 1999. Until now no proof of successful reproduction exists for Belgium." (Author)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

1729. Knijf, G. de (1999): Verslag van de excursie naar Mol-Postel op zaterdag 21 augustus 1999. Gomphus 15(3): 134-136. (in Dutch with French summary). [Report from a trip to the Mol-Postel region, Belgium with records of *Sympetrum depressiusculum*, *S. pedemontanum*, *Somatochlora metallica*, *Orthetrum coerulescens*, *Aeshna juncea*, *Ceriagrion tenellum*, and *Cercion lindenii*.] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

1730. Kosterin, O.E. (1999): Fauna of Dragonflies (Odonata) of the Daurkii State Nature Reserve and its

surroundings. Insects of Dahuria and adjacent territories. Proceedings of the Dahurskii State Biosphere Nature Reserve. Vol. II. Novosibirsk: 5-40. (in Russian with English summary). ["Dragonflies of the Dauriskii State Nature Reserve and the surroundings of the village Nizhnii Tsasuchei, where its office is situated, were observed and collected in 1995 - 1997. The region studied is briefly characterized. An annotated list of species contains a full reference to the specimens collected, notes on biotope preferences and relative abundance of species, for some species systematic notes and data on variation are given. Earlier 17 species were reported for this territory, now their number have risen to 31. Among them the Manshurian species *Cercion v-nigrum* Needham and *Anisogomphus maackii* Selys, thought to range westwards up to Blagoveshchensk only, were found out. *Anax parthenope* Selys and *Pantala flavescens* Fabricius proved to be present in Transbaikalia. A Chinese/Mongolian species *Ophiogomphus spinicornis* Selys is for the first time reliably reported for the Russian territory. Small dragonfly collections made in July 1996 on the territory of the adjacent Mongol Daguur Natura Reserve (Mongolian People's Republic) are also considered. Dragonfly faunas of Transbaikalia, Mongolian People's Republic and the NW part of Inner Mongolia (China) are compared preliminarily." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

1731. Kreuzweiser, D.P.; Capell, S.S.; Scarr, T.A. (1999): Acute lethal and sublethal effects of a neem-based insecticide on nontarget aquatic insects in stream channels. *Bulletin of Environmental Contamination & Toxicology* 63(3): 365-371. (in English). [Extracts from seeds and leaves of the neem tree, *Azadirachta indica*, express insecticidal activity against a broad range of insect pests. The primary active ingredient in neem extracts is the triterpenoid, azadirachtin. Because several common forest pests are among the most susceptible insects to azadirachtin, the use of neem-based insecticides in Canadian forest pest management programs is being investigated. Insecticide applications to forests may result in some of the product entering nearby water bodies and it is therefore important to ensure that these insecticides do not pose a risk of adverse effects on aquatic organisms. Small streams are particularly susceptible to contamination by runoff from adjacent sprayed areas because of low dilution potential, and from inadvertent overspray because they are difficult to avoid during aerial applications. The authors investigated the potential for adverse effects on stream insects by applying a neem-based insecticide to outdoor stream channels and measuring acute lethal and sublethal responses. Experiments were conducted at the Icewater Creek Research Area, 50 km north of Sault Ste. Marie, Ontario, Canada. In a laboratory study, at a concentration of 0.84 mg/L azadirachtin, only the stonefly *Isogenoides* sp. exhibited a drift rate (64%) that was significantly different from controls. At concentrations of 0.28 mg/L azadirachtin the drift was not significantly different from controls. Survival of *Isogenoides* sp., the mayfly *Isonychia bicolor/rufa*, and the caddisfly *Hydropsyche bifida/recurvata* were negatively affected by exposure to the maximum test concentration of 0.84 mg/L azadirachtin. Nor drift rate nor mortality of *Ophiogomphus* sp. was affected by azadirachtin.] Address: Kreuzweiser, D.P., Canadian Forest Service,

Great Lakes Forestry Centre, 1219 Queen Street East, Sault Ste. Marie, Ontario, Canada P6A 5M7.

1732. Krotzer, S. (1999): *Erythemis vesiculosa* (Fabricius), Great Pondhawk, new for Alabama. *Argia* 11(4): 7-8. (in English). [Alabama, USA, Grand Bay Savanna Nature Preserve, August 14, 1999] Address: Krotzer, S., 6010 Woodvale Drive, Helena, AL 35080, USA. E-mail: smjkrotzer@aol.com

1733. Lang, C. (1999): Zur Biologie und Mikrohabitatwahl der Larven von *Cordulegaster heros* Theischinger, 1979 und *Cordulegaster bidentata* Selys, 1843 (Insecta: Odonata) im Weidlingbach (Niederösterreich). Diplomarbeit, Formal- und Naturwissenschaftliche Fakultät der Universität Wien. 97 pp. (in German with English summary). ["Between May 1997 and April 1998, the biology and ecology of larvae of *Cordulegaster heros* and *C. bidentata* were examined in the catchment area of the Weidlingbach (Lower Austria). A total of 688 *C. heros* and 314 *C. bidentata* larvae at 12 sampling sites were collected, measured biometrically (caput width, whole length, length of tibia, mentum and wing pad, and mentum width), and their occurrence related to physical and chemical parameters. With increasing developmental stage, *C. heros* larvae are larger than *C. bidentata*, and females larvae are bigger than males. The last five of a total of 14 stages (DOMBROWSKI, 1989) are particularly well delimited from each other in both species. Applying the rule of DYAR reveals an exponential increase in caput width per developmental stage. A life cycle diagram shows that larval development from stage F-4 to F-1 takes place within a year. The last molt to F occurs in autumn. The larvae hibernate in stage F until they leave the larval developmental cycle by imaginal ecdysis in late May to early June. Certain differences were recorded between *C. heros* and *C. bidentata* in connection with hydrological parameters. *C. heros* larvae tolerate higher velocities and water depth than *C. bidentata*, which counteract drift by burrowing into the sediment. Especially earlier, smaller developmental stages of *C. bidentata* often colonize microhabitats at the margin of the brook with low velocity and shallow water depth. A high negative correlation was found between water depth and water temperature, enabling the larvae to avoid freezing in winter. In general the larvae are exposed at right angles to the current; the stronger the current (> 5 cm/s), the less sectional area the animals expose to the current. The preference for coarse sediment increases with developmental stage, except the last instar, where the trend reverses. *Cordulegaster* larvae are mostly found totally burrowed and lying in wait, exposing only the antennae and the anal pyramid. Smaller individuals, which settle zones with weaker current, are uncovered or less covered with sediment than larger animals colonizing sites with higher velocity. In winter, at low water temperature, most of the animals are totally covered with sediment; about the half the *C. heros* larvae (n = 36) were burrowed as deep as 4 cm. Prior to imaginal emergence, most *Cordulegaster* larvae apparently stay in moist mud outside the water (1-69 cm) for physiological transformation to the adult. Generally, *C. heros* and *C. bidentata* are able to syntopically colonize a brook because of overlapping ecological valences. *C. bidentata* prefers smaller waters with slower flow, higher conductivity and water hardness than *C. heros*. This preference is also reflected in the different abundance of both species at sampling sites PI to PI 2. PI 1 and P 12 are outside both ecological va-



lences because of the high flow ( $> 0,03 \text{ m}^3\text{s}^{-1}$ ) and great depth ( $> 19 \text{ cm}$ ); consequently, they do not serve as a breeding water for *Cordulegaster*." (Author)] Address: Lang, C. c/o Waringer, J., Fachrichtung Biologie, Formal- und Naturwissenschaftliche Fakultät der Universität Wien, Wien, Austria

1734. Lauder milk, E. (1999): Carl Cook receives Kentucky award. *Argia* 11(4): 2. (in English). [C. Cook was selected for the Biodiversity Protection Award of the Kentucky State Nature Preserves Commission, USA.] Address: Lauder milk, E., 570 Catalpa Lane, Shelbyville, KY, 40065, USA.

1735. Léonard, N.J.; Forbes, M.R.; Baker, R.L. (1999): Effects of a mite, *Limnochares americana* (Hydrachnida: Limnocharidae), on the life-history traits and grooming behaviour of its damselfly host, *Enallagma ebrium* (Odonata: Coenagrionidae). *Can. J. Zool.* 77: 1615-1622. (in English). ["We examined whether experimental parasitism by a mite *L. americana* (Lundblad) affected survivorship and maturation of adult damselflies *E. ebrium* (Hagen). We then tested whether differences in grooming activity between control and exposed individuals (within different age or sex categories of host) mirrored reductions in fitness that resulted from experimental parasitism. We based our choice of experimental numbers of mites on our finding that adult damselflies had between 0 and 12 mites (71% had 0 mites), and mature adults had a higher prevalence and intensity of parasitism than did prereproductive damselflies in two of three field surveys. Low numbers of mites did not affect survivorship of teneral or mature males and females: however, high numbers of mites significantly depressed survivorship of teneral males and females and mature males, and were associated with a delay in maturation of females of teneral individuals, only females groomed more than controls when challenged with low numbers of mites: mature individuals of both sexes groomed more than controls in response to high numbers of mites but not in response to low numbers. Our results suggest that variation in grooming behaviour partially reflects variation in fitness costs, due to mite parasitism, across age and sex categories of hosts." (Authors)] Address: Forbes, M.R., Department of Biology, 2240 Herzberg Laboratories, Carleton University, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

1736. Machado, A.B.M. (1999): Studies on neotropical Protoneuridae. 9. *Phasmoneura ciganae* Santos, conspecific with *Phasmoneura sancta* (Hagen) comb. n. (Zygoptera). *Notul. odonatol.* 5(3): 37-38. (in English). [Detailed discussion of the synonymy of *Forcepsioneura sancta* (Hagen in Selys, 1860).] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil

1737. Marden, J.; Fitzhugh, G.H.; Wolf, M.R.; Arnold, K.D.; Rowan, B. (1999): Alternative splicing, muscle calcium sensitivity, and the modulation of dragonfly flight performance. *Proceedings of the National Academy of Sciences of the United States of America* 96(26): 15304-15309. ["Calcium sensitivity of myosin cross-bridge activation in striated muscles commonly varies during ontogeny and in response to alterations in muscle usage, but the consequences for whole-organism physiology are not well known. Here we show

that the relative abundances of alternatively spliced transcripts of the calcium regulatory protein troponin T (TnT) vary widely in flight muscle of *Libellula pulchella* dragonflies, and that the mixture of TnT splice variants explains significant portions of the variation in muscle calcium sensitivity, wing-beat frequency, and an index of aerodynamic power output during free flight. Two size-distinguishable morphs differ in their maturational pattern of TnT splicing, yet they show the same relationship between TnT transcript mixture and calcium sensitivity and between calcium sensitivity and aerodynamic power output. This consistency of effect in different developmental and physiological contexts strengthens the hypothesis that TnT isoform variation modulates muscle calcium sensitivity and whole-organism locomotor performance. Modulating muscle power output appears to provide the ecologically important ability to operate at different points along a tradeoff between performance and energetic cost." (Author)] Address: Marden, J.H., Dept Biol., Pennsylvania St. University, 208 Mueller Laboratory, University Park, PA 16802, USA

1738. Marino, P.I.; Ellenrieder, N. von (1999): New records of *Forcipomya* (*Pterobosca*) *incubans* (Macfie) (Diptera: Ceratopogonidae) on Libellulids (Anisoptera). *Notul. odonatol.* 5(3): 38-39. (in English). [Argentina; *F. incubans* was found parasitic on *Miathyria marcella* and *Erythrodiplax melanorubra*.] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C. 712, AR-1900, La Plata, Argentina. E-mail: ellenr@ilpla.edu.ar

1739. Marinov, M. (1999): *Chalcolestes parvidens* (Artoboleviski) and *Somatochlora meridionalis* Nielsen in Bulgaria (Zygoptera: Lestidae; Anisoptera: Corduliidae). *Notul. odonatol.* 5(3): 31-33. (in English). [The occurrence of the two species is documented in a tab. with detailed recording data and presented in distribution maps.] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mgmarinov@yahoo.com

1740. McPeck, M. (1999): Biochemical evolution associated with antipredator adaptation in damselflies. *Evolution* 53(6): 1835-1845. (in English). ["Previous studies have shown that at least two lineages of *Enallagma* damselflies (Odonata: Coenagrionidae) shifted from inhabiting lakes with fish as top predators to inhabiting ponds and lakes with large dragonflies as the top predators. In adapting to living with the new predator type, these lineages evolved much greater swimming speeds to avoid attacking dragonflies. In this paper, I test whether biochemical adaptations to fuel swimming arose in concert with previously identified morphological changes that increase swimming speed. I assayed the mass-specific enzyme activities of three enzymes involved in fueling strenuous activity: pyruvate kinase and lactate dehydrogenase (enzymes involved in glycolysis) and arginine kinase (the enzyme that recharges the ATP pool). Enzyme activities were determined for 14 *Enallagma* species from across the genus. Species that coexist with dragonfly predators had significantly higher mass-specific arginine kinase activities than species that coexist with fish. and the results of evolutionary contrasts analyses indicate that this difference between the two groups is the result of evolutionary change associated with the habitat shifts of lineages from fish lakes to dragonfly lakes. Although significant evolution was documented for lactate dehydrogenase and pyru-

vate kinase across the genus, evolutionary change in the activities of these enzymes was not consistent with adaptation to coexisting with dragonfly predators. Swimming bouts to avoid dragonfly predators last for only a few seconds, and the action of arginine kinase to phosphorylate ADP to make ATP will extend the duration of maximal exertion for swimming for a few seconds. However, much longer time periods (over 45 sec) are required to generate ATP via glycolysis. Therefore, selection may have favored adaptation only at the arginine kinase locus." (Author)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

1741. Miller, M.N.; Fincke, O.M. (1999): Cues for mate recognition and the effect of prior experience on mate recognition in *Enallagma damselflies*. *Journal of Insect Behavior* 12(6): 801-814. (in English). ["In many coenagrionid damselflies, sexually mature females exhibit color polymorphisms, with some females resembling conspecific males. Although it has been suggested that the latter function as male mimics, this does not appear to be the case for those in the genus *Enallagma*. We found that sexually dimorphic coloration of the female abdomen and thorax are important cues for sexual recognition by males. We demonstrate for the first time in the Odonata, that males learn to recognize andromorphs as potential mates. After 2 days in an enclosure, sexually mature males exposed to only andromorphic females initiated more sexual interactions with tethered andromorphs than with heteromorphs, the majority morph in the natural population. Exposure to only heteromorphic females tended to decrease males' sexual responses to andromorphs, but not significantly so. Because the frequency of female morphs often varies within a population, learned mate recognition would be advantageous for males that search for mates. Our results lead to a novel, frequency-dependent hypothesis for the occurrence and maintenance of female-limited color polymorphisms." (Authors)] Address: Fincke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA

1742. Mitra, A. (1999): Two new odonate records for the western Himalaya, India (Anisoptera: Macrodiplacidae, Libellulidae). *Notul. odonatol.* 5(3): 39. (in English). [*Urothemis signata*, *Diplacodes lefebvrei*] Address: Mitra, A., Northern Regional Station, Zoological Survey of India, 218 Kaulagarh Roads, Dehra Dun - 248195, India

1743. Mola, L.M.; Papeschi, A.G.; Taboada Carrillo, E. (1999): Cytogenetics of seven species of dragonflies. novel sex chromosome determining system in *Micrathyrina unguolata*. *Heredias* 131: 147-153. (in English). ["More than 80% of the taxonomically described species of Anisoptera (Odonata) belong to the families Libellulidae and Aeshnidae. Here the chromosome complement and male meiotic behaviour of seven species of dragonflies of these families are analysed. *Anax amazili* and *Coryphaeschna perrensi* are  $2n = 27$ ,  $n = 13+X$ , which is characteristic of Aeshnidae. Within Libellulidae, *Planiplax erythrogyga*, *Micrathyrina spuria*, and *M. hesperis* have  $2n = 25$ ,  $n = 12+X$ , which corresponds to the modal chromosome number of the family. *Oligoclada laetitiae* and *M. unguolata*, on the other hand, have a reduced chromosome complement ( $n = 11 + X$  and  $n = 10 + X1X2Y$ , respectively). In *Micrathyrina unguolata* an  $X1X2Y$  sex chromosome system is described, and its origin is discussed. This represents a new sex chromo-

some determining system in the order Odonata." (Author)] Address: Mola, Liliana, Genetica. Depto. de Cs. Biológicas, Fac. Cs. Exactas y Naturales, Univ. de Buenos Aires, Ciudad Universitaria, 1428 Buenos Aires, Argentina. E-mail: limola@bg.feen.uba.ar

1744. Monnerat, C. (1999): Premières observations de *Anax imperator* Leach et *Orthetrum cancellatum* (L.) pour Chypre (Anisoptera: Aeshnidae, Libellulidae). *Notul. odonatol.* 5(3): 34-35. (in French with English abstract). [From four localities, visited in early May 1998, 11 species are recorded. *A. imperator* and *O. cancellatum* are listed as new to Cyprus. The occurrence of *Pantala flavescens* is remarkable too.] Address: Monnerat, C., Laboratoire de Phanérogamie, Université de Neuchâtel, Rue Emile-Argand 11, CH-2007 Neuchâtel, Switzerland

1745. Müller, H. (1999): Zur Phänologie und Ökologie der Imagines von *Cordulegaster heros* Theischinger, 1979 und *Cordulegaster bidentata* Selys, 1843 (Insecta: Odonata) im Weidlingbach (Niederösterreich). *Diplomarbeit, Formal- und Naturwissenschaftliche Fakultät der Universität Wien*. 90 pp. (in German with English summary). ["Between June and August in 1997 and 1998 the biology and ecology of the Odonata species *Cordulegaster heros* and *C. bidentata* were examined in the catchment of the Weidlingbach (Lower Austria). Four main sampling sites with a length of respectively 100 m were visited regularly and eight secondary sampling sites, which were patrolled for mapping, were selected. A total of 89 individuals of *C. heros* and 23 of *C. bidentata* of both sexes were measured biometrically (wingspan, forewing, hindwing, total length). *C. heros* is clearly larger and this species can therefore be delimited taxonomically from the *C. boltoni* and *C. picta*. *C. bidentata* coincides both biometrically and regarding its species-specific black-yellow pattern with existing bibliographical data (e. g. ASKEW, 1988). Both odonates belong to the late spring species because of their short emergence period between late May and early June; on average, *C. bidentata* appears seven days earlier than *C. heros*. For imaginal emergence, larvae select vegetational structures directly next to the brook at a horizontal distance of 2.3 - 3.0 m and at an average height of 1.2 - 1.5 m. Sites with certain substructures (twigs, leaves, branch stigmata) at the hatch site are preferentially sought out. After a maturation period of about two weeks, during which the dragonflies also colonize sites far from the brook, the sexually mature imagines return to their breeding waters. *C. bidentata* males largely patrol smaller brooks with a maximal width of 200 cm. The main flying direction over the water is upstream; the males return to the starting point in rapidly flight over land. *C. heros* males overfly brooks with a maximum width of 350 cm and patrol the water both upwards and downwards in the same frequency. Changes in flight direction are caused by barriers such as debris dams or bushes projecting over the brook. A positive correlation was found between flight height and water width as well as with the number of barriers in the water. Such patrol flights can be distinguished from hunting flights based on higher flying speed and larger distance from the surface. Moreover, there is a correlation between unfavorable meteorological conditions and inactivity of the imagines of *C. heros* and *C. bidentata*. Females located by males during patrol flights are grasped and taken into the bank vegetation for subsequent copulation (> 40 min). After copula, the females search for shallow,

search for shallow, less flooded sites (max. depth 4 cm) to deposit the eggs into the sediment with their robust ovipositor. Flying speed and flight height coincide with those of patrolling males. The frequency of oviposition is ca. 1-2 per second and more than 100 holes may be made at suitable sites. The "Cordulegaster-Ophiogomphus-coenosis" defined by JACOB (1959) could not be verified at the Weidlingbach." (Author)] Address: Müller, Heidemarie c/o Waringer, J., Studienrichtung Biologie, Formal- und Naturwissenschaftliche Fakultät der Universität Wien, Wien, Austria

1746. Müller, J. (1999): 7.24 Bestandsentwicklung der Libellen (Odonata). In: Frank, D. & V. Neumann (Hrsg.): Bestandssituation der Pflanzen und Tiere Sachsen-Anhalts. Ulmer Verlag, Stuttgart. ISBN 3-8001-3368-7: 442-448. (in German). [Short introduction into current odonatological research in the Federal State Sachsen-Anhalt, Germany; comments on some species with reference to their status: *Calopteryx splendens*, *C. virgo*, *Lestes barbarus*, *Coenagrion mercuriale*, *Aeshna affinis*, *A. viridis*, *Anax parthenope*, *Cordulegaster boltonii*, *Stylurus flavipes*, *Gomphus pulchellus*, *G. vulgatissimus*, *Ophiogomphus cecilia*, and *Orthetrum coerulescens*; bibliography; checklist of the Odonata of Sachsen-Anhalt.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. [jmueller@mu.lsa-net.de](mailto:jmueller@mu.lsa-net.de)

1747. Mungenast, F. (1999): Aus der Nordtiroler Odonatenfauna: Die Libellen der Trams bei Landeck (Insecta: Odonata). Veröffentlichungen des Tiroler Landesmuseums Ferdinandeum 79: 317-326. (in German with English summary). [The Trams is a recreation park in the Landeck region, Austria. The Odonata of two ponds were surveyed in 1997 and 1998. A total of 22 species was recorded, reflecting a typical dragonfly cenosis of ponds: *Erythromma-Anax imperator*-cenose. The presence of *Erythromma najas* and *Chalcolestes viridis* in the region is of special faunistic interest.] Address: Mungenast, F., Stadtplatz 12, A-6460 Imst, Austria

1748. Nakatani, M.; Nakamura, N.; Tsuchiya, K. (1999): *Anax guttatus* was collected from the Nemuro Peninsula. *Sylvicola* 17: 9-11. (in Japanese with English translation of the title). [Japan; Collection data, photographs of the specimens and the habitat, and distribution map] Address: Sichou Koutaku, Meiji-machi 2-6, Nemuro city, 087-0003, Japan

1749. Nakatani, M.; Nakamura, N.; Tsuchiya, K. (1999): Discovery of *Ischnura elegans elegans* and re-discovery of *Cercion hieroglyphicum* in Lake Harutori, Kushiro City. *Sylvicola* 17: 1-8. (in Japanese with English translation of the title). [Japan; Collection data, photographs of the specimens and distribution map] Address: Sichou Koutaku, Meiji-machi 2-6, Nemuro city, 087-0003, Japan

1750. Nel, A.; Gand, G.; Fleck, G.; Bethoux, O.; Lapeyrie, J.; Garric, J. (1999): *Saxonagrion minutus* nov. gen. et sp., the oldest damselfly from the Upper Permian of France (Odonoptera, Panodonata, Saxonagrionidae nov. fam.). *Geobios* 32(6): 883-888. (in French with English summary). ["*Saxonagrion minutus* nov. gen. et sp. was found in the Saxonian (Salagou Formation) of the Lodeve basin. It is the oldest and the first record of the modern infra-order Panodonata in the Palaeozoic (Upper Permian of France). The present discovery supports the hypothesis concerning the persistence of many groups of Odonoptera through the Permo-Triassic

boundary." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

1751. Nel, A.; Gand, G.; Garric, J.; Lapeyrie, J. (1999): The first recorded protozygopteran insects from the Upper Permian of France. *Palaeontology* 42(1): 83-97. (in English). ["The earliest known Odonoptera: Protozygoptera from the Upper Permian of Lodeve (France) are described. *Epilestes gallica* sp. nov. belongs to the Permolestidae and *Lodevia longialata* gen. et sp. nov. to the Permepallagidae. Both of these families were previously known from the Kazanian of Russia, suggesting a similar age for the formation of Lodeve." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

1752. Pix, A. (1999): Im Reich der Libellen. ISBN 3-933241-27-8: 192 pp. (in German). [This book is directed to the reader interested in these beautiful creatures, and not to the professional odonatologist. Readers will find interesting details on dragonflies, their habitats, and behaviour. The information presented is sound and well documented. The texts are easy to read. The strength of the book are the very good colour photographs from habitats and species. Each of the photographs is documented in an appendix. Most of the pictures were taken in the region South of the federal state Niedersachsen and north of the federal state Hessen, Germany.] Address: Krone-Verlag, Waldstr. 2a, D-42799 Leichlingen, Germany

1753. Polhemus, D.A.; Oppenheimer, H.; Starr, F.; Martz, K. (1999): Notable rediscoveries of Megalagrion species on Maui (Odonata: Coenagrionidae). *Bishop Museum Occasional Papers* 59: 27-29. (in English). [Among the species of endemic Megalagrion damselflies in Hawai'i, particular concern in recent years has centered on the fate of *M. pacificum* and *M. xanthomelas*, which formerly occupied lowland habitats throughout the state. ["Based on surveys conducted in the early 1990s, the former species was known to occur only as scattered populations on the windward flanks of Haleakala and eastern Moloka'i, while a distributional review of the latter species by Polhemus (1996) noted that it had not been taken on the island of Maui in this century. It is therefore significant that additional colonies of both these species have been located on Maui during the past two years"; these records are reported in this paper.] Address: Polhemus, D., Dept. of Entomology, MRC 105, Smithsonian Institution, Washington, D.C. 20560, USA. Email: [bugman@bpbm.org](mailto:bugman@bpbm.org)

1754. Prat, N.; Toja, J.; Sola, C.; Burgos, M.D.; Plans, M.; Rieradevall, M. (1999): Effect of dumping and cleaning activities on the aquatic ecosystems of the Guadiamar River following a toxic flood. *The sciences of the total environment* 242: 231-248. (in English). ["The main aim of the study was to document the recovery of the aquatic ecosystem after the release of toxic mining waste in the Guadiamar River Basin (Sevilla, SW Spain) in April 1998. Samples of water, plankton, periphyton and macroinvertebrates were taken once a month at nine sampling stations (six affected by the toxic release and three for control).[...] After 6 months of cleaning operations, in November 1998 the macroinvertebrate community of the river was composed mainly of species of short life cycles typical of ponds (Heteroptera,



ra, Coleoptera and Odonata ["Coenagrionidae"]), while typical riverine species found at the upstream control station had not recolonised the river due to the transformation of the river into a series of artificial ponds constructed as sediment traps. An analysis of variance showed significantly higher values ( $P < 0.05$ ) for all heavy metals analysed (Zn, Cu, Pb, As, Cd, Sb, Tl) in plankton and macroinvertebrate communities from impacted sites. Values found in invertebrates were highly variable, with a mean concentration of the most abundant metals, Zn and Cu, between two and three times those found in unpolluted areas. Values for As were up to five times higher while Pb, Sb and Tl showed up to 10-fold increases. At the affected stations, the metal concentrations found in biofilms, plankton and particulate material were more than five times greater than those in invertebrates. The slow recovery of the aquatic ecosystem clearly reflected the impact of metal discharge and the subsequent cleaning activities following the mine spill, as well as the sewage inputs at two of the stations studied." (Authors)] Address: Prat, N., Department of Ecology, Universidad de Barcelona, Av. Diagonal 645, E-08028 Barcelona, Spain. E-mail: narcis@porthos.bio.ub.es (N. Prat)

1755. Ramos Hernandez, J.M. (1999): New records of Odonata for some provinces of the Dominican Republic. *Argia* 11(4): 6-7. (in English). [15 taxa are listed from the Dominican Republic.] Address: Ramos Hernandez, J.M., Apartado Postal 2204, Sancti-Spiritus, Cuba, CP 60100

1756. Riffell, S.K. (1999): Road mortality of dragonflies (Odonata) in a Great Lakes coastal wetland. *Great Lake Entomologist* 32(1/2): 63-73. (in English). ["Although road mortality of vertebrates has been well studied, road mortality of invertebrates has rarely been studied or considered in management scenarios. Mackinac Bay is an extensive coastal wetland in northern Michigan. It is bordered by a two-lane paved highway that separates the marsh, where dragonflies defend territories and breed, from the adjacent forest where dragonflies forage and rest. During mid-summer of 1997, daily collections of dragonfly corpses from the road and road edge were used to estimate daily mortality rates and sex ratios among casualties. Daily mortality was highly variable, ranging from 10 to 256 casualties per kilometer. Sex ratios among casualties were generally male-skewed (60% or higher). Life-history differences between the sexes present a parsimonious explanation for male-specific mortality. Mortality was even or female-skewed for some species, and impacts of road mortality may be more severe in populations where mortality is female-skewed. More research about the effects of roads on dragonflies is warranted because dragonfly populations are small relative to many invertebrates and are restricted to wetland habitats which are being degraded or destroyed in many regions." (Authors) 29 odonate taxa are considered in this study.] Address: Riffell, S.K., Department of Zoology, Michigan State University, East Lansing, MI 48824, USA

1757. Rolff, J.; Schröder, B. (1999): Regaining the water: a simulation model approach for *Arrenurus* larvae (Hydrachnellae) parasitizing damselflies (*Coenagrion puella*: Odonata). In: Bruin, J., L.P.S. van der Geest & M. Sabelis (Ed.) *Evolution and Ecology of Acari*, Kluwer Academic Publishers: 359-366. (in English). ["A matrix population model is presented which describes the po-

pulation dynamics and the return rate of parasitic *Arrenurus* larvae to the pond. This is a function of hosts' post-emergence life history and mating success. Three different aspects were simulated: a change in daily miteload, the impact of weather on hosts oviposition probability and a combination of both. It was found that a high abundance of larval water mites drastically reduces their return rate mites due to the high parasite-induced mortality of the hosts. Reduced oviposition probabilities of *Coenagrion puella* also decrease dramatically the number of mites detaching. The model may be applicable to other water-mite/host systems if the life-table data of the host are known." ] Address: Rolff, J., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: j.rolff@tu-bs.de

1758. Rolff, J. (1999): Vom individuellen Verhalten zur Population: Ökologie eines Wirt-Parasit-Systems in Freiland und Modell (*Coenagrion puella*, Odonata, *Arrenurus cuspidator*, Acari). Dissertation, Technische Universität Carolo-Wilhelms Braunschweig: 95 pp. [Ph.D. on the host-parasite interaction of *Coenagrion puella* and *Arrenurus cuspidator*; the thesis is structured in German and English overviews and summaries, six chapters, acknowledgments, and list of publications. The chapters are published separately in different journals: Chap. 1: see OAS 206; Chap. 2: see OAS 1936; Chap. 3: see OAS 1757, Chap. 4: submitted, see next issue of OAS; Chap. 5: see OAS 1935; Chap. 6: see OAS 1419.]

1759. Schaetzen, R. de (1999): Compte rendu de l'excursion à l'ancien canal entre Ronquières et Seneffe du 13 juin 1999. *Gomphus* 15(3): 136-138. (in French with Dutch summary). [Of special interest is the record of the rare *Libellula fulva*; further Odonata observed and including *Erythromma najas* and *Gomphus pulchellus* are shortly commented] Address: not stated. E-mail: roland.deschaetzen@advalvas.be

1760. Schmid, U. (1999): Das Makrozoobenthos des Unteren Odertals - Faunenzusammensetzung und Besiedlungsdynamik in einer Flußaue. *Limnologie aktuell* 9: 317-336. (in German with English summary). ["The macrozoobenthos from nine sampling sites in the Lower Oder Valley (Brandenburg, Germany) was investigated from December 1993 to May 1997. Samples were collected from permanent water bodies of the former and the active floodplain and from the River Oder. Additional samples were taken from the alluvial plains. The area is flooded extensively every year. It is characterized by a high number of rare and endangered species. In summer, species composition in the active floodplain is similar to that of the former floodplain. In the active floodplain, the floodpulse causes a gradient of species composition during spate. With the flood, species of the running water enter the Alte Oder, an old arm of the river. Due to man-made regulation of the water regime, these species are confronted with unfavourable conditions in these water bodies. Numerous taxa of the macrozoobenthos have developed strategies to survive the alternation of flooding and desiccation, i.e. drought resistance, or recolonization during each flooding period by means of egg-laying, drift, or active migration." (Author). 20 odonate taxa are listed including a first record of *Gomphus pulchellus* in the Federal State of Brandenburg which urgently is in need to be confirmed. Although *Stylurus flavipes* is well represented along the Oder, it is not listed.] Address: Schmid, Ulrike, Freie U-

niversität Berlin, Inst. Zool., Königin-Luise-Str. 1-3, D-14195 Berlin, Germany

1761. Schmidt, E.; Woike, M. (1999): Rote Liste der in Nordrhein-Westfalen gefährdeten Libellen (Odonata) (3. Fassung, Stand 1.10.1998). Schriftenreihe der Landesanstalt für Ökologie, Bodenordnung und Forsten / Landesamt für Agrarordnung 17: 507-521. (in German). [Short introduction into dragonfly biology; remarks on nomenclature and categories of threat; remarks on mapping of dragonflies in Nordrhein-Westfalen, Germany; detailed remarks on threats and establishment of selected species; checklist of the dragonflies with assessment of the situation of threat in six different regions ("Großlandschaften") of Nordrhein-Westfalen] Address: Schmidt, E., Biologie und ihre Didaktik, FB9/S05, Universität GH Essen, D-45117 Essen, Germany

1762. Seidenbusch, R. (1999): Annotations in females types of *Ischnura aralensis* Haritonov, 1979 (Odonata: Coenagrionidae). Sulzbach-Rosenberger Libellenrundbriefe 11: 1-2. (in English). [Discussion of the relationships between *Ischnura aralensis* Haritonov, 1979, *I. haritonovi* Dumont, 1997, and *I. calicis* Bartenev nom. nud.. It is quite likely that *I. haritonovi* is *I. aralensis*. But further studies are needed.] Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany

1763. Seidenbusch, R. (1999): Description of two last instar larvae out of the genus *Gomphidia* (Odonata, Anisoptera, Gomphidae). Sulzbach-Rosenberger Libellenrundbriefe 11: 3-9. (in English). [One exuvia of a *Gomphidia* female had been collected in Kenia (Hunter's Lodge, on a shady brook) by H.U. Kohler. It was compared with five other exuviae out of the genus *Gomphidia* collected in Comol (Ivory Coast) by K. Grabow. First one is presumed belonging to *Gomphidia madi* Pinhey, 1961, the only species common there (Miller, 1991). Both specimens are described and compared with other members of the genus *Gomphidia* (*G. confluens*), *Ictinogomphus ferox* and *Lindenia tetraphylla*.] Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany

1764. Seidenbusch, R. (1999): Tandem-linkage structures in females of the genus *Enallagma* (Odonata: Coenagrionidae). Sulzbach-Rosenberger Libellenrundbriefe 11: 10-20. (in English). [The following species were examined: *Enallagma cyathigerum cyathigerum* (Germany), *E. cyathigerum antiquum* (E-Siberia), *E. cyathigerum annexum* (USA), *E. deserti* (Marocco), *E. risi* (Central-Asia), *E. belyshevi* (Kuriles Islands), *E. circulatum* (Japan), and *E. boreale* (USA, Canada). The synonymy of *E. antiquum* Malikova, 1995 is outlined on page 11. Some hypothetical remarks on the possible superspecies *E. cyathigerum* and/or *E. deserti* and/or *E. boreale* are made.] Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany

1765. Sirot, L.K. (1999): Reproductive behavior of two female morphs of the damselfly, *Ischnura ramburii*. *American Zoologist* 39(5): 23A. (in English).] Address: Sirot, L.K., Univ of Florida, Gainesville, FL USA

1766. Siva-Jothy, M. (1999): Book reviews: *Damsels and dragons. Dragonflies: Behaviour and Ecology of Odonata* by Philip S. Corbet. Harley: 1999. 882pp.. *Nature* 400: 634. (in English). ["... as one of the definitive

natural history texts of the twentieth century". For an extensive review see OAS 1565.] Address: Siva-Jothy, M.T., Department of Animal and Plant Sciences, University of Sheffield, Sheffield, S10 2TN, UK. E-mail: m.siva-jothy@sheffield.ac.uk

1767. Siva-Jothy, M.T. (1999): Male wing pigmentation may affect reproductive success via female choice in a calopterygid damselfly (Zygoptera). *Behaviour* 136: 1365-1377. (in English). ["Male calopterygid damselflies show striking morphological and behavioural secondary sexual traits which are known to function in intrasexual contests. The distribution of pigment in the sexually dimorphic wing 'spot' is prominently displayed to the female during courtship, yet there is little empirical evidence that this trait functions in an epigamic context. Observations of marked field populations revealed (a) there was variation in wing pigment distribution in males, (b) the pigmentation was fixed in reproductively active males, (c) resource holding males had less heterogeneity in the distribution of the wing pigment than males that were never observed to hold a resource and (d) that females frequently (60,3%) rejected males after courtship. An experiment was conducted in which the frequency of key reproductive behaviours (female inspection flights, courtships, copulations, and oviposition) was measured for the same male utilising the same territory before and after treatment or control manipulation of wing pigment parameters. Increasing the heterogeneity (and decreasing the area) of the wing pigmentation by removing small areas of pigmented cuticle from their wings resulted in a decrease in the measured reproductive behaviours (control males that had non-pigmented areas removed from their wings showed no decreases). Since females cannot be coerced into these behaviours, the experimentally induced decrease suggests females avoided males with higher levels of wing pigment heterogeneity. The results are discussed in the context of the benefits females might receive as a consequence of their reproductive decisions." (Author)] Address: Siva-Jothy, M.T., Department of Animal and Plant Sciences, University of Sheffield, Sheffield, S10 2TN, UK. E-mail: m.siva-jothy@sheffield.ac.uk

1768. Stoks, R.; De Block, M.; Van Gossum, H.; De Bruyn, L. (1999): Phenotypic shifts caused by predation: Selection or life-history shifts? *Evolutionary Ecology* 13(2): 115-129. (in English). ["Predators can impose both selection and life-history shifts in prey populations. Because both processes may affect phenotypic distributions, the estimates of selection differentials may be biased. We carried out two field experiments to disentangle these separate effects. We studied whether dragonfly predation by *Aeshna cyanea* changes the distributions in body size and lamellae morphology in the damselfly *Lestes sponsa*. Damselflies have caudal lamellae which are used in escapes by swimming. In a first experiment, we manipulated predator presence (No *Aeshna*, Encaged *Aeshna* or Free-ranging *Aeshna*) and stopped the experiment when all larvae had moulted once. In a second experiment, larvae were confronted with a Free-ranging *Aeshna* but collected before moulting, and survivors were compared with a control sample taken at the start of the experiment. The presence of *Aeshna* largely reduced the survival probabilities of the *Lestes* larvae at a very similar rate in both experiments. Daily survival probabilities did not differ between the No *Aeshna* and Encaged *Aeshna* treatments. In the Free-ranging *Aeshna* treatment of the first experiment,

size was reduced compared to the other two treatments, creating a significant apparent selection differential. This was probably mainly due to predator-induced reduced growth because in the second experiment, where growth effects were excluded, size of the survivors did not differ from the control sample. In both experiments there was a significant selection pressure for larger lamellae. Standardized directional selection differentials were similar in both experiments (0.57 and 0.28 phenotypic standard deviation units). No survival selection on lamellae shape was detected. These results are in agreement with previous findings that lamellae size, but not lamellae shape, enhances swimming performance and thereby predator escape in this species." (Authors)] Address: Stoks, R., Evolutionary Biology Group, Department of Biology, University of Antwerpen (RUCA), Groenenborgerlaan 171, B-2020 Antwerpen, Belgium. e-mail: stoks@ruca.ua.ac.be

1769. Sudo, S.; Tsuyuki, K.; Ikohagi, T.; Ohta, F.; Shida, S.; Tani, J. (1999): A study on the wing structure and flapping behavior of a dragonfly. JSME - International Journal, Ser. C. Mechanical systems, machine elements and manufacturing: 721-729. (in English). [Wing structure and aerodynamic characteristics of a dragonfly in flight (*Sympetrum infuscatum*, *S. frequens*) are studied. The structural properties of dragonfly wings were characterised by morphological parameters using scanning electron microscopic observation. Dragonflies were examined in a small low-turbulence wind tunnel. For measurements of wing flapping, an optical displacement detector was used to measure the displacement of the dragonfly wing. In the experiment on the measurements of the velocity fluctuation, a hot-wire anemometer was used to measure the velocity field. The spectrum of dragonfly flight was revealed by the measurements of velocity fluctuation.] Address: Sudo, S., Dept of Mechanical Engineering, Iwaki Meisei University, Iino 5-5-1, Chuohdai, Iwaki 970-8551, Japan. E-mail: sudou@iwakimu.ac.jp

1770. Wakeham-Dawson, A.; Benton, T.; Barnham, V. (1999): Butterflies and dragonflies in northern Greece, 27 June - 9 July 1997. Entomologist's Record & Journal of Variation 111(3): 121-128. (in English). [The following note on Odonata is made: "We explored Mount Falakrón (north-west of Drama) on 6 July. Along a small stream at 600 m, we found many Odonata including *Calopteryx splendens* Harris, *Platycnemis pennipcs* Pallas, *Anax imperator* Leach, *Orthetrum brunneum* Fonscolombe and a fine species of damselfly, *Epallage fatime* Charpentier (Fig. 3). This damselfly is similar to *Calopteryx* spp., and we saw several males, which had a blue abdomen and clear wings with smoky black tips. They settled on twigs or stream-edge vegetation and behaved rather like darter dragonflies when in pursuit of insect prey."] Address: Wakeham-Dawson, A., Mill Lane Farm, Lewes, East Sussex, UK

1771. Walia, G.K.; Sandhu, R. (1999): Karyological investigation on *Davidius zallorencis zallorencis* (Gomphidae: Anisoptera: Odonata). Chromosome Science 3 (1): 43-44. (in English). ["Chromosome analysis on a cytologically new species *Davidius zallorencis zallorencis* belonging to the family Gomphidae has been carried out. The diploid chromosome number is 23, without m chromosomes. Sex determining mechanism is XO-type, showing sex element as the smallest one. Structure and behaviour of chromosomes during mitosis and

mitosis and meiosis has been studied and the recombination index and relative lengths of chromosomes has also been calculated." (Authors)] Address: Walia, G.K., Department of Zoology, Punjabi University, Patiala, PU, 147 002, India

1772. Walia, G.K.; Sandhu, R. (1999): Karyotypic study of two species of the family Aeschnidae (Anisoptera: Odonata). Chromosome Science 3(1): 45-47. (in English). ["Spermatogonial and primary spermatocyte chromosomes of *Anaciaeschna jaspidea* and *Anax nigrofasciatus nigrolineatus* [...] from Punjab and Himachal Pradesh, India, have been described and illustrated. The former species possess the chromosome number of  $2n_{male}=25$ ,  $n_{male}=13$ , while the latter species reveal  $2n_{male}=27$ ,  $n_{male}=14$  with XO sex determining mechanism. The diploid number in both the species include a pair of m chromosomes. The sex elements are the smallest during the spermatogenic cycle. *Anaciaeschna* is new to cytology, while *Anax* [...] shows variation in diploid number reported earlier from the same locality." (Authors)] Address: Walia, G.K., Department of Zoology, Punjabi University, Patiala, PU, 147 002, India

1773. Wataji, M.; Maruyama, F.; Kanou, M.; Yoshinuma, T.; Taguchi, M. (1999): Present situation, behaviour and life history of *Nehalennia speciosa* (Coenagrionidae, Odonata) at a disappearing habitat, Shinoro Fukui bog, situated in the wetland zone of Ishikari River, Hokkaido. (1) Adult stage. Bulletin of the Hokkaido Odonatological Society 11: 10-18. (in Japanese). [Brief description of the habitat, seasonal occurrence, population density, food habit, mating, oviposition, number of eggs in the ovaries, territorial behavior, movement] Address: not translated

1774. Watanabe, Y.; Yokota, H.; Kato, K.; Hatakeyama, M. (1999): Artificial parthenogenesis in the dragonfly, *Stylurus ocellatus* (Odonata). Proc. Arthropod. Embryol. Soc. Japan 34: 31-32. (in Japanese). [Parthenogenesis in insects have been so far reported in all the orders except Odonata [...]. We used the females of *S. ocellatus* captured at the Biwa lakeside. Females of the species conduct in general flying-oviposition into the water, and prior to oviposition they usually perch on the sand making an egg mass on the abdominal tip. We captured a female just making an egg mass on the sand, and collected eggs (normally oviposited eggs) by soaking the abdominal tip into a film case filled with water. As a female that appears to an oviposition site, usually has mature eggs in ovaries, which lie in 1st -9th segment, we separated the thorax and the abdomen, from which we cut off 4 posterior segments with seminal receptacle, and pulled out the anterior part of the ovaries and collected eggs. These eggs (experimented group) were divided into three groups and kept in plastic petri dishes filled with the city water; 1st group dissected from ovaries. 2nd: dissected from ovaries and macerated with sperm, 3rd: dissected from ovaries and macerated without sperm. [...] The eggs of Odonata generally exhibit chorionic pigmentation when they start normal embryonic development (Corbet, 1962). All of normally oviposited eggs exhibited chorionic pigmentation, and also in the dissected groups 83-93% of the eggs were chorionically pigmented. In further development of embryos, eye pigmentation can be observed. In almost all the normally oviposited eggs pigmentation occurred, and from them normal larvae were seen hatched. In the



ched. In the experimented groups lastly less than 20 % of the eggs hatched, however, a lot of the hatched larvae were morphologically abnormal, some without some segments or legs. Among the groups there were no significant difference of hatchability, therefore, these larvae seemingly hatched from the eggs of parthenogenesis, not from fertilized eggs. So we tried the same treatments on other females, and made chromosome specimens from the embryos soon before the eye pigmentation, and examined the chromosome [...]. In the genus *Stylurus*, the number of chromosomes is reported 23 XO in the male and 24 XX in the female (Katatani, 1995). In the normally oviposited eggs, the number was 23 or 24, and this is assumed to be similar to that of other *Stylurus*. In the larvae hatched from the eggs of 2nd and 3rd group none of them had 23 chromosomes, but some had 24 chromosomes, and others had cells mixed with 12 and 24 chromosomes. Thus, these facts suggests that unfertilized mature eggs of *S. oculatus*, activated in the water, developed as haploid cells, and the chromosomes were doubled by some factors and continued development. The occurrence of many morphologically abnormal larvae in the experimented groups may be related to the high frequency of larvae, the number of which chromosomes was abnormal. (Verbatim, translation from DJOSC 10.) Address: Watanabe, Yoko, 4-14, Nishida-cho, Nishinomiya City, Hyogo Pref., 662-0034, Japan

1775. Weihmann, T. (1999): Untersuchung von Makroinvertebratengemeinschaften in ausgewählten Kleingewässern im Gebiet des Tagebaues Berzdorf bei Görlitz. Diplomarbeit. Fakultät für Biowissenschaften, Pharmazie und Psychologie. Inst. für Zoologie. Universität Leipzig: 150 pp. (in German). [Investigation of the macroinvertebrates of small waters in brown coal mining regions in southeastern Germany; 24 odonate species were recorded in eleven waters including *Coenagrion lunulatum* and *Sympetrum depressiusculum*. The dominance of the species is discussed, and some species are shortly commented. For more details see: Xylander, W.E.R.; Stephan, R., 1998, OAS 1683] Address: Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany

1776. Williamson, M.; Gaston, K.J. (1999): A simple transformation for sets of range sizes. *Ecography* 22(6): 674-680. (in English). ["Transformation of data to normality may be illuminating and useful statistically. There are two standard families of transformations, power transformations for positive numbers, bounded at the left, and folded transformations for proportions, bounded both at the left and the right. It has been shown that there is no one satisfactory power transformation for range size data. However, such measures are limited to the right as well as the left, and we consider applying folded transformations to them. Seven data sets of range sizes recorded by 10 km squares are studied. Six are British (native and introduced plants, mammals, dragonflies and two breeding bird surveys) the seventh is of Swiss breeding birds. Using these we show that the right hand limit of the distribution can be estimated and the best folded transformation found. In all cases the right hand limit is larger than the range size of the most widespread species and smaller than the national scope of the survey. In all cases the logit or flog, the logarithmic folded transformation, is satisfactory; in five cases it is the best. It is well known that abundance is approximately (though not exactly) log-normally distributed.

The relationship of that to our discovery that range size data are approximately logit-normal is discussed. There is no fully satisfactory explanation for either observation at present." (Authors)] Address: Williamson M., Dept of Biology, Univ of York, York, YO10 5DD, UK

1777. Xylander, W.E.R. (1999): Aquatic insects in mining and post-mining sites: Investigations on a species rich dragonfly coenosis. Abstracts of the International Symposium "Ecology of Post-Mining Landscapes. EcoPoL '99". Brandenburg University of Technology at Cottbus, Germany, March 15-19, 1999: 1 p. (in English). ["Investigations of about 50 ponds (of the 250 present) and two creeks in the former brown coal mining site of Berzdorf (Upper Lusatia, Saxonia, Germany) from summer 1996 to autumn 1998 showed that a species rich dragonfly coenosis occurs in this habitat. 48 species (of 80 species found in Germany and 67 in Saxonia) could be observed in this area. 31 of the species found are on the red list of dragonflies in Saxonia; a few of the threatened species can be found at some ponds in high numbers (e. g. *Coenagrion lunulatum*, *Orthetrum brunneum*). The post-mining site at Berzdorf holds the highest number of dragonfly species in such a small scale area all over Germany. For this species richness the mosaic of aquatic habitats in the mining site is responsible. The highest number of species (36 species) could be found in a number of larger formerly separated ponds made in the late seventies and recently fused due to recultivation activities. These ponds therefore form a temporary mosaic of several younger and older subbiotopes at different stages of succession (with large groups of *Typha*, large areas covered with *P. natans* vs. no vegetation at all). Other species rich ponds arose since the eighties by slipping of the edge of the mining site that still holds on resulting in permanent changes of the area (32 species). High numbers (between 20 and 30 species) could, however, also be observed in artificial older ponds at the periphery and younger ones in the center of the recultivation area. The age of the artificial ponds had some influence on species richness but other factors like depth, vegetation of the ponds and the surroundings, exposure to sun and shelter from wind seem to be of higher importance; water chemistry is of low significance. The recultivation activities of the next years - actually transferring the mining into post-mining sites - should consider not only the terrestrial and larger aquatic habitats but also the ponds and creeks and their biocoenoses which comprise a large number of endangered species that have found their transitory home in this secondary biotope." (Verbatim)] Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany. E-mail: Naturmuseum.GR.Dr.Xylander@t-online.de

1778. Xylander, W.E.R. (1999): Libellen (Insecta: Odonata) der Grube Fernie, einer ehemaligen Mangan-grube bei Linden (Hessen). *Chionea* (Zeitschr. Naturk. Natursch. Vogelsberg) 15: 5-18. (in German with English summary). ["The dragonfly coenosis of the Grube Fernie, a former manganese mining site close to Großen-Linden (Hessie, Germany) had been steadily investigated from late summer 1991 to autumn 1994 and sporadically hereafter until late summer 1998; 11 species of Anisoptera and 11 of Zygoptera could be found; among these species was *Crocothemis erythraea*. Information pertaining to imaginal periods, abundance

abundance and reproduction is given. Of the species documented, four are encountered on the Red List for Dragonflies in Hessie (*O. brunneum*, *C. virgo*, *S. fusca*, and *E. najas*). The number of species found at the Grube Fernie is high in comparison to other ponds and lakes around Gießen. The locality must therefore be regarded as of high biological value." (Author)] Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany. E-mail: Naturmuseum.GR.Dr.Xylander@t-online.de

1779. Yamamoto, Y. (1999): A female *Cercion melanurum* Selys preyed a male *Nannophya pygmaea* Rambur - On its foraging behaviour. *Gekkan-Mushi* 345: 26. (in Japanese). Address: Yamamoto, Y., Urban Rafure Nijigaoka-nishi 6-704, 2-7, Nijigaoka, Meito-ku, Nagoya City, 465-0078, Japan

1780. Yanoviak, S.P. (1999): Effects of *Mecistogaster* spp (Odonata: Pseudostigmatidae) and *Culex mollis* (Diptera: Culicidae) on litter decomposition in neotropical treehole microcosms. *Florida Entomologist* 82(3): 462-468. (in English with Spanish summary). ["I investigated the effects of a top predator, *Mecistogaster* spp (Odonata: Pseudostigmatidae), on survivorship of the grazer *Culex mollis* (Diptera: Culicidae) and decomposition rates of leaf litter in treehole microcosms. In a factorial experiment using 200 ml cups, less litter mass remained when grazers (51%) and grazers plus predators (51%) were present, than without grazers (57%). Predators reduced mosquito survival, but had no indirect effect on litter decomposition rate. Mosquito larvae facilitated decomposition of litter and may have become food limited." (Author)] Address: Yanoviak, S.P., Lab I, Evergreen State College, Olympia, WA, 98505, USA

1781. Yokoyama, T. (1999): A record of winter emergence in *Aeschnophlebia longistigma* reared in a room. *Bulletin of the Hokkaido Odonatological Society* 11: 8. (in Japanese). [A full grown larva of *A. longistigma* captured at Ebetsu city on 1st November emerged on 20th December after rearing in a room without heating] Address: not translated

1782. Yokoyama, T.; Fujibayashi, T. (1999): Dragonflies of Ebetsu city (2): Records of *Somatochlora clavata* in Nishi-Nopporo. *Bulletin of the Hokkaido Odonatological Society* 11: 5-7. (in Japanese). [Larval habitat as well as collection records of adults and larvae of *Somatochlora clavata* which is a rare species in Japan are reported] Address: not translated

1783. Zhang, Junfeng (1999): *Aeschnidiid* nymphs from the Jehol biota (latest Jurassic-Early Cretaceous), China, with a discussion of the family *Aeschnidiidae* (Insecta, Odonata). *Cretaceous Research* 20: 813-827. (in English). ["Undoubted fossil nymphs of the family *Aeschnidiidae* within the *Aeschnidoidea* of the Anisoptera, Odonata are identified and described and their phylogenetic relationship and bioecological characteristics are deduced. The nymphs discovered previously in China, Mongolia and Russia and considered to be *aeschnidiids* are, in fact, unrelated to this group. All nine Chinese species in six genera can be merged into one alone, *Aeschnidium heishankowense*. It is the first animal from the 'Jehol biota' of East Asia to be linked with the species known from the Lower Tithonian of Germany. The geological age of the oldest strata bearing the fossil nymphs is debatable; it could be latest Jurassic rather than Early Cretaceous." (Author)]

Address: Junfeng Zhang, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China

1784. Zhu, Hui-qian (1999): *Sympetrum daliensis* spec. nov. from Yuannan, China (Anisoptera: Libellulidae). *Wuyi Science Journal* 15: 27-29. (in Chinese with English summary). [Holotype male, allotype female, and paratype males and females are described from Canshan, China. Collector: B.-y. Mao; Collecting date: 26 July, 1998; Collection deposited at the Dali Teachers Training Collage and the Shanxi University.] Address: Zhu, HuiQian, Shanxi University, 12-38, Taiyuan 030006, China

## 2000

1785. Andres, J.A.; Cordero, A. (2000): Copulation duration and fertilization success in a damselfly: An example of cryptic female choice? *Animal Behaviour* 59 (4): 695-703. (in English). ["Copulation duration is highly variable (0.5-3 h) in the damselfly, *Ceriagrion tenellum* (Coenagrionidae). Using laboratory experiments, we tested four adaptive hypotheses to explain this variation: the effect of time constraints, in-copula mate guarding, sperm displacement and cryptic female choice. Copulation duration was negatively correlated with time of day, as predicted by the first two hypotheses, and positively correlated with male density, as predicted by the mate-guarding hypothesis. Males prolonged copulation in response to the volume of sperm stored by females, suggesting they were able to detect and quantify the amount of sperm stored. This behaviour is not explained by mate guarding or time constraint effects. Males removed all the sperm from the bursa copulatrix in just 10 min. Our results also suggest that, because the duct is too narrow to allow male genitalia to enter, males do not remove spermathecal sperm. Therefore, direct sperm removal could not explain long copulations. Prolonged copulations could also have evolved as a result of cryptic female choice if they increase male fertilization success by female-mediated processes. Our results support this idea: male fertilization success was greater after long copulations. Apparently, male copulatory behaviour elicits female responses that increase male fertilization success." (Authors)] Address: Cordero, A., Area Ecol., EUET Forestal, Campus Univ., 36005 Pontevedra. Spain.

1786. Anonymus (2000): Flugtechnik: High-Tech im Libellenflügel. *Bild der Wissenschaft* 3/2000: 9. (in German). [Short report on the results of S. Gorbs's studies on the functional morphology of dragonfly-wings.] Address: not stated

1787. Artmeyer, C.; Fronek, A.; Göcking, C.; Häusler, M.; Menke, N.; Willigalla, C.; Winters, S. (2000): Die Libellenfauna der Stadt Münster. *Abh. Westfäl. Mus. Naturk.* 62(4): 73 pp. (in German with English summary). [Monographic treatment of the dragonfly fauna (57 species) of the town of Münster, Nordrhein-Westfalen, Germany. 52 species are mapped for three different periods of investigation: historical data until 1975, 1976-1995, and 1996-1999. Currently, 43 species including 30 indigeous species, are occurring in the town, 14 species are extirpated or have not been recorded in the

past years. Selected habitats are described, and an action plan for dragonfly conservation in Münster is presented. This is an interesting regional odonate fauna from a region with some historical importance for odonatology in Germany and Central Europe.] Address: Menke, N., Stephansweg 15, D-48155 Münster, Germany. E-mail: menkems@aol.com

1788. Artmeyer, C. (2000): Untersuchungen zur Libellenfauna (Odonata) ausgewählter Stillgewässer in der Emsaue des Kreises Steinfurt. *Natur und Heimat* 60(1): 25-32. (in German). [In the floodplaine of River Ems (Landkreis Steinfurt, Nordrhein-Westfalen) in 1997 33 odonate species were recorded. Special emphasize is given to the alteration of vegetation and its impact on suitability of habitats for Odonata. Eutrophication, grazing, and the lack of flood dynamic seem to be the most negative factors impacting the odonate fauna of the Ems alluvium. Therefore species which tolerate or need eutrophic (old) waters are dominant.] Address: Artmeyer, C., Philippstraße 16, D-48149 Münster, Germany. E-mail: artmeyc@uni-muenster.de

1789. Beckemeyer, R. (2000): R.J. Tillyard and the medium Margery: dragonflies and seances. *Argia* 12(2): 11-13. (in English). [Short biography of Robin John Tillyard (1881-1937) with special emphasize on his visites in USA, his interest in Permian odonate fossils from Kanasas, and his interest in spiritualism.] Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

1790. Bedê, L.C.; Piper, W.; Peters, G.; Machado, A. B.M. (2000): Phenology and oviposition behaviour of *Gynacantha bifida* Rambur in Brazil (Anisoptera: Aeshnidae). *Odonatologica* 29(4): 317-324. (in English). ["On 2 evenings in late Oct. 1999 several females were observed laying eggs in almost dry mud and sand and under mosses, within a temporary pond system, surrounded by rain forest, near Tiradentes, Minas Gerais, Brazil. The ponds are filled with water during the rainy season (Oct. - March) but dry up entirely by the end of the dry season (Aug. - Sept.). Data compiled from field records, Odonatological collections and literature showed that in Brazil *G. bifida* stays on the wing throughout the year. Apparently, the sp. possesses a univoltine life cycle with 2 generations of larvae, one during the warmer rainy season and another in the early dry season (Oct./Nov. - Jan./Feb. and Feb./March - May/June, respectively). Mud attached to the terminal abdominal segments of 9 specimens in Odonatological collections was used as an evidence of an oviposition mode comparable to that observed in the field." (Authors)] Address: Bedê, L.C., Laboratorio de Ecologia e Comportamento de Insetos, Departatnento de Biologia Geral. 1CB/UFMG, Cx.P. 486, BR-30161-970 Belo Horizonte, MG, Brazil

1791. Bedjanic, M.; Weltt, S. (2000): Rediscovery of *Coenagrion hastulatum* (Charpentier, 1825) in Slovenia (Zygoptera: Coenagrionidae). *Exuviae* 7: 27-30. (in English with Slovene summary). ["At the pond Jezerce in the vicinity of Rogia, Pohorje Mts., NE Slovenia, four males and one tandem of the species were recorded on 30-VI-1999. The occurrence of the species on the southern border of its European range is outlined and a short discussion on its threat status in Slovenia is appended." (Authors)] Address: Weltt, S., Delavska ulica

26, SI-2215 Cersak, Slovenia. E-mail: welti@mailcity.com

1792. Behrstock, R.A. (2000): First Texas record of Amethyst dancer (*Argia pallens*) Calvert, 1902. *Argia* 12(2): 6-7. (in English). [USA; Big Bend Rance State Park, east of Presidio, Texas; the paper includes a list of additional species caught in this desert oasis] Address: Behrstock, R.A., 9707 S.Gessner #3506, Houston, TX, 77071-1032, USA. E-mail: rbehrstock@aol.com

1793. Behrstock, R.A. (2000): New records of neotropical odonates on the upper Texas coast with comments on recent temperature increases. *Argia* 12(1): 8-11. (in English). USA, [Texas; Records of *Micrathyria hageni*, *Erythemis plebeja*, *Erythemis vesiculosa*, *Orthemis discolor*, and *Lestes forficula* are documented and commented in view of range extansion and global warming.] Address: Behrstock, R.A., 9707 S.Gessner #3506, Houston, TX, 77071-1032, USA. E-mail: rbehrstock@aol.com

1794. Blumenkamp, K. (2000): Die Odonatenfauna einer ehemaligen Kiesgrube (heute flächenhaftes Naturdenkmal) in Düsseldorf/Kaiserswerth. *Verh. Westd. Entom. Tag* 1998: 147-156. (in German). [Commented list of the dragonfly fauna (27 species) of a former gravel-pit (Lake Spee) in Nordrhein-Westfalen, Germany. The trade-off between vegetation and species assemblages and species richness are stressed.] Address: Blumenkamp, Karin, Biologie und ihre Didaktik, FB9/ S05, Universität GH Essen, D-45117 Essen, Germany

1795. Bocanegra, O.R. (2000): An interesting county record for Texas. *Argia* 12(2): 8-9. (in English). [Tarrant County, Texas, USA; *Epiaschna heros*] Address: Bocanegra, O.R., US Fish and Wildlife Service, Arlington, Texas, USA

1796. Bright, E.; Cronk, K.L. (2000): *Perigomphus*: a new country record for Honduras. *Argia* 12(2): 10-11. [Larva of *Periogomphus pallidostylus*; the locality is described in detail.] Address: Bright, E., School of Natural Resources and Environment, University of Michigan and Univ. of Mich. Museum of Zoology, Insect Division

1797. Brock, V. (2000): Quelljungfer. Eine ungewöhnliche Begegnung am Krötenzaun. *Naturschutz in der Samtgemeinde Tostedt* 11: 23. (in German). [A larva of *Cordulegaster boltonii* was found in a bucket used to sample migrating amphibs on 5 February 2000 near the Holmer Teiche (Harburg, Niedersachsen, Germany). The origin of the dispersive larva must have been in a distance of 50 m in a ditch which was in this period without running water at least for two month. The nearest ditch with running water was in a distance of 140 m. The author supposes that the larva was actively in search for a suitable new habitat.] Address: Brock, Vilmut, Heidekamp 7, D-21256 Handeloh, Germany

1798. Brockhaus, T.; Huth, J. (2000): Die Libellenfauna im Großschutzgebiet "Presseler Heidewald- und Moorgebiet" in Sachsen. *Artenschutzreport* 9 (1999): 45-48. (in German). [Saxonia, Germany; 40 odonate species were recorded. They are listed in a tab. locality wise and shortly commented. Of special interest are records of *Aeshna subarctica elisabethae* Djakonov, 1922, *Brachytron pratense*, *Somatochlora flavomacula-*



ta, *Orthetrum coerulescens*, *Leucorrhinia albifrons*, *L. pectoralis*, *Sympetrum pedemontanum*, and *S. flaveolum*.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

1799. Brugière, D. (2000): Du nouveau sur *Macromia splendens* (Pictet, 1843) en Lozère. *Martinia* 16(1): 8. (in French). [Observation of *M. splendens* along the river Tarn, France near Montbrun in the Lozèrian part of the river. The species is well known from the part of the River Tarn in the Département Aveyron (Milliau-region) but was not known from the part of the River Tarn in Lozère prior the record of July 18, 1999.] Address: Brugière, D., 39, rue Sidi-Brahim, F-03200 Vichy, France

1800. Buczynski, P. (2000): New data on the occurrence of *Orthetrum brunneum* (Fonsc.) and *O. coerulescens* (Fabr.) (Odonata: Libellulidae) in the Lublin region. *Wiad. entomol.* 19(1): 51-52. (in Polish; a German translation of the paper is available from the author). [Detailed documentation of habitat parameters and records of *O. brunneum* and *O. coerulescens* from three Polish localities.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

1801. Buskirk, J. van; McCollum, S.A. (2000): Functional mechanisms of an inducible defence in tadpoles: morphology and behaviour influence mortality risk from predation. *Jour. evol. biol.* 13: 336-347. (in English). ["In many amphibian larvae a suite of morphological and behavioural characters varies together in an induced defence against predators, but it remains unclear which features are functionally related to defence. We independently manipulated behaviour and morphology in tadpoles of *Hyla versicolor* and assessed their consequences for swimming performance and predator escape. Data on burst swimming showed that tadpoles which accelerated rapidly were elongate, with shallow bodies and tails. Predator escape was measured by exposing tadpoles to predators (larval *Anax longipes* dragonflies or larval *Ambystoma salamanders*) and recording time until death. Tadpoles were first reared for 30 days in ponds containing either caged *Anax* or no predators; individuals responded to predators by developing large brightly coloured tails and short bodies. We placed tadpoles of both morphological phenotypes into plastic tubs, and manipulated their behaviour using food and chemical cues from predators. Mortality risk experienced by the predator-induced phenotype was about half that of the no-predator phenotype, and risk increased with time spent swimming. An interaction between morphology and behaviour arose because increasing activity caused higher risk for tadpoles with deep tail fins but not shallow tail fins." (Authors)] Address: Buskirk, J.van & S.A. McCollum, Department of Biology. University of Michigan, Ann Arbor, MI 48109 USA

1802. Buskirk, J. van (2000): The costs of an inducible defence in anuran larvae. *Ecology* 81(10): 2813-2821. (in English). ["Costs of inducible phenotypes are a central component of theoretical treatments for the evolution of plasticity but have proved difficult to measure empirically. I estimated the costs of responding to predators for 15 species of anuran tadpoles, in artificial pond experiments performed over a period of several years. The experiments included a treatment without predators

and another treatment with aeshnid dragonfly larvae (*Aeshna cyanea*, *Anax junius*, *A. longipes*, *A. imperator*) confined within cages; experimental protocols and ponds were generally similar. Tadpoles in the caged-predator treatment were not at risk of predation, but they responded as if predators were present. The cost of the predator-induced response was estimated by the difference in growth rate or survival between the two treatments. There was considerable variation among species (experiments) in growth and survival. Across all species there was a highly significant reduction in growth rate in the presence of predators, but no tendency for a survival cost of responding to predators. I tested whether particular components of the anti-predator response are especially costly by comparing, within a phylogenetic context, the magnitude of costs with the magnitude of predator-induced plasticity in behavior and morphology. The absence of significant correlations in this analysis indicated that evolutionary changes in specific phenotypic responses to predators have not been accompanied by changes in the cost. The prevalence of growth costs of responding to predators, but not survival costs, supports models of induced defenses that assume that fitness costs arise from shifts in allocation of time and energy." (Author)] Address: Buskirk, J. van, Institute of Zoology, University of Zürich, CH-8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

1803. Carchini, G.; Chiarotti, F.; Di Domenico, M.; Paganotti, G. (2000): Fluctuating asymmetry, size and mating success in males of *Ischnura elegans* (Vander Linden) (Odonata: Coenagrionidae). *Animal behaviour* 59 (1): 177-182. (in English). ["Fluctuating asymmetry (FA) is thought to be an indicator of developmental stability and negatively related to male mating success in many animal taxa. We investigated the relationships between mating success of males, body size and FA for both wing length and number of setae on the legs in the damselfly *Ischnura elegans*. Males were classified as mated or unmated at the time of sampling. Fluctuating asymmetry, expressed as right - left differences, showed normal distributions without evidence of directional asymmetry or antisymmetry. Univariate analyses showed a significant negative correlation between size and mating success, and significant negative correlations between FA and mating success for both characters. On the other hand, with a multivariate analysis, new to studies on FA, the effect of body size was still significant but FA did not reach significance for either character. We conclude that the multivariate analysis should be used to assess the role of the different factors affecting mating success." (Authors)] Address: Carchini, G., Dipartimento di Biologia, Università "Tor Vergata", Viale della Ricerca Scientifica, I-00133 Roma, Italy. E-mail: archini@utovrm.it

1804. Carvalho, A.L. (2000): Descriptions of the last instar larva and some structures in the pharate male adult of *Praeviomphus proprius* Belle, 1995, with notes on the occurrence and taxonomic status of the species (Anisoptera: Gomphidae, Octogomphinae). *Odonatologica* 29(3): 239-246. (in English). ["The ultimate instar larva, as well as wing venation and male secondary genitalia of a pharate adult, assigned to *P. proprius*, are described and figured, based on material from Teresópolis, Rio de Janeiro State, Brazil. Some notes on the collecting site are provided. The taxonomic status of the sp. and the geographic distribution of the *Octogomphi-*

nae are evaluated." (Author)] Address: Carvalho, A.L. Caixa Postal 68044, BR-21944-970 Rio de Janeiro, RJ, Brazil. E-mail: alagoc@acd.ufjr.br

1805. Charvet, S.; Statzner, B.; Usseglio-Polatera, P.; Dumont, B. (2000): Traits of benthic macroinvertebrates in semi-natural French streams: an initial application to biomonitoring in Europe. *Freshwater Biology* 43: 277-296. (in English). ["The methods used to indicate the biological state of streams are often based on taxonomic composition, and the abundance of species or other taxa. This 'taxonomic structure' varies among eco-regions and cannot be applied to wider geographical areas. Therefore, we assessed the species traits of benthic macroinvertebrates from semi-natural reference sites as a potential benchmark for large-scale biomonitoring. Our purpose was to assess the stability of community structure, based on the representation of taxa and of traits, across large gradients of geology, altitude, geographical coordinates, stream order, and slope. [...]"] (Authors). Invertebrate abundance data from 62 most natural French stream sites were analysed. 11 odonate genera are considered in this study.] Address: Charvet, S., Cemagref, Laboratoire Diagnose des Systemes Aquatiques, 3 bis quai Chauveau, 69336 Lyon Cedex 09, France. E-mail: charvet@lyon.cemagref.fr

1806. Corbet, P.S. (2000): The first recorded arrival of *Anax junius* Drury (Anisoptera: Aeshnidae) in Europe: A scientist's perspective. *International Journal of Odonatology* 3(2): 153-162. (in English). ["In September and October 1998 adults of *Anax junius* (Common Green Darner) were encountered in small numbers at coastal sites in southwestern U.K. Circumstantial evidence supports the inference that they reached there on winds originating from New Brunswick and Quebec, Canada in early September, a time when this species regularly migrates southwards along the Atlantic Canada and New England coasts of northeastern North America. Although identification of the specimens to species as currently defined seems secure, attempts to retain a voucher specimen were frustrated, making it impossible to re-evaluate the identification in the light of future taxonomic knowledge. Two physiological subspecific entities of *Anax junius* are currently recognized in North America and it is not known to which entity the arriving individuals belonged. Capture of a voucher specimen for The Natural History Museum, London was prevented by vigilante action on a Cornwall Wildlife Trust nature reserve at Penlee, despite prior permission to collect having been granted by the Trust. The incident was followed by wide dissemination of e-mails from an individual endorsing the vigilante action mounted against the would-be collector. Recommendations are offered for safeguarding the interests of scientists who deem it necessary to obtain voucher specimens." (Author)] Address: Corbet, P.S., Crean Mill, Crean, St Buryan, Cornwall, TR19 6HA, UK. E-mail: pscorbet@creanmill.u-net.com

1807. Cordero Rivera, A. (2000): Distribution, habitat requirements and conservation of *Macromia splendens* Pictet (Odonata: Corduliidae) in Galicia (NW Spain). *Int. Jour. Odonatology* 3(1): 73-83. (in English). ["The range of *Macromia splendens*, a rare anisopteran, includes SE France and some scattered localities on the Iberian Peninsula. During 1996-1998, I made an exhaustive search for the characteristics of the species' larval and adult habitat, flight period and adult activity in NW

Spain. Nine populations were found, greatly increasing its known range. Adults were observed on slowly flowing rivers, with deep, warm water. Seven populations were found on natural rivers, but two inhabited man-made hydroelectric reservoirs, where aquatic and riverine vegetation are absent. One population was found inside a Natural Park. Populations concentrated in zones with a mean annual temperature higher than 13°C. Larvae live among tree roots or flattened on the muddy substrate and emerge in May-June from eggs laid in June-July two years earlier. Pollution and habitat destruction are the main problems for the conservation of this species." (Author)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

1808. Córdoba-Aguilar, A. (2000): Reproductive behaviour of the territorial damselfly *Calopteryx haemorrhoidalis asturica* Ocharan (Zygoptera: Calopterygidae). *Odonatologica* 29(4): 295-305. (in English). ["The reproductive behaviour of *C. h. asturica* is described. Males fought with each other for the possession of territories which contained the oviposition resource required by females. Females arrived at territories and either copulated and left the territory, copulated and oviposited in that territory or oviposited without a preceding copulation with the territorial male. Territorial males seemed to have a higher mating success than nonterritorial males. Males carried out courtship displays before and after copulation until females finished oviposition. Copulation was divided in two stages which were characterised by the nature of the male's abdominal flexions. The number of abdominal flexions during stage I and II was  $50.2 \pm 7.2$  and  $54.5 \pm 16.7$  (mean  $\pm$  s.d.) respectively. The sexual behaviour of both sexes is discussed under current knowledge of sexual selection studies in Calopterygidae." (Author)] Address: Córdoba-Aguilar, A. Departamento de Entomología, Instituto de Ecología, A.C., Apdo Postal 63. MX-91000 Xalapa, Ver. Mexico

1809. Costa, J.M.; Santos, T.C. (2000): *Neocordulia mambucabensis* spec. nov., a new dragonfly from Rio de Janeiro, Brazil (Anisoptera: Corduliidae). *Odonatologica* 29(3): 247-253. (in English). ["The new sp. is described and illustrated and its affinities are discussed. Holotype male, allotype female: Brazil, Rio de Janeiro, Serra da Bocaina, Rio Mambucaba, 22-XI-1979; deposited at MNRJ, Rio de Janeiro. The known spp. of the subgenus *Neocordulia* are keyed." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisys.com.br

1810. Czachorowski, S.; Buczynski, P. (2000): Threats to and protection of water insects in Poland. *Wiad. entomol.* 18, Suppl. 2: 95-120. (in Polish with English summary). [Based on literature data, enquiries filled in by specialists and collections of the authors the present status of more than 3340 species of aquatic insects occurring in Poland is reviewed. No information on threat of app. 80 % of the species is available. 30 % of the better recognised species are vulnerable. Current activities aimed at the protection of the water insects of Poland are reviewed, and proposals for intensified activities to protection and study of the water insects are made. The authors propose legal protection of some species living in freshwater habitats. Odonata are trea-

ted in chapter 3.2.3, and the habitats of Odonata in tab. III. Most endangered species are those of high and transitional bogs, running waters, and the species of stagnant, small waters without adaption to temporal water levels. The following odonate umbrella species are introduced: *Calopteryx virgo*, *Stylurus flavipes*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Cordulegaster boltonii*, *Thecagaster bidentata*, *Orthetrum brunnum*, *O. coerulescens*, *Sympetrum pedemontanum* (running waters), *Cercion lindenii* (lakes), *Coenagrion armatum* (small stagnant waters), *Nehalennia speciosa*, *Aeshna caerulea*, *A. juncea*. *A. subarctica* (elisabethae), *Soatochlora arcitia*, *S. alpestris*, *Libellula fulva*, *Leucorrhinia albifrons*, *L. caudalis*, and *L. dubia* (bogs)] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

1811. Daigle, J.J.; Tennessen, K.J. (2000): Cades Cove cook-down! *Argia* 12(2): 1-2. (in English). [Report on the 2000 Southeast Regional Meeting of the Dragonfly Society of the Americas which was held in Cades Cove, Blount County, Tennessee in the Great Smoky Mountains National Park from May 26 to 28. 22 odonatologists participated in the meeting. 29 odonate taxa are listed. ["Carl Cook presented a small roast of Nick Donnelly. Just before our meeting in Cades Cove, Carl had been talking to a group of KY farmers about the seriousness of the drought. He told them that whenever Nick Donnelly showed up for a DSA meeting, it would rain and even storm, and that we called it the "Donnelly Effect". Later that day it rained 6" in their area, so they wrote a letter of appreciation to Nick and they all signed it."] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: daiglej@dep.state.fl.us

1812. Daigle, J.J.; Tennessen, K.J. (2000): *Heteragrion cooki* spec. nov. from Ecuador (Zygoptera: Megapodagrionidae). *Odonatologica* 29(3): 255-259. (in English). ["The new sp. is described from Ecuador (holotype male Pichincha Province, Hotel Tinalandia, 31-1-1997; allotype female: Pichincha prov., Rio Palenque Biological Station, 9-X-1988; both deposited in FSCA). Males can be distinguished by the very large decumbent tooth on the cercus." (Authors)] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. e-mail: daiglej@dep.state.fl.us

1813. Daigle, J.J. (2000): Meet the beetles! *Argia* 12(2): 9-10. (in English). [Report of a trip in February to Buenavista, Bolivia; the odonate species caught are listed including some species unknown to science.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. e-mail: daiglej@dep.state.fl.us

1814. Daigle, J.J. (2000): *Metaleptobasis mauffrayi* sp. nov. from Ecuador and Peru (Zygoptera: Coenagrionidae). *Odonatologica* 29(4): 325-328. ["The new sp. is described from Ecuador (holotype male: Napo Province, Parque Nacional Yasuni, July 1996; allotype female: Napo Province, Parque Nacional Yasuni, November 1997; both deposited in FSCA, Gainesville, FL, USA). Males can be distinguished by the long cerci, subequal to epiprocts." (Author)]. Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: daiglej@dep.state.fl.us

1815. D'Antonio, C. (2000): *Lindenia* - Notiziario dell'Ufficio Nazionale Italiano della Società Odonatologica Internazionale. *Lindenia* 32: 135-138. (in Italian).

[In this issue of *Lindenia* some contributions of interest to Italian members are published: reduced subscription fees for *Odonatologica* for students, announcements of the international symposia of WDA, SIO-Foundation, and DSA, changes of address or e-mail, and information on Odonata links in the World Wide Web. Additions to the *Hemianax*-archive in Italy are given on page 137, and an up-to-date distribution map of *Anax ephippiger* in Italy is given on page 138.] Address: D'Antonio, C., Via A. Falcone 386/b, I-80127 Napoli, Italy. E-mail: lindeniam@freemail.it

1816. Dettinger-Klemm, A. (2000): Temporäre Stillgewässer - Charakteristika, Ökologie und Bedeutung für den Naturschutz. *Natur- und Umweltschutz Akademie Nordrhein-Westfalen - Seminarberichte* 5: 17-42. (in German). [Introduction into the ecology of temporary water bodies with emphasis on Culicidae (Diptera), Scirtidae (Coleoptera), and Crustacea (Anostraca, Conchostraca, Notostraca). In Tab. 5, 7 European odonate species considered typical for temporary water bodies are listed.] Address: Dettinger-Klemm, A., Fachbereich Biologie/Zoologie, Arbeitsgruppe Tierökologie, Phillips-Universität Marburg, Karl-von-Frisch-Straße, D-35043 Marburg, Germany

1817. Dieterich, M. (2000): Stoffretention und Habitatqualität: Die potentielle Bedeutung temporärer Fließgewässer für naturschutzfachlich orientierte Landschaftsplanung. *Natur- und Umweltschutz Akademie Nordrhein-Westfalen - Seminarberichte* 5: 156-166. (in German). [Results from a Ph.D. Thesis (Oregon State University, Corvallis, USA) "Insect community composition and physico-chemical processes in summer-dry streams in western Oregon" are presented. Tab. 3 contains a passing reference to "Odonata". For more (odonatological) details see OAS 1492.] Address: Dieterich, M., Büro für Landschaftsökologie, Freiraumplanung und nachhaltige Landnutzung, Röntgenstr. 17, D-73230 Kirchheim, Germany

1818. Dijkstra, K.-D.; Dingemans, N.J. (2000): New records of *Crocothemis sanguinolenta* (Burmeister, 1839) from Israel, with a critical note on the subspecies *arabica* Schneider, 1982. *International Journal of Odonatology* 3(2): 169-171. (in English). [*C. sanguinolenta* is a widespread Afrotropical species whose area of distribution extends into the south of the Arabian Peninsula. Additionally, isolated populations have been found in the Dead Sea Basin. The first report from this region is by Morton (1924). The species is known from Jordan (Schneider 1982, 1985). In Israel it is thus far known only from En Gedi on the Dead Sea coast (31°27'N, 35°22'E). Morton (1924) already noticed that his specimens differed from African ones. These were later described as a separate subspecies, *Crocothemis sanguinolenta arabica* Schneider, 1982. According to Schneider (1982) the male of the subspecies *arabica* differs from the nominate in being smaller, having a more open venation, less yellow on the wing bases and no dark markings on the abdomen. The single male from Israel is compared with material from Jordan, Yemen, Oman and Uganda in Table 1. It is obvious that the distinction between *arabica* and *sanguinolenta* is not clear-cut and that intermediate forms occur. The authors take a Levantine subspecies not justified to recognise a subspecies *arabica*.] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl



1819. Dolédec, S.; Olivier, J.M.; Statzner, B. (2000): Accurate description of the abundance of taxa and their biological traits in stream invertebrate communities: effects of taxonomic and spatial resolution. *Arch. Hydrobiol.* 148(1): 25-43. (in English). ["Studies of biodiversity and ecosystem function require to consider the identification level that accurately describes the functional diversity of communities, in terms of their biological traits, at different spatial scales. Therefore, we combined three published data sets of stream macroinvertebrate" (including Odonata) "abundances collected at three spatial scales with a database of functional species traits (e.g. life history, morphology, physiology, and behaviour). We investigated the abundance of taxa and their traits at five levels of taxonomic (from species to class) and three levels of spatial resolution (from local habitat to catchment). We used multivariate analyses and correlations to evaluate the accuracy of community descriptions through the stability of such descriptions, the degree of similarity of site ordinations, and the overall community structure expressed at each taxonomic level. The accuracy of community descriptions based on the abundance of taxa depended on the spatial scale considered. The accurate description of the abundance of taxa required identifications to genera and/or families on the local habitat scale, while species identifications were needed on the catchment scale. In contrast, the accurate description of the abundance of biological traits was achieved by identifications to species, genera, or families on all three spatial scales. Thus, species identifications may not be necessary for future studies on the functional diversity of the stream benthos at different spatial scales." (Authors)] Address: Statzner, B., CNR, Ecologie des Eaux Douces et des Grands Fleuves, Université Lyon I, F-69622 Villeurbanne Cedex, France. E-mail: sylvain@biomserv.univ-lyon1.fr
1820. Dommanget, J.-L. (2000): Analyses d'ouvrages: Dragonflies, Behaviour and Ecology of Odonata, par Philip S. Corbet, 1999. ISBN 0-946589-64 X.. *Martinia* 16(1): 20-22. (in French). [Book review; see OAS 1565] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France
1821. Donnelly, T.W.; Carle, F.L. (2000): A new subspecies of *Gomphus* (*Gomphurus*) *septima* from the Delaware River of New Jersey, New York, and Pennsylvania (Odonata, Gomphidae). *International Journal of Odonatology* 3(2): 111-123. (in English). ["*Gomphus* (*Gomphurus*) *septima* *delawarensis* is described from the Delaware River, NJ, PA, and NY (Type locality: Flatbrookville, NJ). The new subspecies differs from nominate *G. septima septima* Westfall (new status) mainly by differences in the male cerci and epiproct, and in the female vulvar lamina and lateral occipital horns. The larvae of the two subspecies are similar and differ widely from other *Gomphurus* by the rounded dorsal tubercles on abdominal segments 6-8, and by the highly shortened row of teeth on the lateral palp of the labium. *Gomphus septima* is most closely related to the *vastus* group of *Gomphurus*." (Authors)] Address: Carle, F.L., 146 Mountain View Rd., Warren NJ 07060, USA.
1822. Donnelly, N. (2000): Disjunct odonata records - the agony and the ecstasy. *Argia* 12(1): 7-8. (in English). [Examples of the so called disjunctive range of species which in some cases is due to misidentified specimens. Examples from Nebraska, USA are shortly outlined.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. [tdonnel@binghamton.edu](mailto:tdonnel@binghamton.edu)
1823. Donnelly, N. (2000): Dot map project nearing completion! *Argia* 12(1): 6-7. (in English). [More than 102000 records of North American Odonata (USA, Canada) are existing. The current status of the dot map project is shortly outlined. A map with dots (Counties and 30' cells) and a map of the distribution of the most common North American dragonfly *Anax junius* are presented.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. [tdonnel@binghamton.edu](mailto:tdonnel@binghamton.edu)
1824. Donnelly, N. (2000): Northeast DSA meeting in Sterling Forest. *Argia* 12(2): 2-3. (in English). [Report on the DSA meeting in Orange Co., NY, on 10 June 2000] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. [tdonnel@binghamton.edu](mailto:tdonnel@binghamton.edu)
1825. Donnelly, N. (2000): The hunt for red *Orthemis*. *Argia* 12(1): 11-12. (in English). [Attempt for defining the red to purplish colours of the *Orthemis* taxa; report on efforts to spot the undescribed *Orthemis* taxa different from *ferruginea* and *discolor* on Grenade and Puerto Rico; "the red form may be a juvenile (not teneral) stage that "purple" with age ..."] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. [tdonnel@binghamton.edu](mailto:tdonnel@binghamton.edu)
1826. Dudgeon, D. (2000): Indiscriminate feeding by a predatory stonefly (Plecoptera: Perlidae) in a tropical Asian stream. *Aquatic Insects* 22(1): 39-47. (in English). ["The diet of an undescribed species of *Kamimuria* was investigated in Tai Po Kau Forest Stream, Hong Kong, by comparing larval gut contents with the array of available prey living on and among cobble substrates. Diets were dominated by chironomids and philopotamid caddisflies, with Baetidae, Heptageniidae, Hydropsychidae and Simuliidae comprising secondary dietary items. These six taxa made up 94% of the prey individuals eaten by *Kamimuria*. Data analysis using a selectivity index revealed that these stoneflies fed indiscriminately, eating individual prey taxa in proportion to their availability in the environment. Large and small *Kamimuria* exploited essentially the same prey. A comparison of the diet of *Kamimuria* with the diets of four sympatric Odonata indicated that the degree of interspecific similarity was determined by the extent of overlap in microhabitat use. Diets of *Euphaea decorata* [...] larvae, which live under cobbles, were most similar to *Kamimuria*. This is the first - albeit limited - study of the gut contents of a tropical Asian stonefly. The results suggest that these predators have the potential to limit benthic invertebrate abundance but, because *Kamimuria* larvae feed unselectively, community structure may not be affected by their activities." (Author)] Address: Dudgeon, D., Department of Ecology and Biodiversity, University of Hong Kong, Pokfulam Road, Hong Kong, China
1827. Dyrce, A.; Flunks, H. (2000): Potential food resources and nestling food in the Great Reed Warbler (*Acrocephalus arundinaceus arundinaceus*) and Eastern Great Reed Warbler (*Acrocephalus arundinaceus orientalis*). *J. Ornithol.* 141: 351-360. (in English with German summary). ["The main ecological difference between the Great Reed Warbler and Eastern Great Reed Warbler lies in the density of breeding population,

which in the Eastern subspecies studied in Japan is on average 10 times higher than that of European populations of the Western subspecies. In this study it is shown that potential food resources of the Great Reed Warbler in Japan are more than ten times more abundant than those in Poland, with respect both to the number of potential prey items (invertebrates) and to their total biomass. This strongly suggests that such high densities of Great Reed Warbler in Japan are at least partly due to more plentiful food supply. Other factors which could explain the difference between breeding densities in Japan and Poland are the predation by Marsh Harrier (*Circus aeruginosus*) in Poland and lack of competition with Reed Warbler (*Acrocephalus scirpaceus*) in Japan. The abundance of food on the sample plot in Japan resulted primarily from outbreaks of dipterans of the suborder Nematocera, the most common of which were Chironomidae. Although Chironomidae were not the preferred prey, they made up a substantial proportion of the diet of nestlings. In both studied areas, apart from dipterans, the greatest proportion of nestlings' diet constituted arachnids. Differences in nestlings' diet between study sites resulted mainly from a greater proportion of Nematocera and lower proportion of Coleoptera and Odonata in Japan." (Authors) The potential availability of Odonata as food (collected by the sweep-net method in reed and herbaceous vegetation) is greater in Poland than in Japan (Fig. 4 and 5). The proportion of Odonata in the food composition (number of individuals) of nestlings is in Poland app. 10%, and in Japan app. 5%.] Address: Dyrz, A., Department of Avian Ecology, University of Wrocław, Sienkiewicza 21, 50-335 Wrocław, Poland; Flinks, H., Am Kuhm 19, D-46325 Borchen, Germany

1828. Eklov, P. (2000): Chemical cues from multiple predator-prey interactions induce changes in behavior and growth of anuran larvae. *Oecologia* 123(2): 192-199. (in English). ["Chemical signals are used as information by prey to assess predation risk in their environment. To evaluate the effects of multiple predators on prey growth, mediated by a change in prey activity, I exposed small and large bullfrog (*Rana catesbeiana*) larvae (tadpoles) to chemical cues from different combinations of bluegill sunfish (*Lepomis macrochirus*) and larval dragonfly (*Anax junius*) predators. Water was regularly transferred from predation trials (outdoor experiment) to aquaria (indoor experiment) in which activity and growth of tadpoles was measured. The highest predation mortality of small bullfrog larvae in the outdoor experiment was due to *Anax*, and it was slightly lower in the presence of both predators, probably resulting from interactions between predators. There was almost no mortality of prey with bluegill. The activity and growth of small bullfrog larvae was highest in the absence of predators and lowest in the presence of *Anax*. In the presence of bluegill only, or with both predators, the activity and growth of small bullfrog tadpoles was intermediate. Predators did not affect large tadpole activity and growth. Regressing mortality of small bullfrog tadpoles against activity and growth of bullfrog tadpoles revealed a significant effect for small bullfrog larvae but a non-significant effect for large bullfrog larvae. This shows that the response of bullfrog tadpoles to predators is related to their own body size. The experiment demonstrates that chemical cues are released both as predator odor and as alarm substances and both have the potential to strongly alter the activity and growth of prey. Different mechanisms by which chemical cues

may be transmitted to species interactions in the food web are discussed." (Author)] Address: Eklov, P., Department of Ecology and Environmental Science, Animal Ecology, Umea University, S-901 87 Umea, Sweden

1829. Ellenrieder, N. von (2000): *Aeshna tinti* sp. nov. from Chile and redescription of *A. elsia* Calvert (Anisoptera: Aeshnidae). *Odonatologica* 29(4): 347-358. (in English). ["*A. tinti* sp. n. is described and illustrated from the Chilean Tarapaca and Antofagasta regions (holotype male and allotype female: Chile, Antofagasta, El Loa prov., Tilopozo, 23°49'S 68°15'W, 1-1996; deposited at MLP, Argentina). A redescription and drawings of *A. elsia* Calvert are provided, as well as a comparison of the new sp. with all the sympatric *Aeshna* spp." (Author). *A. variegata*, *A. brevifrons*.] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C. 712, AR-1900, La Plata, Argentina. E-mail: ellenr@ilpla.edu.ar

1830. Ellenrieder, N. von; Muzón, J. (2000): Description of the last instar larva of *Erythrodiplax nigricans* (Rambur) (Anisoptera: Libellulidae). *Odonatologica* 29 (3): 267-272. (in English). [The larva is described and illustrated, based on Argentinean specimens. Larval structural features of *Erythrodiplax ochracea* (Burmeister 1839), *E. pallida* (Needham 1904), *E. umbrata* (Linnaeus 1758), *E. anomala* (Brauer 1865), *E. berenice* (Drury 1770) (and *E. naeva* syn of *E. berenice*), *E. connata* (Burmeister 1839), *E. funerea* (Hagen 1861), *E. fusca* (Rambur 1842), *E. juliana* Ris 1911, *E. justiniana* (Selys 1857), *E. melanorubra* Borrer 1942, *E. minuscula* (Rambur, 1842) are reviewed.] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C. 712, AR-1900, La Plata, Argentina. E-mail: ellenr@ilpla.edu.ar

1831. Endersby, I.D. (2000): Checklist of Victorian dragonflies (Insecta: Odonata). *Proceedings of the Royal Society of Victoria* 112(1): 59-64. (in English). [The dragonfly fauna currently known from Victoria comprises 74 species: 26 Zygoptera and 48 Anisoptera (here named: Eiproctophora). New distribution records and taxonomic nomenclatural changes since 1974 are detailed for 31 species.] Address: Endersby, I.D., 56 Looker Road, Montmorency, VIC, 3094 Australia. E-mail: endersby@werple.net.au

1832. Faton, J.-M.; Deliry, C. (2000): Nouvelles données sur la population de *Coenagrion caerulescens* (Fonscolombe, 1838) dans les Hautes-Alpes. *Martinia* 16(1): 11-14. (in French, with English summary). [Between 1996 and 1999, four localities of *C. caerulescens* have been discovered in the Département Hautes-Alpes, France. The habitat of the species is figured and described, and the co-occurring odonate species are listed.] Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France

1833. Feld, C.; Pusch, M. (2000): Die Bedeutung von Totholzstrukturen für die Makroinvertebraten-Taxozönose in einem Flachlandfluß des Norddeutschen Tieflandes. *Verh. Westd. Entomol. Tag 1998*: 165-172. (in German). [*Ophiogomphus cecilia* is said to be present in abundances between 5 and 11 ind./m<sup>2</sup> on waddy debris in the Müggelspree, Berlin/Brandenburg, Germany.] Address: Feld, C. & M. Pusch, Institut für Gewässerökologie und Binnenfischerei im Forschungsver-

bund Berlin e.V., Müggelseedamm 310, D-12561 Berlin, Germany. E-mail: pusch@igb-berlin.de

1834. Ferreras-Romero, M.; Atienzar, M.D.; Corbet, P.S. (2000): Voltinism of *Calopteryx haemorrhoidalis* (Vander Linden) in the Sierra Morena mountains, southern Spain (Zygoptera: Calopterygidae): a preliminary study. *International Journal of Odonatology* 3(2): 125-130. (in English). ["Small sweep-net samples of larvae of *C. haemorrhoidalis*, obtained during five consecutive years from a permanent stream in the Sierra Morena Mountains, southern Spain, were combined according to month to infer the voltinism during the study period. Detailed records of head width, wing-sheath length and metamorphosis status for individual larvae are consistent with the population being mainly univoltine, a few individuals being semivoltine, and the life cycle being predominantly of the summer-species type." (Authors)] Address: Ferreras-Romero, M., Departamento de Biología Animal (Zoología), Facultad de Ciencias, Universidad de Córdoba, Avda. San Alberto Magno s/n, E-14004 Córdoba, Spain. E-mail: ferreras@teleline.es

1835. Fet, V.; Bechly, G. (2000): *Ischnurinae* Fraser, 1957 (Insecta, Odonata): Proposed conservation as the correct spelling of *Ischnurinae* to remove homonymy with *Ischnuridae* Simon, 1879 (Arachnida, Scorpiones). *Bulletin of Zoological Nomenclature* 57(1): 26-28. (in English). ["The purpose of this application is to remove the homonymy between the damselfly subfamily name *Ischnurinae* Fraser, 1957 (type genus *Ischnura* Charpentier, 1840; family Coenagrionidae) and the scorpion family name *Ischnuridae* Simon, 1879 (type genus *Ischnurus* C.L. Koch, 1837, a junior subjective synonym of *Liocheles* Sundevall, 1833). It is proposed that the entire generic name of *Ischnura* should be adopted as the stem, so that the correct spelling of the damselfly subfamily will be *Ischnurinae* Fraser, 1957." (Authors)] Address: Fet, V., Department of Biological Sciences, Marshall University, Marshall, WV, 25755, USA

1836. Fliedner, T.; Fliedner, H. (2000): Herbstschlupf von *Gomphus vulgatissimus* (Odonata: Gomphidae). *Libellula* 19(1/2): 79-84. (in German with English summary). ["A teneral male of *G. vulgatissimus* was observed on 26-IX-1999 10 km NW Verden, Lower Saxony, Germany. This autumnal emergence is probably due to a period of extraordinary warm weather in September." (Authors)] Address: Traute und Heinrich Fliedner, Louisa-Seegelken-Str. 106, D-28717 Bremen, Germany

1837. Fonseca, T. de (2000): The dragonflies of Sri Lanka. WHT Publications, Colombo. ISBN 955-9114-19-0: 303 pp. (in English). [The dragonflies of Sri Lanka provides a comprehensive review of the Odonata of the Indian-Ocean island of Sri Lanka. It draws together such information on taxonomy, distribution and ecology as is presently available in the published literature. The dragonflies of Sri Lanka includes complete descriptions of the imagines, keys to the imagines (adults) of all species hitherto recorded from the island. In addition, it also includes keys to and descriptions of the larval stages of many of the species. The black and white drawings are taken - in most cases - from different publications of Fraser or Lieftinck. For each species, there are also information on references, its synonymy, and distribution. ["The book is intended to serve as an introduction to a more comprehensive exploration of this remarkable fauna, which includes some 52 species endemic

to Sri Lanka. The fauna is far from well known, however, and future studies will undoubtedly bring several more species to light; this guide is intended to lay a foundation for future research. [" 20 colour plates, information on rearing of dragonfly larvae, information on "Making and keeping a collection", a checklist of the Sri Lankan Odonata in the National Museum, Colombo, a glossary, a bibliography, and a species index will provide a lot of useful information on the Sri Lankan odonate fauna. I enjoyed this book. It should not be missing in any odonatological library. (M. Schorr)] Address: WHT Publications, 95 Cotta Road, Colombo 8, Sri Lanka

1838. Frat, J. (2000): Première observation de *Leucorrhinia pectoralis* (Charpentier, 1825) dans le département de l'Allier (Odonata, Anisoptera, Libellulidae). *Martinia* 16(1): 15-17. (in French, with English summary). [*L. pectoralis* was detected on May 29, 1999 near Chevagnes, Département Allier, France.] Address: Frat, J., Les Hauts Goths, F-03230 Lusigny, France

1839. Fürst von Lieven, A. (2000): The transformation from monocondylous to dicondylous mandibles in the Insecta. *Zoologischer Anzeiger* 239(2): 139-146. (in English with German summary). ["The evolution of the dicondylous mandible of insects can be reconstructed because the Lepismatidae show an intermediate condition between monocondylous and dicondylous mandibles. Monocondylous mandibles as in the Entognatha and Archaeognatha have only the dorsal (primary) condyle found in all Mandibulata and are moved around a vertical axis. Dicondylous "biting-type" mandibles as in the Pterygota have an additional (secondary) articulation anterior to the primary articulation, so that movement is limited to a transverse adduction around a horizontal axis of swing. Mandibles of the Lepismatidae have been considered intermediate with respect to their elongated shape and their musculature (BORNER 1909). Video recordings of the feeding movements of *Lepisma saccharina* L., 1758 show an unexpected motion pattern of the mandibles. The anterior articulation of *L. saccharina* comprises a clypeal and a tentorial condyle forming a guide for two sclerotized ridges on the dorsal surface of the mandible. Contrary to orthopteroid mandibles, which possess ball and socket type articulations, the movement of lepismatid mandibles is mainly a pro- and retraction. The secondary articulation acts as a guide. The same components of the secondary articulation as in the Lepismatidae can be found in larval Ephemeroptera, where the tentorial condyle is attached to the inner ridge of the mandible. In Odonata and Neoptera the secondary articulation is a ball joint, formed between the clypeal condyle and the ridges. These results show that the mandibles in the Lepismatidae have an intermediate condition in regard to shape, musculature and function of the secondary articulation. The further transformation of the insect mandible took different paths in Ephemeroptera and Metapterygota." (Author)] Address: Fürst von Lieven, A., AG Evolutionsbiologie, Freie Universität Berlin, Institut für Zoologie, Königin-Luise-Str. 1-3, D - 14195 Berlin, Germany

1840. Garcia Berthou, E.; Moreno Amich, R. (2000): Food of introduced pumpkinseed sunfish: ontogenetic diet shift and seasonal variation. *Journal of Fish Biology* 57(1): 29-40. (in English). ["The pumpkinseed sunfish *Lepomis gibbosus* introduced into Lake Banyoles (Spain) were predominantly littoral but there was a tendency of large fish to use deeper zones. Their diet was



dominated by littoral macrobenthos, particularly amphipods (*Echinogammarus* sp.). There was ontogenetic variation in the diet, with small young-of-the-year (L-F < 4 cm) feeding on several littoral microcrustaceans, especially the cladoceran *Ceriodaphnia reticulata*, whereas larger fish shifted to a freshwater shrimp (*Atyaephyra desmaresti*), snails and damselfly larvae. Seasonal variation in diet was linked to resource availability, with consumption of fish eggs and plant debris in spring and summer. In autumn, pumpkinseeds were partially zooplanktivores, preying on the cladoceran *Daphnia longispina*. The diet of pumpkinseeds in Lake Banyoles and other Iberian populations shows less molluscivory than North American populations. The potential ecological impact of this successful exotic species involves mainly predation on fish eggs and molluscs." (Authors)] Address: Garcia Berthou, E., Univ. Girona, Dept Ciencias Ambientals, E-17071 Girona, Spain. E-mail: caegb@fc.udg.es

1841. Geenen, S.; Jordaens, K.; de Block, M.; Stoks, R.; De Bruyn, L. (2000): Genetic differentiation and dispersal among populations of the damselfly *Lestes viridis* (Odonata). *J. N. Am. Benthol. Soc.* 19(2): 321-328. (in English). ["We investigated genetic differentiation among 8 populations of the protected damselfly *L. viridis* (Vander Linden, 1825) in permanent ponds in northern Belgium by means of allozyme electrophoresis and isoelectric focusing, and estimated levels of gene flow using F-statistics. In addition, we did a capture-mark-recapture experiment to estimate direct levels of gene flow. Our aim was to test whether populations of *L. viridis* represented a single, large panmictic population or formed a series of demographically isolated populations, which may be defined as appropriate management units (MU). None of the marked individuals moved among the ponds, indicating a strong fidelity for adults to their breeding pond. Only 1 population was genetically strongly differentiated, whereas little or no differentiation was observed among the 7 other ponds. Absence of adult dispersal but genetic homogeneity between ponds thus suggested substantial general dispersal. We observed large heterozygote deficiencies at 2 loci (*Fdh* and *Est*). Significant differences in allele frequencies among ponds suggests that populations of *L. viridis* in northern Belgium may consist of >1 MU. Management plans for conservation should therefore take into consideration the presence of several MUs in this species." (Authors)] Address: Geenen, Sofie, Department of Biohy, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: sgeenen@ruca.ua.ac.be

1842. Geissen, H.-P. (2000): Faunistische Mitteilungen für den Regierungsbezirk Koblenz, Beobachtungsjahre 1997 und 1998. *Fauna und Flora in Rheinland-Pfalz, Beih.* 25: 123-176. (in German). [Records of 23 odonate species are documented including records of *Lestes barbarus*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, and *Thecagaster bidentata*. Rheinland-Pfalz, Germany] Address: Geissen, H.-P., Brunnenstr. 34, D-56075 Koblenz, Germany

1843. Gesellschaft deutschsprachiger Odonatologen (2000): 19. Jahrestagung der GdO in Schwäbisch-Hall, 17. - 19. März 2000 Programm. Tagungsband: 31 pp. (in German / English). [The following lectures were held on the occasion of the 19th meeting of the German speaking Odonatologists: • Busch-Nowak, A.: Die AG

Libellen (AGL) Schwäbisch Hall • Riexinger, W.-D.: Naturschutz an naturnahen Fließgewässerökosystemen am Beispiel der Jagst, Baden-Württemberg. • Schmidt, B.: Modelluntersuchung zur Flußlibellenfauna an der Jagst. - insbesondere zu Metapopulationen von Gomphiden. • Sternberg, K.: Die Verbreitung der Libellen Baden-Württembergs im Einfluß der geografischen Lage und Topographie des Landes. • Schiel, F.J.: Aktuelle Bestandsentwicklung von und geplante Artenschutzmaßnahmen für *Leucorrhinia caudalis* in Baden-Württemberg. • Hunger, H.: Bemerkenswerte Vorkommen von *Sympetrum pedemontanum* und *S. fonscolombii* in der Oberrheinebene, Baden-Württemberg. • Rademacher, M.: Libellengemeinschaften von Kleingewässern im Randbereich einer Kiesgrube der Hartheimer Trockenau (Landkreis Breisgau-Hochschwarzwald), Baden-Württemberg. • Buchwald, R. & W. Röske: Welche Bedeutung hat die Vegetation für die Wahl des Kleinhabitats bei Zygopteren? • Bárdosii, E.; Müller, Z.; Nagy, S.; Devai, G.; Kiss, B.; Csabai, Z.;- Móra, A.; Szálassy, N.: Ein Vorschlag zur quantitativen Sammlung der in den verschiedenen Pflanzenbeständen lebenden Libellenlarven. • Buczynski, R.: Zwischen Ost und West: ein Vorkommen von *Sympetma paedisca* in Polen. • Samraoui, B.: Delayed maturation in Algerian Odonata: a response to the Mediterranean climate. • Jödicke, R.: Saisonale Anpassungen mediterraner und mitteleuropäischer *Sympetrum striolatum*. • Olberg, R.: Neuroethology of prey pursuit: neural connections from eyes to wings. (Part I). • Worthington, A.: Neuroethology of prey pursuit: video analysis of prey interception. (Part 2). • Schneider, W.: Die Insel Soqatra - Galapagos des Indischen Ozeans. • Ott, J.: 15 Jahre Monitoring der Libellenfauna einer Kiesgrube - wann ist endlich Schluss? • Kühn, J., & J.M. Müller: 20 Jahre Libellen am Schmiechener See: Zwischenbilanz einer Langzeitstudie. • Wildermuth, H.: Hat sich das Rotations-Modell zur Pflege kleiner Libellengewässer bewährt? Eine Rückschau auf 25 Jahre Erfahrung. • Clausnitzer, H.-J.: Auswirkungen einer Naturschutzmaßnahme auf Libellen. • Brockhaus, T.: Größendifferenzierungen in Libellenpopulationen und ihre mögliche Bedeutung für die Populationsdynamik. • Jahn, P.: Kopfhöcker als Sonderbildungen früherer Stadien von Libellenlarven. • Günther, A.: Reproduktionsverhalten einer bisher unbeschriebenen Form der Gattung *Disparocypha* aus Zentralsulawesi (Indonesien). • Grebe, B.: Violinen und kleine Müller - Libellen in Bulgarien. • Miller, E. & J. Miller: Winterbeobachtung von *Sympetma paedisca*. • Kern, D.: Bericht vom ersten Treffen der *Gomphus vulgatissimus* AG. The abstracts of each lecture are in German or English. On pages 25 - 27 an introduction into the natural history of the region around Schwäbisch-Hall, Baden-Württemberg, Germany is given with special emphasis on Odonata.] Address: GdO, z.H. Ulrike Krüner, Gelderner Str. 39, D-41189 Mönchengladbach, Germany

1844. Gillooly, J.F.; Dodson, S.I. (2000): The relationship of egg size and incubation temperature to embryonic development time in univoltine and multivoltine aquatic insects. *Freshwater biology* 44: 595-604. (in English). ["1. We used published data to investigate the combined influence of egg size and incubation temperature on embryonic development time for a broad assortment of aquatic insects at four different incubation temperatures (10, 15, 20 and 25 °C). 2. Embryonic development time (EDT) was positively correlated with egg size at each of the four temperatures, but with diffe-

rent relationships for univoltine and multivoltine aquatic insects. The relationships of embryonic development time to egg size expressed in degree-days did not significantly differ in slope ( $P > 0.50$ ) or intercept ( $P > 0.05$ ) for either univoltine or multivoltine aquatic insects at each of the four temperatures. 3. The relationship of EDT (degree-days) to egg mass in multivoltine aquatic insects ( $EDT = 885 \times 0,19$ ,  $P < 0.0001$ ,  $r^2 = 0.48$ ) is similar in slope and intercept to that for other oviparous animals (i.e., zooplankton, fish, amphibians and reptiles), and to the relationship of embryonic development time to neonate mass in mammals. Univoltine species on average require 3-5 times longer to develop ( $EDT = 14190 \times 0,29$ ,  $P < 0.001$ ,  $r^2 = 0.29$ ) than most other animals of equivalent egg mass, but the relationship of embryonic development time to egg mass is similar in slope to that of most other animals. Together, these relationships provide a basis for evaluating differences in embryonic development time among aquatic insects." (Authors). Data of *Diplacodes bipunctata*, *Diplacodes haematodes*, *Orthetrum caledonicum*, *Enallagma vernale*, *Enallagma ebrium*, and *Coenagrion puella* are involved in this study.] Address: Gillooly, J.F., 104 13th Avenue, St Pete Beach, FL 33706, USA. E-mail: jfgillooly@hotmail.com

1845. Goffart, P. (2000): Compte-rendu de l'excursion au Plateau des Tailles du dimanche 19 septembre 1999. *Gomphus* 16(1): 110-112. (in French). [Report from a trip to the bog of 'As Massotais', Belgium. *Aeshna cyanea*, *A. juncea*, *A. subarctica elisabethae*, and *Sympetrum danae* could be observed.] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvai-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

1846. Goffart, P. (2000): Compte-rendu des observations d'espèces prioritaires d'Odonates en Wallonie durant la saison 1999, dans le cadre du programme d'Inventaire et Surveillance de la Biodiversité (ISB). *Gomphus* 16(1): 85-98. (in French with English and Dutch summaries). ["This report gives an account of observations made in 1999 by the Gomphus Working Group collaborators about Odonata priority species, pointed out in the "Biodiversity Survey and Monitoring" program in Wallonie because of their great rarity and/or decline. It also presents collected information dealing with rare southern species, expanding to the north, during the same flight-season. New reproductive populations were discovered for the following species: *Sympetma fusca*, *Lestes dryas*, *Coenagrion pulchellum*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Oxygastra curtisii*, *Somatochlora arctica*, *Libellula fulva* and *Orthetrum coerulescens*. The progression of some southern species has been confirmed, in particular for *Coenagrion scitulum*, *Anax parthenope* and *Sympetrum fonscolombii*: serious presumptions of reproduction now exist for the first two and new evidences were reported for the third one." (Author). In addition, the following species are commented in some detail: *Lestes barbarus*, *Coenagrion hastulatum*, *C. mercuriale*, *C. pulchellum*, *Ceragrion tenellum*, *Thecagaster bidentata*, *Aeshna subarctica elisabethae* Djakonov, 1922, *Brachytron pratense*, *Epithea bimaculata*, *Somatochlora arctica*, *S. flavomaculata*, *Leucorrhinia rubicunda*, and *Orthetrum brunneum*.] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvai-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

1847. Gonzalez-Soriano, E.; Del Pilar Villeda-Callejas, M. (2000): *Ophiogomphus purepecha* spec. nov. from Mexico (Anisoptera: Gomphidae). *Odonatologica* 29(3): 261-266. (in English). ["The new sp. is described, illustrated and compared with *O. arizonicus* Kennedy, 1917. Holotype male Michoacán state, Los Azufres, Arroyo San Pedro, 4 km NW of San Pedro Jácuaro, alt. 2295 m, 29-XI-1998; allotype female, same data, but 18-XI-1989; deposited at CNIN, UNAM, Mexico. Its discovery in central Mexico represents a notable southern extension of the range of this genus in America." (Authors)] Address: Gonzalez-Soriano, E., Depto Zoología, Inst. Biol., Universidad Autonoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico

1848. Gorb, S.N. (2000): Ultrastructure of the neck membrane in dragonflies (Insecta, Odonata). *Journal of Zoology* 250(4): 479-494. (in English). ["This study describes and quantifies the microsculpture and ultrastructural design of the neck membrane of adult Odonata using scanning and transmission electron microscopy. The membranous cuticle has a complex pattern of microfolds, which appear to have a specialized mechanical function. The membrane has two layers of cuticle: the epicuticle and exocuticle. The outermost layer is the electron-opaque epicuticle, which repeats the shapes of the microfolds. The epicuticle has no fibrillar elements. The exocuticle is electron-lucent and rather thin (0.5-1.5  $\mu\text{m}$ ) compared with the sclerite cuticle. The cuticle microfibrils in successive lamellae are at angles to each other. The epidermal cells underlying the membrane have an electron-lucent matrix filled with electron-opaque spherical vesicles of 0.1-0.4  $\mu\text{m}$  in diameter. The behaviour of the membrane folds under loading was studied by shock-freezing experiments; these showed that the shape of the folds changed in response to head movements, and stretched under loading. A comparison of the surface patterns of the membrane in 10 odonate species from seven families [...] had not revealed any correlation of the measured parameters with the size, sex or systematic position of species studied." (Author) *Aeshna mixta*, *Anotogaster sieboldii*, *Coenagrion puella*, *Hemicordulia okinawensis*, *Hypolestes clara*, *Ischnura elegans*, *Lestes barbarus*, *Pyrrosoma nymphula*, *Sympetrum sanguineum*, *Zygonyx ida*] Address: Stanislav Gorb, Max-Planck-Institut für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. E-Mail: stas.gorb@tuebingen.mpg.de

1849. Grabow, K.; Martens, A. (2000): Polypen von *Hydra* sp. als Epizoen der Larve von *Somatochlora metallica* (Cnidaria: Hydrozoa; Odonata: Corduliidae). *Libellula* 19(1/2): 89-91. (in German with English summary). ["One final-instar larva taken from the stony shore of a navigable canal SE Berlin, Germany, in May 1998 bore 3 hydrozoan polyps." (Authors)] Address: Grabow, K., Hangelsberger Weg 23, D-15537 Grinheide/Mark, Germany. E-mail: karstengrabow@01019freenet.de

1850. Grand, D.; Papazin, M. (2000): Étude faunistique des odonates de Corse. *Martinia* 16(2): 31-50. (in French with English summary). [On the base of new records (in most cases from July 1999), the list of the 46 odonate species hitherto known from the island of Corsica, is commented, and a bibliography is provided. The fauna of Corsica (France) is compared with that of Sardinia and Sicily (Italy).] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mt d'or, France

1851. Hämäläinen, M.; Yeh, W.-C. (2000): *Matrona cyanoptera* spec. nov. from Taiwan (Odonata: Calopterygidae). *Opusc. zool. flumin.* 180: 1-6. (in English). ["The well known Taiwanese damselfly, usually called '*Matrona basilaris* subsp.', is described as a new species *Matrona cyanoptera* (holotype male: northern Taiwan: Taipei, Neishwangshi, 29-VI-1997)."] (Authors)] Addresses: Hämäläinen M., Dept Applied Zool., P.O. Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi.

Yeh, W.-C., Division of Forest Protection, Taiwan Forestry Research Institute, 53 Nanhai Road, Taipei, Taiwan, R.O.C. E-mail: wcyeh @serv.tfri.gov.tw

1852. Hämäläinen, M. (2000): *Risioenemis seidenschwarzi* spec. nov., an endangered damselfly from Tabunan forest in Cebu, the Philippines (Odonata: Platycnemididae). *Entomologische Berichten*, Amsterdam 60 (3): 46-49. (in English). ["A new dragonfly species, *Risioenemis seidenschwarzi* spec. nov. (holotype male: Philippines, Cebu, Tabunan, 9.II.1999) is described, illustrated and compared with the closely related *R. rolandmuelleri* Hämäläinen. The new species appears to be endemic to Cebu, where it, as a forest stream dweller, has a very limited area left for survival. Its endangered status is emphasized and its remaining habitat in the Tabunan forest area is characterized in detail."] (Author)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; e-mail: matti.hamalainen@helsinki.fi

1853. Hardersen, S. (2000): Effects of carbaryl exposure on the last larval instar of *Xanthocnemis zealandica* - fluctuating asymmetry and adult emergence. *Entomologia experimentalis et applicata* 96(3): 221-230. (in English). ["Fluctuating asymmetry (FA), a measure of developmental stability, has been suggested as a monitoring tool for environmental pollution. Aquatic pollution events are often transitional and the level of FA in populations exposed to such incidents has not yet been investigated. Research into the morphological effects of transitional pollution also provides a tool to elucidate the timing and duration of any 'window of opportunity' for the determination of FA in the developing organism. The present study was undertaken to investigate if exposure of the last instar of the damselfly *X. zealandica* [...] to different levels of insecticidal stress resulted in different levels of FA in the wings of the adult insects and if adult emergence was altered by different concentrations of pesticide. Three concentrations of carbaryl (40 ppb, 2 ppb and 0.1 ppb) and a control were used. The emergence success of the damselflies was not affected by any treatment, but the insecticide had a stimulatory effect on the developing larvae. Exposure of the last instar of *X. zealandica* to carbaryl at 40 ppb had no consistent effect on FA in metric traits and increased FA in meristic traits compared with the control. Segregation of the emerged adults into two groups revealed more details about the 'window of opportunity' in the meristic traits. Larvae which had already completed more than half of their development when the experiment started did not show significant differences in the level of FA. In contrast, damselflies which were exposed for more than half of the final instar showed a clear difference in their levels of FA. The greater difference in the latter group was mainly caused by a decrease of FA in the controls rather than by an increase in the treatment. These data suggest that the 'window of opportunity' for the determination of the level of FA of the meristic traits

in damselfly wings closes approximately halfway through the final larval instar." (Author)] Address: Hardersen, S., Tiergartenstr. 111, D-47533 Kleve, Germany. E-mail: sonke7hard@aol.com

1854. Hardersen, S.; Wratten, S.D. (2000): Sensitivity of aquatic life stages of *Xanthocnemis zealandica* (Odonata: Zygoptera) to azinphos-methyl and carbaryl. *New Zealand Journal of Marine & Freshwater Research* 34(1): 117-123. (in English). ["The susceptibility (48-h LC50 values) of aquatic life stages of *Xanthocnemis zealandica* McLachlan to azinphos-methyl and carbaryl was investigated. The LC50 values of azinphos-methyl did not correlate with instar. The most susceptible stage was instar 7 (LC50 value: 26.6 ppb), and the least susceptible were instars 2 (LC50 value: 50.2 ppb) and 13 (LC50 value: 45.1 ppb). In contrast, LC50 values for carbaryl were positively related to larval instar (instar 2: LC50 value: 156.6 ppb; instar 13: LC50 value: 760 ppb). Damselfly eggs were exposed to insecticide solutions (azinphos-methyl: control, 0.04, 0.4, 4, and 40 ppb; carbaryl: 0.6 and 6, 60, and 600 ppb) and hatching success evaluated. Only carbaryl at 600 ppb reduced hatching success significantly. Although the investigation on eggs was carried out at a higher temperature than the LC50 experiments it can be concluded that the egg stage is more resilient to both insecticides than the larval stages." (Authors)] Address: Hardersen, S., Tiergartenstr. 111, D-47533 Kleve, Germany. E-mail: sonke7hard@aol.com

1855. Hardersen, S. (2000): The role of behavioural ecology of damselflies in the use of fluctuating asymmetry as a bioindicator of water pollution. *Ecological Entomology* 25: 45-53. (in English). *Xanthocnemis zealandica* (McLachlan, 1873), "1. Fluctuating asymmetry has been used widely to investigate questions concerned with evolution and behaviour, and to study the effects of environmental pollution. Damselflies have been used to answer questions in both fields, but no attempt has been made to combine the knowledge from these areas to investigate whether and how evolutionary ecology and behaviour interfere with the use of fluctuating asymmetry as a bioindicator of water pollution. 2. Four hypotheses were formulated to investigate possible interferences: (1) Paired males should be less asymmetrical than unpaired males. (2) Males caught at breeding sites should be less asymmetrical than females caught at breeding sites. (3) Damselflies caught earlier in the season should be less asymmetrical than those caught later in the year. (4) Damselflies caught at control sites should be less asymmetrical than those caught at sites within areas of high pesticide usage. 3. No significant difference in asymmetry levels was found between paired and unpaired males. 4. Males were significantly less asymmetrical than females. 5. Damselflies caught earlier in the year were less asymmetrical than those caught later. 6. The data used to test the hypothesis that fluctuating asymmetry in the wings of mature damselflies reflects the level of pesticides used in the surrounding environment were equivocal. 7. The findings suggest that evolutionary ecology and behaviour interfere with the suitability of fluctuating asymmetry in mature damselflies as a biomonitoring tool and it is concluded that fluctuating asymmetry in emerging adults should be much more appropriate as a bioindicator." (Author)] Address: Hardersen, S., Tiergartenstr. 111, D-47533 Kleve, Germany. E-mail: sonke7hard@aol.com



1856. Haritonov, A.Yu. (2000): Charter meeting of the Russian section of Societas Internationalis Odonatologica (R.S.S.I.O.). Notul. odonatol. 5(3): 29-31. (in English). ["The meeting took place in Novosibirsk, on 11 Feb. 1998, and was attended by 13 workers. The Chairman of the Section and the Editor of its semiannual periodical, BELYSHEVIA, is Prof. Dr. A.Yu. Haritonov. Among the objectives of the Section are the coordination and promotion of Odonatological research in Russia, and the organisation of the 15th International Symposium of Odonatology, scheduled to be convened in Novosibirsk, in July 2001." (Author)] Address: Haritonov, A.Yu., Institute of Animal Systematics and Ecology, Siberian Branch of the Russian Academy of Sciences, Ul. Frunse 11, RUS-630091 Novosibirsk, Russia

1857. Harp, G.L. (2000): New zygopteran state records. *Argia* 12(2): 6. (in English). [USA; Tennessee: Telebasis byersi; Missouri: *Lestes inaequalis*, *Ischnura kellicottii*] Address: Harp, G.L., 3206 Maplewood Terrace, Jonesboro, AR, 72401, USA. E-mail: glharp@navajo.astate.edu

1858. Harrison, J.F.; Roberts, S.P. (2000): Flight respiration and energetics. Annual review of physiology 62: 179-205. (in English). ["We use a comparative approach to examine some of the physiological traits that make flight possible. Comparisons of related fliers and runners suggest that fliers generally have higher aerobic metabolic capacities than runners but that the difference is highly dependent on the taxa studied. The high metabolic rates of fliers relative to runners, especially in insects, are correlated with high locomotory muscle cycle frequencies and low efficiencies of conversion of metabolic power to mechanical power. We examine some factors that produce variation in flight respiration and energetics. Air temperature strongly affects the flight metabolic rate of some insects and birds. Flight speed interacts with flier mass, so that small fliers tend to exhibit a J-shaped power curve and larger fliers a U-shaped power curve. As body size increases, mass-specific aerobic flight metabolism decreases in most studies, but mass-specific power output is constant or increases, leading to an increase in efficiency with size. Intraspecific studies have revealed specific genetically based effects on flight metabolism and power output and multiple ecological correlates of flight capabilities." (Authors); *Anax junius* is mentioned] Address: Harrison, J.F., Arizona State Univ., Dept Biol., Tempe, AZ 85287, USA. E-mail: j.harrison@asu.edu

1859. Herren, B.; Herren, K. (2000): Entwicklung von *Onychogomphus forcipatus unguiculatus* in einem See (Odonata: Gomphidae). *Libellula* 19(1/2): 105-106. (in German with English summary). ["In 1998, 2 exuviae were collected at the Italian part of the Lago di Lugano. This is the first breeding record of the ssp. in a lentic habitat." (Authors)] Address: Bernhard und Kathrin Herren, Oberfeldstr. 46, CH-3550 Langnau im Emmental, Switzerland

1860. Hill, B.; Beinlich, B. (2000): The dragonfly community of a communal cattle pasture in the Sava floodplain (Croatia) with special reference to the biology of *Lestes barbarus* (Fabricius, 1798) (Zygoptera: Lestidae). *Exuviae* 7: 1-18. (in English with Slovene summary). ["A total of 25 dragonfly species were recorded between May and September 1997 on the communal cattle pasture of Lonja village and its surrounding area

in the Lonjsko Polje Nature Park. At least 10 dragonfly species were reproducing successfully in the astatic ponds. *Sympetrum* spp. were dominating the community as they accounted for 95 % of all exuviae collected. Their high productivity in astatic environment is shown by average densities of over 70 exuviae/m<sup>2</sup>/year. By employing mark-recapture techniques it was stated that after emergence, *L. barbarus* covers distances of 80 to 880m to reach the hedges surrounding the pasture, where the animals spend the entire maturation period. Suitability of hedges as maturation habitat depends on their width and the width of adjacent margins. When mature, nearly all animals observed returned to the pond where they had emerged. Densely vegetated pond habitats with vegetation heights between 20 and 50cm are preferred reproduction sites for *L. barbarus*. The highest recorded age for individuals was 69 and 68 days for males and females respectively. The importance of low-intensity pasturing systems for nature conservation is briefly discussed." (Authors)] Address: Hill, B.T.; Beinlich, B., Bioplan Marburg - Höxter, Deutschausstr. 36, D-35037 Marburg, Germany. E-mail: bioplan.marburg@t-online.de

1861. Hoekstra, J.D.; Smith, R.L. (2000): Reproductive behavior of two *Argia* spp. (Odonata: Coenagrionidae) at an Arizona stream. *Int. Jour. Odonatology* 3(1): 85-94. (in English). ["Here we provide a first report on the reproductive behavior of *Argia sabino* Garrison and *Argia pima* Garrison from observations at Sabino Creek, Arizona. Both species reproduce in autumn (September-October) following late summer rainstorms. Tandem pairs of *A. sabino* submerge to oviposit on rock substrates. The oviposition substrate is abundant and widespread. Male *A. sabino* defend mate-encounter territories in the morning at boulder fields or rock outcrops away from the stream. Copulation may last 30 minutes or more. Ovipositing females submerge in tandem with males, typically to depths of 10-30 cm, and pairs may remain submerged for over 30 minutes. Male submergence with females can be interpreted as contact mate guarding promoted by sperm competition and/or as a male investment in the female's survival and oviposition success. We discuss evidence for both possibilities based on field observations. Whereas ovipositional resources for *A. sabino* are ubiquitous at Sabino Creek, *A. pima* uses patchily distributed, discrete ovipositional habitats (wetter rootlets of riparian trees at waterfalls and riffles). Males of *A. pima* employ a mixture of contact and noncontact mate-attendance strategies. Females occasionally submerge to oviposit. Often they oviposit along the margins of torrential cascades. Male *A. pima* have been observed to release submerging mates just before their own wings become wetted, and to monitor submerged ovipositing females from a nearby perch thereafter." (Authors)] Address: Hoekstra, J.D., Center for Aquatic Ecology, Illinois Natural History Survey, 607 E. Peabody, Champaign, IL 61820, USA. E-mail: hoekstra@inhs.vivc.edu

1862. Hoffmann, L. (2000): Vergleich von Libellenvorkommen an Gewässern mit vergleichbaren Strukturen im Bereich von ehemaligen Tongruben im Westerwald. *Pflanzen und Tiere in Rheinland-Pfalz - Berichtsjahr 1999 - Heft 10*: 181. (in German). [List of odonate records from 14 clay pits in the Westerwald region, Rheinland-Pfalz, Germany. 24 species are listed; the records of *Erythromma najas*, *Ischnura pumilio*, and

*Orthetrum brunneum* are of some faunistical interest.]  
Address: not stated

1863. Holmen, M. (2000): Comments on Henning Pedersen's paper about rare and new dragonfly species in Denmark 1997-1998. *Nordic Odonatological Society Newsletter* 6(1): 16-17. (in Danish with English summary). ["In recent, almost identical papers in this and two other magazines, Henning Pedersen presented new records of several dragonfly species rare or new to the Danish fauna. The papers also includes a severe criticism on the presented distribution of species in the book on Danish dragonflies by Nielsen (1998). The present paper comments on the often very unprecise and reduced data, that are so far available from Henning Pedersen and his Danish mapping-project GOMPHUS. It also emphasizes the need to bring forward knowledge relevant for the protection of species and their habitats. A few corrections about older records mentioned in Henning Pedersen's paper are suggested. It is also suggested, that the specimen published by Ole Fogh Nielsen as *Sympetrum fonscolombei* new to Denmark, is actually a female *S. flaveolum*." (Author)] Address: Holmen, M., Gadeledsvej 48, Gadevang, DK.-3400 Hillerød, Denmark. E-mail: ma@fa.dk

1864. Hunter, M. (2000): Broad-bodied Chaser *Libellula depressa* in County Durham. *Atropos* 11: 58. (in English). [September record of *L. depressa* in north-east England.] Address: Hunter, M., 45 Brinkburn Avenue, Darlington, Co. Durham, DL3 0JN, UK.

1865. Illmonen, J.; Korkeamäki (2000): The fourth nordic meeting for odonatologists. *Nordic Odonatological Society Newsletter* 6(1): 8-10. (in English). [Report from the 4th meeting of the Scandinavian odonatologists on 26-28 June 1998 in Konnevesi Research Station, Finland. In the framework of the meeting, 28 species on five localities surveyed could be recorded, including species as *Platycnemis pennipes*, *Erythromma najas*, *Coenagrion armatum*, *C. johanssoni*, *Aeshna subarctica elisabethae*, *Ophiogomphus cecilia*, *Somatochlora flavomaculata*, *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis*, and *Sympetrum flaveolum*.] Address: Korkeamäki, E., Karkunkatu 18 a 4 b, FIN-48600 Karhula, Finland.

1866. Jiang, Y.-H. (2000): Verification and distribution of genus *Aeschnophlebia* Selys (Odonata: Aeschnidae) in China. *Zhonghua Kunchong* 20(1): 63-67. (in Chinese with English summary). ["This article discusses the identity of two species of *Aeschnophlebia* Selys 1883, *A. anisoptera* Selys and *A. logistigma* Selys, in China. The author fully recognizes the presence of the latter by the specimen obtained from Nanjing and Yuntai Mountain in the northern part of Jiangsu Province. *A. anisoptera* Selys is not present in China. Descriptions and illustrations of these two species are provided. This article also states that *A. kolthoffi* Sjöstedt 1925 is a new synonym of *A. longistigma* Selys 1883." (Author)] Address: Jiang, Yao-Hua, Yuntaixiang Diversified Management Office, Lianyungang City, Jiangsu, 222064, China

1867. Jödicke, R.; Borisov, S.N.; Haritonov, A.Y.; Popova, O. (2000): Additions to the knowledge of *Sympetrum sinaiticum* Dumont (Odonata: Libellulidae). *International Journal of Odonatology* 3(2): 131-140. ["New information shows that *S. sinaiticum* is not divided into subspecies, as hitherto supposed. The subspecific name *tarraconense* Jödicke, 1994 must be regarded as a

junior synonym of *sinaiticum*. In contrast, the name *arenicolor* Jödicke, 1994 denotes a taxon at full species rank, characterized by its larval and ligula morphology. This species is taxonomically identical to *S. s. deserti* Jödicke, 1994. Since the latter name has been established in the same work, we determine the precedence of *arenicolor* as the valid name for the Asiatic species. Range, seasonality, and habitat selection of *S. sinaiticum* are outlined." (Authors)] Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany. E-mail: r.joedicke@t-online.de

1868. Jödicke, R. (2000): Späte Herbstnachweise von *Lestes sponsa* und *Sympetrum striolatum* (Odonata: Lestidae, Libellulidae). *Libellula* 19(1/2): 113-115. (in German with English summary). ["*L. sponsa* was on the wing until 07-XI-1999 in Baden-Württemberg, southwestern Germany, and *S. striolatum* until 17-XII-1994 in Switzerland. Both observations are the latest autumnal records of these species in Central Europe." (Author)] Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany. E-mail: r.joedicke@t-online.de

1869. Jödicke, R.; Arlt, J.; Kunz, B.; Lopau, W.; Seidenbusch, R. (2000): The Odonata of Tunisia. *Int. Jour. Odonatology* 3(1): 41-71. (in English). ["Between 1987 and 1999 several visits to 69 localities in Tunisia were made. Altogether 46 species of Odonata, including 10 new to Tunisia, were recorded, raising the Tunisian checklist to 52 species. Our observations cover early May to mid June and late September to early November. Using as a basis for inference data from nearby Numidia that cover the period missing from our own observations, we assume that many species have a long flight period. Among such species, some are known to be univoltine, exhibiting protracted aestivation as a prereproductive adult, whereas some others, we suggest, may be bivoltine." (Authors)] Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany. E-mail: r.joedicke@t-online.de

1870. Johnson, M.D. (2000): Evaluation of an arthropod sampling technique for measuring food availability for forest insectivorous birds. *J. field ornithol.* 71: 88-109. (in English). [In Tab. 2 Odonata are mentioned as food of Northern Parula and American Redstart] Address: Johnson, M.D., Dept of Wildlife, Humboldt State Univ., Arcata, California 95521, USA

1871. Jourde, P. (2000): Nouvelles données de captures d'odonates par un végétal non carnivore. *Martinia* 16(1): 3-7. (in French with English summary). [More than 200 individuals of *Calotperyx splendens*, *Platycnemis latipes*, *Ischnura elegans*, *Cercion lindenii*, *Ceragrion tenelleum*, and *Sympetrum striolatum* were seen caught by the bristles of Rough Bristle-grass *Setaria verticillata* growing along the river Charente in the French départements of Charente and Charente-Maritime.] Address: Jourde, P., 4, rue du Fressin, Les Creuseaux, 17250 Romegoux, France

1872. Jurzitza, G. (2000): *Der Kosmos Libellenführer. Die Arten Mittel- und Südeuropas.* Kosmos Naturführer. Franckh. Stuttgart. 2. überarbeitete und aktualisierte Ausgabe. ISBN 3.440-08402-7: 191 pp. (in German). [When in 1978 Gerhard Jurzitza's book on the Central European Odonata was published, a corner stone of Central and Western European odonatology was set. I can hardly imagine what would have happen with my li-

fe if I had not purchased this book as a schoolboy. I think, it was the most important book in my life. This book was translated into several languages and I suppose it has influenced many of us. Ten years later a new edition - with the species from southwestern Europe added - was published. The reader got a sound introduction into odontology, and many very good colour pictures which enabled people to enjoy and to identify dragonflies. The book was modern and the information given up-to-date. The second edition is improved by some amendments. The checklist of European dragonflies is quite complete, including species from Italy and southeastern Europe. The book is now hard bound. It is regrettable that the opportunity was not taken to produce a completely new book on the Odonata of Central and Southern Europe (as the title suggests!), Colour photographs of all species (except of *Cordulegaster charpentieri*?) are available and thus all species could have been covered. Additional species for France (*Somatochlora meridionalis*) are also not documented. Although this is a fine book, it contains no real new information compared to the 1988 edition. I never will forget the merits Dr. G. Jurzitza earns for his 1978 book and his odontological vita. Therefore it is very sad that he was not given the opportunity to write a completely new book on the (southern) European Odonata. (M. Schorr)]

1873. Kalkman, V.J. (2000): Records on the dragonfly fauna of northwestern Albania (Odonata). *Libellula* 19 (1/2): 107-111. (in English with German summary). ["A total of 24 Odonata species were recorded in June and July 1996. The characters of the ssp. of *Lestes virens* conform with neither with ssp. *virens* nor with ssp. *vestalis*. As expected the specimens of *Lestes viridis* belong to the ssp. *parvidens*." (Author)] Address: Vincent J. Kalkman, National Museum of Natural History, P.O. Box 9517, NL-2300 RA Leiden, The Netherlands. E-mail: Kalkman@naturalis.nnm.nl

1874. Kamimura, Y. (2000): Possible removal of rival sperm by the elongated genitalia of the earwig, *Euborellia plebeja*. *Zoological science* 17(5): 667-672. (in English). ["Sperm displacement is a sperm competition avoidance mechanism that reduces the paternity of males that have already mated with the female. Direct anatomical sperm removal or sperm flushing is known to occur in four insect orders: Odonata, Orthoptera, Coleoptera and Hymenoptera. In a fifth order, Dermaptera (earwigs), I found that the virga (the elongated rod of the male genitalia) of *Euborellia plebeja* seems to be used to remove rival sperm from the spermatheca (a fine-tubed female sperm storage organ). In this species, copulation lasted on average 4.6 minutes, during which time the male inserted the virga deep into the spermatheca, and then extracted it ejaculating semen from the opening of the virgal tip. The extraction of virgae (with its brim-like tip) appeared to cause removal of stored sperm in the spermatheca. The virga was as long as the body length of males, and the spermatheca was twice the female body length. The long length of the spermatheca and the possible removal function of the virga may select for virgal elongation." (Author)] Address: Kamimura, Y., Tokyo Metropolitan Univ., Dept Biol., Minamiosawa 1-1, Hachioji, Tokyo 0397, Japan. E-mail: kamimu@comp.metro-u.ac.jp

1875. Kempe, R. (2000): Das NSG "Heidemoor bei Ottermoor" und die "Otterheide". *Naturschutz in der*

Samtgemeinde Tostedt 11: 10-12. (in German). [In a more popular account on the flora and fauna of two bog-dune habitats near Tostedt (Niedersachsen, Germany) 15 odonate species not further detailed are mentioned. A freshly emerged *Aeshna subarctica elisabethae* is pictured.] Address: Kempe, R., Wörner Weg 3, D-21256 Höckel, Germany. E-mail: JureiKempe@aol.com

1876. Kenner, R.D.; Cannings, R.A.; Cannings, S.G. (2000): The larva of *Leucorrhinia patrica* Walker (Odonata: Libellulidae). *Int. Jour. Odonatology* 3(1): 1-10. (in English). [The final-stadium larva of *L. patricia* is described from six exuviae with associated teneral adults collected in northern British Columbia, Canada. "*L. patricia* belongs to the group of nearctic *Leucorrhinia* that has larvae with three ventral stripes. The larvae are very similar to those *L. hudsonica* (Selys) larvae that are small and lack dorsal spines. Several characters help to separate these species, at least in the western part of their range: length of the epiproct and patterns of the profemora and abdomen. The preparation of a more definitive key awaits the analysis of more material of *L. patricia* and *L. hudsonica*." (Authors)] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street Victoria, British Columbia V8W 9W2. Canada. E-mail: rcannings@royalbcmuseum.bc.ca

1877. Kinvig, R.G.; Samways, M.J. (2000): Conserving dragonflies (Odonata) along streams running through commercial forestry. *Odonatologica* 29(3): 195-208. (in English). ["Commercial afforestation of natural ecosystems is increasing worldwide. There is little information however, on the extent to which biodiversity is being affected by this practice. This is especially so for stream fauna, including the conspicuous Odonata. Some dragonflies and damselflies may decline when their natural environment is anthropogenically changed and, as a group, they are sensitive to the impact of afforestation. The sites were four pine plantations in KwaZulu-Natal, South Africa. 14 environmental factors were recorded along stretches of streams running through each of the four sites. The diversity of odonate spp. and their abundances along these streams were measured. There was a strong positive correlation between certain abiotic factors, for example, boulder cover and shade, with the local distributions of these insects. Water pH was also a strong correlate. Most spp. required both unpolluted water and a sunlit stream. Particular vegetation type and exact distance of pine trees from the water's edge (so long as they did not shade the stream) were not strong correlates. This meant that species diversity dropped dramatically where the water was completely shaded by a closed canopy, whether it was from natural forest or from exotic trees. It is recommended that no plantation trees should shade a stream edge, and should be planted at least 30m from the water. All highly invasive, dense-canopy weeds, especially *Acacia mearnsii*, should be removed, and extensive and intensive cattle trampling of the banks avoided." (Authors)] Address: Samways M.J., Invertebrate Conservation Research Centre, Dept Zool. & Entomol., University of Natal, P/Bag X01, Scottsville 3209, Pietermaritzburg, South Africa. e-mail: samways@zoology.unp.ac.za

1878. Kobayashi, H.; Sekizawa, Y.; Aizu, M.; Umeda, M. (2000): Lethal and non-lethal responses of spermatozoa from a wide variety of vertebrates and invertebra-



tes to lysenin, a protein from the coelomic fluid of the earthworm *Eisenia foetida*. *Journal of Experimental Zoology* 286(5): 538-549. (in English). ["Lysenin, a novel protein that we isolated from the coelomic fluid of the earthworm *Eisenia foetida*, binds specifically to sphingomyelin (SM) among various phospholipids found in cell membranes, and causes cytolysis. The plasma membrane of mammalian spermatozoa is known to contain SM at relatively high levels and we therefore examined the effects of lysenin on the spermatozoa of various animals. Lysenin had lethal effects on spermatozoa of 5 of 33 species of invertebrates tested and on spermatozoa of 30 of 39 species of vertebrates. We postulated that plasma membranes of the spermatozoa of most invertebrates might not contain SM whereas those of most vertebrate species might contain SM. These possibilities were supported by our failure to detect SM chemically in the testes of three species of invertebrates, in none of which spermatozoa responded to lysenin. In contrast, we detected SM in the testes of all 25 vertebrate species examined, irrespective of a negative or positive response of spermatozoa to lysenin. None of the six species of Protista examined was affected by lysenin. Our survey suggests that, in general, the spermatozoa of animals can be grouped into two categories, invertebrate and vertebrate, depending on the absence or presence of SM in their plasma membrane. The incorporation of SM into spermatozoa seems first to have occurred in protochordates during the course of evolution. Discussions about the exceptional responses to lysenin observed in the spermatozoa of five species of invertebrates and of nine species of vertebrates are made from phylogenetic and reproductive viewpoints." (Authors) *Crocothemis servilia*, *Orthetrum albistylum japonicum*, *Sympetrum darwinianum*, *Sympetrum frequens*] Address: Kobayashi, H., 3-16-17 Kamisaginomiya, Nakano-ku, Tokyo, 165-0031, Japan

1879. Kuhn, J. (2000): Pflegeproblematik in präalpinen Mooren am Beispiel von Libellen und Amphibien. In: Schutzgemeinschaft Libellen in Baden-Württemberg (SGL). Artenschutz in Mooren - Konzeption um Umsetzung. Vorträge der Tagung der Schutzgemeinschaft Libellen in Baden-Württemberg am 19. und 20. Mai 2000 in Kißlegg: 10. (in German). [The efficiency of "Prozeßschutz" (self-regulated processes of habitat development) for nature conservation aims is critically discussed with emphasize to habitat selection of Odonata and Amphibia. In most cases self-regulated processes are unsuitable to realise the tasks of habitat and species conservation in Central Europe.] Address: Kuhn, J., Max-Planck-Institut für Verhaltensphysiologie, Abt. Winckler, D-82319 Seewiesen. E-mail: kuhn@mpi-seewiesen.mpg.de

1880. Kunz, B. (2000): Zum Lac Obeira in Algerien. *Libellennachrichten* 4: 16-18. (in German). [Report on a short odonatological trip to the famous Lac Obeira in Algeria. *Urothemis edwardsii* and *Acisoma panoroides ascalapoides* could not be traced.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@gmx.de

1881. Lafontaine, R.-M.; Goffart, P. (2000): *Compte-rendu de l'excursion du 18 juillet 1999 en Gaume ou "Peut-on voir 40 espèces de libellules en une journée en Wallonie?"*. *Gomphus* 16(1): 106-110. (in French). [34 species were observed near Gaume, Belgium. Of

special interest are observations of *Coenagrion scitulum*, *C. mercuriale*, *C. pulchellum*, *Somatochlora flavomaculata*, *S. arctica*, *Thecagaster bidentata*, *Crocothemis erythraea*, and *Sympetrum fonscolombei*.] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

1882. Laurila, A. (2000): Behavioural responses to predator chemical cues and local variation in antipredator performance in *Rana temporaria* tadpoles. *Oikos* 88(1): 159-168. (in English). ["Antipredator behaviour is an important factor influencing survival probability of prey animals, and it may evolve rapidly as a response to changes in predator regime. I studied antipredator behaviour of common frog (*Rana temporaria*) tadpoles from three populations that differ in predator regimes. In the first experiment, tadpoles obtained from four natural matings in each population were subjected to chemical cues from either European perch (*Perca fluviatilis*) or from larvae of the dragonfly *Aeshna juncea*. Tadpoles decreased their activity in response to both predators, but the spatial behaviour of tadpoles differed between the two predator treatments. In general, there were no differences in behaviours among the populations, but in three out of four studied behaviours there were differences between parentages within the populations suggesting that these behaviours may be genetically determined. The lack of a significant Predator X Population interaction suggests no differences in plastic antipredator behaviour among the populations, while the lack of significant Predator X Parentage interaction suggests no genetic variance within the populations for plastic antipredator behaviour. In the second experiment, tadpoles from the three populations were exposed to predation by a free-ranging *A. juncea*. In line with the first experiment, there were no differences in survival rate between the populations. *R. temporaria* tadpoles seem to rely heavily on plastic antipredator behaviour as their main response to predator chemical cues. There was very little indication of local behavioural differentiation and the possible reasons for the lack of divergence among populations are discussed." (Author)] Address: Laurila, A., Dept of Population Biology, Evolutionary Biology Centre, Uppsala Univ., Norbyvagen 18d, SE-75236, Uppsala, Sweden

1883. Lederer, P. (2000): The travelling ode show. *Argia* 12(2): 3-6. (in English). [Teaching about dragonflies] Address: Lederer, P.T., 33 Hamden Avenue, Staten Island, NY, 10306, USA

1884. Lingenfelder, U. (2000): Die Libellenfauna (Odonata) des Wieslautertales und ausgewählter Seitentäler im Pfälzerwald. Diplomarbeit, FB Sozial- und Umweltwissenschaften, Fachrichtung Biogeographie, Universität des Saarlandes: 186 pp. (in German). [The Pfälzerwald-region is situated in the southwestern part of Rheinland-Pfalz, Germany. The natural heritage of this region is outstanding, and so is its odonate fauna. Most important are the so called "Wooge", standing waters with a flora and fauna of transition bogs. Of European importance are the running waters with their strong populations of *Ophiogomphus cecilia*, and other river dwelling odonate species. One of these running waters, the Wieslauter, and the waters situated close to this brook, were investigated in 1999. 32 species could be observed. Each of the species is treated in a monographic way, and the records are mapped localitywi-

se. This is a very sound regional fauna with a lot of interesting details.] Address: Lingenfelder, U., Seebergstr. 1, 67716 Heltersberg, Germany

1885. Lohr, M. (2000): Reproduction de *Trithemis annulata* (Palisot de Beauvois, 1805) dans le département des Pyrénées-Orientales (Odonata, Libellulidae). *Martina* 16(2): 51-52. (in French with English summary). [July 5, 1999 two exuviae of *T. annulata* were found on the banks of River Tech near its mouth at the Mediterranean Sea, 15 km south-east of Perpignan, France.] Address: Lohr, M., An der Kirche 22, D-37671 Hörter, Germany

1886. Lucker, T. (2000): Revitalisierung von Fließgewässern der Agrarlandschaft - Ergebnisse limnologischer Effizienzuntersuchungen und Schlußfolgerungen für die Praxis. *Artenschutzreport* 9 (1999): 48-55. (in German with English summary). ["Since 1990 the nature conservation project „Revitalisierung in der Ise-Niederung" has taken a variety of measures to revitalise the cultivated land in the catchment area of the river Ise (east Lower Saxony). Scientific efficiency controls were carried out to determine the results for nature conservation aims. An increase of macrozoobenthos species diversity over a period of 7 years has been observed. However the number of rheotypical species showed more growth compared to limnotypical or indifferent species. These positive changes were analysed and discussed. References for establishing nature conservation achievements in landscapes of intensive farming were given from the limnological point of view." (Author). 7 odonate species including *Calopteryx splendens*, *Gomphus vulgatissimus*, and *Ophiogomphus cecilia* are recorded from 3 sample localities.] Address: Lucker, T., Otter-Zentrum, D-29386 Hankensbüttel, Germany

1887. Mahato, M. (2000): Resource partitioning among larvae of six coexisting odonate species of the Kali Gandakiriver, central Nepal (Anisoptera). *Odonatologica* 29(3): 209-223. (in English). ["Odonate larvae were collected from 50-1190 m elevation in central Nepal's Gandaki River from 1984 to 1986. Resource partitioning among coexisting odonate spp. at high (>500m) and low (<500m) elevations was investigated by examining their gut contents. At both elevations, diet differences between *Anisogomphus occipitalis* and *Davidius* sp. were statistically significant. *A. occipitalis* ate mostly midges whereas *Davidius* sp. ate mayflies and caddisflies as well as midges. At low elevation there was no diet difference between *A. occipitalis* and *Paragomphus lineatus* nor between the libellulids *Crocothemis servilia* and *Trithemis festiva*. Analyses of niche breadths indicate overlap between *Davidius* sp., *Macromia moorei*, *C. servilia*, and *T. festiva*, and between *A. occipitalis* and *P. lineatus*. Significant diet differences in both *A. occipitalis* and *Davidius* sp. between low and high elevations may indicate negative interactions in the presence of other coexisting species at low elevation. Similarly, at low elevation both spp. have a narrow niche breadth, a low average number of prey items per gut, and also more empty guts than at high elevation. Mean body weights of studied Odonata were relatively higher at lower elevation than at higher elevation. Predatory interactions seemed to be of little or no importance in structuring this lotic odonate assemblage, in contrast with lentic Odonata in other studies." (Author)] Address: Mahato, M., URS Greiner Woodward

Clyde, P.O. Box 681059, Franklin, Tennessee 37067, USA. E-mail: MahendraMahato@urscorp.com

1888. Mardulyn, H. (2000): Évolution des populations d'Odonates dans la réserve naturelle du Bec du Feyi, en Ardenne. *Gomphus* 16(1): 37-48. (in French with English and Dutch summaries). ["Since the creation of the nature reserve of Bec du Feyi in 1992, its dragonfly populations have been systematically monitored [...]. After seven seasons, 25 species have been found. The noticeable increase of observed annual species number, from 1993 to 1999, could be a result of the conservation and management measures taken in the reserve. Possible causes of important populations fluctuations noticed in some species are discussed." (Author) Emphasize is given to the development of the populations of *Coenagrion puella*, *Lestes sponsa*, and *Gomphus pulchellus*.] Address: Mardulyn, H., Avenue de la Liberté, 101, B-1080 Bruxelles, Belgium

1889. Marinov, M. (2000): Pocket field guide to the dragonflies of Bulgaria. Eventus Publishing House, Sofia. ISBN 954-90613-1-0: 104pp. (in Bulgarian). [In fact this is the first color field guide for any invertebrate group for Bulgaria. Only imagines are dealt with. Twelve color photos (page 14-17) represent different types of habitats in Bulgaria. The identification key (page 18-32) is organized using color computer graphics with arrows pointed to the exact morphological features. All 66 species so far known for Bulgaria are illustrated (page 34-95) and the color graphics from the identification key are added. In addition very short information for each species is provided. It refers to the species dimorphism (if any) - sexual and age dependend; closely related species; subspecies in Bulgaria (only for established ones); ecological notes (larval preferences); flying period (according to the earliest and latest observation dates for Bulgaria) and measurements (total length and wing span). The guide suffers from some mistakes the most significant of which is the coloration of the abdominal tip in female *Ischnura pumilio* (page 19 and 57), which is illustrated like in the male. (Autorreferat Milen Marinov). On page 79 frons and wing venation of *Somatochlora meridionalis* and *S. metallica* seem to be exactly the same computer graphs which correspond to *S. metallica*. The distribution maps of the species are useful. "The British Government, through the British Embassy in Bulgaria, decided to fund the publication because such a well-designed guide, used properly, can help in encouraging an interest of nature among young people in Bulgaria. We hope that the guide will bring a great deal of enjoyment to many people, and help them to appreciate and become more involved in Bulgaria's nature heritage."] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mgmarinov@yahoo.com

1890. Martens, A. (2000): Group oviposition in *Coenagrion mercuriale* (Charpentier) (Zygoptera: Coenagrionidae). *Odonatologica* 29(4): 329-332. (in English). ["Pairs aggregate during oviposition. Discrimination experiments with pairs of floating leaves of *Berula erecta* show that tandems land preferentially on leaves where a single motionless male in the typical vertical position of a tandem male is present." (Author)] Address: Martens, A., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: andreas.martens@tu-bs.de

1891. Mauersberger, R. (2000): Rezenten Fließgewässervorkommen von *Onychogomphus forcipatus forcipatus* in Brandenburg (Odonata: Gomphidae). *Libellula* 19(1/2): 97-103. (in German with English summary). [In 1999, the reproduction of *Onychogomphus forcipatus* (L.) in running waters in Brandenburg was recorded for the first time. The habitats are brooks between Feldberg (Mecklenburg-Vorpommern) and Lychen (Brandenburg) with solid sediments comprising gravel and shells, fully shaded by forests and supplied with warm water by clear water lakes. Other rheophilous species found there are *Gomphus vulgatissimus*, *Calopteryx virgo*, *Unio crassus* and *Theodoxus fluviatilis*. Lake habitats of *O. forcipatus* as they are typical for the glacial formed landscape of NE-Germany are situated nearby." (Author)] Address: Mauersberger, R., Waldstr. 4, D-16278 Steinhöfel, Germany. E-mail: FoerderevereinUckermaerk.Seen@t-online.de

1892. May, M. (2000): Margaret Westfall: 1921-2000. *Argia* 128(1): 4-5. (in English). [Obituary of Margaret Westfall born in Corning NY (USA), on August 5, 1921 and passed away in Gainesville, GA, on February 9, 2000.] Address: ML 5109L 5109ay, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA

1893. McIntyre, P.B.; McCollum, A.S. (2000): Responses of bullfrog tadpoles to hypoxia and predators. *Oecologia* 125: 301-308. (in English). [Low dissolved oxygen concentrations present numerous challenges for non-air-breathing aquatic organisms. Amphibian larvae and their predators can respond to oxygen levels by altering their behavior and physiology, but the ecological consequences of these responses are generally unknown. We conducted two laboratory experiments to study the effects of dissolved oxygen on respiratory behavior and susceptibility to predation of larval bullfrogs (*Rana catesbeiana*). In the first, we exposed small, lungless tadpoles to a predatory salamander larva (*Ambystoma tigrinum*) under high and low oxygen conditions. More tadpoles were consumed in high oxygen tanks than in low ones, presumably because salamanders remained near the surface in the low oxygen tanks while most tadpoles rested on the bottom. Tadpole activity depended on both oxygen and predator presence: swimming decreased after addition of salamanders under high oxygen, but increased under low oxygen. In the second experiment, we examined the effect of predator chemical cues on the air-breathing rate of large tadpoles with well-developed lungs under low oxygen conditions. In the presence of chemical cues produced by dragonfly larvae (*Anax longipes*) consuming bullfrog tadpoles, air-breathing and swimming were significantly reduced relative to controls. These experiments demonstrate the potential impact of dissolved oxygen on predator-prey interactions, and suggest that outcomes depend on the respiratory ecology of both predator and prey." (Authors)] Address: McIntyre, P.B., Department of Ecology and Evolutionary Biology, Corson Hall, Cornell University, Ithaca, NY 14853-2701, USA

1894. McMillan, V.E. (2000): Postcopulatory behavior in *Libellula pulchella* Drury (Odonata: Libellulidae) and female tactics for avoiding male interference with oviposition. *Journal of Insect Behavior* 13(4): 573-583. (in English). [Postcopulatory behavior was studied in *Libellula pulchella*, a North American dragonfly in which

ovipositing females face frequent harassment by unpaired males seeking matings. Although males performed noncontact guarding of their mates after copulation, females received minimal protection since their guards tended to leave on extended chases of other males when harassment was intense. Ovipositions by unguarded females were even more likely to be terminated by harassment and were disrupted sooner. Female tactics to minimize interference included rapid escape flights, repeated return visits to the water within short time periods, perching when severely harassed, and proceeding with mating when clasped. Female use of multiple oviposition sites is discussed in the context of guarding effectiveness and mate recognition by males." (Author)] Address: McMillan, Vicky, Colgate Univ., Dept. Biol., 13 Oak Dr. Hamilton, NY 13346, USA . E-mail: vmcmillan@mail.colgate.edu

1895. Meurgey, F.; Herbrecht, F.; Gurliat, P.; Dortel, F.; Boureau, A.; Duscoulier, F.; Williamson, T. (2000): Atlas préliminaire des Odonates de Loire-Atlantique. *Martinia* 16 (Suppl. 1): 1-28. (in French with English summary). [Commented maps of the 54 Odonata species recorded so far in Loire-Atlantique département, France.] Address: Meurgey, F., 2, rue Bossuet, F-44000 Nantes, France

1896. Meyer, E.; Meyer, A.; Billen, M. (2000): Fallbeispiel Sauer, ein Karstbach der Paderborner Hochfläche. *Natur- und Umweltschutz Akademie Nordrhein-Westfalen - Seminarberichte* 5: 121-128. (in German). [In a case study the macrozoobenthos of a carstic brook in the east of the federal state Nordrhein-Westfalen, Germany was surveyed from January to October 1996. *Calopteryx splendens* (larva) was found at a single sampling point.] Address: Meyer, Elisabeth, Inst. Spezielle Zoologie, Abt. Limnologie, Westfälische Wilhelms-Universität Münster, Hüfferstr. 1, D-48149 Münster, Germany.

1897. Mikolajewski, D.J.; Miksche, D.; Leipelt, K.G.; Suhling, F. (2000): Weibchenpolymorphismus, Geschlechterverhältnis und Größenunterschiede in französischen Populationen von *Boyeria irene* (Odonata: Aeshnidae). *Libellula* 19(1/2): 1-15. (in German with English and French summaries). In July 1999 exuviae of *B. irene* "were collected at three river systems in southern and southwestern France. Females were polymorphic in regard to cercus length. Whereas at the Gardon de Mialet the ratio of females with long and females with short cerci was about 50 %, we found 41 % females with long cerci at the Gardon de St. Jean and only 12 % at the Aveyron-system. The sex ratio was slightly female biased at all sites. The size (labium length) was significantly different between males and females at all rivers, but did not differ between the two female forms. The ratio of the female forms is compared with results from other parts of the range." (Authors)] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

1898. Moore, N. (2000): Book review: *Dragonflies: Behaviour and Ecology of Odonata*. Philip S. Corbet. Harley Books, Great Horkeley, 1999. 829 pp. *Biological Conservation* 94: 264. (in English). ["... I am convinced that Philip Corbet's *Dragonflies* is and will remain one of the truly great entomological books." (see also OAS 1565).] Address: Moore N.W., The Farmhouse, 117



Boxworth End, Swavesey, Cambridge CB4 5RA, United Kingdom

1899. Moore, N.W. (2000): Interspecific encounters between male aeshnids: do they have a function? *International Journal of Odonatology* 3(2): 141-151. (in English). ["Male aeshnid dragonflies at a small pond (circumference ca 90 m) in Cambridgeshire, U.K. generally pursued males of other aeshnid species as well as their own. As a result of these encounters the pursued insect frequently left the pond, particularly when it belonged to a smaller species. Libellulids, which differed greatly from the aeshnids in size and appearance, were also pursued. Male aeshnids attacking males of other species frequently pressed home their attacks even when they were close enough apparently to identify the pursued insect. Consequently interspecific pursuits appear to have a function over and above ensuring that no opportunity is lost to mate or to drive out a conspecific rival. It is suggested that a positive function of interspecific pursuit is practice in developing fighting skills against conspecifics." (Author)] Address: Moore, N.W., The Farm House, 117 Boxworth End, Swavesey, Cambridge, CB4 5RA, UK.

1900. Moritz, K. (2000): Beitrag zur Insektenfauna des Bezirks Mattersburg, Burgenland. *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen* 52(1-2): 35-54. (in German with English summary). [Presentation of data of different insect groups collected in northern Burgenland (environs of Mattersburg): Lepidoptera, Coleoptera, Saltatoria, and Odonata.] Address: Moritz, K., Bachzeile 7, A-7022, Loipersbach, Austria

1901. Müller, J.M. (2000): *Coenagrion lunulatum* in einem oberschwäbischen Moorgebiet (Odonata: Coenagrionidae). *Libellula* 19(1/2): 65-69. (in German with English summary). ["In 1998 and 1999 the species was recorded at a bog pond. The status of this rare species in southwestern Germany is briefly discussed. Observations on phenology and behaviour are given and the habitat is characterized." (Author)] Address: Müller, J.M., Goethestr. 25, D-89601 Schelklingen, Germany. E-mail; Jochen.Mueller@Student.Uni-Ulm.de

1902. Nelson, B. (2000): Dragonflies of the Burren and surrounding areas. *Atropos* 11: 9. (in English). [The odonate fauna of the seasonal turloughs and permanent lakes and fens of the Burren National Park situated in north Clare, North Ireland, UK is shortly described. Of some interest is the metapopulation of *Lestes dryas* in this region.] Address: Nelson, B., Dept of Zoology, Ulster Museum, Botanic Gardens, Belfast BT9 5AB, UK.

1903. Nelson, B. (2000): Irish Odonata Recording Project. *Atropos* 11: 60. (in English). (Verbatim) ["A new project to record the distribution of Odonata in Ireland, DragonflyIreland, has been launched. This ambitious four-year project is supported by Dúchas, The Heritage Service, Environment and Heritage Service, and the Ulster Museum, Belfast. The active participation of all dragonfly recorders and naturalists is sought, and we would especially welcome records from anyone visiting Ireland. Old records would also be very welcome. Full details of the scheme can be found on the Dragonfly-Ireland webpages at <http://www.ulstermuseum.org.uk/> cedar or by contacting the scheme organiser Robert Thompson, 8 Weaver's Court, Banbridge, Co Down BT32 4RP. Enquiries about species or habitats can be

addressed to me at the address below."] Address: Nelson, B., Dept. of Zoology, Ulster Museum, Botanic Gardens, Belfast BT9 5AB, UK

1904. Nessimian, J.L.; Ribeiro, J.R.I. (2000): On the biology of *Buenoa platycnemis* (Fieber) (Insecta, Heteroptera, Notonectidae) at Restinga de Marica, Rio de Janeiro State, Brazil. *Revista Brasileira de Zoologia* 17 (1): 229-239. (in Portuguese with English summary). ["A monthly quantitative study on *B. platycnemis* (Fieber, 1851) was carried out in a sand dune marsh, on the littoral of Rio Janeiro State. The aims of this study were to correlate the life cycle of the species with the seasonal regime of the water body, defining steps of the annual cycle, age structure, and to indicate oviposition sites and trophic relations. The species shows a marked seasonal tendency. The major steps of the life cycle obtained were an invernal (weak) with a predominance of imagines, followed by another of population expansion, characterized by the absence of adults, massive eclosures and predominance of low instar nymphs. Probably, *B. platycnemis* has a sensibility to water level variation and might be influenced by the concentration of *Spirogyra* sp. (Chlorophyceae) in the water column. In relation to oviposition, *B. platycnemis* has not shown preference for any macrophyte [...]. The observed predators of *B. platycnemis* were *Anax amazilli* (Burmeister, 1839) (Aeshinidae), *Erythemis credula* (Hagen, 1861) (Libellulidae) and other Odonata [...]" (Authors)] Address: Nessimian, J.L.; Ribeiro, J.R.I., Departamento de Zoologia, Instituto de Biologia, Universidade Federal do Rio de Janeiro, 21944-970 Rio de Janeiro, RJ Brazil

1905. O'Brien, M. (2000): A brief history of odonatologists at the University of Michigan Museum of Zoology. *Argia* 12(2): 13-16. (in English). [Edward Bruce Williamson, Clarence H. Kennedy, Dolly Gloyd, Mike Wright; for German odonatologists the paragraph on Friedrich Förster ist of special interest; this contribution will be of enormous importance for all odonatologists interested in the history of odonatology because it opens a window to new and unexpected sources of information.] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

1906. O'Brien, M. (2000): Leonard's *Acanthagrion* specimens presents continuing problems for UMMZ. *Argia* 12(1): 20-21. (in English). [Brief history of J.W. Leonard's revision of the genus *Acanthagrion* and the problems caused by publishing his thesis unreviewed posthumously.] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

1907. Olsvik, H. (2000): A dragonfly visit in Ostfold, SW-Norway in 1999. *Nordic Odonatological Society Newsletter* 6(1): 13-15. (in Norwegian with English summary). ["Dammyrtjenn, Rakkestad got the Norwegian record in best numbers of *Somatochlora flavomaculata* when more than 50 ind. were seen. Gjolsjo, Marker has one of Norways most dense occurrences of *Leucorrhinia pectoralis* and 50-100 ind. were observed. Brutjenna, Marker still houses occurrences *Leucorrhinia caudalis* and *L. albifrons*. *Coenagrion puella*, that is rare in Ostfold, found again in some ponds near Refsahl, Fredrikstad. At Svarverudtjenn, Eidsberg 18 dragonfly species were observed, probably a Norwegian record at one locality at one day. *Epithea bimaculata* was ob-

servered at Gyltjetjennet, Trogstad and Moentjenn, Eidsberg." (Author)] Address: Olsvik, H., N-6694 Foldfjorden, Norway. E-mail: haolsvik@frisurf.no

1908. Olsvik, H. (2000): Dragonflies in man influenced environments. Nordic Odonatological Society Newsletter 6(1): 4-7. (in Norwegian with English summary). The following species are treated: *Calopteryx splendens*, *C. virgo*, *Lestes dryas*, *Platycnemis pennipes*, *Coenagrion armatum*, *Aeshna cyanea*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Cordulegaster boltonii*, *Somatochlora flavomaculata*, *Libellula depressa*, and *Sympetrum flaveolum*.] Address: Olsvik, H., N-6694 Foldfjorden, Norway. E-mail: haolsvik@frisurf.no

1909. Olsvik, H. (2000): Dragonflies in Rindal, western central Norway. Nordic Odonatological Society Newsletter 6(1): 18-19. (in Norwegian with English summary). [65 localities of the Rindal municipality in More & Romsdal, Norway have been surveyed between 1971 and 1998. A total of 19 species is listed in a tab. according to the frequency of records. *Aeshna juncea*, *Coenagrion hastulatum*, *Leucorrhinia dubia*, and *A. caerulea* could be detected at more than 50% of the surveyed localities. *Sympetrum striolatum*, and *Leucorrhinia rubicunda* are the most rare species in the region (each 1 record). The most interesting (seven) localities are shortly presented.] Address: Olsvik, H., N-6694 Foldfjorden, Norway. E-mail: haolsvik@frisurf.no

1910. Olsvik, H. (2000): En liten samling fra Lefkas, Hellas. Nordic Odonatological Society Newsletter 6(1): 19. (in Norwegian with English summary). [Short documentation of 27 specimens from 8 species collected by Torgeir Berge in the last week of May 1998 on the Island Lefkas, Greece: *Calopteryx virgo festiva*, *Coenagrion scitulum*, *Callaieschna microstigma*, *Gomphus schneideri*, *Libellula fulva*, *Orthetum coerulescens*, *Crocothemis erythraea*, and *Sympetrum fonscolombii*.] Address: Olsvik, H., N-6694 Foldfjorden, Norway. E-mail: haolsvik@frisurf.no

1911. Olsvik, H. (2000): From the 5th summer meeting of the nordic odonatological society in Aure, Norway, 6.-8. August 1999. Nordic Odonatological Society Newsletter 6(1): 11-12. (in Norwegian with English summary). [Short report from the 5th meeting of the Nordic Odonatological Society in Aure, Norway, and presentation of the results of the odonatological survey of 11 localities. *Aeshna caerulea*, *Somatochlora alpestris*, *S. arctica*, *Sympetrum nigrescens*.] Address: Olsvik, H., N-6694 Foldfjorden, Norway. E-mail: haolsvik@frisurf.no

1912. Olsvik, H. (2000): Mer om larve / exuvia -kjennetegn på *Somatochlora arctica*. Nordic Odonatological Society Newsletter 6(1): 17. (in Norwegian). ["A larvae of *Somatochlora arctica* lacking the specific recognising feature/marks at the underside of abdominal segment 7 was found in Tingvoll, western central Norway October, 2nd. 1999." (Author)] Address: Olsvik, H., N-6694 Foldfjorden, Norway. E-mail: haolsvik@frisurf.no

1913. Orr, R. (2000): The dragonflies and damselflies of Finzel swamp (Maryland). *Argia* 12(1): 13-14. (in English). [The Finzel swamps are one of the last relict ice age plant community places left in Maryland, USA. In this habitat with cold microclimate 40 odonate species could be recorded including *Enallagma antennatum*, known in Maryland only from this locality.]

Address: Orr, R.L., 5215 Durham Road East, Columbia, MD 21044-4444, USA. E-mail: richard.l.orr@usad.gov

1914. Pankratius, U. (2000): Vermehrungsnachweis von *Sympetrum meridionale* in Nordbayern (Odonata: Libellulidae). *Libellula* 19(1/2): 85-88. (in German with English summary). ["On 26-VI-1999 a newly emerged male was found at the fish-ponds "Schwarzweiher" in the district of Höchststadt/Aisch, Bayern, Germany. This is the first record of reproduction for this species in northern Bavaria." (Author)] Address: Pankratius, U., Al-lensteiner StraBe 6, D-90766 Fürth, Germany.

1915. Papazian, M. (2000): Chronique de l'insolite: (2 ème note): *Sympetrum fonscolombii* (Selys, 1840), la mer et l'automobile. *Martinia* 16(1): 9-10. (in French, with English summary). [France; oviposition in open sea, and on the clearcoat of a car are reported.] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France

1916. Parr, A. (2000): An annotated list of the Odonata of Britain and Ireland. *Atropos* 11: 10-20. (in English). [According four categories, the odonate species recorded in Britain are listed and commented: A: Species resident in Britain and Ireland or recorded as a genuine immigrant (n=55). B: Species whose status is unclear or where doubt exists about the validity of records (n=3). C: Exotics. Species recorded as obvious accidental introductions, principally from aquatic nurseries (n=12). D: Species known only from the Channel Islands (n=2).] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

1917. Paternoster, T. (2000): Implantation récente du *Sympetrum à nervures rouges* (*Sympetrum fonscolombii* Selys, 1840) dans le bassin de la Haine. *Gomphus* 16(1): 61-68. (in French with English and Dutch summaries). ["Since 1996, repeated observations of *Sympetrum fonscolombii* adults groups have been done in three noteworthy humid areas from the Haine basin (the marshes of Harchies-Hensies-Pommeroeul, the approved nature reserve of Thieu, and an old quarry at Ville-rot). The first neonate of this species has been seen in the nature reserve of Thieu in September 1999, denoting a successful reproduction. This meridional species, considered a few years before as being rare in Wallonia, seems now well established in this area of the hen-nuyer district." (Author)] Address: Paternoster, T., C.R.N.F.B. 10, rue des Preaux B-7321 Harchies, Belgium. E-mail: T. Paternoster (c)mrw.wallonie.be.

1918. Paulson, D. (2000): First record of two tropical damselflies from the United States. *Argia* 12(1): 12. (in English). [USA, Florida; *Nehalennia minuta* (Selys in Sagra, 1857), *Chrysobasis lucifer* Donnelly, 1967] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

1919. Peters, G. (2000): Unbekannte Bekannte: die Anax-Species in Europa (Odonata: Aeshnidae). *Libellula* 19(1/2): 53-64. (in German with English summary). ["The records of a fifth Anax species in Europe, namely *A. junius* (DRURY), invited comment on the systematics and nomenclature of the taxon Anax in general and the westpaleartic species in particular, supplemented by remarks on their species-specific characters, including a determination key for their exuviae. It seems likely that *A. junius* will appear again in western Europe. Thus

strong emphasis should be put on accurate observations of the activities of living specimens as well as on safeguarding of voucher specimens and their examination by specialists." (Author)] Address: Peters, G., Museum für Naturkunde, Institut für Systematische Zoologie, Invalidenstr. 43, D-10115 Berlin, Germany. E-mail: dirzool@rz.hu-berlin.de

1920. Pinkney, A.E.; McGowan, P.C.; Murphy, D.R.; Lowe, T.P.; Sparling, D.W.; Ferrington, L.C. (2000): Effects of the mosquito larvicides temephos and methoprene on insect populations in experimental ponds. *Environmental Toxicology and Chemistry* 19(3): 678-684. (in English). ["The nontarget effects of Abate(r) 4E (44.6% temephos) at 0.054 kg of active ingredient (a.i.) per 1 ha and of Altosid(r) Liquid Larvicide (5% methoprene) at 0.011 kg a.i./ha were investigated in 18 experimental ponds (average area, 202 m<sup>2</sup> maximum depth. 0.7 m) at Patuxent Wildlife Research Center, Laurel, Maryland, USA. Ponds were sprayed three times at 3-week intervals. Six ponds were sprayed with Abate, six with Altosid, and six with distilled water. Two insect-emergence traps per pond collected for 7 d and were then harvested 1 d before each spray and 13 to 14 days afterward. A repeated measures analysis of variance (ANOVA) revealed significant reductions in Shannon diversity, equitability, and numbers of individuals, species, and families in the Abate ponds relative to controls. Significant reductions also occurred in Ephemeroptera, Odonata, Diptera, Chironomidae, and Chaohorus sp. Hester-Dendy samplers were installed before spray one and harvested 16 d after spray three. Based on one-way ANOVA, Shannon diversity, equitability, and number of Ephemeroptera and Chironomidae were significantly reduced in the Abate ponds. Emergence data indicate only isolated cases with significant reductions in the Altosid ponds relative to controls, and the Hester-Dendy data indicate no significant differences between the Altosid and control ponds." (Authors)] Address: Pinkney, A., U.S. Fish and Wildlife Service, Chesapeake Bay Field Office, 177 Admiral Cochrane Drive, Annapolis, Maryland 21401 tU.S. Geological

1921. Piper, W.; Krüner, U. (2000): Libellennachrichten. *Libellennachrichten* 4: 1-20. (in German). [Volume 4 of the newsletter of the Society of German Speaking Odonatologists contains information on recent activities of the society as well as the minutes of the 19th meeting, announcement of meetings, reviews of odonatological publications and CD-ROM's, new theses on Odonata, calls for cooperation ...] Address: Krüner, Ulrike, Gelderner Str. 39, D-41189 Mönchengladbach, Germany

1922. Plaistow, S.J.; Tsubaki Y. (2000): A selective trade-off for territoriality and non-territoriality in the polymorphic damselfly *Mnais costalis*. *Proceedings of the Royal Society Biological Sciences Series B*. 267(1447): 969-975. (in English). ["Males of the damselfly *Mnais costalis* occur as territorial orange-winged 'fighter' males or non-territorial clear-winged 'sneaker' males. Their morph life histories differ considerably but the estimated lifetime reproductive success is the same for the two morphs. In this study we compared the developmental and reproductive costs associated with the two morphs. Orange-winged male and female reproductive costs resulted in a decline in adult fat reserves with increasing age. In contrast, the fat reserves of clear-winged males remained constant with adult age. Body size was posi-

tively correlated with mating success in orange-winged males, but had no influence on the mating success of clear-winged males. The orange-winged male flight muscle ratios (FMRs) were significantly higher than the clear-winged male and female FMRs. However, there was no difference in the size-corrected fat reserves of the two morphs; both had higher fat reserves than females. The gain in mass between eclosion and reproduction in orange-winged males and females was almost double the mass gained by clear-winged males, suggesting that clear-winged male development is less costly. An experiment in which pre-reproductive levels of nutrition were manipulated confirmed this." (Authors)] Address: Plaistow, S.J.; Tsubaki Y., Laboratoire Ecologie-Evolution (UMR CNRS 2155 Biogeosciences), Université de Bourgogne, 6 Boulevard Gabriel, F-21000 Dijon, France

1923. Pritchard, G.; Harder, L.D.; Kortello, A.; Krishnaraj, R. (2000): The response of larval growth rate to temperature in three species of coenagrionid dragonflies with some comments on *Lestes disjunctus* (Odonata: Coenagrionidae, Lestidae). *International Journal of Odonatology* 3(2): 105-110. (in English). ["Larval growth rate has the same temperature coefficient in three species of coenagrionids, but *Argia vivida* and *Amphiagrion abbreviatum*, which frequently live in geothermally heated water, grow fastest at 29.0-30.0°C compared with 23.4°C for *Coenagrion resolutum*, which lives in cooler water. Survival below 15°C in the laboratory was much better in *C. resolutum*. These characteristics are reflected in the distributions of the three species, *C. resolutum* ranging much further north in North America than the other two species, but not penetrating as far south. By contrast, the temperature coefficient for *Lestes disjunctus* is higher than that of the coenagrionids, and this is related to a different life history. In the coenagrionids, one or more winters are spent in the larval stage. In *L. disjunctus*, winter is spent in the egg stage, and larval growth must be completed quickly." (Authors)] Address: Pritchard, P., Department of Biological Sciences, University of Calgary, 2500 University Drive NW, Calgary, Alberta, Canada T2N 1N4. E-mail: gpritcha@ucalgary.ca

1924. Ramirez, A.; Paulson, D.R.; Esquivel, C. (2000): Odonata of Costa Rica: Diversity and checklist of species. *Revista de biología tropical* 48(1): 247-254. (in English). ["An updated list of the Odonata of Costa Rica is presented containing 268 species. Since the last published list for the country, 41 additional species have been reported. The country is the best studied in Central America. The most species-rich families are Libellulidae, Coenagrionidae, Gomphidae, and Aeshniidae, together comprising similar to 75% of the total fauna. Most species in the country are also found in South America, indicating a tendency for wide ranges rather than endemism. However, about a fifth of the species appear to be endemic to the Costa Rica-Panama region. Estimates of the range of the proportion of total world species occurring in Costa Rica lead to predictions of a range of 5 600-9 000 species of Odonata worldwide." (Authors)] Address: Ramirez, A., Univ. Georgia, Inst. Ecol., Athens, GA 30602, USA. E-mail: aramirez@arches.uga.edu

1925. Ramos Hernández, J.M. (2000): Predation by the bat *Macrotus waterhousei* minor (Chiroptera: Phyllostomatidae) on dragonflies. *Argia* 12(2): 7-8. (in Eng-



English). [Survey of bat predation on dragonflies in the province Sancti-Spiritus, Cuba; the 17 odonate taxa preyed are listed locality wise (n=8) in a tab.] Address: Ramos Hernández, J.M., Apartado Postal 2204, Sancti-Spiritus, Cuba CP. 60100

1926. Raskin, R. (2000): Renaturierung eines Heide-moors im Hohen Venn. Ergebnisse einer fünfjährigen ökologischen Effizienzkontrolle. Naturschutz und Landschaftsplanung 32(7): 212-221. (in German with English summary). ["A degraded heath-moor complex in the 'Hohes Venn' (Eifel), comprising 4 ha, has been renatured as a compensatory measure [...]. The restoration measures included rewetting, tree removal and topsoil removal during winter 1992/93. In an ecological efficiency control effects of the renaturation on flora, vegetation and fauna have been investigated for five years. So far the renaturation was successful. The size of boggy heathland and moors has more than doubled. With an increase of typical plant and animal species the quality of the heathland biotopes has improved [...]."] *Aeshna juncea*, *Leucorrhinia dubia*, *Libellula quadrimaculata*, *Pyrrhosoma nymphula*, *Sympetrum danae*, and *Sympetrum striolatum* could be observed in the heath-moor complex.] Address: Raskin, R., Kirberichshofer Weg 6, D-52066 Aachen, Germany. E-mail: info@raskin-ac.de

1927. R.C. (2000): Analyses d'ouvrages: Die Exuvien Europäischer Libellen, Insecta, Odonata. Par Bernd Gerken et Klaus Sternberg. 1999. Huxaria-Verlag. ISBN 3-9805700-4-5. *Martinia* 16(1): 18-22. (in French). [Book review of the bilingual (German/English) determination key of most of the European dragonfly exuviae.] Address: not stated

1928. Reinhardt, K. (2000): Eine Libellenbeobachtung in etwa 5000 m Höhe. *Libellennachrichten* 4: 15-16. (in German). [Note on a book (Walter Steiner: Auf den Gletschern des Pamir [Tadshikistan, Pamir-Alai-mountains]) with a short notice on a dragonfly gliding from ice tip to ice tip on a glacier. With reference to a chapter in Philip Corbet's (1999) book, Klaus Reinhardt comments on some further high mountain records of dragonflies. It is likely that the record of Steiner refers to *Pantala flavescens*.] Address: Reinhardt, K., Institut für Ökologie, Universität Jena, Dornburger Str. 159, D-07743 Jena, Germany. E-mail: b5klre@pluto.rz.uni-jena.de

1929. Relyea, R.A.; Werner, E.E. (2000): Morphological Plasticity in Four Larval Anurans Distributed along an Environmental Gradient. *Copeia* 2000(1): 178-190. (in English). ["We investigated morphological plasticity to the presence of predators in the tadpoles of four ranid frog species distributed along a pond hydroperiod gradient in southeast Michigan. We first reared all four species (Wood Frog, *Rana sylvatica*, Leopard Frog *R. pipiens*, Green Frog, *R. clamitaw*, and Bullfrog, *R. catesbeiana*) under identical laboratory conditions in the presence and absence of caged larval dragonflies (*Anax* spp. [*A. junius*, *A. longipes*]). We then reared wood frog and leopard frog in outdoor mesocosms to examine the predator-induced responses during ontogeny. Finally, we reared leopard frog with predators fed either leopard frog or wood frog larvae to determine whether prey responses depended upon predators consuming conspecific prey. All four ranids exhibited some degree of morphological change in the presence of *Anax*; these differences were species specific and fairly robust to

different experimental conditions. The responses over ontogeny indicated that the changes were direct responses to the predator's presence and not an indirect result of the predator slowing anuran growth or development. Finally, larval leopard frog responded similarly to predators feeding on conspecifics and congeners. Taken together, these results suggest that morphological responses to predators may be relatively common in larval anurans. Further, because many of the responses are known to be adaptive antipredator strategies, predator-induced morphological plasticity has important evolutionary and ecological implications." (Authors)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

1930. Reyniers, J. (2000): Vespreidmgsonderzoek van libellen in Klein-Brabant (provincie Antwerpen). *Gomphus* 16(1): 5-36. (in Dutch with English and French summaries). ["Distribution of dragonflies in 'Klein - Brabant (province of Antwerp). This study shows the results of an inventory over 1996 and 1997, where most of the 1 km-squares in the communes of Bornem, Puurs and Sint-Amands were visited. To these data older observations going back to 1983 and recent ones from 1998 and 1999 were added. During the inspections numbers of adults were counted and proofs of reproduction (egg-laying, exuvia, ...) noted." (Author) The results of the study are mapped, and the distribution of the species is discussed in detail.] Address: Reyniers, J., Pandgatheide 2, B-2890 Sint-Amands, Belgium. Email: joost.reyniers@lin.vlaanderen.be

1931. Rhl (2000): Warum Libellen rückwärts fliegen. *Welt am Sonntag* 30. April 2000: (in German). [Report on the work of S. Gorb on functional morphology of dragonfly wings in a newspaper.] Address: not stated

1932. Rincon, J. Cressa, C. (2000): Temporal variability of macroinvertebrate assemblages in a neotropical intermittent stream in Northwestern Venezuela. *Archiv für Hydrobiologie* 148(3): 421-432. (in English). ["Changes in macroinvertebrate assemblages were identified among different flow phases during the dry and rainy seasons in a neotropical intermittent stream in Northwestern Venezuela. Invertebrates and physicochemical parameters were sampled during 9 months to assess temporal changes in biotic and abiotic variables. Macroinvertebrate densities decreased following either a high-flow or a stream drought. Three invertebrate assemblages were identified via PCA and cluster analysis..." (Authors) Abundance of *Coenagrionidae* was highest at "low-intermediate flow" and "high flow", abundance of *Libellulidae* was highest at "low-intermediate flow".] Address: Rincón, J., Department de Biología, Facultad Experimental de Ciencias, Universidad del Zulia. Apdo. 15247, Maracaibo 4005-A, Las Delicias, Estado Zulia. Venezuela

1933. Rodrigues Capitulo, A. (2000): Population dynamics of larval stages of *Tauriphila risi* Martin and *Erythemis attala* (Selys) in Punta Lara Gallery Forest, Buenos Aires, Argentina (Anisoptera: Libellulidae). *Odonatologica* 29(4): 333-340. (in English). ["Larval populations of the 2 spp. were studied in a lentic freshwater environment. 13 larval instars were recognized from plots of head width and length of wing-pads. Density, population dynamics, age structure, flying period and winter

quiescence were analysed. Both uni- and semivoltine individuals were found. Microhabitat differences were found between the 2 spp. T. risi preferring *Pistia stratiotes* and *Hydrocotyle ranunculoides*, whereas *E. attala* preferred lemnaceas. A life table was constructed for *T. risi*, which showed mortality rate maxima at hatching and at 10 and 23 months." (Author)] Address: Rodrigues Capitulo, A., Instituto de Limnología "Raúl A. Ringuelet", Universidad Nacional de La Plata, C.C. 712, AR-1900 La Plata, Argentina

1934. Rolff, J. (2000): Intime Interaktionen: ektoparasitische Wassermilben an Libellen (Hydrachnidia; Odonata). *Libellula* 19(1/2): 41-52. (in German with English summary). ["This review of host-parasite interaction in dragonflies and water mites has three major aims. First, the life cycle of water mites parasitizing dragonflies is briefly reviewed. Second, the impact of water mite parasitism on dragonfly condition and ecology is illuminated. Water mite parasitism lowers dragonfly survivorship and decreases clutch sizes. Third an experimental approach to investigate which water mite species parasitizes which dragonfly species is described." (Author)] Address: Rolff, J., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: j.rolff@tu-bs.de

1935. Rolff, J.; Antvogel, H.; Schrimpf, I. (2000): No correlation between ectoparasitism and male mating success in a damselfly: Why parasite behavior matters. *Journal of insect behavior* 13(4): 563-571. (in English). ["The mating success of individually marked male damselflies parasitized by water mites was closely followed. The number of ectoparasites could be determined exactly from knowledge of the parasite's life cycle. In contrast to previous studies no correlation between water mite infestation and male mating success was revealed. The reasons for this discrepancy may be explained by the inclusion of the parasite's behavior. The body fat content of the males was negatively correlated with the mite load, indicating that parasitism reduces host's condition. It is hypothesised that the water mites damselfly system is not valuable for testing the Hamilton and Zuk hypothesis. Furthermore, selection exerted or mediated by parasites should act during the teneral phase." (Authors) *Enallagma ebrium*, *Coenagrion puella*] Address: Rolff, J., Tech. Univ. Braunschweig, Inst. Zool., Fasanenstr 3, D-38092 Braunschweig, Germany. E-mail: j.rolff@tu-bs.de

1936. Rolff, J. (2000): Water mite parasitism in damselflies during emergence: two hosts, one pattern. *Ecography* 23: 273-282. (in English). ["The infections of emerging damselfly cohorts by ectoparasitic water mites *Arrenurus cuspidator* were followed closely over two years in two populations. In one pond *Coenagrion puella* was the single host species, whereas in the second pond *C. hastulatum* co-occurred. The prevalences found were close to 100%. The mean daily abundance of mites ranged from 1 to 45 mites per host with a peak after roughly one third of the emergence period. The water mites displayed a clumped distribution on their hosts measured by the variance/mean ratio. No differences in parasite abundance due to host sex, head width, or host species could be detected. The abundance of mites was synchronised with host's emergence patterns. This was stronger in the system with two host species. Shaw and Dobson recently showed a generalised relationship of variance/mean of parasite abun-

dance combining data from 269 host parasite systems. The data presented here and some other water mite associations show a significant deviation from this general rule." (Author)] Address: Rolff, J., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: j.rolff@tu-bs.de

1937. Rose, J.S. (2000): Dragonfly days (13-14 may, in the Rio Grande Valley). *Argia* 12(2): 3. (in English). *Brachymesia gravida*, *Gomphus militaris*, *Erythemis plebeja*, *Micrathyria hageni*, *Micrathyria aequalis*, *Enallagma novaehispaniae*, *Tramea calverti*, *Dythemis nigrescens*, *Libellula needhami*, *Erpetogomphus designatus*, *Enallagma signatum*] Address: not sated

1938. Ross, S. (2000): The occurrence of a male - male tandem pair of *Enallagma damselflies* in Mecosta County, Michigan. *Argia* 12(1): 20. (in English). [*Enallagma geminatum* (m) / *Enallagma traviatum* (m)] Address: E-mail: rosssb@tucker-usa.com

1939. Samraoui, B.; Corbet, P.S. (2000): The Odonata of Numidia, northeastern Algeria. Part I: status and distribution. *Int. Jour. Odonatology* 3(1): 11-25. (in English). ["Forty-five species of Odonata have been recorded within Numidia, which includes the El Kala and the Guerbes-Senhadja wetlands in northeastern Algeria. Five species are new to the area. Changes occurring in dragonfly diversity over a century and a half are discussed. This paper (Part I) deals with the status and spatial distribution of each recorded taxon." (Authors)]. Address: Corbet, P.S., Crean Mill, Crean, St Buryan, Cornwall, TR19 6HA, UK. E-mail: pscorbet@creanmill.u-net.com

1940. Samraoui, B.; Corbet, P.S. (2000): The Odonata of Numidia, northeastern Algeria. Part II: Seasonal ecology. *Int. Jour. Odonatology* 3(1): 27-39. (in English). ["This paper [...] summarizes current knowledge of their seasonal ecology and identifies areas where promising research avenues exist. Annual patterns of adult occurrence and reproductive activity are used to infer life cycles, with particular reference to strategies that enable species to bridge the hot, dry summer, and to propose a phenological classification applicable to south-temperate north-African Odonata." (Authors)] Address: Corbet, P.S., Crean Mill, Crean, St Buryan, Cornwall, TR19 6HA, UK. E-mail: pscorbet@creanmill.u-net.com

1941. Schall, B. (2000): Artenschutz durch Prozessschutz am Beispiel des Wurzacher Riedes. In: Schutzgemeinschaft Libellen in Baden-Württemberg (SGL). Artenschutz in Mooren - Konzeption um Umsetzung. Vorträge der Tagung der Schutzgemeinschaft Libellen in Baden-Württemberg am 19. und 20. Mai 2000 in Kißlegg: 4-6. (in German). [The Wurzacher Ried, Baden-Württemberg, Germany; the author discusses the strategy of nature conservation to develop a dynamic, self-regulated succession in bog and fen habitats ("Prozeßschutz"). Orthoptera, Lepidoptera, and Odonata are discussed with special emphasize to the winners and the losers of the self-regulated processes. *Somatochlora arctica* and *Nehalennia speciosa* are assessed as winners. *Aeshna subarctica elisabethae*, *Leucorrhinia dubia*, *L. pectoralis*, *Lestes virens*, and *Coenagrion hastulatum* are assessed as losers.] Address: Schall, B., Bezirksstelle für Naturschutz und Landschaftspflege, Konrad-Adenauer-Str. 20, D-72072 Tübingen, Germany. E-mail: Schall@BNLTU.BWL.de

1942. Schiel, F.-J.; Buchwald, R. (2000): Konzeption, Durchführung und erste Ergebnisse des LIFE-Natur-Projektes "Gefährdete Libellenarten in SW-Deutschland (Teil *Leucorrhinia pectoralis*). In: Schutzgemeinschaft Libellen in Baden-Württemberg (SGL). Artenschutz in Mooren - Konzeption um Umsetzung. Vorträge der Tagung der Schutzgemeinschaft Libellen in Baden-Württemberg am 19. und 20. Mai 2000 in Kißlegg.: 23-26. (in German). [Aims and results of the LIFE-project - promoted by the European Union - are presented. The main tasks are (1) surveying the known and the possible new localities of the species, (2) the analysis of the habitat requirements of the species in Baden-Württemberg, Germany, and (3) the realisation of practical measures to protect the populations of *L. pectoralis*.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Friesenheimer Hauptstr. 20, 77948 Friesenheim, Germany. E-mail: Jupp@INULA.de

1943. Schorr, M. (2000): Störungsökologische Wirkungen von Bootsportaktivitäten auf Fließgewässer-Libellen - dargestellt am Beispiel der Wieslauter (Pfälzerwald, Rheinland-Pfalz). *Fauna und Flora in Rheinland-Pfalz* 10: 663-679. [Possible conflicts between boating activities on running waters and the needs of conservation - exemplified by dragonflies (Odonata) along the brook Wieslauter (Pfälzerwald, Rheinland-Pfalz, Germany). The Wieslauter, a brook situated in the District Südwestpfalz (Rhineland-Palatinate), is of European importance as far as nature conservation is concerned. Over the past few years the brook has been increasingly used by canoeists and this has caused a lot of problems with local people owning property on its banks and it has also caused conflict with the conservationists. As the problems escalated, it became necessary to resolve them by using official administrative procedures ("Regelung des Gemeingebrauchs durch Kanuten an der Wieslauter"). This paper focuses on the odonatological arguments used to solve the conflicts. (1) Canoeing seriously affects the habitats of the early stages of Odonata: scraping along the bed of a brook causes a catastrophic drift of larvae and ova; people getting in or out of canoes can hurt or even cause death in larvae living in the substrate near the shore line; drifts of fine sand particles block the rectum of larvae and this can cause suffocation, especially among the later instars (see Tobias 1996). (2) The wash of moving canoes can seriously harm individuals emerging near the waterline, often causing deformities in abdomen and wings. Those affected by the wash will try to remove the water drops by moving the abdomen up and down and by beating the wings, actions which make them more detectable for predators such as birds. Heavy wash can also remove an individual from its chosen emergence site, which will lead to its death by drowning. (3) Passing canoes in smaller parts of a brook have an impact on the territories of the males by causing them to move away; they will also disturb ovipositing females and even prevent them from egg laying. When such disturbances occur frequently, the residents and dispersing individuals along the brook will leave it; in some species, females only use a short period of the day for egg laying and, if distracted in this period, no reproduction is possible. Both factors have serious effects on the reproduction success of a population. To solve the problems between canoeists and the needs of conservation, it may, in a few cases, become necessary to curb such disruptive activities in order to preserve the biotopes. It is vital for the preservation of

such key stone species as *Ophiogomphus cecilia* (species of the European Habitats Directive) to have brooks without any canoeing at all. In other cases it may be possible to find solutions for a common enjoyment of running waters by sportsmen and dragonflies. (Jill Silsby)] Address: Martin Schorr, Waldfrieden 25, D-54314 Zerf, Germany. E-mail: foeatrier@aol.com

1944. Sibley, F.C. (2000): Additional comments on the dragonflies of the British Virgin Islands. *Argia* 12(1): 18-19. (in English). [More recent studies of the odonate fauna von British Virgent Island brought the list of species to 11, of which 4 species could be collected as larvae or exuviae. In addition this paper some remarks to response of *Pantala flavescens* to storms are made.] Address: Sibley, F.C., 25 Shirley Street, Naugatuck, CT, 06770, USA. E-mail: fcs@george.peabody.yale.edu

1945. Sibley, F.C. (2000): Mismatched mating *Enallagma*. *Argia* 12(1): 19-20. (in English). [Cayuta Lake, Schuylar Co, New York, USA; *Enallagma carunculatum* (m) / *Argia moesta*(f); *Enallagma geminatum* (m) / *Enallagma exulans* (f)] Address: Sibley, F.C., 25 Shirley Street, Naugatuck, CT, 06770, USA. E-mail: fcs@george.peabody.yale.edu

1946. Simpkin, J.L.; Britten, H.B.; Brussard, P.F. (2000): Effects of habitat fragmentation and differing mobility on the population structures of a Great Basin dragonfly (*Sympetrum corruptum*) and damselfly (*Enallagma carunculatum*). *Western North American Naturalist* 60(3): 320-332. (in English). ["The population structure of 2 Great Basin odonate species was assessed using protein electrophoresis. Analyses included 7 populations of *Sympetrum corruptum* [...], a migratory and highly mobile dragonfly and 8 populations of *Enallagma carunculatum* [...], a weak flier that is not known to migrate far from natal water sources. Though we expected the damselfly (*E. carunculatum*) to show greater genetic isolation than the dragonfly (*S. corruptum*). Both species apparently had high levels of gene flow ( $\theta = 0.0604$  for *S. corruptum*,  $\theta = 0.0485$  for *E. carunculatum*) and showed no evidence for isolation by distance. These results suggest that both species are highly vagile and that the most important factors affecting population structure of these odonates may be ecological conditions such as habitat patchiness and the ephemerality of water sources." (Authors)] Address: Simpkin, Janice, Life Sciences. College of Southern Idaho, Twin Falls, ID 83303, USA

1947. Sokolovska, N.; Rowe, L.; Johansson, F. (2000): Fitness and body size in mature odonates. *Ecological Entomology* 25(2): 239-248. (in English). ["The relationship between body size and fitness components in odonates was examined using a meta-analysis of 33 published studies. There was a positive and significant overall effect of body size on mating rate and lifetime mating success among males. There was also a weaker but still significant positive effect of body size on survivorship of males. The relationship between body size, mating rate, longevity, and lifetime mating success differed significantly between males of territorial species. The effect of body size was significant for all fitness components in territorial species but significant only for longevity and lifetime mating success in nonterritorial species. Effect sizes appeared to be strongest on longevity in both sexes, and on male mating rate in



territorial species. Other effect sizes, even when significant, were small. Despite a much smaller data set, female fitness also increased significantly with body size. Both clutch size and longevity showed a significant positive relationship with body size. These results suggest that there is a general fitness benefit to large size in odonates. Nevertheless, significant heterogeneity is apparent in this effect, which can be attributed to sex, mating system, and fitness component. Finally, these analyses point to inadequacies in the current data that need further study before the potentially rich patterns in size effects on fitness can be explored more thoroughly." (Authors)] Address: Rowe, L., Department of Zoology, University of Toronto, Toronto, Ontario, M5S 3G5 Canada

1948. Sommerhäuser, M. (2000): Sommertrockene Fließgewässer im nordrhein-westfälischen Tiefland - Lebensbedingungen und Lebensgemeinschaften. Natur- und Umweltschutz Akademie Nordrhein-Westfalen - Seminarberichte 5: 101-114. (in German). [The ecology of temporary - summer dry - brooks in western Europe is outlined. In Tab. 4 Cordulegaster boltonii is listed to be characteristic for such water bodies with a terrestrial phase in September and October.] Address: Sommerhäuser, M., Universität-GH Essen, Inst. Ökologie, Abt. Hydrobiologie, D-45117 Essen, Germany

1949. Soors, J. (2000): De Bandheidelibel (*Sympetrum pedemontanum*) in Vlaanderen. *Gomphus* 16(1): 75-84. (in Dutch with English and French summaries). ["*Sympetrum pedemontanum* in Flanders. - In the summer of 1999, several individuals of *Sympetrum pedemontanum* were observed in the 'Bos van Aa' in Zemst (Vlaams-Brabant). The high number of individuals suggest that it may be a new local population. This was the reason to outline the evolution of the distribution of *S. pedemontanum* in Flanders. We compare the habitat requirements found in the literature with the habitat choice in the 'Bos van Aa'. It is clear that the last years, *S. pedemontanum* has shifted its distribution in northwestern direction. Outside the source population in the eastern part of the province of Antwerp, we only find on some places a new population. The 'Bos van Aa' can probably become one of them." (Author)] Address: Soors, J., Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. Email: jan.soors@instnat.be

1950. Steiner, C.; Siegert, B.; Schulz, S.; Suhling, F. (2000): Habitat selection in the larvae of two species of Zygoptera (Odonata): biotic interactions and abiotic limitation. *Hydrobiologia* 427(1-3): 167-176. (in English). ["Field and laboratory experiments were set up to obtain data on the reasons for different habitat selection of *Enallagma cyathigerum* and *Platycnemis pennipes*. (1) Rearing of larvae in two different ponds showed that while *P. pennipes* was not able to survive conditions of low oxygen content, 50% of the *E. cyathigerum* larvae survived. (2) In field predation experiments with sticklebacks and dragonflies as predators, we found that *E. cyathigerum* suffered highest predation by the fish. In *P. pennipes*, mortality was highest with *Anax imperator*. (3) Experiments regarding larval behaviour showed that *E. cyathigerum* was generally more active and had higher foraging success than *P. pennipes*. Both species reduced activity in the presence of fish, but *E. cyathigerum* did so to a minor extent. In contrast to *P. pennipes*, *E. cyathigerum* showed escaping behaviour. (4) In the laboratory, the growth of *E. cyathigerum* was faster

than that of *P. pennipes*." (Authors)] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

1951. Stephan, R.; Xylander, W.E.R.; Zumkowski-Xylander H. (2000): Nachweise von *Gomphus vulgaticornis* (Linné, 1758) im ehemaligen Braunkohletagebau Berzdorf. *Abh. Ber. Naturkundemus. Görlitz* 72(1): 151-152. (in German with English summary). ["Adult specimens of the club-tailed dragonfly *Gomphus vulgaticornis* were detected at different sites of the former lignite mining area Berzdorf near Görlitz/Saxonia in June 2000; however, neither larvae nor exuviae could be found. The odonate coenosis documented in this secondary biotope now comprises 49 species."] Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany. E-mail: Naturmuseum.GR.Dr.Xylander@t-online.de

1952. Stoks, R. (2000): Components of lifetime mating success and body size in males of a scrambling damselfly. *Animal Behaviour* 59(2): 339-348. (in English). ["Sexual selection is hypothesized to favour small body size in males of scrambling species, that is, those in which males obtain matings by actively searching for females. I tested this hypothesis in a natural population of the scrambling emerald damselfly, *Lestes sponsa*. Mating efficiency (matings/visit to the pond) was the most important factor explaining variation in male lifetime mating success (LMS; 71%). This suggests a large potential for sexual selection. Path analysis of male LMS suggested a quality factor that positively affected both mating efficiency and life span. In contrast with the small-male mating advantage hypothesis, part of this potential for sexual selection was realized as stabilizing selection on male body size, indicating that there may also be a lower limit to body size for mating efficiency. This also illustrates that the constancy of body size may be explained by sexual selection alone. Survival explained about 20% of the variation in LMS and random processes were potentially important for determining LMS. My results show the problems of using mating efficiency as a measure for the intensity of sexual selection and the need to distinguish between potential and realized selection pressures, especially when comparing the importance of natural and sexual selection. I discuss mechanisms that may have caused the intermediate-male mating advantage in this scrambling species." (Author)] Address: Stoks, R., Department of Biological Sciences, Dartmouth College, Hanover, NH, USA

1953. Stoks, R. (2000): De Bruine Korenbout (*Libellula fulva*) in Vlaanderen in de jaren '90: vooruitgang of status quo? *Gomphus* 16(1): 49-60. (in Dutch with English and French summaries). ["*Libellula fulva* in Flanders in the '90: advance or status quo? - The dragonfly *Libellula fulva* is a critically endangered species in Flanders. In the period 1996-1999 there was a sharp increase in both the number of observations and observation sites. Analysis of the new records showed that the new sites were almost always very close to the known sites in the regions Klein-Brabant and northeast Limburg. Furthermore, at a lot of the observation sites there is no proof of local reproduction and even if there is proof, populations are always small. Therefore, the increase in records probably does not reflect a real increase in numbers and may just reflect an increase in

observation intensity and the status of the species in Flanders probably has not changed. Some evidence is given for the existence of a population north of Antwerpen. At least in Belgium, the species seems to have a broad habitat spectrum with a preference for lentic or lotic water depending on the region. The apparent difference in habitat choice of the species between countries and its potential reasons and implications for species conservation are discussed." (Author)] Address: Stoks, R., Evolutionary Biology Group, Department of Biology, University of Antwerpen (RUCA), Groenenborgerlaan 171, B-2020 Antwerpen, Belgium. E-mail: stoks@ruca.ua.ac.be

1954. Stoks, R. (2000): Recensies-Recensions: Corbet, P.S. (1999). Dragonflies - Behaviour and ecology of Odonata. *Gomphus* 15(3): 130-131. (in Dutch). [Book review of P.S. Corbet's outstanding work (see OAS 1565)] Address: Stoks, R., Evolutionary Biology Group, Department of Biology, University of Antwerpen (RUCA), Groenenborgerlaan 171, B-2020 Antwerpen, Belgium. e-mail: stoks@ruca.ua.ac.be

1955. Suri Babu, B. (2000): Description of the larva of *Neurothemis intermedia* (Rambur), with notes on biology (Anisoptera: Libellulidae). *Odonatologica* 29(4): 341-346. (in English). ["The morphology of the final instar larva is described and illustrated, based on exuviae and larvae from Sagar, Madhya Pradesh, India. Notes on the larval habitat, life history pattern and emergence are added." (Author)] Address: Suri Babu, B., Scene of Crime Mobile Unit, Police Control Room, Jagdalpur-494001 (M.P.), India

1956. Switzer, P.V.; Grether, G.F. (2000): Characteristics and possible functions of traditional night roosting aggregations in rubyspot damselflies. *Behaviour* 137(4): 401-416. (in English). ["Many species of animals congregate into groups when roosting. While studies exploring roosting behavior are common, relatively few detailed, quantitative studies have been done on the roosting behavior of insects, and the adaptive value of roosting aggregations are still unclear for most edible (non-distasteful) species of any taxon. We investigated night roosting aggregations of the rubyspot damselfly, *Hetaerina americana*, along a creek in the Coastal Range Mountains of California. Both male and female rubyspots were found in roosting aggregations, although the aggregations tended to be male-biased relative to the population sex ratio. Rubyspots roosted on the west side of slow moving sections of the creek; within this habitat they were highly aggregated but were not associated with any particular habitat features. The spatial pattern of site use tended to change gradually over time and sites with a relatively large number of individuals were more likely to be used on subsequent nights. These results suggest that within suitable habitat, the specific locations of roosting aggregations were traditional (socially learned). Rubyspot roosting patterns, when taken in combination with other aspects of this species' biology, do not support habitat limitation, thermal or desiccation benefit, foraging, and aposematic hypotheses for the function of rubyspot roosting aggregations. Rather, the roosting aggregations most likely serve an anti-predator function or are the result of using conspecifics to choose safe sites." (Authors)] Address: Switzer, P.V., Eastern Illinois Univ., Dept Biol, Sci., Charleston IL 61920; USA. E-mail: cfpvs@eiu.edu

1957. Szalay, F. de (2000): Factors influencing macroinvertebrate colonization of seasonal wetlands: responses to emergent plant cover. *Freshwater biology* 45: 295-308. (in English). ["We conducted field experiments to examine factors influencing macroinvertebrate colonization of seasonally flooded marshes. Few macroinvertebrate species were found aestivating in soils within non-flooded wetlands indicating that most taxa colonize these marshes from other flooded habitats. ... These results demonstrate that invertebrate communities may be different within plant stands with heterogeneous amounts of emergent cover, and management practices that alter the structure of wetland vegetation can influence macroinvertebrate communities colonizing seasonal marshes." (Authors). *Pachydiplax* sp. ist listed in tab. 2 for sample areas with high plant cover.] Address: Ferenc de Szalay, Department of Biological Sciences, Kent State University, Kent, OH 44242, U.S.A. Email: ferenc@kent.edu

1958. Theischinger, G. (2000): A new species of *Pseudagrion SELYS* from Australia (Odonata: Coenagrionidae). *Linzer biol. Beitr.* 32(1): 253-257. (in English). ["*Pseudagrion ingrid* sp. n. (male holotype: Eubenangee Swamp near Babinda, Queensland, Australia) is described, illustrated and compared with the other species of *Pseudagrion SELYS* known from Australia." P. jedda, P. microcephalum, P. aureofrons, P. cingillum, P. ignifer ignifer, P. ignifer aureum, and P. lucifer are figured too.] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

1959. Theischinger, G. (2000): The *Acanthaeschna* Story (Odonata: Aeshnoidea). *Linzer biol. Beitr.* 32(1): 235-240. (in English). [The history of discovery and re-discovery of *Acanthaeschna victoria* Martin are presented, together with the description of its supposed larva and a discussion of its possible systematic position, ecology and distribution.] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

1960. Theischinger, G.; Hawking, J.H. (2000): The larva of *Eusynthemis ursula* Theischinger (Odonata: Synthemistidae). *Linzer biol. Beitr.* 32(1): 247-251. (in English). [The larva of *E. ursula* is described, illustrated, diagnosed and discussed. Colour photos of the larva and its habitat are provided.] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

1961. Theischinger, G. (2000): The larva of *Synthemipsis gomphomacromioides* Tillyard (Odonata: Synthemistidae). *Linzer biol. Beitr.* 32(1): 259-263. (in English). ["The larva of *S. gomphomacromioides* is described, illustrated and compared with the larvae of the other Tasmanian synthemistid species and with all other Australian synthemistid genera." (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

1962. Theischinger, G. (2000): The male of *Eusynthemis tenera* Theischinger (Odonata: Synthemistidae). *Linzer biol. Beitr.* 32(1): 241-245. (in English). [The male of *E. tenera* is described. The species is compared with all known Australian *Eusynthemis* species, particularly with its closest ally, *E. barbarae* (Moulds).] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

1963. Thompson, D.J. (2000): On the biology of the damselfly *Vestalis amabilis* Liefinck (Odonata: Calopterygidae) in Borneo. *International journal of Odonatology* 3(2): 179-190. (in English). ["The habitat, territorial and reproductive behaviour of the Bornean calopterygid damselfly *V. amabilis* are described. Males are territorial and will remain at the same site defending a territory for up to three weeks. Territories take the form of sun flecks whose physical location changes slowly throughout the day as the sun moves across the sky. There is a considerable amount of fighting between males, ranging from simple, short chases to more extensive escalated contests. Longer contests are thought to be brought about due to confusion over residency as the physical location of the territory changes. Courtship is brief and simple, copulation duration is around 2 minutes and females oviposit alone while being non-contact guarded by the male. Oviposition takes place in dead leaves, usually over about 30 minutes during which time the pair is harassed by other males. Matings are infrequent and females prospect either the territories or the territory owners before accepting courting males, resulting in more copulations later in the day." (Author)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK
1964. Tóth, S. (2000): Comparative analysis of dragonfly (Odonata) fauna living in the streams flowing into shallow lake Balaton. *Folia Musei historico-naturalis Bakonyiensis* 15 (1996): 53-73. (in Hungarian with English and German summaries). [The odonate fauna of the running waters feeding Lake Balaton was surveyed in 1994 and 1995. 29 species are recorded and documented locality wise. Of some interest is the strong population of the rare European *Coenagrion ornatum* along the small running waters.] Address: Toth, S., Széchenyi u. 2, H-8420 Zirc, Hungaria. E-mail: flycatcher@freemail.hu
1965. Trockur, B.; Mauersberger, R. (2000): Vergleichende ökologische Untersuchungen an *Epitheca bimaculata* Charpentier 1825 im Saarland und in der Uckermark (Odonata: Corduliidae). *Beiträge zur Entomologie* 50(2): 487-518. (in German with English summary). [Between 1988 and 1998, more than one hundred habitats of the rare *E. bimaculata* were studied in the western parts of the Saarland (SW-Germany) including the adjacent parts of Luxembourg and France (especially the valleys of the rivers Saar and Mosel), and in the Uckermark („Biosphärenreservat Schorfheide-Chorin“, NE-Germany). In the Saarland-region, "the species inhabits eutrophic to polytrophic artificial backwaters, gravelpits and fish-ponds, whereas in the Uckermark it occurs in small natural, predominantly eutrophic lakes. Relevant characteristics of the *Epitheca*-habitats in both regions are: ● calm waters of small area: 85% of the habitats are less than 10 ha, 63% less than 4 ha; ● relatively shallow water body without distinct stratification: maximum water depth between 1.1 and 12 m (91% less than 8 m, 67% between 2 and 6 m, only 12% with complete temperature stratification) ● low oxygen content in deeper strata: usually less than 2 mg O<sub>2</sub>/l below 4 m; ● water clouded by phytoplankton, eutrophic to polytrophic: breeding sites between 0.5 and 3.1 m median Secchi-depth (68% with visibility of less than 2 m); ● water surface with abundant floating or submerged vegetation, more rarely also tree trunks or reed: substrates for oviposition and habitats of the younger larvae; ● water surrounded by shrubs and/or deciduous woodland; ● water inhabited by fish populations; ● the dragonfly communities are dominated by *Orthetrum cancellatum*, *Cordulia aenea* and *Erythromma* species; aeshnids usually occur at low densities. The typical habitats of *Epitheca* in central and western Europe are not large, oligotrophic lakes or slightly acetous bog ponds, but still waters in the flood plain (river lagoons or gravel pits) and small lakes inhabited by fish populations." (Authors).] Address: Trockur, B., Schulstr. 4, D-66636 Tholey-Scheuern, Germany.
1966. Valley, S. (2000): Some interesting observations of *Tanypteryx hageni*. *Argia* 12(2): 9. (in English). [Observation on drought resistance and (re-)colonisation potential of larval *T. hageni* in the bogs of Todd Lake in Deschutes National Forest, Oregon, USA.] Address: E-mail: svalley@skipnet.com
1967. Vick, G.S. (2000): *Mesumbethemis takamandensis* gen. nov., spec. nov., a new genus and species of the Tetrathemistinae from Cameroon, with a key to the African genera of the subfamily (Anisoptera: Libellulidae). *Odonatologica* 29(3): 225-237. (in English). ["The new sp. is described from a single male from Cameroon (South West Prov., Manyu, Takamanda Forest Reserve, Assam, 06°01'N, 09°18'E, alt.140 m, 20-II-1998). The holotype will be deposited in the collection of the Natural History Museum (London). The justification for the placement of the new genus in the Tetrathemistinae is presented. Because of the combination of characters of wing venation which it possesses, the new sp. does not fit into any existing genus and the new genus *Mesumbethemis* is erected to accommodate it. The unique shape of the anal appendages and the accessory genitalia can at this stage also be regarded as characteristic of this presently-monotypic genus. A key to the African Tetrathemistinae genera is provided." (Author)] Address: Vick, G.S., Crossfields, Little London, Tadley, Hants RG26 5ET, United Kingdom
1968. Viessmann, R. (2000): Libellen - Odonata. Pflanzen und Tiere in Rheinland-Pfalz - Berichtsjahr 1999 - Heft 10: 195-209. (in German). [Compilation of dragonfly records from different habitats situated in the eastern and southern parts of Rheinland-Pfalz, Germany. Of faunistical interest are the records of *Coenagrion mercuriale*, *C. pulchellum*, *Erythromma najas*, *Ischnura pumilio*, *Lestes barbarus*, *Sympetma fusca*, *Brachytron pratense*, *Aeshna affinis*, *Anax parthenope*, *Ophiogomphus cecilia*, *Crocothemis erythraea*, *Libellula fulva*, *Orthetrum brunneum*, and *Sympetrum flaveolum*.] Address: Viessmann, R., Gängelstockweg 8, D-67295 Bolanden, Germany
1969. Viessmann, R. (2000): Populationsförderung einer seltenen Libellenart am Beispiel *Orthetrum brunneum* - Südlicher Blaupfeil. Pflanzen und Tiere in Rheinland-Pfalz - Berichtsjahr 1999 - Heft 10: 182-183. (in German). [Donnersberg, Rheinland-Pfalz, Germany. Mass emergence of *O. brunneum* occurred between May 25 and 29, 1999 and May 15-16, 2000 in a habitat improved by compensatory measures for nature conservation purposes. 125 specimens emerged in a shallow spring area of app. 120m<sup>2</sup>. From the same region, additional examples of newly created habitats with a colonisation potential are given.] Address: Viess-



mann, R., Gängelstockweg 8, D-67295 Bolanden, Germany

1970. Vlietinck, K. (2000): Monitoring van de libellenfauna van het Boerenven in de Kalmthoutse Heide in 1999. *Gomphus* 16(1): 69-74. (in Dutch with English and French summaries). ["Census of the Odonatafauna of the Boerenven in 1999 in the Kalmthoutse heide. - The dragonfly-fauna of the Boerenven in the heathlands of Kalmthout was weekly censused in the period between May and September. The Boerenven is a small fen, which is covered by abundant water vegetation. 10 species of dragonflies were observed. Two species, *Enallagma cyathigerum* and *Coenagrion puella*, which are very common, don't occur at the same time. The reproduction of 8 species was documented." (Authors)] Address: Vlietinck, K., Koningin Astridlaan 4 B-2920 Kalmthout, Belgium. E-mail: kristof.vlietinck@instnat.be

1971. Walker, J.; Smentowski, J. (2000): Swinging nets in the "bootheel". *Argia* 12(1): 16-17. (in English). [USA, Missouri] Address: Smentowski, J.H., 9714 Mueck Terrace, Rock Hill, MO, 63119, USA.

1972. Watanabe, M.; Taguchi, M. (2000): Behavioural protandry in the damselfly *Mnais pruinosa costalis* Selys in relation to territorial behaviour (Zygoptera: Calopterygidae). *Odonatologica* 29(4): 307-316. (in English). ["The reproductive strategy of the male *M. p. costalis* can be defined as an attempt to maximize the number of females mated. Males exhibit wing colour dimorphism: one form has orange wings, and the other has hyaline wings which resemble female wings. The former is usually territorial and the latter uses sneaky mate securing tactics around the territories of orange-winged males. Although the length of the emergence period varied from year to year, no evidence of protandry was observed. Studies over 10 years have shown that if the length of the sexually active period in females is stable, the orange-winged males should become sexually mature before females do to achieve maximal reproductive success. On the other hand, the hyaline-winged males do not mature before females due to the fact that they utilize the territories of orange-winged males. This study shows that behavioural protandry should be considered a reproductive strategy of the orange-winged males for establishing territories." (Authors)] Addresses: Watanabe, M., Department of Biology, Faculty of Education, Mie University, Tsu, Mie 514-8507, Japan. E-mail: watanabe@edu.mie-u.ac.jp. Taguchi, M., Yaei-Higashi High School, Sagamihara, Kanagawa 229-0029, Japan

1973. Wazalwar, S.M.; Tembhare, D.B. (2000): Innervation of mouthpart sensilla in the dragonfly *Brachythemis contaminata* (Fabricius) (Anisoptera: Libellulidae). *Odonatologica* 29(4): 359-364. (in English). ["Neuroanatomical studies demonstrate single dendritic innervation of trichoid sensilla, basiconic sensilla and microtrichia, and multidendritic innervation of the papillae and sensory pegs. These sensilla can therefore be considered as mechano- and chemo-receptors respectively. The campaniform sensilla are innervated by several dendrites and may function as proprioceptors. No innervations of the spines, teeth, hooks and acanthae was observed suggesting non-sensory nature." (Authors)] Address: Tembhare, D.B., Dept Zool., Nagpur Univ. Campus, Amravati Road, Nagpur-440010, Maharashtra, India

1974. Weidel, B.C.; Josephson, D.C.; Krueger, C.C. (2000): Diet and prey selection of naturalized smallmouth bass in an oligotrophic Adirondack lake. *Journal of freshwater ecology* 15(3): 411-420. (in English). ["Smallmouth bass (*Micropterus dolomieu*) introduced nearly 50 years ago have established a permanent population in Little Moose Lake, NY. Over 500 smallmouth bass were collected by angling in the littoral zone from June to August. Gut contents were compared for differences based on length of bass, date of capture, and substrate type where each fish was caught. Crayfish were the most frequent diet item and made up the largest percent composition by number. The average number of crayfish per stomach increased with bass length as did the number of fish per stomach. Crayfish, Ephemeroptera, Odonata, and fish made up 77% of the total number of diet items, excluding zooplankton. A noticeable diet shift from smaller diet items (Ephemeroptera) to larger ones (crayfish and fish) occurred when smallmouth bass approached 150 mm. A high amount of diet overlap occurred between bass caught over different substrate types and among most size classes. Smallmouth bass in Little Moose Lake were opportunistic feeders, using benthic, terrestrial, and pelagic littoral zone food resources. The most likely processes by which smallmouth bass affect salmonid and native fishes in Little Moose Lake are competition for food resources and predation." (Authors)] Address: Josephson, D.C., Cornell Univ., Dept Nat. Resources, Fernow Hall, Ithaca, NY 14853, USA. E-mail: dcj3@cornell.edu

1975. Weihrauch, F. (2000): A note on *Brachytron pratense* (Müller, 1764) from coastal Istria, NW Croatia (Anisoptera: Aeshnidae). *Exuviae* 7: 19-26. (in English with Slovene summary). ["A good population of *Brachytron pratense* was recorded on 25-IV and 28-IV-2000 from Lake Palud near Rovinj, representing its first record for the Istria peninsula. All relevant references as well as known unpublished data were gathered in order to outline and discuss the distribution of the species in the Adriatic region. In addition, April records for five other dragonfly species, observed at eight localities in Croatian Istria, are appended." (Author)] Address: Weihrauch, F., Hengelerstr. 9, D-80637 München, Germany. E-mail: Florian.Weihrauch@lbp.bayern.de

1976. Wildermuth, H. (2000): Das Rotationsmodell zur Pflege kleiner Moorgewässer - Simulation naturgemäßer Dynamik. In: Schutzgemeinschaft Libellen in Baden-Württemberg (SGL). Artenschutz in Mooren - Konzeption um Umsetzung. Vorträge der Tagung der Schutzgemeinschaft Libellen in Baden-Württemberg am 19. und 20. Mai 2000 in Kißlegg.: 11-13. (in German). [Wildermuth & Schiess (1983), *Odonatologica* 12: 345-366 introduced the so called "Rotations-Modell" to realise different states of vegetation succession in water bodies. In dependence of the state of succession different species find optimal possibilities to develop. To protect the whole spectrum of a local or regional fauna and flora it is mandatory to develop in a given time and in a given area water bodies with a different succession of vegetation. The transfer of the modell to practice is exemplified with *Leucorrhinia pectoralis*. In the past two decades the measures developed from the modell guaranteed a stable metapopulation of *L. pectoralis* in the Swiss nature reserve "Drumlinlandschaft Zürcher Oberland".] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: wildermuth@swissonline.ch

1977. Wildermuth, H. (2000): *Lestes barbarus* bei der Eiablage in einem subalpinen Hochmoor der Schweizer Alpen (Odonata: Lestidae). *Libellula* 19(1/2): 93-96. (in German with English summary). ["On 22 August 1999 a single female was seen ovipositing in stems of *Scheuchzeria palustris* and *Trichophorum caespitosum* in a small alpine bog at 1690 m a.s.l. near the natural tree line. The record is unusual regarding the climatic situation as well as the habitat type." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: wildermuth@swissonline.ch

1978. Wildermuth, H. (2000): Totstellreflex bei Großlibellenlarven (Odonata). *Libellula* 19(1/2): 17-39. (in German with English summary). ["Larvae of 18 European Anisoptera species, mainly final instar, were studied with respect to reflex immobilization (RI). In *Brachytron pratense*, *Somatochlora flavomaculata*, *S. meridionalis*, and *S. metallica* RI revealed an obligatory reaction to disturbance in the water. An additional 4 species exhibited facultative RI. All the other species reacted by rapid escape or became immobile for some time but only when they were brought on land. RI was released exclusively by tactile stimulation, especially by a firm grip on the thorax or abdomen, but not on the legs or antennae. In 3 *Somatochlora* spp. RI lasted 83, 87 and 154 s (median values) and varied between 5 and 679 s. The posture during RI, depicted in 10 line drawings, differed according to the species. In *Somatochlora* up to 3 postures were recorded: larvae either extended their legs laterally or folded them closely against the body or held them obliquely upwards. In individuals that were successively stimulated, the duration of RI tended to decrease, but not in all cases. Larvae of 2 *Somatochlora* alpestris, *S. arctica* and *S. flavomaculata* exhibited RI already in the first free-living larval instar. The adaptive value of RI which is assumed to be an antipredation strategy, is discussed with respect to the species, microhabitats and potential predators." (Author)] Occurrence of reflex immobilization of the following species is compiled in a tab.: *Aeshna cyanea*, *A. juncea*, *Anax imperator*, *Cordulegaster boltonii*, *Cordulia aenea*, *Epithea bimaculata*, *Libellula quadrimaculata*, *Libellula fulva*, *Orthetrum cancellatum*, *Orthetrum coerulescens*, *Sympetrum striolatum*, *Leucorrhinia dubia*, and *L. pectoralis*.] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: wildermuth@swissonline.ch

1979. Wilson, K.D.P.; Zhou, W.-b. (2000): *Sinocnemis yangbingi* gen. nov., sp. nov. and *Sinocnemis dumonti* sp. nov., new platycnemidids from south west China (Odonata: Platycnemididae). *International Journal of Odonatology* 3(2): 173-177. (in English). ["A new genus, *Sinocnemis* gen. n., is established to receive two new species of platycnemidid described here as *Sinocnemis yangbingi* sp. n., from Emeishan, Sichuan, China and *Sinocnemis dumonti* sp. n. from Xishui, Guizhou, China." (Authors)] Address: Wilson, K., 6F, 25 Borrett Rd, Mid-levels, Hong Kong, China. E-mail: wislonhk@hk.super.net. Hou, W.-b., Zhejiang Museum of Natural History, Jiaogonglu 71, Hang Zhou-310012, China.

1980. Yeh, W.-C.; Veenakumari, K. (2000): Description of *Gynacantha andamanae* spec. nov. from south Andaman Island, Indian ocean (Anisoptera: Aeshnidae). *International Journal of Odonatology* 3(2): 162-167. ["*Gynacantha andamanae* [Yeh & Veenakumari] sp. nov., collected from Mt Harriet in South Andaman Island of Indian Ocean, is described and figured. The

relationship of the new species with its oriental congeners is discussed." (Authors)] Address: Yeh, Wen-Chi, Division of Forest Protection, Taiwan Forestry Research Institute (TFRI) 53 Nan-hai Rd, Taipei, Taiwan. E-mail: wcyeh @ serv.tfri.gov.tw. Veenakumari, K., Central Agricultural Research Institute, P. B. No. 181, Port Blair 744 101, Andaman and Nicobar Islands, India.

1981. Yong, H.S.; Bernard, H.; Hämäläinen, M. (2000): A collection of Odonates from the northern part of the Belum Forest Reserve, Perak, Peninsular Malaysia. *Malayan Nature Journal* 54: 255-257. (in English). 19 odonate species are listed resulting from a brief survey in May 1998] Address: Yong, H.S, Institute of Biological Sciences, University Malaya, 50603 Kuala Lumpur, Malaysia Hämäläinen M., Dept Applied Zool., P.O. Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

1982. Zhu, H.-q; Ou-Yan, J. (2000): *Coenagrion bifurcatum* spec. nov., a new damselfly from Heilongjiang, China (Zygoptera: Coenagrionidae). *Odonatologica* 29 (4): 365-368. (in English). Holotype male and allotype female: Mao-er shan, Dong-ling, Heilongjiang, China, 15-VII-1999; deposited at Heilongjiang Nonken Teachers' College, Achen. The new sp. is described, illustrated and compared with *C. hylas*. Address: Zhu H.-q, Dept Biol., Shanxi University 42-38, Taiyuan 030006, Shanxi, China. Ou-Yan, J., Heilongjiang Nonken Teachers' College, Achen 150301, Heilongjiang, China

#### Annotation to this issue of OAS:

(1) Persons interested in Japanese odonatology profit from the journal TOMBO. Reading the Odonatological Abstracts in *Odonatologia* it becomes clear that there are some other journals in which odontologists publish the result of their studies or observations. Regrettably in most cases these publications are written in Japanese, a language not understood by most odonatologists, and the papers are published in journals not available in any of the western libraries.

I was more than surprised to get information from Dr. Klaus Sternberg, Germany on an English written journal on Japanese odonatology that covers these small, scattered publications on dragonflies. In March 2000 number 10 of the "Digest of Japanese Odonatological Short Communications" (DJOSC) was released, with translations of many small, but noteworthy papers on Odonata.

In October 2000 I contacted the editor of the Digest, Naoya Ishizawa, and arranged an exchange between the Digest and OAS. So users of OAS can profit from the Digest. In OAS abstracts taken from the Digest are identified as follows: "taken from DJOSC No. nn". The journal is worth to be subscribed. Only with the Digest one has full access to the information of papers published in different Japanese journals.

Persons interested in this journal should contact:

Naoya Ishizawa  
1644-15, Yamaguchi  
Tokorozawa City  
Saitama Pref., 359-1145  
Japan

(2) OAS profits from the cooperation with many odonatologists who send their reprints or give copies of papers not known to us. We cordially thank them all. Of special value is the help of Pawel Buzcynski, Poland, and Hidenoi Ubukata, Japan, who translated papers in their languages into English. We have an extraordinarily good cooperation with Jill Silsby and Wolfgang Schneider.



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: Lindeboom@aol.com and Martin Schorr, Waldfrieden 25, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: FOEATrier@aol.com

Published in Rheinfelden, Germany and printed in Tübingen, Germany.  
ISSN 1438-0269

## 1997

1983. Paternoster, T. (1997): 1996 une année exceptionnelle pour l'observation des odonates du marais d'Harchies-Hensies-Pommeroeul. Naturalistes de Mons et du Borinage 99: 8-15. (in French). [27 odonate species are recorded in 1996 in the swamps of Harchies, Belgium. Of special interest are the records of *Brachytron pratense* (supposed extinct in the Wallonia), *Aeshna affinis*, *Anax parthenope*, and *Sympetrum fonscolombii*. The distribution of these species in Belgium and Luxemburg is mapped.] Address: Paternoster, T., Direction Générale des Ressources naturelles et de l'environnement, Centre Recherche de la nature, des forêts et du bois, Chemin des Préaux 5, B-7321 Harchies, Belgium

1984. Rebhan, H. (1997): Naturschutz- und Bewirtschaftungskonzepte für Stillgewässer, Fallbeispiele Craimoosweiher (Lkr. Bayreuth) und Stocksee (Lkr. Bamberg). Bericht der naturforschenden Gesellschaft Bamberg 71: 33-52. (in German). [Concepts for restoration of eutrophicated large ponds in Bavaria, Germany via foodchain manipulation are outlined. For the odonatalogical aspects of this paper see OAS 2006; *Erythromma viridulum* is a key stone species of submerse vegetation and used as monitoring organism for assessing the conservation measure efforts.] Address: Rebhan, H., Regierung von Oberfranken, Ludwigstr. 20, D-95444 Bayreuth, Germany

## 1998

1985. Brux, H.; Döring, G.; Hielscher, M.; Nordmann, M.; Walter, G. Wiegler, G. (1998): Zur Fauna der Stadt Oldenburg: Erste Übersicht ausgewählter Gruppen: Säugetiere, Vögel, Reptilien, Amphibien, Libellen, Heuschrecken, Laufkäfer, Schmetterlinge. Oldenburger Jahrbuch 98: 247-319. (in German). [On the basis of so called functional ecological areas in the town of Oldenburg, Germany, 23 odonate species are recorded. They are listed in a tab. and shortly commented.] Address: Brux, H., c/o IBL Umweltplanung, Unterm Berg 39, D-26123 Oldenburg, Germany

1986. Endersby, I.D. (1998): Dragonflies of Mount Buffalo National Park. Victorian Entomologist 28(5): 83-85. (in English). [At 6 localities situated within the Mount Buffalo National Park, Victoria, Australia, 12 odonate species were recorded. The habitats of *Synthemis eustalacta* and *Austroaeschna flavomaculata* are shortly discussed.] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@werple.net.au

1987. Holusa, O. (1998): On the occurrence of dragonfly *Leucorrhinia pectoralis* (Charpentier, 1825) (Odonata: Libellulidae) in the Czech and Slovak Republics. Sbornik Přírodovědného klubu v Uh. Hradisti 3: 45-53. (in Czech with extensive English summary). [Between 1995-1998 12 new localities of *L. pectoralis* in the Czech Republic could be traced. All published data on the occurrence of this species in the Czech and Slovak Republics are summarized and plotted in a distribution map. Figures demonstrate the abundance at the Dobra - Kamenec locality in the season of 1997 and 1998 as well as the number of localities according to the sea level and phenology in the Czech and Slovak Republics. The habitats of some localities are described in some detail.] Address: Holusa, O., Muzeum Beskyd, přírodovědné oddelení, Zámecké náměstí 1264, CZ-738 01 Frydek-Místek. E-mail: holusao@post.cz

1988. Hughes, S.J.; Furse, M.T.; Blackburn, J.H.; Langton, P.H. (1998): A checklist of Madeiran freshwater macroinvertebrates. Bolm Mus. munic. Funchal 50 (284): 5-41. (in English with Portugese summary). [The checklist of the Madeira's 240 freshwater macroinvertebrates includes 6 Odonata compiled from literature data; the taxa are briefly annotated. *Ischnura senegalensis*, *I. pumilio*, *Anax imperator*, *Sympetrum nigrifemur*, *S. fonscolombii*, *Gomphus* sp.] Address: Hughes, Samantha, Laboratório Regional de Engenharia Civil, Departamento de Recursos Naturais e de Hidráulica, Rua Agostinho Pereira de Oliveira, PT-9000-264 Funchal, Madeira. E-mail: samjhughes@hotmail.com

1989. Lopez, R.; Espinoza, P.; Lopez-Q., M.M.; Valle, S.; Rivera, P.; Garcia, I. (1998): Las libelulas (Insecta: Odonata) come bioreguladores de larvas de mosquitos en Nicaragua. Revta nicarag. Ent. 45: 1-6. (in Spanish with English summary). [During 1996, the mosquito-regulation capacities of larval *Ischnura ramburii*, *Anax amazillii*, and *Pantala flavescens* were examined in the laboratory. These species can be successfully used in mosquito control, but *A. amazillii* is the most effective.

The numbers of the consumed mosquito larvae per day are stated for habitats with vegetation and for those without it.] Address: Lopez, R., Centre Nac. de Diagnostico y Referencia, Ministerio da Salud, A.P. 2900, Managua, Nicaragua

1990. Richards, S.; Kawanamo, M.; Torr, G. (1998): Insects part 2: Odonata (Dragonflies and damselflies). Conservation International: A biological assessment of the Lakekamu basin, Papua New Guinea. Washington. Rapid Assessment Programm 9. ISBN 1-881173-20-8: 10-11, 47-49, 144-148. (in English). [The Odonata of the Lakekamu Basin, Papua New Guinea were surveyed in Nov. to Dec. 1996, yielding a total of 34 species. Among these there is at least one, possibly three, undescribed species and possibly a new genus. Taxonomic knowledge of south PNG's Odonata is poor enough that certain identification of just these 34 species is extremely difficult. One species collected appears to be identical to a species previously known only from Misool Island (*Diplacina erigone*). A checklist (Appendix 7) and a compilation of the habitat preferences and some taxonomic remarks of each species (Appendix 8) are also presented.] Address: Richards, S., James Cook University, Department of Zoology, Townsville, QLD 4811, Australia. E-mail: stephan.richard@jcu.edu.au

#### 1999

1991. Bönsel, A. (1999): Das Kleine Granatauge (*Erythromma viridulum* Charp., 1840) in Mecklenburg-Vorpommern. Naturschutzarbeit in Mecklenburg-Vorpommern 42(1): 48-56. (in German). [Documentation of the dispersion of *E. viridulum* in Mecklenburg-Vorpommern, Germany, and discussion of factors influencing colonisation success of water bodies. Prescence of *Ceratophyllum*- or *Myriophyllum*-vegetation, and weather conditions with high temperatures, high global radiation and low precipitation are discussed as the most important factors for the range extension of the species into northern Central Europe.] Address: Bönsel, A., Vasenbusch 15, D-18337 Gresenhorst, Germany. E-mail: andre.boensel@gmx.de

1992. Braun, M.; Braun, U. (1999): Fliegende Edelsteine. Libellen im Naturpark Nassau. Zweckverband Naturpark Nassau (Hrsg.): 32 pp. (in German). [This is a nicely produced booklet (reprint from: Heimatjahrbuch Rhein-Lahn-Kreis 2000: 97-128) on the dragonflies of the Regional Park Nassau, Rheinland-Pfalz, Germany. Chapter 2 contains a general introduction into biology and ecology of the Odonata, chapter 4 some remarks on dragonfly conservation, and chapter 5 a short bibliography. In chapter 3 the 33 species known from the region are treated in a monographic way. Information on morphology is accompanied in most cases by excellent colour pictures; in addition notes on the regional phenology and the habitats are given. The booklet is directed to a more general readership, but as in many other cases it contains very interesting information for the advanced odonatologist: here it is a picture of a lizard (*Lacerta agilis*) devouring an imago of *Orthetrum concellatum*. This is one of the rare documents of predation of reptiles on Odonata.] Address: Braun, Ursula, Im Mühlbachtal 2, D-56377 Nassau, Germany

1993. Chao, H.-f.; Zhu, H. (1999): A new species of *Nihonogomphus* from Guangxi, China (Odonata: Gomphidae). *Wuyi Sci. J.* 15: 17-18. (in English with Chinese summary). ["*N. huangshaensis* sp. n. is described, illustrated and compared with *N. lieftincki*. Holotype male: Huangsha, Guangxi prov., no date; deposited at the institution of the first author."] Address: Chao, H.-f., Biol. Control Res. Inst., Fujian Agric. Univ., Fuzhou-350002, Fujian, P.R. China

1994. Chao, H.-f. (1999): New or little-known gomphid dragonflies from China, 1 [recte: 2] (Odonata: Gomphidae). *Wuyi Sci. J.* 15: 12-16. (in English with Chinese summary). [*Paradavidius* sgen. n. is proposed in *Davidius* (type sp.: *D. fruhstorferi* Martin); the 9 subgeneric distinctions in *Nihonogomphus* are stated; and *Mergomphus vespertinus* sp. n. is described, illustrated and compared with the two Chinese congeners. Holotype male: Lushan Co., Sichuan prov., mid-V / mid-VIII-1997; deposited at Author's institution.] Address: Chao, H.-f., Biol. Control Res. Inst., Fujian Agric. Univ., Fuzhou-350002, Fujian, P.R. China

1995. Darblade, S.; Avignon, S. (1999): Effect of water treatment and site reallocation on Odonates (Arjuzanx, Landes). *Gibier Faune Sauvage* 16(4): 339-353. (in French with English and German summaries). ["Many aquatic organisms are closely dependent on the physico-chemical quality of the water and the morpho-dynamic characteristics of the biotopes in which they are evolving and often adapt to the environmental changes the latter are submitted to over more or less long periods. In a former mining site in Arjuzanx (Landes), which was reallocated and became a National Hunting and Wildlife Reserve, we studied the effect of wetland basification treatments (in particular by liming with 'Champagne chalk') on dragonflies, Odonata [...]. We monitored several environmental parameters (pH, conductivity, turbidity, quantity of dissolved oxygen and temperature) as well as biological ones (species presence/absence at adult/larval stages) that had been delineated across small shallow water basins and their edges from April to August 1998. We showed that when left untreated the water basin's basification (pH 3.5-4 to 8.2) took only fifteen years (1985-1998). 29 Odonate species (representing about one-third of the Odonate species present in France) could be listed. When evaluating Odonate presence with respect to the two adult and larval stages, the Odonate species frequented the untreated habitats more intensively than the treated ones ( $P < 0.05$ ), probably because of a lesser degree of turbidity ( $P < 0.05$ ), all other physico-chemical parameters being the same. At the adult and larval stages, however, the indicator species of sensitivity to habitat treatment were not the same. The Arjuzanx site is classified as a site of special patrimonial interest, because of the presence of two dragonfly species with a special protection status: *Leucorrhinia pectoralis* and *L. albifrons*. Management of this type of habitat for Odonates, thus should be directed towards favouring species diversity, and towards protecting the rare species which are often associated with endangered habitats." (Authors). A further species of interest is *Coenagrion scitulum*.] Address: Darblade, Stéphanie, Reserve Naturelle de l'E-tang Noir, Avenue du Hall des Sports, F-40510 Seignosse, France

1996. David, S. (1999): Dragonfly research in Slovakia. *Sbornik z mezinárodního seminare "Vázky 1999"*,

CSOP Vlasim: 83-92. (in Slovakian with English summary). [This paper is a short introduction into the odonatological history of Slovakia. Distribution maps of *Thecagaster bidentata* and *Crocothemis erythraea* and a checklist of the 73 species known to occur in Slovakia are presented. In a Red List the species are classified according to the criteria of IUCN.] Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. E-mail: nrukdavi@savba.sk

1997. De Marmels, J. (1999): A new species of *Dimeragrion* Calvert 1913 from Pantepui, Venezuela (Odonata: Megapodagrionidae). *Boln Ent. venez.* 14(1): 27-36. (in English with Spanish summary). [*Dimeragrion clavijoi* sp. n. (holotype male: Venezuela: Amazonas, Cerro Yutaje, lat 05°43'35"N, long 66°08'03"W, 1750 m, 12/19.ii.1995; MIZA) is described and illustrated on the basis of eighteen males and eight females. A key to the species of *Dimeragrion* Calvert 1913 and distributional maps are provided. The supposed larva of *D. percubitale* Calvert 1913 is described and figured." (Author)] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela

1998. Düttmann, H. (1999): Die Marka-Mittelradde-Niederung. Plädoyer für ein bedeutendes Feuchtgebiet in Nordwestdeutschland. *Oldenburger Jahrbuch* 99: 333-357. (in German). [This is a natural history of a marsh region the northwestern part of Germany (Emsland, Niedersachsen) with special emphasize on its importance for nature conservation purposes. 15 odonate species are listed; the data are resulting from different sources including unpublished expertices.] Address: Düttmann, H., Institut für Naturschutz und Umweltbildung, Hochschule Vechta, Driverstr. 22, D-49377 Vechta, Germany.

1999. Endersby, I.D. (1999): Dragonflies of the Organ Pipes national Park. *Victorian Entomologist* 29(3): 51-52. (in English). [The Organ Pipes National park is situated 30 km NW of Melbourne, Australia. 4 trips in 1997 to 1999 yielded in 12 odonate taxa including *Rhadinosticta simplex*.] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@werple.net.au

2000. Holusa, O. (1999): The dragonflies (Odonata) in the surroundings of Vsetín and Valasské Mezirici. *Sbornik Přírodovedneho klubu v Uh. Hradisti* 4: 82-102. (in Czech with extensive English summary). [Between 1992-1998 some localities in the surroundings of Vsetín and Valasské Mezirici (south-eastern region of the Czech Republic) were investigated. Different habitats were studied - from stagnant waters in lowlands (274 m a.s.l.) to streams in mountain regions (650 m a.s.l.). 36 species are known from the region, 33 species were recorded in the framework of this study. *Thecagaster bidentata* was very abundant, *Brachytron pratense*, and *Leucorrhinia pectoralis* belong to the very rare species.] Address: Holusa, O., Muzeum Beskyd, prirodovedné oddelení, Zámecké náměstí 1264, CZ-738 01 Frydek-Místek. E-mail: holusao@post.cz

2001. Holzinger, W.E.; Ehmann, H.; Schwarz-Waubke, M. (1999): Rote Liste der Libellen Kärntens (Insecta: Odonata). *Naturschutz in Kärnten* 15: 497-507. (in German). [17 data sets of odonatological data known from the Federal State Kärnten, Austria are analysed and compiled in a commented list of 60 species (name

of the species, habitat, records prior 1980, records of 1980 and the following years, classification according to the Red List criteria). The distribution of *Coenagrion hastulatum*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Orthetrum albistylum*, *O. cancellatum*, *Leucorrhinia pectoralis*, *L. albifrons*, *Somatochlora flavomaculata*, and all localities with records of Odonata in Kärnten are mapped. Some of the old records are discussed, and a bibliography of odonatological publications from Kärnten is annexed.] Address: Schwarz-Waubke, Maria, Eben 21, A-4202 Kirschsschlag, Austria

2002. Jost, W. (1999): Libellenfauna rund um Wiesbaden. *Jahrbuch des nassauischen Vereins für Naturkunde* 120: 75-81. (in German). [Hessen, Germany; this paper is a mixture of general remarks on Odonata, a checklist of 25 species from the Wiesbaden region based on 15 years of investigation, and some notes on localities of special odonatological or conservational interest. Examples of impacts of recreational fishing on habitats and species are outlined.] Address: Jost, W., Dr.-Jakob-Witte mann-Str. 20, D-65527 Niedernhausen, Germany

2003. Jourde, P.; Allenou; Caupenne, M.; Thirion, J.-M. (1999): Contribution à l'Inventaire des odonates de Charente-Maritime. *Annales de la société des sciences naturelles* 8(8): 967-972. (in French, with English summary). [For more details, see OAS 1022] Address: Jourde, P.; La Grande Métairie, 20 rue de Charnay, F-17250 Pont-L'Abbé-D'Arnoult, France

2004. Lange, L. (1999): Ganzliner Torfstiche - ein Lebensraum für gefährdete Libellen. *Naturschutzarbeit in Mecklenburg-Vorpommern* 42(2): 64-65. (in German). [29 odonate species are reported from the localities situated in the southwestern part of Mecklenburg-Vorpommern, Germany. Of special interest is the record of *Leucorrhinia albifrons*.] Address: Lange, L., Deichreihe 21, D-25599 Wewelsfleth, Germany.

2005. Papazin, M. (1999): Les odonates de Guyane française I. Les Calopterygidae (Odonata, Zygoptera). *L'entomologiste* 55(6): 235-239. (in French with English summary). [In French Guyana, Calopterygidae are represented by two genera, *Hetaerina* and *Mnesarete* including six species. *Hetaerina gallardi* Machet, 1989 has been rediscovered at the locus typicus. A key, based on the wing coloration, is proposed to identify the males of the six known species. Male appendices are figured.] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France

2006. Romstöck-Völkl, M.; Rebhan, H.; Völkl, W. (1999): Folgen des Auswinterns von Stillgewässern. Veränderungen der Libellenfauna im NSG Craimoosweiher. *Naturschutz und Landschaftsplanung* 31(5): 143-146. (in German, with English summary). [Consequences of the Winter Draining of Ponds - Changes in the Fauna of Damselfly and Dragonflies in the Nature Reserve 'Craimoosweiher' (Bavaria) In the nature conservation area 'Craimoosweiher' (administrative district of Bayreuth), 25 species of Odonata were recorded between 1995 and 1997. The abundance of most damselfly species declined in 1997 compared to 1995. The most conspicuous decline was found in *Erythromma viridulum* (population extinct in 1997) and *Erythromma najas* (only few individuals in 1997) whilst the abundance of Anisoptera varied only slightly. The most important reasons for the dramatic reduction in damselfly a-



bundance may be the drainage of the pond and the severe frost during winter 1995/96. This thoughtless measure resulted in the disappearance of the submerse vegetation which had provided oviposition sites for adult damselflies and hiding-places for larvae." (Authors)] Address: Romstöck-Völk, Maria, Hohe Eiche 6, D-95517 Seybothenreuth, Germany

2007. Rumpf, M. (1999): Nachweis der Zierlichen Moosjungfer *Leucorrhinia caudalis* im Naturpark Feldberger Seenlandschaft. Naturschutzarbeit in Mecklenburg-Vorpommern 42(2): 81- (in German). [In 1999 a strong population of the rare *L. caudalis* which was thought extinct in Mecklenburg-Vorpommern, Germany was recorded in a *Cladium mariscus* marsh in the NSG Krüselin-Mechowseen.] Address: Rumpf, M., Blumenstr. 13, D-17268 Warthe, Germany

2008. Schulz, R.; Mühle, R.-U.; Wilke, T. (1999): Zur Odonatenfauna des einstweilig gesicherten Teichgebietes Lakoma. Veröff. Potsdam-Museum 33: 71-76. (in German with English summary). [Brandenburg, Germany; in July 1994 19 odonate species were recorded at 10 localities; *Orthetrum coerulescens*, *Sympetrum depressiusculum*, *S. pedemontanum*] Address: Mühle, R.U., Universität Potsdam, Inst. Ökologie und Naturschutz, Lennéstr. 7a, D-14471 Potsdam, Germany.

2009. Starke, W.; Wachlin, V. (1999): Konzept für ein Monitoring zum LIFE-Projekt "Erhaltung und Wiederherstellung des Trebeltalmooses". Naturschutzarbeit in Mecklenburg-Vorpommern 42(1): 41-47. (in German). [Mecklenburg-Vorpommern, Germany; the monitoring concept includes the Odonata] Address: Wachlin, V., Karrenderfer Str. 3, D-17498 Leist, Germany

2010. Usseglio-Polatera, P.; Thomas, S.; Beisel, J.-N.; Moreteau, J.-C. (1999): Illustration de la valeur indicatrice des caractéristiques biologiques des macroinvertébrés d'une communauté benthique à différentes échelles d'observation. *Annls Limnol.* 35 (1): 71-80. (in French with English summary). ["The faunal assemblage of a river ecosystem integrates the spatial and temporal variability of the habitat. Taxa with appropriate combinations of adaptations, concerning especially traits related to survival and reproduction use particular habitat types. Consequently, the synthesis of published autecological information on macroinvertebrate taxa can be used to demonstrate some of the environmental changes of an ecosystem. Mesohabitats were sampled in spring and autumn 1993 and 1994 in twelve study sites on 1st to 4th order streams in three river catchments located in the northeast of France. Sites were selected to exhibit high microscale heterogeneity. Affinities of taxa for modalities of biological traits and/or ecological strategies were described. The investigation of the relationship between traits and distributions of taxa can demonstrate some of the characteristics of both faunal community and environment and provide clear information on changes in biotopes across different spatial scales (mesohabitat, station, catchment basin). The benthic assemblage of each mesohabitat type displayed a specific combination of biological traits. Thus, taxa can provide insights about mesohabitat characteristics in terms of stability, diversity or trophic potentialities of their potential ecological niches." (Authors) Odonata are treated on the family level.] Address: Usseglio-Polatera, P.; ESA 5023 CNRS, Ecologie des Eaux Douces et des Grands Fleuves, 43 Bd du 11 No-

vembre 1918, F-69622 Villeurbanne Cedex, France. E-mail: usseglio@sciences.univ-metz.fr

2011. Uvíra, V.; Jeziorski, P.; Hanel, L.; Holusa, O. (1999): Aquatic Invertebrates of the Pálava Biosphere Reserve of UNESCO: Odonata. *Folia Fac. Sci. Nat. Univ. Masaryk. Brun., Biol.*, 101: 173-180. (in English). [So far 69 species of dragonflies have been recorded in the territory of the Czech Republic; in the Pálava Biosphere Reserve (in its extended concept) 45 species have been ascertained, i.e. 65 % of the total number known to occur in the Czech Republic. The paper outlines some general introduction into Odonata, collection methods, the history of odonatological investigation of the Pálava Biosphere Reserve, some species of special faunistic interest (*Epitheca bimaculata*, *Stylurus flavipes*, *Anax ephippiger*, *Sympetrum fonscolombii*), the potential for monitoring, and some information referring conservation of Odonata. All records are documented in detail.] Address: Holusa, O., Muzeum Beskyd, prírodovedné oddelení, Zámecké náměstí 1264, CZ-738 01 Frydek-Místek. E-mail: holusao@post.cz

2012. Wachlin, V.; Müller-Motzfel, G. (1999): Monitoring von Insekten in Mecklenburg-Vorpommern. Naturschutzarbeit in Mecklenburg-Vorpommern 42(1): 17-23. (in German). [According to the Fauna-Flora-Habitat-Directive of the European Union monitoring of species and habitats is mandatory for the Natura 2000 areas. This paper lists the present status of the species of Appendix II of the Directive in Mecklenburg-Vorpommern, Germany, and proposes insect orders and methods suitable for monitoring. The results of an inventory in 1997 and 1998 of the Odonata are presented. *Sympecma paedisca*, *Aeshna viridis*, *Leucorrhinia albifrons*, and *L. pectoralis* were recorded in 1998, while *Stylurus flavipes*, *Ophiogomphus cecilia*, and *L. caudalis* could not be traced.] Address: Wachlin, V., Karrenderfer Str. 3, D-17498 Leist, Germany

2013. Weissmann, M.J.; Kondratieff, B.C. (1999): An inventory of arthropod fauna at Great Sand Dunes National Monument, Colorado. *Spec. Publ. Univ. Kansas not. Hist. Mus.* 24: 69-80. [USA, Colorado; *Lestes congener*, *L. dryas*, *L. unguiculatus*, *Aeshna constricta*, *A. palmata*, *Sympetrum corruptum*, and *S. occidentale*] Address: Weissmann, M.J., Dept Bioagric. Sci. & Pest Manag., Colorado St. Univ., Fort Collins, CO 80523, USA

2014. Wernicke, P.; Rumpf, M.; Mösch, W. (1999): Die Vorkommen bedeutsamer Lebensräume und Arten im Naturpark Feldberger Seenlandschaft. Naturschutzarbeit in Mecklenburg-Vorpommern 42(2): 15-26. (in German). [Habitats, flora and fauna of special interest are described for this 34500 ha large area in Mecklenburg-Vorpommern, Germany. 52 odonate species are reported, but only *Leucorrhinia pectoralis* and *Aeshna viridis* are briefly discussed.] Address: Wernicke, P., Dorfstr. 33c, D-17237 Thurow, Germany

2015. Wieland, A. (1999): Surveys of flora and fauna in the Senné fishpond area, Slovakia, spring 1997. Report of the Working Group International Wader and Waterfowl Research 65: 85 pp. (in English). [The Senné fishponds, situated in eastern Slovakia, have been surveyed between April 15 and June 9, 1997. During the migration season up to 20000 waterbirds are present regularly. Thus this report stresses on birds. In addition, data on dragonflies, butterflies, amphibians, mammals,

and plants are also presented. The odonatological results - 12 species including *Coenagrion pulchellum*, *Erythromma najas*, and *Brachytron pratense* - are compiled in tab. 7. Additions to this list can be taken from a list of 24 species (including *Erythromma viridulum*, *Crocothemis erythraea*, *Sympetrum flaveolum*) with observations between 6th and 16th of August 1998 (Appendix 3). In total 27 species could be observed in the Senné fishponds.] Address: WIWO, P.P. Box 925, NL-3700 AX Zeist, The Netherlands

2016. Wolf, F. (1999): Die Tier- und Pflanzenwelt im Hütter Wohld: Kartierungen der Libellen (Odonata), Süßwassermollusken (Gastropoda et Bivalvia) und Laufkäfer (Carabidae) des "Hütter Wohldes". Archiv d. Freunde Naturg. Mecklenburg 38: 309-326. (in German). [Germany, Mecklenburg-Vorpommern; commented list of 13 odonate species] Address: Wolf, F., Martin-Andersen-Nexo-Ring 7, D-18106 Rostock, Germany

2017. Xylander, W.E.R.; Stephan, R. (1999): Habitatwahl und ökologische Ansprüche ausgewählter Libellenarten im Braunkohletagebauegebiet Berzdorf. Ber. Naturforsch. Gesell. Oberlausitz 7/8: 95-100. (in German with English summary). ["Habitat selection and ecological demands of selected dragonfly species from the brown coal mining site Berzdorf. During investigations of small ponds in the former brown coal mining site Berzdorf (Upper Lusatia. Saxonia. Eastern Germany) 48 dragonfly species were documented from May 1996 until October 1998. Some of these species developed in ponds and a smaller river which significantly differ - with regard to their biological and physico-chemical properties - from the habitat demands described in the literature. At several ponds coenoses occur, the species of which should not share the same habitats according to their postulated habitat preferences. Selected dragonfly species and their habitats in the former brown coal mining site are described and compared with data from the literature." (Authors) *Leucorrhinia dubia*, *L. rubicunda*, *Ophiogomphus cecilia*] Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany. E-mail: Naturmuseum. GR.Dr.Xylander@t-online.de

2018. Zhou, W.-b. (1999): A new species of the genus *Phaenandrogomphus* from Yunnan (Odonata: Gomphidae). Wuyi Sci. J. 15: 40-41. (in Chinese with English summary). [*P. yunnanensis* sp. n. is described, illustrated and compared with *P. aureus* Laidlaw holotype male: Simao, Yunnan prov., 20-IV-1996.] Address: Zhou, W.-e., Zhejiang Mus. Nat. Hist., Gu-shan, Hanzhou-310012, P.R. China

2019. Zhu, B. (1999): A new species of *Lamelligomphus* Fraser from Yunnan, China (Odonata: Gomphidae). Wuyi Sci. J. 15: 36-37. (in Chinese with English summary). [*L. chaoi* sp. n. is described and illustrated from a single female: Canshan, Dali, Yunnan prov., China, 5-VI-1998; deposited at Dali Teacher Training Coll., Dali, China.] Address: Zhu, H.-q., 42-38. Shanxi University, Taiyuan 030006 Shanxi. China

2020. Zhu, H.; Zhou, W.. (1999): A new species of the genus *Anisopleura* Selys from Yunnan (Odonata: Euphaeidae). Wuyi Sci. J. 15: 33-35. (in Chinese with English summary). ["*A. yunnanensis* sp. n. is described and illustrated. Holotype male: Canshan, Dali, Yunnan prov., China, 15-V-1987; deposited at Shanxi Univ.; several paratypes of both sexes. The new species is rela-

ted to *A. subplatystyla*, from which it differs in the colour of prothorax, legs and abdomen, and in the structure of anal appendages."] Address: Zhu, H.-q., 42-38. Shanxi University, Taiyuan 030006 Shanxi. China

2021. Zhu, H.; Mao, B. (1999): The first descriptions of the male *Indolestes assamica* Fraser, 1930 and the female *Gynacantha incisura* Fraser, 1935 (Odonata: Lestidae, Aeshnidae). Wuyi Sci. J. 15: 30-32. (in Chinese with English summary). [The allotypes of *I. assamica* are described from Canshan, Dali city, Yunnan prov., China, and are deposited in Dept Biol., Dali Teacher Training Coll., Dali-671000, Yunnan, P.R. China. *G. incisura* is a new record for China.] Address: Zhu, H.-q., 42-38. Shanxi University, Taiyuan 030006 Shanxi. China

## 2000

2022. Anonymus (2000): Mitarbeiter des Arbeitskreises Libellen NRW treffen sich in Herne. LÖBF-Mitteilungen 3/00: 14. (in German). [Announcement of the 6th meeting of the working group of dragonfly researchers in the Federal State Nordrhein-Westfalen, Germany.] Address: <http://www.ak-libellen-nrw.de>

2023. Anonymus (2000): Warum gelingt der Libellenflug? Klett-Magazin 24: p? (in German). [Description of the role of the protein Resilin giving the wings of dragonflies elasticity; for more details see the paper abstracted as OAS 1716.] Address: not stated

2024. Bailey, M.P. (2000): Predation of Four-spotted Chaser *Libellula quadrimaculata* L. by otter *Lutra lutra* L.. J. Br. Dragonfly Society 16(2): 64. (in English). [Wings and other fragments of *L. quadrimaculata* were found on a route used by an otter and close by an Otter spraint. The diet of Eurasian Otter has been investigated in some detail but this observation appears to be the first record instance of predation on adult Odonata.] Address: Bailey, M.P., Countryside Council for Wales, Plas Gogerddan, Aberystwyth, Ceredigion SY23 3EE, UK

2025. Bal, B. (2000): L'inventaire des odonates de Haute-Savoie. Bulletin romand d'entomologie 18: 59-64. (in French). [Status quo report on faunistic research of the Odonata of the south-eastern part of France. 69 species are known at present, most of them are discussed briefly.] Address: Bal, B., APEGE, BP 66, F-74963 Cran-Gevrier Cedex, France

2026. Baltes, B. (2000): Einfluss der Gewässerversauerung auf aquatische Insekten. Mitt. dtsh. Gesell. allg. angew. Entomol. 12: 232-235. (in German). [In the middle range mountain Hunsrück (Saarland, Germany) *Cordulegaster boltonii* was found to be quite tolerant against acidification of running waters.] Address: Baltes, Brigitte, Institut für Natur-, Landschafts- und Umweltschutz / Biogeographie, Universität Basel, St. Johannes-Vorstadt 10, CH-4056 Basel, Switzerland. E-mail: [Brigitte.Baltes@unibas.ch](mailto:Brigitte.Baltes@unibas.ch)

2027. Baumann, R.W.; Huillet, A.L. (2000): Odonata of Moapa warm springs, Clark county, Nevada. *Argia* 12(4): 2-3. (in English). [25 species are listed; *Ischnura barberi*, *I. hastata*, *Brechmorhoga mendax*, and *Stylu-*

rus plagiatus are new for Nevada, USA.] Address: Baumann, R.W., Brigham Young University, Provo, Utah 84602, USA

2028. Bechly, G. (2000): Two new fossil dragonfly species (Insecta: Odonata: Pananisoptera: Aeschniidae and Aktassiidae) from the Solnhofen lithographic limestones (Upper Jurassic, Germany). Stuttgarter Beiträge zur Naturkunde Serie B (Geologie und Paläontologie) 288: 1-9. (in English with German summary). ["Two new dragonfly taxa are described from the Upper Jurassic Solnhofen Limestone (Bavaria, Germany) Solnhofenia stobeneri n. g., n. sp. is the sixth species of Aeschniidae from this locality and also the smallest one. Aeschnogomphus kuempeli n. sp. (Petalurida: Aktassiidae) is one of the biggest dragonflies known from this locality and even from the whole post-Triassic Mesozoic and Cenozoic." (Author)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

2029. Belz, A.; Fuhrmann, M. (2000): Die Libellen des Kreises Siegen-Wittgenstein. Der Sauerländische Naturbeobachter 27: 45-48. (in German with English summary). [For a more detailed presentation of this paper see OAS 2030] Address: Fuhrmann, M., Zum Großen Wald 19, D-57223 Kreuztal, Germany

2030. Belz, A.; Fuhrmann, M. (2000): Libellen. Beiträge zur Tier- und Pflanzenwelt des Kreises Siegen-Wittgenstein 6: 83 pp. (in German). [This regional fauna on the Odonata of the low mountain range in the southern region of the federal state Nordrhein-Westfalen, Germany, gives information on 35 species of which 28 are assessed as autochthonous. Each species is treated in a monographic style, providing information on regional distribution (the maps are plotted against altitude), habitat, and habits. The species are documented by colour photographs.

(Auf der Informationsbasis eines etwa 25 jährigen Untersuchungszeitraums legen die Autoren Albrecht Belz und Markus Fuhrmann eine 83 Seiten umfassende Regionalfauna vor. Im Bundesland Nordrhein-Westfalen gelegen grenzt der Landkreis Siegen-Wittgenstein an Rheinland-Pfalz und Hessen. 35 nachgewiesene Arten, von denen 28 als bodenständig angesehen werden, dokumentieren eine eher artenarme Mittelgebirgs-Libellenfauna, was jedoch angesichts der Höhenlage (meist über 400 m und bis über 750 m NN) nicht weiter verwundert. Das Werk gliedert sich in 7 Kapitel: Einleitung, Geschichte der odonatologischen Kartierungen im Landkreis, Einführung in die regionale Geographie, Methoden und allgemeine Angaben zu Libellen, Liste und monographische Abhandlung der nachgewiesenen Arten, Anmerkungen zu Gefährdungen und Schutzmaßnahmen, Literatur. Den Artunterkapiteln sind jeweils Angaben zu "Verbreitung und Bestand", "Lebensraum", "Lebensweise" und - selten - "Besonderheiten" oder "Kuriosa" (u.a. Hinweis auf eine zwergwüchsige Aeshna cyanea) zu entnehmen. Beigegeben sind Rasterverbreitungskarten sowie ein Flugzeitendiagramm und - im Regelfall - ein Farbfoto der jeweiligen Art, jedoch nur dann, wenn das Belegfoto im Landkreis angefertigt werden konnte. Willenkommen ist dieses Buch für alle, die sich für Regionalfaunen und Ergänzungen im Flickenteppich der Verbreitungskarte der deutschen Libellenfauna interessieren. Für mich am interessantesten

waren einige Hinweise - manchmal nur am Rande erwähnt - zur (Wieder-?)besiedlung des Landkreises durch einige Arten vor dem Hintergrund der Landschaftsveränderungen und der klimatischen Änderungen in den zurückliegenden zwei Dekaden. (Martin Schorr)] Address: NABU Siegen-Wittgenstein e.V., In der Hüttenwiese 30, D-57072 Siegen, Germany

2031. Bernard, R. (2000): State of knowledge of the occurrence and biology of Cordulegaster boltonii (Donovan, 1807) in Poland (Odonata: Cordulegastridae). Roczn. nauk. Pol. Tow. Ochr. Przyr. "Salamandra" 4: 55-87. (in Polish with extensive English summary). ["All literature data on the occurrence of C. boltonii in Poland are summarized and new localities are added. Distribution, habitat, period of flight, location of exuviae and selected aspects of behaviour of the species in Poland are presented and discussed. C. boltonii is a vulnerable species in Poland. Threats are given and ways to stop a regressive trend are proposed." (Author)] Address: Bernard, R., Department of General Zoology, Adam Mickiewicz University, Fredry 10, PL-61-702 Poznan, Poland; E-mail: rbernard@main.amu.edu.pl

2032. Bezdecka, P. (2000): Effect of extreme floods in July 1997 on the dragonfly diversity (Odonata) in the middle section of the river Morava (Moravia, Czech Republic). In: Hanel, L. (Ed.): Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chráněné krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 37-51. (in Czech with English summary). [The author compares the dragonfly diversity in the middle section of the Czech river Morava (river km 98,9-172,15) on the basis of investigation in 1955-1956, 1995-1996, and 1997-1998. "In July 1997, the northeastern part of the Moravian territory and north-east part of the Bohemian were afflicted by intensive rains lasting several days, and as a result, the water streams in the drainage areas of the rivers Morava, Odra, Orlice and in the upper part of the drainage of the river Labe were marked of extreme flood flows, which attained or surpassed the level of so called Q 100 years' flows." A total of 42 odonate species are known from the study area. "[...] It is interesting that extreme floods in July 1997 had no negative influence on dragonfly diversity, even the increasing of dragonfly diversity was found during two years after floods in most examined localities (backwaters)."] Address: Bezdecka, P., V. Vaculky 994, 686 05 Uherské Hradiste, Czech Republic. E-mail: pbezdecka@iol.cz

2033. Binot-Hafke, M.; Buchwald, R.; Clausnitzer, H.-J.; Donath, H.; Hunger, H.; Kuhn, J.; Ott, J.; Piper, W.; Schiel, F.-J.; Winterholler, M. (2000): Ermittlung der Gefährdungsursachen von Tierarten der Roten Liste am Beispiel der gefährdeten Libellen Deutschlands - Projektkonzeption und Ergebnisse. Natur und Landschaft 75(9/10): 393-401. (in German with English summary). ["This presented project aims on national level a compilation of causes of threat for the animal species of the Red List. For this there was a catalogue developed, which contains general causes of threat and enables to evaluate results comprehensive for all animal groups. It was tested exemplary for the dragonflies, if this catalogues is suitable for using. By means of expert opinions the data admit conclusions about causes of threat for each species, responsible groups and trends. The results confirm the procedure. In future the catalogue and



the number of sampling must be optimized for the survey of the causes of threat of other animal groups." (Authors)] Address: Binot-Hafke, Margret, Bundesamt für Naturschutz, FG 11.1, Konstantinstr. 110, D-53179 Bonn, Germany. E-mail: binotm@bfn.de

2034. Bönsel, A.; Kühner, A. (2000): (Odonata) aus der Sammlung des Zoologischen Instituts der Universität Rostock. *Libellula* 19(3/4): 199-211. (in German with English summary). [Mecklenburg-Vorpommern, Germany. "The collection includes 92 specimens of 33 spp. Most specimens were collected by Mr A. GUNDLACH between 1906 and 1909 in the vicinity of Neustrelitz, northern Germany. That area is known for one of earliest faunistic works in northern Germany (FÜLDNER 1855). The data on collecting sites were compared with a map from 1882 and the recent situation. There was a drastic decrease in swamps and fens which could be related to changes in species composition." (Authors)] Address: Bönsel, A., Vasenbusch 15, D-18337 Gresenhorst, Germany. E-mail: andre.boensel@gmx.de

2035. Bönsel, A.; Matthes, H.; Matthes, J. (2000): Wo existiert noch ein bodenständiges Vorkommen der Torf-Mosaikjungfer, *Aeshna juncea* (L. 1758), in Mecklenburg-Vorpommern? *Naturschutzarbeit in Mecklenburg-Vorpommern* 43(2): 44-45. (in German). [This paper compiles the current knowledge on the distribution of *A. juncea* in the Federal State Mecklenburg-Vorpommern, Germany, and intends to make faunists sensible for the species. Surprisingly this species is very rare. The authors give some advice to the identification of the species.] Address: Bönsel, A., Vasenbusch 15, D-18337 Gresenhorst, Germany. E-mail: andre.boensel@gmx.de

2036. Boness, M. (2000): Massenflug der Schabrackenlibelle *Hemianax ephippiger* Burmeister an der Küste der Algarve (Portugal). *Atalanta* 31(3/4): 585. (in German). [Near Ferragudo, Portugal, September 16, 1999, several hundreds to thousands immature *Anax ephippiger* perched on shrub vegetation or near the ground directly in front of the cliff. The following days only few specimens could be traced. The possibility of an influx originating from Africa or Spain is shortly discussed.] Address: Boness, M., Birkenweg 18, D-51381 Leverkusen, Germany

2037. Bornholdt, G.; Braun, H.; Kress, J.C. (2000): Erfolgskontrollen im abgeschlossenen Naturschutzgroßprojekt "Hohe Rhön / Lange Rhön". *Angewandte Landschaftsökologie* 30: 261 pp.- (in German with English summary). ["It is the aim of this survey to gather experience in controlling the success of large scale national nature projects and to find practical guidelines for future projects. For that model success controls were made in the large scale conservation project „Hohe Rhön / Lange Rhön" during the vegetation periods of 1996 and 1997. They dealt with the flora, the vegetation, birds, amphibians, ground beetles, bugs, cicadas and dragonflies. Furthermore changes in the structure of the landscape and its use were analysed. [...]". Measures for Odonata nearly totally failed; the population of *Cordulegaster boltonii* and *Calopteryx virgo* diminished greatly. *Thecagaster bidentata* could not be observed. Due to priority for conservation measures directed to the Black Grouse (*Aves: Tetrao tetrix*), which is highly sensitive against human impacts including scientific studies, it was not possible to assess measures reali-

sed to increase populations of odonate bog species.] Address: not stated

2038. Breuer, M.; Douma-Petridou, E. (2000): A Greek mountain stream (N Peloponnesus) as habitat of *Callaieschna microstigma* (Odonata: Aeshnidae). *Libellula* Suppl. 3: 1-7. (in English with German summary). ["The odonate fauna of a small stream, bordered with plane trees in the mountain area of Panahaikon (SE Patras, Achaia, Greece), was studied in 1994 and 1997. Two species were found: *Callaieschna microstigma* and *Calopteryx virgo festiva*. The flight period of *C. microstigma* lasted from May to August, with a maximum emergence in the first half of June. The adult behaviour was inconspicuous and flight occurred until late dusk. *C. microstigma* seems to be restricted to a definite habitat. The following habitat characteristics may be important for its occurrence: (1) a wooded or at least tree-bordered shaded small watercourse, and (2) fast running water with calmer areas. The latter seem to serve as larval habitats." (Authors)] Address: Breuer, M., Zoological Institute, Laboratory for Developmental Physiology and Molecular Biology, Katholieke Universiteit Leuven, Naamsestraat 59, B-3000 Leuven, Belgium. E-mail: michael.breuer@bio.kuleuven.ac.be

2039. Breuer, M.; Douma-Petridou, E.; Koutsaftikis, A. (2000): Seasonal distribution of Odonata in brackish temporary wetlands of the NW Peloponnesus, Greece. *Libellula* Suppl. 3: 9-24. (in English with German summary). ["For at least one annual cycle, three different waters at the wooded coastal area of Strofilia (district Achaia) were studied. 17 species were recorded, some in rather high numbers. Limiting factors might be the salinity and the temporary character of the waters. A range of adaptations to these conditions are discussed: deposition of drought-resistant eggs, early and late appearance of the adults and protracted emergence. Several species appear to be multivoltine. High densities of *Aeshna mixta* and *A. affinis* as well as occurrence of hibernating adults of *Sympetrum striolatum* are noteworthy. Many species recorded at the Strofilia area are well known as dispersing insects." (Authors)] Address: Douma-Petridou, E., University of Patras, Faculty of Science, Department of Biology, Section of Animal Biology, GR-26110 Patras, Greece

2040. Brown, D. (2000): Lilac Beauty *Apeira syringaria* (L.) (Lep.: Geometridae): a second generation specimen at Charlecote Warwick. *Entomologist's record and Journal of variation* 112: 170. (in English). [*Aeshna mixta* was attracted by a light trap September 22, 1999.] Address: Brown, D., Jacksons Lawn, Charlecote, Warwick, CV35 9EW, UK

2041. Bruyn, L. de; Grootaert, P.; Pollet, M.; Knijf, G. de (2000): Hebben ongewervelden een toekomst in onze tuinen? *Ankora, Antwerpse Koepel voor Natuurstudie, Jaarboek 1999*: 68-83. (in Dutch). [Is there any future for invertebrates in our gardens? - The role of garden habitats in protection of Syrphidae (Diptera) and Odonata was investigated in the surroundings of Antwerpen, Belgium. In comparison to nature reserves, gardens habitats are inhabited by ubiquitous species only.] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

2042. Buczynski, P. (2000): Dragonflies (Odonata) of some existing and proposed peat bog reserves in the

region Polesie Lubelskie. Roczn. nauk. Pol. Tow. Ochr. Przyr. "Salamandra" 4: 89-101. (in Polish with extensive English summary). [Between 1992 and 1997, 39 species are recorded in four peat bogs in the Polish part of the region Polesie (border region to Belarussia and Ukraine). The most interesting species are "Sympecma fusca, Orthetrum albistylum, Libellula fulva, and Sympetrum pedemontanum. The northern range limits of the former two species run in eastern Poland, and the last compact complexes of localities of these species are known in the study area; northwards only single localities occur [...]. The development of *O. albistylum* in peat bog waters confirms also its wide habitat spectrum in mideastern Poland [...]. *L. fulva* and *S. pedemontanum* are widely distributed, but they occur rarely. *S. pedemontanum* was known from only one locality in the Polish Polesie [...]. *L. fulva* is given from this region for the first time and two other new records are also given. Both species are probably more frequent in the region, but they need intensive investigations focused on their typical habitats. [...]" (Author)] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

2043. Buczynski, P. (2000): Großlibellen auf Kiefernadeln aufgespießt (Odonata: Libellulidae). *Libellula* 19(3/4): 213-216. (in German with English summary). ["Dragonflies speared by pine needles (Odonata: Libellulidae) - Adult *Orthetrum cancellatum* and *Sympetrum danae* pinned to coniferous needles were found at peatbogs in southeastern Poland. The imago of *S. danae* had survived and flew dexterously with a pin impaling its abdomen. It is suggested that this phenomenon was caused by shrikes." (Author)] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

2044. Buczynski, P.; Pakulnicka, J. (2000): Odonate larvae of gravel and clay pits in the Mazurian lake district (NE Poland), with notes on extremely northern localities of some Mediterranean species. *Notul. odonatol.* 5(6): 69-72. (in English). [Larvae of 30 spp. were collected during 1998 and 1999 at 6 localities. Of special interest are *Orthetrum albistylum*, *Sympetrum depressiusculum*, *S. fonscolombii*, *S. meridionalis*, *S. striolatum*, and *Leucorrhinia pectoralis*. The localities for *O. albistylum* lie far from its hitherto known area of distribution.] Address: Pakulnicka, J., Chair of Ecology and Environment Protection, Warminko-Mazurski University, Zolnierska 14, PL-10-561 Olsztyn, Poland

2045. Burbach, K.; Weihrach, F. (2000): Entwicklung von drei Gomphiden-Arten in einem Baggersee bei München (Odonata: Gomphidae). *Libellula* 19(3/4): 237-240. (in German with English summary). ["In June 2000, exuviae of *Gomphus pulchellus*, *G. vulgatissimus* and *Onychogomphus f. forcipatus* were collected at an old gravel pit lake near Munich, Bavaria, Germany. In September 2000, these species were recorded as larvae in the same lake. This is the first record for Central Europe of the concurrent development of three gomphid species in stagnant waters." (Authors)] Address: Burbach, K., Griesfeldstr. 5a, D-85354 Freising, Germany. E-mail: klaus.burbach@gmx.de

2046. Burbach, K. (2000): Nachweis einer zweiten Jahresgeneration von *Enallagma cyathigerum* und

*Ischnura pumilio* in Mitteleuropa (Odonata: Coenagrionidae). *Libellula* 19(3/4): 217-227. (in German with English summary). ["South of Neuburg/Donau, Bavaria, Germany (48°41'N, 11°11'E) two freshly emerged adults and five exuviae of *E. cyathigerum* as well as one emerging and two fresh emerged imagines of *I. pumilio* have been recorded on 26-VIII and 30-VIII 1998, respectively. The site was a newly built pond which was flooded on 20-V-1998. The only probable origin of the odonates is from oviposition into the vegetation in spring 1998. The development from egg to adult must have taken place in about 100 days and was favoured by warm weather, high water temperature and lack of competition. Long flight periods and late emergence records suggest that a second generation is not uncommon and may often be overlooked due to methodical problems. The variation of life cycles in both spp. is discussed." (Author)] Address: Burbach, K., Griesfeldstr. 5a, D-85354 Freising, Germany

2047. Burkart, W.; Lopau, W. (2000): Libellen im Landkreis Rotenburg (Wümme). *Naturkundliche Schriftenreihe der Stiftung Naturschutz im Landkreis Rotenburg (Wümme)* 2: 175 pp. (in German). [The Landkreis Rotenburg (Wümme) is situated in the north of the Federal State Niedersachsen, Germany, south-west of Hamburg. The odonate fauna of this region is treated in a very nice, sophisticated book. In a general part the authors present an introduction into the natural history (geology, climate etc.) and the typical dragonfly habitats; maps and colour photos illustrate the given information. Furthermore the data basis is outlined, including a short history of odonatological research in the region. The book is directed to the advanced amateur and a more general public, thus: a biology of dragonfly is not lacking. Part II treats in a monographic style 55 odonate species. Each species is introduced by a colour photo and characterised more generally. Special emphasize is given to the distribution and the habitats in the Landkreis Rotenburg (Wümme). A map, a figure with phenology, information on threat, and possible conservation measures provide a lot of sound information of more than regional interest. A quite extensive chapter is directed to the protection of dragonflies under a more regional view. Some habitats and species in the Landkreis Rotenburg (Wümme) are of national importance in view of conservation view. The appendix includes a glossary and a regional bibliography. No doubt, this is a book which should not be missing from your odonatological library. (M. Schorr)] Address: Stiftung Naturschutz im Landkreis Rotenburg (Wümme), Postfach 1440, D-27344 Rotenburg (Wümme), Germany

2048. Buskirk, J. van; Schmidt, B.R. (2000): Predator-induced phenotypic plasticity in larval newts: trade-offs, selection, and variation in nature. *Ecology* 81(11): 3009-3028. (in English). ["Phenotypic plasticity has important ecological consequences because the strengths of species interactions can change with the behavior and morphology of interacting individuals. Evolutionary studies of plasticity can predict conditions under which shifts in phenotypes will occur and, therefore, may modify species interactions. We studied evolutionary mechanisms maintaining an induced response to predators in *Triturus* newt larvae, which are among many taxa in freshwater habitats exhibiting predator-induced plasticity. When exposed to caged (nonlethal) *Aeshna* dragonfly larvae, newts of two species (*T. alpestris* and *T. helveticus*) spent more time hiding in the leaf litter,

had darker pigmentation in the tail fin, and developed larger heads and larger tails relative to their body size, in comparison with newts in predator-free ponds. The two phenotypes faced a performance trade-off across environments with and without odonates: the predator-induced phenotype survived twice as well as the no-predator phenotype when exposed to free dragonflies, but the predator-induced phenotype of both species grew more slowly until just before metamorphosis. For *Triturus alpestris*, a direct comparison of performance between phenotypes was complicated because predator-induced newts emerged later in the summer but at a larger body size. Nonrandom mortality imposed by hunting dragonflies caused selection favoring increasing tail size, but we found no selection on specific traits in predator-free ponds. Head shape was not subject to selection in either environment; we suspect that head shape is involved in consuming different prey in the presence and absence of predators and is unrelated to predator escape. *Triturus* in 25 natural populations from which we collected quantitative samples in 1997 and 1998 exhibited extreme spatial variation in predation regime (density of large predators ranged from 0 to 24 individuals/m<sup>2</sup>). Variation among populations in head shape was exactly as predicted by experimental results (*Triturus* of both species had relatively large heads when exposed to predators), but results for tail shape were consistent with the experiments in only one of the two years. The evolutionary mechanisms maintaining plasticity in *Triturus* and other amphibian larvae should apply to many organisms inhabiting freshwater ponds, so trait-mediated indirect effects seem especially likely to occur in these habitats." (Authors). *Aeshna cyanea*, *Anax imperator*] Address: Buskirk, J. van, Institute of Zoology, University of Zürich, CH-8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

2049. Bußmann, M. (2000): Libellenfunde im nord-westlichen Sauerland - eine vorläufige, kommentierte Artenliste. *Der Sauerländische Naturbeobachter* 27: 49-56. (in German with English summary). [Commented list of 27 odonate species of the northwestern Sauerland, Nordrhein-Westfalen, Germany.] Address: Bußmann, M., Elberfelder Str. 9, D-58285 Gevelsberg, Germany

2050. Carvalho, A.L.; Calil, E.R. (2000): Identification Keys to the Families of Odonata (Insecta) occurring in Brazil, Adults and Larvae. *Papeis Avulsos de Zoologia* 41(5): 223-241. (in Spanish with English summary). [New identification keys for adults and last instar larvae of 13 odonate families are presented. A synopsis of the geographic range, habitats of breeding, and number of genera and species is compiled for each family. General data on the biology and morphology of the order with emphasize on wing venation are added.] Address: Carvalho, A.L., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro (UFRJ), Rio de Janeiro, Brazil

2051. Cempírek, J. (2000): The contribution about dragonflies marking (Odonata). In: Hanel, L. (Ed.): *Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chránené krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim.* ISBN 80-86327-12-4: 24-29. (in Czech with English summary). [The author communicates his with experience marking *Cordulia aenea* wings with a acetone car paint. He uses the 12 positions (loci) method. "Each locus has its own number

code beginning from the tip of the anterior left wing - code 1, to the last locus on the tip of the posterior right wing- code 12. The combination of the single spot codes gives a resulting individual code number for each specimen. The colour spots are well visible, permanent and help to identify each marked specimen during its fly or rest without any recapture."] Address: Cempírek, J., Vidov 37, 370 07 České Budejovice, Czech Republic

2052. Chalmel, R.; Dommanget, J.-L. (2000): Rubrique bibliographique. *Martinia* 16(4): 209-212. (in French). [Odonatological publications from 1995 to 2000 referring to France are listed.] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

2053. Cloupeau, R.; Boudier, F.; Levasseur, M.; Coquempot, C. (2000): Les odonates de Touraine (Département d'Indre-et-Loire, France). Bilan de l'Inventaire en cours. *Martinia* 16(4): 153-170. (in French with English summary). [Records of 58 odonate species - own field observations, literature data, and data from the French record scheme - are listed and commented. Special attention is paid to the Gomphidae dwelling the River Loire and its tributaries. The records of *Leucorrhinia caudalis*, *Oxygastra curtisii*, *Ophiogomphus cecilia*, *Gomphus graslinii*, *Stylurus flavipes*, and *Coenagrion mercuriale* are of European importance.] Address: Cloupeau, R., 10, av. L. Brulé, F-37210 Vouvray, France

2054. Collier, K.J.; Halliday, J.N. (2000): Macroinvertebrate-wood associations during decay of plantation pine in New Zealand pumice-bed streams; stable habitat or trophic subsidy? *Journal N. Am. benthol. Soc.* 19(1): 94-111. (in English). [Antipodochlora braueri was identified in 3 wood and 2 inorganic substrate samples, collected in summer 1996 from 12 New Zealand pumice-bed streams.] Address: Collier, K.J., Natn. Inst. Water & Atmospheric Res., P.O. Box 11-115, Hamilton, New Zealand

2055. Conze, K.-J. (2000): Faunistische Untersuchungen zur Effizienzkontrolle im Gewässerrenaturierungsprogramm 1999. *Natur- und Umweltschutzakademie Nordrhein-Westfalen - Seminarbericht* 6: 62-66. (in German). [Controlling the success of restoration measures of the River Ems, Nordrhein-Westfalen, Germany, birds and dragonflies were monitored along four sampling stretches. 21 odonate species were observed. The results are critically assessed with emphasize on age of restoration measures / substrat diversity, so called standard methods for ecological surveys, and biocological phenomena as between years changing abundances of insect populations. If monitoring has to be realised under the pressure of a low budget, results are hardly to be considered as serious in a scientific sense.] Address: Conze, K.-J., LökPlan-Conze, Cordes & Kirst GmbH, Hedwigstr. 32b, D-59609 Anröchte, Germany. E-mail: lökplan@t-online.de

2056. Costa, J.M.; Santos, T.C (2000): *Especie nova de Heteragrion Selys, 1862 do estado do Rio de Janeiro, Brasil (Odonata: Zygoptera: Megapodagrionidae).* *Bolm Mus. nac. Rio de J. (N.S. / Zool.)* 411: 1-7. (in Portugese with English summary). [Heteragrion muryense sp. n. is described and illustrated. Holotype male, allotype female: Rio de Janeiro, Nova Friburgo, Mury, alt. 1500 m, 10-11-1990; deposited at MNRJ. Keys to separate the three groups within the genus, and the



eight species (groupe I and II) that occur in the state of Rio de Janeiro, Brasil are provided.] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisys.com.br

2057. Couteyen, S.; Papazin, M. (2000): Contribution à la connaissance des Odonates de l'île de la Réunion 2. Description de la larve de *Gynacantha bispina* Rambur. (Odonata, Aeshnidae). *L'entomologiste* 56(5): 215-219. (in French with English summary). ["The ultimate instar larva of *Gynacantha bispina* Rambur, 1842 is described and figured. Some biological notes are added. It is compared to the larva of *Anax imperator mauricianus* Rambur, 1842, the other known Aeshnidae from La Réunion." (Authors)] Address: Couteyen, S., 188, Chemin Nid Joli, F 97430 Le Tampon, La Réunion

2058. Couteyen, S.; Papazin, M. (2000): Contribution à la connaissance des odonates de la Réunion 3. *Hemicordulia asiatica* Sélys, 1878, une espèce nouvelle pour l'île (Odonata, Corduliidae). *Martinia* 16(3): 107-110. (in French with English summary). [*H. asiatica* was observed December 17, 1998. A checklist of the Réunionian Odonata is added.] Address: Couteyen, S., 188 chemin Nid Joli, F-97430 Le Tampon, La Réunion, France

2059. Couteyen, S.; Papazin, M. (2000): Contribution à la connaissance des odonates de l'île de la Réunion 1. Présence de *Gynacantha bispina* Rambur, 1842 (Odonata, Aeshnidae). *Entomologiste* 56(3): 127-134. (in French with English summary). [*Gynacantha bispina*, *G. radama*, *G. malgassica*, and *G. hova* are known to occur on the isles of Madagascar, Réunion, Mauritius, and the Comores. The specimens of the genus known from Réunion are analyzed, and turned out to belong exclusively to *G. bispina*. Thus, *G. radama* has to be eliminated from the checklist of the Odonata from Réunion; a new checklist (16 species) is given in the appendix of the paper. The species (excl. *G. hova*) are figured, *G. bispina* is described, and compared in detail with *G. malgassica*.] Address: Couteyen, S., 188 chemin Nid Joli, F-97430 Le Tampon, La Réunion, France

2060. Couteyen, S. (2000): Déterminisme de la posture de guet chez *Trithemis annulata haematina* (Rambur, 1842) (Odonata, Libellulidae). *Martinia* 16(3): 101-106. (in French with English summary). [Réunion; the perch site selection of *T. haematina* is studied in dependence of day time, temperature of air, temperature of perch surface, wind, and on of four differed perch positions previously occupied.] Address: Couteyen, S., 188 chemin Nid Joli, F-97430 Le Tampon, La Réunion, France

2061. Cruden, R.W.; Gode, O.J. (2000): The Odonata of Iowa. *Bulletin of American Odonatology* 6(2): 13-48. (in English). ["We report 108 species from Iowa, which include 103 species collected since 1985, two accidentals, and three species that were probably extirpated many decades ago. We discuss reports of 20 additional species whose presence in the state is questionable. As many as 31 species may be imperiled or critically imperiled. This reflects, at least in part, that the distributional ranges of 19 species barely reach Iowa. Most of the imperiled species occur in lotic habitats or wetlands, habitats most affected by human activity. Dramatic post-settlement changes in the state's river systems

were followed by the movement of species into lotic systems, e.g., *Argia moesta*, *Enallagma anna*, *Gomphus externus*, *Progomphus obscurus*, and *Stylurus notatus*. [...] *Hagenius brevistylus*, *Gomphus fraternus*, *G. exilis*, have become less common or were extirpated due to stream degradation. Further, prior to settlement there were few deep lakes and ponds in the state and virtually no wetlands or ponds in southern Iowa. The construction of farm ponds, gravel pits, etc., and the elimination of wetlands dramatically changed the lentic fauna. Species that were absent from Iowa, rare, or restricted to eastern Iowa early in the 1900s are now common across the state, e.g., *Epitheca princeps*, *Celithemis eponina*, and *Perithemis tenera*. In contrast, at least one wetland species was possibly extirpated, i.e., *Lestes vigilax*, and the ranges of others probably contracted, e.g., *Aeshna verticalis*, *Nasiaeschna pentacantha*, and *Sympetrum ambiguum*." (Authors)] Address: Cruden, R.W., Department of Biological Sciences, University of Iowa, Iowa City, IA 52242, USA. E-mail: robert-cruden@uiowa.edu

2062. Czachorowski, S.; Buczynski, P.; Walczak, U.; Pakulnicka, J. (2000): Cover species (umbrella species) in the protection of insects. *Przegląd Przyrodniczy* 11(2-3): 139-148. (in Polish with English summary). ["Current laws on nature protection in Poland are grounded on experiences with protection of vertebrates and plants. However, they are often insufficient and ineffective in case of insects. Moreover, they also make difficult basic studies on faunistics and ecology which are vital to plan proper protection activities. Such activities, outside protected areas (National Parks and Nature Reserves) are proposed in this article, using the so-called 'cover species' ('umbrella species') method. The umbrella species for variable biotopes in Poland are suggested, including the caddisflies, dragonflies, water beetles, water bugs, and butterflies." (Authors) A German translation of the paper is available from Pawel Buczynski.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

2063. d'Aguilar, J. (2000): Les descriptions originales des Odonates d'Europe. 6. Fonscolombe, Etienne, Laurent, Joseph, Hyppolyte, Boyer de (1775-1853). *Martinia* 16(4): 185-208. (in French with English summary). [The sixth article in the series of facsimilies of fundamental odonatological publications is devoted to Boyer de Fonscolombe (1775-1853) who described several Odonata species, among them *brunneum* (Orthetrum), *caerulescens* (Coenagrion) and *irene* (Boyeria).] Address: d'Aguilar, J., 7, rue Adrien Lejeune, F-93170 Bagnolet, France

2064. Daigle, J.J. (2000): Sarasota surprises! *Argia* 12(4): 9-10. (in English). [USA, Florida; *Coryphaeschna adnexa*, *Crocothemis servilia*, *Erythemis plebeja*, *Brachymesia gravida*, *Aphylla williamsoni*, *Erythrodiplax umbrata*, *Miathyria marcella*] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: daiglej@dep.state.fl.us

2065. Danforth, D. (2000): First record of *Dythemis maya* for Arizona. *Argia* 12(4): 3. (in English). [September 30, 2000; Lower Parker Canyon, Santa Cruz County, Arizona, USA] Address: Danforth, D., P.O. Box 232, Bisbee, Az., 85603, USA. E-mail: Dougofbis@yahoo.com

2066. David, S. (2000): Bibliography of dragonflies (Insecta: Odonata) of Slovakia. III (1993-2000). Sborník referátu III. celostátního semináře odonatologi v CHKO Trebonsko, 2000: 175-183. (in Slovakian with English summary). [The third part of the Slovakian odonatological bibliography compiles 86 publications.] Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. E-mail: nruk-davi@savba.sk

2067. David, S. (2000): Dragonfly (Odonata) communities and water habitats in the inundation of the Hron river potamal (SW Slovakia). Ekológia (Bratislava) 19 (Suppl. 2): 137-150. (in English with Slovakian summary). ["The species composition in the dragonfly communities of lentic and lotic habitats in the inundation area of the Hron River is analysed. The investigation was carried out from April 1987 to October 1993, neglecting the winter period. A total of 61 samples were taken in 20 habitats. A total of 33 species were captured, 28 of which were found in the larval stage. One of these - *Sympetrum danae* (as a peat-moos species) is recorded for the first time in the Hron floodplain. Among endangered and rare species, *Onychogomphus forcipatus*, *Sympetrum meridionale*, *S. pedemontanum*, and *Somatochlora metallica* respectively, may be mentioned about. Surprising is the finding of the peat-moss and moorland species *S. danae*. According to origin 17 Mediterranean and 10 Palearctic species dominate. Five species originate from Ponto-Caspian refuge area. 17 species are wide-spread in Euro-Siberian and west-Siberian areas, Palearctic area harbours 9 species and 5 species are wide-spread in the area extending from Mediterranean region to southern Scandinavia and Russia. *Erythromma viridulum*, *Aeshna affinis*, *Anax imperator*, and *Crocothemis erythraea* are species of invasion character. The types of habitat could be separated into the four groups of different community structure. The ordination and classification of the dragonfly communities were set up using NCLAS and PRINCOMP programs. We have identified odonatocenoses: *Gomphus - Calopteryx splendens* in the Hron river (rheophile communities) and small defined species communities of *Orthetrum - Lihellula depressa* in study area. The habitats present here are the Hron branches (oxbow lakes) and the big gravel pits. The habitats of the richest communities of species *Lestes - Sympetrum - Aeshna* (*mixta*, *affinis*) are gravel pits filled with soil and oxbow lakes of Hron. Despite the difficulties with interpretation of the results obtained by ordination (indirect gradient analysis), the presented methods of numeric data elaboration are considered to be a contribution to the study on community composition problems of dragonflies." (Author)] Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. E-mail: nruk-davi@savba.sk

2068. David, S. (2000): Dragonfly fauna (Insecta: Odonata) of the Stiavnické vrchy Mts. Entomofauna carpathica 12: 25-31. (in Slovakian with English summary). [The dragonfly fauna of 25 localities in the Stiavnické vrchy Mts. (middle Slovakia) was investigated from 1990 to 1998. 28 species are documented in detail and zoogeographically analyzed. A total of 33 odonate species is known from the region. The records of *Coenagrion ornatum*, *Thecagaster bidentata*, *Orthetrum brunneum*, and *Leucorrhinia pectoralis* are the most considerable faunistic results from the surveys of the Stiavnické vrchy Mts.] Address: David, S., ÚKE SAV,

Akademická 2, SK-94901 Nitra, Slovakia. E-mail: nruk-davi@savba.sk

2069. David, S. (2000): New records of dragonflies (Insecta, Odonata) from Slovakia. Biologia, Bratislava 55(5): 444- (in English). [The record of *Coenagrion armatum* (May 15, 1999, Poprad-Stufy) enlarges the number of odonate species known from Slovakia to 74. Some additional records of *Somatochlora meridionalis* (different dates, Semerovský potok brook and Sahy-Tesmak) are dealt with.] Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. E-mail: nruk-davi@savba.sk

2070. Dijkstra, K.D.; Dingemans, N.J. (2000): Odonata from Kibale National Park, western Uganda. Notul. odonatol. 5(6): 72-75. (in English). [Records for 47 spp. collected from Oct. 1995 to Febr. 1996 in Kibale National Park and its surroundings are presented. Notes on habitat, behaviour and taxonomy are added for some spp, e.g. *Umma saphirina* Förster 1916, *Chlorocnemis marshalli* Ris 1921, *Chlorocnemis pauli*, *Enallagma pseudelongatum*, *Pseudagrion hageni*, *Pseudagrion kibalense*, *Aeshna ellioti*, *Notogomphus butoloensis*, *Atoconeura biordinata*, *Hemistigma albipuncta*, *Micromacromia camerunica*, *Notiothemis robertsi*, *Orthetrum julia*, *Zygonyx regisalberti*.] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

2071. Dolný, A. (2000): Dragonflies (Odonata) as biological indicators. In: Hanel, L. (Ed.): Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chránené krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 8-23. (in Czech with English summary). [Dragonflies are suitable to determine the saprobity of running waters based on a calculation of the saprobic index of the community. "In this contribution the author sums the knowledge about the possibilities of using dragonfly (Odonata) larvae for bioindication. [...] Dragonflies are also a suitable group of insects for bioindication of the naturalness level of zoocenoses and for monitoring the ecological state of biotops significant from the point of view of conservation of the nature and namely peat bogs."] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic

2072. Dommangeat, J.-L.; Mashaal, M. (2000): Les Départements et Territoires d'Outre-mer français. Généralités. Martinia 16(3): 85-94. (in French with English summary). [This is a general introduction into the political and geographical situation of the French overseas departments and territories in the framework of a special issue of Martinia on the Odonata of these countries. They represent an area of about 120000 km<sup>2</sup> and a population of more than 2,2 millions inhabitants. "Most of these territories are tropical and have therefore weather conditions favorable to Odonata. A general introduction is followed by some information about the geography, the climate and the economy of the different territories. The odonatological interest of each is also mentioned, mainly for the territories not covered in other articles of the present issue." (Authors)] Address: Mashaal, M., 2, rue Meilhac, F-75015 Paris, France

2073. Dommangeat, J.-L. (2000): Note préliminaire sur des collections d'odonates exotiques mises à disposition de la SFO. Martinia 16(3): 133- (in French). [Short

notice with reference to specimens from different countries waiting for determination, including some identifications from Guadeloupe.] Address: Dommangeat, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

2074. Donath, H. (2000): Bergbaufolgelandschaft - Leit- und Zielarten zur Beurteilung von Naturschutzkonzepten. Teil 2: Odonata. Biologische Studien, Luckau 29: 25-41. (in German). [Odonata were surveyed between 1995 and 2000 in the abandoned brown-coal-mining area Schlabendorf Nord and Schlabendorf Süd, Brandenburg, Germany. 43 (27 autochthonous) species could be recorded. In addition data of the Stoßendorf See (colonisation by Odonata after flooding) and the Tornower Waldsee are presented. The author defines umbrella species (e.g. species of ponds, acid lakes, high bogs, ubiquitous) dwelling the brown coal waters and compares their habitat selection with different stages of succession of these waters. Factors discussed are pH, age, water level, wind exposition, or vegetation. The author concludes that measures for species of late succession stages with reed belts and hydrophyte and submerged vegetation should be given priority.] Address: Donath, H., Caule Nr. 1, D-15926 Zieckau, Germany

2075. Donnelly, N. (2000): A hybrid *Ophiogomphus* female - again. *Argia* 12(4): 9. (in English). ["A few years ago I reported on a strange *Ophiogomphus* female collected by the late Richard Forster. It was found on the Squannacook River at West Groton, Middlesex Co., Massachusetts, on 10 Aug. 1996. Its characters were almost precisely halfway between *O. rupinsulensis* and *carolus*, and I determined it to be a hybrid between those two species. This summer Jeremiah Trimble found a second example, on the Machias River, Washington Co., Maine, on 26 June 2000. It is also a female and is essentially identical to the Forster specimen. The morphological character that is most significant in both examples is the post-occipital horn, which is similar to that of *rupinsulensis*, but very thin. (*O. carolus* lacks a horn here). It is curious that these two specimens are females; generally males show their hybrid origins much more clearly." (Verbatim)] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

2076. Donnelly, N. (2000): Hybrid between *Enallagma anna* and *civile* - from Ontario and Iowa!. *Argia* 12(4): 8-9. (in English). [The male appendages of *E. anna* and *E. civile*, and of *E. anna* x *civile* are figured. The case of *E. optimolocus* Miller & Ivie, 1996 is discussed; the species could possibly be a hybrid between *E. anna* and *E. carunculatum*. Nick Donnelly concludes: "Hybridization may be more frequent than we think."] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

2077. Donnelly, N. (2000): Review: Dragonflies of North America. Revised edition. By Needham, J.G., Westfall, M.J., and May, M.L. Gainesville. Scientific Publishers. *Argia* 12(4): 11-13. (in English). [Critical and detailed review of the new cornerstone of north American anisopteran odonatology.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

2078. Donnelly, T.W. (2000): Clef d'identification des Odonates de Guadeloupe, Dominique et Martinique. *Martinia* 16(3): 111-121. (in French with English sum-

mary). ["The author provides an identification key to Odonata of Guadeloupe, Dominica, and Martinique. It includes also some species not recorded in these islands of the Lesser Antilles but whose presence is a possibility." (Author)] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

2079. Duhé, R. (2000): Ant lion eats *Erythemis*. *Argia* 12(4): 9. (in English). [Texas, USA; "[...] there was a female *Erythemis simplicicollis* apparently "stuck" to the ground and flapping its wings wildly. Closer observation showed the dragon had, most unfortunately, chosen a bare spot on the bank only a few square inches in area that happened to be the site of an antlion's den! An ill-fated rescue attempt (mostly to discover the predator's true identity) only yielded the dragonfly minus its abdomen. The mostly clay with sand bank was too difficult to dig fast enough to yield the culprit." (Author)] Address: Rand Duhé. E-mail: duhe@infohwy.com

2080. Duinen, G.-J. van ; de Bruijn, L.; Hanzen, D.; Kleef, H. van; Kuper, J.; Scarse, D.; Esselink, H. (2000): Do restoration measures help to restore dragonfly communities in raised bog remnants? Proceedings of the Section Experimental & Applied Entomology of the Netherlands Entomological Society (N.E.V.) 11: 151-158. (in English). ["Until now it is unknown whether restoration of raised bog remnants in The Netherlands result in the restoration of fauna communities characteristic of intact raised bog systems. Preliminary results of a comparative study in four different raised bog remnants under restoration show remarkable differences in dragonfly density and species composition. A main factor seems to be the presence or absence of variation in water quality, as found in intact raised bog complexes, including natural transitions to the surrounding landscape. Influence of atmospheric deposition, present spatial configuration of raised bog remnants, and hydrological interactions may hinder restoration efforts." (Authors) Abundance and total number of individuals were counted using the transect method. All species observed (n = 30) were divided into ecological categories. An analysis of the current species composition compared with these categories concluded that dragonfly communities of both ombrotrophic raised bog centres (*Aeshna subarctica elisabethae* and *Somatochlora arctica*, the latter not present in the study area) and of gradients to more minerotrophic parts of the systems are still not completely present in the studied raised bog remnants.] Address: Duinen, G.-J. van, Department of Environmental Studies, Bargerveen Foundation, University of Nijmegen, 6500 GL, Nijmegen, Netherlands

2081. Dupont, P. (2000): Contribution à l'inventaire des odonates de Martinique. *Martinia* 16(3): 122. (in French). [Lesser Antilles; Martinique; a list of ten taxa collected at five localities is presented] Address: Dupont, P., Cidex 116, 1286, rue de Belledonne, F-38920 Crolles, France

2082. Easton, E.R.; Liang, G.-Q. (2000): The Odonata of Macao, southern China. *Notul. odonatol.* 5(6): 75-80. (in English). [27 spp. are listed, of which 25 are considered new records for the region. *Cercion sexlineatum*, *Sinictinogomphus clavatus*, and *Anax parthenope julius* were attracted to lights.] Address: Easton, E.R., 46-130 Kiowai Street No. 2714, Kaneohe, Hawaii 96744, USA; Liang, G.-Q., Research Institute of Ento-



mology, Zhongshan University, Guangzhou-510275, China

2083. Ehmann, H. (2000): Libellenfunde im Bundesland Salzburg 1990-1999 (Insecta: Odonata). *Anax*, Wien 3: 1-17. (in German with English summary). [119 localities in the federal state Salzburg, Austria were surveyed for their odonate fauna. The records of the 55 species are documented date- and locally-wise. Compared to the checklist of Landmann (1984) 6 species (*Coenagrion ornatum*, *C. lunulatum*, *Ophiogomphus cecilia*, *Leucorrhinia pectoralis*, *L. caudalis*, and *Sympecma paedisca*) could not be traced again, five species (*Anax ephippiger*, *Libellula fulva*, *Orthetrum albistylum*, *Epitheca bimaculata*, and *Cercion lindenii*) are new for the region.] Address: Ehmann, H., Hirschenh hstr. 25, A-5450 Werfen, Austria

2084. Eisermann, K.; Schulz, U.; Oehlke, J. (2000): Die Libellenfauna (Odonata) eines extensiv genutzten Schifffahrtskanals: der Finowkanal in Eberswalde. *Entomologische Nachrichten und Berichte* 44(4): 253-258. (in German with English summary). [19 odonate species were recorded in 1996. *Platycnemis pennipes* and *Ischnura elegans* are dominant. The following species are discussed in some detail: *Brachytron pratense*, *Erythronia najas*, *Coenagrion puella*, *C. pulchellum*, *Sympecma fusca*, *Gomphus vulgatissimus*, *Libellula fulva*, *Calopteryx splendens*, *P. pennipes*, *I. elegans*, *Somatochlora metallica*, *Orthetrum cancellatum*, *Sympetrum sanguineum*.] Address: Oelke, J., Fachhochschule Eberswalde, Fachbereich Landschaftsnutzung und Naturschutz, Schicklerstr. 3-5, D-16225 Eberswalde, Germany

2085. Eklov, P.; Werner, E.E. (2000): Multiple predator effects on size-dependent behavior and mortality of two species of anuran larvae. *Oikos* 88(2): 250-258. (in English). [This study examined the effects of multiple predators on size-specific behavior and mortality of two species of anuran larvae. Particularly, we focused on how trait changes in predators and prey may be transmitted to other species in the food web. In laboratory experiments, we examined the effects of bluegill sunfish, *Lepomis macrochirus*, and the odonate larva *Anax junius* on behavior and mortality of tadpoles of the bullfrog, *Rana catesbeiana*, and the green frog *R. clamitans*. Experiments were conducted with predators alone and together to assess effects on behavior and mortality of the tadpoles. The experiments were replicated on five size classes of the tadpoles to evaluate how responses varied with body size. Predation rates by *Anax* were higher on bullfrogs than on green frogs, and both bullfrogs and green frogs suffered greater mortality from *Anax* than from bluegill. Bluegill only consumed green frogs. Predation rates by both predators decreased with increasing tadpole size and decreased in the non-lethal (caged) presence of the other predator. Both anuran larvae decreased activity when exposed to predators. Bullfrogs, however, decreased activity more in the presence of *Anax* than in the presence of bluegill, whereas green frogs decreased activity similarly in the presence of both predators. The largest size class of green frogs, but not of bullfrogs, exhibited spatial avoidance of bluegill. These responses were directly related to the risk posed by the different predators to each anuran species. *Anax* activity (speed and move frequency) also was higher when alone than in the non-lethal presence of bluegill. We observed decreased predation rate of

each predator in the non-lethal presence of the other, apparently caused by two different mechanisms. Bluegill decreased *Anax* mortality on tadpoles by restricting the *Anax* activity. In contrast, *Anax* decreased bluegill mortality on tadpoles by reducing tadpole activity. We discuss how the activity and spatial responses of the tadpoles interact with palatability and body size to create different mortality patterns in the prey species and the implications of these results to direct and indirect interactions in this system." (Authors)] Address: Eklov, P., Dept of Ecology and Environmental Science, Animal Ecology, Umea Univ., SE-901 87, Umea Sweden

2086. Elkin, C.M.; Baker, R.L. (2000): Lack of preference for low-predation-risk habitats in larval damselflies explained by costs of intraspecific interactions. *Animal Behaviour* 60(4): 511-521. (in English). [Many studies indicate prey organisms select microhabitats with high structural complexity as a way of reducing risk of predation. We used laboratory experiments to show that damselfly larvae, *Ischnura verticalis*, suffer higher predation rates from pumpkinseed sunfish in low-density vegetation. However, larvae do not preferentially occupy microhabitats with high vegetation density in either the presence or absence of sunfish; when given a choice, the number of larvae per stem of vegetation was equal across all densities of vegetation. That larvae do not congregate in dense vegetation may reflect costs of aggressive interactions. Results from laboratory experiments indicated larval interactions increase conspicuous behaviours (most notably swimming) and consequently increase fish predation. A subsequent experiment indicated that frequency of larval interactions increases with increased vegetation density when number of larvae/stem is constant. Thus, larval microhabitat selection may reflect a trade-off between reduced risk of predation in areas of high vegetation density, caused by reduced fish foraging ability, and increased aggressive larval interactions, due to decreased proximity of larvae." (Authors)] Address: Baker, R.L., Dept Zoo], Erindale Coll., Univ. Toronto, Mississauga, ON, L6L 2C6. Canada. E-mail: rba-ker@credit.erin.utoronto.ca

2087. Endersby, I.D. (2000): Common names for dragonflies. *Victorian Entomologist* 30(4): 53-54. (in English). [The author compiles on the family level common names for Australian Odonata; he compares the names used in UK, USA, and New Zealand. In the cases of species occurring in New Zealand and Australia common names on the species level are adopted. He concludes that except for Gomphidae ("Clubtails") and Corduliidae ("Emeralds") "Australia can feel free to produce a unique set of vernacular names as there is no international standard to which it should conform."] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@werple.net.au

2088. Endersby, I.D. (2000): Dragonfly conservation in Victoria. *Victorian Entomologist* 30(4): 47-51. (in English). [This is a general introduction into problems of dragonfly conservation in Victoria, Australia. Special emphasis is given on defining so-called flagship species. For those species which are known to occur in Victoria, Hawking's (1999) (see OAS 983) assessment of their Australian status is delimited to the Victorian regional situation. 74 species are listed; *Hemiphysalia mirabilis* is listed as 'Vulnerable', 11 species as 'Near threatened', 55 as 'Least concern', and 7 as 'Data defi-

cient'.] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@werple.net.au

2089. Endersby, I.D. (2000): Nomenclatural changes affecting Victorian dragonflies. *Victorian Entomologist* 30(3): 40-41. (in English). [A full catalogue of Victorian Odonata is given in Endersby (2000) (see OAS 1831). This paper summarises the family level taxonomy changes as they affect the Victorian Odonata.] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@werple.net.au

2090. Etter, W.; Kuhn, O. (2000): An articulated dragonfly (Insecta, Odonata) from the Upper Liassic Posidonia shale of northern Switzerland. *Palaeontology* 43(5): 967-977. (in English). ["An articulated dragonfly from the Lower Jurassic Posidonia Shale of northern Switzerland is described. The specimen is assigned to *Liassogomphus brodiei* (Buckman). This is the first description of an articulated member of the family Liassogomphidae, hitherto known from isolated wings only. Almost identical wings were previously described as *Phthitogomphus angulatus* (Handlirsch) and *Palaeogomphus propinquus* (Bode). The latter is now treated as synonymous with *Liassogomphus brodiei*, and the genus *Palaeogomphus* Handlirsch is therefore a junior synonym of *Liassogomphus* Cowley. The structures of the head, eyes, thorax, legs, and first segments of the abdomen confirm the state of the Liassogomphidae within the Anisoptera (or Pananisoptera) and point perhaps to a close relationship of the Liassogomphidae to the extant family Aeshnidae. This has already been stated previously based on wing venation patterns alone. The taphonomy of dragonflies in marine settings is briefly addressed. Only a combination of several exceptional circumstances led to the fossilization of this remarkable fossil." (Authors)] Address: Etter, W., Paläontologisches Institut und Museum der Universität, Karl Schmid-Str. 4, CH-8006 Zürich, Switzerland. E-mail: wetter@pim.unizh.ch

2091. EVSA e.V. (2000): Bestandserhebungen bei Insekten im Norden Sachsen-Anhalts. *Entomol. Mitt. Sachsen-Anhalt* 8(2): 68-76. (in German). [Several localities in the north of the Federal State Sachsen-Anhalt, Germany, the fauna of which is very insufficient known, were surveyed in end of June 2000. Weather conditions have been poor. Therefore quite few dragonflies could be traced. J. Müller and R. Steglich list eleven species from five sampling sites including records of *Stylurus flavipes* from the River Elbe.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: jmueller@mu.lsa-net.de

2092. Falck, J.; Johansson, F. (2000): Patterns in size, sex ratio and time at emergence in a south Swedish population of *Sympetrum sanguineum* (Odonata). *Aquatic Insects* 22(4): 311-317. (in English). ["Differences between sexes in life history patterns of *Sympetrum sanguineum* were studied in a small pond in southern Sweden by means of exuviae and adult sampling. Emergence occurred from 4 to 28 July, and mean emergence date was 10 July for both males and females. The sex ratio at emergence (53% females) did not differ from 1:1, but significantly more females emerged during the first 5 days of the emergence period. Size of emerging individuals (immatures) decreased as season progressed and males emerged at a larger size than fema-

les. While immature males were heavier than immature females, no such difference was found in mature individuals. We suggest that the sexual differences in size and emergence patterns observed are the result of different optimisation by males and females with respect to the growth-mortality risk trade-off in the larval and adult stages." (Author)] Address: Johansson, F., Department of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Limed, Sweden. E-mail: frank.johansson@eg.umu.se

2093. Faton, J.-M. (2000): L'intérêt odonatologique du Marais de Printegarde, au confluent de la Drôme et du Rhône. *Sympetrum* 15: 39-49. (in French). [41 species of which 34 are considered autochthonous, are reported from a marsh situated in the confluent of the rivers Drôme and Rhône, France. In tab. 2 the species turn over of the periods 1985 to 1991 and 1994 to 1997 is compared. In fig. 1 the population density of *Coenagrion mercuriale*, *C. puella*, *C. pulchellum*, *C. scitulum*, and *Cercion lindenii* is presented. First results of a transect walk to document the abundance and dominance of the species is presented in tab. 3 and fig. 2.] Address: Faton, J.-M., Réserve Naturelle des Ramières, les Garis, F-26120 La Baume Cornillane, France

2094. Fischer, U.; Weigel, A. (2000): Beitrag zur Fauna des Geschützten Landschaftsbestandteiles "Wiese am Kirchsteig" und dessen Umfeld bei Niederböhmersdorf (Thüringen: Landkreis Greiz). *Thüringer Faunistische Abhandlungen* 7: 21-44. (in German with English summary). [Between 1995 and 2000, 27 odonate species including *Coenagrion hastulatum*, *Erythromma najas*, *Sympetrum flaveolum*, and *S. pedemontanum* are recorded. They are listed and interesting species are shortly discussed.] Address: Fischer, U., Anton-Günther-Str. 12, D-08340 Schwarzenberg, Germany

2095. Fitzstephens, D.M.; Getty, T. (2000): Colour, fat and social status in male damselflies, *Calopteryx maculata*. *Animal Behaviour* 60(6): 851-855. (in English). ["In the black-winged damselfly, *Calopteryx maculata*, younger males challenge and displace older males from mating territories. Fatter males tend to win fights. These fights were initially interpreted as wars of attrition based on fat reserves, but the distributions of fat at the end of fights suggests at least some assessment of the opponent's condition. Alternatively, new models have been developed that show how the observed pattern could result without assessment. We show that there is a subtle but reliable cue to fat reserves: colour. Females are a relatively drab brown-black. Males are a strikingly iridescent blue-green colour, resulting from a multilayer constructive interference reflector system in the epicuticle. In fatter males the lamellae are more compressed and the peak reflectance is at shorter wavelengths (blue). Leaner, greener males have greater spacing between lamellae and reflect longer wavelengths. The peak reflectance is as predicted from transmission electron micrograph measurements of the lamellar spacing. The rate of change in spacing over time can be manipulated experimentally by manipulating the diet. Individuals on a higher food diet remained blue longer and at the end of the experiment were fatter and bluer. In our studies, colour is a better predictor of territorial status than fat." (Authors)] Address: Getty, T., Kellogg Biological Station, Michigan State University, Hickory Corners, MI, 49060, USA. E-mail: getty@kbs.msu.edu

2096. Flíček, J. (2000): A current state of the knowledge of the dragonflies (Odonata) of peat bogs around the river Luznice (Southern Bohemia). In: Hanel, L. (Ed.): Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chráněné krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 60-65. (in Czech with English summary). [47 species were collected during 1966 - 2000 in peat bogs in the river Luznice basin (region of Trebonsko, southern Bohemia, Czech Republic). The current state of the dragonfly fauna of seven localities is compared for four decades. Records of *Coenagrion hastulatum*, *C. lunulatum*, *C. pulchellum*, *Brachytron pratense*, *Aeshna subarctica elisabethae*, *A. juncea*, *Anaciaeschna isoceles*, *Gomphus pulchellus*, *Ophiogomphus cecilia*, *Somatochlora flavomaculata*, *S. arctica*, *Sympetrum flaveolum*, *Leucorrhinia dubia*, *L. pectoralis*, and *L. rubicunda* are of some interest.] Address: Flíček, J., Velký kopec 325, 378 04 Chlum u Trebone, Czech Republic. E-mail: drflicek@satnam.cz
2097. Flint, O. (2000): *Nehalennia pallidus* in Texas! *Argia* 12(4): 3-4. (in English). [Odonate specimens from a 1918 collection made in Texas yielded to be *N. pallidus*. This species was formerly thought to be endemic for Florida, USA] Address: Flint, O.S., Natn Mus. Nat. Hist., Smithsonian Inst., Washington, DC 20560, USA
2098. Flint, O. (2000): *Sympetrum signiferum* at Leslie Canyon, Arizona. *Argia* 12(4): 6-7. (in English). [*S. signiferum* was recorded from August 30 until around November 20, 2000.] Address: Flint, O.S., Natn Mus. Nat. Hist., Smithsonian Inst., Washington, DC 20560, USA
2099. Garcia-Berthou, E.; Moreno-Amich, R. (2000): Food of introduced pumpkinseed sunfish: Ontogenetic diet shift and seasonal variation. *Journal of Fish Biology* 57(1): 29-40. (in English) ["The pumpkinseed sunfish *Lepomis gibbosus* introduced into Lake Banyoles (Spain) were predominantly littoral but there was a tendency of large fish to use deeper zones. Their diet was dominated by littoral macrobenthos, particularly amphipods (*Echinogammarus* sp.). There was ontogenetic variation in the diet, with small young-of-the-year (LF<4 cm) feeding on several littoral microcrustaceans, especially the cladoceran *Ceriodaphnia reticulata*, whereas larger fish shifted to a freshwater shrimp (*Atyaephyra desmaresti*), snails and damselfly larvae. Seasonal variation in diet was linked to the availability, with consumption of fish eggs and plant debris in spring and summer. In autumn, pumpkinseeds were partially zooplanktivores, preying on the cladoceran *Daphnia longispina*. The diet of pumpkinseeds in Lake Banyoles and other Iberian populations shows less molluscivory than North American populations. The potential ecological impact of this successful exotic species involves mainly predation on fish eggs and molluscs." (Authors).] Address: Garcia-Berthou E., Departament de Ciències Ambientals and Institut d'Ecologia Aquàtica, Universitat de Girona, E-17071, Girona, Catalonia, Spain
2100. Gassmann, D. (2000): Revision of the Papuan *Idiocnemis bidentata*-group (Odonata: Platycnemididae). *Zool. Med. Leiden* 74 (23): 375-402. (in English). ["Eight species of the Papuan genus *Idiocnemis* Selys, 1878, sharing common traits in ligula structure and colour pattern, referred to here as the *Idiocnemis bidentata*-group, are redescribed or newly described. Taxonomy and distribution are updated and one new taxon, *Idiocnemis polhemi* spec. nov., is described from South-East New Guinea." (Author) *Idiocnemis bidentata*, *I. dagnyae*, *I. mertonii*, *I. nigrivertris*, *I. obliterateda*, *I. inaequidens*, *I. pruinescens*. An identification key to the species (males and females) and a distribution map of the *I. bidentata*-group in New Guinea are also provided.] Address: Dirk Gassmann, Institute of Evolutionary and Ecological Sciences, Leiden University, c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: Gassmann@rulsfb.leidenuniv.nl
2101. Gebhard, B. (2000): EU-LIFE-Projekt "Feuchtlebensraummanagement im Biosphärenreservat Schaalsee". *Naturschutzarbeit in Mecklenburg-Vorpommern* 43(1): 13-21. (in German). [Report on a management plan for the biosphere reserve "Schaalsee" in Mecklenburg-Vorpommern, Germany. A monitoring for Odonata is scheduled; only *Lestes dryas* and *Brachytron pratense* are mentioned in the text.] Address: Gebhard, Bettina, Amt für das Biosphärenreservat Schaalsee, Wittenburger Chausee 13, D-19246 Zarrentin, Germany
2102. Geissen, H.-P. (2000): Gomphidae vom südlichen Mittelrhein (Odonata). *Libellula* 19(3/4): 157-174. (in German with English summary). [Rheinland-Pfalz, Germany. "Based on collections of exuviae, *Gomphus flavipes*, *G. pulchellus*, *G. vulgatissimus*, *Ophiogomphus cecilia*, and *Onychogomphus f. forcipatus* were recorded from the southern Midrhine in 2000. The most abundant species, *G. flavipes* and *G. vulgatissimus*, emerged on a variety of substrates which, in contrast to other studies, included boulder embankments but not trees. The origin of the populations is discussed." (Author)] Address: Geissen, H.-P., Brunnenstr. 34, D-56075 Koblenz-Stolzenfels, Germany
2103. Gemeinhardt, M. (2000): Zur Fauna der Unstrutniederung bei Heldrungen (Kyffhäuserkreis/Thüringen). *Thüringer Faunistische Abhandlungen* 7: 45-64. (in German with English summary). [The floodplain of the river Unstrut, Thüringen, Germany was investigated in 1996 and 1999. 19 odonate species are recorded. One oxbow of the River Unstrut is of special importance as habitat of a strong population of the rare *Coenagrion pulchellum*.] Address: Gemeinhardt, M., Rathenastr. 24, D-99085 Erfurt, Germany
2104. Geraeds, R.P.G.; Hermans, J.T. (2000): Dragonfly *Ophiogomphus cecilia* (Fourcroy, 1785) along the River Roer. *Natuurhistorisch Maandblad* 89: 254-259. (in Dutch with English summary). ["*O. cecilia* has always been a rare dragonfly in the Netherlands, where it had been extinct since 1936. In 1995 and 1996, a few animals were found at the Geleen-beek brook. In August and September of 2000, the species was spotted in low densities along the river Roer near Melick. The animals were mostly found perching in full sunlight on sandy soil, pieces of dead wood and vegetation on the banks of the river. Two females were observed while ovipositing. How *O. cecilia* managed to reach the river Roer after such a long time is not clear. An explanation could be that the animals drifted towards the Roer from the nearest populations in Germany and France. Another option could be that a small, undiscovered population of this species has lived along the river Roer for a longer period of time. The improving quality of the water could have made this possible. Further investigations



will have to show whether the Roer is a suitable habitat for *O. cecilia*." (Authors)] Address: Geraeds, R.P.G., Julianalaan 46, NL-6042 JH Roermond, The Netherlands

2105. Gilard, B.; Dommange, J.-L. (2000): 3e rencontres odonatologiques de France. Saint-Beuzire (Haute-Loire), 29 et 30 juin, 1er, 2 et 3 juillet 2000. Bilan et perspectives. *Martinia* 16(4): 175-184. (in French with English summary). [This is a detailed report of the third odontological meeting of France. In a chronological order lectures and field trips are documented. The data of the field trips are documented, including records of the rare *Coenagrion lunulatum*.] Address: Dommange, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

2106. Gilard, B. (2000): Une visite au "Lac du Lauzon" (Lus-la-Croix-Haute, massif du Dévoluy, Drôme). *Symptetrum* 15: 51-53. (in French). [France; at 1935 m asl, *Aeshna juncea* and *Coenagrion puella* are recorded.] Address: Gilard, B., 6, Route du Saut du Loup, F-63340 Le Beuil-sur-Couze, France

2107. Goffart, P. (2000): Compte-rendu de l'excursion aux étangs de Virelles et Roly du samedi 1er juillet 2000. *Gomphus* 16(2): 150-151. (in French with Dutch summary). [Belgium; *Coenagrion scitulum*, *Cercion lindenii*, *Anax parthenope*, *Somatochlora flavomaculata*, *Epithea bimaculata*, *Crocothemis erythraea*, and *Symptetrum fonscolombii* are among the species observed.] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

2108. Goffart, P. (2000): Compte-rendu de l'excursion du samedi 26 août 2000 dans la région de Spa. *Gomphus* 16(2): 151-153. (in French with Dutch summary). [14 odonate species are reported from this trip to Spa, Belgium. *Aeshna subarctica elisabethae* could not be traced. Of some interest is the record of *Lestes barbarus*.] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

2109. Goffart, P. (2000): Statut des espèces prioritaires d'Odonates du programme "Inventaire et Surveillance de la Biodiversité en Wallonie": bilan décennal (1990-1999). *Gomphus* 16(2): 139-149. (in French with English and Dutch summaries). ["The aim of this article is to offer a very concise survey of the 21 species considered priority in Wallonia. The survey is based on data collected in Wallonia during the last decade. A number of data of 2000 have also been used. All the information is presented in the form of synoptic tables. Among those priority species 4 have clearly declined, so have probably 6 others more (= 48%); one species (*Aeshna isosceles*) probably has disappeared. The others show a status-quo or some even a possible expansion. The tables show for each of these 21 species: natural regions, habitat, number of populations, threats and appropriate conservation measures." (Author)] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

2110. Gomez-Anaya, J.A.; Novelo-Gutierrez, R.; Arce-Perez, R.A.C (2000): The Odonata in the zone affected by the Central Hydroelectric Plant of Zimapan named for Engineer Fernando Hiriart Balderrama, Hidalgo, Mexico. *Folia Entomologica Mexicana* 108: 1-34. (in Spanish with English summary). ["A faunistic study of

Odonata, based mainly in the larval stage, was carried out in Zimapan's influence area, which is located at the boundaries of Hidalgo and Queretaro States, Mexico. Samples were taken monthly, from August-95 to July-96 in five water bodies. The whole community structure of each water body was described and compared regarding to the others in terms of richness, Shannon diversity index, Hill's evenness index, rareness and density. Ecological distributional and seasonal data are provided for the majority of species, a list of species and an illustrated key to larvae species were also included. A total of 10,943 larvae and 193 imagoes belonging to 41 species of 23 genera included in seven families were caught. We found the highest richness, diversity, rareness and evenness in San Francisco River, whereas Tula River had the lowest density and diversity values. Fourteen species were recorded for the first time for Hidalgo State: *Argia pallens*, *A. pulla*, *A. sedula*, *A. tezpi*, *Ischnura ramburii*, *Aeshna dugesi*, *Anax walsinghami*, *Erpetogomphus crotalinus*, *Brechmorhoga praecox postlobata*, *Dythemis maya*, *Erythemis plebeja*, *Paltothemis lineatipes*, *Perithemis intensa*, and *Pseudoleon superbus*." (Authors)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@sun.ieco.conacyt.mx

2111. Goodyear, K.G. (2000): A comparison of the environmental requirements of larvae of the Banded Demoiselle *Calopteryx splendens* (Harris) and the Beautiful Demoiselle *C. virgo* (L.). *J. Br. Dragonfly Society* 16 (2): 33-51. (in English). [The only previous detailed work on the habitats and ecological requirements of the two *Calopteryx* species in UK covered the Wey river system of Hampshire and Surrey. In this paper the author observed that there has been considerable variation in the reported habitat requirements of these species compared with the study of Prendergast (1988). 20 locations were surveyed for their (co-occurring) dragonfly fauna, physical factors (water temperatures, water flow, depth, volume), chemical factors (hydrogen-ion concentration, oxygen, nitrate), and ecological factors (aquatic, emergent, and marginal vegetation).] Address: Goodyear, K.G., 26 Twynham Avenue, Christchurch, Dorset BH23 1QU, UK

2112. Gorb, S.N.; Kesel, A.; Berger J. (2000): Microsculpture of the wing surface in Odonata: Evidence for cuticular wax covering. *Arthropod Structure & Development* 29(2): 129-135. (in English). ["The insect wing membrane is usually covered by scales, hairs, and acanthae, which serve diverse functions, such as species-specific coloration pattern, decrease of wind resistance during flight or decrease of wing wettability. Representatives of Palaeoptera (Odonata and Ephemeroptera) have no hairy structures on the wing membrane, but both its sides are fine-sculptured. In this study, the nature of the wing covering was studied using acoustic microscopy, scanning- and transmission electron microscopy followed by a variety of chemical treatments. It was shown that wing microsculptures are not cuticular outgrowths, but a wax covering, which is similar to pruinosity, which has been previously described in several odonate taxa. Data from scanning acoustic microscopy revealed that scratches on the wax covering have material density different from the surrounding material. Various functions of the wax covering are discussed." (Authors)] Address: Gorb, S., Max-Planck-Institut für Entwicklungsbiologie,

Planck-Institut für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. E-mail: stas.gorb@tuebingen.mpg.de

2113. Grand, D. (2000): Influence d'une éclipse de soleil sur une population d'odonates. Bulletin romand d'entomologie 18: 84-91. (in French). [15 km NE of Lyon, France along a line transect abundance and activities of Odonata were observed during the 91,2% solar eclipse of August 11, 1999.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

2114. Grand, D. (2000): USA été 1979. Sympetrum 15: 55-58. (in French). [15 common taxa from six localities from eastern USA are listed.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

2115. Grand, D. (2000): Voyage en Martinique. Martinia 16(3): 127-132. (in French with English summary). [In April and early May 2000, 14 odonate species were observed in Martinique, including *Tholymis citrina* which seems to be a new species for the Lesser Antilles.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

2116. Grangier, C. (2000): Les araignées au menu de ces demoiselles. Sympetrum 15: 3-4. (in French). [Usually Odonata are preyed by spiders. This article reports two examples of spider preying Odonata from France. (1) *Ischnura elegans* devours a small *Araniella cucurbitina* (or *A. inconspicua*). (2) *Sympecma fusca* preyed on a very small, probably immature indetermined spider.] Address: Grangier, C., Le Trio, F-8460 Optevoz, France

2117. Greis-Harnischmacher, W. (2000): Bemerkungen zum Vorkommen von *Cordulegaster bidentata* in Hagen. Der Sauerländische Naturbeobachter 27: 115-120. (in German with English summary). [*Thecagaster bidentata* has been found on three localities of the Hagen region, Nordrhein-Westfalen, Germany. The reproduction habitats are gathering areas, where the larvae live buried in fine-sediments. The author used an interesting method to reveal the larvae by digging small hollows in which water and fine sediments can gather. After a few hours he succeeded in sifting out larvae from these hollows. Some advice in identification of early instar larvae of *T. bidentata* is given (dark spots on the ventral side of young larvae).] Address: Greis-Harnischmacher, W., Arndtstr. 20, D-58097 Hagen, Germany

2118. Grether, G.F.; Switzer, P.V. (2000): Mechanisms for the formation and maintenance of traditional night roost aggregations in a territorial damselfly. Animal Behaviour 60(5): 569-579. (in English). ["Communal roosting has been studied extensively in birds, but the mechanisms and functions of this taxonomically widespread behaviour pattern remain poorly understood. We studied the roosting behaviour of rubyspot damselflies, *Hetaerina americana*, in relation to sex and territorial status, and conducted field experiments to test for specific mechanisms of roost formation and maintenance. Both sexes tended to return close to their previous night's roost, but only males were significantly more roost site faithful than chance expectations based on individual day ranges. Males were more roost site faithful when they held mating territories. After acquiring a territory, males usually began roosting closer to the territory after a delay of a few days. Roosts were not lo-

cated at sites that reduced the daily commuting distance between hunting areas and territories; males generally hunted closer to their territories than to their roosts. In field experiments, sites 'seeded' with synthetic models of male rubyspots attracted more recruits than vacant control sites and control sites seeded with nonrubyspot (clear-winged) damselfly models. Sites seeded repeatedly with rubyspot models often remained popular for roosting after the models were removed, suggesting that the models established new traditional roosts. These results indicate that conspecific attraction and individual spatial memory together may be sufficient to explain, at a proximate level, the traditional night roost aggregations of this species. We discuss these results in relation to functional hypotheses for roost site choice and fidelity." (Authors)] Address: Grether, G.F., Department of Organismic Biology, Ecology and Evolution, University of California, 621 Charles E Young Drive South, Los Angeles, CA, 90095. USA. E-mail: ggrether@obee.ucla.edu

2119. G.R.P.L.S. (2000): Publications du G.R.P.L.S. depuis de Sympetrum n° 11. Sympetrum 15: 59-61. (in French). [In most cases unpublished reports of the Groupe de Recherche et de Protection des Libellules "Sympetrum" are compiled. There are many studies referring to one locality or some referring to species of special interest like *Leucorrhinia pectoralis* and *Coenagrion mercuriale*.] Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France

2120. Gurliat, P. (2000): Les Odonates de Loire-Atlantique. Bull. soc. sci. nat. Ouest de la France N.S. 21(2): 83-89. (in French with English summary). [Commented checklist of the 55 Odonata species recorded so far in the Loire-Atlantique département, France.] Address: Meurgey, F., 2, rue Bossuet, F-44000 Nantes, France

2121. Hämäläinen, M. (2000): The status of *Calopteryx okinawana* Matsumura, 1931 (Zygoptera: Calopterygidae). Notul. odonatol. 5(6): 83. (in English). ["In his '6000 illustrated insects of Japan-Empire', S. Matsumura (1931, p. 1454) described and illustrated *Calopteryx okinawana* Mats. as a new species from Okinawa, Japan. This is conspecific with *Matrona basilaris japonica* Förster, 1897. However, as far as I know, this synonymy has not been presented in any publication. Consequently, in their catalogues, C.A. Bridges (1994) and H. Steinmann (1997) list *okinawana* as a good species in *Calopteryx*, though the former hesitantly so, with a question mark after the genus name. Thus: *Matrona basilaris japonica* Förster, 1897, *Calopteryx okinawana* Matsumura, 1931, syn. nov.." (Author)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

2122. Hájek, J.; Mocek, B. (2000): The occurrence of the dragonfly *Sympecma annulata* (Selys, 1887) (Odonata: Lestidae) in the Czech Republic. In: Hanel, L. (Ed.): Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chránené krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 52-59. (in Czech with English summary). [Three notes on the occurrence of *Sympecma paeidisca* in the area of the Czech Republic are resulting from the 30s and 40s of the past century. Thus, the species has been catalogued in the Red List of dra-

gonflies of the Czech Republic as missing. It now was rediscovered during surveys of insects of reclaimed dumps of lignite from the Sokolov region in the years 1998-2000. A revision of the known data and of the stored specimens in the collections of the National museum shows that *S. paedisca* is restricted in the Czech Republic to the north-western Bohemian districts Sokolov and Karlovy Vary (Sokolov basin, one locality reaching as far as to the Doupovské hory mountains). "New findings originate from strongly anthropic localities, which are recultivated dumps of lignite, where the species prefers only several years old reservoirs and wet-grounds that are only sparsely covered by herbal vegetation." A successive concentration of high mineral salt content in water has been recorded. Ten adults were observed from May till September. [...] It seems that the species has been overseen in this area, or that an extensive survey of dragonflies has not been done there, for more than fifty years." The Czech population is considered as an isolated population on the western border of the area. Abstracters note: The publications of Bönisch, R. (1994): Die Odonaten der Naab-Wondreb-Senke / Nordost-Bayern unter besonderer Berücksichtigung von *Sympetrum depressiusculum*. Naturschutzzentrum Wasserschloß Mitwitz - Materialien 1/94: 85-88 and Pröse, H. (1954): *Sympetma paedisca* Brau., neu für Nordbayern. Nachbl. bay. Entomol. 3: 55-56 seem to be unknown to the authors. These publications document a Bavarian / Czech population of *S. paedisca* closely related resp. ranging to the Sokolov region.] Address: Mocek, B., Regional Museum of Eastern Bohemia, Dept Natural History, Eliscino Nábřeží 465, CZ-50001 Hradec Králové, Czech Republik. E-mail: mvc@mvc.anet.cz

2123. Hanel, L. (2000): The influence of the solar eclipse on dragonfly activities. In: Hanel, L. (Ed.): *Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chráněné krajinné oblasti Trebonsko 15.-18.6.2000*. Vlasim. ISBN 80-86327-12-4: 30-34. (in Czech with extensive English summary). [...] From the observation it is clear that dragonfly imagoes reacted in a similar way during the solar eclipse like during any other unpleasant change of weather. The majority of the individuals left the vegetation near the bank and hid in the near-by growth. The individuals that stayed near the bank were not active and remained sitting on the vegetation most of the time (at the maximum of the eclipse the least number of individuals was found in the area - four - out of whom only one was flying). A similar behaviour was observed during a bad change in the weather (overcast, breeze, light shower during the walk from 11.50 till 12.00). After the eclipse had terminated, dragonflies returned back gradually to the banks of the pond, the same number of individuals were counted approximately 30 minutes after the solar eclipse had ended." (Author)] Address: Hanel, L., Správa chráněné krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republik. E-mail: blanik@schkocr.cz

2124. Hauck, S. (2000): Die Ausbreitung der Gebärderten Prachtlibelle (*Calopteryx splendens*) im mittleren Lennetal. *Der Sauerländische Naturbeobachter* 27: 134. (in German with English summary). [Presentation of some counts of *C. splendens* along the River Lenne, Nordrhein-Westfalen, Germany in the period between 1993 and 1997.] Address: Hauck, S., Schulstr. 15, D-58513 Lüdenscheid, Germany

2125. Hedge, T.A.; Crouch, T. E. (2000): A catalogue of the dragonflies and damselflies (Odonata) of South Africa with nomenclatural clarification. *Durban Museum Novitates* 25: 40-55. (in English). ["The past 10 years have been marked by a renewed interest in the biogeography and conservation of southern African Odonata. While significant advances have been made within these fields, the taxonomy of this group last received attention during the 1980s. One of the consequences of this neglect is the perpetuation of orthographic errors and incorrect and inconsistent usage of species names in subsequent literature. In order to obviate further confusion, a catalogue of the Odonata of southern Africa is presented. It is a synopsis of current odonate literature, names in current usage, authors and dates at all cited taxonomic levels. Families, genera and species are listed alphabetically within each superfamily and no synonymies are given. The catalogue is thus taxonomic rather than systematic, with emphasis on clarification and correction of earlier nomenclatural irregularities appearing in literature. All species recorded for the country, irrespective of the current status of these records, have been included. Two suborders, six superfamilies, 11 families, 59 genera, 147 species and 13 subspecies, are recorded from past literature as South African. Of the 170 species-group taxa listed, 10 do not occur in South Africa as the nominotypical taxon, but as subspecies thereof, three are known from only one collection, one is known from only two collections and two are of doubtful provenance in South Africa." (Authors)] Address: Crouch, T. E., Durban Natural Science Museum, Durban, 4000 South Africa

2126. Heimann, H. (2000): Libellenvorkommen im Raum Schwerte und Holzwickede. *Der Sauerländische Naturbeobachter* 27: 121-128. (in German with English summary). [Nordrhein-Westfalen, Germany. Between 1991 and 1997 26 odonate species were recorded. The results of the survey are presented on distribution maps.] Address: Heimann, H., Albert-Schweizer Str. 8, 59439 Holzwickede, Germany

2127. Hochebner, T.; Lopau, W.; Pennerstorfer, J. (2000): Die Libellenfauna der Insel Lesbos, Griechenland (Odonata). *Libellula Suppl.* 3: 25-40. (in German with English summary). ["Records of six journeys from 1995 to 1998 have been combined with published and unpublished data known from the island. Altogether, 42 spp. have been recorded. The checklist is discussed in terms of behaviour and habitat preferences." (Authors)] Address: Hochebner, T., Hauptstr. 13, A-3153 Eschenau, Austria. E-mail: t.hochebner@utanet.at

2128. Holusa, O. (2000): The dragonflies (Insecta: Odonata) in the collections of the Museum of the Beskydy Mts Frydek-Místek (Czech Republic). *Klapalekia* 36: 71-79. (in Czech with English summary). [578 imagoes and 132 larvae of 37 species, mainly collected between 1963-1996 in north-eastern Moravia and Silesia, Czech Republik, are stored in the collection.] Address: Holusa, O., Muzeum Beskyd, přírodovědné oddělení, Zámecké náměstí 1264, CZ-738 01 Frydek-Místek. E-mail: holusao@post.cz

2129. Holusa, O. (2000): The results of faunistics research of the dragonflies (Odonata) in the Bohemian Forest. *Silva Gabreta* 5: 149-166. (in Czech with extensive English summary). [In 1997-1998 in "Bohemian Forest" (Sumava National Park and Protected Landscape



Area) 27 odonate species were collected. Published records arise the number of species to a total of 31. The region is situated in southwestern Czech Republic close to the German border. *Aeshna caerulea*, *A. subarctica elisabethae*, *Somatochlora arctica*, *S. alpestris*, and *Leucorrhinia dubia* are discussed in some detail with special reference to habitats and altitudinal distribution.] Address: Holusa, O., Muzeum Beskyd, prirodovedné oddelení, Zámecké náměstí 1264, CZ-738 01 Frydek-Místek. E-mail: holusao@post.cz

2130. Hochstettler, K. (2000): Neue Fundorte der Sibirischen Winterlibelle und der Gemeinen Keiljungfer (Odonata) im Gottlieber Ried und am Seerhein (Thurgau). Mitt. thurg. naturf. Ges. 56: 83-88. (in German). [Switzerland; documentation of dragonfly records between 1985 and 1996; 18 species are recorded including the new to the region records of *Sympetma paedisca* and *Gomphus vulgatissimus*. Habitat, oviposition of *S. paedisca*, and the effects of changing lake levels on oviposition side quality are described in detail.] Address: Hostettler, K., Schulstr. 7, CH-8590 Romanshorn, Switzerland

2131. Huber, A. (2000): On the odonate fauna of the Szamos (Somes) River and its surroundings in Romania. Notul. odonatol. 5(6): 80-82. (in English). [Commented checklist of 26 species including *Stylurus flavipes*, *Ophiogomphus cecilia*, and *Somatochlora flavomaculata* evidenced in August 1996. The record of *S. metallica* is questionable; the specimens should be *S. meridionalis*.] Address: Huber, A., Ecological Institute, Lajos Kossuth University, H-40010 Debrecen, Hungary

2132. Jacquemin, G. (2000): Une petite collection d'odonates de la Guadeloupe. Martinia 16(3): 100. (in French). [From 7 localities 10 taxa were collected in 1996.] Address: Jacquemin, G., Biologie des Insectes, Université H. Poincaré, Nancy 1, BP 239, F-54506 Vandoeuvre-lès-Nancy, France

2133. Jödicke, R.; Lopau, W. (2000): Overlapping adult generations of the univoltine dragonfly, *Sympetrum striolatum* in southern Greece (Odonata: Libellulidae). Libellula Suppl. 3: 41-47. (in English with German summary). ["Very old individuals were still on the wing in late April when the next generation started emergence. The unusually long life-span of adults corresponds with a long prereproductive aestivation. The phenology of *S. striolatum* in Greece is compared to that in Central Europe." (Authors)] Address: Lopau, W., Kuhstedtmoor 26, D-27442 Gnarrenburg, Germany. E-mail: lopi@t-online.de

2134. Johnson, M.E.; Lombardo, M.P. (2000): Nestling Tree Swallow (*Tachycineta bicolor*) diets in an upland old field in western Michigan. Am. Midl. Nat. 144 (1): 216-219. (in English). ["We collected and identified 1852 prey items from 89 boluses delivered to 62 nestling tree swallows (*Tachycineta bicolor*) at 14 nests in an upland old field in western Michigan. We found that 90.8% of nestling diets was insects from the Orders Diptera, Homoptera, Hymenoptera and Coleoptera. We also found clam and snail shells in boluses. [...]. Nestling diets at our study site were similar in the proportions of many prey items, such as Diptera and Homoptera, to tree swallow nestling diets in other habitats but contained fewer aquatic forms such as Odonata and Ephemeroptera." (Authors)] Address: Johnson, M.E., Lombardo, M.P., Dept of biology, Grand Valley State University, Allendale, Michigan

State University, Allendale, Michigan 49401, USA. E-mail: lombardm@gvsu.edu

2135. Juliand, C.; Juliand, P.; Ladet, A. (2000): Bilan de neuf années de prospection odonatalogique dans le département de L'Ardeche. Sympetrum 15: 5-18. (in French). [A total of 66 species (68 taxa) is reported from the department L'Ardeche, France. Each of the species is shortly commented. In tab. 2 some interesting altitude records of ten species are documented. Of special interest are the records of *Coenagrion mercuriale*, *C. caerulescens*, *C. hastulatum*, *Gomphus graslini*, *Oxygastra curtisii*, *Macromia splendens*, *Somatochlora arctica*, *Sympetrum depressiusculum*, and *Leucorrhinia dubia*.] Address: Juliand, Christine, Le Serre, F-07110 Joannas, France

2136. Kenner, R. D. (2000): *Somatochlora kennedyi* (Odonata: Corduliidae): A new species for British Columbia, with notes on geographic variation in size and wing venation. Journal of the Entomological Society of British Columbia 97: 47-49. (in English). ["The first confirmed record for *S. kennedyi* in British Columbia is reported. Specimens of this species from the northern Yukon are smaller than those from elsewhere in its range and have a reduced number of cells in certain parts of the wings." (Author)] Address: Kenner, R. D., 5560 Linscott Court, Richmond, BC, V7C 2W9 Canada

2137. Kesel, A.B. (2000): Aerodynamic characteristics of dragonfly wing sections compared with technical aerofoils. Journal of Experimental Biology 203(20): 3125-3135. (in English). ["During gliding, dragonfly wings can be interpreted as acting as ultra-light aerofoils which, for static reasons, have a well-defined cross-sectional corrugation. This corrugation forms profile valleys in which rotating vortices develop. The cross-sectional configuration varies greatly along the longitudinal axis of the wing. This produces different local aerodynamic characteristics. Analyses of the CL/CD characteristics, where CL and CD are the lift and drag coefficients, respectively (at Reynolds numbers  $Re$  of 7880 and 10 000), using a force balance system, have shown that all cross-sectional geometries have very low drag coefficients ( $CD_{min} < 0.06$ ) closely resembling those of flat plates. However, the wing profiles, depending upon their position along the span length, attain much higher lift values than flat plates. The orientation of the leading edge does not play an important role. The detectable lift forces can be compared with those of technical wing profiles for low  $Re$  numbers. Pressure measurements (at  $Re=9300$ ) show that, because of rotating vortices along the chord length, not only is the effective profile form changed, but the pressure relationship on the profile is also changed. Irrespective of the side of the profile, negative pressure is produced in the profile valleys, and net negative pressure on the upper side of the profile is reached only at angles of attack greater than 0 degree. These results demonstrate the importance of careful geometrical synchronisation as an answer to the static and aerodynamic demands placed upon the ultra-flight aerofoils of a dragonfly." (Author)] Address: Kesel, Antonia B., Department of Zoology, Technical Biology and Bionics, University of Saarland, D-66041, Saarbrücken, Germany. E-mail: a.kesel@rz.uni-sb.de

2138. King, R.S.; Nunnery, K. T.; Richardson, C. J. (2000): Macroinvertebrate assemblage response to highway crossings in forested wetlands: Implications for

biological assessment. *Wetlands Ecology & Management* 8(4): 243-256. (in English). [USA, North Carolina; "Despite the mandate of the Clean Water Act to protect the physical, chemical, and biological integrity of the USA's wetlands, the use of biota to assess wetland condition has not been well explored. During June, 1996, we evaluated the response of macroinvertebrate assemblages to fill-culvert highway crossings in two bottomland forested wetlands in North Carolina. Our objective was to apply biological assessment methods and metrics that have been effectively used in streams to explore their applicability in forested wetlands. We found significant changes in several metrics as a function of distance from the highway crossings. Areal and numerical taxon richness increased within at least 40 m of highway when compared to control locations. Percent dominant taxon values were lowest within 10 m of the highway. Percent herbivores also increased significantly within at least 40 m of the highway, reflecting the lower % crown closure and associated shift in primary production from trees to herbaceous macrophytes and algae. The North Carolina Biotic Index, a metric of tolerance, did not reflect assemblage changes near the highway. Ordination and permutation tests revealed that assemblage composition was significantly different from controls at 10 and 40 m distances from the highway crossings. In particular, algal grazers such as the mayflies *Caenis* sp. and *Callibaetis* sp. responded positively and the damselflies *Ischnura* spp. and the finger-nail clams *Sphaerium* spp. responded negatively to the crossings. Favorable algal and herbaceous detrital resources, greater patchiness and habitat complexity, and overall high tolerance to natural stressors probably contributed to the increase in taxon richness near the highway. However, significant deviation from control locations indicated the highway was a source of perturbation. Our findings illustrate the potential utility of macroinvertebrate assemblages for wetland assessment, but suggest the importance of defining the reference condition as well as the need for development of metrics for specific classes of wetlands." (Authors) *Nehalennia irene*, *Ischnura posita*, *I. prognata*, *Erythemis simplicollis*, *Pachydiplax longipennis*, *Libellula* sp., *Epitheca* sp.] Address: King, R.S., Duke Wetland Center, Nicholas School of the Environment, Durham, NC, 27708 USA

2139. Knab, N.; Göcking, C.; Knab, D.; Schelden, A.; Willigalla, C. (2000): Zur Verbreitung von *Gomphus vulgatissimus* (L.) im Einzugsgebiet der Ems im Kreis Warendorf (Odonata: Gomphidae). *Natur- und Umweltschutzakademie Nordrhein-Westfalen - Seminarbericht* 6: 76-81. (in German). [The distribution of *G. vulgatissimus* in the River Ems system, Nordrhein-Westfalen, Germany, was studied in 1999. *G. vulgatissimus* occurs in all stretches of the Ems and in many stretches of its tributaries. This increase of records is discussed under the aspects of reduced maintaining measures of river banks, improvement of water quality, favourable climate conditions in the past years, and optimised methods for collecting exuviae.] Address: Göcking, C., Zum Hiltruper See 9, D-48161 Münster, Germany. E-mail: gockinc@uni-muenster.de

2140. Knaus, P. (2000): Emergenzstudien an *Somatochlora alpestris* in den Zentralalpen (Odonata: Corduliidae). *Libellula* 19(3/4): 117-142. (in German with English summary). ["*S. alpestris* was analysed in regard to

to its emergence period and emergence ecology. The study was carried out in 1997 and 1998 at »Barenseewen«, a subalpine plateau with several ponds at 2000 m a.s.l. in the Prättigau valley (Orisons, Switzerland). The emergence lasted about 3.5 hours and the behavioural pattern of *S. alpestris* was similar to that of other corduliids. Emergence took place mainly within a strip of 1 m on either side of the water line and at a median height of 9.0 cm above ground. In total 674 exuviae at 16 ponds were collected during the emergence period in 1998. The density per pond ranged from 0.03 to 5.51 emerging adults per m<sup>2</sup>. The mortality during emergence was 7.1 %. As a typical spring species *S. alpestris* has a synchronised emergence with an EM50 of 5.5 days. The emergence period in 1998 lasted 37 days, beginning on 19 June. With 44.0 % males the sex ratio was significantly different from 1:1, and males emerged earlier than females. The results are discussed in respect to habitat preference and adaptation strategies and are compared with those of other corduliids." (Author)] Address: Peter Knaus, Schweizerische Vogelwarte, CH-6204 Sempach. Switzerland. E-mail: peter.knaus@vogelwarte.ch

2141. Knijf, G. de; Demolder, H. (2000): Een populatie van *Coenagrion mercuriale* en *Libellula fulva* in de Gaume (Belgisch Lotharingen). *Gomphus* 16(2): 115-122. (in Dutch with English and French summaries). ["A population of *Coenagrion mercuriale* and *Libellula fulva* in the Gaume (Belgium). A population of both species was discovered in June 2000 in the Gaume, the most southern part of Belgium. Until then, only two, respectively three populations were known from the Walloon part of Belgium. We suspect that both species have colonized the region the last years from the adjacent northern part of France, but it is possible that they were already present for many years. We suppose that the very good weather in the spring of the year 2000, has contributed to a higher number of individuals in the population of both species so that the probability to catch them becomes greater. We presume that it is possible to find more populations from both species in some of the many similar valleys in the Gaume."(Authors) The habitat is described and co-occurring Odonata are briefly discussed.] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

2142. Kordges, T. (2000): Die Libellenfauna der Stadt Hattingen. *Der Sauerländische Naturbeobachter* 27: 57-66. (in German with English summary). [Since 1985 a total of 28 species of dragonflies was recorded in the district of Hattingen, Nordrhein-Westfalen, Germany. In the period since this to 1999 *Coenagrion pulchellum* and *Aeshna grandis* have become extinct, while *Erythromma vindulum*, *Gomphus vulgatissimus*, and *G. pulchellus* were recorded for the first time. *Libellula quadrimaculata*, *Lestes sponsa*, *Sympetrum flaveolum*, and *S. danae* seem to become rare. On the other hand the situation especially in some rheophilous species obviously has become better within this time due to the better water quality of the river Ruhr and some brooks. "Within the study area more than 78% of the species prefer the Ruhr valley, where species diversity and the population density reach the highest values. Few species are widely distributed in the region but prefer the hillsides in the south of Hattingen (*P. nymphula* and *A.*

cyanea), while *C. virgo* and *C. boltonii* are mainly restricted to this hillside area." Address: Kordges, T., Feldstr. 79, D-54549 Sprockhövel, Germany

2143. Kordges, T.; Keil, P. (2000): Erstnachweis der Frühen Heidelibelle *Sympetrum fonscolombii* (Selys) im Ruhrgebiet. Dortmund Beiträge zur Landeskunde, Naturwiss. Reihe 34: 117-121. (in German). [Near Essen, Nordrhein-Westfalen, Germany freshly emerged *S. fonscolombii* were recorded on September 7, 1999. On July 14, 2000 at the same water several specimens of *Lestes barbarus* but no *S. fonscolombii* could be observed. The flora of the water body prior and after clearing the shrub on the water's edge is described. A total of 21 odonate species is listed.] Address: Kordges, T., Ökoplan, Husmannshofstr. 10, D-45143 Essen, Germany

2144. Kruijs, I. (2000): [Butterfly watching: An alternative to collecting]. *Fauna och Flora* (Stockholm) 95(3): 105-112. (in Swedish with English summary). ["It is no longer necessary to collect and preserve the larger insects which are identifiable in the field in order to add to our knowledge of their distribution and behaviour. Killing insects can be a daunting factor in furthering entomology as a field of interest. The main advantage of collection, the ease of identification, can be matched by developing identification techniques without having to catch and kill specimens. Like bird watching, insect watching can be an interesting pastime and can do much to add to our knowledge, especially where butterflies and dragonflies are concerned. Though collectors gain much knowledge through their experience, the very aim to collect as many species as possible puts the occurrence of species that they already have in their collections in the background. The art of identifying butterflies in the field includes the use of binoculars that reduces the need to use a net. Since different butterfly families have characteristic types of flight, many species can be identified by observing their flight, much in the same way as watching birds. Records can be made as to locality, occurrence and estimation of numbers, behaviour with notes on temperature, weather, as well as date and time. Behaviour studies can include effects of temperature, territorial behaviour, courtship and mating, egg-laying and choice of foodplant. Taking photographs and video films might be a useful aid and can satisfy the need to collect, if collecting actual sightings is in itself not satisfying." (Author)] Address: not stated

2145. Kuhn, J. (2000): Libellen (Odonata) am Schmiechener See 1980-1999-Zwischenbilanz einer Langzeitstudie. *Verhandlungen des Westdeutschen Entomologen Tag 1999*: 185-190. (in German with English summary). ["The "Schmiechener See" (SW Germany, Bayern) is a shallow 50 ha lake strong and irregular in water-level. Composition and abundances of the fauna (42 species) are subject both to heavy short-term fluctuations and to pronounced long-term changes. Special attention is directed to the efficiency of conservation and management measures, particularly with regard to survival of the target species *Lestes dryas* and *Sympetrum flaveolum*." (Author)] Address: Kuhn, J., Max-Planck-Institut für Verhaltensphysiologie, Abt. Winckler, D-82319 Seewiesen. E-mail: kuhn@mpi-seewiesen.mpg.de

2146. Lässig, A.; Brockhaus, T.; Küttner, R. (2000): Einige interessante Insektennachweise aus dem Raum Rochlitz und Colditz (Lepidoptera, Odonata, Ephemeroptera, Trichoptera). *Entomologische Nachrichten und*

*Berichte* 44(4): 279-283. (in German). [Germany, Sachsen; checklist of 18 species recorded in summer 1999 including *Sympecma fusca*, *Somatochlora flavomaculata*, *Cordulegaster boltonii*] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

2147. Lang, C. (2000): Untersuchungen zu *Cordulegaster heros* Theischinger, 1979 und *C. bidentata* Selys, 1843. Teil 2: Larven. *Anax*, Wien 3: 23-27. (in German with English summary). ["Between May 1997 and April 1998, the biology of larvae of *Cordulegaster heros* and *C. bidentata* were examined in the catchment area of the Weidlingbach (Lower Austria). A total of 688 *C. heros* and 314 *C. bidentata* larvae at 12 sampling sites were collected and their occurrence related to physical and chemical parameters. Generally, both species are able to colonize a brook syntopically, but *C. bidentata* prefers stream sections nearer to the source with slower flow, higher conductivity and water hardness than *C. heros*." (Author) For more details see OAS 1733.] Address: Lang, C., Muhrhoferweg 1-5/4/42, A-110 Wien, Austria. E-mail: lang.mueller@EUnet.at

2148. Lange, L. (2000): Ein weiterer Beitrag zur Libellenfauna des Kreises Steinburg. *Bombus* 3(45/46): 177-179. (in German). [Schleswig-Holstein, Germany; 32 species are listed for three localities; the impact of road construction activities on Odonata is shortly outlined; *Lestes barbarus*, *Ischnura pumilio*, *Aeshna viridis*, *Sympetrum fonscolombii*, *S. pedemontanum*, and *Leucorrhinia rubicunda* are discussed] Address: Lange, L., Deichreihe 21, D-25599 Wewelsfleth, Germany

2149. Leitfeld, D.; Lohr, M. (2000): Erstfund von *Gomphus flavipes* an der Oberweser (Odonata: Gomphidae). *Libellula* 19(3/4): 229-231. (in German with English summary). [Germany, Niedersachsen, River Weser, 29-VII-1999] Address: Leitfeld, D., Projektgruppe Weserniederung, Lehrgebiet Tierökologie, Universität Paderborn, Fachhochschulabteilung Höxter, An der Wilhelmshöhe 44, D-37671 Höxter, Germany. E-mail: dleitfeld@fh-hoexter.de

2150. Loos, G.H. (2000): Libellen im Siedlungsbereich. *Der Sauerländische Naturbeobachter* 27: 129-133. (in German with English summary). [The occurrence of Odonata in typical water bodies of urban zones is outlined and exemplified in the district of Unna, Nordrhein-Westfalen, Germany. 23 species are listed including rare species as *Ceriagrion tenellum* and *Sympetrum depressiusculum*. The draft of typical urban dragonfly ponds and species composition of different waterbodies is presented.] Address: Loos, G.H., Ruhr-Universität Bochum, AG Geobotanik und Geographisches Institut, ND 03/175, D-44780 Bochum, Germany

2151. Lopau, W. (2000): Bisher unveröffentlichte Libellenbeobachtungen aus Griechenland II (Odonata). *Libellula* Suppl. 3: 81-112. (in German with English summary). ["More than 1 000 Odonata records provided by 9 workers are listed. The data for 57 of the 73 species known from Greece, were recorded between 30-III-1970 and 27-IV-2000." (Author)] Address: Lopau, W., Kuhstedtermoor 26, D-27442 Gnarrenburg, Germany. E-mail: lopi@t-online.de

2152. Lotzing, K. (2000): Untersuchungen zur aktuellen Libellen-Fauna (Odonata) in ausgewählten natürlichen Binnenland-Salzstellen am Südrand der Magde-



burger Börde (Sachsen-Anhalt). *Entomologische Nachrichten und Berichte* 44(3): 175-182. (in German with English summary). [27 odonate species are recorded for three saline habitats situated in the Magdeburger Börde, Sachsen-Anhalt, Germany. The species are shortly commented; a special halophile odonate fauna is not represented. *Lestes barbarus* and *Sympetrum pedemontanum* are typical for sparsely-vegetated and thermally favoured waters which are protected from wind. The rare *Sympetrum flaveolum* is represented with high population densities.] Address: Lotzing, K., Am Hollschen Bruch 4c, D.39435 Unseburg, Germany

2153. Lytle, D.A. (2000): Biotic and abiotic effects of flash flooding in a montane desert stream. *Archiv für Hydrobiologie* 150(1): 85-100. (in English). ["Flash floods in desert streams can be more sudden, brief, and severe compared to floods in mesic streams. To determine their biotic and abiotic effects, substrate composition, organic detritus abundance, and aquatic animal taxonomic richness and abundance were measured 8-16 d before and 7 d after a flash flood in a 122 m reach of a montane desert stream (Chihuahuan Desert, USA). The flash flood severely altered channel morphology by scouring and depositing substrates, but it did not change the overall abundance of any substrate particle size class. The flood removed most coarse detritus from the stream reach, although the quantity of organic particles <2 mm was unchanged. High losses were observed in most animal taxa (95 % overall), and reach-wide taxonomic richness was reduced from 35 to 21 taxa. Ephemeroptera were entirely eliminated from the study reach. The taxon experiencing the lowest percent loss (the belostomatid hemipteran *Abedus herberti*, 14 % loss) is known to possess behavioral mechanisms for flash flood avoidance. Compared to studies of flooding in mesic streams, this study suggests that flash floods in montane desert streams cause greater mortality in animal populations and remove more detritus. Ecologically, these high local mortality rates stress the importance of recolonization mechanisms. Evolutionarily, flash floods provide a strong selection pressure that may influence the genetic structure of populations." (Author) "*Argia*" and *Cordulegaster diadema* were eliminated from the reach (100% loss), "early instars" were reduced by 87%.] Address: Lytle, D.A., Dept. of Ecology & Evolution, University of Chicago, 1101 E. 57th St., Chicago, IL 60637, USA. E-mail: dalytle@uchicago.edu

2154. Maillet, G. (2000): Note pratique sur l'observation des libellules et l'utilisation d'une pochette en plastique. *Martinia* 16(4): 171-173. (in French with English summary). ["The author presents a method for observing Odonata adults in the field. It consists in using transparent plastic bags in which the insect can be immobilized without damage, and released after identification." (Author)] Address: Maillet, G., Château de la Touvière, F-38690 Chabons, France

2155. Malmqvist, B.; Hoffsten, P.-O. (2000): Macroinvertebrate taxonomic richness, community structure and nestedness in Swedish streams. *Archiv für Hydrobiologie* 150(1): 29-54. (in English). ["Taxonomic richness and community composition were related to environmental variables in 88 streams in an area of 60,000 km<sup>2</sup> in central Sweden. In all, 247 macroinvertebrate taxa were recorded and taxonomic richness observed per site ranged from 21 to 77. Partial least squares regression analysis suggested that taxonomic richness

was positively and most strongly correlated with channel width and catchment size. Correlations were also positive, but weaker, with the percentage of lakes in the catchment, temperature and macrophyte abundance, whereas the degree of shading, moss coverage and distance to upstream lakes showed negative associations with species richness. The number of 'rare' (found at <25 % of the sites) and 'very rare' (found at <10 % of the sites) taxa, showed similar trends although the correlation with distance below upstream lakes was positive rather than negative in the 'very rare' taxa category. The most taxa-rich sites were found in streams of intermediate size leading to a significant quadratic relationship between catchment size and taxonomic richness. Canonical correspondence analysis indicated that catchment area, distance from upstream lakes, substratum, temperature, altitude, amount of macrophytes, pH, colour, and *Fontinalis* spp. were the variables explaining most variation in community composition. Ephemeroptera, Plecoptera, Trichoptera and Diptera: Simuliidae showed nested distribution patterns, i.e. species-rich sites tended to be inhabited by species present also at species-poor sites. Some taxa, however, deviated from expected distributions possibly because they are sensitive to biotic interactions, restricted to small streams, or specialised with respect to some habitat features. In comparisons with other studies of Swedish macroinvertebrates, we observed differences suggesting that the design of studies, including the selection of geographical regions and limited range of stream sizes, can importantly influence the results." (Authors) 10 odonate species are listed in the appendix. In most cases species are represented "very rare" at the sampling sites.] Address: Malmqvist, B., Department of Ecology and Environmental Science, Umea University SE-90187 Umea, Sweden. E-mail: bjorn.malmqvist@eg.umu.se

2156. Marigo, P. (2000): Étude de la faune des tourbières subalpines du Plateau des Lac du massif du Taillefer (Isère). *Sympetrum* 15: 19-37. (in French). [Selected species of Hemiptera, Mollusca, Araneae, and Odonata characteristic for the subalpine bogs in the Massif du Taillefer (Isère, France) are discussed - but in most cases on the basis of literature - in some detail. *Aeshna juncea*, *Somatochlora alpestris*, *S. arctica*, *S. metallica*, *Leucorrhinia dubia*.] Address: Marigo, P., 20 allée du Bouchon, F- 74940 Annecy Levieux, France

2157. Marinov, M. (2000): An atypical *Caliaeschna microstigma* (Schneider) habitat in Bulgaria (Anisoptera: Aeshnidae). *Notul. odonatol.* 5(6): 83. (in English). ["On 22-VI-1999, numerous males were sighted flying over a small forest stream, the Izgrevsko Dere, in the village of Izgrev, Mt Strandja, SE Bulgaria. Surprisingly, the rivulet is completely devoid of any kind of vegetation, whether aquatic or on the banks. The bottom is stony and stones are spread along the bank as well. The surrounding trees (mainly *Alnus*) are casting a deep shade, as peculiar for the *Caliaeschna* habitats. The sole exuviae found was sitting on the bark of a tree." (Author)] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mgmarinov@yahoo.com

2158. Mashaal, M. (2000): Bref souvenirs odonatologiques de Guadeloupe, Martinique et Réunion. *Martinia* 16(3): 123-126. (in French with English summary). [Lists of species from Guadeloupe (9 localities/11 taxa), Martinique (4 loc./6 taxa), and Réunion (11 loc./11 ta-

xa)] Address: Mashaal, M., 2, rue Meilhac, F-75015 Paris, France

2159. Mason, R.P.; Laporte, J.-M.; Andres, S. (2000): Factors controlling the bioaccumulation of mercury, methylmercury, arsenic, selenium and cadmium by freshwater invertebrates and fish. *Archiv environment. Contain. Toxicol.* 38(3): 283-297. (in English). ["Concentrations of Hg, MMHg, As, Se, and Cd were measured in atmospheric deposition, stream water, and biota in two streams in Maryland, USA. They are stated for *Aeshna* sp., compared with other insect orders, and discussed."] Address: Mason, R.P., Cent. Envir. Sci., Chesapeake Biol. Lab., Univ. Maryland, P.O. Box 38, Solomons, MD 30688, USA

2160. Mauersberger, R. (2000): Artenliste und Rote Liste der Libellen (Odonata) des Landes Brandenburg. *Naturschutz und Landschaftspflege in Brandenburg* 9(4, Beilage): 22 pp. (in German). [This is an introduction into the Odonata of the Federal State Brandenburg in Germany. Several aspects of the odonate fauna e.g. climatic or anthropogenic factors responsible for the occurrence on the geographic scale of the state, information on invasive species, reasons for threats, a commented checklist of the 66 species known to occur in Brandenburg, an assessment according to the criteria of the Red List, main tasks for conservation action plans, and a bibliography are briefly outlined or compiled. This is a short but sound contribution to the knowledge of the Odonata in the eastern part of Germany written by one of the leading German odonatologists.] Address: Mauersberger, R., Waldstr. 4, D-16278 Steinhöfel, Germany

2161. Maxted, J.R.; Harbour, M.T.; Gerritsen, J.; Porretti, V.; Primrose, N.; Silva, A.; Penrose, D.; Renfrow, R. (2000): Assessment framework for mid-Atlantic coastal plain streams using benthic macroinvertebrates. *Journal N. Am. benthol. Soc.* 19(1): 128-144. (in English). ["A collaborative study among 6 states along the mid-Atlantic seaboard of the USA developed a consistent approach for collecting and interpreting macroinvertebrate data for low-gradient streams of the coastal plain. The study had 3 objectives: (1) to evaluate the validity of aggregating reference site data into a single bioregion, (2) to select biological metrics that best discriminated reference sites from sites impaired by habitat disturbance and organic pollution, and (3) to combine these metrics into an index of biological quality. Macroinvertebrate, physical habitat, and water-quality data were collected in 106 streams during autumn 1995. Fifty-five sites were referenced, 34 sites had habitat stresses, and 17 sites had water-quality stresses. Classification of reference sites divided the coastal plain into 3 bioregions, separated N and S by Chesapeake Bay and separated E and W by ecoregion. - 20 odon. genera are listed, with annotations on tolerance values and clinger habit."] Address: Maxted, J.R., Delaware Dept Natural Resour. & Envir. Control, 89 Kings Highway, Dover, DE 19903, USA)

2162. McMillan, V. (2000): Aggregating Behavior During Oviposition in the Dragonfly *Sympetrum vicinum* (Hagen) (Odonata: Libellulidae). *Am. Midl. Nat.* 144: 11-18. (in English). ["This study examined the adaptive significance of ovipositing near conspecifics by pairs of the dragonfly *Sympetrum vicinum*. Studies were conducted at two artificial ponds in New York using a series of 1 m<sup>2</sup> plots along their shorelines. Although the major-

ity of pairs oviposited alone, pairs also tolerated the presence of others only 5-10 cm away, and sometimes 2-7 pairs oviposited together within a single plot. Habitat selection (preference for certain plots over others) partially accounted for such behavior. However, where adjoining plots were homogeneous (i.e., used equally for oviposition), newly arriving pairs were more likely to begin dipping in a plot in which one or more pairs were already present, thus also suggesting mutual attraction among pairs. Oviposition efficiency (measured as no. abdominal dips/s) was apparently not compromised by ovipositing near conspecifics. Harassment from unpaired males had little effect on oviposition since unpaired males were uncommon and rarely approached pairs. However, lone pairs were attacked relatively more frequently by frogs than were pairs present simultaneously in the same plot. Although none of the 112 predation attempts I recorded were successful, frog attacks forced pairs to change sites, thereby lengthening the time required for oviposition. The absence of frogs or frog attacks at a site provided favorable conditions for pairs to accumulate at a site; thus the presence of conspecifics may have signaled a safe area for oviposition." (Author)] Address: McMillan, Vicky, Colgate Univ., Dept. Biol., 13 Oak Dr. Hamilton, NY 13346-1398, USA . E-mail: vmcmillan@mail.colgate.edu

2163. Meitzner, V.; Martschei, T. (2000): Neue Funde europäisch geschützter Insektenarten. *Naturschutzarbeit in Mecklenburg-Vorpommern* 43(1): 70-71. (in German). [Mecklenburg-Vorpommern, Germany. Records of species of the Appendix II of the European Fauna-Flora-Habitat-Directive are shortly reported. *Leucorrhinia pectoralis* is given for two localities.] Address: Meitzner, V.; Bischofstr. 13, D-17033 Neubrandenburg, Germany

2164. Mey, D. (2000): Vorkommen der Gestreiften Quelljungfer *Cordulegaster bidentata* (Insecta, Odonata, Anisoptera) an Kalksinterbächen in Nordwestthüringen. *Rudolstädter naturhist. Schr.* 10: 33-46. (in German with English summary). [In April 1998 a habitat of *Thecagaster bidentata* was discovered in the border region of Thüringen and Hessen, Germany. This is the first breeding record of the species in Thüringen. The localities are characterised in detail by vegetation, morphology of the krenal, and chemical and physical factors. Observations on larval habitat, emergence, hunting of imagos, oviposition, and accompanying fauna are dealt with.] Address: Mey, D., Karl-Hermann-Str. 3, D-99848 Wutha-Farnroda, Germany

2165. Mielewczyk, S. (2000): Wazki (Odonata). *Flora i Faua Pienin - Monografie Pieninskie* 1: 143-145. (in Polish with English summary). [This short paper summarizes the current knowledge on the dragonfly fauna of the Pienin mountains, Poland based on historical and recent data. A total of 38 species is known from the region; *Sympetrum pedemontana*, *Anax ephippiger*, *Thecagaster bidentata*, and *Sympetrum pedemontana* are stressed.] Address: Mielewczyk, S., Zaklad Badan, Srodowiska Rolniczego i Lesnego, Polska Akademia Nauk, ul. Bukowska 19, 60-809, Poznan, Poland

2166. Ministerium Ländlicher Raum Baden-Württemberg; Landesanstalt für Umweltschutz Baden-Württemberg (Hrsg) (2000): *NATURA 2000 in Baden-Württemberg*. Ministerium Ländlicher Raum Baden-Württemberg. Stuttgart: 162 pp. (in German). [This is a recom-

modation for the realisation of the European Flora-Fauna-Habitat-Directive directed to the general public. Some elucidation of the aims and task of this directive are outlined, and the Directive is printed in a German translation. Each of the habitats and the species listed in the annexes of the Directive and represented in Baden-Württemberg, Germany are briefly characterised, their distribution in Baden-Württemberg is mentioned, the importance for nature conservation is outlined, each habitat type and species are documented by very good colour photographs. Three odonate species included in the Annex II of the Directive occur in Baden-Württemberg: *Coenagrion mercuriale*, *Leucorrhinia pectoralis*, and *Ophiogomphus cecilia*.] Address: Ministerium Ländlicher Raum Baden-Württemberg, Kernerplatz 10, D-70182 Stuttgart, Germany. E-mail: poststelle@lfuka.lfu.bwl.de

2167. Miserendino, M.L.; Pizzolón, L.A. (2000): Macroinvertebrates of a fluvial system in Patagonia: altitudinal zonation and functional structure. *Archiv für Hydrobiologie* 150(1): 55-83. (in English). [This "study of altitudinal zonation of macrobenthic communities in the Patagonian Andes was carried out at 14 sampling stations along 51 km of the Esquel-Percy River system over a 1000 m altitudinal gradient. Untreated sewage of Esquel City discharges in the middle section of the system. The main species assemblages of the monitored sites were identified and a functional categorization of the taxa was produced. Population distribution patterns were analyzed throughout a complete annual cycle [...] The macrobenthic community found along the Esquel-Percy system is rich and diverse, except at middle-stretch stations, which are altered by anthropogenic perturbations. Specific composition, diversity and density were influenced by the topographic gradient, geochemical (conductivity and total alkalinity) and anthropogenic factors (BOD and oxygen saturation), and the seasonality of the system. [...] The biomass of shredders and predators decreased, while collectors increased, downstream from the headwaters. Collector-gatherers were the most important group at all sites. Functional organization showed better correspondence with the RCC model if biomass was used instead of macroinvertebrate density. We found that local and regional characteristics produced deviations from the RCC model, but it is still useful as a comprehensive framework for stream ecology in the Patagonian Andes." (Authors) "*Aesha variegata*?" is listed for one sampling site.] Address: Miserendino, Laura, Laboratorio de Ecología Acuática, Sarmiento 849, Universidad Nacional de la Patagonia, Sede Esquel, 9200 Esquel, Chubut, Argentina. E-mail: Lauram@teletel.com.ar

2168. Monaghan, K.A.; Peck, M.R.; Brewin, P.A.; Masiero, M.; Zarate, E.; Turcotte, P.; Ormerod, S.J. (2000): Macroinvertebrate distribution in Ecuadorian hill streams: the effects of altitude and land use. *Archiv für Hydrobiologie* 149(3): 421-440. (in English). [To assess the effects of altitude and land use on stream fauna macroinvertebrates were sampled from riffle and marginal habitats of 45 streams in three regions of the Ecuadorian Andes. "Assemblage structure and richness were assessed in relation to habitat character, water chemistry and catchment land use. Land use varied from humid montane forest in the Western and Eastern Cordillera to transition forest and Parámo in the Central Valley. However, c. 30 % of sites in each region were

located in managed catchments of cleared forest, pasture or crop plantations. Water chemistry and stream habitat varied significantly between regions, altitudes and land use. Invertebrate assemblages were dominated by Baetidae, Leptophlebiidae, Tricorythidae, Elmidae, and Chironomidae, but ordination revealed major variations in assemblage structure with altitude. Hydropsychidae, Philopotamidae, Ptilodactylidae and Gomphidae" (and "Calopterygidae", "Libellulidae", and "Zygoptera A") were restricted to lower altitude whereas Scritidae and Gammaridae characterised higher altitude sites. Secondary variations in assemblage structure were correlated with habitat structure and metal concentrations (Al, Fe and Mn), and in turn were reflected in taxon richness. Classification revealed generally similar patterns, but showed also potential effects on assemblage structure in the Western Cordillera where humid montane forest had been cleared for agriculture. We conclude that, as in other mountain regions, major downslope patterns are clear among aquatic invertebrates in the Ecuadorian Andes. However, from these data altitude affects assemblage composition more than richness. Downslope patterns might have been modified by human activity at the catchment scale, and also by local site attributes such as habitat structure and stream chemistry." (Authors) "*Aeshnidae*" are restricted to the Eastern Cordillera.] Address: Monaghan, K.A., Catchment Research Group, School of Biosciences, Cardiff University, P.O. Box 915, Cardiff, CF10 3TL, UK. E-mail: K.A.Monaghan@bham.ac.uk

2169. Moskowitz, D. (2000): A new county record of *Archilestes grandis* in New York with notes on habitat and water quality. *Argia* 12(4): 7-8. (in English). ["On 3 October 2000 a male *Archilestes grandis* was collected on Mine Brook in Mt. Pleasant, Westchester County, New York. This appears to be the first record for Westchester County and only the second confirmed record for the state. [...] When combined with other measured parameters and field data including dissolved oxygen and temperature, Mine Brook is best characterized as moderately impaired. This is consistent with other reports of *A. grandis* habitats [...]" (Author)] Address: Moskowitz, D. c/o EcolSciences, Inc. 75 Fleetwood Drive, Suite 250 Rockaway, New Jersey 07866 dmoskowi@ecolsciences.com

2170. Müller, H. (2000): Untersuchungen zu *Cordulegaster heros* Theischinger, 1979 und *C. bidentata* Selys, 1843. Teil 1: Imagines. *Anax*, Wien 3: 19-22. (in German with English summary). [In 1997 and 1998, data about the phenology and ecology of *Cordulegaster heros* and *C. bidentata*, co-occurring syntopic, were obtained in the catchment of the Weidlingbach (Lower Austria). Emergence, dimigration and habitat during the maturation period, dependence of the high of patrol flights of males from the width of the brook, dependence of velocity of the patrol flight in relation to riffles and pools (preferred egg deposition habitats), and reproduction behaviour of the females were examined. For more details see OAS 1745.] Address: Müller, Heidemarie, Muhrhoferweg 1-5/4/42, A-110 Wien, Austria. E-mail: lang.mueller@EUnet.at

2171. Müller, J. (2000): Untersuchungen zur Ökologie und Verbreitung der Sibirischen Azurjungfer (*Coenagrion hylas*) im Tiroler Lechtal (Odonata: Coenagrionidae). Zulassungsarbeit zur wissenschaftlichen Prüfung für das Lehramt an Gymnasien. Fach Biologie, Institut



für Experimentelle Ökologie der Tiere der Universität Ulm.: 118 pp. (in German). [The very rare *C. hylas* is known from the Ural mountains in Russia to Japan, and from a disjunct area in the European alpes. This study enlarges our knowledge on ecology and distribution in this disjunct area of the species in quite extent. Seven habitats with records of *C. hylas* are known now, all situated in the valley of the River Lech. In detail the habitats are described and figured, and characterised by chemical and physical parameters. Larval, emergence, maturation, hunting, reproduction, oviposition, and perching (dormitories) habitats and ethoecology are analyzed. Information on phenology with special reference to emergence period, abundance, morphology of larvae, and co-occurring Odonata are given. In considerable detail conservation measures are outlined. This publication is a corner stone on ecology of one of the most interesting and threatened western palearctic damselflies.] Address: Müller, J., Goethestr. 25, D-89601 Schelklingen, Germany

2172. Müller, J. (2000): Zur Schutzwürdigkeit und nachhaltigen Entwicklung der Elbe unter besonderer Berücksichtigung der Libellen-Fauna. 7. Landschaftstag 1999. Flusslandschaft Elbe: 24-31. (in German). [This is an introduction into the odonate fauna of the rivers and their floodplains in central Germany exemplified with the river Elbe. The main factors characterising the floodplain, its vegetation, and its fauna and flora with special emphasize to the species of the European Bird habitat- and Fauna-Flora-Habitat- directives are outlined. The bioindicatorial value of Odonata for different habitats in the river-floodplain landscape is assessed, and characteristic species are presented. A cross-section through the river and the floodplain gives an insight into the use of habitats by odonate larva and imago. The booklet can be ordered at a price of DM 3,- from: Landeshauptstadt Magdeburg, Umweltamt, D-39090 Magdeburg, Germany.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. [jmueller@mu.lsa-net.de](mailto:jmueller@mu.lsa-net.de)

2173. Müller, O.; Schütte, C.; Artmeyer, C.; Burbach, K.; Grand, D.; Kern, D.; Leipelt, K.G.; Martens, A.; Petzold, F.; Suhling, F.; Weihrauch, F.; Werzinger, J.; Werzinger, S. (2000): Entwicklungsdauer von *Gomphus vulgatissimus*: Einfluss von Gewässertyp und Klima (Odonata: Gomphidae). *Libellula* 19(3/4): 175-198. (in German with English summary). ["*G. vulgatissimus* lives in different waters and completes its life cycle in two, three or four years. These different life cycles indicate that the duration of larval development depends on the type of water or climatic situation. Therefore, in the middle of October 1999 larvae were collected at 11 localities in Central Europe. Larval population structures were investigated by measuring the head widths of larvae. The data show that larval development could be finished within two years in warm, shallow rivers like the Oder and the Ems. In streams with low temperatures and lakes the sp. has a three or four year life-cycle. The population structures and duration of life cycles did not show any clear dependence on climate or latitude." (Authors)] Address: Müller, O., Birkenweg 6d, D-13206 Libbenichen, Germany. E-mail: [olemueller@freenet.de](mailto:olemueller@freenet.de)

2174. Needham, J.G.; Westfall, M.-J.; May, M.L. (2000): *Dragonflies of North America*. Revised Edition. Scientific Publishers. Gainesville. Washington, Hamburg. Lima. Taipei. Tokyo. ISBN 0-945417-94-2: I-XY,

940 pp. (in English). [Everyone interested in the Odonata of the North American continent will welcome this book. It is a manual with special emphasize on larval and imaginal taxonomy and morphology. Many (colour) illustrations and keys will enable people to identify all North American species including *Erythrodiplax bromeliicola* Westfall n. sp. from Jamaica. I am not the position to criticize this impressive work. For a detailed review see Donnelly (2000, *Argia* 12(4): 11-13). But if I may criticize one aspect of the book: I miss information on habitats and habits of the species. (M. Schorr)] Address: Scientific Publishers, Inc., 4460 SW 35th Terrace, Suite 305, Gainesville, FL 32608, USA

2175. O'Brien, M. (2000): New additions to the University of Michigan Museum of Zoology Odonata Library. *Argia* 12(4): 10. (in English). ["We recently received a shipment of books belonging to the estate of Leonora (Dolly) K. Gloyd from her son, Roger Gloyd, of Plano, TX. Mrs. Gloyd had been an adjunct curator of Odonata at the UMMZ for nearly 50 years, and although we had her reprints and specimens here at the UMMZ, her personal library had been sent to her son when she left the museum to live in Texas. Dolly had acquired many books on Odonata, some of which are quite rare. All of the Odonata-related books will be housed in the Williamson-Kennedy-Gloyd Odonata Library. [...]"] (Author)] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: [mfbrien@umich.edu](mailto:mfbrien@umich.edu)

2176. Ott, J. (2000): Die Ausbreitung mediterraner Libellenarten in Deutschland und Europa - die Folge einer Klimaveränderung? *Berichte der Niedersächsischen Naturschutzakademie* 2/2000: 13-35. (in German). [This paper discusses extensively the current range extensions or changes in odonate faunas with focus on Europe. There is evidence that in the past years some species extended their distribution area to the north and to higher altitudes, with an increase in breeding habitats and population size; best studied species is *Crocothemis erythraea*. The author presents some additional examples of species for which global warming is advantageous. He also discusses amendments of regional species composition giving indication for processes of dominance of "Mediterranean" species over "Nordic" or "Eurosiberian" species.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: [L.U.P.O.GmbH@t-online.de](mailto:L.U.P.O.GmbH@t-online.de)

2177. Parr, A. (2000): Migrant dragonflies in 1999 including recent decisions and comments by The Odonata Record Committee. *J. Br. Dragonfly Society* 16(2): 52-58. (in English). [The following species are treated and in most cases discussed in detail (see also *Atropos* 9: 21-25): *Calopteryx splendens*, *Erythromma viridulum*, *Aeshna mixta*, *A. affinis*, *Anax parthenope*, *A. ephippiger*, *Libellula depressa*, *Sympetrum striolatum*, *S. fonscolombii*, *S. flaveolum*, *S. sanguineum*, *S. danae*, and *Pachydiplax longipennis*. The latter is a new addition to the European odonate fauna. The female specimen was detected dead on 6 September 1999 on the Sedco 706 oil rig in the Dunbar field on the east of Shetland.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

2178. Paulson, D.; Potter, S. (2000): Three dragonflies new to Nevada. *Argia* 12(4): 3- (in English). [*Argia sedulum*, *Perithemis intensa*, *Libellula luctuosa*]

Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

2179. Peacor, S.D.; Werner, E.E. (2000): Predator effects on an assemblage of consumers through induced changes in consumer foraging behavior. *Ecology* 81(7): 1998-2010. ["This investigation examines how a predator-induced reduction in activity of a prey species (a "nonlethal" predator effect) affects the growth rate of the prey and, indirectly, the growth rate of competitors of the prey. We further determine how the magnitudes of these effects depend on density of the prey species. We develop a foraging model that predicts a predator will reduce the growth of a focal prey species at low prey density but have little effect at high prey density. The model also predicts that presence of the predator will indirectly facilitate growth of a competitor of the focal species, and that this effect will be negligible at low, and maximal at high, focal species density. Thus it is precisely where the effect of the predator on the growth of the focal species is minimum that the indirect effect on the competitor is maximum. We tested these predictions using a system of three species/size classes of anuran larvae and a larval odonate predator (*Anax longipes*) in cattle watering tanks. By caging the predator we isolated its effect on foraging behavior of the anuran larvae from that of density reduction. We manipulated the density of small green frog larvae (*Rana clamitans*) while holding density of small bullfrog (*R. catesbeiana*) and large green frog competitors constant. Small green frogs and bullfrogs reduce their activity in the presence of caged *Anax* whereas the large green frogs do not. Results were in accord with the model predictions. Caged *Anax* reduced small green frog and bullfrog growth at low small green frog density but had no effect at high small green frog density. In contrast, caged *Anax* had a positive effect on large green frog growth, but this effect was negligible at low small green frog density and maximal at high small green frog density. The results also showed that the indirect effects of the predator that arose through reduction in prey foraging activity were comparable in magnitude to those expected through reduction in prey density. These results suggest that the nonlethal effects of a predator on prey and, indirectly, on competitors of their prey, can be large in magnitude and depend strongly on relative species densities." (Authors)] Address: Werner, E.E., Department of Biology, University of Michigan, Ann Arbor, MI, 48109 USA.

2180. Perron, J.-M.; Ruel, Y (2000): Extension de l'aire de répartition connue au Québec d'*Ophiogomphus anomalus* Harvey (Odonata: Gomphidae). *Fabriques* 25(1): 22. (in French). [Canada, Québec; the records of exuviae from Moulin Banal (1 male, 7-VII-1998; 2 males, 1 female, 9/16-VI-1999) are to be added to the known localities of the species.] Address: Perron, J.-M., 506-953, rue Grandjean, Sainte-Foy, Que, G1X4P9, Canada

2181. Perron, J.-M.; Jobin, L.J. (2000): Faune odonologique du territoire du marais Léon-Provancher, Neuville, Québec. *Naturaliste can.* 124(1): 26-33. [A comprehensive review of the fauna (42 spp.) of this wetland area, Québec, Canada, with annotations on species abundance, flight periods etc., and with specimen phot. of all spp.] Address: Perron, J.-M., 506-953, rue Grandjean, Sainte-Foy, Que, G1X4P9, Canada

2182. Perron, J.-M.; Ruel, Y. (2000): Implantation d'*Enallagma civile* (Hagen) (Odonata: Coenagrionidae) sur le territoire du marais Léon-Provancher, Neuville (Québec). *Fabriques* 25(1): 20-21. (in French). [A small population of *E. civile* was discovered in 1999; its habitat is described in detail.] Address: Ruel, Y., 760, chemin Saint-Louis, Québec, Que., G1S 1C3, Canada

2183. Peters, G.; Günther, A. (2000): Frühjahrsbeobachtungen an *Anax ephippiger* auf Rhodos nebst Anmerkungen über den Invasionsraum der Art (Odonata: Aeshnidae). *Libellula Suppl.* 3: 49-61. (in German with English summary). ["The numerous specimens recorded during the last week of March 1999 and the few which lingered at the island until the last days of April, are interpreted as being members of a mass invasion in mid March. More than 50 % of the *Anax ephippiger* sightings in the area of the Aegean Sea occur in springtime, up to the first third of May. Observations made in late summer and autumn confirm the development of a summer generation of larvae and adults. The probability of the existence of resident populations in the Mediterranean, produced by successful hibernation of larvae and subsequent emergence of adults, remains to be proved. It seems likely, that *Anax imperator*, *A. parthenope* and *A. junius*, have been unable to produce diapause larvae, which would allow them to survive under conditions of low temperature." (Authors)] Address: Peters, G., Museum für Naturkunde, Institut für Systematische Zoologie, Invalidenstraße 43, D-10115 Berlin, Germany. E-mail: thekla.kauffmann@rz.hu-berlin.de; Günther, A., Naturschutzinstitut Freiberg, Waisenhausstr. 10, D-09599 Freiberg, Germany. E-mail: a.guenther@abo.freiepresse.de

2184. Pfau, H.K. (2000): *Erasipteron larischi* PRUVOST, 1933, *Eugeropteron lunatum* RIEK, 1984 und die Evolution der Verstellpropeller-Flügel der Libellen. *Mitt. Schweiz. Entomol. Gesell.* 73: 223-263. (in German with English summary). ["The functional morphology of the dragonfly wing base is shortly described using a mechanical model (details see PFAU, 1986). Special attention has been put on the mechanism of supinatory twisting of the wing in the range of upstroke pitch (Aufschlagsdrehbereich). In this range the fulcral muscle, a pronator which reduces the wing twist, is most essential for enhancement of forward thrust. The wings of *Erasipteron larischi* PRUVOST, 1933 and *Eugeropteron lunatum* RIEK, 1984, which have been classified amongst the oldest representatives in the stem group of Odonata, are "reanimated" by postulation of various functional wing characters (mainly joints between veins) concerning wing twisting. These fossil wings are interpreted as early steps of an evolutionary sequence, which led from *Erasipteron* to *Eugeropteron* (in contrast to the sequence proposed by RIEK & KUKALOVA-PECK, 1984, based on morphological considerations). In this sequence the efficiency of wing twisting in the range of upstroke pitch (Aufschlagsdrehbereich) is enhanced. This is due mainly to evolution of the mid and posterior arculus, since frontal veins of the wing were integrated into the twisting part of the wing (Cubital-sector), enlarging it considerably by adding their distal surface parts. As a next step, the formation of a further (frontal) part of the arculus, the anterior arculus, integrated a very large part of the wing (including the wings tip!) into the cubital sector. This was followed by the evolution of the nodus, a most essential joint of the "variable-pitch propeller wing" of dragonflies. The

further functional development of the nodus and the improvement of co-operation of arculus and nodus presumably then happened in a petiolate zygopteroid wing with a proximally situated nodus. It is postulated that this was the wing-type of the common ancestor of all extant Odonata (i.e. of the stem species of \*Odonata). The Protanisoptera, possessing a primitive "distal" nodus and a very oblique ("soft") anterior and mid arculus are considered as a "transition stage" on the way to the Protozygoptera and the "Odonata. The complicated mechanical interaction between the wing base, arculus, and nodus has been tested in different constellations using working models. Within the \*Odonata the wings again broadened and the nodus was shifted distally resulting in a functional bisection of the wing into a proximal bearing-surface part ("airfoil") and a distal twisting part. It is possible that this evolution, which led to Anisozygoptera+Anisoptera, included groups of Zygoptera ("Lestine Complex", "Calopterygoidea"), supporting the hypothesis of paraphyly of Zygoptera (FRASER, 1957). Convergence, however, could not be excluded. At the base of the Anisozygoptera+Anisoptera - and again at the base of Anisoptera - the wing also broadened in its proximal part (mainly the hind wings). This evolution proceeded with parallel changes in the flight apparatus as a whole: alteration of the basic (i.e. thorax-integrated) angle of wing stroke-plane, simplification and strengthening of the flight motor (the latter mainly in the metathorax)." (Author)] Address: Pfau, H.K., Rathenaustr. 14, D-65326 Aarbergen, Germany

2185. Pither, J.; Taylor, P.D. (2000): Directional and fluctuating asymmetry in the black-winged damselfly *Calopteryx maculata* (Beauvois) (Odonata: Calopterygidae). *Canadian Journal of Zoology* 78(10): 1740-1748. (in English). ["Directional asymmetry (DA) has received considerably less attention than fluctuating asymmetry (FA) in the literature. Evidence for DA, however, is building among insect taxa. We examined asymmetries in two wing traits within both sexes of the damselfly *Calopteryx maculata* [...] sampled from three sites in southeastern Ontario. After accounting for measurement error, we show that proximal segments within right fore and hind wings are consistently longer than those in the left in all but one sample group. Full wing lengths, however, exhibited FA rather than DA. Mean asymmetry values for both traits (segment and length) occurred in the direction of right-wingedness significantly more often than expected by chance. Patterns of asymmetry were generally consistent among the sexes and sites, although males tended to exhibit more pronounced DA. We suggest that the wings of *C. maculata* may undergo compensatory development, so that full lengths are more bilaterally symmetrical than their component parts." (Author)] Address: Pither, K., Department of Biology, Queen's University, Kingston, ON, K7L 3N6 Canada

2186. Postler, E.; Postler, W. (2000): Entwicklung von *Gomphus vulgatissimus* im Datteln-Hamm-Kanal (Odonata: Gomphidae). *Libellula* 19(3/4): 233-235. (in German with English summary). ["In May and June 2000, 138 exuviae of this running-water species were collected from a navigable canal in the region of Lünen-Hamm, Northrhine-Westphalia, Germany. One exuvia of *G. vulgatissimus* was found with an attached Zebra Mussel *Dreissena polymorpha*." (Authors)] Address: Postler, Elisabeth und Wolfgang, Hammer Straße 39, D-59174 Kamen

2187. Pottgiesser, T.; Sommerhäuser, M. (2000): Naturnahe Tieflandbäche in Nordrhein-Westfalen - Refugien seltener und gefährdeter Wasserinsekten. *Verhandlungen des Westdeutschen Entomologen Tag 1999*: 233-246. (in German). [30 brooks and rivers in the lowlands of Nordrhein-Westfalen, Germany are surveyed for their macrozoobenthos; *Calopteryx splendens*, *C. virgo*, *Gomphus vulgatissimus*, and *Cordulegaster boltonii* are mentioned in a tab.] Address: Sommerhäuser, M., Universität Essen, Institut für Ökologie, Abt. Hydrobiologie, D-45117 Essen, Germany. E-mail: sommerhaeuser@uni-essen.de

2188. Prokop, J.; Nel, A. (2000): *Merlax bohemicus* gen. n., sp. n., a new fossil dragonfly from the Lower Miocene of northern Bohemia (Odonata: Aeshnidae). *European Journal of Entomology* 97(3): 427-431. (in English). ["Two aeshnid dragonflies are described from the Lower Miocene deposits in the Bilina mine in the north of the Czech Republic, including a new genus and species of Anactini, *Merlax bohemicus* gen. n., sp. n., and a further specimen assigned to the genus *Aeshna*." (Authors)] Address: Prokop, J., Department of Palaeontology, Charles University, Albertov 6, CZ-128 43, Praha 2 Czech Republic

2189. Reder, G.; Vogel, W. (2000): Wellenschlag als limitierender Faktor bei der Emergenz von Libellen? Beobachtungen beim Schlupf von *Gomphus flavipes* (Charpentier) (Anisoptera: Gomphidae). *Fauna Flora Rheinland-Pfalz* 9(2): 681-685. (in German). [A male of *Stylurus flavipes* was traced emerging on the margin of a groyne in River Rhine near Worms, Rheinland-Pfalz, Germany. The specimen was caught by the wash off of a boat and washed into the open water of the river. The abdomen still stuck into the larval skin. After ten minutes the authors caught the specimen and put it near the bank onto a log. The specimen had put its abdomen out of the skin floating in the water. After 40 min the specimen take off to its maturation flight.] Address: Reder, Gerd, Am Pfortengarten 37, D-67592 Flörsheim-Dalsheim, Germany. E-mail: PG.Reder@t-online.de

2190. Rejl, J. (2000): Finding of dragonflies in bird's nets. In: Hanel, L. (Ed.): *Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chráněné krajinné oblasti Trebonsko 15.-18.6.2000*. Vlasim. ISBN 80-86327-12-4: 34-35. (in Czech with English summary). [In the framework of catching of birds living in reeds in the National Reserve Bohdanecký rybník pond and the pond Matka *Orthetrum cancellatum*, *Aeshna cyanea*, and *A. mixta* were regularly caught in mist nets. Rare species (first proof of the existence in the region of Eastern Bohemia) are: 19.7.1999 *Ophiogomphus cecilia*, and 2.8. 1999 *Anax parthenope*. In the meadows of the Svratka river (township territory Krizánky, region Zďár nad Sázavou, mapping field no. 6362a) *Cordulegaster boltonii* was caught in a mist net on 17.6.1998.] Address: Rejl, J., Agentura ochrany přírody a krajiny CR, Bozeny Nemcové 2625, 530 02 Pardubice, Czech Republic

2191. Relyea, R. (2000): Trait-mediated indirect effects in larval anurans: reversing competition with the threat of predators. *Ecology* 81(8): 2278-2289. (in English). ["Ecologists recently have been focusing on the role that trait-mediated indirect effects can have on community structure and composition. To date, this



work has primarily focused on the effects of predator-induced behavioral plasticity on communities. However, predator-induced morphological plasticity, which has been documented in many taxa, might also lead to trait-mediated indirect effects. Here, I examined how predators altered the behavior and morphology of larval wood frogs (*Rana sylvatica*) and leopard frogs (*R. pipiens*) and how these phenotypic changes altered the outcome of competition between the two species. Competition in the absence of caged predators was asymmetric; when reared separately, leopard frogs grew more than wood frogs, but when competing (without predators), wood frogs grew faster than leopard frogs. The presence of caged predators reversed the outcome of competition between the two anuran prey. In the presence of larval dragonflies (*Anax* spp.) or caged mudminnows (*Umbra limi*), leopard frogs grew faster than wood frogs while total tadpole biomass production remained unchanged. Thus, there was a predator-mediated indirect effect. Because predators alter both the behavior and morphology of larval anurans and both of these traits are known to affect resource consumption and growth, both are potential mechanisms to explain the change in competitive outcome. Changes in behavior were not related to changes in growth, but changes in morphology (specifically mouth width and tail length) were related to changes in growth. When competitors were added (without predators), wood frogs increased their mouth width by 10% and their tail length by 3%, while leopard frogs increased their mouth width by 5% and did not change their tail length. The greater increase in mouth width for wood frogs should increase their forage intake, since tadpoles feed by scraping periphyton; the importance of a 3% longer tail in competitive ability is unknown. The presence of the predator threat (via chemical cues from the caged predators) reduced both the mouth width and tail length in the two prey species to pre-competition levels. This response corresponded with the reduced competitive ability of the wood frogs. This work demonstrates that both competitors and predators can alter prey morphology and suggests that changes in morphology can cause trait-mediated indirect effects." (Authors)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

2192. Schlüpmann, M. (2000): Die Libellen des Hager Raumes - Verbreitung, Bestand und Lebensräume. Der Sauerländische Naturbeobachter 27: 71-115. (in German with English summary). [Starting in 1980 324 small stagnant water bodies and 65 running water segments were surveyed in the Hagen area. The distribution of the 32 dragonflies species is displayed as 1 square km grid maps. Up to now data has been collected for 184 grid areas. "Distribution and frequency is characterized by percentage of the populated grid areas and populated bodies of water, the indigeneness or rather, the probability of it, is included in derived values and a frequency index is formed." *Aeshna cyanea* is the most widespread and frequent species. *Pyrrhosoma nymphula* was recorded in 40%, *Ischnura elegans* in 35% of the water bodies. *Coenagrion puella* and *Libellula depressa* belong to these widespread species, too. All the other species achieve low frequency indices. Some examples of regional fluctuation in species representation are given: *Gomphus pulchellus* was observed for the first time in 1994. *Erythromma najas* could be observed on old branches of the Ruhr-

River-Valley until 1980, however, it was impossible to find it between 1980 and 1989. In 1997 *Erythromma viridulum* was discovered in the Lenne floodplain for the first time. *Platycnemis pennipes*, which was present in the seventies, but was missing in the eighties, could just recently be confirmed on three places in the Ruhr-Valley. In 1983 and 1984, *Ischnura pumilio* was only observed in the region of the Lenne-Valley and the adjoining region; it was never been seen since that time. Special emphasize ist given to the regional distribution, and their habitat preference (small body of water type, general characteristics of the body of water, vegetation).] Address: Schlüpmann, M., Hierseier Weg 18, D-58119 Hagen, Germany. E-mail: martin-schluempmann@t-online.de

2193. Schlüpmann, M. (2000): Die Libellen des Südwestfälischen Berglandes. Der Sauerländische Naturbeobachter 27: 5-55. (in German with English summary). [The distribution of Odonata in Southern Westphalia, Germany is grid mapped. Information from 172 topographic maps from a possible total of 219 has been made available. 45 dragonfly species are known from the region, 3 of them couldn't be traced in the framework of this study. 35 species are indigenous, *Sympetrum pedemontanum* appeared temporarily in the eighties. In 1998 *Sympetrum fonscolombii* and in 2000 *Ophiogomphus cecilia* were found for the first time. The status for another six species remains questionable. *Aeshna cyanea* and *Pyrrhosoma nymphula* are the dominate species in the region. An analysis of the distribution of the species on the basis of geographic landscapes ("Naturräume") shows that higher altitudes are represented by a clearly defined smaller amount of species. Many species have only been found in peripheral regions only. *Leucorrhinia dubia* and *L. pectoralis* are confined on a few boggy habitats of the higher region of the study area. Due to the water quality improvement of the rivers a population increase of *Calopteryx splendens* has been observed. *Anax imperator* and *Erythromma viridulum* could also increase their populations during the last 10 years - the reason might be an increase in temperatures. A population decrease is to be observed in species of oligotrophic to mesotrophic habitats (*Aeshna juncea*, *Sympetrum danae*, *S. flaveolum*). The regional distribution, population and habitat ecology, and range extensions of the species are described and discussed in some detail.] Address: Schlüpmann, M., Hierseier Weg 18, D-58119 Hagen, Germany. E-mail: martin.schluempmann@t-online.de

2194. Schmidt, E. (2000): Emergenzuntersuchungen an *Gomphus vulgatissimus* und *G. pulchellus* (Odonata: Gomphidae) am Dortmund-Ems-Kanal bei Lüdinghausen (Westmünsterland). Verhandlungen des Westdeutschen Entomologen Tag 1999: 191-197. (in German). [Nordrhein-Westfalen, Germany; emergence patterns in 1999 (long emergence period) and in 2000 (short emergence period) are compared and discussed.] Address: Schmidt, E., Biologie und ihre Didaktik, FB9/S05, Universität GH Essen, D-45117 Essen, Germany

2195. Schnapauff, I; Ullmann, K.; Suhling, F. (2000): Die Libellen-Lebensgemeinschaft griechischer Reisfelder (Odonata): Auswirkungen von Habitatdauer, Anbaumethode und Vegetationsdichte. *Libellula* Suppl. 3: 63-80. (in German with English summary). ["The Odonata of experimental rice-fields situated in the Nestos-delta (NE Greece) were studied from May to September

1994. The number of species breeding successfully in rice-fields was lower than that in ponds and ditches in the vicinity. Only species with a larval period of less than 120 days were able to emerge from the rice-fields. The phenology of adults and the emergence of *Sympetrum fonscolombii* from rice-fields are described. The larval densities of *Ischnura elegans* and *S. fonscolombii* are not significantly different between pesticide-free rice-fields and those treated with propanil and parathion. On the other hand, the number of emerging individuals of both species differed between the treatments. A significant negative correlation between the density of rice plants and the larval density of *I. elegans* in the experimental fields was found. The comparability of results from small experimental plots with original rice-fields is discussed." (Authors)] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

2196. Schöll, F.; Fuksa, J. (2000): Das Makrozoobenthos der Elbe vom Riesengebirge bis Cuxhaven. Bundesanstalt für Gewässerkunde Koblenz. T.G. Masaryk Water Research Institute Prag. Internationale Kommission zum Schutz der Elbe. Koblenz: 29 pp. (in German). [Compilation of faunistic data of the River Elbe covering the fauna from the spring in the Czech Republic up to the estuary in Germany. The data are arranged in an appendix according to four ecoregions: (1) Bohemian Elbe (Krkonoše [Riesengebirge], Vrchlabí - Decín), (2) Upper range (Decín - Pirna, Pirna - Hirschstein) [Czech Republic], (3) Middle range (Hirschstein - Magdeburg, Magdeburg - Geesthacht), and (4) Tide influenced region (Geesthacht - Wedel, Wedel - Cuxhaven) [Germany]. 9 odonate species are listed; this list of course is far away of being complete even for rheophiles species or species of the floodplain of the river Elbe. In spite of this the paper gives a good introduction into the ecological importance of this river in Europe and the fauna of the different ranges of the Elbe. Characteristic species are figured (colour pictures) and some chemical factors influencing the macrozoobenthos are presented in graphs.] Address: Bundesanstalt für Gewässerkunde, Kaiserin-Augusta-Anlagen 15-17, D-56068 Koblenz, Germany; T.G. Masaryk Water Research Institute, Podbabska 30, Praha 6, Czech Republic.

2197. Schulz, C.-J. (2000): Aquatische Insekten der Wipper, einem salzbelasteten Fluß Nordthüringens. Mitt. dtsh. Gesell. allgem. angew. Entomol. 12: 249-254. (in German with English summary). ["Decline of potassium mining in Northern Thuringia led to a decrease in salinity of the river Wipper during the last years. Up to now, drainage waters from the salt heaps cause a salinization, reaching an annual mean value of  $1,528 \text{ mg Cl}^{-1}$  at the sampling location at the village of Hachelbich in 1998. However, this is only little compared to a decade ago (1989:  $7,080 \text{ mg Cl}^{-1}$ ). This severe salinization affected also the aquatic insect community of the river Wipper. Whereas records from the beginning of this century report a diverse aquatic insect fauna, Chironomidae started dominating nearby the potassium mines in the 1930's. Since the beginning of the 1950's, mass developments of a few species, mostly Chironomidae, had characterized long sections of the river. This remained so until in 1994 chloride concentration dropped to  $1,575 \text{ mg l}^{-1}$  (annual mean at Hachelbich). From then on, taxa such as *Sialis*, *Agabus* and *Polamonectes* occurred, most of them being euryhaline." (Author)] Also *Calopteryx virgo* and *C. splendens* could be

recorded in the sampling period 1992-1998.] Address: Schulz, C.-J., Staatliches Umweltamt Sondershausen, Postfach 36, D-99701 Sondershausen, Germany

2198. Schwarz-Waubke, M.; Schwarz, M. (2000): Die Libellenfauna im Stadtgebiet von Salzburg (Österreich) - Ergebnisse einer Biotopkartierung aus den Jahren 1994 und 1995. Linzer biologische Beiträge 32(2): 1093-1162. (in German with English summary). [In 1994 and 1995 the dragonfly fauna of 173 water bodies in the city of Salzburg, Austria was investigated. A total of 41 odonate species has been found (hitherto 46 species are known from the city of Salzburg and its environs). The distribution of the species in the Federal State Salzburg and habitat requirements are discussed, and their distribution is mapped. The odonate fauna of twenty waters was examined more intensively with special emphasis on indigeneity and abundance.] Address: Schwarz-Waubke, Maria, Eben 21, A-4202 Kirschschlag, Austria

2199. Sibley, F.C. (2000): New records of *Sympetrum signiferum* from Arizona. *Argia* 12(4): 4-5. (in English). [Compilation of records of the rare *S. signiferum* resulting first from 1968 and following years] Address: Sibley, F.C., 25 Shirley Street, Naugatuck, CT, 06770, USA. E-mail: fcs@george.peabody.yale.edu

2200. Siva-Jothy, M. (2000): A mechanistic link between parasite resistance and expression of a sexually selected trait in a damselfly. *Proceedings of the Royal Society Biological Sciences Series B* 267(1461): 2523-2527. (in English). ["This paper examines a field-based insect system in which a signal trait and an immune effector system responsible for parasite resistance rely on the same melanin-producing enzyme cascade (phenoloxidase, PO). Observations and experiments on males of the calopterygid damselfly *Calopteryx splendens xanthostoma* revealed that resistance to the prevalent parasite in the study system (a eugregarine protozoan infecting the mid-gut) was correlated with quantitative aspects of the sexually dimorphic melanized wingspot of males, a trait that is produced and fixed before the host comes into contact with the sporozoites of the parasite. Regulation of PO during experimental immune challenge showed that males with dark, homogenous melanin distribution in their wings showed no change in PO levels 24 h after challenge. By contrast males with lighter and/or more heterogenous melanin distribution in their wings tended to show higher PO levels 24 h after immune challenge. The changes in PO levels occur despite the lack of a relationship between wing-pigment distribution and the cellular encapsulation response. These results suggest a shared, limiting re may form the mechanistic basis of the trade-off between a condition-dependent signal trait and immune function in this system." (Author)] Address: Siva-Jothy, M.T., Department of Animal and Plant Sciences, University of Sheffield, Sheffield, S10 2TN, UK. E-mail: m.siva-jothy@sheffield.ac.uk

2201. Siva-Jothy, M.T. (2000): Phenoloxidase, parasite resistance and reproductive success: Immunity from an evolutionary ecologist's perspective. *Developmental & Comparative Immunology* 24(Suppl. 1): S54- (in English). [Verbatim: "In recent years evolutionary biologists have begun to realise that immune function is an important life-history trait in animals. In particular the cost of investing in immunity may preclude investment

in other life-history traits. I present the results of a field-based study of a damselfly that show how investment in immune traits (phenol oxidase regulation and encapsulation) varies between individuals and show that that variation affects reproductive success in those individuals. I will discuss the implications of this for our understanding of insect immune function." Address: Siva-Jothy, M.T., Department of Animal and Plant Sciences, University of Sheffield, Sheffield, S10 2TN, UK. E-mail: m.siva-jothy@sheffield.ac.uk

2202. Smith, B. (2000): *Cicindela* larva eats *Gomphus*. *Argia* 12(4): 9. (in English). ["My very first publication was in the *Journal Cicindela* in which I described finding an adult clubtail (probably *Gomphus spicatus*) "stuck" to a sand trail. It was vibrating its wings but couldn't move. I grabbed it thinking this is an easy one and in the process pulled a last instar larva of *Cicindela scutellaris* out of its burrow. The larva had the dragonfly by the anterior portion of the abdomen and didn't let go till it was too late." (verbatim)] Address: not stated

2203. Société française d'odonatologie. Groupe odonatologique Outre-mer (2000): Liste provisoire des odonates de Guadeloupe et de Martinique (Synthèse: Jean-Louis Dommaget). *Martinia* 16(3): 134-137. (in French). [Checklist (35 taxa) from Guadeloupe and Martinique (Lesser Antilles) with comments and bibliography.] Address: Dommaget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

2204. Société française d'odonatologie. Groupe odonatologique Outre-mer (2000): Liste provisoire des odonates de Guyane française (Synthèse: Jean-Louis Dommaget et Michel Papazian). *Martinia* 16(3): 138-141. (in French). [Checklist (160 species) from French Guyana.] Address: Dommaget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

2205. Société française d'odonatologie. Groupe odonatologique Outre-mer (2000): Liste provisoire des odonates de la Nouvelle-Calédonie (Synthèse: Jean-Louis Dommaget). *Martinia* 16(3): 142-144. (in French). [Checklist (51 species) from New-Caledonia.] Address: Dommaget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

2206. Sonntag, H. (2000): Erster Bodenständigkeitsnachweis von *Aeshna mixta* Latreille, 1805 für das Bundesland Tirol. *Anax*, Wien 3: 29-30. (in German with English summary). [Terfens, Tirol, Austria; 10 exuviae were collected between July 27 and August 19, 1998.] Address: Sonntag, H., Bahnhofstr. 2, A-6112 Wattens, Austria. E-mail: hes@tirol.wwf.at

2207. Soupir, C.A.; Brown, M.L.; Kallemeyn, L.W. (2000): Trophic ecology of largemouth bass and northern pike in allopatric and sympatric assemblages in northern boreal lakes. *Canadian Journal of Zoology* 78(10): 1759-1765. (in English). ["Largemouth bass (*Micropterus salmoides*) and northern pike (*Esox lucius*) are top predators in the food chain in most aquatic environments that they occupy; however, limited information exists on species interactions in the northern reaches of largemouth bass distribution. We investigated the seasonal food habits of allopatric and sympatric assemblages of largemouth bass and northern pike in six interior lakes within Voyageurs National Park, Minnesota. Percentages of empty stomachs were variable for largemouth bass (38-54%) and northern pike (34.7-66.7%).

Fishes (mainly yellow perch, *Perca flavescens*) comprised greater than 60% (mean percent mass, MPM) of the northern pike diet during all seasons in both allopatric and sympatric assemblages. Aquatic insects (primarily Odonata and Hemiptera) were important in the diets of largemouth bass in all communities (0.0-79.7 MPM). Although largemouth bass were observed in the diet of northern pike, largemouth bass apparently did not prey on northern pike. Seasonal differences were observed in the proportion of aquatic insects ( $P = 0.010$ ) and fishes ( $P = 0.023$ ) in the diets of northern pike and largemouth bass. Based on three food categories, jackknifed classifications correctly classified 77 and 92% of northern pike and largemouth bass values, respectively. Percent resource overlap values were biologically significant (greater than 60%) during at least one season in each sympatric assemblage, suggesting some diet overlap." (Authors)] Address: Soupir, C.A., Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, SD, 57007 USA

2208. Stav, G.; Kotler, B. P.; Blaustein, L. (2000): Direct and indirect effects of predatory dragonfly (*Anax imperator*) nymphs on green toad (*Bufo viridis*) tadpoles. *Israel Journal of Zoology* 46(2): 173. (in English). [Verbatim: "Artificial-pool experiments were conducted to assess the effects of predatory dragonfly (*Anax imperator*) nymphs on green toad (*Bufo viridis*) tadpoles. Six replicate pools were used for each of three treatment groups: (1) presence of free *Anax* nymphs (direct effects on mortality), (2) caged *Anax* (indirect effects on behavior, development, and individual growth rates), and (3) control (no *Anax*). Each pool consisted of 15 liters (10 cm depth) of water. After five days, 30 three-day-old tadpoles that had hatched from the same egg string were added. Caged *Anax* were fed with tadpoles three times a week. The experiments ran from 11 April through 4 August. Free *Anax* eliminated 90% of the tadpoles within two days and all of them within six days. Caged *Anax* had no effect on the spatial distribution of tadpoles. However, caged *Anax* caused tadpoles to metamorphose earlier and to a larger size (both statistically significant), and to attain a lighter color." Address: Stav, G., Life Science Department and Mitrani Center for Desert Ecology, Jacob Blaustein Institute for Desert Research, Ben-Gurion University of the Negev, Sede Boqer Campus, Beer Sheva, 84990 Israel

2209. Stav, G.; Blaustein, L.; Margalit, Y. (2000): Influence of nymphal *Anax imperator* (Odonata: Aeshnidae) on oviposition by the mosquito *Culiseta longiareolata* (Diptera: Culicidae) and community structure in temporary pools. *Journal of Vector Ecology* 25(2): 190-202. (in English). ["We assessed the overall (consumptive plus non-consumptive) and non-consumptive effects of nymphal *A. imperator* on experimental pool communities by comparing three treatments: (1) control (no *Anax*); (2) free *Anax* (*Anax* was not constrained); and (3) caged *Anax* (*Anax*, enclosed within a cage, could not consume prey outside the cages, but could possibly influence them via perceived risk of predation). Fewer egg rafts of the mosquito *Culiseta longiareolata* were found in the free *Anax* treatment compared to the other two treatments. There was no statistically significant difference in the number of egg rafts between control and caged *Anax* pools. Thus, while *Culiseta* females apparently oviposit fewer egg rafts in the presence of unconstrained *Anax*, they did not respond to predation risk from the caged *Anax*. Larval *Culiseta* densities were drastically reduced by free *Anax*; there



ties were drastically reduced by free *Anax*; there was nearly a 100% reduction in the number reaching metamorphosis (pupae) and a 100% reduction in emergence (pupal exuviae). There were no significant treatment effects on densities of crustaceans, *Daphnia magna* and *Heterocypris* sp., or on chironomid pupal exuviae. Ceratopogonid pupal abundance was higher in free *Anax* pools than in the other two treatments toward the end of the experiment. Free *Anax* caused a trophic cascade, presumably by strongly reducing the dominant periphyton grazer, *Culiseta* larvae; periphyton mass was greater in the free *Anax* treatment than in the control. However, there was no behavioral trophic cascade, i.e., no difference in periphyton abundance between the control and caged *Anax* treatment." (Authors)] Address: Stav, G., Institute for Desert Research, Ben-Gurion University, Sede Boqer Campus, 84990 Israel.

2210. Stiehler, H. (2000): 60 Jahre Naturschutzgebiet Döpe. Naturschutzarbeit in Mecklenburg-Vorpommern 43(1): 72-77. (in German). [*Leucorrhinia pectoralis*, *Ischnura elegans*, *I. pumilio*, *Lestes sponsa*, and *Sympetrum vulgatum* are communicated for the lake Döpe, Mecklenburg-Vorpommern, Germany] Address: Stiehler, H., Schweriner Str. 8, D-23972 Dorf Mecklenburg, Germany

2211. Stoks, R.; Knijf, G. de (2000): De Bruine korenbout (*Libellula fulva*) in Vlaanderen in 2000: hoop voor een met uitsterven bedreigd buitenbeentje? *Gomphus* 16(2): 131-138. (in Dutch with English and French summaries). ["*Libellula fulva* in Flanders in 2000: hope for a treathened outsider? The increase in the number of observations of the Scarce Chaser, *Libellula fulva*, in Flanders during the nineties was continued in 2000. More than 1.600 animals were seen at 13 different sites. In the region Noordoost Limburg there were three sites with only one solitary female and one site with about 100 animals. Very large (>100 individuals) populations were seen at the known sites in Klein-Brabant (Fort van Walem, Kleiputten van Niel, and Grote Wiel te Wintam). Surprisingly, more than 60% of the observations were concentrated outside the known sites in three populations in the Polders of the Scheldt (Waasland). A central population of more than 150 animals was present at the Rupelmondse Kreek. The other two populations of the Waasland were at Paviljoen in Bazel (more than 60 animals) and Steenbakkerij Steendorp (more than 40 animals). These populations together with the ones of Klein-Brabant constitute the region Rupel-Scheldepolders. The data of 2000 confirm the fact that *L. fulva* is a quite unusual 'Critically endangered' species as it can occur in large populations and shows a preference for habitats with fish. It is therefore not surprising that a re-analysis of the Red list status suggests that the species now should be considered 'Endangered' in Flanders." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

2212. Suhling, F.; Befeld, S.; Hausler, M.; Katur, K.; Lepkojus, S.; Mesleard, F. (2000): Effects of insecticide applications on macroinvertebrate density and biomass in rice-fields in the Rhone-delta, France. *Hydrobiologia* 431(1): 69-79. (in English). ["The density of 23 macroinvertebrate species and the total macroinvertebrate biomass were compared between rice-fields treated with lindane and diazinon in June and alphamethine in Au-

gust and untreated controls. The macroinvertebrates could be divided into four groups: (1) Taxa, in which the densities were lower in the insecticide treatment in July and August than in the non-insecticide treatment. (2) The Culicidae which occurred in the insecticide treatment in significantly lower density in July, but in significantly higher density in August. (3) *Ischnura elegans* (Vander L.) which was found in July after the lindane application in significantly higher numbers in the insecticide treatments, but in significantly lower numbers in the insecticide treatment in August after the application of the pyrethroid. In these three groups, we assumed that direct effects due to the insecticides toxicity were the reason for the differences in density. (4) The fourth group included three taxa in which the densities were significantly higher in the insecticide treatment in July and August than in the control. For this, indirect effects due to reduced biotic interactions may be responsible. The biomass was higher in the insecticide treatments in July, mainly because of a high increase in gastropod density, during the rest of the season it was similar between treatments and controls." (Authors) Odonata treated are *Ischnura elegans*, *Orthetrum albistylum*, *O. cancellatum*, *Crocothemis erythraea*, and *Sympetrum fonscolombii*.] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

2213. Swanson, N.L.; Liss, W.J.; Ziller, J.S.; Wade, M.G.; Gresswell, R.E. (2000): Growth and diet of fish in Waldo Lake, Oregon. *Lake & Reservoir Management* 16(1-2): 133-143. (in English). ["Waldo Lake, located in the Oregon Cascades, is considered to be one of the most dilute lakes in the world. Even with low nutrient concentrations and sparse populations of zooplankton, introduced fish in the lake are large in size and in good condition when compared to fish from other lakes. This apparent anomaly is due to the availability of benthic macroinvertebrates. Taxa found in the stomach contents of fish captured in Waldo Lake consist primarily of Chironomidae larvae and pupae, Trichoptera larvae and pupae, amphipods, Ephemeroptera larvae, and Odonata larvae." (Authors)] Address: Swanson, Nicola, USFS, Willamette National Forest, Middle Fork Ranger District, 46375 Highway 58, Westfir, OR, 97492 USA

2214. Switzer, P.V.; Eason, P. K. (2000): Proximate constraints on intruder detection in the dragonfly *Perithemis tenera* (Odonata: Libellulidae): Effects of angle of approach and background. *Annals of the Entomological Society of America* 93(2): 333-339. (in English). ["The implications of insects' vision for territorial defense have been relatively little studied in the field. In the dragonfly *Perithemis tenera* Say we investigated whether either the angle at which an intruder was viewed by a territorial resident or the background against which it was viewed affected the detection of that intruder. Residents detected intruders at a greater distance if the intruders were directly in front of them; they also detected more intruders in front of them than from other angles. Intruders viewed against distant vegetation were detected more readily than were intruders against near vegetation. Residents detected more intruders viewed against distant vegetation than viewed against near vegetation; however, more intruders than expected were detected against near vegetation. The probability of detecting intruders depends on the angle at which they are viewed and the background behind them. Hence, there may be selection on territorial resi-

dents to adjust their orientation and space use to enhance their view of their territory and intruders."(Authors)] Address: Switzer, P.V., Eastern Illinois Univ., Dept Biol, Sci., Charleston IL 61920; USA. E-mail: cfpvs@eiu.edu

2215. Theischinger, G. (2000): A new species of *Nososticta* HAGEN from Australia (Odonata: Protoneuridae). *Linzer biol. Beitr.* 32(2): 1175-1179. (in English). [*Nososticta mouldsi* sp. n. (male holotype: Florence Falls (13°04'S/130°45'E), in shade along small rainforest stream, Northern Territory, Australia, June 21st) is described, illustrated and compared with *Nososticta taracumbi*.] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

2216. Theischinger, G. (2000): Preliminary keys for the identification of larvae of the Australian Gomphides (Odonata). Cooperative Research Centre for Freshwater Ecology Identification Guide No. 28: I-III, 48pp. (in English). ["The descriptive information available on the larvae of the Australian Gomphides is presented. Keys are given for the identification of families, genera, subgenera and species. In this paper the classification of Australian gomphids as adopted by Watson (1991) and Theischinger (1998) is replaced by the classification proposed by Bechly (1996) [...] with Gomphides standing for Gomphidae, Lindeniidae for Ictinogomphinae and Gomphidae for Gomphinae. [...] Six gomphid genera, five subgenera and 39 species, generally based on adults only, have been described since 1854. Only much more recently some information on the larvae was presented. After the most recent comprehensive treatment of Australian gomphid larvae (Theischinger 1998) we now know the larvae of most species, but there are still large gaps in our knowledge. It is the main intention of this presentation to make possible or facilitate the identification of known larvae of Australian gomphid species. I have, however, strongly emphasised existing gaps in our knowledge in order to make it more interesting and easier for people from a wide range of activities to attempt to close some of them. [...] Measurements and descriptions are given from last instar larvae or from final instar exuviae. Most illustrations are given from final instar exuviae. As colouration of individuals may be variable in life due to specific conditions in the habitat and as colouration of preserved specimens may reflect the ways or methods of collection and preservation, colours are not given in the descriptions; they may range from pale greyish yellow to dark greyish brown. Pubescence that is rather strong in all taxa does not appear useful for diagnoses and is therefore omitted in illustrations and usually not mentioned or specified in descriptions. Smoothness or dentition of premental ligula and labial palps may to some degree be effected by conditions of habitat and food and possibly others. All diagnoses are made up in similar style facilitating comparison. Only the most reliable characters are used in keys and diagnoses. In spite of that the keys may be of limited use for identifying other than last instar larvae and exuviae." (Author) G. Theischinger presents information on the family level on taxonomy and diagnosis, and a checklist of the genera. On generic level information on taxonomy, diagnosis, general ecology, and a checklist of the species is given. Each species is keyed out, black-and-white drawings give optimal insight of morphological structures. On the species level information on dimensions, significant morphological structures, ecology, and distribution are compiled. These

attractive volume of the Odonata identification guide series (see OAS 2306) presents also a plate with colour photographs of nine species.] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. Orders: Cooperative Research Centre for Freshwater Ecology Identification, Murray-Darling Freshwater Research Centre, PO Box 921, Albury, NSW 2640, Australia. E-mail: enquiries@mdfrc.canberra.edu.au. / WWW.freshwater.canberra.edu.au

2217. Titeux, H. (2000): Les Odonates de la réserve de Ben-Ahin (vallée de la Meuse): bilan des relevés de 1993 à 2000. *Gomphus* 16(2): 123-130. (in French with English and Dutch summaries). ["During 8 years of Odonata monitoring at Ben-Ahin (Huy, Belgium), 29 species were observed. Reproduction evidences were collected for 20 species. Among them, 4 are critically endangered within the Walloon region (*Sympecma fusca*, *Ceriagrion tenellum*, *Brachytron pratense*, and *Libellula fulva*). Protection status for some of the ponds as well as management measures contribute to the preservation of the rather small populations." (Author)] Address: Titeux, H., Rue d'Angleterre 13, B-4500 Huy, Belgium. E-mail: titeux@pedo.ucl.ac.be

2218. Tol, J. van (2000): The Odonata of Sulawesi and adjacent islands Part 5 The genus *Protosticta* Selys (Platystictidae). *Tijdschrift voor Entomologie* 143(2): 221-266. (in English) ["The type species of the genus *Protosticta* Selys, *P. simplicinervis* Selys, was described from Sulawesi (formerly Celebes, Indonesia). The present paper provides a revision of all Sulawesi species of the genus, and those of the adjacent island of Buton and the Sangihe Islands. Twelve species are recognized, three of which were previously known (*P. bivittata* Lieftinck, *P. gracilis* Kirby, and *P. simplicinervis*). One nominal species, *P. annulata* Fraser, appeared to be a synonym of *P. simplicinervis*. Consequently, nine species are described as new to science, viz *P. coomansi* (type locality: Palu: Lindu valley), *P. geijskesi* (type locality: NNE of Malili), *P. linduensis* (type locality: Polewali), *P. marenae* (type locality: Palu: Lindu valley near Gimpu), *P. maurenbrecheri* (type locality: NW of Palopo), *P. pariwonoi* (type locality: N of Ujung Pandang: Maros), *P. reslae* (type locality: Polewali), *P. rozendalorum* (type locality: Sangihe Islands), and *P. vanderstarrei* (type locality: Polewali). Characters of importance for species recognition are the thoracal and abdominal markings, and the structure of the prothorax and anal appendages in the male. Diagnostic characters of females include the structure of prothorax and anal appendages. The females of four species are unknown. The status of the genus *Protosticta* of the family Platystictidae is preliminarily discussed. Its high diversity in Sulawesi is in contrast with the complete absence of Platynemididae and Euphaeidae, and the virtual absence of the Protoneuridae from this island. Besides, various species as here recognized, show significant variation between populations. The morphological variation is clinal in some species (*P. coomansi*, *P. geijskesi*), presumably related to the geological history of the island." (Author)] Address: Tol, J. van, National Museum of Natural History, P.O. Box 9517, NL-2300 RA Leiden, The Netherlands

2219. Tomás, P. (2000): Dragonflies as prey of the spider *Araneus quadratus*. In: Hanel, L. (Ed.): *Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chránené krajinné oblasti*

Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 36- (in Czech with English summary). [Nature Reserve Smolenská louka (Oderské vrchy, Czech Republic); *Sympetrum danae*, *Aeshna juncea*] Address: Tomáš, P., Zahradní 1260, 31 Lipník nad Bečvou, Czech Republic

2220. Tonczyk, G. (2000): Dragonflies (Odonata) of Niebieskie Zródla Nature Reserve near Tomaszów Mazowiecki (Central Poland). *Acta Universitatis Lodzianensis, Folia limnologica* 7: 79-85. (in English with Polish summary). [Faunistic investigations of the Niebieskie Zródla nature reserve carried out in 1997-1998 resulted in 17 odonate species, 9 of which were new for the area. "All species are typical of small eutrophic pools and streams in Central Poland. The human impact, e.g. dredging of the reservoir and large-scale tourism, seem to have an effect on the changes in the dragonfly community."] Address: Tonczyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i hydrobiologii, Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland

2221. Tonczyk, G.; Klukowska, M.; Jurasz, W.; Markowski, J. (2000): The Niebieskie Zródla Nature Reserve as a subject of scientific research. *Acta Universitatis Lodzianensis, Folia limnologica* 7: 3-17. (in English with Polish summary). ["The landscape nature reserve Niebieskie Zródla is an interesting natural object located in the Polish Lowland. Its very specific natural conditions were created by the discharge of very clear and cold karst waters. During investigations carried out for over 40 years the occurrence of more than 400 plant species and 440 animal species have been recorded. The attempts to institute economical use of underground waters in the vicinity, growing tourism and recreation in the area, as well as the reclamation measures undertaken in the nineties, have resulted in alterations of the environmental conditions of the reserve. The research carried out in 1997-1998 should make it possible to identify the directions and rate of faunistic changes and to prepare a project for the further protection of the karst springs." (Authors) The taxa investigated including Odonata are listed. For the odonatalogical details of the survey see OAS 2220.] Address: Tonczyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i hydrobiologii, Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland

2222. Trusch, R. (2000): Bericht über die Jahrestagung der Entomofaunistischen Gesellschaft e.V. vom 12.-14. Mai 2000 in Üdersee. *Entomologische Nachrichten und Berichte* 44(3): 209-210. (in German). [In the framework of the meeting of the Entomofaunistic Society six odonatalogical lectures were held. The meeting was also the charter meeting for the scheduled atlas of the Odonata of the Federal State Brandenburg, Germany.] Address: not stated

2223. Upson, S. (2000): Life history observations on *Sympetrum signiferum* in Arizona. *Argia* 12(4): 5-6. (in English). [The species was first recorded in early September, 1999 in Leslie Canyon National Wildlife Refuge. On this locality it was on the wing in August between November 2000 (see Flint 2000). Colouration during maturation period, habitat preferences in Arizona, and oviposition are described. Some additional Arizonan localities with records of the species are reported

(see Sibley, 2000).] Address: Upson, Sandy, PO Box, 1453 Bisbee, AZ 85603, USA

2224. Usseglio-Polatera, P.; Bournaud, M.; Richoux, P.; Tachet, H. (2000): Biological and ecological traits of benthic freshwater macroinvertebrates: relationships and definition of groups with similar traits. *Freshwater Biology* 43: 175-205. (in English). ["1. Relating species traits to habitat characteristics can provide important insights into the structure and functioning of stream communities. However, trade-offs among species traits make it difficult to predict accurately the functional diversity of freshwater communities. [...]. 2. We used multivariate analyses to examine separately the relationships among 11 biological traits and among 11 ecological traits of 472 benthic macroinvertebrate taxa (mainly genera). The main objective was to demonstrate (1) potential trade-offs among traits; (2) the importance of the different traits to separate systematic units or functional groupings; and (3) uniform functional groups of taxa that should allow a more effective use of macroinvertebrate biological and ecological traits. 3. We defined eight groups and 15 subgroups according to a biological trait ordination [...]. 4. Seven ecological groups and 13 ecological subgroups included organisms with combinations of traits which should be successively more adequate in habitats from the main channel to temporary waters, and from the crenon to the potamic sections of rivers, and to systems situated outside the river floodplain. [...]. 5. Monitoring and assessment tools for the management of water resources are generally more effective if they are based on a clear understanding of the mechanisms that lead to the presence or absence of species groups in the environment. We believe that groups with similar relationships among their species traits may be useful in developing tools that measure the functional diversity of communities. [...] Group d consisted of a homogeneous assemblage of medium to large-sized insects dominated by Odonata." (in Appendix 1, 25 European odonate genera are classified) "Genera were often semivoltine and had a long life cycle duration. They used a variety of reproductive techniques. Adults were strong fliers. As a result, the dispersal was usually aerial. Egg and larval diapause could be used as resistance strategies. Crawlers and engulferers were dominant in the larvae, and their food was mainly represented by macroinvertebrates." (Authors)] Address: Usseglio-Polatera, P., EBSE, Université de Metz, BP 4116, F-57040 Metz Cedex 01, France. E-mail: usseglio@sciences.univ-metz.fr

2225. Vaillant, F. (2000): Les Odonates de Saint-Pierre-et-Miquelon. *Martinia* 16(3): 95-99. (in French with English summary). [On the occasion of a holiday at Saint-Pierre-et-Miquelon in July 1999, the dragonflies of this French territory located in the east of the Atlantic ocean, 25 km away from Newfoundland (Canada) were studied. The author observed 13 species, bringing the number of odonate species known from Saint-Pierre-et-Miquelon to 15.] Address: Vaillant, F., 41, rue Ausone, F-33000 Bordeaux, France

2226. Wallaschek, M. (2000): Zur Libellen-, Ohrwurm- und Heuschreckenfauna (Odonata, Dermaptera, Saltatoria: Ensifera et Coelifera) des Sonnensteins, des Ohmberges und des Speichers Teistungen im Landkreis Eichsfeld (Thüringen). *Thüringer Faunistische Abhandlungen* 7: 113-135. (in German with English summary). [11 species are reported; *Calopteryx splendens*



and *Cordulia aenea* are red listed species.] Address: Wallaschek, M., Agnes-Gosche-Str. 43, D-06120 Halle (Saale), Germany

2227. Wallaschek, M. (2000): Zur Libellenfauna (Odonata) des Großen Otterbaches (Saale-Orla-Kreis, Thüringen). *Thüringer Faunistische Abhandlungen* 7: 137-152. (in German with English summary). [In 1999, 26 odonate species are recorded from the Otterbach and some closely situated standing waters. The species are listed in different tabs according to their threat in Germany and Thüringen, their distribution in zoogeographic areas, some habitat parameters as vegetation and substrat, and according to their abundance. Special attention is given to *Calopteryx splendens*, *C. virgo*, *Coenagrion hastulatum*, *Ischnura pumilio*, *Cordulegaster boltonii*, *Orthetrum coerulescens*, and *Sympetrum pedemontanum*.] Address: Wallaschek, M., Agnes-Gosche-Str. 43, D-06120 Halle (Saale), Germany

2228. Weide, M. van der (2000): Libellen (Odonata). *Nieuwsbrief European Invertebrate Survey - Nederland* 30: 6. (in Dutch). [Short notice on the range extension of *Stylurus flavipes* in the Netherlands, and the status of the scheduled distribution atlas of the Netherlands Odonata.] Address: Weide, M. van der, Heidevenstraat 223, NL-6533 TP Nijmegen, The Netherlands

2229. Wendler, G. (2000): Steuerungsmechanismen bei Lauf und Flug von Insekten: ein Vergleich. *Verhandlungen des Westdeutschen Entomologen Tag 1999*: 23-57. (in German). [Introduction into neuronal regulation and function of muscles in walking and flying insects.] Address: Wendler, G., Zool. Inst. Universität Köln, Weyertal 119, D-50923 Köln, Germany. E-mail: g.wendler@uni-koeln.de

2230. Wendzonka, J. (2000): New localities of some species of dragonflies (Odonata) rare in central and eastern Poland. *Wiadomosci Entomologiczne* 19(2): 124. (in Polish). [*Aeshna affinis*, *Sympetrum pedemontanum*, *S. depressiusculum*; short description of the habitats] Address: not stated

2231. Westermann, F. (2000): Versauerung von Fließgewässern in Rheinland-Pfalz. *Untersuchungen von Bachoberläufen im Hunsrück 1983-1999 - Entwicklungen und Trends. Landesamt für Wasserwirtschaft - Bericht 206/00*. Mainz: 113 pp. (in German). [Brooks and creeks in the low range mountain Hunsrück, Rheinland-Pfalz, Germany suffered strongly from acidification caused by air pollution. Chemical parameters indicate that acidification has slightly reduced in the past years. Compared with so-called reference running waters which are not acidified macrozoobenthos of acidified running waters indicate a species deficit of 65%. Abundance of *Cordulegaster boltonii* is low in acid and not acid creeks.] Address: not stated

2232. Wildermuth, H. (2000): Alternative Taktiken bei der Weibchensuche von *Boyeria irene* (Odonata: Aeshnidae). *Libellula* 19(3/4): 143-155. (in German with English summary). ["The flight behaviour of the males over water was studied at two mountain streams in southern France. Three flight styles were discriminated: cruise flight, territorial flight and search flight. All flight modes are described in detail and in association with the structural features of the habitat. Only the territorial and search flights were considered sexually motivated. Both tactics were restricted to the same oviposition and

rendezvous sites, these being distributed nonhomogeneously along the watercourse. The shift from one to the other flight mode may be caused by male density. It is suggested that *B. irene* recognizes the rendezvous by bright linear structures with dark cavities along their border. This view is supported by the observation of an obviously deceived male that searched intensely for females along the border of a dirt road with structures similar to those at streams." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: wildermuth@swissonline.ch

2233. Wildermuth, H. (2000): Larvae of the Downy Emerald *Cordulia aenea* (L.) examine the space for eclosion with their hind-legs. *J. Br. Dragonfly Society* 16 (2): 59-62. (in English). ["The reactions to contact with the experimental obstacle during hind-leg circling were the same in all four larvae tested. None remained at the site but all descended and tried to find a new place. However, they did not return to the water but climbed up the same stick and repeated the procedure as before. Having found a new site for emergence, definite clinging and ecdysis ensued. No reaction was found when the pencil was held close to the larvae without physical contact. From the reactions of the larvae it is concluded that only physical contact of the circling hind-legs with the obstacle causes a larva to leave the site and search for a new one for ecdysis. Responses of larvae showed that visual cues were not dictating the behaviour observed. The findings support the hypothesis that an important function of the circling leg movements in emerging *C. aenea* larvae is to test the space around them for unhindered eclosion." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: wildermuth@swissonline.ch

2234. Wimmer, W.; Winkel, W. (2000): Libellen (Odonata) in der Nestlingsnahrung des Trauerschnäppers *Ficedula hypoleuca* (Aves). *Libellula* 19(3/4): 241-246. (in German with English summary). ["The odonate component in the diet of Pied Flycatcher nestlings was examined during 2000 in an afforested area near Lingen / Emsland, NW Germany, by using the neck-ring method and collecting food-remains from the nests. The component amounted to 0.29 % (neck-ring method) and 0.57 % (food remains in nests). *Enallagma cyathigerum*, *Pyrrhosoma nymphula*, *Erythromma najas* and *Gomphus vulgatissimus* were recorded as imagines and *E. cyathigerum* and *Sympetrum flaveolum* as larvae." (Authors)] Address: Walter Wimmer und Dr. Wolfgang Winkel, Institut für Vogelforschung, Außenstation Braunschweig, Bauernstr. 14, D-38162 Cremlingen-Weddel, Germany. E-mail: w.winkel@tu-bs.de

2235. Yeh, W.-C. (2000): Description of a new species of the genus *Oligoaeschna* Selys (Anisoptera: Aeshnidae) from Northern Thailand. *Zhonghua Kunchong* 20(3): 225-231. (in English with Chinese summary). [*Oligoaeschna pramoti* sp. nov., the second representative of the genus recorded from Thailand, is described, figured, and compared with a paratype male of *O. niisatoi*.] Address: Yeh Wen-Chi, Division of Forest Protection, Taiwan Forestry Research Institute, 53 Nan-Hai Rd., Taipei, Taiwan. E-mail: wcyeh@serv.tfri.gov.tw

2236. Yoshida, M. (2000): Predatory behavior of *Leucage magnifica* (Araneae: Tetragnathidae). *Acta Arachnologica* 49(2): 117-123. (in English). ["The predatory behaviour of *L. magnifica* was studied. This spe-

cies employed five predatory sequences: seize-pull out, bite-pull out, bite-wrap, wrap-bite, and wrap. Attack wrapping was used to subdue various types of prey such as grasshoppers, damselflies, ants and stinkbugs, which may be large and/or dangerous prey. Furthermore, living ants were more frequently immobilized by wrapping than dead ants. It suggests that attack wrapping is an effective method to immobilize large and/or dangerous prey." (Author)] Address: Yoshida, M., Department of Biotechnology, Faculty of Science and Engineering, Ritsumeikan University, Kusatsu, Shiga, 525-8577 Japan

## 2001

2237. Ak Libellen NRW (Menke, N.; Conze, K.-J.; Göcking, C.; Artmeyer, C.) (2001): Ergebnisse der landesweiten Libellenerfassung / Rasterkartierung in NRW von 1996 - 2000. AK Libellen in Nordrhein-Westfalen, c/o Conze, K.-J., LökPlan-Conze, Cordes & Kirst GmbH, Hedwigstr. 32b, D-59609 Anröchte, Germany. E-mail: lökplan@t-online.de: 79 pp. (in German). [Nordrhein-Westfalen, Germany; the results of the dragonfly survey of the mapping period 1996 to 2000 are presented on distribution maps. The distribution of 63 species is documented on the basis of 1/4 grid maps, in addition 10 species not traced in the mapping period are shortly discussed. They are briefly commented. The species are arranged in a tab. according to their grid frequency: *Ischnura elegans* occupies 71% of all grids, five species are only known from one locality in this federal state. This very useful up-to-date distribution atlas can be purchased for DM 10,- / Euro 5 from H.-J. Conze.] Address: see above

2238. Andress, R. (2001): Obituary: Terrence de Fonseka (1919 - 2000). *Notul. odonatol.* 5(7): 95. (in English). [Born Sept. 6, 1919 in Kalutara, Sri Lanka, passed away March 21, 2000, Finchley, UK] Address: Andress, R., 38 Capel Close, Whetstone, London, N20 0QU, UK

2239. Artiss, T. (2001): Structure and function of male genitalia in *Libellula*, *Ladona* and *Plathemis* (Anisoptera: Libellulidae). *Odonatologica* 30(1): 13-27. (in English). ["Male genitalia of 25 spp. are studied using scanning electron microscopy, and the structure of the fourth penile segment is described. [...] Species are categorized according to the morphology of the penis and inferred patterns of sperm removal. Type 1 taxa possess relatively large, broad, flat lateral lobes, and lack cornua, or possess cornua that are greatly reduced in size. These spp. are believed to displace sperm in the bursa copulatrix before depositing their own sperm, thereby gaining positional priority during oviposition. Type 2 spp. possess elongated lateral lobes and/or cornua. These taxa are believed to engage in a mixed strategy of sperm displacement and sperm removal. Optimization of these characters on a phylogeny of the 3 genera indicates that the Type 1 sperm displacement strategy is ancestral, and that the Type 2 strategy was subsequently derived within the majority of the *Libellula* s.s. taxa." (Author)] Address: Artiss, T, Lakeside School, 14050 1st Avenue NE, Seattle, WA 98125-3099, United States. E-mail: thomas.artiss@lakesideschool.org

2240. Bagworth, T. (2001): Reports from Coastal Stations - 2000: Calf of Man Bird Observatory. *Atropos* 12:

66-67. (in English). [United Kingdom, *Orthetrum coerulescens*] Address: not stated

2241. Bang, C. (2001): Constructed wetlands: high-quality habitats for Odonata in cultivated landscapes. *International Journal of Odonatology* 4(1): 1-15. (in English). [This study has investigated the potential constructed wetlands (CW) have as habitat for freshwater organisms, exemplified by Odonata. "Four different CWs in southern Norway were investigated, and larval Odonata species composition was related to a wide range of environmental variables. The material was ordinated using Detrended Correspondence analysis (DCA) and Canonical Correspondence analysis (CCA). All the CWs had high nutrient values and high diversities of aquatic plants. Of the 11 Odonata species found, the richest CW contained 10 species. During the study, one of the CWs was exposed to diazinon (an insecticide). Sun exposure and nutrient content were the most important variables determining species composition. The species that dominated the wetlands were typically euryoecious species, indicating harsh living conditions. Despite the high nutrient content, the results clearly indicate that CWs have an obvious role in pond habitat creation, especially in areas managed according to pesticide-free management." (Author)] Address: Bang, C., Syverudveien 80, N-1430 As, Norway. E-mail: christoferbang@hotmail.com

2242. Belle, J. (2001): Two species added to the list of Balinese Odonata, Indonesia. *Notul. odonatol.* 5(7): 94. (in English). [Bali, Indonesia; *Agrionemys pygmaea*, *Tholymis tillarga*] Address: Belle, J., Onder de Beumkes 35, NL-6883 HC Velp, The Netherlands

2243. Beynon, T. (2001): My best day. *Atropos* 12: 36-37. (in English). [Report from a 'dragonfly day' in Chartley Moss, Staffordshire, UK. (see OAS 2244)] Address: Beynon, T.G.; 34 Church Lane, Checkley, Stoke-on-Trent, Staffordshire ST10 4NJ, UK

2244. Beynon, T.G. (2001): Colonization by White-faced Darter *Leucorrhinia dubia* (Vander Linden) of the East-West Ditch at Chartley Moss NNR, Staffordshire, with notes on its status at other pools. *J. Br. Dragonfly Soc.* 17(1): 20-30. (in English). ["*L. dubia* has bred for many years at two pools on Chartley Moss. [...] A rising lens of peat plugged Dead Pine Gulch some years ago, and this has gradually become vegetated so that the amount of free water is now minimal, and it is likely that the *L. dubia* population here will soon become extinct. [...] A significant recent development has been the colonization by *L. dubia* of the largest water body on the Moss, the East-West Ditch" (draining ditch constructed in the 18th century and maintained the following years). "[...] Fewer than ten adults were recorded annually between the mid 1980s and 1995. The population has increased rapidly since the first proof of breeding in 1995. About 850 adults emerged in 1998, and a careful census during emergence in 1999 produced a minimum of 826, with a probable population of c. 1,240. [...]". A series of 19 dams were constructed between 1986 and 1989 to reverse the drying out of the Moss. After damming, most sections gradually became colonized by Sphagnum moss to a varying extent. "The colonization increased very rapidly in the summers of 1998 and 1999, so that with few exceptions most now have more than 90 per cent cover. It is noticeable that those with almost complete semi-submerged Sphagnum produce

far more emerging adults of *L. dubia* than clearer sections [...]". Systematic counts of exuviae and habitat parameters (length, temperature, Sphagnum cover) per section are documented in tabs and discussed in detail.] Address: Beynon, T.G.; 34 Church Lane, Checkley, Stoke-on-Trent, Staffordshire ST10 4NJ, UK

2245. Bogunski, G. (2001): Zusammenfassung entomologischer Daten vom NSG "Jahnsgrüner Hochmoor" im Hartmannsdorfer Forst. Mitteilungen Sächsischer Entomologen 53: 11-18. (in German). [Sachsen, Germany; 19 odonate species from a devastated bog are listed; *Lestes virens vestalis*, *Coenagrion hastulatum*, *Aeshna juncea*, *Libellula quadrimaculata*, and *Leucorhinia dubia* are remains from the formerly typical odonate fauna of the bog.] Address: Bogunski, G., Gartenstr. 10, D-08141 Reinsdorf, Germany

2246. Boudot, J.-P. (2001): Les Cordulegaster du Paléarctique occidental: identification et répartition (Odonata, Anisoptera, Cordulegastridae). *Martinia* 17(1): 3-34. (in French with English summary). [An illustrated identification key of most of the known European cordulegastid taxa is proposed and distribution maps of the species are presented.] Address: Boudot, J.-P., Centre de Pédologie Biologique, 17, rue Notre-Dame de Pauvres, B.P. 5, F-54501 Vandoeuvre-lès-Nancy, France. E-mail: boudot@cpb.cnrs-nancy.fr

2247. Bowers, J. (2001): Identification of Southern Darter *Sympetrum meridionale*. *Atropos* 12: 79. (in English). [April 26, 2000, Lesbos, Greece; a black triangle on the synthorax is documented on a colour photo and discussed as a field identification character for general individuals of the species] Address: Bowers, J., 6 Ashwood Terrace, Leeds, West Yorkshire, L56 2EH, UK

2248. Bowman, N. (2001): Reports from Coastal Stations - 2000: Eccles-on-Sea, Norfolk. *Atropos* 12: 60-61. (in English). [United Kingdom; 3 odonate species are recorded] Address: not stated

2249. Brooks, S.J.; Jackson, K.A. (2001): The Odonata of Bioko, Republic of Equatorial Guinea, with the description of fan-shaped setae on early instar *Libellulidae* larvae. *Odonatologica* 30(1): 29-38. (in English). [A checklist of 48 spp. recorded from the island of Bioko (3°30'N 8°40'E), based on historical records compiled by Dr Elliot Pinhey and augmented by a collection made in March-April 1999, is presented, together with notes on the distribution of the species on the island. The Odonata fauna apparently comprises 2 elements, an upland fauna which includes 6 spp. that only occur above 500 m, and a lowland fauna of 17 spp., none of which occurs above 500 m. A further 13 spp. have been found in both lowland and upland sites. There are insufficient published data on the remaining 13 spp. to assign them to either of these faunistic elements. In addition, unique fan-shaped setae on the dorsum of the head, thorax and abdomen of early instar libellulid larvae are described. These setae are thought to be mechano-receptors that are held above the sediment to detect the presence of prey and current flow while the larva remains buried." (Authors)] Address: Brooks, S.J., Entomology, The Natural History Museum, Cromwell Road, London, SW7 5BD, United Kingdom

2250. Brunelle, P.-M. (2001): Status of *Somatochlora brevicincta* (Odonata: Corduliidae), the Quebec Eme-

rald, in North America. *IDF-Report* 3(1/2): 1-8. (in English). [*Somatochlora brevicincta* is one of the rarest odonates in Canada, and one of the most recently described. In the past few years considerable efforts were made to discover new localities of the species. This paper presents in detail the current known distribution, *S. brevicincta* is now known cross-continently over ca. 66 degrees of longitude (54°W in Newfoundland to 120°W in British Columbia), and the known latitude range is 8°75' (54°N in British Columbia to 45°25'N in Maine). In addition it provides information on phenology and habitat.] Address: Brunelle, P.-M., Nova Scotia Museum, 1747 Summer Street, Halifax, Nova Scotia, Canada, B3H 3A6. E-mail: as849@chebucto.ns.ca

2251. Burmeister, E.-G. (2001): Insekt des Jahres 2001: Der Plattbauch (*Libellula depressa* L., 1785). *Nachrichtenblatt der bayerischen Entomologen* 50(1/2): 68. (in German). [*L. depressa* was declared in Germany as the "Insect of the year". This article provides some general information on this dragonfly species and the bioindicatorial reasons for its choice.] Address: Burmeister, E.-G., Zoologische Staatssammlung, Münchenstr. 21, D-81247 München, Germany

2252. Busuttil, S. (2001): Lesser Emperor *Anax parthenope* at Dungeness in 2000. *Atropos* 12: 77. (in English). [United Kingdom; documentation of the records of *A. parthenope*] Address: Busuttil, S., Dungeness RSPB Reserve, Boulderwall Farm, Dungeness, Romney Marsh, Kent, UK

2253. Busuttil, S. (2001): Red-veined Darters *Sympetrum fonscolombi* (Selys) at Dungeness RSPB Reserve (1993 to 2000). *Atropos* 12: 24-27. (in English). [2000 proved to be the year with highest abundance of *S. fonscolombii* in Dungeness Reserve, Kent, UK. The recent history of this species in the locality is outlined. In addition the habitat is described and conservation management measures are discussed. Additional records of the species are reported from a locality 30 km north-east of Dungeness: Samphire Hoe.] Address: Busuttil, S., Dungeness RSPB Reserve, Boulderwall Farm, Dungeness, Romney Marsh, Kent, UK

2254. Cham, S. (2001): The status of Small Red-eyed Damselfly *Erythromma viridulum* (Charpentier) in the British Isles. *Atropos* 12: 7-9. (in English). [In 1999 *E. viridulum* was discovered breeding in Essex, UK. In summer 2000 further discoveries provided the opportunity to follow the progress of colonisation. The new records are documented and mapped. In a figure the flight period of *Erythromma najas* is compared with that of *E. viridulum*.] Address: Cham, S., 45 Weltmore Road, Luton, Bedfordshire LU3 2TN, UK

2255. Chelmick, D.G. (2001): Larvae of the genus *Aeshna* Fabricius in Africa south of the Sahara (Anisoptera: Aeshnidae). *Odonatologica* 30(1): 39-47. (in English). ["9 species have been recorded from sub-Saharan Africa, of which only 5 species have been described as larvae. A more complete larval description of *A. scotias* Pinhey from Cameroon and a review of the current level of information on the larvae of the genus in the region, are provided here, and the known larvae are keyed." (Author) *Aeshna ellioti*, *A. rileyi*, *A. subpupillata*, *A. minuscula*] Address: Chelmick, D.G., 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK. E-mail: david.chelmick@mdagroup.com



2256. Clancy, S. (2001): Reports from Coastal Stations - 2000: Dungeness area, Kent. *Atropos* 12: 55-56. (in English). [United Kingdom; *Anax parthenope*, *Sympetrum fonscolombii*] Address: not stated
2257. Clausnitzer, V. (2001): Notes on the species diversity of East African Odonata, with a checklist of species. *Odonatologica* 30(1): 49-66. (in English). ["Preliminary considerations concerning the species diversity of East African dragonflies and the problems of identifying and using such diversity figures are given. For a detailed approach the basic problem is lack of sufficient data in that area. A checklist of species recorded so far for East Africa is given. Looking at pure species number in relation to area, Uganda is definitely more important for dragonfly diversity than its eastern neighbouring countries. If taking endemism and taxonomic singularity into account, the coastal forests of Tanzania and Kenya are very important too." (Author)] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: wesche@mail.uni-marburg.de
2258. Dewick, S. (2001): Problems at Small Red-eyed Damselfly *Erythromma viridulum* Site. *Atropos* 12: 74- (in English). [Verbatim: " In *Atropos* 9: 3-4 Richard Gerussi and I gave an account of our discovery of the first British colonies of Small Red-eyed Damselfly *Erythromma viridulum*. We were concerned about the vulnerability of the sites and explained that until such time as a foothold in this country appears more secure, the authors have decided to withhold information that could identify the existing localities. It is hoped that readers will understand and respect our decision. Acts of selfishness and stupidity are sadly not unknown in the world of insect recording, but nothing could have prepared me for what was to follow. From 30 July 2000, Curry Lane was invaded by in excess of 200 twitchers who had located a previously unknown colony at New House, Mill End, Bradwell. Our private lane just happened to be a convenient way to reach it! As if mass trespass was not enough, those approached reacted with rudeness and defiance, and bizarre messages appeared on the internet accusing us of obstructing a public footpath. Conservationists face an uphill struggle to convince many farmers to support wildlife the kind of behaviour seen at Bradwell does nothing to help our cause!"] Address: Stephen Dewick, Curry Farm, Bradwdl-on-Sea, Southminster, Essex, CMO 7HL, UK
2259. Dewick, S. (2001): Reports from Coastal Stations - 2000: Bradwell-on-Sea, Essex. *Atropos* 12: 56-57. (in English). [United Kingdom; a list of 15 odonate species is communicated including *Brachytron pratense*. 19 specimens of *Sympetrum* were taken at light.] Address: not stated
2260. Di Domenico, M.; Carchini, G.; Samways, M.J.; Whiteley, G. (2001): Description of the last instar larva of *Chalcostephia flavifrons* Kirby, 1889 and comparison with other *Brachydiplactinae* (Anisoptera: Libellulidae). *Odonatologica* 30(1): 97-101. (in English). ["The morphology of this African sp. is illustrated and described. A comparison is made with other known *Brachydiplactinae*, the South American *Elga leptostyla* and *Nephepeltia phryne* and the African *Hemistigma albipuncta*. The group is a very heterogenous one in terms of larval morphology." (Authors)] Address: Carchini, G., Dipartimento di Biologia, Università "Tor Vergata", Viale della Ricerca Scientifica, I-00133 Roma, Italy. E-mail: ar-
- chini  
@utovrm.it
2261. Dijkstra, K.D.; Koese, B. (2001): Dragonflies of the Prioyat National Park, Belarus (Odonata). *Opusc. zool. flumin.* 192: 1-20. (in English). ["Pripyat National Park in Gomelskaya Oblast, southern Belarus was studied as a reference for conservation of river systems in Western Europe. A total of 43 odonate species is reported. *Sympecma paedisca*, *Coenagrion armatum*, *Ischnura pumilio*, *Pyrrhosoma nymphula*, *Aeshna subarctica*, *Anax imperator*, *Cordulegaster boltonii*, *Somatochlora arctica*, and *Leucorrhinia albifrons* are recorded from the Oblast for the first time. Records of " *Leucorrhinia pectoralis*, " *Lestes barbarus* and *Nehalennia speciosa* are also of interest. Information on ecology and larval habitats is provided for many spp. Early or mass emergence in relation to climate and habitat structure is discussed for *A. subarctica*, *N. speciosa*, *S. arctica* and other bog species. Peculiarities in habitat choice of *C. armatum*, *I. elegans*, and *P. nymphula* are also stipulated." (Authors) Of some interest is the observation that villagers in the area harvest *Stratiotes aloides* as pig fodder. *S. aloides* nearly exclusively is used by *Aeshna viridis* for egg deposition. This plant overgrows quite fast ditches, then becoming unsuitable as habitat for *A. viridis*. The villagers unintentionally maintain the larval biotops, which would otherwise disappear with progressing succession of the vegetation.] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl
2262. Dijkstra, K.-D.; Kalkman, V.J. (2001): Early spring records of Odonata from southern Turkey, with special reference to the sympatric occurrence of *Crocothemis erythraea* (Brullé) and *C. servilia* (Drury) (Anisoptera: Libellulidae). *Notul. odonatol.* 5(7): 85-88. (in English). [Odonata from eight localities - in most cases situated in the Silifke region (Göksu-Delta) - collected from 29 March to 9 April 1999 are presented. They are among the earliest ever published for Turkey. 22 species are recorded; the records of *Lestes macrostigma* and *Anax immaculifrons* are noteworthy. *Crocothemis erythraea* and *C. servilia* were found emerging from the same ditch; notes on their identification in teneral state and as exuviae are added.] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl
2263. Dijkstra, K.-D.; Cordero Rivera, A.; Andrés, J.A. (2001): Repeated predation of Odonata by the hornet *Vespa crabro* (Hymenoptera: Vespidae). *International Journal of Odonatology* 4(1): 17-21. (in English). ["Predation of aggregated, ovipositing tandems of *Sympetrum sanguineum* and *S. vulgatum* by the hornet *Vespa crabro* was observed in Belarus. The same species of hornet was seen killing territorial males and copulating females of *Calopteryx haemorrhoidalis* in Italy. Numerous remains of these odonates at the oviposition sites suggest that attacks occur frequently. A short review of vespid predation of Odonata is given. Species of the genera *Vespa* and *Vespula* have often been reported as predators of single, emerging and ovipositing odonates, taking prey as big as large *Aeshna* species. Odonata may form an important source of protein for *V. crabro* in parts of its range. Such predation may contribute strongly to odonate mortality locally. The disturbing effect may also disrupt opportunity for reproductive be-

haviour." (Authors)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

2264. Field, R. (2001): Reports from Coastal Stations - 2000: Skomer Island NNR, Pembrokeshire. *Atropos* 12: 67-68. (in English). [United Kingdom, eight odonate species are documented] Address: not stated

2265. Finck, P. (2001): Untersuchungen des Makrozoobenthos am Strom zwischen Boitzenburg und Prenzlau (Uckermark). *Naturschutz und Landschaftspflege in Brandenburg* 10(1): 36-42. (in German). [Brandenburg, Germany; The survey of the 'most important' creek system in Uckermark, the Strom, conducted between 1993 and 1995, yielded in a list of macrozoobenthos including *Calopteryx splendens* and *C. virgo*.] Address: Finck, P., Bundesamt für Naturschutz, Abt. Biotopschutz und Landschaftsökologie, Konstantinstr. 110, D-53179 Bonn, Germany

2266. Gossum, H. van; Stoks, R.; De Bruyn, L. (2001): Discriminative mate choice in relation with female maturation in *Ischnura elegans* (Odonata: Coenagrionidae). *International Journal of Odonatology* 4(1): 83-91. (in English). ["It is often assumed that males do not choose among females because competition for partners is high and male mating costs are low. Nevertheless, this assumption does not always hold. In some species duration of copulation is long, possibly causing a limitation on the lifetime number of matings for males. In this case we expect males to discriminate among females differing in quality. We first discuss quality differences between immature and mature females. Second, we test whether males of the zygopteran *Ischnura elegans* discriminate between immature and mature females. The hypothesis was examined by performing binary choice experiments in small cages in three different populations. To examine possible mechanisms for discrimination we excluded behavioural differences in one of the two experiments by using dead females. The results show that males of *I. elegans* prefer mature to immature females and that this choice is probably based upon a difference in body coloration." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

2267. Gossum, H. van; Stoks, R.; De Bruyn, L. (2001): Reversible frequency-dependent switches in male mate choice. *Proceedings of the Royal Society Biological Sciences Series B* 268(1462): 83-85. (in English). ["Current sexual-selection theories predict that mating should occur preferentially with the highest-quality partner, and assume that for distinguishing among potential mates the choosy sex applies an internal representation of the characteristics of the desired mate, i.e a template. Binary choice experiments were performed to test male mate choice between two different female colour morphs in the damselfly *Ischnura elegans*. Choice experiments were conducted before and after an habituation period, during which males were exposed to only one female colour morph. Given the choice between the two female morphs, males did exhibit a choice for the most recently experienced female morph. This is the first evidence for a reversible switch in mate choice in a frequency-dependent way. In contrast with previous studies on mate choice, template

formation in male *I. elegans* seems not to be based on quality. Switching mate choice in a frequency-dependent manner, choosing the most common morph, probably allows males to minimize their search efforts and to maximize fitness." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020, Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

2268. Hämäläinen, M.; Karube, H. (2001): Two new species of Caloptera damselflies from southern Vietnam (Zygoptera: Chlorocyphidae, Euphaeidae). *Odonatologica* 30(2): 209-215. (in English). ["*Rhinocypha seducta* sp. n. (holotype male: southern Vietnam, Lam Dong prov., nr Di Linh, 26-IV-1998) and *Euphaea hirta* sp. n. (holotype male: southern Vietnam, Lam Dong prov., Bao Loc, 14-VI-1996) are described and illustrated, and their taxonomic status is discussed. The latter species co-occurs with *E. guerini* Rambur and *E. masoni* Selys." (Authors)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

2269. Hunter, I. (2001): Reports from Coastal Stations - 2000: Elms Farm, Icklesham, East Sussex. *Atropos* 12: 53-54. (in English). [United Kingdom; *Aeshna juncea*, *Sympetrum flaveolum*, *S. danae*, *Libellula quadrimaculata*.] Address: not stated

2270. Inoue, K.; Yokota, H. (2001): *Somatochlora taiwana* spec. nov., a new dragonfly from Taiwan (Anisoptera: Corduliidae). *Odonatologica* 30(2): 217-221. (in English). ["The new sp. is described and illustrated from a single male (holotype): Taiwan, Hsinchu Hsien, Chienshih, nr Yuan Yang Lake, alt. 1670 m, 11-VIII-2000; to be deposited at Taiwan Forest Res. Inst., Taipei. It is compared with *S. dido* Needham." (Authors)] Address: Inoue, K., 5-9 Fuminosato 4-chome, Abenoku, Osaka 545, Japan

2271. Jenkins, D.K. (2001): Population studies of the Southern Damselfly *Coenagrion mercuriale* (Charpentier) in the New Forest. Part 8. Short range dispersal. *J. Br. Dragonfly Society* 17(1): 13-19. (in English). ["In the New Forest there is little evidence for establishment of new colonies over the past 50 years. The few new sites discovered are probably the result of more thorough coverage by recorders and are offset by a similar number of sites which have been lost through prolonged summer drought or habitat change. It has been established that *C. mercuriale* regularly move short distances along the same watercourse (Hopkins & Day, 1997), but are reluctant to pass sections of unsuitable habitat (Jenkins, 1998). Systematic attempts with marked insects to prove long distance dispersal have been disappointing. At Crockford in the New Forest, only two males have been recovered away from the marking area, both at distances of approximately 1km on, or near, the same stream (Hopkins & Day, 1997; Thompson & Purse, 1999). [...] Considering the high number of *C. mercuriale* marked, as well as the potential for dispersal arising from both weather conditions and site topography, it is quite remarkable that only one individual was confirmed as crossing the short distance between the ditches. This does, however, fit well with previous observations. [...] However, on 6 June 1986 and 12 June 1994, large numbers of male *C. mercuriale* were seen at distances of up to 0.5km west and east of Upper Crockford Stream respectively. Although this

might suggest a coordinated maiden flight and the possibility that most dispersal occurs at this stage, mass movement appears to be a rare phenomenon. At Rooks Bridge, a relatively high proportion of unmarked insects appeared each day, but none were found more than 3-4m from the water." (Author)] Address: Jenkins, D.K., 7 Lakewood Road, Ashurst, Southampton, SO40 7DH, UK

2272. Kemp, R.G.; Butler, S.G. (2001): Some dragonfly records from Phewa Tal, Pokhara, Nepal with notes on *Philoganga montana* (Selys) (Zygoptera: Amphipterygidae). *Notul. odonatol.* 5(7): 88-91. (in English). [Between the 22nd May and 27th May, 2000, dragonfly observations were made at the south-east end of the lake Phewa Tal, Pokhara, Nepal in the vicinity of the Fish Tail Lodge Hotel complex. Of the 20 species observed at the locality, *Gomphidia t-nigrum* is recorded for the first time from Nepal. *Philoganga montana* appears to be an exclusively arboreal insect during the adult stage. Observations on *Calicnemia nipalica*, *C. pulverulans*, *Epophthalmia frontalis* and *Macromia flavicolorata* are commented.] Address: Kemp, R.G., "Tree Tops" 5 Mailings Close, Ackleton, Wolverhampton, WV6 7WB, UK

2273. Kitt, M. (2001): Wiederaufnahme von Grabenräumungen zur Wiederherstellung seltener Lebensgemeinschaften? *Pollichia-Kurier* 17(2): 26-28. (in German). [Results of a ditch cleaning management system to restore a typical vegetation and fauna are reported. The measures are conducted in the Special protected area of the "Lauterniederung", Rheinland-Pfalz, Germany, a part of the European network NATURA 2000. Special emphasize is given to *Coenagrion ornatum*, *C. mercuriale*, and *Cordulegaster boltonii*.] Address: Kitt, M., Raiffeisenstr. 39, D-76872 Minfeld, Germany

2274. Knill-Jones, S. (2001): Reports from Coastal Stations - 2000: Isle of Wight. *Atropos* 12: 49-50. (in English). [United Kingdom; *Erythromma viridulum* and *Sympetrum fonscolombii* are communicated.] Address: not stated

2275. Kohler, H.-U. (2001): Odonate records from the Island of Mahé, the Seychelles. *Notul. odonatol.* 5(7): 94, (in English). [10 of 19 species known to occur on Mahé were evidenced in early May 2000.] Address: Kohler, H.-U., Tulpenweg 107, CH-3098 Köniz, Switzerland

2276. Kuratorium Insekt des Jahres (2001): Insekt des Jahres 2001: Die Plattbauch-Segellibelle. Leaflet: 6 pp. (in German). [In 2001 *L. depressa* was selected as "Insect of the Year". The leaflet gives a general introduction into dragonflies as an example with *L. depressa*, and directed to the more general reader. Special emphasize is given to the bioindicatorial value of the species for waters in an early succession status and the legal protection of Odonata in Germany.] Address: Deutsches Entomologisches Institut, PF 100238, D-16202 Eberswalde, Germany. E-mail: DEI@DEI-eberswalde.de

2277. Leipelt, K.G.; Suhling, F. (2001): Habitat selection of larval *Gomphus graslinii* and *Oxygastra curtisii* (Odonata: Gomphidae, Corduliidae). *International Journal of Odonatology* 4(1): 25-34. (in English). ["The microdistribution patterns of larval *Gomphus graslinii* and *Oxygastra curtisii* in three rivers in southern France we-

re studied. While *G. graslinii* was caught mainly in sandy reaches covered with leaf litter, *O. curtisii* was found almost exclusively clinging to alder roots at the river margins. Preferences of habitat structure were determined from habitat selection experiments under outdoor conditions with four types of substrates: (I) gravel, (II) sand, (III) sand covered with leaves, and (IV) alder roots. *G. graslinii* preferred substrate types III and II over I and IV; *O. curtisii* preferred IV and III over I and II." (Authors)] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

2278. Marinov, M. (2001): Commented Bibliography of the Bulgarian fauna of the Odonata. IDF-Report 3(1/2): 17-45. (in English). [There are 108 years of history for Bulgarian odonatology. The first material was published by Hristovitch in 1892. Many scientists have since contributed to the understanding of the Bulgarian dragonfly fauna. A total of 135 articles dealing with the dragonfly fauna of Bulgaria were found during the literature survey. All papers are listed and - in some cases critically - annotated.] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mgmarinov@yahoo.com

2279. Marinov, M. (2001): *Somatochlora borisi* spec. nov., a new European dragonfly species from Bulgaria (Anisoptera: Corduliidae). IDF-Report 3(1/2): 9-16. (in English). [*Somatochlora borisi* n. sp. is described and depicted. Short ecological and behavioural notes from the type locality are given. Holotype: 1 male, Deimin dere river (41°26'N 25°54'E) near the village of Byal Gradetz, Eastern Rhodopes mountain, S Bulgaria, 20 May 2000. Paratypes: 3 males, same locality, one 20 May 1999, one 20 May 2000 and one 22 June 2000. Holotype and paratypes are deposited in the National Museum of Natural History in Sofia. One paratype is deposited in the collection of Dr. H. Wildermuth, Rüti, Switzerland.] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mgmarinov@yahoo.com

2280. Marinov, M. (2001): The genus *Somatochlora* Selys in Bulgaria. IDF-Report 3(1/2): 46-53. (in English). [With an IDF grant M. Marinov studied the distribution of the genus *Somatochlora* in Bulgaria by reviewing museums collections and conducting field work. The results of this study are published in this paper. The distribution of four of the seven members of the genus known to occur in Europe are listed in a tab, discussed, and mapped: *Somatochlora metallica*, *S. meridionalis*, *S. flavomaculata*, and *S. borisi*.] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mgmarinov@yahoo.com

2281. Marinov, M. (2001): The *Orthetrum coerulescens* complex in Bulgaria (Odonata: Libellulidae). *International Journal of Odonatology* 4(1): 35-40. (in English). ["Although there are many records of *Orthetrum coerulescens* in Bulgaria, the presence of the nominotypical subspecies is doubtful. A critical analysis of all specimens available revealed that they belong either to *O. c. anceps* or to intermediate forms, but not to *O. c. coerulescens*. The latter taxon is therefore omitted from the Bulgarian species list, bringing the number of recorded species to 66." (Author)] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mgmarinov@yahoo.com



2282. Martens, A. (2001): Oviposition of *Coenagrionemis reuniensis* (Fraser) in volcanic rock as an adaptation to an extreme running water habitat (Zygoptera: Coenagrionidae). *Odonatologica* 30(1): 103-109. (in English). ["The sp. inhabits streams and rivers in the mountain forests of the Indian Ocean of La Réunion. Because of heavy seasonal rainfalls and steep inclines, there are drastic changes of water level. As a consequence, no water plants, roots or wet driftwood at all are available for oviposition. The sp. seems to be well adapted to this habitat: females oviposit into wet soft and porous lava stones. The closely related *C. insularis* and *C. rufipes* inhabit streams and rivers on Mauritius, where there are less extreme conditions. Both spp. deposit eggs in plant tissue." (Author)] Address: Martens, A., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: andreas.martens@tu-bs.de
2283. Mauersberger, R. (2001): *Orthetrum brunneum* (Fonscolombe, 1837) und *Orthetrum coerulescens* (Fabricius, 1798) wieder im Nordosten Deutschlands (Odonata: Libellulidae). *Märkische entomologische Nachrichten* 3(1): 29-32. (in German with English summary). [Germany, Brandenburg, Lychen; *Orthetrum coerulescens* and *O. brunneum* - both rare in northeastern Germany - were observed as pioneer colonizers of a restored spring swamp. Also the well known pioneer species *Ischnura pumilio* and *Libellula depressa* co-occurred.] Address: Mauersberger, R., Waldstr. 4, D-16278 Steinhöfel, Germany
2284. May, M.L.; Corbet, P.S. (2001): Occurrence and taxonomic significance of a palpal spine in larvae of *Enallagma* and other genera (Odonata: Coenagrionidae). *International Journal of Odonatology* 4(1): 41-49. (in English). ["A small inconspicuous spine, first detected at the base of the distal-most seta on each labial palpus of early stadia of two species of *Enallagma*, is reported to occur in final-stadium (F-0) larvae of Palearctic and Nearctic *E. cyathigerum*, in F-0 of 31 other Nearctic species of *Enallagma* and in F-0 of three other coenagrionid genera among 11 inspected for this character. The spine is absent from F-0 of eight other coenagrionid genera, including *Coenagrion* and *Ischnura*. It is also lacking from F-0 of the two species of Afrotropical *Enallagma* that we examined, a discovery that suggests the latter may not be closely related to Nearctic and Palearctic species. In European populations such a spine occurs in the first few stadia of certain Coenagrion species but persists to F-0 only in *E. cyathigerum*. We re-emphasize the potential value of this spine as a means of distinguishing at least the last three stadia of *E. cyathigerum* from those of other coenagrionid genera in Europe, and very probably from *Coenagrion* and *Ischnura* everywhere." (Authors)] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu
2285. Nakott, J. (2001): Horror am Baggersee. Die Ur-libelle *Meganeuropsos* - lebensgroß rekonstruiert. *National Geographic* (German edition) April 2001: 9-11. (in German). [Short report on the efforts of Werner Kraus, University Aachen, Germany to reconstruct *Meganeuropsis permiana* after a fossil wing from Elmo, Kansas, USA and parts of bodies from additional localities scattered above the globe. The reconstruction was realised in cooperation with Carsten Brauckmann, University Clausthal-Zellerfeld. The model is presented to the public in the palaeontological collection of the University Clausthal-Zellerfeld, Germany.] Address: not stated
2286. O'Neill, G.; Paulson, D.R. (2001): An annotated list of Odonata collected in Ghana in 1997, a checklist of Ghana Odonata, and comments on West African odonate biodiversity and biogeography. *Odonatologica* 30(1): 67-86. (in English). ["Collections were made at 8 localities in southern Ghana during the summer of 1997. Three regions were sampled: coastal savanna, wooded savanna, and rainforest. 71 spp. were collected, 24 of which are new for the country, bringing the Ghana list to 123 spp. A list of spp. known from the country is included. *Trithemis dejouxi* Pinhey, 1978, is raised to specific rank. Individual variation in *Phaon iridipennis* and *Palpopleura lucia* is quantified. West African Odonata biodiversity and biogeography are discussed." (Authors)] Address: O'Neill, G., 14 Lehigh Ave., Wilmington, DE 19805, USA
2287. Orr, A.G.; Tol, J. van (2001): *Pseudagrion lalakense* spec. nov. from Borneo with notes on its ecology (Odonata: Coenagrionidae). *International Journal of Odonatology* 4(1): 51-56. (in English). ["*Pseudagrion lalakense*, a new species of coenagrionid from Borneo, is described and figured. The species is phylogenetically close to the very widespread and eurytopic *P. microcephalum* and the two fly together. [...] *P. lalakense* is highly stenotopic, being known only from highly acidic black-water marsh in two localities in Brunei where it is associated with the sedge *Hydrolytha*. Activity patterns of *P. lalakense* appear similar to those of *P. microcephalum* but the two species differ in their preferred perches and oviposition sites. A list of seven species of other odonates flying in the same habitat is provided." (Authors). Holotype: male, Brunei, Belait District, Luagan Lalak, 17-04-1994, RMNH; paratypes, same locality, different sampling dates, RMNH, Cambridge University, Zool. Dept Mus., UBD Biology Dept Mus., A.G. Orr collection.] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au
2288. Parfitt, A. (2001): Reports from Coastal Stations - 2000: Minsmere RSPB Nature Reserve, Suffolk. *Atropos* 12: 59-60. (in English). [United Kingdom; 14 odonate species are recorded, but not all are listed] Address: not stated
2289. Parr, A. (2001): Another record of Green Darner *Anax junius* (Drury). *Atropos* 12: 28-29. (in English). [Photographs of the species taken at Penlee NR, Rame Head, Cornwall, UK (September 11/12, 1998) turned out to be of two different specimens, and not as supposed of one individual.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK
2290. Parr, A. (2001): Migrant dragonflies in 2000 including recent decisions and comments by The Odonata Record Committee. *Atropos* 12: 16-19. (in English). [The following species are treated: *Calopteryx splendens*, *Ceriagrion tenellum*, *Erythromma viridulum*, *Aeshna mixta*, *A. grandis*, *Anax imperator*, *A. parthenope*, *Libellula quadrimaculata*, *Crocothemis erythraea*, *Sympetrum striolatum*, *S. fonscolombii*, and *S. flaveo-*

lum.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

2291. Patton, S. (2001): Reports from Coastal Stations - 2000: Selsey Peninsular, West Sussex. *Atropos* 12: 50-51. (in English). [United Kingdom; *Brachytron pratense*, *Aeshna mixta*, *A. juncea*, *Sympetrum sanguineum*] Address: not stated

2292. Paulson, D.R. (2001): Recent Odonata records from southern Florida - effects of global warming? *International Journal of Odonatology* 4(1): 57-69. (in English). ["A brief Odonata survey in southern Florida, USA, in January 2000 resulted in the discovery of two new species, *Chrysobasis lucifer* and *Nehalennia minuta*, for the USA and established populations of two other species, *Tholymis citrina* and *Tramea calverti*, that had been considered vagrants. Flight seasons of six additional species were extended. These records are discussed in light of the predicted effects of global warming." (Author)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

2293. Pellow, K. (2001): Observations of the Red-veined Darter *Sympetrum fonscolombi* (Selys) at Bake Lakes in Cornwall during 2000. *J. Br. Dragonfly Soc.* 17 (1): 31-32. (in English). ["Following successful breeding at Bake Lakes each summer since 1997, regular visits were again made to the site in 2000 to monitor the breeding activity of *S. fonscolombii*. Between 29 April and 21 October 2000, a total of 48 visits were made. In comparison to 1999, substantially more adult *S. fonscolombii* were encountered during the early summer of 2000, resulting in a proportionately higher number of emerging dragonflies later in the season. However, in comparison to 1998, far fewer dragonflies emerged [...]" (Author) A lot of phenological data on flight season are communicated too.] Address: Pellow, K., Mount Pleasant Bungalow, Botus Fleming, Cornwall PL12 6NQ, UK

2294. Piper, W.; Krüner, U. (2001): *Libellennachrichten*. *Libellennachrichten* 5: 1-20. (in German). [Vol. 5 of the newsletter of the Society of German Speaking Odonatologists contains information on the 20th meeting to be held in Görlitz, announcements of meetings of other European odonatological societies, reviews of odonatological publications and new theses on Odonata, and information on "Dragonflies and Music", "Dragonflies and Literature", and "Dragonflies and Art".] Address: Krüner, U., Gelderner Str. 39, D-41189 Mönchengladbach, Germany

2295. Preddy, S. (2001): Identification workshop: The common *Aeshna* hawkers. *Atropos* 13: 44-48. (in English). [Identification characters of *Aeshna mixta*, *A. cyanea*, and *A. juncea* are discussed; colour plates present the species in both sexes and in so called colour forms which are age- or temperature related.] Address: Preddy, S., 94 Winchester Road, Bristol, BS4 3NL, UK. E-mail: Steve.Preddy@blueyonder.co.uk

2296. Ramírez, A.; Pringle, C.M. (2001): Spatial and temporal patterns of invertebrate drift in streams draining a Neotropical landscape. *Freshwater Biology* 46: 47-62. (in English). ["1. Invertebrate drift in streams draining a tropical landscape in Costa Rica was studied to assess differences in assemblage composition above and below a major gradient break in geomorphic land-

form and to assess temporal patterns of drift in lowland reaches below the gradient break. The gradient break (~ 50 m a.s.l.) is the point at which the foothills of the Costa Rican Cordillera Central (piedmont) merge with the Caribbean coastal plain (lowlands). 2. Spatial patterns were assessed along two streams by sampling drift over 24 h once a month for 3 months in both the piedmont (90 m a.s.l.) and lowlands (30 m a.s.l.). Temporal patterns of drift were assessed through monthly diel sampling of three lowland sites over 8-10 months, encompassing both 'dry' (< 400 mm precipitation per month, November to May) and wet (July to October) seasons. 3. Drift composition was insect dominated in piedmont sites and larval shrimp dominated in the lowlands. Percent similarity of assemblages between piedmont and lowland sites was low (range 26-43%) because of high larval shrimp densities in lowland versus piedmont sites. 4. Drift densities were higher during night than day, with peaks at sunset on all dates and at all sites. Diel patterns in drift agree with previous observations for the study area and support the 'risk of predation' hypothesis. 5. Analysis of monthly patterns in lowland sites showed high variability in drift densities; however, all major taxa were found every month. Overall, there was a trend for high invertebrate densities during the 'dry' season but these trends were not significant. 6. Observed changes in drift composition support the concept of river zonation, which predicts a change in community composition along the stream continuum due to geomorphic features. Drift at lowland sites below the gradient break was dominated by shrimps, which are linked to marine environments via their migratory behaviour." (Authors) Drift densities of Odonata are measured on the family level.] Address: Ramírez, A., Inst. Tropical Ecosystem Studies, Univ. of Puerto Rico, P.O. Box 363682, San Juan PR 00936-3682, Puerto Rico. E-mail: aramirez@sunites.upr.clu.edu

2297. Relyea, R. (2001): The relationship between predation risk and antipredator responses in larval anurans. *Ecology* 82(2): 541-554. (in English). ["Organisms that produce alternative, nondiscrete phenotypes in response to environmental conditions are expected to alter their phenotypes in relation to the degree of environmental change. This idea has been applied to the evolution of antipredator responses by prey, in which it has been hypothesized that prey should respond more strongly to predators that pose greater mortality risk. In a companion paper, I quantified predator-induced behavioral and morphological responses in six species of larval anurans across five different predator environments and found that these responses were prey- and predator-specific. In the present study, I addressed whether the responses were related to the level of predation risk posed by each of the predators. Within each prey species, I found that different predators posed different levels of predation risk; within each predator species, different prey species experienced different levels of risk. The differences in predation risk could be understood mechanistically after I quantified differences among predators in their ability to capture, handle, and consume prey and differences among prey in behavior and morphology. Using multivariate analyses, I found that predation risk had no significant effect on how a given prey responds to predators, although there were significant univariate behavioral effects; higher predation risk was related to greater decreases in activity and greater spatial avoidance. I also examined the relationship between risk and response across the six prey

species within a predator treatment and found that higher predation risk across species leads to greater decreases in activity in the presence of *Umbra* and greater increases in tail depth in the presence of *Anax*. Thus, while previous studies have found relationships between predation risk and prey response when focusing on relatively few species, few predators, and a single trait, this more powerful test using 30 predator-prey combinations and nine traits suggests that the relationship is not well supported. This finding arises from the fact that larval anurans, as well as many other taxa, exhibit predator- and prey-specific behavioral and morphological changes in response to predator- and prey-specific risk." (Author)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

2298. Ryazanova, G.I. (2001): One the reproduction tactics in the males of *Lestes sponsa* (Hansemann) (Zygoptera: Lestidae). *Notul. odonatol.* 5(7): 92-93. (in English). [The behaviour at the water of individually marked males of *L. sponsa* was observed in the floodplain of Borzhava river, Ukraine. Elements of territoriality and conservatism of individual reproductive tactics, despite a lasting absence of reproductive success, are demonstrated.] Address: Ryazanova, G.I., Department of Entomology, Faculty of Biology, Moscow State M.V. Lomonosov University, RUS-119899 Moscow, Russia

2299. Samways, M.J. (2001): *Aciagrion pinheyi* spec. nov. from South Africa (Zygoptera: Coenagrionidae). *Odonatologica* 30(1): 111-116. (in English). ["*Aciagrion* had until now not been recorded in South Africa. The new sp. from a pan in thick subtropical savanna is described, illustrated and compared with similar congeners. Holotype male, allotype female (in copula): South Africa, KwaZulu-Natal prov., Ndumo Game Reserve, 21-1-2000; deposited at SAM, Cape Town." (Author)] The sp. n. is compared with *Aciagrion gracile gracile*, *A. g. attenuatum*, and *A. ? hamoni*] Address: Samways M.J., Invertebrate Conservation Research Centre, Dept Zool. & Entomol., University of Natal, P/Bag X01, Scottsville 3209, Pietermaritzburg, South Africa. E-mail: samways@un.ac.za

2300. Sherratt, T. (2001): The evolution of female-limited polymorphisms in damselflies: A signal detection model. *Ecology Letters* 4(1): 22-29. (in English). ["Female-limited intraspecific colour variation is a widely distributed trait within damselflies. Typically, one morph resembles the male (the andromorph) whereas one, or sometimes more, do not (the heteromorph(s)). While several selective explanations have been offered, such as decreased harassment by males balanced by predation or lack of mating success, field data indicate that andromorphs and heteromorphs mate at equal frequencies in the field, and survive equally well. In this paper, I use a signal detection model to characterize the properties of a new male-mimicry hypothesis, in which andromorphs are not only more similar to males, but are also encountered more by males. I show that this combination of frequency-dependent and frequency-independent factors readily combine to generate a balanced polymorphism. The model explains why morphs have similar mean mating frequencies, why the experimentally observed mating preferences of males vary between ponds, and why the frequency of andromorphs tends to rise with sex ratio." (Author)] Address: Sherratt, T.N., Department of Biological Sciences, Uni-

versity of Durham, South Road, Durham, DH1 3LE, UK. E-mail: T.N.Sherratt@durham.ac.uk

2301. Sirot, L. K.; Brockmann, H. J. (2001): Costs of sexual interactions to females in Rambur's forktail damselfly, *Ischnura ramburi* (Zygoptera: Coenagrionidae). *Animal Behaviour* 61(2): 415-424. (in English). ["Several species of damselflies, dragonflies and butterflies are characterized by a female-limited polymorphism in which one type of female, the andromorph, looks and behaves like males whereas the other type of female, the gynomorph, looks and behaves differently. Sexual conflict has been hypothesized to play a role in the maintenance of this polymorphism in that andromorphs may have an advantage over gynomorphs by avoiding costly sexual interactions through male mimicry. We tested for costs of sexual interactions to female *Ischnura ramburi* damselflies by comparing the success of singly mated females maintained with no males to the success of females maintained continuously with males at a 3:1 (male to female) operational sex ratio (OSR) and a 1:1 OSR. Our findings suggest that sexual interactions affect the two morphs differently. The time spent feeding, number of eggs laid and egg-laying rate of andromorphs were lower in the 3:1 OSR treatment than in the treatment with no males. Time spent feeding and number and rate of eggs laid by gynomorphs did not differ among treatments. Sexual conflict may be occurring between males and mated andromorphs because sexual interactions are associated with net costs to mated andromorphs whereas sexual interactions with mated andromorphs are beneficial to males because there is high last-male sperm precedence. Based on this experiment, andromorphs cannot be said to have an advantage over gynomorphs by avoiding costly sexual interactions because sexual interactions were not associated with net costs to gynomorphs." (Author)] Address: Sirot, Laura, Department of Zoology, University of Florida, 223 Bartram Hall, Gainesville, FL, 32611-8525. USA. E-mail: lsirot@zoo.ufl.edu

2302. Smith, P.H. (2001): Diversity of dragonflies in dune ponds at Birkdale Sandhills, Sefton Coast, Merseyside. *J. Br. Dragonfly soc.* 17(1): 1-12. (in English). [11 of 16 odonate species known from this British locality breed in sand dune waterbodies. Of these, in 1994 and 1995 8 breeding species from a total of 13 observed species are analysed using different diversity indices, and counting maximum abundance. Dominant species are *Lestes sponsa* and *Enallagma cyathigerum*, *Sympetrum striolatum*, *Ischnura elegans*, and *Coenagrion puella* are fairly numerous, and the remaining eight species being relatively scarce. There is a positive relationship between the total numbers of individuals and the length of the margin at each pond. The ponds surveyed are assessed according positive and negative environmental factors.] Address: Smith, P.H., 2 Highfield Grove, Lostock Hall, Preston, Lancashire PR5 5YB, UK

2303. Spence, B. (2001): Reports from Coastal Stations - 2000: Spurn NNR, East Yorkshire. *Atropos* 12: 62-63. (in English). [United Kingdom; *Libellula depressa* and *Anax parthenope* are new; population of *Sympetrum fonscolombii* increased; *Anax imperator*, *Orthetrum cancellatum*] Address: not stated

2304. Stoks, R. (2001): Food stress and predator-induced stress shape developmental performance in a damselfly. *Oecologia* 127: 222-229. (in English). ["I stu-



died effects of stress factors like food shortage, non-lethal predator presence and autotomy on survival and larval performance (growth rate, development rate and developmental stability) of larvae of the damselfly *Lestes sponsa*. In a laboratory experiment, larvae were raised during their last two instars at two food levels (high or low) crossed with two levels of autotomy (caudal lamellae present or absent). These treatments were nested within three levels of predation risk (*Aeshna cyanea* absent, Chironomus-fed caged *Aeshna* or *Lestes*-fed caged *Aeshna*). The diet of the predator had no effects. The low food level and the presence of *Aeshna* independently increased mortality rates of *L. sponsa* larvae. The low food level, presence of a caged *Aeshna* and autotomy all independently reduced growth rate (mass and body size at day 40) and wing size at emergence, and the first two stress factors also reduced development rate. Regardless of predator presence and autotomy, all damselfly larvae consumed the food available. This indicated that the predator-induced stress effects were not due to reduced food uptake, but probably reflected lowered assimilation efficiency and/or a higher metabolic rate. Besides a low food level, the presence of caged *Aeshna* predator larvae and autotomy also increased hind wing asymmetry. This result demonstrated that predator-induced stress may reduce developmental stability in the prey." (Author)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U. Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

2305. Tennessen, K.J. (2001): *Coryphaeschna huaorania* spec. nov. from central Ecuador with keys to all species in the genus (Odonata: Aeshnidae). *International Journal of Odonatology* 4(1): 71-81. (in English). ["*Coryphaeschna huaorania* sp. n. (holotype male: Ecuador, Morona Santiago Prov., pond 5 km N of Mendez jet., 6 Nov 1997; allotype female, same data; both to be deposited in FSCA, Gainesville, FL, USA) is described and compared with *C. amazonica*, *C. apeora*, and *C. perrensi*. The new species can be recognized by having 3 transverse rows of cells in the fork of Rs for a distance of 2 to 4 cells, and a combination of reddish frons without a dark spot, green thorax with small brown mesepisternal stripes, a reddish abdomen, and epiproct about half as long as the cerci. Separate keys are provided to males and females of the eight species currently recognized in the genus." (Author)] Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktennessen@aol.com

2306. Theischinger, G. (2001): Preliminary keys for the identification of larvae of the Australian Synthemistidae, Gomphomacromiidae, Pseudocorduliidae, Macromiidae, and Austrocorduliidae (Odonata). Cooperative Research Centre for Freshwater Ecology Identification Guide No. 34: I-IV, 88pp. (in English). ["The more primitive Australian Libelluloidea were treated by Watson et al. (1991) under the corduliid subfamilies Synthemistinae, Gomphomacromiinae and Macromiinae. Hawking & Theischinger (1999), however, adopted for the above group of dragonflies a classification that Bechly (1996) based mainly on his own studies and on Carle (1995) and Lohmann (1996). The families Synthemistidae, Gomphomacromiidae, Pseudocorduliidae, Macromiidae and Austrocorduliidae in their present concepts are a significant portion of the Australian dragonfly fauna including 42 recognised species in 16 genera. Whereas Gomphomacromiidae, Pseudocorduliidae and Macro-

miidae each are represented in Australia by a single genus with two species, Synthemistidae and Austrocorduliidae are quite diverse, particularly at generic level. [...] It is the aim of this presentation to facilitate the identification of all known larvae of a group of Australian dragonflies whose identification up to now would have required a rather large number of papers, some of them containing misleading errors. There is also strong emphasis on the still existing gaps in our knowledge. To establish and confirm family identification, an updated version of the family key presented by Hawking & Theischinger (1999) is given at the beginning. Then there are, for each of the five families concerned, a taxonomic overview, a brief diagnosis and a key to genera and species followed by more detailed generic and specific treatments. Whereas the species lists given for each family are alphabetical, the more detailed treatments of genera and species are arranged in an order of detected similarity which may or may not reflect phylogenetic relationships. [...]. Measurements and descriptions are given from last instar larvae or from final instar exuviae. Most illustrations are given from final instar exuviae. As colouration of individuals may be variable in life due to specific conditions in the habitat and as colouration of preserved specimens may reflect the ways or methods of collection and preservation, colours are not given in the descriptions; [...] (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. Orders: Cooperative Research Centre for Freshwater Ecology Identification, Murray-Darling Freshwater Research Centre, PO Box 921, Albury, NSW 2640, Australia. E-mail: enquiries@mdfrc.canberra.edu.au. / WWW.freshwater.canberra.edu.au

2307. Theischinger, G. (2001): Regions of taxonomic disjunction in Australian Odonata and other freshwater insects: Second addendum, with the description of *Austroaeschna unicornis pinheyi* ssp. nov. (Anisoptera: Aeshnidae). *Odonatologica* 30(1): 87-96. (in English). ["The information on taxonomic disjunction at the gap between the Paluma Range (ca 19°S) and Eugella (ca 21°S) of mostly species pairs of Odonata is updated and discussed. The holotype male of *A. u. pinheyi* ssp. n. comes from Queensland, Carnarvon Gorge (18/ 21-11-1990), deposited in ANIC, Canberra. *A. u. cooloola* Theischinger and *A. u. speciosa* Sjöstedt are appraised, respectively re-appraised, as distinct species." (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

2308. Tunmore, M. (2001): Reports from Coastal Stations - 2000: The Lizard, Cornwall. *Atropos* 12: 46-48. (in English). [United Kingdom; *Ischnura pumilio*, *Sympetrum fonscolombii*, and *S. striolatum* are communicated.] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK

2309. Uzunov, Y.; Tzavkova, V.; Todorov, I.; Varadinova, E. (2001): The macrozoobenthic fauna of the Biosphere reserve Srebarna Lake in north-eastern Bulgaria. *Lauterbornia* 40: 43-51. (in English). ["The paper represents the results of two years regular observations on the species diversity of the benthic invertebrate communities of the Srebarna Lake - a Biosphere Reserve, World Natural Heritage Site and Ramsar Site of international importance, located on the Danube bank in north-eastern Bulgaria. All available faunistic information about the species content is associated with the data obtained in 1997-1999 as a part of a large monito-

ring program in developing a management plan of the reserve." 36 Odonata based on a survey of V. Beschovsky and M. Marinov are listed.] Address: Uzunov, Y., Central Laboratory of General Ecology, Bulgarian Academy of Sciences, 2 Gagarin Street, BG-1113 Sofia, Bulgaria

2310. Watts, P.C.; Thompson, D.J.; Kemp, S.J. (2001): A protocol for non-destructive extraction of DNA from odonates. *Odonatologica* 30(2): 223-226. (in English). ["Genetic methods are often utilised for the ecological study of odonate species. In many instances, especially from a conservation standpoint, it is desirable to employ a method of extracting DNA that does not affect the subsequent survival of the animal under investigation. Removal of part of an odonate leg has been demonstrated not to affect the subsequent reproductive success of the animal. Thus for odonates, a simple and quick method of extracting DNA from a portion of an odonate leg is presented that provides high yields of DNA suitable for PCR." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

2311. Wilson, K. (2001): Reports from Coastal Stations - 2000: Gibraltar Point NNR, Lincolnshire. *Atropos* 12: 61-62. (in English). [United Kingdom; a total of 13 breeding odonate species and one migrant were recorded in 2000. *Sympetrum fonscolombii*, *Orthetrum cancellatum*, *Coenagrion puella*, and *Lestes sponsa* are briefly discussed.] Address: not stated

2312. Wilson, K.D.P.; Reels, G.T. (2001): Odonata of Hainan, China. *Odonatologica* 30(2): 145-208. (in English). ["The odonate fauna from Hainan, is enumerated. *Vestalis miao* sp. n., *Bayadera kirbyi* sp. n. (Calopterygidae), *Burmargiolestes xinglongensis* sp. n., *Rhinagrion hainanense* sp. n., *Podolestes pandanus* sp. n. (Megapodagrionidae), *Drepanosticta zhoui* sp. n., *D. elongata* sp. n., *Sinosticta hainanense* sp. n. (Platystictidae), *Chlorogomphus icarus* sp. n., *C. gracilis* sp. n. (Chlorogomphidae), *Planaeschna celia* sp. n. and *Oligoaeschna sabre* sp. n. (Aeshnidae) are described. *Lamelligomphus hongkongensis* Wilson is assigned as a synonym of *L. hainanensis* Chao. 6 spp. of *Macromia* are treated. *Macromia hamifera* Lieftinck is synonymised with *M. clio* Ris and other potential synonymies of Vietnamese and South China *Macromias* are discussed. *Pseudagrion australasiae* Lieftinck, *Ceragrion indochinense* Asahina, *Gomphidia a. abbotti* Williamson and *Macromia calliope* Ris are recorded from Chinese territory for the first time. A checklist of dragonfly species from Hainan and details of 71 taxa not previously recorded from Hainan are provided." (Authors)] Address: Reels, G.T. 23-24, Section 3, Wu Kau Tang Village, Tai Po, Hong Kong. E-mail: gtreels@cyberdude.com

2313. Wormwell, K. (2001): A very late record of Beautiful Demoiselle *Calopteryx virgo*. *Atropos* 13: 66. (in English). [8 and 12 October 2000, St. Levan, west Cornwall, UK] Address: Wormwell, K., 53 Cloughbane Drive, Ramsey, Isle of Man IM5 2BH, UK. E-mail: wormwell@mcb.net

2314. Yanoviak, S.R. (2001): Predation, resource availability, and community structure in Neotropical water-filled tree holes. *Oecologia* 126: 125-133. (in Eng-

lish). ["Predation and resource availability influence community structure in many aquatic ecosystems. Predators (odonates) and resources (leaf litter) were manipulated to determine their independent effects on macroorganism species richness, abundance, and composition in water-filled tree holes of Barro Colorado Island, Panama. Interactive effects of these factors were also investigated in artificial tree holes. Large odonates reduced species richness in natural tree holes, but did not significantly reduce macroorganism abundance. The presence of larvae of the mosquito *Culex urichii* and the ceratopogonid midge *Bezzia snowi* were negatively associated with the presence of large odonate larvae. In natural tree holes, leaf litter addition and removal respectively increased and decreased richness by c. 1 species relative to controls, and macroorganism abundance was greater in litter addition holes than in litter removal holes. Independent effects of predation showed similar patterns in artificial holes, but there was no predator x resource interaction, partly due to the short duration of the experiment. Predators grew faster when litter was abundant, and indirectly reduced litter degradation rates when resources were scarce in artificial holes. Both resource availability and predation influence species richness in water-filled tree holes, but act at different time scales; richness follows productivity (litter quantity) over a period of weeks, whereas effects of predation may span several months." (Author). *Megaloprepus coerulatus*] Address: Yanoviak, S.R., Evergreen State College, Lab I, Olympia, WA 98505, USA. E-mail: yanoviak@racsa.co.cr

2315. Zhou, W.-b.; Wilson, K.D.P. (2001): *Priscagrion kiautai* gen. nov., spec. nov. and *P. pinheyi* spec. nov., new damselflies from southwestern China (Zygoptera: Megapodagrionidae). *Odonatologica* 30(1): 117-121. (in English). ["The new genus is established to receive the 2 new spp., *P. kiautai* sp. n. (type sp.; holotype male, paratypes of both sexes: China, Guizhou, Chishui Alsophila Nature Reserve, 18-V-2000; deposited at the Zhejiang Mus. Nat. Hist., Hangzhou) and *P. pinheyi* sp. n. (holotype male: China, Guangxi, Damingshan, 13-V-1997, paratypes of both sexes; same locality, 14-V-1997; holotype and 1 female to be deposited at the Tai Lung Experimental Stn, Agriculture & Fisheries Dept, Lin Tong Mei, Sheung Shi, NT, Hong Kong). *Priscagrion* gen. n. is compared with *Arrhenocnemis* Lieftinck and *Mesopodagrion* McLachlan" (Authors)] Address: Zhou, W.-b., Department of Entomology, Zhejiang Museum of Natural History, Jiaogonglu 71, Hangzhou-310012, China

2316. Zimmermann, W.; Klöppel, M. (2001): Erfassung der Libellenfauna Thüringens. *Landschaftspflege und Naturschutz in Thüringen* 38(1):24-25. (in German). [Short report on the results of the odonatological survey of the Federal State Thüringen, Germany. Prior December 2000, more than 22000 records are available in a database. A first published result is e.g. the plot of a distribution map of *Aeshna affinis*, *A. grandis*, and *A. mixta* in this paper.] Address: Zimmermann, W., Thomas-Müntzer-Str. 5, D-99423 Weimar, Germany

2317. Zloty, J.; Pritchard, G. (2001): *Cora chiribiquete* spec. nov., a new damselfly species from Colombia (Zygoptera: Polythoridae). *Odonatologica* 30(2): 227-232. (in English). ["The new sp. is described from the Sierra de Chiribiquete of Colombian Amazonia. Holotype male: Colombia, Sierra de Chiribiquete, Puerto Abe-

ja, 5-VII-1996; to be deposited in USNM, Washington, DC. It belongs to the modesta group of G.H. Bick & J.C. Bick (1991, Odonatologica 20: 453-458), and can be distinguished from all other Polythoridae by transverse gold bands on the hind wings." (Authors)] Address: Pritchard, P., Department of Biological Sciences, University of Calgary, 2500 University Drive NW, Calgary, Alberta, Canada T2N 1N4. E-mail: gpritcha@ucalgary.ca

**Thanks to all who contributed to this issue of OAS!**



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: Lindeboom@aol.com and Martin Schorr, Schulstr. 7B D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: FOEATrier@aol.com

Published in Rheinfelden, Germany and printed in Tübingen, Germany.  
ISSN 1438-0269

## 1997

**1984.** Dauphin, P.; Laguerre, M.; Tamisier, J.-P.; Teissier, F. (1997): Remarques botaniques et entomologiques sur la Réserve naturelle du marais de la Mazière (Lot-et-Garonne). Bull. soc. linn. Bordeaux 25(1): 15-24. (in French). [18 odonate species are mentioned for the locality but not specified.] Address: Dauphin, P., Poitou, F-33570 Lussac, France

**1985.** Kesel, A. (1997): Einige Aspekte zur Statik der Insektenflügel. Biona-Report 11: 89-114. (in German). [Biophysical factors of insect wings using *Aeshna cyanea* as an odonate example are outlined in some detail (network of veins, geometry of veins, stability of wing [nodus, pterostigma, membranula]). Models to enlarge constructively stability of wings are developed and tested.] Address: Kesel, Antonia, Department of Zoology, Technical Biology and Bionics; University of Saarland; D - 66041 Saarbrücken. E-mail: a.kesel@rz.uni-sb.de

**1986.** Orr, A.G. (1997): Odonate predation in Bornean treehole communities: some observations on predator density and prey diversity. H. Ulrich (ed.): Tropical biodiversity and systematics. Proceedings of the International Symposium on Biodiversity and Systematics in Tropical Ecosystems, Bonn, 1994. Zoologisches Forschungsinstitut und Museum Alexander König, Bonn, 1997: 223-227. (in English). ["Phytotelmata in Bornean mixed dipterocarp forest fall into several categories, the more common of which is the buttress or trunk pan. Such holes are often quite large (up to 10 litres) and are mostly filled nearly to the brim with a thick layer of leaf litter, under which is a large body of anoxic sludge. Despite apparently high rates of decomposition only a few (6-10) species make up the metazoan community, including up to three species of predatory odonate larvae; the Zygopteran *Pericnemis triangularis* (Coenagrionidae) and the Anisopterans *Lyriothemis cleis* (Libellulidae) and *Indaeschna grubaueri* (Aeshnidae). Odonates generally account for a relatively high proportion of the metazoan biomass, in some cases far exceeding the biomass of detritivores. This suggests that decomposition rates must be very high, and it is possible that high predation levels are responsible for suppressing diversity in the detritivore community." (Author)] Address: Orr, A.G., 26 Currimundi Rd, Caloundra, Qld 4451, Australia

**1987.** Ponta, U. (1997): Beitrag zur Kenntnis der Libellenfauna im Gurk-Einzugsgebiet (Insecta, Odonata). Carinthia (II) 187 / 107: 381-384. (in German). [Austria;

abundance, sampling site, and altitude of *Onychogomphus forcipatus*, *Gomphus vulgatissimus*, *Calopteryx splendens*, *C. virgo*, *Platycnemis pennipes*, and *Somatochlora metallica* are documented.] Address: Ponta, Ursula, Kärntner Institut für Seenforschung, Amt der Kärntner Landesregierung, Flatschacher Str. 70, A-9021 Klagenfurt, Austria

## 1998

**1988.** Bernabel, S.; Di Girolamo, I.; Iavarone, I.; Mancini, L. (1998): Alcune note sul popolamento macrobentonico del fiume Arrone (Lazio-Italia). Riv. Idrobiol. 37(1-3): 203-209. (in Italian with English summary). [The macrobenthic community of the river Arrone, Italy first was surveyed in the early 70th, and restudied app. 20 years later. Anthropogenic impacts increased and surrounding land cover was modified, but the macrozoo-benthos seems not to have changed significantly. In a tab, all determined taxa are listed including 11 Odonata of which *Pyrrhosoma nymphula* and *Onychogomphus uncatatus* seem to be the most interesting species.] Address: Istituto Superiore di Sanità, Laboratorio di Igiene Ambientale, Viale Regina Elena, 299, I-00191 Roma, Italy

**1989.** Dolmen, D. (1998): *Orthetrum cancellatum* (L.) (Odonata) rediscovered in Norway. Fauna Norvegica Series B. 45(1-2): 114-115. (in English with Norwegian summary). [The third record of *O. cancellatum* in Norway happened July 8, 1997. The habitat - the brackish-water lake Langangsvatnet - is characterised by physical and chemical parameters, and co-occurring Odonata are listed.] Address: Dolmen, D., NTNU Museum, N-7004, Trondheim Norway

**1990.** Donnelly, T.; Ellenrieder, N. von; Muzon, J. (1998): Nuevos registros de Odonata (Insecta) para la Argentina. Neotropica (La Plata) 44(111-112): 115-116. (in Spanish). [16 taxa are added to the list of Odonata of Argentina including several species to be described: *Aeshna psilus* Calvert 1947, *Andaeschna rufipes* (Ris 1918), *Progomphus recticarinatus* Calvert 1909, *Argia translata* Hagen in Selys 1865, *Enallagma novaehispaniae* Calvert 1907, *Brechmorhoga praedatrix* Calvert 1909, *Tramea rustica* De Marmels & Racenis 1982, *Mecistogaster amalia* (Burmeister, 1839), *Neoneura ethela*

Williamson 1917, *Argia hasemani* Calvert, 1909, *Argia reclusa* Selys 1865, *Aeshna* n.sp., *Limnetron* n.sp., *Erythrodiplax* n.sp., and *Epipleoneura* n.sp.. Additions to the list of the National parks of Callegua and Iguazú are also made.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. tdonnel@binghamton.edu

**1991.** Ehmann, H. (1998): Beitrag zur Kenntnis der Libellenfauna Kärntens (Insecta: Odonata). *Carinthia* II 188(108): 607-617. (in German with English summary). [Between 1991 and 1997, the odonate fauna has been investigated on various waters of Carinthia, Austria. Records of 51 species are documented for 31 localities. *Crocothemis erythraea*, *Leucorrhinia dubia*, and *Erythromma viridulum* have been found for the first time in Carinthia. In addition the following interesting species should be mentioned: *Coenagrion hastulatum*, *C. pulchellum*, *Anaciaeschna isosceles*, *Brachytron pratense*, *Ophiogomphus cecilia*, *Cordulegaster heros*, *Somatochlora meridionalis*, *Sympetrum pedemontanum*, and *Leucorrhinia albifrons*.] Address: Ehmann, H., Hirschenhöfstr. 25, A-5450 Werfen, Austria.

**1992.** Keim, C. (1998): Emergence hivernale d'*Anax imperator* Leach (Odonata: Aeshnidae) à Martigny (Valais, Suisse). *Bull. romand Ent.* 16(2): 57-64. (in French, with English summary). ["On January, 9th 1998, a living adult Emperor dragonfly (*Anax imperator*) has been found close to an artificial pond in Martigny, Valais (southwestern Switzerland). Because of its pale coloration, the specimen was apparently a freshly-emerged adult. The relatively high ambient temperatures, which prevailed from October 1997 through to the beginning of January 1998, could explain this winter emergence. To our knowledge, winter emergences of *A. imperator* have never been reported in Switzerland." (Author)] Address: Keim, C., Finettes 10, CH-1920 Martigny, Switzerland

**1993.** Kreuz, P.; Kempf, M.; Kesel, A.; Göken, M.; Vehoff, H.; Nahtigall, W. (1998): Materialwissenschaftliche Analyse der Insektenkutikula am Beispiel Libellenflügel. *Biona-Report* 12: 327-329. (in German). [Functional morphologic studies of a wing of *Anax imperator* to test mechanical capacity of the membranula are shortly outlined. Hardness and elastic modulus of cuticula are variable. Dragonfly wings are assessed to have a great potential to develop new technical materials for human use.] Address: Kesel, Antonia, Department of Zoology, Technical Biology and Bionics; University of Saarland; D - 66041 Saarbrücken. E-mail: a.kesel@rz.uni-sb.de

**1994.** Rademacher, M. (1998): Bioökologische Untersuchungen zur Habitatpräferenz der Fledermaus-Azurjungfer (*Coenagrion pulchellum*). *Naturschutz am südlichen Oberrhein* 2: 119-128. (in German with English summary). ["In 1994 and 1995, waters in the southern and middle Upper Rhine valley serving as reproduction habitats for [...] *C. pulchellum* were studied. Vegetation maps, protocols of oviposition and emergence, and supplementary measurements of the morphology of the waters, physical and chemical parameters were employed to investigate the function of vegetation for occurrence and reproduction of the species. An experiment was conducted to document diurnal activity patterns. The results allow a detailed description of the species' preferred habitats within the study area. Threat factors and protective measures that should be

taken are discussed. In the study area, *C. pulchellum* colonizes mainly older still waters with well-developed water-plant vegetation. Oviposition and emergence sites of the examined waters can be divided into two types distinguished by their markedly different structure: A) Phytocoenoses characterized by water-plants with floating leaves (alliance *Nymphaeion*) mixed with reed and sedge vegetation (alliances *Phragmition* and *Magnocaricion*). B) Areas of waters with phytocoenoses of water-plants with floating leaves (alliance *Nymphaeion*), or containing other floating oviposition substrates, that are moderately shaded (maximum: 80 %) by overhanging woody vegetation." (Author)] Address: Rademacher, M., c/o Heidelberger Technology Center, Peter-Schumacher-Str. 8, 69181 Leimen, Germany

**1995.** Rademacher, M. (1998): Untersuchungen zum Schlupf- und Eiablagehabitat der Gemeinen Winterlibelle (*Sympecma fusca*) am südlichen und mittleren Oberrhein und mögliche Schutzmaßnahmen. *Naturschutz am südlichen Oberrhein* 2: 107-118. (in German with English summary). ["On 33 waters in the southern and middle Upper Rhine valley serving as reproduction habitats for *Sympecma fusca* oviposition sites and emergence sites were analyzed using standardized protocol forms. Oviposition and emergence occur in more or less extensive reed and sedge communities (alliances *Phragmition* and *Magnocaricion*) which are intensely mixed with water-plant communities. This vegetation has to be submerged from April/ May through July/ August and must have low coverages (<40 %) of emerged vegetation during the period of oviposition. The presence of a certain amount of dead or fresh plant material floating on the surface is a prerequisite for oviposition. The sites have to be well exposed to the sun during the whole day; shading by surrounding woody plants must not exceed 10 %. Compared to surrounding areas, the water temperature is markedly higher where oviposition takes place." (Author)] Address: Rademacher, M., c/o Heidelberger Technology Center, Peter-Schumacher-Str. 8, D-69181 Leimen, Germany

**1996.** Suri Babu, B. (1998): Final instar larva of *Ischnura aurora aurora* (Brauer) (Zygoptera: Coenagrionidae). *Journal of the Bombay Natural History Society* 95: 354-357. [India (M.P.), Sagar, Gwalla mohalla village and Dharmashri village; description of final instar larvae of *I. aurora* from specimens reared in the laboratory. ] Address: Suri Babu, B., Forensic Science Laboratory, Police Control Room, Jagdalpur-494001 (M.P.), India

**1997.** Vogel, J. (1998): Das Dubringer Moor. *Staatliches Umweltfachamt Bautzen und Naturforschende Gesellschaft der Oberlausitz* (Hrsg.): 128 pp. (in German). [30 odonate species are listed from the bog of Dubringen, Saxonia, Germany. Population regression trends of some species are shortly outlined.] Address: Staatliches Umweltfachamt Bautzen, Postfach 1343, D-02603 Bautzen, Germany

## 1999

**1998.** D'Antonio, C. (1999): Nuovi reperti odontologici della provincia di Bergamo, Lombardia, Italia settentrionale (Odonata). *Opusc. zool. flum.* 173: 11-15. (in Italian with English summary). [So far only 4 odonate species were known from the province Bergamo, Italy. Here, an annotated provincial checklist of 30 spp. is pre-

sented. Most of these were evidenced at 23 localities in July-August 1997. The record of *Coenagrion pulchellum mediterraneum* (Schmidt) (2 males 1 female, Oltre di colle, alt. 1050 m; 9-VII-1997) is extending the northern limit of the ssp. range.] Address: D'Antonio, C., Via A. Falcone 386/b, I-80127 Napoli, Italy. E-mail: lindenia@freemail.it

**1999.** D'Antonio, C. (1999): Odonati della provincia di Brescia, Lombardia, Italia settentrionale (Odonata). *Opusc. zool. flum.* 173: 17-32. (in Italian with English summary). [An annotated checklist is presented of the 56 spp. hitherto known to occur in the province, based on literature and on previously unpublished material, brought together in 1997 from 46 localities. The species composition is biogeographically analysed. Also provided are concise comments on the occurrence of 15 spp., considered of particular regional interest. The complete regional bibliography is appended.] Address: D'Antonio, C., Via A. Falcone 386/b, I-80127 Napoli, Italy. E-mail: lindenia@freemail.it

**2000.** D'Antonio, C. (1999): Odonati italiani della collezione entomologica del Museo Civico di Scienze Naturali di Brescia (Odonata). *Opusc. zool. flum.* 173: 1-10. (in Italian with English summary). [53 spp. are listed along with the precise locality data and collection dates. *Aeshna juncea* is recorded from the province of Brescia for the first time since 1879. *Ophiogomphus cecilia* is new for the fauna of Brescia, *Somatochlora metallica* is new for that of the province of Mantova, and 20 spp. are added to the province of Cremona list. Records from the following Italian regions are dealt with: Emilia Romagna, Friuli Venezia Giulia, Liguria, Lombardia, Veneto, Sardegna, and Trentino Alto Adige. *Sympetrum fonsolombii* is listed from Corsica, France.] Address: D'Antonio, C., Via A. Falcone 386/b, I-80127 Napoli, Italy. E-mail: lindenia@freemail.it

**2001.** Federschmidt, A. (1999): Die Libellen der Taube und angrenzender Gräben auf dem Gebiet der Stadt Dessau. *Naturwiss. Beitr. Museum Dessau* 11: 66-73. (in German). [The River Taube (Dessau, Sachsen-Anhalt, Germany) and tributary ditches were surveyed for their dragonfly fauna. 27 species could be traced in 1995. 9 different stretches of the river including some ditches are assessed according to its species diversity. Records of *Orthetrum coerulescens*, *Ischnura pumilio*, *Calopteryx splendens*, and *Sympetrum pedemontanum* are of some regional interest.] Address: Federschmidt, A., LPR Landschaftsplanung Dr. Reichhoff GmbH, Außenstelle Magdeburg, Am Vogelgesang 2a, D-39124 Magdeburg, Germany

**2002.** Klop, E.; Hahn, T.; Kauth, M.; Engel, S.; Lastimoza, L.; Curio, L. (1999): Diet composition and food provisioning of the Visayan Tarctic Hornbill (*Penelopides panini panini*) during the breeding season. *Ökologie der Vögel* 21: 389-404. (in English with German summary). [Two nests of the Visayan Tarctic hornbill (Aves) on the Philippine island of Panay were monitored for a total of 465 hours, to reveal the diet composition both during the breeding season and in the course of the day. About 32 different fruit species were observed to be delivered by the male Tarctic during the nestling period, which comprise about 83% of the food items. Small insects like flies, ants and termites make up the biggest part of the invertebrate prey, whereas the vertebrate prey consisted mainly of lizards. Odonata are

among the food delivered, but the number of specimens was too small to be quantified.] Address: Curio, E.; Conservation Biology Unit, Faculty of Biology, Ruhr-Universität Bochum, D-44780 Bochum, Germany.

**2003.** Lange, L. (1999): Die Libellen der Wilstermarsch. *Bombus* 3(42/44): 172-176. (in German). [The odonate fauna of the marsh regions in Schleswig-Holstein, Germany is quite poorly known. Aim of the study was to make a significant contribution to close this gap of knowledge. Between 1996 and 1999 several standing water bodies were studied. A total of 33 species could be found, among them *Aeshna viridis*, a species of the European Fauna-Flora-Habitat-Directive. Influence of weather conditions in different years on the species composition of the region and the importance of selected water bodies as source habitats are outlined. Special attention is given to *Anax imperator*.] Address: Lange, L., Deichreihe 21, D-25599 Wewelsfleth, Germany

**2004.** Rademacher, M. (1999): Die Bedeutung von Kleingewässern in Kiesgruben für Libellen (Odonata) - Ein Fallbeispiel aus der südbadischen Trockenaue. *Ber. naturforsch. Gesell. Freiburg im Br.* 88/89: 185-222. (in German with English summary). [In a gravel pit northwest of Hartheim (Landkreis Breisgau-Hochschwarzwald, Baden-Württemberg, Germany) odonate "communities" in 22 small ponds and one gravel lake were studied from 1997 to 1999 and the results were compared with the species spectrum of 1 km along the Rhine River. Totally 32 species can be proved in the gravel pit area of which 24 species were indigenous (proof of reproduction by finding exuviae). Nearly 50% of the species are protected in Baden-Württemberg. Based on vegetation mapping four successional stages (Characeen-, Initial-, Accumulation- and Reed-Stage) were distinguished differing significantly in dragonfly species spectra. The highest species diversity was found in the accumulation-stage. A comparison with the shoreline of the river Rhine shows that many pioneer species of the ancient wild water meadow find important secondary habitats in gravel pits. The value of these secondary habitats for nature protection will be discussed and some maintenance measures for the gravel pit near Hartheim will be suggested." (Author) Finally some general proposals for dragonfly protection in gravel pits in the southern upper Rhine Valley are given.] Address: Rademacher, M., c/o Heidelberger Technology Center, Peter-Schumacher-Str. 8, 69181 Leimen, Germany

**2005.** Rademacher, M. (1999): Naturschutzwert von Baggerseen am Oberrhein. *Steinbruch und Sandgrube* 92(10): 6-11. (in German). [Presentation of some results of an intensive study of vegetation of the gravel pits in the upper Rhine floodplains, Germany. The importance of gravel pits for Odonata is shortly outlined. For more details see OAS 2004.] Address: Rademacher, M., c/o Heidelberger Technology Center, Peter-Schumacher-Str. 8, 69181 Leimen, Germany

**2006.** Rademacher, M. (1999): Naturschutzwert von Kies- und Sandrohböden im Bereich von Baggerseen der Oberrheinebene - Statusbericht. *Schriftenreihe der Umweltberatung im ISTE Baden-Württemberg* 2: 75-83. (in German). [M. Rademacher studied intensively in the past years vegetation and fauna - with special emphasis Odonata - of gravel pits. Results of his study, relevant for nature conservation measures, are outlined.



Odonata are discussed in terms of habitat requirements of *Sympecma fusca* and *Leucorrhinia caudalis*. Odonata demonstrate that the different aging stages of gravel pits have their own importance for different odonate coenocenes. In the case of *L. caudalis*, this extremely rare and threatened species stands for the stage of old gravel pits, often assessed as less important for nature conservation purposes.] Address: Rademacher, M., c/o Heidelberger Technology Center, Peter-Schumacher-Str. 8, 69181 Leimen, Germany

## 2000

**2007.** Anderson, N.; Barclay, M.; Menzies, I.S.; Page, K.; Prowse, A.D.; Swinney, I.F.; Willmott, K.J. (2000): Survey of Bookham Common: Fifty-eighth year: Progress report for 1999. *London Naturalist* 79: 177-186. (in English). [Anderson reports of two visits in July and August at two standing waters. The results, some more common odonate species in low abundance, are assessed as disappointing. It is supposed that fish have a significant negative impact on odonate fauna of the waters] Address: Anderson, N., 52 Beechwood Avenue, Greenford, Middlesex, UB6 9UB, UK

**2008.** Andres, J. A.; Sanchez-Guillen, R.A.; Cordero Rivera, A. (2000): Molecular evidence for selection on female color polymorphism in the damselfly *Ischnura graellsii*. *Evolution* 54(6): 2156-2161. (in English). ["The significance of female color polymorphism in Odonata remains controversial despite many field studies. The importance of random factors (founder effects, genetic drift and migration) versus selective forces for the maintenance of this polymorphism is still discussed. In this study, we specifically test whether the female color polymorphism of *Ischnura graellsii* (Odonata, Coenagrionidae) is under selection in the wild. We compared the degree of genetic differentiation based on RAPD markers (assumed to be neutral) with the degree of differentiation based on color alleles. Weir and Cockerham's theta values showed a significant degree of population differentiation for both sets of loci (RAPD and color alleles) but the estimated degree of population differentiation (theta) was significantly greater for the set of RAPD loci. This result shows that some sort of selection contributes to the maintenance of similar color morph frequencies across the studied populations. Our results combined with those of previous field studies suggest that at least in some *I. graellsii* populations, density-dependent mechanisms might help to prevent the loss of this polymorphism but cannot explain the similarity in morph frequencies among populations." (Authors)] Address: Andres, J. A., Animal Ecology, Ecology & Environmental Science, Umea University, SE 90187, Umea, Sweden. E-mail: jose.andres@eg.umu.se

**2009.** Arnold, A. (2000): Verbreitungsatlas der Libellen im Regierungsbezirk Leipzig. Veröffentlichungen des Naturkundemuseum Leipzig 19: 55-144. (in German with English summary). [More than 4400 data sets of odonatological records are compiled for the district Leipzig, situated in the west of Saxonia, Germany. 58 species could be traced. They are presented in a monographic way. Each species is discussed in most cases presenting interesting original material from the region or adjacent regions, e.g. reflections about colonisation and dispersal of the studied area by some spe-

cies (e.g. *Brachytron pratense*). Faunistic records are analyzed for the periods 1884-1945, 1946-1980, and 1981-1996, and presented in distribution maps. 12 additional species, occurring in neighbouring regions, are shortly discussed. The history of regional odonatological research is outlined, trends of development of populations, and the phenology of species are presented in some detail. This is a sound study with a lot of interesting material. Nevertheless it will be necessary to correct the chapter on *Coenagrion armatum*: we have to assume that this species never was represented in Saxonia (for details see Müller & Schorr, 2001: 41f.; **OAS 2160**).] Address: Arnold, A., Zur schönen Aussicht 25, D-04435 Schkeuditz, Germany

**2010.** Barker, J.J. (2000): Dragonfly Migration in the western Lake Ontario area in 1999. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 49-50. (in English). [Approximately 4000 dragonflies were recorded at two locations in the western Lake Ontario area in August and September 1999 during monitoring of hawk migration. The dominant *Anax junius* and *Tamea lacerata*, but *Pantala flavescens* and *P. hymenaea* were also present.] Address: Barker, J.J., 55-4101 Westminster Place, Mississauga, Ontario L4W 4X4, Canada

**2011.** Berrady, I.; Essafi, K.; Mathieu, J. (2000): Comparative physico-chemical and faunal studies of two thermal springbrooks near Sidi Harazem (Morocco). *Annales de Limnologie* 36(4): 261-274. (in English with French summary). ["The origin of the water of the two Sidi Harazem springs (Morocco), was found to be different. Environmental parameters made it possible to recognise three types of water: one issuing from a "cool spring", with lowest temperature (mean: 26.7°C), conductivity and chloride concentration; one issuing from the "hot spring" (mean: 31.7°C) with the highest temperature and high conductivity; and the one of the oued itself into which both springs flow. This oued had the highest values of pH, conductivity, chlorides, and calcium. The interstitial fauna collected by means of artificial substrates was composed of both epigeal and stygobite species. Only the "cool spring" included stygobite species, the number of which generally decreased with depth." (Authors) "Odonata" are recorded on sampling sites of the "hot spring" upstream, but not at the "cools spring" or "cool stream".] Address: Mathieu, J., Laboratoire d'Hydrobiologie et Ecologie Souterraines, Université Claude Bernard Lyon I, ESA CNRS 5023, 43 Bd du 11 Novembre 1918, F-69622, Villeurbanne Cedex, France. E-mail: mathieu@biomserv.univ-lyon1.fr

**2012.** Bree, D. (2000): Observations of Stream Bluets (*Enallagma exulans*) ovipositing at Mazinaw Lake, some interesting questions. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 21-22. (in English). ["Observations of relatively large numbers of *Enallagma exulans* ovipositing on floating aquatic vegetation around a dock at Mazinaw Lake raise some interesting questions regarding effects of man-made shoreline structures and survival of eggs in detached vegetation." (Author)] Address: Bree, D., Box 123, Bloomfield, Ontario K0K 1G0, Canada. E-mail: dbree@post.kosone.com

- 2013.** Bree, D. (2000): Odonata of Bon Echo Provincial Park - Preliminary checklist with notes. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 17-20. (in English). [Based largely on fieldwork in 1999, an annotated list of 48 species of Odonata with notes on specific locations and abundance is provided for Bon Echo Provincial Park (44°55' N., 77° 15' W) in Lennox and Addington and Frontenac counties, Ontario.] Address: Bree, D., Box 123, Bloomfield, Ontario K0K 1G0, Canada. E-mail: dbree@post.kosone.com
- 2014.** Catling, P.M. (2000): Erosion control, channelization and reservoirs destroy habitats of imperiled dragonflies. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 24-25. (in English). ["Although only about 25% of Ontario's damselflies and dragonflies are characteristic inhabitants of streams and rivers, about 75% of the imperiled species are characteristic of riverine habitats. Habitats of these species are destroyed by water pollution, but also by manipulations, such as erosion control, channelization and construction of dams for reservoirs. The hanging clubtails (*Stylurus* spp.), in particular, require ongoing erosion and depositional processes to provide fresh sand and silt deposits for burrowing nymphs." (Author)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net
- 2015.** Catling, P.M. (2000): An illustrated key to the mature nymphs and exuviae of eastern Canadian Hanging Clubtails (*Stylurus*). In: Cating, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 52-54. (in English). ["An illustrated key to the mature nymphs and exuviae of eastern Canadian *Stylurus* including *Stylurus amnicola*, *S. laurae*, *S. notatus*, *S. plagiatus*, and *S. scudderi* is presented. The key includes a few new characters, separates most distinct species first and emphasizes characters useful in both nymphs and exuviae." (Author) Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net
- 2016.** Catling, P.M.; Brownell, V.R.; Bree, D. (2000): Notes on the Odonata of Sandbanks Provincial Park and surrounding area. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 10-13. (in English). ["42 species of Odonata are reported for Sandbanks Provincial Park at the eastern end of Lake Ontario. The area is important for southern species near their northern range limit and as a staging area for autumn migration. Restricted species probably breeding include *Enallagma asperum* and *Lestes inaequalis*. Large populations of *Epitheca princeps* and *Celithemis eponina* are noteworthy." (Authors)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net
- 2017.** Catling, P.M.; Brownell, V.R.; Catling, C.H. (2000): Notes on the Odonata of Wheatley Provincial Park. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 20-21. (in English). ["Twenty species of Odonata are reported for Wheatley Provincial Park on the Lake Erie shore of extreme southwestern Ontario. Evidence suggests that the park may have a resident population of *Libellula vibrans*, a species at its northern range limit and previously considered to be accidental and non-breeding in Ontario." (Authors)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net
- 2018.** Catling, P.M.; Brownell, V.R.; Pratt, P.; Marshall, S. (2000): A preliminary annotated list of the Odonata of northern Bruce County including Bruce Peninsula National Park. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 34-39. (in English). ["Sixty species of Odonata are reported for northern Bruce County including Bruce Peninsula National Park on the east side of Lake Huron. Of particular interest are the records of the localized *Nehalennia gracilis* and *Nannothemis bella* in fens whereas these species have often been associated with bogs. The generally western and boreal *Aeshna interrupta lineata* is apparently a significant southeastern range extension from northwestern Ontario. Presence of *Enallagma asperum* and *E. civile* support recent observations of these species being widespread in southern Ontario. The peninsula represents a near northern limit for some southern species such as *Libellula pulchella* and a southern limit for some boreal species such as *Somatochlora minor*." (Authors)] Address: Pratt, P.D., 7100 Matchette Rd, La Salle, ON, Canada, N9C 2S3. E-mail: prairie@netcore.ca
- 2019.** Curio, E. (2000): Die Dolchstichttaube von Panay, Philippinen - eine erste Bilddokumentation. Nachrichten der Vereinigung für Artenschutz, Vogelhaltung und Vogelzucht 47(7): 386-389. (in German). [The first record of *Gallicolumba keayi* (Eagle-Clark, 1900) (Aves) is documented including pictures of a preying individual. Odonata are among the invertebrate prey, but it is unclear if the dove preys on Odonata under natural conditions or if it was fed with dragonflies in a cage. The latter seems to be the most possible case (see Curio 2001: 261, OAS 2087).] Address: Curio, E., Conservation Biology Unit, Ruhr-Universität Bochum, Postfach 102148, D-44780 Bochum, Germany. Email: Eberhard.curio@ruhr-uni-bochum.de
- 2020.** Eisermann, K. (2000): Ökologische Bewertung einer ehemaligen Militärfäche: Das Tanklager Zeisigwald. Veröff. Museum für Naturkunde Chemnitz 23: 51-62. (in German). [The odonate fauna of a petrol depot, used until 1991, and situated near Chemnitz, Saxonia, Germany, totals in 27 species. The results of the study - arranged according to the odonate dominance structure of the surveyed water bodies - are compiled in a tab., and shortly discussed. Some emphasis is given to the function and importance of short turf vegetation including heathlands as hunting area of *Lestes sponsa* and *L. virens*, as well as the genera *Aeshna* and *Sympetrum*.] Address: Eisermann, K., Carl-von-Ossietzky-Str. 213, D-09127 Chemnitz, Germany
- 2021.** Eterovick, P.C.; Sazima, I. (2000): Structure of an anuran community in a montane meadow in southeastern Brazil: Effects of seasonality, habitat, and predation. *Amphibia-Reptilia* 21(4): 439-461. (in English). ["In order to assess the main factors influencing its structure, an anuran community was studied from August 1996 to July 1997, in a 1200 m high rocky meadow site at the Serra do Cipo, Minas Gerais, Brasil, a region with markedly seasonal climate. The study site

included three temporary habitats: a stream, a puddle, and a swamp. Thirteen anuran species were recorded at the study site. Species of tadpoles differed in micro-habitat as to their position in water column, annual occurrence period, and water flow in the occupied sites. Aquatic vegetation, depth and occupied habitat (stream, swamp, or puddle) were of secondary importance in telling species apart. Calling sites of males were distinguished based on occupied habitat and annual activity period. Most species started their reproductive activities at the onset of the rains, in an opportunistic way. Water availability in the habitat seems to be the most important factor affecting temporal distribution of reproductive activities in the anuran community. Competitive interactions could not be detected in the community. The most important tadpole predators recorded at the study site were belostomatid water bugs and dragonfly nymphs. Their abundance peaks occurred after those of tadpoles, as predicted for predator-prey populations with interconnected cycles. Mortality rates were high for tadpoles, and predation is the most likely cause. Differences recorded among species, considering time of occurrence, tadpole microhabitats, and male calling sites, may reflect distinct specific adaptations and preferences." (Authors)] Address: Eterovick, Paula Cabral, Departamento de Biologia Geral, Instituto de Ciencias Biologicas, Universidade Federal de Minas Gerais, 30161-970, Belo Horizonte, MG, Brazil. E-mail: ecpaula@mono.icb.ufmg.br

**2022.** France, R. L.; Schlaepfer, M. A. (2000): 13C and 15N depletion in components of a foodweb from an ephemeral boreal wetland compared to boreal lakes: Putative evidence for microbial processes. *Hydrobiologia* 439: 1-6. (in English). ["Stable carbon and nitrogen isotope ratios were used to posit the relative importance of microbial processes on energy pathways in an ephemeral, humic boreal wetland compared to four clearwater lakes in northwestern Ontario, Canada. In addition to algae and dipteran larvae, odonate larvae were sampled as these latter organisms are known to predate indiscriminately on smaller invertebrates and are thus likely to have average isotope ratios reflective of their habitats. Similarities in delta13C and delta15N values between lake insect larvae and emerged adults suggested that littoral foodwebs in these oligotrophic lakes may rely to a considerable degree upon terrestrial carbon. Wetland insect larvae and algae were depleted in both 13C and 15N compared to biota in lakes Carbon isotope analysis implied a substantial presence of microbial respiration from decomposition in the humic wetland, whereas nitrogen isotope analysis suggested the prevalence of microbially modified nitrogen dynamics, including the possibility of N-fixation." (Authors)] Address: France, R. L., Graduate School of Design, Harvard University, 48 Quincy Street, Cambridge, MA, 02138 USA

**2023.** Gorb, S.N.; Kesel, A.; Berger, J. (2000): Micro-sculpture of the wing surface in Odonata: evidence for cuticular wax covering. *Arthropod Structure & Development* 29: 129-135. (in English). ["The insect wing membrane is usually covered by scales, hairs, and acanthae, which serve diverse functions, such as species-specific coloration pattern, decrease of wind resistance during flight or decrease of wing wettability. Representatives of Palaeoptera (Odonata and Ephemeroptera) have no hairy structures on the wing membrane, but both its sides are fine-sculptured. In this study,

the nature of the wing covering was studied using acoustic microscopy, scanning- and transmission electron microscopy followed by a variety of chemical treatments. It was shown that wing microsculptures are not cuticular outgrowths, but a wax covering, which is similar to pruinosity, which has been previously described in several odonate taxa. Data from scanning acoustic microscopy revealed that scratches on the wax covering have material density different from the surrounding material. Various functions of the wax covering are discussed." (Authors) Coenagrion puella, Pyrrhosoma nymphula, Aeshna cyanea] Address: Gorb, S., Max-Planck-Institut für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. E-mail: stas.gorb@tuebingen.mpg.de

**2024.** Gorb, S.N.; Pavljuk, R.S.; Spirus, Z.D. (2000): Odonata of Ukraine. A faunistic overview. *Vestnik zoologii, Suppl.* 15: 154 pp. (in Ukrainian). [Keys, numerous b/w morphological drawings, all localities listed, bibliography, paperback. This publication summarises the results of faunistic odonatological research in the Ukraine. Using the original and literature data, the authors created and analysed a database containing 4635 records. Numerous records have not been previously published. This work is not only a comprehensive list of Odonata in the Ukraine, but contains some general information on odonate morphology, biology, flight periods, and a history of studies of the odonate fauna in the Ukraine. Identification tables and numerous illustrations of morphological details will help with species identification.] Address: Gorb, S., Max-Planck-Institut für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. E-mail: stas.gorb@tuebingen.mpg.de

**2025.** Hänel, S.; Schrack, M. (2000): Zur Moosflora in Waldmooren der Radeburger und Laußnitzer Heiden. *Veröff. Mus. Westlausitz Kamenz* 22: 15-44. (in German). [Mosses with boreo-montaneous distribution are well represented in the region. Co-occurring Odonata with similar distribution are listed.] Address: Schrack, M., Hauptstr. 48a, D-01471 Radeburg-Großdittmannsdorf, Germany

**2026.** Hayes, P.A.; Maret, T.J. (2000): Wood frog and American toad tadpole behavioral responses to predators. *Journal of the Pennsylvania Academy of Science* 73 (Suppl.): 160. (in English). [Verbatim: "We examined the behavioral responses of tadpoles of wood frogs, *Rana sylvatica*, and American toads, *Bufo americanus* to the presence of bluegill sunfish, adult red-spotted newts, marbled salamander larvae, and dragonfly naiads. Groups of ten tadpoles of one species were placed into containers of water containing one large leaf as a hiding place and a wire cage into which a predator was added. The numbers of tadpoles moving and hiding under the leaf were counted before and after addition of a predator to the cage. Movement of wood frog tadpoles decreased in the presence of the newts and salamander larvae. Hiding by wood frog tadpoles increased in the presence of salamander larvae. Toad tadpoles, which are considered to be unpalatable to many vertebrates, showed no significant responses to presence of any predators. Wood frog tadpoles appear to respond adaptively to avoid predation by vertebrate predators they naturally encounter in temporary pond habitats."] Address: Hayes, P.A., Department of Biology, Shippensburg University, Shippensburg, PA, 17257 USA



**2027.** Hostettler, K. (2000): Neue Funde der Sibirischen Winterlibelle und der Gemeinen Keiljungfer (*Odonata*) im Gottlieber Ried und am Seerhein (Thurgau). *Mitt. thurg. naturf. Ges.* 56: 83-88. (in German). [In the "Gottlieber Ried" and along the "Tägerwilen See-Rhein", situated in the south of the Bodensee ("Lake Constanze"), Switzerland, 19 odonate species were recorded between 1985 and 1996 with *Ischnura pumilio* as an additional record in 2000. The reproduction habitat of *Sympecma paedisca* and its strategies to recognize suitable habitats are discussed in detail with special reference to factors as high waters. The regionally rare *Gomphus vulgatissimus* was found 21 May 1995.] Address: Hostettler, K., Schulstr. 7, CH-8590 Romanshorn, Switzerland

**2028.** Jones, C.D. (2000): Common Garter Snake (*Thamnophis sirtalis*) preying upon a teneral Black-tipped Darner (*Aeshna tuberculifer*) at Bat Lake, Algonquin Provincial Park, Ontario. In: Catling, P.M.; Jones, C.D.; Pratt, P. (Eds.): *Ontario Odonata*, vol. 1. Toronto Entomologists Association. ISBN 0-921631-22-7: 22-24. (in English). ["A review of the literature revealed that an observation of a Common Garter Snake [...] preying upon [...] *A. tuberculifer* is possibly the first unequivocal evidence of adult odonates as food items of garter snakes. Aspects of insects in the diet of garter snakes are discussed." (Author)] Address: Jones, C.D., Box 182, Lakefield, Ontario, K0L 2H0, Canada. E-mail: colin.jones@mnr.gov.on.ca

**2029.** Jones, C.D. (2000): New odonate records for Timiskaming District, Ontario. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 25-27. (in English). ["Sixteen new district records are reported for Timiskaming District, Ontario. A record of *Enallagma carunculatum* is a northern range extension. The rare species *Somatochlora incurvata* was discovered and the habitat described.] Address: Jones, C.D., Box 182, Lakefield, Ontario, K0L 2H0, Canada. E-mail: colin.jones@mnr.gov.on.ca

**2030.** Jones, C.D.; Holder, M.L. (2000): Additions to (and a deletion from) the Odonata list of Algonquin Provincial Park. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 13-17. (in English). ["Continued interest in the Odonata by Park Naturalists in Algonquin Provincial Park has led to the addition of 14 species (*Lestes forcipatus*, *Amphiagrion saucium*, *Coenagrion interrogatum*, *Enallagma carunculatum*, *E. cyathigerum*, *E. geminatum*, *Nehalennia gracilis*, *Epi-aeschna heros*, *Gomphaeschna firicillata*, *Arigomphus jurcifer*, *Somatochlora cingulata*, *Williamsonia fletcheri*, *Leucorrhinia intacta*, and *Nannothemis bella*) and the deletion of one (*Stylurus spiniceps*) from the Park's list since 1996. These changes are reported here along with annotations." (Authors)] Address: Jones, C.D., Box 182, Lakefield, Ontario, K0L 2H0, Canada

**2031.** Jones, C.D.; Michener, C.; Purdon, C.; Runtz, M.W.P. (2000): An annotated checklist of the Odonata of Renfrew County, Ontario. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 39-48. (in English). ["An annotated checklist of the Odonata of Renfrew County, Ontario is presented detailing the records for 93 species (26 Zygoptera, and 67 Anisoptera).

A list of an additional 36 species expected to occur in the county is also provided. This makes Renfrew the third in known diversity of approximately 50 Ontario counties and districts. Noteworthy species include *Gomphus vastus*, *Ophiogomphus anomalus*, *Stylurus spiniceps*, *S. notatus* and *Aeshna clepsydra*, the latter at or near to its northern limit." (Authors)] Address: Jones, C.D., Box 182, Lakefield, Ontario, K0L 2H0, Canada. E-mail: colin.jones@mnr.gov.on.ca

**2032.** Kalkman, V.; Dijkstra, K.D. (2000): The dragonflies of the Bialowieza area, Poland and Belarus (*Odonata*). *Opusc. zool. flumin* 185: 1-19. (in English). ["A synthesis of 942 records from the Bialowieza Forest and its surroundings, collected in 1983, 1990, 1993 and 1995-1999, is presented. Only 10% of them refer to Belarus, the rest being from Poland. A total of 49 spp was found. The fauna includes southern elements (*Sympecma fusca*, *Lestes barbarus*, *Erythromma viridulum*, *Ischnura pumilio*, *Anax imperator*, *Crocothemis erythraea*, *Orthetrum albisylum*, and *Sympetrum depressusculum*) and interesting northern and eastern spp (*Sympecma paedisca*, *Coenagrion armatum*, *C. hastulatum*, *C. lunulatum*, *Ophiogomphus cecilia*, *Epi-theca bimaculata*, *Somatochlora arctica*, *Sympetrum pedemontanum*, *Leucorrhinia albifrons*, *L. caudalis*, and *L. pectoralis*). Brief remarks are made about differences in habitat preference of spp between western and eastern Europe. It is postulated that *Pyrrhosoma nymphula* is restricted to running waters in the East. A short note on the subspecific status of *Somatochlora metallica* in northeastern Europe is added. It is concluded that specimens show a mix of features of the ssp. *metallica* and *abocanica* and that the recognition of the latter in the region by H. Lohmann (1994, *Notul. odonol.* 4: 39-40) is unjustified. The value of the area as a reference for conservation is discussed and conservation priorities are stressed." (Authors)] Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands. E-mail: kalkmann@naturalis.nnm.nl

**2033.** Koyama, T. (Publ.) (2000): *Bulletin of The Hokkaido Odonatological Society* Vol. 12, December, 2001. *Bulletin of The Hokkaido Odonatological Society* Vol. 12: [Contents Cover photo: *Coenagrion terue* at the lake Chitose by Hiratsuka, Kazuhiro. WATAJI, Masashi, TAMURA, Sanae, YAMADA, Kozue, OTA, Kengo, KURAUCHI, Yohei and UEMURA, Takeji, The original fauna and its shift at the lower reach of the River Ishikari: 1; YOKOYAMA, Toru, A report of Odonata fauna of Ono Pond at Hokkaido University: 14; YOKOYAMA Toru & Fujimoto, Shigeyuki, A record of *Oligo-aeschna pryleri* from Nishioka Reservoir: 17; YOKOYAMA, Toru and TSUJI, Masahiko, Investigation of the survival of *Aeshna subarctica* at Kyogoku-cho: 18; FUTAHASHI, Ryo, FUTAHASHI, Hiroyuki and FUTAHASHI, Seishi, Sighting of *Rhyothemis fuliginosa* at Nishinoboro, Ebetsu City: 21; HIRATSUKA, Kazuhiro, Observation on dragonflies at Onuma Park at Nanae-cho: 24; HIRATSUKA, Kazuhiro, Collection of *Cordulia aenea amurensis* in Soya-shicho: 25; Editorial board, First and last records (literature data): 26; Editorial board, Phenological data in Hokkaido (1): 29; Editorial board, Table of the regional distribution of Odonata by shicho (12): 32; HIRATSUKA, Kazuhiro, Book review: 35; Editorial board, Report on conservation efforts of *Mortonagrion hirossei* at Nishioka Reservoir and Yamaguchi Prefecture: 36 Translation: Ishizawa, Naoyo]

- 2034.** Kreuz, P.; Kesel, A.; Göken, M.; Vehoff, H. (2000): Mechanische Eigenschaften biologischer Materialien am Beispiel der Insektenflügel. Biona-Report 14: 201-202. (in German). [Elasticity of membranulae of wings of *Aeshna cyanea* and *Orthetrum cancellatum* are tested.] Address: Kesel, Antonia, Department of Zoology, Technical Biology and Bionics; University of Saarland; D - 66041 Saarbrücken. E-mail: a.kesel@rz.uni-sb.de
- 2035.** Kuhn, K. (2000): Untersuchungen zum Vorkommen der Helm-Azurjungfer (*Coenagrion mercuriale* Charpentier, 1840) im mittleren Mindeltal (Insecta, Odonata). Ber. naturf. Ges. Augsburg 59: 39-50. (in German). [Bavaria, Germany; the general amendment of regional running waters in the past 170 years, and the distribution of the species in Bavaria are outlined, and known regional records are compiled. The habitats of five populations of *C. mercuriale* are described in detail and the habitat requirements are analysed. The velocity and aquatic and riparian vegetation are of principal importance, while the quality of water is but rarely of any significance in habitat choice of *C. mercuriale* in this area. In addition, abundance and accompanying odonate species are dealt with.] Address: Kuhn, K., Ravensburgerstr. 7, D-86150 Augsburg
- 2036.** Labeledzki, A. (2000): Dragonflies (Odonata) in the Bieszczady Mountains. In: Pawlowski, J. (Ed.): Osiłek Naukowy - Dydaktyczny Bieszczadzkiego Parku Narodowego. Monografie Bieszczadzkie VII. Bezkręgowce Bieszczadów Zachodnich ze Szczególnym uwzględnieniem Bielszczadzkiego Parku Narodowego Czesc. Ustrzyki Dolne: 157-163. (in Polish with English summary). ["Data from the literature and the results of contemporary studies indicate that the Bieszczady Mountains harbour 45 dragonfly species, which constitutes 62,5% of the native dragonfly fauna in Poland (72 species). In the Bieszczady National Park and its protection zone 30 dragonfly species have been identified. Among them there are 4 protected species (*Sympetma braueri* Bianchi, *Ophiogomphus cecilia* (Fourcroy), *Leucorrhinia albifrons* (Burmeister), *Leucorrhinia pectoralis* (Charpentier), of the total of 7 dragonfly species protected by law in Poland. In respect of the number of southern taxa, the BNP is one of the richest national parks in Poland. In the Bieszczady fauna the most interesting and valuable dragonfly species are *Ophiogomphus cecilia*, *Aeshna affinis*, *Hemianax ephippiger*, *Cordulegaster bidentatus*, *Crocothemis erythraea*, *Tarnetrum fonscolombii*, *Leucorrhinia albifrons*, and *Leucorrhinia pectoralis*. Among the most endangered species one should reckon taxa connected with small water bodies (*O. cecilia*, *C. bidentatus*, and *O. coerulescens*) and acid bog waters (*S. braueri*, *L. albifrons*, and *L. pectoralis*) because these species can not develop in replacement sites. The best form of conservation of rare and critically endangered species in the Bieszczady National Park and its protection zone should be protection of their biotopes, as recommended by the European Commission of Nature and Natural Resources Conservation. Individual species protection does not produce satisfactory results, as exemplified by *O. cecilia* in Poland." (Author) *Sympetrum meridionale* is also listed; this record is of special faunistic interest in central Europe.] Address: Labeledzki, A., Akademia Rolnicza, Katedra Entomologii Lesnej, ul. Wojska Polskiego 71c, PL-60-625 Poznan, Poland. E-mail: andrzejlab@poczta.onet.pl
- 2037.** Lindenia No. 33 (2000): LINDENIA. Notiziario dell'Ufficio nazionale italiano della Societa odonologica internazionale, Napoli. Lindenia No. 33: 140-142. (in Italian). [Announcements of odonatological symposia; faunistic notes: Anonymous: Le libellule di Campo Imperatore (pp. 140-141; L'Aquila prov., with a distribution map of *Orthetrum albistylum* in Italy); 11 *Hemianax ephippiger* sightings in Italy, in 2000, a poem, and a bibliographic note.] Address: Di C. D'Antonio, Via A. Falcone 386/b, 1-80127 Napoli, Italy; E-mail: lindenia@freemail.it
- 2038.** Lüderitz, V.; Pütter, S.; Heidecke, F.; Jüpner, R. (2000): Revitalisierung der Alten Elbe bei Magdeburg - ökologische und wasserwirtschaftliche Grundlagen. Abhandlungen und Berichte für Naturkunde, Magdeburg 23: 29-46. (in German with English summary). [A project for revitalisation of the old water course of river Elbe near Magdeburg, Sachsen-Anhalt, Germany is scheduled. An extensive study of biological and hydrological factors was realised including a survey of the Odonata. 38 species were traced including *Anaciaeschna isosceles*, *Aeshna viridis*, *Somatochlora flavomaculata*, *Leucorrhinia pectoralis*, and *Coenagrion lunulatum*. The species are arranged according to a classification of dragonflies in coenoses erected by J. Müller (1996).] Address: Heidecke, F., BUND Sachsen-Anhalt, Olvenstedter Str. 10, D-39108 Magdeburg, Germany
- 2039.** Marden, J.H.; Rowan, B. (2000): Growth, differential survival, and shifting sex ratio of free-living *Libellula pulchella* (Odonata: Libellulidae) dragonflies during adult maturation. Annals of the Entomological Society of America 93(3): 452-458. (in English). ["We performed a mark-recapture study to determine rates of change in body mass during maturation of adult free-living *L. pulchella* dragonflies. We captured, weighed, marked, and released 444 individuals (278 females, 166 males) that were 0-5 d old, including 261 that had emerged on the day of initial capture. On subsequent days, we recaptured 87 individuals at least once, and 6 were recaptured more than once. Nearly all new emergents (mean mass = 272 mg) that were recaptured after 1 or 2 d had lost mass (mean change = -29 mg), whereas most individuals recaptured after 3 days had gained mass (mean change = 109 mg; mean rate = 18 mg/d). Individuals that were heavier at emergence were much more likely to gain mass and to be recaptured at ages >1 or 2 d, thus suggesting differential survivorship based on size at emergence. Average growth rates of gainers were as high as 57 mg/d over a 5-d period. The sex ratio of newly emerged adults was heavily biased toward females (61%), but males were significantly larger at emergence, were more successful at gaining mass, and the sex ratio of individuals that ultimately gained mass did not differ significantly from 1:1. New emergents had empty guts and minimal fat, and changes in fat and water content explained very little of the average decrease in body mass observed for most new emergents. Overall, our data suggest that *L. pulchella* dragonflies face severe energy stress during early adult maturation, which strongly affects their demography." (Authors)] Address: Marden, J.H., Dept Biol., Pennsylvania St. University, 208 Mueller Laboratory, University Park, PA 16802, USA
- 2040.** McPeck, M.A. (2000): Predisposed to adapt? Clade-level differences in characters affecting swimming performance in damselflies. Evolution 54(6):

2072-2080. (in English). ["Previous studies have shown that two or three lineages of *Enallagma* damselflies, which historically co-existed with fish, recently invaded and adapted to living with large dragonfly predators in fishless waters. In adapting to live with these new predators, lineages shifted behaviorally to using swimming as an evasive tactic against attacking predators, evolved morphological features that made them faster swimmers, and evolved biochemical features to increase refueling strenuous activities like swimming. However, these habitat shifts have occurred in only one of the two primary clades within the genus in North America. Here, I show that clade-level differences exist among species in the ancestral, fish-lake habitat that should make habitat shifts easier to accomplish in the clade in which they have occurred. Specifically, fish-lake species in the clade in which habitat shifts occurred have much higher propensities to swim in the laboratory, swim faster when they do swim, and have higher mass-specific activities for arginine kinase than do species in the other primary clade, in which no extant species are found in fishless waters. These results are discussed in the context of the dynamics of founder events and the potential implications for community structure." (Authors)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**2041.** Oldham, M.J. (2000): Citrine Forktail (*Ischnura hastata*) in Ontario. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 7-9. (in English). [*I. hastata* "is reported from three sites in three SW Ontario counties (Kent, Essex, and Wellington) based on collections made in 1999. The three previous Ontario records are discussed and mapped and information is provided on habitat and identification." (Author)] Address: Oldham, M.J., Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Box 7000, 300 Water Street, Peterborough, Ontario K9J 8M5, Canada. E-mail: michael.oldham@mnr.eov.on.ca

**2042.** Oldham, M.J. (2000): Green-faced Clubtail (*Gomphus viridifrons*) in Ontario. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 51-52. (in English). [*G. viridifrons* "is reported for the second time in Ontario and Canada, based on two collections from Rainy River District in northwestern Ontario. The previous Canadian record, from Middlesex County in SW Ontario, is discussed, as is the distribution and status of this species elsewhere in North America." (Author)] Address: Oldham, M.J., Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Box 7000, 300 Water Street, Peterborough, Ontario K9J 8M5, Canada. E-mail: michael.oldham@mnr.eov.on.ca

**2043.** Oldham, M.J.; Elder, D.R. (2000): Noteworthy Odonata records from northwestern Ontario. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 28-33. (in English). ["Information is presented on 39 new county records for dragonflies and damselflies in the three northwestern Ontario districts of Rainy River, Kenora, and Thunder Bay. Rainy River District in particular has been little studied in the past and our records more than double the list of species known from the district, bringing the total to 73 odonate taxa. Some

of these records (e.g. for *Boyeria vinosa*, *Celithemis elisa*, *Chromagrion conditum*, *Enallagma exsulans*, *Epi-theca princeps*, *Pantala flavescens*, and *Sympetrum vicinum*) represent range extension of several hundred kilometers within the province. Notes are provided on habitat, abundance, collection details, and distribution and status in adjacent areas." (Authors)] Address: Elder, D.R., Ontario Ministry of Natural Resources, 922 Scott Street, Fort Frances, Ontario P9A 1J4, Canada. E-mail: darren.elder@mnr.gov.on.ca

**2044.** Oldham, M.J.; Sutherland, D.A.; Holder, M.L. (2000): Conservation Status Ranks for Ontario Odonata. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 1-7. (in English). ["The system of conservation status ranks used by Ontario's Natural Heritage Information Centre and similar conservation data centres throughout the Western Hemisphere is described, defined and applied to 164 Ontario dragonflies and damselflies. Global (Granks) and subnational (Srank) conservation status ranks are provided for all Ontario odonate species." (Authors)] Address: Oldham, M.J., Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Box 7000, 300 Water Street, Peterborough, Ontario K9J 8M5, Canada. E-mail: michael.oldham@mnr.eov.on.ca

**2045.** Pudwill, R. (2000): Kolonisation und Populationsdynamik von Libellen an neu angelegten Moorweihern (Odonata). Braunschweiger Naturk. Schr. 6(1): 57-67. (in German with English summary). ["The dragonfly fauna of a newly made acid and oligotrophic moor pond in Lower Saxony, Germany was investigated for 3 years. 25 species were recorded as adults, 16 of them as exuviae. The dragonfly fauna was a typical bog fauna. Characteristic species were: *Leucorrhinia dubia*, *Leucorrhinia rubicunda*, *Aeshna juncea*, and *Sympetrum danae*." (Author) Emergence patterns of *Anax imperator*, *Leucorrhinia dubia*, *L. rubicunda*, *Libellula quadrimaculata*, *Aeshna juncea*, and *Sympetrum danae* are documented in detail.] Address: Pudwill, R., Böttcherstr. 3, D-38518, Gifhorn, Germany

**2046.** Rademacher, M. (2000): Pilotprojekt "Konfliktarme Baggerseen". Ergebnisse und Erfahrungen am Beispiel der Region Oberrhein - Naturschutz-Asepkte. Beiträge der Akademie für Natur- und Umweltschutz Baden-Württemberg 29: 183-194. (in German). [Conflicts between excavation of gravel in the alluvium of River Rhine, Germany and succeeding use for different purposes are studied with special emphasize on nature conservation purposes. Different succession stadia of vegetation and odonate fauna in gravel pits and possibilities to maintain different old stadia are discussed.] Address: Rademacher, M., c/o Heidelberger Technology Center, Peter-Schumacher-Str. 8, D-69181 Leimen, Germany

**2047.** Rantala, M.J.; Koskimaki, J.; Taskinen, J.; Tynkkynen, K.; Suhonen, J. (2000): Immunocompetence, developmental stability and wingspot size in the damselfly *Calopteryx splendens* L.. Proc. of the Royal Society Biological Sciences Series B 267(1460): 2453-2457. (in English). ["*Calopteryx splendens* males exhibit a remarkable variation in wing pigmentation both within and between populations. In this study, we examined whether the wingspots of male *C. splendens* are related to male quality. We measured the nylon implant en-



capsulation rate for 85 males and found that males with larger wingspots had a faster encapsulation rate, indicating a better immunocompetence. We also found that the encapsulation rate was positively correlated with the density of haemocytes in the haemolymph. Another measurement of male quality, fluctuating asymmetry of wingspots, correlated negatively with the size of the wingspots. Males with asymmetrical wingspots also had lower encapsulation rates than more symmetrical males. Our results suggest that the size of wingspot is an indicator of male quality in *C. splendens*." (Authors)] Address: Rantala, M., Dept of Biological and Environmental Science, University of Jyväskylä, FIN-40351, Jyväskylä, Finland. E-mail: [marrant@st.jyu.fi](mailto:marrant@st.jyu.fi)

**2048.** Salm, P. (2000): Methodentests zur Erfassung von Arten der Anhänge II, IV und V der FFH-Richtlinie. Schriftenreihe für Landschaftspflege und Naturschutz 68: 137-151. (in German with English summary). [Article 17 of the Fauna-Flora-Habitat Directive requires the member states to produce a report at six-year intervals concerning the implications of the required measures and their effects on the Annex I habitat types and on the Annex II species. Therefore, the Federal Agency for Nature Conservation at Bonn, Germany carried out a research project „Selection of parameters and tests of methods to record and evaluate the conservation status of species and habitat types according to the Habitats Directive". The aim of the project was to suggest how these reporting obligations should be implemented. The study of species from the Habitats Directive Annexes served for the development of a standardised method for the conservation-orientated implementation of the reporting obligations. An overview of the species studied is given in this paper; as an example a study on *Aeshna viridis* is presented.] Address: Salm, Petra, c/o Landschaftsökologisches Planungsbüro Stelzig, Aldegreverwall 1, D-59594 Soest, Germany

**2049.** Schnabel, H. (2000): Der Libellenbestand eines Naturschutzteiches am Stadtrand von Wittichenau. Veröff. Mus. Westlausitz Kamenz 22: 57-64. (in German). [Saxonia, Germany; after restoration of the standing water, between 1996 and 1998 22 odonate species could be observed.] Address: Schnabel, H., Keula 16, D-02997 Wittichenau, Germany

**2050.** Schoorl, J. W. (2000): Notes on Central Asian dragonflies (Insecta: Odonata). Zoologische Mededelingen (Leiden) 74: 205-213. (in English). ["New and old material from Central Asia is published. In total 38 species are recorded from various locations in this region. For the more interesting species notes and figures are provided. One probably new *Ischnura* species is briefly described, but not formally named. For a, possibly new, subspecies of *Sympetrum sinaiticum* Dumont, 1977, a short diagnosis with figures is provided." (Author) The material studied was collected in Turkmenistan, Tajikistan, Kirgizistan, and Uzbekistan. *Calopteryx orientalis*, *Sympecma fusca*, *S. gobica*, *S. paedisca*, *Lestes barbarus*, *Callaeschna microstigma*, *Cordulegaster insignis*, *Sympetrum striolatum*, *S. vulgatum*, and *S. sinaiticum* are commented more in detail, and partly illustrated. Of some interest are the records of *Onychogomphus forcipatus* in the eastern part of its range and of the very rare *Ladona pontica*.] Address: Schoorl, J. W., Jr., F Simonszstraat 86 II, 1017 TK, Amsterdam, The Netherlands

**2051.** Stoks, R.; Johansson, F. (2000): Trading off mortality risk against foraging effort in damselflies that differ in life cycle length. *Oikos* 91(3): 559-567. (in English). ["Life history theory predicts that size and age at emergence depend on the slope and shape of the relationship between mortality rate and foraging effort. Given the high expected foraging effort in obligate univoltine species compared with semivoltine species we expected a low slope and an increase in foraging effort in the presence of a predator for the former and the opposite pattern for the latter. We tested these predictions in two damselfly species of the univoltine genus *Lestes*, and the semi-voltine genus *Coenagrion* when confronted with perch. We determined for each of the four study species the relationships between mortality rate and foraging effort at an individual level. As expected by the different growth demands associated with differences in life cycle length, both *Lestes* species had a higher foraging effort than the two *Coenagrion* species in the absence as well as in the presence of perch. As a result, *lestids* also suffered a higher mortality rate. The slope of the regression between mortality rate and foraging effort was, as predicted, lower for *lestids* than for *coenagrionids*, for one species pair. Despite this, and opposite to our prediction, the *lestids* decreased foraging effort even more than *coenagrionids* in the presence of perch. We discuss these findings in the light of life history responses in species that differ in life cycle length." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: [robby.stoks@bio.kuleuven.ac.be](mailto:robby.stoks@bio.kuleuven.ac.be)

**2052.** Stolzenburg, U. (2000): Nachweis der Arktischen Smaragdlibelle (*Somatochlora arctica* Zetterstedt, 1840) in der Radeburger Heide. Veröff. Mus. Westlausitz Kamenz 22: 93-96. (in German). [Saxonia, Germany, Landkreis Meißen, NSG "Töpfergrund in der Radeburger Heide"; *S. arctica* was recorded in June / July 2000 and May/June 2001. The habitat and co-occurring odonate species are described, and some conservation measures are proposed.] Address: Stolzenburg, U., Bärnsdorfer Str. 1a, D-01471 Berbisdorf, Germany

**2053.** Tanaka, S. (2000): Induction of darkening by corazonins in several species of Orthoptera and their possible presence in ten insect orders. *Applied Entomology & Zoology* 35(4): 509-517. (in English). ["(His7)-corazonin is known to play an important role in the control of body-color polymorphism in the migratory locust, *Locusta migratoria* (Orthoptera: Acrididae). Another neuropeptide, (Arg7)-corazonin, which has been isolated from other insects, is also known to induce darkening in this locust. These two neuropeptides were injected into nymphs of other orthopteran species to determine if they could induce darkening in those species. The test species belonged to 4 families: Acrididae (*Acrida cinerea*, *Gastrimargus marmoratus* and *Nomadacris succincta*), Catantopidae (*Oxya yezoensis*), Pyrgomorphidae (*Atractomorpha lata*), and Tettigoniidae (*Euconocephalus pallidus*). Except for the katydid, *E. pallidus*, all species injected with 1 nmol of (His7)-corazonin turned dark as compared with oil-injected controls. (Arg7)-corazonin showed a similar effect in the two acridid species tested, but no effect in the katydid. These results suggest that (His7)-corazonin or a similar neuropeptide may be involved in the control of body color in the locusts and grasshoppers, but not in the katydid. When a brain and/or corpora cardiaca (CC)

When a brain and/or corpora cardiaca (CC) taken from nymphs of each test species were implanted in albino nymphs of *L. migratoria*, dark color was induced in the latter, indicating that all test orthopterans contained some factor identical or similar to (His7)- or (Arg7)-corazonin. Likewise, brain-CC complexes from 47 other species of 10 insect orders including Orthoptera, Dermaptera, Dictyoptera, Isoptera, Homoptera, Hemiptera, Odonata, Hymenoptera, Lepidoptera, and Diptera induced darkening in albino locusts, whereas those from 8 species of Coleoptera all failed to do so." (Author)] Address: Tanaka, S., Department of Insect Physiology and Behavior, National Institute of Sericultural and Entomological Science, Tsukuba, Ibaraki, 305-8634, Japan. E-mail: stanaka@nises.affrc.go.jp

**2054.** Tannert, R.; Rupprecht, R. (2000): Erfassung der Insektenfauna im Nürnberger Reichswald bei Fischbach-Brunn von 1978 bis 1999, insbesondere Macro-, Microlepidoptera und Coleoptera. *Galathea* 16(3): 75-108. (in German with English summary). [Nürnberg, Bavaria, Germany; *Pyrrhosoma nymphula*, *Aeshna cyanea*] Address: Tannert, R., Josef Simon Str. 52, D-90473 Nürnberg, Germany

**2055.** Thomas, H. (2000): La boîte à bonnes bêtes. *Bulletin de la Société Linnéenne de Bordeaux* 28(3): 152-155. (in French). [*Leucorrhinia albifrons* was recorded in a bog on 29-06-1993 in Hostens, Département Gironde, France] Address: Thomas, H., 48 rue du Bocage, F-33200 Bordeaux, France. E-mail: pelobates@wanadoo.fr

**2056.** Witte, R (2000): Zuidelijke Glazenmaker (*Aeshna affinis*) ontdekt tijdens de excursie op de Schotsman. *Zeeuwse Prikkebeen* 8(3): 5-7. (in Dutch). [*A. affinis* and additional 8 Odonata are listed from the Schotsman, Zeeland prov., the Netherlands; 19-V11I-2000.] Address: Witte, R., Parelplein 36, NL-4337 MS Middelburg, The Netherlands. E-mail: Richard.Phoenix@planet.nl

**2057.** Zipfel, C.; Xylander, W.E.R. (2000): Zoogeographical investigations on *Cercion lindenii* (Odonata, Coenagrionidae) based on morphometry and isoenzyme-PAGE. *Zoology* 103 (Suppl. 3): 14. (in English). [Verbatim: *C. lindenii* occurs in Germany with at least two isolated populations that are considered to represent different subspecies. *C. lindenii* has been increasing its zoogeographical distribution significantly since the early eighties and the isolation may be overcome within the next years. In this investigation, therefore, 117 adult specimens from five localities have been investigated regarding their wing morphometry and protein differences in electrophoresis: two each from southwestern (Giessen, Hessen; St. Leon, Baden-Württemberg) and central (Rheine, Nordrhein-Westfalen; Hameln, Niedersachsen), and one from eastern Germany (Großer Schwansee, Brandenburg). Wing morphometry showed significant differences (euclidean distance and UPGMA) between the eastern and all other populations. The males of the eastern population had larger wings whereas there was no significant difference between the females. This corresponds to earlier results (Beutler, H., 1985, *Faun. Abh. Staatl. Mus. Tierk., Dresden* 49, 82) but may, however, not definitively indicate the occurrence of an eastern subspecies, whereas odonate populations from colder regions tend to have larger wings (Carius, W., 1993, Dissertation,

Univ. Bremen). 5 of 21 enzymes tested were polymorphic (IDH, esterases, PGM, GPD, diaphorase); in all cases but one the less frequent allele(s) occurred only in heterozygotes. Specimens from central Germany showed the highest heterozygosity (up to half of the population in IDH) whereas all other locations tested showed very high frequencies of one allele and low frequencies of all others or were homozygote. Also similarities between distant populations are often higher than to those from nearer locations. Regarding the isoenzyme patterns found, the German *C. lindenii* populations appear to be biochemically rather uniform and the variability is too low for postulating two subspecies. The evaluation of the total protein spectrum, however, showed that two groups can be differentiated: one group comprising all western populations investigated (Hameln, Rheine, Giessen, St. Leon) showed a homogeneous pattern of protein bands (within and between populations). The protein samples from the Schwansee population, however, differed significantly. The similarity between the Schwansee and the other populations decreased continuously from north to south.] Address: Zipfel, C., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany

## 2001

**2058.** Andrés, J.A.; Cordero Rivera, A. (2001): Survival rates in a natural population of the damselfly *Ceragrion tenellum*: effects of sex and female phenotype. *Ecological Entomology* 26: 341-346. (in English). ["1. *Ceragrion tenellum* females show genetic colour polymorphism. Androchrome (erythrogastrum) females are brightly (male-like) coloured while gynochrome females (typica and melanogastrum) show cryptic colouration. 2. Several hypotheses have been proposed to explain the existence of more than one female morph in damselfly populations. The reproductive isolation and intraspecific mimicry hypotheses predict greater survival of gynochrome females, while the density dependent hypothesis predicts no differential survival between morphs. 3. Mature males had greater recapture probability than females while the survival probability was similar for both sexes. Survival and recapture rates were similar for androchrome and gynochrome females. 4. Gynochrome females showed greater mortality or migration rate than androchrome females during the pre-reproductive period. This result is not predicted by the above hypotheses or by the null hypothesis that colour polymorphism is only maintained by random factors: founder effects, genetic drift, and migration." (Authors)] Address: Andrés, J.A., Department of Ecology and Environmental Science, Animal Ecology, SE-90187 Umeå, Sweden. E-mail: jose.andres@eg.umu.se

**2059.** Andrew, R.J. (2001): Evidence of sperm displacement in *Ischnura aurora* (Brauer) (Zygoptera: Coenagrionidae). *Odonatologica* 30(4): 435-439. (in English). ["Five spindle-shaped sperm 'pellets' (bundles) were found in the vagina of copulation-interrupted androchrome female. The second and third pellets had a long thin tail while the fourth had partly and the fifth completely disintegrated. In an other female, the vagina was packed with sperm material even though the sperm storage organs (spermatheca and bursa copulatrix) were completely filled. It is proposed that this sp. exhibits a transitional reproductive behaviour with respect to

sperm competition." (Author)] Address: Andrew, R.J., Department of Zoology, Shri Shivaji ESA's Science College, Congress Nagar, Nagpur - 440012 (MS), India

**2060.** Anholt, B.; Vorburger, C.; Knaus, P. (2001): Mark-recapture estimates of daily survival rates of two damselflies (*Coenagrion puella* and *Ischnura elegans*). *Canadian Journal of Zoology* 79(5): 895-899. (in English with French summary). ["Male-biased operational sex ratios are very common in sexually mature dragonflies. These may be due to differential survival or differences in time spent at the breeding site by the sexes. Because most studies are carried out at the breeding site, these two processes can be measured as survival rates or recapture rates using modern capture-mark-recapture methods. We marked 66 female and 233 male *Coenagrion puella*, and 137 female and 347 male *Ischnura elegans* during three capture periods spread over 18 days. Each time an animal was recaptured it was remarked so that the capture history of any captured animal could be readily identified. We recaptured 131 *C. puella* and 55 *I. elegans* at least once. We used the Cormack-Jolly-Seber model to estimate the daily probability of survival and recapture. The probability of recapture was, on average, more than three times higher for male *C. puella* (0.489) than females (0.133) with significant day to day variation. The daily probability of survival did not differ significantly between the sexes (0.860), with no significant variation among days. In contrast, in *I. elegans* the probability of recapture did not differ between the sexes (0.139 for the first 5 days; between 0.032 and 0.287 for the final 3 days), but the daily probability of surviving was much higher for males (0.812) than for females (0.579). Assuming that the sex ratio was unity at sexual maturity, the recapture and survival rates predicted well the sex ratio of the sample of *C. puella* but predicted more males than were observed in the sample of *I. elegans*. This suggests that male *I. elegans* may suffer higher mortality than females in the immature stage." (Authors)] Address: Anholt, B.R., Dept Biology, University of Victoria, PO Box 3020, Victoria, BC, V8W 3N5, Canada. E-mail: banholt@uvic.ca

**2061.** Arai, Y. (2001): Wonders of dragonflies (Tombo no Fushigi). Dobutsu-sha. Tokyo. Japan: 166 pp. (in Japanese). [This book based on the author's observations made in many years and the uniqueness of his hypotheses regarding the ecology of dragonflies. Therefore this book is enriched with many suggestions and problems to be investigated. Contents. Prologue. Part 1 Midair: Quiz on Odonata 12; wings are most important to fly 15; eyes more beautiful than jewels 17; though fragile legs are indispensable 19; aim of their lives 20; the reason why they do not stay at emergence sites 22; aka-tombo is not a name for the species 23; travel for summering 25; how to clarify the enigma 27; doubt on the accepted view 29; ransoceanic dragonflies 30; coming over to Chichibu City 31; cause of the death 34; why do they go north? 35; rendez-vous sites of both males and females 37; males' strategies for mating 39; Shiokara-tombo (male of *Orthetrum albistylum speciosum*) and Mugiwara-tombo (female of the species) 42; need not hold territories 45; awaiting females at roosting sites 47; process of copulation 48; gentle courtship 52; refusal of copulation 54; two ways of prevention of unfaithfulness of females 57; choose ways to suit cases 60; various ways of oviposition 61; oviposition at midnight 64; one hypothesis 66; intriguing styles of perching 68; dragonflies at night 70; bathing in the

water and dress up 72; predators 74; overwintering 76; another way of wintering 77; catching dragonflies 80; smart catching of dragonflies 81. Part 2 Underwater: What is a larva? 86; their lives 88; how to breed larvae 89; preparation for emergence 92; dramatic emergence 93; the first step of the underwater life 95; lotic larvae 98; lentic larvae 101; dragonflies living in the rice paddies 102; tragedies of *Sympetrum frequens* 104; larvae living in different habitats 106; enigma of *Oligoaeschna pryleri* 108; morphology of larvae 110; how to distinguish larvae 113; feed of larvae 113; four ways of lives 116; predators of larvae 117; ways to protect themselves 119; death mimicry 121; go downstream 122; why larvae go downstream? 124; survival from drought 126; larvae tolerant or intolerant of drought 130; one more step to the wonderful world 132. Part 3 Easy way to distinguish 30 species: Let's learn about familiar dragonflies 136; there is no rule without exceptions 137; males have penes 137; three groups of Odonata 139; Aeshnidae 140; Cordulegastridae 141; Corduliidae 141; Libellulidae 142; Gomphidae 146; Calopterygidae 146; Coenagrionidae 147; Platycnemididae 148; Lestidae 149. Epilogue 162. Index 165. Translation: Naoya Ishizawa] Address: Arai, Yutaka, 1233-2, Sueno, Yorii-machi, Osato-gun, Saitama Pref., 369-1205. Japan. Published by Dobutsu-sha, 4-27-4, Koenji-kita, Suginami-ku, Tokyo, 166-0002, Japan. Price: 1,500 Yen (tax 75 Yen + postage added)

**2062.** Artiss, T.; Schultz, T.R.; Polhemus, D.A.; Simon, C. (2001): Molecular phylogenetic analysis of the dragonfly genera *Libellula*, *Ladona*, and *Plathemis* (Odonata: Libellulidae) based on mitochondrial cytochrome oxidase I and 16S rRNA sequence data. *Molecular Phylogenetics & Evolution* 18(3): 348-361. (in English). ["Molecular phylogenetic relationships among members of the odonate genus *Libellula* (Odonata: Anisoptera: Libellulidae) were examined using 735 bp of mitochondrial COI and 416 bp of 16S ribosomal RNA gene sequences. Considerable debate exists over several relationships within *Libellula*, as well over the status of two putative genera often placed as subgenera within *Libellula*: *Ladona* and *Plathemis*. Parsimony and maximum-likelihood analyses of the separate and combined data sets indicate that *Plathemis* is basal and monophyletic and that *Ladona* is the sister clade to the remainder of *Libellula sensu stricto* (s.s.) (all species within the genus *Libellula*, excluding *Plathemis* and *Ladona*). Moreover, two European taxa, *Libellula fulva* and *L. depressa*, were found to occupy a sister group relationship within the *Ladona* clade. Relationships within *Libellula s.s.* are less well resolved. However, monophyletic lineages within the genus are largely consistent with morphologically based subgeneric classifications. Although tree topologies from each analysis differed in some details, the differences were in no case statistically significant. The analysis of the combined COI and 16S data yielded trees with overall stronger support than analyses of either gene alone. Several analyses failed to support the monophyly of *Libellula sensu lato* due to the inclusion of one or more outgroup species. However, statistical comparisons of topologies produced by unconstrained analyses and analyses in which the monophyly of *Libellula* was constrained indicate that any differences are nonsignificant. Based on morphological data, we therefore reject the paraphyly of *Libellula* and accept the outgroup status of *Orthemis ferruginea* and *Pachydiplax longipennis*." (Authors)] Address: Artiss, T., Lakeside School, 14050 1st Avenue NE, Seat-



tle, WA, 98125. USA. E-mail: thomas.artiss@lakesideschool.org

**2063.** Babbitt, K.J. (2001): Behaviour and growth of southern Leopard frog (*Rana sphenoccephala*) tadpoles: Effects of food and predation risk. *Canadian Journal of Zoology* 79(5): 809-814. (in English with French summary). ["I examined the effects of a nonlethal predator, larvae of the odonate *Anax junius*, and food-resource level on behaviour and growth of larval southern Leopard frogs (*Rana sphenoccephala*) to test whether the strength of effects of a nonlethal predator was influenced by background resource level. I crossed two levels of food resources, growth-limiting and non-growth-limiting, with the presence or absence of *A. junius*. Tadpoles responded to predators by altering spatial distribution and activity. When predators were present, tadpoles on both food treatments had similar low levels of activity, but tadpoles on the nonlimiting food treatment showed a much larger reduction in activity than tadpoles on the growth-limiting treatment. Tadpoles on both food treatments delayed metamorphosis when exposed to predators. Growth and size at metamorphosis were affected significantly by food treatment but not by predator treatment. However, the direction of response to predators differed. Tadpoles on the growth-limiting treatment were larger at metamorphosis and grew faster when exposed to predators; the opposite was true for tadpoles on the non-growth-limited food treatment. This raises the interesting possibility that for some species experiencing low resource availability, predators may induce a behaviourally mediated positive effect on growth." (Author)] Address: Babbitt K J, Dept of Natural Resources, University of New Hampshire, Durham, NH, 03824: kbabbitt@christa.unh.edu USA

**2064.** Baptista, D.F.; Dorville, L.; Buss, D.F.; Nessiamian, J.L. (2001): Spatial and temporal organization of aquatic insects assemblages in the longitudinal gradient of a tropical river. *Brazilian Journal of Biology* 61(2): 295-304. (in English with Portuguese summary). ["The distribution and abundance of aquatic insects were studied in the longitudinal gradient of the watershed of Macae River, a coastal Atlantic Forest river in Southeastern Brazil. Sampling stations were selected in the first, second, fourth, fifth, and sixth orders and sampled in April, July, and October 1995. This represented the end of the rainy season, the dry season, and the beginning of another rainy season, respectively. In each month four samples were collected using a Surber sampler from each of the following substrates: sand, litter deposited in pool areas, litter in riffle areas, and stones. A total of 46,431 specimens of aquatic insects belonging to ten orders were obtained. The data were analyzed by the multivariate methodologies of Correspondence Analysis (CA) and Cluster Analysis (UPGMA) using the similarity index of Morisita, for all three months. Both showed a significant faunal disruption in the river, which can be divided in two sections: the upper one, from first to fourth orders, and the lower section, including fifth and sixth orders. The same results were obtained with presence-absence matrices, using Jaccard similarity index, showing that the changes are not only due to quantitative differences. A Mantel test was used to compare the assemblage composition temporally and no difference was detected between the three months. Moreover, a Canonical Correspondence Analysis (CCA) was applied to the data to check which of the 14 physical and chemical variables significantly

explained macro-invertebrate community variation. The most significant variables were conductivity, CPOM, and pH for the upper stations (1st, 2nd and 4th orders), and alkalinity, FPOM, and HCO<sub>3</sub> for the lower stations (5th and 6th orders)." (Authors)] Address: Baptista, D.F., Laboratorio de Avaliacao e Promocao da Saude Ambiental, Departamento de Biologia, IOC, Fiocruz, Av. Brasil, 4.365, CEP 21045-900, Manguinhos, Rio de Janeiro. Brazil. E-mail: darcilio@gene.dbbm.fiocruz.br

**2065.** Benke, A.C.; Wallace, J.B.; Harrison, J.W.; Koebel, J.W. (2001): Food web quantification using secondary production analysis: Predaceous invertebrates of the snag habitat in a subtropical river. *Freshwater Biology* 46(3): 329-346. (in English). ["1. Secondary production was estimated for Plecoptera, Odonata and Megaloptera (mostly large predators) occurring on the snag habitat of a subtropical blackwater river in the southeastern U.S.A. Coastal Plain for 2 years. Production estimates and gut analyses were used in estimating species-specific ingestion to construct a quantitative foodweb of the predator portion of the invertebrate assemblage. Neither basal resources (e.g. detritus) nor predaceous vertebrates (e.g. fishes) were considered in this analysis. A discharge-specific model of snag-habitat availability was used to convert values per m<sup>2</sup> of snag surface to values per m<sup>2</sup> of river bed. 2. These three orders included the major large predators on the snag habitat, as well as two detritivorous stoneflies. The major predators were the hellgrammite (*Corydalus cornutus*), five perlid stoneflies (*Paragnetina kansensis*, *Perlesta placida*, *Neoperla clymene*, *Acroneturia evoluta* and *A. abnormis*) and two dragonflies (*Neurocordulia molesta* and *Boyeria vinosa*). The detritivores were *Pteronarcys dorsata* and *Taeniopteryx lita*. 3. Total predator production was high, but varied from only 7.1 to 7.4 g dry mass (DM) m<sup>-2</sup> y<sup>-1</sup> of snag surface (2.4-2.7 g DM m<sup>-2</sup> y<sup>-1</sup> of river bed) over two years. *Corydalus* was the largest predator and had the highest production (2.8-3.1 g DM m<sup>-2</sup> of snag surface). The most productive stoneflies were *Perlesta* (0.7-1.0 g DM m<sup>-2</sup> of snag surface) and *Paragnetina* (1.0-1.3 g DM m<sup>-2</sup> of snag surface). The most productive dragonfly was *Neurocordulia* (0.7-1.9 g DM m<sup>-2</sup> of snag surface). Production of the non-predaceous stoneflies was 1.0-2.3 g DM m<sup>-2</sup> of snag surface. Production values per m<sup>2</sup> of river bed were 2-3.5 times lower than the values per m<sup>2</sup> snag surface. 4. Measurement of ingestion fluxes within the predator portion of the food web showed that predaceous invertebrates were primarily supported by chironomid and mayfly prey. However, the greatest consumption of chironomids and mayflies was by omnivorous hydroptychid caddisflies, which had a considerably higher production than the larger predators. There was a hierarchy of feeding with *Corydalus* as top predator consuming all other groups, followed in order by dragonflies, stoneflies and hydroptychids. Although the feeding hierarchy suggested the presence of four predatory trophic levels within the invertebrate assemblage, calculations of trophic position indicated there were less than two. With primary consumers (e.g. midges) having a trophic position of 2, *Corydalus* had a trophic position of only 3.5. 5. A relatively high fraction of invertebrate production was consumed by predaceous invertebrates, ranging from 9 to > 100% for various primary consumer groups, with total consumption representing 52% of total production. Because these estimates do not include vertebrate consumption or emergence, it means that a high fraction of larval mortality is due to predation."

(Authors)] Address: Benke, A.C., Department of Biological Sciences, University of Alabama, Tuscaloosa, AL, 35487. USA. E-mail: abenke@biology.as.ua.edu

**2066.** Benstead, J.P.; Barnes, K.H.; Pringle, C.M. (2001): Diet, activity patterns, foraging movement and responses to deforestation of the aquatic tenrec *Limnogale mergulus* (Lipotyphla: Tenrecidae) in eastern Madagascar. *Journal of Zoology (London)* 254(1): 119-129. (in English). ["The aquatic or web-footed tenrec *Limnogale mergulus* is a semi-aquatic lipotyphlan insectivore known only from stream habitats of eastern Madagascar. *Limnogale* is considered a high conservation priority because of its rarity, suspected vulnerability to habitat degradation, and unique ecological niche on the island. However, its ecology and behaviour remain poorly understood. Quantitative faecal analysis and radio-tracking were used to study the diet and foraging activity of *Limnogale* in eastern Madagascar. Faecal pellet counts along forest and zero-canopy streams were also conducted to examine the response of aquatic tenrec populations to catchment deforestation. Faecal analysis indicated that the diet of *Limnogale* consists mainly of larval and adult aquatic insects, larval anurans and crayfishes. The most important prey were Ephemeroptera, Odonata and Trichoptera larvae. Diets did not differ substantially between forest and zero-canopy streams. Radio-tracking of two individuals indicated that *Limnogale* is strictly nocturnal and remains in streamside burrows during daylight. Nocturnal movement was restricted solely to stream channels and consisted of active foraging by swimming and diving. Distance travelled per night ranged from 200 to 1550 m along the stream channel (means 1067 and 860 m, respectively). The total lengths of stream channel used by the two aquatic tenrecs during each radio-tracking study were 1160 and 505 m, respectively. Faecal pellet counts along forest and zero-canopy streams suggested that *Limnogale* was at least as abundant in zero-canopy streams. This finding suggests that *Limnogale* is not an obligate forest species; however, it preys on benthic communities that are extremely vulnerable to sedimentation. Control of excessive sedimentation and maintenance of healthy benthic communities are essential to *Limnogale* conservation. We include an updated list of known sites for *Limnogale* and recommend the use of faecal pellet surveys to assess the current distribution of the species." (Authors)] Address: Benstead, J.P., Institute of Ecology, University of Georgia, Athens, GA, 30602. USA. E-mail: benstead@sparc.ecology.uga.edu

**2067.** Benzler, A. (2001): Seltene, bedrohte und endemische Tier- und Pflanzenarten - Auswahl von Artengruppen und Arten für ein bundesweites Naturschutzmonitoring. *Natur und Landschaft* 76(2): 70-87. (in German with English summary). ["In 1999 a nationwide monitoring concept for nature conservation was elaborated by a working group comprising experts of the nature conservation authorities of the German federal states (Länder) and the German Federal Agency for Nature Conservation. This was spurred by the lack of biotic data on national level, which is needed urgently in order to evaluate biodiversity status and trends, and to provide arguments for the policy process. This paper considers only one component of the overall concept, namely the monitoring of rare, threatened and endemic animal and plant species. Three groups of species are considered; species which must be monitored under

commitments resulting from international agreements and directives, species which are the object of particular German responsibility (e.g. endemic species) and species which are the focus of conflicts between nature conservation and land-use interests. The objective of monitoring is to meet the need for nation-wide representative data on these species. The paper describes the methods of selecting systematic species groups and species, and presents the species lists in an annex. There is a need for further work to develop monitoring methods." *Aeshna viridis*, *Coenagrion hylas*, *C. mercuriale*, *Epitheca bimaculata*, *Stylurus flavipes*, *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis*, *Nehalennia speciosa*, *Ophiogomphus cecilia*, *Oxygastra curtisii*, and *Sympetma paedisca* are selected for odonatological monitoring.] Address: Benzler, A., Bundesamt für Naturschutz, Konstantinstr. 110, D-53179 Bonn, Germany

**2068.** Bilton, D.T.; Foggo, A.; Rundle, S.D. (2001): Size, permanence and the proportion of predators in ponds. *Arch. Hydrobiol.* 151(3): 451-458. (in English). ["The species richness and proportion of predatory species were investigated in ponds of differing area and permanence on the Lizard Peninsula, West Cornwall, UK, an area with a high density of seasonally fluctuating waterbodies, and a rich aquatic biota. A total of 169 taxa [including "Odonata"] were identified through monthly sampling of 16 ponds. Permanence, rather than pond area, was strongly related to overall species richness and the proportion of predators found. These results contrast with other studies which have shown strong effects of area on such community parameters. We suggest that issues of scale, and differences in regional species pools account for these contrasting results, and should be considered when searching for common factors underlying community attributes." (Authors)] Address: Bilton, D.T., Department of Biological Sciences & Plymouth Environmental Research Centre, University of Plymouth, Drake Circus, Plymouth PL4 8 AA, UK. E-mail: dbilton@plym.ac.uk

**2069.** Bönsel, A. (2001): Zusammenhänge zwischen der Gewässereutrophierung und der Ausbreitung von *Erythromma viridulum* (CHARP. 1840) (Zygoptera: Coenagrionidae), am Beispiel von Mecklenburg-Vorpommern. *Zeitschrift für Ökologie und Naturschutz* 9: 211-217. (in German with English summary). ["*E. viridulum* obviously established local populations only during the last 10-20 years in the northern part of Mecklenburg-Vorpommern. Only in the southern part the species was found already in the 1960's. At the end of the 20th century it occurred all over the county [...]. The phenomenon of expansion was not connected with the global climate change. It was rather the water eutrophication that created the conditions for a successful establishment of the originally Mediterranean species in northern Central Europe. Eutrophication supported the expansion of *Ceratophyllum* species. The enormous biomass production caused foul sludge deposits which entailed a decreasing water level. Shallow waters warm up rapidly. So numerous thermically favourable larval waters were created for the Mediterranean species. Besides few predatory species or other dragonflies were found amongst the tangle of the *Ceratophyllum*-population. This missing pressure by competition and predators is also considered as a favourable habitat constellation for the establishment of *Erythromma viridulum*." (Author)] Address: Bönsel, A., Vasenbusch 15, D-18337 Gresen-

D-18337 Gresenhorst, Germany. E-mail: andre.boensel@gmx.de

**2070.** Borisov, S.N.; Haritonov, A.Y. (2001): A study of dragonflies of central Asian Nature Reserves. *Belyshevia* 1(1): 2-5. (in Russian, with short English summary). [In Central Asia 15 Nature Reserves were established; 7 of them - the one with information of their odonate fauna - are shortly characterised. The Odonata are presented in a checklist with information on their presence in the very Nature Reserve. It is not clear if the list was checked critically, for it seems impossible that e.g. *Coenagrion scitulum* is occurring in the region (The species was given for the nature Reserve Ramit).] Address: Haritonov, A.YU.; Laboratory of Insect Ecology, Biological Institute of the Siberian Branch of the Academy of Sciences, Frunze str. 11, RUS-630091 Novosibirsk, Russia

**2071.** Braune, P.; Rolff, J. (2001): Parasitism and survival in a damselfly: Does host sex matter? *Proc. Royal Soc. Biol. Sci. Ser. B* 268(1472): 1133-1137. (in English). ["We present experimental data on the survivorship of damselflies infested by parasitic water mites from a population in field cages. In addition, we show correlative laboratory data under simulated severe weather conditions. In the manipulative experiment, parasitized females' individual condition, which was measured as weight at emergence, was an important determinant of survival under field conditions. In contrast, such a relationship did not occur in males and unparasitized females. It was found in the laboratory experiment that water mites as well as weight at emergence both contributed significantly to the reduced survivorship of male and female damselflies. It was concluded that the impact of parasitism depends on environmental conditions and that host sexes differ in their responses to parasitism. This is discussed in the light of immunocompetence in invertebrates." (Authors)] Address: Rolff, J., Evolutionary Ecology Group, Department of Animal and Plant Sciences, University of Sheffield, Sheffield, S10 2TN. UK. E-mail: jor@sheffield.ac.uk

**2072.** Bree, D. (2001): Further notes on the Odonata of Sandbanks Provincial Park. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 24-26. (in English) ["Records on flight periods, abundance, and behaviour are provided for 17 species of odonates from Sandbanks Provincial Park, Ontario. *Aeshna canadensis*, *Sympetrum internum*, and *S. semicinctum* are added to the park list, while *Argia jumipennis violacea* is removed." (Author)] Address: Bree, D., Box 123, Bloomfield, Ontario K0K 1G0, Canada. E-mail: dbree@post.kosone.com

**2073.** Buczynski, P. (2001): Dragonflies (Insecta: Odonata) of the Krzczonowski Landscape Park. *Park Narodowe i Rezerwat Przyrody* 20(1): 63-78. (in Polish with English summary). [The area of Krzczonowski Landscape Park is deforested and impacted by an intensive agriculture. Water basins occur almost exclusively in river valleys. The rivers Gieiczew, Gielczewka and Olszanka drain the area. They are free of organic pollution. Only the Olszanka is impacted by poultry droppings. The rivers are partially regulated and their valleys are reclaimed. Dragonflies were studied in the years 1998 - 2000 at 38 localities of which only 26 are dragonfly habitats. 37 species have been found. The

species number is low, especially compared with other protected areas in the SE Poland (e.g. Poleski National Park: 52 species, Janowskie Forests Landscape Park: 58). Only 13 species occurred outside of the river valleys, but all species are representatives of the "valley-fauna": 15 species were collected in the Olszanka, 24 in the GieJczewka, and 36 in the Gietczew valley. The highest diversity was found at ponds and small pools.] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**2074.** Buczynski, P. (2001): The first record of *Coenagrion armatum* (Charpentier, 1840) (Odonata: Coenagrionidae) from the Roztocze Upland. *Wiad. entomol.* 20(1-2): 87-88. (in Polish). [The in Poland "Critically Endangered" *C. armatum* was discovered in May 2000 in the floodplain of River Wieprz near the village Gućiów. Locality, habitat and co-occurring species are described, and the current situation of the species in Poland is discussed.] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**2075.** Buskirk, J. van; Saxer, G. (2001): Delayed costs of an induced defense in tadpoles? Morphology, hopping, and development rate at metamorphosis. *Evolution* 55(4): 821-829. (in English). ["Models for the evolution of plasticity predict that individuals having phenotypes induced by exposure to enemies should experience relatively low fitness when enemies are absent. However, costs of induced phenotypes have been difficult to find in both plants and animals, perhaps because costs are expressed at later stages in the life cycle. We searched for delayed costs of an induced defense in larvae of the water frog *Rana ridibunda*, which exhibits strong phenotypic responses to predators. Tadpoles grew to metamorphosis in outdoor artificial ponds, in either the presence or absence of *Aeshna* dragonfly larvae confined within cages. We collected metamorphs at forelimb emergence, estimated their development rate until tail resorption was complete, and measured their body and leg shape and hopping performance. Development rate through metamorphosis reflects the duration of a transitional period during which metamorphs are especially vulnerable to predators, and hopping performance may reflect ability to escape predators. Froglets from the dragonfly treatment lost mass through metamorphosis significantly faster than those from predator-free ponds, but they resorbed their tails at about the same rate, despite the fact that their tails were relatively large to begin with. Froglets developing from predator-induced tadpoles had shorter, more muscular legs, and hopped 5% longer distances (difference not significant). Therefore, producing an induced defense against insect predators during the tadpole stage did not exact a cost during or immediately after metamorphosis; if anything, tadpoles with the predator-induced phenotype gave rise to more vigorous froglets. These results focus attention on other costs of the induced phenotype, as well as alternative explanations for plasticity that do not rely on direct fitness trade-offs." (Authors)] Address: Buskirk, J. van, Institute of Zoology, University of Zürich, CH-8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

**2076.** Buskirk, J. van (2001): Specific induced responses to different predator species in anuran larvae. *Jour. evol. biol.* 14(3): 482-489. (in English). ["Models of de-



fence against multiple enemies predict that specialized responses to each enemy should evolve only under restrictive conditions. Nevertheless, tadpoles of *Rana temporaria* can differentiate among several predator species. Small tadpoles used a refuge when *Notonecta* backswimmers were in the pond, but showed a weaker hiding response to adult *Triturus alpestris* newts and no response to aeshnid dragonfly larvae (*Aeshna* and *Anax*). All predators caused a decline in feeding and swimming activity. Large tadpoles reserved the strongest behavioural response for dragonflies, while *Triturus* caused no response. The shift during development suggests that tadpoles distinguished among predators, rather than exhibiting a graded dosage response to a single cue associated with predation. Information on habitat distributions of predators suggests that they are regularly encountered, which would facilitate evolution of adaptive behavioural responses. Morphological responses to all predators were similar, perhaps because similar morphologies defend against all four predators. The evolutionary maintenance of specialized responses to multiple predators may be possible because adaptive responses do not conflict and the predators themselves do not interact strongly." (Author)] Address: Buskirk, J. van, Inst. Zool., Univ. of Zürich, CH-8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

**2077.** Carchini, G.; Chiarotti, F.; Di Domenico, M.; Mattocchia, M.; Paganotti, G. (2001): Fluctuating asymmetry, mating success, body size and heterozygosity in *Coenagrion scitulum* (Rambur) (Odonata: Coenagrionidae). *Animal Behaviour* 61(3): 661-669. (in English). ["For decades fluctuating asymmetry (FA) has been considered a good descriptor of developmental stability. Correlations have been shown between FA and several fitness components, including mating success and heterozygosity level. However, some doubts have been expressed about the generalization of these results, perhaps because of bias towards positive results and a poor critical approach in the first phase of FA studies. Studies on Odonata are scarce and are concentrated on the Coenagrionidae family, with contrasting results in the relationships between FA and mating success, size and other fitness components. We investigated the relationships between FA expressed as right - left wing length ( $R - L$ ), body size expressed as  $(R+L)/2$ , multilocus and single locus heterozygosity assessed by allozyme electrophoresis and short-term mating success (SMS) assessed from the status (mated or not) of the males at the moment of collection. We collected 260 males from a breeding population. The data were analysed by both univariate and multifactorial statistical methods. After excluding a correlation between FA and body size, we checked the presence of a true FA by using tests for normality, directional asymmetry, antisymmetry and difference from the interindividual variations. The results showed no correlation between FA (either signed or absolute) and heterozygosity, body size and SMS, while heterozygosity was clearly positively correlated with body size and with SMS. Our data suggest an effect of the presence of some particular alleles on SMS, instead of an effect of the multilocus heterozygosity, even if the presence of only three polymorphic loci weakens the conclusions. Finally, no correlation was found between body size and SMS." (Authors)] Address: Carchini, G., Dipartimento di Biologia, Università 'Tor Vergata', Via della Ricerca Scientifica, I-00133, Roma. Italy. E-mail: carchini@uniroma2.it

**2078.** Cashatt, E.D.; Vogt, T.E. (2001): Description of the larva of *Somatochlora hineana* with a key to the larvae of the North American species of *Somatochlora* (Odonata: Corduliidae). *Int. Jour. Odonatology* 4(2): 93-105. (in English). ["A detailed description of the final stadium of *Somatochlora hineana*, with brief notes on the penultimate stadium, is presented. An illustration of the entire larva and separate line drawings of the labium and dorsal and lateral views of the abdomen are also included. The habitat of the larva is discussed briefly. Combinations of diagnostic characters are used for distinguishing the *S. hineana* larva from its allied congeners.[...]" (Authors)] Address: Cashatt, E.D., Zoology Section, Illinois State Museum Research and Collection Center, 1011 East Ash, Springfield, IL 62703, USA. E-mail: cashatt@museum.state.il.us

**2079.** Chivers, D.; Mirza, R.S. (2001): Importance of predator diet cues in responses of larval wood frogs to fish and invertebrate predators. *Journal of Chemical Ecology* 27(1): 45-51. (in English). ["We examined the effects of predator diet on the antipredator responses of larval woodfrogs (*Rana sylvatica*). We found that tadpoles showed stronger responses to fish (*Perca flavescens*) than were fed tadpoles than those fed invertebrates. Similarly, we found that tadpoles responded more strongly to larval dragonflies (*Anax* spp.) fed tadpoles than to dragonflies fed invertebrates. The overall intensity of response of tadpoles to fish was much stronger than that to dragonflies. Predator diet effects are not ubiquitous in predator-prey systems. We discuss possible reasons why predator diet effects are seen in some, but not all, predator-prey systems." (Authors)] Address: Chivers, D., Department of Biology, University of Saskatchewan, 112 Science Place, Saskatoon, Saskatchewan, S7N 5E2. Canada. E-mail: doug.chivers@usask.ca

**2080.** Clausnitzer, H.-J. (2001): Auswirkungen von Naturschutzmaßnahmen auf Libellen und Lurche: Ökologische Verbesserung an Bächen durch Rückbau von Teichen. *Natur und Landschaft* 76(4): 145-151. (in German with English summary). ["In the basin of the Lutter, a small river in Lower Saxony (Germany), three large fishpond areas through which the river flows were converted with the aim of ecological restoration of the river. Two former fishpond areas are developing into oligotrophic spring fens; the river flows through these. It does not flow through the third former fishpond area; here, after the removal of dams, small pools, ponds and ephemeral waters have resulted. The article describes the effects of these measures on amphibians and dragonflies. All previous amphibian species are still present, but *Bufo bufo* is not expected to have much breeding success in the future. *Rana esculenta* is also reproducing less. On the other hand, *Rana temporaria* is profiting from the modification, with increasing populations. As concerns dragonflies, in the two oligotrophic fens seven widespread and frequent species have decreased or disappeared, while seven stenoeious species of swamps and springs have settled. In the third area, with new habitats formed by ponds and pools, there have been only two new species settlements, while four species have disappeared. The removal of the commercial fishponds in the river basin has had positive ecological effects in total, as rare habitats have developed for stenoeious and endangered species. Losses are limited to euryoeious and therefore widespread species." (Author) Populations of *Ceragrion*

tenellum, *Orthetrum coerulescens*, *Sympetrum pedemontanum*, *Coenagrion hastulatum*, and *Aeshna juncea* increased, populations of *Lestes viridis*, *Erythromma najas*, *Aeshna mixta*, and *A. grandis* decreased. *Calopteryx splendens*, *C. virgo*, *Cordulegaster boltonii*, *Lestes dryas*, *Sympetrum flaveolum*, *Ischnura pumilio*, and *Libellula depressa* are new.] Address: Clausnitzer, H.-J., Eichenstr. 11, D-29348 Eschede, Germany.

**2081.** Clausnitzer, V. (2001): Notes on *Trithemis bifida* and *T. donaldsoni* (Odonata: Libellulidae). *Int. Jour. Odonatology* 4(2): 107-117. (in English). ["*Trithemis bifida* is reported for the first time from East Africa. Previously there were only two Afrotropical records of this species: one male from Zambia and one male from the Ivory Coast. The male of *T. bifida* is described and compared with the closely related *T. donaldsoni* which is also found in East Africa. Taxonomically relevant structures are figured, differential features between both species are described and notes on the ecology of *T. bifida* are given."(Author)] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: wesche@mail.uni-marburg.de

**2082.** Cleto, F.S.E.N.; Walker, I. (2001): Efeitos da ocupação urbana sobre a macrofauna de invertebrados aquáticos de um igarapé da cidade de Manaus/AM - Amazonia central. *Acta Amazonica* 31(1): 69-89. (in Portuguese with English summary). ["Effects of urban occupation on the aquatic macroinvertebrates from a small stream of Manaus, Amazonas State, Brazil. - Conditions of water quality and of the invertebrate fauna in the stream Mindu, originating in undisturbed forest area and crossing the city of Manaus/AM, were studied from 1993 to 1995. Deforestation and invasive colonization along the headwater streams and pollution in the city center caused drastic alterations of the limnological and faunistic conditions. Thus, water temperature, conductivity, pH values and quantity of sediments in suspension rose significantly, while oxygen levels dropped. Together with the natural reduction of flow speed and increased solar radiation these alterations resulted in eutrophication and a marked change of the composition of the invertebrate fauna." (Authors)] Address: Cleto, F.S. & Walker, Ilse, INPA/CPEC/PPG, Manaus, AM, Brasil, E-mail: sergiocleto@bol.com.br, iwalker@inpa.gov.br

**2083.** Córdoba-Aguilar, A. (2001): Sperm displacement ability in the damselfly *Calopteryx haemorrhoidalis asturica* Ocharan: no effect of male age, territorial status, copulation duration and syn-copulatory behaviour (Zygoptera: Calopterygidae). *Odonatologica* 30(4): 375-380. (in English). ["During copulation and before sperm transfer, odonate males are able to manipulate rival sperm stored in the 9 sperm storage organs (usually the bursa copulatrix and spermathecae). Males of the territorial *C. h. asturica* use 2 mechanisms for this. Bursal sperm is removed physically whilst spermathecal sperm is displaced via aedeagal stimulation (through a series of abdominal flexions) of the female sensory system that controls spermathecal sperm ejection. Most bursal sperm is removed but there is individual variation in spermathecal sperm displacement. Previous results have found that this variation is related to aedeagal width. In this paper 4 variables that may also explain variation in spermathecal sperm displacement ability are investigated: Male age and status (territorial and nonterritorial), duration of the sperm displacement sta-

ge and the number of aedeagal stimulatory flexions. Variation in the ability to displace spermathecal sperm, however, was not related to these variables. This suggests that variation in this ability is reliant only on <J genitalic attributes, aedeagal width. These results are briefly discussed in terms of current theory of sexual selection as the process propelling genitalic evolution." (Author)] Address: Córdoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**2084.** Costa, J.M.; Garrison, R.W. (2001): Description of the female of *Leptagrion aculeatum* Santos, 1965 with keys to the known species (Zygoptera: Coenagrionidae). *Odonatologica* 30(4): 381-394. (in English). [The female of *Leptagrion aculeatum* is described after material from Amapá, Serra do Navio, rio Amapari, Brasil from 26 Sept. 1965. The generic or species status of *L. aculeatum* Santos, 1965, *L. auriceps* St. Quentin 1960, *L. autazense* Sjöstedt 1918, *L. croceum* (Burmeister 1839), *Leptagrion* ? *obsoletum* Selys 1876, and *Leptagrion* ? *rufum* Selys, 1876 are discussed in detail on the basis of a re-analysis of the original descriptions. The known species of the genus represented in Brasil are presented in illustrated keys both for males and females.] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisy.com.br

**2085.** Costa, J.M.; Santos, T.C. (2001): Occurrence of *Tigriagrion aurantigrum* (Calvert) in Paraguay and new sites in Brazil (Zygoptera: Coenagrionidae). *Odonatologica* 30(3): 327-333. (in English). ["The sp., formally known from only Chapada, Brazil, has now been reported at other sites and 2 other countries from South America (Bolivia, Paraguay). Some additional characters including penis structure in the male and the prothoracic hind lobe, mesostigmal plates and caudal appendages of the female are described and illustrated." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisy.com.br

**2086.** Couteyen, S.; Papazian, M. (2001): Contribution à la connaissance des Odonates de l'île de la Réunion 4. *Sympetrum fonscolombii* (Selys, 1840), une espèce nouvelle pour l'île (Odonata, Libellulidae). *Martinia* 17(2): 51-53. (in French with English summary). [*S. fonscolombii* has recently been discovered in La Réunion at app. 2000 a.s.l. The presence of this species on this island proves that it is able to colonize high altitude tropical regions.] Address: Couteyen, S., 188 chemin Nid Joli, F-97430 Le Tampon, La Réunion, France

**2087.** Curio, E. (2001): Wie Vögel ihr Auge schützen: Zur Arbeitsteilung von Oberlid, Unterlid und Nickhaut. *Journal für Ornithologie* 142: 257-272. (in German with English summary). ["Birds close their eyes during sleep in various taxon-specific ways. Either the lower lid moves up as in the majority of species including the Anseres, Accipitres, Falconiformes, Galli, Charadrioidae, Columbiformes, and Oscines; or the upper lid moves down (Psittaciformes, Trochili), or both lids close the eye as in

Strigiformes and Caprimulgi. Such information is absent for most orders, or the handbooks provide wrong or conflicting information. Beside the tonic, sleep-related eye closure, birds move one or both lids in a phasic, usually swift mode when awake. These frequent lid movements are typified by their different co-ordination and function. Photographic and observational evidence strongly suggests mechanical protection of the eye as a novel function (where this had not been proposed previously). When an impact from any object is imminent from in front of or above the head, the upper lid shuts in pigeons, owls and oscines, and with water splashing, the lower lid as well (Cinclus). The most convincing evidence for mechanical protection comes from the deployment of the upper lid during the picking up of spiny insect prey as compared to easy-to-swallow berries, when both lids stay at rest (*Gallinula*). [...] In fig. 1 a black and white drawing shows a Negro Bleeding-heart Pigeon (*Gallinula keayi*) from the Philippines picking up a dragonfly. Closure of the eye with the upper lid in response to imminent mechanical impact (after Curio et al. 2000, see OAS 2019), where alternatively, the picking up of a berry with open eyes is documented.] Address: Curio, E., Conservation Biology Unit, Ruhr-Universität Bochum, PF 102148, 44780 Bochum, Germany. Email: Eberhard.curio@ruhr-uni-bochum.de

**2088.** d'Aguiar, J. (2001): Les descriptions originales des Odonates d'Europe 7. Sulzer, Johan Heinrich (1735-1813). *Martinia* 17(2): 69-74. (in French with English summary). [Faksimiles of Johan Heinrich Sulzer's descriptions of *Pyrrhosoma nymphula* and *Sympetrum danae* are published and shortly commented.] Address: d'Aguiar, J., 7, rue Adrien Lejeune, F-93170 Bagnolet, France

**2089.** Danielzik, J. (2001): FFH-Umsetzung in Nordrhein-Westfalen aus Sicht der Entomofaunistik. - Situationsanalyse zur Realisierung der Fauna-Flora-Habitat-Richtlinie. *Naturschutz und Landschaftsplanung* 33(11): 344-350. (in German with English summary). ["The study examines the FFH site proposals in the Federal State of North Rhine-Westphalia (NW), Germany to the European network of conservation areas "Natura 2000". After introducing faunistic characteristics and investigation methods of the sites the paper illustrates why the 490 FFH site proposals and the 15 International Bird Areas are assessed as insufficient from a nature conservation point of view as regards the insects according to Appendix II of the Habitats Directive (34 species in Germany, 11 in NW). [...] The present scientific knowledge of the distribution and ecology of the species needs urgent improvement as well as the quality of the data, which are partly difficult to access." It is said that only *Coenagrion mercuriale* and *Leucorrhinia pectoralis* occur in NW; their habitat requirements and threats are shortly outlined.] Address: Danielzik, J., Auf der Kämpe 11, D-46244 Bottrop, Germany. E-mail: daejd@gmx.de

**2090.** De Marmels, J. (2001): *Aeshna* (*Hesperaeschna*) *condor* sp. nov. from the Venezuelan Andes, with a redescription of *A. (H.) joannisi*, comments on other species, and descriptions of larvae (Odonata: Aeshnidae). *Int. Jour. Odonatology* 4(2): 119-134. (in English). ["*Aeshna* (*Hesperaeschna*) *condor* sp. nov. is described and illustrated from four males and six exuviae. The adult color pattern does not resemble that of any other Venezuelan species, but structurally the new species

comes closest to *A. (H.) punctata* and *A. (H.) joannisi*. This latter is here recorded for the first time from Venezuela, and its exuviae are described. The larva of *A. (Marmaraeschna)* *vigintipunctata* is also described and figured. A key to the ultimate instar larvae of all aeshnids found in the region of the upper Rio Quinimari, Tachira State, Venezuela, is presented." (Author)] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com

**2091.** De Marmels, J. (2001): *Sympetrum paramo* sp. n. (Odonata: Libellulidae) from the Venezuelan high Andes, with a key to the species of *Sympetrum* Newman, 1833 found in Venezuela. *Entomotropica* 16(1): 15-19. (in English with Spanish summary). ["The new species is described and illustrated on the basis of four males and one female (holotype cf. Venezuela: Merida State, Sierra Nevada National Park, Paramo El Tisure, Laguna Tisure, 3 650 m, 29.XII.1994; MIZA). Diagnostic characters are the strongly developed first white lateral thoracic stripe, the dark tibiae and the checkered abdominal pattern. A key to adults of all species of *Sympetrum* found in Venezuela is provided. The difference at the species level between *S. illotum* (Hagen) and *S. gilvum* (Selys) is confirmed and illustrations of important features of both are given." (Author)] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com

**2092.** Donath, H. (2001): Erstnachweis der Feuerlibelle (*Crocothemis erythraea* (Brullé)) in der Niederlausitz. *Biologische Studien, Luckau* 30: 56-58. (in German). [The second record of this southern species in Brandenburg, Germany (Neuer Grubensee, Bornsdorf) in June and July 2001 is documented in detail: description of habitat, field diagnostic flight behaviour, co-occurring species (including the rare *Leucorrhinia caudalis* and *L. albifrons*), and some reflections for species turn over in Brandenburg. In the past years new records represent Ethiopian or Mediterranean species (*Anax ephippiger*, *Aeshna affinis*, *Crocothemis erythraea*). Only *L. caudalis* - an Eurosiberian element of fauna - was successful to colonise the region Niederlausitz more recently. Regionally declining or even extinct species belong in general to the Eurosiberian, continental faunistic element.] Address: Donath, H., Caule Nr. 1, D-15926 Zieckau, Germany

**2093.** Doty, G.; Welch, A. (2001): Advertisement call duration indicates good genes for offspring feeding rate in gray tree frogs (*Hyla versicolor*). *Behavioral Ecology & Sociobiology* 49(2-3): 150-156. (in English). ["Indicator or "good genes" models of sexual selection predict that mating preferences allow females to choose mates that are genetically superior. Female gray tree frogs (*Hyla versicolor*) prefer male advertisement calls of long call duration, which can be indicators of enhanced offspring growth performance. We tested the effects of father's call duration and the presence of a caged predator (dragonfly naiad) on tadpole activity and growth in a factorial experiment, controlling for maternal and environmental effects. The effect of food availability (a repeated measure) on tadpole activity was also examined. Tadpoles responded to predator presence and to high food availability by decreasing activity and feeding.



Tadpoles exposed to a caged predator were smaller after 14 days than those exposed to an empty cage, suggesting that spending less time feeding carries the cost of reduced growth. Offspring of males with long versus short calls responded similarly to the presence of a predator. Nonetheless, offspring of long-calling males spent more time feeding than did offspring of short-calling males, except when a predator was present but no food was available. Increased time spent feeding may contribute to enhanced offspring growth and, therefore, to the indirect benefit that a female may realize by selecting a mate with long calls. However, because the behavioral differences depended on the environment, and because the fitness consequences of such behavioral differences should also vary with the environment, the benefit of mating with a long-calling male may depend on the conditions encountered by the offspring." (Authors)] Address: Doty Grace & Welch Allison, Department of Biology, University of North Carolina, Coker Hall, Chapel Hill, NC, 27599-3280, USA. E-mail: welcha@unc.edu

**2094.** Dronzikova, M.V. (2001): "Life cycles of separate species of dragonflies in conditions of Kuznetskoi valley". *Belyshevia* 1(1): 6-9. (in Russian with short English summary). [Life cycles of *Libellula quadrimaculata*, *Sympetrum flaveolum*, *Aeshna viridis*, *Orthetrum cancellatum*, *Coenagrion hastulatum*, and *Leucorrhinia pectoralis* were studied in the Altai-Sajan mountains, Russia.] Address: Dronzikova, M.V., Novokuznetskii Pedagogicheskii Institut, 654000 Novokuznetsk, PR., Pionerskii, 13, Russia

**2095.** Ellenrieder, N. von (2001): A synopsis of the Patagonian species of the genus *Aeshna* Fabricius (Anisoptera: Aeshnidae). *Odonatologica* 30(3): 299-325. (in English). ["This synopsis includes diagnoses for adults, a key for male and female, illustrations of taxonomic characters and updated distribution data for each sp. The ventral terga contour is found to vary interspecifically allowing identification of all species. Other useful characters are the presence or absence of black stripes over frontoclypeal and fronto-ocular grooves, abdominal colour pattern and shape of the cerci. Some colour characters of *A. variegata* vary geographically and two forms are described: a dark (humid biomes) and light form (dry biomes). The synonymy of *A. peralta* and *A. variegata* is considered doubtful." (Author) *Aeshna variegata* Fabricius 1775, *A. absoluta* Calvert 1952, *A. bonariensis* Rambur 1842, *A. diffinis* Rambur 1842, *A. confusa* Rambur 1842] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C. 712, AR-1900, La Plata, Argentina. E-mail: ellenr@ilpla.edu.ar

**2096.** Ellenrieder, N. von (2001): The larvae of Patagonian species of the genus *Aeshna* Fabricius (Anisoptera: Aeshnidae). *Odonatologica* 30(4): 423-434. (in English). ["The last larval instar of *Aeshna absoluta* Calvert 1952 and *A. confusa* Rambur 1842, as well as that of the light form of *Aeshna variegata* Fabricius, are described for the first time and compared with the other Patagonian larvae of this genus. They can be identified based on prementum width/length ratio, number of teeth on each side of the prementum median cleft, shape of prothoracic processes and relative length of the terminalia." (Author)] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C.

712, AR-1900, La Plata, Argentina. E-mail: ellenr@ilpla.edu.ar

**2097.** Englund, R.A. (2001): Long-term monitoring of one of the most restricted insect populations in the United States, *Megalagrion xanthomelas* (Selys-Longchamps), at Tripler Army Medical Center, Oahu, Hawaii (Zygoptera: Coenagrionidae). *Odonatologica* 30(3): 255-263. (in English). ["Long-term monitoring of a remnant population of *M. xanthomelas*, located at Tripler Army Medical Center (TAMC) began in May 1997 and continued to Febr. 2000 for the mitigation ponds and June 2000 for the TAMC stream. This sp. has been reduced to little more than 100 m of stream habitat on Oahu at the TAMC. Threats to *M. xanthomelas* include alien fish spp., stream dewatering, and habitat alteration. The TAMC stream now requires augmented water flow because construction of a facility up gradient of the TAMC stream disrupted the normal hydrology of the small stream. The Oahu race of *M. xanthomelas* will soon become extinct if the stream were allowed to become dry, as nearly happened in June 1997. The most cost-effective way to ensure the survival of this sp. on Oahu would be to continue some mitigation water flows to the TAMC stream. The next step would be the establishment of another wild population to a stream lacking alien fish spp. It is highly recommended that a cooperative association of biologists from the Bishop Museum, University of Hawaii, U.S. Fish and Wildlife Service, and U.S. Army environmental staff continue to monitor the population of *M. xanthomelas*, arguably the rarest insect population in the United States." (Author)] Address: Englund, R.A., Hawaii Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, HI, 96817, USA. E-mail: englund@bishopmuseum.org

**2098.** Feld, C.K.; Grünert, U.; Schönfelder, J.; Pusch, M. (2001): Beitrag zur Kenntnis des Makrozoobenthos der Spree oberhalb von Berlin ("Müggelspree"). *Lauterbornia* 41: 113-128. (in German with English summary). ["From 1994 to 2000 the macrozoobenthos of the River Spree was sampled with various methods, focussing on the colonisation of woody debris. A total of 210 taxa (196 species) was identified including 145 insect species. Many species showed preferences for wood and other solid substrates. Wood was colonised by the highest number of taxa (107) compared to 72 taxa on stones of artificial rip-rap." (Authors) 11 odonate species were recorded including *Stylurus flavipes*, *Gomphus vulgatissimus*, and *Ophiogomphus cecilia*.] Address: Feld, C.K., Parrisiusstr. 35, D-12555 Berlin, Germany. E-mail: feld@effeplan.de

**2099.** Fincke, O.M.; Hadrys, H. (2001): Unpredictable offspring survivorship in the damselfly, *Megaloprepus coerulatus*, shapes parental behavior, constrains sexual selection, and challenges traditional fitness estimates. *Evolution* 55(4): 762-772. (in English). ["Evolutionary biologists typically assume that the number of eggs fertilized or developing embryos produced is correlated with an individual's fitness. Using microsatellite markers, we document for the first time estimates of realized fitness quantified as the number of offspring surviving to adulthood in an insect under field conditions. In a territorial damselfly whose males defend tree hole oviposition sites, patterns of offspring survivorship could not be anticipated by adults. Fewer than half of the parents contributing eggs to a larval habitat realized any reproductive success from their investment. The best

fitness correlate was the span over which eggs in a clutch hatched. Among parents, female fecundity and male fertilization success were poor predictors of realized fitness. Although body size was correlated with female clutch size and male mating success, larger parents did not realize greater fitness than smaller ones. The uncoupling of traditional fitness surrogates from realized fitness provides strong empirical evidence that selection at the larval stage constrains selection on mated adults." (Authors)] Address: Finke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: finke@ou.edu

**2100.** Fossati, O.; Wasson, J.-G.; Hery, C.; Salinas, G.; Marin, R. (2001): Impact of sediment releases on water chemistry and macroinvertebrate communities in clear water Andean streams (Bolivia). *Archiv für Hydrobiologie* 151(1): 33-50. (in English). ["The impact of sediment releases due to road construction on water chemistry and invertebrate communities was studied in a clear water river system in the tropical humid Bolivian Andes. Eight sites (2 reference, 1 source and 5 impacted along the main river) were sampled during the 1997 low flow season. Suspended sediment concentrations exhibited a 500-fold increase downstream from the source of pollution compared to the reference site, but recovered to natural levels within 90km in the main river. Suspended solids had only a minor influence on other chemical parameters, but had a clear negative effect on invertebrate density (200-fold decrease in abundance) and diversity (6-fold decrease in number of taxa) in the main river. The most affected insects were epibenthic gatherers (e. g. Ephemeroptera: Leptohyphidae, Coleoptera: Elmidae), swimmers (Ephemeroptera: Leptophlebiidae), and scrapers (Coleoptera: Psephenidae, Trichoptera: Hydropsychidae). These families are therefore considered to be the best potential bio-indicators of sediment release impact in clear-water Andean rivers." (Authors) The density of Odonata ("Libellulidae, Gomphidae") in the streams surveyed is very low.] Address: Fossati, Odile, Institut de Recherche pour le Développement (IRD) - Université Lyon 1, Ecologie des Hydrosystèmes fluviaux, 43 Bd du 11 novembre 1918, 69622 Villeurbanne Cedex, France. - E-mail: j.o.fossati@wanadoo.fr

**2101.** Gaino, E.; Reborá, M. (2001): Apical antennal sensilla in nymphs of *Libellula depressa* (Odonata: Libellulidae). *Invertebrate Biology* 120(2): 162-169. (in English). ["In an ultrastructural study of the apical antenna of the last nymphal stages of *L. depressa*, we found long sensilla trichodea, 2 sensory pegs, and a coeloconic sensillum on the last article of the flagellum (the distal part of the antenna). The long sensilla trichodea are mechanoreceptors, almost identical to the long filiform hairs of some terrestrial insects and the first sensilla of this kind to be described in aquatic insects. Particular attention was given to the complex coeloconic sensillum, a compound sensillum innervated by 2 groups of 3 neurons wrapped in a dendritic sheath. A cuticular sleeve envelops the distal portion of the outer dendritic segment. The cuticle of the coeloconic sensillum shows wide channels and is contiguous to the underlying granular and fibrillar layer. Similar structures on the antennae of the adults of other dragonflies were identified as chemoreceptors in previous studies. We hypothesize that this larval coeloconic sensillum might likewise have a chemosensory function, responding to molecules that diffuse through the cuticle and the un-

derlying granular and fibrillar layer, as no clear pore or pore-tubule system is visible. Alternative functions are also explored on the basis of morphological details." (Authors)] Address: Gaino, E., Dipartimento di Biologia Animale ed Ecologia, Università di Perugia, Via Elce di Sotto, I-06123, Perugia, Italy. E-mail: gaino@unipg.it

**2102.** Gallie, J.A. ; Mumme, R.L.; Wissinger, S.A. (2001): Experience has no effect on the development of chemosensory recognition of predators by tadpoles of the American toad, *Bufo americanus*. *Herpetologica* 57(3) : 376-383. (in English). ["Although chemosensory recognition of predators by larval amphibians is well known, the extent to which experience plays a role in the development of this anti-predator behavior is unclear. We addressed this issue by exposing laboratory-reared (naive) and wild-caught (experienced) tadpoles of the American toad, *Bufo americanus*, to water-borne chemical cues of three different potential predators (bluegill sunfish, *Lepomis macrochirus*, larvae of the odonate *Anax junius*, and adults of the red-spotted newt, *Notophthalmus viridescens*). Compared to control tadpoles exposed to dechlorinated water, tadpoles exposed to chemical cues of *Lepomis* and *Anax* significantly decreased activity and significantly increased aggregation. However, the behavior of tadpoles exposed to chemical cues of *Notophthalmus* was identical to that of control tadpoles. Most importantly, we found no difference in anti-predator behavior between laboratory-reared and wild-caught tadpoles. We conclude that larval experience with predators is unnecessary for the development of chemosensory predator recognition and that anti-predator behavior in this species is largely innate." (Authors)] Address: Gallie, J., Department of Biological Sciences, Northern Arizona University, Flagstaff, AZ, 86011 USA.

**2103.** Gierk, M.; Kalbe, L. (2001): Ökologische Bewertung von Wiedervernässungsgebieten in Brandenburg - dargestellt am Beispiel der Nuthe-Nieplitz-Niederung. *Naturschutz und Landschaftspflege in Brandenburg* 10(2): 52-61. (in German). [Increasing water tables in the Nuthe-Nieplitz-lowlands, Brandenburg, Germany caused changes of vegetation and fauna. The current situation is assessed as an intermediate stadium of succession to silting up mires. In the early 90th, 42 odonate species were recorded from the region. *Gomphus vulgatissimus*, *Stylurus flavipes*, and *Orthetrum cancellatum* are the only species mentioned.] Address: Gierk, Meike, Landesumweltamt Brandenburg, Abteilung W 2, PF 601061, D-14410 Potsdam, Germany

**2104.** Göbl, O. (2001): Exkursion der Pollichia-Kreisgruppe Birkenfeld in das Naturschutzgebiet Birkenfelder Tongruben. *Pollichia-Kurier* 17(4): 31. (in German). [Report of an excursion to a clay pit near Birkenfeld, Rheinland-Pfalz, Germany, one of the most important standing water habitats in the region. Some common odonate species are referenced.] Address: not stated

**2105.** Gonzalez-Soriano, E.; Novelo-Gutiérrez, R. (2001): *Lestes alfonsoi* spec. nov., a new damselfly from Mexico (Zygoptera: Lestidae). *Odonatologica* 30(4): 441-444. (in English). ["The new species is described, illustrated and compared with *L. simplex* Hag. Holotype male and allotype female: Veracruz, Laguna de Santo Domingo, 4 km NW of Huatusco, alt. 1300 m, 9-VII-2000; deposited at CNIN, UNAM, Mexico." (Au-

thors)] Address: Gonzalez-Soriano, E., Depto Zoologia, Inst. Biol., Universidad Autonoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**2106.** Gonzalez-Soriano, E. (2001): An unusual male aggregation in the Odonata: An aerial mating swarm in *Protoneura cara* Calvert and notes on other Mexican Protoneuridae (Zygoptera). *Odonatologica* 30(3): 335-340. (in English). ["On several occasions aggregations were seen hovering high among trees beside streams in Mexico. Intermittent arrival of conspecific females at some aggregations and their departure, sometimes in tandem, and the apparent absence of foraging within aggregations supports the inference that such aggregations are mating swarms. It remains to be discovered whether trees over which swarms form are potential oviposition sites for this sp., or are places in which both males and females overnigh. Flying aggregations of males in other spp. of Protoneuridae are described and discussed." (Author)] Address: Gonzalez-Soriano, E., Depto Zoologia, Inst. Biol., Universidad Autonoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**2107.** Gossum, H. van; Stoks, R.; De Bruyn, L. (2001): Reversible frequency-dependent switches in male mate choice. *Proceedings of the Royal Society Biological Sciences Series B* 268(1462): 83-85. (in English). ["Current sexual-selection theories predict that mating should occur preferentially with the highest-quality partner, and assume that for distinguishing among potential mates the choosy sex applies an internal representation of the characteristics of the desired mate, i.e. a template. Binary choice experiments were performed to test male mate choice between two different female colour morphs in the damselfly *Ischnura elegans*. Choice experiments were conducted before and after an habituation period, during which males were exposed to only one female colour morph. Given the choice between the two female morphs, males did exhibit a choice for the most recently experienced female morph. This is the first evidence for a reversible switch in mate choice in a frequency-dependent way. In contrast with previous studies on mate choice, template formation in male *I. elegans* seems not to be based on quality. Switching mate choice in a frequency-dependent manner, choosing the most common morph, probably allows males to minimize their search efforts and to maximize fitness." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**2108.** Grand, D. (2001): Quelques observations de libellules en Grèce et à Chypre (Odonata). *Opusc. zool. flumin.* 196: 1-10. (in French with English summary). [A commented checklist is presented of 41 spp., evidenced at 30 localities during 5 visits (1978-1999) in Chalkidiki, Thessaloniki, and on the islands of Crete, Lesbos, Rhodos, Samos, Eubeos, Skyros, and Cyprus. Some of the noteworthy species are: *Boyeria cretensis* (Crete), *Lindenia tetraphylla* (Thessaloniki), *Orthetrum sabina* (Samos), *O. taeniolatum* (Rhodos), *Sympetrum meridionalis* (Chalkidiki), *Trithemis festiva* (Rhodos, Cyprus), *Coenagrion scitulum* (Lesbos), *Lestes macrostigma* (Lesbos), and *Cordulegaster picta* (Samos).] Address: Grand, D., 3 bis, Impasse de la Voute, F-69270 St-Romain-au-Mont-d'Or, France

**2109.** Haesloop, U. (2001): Erfolgskontrolle vom Umgestaltungsmassnahmen an bremschen Gräben und Fleeten. *Bremer Beiträge für Naturkunde und Naturschutz* 5: 197-202. (in German with English summary). [After revitalisation of different ditches throughout the Bremen city area, *Calopteryx splendens* and *Brachytron pratense* recolonised some of them.] Address: Haesloop, U., Gewässerökologisches Büro, Jenaer Str. 10, D-28215 Bremen, Germany

**2110.** Hampton, S.E.; Gilbert, J.J. (2001): Observations of insect predation on rotifers. *Hydrobiologia* (446-447): 115-121. (in English). ["Interactions between rotifers and their insect predators have not received adequate attention, possibly due to the assumption that rotifers are too small for insects to eat. In laboratory experiments, we offered the rotifers *Hexarthra mira*, *Platinius patulus* and small and large *Synchaeta pectinata* to four common insect predators: the notonectids *Notopecta lunata* and *Buenoa macrotibialis*, the smaller hemipteran *Neoplea striola* and small (1.5 mm) aeshnid dragonfly larvae. Excepting *Platinius* offered to dragonflies, all rotifer preys were consumed to some degree. No size selectivity was apparent for predators that ate few rotifers, but small instar *Buenoa* ate significantly more large (420 µm) than small (300 µm) *Synchaeta*. Predator size appeared to be less important than predatory style and prey morphology in determining ingestion rates. *Neoplea* and dragonflies ate more *Hexarthra* than *Platinius*, while the pattern was reversed for *Buenoa*, possibly because *Buenoa* is able to manipulate the hard lorica of *Platinius* better. Insect predators are capable of direct suppression of rotifer populations, an interaction which may be particularly important in littoral zones and fishless ponds where macroinvertebrates are numerous." (Author)] Address: Hampton, Stephanie, Department of Biological Sciences, Dartmouth College, 6044 Gilman, Hanover, NH, 03755-3576, USA. E-mail: stephanie.e.hampton@dartmouth.edu, john.j.gilbert@dartmouth.edu

**2111.** Hansen, M.D. (2001): Mass occurrence and migration of *Libellula quadrimaculata* at the Skaw Peninsula, N Jutland, Denmark in 2000. *Flora og Fauna* 107(1): 22-26. (in Danish with English summary). ["During May and June 2000 *L. quadrimaculata* was extremely common at the Skaw Peninsula in northern Jutland, Denmark. A sudden, massive emergence from the small, shallow lakes (water-covered area >1 km<sup>2</sup>) on the peninsula took place on May 8, after a long period of hot and sunny weather conditions. The density of larval exuviae in this area was estimated to exceed 1 m<sup>2</sup>, and on May 14, more than 3000 stationary dragonflies were recorded in a 300 m transect count. At the northernmost coastline of the peninsula, migrations took place during the period May 12-16, with a pronounced peak on May 16 when thousands of dragonflies migrated towards west against a light westerly breeze. Four 1-minute counts were performed, and the mean density was estimated to 160 migrating *L. quadrimaculata* per 50 meter front per minute. As the width of the migratory wave was approx 500 meters, it can be calculated that, on this day, almost 100.000 *L. quadrimaculata* per hour migrated towards west on the Skaw Peninsula. Although the species was still very common during the following weeks, no further migrations were recorded, probably due to cold and windy weather conditions. These observations are discussed in relation to the migration ecology of the species." (Author)] Address: Han-



(Author)] Address: Hansen, M.D., Naturhistorisk Museum, Aarhus Universitetsparken, Bygning 210, 8000, Aarhus C Denmark

**2112.** Heino, J. (2001): Regional gradient analysis of freshwater biota: Do similar biogeographic patterns exist among multiple taxonomic groups? *Journal of Biogeography* 28(1): 69-76. (in Danish with English summary). ["Aim: To examine if different groups of freshwater organisms show concordant distribution patterns at large spatial scales. Location: Northern Europe: Denmark, Sweden, Norway, Finland. Methods: I analysed provincial distribution records of macrophytes, dragonflies, stoneflies, dytiscid beetles and teleost fishes in northern Europe. I conducted multivariate analyses, including two-way indicator species analysis (TWINSPAN), canonical correspondence analysis (CCA) and Mantel test to reveal biogeographical patterns and the degree of concordance in the distribution patterns among taxa. Results: TWINSPAN and Mantel tests indicated that broadly similar biogeographical patterns existed among the taxonomic groups. The results of CCA confirmed that variation in provincial species composition was generally related to climatic variation along latitudinal and altitudinal gradients. However, variation partitioning revealed that less than 50% of variation in the distribution patterns of each taxonomic group was accounted for by the climatic and geographical variables. Main conclusions: The distribution patterns of most taxonomic groups were strongly concordant and related to provincial climate and geographical location. Such patterns suggest that large-scale factors determine not only provincial species combinations, but also express severe constraints on the composition of local communities. Therefore, these factors should also be considered in studies on the structure and conservation of local freshwater systems. [...] Dragonflies: Data for the distribution of dragonflies were derived from Askew (1988) and references therein. Although less accurate than the maps for macrophytes, these distribution maps are based on relatively good north European literature. Original data were transformed to provincial records. Altogether 56 species of dragonflies were regarded as having breeding populations in the area." (Author)] Address: Heino, J., Department of Biology, University of Oulu, 90401, Oulu, Finland. E-mail: jani.heino@oulu.fi

**2113.** Hero, J.-M.; Magnusson, W.E.; Rocha, C.F.D.; Catterall, C.P. (2001): Antipredator defenses influence the distribution of amphibian prey species in the central Amazon Rain Forest. *Biotropica* 33(1): 131-141. (in English with Portuguese summary). ["The high diversity of amphibians in the central Amazon Rain Forest allowed us to examine the influence of tadpole antipredator defenses on assemblage structure and composition within bodies of water (alpha diversity) and among aquatic sites (beta diversity) at a local scale. During a three-year study of tadpole assemblage composition, we found that the anuran community used a variety of bodies of water for reproduction; these ranged from streams and streamside ponds to isolated forest ponds. The distribution of several tadpole species was negatively related to fish density, while other species coexisted with high densities of fish. Tadpole size did not ensure survival against fish, and few tadpoles avoided fish by hiding in the leaf litter. Controlled predation experiments using a single tadpole species in a no-choice situation were conducted over 24- to 48-hour periods. Nearly all species of tadpoles that occurred in habitats

with high fish densities were unpalatable to fish (except *Centrolenella oyampiensis*), indicating that unpalatability is a major adaptation allowing tadpoles and fish to coexist in this system. Unpalatability (to fish), however, was not an effective antipredator defense against odonate larvae, the other major tadpole predator in this system. The combination of predation pressure and the antipredator traits exhibited by individual species largely determined the composition of tadpole assemblages in individual bodies of water (alpha diversity). The heterogeneous distribution of predators among bodies of water and the diversity of antipredator defenses exhibited by larval amphibians facilitated high diversity in this community (beta diversity)." (Authors)] Address: Hero, J.-M., School of Environmental and Applied Sciences, Griffith University Gold Coast, Southport, QLD, 9726, Australia. E-mail: M.Hero@mailbox.gu.edu.au

**2114.** Heßberg, A. von (2001): Anstieg der Biodiversität im Bereich eines redynamisierten Fließgewässers (Obermain). *Verhandlungen der Gesellschaft für Ökologie* 31: 219. (in German). [Beginning in 1992 river banks were renaturalised along the river main, Bavaria, Germany. The efforts of these measures are assessed using different fauna groups including Odonata and the vegetation by comparing renaturalized (22 species) with canal (14 species) strips of the bank. No further details are outlined.] Address: Heßberg, A. von, Lehrstuhl für Tierökologie I, Universität Bayreuth, D-95440 Bayreuth, Germany. E-mail: andreas.vonhessberg@uni-bayreuth.de

**2115.** Higashi, K.; Lee, C.E.; Kayano, H.; Kayano, A. (2001): Korea Strait delimiting distribution of distinct karyomorphs of *Crocothemis servilia* (Drury) (Anisoptera: Libellulidae). *Odonatologica* 30(3): 265-270. (in English). ["In order to define the eastern limit of the distribution of *C. s. servilia* (2n male = 25, XO) and the western limit of *C. s. mariannae* (2n male = 24, neo-XY), the karyotypes were studied in specimens from Cheju island and the mainland of the Republic of Korea, and from the islands of North Kyushu, Japan. The dividing line between the 2 spp. appears in the Korea Strait, between the Korean mainland and Tsushima island. The mechanism of maintaining a distinct karyomorph in each area of distribution is discussed in details." (Authors)] Address: Higashi, K., Department of Applied Biological Sciences, Faculty of Agriculture, Saga University, Honjyo-machi 1, Saga, 840-8502, Japan. E-mail: higashik@cc.saga-u.ac.jp

**2116.** Hopkinson, P.; Travis, J.M.J.; Evans, J.; Gregory, R.D.; Telfer, M.; Williams, P.H. (2001): Flexibility and the use of indicator taxa in the selection of sites for nature reserves. *Biodiversity & Conservation* 10(2): 271-285. (in English). ["'Minimum' sets of complementary areas represent all species in a region a given number of times. In recent years, conservation assessments have centred around the evaluation of these 'minimum' sets. Previous research shows little overlap between 'minimum' sets and existing nature reserves and between 'minimum' sets for different taxonomic groups. The latter has been used as an argument to discount the use of indicator taxa in the selection of sites for nature reserves. However, these 'minimum' set analyses have only considered a single set for each taxonomic group when there are, in fact, a large number of equally valid 'minimum' sets. We present new methods for evaluating all of these alternative 'minimum' sets. We de-

monstrate that if all of the sets are evaluated, significantly higher levels of overlap are found between 'minimum' sets and nature reserves, and pairs of 'minimum' sets for different taxonomic groups. Furthermore, significantly higher proportions of species from non-target taxonomic groups are recorded in the 'minimum' sets of target groups. Our results suggest that previous conservation assessments using 'minimum' sets may have been unduly pessimistic." (Authors)] Address: Hopkinson, P., NERC Centre for Population Biology, Imperial College at Silwood Park, Ascot, Berkshire, SL5 7PY, UK. E-mail: paulhopkinson@mail.com

**2117.** Hopper, K.R (2001): Flexible antipredator behavior in a dragonfly species that coexists with different predator types. *Oikos* 93(3): 470-476. (in English). ["Two of the main predators of dragonfly larvae, insectivorous fish in communities with fish and large dragonfly species in communities without fish, differ markedly in their mode of predation. In general, dragonfly species coexist successfully with one predator or the other, but larvae of the dragonfly *Pachydiplax longipennis* can coexist successfully with both. I examined the behavioral response of these larvae to a simulated predator attack to determine whether their response (1) differs between the two communities, and (2) is sensitive to waterborne cues about the type of predator present. I compared larvae from two different communities: fish ponds where insectivorous fish were the top predators, and fish-free ponds where large dragonflies were the top predators. Larvae from fish-free ponds actively moved away from an attack significantly more than did larvae from fish ponds, provided each was attacked in its native pond water. Larvae collected from a fish-free pond but then attacked in fish water moved less than did controls (larvae attacked in fish-free water). Likewise, larvae collected from a fish pond but attacked in fish-free water moved more than did controls (larvae attacked in fish water). Larvae attacked first in water from their native pond and then in water from the contrasting pond changed their response in the expected direction. These results indicate that escape behavior in *P. longipennis* differs between communities with different predator types and is sensitive to water-borne cues in a manner consistent with the mode of predation employed by each predator." (Author)] Address: Hopper, K.R. Biological Sciences, Univ. of Kentucky Lexington Community College, Lexington, KY, 40506-0235, USA. E-mail: hopper@pop.uky.edu

**2118.** Hostettler, K. (2001): Libellen (Odonata) in Vorarlberg (Österreich). *Vorarlberger Naturschau* 9: 9-134. (in German with English summary). ["In 1991 the first mapping of dragonflies for Vorarlberg was started at the Rhine delta. In the course of the subsequent eight years, in collaboration with the Vorarlberger Naturschau, it was extended to the other regions of this mountainous region. At nearly 336 habitats 55 species of dragonflies were recorded. 49 species were found in the valley and 37 species in mountainous at subalpine altitudes. In particular the large populations of *Sympetma paedisca* and *Sympetrum depressiusculum* in the Rhine delta at the Lake of Constance have to be mentioned, but also the relatively good presence of *Somatochlora alpestris*, *Orthetrum coerulescens*, *Aeshna caerulea*, *Leucorrhinia dubia*, and *Cordulegaster bidentata* at certain altitudes and regions." Each species is characterised in a monographic way containing a map of its regional distribution, and information

on habitat and ecology, threat and protective measures. "For the first time a red list of the endangered species of dragonflies is provided for Vorarlberg. Finally some types of habitats (mires, flowing waters) and their dragonfly fauna are presented." (Author) This paper also includes a short introduction into dragonfly biology and some nice colour photographs of species and habitats.] Address: Hostettler, K., Schulstr. 7, CH-8590 Romanshorn, Switzerland

**2119.** Hunger, H.; Röske, W. (2001): Short-range dispersal of the Southern Damselfly (*Coenagrion mercuriale*, Odonata) defined experimentally using UV fluorescent ink. *Zeitschrift für Ökologie und Naturschutz* 9: 181-187. (in English with German summary). [Specimens of *C. mercuriale* were marked with numbers and with a dot of UV fluorescent ink. At night "controls with a portable UV-lamp allowed high recapture rates. Only few individuals, however, were recaptured in study sites different from the ones where they had been marked. The maximum distance covered by an individual was 300 m. [...] this means that protective measures with the aim of preventing further habitat fragmentation are of extreme importance for *C. mercuriale* as one of the most endangered Odonata species of Central Europe." (Authors)] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), Am Pfahlgraben 8, D-79276 Reute, Germany

**2120.** InsectLine (2001): Insects reported during April and July 2001. *Atropos* 14: 33-35. (in English). ["[...] Dragonfly immigration was also low-key. Single Red-veined Darter *Sympetrum fonscolombei* were reported at Heysham, Lancashire (also seen the next day), and near Tring, Hertfordshire, on 6th. Reports also came from some of the suspected West Country breeding sites later in the month, but all in very low numbers and more suggestive of immigration. Single Lesser Emperor *Anax parthenope* were at the Middleton Industrial Estate, Lancashire, and Dungeness RSPB, Kent, on 23rd, Marazion Marsh RSPB, Cornwall, from 28th with one nearby on the Lizard the following day. A Small Red-eyed Damselfly *Erythromma viridulum* was reported at Sizewell, Suffolk, on 31st. [...] (Verbatim)] Address: InsectLine, 1 Cline Cottage, London road, Allstock, Knutsford, Cheshire, WA16 9LT, UK

**2121.** Johansson, F.; Stoks, R.; Rowe, L.; De Block, M. (2001): Life history plasticity in a damselfly: Effects of combined time and biotic constraints. *Ecology* 82(7): 1857-1869. (in English). ["Optimal values for life history traits are expected to depend upon environmental conditions during development and the period within which development is constrained (e.g., biotic factors and time constraints, respectively). Theory predicts that life history responses to both biotic factors and time constraints may be both direct and behaviorally mediated. Few experimental studies of life histories have considered the joint effects of biotic factors and time constraints, and fewer still have been able to disentangle direct from behaviorally mediated effects. We studied such interactions by manipulating the perceived time to the onset of winter, predation risk, and food resources level in larvae of the damselfly *Lestes sponsa*. In the first experiment (predation X time constraint), the presence of a predator caused an overall reduction in foraging activity, development rate, and mass at emergence. However, larvae that had less time available before the end of the season, increased foraging activity and development

rate, while mass at emergence decreased. These results suggest that the observed changes in life history characters were behaviorally mediated in the presence of predators. In contrast, life history responses of time-constrained larvae occurred independently of the behavioral changes and, therefore, were direct. In the second experiment (food level X time constraint) larvae under high food levels had a higher foraging activity, increased development rate, and higher growth rates, compared to low food-level treatments. Time-constrained larvae accelerated development and had a smaller mass at emergence at high food levels than larvae that were not time constrained. In contrast, and opposite to predictions, time-constrained larvae at low food levels had the slowest development rate and the largest mass at emergence. We suggest that larvae in the latter group were aiming to delay emergence to the next season (cohort splitting). Our results suggest that both behaviorally mediated and direct responses to biotic factors and time constraints are a feature of the life history of this damselfly." (Authors)] Address: Johansson, F., Department of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Limed, Sweden. E-mail: frank.johansson@eg.umu.se

**2122.** Karouna-Renier, N.K.; Sparling, D.W. (2001): Relationships between ambient geochemistry, watershed land-use and trace metal concentrations in aquatic invertebrates living in stormwater treatment ponds. *Environmental Pollution* 112(2): 183-192. (in English). ["Stormwater treatment ponds receive elevated levels of metals from urban runoff, but the effects of these pollutants on organisms residing in the ponds are unknown. We investigated the accumulation of Cu, Zn, and Pb by macroinvertebrates collected from stormwater treatment ponds in Maryland serving commercial, highway, residential and open-space watersheds, and determined whether watershed land-use classification influences metal concentrations in macroinvertebrates, sediments, and water. Three types of invertebrate samples were analyzed - molluscs, odonates, and composite. Zn concentrations in odonates from ponds draining watersheds with commercial development (mean = 113.82  $\mu\text{g g}^{-1}$ ) were significantly higher than concentrations in the other land-use categories. Similarly, Cu levels in odonates from commercial ponds (mean = 27.12  $\mu\text{g g}^{-1}$ ) were significantly higher than from highway (mean = 20.23  $\mu\text{g g}^{-1}$ ) and open space (mean = 17.79  $\mu\text{g g}^{-1}$ ) ponds. However, metal concentrations in sediments and water did not differ significantly among land-uses. The results suggest that despite the high variation in ambient metal concentrations within each land-use category, macroinvertebrates in ponds serving commercial watersheds accumulate higher levels of Cu and Zn. The levels of Cu, Zn, and Pb in invertebrates from all ponds were less than dietary concentrations considered toxic to fish." (Authors)] Address: Sparling, D.W., USGS Patuxent Wildlife Research Center, 11510 American Holly Drive, Laurel, MD, 20708, USA. E-mail: donsparling@usgs.gov

**2123.** Karube, H. (2001): Three new species of gomphidae from Vietnam (Anisoptera). *Odonatologica* 30 (3): 271-279. (in English). ["*Amphigomphus nakamurai* sp. n. (holotype male: Vietnam, Binh Phuh prov., Mt Tamdao, 30-V-1993), *Merogomphus tamdaoensis* sp. n. (holotype male: Vietnam, Binh Phuh prov., Mt. Tamdao, 19/24-V-1993), and *Leptogomphus baolocensis* sp. n. (holotype male: Vietnam, 15 km from Baoloc to

Ho-chi-minh, Lamdong prov., 16-VI-1996) are described, illustrated and their affinities are pointed out. Material is deposited in the author's institution." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan

**2124.** Kenner, R.D. (2001): Redescription of the larva of *Leucorrhinia glacialis* Hagen with a key to the nearctic *Leucorrhinia* species (Anisoptera: Libellulidae). *Odonatologica* 30(3): 281-288. (in English). ["The final-stadium larva is redescribed from 24 authenticated larvae and exuviae. It is a medium-sized larva (total length 17.6-20.8 mm) with three ventral stripes and a dorsal pattern on the abdomen that includes large spots in the sublateral area on at least segments 4-7. The penultimate stadium is also briefly described and some natural history observations are reported. A key for the seven nearctic *Leucorrhinia* spp. is given." (Author)] Address: Kenner, R.D., c/o Spencer Entomological Museum, University of British Columbia, Vancouver, BC, V6T 1Z4, Canada. E-mail: kenner@zoology.ubc.ca

**2125.** Kesel, A.B. (2001): The ultralight aerofoils of insects - an evolutionary masterpiece. *Zoology* 103: 222-229. (in English). ["The development of wings can be regarded as the key innovation in the course of insect evolution. They make locomotion in a three-dimensional space possible, a world wide spreading and the inhabitation of almost all biotopes. Due to their low mass and high stability, wings can be interpreted as ultralight aerofoils. To guarantee the enormous mechanical demands of flight, the material and its geometrical arrangement are of crucial importance. The wings are part of the cuticular exoskeleton of the insects. This cuticle is a helicoidal fibre reinforced material of crystalline biopolymers, embedded in a protein matrix. Apart from providing the necessary stability, the ingenious structure design induces excellent aerodynamic performance. The statics as well as the aerodynamic quality of the highly complex system wing are supported throughout all hierarchic levels by a series of fine structures." (Author) *Libellula depressa* has "a very conservative wing vein pattern. An encircling marginal vein, serving as mechanical protection and stiffening of the wing and, compared to other species, a complex network of smaller veins with thin membranes stretched between them."] Address: Kesel, Antonia, Department of Zoology, Technical Biology and Bionics; University of Saarland; D - 66041 Saarbrücken. E-mail: a.kesel@rz.uni-sb.de

**2126.** Ketelaar, R. (2001): European Reports 2000. The Netherlands. *Odonata. Atropos* 14: 48-49. (in English). [The year 2000 was an average year for southern migrants. Records of *Lestes barbarus*, *Sympetma fusca*, *Anax parthenope*, *A. ephippiger*, *Sympetrum fonscolombii*, and *Crocothemis erythraea* are documented. In addition, *C. erythraea* now breeds in at least four localities, all in the southern part of the Netherlands, and *Cercion lindenii* is expanding northwards and is increasing its populations. Range extension of *Leucorrhinia dubia*, *L. rubicunda*, and *Coenagrion lunulatum* is also considered. A major discovery in 2000 was a possible breeding site of *Ophiogomphus cecilia* and *Onychogomphus forcipatus* along the river Roer, near the German border.] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: ketelaar@vlinderstichting.nl



- 2127.** Ketelaar, R. (2001): Verspreidingsgegevens van libellen als instrument bij het herstel van vennen. *Levende Natuur* 102(4): 166-170. (in Dutch with English summary). ["Distribution records of dragonflies as a management tool in moorland pool restoration projects. - In The Netherlands moorland pools (shallow lakes on sandy soils) are highly valuable in terms of dragonfly species diversity. However, most pools are negatively influenced by acidification, eutrofication and desiccation. Especially dragonflies of (weakly) buffered, mesotrophic, moderately acid pools have declined severely during the last century. A number of restoration plans for moorland pools have been prepared or executed in the past decade in the southern part of The Netherlands. These measures include removal of the organic top layer of both the bottom of the pool and the shore and cutting of forest and (artificially) restoration of the buffering capacity. However the ecological demands of fauna are often not taken into consideration and this sometimes result in 'fauna accidents': special fauna elements disappear. In the province of Noord-Brabant dragonfly distribution data are now available for most moorland pools, thus making it possible to take full account of dragonflies while making restoration plans. Dependent on the number of characteristic dragonfly species four scenarios for restoration are presented: If more than two characteristic dragonfly species are present: Stop restoration. If there are one or two characteristic species present: Take care while planning the restoration. If there are no characteristic species present: Continue. If there is insufficient data available: More research." (Author)] Address: Ketelaar, R., De Vlinderstichting, 6700 AM, Wageningen, The Netherlands. E-mail: robert.ketelaar@vlinderstichting.nl
- 2128.** Kilgour, R. (2001): Emperor Anax imperator predating Brimstone Gonepteryx rhamni. *Atropos* 14: 62. (in English). [UK, Park Corner Heath Butterfly Conservation reserve, East Sussex, 4 June 2001, "[...] Libellula depressa and an Emperor Anax imperator were also present. Much to our surprise, the Emperor was seen to take one of the Brimstone butterflies in flight and carry it off to a bush, where it became its next meal."] Address: Kilgour, R., 153 Heron Way, Cranham, Uppminster, Essex, RM14 1EE, UK
- 2129.** Kirkton, S.D.; Schultz, T.D. (2001): Age-specific behavior and habitat selection of adult male damselflies, *Calopteryx maculata* (Odonata: Calopterygidae). *Journal of Insect Behavior* 14(4): 545-556. (in English). ["We compared the age, movement, and time-activity budgets of male *Calopteryx maculata* damselflies occupying off-stream tree-fall gaps with those at stream sites within a 10-ha woodland. All males collected at off-stream sites were younger than males collected at stream sites-as indicated by their significantly higher wing transmittance. Thirty-three percent of teneral males marked at off-stream gaps moved to stream sites within 4 days (mean distance = 140 m), while mature males marked at stream sites never left the stream. In contrast to stream site males, off-stream males spent significantly more time capturing prey and never engaged in aggressive interactions with other males. Behavioral differences were not due to variations in the operative body temperature. However, malaise trapping revealed a greater frequency of suitable prey in forest light gaps. Our findings support the idea that teneral male *Calopteryx* leave their emergence sites along the stream for off-stream light gaps to forage without interference and build the energy reserves necessary to attain and hold streamside territories." (Authors)] Address: Schultz, T. D. Dept of Biology, Denison University, Granville, Ohio 43023, USA. E-mail: Schultz@Denison.edu
- 2130.** Klaus, D. (2001): Bericht über die Tagung Sächsischer Entomologen am 6. Oktober 2001 in Dresden. *Mitteilungen Sächsischer Entomologen* 55: 20-21. (in German). [The report of the meeting of Saxonian entomologists includes short summaries of two lectures devoted to Odonata: The discovery of *Ophiogomphus cecilia* and *Gomphus vulgatissimus* along the River Elbe (Saxonian part), and a report of Thomas Brockhaus of the SIO meeting in summer 2001 in Novosibirsk, Russia.] Address: Klaus, D., Heimstätten 10, D-04571 Rötha, Germany
- 2131.** Knijf, G. de (2001): Bosbeheer en biodiversiteit - bijdrage 11. Libellen en bosbeheer: graag wat meer licht en structuur in het bos!. *De Boskrant* 31(2): 22-25. (in Dutch). [The protection of woods and the biodiversity - Part 11: Odonata and wood protection: Please, a lit bit more light and structure in our forests! - This is an introduction into general aspects of dragonfly biology with special emphasis to the importance of woods in life cycle. The author take *Calopteryx virgo* and *Cordulegaster boltonii* as characteristic "wood-dragonflies", and outlines some ecological factors influencing these brook dwelling species as acidification of water and shading of banks by dense and high growing trees.] Address: Knijf, G. de, Inst. v. Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be
- 2132.** Knijf, G. de; Anselin, A. (2001): Libellen in Limburg: verandering in verspreiding en het belang voor Vlaanderen. *LIKONA jaarboek 2000*: 51-62. (in Dutch). [Odonata in Limburg: changes in distribution, and the importance of this for Flandern. - 58 odonate species are recorded from the province of Limburg, southern Belgium. All available records of odonata in Limburg (n = 9136) are analyzed for five periods on the basis of 5 x 5 km squares. Aims are to compare the frequency of squares of the Odonata of Limburg, to demonstrate hot spots of species diversity, and to analyze trends in population density in southern Belgium. In a tab. the population trends of the periods of 1980-1989 and 1990-2000 are documented in detail: generally spoken, Mediterranean species are increasing, in some cases dramatically, and species of bogs are decreasing. This publication is very useful for all odonatologists interested in population trends over a longer period of time.] Address: Anselin, Anny, Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be
- 2133.** Kosterin, O.E.; Haritonov, A.; Inoue, K. (2001): Dragonflies of the part of Novosibirsk Province east of the Ob River, Russia. *Sympetrum Hyogo* 7/8: 24-49. (Bilingual in Japanese and English). ["An annotated list of the dragonfly fauna is presented of the part of the Novosibirsk Province situated east of the Ob River as the most interesting territory including the city, within 53° 28' - 56° 03' N and 82° 48' - 85° 10' E. and comprising the Bolotninskii, Moshkovskii, Toguchinskii, Novosibirskii, Iskitimskii, Cherepanovskii, Maslyaninskii, and Suzunskii Districts. A short sketch of natural conditions of this region is presented. 48 species are recorded. In-

formation is given on the distribution of dragonfly species over the territory considered, their biotope preferences and approximate flight periods. The fauna has in general a western appearance. 5 species (*Lestes dryas*, *Aeshna subarctica*, *A. juncea*, *Sympetrum danae*, *Libellula quadrimaculata*) have holarctic ranges, 21 species (*Lestes sponsa*, *Sympecma paedisca*, *Coenagrion armatum*, *C. johannsoni*, *C. lunulatum*, *Erythromma najas*, *Enallagma cyathigerum*, *Ischnura elegans*, *Nehalennia speciosa*, *Aeshna mixta*, *A. crenata*, *A. serrata*, *A. viridis*, *Stylurus flavipes*, *Epitheca bimaculata*, *Somatochlora metallica*, *S. arctica*, *Cordulia aenea*, *Sympetrum flaveolum*, *S. pedemontanum*, *S. vulgatum*) have Transpalearctic or nearly Transpalearctic ranges. 18 species (*Calopteryx splendens*, *Lestes barbarus*, *L. virens*, *Coenagrion hastulatum*, *C. puella*, *C. pulchellum*, *Platycnemis pennipes*, *Aeshna affinis*, *A. grandis*, *Ophiogomphus serpentinus*, *Gomphus vulgatissimus*, *Somatochlora flavomaculata*, *Leucorrhinia caudalis*, *L. pectoralis*, *L. albifrons*, *L. dubia*, *L. rubicunda*, *Sympetrum sanguineum*) have West Palearctic ranges, 4 species (*Nihonogomphus ruptus*, *Gomphus epophthalmus*, *Macromia amphigena*, *Sympetrum croceolum*) have East Palearctic ranges being distributed from the Pacific to the Ob River and found in the territory considered the western borders of their ranges. Distribution in Siberia of *Gomphus epophthalmus*, *Macromia amphigena*, and *Sympetrum croceolum* is given in detail [...]. The two former are East-Asiatic species absent (or at least extremely local) from the vast territory of East Siberia (not taking into account a very doubtful original report of *G. epophthalmus* for Irkutsk) but appear in the piedmonts of the western South Siberian mountains: in the environs of Krasnoyarsk, in North Altai, Kuznetskii Alatau, Gomaya Shoria and Salairskii Kryazh Mts. For *S. croceolum* only two localities are hitherto known in its western range: on NW Altai (Kosterin, 1987a, b, 1997b) and the SE extreme of the Novosibirsk Province (Belyshev et al., 1989) (detailed information on these two localities is given in this paper). Such a disjunctive Altai-Far Eastern range type was recently isolated for some Lepidoptera connected with nemoral forest formations. It is supposed to be exhibited by some species which acquired a continuous Siberian-Far Eastern distribution during the Climatic Optimum of the Holocene due to westward migrations but later retrived due to cooling and aridisation of the climate, leaving isolates in sufficiently moist NW part of the Altai-Sayan Mountain System (Dubatolov, Kosterin, 1998; 2000). Interesting is the fact that an in general rare species *Gomphus epophthalmus* predominates over other Gomphid species on the Inya River while *G. vulgatissimus* (so far not found in other regions in Siberia) prevails on all other rivers and rivulets. An intergeneric copulation was observed and photographed between a male *Cordulia aenea* and a female *Epitheca bimaculata*. (Authors)] Address: Inoue, K., 5-9 Fuminosato 4-chome, Abeno-ku, Osaka 545, Japan

**2134.** Koyama, T. (Publ.) (2001): Bulletin of The Hokkaido Odonatological Society Vol. 13, March, 2001. Bulletin of The Hokkaido Odonatological Society Vol. 13: (in Japanese). [Contents Cover photo: *Gomphus postocularis* at Nishioka Reservoir on May 22, 1997 by YOKOYAMA, Toru.; KOYAMA, Tomoyasu, For the new century: 1; YOKOYAMA Toru, AKAISHI, Shinichi & HIROSE, Yoshinori, The new locality of *Lyriothemis pachygastra* and its life history in the southern Hokkaido: 2; YOKOYAMA, Toru, Larval duration of *Planaeschna*

*milnei* in Hokkaido: 5; YOKOYAMA, Toru, Overwintering of the larvae of several lotic species in the northern district: 10; HORI, Shigehisa & Toru YOKOYAMA, Record of two species at Noboro Forest Park: 11; AKAISHI, Shinichi, Dragonfly fauna of Matsuyama Marsh at Miyuki-cho: 13; AKAISHI, Shinichi, Probable emergence of *Boyeria maclachlani* at Asahikawa City: 15; NATSUME, Hidetaka, Collection of *Sympetrum darwinianum* at Nishioka Reservoir: 16; NARAOKA, Hiroji, Correction of Report of observations on dragonflies at Kushiro Marsh in Hokkaido (1972): 17; Editorial board, Table of first and last records in Hokkaido (2): 18; Editorial board, Table of the regional distribution of Odonata by shicho (13): 21; Editorial board, Table of the regional distribution of Odonata by island (12): 24; Editorial board: 27; Translation: Ishizawa, Naoya] Address: Editor: HARAUCHI, Yutaka, Editor's address: 9-2-20-113, Hon-machi 2 jo, Higashi-ku, Sapporo City, 062-0042, Japan

**2135.** Kraft, H.W. (2001): Libellen. Rasante Flieger in schillernden Farben. Paulinus Kalender 2002: 121-124. (in German). [Popular account on dragonflies in the religious annual of the German diocese Trier.] Address: Paulinus Verlag GmbH, Trier

**2136.** Krech, M.; Lindner, I. (2001): Ein Beitrag zur Libellenfauna nordostdeutscher Regenhochmoore. - Das NSG "Teufelsmoor" bei Samitz (Landkreis Bad Döberan). Archiv der Freunde für Naturgeschichte in Mecklenburg-Vorpommern 39 (2000): 45-56. (in German). [The Odonata of a bog moor in north-eastern Germany (Mecklenburg-Vorpommern) was surveyed between 1997 and 2000. 31 species were traced of which 24 are assessed as autochthonous. Special emphasize was given to reproduction habitats of *Aeshna subarctica elisabethae* and its phenology of emergence.] Address: Lindner, Iris, Universität Rostock, FB Biowissenschaften, Doberaner Str. 143, D-18051 Rostock, Germany

**2137.** Kuhn, K. (2001): Libellen am nördlichen Lech. Ber. naturf. Ges. Augsburg, Sonderbericht 2001: 138-146. (in German). [Bavaria, Germany; the Odonata of an area covering 150 km<sup>2</sup> were studied. 41 odonate species are known to occur in the region. 39 species are shortly commented. Special emphasize is given to *Coenagrion mercuriale*, a species of the EU-Fauna-Flora-Habitat-Directive and the problems of legal and actual protection of the species in the town of Augsburg.] Address: Kuhn, K., Ravenspurgerstr. 7., D-86150 Augsburg, Germany

**2138.** Labeledzki, A. (2001): Ordo (rzad): Odonata - wazki. In: Gutowski, J.M. & B. Jaroszewicz (Eds): Catalogue of the fauna of Bialowieza Primeval Forest. Instytut Badawczy Lesnictwa. Warszawa.: 88-91. (in Polish and English). [Verbatim: "In the work (ARABINA et al. 1984) concerning the Belarussian part of PB three further genera of dragonflies from the River Przewtoka are reported (*Calopteryx* sp., *Coenagrion* sp., *Sympetrum* sp.). Due to the lack of the species determination, they are excluded from the systematic list. In the Polish part of PB the occurrence of 50 species of dragonflies was ascertained, which makes more than 68% of Odonata from Poland. There are 30 species from the materials not published yet, being new to PB; the data come from the author's own investigations as well as from the papers of Bargiel (1990) and Dijkstra et al. (1997). The Belarussian part of PB is almost not

recognised yet, probably due to the fact that in Belarus for several years there have been no entomologists specialising in dragonflies. Among the most interesting and scarce species there are: *N. speciosa* (associated with sedge lowmoors), *H. ephippiger* (flying to Poland from southern Europe and northern Africa only during the hottest summers), *L. fulva* (developing in small in-forest water bodies with the thick layer of not decomposed alder leaves on the bottom) and *O. brunneum* (southern species associated with shallow, warm running waters). In the described area, 5 out of 7 species protected by law in Poland were found: *Sympetma paedisca*, *Aeshna viridis*, *Ophiogomphus cecilla*, *Leucorrhinia albifrons*, *L. pectoralis*. Taking into consideration the diversity of water body types one can suspect that more detailed investigations could allow to increase the number of dragonfly species known from PB by at least 5-6. [...] (Author) Address: Labedzki, A., Akademia Rolnicza, Katedra Entomologii Lesnej, ull. Wojska Polskiego 71c, PL-60-625 Poznan, Poland. E-mail: andrzejlab@poczta.onet.pl

**2139.** Laister, G. (2001): Wieder vital? - Libellenbestand 7 Jahre nach der Renaturierung. ÖKO-L. Zeitschrift für Ökologie, Natur- und Umweltschutz, Linz 23(2): 3-10. (in German). [To assess the success of revitalisation of a running water of the town of Linz, Austria ("Sammelgerinne Urfahr"), starting in 1995 the odonate fauna of some stretches was surveyed. The following species are analysed in detail: *Calopteryx splendens*, *C. virgo*, *Platycnemis pennipes*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Onychogomphus forcipatus*, and *Cordulegaster boltonii*. There was no significant difference between regulated and revitalised stretches of the running water. Ecological quality for dragonflies depends on structural diversity of the running waters and ecological processes (e.g. availability of sand or gravel banks) more than on revitalisation or not.] Address: Laister, G., Naturkundliche Station, Neues Rathaus, Hauptstr. 1-5, A-4041 Linz, Austria

**2140.** Lang, C.; Müller, H.; Waringer, J.A. (2001): Larval habitats and longitudinal distribution patterns of *Cordulegaster heros* Theischinger and *C. bidentata* Selys in an Austrian forest stream (Anisoptera: Cordulegastriidae). *Odonatologica* 30(4): 395-409. (in English). ["From May 1997 to April 1998 larvae were recorded at the Weidlingbach, a fourth order tributary of the Danube nr Vienna, at 12 sampling stations from source to mouth. From the 14 larval instars reported for the genus, 5 (F to F-4; based on head width) could be identified in both spp.; head widths of female larvae were significantly larger than in male. Both spp. were most abundant within medium sand sediments with a mean grain size (Q50) of 2.04 mm in *C. bidentata* and 2.79 mm in *C. heros*. Mean water depths and nose current speeds measured at larval microhabitats were 4.4 cm and 2.3 cm s<sup>-1</sup> (*C. bidentata*) and 5.6 cm and 2.6 cm s<sup>-1</sup> (*C. heros*). During the winter months larvae chose the water depths slightly deeper than during summer. Throughout the observation period, a high proportion of the larvae (*C. bidentata*: 70-100%; *C. heros*: 41-90%) were burrowed in sandy sediments, either totally or displaying the typical ambush posture with only head and anal pyramid visible. In winter, the proportion of burrowing larvae was insignificantly higher than in summer. *C. bidentata* larvae were most abundant near the sources, preferring first order stream sections (discharge 0.1 -3.21 s<sup>-1</sup>) with high hardness (up to 34

German degrees) and conductivity (up to 1100 uS cm<sup>-1</sup>) and a high proportion of fine sediments. Although *C. heros* larvae were also collected at such first order sites, they reached their highest abundance (larval density up to 7.84 specimens per 10 meter shore length) at second order stream sections (discharge 0.3-6.0 l s<sup>-1</sup>) with lower hardness and conductivity and a higher proportion of coarse sediments." (Authors)] Address: Waringer, J., Institute of Ecology and Nature Conservation, University of Vienna, Althanstr., A-1090 Vienna, Austria

**2141.** Legrand, J.; Lachaise, M. (2001): Un nouveau gomphidae afrotropical, *Lestinogomphus matilei* n. sp. (Odonata, Anisoptera). *Revue Française d'Entomologie (Nouvelle Série)* 23(1): 1-8. (in French with English summary). [*L. matilei* is described and illustrated on a single male specimen from Ivory Coast; it is dedicated to late Professor Loic Matile who was director of the Laboratoire d'Entomologie (MNHN). A diagnose of the genus and an illustrated redescription of the type species *L. angustus* Martin, are given.] Address: Legrand, J., 10, rue du Chemin de fer, F-94110 Arcueil, France

**2142.** Leipelt, K.G. (2001): Larvenfund der Gestreiften Quelljungfer *Cordulegaster bidentata* Selys (Odonata: Corduliidae) in Sachsen-Anhalt. *Entomol. Mitt. Sachsen-Anhalt* 8(1): 19-22. (in German with English summary). [Stolberg, eastern Harz Mountains, Sachsen-Anhalt, Germany; September 20, 1999, in the crenal of a brook near Stollberg, two larvae were caught; this record is considered the first larval record of *Thecagaster bidentata* in Sachsen-Anhalt.] Address: Leipelt, K.G., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

**2143.** Lencioni, F.A.A. (2001): *Cyanallagma angelae* spec. nov. and a key to the non-Andean species of *Cyanallagma* (Zygoptera: Coenagrionidae). *Odonatologica* 30(3): 345-350. (in English). ["The new species is described from 15 male and 3 female collected in Salesopolis-Sao Paulo State (23°35'52"S, 45°43'41"W; alt. 1074 m) 14-III and 3-IV-1999. Keys and illustrations to the non-Andean species of *Cyanallagma* are given." (Author) *C. trimaculatum* (Selys 1876), *C. interruptum* (Selys 1876), *C. bonariense* (Ris 1918), *C. nigrinuchale* (Selys 1876)] Address: Lencioni, F.A.A., Rua dos Ferrovianos 55, Jardim Mesquita, BR-12300-000, Jacarei, S.P., Brazil. E-mail: odonata@iconet.com.br

**2144.** Lenders, H.J.R.; Leuven, R.S.E.; Nienhuis, P.H.; Nooij, R.J.W. de; Rooij, S.A.M. van (2001): BIO-SAFE: A method for evaluation of biodiversity values on the basis of political and legal criteria. *Landscape & Urban Planning* 55(2): 121-137. (in English). ["This paper presents a Spreadsheet Application For Evaluation of Biodiversity (BIO-SAFE) on the basis of political and legal criteria derived from national and international policy plans, laws, treaties and directives. The BIO-SAFE is developed as a management tool to optimise mutual attuning of nature conservation policies and other interests in spatial planning. Fields of application of BIO-SAFE comprise designs and evaluations of physical planning projects, environmental impact assessments and comparative landscape-ecological studies. Taxonomic groups involved in BIO-SAFE are higher plants, dragonflies and damselflies, butterflies, fish, amphibians, reptiles, birds and mammals. The development of BIO-SAFE was based on species characteristic of rivers and their floodplains, but the principles of the me-



thod can easily be applied to other ecosystems as well. The BIO-SAFE has been applied on behalf of a combined flood risk reduction and ecological rehabilitation plan for the Rijnwaarden floodplains (River Rhine, the Netherlands). Application to flora and fauna data available for this area showed that the BIO-SAFE method enables the user to express politically and legally based biodiversity values in quantitative terms and to compare biodiversity values for various taxonomic groups, landscape-ecological units (e.g. ecotopes) and physical planning scenarios. By linking habitat preferences of the species selected to ecotopes, the method also allows the user to derive relevant information at the ecosystem level. Because of its policy-based character, BIO-SAFE yields complementary information to more established ecological biodiversity indices." (Authors)] Address: Lenders, H.J.R., Department of Environmental Studies, Faculty of Science, Mathematics and Informatics, University of Nijmegen, 6500 GL, Nijmegen, The Netherlands. E-mail: rlenders@sci.kun.nl

**2145.** Leroy, T. (2001): Les Odonates des lacs-tourbières de l'Artense en Auvergne (Puy-de-Dôme et Cantal). *Martinia* 17(2): 37-50. (in French with English summary). [Between 1996 to 1999, composition and the structure in terms of frequency and abundance of the odonate fauna of 8 bog lakes of Artense, France was studied. 40 species are present, of which 34 are autochthonous. The species composition is characterised by a high degree of species typical for the peat bogs of the Massif Central (e.g. *Somatochlora arctica*, *Leucorrhinia dubia*) and a strong contingent of species not belonging to bogs, most of them of Mediterranean or Atlantic affinity (e.g. *Platycnemis acutipennis*, *Lestes v. virens*).] Address: Leroy, T., Le Bourg, F-63210 Heume-L'Église, France

**2146.** Leung, B.; Forbes, M.R.; Baker, R.L. (2001): Nutritional stress and behavioural immunity of damselflies. *Animal Behaviour* 61(6): 1093-1099. (in English). ["Increased mortality in the presence of stress may result from stress-reduced availability of energy for immune function, coupled with the presence of pathogens or parasites. We tested the hypothesis that stress reduces antiparasite responses of damselflies *Ischnura verticalis* (Hagen) to their ectoparasitic mites *Arrenurus pseudosuperior* (Marshall). Numbers of colonizing mites did not differ between nutritionally stressed and unstressed damselflies. However, unstressed damselflies successfully removed more attached mites than nutritionally stressed host larvae. Furthermore, certain damselfly behaviours increased in the presence of non-feeding mite larvae. Some of these behaviours were effective in defending against mites, but were reduced by nutritional stress. These results are sufficient to explain inverse relations found between damselfly condition and intensity of mite parasitism seen in nature, and are likely to be applicable to other host-ectoparasite associations." (Authors)] Address: Leung, B., Department of Zoology, Cambridge University, Downing Street, Cambridge, CB2 3EJ, UK. E-mail: bleung@zoo.cam.ac.uk

**2147.** Lotzing, K. (2001): Die Plattbauchlibelle (*Libellula depressa* L.) - Insekt des Jahres 2001. *Halophila* 42: 17. (in German). [Short and general remarks on the "Insect of the Year" in Germany, *L. depressa*.] Address: Lotzing, K., Am Hollschen Bruch 4c, D.39435 Unseburg, Germany

**2148.** Manteifel, Y.B.; Reshetnikov, A.N. (2001): Selective predation on tadpoles of three anuran species. *Zhurnal Obshchei Biologii* 62(2): 150-156. (in Russian with English summary). ["In laboratory experiments an introduced fish *Perccottus glenii* consumed selectively tadpoles of three numerous anuran amphibian species of Moscow Province. *Perccottus glenii* actively consumed all seized tadpoles of the *Rana arvalis* and *R. temporaria*. These predators consumed significantly lesser number of *Bufo bufo* tadpoles and frequently rejected them after seizing without considerable damages. Observations showed that *P. glenii* rejects *B. bufo* after intraoral testing. Larvae of dragonfly *Aeshna cyanea* also actively consumed almost all seized *R. arvalis* tadpoles, while usually rejected *B. bufo* after attacking and damaging them. Larvae of diving beetle *Dytiscus marginalis* sucking out captured prey, intensively consumed tadpoles of *R. arvalis* and *B. bufo* and did not reject them." (Authors)] Address: Manteifel, Y.B., A. N. Severtsov Institute of Ecology and Evolution, Russian Academy of Science, Leninsky pr. 33, Moscow, 117071, Russia. E-mail: sevin@orc.ru

**2149.** Marinov, M. (2001): Does *Coenagrion mercuriale* (Charpentier, 1840) occur in Bulgaria? *Exuviae* 8(1): 13-19. (in English with Slovene summary). ["Older Bulgarian larval material, reported by several authors as *C. mercuriale* (Charp.) and deposited in the collection of the Institute of Zoology in Sofia, was re-examined. It was mostly identified as *Coenagrion ornatum* (Sélys) which is not uncommon in Bulgaria and other parts of the Balkans. Because of very doubtful determination in older records, and lack of any fresh material from south-eastern Europe it is suggested that *C. mercuriale* be deleted from the species lists of Bulgaria, Macedonia and Croatia." (Author)] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mgmarinov@yahoo.com

**2150.** Martens, A. (2001): Initial preference of oviposition sites: discrimination between living and dead plant material in *Sympecma fusca* and *Coenagrion caerulescens* (Odonata: Libellulidae, Coenagrionidae). *European Journal of Entomology* 98: 121-123. (in English). ["*Sympecma fusca* and *Coenagrion caerulescens* mainly deposit their eggs into floating dead parts of emergent plants. In their initial choice of oviposition site (selection of landing site) *S. fusca* does not distinguish between fresh and dead plant material, whereas *C. caerulescens* significantly prefers dead material. In *S. fusca*, the missing discrimination of the plant condition in the choice of the landing site is explained by its oviposition period in the beginning of the vegetation period when the green plant material is rare. *C. caerulescens* reproduces in summer and finds dead and living plants side by side. I suggest that in the latter species an early recognition of dead material is advantageous because of the reduction of the expense in searching." (Author)] *S. fusca* was studied between 1989 and 1995 near Gifhorn, Germany, and *C. caerulescens* from 20 to 30 June 1993 at the Canal de Vergières, France.] Address: Martens, A., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: andreas.martens@tu-bs.de

**2151.** Martens, A. (2001): Perching site choice in *Onychogomphus f. forcipatus* (L.): an experimental approach (Anisoptera: Gomphidae). *Odonatologica* 30(4): 445-449. (in English). ["At the rendezvous, males prefer

stones as perches. Discrimination experiments with pairs of substrates showed that they land preferentially on perches that correspond in height to the flight level of females appearing at the water. When they first landed, males preferred perches in the middle of the stream, but afterwards they also used those near the stream margin. The results are interpreted in terms of early recognition of females and rapid formation of tandem linkage." (Author)] Address: Martens, A., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: andreas.martens@tu-bs.de

**2152.** Mauco, L.; Favero, M.; Bo, M.S. (2001): Food and feeding biology of the Common Tern during the nonbreeding season in Samborombon Bay, Buenos Aires, Argentina. *Waterbirds* 24(1): 89-96. (in English). ["Common Terns (*Sterna hirundo*), which breed in North America and migrate into the southern hemisphere in winter, show a wide nonbreeding distribution that includes the Atlantic coasts of Argentina and Brazil. At Punta Rasa (Samborombon Bay, Argentina), there were about 30,000 Common Terns. Their diet in winter was assessed by the analysis of regurgitated pellets collected at Punta Rasa. Adult Coleoptera, Odonata, Orthoptera and Hemiptera were the main insects found in the diet. A total of 14 species of fishes were identified. Argentine Anchovy (*Engraulis anchoita*) and Anchovy (*Anchoa mitchilli*) (Family Engraulididae), represented 79% by number and the 78% of the consumed biomass of fish prey. The average length of fish prey was  $90.0 \pm 17.6$  mm. Half the prey lived in seawater, while the other half was taken in estuarine or seawater. There was no evidence of fish prey taken by terns foraging in freshwater habitats. Total consumption of food was estimated as 106 tons of fish (most of them juvenile) during a five month period at Punta Rasa." (Authors)] Address: Mauco, Laura, Departamento de Biología, Facultad de Ciencias Exactas y Naturales, Universidad Nacional de Mar del Plata, Funes 3250, 7600, Mar del Plata, Argentina. E-mail: lmauco@mdp.edu.ar

**2153.** Mayer, G. (2001): Neue Vorkommen der bedrohten Grünen Keiljungfer entdeckt. *Vogelschutz* 2 / 2001: 20. (in German). [A survey of the river Paar between Schmiechen and Unterbernbach, Landkreis Aichach-Friedberg, Bayern, Germany, resulted in the discovery of a strong population of the rare *Ophiogomphus cecilia*.] Address: not stated

**2154.** McPeck, M.A.; Grace, M.; Richardson, J.M. L. (2001): Physiological and behavioral responses to predators shape the growth/predation risk trade-off in damselflies. *Ecology* 82(6): 1535-1545. (in English). ["Most organisms must simultaneously find enough food for themselves while trying not to become food for some other organism. Previous field experiments have shown that larvae of *Enallagma* and *Ischnura* species are able to coexist in the littoral zones of lakes because they resolve this growth/predation risk trade-off differently: *Ischnura* species grow more quickly than *Enallagma* species, but *Ischnura* species suffer higher mortality rates than *Enallagma*. We performed a series of laboratory studies to explore the mechanistic basis for the difference in growth between the genera. When held in complete isolation and with unlimited food, larvae of a number of *Enallagma* species that coexist with fish accumulated mass at much faster rates than *Ischnura* species. This difference in isolation was due to the fish-lake *Enallagma* simply ingesting more food. In contrast,

contrast, when held in the presence of other damselflies or a fish predator, *Ischnura* had significantly higher growth rates than *Enallagma* species from fish lakes. All species decreased the amount of food they ingested in the presence of the fish predator as compared to when fish were absent, which resulted in decreased growth in the presence of the predator for all species. However, the interspecific differences in growth rate were due primarily to differences in the abilities of the species to convert ingested food into their own biomass; in the presence of fish, comparably sized larvae ingested nearly identical amounts of food, but *Ischnura* larvae grew faster because they converted significantly more ingested food into their own biomass than did larvae of *Enallagma* species from fish lakes. This difference in conversion efficiency between the genera was not apparent when larvae were raised in complete isolation. These results indicate that *Enallagma* and *Ischnura* species differ in physiological stress responses to the presence of predators, and this difference may facilitate the coexistence of *Enallagma* and *Ischnura* species in the field." (Authors)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**2155.** Meurgey, F. (2001): Donnée nouvelle pour *Paragomphus genei* (Sélys, 1841). Contribution à la faune des odonates de Corse. *Martinia* 17(2): 54. (in French). [*P. genei* was captured 21 July 1972 near Porto Vecchio, Island of Corsica, France.] Address: Meurgey, F., Museum d'histoire naturelle de Nantes, 12, rue Voltaire F-44000 Nantes, France

**2156.** Meurgey, F. (2001): Les collections d'Odonates du Muséum d'Histoire Naturelle de Nantes. 1. Collection H. et T. Piel de Churchville. Inventaire et revision. *Martinia* 17(2): 55-66. (in French with English summary). [The author presents an inventory and revision of the Piel de Churchville Odonata collection. It includes 49 species caught in Loire-Atlantique department, France between 1889 and 1895, and was published in 1895. The list of species and references of capture data are given.] Address: Meurgey, F., Museum d'histoire naturelle de Nantes, 12, rue Voltaire F-44000 Nantes, France

**2157.** Misof, B.; Rickert, A. M.; Buckley, T.R.; Fleck, G.; Sauer, K. P. (2001): Phylogenetic signal and its decay in mitochondrial SSU and LSU rRNA gene fragments of Anisoptera. *Molecular Biology & Evolution* 18(1): 27-37. (in English). ["The phylogeny of Anisoptera, dragonflies in the strict sense, has proven to be notoriously difficult to resolve. Based on morphological characters, several recent publications dealing with the phylogeny of dragonflies proposed contradicting inter- and intrafamily relationships. We explored phylogenetic information content of mitochondrial large-subunit (LSU) and small-subunit (SSU) ribosomal gene fragments for these systematic problems. Starting at published universal primers, we developed primer sets suitable for amplifying large parts of the LSU and SSU rRNA genes within dragonflies. These fragments turned out to harbor sufficient phylogenetic information to satisfactorily resolve intrafamily relationships, but they contain insufficient phylogenetic structure to permit reliable conclusions about several interfamily relationships. We demonstrate that decay of phylogenetic signal progresses from intrafamily to interfamily to outgroup relationships and is correlated with an increase of genetic di-

stances. As expected, signal decay is most pronounced in fast-changing sites. Additionally, base composition among fast-changing sites significantly deviates from the expected homogeneity. Homogeneity of base composition among all included taxa was restored only after removing fast-changing sites from the data set. The molecular data tentatively support interfamily relationships proposed by the most recent publication based on morphological characters of fossil and extant dragonflies." (Authors)] Address: Misof, B., Institute for Evolutionary Biology and Ecology, University of Bonn, An der Immenburg 1, D- 53121 Bonn, Germany. E-mail: bmisof@evolution.uni-bonn.de

**2158.** Misof, B.; Rickert, A.M.; Buckley, T.R.; Fleck, G.; Sauer, K.P. (2001): Phylogenetic signal and its decay in mitochondrial SSU and LSU rRNA gene fragments of anisoptera. *Molecular Biology & Evolution* 18(1): 27-37. (in English). ["The phylogeny of Anisoptera, dragonflies in the strict sense, has proven to be notoriously difficult to resolve. Based on morphological characters, several recent publications dealing with the phylogeny of dragonflies proposed contradicting inter- and intrafamily relationships. We explored phylogenetic information content of mitochondrial large-subunit (LSU) and small-subunit (SSU) ribosomal gene fragments for these systematic problems. Starting at published universal primers, we developed primer sets suitable for amplifying large parts of the LSU and SSU rRNA genes within dragonflies. These fragments turned out to harbor sufficient phylogenetic information to satisfactorily resolve intrafamily relationships, but they contain insufficient phylogenetic structure to permit reliable conclusions about several interfamily relationships. We demonstrate that decay of phylogenetic signal progresses from intrafamily to interfamily to outgroup relationships and is correlated with an increase of genetic distances. As expected, signal decay is most pronounced in fast-changing sites. Additionally, base composition among fast-changing sites significantly deviates from the expected homogeneity. Homogeneity of base composition among all included taxa was restored only after removing fast-changing sites from the data set. The molecular data tentatively support interfamily relationships proposed by the most recent publication based on morphological characters of fossil and extant dragonflies." (Authors)] Address: Misof, B., Institute for Evolutionary Biology and Ecology, University of Bonn, An der Immenburg 1, 53121 Bonn, Germany. E-mail: bmisof@evolution.uni-bonn.de

**2159.** Moore, N.W. (2001): Changes in the dragonfly communities at the twenty ponds at Woodwalton Fen, Cambridgeshire, United Kingdom, since the study of 1962-1988. *Odonatologica* 30(3): 289-298. (in English). ["The pattern of the number of spp. per pond changed completely between 1988 and 2000. The growth of scrub on the edges of the ponds caused a decline in the number of dragonfly spp. when more than 50% of pond edge was shaded by bushes. When the ponds were completely shaded they lost all their dragonfly spp. The decline in spp. appeared to be caused by shading rather than changes in the aquatic flora caused by shading. When the scrub was not controlled the ponds were inhabited by dragonflies from 26 to at least 39 yr. In ponds where no scrub developed, or where it was controlled, *Coenagrion puella*, *Ischnura elegans*, *Aeshna cyanea*, *Libellula quadrimaculata*, *Sympetrum striolatum* and *Sympetrum sanguineum* were still conti-

ning to inhabit the ponds after 39 yr. *Aeshna grandis*, which had occurred most yr. in the 1962-1988 period, was still present in 2000. *Pyrrhosoma nymphula* and *Brachytron pratense*, which had bred from 1964 to 1972 and 1968 to 1973 respectively, both reappeared after 20 yr. absence. Their return to the ponds appeared to be connected with their increase in adjacent habitats at Woodwalton Fen in the 1989-2000 period. *Anax imperator* and *Libellula fulva*, which had also increased at Woodwalton Fen, were seen for the first time at the ponds during this period. The reason for the recent disappearance of *Lestes sponsa* from the ponds and adjacent habitats is not known. This study yet further emphasises the need to conserve large core populations of dragonflies, and it reiterates the need for really long term monitoring." (Author)] Address: Moore N.W., The Farmhouse, 117 Boxworth End, Swavesey, Cambridge CB4 5RA, United Kingdom

**2160.** Müller, J.; Schorr, M. (2001): Verzeichnis der Libellen (Odonata) Deutschlands. *Entomofauna Germanica* 5: 9-44. (in German with English summary). [Data on the representation of the German odonate fauna are compiled in a table (checklist). Each species is arranged according to its occurrence and its current status in the 16 Federal States of Germany. The compilation is based on an extensive survey and on a critical discussion of literature data. In some cases annotations on nomenclatorial problems are made. In other cases it is mandatory to evaluate the identification of species, to discuss possible misidentifications or to discuss trends of range extension. This refers to the following species: *C. armatum*, *C. ornatum*, *C. scitulum*, *G. pulchellus*, *G. flavipes*, *O. cecilia*, *B. pratense*, *A. isoceles*, *A. ephippiger*, *C. bidentata*, *L. depressa*, *L. fulva*, *C. erythraea*, *S. fonscolombii*, and *S. meridionale*. A selected but representative bibliography and some introductory remarks on the German odonatological history provide some additional information.] Address: Müller, J., Frankefelde 3, D-39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**2161.** Müller, O.; Suhling, F. (2001): *Phyllogomphoides litoralis* Belle: description of the final instar larva (Anisoptera: Gomphidae). *Odonatologica* 30(4): 451-456. (in English). [*P. litoralis*, El Valle, Panama, 5/6-III-1998 was reared in the laboratory. Morphological characters are described and illustrated.] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, 38092 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**2162.** Muzón, J.; Ellenrieder, N. von (2001): Revision of the subgenus *Marmaraeschna* (Odonata: Aeshnidae). *Int. Jour. Odonatology* 4(2): 135-166. (in English). ["This revision of the subgenus *Marmaraeschna* includes the description of three new species: *Aeshna* (*M.*) *fissifrons*, *A.* (*M.*) *obscura* and *A.* (*M.*) *brevicercia*, as well as redescrptions of the previously known species, including the first description of the male of *A.* (*M.*) *pallipes*, a key for males and females and an updated distribution for each species. Useful characters are the presence or absence of black stripes over frontoclypeal and fronto-ocular grooves, T-spot shape, abdominal colour pattern, ventral terga contour and cerci shape." (Authors)] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C. 712, AR-1900, La Plata, Argentina. E-mail: ellenr@ilpla.edu.ar



**2163.** Naraoka, H. (2001): Post-copulatory behaviour in the dragonfly *Sympetrum parvulum* Bartenef (Anisoptera: Libellulidae). *Odonatologica* 30(4): 411-422. (in English). ["According to their social status, the males are divided into 2 categories: territory holders (territorial males) and non-territory holders (wandering males). The duration of copulation was longer in wandering (461.5±347.8 s.n = 46) than in territorial pairs (201.3±149.8 s.n = 85). Oviposition modes are 3-fold: viz. (1) single, with non-contact guarding (territorial pairs: 115.1±75.5 s.n = 27; wandering pairs: 133.9±45.5 s.n = 14); (2) tandem oviposition (territorial pairs: 214.6±76.6 s.n = 5; wandering pairs: 141.0±76.2s.n = 7); - and (3) tandem oviposition + non-contact guarding (NCGO) (territorial pairs: 131.6±93.8 s.n = 5; wandering pairs: 157.5±72.8 s.n = 2). The first type was most common in territorial (75%) and in wandering pairs (62.1 %). The second type was in wandering pairs (24.1 %) twice as frequent as in territorial pairs (10.4%). The third mode was infrequent (territorial pairs: 14.6%, wandering pairs: 13.8%). The relationships between male social status and the interference of territorial males on one hand, and the duration of copulation and the oviposition mode on the other, are discussed. The effects of vegetation and air temperature on the oviposition mode are briefly outlined." (Author)] Address: Naraoka, H., 36-71 Motoizumi, Fukunoda, I-tayanagi-machi, Kita-gun, Aomori prefecture, 038-3661, Japan

**2164.** Nishhu, S. (2001): The present situation of *Lestes japonicus*. *Nature and Insects* 36(7): 22-25. (in Japanese). [*Lestes japonicus* Selys, 1883 is designated as a Vulnerable species in Red Data Book of the Ministry of the Environment in Japan. Its distribution is restricted to the region reaching from the Aomori Pref. to the Kagoshima Pref, with the exception of Toyama, Ishikawa, Yamanashi, and Kochi. The species is recorded from 155 localities, but only 46 turn out to have reproductive populations. The present status of the species urgently needs to be investigated. (Extracted from a translation of Naoya Ishizawa).] Address: not stated

**2165.** Oldham, M.J.; Sutherland, J.A.; Jones, C.D. (2001): Additions to the Odonata of Sudbury District and Regional Municipality, Ontario. In: Cating, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 1-4. (in English). ["21 new county records are reported for Sudbury District and Regional Municipality based on two days of fieldwork in August 2000. Notes are provided on six rare species (*Nehalennia gracilis*, *Ophiogomphus carolus*, *O. colubrinus*, *O. rupinsulensis*, *Stylogomphus albistylus*, *Stylurus scudderii*)" (Authors)] Address: Oldham, M.J., Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Box 7000, 300 Water Street, Peterborough, Ontario K9J 8M5, Canada. E-mail: michael.oldham@mnr.eov.on.ca

**2166.** Orr, A.G. (2001): An annotated checklist of the Odonata of Brunei with ecological notes and descriptions of hitherto unknown males and larvae. *Int. Jour. Odonatology* 4(2): 167-220. (in English). ["This study records 175 species of odonates from Brunei, representing more than half the known Bornean fauna. Of these, 169 species were collected by the author and associates using a systematic sampling protocol at 35 sites throughout the country. Sites were located in diverse habitats: in primary forest, natural lakes and marshes

and degraded areas. Species richness and faunistic composition are discussed for all sites and the levels of similarity between sites is assessed on the basis of species and higher taxonomic level comparisons. Patterns of habitat utilization are assessed for higher taxonomic groupings. Notes on behaviour and ecology are provided for all species for which adequate information was available. The previously unknown males of *Pericnemis triangularis* and *Drepanosticta versicolor* comb. nov. and the larvae of *Tetracanthagyna degorsi* and *Onychothemis coccinea* are described and figured." (Author)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest, Ecology and Management, Environmental Sciences, Griffith Univ., Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**2167.** Oyediran, I.O.; Heinrichs, E.A. (2001): Arthropod populations and rice yields in direct-seeded and transplanted lowland rice in West Africa. *International Journal of Pest Management* 47(3): 195-200. (in English). ["Two methods for planting rice in irrigated lowland were evaluated during the wet seasons of 1994 and 1995 to determine their effect on rice arthropod numbers, insect-caused rice plant damage and rice grain yield. The six treatments tested were: hand transplanting of seedlings at spacings of 14 cm X 14 cm, 20 cm X 20 cm, and 30 cm X 30 cm; and direct-seeding of rice at 60 kg seeds ha<sup>-1</sup>, 90 kg seeds ha<sup>-1</sup> and 120 kg seeds ha<sup>-1</sup>. The most abundant arthropods in the study were the diopsid flies, *Diopsis longicornis* Maquart and *D. apicalis* Dalman; the green leafhoppers *Nephotettix* spp.; the white leafhoppers *Cofana unimaculata* (Signoret) and *C. spectra* (Distant); spiders; dragonflies and damselflies; and stem borers. There was no overall difference between transplanting and direct-seeding, or between plant densities, in regard to sweep net counts of *Cofana* spp. and spiders. *Diopsis longicornis* and *D. apicalis* adult numbers were highest in the 20 cm X 20 cm transplanted plots in 1994, but no significant differences occurred in 1995. *Nephotettix* spp. adult numbers were highest in the 120 kg seeds ha<sup>-1</sup> direct-seeded plots in 1995 but no significant differences occurred in 1994. The percentage of tillers infested with stem borers was highest in the three transplanted and the 120 kg seed ha<sup>-1</sup> direct-seeded treatments in 1994 and the three transplanted treatments in 1995. In 1995, the percentage of whiteheads (empty panicles) caused by stem borer feeding was highest in the direct-seeded treatments, increasing from the low rate of 60 kg seeds ha<sup>-1</sup> to the highest rate of 120 kg seeds ha<sup>-1</sup>. Grain yields were generally similar in the transplanted and direct-seeded plots. Implications of planting methods and plant density as management practices in rice IPM and labour requirements for rice production are discussed." (Authors)] Address: Heinrichs, E.A., Department of Entomology, University of Nebraska, 202 Plant Industry-East Campus, Lincoln, NE, 68583-0816, USA. E-mail: eheinric@unlnotes.unl.edu

**2168.** Parr, A. (2001): Thoughts on the identification of Lesser Emperor *Anax parthenope* Selys. *Atropos* 14: 17-18. (in English). ["[...] Although there is a form with a brighter abdomen, showing some blue along its entire length, this has so far not been reported in Britain." This colour form is discussed in detail and compared with *Aeshna mixta*, *Anax ephippiger*, and males and females of *A. imperator*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

- 2169.** Peacor, S.D.; Werner, E.E. (2001): The contribution of trait-mediated indirect effects to the net effects of a predator. *Proceedings of the National Academy of Sciences of the United States of America* 98(7): 3904-3908. (in English). ["Many prey modify traits in response to predation risk and this modification of traits can influence the prey's resource acquisition rate. A predator thus can have a "nonlethal" impact on prey that can lead to indirect effects on other community members. Such indirect interactions are termed trait-mediated indirect interactions because they arise from a predator's influence on prey traits, rather than prey density. Because such nonlethal predator effects are immediate, can influence the entire prey population, and can occur over the entire prey lifetime, we argue that nonlethal predator effects are likely to contribute strongly to the net indirect effects of predators (i.e., nonlethal effects may be comparable in magnitude to those resulting from killing prey). This prediction was supported by an experiment in which the indirect effects of a larval dragonfly (*Anax* sp.) predator on large bullfrog tadpoles (*Rana catesbeiana*), through nonlethal affects on competing small bullfrog tadpoles, were large relative to indirect effects caused by density reduction of the small tadpoles (the lethal effect). Treatments in which lethal and nonlethal effects of *Anax* were manipulated independently indicated that this result was robust for a large range of different combinations of lethal and nonlethal effects. Because many, if not most, prey modify traits in response to predators, our results suggest that the magnitude of interaction coefficients between two species may often be dynamically related to changes in other community members, and that many indirect effects previously attributed to the lethal effects of predators may instead be due to shifts in traits of surviving prey." (Author)] Address: Peacor, S., Department of Biology, University of Michigan, Ann Arbor, MI, 48109, USA. E-mail: speacor@umich.edu
- 2170.** Perepelov, E.; Bugrov, A.G. (2001): C-heterochromatin in chromosomes of *Ophiogomphus cecilia* (Four.) (Anisoptera: Gomphidae) with notes on the sex chromosome origin in the species. *Caryologia* 54(2): 169-172. (in English). ["The karyotype of *Ophiogomphus cecilia* ( $2n$  male=23, X0) was analyzed using C-banding technique. All autosomes possess terminal C-bands. The X-chromosome is the largest element of the set and it consists of heterochromatic region at one of the ends and euchromatic part with three interstitial heterochromatic blocks. Possible ways of the formation of the X-chromosome are considered." (Authors)] Address: Perepelov, E. & A. Bugrov, Siberian Branch, Institute of Animal Systematics and Ecology, Russian Academy of Sciences, 11 Frunze St., 630091, Novosibirsk, Russia. E-mail: bugrov@fen.nsu.ru
- 2171.** Perepelov, E.A.; Bugrov, A.G. (2001): The constituent heterochromatin in karyotypes of dragonflies. *Belyshevia* 1(1): 10-13. (in Russian with short English summary). ["The karyotypes of 35 species of dragonflies were studied using the C-banding method. The results received allow to value positively the perspectives of usage of the method in cytogenetics of dragonflies and other insects groups possessing the holokinetic chromosomes." (Authors) The following species were studied: *Calopteryx splendens*, *Coenagrion lunulatum*, *Enallagma circuratum*, *Erythromma najas*, *Lestes dryas*, *L. sponsa*, *Gomphus epoptalmus*, *G. vulgatisimus*, *Nihonogomphus ruptus*, *Ophiogomphus cecilia*, *O. obscurus*, *Stylurus flavipes*, *Aeshna crenata*, *A. grandis*, *A. juncea*, *A. mixta*, *A. nigroflava*, *A. viridis*, *Anax imperator*, *Anotogaster sieboldii*, *Cordulia aenea*, *Macromia amphigena*, *Somatochlora graeseri*, *S. metallica*, *Leucorrhinia pectoralis*, *Libellula depressa*, *L. quadrimaculata*, *Orthetrum albistylum*, *O. brunneum*, *O. coerulescens*, *O. triangulare*, *Pantala flavescens*, *Sympetrum pedemontanum*, and *S. sanguineum*.] Address: Perepelov, E. & A. Bugrov, Siberian Branch, Institute of Animal Systematics and Ecology, Russian Academy of Sciences, 11 Frunze St., 630091, Novosibirsk, Russia. E-mail: bugrov@fen.nsu.ru
- 2172.** Phillips, E.C. (2001): Life history, food habits and production of *Progomphus obscurus* Rambur (Odonata: Gomphidae) in Harmon Creek of east Texas. *Texas Journal of Science* 53(1): 19-28. (in English). ["*P. obscurus* is a burrowing dragonfly species which is abundant in eastern Texas sandy streams. The naiads and adults of *P. obscurus* were collected from and around Harmon Creek (Walker County, Texas) from November 1995 through May 1997. This species has a univoltine life cycle and produces a total of 11 instars. At Harmon Creek, emergence of adults began in mid April and continued until mid to late September. Oviposition was observed from early May through mid August. First instar naiads were collected from May through early September. May, June and July were the months of greatest recruitment. Penultimate naiads were first collected during late February. The annual secondary production estimate for *P. obscurus* was 6.842 g/m<sup>2</sup>/yr, the standing stock biomass was 1.682 g/m<sup>2</sup>, and the cohort production/biomass ratio (P/B ratio) was 4.067. The primary food items consumed by naiads of *P. obscurus* were chironomid larvae, followed by mayfly naiads of the families Caenidae and Baetidae." (Author)] Address: Phillips, E.C., Department of Biology, Gannon University, Erie, PA, 16541 USA
- 2173.** Popova, O.N. (2001): "Dependence of dragonfly distribution of the genus *Sympetrum* on larval features". *Belyshevia* 1(1): 14-17. (in Russian with short English summary). [Environmental factors affecting the distribution of larvae of the genus *Sympetrum* are discussed.] Address: Popova, O.N., Institut Sistemati i Zkologii Zhivotnykh, 630091 Novosibirsk, Ul. Frunse 11, Russia
- 2174.** Reder, G.; Vogel, W. (2001): Nachweise der Grünen Flußjungfer - *Ophiogomphus cecilia* (Fourcroy, 1785) - in Hessen (Anisoptera: Gomphidae). *Hessische Faunistische Briefe* 20(1): 11-18. (in German with English summary). [26 June 1999 a female of *O. cecilia* was discovered on a clearing in a forest closeley situated to Bürstadt, Hessen, Germany. This is the first record for the Federal State of Hessen since 70 years. In addition, in the same time period some exuviae of *O. cecilia* were found in the Hessian part of the River Rhine.] Address: Reder, Gerd, Am Pfortengarten 37, D-67592 Flörsheim-Dalsheim, Germany. E-mail: PG.Reder@t-online.de
- 2175.** Reinhardt, K.; Gerighausen, U. (2001): Oviposition site preference and egg parasitism in *Sympecma paedisca* (Odonata: Lestidae). *Int. Jour. Odonatology* 4(2): 221-230. (in English). ["Oviposition of *Sympecma paedisca* was observed in eastern Kazakstan. The main oviposition substrates were living *Phragmites* leaves. In comparison with European and Japanese popu-

lations we propose geographic variation in the proportional use of horizontal versus vertical oviposition substrates. Ovipositing females seemed to avoid the inner parts of Phragmites stands and there was a preference for individual plants. Eggs were on average 1.28 mm long and densities of up to one egg per mm<sup>2</sup> leaf area were observed. Parasitoid wasps of the genus *Anagrus* emerged from almost 2% of 13,938 eggs examined. Further estimates revealed that 22.4% of the eggs were parasitized. There was no significant correlation between the degree of parasitism and egg density. We propose that clutch size may not be the best female fitness parameter in endophytically laying odonate species." (Authors)] Address: Reinhardt, K., Institut für Ökologie, Universität Jena, Dornburger Str. 159, D-07743 Jena, Germany. E-mail: b5klre@pluto.rz.uni-jena.de

**2176.** Relyea, R.A. (2001): The lasting effects of adaptive plasticity: Predator-induced tadpoles become long-legged frogs. *Ecology* 82(7): 1947-1955. (in English). ["Changes in environmental conditions often alter the traits of individuals; however, we have a poor understanding of how changes in phenotypically plastic traits early in development may affect traits later in life. Such effects are of particular interest in organisms with complex life cycles in which early and late life stages can have drastically different morphologies and occupy different habitats. In this study, I examined how differences in the mass, morphology, and larval period of wood frog tadpoles (*Rana sylvatica*) subsequently affected the mass and morphology of metamorphic frogs. I found three major patterns: (1) larval mass and larval period were positively related to metamorphic mass; (2) larval period was positively related to metamorph hindlimb and forelimb length and negatively related to metamorph body width; and (3) larval body length was positively related to metamorph forelimb size. I then used these correlations to interpret the connection between the traits of predator-induced tadpoles and the subsequent traits of metamorphic frogs. Tadpoles reared with caged predators (aeshnid dragonflies) developed relatively deeper tail fins and had shorter bodies, lower mass, and longer developmental times than tadpoles reared without predators. Metamorphs emerging from larval predator environments exhibited no differences in mass but developed relatively large hindlimbs and forelimbs and narrower bodies than metamorphs emerging from predator-free larval environments. These differences arose primarily due to predator-induced changes in larval development time and not due to the predator-induced changes in larval morphology. By focusing on a large number of traits and a wide range of trait values, one can readily generate predictions about how a variety of environments, which alter traits early in development, can subsequently alter traits later in development." (Author)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**2177.** Richardson, J. (2001): A comparative study of activity levels in larval anurans and response to the presence of different predators. *Behavioral Ecology* 12(1): 51-58. (in English). ["Activity level is a key behavioral trait in many animals which mediates a trade-off between finding food and avoiding predation. Optimal activity level will therefore depend on environment, and plasticity in response may increase fitness (if an organism encounters multiple environments in a lifetime).

One group in which activity level, and its relationship to foraging and predation risk, has been well studied is larval anurans. Anurans inhabit a range of distinct freshwater aquatic community types that are created by differences in pond permanency and top predator. Species segregate across these pond types and therefore tadpoles from different species encounter different selection regimes. I hypothesized that species from different pond types would therefore differ in activity behavior, and in plasticity of this behavior. I tested this in a phylogenetic framework to consider the evolution of plasticity in anurans diversifying into different pond types. Time spent active was quantified for larvae of each of 13 anuran species (from three taxonomic families) in four conditions: when no predator was present, and in the non-lethal presence of a dragonfly, newt, or fish predator. Species nested within pond type by taxonomic family differed significantly in time spent active. A significant interaction between predator treatment and taxonomic family was also observed. A phylogenetic analysis of change in behavior revealed strong positive correlations in evolution of these behaviors and suggests constraints on the ability of larval anurans to independently modify activity levels in the presence versus absence of predators." (Author)] Address: Richardson, J.M. L., Department of Zoology, University of Toronto, 25 Harbord St., Toronto, ON, M5S 3G5, Canada. E-mail: jmlr@zool.utoronto.ca

**2178.** Richardson, J.M.L. (2001): A comparative study of activity levels in larval anurans and response to the presence of different predators. *Behavioral Ecology* 12(1): 51-58. (in English). ["Activity level is a key behavioral trait in many animals which mediates a trade-off between finding food and avoiding predation. Optimal activity level will therefore depend on environment, and plasticity in response may increase fitness (if an organism encounters multiple environments in a lifetime). One group in which activity level, and its relationship to foraging and predation risk, has been well studied is larval anurans. Anurans inhabit a range of distinct freshwater aquatic community types that are created by differences in pond permanency and top predator. Species segregate across these pond types and therefore tadpoles from different species encounter different selection regimes. I hypothesized that species from different pond types would therefore differ in activity behavior, and in plasticity of this behavior. I tested this in a phylogenetic framework to consider the evolution of plasticity in anurans diversifying into different pond types. Time spent active was quantified for larvae of each of 13 anuran species (from three taxonomic families) in four conditions: when no predator was present, and in the non-lethal presence of a dragonfly, newt, or fish predator. Species nested within pond type by taxonomic family differed significantly in time spent active. A significant interaction between predator treatment and taxonomic family was also observed. A phylogenetic analysis of change in behavior revealed strong positive correlations in evolution of these behaviors and suggests constraints on the ability of larval anurans to independently modify activity levels in the presence versus absence of predators." (Author)] Address: Richardson, J., Department of Zoology, University of Toronto, 25 Harbord St., Toronto, ON, M5S 3G5, Canada. E-mail: jmlr@zool.utoronto.ca

**2179.** Roos, P.; Marten, M. (2001): Das Makrozoobenthos der Alb im Stadtgebiet von Karlsruhe. *Lauter-*



bornia 41: 89-103. (in German with English summary). [Macrozoobenthos of the River Alb, a right affluent of the Rhine in Karlsruhe (Germany) was studied in 1995-2000. In total 241 taxa have been recorded, 198 of them identified up to species level. Remarkable is the constant presence of *Allogamus ligonifer*, a in Germany extremely rare Trichoptera, and *Ophiogomphus cecilia*; the river Alb harbours the most important population of this species in the Federal State Baden-Württemberg. The black fly *Simulium degrangei* was found for the first time in Germany.] Address: Marten, M., Landesanstalt für Umweltschutz Baden-Württemberg, Griesbachstr. 1, D-76185 Karlsruhe, Germany

**2180.** Ryazanova, G.I. (2001): Ontogenesis of behavior in insects: Specific features in sexual behavior of odonate larvae. *Zoologicheskii Zhurnal* 80(1): 45-51. (in Russian with English summary). ["Specific features in sexual behavior of *Calopteryx splendens* Harris larvae were revealed. Such a specificity was found in responses of larvae to a large threatening object and in conspecific interactions of larvae. The behavioral peculiarities are manifested to a greater degree in increasing the aggressiveness of male larvae resulted in a greater damage of them. The specific sexual behavior described is considered as a display of forming the future imago behavior similar to developing imaginal morphology in larvae of hemimetabolic insects. The behavior of elder larvae is characterized as a forced compromise of the larva adaptive behavior and peculiarities of developing imaginal behavior which are of no adaptive value." (Author)] Address: Ryazanova, G., Faculty of Biology, Moscow State University, Moscow, 119899 Russia

**2181.** Sahlén, G.; Ekestubbe, K. (2001): Identification of dragonflies (Odonata) as indicators of general species richness in boreal forest lakes. *Biodiversity & Conservation* 10(5): 673-690. (in English). ["We argue the need to select indicator species on empirical data to avoid influence of personal opinions. To test an empirical selection process based on a nested subset matrix, we sampled partivoltine dragonfly larvae from 74 small lakes in central Sweden. A nestedness matrix was set up using the 'nestedness temperature calculator' program, selecting 11 species as potential indicators of species richness. These were tested against a known indicator species for water quality (the pool frog) and plant diversity through inventories and comparison to existing surveys of biological values ('rich' lakes vs. 'ordinary' lakes). We could only see a trend towards the pool frog occurring in dragonfly-rich lakes, but found a significant connection between the number of aquatic plants along the shore line and the number of dragonfly species present. A significantly higher number of indicators were encountered in lakes previously surveyed as 'rich' in plants than in lakes classified as 'ordinary'. Dragonfly species richness therefore appears to be positively associated with species richness of vascular plants. We propose nestedness matrices to be a good selecting tool for indicator species, particularly in groups where the biology of the species is not well known. However, it is important to define what such indicators really indicate." (Authors)] Address: Sahlén, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvagen 18d, SE-752 36 Uppsala, Sweden. E-mail: goran.sahlen@ebc.uu.se

**2182.** Santos, L.N. dos; Gonzalez, A.F.; Araujo, F.G. (2001): Dieta do tucunare-amarelo *Cichla monoculus*

(Bloch & Schneider) (Osteichthyes, Cichlidae), no Reservatório de Lajes, Rio de Janeiro, Brasil. *Revista Brasileira de Zoologia* 18(Supl. 1): 191-204. (in Portuguese with English summary). ["Diet of *Cichla monoculus* (Bloch & Schneider) (Osteichthyes, Cichlidae) in Lajes' Reservoir, Rio de Janeiro, Brazil. - The diet of *C. monoculus* in Lajes's Reservoir, a major impoundment in Rio de Janeiro State, Brazil, was assessed, from fishes collected in 1994, 1996 and 1999/2000. Gut contents in individuals was analyzed by the index of relative importance (IRI) which deals with numerical, gravimetric and frequency of occurrence. *C. monoculus* showed a strong piscivorous habits feeding on Cichlidae, Characidae and Pimelodidae, in decreasing order of importance, with a remarkable cannibalism on young-of-the-year. Others minor items in the diet were *Macrobrachium* sp. and Odonata. Changes in feeding composition varied with reservoir's zones and seasons, with higher diversity in autumn and peaks of cannibalism in lower zone during spring/summer. [...]" (Authors)] Address: Gonzalez, A.F., Laboratório de Ecologia de Peixes, Posto de Aquicultura, Universidade Federal Rural do Rio de Janeiro, Antiga Rodovia Rio-Sao Paulo, Km 47, 23851-970, Seropedica, RJ, Brazil. E-mail: alejandrafilippo@hotmail.com

**2183.** Schneider, W. (2001): Buchbesprechungen: Gerken, B. & K. Sternberg (1999): *Die Exuvien europäischer Libellen*. *Insecta Odonata*. ISBN 3-9805700-4-5. *Nachrichten der Deutschen Gesellschaft für allgemeine und angewandte Entomologie* 15(1): 26-27. (in German). [Review of the identification key of European odonate larvae with special emphasize of species not covered by the key.] Address: Schneider, W., Hess. Landesmus., Zool. Abt., Friedensplatz 1, D-64283 Darmstadt, Germany. E-mail: w.schneider@hlmd.de

**2184.** Seidenbusch, R. (2001): "Dragonflies of the Adana-region, southern Turkey in May 2000 and May 2001". *Sulzbach-Rosenberger Libellenrundbriefe* 12: 59 pp. (in English). [This issue is an extensive report on two odonatological trips to the Adana region in Turkey. It contains a broad range of information starting with some private "remembers" of landscapes, culture, and human beings of the region, "curiosities" (*Calopteryx intermedia*, *Gomphus davidi*, *Libellula depressa*), observations on habitat requirements or emergence habitats (*Ladona pontica*, *Platycnemis kervillei*, *P. dealbata*, *Coenagrion syriacum*, *Crocothemis erythraea*, *Gomphus schneiderii*, *G. davidi*, *Stylurus flavipes lineatus*, *Onychogomphus macrodon*, *O. lefebvrei*, *O. assimilis*, *Paragomphus lineatus*) and regional altitudinal distribution of Gomphidae. A photo gallery documents in a most impressive way the destruction of habitats of (running water dwelling) Odonata in southern Turkey. The collected material of the trips is used to increase our knowledge on morphological structures of exuviae of some poorly known species; most of them are compared with closely related species: *Ladona pontica*, *Ceragrion georgifreyi* and *C. tenellum*, *Coenagrion syriacum* and *C. puella*, *C. pulchellum*, *C. intermedium*, *Platycnemis kervillei* and *P. dealbata*, *Onychogomphus lefebvrei*, key to the European and Turkish members of *Onychogomphus*, *Paragomphus lineatus* and *P. genei*, *Gomphus schneiderii* and *G. davidi*, *Stylurus flavipes lineatus*. The habitats are described and photographically documented, and their odonate fauna - including *Brachythemis fuscopalliata* (Selys 1887) - is documen-

ted in detail. ] Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany

**2185.** Serbina, E.A.; Haritonov, A.Yu. (2001): The role of dragonflies in the life cycles of trematodes of the family Prosthogonimidae living in west Siberian forest-steppe water bodies. *Belyshevia* 1(1): 18-20. [Life cycles of trematodes living in the Lake Chany are described. In the intermediate stage Mollusca, and supplementary Odonata (*Aeshna juncea*, *Sympetrum flaveolum*, and *S. vulgatum*), and in the final stage birds are used as hosts.] Address: Haritonov, A.YU.; Laboratory of Insect Ecology, Biological Institute of the Siberian Branch of the Academy of Sciences, Frunze str. 11, RUS-630091 Novosibirsk, Russia

**2186.** Sherwin, G. (2001): White-faced Darter *Leucorrhinia dubia* and Black Darter *Sympetrum danae* in Tandem. *Atropos* 14: 64. (in English). [United Kingdom, Scotland, Highlands, Glen Affric, 27 July 2001; mixed couple of a *Sympetrum danae* male and a female of *Leucorrhinia dubia* with a blue coloured abdomen] Address: Sherwin, G., The Beeches, Sporle Road, Little Dunham, Kings Lynn, Norfolk, PE32 2DG, UK

**2187.** Silsby, J. (2001): Dragonflies of the world. Natural History Museum, London. ISBN 0-565-09165-4: VII + 216 pp. (in English). [This valuable book presents, for the first time, a comprehensive account of representatives of each of the 73 subfamilies of the Odonata, together with an account of their habits and habitats, and clear colour photographs of preserved or (more often) living specimens of larvae and adults and (sometimes) typical habitats. In this regard it fills a long-standing lacuna in the odonatological literature. Besides the main chapter devoted to representatives of subfamilies, there are 12 others treating various aspects of odonate biology, five of which have been authored by appropriate specialists. Eight other specialists have contributed sections within chapters. A wide range of diverse information about odonate biology is included in the book, for the most part being cited to secondary sources. Apart from its unique value in documenting representatives of all subfamilies, the book is likely to be much in demand for its many beautiful photographs, of odonates and of their habitats, mostly by the author, but including those from 27 other people. Another strength of the book, which achieves a stated aim of the author, is that biological and technical information is presented in a way that makes it readily accessible, and enjoyable, to the non-specialist. The book has been attractively produced, and the lay-out makes excellent use of the large page size of 22.5 x 25.5 cm. It is expected that all odonatologists, no matter how experienced they are, will wish to possess a copy of this fine book. Philip Corbet] Address: The Natural History Museum, Cromwell Road London SW7 5BD, UK. Price: £27.50

**2188.** Sirot, L.K.; Brockmann, H.J. (2001): Costs of sexual interactions to females in Rambur's fork-tail damselfly, *Ischnura ramburi* (Zygoptera: Coenagrionidae). *Animal Behaviour* 61(2): 415-424. (in English). ["Several species of damselflies, dragonflies and butterflies are characterized by a female-limited polymorphism in which one type of female, the andromorph, looks and behaves like males whereas the other type of female, the gynomorph, looks and behaves differently. Sexual conflict has been hypothesized to play a role in the maintenance of this polymorphism in that andromorphs

may have an advantage over gynomorphs by avoiding costly sexual interactions through male mimicry. We tested for costs of sexual interactions to female *Ischnura ramburi* damselflies by comparing the success of singly mated females maintained with no males to the success of females maintained continuously with males at a 3:1 (male to female) operational sex ratio (OSR) and a 1:1 OSR. Our findings suggest that sexual interactions affect the two morphs differently. The time spent feeding, number of eggs laid and egg-laying rate of andromorphs were lower in the 3:1 OSR treatment than in the treatment with no males. Time spent feeding and number and rate of eggs laid by gynomorphs did not differ among treatments. Sexual conflict may be occurring between males and mated andromorphs because sexual interactions are associated with net costs to mated andromorphs whereas sexual interactions with mated andromorphs are beneficial to males because there is high last-male sperm precedence. Based on this experiment, andromorphs cannot be said to have an advantage over gynomorphs by avoiding costly sexual interactions because sexual interactions were not associated with net costs to gynomorphs." (Authors)] Address: Sirot, Laura, Department of Zoology, University of Florida, 223 Bartram Hall, Gainesville, FL, 32611-8525, USA. E-mail: lsirot@zoo.ufl.edu

**2189.** Siva-Jothy, M.T.; Tsubaki, Y.; Hooper, R.E.; Plaistow, S.J. (2001): Investment in immune function under chronic and acute immune challenge in an insect. *Physiological Entomology* 26(1): 1-5. (in English). ["In this paper we investigate the relationship between the chronic burden of mid-gut parasites (eugregarine trophozoites) and the effect of an acute haemolymph challenge (a nylon insert) on two important insect immune effector systems (phenol oxidase (PO) and the encapsulation response) in a field-population of damselflies. PO levels in the haemolymph, and the magnitude of the encapsulation response were maintained, regardless of chronic and subsequent acute experimental immune challenges. The maintenance of these effector systems is therefore probably an important life-history requirement in these damselflies. Investment in mid-gut PO levels was significantly negatively related to the animal's chronic parasite burden after an acute experimental challenge in the haemolymph, suggesting that maintaining PO levels across two physiological compartments (haemolymph and mid-gut) is costly. The results suggest that the immune effector system activity in different physiological compartments in an insect's body is affected by chronic parasite burdens in the face of the demands imposed by an acute immune insult." (Authors)] Address: Siva-Jothy, M.T., Department of Animal and Plant Sciences, University of Sheffield, Sheffield, S10 2TN, UK. E-mail: m.siva-jothy@sheffield.ac.uk

**2190.** Spindola, L.; De Souza, L.O.I.; Costa, J.M. (2001): Descricao da larva de *Perithemis thais* Kirby, 1889, com chave para identificacao das larvas das especies conhecidas do genero citadas para o Brasil (Odonata: Libellulidae). *Boletim Museu Nacional Rio de Janeiro Zoologia* (442): 1-8. (in Portuguese with English summary). ["Description of the larva of the *Perithemis thais* Kirby, 1889, with key to identification of the known larvae of the species of the genus cited to Brazil (Odonata: Libellulidae). -The last instar larva of *Perithemis thais* Kirby, 1889, from the Pantanal of Mato Grosso do Sul, Brazil, is described and illustrated. A key to the lar-

vae of the species of *Perithemis* Hagen, 1861, cited to Brazil is appended." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisys.com.br

**2191.** Steglich, R. (2001): Die Tier- und Pflanzenarten nach Anhang II der Fauna-Flora-Habitatrichtlinie im Land-Sachsen-Anhalt. 3.1.2 Odonata. Naturschutz im Land Sachsen-Anhalt 38 (Sonderheft): 15-21. (in German). [A special issue of the journal is dedicated to the species of Appendix II of the Fauna-Flora-Habitat-Directive of the European Union. Each species occurring in the Federal State Sachsen-Anhalt, Germany is treated in a monographic way: short description of the species including a photograph of the species and its habitat, information on biology and ecology, distribution in Europe and a detailed commented map of its distribution in Sachsen-Anhalt, and information on threats and conservation measures. This is a sophisticated contribution on *Coenagrion mercuriale*, *Leucorrhinia pectoralis*, and *Ophiogomphus cecilia* in Sachsen-Anhalt and a solid fundament for building the European network NATURA 2000.] Address: Steglich, Rosmarie, Quittenweg 53, 39118 Magdeburg, Germany

**2192.** Stoks, R. (2001): Male-biased sex ratios in mature damselfly populations: Real or artefact? *Ecological Entomology* 26(2): 181-187. (in English). ["1. There is ongoing controversy about whether biased sex ratios in diploid insect populations are real or an artefact caused by different behaviours and/or different catchability of the sexes. This was tested by monitoring two field and three semi-natural populations of the damselfly *Lestes sponsa*. 2. Capture-mark-recapture data showed that population size estimates were about twice as large for males as for females at both field sites. Independent estimates of the sex ratios based on total numbers of males and females captured supported the male bias. 3. Males had higher recapture probabilities than females due to longer times between successive visits in females. Because the same pattern was found in the semi-natural populations, the longer intervals in females are no artefact due to their lower detectability. 4. Theoretical models show that the strong temporary emigration of females tends, if anything, to overestimate female population sizes and that the heterogeneity of recapture probabilities observed in males tends to underestimate male population sizes. Hence, behavioural differences between the sexes do not cause an artificially male-biased sex ratio. 5. Spatial data show that operational sex ratios are male biased at the pond but become female biased in the plots further away from the shoreline; however because of the decrease in densities away from the shoreline, this does not result in a global even sex ratio. 6. Spatial data, temporary emigration patterns, and independent estimates suggest strongly that the male-biased sex ratios in mature damselfly populations are real." (Author)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**2193.** Stoks, R. (2001): What causes male-biased sex ratios in mature damselfly populations? *Ecological Entomology* 26: 188-197. (in English). ["1. Several hypotheses to account for biased sex ratios in mature insect populations were tested by monitoring two field popula-

tions of the damselfly *Lestes sponsa* and by performing experiments in field cages. The population sex ratios are heavily male biased in this species. 2. The observed sex ratio at emergence was even and both sexes emerged synchronously. Females had longer maturation times but these were insufficient to explain the observed sex ratio shift. 3. Mass increases during maturation were consistently larger in females. In agreement with this, immature females made more flights per unit of time, which should make them more vulnerable to predation, however maturation probabilities were lower in females only in one field cage experiment. This inconsistency may be due to long bad weather conditions. Interestingly, predators reduced mass increase and this reduction was larger in females than in males. 4. Calculations based on the sex specific maturation times show that only slightly lower daily survival probabilities during maturation in females are enough to generate the observed sex ratio shift. 5. Mature survival was higher in males than in females in one field population but not in another, indicating that this cannot be a general mechanism causing the sex ratio. A higher maturation probability in males is therefore the most plausible mechanism causing the sex ratio shift in damselfly populations." (Author)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**2194.** Suh, A.; N.; Samways, M.J. (2001): Development of a dragonfly awareness trail in an African botanical garden. *Biological Conservation* 100: 345-353. (in English). ["The IUCN/SSC Status Survey and Conservation Action Plan: Dragonflies calls for an increase in educating the public and increasing awareness of dragonflies (Odonata). Dragonflies are conspicuous and attractive, and can 'stand in' for other invertebrates in raising awareness of the necessity to conserve invertebrates. While reserves have been set aside for dragonfly awareness and conservation in the northern hemisphere, no such dragonfly reserves appear to exist in the southern hemisphere, despite its rich dragonfly fauna. This paper describes the development of a dragonfly-awareness trail in an established and well-visited botanical garden (The National Botanical Gardens, Pietermaritzburg, South Africa). Correlations between species and environmental variables were significantly high for six measured environmental variables: pH, percentage shade, vegetation (structural and compositional), ambient and water temperature, and water depth. Multivariate analyses of data, classified 20 a priori selected sampling units into four ecologically meaningful biotope types, each with a characteristic dragonfly assemblage. The four biotopes provided potential viewing points. To these were added a further three duplicate biotopes so as to link the trail into a circuit. Questionnaires assessed public awareness of dragonflies, and helped design a preliminary leaflet. A final trail design was drawn up along with an expanded booklet. The trail has now been implemented. Recommendations are made on the minimal scientific underpinning required for future trail design." (Authors)] Address: Samways M.J., Invertebrate Conservation Research Centre, Dept Zool. & Entomol., Univ. of Natal, P/Bag X01, Scottsville 3209, Pietermaritzburg, South Africa. E-mail: samways@un.ac.za

**2195.** Suhling, F.; Lepkojus, S. (2001): Differences in growth and behaviour influence asymmetric predation among early-instar dragonfly larvae. *Canadian Journal*



of Zoology 79(5): 854-860. (in English with French summary). ["Libellulid dragonflies lay large egg clutches. When eggs of two or more species are deposited at the same time and patch, one can expect a high density of early-instar larvae. Thus, interspecific interactions should be evident. We studied the interaction of two species, *Sympetrum fonscolombii* and *Orthetrum cancellatum*, which typically co-occur in French rice fields. We experimentally simulated the laying of egg clutches of both species at the same time and site. Survival of *O. cancellatum* was reduced compared with that of controls without *S. fonscolombii* and also with that of *S. fonscolombii* in the two-species treatment. At the end of the experiment, mean head width of *S. fonscolombii* was greater than that of *O. cancellatum*, which may be one reason for the differential survival. In a second experiment we observed the behaviour of pairs of early-instar larvae of both species in different size combinations. Small larvae of *S. fonscolombii* reduced locomotory activity in the presence of larger *O. cancellatum*. In contrast, small *O. cancellatum* did not do so in the presence of larger *S. fonscolombii*. This behavioural difference may also cause asymmetric interspecific predation." (Authors)] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**2196.** Suhling, F. (2001): Intraguild predation, activity patterns, growth and longitudinal distribution in running water odonate larvae. *Archiv für Hydrobiologie* 151(1): 1-15. (in English). ["I studied predation by larval *Cordulegaster boltonii* on larvae of two other dragonfly species in a laboratory artificial stream. *Onychogomphus forcipatus unguiculatus* suffered significantly higher predation than *Onychogomphus uncatus*. Activity was much lower in *O. uncatus*, which is interpreted as an antipredation trait against *C. boltonii*. The higher activity of *O. f. unguiculatus* makes it vulnerable to the Sit-and-wait predator *C. boltonii* due to increased encounters. Rearing of both *Onychogomphus* in field cages under the same conditions of temperature, food availability and density revealed lower growth rates of *O. uncatus*, which may be interpreted as a cost of the antipredation behaviour. To test whether experimental results have relevance for large-scale distribution patterns of the two *Onychogomphus*, samples were taken at 23 sites in river-systems of southern France where both species co-occur. In the field I found that *O. f. unguiculatus* does not coexist with *C. boltonii* at sites where the latter occurs in high numbers. In contrast, *O. uncatus* is established even at high density of *C. boltonii*." (Author)] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**2197.** Suri Babu, B.; Srivastava, V.K. (2001): Annotations on the dragonfly fauna of Sagar, Madhya Pradesh, Central India (Odonata: Anisoptera). *Opusc. zool. flumin.* 193: 1-7. (in English). [21 anisopteran species, evidenced during 1992-1996, are listed and field notes are provided on all of them. 17 species were not previously recorded from the district of Sagar. The obscure status of *Crocothemis misrai* Baijal & Agarwal, 1956 is shortly discussed.] Address: Suri Babu, B., Forensic Sciece Laboratory, Police Control Room, Jagdalpur-494001 (M.P.), India

**2198.** Theischinger, G. (2001): The larva of *Gynacantha mocsaryi* FÖRSTER (Odonata: Aeshnidae).

*Linzer biol. Beitr.* 33(1): 603-605. (in English). [Morphological details presented by FRASER (1963) in the description of the larva of *G. mocsaryi* are corrected, illustrated and discussed.] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

**2199.** Theuerkauf, J.; Rouys, S (2001): Habitats of Odonata in the Bialowieza Forest and its surroundings (Poland). *Fragmenta Faunistica* (Warsaw) 44(1): 33-39. (in English. with Polish summary). ["From 1997 to 1999, we found 48 Odonata species in the Bialowieza Forest and its surroundings (Poland). We attribute the high number of species in the mainly forested study area to the extensive river network, which is shaped by a mostly natural water regime including many natural pools, and to the abundance of small-scale sandpits bearing water bodies in various stages of succession. The Bialowieza Forest is, until now, the northernmost place of a reproduction of *Crocothemis erythraea* (52°39' N, 23°35' E)." (Authors) There are some more species of special faunistic interest, e.g. *Sympecma paedisca*, *Coeagrion lunulatum*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Epithea bimaculata*, *Sympetrum meridionale*, *S. pedemontanum*, *Leucorrhinia albifrons*, *L. caudalis*, and *L. pectoralis*.] Address: Theuerkauf, J., Wildlife Biology and Management Unit, Dept of Ecosystem and Landscape Management, Munich University of Technical Sciences, 85354 Freising, Germany. E-mail: Theuerkauf.Joern@t-online.de Germany

**2200.** Thurnheer, S.; Reyer, H.-U. (2001): Spatial distribution and survival rate of waterfrog tadpoles in relation to biotic and abiotic factors: A field experiment. *Amphibia-Reptilia* 22(1): 21-32. (in English). ["Predictions about population and community dynamics are usually based on lab experiments. Because the results are difficult to transfer to natural conditions, the major purpose of this study was to test the effects of biotic and abiotic factors on tadpole populations in a natural environment. We stocked six ponds, created the previous year, with known numbers of *Rana esculenta* and *R. lessonae* tadpoles and followed their development over several months. When compared among ponds, tadpole density correlated positively with the nitrate:phosphate ratio. This suggests that water chemistry may have affected survival, either directly or indirectly via productivity. Within ponds, both species showed a clear preference for the shallow zone. This behavior probably reflects a preference for warm water close to the surface, rather than avoidance of predators, because relative densities of odonates also increased from deep to shallow zones. This study is one of few that not only considers the distribution of the anuran tadpoles but the distribution of their predators as well." (Authors)] Address: Thurnheer, Sylvie, Zoological Institute, University of Zürich, CH-8057 Zürich, Switzerland. E-mail: ulireyer@zool.unizh.ch

**2201.** Tolonen, K.T.; Hämäläinen, H.; Holopainen, I. J.; Karjalainen, J. (2001): Influences of habitat type and environmental variables on littoral macroinvertebrate communities in a large lake system. *Arch. Hydrobiol.* 152(1): 39-67. (in English). ["The community structure of littoral macroinvertebrates was explored by multivariate analyses in three basins of the large Lake Saimaa system (eastern Finland). The basins differed in trophic status and degree of human influence. It was hypothesized that the structure of littoral invertebrate communi-

ties is influenced by lake trophic status, as is the case in profundal communities. Three littoral habitat types with different substrate (stony, sandy and vegetated shores) were sampled from the shoreline to a depth of 1.5-3 meters. The habitat type was found to be largely determined by the slope of the shore and the wind exposure. Each habitat type supported fairly characteristic fauna, and detrended correspondence analysis grouped the invertebrate assemblages by habitat type rather than by basin. Within each habitat type, canonical correspondence analysis indicated that species composition changed along the trophic gradient. In the vegetated littoral zone, the greatest change in community structure occurred within the macrophyte beds, varying from the outer edge of macrophytes to the shoreline. Two alternative or complementary explanations are given for this horizontal gradient. First, a horizontal gradient of abiotic characteristics results in a change of community composition. Second, the macrophyte beds may form a horizontal transition zone in predation, from invertebrate predation inshore to fish predators offshore. On the stony and sandy shores, the magnitude of wave action was also important in structuring the communities. As each habitat type harbors characteristic fauna, a variety of habitats needs to be protected in order to conserve littoral macroinvertebrate diversity in large lakes. To make among-lake comparisons of littoral macroinvertebrate assemblages, stratification by habitat type is obviously necessary. The effects of eutrophication on invertebrate assemblages were most pronounced in stony habitats." (Authors) 13 odonate taxa (11 on species level) are listed in appendix 1.] Address: Tolonen, K.T., Department of Ecology, Karelian Institute, University of Joensuu, P.O. Box 111, 80101 Joensuu, Finland. E-mail: ktolonen@cc.joensuu.fi

**2202.** Tonn, M. (2001): Hochzeit in Herzform. Hamburger Abendblatt 24. Juli 2001: 6. (in German). [Popular article on dragonflies in a German newspaper. Special emphasize is given to mating behaviour, which is compared with human sexuality.] Address: not stated

**2203.** Vacher, J.-P. (2001): Nouvelles observations d'*Oxygastra curtisii* (Dale, 1834) dans le département de la Haute-Garonne (Odonata, Corduliidae). *Martinia* 17 (2): 67-68. (in French with English summary). ["The presence of *O. curtisii* in Haute-Garonne, near Toulouse, is confirmed. The previous notice of this Odonata in this department was that of Marquet in 1881. Although breeding has not been proved, the observation of individuals in the three localities surveyed make it likely that the species is still breeding in this area." (Author)] Address: Vacher, J.-P., 5, rue Pons-Capdenier, F-31500 Toulouse, France

**2204.** Weekers, P.H.; De Jonckheere, J.F.; Dumont, H.J. (2001): Phylogenetic relationships inferred from ribosomal ITS sequences and biogeographic patterns in representatives of the genus *Calopteryx* (Insecta: Odonata) of the West Mediterranean and adjacent West European zone. *Molecular Phylogenetics & Evolution* 20 (1): 89-99. (in English). ["Western Europe is a reinvansion zone for the riverine dragonfly genus *Calopteryx* (Insecta: Odonata). Reinvansion may have been from central West Asia or from the West Mediterranean refugium. Phylogenetic relationships of West Mediterranean and West European taxa of the genus *Calopteryx* from different localities were inferred from sequences of the internal transcribed spacers (ITS1 and ITS2) of the nuclear

ribosomal RNA genes. 26 taxa belonging to the species groups *C. splendens*, *C. meridionalis*, *C. haemorrhoidalis*, *C. virgo*, *C. xanthostoma*, and *C. exul* were analyzed, with two North American species, *C. amata* and *C. aequabilis*, as outgroup. Sequence data and phylogenetic analyses were used to infer biogeographical patterns. The ribosomal spacers (ITS1 and ITS2) and the intervening 5.8S rDNA gene were amplified by PCR and sequenced. The ITS2 sequences of the West Mediterranean and West European calopterygids show no length variation but the ITS1 region was slightly variable in length. The sequence variation for ITS1 and ITS2 regions between different West Mediterranean and West European calopterygids was 14.5 and 6.1%, respectively. Phylogenetic relationships inferred from ITS sequences only partly confirm morphological data. A monophyletic origin of all West Mediterranean and West European species emerged. They are separated into two main clades; the *splendens*-like forms and the *virgo/meridionalis/haemorrhoidalis* group. Intraspecific variability, indicating different stages of speciation, was detected only in West Mediterranean representatives (e.g., *C. xanthostoma*) but not in invasive representatives in West Europe. The North African endemic *C. exul* is more closely related to the Italian *C. s. caprai* than to *C. splendens sensu strictu*. Based on the present information, Cretan populations are the only *splendens*-like taxa in addition to *C. s. caprai* that deserve subspecies status." (Authors)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstr. 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

**2205.** Wendzonka, J. (2001): Dragonflies (Odonata) of Gostyn at its environs (southern Wielkopolska). *Badania fizjograficzne nad Polska zachodnia Ser. C., Zool.* 48: 29-39. (in Polish with English summary). [In 1995-2000 the Odonata of Gostyn and its environs in southern Wielkopolska-Kuiawy Lowland, Poland have been investigated. A total of 44 species was recorded, including several rare species such as *Aeshna affinis*, *Orthetrum albistylum*, *Sympetrum striolatum*, *Leucorrhinia caudalis*, and *L. albifrons*, and some species which are not rare but "insufficiently presented in published papers", such as *Lestes barbarus*, *Ischnura pumilio*, and *Erythromma viridulum*. *A. affinis* has its northern range limit in Wielkopolska ("Great Poland"), so this is a region where the species reproduces probably only temporarily. *O. albistylum*, almost till the end of the 20th century only known from the south of Poland, now has been found also in other parts of the country, mostly in mid-eastern and northeastern parts. Two localities near Gostyn, described in this paper, are the northernmost in western Poland. *O. albistylum* significantly prefers gravel and sand pits, unshaded habitats, protected from wind, generally with well-developed vegetation but also with some bare patches. At the locality Pokrzywnica *O. albistylum* predominated over the rare *O. cancellatum*, however in Smilowo the former species was rare and occupied positions away from water. In Smitowc only tandems and ovipositing females used habitats, where *O. cancellatum* and *L. depressa* (aggressive towards each other) predominated.] Address: Wendzonka, J., Zakład Ekologii, Akademia Bydgoska im. Kazimierza Włocławskiego, ul. Chodkiewiczza 51, 85-667 Bydgoszcz, Poland. E-mail: wendzonkafawp.pl

**2206.** Wheeler, W.; Whiting, M.; Wheeler, Q. D.; Carpenter, J.M. (2001): The phylogeny of the extant hexa-

pod orders. *Cladistics* 17(2): 113-169. (in English). ["Morphological and molecular data are marshalled to address the question of hexapod ordinal relationships. The combination of 275 morphological variables, 1000 bases of the small subunit nuclear rDNA (18S), and 350 bases of the large subunit nuclear rDNA (28S) are subjected to a variety of analysis parameters (indel and transversion costs). Representatives of each hexapod order are included with most orders represented multiply. Those parameters that minimize character incongruence (ILD of Mickevich and Farris, 1981, *Syst. Zool.* 30, 351-370), among the morphological and molecular data sets are chosen to generate the best supported cladogram. A well-resolved and robust cladogram of ordinal relationships is produced with the topology (Crustacea (Chilopoda Diplopoda) (Collembola Protura) (Japygina Campodeina) (Archaeognatha (Zygentoma (Ephemera (Odonata (Mantodea Blattaria) Isoptera) Zoraptera) (Plecoptera Embiidina) (Orthoptera Phasmida) (Grylloblattaria Dermaptera) (Psocoptera Phthiraptera) Thysanoptera) Hemiptera) ((Neuropteroidea Coleoptera) (Strepsiptera Diptera) Mecoptera) Siphonaptera) (Trichoptera Lepidoptera) Hymenoptera)."] (Authors)] Address: Wheeler, W.; Div. Invert. Zoology, American Museum of Natural History, Central Park West at 79th Street, New York, NY, 10024-5192 USA

**2207.** Wildermuth, H. (2001): Concealment in European Somatochlora larvae (Anisoptera: Corduliidae). *Exuviae* 8(1): 1-12. (in English with Slovene summary). [Adaptive coloration and concealment behaviour were studied in late-stadium larvae of *Somatochlora alpestris*, *S. flavomaculata*, *S. meridionalis*, and *S. metallica*. Their features were interpreted in the light of antipredation adaptations. "Differences between species in body shape, coloration, color pattern, and behaviour are considered to be correlated with the presence or absence of fish in the habitats as well as by the microhabitats the larvae occupy."] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**2208.** Wildermuth, H. (2001): Das Rotationsmodell zur Pflege kleiner Moorgewässer. - Simulation naturgemäßer Dynamik. *Naturschutz und Landschaftsplanung* 33(9): 269-273. (in German with English summary). ["The model describes a management mode enabling the establishment of a mosaic of all succession stages, with changes in space and time on a confined area. By offering different succession stages at the same time it is intended to provide permanent habitats for a high diversity of aquatic organisms. The model simulates the fictitious dynamics of small water bodies in certain moorland biotopes formerly unimpaired by human activities. It has been applied for about 20 years in a nature reserve in the Swiss Alpine Foothills where peat was exploited by hand up to 1950. Long-term monitoring of selected plant and animal taxa shows that typical biocoenoses of small peat ponds could be preserved and promoted in various succession stages. Special attention was given to the population dynamics of the local dragonfly fauna including the highly endangered *Leucorrhinia pectoralis*, a species of the Bern Convention and the Habitats Directive of the EU. The prerequisites, possibilities and limits of the model are discussed with respect to biodiversity conservation and landscape management as well as in terms of their practicability."] (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-

8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**2209.** Wong, A.; Forbes, M.R.; Smith, B.P. (2001): Characterization of AFLP markers in damselflies: Prevalence of codominant markers and implications for population genetic applications. *Genome* 44(4): 677-684. (in English with French summary). ["Amplified fragment length polymorphism (AFLP) analysis is becoming increasingly popular as a method for generating molecular markers for population genetic applications. For practical considerations, it is generally assumed in population studies that AFLPs segregate as dominant markers, i.e., that present and absent are the only possible states of a given locus. We tested the assumption of dominance in natural populations of the damselfly *Nehalennia irene* [...] Electro-blotted AFLP products from 21 samples were probed with individual markers. Eleven markers were analyzed, of which two were monomorphic and nine were polymorphic. Only two of the polymorphic markers behaved in a strictly dominant manner. The remaining seven polymorphic markers displayed various degrees of codominance, with 2-10 visible alleles in the sample. Of the three markers displaying the highest degree of variability, two contained microsatellite repeat tracts. Our results suggest that the assumption of dominance is unfounded. As a result, AFLP analysis may be unsuitable for estimating several important population genetic parameters, including genetic diversity."] (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**2210.** Wood, P.J.; Greenwooda, M.T.; Barkerb, S.A.; Gunn, J. (2001): The effects of amenity management for angling on the conservation value of aquatic invertebrate communities in old industrial ponds. *Biological Conservation* 102: 17-29. (in English). ["The conservation value of aquatic macroinvertebrate assemblages in old industrial mill ponds was examined within the urban environment. Of the 60 pond sites identified, 18 (31%) have been drained and/or redeveloped since 1985. Canonical correspondence analysis identified differences between the invertebrate communities of managed and unmanaged ponds. Community composition was strongly influenced by the percentage of vegetation cover and the presence of stocked fish for recreational angling. Managed/ stocked ponds have communities dominated by burrowing Oligochaeta and Chironomidae. Unmanaged sites had higher macroinvertebrate diversity compared to managed/stocked ponds and were typified by larval Trichoptera, Coleoptera and Zygoptera. However, unmanaged and 'derelict' sites are at greater risk of drainage and redevelopment in the urban environment. The potential conflict between active management of old industrial mill ponds for recreational angling and the conservation of macroinvertebrate biodiversity is explored."] (Authors) In an appendix the invertebrate taxa recorded and the number of ponds at which they were recorded are documented: *Coenagrion puella* (15), *Ischnura elegans* (14), *Enallagma cyathigerum* (12), and *Pyrrhosoma nymphula* (1).] Address: Wood, P.J.; Department of Geography, Loughborough University, Loughborough, Leicestershire, LE1 1 3TV, UK. E-mail: p.j.wood@lboro.ac.uk

**2211.** Woodward, G.; Hildrew, A.G. (2001): Invasion of a stream food web by a new top predator. *Journal of*



Animal Ecology 70(2): 273-288. (in English). [1. A new top predator, the dragonfly *Cordulegaster boltonii* Donovan, 'invaded' a stream with a well-described food web. 2. The pre-invasion web was species-poor but complex, with prevalent intraguild predation, cannibalism and omnivory. Such characteristics differ from expectations based upon the early food web literature, but are consistent with more recent empirical webs and theoretical developments. 3. Exhaustive sampling was necessary to describe web structure, with the gut contents of several hundred individuals being required to reach the asymptote of the total number of links for individual species. There was no single 'standard' sample size that was applicable for estimating the number of links: sampling 'x' guts gave a different fraction of the asymptotic value for different species. Smaller predators were more prone to under-estimation of links than larger species higher in the web. 4. The number of feeding links, trophic status and the degree of omnivory increased progressively with predator body size, both within and among species. The diet of each predator species (or instar) was effectively a subset of the diet of the next largest predator. 5. The invader was extremely polyphagous and fed at all trophic levels. Mean chain length increased by half a link following the invasion. Web complexity, and omnivory in particular, also increased. Pre- and post-invasion webs displayed intervality and rigid circuitry. The resident predators were frequently eaten by the invader, but the only significant predators of *C. boltonii* were larger conspecifics. Although no species have yet been deleted, there has been a 21% increase in links for a 6% increase in species since the invasion, suggesting that the members of the web had become more tightly packed within niche space. Most prey species were eaten by every predator species (including *C. boltonii*), indicating the potential for strong apparent competition within the web." (Authors)] Address: Woodward, G., IERM, University of Edinburgh, Mayfield Road, Edinburgh, EH9 3JU: UK. E-mail: Guy.Woodward@ed.ac.uk

**2212.** Worthen, W.B.; Blue, T.; Haney, D.C.; Andersen, C.B. (2001): Abundance of *Boyeria vinosa* larvae in the Enoree River basin, USA: chemical, physical, and biological correlates (Odonata: Aeshnidae). *Int. Jour. Odonatology* 4(2): 231-240. (in English). [Relationships between the abundance of *B. vinosa* larvae and the chemical, physical and biological properties of the Enoree River of South Carolina, USA and nine of its tributary stream systems are described. "The abundance (number/sample) of *B. vinosa* was positively correlated with stream means for pH, bicarbonate, silicon, magnesium, and calcium ( $p < 0.01$ ). Also, *B. vinosa* were more abundant in streams with a higher frequency of sandy bottoms sites ( $r = 0.622$ ,  $p < 0.05$ ). At the site scale, sites with *B. vinosa* had significantly more crayfish, fish, and other odonates, higher pH, and dissolved oxygen, and less chloride than sites without *B. vinosa* (Mann-Whitney U tests,  $p < 0.05$ ). Where *B. vinosa* were present, abundance was positively correlated with fish abundance, odonate abundance, pH, conductivity, and concentrations of sodium, calcium, magnesium, bicarbonate, bromine, silicon, and aluminum ( $p < 0.05$ ). As such, larval abundance of *B. vinosa* was strongly correlated with chemical and physical parameters at both site and stream scales, but only covaried with the abundance of other organisms at the site scale. Larval abundance did not correlate with the abundance of predatory centrarchid fish at either scale." (Authors)] Ad-

dress: Worthen, W.B. D., Department of Biology, Furman University, Greenville, SC, USA, 29613. E-mail: worthen@furman.edu

**2213.** Wright, A.B.; Smock, L.A. (2001): Macroinvertebrate community structure and production in a low-gradient stream in an undisturbed watershed. *Arch. Hydrobiol.* 152(2): 297-313. (in English). ["Macroinvertebrate community composition, abundance and production were measured in a sand-bottomed, headwater stream on the Coastal Plain physiographic province in the southeastern U.S.A. The stream's watershed had experienced almost no anthropogenic disturbance for over 100 years and thus the stream represented as close to pristine, reference conditions as occurs in this geographic region. Macroinvertebrates were sampled over one year in the three dominant habitats in the stream: sand sediment, submerged wood and macrophytes (*Sparganium americanum*). Total taxa richness as well as the taxa richness of Ephemeroptera, Plecoptera, Trichoptera and Chironomidae all were greater than in streams flowing through more disturbed watersheds in the area. Annual mean habitat-specific density and biomass were highest in the sediment; density was lowest on the wood and biomass lowest on *Sparganium*. Habitat-specific production was  $39-42 \text{ gm}^{-2} \text{ y}^{-1}$  in the sediment and on wood and  $16 \text{ gm}^{-2} \text{ y}^{-1}$  on *Sparganium*. The majority of production in all three habitats was by Chironomidae, which comprised 80-92% of total production in each habitat. Taxa in the collector-gatherer and predator functional feeding groups accounted for the majority of production in the sediment and on wood, whereas filter-feeders were predominant on *Sparganium*. Whole-stream production, calculated by summing habitat-specific values that had been weighted for habitat availability, was  $64 \text{ gm}^{-2} \text{ y}^{-1}$ , considerably higher than production in more disturbed streams in the region. About 65 % of the total production occurred in the sediment, 26 % on wood, and 9 % on *Sparganium*. [...] The production to biomass ratio for the macroinvertebrate community was 33.3; ratios for six taxa of chironomids exceeded 100. Along with the higher species richness in this stream, production of macroinvertebrates was at least twice as high as that in nearby streams with more disturbed watersheds. These differences may be attributable to the long time since the last anthropogenic disturbance of the stream's watershed, which has led to a mature forest covering nearly all of the watershed and which has resulted in a more stable stream flow and less disturbance of the sediment during high flow than in streams in more disturbed watersheds." (Authors) In tab. 1 *Boyeria vinosa*, *Calopteryx maculata*, *Cordulegaster maculata*, and *Dromogomphus spinosus* are listed.] Address: Smock, L.A., Department of Biology, Virginia Commonwealth University, Richmond, Virginia, U.S.A. 23284-2012.

**2214.** Yourth, C.P.; Forbes, M.R.; Smith, B.P. (2001): On understanding variation in immune expression of the damselflies *Lestes* spp. *Canadian Jour. Zoology* 79(5): 815-821. (in English with French summary). ["Immune ability and immune expression have been viewed as life-history traits that are influenced by such factors as the likelihood of being parasitized, intensity and costs of parasitism, and trade-offs associated with immune expression. In this paper we show that different patterns of infestation by a generalist ectoparasite, *Arrenurus planus* Marshall (Arrenuridae: Hydrachnida), do not fully explain the variation in immune expression ac-

ross four species of sympatric damselflies (Lestidae: Zygoptera). Within species, no gender biases in immune expression were evident. Whereas both males and females of one oft-exploited species did not mount immune responses against attending larval mites, males and females of three other species showed similar immune responses, with variable expression. The immune response was melanotic encapsulation of mite feeding tubes, and was associated with dead mites. Of the three species showing immune expression, the species with the highest prevalence and intensity of infestation had a significantly higher proportion of individuals responding immunologically to mites. In conclusion, current infestation levels only partially predict immune investment; consideration of the timing of emergence of different species suggests that season may be an important predictor of immune investment." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**Thanks to all who contributed to this issue of OAS!**

This issue is dedicated to the memory of Joachim Werzinger, Nürnberg, who died in December 2001, and who made many significant contributions to odonatology and friendship among odonatologists.

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: Lindeboom@aol.com and Martin Schorr, Schulstr. 7B D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: martin.schorr@foea.de

Published in Rheinfelden, Germany and printed in Tübingen, Germany.  
ISSN 1438-0269

## 1997

- 2215.** Aoki, T. (1997): Dragonflies inhabiting Shijimi River in Shijimi-cho, Miki City, Hyogo Prefecture. *Sympetrum Hyogo* 4: 15. (in Japanese with English summary). [A survey on the Odonata fauna of Shijimi River, Japan was carried out on 26 May 1996. Relatively clear water from Donto-dam before joining Ogo River enabled the development of gomphid species such as *Nihonogomphus viridis*, *Stylogomphus suzukii*, *Onychogomphus viridicostus*, *Asiagomphus pryeri*, *Trigomphus citimus tabei*, *Gomphus postocularis*, and *Sieboldius albardae*. Increasing water pollution downstream reduced gomphid diversity.] Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: taoki@ma3.justnet.ne.jp
- 2216.** Aoki, T. (1997): *Lanthus fujiacus* (FRASER) was discovered in Kobe City, Hyogo Prefecture. *Sympetrum Hyogo* 4: 4. (in Japanese with English summary). [I collected an ultimate instar larva of *L. fujiacus* at Arima-cho, Kobe on July 9, 1996. This species has often been found at habitats of *Epiophlebia superstes*. I heard that the latter species was found there, so I tried to collect the former species. It was successful, and the total number of species recorded in Kobe counts 89 including 14 species in Gomphidae.] (Author) Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: taoki@ma3.justnet.ne.jp
- 2217.** Aoki, T. (1997): Odonata fauna of Kobe City, Part 5. (Lestidae). *Sympetrum Hyogo* 4: 2-4. (in Japanese with English summary). [Lestes sponsa, *L. japonicus*, *Sympecma paedisca*, and *Indolestes peregrinus* are treated. *L. japonicus* seriously has been influenced negatively by destruction of habitats.] Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: taoki@ma3.justnet.ne.jp
- 2218.** Aoki, T. (1997): The Odonata fauna of Kobe City, Part 6. (Calopterygidae). *Sympetrum Hyogo* 4: 25-27. (in Japanese with English summary). [*Calopteryx atrata* Selys 1853, *C. cornelia* Selys 1853, *Mnais pruinosa* Selys 1853, *Mnais nawai* Yamamoto, 1956. The status of *C. japonica* Selys 1869 in the Kobe region is unknown; only old records are existing.] Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: taoki@ma3.justnet.ne.jp
- 2219.** Muraki, A. (1997): A case of oviposition of *Epiophlebia superstes* in Gifu Prefecture. *Sympetrum Hyogo* 4: 16-17. (in Japanese with English summary). [A female *E. superstes* was laying eggs into bryophytes in Gifu Pref. in 1975. This is the 12th prefecture in which this species was found ovipositing into mosses.] Address: not stated
- 2220.** Nishu, S. (1997): Report of the survey trip of the Hyogo Society of Odonatology, Part 1 in 1996. *Sympetrum Hyogo* 4: 8-13. (in Japanese with English summary). [27 species have been recorded on April 28 and May 6, 1996. Special emphasis was given to *Libellula angelina*. This endangered species was found in low abundance at Sara Pond, Fukuden-cho, Ono City, but none was observed in the additionally visited habitat Maruodani, Kobe City. "The latter pond lost its water because of drought in 1994, leak from cracks of pond walls caused by the great earthquake in 1995 and complete drainage for the repairing works in 1995 and 1996." In 1970's, more than ten habitats of *L. angelina* in Hyogo Prefecture were known, but actually only Sara Pond seems to bear a population. Even this habitat is threatened by a local government "development plan". Action has to be taken, to enable survival of the species at Sara Pond.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net
- 2221.** Nishu, S. (1997): Report of the survey trip of the Hyogo Society of Odonatology, Part 2 in 1996. *Sympetrum Hyogo* 4: 18-24. (in Japanese with English summary). ["The Hyogo Society of Odonatology had a survey tour for *Mortonagrion hirosei* visiting Momojima Pond, Kinomaki-cho, Hyogo Prefecture on July 20-21. Estimation of the individual number was made through the marking-recapturing method. 100 males were marked and released, and 92 males were captured on the next day including 13 marked ones. The total number of this damselfly inhabiting this pond was estimated to be at the order of 10,000 for the time. Masses of this species were found sleeping at night. Most of them were roosting on stalks at a height of 10 to 20 cm above water-level. [...]"] A list of 41 species recorded in the framework of the survey are listed in a table.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net
- 2222.** Nishu, S. (1997): Report of the survey trip of the Hyogo Society of Odonatology, Part 3 in 1996. *Sympetrum Hyogo* 4: 28-31. (in Japanese with English sum-



summary). ["An immature male *Stylurus nagoyanus* was caught in Mt. Funakoshi, Sayo-cho in 1993. This is the only record of this species in Hyogo Prefecture until today. Immature imagoes of this species are known to migrate to distant places, and we had a survey trip to find the original habitat. One of our members, Mr Inoue, once happened to see a gomphid dragonfly much like this species along Ibo River, hence we had a survey trip to this river on September 8, 1996. The results were not successful, but we recorded 14 species in 6 families including many males and 3 females of *Onychogomphus viridicostus* and 5 males of *Anisogomphus maaki*." (Author) In addition species lists for five localities are given in two tables.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snis-hu@mx2.nisiq.net

**2223.** Sogame, S. (1997): A male *Sympetrum pedemontanum elatum* with an aberrant wing brown marking. *Sympetrum Hyogo* 4: 14. (in Japanese with English summary). [A male *S. pedemontanum elatum* had a round colourless area in the brown marking on right forewing. This area is thinner than the other parts, and was found broken after the specimen was kept in a triangular paper.] Address: not stated

**2224.** Wada, N.; Inoue, K. (1997): First record of *Zyomma obtusum* from Kuroshima island, Taketomi-cho, Okinawa Prefecture. *Sympetrum Hyogo* 4: 5-7. (in Japanese with English summary). [A male *Z. obtusum* was caught on Kuroshima Island, Japan, a small oceanic island located between Ishigaki and Iriomote Islands. "This crepuscular insect was found at 20:00 - 21:00 attracted to a fluorescent lamp in a passage of a cottage in Marine Research Center. This species had been found only on North and South Borodino Islands in Japan, but in 1996 a female was caught by Mr Akira Nishida on June 23 at Nishi-funatsukibashi, Iriomote Island (Nishida, A. 1996) and males and females were captured by Mr Osamu Tabata on June 30 to July 2 at Taisho Pond, Iriomote Island [...]. Thus this is the third record outside N. and S. Borodino Islands. Oguma, K. recorded a male of this species in 1915. The specimen is labelled "Okinawa, VIII, 1902", but no additional material had been found from Okinawa Main Island, and many males and females have been found after 1958 on N. and S. Borodino Islands which are in Okinawa Prefecture, thus the Oguma's specimen had been supposed to have come from N. or S. Borodino Island. The new discovery of this oceanic species from islands outside N. and S. Borodino Islands brought a discussion on the possibility to be found on Okinawa Main Island. Another point to be mentioned is that this male was attracted to an artificial light. Lieftinck (1954) writes "Females often attracted to light", and it is advised to try "light trap method" for further studies." (Authors)] Address: Inoue, K., 5-9 Fuminosato 4-chome, Abeno-ku, Osaka 545, Japan

## 1998

**2225.** Althmoos, M. (1998): Möglichkeiten und Grenzen des Einsatzes regionalisierter Zielarten - dargestellt am Modellbeispiel des Biosphärenreservates Rhön. *Laufener Seminarbeiträge* 8/98: 127-156. (in German). [This

is an extensive and sound discussion of methods and fundamentals for the use of a regionalised target species concept. Odonata are considered as good target species; in the studied area *Calopteryx virgo* / *C. splendens*, *Gomphus vulgatissimus*, *Coenagrion hastulatum*, *Lestes dryas*, *Aeshna juncea*, *A. subarctica* / *Soma-tochlora arctica*, *Cordulegaster boltonii*, and *Sympetrum flaveolum* are important umbrella species for nature conservation measures.] Address: Althmoos, M., Projekt "Zoologischer Artenschutz im Biosphärenreservat Rhön", Bauerbacher Str. 46, D-35043 Marburg, Germany.

**2226.** Aoki, T.; Nishu, S. (1998): A survey for discovery of new breeding sites colonized by *Ictinogomphus pertinax* (Selys) in southwestern Hyogo Prefecture. *Sympetrum Hyogo* 5: 16-20. (in Japanese with English summary). [*I. pertinax* extends its range northeastward in Japan. It was found at Ushimado in eastern part of Okayama Prefecture in 1980, and at Akashi in southwestern part of Hyogo Prefecture in 1987. "In 1994, the senior author found a new locality at Kakogawa, some 25 km northwest to Akashi. The area from Ushimado to Kakogawa has been left unrecorded for this species." On 18 August 1997 five members of the Hyogo Society of Odonatology tried to fill the blank. Eleven localities - with splendid dragonfly populations - were visited, but they failed to discover this southern gomphid species. The results of the survey are compiled in a table including 24 species.] Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: taoki@ma3.justnet.ne.jp

**2227.** Aoki, T. (1998): Odonata fauna of Kobe City, Part 7. (Platycnemididae, Epiophlebiidae, Petaluridae). *Sympetrum Hyogo* 5: 21-22. (in Japanese with English summary). [*Platycnemis foliacea sasakii*, *Copera annulata*, *Epiophlebia superstes*, and *Tanypteryx pryeri* are recorded in Kobe City. "*E. superstes* was found at Arima in Mt. Rokko area on June 12, 1996 (two larvae), on July 9, 1996 (two larvae) and on May 25, 1997 (oviposition incisions). These records are rediscoveries after 60 years for this area."] Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: taoki@ma3.justnet.ne.jp

**2228.** Fincke, O.M. (1998): The population ecology of *Megaloprepus coerulatus* and its effect on species assemblages in water filled tree holes. In: Dempster, J.P. & I.F.G. Mclean (Eds.): *Insect populations: in Theory and Practice*. Kluwer Academic Publishers. London: 391-416. (in English). ["Although its larvae are restricted to tree holes, the influence of *M. coerulatus* extends beyond that microhabitat via its effects on intraguild predators, such as *Dendrobates* and *Toxorhynchites*, that also breed in other phytotelmata. The evidence to date suggests that the abundance of *M. coerulatus* is primarily affected by biotic factors during the larval stage, specifically obligate sibicide and cannibalism followed by intraguild predation. Within this competitive framework, at a local level, population size should be affected by abiotic factors. The number of generations a tree hole can support annually reflects rainfall patterns as well as nutrient input (e.g. leaf and fruit detritus), which influences growth rate and adult body size via increased prey productivity. Among forests, body size probably reflects evolutionary responses to differences in tree-hole nutrient levels. Finally, changes in forest

composition would affect the abundance of *Megaloprepus* because tree holes are non-randomly distributed with respect to tree species. There is no evidence that adult *Megaloprepus* are limited by the availability of prey (i.e. spiders) or by predation. Their ability to find tree-hole oviposition sites may be more limiting than their capacity to produce excess eggs. However, in seasonal forests, persistence of *Megaloprepus* depends on adults surviving the dry season. Adults are also the dispersal stage. Because *Megaloprepus* avoids large, man-made clearings, it may be particularly vulnerable to habitat fragmentation." (Author)] Address: Finke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**2229.** Franz, D. (1998): Das Blaukehlchen. ISBN 3-89104-582-4: 140 pp. (in German). [Odonata rarely seem to be the prey of *Luscinia svecica* (Aves). On page 104 a few records are compiled, among them a note on a picture of a male *Libellula depressa* preyed by the Bluethroat.]

**2230.** Grosser, N.; Rötzer, B. (1998): Realisierbarkeit eines Zielartenkonzepts auf regionaler Ebene. - Ergebnisse einer Projekt-Diskussion im Bereich der Gemeinde Friedenfels, Landkreis Tirschenreuth (Oberpfalz). Laufener Seminarbeiträge 8/98: 121-126. (in German). [A students project group discussed - in the framework of the realisation of the communal landscape plan of the community Friedenfels, Bavaria - the possibilities to use target species for a sound realisation of measures. Some theoretical thoughts to select target species are presented. These species are discussed on the in reality existing level of restrictions among a community and acceptance of nature conservation measures by its population. Among the target species without any conflict potential are *Calopteryx virgo*, *C. splendens*, and *Cordulegaster boltonii*.] Address: Grosser, N., Fachhochschule Erfurt, Fachbereich Landschaftsarchitektur, Leipziger Str. 77, D-99085 Erfurt, Germany. E-mail: grosser@la.fh-erfurt.de

**2231.** Marabini, J. (1998): Die Rolle von Ziel- und Leitarten für die Renaturierung von Mooreichen - am Beispiel eines ABSP-Projektes im Aischgrund. Laufener Seminarbeiträge 8/98: 165-168. (in German). [Activities of human beings in ancient times e.g. to create and to run carp ponds provided suitable habitats for some specialized plants and animals. This paper discusses activities to manage abandoned ponds for nature conservation purposes. Examples given are the plant genus *Utricularia*, the moor frog (*Rana arvalis*), and *Leucorrhinia dubia*, *L. rubicunda*, and *L. pectoralis*.] Address: Marabini, J., Landratsamt Erlangen-Höchstädt, Schloßberg 10, D-91315 Höchstädt/Aisch, Germany

**2232.** Matsuda, I. (1998): Memories of the late Mr. Hiroshi Itoh. *Sympetrum Hyogo* 5: 2-3. (in Japanese with English summary). ["Mr. Hiroshi Itoh passed away on July 14, 1997 at the age of 62. He was a very kind person, and he had often guided us to many good habitats of various species. An oral tumour was found in October, 1995, and the operation was carried out successfully. But it metastasized to the lung, and he had operations during July to October, 1996. He had recovered well, and he attended field meetings and the Celebrating Party of Mr. Y. Miyatake held on June 1, 1997. In early July he was hospitalised again, and could not re-

cover this time. He, with his kind and heartily personality, will live in our heart forever." (Author)] Address: not stated

**2233.** Müller, J. (1998): Die Libellenfauna (Insecta: Odonata) der Naturschutzgebiete Mahlpfuhler Fenn, Jävenitzer Moor und Benitz des Tanger-Gebietes und der Altmark-Heiden in Sachsen-Anhalt. *Abh. Ber. Mus. Naturk. Magdeburg* 20: 3-18. (in German with English summary). [The odonate fauna of two bog moors (Mahlpfuhler Fenn, Jävenitzer Moor) and a gravel pit (Benitz), Sachsen-Anhalt, Germany, is documented in detail. The species are arranged according to ecological groups of habitat preference and the zoogeographical distribution. The species list accounts 42 species, 19 of them are commented.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: Fau-nOek.Jmueller@t-online.de

**2234.** Muraki, A.: (1998): Record of dragonflies of Kohama Island, Yaeyama, Okinawa Pref. made by the late Mr. Hiroshi Itoh. *Sympetrum Hyogo* 5: 4. (in Japanese with English summary). ["The late Mr. Hiroshi Itoh visited Kohama Island on May 13, 1996, but he has not reported on the results. He found seven species including *Ictinogomphus pertinax*, *Brachythemis contaminata*, *Pseudothemis zonata*, and *Tholymis tillarga* which are new to this island." (Author)] Address: not stated

**2235.** Nishu, S. (1998): A supposed hybrid between *Anax parthenope julius* and *A. n. nigrofasciatus* emerged from a bred larva. *Sympetrum Hyogo* 5: 31-33. (in Japanese with English summary). ["A final instar larva of a suspicious species was caught at a dragonfly pond in Amagasaki No.3 Power Plant of Kansai Electric Power Co. on August 9, 1997. It resembled that of *Anax n. nigrofasciatus*, but larvae of this species are univoltine which generally reach the final instar much later. It was brought home, and emerged on September 11, the same year. It is a male *Anax* which shows three features intermediate between *A. parthenope julius* and *A. n. nigrofasciatus*, seven features like the latter while a feature like the former. Thus it is most probably a hybrid between these two species, and the second record of emerged hybrids in this combination of species." (Author)] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net

**2236.** Nishu, S. (1998): A survey report of *Libellula angelina* Selys in Hyogo Pref., 1997. *Sympetrum Hyogo* 5: 5-8. (in Japanese with English summary). ["*L. angelina* was seen in many places in Hyogo Pref. until several years ago, but Sara Pond, Fukuden-cho, Ono City is the only known habitat for this endangered species in this prefecture at present. Members of the Hyogo Society of Odonatology visited this pond on April 29 and May 11, and two additional localities on April 29." Two males were found in May at Sara Pond. The environmental condition of the habitat seem to have recovered and be comparable with that formerly existing. In spite of this first side indication, low abundance demonstrates that at least one ecological factor must prevent the species to settle on this habitat.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net

**2237.** Nishu, S. (1998): A survey report of *Mortonagrion hirosei* Asahina in Hyogo Pref., 1997. *Sym-*

petrum Hyogo 5: 9-11. (in Japanese with English summary). [M. hirosei was surveyed during 20-21 July 1997 at three localities in the northern part of Hyogo Prefecture, Japan. Abundance was higher than the years before (Counts of sleeping specimens). But contrary to the previous year the specimens were found sleeping rather dispersed and not congregated. A list of 23 additional species found at the four localities is appended.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net

**2238.** Nishu, S. (1998): First discovery of the locality of *Stylurus nagoyanus* (Asahina) in Hyogo Prefecture. *Sympetrum Hyogo* 5: 12-15. (in Japanese with English summary). [A male *S. nagoyanus* was found in Hyogo Pref. in 1993, but the larval habitat was unknown. Izushi River in the northern part of this prefecture turned out to be a reproductive habitat of the species: 3 males, 1 female and 8 larvae were caught on 21 July 1997, and 2 males and 1 female were caught on September 21. The habitat seems to provide suitable conditions, and was dwelled by one of the Japanese Red Data Book species, *Macromia daimoji* too. 23 additional species recorded at this locality are listed in a table.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net

**2239.** Reck, H. (1998): Der Zielartenansatz in großmaßstäbiger Anwendung - anhand von Beispielen aus Eingriffsplanung, Flurbereinigungsverfahren sowie der Erfolgskontrolle von Pflege- und Entwicklungsplänen. *Laufener Seminarbeiträge* 8/98: 43-68. (in German). [Target species concepts are used to focus assessment of environmental impacts or nature conservation measures on so-called umbrella species or selected species of special importance for nature conservation purposes. This paper compiles such concepts and exemplifies them on different levels of planning. Odonata are used to demonstrate the deduction of renaturation aims for the peat bog / fen habitat mosaic of the Wurzachener Ried, Baden-Württemberg, Germany.] Address: Reck, H., Ökologiezentrum der Univ. Kiel, Fachabteilung Landschaftsökologie, Schauenburger Str. 112, D-24118 Kiel, Germany

**2240.** Sachtleben, J. (1998): Von der Theorie in die Praxis - zur Umsetzung des bayerischen Arten- und Biotopschutzprogrammes auf der Grundlage von Ziel- und Leitarten. *Laufener Seminarbeiträge* 8/98: 157-164. (in German). [Report on the current status of realisation of the Bavarian Programme for Species and Habitat Conservation. Odonata are referred as good target species on several occasions.] Address: Sachtleben, J., Projektgruppe ABSP / PAN Partnerschaft, Rosenkavaliertplatz 10, D-81925 München, Germany. E-mail: panp@t-online.de

**2241.** Sasamoto, A. (1998): A female *Davidius nanus* having aberrant wings. *Sympetrum Hyogo* 5: 34-35. (in Japanese with English summary). [A female *Davidius nanus* having aberrant wings emerged from a larva which I caught in Kyoto prefecture. Its right fore-wing lacks 3rd radius and has several small vein aberrations. In its right hind-wing the pterostigma is long and curved and includes postnodal nerves, in addition, many disordered veins and spaces are found. The exuviae has also transformed right hind wing sheath. The other spe-

cimens caught at the same time were normal." (Author)] Address: not stated

**2242.** Sogame, S. (1998): A malformed exuviae of *Onychogomphus viridicostus* (OGUMA). *Sympetrum Hyogo* 5: 30. (in Japanese with English summary). [74 exuviae of *O. viridicostus* collected along the shore of Hazu River, Takarazuka City, Hyogo Prefecture, Japan, contained an exuvium with only 9 segments. In addition, the 7th segment is fused with the 8th at the left side when seen ventrally.] Address: not stated

**2243.** Sogame, S. (1998): Dragonflies inhabiting Hatsuka River in Sanda City, Hyogo Prefecture. *Sympetrum Hyogo* 5: 28-29. (in Japanese with English summary). [Between May 1996 and August 1997, 19 taxa could be recorded from the river. The occurrence of *Calopteryx japonica* and a strong population of *Platycnemis foliacea sasakii* indicate a quite good water quality.] Address: not stated

**2244.** Sogame, S. (1998): Odonate fauna of Takarazuka City, Hyogo Prefecture. *Sympetrum Hyogo* 5: 23-27. (in Japanese with English summary). [66 odonate species could be recorded between 1992 and 1997. 8 of them are new compared with a compilation published in 1982, but also 8 species couldn't be confirmed.] Address: not stated

#### 1999

**2245.** Aoki, T. (1999): Odonata fauna of Kobe City, Part 8 (Libellulidae 2 and supplements). *Sympetrum Hyogo* 6: 9-13. (in Japanese with English summary). [13 libellulid species - excluding the genus *Sympetrum* - and *Anax guttatus*, *Ictinogomphus pertinax*, *Ashna juncea*, and *Stylurus ocellatus* are documented for Kobe City, Japan.] Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: taoki@ma3.justnet.ne.jp

**2246.** Azuma, T.; Aoki, T. (1999): Supposed westward expansion of *Ictinogomphus pertinax* in southern part of Hyogo Prefecture. *Sympetrum Hyogo* 6: 2-3. (in Japanese with English summary). ["Some new breeding sites of *I. pertinax* were found in the southern part of Hyogo Prefecture in 1998. They are situated some kilometers west of the known localities. It is very likely that this species started to extend its breeding sites westward after" - a ten years lasting interruption - "since the first finding in the southern part of Hyogo Prefecture." (Authors)] Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: taoki@ma3.justnet.ne.jp

**2247.** Bezdecka, P. (1999): The current state of dragonfly research in the Bělé Karpaty (White Carpathians), Czech Republic. In: Hanel, L. (Ed.): *Vazky 1999. Sborník referátu z mezinárodního semináře konaného v Podblanickém ekocentru CSOP ve Vlasimi* 6.-7.3.1999. ISBN 80-86327-00-0: 69-72. (in Czech with English summary). [List of 36 Odonata (37 taxa) from the Carpathian mountains resp. the Region of the Czech - Slovakian border.] Address: Bezdecka, P., Správa CHKO Bílé Karpaty, Nádražní 318, CZ 76326 Luhacovice, Czech Republic



- 2248.** Carl, M. (1999): Biomonitoring zur Ökologie und Renaturierung anthropogen veränderter Lebensräume des bayerischen Salzachauen-Ökosystems von Freilassing bis zur Mündung in den Inn. Berichte der Akademie für Naturschutz Laufen 23: 121-131. (in German). [In the framework of a revitalisation project of the river Salzach, Bavaria, Germany, *Thecagaster bidentata* was considered a good bioindicator for assessing success of measures undertaken. This assumption is based on the known distinct factors characterising the habitat of the species. Going ahead with the revitalisation measures *T. bidentata* turned out to be unsufficiently suitable to indicate and assess the middle to large scale measures. Even natural factors may influence the habitat of larvae, while an indicator for revitalisation measures has to react on a causal scale: The species is a good indicator for micro habitats, but not for the ecosystem of the alluvium. Thus, it was excluded from the list of bioindicator species that will be used to assess the success of the revitalisation in future.] Address: Carl, M., Gollenbergstr. 12, D-82299 Türkenfeld, Germany
- 2249.** Cempírek, J. (1999): The dragonflies of the town České Budjovice I. (southern Bohemia). In: Hanel, L. (Ed.): Vazky 1999. Sborník referátu z mezinárodního semináře konaného v Podblanickém ekocentru CSOP ve Vlasimi 6.-7.3.1999. ISBN 80-86327-00-0: 47-52. (in Czech with English summary). [Two localities (forest lake, gravel-pit) in the environs of České Budjovice, Czech Republic were surveyed for their odonate fauna. 33 excursions between 1985 and 1988 are documented in detail in a "present-absent-table" for the forest lake and the gravel pit (5 excursions).] Address: Cempírek, J., Vidov 37, 370 07 České Budjovice, Czech Republic
- 2250.** Devai, G.; Miskolczi, M. (1999): Faunistical data on dragonflies (Odonata) of the creek Ólyvös (E-Hungary). *Studia odonatol. hung.* 5: 5-13. (in Hungarian with English summary). [The paper presents faunistical data based on an adults collection of the geographical microregion Bihari-sík in E-Hungary (administrative area of the settlements Berettyóújfalu, Bojt, Mezöpeterd). Between 1983 and 1986, 28 species were recorded along the Ólyvös, a typical small and fast-flowing creek of the Hungarian plains. *Coenagrion pulchellum*, *C. ornatum*, *Sympecma fusca*, *Brachytron pratense*, *Sympetrum flaveolum*, and *S. meridionale* should be mentioned.] Address: Devai, G., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary
- 2251.** Devai, G.; Miskolczi, M. (1999): Revelation of the facts and prediction of the state for the dragonfly (Odonata) fauna of the Aggtelek National Park and its surroundings. *Studia odonatol. hung.* 5: 47-65. (in Hungarian with English summary). [Aggtelek National Park, North-Hungary; the paper compiles and discusses literature data of 22 species including *Coenagrion lunulatum* and *C. scitulum*.] Address: Devai, G., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary
- 2252.** Hanel, L. (1999): A six-language dictionary of the central European dragonflies. In: Hanel, L. (Ed.): Vazky 1999. Sborník referátu z mezinárodního semináře konaného v Podblanickém ekocentru CSOP ve Vlasimi 6.-7.3.1999. ISBN 80-86327-00-0: 105-116. (in Czech with English summary). [The popular names of 78 central European Odonata are compiled covering the Latin, Czech, Slovak, Hungary, German, and English languages.] Address: Hanel, L., Správa chránené krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blantik@schkocr.cz
- 2253.** Hanel, L. (1999): An odonatological bibliography of the Czech Republic. In: Hanel, L. (Ed.): Vazky 1999. Sborník referátu z mezinárodního semináře konaného v Podblanickém ekocentru CSOP ve Vlasimi 6.-7.3.1999. ISBN 80-86327-00-0: 93-104. (in Czech with English summary). [About 200 papers with original odonatological information and covering 1859 - 1999 are compiled in this list] Address: Hanel, L., Správa chránené krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blantik@schkocr.cz
- 2254.** Hanel, L. (1999): The directory of co-workers of dragonfly research in the Czech Republic. In: Hanel, L. (Ed.): Vazky 1999. Sborník referátu z mezinárodního semináře konaného v Podblanickém ekocentru CSOP ve Vlasimi 6.-7.3.1999. ISBN 80-86327-00-0: 117-119. (in Czech with English summary). [The list compiles 40 addresses of persons co-operating in the Czech Dragonfly Project.] Address: Hanel, L., Správa chránené krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blantik@schkocr.cz
- 2255.** Hanel, L. (1999): The dragonflies (Odonata) of the nature Reserve "Podlesi" in the Protected Landscape Area Blaník (Central Bohemia, Czech Republic). In: Hanel, L. (Ed.): Vazky 1999. Sborník referátu z mezinárodního semináře konaného v Podblanickém ekocentru CSOP ve Vlasimi 6.-7.3.1999. ISBN 80-86327-00-0: 53-59. (in Czech with English summary). [A total of 29 odonate species were collected between 1992 and 1999. The two ponds studied are characterised by chemical parameters (including sediment load with heavy metals) and vegetation. The Odonata are arranged in a table, which provides information on phenology, dominance, and autochtony of the species. Some species of interest are *Lestes dryas*, *Sympecma fusca*, *Coenagrion hastulatum*, *Erythromma najas*, *Aeshna grandis*, *Anax parthenope*, *Anaciaeschna isocetes*, *Somatochlora metallica*, *Orthetrum albistylum*, *Sympetrum danae*, *S. flaveolum*, and *Leucorrhinia pectoralis*.] Address: Hanel, L., Správa chránené krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blantik@schkocr.cz
- 2256.** Hanel, L.; Zelený, J. (1999): The Red List of Odonata in the Czech Republic - 1999 version. In: Hanel, L. (Ed.): Vazky 1999. Sborník referátu z mezinárodního semináře konaného v Podblanickém ekocentru CSOP ve Vlasimi 6.-7.3.1999. ISBN 80-86327-00-0: 77-81. (in Czech with English summary). [Based on the 1997-state of information a Red List of the Czech Republic is presented. The list also contains the Czech names of the Odonata.] Address: Hanel, L., Správa chránené krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blantik@schkocr.cz
- 2257.** Hanel, L. (1999): Topical knowledge on dragonflies (Odonata) in the Czech Republic territory. In: Hanel, L. (Ed.): Vazky 1999. Sborník referátu z mezinárodního semináře konaného v Podblanickém ekocentru CSOP ve Vlasimi 6.-7.3.1999. ISBN 80-86327-00-0: 7-

15. (in Czech with extensive English summary). [The paper outlines the current status of odonatological research in the Czech Republic starting with the first studies published in the end of the 19th century. In 1994 a National Biodiversity projekt "Dragonflies" was started, which enforced recent odonatological research. As a aim of this project, handbooks were released, and educating of persons interested in Odonata was started. The first results of these endeavours were presented in 1999 in the framework of an odonatological meeting in Vlasim. Assessed on the basis of 100 km<sup>2</sup> squares, in the end of the 20th century odonatological information of app. 1/3 of all squares is available. Middle term aims of odonatological studies are the preparation of a Red List and realising an atlas of the Czech Odonata.] Address: Hanel, L., Správa chránené krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blanik@schkocr. cz
- 2258.** Hatanaka, N. (1999): Report of the survey trip of the Hyogo Society of Odonatology, Part 4 in 1998. *Sympetrum Hyogo* 6: 33-35. (in Japanese with English summary). [The rare *Stylurus nagoyanus* (imagoes), and *Macromia daimoji* (larvae) were observed on 6 September 1998 at Izushi River, Izushi-cho, Hyogo Prefecture, Japan. A table with additional records of 18 taxa is appended.] Address: not stated
- 2259.** Hlásek, J. (1999): The dragonfly *Nehalennia speciosa* - a new species in the Czech Republic. In: Hanel, L. (Ed.): *Vazky 1999. Sborník referátu z mezinárodního semináře konaného v Podblanickém ekocentru CSOP ve Vlasimi 6.-7.3.1999.* ISBN 80-86327-00-0: 75-76. (in Czech with English summary). [*N. speciosa* is described from the boggy fen "Kramafka" (Czech mapping square 6854). The locality is situated in the Protected Landscape Area Trebonsko (South Bohemia). In total 37 mostly freshly hatched specimens (17 males and 20 females) were found on 14. July 1998. The habitat is characterized by the plant community of *Caricetum rostratae*. Co-occurring species are *Aeshna juncea*, *Calopteryx splendens*, *Coenagrion hastulatum*, *C. puella*, *Cordulia aenea*, *Erythromma najas*, *Ischnura elegans*, *Lestes sponsa*, *Leucorrhinia rubicunda*, *Libellula quadrimaculata*, *Platycnemis pennipes*, *Pyrrosoma nymphula*, *Sympecma fusca*, *Sympetrum danae*, and *S. vulgatum*.] Address: Hlásek, J., 39181 Veselí nad Lužnicí I/308, Czech Republic
- 2260.** Huber, A. (1999): Data on the dragonfly (Odonata) fauna of the Landscape Protection Area of Middle-Tisza and its surroundings. *Studia odonotol. hung.* 5: 29-46. (in Hungarian with English summary). [Hungaria; between April 1994 and November 1996, 38 species were collected at 51 localities. Records of *Coenagrion pulchellum*, *Erythromma najas*, *E. viridulum*, *Sympecma fusca*, *Stylurus flavipes*, *Epitheca bimaculata*, *Lestes virens*, *Brachytron pratense*, *Sympetrum depressiusculum*, *S. flaveolum*, *S. meridionale*, and *S. pedemontanum* should be noted.] Address: Huber, A., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary
- 2261.** Isley, M. (1999): Flutter by, dragonfly, that we may know you better. *Lake County News-Chronicale* 19 July 1999: 1, 3. (in English). [Copy of a report of the WDA-symposium in a regional newspaper, printed in the Nord. *Odonatol. Soc. Newsl.* 7(1): 18.] Address: not stated
- 2262.** Lucan, R. (1999): The first discovery of the dragonfly *Coenagrion scitulum* in the Czech Republic. In: Hanel, L. (Ed.): *Vazky 1999. Sborník referátu z mezinárodního semináře konaného v Podblanickém ekocentru CSOP ve Vlasimi 6.-7.3.1999.* ISBN 80-86327-00-0: 73-74. (in Czech with English summary). [4.7.1997 a small population of *C. scitulum* was found near the village Sisma (district Prerov, central Moravia) behind a dam. Unfortunately the habitat was destroyed later by the destruction of the dam as a consequence of a big flood.] Address: Lucan, R., U rev'ru 151, CZ-76872 Chvalcov, Czech Republic
- 2263.** Marík, J. (1999): A note to the occurrence of the dragonfly *Cordulegaster boltonii* in the vicinity of the town As (western Bohemia, Czech Republic). In: Hanel, L. (Ed.): *Vazky 1999. Sborník referátu z mezinárodního semináře konaného v Podblanickém ekocentru CSOP ve Vlasimi 6.-7.3.1999.* ISBN 80-86327-00-0: 61-63. (in Czech with English summary). [Several specimens of *C. boltonii* were observed near the Czech-German border. The habitats are briefly characterized and co-occurring odonate species are listed.] Address: Marík, J., Dukelská 26, CZ-35002 Cheb 2, Czech Republic
- 2264.** Matsuda, I. (1999): A late emergence of *Anax nigrofasciatus nigrofasciatus*. *Sympetrum Hyogo* 6: 38. (in Japanese with English summary). ["A male *Anax n. nigrofasciatus* emerged at an outdoor pond on October 13, 1998 from a larva caught on October 10 at a dragonfly pond in Amagasaki City, Hyogo Prefecture. This record is noteworthy as a case of very late emergence." (Author)] Address: not stated
- 2265.** Mocek, B. (1999): A current state of the dragonfly (Odonata) research in the eastern Bohemia. In: Hanel, L. (Ed.): *Vazky 1999. Sborník referátu z mezinárodního semináře konaného v Podblanickém ekocentru CSOP ve Vlasimi 6.-7.3.1999.* ISBN 80-86327-00-0: 17-46. (in Czech with English summary). [508 odonatological data from 97 localities and referring to 46 species (collected between 1981 and 1997) are detailed in an extensive table.] Address: Mocek, B., Regional Museum of Eastern Bohemia, Dept Natural History, Eliscino Nábřeží 465, CZ-50001 Hradec Králové, Czech Republic. e-mail: mvc@mvc.anet.cz
- 2266.** Moens, J. (1999): Libellen boeiende getuigen van een verleden. *Limburg University Centre-nieuws* Feb. 1999: 20-24. (in Dutch). ["Dragonflies, fascinating witnesses from a far past." This is an introduction into dragonfly biology directed to a general reader. The paper is illustrated with some black and white drawings, and a portrait of Prof. Dr. Jos Moens.] Address: Moens, J., Dept. S.B.M., Limburgs Universitair Centrum, Universitaire Campus, B-3610 Diepenbeek, Belgium
- 2267.** Moriyasu, T. (1999): Larvae of *Macromia daimoji* first caught at Chikusa River, Hyogo Prefecture. *Sympetrum Hyogo* 6: 8. (in Japanese with English summary). [Two final instar larvae of *M. daimoji* were caught on 3 January 1998 in the Chikusa River, Ako City, Hyogo Prefecture, Japan.] Address: not stated
- 2268.** Naraoka, H. (1999): On the *Forcipomyia* (*Pterobasca*) *tokunagai* Oka and *Asahina* (Diptera: Ceratopogonidae). *Journal of natural History of Aomori* 4: 17-21. (in Japanese (Translation by H. Naraoka and N. Ishizawa)). [The paper compiles published records of the ceratopogonid *F. (Pterobasca) tokunagai* parasitizing

Japanese Odonata. The author adds some new material collected between 1985 and 1998 (*Mnais pruinosa* Selys 1853, *Davidius moiwanus* (Okumura 1935), *Davidius fujiana* Fraser, 1936, *Sympetrum darwinianum* (Selys 1883), *S. frequens* (Selys 1883), *S. eroticum* (Selys 1883), *S. infuscatum* (Selys 1883), *Trithemis aurora* (Burmeister 1839), and *Pseudothemis zonata* Burmeister, 1839). More recently published assumptions, Ceratopogonidae would stuck Odonata during emergence are rejected. The author didn't find just emerged dragonflies parasitised, but parasitism on mature dragonflies was recognized. Parasitism is interpreted to depend on congruence of flight period of the ceratopogonid and odonate specimens.] Address: Naraoka, H., 36-71, Aza-Motoizumi, Fukunoda, Itayanagi-cho, Kitagun, Aomori Prefecture, 038-3661, Japan

**2269.** Nishu, S. (1999): Report of the survey trip of the Hyogo Society of Odonatology, Part 3 in 1998. *Sympetrum Hyogo* 6: 29-32. (in Japanese with English summary). [Momojima Pond, Kinosaki-cho Hyogo Prefecture, Japan was visited during July 19-20, 1998. The society carried out annual survey trips for *Mortonagrion Hirosei* since the first discovery in 1992. It is planned to construct a sewage treatment plant at Kinosaki-cho, and a part of the habitat has to be filled up. Construction works had started already. *M. Hirosei* inhabits also the part to be destroyed. Some larvae of this species were found together with the larvae of *Ischnura senegalensis* which is a strong predator on the former species. Two additional habitats of *M. Hirosei* were visited. *Stylurus nagoyanus*, *Onychogomphus viridicostus*, and *Macromia daimoji* have been found at Izushi River.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisq.net

**2270.** Nishu, S. (1999): *Stylurus ocellatus* first found in Hyogo Prefecture. *Sympetrum Hyogo* 6: 3. (in Japanese with English summary). [The species was caught on 18 July 1998 at the seashore of Suma, Kobe City, Japan. It is the 98th Odonata reported from the Hyogo Pref., and the 90th in Kobe City.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisq.net

**2271.** Oka, I. (1999): Report of the survey trips of the Hyogo Society of Odonatology, Part 1 and 2 focused to *Libellula angelina*. *Sympetrum Hyogo* 6: 23. (in Japanese with English summary). [A total of 18 members of the Society failed on 3 and 24 May 1998 to discover this endangered species in Sara Pond, Ono City, Hyogo Prefecture, while between 1991-1994, about 200-300 imature specimens were observed every year at both Yude Pond in Kobe City and Sara Pond in Ono City. The species disappeared in 1995 at the former pond, and in 1997 at the latter pond. The law regulation - started in 1993 - couldn't stop the extinction of *L. angelina*. A brief note is made to longevity of a specimen marked at emergence (53 days). Additional species recorded in the framework of the survey are listed in appended tables.] Address: not stated

**2272.** Olajos, P.; Kiss, B. (1999): Data on the dragonfly (Odonata) fauna of the north-eastern part of the Hungarian flatland Tiszai-Alföld. *Studia odonatol. hung.* 5: 15-28. (in Hungarian with English summary). [A total of 43 species was collected at 54 localities in the eas-

tern part of Great Hungarian Plain. Records of *Leucorrhinia caudalis*, *L. pectoralis*. and *Aeshna cyanea* are considered of special regional interest. In addition, *Brachytron pratense*, *Aeshna viridis*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Epithecica bimaculata*, and *Sympetrum depressiusculum* should be noted.] Address: Olajos, P., Hortobágy Nemzeti Park, Igazgatóság, H-4024 Debrecen, Sumen u.2, Hungary

**2273.** Potrykus, W.; Strätz, C.; Weid, S. (1999): Zum Vorkommen der Gemeinen Keiljungfer [*Gomphus vulgatissimus* (Linnaeus 1758)] in Oberfranken. *Ber. naturf. Ges. Bamberg* 73: 51-64. (in German). [Compilation and mapping of records of *G. vulgatissimus* in the region Oberfranken, Bayern, Germany. In addition records of the regionally rare *Onychogomphus forcipatus* are dealt with.] Address: Strätz, C., Alexanderstr. 5, D-95444 Bayreuth, Germany. E-mail: chris.straetz@bth.de

**2274.** Sálek, P. (1999): The faunistic research of dragonflies (Odonata) in three marshes in the district Vsetín (north Moravia, Czech Republic). In: Hanel, L. (Ed.): *Vazky 1999. Sborník referátu z mezinárodního semináře konaného v Podblanickém ekocentru CSOP ve Vlasimi 6.-7.3.1999.* ISBN 80-86327-00-0: 65-68. (in Czech with English summary). [A total of 22 species were recorded at three localities. Some management measures are proposed to improve situation for Odonata.] Address: Sálek, P., Visnovce 1093, CZ-746824 Hulín, Czech Republic

**2275.** Sasamoto, A.; Inoue, K. (1999): *Anax guttatus* caught at Aonogahara, Hyogo Prefecture. *Sympetrum Hyogo* 6: 36-37. (in Japanese with English summary). ["Sasamoto visited Sara Pond and Hira Pond in Aonogahara, Hyogo Prefecture on October 10, 1998, and caught 1 male and 1 female *Anax guttatus*. Next day Inoue visited Sara Pond, not knowing the former's findings, and caught 1 male of the same species. In both cases several males of this tropical aeshnid species were observed patrolling rapidly in search of females along the shore, and Sasamoto found a female ovipositing solitarily. This female was brought home, and laid ca 2,000 eggs in two days. Eggs started to hatch 15 days after oviposition under the room temperature of about 20°C." ] Address: Inoue, K., 5-9 Fuminosato 4-chome, Abeno-ku, Osaka 545, Japan

**2276.** Sogame, S. (1999): Odonate fauna of Kohzuki and the neighbouring localities in Sanda City, Hyogo Prefecture. *Sympetrum Hyogo* 6: 4-7. (in Japanese with English summary). [Between 1996 and 1998, 47 species were recorded. The survey stressed on the fauna of sunny irrigation ponds (For riverine Odonata see Sogame 1998).] Address: not stated

**2277.** Yagi, T. (1999): Collection records of *Anax guttatus* in Sanda City, Hyogo Prefecture. *Sympetrum Hyogo* 6: 38. (in Japanese). [Two records of *A. guttatus* are communicated.] Address: not stated

**2278.** Yagi, T. (1999): Poster exhibition at the 9th Dragonfly Citizen Summit in Kobe. *Sympetrum Hyogo* 6: 39. (in Japanese). [A poster of *Mortonagrion Hirosei* without further explanations presented on 23 August 1998 is documented.] Address: not stated



2000

**2279.** Alvo, R.; Campbell, D. (2000): Pre-fledged Common Loon, *Gavia immer*, on an acidic lake dies with food bolus in esophagus. *Can. Field-Nat.* 114(4): 700-702. (in English). ["A moribund pre-fledged Common Loon (*Gavia immer*) with a bulge in its throat was collected from acidic Silvester Lake. It died soon afterwards. Dissection of the bird revealed that the bulge was a food bolus containing Yellow Perch (*Perca flavescens*), dragonfly larvae (*Somatochlora cingulata* and *Aeshna* sp.), crayfish (*Cambarus robustus*) and whirligig beetles (*Dineutus* sp.). We suggest this bird may have swallowed a large fish that punctured the esophagus on its way to the proventriculus, causing peristalsis to cease. Food subsequently swallowed could not move beyond the esophagus, thus forming the bolus. The loon may have swallowed the large fish because food of suitable size for a bird of that size was in short supply due to the lakes acidity." (Author)] Address: Alvo, R., 58 Rue Parulines, Hull, PQ J9A 1Z2, Canada

**2280.** Bánkuti, K.; Devai, G.; Miskolczi, M. (2000): Data on the dragonfly (Odonata) fauna of the Aggtelek region based on a survey of exuvia. *Studia odonotologica*. 6: 21-25. (in Hungarian with English summary). [In 1993, 18 odonate species (exuviae) were collected at 17 localities in Aggtelek National Park, N-Hungary. The list includes *Coenagrion ornatum* and *Ophogomphus cecilia*.] Address: Devai, G., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

**2281.** Bechly, G. (2000): A new fossil damselfly species (Insecta: Odonata: Zygoptera: Coenagrionidae: Ischnurinae) from Dominican Amber. *Stuttg. Beitr. Naturk. (B)* 299: 1-9. [*Ischnura velteni* sp. n. is described from an unknown locality, Dominican Republic, Eocene-Miocene (female holotype: Do-5687, in SMNS, Stuttgart). It represents the first fossil record of this genus, and it is one of the smallest known fossil Odonata. Its systematic position is outlined and discussed.] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**2282.** Bedjanic, M.; Pirnat, A. (2000): A contribution to the knowledge of the dragonfly fauna (Insecta, Odonata) of the Vipava valley, W-Slovenia. *Natura Sloveniae* 2(2): 29-45. (in Slovene with extensive English summary). ["An annotated list of 32 dragonfly species collected at 27 localities during the 1994-2000 period is given. Three species, viz. *Ceragrion tenellum*, *Anax parthenope*, and *Libellula fulva*, are new for the investigated area. The records of *Coenagrion ornatum*, *Cercion lindenii*, *Cordulegaster heros*, *Somatochlora flavomaculata*, and *Orthetrum c. coerulescens* are also briefly commented as they deserve attention from zoogeographical or nature conservation point of view. A list of 44 dragonfly species, hereto reported from the Vipava valley with its surroundings, is compiled and an odonatological bibliography of the investigated area is presented." (Authors)] Address: Pirnat, Alja, Bioloski Institut, ZRC

SAZU, Novi trg 5, SI-1000 Ljubljana, Slovenia. E-mail: alja@zrc-sazu.si

**2283.** Beutler, H. (2000): Landschaft in neuer Bestimmung. Russische Truppenübungsplätze. Findling. Neuenhagen. ISBN 3-933603-11-0. 192 pp. (in German). [Texts directed to a public interested in nature, and intrusive colour photos elucidate the outstanding importance of the former military training areas of the Russians in Germany for nature conservation purposes. In an appendix, 12 of these training areas are characterised in detail. As far as odonatological data are available, these are compiled. Of special interest are *Coenagrion mercuriale*, *Nehalennia speciosa*, *Aeshna viridis*, *Epithea bimaculata*, *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis*, and lake-populations of *Cercion lindenii* and *Onychogomphus forcipatus*.] Address: Beutler, H., Kirschallee 35, D-15848 Stemmen, Germany

**2284.** Bezdecka, P. (2000): Dragonflies (Odonata) of the Chriby Highlands (Moravia, Czech Republic). In: Hanel, L. (Ed.): *Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chráněné krajinné oblasti Trebonsko 15.-18.6.2000*. Vlasim. ISBN 80-86327-12-4: 154-161. (in Czech with English summary). [The survey of 47 localities resulted in 35 Odonata, which are briefly commented. The region seems to be a hot spot for the rare *Cordulegaster boltonii* and *Thecagaster bidentata* in the Czech Republic.] Address: Bezdecka, P., V.Vaculky 994, CZ-68605 Uherské Hradiště, Czech republic. E-mail: pbezdecka@iol.cz.

**2285.** Bösel, A. (2000): Hat *Aeshna subarctica* (Walker 1908) in Nordostdeutschland eine Überlebenschance? *Natur und Landschaft* 76(6): 257-261. (in German with English summary). ["The exuvia of *A. subarctica* have been recorded since 1995 in the Gölde nitzer Moor mire in the German regional state of Mecklenburg / Western Pomerania. Occurrence declined within 6 years from 322 to 12 hatched individuals. This is associated with the simultaneously observed disappearance of *Sphagnum* ssp. The loss of *Sphagnum* plants is due to intensive drainage and elevated nutrient availability. In the Horster Moor mire, a presumably extinct population re-established itself after restoration measures as an abundant and autochthonous population. Restoration of the Horster Moor site, where peat had previously been extracted industrially commenced in 1986 by water-logging this ombrogenous bog. At first, *Sphagnum* cover developed only slowly. Finally, however, in shallow flooded areas a stand of *Eriophorum* ssp. with mossy bog ponds developed. In areas where manual peat-digging was practised, too, flooded *Sphagnum* grew again after the water level rose. Consequently, after 14 years of recultivation, *A. subarctica* has re-established itself with a major autochthonous population. However, this population remains endangered by eutrophication of its larval waters." In Western Pomerania 9 additional localities with records of *A. subarctica* are known, which are in total severely threatened. The author therefore takes at medium-terms the extinction of this dragonfly in north-eastern Germany as likely. Comment of M. Schorr: *A. subarctica* is not occurring in Germany, the correct taxa is *Aeshna subarctica elisabethae* Djakonov, 1922.] Address: Bösel, A., Vasenbusch 15, D-18337 Gresenhorst, Germany. E-mail: andre.boensel@gmx.de

**2286.** Burkart, G.; Burkart, W. (2000): Två nya trollsländearter för Gotland! *Körkmacken* 27: 14-15. (in Swedish). [Two new Odonata for Gotland. *Sympecma fusca* and *S. paedisca* have been discovered in late April 2000 on the island of Gotland, Sweden. Both species are new for the island, and *S. paedisca* never has been observed prior 2000 in Sweden. Hence, a new Swedish name "Sibirisk vinterflickslända" is proposed.] Address: Burkardt, G. & W., Am Emel 7, D-27412 Wilstedt b. Bremen, Germany

**2287.** Burkart, W. (2000): Trollsländefynd, *Aeshna mixta*. *Körkmacken* April 2000: 3. (in English with Swedish notes). [This is a faunistic note on a record of *A. mixta* which is new to the Island of Gotland, Sweden. Locality information are very detailed, but the date of record (probably 1999) is missing.] Address: Burkardt, W., Am Emel 7, D-27412 Wilstedt, Germany.

**2288.** Burmeister, E.-G. (2000): Der Einsatz von Bti-Präparaten zur Stekmückenbekämpfung - Hintergründe, Risiken und Bedenken. *Berichte der Akademie für Naturschutz, Laufen* 24: 125-136. (in German with English summary). ["In the last years in Germany, especially in Bavaria, mosquito control has come into high demand. Mosquito populations, within their natural turnover have not increased, but the contact zones between mosquito and man have. Recreational activities, sports and sports fields, camping sites, restaurants etc. are entering areas like alluvial flood plains or flooded areas of lakes dominated by mosquitoes. The same applies to residential areas. The extract from *Bacillus thuringiensis israelensis* (Bti) was developed for biological pest-control (endo-toxin) effective specifically against mosquitoes (Culicidae) and black-flies (Simuliidae), according to assurances by the producer and persons with interests in using Bti. The difficulties with Bti applications are demonstrated here. Bti has also been used against non-biting midges (Chironomidae) in the impoundments of the Danube river (Bavaria). This study documents further that other animals in small ponds are also killed. Together with the primary effect on target and non-target organisms also the secondary effect on higher levels in the food chains, such as birds and bats, is to be emphasised: the reduction of the masses of mosquitoes and midges, the basis for their nutrition. Pest control with Bti is an intervention in the biocoenotic systems of valuable habitats. In the present work, the biology of mosquitoes, their control with modern methods and aspects, the effect on animal life in habitats and the studies on the success of the pest-control are documented. The most problematic applications of this special insecticide in protected areas are discussed. Some alternative methods for prevention against mosquitoes are given." (Author) In table 1 literature data on impact of Bti on taxa is compiled. Short time studies - up to 1 month - on Odonata (*Calopterygidae* spp., *Ischnura elegans*, *Aeshna* sp., *Sympetrum striolatum*, *Orthetrum brunneum*) didn't find any influence on the taxa. In two studies population density of *Coenagrionidae* and *Anax* sp. was reduced.] Address: Burmeister, E.-G., Zoologische Staatssammlung, Münchhausenstr. 21, D-81247 München, Germany

**2289.** Catling, P.M.; Jones, C.D.; Pratt, P. (Eds) (2000): Ontario Odonata, vol. 1. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 1. Toronto Entomologist's Association, Toronto, Ontario. 153 pp. (in English). [This is the first volume of a series devoted

to the Ontario (Canada) Odonata. Plenty odonatological contributions - as far as they are "scientific papers" they are abstracted in OAS 9 - are published. The issue contains some additional organisational information and comments as follows: "Ontario Odonata Projects", "News: 1. A new species of *Neurocordulia* (Odonata: Anisoptera: Corduliidae) from eastern North America", 2. Damselflies and dragonflies (Odonata) of Ontario: resource guide and annotated list, and 3. A field guide to the Dragonflies and Damselflies of Algonquin Provincial Park". "Notice to contributors" introduces and organises the Ontario Odonata Survey. An index of 1999 Ontario species closes the impressive contribution to the knowledge of North American Odonata.] Address: Alan J. Hanks, 34 Seaton Drive, Aurora, Ontario, Canada L4G 2K1. E-mail: A.Hanks@aci.on.ca

**2290.** Catling, P.M.; Jones, C.D.; Pratt, P. (2000): Introduction to the 1999 Ontario Odonata Summary Records. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 1. Toronto Entomologist's Association, Toronto, Ontario: 54-145. (in English). [29 odonatologists contributed to the Ontario odonate survey. The data are presented in a table giving information on species, county, location, latitude and longitude of localities, collecting date, collector, and status (imago, larva); the table includes 3612 records. In addition, information of weather conditions in 1999 and trends, analyses and notable records of selected species are given. Special emphasis is given to *Anax junius*, *Epithea canis*, and *Sympetrum vicinum*] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net

**2291.** Cempírek, J. (2000): A contribution to the knowledge of dragonflies (Odonata) of the pond Svárov near Porčí nad Sázavou (Central Bohemia). In: Hanel, L. (Ed.): Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chráněné krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 114-117. (in Czech with English summary). [A fishpond - surveyed in 1991 - harbours 18 odonate species.] Address: Cempírek, J., Vidov 37, 370 07 České Budejovice, Czech Republic

**2292.** Cempírek, J. (2000): Dragonflies (Odonata) of three peat bogs in the Sumava mountains. In: Hanel, L. (Ed.): Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chráněné krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 130-143. (in Czech with English summary). [The list of 17 species include *Coenagrion hastulatum*, *Aeshna juncea*, *A. subarctica elisabethae*, *Somatochlora alpestris*, *S. arctica*, and *Leucorrhinia dubia*.] Address: Cempírek, J., Vidov 37, 370 07 České Budejovice, Czech Republic

**2293.** Chovanec, A. (2000): Dragonflies (Insecta: Odonata) as indicators of the ecological integrity of aquatic systems - a new assessment approach. *Verh. Internat. Verein. Limnol.* 27: 887-890. (in English). [Odonata are considered reliable indicators for assessing the "ecological quality of land-water ecotones and the habitat heterogeneity (e.g. structural components like aquatic vegetation) of water bodies. In view of the new European water management legislation, the development of new practical assessment approaches is essential. One of the major targets of the draft Council Directive establishing a Framework for Community Action in the

Field of Water Policy (EU Water Framework Directive, EUWFD; EUROPEAN UNION COUNCIL 1998) is to classify the ecological status of surface waters in a five-stage system ("high", "good", "moderate", "poor", "bad"). Within this process, investigations of the biological community play a major role. The ecological status of water bodies can be assessed by comparing the status quo of the habitat and a reference condition [...]. The goal of this paper is to demonstrate a new approach to assess aspects of the ecological integrity of standing waters or wetlands by analysing dragonfly communities. The method has been designed to meet the requirements of the new EUWFD" using the dragonfly fauna of the Tritonwasser and Priessnitz Pond (Austria) as case studies.] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, A-1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

**2294.** David, S. (2000): Dragonflies (Insecta-Odonata) of the Slovak-Moravian Carpathians Mountains and the Dolnovazska niva Lea. *Biodiversitas Slovaca* 1: 61-69. (in English with Slovakian summary). [Between 1988 and 1993 21 localities of the Biele Karpaty mountains, Povazie Valley, Myjaské pahorkatiny Hill-land and Dolnovazska niva Lea were surveyed. 28 odonate species including the rare Slovakian *Sympecma fusca*, *Lestes virens*, *L. viridis*, *Ischnura pumilio*, *Anax imperator*, *Epi-theca bimaculata*, *Crocothemis erythraea*, and *Sympetrum pedemontanum* could be traced. The species of different water body types are classified as *Orthetrum - Libellula depressa*-, *Lestes - Sympetrum - Aeshna mixta*- and *Anax - Erythromma najas*- coenoses.] Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. E-mail: david@pribina.savba.sk

**2295.** Devai, G.; Miskolczi, M. (2000): Data on the dragonfly (Odonata) fauna of the Aggtelek region based on a survey of adults. *Studia odonatol. hung.* 6: 5-19. (in Hungarian with English summary). [In 1992 and 1993, 40 odonate species (imagos) were collected at 54 localities in Aggtelek National Park, N-Hungary. The species-wise documentation includes *Coenagrion ornatum*, *Ophiogomphus cecilia*, and *Sympetrum depressiusculum*.] Address: Devai, G., Dept of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

**2296.** Devai, G.; Miskolczi, M. (2000): Results of biodiversity monitoring on community level by dragonflies (Odonata) in the inundation area (HNBM Programme, Pilot Project) of River Tisza between Tiszabercel and Balsa (NE-Hungary). *Studia odonatol. hung.* 6: 27-54. (in Hungarian with English summary). [This is an attempt to characterise odonate species assemblages on the community level building so called coenoses. The study was realized in the framework of the Hungarian National Biodiversity Monitoring (HNBM)-Programme at six localities in the floodplain of river Tisza. Ox-bows are characterised by a *Ischnura elegans*-*Orthetrum albistylum*-coenoses, marshes by the *Lestes sponsa*-*Sympetrum sanguineum* coenoses. The localities are documented in detail by habitat parameters and photographs as well as by species assemblages.] Address: Devai, G., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

**2297.** Di Giovanni, M.V.; Goretti, E.; Larporta, E.; Ceccagnoli, D. (2000): Larval development of *Libellula depressa* (Odonata, Libellulidae) from pools in central Italy. *Ital. J. Zool* 67: 343-347. [The developmental sta-

ges of the larvae of *L.depressa* were investigated for three years in permanent freshwater pools in central Italy. Eleven instars (F-0 - F-10) of *L. depressa* were discriminated by size and scatter plot. Scatter plots were constructed using the following measurements: labium length, head width, metafemur length, forewing-pad length, and total larval body length. Prolarvae instar was derived by Dyer's law. The mean growth rate coefficient values were about 0.77 for isometric parameters and 0.51 for the forewing-pad allometric parameter. *L. depressa* appeared to be a 'spring species', as defined by Corbet, and the population we studied had a mainly semivoltine life history and, probably, a small proportion of the larvae a univoltine cycle. Eggs showed direct development.] Address: Di Giovanni, M.V., Dipto Biol. anim. & Ecol., Univ. Perugia, Via Elco di Sotto, 1-06123 Perugia

**2298.** Dolný, A.; Volná, K.; Veselý, M. (2000): On the occurrence of dragonflies (Odonata) in two nature reserves of south-east Asia (Thailand, Malaysia). In: Hanel, L. (Ed.): *Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chráněné krajinné oblasti Trebonsko 15.-18.6.2000.* Vlasim. ISBN 80-86327-12-4: 171-174. (in Czech with English summary). [24 taxa are listed for Chiang Mai (Thailand) and Kenong Rimba State Park (Malaysia).] Address: Dolný, A., Katedra biologie e ekologie, Přírodovědecká fakulta Ostravské university, Bráfova 7, CZ-70103 Ostrava 1, Czech Republic.

**2299.** Dunkle, S.W. (2000): *Dragonflies through binoculars.* Oxford University Press. ISBN 0-19-511268-7: 266 pp, 47 plates. (in English). [I hesitate to write that it will be possible to identify with certainty a specimen using a binocular and using this book. To do so, (1) a lot of "plate-turing" will be necessary, and (2) stamped photos will not enable you in every case to identify the species. I think the blatant title of the book - I expected figures and photos definitively enabling the secure identification of a specimen - "dazes" the real quality of Sid Dunkle's book. It contains a lot of sound information on North American Anisoptera well organised in app. 15 introductory chapters and 307 species accounts. After careful reading, Sid's description of the very species will enable you in fact to identify a specimen: extensive information on identification, body features, and similar species provide a lot of help from one of the leading odonatologist, if not the authority on identification of North American Odonata. But, in field and using a binocular: is there enough to read the text and to find the plate with the very species? I feel not competent to assess this book resp. its didactical concept. Therefore I would recommend to read the reviews of Ken Tennessen in *Argia* 12(3), or Colin Jones in *Ontario Odonata* Vol 2. (Martin Schorr)]

**2300.** Fischer, S. (2000): Kleiner Beitrag zur Ernährung des Drosselrohrsängers *Acrocephalus arundinaceus*. *Berliner ornithologische Berichte* 10: 49-51. (in German with English summary). [Odonata regularly are a preferred prey of the Great Reed Warbler, *A. arundinaceus* (Aves). In contrast to this, no Odonata could be found as prey at the Müggelsee, Berlin, Germany.] Address: Fischer, S., Anzengruberstr. 23, D-12043 Berlin, Germany

**2301.** Friess, T. (2000): Libellen (Odonata) und Wanzen (Heteroptera) aus dem Naturschutzgebiet "Gut



Walterskirchen" am Wörthersee. Carinthia (II) 190/110: 517-530. (in German with English summary). [14 odonate species. are listed from the "Walterskirchen" property, W of Krumpendorf, on the northern shore of Wörthersee, Carinthia, Austria. 4 of these are redlisted and their occurrence and biology are outlined in some detail.] Address: Friess, T., Inst. Zool., Univ. Graz, Universitätsplatz 2, A-8010 Graz, Österreich

**2302.** Gerhards, E. (2000): Der fliegende Tod (Gottfried von Wedig, Stilleben, 1639), Wallraf-Richartz-Museum, Köln. SWR-Schulfernsehen Schuljahr 1999/2000 (3): 22-23. (in German). [A still life with a fly (Diptera: Muscidae) is described and background information on diseases caused by flies in past centuries are outlined. A dragonfly is sitting on an apple situated in a bowl. The text of the paper is layouted using *Aeshna cyanea*, but no reference is made to Odonata. Probably dragonflies symbolise most best a "flying death".] Address: SWR Schulfernsehen, Hans-Bredow-Straße, D-76530 Baden, Germany

**2303.** Gerken, B.; Böttcher, H.; Leitfeld, D.; Lohr, M.; Dörfer, K.; Leushacke-Schneider, C. (2000 ): Beurteilung von Regenerationsmaßnahmen durch vegetationskundliche und faunistische Untersuchungen - Beispiele aus der Oberweserniederung. Angewandte Landschaftsökologie 37: 205-216. (in German with English summary). [Results of a project to restore floodplain dynamics in the alluvium of the river Weser, Germany are briefly outlined. A status quo analysis was realized in 1989, restoration measures started in 1993. Vegetation was mapped in detail, and its succession and dynamic in the floodplain channel are illustrated. 32 species of Odonata are compiled in a table. Prior to the measures, 14 (1989) and 12 (1993) species could be observed. Species number increased in 1994 to 20, and 23 - 25 in 1995-1999. Dominance and abundance of species pulsated depending on habitat diversity and dynamic of water regime and vegetation development. Special emphasize is given to Lestidae, and the dependence of the genus from reed vegetation. The results demonstrate that measures as well as natural factors (flood) modify species composition, and make it sometime difficult to asses the "success" of the measures in a political framework.] Address: Lohr, M., An der Kirche 22, D-37671 Hötter, Germany. E-mail: mlohr@fh-hoexter.de

**2304.** Gueffroy, D.; Lieckweg, T. (2000): Zur Odonatenfauna des Fintlandsmoores (Landkreis Ammerland). Dossera, Oldenburg 2000: 53-65. (in German with English summary). ["On 10 excursions during 1999 the dragonfly fauna of the Fintlandsmoor, Ammerland county, was surveyed. The main focus of the survey was on the southern dystrophic rewetted bog and the undisturbed section of the former raised bog, which is situated in the centre of the nature reserve. A total of 15 indigenous dragonfly species were found. With reference to former surveys performed in 1973-78 and 1986 an increasing eutrophication was clearly shown by the changes in species composition. Currently suggestions for land-use, which would help secure the presence of certain endangered species such as *Ceriatonella tenellum*, *Aeshna subarctica*, and members of the genus *Leucorrhinia*, are being developed and strengthened in order to protect these species within this region. It is important to note, that through a spatial separation of functions the conflicts between species protection, tou-

rism, and natural succession will be reduced. The high dragonfly species diversity as well as the species composition are indicative of the extreme natural value of the Fintlandsmoor." (Authors)] Address: Gueffroy, D., Littenweilerstr. 36c; D-79117 Freiburg, Germany. E-mail: gueffroy@uni-freiburg.de

**2305.** Halacka, K.; Hanel, L. (2000 ): Dragonflies (Odonata) of the alluvial area of the lower stream of the river Dyje (Southern Moravia, Czech Republic). In: Hanel, L. (Ed.): Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chránené krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 118-129. (in Czech with English summary). [An intensive study from 1997 to 1999 along 32 stretches of the river Dyje, resulted in a total of 32 odonate species. Remarkable species are, *Lestes virens*, *L. dryas*, *Ischnura pumilio*, *Aeshna affinis*, *Anaciaeschna isocetes*, *Anax parthenope*, *Gomphus vulgatissimus*, *Orthetrum albistylum*, *O. brunneum*, *Sympetrum danae*, and *S. meridionale*.] Address: Hanel, L., Správa chránené krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blanik@schkocr.cz

**2306.** Hanel, L.; Hlásek, J.; Cempírek, J.; Ciesla, M.; Dolný, A.; Fikáček, M.; Flíček, J.; Honcu, M.; Mocek, B.; Rejl, J.; Rus, I.; Sálek, P.; Zelený, J. (2000): List of dragonflies (Odonata) found during the 3rd Odonatological Days in June 2000 in the protected landscape area Trebonsko (southern Bohemia). In: Hanel, L. (Ed.): Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chránené krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 66-77. (in Czech with English summary). [A total of 36 species were found at ten localities during 15.-18. June 2000). The species list includes some (very) rare Czech species as *Sympecma fusca*, *Lestes virens*, *L. dryas*, *Coenagrion hastulatum*, *Erythromma najas*, *Ischnura pumilio*, *Nehalennia speciosa*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Cordulegaster boltonii*, *Orthetrum albistylum*, *Crocothemis erythraea*, *Leucorrhinia dubia*, *L. pectoralis*, and *L. rubicunda*.] Address: Hanel, L., Správa chránené krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blanik@schkocr.cz

**2307.** Hanel, L. (2000 ): Note on dragonflies (Odonata) of the pools along-side Labe river near Celákovice (Central Bohemia). In: Hanel, L. (Ed.): Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chránené krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 102-113. (in Czech with English summary). [Recently 25 species could be traced in the study area. Compared with data from 1889 to 1956 this is a significant loss of species.] Address: Hanel, L., Správa chránené krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blanik@schkocr.cz

**2308.** Hanel, L. (2000 ): Preliminary list of dragonflies (Odonata) in the protected landscape area Krivoklátsko (Central Bohemia). In: Hanel, L. (Ed.): Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chránené krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 86-94. (in Czech with English summary). [28 species including the rare *Lestes virens*, *Coenagrion hastulatum*, *Erythromma najas*, *Gomphus vulgatissimus*, and *Sympetrum*

danae are listed from 22 localities.] Address: Hanel, L., Správa chránené krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blantik@schkocr.cz

**2309.** Hanel, L. (2000): The world Red List of Odonata - version 1996. In: Hanel, L. (Ed.): Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chránené krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 162-170. (in Czech with English summary). [This is a documentation of the IUCN Red List of Odonata, which in 1996 comprised 162 species. No species occurring in the Czech Republic are included in this list.] Address: Hanel, L., Správa chránené krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blantik@schkocr.cz

**2310.** Honcu, M.; Waldhauser, J. (2000): The dragonflies (Odonata) of the ponds Hranicni rybnik and jedlovské rybnik in the Lusation mountains (northern Bohemia, Czech Republic). In: Hanel, L. (Ed.): Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chránené krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 78-85. (in Czech with English summary). [This study presents for the first time odonatological results from the Luzické hory Mountains. In total, 23 species including Anax imperator, Aeshna juncea, and Cordulegaster boltonii which are rare in the Czech Republic, are listed.] Address: Honcu, M., District Museum, CZ-47001 Česká Lípa, Czech Republic.

**2311.** Jelený, J.; Hanel, L. (2000): Comments on dragonflies (Odonata) of the Sumava mountains (southern Bohemia). In: Hanel, L. (Ed.): Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chránené krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 144-153. (in Czech with English summary). [A compilation of available data totals in 40 odonate species. Among them are Lestes macrostigma, Erythromma najas, Coenagrion hastulatum, C. pulchellum, Aeshna caerulea, A. subarctica elisabethae, Thecagaster bidentata, Cordulegaster boltonii, Somatochlora alpestris, S. arctica, Sympetrum pedemontanum, S. danae, S. meridionale, Leucorrhinia albifrons, L. rubicunda, and L. dubia.] Address: Hanel, L., Správa chránené krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blantik@schkocr.cz

**2312.** Kroehling, A. (2000): Renaturierung der Ergoldinger Au - Vorstellung der bisherigen Umsetzung (1995-1999). Selbstverlag Markt Ergolding: 26 pp. (in German). [Report of the realisation of an ambitious action plan for revitalising the floodplain of the Ergoldinger Au in Bavaria, Germany. Starting in 1991, in the successive period conservation and developing measures were realised. The report presents the results and the efficiency of measures for the period between 1995 and 1999. Odonata are referred and presented as "umbrella-species" or used as examples in the framework of environmental education. The booklet is a didactically very interesting combination of landscape or measurement plans with colour photos of species and habitats, and some general, but very interesting biological information. It can be ordered for 4 Euro at the address below.] Address: Markt Ergolding, Lindenstr. 25, D-84030 Ergolding, Bayern

**2313.** Lindenia No. 32 (2000): LINDENIA. Notiziario dell'Ufficio nazionale italiano della Società odonatologica internazionale, Napoli. Lindenia No. 32: 135-138. (in Italian). [Announcements of odonatological symposia; Dragonflies in WWW; Anax (Hemianax) ephippiger sightings in Italy, 1998- 2000] Address: C. D'Antonio, Via A. Falcone 386/b, 1-80127 Napoli, Italy; E-mail: lindenia@freemail.it

**2314.** Meier, C.; Zucchi, H. (2000): Zur Bedeutung von Regenwasserrückhaltebecken für Libellen (Odonata): ein Beitrag zum urbanen Artenschutz. Osnabrück. naturw. Mitt. 26: 153-166. (in German with English summary). ["The investigations were carried out at 5 selected rainwater retention basins in the city of Osnabrück, Lower Saxony, Germany, where 22 out of the 27 regional species were evidenced. Though most of these were generalists, the results indicate the importance of city retention basins for the preservation of the fauna."] Address: Meier, C., Girardetstr. 71, D-45131 Essen, Germany.

**2315.** Mermet, E.; Galli, P. (2000): Contributo alla conoscenza delle libellule (Insecta: Odonata) del Varesotto. Bollettino della società di scienze naturali 88(1-2): 19-23. (in Italian with English summary) [Records of 47 species are documented and commented.] Address: Mermet, E., Civico Museo Insubrico di Storia Naturale, Piazza Giovanni XXIII, I-21056 Induno Olona, Italy.

**2316.** Mitchell, F.L.; Lasswell, J.L. (2000): Digital dragonflies. American Entomologist 46(2): 110-115. (in English). [The authors present a method conserving the colours of collected specimens. Odonata were refrigerated for app. 30 min, and put on a scanner. Catching dragonflies, handling, hard- and software are described in detail to realise optimal results of colour preservation. This interesting method is a combination of a conservative collection with dried pinned or acetoned specimens and a data base with identical scanned specimens.] Address: Lasswell, J.L., Institution Texas Agric. Exp. Stn., Route 2 Box 00, Stephenville, TX 76401, USA.

**2317.** Müller, Z.; Szállassy, N.; Jakab, T.; Bárdosi, E. (2000): Faunistical data on dragonflies (Odonata) from the ancient floodplain area Berek-lapos (Sárospatak). Studia odonatol. hung. 6: 55-68. (in Hungarian with English summary). [The paper presents faunistical data on dragonflies collected in the ancient floodplain area Berek-lapos, situated in the geographical microregion Bodrogbz (administrative area of the settlement Sárospatak), Hungaria. The fieldwork was carried out in 1999 at 12 localities. The list of 33 odonate species include the rare Hungarian Sympetrum danae as well as Brachytron pratense, Aeshna viridis, Epithea bimaculata, and Leucorrhinia caudalis.] Address: Müller, Z., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

**2318.** O'Brien, M. (2000): Williamson dragonfly gun confiscated! Argia 13(1): 22. (in English). [Verbatim: "In early February, Univ. of Michigan Dept. of Public Safety and Security conducted an inventory of firearms being stored in the Museum of Zoology While most of the attention was on the Bird, Mammal and Herpetology Divisions, it turned out that the only illegal weapon being stored here was in the Insect Division. Yes, you guessed it - the 22-cal. pistol with a soldered on 26" barrel that E.B. Williamson used to shoot down high-flying Odonata. He used 22 - cal. dust-shot rounds, which we-

re only potent enough to bag small creatures. I suspect that E.B. subscribed to "walking softly and carrying a big stick" and certainly the weapon in question looks somewhat impressive. Officer Tim Shannon was very apologetic about confiscating the pistol, as it was illegally modified under State law and also illegal under campus policy. However, since the weapon has not been fired in probably 75 years, it will not be a loss in terms of its use. At my suggestion, they'll make the pistol inoperable and return it so we can mount it on a plaque for display. Okay, so you thought dragonflies were harmless. They used to be bigger and a lot meaner, which was why EBW carried the weapon in the field. I don't know if they ever used dynamite for catching larvae." Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

**2319.** Rus, I. (2000): The current state of knowledge about dragonflies (Odonata) research in the vicinity of the town Kolin near Labe river (Central Bohemia). In: Hanel, L. (Ed.): Vazky 2000. Sborník referátu III. celostátního semináře odonatologu, který se konal v Chráněné krajinné oblasti Trebonsko 15.-18.6.2000. Vlasim. ISBN 80-86327-12-4: 95-101. (in Czech with English summary). [1995-2000, 12 localities were surveyed for their Odonata. A total of 29 species also includes *Lestes virens*, *Sympetma fusca*, *Coenagrion pulchellum*, *Erythromma najas*, *Brachytron pratense*, *Crocothemis erythraea*, and *Sympetrum flaveolum*.] Address: Rus, I., Regionální muzeum, v Kolíne, Brandlova 27, CZ-28002 Kolin I, Czech Republic

**2320.** Schulz, C.-J.; Bellstedt, R. (2000): Die Wipper: Verödung und Wiederbesiedlung eines Flusses im ehemaligen Kalirevier "Südharz", dargestellt am Beispiel aquatischer Insekten. Abh. Ber. Nat. Gotha 21: 103-110. (in German). [The decline of potassium mining in Northern Thuringia, Germany led to a decrease in salinity of the river Wipper during the last years. Recolonisation of the river is documented comparing macrobenthos collections from the tenth, fifties, and ninties of the 20th century. Five odonate taxa including *Calopteryx splendens*, *C.virgo*, *Ischnura elegans*, and *Platycnemis pennipes*.] Address: Schulz, C.-J., Staatliches Umweltamt Sondershausen, Am Petersenschacht 3, D-99701 Sondershausen, Germany

**2321.** Wang, L.-J. (2000): Dragonflies of Taiwan. ISBN 957-30885-1-7: 349 pp. (in Chinese and English). [This is my favourite dragonfly book of the year. Liang-Jong Wang has written a fascinating book on the Taiwanese Odonata! The chapters and species accounts are written in Chinese. But to enable access to the species monographs, a brief "Natural history" and information on the distribution on the Asian scale are added. Together with the excellent, in some cases outstanding photographs of the species, you will have full access to the Odonata of Taiwan. Additional information is given - and sometimes illustrated by photographs - to morphology, life history, and behaviour. Very useful is the chapter of typical Taiwanese habitats: Photographs - reduced in scale - of the typical species of paddy fields, fish ponds, forest lakes and swamps, ponds in parks, mountain lakes, hill streams, and forest brooks are compiled and crossreferenced to the species chapter. This book definitely should not be missing in any odonatalogical library. (Martin Schorr)] Address: www.jccalendar.com.tw

**2322.** Wedmann, S. (2000): Die Insekten der oberoligozänen Fossilagerstätte Enspel (Westerwald, Deutschland). Systematik, Biostratonomie und Paläoökologie. Mainzer Naturwissenschaftliches Archiv, Beiheft 23: 142 pp, Anhang. (in German with English summary). [The insect taphocoenosis from the Upper Oligocene lacustrine deposits of Enspel (Westerwald, Rheinland-Pfalz, Germany) was studied in detail. The systematic composition of the over 5000 insect fossils permits detailed paleoecological conclusions. These interpretations are based on the spectra of the different digging sites and horizons as well as on the ecological needs of the closely related extant taxa. The taphocoenosis is dominated by terrestrial insects. Aquatic taxa - including 15 specimens of Odonata - are represented with only a few fossils. *Oligaeschna jungi* is a dragonfly which is already known from a fossil site in France. Additional species are identified on the family-level. A zygopteran species is pictured on a colour plate showing the colouration of the species. The ecosystem of lake Enspel is reconstructed; Odonata are treated in some detail. The fauna of Enspel is compared with some other regional fossil deposits.] Address: Wedemann, Sonja, Institut für Zoologie und Anthropologie, Berliner Str. 28, D-37073 Göttingen, Germany. E-mail: swedman@gwdg.de

**2323.** Westermann, K. (2000): Die Eiablageplätze der Weidenjungfer (*Chalcolestes viridis*) in einem südbadischen Altrheingebiet. Naturschutz südl. Oberrhein 3(1): 93-107. (in German with English summary). [A survey for *C. viridis* clutches was conducted along the Old-Rhine nr Weisweil, co. Emmendingen, Baden-Württemberg, SW Germany. 37 tree and bush species with successfully hatched prolarvae were identified, 15 of them have not been previously mentioned in the literature. Young trees and bushes, such as *Viburnum opulus*, *Alnus glutinosa*, *A. incana*, *Fraxinus excelsior*, *Ligustrum vulgare*, *Salix alba*, some smaller willow species and *Prunus padus*, appear the preferred oviposition sites. The branches were selected from close above the water to an approx. height of 25 m, the number of clutches decreasing with the height. At some distance from the water, they were rarely seen.] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany

**2324.** Yokoi, N. (2000): A list of dragonflies collected in Central Laos. Gekkan-Mushi 356: 18-22. (in Japanese with English summary). [23 species are dealt with, 20 of them are recorded for the first time in central Laos. *Prodasineura auricolor* (Fraser 1927), *Protosticta taipokauensis* Asahina & Dudgeon 1987, *Ictinogomphus pertinax* (Hagen 1854), *Labrogomphus torvus* Needham 1931, *Merogomphus paviei* Martin 1904, *Epopthalmia elegans* (Brauer, 1865), *Macromia callisto* Laidlaw 1922, *Macromia chaiyaphumensis* Hämäläinen 1985, *Macromia pinratani* Asahina 1983, and *Hylaeothemis clementia* Ris 1909 are illustrated. *P. taipokauensis* and *E. elegans* are first records for Indochina. *I. pertinax* and *P. taipokauensis* are compared with specimens from Hong Kong, China.] Address: Yokoi, N., 2-37-11, Kaisei, Koriyama, Fukushima, 963-8851, Japan

2001



- 2325.** Abbott, J.C. (2001): Distribution of dragonflies and damselflies (Odonata) in Texas. *Trans. Am. Entomol. Soc.* 127(2): 189-228. (in English). [“205 species of Odonata are listed from Texas. County records, seasonal occurrence and habitat preference are given for each species. Publications containing Texas records are presented and briefly discussed in a history of the Odonata research in the state. The physiography of Odonata habitats and zoogeography of the species themselves are discussed. Texas contains a highly diverse odonate fauna, because of its unique geographic position and highly variable physical composition relative to other physiographic provinces. A total of 5,098 records of Odonata are documented from 210 counties in Texas. These records include personal collections, valid literature records, verified material in museum and personal collections, and verified photographic records.” (Author)] Address: Abbott, J.C., Univ Texas, Sect. Integrat. Biol., Austin, TX 78712 USA
- 2326.** Adena, J.; Handke, K. (2001): Die Libellenfauna von Grünland-Grabensystemen im Bremer Raum. *Bremer Beiträge für Naturkunde und Naturschutz* 5: 91-103. (in German with English summary). [Based on investigations starting in 1980, a compilation of the dragonfly fauna of 7 selected ditch systems in the lowlands of the Bremen area, Germany, is presented and analyzed. A total of 35 odonate species including 29 probably or securely indigenous species could be recorded. The species are discussed according their regional rarity, which discriminates the regions from other western or central European regions. Species like *Lestes sponsa*, *Coenagrion pulchellum*, *Aeshna grandis*, and *Sympetrum vulgatum* belong to the most common Odonata whereas species like *Enallagma cyathigerum*, *Aeshna cyanea*, and *Sympetrum flaveolum* are more rare ones. The rare *Brachytron pratense*, *Aeshna viridis*, and *Anaciaeschna isosceles* build strong populations in the ditch systems in the environs of Bremen. Factors as ditch maintenance, waterflow, water supply, water level, morphology, and vegetation succession explain different odonate coenoses and habitat quality for dragonflies. The most significant threat for the odonate coenoses of the ditch systems are high frequent dredging, upsilting and build over with buildings.] Address: Adena, Julia, Geibelstr. 61, D-28215 Bremen, Germany
- 2327.** Andrew, R.J.; Chandrasekhar, S. (2001): A collection of Odonata from Umrer, Nagpur district, central India, with a note on the behaviour of *Pantala flavescens* (Fabricius) in the rain. *Notul. odonatol.* 5(8): 97-108. (in English). [48 species are recorded, 5 of these are new to the fauna of central India. The behaviour of *P. flavescens* during rainfall is discussed in terms of endothermic warming. Feeding behaviour of *P. flavescens* on termites is shortly outlined.] Address: Andrew, R.J., Department of Zoology, Shri Shivaji ESA's Science College, Congress Nagar, Nagpur - 440012 (MS), India
- 2328.** Andrews, S.J. (2001): Some observations on the identification of the exuviae of the final-instar larvae of the Common Blue Damselfly *Enallagma cyathigerum* (Charpentier). *J. Br. Dragonfly Society* 17( 2): 35-44. (in English). [A total of 553 exuviae of *E. cyathigerum* were collected: “Conclusions: Significant intraspecific variation in labial setation was noted and, as such, it is not considered a sufficiently consistent character to use for larval identification. It is suggested that the following amendments should be made to the commonly used specific characters to identify the exuviae of *E. cyathigerum*: (1.) Mean body length (including lamellae) about 20.5 mm (range 17 to 23.5 mm). (2.) Labial palp with a very small spine on at least one of the outer margins adjacent to the distal seta. (3.) Prominent mid-dorsal, longitudinal pale line on all visible segments except S10. (4.) Caudal lamella subnodate and about 6 mm long (range 3.5 to 7 mm), usually with one to three (rarely zero or four) narrow, transverse, dark bands; thicker setae generally reaching to (or beyond) the mid-point on both margins of the caudal lamellae.” (Author)] Address: Andrews, S.J., 39 Guildford Street, Staines, Middlesex TW18 2EQ, UK
- 2329.** Andretzke, H. (2001): Naturschutzmassnahmen am Grabensystem des NSG "Borgfelder Wümmewiesen" - Erfolgskontrolle anhand der Libellenfauna. *Bremer Beiträge für Naturkunde und Naturschutz* 5: 189-196. (in German with English summary). [The efficiency of reshaping measures at stretches of the ditch system in the nature protection area "Borgfelder Wümmewiesen" is assessed using Odonata. 26, including 19 indigenous species had been observed in the area. As to expect, the more ubiquitous species could be listed completely, but the target species of oxbow lakes and fens are still lacking about 4 years after first reshaping measures. But, even successful reproduction of the more common species was missed at most of the ditches with compensation measures due to unsuitable habitat conditions (e.g. extensive mudbeds). The author concludes that for the time the measures at the draining ditches have to be assessed as unsuccessful.] Address: Andretzke, H., BIOS, Lindenstr. 40, D-27111 Osterholz-Scharmbeck, Germany
- 2330.** Aoki, T. (2001): Active flights of *Chlorogomphus brunneus costalis* in late evening. *Sympetrum Hyogo* 7/8: 70. (in Japanese with English summary). [“Active flight of many males of *C. brunneus costalis* was observed in the evening during 17:30-18:50 on June 24, 2000 at Hiwasa-cho, Tokushima Prefecture, Japan. They flew low about 1 m above ground. In early hours most males came out of the shaded stream, where females oviposited in the morning, and went away along the road (path 1) and a few males returned to the stream (path 2). In later hours most males came out and went back soon to the shaded stream (path 2). When two males encountered on the road, one chased the other. Exceptions are a female flew from the opposite side (path 3) and a male staying for feeding at a space among the trees on the road side at 3 m above ground (path 5).” (Author) Path numbers refer to a figure with a map of the locality.] Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: taoki@ma3.justnet.ne.jp
- 2331.** Aoki, T. (2001): Odonata fauna of Kobe City, Part 9. (Corduliidae and supplement 2). *Sympetrum Hyogo* 7/8: 6-8. (in Japanese with English summary). [*Macromia amphigena* Selys 1871, *M. daimoji* Okumura, 1949, *Epophthalmia elegans* (Brauer, 1865), *Soma-tochlorella viridiaenea* (Uhler 1858), *S. clavata* Oguma 1922, *S. uchidai* Förster 1909, *Epiteca marginata* (Selys 1883), *Sympetrum uniforme* (Selys 1883), *Lanthus fujiacus* (Fraser 1936), *Tramea virginia* (Rambur 1842), *Tanypteryx pryeri* (Selys, 1889), *Cercion melanotum*

(Selys, 1876), and *Ceriagrion nipponicum* Asahina 1967 are treated in the 9th part of the odonata fauna of the city of Kobe, Japan.] Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: taoki@ma3.justnet.ne.jp

**2332.** Aoki, T. (2001): Three males of *Sympetrum depressiusculum* were caught in Ibogawa-cho, Hyogo Prefecture. *Sympetrum Hyogo* 7/8: 13. (in Japanese with English summary). [S. *depressiusculum* was found on October 22, 2000 at a pond in Baba, Ibogawa-cho, Hyogo Prefecture, Japan. This record is one of the scarce records on the Setonaikai Inland Sea side, while in contrast more records on the Japan Sea side are made. The pond was visited again on November 3, but the species had disappeared.] Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: taoki@ma3.justnet.ne.jp

**2333.** Auerswald, J.; Franke, T.; Reisinger, E. (2001): Erfolgreiche Pflegemaßnahmen im NSG "Dreba-Plöthner Teichgebiet". *Landschaftspflege und Naturschutz in Thüringen* 38(2): 62-65. (in German). [Efficiency of conservation measures in the Nature Conservation Area "Dreba-Plöthener Teichgebiet" (Thüringen, Germany) was assessed using some indicator species. Odonata are mentioned to have developed strong populations, and the species mentioned are including e.g. *Anaciaeschna isosceles*.] Address: Auerswald, J., Landratsamt Saale-Orla-Kreis, Umweltamt, Oschitzer Str. 4, D-07907 Schleiz, Germany

**2334.** Azuma, T. (2001): Distribution of *Trigomphus melampus* in Hyogo Prefecture. *Sympetrum Hyogo* 7/8: 4-5. (in Japanese with English summary). [18 new habitats of *T. melampus* were discovered in the northern district of Hyogo Prefecture, Japan, in 1999, totaling the known habitats to 24. Larvae prefer shallow ponds with grass vegetation; it is assumed that they inhabit irrigation ditches too. The distribution of the species is limited to the northeastern parts, namely Kinosaki-gun, Toyo-oka City and Mikata-gun, and does not reach Yabu-gun. Abandonment of traditional rice field cultivation and development of artificial irrigation ditches are reasons for regressing populations of this species.] Address: not stated

**2335.** Azuma, T. (2001): Odonate fauna of Sanda City, Gyogo Prefecture. *Sympetrum Hyogo* 7/8: 14-20. (in Japanese with English summary). ["The odonate fauna of Sanda City, Hyogo Prefecture, Japan, had been reported only incompletely, while the urbanization owing to an exceptional rapid expansion of population has caused big loss of natural environment. [...]"] To document the remaining odonate fauna, 90 localities had been surveyed in 1998. Now, 61 species including the author's unpublished former records of 1972 and 1993 are known from the region. Sogame (1998, 1999) recorded additional 13 species; this totals the number of species to 74.] Address: not stated

**2336.** Baumann, K. (2001): Habitat und Vergesellschaftung von *Somatochlora alpestris* und *S. arctica* im Nationalpark Harz (Odonata: Corduliidae). *Libellula* 20 (1/2): 47-67. (in German with English summary). ["In 2000, thirty moorland pools and the pothole in the "Odersprungmoor" have been analysed in regard to their population of dragonflies by collecting exuviae. In the

moorland-pools different data concerning the structure were surveyed in order to compare the habitat selection of the various species. In total, 705 exuviae of 10 species were collected. The species with the highest number of individuals was *Leucorrhinia dubia*. *Somatochlora alpestris* was detected in most of the pools but the populations usually were small. This species and the less frequent *S. arctica* could be found in the smallest and shallowest waterbodies. Both were able to coexist with up to 5 additional species. Larger populations of both *Somatochlora* species and *Leucorrhinia dubia* excluded each other." (Author)] Address: Baumann, Kathrin, Arbeitsgemeinschaft für Landschaftsplanung, Naturschutz und Umweltstudien (ALNUS GbR), Rudolf-Huch-Straße 6, D-38667 Bad Harzburg, Germany. E-Mail: alnus-k.baumann@t-online.de

**2337.** Bechly, G.; Brauckmann, C.; Zessin, W.; Gröning, E. (2001): New results concerning the morphology of the most ancient dragonflies (Insecta: Odonoptera) from the Namurian of Hagen-Vorhalle (Germany). *J. Zool. Syst. Evol. Res.* 39(4): 209-226. (in English). ["The holotype specimen of the 'protodonate' *Erasipteroides valentini* (Brauckmann in Brauckmann et al., 1985) and the paratype specimen K-13 of the giant 'protodonate' *Namurotypus sippeli* Brauckmann and Zessin, 1989 from the Upper Carboniferous (Namurian B) of Hagen-Vorhalle (Germany) are redescribed, and a new specimen of *Erasipteroides* cf. *valentini* is described. The new evidence is used to refine the groundplan reconstruction of Odonoptera and the reconstruction of odonatoid phylogeny. Prothoracic winglets for *Erasipteroides* and the absence of an archaedictyon are documented. Furthermore, a very long and sclerotized ovipositor with gonangulum is described from the female holotype specimen of *Erasipteroides valentini*, and it is proposed that it was not used for endophytic but for endosubstratic oviposition. The record of prothoracic winglets in early 'odonatoids' and their presence in fossil Palaeodictyoptera and 'protorthopteres', indicates that the groundplan of Pterygota indeed included three pairs of wings. A phylogenetic analysis suggests that the Palaeozoic giant Meganisoptera and "higher" odonatoids (incl. crown group Odonata) together form a monophyletic group which is here named Euodonoptera. *Erasipteroides* and the other 'Erasipteridae' are shown to be more closely related to Euodonoptera than to Eugeropteridae. The description of the male primary genital structures of *Namurotypus sippeli* is emended and a new interpretation is proposed including new hypotheses concerning their function. The males of *Namurotypus* had a paired penis with a pair of lateral parameres, and a pair of leaf-like, but still segmented, gonopods. Segmented leg-like male gonopods are considered as a groundplan character of insects, while a paired penis is regarded as a putative synapomorphy of the palaeopterous insect orders Palaeodictyopteroidea, Ephemeroptera, and Odonoptera. It is proposed that *Namurotypus* did not mate by direct copulation but retained the archaic deposition of external spermatophores, just like the primarily wingless insects. The sigmoidal male cerci may have been placed behind the female head and used to drag the female over the spermatophore, which is remotely similar to the mating behaviour of some extant arachnids (e.g. *Amblypygi*). Three hypothetical scenarios regarding the evolution of secondary copulation in modern Odonata are proposed." (Authors)] Address: Bechly, G., Staatliches Museum für

Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**2338.** Beckemeyer, R. (2001): Biological diversity and politics: the impact of recent regulatory trends on scientists who study the taxonomy and distribution of organisms. *Argia* 13(1): 28-29. (in English). [This is a discussion of current trends in getting collecting permissions in the framework of biodiversity politics. Current regulations in India and Brazil are to assess that they will stop any transboundary scientific work on species. "This is a sad state of affairs that truly bodes ill for increasing our understanding of Earth's biodiversity."] Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**2339.** Beckemeyer, R. (2001): Phop Gan Mai Tik Khrap, Thailand. *Argia* 13(1): 9-12. (in English). [Report from a birding and dragonflying trip to Thailand in early 2000. Most of the referred species are common ones with the exception of *Coeliccia kazukoae* Asahina 1984 and *Vestalis yunosukei* Asahina 1990.] Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**2340.** Bedell, P. (2001): Some recent Odonate records for Nebraska. *Argia* 13(2): 2. (in English). [*Ischnura barberi*, *Aeshna californica*] Address: Bedell, P., 10120 Silverleaf Terr., Richmond, VA 23236, USA. E-mail: pbedell@vci.org

**2341.** Behrends, T. (2001): Libellen-Monitoring im Rahmen des E & E-Projektes "Halboffene Weidelandchaft Hölftigbaum" von 2000 - 2004. *Abh. Ber. Naturkundemus. Görlitz* 73(1): 1-2. (in German with English summary). ["Dragonfly populations of a newly established, 220-hectare comprising pasture landscape on a former military area in northern Germany near Hamburg will be investigated over a period of 5 years. An average of 100 cattle and 120 sheep graze on the semi-open landscape without any restriction. One of the main characteristics of the landscape are numerous small temporary pools on sandy or loamy soil with less nutritive substances. Most of them are flooded in winter or early spring and dry out during summer. Within the first year of this study, 22 species of dragonflies were observed, of which some were endangered or vulnerable in Germany such as *Lestes virens*, *L. barbarus*, *L. dryas*, *Coenagrion lunulatum*, and *Ischnura pumilio*. The population dynamic and short distance migration within the area of *L. barbarus* will be further investigated with a capture-mark-recapture method." (Author)] Address: Behrends, T., Inst. Ökologie und Umweltchemie, Univ. Lüneburg, Scharnhorststr. 1, D-21332 Lüneburg, Germany. E-mail: thomasbehrends@exmail.de

**2342.** Belgische Libellenonderzoekers (2001): Diffusion d'un communiqué de presse de Gomphus en relation avec le changement climatique et la Conférence de la Haye. *Gomphus* 17(1): 63-68. (in partly bilingual in French and Dutch). [End of November 2000 the international conference of climatic change was held in Den Haag, The Netherlands. The Belgian odonatologists used the situation to present to the public changes of odonate composition in Belgium. Climatic warming is indicated by several species; the increasing number of records is plotted in a graph showing the relative observation frequency of six southern species (*Sympetrum fonscolombii*, *Lestes barbarus*, *Crocothemis erythraea*, *Coenagrion scitulum*, *Anax parthenope*, and *Aeshna* af-

finis) in Wallonia during the last 20 years.] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

**2343.** Belshe, J. (2001): Children's stories about dragonflies. *Argia* 13(1): 28. (in English). [Some brief information is given on a book "Nature stories for little folk" from the beginning of the 20th century including some dragonfly illustrations and a story about a dragonfly.] Address: Belshe, J.F., 221 SW 21 Rd., Warrensburg MO 64093, USA

**2344.** Bender, J.; Xylander, W.E.R.; Stephan, R. (2001): Lösungsansätze im Zielkonflikt zwischen Rekultivierung und Naturschutz in der Bergbausanierung-Wiederherstellung eines Libellengewässers auf Halden des Braunkohletagebaus Berzdorf. *Abh. Ber. Naturkundemus. Görlitz* 73(1): 3-8. (in German with English summary). ["A geological depression was formed by chance during mine dumping at the Neuberzdorfer Holz. In the course of natural events the depression developed into a favourable biotope for dragonflies, in which a number of rare species have been recorded. After the closing of mining activities in 1997 reclamation work began, which in the meanwhile has led to a nearly total destruction of the new biotope. It was agreed between the mining corporation, the conservation authorities and the Natural History Museum in Görlitz to create a similar biotope in the vicinity as a replacement for that lost through reclamation activities." (Authors) Habitat developing measures with special emphasize to Odonata are outlined.] Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany. E-mail: Naturmuseum. GR.Dr. Xylander@t-online.de

**2345.** Benedikt R. Schmidt, B.R.; Van Buskirk, J. (2001): Verhalten, Wachstum und Morphologie von Kammolch-Larven in der An- und Abwesenheit von Libellenlarven. *Rana, Sonderheft* 4: 179-191. (in German with English summary). ["We tested for predator-induced plasticity in behavioural, morphological and life-history traits of larvae of the newt *Triturus cristatus* using larvae of the dragonfly *Aeshna cyanea* as predators. There was no evidence for plasticity in morphology or life history in a controlled experiment and we found no evidence for morphological plasticity in samples taken from natural ponds. In contrast to other newt species, larvae of *T. cristatus* were more active in the presence of predatory dragonflies. We do not know why phenotypic plasticity in *T. cristatus* is different from the predator-induced defences seen in other newt species. We suggest that differences between newt species in plasticity and predator-prey interactions may affect their distribution and abundance." (Authors)] Address: Buskirk, J. van, Institute of Zoology, University of Zürich, CH-8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch; bschmidt@zool.inizh.ch

**2346.** Bönsel, A. (2001): *Aeshna subarctica* Walker, 1908 in the Biebrza Valley (Odonata: Aeshnidae). *Wiad. entomol.* 19(3/4): 187. (in Polish with English title). [4 males and 1 female of *Aeshna subarctica* elisabethae Djakonov, 1922 were recorded at 9 Aug. 1998; co-occurring species were *Libellula quadrimaculata*, *Leucorrhinia rubicunda*, and *Sympetrum danae*.] Address: Bönsel, A., Vasenbusch 15, D-18337 Gresenhorst, Germany. E-mail: andre.boensel@gmx.de



- 2347.** Borgula, A. (2001): Die Würfelnatter während und nach dem Bau des Seeuferweges am Lopper. In: Amphibien und Reptilien in Ob- und Nidwalden. Naturforsch. Gesell. Ob- und Nidwalden, Grafenort. 227 pp. (in German). [In the framework of conservation measures directed to the serpent *Natrix tessellata*, the emergence of *Gomphus vulgatissimus* on the shore of lake Alpnach, Switzerland was recorded. Three photographs document the emergence of the species in 1998.] Address: Borgula, A., Brambergstr. 3B, CH-6004 Luzern, Switzerland. E-mail: borgula@freesurf.ch
- 2348.** Bräu, M.; Schwibinger, M.; Weihrauch, F. (2001): Die Libellenfauna der Stadt München. *NachrBl. bayer. Entomol.* 50(4): 128-137. (in German with English summary). ["A commented list of 52 Odonata, which have been reported within today's borders of the City of Munich, Bavaria, Germany is given. It "covers the 41 currently recorded species since 1990 as well as the 46 historical records. Nowadays, a number of species are restricted to only a few sites and apparently endangered. More detailed information on the status of *Coenagrion mercuriale*, *Gomphus vulgatissimus*, *Onychogomphus f. forcipatus*, *Orthetrum coerulescens*, *Sympetrum flaveolum* and *Sympetrum pedemontanum* is given." The record of *S. meridionale* is of special faunistic interest.] Address: Weihrauch, F., Hengelerstr. 9, D-80637 München, Germany. E-mail: Florian.Weihrauch@lbp.bayern.de
- 2349.** Bree, D. (2001): European Praying Mantis (*Mantis religiosa*) feeding on a Common Green Darner (*Anax junius*). In: Catling, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 49. (in English). ["An observation of [...] *M. religiosa* preying upon [...] *A. junius* is reported from a migration resting place for odonates on the north shore of Lake Ontario in Prince Edward County, Ontario." (Author)] Address: Bree, D., Box 123, Bloomfield, Ontario K0K 1G0, Canada. E-mail: dbree@post.kosone.com
- 2350.** Bree, D.; White, H.; Deliry, C. (2001): Mantids eating dragonflies. *Argia* 13(1): 27-28. (in English). [Several recent e-mail noting mantids foraging Odonata are compiled in this contribution. Two of the observations are from North America (*Anax junius*, Ontario, Canada; *Pachydiplax longipennis*, Delaware, USA), one from France, Europe (*Anax parthenope*.)] Address: David Bree: dbree@post.kosone.com; Hal White: halwhite@UDel.Edu; Cyrille Deliry: cyrille@deliry.com
- 2351.** Bree, D. (2001): Odonates of the Sandbanks Pannes during 2000. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 27-30. (in English). ["Twenty-six species of odonates are reported for the interdunal pannes at Sandbanks Provincial Park during an abnormally wet year when the pannes, which often dry out in summer, retained as much as 1.75 m of water throughout the season. Eleven of the species recorded showed evidence of larval development in the pannes. Both *Pantala hymenaea* and *Pantala flavescens* were found emerging and as teneral. Seven species are reported as new for Sandbanks Provincial Park including *Ischnura hastata* and *Leucorrhinia frigida*. The *Ischnura hastata* record represents a northern range extension in Ontario." (Author)] Address: Bree, D., Box 123, Bloomfield, Ontario K0K 1G0, Canada. E-mail: dbree@post.kosone.com
- 2352.** Bridgehouse, D.W. (2001): Occurrence of *Ce-lithemis martha* (Odonata: Libellulidae) in Nova Scotia. *Northeastern Naturalist* 8(4): 495-498. (in English). [This note augments previous historical records of *Ce-lithemis martha* by presenting a new locality and further flight season records for Nova Scotia, Canada.] Address: Bridgehouse DW 24 Kiel Court, Eastern Passage, NS B5G 1R3, Canada
- 2353.** Briscoe, A.D.; Chittka, L. (2001): The evolution of color vision in insects. *Annu. Rev. Ent.* 46: 471-510, 1 Pl. excl. (in English). ["The physiological, molecular and neural mechanisms of insect colour vision are reviewed. A review of spectral sensitivity data for 6 anisopteran species is included. Phylogenetic and molecular analyses reveal that the basic bauplan, UV-blue-green-trichomacy, appears to date back to the Devonian ancestor of all pterygote insects."] Address: Briscoe, A.D., Dept Molec. & Cell Biol, Univ. Arizona, Tucson, AZ 85721, USA
- 2354.** Brockhaus, T. (2001): Beobachtungen zur Libellenfauna der Shivapuri Berge, Nepal (Odonata). *Ent. Nachr. Berichte* 45(3/4): 221-223. (in German with English summary). [In May 2000, *Caliphaea confusa*, *Anotogaster nipalensis*, *Neallogaster hermione*, *Davidius aberrans*, and *Orthetrum glaucum* were recorded app. 10 km N of Kathmandu. Habitats and altitudinal distribution are briefly described.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de
- 2355.** Brockhaus, T.; Fischer, U. (2001): Die Verbreitung von *Cordulegaster boltonii* und *Somatochlora arctica* in Sachsen - Ergebnisse aus dem Projekt "Entomofauna Saxonica". *Abh. Ber. Naturkundemus. Görlitz* 73(1): (in German with English summary). [The distribution of *C. boltonii* (101 localities) and *S. arctica* (11 loc.) in Saxony is briefly described.] Address: Fischer, U., Anton-Gunter-Str. 12, D-08340 Schwarzenberg, Germany
- 2356.** Brockhaus, T. (2001): Untersuchungen zur Individualentwicklung, Phänologie und Populationsdynamik der Imagines von *Sympetrum pedemontanum* (Odonata: Libellulidae). *Libellula* 20(3/4): 115-130. (in German with English summary). ["In 1994 and 1995, *S. pedemontanum* was investigated by a mark-and-recapture study at River Zschopau in Saxony, Germany. In 1994, 23 of 281 specimen were recaptured once or more. In 1995, the recapture rate was 23 specimen of 444 specimen total. The maturation time of males was approximately eight days and a little bit longer in females. The duration of imaginal life was 13-17 days for males and 7-16 days for females. One male survived 45 days. From 77 (1994) and 211 (1995) emerged specimen, 34 (1994) and 90 (1995) were females, respectively. Emergence was strongly synchronised in both years: EM50 was seven days in 1994 and 11 days in 1995. After a strong emigration after emergence, especially in females, during the reproduction period the population remained stable at a low level." (Author)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de
- 2357.** Buczynski, P.; Czachorowski, S.; Lechowski, L. (2001): Some groups of water insects (Odonata, Hete-

roptera, Coleoptera, Trichoptera) of the projected reserve "Hanging peat bogs by Jaczno Lake" and its surroundings: results of preliminary studies. *Rocz. nauk. Tow. Ochr. Przyr. "Salamandra"* 5: 27-42. (in Polish with English summary). [On the north eastern edge of Poland (54°17'N 22°53'E) 37 odonate species from seven localities are listed. Here, *Chalcolestes viridis* and *Anax parthenope* reach the northernmost edge of their ranges in Poland. Other remarkable species are: *Sympecma paedisca*, *Ophiogomphus cecilia*, *Brachytron pratense*, *Anaciaeschna isocoles*, *Somatochlora arctica*, *S. flavomaculata*, *Libellula fulva*, and *Leucorrhinia caudalis*.] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**2358.** Burkart, W.; Burkart, G. (2001): Two new Odonata species for Gotland, Sweden. *Nord. Odonat. Soc. Newsl.* 7(1): 10. (in Swedish with English summary). ["In an article in the journal "Körkmacken" (No. 27, August 2000, pp. 14-15) of the Gotland Entomological Society, Werner and Gudrun Burkart briefly presents their records of *Sympecma fusca* and *S. paedisca* in April 2000 at the island Gotland in the Baltic sea. Both species are new to Gotland, and the record of *S. paedisca* is the first for Sweden and Scandinavia."] Address: Burkart, W. a. G., Am Emel 7, D-27412 Wilstedt, Germany

**2359.** Burks, R.L.; Jeppesen, E.; Lodge, D.M. (2001): Pelagic prey and benthic predators: impact of odonate predation on *Daphnia*. *J. N. Am. Benthol. Soc.* 20(4): 615-628. (in English). ["Interactions between benthic predators and pelagic prey, such as larval odonates and *Daphnia*, are often used to describe classic predator-prey relationships in laboratory-studies. However, few field studies explore the potential impact of benthic predators on pelagic prey. Recent studies of cladocerans document diel horizontal migration (DHM), where large-bodied zooplankton (i.e., *Daphnia*) decrease their exposure to pelagic predators by seeking refuge among macrophytes. However, daphnids undergoing DHM may simultaneously increase their likelihood of encountering benthic predators that commonly occur in littoral zones. In laboratory experiments, we showed that dragonfly nymphs (*Epiheca cynosura*) effectively eliminated all *Daphnia* within 24 h, regardless of macrophyte presence or architecture. We also tested whether additions of larval damselflies (*Ischnura elegans*, *Coenagrion puella*, *C. pulchellum*) and dragonflies (*Somatochlora flavomaculata*) (total odonate density of 35-55 / m<sup>2</sup>) significantly reduced total zooplankton or benthic invertebrate abundance in field enclosures with different macrophyte densities (20, 40, 80% volume infested [PVI]). Odonates significantly reduced *Daphnia* abundance at 20 PVI. However, the magnitude of the influence of odonates on daphnids, as well as *Ceriodaphnia* and *Polyphemus*, decreased with increasing macrophyte density. Odonate predation did not significantly affect benthic taxa abundance. Thus, daphnids undergoing DHM may lower predation from pelagic predators, but our results suggest that mortality from littoral predators may be significant. The net benefit of DHM may, therefore, differ among lakes as a function of the relative threats posed by pelagic and littoral predators." (Authors)] Address: Burks, R.L., Rhodes Coll, Dept Biol., 2000 N Pkwy, Memphis, TN 38112 USA

**2360.** Cai, Z.J.; Zeng, L.J.; Feng, Z.J. (2001): Extracting the weak distorted fringes on the dragonfly wing by a correlation algorithm. *Optics & Laser Technology* 33(7): 493-497. (in English). ["We have proposed a simple correlation algorithm to extract weak distorted fringes buried in both background noise and random noise. The relationship among threshold value, signal to noise ratio and least frame number was discussed. The method, is efficiency to measure the shape of an object with low diffuse reflectivity. We have successfully applied the method to measure the shape of a dragonfly wing." (Authors)] Address: Cai Z.J., Tsing Hua Univ., Dept Precis Instruments, State Key Lab Precis Measurement Technol & Instru, Beijing 100084, Peoples Rep. China

**2361.** Catling, P.M.; Jones, C.D.; Pratt, P. (Eds) (2001): Ontario Odonata, vol. 2. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 2. Toronto Entomologist's Association, Toronto, Ontario. 186 pp. (in English). [Plenty odonatological contributions - as far as they are "scientific papers" they are abstracted in OAS 9 - are published in Vol. 2 of the Ontario Odonata. The issue contains some additional information and comments as follows: "Corrections to Volume 1", "Ontario Odonata Projects", "News and comments: 1. Ontario Odonata Survey, 2. *Amphiagrion abbreviatum*, a possible addition to the damselflies of northern Ontario, 3. Damselflies and dragonflies (Odonata) of Ontario: resource guide and annotated list, 4. A field guide to the Dragonflies and Damselflies of Algonquin Provincial Park", 5. A Guide to the Damselflies and Dragonflies of Ontario: Part 1 Damselflies", 6. Atlas of Ontario Odonata, 7. Value of Records" (P.M. Catling), "Recent literature" referring to Ontario, and instructions to contributors of the Ontario Odonata Survey ("Notice to contributors"). This most impressive volume closes with a species index.] Address: Alan J. Hanks, 34 Seaton Drive, Aurora, Ontario, Canada L4G 2K1. E-mail: A.Hanks@aci.on.ca

**2362.** Catling, P.M.; Brownell, V.R.; Hutchinson, R.; Ménard, B. (2001): A preliminary annotated list of the Odonata of Lanark County, Ontario. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 13-23. (in English). ["Eighty species of Odonata are reported for the county of Lanark in eastern Ontario at approximately 45.0176° N, 76.3630° W. The county is a Carolinian subzonal limit with southern species, such as *Celithemis eponina* and *Pachydiplax longipennis*, reaching their northern limits, and northern species, such as *Aeshna eremita*, *Gomphus adelphus*, and *Leucorrhinia glacialis*, at or near their southern limits in Ontario." (Authors)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net

**2363.** Catling, P.M. (2001): Emergence of Odonata in southern Ontario during cool and wet weather. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 44. (in English). ["Species of Odonata emerging in relatively large numbers in eastern Ontario during cool and rainy weather included *Argia moesta*, *Dromogomphus spinosus*, and *Hagenius brevistylis*. Emergence under such conditions when adults are inactive may reduce predation. Significant information on dragonfly populations can be obtained during cool

and wet weather." (Author)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net

**2364.** Catling, P.M.; Brownell, V.R.; Pratt, P. (2001): Extension of the known range of *Argia tibialis* in Ontario beyond the Carolinian zone. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 4-8. (in English). ["The discovery of *Argia tibialis* on a semi-shaded path on the east side of the Nottawasaga River, 1 km northeast of Angus (44.336° N, 79.8705° W) in Simcoe Co., extends its known range 211 km to the northeast and outside the Carolinian zone. This inconspicuous species has probably been overlooked in this subunit of the Carolinian zone, and may have been present in the area for thousands of years, but a recent expansion of range into the region cannot be completely ruled out." (Authors)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net

**2365.** Catling, P.M.; Brownell, V.R.; Jones, C.D.; Sutherland, D. (2001): Further northeastern extension of the range of River Bluet (*Enallagma anna*). In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 8-10. (in English). ["The known range of River Bluet (*Enallagma anna*) is extended 322 km to the northeast to Oxford, Brant, and Peel counties in southwestern Ontario. Habitats at the newly discovered locations included a small, clean and spring-fed stream, three ditch-like, and muddy-bottomed streams, and one fast-flowing rocky river. It may have been overlooked at these locations, rather than being a recent immigrant as suggested by its general rarity and association with long established habitats." (Authors)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net

**2366.** Catling, P.M.; Jones, C.D.; Pratt, P. (2001): Introduction to the 2000 Ontario Odonata Summary Records. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 53-170. (in English). [23 odonatologists contributed to the Ontario odonate survey. The data are presented in a table giving information on species, county, location, latitude and longitude of localities, collecting date, collector, and status (imago, larva); the table includes 5699 records. In addition, information of weather conditions in 1999 and trends, analyses and notable records of selected species are given (*Ischnura hastata*, *Stylurus notatus*, *S. amnicola*, *Gomphaeschna furcillata*, *Gomphus viridifrons*, *Somatochlora tenebrosa*, *Macromia taeniolata*, *Sympetrum corruptum*, *S. danae*, and two hybrids: *Enallagma anna* x *civile*, *E. ebrium* x *hageni*.)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net

**2367.** Catling, P.M. (2001): Odonata associated with temporary pools on the Burnt Lands Alvar, Ontario. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 23-24. (in English). ["Shallow pools on alvars are available during wet and/or cool years. Surveys of adult Odonata associated with such pools on the Burnt Lands alvar, near Ottawa, Ontario, were conducted on 11 July 2000, and on 4 Aug. 2000. Odonata

associated with the temporary pools as tenerals and in sufficient numbers to suggest development in the pools included *Lestes congener*, *L. disjunctus*, *L. forcipatus*, *L. dryas*, *L. unguiculatus*, *Ischnura verticalis*, *Nehalennia irene*, *Sympetrum costiferum* and *S. obtrusum*." (Author)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net

**2368.** Catling, P.M. (2001): Odonata in the University of Western Ontario Insect Collection. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 30-36. (in English). ["The University of Western Ontario insect collection consists of two sections. One is referred to as the "University collection" which includes many older specimens verified by E.M. Walker and voucher specimens, and the other is referred to as the "student collections", mostly obtained during the 1960s and 1970s. A database including 176 Odonata specimens, i.e. most of the Ontario material, is included here. The principal values of the collection are (1) the vouchers for W.W. Judd's publications, (2) the older collections from well-known professional entomologists, and (3) the extensive material from the London area. This survey of Odonata in the University's collection is not only of interest with regard to mat group, but also provides a general picture of the contents of the collection that can be applied to other groups of insects. The collection is scientifically valuable and is much more than just a very good teaching collection." (Author)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net

**2369.** Catling, P.M.; Brownell, V.R.; Pratt, P. (2001): Range expansion of Double striped Bluet, *Enallagma basidens* in Ontario. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 10-13. (in English). ["First discovered in Ontario in 1985 in southern and western Essex County, *E. basidens* appears to have expanded its range northward and eastward by 100 km and since 1991 has been found in 20 additional locations. In Ontario it occurs primarily in man-made ponds including gravel pit ponds, but it has also been found on three rivers. Adults have been reported from late May to early September with a peak in late June and early July and another less prominent peak in late August." (Author)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net

**2370.** Catling, P.M. (2001): Review of "Distribution of damselflies and dragonflies (Odonata) of Cape Breton Island, Nova Scotia, Canada". In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 53. (in English). ["Review of "Brunelle, Paul-Michael. 2000. Distribution of damselflies and dragonflies (Odonata) of Cape Breton Island, Nova Scotia, Canada. Parks Canada Technical Reports in Ecosystem Science no. 24: pp. iv + 52. Available from: Neil Munro, Report Series Editor, Parks Canada, Historic Properties, Halifax, Nova Scotia, B3J 1S9, Canada. Tel: 902 426 2797, FAX: 902 426 2728": This report is exceptionally good and sets a high standard for regional evaluation. It should be of interest to anyone doing regional inventories. [...]."] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3,



Metcalf, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net

**2371.** Catling, P.M. (2001): Streams and rivers highlighted as major natural area protection priorities in Ontario based on damselfly and dragonfly indicators. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 36-43. (in English). ["The highest ranking groups of Ontario Odonata of conservation concern include globally vulnerable (G3) and provincially critically imperilled (SI) species most of which are inhabitants of large rivers and streams. In fact there are significantly more rare species in high risk categories associated with rivers and streams than would be expected on the basis of habitat frequencies of Ontario Odonata overall. Particular Ontario rivers highlighted for biodiversity protection on the basis of Odonata are the Ausable, Ottawa, Sydenham, and Thames, and these same rivers have been highlighted by other groups of environmental indicators such as Unionid molluscs. Recent emphasis on the protection of wetlands has focussed on extensive areas with emergent plant communities, while rivers and streams have suffered seriously inadequate attention." (Author)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, USA. E-mail: brownell@achilles.net

**2372.** Chovanec, A.; Waringer, J. (2001): Ecological integrity of river-floodplain systems-assessment by dragonfly surveys (Insecta: Odonata). Regul. Rivers: Res. Manage. 17(4-5): 493-507. ["Dragonflies are reliable indicators of the ecological quality of land-water ecotones, habitat heterogeneity and the hydrological dynamics of water bodies. In recent years, surveys of dragonfly communities have become a powerful tool for the ecological assessment of floodplain areas. The goal of this paper is to present a new approach towards assessing the ecological integrity of river-floodplain systems by analysing resident breeding dragonfly species. The methodology is based on experiences with existing approaches using macroinvertebrates as bioindicators, in particular, calculations of saprobic indices, longitudinal zonation and functional feeding group patterns. In addition to the total number of species and the number of sensitive species, the 'Odonate Habitat Index' (OHI) is a key element of the assessment method. It indicates characteristic features of a river-floodplain system, such as connectivity aspects, flow dynamics and terrestrialization processes. The OHI is calculated from the species-specific habitat values (expressing habitat preferences), abundances and the species-specific indication weight, which distinguishes eurytopic from stenotopic species. The comparison of the status quo with a reference condition allows an assessment of individual water bodies and/or of a whole area in a five-tiered classification scheme. The approach presented may also be used for the evaluation of restoration measures (e.g. reconnection of side arms) and for the definition of management objectives. Apart from the methodological framework, the results of a first application of this approach are presented in the paper as well. The study areas were selected floodplain systems of the Austrian section of the Danube and man-made inshore structures of the impounded Danube section in Vienna." (Authors)] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, A-1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

**2373.** Clausnitzer, H.-J. (2001): Die Zwerglibelle (*Nehalennia speciosa*) in Niedersachsen. Abh. Ber. Naturkundemus. Görlitz 73(1): 11-12. (in German with English summary). ["The occurrence of the rare damselfly *N. speciosa* in Lower Saxony is described. The habitats of the larvae and imagines differ considerably from those in southern Germany. In Lower Saxony larvae grow up in pools within bogs with relatively scarce vegetation, mostly dense carpets of *Sphagnum cuspidatum* and *Drepanocladus fluitans*. The imagines live in large tussocks of *Mollinia coerulea* not far from the water." (Author)] Address: Clausnitzer, H.-J., Eichenstr. 11, D-29348 Eschede, Germany. E-mail: H.-J.Clausnitzer@t-online.de

**2374.** Conze, K.-J.; Göcking, C. (2001): 'FFH - Libellenarten' in Nordrhein-Westfalen (NRW). Abh. Ber. Naturkundemus. Görlitz 73(1): 13-15. (in German with English summary). ["The current state of knowledge about dragonfly species in Northrhine-Westfalia, which are protected by the 'flora-fauna-habitat' (ffh) directive (appendix II and IV) of the European Community, is outlined. At least historical records show that nine out of the 'ffh-dragonfly species' known in Germany were found in NRW. Four of these species (*Coenagrion mercuriale*, *Leucorrhinia pectoralis*, *Ophiogomphus cecilia*, and *Gomphus flavipes*) have been reported to exist presently in NRW. The official proposal list of NRW includes several special protection areas for the species *C. mercuriale* and *L. pectoralis*." (Authors)] Address: Conze, K.-J., LökPlan-Conze, Cordes & Kirst GmbH, Hedwigstr. 32b, D-59609 Anröchte, Germany. E-mail: lökplan@t-online.de

**2375.** Cook, T.J.P.; Janovy, J.; Clopton, R.E. (2001): Epimerite-host epithelium relationships among eugregarines parasitizing the damselflies *Enallagma civile* and *Ischnura verticalis*. J. Parasitol. 87(5): 988-996. (in English). ["The host-parasite interface between 2 species of damselflies and 4 species of eugregarines was examined at the ultrastructural level. *Nubenocephalus nebraskensis* organisms attached to the host midgut epithelium by means of a sucker-like protomerite; the space between the epicytic folds and host epithelium was filled with electron-dense material interpreted to be adhesive in nature. *Actinocephalus carrilynae* organisms attached by means of the epimerite, which had no epicytic folds, and by the fluted stalk with characteristic epicytic folds; host cell and parasite membranes appeared fused at some places on the epimerite. *Hoplorhynchus acanthatholius* organisms attached by means of an ovoid epimerite with backward-pointing digitations; the entire epimerite was embedded in a host cell, and host cell microvilli surrounded the stalk. *Steganorhynchus dunwoodyi* organisms attached by means of an ovoid stalk papilla enclosed in a retractable globular sheath; the papilla was covered with epicytic folds, but the sheath was not, and the sheath had a single membrane, whereas the epicytic folds had 2 or 3 membranes. The entire apparatus was inserted between epithelial cells, and the sheath was highly folded at its surface. The ultrastructural observations suggest that actinocephalid gregarines have evolved 2 general strategies for attaching to the host epithelium, that is, suckerlike protomerites, as in the case of *N. nebraskensis*, and deeply embedded epimerites inserted within or between host cells, as in the other species studied." (Authors)] Address: Janovy, J., Univ Nebraska, Sch. Biol. Sci., Lincoln, NE 68588 USA

- 2376.** Couteyen, S.; Papazian, M. (2001): Contribution à la connaissance des Odonates de l'île de la Réunion 5. Orthetrum stemmale (Burmeister, 1839), une espèce redécouverte sur l'île (Odonata, Libellulidae). *Martinia* 17(3): 89-90. (in French with English summary). [14 Feb. 2001 O. stemmale has been rediscovered in la Réunion. The species was considered by Selys in 1862 as *Libellula contracta* Rambur, 1842.] Address: Couteyen, S., 188 chemin Nid Joli, F-97430 Le Tampon, La Réunion, France
- 2377.** Curry, J.R. (2001): Dragonflies of Indiana. Indiana Academy of Sciences. ISBN 1-883362-11-3: 303 pp. (in English). [European readers may know Indiana from the mad rush of racing cars across the Indianapolis circuit. This wonderful book gives the chance to read something about fast flying beasts, the dragonflies. Dragonflies means Anisoptera, Zygoptera are not treated in the book. Curry's book starts with a brief but very readable account on a history of dragonfly biology in Indiana with some very prominent members of our community as T. Say, E.B. Willamson, and B.E. Montgomery. This chapter is followed by an account of the immature stages and life history. 97 individual species accounts, which comprise the bulk of the book, are clearly organised as follows: Most of the species in the book are represented by two photographs. These illustrate the recognition characters discussed in the text. The common names are heading each species chapter. Specific characters common or unique to the species including the mean size are listed to aid in identification ("Recognition"). "Indiana Flight season" data are based upon published reports as well as specimens in the collection of the author. "Status" indicate the current status of the species in Indiana. A "description" of the physical characteristics of the species intends to focus identification on essential morphological characters. In the paragraph "Habitat" it is outlined where the species is most commonly found to exist, including its preferred breeding habitat. Commonly observed habits ("Behaviour") may help in identification. North American "ranges" are based primarily upon published reports. A visual display of the flight season in Indiana, and distribution maps on the basis of counties where the particular species has been reported provide additional information. A glossar and a bibliography are also useful. From the European view, I personally think this is a wonderful book fascinating in its scope and in the quality of species (and habitat) photographs. I am very glad to have the book in my library. (Martin Schorr)] Address: Indiana Academy of Science, Chair of Publ. Comit., Bill N. McKnight, c/o Park Tudor School, 7200 North College Avenue, Indianapolis, Indiana 46240-3016, USA. US\$ 32.00.
- 2378.** d'Aguilar, J. (2001): Les descriptions originales des Odonates d'Europe 8. Leach, William Elford (1790-1836). *Martinia* 17(3): 115-118. (in French with English summary). [This eighth article of the series is devoted to William Elford Leach (1790-1836), who described several genera - in the case of Odonata: *Cordulia*, *Cordulegaster*, *Gomphus*, *Anax*, *Lestes*, *Calopteryx*, and *Anax imperator*.] Address: d'Aguilar, J., 7, rue Adrien Lejeune, F-93170 Bagnolet, France
- 2379.** D'Aguilar, J. (2001): Sur la date de description de *Calopteryx splendens* (Harris). *Entomologiste* (Paris) 57(2): 85-88. (in French). [Evidence is given to the fact that *C. splendens* first was described in 1776 and not in 1782 as stated in odonatological literature and taxonomical lists.] Address: d'Aguilar, J., 7, rue Adrien Lejeune, F-93170 Bagnolet, France
- 2380.** D'Antonio, C. (2001): Dati inediti di libellule catturate in Sicilia nella primavera del 1998. *Lindenia* 34: 145-146. (in Italian). [20 species from 27 localities in Sicilia, Italy, are listed. *Sympetma fusca*, *Coenagrion puella*, *Pyrrhosoma nymphula*, and *Orthetrum brunneum* are briefly discussed. Species with the highest locality-frequency are *Calopteryx haemorrhoidalis*, *Anax imperator* and the rare European *Coenagrion caeruleum* (ssp *caesarum*)!] Address: D'Antonio, C., Via A. Falcone 386/b, I-80127 Napoli, Italy. E-mail: lindenia@freemail.it
- 2381.** De Almeida Spindola, L.; Irineu de Souza, L.; Costa, J.M. (2001): Descriçao da larva de *Perithemis thais* Kirby, 1889, com chave para identificacao das larvas das especies conhecidas do genero citadas para o Brasil (Odonata: Libellulidae). *Bolm Mas. nac. Rio de J. (N.S.) Zool.* 442: 1-8. (in Portuguese with English summary). [The final instar larva is described and illustrated and the known Brazilian *Perithemis* larvae are keyed.] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisy.com.br
- 2382.** Denson, D. (2001): *Anax* on ice. *Argia* 13(1): 29. (in English). [*Anax junius* was collected 20th December 2000 in the Orlando area, (Florida?), USA encaged in a 1 cm thick piece of ice.] Address: not stated
- 2383.** Devai, G.; Miskolczi, M. (2001): Fundamental knowledge to the long term biodiversity monitoring on the basis of dragonfly (Odonata) fauna in the inundation area of River Tisza between Tiszabercel and Balsa (HNBM Programme, Pilot Project). *Studia odonotologica* 7: 13-37. (in Hungarian with English summary). [The paper compiles the results of studies performed in the framework of the Hungarian Biodiversity Monitoring Programme. The analysis of data refers to a 37year period between 1961 and 1996. In the studied region, a total of 42 odonate species was recorded. Records of the following species should be of some interest: *Brachytron pratense*, *Aeshna viridis*, *Sympetrum depressiusculum*, *S. fonscolombii*, and *Leucorrhinia pectoralis*.] Address: Devai, G., Dept of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary
- 2384.** Dommangeat, J.-L.; Jolivet, S. (2001): Découverte d'une petite population de *Coenagrion caeruleum* (Fonscolombe, 1838) dans le département de l'Aveyron (Odonata, Zygoptera, Coenagrionidae). *Martinia* 17(3): 88. (in French). [In July 2001 in a marshy littoral habitat along the Dourdou de Camarès (affluent of the river Tarn), *C. caeruleum* was discovered. Habitat, co-occurring odonate species, and the azonal distribution in the "continental", not Mediterranean region of France are discussed.] Address: Dommangeat, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France
- 2385.** Dommangeat, J.-L.; Heidemann, H. (2001): In memoriam Herbert Wichmann. 1922-2000. *Martinia* 17(4): 121-122. (in French). [Interest in dragonflies, especially dragonfly photographing, led to a friendship between H. Wichmann and J.-L. Dommangeat which is as important as scientific contacts among odonatolo-

gists.] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**2386.** Dommanget, J.-L. (2001): Le point sur les connaissances relatives aux Odonates du département de l'Aveyron. *Martinia* 17(3): 95-106. (in French with English summary). [On the occasion of an unpublished report about *Macromia splendens* (Pictet, 1843) in Tarn valley (Aveyron département) for the French Ministry of Development and Environment, the author presents an assessment of the Odonata recorded in Aveyron. Two tables summarize the 57 species observed, according to their autochthonous character and their habitats. Some species are commented, and reflections about the potential number of species in different regions - depending on geographic situation and the diversity of aquatic habitats - of the Tarn catchment are made. Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**2387.** Dommanget, J.-L. (2001): Rubrique bibliographique. *Martinia* 17(4): 169-175. (in French). [The odonatological bibliography covers publications from 1994 to 2001.] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**2388.** Donnelly, N. (2001): History of Odonata study in America: Donald J. Borror (1909 - 1988). *Argia* 13(2): 4-5. (in English). [A further part of the welcome series on pioneer odonatologists.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**2389.** Donnelly, N. (2001): Rediscovery of *Orthemis sulphurata*. *Argia* 13(2): 11-12. (in English). [The puzzle with the enigmatic *O. sulphurata* Hagen, 1868 could be solved due to specimens caught by Fred Sibley in Guayaquil, Ecuador.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**2390.** Donnelly, N. (2001): Taxonomic problems with North American Odonata species - a last appeal for information. *Argia* 13(2): 5-10. (in English). [The following taxa are treated: *Lestes disjunctus*-complex (*disjunctus*, *forcipatus*, *australis*), *Amphiagrion saucium* (Burmeister 1839) and *A. abbreviatum* (Selys 1876), *Enallagma vernale* Gloyd, 1943 and *E. cyathigerum* (Charpentier, 1840), *Aeshna interrupta* subspecies, *Cordulegaster bilineata* (Carle 1983) and *C. diastatops* (Selys 1854), *Epitheca costalis* (Selys 1871), *E. petechialis* Muttkowski 1911 and *E. cynosura* (Say 1839), *Erythemis collocata* (Hagen 1861) and *E. simplicollis* (Say 1839), *Orthemis ferruginea* (Fabricius 1775), *O. discolor* (Burmeister, 1839) and "a third species", *Sympetrum internum* Montgomery 1943, *S. janeae* Carle 1993 and *S. rubicundulum* (Say 1839), *Sympetrum semicinctum* (Say 1839) and *S. occidentale* Barteneff 1914, and *Sympetrum signiferum* Cannings & Garrison, 1991 and *S. vicinum* (Hagen 1861).] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**2391.** Donnelly, N.: (2001): Watch out for warthogs! *Argia* 13(1): 15-17. (in English). [Uganda records including *Umma saphirina* Förster 1916, *Chlorocypha trifaria* (Karsch 1899), *Anax speratus* Hagen 1867, *Aethriamanta rezia* Kirby 1889, *Ceriagrion kordofanicum* Ris 1924, *Platycypha caligata* (Selys 1853), and *Chlorocypha curta* (Hagen in Selys 1853).] Address: Donnelly,

T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**2392.** Ellwanger, G. (2001): Verbreitungskarten der Libellenarten der Anhänge II und IV der FFH-Richtlinie in Deutschland auf der Basis des Messtischblattrasters. *Abh. Ber. Naturkundemus. Görlitz* 73(1): 19-21. (in German with English summary). ["The distribution of the dragonflies listed in Annex II of the Habitats Directive was analysed in a project, which was carried out on behalf of the Federal Agency for Nature Conservation. Data about the distribution of the Annex-IV-species are lacking with the exception of *Gomphus flavipes*." (Author)] Address: Ellwanger, G., Cäsariusstr. 1b, D-53173 Bonn, Germany. E-mail: EllwangerG@bfn.de

**2393.** Engemann, R.; Marx, J.; Schwab, U. (2001): Lebensräume, Flora und Fauna im Gebiet der Pöplitzer Teiche / Dübener Heide. *Naturschutz im Land Sachsen-Anhalt* 38(1): 9-26. (in German). [Germany, Sachsen-Anhalt; 22 species are listed as a result of a survey in 1999. It is assumed that due to the unaccessibility of the area and the low frequency of excursions the actual number of species will be significantly higher. Of special interest are the records of the regionally rare *Calopteryx virgo*.] Address: Engemann, R., c/o peb Gesellschaft für Landschafts- und Freiraumplanung, Münchener Str. 37, D-85221 Dachau, Germany

**2394.** Englund, R.A.; Polhemus, D.A. (2001): Evaluating the effects of introduced Rainbow Trout (*Oncorhynchus mykiss*) on native stream insects on Kauai Island, Hawaii; Contribution No. 2001-012 to the Hawaii Biological Survey, Bishop Museum. *Journal of Insect Conservation* 5(4): 265-281. (in English). ["Rainbow trout (*Oncorhynchus mykiss*) and other salmonids have been widely stocked into upland streams throughout the world to provide a basis for sport fisheries, but the effects of such introductions on indigenous and endemic aquatic insect assemblages are poorly documented. In this study, we examine the impact of rainbow trout on the indigenous and endemic entomofauna of upland streams in Kokee State Park, Kauai, Hawaii, with particular emphasis on the potential threat trout pose to populations of endemic damselflies in the genus *Megalagrion*. Rainbow trout were introduced into the upland streams of Kauai beginning in the 1920s, with over 60 years of subsequent restocking. This study indicates, however, that streams in this area still maintain diverse populations of *Megalagrion* damselflies and other indigenous and endemic aquatic insects, both in catchments containing naturally reproducing trout populations and in catchments lacking rainbow trout. Our results indicate that the indigenous and endemic aquatic insect communities in the streams under study compare favorably in terms of density and taxonomic richness with other isolated and unimpacted streams elsewhere in Hawaii, and retain high densities and relative percentages of indigenous and endemic aquatic insect taxa. Our results demonstrate that the threats posed by conspicuous introduced species such as trout should not simply be assumed a priori on the basis of postulated negative interactions, because this may divert limited resources from programs aimed at control of other, potentially more destructive introduced taxa such as inconspicuous poeciliid fishes." (Authors)] Address: Englund, R.A., Hawaii Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, HI, 96817, USA. E-mail: englund@bishopmuseum.org



**2395.** Fleck, G.; Nel, A.; Bechly, G.; Martinez-Delclos, X. (2001): Revision and phylogenetic affinities of the Jurassic Steleopteridae Handlirsch, 1906 (Odonata : Zygoptera). *Insect Syst. Evol.* 32(3): 285-305. (in English). ["The Jurassic odonate family Steleopteridae is revised. Two new genera and species *Parasteleopteron guischari* and *Euparasteleopteron vohli* are described. The phylogenetic affinities of this group are discussed. The Steleopteridae are excluded from the Epiproctophora and transferred into the Zygoptera (stemgroup). *Euphaeopsis multinervis* is redescribed and transferred to Epiproctophora: Isophlebioidea, and the genus *Pseudoeuphaea* with its four species is considered as a nomen dubium in Odonata incertae sedis." (Authors)] Address: Fleck, G., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France

**2396.** Fukui, M.; Iwamoto, A.; and 21 other members (Okegayanuma group of Biology Club of Iwata-minami Prefectural High School) (2001): A study of the way to breed *Libellula angelina* in the Okegayanuma, Iwata - city. *Nature and Insects* 36(7): 20-23. (in Japanese). [Introduction: Okegayanuma marsh is located at the northeast of Iwata-city, the west of Shizuoka Prefecture, and famous for the rich habitat of aquatic creatures, especially dragonflies. Among them, *L. angelina* is designated as Endangered species in RDB List. To protect the environment, local people, government and nature conservation groups are in action in closer connection. We investigated the population size since 1991. In 1993 to 1994 the population amounted 700 to 800 but thereafter it decreased and at last in 1999 only to 47. This was a critical situation. The factor of the sharp decrease was the burst multiplication of crayfish. We caught more than 20000 crayfish in the year, and from the year on we have continued to rid the marsh of it. 2. Breeding in our high school: Under the permission of the Ministry of the Environment we caught ten female of *L. angelina* in mid May, and got 5000 to 6000 eggs. We bred them in outdoor plastic containers, each containing aquatic plants, and bred 60 to 210 larvae in each container. At first we bred them with planktons which were collected from ponds, and brine shrimp and from the later stages with tubifexes and larvae of midge. 3. Result and analysis of the conditions of breeding: Larvae bred in 41 cases in 1999 to 2000 amounted 1326, and in 2000 to 2001, 1813 in 52 cases. The mean of larvae bred outdoors 36.9 for each case (total 49), and 1.3 indoors (3 cases). Larvae were bred outdoors more than indoors. This seems to be due to abundance with plankton, supply of rain water, and oxygen supply by water plants. The mean viability was 24.4%. 4. Emergence from bred larvae at Okegayanuma and its effect: Bred larvae (1300) were moved to the marsh, where emergence began on April 15, reached its peak on April 23. More than 70% of emergence from the larvae were counted. Adults of 131 were recorded. Adults came to oviposit in the containers for emergence. 5. Management of breeding containers and tracking of growth of larvae: We compared the conditions of larval growth between the containers from which intruders' larvae were eliminated and those not eliminated. Intruders were seven species; *Crocothemis servilia mariannae*, *Orthetrum albistylum speciosum*, *Lyriothemis pachygastra*, *Pantala flavescens*, *Anax parthenope julius*, *A. nigrofasciatus nigrofasciatus*, *Rhyothemis fuliginosa*. Among them *A. n. nigrofasciatus* has great impact to the larvae of *L. angelina*. Translation: Ishizawa, Naoya] Address: not stated

**2397.** Gaino, E.; Reborá, M. (2001): Apical antennal sensilla in nymphs of *Libellula depressa* (Odonata: Libellulidae). *Invertebr. Biol.* 120(2): 162-169. (in English). ["In an ultrastructural study of the apical antenna of the last nymphal stages of *Libellula depressa* (Odonata: Libellulidae), we found long sensilla trichodea, 2 sensory pegs, and a coeloconic sensillum on the last article of the flagellum (the distal part of the antenna). The long sensilla trichodea are mechanoreceptors, almost identical to the long filiform hairs of some terrestrial insects and the first sensilla of this kind to be described in aquatic insects. Particular attention was given to the complex coeloconic sensillum, a compound sensillum innervated by 2 groups of 3 neurons wrapped in a dendritic sheath. A cuticular sleeve envelops the distal portion of the outer dendritic segment. The cuticle of the coeloconic sensillum shows wide channels and is contiguous to the underlying granular and fibrillar layer. Similar structures on the antennae of the adults of other dragonflies were identified as chemoreceptors in previous studies. We hypothesize that this larval coeloconic sensillum might likewise have a chemosensory function, responding to molecules that diffuse through the cuticle and the underlying granular and fibrillar layer, as no clear pore or pore-tubule system is visible. Alternative functions are also explored on the basis of morphological details." (Authors)] Address: Gaino, E., Univ. Perugia, Dipartimento Biol. Anim. & Ecol., Via Elce Sotto, I-06123 Perugia, Italy

**2398.** Garrison, R. (2001): Brazil 2000, or living it up (and collecting) in Rio. *Argia* 13(1): 12-15. (in English). [Report of a visit in the Museu Nacional do Rio de Janeiro working with Hetaerina and Argia, trips to the National Park of Itatiaia, to Iha de Marambaia and Cochoeira de Macucu, reflections on difficulties identifying members of the genus Heteragrion. The following species are mentioned in the paper: *Telebasis filiola* (Perty 1834), *Hetaerina hebe* Selys 1853, *H. rosea* Selys 1853, *Heteragrion consors* Hagen in Selys 1862, *Perilestes fragilis* Hagen in Selys, 1862, *Epigomphus paludosus* Hagen in Selys, 1854, *Forcepsioneura sancta* (Hagen in Selys, 1860), *Leptagrion elongatum* Selys 1876, *Tramea binotata* (Rambur 1842), *T. calverti* Muttkowski 1910, *Tramea cophysa* Hagen 1867, *Perithemis icteroptera* (Selys 1857), *Forcepsioneura itatiaiae* (Santos 1970), *Hetaerina proxima* Selys 1853, *Argia tamoyo* Calvert, 1909, *A.sordida* Hagen in Selys, 1865, *Macrothemis imitans* Karsch 1890, *Dasythemis venosa* (Burmeister 1839), *Orthemis cultriformis* Calvert 1899, *Triacanthagyna satyrus* (Martin 1909), *Minagrion mecistogastrum* (Selys 1876), *Elasmothemis constricta* (Calvert, 1898), *Acanthagrion gracile* (Rambur 1842), *Argia lilacina* Selys 1865, *Oxyagrion terminale* Selys 1876, *Erythrodiplax juliana* Ris 1911, *Heteragrion dorsale* Selys 1862, *Hetaerina brightwelli* (Kirby 1823), *Progomphus gracilis* Hagen in Selys 1854, and *Hetaerina longipes* Hagen in Selys 1853] Address: Garrison, R., 1030 Fondale, Azusa, CA 91702-0821, USA: rosergarrison@compuserve.com

**2399.** Glatzle, B. (2001): Die Rolle der Libellen im Nahrungsspektrum der Gebirgsstelze *Motacilla cinerea* Tunstall, 1771 an einem Tieflandfluss. *Abh. Ber. Naturkundemus. Görlitz* 73(1): 23-24. (in German with English summary). ["In 2000, three breeding pairs of the Grey Wagtail nesting along the river Oker near Braunschweig (Lower Saxony, Germany) were observed and filmed in order to analyse their food composition. The

Oker river is a lowland river with high abundance of dragonflies. Corresponding with the opportunistic feeding behaviour of the Grey Wagtail, Odonata form the dominant food component in this study, reaching up to 20 % of all prey individuals recorded." (Author)] Address: Glatzle, Birgit., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: B.Glatzle@tu-bs.de

**2400.** Glover, K.: (2001): Poem: "Flash and flicker". *Argia* 13(1): 26. (in English). Address: not stated

**2401.** Goffart, P. (2001): Compte-rendu des observations d'espèces prioritaires d'Odonates en Wallonie durant la saison 2000, dans le cadre du programme d'Inventaire et Surveillance de la Biodiversité (ISB). *Gomphus* 17(1): 23-36. (in French with Dutch and English summaries). ["This report gives an account of observations made in 2000 by the Gomphus Working Group collaborators on Odonata priority species, pointed out in the "Biodiversity Survey and Monitoring" program in Wallonie because of their great rarity and/or decline. It also presents information dealing with rare southern species, expanding to the North, during the same flight-season. [...]"] (Author) The following species are treated in detail: *Sympetma fusca*, *Lestes dryas*, *Coenagrion hastulatum*, *C. mercuriale*, *C. pulchellum*, *Ceragrion tenellum*, *Gomphus vulgatissimus*, *Thecagaster bidentata*, *Aeshna subarctica elisabethae*, *Brachytron pratense*, *Epitheca bimaculata*, *Oxygastra curtisii*, *Somatochlora arctica*, *S.flavomaculata*, *Libellula fulva*, *Orthetrum coerulescens*, *Sympetrum pedemontanum*, *Leucorrhinia rubicunda*, *Lestes barbarus*, *Coenagrion scitulum*, *Aeshna affinis*, *Anax parthenope*, *Orthetrum brunneum*, *Sympetrum fonscolombii*, and *Sympetrum meridionale* .] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

**2402.** Goretti, E.; Ceccagnoli, D.; La Porta, G.; Di Giovanni, M.V. (2001): Larval development of *Aeshna cyanea* (Müller, 1764) (Odonata: Aeshnidae) in Central Italy. *Hydrobiologia* 457: 149-154. (in English). ["A three-year investigation was carried out on the life cycle of *A. cyanea* in temporary freshwater pools in Central Italy. The instars were discriminated by size and scatter plot, based on measurements of labium length, head width, metafemur length, forewing-pad length and total larval body length. The prolarvae instar was derived by Dyar's law. The mean increase value index between following and previous instar was between 1.26 and 1.33 for isometric variables, and around 1.96 for the wing-pad allometric variable. *A. cyanea* entered diapause mainly at the F-2 instar, placing it almost intermediate between the Southern Spain populations, which usually overwintered in the F-3 instar, and those of England and Central Europe, who spent their last winter in F-1. *A. cyanea* appeared to be a 'summer species', as defined by Corbet (1962), and the population we studied had a semi-voltine life cycle." (Authors)] Address: Di Giovanni, M.V., Univ. Perugia, Dipartimento Biol. Anim. & Ecol., Via Elce di Sotto, I-06123 Perugia, Italy

**2403.** Grand, D.; Greff, N.; Delcourt, G. (2001): *Leucorrhinia pectoralis* (Charpentier, 1825) nouveau pour le département du Rhône. *Martinia* 17(3): 107-109. (in French with English summary). [In 2000, *L. pectoralis* was recorded at two localities of the Rhône département,

France. The habitats and co-occurring species are described.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

**2404.** Grimaldi, D. (2001): Insect evolutionary history from Handlirsch to Hennig, and beyond. *J. Paleontol.* 75 (6): 1152-1160. (in English). ["Significant investigators and aspects in the past century of insect paleontology are briefly reviewed. Despite the pervasive influence of the paleontologist Willi Hennig in systematic biology, the study of fossil insects remains more descriptive than most other paleontological areas. Hypotheses are reviewed on relationships and chronologies of early divergences in insects (Paleozoic, Lower Mesozoic), particularly living and extinct orders of the lower pterygotes and putative monophyly of the Paleoptera (Odonata + Ephemeroptera.). The Dictyoptera (Mantodea, Isoptera, Blattaria) illustrate relationships and discrepancies between stratigraphic record and phylogenetic relationships. Future directions in the field are suggested." (Author)] Address: Grimaldi, D., Amer. Museum Nat. Hist., Dept. Invertebrates, New York, NY 10024 USA

**2405.** Gubbels, R. (2001): Eerste waarneming van *Gomphus flavipes* (Charpentier, 1825) in België: een grensgeval. *Gomphus* 17(1): 3-8. (in Dutch with English and French summaries). ["First observation of *G. flavipes* in Belgium: a borderline case. In the summer of 2000 two males of *G. flavipes* were found along the river Meuse (Grensmaas) in the neighbourhood of Maasmechelen. This is the first observation of *G. flavipes* for Belgium." (Author)] Address: Gubbels, R., Langs de Veestraat 15, NI-6125 RN Obbicht, The Netherlands

**2406.** Günther, A. (2001): Differenzierung von Drohflügen und Balzverhalten verschiedener Rhinocypha-Formen Sulawesi (Indonesien). *Abh. Ber. Naturkundemus. Görlitz* 73(1): 25-26. (in German with English summary). ["The genus *Rhinocypha*, which has its distribution range in southeast Asia, exhibits ritualised threatening flights and specialised courtship behaviour, both of which are closely connected with the egg deposition substrate. The differentiation of this behaviour in several *Rhinocypha* species is briefly described and discussed." (Author)] Address: Günther, A., Naturschutzinstitut Freiberg, WaisenhausstraBe 10, D-09599 Freiberg, Germany. E-mail: a.guenther@abo.freiepresse.de

**2407.** Guerold, F.; Boudot, J.-P.; Jacquemin, G. (2001): Première preuve de la reproduction d'*Aeshna affinis* Vander Linden, 1820 (Odonata, Anisoptera, Aeshnidae) et nouvelles observations d'Odonates rares en Lorraine. *Martinia* 17(3): 77-87. (in French with English summary). ["During Odonatological studies in the Lorraine area in 1999, we observed both immature and mature males of *Aeshna affinis* in the vicinity of Pont-à-Mousson. An exuvia corresponding to this species was collected on macrophytes growing in a artificial pond resulting from archaeological soundings. This observation constitutes the first evidence of the reproduction of *A. affinis* in the Lorraine region. Companion species and earlier records of this species in NE France are specified. Other records of rare or new species in this area (*Lestes barbarus*, *Coenagrion scitulum*, *Aeshna isoceles*, *Anax parthenope*, *Sympetrum meridionale*, *S. flaveolum*, *S. fonscolombii*, *S. pedemontanum*, *Leucorrhinia caudalis*, *L. pectoralis*) are brought on record. *Boyeria irene* was found one time at short distance of the

the Lorraine limits. Some of these dragonflies are thermophilous species often regarded in progression towards the N of Europe. Some of them were known in Lorraine in the second half of the 19th century, but have not been recorded again since." (Authors)] Address: Guerold, F., Université de Metz, Équipe d'Écotoxicologie, Campus de Bridoux, BP 4116, F- 57040 - Metz Cedex 1, France. E-mail: gue-  
rold@bridoux.sciences.univ-metz.fr

**2408.** Handke, K.; Adena, J. (2001): Zur Fauna neu angelegter Gewässer in der Bremer Flussmarsch unter besonderer Berücksichtigung der Libellen. Bremer Beiträge für Naturkunde und Naturschutz 5: 175-188. (in German with English summary). [In the middle of the 1980th in the Niedervieland-region near Bremen, Germany due to industrial development measures many habitats had been destroyed. To compensate habitat destruction, due to legal restrictions new habitats had to be created, and the success of the measures had to be monitored. In 1997 28 odonate species including 21 indigenous species colonised the newly created system of waters. The authors conclude, that "most of the animal species of the former ditch systems have also been found at and in the new waters in the course of the ten years." But compared to the old ditch systems significant differences turned out for the specialists of Water Aloe (*Stratiotes aloides*) habitats like *Aeshna viridis* and *Anaciaeschna isosceles*, which are less frequent than formerly. The paper provides some interesting observations on dispersal of species and on succession of odonate species composition in dependence of the succession status of the waters.] Address: Handke, K., Delmestr. 28, D-27777 Ganderkesee, Germany

**2409.** Hardersen, S. (2001): "Fluctuating Asymmetry" als Instrument für die Bioindikation mit Libellen. Abh. Ber. Naturkundemus. Görlitz 73(1): 27-28. (in German with English summary). ["The damselfly *Xanthocnemis zealandica* was used to investigate the practicability of 'fluctuating asymmetry' (FA) as a bioindicator. Exposure of the last larval instar to the insecticide carbaryl (40 ppb) increased the level of FA compared with the control in the laboratory. Attempts to confirm these laboratory results using artificial ponds or field populations were only partly successful. It is concluded that the use of FA as a bioindicator is fraught with difficulties." (Author)] Address: Hardersen, S., Tiergartenstr. 111, D-47533 Kleve, Germany. E-mail: sonke7hard@aol.com

**2410.** Harding, R.W. (2001): *Enallagma aspersum* in Prince Edward Island. *Argia* 13(2): 2-3. (in English). [First record of *E. aspersum* at Isaac's Lake, Prince Edward Island, Canada on 2 Sept. 2000.] Address: Harding, R.W., PR#3 Montague, Summerville, PE, C0A 1R0, Canada

**2411.** Hartung, M. (2001): Bestimmung von isolierten Flügeln von Gomphiden am Ufer der Oder. Abh. Ber. Naturkundemus. Görlitz 73(1): 29-31. (in German with English summary). [The use of 'leftover' wings of *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, and *Stylurus flavipes* preyed upon by birds is discussed as an indicator for the occurrence of dragonfly species.] Address: Hartung, M., Wehnertstr. 20A, D-12277 Berlin, Germany. E-mail: AEH.Matthias.Hartung@t-online.de

**2412.** Heijligers, H.; Hermans, J. (2001): Dragonflies in northern Limburg. *Natuurhistorisch maandblad* 90: 101-109. (in Dutch with English summary). ["This article

reports the findings of a weekend survey by the Venray branch and the Dragonfly Study Group of the Limburg Natural History Society. Twenty-two persons inspected 37 different areas in northern Limburg for dragonflies. Data were collected on a total of 33 different species of dragonfly. The areas visited are briefly characterised. A more detailed description is provided of the species *Lestes virens*, *Ceriagrion tenellum*, *Coenagrion pulchellum*, *Cordulia aenea*, *Somatochlora metallica*, *Crocothemis erythraea* and the genus *Leucorrhinia*. New locations were found for *Lestes virens* (Ravenvennen), *Ceriagrion tenellum* (Ravenvennen, Grinderij Hamert), *Coenagrion pulchellum* (Gubbelsvijver, Schuitwater Mergelsum), *Cordulia aenea* (Elsbeemden, Ravenvennen, Gubbelsvijver, Linksstraat), *Somatochlora metallica* (Gubbelsvijver, Groote Molenbeek, Broekhuizer Molenbeek), *Crocothemis erythraea* (Bergerheide, Elsbeemden, Hamert), *Leucorrhinia pectoralis* (Ravenvennen, Duivelskuil) *Leucorrhinia dubia*, and *L. rubicunda* (Bergerheide, Grinderij Hamert, Ravenvennen)." (Authors)] Address: Hermans, J.T.; Hertestraat 21, NL-6067 ER Linne, The Netherlands

**2413.** Heinze, B. (2001): Insekt des Jahres 2001: Die Plattbauch-Segellibelle *Libellula depressa* Linnaeus, 1758. *Untere Havel - Naturkundliche Berichte* 11: 23-24. (in German). [Some general information referring to *L. depressa*] Address: Heinze, B., Lindenstr. 16, D-39539 Havelberg, Germany

**2414.** Heitz, S. (2001): Integration des Libellenschutzes in die Unterhaltung von Wiesenbächen. Maßnahmen zum Schutz der Helm-Azurjungfer (*Coenagrion mercuriale*) im Ortenaukreis (Baden-Württemberg). Diplomarbeit an Institut für Landschaftspflege und Naturschutz der Universität Hannover. 98 pp., Anhang. (in German). [Ditch management in most cases leads to significant impacts on fauna and flora. This thesis provides sound information and practicable measures to combine a ditch management that guarantees minimal (and where necessary, differentiated) economical and ecological standards. The partitioning of ditches into a system of stretches enables *C. mercuriale* (and additional species as *Orthetrum coerulescens* etc.) to complete its life cycle, to disperse, and to recolonize new stretches. This thesis can be considered a handbook for ditch management with special emphasize on Odonata. In addition it provides plenty of information referring to general aspects of ditch management, and it compiles the long lasting experience of conflict management between German conservationists and the responsible authorities for ditch management. The thesis is organized, so it even enables everyone from abroad and non German speaking persons to profit from the study. It is highly recommended to everybody interested in *C. mercuriale* or ditch management. (Martin Schorr)] Address: Heitz, S., Moosweg 15, D-77749 Hohberg, Germany

**2415.** Herren, B.; Herren, K. (2001): Libellule in Sicilia (Autunno 2000). *Lindenia* 34: 144-145. (in Italian). [Odonate taxa of 12 localities situated in Sicilia, Italy are listed; 15 species could be identified to the species level including a record of *Orthetrum trinacria*.] Address: Herren, B. & K., Oberfelderstr. 46, CH-3550 Langnau, Switzerland. E-mail: schule.rosig@bluewin.ch

**2416.** Hess, M.; Heckes, U. (2001): Beitrag zur Wasserinsektenfauna der Bäche und Quellen im Stadtge-



biet München (Ephemeroptera, Plecoptera, Heteroptera, Coleoptera, Trichoptera u.a.). *NachrBl. bayer. Ent.* 50 (4): 113-127. (in German with English summary). ["Based on an actual study in streams and springs in the City of Munich records of aquatic insects from various orders are summarized. They are supplemented by data from recent literature. Some faunistically remarkable species are commented more in detail. By way of a resemblance analysis a faunistic classification is worked out, examining particularly the correspondence with hydrogeological / geo-morphological subunits of the Münchener Ebene within the city. The differentiated species communities are characterised and discussed with regard to the assumed near-natural state." (Authors) 8 odonate species including *Coenagrion mercuriale* are listed in tab. 1] Address: Hess, Monika, c/o ÖKOKART, Wasserburger Landstr. 151, D-81827 München, Germany. E-mail: info@oekokart.de

**2417.** Heymer, A. (2001): Gedanken zum "Vier-Beine-Sitzen" bei Libellen. *Notul. odonotol.* 5(8): 99-103. (in German with English summary). ["In odonates, the prothoracic legs serve, among other purposes, for holding prey while eating and, with the help of the specialised tibial combing spikes, they function as a "cleaning apparatus" for the head and the compound eyes. Thus, early in the hexapod evolution they have assumed the functions, which entailed that in some species the clasping reflex is no longer elicited during perching. Among the phylogenetically relatively young Libellulinae, the non-use of fore legs while sitting on substrate seems a general habit in Libellula and Orthetrum. Apparently, this behavioural peculiarity is to be considered a progressive feature in phylogeny. In the Zygoptera, this phenomenon has been so far recorded only in the euphaeid, *Dysphaea dimidiata*, which displays a perching behaviour convergent to that in Orthetrum." (Author)] Address: Heymer, A., Écologie Générale, Muséum National d'Histoire Naturelle, 4, Avenue du Petit Château, F-91800 Brunoy (Essone), France

**2418.** Hiemeyer, F.; Miller, E.; Miller, J. (2001): Winterbeobachtungen an *Sympetma paedisca* (Odonata: Libellula 20(3/4): 103-113. (in German with English summary). ["After several sightings in November 1997 and 1998, we systematically studied the behaviour of hibernating individuals at two ponds in the Allgäu, south-eastern Bavaria, Germany, in both following winters 1999/2000 and 2000/2001. They stayed during the winter in the shore vegetation of their breeding waters, sitting vertically on reedblades or horizontally on *Carex elata*. All were completely exposed to sun, wind, rain and snow. They safely survived snowing in, hoarfrost and freezing. If temperature was above 0 °C, the individuals were able to move and to crawl over snow, and if temperature was about 15 °C, they even could fly." (Author)] Address: Hiemeyer, F., Gögginger Str. 120, D-86199 Augsburg, Germany. E-mail: FritzHiemeyer@web.de

**2419.** Holder, M.; Kingsley, A. (2001): Summer 2000 peatland odonate surveys in New Brunswick and Nova Scotia, Canada. *Argia* 13(1): 17-19. (in English). [Examining peatland flora and fauna, 59 odonate species were spotted in 2000 including 30 new county records for the provinces of New Brunswick and Nova Scotia. *Somatochlora kennedyi* was recorded for the first time in Nova Scotia. *Leucorrhinia patricia* is considered a further remarkable record; the habitat of the species is

briefly characterised.] Address: Holder, M., Kingsley, Andrea, 4605 Hwy'12, Kentville, Nova Scotia B4N 3V8, Canada. E-mail: kingsley.holder@ns.sympatico.ca

**2420.** Hostettler, K. (2001): Der Kleine Blaupfeil (*Orthetrum coerulescens*) in Vorarlberg. *mercuriale* 1: 2-4. (in German). [39 localities with records of *O. coerulescens* in Vorarlberg, Austria are analyzed according to their altitudinal situation and to co-occurring Odonata.] Address: Hostettler, K., Schulstr. 7, CH-8590 Romanshorn, Schweiz. E-mail: kurt.hostettler@gmx.ch

**2421.** Huang, D.Y.; Lin, Q.B. (2001): The Early Cretaceous Hemeroscopid larva fossils from Beijing, China. *Chin. Sci. Bull.* 46(17): 1477-1481. (in English with Chinese summary). ["More than 100 hemeroscopid larva fossils were discovered from the Lower Cretaceous in southwest Beijing, which effectively ends the discussion of morphology and makes it more complete. It is assigned within the Libelluloidea, and shows close evolutionary correlations with modern Libellulidae. Although the wing characters of adult Hemeroscopus from the same formation indicates the close relationship to Aeschnoidea, we suggest that the larvae and the adults were the same species. Therefore, it probably shows the evolutionary ancestors of Libellulidae. Being the fundamental species discriminating Jehol Entomofauna and Lushangfen Entomofauna, Hemeroscopus bears great significance in the study of stratigraphy." (Author)] Address: Huang, D.Y., Acad. Sinica, Nanjing Inst. Geol. & Paleontol., Nanjing 210008, Peoples Rep. China

**2422.** Hünken, A.; Schütte, C. (2001): Im Trüben fischen: Predation von Flussbarschen auf Calopteryx-Larven. *Abh. Ber. Naturkundemus. Görlitz* 73(1): 33-34. (in German with English summary). ["Fishing in murky waters: Predation of perch on two Calopteryx species. - The role of turbidity in predator-prey interactions between *Perca fluviatilis* and *Calopteryx splendens* and *C. virgo* respectively was tested in laboratory experiments. In turbid water mortality induced by the fish was significantly higher in *C. splendens* as in *C. virgo*. *C. virgo* was less affected by predation of the fish than *C. splendens*, no matter if water was turbid or not. The differences between both Calopteryx species are discussed in terms of their life style." (Authors)] Address: Schütte C., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

**2423.** Huth, J. (2001): Libellen (Odonata) der Braunkohlen-Bergbaufolgelandschaft Sachsen-Anhalts. *Abh. Ber. Naturkundemus. Görlitz* 73(1): 35-37. (in German with English summary). ["From 1996 to 2000 altogether 47 species of dragonflies (75 % of the recorded species of Sachsen-Anhalt), including 21 endangered species of Sachsen-Anhalt and 22 endangered species of Germany, were found in the open-cast lignite post-mining landscapes of Sachsen-Anhalt. The importance of dragonflies of different types of post-mining waters are described, the most important of which is the nature reserve 'Schlauch Burgkernitz' near Bitterfeld. 40 species (including 17 endangered species of Sachsen-Anhalt and 19 endangered species of Germany) were found there." (Author)] Address: Huth, J., Oekokart GmbH, G.-Cantor-Str. 31, D-06108 Halle/Saale. E-mail: oekokart-halle@t-online.de

**2424.** Inoue, K. (2001): Non-contact sitting oviposition of *Sympetrum maculatum*. *Sympetrum Hyogo* 7/8: 2. (in Japanese with English summary). [*S. maculatum* fema-

les usually oviposit in tandem or single flight (non-contact flying oviposition), but a case of non-contact sitting oviposition was observed on October 20, 1990 at Sara Pond, Aonogahara, Ono City, Hyogo Prefecture, Japan. A few minutes later the female started to fly and oviposited in flight.] Address: Inoue, K., 5-9 Fuminosato 4-chome, Abeno-ku, Osaka 545, Japan

**2425.** Jakab, T.; Müller, Z.; Dévai, G. (2001): Quantitative survey of *Gomphus flavipes* (Charpentier, 1825) exuviae along River Tisza. Abh. Ber. Naturkundemus. Görlitz 73(1): 39. (in English with German summary). [In February 2000 accidentally cyanid-pollution penetrated the ecosystem of River Tisza, Hungaria. Along a 17 km stretch of this river *Stylurus flavipes* exuviae were sampled. Co-occurring species are *Ophiogomphus cecilia*, *Gomphus vulgatissimus*, *Platycnemis pennipes* *Calopteryx splendens*, *Ishnura elegans*, *Sympetrum vulgatum*, "*Cordulia aeneaturfosa*", and "*Crocothemis servilia*" (= *C. erythraea*). The author conclude that there was no negative influence of cyanid pollution resp. no drastic decrease in *S. flavipes* population.] Address: Devai, G., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

**2426.** Jeffries, M. (2001): The Northumbrian frontier of the Banded Demoiselle *Calopteryx splendens* (Harris). J. Br. Dragonfly Society 17( 2): 55-58. (in English). [*C. splendens* is a species with a southern and midland distribution in England and Wales, declining in Yorkshire, and with an isolated northern outpost on the Solway Firth. More recent studies on the distribution of this species "show a stronger presence up through County Durham and one record north of the River Tyne in southern Northumberland. This paper describes the recent distribution of *C. splendens* within Northumberland (north of the River Tyne), from the time of its discovery in 1988. The extent of available habitat appearing suitable for further colonization is also considered."] Address: Jeffries, M., Division of Geography and Environmental Management, Lipman Building, University of Northumbria, Newcastle upon Tyne, NE1 8ST, UK.

**2427.** Jödicke, R. (2001): Saisonale Einnischung von *Paragomphus genei* in Tunesien (Odonata: Gomphidae). *Libellula* 20(1/2): 13-22. (in German with English summary). ["On the basis of the seasonal pattern of emergence and the flying season the species can be best considered to be bivoltine. This life cycle is supposed to be typical of the West-Mediterranean populations; univoltinism may partly occur. In the southern oases a continuous emergence throughout the year was recorded, indicating a facultative multivoltinism." (Author)] Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany. E-mail: r.joedicke@t-online.de

**2428.** Jones, C.D.; Burke, P.S.; Falls, J.B.; Oldham, M.J.; Sutherland, D.A. (2001): Additions to the Odonata list of Peterborough County, Ontario. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 44-47. (in English). ["Twelve new county records are reported for Peterborough County from the 1999 and 2000 field seasons, bringing the county list to a total of 96 species. Additions reported are: *Lestes eurinus*, *Amphiagrion saucium*, *Aeshna constricta*, *A. eremita*, *A. verticalis*, *Nasiaeschna pentacantha*, *Gomphus borealis*, *G. descriptus*, *Stylurus scudderi*, *Cordulegaster diastatops*, *Helocordulia uhleri*, and *Somatochlora*

*franklini*. In addition, the occurrence of *Lestes forcipatus* has been confirmed and another species, *Sympetrum costiferum*, which was inadvertently excluded from a published 1999 list is "officially" added here. Nine of these species are considered provincially rare. Notes on habitat, behaviour and relative abundance are provided for some species." (Authors)] Address: Jones, C.D., Box 182, Lakefield, Ontario, K0L 2H0, Canada. E-mail: colin.jones@mnr.gov.on.ca

**2429.** Jones, C.D. (2001): Book Review of "Dragonflies through Binoculars: A Field Guide to Dragonflies of North America". In: Catling, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 49-52. (in English). [Colin D. Jones reviews extensively Sid Dunkle's book "Dragonflies through Binoculars: A Field Guide to Dragonflies of North America Oxford University Press, New York. Softcover, 266 pages. US\$ 29.95 (ISBN 0-19-511268-7)". Special emphasize is given to the discussion of common - English - names of the dragonflies, and to the range maps of the species which are commentend and corrected - where necessary - in detail.] Address: Jones, C.D., Box 182, Lakefield, Ontario, K0L 2H0, Canada. E-mail: colin.jones@mnr.gov.on.ca

**2430.** Jones, C.D. (2001): *Somatochlora incurvata* (Incurvate Emerald) New to Algonquin Provincial Park, Ontario. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 2. Toronto Entomologist's Association, Toronto, Ontario: 47-48. (in English). ["*S. incurvata* [...] is reported from Algonquin Provincial Park, Ontario - representing the fourth location of this rare species in Ontario. With the inclusion of this species, the park's list of Odonata now stands at 99 species. The habitat is described as a sedge bog or poor fen, dominated by *Carex*, with *Sphagnum* and scattered clumps of *Chamaedaphne calyculata*. A female was observed ovipositing by dipping her abdomen into a shallow pool of water (30 x 30 cm) within the sedge-sphagnum mat." (Author)] Address: Jones, C.D., Box 182, Lakefield, Ontario, K0L 2H0, Canada. E-mail: colin.jones@mnr.gov.on.ca

**2431.** Kagimoto, B. (2001): The present state and the protection of the dragonfly, *Orthetrum poecilops miyajimaense* Yuki et Doi. *Nature and Insects* 36(7): 17-19. (in Japanese). [Introduction: *O. poecilops miyajimaense* is a rare species which inhabits only Miyajima in Hiroshima Prefecture in Japan, and is listed as an endangered species in RDB. This dragonfly was first discovered by Yuki, Jiro at Yamashiraura on Miyajima in 1936, and in 1955 by Dr. Sawano, Juzo it was rediscovered at the same point. After that the discovered spot had disappeared due to development. Also in Hiroshima Prefecture this species has been designated as a special wildlife species, which should be protected by the local governmental by law of Hiroshima. Collection of the species is prohibited and a violator will be sentenced to one year's penalty or fined 500 thousand yen. This species inhabit wetlands on the seashore, where rice grass, *Claudium chinense*, grows, and is rather tolerant of saline water. Development has been prohibited all over in Miyajima as a holy island, and the environment of the dragonfly has been preserved. The conditions of the environment for the species are as follows; (1) The wetland is always filled with spring water or by small streams which flow from the forests of the hinterland.

(2) The bed of the wetland is covered by the organic mud. (3) The sea water is quickly drained from the wetland. Only three well conditioned spots are left in the island. 1. Situation of the habitats: Habitat A: the southern limit on the island, which was pooled with sea water by the typhoon 19th of 1991 and the 18th in 1999 and damaged. The population decreased sharply. Habitat B: this habitat is located closely near to Habitat A, and rather well conditioned. Population is maintained in spite of the 19th typhoon. Habitat B: this habitat harbours the strongest population, and its ecological conditions are the best of the three locations 2. Measures for protection: The bylaw of prefectural government and municipal preservation activities for the habitats are helpful for the protection of the dragonfly. Also stock of larvae bred from eggs by members of Hiroshima Mushi no Kai has contributed to the increase of the population. 3. Prospect: The preservation of the habitats is most important. (1) Preservation of the forests of the hinterland. (2) Maintenance of shallow pools of sea water; drainage is important. (3) Precise investigation of the population size. (4) Preservation of the species from the view point all over the Inland Sea. Translation: Ishizawa, Naoya] Address: not stated

**2432.** Kalko, E. (2001): Bats gleaning dragonflies. *Argia* 13(1): 27. (in English). [Infrared filming of bats (*Micronycteris megalotis*) resulted that they prey using echolocation on sitting dragonflies] Address: Elisabeth.Kalko@biologie.uni-ulm.de

**2433.** Kamigaki, K. (2001): Intergeneric tandem of *Sympetrum frequens* male and *Pantala flavescens* female. *Sympetrum Hyogo* 7/8: 9. (in Japanese with English summary). [The intergeneric tandem was observed at Aonogahara, Ono City, Hyogo Prefecture, Japan on November 3, 2000. "They were flying swinging up and down, and perched on a grass on the margin of a pond, but flew away soon. They did not copulate during my observation."] Address: not stated

**2434.** Keil, R. (2001): Die Rolle von Libellen in der historischen Karpfenteichwirtschaft. *Abh. Ber. Naturkundemus. Görlitz* 73(1): 41-43. (in German with English summary). ["Based on literature, considerations on the impact of carp farming on the occurrence and development of Odonata in historic fishery ponds are presented." (Author)] Address: Keil, R., Prof. Wagenfeld-Ring 102, D-02943 Weißwasser. E-mail: rene-keil@gmx.de

**2435.** Kerry, L. (2001): Habitat management for the Southern Damselfly *Coenagrion mercuriale* (Charpentier) on Aylesbeare Common, Devon. *J. Br. Dragonfly Soc.* 17( 2): (in English). [A colony of *C. mercuriale* has been recorded intermittently at this site in low numbers since 1956. With the exception of 1986, when twelve individuals were recorded, the maximum count was four individuals for each year from 1977 to 1990. Two other colonies are present within 5 km of this site [...] Colaton Raleigh Common, has been recorded since 1963, with a maximum count of over 100 in 1986. [...] Venn Ottery Common, has been recorded since 1979, but only low numbers were recorded prior to the last sighting of a lone male in 1990. [...] The population of *C. mercuriale* at Aylesbeare Common has significantly increased since the advent of cattle grazing up to more than 300 specimens in 2001. "It is probable that the grazing is responsible for the increase in damselflies. Various factors may be important, for example the cattle poach the sub-

strate and create a mosaic of shallow pools; their droppings enrich the water; and their grazing alters the vegetation structure." The crucial parameter is unknown; therefore a PhD study will bring together the management regimes on other sites and establish the specific habitat requirements for *C. mercuriale*. "The future management at Aylesbeare will continue with light summer grazing, followed by brush cutting of small areas of Black Bog-rush (*Schoenus nigricans*) during the winter. The *C. mercuriale* population will continue to be monitored on a standard transect and the vegetation quadrats will be surveyed on a long-term basis." (Author)] Address: Kerry, L. Mount Pleasant, Stoneyford, Colaton Raleigh, Sidmouth, Devon EX 10 OHZ, UK

**2436.** Kitching, R.L. (2001): Food web in phytotelmata: "bottom-up" and "top-down" explanations for community structure. *Annu. Rev. Ent.* 46: 729-760, 1 Pl. excl. (in English). [The field study of food webs and the processes maintaining them is hampered by the sheer complexity and unreplicated nature of natural systems. The animal communities in phytotelmata, plant-held waters, are a convenient exception to this generalization. Tree holes, bamboo internodes, pitcher plants, tank bromeliads, and water-retaining plant axils contain a rich fauna, principally of arthropods, which constitute more or less complex, highly discrete food webs. They are widespread and replicated. The explanations for the community structure observed in these systems may call on "bottom-up" mechanisms such as simple environmental limitations, competition, predation, and facilitation, or they may adduce grander "top-down" theories, which explore biogeographic, energetic, dynamic, or biodiversity-related constraints. The existence of the bottom-up mechanisms is well established in experimental systems, and their consequences may be apparent in naturally occurring food webs. Top-down mechanisms demand a more holistic approach and are more difficult to test either by pattern analysis or experimental manipulation. The synoptic explanation of community composition and structure demands a multidimensional approach best expressed as a heuristic "template". Phytotelmata represent nearly ideal natural instruments for further study of food web dynamics, and exciting opportunities exist for the development and testing of community theories through their manipulation."] Address: Kitching, R., Aust. School Envir. Stud., Griffith Univ., Brisbane, Qld 4111, Australia

**2437.** Knaus, P.; Vorburger, C. (2001): Neuer Fundort von *Sympetma paedisca* in der Ostschweiz (Odonata: Libellula 20(1/2): 91-96. (in German with English summary). ["The species is threatened of extinction in Switzerland with the only actual breeding localities in the Valais and at Lake Constance (Untersee). We report on a new locality near St. Margrethen where *S. paedisca* was recorded regularly since 1994 in summer and autumn. Records derive from the northern slope of the »Heldsberg« at 420 - 440 m a.s.l., which is mainly covered with deciduous and coniferous forest. It is yet unclarified whether the species is autochthonous at the locality or whether the animals originated from the large population in the Rhine delta (Vorarlberg, Austria), approximately 5 km away." (Authors)] Address: Knaus, P., Schweizerische Vogelwarte, CH-6204 Sempach, Switzerland. E-Mail: peter.knaus@vogelwarte.ch

**2438.** Knijff, G. de (2001): *Leucorrhinia pectoralis* (Charpentier, 1825) in 2000 in Vlaanderen: terug van



weggeweest of toch nooit volledig verdwenen? *Gomphus* 17(1): 9-22. (in Dutch with English and French summaries). ["*L. pectoralis* in 2000 in Flanders: back again or never disappeared? The last observations of *L. pectoralis* in Flanders date back from 1989 and this was the reason to consider this species in the red list as 'extinct in Flanders'. In 2000 however, *L. pectoralis* was observed at 5 different localities and altogether 10 individuals were noted. At one site one tandem and a third individual were observed. All these sites are situated in the Campine (Kempen), 4 in the province of Antwerp (Kalmthout, Herentals and Mol, twice) and one in the province of Limburg (Opglabbeek). From those 5 sites, *L. pectoralis* had only been observed in the past in Opglabbeek. The habitats where *L. pectoralis* was observed in 2000 are an acidified fen (twice), a humic acid fen, a mesotrophic pond and a nutrient poor peatbog with seepage chalk water. All the observations of *L. pectoralis* in 2000 are situated between the 13th of May and the 11th of July. This corresponds completely with the old observations from Flanders. It is impossible to track the origin of the individuals seen in 2000. Considering the great distance (>150 km) to the known populations in Northwestern Europe and the fact that 10 individuals were seen within a time period of two months, we presume that at least the majority, if not all, of the individuals have emerged in Flanders and that there still exist one or more populations in Flanders. Extra arguments for this reasoning are the facts that the optimal habitat of *L. pectoralis* is only accessible with difficulty for men, the usually small number of individuals in a population and the short flying period. We suggest that the Red list status of *L. pectoralis* should now be considered 'Critically endangered' in Flanders." (Author)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**2439.** Krech, M. (2001): Ein Beitrag zur Libellenfauna nordostdeutscher Regenhochmoore - Das NSG Gölde-nitzer Moor bei Cammin. (Landkreis Bad Doberan). Archiv Freunde Naturgeschichte in Mecklenburg 40: 161-172. (in German). [The Gölde-nitzer Moor is one of the classical odonatological localities in Germany (see W. Rabeler, 1931, who lists 20 species). Additional surveys in the 1980ies increased the species list, and today 39 species are known, 24 to be autochthonous. Bog species are well represented; the rare *Aeshna subarctica elisabethae* continuously is known from the 1920ies. Interesting is the reproduction of *Anax imperator* in an dystrophic water body. The bog is threatened by peat harvesting, melioration and succession of vegetation in the water bodies used for reproduction.] Address: Krech, M., Auf der Großen Mühle 7, D-99198 Erfurt, Germany

**2440.** Kreuz, P.; Arnold, W.; Kesel, A.B. (2001): Acoustic microscopic analysis of the biological structure of insect wing membranes with emphasis on their waxy surface. Annuals Biomedical Engineering 29(12): 1054-1058. (in English). ["The mechanical performance of natural materials depends on the type, and especially the composition of the molecular constituents. They are almost without exception composite materials, whose characteristics are determined by the characteristics of the individual constituents, their shape, their interaction, and in particular their orientation within the natural material. One of the most impressive natural composites is the insect cuticle. This lightweight building material im-

presses one with its ability to withstand extremely heavy loading. Even the ultrathin (3-10 µm) membranes of insect wings add greatly to the structural stability of the wings. By means of acoustic microscopy, the present study also shows that the thin covering of wax on the membrane is not an accidental material arrangement. Contrary to that of locust wings, dragonfly (*Aeshna cyanea*) wing membranes were found to have a criss-cross fiber-like density gradient within to the waxy layer. This density gradient proved to be mechanically relevant in stabilizing the wings." (Authors)] Address: Kesel, Antonia, Department of Zoology, Technical Biology and Bionics; University of Saarland; D - 66041 Saarbrücken. E-mail: a.kesel@rz.uni-sb.de

**2441.** Krüner, U. (2001): *Orthetrum brunneum* (Fonscolombe, 1837), ein fester Bestandteil der Libellenfauna in NRW?. Abh. Ber. Naturkundemus. Görlitz 73(1): 45-46. (in German with English summary). [A large breeding population of *O. brunneum* with more than a hundred individuals is reported from a location in Northrhine-Westfalia, Germany. The regional dispersion of the species, development of habitat parameters in the open drain of a hard coal dump since 1992, and conservation measure are briefly outlined.] Address: Krüner, Ulrike, Gelderner Str. 39, D-41189 Mönchengladbach, Germany. E-mail: kruener@t-online.de

**2442.** Kuhn, J. (2001): Prozessschutz versus Nutzung und Pflege: Probleme des Libellenschutzes in Mooren des süddeutschen Alpenvorlandes. Abh. Ber. Naturkundemus. Görlitz 73(1): 47-49. (in German with English summary). ["Process conservation versus use and maintenance: Problems of dragonfly conservation in bogs of the southern German prealpine district. - Several dragonfly species of prealpine mires (fens and bogs) in southern Germany largely depend on recent and/or historical land use by man (e.g. litter meadows, bog clearing, peat cutting by hand). Due to irreversible hydrological and trophic changes as well as for lack of exogenous dynamics, conservation of these species by means of 'process conservation' probably will not be successful. Problems of abandonment and management of 'semi-natural' man-made dragonfly habitats in mires are discussed." (Author)] Address: Kuhn, J., Max-Planck-Institut für Verhaltensphysiologie, Abt. Winckler, D-82319 Seewiesen. E-mail: kuhn@mpi-seewiesen.mpg.de

**2443.** Kunz, B.; Kunz, D. (2001): *Lindenia tetraphylla*: Wiederfund für Nordafrika (Odonata: Gomphidae). Libellula 20(1/2): 79-85. (in German with English summary). ["After a period of more than 150 years the species has been recorded in the Maghreb again. The finding place is a reservoir in central Tunisia. The individuals observed were conspicuously dark. This fact is discussed to conform with the age colouration. We interpret our record as the result of an actual migration rather than a permanent occurrence. The possible origin and migration path of the individuals are discussed. The Tunisian checklist of dragonflies is thus enlarged to 53 spp." (Authors)] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de

**2444.** Kunz, B. (2001): Suchstrategien für in Baden-Württemberg (vermutlich) unterrepräsentierte Libellenarten. *mercuriale* 1: 4-8. (in German). [The following species are assessed as underrepresented in field

records of odonatologists: *Sympecma fusca*, *Coenagrion hastulatum*, *C. ornatum*, *Ischnura pumilio*, *Lestes virens*, *L. barbarus*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Onychogomphus forcipatus*. Information on tracing strategies are outlined with the aim to get a more realistic view of the current situation of the species in the Federal State Baden-Württemberg.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de

**2445.** Kunz, B. (2001): Zum Kenntnisstand des aktuellen Fundortes der Vogelazurjungfer (*Coenagrion ornatum*). *mercuriale* 1: 24. (in German). [Status quo report of the small population of *C. ornatum* in the Federal State Baden-Württemberg, Germany.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de

**2446.** Kurstjens, G. (2001): Lesser Emperor (*Anax parthenope*) found in Limburg. *Natuurhistorisch maandblad* 90: 94-95. (in Dutch with English summary). ["On 7 June 2000, *Anax parthenope* was observed in a brook valley near the Belgian-Dutch border at Kessenich-Thorn. This was the sixth observation of this rare dragonfly species recorded in the Netherlands. The occurrence of the specimen may have been due to the period of unusually hot weather from the end of April to mid-May. This observation fits into a pattern of increasing numbers in western Europe during the 1990s, when the species was also found in England and Belgium. In view of the current climate changes, the species might be expected to start breeding in the Netherlands in the near future, as has also been found for other southern insect and spider species." (Author)] Address: Kurstjens, G., Ecologisch adviesbureau, Col. Ekmanstr. 15, NL-6573 BM Beek-Ubbergen, The Netherlands

**2447.** Lafontaine, R.-M.; Goffart, P. (2001): Comptendu de l'excursion en Gaume de juillet 2000: le record n'est pas battu, mai il le sera bientôt .... *Gomphus* 17 (1): 51-53. (in French). [Belgium; 32 species were recorded on 22 July 2000 including *Sympecma fusca*, *Coenagrion scitulum*, *C. mercuriale*, *Ischnura pumilio*, *Somatochlora flavomaculata*, *Orthetrum brunneum*, and *O. coerulescens*] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

**2448.** Lafontaine, R.-M.; Knijf, G. de (2001): Libellules observées lors de l'excursion *Gomphus* en Lorraine française du 25 juin 2000. *Gomphus* 17(1): 54-55. (in French). [Documentation of records of 21 species including *Lestes virens*, *Erythronema najas*, *Coenagrion pulchellum*, and *C. scitulum*. Records from 20-06-1999 (e.g. *Anaciaeschna isosceles*, *Leucorrhinia caudalis*) and 10-06-2000 (e.g. *Brachytron pratense*, *Coenagrion mercuriale*) are added.] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**2449.** Landesumweltamt Nordrhein-Westfalen (Hrsg.) (2001): Referenzgewässer der Fließgewässertypen Nordrhein-Westfalens. Teil 2: Mittelgroße bis große Fließgewässer - Gewässerabschnitte und Referenzstrukturen. Merkblätter des Landesumweltamt Nordrhein-Westfalen 29. 247 pp. (in German). [42 stretches of running waters in the Federal State Nordrhein-Westfalen, Germany are characterised and documented in detail; such stretches with reference character can

serve to develop so called "Leitbilder" (strategic models, ecological goal functions) for revitalisation measures along additional stretches of the same water or comparable waters in the catchment area. Macrozoobenthos of the stretches is also compiled including odonate taxa, in most cases *Calopteryx virgo*, *C. splendens*, *Platycnemis pennipes*, and *Gomphus vulgatissimus*. *Onychogomphus forcipatus* is documented for the river Eder. *Ischnura elegans*, *Coenagrion puella*, *Pyrrhosoma nymphula*, and *Chalcolestes viridis* are documented for a few rivers with slow current.] Address: Landesumweltamt NRW, PF 102363, D-45023 Essen, Germany

**2450.** Legrand, J. (2001): *Malgassophlebia mayanga* (Ris, 1909) et une nouvelle espèce du genre à Madagascar (Odonata, Anisoptera, Libellulidae). *Revue Française d'Entomologie (Nouvelle Série)* 23(4): 225-236. (in French with English summary). [Male, female, and last instar larvae of *Malgassophlebia mayanga* (Ris 1909) are redescribed. Male, female, and last instar larvae of *Malgassophlebia mediodentata* n.sp. (holotype male, allotype female, 7/XI/1998, Bassin du Rianila, 15 km east of Morarano, Madagascar) are described. Both species are illustrated and compared in detail. Larval characters, allied species, biology, and distribution are briefly discussed.] Address: Legrand, J., 10, rue du Chemin de fer, F-94110 Arcueil, France

**2451.** Leipelt, K.G.; Schütte, C.; Suhling, F. (2001): Neue Daten zur Larvalökologie von *Macromia splendens* (Odonata: Macromiidae). *Libellula* 20(1/2): 1-11. (in German with English and French summaries). ["At the end of July, 1998, in mid July, 1999, and in mid June, 2000, a total of 67 larvae was recorded at a section of about 100 m in length at the Garden de Mialet in the mountain range of the Cevennes, southern France. Only one larval generation, comprising up to four different stadia was found during June and July. Another generation was on the wing, the third was in the egg stage. Therefore the duration of larval development is considered to last two years in that region. All larvae were found in reaches where the water current was hardly noticeable: We recorded 53 larvae at sandy patches in shallow water near the river margin, five in deposits of a mixture of twig, leaf and fine detritus, and nine on bedrock in about 1 m water depth. In other microhabitats like alder roots, gravel and boulder no larvae were found." (Authors)] Address: Leipelt, K.G., Zoologisches Institut -Ökologie-, Technische Universität Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-Mail: k.leipelt@tu-bs.de

**2452.** Leipelt, K.G.; Sommer, R.; Martens, A. (2001): Territorialität bei *Oxygastra curtisii* (Odonata: Corduliidae). *Libellula* 20 (3/4): 155-170. (in German with English summary). ["In the Cevennes mountains, southern France, males patrolled continuously at 6-15 m long stretches at the river margin. They defended their territories against conspecific males. In the territories patrol flights of individual marked males lasted between less than one and up to 28 minutes. Within one hour males patrolled in up to four different territories." (Authors) In addition information on habitat preference and activity patterns in relation to temperature and rain of *Boyeria irene* are given.] Address: Leipelt, K.G., Zool. Inst. -Ökologie-, Technische Universität Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-Mail: k.leipelt@tu-bs.de

- 2453.** Lenk, P. (2001): Libellenbeobachtungen in der Kahler Seenlandschaft. Unser Kahlgrund. Heimatjahrbuch für den ehemaligen Landkreis Alzenau. 2002: 68-76. (in German). [Germany, Bavaria; 26 odonate species could be observed between 1999 and 2001. Habitats are in most cases brown coal mining waters and sand pits. Records of *Anaciaeschna isoceles*, *Anax parthenope*, *Brachytron pratense*, and *Crocothemis erythraea* are of some interest. The negative impact of carp and swans on vegetation and Odonata is briefly discussed.] Address: Lenk, P., Hess. Landesmus., Zool. Abt., Friedensplatz 1, D-64283 Darmstadt, Germany. E-mail: p-lenkr@hlmd.de
- 2454.** Lett, J.-M.; Cloupeau, R.; Pratz, J.-L.; Male-Malherbe, E. (2001): Liste commentée des odonates de la région Centre (Département du Cher, de l'Eure-et-Loir, de l'Indre, de l'Indre-et-Loire, du Loir-et-Cher et du Loiret). *Martinia* 17(4): 123-168. (in French with English summary). [Published data, data from the French mapping programme of Odonata and observations of the authors are compiled. 34 of the 68 species known to be represented in the region (62 species between 1990 and 2001) are commented in detail and the distribution 28 species is mapped: *Lestes dryas*, *Platycnemis acutipennis*, *Coenagrion mercuriale*, *C. ornatum*, *C. pulchellum*, *C. scitulum*, *Ischnura pumilio*, *Aeshna grandis*, *Anaciaeschna isoceles*, *Anax parthenope*, *Boyeria irene*, *Brachytron pratense*, *Stylurus flavipes*, *Gomphus graslinii*, *Onychogomphus uncatius*, *Ophiogomphus cecilia*, *Cordulegaster boltonii*, *Epithea bimaculata*, *Oxygastra curtisii*, *Somatochlora flavomaculata*, *S. metallica*, *Leucorrhinia caudalis*, *L. pectoralis*, *Libellula fulva*, *Sympetrum danae*, *S. fonscolombii*, *S. meridionale*, and *S. vulgatum*.] Address: Lett, J.-M., 1, les Cosses, F-41320 Saint-Loup-sur-Cher, France
- 2455.** Lett, J.-M. (2001): Première donnée de *Coenagrion ornatum* (Sélys, 1850) dans la région Centre, département du Cher (Odonata, Zygoptera, Coenagrionidae). *Martinia* 17(3): 94. (in French). [29 June 2001 the rare *C. ornatum* was recorded at Neuvy-le-Barrois situated near Sancoins, France (catchment of river Allier). The habitat is described, and the regional distribution of the species is outlined. *C. mercuriale* is also well represented in the habitat.] Address: Lett, J.-M., 1, les Cosses, F-41320 Saint-Loup-sur-Cher, France
- 2456.** Levasseur, M.; Dommange, J.-L. (2001): *Martinia*. Index 1985-2000. *Martinia* 17 (Suppl. 1): 44 pp. (in French). [The issues of the odonatological journal *Martinia* issued between 1985 and 2000 are indexed in detail: dates of release, bibliography, geographic index (Départements), index of species, (a few) key words.] Address: Dommange, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France
- 2457.** Lohr, M.; Mitzka, H.-D. (2001): Die Libellenfauna der Weserrandsenke "Taubenborn" bei Höxter (Insecta: Odonata). Eine Dokumentation von Bestandentwicklungen am Beispiel der Libellen zwischen 1989 und 2001. *Egge-Weser* 14: 31-50. (in German). [29 odonate species are documented from several water bodies in the floodplain of river Weser, Nordrhein-Westfalen, Germany. Habitat parameters (vegetation) and species composition of the waters are documented in tables and discussed in detail. Regional development of species composition over a period of 12 years is outlined as well as range extensions are discussed. Of some interest are notes on the occurrence of some Mediterranean species and *Brachytron pratense*, and dynamic of population fluctuation of *Sympetrum flaveolum*. The habitat is assessed as one of the most important regional habitats.] Address: Lohr, M., An der Kirche 22, D-37671 Höxter, Germany. E-mail: mlohr@fh-hoexter.de
- 2458.** Male-Malherbe, E.; Caupenne, M. (2001): Le point sur six odonates remarquable de Brenne (département de l'Indre). *Martinia* 17(3): 111-114. (in French with English summary). [France; records of *Coenagrion mercuriale*, *Anax parthenope*, *Epithea bimaculata*, *Leucorrhinia caudalis*, *L. pectoralis*, and *Sympetrum danae* are discussed.] Address: Male-Malherbe, E., 38, La Gabrière, F-36220 Lingé, France
- 2459.** Manach, A. (2001): Atlas préliminaire des Odonates de Bretagne (Région administrative: départements des Côtes-d'Armor, du Finistère, de l'Ille-et-Vilaine et du Morbihan). *Martinia* 17 (Suppl. 2): 3-60. (in French with English summary). [Distribution maps for each of the 54 Odonata taxa recorded in the Brittany region (France) are presented. The paper also includes eight colour plates with some regionally remarkable or rare species.] Address: Manach, A., 11, rue d'Ouesant, F-29200 Brest, France
- 2460.** Marden, J.H.; Fitzhugh, G.H.; Girgenrath, M.; Wolf, M.R.; Girgenrath, S. (2001): Alternative splicing, muscle contraction and intraspecific variation: associations between troponin T transcripts,  $Ca_{2+}$  sensitivity and the force and power output of dragonfly flight muscles during oscillatory contraction. *J. Exp. Biol.* 204(20): 3457-3470. (in English). ["The flight muscles of *Libellula pulchella* dragonflies contain a mixture of six alternatively spliced transcripts of a single troponin T (TnT) gene. Here, we examine how intraspecific variation in the relative abundance of different TnT transcripts affects the  $Ca_{2+}$  sensitivity of skinned muscle fibers and the performance of intact muscles during work-loop contraction regimes that approximate in vivo conditions during flight. The relative abundance of one TnT transcript, or the pooled relative abundance of two TnT transcripts, showed a positive correlation with a 10-fold range of variation in  $Ca_{2+}$  sensitivity of skinned fibers ( $r(2)=0.77$ ,  $P < 0.0001$ ) and a threefold range in peak specific force ( $r(2)=0.74$ ,  $P < 0.0001$ ), specific work per cycle ( $r(2)=0.54$ ;  $P < 0.0001$ ) and maximum specific power output ( $r(2)=0.48$ ,  $P=0.0005$ ) of intact muscle. Using these results to reanalyze previously published data for wing kinematics during free flight, we show that the relative abundances of these particular transcripts are also positively correlated with wingbeat frequency and amplitude. TnT variation alone may be responsible for these effects, or TnT variation may be a marker for changes in a suite of co-regulated molecules. Dragonflies from two ponds separated by 16 km differed significantly in both TnT transcript composition and muscle contractile performance, and within each population there are two distinct morphs that showed different maturational trajectories of TnT transcript composition and muscle contractility. Thus, there is broad intraspecific variability and a high degree of population structure for contractile performance phenotypes, TnT ribotypes and ontogenetic patterns involving these traits that affect locomotor performance." (Authors)] Address: Marden, J.H., Dept Biol., Pennsylvania St. University,



208 Mueller Laboratory, University Park, PA 16802, USA

**2461.** Marinov, M. (2001): Review of *Hemianax ephippiger* (Burm.) records from Bulgaria (Anisoptera: Aeshnidae). *Notul. odonatol.* 5(8): 105-106. (in English). [Compilation of Bulgarian records of *A. ephippiger*; the author tentatively postulates that one of the East Mediterranean migration routes of the species leads along the Black Sea coast.] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mgmarinov@yahoo.com

**2462.** Martens, A. (2001): Buchbesprechung: Sternberg, K. & R. Buchwald (Eds.): *Die Libellen Baden-Württembergs*. Band 2. Ulmer. Stuttgart. ISBN 3-8001-3514-0. *Lauterbornia* 41: 184-185. (in German). [Review of this outstanding book on central and west European Anisoptera.] Address: Martens, A., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: andreas.martens@tu-bs.de

**2463.** Martens, A. (2001): Experimente zur Sitzplatzwahl von *Onychogomphus forcipatus forcipatus* (L., 1758). *Abh. Ber. Naturkundemus. Görlitz* 73(1): 51. (in German with English summary). ["At the rendezvous males prefer stones as perches. Discrimination experiments with pairs of substrates showed that males land preferentially on perches that correspond in height to the flight level of females appearing at the water. When they first landed males preferred perches in the middle of the stream, but afterwards they used perches near the stream margin. The results are interpreted in terms of early recognition of females and rapid formation of tandem linkage." (Author)] Address: Martens, A., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: andreas.martens@tu-bs.de

**2464.** Mauersberger, H.; Mauersberger, R. (2001): Hornisse *Vespa crabro* als Prädator von *Aeshna cyanea* (Hymenoptera: Vespidae; Odonata: Aeshnidae). *Libellula* 20(1/2): 87-89. (in German with English summary). [Germany, Brandenburg. "A worker of *Vespa crabro* caught a fully active male of *A. cyanea* at a sunny day. During the fight the dragonfly was often stung and then decapitated. The large wasp removed the whole dragonfly body piece by piece." (Authors)] Address: Mauersberger, R., Waldstr. 4, D-16278 Steinhöfel, Germany

**2465.** Mauersberger, R.; Petzold, F. (2001): Seen als Habitate für *Onychogomphus forcipatus forcipatus* (L.) im Jungpleistozängebiet Nordost-Deutschlands. *Abh. Ber. Naturkundemus. Görlitz* 73(1): 53-55. (in German with English summary). ["The occurrence, distribution, phenology and abundance of *O. forcipatus* are described, along with a brief characterisation of the northeast German lake district as a habitat for *O. forcipatus*." (Authors)] Address: Mauersberger, R., Waldstr. 4, D-16278 Steinhöfel, Germany. E-mail: FoerderevereinUeckermark.Seen@t-online.de

**2466.** Mikolajewski, D.-J. (2001): Dornenausbildung bei Larven der Gattung *Sympetrum* (Odonata: Anisoptera): Induzierbarer Schutz gegen Fischprädation. *Abh. Ber. Naturkundemus. Görlitz* 73(1): 59-61. (in German with English summary). ["Effects of chemical cues by fish on the shape of abdominal spines of *S. sanguineum* and *S. vulgatum*: Inducible defence against predation. - The question whether the presence of fish has an influence on the shape of the abdominal spines was

tested in non-lethal laboratory experiments and field studies. It was shown that the presence of fish induced an increase of spine length and the distance between the dorsal spines on the abdomen in both species. The results are interpreted as an inducible morphological defence against fish predation." (Author)] Address: Mikolajewski, D.-J., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: d.mikolajewski@tu-bs.de

**2467.** Moroz, M.; Czachorowski, S.; Lewandowski, K. (2001): Aquatic insects (Insecta: Ephemeroptera, Odonata, Heteroptera, Trichoptera) of the Bieriezinsky Biosphere Reserve. *Parki Narodowe i Rezerwy Przyrody* 20(4): 75-81. (in Russian with Polish and English summaries). [Belorussia; between 1997 and 2000 the valley of river Berezyna was surveyed. 44 species are traced, among them *Calopteryx splendens*, *Platycnemis pennipes*, *Erythromma najas*, *Stylurus flavipes*, *Gomphus vulgatissimus*, *Aeshna grandis*, *Sympetrum flaveolum*, and *S. sanguineum*.] Address: Moraz, M., Inst. Zool., Belarussian Academy of Sciences, Akademicheskaja 27, Minsk 220072, Belarus

**2468.** Moskowitz, D.; Moskowitz, J.; Moskowitz, S.; Moskowitz, H. (2001): Notes on a large dragonfly and butterfly migration in New Jersey. *Northeastern Naturalist* 8(4): 483-490. (in English). ["We report our observations of a large migratory flight of monarch butterflies (*Danaus plexippus* L.) and dragonflies (*Anax junius* Drury, *Tramea lacerata* Hagen) in central New Jersey and review what is currently known about these migratory movements in eastern North America. The migration followed the passage of Hurricane Floyd, one of the strongest coastal storms to cross New Jersey during the twentieth century. Our observations suggest that weather conditions associated with this storm may have signaled the onset of the migration we recorded." (Authors)] Address: Moskowitz, D., EcolSci Inc, 75 Fleetwood Dr, Rockaway, NJ 07866 USA

**2469.** Müller, J.; Steglich, R. (2001): Zum aktuellen Vorkommen der Flußjungfern (*Gomphus* et *Ophiogomphus* - Odonata) in der Elbe Sachsen-Anhalts. *Entomol. Nachr. Berichte* 45(3/4): 145-150. (in German with English summary). [*Ophiogomphus cecilia*, *Stylurus flavipes*, and *Gomphus vulgatissimus* are assessed to be well suitable bioindicators to monitor habitat development in the special protected site according the European Fauna-Flora-Habitat-Directive. The distribution of the species along the River Elbe is documented on the basis of a grid map.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.Jmueller@t-online.de

**2470.** Müller, J.; Steglich, R. (2001): Zur Indikation der "FFH-Tauglichkeit" der Elbe durch die Flußjungfern (*Gomphidae*). *Abh. Ber. Naturkundemus. Görlitz* 73(1): 59-61. (in German with English summary). ["Gomphids as indicators for FFH classification of the Elbe River. - The occurrences of *Ophiogomphus cecilia*, *G. (Stylurus) flavipes*, and *G. vulgatissimus* in the Elbe River are of superregional importance and allow areas along the Elbe to be placed in proposed Sites of Community Interest (pSCI of FFH-GL)." (Authors)] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**2471.** Müller, J.H. (2001): Neue Erkenntnisse zu Ökologie und Verbreitung der Sibirischen Azurjungfer *Coe-*

nagrion hylas. mercuriale 1: 9-12. (in German). [This is a compilation of the significant results of an extensive study (see OAS 2171) of the most rare damselfly of central Europe. Reproduction habitat, hunting habitat (up to 500 m away from reproduction habitat), diurnal activity rhythms, emergence curve, and phenology of the species are outlined. The significant increase of knowledge on ecology of the extremely rare species enlarges the chance to preserve it in central Europe. Conservation measures are developed in the framework of a LIFE-project financed by the EU and realised by WWF-Austria.] Address: Müller, J.M., Goethestr. 25, D-89601 Schelklingen, Germany. E-mail: Libellen@Jo-chen.de

**2472.** Müller, O.; Müller, B. (2001): Armeleuchteralgen als Substrat für Larven von *Onychogomphus forcipatus* (Odonata: Gomphidae). *Libellula* 20(1/2): 69-78. (in German with English summary). ["In an oligotrophic mining lake in Brandenburg, Germany, larvae of *O. f. forcipatus* were found in pads of the Common Stonewort *Chara contraria* (Charophyceae: Characeae). Under laboratory conditions, given the choice between stoneworts and bare sand the larvae preferred stoneworts significantly, but they showed no significant preference when the sand was covered by detritus. The pads provide different microhabitats for larvae of gomphid dragonflies. Under artificial conditions in the laboratory, *O. forcipatus* larvae were usually found buried in the basal layer which consist of rotting material and *Chara* rhizoids. Some larvae were also recorded sitting in the *Chara* thalli and waiting for prey. The use of different microhabitats is interpreted as an anti-predator behaviour and adaptive behaviour to improve the efficiency of hunting as well." (Authors)] Address: Müller, O., Birkenweg 6d, D-13206 Libbenichen, Germany. E-mail: olemueller@freenet.de

**2473.** Müller, O.; Müller, B. (2001): Sand oder Algen? Habitatwahlverhalten der Larven von *Onychogomphus f. forcipatus* (L., 1758). *Abh. Ber. Naturkundemus. Görlitz* 73(1): 63. (in German with English summary). ["In an oligotrophic mining lake in Brandenburg, larvae of *Onychogomphus f. forcipatus* were found in pads of the stonewort *Chara contraria* (Charophyceae: Characeae). Habitat selection experiments showed that *O. forcipatus* prefers algal pads to bare sand. The use of different microhabitats in the pads is interpreted as an anti-predator behaviour and as an adaptive behaviour to improve the efficiency of hunting." (Authors)] Address: Müller, O., Birkenweg 6d, D-13206 Libbenichen, Germany. E-mail: olemueller@freenet.de

**2474.** Müller, Z.; Jakab, T.; Szállassy, N. (2001): Faunistic data on dragonflies (Odonata) from the inundation area of River Tisza between Tiszabercel and Balsa. *Studia odonatol. hung.* 7: 39-58. (in Hungarian with English summary). [Hungary; in 1998 and 1999, 22 localities were surveyed for their Odonata. A total of 34 species were recorded. The species list include *Brachytron pratense*, *Epitheca bimaculata*, and *Stylurus flavipes*.] Address: Müller, Z., Dept of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

**2475.** Müller, Z.; Jakab, T.; Devai, G.; Szállassy, N. (2001): The effect of habitat degradation on dragonfly assemblages on the floodplain of the River Tisza. *Abh. Ber. Naturkundemus. Görlitz* 73(1): 65-66. (in English with German summary). [The floodplain of River Tisza

including many backwaters plays an important role as a core area in the conservation of biodiversity in Hungary. In spite of this these water bodies are effected by numerous unfavourable human impacts (intense agricultural, forestry and angling utilisation). The aims of the study (conducted 1998 and 1999) were to answer the questions: (i) how biotope and habitat differences caused by the different intensity of angling are related and (ii) what kind of connection exists between the intensity of angling and some variables of dragonfly assemblages: "(i) the presence-absence data of dragonfly species show that habitat-level differences caused by the different intensity of angling within a specific water body can exceed biotope-level differences among water bodies of different types, (ii) the species number of dragonfly assemblages and the summarised data number relative abundance of the 5 rarest species of the floodplain section decrease parallel with the increase in the intensity of angling utilisation according to linear relation, at the same time the summarised data number relative abundance of the 5 most frequent species increases."] Address: Müller, Z., Dept of Ecol., Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

**2476.** Nawroth, J. (2001): Libellen an der lykischen Küste (Türkei). *Naturkundliche Beiträge des Deutschen Jugendbund für Naturbeobachtung* 34: 3-4. (in German). [Some notes from a travel along the lykian coast (Turkey). Some odonate species are referred, but no localities are given. None of the specimens was collected, and all identifications are doubtful due to insufficient identification literature used.] Address: Nawroth, Janna, Johann-Fischer-Str. 21, D-69121 Heidelberg, Germany

**2477.** Nel, A.; Bethoux, O.; Bechly, G.; Martinez-Delclos, X.; Papier, F. (2001): The Permo-Triassic odonoptera of the "protodonate" grade (Insecta: Odonoptera). *Ann. Soc. Entomol. Fr.* 37(4): 501-525. (in English with French summary). ["We describe a new fossil dragonfly *Permophlebia uralica*, gen. n., sp. n. that we attribute to a new family *Permophlebiidae*. Several Permo-Triassic odonate taxa are redescribed, viz. the taxa of the family *Triadotypidae*, and the genera *Kargalotypus* Rohdendorf, 1962, and *Liadotypus* Martynov, 1937. Their phylogenetic positions are discussed, and some earlier taxonomic decisions re-evaluated. The *Piroutetiidae* Nel, 1989 is transferred in the *Triadophlebiomorpha*, superfamily undetermined sit. nov. The *Kargalotypidae* Zessin, 1983 is transferred in the *Triadophlebiomorpha*: *Zygophlebiida* sit. nov. The *Liadotypidae* Grauvogel & Laurentiaux, 1952 (non Martynov, 1937) is transferred in the *Isophlebiida* sit. nov. family incertae sedis stat. nov. The cladistic analysis of the *Zygophlebiida* (new clade) is proposed." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**2478.** Nielsen, O. F. (2001): *Anax imperator* - records in Denmark in the period 1994 - 2000. *Nord. Odonat. Soc. Newsl.* 7(1): 12-13. (in Danish with English summary). ["*A. imperator* was first recorded in Denmark in 1994, in SW-Jylland (Jutland). Later the species has been found at several new localities, also at the islands Fyn and Sjælland. It is now known from seven localities, both lakes poor on nutrients and richer ponds and lakes." (Author)] Address: Nielsen, O.F., Tulstrupvej 112, DK-8680 Ry, Denmark

- 2479.** Nielsen, O. F. (2001): *Ischnura pumilio* - a description of the larva and a comparison with the larva of *Ischnura elegans*. Nord. Odonat. Soc. Newsl. 7(1): 14. (in Danish with English summary). ["8 larvae of *I. pumilio* from the Ry area were hatched under controlled conditions in 1999, 10-13 days after they were collected 8 April. Nordic larvae of *I. pumilio* have not been described before, so a short description is given here. Most of these exuviae and also a number of larvae were pale (reddish yellow, pale brown), some darker brown or almost black. Femora without dark ring. Gills pale with pale or reddish brown trachea. Weak contrast between trachea and the rest of the gill, few and sparsely branched side-trachea. Gills with long pointed tips, the white tip clearly visible in 10x magnification." (Author)] Address: Nielsen, O.F., Tulstrupvej 112, DK-8680 Ry, Denmark
- 2480.** Nielsen, O. F. (2001): Surveillance of 6 of the red-listed dragonflies in Denmark. Nord. Odonat. Soc. Newsl. 7(1): 6-10. (in Danish with English summary). ["The situation for six of the red-listed dragonfly species in Denmark the last ten years is surveyed and discussed. *Coenagrion armatum* (E) has disappeared at the old localities that have been investigated, and is only known from three localities in the last decade. *Aeshna viridis* (V) still seems to be present at a few localities in two areas, and is also recorded more accidentally (?) in other places. *Ophiogomphus cecilia* (R) still occurs in fairly good numbers in three of the four river systems where it has been recorded. *Libellula fulva* (E) is still living in good numbers at four clean lakes and one stream. Only one female of *Orthetrum coerulescens* (E) has been seen in Denmark since 1935, in 1991, but a possible occurrence could not be confirmed in the investigations of the last years. *Leucorrhinia pectoralis* (E) has only been found present at four of the about twenty previous known localities. ] Address: Nielsen, O.F., Tulstrupvej 112, DK-8680 Ry, Denmark
- 2481.** Nikula, B.J.; Sones, J.L.; Trimble, J.R. (2001): New and notable records of Odonata from Massachusetts. Northeastern Naturalist 8(3): 337-342. (in English). [The occurrence of six species of Odonata previously unknown from Massachusetts, USA is documented: *Ischnura prognata*, *Aeshna subarctica*, *Somatochlora incurvata*, *Gomphaeschna antilope*, *Libellula axilena*, and *Tamea calverti*. Four of these species were unknown from New England prior to 1995. Additionally, recent records of *Somatochlora georgiana* and *Sympetrum corruptum*, two species rarely recorded from New England, are discussed.] Address: Nikula, B., 2 Gilbert Lane, Harwich Port, MA 02646, USA. E-mail: odenews@capecod.net
- 2482.** Nishu, S. (2001): *Aeshna mixta soneharai* caught in Toyano-gata Pond, Niigata Prefecture. *Sympetrum Hyogo* 7/8: 23. (in Japanese with English summary). [Japan; the first regional records of *Aeshna mixta soneharai* are documented.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net
- 2483.** Nishu, S.; Azuma, T. (2001): Northern record of *Ictinogomphus pertinax* in the southern part of Hyogo Prefecture. *Sympetrum Hyogo* 7/8: 22-23. (in Japanese with English summary). [Eleven new habitats of this southern species were discovered in 2000. The habitats include two in Ono City which are the northernmost record in Hyogo Prefecture, Japan.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net
- 2484.** Nishu, S. (2001): Record of the odonate fauna of Dragonfly Pond in Kyoto Gyo-en, Kyoto Prefecture. *Sympetrum Hyogo* 7/8: 74-75. (in Japanese with English summary). ["The so-called Dragonfly Pond in Kyoto Gyo-en was built in 1994 or 1995, and a survey on the odonate fauna was made on March 6, 1997 by four members including the author. Larvae of four species including *Libellula quadrimaculata asahinai*" which is an addition to the twenty recorded by Tsukamoto et al. (1995). Deep shading by *Nelumbo nucifera* is responsible for the poor odonate fauna at the pond.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net
- 2485.** Nishu, S. (2001): Report of the survey trips of the Hyogo Society of Odonatology in 1999. Part 1 focused to *Libellula angelina*. *Sympetrum Hyogo* 7/8: 53-56. (in Japanese with English summary). ["Survey trips [...] were held on April 29, May 2 and May 15, 1999 at Sara Pond in Ono City, Japan, but no *angelina* was found. On the contrary, about one hundred *angelina* were found at a pond in Kasai City on May 15, 1999. This pond had been inhabited by a good number of *angelina* before 1996, but the population was destroyed by the civil works which destroyed the bank and the water was removed for a few years." The origin of the immigrating specimens is not known.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net
- 2486.** Nishu, S. (2001): Report of the survey trips of the Hyogo Society of Odonatology in 1999. Part 2 focused to *Mortonagrion hirosei* and *Stylurus ngoyanus*. *Sympetrum Hyogo* 7/8: 57-61. (in Japanese with English summary). [Both species were surveyed during June 26-27 visiting Momoshima Pond and its vicinities, Funa-machi, Toyo-oka City along Maruyama River and Izushi-cho along Izushi River, Japan. Abundance of adult *M. hirosei* was quite low, but the larval population was high, presumably due to the visit in the early season of the species. 19 exuviae of *S. ngoyanus* were found at the bank of Maruyama River some 7 km downstream of the oviposition sites. This is the first discovery of the emerging site of this species in Hyogo Prefecture. Tables with localities and accompanying species are included in this paper.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net
- 2487.** Nishu, S. (2001): Report of the survey trips of the Hyogo Society of Odonatology in 2000. Part 1 focused to *Libellula angelica*. *Sympetrum Hyogo* 7/8: 62-66. (in Japanese with English summary). [*L. angelina* was surveyed on April 30, May 14 and 21, 2000 at some localities including the Pond A, B and C in Kasai City, with a strong population of the species. The author takes it for very likely "that females judge whether a pond is suitable for larval growth or not, and they will not be attracted by males in their territory if females judge negatively." Sara Pond was also surveyed, but no *angelina* was found in 2000.] Address: Nishu, S., 247 Gunge



Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net

**2488.** Nishu, S. (2001): Report of the survey trips of the Hyogo Society of Odonatology in 2000. Part 2 focused to *Chlorogomphus brunneus costalis*. *Sympetrum Hyogo* 7/8: 67-69. (in Japanese with English summary). ["Four localities in Tokushima Prefecture were visited by members of the Hyogo Society of Odonatology during June 24-25, 2000. Larvae, exuviae and imagoes of *C. brunneus costalis* were found at two localities, and those of *Rhipidolestes hiraoui* were found at three localities." To trace *Chlorogomphus* in the southern part of Awaji Island failed.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net

**2489.** Nishu, S. (2001): Report of the survey trips of the Hyogo Society of Odonatology in 2000. Part 3 focused to *Mortonagrion Hirosei* and *Stylurus nagoyanus*. *Sympetrum Hyogo* 7/8: 71-73. (in Japanese with English summary). ["Many imagoes and larvae of *M. Hirosei* were found at Momoshima Pond on July 15 and 16, 2000. The pond was partly filled up by the construction civil works of a sewage treatment plant, but it is proved that the habitat of this coenagrionid damselfly was not influenced. Exuviae and emergence of *S. nagoyanus* were observed at the bank of Maruyama River and exuviae of this species were found also at Izushi River." (Author)] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net

**2490.** Nishu, S. (2001): *Tamea virginia* observed at the Expo Site of Japan Flora 2000. *Sympetrum Hyogo* 7/8: 21. (in Japanese with English summary). [*T. virginia* was found at a newly constructed pond at the Expo Site of Japan Flora 2000 on August 25, 2000. This southern species is considered not established in Hyogo Prefecture.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net

**2491.** Norma-Rashid, Y.; Mohd-Sofian, A.; Zakaria-Ismail, M. (2001): Diversity and distribution of Odonata (dragonflies and damselflies) in the fresh water swamp lake Tasek Bera, Malaysia. *Hydrobiologia* 459: 135-146. (in English). ["Fifty-nine species of Odonata were collected in a recent study in the freshwater swamp lake of Tasek Bera, Peninsular Malaysia, in contrast to 33 species that were recorded previously from the Ramsar site. This study added 35 species to the odonate records and together with the museum records, the number of species for the site now stands at 78 from 12 families. The causal factors for the absence of 19 species and other biological aspects such as habitat clustering and temporal activity profile were discussed." (Authors)] Address: Norma-Rashid, Y., Univ. Malaysia, Fac. Sci., Inst. Biol. Sci., Kuala Lumpur 50603, Malaysia

**2492.** Ochsner, E. (2001): Libellen - Kleinodien unserer Gewässer. *Insektenkurier* 70: 28-33. (in German). [This popular, but well written introduction into dragonflies is published in a journal of stamp collectors with interest in insects. The paper is illustrated with stamps from different countries showing dragonflies. A checklist of German dragonflies is appended.] Address: Ochsner, E., Schulstr. 4, CH-8640 Rapperswil, Switzerland

**2493.** Ochsner, E. (2001): Plattbauch-Segellibelle - Insekt des Jahres 2001. *Insektenkurier* 70: 27. (in German). [*Libellula depressa* was elected the "Insect of the year 2001"; the author introduces into several aspects of this dragonfly with special emphasize to the name, habitat, and habits. Because the 'Insektenkurier' is a journal for stamp collectors with interest in insects, the species is illustrated by a stamp issued by the German Bundespost in 1991.] Address: Ochsner, E., Schulstr. 4, CH-8640 Rapperswil, Switzerland

**2494.** Oda, I. (2001): Some observations on the behaviour of *Sympetrum frequens*. *Sympetrum Hyogo* 7/8: 50-53. (in Japanese with English summary). [During a stay at a hospital in Yonago City, Tottori Prefecture, Japan during October 17-31, 1999, the behaviour of *S. frequens* was observed. The Yone River was degraded to a concrete channel, but after flooding it with water ("First stage"), tandems of this species passed over the river, but without taking any attention. When the water table diminished to 3 to 4 cm depth and current velocity receded to zero ("Second stage"), "some pairs came down, but flew away, while the other pairs passed by without attention". When the water table diminished more strong, leaving only splashes ("Third stage"), 100% of tandems used it for oviposition. [...] "Two modes of oviposition were recognized based on 11 cases in which tandem pairs visited Yone River. One is called "tentative oviposition" and another "substantial oviposition". In tentative oviposition pairs oviposit slowly for a short while, then they copulate and oviposit again. In substantial oviposition pairs oviposit rapidly for a longer while, and they separate after oviposition, sitting separated without paying any attention to the former partner.] Address: not stated

**2495.** Olsvik, H. (2001): From the meeting in Skane in August 2000. *Nord. Odonat. Soc. Newsl.* 7(1): 15-16. (in Norwegian). [The 6th nordic Odonata meeting was held in Scania, Sweden from 4 to 6th August 2000. Some photos of give an impression of the meeting. Odonate species recorded at three localities in the framework of the meeting are listed. The list includes species as *Coenagrion lunulatum*, *Aeshna viridis*, *Somatochlora flavomaculata*, *Orthetrum cancellatum*, and *Leucorrhinia albifrons*.] Address: Olsvik, H., N-6694 Foldfjorden, Norway. E-mail: haolsvik@frisurf.no

**2496.** Olsvik, H. (2001): Late dragonflies and new autumn extremes in More and Romsdal 2000. *Nord. Odonat. Soc. Newsl.* 7(1): 17. (in Norwegian with English summary). ["New national late extremes were recorded for *Pyrrhosoma nymphula* (6.9), *Ischnura elegans* (20.9), *Aeshna caerulea* (1.10), *A. grandis* (7.10), *Somatochlora metallica* (20.9), *S. arctica* (1.10), *Libellula quadrimaculata* (20.9), and the second overall late Odonata-record in Norway, from Nov. 6th, and as the first, the species was *Sympetrum nigrescens*." (Author)] Address: Olsvik, H., N-6694 Foldfjorden, Norway. E-mail: haolsvik@frisurf.no

**2497.** Orr, R. (2001): Preliminary list of the dragonflies and damselflies of Washington D.C.. *Argia* 13(1): 20-22. (in English). [This primarily and discussion list compiles available information - published and unpublished - on the Odonata of Washington D.C., USA.] Address: Orr, R.L., 5215 Durham Road East, Columbia, MD 21044-4444, USA. E-mail: richard.l.orr@usad.gov

**2498.** Ott, J. (2001): Erfahrungen aus der Planungspraxis bei Monitoringstudien mit Libellen. Abh. Ber. Naturkundemus. Görlitz 73(1): 67-68. (in German with English summary). ["Four monitoring studies, which all took place in different parts of the German federal state Rhineland-Palatinate, are presented. The studies covered the long-term impact of fish stocking on the dragonfly fauna of a gravel pit, the constant changing of the fauna of some shallow waters, control of the success of a restoration measure, and finally the monitoring of a possible future impact on wetlands as a consequence of groundwater extraction." (Author)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**2499.** Ott, J. (2001): Expansion of Mediterranean Odonata in Germany and Europe - consequences of climatic changes. In: Walther, G.-R., C.A. Burga & P.J. Edwards (Eds.): "Fingerprints" of Climate Change. Kluwer Academic/Plenum Publishers. New York, Boston, Dordrecht, London, Moscow: 89-111. (in English). ["Whereas a few years ago a clear northward expansion was shown only for the dragonfly *Crocothemis erythraea*, a Mediterranean element of the German dragonfly fauna, now for a lot of dragonflies a comparable situation is very obvious. In this paper an overview of recent expansion of many dragonfly species in Germany and Europe is given, as well as some information on the biological and ecological consequences. Beside this clear trend of expansion towards the north, the increase of population sizes and the colonisation of biotopes in higher altitudes, also several biological and behavioural adaptations could be registered, which are shown in detail. Consequences and scenaria for the future of several dragonfly species and for the aquatic systems as a whole are pointed out." (Author).] Address: Ott, J., L.U.P.O. GmbH, Friedhofstrasse 28, D-67705 Trippstadt, Germany

**2500.** Ott, J. (2001): Zum Einsatz von Libellen als Bioindikatoren und Monitoringorganismen in Feuchtgebieten - das Beispiel einer geplanten Wasserentnahme im Naturschutzgebiet «Täler und Verlandungszone am Gelterswoog» (Biosphärenreservat Pfälzerwald). Ann. Sci. Rés. Bios. Trans. Vosges du Nord-Pfälzerwald 9: 151-177. (in German with French and English summaries). ["In a system of valleys measuring approximately 50 hectares, to the south west of Kaiserslautern, the extraction of approximately one million m<sup>3</sup> of ground water is planned from the year 2001 onwards in the «Valleys and alluvial zones in the Gelterswoog». To ensure that this water extraction does not create any significant damage to the area's important flora and fauna, ecological monitoring with intensive studies of flora and fauna has been carried out since 1998. As part of this, individual aspects of dragonfly species have been presented, and related back to previous examinations of the same area. In total in the most varied wet, habitat rich areas (streams, low-lying marshland, dystrophic ponds, alluvial zones, fallow lands, etc.) 33 species of dragonflies have been recorded thus far, [...] including 23 species on the Rheinland-Pfalz Red List and 17 species on the German National Red List. It has so far, except for individual fish stocking measures and local water management operations, as well as natural succession, established only few massive damaging factors for the dragonfly population. In addition to the high degree of diversity and mosaic type of habitats it is above all remarkable for its almost barrier free composi-

tion. The number of indigenous species is relatively constant and the annual turnover of species throughout the whole area is low. One indigenous species that has now disappeared is *Calopteryx splendens*, but on the other hand the following species have re-established themselves and are breeding successfully: *Gomphus pulchellus*, *Brachytron pratense*, *Anax imperator*, *Sympetma fusca*, and *Erythromma viridulum*. As regards species protection, the most significant species in the area in addition to *Coenagrion hastulatum*, *Orthetrum coerulescens* and *Leucorrhinia dubia* is *Somatochlora arctica*. The possibilities for using dragonflies as bioindicators and monitoring organisms are explained in detail as an example of possible reactions to changes in water level." (Author)] Address: OTT, J., L.U.P.O., Friedhofstrasse 28, D-67705 Trippstadt, Germany

**2501.** Parr, A. (2001): Migrant and dispersive dragonflies in Britain during 2000. J. Br. Dragonfly Society 17 (2): 49-54. (in English). ["The year 2000 was perhaps not as dramatic for migrant Odonata in Britain as, for example, 1995 or 1998, but there were a number of highlights. Most notably, high numbers of *Sympetrum fonscolombii* arrived for the third time in the last five years and several other unusual migrant species were recorded. Two main periods of immigration took place. A brief hot spell in mid-June saw a significant arrival of migrant insects, including dragonflies such as *S. fonscolombii*, *Anax parthenope* and a single *Crocothemis erythraea*. During late-July, further arrivals of *Anax parthenope* and *S. fonscolombii* were observed. The first wave of immigration pushed quite far north; the record of *A. parthenope* from Orkney represents the most northerly record for this species in Europe. Complementing the events in Britain, three species new to Ireland (*Aeshna mixta*, *A. imperator*, *A. parthenope*, were recorded during the year." (Author). Additional species treated are: *Calopteryx splendens*, *Ceriagrion tenellum*, *Erythromma viridulum*, *Aeshna grandis*, *Cordulia aenea*, *Libellula quadrimaculata*, *L. depressa*, *Orthetrum cancellatum*, *Sympetrum striolatum*, *S. sanguineum*, and *S. flaveolum*. Some observations referring *A. grandis*, *A. imperator*, and *S. striolatum* attracted by UV light resp. moth traps are of general interest.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

**2502.** Paulson, D. (2001): A Venezuelan odonate vacation. Argia 13(1): 7-9. (in English). [The trip in the dry season to Venezuela turned out - from the odonatological view - to be quite "disappointing". 500+ specimens in 102 species could be collected among them *Phyllogomphoides major* Belle 1984, *Erythemis credula* (Hagen 1861), *Neoneura cristina* Rácenis, 1955, *Neoneura luzmarina* De Marmels 1989, *Neoneura sylvatica* Hagen in Selys 1886, and *Oligoclada sylvia* (Kirby 1889). New species for Venezuela are *Phyllocycla bartica* Calvert 1948, *Idiataphe cubensis* (Scudder 1866), *Micrathyrina dunklei* Westfall 1992, and *Micrathyrina occipita* Westfall 1992.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**2503.** Paulson, D. (2001): Review: Dragonflies through binoculars - A field guide to dragonflies of North America. Science 293(5537): 2005. (in English). [Review of Sid Dunkle's book on North America Anisoptera.] Address: Paulson, D.R., Slater Museum, Univ. of

Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**2504.** Paulson, D. (2001): *Sympetrum madidum* in Minnesota. *Argia* 13(1): 19-20. (in English). [S. madidum caught 11 July 1966 near Karistad has to be added to the list of Minnesotan Odonata.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**2505.** Pavey, C.R.; Burwell, C.J.; Grunwald, J.E.; Marshall, C.J.; Neuweiler, G. (2001): Dietary benefits of twilight foraging by the insectivorous bat *Hipposideros speoris*. *Biotropica* 33(4): 670-681. (in English). [ "Although bats are nocturnal, many species emerge from roosts to forage during twilight, despite a presumed high risk of predation at this time. Here, we describe twilight foraging by a maternity colony of Schneider's leafnosed bat (*Hipposideros speoris*) in the dry zone of Sri Lanka and determine the dietary benefits of such behavior. Bats usually began foraging during dusk, sometimes before sunset, and also foraged during twilight in the morning. Mean use of available twilight by four radio-tagged bats was 75 percent. Twilight foraging made up, on average, 47 percent of the total foraging time of these bats (range = 25-96%), although twilight consisted of only 12 percent of the available time between sunset and sunrise the next morning. Eight species of potential predators (7 birds and 1 mammal) were observed within a 1 km radius of the colony, of which 5 species are predicted to regularly capture bats. Bats took a wide diversity of prey (11 insect orders, including at least 27 families, and spiders) that ranged in wing length from 2.0 to 54.0 mm. Major orders in the diet were Coleoptera, Lepidoptera, and Diptera. Prey of secondary importance included Hemiptera, Hymenoptera, Isoptera, and Neuroptera. Bats captured large numbers of insects that were only available or had marked peaks of abundance during twilight. These groups included small, swarming insects (especially flies) that have peaks in flight activity at dusk and dawn, large diurnal species (especially dragonflies) that have crepuscular activity, and winged termites that emerge in swarms at dusk. Access to these insects was a clear benefit of twilight foraging." (Authors)] Address: Pavey, C.R., Pk & Wildlife Commission Northern Territory, Arid Zone Research Institute, POB 1046, Alice Springs, NT 0871, Australia

**2506.** Perepelov, E.; Bugrov, A.G.; Warchalowska-Sliwa, E. (2001): C-banded karyotypes of some dragonfly species from Russia. II. The families Cordulegasteridae, Corduliidae and Gomphidae. *Folia Biologica, Krakow* 49(3-4): 175-178. (in English with Polish summary). [ "The C-stained karyotypes of five species of three dragonfly families from Western Siberia and Kunashir Island have been analysed. *Gomphus epoptalmus*, *G. vulgatissimus*, *Nihonogomphus ruptus*, and *Anotogaster sieboldii* showed usual character of C-heterochromatin distribution, all chromosomes have terminal C-bands. *Somatochlora graeseri* has unique for dragonflies type of terminal C-blocks on autosomes. Three pairs of autosomes have the very large heterochromatic blocks, other chromosomes, including the X, have no C-band." (Authors)] Address: Perepelov, E. & A. Bugrov, Siberian Branch, Institute of Animal Systematics and Ecology, Russian Academy of Sciences, 11 Frunze St., 630091, Novosibirsk, Russia. E-mail: bugrov@fen.nsu.ru

**2507.** Phoenix, J.; Kneis, P.; Zinke, J. (2001): *Ophiogomphus cecilia* im sächsischen Abschnitt der Elbe (Odonata: Gomphidae). *Libellula* 20(1/2): 23-32. (in German with English summary). [ "Along the River Elbe in the Free State of Saxony about one hundred individuals (larvae, exuviae, adults) of *O. cecilia* were recorded at 26 localities in the year 2000. The species settles along the whole Saxon section of the River Elbe with a length of about 180 km. The species is the most frequently recorded gomphid in this section of the River Elbe. [...]" (Authors)] Address: Phoenix, J., Goethestr. 22, D-01824 Königstein, Germany. E-mail: Juergen.Phoenix@t-online.de

**2508.** Piper, W.; Schrimpf, I. (2001): *Libellennachrichten*. *Libellennachrichten* 6: 1-16. (in German). [Volume 6 of the newsletter of the Society of German Speaking Odonatologists contains information on the 20th meeting held in Görlitz, the minutes of this meeting, announcements, reviews, calls for cooperation, reports of the 2001 odonatological symposia in Novosibirsk and Gällivare, "Dragonflies and new media", "Dragonflies and Literature", and "Dragonflies and Art".] Address: Schrimpf, Ilona, Heimbühlerstr. 32, D-72768 Reutlingen, Germany

**2509.** Plotnikova, S.I.; Sinakevich-Pean, I.E. (2001): Descending neurons of the epipharyngeal ganglion in the dragonfly *Aeshna* larva. *J. Evol. Biochem. Physiol.* 37(4): 441-443. (in English). [Using staining with methylene blue, several descending neurons were revealed in the epipharyngeal ganglion of an *Aeshna* larva. "Among them there is a neuron that has extensive arborization and unites a significant part of the epipharyngeal ganglion. The contacts of this neuron with the bundle of optic fibers from the lobule are found, which allows suggesting its participation in the descending visual pathway. A neuron of the central complex of the descending tract is revealed." (Authors)] Address: Plotnikova, S.I., Russian Acad. Sci., Sechenov Inst. Evolutionary Biochem. & Physiol., St Petersburg, Russia

**2510.** Radford, A.P. (2001): Repeated interception of wind blown flowers of Common Cottongrass by the Emperor Dragonfly *Anax imperator* Leach. *J. Br. Dragonfly Society* 17( 2): 59. (in English). [28 June 2001, at the Waldegrave Pool, near Priddy, Somerset, UK; a strong, gusting, south-west wind carried the flowers of Common Cottongrass *Eriophorum angustifolium* "towards the pool where a male *A. imperator* was routinely patrolling over the water. As the flowers approached, the dragonfly flew towards them, into the wind. The dragonfly usually made contact with the flowers that were intercepted, although no attempt was made to seize any flowers, either by using the legs or the mouthparts. This behaviour continued, intermittently, for about five minutes, during which five or six flowers were intercepted. The individual dragonfly then resumed normal patrol activity, quite ignoring any further flowers that drifted over. There were other individuals of *A. imperator* patrolling over the pond, but none of these flew towards the airborne flowers. It was clear that only one individual was involved. Corbet (1999) mentions that Anisoptera may make investigatory flights towards large objects and then reject them when a few feet away. He states that in Florida, *Anax junius* (Drury) and *Coryphaesctma ingens* (Rambur) have been observed chasing badminton shuttlecocks. It is not clear whether these activities represent territorial defence or mistaken



prey identification." (Author)] Address: Radford, A.P., Crossways Cottage, West Bagborough, Taunton, Somerset TA4 3EG, UK.

**2511.** Rantala, M.J.; Hovi, M.; Korkeamaki, E.; Suhonen, J. (2001): No trade-off between the size and timing of emergence in the damselfly, *Calopteryx virgo* L.. *Ann. Zool. Fenn.* 38(2): 117-122. (in English). ["Many species of insects have been reported to show seasonally declining size at emergence. This has been explained as an adaptive response to time constraint between size and age at maturity (emergence). We studied seasonal variation in the size of damselfly *Calopteryx virgo* L. in six different creeks in central Finland. The length of hind wings was measured for 942 males and 285 females covering the flying period from mid June to mid August. The length of the hind wings of damselflies did not decrease towards the end of flying period in any river or either sex. In light of this study, seasonal reduction of body size is not a general phenomenon among odonates contrary to common understanding." (Authors)] Address: Rantala, M.J., Univ. Jyväskylä, Dept Biol. & Environm. Sci., POB 35, FIN-40351 Jyväskylä, Finland

**2512.** Reder, G. (2001): Späte Flugzeit von *Gomphus flavipes* am nördlichen Oberrhein (Odonata: Gomphidae). *Libellula* 20 (3/4): 175-178. (in German with English summary). [16-X-2000 and 21-X- 200, river Rhine near Nordheim, Hessen, Germany (49°42'N, 08°23'E).] Address: Reder, Gerd, Am Pfortengarten 37, D-67592 Flörsheim-Dalsheim, Germany. E-mail: PG.Reder@t-online.de

**2513.** Reinhardt, K.; Naumann, J. (2001): Ergänzungen zur Libellenfauna des Mittleren Saaletales (Insecta: Odonata). *Thüringer faunistische Abhandlungen* 8: 59-61. (in German with English summary). ["Twenty-seven species of dragonflies are recorded from 17 localities. *Brachytron pratense* is recorded for the first time. *Cordulia aenea* has been discovered for the first time since the 1960ies. Two new localities for *Leucorrhinia rubicunda* are mentioned. *Erythromma viridulum*, *Sympetrum pedemontanum*, *S. vulgatum*, and *Anax imperator* were shown to be able to complete their development in one year." (Authors)] Address: Naumann, J., S.-Jacob-Str. 18, D-07743 Jena, Germany

**2514.** Rettig, K. (2001): Glänzende Smaragdlibelle (*Somatochlora metallica*). *Beitr. Vogel-Insektenwelt Ostfrieslands* 166: 19. (in German). [Germany, Lower-Saxony, LSG "Restmoor Ochtelbur", Mow; a copula of *S. metallica* was observed at 10-VII-2001.] Address: Rettig, K., Danziger Str. 11, D-26725 Emden, Germany

**2515.** Röhn, C. (2001): Libellen des Hepbacher-Leimbacher Rieds. *mercuriale* 1: 12-14. (in German). [This fen situated near the Lake Constance, Baden-Württemberg, Germany inhabits 40 odonate species including *Coenagrion mercuriale*, *Brachytron pratense*, *Somatochlora flavomaculata*, and *Sympetrum depressiusculum*. For more than 20 years, it harbours one of the most important populations of *S. flaveolum* in the Federal State Baden-Württemberg, Germany, [the location may be therefore considered as a core habitat of the *S. flaveolum*-population in Europe (comment of M.S.).] Address: Röhn, C., Bernried 15, D-88099 Neukirch, Germany.

**2516.** Rolff, J.; Vogel, C.; Poethke, H.J. (2001): Co-evolution between ectoparasites and their insect hosts: a simulation study of a damselfly-water mite interaction. *Ecol. Entomol.* 26(6): 638-645. (in English). ["1. A simulation model investigating the co-evolution of water mites infesting their aquatic insect hosts during emergence is presented. The model is based on field and experimental studies of the ectoparasitic water mite *Arrenurus cuspidator* and the damselfly *Coenagrion puella*. 2. Three scenarios were studied: (1) Only the host was allowed to evolve timing of emergence, while the timing of the parasites' infestation opportunity was held constant. (2) Both host and parasite were allowed to evolve. (3) Only the parasite's timing was allowed to evolve, while the host was constrained completely. 3. In the first two scenarios, parasite abundances decreased in the course of evolution and reached values well below, those found in the field, whereas in the third scenario parasite abundances were maintained at a level close to that found in the field. In the second scenario (co-evolution), the host seemed to be the leader in the evolutionary race. 4. It is concluded that water mite parasitism is capable of shaping emergence patterns in aquatic insects and, despite the same life-cycle length for host and parasite, the parasite evolves fast enough to shape its hatching pattern to match the emergence pattern of its host." (Authors)] Address: Rolff, J., Department of Animal and Plant Sciences, University of Sheffield, S10 2TN Sheffield, UK. E-mail: JOR@sheffield.ac.uk

**2517.** Rolff, J.; Braune, P.; Siva-Jothy, M.T. (2001): Ectoparasites do not affect ejaculate volume in the dragonfly *Coenagrion puella*. *Physiol. Entomol.* 26(4): 315-319. (in English). ["Imagoes of the dragonfly *C. puella* are parasitized frequently by ectoparasitic water mites. In an experimental study of the parasite load we examined the influence of parasite burden on host sperm volume. Infection with ectoparasitic water mites did not affect sperm volume in the seminal vesicle (ejaculate volume). It is concluded that water mite parasitism does not affect male fitness in *C. puella* by reducing sperm production." (Authors)] Address: Rolff, J., Department of Animal and Plant Sciences, University of Sheffield, S10 2TN Sheffield, UK. E-mail: JOR@sheffield.ac.uk

**2518.** Rolff, J. (2001): Effects of age and gender on immune function of dragonflies (Odonata, Lestidae) from a wild population. *Can. J. Zool.* 79(12): 2176-2180. (in English). ["Immunity is a crucial determinant of fitness. Despite this, very few studies have addressed the expression of immune function in insect populations in the wild. I present data on two immune parameters, hemocyte load and expression of phenoloxidase, in adult damselflies (*Lestes viridis*) from a wild population. In a comparison of newly emerged with sexually mature adults, it was found that the latter had higher hemocyte loads but lower phenoloxidase expression. Mature females showed significantly higher phenoloxidase expression than mature males. The sexual differences might be explained by gender differences in life history." (Author)] Address: Rolff, J., Department of Animal and Plant Sciences, University of Sheffield, S10 2TN Sheffield, UK. E-mail: JOR@sheffield.ac.uk

**2519.** Rolff, J. (2001): Evolutionary Ecology of water mite-insect interactions: a critical appraisal. *Archiv für Hydrobiologie* 152(3): 353-368. (in English). ["Water mites are ubiquitous parasites in freshwater ecosystems.

The interaction between water mites and aquatic insects has been scarcely studied from an evolutionary ecology viewpoint. Host finding is an important feature of the water mite's life cycle. The host finding success is suggested to depend upon host behaviour and quality. Water mite parasitism lowers host fitness via different routes: by draining nutrients hosts can suffer from decreased fecundity, increased mortality etc. Host sexes and closely related species are affected differently. Recent studies on host fitness, whilst taking the parasite behaviour into account, revealed results contrasting older studies where knowledge of the parasites' life cycle was absent. The potential for coevolution is discussed. For exploring evolutionary trends a water mite phylogeny is needed. Water mite-aquatic insect interactions can be assumed to provide excellent conditions to conduct experimental studies on direct and indirect effects of multiple natural enemies in freshwater ecosystems." (Author)] Address: Rolff, J., Department of Animal and Plant Sciences, University of Sheffield, S10 2TN Sheffield, UK. E-mail: JOR@sheffield.ac.uk

**2520.** Samways, M. (2001): Testing the new Categories of Threat on dragonflies in Africa. *Species* 35: 23. (in English). ["Verbatim: In a recent assessment of dragonflies across Africa and neighboring islands, it was important to distinguish between those species that are simply rare, those that are 'Data Deficient', and those that are actually threatened. The Extinct category needs very careful consideration, as premature inclusion of a species or ESU (Evolutionarily Significant Unit) could thwart further searches. In short, the IUCN 2000 Categories of Threat were found to be very workable for African dragonflies. Problems encountered were more in terms of difficulties of field assessments than with the categorization process. However, while the Red List is of great value when considering one species at a time, it should not be considered as a general database for analyzing comparative figures on assemblages. Such an analysis is likely to reveal more on assessment efforts than on the organisms themselves."] Address: Samways M.J., Invertebrate Conservation Research Centre, Dept Zool. & Entomol., University of Natal, P / Bag X01, Scottsville 3209, Pietermaritzburg, South Africa. E-mail: samways@un.ac.za

**2521.** Sasahara, S. (2001): On the status quo and conservation of *Rhyothemis severini* Ris. *Nature and Insects* 36(7): 26-28. (in Japanese). [*R. servini* was first found by me at Naze on the Amami Islands in July, 1993 and was designated as Near Threatened species in 2000. This dragonfly inhabits about ten bogs (20 to 30 cm deep) of about 50 to 500 square meters in the fallow fields, where wild millets grow. 19 sympatric species of Odonata inhabit there. The species has a weak territoriality. Males watch their mates ovipositing at the height of 1 meter from the surface of the water. They were often interfered by sympatric *R. variegata* impenetratrix. The maximum population was 30 in 1993 and in 2000 none was sighted. The main factor of decreasing is widening of a road, which caused scanty of filling water into the bogs, and pollution of water, and increasing of crayfish. This dragonfly is a newcomer to the island and preservation of it is an difficult problem. Translation; Ishizawa, Naoya] Address: not stated

**2522.** Saugestad, T. (2001): New observations of *Leucorrhinia pectoralis* (Charpentier, 1825) in Hordaland, western Norway. *Nord. Odonat. Soc. Newsl.* 7(1): 11.

(in Norwegian with English summary). ["A second and probable third locality in Hordaland for *L. pectoralis* was discovered 14.vii. 2000, at two small nameless bog lakes in Os municipality, near Bergen. The localities are briefly described. The probable origin of what seems to be an isolated occurrence at the west coast of Norway is also discussed." (Author)] Address: Saugestad, T., Gml. Kalvedalsv.12B, N- 5019 Bergen, Norway

**2523.** Schaijk, V.A. van; Geraeds, R.P.G. (2001): First findings of exuviae of the dragonfly *Ophiogomphus cecilia* (Fourcroy 1785) in the Netherlands. *Natuurhistorisch maandblad* 90: 166-167. (in Dutch with English summary). ["In the period of the 25th of June until the 29th of July 2001, four exuviae of *O. cecilia* were found along the river Roer. These are the first exuviae of this species found in the Netherlands. During the same inventory, two freshly emerged female adults were also spotted in the same area. These observations are the result of an intensive survey undertaken after the first sighting of this species along the river Roer last year (GERAEDS & HERMANS, 2000). The findings confirm the existence of a population of *O. cecilia* in this particular river. Further investigations in the next few years will have to show whether this species can establish itself in this area." (Author)] Address: Geraeds, R.P.G., Juliana-laan 46, NL-6042 JH Roermond, The Netherlands

**2524.** Schiel, F.-J. (2001): Aktuelle Daten zum Vorkommen der Asiatischen Keiljungfer (*Gomphus flavipes*) in Baden-Württemberg. *mercuriale* 1: 23-24. (in German). [Additional four localities in the Federal State Baden-Württemberg, Germany with records (exuviae) of *Stylurus flavipes* along river Rhine are dealt with.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**2525.** Schiel, F.-J.; Buchwald, R. (2001): Die Große Moosjungfer in Südwest-Deutschland. Konzeption, Durchführung und Ergebnisse des LIFE-Natur-Projekts für gefährdete Libellenarten am Beispiel von *Leucorrhinia pectoralis*. *Naturschutz und Landschaftsplanung* 33(9): 274-280. (in German with English summary). ["The LIFE-Nature project, running from 1997 to 2000, included population counts, various management measures, and extensive public information aiming to support the long-term survival of *L. pectoralis*. The survey of a total of 37 mires identified 15 populations. All of them are situated in the region "Oberschwäbisches Hügelland" (County of Ravensburg). For 11 of these populations, successful reproduction of the species has either been proven or can be considered likely. The present habitats are negatively affected by nutrient inputs and internal mineralisation. These processes lead to an accelerated growth of shore plants, and the colonised peat pools become more and more shaded by woody plants. Practical implementation of the LIFE-Nature project focused on 24 management measures undertaken in 12 different mires respectively mire areas. In four cases the removal of the dense vegetation led to a clear rise in number of observed adult dragonflies. In at least one case an increase in number of emerging individuals was shown three years after the management measures. In order to guarantee the long-term survival of *L. pectoralis* in Baden-Württemberg, management activities will remain absolutely necessary. We recommend the employment of Wildermuth's rotation model which has been successfully tested over

many years in Switzerland. Re-establishment respectively improvement of several metapopulations in the "Oberrheinisches Hügelland" has to be the main purpose of future management plans. In this way, a stable situation for *L. pectoralis* can be achieved, possibly also allowing recolonisation of adjacent regions." (Authors)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**2526.** Schlüpmann, M. (2001): Beobachtungen zur Phänologie der Libellen-Imagines im nördlichen Sauerland (Odonata). *Entomol. Nachr. Berichte* 45(3/4): 171-179. (in German with English summary). [Nordrhein-Westfalen, Germany; phenological data of several Odonata including seasonal dependend abundances are documented. Special emphasize is given to *Aeshna cyanea* and its long lasting maturation resp. pre-reproductive period.] Address: Schlüpmann, M., Hierseier Weg 18, D-58119 Hagen, Germany. E-mail: martin.schluepmann@t-online.de

**2527.** Schlüpmann, M. (2001): Die Libellenfauna urbaner Lebensräume am Beispiel der Stadt Hagen. *Dortmunder Beitr. Landeskunde, Naturwiss. Mitt.* 35: 191-216. (in German with English summary). [The study discusses parameters responsible for suitability of water bodies in urban environments. Frequency and indiginity of species are compiled in a table. Relationships between Odonata and the degree of areas developed for buildings are discussed. The importance of garden ponds, and measures to improve their habitat quality for dragonflies is outlined. It is concluded that a urbanophilous odonate coenoses is not existing.] Address: Schlüpmann, M., Hierseier Weg 18, D-58119 Hagen, German. E-mail: martin-schluepmann@t-online.de

**2528.** Schmidt, B.; Osterried, J.; Stottele, T. (2001): *Gewässerbericht 2000 der Stadt Friedrichshafen; Zustände, Entwicklungsziele und Maßnahmen.* Schriftenreihe Umwelt der Stadt Friedrichshafen 1. 116 pp. (in German). [This is an exhaustive report on the current situation of the running waters and water management on the territory of the city of Friedrichshafen, Lake Constance, Germany. Each of the running waters is described in detail with special emphasize on restoration measures to be realised. Fauna and flora, and bordering vegetation and biotyps in the catchment area are characterised stressing indicator species and measures according environmental quality aims. Many tabs and colour pictures help to get a deep insight into the situation of the running waters of the region. Some of the material and (didactical) graphs are sound and very original. B. Schmidt is one of the leading German odonatologists, thus Odonata are well represented in this report.] Address: Stadt Friedrichshafen Amt für Umwelt und Naturschutz und Eigenbetrieb Stadtentwässerung, Postfach 2440, D-88014 Friedrichshafen, Germany

**2529.** Schmidt, B. (2001): Habitate, Fortpflanzungsverhalten und Eiablagestrategien der Südlichen Mosaikjungfer (*Aeshna affinis*) im Eriskircher Ried (Bodensee). *mercuriale* 1: 14-18. (in German). [Probably since more than 10 years, an autochthonous population of the Mediterranean species *A. affinis*, which currently extends its range to the north, exists in the Eriskirchener Ried (fen situated near Lake Constance, Baden-Württemberg, Germany). The author documents all records of the species in this locality, supposing that the initial establishment of the species

establishment of the species may be the result of influxes in 1987 (or 1992 and 1995). In 1999 *A. affinis* was the most common member of Aeshnidae in the Eriskircher Ried! The climatic preferred situation of the locality is in addition documented by a strong population of *Lestes barbarus*. The author describes the habitat, hunting and searching flights for females, and oviposition sites in detail. He discusses the possibility of different oviposition strategies of the two colour morphs of females (brown/light blue and brown/yellow green): the light blue colour morph seems to oviposit without male in more densely grown habitats, while the yellow green morph seems to oviposit in tandem position with male in more open, shallow waters. Advantage and disadvantage of the strategies on the population level are discussed.] Address: Schmidt, B., Sandöschstr. 28; D-88048 Friedrichshafen, Germany. E-mail: Schmidt-empire@gmx.de

**2530.** Schmidt, Eb. (2001): Strittige systematische Fragen auf Gattungsniveau bei mitteleuropäischen Libellen (Odonata). *Abh. Ber. Naturkundemus. Görlitz* 73 (1): (in German with English summary). ["The following genera (including European species) can be separated by autapomorphies: *Chalcolestes* Kennedy, 1920, from *Lestes* Leach, 1815, with *C. viridis* (Vander Linden, 1825); *Stylurus* Needham, 1897, from *Gomphus* Leach, 1815, with *S. flavipes* (Charpentier, 1825); *Platetrum* Newman, 1833, from *Libellula* L., 1758, with *P. depressum* (L., 1758); *Ladona* Needham, 1897, from *Libellula* too, with *L. fulva* (Müller, 1764). *Aeshna isocetes* (Müller, 1767) should not yet be transferred into the (palaetropical) genus *Anaciaeschna* Selys, 1878. *Tarnetrum* Needham & Fisher, 1936 is now accepted on subgenus level only for *Sympetrum* (*Tarnetrum*) *fonscolombii* (Selys, 1840). The genera *Cercion* and *Erythromma*, *Anax* and *Hemianax* should still remain separated for the European species." (Author)] Address: Schmidt, E., Biologie und ihre Didaktik, FB9 / S05, Universität GH Essen, D-45117 Essen, Germany

**2531.** Schnabel, H. (2001): Untersuchungen zum Vorkommen larval überwinternder Libellenlarven in Karpenteichen des Oberlausitzer Heide- und Teichgebietes. *Abh. Ber. Naturkundemus. Görlitz* 73(1): 79-83. (in German with English summary). ["In 1999 and 2000, 69 commercial fishery ponds in the Upper Lusatian heath and lake district were investigated as to the occurrence of dragonfly larvae. A total of 12668 individuals belonging to 19 species was recorded. The results are compared with existing literature and the relationship between occurrence and fish stocking density are discussed on the representative basis of the 'Großer Streichteich'-Pond in Bernsdorf, Germany". (Author)] Address: Schnabel, H., Keula 16, D-02997 Wittichenau, Germany

**2532.** Schultz, J.K.; Switzer, P.V. (2001): Pursuit of heterospecific targets by territorial Amberwing Dragonflies (*Perithemis tenera* Say): A case of mistaken identity. *Journal of Insect Behavior* 14(5): 607-620. (in English). ["Although they are defending mating territories, territory residents of a wide variety of insect species have been observed to pursue heterospecifics in addition to the conspecifics that intrude on their territories. One species that has such heterospecific pursuits is" *Perithemis tenera* "In this study, we tested five alternative hypotheses for the function of heterospecific pursuits in amberwings: competition for resources, preven-



tion of interference while mating, predator deterrence, foraging, and mistaken identity. Resident males pursued both male and female conspecifics, as well as a species of horse fly (*Tabanus* spp.) and butterfly (*Ancyloxypha numitor*). Other intruding odonates, including *Epitheca princeps*, *Erythemis simplicicollis*, *Libellula luctuosa*, *Pachydiplax longipennis*, and *Plathemis lydia*, were relatively ignored. Because the horse fly and butterfly were similar to amberwings in body size, color, and flight height, and because they are not predators or prey of amberwings, we concluded that the pursuit of these heterospecifics was due to mistaken identity. The characteristics of the horsefly and butterfly likely correspond to the cues that the male amberwings use to identify conspecifics, and the relative rarity of intrusions by these two species (as well as by female amberwings) probably made it more costly to discriminate and pursue only conspecifics than to make some mistaken pursuits." (Authors)] Address: Switzer, P.V., Eastern Illinois Univ., Dept Biol, Sci., Charleston IL 61920; USA. E-mail: cfvps@eiu.edu

**2533.** Schutzgemeinschaft Libellen in Baden-Württemberg (2001): Kurzbeiträge / Termie 2002 / SGL mercuriale 1: 25-36. (in German). [Documentation of some mailings circulated to members of the SGL with notes on records of *Coenagrion scitulum* in Vorarlberg, Austria, a new record of *Ophiogomphus cecilia*, some sneering comments on the myth of sticking dragonflies (the myth is assessed as unthreatened in the Red list of myths), notes on the comming meeting of SGL and GdO, and the minutes of the founding meeting of SGL and the constitution of this organisation.] Address: SGL c/o Röske, W., Kandelstr. 26, D-79106 Freiburg, Germany

**2534.** Sherratt, T.N.; Forbes, M.R. (2001): Sexual differences in coloration of Coenagrionid damselflies (Odonata): a case of intraspecific aposematism? *Anim. Behav.* 62(4): 653-660. (in English). ["Sexual dimorphism is commonly explained as a consequence of selection on traits that increase male attractiveness to females, or simply allow males greater access to females. Here, we consider another explanation for sexual differences in coloration within species of the damselfly family Coenagrionidae (Odonata: Zygoptera). In many of these species, males are more brightly coloured than females and have different patterns. Yet they are non-territorial and do not engage in displays: indeed, male competition for mates often resembles a scramble. We therefore argue that even if females show a degree of mate choice, then it is unlikely to be based on colour or pattern. Instead, we suggest that sexual dimorphism has evolved in this group primarily as a form of sex-related warning coloration. First, we argue that it is almost inevitable that male-male interactions will incur a small cost to both participants. We then provide some evidence that males are capable of using colour as a clue to sexual identity. Using a simple model, we show that if these conditions hold, then sexual dimorphism will readily evolve. Furthermore, the model shows that if females are selected to avoid excessive harassment by males as is often suggested, then males should evolve much brighter coloration than females. If the assumptions underlying our 'unprofitable mate' model are broadly correct, then not only does it offer a novel explanation for sexual dimorphism, but it also provides the first case example of the evolution of aposematism as a result of intraspecific interactions." (Authors)] Address: Sherratt

T.N., Univ Durham, Dept Biol Sci., South Rd, Durham DH1 3LE, UK

**2535.** Showers, J.; Horsnail, P. (2001): Damselfly exuviae found in a UV light moth trap. *J. Br. Dragonfly Society* 17( 2): 33-34. (in English). ["Damselflies were first noted in the trap on 31 May 2000, and were then found on each day until 12 June 2000. A total of 187 exuviae were collected during this period, with a maximum total of 56 collected on 1 June. After 12 June, only occasional exuviae were found and these were not identified. In addition to the exuviae found inside the light trap, many exuviae were present on the supports, but these were not collected. The emerged damselflies either found their own way out of the trap or were released when the trap was checked for moths." A total of 105 exuviae of *Enallagma cyathigerum* and three *Erythromma najas* exuviae were identified. "It was not possible to identify all specimens, as many were badly damaged." [...] "The discovery of large numbers of damselfly exuviae in the moth trap suggests that damselfly larvae may be attracted to UV light at emergence. This observation supports previous work indicating a response to UV light by emerging larvae of the family Coenagrionidae (Lavoie-Dornik & Pilon, 1987). It also poses several areas for further investigations, including the variation in response between species, the most effective wavelengths for eliciting a response, and the relationship between the intensity of the light source and the distances over which damselfly larvae will be attracted." (Authors)] Address: Showers, J., B., Desborough Road, Rothwell, Kettering, Northants NN14 6JQ, UK

**2536.** Sibl, J.; Seginkova, A.; Bulánková, E. (2001): Contribution to the knowledge of dragonfly fauna (Odonata) of the Danubian Plain (southwestern Slovakia). *Entomofauna carpathica* 13: 68-71. (in Slovakian with English summary). [The regional Odonata fauna totals in 45 species including literature records. In 1999 and 2000, 34 species could be recorded at 9 localities. Some rare Slovakian species as *Coenagrion scitulum*, *Brachytron pratense*, *Anaciaeschna isocles*, *Anax parthenope*, *Orthetrum albistylum*, *O. coerulescens*, *Symptetrum meridionale*, *S. pedemontanum*, *S. depressiusculum*, and *Leucorrhinia pectoralis* could be confirmed.] Address: Sibl, J., J. Stanislava 15, SK 84105 Bratislava, Slovakia. E-mail: sibl@changenet.sk

**2537.** Silsby, J. (2001): WDA: present status report. *Argia* 13(1): 22-23. (in English). [Report of activities and services of Worldwide Dragonfly Association.] Address: Silsby, Jill, 37 Astoria House, 116 Hight Street, Purley, Surrey CR8 2XT, UK

**2538.** Silsby, J. (Ed.) (2001): Newsletter of the worldwide Dragonfly Association 5(1). W.D.A.'s AGRION 5(1): 16 pp. (in English). [[Scientific notes:] Dunkle, S.: Apache Spiketail, *Cordulegaster diadema* Selys, 1868 (pp. 3-4); - Paulson, D.: Zenithoptera americana Linnaeus, 1758 (p. 4); - Wasscher, M.: A Mecistogaster smarter than me (p. 4); - Alien, P.: *Scapanea frontalis* Burmeister, 1890 (p. 4); - Garrison, R.: Two beautiful odonates from Brazil (pp. 4-5); - Endersby, I.: *Cordulephya pygmaea* Selys, 1871 (p. 5); - Taylor, J.: The reed "butterfly", *Rhyothemis graphiptera* Rambur, 1842 (pp. 5-6); - Moore, N.: *Archipetalia auriculata* Tillyard, 1917 (p. 6); - Silsby, J.: *Cyrano unicolor* Selys, 1869 (pp. 6-7); - M. Hämäläinen: In search of beautiful wings: *Vestalis melania* Selys, 1873 (pp. 7-8); - Natsume, H.:

Globe Skimmer, *Pantala flavescens* (Fab., 1798) & other favourites (p. 8); - Wilson, K.: *Chlorogomphus papilio* Ris, 1927 (p. 9); - Kalkman, V.: The Oriental Rock-dweller, *Bradinopyga geminata* (Rambur, 1842) (pp. 9-10); - Miller, K.: The Twister, *Tholymis tillarga* (Fabricius, 1798) (pp. 10-11); - Dijkstra, K.-D.B.: Sky-blue Skimmer, *Cyanothemis simpsoni* Ris, 1915 (pp. 11-12); - Clausnitzer, V.: Mock Emerald, *Olpogastra lugubris* (Karsch, 1895) (p. 12); - Corbel, P.S.: An abiding magical moment: *Rhyothemis fenestrina* Rambur, 1842 (p. 12); - Jödicke, R.: *Sympetrum sinaiticum* Dumont, 1977 (pp. 12-13); - Parr, M.: *Ischnura elegans* (Vander Linden, 1820) (p. 13); - Champion, M.H.: Notes on sighting of *Lindenia tetraphylla* (Vander Linden) by lake Volvi, Greece in July 2000 (p. 13; with a postscript by P.S. Corbet); - Beckemeyer, R.: Favorite dragonflies in Thailand and the USA (p. 14); - Orr, A. G.: *Rhinocypha aurofulgens* Laidlaw, 1931 & others from Australia, New Guinea, Africa & Sulawesi (pp. 14-15); - Corbet, P.S.: [book review] All about dragonflies, by K. Inoue & K. Tani (p. 16); - de Fonseca, N.: [obituary] Terence de Fonseca (p. 16).] Address: Silsby, Jill., 37, Astoria House, 116 Hight Street, Purley, Surrey CR8 2XT, UK. E-mail: jsilsby1@aol.com

**2539.** Sommerhäuser, V. (2001): Insekt des Jahres 2001 - Plattbauchlibelle (*Libellula depressa* Linnaeus). Naturschutz und Landschaftspflege in Brandenburg 10 (4): 126. (in German). [General resp. introductory remarks on the "Insect of the Year" in Germany, *L. depressa* are outlined; special emphasize is given to the adaptations to the primary habitat in floodplains of rivers and to secondary habitats in gravel pits or garden ponds.] Address: not stated

**2540.** Stephan, R.; Xylander, W.E.R. (2001): Die Libellen der Umgebung von Görlitz, gestern und heute. Abh. Ber. Naturkundemus. Görlitz 73(1): 85-89. (in German with English summary). ["The dragonflies of Görlitz and the neighbouring area have been investigated since 1885. Since then, 68 species have been encountered. In recent investigations, 58 species were documented within an area of 30 km around the city of Görlitz. This high number results from an extraordinary diverse landscape structure and thus many different biotopes. The coenoses of dragonflies have obviously changed significantly, resulting in formerly rare species being abundant today (e.g. *A. imperator*, *O. cancellatum*) whereas others have declined in number (*S. flaveolum*, *G. vulgatissimus*, *O. cecilia*, *O. coerulescens*, *O. brunneum*)."] (Authors)] Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany. E-mail: Naturmuseum. GR. Dr.Xylander@t-online.de

**2541.** Sternberg, K.; Buchwald, R. (2001): 20 Jahre "Schutzgemeinschaft Libellen in Baden-Württemberg" von den ersten Anfängen bis Grundlagenwerk und Vereinsgründung. *mercuriale* 1: 19-23. (in German). [This is a detail history of the most active regional odonatological society in Germany, which "produced" a lot of leading German odonatologist, and the recently published most impressive German book on Odonata "Die Libellen Baden-Württembergs Vol. 1 & 2". Of some interest are reflections about the work of amateur odonatologists using political economy cost calculations: More than 20000 hours were necessary to produce the book; but this was only possible on a basis of amateur or student research activities calculated with nearly 90000

hours.] Address: Sternberg, K., Schillerstr. 15, D-76297 Stutensee, Germany

**2542.** Stevani, C.V.; Liria, C.W.; Miranda, M.T.M.; Bechara, E.J.H. (2001): Cysteic acid is the chemical mediator of automotive clearcoat damage promoted by dragonfly eggs. *J. Appl. Polym. Sci.* 81(6): 1549-1554. (in English). ["The damage caused by dragonfly eggs on automotive clearcoats exposed to sunlight occurs by a chemical mechanism similar to that caused by acid rain. Cysteine and cystine residues present in dragonfly eggs are oxidized during the egg hardening process, which releases hydrogen peroxide, to a cysteic acid derivative, a strong acid capable to catalyze the hydrolysis of acrylo/melamine clearcoat polymer. Cysteic acid was indeed identified and quantified by ion-exchange HPLC in dragonfly egg extracts submitted to oxidation by  $H_2O_2$  followed by acid digestion. Moreover,  $H_2O_2$  concentration, temperature, and exposure time profiles of cysteic acid formation as well as an apparent activation energy for cysteine (in dragonfly eggs) oxidation to cysteic acid by  $H_2O_2$  (32 +/- 2 kJ/mol) were determined."] (Authors)] Address: Bechara, E.J.H., Univ. São Paulo, Inst. Quim., CP 26077, BR-05513970 São Paulo, Brazil

**2543.** Stevens, M.; Riedel, H.-W. (2001): Die Wiederbesiedlung des Gebietes der Stadt Bergisch Gladbach durch die Blauflügel-Prachtlibelle *Calopteryx virgo* (L. 1758) (Odonata, Calopterygidae) in den Jahren 1989-2000. *Verh. Westd. Entomol. Tag* 2000: 51-64. (in German with English summary). [In the Rhine-Ruhr agglomeration, Germany, *C. virgo* survived in the near-natural forests of the "Königsforst" in small populations. Between 1990 and 1994, the species seems to have been extirpated in the region. But, it was able to spread into urban areas of Bergisch Gladbach. "From 1995 to 2000 both the number of sites and the number of larvae increased continuously. The "Königsforst" is a refugial habitat, necessary both for survival of nucleus populations and centres of dispersal. A prerequisite for successful recolonisation is a high quality of water and a divers structure of stream-morphology. Recolonisation by larvae takes place in the upwards direction. [...]"] Address: Riedel, H.-W., Stadt Bergisch Gladbach, Fachbereich Umwelt und Technik, Wilhelm-Wagner Platz, D-51429 Bergisch Gladbach, Germany

**2544.** Struktur- und Genehmigungsdirektion Süd (Hrsg.) (2001): NSG Täler und Verdandungszonen am Gelterswoog. Leaflet: 6 pp. (in German). [The leaflet shortly characterizes a Nature Conservation Areal situated near the town of Kaiserslautern, Rheinland-Pfalz, Germany. Pictures of *Erythromma najas* and *Somatochlora arctica* illustrate the odonatological importance of the area. For more odonatological details see: Ott, J. (1990): Die Libellenfauna des geplanten Naturschutzgebietes "Gelterswoog - Kolbenwoog" - mit einem Wiederfund von *Somatochlora arctica* Zetterstedt für Rheinland-Pfalz. *Fauna Flora Rheinland-Pfalz* 6: 227-246.] Address: Struktur- und Genehmigungsdirektion Süd, Neustadt an der Weinstraße

**2545.** Swaay, C. van; Ketelaar, R.; Groenendijk, D. (2001): Dagvlinders en libellen onder de meetlat: jaaverslag 2000. Rapport VS2001.07. De Vlinderstichting Wageningen: 29 pp. (in Dutch with English summary). [This is a report on the monitoring scheme of butterflies and dragonflies in The Netherlands in 2000. The butterfly scheme started in 1990, the dragonfly scheme in

1997. Butterflies and dragonflies are counted using a line-transect method. Dragonfly transects are visited once every two weeks. "The length of the transects is variable and dependent on habitat quality and availability. In addition, single species transects are exclusively counted for a specific threatened butterfly or dragonfly. Thus, more information is obtained on trends of our Red List species. Indices were calculated using the computer program TRIM (Trends and Indices for Monitoring Schemes). This program was developed by CBS ("Statistics Netherlands") for the analysis of time series of counts with missing observations." 185 Odonata-transects were visited every fortnight and 133 single species plots were counted. "Although the number of transects is still growing, in the southern provinces more plots are needed for reliable indices. *Enallagma cyathigerum* was again by far the most numerous dragonfly species in 2000. At the most species-rich plots 25 species were recorded. Special results from the monitoring scheme include for example: (1) *Calopteryx virgo* was counted at 8 transects in 2000. A total of more than 1600 individuals was recorded. At one wooded lowland river densities were much higher than in any other river system in The Netherlands. *C. virgo* is now satisfactorily covered within the monitoring scheme. (2) *Aeshna viridis* is one of the best followed species within the dragonfly monitoring scheme. At a total of 14 transects 185 dragonflies were counted. (3) In the city of Gouda much more dragonflies (both diversity and the number of individuals) were counted at transects alongside ecologically restored banks in the city than in non-restored localities." Address: De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: info@vlinderstichting.nl

**2546.** Szállassy, N.; Bárdosi, E.; Szabó, Z.; Dévai, G. (2001): Fluctuating asymmetry and mating success in males of *Libellula fulva* Müller, 1764. *Abh. Ber. Naturkundemus. Görlitz* 73(1): 91-92. (in English with German summary). [In this study, individually marked *Libellula fulva* males were used to compare short-term and medium-term methods on the basis of correlating wing asymmetry with mating success.] Address: Devai, G., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

**2547.** Tabata, O. (2001): Odonae fauna of Hongo, Sasayama City, Hyogo Prefecture. *Sympetrum Hyogo* 7/8: 10-12. (in Japanese with English summary). ["I spent my boyhood catching insects and fish at Kongo, Sasayama City, which was a cosy country surrounded by hills of 300-400 m altitude. Rice fields were fed by upper and middle reaches of two rivers joining there, and many animals including dragonflies were living. A list of 41 odonate species and short account of the habitats are given based on the records in the 1960s and 1990s. Artificial construction works have damaged the habitats, and 16 species are recorded only in the 1960s." (Author)] Address: not stated

**2548.** Taily, M. (2001): De libellen van het Kraaibos te Moen-Zwevegem (West-Vlaanderen). *Gomphus* 17(1): 37-45. (in Dutch with English and French summaries). ["The dragonflies of the Kraaibos at Moen-Zwevegem (West-Flanders). The Kraaibos at Moen-Zwevegem is a new site, made by the heaping up of clay when modernising the adjacent canal. The terrain has been planted with trees but a central part with a number of smaller ponds is grazed by ponies. Since 1992 a total of 21 dra-

gonfly species were observed, with *Sympetma fusca* and *Ischnura pumilio*. For 14 of them reproduction was at least probable. Also interesting is the presence since some years of a nice population of *Lestes barbarus*. The text closes with some remarks on the management of the site." (Author)] Address: Taily, M., Hoonakkerdreef 35, 8791 Waregem marc.taily@pandora.be

**2549.** Taily, M. (2001): Een vondst van *Ischnura pumilio* (Charpentier, 1825) te Moen-Zwevegem (West-Vlaanderen). *Gomphus* 17(1): 46-50. (in Dutch with English and French summaries). ["An observation of *Ischnura pumilio* in Moen-Zwevegem (West-Flanders). One male of this in Flanders threatened species was found on 19/08/2000 on a site with a typical habitat for the species. This fact is discussed with the rareness in the western part of Belgium and its ecology in mind." (Author)] Address: Taily, M., Hoonakkerdreef 35, 8791 Waregem marc.taily@pandora.be

**2550.** Tennessen, K. (2001): Color pattern in immature *Coryphaeschna adnexa*. *Argia* 13(2): 10-11. (in English). [Preparing a description of a new *Coryphaeschna*, the author checked *C. guyanensis* Machet (1991) which was synonymized with *C. adnexa* for colour patterns. The synonymization is correct, but it was possible to show the problems which lead to the description of *C. guyanensis*: obviously the specimen was an teneral with colour patterns which disappear in a few days in immature stage.] Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktennessen@aol.com

**2551.** Trapero Quintana, A.; Naranjo Lopez, C. (2001): New locality reports for *Crocothemis servillia* (Drury, 1773) (Odonata: Libellulidae) in Cuba. *Argia* 13(2): 3. (in English). [Compilation of present records of *C. servillia* in Cuba.] Address: not stated

**2552.** Trockur, B.; Didion, A. (2001): Libellenatlas Saar. Sektion Libellen der Arbeitsgemeinschaft für Tier- und Pflanzengeographische Heimatforschung im Saarland - Delattinia. 83 pp. (in German). [This atlas of the Odonata of the German Federal State Saarland compiles all available data on Odonata. Few data are available from the period prior 1980. An significant increase resulted in the period between 1980 and 1990. The majority of data was obtained after 1990 - 1998 when several odonatologists surveyed with increased intensity the water bodies in Saarland. Data of 55 species are provided. For each species two distribution maps are presented (one with all records of the very species, and one with records of indiginity) and a table which demonstrates the status of the species in the regional ecoregions ("Naturräumliche Einheiten"). Additional information is given to the regional odonate biodiversity, and an "appendix" with remarkable records including some records from Luxembourg from 1998 - 2001 is added. The booklet contains also an updated Red List and a bibliography. The study is available from the senior author at 10,- EURO (plus P+P).] Address: Trockur, B., Schulstr. 4, D-66636 Tholey-Scheuern

**2553.** Upson, S.: (2001): A further *Argia lacrimans* population in southeast Arizona. *Argia* 13(1): 19. (in English). [In 1999 and 2000, the species was observed in Leslie Canyon National Wildlife refuge, 16 miles N Douglas, Arizona, USA. Co-occurring species are listed, and useful morphological features to separate it from its nearest congener *Argia pima* are outlined.] Address:



Upton, Sandy, P.O. Box 1453, Bisbee, Arizona, 85603, USA. E-mail: sandyupson@excite.com

**2554.** Utzeri, C. (2001): Winter oviposition of *Sympetrum striolatum* (Charp.) in central Italy (Anisoptera: Libellulidae). *Notul. odonatol.* 5(8): 106-107. (in English). [In January 2000 and 2001 *Sympetrum* sp. were observed in Italy. "The present record suggests, therefore, that at least at the central Italian latitudes, the yearly extinction of the *S. striolatum* adult population in late autumn is probably caused by long periods of bad weather, including drop of temperature, which preclude dragonfly activity and feeding. If ambient conditions keep relatively good and stable, dragonflies can probably go on with feeding and egg maturation, and perform normal reproductive behaviour, including mating and oviposition." (Author)] Address: Utzeri, C., Dipartimento di Biologia Animale e dell'Uomo, Università di Roma "La Sapienza". Viale dell'Università 32, 1-00185 Roma, Italy. E-mail: carlo.utzeri@uniroma1.it

**2555.** Van Gossum, H.; Stoks, R.; De Bruyn, L. (2001): Frequency-dependent male mate harassment and intra-specific variation in its avoidance by females of the damselfly *Ischnura elegans*. *Behav. Ecol. Sociobiol.* 51: 69-75. (in English). ["We focused on male harassment on different female color morphs of the damselfly *Ischnura elegans* and on variation in morph-specific mating avoidance tactics by females. In *I. elegans*, one of the female morphs is colored like the conspecific male (andromorphs) while the other morphs are not (gynomorphs). Our first goal was to quantify morph-specific male mating attempts, hence male harassment, in populations with manipulated population parameters (densities, sex ratios, and proportion of andromorphs). Second, we examined the female's perspective by looking for potential differences in morph-specific mating avoidance tactics and success of those tactics in a natural population. Differences in population conditions did influence the number of male mating attempts per morph. The less frequent female morph was always subject to fewer mating attempts, which contradicts earlier hypotheses on mimicry, but supports those that assume that males learn to recognize female morphs. Gynomorphs occupy less open habitat and often fly away when a male approaches, while andromorphs use more open habitat, do not fly large distances and directly face approaching males. Female morphs did not differ in the proportion of successful mating-avoidance attempts. Our results suggest that the maintenance of the color polymorphism is most probably the result of interactive selective forces depending on variation in all population conditions, instead of solely density- or frequency-dependent selection within populations." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**2556.** Vanappelghem, C.; Veille, F. (2001): Observations de *Leucorrhinia rubicunda* (L., 1758) dans le Nord-Pas-de-Calais en 2000 (Odonata, Anisoptera, Libellulidae). *Martinia* 17(3): 91-94. (in French with English summary). [Two male adults of *L. rubicunda* were captured 15 May 2000. The habitat is described, and the existence of local populations is discussed, but it may be likely that the species has (dis)migrated from Belgium.] Address: Veille, F., Office National des Forêts, 19 avenue du General de Gaulle, F-62600 Berck, France

**2557.** Vizslán, T.; Huber, A. (2001): Odonate records from sub-Carpathia, southwestern Ukraine. *Notul. odonatol.* 5(8): 103-105. (in English). [Records of 24 odonate species from 21 localities in the area of the rivers Latorcyja and Uz are presented. The list includes *Coenagrion pulchellum*, *Erythromma viridulum*, and *Soma-tochlora metallica*] Address: Vizslán, T., Szent Mihály út 9., H-9400 Sopron, Hungary

**2558.** Wallaschek, M. (2001): Zur Insekten- und Herpetofauna (Odonata, Dermaptera, Blattoptera, Saltatoria: Ensifera et Caelifera, Amphibia, Reptilia) von Trocken- und Feuchtgebieten im Landkreis Eichsfeld (Thüringen). *Thüringer faunistische Abhandlungen* 8: 7-36. (in German with English summary). [22 odonate species from 7 sampling localities are documented and briefly discussed. *Lestes dryas*, *L. virens*, *Sympetma fusca*, *Ischnura pumilio*, *Sympetrum flaveolum*, and *Leucorrhinia rubicunda* are of some regional interest.] Address: Wallaschek, M., Agnes-Gosche-Str. 43, D-06120 Halle (Saale), Germany

**2559.** Weatherhead, M.A.; James, M.R. (2001): Distribution of macroinvertebrates in relation to physical and biological variables in the littoral zone of nine New Zealand lakes. *Hydrobiologia* 462: 115-129. (in English). ["[...] there have been few attempts to relate macroinvertebrates to habitat factors in lakes. In this study, nine mainly oligotrophic lakes from throughout New Zealand were surveyed for macroinvertebrates. The lakes were selected to represent a range of suspended sediment loading and lake level regimes. Within each lake, several sites were selected to provide a range of exposure to wave action. A multiple regression approach was taken to relate macroinvertebrate community composition and habitat characteristics. The results of the analysis suggest that the littoral zone of the lakes we studied could be divided into four general habitats. The first is the wave wash zone characterised by coarse substrates and macroinvertebrate taxa usually associated with lotic environments, such as Ephemeroptera and Plecoptera. The second habitat is associated with macrophytes and is limited at the top by wave action and at depth by light attenuation. In this zone, the snail *Potamopyrgus antipodarum* is dominant, along with Trichoptera and Odonata. At the base of the macrophytes is the detrital habitat characterised by fine, organic rich sediments and dominated by chironomids, oligochaetes and Trichoptera. At depths below the macrophyte zone, fine sediments are found, and bivalves such as the freshwater mussel *Hyridella menziesi* are common. While macroinvertebrate abundance can be highly variable, some general predictions of community structure can be made based on a few key environmental factors. Abundance of snails, Odonata and Trichoptera was positively related to macrophyte biomass. Some macroinvertebrate groups such as oligochaetes, chironomids, snails and bivalves were more common in line substrates, while Ephemeroptera were characteristic of coarse substrates. Detrital biomass was important for most of the macroinvertebrate groups studied showing a positive relationship for oligochaetes and Trichoptera and a negative relationship for Ephemeroptera and Plecoptera." (Authors)] Address: Weatherhead, M.A., Natl Inst Water & Atmospher Res Ltd, POB 8602, Christchurch, New Zealand

**2560.** Weihrauch, F. (2001): Entwicklung von *Onychogomphus f. forcipatus* in einem Kleingewässer (Odonata)

ta: Gomphidae). *Libellula* 20 (3/4): 149-154. (in German with English summary). ["From May 21 to June 02 2001, 175 exuviae of *O. f. forcipatus* were collected at a shallow gravel pond with a size of almost 300 m<sup>2</sup> in Munich, Bavaria, Germany. This is the first record of the successful development of the species in waters of that kind. Besides, this is the hitherto earliest seasonal record of *O. f. forcipatus* from Bavaria." (Author)] Address: Weihrauch, F., Hengelerstr. 9, D-80637 München, Germany. E-mail: Florian.Weihrauch@t-online.de

**2561.** Weipert, J.; Bößneck, U. (2001): Die Schutzgebiete der Landeshauptstadt Erfurt (Thüringen) Teil IV: Flora und Fauna des GLB "Dorfstattwiese". Veröff. Naturkundemus. Erfurt 20: 57-80. (in German with English summary). [Thuringia, Germany; in 1995, five common odonate species were recorded.] Address: Bößneck, U., Stadtverwaltung Erfurt, Umwelt- und Naturschutzamt, Staffenbergallee 18, D-99085 Erfurt, Germany

**2562.** Werzinger, S.; Werzinger, J. (2001): Ganz schön flexibel! Zur Entwicklung von *Anax parthenope* in Bayern (Odonata: Aeshnidae). *Libellula* 20(3/4): 131-148. (in German with English summary). ["A Bavarian larval generation of *A. parthenope* developed bivoltin as well as univoltin. At an unused fish-free pond we recorded 244 exuviae - 226 (92,6 %) during the autumn in 1998 and 18 (7,4 %) during the following spring in 1999. The pond was located in an area of about 400 km<sup>2</sup>, the so-called Florisches Weihergebiet, about 40 km northwest of Nuremberg. *A. parthenope* is well known here for several decades, but there have been no breeding records so far. Since 1998 we observed increasing occurrences of imagines, especially in springtime. In spite of the successful development in 1998 and 1999 it is still unknown where the breeding generations normally origin. Larval development and emergence of *A. parthenope* are discussed." (Authors)] Address: Werzinger, S., Düsseldorfer Str. 15, D-90425 Nürnberg, Germany. E-mail: Werzinger-Nbg@t-online.de

**2563.** Wildermuth, H.; Bauer, S. (2001): Das Wurzelgeflecht schwimmender Seggenstöcke als Mikrohabitat von Libellenlarven (Odonata). *Libellula* 20(1/2): 33-45. (in German with English summary). ["Larvae of 4 Zygoptera and 4 Anisoptera species were found among roots and in cavities of floating sedge (*Carex elata*, *C. paniculata*) tussocks of two small moorland lakes in southern Germany. *Cordulia aenea* was the most numerous species, followed by *Platycnemis pennipes*, *Erythromma najas*, *Somatochlora metallica*, *Aeshna grandis* and *Epitheca bimaculata*. Prior to the emergence period of the «spring species», a single tussock harboured at least 1 and 46 larvae at most (43 *C. aenea*) on a probing day. Final stage larvae of *C. aenea* amounted up to 77% of a day total. The root system of sedge tussocks at steep lake and pond shores otherwise poor in structure turned out to be an important microhabitat for dragonfly larvae, especially during the final stage, as well as for many other benthic animal species. Measures for conservation and promotion of the structural diversity at the shores of stagnant waters are discussed." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**2564.** Wildermuth, H. (2001): Moostierchen und Zuckmücken als Epizoen von *Macromia amphigena* (Bryo-

zoa: Plumatellidae; Diptera: Chironomidae; Odonata: Macromiidae). *Libellula* 20(1/2): 97-102. (in German with English summary). ["A small colony of *Fredericella* sp. was found on the left hind leg of an exuvia of *M. amphigena* originating from the Bevd River of the Novosibirsk District, Siberia, Russia. The same exuvia bore four cases of chironomid larvae, two attached to the mesothorax, one to the femur of the right hind leg and one to the 6th abdominal tergite." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**2565.** Wildermuth, H. (2001): Zuckmückenlarven als Epizoen von *Somatochlora metallica* (Diptera: Chironomidae; Odonata: Corduliidae). *Libellula* 20 (3/4): 171-174. (in German with English summary). ["In a pond SE of Zürich, Switzerland a living red chironomid larva within its tube consisting of mud particles was found firmly attached to the dorsal side of the abdomen of a F-0-larva of *S. metallica*. The role of Odonata larvae for epizoic chironomids is discussed." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**2566.** Williams, C.E. (2001): Avian dragonfly collectors (Anisoptera). *Notul. odonatol.* 5(8): 107. (in English). [In July 1998 Purple martins [...] were observed feeding large dragonflies to their almost fully-grown fledglings. The species turned out to be *Anax junius*, *Macromia annulata*, and the very rare *Anax amazili*.] Address: Williams, C.E., 704 Foster Street, Marlin, Texas 76661-2428, US

**2567.** Williamson, T.; Meurgey, F. (2001): Microhabitats refuges pour d'Ischnura elegans (Vander Linden, 1820) et *Platycnemis pennipes* (Pallas, 1771) (Odonata, Zygoptera, Platycnemididae et Coenagrionidae). *Martinia* 17(3): 110. (in French). [A case of drought resistance resp. the use of terrestrial habitats of larvae and the co-occurring macrobenthic species are outlined.] Address: Williamson, T., 13, impasse du Moulin, F-49270 Champtoceaux, France

**2568.** Willigalla, C.; Artmeyer, C. (2001): Zur Verbreitung von *Sympecma fusca* (Vander Linden) und *Gomphus vulgatissimus* (Linnaeus) (Odonata: Lestidae & Gomphidae) in Nordrhein-Westfalen. *Verh. Westd. Entomol. Tag 2000*: 287-290. (in German). [The development of knowledge of the distribution of *S. fusca* and *G. vulgatissimus* in the Federal State Nordrhein-Westfalen, Germany is briefly outlined. *S. fusca* could be observed in 12.8% of all grid squares. In most cases records refer to single specimens, only few strong populations are existing. Records of *G. vulgatissimus* increased in the past years significantly.] Address: Willigalla, C., Brock 45, D-48346 Ostbevern, Germany. E-mail: christoph@willigalla.de

**2569.** Wong, A.; Forbes, M.R.; Smith, M.L. (2001): Characterization of AFLP markers in damselflies: prevalence of codominant markers and implications for population genetic applications. *Genome* 44(4): 677-684. (in English). ["Amplified fragment length polymorphism (AFLP) analysis is becoming increasingly popular as a method for generating molecular markers for population genetic applications. For practical considerations, it is generally assumed in population studies that AFLPs segregate as dominant markers, i.e., that present and absent are the only possible states of a given locus. We tested the assumption of dominance in natural popula-

tions of the damselfly *Nehalennia irene* [...]. Electroblotted AFLP products from 21 samples were probed with individual markers. Eleven markers were analyzed, of which two were monomorphic and nine were polymorphic. Only two of the polymorphic markers behaved in a strictly dominant manner. The remaining seven polymorphic markers displayed various degrees of codominance, with 2-10 visible alleles in the sample. Of the three markers displaying the highest degree of variability, two contained microsatellite repeat tracts. Our results suggest that the assumption of dominance is unfounded. As a result, AFLP analysis may be unsuitable for estimating several important population genetic parameters, including genetic diversity." (Authors)] Address: Wong, A., Carleton Univ, Dept Biol, Ottawa, ON K1S 5B6, Canada

**2570.** Xylander, W.E.R.; Stephan, R. (2001): Libellenzönosen in Braunkohle-Tagebaufolgelandschaften als Reflexion von Rekultivierung und Sukzession. Abh. Ber. Naturkundemus. Görlitz 73(1): 93-95. (in German with English summary). ["Since 1996 dragonflies are documented in ca. 50 ponds of a lignite-mining site close to Görlitz where mining took place until December 1997. 49 species were found, 28 of which are listed in the red data list for dragonflies in Saxony, Germany. This high number is the result of a complex biotope mosaic. Since the beginning of the investigation, a decline of some species could be documented (mostly due to reclamation activities) whereas other species, which prefer later stages of succession, increased in number (mostly owing to the enhanced development of vegetation as a result of amelioration)."] (Authors)] Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany. E-mail: Naturmuseum.GR.Dr.Xylander@t-online.de

**2571.** Xylander, W.E.R. (Hrsg.) (2001): Kurzfassungen der Vorträge der 20. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen [GdO], Görlitz, 16.-18. März 2001. Abh. Ber. NaturkMus. Görlitz 73(1): VIII + 100 pp. (in German). [Behrends, T.: Libellen-Monitoring im Rahmen des E & E-Projektes "Halboffene Weidelandchaft Höltigbaum" von 2000-2004 (pp. 1-2); - Bender, J., W.E.R. Xylander & R. Stephan: Lösungsansätze im Zielkonflikt zwischen Rekultivierung und Naturschutz in der Bergbausanierung: Wiederherstellung eines Libellengewässers auf Halden des Braunkohletagebaus Berzdorf (pp. 3-8); - Brockhaus, T. & U. Fischer: Die Verbreitung von *Cordulegaster boltonii* und *Somatochlora arctica* in Sachsen: Ergebnisse aus dem Projekt "Entomofauna Saxonica" (p. 9); - Clausnitzer, H.-J.: Die Zwerglibelle (*Nehalennia speciosa*) in Niedersachsen (pp. 11-12); - Conze, K.-J. & C. Göcking: "FFH-Libellenarten" in Nordrhein-Westfalen (NRW) (pp. 13-15); - Donath, H.: Sukzessionsverlauf und Libellenzönosen an Tagebauseen im Naturpark Niederlausitzer Landrücken (pp. 17-18); - Ellwanger, G.: Verbreitungskarten der Libellenarten der Anhänge II und IV der FFH-Richtlinie in Deutschland auf der Basis des Messischblatrsters (pp. 19-21); - Glatzle, B.: Die Rolle der Libellen im Nahrungsspektrum der Gebirgsstelze *Motacilla cinerea* Tunstall, 1771 an einem Tieflandfluss (pp. 23-24); - Günther, A.: Differenzierung von Drohflügen und Balzverhalten verschiedener *Rhinocypha*-Formen Sulawesi (Indonesien) (pp. 25-26); - Hardersen, S.: "Fluctuating Asymmetry" als Instrument für die Bioindikation mit Libellen (pp. 27-28); - Hartung, M.: Bestimmung von isolierten Flügeln von Gomphiden am Ufer

der Oder (pp. 29-31); - Hünken, A. & C. Schütte: Im Trüben fischen: Pradation von Flussbarschen auf *Catopteryx*-Larven (pp. 33-34); - Huth, J.: Libellen (Odonata) der Braunkohlen-Bergbaufolgelandschaft Sachsen-Anhalts (pp. 35-37); - Jakob, T., Z. Mutter & G. Devai: Quantitative survey of *Gomphus flavipes* (Charpentier, 1825) exuviae along river Tisza (p. 39); - Keil, R.: Die Rolle von Libellen in der historischen Karpfenteichwirtschaft (pp. 41-43); - Krüner, U.: *Orthetrum brunneum* (Fonscolombe, 1837), ein fester Bestandteil der Libellenfauna in NRW? (pp. 45-46); - Kuhn, J.: Prozessschutz versus Nutzung und Pflege: Probleme des Libellenschutzes in Mooren des süddeutschen Alpenvorlandes (pp. 47-49); - Martens, A.: Experimente zur Sitzplatzwahl von *Onychogomphus f. forcipatus* (L., 1758) (p. 51); - Mauersberger, R. & F. Petzold: Seen als Habitate für *Onychogomphus f. forcipatus* (L.) im Jungpleistozängebiet Nordost-Deutschlands (pp. 53-55); - Mikolajewski, D.-J.: Dornenausbildung bei Larven der Gattung *Sympetrum* (Odonata: Anisoptera): Induzierbarer Schutz gegen Fischpradation (pp. 57-58); - Müller, J. & R. Steglich: Zur Indikation der "FFH-Tauglichkeit" der Elbe durch die Flussjungfern (Gomphidae) (pp. 59-61); - Müller, O. & B. Müller: Sand oder Algen? Habitatwahlverhalten der Larven von *Onychogomphus f. forcipatus* (L., 1758) (p. 63); - Müller, Z., T. Jakob, G. Devai & N. Szdllassy: The effect of habitat degradation on dragonfly assemblages on the floodplain of the river Tisza (pp. 65-66); - Ott, J.: Erfahrungen aus der Planungspraxis bei Monitoringstudien mit Libellen (pp. 67-68); - Schmidt, E.G.: Strittige systematische Fragen auf Gattungsniveau bei mitteleuropäischen Libellen (Odonata) (pp. 69-77); - Schnabel, H.: Untersuchungen zum Vorkommen larval überwinternder Libellenlarven in Karpfenteichen des Oberlausitzer Heide- und Teichgebietes (pp. 79-83); - Stephan, R. & W.E.R. Xylander: Die Libellen der Umgebung von Görlitz, gestern und heute (pp. 85-89); - Szdllassy, N., E. Bdrdosi, Z. Szabo, Z. Müller & G. Devai: Fluctuating asymmetry and mating success in males of *Libellula fulva* Müller, 1764 (pp. 91-92); - Xylander, W.E.R. & R. Stephan: Libellenzönosen in Braunkohle-Tagebaufolgelandschaften als Reflexion von Rekultivierung und Sukzession (pp. 93-95); - Teilnehmerliste (pp. 97-99).] Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany. E-mail: Naturmuseum.GR.Dr.Xylander@t-online.de

**2572.** Zhang, J.F.; Zhang, H.C. (2001): New findings of larval and adult aeschnidiids (Insecta: Odonata) in the Yixian Formation, Liaoning Province, China. *Cretac. Res.* 22(4): 443-450. (in English). ["Two new species referable to two new genera of the family Aeschnidiidae are described. *Stylaeschnidium rarum* gen. et sp. nov. is based on a pair of near-ultimate instar female larvae, and *Dracontaeschnidium orientale* gen. et sp. nov. on a single adult hindwing. The age of the dragonfly-bearing beds of the Yixian Formation in Liaoning, China, may be as old as latest Jurassic and as young as mid-Early Cretaceous, A larval mask described previously from Transbaikal, Russia, is unrelated to aeschnidiids, it belongs instead to the larvae of *Hemeroscopus baissicus* Pritykina, 1977 within the Hemeroscopidae, whereas the adult *Hemeroscopus baissicus* is probably related to the larva *Hemeroscopus baissicus* according to new material recently recovered in China." (Authors)] Address: Zhang, J.F., Chinese Acad. Sci., Nanjing Inst. Geol. & Palaeontol., Nanjing 210008, Peoples Rep. China



**2573.** Zimmermann, W. (2001): Rote Liste der Libellen (Odonata) Thüringens. 3. Fassung, Stand 10/2001. Naturschutzreport 18: 76-79. (in German). [Red list of endangered Odonata from Thuringia, Germany. 52 of the 61 Thuringian Odonata are autochthonous, 32 species are redlisted. Compared with the second version of the list (Zimmermann & Mey, 1993) *Calopteryx splendens*, *Coenagrion hastulatum*, and *Aeshna grandis* could be deleted from the list due to improvement of knowledge or increasing populations. *Leucorrhinia dubia* and *Erythromma najas* had to be added due to decline of populations, and *Coenagrion ornatum*, *Gomphus vulgatissimus*, *Thecagaster bidentata*, and *Leucorrhinia albifrons* have been (re-)discovered in recent years.] Address: Zimmermann, W., Thomas-Müntzer-Str. 5, D-99423 Weimar, Germany

## 2002

**2574.** Andrew, R.J. (2002): Egg chorionic ultrastructure of the dragonfly *Tramea virginia* (Rambur) (Anisoptera: Libellulidae). *Odonatologica* 31(2): 171-175. (in English). ["SEM studies reveal that the egg chorion of *T. virginia* is divided into an outer soft exochorion and an inner tough endochorion. The exochorion expands into a jelly-like, sticky coat in water, while the endochorion is smooth, thin and unsculptured. The apically situated micropylar apparatus is formed of a large, dome-shaped, sperm-storage chamber and a small, flat, micropylar stalk which contains a pair of circular micropylar orifices. The micropylar apparatus is encircled by an exochorionic collar. The chorion is modified in accordance with the aquatic (still-water) mode of oviposition exhibited by this species while the micropylar apparatus is shaped to fit in the fertilization pore of the vagina." (Author)] Address: Andrew, R.J., Department of Zoology, Shri Shivaji ESA's Science College, Congress Nagar, Nagpur - 440012 (MS), India

**2575.** Bede, L.C.; Machado, A.B.M.; Piper, W. (2002): *Erythrodiplax venusta* (Kirby), an Amazonian species introduced into Minas Gerais, SE Brazil (Anisoptera: Libellulidae). *Notul. odonatol.* 5(9): 113-114. (in English). [The distribution of *E. venusta* encompasses the Amazonian parts of Venezuela, Surinam, Guiana, Bolivia, Peru and northern to western Brazil. The compilation of Borror (1942) and the examination of the Machado-collection with material from all Brazilian states showed *E. venusta* to be restricted to the Amazonian region, thus not belonging to the fauna of Minas Gerais, a state that has been intensively collected for about 50 years. It was surprising therefore, that on February 26 and April 9, 1994, 5 male *E. venusta* were collected at the Sumidouro lake (municipalities of Pedro Leopoldo & Lagoa Santa, Minas Gerais, southeast Brazil, 19°32'05"S; 43°56'28"W), a locality situated as far as 1300 km from the hitherto known southernmost range of this species, in Mato Grosso. The locality was surveyed formerly by Machado in March 1975. At that time, no *E. venusta* was sighted. The authors conclude, that these circumstances indicate that this species has been introduced into the area not too long ago, and the question raised as to how it was transported there. The possibility that *E. venusta* was brought to the Lagoa Santa region by some atmospheric phenomenon, involving wind transportation, cannot be ruled out. However, in 1984 a modern airport was built in the area (Confins Internatio-

nal Airport, ca 20 km from the Sumidouro lake) and started receiving regular cargo from the northern cities, like Manaus and Belem, where *E. venusta* occurs. Therefore it is probable that the species may have been incidentally introduced into the area by aircraft. The Confins Airport frequently receives ornamental and game fish from the Amazon region, bringing the possibility of eventual introduction of dragonfly eggs or larvae into the Lagoa Santa karst system.] Address: Bede, L.C., Laboratorio de Ecologia e Comportamento de Insetos, Departamento de Biologia Geral, ICB/UFMG, C.P. 486, BR-31270-901 Belo Horizonte, MG, Brazil

**2576.** Belle, J. (2002): Commented checklist of the Odonata of Surinam. *Odonatologica* 31(1): 1-8. (in English). ["A list is given of 283 spp. and sspp., referable to 87 genera of 15 families. Some additional taxa are evidenced but remain unidentified. Notes are supplied on some spp. *Hetaerina cruentata*, *Argia extranea*, *Phyllocycla signata*, *Phyllogomphoides audax*, *Dythemis sterilis*, *D. velox*, *Erythrodiplax attenuata*, *E. ochracea*, *E. aequatorialis*, and *Perithemis waltheri* are deleted from the national list." (Author)] Address: Belle, J., Onder Beumkes 35, NL-6883 HC Velp, The Netherlands

**2577.** Bernard, R. (2002): First records of *Aeshna crenata* Hagen, 1856 in Lithuania with selected aspects of its biology (Odonata: Aeshnidae). *Opusc. zool. flumin.* 202: 1-21. (in English). [The six Lithuanian records of *A. crenata* have significantly broadened the known range of the species to the southwest. Its habitat - wind sheltered, mostly Shagnum-rich lakes - is characterized in detail. The size of individuals and the thoracic pattern are briefly described. Some aspects of the emergence are presented. The behaviour of territorial males and ovipositing females is described in great detail. The co-existence with other aeshnids is briefly analysed, with reference to spatial segregation between *A. crenata* and *A. juncea* / *A. subarctica elisabethae*. The 6 localities are described in detail and the co-occurring odonate species are listed, among them *Nehalennia speciosa*, *Epithea bimaculata*, *Leucorrhinia albifrons*, and *L. caudalis*.] Address: Bernard, R., Dept of General Zoology, Adam Mickiewicz University, Fredry 10, PL-61-702 Poznan, Poland; E-mail: rbernard@main.amu.edu.pl

**2578.** Beukema, J.J. (2002): Changing distribution patterns along a stream in adults of *Calopteryx haemorrhoidalis* (Odonata: Calopterygidae): a case of larval-drift compensation? *International Journal of Odonatology* 5(1): 1-14. (in English). ["The distribution of an isolated population of adult *C. haemorrhoidalis* was studied along a small stream in NE Spain, during two-week or three-week summer periods over five years. Distribution patterns differed consistently between age groups. Reproductive activities took place along the entire stream, whereas the presence of teneral and older immature individuals was restricted to the lower reaches of the stream. It is concluded that emergence took place only in the lower reaches and that this can be explained by larval drift due to strong currents regularly depleting the upper half of the stream. Recovery of individually marked teneral specimens indicated that immature individuals remained in the area around the lower reaches, during roughly the first week of their adult life. During the following week, when they had attained mature wing coloration but did not yet show reproductive activities, they moved for long distances.

This was particularly true for newly matured males, where the distance between two successive encounters could amount to hundreds of meters. By far the greatest proportion of these moves was upstream. Movement in later life stages, i.e. during the reproductive part of their life, was infrequent, much shorter and less consistently directed, though generally more often upstream than downstream. Once the males defended a territory, they hardly moved anymore. Territories were spread more evenly along the stream at high rather than at low overall densities. It is concluded that territorial behaviour contributed to a more even distribution of mature males and that an inborn tendency to fly upstream is not a prerequisite for the observed upstream-biased dispersal during adult life." (Author)] Address: Beukema, J.J., Netherlands Institute for Sea Research, P.O. Box 59, NL-1790 AB Den Burg, Texel, The Netherlands. E-mail: janb@nioz.nl

**2579.** Beukema, J.J. (2002): Survival rates, site fidelity and homing ability in territorial *Calopteryx haemorrhoidalis* (Vander Linden) (Zygoptera : Calopterygidae). *Odonatologica* 31(1): 9-22. (in English). ["In a small isolated population along a small stream in NE Spain, a high proportion of the adults present were individually marked. During subsequent days, their locations were assessed by twice-daily surveys along the entire length of the stream. Mean daily survival rates in mature males and females and pre-reproductive males were similar, 94%. Only during the first day after marking were survival rates significantly lower (viz. 77 to 84% in the various groups). High proportions (around 90%) of mature males were found to return to the same (territory) site every morning once they had occupied that site for 2 or more days. Site fidelity was low in pre-reproductive males and intermediate in mature females. In a displacement experiment, 67 territorial males were transferred one by one to distant locations (80 to 240 m along the stream). Half of them returned to their original territory, usually on the same day." (Author)] Address: Beukema, J.J., Netherlands Inst Sea Research, POB 59, NL-1790 AB Den Burg, The Netherlands. e-mail: janb@nioz.nl

**2580.** Bowles, B. (2002): Results of the 2001 Garden Odonate Count. *Ontario Insects* 7(2): 39. (in English). [Canada, Ontario; the 5th annual Garden Odonate count was held on Saturday, July 14, 2001. Five observers tallied a total of 26 species and 1581 individuals. A male Midland Clubtail (*Gomphus fratremus*) represents a new species for Victoria County.] Address: not stated

**2581.** Bowles, B. (2002): Results of the 2001 Pelee Island Butterfly and Odonate Counts. *Ontario Insects* 7(2): 34-35. (in English). ["The 2nd annual Pelee Island Odonate count was held on Sunday, August 5, 2001. Twelve observers reported only 12 species and 82 individuals. Hot dry weather in late July probably contributed to the low numbers of Odonata on the island. No new species were reported for the Pelee Island list." (Author)] Address: not stated

**2582.** Bowman, N. (2002): Reports from Coastal Stations - 2001: Eccles-on-Sea, Norfolk. *Atropos* 15: 64. (in English). [United Kingdom; *Erythromma viridulum*, *Sympetrum sanguineum*, *Aeshna juncea*] Address: not stated

**2583.** Brockhaus, T.; Fischer, U.; Günther, A.; Phoenix, J. (2002): Das Projekt "Libellenfauna Sachsen

2004". *Mitt. Sächs. Entomol.* 56: 18-20. (in German). [It is planned to enlarge and to compile information on the Saxonian Odonata to be published in 2004. Odonatologists are asked to make available old and current data referring Saxonia, Germany.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**2584.** Broek, J. van den (2002): *Libellen en juffers in waterverf*. *Natuur & Techniek* 70(6): 52-53. (in Dutch). [This is a quite unusual review of a new book on Odonata: De Nederlandse Vereniging voor Libellenstudie. De Nederlandse fauna Deel 4. De Nederlandse libellen. Utrecht. 496 pp. ISBN 90-5011-154-8. On two pages illustrations (watercolour pictures) are presented, and some information on the artists, the publishing politics of the Nationaal Natuurhistorisch Museum Naturalis, Leiden, and the content of the book are given. The species illustrated are: *Anax imperator*, *Cordulegaster boltonii*, *Libellula depressa*, *Lestes barbarus*, *Chalcolestes viridis*, *Enallagma cyathigerum*, and *Calopteryx virgo*.] Address: not stated

**2585.** Buczynski, P.; Theuerkauf, J.; Rouys, S. (2002): New records of *Cordulegaster bidentata* Sélys, 1843 (Odonata: Cordulegastridae) from the Bieszczady Mountains. *Wiad entomol.* 20(2/4): 183-184. (in Polish). [Two new records are added to the previously known app. 40 records of this species rare in Poland.] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**2586.** Buskirk, J., van (2002): Phenotypic lability and the evolution of predator-induced plasticity in tadpoles. *Evolution* 56(2): 361-370. (in English). ["The hypothesis that predator-induced defenses in anuran larvae are maintained by divergent selection across multiple predation environments has not been fully supported by empirical results. One reason may be that traits that respond slowly to environmental variation experience a fitness cost not incorporated in the standard adaptive model, due to a time lag between detecting the state of the environment and expressing the phenotypic response. I measured the rate at which behavior and morphology of *Rana temporaria* tadpoles change when confronted with a switch in the predation environment at two points in development. Hatchling tadpoles that had been exposed during the egg stage to *Aeshna* dragonfly larvae were not phenotypically different from those exposed as eggs to predator-free conditions, and both responded similarly to post-hatching predator treatments. When 25-day-old tadpoles from treatments with and without dragonflies were subjected to a switch in the environment, their activity budgets reversed completely within 24-36 h, and their body and tail shape began changing significantly within 4 days. The behavioral response was conservative: Tadpoles switched from high-risk to predator-free treatments were slower to adjust their activity. The study confirmed that behavioral traits are relatively labile and exhibit strong plasticity, but it did not reveal such a pattern at the level of individual traits: Morphological traits that developed slowly did not show the least plasticity. Thus, I found that differences in lability of traits here useful for predicting the magnitude of plasticity only for fundamentally different kinds of characters." (Author)] Address: Buskirk, J. van, Institute of Zoology, University of Zürich, CH-8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

- 2587.** Carvalho, A.L.; Werneck-de-Carvalho, P.C.; Caill, E.R. (2002): Description of the larvae of two species of *Dasythemis* Karsch, with a key to the genera of Libellulidae occurring in the states of Rio de Janeiro and São Paulo, Brazil (Anisoptera). *Odonatologica* 31(1): 23-33. (in English). ["The ultimate instar larvae of *D. mincki* and *D. venosa* are described and illustrated, based on material from SE Brazil, and general notes on the breeding habitats are provided. A preliminary key to the genera of Libellulidae larvae occurring in the region is appended." (Authors)] Address: Carvalho, A.L., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Caixa Postal 68044, BR 21944-970, Cidade Universitária, Rio de Janeiro, RJ, Brazil. E-mail: alagoc@acd.ufrj.br
- 2588.** Cham, S. (2002): The range expansion of small Red-eyed Damselfly *Erythromma viridulum* (Charp.) in the British Isles. *Atropos* 15: 3-9. (in English). [This is an detailed up date of the current state of colonisation of the British Isles by *E. viridulum*. Known records are documented and the recent distribution of the species is mapped.] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com
- 2589.** Cheverton, J. (2002): Emperor *Anax imperator* predated Brimstone *Gonepteryx rhamni*. *Atropos* 15: 75. (in English). [Parkhurst Forest, Isle of Wight, UK, 30 May 2001. A female *A. imperator* spent at least five minutes consuming its prey.] Address: Cheverton, J., 6 Westhill Drive, Shanklin, Isle of Wight, PO37 6PX, UK
- 2590.** Chovanec, A.; Schindler, M.; Waringer, J. (2002): Bewertung des ökologischen Zustandes eines Donaualtarmes ("Alte Donau") in Wien aus libellenkundlicher Sicht (Insecta: Odonata). *Lauterbornia* 44: 83-97. (in German with English summary). ["The ecological status of a Danubian backwater (Old Danube) situated in Vienna (Austria) was assessed by a dragonfly survey. 8 field trips were conducted at 9 sites (shore length = 100 m). A total of 20 species was recorded, 17 of them autochthonous. In this study a new assessment procedure based on the Odonate Habitat Index ("OHI") was applied. The range of site-specific index values was very close (2.49-3.05) with the mean OHI being 2.81. These numbers indicate a low level of habitat diversity. The comparison of the status quo with a reference condition is the basis of the assessment of the ecological status according to the EU Water Framework Directive. According to this the ecological status of the Old Danube was ranked as class III ("moderate ecological status") in the 5-tiered classification scheme. Missing littoral habitat structures and the lack of hydrological dynamics are the main reasons for this result." (Authors)] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, A-1090 Wien, Austria
- 2591.** Chovanec, A.; Raab, R. (2002): Die Libellenfauna (Insecta: Odonata) des Tritonwassers auf der Donauinsel Wien - Ergebnisse einer Langzeitstudie, Aspekte der Gewässerbewertung und der Bioindikation. *Densia* 03: 63-79. (in German with English summary). [The paper presents a long-term study dealing with the colonisation of a man-made pond by dragonflies. Between 1990-1998 a total of 36 species had been observed. A steady increase of number of species over this period could be observed. Finally, in 1998, 29 species were recorded, 23 of them have been classified as autochthonous or probably autochthonous. The species inventory comprises species typical of open water areas with floating macrophytes, for dense reed stands and for littoral zones poor in vegetation. The dragonfly fauna of a potentially natural dragonfly fauna (reference fauna) is compared with the current fauna.] Address: Raab, R., Anton Bruckner-Gasse 2/2, A-2232 Deutsch-Wagram, Austria. E-mail: rainer.raab@gmx.at
- 2592.** Clancy, S. (2002): Reports from Coastal Stations - 2001: Dungeness area, Kent. *Atropos* 15: 59-60. (in English). [United Kingdom; *Erythromma viridulum*, *Anax parthenope*, *Sympetrum fonscolombii*] Address: not stated
- 2593.** Clausnitzer, V.; Lindeboom, M. (2002): Natural history and description of the dendrolimnetic larva of *Coryphagrion grandis* (Odonata). *International Journal of Odonatology* 5(1): 29-44. (in English). ["The morphology of the last stadium larvae of the African *C. grandis* is described for the first time, based on one exuvia and three last instar larvae from Kenya. Taxonomically important morphological characters are illustrated and discussed. [...] Notes on habitat conditions are given and compared with results for other odonate species, which are known to breed in phytotelmata. The systematic position of *Coryphagrion* is briefly discussed. *Coryphagrion* is hypothesised to be phylogenetically closely related with the neotropical family Pseudostigmatidae based on larval morphology, adult morphology, behaviour and ecology." (Authors)] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: wesche@mail.uni-marburg.de
- 2594.** Clausnitzer, V. (2002): Reproductive behaviour and ecology of the dendrolimnetic *Hadrothemis scabrifrons* (Odonata: Libellulidae). *International Journal of Odonatology* 5(1): 15-28. (in English). ["Oviposition in water-filled tree holes and mating behaviour of *H. scabrifrons* was observed in a lowland coastal forest in Kenya. Conforming with the predominant mode of oviposition in the Libellulidae, females of *H. scabrifrons* touch the water with their ovipositor while hovering above tree holes. Male behaviour is opportunistic: usually males perch and patrol in clearings away from tree holes but at exceptionally large tree holes males are territorial and guard mates. Larvae and adults were found in different seasons; the species seems to be non-seasonal." (Author)] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: wesche@mail.uni-marburg.de
- 2595.** Corbet, P.S. (2002): Stadia and growth ratios of Odonata: a review. *International Journal of Odonatology* 5(1): 45-73. (in English). ["A terminology is presented for structures and events in larval development of Odonata with the aim of bringing terms into conformity with those used for other insect orders in the light of accepted views of homology. The terms 'exuvia', 'larva', 'prolarva' and 'stadium' receive special mention. Records of the number of stadia required to complete larval development for 118 species are listed and analysed, showing that the range for Odonata is 8 through 18 stadia (8 through 18 for 8 species of Anisoptera; 8 through 17 for 38 species of Zygoptera) averaging 12.4 stadia for the order (Anisoptera 12.5 and Zygoptera 12.2), in which >90% of records range from 10 through 16 stadia (both Anisoptera and Zygoptera >90%). The number of stadia varies between and within species,



sometimes within members arising from a single egg batch. No unifying hypothesis exists to rationalize variation in the number of stadia. Duration of successive stadia within a species can be a smooth, increasing progression but can also show wide departures from such a pattern. Duration of a single stadium can range from 1 day (or <1 day in the prolarva) through >1 year. Uniformity of size of the final-stadium larva can be achieved by the growth ratio (between successive ecdyses) compensating for the number of stadia. Aeshnidae typically have more stadia than do Libellulidae and also have a smaller average growth ratio. Ontogenetic profiles of growth ratios for different dimensions tend to have a characteristic form for each dimension, regardless of the eventual number of stadia. For some dimensions (e.g. headwidth) and some species the profile forms a smooth declining progression but for others (e.g. length of caudal appendage) it fluctuates irregularly. Headwidth therefore represents the dimension of choice for specifying stages of larval development. Rewarding avenues for research include the documentation of prospective links between larval life style on the one hand and stadal numbers and growth-ratio profiles on the other, and discovery of morphological characters that make it possible to determine to species larvae of early stadia." (Author)] Address: Corbet, P.S., Crean Mill, Crean, St Buryan, Cornwall, TR19 6HA, UK. E-mail: pscorbet@creanmill.u-net.com

**2596.** Cordero Rivera, A.; Egido Perez; F.J.; Andres, A. (2002): The effect of handling damage, mobility, body size, and fluctuating asymmetry on lifetime mating success of *Ischnura graellsii* (Rambur) (Zygoptera: Coenagrionidae). *Odonatologica* 31(2): 117-128. (in English). ["Several species of odonates have been the subject of sexual selection studies. In non-territorial species most variance in lifetime mating success (LMS) is accounted for by lifespan and specially by the number of visits, and random factors (like rainy weather) can have strong effect on reproductive success. Here we present the study of 2 natural populations of *I. graellsii* by marking-recapture methods. Our results show that male mating success is related to body size, mobility and handling damage, but not to fluctuating asymmetry. Larger males had greater success in both populations, a result in agreement with previous findings on the same sp. Nevertheless, multivariate analyses indicate that body length was a significant correlate of LMS in just one of the studied populations. We estimated a mobility index for males averaging the distance between consecutive resightings. For long-lived males, we found a positive relationship between mobility and LMS. There was a clear effect of leg loss during marking on survivorship, and a marginally significant negative effect on LMS. Finally, we studied the effect of wing fluctuating asymmetry (FA) on LMS by capturing a sample of marked individuals at the end of field work. Results suggest that FA is not an important correlate of LMS in this sp." (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**2597.** Covanec, A.; Schiemer, F.; Waidbacher, H.; Spolwind, R. (2002): Rehabilitation of a heavily modified river section of the Danube in Vienna (Austria): Biological assessment of landscape linkages on different scales. *Internat. Rev. Hydrobiol.* 87: 183-195. (in German with English summary). ["The ecological condition

of the Danube section in Vienna (Austria) has been greatly impaired by urban development, regulation, channel straightening and the construction of a hydroelectric power plant. In 1997, the shoreline of the Danube in this area was restructured by artificial side channels, coves, gravel banks, pools and temporary waters. A monitoring programme has been established focusing on the investigation of the functional integrity of these inshore structures: first results show that the sites isolated from the Danube serve as stepping stone biotopes for dragonflies and amphibians. Particularly amphibians are suitable indicators of the ecological functioning of riparian migration linkages on a (macro-) habitat scale. Rheophilic fish species (e.g. *Chondrostoma nasus*) colonise side channels connected with the Danube and indicate a longitudinal connectivity on a landscape scale. The role of these structures within an urban greenway is discussed." (Authors) Fig. 2 demonstrates succession of odonate fauna at different newly created inshore zone each for the successive years 1998 and 1999.] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, A-1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

**2598.** Daigle, J.J. (2002): *Telebasis bickorum* spec. nov. from Bolivia (Zygoptera: Coenagrionidae). *Odonatologica* 31(2): 177-180. (in English). ["The new species is described from Bolivia (holotype male: Santa Cruz Dept, Ichilo Province, Buena Vista, February 2001; allotype female: same data as holotype). Holotype deposited in Universidad Autonoma "Gabriel Rene Moreno" (U.A.G.R.M.) in Santa Cruz, Bolivia; allotype deposited in the Florida State Collection of Arthropods in Gainesville, Florida, USA. Both sexes differ by the long and narrow black mesopleural suture on the thorax and acuminate male cerci which are longer than the paraprocts." (Author)] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**2599.** Daigle, J.J. (2002): *Telebasis gigantea* spec. nov. from Bolivia (Zygoptera: Coenagrionidae). *Odonatologica* 31(1): 73-76. (in English). ["The new species is described and illustrated (holotype male: Santa Cruz dept., Ichilo prov., Buena Vista, Feb. 2000; allotype female: same data as holotype). Holotype deposited in Universidad Autonoma "Gabriel Rene Moreno" (U.A.G.R.M.) in Santa Cruz, Bolivia; allotype deposited in Gainesville, Florida, USA. Male and female can be distinguished by their very large size, dull gold thorax, and facial color which is sky-blue in male but yellowish-blue in female." (Author)] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**2600.** De Marco, P.; Resende, D.C. (2002): Activity patterns and thermoregulation in a tropical dragonfly assemblage. *Odonatologica* 31(2): 129-138. (in English). ["Solar exposure is a key factor determining odonate activity, particularly in tropical areas. Small sized perchers, classified as thermal conformers, can begin their activity when air temperature is sufficiently high, and larger species become active when direct exposure to the sun is possible. In this study, the activity patterns in a neotropical dragonfly assemblage present on the Federal University of Viçosa, SE Brazil, have been described and following predictions about their thermoregulatory behaviour tested: (a) a decrease in activity of the percher dragonflies in the warmest peri-

ods is expected due to high thoracic temperatures; (b) conformers species will be controlled by temperature, not luminosity, whereas in heliothermic species, the initiation and termination of their activity is only constrained by luminosity. In the dry season, low air temperatures represent a limiting factor to the beginning and the end of activity, resulting in a shorter total activity time. *Orthemis discolor* and *Micrathyria hesperis* showed a decrease in activity in the middle of the day in the rainy season. *Perithemis mooma* was the only species that had a higher abundance near midday. As this species had a light-coloured thorax compared to the others, it is suggested that it could minimize the effect of the high temperatures. There is a clear effect of season on activity time, and also large differences in the intensity of this effect among species. When clouds precluded direct exposure to sun, variations only in the temperature did not affect the activity of *Erythrodiplax fusca*, *M. hesperis*, and *O. discolor*, but the activity of the small sized *P. mooma* remained dependent on temperature. These results highlighted that the minimum body size to be a heliotherm could be a complex function of behavioural and morphological characteristics, including body colour, preferred substrate and perch posture." (Authors)] Address: De Marco, P., Laboratory of Quantitative Ecology, Department of General Biology, Federal University of Viçosa, BR-36571-000 Viçosa, MG, Brazil

**2601.** De Marmels, J. (2002): A study of *Chromagrion* Needham, 1903, *Hesperagrion* Calvert, 1902, and *Zoniagrion* Kennedy, 1917: Three monotypic North American damselfly genera without uncertain generic relationships (Zygoptera: Coenagrionidae). *Odonatologica* 31 (2): 139-150. (in English). ["Comparative morphology identifies *Chromagrion* as the sister genus of *Pyrrhosoma* Charp. The genera *Hesperagrion*, *Anisagrion* Selys, *Apanisagrion* Kennedy and *Calvertagrion* St. Quentin probably form a monophyletic group as they share a bifid apical penis segment armed with a pair of sclerotized spine-like processes. A new interpretation of certain penis structures, and biogeographic considerations, suggest that *Zoniagrion* is probably a primitive genus, which occupies a basal position on the stem of the *Acanthagrion*-series, within the *ischnurine* Coenagrionidae." (Author)] Address: De Marmels, J., Inst. Zool. Agrícola, Fac. Agronomía, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com

**2602.** Dewick, S. (2002): Reports from Coastal Stations - 2001: Bradwell-on-Sea, Essex. *Atropos* 15: 61-62. (in English). [United Kingdom; a list of 17 odonate species is communicated including *Erythromma viridulum* and *Brachytron pratense*] Address: not stated

**2603.** Donnelly, T.W. (2002): Odonata in and around Murchison Falls national Park, Uganda. *Notul. odonatol.* 5(9): 114-115. (in English). [A list of 42 odonate taxa collected from 21 to 25 January 2001 around the Murchison Falls (e.g. Nile River, Lake Albert, Sambiya River, river at the Rabongo Forest) is compiled. "The placement of F.C. FRASER's (1928, *Trans. ent. Soc. Lond.* 70: 123-138) *Copera subaequistyla* (= *sikas-soensis* [Martin] in *Platycnemis* is mysterious. I can find few differences between this species and the SE Asian *Copera vittata* (Sel.), and I regard Fraser's generic placement as correct."] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**2604.** Fleck, G.; Nel, A.; Bechly, G.; Escuillite, F. (2002): The larvae of the mesozoic family aeschnidiidae and their phylogenetic implications (Insecta, Odonata, Anisoptera). *Paleontology* 45(1): 165-184. (in English). ["Four giant dragonfly larvae are described from the Lower Cretaceous of China. Owing to the preservation of wing tracheal venation on the larval wing sheaths, they can be identified as the first undoubted larvae of the extinct Mesozoic family Aeschnidiidae. They are ultimate or penultimate male and female specimens, and a younger larva. The female larva has a very long ovipositor sheath. These larvae have an anisopteran anal pyramid and a very particular spoon-shaped labial mask, with a very narrow prementum and large palps with numerous teeth, suggesting possible affinities of the Aeschnidiidae with the Anisoptera Cavilabiata. The positions of other larvae formally attributed to the Aeschnidiidae are discussed, i.e. *Nothomacromia sensibilis* (Carle and Wighton, 1990), *Sona nectes* Pritykina, 1986, and the alleged larvae of *Hemeroscopus baissicus* Pritykina, 1977. They differ greatly from the true Chinese larval Aeschnidiidae, in the labial mask and female ovipositor, even if they show some similarities in the anal pyramid." (Authors)] Address: Fleck, G., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France

**2605.** Geissen, H.-P. (2002): Faunistische Mitteilungen 1999 und 2000 aus dem Bereich des ehemaligen Regierungsbezirks Koblenz. *Fauna und Flora in Rheinland-Pfalz*, Beih. 27: 155-213. (in German). [Rheinland-Pfalz, Germany; records of 32 odonate species are documented including *Lestes barbarus* and *Orthetrum brunneum* which are annotated with some detail.] Address: Geissen, H.-P., Brunnenstr. 34, D-56075 Koblenz, Germany

**2606.** González-Soriano, E. (2002): *Leptobasis melinogaster* spec. nov., a new species from Mexico (Zygoptera: Coenagrionidae). *Odonatologica* 31(2): 181-185. (in English). ["The new species is described, illustrated and compared with *Leptobasis vacillans* Hag. in Sel. and L. *candelaria* Alayo. A key to separate males of Mexican and Central American species of *Leptobasis* is provided." (Authors)] Address: González-Soriano, E., Depto Zoología, Inst. Biol., Universidad Autónoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**2607.** Gwynne, D.T. (2002): A secondary copulatory structure in a female insect: a clasp for a nuptial meal? *Naturwissenschaften* 89(3): 125-127. (in English). ["Secondary copulatory structures are well-known in male dragonflies and spiders. Here I report a secondary copulatory organ in female ground wets, *Hemiandrus pallitarsis* (Ensifera, Orthoptera - crickets and allies). The organ, located on the underside of the abdomen, appears to secure the male's genitalia during the transfer of a spermatophylax nuptial meal to this location, an area quite separate from the female's primary copulatory structures, where the sperm ampulla is attached." (Author)] Address: Gwynne, D.T., Univ Toronto, Dept Zool, Mississauga, ON L5L 1C6, Canada

**2608.** Harrison, P. (2002): 'Blue' Southern Hawker *Aeshna cyanea* in Worcestershire. *Atropos* 15: 74-75. (in English). [Verbatim: I am prompted by Steve Freddy's comprehensive treatment of the identification of the common *Aeshna* hawkers (*Atropos* 13 : 44-48) to relate

our experience with the blue colour morph of the Southern Hawker *Aeshna cyanea* in Monkwood nature reserve, near Worcester. They are said to be very rare in Britain. If that is the case then we can count ourselves rather lucky we have recorded a 'blue' specimen in each of the years 1998, 1999 and 2000. What has surprised us is that all three records occurred within the same 150 m stretch of woodland path. We have thus seen three individuals, three years running, and in virtually the same spot. It could be pure chance, but might there be genetic factors at play here? Perhaps a local strain of Southern Hawker with an inherited tendency to throw up a blue male every now and then? It may be worthy of note that the photograph we took of the 2000 specimen reveals that though the dorsal abdominal spots are all blue, the triangular marking on segment 2 remains green.] Address: Harrison, P., Moorcroft Barn, Sinton Green, Hallow, Worcester, WR2 6NW, UK

**2609.** Hartung, M. (2002): *Heteragrion palmichae* spec. nov., a new damselfly from the Cordillera de la Costa, Venezuela (Zygoptera: Megapodagrionidae). *Odonatologica* 31(2): 187-191. (in English). ["The new species is described from the Cordillera de la Costa in Venezuela. Holotype male: Venezuela, Edo. Carabobo, Bejuma, Cerro de Paja mountain, alt. ca 1200 m, 13-VI-1992; paratype female, same data; the holotype is to be deposited in MIZA, Maracay, Venezuela. No other specimens are known to date. This is one of the largest species within *Heteragrion*. The appendices are strongly arched in contrast to other members of the genus. Some similarities of appendices or size exist with *H. tricellulare* Calv., *simulation* Wllmsn, *peregrinum* Wllmsn, and *icterops* Sel. The new species was found in an inhabited region of the Cordillera de la Costa, near Bejuma, Carabobo." (Author)] Address: Hartung, M., Wehnertstr. 20a, D-12277 Berlin, Germany. E-mail: AEH.Matthias.Hartung@t-online.de

**2610.** Hecker, K.R.; Forbes, M.R.; Leonard, N.J. (2002): Parasitism of damselflies (*Enallagma boreale*) by gregarines: sex biases and relations to adult survivorship. *Can. J. Zool.* 80(1): 162-168. (in English with French summary). ["We studied host damselflies *E. boreale* [...] and their gregarine parasites (Apicomplexa: Eugregarinidae) to elucidate the causes and consequences of any sex biases in parasitism of adult hosts. Larvae of both sexes were highly infected, but there was no difference between male and female larvae in either prevalence or intensity of gregarine infections. Newly emerged adults had few or no parasites, thereby setting the stage for investigating accumulation of parasites by adults. Adult females had a higher prevalence and intensity of infection by gregarines than did males, but only on 1 (of 2) days when the potential confounding factor of host age was controlled for. Both adult males and females showed a positive correlation between longevity under conditions of food stress and the number of gregarines they initially carried. This finding may be explained if the food ingested with the infective cysts is more beneficial than the parasites are harmful, and it also has implications for investigating sex biases in numbers of trophically transmitted parasites of such insects." (Author)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**2611.** Heino, J. (2002): Concordance of species richness patterns among multiple freshwater taxa: a regional perspective. *Biodivers. Conserv.* 11(1): 137-147. (in English). ["Geographical gradients in species richness and the degree to which different taxa show congruent patterns remain unknown for many taxonomic groups. Here, I examined broad-scale species richness patterns in five groups of freshwater organisms; macrophytes, dragonflies, stoneflies, aquatic beetles and fishes. The analyses were based on provincial distribution records in Denmark, Norway, Sweden and Finland. In general, variation in species richness across provinces was concordant among the groups, but stoneflies showed weaker negative relationships with the other taxonomic groups. Species richness in most groups decreased with increasing latitude and altitude, and a considerable part of the variation was explained by mean July temperature. However, stoneflies showed a reversed pattern, with species richness correlating positively, albeit more weakly, with mean provincial altitude. Nevertheless, combined species richness of all five taxa showed a strong relationship with mean July temperature, accounting for 74% of variation in provincial species richness alone. Such temperature-controlled patterns suggest that regional freshwater biodiversity will strongly respond to climate change, with repercussions for local community organization in freshwater ecosystems in Fennoscandia." (Author)] Address: Heino, J., Dept of Biology, University of Oulu, 90401, Oulu, Finland. E-mail: jani.heino@oulu.fi

**2612.** Hoshide, K.; Janovy, J. (2002): The structure of the nucleus of *Odonaticola polyhamatus* (Gregarinea: Actinocephalidae), a parasite of *Mnais strigata* (Hagen) (Odonata: Calopterygidae). *Acta Protozool.* 41(1): 17-22. (in English). ["The nucleus of *Odonaticola polyhamatus* was isolated from the body and observed with light, scanning electron and transmission electron microscopy. The nucleus had a thick thread-like structure with which it was tied to the septum. This thread-like structure has not been reported or described previously. The gregarine nuclear surface was covered with a fine fibrous net. This is the first report of the surface structure of a gregarine nucleus as revealed by SEM. Inside the nuclear membrane was a thin honeycomb layer similar to that reported for some other gregarines. Several spherical nucleoli and numerous electron dense small structures were observed inside the nucleus." (Author)] Address: Hoshide, K., Yamaguchi Univ., Inst. Biol., Fac. Educ., Yamaguchi 7538513, Japan

**2613.** Hunter, I. (2002): Reports from Coastal Stations - 2001: Elms Farm, Icklesham, East Sussex. *Atropos* 15: 58-59. (in English). [United Kingdom; *Calopteryx splendens*, *C. virgo*, *Brachytron pratense*, *Aeshna mixta*, *Sympetrum striolatum*] Address: not stated

**2614.** Ivanov, P.Yu. (2002): To the fauna of dragonflies (Odonata) of Sakhalin Island. The North Pacific Islands Biological Researches 7: 1-9. (in Russian with English summary). [21 odonate species from 19 localities are annotated in a checklist. *Aeshna caerulea* and *Leucorrhinia intermedia* are new to Sakhalin. This totals the known species to 31.] Address: Ivanov, P., Inst. of Biology and Soil Sciences, Far East Branch of the Russian Academy of Sciences, RUS 690022 Vladivostok-22, Russia. E-mail: entomol@ibss.dvo.ru (Pavel Ivanov)



**2615.** Jenkins, R.K.B; Ormerod, S.J. (2002): Habitat preferences of breeding water rail *Rallus aquaticus*. *Bird Study* 49(1): 2-10. (in English). ["[...] To test a survey method for estimating the abundance of breeding Water Rail and to provide an assessment of coarse-scale habitat selection, Water Rails were surveyed in 1996-97 at 77 wetland sites across Wales using broadcast vocalizations from a handheld cassette player. [...] Basic habitat characteristics were recorded for all sites and more detailed information, including freshwater invertebrate samples, were taken from a subset of 22 sites. A minimum of 43 to 49 breeding pairs of Water Rail were counted. Numbers of individuals differed significantly between the two survey years, but estimates of the number of pairs were consistent. Water Rail occurrence at a site was significantly related to the presence of wet reed *Phragmites* sp. Dry sites with low vegetation cover were the least occupied. Water Rail abundance was positively correlated with the abundance of Odonata, Plecoptera and Diptera larvae, but lack of data on actual dietary composition prohibits concluding a causal relationship. We hypothesize that increased Water Rail abundance associated with expanses of wet reed reflects a combination of nest safety, reduced risk of predation, and increased food availability. Current reed-bed management to maintain wetland conditions, often standard procedures for such systems, are probably beneficial to Water Rail." (Authors)] Address: Ormerod, S.J., Cardiff Univ, Sch Biosci, POB 915, Cardiff CF10 3TL, S Glam, Wales

**2616.** Johansson, F.; Wahlström, E. (2002): Induced morphological defence: evidence from whole-lake manipulation experiments. *Can. J. Zool.* 80(2): 199-206. (in English). ["Predator-induced defences are activated by cues associated with predators and confer some degree of resistance to subsequent attacks. Laboratory studies of many taxa have revealed such induced defences, and these data often conform to large-scale surveys of defence levels in habitats with and without predators. However, there have been no studies that make the direct connection between these laboratory studies and field surveys. We conducted a large-scale field manipulation of predators to provide this connection. Previous laboratory experiments on dragonfly (*Leucorrhinia dubia*) larvae have demonstrated that the presence of fish predators induces the development of elongated abdominal spines that serve to reduce mortality risk. In this study we determine the effect of whole-lake predator manipulation on this induced morphological defence of *L. dubia*. We monitored the spine lengths of final-instar larvae in two experimental lakes for 7 consecutive years. Fish were present during the first 2 years and then removed for the remaining 5 years. Results demonstrate that the spine lengths of *L. dubia* larvae decreased significantly in both lakes after the removal of fish. In contrast, there was no corresponding change in the spine lengths of larvae in reference lakes, and we found little change in food supply for larvae. Our results suggest that the plastic response in spine length is strong and attributable to the presence of predators." (Authors)] Address: Johansson, F., Dept of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Limed, Sweden. E-mail: frank.johansson@eg.umu.se

**2617.** Karjalainen, S. (2002): Suomen sudenkorennot (The Dragonflies of Finland). Tammi.



ISBN 951-31-2212-3. 222 pp. (in Finnish with brief instructions in English) [This book covers the 52 odonate species recorded in Finland. 51 were observed in the field and photographed by the author over a period of more than ten years. Only *Somatochlora sahlbergi* was netted and posed for photographing. A total of 228 colour photographs, some of outstanding quality, and almost 80 of full page size, will enable non-Finnish readers to enjoy the dragonflies of northern Europe. Of special value are the distribution maps which will close a gap in our knowledge on the distribution of the dragonflies in western palaearctic. This book should not be missing in your odonatological library.] Address: Karjalainen, S., <http://dragonflies.korento.net>. E-mail: [sk@korento.net](mailto:sk@korento.net). Orders of the book (hardcover, 21 x 26 cm) should be directed to Academic bookstore (<http://iki.fi/sudenkorennot/book.html>). The price of the book is 42,- EURO plus 20,- EURO for postage and handling charges.

**2618.** Knill-Jones, S. (2002): Reports from Coastal Stations - 2001: Isle of Wight. *Atropos* 15: 54-55. (in English). [United Kingdom; *Erythronna najas*, *E. viridulum*, *Brachytron pratense* and *Sympetrum danae* are communicated.] Address: not stated

**2619.** Kotiaho, J.S.; Hovi, M. (2002): Correcting species richness hotspots for latitudinal gradients: a new method. *Ann. Zool. Fenn.* 39(1): 3-6. (in English). ["Species richness hotspots are of critical importance in conserving biodiversity, but by using simple species richness in an area, there is an inevitable bias in favour of lower latitudes. We propose a simple method for estimating regionally representative species richness hotspots where the effect of latitudinal gradients is accounted for. By using this method, the same number of species are conserved but instead of being concentrated on lower latitudes the selected areas fall into much larger geographical regions resulting in a broader range of habitat types conserved. This method suits any scale and is also applicable to other kinds of environmental gradients. These regions are illustrated with data on birds and dragonflies of Finland." (Author)] Address: Kotiaho, J.S., Univ. Jyväskylä, Dept Biol. & Environm. Sci., POB 35, FIN-40351 Jyväskylä, Finland

**2620.** Legrand, J. (2002): Un nouveau *Tragogomphus* d'Afrique équatoriale: *T. ellioti* spec. nov. (Anisoptera: Gomphidae). *Odonatologica* 31(2): 193-197. (in French with English summary). ["The new species is described and illustrated from a single male, collected in Gabon. Holotype male: Eastern Gabon, Makokou area, 1-XI-1976; deposited in MNHN, Paris. It lives in the upper sections of forest streams. The new sp. seems to be close to *T. aurivillii* Sjöstedt, 1899, but it is very different from the sympatric *T. tenaculatus* (Fraser, 1926), known from this region." (Author)] Address: Legrand, J., 10, rue du Chemin de fer, F-94110 Arcueil, France

**2621.** Long, R. (2002): Southern Skimmer *Orthetrum brunneum* (Fonsc.) on Guernsey. *Atropos* 15: 10. (in English). [Supposed to be a representative of the Guernseyian fauna since 1999, 10 July 2001 it was possible to net a specimen of *O. brunneum*.] Address: Long, R., Ozarda, Les Hammonnets, St. John, Jersey, Channel Islands, JE3 4FP, UK

**2622.** Lopau, W.; Adena, J. (2002): Die Libellen von Cypern. *Naturkundliche Reiseberichte* 19. 72 pp. (in German). [This paper is divided into two major parts: in

Part 1 odonate data from different workers including historical data and material from museums are documented in detail. Part 2 gives information on the 33 species of *Cyprus*. For every species a black and white photo, a map, a detailed documentation of records, and a discussion of the taxonomic status and the habitats are presented. This paper is a further example of the sophisticated work of W. Lopau to increase our knowledge on the eastern-Mediterranean Odonata, and a cornerstone for ongoing odonatological work in the region.] Address: Lopau, W., Kuhstedtermoor 26, D-27442 Gnarrenburg, Germany. E-mail: lopi-@t-online

**2623.** Lorenz, J.; Voigt, H.; Walter, S.; Zinke, J. (2002): Erste Ergebnisse entomofaunistischer Untersuchungen im Bahretal südlich von Pirna. Mitt. Sächs. Entomol. 58: 4-9. (in German). [6 species including *Lestes barbarus* and *Ischnura pumilio* are listed. Only a few water bodies are existing in the study area; thus, its odonate fauna has to be expected as being poor.] Address: Lorenz, J., Talmühlenstr. 4, D.01737 Tharandt, Germany

**2624.** Machado, A.B.M. (2002): *Neoneura lucas* spec. nov. from Brazilian Pantanal (Zygoptera: Protoneuridae). *Odonatologica* 31(2): 199-204. (in English). ["The new sp. is described and illustrated from 15 males and 2 females, collected in the Pantanal Region of Brazil. Holotype male, allotype female: Poconé, Rio Cuiabá, Mato Grosso, Feb. 1986; deposited in the author's collection, Belo Horizonte. In view of the arrangement of the decumbent process of the dorsal branch of the superior appendage, the new sp. belongs to the fulvicollis-group R.W. GARRISON (1999, *Odonatologica* 28: 343-375), differing from the other species of this group mainly by the presence of a small ventral hook on the apex of the upper branch of the superior appendage." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil

**2625.** Machado, A.B.M. (2002): Studies on neotropical Protoneuridae, 13: The types of *Neoneura rufithorax* Selys (Zygoptera). *Notul. odonatol.* 5(9): 115-116. (in English). [(1) It was possible to trace the believed lost specimens described by Selys as *N. rufithorax* in a cabinet (Box 27) of the Selysian collection in Bruxelles. Two specimens were labeled as *N. parvula*. The author logical arguments the conspecificity of *N. rufithorax* with the two specimens labeled "*N. parvula*" in the cabinet. He declared the undamaged specimen as lectotype, the damaged specimen became paralectotype of *N. rufithorax*. (2) It is confirmed that the description of a specimen by Garrison (1999) believed to be *N. rufithorax* now unequivocal belongs to this species. (3) In addition some records of *N. rufithorax* stored in the Machado-collection are documented.] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil

**2626.** Martens, A. (2002): Group oviposition in three platycnemidid species (Odonata: Platycnemididae). *International Journal of Odonatology* 5(1): 75-80. (in English). ["The European *Platycnemis acutipennis* and *P. latipes* and the African *Mesocnemis singularis* aggregate during oviposition. Choice experiments show that, in all three species, groups develop because tan-

dem preferentially land where conspecifics already show oviposition behaviour. Just a single motionless male in the typical vertical position of a tandem male stimulates aggregation and oviposition behaviour in conspecifics." (Author)] Address: Martens, A., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: andreas.martens@tu-bs.de

**2627.** Martins, G.F.; Serrão, J.E. (2002): Notes on ovary structure in four species of adult dragonflies (Anisoptera: Gomphidae, Libellulidae). *Notul. odonatol.* 5 (9): 109-113. (in English). [Histological aspects of the panoistic ovarioles of the Brazilian dragonfly species *Aphylla theodorina* (Gomphidae), *Orthemis discolor*, *Pantala flavescens*, and *Perithemis mooma* (all Libellulidae) are described. "Each ovary consists of a great number of peccated ovarioles. A typical germarium, with undifferentiated germ cells, was not observed in these spp. In the vitellarium, 3 regions can be distinguished, viz. previtellogenic, vitellogenic and postvitellogenic. A single layer of follicular, often binucleated cells lines each follicle."] Address: Serrão, J.E., Departamento de Biologia Geral, Universidade Federal de Viçosa, BR-36571-000 Viçosa, MG, Brasil. E-mail: jeser-[rao@mail.ufv.br](mailto:rao@mail.ufv.br)

**2628.** Matushkina, N.; Gorb, S. (2002): Stylus of the odonate endophytic ovipositor: a mechanosensory organ controlling egg positioning. *J. Insect Physiol.* 48(2): 213-219. (in English). ["Using light and scanning electron microscopy, a sensory field consisting of 15-20 campaniform sensillae is described on the base of the stylus of the endophytic ovipositor of Odonata. It is hypothesised that two symmetric styli equipped with this number of sensillae can function as a mechanosensory organ responsible for control of precise egg positioning in plant stems during oviposition. In laboratory experiments with females of damselflies *Lestes sponsa* and *L. barbarus*, it was demonstrated that the distance between laid eggs is not dependent on the presence of styli. Removal of styli from both sides did not influence a shift of oviposition to one side. Females with one removed stylus shifted the clutch line in the opposite direction toward the removed stylus. Additionally, removal of styli influenced positions of single eggs in egg sets, and disturbed the capacity for complex oviposition. Thus, both morphological and experimental data support the hypothesis that styli participate in the control of egg line and egg patterning in the clutch." (Author)] Address: Gorb, S., Max-Planck-Institut für Entwicklungsbiol., Spemannstr. 35, D-72076 Tübingen, Germany. E-mail: [stas.gorb@tuebingen.mpg.de](mailto:stas.gorb@tuebingen.mpg.de)

**2629.** Melnychuk, M.C.; Srivastava, D.S. (2002): Abundance and vertical distribution of a bromeliad-dwelling zygopteran larva, *Mecistogaster modesta*, in a Costa Rican rainforest (Odonata: Pseudostigmatidae). *International Journal of Odonatology* 5(1): 81-97. (in English). ["We compared the larval abundance of *M. modesta* between bromeliads at ground level and canopy level in a primary tropical wet forest. Zygopteran abundance correlated strongly with bromeliad diameter at both levels. Although the per-bromeliad zygopteran abundance did not differ between vertical levels, *M. modesta* showed a strong vertical distribution in abundance owing to the variation in bromeliad size and density along a vertical gradient, with more and larger bromeliads closer to ground level than to the canopy. We predict *M. modesta* larval abundance to be  $171 \pm 65$

(s.e.) per hectare, with >80% of larvae below halfway to the lower canopy limit. The total prey abundance or species richness did not differ between ground and canopy bromeliads, further suggesting that apart from bromeliad size, habitat quality for *M. modesta* was similar between vertical levels. Effects of habitat size on larval abundance patterns are addressed by comparing habitat volume and basal resource mass with diameter. Finally, larger-scale spatial patterns in zygopteran abundance are discussed with reference to bromeliad distributions." (Authors)] Address: Melnychuk, M. & Diane S. Srivastava, Dept of Zoology, University of British Columbia, 6270 University Boulevard, Vancouver, B.C., Canada V6T 1Z4. E-mail: srivast@zoology.ubc.ca

**2630.** Minelli, A. (2002): Homology, limbs, and genitalia. *Evolution & Development* 4(2): 127-132. (in English). ["Similarities in genetic control between the main body axis and its appendages have been generally explained in terms of genetic co-option. In particular, arthropod and vertebrate appendages have been explained to invoke a common ancestor already provided with patterned body outgrowths or independent recruitment in limb patterning of genes or genetic cassettes originally used for purposes other than axis patterning. An alternative explanation is that body appendages, including genitalia, are evolutionarily divergent duplicates (paramorphs) of the main body axis. However, are all metazoan limbs and genitalia homologous? The concept of body appendages as paramorphs of the main body axis eliminates the requirement for the last common ancestor of limb-bearing animals to have been provided with limbs. Moreover, the possibility for an animal to express complex organs ectopically demonstrates that positional and special homology may be ontogenetically and evolutionarily uncoupled. To assess the homology of animal genitalia, we need to take into account three different sets of mechanisms, all contributing to their positional and/or special homology and respectively involved (1) in the patterning of the main body axis, (2) in axis duplication, followed by limb patterning mechanisms diverging away from those still patterning the main body axis (axis paramorphism), and (3) in controlling the specification of sexual/genital features, which often, but not necessarily, come into play by modifying already developed and patterned body appendages. This analysis demonstrates that a combinatorial approach to homology helps disentangling phylogenetic and ontogenetic layers of homology." (Author) *Drosophila* and *Odonata* are studied.] Address: Minelli, A., Univ Padua, Dept Biol, Via Ugo Bassi 58B, I-35131 Padua, Italy

**2631.** Novelo-Gutiérrez, R. (2002): Larvae of the ophibolus-species group of *Erpetogomphus* Hagen in Selys from Mexico and central America (Anisoptera: Gomphidae). *Odonatologica* 31(1): 35-46. (in English). ["Detailed descriptions and illustrations of *Erpetogomphus* *agkistrodon* Garrison, *E. erici* Novelo and *E. ophibolus* Calvert are provided and a comparison with other larvae of the subgenus *Erpetocyclops* Carle is also included. Larvae of *E. agkistrodon* and *E. erici* show the closest resemblance, while *E. ophibolus* is more similar to *E. constrictor*." (Author) In addition *Erpetogomphus* *sabaleticus* Williamson 1918 and *E. tristani* Calvert 1912 are described without figures.] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a

Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx

**2632.** Odin, N. (2002): Reports from Coastal Stations - 2001: Landguard Bird Observatory, Suffolk. *Atropos* 15: 63. (in English). [*Sympetrum striolatum*] Address: not stated

**2633.** Oertli, B.; Auderset Joye, D.; Castella, E.; Juge, R.; Cambin, D.; Lachavanne, J.-B. (2002): Does size matter? The relationship between pond area and biodiversity. *Biological Conservation* 104: 59-70. (in English). ["Larger areas support more species. To test the application of this biogeographic principle to ponds, we consider the relationship between size and diversity for 80 ponds in Switzerland, using richness (number of species) and conservation value (score for all species present, according to their degree of rarity) of aquatic plants, molluscs (Gastropoda, Sphaeriidae), Coleoptera, Odonata (adults) and Amphibia. Pond size was found to be important only for Odonata and explained 31% of the variability of their species richness. Pond size showed only a feeble relationship with the species richness of all other groups, particularly the Coleoptera and Amphibia. The weakness of this relationship was also indicated by the low z-values obtained (< 0.13). The SLOSS analyses showed that a set of ponds of small size has more species and has a higher conservation value than a single large pond of the same total area. But we also show that large ponds harbour species missing in the smaller ponds. Finally, we conclude that in a global conservation policy (protection, restoration, management), all size ranges of ponds should be promoted." (Authors) 0-24 odonate species, in mean 8,4 species, occurred at the ponds.] Address: Oertli, B., Laboratoire d'Ecologie et de Biologie Aquatique, University of Geneva, IS chemin des Clochettes, CH-1206 Geneva, Switzerland. E-mail address: beat.oertli@leba.unige.ch.

**2634.** Parr, A. (2002): Migrant dragonflies in 2001 including recent decisions and comments by The Odonata Record Committee. *Atropos* 15: 31-35. (in English). [The following species are treated: *Calopteryx virgo*, *C. splendens*, *Ischnura pumilio*, *Erythromma najas*, *E. viridulum*, *Aeshna mixta*, *A. parthenope*, *Orthetrum brunneum*, *Sympetrum fonscolombii*, *S. flaveolum*, *S. vulgatum*, and *S. danae*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

**2635.** Patton, S. (2002): Reports from Coastal Stations - 2001: Selsey Peninsular, West Sussex. *Atropos* 15: 55-56. (in English). [United Kingdom; *Brachytron pratense*] Address: not stated

**2636.** Peacor, S.D. (2002): Positive effect of predators on prey growth rate through induced modifications of prey behaviour. *Ecology Letters* 5(1): 77-85. (in English). ["Many prey modify behaviour in response to predation risk and this modification frequently leads to a foraging rate reduction. Although this reduction can have a clear direct negative effect on prey growth rate, theory predicts that a net positive effect can occur when the combined reduction in foraging by the entire population leads to a large increase in resource level. Here, I present experimental results that corroborate this counterintuitive prediction: the predation threat of 'nonlethal' caged larval dragonflies (*Anax longipes*) caused a net increase in small bullfrog (*Rana catesbeiana*) growth. *A. longipes* caused a net increase in small bullfrog be-



havioural response (i.e. a reduction in activity, level and microhabitat usage) was likely to have negatively affected growth, but was offset by a positive effect of growth from a large increase in resource levels (measured using a bioassay). Further, the positive *Anax* effect was dependent on nutrient level, illustrating the role of the resource response magnitude. Results of this study are discussed in the context of studies in which *Anax* had the opposite (i.e. negative) effect on tadpole growth. Predator-induced modifications in prey behaviour can have large negative or positive effects on prey growth, the sign and magnitude of which are dependent on relative species density, and resource dynamics." (Author)] Address: Peacor, S.D., Michigan State Univ, Dept Fisheries & Wildlife, E Lansing, MI 48824 USA

**2637.** Perepelov, E.; Bugrov, A.G. (2002): Constitutive heterochromatin in chromosomes of some Aeshnidae, with notes on the formation of the neo-XY/neo-XX mode of sex determination in *Aeshna* (Anisoptera). *Odonatologica* 31(1): 77-83. (in English). ["C-stained male karyotypes of *Aeshna crenata* (2n male = 27; X0), *A. grandis* (2n male = 26; neo-XY), *A. juncea* (2n male = 26; neo-XY), *A. nigroflava* (2n male = 27; X0) and *Anax imperator* (2n male = 27 X0) from W Siberia, N Caucasus, Russian Far East and Hokkaido (Japan) are figured and analyzed." (Authors)] Address: Perepelov, E. & A. Bugrov, Siberian Branch, Institute of Animal Systematics and Ecology, Russian Academy of Sciences, 11 Frunze St., 630091, Novosibirsk, Russia. E-mail: bugrov@fen.nsu.ru

**2638.** Purse, B.V.; Thompson, D.J. (2002): Voltinism and larval growth pattern in *Coenagrion mercuriale* (Odonata : Coenagrionidae) at its northern range margin. *Eur. J. Entomol.* 99(1): 11-18. (in English). ["Voltinism and larval growth pattern were investigated in an edge-of-range population of *C. mercuriale*. *C. mercuriale* is semi-voltine in Britain and growth is inhibited in winter. The 2nd year group overwinters in a range of instars between the antepenultimate and final instar consistent with the early, asynchronous emergence pattern of this species. A facultative autumnal diapause in the penultimate instar is the most likely mode of seasonal regulation. The broad size distribution of larvae produced by this growth pattern was wider than that found in co-occurring populations of *Pyrrhosoma nymphula*, a "spring" species with synchronous emergence. The broad size distributions may lead to considerable intraspecific interference between *C. mercuriale* larvae. Sex ratio in the last three larval instars of *C. mercuriale* did not differ significantly from unity. A laboratory investigation of the effect of temperature and photoperiod on growth and diapause in *C. mercuriale* is recommended to determine whether high minimum temperature thresholds for development limit both the width of the temporal niche and microhabitat use by this species at its range margin." (Authors)] Address: Purse, B.V., Univ Liverpool, Populac & Evolutionary Biol Res Grp, Sch Biol Sci, Nicholson Bldg, POB 147, Liverpool L69 3GS, Merseyside, UK

**2639.** Reinhardt, R.; Klausnitzer, B. (2002): Bibliographie über Sachsens Insekten - ein 300jähriger Rückblick. *Mitt. Sächs. Entomol.* 57: 183 pp. (in German). [This bibliography is a real treasure trove for anybody looking for the regional literature on Saxonian entomofauna. The titles are organised alpha-numerical, and according to five regions ("Planungsregionen") and in-

sect orders. The bibliography includes published and unpublished literature, e.g. management plans or expertises. Odonatological literature is easy to trace from this bibliography. It is planned to edit an electronic version of the bibliography in the beginning of 2003. Orders should be directed to the address below.] Address: Reinhardt, R., Burgstädter Str. 80a, D-09648 Mittheida, Germany. E-mail: Reinhardt-Mittw@t-online.de

**2640.** Relyea, R.A. (2002): Costs of phenotypic plasticity. *American Naturalist* 159(3): 272-282. (in English). ["Phenotypically plastic organisms display alternative phenotypes in different environments. It is widely appreciated that possessing alternative phenotypes can affect fitness. However, some investigators have suggested that simply carrying the ability to be plastic could also affect fitness. Evolutionary models suggest that high costs of plasticity could constrain the evolution of optimal phenotypes. However, costs (and limits) of plasticity are primarily hypothetical. Little empirical evidence exists to show that increased plasticity leads to reduced growth and development, leads to increased developmental instability, or limits the ability of organisms to produce more extreme phenotypes. I used half-sib families of larval wood frogs (*Rana sylvatica*) reared in outdoor mesocosms to examine how tadpoles altered behavioral, morphological, and life-historical traits in response to larval dragonfly predators (*Anax longipes*). The predators induced lower activity and the development of relatively large tails and small bodies in wood frogs. As a result, wood frogs experienced reduced growth and development. I then examined whether tadpole sibships with higher plasticity experienced fitness costs (above and beyond the costs of expressing a particular phenotype) and whether they were limited in producing extreme phenotypes. Fitness effects of plasticity were widespread. Depending on the trait examined and the environment experienced, increased plasticity had either positive effects, negative effects, or no effects on tadpole mass, development, and survivorship. I found no relationship between increased plasticity and greater developmental instability. There was also no evidence that sibships with increased plasticity produced less extreme phenotypes; the most extreme trait states were always produced by the most plastic genotypes. This work suggests that costs of plasticity may be pervasive in nature and may substantially impact the evolution of optimal phenotypes in organisms that live in heterogeneous environments." (Author)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburg, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**2641.** rtr (2002): Kunstinsekten für den Mars. die tagzeitung, Freitag, 25. Januar 2002: 14. [Verbatim: "SYDNEY rtr Über die Oberfläche des Mars könnten bald winzige Flugzeuge mit der Gewandtheit von Libellen und dem Sehvermögen von Bienen schwirren. Wissenschaftler in Australien haben eigenen Angaben zufolge die Sinnesorgane verschiedener Insektenarten imitiert und neuartige Navigations- und Fluggeräte entwickelt. Die neuen Sensoren seien so klein, dass sie auf "Microflyers" mit einem Gewicht von 75 Gramm Platz fänden, sagten die Forscher der Australian National University (ANU). Trotz ihrer kleinen Gehirne können Insekten wie Libellen schnelle und präzise Manöver fliegen, die Flugstabilität und Kollisionsvermeidung voraussetzen", sagte Javaan Singh Chahl von der ANU. Die diesem Prinzip nachentwickelte Technologie

könnte seinen Angaben zufolge 2007 bei einer Mission eingesetzt werden, bei der die Felsstruktur des Val-les Marineris auf dem Mars erkundet werden soll. Das Modell der Wissenschaftler ist den Facettenaugen von Insekten nachempfunden. Nach Aussagen der Forscher könnten die Kunstinsekten auch in der äußerst dünnen Atmosphäre des Mars stabil und kontrolliert navigiert werden."]

**2642.** Samways, M. (2002): Red-listed Odonata of Africa. *Odonatologica* 31(2): 151-170. (in English). ["The Red-Listed African Odonata species are re-assessed and are assigned or re-assigned to the IUCN Categories of Threat. It is important to distinguish between those species that are simply rare, those that are 'Data Deficient' and those that are genuinely threatened. It is also important to consider the 'Extinct' category very carefully as premature inclusion of a taxon in this category can preclude further searches for it. The IUCN Categories of Threat were found to be very workable for the African Odonata. Problems are more to do with the practicalities of doing the field assessments, rather than with the categorisation itself. While the Red List is of enormous value when considering one species at a time, it should not be seen as a generalized data base amenable to comparative assemblage statistics, which are likely to reveal more on assessment efforts than on the organisms." (Author)] Address: Samways, M., Invertebrate Conservation Research Centre, School of Botany and Zoology, University of Natal (Pietermaritzburg), Private Bag X01, Scottsville 3209, South Africa. E-mail: samways@nu.ac.za

**2643.** Schütte, C.; Schrimpf, I. (2002): Explaining species distribution in running water systems: larval respiration and growth of two Calopteryx species (Odonata, Zygoptera). *Archiv für Hydrobiologie* 153(2): 217-229. (in German with English summary). ["*C. virgo* is most often encountered at running water rhithron, whereas *C. splendens* predominantly chooses the hyporhithron to metapotamon. Larval growth of both species was studied in two streams in the field and under three different temperatures in the laboratory (12 °C / 18 °C / 24 °C). Their respiration was tested at the same three temperatures by measuring the CO<sub>2</sub>-production of the larvae via gas chromatography. At low temperatures, *C. virgo* was growing faster and had a higher standard metabolism than *C. splendens*. While *C. splendens* had similar respiration rates at 12 °C, 18 °C and 24 °C, the respiration of *C. virgo* was significantly higher at lower temperatures, as it is adapted to cold environments. But additionally, *C. virgo* is outspeeding *C. splendens* in growth even at 24 °C, suggesting that besides temperature adaptation there have to be other factors hindering co-occurrence of both species in warm streams." (Authors)] Address: Schütte C., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

**2644.** Sefrin, E. (2002): Libellenvorkommen an zwei Gewässern der Vorderpfalz. *Pflanzen und Tiere in Rheinland-Pfalz - Berichtsjahr 2001 - Heft 12*: 155. (in German). [Rheinland-Pfalz, Germany; 11 species are listed for a water body situated in the NSG Schwarzwald, and 17 species for the NSG Mechttersheimer Tongruben. Of some interest are records of *Brachytron pratense*.] Address: not stated.

**2645.** Spence, B. (2002): Reports from Coastal Stations - 2001: Spurn NNR, East Yorkshire. *Atropos* 15: 66-67. (in English). [United Kingdom; *Libellula depressa*, *Sympetrum fonscolombii*, *Anax imperator*, *Aeshna mixta*] Address: not stated

**2646.** Stansfield, S. (2002): Reports from Coastal Stations - 2001: Bardsey Island. *Atropos* 15: 68-69. (in English). [United Kingdom; *Anax imperator*, *Aeshna juncea*, *A. mixta*] Address: not stated

**2647.** Telfer, M. (2002): Insects at sea. *Atropos* 15: 83-84. (in English). ["[...] Surprisingly, only a single dragonfly was reported: a Brown hawkler *Aeshna grandis* seen two miles out off the East Anglian coast in 2000, heading towards the continent."] Address: Telfer, M., 7 Tennyson Avenue, St. Ives, Cambridgeshire, PE27 6TU, UK. E-mail: mgt@ceh.ac.uk

**2648.** Tembhare, D.B.; Wazalwar, S.M. (2002): Stomodaeal cuticular structures in the dragonfly *Brachythemis contaminata* (Fabricius) (Anisoptera : Libellulidae). *Odonatologica* 31(1): 47-54. (in English). ["Light and scanning electron microscopic studies reveal various stomodaeal cuticular structures. In the larvae and adults, microspines on the surface of the longitudinal folds of the pharynx, and dome-shaped, beaded structures on the inner surface of the oesophagus are evident. In the larvae, the folds of the crop bear long hairs laterally and parallel rows of microspines medially. In the larvae, the proventriculus is provided with 4 longitudinal plates; 2 large plates with teeth on each lateral side and 2 small plates each with 4 fine apical teeth, on either side. Scale-like acanthae are observed near the stomodaeal valve. A whorl of long hairs is evident in the stomodaeal valve. In the adult dragonfly, the acanthae and curved spines occupy the anterior and posterior regions of the proventricular dental plates, respectively. The functional significance of various stomodaeal cuticular structures is discussed." (Author)] Address: Tembhare, D.B., Dept Zool., Nagpur Univ. Campus, Nagpur 440010, Maharashtra, India

**2649.** Tennessen, K.J. (2002): *Argia rosleri* sp. nov. from central Bolivia (Odonata: Coenagrionidae). *International Journal of Odonatology* 5(1): 99-104. (in English). ["*Argia rosleri* sp. nov. is described from central Bolivia. Holotype male: Santa Cruz Department, Florida Province, seep along Rio Achira, 8.6 km E of Samaipata (18°09'42"S, 63°48'53"W), 1,400 m a.s.l., 25 xi 1999; allotype female: same locality, 05 xi 1998; both leg. K.J. Tennessen. The new species appears to be related to the *A. gerhardi/nigrior* complex, but differs in being mostly pale and having the decumbent ventral tooth of the male cerci apically situated." (Author)] Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktennessen@aol.com

**2650.** Tennessen, K.J. (2002): *Telebasis simulata* spec. nov. from South America, previously confused with *T. sanguinalis* Calvert (Zygoptera: Coenagrionidae). *Odonatologica* 31(2): 205-210. (in English). ["The new species (holotype male, allotype female: Brazil, State of Amazonas, Manaus, 20-VI-1922; deposited in FSCA, Gainesville, Fla, USA) is described and illustrated based on 82 males and 15 females from Brazil, Surinam, Trinidad and Venezuela. It most closely resembles *T. sanguinalis* but differs mainly by: (1) translucent dorsal flap of terminal penile segment rectangular in lateral view, gradually tapered to posterior lateral

angle (vs flap with a posterolateral lobe-like extension directed posteriorly); (2) cerci 1.6 to 1.8 times as long as paraprocts (vs 2.0 times as long); (3) rear of head half black, black marking extending to occipital foramen (vs pale except for a pair of small, dark circular spots). *T. sanguinalis* is known only from central Bolivia and western Brazil." (Author)] Address: Tennesen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktennesen@aol.com

**2651.** Trembath, R.; Anholt, B.R. (2002): Predator-induced morphological and behavioral changes in a temporary pool vertebrate. *Israel Jour. Zool.* 47(4): 419-431. (in English). ["Temporary pools vary unpredictably in their complement of predators, which should select for inducible anti-predator defenses. Temporary pools are used by many amphibians during the larval stage. We raised larvae of a hylid frog, *Hyla versicolor*, in the presence and absence of their predator, the larval dragonfly *Anax junius*. Tadpoles raised in the presence of predators were less active, more variable in size, and had larger, more brightly colored tails than those raised in the absence of predators. We found that acceleration from a motionless start was related to tail morphology. Similar to previous studies, our data suggested that tadpoles raised in the presence of predators were less vulnerable than those raised in the absence of predators, although our results were not statistically significant. The stochastic nature of oviposition into temporary pools argues that their biota will be variable in space and time. We expect that temporary pool specialists will often show inducible phenotypes for anti-predator defenses." (Authors)] Address: Anholt, B.R., Dept Biology, University of Victoria, PO Box 3020, Victoria, BC, V8W 3N5, Canada. E-mail: banholt@uvic.ca

**2652.** Troake, P. (2002): Reports from Coastal Station - 2001: Rye Harbour SSSI, East Sussex. *Atropos* 15: 56-58. (in English). [*Anax parthenope*, *Calopteryx splendens*] Address: not stated

**2653.** Tunmore, M. (2002): Reports from Coastal Stations - 2001: The Lizard, Cornwall. *Atropos* 15: 50-52. (in English). [United Kingdom; *Sympetrum fonscolombii*. One male was caught in an UV light trap.] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK

**2654.** Weihrauch, F.; Borchering, J. (2002): The zebra mussel, *Dreissena polymorpha* (Pallas), as an epizoon of anisopteran larvae (Anisoptera: Gomphidae, Corduliidae, Libellulidae). *Odonatologica* 31(1): 85-94. (in English). ["A list of records of anisopteran larvae and final instar exuviae with attached zebra mussels is provided. It contains records of 29 specimens from 10 spp. with zebra mussels including 2 new records. The possibilities how this association between odonate larvae and zebra mussels comes into being are discussed. Considering the biology and the life history of the mussels, from a few of the recorded cases of this interaction it is assumed that the larval development of the Odonata involved is more variable than hitherto known." (Authors)] Address: Weihrauch, F., Hengelerstr. 9, D-80637 München, Germany. E-mail: Florian.Weihrauch@lbp.bayern.de

**2655.** Williams, P.; Whitfield, M.; Biggs, J.; Fox, G.; Nicolet, P.; Shillabeer, N.; Sherratt, T.; Heneghan, P.; Jepson, P.; Maund, S. (2002): How realistic are outdoor microcosms? A comparison of the biota of microcosms

and natural ponds. *Environ. Toxicol. Chem.* 21(1): 143-150. (in English). ["This study investigated the extent to which aquatic plant and macroinvertebrate assemblages in small outdoor microcosms (cylinders 1.25 m diameter x 1.25 m deep) resembled assemblages found in natural ponds in Britain. Comparisons were made in terms of community structure, species richness, and numbers of uncommon species. Multivariate analysis indicated that, although the microcosms had no exact natural analogues, their plant and animal assemblages were most like those of deep, circumneutral ponds. Unlike natural ponds, the microcosms supported relatively species-poor invertebrate assemblages, lacking uncommon species. Among individual taxa, microcosms supported similar numbers of species of Gastropoda, Isopoda, Amphipoda, and Odonata as natural ponds but significantly fewer Coleoptera, Hemiptera, and Trichoptera species. This was most likely due to the absence of a shallow littoral area in the microcosms. Because of their vertical sides, the microcosms supported no marginal wetland plants, but submerged and floating-leaved plant assemblages were similar in community type and species richness to natural ponds. Refinements to microcosm and mesocosm designs are identified that would enable experimental systems to more closely replicate the assemblages found in natural ponds. In particular, the incorporation of natural margins would be likely to lead to experimental communities that were closer analogues of natural ponds." (Authors)] Address: Biggs, J., Oxford Brookes Univ., Ponds Conservat. Trust Policy & Res., Gipsy Lane, Oxford OX3 0BP, UK

**2656.** Wilson, K. (2002): Reports from Coastal Stations - 2001: Gibraltar Point NNR, Lincolnshire. *Atropos* 15: 66. (in English). [United Kingdom; *Lestes sponsa*] Address: not stated

**2657.** Wilson, K.D.P. (2002): Notes on Chlorogomphidae from southern China, with descriptions of two new species. *Odonatologica* 31(1): 65-72. (in English). ["*Chlorogomphus shanicus* sp. n. and *Chloropetalia soarer* sp. n. are described and illustrated from north Guangdong, China. *Chlorogomphus icarus* Wilson & Reels is synonymised with *C. usudai* Ishida and *C. papilla* Ris is illustrated." (Author)] Address: Wilson, K.D.P., Flat 20, 6 Mansfield Road, The Peak, Hong Kong, China. E-mail: wilsonkd@netvigator.com

**2658.** Yourth, C.P.; Forbes, M.R.; Smith, B.P. (2002): Immune expression in a damselfly is related to time of season, not to fluctuating asymmetry or host size. *Ecol. Entomol.* 27(1): 123-128. (in English). ["Variation in immune responsiveness within and among species is the subject of the emerging field of ecological immunology. The work reported here showed that individuals of *Lestes forcipatus* Rambur differ in their likelihood of mounting immune responses, and in the magnitude of those responses, against a generalist ectoparasite, the water mite *Arrenurus planus* Marshall. 2. Immune responses took the form of melanotic encapsulation of mite feeding tubes, occurred in the few days after host emergence, and resulted in mites dying without engorging. Such immune responses were more probable and stronger for hosts sampled later rather than earlier in the season. Such responses may act as selection affecting seasonal patterns of egg hatching and larval abundance of mites. 3. Contrary to expectation, metrics of host size (wing length) and wing cell fluctuating asym-



metry were not related to the likelihood of immune responses. 4. The importance of season on immune expression of insects has not been explored in detail. These results suggest possible trade-offs in allocation of melanin (or its precursors) to maturation versus immunity and indicate the need for studies on the synergistic effects of weather and parasitism on host species that use melanotic encapsulation to combat parasites and pathogens." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**Thanks to all who contributed to this issue of OAS!**

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: Lindeboom@aol.com and Martin Schorr, Schulstr. 7B D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: martin.schorr@foea.de

Published in Rheinfelden, Germany and printed in Tübingen, Germany.  
ISSN 1438-0269

1997

- 2659.** Akaishi, S. (1997): Dragonflies of Asahikawacity. Bulletin of the Hokkaido Odonatological Society 9: 3-6. (in Japanese). [Japan; 32 odonate species are documented.] Address: not stated in English
- 2660.** Anzai, M. (1997): A record of *Aeshna mixta soneharai* in Kamikawa District. Bulletin of the Hokkaido Odonatological Society 9: 2. (in Japanese). [Japan; August 1, 1991, *A. mixta sonehara* was observed along with additional six odonate species listed.] Address: not stated in English
- 2661.** Beckemeyer, R. (1997): Some Nebraska Odonata specimens in the University of Nebraska - Lincoln Insect Collection. *Argia* 9(4): 7. (in English). [A preliminary browsing in the insect collection of Univ. of Nebraska, Lincoln Insect Collection resulted in 9 Anisoptera. Zygoptera are waiting for a detailed survey of the collection.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net
- 2662.** Cole, J. (1997): The second coming of *Argia lacrimans*. *Argia* 9(4): 10-11. (in English). [*Argia lacrimans* was confirmed for the second time in USA. At the same locality (Garden Canyon, near Fort Huachuca, Arizona) *A. tonto* was also recorded. In the paper the additional species from the collecting trip in July 1997 are documented.] Address: Cole, J., 7926 Ramsgate Avenue, Los Angeles, CA 90045, USA
- 2663.** Donnelly, T.W. (1997): *Somatochlora brevicincta* in New Brunswick and Nova Scotia!. *Argia* 9(4): 5. (in English). [Report on some e-mail news about new discovered localities or specimen of the rare *S. brevicincta*.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 2664.** Foeckler, F.; Schmidt, H.; Deichner, O. (1997): Naturschutzfachliche Analyse und Bewertung der Auswirkungen von Fischteichen auf die Gewässerfauna von Flußperlmuschelbächen Nordostbayerns. *Zschr. Ökol. u. Naturschutz* 6: 111-123. (in German with English summary). [Eutrophication caused by water body effluents degrades the water quality of pearl mussel brooks in Bavaria, Germany. Measures to improve the water quality are discussed. Odonata dwelling the water bodies are listed along with other macrozoobenthic species.] Address: ÖKON, Dechbettener Str. 9, D-93049 Regensburg, Germany
- 2665.** Harauchi, Y.; Joh, Y. (1997): Emergence process of *Epiophlebia superstes* in laboratory. Bulletin of the Hokkaido Odonatological Society 9: 8-9. (in Japanese). [This is a detailed (photo) documentation of the emergence of *E. superstes*.] Address: not stated in English
- 2666.** Hiratuka, K. (1997): Two dragonfly species new to Shiribeshi District. Bulletin of the Hokkaido Odonatological Society 9: 1. (in Japanese). [Japan; *Coenagrion terue* (Asahina 1949), *Copera annulata* (Selys 1863)] Address: Hiratsuka, K., 2-20-113, Honcho 2 jo-9, Higashi-ku, Sapporo City, 065-0042, Japan
- 2667.** Hirose, Y. (1997): A record of *Coenagrion ecornutum* representing its southern limit. Bulletin of the Hokkaido Odonatological Society 9: 10. (in Japanese). Address: not stated in English
- 2668.** Hori, S. (1997): *Aeschnophlebia longistigma* recorded from Lake Utona. Bulletin of the Hokkaido Odonatological Society 9: 24. (in Japanese). [Japan; female, 16-VIII-1995] Address: not stated in English
- 2669.** Naraoka, H. (1997): Reproductive behavior of *Sympecma paedisca paedisca* (Odonata, Lestidae). *New Entomologist* 46(1/2): 20-25. (in Jap., with English summary (English translation of Naoya Ishizawa in Digest of Japanese odonatological Short Communications 7, 1998)). ["The reproductive behaviour was studied at a small pond in Shiura village, Kita-gun. Aomori pref., N Japan, from May to Aug. 1996. Hibernated adults appeared at the pond from mid May, and a few adults remained until early August. Reproductive behaviour was observed on fine and warm days from late May to mid July (peak during the first half of June). Male seized the female without courtship and display, immediately after he found her. Sperm transfer ( $x=60.8$  s) was carried out just after the tandem was formed at a perching site. Copulation was observed between 7:30 and 14:30 h with the peak from 9:00 to 10:00 h and it was divided into 3 stages; the characteristic pumping was seen at each stage. Copulation lasted 15 min 47 s on average (stage 1: 14 min, 42 s, I: 93.4 s. III: 10.3 s). Sperm displacement was recognized by comparing the volumes of 9s sperm storage organ collected at precopula, copula and postcopula. Tandem oviposition took place soon after copulation in the leaves of *Phragmites communis*, above the water, during 8:00-16:00 h, with the peak from 10:00 to 12:00 h; interspecific tandem was recorded in 3 cases." (Author)] Address: Naraoka, H.,

36-71, Aza Motoizumi, Fukunoda, Itayanagi-machi, Kita-gun, Aomori, 038-36, JA

**2670.** O'Brien, M. (1997): *Somatochlora tenebrosa* not in Michigan. *Argia* 9(4): 9-10. (in English). [*S. tenebrosa* turned out to be *S. hineana*, but the locality data of the specimen are quite obscure.] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

**2671.** O'Brien, M. (1997): *Stylurus spiniceps* finally verified for Michigan (Odonata: Gomphidae). *Argia* 9(4): 8-9. (in English). [On 20 July 1997, *Stylurus spiniceps*, prior only known from a little bit obscure literature data, was verified from a Michigan locality (Huron River).] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

**2672.** Ohkubo, K. (1997): Notes on two species of the dragonflies of Chichi-jima Island, Ogasawara in 1996. *Aeschna* 34: 37-38. (in Japanese). [Japan; Boninagrion ezoin, *Hemicordulia ogasawarensis*.] Address: not stated in English

**2673.** Ozono, A. (1997): Re-discovery of *Macromia daimoji* OKUMURA from Osaka Prefecture. *Aeschna* 34: 24. (in Japanese). Address: not stated in English

**2674.** Paulson, D. (1997): New odonata records for Idaho. *Argia* 9(4): 8. (in English). [Idaho, USA; August 1997; *Stylurus olivaceus*, *Sympetrum madidum*, *Pantala flavescens*] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**2675.** Paulson, D. (1997): New odonata records for Maine and New Hampshire. *Argia* 9(4): 7. (in English). [New county records from a collection Netta Smith made in 1997 in Maine and New Hampshire, USA are documented.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**2676.** Sato, M. (1997): Phenology of *Sympetrum frequens* in Obihirocity. *Bulletin of the Hokkaido Odonatological Society* 9: 16-19. (in Japanese). [Phenological data of *S. frequens* from 1989, 1990, and 1992 are presented in detail.] Address: not stated in English

**2677.** Wataji, M.; Maruyama, F.; Taguchi, M.; Kano, M.; Yoshinuma, T. (1997): Species composition and collection records of the dragonflies inhabiting Tonneusu Pond. *Bulletin of the Hokkaido Odonatological Society* 9: 20-23. (in Japanese). [Japan; collection data of 28 odonate species resulting from 1990-95 are documented in detail.] Address: Taguchi, M., Yaei-Higashi High School, Sagamihara, Kanagawa 229-0029, Japan

**2678.** Wilson, J. (1997): Continuation. *Argia* 9(4): 27. (in English). [dragonfly poem] Address: Wilson, Jacquelyn, 245 South Park St., Apt. 811, Madison WI 53715, USA.

**2679.** Wisenden, B.D.; Chivers, D.P.; Smith, J.F. (1997): Learned recognition of predation risk by *Enallagma* damselfly larvae (Odonata, Zygoptera) on the basis of chemical cues. *Journal of Chemical Ecology* 23(1) : 137-151. (in English). ["We studied two populations of damselfly larvae (*Enallagma boreale*): one popu-

lation cooccurred with a predatory fish (northern pike, *Esox lucius*); the other did not. Damselflies that cooccurred with pike adopted antipredator behavior (reduced activity) in response to chemical stimuli from injured conspecifics, and to chemical stimuli from pike, relative to a distilled water control. Damselflies from an area where pike do not occur responded only to chemical stimuli from injured conspecifics. In a second set of experiments, we conditioned pike-naive damselflies to recognize and respond to chemical stimuli from pike with antipredator behavior. Damselfly larvae that were previously unresponsive to pike stimuli learned to recognize pike stimuli after a single exposure to stimuli from pike and injured damselflies or pike and injured fathead minnows (*Pimephales promelas*). The response to injured fathead minnows was not a general response to injured fish because damselfly larvae did not respond to chemical stimuli from injured swordtails (*Xiphophorus helleri*), an allopatric fish. Taken together, these data suggest a flexible learning program that allows damselfly larvae to rapidly acquire the ability to recognize local predation risk based on chemical stimuli from predators, conspecifics, and heterospecific members of their prey guild." (Authors)] Address: Wisenden, B.D., Department of Biology, University of Saskatchewan 112 Science Place, Saskatoon, Saskatchewan, Canada, S7N 5E2, Canada

**2680.** Wudkevich, K.; Wisenden, B.D.; Chivers, D.P.; Smith, J.F. (1997): Reactions of *Gammarus lacustris* to chemical stimuli from natural predators and injured conspecifics. *Journal of Chemical Ecology* 23(4) : 1163-1171. (in English). ["We exposed the freshwater amphipod *G. lacustris*, to chemical stimuli from injured conspecifics and to chemical stimuli from two types of natural predators: dragonfly larvae (*Aeshna eremita*) and northern pike (*Esox Indus*). Exposure to all three stimuli caused *G. lacustris* to reduce significantly its level of activity relative to activity recorded in response to a distilled water control. The similarity in responses to chemicals associated with predators and to injured conspecifics suggests the presence of an alarm pheromone within the body tissues of *G. lacustris*. In response to chemical stimuli from pike, *G. lacustris* tended to reduce its time in the water column and spend more time near the bottom of the test aquaria. However, no such trend was apparent in response to chemical stimuli from dragonfly larvae. The differences in response to chemical stimuli from pike and larval dragonflies suggest that *G. lacustris* does not have a rigid behavioral response to predation risk; instead, antipredator behavior may be modified to maximize avoidance of predators that are active in different microhabitats." (Authors)] Address: Wisenden, B.D., Department of Biology, University of Saskatchewan 112 Science Place, Saskatoon, Saskatchewan, Canada, S7N 5E2, Canada

**2681.** Yokoyama, T.; Hirose, Y. (1997): Habitat and ecology of *Planaeschna milnei* in Kikonai town. *Bull. Hokkaido Odonatological Society* 9: 11-15. (in Japanese). Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**2682.** Yokoyama, T. (1997): Records of *Sympetrum parvulum* in Tomakomai city and Chitose city. *Bulletin of the Hokkaido Odonatological Society* 9: 7. (in Japanese). [12-X-1996] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan



- 2683.** Adena, J. (1998): Zur Libellenfauna neuangelegter Gewässer in einem Flussmarschgebiet Bremens - Erfolgskontrolle von Ausgleichs- und Ersatzmaßnahmen. Diplomarbeit. Prof. Dr. D. Mossakowski. Universität Bremen: 102 pp, Anhang 35 pp. (in German). [A published abridged version of this M. Sc. thesis is abstracted in OAS 2408. The thesis provides a lot of additional information, e.g. distribution maps, graphs of the sampling localities, detailed species lists, and species monographs. The focus of the thesis is set on the efficiency and efforts of measures made to compensate impacts on landscape and habitats from the odonatological point of view. Each of these measures is assessed in detail. Of some interest is the description of the success of ditch management with special emphasize of species preferring *Stratiotes aloides* (*Aeshna viridis*, *Anaciaeschna isosceles*). In general, the study provides interesting material on the design of compensation measures for Odonata.] Address: Adena, Julia, Geibelstr. 61, D-28215 Bremen, Germany
- 2684.** Beckemeyer, R. (1998): 1997 publications on odonata of other lands. *Argia* 9(4): 22-24. (in English). [Reviews of Terence de Fonseca's book "A Guide to the Dragonflies of Sri Lanka", "Dragonflies of the Natal Drakensberg" by M. J. Samways and G. Whiteley, and S. Brooks' "Field Guide to the Dragonflies and Damselflies of Great Britain and Ireland".] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net
- 2685.** Beckemeyer, R.J.; Huggins, D.G. (1998): Some midwestern Odonata records for 1997. *Argia* 9(4): 6. (in English). [USA; records from Boone county, Arkansas, some from Kansas, and several from Nebraska.] Address: Beckemeyer, R.J., 957 Perry, Wichita, KS 67203-3141, USA
- 2686.** Donnelly, T.W. (1998): "Guidebook to dragonflies of Taiwan (Part 1)". *Argia* 9(4): 24. (in English). [Review of Wang, H.Y. & J.B. Heppner (1997).] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 2687.** Donnelly, T.W. (1998): "Status survey and conservation plan. Dragonflies". *Argia* 9(4): 24-25. (in English). [Critical account on the Odonata conservation plan.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 2688.** Donnelly, T.W. (1998): Ecuador epilogue: a trip to La Selva. *Argia* 9(4): 15-16. (in English). [Report of a short collecting visit in La Selva, Coca, Ecuador. Some attention is given to *Microstigma rotundatum*.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 2689.** Donnelly, T.W. (1998): Massachusetts group has a productive summer, digested from the ODE NEWS. *Argia* 9(4): 12. (in English). [Massachusetts, USA; records of the following species are briefly discussed: migrating *Anax junius*, some preyed by Kestrels, *Somatochlora georgiana*, *Coenagrion resolutum*, *Gomphaeschna antilope*, *Aeshna mutata*, *Tramea calverti*, and *Calopteryx dimidiata*.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 2690.** Donnelly, T.W. (1998): Michigan odonate survey news, extracted from WILLIAMSONIA. *Argia* 9(4): 12. (in English). [The second record of *Enallagma exsulans* in Michigan, USA is used to outline briefly the range extension of the species in the past decades in USA.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 2691.** Mauffray, B. (1998): Update from the IORI. *Argia* 9(4): 25-26. (in English). [Report of the 1997 activities of the International Odonata Research Institute in Gainesville, Florida, USA.] Address: Mauffray, B., 4525 N.W. 53rd Lane., Gainesville, FL 32653, USA. E-mail: iori@afn.org
- 2692.** May, M. (1998): International odonatology: participation and peaceful coexistence. *Argia* 9(4): 3-5. (in English). [This is a personal and balanced account on the relationships between WDA and SIO-Foundation.] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu
- 2693.** Nikula, B. (1998): *Neoneura amelia*, new to the United States. *Argia* 9(4): 11-12. (in English). [*N. amelia* was caught at 25 April 1997 in the Rio Grande valley of south Texas, and confirmed on 12./13. May 1997 at the same locality. The habitat and the co-occurring species are briefly described.] Address: Nikula, B., 2 Gilbert Lane, Harwich Port, MA 02646, USA. e-mail: odenews@capecod.net
- 2694.** Paulson, D. (1998): Dragonflies out of Africa. *Argia* 9(4): 17-20. (in English). [Detailed report of a trip in October-November 1997 to Zimbabwe and South Africa; *Pseudagrion deningi* is a new record for Zimbabwe.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu
- 2695.** Paulson, D. (1998): Specimens tell story of migration - but no longer? *Argia* 9(4): 22. (in English). [Some reflections on fat deposition of wandering dragonflies.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu
- 2696.** Rampazzi, F. (1998): Le libellule (Insecta: Odonata) delle torbiere a sfagni del cantone Ticino e del Moesano (Val Calanca e Val Mesolcina, GR), Svizzera. *Boll. Soc. ticin. Sci. not.* 86(2): 19-28. (in Italian, with English summary). [During the period 1990-1993 the Odonata of 20 peat-bogs of the Canton Ticino and Moesano (Calanca and Mesolcina, GR, Switzerland) were surveyed. The study sites are situated in the southern Swiss Alps (Ticino, Grisons) at altitudes between 275 and 2020 m a.s.l. 25 species of dragonflies were recorded, 18 of which are reproducing in at least one of the 20 investigated sites, but only *Aeshna caerulea*, *A. juncea*, *Somatochlora alpestris*, *S. arctica*, *Libellula quadrimaculata*, *Sympetrum danae*, and *Leucorrhinia dubia* show clear preferences for peat-bog habitats. The occurrence of peat-bog species depends particularly on temperature, water acidity and structure of aquatic habitats. The most characteristic species are represen-

ted by *S. arctica* and *A. caerulea* (only in peat-bogs above 1700 m a.s.l.) and particularly by *L. dubia*, which occurs only in peat-bogs with dystrophic ponds. In the study-area *A. caerulea* and *L. dubia* are very rare species (only 3 sites), while *A. juncea* and *S. alpestris* show the higher frequency among the investigated dragonflies-communities (12-14 sites). However, the affinity of *A. juncea* and *S. alpestris* with peat-bog habitats decrease strongly by increasing altitude, and in the subalpin region they become more or less eurytopic. The likewise "tyrphobiontic species" such as *Coenagrion hastulatum* or *L. pectoralis*, which are both present in the northern part of Switzerland and of Italy, could not be found.] Address: Rampazzi, F., Mus. cantonale Stor. nat., Viale Cattaneo 4, CH-6900 Lugano, Switzerland.

**2697.** Tennessen, K. (1998): Ecuador IV - we learn some more. *Argia* 9(4): 13-15. (in English). [Report of a collecting trip to the eastern slopes of Ecuador.] Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktennessen@aol.com

**2698.** Utzeri, C.; Cordero, A., Santolamazza Carbone, S.; Dell'Anna, L.; Mamcini, L. (1998): *Somatochlora meridionalis* Nielsen, 1935 nel Lazio (Italia centrale), con note di autecologia e comportamento (Odonata: Corduliidae). *Opusc. zool. flumin.* 163: 1-16. (in Italian, with English summary). ["The 12 hitherto known *Lalium* localities of the species are mapped. At 5 sites, in 2 streams, the temperature, pH, dissolved oxygen, oxygen saturation, conductivity and salinity were recorded, and the concentration of sulfite-reducing clostridia was evidenced in water and in sediments by means of anaerobic culture on SPS-agar. In winter, during the larval stage, water was cool and oversaturated by oxygen, pH was over 8. Since water bodies with such pH values are uncommon in central Italy, the high alkalinity might present a restricting factor for larval growth, hence it could be responsible for the localised distribution of the species. Mature individuals were recorded on the wing between early July and the second half of August, but the entire flight period, incl. the maturation time, probably extends from mid June to the end of August at least. Throughout this period, 13 odonate species were associated with *S. meridionalis* at 3 of its habitats. There is no evidence on territorial behaviour. Males search for females in the shadedmost parts of the river banks. However, the copulation takes place either at the watersite or, in 1 case, it occurred 2 km off the water. This may suggest an unusual mating system in this species. Intra-male sperm translocation behaviour was observed once, after tandem formation. The oviposition takes place at very sheltered and shaded sites, either in the water, or in the mud at the water edge. At times, females can also repeatedly alternate several oviposition movements onto the ground (at a short distance from water) with a single one onto the water. Eggs, deposited on 22 August 1997, and reared first under natural conditions, and subsequently in the laboratory (15 h light period), hatched after 29 days. The female preference for very shaded oviposition sites might explain the literature reports on larvae, recovered from flooded caves and Etruscan tombs, although these can be carried into the caves by the surface streams as well." (Authors)] Address: Utzeri, C., Dipartimento di Biologia Animale e dell'Uomo, Università di Roma "La Sapienza", Viale dell'Università 32, I-00185 Roma, Italy

**2699.** Vizslán, L.; Vizslán, T. (1998): Adatok a Varbói-Tározó szilakötő (Odonata) faunájához. *Acta Academiae Paedagogicae Agriensis Nova Series (Sectio Zoologica)* 22: 35-46. (in Hungarian with English summary). [The paper documents the odonate fauna of the Varbó reservoir in the Tardonai Hills, Hungaria. 29 species, most of them collected in 1995 and 1996, are listed. Special emphasize is given by the authors to *Pyrrhosoma nymphula interposita*, *Aeshna mixta*, *Anax imperator*, *Libellula fulva*, and *Sympetrum pedemontanum*.] Address: Vizslán, V., Kitaibel Pál út 32/C Fsz: 2, HU-9400 Sopron, Hungaria

1999

**2700.** Angelibert, S.; Cayrou, J.; Cereghino, R.; Giani, N. (1999): Biodiversity of three rocky ponds of the "Causses du Quercy" Regional Natural Park. *Bulletin de la Societe D'Histoire Naturelle de Toulouse* 135: 37-45. (in French with English summary). ["In the arid Causse region (South-western France), aquatic ecosystems are scarce, and essential to the maintain of both wildlife and human activities. Since the 12th century, several ponds were bored into the calcareous rock of this region. These man-made ecosystems belong now to the patrimony of the "Causses du Qercy" Regional Natural Park. The aim of this work was to evaluate the biodiversity of the aquatic flora and fauna of these ponds. Because of the rocky nature of the substrate, the specific richness of the flora was low (only 13 plant species were recorded). The invertebrate and vertebrate fauna was sampled from March to July 1999 :155 taxa (i.e. 145 invertebrates and 10 vertebrates) from 61 families were recorded. These taxa were characteristic of plains and mountains from occidental Europe. However, this species list is certainly not extensive. Most of the winged adults could be considered as migrating species (i.e. from pond to pond), with reproduction occurring in a certain number of ponds only. Diptera Chironomidae were the most diversified group, with 33 identified taxa. The absence of expected taxa (i.e. usually found in such ecosystems: Odonata Gomphidae, Mollusca Sphaeriidae) was probably due to the absence of mud accumulation on the rocky substrate. Our study showed that these ponds require particular attention and should be preserved, as : i) they could be considered as isolated biodiversity reservoirs within this wide arid area, and ii) they are the only of water for the terrestrial fauna, including insects which have a major role in plant pollinisation." (Authors)] Address: Angelibert, S., Centre d'Ecologie des Systemes Aquatiques Continentaux, UMRC 5576, 118 route de Narbonne, F-31062, Toulouse Cedex, 4 France

**2701.** Foeckler, F.; Theiß, J.; Schmidt, H.; Deichner, O.; Schiller, W. (1999): Auswirkungen der Extensivierung teichwirtschaftlicher Nutzung auf Makrozoobenthos, Plankton-Entwicklung und Trophie am Beispiel der Naturschutzgebiete "Vogelfreistätte Großer Rußweiher" und "Eschenbacher Weihergebiet". *Schriftenreihe des Bayerischen Landesamtes für Umweltschutz* 150: 245-267. (in German). [Bavarian (Germany) conservation measures for water bodies intent to extensify pisciculture. To assess efforts of this extensification, the fauna including Odonata of six water bodies before (1995) and after (1996) extensification measures was

surveyed. At present, there is no significant increase of species diversity measurable.] Address: ÖKON, Dechbettener Str. 9, D-93049 Regensburg, Germany

**2702.** Futahashi, R. (1999): Late records of *Crocothemis servilia mariannae* KIAUTA and *Aeschnophlebia longistigma* SELYS. *Aeschna* 35: 47-48. (in Japanese). Address: not stated in Japanese

**2703.** Inoue, K.; Kano, K.; Kuwahara, H.; Sano, O.; Yahiro, I. (1999): Records of Odonata from Guam Island, Mariana Islands, USA. *Sympetrum Hyogo* 6: 14-22. (in Japanese with English summary). ["Many Japanese travelers have visited this island mainly for sight-seeing, but no faunal records have ever been published after Lieftinck's publication on Odonata of Micronesia in 1962. This report compiles specimens collected by Kano, Kuwahara, Sano and Yahiro, who have visited this island during 1983 to 1997 independently. The twelve species listed by Lieftinck for Guam, could be confirmed. *Orthetrum s. sabina*, *Zygomma petiolatum*, and *Macrodiplax cora* are new additions to this island (cf. Kano, 1990 and 1991), and *Anax guttatus* was proved to occur in good numbers in contrast to Lieftinck's single female. The status of *Anax piraticus* is discussed in comparison with *A. guttatus* and *A. panybeus* in great detail and the taxa are figured. Figures of *Agrionoptera insignis guamensis* and the Japanese *A. i. insignis* are welcome for studying the status of the taxa. Some of the species are pictured with colour photos, and a picture shows a couple of *O. sabina* and *Z. petiolatum*. In addition body length of *Hemicordulia mindana mindana* and *H. m. nipponica* are compiled in a table." (Authors)] Address: Inoue, K., 5-9 Fuminosato 4-chome, Abenoku, Osaka 545, Japan

**2704.** Kitagawa, K. (1999): Mr. Wako KITAWAKI in memoriam. *Aeschna* 35: 1-2. (in Japanese). [Obituary] Address: Kitagawa, K., Imaiti 1-11-6, Asahi-ku, Osaka C., Osaka, 535-0011, Japan

**2705.** Larube, H. (1999): A note on *Zygomma obtusum* ALBARDA caught with light traps. *Aeschna* 36: 32. (in Japanese). Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan

**2706.** *Lindenia* No. 33 (1999): LINDENIA. *Notiziario dell'Ufficio nazionale italiano della Società odonologica internazionale*, Napoli. *Lindenia* No. 30: 129-132. (in Italian). [Announcements of odonological symposia; review; list of province-wise occurrence (absolute and relative amount) of each Italian odonate species] Address: C. D'Antonio, Via A. Falcone 386/b, 1-80127 Napoli, Italy; E-mail: lindenia@freemail.it

**2707.** Matsuda, I. (1999): A record of the dragonflies newly caught in Kohama Island, the Ryukyus. *Aeschna* 35: 44. (in Japanese). [Japan; 6 species caught at 16 July 1997 are listed.] Address: not stated in Japanese

**2708.** Muraki, A.; Fujimoto, K. (1999): A record of *Sympetrum cordulegaster* (SELYS) from Nagano Prefecture in 1997. *Aeschna* 35: 36. (in Japanese). [Japan; 26-X-1997.] Address: Muraki, A., Shigino-nishi 3-4-2-309, Jôtô-ku, Osaka C., Osaka 536, Japan

**2709.** Sacha, D.; Sibl, J. (1999): Príspevok k poznaniu fauny vážok (Odonata) Záhoria. *Folia faunistica Slovaca*, Bratislava 4: 45-53. (in Slovakian with English

summary). [Between 1995 and 1997, 46 odonate species were collected in the Rudna river-basin, Slovakia. This totals the number of the regionally known species to 49. Most interesting records are *Coenagrion scitulum*, *C. ornatum*, *Ophiogomphus cecilia*, *Brachytron pratense*, *Anaciaeschna isocles*, *Anax parthenope*, *Cordulegaster boltonii*, *Somatochlora flavomaculata*, *Epitheca bimaculata*, *Orthetrum brunneum*, *O. coerulescens*, *Sympetrum danae*, *S. meridionale*, *S. pedemontanum*, and *Leucorrhinia pectoralis*.] Address: Sibl, J., J. Stanislava 15, SK 84105 Bratislava, Slovakia. E-mail: sibl@changenet.sk

**2710.** Schmidl, J. (1999): Erfolgskontrolle an Tümpelneuanlagen in schwäbischen Niedermooren anhand Kleingewässer bewohnender Insektengruppen (*Hydradephaga*, Odonata). *Schriftenreihe des Bayerischen Landesamtes für Umweltschutz* 150: 269-274. (in German). [In the past decades, water bodies in fen bogs in Bavaria, Germany were impacted heavily by a diversity of human activities. To assess conservation measures (creation of new water bodies), water beetles and Odonata were used as monitoring organisms for the colonisation success of these water bodies. Records of Odonata with a "special value for nature conservation purposes" are *Sympecma fusca*, *Aeshna grandis*, *Brachytron pratense*, *Somatochlora flavomaculata*, and *Sympetrum striolatum*.] Address: Schmidl, J., bufos, Schopershofstr. 63, D-90489 Nürnberg, Germany

**2711.** Sugitani, A. (1999): Cherish the memory of Mr. Hiroshi ITOH. *Aeschna* 35: 56. (in Japanese). [Obituary] Address: not stated in English

**2712.** Suhling, F.; Schütte, C. (1999): Sternberg, K.; Buchwald, R. (Eds.) (1999): *Die Libellen Baden-Württembergs*. Band 1. *Lauterbornia* 37: 248-249. (in German). [oas 6; Review of the book, see OAS 1149] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

**2713.** Vizslán, T.; Pingitzer, B. (1999): Adatok Magyarország szitakötő - faunájához (Odonata) III. *Folia hist. nat. Mus. matraensis* 23: 179-190. (in Hungarian with short English summary). [Records of 47 Odonata from 151 Hungarian localities are presented species wise. The list includes species as *Lestes virens vestalis*, *Erythromma najas*, *Coenagrion ornatum*, *C. pulchellum*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Thecagaster bidentata*, *Somatochlora metallica*, *Epitheca bimaculata*, *Sympetrum meridionale*, and *S. pedemontanum*. Of more anecdotal interest is that *Crocothemis erythraea* (Brullé, 1832) at last! replaced *C. servillia* (Drury 1770) from Hungaria; it ever will remain a secret of (some) Hungarian odonatologists why they insisted on a disjunctive area of *C. servillia* in Hungaria.] Address: Vizslán, T., Kitaibel P. u. 32/C. Fru 2, HU-9400 Sopron, Hungaria

**2714.** Vizslán, T.; Pingitzer, B. (1999): Publication of data to the Odonata of County Borsod-Abaúj-Zemplén 4.. *Folia hist. nat. Mus. matraensis* 23: 171-177. (in Hungarian, with English summary). [Records of 34 species evidenced in 1995 are documented along with locality records and dates. Of some interest are records of *Coenagrion ornatum*, *Lestes dryas*, *L. sponsa*, *Anax ephippiger*, *Epitheca bimaculata*, *Orthetrum coerulescens anceps*, and *Sympetrum meridionale*.] Address: Vizslán, T., Szent Mihály u. 9, HU-9400 Sopron, Hungaria



**2715.** Yoshida, K. (1999): New localities of *Macromia daimoji* OKUMURA from Shikoku. *Aeschna* 35: 53. (in Japanese). Address: not stated in English

**2716.** Yoshida, M.; Ohkubo, K. (1999): A record of *Anax guttatus* (BRUMEISTER) in late season. *Aeschna* 36: 46. (in Japanese). [11. Nov. 1998] Address: not stated in Japanese

## 2000

**2717.** Bechly, G. (2000): Two new fossil dragonfly species (Insecta: Odonata: Anisoptera: Araripegomphidae and Lindeniidae) from the Crato Limestone (Lower Cretaceous, Brazil). *Stuttgarter Beitrage zur Naturkunde Serie B (Geologie und Palaeontologie)* 296: 1-16. (in English with German summary). ["Two new dragonfly taxa are described from the Lower Cretaceous limestones of the Crato Formation (Brazil): *Araripegomphus hanseggeri* n. sp. and *Cratolindenia knuepfiae* n. gen. n. sp. which both belong to the gomphid clade within Anisoptera. With at least 10 known species the gomphids represent the most diverse and also most abundant group of dragonflies at this locality, which has to be regarded as strong evidence for the presence of rivers. While all other known gomphid species belong to the Araripegomphidae and Proterogomphidae - Cordulagomphinae, the new genus *Cratolindenia* appears to be the first record of Lindeniidae - Lindeniinae from this locality." (Author)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**2718.** Boonthai, C.; Scott, R.R. Chapman, R.B. (2000): Acetylcholinesterase as a biomarker to assess the effect of chlorpyrifos and atrazine on some New Zealand aquatic invertebrates. *Australasian Journal of Ecotoxicology* 6(1): 59-64. (in English). ["Acetylcholinesterase (AChE) activity was investigated in selected species of New Zealand aquatic invertebrates using a modified microplate assay based on the Ellman technique as a biomarker of chlorpyrifos and atrazine exposure. After two days exposure to different concentrations of chlorpyrifos and atrazine, mayfly nymphs, *Deleatidium* sp., common water boatman, *Sigara arguta*, and common red damselfly nymphs, *Xanthocnemis zealandica*, showed a general trend of depression in AChE level but there were differences between the species. The results indicate that acetylcholinesterase may be useful as a biomarker but the choice of species is critical. The results also showed that atrazine may inhibit the activity of AChE. These results suggest that the restriction of AChE as a biomarker for organophosphorus and carbamate pesticides may not be valid and the use of this enzyme as a biomarker may be able to extended." (Authors)] Address: Boonthai, C.; Ecology and Entomology Group, Soil, Plant, and Ecological Sciences Division, Lincoln University, Canterbury New Zealand.

**2719.** Brown, J.M.; McPeck, M.A.; May, M.L. (2000): A phylogenetic perspective on habitat shifts and diversity in the North American *Enallagma* damselflies. *Systematic Biology* 49(4): 697-712. (in English). ["Community ecologists are increasingly aware that the regional history of taxon diversification can have an impor-

tant influence on community structure. Likewise, systematists recognize that ecological context can have an important influence on the processes of speciation and extinction that create patterns of descent. We present a phylogenetic analysis of 33 species of a North American radiation of damselflies (Zygoptera: Coenagrionidae: *Enallagma* Selys), which have been well studied ecologically, to elucidate the evolutionary mechanisms that have contributed to differences in diversity between larval habitats (lakes with and without fish predators). Analysis of molecular variation in 842 bp of the mitochondrial cytochrome oxidase I and II subunit and of the intervening Leu-tRNA and 37 morphological characters resulted in three well-defined clades that are only partially congruent with previous phylogenetic hypotheses. Molecular and morphological data partitions were significantly incongruent ( $p < .01$ ). Lack of haplotype monophyly within species and small amounts of sequence divergence (<1%) between related species in three of the four clades suggest that recent, and parallel, speciation has been an important of community diversity. Reconstruction of habitat preference over the phylogeny suggests that the greater species diversity in fish-containing lake habitats reflects the recency of shifts into the fishless lake habit, although a difference in speciation or extinction rates between the two habitats is difficult to exclude as an additional mechanism." (Authors)] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu

**2720.** Chae, J.-S.; Pusterla, N.; Johnson, E.; Derock, E.; Lawler, S.P.; Madigan, J.E. (2000): Infection of aquatic insects with trematode metacercariae carrying *Ehrlichia risticii*, the cause of Potomac horse fever. *Journal of Medical Entomology* 37(4): 619-625. (in English). ["We provide evidence of *Ehrlichia risticii* Holland, the agent of Potomac horse fever, in trematode stages found in aquatic insects collected from a pasture stream in northern California, using nested polymerase chain reaction (PCR) amplification and sequence analyses of the 16S rRNA, 51 kDa major antigen and groEL heat shock protein genes. *E. risticii* was detected in metacercariae found in the immatures and adults of the following insects: caddisflies (Trichoptera), mayflies (Ephemeroptera), damselflies (Odonata, Zygoptera), dragonflies (Odonata, Anisoptera), and stoneflies (Plecoptera). The prevalence of *E. risticii* was 31.9% ( $n = 454$  individuals) in aquatic insects (13 of 17 species were positive). Prevalence within orders was as follows: 43.5% ( $n = 207$ ) in caddisflies, 15.2% ( $n = 92$ ) in mayflies, 13.9% ( $n = 115$ ) in damselflies, 10.0% ( $n = 10$ ) in dragonflies, and 80.0% ( $n = 30$ ) in stoneflies. This study demonstrates a broad intermediate host range for trematodes that act as vector for *E. risticii*. Insects are likely to play an important role in the epidemiology of this disease." (Authors)] Address: Chae J.-S., College of Veterinary Medicine, Chonbuk National University, Chonju, Chonbuk, 561-756 South Korea

**2721.** Combes, S.A.; Trimble, A.C.; Daniel, T.L. (2000): Spatial profiles of wing stiffness in hawk-moths and dragonflies. *American Zoologist* 40(6): 978. (in English). ["Insect flight performance depends strongly on the dynamic geometry of wings. The curvature of the trailing edge, in particular, is a crucial determinant of aerodynamic force generation. In insects, wing curvature results from the instantaneous interaction between

aerodynamic forces and bending stiffness. If bending stiffness varies spatially, then regional flow control is possible, suggesting a passive mechanism of stability. To examine this structural heterogeneity and its consequences for flight aerodynamics, we characterize spatial variation of wing flexural stiffness in both the spanwise and chordwise direction of insect wings. We measure the surface shape of wings by multiple laser ranging techniques, and then calculate flexural stiffness along the wing by comparing the surface shape of wings before and after loading the tip with a known force. We compare the spatial distribution of wing stiffness in the hawkmoth, *Manduca sexta*, and an aeshnid dragonfly, *Aeshna multicolor*. These insects, both excellent fliers, differ greatly in wing shape and venation pattern. Despite such morphological differences, we find that the profile of flexural stiffness in the spanwise direction is remarkably similar in both species, with a peak in stiffness located between 1/3 and 1/2 of wing span, and a sharp drop in stiffness (apprx2 fold) past this point. In contrast, chordwise stiffness differs in the two species; in *Manduca*, stiffness falls sharply towards the trailing edge, while the dragonfly does not display this abrupt drop. Thus, trailing edge curvature and chordwise flow may differ significantly in these species." (Authors)] Address: Combes, S.A. ; Trimble, A. C. ; Daniel, T. L., University of Washington, Seattle, WA USA

**2722.** Fischer, S.; Marinone, M.C.; Fontanarrosa, M.S.; Nieves, M.; Schweigmann, N. (2000): Urban rain pools: Seasonal dynamics and entomofauna in a park of Buenos Aires.. *Hydrobiologia* 441: 45-53. (in English). ["We describe the seasonal variations of the insect community of the rain pools in a park of Buenos Aires during a 1-year period, based on a weekly sampling programme. We also analyse the relationships between the observed biotic patterns and some physical and meteorological variables. Four periods, fairly coincident with the seasons of the year, were graphically identified as functions of temperature, rainfall, flooded area, number of rain pools, depth and taxonomic richness. A total of 45 insect taxa was identified: 18 Coleoptera, 15 Diptera, 9 Heteroptera, 1 Ephemeroptera and 2 Odonata. [...]."] (Authors). Address: Fischer, Sylvia, Departamento de Ciencias Biologicas, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Ciudad Universitaria, Pabellon II, C1428 EHA, Buenos Aires, Argentina. E-mail: mosquito@bg.fcen.uba.ar

**2723.** Fleck, G.; Nel, A.; Ploeg, G. de; Masselot, G. (2000): A fossil dragonfly from the Paris Basin amber of France (Lowermost Eocene) (Insecta, Odonata, Anisoptera). *Acta Geologica Hispanica* 35(1-2) : 131-134. (in English). ["A new fossil libelluloid dragonfly is recorded from the Lowermost Eocene amber of Oise (France). This discovery is not only exceptional as a dragonfly in amber but also represents one of the oldest records of the libelluloid clade in the Cenozoic." (Authors)] Address: Fleck, G., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France

**2724.** Gröger, T.; Lange, K.-P. (Bearb.) (2000): Beiträge zur Entwicklung eines ökologischen Leitbildes für Flusslandschaften am Beispiel der Jahna, einem Nebenfluss der Elbe in Sachsen. Staatsministerium für Umwelt und Landwirtschaft, Freistaat Sachsen (Hrsg.): 183 pp. (in German). [Aim of the study is to prepare fundamentals for a river management plan. It documents extensively the ecological (abiotic, biotic, mana-

gement) situation in the catchment of the Jahna, a tributary of the River Elbe, Sachsen, Germany. In Chap. 4.1.5, the results of an odonatological survey are briefly outlined, but without details. In 1999 and 2000, 25 species were recorded. From the odonatological point of view, management measures should be developed on the basis of habitat requirements of *Ophiogomphus cecilia*. The study can be obtained for 5,- Euro from the address listed below.] Address: Staatliches Umweltfachamt Radebeul, Wasastr. 50, D-01445 Radebeul, Germany. E-mail: poststelle@sturfARB.smul.sachsen.de

**2725.** Habdua, I.; Radanovic, I. Matonickin, R. (2000): Functional feeding structure of benthic macroinvertebrates in travertine barrier biotopes. *Verh. int. Ver. Limnol.* 27(5): 2594-2599. (in English). [Plitvice Lakes, NW Dinarid Mts, Croatia; *Onychogomphus forcipatus* is reported from the travertine moss- and filamentous algae covered substrate.] Address: Habdua, I., Dept Zool., Fac. Sci., Univ. Zagreb, Rooseveltov trg 6, CRO-10000 Zagreb, Croatia

**2726.** Hiratsuka, K. (2000): Collection of *Cordulia aenea amurensis* in Soya-shicho. *Bulletin of The Hokkaido Odonatological Society* 12: 25. (in Japanese). [Hokkaido, Japan; 30 Aug. 2000.] Address: Hiratsuka, K., 2-20-113, Honcho 2 jo-9, Higashi-ku, Sapporo City, 065-0042, Japan

**2727.** Hiratsuka, K. (2000): Observation on dragonflies at Onuma Park at Nanae-cho. *Bull. Hokkaido Odonatol. Society* 12: 24-25. (in Japanese). [Japan; *Lestes dryas*, *Somatochlora viridiaenea*, *Sympetrum risi*, *S. darwinianum*] Address: Hiratsuka, K., 2-20-113, Honcho 2 jo-9, Higashi-ku, Sapporo City, 065-0042, Japan

**2728.** Huth, J. (2000): Libellen (Odonata) der Braunkohlen-Bergbaufolgelandschaft Sachsen-Anhalts. *Abh. Ber. Naturkunde, Magdeburg* 23: 3-27. (in German with English summary). [Between 1996 and 1998, 46 odonate species were recorded from 93 water bodies within open-cast lignite post-mining landscapes of Sachsen-Anhalt, Germany. From the nature conservation point of view, the most important habitats are those with good water quality and a high diversity of vegetation. Each species is discussed in some detail. Succession of water body (early phase, transition phase, established phase [ $>35$  years old]) and the specific odonate species are outlined. This paper provides significant information on the characteristic coenosis and key species of different water bodies.] Address: Huth, J., OEKOKART GmbH, Georg-Cantor-Str. 31, D-06108 Halle/Saale, Germany

**2729.** Iannacone, J.A.; Alvarino, L.; Moreno, R.; Reyes, M.; Chauca, J. (2000): Culicidos (Diptera) del rio Chillón y sectores adyacentes de la provincia constitucional del Callao, Peru, durante El Niño 1997-1998. *Acta Entomologica Chilena* 24: 51-60. (in Spanish with English summary). [The study evaluated some areas of natural breeding places of mosquitoes - in most cases near underdeveloped town - near human populations in Callao-Peru during December 97 to August 98. Larvae of culicids of medical importance as *Anopheles pseudopunctipennis* (Theobald), *Culex quinquefasciatus* (Say), and *Aedes taeniorhynchus* (Wiedemann) were assessed. Habitat conditions resp. requirements of the species as salinity, temperature, and pH (7,8) were analyzed. "Moreover, spatial and temporal variation of population and the larvae index were observed in nine

survey points of Chillan River. High larvae indexes of *A. pseudopunctipennis* were associated with presence of the algae *Cladophora glomerata* (L.) Kuetzing and with the macrophyte *Lemna minor* (L.). The larvivorous fish *Poecilia reticulata* Peters, nymphs of Libellulidae and Coenagrionidae (Odonata) and adults of Dytiscidae (Coleoptera) were recorded as potential predators. The results were compared with those of the 1995-96 Pre-ENSO event, concluding that one of the consequences of Southern Oscillation ENSO "El Niño" 1997-98 event in the Peruvian coast was an increase of the population of these culicids of medical importance." (Authors)] Address: Iannaccone, J.A., Laboratorio de Ecofisiología, Área de Biodiversidad Animal, Facultad de Ciencias Naturales y Matemáticas, Universidad Nacional Federico Villarreal, Calle San Marcos 383, Pueblo Libre, Lima 21, Peru. E-mail: joselorena@terra.com.pe

**2730.** Jeziorski, P. (2000): *Leucorrhinia albifrons* (Burmeister, 1839) and *L. caudalis* (Charpentier, 1840) (Insecta: Odonata: Libellulidae) in the Czech Republic. *Casopis Národního Muzea Rada Přírodovědná* 169(1-4): 45-46. (in English). [*L. albifrons* and *L. caudalis* were traced in the collection of the National Museum Prague, Czech Republic. The findings are listed in a tab. with the known (very few) Czech records.] Address: Jeziorski, P., Na belide 1, CZ-73564 Havírov-Suchá

**2731.** Jonsen, I.; Taylor, P.D. (2000): Calopteryx damselfly dispersions arising from multiscale responses to landscape structure. *Conservation Ecology*. [online] 4(2). [cited September 14, 2001] Dec, 2000. 1-29. <http://www.consecol.org/Journal/vol4/iss2/art4/index.html>: (in English). ["Using spatially explicit simulation models, we explored the extent to which fine-scale (i.e., meters to tens of meters) movement behaviors could be used to predict broader scale patterns of distribution on heterogeneous landscapes. Our models were tailored by empirical data on Calopterygid damselfly movements on three types of landscapes that differed in amount of forest habitat. Surveys of the two congeneric damselflies, *C. aequabilis* and *C. maculata*, demonstrated that both species occupied stream and forest habitats on forested and partially forested landscapes, but were found primarily along streams on nonforested landscapes. Simulation models whose parameters were derived using empirical movement data for both species showed that fine-scale movement behaviors could be used to predict, on average, broader scale dispersion across a range of landscape structures, but that it was necessary to include information about broader scale landscape features in those models. In particular, the probability of crossing a patch boundary (patch boundary permeability) and the rate of movement in a given habitat patch (patch viscosity) were important determinants of damselfly dispersion on heterogeneous landscapes. In other words, our results suggest that damselfly dispersions may arise as a function of behavioral responses to spatial patterns at multiple scales." (Authors)] Address: Jonsen, D.I., Lethbridge Research Centre, Agriculture & Agri-Food Canada, P.O. Box 3000, Lethbridge, AB, Canada T1J 4B1. E-mail: jonse- ni@em.agr.ca

**2732.** Kenner, R.D. (2000): *Somatochlora kennedyi* (Odonata: Corduliidae): a new species for British Columbia, with notes on geographic variation in size and wing venation. *J. ent. Soc. Br. Columbia* 97: 47-49. (in English). [1 female, Andy Bailly Lake, S of Fort Nelson,

25-VI-1997. Specimens from the northern Yukon are smaller than those from elsewhere in its range and have a reduced number of cells in R2 in fore- and hind-wing.] Address: Kenner, R.D., Spencer Ent. Mus., Dept Zool., Univ. Brit. Columbia, Vancouver, BC, V6T 1Z4, CA

**2733.** Kopij, G.; De Swardt, D.H.; Nuttall, R.N. (2000): Diet of seven coraciiform species (Coraciiformes) in South Africa. *Acta Ornithologica* (Warsaw) 35(2): 207-209. (in English with Polish summary). ["A total of 62 stomach contents of four Merops and three other coraciiform species from South Africa, were analysed. Hymenoptera constituted the bulk of the diet of all four Merops species examined, with Odonata and Coleoptera being supplementary components. Upupa epops and *Phoeniculus cyanomelas* fed mainly on insect larvae, while *Coracias caudata* preyed upon Scarabaeidae, Acrididae, Isoptera and Solifugae." (Authors) The percentage of Odonata "of the prey in relation to the total number of prey identified" was 6.1 (*Merops apiaster*), 5.2 (*M. bullockiodes*), 8.5 (*M. persicus*), and 0 (*M. hirundineus*). It is discussed that "if wet mass is taken into consideration, the contribution of Odonata to the diet [...] is probably underestimated."] Address: Kopij, G., Dept Biol., National University of Lesotho, P.O. Roma 180, Lesotho. E-mail: g.kopij@nul.ls

**2734.** Kúdela, M. (2000): On the occurrence of some dragonflies (Odonata) in Podunajská rovina Plain. *Entomofauna carpathica* 12: 32-33. (in Slovakian, with English summary). [Trpis (1957) published odonate records from the Podunajská rovina Plain. The red listed *Stylurus flavipes* and *Sympetrum depressiusculum* have been rediscovered in this region; *Aeshna cyanea* has been recorded for the first time. *Gomphus pulchellus*, listed for the Podunajská rovina Plain, turns out to have been misrecorded, "as the place of record does not belong to this area." Annotation of ms: *G. pulchellus* was published for the Slovakian Republic from Dudich, E. (1958): Die Grundlagen der Fauna eines Karpaten-Flusses. *Acta zool. Acad. sci. hung.* 3(3-4): 179-200; the correct identification of the specimen is questionable.] Address: Kúdela, M., Katedra zoológie Prírodovedeckej fakulty UK, Mlynská dolina B-1, 842 15 Bratislava, Slovakia

**2735.** Mostert, K. (2000): Fauna in de stad: Mogelijkheden en beperkingen. *Levende Natuur* 101(6): 209-212. (in Dutch with English summary). ["Fauna in urban areas: Chances and limitations: In general urban areas host a large number of fauna species. Many of these species roam a lot. Far less species manage to maintain vital populations in urban areas. In larger cities most species are found in the sub-urban areas. Specific management offers especially in these areas attractive ecological possibilities. Apart from some building dwelling species the urban bird fauna consists mainly of forestborn species. Settlement of colonies causes often conflicts with 'human' fauna. Water birds and birds nesting on the ground are rare, because of predating pets. For example White wagtail, Swallow and Tree sparrow breed in rural areas in or around human buildings, but are largely absent in urban areas. Bats indicate ecological infrastructure in urban areas. The ecological quality of lawns in recreational areas and roadsides is well indicated by abundance and diversity of butterflies and grasshoppers. Dragonflies and in a lesser extent amphibians are suitable for judging the suc-



cess of riparian ecological management. Opportunities for ecological successes are linked to ecological corridors, extensive grassland management and in riparian management. Vegetations consisting of ruderal plant species are important in suburban areas, whereas these can accommodate many species, which lack in urban areas. Exotic species like Ring-necked parakeet, Siberian chipmunk and Midwife toad increase as a part of the urban fauna. Contrary to the flora the urban fauna hardly contains rare (Red List) species." (Author)] Address: Mostert, K., Palamedesstraat 74, NL-2612 XS Delft, The Netherlands

**2736.** NABU (2000): Das NABU-Naturschutzprojekt "Vogelsbergteiche" - ein einmaliges Naturidyll in Deutschland wird vorgestellt. Jahrbuch Naturschutz in Hessen 5: 7-9. (in German). [These water bodies are situated in the high middle range mountains in Hessen, Germany and of special ornithological importance. A passing reference on Odonata states that the population density of *Enallagma cyathigerum* was projected to 300000 individuals. So far 16 species are known from the region, but only *Aeshna mixta* is specified.] Address: NABU, Landesverband Hessen, Garbenheimer Str. 32, D-35578 Wetzlar, Germany. [www.NABU-Hessen.de](http://www.NABU-Hessen.de)

**2737.** Niesler, A. (2000): Ocena jakosci wody potoku Slepjotka na podstawie badan sestonu oraz bentosu. *Acta Biologica Silesiana* 34(51): 97-118. (in Polish with English and Russian summaries). ["Estimation of the water quality in Slepjotka stream on the ground of seston and bentos investigations: Studies concerned qualitative and quantitative analysis of seston and bentos fauna communities of the stream Slepjotka (Upper Silesia). Samples were taken from March to November 1996, once a month. Ciliata were the group which dominated in number and variety in species. Qualitative and quantitative analysis were helpful in distinguishing three different zones: the clean water zone (corresponded with oligosaprobic zone - next to the spring), the strong polluted zone (corresponded with alpha-mesosaprobic zone with some polisaprobionts - in the middle site) and the self-clarificated one (corresponded with alpha-mesosaprobic zone with some oligo- and beta-mesosaprobionts - near the fall of Slepjotka into Klodnica River). The communal sewage which flew down into the stream had a double influence over organisms living there. On the one hand it was connected with degradation of Ostracoda, Coleoptera, Dixidae, Heleidae, Ephemeroptera, Heteroptera, Odonata, Plecoptera (in bentos) and Cladocera (in seston). On the other hand it caused the massive occurrence of Ciliata, Nematoda and Diptera. Taking into account variety of trophic types, the lowest number of bacteria-feeders at the clean zone and their higher amount in the remaining sites were recorded. In spite of fact that the qualitative composition of bentos was indicative of greater pollution than in seston, the bentos communities as well as the seston one were helpful in estimating of the water quality." (Author)] Address: Niesler, Anna., Katedra Ekologii, Uniwersytet Slaski, ul. Bankowa 9, 40-007, Katowice Poland

**2738.** Polhemus, D.A.; Asquith, A.; Miller, S (2000): A new species of *Ischnura* from Rota (Odonata: Coenagrionidae), and a discussion of zygopteran zoogeography in the insular tropical Pacific. *Occ. Pap. Bemise P. Bishop Mus.* 62: 5-12. (in English). [*Ischnura luta* sp.

n. is described from the island of Rota in the northern Marianes. Holotype male, allotype female: Mariana Isls, Rota: Talakhaya, Water Cave Stream, 1/2-IV-1996; deposited at BPBM, Honolulu. It is similar to *I. ezoin* from the Bonin Isls, but can be easily distinguished from all Micronesian congeners by the structure of the male genitalia. The key characters are illustrated, and its biogeographic significance is discussed in the overall context of zygopteran distribution patterns in the tropical Pacific.] Address: Polemus, D.A., Dept Ent., MRC 105, Natn. Mus. Nat. Hist., Smithsonian. Instn, Washington, DC 20560, USA

**2739.** Pretscher, P. (2000): Neue Bücher: Sternberg, Klaus & Buchwald, Rainer: Die Libellen Baden-Württembergs. Band 1. Stuttgart: Eugen Ulmer Verlag, 1999. 468 S. - 98 DM. ISBN 3-8001-35098. *Natur und Landschaft* 75(5): 233. (in German). [oas 6; book review, see OAS 1149] Address: Pretscher, P., c/o Bundesamt für Naturschutz, Konstantinstr. 110, 53179 Bonn, Germany

**2740.** Primack, R.; Kobori, H.; Mori, S. (2000): Dragonfly pond restoration promotes conservation awareness in Japan. *Conservation Biology* 14(5): 1553-1554. (in English). ["The Yokohama city authorities and community groups have restored a dragonfly habitat (1986) in a previous ornamental fish pond. The odonate fauna increased from the original 3 to 27 species now, and dragonfly watching became a popular pastime for the urban population. On school grounds, 70 more dragonfly ponds were built in the Yokohama area, 300 being the final goal. The program, with pronounced educational and teaching objectives, has attracted widespread attention in Japan, and there are 500-1000 dragonfly ponds elsewhere in the country. Those next to schools are successfully encouraging an appreciation for nature and its conservation in children."] Address: Primack, R., Biol. Dept, Boston Univ., Boston, MA 02215, USA

**2741.** Reeves, D. (2000): *Austrolestes*, Newsletter of the Australian Dragonfly Society. *Austrolestes* 1: 1-4. (in English). [In 2000, the Australian Dragonfly Society was launched. 'Austrolestes' will deal as newsletter, will give advice in identifying specimens, will prepare bibliographic information, and will report on current activities in Australian odonatology. Issue No. 1 introduces *Austrolestes*, provides a key to the red species of *Diplacodes*, defines the terminology of Odonata size by wingspan, and lists most recent publications. It also will prepare species profiles.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: [denissreeves@uq.net.au](mailto:denissreeves@uq.net.au)

**2742.** Reeves, D. (2000): *Ictinogomphus australis* at Brown Lake, North Stradbroke Island, QLD. *Austrolestes* 1: 2. (in English). [8 exuviae of *I. australis* were discovered in November 2000.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: [denissreeves@uq.net.au](mailto:denissreeves@uq.net.au)

**2743.** Reeves, D. (2000): Species profile: *Austrolestes minjerriba* Watson 1979. *Austrolestes* 1: 4. (in English). [Morphological features and the habitat of the species are briefly outlined. Special emphasize is given to oviposition behaviour.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: [denissreeves@uq.net.au](mailto:denissreeves@uq.net.au)

- 2744.** Schultz, T.D. (2000): *Libellula flavida* (Odonata: Libellulidae), a dragonfly new to Ohio. *Great Lakes Entomologist* 33(3-4): 205-207. (in English). ["*L. flavida*, a widespread but uncommon dragonfly of southeastern and south central North America, is now recorded from Ohio. A breeding population was discovered in an acidic fen on the site of a sandstone quarry in southern Ohio." (Author)] Address: Schultz, T.D., Dept Biol., Denison Univ., Granville OH 43023, USA. E-mail: schultz@cc.denison.edu
- 2745.** Soldan, T.; Putz, M. (2000): Karyotypes of some Central European mayflies (Ephemeroptera) and their contribution to phylogeny of the order. *Acta Societatis Zoologicae Bohemicae* 64(4): 437-445. (in English). [Relations of the mayfly karyotype to that of the Odonata are discussed. Quite different Ephemeroptera karyotype supports the idea of the Ephemeroptera and Odonata + Neoptera sister grouping of pterygote insects.] Address: Soldan, T., Institute of Entomology, Academy of Sciences of the Czech Republic, Branišovska 31, CZ-370 05, Ceske Budejovice Czech Republic
- 2746.** Twisk, W.; Noordervliet, M.A.W.; ter Keurs, W.J. (2000): Effects of ditch management on caddisfly, dragonfly and amphibian larvae in intensively farmed peat areas. *Aquatic Ecology* 34(4): 397-411. (in English). ["Conservation of natural values within farming practice is growing rapidly within the Netherlands. The focus is primarily on terrestrial flora and fauna such as the vegetation in ditch banks and meadow birds. Knowledge needed to enhance biodiversity in ditches is limited. Therefore, a field study was set up to determine the effects of dredging, ditch cleaning and nutrient supply in the adjacent fields on caddisfly, dragonfly and amphibian larvae in the ditches in a peat area. Two-hundred forty ditches spread over 84 dairy farms were selected to determine the individual effect of several management aspects. Generalised linear modelling was used as a tool to detect the most relevant aspects and to obtain quantitative relations with the chance of the larvae being present. Dredging had an impact on the presence of all larvae types. The type of dredging machine, the dredging period, the water depth and the frequency of dredging can influence the presence of the larvae. The presence of caddisfly larvae was also affected by the cleaning machine and period and by the P supply in the adjacent field. The presence of amphibian larvae was also affected by the cleaning period. Measures that will enhance the presence of the larvae are formulated. Options for water boards and other government authorities to stimulate farmers to take these measures are given." (Authors) *Coenagrion pulchellum*, *Erythromma najas*, *Ischnura elegans*, and *Chalcolestes viridis* are listed in tab. 2.] Address: Twisk, W., Section Environmental Biology, Institute of Evolutionary and Ecological Sciences, Leiden University, 2300 RA, Leiden, The Netherlands. E-mail: w.twisk@zhew.nl
- 2747.** Ubukata, H. (2000): The impact of global warming on insects. In: Domoto, A., K. Iwatsuki, T. Kawamichi and J. McNeely (Eds): A threat to life. The impact of climate change on Japanese biodiversity. Biodiversity network Japan & IUCN: 61-70. (in English). [The paper compiles the current knowledge on possible impacts of climate change on Japanese butterflies and dragonflies using examples from different literature sources from Japan, Europe, and North America. Special emphasize is given to northward expanding Odonata as *Ictinogomphus pertinax*, the fate of so called northern species as *Somatochlora alpestris* and *Aeshna subarctica*, and *Mortonagrion Hirose* which may be impacted by increasing sea water table.] Address: Ubukata, H., Hokkaido University of Education at Kushiro, Dept Science Education, Shiroyama 1-15-55, Kushiro, 085, Japan. E-mail: ubukata@kus.hokkyodai.ac.jp
- 2748.** Vizslán, T. (2000): Data on the odonate fauna of Transdanubia, 1.. *Folia hist. not. Mus. matraensis* 24: 139-144. (in Hungarian with English summary). [Compilation of 30 odonate species recorded from 56 Hungarian localities. The list includes records of *Lestes macrostigma* and *Coenagrion ornatum*.] Address: Vizslán, T., Kitaibel P. u. 32/C. Fru 2, HU-9400 Sopron, Hungaria
- 2749.** Wataji, M.; Tamura, S.; Yamada, K.; Ota, K.; Kurauchi, Y.; Uemura, T. (2000): The original fauna and its shift at the lower reach of the River Ishikari. *Bulletin of The Hokkaido Odonatological Society* 12: 1-13. (in Japanese with English summary). [Urbanization in and around of Sapporo, Japan, changed the dragonfly fauna in a drastic way; this is exemplified by a survey of seven habitats (6 rivers and a bog in the northern part of Sapporo City) near the mouth of the Ishikari River. The present dragonfly fauna is dominated by pond-dwellers, whereas bog-species appear to have been exterminated by modification of the natural environment. The results are presented in tabs and graphs.] Address: not stated in English
- 2750.** Winterbourn, M.J.; Gregson, K.L.D.; Dolphin, C.H. (2000): Guide to the Aquatic Insects of New Zealand, Third Edition.. *Bulletin of the Entomological Society of New Zealand* 13: 102 pp.. (in English). ["This guide includes the latest information on the aquatic insects of New Zealand. Illustrated taxonomic keys are provided for the 11 orders of aquatic and water-associated insects inhabiting the three main islands of New Zealand. Where possible, insects are identified to genera and sometimes species. Annotated notes on distribution, habitat, and taxonomic problems are incorporated in the keys and references to relevant taxonomic studies are provided. A chapter on the collection, preservation, and curation is provided and the text is supplemented by maps and an index." ] Address: Winterbourn, M., Zool. Dept, Univ. of Canterbury, Christchurch New Zealand
- 2751.** Xyländer, W.E.R.; Zumkowski-Xyländer, H.; Franke, R. (2000): Libellenfunde (Insecta, Odonata) in den Königshainer Bergen. *Przyroda Sudétow Zachodnich* 3: 77-84. (in German, with Polish and Czech summaries). [In 1999 and 2000, 40 odonate species could be recorded in the Landscape Protection Site "Königshainer Berge" situated in Saxonia, Germany. A total of 45 species - including some hitherto unpublished records of Petzold and Seiffert, and records of Weibel (1930) - are listed and briefly discussed. Among other species *Ophiogomphus cecilia*, *Somatochlora flavomaculata*, *Anaciaeschna isocetes*, *Brachytron pratense*, *Anax ephippiger*, *Leucorrhinia pectoralis*, *Sympetrum depressiusculum*, and a strong population of *Cordulegaster boltonii* (rare in Saxonia) are of some interest.] Address: Xyländer, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany. E-mail: Naturmuseum.GR.Dr.Xyländer@t-online.de

**2752.** Yokoyama, T.; Fujimoto, S. (2000): A record of *Oligoaeschna pryeri* from Nishioka Reservoir. Bulletin of The Hokkaido Odonatological Society 12: 17. (in Japanese). [Japan] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**2753.** Yokoyama, T. (2000): A report of Odonata fauna of Ono Pond at Hokkaido University. Bulletin of The Hokkaido Odonatological Society 12: 14-16. (in Japanese). Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**2754.** Yokoyama, T.; Tsuji, M. (2000): Investigation of the survival of *Aeshna subarctica* at Kyogoku-cho. Bulletin of The Hokkaido Odonatological Society 12: 18-20. (in Japanese). [Japan] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**2755.** Zeng, L. (2000): Optical methods for measuring the natural frequencies and torsional deformations of a dragonfly wing. Internet article: <http://www.jst.go.jp/jst/erato/erato-symp-j/95Yo1/9501-TXT/koe nl-07-E.html>.

## 2001

**2756.** Akaishi, S. (2001): Dragonfly fauna of Matsuyama Marsh at Miyuki-cho. Bulletin of The Hokkaido Odonatological Society 13: 13-14. (in Japanese). [Lestes sponsa, Enallagma boreale circulatum, Aeshna juncea, A. nigroflava, Cordulia aenea, Sympetrum frequens, S. infuscatum, Leucorrhinia orientalis.] Address: not stated in English

**2757.** Akaishi, S. (2001): Probable emergence of *Boyeria maclachlani* at Asahikawa City. Bulletin of The Hokkaido Odonatological Society 13: 15. (in Japanese). Address: not stated in English

**2758.** Arnold, A. (2001): Neue Nachweise von Gomphiden (Odonata) im Regierungsbezirk Leipzig (Sachsen) und am Bitterfelder Muldestausee (Sachsen-Anhalt). Veröff. Naturkundemuseum Leipzig 20: 62-65. (in German). [Emerging Gomphus vulgatissimus were found on 15 May 2001 along the shore of the Muldestausee near Bitterfeld, Sachsen-Anhalt, Germany; the emerging habitats are characterised. In addition, the species occurs in the river Mulde (Sachsen). Comparable to *Calopteryx splendens*, *G. vulgatissimus* seems to recolonise some of the formerly heavily impacted rivers in the eastern parts of Germany. 11 and 14 July 2001 (a freshly emerged) *Ophiogomphus cecilia* was recorded near Scholtitz, Sachsen. This is one of the rare Saxonian records of the species which are also documented.] Address: Arnold, A., Zur schönen Aussicht 25, D-04435 Schkeuditz, Germany

**2759.** Baptista, D.F.; Buss, D.F.; Dorville, L.F.M.; Nessimian, J. L. (2001): Diversity and habitat preference of aquatic insects along the longitudinal gradient of the Macae River basin, Rio de Janeiro, Brazil. Brazilian Journal of Biology 61(2): 249-258. (in English with Portuguese summary). ["Diversity and habitat preference of macroinvertebrates were studied in Macae River basin, Rio de Janeiro State, Brazil, along its longitudinal gradient. We selected stream reaches corresponding to

1st, 2nd, 4th, 5th and 6th orders. A Surber sampler was used to collect four macroinvertebrates samples of each substrate (sand, litter in pool areas, stones, and litter in riffle areas) during the three sampling periods, defined based on the rain regime: April (end of the rainy season), July (dry season), and October (beginning of the rainy season). We identified 46,431 specimens corresponding to 117 taxa. Analysis of diversity numbers (both for family or genus level) indicated that all insect taxonomic orders had higher numbers on 2nd order stream reach, except for Ephemeroptera, on 4th order. However when considering morph-species taxonomic level, the higher diversity number occurred on 4th order stream. The highest richness and diversity numbers were found at the dry season. Considering habitat preference, both litter in pool areas and litter in riffle areas had the highest faunal richness." (Authors)] Address: Baptista, D.F., Laboratorio de Avaliacao e Promocao da Saude Ambiental, Departamento de Biologia, IOC, Fiocruz, Av. Brasil, 4.365, CEP 21045-900, Manguinhos, Rio de Janeiro, Brazil. E-mail: [darcilio@gene.dbbm.fiocruz.br](mailto:darcilio@gene.dbbm.fiocruz.br)

**2760.** Bechly, G. (2001): A new species of *Cymatophlebia* (Insecta: Odonata: Anisoptera: Cymatophlebiidae) from the Solnhofen lithographic limestone (Upper Jurassic, Germany). Stuttgarter Beiträge zur Naturkunde Serie B (Geologie und Palaeontologie) 301: 1-5. (in English). ["A new dragonfly species, *Cymatophlebia densa* n. sp. (Anisoptera: Aeshnoptera: Cymatophlebiidae), is described from the Upper Jurassic Solnhofen Limestone of Germany. It is the fourth species of this Mesozoic genus known from this famous fossil locality." (Author)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail [bechly@gmx.de](mailto:bechly@gmx.de)

**2761.** Bechly, G.; et al. (2001): A revision and phylogenetic study of Mesozoic Aeshnoptera, with description of numerous new taxa (Insecta: Odonata: Anisoptera). Neue Paläontologische Abhandlungen 4. ISBN 3-931689-07-7: 230 pp., 137 textfig., 48 pls. (in English with German summary). ["All Mesozoic Aeshnoptera are revised and their phylogenetic relationships are reconstructed. The type species of the genus *Mesuropetala* is redescribed, and *Mesuropetala muensteri* (GERMAR, 1839) comb. nov. is considered as its valid name instead of *Mesuropetala koehleri* (HAGEN, 1848). *Mesuropetala magna* sp. nov. is described from the Lower Cretaceous of Russia. "*Aeschna*" *antiqua* VANDER LINDEN, 1827 and "*Aeschna*" *schmiedeli* GIEBEL, 1856 could be synonyms of *Mesuropetala muensteri* or *Protolindenia wittei*, and thus are here considered as nomina dubia in Anisoptera incertae sedis. *Cymatophlebiopsis pseudobubas* HANDLIRSCH, 1939 is regarded as junior subjective synonym of *Aeschnopsis perampla* (BRODIE, 1945), and the genus *Aeschnopsis* HANDLIRSCH, 1939 stat. restor. is transferred to *Mesuropetalidae*. *Necrogomphus jurassicus* (GIEBEL, 1856) from the Lower Cretaceous of England is attributed to the genus *Aeschnopsis*. Furthermore, two new species, *Aeschnopsis perkinsi* sp. nov. and *A. tischlingeri* sp. nov. are described from the Upper Jurassic of Germany. *Liupanshanina* HONG, 1982 (*L. sijiensis* HONG, 1982) is transferred from Aeshnidae to a new family *Liupanshaniidae* fam. nov. that is regarded as sistergroup of *Mesuropetalidae*, and also includes the new taxa *Paramesuropetala gigantea* gen. et sp. nov. and *Araripeliupanshanina annesusae* gen. et sp. nov.



from the Lower Cretaceous of Brazil, *Paraliupanshania torvaldsi* gen. et sp. nov. and *P. rohdendorfi* sp. nov. from the lower Upper Cretaceous of Russia, and *Paraliupanshania britannica* sp. nov. from the Lower Cretaceous of England. *Progobiaeshna liaoningensis* gen. et sp. nov. is described from the Lower Cretaceous of China in a new family *Progobiaeshnidae* fam. nov. which is regarded as sistergroup of *Aeshnida* within *Aeshnomorpha* taxon nov. - *Panaeshnida* taxon nov. *Gobiaeshna PRITYKINA, 1977* (*G. occulta PRITYKINA, 1977*) is preliminarily attributed to *Progobiaeshnidae* fam. nov. as well. *Cymatophlebia longialata* (MÜNSTER in GERMAR, 1839) from the Upper Jurassic of Germany is redescribed and all *Cymatophlebiidae* are revised. Curious (autapomorphic) structures on the male abdomen of *Cymatophlebia* and *Rudiaeschna* are described in detail and their function is discussed. The phylogenetic position of *Cymatophlebiidae* within *Anisoptera* is discussed and seven new species are described: *Cymatophlebia kuempeli* sp. nov., *Cymatophlebia pumilio* sp. nov., *Cymatophlebia suevica* sp. nov., and *Cymatophlebia herrlenae* sp. nov. from the Upper Jurassic of Germany, as well as *Cymatophlebia purbeckensis* sp. nov., *?Valdaeshna andressi* sp. nov., and *Prohoyaeshna milleri* gen. et sp. nov. from the Lower Cretaceous of England. "*Cymatophlebia*" *mongolica* COCKERELL, 1924 is transferred as nomen dubium to *Anisoptera incertae sedis*. *Libellulum* WESTWOOD, 1854 is rejected as synonym of *Cymatophlebia*, and its type species *L. agrias* WESTWOOD, 1854 is regarded as nomen dubium, probably belonging to *Valdaeshninae* subfam. nov. within *Cymatophlebiidae*. The two holotype specimens of *Cymatophlebia suevica* sp. nov., and *Cymatophlebia herrlenae* sp. nov. represent the first and currently sole fossil insect remains known from the Malm beta of the Swabian Alb in Southern Germany. These two new species furthermore have to be regarded as the oldest known crown-group representatives of *Anisoptera*. With an estimated wing span of more than 220 mm, *Cymatophlebia suevica* sp. nov. and *Prohoyaeshna milleri* gen. et sp. nov. seem to represent the biggest *Anisoptera* and even the biggest crown-group *Odonata* known at all. *Rudiaeschnidae* fam. nov. is proposed as new family for *Rudiaeschna limnobia* DONG & ZI-GUANG, 1996 (Lower Cretaceous, China). This new family is regarded as sistergroup of *Cymatophlebiidae* and classified with the latter in a new superfamily *Cymatophlebioidea* stat. nov. *Paracymatophlebia splendida* gen. et sp. nov. from the Upper Jurassic of Kazakhstan is described in a new family *Paracymatophlebiidae* fam. nov. which is regarded as sistergroup of *Euaeshnida* (together: *Panaeshnida* taxon nov.). *Eumorbaeschnidae* fam. nov. from the Upper Jurassic of Germany is proposed as most basal family of *Euaeshnida*, based on *Eumorbaeschna jurassica* (CARPENTER, 1932) gen. et comb. nov. as "replacement" name for the aeshnid described by NEEDHAM (1907) under the incorrect name "*Morbaeschna muensteri*" because of a misidentified type species. The genus *Morbaeschna* NEEDHAM (1907) is synonymized with the genus *Mesuropetala*. *Anomalaeschna berndschusteri* gen. et sp. nov. (Lower Cretaceous, Brazil), *Paramorbaeschna araripensis* gen. et sp. nov. (Lower Cretaceous, Brazil), *Progomphaeschna ursulae* gen. et sp. nov. and *Progomphaeschna staniczeki* sp. nov. (Lower Cretaceous, Brazil), *Plesigomphaeschna mongolensis* gen. et sp. nov. (Lower Cretaceous, Mongolia) and *Plesigomphaeschna pindelskii* sp. nov. (Lower Cretaceous, England) are described

within *Neoaeshnida* - *Gomphaeschnidae* in a new subfamily *Gomphaeschnaoidinae* subfam. nov. In the same group three new species, *Gomphaeschnaoides magnus* sp. nov., *Gomphaeschnaoides petersi* sp. nov., and *Gomphaeschnaoides betoreti* sp. nov. are described from the Lower Cretaceous of Brazil, together with a redescription of the type species *Gomphaeschnaoides obliquus*, including its previously unknown forewings and body. "*Gomphaeschna*" *paleocenica* and "*Gomphaeschna*" *danica* from the Palaeocene of Denmark are preliminarily transferred to the new genus *Plesigomphaeschnaoides* gen. nov. as well. *Sinojagoria imperfecta* gen. et sp. nov. is described from the Lower Cretaceous of China and regarded as most basal representative of *Gomphaeschnaoidinae* subfam. nov. *?Gomphaeschna sibirica* sp. nov. and *Baissaeshna zherikhini* sp. nov. are described from the Lower Cretaceous of Russia. The genus *Cymatophlebiella* PRITYKINA, 1968 is excluded from *Cymatophlebiidae* and regarded as a basal *Aeshnoptera incertae sedis*; its type species *C. euryptera* PRITYKINA, 1968 is redescribed. Several taxonomic errors in LOHMANN (1996a-c) are corrected. Some general conclusions concerning the evolution and historic biogeography of *Aeshnoptera* are suggested, including an Mid-Jurassic Palaeartic origin and radiation of this monophylum. Totally 26 genera and 52 species of fossil dragonflies are revised. The following new taxonomic decisions are found in this publication: 5 taxa nov., 5 fam. nov., 2 subfam. nov., 2 trib. nov., 12 gen. nov., 29 sp. nov., 8 syn. nov., 5 stat. nov., 6 comb. nov., 2 nom. correct., 3 stat. restor., 3 sensu nov., 5 pos. nov." (Authors)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**2762.** Bezdecka, P. (2001): A contribution to the knowledge about Dragonflies (*Odonata*) of the Vizovické vrchy Highlands and Hlucka pahorkatina Highlands (Moravia, Czech Republic). *Vázky* 2001. Sborník referátu IV. celostátního semináře odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminár usporádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 50-61. (in Czech with English summary). [In 2000, 25 localities were sampled for *odonata*. A total of 40 species including *Coenagrion pulchellum*, *Erythromma viridulum*, *Brachytron pratense*, *Aeshna affinis*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, and *Thecagaster bidentata* are compiled, arranged according their locality frequency, and briefly commented.] Address: Bezdecka, P., V. Vaculky 994, 68605 Uherské Hradiště, Czech Republic. E-mail: pbezdecka@iol.cz

**2763.** Bryer, P.J.; Glanz, W.E. (2001): Oviposition site selection by a tropical treefrog in a temporary pool environment. *American Zoologist* 41(6): 1639. (in English). ["Frogs that oviposit unguarded aquatic eggs display various strategies to help ensure their offspring's survival. At one extreme, frogs can rely on camouflage or aversive taste to protect their eggs from predators, particularly fish. Alternatively, frogs can lay eggs in places where predators cannot survive, such as in temporary pools. These ephemeral environments, although typically fishless, still possess risks from the presence of predatory invertebrates and possibility of the pool drying up before the young metamorphose. To compound the difficulty faced by ovipositing pairs, pools that are free of predators may be very small and ephemeral,

while other pools that are more likely to persist for the entire period of development usually contain predatory invertebrates. We tested whether a temporary-pool breeding frog (*Hyla parviceps*) would discriminate between these pools. Thirty-five temporary pools near Posadas Amazonas, Madre de Dios province, Peru were censused daily for egg deposition. The pools were monitored weekly for invertebrate predators (primarily odonates), tadpole competitors of the families Hylidae and Leptodactylidae, and abiotic measurements (DO, pH, temperature, surface area, and depth). When the numbers of eggs laid in predator-free pools were compared with those pools containing predators a significant positive correlation between predator abundance and number of eggs laid was found. However, the main predictor of both predator abundance and the number of eggs laid was pool permanency, as estimated from pool volume. We feel that the frogs are choosing to ignore the risk posed by aquatic invertebrate predators because the alternative, drying risk, is greater in the smaller temporary pools." (Authors)] Address: Bryer, P.J. ; Glanz, W.E .,University of Maine, Orono, ME USA

**2764.** Catling, P.M.; Brownell, V.R. (2001): Biodiversity of adult damselflies (Zygoptera) at eastern Ontario gravel pit ponds. *Canadian Field-Naturalist* 115(3): 402-405. (in English). ["Adults of twenty-five species of damselflies were recorded at 41 gravel pit ponds in eastern Ontario. Twenty-four of the species recorded are believed to breed in the ponds where they were captured. Species present at 16 or more of the sites included *Enallagma boreale*, *E. civile*, *E. cyathigerum*, *E. ebrium*, *E. hageni*, *Ischnura verticalis*, *Lestes forcipatus*, *L. unguiculatus*, and *Nehalennia irene*. Two provincially and regionally rare species, *Lestes eurinus* and *Enallagma aspersum*, were abundant in some of the pit ponds. With 70% of the eastern Ontario zygopteran fauna, these naturally colonized sites may serve as important habitats for the conservation of biodiversity. The relatively high overall diversity compared to the much lower within-pond diversity is probably related to variation between ponds in flora, fauna, depth and other characteristics. Species specific associations with characteristics of the water body other than chemistry, may make damselflies a valuable group of bioindicators." (Authors)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, Kanada. E-mail: brownell@achilles.net

**2765.** Cempírek, J. (2001): Dragonflies (Odonata) of the town Ceske Budejovice (Southern Bohemia). Part II, the pond Bagr in Stromovka (1985-86, 2001). *Vázky* 2001. Sborník referátu IV. celostátního seminare odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminár usporádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 109-123. (in Czech with English summary). [Faunistical data from this Czech locality, resulting from 1985 and 1986 (26 species) are compared with data from 2001 (12 species). In the 1980ies the pond was in nearly natural condition including species as *Leucorrhinia dubia* and *L. pectoralis*. Later, the pond was amended to a concrete recreational reservoir. Most of the species were lost, but *Erythromma viridulum* and *Anax parthenope* are new immigrants to the locality.] Address: Cempírek, J., Vidov 37, 370 07 České Budejovice, Czech Republic

**2766.** Cervenka, P. (2001): A further discovery of the dragonfly *Leucorrhinia albifrons* (Odonata: Libellulidae)

in Moravia (Czech Republic). *Vázky* 2001. Sborník referátu IV. celostátního seminare odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminár usporádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 143-145. (in Czech with English summary). [*L. albifrons* is rare in the Czech Republic; one male was caught on 6 Aug. 2001 at the Malovický pond (mapping square 6871, 226 m asl, district Zlín).] Address: Cervenka, P., Pionýrů 862, 76302 Zlín-Malenovice Czech Republic. E-mail: pcervenka@seznam.cz

**2767.** Cervenka, P. (2001): Dragonflies (Odonata) in Finnish National Parks. *Vázky* 2001. Sborník referátu IV. celostátního seminare odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminár usporádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 158-164. (in Czech with English summary). [A total of 22 odonate species was found by visiting 11 National Parks in Finland ( Nuuksio, Helventijärvi, Pyhä-Häkki, Salamajärvi, Rokua, Lemmenjoki, Urho Kekkonen, Oulanka, Hiidenportti, Isojärvi) in June-July 2001. The following species are documented National Park - wise: *Calopteryx virgo*, *Pyrrhosoma nymphula*, *Erythromma najas*, *Coenagrion johanssoni*, *C. hastulatum*, *Enallagma cyathigerum*, *Ischnura elegans*, *Aeshna caerulea*, *A. juncea*, *A. suharctica*, *A. grandis*, *Cordulegaster boltonii*, *Cordulia aenea*, *Somatochlora metallica*, *S. alpestris*, *S. arctica*, *Libellula quadrimaculata*, *L. depressa*, *Leucorrhinia caudalis*, *L. dubia*, *L. rubicunda*, and *L. pectoralis*.] Address: Cempírek, J., Vidov 37, 370 07 České Budejovice, Czech Republic

**2768.** Costa, J.M.; Vieira, L.P.; Do Nascimento, L.A. (2001): Descricao de tres larvas de *Erythrodiplax Brauer*, 1868, e redescricao das larvas de *E. pallida* (Needham, 1904) e *E. umbrata* (Linnaeus, 1758), com chave para identificacao das larvas conhecidas das especies Brasileiras (Odonata, Libellulidae). *Boletim do Museu Nacional Rio de Janeiro Zoologia* 465: 1-16. (in Portuguese with English summary). ["The ultimate larvae of *E. basalis* (Kirby, 1897), *E. latimaculata* Ris, 1911, *E. lygaea* Ris, 1911, *E. pallida* (Needham, 1904), and of *E. umbrata* (Linnaeus, 1758) are described or redescribed, and illustrated based on exuviae of reared specimens. A key to the larvae of the known Brazilian species of *Erythrodiplax Brauer*, 1868 is presented." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisys.com.br

**2769.** Dannelid, E.; Ekestubbe, K. (2001): Vinterflickslandan (*Sympecma fusca*) på spridning norrut? *Ent. Tidskr.* 122(4): 173-176. (in Swedish, with English summary). [Winter Damselfly (*Sympecma fusca*) spreading north in Sweden? The species, known from SE Sweden, has been recorded recently from various localities in the provinces of Sodermanland and Uppland, and from the island of Gotland (where *S. paedisca* also occurs). The possibility of a northward expansion trend is discussed.] Address: Dannelid, E., Inst. Zool., Univ. Stockholm, S-10691 Stockholm, Sweden

**2770.** David, S. (2001): *Vázky* (Insecta: Odonata) dolního toku reky Ipel'. *Acta Musei Tekovensis Levice* IV: 37-48. (in Slovak with English summary). [The Odonata of the lower reaches of the river Ipel, southern Slovakia, characterised by a high sediment load, have been sur-

veyed starting in 1982 at 22 sampling places. The list of 13 species includes *Ophiogomphus cecilia*, *Stylurus flavipes*, *Somatochlora metallica*, *Onychogomphus forcipatus*, *Coenagrion pulchellum*, and *Orthetrum albistylum*. The dominant species are *Calopteryx splendens*, *Gomphus vulgatissimus*, and *Platycnemis pennipes*.] Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. E-mail: david@pribina.savba.sk

**2771.** De Marmels, J. (2001): Revision of Megapodagrion Selys, 1886 (Insecta, Odonata: Megapodagrionidae). Dissertation, Mathematisch-naturwissenschaftlichen Fakultät, Universität Zürich: 220 pp. (in English with German summary). ["The South American genus Megapodagrion Selys is split into Megapodagrion s. str. [monotypic: megalopus (Selys)], Allopodagrion Förster rev. status, [three species, viz., brachyurum sp. n., conortum (Hagen) (type species), erinys (Ris) comb. n., and Teinopodagrion gen. n. [24 species, viz., angulatum sp. n., caquetanum sp. n., chinchaysuyum sp. n., curtum (Selys) comb. n., decipiens sp. n., depressum sp. n., epidrium sp. n., eretes sp. n., lepidum (Racenis) comb. n., macropus (Selys) comb. n. (type species), mercenarium (Hagen) comb. n., meridionale sp. n., muzanum (Navas) comb. n., nebulosum (Selys) comb. n., oscillans (Selys) comb. n., schiessi sp. n., setigerum (Selys) comb. n., temporale (Selys) comb. n., turikum sp. n., vallenatum sp. n., venale (Selys) comb. n., vilorianum sp. n., waynu sp. n., yunka sp. n.]. The two unidentified species of RIS [1918, Arch. Naturg. (A) 9: 1-197] are also discussed. All taxa are keyed (except *T. muzanum*), described and their characteristic features are illustrated. A complete list of synonyms and misapplied names is presented for every taxon. Notes on habitats are given, if known. The larva of *Teinopodagrion* is characterized on the basis of *T. venale* and *T. oscillans*, the latter of which is here described for the first time. The geographic distribution of all taxa is mapped. The monophyly of the Megapodagrion-complex, composed of the three genera, is shown on the basis of four synapomorphies in adult morphology, including two penis characters. The ground pattern -or groundplan- of the Megapodagrion-complex is reconstructed using 35 adult and three larval characters. The apomorphic character states are established through comparison with numerous megapodagrionid and other odonate taxa (outgroups). The three genera of the Megapodagrion-complex are equally related to each other, but Megapodagrion s. str. is the most autapomorphic. Penis morphology suggests a closer transpacific relationship of the Megapodagrion-complex with several argiolestine genera found in the Malayan and Australo-Papuan region, and a more remote relation with some genera present in Asia, Madagascar, West Africa, Central America and western South America. The three genera of the Megapodagrion-complex began to rise from a common ancestor probably in the late Cretaceous, while the recent species are of Oligocene/Miocene age. The evolution of Allopodagrion is thought to be related with the formation of the southeast Brazilian mountains, while the origin and speciation of Teinopodagrion was triggered by the Andean orogeny. Megapodagrion s. str. evolved in the large intracratonic basins which separate the Guyana from the Brazilian shield, and both from the Andes. Mapping of some key characters present in Teinopodagrion allows for recognition of a southern and a northern group of species. The presence amidst the northern group of a species morphologically referable to the southern group based on synapo-

morphies suggests repeated and independent local fixation of identical combinations of character states already present in a polymorphic ancestor, rather than colonizing events through migration out of a 'center of origin'. Ecologically the distribution of each of the three genera of the Megapodagrion-complex closely matches certain well-defined types of forest." (Author)] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com

**2772.** Dijkstra, K.-D.; Kalkman, V.J. (2001): Orange and gold. *Malangpo* 18: 164-166. (in English). [Checklist of Odonata taken at seven localities in Thailand from late January to mid February 2001.] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**2773.** Dolný, A. (2001): A discovery of the dragonfly *Libellula fulva* (Odonata: Libellulidae) in the Protected Landscape Area Poodří (Silesia). *Vázky* 2001. Sborník referátu IV. celostátního semináře odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminář uspořádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 146-151. (in Czech with English summary). [An adult male was caught on 26 June 1999; coordinates of the locality are: 49°44.145'N, 18°06.542'E.] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic. E-mail: Alnes.Dolny@osu.cz

**2774.** Dolný, A.; Teperova, E.; Volna, K. (2001): Dragonflies (Odonata) of the Nature Reserve Rajviz: current state, changes during the 20th century, conservation. *Cas. slez. Muz. Opava* (A) 50 (Suppl.): 66-77. (in Czech, with English summary). [The status of the 27 odonate species in the peat bog nature reserve in 1929-1932, 1949, 1950-1956, 1992, and 1998-2000 is compared and discussed. *Aeshna subarctica elisabethae*, *Somatochlora alpestris*, and *Leucorrhinia dubia* are of particular interest.] Address: Dolný, A., Katedra Biol. & Ekol., Ostravske Univ., ul. 30-dubna 22, CZ-70103 Ostrava, Czech Republic

**2775.** Dolný, A. (2001): The unusual occurrence of the dragonfly *Leucorrhinia pectoralis* (Odonata: Libellulidae) in the mining landscape in the town Karvina (Silesia, Czech Republic). *Vázky* 2001. Sborník referátu IV. celostátního semináře odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminář uspořádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 124-130. (in Czech with English summary). [*L. pectoralis* was found in the mining landscape in the town Karvina (49° 49.309'N, 18° 29.529'E, Silesia, Czech Republic). The bottom of the shallow pond (size 90 x 20 m, maximum depth of 90 cm) is muddy, only sporadically covered with stones and reminders of flooded woods. The locality is heavily influenced by human activities (building waste, dumps of mining deads, old tyres etc.). The dominant plant species *Typha latifolia* forms discontinuous growth in the pond. On 11.9.2001 chemical water parameters were: 7,42 pH, conductivity 1021 uS/cm. On 14.7.2001 10-20 males of *L. pectoralis* were accompanied by the following species: *Lestes viridis*, *L. sponsa*, *L. virens*, *Platycnemis pennipes*, *Coenagrion puella*, *Enallagma cyathigerum*, *Ischnura pumilio*, *I. elegans*, *Aeshna mixta*, *A. cyanea*, *A. grandis*,



Anax imperator, A. parthenope, Somatochlora metallica, Libellula depressa, L. quadrimaculata, Orthetrum cancellatum, O. albistylum, O. coerulescens, Symptetrum striolatum, S. vulgatum, S. sanguineum, and S. danae.] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic. E-mail: Alnes.Dolny@osu.cz

**2776.** Editorial board (2001): Daily Table of the first and the last records in Hokkaido (2). Bulletin of The Hokkaido Odonatological Society 13: 18-20. (in Japanese). Address: Harauchi, Y., 9-2-20-113, Hon-machi 2 jo, Higashi-ku, Sapporo City, 062-0042, Japan.

**2777.** Editorial board (2001): Table of the regional distribution of Odonata by island (12). Bulletin of The Hokkaido Odonatological Society 13: 24-26. (in Japanese). Address: Harauchi, Y., 9-2-20-113, Hon-machi 2 jo, Higashi-ku, Sapporo City, 062-0042, Japan.

**2778.** Editorial board (2001): Table of the regional distribution of Odonata by shicho (13). Bulletin of The Hokkaido Odonatological Society 13: 21-23. (in Japanese). Address: Harauchi, Y., 9-2-20-113, Hon-machi 2 jo, Higashi-ku, Sapporo City, 062-0042, Japan.

**2779.** Eidietis, L. (2001): Escape response of *Rana sylvatica* and *Rana clamitans* tadpoles. American Zoologist 41(6): 1641-1642. (in English). ["Predation of dragonfly larvae (*Anax junius*) on wood frog (*Rana sylvatica*) tadpoles was observed using standard and high-speed video. Typical predatory behavior of *A. junius* consists of stalking, extending the lower mouthparts, grasping the tadpole, and drawing it into the mouth. *A. junius* typically neither chase prey nor repeat strikes before tadpoles move out of range. *R. sylvatica* response to *A. junius* contact begins with curling into a tear-drop shape, followed by large-amplitude tail motions. Both curl and tail motions often rip *R. sylvatica* from the grasp of *A. junius*, at which point, the tail motions propel the tadpole. Green frog (*Rana clamitans*) tadpole response to poking were recorded and analyzed to ascertain whether tadpole escape behavior is caused by touch and to acquire multiple replicates of the response for analysis of kinematics. *R. clamitans* response to poking was similar to *R. sylvatica* response to *A. junius* strikes. The curl consisted of rotating the body around the center of mass while folding the tail towards the body. The amplitude of tail motions increased linearly with distance from the center of mass. A probabilistic model based on these descriptions of predation and escape behavior predicts that the performance of both the curl and the tail motions affects the probability of tadpoles surviving *A. junius* strikes. Increasing the rotational momentum of the point of contact would improve curl and tail motion performance. An empirically based model suggests that morphological changes induced by predators in *R. sylvatica* would serve to substantially increase the curl and tail motion performance, thereby increasing the probability of surviving a predatory strike." (Author)] Address: Eidietis, L., University of Michigan, Ann Arbor, MI, USA

**2780.** Ellenrieder, N. von (2001): Species composition and distribution patterns of the Argentinian Aeshnidae (Odonata: Anisoptera). Revista de la Sociedad Entomologica Argentina 60(1-4): 39-60. (in English). ["Ten genera and 27 species of Aeshnidae are recorded from Argentina: For each species a synonymy list and dist-

tribution data are provided, as well as diagnostic keys for adults and known larvae. Distribution data per biogeographic province in Argentina are compared through cluster analysis. Specific and generic distribution patterns show that the richest areas are those of the subtropical forests encompassed by the Paranaense and Yungas biogeographic provinces, and that there are no Subantarctic endemics within Aeshnidae. Cluster analysis and complementarity values show that the Aeshnidae assemblage of the Monte biogeographic province is more closely related to that of Prepuna, Patagonian and Subantarctic provinces than to that of the Guyano-Brazilian provinces, supporting the existence of an Andean-Patagonian domain as proposed by Ringuélet." (Author)] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuélet", C.C. 712, AR-1900, La Plata, Argentina. E-mail: ellenr@ilpla.edu.ar

**2781.** Endersby, I.D. (2001): Lentic habitat for *Rhadinosticta simplex* (Odonata). Victorian Entomologist 31: 55. (in English). [Bayule, Victoria, Australia, 6 March 2001; a lentic habitat of this stream and river dwelling species is described.] Address: Endersby, I.D., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@werple.net.au

**2782.** Feng, Y.; Chen, X.-m.; Wang S.-.; Ye S.-d.; Chen Y. (2001): Three edible Odonata species and their nutritive value. Forest Research 14(4): 421-424. (in Chinese with English summary). ["Dragonflies are common insects distributed widely. Parts of their larvae are edible. The research results showed that there is custom of eating dragonfly larvae in many places of Yunnan. The common edible species are *Crocothemis servilia*, *Gomphus cuneatus*, and *Lestes praemorsa*. The larvae contain protein, fat, amino acids and microelements. The average contents of protein, fat and amino acids are 58.92%, 25.37% and 46.03% respectively. The content of 8 kinds amino acids necessary for human body is 16.41% in average, which accounts for 35.69% of the total amount of amino acids. The content of potassium, zinc, calcium and ferrum are 2 960 mg cntdotkg-1, 125.4 mgcntdotkg-1, 2 616.9 mgcntdotkg-1 and 796.2 mgcntdotkg-1. Therefore the dragonfly larva is one of nutritive edible insect resources."(Authors)] Address: Feng, Y., Research Institute of Resource Insects, CAF, Kunming, Yunnan, 650216 China

**2783.** Fet, V.; Bechly, G. (2001): Liochelidae, fam. nov. (Scorpiones): Proposed introduction as a substitute name for Ischnuridae Simon, 1879, as an alternative to the suggested emendment of Ischnurinae Fraser, 1957 (Insecta, Odonata) to Ischnurinae in order to remove homonymy. Bulletin of Zoological Nomenclature 58(4): 280-281. (in Chinese with English summary). ["The purpose of this application is to establish the new scorpion family name Liochelidae Fet & Bechly, 2001 (1879) as a substitute name for Ischnuridae Simon, 1879, which is a homonym of the widely used damselfly (Odonata) name Ischnurinae Fraser, 1957. In a previous application (BZN 57: 26-28) the authors proposed emending the latter name to Ischnurinae, but the introduction of Liochelidae avoids this undesirable change. The type genus of the Liochelidae is *Liocheles Sundevall*, 1833, which is in wide use as the valid senior or synonym of the long abandoned name *Ischnurus* C.L. Koch, 1837 (the type genus of Ischnuridae Simon, 1879)." (Authors) ] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosen-

stein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**2784.** Flíček, J. (2001): Dragonflies (Odonata) of the Natural Reserve Dráčovské tune in the central reaches of the river Luznice (Southern Bohemia). *Vázky* 2001. Sborník referátu IV. celostátního semináře odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminár usporádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 26-31. (in Czech with English summary). [At three localities a total of 30 species was collected; 16 species were proved by larvae.] Address: Flíček, J., Velký kopec 325, 378 04 Chlum u Trebone, Czech Republic. E-mail: drflíček@satnam.cz

**2785.** Flíček, J. (2001): Dragonflies (Odonata) of the Natural Reserve Krabonosska niva on the upper reaches of the river Luznice (Southern Bohemia). *Vázky* 2001. Sborník referátu IV. celostátního semináře odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminár usporádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 32-36. (in Czech with English summary). [In 1999, a total of 27 species (17 proved by larvae) was collected in the floodplain of river Luznice, Czech Republic. The list includes *Ophiogomphus cecilia* and *Leucorrhinia pectoralis*.] Address: Flíček, J., Velký kopec 325, 378 04 Chlum u Trebone, Czech Republic. E-mail: drflíček@satnam.cz

**2786.** Fritzlar, F.; Nöllert, A.; Westhus, W. (2001): Übersicht über die im Jahr 2000 erarbeiteten Naturschutz-Gutachten. *Landschaftspflege und Naturschutz in Thüringen* 38(3): 105-112. (in German). [List of expertises for nature conservation purposes including some with odonatological subject, finished in 2000 and referring to Thüringen, Germany.] Address: Fritzlar, F., Thüringer Landesanstalt für Umwelt und Geologie, Abt. Ökologie und Naturschutz, Prüssingstr. 25, D-07745 Jena, Germany

**2787.** Goffart, P.; Testaert, D.; Paquay, M. (2001): Actualisation du statut de l'Agrion de Mercure (*Coenagrion mercuriale*) dans la plaine de Focant (Beauraing). *Gomphus* 17(2): 83-94. (in French with English and Dutch summaries). ["Systematic surveys were conducted by means of transect-walk during the 2000 and 2001 seasons in order to estimate the current situation of *C. mercuriale* in the Focant floodplain and to compare it to those of the previous decades. The species has been found on 13 distinct zones, from which 11 were not known before, but the numbers were below 10 individuals in 7 of them. Two sectors only housed high level populations, with counts reaching nearly 100 and 500 individuals. The species has disappeared from 4 previously occupied zones and has severely declined in one other, facts which can be explained by negative habitat evolutions. If the species doesn't seem to be in the dangerous posture which could have been predicted from the mid nineties results, thanks maybe to better climatic conditions, its situation is not really safe and reassuring in the Focant area, where intensive agriculture still influence negatively aquatic habitats. Some tracks are suggested to conserve both the species and a certain level of farming." (Authors)] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

**2788.** Gonseth, Y.; Monnerat, C.; (et la collaboration de René Hoess, Christian Keim, Tiziano Maddalena, Alain Maibach, Claude Meier, Peter Weidmann, Hansruedi Wildermuth) (2001): *Odonata 2000* Activités et résultats de la saison de terrain 2000. www.cscf.ch: 30 pp. (in French). [This report presents the results of a mapping scheme resp. monitoring of the Swiss Odonata. Special emphasize is given to population trends, and a current version of the Red list of the Swiss Odonata is implemented. Population trends of the following species are outlined: *Calopteryx splendens caprai*, *Lestes dryas*, *L. sponsa*, *L. virens*, *Nehalennia speciosa*, *Coenagrion lunulatum*, *C. pulchellum*, *Cercion lindenii*, *Erythromma viridulum*, *Epithea bimaculata*, *Ophiogomphus cecilia*, *Gomphus pulchellus*, *Brachytron pratense*, *Thecagaster bidentata*, *Sympetrum flaveolum*, *S. pedemontanum*, *Leucorrhinia pectoralis*, *Orthetrum albistylum*, and some more common species were population trends may be influenced by mapping methodology.] Address: CSCF, Terreaux 14, CH-2000 Neuchâtel, Switzerland

**2789.** Hämäläinen, M. (2001): Review of two recent Japanese papers on Thai dragonflies, with some additional notes. *Malangpo* 18: 169-170. (in English). [Two papers of Kazuma Kitagawa published in *Aeschna*, Osaka are abstracted and commented. Novelities (*Aciagrion azureum*, *Macromia* undescribed species) are brought to notice, the insufficiently known taxonomic status of the genus *Aciagrion* is discussed, and empty places on the Thai Odonata Atlas are filled in.] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**2790.** Hämäläinen, M.; Karube, H. (2001): *Rhinocypha oreo spec. nov.*, a new damselfly from Vietnam (Odonata: Chlorocyphidae). *Zool. Med. Leiden* 75(23): 405-408. (in English). ["*Rhinocypha oreo spec. nov.* (holotype male, northern Vietnam, Vinh Phu province, Mt Tam Dao, 1993) is described and illustrated in both sexes. Its unique wing colour pattern among the chlorocyphids is emphasized." (Authors)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi.; Karube, H., Kanagawa Prefectural Museum of Natural History, 499 Iryuda, Odawara, Kanagawa, 250-0031, Japan

**2791.** Hanel, L.; Cempírek, J.; Zelený, J. (2001): A list of Dragonflies (Odonata) found during the 4th Odonatological Days in August 2001 in the Sumava Mountains (Southern Bohemia). *Vázky* 2001. Sborník referátu IV. celostátního semináře odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminár usporádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 37-49. (in Czech with English summary). [In the framework of the 4th Czech odontological symposium four localities in the Sumava mountains (southern Bohemia, Czech republic) were surveyed. A total of 24 species was found. These records and records from the same localities starting in 1985 were compiled.] Address: Hanel, L., Správa chránené krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blantik@schkocr.cz

**2792.** Hanel, L.; Cempírek, J. (2001): A note on the evidence of a dragonfly occurrence within the faunistic research of dragonflies (Odonata). *Vázky* 2001.

Sborník referátu IV. celostátního semináře odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminář uspořádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 22-25. (in Czech with English summary). [30 odonate species are listed in a special matter. The paper tries to set up a new standard of documentation of odonate records.] Address: Hanel, L., Správa chráněné krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blantik@schkocr.cz

**2793.** Hanel, L. (2001): Addenda et Corrigenda to three Odonatological publications; Hanel, L. (1999): „Vázky Podblanicka“, Hanel L., Zeleny J. (2000): „Vázky - výzkum a ochrana“ a „Vázky 2000 - Sborník referátu z celostátního semináře“. Vázky 2001. Sborník referátu IV. celostátního semináře odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminář uspořádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 165-169. (in Czech with English title). [In most cases spelling errors are corrected.] Address: Hanel, L., Správa chráněné krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blantik@schkocr.cz

**2794.** Hanel, L. (2001): Fundamental identification parameters for faunistic studies of dragonflies (Odonata). Vázky 2001. Sborník referátu IV. celostátního semináře odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminář uspořádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 12-21. (in Czech with English summary). [The author identified some fundamental parameters for documentation of odonotological records. These include "locality", "date", "habitat", "weather conditions", "method of investigation", and "faunistic data".] Address: Hanel, L., Správa chráněné krajinné oblasti Blaník, 257 06 Lounovice pod Blaníkem 8, Czech Republic. E-mail: blantik@schkocr.cz

**2795.** Hedström, I.; Sahlén, G. (2001): A key to the adult Costa Rican "helicopter" damselflies (Odonata: Pseudostigmatidae) with notes on their phenology and life zone preferences. *Revista de Biología Tropical* 49(3-4): 1037-1056. (in English). ["We present a key to the Costa Rican species of Pseudostigmatidae, comprising three genera with the following species: *Megaloprepus caerulatus*, *Mecistogaster linearis*, *M. modesta*, *M. ornata* and *Pseudostigma aberrans*. *Pseudostigma accedens*, which may occur in the region, is also included. For each species we give a brief account of morphology, phenology and life zone preferences, including distributional maps based on more than 270 records. These are not all of the known specimens from the area, but a high enough number to give a relatively good picture of the distribution and status of the species. We found *M. caerulatus* to be active during the first half of the year in seasonal, tropical semi-dry lowland forest and tropical moist forest at mid-elevation, but like *M. linearis*. *M. caerulatus* was active all year round in non-seasonal, tropical wet lowland forest and tropical moist forest at mid-elevation. *Mecistogaster modesta* also flew year round in non-seasonal, tropical wet lowland forest and tropical moist evergreen forest at mid-elevation, and likewise in seasonal and non-seasonal, tropical premontane moist forest. Only a few findings, however, have been made of *M. modesta* in seasonal, tropical semi-dry deciduous forest and seasonal, tropical moist evergreen forest. *Mecistogaster*

*ornata* was missing entirely from non-seasonal, tropical wet lowland forest and non-seasonal, tropical moist forest at mid-elevation, while this species was active year round in seasonal, tropical dry lowland forest and tropical semi-dry forest, as well as in seasonal, tropical moist evergreen forest and tropical premontane moist forest, both at mid-elevation. *Pseudostigma aberrans* has so far been found too few times in Costa Rica for any indication of flight time preference." (Authors)] Address: Sahlén, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, S-752 36 Uppsala, Sweden. E-mail: goran.sahlen@zoologi.uu.se

**2796.** Henry, J.D.; O'Carroll, D.C. (2001): What visual information do hawking dragonfly predators use to intercept prey? *American Zoologist* 41(6): 1470. (in English). ["Dragonflies are voracious predators that locate and intercept prey with astonishing accuracy. Many dragonflies (e.g. Corduliidae and Aeshnidae) are hawking predators, hunting while patrolling a territory. Dragonfly hunting is a visually guided behavior, utilizing large, highly acute eyes. Hawking dragonflies could use one or both of two mechanisms to extract visual information from their environment to determine prey location: (i) stereopsis and (ii) motion parallax. Stereopsis requires binocular overlap to determine object depth. Motion parallax uses relative image motion (due to motion of the viewer) to determine object distance; near objects will appear to move more quickly than far objects. Stereopsis would require an interneuron acting as a coincidence detector for movement in both halves of the small dorsal region of binocular overlap. Motion parallax would require integrating the output of two neurons that view the same region in space but are tuned to different velocities. To investigate which mechanism hawking dragonflies employ, we use intracellular recording and dye injection in the third optic ganglion (lobula) of Aeshnidae and Corduliidae. We find: (i) There are neurons that selectively respond to the motion of small targets. (ii) Neuroanatomical and physiological data indicate the presence of a binocular feature detecting neuron in the Corduliid *Hemicordulia tau*. (iii) There are at least three distinct classes of velocity tuning in target sensitive neurons (two classes have been found in Corduliids, three in Aeshnids). Data thus far support both models, indicating the potential for behavioral plasticity within the general strategy of being a hawking predator." (Authors)] Address: Henry, J.D., Univ Washington, Seattle, WA 98195 USA

**2797.** Herrmann, T.; Altmüller, R.; Grein, G.; Podloucky, R.; Pott-Dörfer, B. (2001): Das Niedersächsisches Tierarten-Erfassungsprogramm. Informationsdienst Naturschutz Niedersachsen 5/2001 (Suppl.): 44 pp. (in German). [Detailed introduction how to map the animals of Niedersachsen, Germany. Odonata are treated on pages 10-11, 25-26, and 35.] Address: Niedersächsisches Landesamt für Ökologie, Abt. Naturschutz, Postfach 101062, D-31110 Hildesheim, Germany. www.nloe.de

**2798.** Hesoun, P. (2001): An occurrence of the dragonfly *Coenagrion lunulatum* (Odonata: Libellulidae) in six localities in the district Jindřichuv Hradec (Bohemia). Vázky 2001. Sborník referátu IV. celostátního semináře odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminář uspořádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: (in Czech



with English summary). [Six localities with records of *C. lunulatum* are described in detail; special emphasize is given to the accompanying odonate species. Records of *Leucorrhinia pectoralis* and *L. rubicunda* are of some interest.] Address: Hesoun, P., Bednářeček 58, CZ-37842 Nová Včelnice, Czech Republic. E-mail: krme@quick.cz

**2799.** Hiemeyer, F.; Miller, E.; Miller, J. (2001): Winterbeobachtungen an *Sympetma paedisca* (Odonata: Lestidae). *Berichte des naturwissenschaftlichen Vereins für Schwaben* 105: 126-137. (in German). [This is a nearly identical publication of the paper abstracted as OAS 2418; from this paper it differs by a quite extensive discussion of hibernation behaviour and habitat.] Address: Hiemeyer, F., Gögginger Str. 120, D-86199 Augsburg, Germany. E-mail: FritzHiemeyer@web.de

**2800.** Hoess, R. (2001): Die Libellen (Odonata) des Giswilriedes, Kanton Obwalden. *Entomologische Berichte Luzern* 46: 129-146. (in German). [The paper compiles historical and present data from a fen bog (Giswilried) situated on the upper corner of lake Sarner, Switzerland. 14 odonatologists visited the region including F. Ris and O.-P. Wenger. The latter contributed extensive records, the specimens are deposited in the museum collections of ETH Zürich and NM Bern. In detail, 13 localities were surveyed between 1998 and 2001 by the author. Historical and present records count to a total of 51 odonate species, including *Boyeria irene* (from 1985), a rare Swiss species at the northern border of its range. The species turn-over is discussed in some detail. In addition, phenology, collecting localities of O.-P. Wenger, and conservation measures are stressed.] Address: Hoess, R., Normannenstr. 35, CH-3018 Bern, Switzerland. E-mail: ReneHoess@1st.ch

**2801.** Honcu, M. (2001): The occurrence of the dragonfly *Ophiogomphus cecilia* (Odonata: Gomphidae) in the district Ceska Lipa (Northern Bohemia), and a proposal to proclaim the protection of a part of the Ploucnice River in the framework of the Programme NATURA 2000. *Vázky 2001. Sborník referátu IV. celostátního semináře odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminár usporádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 131-142.* (in Czech with English summary). [Between 1982 and 2001, *O. cecilia* was observed at 27 localities. The natural meandering stretch of the River Ploucnice from the bridge of Boreček to the village Veselí is proposed as a NATURA 2000 area.] Address: Honcu, M.; Okrewski vlastivedné muzeum, náměstí Osvobození 297, 47001 Ceská Lipa, Czech Republic

**2802.** Honcu, M.; Roztocil, O. (2001): The results of monitoring of dragonflies (Odonata) in the district Ceska Lipa (Northern Bohemia). *Vázky 2001. Sborník referátu IV. celostátního semináře odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminár usporádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 79-108.* (in Czech with German and English summaries). [Between 1995 and 2001, 83 localities were surveyed for their odonate fauna. The faunistic data of 36 species is documented in detail. The results of the survey were compared with material collected prior 1995. In total 43 species are known from the district of Ceská Lipa.] Address: Honcu, M.;

Okrewski vlastivedné muzeum, náměstí Osvobození 297, 47001 Ceská Lipa, Czech Republic

**2803.** Hori, S.; Yokoyama, T. (2001): Record of two species at Noboro Forest Park. *Bulletin of The Hokkaido Odonatological Society* 13: 11-12. (in Japanese). [*Mnais pruinosa costalis*, *Davidius moiwanus*] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**2804.** Karube, H. (2001): On the endangered species of *Sympetrum maculata* Oguma. *Nature & Insects* 36(7): 14-16. (in Japanese). [Introduction: Nearly unnoticed, *S. maculatum* turned out to be one of the most endangered species in Japan. It is indigenous to Japan, and recorded from 17 prefectures of the southern part of the northeastern district to the Chugoku region of Japan. It inhabits clean and shallow reservoirs mainly to the west of central Japan, and highland bogs located close to the Sea of Japan. Due to reports of a significant decrease of the species, it was assessed as endangered in Hyogo Prefecture (Aoki and Azuma, 1998). When, in spring 1999, we collected information on endangered species from all over the country to revise the RDB of the Environment Agency, we found the species in critical condition: only less than 30 habitats could be traced in Japan. This situation contrasts with the fact, that it was not listed as an endangered species in the RDB of 1991, and was not designated as a rare species. The current survey of the species results as follows: Situation: *S. maculata* is known from 30 habitats in 10 prefectures; it is extirpated from 7 prefectures. Most of the habitats are in a critical condition, and especially the habitats to the west of the Japanese mainland sharply decreased. Most habitats are isolated with distances of about 50 to 100 km to the next habitat. In 2000, in Hyogo Prefecture, all habitats seem to be lost. Causes of decrease: It inhabits natural habitats which are easily developed. The factors are as follows; No. 1: reclamation of reservoirs and bank protection works; No. 2: aridity of bogs and growth of reeds; No. 3: drought damage in 1994 and 1995; No. 4: Changes of environment of the habitats; No. 5: chemical spraying to rid pine weevils; No. 6; water pollution; No. 7: Change of management of reservoirs, e.g.; non drainage of water in winter. Also the character of persistency to special environment accelerate the decrease. Oviposition sites are situated in bogs of low grasses, and shallow ponds, therefore the habitats are often damaged by drought. In addition, *S. maculata* is endangered by black bass. Habitat environment: The investigated habitats - wet land with low grasses - were characterised in most cases by clean and rather acid water. Ecology: Most *Sympetrum* species including this species are active from morning till noon. In the region near the Sea of Japan, I found that species active at the edges of water bodies on cloudy or rainy days as long as the ambient temperature was high. The time of activity and ecology differed between the populations near the Sea of Japan and in central Japan. In the latter the species was not active in the unfavorable weather. Prospect of protection: I think this species should be designated as Endangered species for the RDB List. Furthermore we need to investigate the known habitats and new habitats and notify the habitats to governments and promote the preparation of conservation action plans. Translation: Ishizawa, Naoya] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan

**2805.** Kazunobu, K. (2001): The deteriorating situation of the Endangered *Copera tokyoensis* Asahina in Japan. *Nature & Insects* 36 (7): 10-13. (in Japanese). [Introduction: *Copera tokyoensis* Asahina was designated as a Critically Endangered species (CR+EN) in Red Data Book by Ministry of the Environment in April, 2000. The committee of nature conservation of The Japanese Society for Odonatology decided to conduct a long term investigation of the situations of the damselfly and to collect information about it including other endangered species from 2000. As I am the organizer of the division of *Copera tokyoensis* Asahina and *Cercion plagiolum* (Needham) of the committee, I studied the situations of the species in the recorded localities. Here I report the data and an example of the action for conservation of the species. Also I expect readers to contribute to us information on the species.

Distribution: In the genus *Copera* Kirby, 8 species and 7 subspecies have been recorded from all over the world, and from Japan only two, the species and *C. annulata* were recorded. This damselfly was discovered in the northeastern Tokyo by Ishikura, Hideji in 1936, and named as a new species by Dr. Asahina, Syojiro in 1948. Its zoological name *tokyoensis* was named after the locality of the discovery: Tokyo (Koaidame at Kanamachi). *C. annulata* and *C. ciliata* are the closely related species of the damselfly. *C. annulata* is widely distributed at ponds and marshes surrounded by forests in the lowlands in Japan from Hokkaido, Honshu: the mainland of Japan, Shikoku and Kyushu, and in China. While *C. tokyoensis* is limitedly distributed wide and open ponds, of which vegetation are reed and Indian rice, along the main and branch streams of the Tone River in the Kanto plains, the lower reaches of the Shinano River in Niigata Pref., and in Miyagi Pref. In abroad it was recorded from Seoul in South Korea and the Yangtze Basin. It has not been cleared yet why the damselfly is isolatedly distributed, however, in the ice age when the regression advanced, the main river of Japan and the Yangtze River were said to be connected, and this species might have been distributed the lower reaches of the old Yangtze River. Thereafter the rivers were separated by the transgression, and in Japan it has been reliclikely distributed to the well developed deltas of the Tone and the Shinano. 2. Flying season and body size: The flying season of the species is from mid May to the end of September, its peak is August. The latest record was October 10, 1975 at Yagyū, Kitakawabe-cho, Saitama Pref. As the season advances the body size becomes smaller. The individuals emerges in mid and late August are considered as the second generation for the year. 3. Behaviour of adult: The behaviour of immature adults is not so different from *C. annulata*. The damselflies perch low on leaves or stems of grasses at the water edges of reed and Indian rice, or open spaces by trampled down. They did not move long distance, at longest within 10 meters, and rest in the shade at the edges of forests. They reproduce after the rainy season. They oviposit in tandem endophytically into tissues of water plants. At the time males of the species often stand upright with the prothorax of the female grasped by the appendage of the male. The substrate of oviposition is submerged plants, or rotten leaves and stems drifting on the surface of water. 4. Intermediate form: The distributions of both species overlap each other, but they do not rarely inhabit the same water body (only a few areas in the Kanto district). Many intermediate form of individuals had been recorded

from Sakata Marsh, Gunma Pref., the Lake Semba, Ibaraki Pref., Amidase Pond, and Junsai Pond, Niigata Pref., etc. and these are necessary to be investigated the possibility of the hybrid with *C. annulata*. 5. Localities: This damselfly has been recorded from 135 localities since 1952, however, only 22 localities are left for these 3 years. Only two (from Niigata and Ibaraki, respectively) are newly found for the three years. The past localities are as follows; Chiba (45), Ibaraki (25), Saitama (25), Gunma (19) and Niigata (12), among them in Chiba and Gunma the numbers decreased sharply and in these areas conservation plan should be formed. 6. Problems for conservation: Most of the localities distributed in the delta areas and these are likely to be reclaimed for residential areas, and the waters are polluted by domestic waste and eutrophication. Also the damselfies are being endangered by secret release of black bass. Now these ponds are aged and accumulated by sludge, which prevents growth of water plants, and consequently oviposition substrates of the damselfly are lost which lastly causes it to extinction. At isolated areas in such circumstances, the dragonfly is driven to extinction because of lack of dispersibility. Here I introduce an example of action for conservation at Hakidashi-numa in Noda City, Chiba Pref. The area belong to an inundated region of the Tone River, where many farming reservoirs had been distributed. In the pond, which is 400 meters around, spring water wells up and 23 species including *C. tokyoensis* inhabit. The local action of conserving the pond started in 1996. The pond was leased by the city government, and eight local volunteers groups organized a conservation union of Noda and are managing actions; watch of illegal dumping of waste, mowing of weeds and grasses, investigation of fluctuation of specified species and forbidding of anglers into the pond, etc. 7. Prospect: These endangered species are necessary to be notified well to people. The conservation should not be limited only to the specified species and specified areas but more widened in cooperation with governments, citizens and NPO, who discuss each other and consult experts. Translation: Ishizawa, Naoya] Address: not stated

**2806.** Klausnitzer, B. (2001): Gemeinschaftsjagd von *Aeshna mixta* Latreille, 1805 (Odonata) in einem Naturgarten in der Oberlausitz. *Ent. Nachr. Ber.* 45(2): 137-138. (in German). [Opitz, Bautzen Saxonia, Germany; aggregations of feeding *Aeshna mixta* preying on the ant *Lasius flavus* (Insecta: Hymenoptera) are described in detail. These feeding aggregations were observed over a period of seven years (1995-2001); potential reproduction waters are situated in a distance of more than 1 km from the feeding grounds. In addition, observations of *Symetrum vulgatum* and *S. sanguineum* sitting on fence wires are given.] Address: Klausnitzer, B., Lannerstr. 5, D-01219 Dresden, Germany

**2807.** Knijf, G. De (2001): Bibliografisch overzicht van de periode 1995-2001. *Gomphus* 17(2): 95-101. (in Dutch with French summary). [Bibliographie of the odonatalogical literature from Belgium covering the period 1995 to 2001.] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**2808.** Knijf, G. De (2001): Observation of *Leucorrhinia rubicunda* (Linnaeus, 1758) at the 'Kraaibos' in Moen-Zwevegem (Province of West-Flanders). *Gomphus*

17(2): 75-82. (in Dutch with English and French summaries). [29 May, 2001, two adult males of *L. rubicunda* were observed at the Kraaibos, Belgium. "This is the first observation of the species for this most western province of Belgium and the first observation after more than 70 years outside their distribution area in Flanders. The habitat, especially clay soils, is aberrant from the other sites in Belgium and doesn't correspond with the literature. The nearest Belgian populations of *L. rubicunda* are located more than 100 km away from the 'Kraaibos'. Very remarkable are the observations of three adult males on three different localities since 1998 in adjacent northern France, where the species was considered as extinct. Suitable habitat seems to be still present there and it is very likely that there are locally some populations present." (Author)] Address: Knijf, G. de, Instituut v. Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**2809.** Kurashina, H.; Kikuya, N. (2001): A study of the decreasing cause of *Libellula angelina*. *Nature & Insects* 36 (7): 5-9. (in Japanese). [In 1969, habitats of *Libellula angelina* were spread from the northern Miyagi Prefecture to Kagoshima Prefecture, mostly in Honshu, the main Island of Japan, however in 2000, only 3 habitats remained in Honshu. The species also occurs in Kyushu except Oita Prefecture and Kagoshima Prefecture, the rest of the habitats are in an extremely critical condition. We studied distribution, ecology, behaviour and fluctuation of populations of *L. angelina*, particularly in Oita since 1993. In 1997, *L. angelina* was found at nine localities in Oita Prefecture. These habitats are all in a critical, unpreferable condition. Reasons of the decline of *L. angelina* are discussed as follows. 1. The first stage of extinction: In general, *L. angelina* inhabits shallow habitats within reservoirs in the rice farming area of the lowlands along the coast. Reservoirs were depreciated recently because of large scale irrigation works, reclamation of farm land for road construction, development of residential areas and factories, or reduction of rice cultivation acreage. Consequently most of the reservoirs were reclaimed and disappeared. Thus, habitat loss is a serious reason for the declining populations of *L. angelina*. Also agricultural chemicals which came into wide use since the latter half of 1950s affected the decrease of the dragonfly. Insecticides affected preys as well as predators. *L. angelina* is more sensitive to chemicals than other odonata. This can be concluded by the fact that imagines could be observed at ponds polluted by waste water of farming and domestic waste, but never reproduced there. 2. The second stage of extinction: In spite of the the habitat loss and habitat depreciation, a few populations of the species survived at isolated localities. In these habitats the dragonfly is endangered by drought, aridity, and introduced species like black bass, bullfrog, carp and crayfish, and especially technical maintainance of reservoirs. After emergence, most of the individuals of *L. angelina* don't disperse and stay in "its habitat". 90-95% of a local population are estimated to be philopatric. This increase the risk of local extincting (e.g. by habitat loss) significantly. Populations in (newly settled?) habitats in large reclaimed areas near the seashores, were given up soon. This could be due to genetic isolation and lack in diversity of gene. Therefore the adaptability to the environment of the species may be low and the population can not be stable. 3. Conditions in the stable populations: Now isolated populations were extinguished one after another. Though isolated, a population in Imuta Pond at Ketoin-

cho, Kagoshima Pref., could kept be stable by optimization habitat management system. 4. Hypothesis of sub population: We define a 'sub population' as the population that belongs to the same habitat population but differs in the emergence and reproductive site. In a large bog, there exist several sub population, and this may enable the genetic diversity of the species to enhance. At Noishin-ike 1000 to 2000 individuals occurred every year since 1994. Therefore populations of Noishin-ike or Imuta-ike might be kept stable by steady environment and sub populations, which must enhance steady genetic diversity. Translation Ishizwawa, Naoya. (The translation was slightly revised by M. Schorr.)] Address: not stated

**2810.** Lambrechts, J.; Knijf, G. De (2001): Verslag van de excursie naar het Wik te Bokrijk en De Teut te Zonhoven op 9 juni 2001. *Gomphus* 17(2): 102-105. (in Dutch with French summary). [An excursion to 2 localities in Belgium resulted in a total of 18 odonate species; as most interesting species for Wik te Bokrijk are: *Sympetma fusca*, *Ischnura pumilio*, *Cordulia aenea*, *Soma-tochlora metallica*, *Orthetrum coerulescens*, and *Leucorrhinia rubicunda*. In De Teut are remarkable *Coenagrion hastulatum*, *Ceriagrion tenellum*, *O. coerulescens*, and *L. dubia*.] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**2811.** Machado, A.B.M. (2001): Studies on neotropical protoneuridae. 11. Two new species of *Forcepsioneura* Lencioni (Odonata-Zygoptera) with a key to males of the genus. *Revista Brasileira de Zoologia* 18(3): 845-854. (in English). [*Forcepsioneura haerteli* sp. n. and *F. westfalli* sp. n. are described and illustrated from material collected respectively in the Santa Catarina State (Blumenau), Brazil and in the Napo Province (Limoncocha), Ecuador. Some notes are made on *Forcepsioneura sancta* (Hagen, 1860) and a male topotype is illustrated. A key to males of *Forcepsioneura* is provided." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federale de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil

**2812.** Mahaulpatha, T.; Mahaulpatha, D.; Nakane, K.; Fujii, T. (2001): Nestling diet and prey selection of the Japanese Wagtail *Motacilla grandis*. *Journal of the Yamashina Institute for Ornithology* 33(1): 36-43. (in English with Japanese summary). ["Nestling diet of Japanese Wagtails (*Motacilla grandis*) was investigated by the neck ligation method and compared with the food availability in their feeding habitat during the breeding season of 1999 in Higashi Hiroshima, western Japan. Nestling diet comprised of 85.5% insects, 14.2% arachnids and 0.3% chilopods in individual number basis. Odonata order comprised nearly one-fourth of the diet in dry weight basis. Diptera, Lepidoptera, Coleoptera, Orthoptera and Arachnida were also important contributors to the total prey weight. Chironomidae and Ephemeroptera families were the most numerous prey items but their contribution to the total prey weight was small. Electivity indices indicated that the Japanese Wagtail prefer certain prey items (*Libellulidae*, *Tipulidae*, *Dytiscidae*) when collecting prey for the nestlings." (Authors)] Address: Mahaulpatha, T., Graduate School of Biosphere Sciences, Hiroshima University, Higashi-Hiroshima, 739-8521 Japan



**2813.** Marconi, A.; Terzani, F.; Carletti, B. (2001): Descrizione di *Phyllogomphus bartolozzii* spec. nov. della Sierra Leone (Odonata: Gomphidae). *Opusc. zool. flum.* 199: 1-5. (in Italian with English summary). [The new species is described and illustrated, and its affinities with *P. montanus* Fraser, 1957 and *P. corbetiae* Vick, 1999 are discussed and keyed. Holotype male: Sierra Leone, Northern prov.: Bumbuna, 4/5-VI-1994; deposited at MZUF, Firenze.] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**2814.** Martin, D.C.; Neely, R.K. (2001): Benthic macroinvertebrate response to sedimentation in a *Typha angustifolia* L. wetland. *Wetlands Ecology & Management* 9(5): 441-454. (in English). ["Fiberglass mesh enclosures (1 X 1 m<sup>2</sup>) in a *Typha angustifolia* L. marsh were employed to examine the effects of clay additions on the resident macroinvertebrate communities. Total invertebrate density, insect density, and number of insect families decreased significantly by 33%, 37%, and 17%, respectively, in enclosures receiving sediment. More specifically, incoming clay adversely affected densities of Coleoptera larvae, Diptera larvae, Megaloptera larvae, Odonata larvae, Pelecydota, and Gastropoda. Densities of specific families within the Diptera (larvae) and Coleoptera were also affected; Dolichopodidae, Stratiomyidae, Hydrophilidae, Tabanidae, Dytiscidae adults, and Scirtidae larvae decreased significantly in numbers in sedimented enclosures. In contrast, the effect of sedimentation on Carabidae (adults and larvae) and Dytiscidae larval densities varied significantly with time, whereby densities were higher in the sedimented treatment only for the initial two months of the study. Densities of predator-engulfers, collector-filterers, and scraper feeding groups were reduced in sedimented plots by 28%, 44%, and 27%, respectively. Significant short- and long-term increases in turbidity and suspended solids in enclosures treated with clay, as well as sediment deposition, were probably responsible for changes in the invertebrate communities." (Author)] Address: Martin, Dianne, Department of Biology, Eastern Michigan University, Ypsilanti, MI, 48197, USA. E-Mail: bob.neely@emich.edu

**2815.** Matsuki, K. (2001): Threatened dragonfly species in Japan. Part II. *Nature & Insects* 36 (7): 2-4. (in Japanese). [This number is a sequel to the articles "Threatened dragonflies" *Nature & Insects* Vol.33, No. 10, October, 1998. Thereafter the revised list of Red Data Book (RDB) was published by the Environment Agency (from the start of the fiscal year, April, 2001 its name was changed to Ministry of the Environment) in March, 2000. In order to cope with the revision, the committee of nature conservation of The Japanese Society for Odonatology set up new sections, and started collection of information. Last year the problem of black bass (large mouth bass) became a subject of discussion abruptly. For these years, RDB of prefectures have been published, and some of them are under the first revision. 1. Revision of RDB and the change of the criteria. For these ten years, the habitat environment of Odonata has been worsened heavily, and Odonata decreased sharply, especially lentic Odonata. (1) Endangered species of Odonata increased from two in RDB of 1991 to 10 in RDB of 2000, and the Vulnerable species, which is the Endangered species in the old category, increased from one to ten (Table 1). (2) Five rare species of Odonata of

re species of Odonata of the Ogasawara Islands were designated as Endangered species: *Indolestes boninensis* and *Hemicordulia ogasawarensis*; Vulnerable species: *Boninagrion ezoin*, *Rhinocypha ogasawarensis* and *Boninthemis insularis*. The revised Red List of Odonata was taken charge of by the committee of nature conservation of The Japanese Society for Odonatology based upon the quantitative data during these ten years, and 38 species and one local population were listed and included around 20% of Japanese fauna of Odonata. 2. Actions of The Japanese Society for Odonatology. As the Red List of Endangered species and Vulnerable species of RDB increased, we set up the new special sections for *Sympetrum maculatum*, *Orthetrum poecilops miyajimensis*, *Cercion plagiosum*, *Copera tokyoensis*, *Sympetrum uniforme*, *Lestes japonicus*, *Coenagrion hylas*, *Leucorrhinia intermedia ijimai*, *Macromia daimoji*, *Rhyothemis severini*, Indigenous species of Ogasawara Islands and Okinawa and local populations, and collect information and literature on them. But our staff for the sections is not enough, and we give priority over the Endangered species and Vulnerable species. The sections of *Libellula angelina* and *Mortnagrion Hirosei* accumulated so much information for these several years, and appealed conservation of the species to local governments and provided local citizens with useful information. It was reported that Fisheries Agency was reconsidering the administration policy and relaxing fishing rights of black bass, enlarging the licensed areas of the fish. This means change of policy by the agency to habitat segregation of the fish. For fear that the predation pressure by the fish may cause reduction of the local dragonfly fauna or extinction of the designated species from all over Japan, we requested the Minister of Agriculture, Forestry and Fisheries, Director General of Fisheries, prefectural governors and prefectural committees of administration of fresh-water fisheries not to enlarge the licensed areas of the fish in corporation with The Ichthyological Society of Japan and The Japanese society of Coleopterology. We, President Eda, Vice-president Inoue and Secretary Karube visited Director General of Fisheries and explained foreign and domestic examples of predation on Odonata by black bass and professed opposition to the Fisheries' Plan. According to a report from Niigata Prefecture, black bass preyed on adult dragonflies as well as larvae in the water; from stomach contents of nine black bass about 70 dragonflies were found. We set up the countermeasure section of foreign fish, such as black bass or bluegill. 3. Problems of Prefectural RDB and the prospect. Obscure criteria of data collection(1), ranking(2) and attitude for conservation(3).

Table 1. The list of RDB of 1991 and 2000, 1991 Red List: Endangered species (E), 1: *Mortnagrion Hirosei*, *Libellula angelina*; Vulnerable species (V), 2: *Orthetrum poecilops miyajimaense* Rare species (R), 38: *Agrion hylas*, *Erythromma najas baicalense*, *Nehalennia speciosa*, *Boninagrion ezoin*, *Coelicia ryukyuensis ryukyensis*, *C. r. amamii*, *C. flavicauda masakii*, *Rhipidolestes okinawana*, *Indolestes boninensis*, *Rhinocypha ogasawarensis*, *R. uenoi*, *Bayadera brevicauda ishigakiana*, *Matrona basilaris japonica*, *Asiagomphus amamiensis okinawanus*, *A. a. amamiensis*, *A. yayeyamensis*, *Stylogomphus ryukyuanus asatoi*, *S. shirozui watanabei*, *Leptogomphus yayeyamensis*, *Oligoaeschna kunigamiensis*, *Planaaeschna ishigakiana nagami-nei*, *P. i. ishigakiana*, *P. risi sakishimana*, *Aeschna subarctica*, *Chlorogomphus brunneus brunneus*, *C. b. ke-*

ramensis, *C. brevistigma okinawaensis*, *C. iriomotensis*, *Macromia kubokaiya*, *M. urania*, *M. clio*, *Macromia ishidai*, *Hemicordulia ogasawarenis*, *H. mindana nipponica*, *H. okinawaensis*, *Boninthemis insularis*, *Lyriothemis tricolor*, *Leucorrhinia intermedia ijimai*

2001 Revised Red List: Endangered species (EN), 10: *Mortonagrion hirosei*, *Pseudoagrion microcephalum*, *Cercion plagiosum*, *Coenagrion hylas*, *Copera tokyoensis*, *Indolestes boninensis*, *Hemicordulia ogasawarenis*, *Orthetrum poecilops miyajimaense*, *Libellula angelina*, *Orthetrum poecilops miyajimaense*, *Sympetrum maculatum*. Vulnerable species (VU), 10: *Ceriagrion nipponicum*, *Boninagrion ezoin*, *Platycnemis foliacea sasakii*, *Lestes nipponicus*, *Rhynocypha ogasawarenis*, *Macromia daimoji*, *Boninthemis insularis*, *Sympetrum gracile*, *Sympetrum uniforme*, *Leucorrhinia intermedia ijimai*. Near Threatened species (NT), 18: *Agriocnemis pygmaea*, *Ischnura elegans elegans*, *Nehannia speciosa*, *Erythromma humerale*, *Asiagomphus amamiensis okinawanus*, *A. a. amamiensis*, *A. yayeyamaensis*, *Davidius moiwanus sawanoi*, *Chlorogomphus brevistigma okinawensis*, *C. brunneus keramensis*, *Oligoaeschna kunigamiensis*, *Planaeschna ishigakiana nagaminei*, *P. ishigakiana*, *Aeshna subarctica*, *Macromia urania*, *Macromia kubokaiya*, *Diplacodes bipunctata*, *Rhyothemis severini*. Threatened local population (LP), 1: *Mnais pruinosa costalis* including *M. pruinosa costalis-forma edai* from the Boso Peninsula. Translation: Ishizawa, Noaya] Address: Matsuki, K, 3-1575-14, Hazama, Funabashi City, Chiba Pref., 274-0822, Japan

**2816.** Matthes, H.; Meyer, E.I.; Artmeyer, C.; Göcking, C.; Krismann, M.; Niepagenkemper, O. (2001): Kanusport und Naturschutz - Forschungsbericht über die Auswirkungen des Kanusportes an Fließgewässern in NRW. Forschungsprojekt im Auftrag des Ministeriums für Umwelt, Raumordnung und Landwirtschaft des Landes Nordrhein-Westfalen, des Ministeriums für Arbeit, Soziales und Stadtentwicklung, Kultur und Sport des Landes NRW, der Landesanstalt für Ökologie, Bodenordnung und Forsten / Landesamt für Agrarordnung, des Deutschen Kanu-Verbandes und des Kanu-Verbandes NRW.: 259 pp. (in German). [Conflicts between boating and target species of nature conservation are analysed and assessed. The main focus lays on birds, but fishes and macrozoobenthos have been studied too. Boat induced drift of macrozoobenthos was studied by field observations and experiments. Odonata are among the taxa listed for the study localities. For more, and detailed information see: [www.bfn.de](http://www.bfn.de) (NaturSportInfo; browse to the author Mattes). In this exhaustive data base, there are some additional studies which surveyed boat induced mortality and drift on Odonata (search for the studies of Bertrand Schmidt, Schorr, Sabarth, and Tobias).] Address: not stated, but you can contact Artmeyer, C., Philippstr. 16, D-48149 Münster, Germany. E-mail: [artmeyc@uni-muenster.de](mailto:artmeyc@uni-muenster.de)

**2817.** Mayer, G. (2001): Die Grüne Keiljungfer *Ophiogomphus cecilia* im Landkreis Aichach-Freiberg. Berichte des naturwissenschaftlichen Vereins für Schwaben 105: 138-148. (in German). [The paper compiles all known records of *O. cecilia* in the county Aichach-Freiberg, Bavaria, Germany. The habitats of *O. cecilia* are described. The river Paar and its tributaries seem to be a regional core habitat of *O. cecilia*. In spite of this, it was not reported as Natura 2000 site to the European Commission by the Bavarian government. In the frame-

work of a local Agenda 21 process some conservation measures have been undertaken to secure the habitat along the river Paar.] Address: Mayer, G., Am Harfenacker 10, D-86316 Friedberg, Germany.

**2818.** Miserendino, M.L. (2001): Length-mass relationships for macroinvertebrates in freshwater environments of Patagonia (Argentina). *Ecologia Austral* 11(1): 3-8. (in English). [“Mass-length equations were obtained for aquatic macroinvertebrates collected in different streams and rivers of Patagonia, Argentina. Thirty-six taxa were studied: [...] Anisoptera (1 genus), [...] Mass-length relationships were estimated by fitting the model  $UPSILON = aX^b$  linearized by logarithmic transformation) to data of dry mass vs. body length of preserved specimens. The regressions were highly significant and explained a high proportion of variation of the dependent variable, as expressed by the Coefficient of Determination ( $R^2 = 0.58-0.98$ ). The equations obtained allow the estimation of biomass of invertebrates in Patagonian running waters from measurements of linear dimensions, facilitating calculations of benthic standing crop and of secondary production.] Address: Miserendino, Maria, Flathead Lake Biological Station, The University of Montana, 311 Bio Station Lane, Polson, MT, 59860 9659, USA. E-Mail: [mlau@ar.inter.net](mailto:mlau@ar.inter.net)

**2819.** Mungenast, F. (2001): Die Libellen des Gurgltales bei Imst, Nordtirol (Insecta: Odonata): Eine faunistisch-ökologische Untersuchung. *Veröff. Tiroler Landesmus. Ferdinandeum* 81: 113-153. (in German with English summary). [Between 1996-1999, the survey of 36 habitats/localities in the Gurgl Valley, between Imst and Nassereith, N Tyrol, Austria, totaled in 35 species. Of particular interest are the occurrence of *Nehalennia speciosa* (Kropfsee) and *Aeshna subarctica* (Sinnerbrunn, alt. 1500 m). Data concerning the horizontal and vertical distribution, frequency, abundance, flight phenology and associations of adult dragonflies are presented. In addition records of *Thecagaster bidentata*, *Cordulegaster boltonii*, and *Orthetrum coerulescens* are stressed.] Address: Mungenast, F., Stadtplatz 12, A-6460 Imst, Austria

**2820.** Muzon, J.; Ellenrieder, N. von; Pessacq P. (2001): Description of the last larval instar of *Acanthagrion hildegarda* (Odonata: Coenagrionidae). *Revista de la Sociedad Entomologica Argentina* 60: 95-98. (in English). [“The last larval instar of *Acanthagrion hildegarda* Gloger, is here described and compared to the other known larvae of this genus. It differs from them mainly in number of palpal and premental setae.” (Authors)] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C. 712, AR-1900, La Plata, Argentina. E-mail: [ellenr@ilpla.edu.ar](mailto:ellenr@ilpla.edu.ar)

**2821.** Naraoka, H. (2001): Correction of Report of observations on dragonflies at Kushiro Marsh in Hokkaido (1972). *Bulletin of The Hokkaido Odonatological Society* 13: 17. (in Japanese). Address: not stated in English

**2822.** Natsume, H. (2001): Collection of *Sympetrum darwinianum* at Nishioka Reservoir. *Bull. Hokkaido Odonatological Society* 13: 16. (in Japanese). [S. baccha, S. darwinianum.] Address: not stated in English.

**2823.** Nel, A.; Bechly, G.; Martinez-Delclos, X.; Fleck, G. (2001): A new family of anisoptera from the Upper Jurassic of Karatau in Kazakhstan (Insecta: Odonata: Juragomphidae n. fam.). *Stuttgarter Beiträge zur Natur-*

kunde Serie B (Geologie und Palaeontologie) 314: 1-9. (in English). ["A new dragonfly genus and species, *Juragomphus karatauensis*, from the Upper Jurassic of Karatau in Kazakhstan is described and attributed to a new family Juragomphidae. The phylogenetic position and relationships of this new taxon are discussed." (Authors)] Address: Nel, A., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**2824.** Nel, A.; Bechly, G.; Martinez-Declos, X. (2001): A new fossil dragonfly from the Upper Jurassic in Germany (Odonata, Anisoptera, Protolindeniidae). *Revue Française d'Entomologie (Nouvelle Série)* 23(4): 257-261. ["Protolindenia vohly sp. n is described and illustrated from Lower Tithonian (Hybonotum Zone), Solnhofen Lithographic Limestone of Frankonian Alb, Bavaria. Holotype (imprint and counterimprint) and paratype (distal part of a hindwing) are deposited in MNHN, Paris (MNHN-LP-R. 55238) and in Jura. Mus. (SOS 1693), resp."] Address: Nel, A., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**2825.** Ortaz, M. (2001): Diet seasonality and food overlap among fishes of the upper Orituco stream, northern Venezuela. *Revista de Biología Tropical* 49(1): 191-197. (in English with Spanish summary). [The diet of four diurnal fish species (*Creagrutus bolivari*, *Knodus deuterodonoides*, *Knodus* sp. and *Poecilia reticulata*) from the Orituco stream at northern Venezuela include also Odonata. Address: Ortaz, M., Instituto de Biología Experimental, Universidad Central de Venezuela, Caracas, 1041, Venezuela. E-Mail: [capricorniomvos@star-media.com](mailto:capricorniomvos@star-media.com)

**2826.** Pathak, S.C.; Choubey, A.K.; Kulshrestha, V. (2001): Biodiversity of insects trapped over Bay of Bengal. *Entomon* 26(3-4): 211-226. (in English). [Wind borne insects of terrestrial origin in the aeolian environment over Bay of Bengal were trapped using multinet trapping system aboard the Ocean going Research Vessel (ORV), Sagar Kanya. Insects trapped belonged to eleven orders of which four viz., Hemiptera (94%), Diptera (4%), Hymenoptera (1%) and Coleoptera (0.5%) accounted for almost 99% of the total haul of 16429 in two traps with three nets in each, operated continuously for the duration of the cruise. Trichoptera, Neuroptera, Thysanoptera, Odonata and Dictyoptera were represented by single digit numbers.] Address: Pathak, S.C., Rani Durgavati Univ, Dept Biol Sci, Jabalpur 482001, India

**2827.** Pinratana, A. (2001): Editorial. *Malangpo* 18: 163. (in English). [Brief introduction into more recent odonate collecting activities in Thailand, and a short note on increasing interest in odonatology in Thailand.] Address: Pinratana, Bro Amnuay, Saint Gabriel's College, Bangkok 10300, Thailand

**2828.** Pliúraitė, V. (2001): The seasonal change of macrozoobenthos is the Merkys river in 1998. *Acta zool. lituan.* 11(1): 39-52. (in English with Lithuanian summary). [Information are given on seasonal dynamics, abundance and biomass in various habitats of the Merkys River, Lithuania. These data refer to "Odonata", while *Calopteryx splendens* and *Gomphus vulgatissimus* are listed in the 1998 taxa list of Merky River.] Address: Pliúraitė, V., Inst. Ecol., Akademijos 2, 2600 Vilnius, Lithuania

**2829.** Prot, J.-M. (2001): Atlas commenté des insectes de France-Comté. Odonates. Office pour l'information eco-entomologique de France-Comté: 185 pp. (in French). [This atlas covers records of Odonata from a region (including 3 Départements) in eastern France situated to the western border of Switzerland and - partly - Germany. This information may be of some interest to stimulate vigilance of odonatologists for some species to be expected under the amendments of global climate: it is fascinating to see that *Boyeria irene* reaches the latitude of Basel. 63 species - regularly reproducing in the region - are presented in detail: each monograph contains information on the habitat and habits, distribution, phenology, status, and comments. The species are documented by colour photographs (exception *Sympetrum sanguineum*), a graph with flight season, and two maps (records per UTM, numbers of observations plotted against locality and altitude). In addition, 16 species probably to occur in the region or to be expected in near future, and species with questionable status are commented. Some introductory chapters with information on history, development of inventarisation of the species, geography, a bibliography, a list of species and their current status specified for each Département and the town of Belfort complete this very interesting atlas. It is fascinating to observe the development of the atlas project of the French odonatologists. Obviously (compare OAS 2887), they have reached the level of regionalised maps with plenty of highly welcome information.] Address: Insectarium - Muséum d'histoire naturelle, La Citadelle, F-25000 Besançon, France. [OPIE-Fcomte@wanadoo.fr](mailto:OPIE-Fcomte@wanadoo.fr)

**2830.** Ramos-Elorduy, B.J.; Pino Moreno, J.M. (2001): Insectos comestibles de Hidalgo, Mexico. *Anales del Instituto de Biología Universidad Nacional Autónoma de México Serie Zoología* 72(1): 43-84. (in Spanish with English summary). [99 species of edible insects in Hidalgo, Mexico include 12 orders: Hymenoptera (35 species), Hemiptera (15 species), Lepidoptera (15 species), Coleoptera (15 species), Trichoptera (four species), Orthoptera (five species), Diptera (four species), Ephemeroptera (two species) and Odonata, Isoptera, Homoptera and Neuroptera with one species each. Regional distribution, consumption period and the way to fix, preserve and commercialize them, are discussed.] Address: Ramos-Elorduy B Julieta, Instituto de Biología, UNAM, 04510, Mexico, D.F. Mexico

**2831.** Reeves, D. (2001): From the president et al.. *Austrolestes* 2: 1-4. (in English). [D. Reeves introduces into some current activities in Australian odonatology (preparation of identification keys for larvae by Günther Theischinger, activities of the society), reviews Jill Silsbys book "Dragonflies of the World", and answers "Frequently asked questions".] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: [denissreeves@uq.net.au](mailto:denissreeves@uq.net.au)

**2832.** Reeves, D. (2001): Roma street wetlands. *Austrolestes* 2: 2. (in English). [Australia; 13 odonate species were recorded in a newly created water body.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: [denissreeves@uq.net.au](mailto:denissreeves@uq.net.au)

**2833.** Reeves, D. (2001): Species profile: S-e Queensland's "Giant Dragonfly" - *Petalura litorea* Theischinger. *Austrolestes* 2: 3-4. (in English). [Habits and the habitat of the species are briefly outlined. Special



emphasize is given to the legal conservation status of the species. In addition, the rest of the taxa of the genus *Petalura* are briefly discussed.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**2834.** Rumpf, M.; Wernicke, P. (2001): Die Libellenfauna ausgewählter Gewässer im Naturpark Feldberger Seenlandschaft. Natur und Naturschutz in Mecklenburg-Vorpommern 36: 92-109. (in German with English summary). [Mecklenburg-Vorpommern, Germany; in 1998 and 1999, 45 water bodies (in most cases lakes, and a few running waters) were surveyed for their odonate fauna. Along with detailed data on morphology and chemistry, the Odonata are documented for each of the water bodies. 48 species could be traced; considering literature data, a total of 55 species is known from the region. The lake with highest diversity (31 species) is the dystrophic Mummelsee, a shallow, temporarily drying out water body with a surface of app. 1-2 ha only. Five species of the genus *Leucorrhinia* make the region to an odonatological hot spot in Europe; the occurrence of "lake-populations" of *Onychogomphus forcipatus* and *Gomphus vulgatissimus* is of special interest. 23 species are discussed in some detail.] Address: Rumpf, M., Blumenstr. 13, D-17268 Warthe, Germany

**2835.** Salamanca-Ocana, J.C.; Cano-Villegas, F.; Ferreras-Romero, M., (2001): Contribution al conocimiento de la distribución ibérica actual de *Onychogomphus costae* Selys, 1885 (Odonata: Gomphidae). Boln Asoc. esp. Ent. 25(1/2): 187-188. (in Spain with English title). ["The published records are reviewed and annotated, and records from Palma de Rio and Cordoba (V/VI-2000) are added."] Address: Ferreras-Romero, M., Departamento de Biología Animal (Zoología), Facultad de Ciencias, Universidad de Córdoba, Avda. San Alberto Magno s/n, E-14004 Córdoba, Spain. E-mail: ferreras@teleline.es

**2836.** Schilder, R.J.; Marden, J.H. (2001): Workloop force and lever arm length allometry in dragonfly flight motors. American Zoologist 41(6): 1651. (in English). ["Maximum isometric muscle force production scales as muscle mass<sup>2/3</sup>, whereas maximum net force output by flying animals scales isometrically with total flight muscle mass. What causes this transition between the two scaling relations? We examined this question by subjecting dragonfly flight muscles to contraction regimes (workloops) that simulated working conditions of the muscle during maximum load lifting. Our hypothesis is that a combination of allometric (rather than isometric) scaling of average net muscle force output and the ratio of lever arm lengths (i.e. mechanical advantage) in the muscle-to-wingtip mechanical linkage is sufficient to account for the observed transition from muscle mass<sup>2/3</sup> scaling to the isometric scaling. We found that 1) maximum isometric force scales as muscle mass<sup>0.67</sup>, 2) maximum net force production during load lifting (F<sub>2</sub>) scales as total flight muscle mass<sup>1.067</sup> (M<sub>1.067</sub>), 3) workloop average net force output (F<sub>1</sub>) scales as muscle mass<sup>0.86</sup> (M<sub>0.86</sub>), 4) muscle fulcrum-lever arm length (d<sub>1</sub>) scales as muscle mass<sup>0.54</sup> (M<sub>0.54</sub>), and 5) fulcrum-wingtip length (d<sub>2</sub>) scales as muscle mass<sup>0.33</sup> (M<sub>0.33</sub>). Since moments are conserved on either side of a fulcrum (F<sub>1</sub>\*d<sub>1</sub>=F<sub>2</sub>\*d<sub>2</sub>), maximum net force output by the muscle-wing system (F<sub>2</sub>) should scale as: M<sub>0.86</sub>\*(M<sub>0.54</sub>/M<sub>0.33</sub>)=M<sub>1.07</sub>, which agrees well with the observed scaling (M<sub>1.067</sub>) in this study and previ-

ous load lifting experiments on dragonflies and other flying animals." (Authors)] Address: Marden, J.H., Dept Biol., Pennsylvania St. University, 208 Mueller Laboratory, University Park, PA 16802, USA

**2837.** Schmidt, E. (2001): Der Plattbauch *Platetrum depressum* (L., 1758), (Odonata), das Insekt des Jahres 2001. Entomologische Nachrichten und Berichte 45(1): 1-8. (in German with English summary). ["It is the type species of *Platetrum* NEWMAN, 1833, which within the *Libellula*-group is based on the prominent bifurcate process at 1st sternum. It is part of the secondary copulatory apparatus at sternite 2/3 and forms a good autapomorphy at genus level. Thus North American *Platetrum* HAGEN, 1861 became the nearctic subgenus of *Platetrum*, including *P. lydia* (DRURY, 1770), the Common Whitetail." This finding coincides with that of Carle & Kjer (2002), see OAS 2902. "The biology/ecology in Central Europe are summed up. They are interpreted as adaptations to settle in open wetlands in natural river landscapes of the plains, which today are devastated in most parts of Germany. Nowadays the species here breeds usually only in man made habitats in the pioneer stage (like shallow drying up pools or gravel pits), which requires a special habitat management." (Author)] Address: Schmidt, E., Biologie und ihre Didaktik, FB9/S05, Universität GH Essen, D-45117 Essen, Germany

**2838.** Schupp, D.; Behm-Berkelmann, K.; Herrmann, T.; Pilgrim, B.; Schacherer, A. (2001): Arten brauchen Daten - Erfassung von Tier- und Pflanzenarten in Niedersachsen. Informationsdienst Naturschutz Niedersachsen 5/2001: 210-239. (in German). [This introductory manual for the species mapping scheme of the Federal State Niedersachsen in Germany refers on pages 230-231 on Odonata. Detailed instructions on mapping have to be taken from Herrmann et al. (see OAS 2797)] Address: Niedersächsisches Landesamt für Ökologie, Abt. Naturschutz, Postfach 101062, D-31110 Hildesheim, Germany. www.nloe.de

**2839.** Seidenbusch, R. (2001): Die Gefährdung der Libellen im Landkreis Amberg-Sulzbach. Eisengau 16: 5-16. (in German). [Amberg-Sulzbach district, Bavaria, Germany; 53 species are listed, and the status of the various aquatic habitats in the region is outlined.] Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany

**2840.** Sformo, T.T.S. (2001): Minimum flight temperature and thermoregulatory performance of sub-arctic dragonflies. American Zoologist 41(6) : 1584-1585. (in English). ["Sub-arctic dragonflies (Odonata: Anisoptera), an order of insect previously not studied in Alaska, provide a unique system with which to examine questions of thermal biology. Two potential adaptations are the ability to initiate flight at low temperature and to thermoregulate. To establish minimum flight temperatures, I record the lowest temperature at which a species can maintain level flight, both in the lab and in the field. To determine thermoregulating ability, I measure thoracic temperature (T<sub>th</sub>) of individual dragonflies using a thermocouple. T<sub>th</sub> is then compared to the dragonfly model providing the operative environmental temperature (T<sub>e</sub>). By regressing T<sub>th</sub> on T<sub>e</sub>, the slope of the regression line indicates thermoregulatory ability (Thermoregulation Performance Index). I predict that northern dragonflies will have lower minimum flight temperatures

than comparable species from lower latitudes. I also predict a general pattern wherein more massive species are able to thermoregulate by both physiological and behavioral means, while less massive species rely solely on behavioral repositioning. The relationship between  $T_{th}$  of living specimens and  $T_e$  is examined for each species and compared across species to examine relative thermoregulating ability. I show, contrary to speculation by Vogt and Heinrich (1983), that minimum flight temperature of northern dragonflies are not different from comparable species from Maine, although they differ from species in Florida. Minimum temperatures range from 14°C for *S. danae* to 22°C for aeshnids. Finally, I conclude that the relative thermoregulating ability is a function of mass, which ranges from 0.09g for the least to 0.86g for the most massive, while the Thermoregulatory Performance Index ranges from 0.90 (a thermal conformer) to 0.14 (a thermal regulator), respectively. (Author)] Address: Sformo, T.T S., University of Alaska Fairbanks, Fairbanks, AK USA.

**2841.** Sharifi, M.; Hemmati, Z. (2001): Food of Mehely's horseshoe bat *Rhinolophus mehelyi* in a maternity colony in western Iran. *Myotis* 39: 17-20. (in English). ["The diet of *R. mehelyi* was investigated from droppings collected in spring and summer 2000 in a maternity roost in Killasefid cave, west-central Zagros Mts. Moths (Lepidoptera) dominated in the food (68-97% of volume), being followed by beetles (Coleoptera, 3-29%) and flies (Diptera, 0.1-1.3). Other prey included Odonata, Neuroptera, Homoptera, Hemiptera, Trichoptera, Dictyoptera and Acarina. Prey diversity declined sharply from April/May to June/July." (Author)] Address: Sharifi, M., Dept of Biology, Faculty of Science, Razi University, Kermanshah, Baghabrisham, 67149, Iran. E-Mail: msharifi@razi.ac.ir

**2842.** Síbl, J.; Seginkova, A. (2001): Contribution to the knowledge of dragonflies (Insecta: Odonata) of national nature reserve Súr fen and its surrounding (southwestern Slovakia). *Entomofauna carpathica* 13: 5-9. (in Slovakian, with English summary). [In 1999 and 2000, 31 dragonfly species have been recorded at 5 localities of the National Nature Reserve "Súr fen" and its surroundings (situated in southwestern Slovakia). The present number of species - including literature records - now amounts to 40. The occurrence of several dragonfly species, which are considered rare in the Slovak Republic, was confirmed, e.g. *Orthetrum coerulescens*. 11 species (*Brachytron pratense*, *Anaciaeschna isosceles*, *Anax imperator*, *A. parthenope*, *Orthetrum albistylum*, *O. coerulescens*, *Libellula quadrimaculata*, *Crocothemis erythraea*, *Cordulia aenea*, *Sympetrum danae*, *S. meridionale*) were recorded for the first time in the study area. The species are grouped to three dragonfly communities following the system of Jacob (1969): Gomphus - *Calopteryx splendens*, *Erythromma* - *Anax imperator*, *Lestes-Sympetrum* - *Aeshna mixta* and *Orthetrum* - *Libellula depressa*.] Address: Síbl, J., J. Stanislava 15, SK 84105 Bratislava, Slovakia

**2843.** Síbl, J. (2001): On the distribution of *Leucorrhinia pectoralis* (Odonata: Libellulidae) in western Slovakia. *Entomofauna carpathica* 13: 3-4. (in Slovakian, with English summary). [The red listed *L. pectoralis* is considered rare in the Slovak Republic; it was confirmed recently in western Slovakia within 2 geomorphological units at 10 localities for the first time.] Address: Síbl, J., J. Stanislava 15, SK 84105 Bratislava, Slovakia

**2844.** Song, D.; Wang, H.; Zeng, L.; Yin, C. (2001): Measuring the camber deformation of a dragonfly wing using projected comb fringe. *Review of Scientific Instruments* 72(5): 2450-2454. [This is a contribution about non-contact methods of measuring wing deformation patterns.] Address: unknown.

**2845.** Sprandel, G.L. (2001): Fall dragonfly (Odonata) and butterfly (Lepidoptera) migration at St. Joseph Peninsula, Gulf County, Florida. *Florida Entomologist* 84(2): 234-238. (in English). [The author describes the fall 1999 migration of 5 Lepidoptera and 4 Odonata species north along St. Joseph Peninsula, Gulf County, in the Florida Panhandle. The Gulf fritillary butterfly (*Agraulis vanillae* (L.), Lepidoptera: Nymphalidae) accounted for 58% of the insects counted; the highest rate was 3,162/h, with an estimate of total season migration of over 250000 individuals. *Anax junius* was the next most common with a maximum rate of 3,297/h, and with an estimate of total season migration of app. 78000 individuals. "The median and peak period for these two species was the first week in October. The observed flight pattern may demonstrate a reluctance to cross open water." In tab. 1 the migration levels of all dragonflies and butterflies incl. *Tramea lacerata* (3.3% / app. 21000 ind.), *Pantala flavescens* (1.8% / app. 9000 ind.), and *Tramea carolina* (1% / app. 4700 ind.) are documented. Additional information of preying of *A. junius* on insects, road traffic mortality, flying in tandem, and flight high should be noted.] Address: Sprandel, G.L., Florida Fish & Wildlife Conservation Commission, 620 Meridan St., Tallahassee, FL 32399 USA

**2846.** Terzani, F.; Carletti, B. (2001): Descrizione di *Pseudagrion bernardi* spec. nov. della Repubblica del Congo (Odonata: Coenagrionidae). *Opusc. zool. flum.* 199: 7-12. (in Italian with English summary). ["The new species is described and illustrated, and its affinities with *P. kibalense* Longfield, 1959, *P. symoensii* Pinhey, 1967, and *P. fisheri* Pinhey, 1961 are discussed. Holotype male and allotype female; Republic of Congo: Kintele, 6-XI-1978; deposited at MZUF, Firenze. Paratypes of both sexes from Djili (VI-1978, XII-1979, XI-1980), Kintele (V, VI, 6-XI-1978, 5-1, II, III, XII-1980), Loufula (1-1980), Makabana (X-1980), Voka (1-1980) and Dimonika (VI-1980)." (Authors)] Address: Terzani, F., Museo di Storia Naturale dell'Universita di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**2847.** Terzani, F. (2001): Odonati. In: A. Sforzi & L. Bartolozzi, [Eds], *Libro Rosso degli insetti della Toscana*, ARSIA, Regione Toscana, Firenze: 49-70. (in Italian). [20 (including *Coenagrion caerulescens caesarum* Schmidt, 1959, *C. mercuriale castellanii* (Roberts, 1848), and *C. pulchellum mediterraneum* Schmidt, 1964) out of the 55 species known to occur in the province of Toscana, Italy are redlisted. Colour portraits, brief descriptions, provincial distribution dot maps, and statements on their habitat, biology, ecology, distribution and status are provided.] Address: Terzani, F., Museo di Storia Naturale dell'Universita di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**2848.** Theischinger, G. (2001): A new species of *Eurysticta* WATSON from Australia (Odonata: Isostictidae). *Linzer biol. Beitr.* 33(2) : 1291-1294. (in English). ["*E. reevesi* sp.n. (male holotype: Torrens Creek Gorge,

White Mountains National Park, Queensland, Australia) is described after two males. The species is illustrated and compared with the described species of *Eurysticta WATSON*. (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

**2849.** Thipaksom, A.; Kittayapong, P.; Milne, J.R.; Thirakupt, V.; Sindhusake, C.; Poonchaisri, S. (2001): Additions to the distributions of rice field odonates in Thailand. *Malangpo* 18: 171-174. (in English). [In 1998-2000, we collected adult odonates from rice fields in 36 provinces of every part of Thailand. We collected them by sweep net and stored them in a foam box containing dry ice (-78°C) until they were transported to an experimental laboratory at the Department of Biology, Mahidol University, for further analysis. Odonate specimens were identified to species by morphology and confirmed by comparison with representative specimens at St. Gabriel's Museum, Bangkok. After identification, the specimens were kept at -20°C until used for the molecular detection of *Wolbachia* infection in odonates (Thipaksom et al. in preparation). From our material we could determine a large number of new provincial distribution records for a total of 15 coenagrionid and 11 libellulid species. They are reported here.] Address: Thipaksom, A., Department of Biology, Faculty of Science, Mahidol University, Bangkok

**2850.** Vick, G.S. & D.G. Chelmick (2001): A preliminary report on the odonate fauna of Guapi Acu, a nature reserve in the Atlantic coast forest of Brazil, with taxonomic notes and annotations. *Opusc. zool. flumin.* 200: 1-11. (in English). [Based upon a preliminary survey, the presence of 48 species is brought on record; 20 of these are Atlantic coast endemics. A second species was discovered in the hitherto monotypic genus *Limnetron* (female only); the differing features of the respective female specimens are outlined.] (Authors)] Address: Vick G.S., Crossfields, Little London, Tadley, Hants RG26 5ET, United Kingdom

**2851.** Viessmann, R. (2001): Libellen - Odonata. Pflanzen und Tiere in Rheinland-Pfalz - Berichtsjahr 2000 - Heft 11: 207-220. (in German). [Compilation of dragonfly records from different habitats situated in the eastern and southern parts of Rheinland-Pfalz, Germany. Of faunistic interest are the records of *Coenagrion mercuriale*, *Erythromma najas*, *Ischnura pumilio*, *Lestes barbarus*, *L. virens*, *Sympetma fusca*, *Brachytron pratense*, *Aeshna affinis*, *Anax parthenope*, *Ophiogomphus cecilia*, *Crocothemis erythraea*, *Libellula fulva*, *Orthetrum brunneum*, and *Sympetrum flaveolum*.] Address: Viessmann, R., Gängelstockweg 8, D-67295 Bollanden, Germany

**2852.** Vizslán, T.; Pingitzer, B. (2001): Data on the odonate fauna of Bükk Mountains and Miskolc. *Folia hist. not. Mus. matraensis* 25: 121-126. (in Hungarian with English summary). [40 species, evidenced during 1999-2000, are listed along with the locality data and collection dates. Of some interest are records of *Lestes sponsa*, *Coenagrion ornatum*, *Brachytron pratense*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Libellula quadrimaculata*, and *Sympetrum danae*.] Address: Vizslán, T., Kitaibel P. u. 32/C. Fru 2, HU-9400 Sopron, Hungaria

**2853.** Vizslán, T.; Pingitzer, B. (2001): Data on the odonate fauna of Transdanubia, 2.. *Folia hist. not. Mus. matraensis* 25: 127-134. (in Hungarian with English

summary). [40 species, evidenced in 2000, are listed along with the locality data and collection dates. Noteworthy are species as *Coenagrion scitulum*, *Brachytron pratense*, *Cordulegaster heros*, *Epitheca bimaculata*, *Libellula quadrimaculata*, *Sympetrum danae*, *S. pedemontanum*, and *Leucorrhinia pectoralis*.] Address: Vizslán, T., Kitaibel P. u. 32/C. Fru 2, HU-9400 Sopron, Hungaria

**2854.** Waldhauser, M. (2001): The current state of knowledge about dragonflies (Odonata) research in the Protected Landscape Area Luzické hory Mountains (Northern Bohemia). *Vázky* 2001. Sborník referátu IV. celostátního semináře odonatologu, který se konal v Národním parku Sumava 2. - 5. 8. 2001. Seminár usporádali: ZO CSOP Vlasim, Správa NP Sumava, Správa. CHKO Blaník: 62-79. (in Czech with English summary). [The paper compiles and briefly discusses records of 35 species which were collected in 2000 and 2001.] Address: Waldhauser, M., Správa CHKO Luzické hory, Skolín 12, 47125 Jablonné v Podjestedi, Czech Republic

**2855.** Wootton, R.J. (2001): How insect wings evolved.. In: If. Woiwod, D.R. Reynolds & C.D. Thomas, [Eds], *Insect movement mechanisms and consequences*. CABI Publishing, Wallingford, ISBN 0-85199-456-3: 43-64. (in English). [There is now a majority support for the view that insect wings evolved from lateral segmental structures which were already mobile. The most plausible routes for the origin of flight appear to be either through parachuting and gliding, or through skimming on the surface of water. For the development of active flight, wing would initially need to enlarge, and to develop structural rigidity and a firm articulation to the thorax, then progressively to acquire structural adaptations for automatic, useful deformation when aerodynamically and inertially loaded. Thereafter the way would be open for specialization into different modes of flight, e.g. slow flight and hovering (Zygoptera: narrowing of the base, usually accompanied by vein fusion, etc.), or adaptations for flight over a wide speed range (Anisoptera: combining torsionally compliant wings with broad bases, usually associated with faster flight).] Address: Wootton, R.J., Hatherly Lab., Sch. Biol. Sci., Univ. Exeter, Prince of Wales Rd, Exeter, EX4 4PS, UK

**2856.** Yang, Z.-d.; Zhu, H.-q (2001): A new species of the genus *Lamelligomphus* (Odonata: Gomphidae) from Shaanxi province. *Entomotaxonomia* 23(3): 157-159. (in Chinese with English summary). [*L. hanzhongensis* sp. n. is described, illustrated and compared with *L. formosanus* (Matsumura in Oguma, 1926). The holotype is deposited at Shaanxi University.] Address: Yang, Z.-d., Adult Education Dept, Hanzhong Normal College, Hanzhong, Shaanxi-72300, China

**2857.** Yanoviak, S.P., (2001): Container color and location affect macroinvertebrate community structure in artificial treeholes in Panama. *Florida Entomologist* 84(2): 265-271. (in English with Spanish summary). [I investigated the effects of habitat color and location on community structure in artificial water-filled treeholes in the forest of Barro Colorado Island, Panama. The macroinvertebrate fauna of 9 replications (5 in understory, 4 in tree-fall gaps) of black, blue, red, and green 650 ml plastic cups were censused weekly for 7 wks. Macroinvertebrate abundance and species richness were greater in understory cups than in gap cups. Seven species



colonized black cups exclusively. Black cups in the understory, and red and black cups in gaps, attracted more species on average than other colors. Species richness and abundance were consistently lowest in green cups. Species were more broadly distributed among cup colors in the understory, suggesting that diffuse light conditions influenced color perception. There was no overlap in species composition between water in the artificial treeholes and water held by red *Heliconia* bracts or green tank bromeliads." (Author) *Mecistogaster* ssp. was found one time in a black container in understory, and one time in a black container in gap. *Mecistogaster* on BCI avoid other phytotelmata, including bromeliads, and prefer treeholes. "It is reasonable to conclude that the presence ... only in black cups reflects a habitat color preference."] Address: Yanoviak, S.P., Evergreen State College, Lab 1, Olympia, WA 98505, USA

**2858.** Yokoi, N. (2001): Studying dragonflies in central Laos. *Malangpo* 18: 167-169. (in English). [This paper presents a compilation of several publications of the author from 1995 to 2001 on the Odonata of Laos, most of them written in Japanese. Along with some remarks on more recently visited localities the paper is welcome to people not common with the Japanese language.] Address: Yokoi, N., 2-37-11, Kaisei, Koriyama, Fukushima, 963-8851 Japan

**2859.** Yokoyama, T. (2001): Larval duration of *Planaeschna milnei* in Hokkaido. *Bulletin of The Hokkaido Odonatological Society* 13: 5-9. (in Japanese). Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**2860.** Yokoyama, T. (2001): Overwinter of the larvae of several lotic species in the northern district. *Bulletin of The Hokkaido Odonatological Society* 13: 10. (in Japanese). [*Mnais pruinosa*, *Davidius moiwanus*, *Anotogaster sieboldii*] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**2861.** Yokoyama, T.; Akaishi, S.; Hirose, Y. (2001): The new locality of *Lyriothemis pachygastra* and its life history in the southern Hokkaido. *Bulletin of The Hokkaido Odonatological Society* 13: 2-4. (in Japanese). Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**2862.** Zimmer, K.D.; Hanson, M.A.; Butler, M.G.; Duffy, W.G. (2001): Size distribution of aquatic invertebrates in two prairie wetlands, with and without fish, with implications for community production. *Freshwater Biology* 46: 1373-1386. (in English). ["1. We compared the size distribution of aquatic invertebrates in two prairie wetlands, one supporting a population of fathead minnows and the other fishless. Both wetlands were sampled in three depth zones on three dates, allowing assessment of temporal and spatial variation. 2. We determined biomass of aquatic invertebrates in 17 log<sub>2</sub> size classes, and used these data to develop normalized size spectra. We also coupled size distributions with an allometric model to estimate relative production at the community level. 3. The composition of the invertebrate communities differed greatly between sites, and invertebrate biomass was higher in nearly all size classes in the fishless wetland. Intercepts of normalized size spectra were significantly different between wetlands, but slopes generally were not, indicating differences in

standing-stock biomass but similar size structures between the two invertebrate communities. Higher standing-stock biomass in the fishless wetland resulted in higher relative production per unit area, but similar size distributions resulted in similar mass-specific production (P/B) between wetlands. 4. Our results indicate that invertebrate communities in prairie wetlands may have relatively consistent size structures in spite of large differences in community composition and standing-stock biomass. We hypothesize that the observed differences are because of predation by the minnow population and/or differences in the macrophyte communities between the two sites. However, the relative importance of macrophytes and fish predation in structuring invertebrate communities in prairie wetlands is poorly known." (Authors) The biomass of Odonata depends from the stratum and the date of sampling. In the fishless pond Odonata biomass of e.g. the shallow stratum accounts to nearly 60% of the total macroinvertebrate biomass, and to nearly 50% on 23 June. Whereas in the pond supporting a population of the fathead minnow biomass in the mid-depth stratum accounts for less than 5% (app. 0% in the shallow and deep stratum); biomass was less than 5% on 19 May, no Odonata could be sampled on the two succeeding sampling dates.] Address: Zimmer, Kyle, D., Dept of Ecology, Evolution and Behavior, University of Minnesota, 100 Ecology, 1987 Upper Buford Circle, St Paul, MN 55108, USA. E-mail: zimme076@umn.edu

**2863.** Zottoli, S.J.; Walfish, D.T.O.; Westbrooks, D.A.; Smith, D.C. (2001): Small tadpoles do not initiate a startle response before being struck by the labium of dragonfly larvae. *Society for Neuroscience* 27(2): 1984. (in English). ["Dragonfly larvae of the family Aeshnidae are voracious predators whose diet includes tadpoles. Larvae hydraulically protrude a labium that has movable hooks, which may attach to prey on contact. This rapid labial movement (13.8+-3.7ms to full extension; mean+-S.D.; n=10) may preclude the ability of tadpoles to use a startle response to escape being struck by the labium. Digital imaging (500 frames/s) was used to detect whether a tadpole startle response is involved in escape from the dragonfly labial strike. Dragonfly larvae (2.8+-1.7cm in total length; 6.5+-2.5mm head width; n=10) were held at 22degreeC and were not fed for three days prior to trials. In each trial a dragonfly larva was placed in the base of a 60X5mm petri dish, covered with conditioned water and allowed to acclimate for at least 10 min. A small tadpole (*Rana*, 12.3+-3.7mm in total length; n=10; purchased from suppliers) was then introduced into the dish and images of labial strikes were saved and analyzed. Tadpoles never displayed a startle response before being struck by the dragonfly labium. When tadpoles were hooked, they were almost always eaten or released by the dragonfly larvae and in a few cases the tadpole was able to break free from the labial hooks utilizing a startle response. When tadpoles were struck but not hooked, startle responses were initiated 23.8+-4.8ms (n=10) after contact by the labium. The results clearly indicate that small tadpoles do not initiate a startle response before being struck by the dragonfly labium. We hypothesize that the startle response may aid in escape from predation only after labial contact." (Authors)] Address: Zottoli, S.J., Biology, Williams College, Williamstown, MA, USA

- 2864.** Abbott, J.; Donnelly, T.W.; Gonzalez-Soriano, E.; Harp, G.L. ("Nicaragua expedition 2001") (2002): Odonata collected in Nicaragua. *Notul. odonatol.* 5(10): 125-128. (in English). [71 species (and 4 spp.) were collected at 12 localities in the Jinotega and Matagalpa Departments, Nicaragua. 25 species are new and raise the number of Odonata of Nicaragua to 124. The possible odonate diversity of Nicaragua is briefly discussed.] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu
- 2865.** Abbott, J.C. (2002): A new dragonfly for Utah. *Argia* 14(2): 13. (in English). [Utah, USA; *Aeshna persephone*] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu
- 2866.** Altwegg, R. (2002): Predator-induced life-history plasticity under time constraints in pool frogs. *Ecology* 83(9): 2542-2551. (in English). ["The mere presence of predators often decreases the growth rate of prey individuals, which devote energy and time to predator avoidance mechanisms. However, if time constraints are present, the prey individuals might be forced to neglect predators in order to grow faster. Amphibian larvae lower their activity when exposed to predators, which increases their survival probability but lowers their growth rate. I investigated how time constraints affect the growth strategies of pool frogs (*Rana lessonae*) in the presence and absence of caged (i.e., nonlethal) predators (*Anax imperator*), and what the consequences are for their survival during the larval and the subsequent terrestrial life stage. In two outdoor experiments, I limited the available development time by delaying the hatching date, and by simulating pond drying. Tadpoles whose hatching date was experimentally delayed reduced their development and their activity less in the presence of predators than did control tadpoles. The survival consequences of caged predators was similar for early- and late-hatched tadpoles. Tadpoles exposed to falling water level increased their developmental rate compared to constant-water-level controls. In response to predators, however, tadpoles decreased activity and developmental rate, regardless of the water level treatment. Survival in treatments combining fast drying and caged predators was lower than in the other treatments. These results suggest that time constraints critically affect the role of predators in the life history of pool frogs and might change the relative importance of lethal and nonlethal predator effects on their population dynamics." (Author)] Address: Altwegg, R., Institute of Zoology, University of Zürich, Winterthurerstr. 190, CH-8057 Zürich, Switzerland. E-mail: Altwegg@zool.unizh.ch
- 2867.** Altwegg, R. (2002): Trait-mediated indirect effects and complex life-cycles in two European frogs. *Evolutionary Ecology Research* 4(4): 519-536. (in English). ["Most animals actively avoid predators. If such a reaction reduces competitive ability, for example by reducing food intake, predator presence can lead to trait-mediated indirect effects. Because predator avoidance typically leads to reduced growth rather than reduced survival, its effect on population processes is difficult to assess. This is especially true for organisms with complex life-cycles, where predator avoidance during one stage is expected to lead to trait-mediated indirect effects if it has effects reaching into the following life stages. I experimentally investigated the effect of caged (thus non-lethal) dragonfly larvae on the competition between tadpoles of two frog species (*Rana lessonae* and *R. esculenta*) and on juvenile frog survival during the subsequent terrestrial stage. In response to caged predators, *R. lessonae* delayed metamorphosis more than *R. esculenta*, but they both metamorphosed heavier. These differences suggest the possibility of a competitive disadvantage for *R. lessonae* in the presence of predators, which could lead to trait-mediated indirect effects. However, the presence of predators did not modify competitive effects and had no measurable consequences on terrestrial survival. Regardless of the presence of predators, competition during the larval stage had large effects on metamorphosis and led to strongly decreased survival in the subsequent terrestrial stage. These results suggest that trait-mediated indirect effects are not important in this system, because the predator reaction of the tadpoles in both species had no measurable effect on the following life stage and, therefore, probably no strong effect on community dynamics." (Author)] Address: Altwegg, R., Institute of Zoology, University of Zürich, Winterthurerstr. 190, CH-8057 Zürich, Switzerland. E-mail: Altwegg@zool.unizh.ch
- 2868.** Andres, J.A.; Sanchez-Guillen, R.A.; Cordero Rivera, A. (2002): Evolution of female colour polymorphism in damselflies: testing the hypotheses. *Animal Behaviour* 63(4): 677-685. (in English). ["The existence of several female colour morphs is a conspicuous characteristic of many damselflies that show one male-like (androchrome) and several nonmale-like (gynochrome) morphs. We tested several adaptive hypotheses and the null model for the maintenance of female polychromatism (one androchrome and two gynochromes) in the damselfly *Ceragrion tenellum*. We tested the null model by comparing the degree of genetic differentiation between the colour locus and a set of 19 neutral RAPD loci in five populations. Our results indicate that selection is acting to maintain similar frequencies between populations at the colour locus. Using mark-recapture techniques we found that mating success is not dependent on female coloration. We tested the mimicry hypothesis by presenting live and dead models to males. Dead models were highly attractive irrespective of coloration. In contrast, with live models males could not distinguish between androchromes and other males, and were more attracted to gynochrome females. Despite this, within populations morph frequencies remained constant over time and mating was at random with respect to female coloration. However, there was a positive relationship between male density and androchrome frequency in a comparative study of eight populations. We discuss our results in the framework of sexual conflict theory and suggest that andro- and gynochrome females are using different strategies to control their number of matings. The different morphs might be maintained in a balanced polymorphism by a combination of density- and frequency-dependent mechanisms." (Author)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidad de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es
- 2869.** Anonymus (2002): Gebänderte Heidelibelle. *Hydrologie und Wasserbewirtschaftung* 46(2): 254. (in

German). [A picture of *Sympetrum pedemontanum* is mounted on the front page of the periodical; the species is briefly characterised, some of the given information is questionable.] Address: not stated

**2870.** Anonymus (2002): Zur Titelseite: Vogel-Azurjungfer. *Hydrologie und Wasserbewirtschaftung* 46(4): 200. (in German). [Coenagrion ornatum was printed on the journal's front page. Some brief remarks on the species and on Odonata in general are added.] Address: not stated.

**2871.** Armstrong, A.J. (2002): Insects and the determination of priority areas for biodiversity conservation in KwaZulu-Natal province, South Africa. *African Entomology* 10(1): 11-27. (in English). ["The KwaZulu-Natal Nature Conservation Service is undertaking a long-term project to determine the value of untransformed land for biodiversity conservation, to map these areas in accordance with their relative values, and to identify and prioritize irreplaceable areas. The overall goal of the initial stage of the project was to use existing data and expertise to define areas of conservation importance in KwaZulu-Natal. The aim of this paper is to illustrate the procedures used to incorporate insect species and subspecies into the project, including those for identifying insects of conservation concern and for making a first assessment of their distribution and conservation status. A biodiversity hierarchy (from landscapes through ecosystems and communities to species and populations) forms the basis of the analysis. Information received from taxonomists working in South Africa in response to a questionnaire survey was used to choose the species for inclusion in the initial analysis. A total of thirty-seven species and subspecies endemic to the Province in certain families of Coleoptera, Diptera, Lepidoptera, Mecoptera and Odonata were included. Existing distribution data were collated and the potential distributions of the endemics were modelled at a scale of 4 ha. Factors that potentially influence the distributions of the endemics were gleaned from the literature. Database queries using distribution data with a spatial resolution of less than or equal to 250 m and cartographic overlays formed the basis of the modelling procedure. Two areas with little or no statutory protection, the high-lying grasslands of the northwestern region and much of the central region of the Province, are predicted to have a relatively high diversity of endemic insects. Fifty-one percent of the insect species and subspecies in the analysis met the two conservation goals, i.e. 1) at least 10% of their present distributions under formal conservation management, and 2) three such protected areas with viable populations. A benefit of modelling the potential distributions of endemics is that searching for populations of these insects can be directed to areas where they are expected to occur. The data collected can then be used to improve the distribution models for these insects, some of which are poorly known. The distributions and their associated conservation targets form a vital component of the iterative systematic conservation planning project currently underway in the Province." (Author)] Address: Armstrong A J ., Biodiversity Division, KwaZulu-Natal Nature Conservation Service, P.O. Box 13053, Cascades, 3202, South Africa. E-Mail: armstronga@kznnccs.org.za

**2872.** Balázs Bernáth, B.; Szedenics, G.; Wildermuth, H.; Horváth, G. (2002): How can dragonflies discern bright and dark waters from a distance? The degree of

polarisation of reflected light as a possible cue for dragonfly habitat selection. *Freshwater Biology* 47(9): 1707-1719. (in English). ["1. Based on the findings that some dragonflies prefer either 'dark' or 'bright' water (as perceived by the human eye viewing downwards perpendicularly to the water surface), while others choose both types of water bodies in which to lay their eggs, the question arises: How can dragonflies distinguish a bright from a dark pond from far away, before they get sufficiently close to see it is bright or dark? 2. Our hypothesis is that certain dragonfly species may select their preferred breeding sites from a distance on the basis of the polarisation of reflected light. Is it that waters viewed from a distance can be classified on the basis of the polarisation of reflected light? 3. Therefore we measured, at an angle of view of 20° from the horizontal, the reflection-polarisation characteristics of several ponds differing in brightness and in their dragonfly fauna. 4. We show that from a distance, at which the angle of view is 20° from the horizontal, dark water bodies cannot be distinguished from bright ones on the basis of the intensity or the angle of polarisation of reflected light. At a similar angle of view, however, dark waters reflect light with a significantly higher degree of linear polarisation than bright waters in any range of the spectrum and in any direction of view with respect to the sun. 5. Thus, the degree of polarisation of reflected light may be a visual cue for the polarisation-sensitive dragonflies to distinguish dark and bright water bodies from far away. Future experimental studies should prove if dragonflies do indeed use this cue for habitat selection." (Authors) Field studies were carried out near Zürich, Switzerland. The species surveyed are: *Enallagma cyathigerum*, *Anax imperator*, *Libellula depressa*, *Orthetrum cancellatum*, *Orthetrum brunneum*, *Pyrrhosoma nymphula*, *Coenagrion puella*, *Aeshna cyanea*, *Libellula quadrimaculata*, *Sympetrum striolatum*, *Lestes virens*, *L. sponsa*, *Chalcolestes viridis*, *Coenagrion pulchellum*, *Aeshna juncea*, *Cordulia aenea*, *Somatochlora flavomaculata*, *Leucorrhinia pectoralis*, and *Sympetrum sanguineum*.] Address: Horváth, G., Dept Biol. Physics, Eötvös Univ., Pázmány sétány 1, HU-1117 Budapest, Hungary. E-mail: gh@arago.elte.hu

**2873.** Bazyluk W. (2002): Material to the fauna of dragonflies (Odonata) in the vicinity of Siemien in the Lublin province. *Novvy Pam. Fizjogr.* 1(1): 45-52. (in Polish with English summary). [Between 1941 and 1944, the author (who died in 1988) collected dragonflies in the vicinity of Siemien (Lublin province, Poland). 39 species, including *Coenagrion armatum*, *Erythromma najas*, *E. viridulum*, *Aeshna viridis*, *A. affinis*, *Ophiogomphus cecilia*, *Epithea bimaculata*, *Leucorrhinia pectoralis*, *L. rubicunda*, and *Sympetrum depressisculum*. Pawel Buczynski wrote, that the manuscript of this paper - prepared in the 1950 for publication - was stored in a drawer. The wife of W. Buzyluk, Prof. Dr. Anna Liana, app. 50 years later prepared it for publication. P. Buczynski could check the specimens in the zoological institut of the Polish Academy of Sciences, and proved that *Symecma fusca* was misidentified: it should be *S. paedisca*.] Address: Liana, Anna, Muzeum i Instytut Zoologii PAN, ul. Wilcza 64, PL-00-679 Warszawa, Poland

**2874.** Beck, M.L.; Pruett-Jones, S. (2002): Fluctuating asymmetry, sexual selection, and survivorship in male Dark-Winged Damselflies. *Ethology* 108(9): 779-791. (in English). ["We examined fluctuating asymmetry and



morphology as they relate to reproductive success, territoriality, and relative survivorship in the dark-winged damselfly *Calopteryx maculata*. Fluctuating asymmetry was not correlated with any aspect of morphology in males, but it did predict mating status in males. Mating males showed significantly lower levels of forewing asymmetry than did non-mating males holding adjacent territories. While fluctuating asymmetry did not relate to survivorship or resource holding ability, body size did. Larger males were able to hold territories longer and lived longer than smaller individuals. We suggest that size is of greater importance in this species with regards to fitness and that fluctuating asymmetry may play a minor role by impacting short-term mating success." (Authors)] Address: not stated

**2875.** Beckemeyer, R. (2002): Dragonflies in the land of the Incas. *Argia* 13(4): 9-11. (in English). [Some impressions from a three week trip to Peru in November 2000, combining archeological, birding, and odonatological interests.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**2876.** Beckemeyer, R. (2002): Some great plains Odonata records for 2000 and 2001. *Argia* 13(4): 7-8. (in English). [New records from Kansas, Oklahoma, and Nebraska, USA.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**2877.** Beckemeyer, R.J. (2002): Odonata in the Great Plains States: Patterns of distribution and diversity. *Bull. American Odonatology* 6(3): 49-99. (in English). ["Through the March, 1999 cutoff date of this study, a total of 320 species of dragonflies and damselflies, 73% of the Nearctic fauna, had been recorded as occurring in the 13 states comprising the Great Plains of the United States. These species are listed together with the Great Plains states in which they occur and the larger biogeographic region to which they belong. A significant latitudinal gradient in species richness was found to be present in the central Great Plains, with 194 species in Texas and 55 in North Dakota. A suite of similarity and diversity measure were mapped to visually display patterns of relationships of the state faunas. This process led to the identity of four faunal groups in the central Great Plains: Texas; Kansas - Oklahoma; Nebraska - South Dakota - Colorado - Iowa; and North Dakota. In terms of Nearctic biogeographical affinities, 43% of the Great Plains odonate fauna is of eastern origin. The large number of tropical species (42) in Texas contributes 14% of the Great Plains total. Northern transcontinental, western, southwestern, transcontinental, and central groups contribute 11%, 9%, 8%, 8%, and 7%, respectively. The Great Plains is home to major faunal boundaries and regions of overlap, many occurring in the central tier of states from Oklahoma north through North Dakota. The Hicks' 1957 assertion that the 32 to 36 inch precipitation isolines correlated with the area of overlap of eastern and western species groups in Oklahoma appears to hold true for Kansas as well." (Author) The paper contains a brief historic account on dragonfly research in the Great Plains states Colorado, Iowa, Kansas, Missouri, Minnesota, Montana, North Dakota, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming. Distribution patterns of the following species are briefly discussed: *Enallagma anna* Williamson, *E. clausum*, *E. praevarum*, *Ischnura barberi*, *I. da-*

*mula*, *I. perparva*, *Argia alberta*, *A. emma*, and *A. imundum*.] Address: Beckemeyer, R.J., 957 Perry Ave, Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**2878.** Behrstock, B.; Prasad, S. (2002): Odonate species observed at Ft. Clark Springs, Brackettville, Kinney CO, TX: 7/8 Sept. 2001. *Argia* 13(4): 8-9. (in English). [USA, Texas; compilation of odonate records from several localities.] Address: Behrstock, R.A., 9707 S.Gessner #3506, Houston, TX, 77071-1032, USA. E-mail: rbehrstock@aol.com

**2879.** Beketow, M.A. (2002): Ammonia toxicity to larvae of *Erythromma najas* (Hansemann), *Lestes sponsa* (Hansemann) and *Sympetrum flaveolum* (Linnaeus) (Zygoptera: Coenagrionidae, Lestidae; Anisoptera: Libellulidae). *Odonatologica* 31(3): 297-304. (in English). ["Three different types of toxicological test were conducted, viz. the standard toxicological test at varying pH, a test with starved larvae and a test with different ionic composition of the water. For the larvae of *L. sponsa*, ammonia toxicity was examined only in the standard test at one pH value and in the test with varying ionic composition of the medium. Total ammonia was more toxic at elevated than at low pH to both *S. flaveolum* and *E. najas* larvae. In contrast, toxicity based on the un-ionized form appeared to increase with decrease in pH value. In general, larvae of all species have a high ammonia tolerance when compared to other aquatic animals. Tests with starved larvae showed that the ammonia tolerance of starved larvae of *S. flaveolum* was 3.7 times greater than that for the fed ones; for *E. najas*, this difference was only 1.2 times, explanations of this effect are discussed. Tests in varying ionic composition of the water illustrated that the absence of sodium ions accounts for a considerable increase in ammonia toxicity. It is interesting that a similar trend was found for fishes and crustaceans. Mechanistic explanations, which may differ from that for other groups, are proposed. Odonate larvae seem to be unsuitable for the bioindication of ammonia pollution." (Author)] Address: Beketow, M.A., Department of Zoology, Novosibirsk State Pedagogical University, P. O. Box 156, RUS-630048 Novosibirsk, Russia. E-mail: Mbeketov@mail.ru

**2880.** Bernard, R.; Samolag, J. (2002): *Coenagrion johanssoni* (Wallengren) in Lithuania (Zygoptera: Coenagrionidae). *Notul. odonatol.* 5(10): 117-120. (in English). [*C. johanssoni* was recorded for the second time in Lithuania (Akutė Lake, NNE of Januliskis, 55°10'59"N 25°51'43"E). The habitat is described in detail. The wind sensitivity of the species is briefly discussed, and cooccurring species including *Nehalennia speciosa* and *Leucorrhinia albifrons* are listed.] Address: Bernard, R., Department of General Zoology, Adam Mickiewicz University, Fredry 10, PL-61-702 Poznan, Poland; E-mail: rbernard@main.amu.edu.pl

**2881.** Bernard, R.; Buczynski, P.; Labeledzki, A.; Tonczyk, G. (2002): Odonata - wazki. In: Glowacinski, Z. (Ed.): Red List of threatened animals in Poland. ISBN: 83-88934-21-X.: 125-127. (in Polish with English summary). [16 of the 72 odonate species known to occur in Poland are red listed. Specialists of Sphagnum bogs and small running waters are the most endangered ones. A German translation of the paper is available from P. Buczynski or the IDF.] Address: Bernard, R., De-

partment of General Zoology, Adam Mickiewicz University, Fredry 10, PL-61-702 Poznan, Poland; E-mail: rbernard@main.amu.edu.pl

**2882.** Beutler, H.; Beutler, D. (2002): Katalog der natürlichen Lebensräume und Arten der Anhänge I und II der FFH-Richtlinie in Brandenburg. Naturschutz und Landschaftspflege in Brandenburg 11(1/2): 1-175. (in German). [This catalog of the habitats (Appendix I), the fauna and the flora (Appendix II) of the European FFH-Directive represented in the Federal State Brandenburg, Germany, compiles in a monographic style the relevant ecological information. Three odonate species of the appendix occur in Brandenburg: *Coenagrion mercuriale*, *Ophiogomphus cecilia*, and *Leucorrhinia pectoralis*. Information on current distribution, biology, fundamentals for actions plans, and monitoring are presented.] Address: Landesumweltamt Brandenburg, Abt. Naturschutz, PF 601061, D-14410 Potsdam, Germany.

**2883.** Bocanegra, O.R. (2002): First record of *Somatochlora tenebrosa* for Texas. *Argia* 13(4): 8. (in English). [Using a rifle loaded with rat shot, the author succeeded to "bring down" *Somatochlora linearis*. Once established in the 1950th (see Buchholz, K.F. (1955): *Morphologische Differenzierung bei der Rassenbildung von Anax parthenope Sélys* (Odonata, Aeshnidae). *Bonner zoologische Beiträge* 6 (1/2): 118-131 and Donnelly, T.W. (1995): *The Beatty - Donnelly southwestern expedition, 1954*. *Argia* 7(2): 15-19 ) it obviously is still state of the art to get specimens (In addition, I know four further papers with this method of dragonfly collecting). *But, S. tenebrosa* was caught using traditional methods, while the specimen was flying over a road: on June 8, 2001 this species was recorded for the first time in Texas, USA.] Address: Bocanegra, O.R., U.S.Fish and Wildlife Service, 711 Stadium Drive, Suite 252, Arlington, Texas 76011, USA

**2884.** Böhm, K. (2002): Erstfund und zugleich erster Entwicklungsnachweis von *Sympetrum meridionalis* in Nordrhein-Westfalen (Odonata: Libellulidae). *Libellula* 21(1/2): 45-47. (in German, with English summary). ["A freshly emerged female was collected near Monheim, Mettmann district, at 12 July 2000. Up to now this is, as far as known, the northernmost breeding place for this species." (Author)] Address: Böhm, K., Erich-Müller-Straße 6, D-40597 Düsseldorf, Germany

**2885.** Bönsel, A. (2002): Standortsuche und Eignungsprüfung für ein zukünftiges FFH-Monitoring der Libellen. *Naturschutzarbeit in Mecklenburg-Vorpommern* 45(1): 48-55. (in German). [The European Fauna Flora Habitat Directive determines that the development of habitats and populations of species has to be monitored. According to an assessment scheme valid in Mecklenburg-Vorpommern, Germany, potential odonate habitats of the Annex II species of this directive have been traced. Maps with records and tab. with detailed information on *Aeshna viridis*, *Leucorrhinia albifrons*, *L. caudalis*, and *L. pectoralis* are documented. In addition, *Stylurus flavipes* is proposed to be integrated into the monitoring program.] Address: Bönsel, A., Vasenbusch 15, D-18337 Gresenhorst, Germany. E-mail: andr.boensel@gmx.de

**2886.** Botman, G.; Coenen, L.; Lanciani, C.A. (2002): Parasitism of *Ischnura posita* (Odonata: Coenagrionidae) in Florida by two species of water mites. *Florida Entomologist* 85(1): 279-280. (in English). ["Two species

of water mites, tentatively identified as *Arrenurus major* and *Arrenurus americanus*, were found to parasitize the damselfly *Ischnura posita* in Florida. The 2 mites attached to different host sites: *A. major* attached to the thorax and abdominal segments 1 through 3 while *A. americanus* attached to abdominal segments 5 through 8." (Authors)] Address: Botman, G., Univ Florida, Dept Zool, Gainesville, FL 32611 USA

**2887.** Boudot, J.-P.; Jacquemin, G. (2002): Inventaire et statut des libellules de Lorraine. *Société Lorraine d'entomologie*: 68 pp. (in French). [This atlas of the Lorrainean Odonata (NE-region of France) provides detailed maps and information on 66 species known from the region. Information on maps are differed for the periods 1863-1969 and 1970-2001. Some additional species occurring close to the borders of the region or expected to be found soon are treated too. This is a highly informative atlas with a lot of original material.] Address: Société Lorraine d'Entomologie, c/o Laurent Godé, 2ter, Quai Choiseul, F-54000 Nancy, France. E-mail: laurent.gode@pnr-lorraine.com

**2888.** Brackenbury, J. (2002): Kinematics and hydrodynamics of an invertebrate undulatory swimmer: The damselfly larva. *Journal of Experimental Biology* 205(5): 627-639. (in English). ["The kinematics and hydrodynamics of free-swimming larvae of *Enallagma cyathigerum* were investigated using videography combined with a simple wake visualisation technique (tracer dyes). Damselfly larvae are undulatory swimmers with two distinct styles of movement: 'slow' swimming, in which body undulation is assisted by paddling of the legs, and 'fast' swimming, in which the legs are inactive. In both cases, the wake consists of discrete ring vortices shed from the caudal fin at the end of each half-stroke. The vortices propagate away from the mid-line, alternately to one side of the body then the other, at an angle of 67degree from dead aft. There is no aft-flowing jet such as that observed in the wakes of continuously swimming fish that use caudal fin propulsion. The estimated momentum within the vortices, and the resultant thrust on the body are in tolerable agreement with calculations based on the large-amplitude bulk momentum model of fish locomotion. However, the drag on the body is not known, so it cannot be concluded with certainty that a force balance exists. The agreement between experiment and prediction gives confidence to the idea that most, if not all, of the vorticity generated by the swimming larva is located within the observable wake elements." (Author)] Address: Brackenbury J., Department of Anatomy, University of Cambridge, Downing Street, Cambridge, CB2 3DY, UK. E-Mail: jhb1000@cam.ac.uk

**2889.** Braddy, S.J.; Briggs, D.E.G. (2002): New Lower Permian Nonmarine Arthropod Trace Fossils From New Mexico And South Africa. *Journal of Paleontology* 76(3): 546-557. (in English). ["The Lower Permian (Late Wolfcampian) marginal marine facies of the Robledo Mountains Member (Hueco Formation) of the Robledo Mountains, New Mexico, contains a diverse ichnofauna dominated by vertebrate trackways. Four new arthropod ichnotaxa are described. *Tonganoxichnus robledoensis* new ichnospecies, consists of repeated small traces comprising imprints of anteriorly directed legs, an elongate tapering abdomen, and a thin tail. *Hedriumiichnus apacheensis* new ichnogenus and ichnospecies consists of isolated small traces comprising imprints of

laterally-directed legs, a broad tapering abdomen, and a short tail. *Rotterodichnium major* new ichnospecies is a large trace with imprints of the head and thorax, a long thin abdomen and three pairs of legs, increasing in length posteriorly. *Quadriscopinchna parvia* new ichnogenus and ichnospecies consists of four diverging or sub-parallel linear or curvilinear imprints of approximately equal length. *Tonganoxichnus*, previously known from the Upper Carboniferous of eastern Kansas, is interpreted as produced by a jumping monuran (an extinct group of wingless insects). *Hedriumichnus*, known only from the Robledo Mountains, is interpreted as the resting trace of a nymph of a primitive Ephemeroptera or Plecoptera. *Rotterodichnium*, previously known from the Lower Permian of Germany, is interpreted as the resting trace of a large dragonfly-like form (Protodonata, Odonata, or Megasecoptera). *Quadriscopinchna*, previously recorded but not named, from the Lower Permian *Ecca* succession of South Africa, is interpreted as a resting trace of a crustacean. These rare traces increase our understanding of the diversity and behavior of nonmarine arthropod communities in the Lower Permian." (Author)] Address: Braddy, S., Department of Earth Sciences, University of Bristol, Queen's Road, Wills Memorial Building, Bristol, BS8 1RJ, UK. E-Mail: S.J.Braddy@bris.ac.uk

**2890.** Braune, E.; Söndgerath, D. (2002): Biodiversity of dragonflies in arid regions regarding habitat variability. *Verhandlungen der Gesellschaft für Ökologie, Cottbus 2002*: 290. (in English). [Verbatim: "We examined factors that regulate the biodiversity of dragonflies within the scope of a sub-project of BIOTA Africa. The main aim of this study is to construct models for the prediction of the dispersal of the dragonflies. The areas under investigation are the ephemeral river catchments in western Namibia. In these arid regions changes in the biodiversity of the Odonata can be expected through changes in the water budget on the local scale, as well as through largescale processes like the climate change. Both processes are influencing the habitat quality and quantity. To model the changes in the population dynamics the first step is to identify the factors which are responsible for the development of a population. Different multivariate analysis methods are used. For single species habitat suitability models are build up using logistic regression. Biotic and abiotic parameters which were recorded during a one year field period in a monitoring program throughout the western river catchments are used as input data. Additionally artificial parameters describing the structural diversity of the habitats were generated. On the (micro-) habitat scale we identified for the most common species habitat properties which favour the occurrence of the adult dragonflies (see Figure 1). These results are supported by field experiments carried out within our project. By incorporating the changes of the habitat quality, resulting in the growth or decline of local populations, the basis for the spatially explicit modelling of the population dynamics is established. In the next step models for the local population dynamics will be linked with each other through a density- and habitat quality dependent dispersal. Figure 1: Example for habitat suitability models for two Namibian dragonfly species. L.h.s.: univariate model for *Crocothemis erythraea*, r.h.s.: bivariate model for *Orthetrum chrysostigma*."] Address: Braune, E., Institut für Geoökologie, Technische Universität Braunschweig, Langer Kamp 19c, D-38106 Braunschweig, Germany. E-mail: e.braune@tu-bs.de

**2891.** Brodin, T.; Johansson, F. (2002): Effects of predator-induced thinning and activity changes on life history in a damselfly. *Oecologia* 132: 316-322. (in English). ["We investigated how the lethal and non-lethal presence and absence of a fish predator, perch (*Perca fluviatilis*), influenced behaviour, numbers emerging, size at emergence, and development rate of the damselfly *Lestes sponsa*. The experiment was carried out in outdoor artificial ponds and spanned from the egg stage to emergence of the damselflies. During the experiment food resources for the damselflies were continuously monitored. Damselflies exposed to a lethal predator showed a significantly lower activity level than those in the absence of predators or subjected to a non-lethal predator. Half-way through the larval stage the reduction in activity level was correlated with the presence of lethal predators, and at the end of the larval stage with higher zooplankton densities. Though larvae decreased activity level, size at emergence was larger and development time faster for individuals in the lethal predator treatment. Since fewer larvae emerged from that treatment we interpret the larger size at emergence to be an effect of a combination of thinning and higher zooplankton densities." (Authors)] Address: Brodin, T., Animal Ecology, Department of Ecology and Environmental Science, Umeå University, 90187 Umeå, Sweden. E-mail: tomas.brodin@eg.umu.se

**2892.** Brunke, M.; Hoffmann, A.; Pusch, M. (2002): Association between invertebrate assemblages and mesohabitats in a lowland river (Spree, Germany): A chance for predictions?. *Arch. Hydrobiol.* 154: 239-259. (in English). ["The influence of hydrological and sedimentological variables on invertebrate assemblages was investigated in the 6th order lowland river Spree (Brandenburg, Germany). The river bottom consisted of eight visually distinguishable organic and inorganic mesohabitats: Dreissena-bank, unionid mussel bed, rip-rap, coarse woody debris, alder roots, stable sand, shifting sand, and mud. The mesohabitats differed in their physical structure, substrate properties, temporal stability, flow velocity and grain size composition. Taxon richness and abundances varied markedly between mesohabitats. Ordination analyses revealed significant differences in taxonomic composition and dominance structure. Nevertheless, similarities in assemblage structure were found for (a) Dreissena-banks and unionid beds, (b) alder roots and coarse woody debris and (c) shifting sand, stable sand and mud. Thus four main habitat groups can be distinguished; mussel, rip-rap, woody, and fine sediment mesohabitats. Mussel mesohabitats, rip-rap and wood mesohabitats exhibited transitions in assemblage structure towards fine mesohabitats. In the case of mussel and wood mesohabitats, these transitions were temporal and occurred during extended periods of low flow and concomitant deposition of seston. In rip-rap these transitions were spatial and occurred when distances to fine sediment mesohabitats were small and nearbed flow velocities were low. Mesoscale predictions of assemblages for this section of river appear to be feasible when processes are taken into account that might affect transitions." (Authors) Only *Gomphus vulgatissimus* occurred exclusively in fine sediment mesohabitats, *Calopteryx* nearly exclusively in woody mesohabitats.] Address: Brunke, M., Institute of Freshwater Ecology and Inland Fisheries, Department of Lowland Rivers, Müggelseedamm 310, 12587 Berlin, Germany. E-mail: brunke@igb-berlin.de



- 2893.** Buczynski, P. (2002): Materials to the knowledge of dragonflies (Odonata) of the Lublin region. Part II. Dragonflies in the collection of the Department of Zoology of the Maria Curie-Skłodowska University in Lublin. *Wiad entomol.* 21(1): 5-10. (in Polish with English summary). [25 odonate species - resulting from collections made between 1947 and 1967 and stored in the institute's collection - are documented in detail. The majority of records results from the Lublin region (SE Poland). The most interesting species are the "thermophilous" *Sympetrum depressiusculum*, *S. fonscolombii*, *S. meridionale*, and *S. striolatum*. It is supposed that these species were rare in this period, while they belong today to the more common element of the dragonfly fauna, indicating an increasing global warming.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl
- 2894.** Buczynski, P.; Zawal, A.; Filipiuk, E. (2002): Neue Nachweise von *Orthetrum albistylum* in Nordpolen: Erweitert sich sein Verbreitungsgebiet in Mitteleuropa? (Odonata: Libellulidae). *Libellula* 21(1/2): 15-24. (in German, with English summary). ["Within Central Europe, the range of *O. albistylum* hitherto was confined to the southern parts. However, in the last few years eight localities were found in Poland far beyond the northern border of its former distribution area. Two new records of the species are provided from north-western Poland. Possibly this expansion results from the exceptionally favourable climatic conditions during 1998-2000 and is only temporary." (Authors)] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl
- 2895.** Bulankova, E.; Halgos, J.; Krno, I. (2002): The influence of the Turcek dam on the macrozoobenthos of the Turiec River basin. *Verhandlungen der Gesellschaft für Ökologie, Cottbus 2002*: 270. (in English). ["Turiec Wetland is part of the Central-Slovakian Turiec River ecosystem, which is internationally important (Ramsar, Emerald localities). Long-term hydrobiological research of the Turiec River basin [...] point to the high biological value of this region. 792 taxa of benthos have been recorded, some of them are endangered: [...] *Ophiogomphus cecilia* (Odonata) [...]. We evaluated the influence of a submontane water supply dam (build in 1993) in the vicinity of Turcek village on the structure of macrozoobenthos of the Turiec River. The dam got a barrier for epirhithral species in the upper part of the river, in the middle part occurred cumulative organic pollution and diversity of macrozoobenthos decreased. Down-stream the dam the river has a more natural character due to underground water supply in Mala Fatra Mts. The construction and present functioning of a water supply dam has adverse downstream effects, which reflects in spreading of eurytherm, mesotroph, betameosaprob, semirheophil species of macrozoobenthos and in increasing of filtrators. Some arrangements were suggested to improve this situation. [...]"] (Authors)] Address: Bulankova, Eva, Institute of Ecology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B-II, SK-84215 Bratislava., Slovakia. E-mail: Bulankova@nic.fns.uniba.sk
- 2896.** Burcher, C.L.; Smock, L.A. (2002): Habitat distribution, dietary composition and life history characteristics of odonate nymphs in a blackwater coastal plain stream. *American Midland Naturalist* 148(1): 75-89. (in English). ["The ecology and life histories of odonates were studied in a headwater, sand-bottomed coastal plain stream in Virginia. Quantitative sampling of odonates in sand and silt sediments, on submerged snags and in debris dams was conducted monthly for 13 mo. Six species of odonates were common in the stream. *Calopteryx maculata* had a univoltine life history, whereas *Boyeria vinosa*, *Cordulegaster maculata*, *Gomphus cavillaris*, *Hagenius brevistylus*, and *Progomphus obscurus* were semivoltine. The odonates were most abundant in debris dams, less abundant in silt and sand sediments and least abundant on snags. Habitat-specific production of odonates was 1.3 g m<sup>-2</sup> y<sup>-1</sup> in debris dams and 0.1-0.3 g m<sup>-2</sup> y<sup>-1</sup> in the sand, silt and snag habitats. The production to biomass ratio (P/B) for *Calopteryx* was 5.9, whereas ratios for semivoltine species ranged from 2.0-4.0. Analysis of overlap in the use of habitat, food and time showed that greatest ecological separation of the species was in their different use of habitat. *B. vinosa* and *C. maculata* primarily inhabited debris dams, *H. brevistylus* and *G. cavillaris* were most abundant in silt and *P. obscurus* was found almost exclusively in sand. *Cordulegaster maculata* occurred throughout the stream except on snags. Narrow niche breadths for *B. vinosa*, *C. maculata* and *P. obscurus* based on their use of habitat suggest high fidelity of these species to one habitat, whereas *C. maculata*, with the broadest habitat niche breadth, was a habitat generalist. There was little difference among the species in prey items. Trophic niche breadths of all species were broad, all species feeding on a wide variety of invertebrates, in particular Chironomidae, Ephemeroptera and Plecoptera. Little ecological separation of the species occurred based on their use of time, all species occurring in the stream throughout the year with little staggering of life history events or growth patterns. Seasonal patterns of changing resource availability and the dynamic nature of the stream environment likely are important in regulating the distribution, abundance and interactions of the odonate community in this stream." (Authors)] Address: Smock, L.A., Department of Biology, Virginia Commonwealth University, Richmond, Virginia, U.S.A. 23284-2012.
- 2897.** Buskirk, J. van (2002): A comparative test of the adaptive plasticity hypothesis: Relationships between habitat and phenotype in anuran larvae. *American Naturalist* 160(1): 87-102. (in English). ["The hypothesis that phenotypic plasticity is maintained by divergent natural selection acting across different environments predicts that populations and species exposed to highly variable environments will express high levels of plasticity. I tested this prediction by measuring the behavioral and morphological responses to aeshnid dragonfly larvae of 16 tadpole species and asking whether predator-induced plasticity is greater in species that experience more variable densities of predators in nature. Tadpole phenotypes were measured in a series of similar experiments in outdoor artificial ponds carried out over a 9-yr period. I quantified tadpole habitats by soliciting evaluations by seven to 36 experienced field observers for each species. There were large differences among species in phenotype, mostly in agreement with earlier descriptions. Nearly all species responded to dragonflies by decreasing activity and body length relative to overall body size and by increasing relative tail fin depth, although the magnitude of the responses differed among species. There was a significant positive

phylogenetic correlation between morphological plasticity and variability in exposure to predators, thus upholding the adaptive hypothesis. The correlation between behavioral responses and habitat variability was not significant, and there was little relationship between behavioral and morphological plasticity, raising the possibility that behavioral responses evolve under different scales of environmental variation than morphological responses." (Author)] Address: Buskirk, J. van, Institute of Zoology, University of Zürich, CH-8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

**2898.** Buskirk, J. van; Müller, C.; Portmann, A.; Surbeck, M. (2002): A test of the risk allocation hypothesis: Tadpole responses to temporal change in predation risk. *Behavioral Ecology* 13(4): 526-530. (in English). ["The risk allocation hypothesis predicts that temporal variation in predation risk can influence how animals allocate feeding behavior among situations that differ in danger. We tested the risk allocation model with tadpoles of the frog *Rana lessonae*, which satisfy the main assumptions of this model because they must feed to reach metamorphosis within a single season, their behavioral defense against predators is costly, and they can respond to changes in risk integrated over time. Our experiment switched tadpoles between artificial ponds with different numbers of caged dragonfly larvae and held them at high and low risk for different portions of their lives. Tadpoles responded strongly to predators, but they did not obey the risk allocation hypothesis: as the high-risk environment became more dangerous, there was no tendency for tadpoles to allocate more feeding to the low-risk environment, and as tadpoles spent more time at risk, they did not increase feeding in both environments. Our results suggest that the model might be more applicable when the time spent under high predation risk is large relative to the time required to collect resources." (Authors)] Address: Buskirk, J. van, Institute of Zoology, University of Zürich, CH-8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

**2899.** Buskirk, J. van; Arioli, M. (2002): Dos age response of an induced defense: How sensitive are tadpoles to predation risk?. *Ecology* 83(6): 1580-1585. (in English). ["Models of behavior and life history evolution under predation risk often assume that animals can detect and respond to subtle temporal, and spatial variation in mortality risk, but there is little evidence supporting this assumption. We measured phenotypic responses of *Rana lessonae* tadpoles to variation in apparent predation risk signaled by different numbers of *Aeshna cyanea* dragonfly larvae consuming different quantities of tadpoles. The experiment took place in 80-L artificial ponds, and the predators were confined within cages so that they could not capture the experimental animals. There was good support for continuous dosage response curves for most behavioral and morphological traits, which indicates sensitivity to graded risk and therefore supports the assumptions of many models. Behavioral traits were most responsive to the number of tadpoles killed by the predators, whereas morphological traits responded to the number of dragonflies independent of the predators' diet. The results imply that behavioral and morphological responses can be triggered by different cues, and suggest that increasing investment in defensive traits entails increasing fitness costs." (Authors)] Address: Buskirk, J. van, Institute of Zoology, University of Zürich, CH-8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

**2900.** Butler, S.G. (2002): The larva of *Macromia euterpe* Laidlaw, 1915 (Anisoptera: Macromiidae). *Odonatologica* 31(4): 383-388. (in English). [An exuvia of *M. euterpe* is described, illustrated and compared with *M. moorei fumata* Krüger and *M. westwoodi* Selys. In addition, larval head and protothorax of *Macromia amphigena* Selys, 1871 (Japan), *Macromia flavocolorata* Fraser, 1922 (Nepal), and *Phyllomacromia trifasciata* (Rambur, 1842) (Madagascar) are illustrated.] Address: Butler S.G., Red Willow, All Stretton, Shropshire SY6 GHN, United Kingdom

**2901.** Cannings, R.A. (2002): Introducing the dragonflies of British Columbia and the Yukon. Royal British Columbia Museum, Victoria, B.C. ISBN 0-7726-4637-6 (paper): 96 pp.. (in English). [This book introduces into the odonate fauna of two Canadian provinces. It is lavishly illustrated. With one exception (*Somatochlora septentrionalis*), all 88 species are documented with color photographs. Rob Cannings has wisely included line drawings of structural details for some of the more difficult genera. After introducing into Odonata, and the regional odonate habitats, the species are briefly described and compared it with closely related ones. Additional information refer to range, and "field notes" include habitat and flight period. This is a really sophisticated book, and its low price makes it very attractive. If I should visit B.C. for odonatological reasons, I would not miss any information! (Martin Schorr)] Address: The book (CAN Dollar 9.95.) can be ordered from: Royal Museum Shop, Royal British Columbia Museum, 675 Belleville Street, Victoria, B.C., V8W 9W2, Canada

**2902.** Carle, F.L.; Kjer, K.M. (2002): Phylogeny of *Libellula* Linnaeus (Odonata: Insecta). *Zootaxa* 87: 1-18. (in English). ["Phylogenetic analysis was performed on a set of 242 morphological characters. The taxon sample included 31 *Libellula*, and representative species from selected libelluline tribes, from all libellulid subfamilies, from all libelluloid families, from all anisopteran superfamilies, and *Epiophlebia*. *Corduliinae* was shown to be paraphyletic even among genera characterized by a well developed anal loop bisector. *Sympetrini* was found to be polyphyletic with *Crocothemis* the sister group to *Libellulini*. The traditional placement of *Trameini*, far from *Libellulini* is in doubt, because it is here placed as the sister group to *Crocothemis* + *Libellulini*. Kennedy's phylogeny of *Libellula* was largely corroborated, with the following exceptions: the subgenera *Libellula*, *Eolibellula*, and *Syntetrum* form a monophyletic group which is the sister group to a clade including *Bellonia*, *Holotania*, *Neotetrum*, and *Eotainia* subgenus nov. [type species *Mesothemis composita* Hagen]; and *Eurothemis* is determined to be the sister group of *Ladona* instead of *Neotetrum*. In addition we confirm *Bellonia* to be monophyletic, and find *Platetrum* + *Platthemis* to form a monophyletic group, sister to *Ladona* + *Eurothemis*; these four subgenera together form the sister group to *Libellula sensu stricto* (s.s.)." (Authors)] Address: Carle, F.L.; Kjer, K.M., Dept of Entomology, Cook College Rutgers, The State University of New Jersey, 93 Lipr Brunswick, NJ 08901, USA. E-mail: carle@aesop.rutgers.edu

**2903.** Carpenter, N.M.; Casazza M.L.; Wylie, G.D. (2002): *Rana catesbeiana* (bullfrog). Diet. *Herpetological Review* 33(2): 130. (in English). [Diet analysis of bullfrogs from Colusa National Wildlife Refuge, Califor-

nia, USA] Address: Carpenter, N. M., U.S. Fish and Wildlife Service, 752 County Road 99W, Willows, CA, 95966, USA. E-Mail: mikecarpenter@r1fws.gov

**2904.** Catling, P.M.; Brownell, V.R. (2002): Large numbers of *Aeshna interrupta* in southeastern Saskatchewan. *Argia* 13(4): 7. (in English). [In July 2001, thousands of *A. interrupta lineata* were seen flying over the (agricultural) prairie landscape while driving along the trans-Canada highway from Ottawa in eastern Ontario to coastal British Columbia. This species "must have a very significant influence on the prairie ecosystem as both predator and prey." From the view of impacts of roads on ecosystems resp. Odonata, some interesting details of road kills by vehicles are outlined.] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, Canada. E-mail: brownell@achilles.net

**2905.** Cauchie, H. (2002): Chitin production by arthropods in the hydrosphere. *Hydrobiologia* 470(1-3) : 63-95. (in English). ["Chitin is widely distributed in nature and its annual production is thought to be huge. However, the chitin production has been rarely estimated in aquatic ecosystems, despite the growing economic interest in this polymer. Arthropods are one of the main chitin producers in the hydrosphere and a correct evaluation of the chitin production by these organisms in the different marine and freshwater ecosystems is of prime interest to understand their importance in the biogeochemical cycles of carbon and nitrogen. Such evaluation is also worth considering to achieve a rational exploitation of crustaceans which are currently the major source of chitin for the industry. Annual chitin production of crustaceans and insects in aquatic ecosystems was estimated on the basis of annual tissue production estimates and body chitin content measurements. About 800 annual tissue production estimates were collected from the literature. Estimates mainly concerned continental fresh waters and neritic ecosystems. Data were almost inexistent for athalassohaline and oceanic ecosystems. On the whole, 60% of the production estimates fell between 0.1 and 10.0 g dry weight m<sup>2</sup> super(-2) yr super(-1). Published chitin levels in crustaceans and insects ranged from 3 to 16% of the whole body dry weight. Data were, however, lacking for some major groups such as trichopterans or amphipods. Aquatic insects and crustaceans were therefore collected and assayed for chitin using a highly specific enzymatic method. The chitin content of the collected insects (Coleoptera, Diptera, Ephemeroptera, Odonata, Plecoptera, Trichoptera) varied from 3 to 10% of the whole body dry weight; that of the collected crustaceans (Amphipoda, Branchiopoda, Copepoda) from 2.5 to 8.5% of the whole body dry weight. Total annual chitin production by arthropods had been estimated to 28 x 10<sup>6</sup> T chitin yr super(-1) for the freshwater ecosystems, to 6 x 10<sup>6</sup> T chitin yr super(-1) for athalassohaline ecosystems and to 1328 x 10<sup>6</sup> T chitin yr super(-1) for marine ecosystems. The importance of the chitin production corresponding to the formation of exuviae and peritrophic membranes in arthropods and the chitin production by non-arthropod organisms in the chitin budget of aquatic ecosystems was highlighted and discussed." (Author)] Address: Cauchie, H.-M., CREBS, CRP-Gabriel Lippmann, 162a avenue de la Faiencerie, L-1511, Luxembourg, Luxembourg; E-Mail: cauchie@crp.gl.lu

**2906.** Cham, S. (2002): Mate guarding behaviour during intense competition for females in the Common Blue Damselfly *Enallagma cyathigerum* (Charpentier). *J. Br. Dragonfly Society* 18(1/2): 46-48. (in English). ["These observations demonstrate that single males of *E. cyathigerum* will harass tandem pairs as they approach the oviposition site and also when oviposition commences. When densities are high it is in the interest of the males to stay in tandem with the female for as long as possible. This increases his chances of guarding the female until she has laid the eggs that he is likely to have fertilized. This guarding behaviour is imperative at high densities as aggressor males appear to go to great lengths to 'win over' a female and are prepared to submerge in order to achieve tandem." (Author)] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com

**2907.** Cham, S. (2002): Review: Dragonflies of the World.. *Atropos* 16: 74. (in English). [Jill Silsby's fine book on the Odonata of the world is reviewed..] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com

**2908.** Clausnitzer, V. (2002): Dragonflies of East Africa. *IDF-Report* 4(1): 11-17. (in English). [Between 1998 and 2000, the IDF supported three studies of V. Clausnitzer on East African Odonata, which include i) the preparation of an identification key, ii) inventories of different areas, iii) collection of ecological data, iv) providing information for and capacity building within the countries. This report gives an overview of what has been done and what research will be done on East African dragonflies. Here scientific results are only mentioned briefly; some of the results have been presented in publications or are in preparation for publication.] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de

**2909.** Conrad, K.F.; Willson, K.H.; Whitfield, K.; Harvey, I.F.; Thomas, C.J.; Sherratt, T.N. (2002): Characteristics of dispersing *Ischnura elegans* and *Coenagrion puella* (Odonata): Age, sex, size, morph and ectoparasitism. *Ecography* 25(4): 439-445. (in English). ["In this study we assessed whether individuals of the damselfly species *Ischnura elegans* and *Coenagrion puella* that moved between ponds differed in their mean characteristics from individuals that did not move. Overall, the sex (female) and species (*C. puella*) that spent the most time away from the breeding site was more likely to move between ponds. *Ischnura elegans* males that dispersed had significantly longer forewings than males that did not, while male *C. puella* parasitised by water mites were more likely to disperse than unparasitised males. There was no evidence for differences in dispersal rates among the female colour forms of either *I. elegans* or *C. puella*. In general, the differences in dispersal characteristics between sexes and species could be explained by underlying variation in activity and mobility. The majority of dispersal between breeding sites by *C. puella* and *I. elegans* did not appear to be directed, but probably arose from chance movements occasionally taking individuals to a different pond from which they emerged." (Authors)] Address: Sherratt, T.N., Department of Biological Sciences, University of Durham, South Road, Durham, DH1 3LE, UK. E-mail: T.N.Sheratt@durham.ac.uk



- 2910.** Corbet, P.S.; Chowdhury, H. (2002): Voltinism of the Common Blue Damselfly *Enallagma cyathigerum* (Charpentier) in a Scottish loch: a preliminary study. *J. Br. Dragonfly Society* 18(1/2): 23-39. (in English). ["During 1986-1987 a larval population of *E. cyathigerum* was sampled repeatedly from a *Littorella* sward near the margin of a small Scottish loch (Rohallion Loch) to determine the species' voltinism and to characterize ontogenetic changes in external morphology. Size-overlap between hatching cohorts made it difficult to trace cohort development but results support the inference that most larvae were developing as semivoltine summer species, spending their second (last) winter in stadia F-I (mainly) and F-0, while a few larvae showed the potential to complete development in either one or three years. Extrapolation backwards from the last three stadia revealed that larvae completing development passed through about 15 stadia (including the prolarva). Regular, heavy stocking of Rohallion Loch with insectivorous fish (including trout) invited comparison with observations by Macan in a tarn in the Lake District with attributes, including aquatic macrophytes and a predominantly semivoltine population of *E. cyathigerum* occupying *Littorella*, resembling those of Rohallion Loch. In Rohallion Loch, larvae of *E. cyathigerum*, though known from research in North America to be vulnerable to predation by fish, were maintaining dense populations in the presence of fish, probably by obtaining refuge in *Littorella* swards. We emphasize the need to discover secure morphological characters for distinguishing small larvae of *E. cyathigerum* from those of other coenagrionids." (Authors)] Address: Corbet, P.S., Crean Mill, Crean, St Buryan, Cornwall, TR19 6HA, UK. E-mail: pscorbet@creanmill.u-net.com
- 2911.** Cordoba-Aguilar, A. (2002): Wing pigmentation in territorial male damselflies, *Calopteryx haemorrhoidalis*: a possible relation to sexual selection. *Animal Behaviour* 63(4): 759-766. (in English). ["One striking characteristic in adult males of some odonate species is the presence of wing pigmentation. In *Calopteryx* species, males show a series of pre- and postcopulatory behavioural displays during which they face females while showing their pigmented wings. One hypothesis to explain the precopulatory flying displays and the associated wing pigmentation is that they may serve a sexual selection function. I investigated this in the territorial damselfly *Calopteryx haemorrhoidalis*. Males of this species defend aquatic substrates that females use for oviposition. Observational evidence indicated that males with a higher proportion of wing pigmentation were more likely to defend a territory, obtained more matings, had fewer gut parasites, survived in the study site and stayed in territories for longer. Experimental evidence suggested that the relationship mating success and wing pigmentation still held when controlling for the size of the substrate defended by territorial males. Similar to other studies in the *Calopterygidae*, these results suggest that wing pigmentation may be favoured by sexual selection. I discuss, however, whether an alternative function for male copulatory courtship displays and wing pigmentation, as sexual and/or species recognition, may also explain the evolution of these traits." (Author)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh. reduaeh.mx
- 2912.** Craves, J. (2002): Cuba trip report. *Argia* 14(2): 6-7. (in English). [The paper reports some late February 2002 records from Cuba. Special emphasis is given to *Crocothemis servillia*, and activities to control the mosquito-borne dengue fever virus by eliminating standing waters and spraying diesel on water surfaces.] Address: Craves, Julie, Rouge River Bird Observatory, University of Michigan-Dearborn, Dearborn, MI 48128, USA
- 2913.** Cross, C.L.; Gerstenberger, S.L. (2002): *Rana catesbeiana* (American bullfrog). *Diet. Herpetological Review* 33(2): 129-130. (in English). [Diet of bullfrog from Nevada, USA] Address: Cross, C. L. ; Gerstenberger, Shawn L., Landscape Ecology Branch, U.S. EPA, 944 East Harmon Avenue, Las Vegas, NV, 89119, USA. E-Mail: cross.chad@epa.gov, sgersten@ccmail.nevada.edu
- 2914.** Crowley, P.H.; Johnsson, F. (2002): Sexual dimorphism in Odonata: age, size, and sex ratio at emergence. *Oikos* 96(2): 364-378. (in English). ["Males and females of many organisms differ in important life-history and behavioral characters. Following its recent optimization analysis of sexually dimorphic life histories, we employed an odonate-like parameter set to identify patterns of life history and behavior to be expected in an odonate population. The default parameter magnitudes generated a smaller body size and shorter development time for males than for females, which resulted in a male-biased sex ratio. Whether population growth as density dependent or density independent, and whether development time was fixed or flexible had major impacts on life-history features. The model generated five general production, for odonate systems. (1) For species with fixed development times, males and females should differ more in activity level, growth and mortality rates than for species, with flexible life cycles. (2) In species with fixed development times population at high latitude or high altitude should be more active, emerge and reproduce at smaller size and have a more male-biased sex ratio than low latitude and low altitude populations. (3) In density-dependent populations, with density dependence mediated by activity-dependent mortality higher predation rates should increase activity levels and reduce development time in species with flexible development times. (4) For species with flexible development times, in strongly density-dependent population, with density dependence mediated by mortality, activity levels should decrease and development times should increase at high prep.abundance. (5) Males should be larger at emergence relative to female, and the sex ratio at emergence should be more female-biased in territorial than in non-territorial species. Existing empirical evidence concerning these predictions is generally sparse and equivocal focused tests are clearly needed." (Authors)] Address: Crowley, P.H., Umea Univ, Dept Ecol & Environm Sci Anim Ecol, SE-90187 Umea, Sweden
- 2915.** Crowley, P.H.; Johansson, F. (2002): Sexual dimorphism in Odonata: age, size, and sex ratio at emergence. *Oikos* 96(2): 364-378. (in English). ["Males and females of many organisms differ in important life-history and behavioral characters. Following a recent optimization analysis of sexually dimorphic life histories, we employed an odonate-like parameter set to identify patterns of life history and behavior to be expected in an odonate population. The default parameter magnitudes

des generated a smaller body size and shorter development time for males than for females, which resulted in a male-biased sex ratio. Whether population growth was density dependent or density independent, and whether development time was fixed or flexible had major impacts on life-history features. The model generated five general predictions for odonate systems. (1) For species with fixed development times, males and females should differ more in activity level, growth and mortality rates than for species with flexible life cycles. (2) In species with fixed development times, populations at high latitude or high altitude should be more active, emerge and reproduce at smaller size and have a more male-biased sex ratio than low latitude and low altitude populations. (3) In density-dependent populations, with density dependence mediated by activity-dependent mortality, higher predation rates should increase activity levels and reduce development time in species with flexible development times. (4) For species with flexible development times, in strongly density-dependent populations with density dependence mediated by mortality, activity levels should decrease and development times should increase at high prey abundance. (5) Males should be larger at emergence relative to females, and the sex ratio at emergence should be more female-biased in territorial than in non-territorial species. Existing empirical evidence concerning these predictions is generally sparse and equivocal; focused tests are clearly needed." (Authors)] Address: Johansson, F., Department of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Limed, Sweden. E-mail: frank.johansson@eg.umu.se

**2916.** Cummins, S.; O'Halloran, J. (2002): An assessment of the diet of nestling Stonechats *Saxicola torquata* using compositional analysis. *Bird Study* 49: 139-145. (in English). [Ireland; Odonata play a minor role in the diet of Stonechat nestlings.] Address: O'Halloran, J., Department of Zoology and Animal Ecology, University College Cork, Ireland. E-mail: j.ohalloran@ucc.ie

**2917.** d'Aguilar, J. (2002): Les descriptions originales des odonates d'Europe. 9. Latreille, Pierre-André (1762 - 1833). *Martinia* 18(2): 69-75. (in French with English summary). [Two of Latreille's works are related to Odonata. They include the description of *Aeshna mixta* and the designation of *virgo* as the type-species of the genus *Agrion*.] Address: d'Aguilar, J., 7, rue Adrien Lejeune, F-93170 Bagnolet, France

**2918.** d'Antonio, C.; Vegliante, F. (2002): *Derivatio nominis libellularum europaeorum*. <http://www.mimiko.it/rubriche/entomolog/doc/Derivatio.htm>; 31.7.2002: (in Italian, with English summary). [The etymology of 197 European dragonfly names is outlined.] Address: D'Antonio, C., Via A. Falcone 386/b, I-80127 Napoli, Italy. E-mail: constantino.d@tin.it

**2919.** Davies, D.A.L. (2002): The odonate fauna of new Caledonia, including the descriptions of a new species and a new subspecies. *Odonatologica* 31(3): 229-251. (in English). ["An updated list is provided of the 55 species known to occur in New Caledonia, with some behavioural and distribution data, and with information on possible origin of the species which found and colonized the island. The new taxa described are: *Adversaeschna brevistyla caledonica* ssp. n. (holotype

male: New Caledonia, Yate-Goro Rd, 22-11-1983), and *Synthemis pamela* sp. n. (holotype male: New Caledonia, Mt Koghis, 9-V-1983). Also described are the previously unknown male *Metaphya elongata* Campion and the previously unknown female *Synthemis serendipita* Winstanley. All type specimens are deposited at CUMZ, Cambridge, UK." (Author)] Address: Davies, D.A.L., 23 Cedar Court, Cambridge CB2 2QJ, UK

**2920.** De Marco, P.; Latini, A.O.; Ribero, P.H.E. (2002): Behavioural ecology of *Erythemis plebeja* (Burmeister) at a small pond in southeastern Brazil (Anisoptera: Libellulidae). *Odonatologica* 31(3): 305-312. (in English). [The time-budget of *E. plebeja* is analyzed, and its reproductive behaviour at a small pond is described. The species is classified as a percher; large perchers are usually more aggressive toward conspecifics. *E. plebeja* males were usually observed simulating oviposition in the areas they previously defended, and evolutionary aspects of this behaviour are discussed.] Address: De Marco, P., Laboratório de Ecologia Quantitativa, Departamento de Biologia Geral, Universidade Federal de Vicosa, BR-36571-000 Viçosa, MG, Brazil. E-mail: pdemarco@ufv.br

**2921.** De Marmels, J. (2002): Phylogenetic relationships of *Priscagrion* Zhou & Wilson, 2001, with a description of *Teinopodagrion croizati* spec. nov. from Ecuador (Zygoptera: Megapodagrionidae). *Odonatologica* 31(4): 389-394. (in English). ["The generic characters of *Priscagrion* Zhou & Wilson, 2001 are reviewed. It is shown that this genus is closely related with the Australo-Papuan 'Argiolestinae' and with the South American 'Megapodagrion-complex'. Hence, a Pacific origin for the whole group seems probable. *Teinopodagrion croizati* sp. n. (holotype male: Ecuador, Pichincha prov., 7.3 km W of Alluriquin, at Hotel Tinalandia, 20-VII-1977; deposited at MIZA, Maracay) is described and illustrated, and its position within the genus is outlined." (Author)] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com

**2922.** Deliry, C. (2002): Nouveaux articles, études ou notes concernant les Libellules dans la région Rhône-Alpes-Dauphiné. *Sympétrum piémontais* 48: 12-15. (in French). [Bibliography of odonatological papers referring to the region Rhône-Alpes-Dauphiné, France, and the period 1997-2000.] Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France

**2923.** Dijkstra, K.-D.; Kalkman, V.; Ketelaar, R.; Weide, M. van der (2002): *De Nederlandse Libellen* (Odonata). *Nederlandse Fauna* 4. ISBN 90-5011-154-8: 440 pp. (in Dutch with English summaries). [Under the auspices of the Nationaal Natuurhistorisch Museum Naturalis, Leiden, the Koninklijke Nederlandse Natuurhistorische Vereniging, Utrecht, and the European Invertebrate Survey, Leiden, and in cooperation with numerous amateur odonatologists, the authors here present an extraordinarily fascinating book on the Netherlands Odonata. It is a heavy weighting book in every sense. Information is presented in 15 chapters, an appendix lists the names of the contributors, and contains the index and a regional gazetteer. Chap. 1 introduces into Dutch dragonfly research and outlines the management to compile the tremendous database which is the fundament of the dot maps. Chap. 2 discusses

aspects of morphology in relation to the life history of Odonata. Excellent illustrations help to understand the Dutch written texts (here and in the following chapters!). Chap. 3 is dedicated to phenological aspects, which means that the different stades (egg, larvae, imago) are discussed with emphasize on the timing of the life cycle of dragonflies. Chap. 4 outlines life history aspects and behaviour of the Odonata in relation to their environment (landscape, weather, prey, enemies). I want to stress the (informative) quality of some most intrusive colour photos of "beasts" preying on Odonata. Chap. 5 is an introduction into evolution and phylogeny of Odonata, it also presents a map of regional diversity on a global scale. The focus is set on the (global) distribution of the European Odonata families. This chapter also provides the folk names of the Odonata in the Netherlands, and explains the (Latin / Greek) nomenclature. Chap. 6 gives a detailed and well illustrated introduction in the identification of Odonata, and provides the identification keys for the adults. Some of the illustrations belong definitely to the best I have seen for European Odonata. Chap. 7 describes in detail the habitats of the species, and maps the potential distribution of special habitats in the Netherlands, which likewise limits the potential distribution of specialised species. Changes (population development trends) in the dragonfly fauna are dealt with in Chap. 8. Natural and anthropological factors which cause the species turn over are discussed. Aspects of conservation and management of species and habitats are treated in Chap. 9. It details on the Red list and results of the monitoring scheme as well as on conservation measures. Chap. 10 outlines details of data collection and validation of the data collected in the framework of the mapping scheme. The core of the book is Chap. 11; each of the 70 species observed in The Netherlands is treated monographically: A more general introduction is followed by a detailed description of the habitat, the life history (egg, larvae, imago, phenology, dispersal potential, cooccurring species), areal, distribution in the Netherlands, conservation measures, and an English summary. Graphs (mostly maps) demonstrate the distribution in different periods and in western Europe, the flight period and a tab. with the cooccurring species (dominances). The quality of the colour photos is impressive, and definitely one of the most amazing high lights of the book are some water colour paintings showing in some cases the species damaged or in more than unfavourable situations. In most cases, these pictures demonstrate simply the beauty of our favorite insects. Compliments to the illustrators! Chap. 12 is devoted to the study of dragonflies. Chap. 13 contains a glossar, and Chap. 14 an extensive bibliography. Chap. 15 summarizes the previous chapters briefly in English. The books price is Euro 74,50 + handling (app. 16,- Euro). This looks much, but not too much for this book! The past two years have produced some remarkable books on dragonflies, may be that the book on the Netherlands dragonflies is the most impressive of all of them. This book may not be missing in any odonatological library. (Martin Schorr)] Address: Publisher: KNNV Publishing House, PO Box 19320, NL-3501 DH Utrecht, The Netherlands. www.knnvuitgeverij.nl

**2924.** Dijkstra, K.-D. (2002): The identity of the West African zygopterans *Pseudagrion emarginatum* and *P. camerunense* (Odonata: Coenagrionidae). *International Journal of Odonatology* 5(2): 105-110. (in English). ["*Pseudagrion emarginatum* is removed from the syno-

nymy of *P. melanicterum*. The following synonymies are established: *P. coeruleiceps* of *P. emarginatum* and *P. angelicum* of *P. camerunense*. The latter, formerly known as *Enallagma camerunense*, should be removed from the list of threatened African Odonata." (Author)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**2925.** Dommange, J.-L. (2002): Protocole de l'inventaire cartographique des odonates de France (Programme INVOD). *Muséum national d'Histoire Naturelle & Société française d'odonatologie*: 64 pp. (in French). [Handbook and mapping instructions for the French Odonata survey.] Address: Dommange, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**2926.** Donnelly, T.W. (2002): Dot map project - patterns of diversity are emerging. *Argia* 14(2): 13-16. (in English). [This is a status quo report on the odonate dot map project which currently covers nearly 109000 species/county records.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**2927.** Donnelly, T.W. (2002): Gorilla my dreams - Uganda revisited. *Argia* 14(2): 7-10. (in English). [This report on an excursion to Uganda, Africa outlines records and additional information on habitats and habits of some interesting species as *Paragomphus viridior*, *Neodythemis fitzgeraldi*, *Brachythemis leucoosticta*, and *Ceragrion bidentatum*. A collection of 88 species was brought together.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**2928.** Donnelly, T.W. (2002): Odes in a cold climate - the DSA Arkansas outing. *Argia* 14(2): 4-5. (in English). [Collecting results from Glenwood, Arkansas, USA (18-19. May 2002) are briefly outlined. Due to insufficient weather conditions, only few species could be traced. Microhabitat use of *Epiheca cynosura* and *E. costalis* is briefly discussed.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**2929.** Donnelly, T.W. (2002): Some names for "Dragonfly". *Argia* 14(2): 16-17. (in English). [Common names of Odonata in Birma and Uganda are communicated.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**2930.** Eda, S. (2002): Unusually early occurrence of *Aeshna mixta soneharai* Asahina. *Tombo* 44 : 11. (in English with Japanese summary). [On 8 July 2002, a teneral female of *A. mixta soneharai* was captured at the Sunahara-ike pond, Ueda city, Nagano Pref., Japan. This is about one month earlier than in the of past years.] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**2931.** Editorial board (2002): Table of the first and last records of dragonflies in Hokkaido (3). *Bulletin of The Hokkaido Odonatological Society* 14: 21-23. (in Japanese). [Tab. with phenological data from Hokkaido, Japan.] Address: Hiratsuka, K., 2-20-113, Honcho 2 jo-9, Higashi-ku, Sapporo City, 065-0042, Japan



**2932.** Editorial board (2002): Table of the regional distribution of Odonata by shicho in Hokkaido (15). Bulletin of The Hokkaido Odonatological Society 14: 24-26. (in Japanese). Address: Hiratsuka, K., 2-20-113, Honcho 2 jo-9, Higashi-ku, Sapporo City, 065-0042, Japan

**2933.** Ellenrieder, N. von (2002): A phylogenetic analysis of the extant Aeshnidae (Odonata: Anisoptera). Systematic Entomology 27: 437-467. (in English). ["A cladistic analysis of the world Aeshnidae is presented, based on fifty-eight characters of adult and larval anatomy. The ingroup taxa include all the extant genera of Aeshnidae, and the austropetaliid genera Phyllopetalia and Hypopetalia were chosen as the outgroup. The strict consensus tree obtained after successive weighting shows that the subgroups defined traditionally for Aeshnidae are paraphyletic or polyphyletic. The previous reclassification derived from analyses based on wing venation is supported in terms of the monophyly of Aeshnidae, Gomphaeschninae and its sister group comprising the remaining Aeshnidae. Gomphaeschninae is confirmed as sister group of the remaining Aeshnidae (= Aeshnodea Bechly). The sister-group relationships between Gomphaeschninae+Sarasaeschna and Linaeschna+Oligoaeschna are corroborated. Within Aeshnodea, three monophyletic groups emerged: Boyeria + (Petaliaeschna+ (Limnetron+Gynacanthaeschna+Periaeschna)) + ((Cephaloeschna+Caliaeschna)+(Allopetalia (Notoaeschna+Spinaeschna))); Dendroaeschna+(Ephiaeschna+ (Aeschnophlebia+ (Nasiaeschna+ (Tetracanthagyna+Brachytron))); and Polycanthagyna+ (Basiaeschna+ (Amphiaeschna+ (Indaeschna+ (Oploniaeschna+ (Racenaeschna+Plattycantha+Agyrtacantha+Triacanthagyna+ (Subaeschna+ Austrogynacantha+Gynacantha) + (Heliaeschna+ (Neuraeschna+Staurophlebia))) + ((Castoraeschna+ Coryphaeschna+Remartinia) + (Oreaeschna+ (Aeshna+ (Anaciaeschna+ ('A.'isosceles+Andaeshna) + (Anax+Hemianax)))))). Additional informative characters are required to test the relationships suggested here between the main groups of Aeshnodea and some enigmatic basal taxa (Antipodophlebia, Austroaeschna, Acanthaeschna, Telephlebia, Austrophlebia and Planaeschna)." (Author) SEM photos or drawings of the following species are provided: Brachytron pratense (Müller, 1764), Rheopetalia apicalis (Selys 1858), Oligoaeschna pryleri (Martin 1909), Boyeria vinosa (Say 1839), Oploniaeschna armata (Hagen 1861), Remartinia luteipennis (Burmeister 1839), Anax amazili (Burmeister 1839), Hemianax papuensis (Burmeister 1839), Allopetalia reticulosa Selys 1873, Nasiaeschna pentacantha (Rambur 1842), Caliaeschna microstigma (Schneider, 1845), Spinaeschna tripunctata (Martin 1901), Limnetron debile (Karsch 1891), WStaurophlebia reticulata (Burmeister 1839), Coryphaeschna perrensi (McLachlan 1887), Gynacantha bifida Rambur 1842, Aeshna absoluta Calvert 1952, Acanthaeschna victoria Martin, 1901, Austropetalia patricia (Tillyard 1910), Andaeschna rufipes (Ris 1918), Ephiaeschna heros (Fabricius 1798), Gomphaeschna furcillata (Say 1839), Basiaeschna janata (Say 1839), Aeshna cornigera Brauer 1865, Hypopetalia pestilens MacLachlan 1870, Coryphaeschna adnexa (Hagen 1861), Anaciaeschna jaspidea (Burmeister 1839), Anaciaeschna isoceles (Müller, 1767), Andaeschna andresi (Racenis 1958), and Aeschnophlebia anisoptera Selys 1883.] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C. 712, AR-1900, La Plata, Argentina. E-mail: ellenr@ilpla.edu.ar

**2934.** Ellenrieder, N. von (2002): Redescription of *Linaeschna polli* Martin, 1909 (Anisoptera: Aeshnidae: Gomphaeschninae). Odonatologica 31(4): 409-413. (in English). [*L. polli* is redescribed and illustrated, based on the male holotype deposited at the National Museum of Natural History, Leiden. Its position in the phylogenetic system of the aeshnids is discussed.] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C. 712, AR-1900, La Plata, Argentina. E-mail: ellenr@ilpla.edu.ar

**2935.** Evans, H.E. (2002): A Review of Prey Choice in Bembicine Sand Wasps (Hymenoptera: Sphecidae). Neotropical Entomology 31(1): 1-11. (in English). ["The prey of 132 species of Bembicini (Hymenoptera) that have been studied is reviewed. About three quarters of the species prey on Diptera, and it is believed that fly predation is ancestral in the group. Eleven species make occasional or regular use of other insects as prey in addition to Diptera (Lepidoptera, Hymenoptera, Neuroptera, Odonata, and/or Homoptera), while 21 species of five genera prey on insects of these same five groups with no use of Diptera. It is hypothesized that this represents an evolutionary progression, whereby populations have experienced shortages of dipterous prey in the past and have broadened their sensory focusing to include other groups of flying insects. Behavior initially learned has, over time, been reinforced genetically to produce the currently observed radiation in prey choice within the group." (Author)] Address: Evans, H. E., Dept. Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, CO, 80523-1177 USA

**2936.** Fachgruppe Faunistik und Ökologie Staßfurt (2002): Dr. Joachim Müller zur Vollendung des 60. Lebensjahres. Entomol. Nachr. Ber. 46(3): 207-208. (in German). [Joachim Müller, Magdeburg is one of the leading German odonatologists with a broad interest in entomology, ornithology, and nature conservation. His companions of the Fachgruppe Faunistik und Ökologie Staßfurt compiled some of the essentials of his curriculum vitae as biologist in Sachsen-Anhalt.] Address: not stated.

**2937.** Ferreira-Peruquetti, P.S.; De Marco, P. (2002): Efeito da alteração ambiental sobre comunidades de Odonata em riachos de Mata Atlântica de Minas Gerais, Brasil. Revista Brasileira de Zoologia 19(2): 317-327. (in Portuguese with English summary). ["Effects of environmental degradation on Odonata community of Atlantic Forest streams from Minas Gerais, Brazil: The effect of riparian deforestation and stream impoundments on an odonate community was studied in areas of surviving Atlantic forest in Vicoso and in Rio Doce State Park (PERD), Marliéria, Minas Gerais, Brazil. During 1997 16 species of Libellulidae, 4 Coenagrionidae, 2 Gomphidae, 2 Calopterygidae, 1 Megapodagrionidae, 1 Aeshnidae and 3 Protoneuridae were collected. In Vicoso, the association of sampled odonates with lotic or lentic systems, and in PERD for areas with or without riparian vegetation were compared. The results suggest that overall odonate taxonomic richness is high in areas without riparian vegetation. This is probably caused by increase of productivity, and the invasion of lentic odonate species." (Authors)] Address: Ferreira-Peruquetti, Patricia Santos, Departamento de Hidrobiologia, Universidade Federal de Sao Carlos, 13565-905, Caixa

Postal 676, Sao Carlos, Sao Paulo, Brazil. E-Mail: patricia@iris.ufscar.br

**2938.** Forbes, M.R.; Muma, K.E.; Smith, B.P. (2002): Diffuse coevolution: Constraints on a generalist parasite favor use of a dead-end host. *Ecography* 25(3): 345-351. (in English). ["Many evolutionary models and empirical studies of parasite-host interactions consider single species of parasites exploiting single host species. However, many parasites are generalists in that they parasitize more than one host species (often many more) and establish associations with other hosts that cannot be described as true parasitism. We identify such an association, explain how constraints may maintain it, and indicate why such diffuse interactions are deserving of attention. We describe the use of two closely related *Sympetrum* dragonfly species by larvae of the water mite *Arrenurus planus* Marshall. Adults of one dragonfly species are resistant whereas adults of the other species are almost wholly susceptible to *A. planus*. However, *A. planus* attaches as often to the resistant host as it does to the susceptible host species when relative abundance and seasonal timing of adult emergence of both species is considered. We present evidence that mites track the susceptible host and are most active early in the season, when early-emerging unsuitable hosts are also present. Thus, use of resistant hosts appears an unavoidable outcome of constraints promoting discovery and use of susceptible hosts. Such findings have implications for studies of local adaptation and host switching." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**2939.** Fritz, K. M.; Dodds, W. K. (2002): Macroinvertebrate assemblage structure across a tall grass prairie stream landscape. *Arch. Hydrobiol.* 154(1): 79-102. (in English). ["Stream macroinvertebrates were collected from four intermittent tributaries and two perennial sites within the Kings Creek basin, Konza Prairie Biological Station (KPBS) near Manhattan, KS, USA. The objectives of this study were to assess the roles of disturbances (floods and drying) and refugia on benthic and colonization (drift and aerial) assemblage composition over two years among sites with contrasting hydrologic regimes. Benthic taxa richness and diversity at the perennial headwater site were significantly greater than richness and diversity at intermittent sites, whereas the downstream perennial site did not differ significantly from two of the intermittent sites. The larger magnitude of floods at the downstream perennial site resulted in greater losses in richness than at the upstream intermittent and perennial sites. Both classification and ordination revealed that benthic assemblage composition was more strongly correlated with time since last disturbance and season than with static hydro-logic descriptors, microhabitat measures, or assemblage characteristics (richness or density). Richness of aerial colonization and drift samples collected at intermittent sites was greatest at the site with the nearest upstream perennial surface water. Because Kings Creek is a relatively pristine stream, these data may be useful as a baseline for comparison with future efforts for bioassessment of intermittent prairie streams." (Authors) *Calopteryx maculata*, *Argia plana*, *Archilestes grandis*, and *Erythemis* sp. are listed in tab. 1.] Address: Dodds, W.K., Department of Biological Sciences, Auburn University, Auburn, AL 36849, USA.

**2940.** Futahashi, R.; Futahashi, H. (2002): A case of female adult of *Anax nigrofasciatus nigrofasciatus* (Aeshnidae) bitten by a last instar larva of the same species. *Tombo* 44: 33. (in Japanese with English summary). ["We observed a female adult of *Anax nigrofasciatus nigrofasciatus* bitten on the tip of abdomen by a last instar larva of the same species. The adult thrashed her wings and finally tried to escape from the predator, but she was injured from the 9<sup>th</sup> to 10<sup>th</sup> abdominal segments and was unable to fly." (Authors) This encounter between two different life stages is documented by an informative photo.] Address: not stated in English

**2941.** Futahashi, R.; Futahashi, H.; Araki, Y. (2002): The odonate fauna of Noto peninsula, Hokuriku District, Honshu. *Tombo* 44: 25-28. (in Japanese with English summary). ["The Odonate fauna in the Noto Peninsula, Ishikawa Prefecture, Hokuriku District, central Honshu, Japan, is outlined based primarily on our recent survey. *Lestes japonica* Selys, 1883 (Lestidae) was found at five ponds (first record from Ishikawa Prefecture). *Soma-tochlora clavata* Oguma, 1913 (Corduliidae) was newly recorded from the peninsula. Consequently, a total of 77 species of 11 families have been recorded from the peninsula. Some zoogeographical comments are given for the following two noteworthy species: *Sympetma paedisca* (Brauer, 1877) (Lestidae) and *Sympetrum speciosum speciosum* Oguma, 1915 (Libellulidae)." (Authors)] Address: not stated in English.

**2942.** García-Criado, F.; Fernández-Aléz, M.; Fernández-Aléz, C. (2002): Relationships between benthic assemblage structure and coal mining in the Boeza River basin (Spain). *Arch. Hydrobiol.* 154(4): 665-689. (in English). [Taxon richness and taxonomical composition of three rivers in northwestern Spain were studied in a two-year survey. Canonical Correspondence Analysis revealed mining as one of the main factors conditioning the faunal composition together with the distance from the source. Richness decreased at impacted sites and was negatively correlated with variables indicating mining pollution (conductivity, sulfate, silt accumulation and some metals, among others). The "Cordulegastridae" seem to tolerate even heavily impacted running waters, but the abundance was low.] Address: García-Criado, F., Departamento de Biología Animal. Facultad de Ciencias Biológicas y Ambientales, Universidad de León, 24071 León, Spain. E-mail: dbafgd@unileon.es

**2943.** Garrison, R.W.; Costa, J.M. (2002): The identity of *Agrion ? minutissimum* Selys, 1876 and *Leptobasis rosea* Selys, 1877 (Zygoptera: Coenagrionidae). *Odonatologica* 31(4): 395-401. (in English). ["Holotypes and allotypes of *Calvertagrion dicellularis* St. Quentin, 1960 and *Inpabasis eliori* Santos, 1961 were compared to holotypes of *Agrion ? minutissimum* Selys, 1876 and *Leptobasis rosea* Selys, 1877, respectively. The first 2 names are considered junior synonyms of the older names. Diagnostic illustrations of all type material are provided." (Authors) *Inpabasis rosea* (Selys, 1877), *Calvertagrion minutissimum* (Selys, 1876)] Address: Garrison, R., 1030 Fondale, Azusa, CA 91702-0821, USA. E-mail: rossergarrison@compuserve.com

**2944.** Glotzhober, R.C.; Moody, D.L. (2002): *Soma-tochlora walshii* (Odonata: Corduliidae), a new state record for Ohio. *Ohio Journal of Science* 102(3): 40-42. (in English). [*S. walshii* was previously unknown from

Ohio. "During the summer of 2000 this species was documented in apparent breeding populations at State Nature Preserves in Ashtabula and Portage counties. While no larvae were found, reproductive behavior was observed and the numerous adults suggest a stable breeding population. Habitat descriptions from other localities match that of these 2 sites, and a long-known population exists in Pennsylvania only about 21 km from the Ashtabula County site. This brings the total number of reported Odonata for Ohio to 162 species and subspecies." (Authos)] Address: Glotzhofer, R., Ohio Natural history society, 1982 Velma Ave., Columbus OH 43211-2497, USA. E-mail: bglotzhofer@ohio-history.org

**2945.** Grand, D. (2002): La distribution de *Coenagrion ornatum* (Sélys, 1850) en France centrale. *Martinia*, Hors Série 4: 55-57. (in French with English summary). ["The distribution of *C. ornatum* (Selys, 1850) was studied in Central France. 21 localities with sunny small brooks were identified as presumed reproductive sites for this species within the Allier, Côte-d'Or, Loire, Nièvre and Saône-et-Loire departments. Together with previous reports, this study shows that this species occurs in at least 28 localities in Central France." (Author)] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

**2946.** Grand, D. (2002): Voyage en Guadeloupe. *Martinia* 18(1): 29-36. (in French with English summary). [In March 2001, 19 odonate species were recorded on Guadeloupe, Lesser Antilles. 19 taxa are commented in some detail. The rare *Protoneura ailsa*, and taxonomic problems between *Brechmorhoga praecox* and *B. grendadensis* are discussed.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

**2947.** Grimaldi, D.A.; Engel, M.S.; Nascimbene, P.C. (2002): Fossiliferous Cretaceous amber from Myanmar (Burma): Its rediscovery, biotic diversity, and paleontological significance. *American Museum Novitates* 3361: 1-72. (in English). ["Amber from Kachin, northern Burma, has been used in China for at least a millennium for carving decorative objects, but the only scientific collection of inclusion fossils, at the Natural History Museum, London (NHML), was made approximately 90 years ago. Age of the material was ambiguous, but probably Cretaceous. Numerous new records and taxa occur in this amber, based on newly excavated material in the American Museum of Natural History (AMNH) containing 3100 organisms. Without having all groups studied, significant new records and taxa thus far include the following (a dag refers to extinct taxa): [...] Odonata indet. (wing fragment); [...]. The stratigraphic distribution of exclusively Mesozoic arthropods in Burmese amber is reviewed, which indicates a probable Turonian-Cenomanian age of this material (90-100 Ma). Paleofaunal differences between the NHML and AMNH collections are discussed, as is the distinct tropical nature of the original biota. Burmese amber probably harbors the most diverse biota in amber from the Cretaceous, and one of the most diverse Mesozoic microbiotas now known." (Authors)] Address: Grimaldi, D., Amer. Museum Nat. Hist., Dept. Invertebrates, New York, NY 10024 USA

**2948.** Günther, A. (2002): Erstnachweis von *Ophiogomphus cecilia* und Wiedernachweis von *Gomphus*

*vulgatissimus* (Odonata: Gomphidae) im Regierungsbezirk Chemnitz. *Mitt. sächs. Ent.* 60: 3-6. (in German). [Sachsen, Germany; both species were considered extinct in the region; this was proved by several collecting trips in the past years. Most recent records of *G. vulgatissimus* and *O. cecilia* are documented in a tab. along with a detailed characterisation of the habitats. The colonisation must have happened in the past few years, and the source population probably originate in the River Elbe.] Address: Günther, A., Naturschutzinstitut Freiberg, Waisenhausstraße 10, D-09599 Freiberg, Germany. E-mail: a.guenther@abo.freiepresse.de

**2949.** Guerbaa, K.; Barataud, J. (2002): Découverte de *Cordulegaster bidentata* Sélys, 1843 dans le département de la Haute-Vienne (Odonata, Anisoptera, Cordulegasteridae). *Martinia* 18(2): 66. (in French). [Two records of *Thecagaster bidentata* are briefly documented; the species was not known from the Département Haute-Vienne (France) prior May 2001.] Address: Guerbaa, K., 1, rue de la Madonnette, F-87250 Bessines-sur-Gartempe, France

**2950.** Guerbaa, K. (2002): Les espèces d'odonates "remarquables" du Limousin. *Martinia* 18(1): 3-12. (in French with English summary). [34 species of the Limousin, France are briefly commented; records base on a collection of 15000 species/location made after 1980.] Address: Guerbaa, K., 1, rue de la Madonnette, F-87250 Bessines-sur-Gartempe, France

**2951.** Ha, L.Y.; Wildermuth, H.; Dorn, S. (2002): Emergenz von *Cordulia aenea* (Odonata: Corduliidae). *Libellula* 21 (1/2): 1-14. (in German with English summary). ["Emergence of *C. aenea* was studied at two ponds in northern Switzerland at 475 m asl in 2000. Emergence started on 27 April and lasted 25 days. The EM50 fell at 8 days for males and 9 days for females. A diel periodicity of emergence with a major peak in the morning was found. The preferred site of emergence was within a strip 5 metres wide along the margin of each pond. Within this strip 99.8 % of the 917 exuviae were found. Exuviae abundance in the 7 sections sampled around the perimeter ranged from 1.4 to 5.5 per metre, depending on the structure of the margin. Both sexes emerged more frequently above dry ground than above water. The sex ratio did not differ significantly from 1 : 1 (48.3 % males). The population size of *C. aenea* emerging from the two ponds in the study year was estimated as 3300 individuals. The spatio-temporal emergence pattern of *C. aenea* is discussed, special emphasis being placed on habitat preferences and comparisons with other corduliid species." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**2952.** Hämäläinen, M. (2002): *Idionyx iida* spec. nov. from Kanchanaburi, Thailand (Odonata: Corduliidae). *Opusc. zool. flumin.* 203(2002): 1-4. (in English). ["*I. iida* sp. n. (holotype male: Thailand, Kanchanaburi prov., Kroeng Kra Via, 5-IV-2001; deposited in RMNH, Leiden) is described and illustrated. The diversity of the genus in Thailand is briefly discussed." (Author)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**2953.** Hämäläinen, M. (2002): Notes on the *Libellago* damselflies of the Andaman and Nicobar Islands, with



description of a new species (Zygoptera: Chlorocyphidae). *Odonatologica* 31(4): 345-358. (in English). ["*Libellago blanda* (Hagen) and *L. andamanensis* (Fraser) are removed from synonymy with *L. lineata* (Bur.); they are redescribed in both sexes and compared with *L. lineata*. Recently acquired material from the Nicobar Isls (Camorta and Great Nicobar) reveals that the original type series of *Micromerus blandus* consists of 2 close, but distinct species. A male specimen (in ZMUC) from Nancowry Island is designated as the lectotype of *L. blanda*. Former syntype females from Little Nicobar belong to a new species, described here as *L. balus* sp.n., holotype (deposited at RMNH, Leiden) of which comes from Great Nicobar Island, Campbell Bay area, 24-XII-2000. Males of *L. blanda* and *L. balus* sp.n. differ in the colour pattern of abdomen and in the shape of rhinarium. The status of *L. indica* (Fraser) is briefly discussed." (Author)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**2954.** Hart, E.A.; Lovvorn, J.R. (2002): Interpreting stable isotopes from macroinvertebrate foodwebs in saline wetlands. *Limnology & Oceanography* 47(2): 580-584. (in English). ["We compared stable-isotope ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ) and gut-content analyses of macroinvertebrate foodwebs in saline wetlands of the Laramie Basin, Wyoming, USA. Standard assumptions of stable-isotope fractionation between trophic levels ( $<1$ permil for  $\delta^{13}\text{C}$ , mean of 3.4permil for  $\delta^{15}\text{N}$ ) suggested that zygopteran (damselfly) larvae consumed mainly amphipods. However, the guts of zygopterans contained no amphipods but rather a mix of chironomid larvae and zooplankton. In all wetlands the gut contents of zygopterans indicated that they were secondary consumers (trophic level 3), but enrichment of  $\delta^{15}\text{N}$  between zygopterans and their prey ( $\Delta\delta^{15}\text{N}$ ) varied from 1 to 3.4permil between wetlands. In other studies, such variation in  $\Delta\delta^{15}\text{N}$  has been interpreted to mean that food-chain length differed between aquatic systems. We review alternative interpretations of variable  $\delta^{15}\text{N}$  enrichment, namely, varying C:N ratios in food, differential enrichment between consumer species, and habitat-specific variation of  $\delta^{15}\text{N}$  at the base of foodwebs. We also suggest that variation in the timing and rates of nitrogen cycling can affect measured  $\Delta\delta^{15}\text{N}$  both within and between foodwebs. For aquatic macroinvertebrates, we urge that stable isotopes be supplemented with independent observations to avoid incorrect conclusions about trophic pathways, trophic levels, and food-chain lengths in different ecosystems." (Authors)] Address: Hart, E.A., Department of Zoology, University of Wyoming, Laramie, WY, 82071, USA. E-Mail: lovorn@uwyo.edu

**2955.** Hawking, J.H.; Theischinger, G. (2002): Vernacular names for the Australian dragonflies (Odonata). *Austrolestes* 4 (Suppl.): 1-6. (in English). [Checklist of all Australian species with latin and vernacular names, and distributional data (geographic regions).] Address: Hawking, J.H., Murray-Darling Freshwater Research Centre, Cooperative Research Centre for Freshwater Ecology, P.O. Box 921, Albury, NSW 2640, Australia

**2956.** Heidari, H.; Dumont, H.J. (2002): An annotated check-list of the Odonata of Iran. *Zoology in the Middle East* 26: 133-150. (in English with German summary). ["A perusal of the literature and study of some additio-

nal collections leads to a list of 95 species and subspecies of dragonflies for Iran. We claim that at least another 15 Eurosiberian and Oriental species await discovery. Eurosiberian species dominate in the north-west and along the Caspian coast; as one moves south in western Iran, Middle-East endemics become more prominent, and a limited admixture of Afrotropical species occurs. The central desert axis is a zoogeographical break, in which predominantly Irano-Turanian species are found. East of it, Irano-Turanians mix with Oriental elements. The Oriental element is particularly strong along the Makran coast, where, additionally, a short series of species occurs with a full Oriental-Afrotropical range. The Zagros mountains and their extensions in Sistan-Baluchistan facilitate dragonfly dispersal across an otherwise arid area, but have been insufficiently studied. The same is true of the Kopet Dag, which provides a wedge between the Asian deserts, and acts as a filter for Eurosiberian species to reach the high mountains of Afghanistan and, vice versa, allows Me-siatic species to spread west. All these conclusions are at a qualitative level: large parts of Iran are still unstudied, and the mapping of the range of individual species remains to be done. East-west and north-south clines are common in *Calopteryx splendens* and other zygopterans, but remain to be worked out in detail." (Authors) Of some interest are records of *Lestes concinnus*, *Pseudagrion laidlawi*, *Brachytron pratense*, *Libellula quadrimaculata*, *Sympetrum arenicolor*, *S. haritonovi*, and *Zygonyx torridus*.] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

**2957.** Heidemann, H.; Seidenbusch, R. (2002): Die Libellenlarven Deutschlands. Die Tierwelt Deutschlands. Teil 72: 328 pp. (in German). [In 1993, H. Heidemann and R. Seidenbusch published a long awaited book on the larvae resp. exuviae of the Odonata occurring in France and Germany. In spite of some shortcomings this was a significant contribution to our knowledge of the larval stage of the Odonata of western Europe. On the fundament of this publication, the authors nearly ten years later publish two revised - a French and a German - editions. The plenty of detailed information makes it very difficult to compare these three editions. More generally spoken, the French edition is more close to the book of 1993, while the German edition appears more original. The French version - which of course includes 11 more species than the German edition - is paperback, while the German version has a solid spine. There are a lot of amendments in detail, even some new plates resp. drawings. From the didactical point of view, the rearrangement of the drawings and the labeling of the drawings (but exclusively in the German version!) improve the useability in a significant way. I personally miss a concept where key and figures are printed close on one page or two opposed pages. Maybe that this is a matter of taste. The scale of the figures was changed in some cases; the printing quality of some of the figures was improved (the labeling is more professional; but e.g. partly missing on plate 7 in the German version). In some cases it will be better to use the 1993-version (e.g. epi- and paraproct of *Pyrrhosoma nymphula*), because the contrast of some of the figures of the first version is better. Without detailing the differences between the two versions - which are original works - the general structure is as follows: Preface, notes for the user, glossar, mor-

phology of the larva, larval ecology, collecting and storing of exuviae, catching and rearing larvae, questions of nomenclature (with some worth reading additions compared with the 1993-version), keys (with extensive additional information on morphological structures, habitats, and distribution), and a selected bibliography. In the framework of nomenclature questions, it is remarkable that *Aeshna subarctica elisbatheae* (Djakonov, 1922) was replaced by the nominate form *A. subarctica* Walker, 1908. I couldn't find any explanation for this. The German edition is written in German, the book on the exuviae of Germany and France in French. Without any doubt, both works are indispensable for field work in Germany and/or France. I think, a forthcoming edition should be improved by separating keys and additional information, and by arranging keys and figures close together. (Martin Schorr) Address: Goecke & Evers, Inh. E. Bauer, Sportplatzweg 5, D-75210 Keltern, Germany. E-mail: [www.goeckeevers.de](http://www.goeckeevers.de)

**2958.** Heidemann, H.; Seidenbusch, R. (2002): Larves et exuvies des libellules de France et d'Allemagne (sauf de Corse). ISBN 2-9597291-5-0: 415 pp. (in French). [For a review of the work see OAS 2957. The book can be obtained by the SFO for 28 Euro.] Address: Société française d'odonatologie (SFO), 7, rue Lamartine, F-78390 Bois-d'Arcy, France.

**2959.** Heitz, S. (2002): Libellen der Wiesenbäche und ihre Einbindung in bestehende Planungsinstrumente - am Beispiel von *C. mercuriale* (Helm-Azurjungfer). *mercuriale* 2: 7-13. (in German). [For details see OAS 2414] Address: Heitz, S., Schlesische Str. 2, D.78224 Singen, Germany. E-mail: [stefanheitz@web.de](mailto:stefanheitz@web.de)

**2960.** Hellmund, M. Hellmund, W. (2002): Eigelege fossiler Zygoteren auf Dikotylenblättern aus dem Mittelmiozän von Salzhausen (Vogelsberg, Hessen, Deutschland). *Odonatologica* 31(3): 253-272. (in German, with English summary). ["22 specimens of dicotyledon leaves with egg-sets of fossil Zygoptera, originating from a locality NE of Frankfurt/Main, Germany and preserved in SMF, Frankfurt/Main are described, illustrated and discussed. In the past (1846, H.R. Goepfert, Die Gattungen der fossilen Pflanzen, Henry & Cohen, Bonn), these structures were misinterpreted as saprophytes, "Hysterites opegraphoides". The true nature of the sets is apparent from fossil and recent evidence; they are to be attributed to the "coenagrionid type" of oviposition, more particularly to the so-called "Zickzack- und Bogenmodus" mode sensu M. Hellmund & W. Hellmund, 1991 (Stuttg. Beitr. Naturk. [B] 177: 1-17). Here-with the phenomenon is recorded for the first time from the Middle Miocene and the Lower Neogene (age ca 15 mio yr), though this oviposition mode is practised since the Upper Cretaceous times (ca 90 mio yr ago) until present. In some Tertiary localities, e.g. Messel (Hesse) and Hammerunterwiesenthal (Saxony), egg-sets are the only evidence of the Zygoptera occurrence." (Authors)] Address: Hellmund, W., Institut für Geologische Wissenschaften und Geiseltalmuseum, Martin-Luther-Universität Halle-Wittenberg, Domstr. 5, D-06108 Halle (Saale), Germany. E-mail: [hellmund@geologie.uni-halle.de](mailto:hellmund@geologie.uni-halle.de) 2 von-Loe-Strasse 31, D-53840 Troisdorf, Deutschland

**2961.** Herkenrath, P.; Evans, M. (2002): Die Mesopotamischen Sümpfe -eine unbemerkte Tragödie. *Ber. Vogelschutz* 38: 157-161. (in German with English sum-

mary). ["The Mesopotamian Marshes in Iraq and Iran, formed by the rivers Euphrates and Tigris, consisted of a range of wetland ecosystems and stretched over an area of 15,000 - 20,000 km<sup>2</sup>. They have been inhabited by the Marsh Arabs with a unique 5,000 year-old culture. For millions of migratory waterbirds and raptors, the Marshes formed one of the most important wintering areas along the West Siberian-Caspian-Nile flyway. The Marshes also harboured globally significant breeding populations of a number of rare and threatened species. Two bird and several other vertebrate species are strictly endemic to the area. 32 large dams in Turkey, Iraq, Iran and Syria have considerably reduced the water flow and changed the sedimentation regime of Euphrates and Tigris while more dams are being planned or under construction. Huge drainage schemes by the Iraq government, especially in the 1990s, have left only some 14.5% of the area of the marshes, as of May 2001. Desertification with the subsequent formation of salt deserts is widespread. The Marsh Arabs were forced to leave their land and to abandon their traditional way of living. [...]. The United Nations Environment Programme (UNEP) has developed a set of recommendations for the regeneration of the Marshes." (Authors) The marshes also harbour a population of *Brachythemis fuscopalliata*; this species is assessed by the authors as "globally endangered" and "a regional endemic species".] Address: Herkenrath, P.; Evans, M.; BirdLife International, Wellbrook Cowl, Girton Road, Cambridge CB3 0NA. UK. E-Mail: [peter.herkenrath@birdlife.org.uk](mailto:peter.herkenrath@birdlife.org.uk), [mike.evans@birdlife.org.uk](mailto:mike.evans@birdlife.org.uk).

**2962.** Hernández, J.M.R. (2002): Notes on the feeding of three species of odonates of the suborder Zygoptera in central Cuba. *Argia* 13(4): 13-14. (in English). [10 insect taxa (Diptera, Homoptera, Heteroptera) preyed by *Ischnura ramburii*, *I. capreolus*, and *Enallagma coecum* are listed in a table along with a list of species caught in the framework of the study.] Address: Hernández, J.M.R., Apartado Postal 2004, Sancti-Spiritus, Cuba CP 60100

**2963.** Hiratsuka, K (2002): New records of dragonflies from Rumoi-shicho. *Bulletin of The Hokkaido Odonatological Society* 14: 19-20. (in Japanese). [Japan; *Trigomphus melampus*, *Anax parthenope julius*, *Somatochlora uchidai*, *Libellula quadrimaculata asahinai*] Address: Hiratsuka, K., 2-20-113, Honcho 2 jo-9, Higashi-ku, Sapporo City, 065-0042, Japan

**2964.** Honig, B. (2002): Myth of the fishless pond. *Argia* 13(4): 14-15. (in English). [The author reports the 21 odonate species of his garden pond, and discusses the factors which enable an owner to have fishes and dragonflies in his ponds.] Address: Honig, R., 3803 Purdue, Houston TX 77005-1129, USA. E-mail: [mandrhonig@aol.com](mailto:mandrhonig@aol.com)

**2965.** Hori, S.; Yokoyama, T. (2002): *Boyeria mac-lachlani* from Noboro Forest Park. *Bull. Hokkaido Odonatological Society* 14: 4-5. (in Japanese). [Records from September and October 2001 are discussed.] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**2966.** Hovmöller, R.; Pape, T.; Källersjö, M. (2002): The Palaeoptera problem: Basal pterygote phylogeny inferred from 18S and 28S rDNA sequences. *Cladistics* 18(3): 313-323. (in English). ["Monophyly of the pterygote insects is generally accepted, but the relationships

among the three basal branches (Odonata, Ephemeroptera and Neoptera) remain controversial. The traditional view, to separate the pterygote insects in Palaeoptera (Odonata + Ephemeroptera) and Neoptera, based on the ability or inability to fold the wings over the abdomen, has been questioned. Various authors have used different sets of morphological characters in support of all three possible arrangements of the basal pterygote branches. We sequenced 18S and 28S rDNA from 18 species of Odonata, 8 species of Ephemeroptera, 2 species of Neoptera, and 1 species of Archaeognatha in our study. The new sequences, in combination with sequences from GenBank, have been used in a parsimony jackknife analysis resulting in strong support for a monophyletic Palaeoptera. Morphological evidence and the phylogenetic implications for understanding the origin of insect flight are discussed." (Authors)] Address: Hovmöller, R., Department of Zoology, Stockholm University, Stockholm Sweden

**2967.** Hunger, H. (2002): Anwendungsorientiertes Habitatmodell für die Helm-Azurjungfer (*Coenagrion mercuriale*, Odonata) aus amtlichen GIS-Grundlagendaten. *Natur und Landschaft* 77(6): 261-265. (in German with English summary). ["A GIS-based habitat model was developed for *C. mercuriale*, a species considered to be 'under immediate threat of extinction' in Germany's Red List of endangered species and listed in Annex II of the European Union Habitats Directive. ATKIS land-use data and a groundwater model were used as thematic layers. Occurrences of *C. mercuriale* in the 'Freiburger Bucht' study area (SW-Germany) were mapped. Following this, a preference analysis was performed. The results showed that, within the study area, the species prefers sections of watercourses that are situated within areas characterized by high groundwater levels. Within arable lands, this preference was distinct up to a groundwater depth of one metre, in grassland up to a depth of 2 metres. The model produced results that are consistent with 'intuitive expert knowledge'. It uses basic geodata which are available at nature conservation agencies. It uses few parameters, which, however, appear to be key factors. Therefore it belongs to a 'new generation' of habitat models with a strongly applied focus. This type of model is in increasing demand for applied nature conservation purposes and planning issues. In 2001 and 2002, the model is being evaluated in an even larger study area." (Author)] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), Am Pfahlgraben 8, D-79276 Reute, Germany

**2968.** Hutchings, G. (2002): Three new species of Odonata for Saskatchewan, Canada. *Argia* 13(4): 5-7. (in English). [In June and July 2001, *Basiaeschna janata*, *Somatochlora walshii*, and *S. williamsoni* were discovered. Habitats and co-occurring species are described resp. listed.] Address: Hutchings, G., 971 Arundel Drive, Victoria, British Columbia, V9A-2C4, Canada. E-mail: sea-trek@islandnet.com

**2969.** Inoue, K. (2002): Report of the 15th International Symposium of Odonatology held in Novosibirsk, Russia. *Argia* 13(4): 3-4. (in English). [This report gives some information on the symposium, with records of species made during the field trips, and the announcement of the 16th symposium to be held in Schwerin, Germany. Of some interest is the note that *Calopteryx virgo* (records from Siberia and Amur-region) is con-

specific with *C. japonica*.] Address: Inoue, K., 5-9 Fuminosato 4-chome, Abeno-ku, Osaka 545, Japan

**2970.** InsectLine (2002): Insects reported during the early part of 2002. *Atropos* 16: 74-75. (in English). [*Pyrrhosoma nymphula* was on the wing in April at several sites.] Address: not stated

**2971.** Irineu de Souza, L.O.; Costa, J.M.; Espindola, L.A. (2002): Description of the last instar larva of *Oligoclada laetitia* Ris, 1911 and comparison with other Libellulidae (Anisoptera). *Odonatologica* 31(4): 403-407. (in English). [Specimens of *O. laetitia* from Pantanal Sul-Mato-Grossense, Brazil are illustrated, described and compared with other genera of Libellulidae possessing dorsal hooks on abdominal segments VIII-X: *Dythemis*, *Macrothemis*, *Perithemis*, *Planiplax*, and *Tauriphila* (in part).] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisis.com.br

**2972.** Jacquemin, G.; Boudot, J.-P. (2002): Les Odonates des tourbières et lacs acides du massif vosgien: bilan de dix années de prospection. *Martinia Hors Série* 4: 27-38. (in French with English summary). [The odonate fauna of 66 peat bogs and 36 peaty lakes in the Vosges mountains (Eastern France) is reported. "One erratic and 48 indigenous species were observed. *Somatochlora alpestris* and *Aeshna subarctica elisabethae* were found to be confined above 700 m a.s.l., 7 species to occur whatever the altitude, and 17 taxa to occur under 500 m a.s.l."] Address: Jacquemin, G., Biologie des Insectes, Université H. Poincaré, Nancy 1, BP 239, F-54506 Vandoeuvre-lès-Nancy, France

**2973.** Jödicke, R. (2002): Nachruf auf Joachim Wenzinger (1. Oktober 1944 -12. Dezember 2001). *Libellula* 21(1/2): 71-76. (in German, with English summary). ["In odonatological circles the German zoologist and journalist was highly regarded, especially owing to his long-term studies on *Ophiogomphus cecilia*. A short biography is followed by a list of his Odonatological publications." (Author)] Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany. E-mail: r.joedicke@t-online.de

**2974.** Johansson, F. (2002): Reaction norms and production costs of predator-induced morphological defences in a larval dragonfly (*Leucorrhinia dubia*: Odonata). *Canadian Journal of Zoology* 80(5): 944-950. (in English). ["To understand the evolution and ecology of inducible defence we need to understand the genetics and costs underlying this phenomenon. It has been suggested that the abdominal spines of odonate larvae work as a defensive trait, and that the presence of fish predators induces the production of longer abdominal spines. This study was designed to answer the following questions: (i) What is the shape of the reaction norms of spine length in the larvae of the dragonfly *Leucorrhinia dubia* reared in the presence and absence of fish? (ii) Does the production of longer spines imply that production costs are incurred in terms of development time or size? I performed a laboratory experiment in which I raised 30 families of *L. dubia* larvae in the presence and absence of fish. In general, the presence of fish induced the production of longer abdominal spines in the larvae, and there was a genotype X environment interaction, suggesting the potential for evolution



of plasticity of the traits. No production costs could be found with respect to development time and size at final instar." (Author)] Address: Johansson, F., Department of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Limed, Sweden. E-mail: frank.johansson@eg.umu.se

**2975.** Johnson, J.; Cooms, E.; Valley, S. (2002): Recent highlights in Oregon. *Argia* 14(2): 11-13. (in English). [Oregon, USA; new findings total the Oregon Odonata to 88 species: *Lestes stultus*, *Nehalennia irene*, *Aeshna subarctica*, *A. sitchensis*, and *Paltothermis lineatipes*. In addition "other interesting records" are: *A. walkeri*, *Somatochlora minor*, *S. semicircularis*, *S. walshii*, and *Libellula comanche*. The habitats/localities of the species are discussed in some detail.] Address: Johnson, J., 6303 SE Ramona Street, Portland OR 97206-5930, USA. E-mail: jimjohn@teleport.com

**2976.** Juillerat, J. (2002): Emergence, mobilité et milieu reproduction chez *Orthetrum coerulescens* (Odonata, Libellulidae) dans le Jura et le Jura bernois. *Nachrichten des Schweizer Zentrums für Kartographie der Fauna* 24: 14. (in French). [Verbatim: Travail de diplôme de Laurent Juillerat, Institut de zoologie, Université de Neuchâtel L'Orthétrum bleuissant (*Orthetrum coerulescens*) est une libellule qui, dans le Jura, se reproduit avant tout dans des marais de pente pâturés par le bétail. La principale menace qui plane sur ses populations est le drainage de ses milieux de reproduction. Dans une logique de conservation, ce travail a démontré qu'un piétinement mesuré des marais par le bétail est favorable à l'espèce, puisqu'il crée les gouilles dans lesquelles elle se reproduit. Il ne peut toutefois dépasser un certain seuil, un piétinement trop intense conduisant à la destruction pure et simple des marais. Près de 600 libellules ont été capturées et marquées entre le 27 mai et le 30 août 2001 dans trois vallées du Jura central. Ce travail a permis d'estimer la durée de vie maximale des adultes à près de 70 jours, ce qui dépasse largement les chiffres jusqu'alors avancés pour l'espèce (32 jours) ; de démontrer que la durée de la période de maturation des adultes était fortement influencée par les conditions météorologiques et qu'elle était plus importante chez les femelles ; de mettre en exergue de fréquents déplacements entre les différents marais d'une même vallée, la distance maximale étant de 1600 m. Cependant, aucun déplacement entre les différentes vallées n'a pu être mis en évidence.] Address: not stated

**2977.** Kalkman, V.J.; Duinen, G.A. van; Esselink, H.; Kuper, J.T. (2002): New records of Odonata from Estonia, with notes on breeding in the Baltic Sea and on species assemblages of raised systems. *Notul. odonatol.* 5(10): 120-125. (in English). [The records (1-21 July 1999, 14-24 July 2000) of 42 spp. resulting from 32 localities are presented. Records of *Lestes virens*, *Coenagrion johanssoni*, *C. puella*, *Pyrrhosoma nymphula*, *Aeshna ossiliensis*, *A. subarctica*, *Anax imperator*, *Somatochlora arctica*, and *Libellula fulva* are discussed in detail. *Ischnura elegans*, *Enallagma cyathigerum*, and *Orthetrum cancellatum* were found breeding in the Baltic Sea. It is concluded that the northward extension of the ranges of *I. elegans* and *O. cancellatum* in the Baltic region is influenced by their concurrence in brackish habitats along the Baltic Sea. Waterbodies in different parts of intact raised bog systems could be distinguished by differences in species assemblages and species

richness. In this context *Leucorrhinia rubicunda* and *L. caudalis* are briefly discussed.] Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands. E-mail: Kalkman@naturalis.nnm.nl

**2978.** Kalkman, V.J.; Smit, J.T. (2002): *Platycnemis subdilitata* Sel., new to the Canary Islands? (Zygoptera: Platycnemididae). *Notul. odonatol.* 5(10): 128. (in English). [A specimen in the collection of the Zoological Museum of Amsterdam with label information on Tenerife is discussed in detail. It is concluded that the origin of the specimen lies in the Sahara from where it was wind dispersed. A less probable explanation is that it was transported by a vessel.] Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands. E-mail: Kalkman@naturalis.nnm.nl

**2979.** Kano, K. (2002): Microhymenopteran insects phoretic on adult female of *Gynacantha ryukyurnis*. *Tombo* 44: 21-22. (in Japanese with English summary). [Tenjinny, Nago City, Okinawa-jima Island, Japan; on 1-VII-2001 a micro-hymenoptera was photographed sitting on the thoracic dorsum near the basal part of the wings of *G. ryukyurnis*.] Address: Kano, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**2980.** Kano, K.; Kobayasi, F. (2002): Some behaviors of *Rhipidolestes asatoi* Asahina. *Tombo* 44: 19-20. (in Japanese with English summary). [*R. asatoi* was found at Nakakosiki Island, Japan, an island never investigated prior 2001 (?). Photographs document the habitat and some behaviours.] Address: Kano, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**2981.** Karube, H. (2002): A new record of *Boninthemis insularis* (Matsumura) from Kitaiwo-jima Island. *Tombo* 44 : 7-8. (in Japanese with English summary). [*B. insularis* was considered as an endemic species from the Ogasawara Islands, Japan. 20/21 June 2001 it was recorded from the Kita-Iwojima Island of the Kazan-retto Group, app. 175 km SSE of the Ogasawara Islands.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan

**2982.** Karube, H. (2002): A new record of *Philosina alba* Wilson from Laos. *Tombo* 44 : 5-6. (in Japanese with English summary). [Prior this record from Laos (1 male, Lak Sao, Vietnam border, 30.IV.1995, S. Nakamura leg.), the species has only been known from the type locality Guandong, China.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan

**2983.** Karube, H. (2002): New records of *Archineura hetaerinoidea* (Fraser) (Calopterygidae) from northern Vietnam with collecting data from Laos. *Tombo* 44 : 6-7. (in Japanese with English summary). [Specimens from Vietnam and Laos are illustrated. The Vietnam specimens have larger milky white maculation on both fore and hind wing than the Laos specimens. The differences are considered as geographical variation.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan

**2984.** Karube, H. (2002): Notes on the Chinese *Planaeschna* (Odonata: Aeshnidae) deposited in the Natural History Museum, London, with description of a new species from southern China. *Tombo* 44: 1-5. (in English). [*Planaeschna gressitti* spec. nov., holotype male, Yim Na San, 650 m asl., Kwangtung, China, 15.VI.

1936, J.L. Gressitt leg., holotype deposited in NHML. The species is closely related to *P. tamdaoensis* of northern Vietnam. *P. suichangensis* from Fujian is redescribed.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan

**2985.** Kipping, J. (2002): Dragonfly research in the Okavango Delta, Botswana. IDF-Report 4(1): 18-26. (in English). [Between April and August 2000, Odonata were studied on West Chief's Island as well as on the Boro and Thamalakane River in Maun, Botswana, in the southeastern range of the Okavango delta. Furthermore, the author joined an excursion to the Panhandle around Mohembo and Shakawe during the first week of June. A total of 72 odonate species is listed without further comments. IDF and WdA promoted this study; more extensive results of the study will be published in the Int. Jour. Odonatology.] Address: Kipping, J., Ringstr. 5/6, D-04600 Altenburg, Germany. E-mail: jenskiping@hotmail.com

**2986.** Kita, H. (2002): Notes on the situation of the dying aged female of *Epiophlebia superstes* (Selys) in ovipositing in the field. Tombo 44: 23-24. (in Japanese with English summary). ["The author observed an aged female of *E. superstes* trying to lay eggs into a hard twig for oviposition. The female was, however, unable to lay eggs into the twig, and after 1 hour and a half, she dropped onto the river water. Dissection of her abdomen revealed no eggs inside." (Author)] Address: Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan (probably not the actual address)

**2987.** Kitt, M.; Werth, C. (2002): Libellen in der Bruchbach-Otterbachniederung. Pollichia-Kurier 18(3): 27-29. (in German). [The paper reviews records of Odonata from the Bienwald region near the German-French border in Rheinland-Pfalz, Germany previously published by M. Kitt or M. Niehuis. In the framework to re-establish the White Stork (*Ciconia ciconia*) in this region, numerous little water bodies have been created. These were surveyed by Christine Werth (University of Karlsruhe) with special emphasize to water chemistry, Amphibians, and Odonata (Ms thesis). The odonatological results are very briefly outlined, and a list of species including older and new records is compiled.] Address: Kitt, M., Raiffeisenstr. 39, D-76872 Minfeld, Germany, E-mail: MKitt@tonline.de; Werth, Christine, Mittelberg 4, D-76571 Gaggenau, Germany

**2988.** Klaus, D. (2002): Bericht über die Tagung Sächsischer Entomologen im Jahre 2002. Mitt. sächs. Ent. 60: 31-33. (in German). [Thomas Brockhaus gave a status quo report on the planned Odonata-fauna of Sachsen.] Address: Klaus, D., Heimstätten 10, D-04571 Rötha, Germany

**2989.** Klausnitzer, B. (2002): Libellen jagen schwärmende Ameisen - eine ältere Literaturangabe (Odonata). Ent. Nachr. Ber. 46(2): 134. (in German). [In 1897, Alexander Reichert published a paper "Aeschna cyanea MÜLL. und Formica rufa L." in the Entomologische Jahrbuch von Krancher 7: 190. He described a feeding aggregation of *A. cyanea* preying on swarming *F. rufa*. This paper is documented as verbatim.] Address: Klausnitzer, B., Lannerstr. 5, D-01219 Dresden, Germany

**2990.** Klein, J.-P. (2002): *Leucorrhinia pectoralis* (Große Moosjungfer) im Elsass. mercuriale 2: 13-16. (in German with French summary). [In 2000 and 2001, new localities of *L. pectoralis* in eastern France were traced. The habitats are described in detail along with a compilation of ancient and present known localities in Alsace.] Address: Klein, J.-P., Laboratoire d'Analyses et de Biologie Médicales Aubert, 22, rue des Carnes, F-54063 Nancy, France. E-mail: jpklein@free.fr

**2991.** Knaus, P.; Wildermuth, H. (2002): Site attachment and displacement of adults in two alpine metapopulations of *Somatochlora alpestris* (Odonata: Corduliidae). International Journal of Odonatology 5(2): 111-128. (in English). ["Site attachment and displacement of adult *S. alpestris* were studied by means of mark-release-resighting during two years at two clusters of ponds (A, B) ca 8 km distant from each other on opposite slopes of Prattigau Valley in the Swiss Alps. Data on 127 marked teneral in 1998 and 92 in 2000 at (A) were obtained. Additionally, in 1998, 187 and in 2000, 23 matures were marked at (A) and 162 at (B). No marked individuals were detected during the pre-reproductive period in the surroundings of the breeding sites. 14.0% of the males and 7.1% of the females marked as tenerals in 1998 were resighted at water subsequently. In 2000 the corresponding resighting rate was significantly lower due to a cold spell (4.0% and 2.4%, respectively). Only one male was resighted for the first time at its emergence pond. The resighting rates of marked adults at (A) were 59.2% (males) and 28.6% (females) in 1998, but only 5.6% and 0% in 2000, respectively. The corresponding resighting rates at (B) in 2000 amounted 27.1% (males) and 9.1% (females). Site attachment and displacement during the reproductive period differed between the two study sites. At (A) site attachment was modest and limited to the largest ponds. Many individuals shuttled between neighbouring ponds and some did so between waters distant up to 2 km from each other. Individuals at (B) exhibited stronger site attachment than at (A) with many being recorded exclusively at their marking water. No marked dragonfly was found to cross the main valley. We conclude that differences in site fidelity and displacement between the localities are due to weather conditions (affecting survival probability), population density (influencing competition) and separation of ponds by forest (inhibiting commuting flights)." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**2992.** Knijff, G. de.; Anselin, A.; Goffart, P. (2002): The Belgium Odonata Atlas Project: changes in distribution. Bull. Inst. Roy. Scien. Nat. Belg. 72 (Suppl.): 111-112. (in English). [The paper abstracts the results of the atlas-activities of the Belgian odonatologists which started in 1983. On the basis of a distribution map presenting data since 1990 the species turn-over with special emphasize to southern species is discussed, and some large scale distribution patterns are outlined.] Address: Knijff, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijff@instnat.be

**2993.** Koel, T.M.; Stevenson, K.E. (2002): Effects of dredge material placement on benthic macroinvertebrates of the Illinois River. Hydrobiologia 474(1-3): 229-238. (in English). ["Since the 1930s, dredge material has been removed from the Illinois River and placed a-

long the main channel border in shallow depths to maintain a 2.7 m deep main channel for commercial navigation. Placement of this material changes the sediment composition from primarily silt/clay to primarily sand, and it buries pre-existing benthic invertebrates. During 1997 and 1998, the benthos of an 125 km reach of the middle Illinois River (La Grange Reach) was studied by extracting 1065 Ponar samples from randomly-selected sites which had never received dredge material, received dredge material one year previous, or received dredge material during the current year. Although total numbers of macroinvertebrates collected was lower in 1998 than in 1997, relative abundances of eight targeted taxa were highly similar between years. Chironimidae were most abundant and comprised >66% of all macroinvertebrates collected both years. Differences in densities of Chironomidae, Ephemeroptera, Sphaeriidae, Corbicula fluminea (Müller, 1774), Dreissena polymorpha (Pallas, 1771), Odonata, and Gastropoda among the three classes of dredge material placement were all significant ( $P < 0.05$ ). For all taxa, densities were highest at sites that had never received dredge material; and, for all taxa except Chironimidae, densities were lowest at sites that received dredge material during the current year. No significant recovery by macroinvertebrates was noticed on dredge areas of this reach after one year ( $P > 0.05$ ). Future operations to maintain a channel for navigation should consider pre-existing densities of macroinvertebrate taxa. Because benthic macroinvertebrates are an important component of the food web and shifting sand does not support diverse macroinvertebrate communities, strategic placement of dredge material by avoiding islands or other areas of high macroinvertebrate diversity could improve overall system productivity and biotic integrity of large river-floodplains." (Authors)] Address: Koel, T.M., Illinois Natural History Survey, LTRMP Havana Field Station, 704 N. Schrader Ave, Havana, IL 62644, U.S.A. Present address: Center for Resources, P.O. Box 168, Yellowstone National Park, WY 82190, U.S.A. E-mail: toddkoel@nps.gov

**2994.** Korkeamäki, E.; Suhonen, J. (2002): Distribution and habitat specialization of species affect local extinction in dragonfly Odonata populations. *Ecography* 25(4): 459-465. ["The object of our study was to determine the effect of distribution and habitat specialization of odonate species on local extinction in streams in central Finland. We studied the local extinction of the 20 most abundant dragonfly (Odonata) species in 34 small creeks and brooks in central Finland. The historical presence of each studied species in our research area was confirmed using existing records gathered between 1930 and 1975. A minimum of five records was available for each species. During the summers of 1995 and 1996, we investigated the current persistence of 219 separate populations with historical presence. In total, 98 historical populations were vanished. As predicted, we found that species with a narrow distribution were less persistent than species with a broad distribution. Therefore, the extinction risk of a species was inversely related to the width of its regional distribution. Using reference works, species were categorized into two main breeding habitat types: lotic species or lentic species. The species main habitat type was a significant predictor of local extinction risk after statistical removal of the effect of regional distribution on extinction risk. The lotic species had lower local extinction risk than other species. Altogether, the highest extinction

risk was found in habitat-specialist species associated with peatlands, probably due to loss of natural breeding habitat. On the other hand, extinction risk was lower in widely distributed habitat generalist species than true lotic species. The local extinction within species was more common in small dynamic upstream than in larger stable downstream habitats. The results of this study are consistent with meta-population theory." (Authors)] Address: Korkeamäki, E., Karkunkatu 18 a 4 b, FIN-48600 Karhula, Finland

**2995.** Krokalo, L.A.; Davydenko, E.V. (2002): Notes on dragonflies (Insecta: Odonata) of Dnipropetrovsk region. *Ecology & Noospherology* 11(1-2): 91-94. (in English with Russian and Ukrainian summaries). [In August 2000, in the environs of the village Andryvka, Novomoskov district, Ukraine (45°15'N 35°00'E), 14 odonate species have been recorded. This enlarges the number district species to 21. Feeding aggregation of *Aeshna mixta* is briefly described.] Address: not stated

**2996.** Krotzer, S. (2002): *Gomphus septima* rediscovered in Alabama. *Argia* 14(2): 10. (in English). [Bibb County, Alabama, USA, 5 May 2002] Address: Krotzer, S., 6010 Woodvale Drive, Helena, AL 35080, USA. E-mail: smjkrotzer@aol.com

**2997.** Kuhn, J. (2002): *Sympetrum meridionale* am Schmiechener See, Schwäbische Alb: Entwicklungsnachweis und Habitate (Odonata: Libellulidae). *Libellula* 21(1/2): 57-63. (in German, with English summary). ["On 1 August 2000 six newly emerged individuals were recorded at the shallow lake "Schmiechener See" (9°44'E, 48°21'N; altitude 534 m, which oscillates strongly and irregularly in water-level. Habitats were a meadow and a ploughed field, both temporarily flooded and maintained for conservation purposes. The presence and abundance of Mediterranean dragonfly species at the "Schmiechener See" strongly increased during 1980-2001." (Author)] Address: Kuhn, J., Max-Planck-Inst. für Verhaltensphysiologie, Abt. Winckler, D-82319 Seewiesen. E-mail: kuhn@mpi-seewiesen.mpg.de

**2998.** Kunz, B. (2002): *Coenagrion ornatum* an einem ausgebauten Wiesengraben in Baden-Württemberg (Zygoptera: Coenagrionidae). *Libellula* 21(1/2): 49-55. (in German, with English summary). ["The species has not been recorded in this federal state of Germany since 1993. In mid-July 1996, a new locality was found in the northeast of the state. This is the first record ever made in this area. Exuviae and a fairly high number of individuals were recorded in all subsequent years. A description of the unusual habitat is given." (Author)] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de

**2999.** Lange, M.; Hofmann, T. (2002): Zum Beutespektrum der Rohrweihe *Circus aeruginosus* in Mecklenburg-Strelitz, Nordost-Deutschland. *Vogelwelt* 123: 65-78. (in German with English summary). ["Between 1995 and 1997 prey remains and pellets were collected from 61 Marsh Harrier nests in Mecklenburg Strelitz (North-east Germany) in order to study the diet composition. Seventy-six species of vertebrates (53 birds species, 14 mammals species) and 38 insect taxa were identified. Species numbers and proportions of prey types differed significantly between prey remains at the nest and pellets. Birds made up 63% of all prey remains but constituted only 23% in pellets where mammals



proved to be dominant with a content of 75% (prey remains 23%). [...] The determination of insect remains turned out to be a special problem and their origin in pellets could not always be accurately solved. Coleoptera, especially carabids, dominated with 87%. [...] Each one unidentified Anisoptera and Zygoptera could be found in the pellets too.] Address: Lange, M., F.-Mehring-Str. 20, D-17489 Greifswald, Germany. E-mail: morgus.lange@gmx.de

**3000.** Lecompte, T. (2002): *Symeptum danae* (Sulzer, 1776) espèce nouvelle pour le marais Vernier (Département de l'Eure). *Martinia* 18(2): 67-68. (in French with English summary). [After starting an intensive survey of Odonata in 1971, the discovery of *S. danae* lasted until August 1999; the species was discovered in and nearby the Nature Reserve Coutils de Bouquelon, France.] Address: Lecompte, T., R.N.V. des Courtils de Bouquelon, la Courtillère, la Vallée, F-27500 Bouquelon, France

**3001.** Leconte, M.; Ilbert, N.; Lapalisse, J.; Laporte, T. (2002): Le point sur les connaissances relatives aux odonates rares des pays de l'Adour (Gers, Landes, Pyrénées-Atlantiques, Hautes-Pyrénées). *Martinia* 18(2): 39-65. (in French with English summary). [72 odonate species have been recorded from the catchment of the River Adour, France. This river system encompasses several smaller rivers north of the Pyrenees-high mountains and the southwestern part of France. Recent and historical records of 32 species are discussed in detail] Address: Leconte, M., Quartie du Caü, F-64260 Arudy, France

**3002.** Leipelt, K.G.; Sommer, R.; Martens, A. (2002): Erratum zu *Libellula* 20 (3/4): 155-170: Territorialität bei *Oxygastra curtisii* (Odonata: Corduliidae). *Libellula* 21 (1/2): 77-78. (in German, with English summary). [In the original paper several lines are missing. These are published in this erratum.] Address: Leipelt, K.G., Zoologisches Institut -Öologie-, Technische Universität Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-Mail: k.leipelt@tu-bs.de

**3003.** *Lindenia* No. 36 (2002): LINDENIA. Notiziario dell'Ufficio nazionale italiano della Società odonologica internazionale, Napoli. *Lindenia* No. 36: 151-152. (in Italian). [Announcements of odonological symposia; new Italian dragonfly site in WWW; Dr. B. Kiauta received a decoration of the brother members of Oranje-Nassau. (see: [www.libellen.org/extra/decorated.html](http://www.libellen.org/extra/decorated.html))] Address: C. D'Antonio, Via A. Falcone 386/b, I-80127 Napoli, Italy; E-mail: lindenia@freemail.it

**3004.** Loman, J. (2002): *Rana temporaria* metamorph production and population dynamics in the field Effects of tadpole density, predation and pond drying. *J. Nat. Conserv.* 10: 95-107. (in English). ["This study investigates factors of importance for tadpoles survival and metamorph production in the common frog *R. temporaria*. It also assesses the importance of this for the population dynamics of the species. Eighteen ponds were studied for up to 8 years. Data collected each year included: number of spawn clumps deposited, tadpole number and metamorph number. The permanency of the ponds was also recorded each year. Measures were taken of predator density. There was no suggestion of density dependence in the survival of tadpoles. In contrast, the number of spawn clumps deposited per pond area was highest for ponds with high survival.

Density of predators (sticklebacks, newts and invertebrates [including "larval Anisopteran"]) was negatively correlated to tadpole and metamorph survival. This was true both within (among years) and among ponds. Several of the study ponds dried completely before metamorphosis in some years. However, those ponds also were those with the smallest number of predators and in years with successful metamorphosis, these ponds produced more metamorphs than more permanent ponds. An analysis of the year to year dynamics showed that population size (number of deposited spawn clumps) was correlated to that in the previous year, suggesting a fairly high adult survival, but also on the number of metamorphs emerging two or three years before (corresponding to the age of sexual maturity of the species). It is concluded that the aquatic stage is not strongly limiting in these ponds but conservation efforts should be focused on the terrestrial habitat. Also, the study stresses the value of temporary ponds, despite the fact that recruitment often fails totally in these." (Author)] Address: Loman, J., Department of Animal Ecology, Lund University, SE-223 62 Lund, Sweden; e-mail: jon.loman@zoekol.lu.se

**3005.** Lopez, R. (2002): X-50 Dragonfly poised for takeoff. *Aerospace America* 40(4): 30-34. (in English). [Although designed as a vertical takeoff and landing aircraft, the Dragonfly will be able to achieve much higher forward speeds than conventional manned helicopters. Its design combines the low disk-loading hover efficiency and low-speed flight characteristics of a helicopter with the high subsonic cruise speed of a fixed-wing aircraft. This new developed aircraft obviously integrates some of the flight characteristics of the Anisoptera, and this may be a reason to name it "Dragonfly".] Address: not stated

**3006.** Lotzing, K. (2002): Die aktuelle Libellen-Fauna (Odonata) der Bergbaufolgegewässer im Bereich der Egelner Mulde innerhalb der Bodeniederung des Landkreises Aschersleben-Staßfurt (Sachsen-Anhalt). *Entomologische Nachrichten und Berichte* 46(2): 85-89. (in German with English summary). [Prior brown coal mining, which started in the first half of 20th century, the region was quite poor in water bodies. This situation changed significantly after ceasing mining activities: the excavations filled with groundwater, and in some cases interesting habitats developed. The Odonata were studied between 1980 and 2001 intensively. A total of 31 species including species of regional interest could be traced: *Calopteryx splendens*, *Lestes barbarus*, *L. dryas*, *L. virens*, *Erythromma viridulum*, *Aeshna affinis*, *Anaciaeschna isosceles*, *Anax parthenope*, *Libellula fulva*, and *Sympetrum pedemontanum*. In addition, records of *Lestes barbarus*, *Erythromma viridulum*, *Brachytron pratense*, *Aeshna affinis*, and *Sympetrum flaveolum* should be mentioned too. The species are listed for each of the 15 surveyed waterbodies, and are zoogeographically classified.] Address: Lotzing, K., Am Hollschen Bruch 4c, D-39435 Unseburg, Germany

**3007.** Luglia, M.; Luglia, T. (2002): Comptage de larves d'*Aeshna cyanea* (Müller, 1764). *Martinia* 18(1): 28. (in French). [273 larvae of *A. cyanea* were recorded in a small basin near Sault, Vaucluse, France. The habitat is characterised.] Address: Luglia, M.; Luglia, T., La Fontaine de Durefort, F-84390 Saint Jean de Sault, France

**3008.** Machado, A.B.M. (2002): Description of *Lauro-macromia flaviae* spec. nov., with notes on the holotype of *L. luismoojeni* (Santos) (Anisoptera: Corduliidae). *Odonatologica* 31(3): 313-318. (in English). [*L. flavia* sp. n. (male holotype: Jaboticatubas, Minas Gerais, Brasil, 14-1-1975; deposited in Author's collection), is described, illustrated, and compared with the males of the two congeners *L. luismoojeni* and *L. dubitalis*. Some amendments are made on the original description of *L. luismoojeni*, based on the examination of the holotype.] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federale de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil

**3009.** Manteifel, Y.B.; Reshetnikov, A.N. (2002): Avoidance of noxious tadpole prey by fish and invertebrate predators: Adaptivity of a chemical defence may depend on predator feeding habits. *Archiv für Hydrobiologie* 153(4): 657-668. (in English). ["We conducted laboratory experiments where different types of predators were allowed to prey on noxious versus non-noxious tadpoles. The introduced fish *Perccottus glenii* showed prey selectivity: while actively consuming all seized tadpoles of *Rana arvalis* and *Rana temporaria*, it consumed significantly fewer *Bufo bufo* tadpoles. When a *Bufo* tadpole was seized, it was frequently rejected after intraoral testing without much damage done to the tadpole. Nymphs of the dragonfly *Aeshna cyanea*, chewing captured prey, also consumed significantly more tadpoles of *Rana* spp. than *Bufo*. Seized *Bufo* tadpoles were as a rule released seriously damaged. The *Aeshna* readily caught the next *Bufo* tadpole. On the contrary, larvae of the diving beetle *Dytiscus marginalis*, who suck out their prey, did not reject *Bufo* tadpoles. Hence, the relative unpalatability of the *Bufo* tadpoles may provide them with a satisfactory defence against *Perccottus*, an incomplete defence against *Aeshna*, and no protection against *Dytiscus*. It is possible that the relative unpalatability of *Bufo* tadpoles increases their population mortality in ponds with high *Aeshna* density."] (Authors)] Address: Manteifel, Y.B., A. N. Severtsov Institute of Ecology and Evolution, Russian Academy of Science, Leninsky pr. 33, Moscow, 117071, Russia. E-mail: sevin@orc.ru

**3010.** Mashaal, M. (2002): *Somatochlora metallica* (Vander Linden, 1825), espèce nouvelle pour la Corse (Odonata, Corduliidae). *Martinia* 18(1): 25-27. (in French with English summary). [*Somatochlora metallica meridionalis* was recorded on 13 July, 2001 app. 15 km SE of Ajaccio, Corsica, France. Habitat and taxonomic status are discussed.] Address: Mashaal, M., 89 avenue Emile Zola, F-75015 Paris, France. E-mail: mashaal@club-internet.fr

**3011.** Matushkina, N.; Gorb, S. (2002): Stylus of the odonate endophytic ovipositor: A mechanosensory organ controlling egg positioning. *Journal of Insect Physiology* 48(2): 213-219. (in English). ["Using light and scanning electron microscopy, a sensory field consisting of 15-20 campaniform sensillae is described on the base of the stylus of the endophytic ovipositor of Odonata. It is hypothesised that two symmetric styli equipped with this number of sensillae can function as a mechanosensory organ responsible for control of precise egg positioning in plant stems during oviposition. In laboratory experiments with females of *Lestes sponsa* and *L. barbarus*, it was demonstrated that the distance

between laid eggs is not dependent on the presence of styli. Removal of styli from both sides did not influence a shift of oviposition to one side. Females with one removed stylus shifted the clutch line in the opposite direction toward the removed stylus. Additionally, removal of styli influenced positions of single eggs in egg sets, and disturbed the capacity for complex oviposition. Thus, both morphological and experimental data support the hypothesis that styli participate in the control of egg line and egg patterning in the clutch."] (Authors)] Address: Gorb, S., Max-Planck-Institut für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. E-mail: stas.gorb@tuebingen.mpg.de

**3012.** May, M.L.; Baird, J.M. (2002): A comparison of foraging behavior in two "percher" dragonflies, *Pachydiplax longipennis* and *Erythemis simplicicollis* (Odonata: Libellulidae). *Journal of Insect Behavior* 15(6): 765-778. (in English). ["Feeding behaviors of two adult libellulid percher dragonflies, *Pachydiplax longipennis* and *Erythemis simplicicollis*, were compared. All results pertain to feeding from natural perches located some distance away from reproductive rendezvous sites. Compared to *P. longipennis*, *E. simplicicollis* chose broader and less structurally discrete perches, moved more frequently and over a larger area, and took, on average, much larger prey, although diet overlapped broadly in the two species. *Erythemis* made more frequent feeding flights but with a much lower success rate than *Pachydiplax*; consequently the prey capture rate was similar in the two species. Gut contents of mature, but not of immature, *E. simplicicollis* comprised a significantly greater proportion of body mass than in *P. longipennis*, apparently confirming the importance of larger prey in the diet of the former. (Authors)] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu

**3013.** May, M.L. (2002): Phylogeny and taxonomy of the damselfly genus *Enallagma* and related taxa (Odonata: Zygoptera: Coenagrionidae). *Systematic Entomology* 27: 387-408. (in English). ["The zygopteran genus *Enallagma* has been the subject of numerous behavioural and ecological studies, but phylogenetic relationships among species have been examined only within eastern North America, and even the composition and diagnosis of the genus are unclear on a world-wide basis. Most authorities currently recognize about seventy species within *Enallagma*, comprising two major radiations, in North America and Africa. This study, using morphological data, demonstrates that the North American and a few related Palaearctic species form a monophyletic group that is quite distinct from the African species. The latter are themselves divided into at least three, and probably four, separate clades, one of which may be related to *E. parvum* of India. Consequently, three of Kennedy's long disused genera, *Africallagma*, *Amphiallagma* and *Proischnura* (Kennedy, 1920) are resurrected and two new genera, *Azuragrion* gen.n. and *Pinheyagrion* gen.n. are established for the remaining African taxa. Finally, *Enallagma* is divided into two subgenera, *Enallagma* s.s., the typical 'bluets', including many North American, Holarctic and Palaearctic species, and *Chromatallagma* subgen.n., comprising a group of species of more variable colour that is confined to North America, the Caribbean and northernmost South America." (Author)] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook

College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu

**3014.** McMillan, V. (2002): 2nd WDA International Symposium of Odonatology, July 22-27, 2001. *Argia* 13(4): 4-5. (in English). [Personal account of the 2nd WDA symposium in Gällivare, Sweden.] Address: McMillan, Vicky, Colgate Univ., Dept. Biol., 13 Oak Dr. Hamilton, NY 13346-1398, USA. E-mail: vmcmillan@mail.colgate.edu

**3015.** Meurgey, F. (2002): Les collections d'odonates du Muséum d'Histoire naturelle de Nantes. 2. Collection G. Broquet. *Inventaire et révision. Martinia* 18(1): 13-24. (in French with english summary). [The collection with 50 species from the mainland of France and the isle of Corsica includes in most cases specimens collected in the 1950th. The collection data are listed in detail.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France

**3016.** Meurgey, F. (2002): Un cas de colonisation par les odonates d'un milieu modifié par les tempêtes de décembre 1999 en Ile-d-France. *Martinia* 18(1): 27-28. (in French). [10 months after the heavy storms that broke some forests, a small brook was settled by *Enallagma cyathigerum*, *Anax imperator*, and *Orthetrum cancellatum*. This brook formerly had been heavily shaded by oaks, and therefore was unsuitable for Odonata.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France

**3017.** Mitra, T.R.; Prasad, M.; Sinha, C. (2002): A note on Odonata recorded from Nagaland, northeastern India. *Opusc. zool. flumin.* 201: 1-6. (in English). [The history of the odonate recording in Nagaland, India is outlined, and 35 species along with collecting data are brought on record.] Address: Mitra, T.R., Zool. Surv. India, M Block, New Alipore, Calcutta-700053, India

**3018.** Monetti, L.; Sanchez-Guillen, R.A.; Cordero Rivera, A. (2002): Hybridization between *Ischnura graellsii* (Vander Linder) and *I. elegans* (Rambur) (Odonata: Coenagrionidae): Are they different species?. *Biological Journal of the Linnean Society* 76(2): 225-235. (in English). ["Two closely related damselflies, *Ischnura graellsii* and *I. elegans*, were analysed for morphological differences and reproductive isolation in the north coast of Galicia (NW Spain). We compared animals from sympatric and allopatric localities, including *I. elegans* from Belgium and *I. graellsii* from southern Spain as pure allopatric populations. A set of morphometric characters were studied by means of multivariate discriminant analysis to determine if these two species can be unambiguously distinguished. Discriminant analysis revealed that *I. graellsii* and *I. elegans* are well differentiated on the first two axis (86% and 11%, respectively). *I. graellsii* individuals are distinguished from *I. elegans* by their smaller size and, specifically, by their narrower and shorter wings and shorter tibiae. In addition, *I. elegans* has a narrower space between the branches of each cercus, and greater distance between the branches of each paraproct. Sympatric individuals are morphologically intermediate, suggesting hybridization. When the species were put together in the laboratory, they showed partial temporal separation in mating behaviour, but males of *I. elegans* readily mated with females of *I. graellsii*, and hybrid individuals were obtained. The opposite heterospecific cross was almost impossible, apparently because of mechanical problems

with the tandem linkage. Laboratory-reared hybrids (from male *I. elegans* X female *I. graellsii*) are morphologically intermediate, mainly resembling the maternal phenotype. Although hybridization between both taxa is common, we suggest maintaining the specific status for both phenotypes because they show incipient reproductive isolation, as it is reported in the literature." (Authors)] Address: Monetti, Liliana, Departamento de Ecología e Biología Animal, Universidade de Vigo, EUET Forestal, Campus Universitario, 36005, Pontevedra, Spain. E-Mail: lmonetti@uvigo.es

**3019.** Müller, J.; Wüstemann, O.; Müller, R.; Steglich, R. (2002): Neufunde von *Cordulegaster bidentata* im Harz und *Epitheca bimaculata* im Elbtal (Odonata) - zur Roten Liste Sachsen-Anhalt. *Entomol. Mitt. Sachsen-Anhalt* 9(2): 47-49. (in German). [The paper compiles and discusses extensively new records of *Thecagaster bidentata* and *E. bimaculata* in Sachsen-Anhalt, Germany. These records cause the modification of the classification of the species in the Red List of endangered Odonata of the Federal State Sachsen-Anhalt.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**3020.** Müller, O. (2002): Die Habitate von Libellenlarven in der Oder (Insecta, Odonata). *Naturschutz und Landschaftspflege in Brandenburg* 11(3): 205-212. (in German). [The River Oder along the German-Polish border harbours one of the most important populations of different gomphid species in Central Europe. Exemplified for the middle stretches of the river, the habitats of *Gomphus vulgatissimus*, *Stylurus flavipes*, and *Ophiogomphus cecilia* are described and analysed in detail. Sedimentation between groynes is the main determinant for habitat quality for the species. In dependence of velocity of water flow and substrat, different substrat types are provided which are used species specific by larvae. This paper provides a significant contribution to the understanding of habitat use by dragonflies in a dynamic ecosystem. In addition, special emphasize is given to aspects of conservation measures. The illustrations and photographs attribute significant information too.] Address: Müller, O., Birkenweg 6d, D-13206 Libbenichen, Germany. E-mail: olemueller@freenet.de

**3021.** Murry, C. (2002): Dragonfly conservation from the BDS. *Atropos* 16: 78-79. (in English). [It is intended to establish a regular column in *Atropos* dedicated to dragonfly conservation. Some main factors causing threat to Odonata are discussed, and ideas to broaden knowledge on conservation measures ("management fact files") are outlined.] Address: not stated

**3022.** Nakatani, M.; Ubukata, H. (2002): Some Dragonflies Collected from Kuril Islands and Sakhalin. *Bulletin of The Hokkaido Odonatological Society* 14: 12-15. (in English with Japanese summary). [*Coenagrion ecornutum*, *Enallagma circulatum*, *Lestes dryas*, and *Pantala flavescens* have been recorded from Sakhalin, *Aeshna juncea* and *P. flavescens* from the Kurile Islands (Paramushir, Matua) in July 2000.] Address: Ubukata, H., Hokkaido University of Education at Kushiro, Dept Science Education, Shiroyama 1-15-55, Kushiro, 085, Japan. E-mail: ubukata@kus.hokkyodai.ac.jp

**3023.** Nishu, S. (2002): Discovery of an exceptional habitat of *Libellula angelina* Selys. *Tombo* 44: 31-32. (in Japanese with English summary). [An exceptional habi-



tat of *L. angelina* was found in Kasai City, Hyogo Prefecture, Japan. This endangered species was considered to inhabit typically ponds with sparse vegetation of *Phragmites australis*, *Typha latifolia* and *Zizania latifolia*. 12 exuviae of this species were found on the concrete breast wall of Pond B where *Paspalum distichum* grows sparsely on April 22-IV-2001. On subsequent days until May 13, several males patrolling in their territories and a female ovipositing were observed.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisq.net

**3024.** Novelo-Gutierrez, R.; Gomez-Anaya, J.A.; Arce-Perez, R. (2002): Community structure of Odonata larvae in two streams in Zimapan, Hidalgo, Mexico. *Odonatologica* 31(3): 273-286. (in English). ["Community structure of odonate larvae was investigated at El Saucillo (ES) and San Francisco (SF) streams, from August 1995 to July 1996. Species richness (S), species composition, Margalef's richness index (R), Shannon-Wiener's diversity index (H'), Hill's evenness index (E), and rareness (Rs) were used to describe and compare the communities. Annual variation of the indices was examined within and among streams. Streams were significantly different in terms of physical/chemical variables, and faunistic similarity between the communities was quite low (37%). Mean larval density was highest at ES, but the remaining parameters were highest at SF. Global richness was 31 spp. and some species such as *Hetaerina americana*, *Enallagma civile*, *Anax junius*, *Erpetogomphus elaps*, *Dythemis nigrescens*, *Aeshna multicolor*, *A. dugesi*, *Erythemis plebeja* and the majority of *Argia* spp. were only found at SF. More abundant spp. at SF were *Pseudoleon superbus*, *Telebasis salva*, *Libellula saturata* and *Enallagma praevarum*, while those more abundant at ES were *Paltothemis lineatipes* and *Argia anceps*." (Authors)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx

**3025.** Orr, A.G. (2002): Notes on the *Rhinocypha cucullata* Selys group from Borneo, with a description of *R. viola* spec. nov. (Zygoptera: Chlorocyphidae). *Odonatologica* 31(3): 287-295. (in English). ["The new species from the central Kalimantan province of Borneo is described and figured. The original type series of *R. cucullata* Selys was examined and a male specimen is designated as lectotype. The single female syntype is shown to in fact be *R. humeralis* Selys. The true female *R. cucullata* is described and figured for the first time. Significant characters of *R. aurofulgens* Laidlaw are figured for comparative purposes. Keys are provided to both sexes of the three species, comprising the extended *cucullata* group of F.F. Laidlaw (1950, *Trans. R. ent. Soc. Land.* 101: 233-269)." (Author)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**3026.** Orr, A.G. (2002): Photographing dragonflies in tropical rainforest. *Austrolestes* 5: 3. (in English). [Special emphasize is given to light conditions in tropical rainforests, and technical possibilities to take photos of dragonflies under this restricting conditions.] Address: Orr, A.G., Cooperative Research Centre for Tropical

Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**3027.** Parr, A. (2002): Lesser Emperor *Anax parthenope* Update. *Atropos* 16: 78. (in English). [Verbatim: "The number of *A. parthenope* seen in Britain since the initial discovery of the species in 1996 now totals at least 45 individuals. Of those dragonflies that were sexed, some 92% have been males with only 8% (3 individuals) being female. Genuine imbalances in the sex ratio of migrating dragonflies have sometimes been noted during periods of visible migration, particularly for darters *Sympetrum* spp., but there are also instances/species where a more equal sex ratio is apparent (Bertram & Haacks 1999, *Libellula* 18: 89-94). The pronounced bias towards records of males in the case of Lesser Emperors seen in Britain must surely in part reflect behavioural differences that make males, especially those holding territory, much more easy to spot than females. One other factor that also needs to be taken into account when considering the British records is the likelihood that females are still being overlooked. Few identification guides as yet contain any illustrations of the female, and with different colour forms existing (Parr 2001) even one picture is not really enough. To facilitate identification of females and to supplement the illustration in Brooks & Lewington (1999) two colour forms are now illustrated on Plate 8 (of *Atropos* 16). It will be of interest to see if more records of females are forthcoming in the next few years, not least in the context of regular breeding in this country." ] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

**3028.** Parr, A. (2002): Migrant and dispersive dragonflies in Britain during 2001. *J. Br. Dragonfly Society* 18(1/2): 40-45. (in English). [Information referring to the following species are provided: *Calopteryx virgo*, *Ischnura pumilio*, *Erythromma najas*, *E. viridulum*, *Aeshna cyanea*, *A. mixta*, *Anax parthenope*, *Cordulia aenea*, *Libellula depressa*, *Orthemis brunneum*, *O. cancellatum*, *Sympetrum striolatum*, *S. fonscolombii*, and *S. darnae*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

**3029.** Paulson, D.R. (2002): Odonata records from Nayarit and Sinaloa, Mexico, with comments on natural history and biogeography. *Odonatologica* 31(4): 359-370. (in English). ["Although the odonate fauna of the Mexican state of Nayarit has been considered well-known, a 7-day visit there in Sept. 2001 resulted in records of 21 species new for the state, bringing the state total to 120 species, fifth highest in Mexico. Records from a 2-day visit in Aug. 1965 are also listed, many of them the first specific localities published for Nayarit, and the first records of 2 species from Sinaloa are also listed. The biology of most neotropical species is poorly known, so natural-history notes are included for many species. A storm-induced aggregation and a large roost of dragonflies is described. The odonate fauna of Nayarit consists of 2 primary elements: a large number of neotropical species reaching their northern known limits, and a montane fauna of the drier Mexican Plateau. At least 57 species of tropical origin reach their northern distribution in the western Mexican lowlands in or N of Nayarit, and these limits must be more accurately defined to detect the changes in distribution that may be taking place with global climate change." ]

(Author)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**3030.** Peiffer, B. (2002): Interesting encounter between *Dromogomphus* and *Sympetrum*. *Argia* 13(4): 14. (in English). [Using some military terms, an encounter between two adults of *Dromogomphus spinus* and *Sympetrum spec.* is reported; 29 July 2001, New York, USA.] Address: Peiffer, B, bryan@VermontBirdTours.com

**3031.** Peiffer, B. (2002): Vermont Ode Study Group. *Argia* 13(4): 15-16. (in English). [Short report about the scheduled activities of the newly founded Vermont Ode Study Group, USA.] Address: Peiffer, B, bryan@VermontBirdTours.com

**3032.** Petzold, F. (2002): Erster Nachweis von *Leucorrhinia albifrons* in Thüringen (Odonata: Libellulidae). *Libellula* 21(1/2): 37-39. (in German, with English summary). [An exuvia was recorded in a drinking-water reservoir near the village of Remptendorf on 19-06-2001. The habitat is described, and the closest regional records are discussed.] Address: Petzold, F., Pappelallee 73, D-10437 Berlin, Germany. E-mail: falkpetzold@web.de

**3033.** Petzold, F. (2002): *Gomphus vulgatissimus* wieder in der thüringischen Saale (Odonata: Gomphidae). *Libellula* 21(1/2): 41-43. (in German, with English summary). ["On 19 May 2001, a larva was recorded in the river Saale between Stoben and Kaatschen 19 km NNW of Jena. The species was proved again to exist in Thuringia, Germany. The most recent previous record was 1960. The species became extinct because of heavy pollution of the river." (Author)] Address: Petzold, F., Pappelallee 73, D-10437 Berlin, Germany. E-mail: falkpetzold@web.de

**3034.** Pfau, H.K. (2002): Tandem grip mechanics and tandem linkage shifting in Odonata - reconstruction of evolution and phylogenetic significance. *International Journal of Odonatology* 5(2): 129-179. (in English). ["The functional morphology of the male caudal clasping apparatus of Zygoptera is compared to that of Epiophlebia superstes (Anisozygoptera) and Anisoptera. Hypotheses concerning the mechanics and muscle functions have been advanced by parallel construction of mechanical working models. The evolution of the clasping apparatus and the tandem linkage shifting - from the female pronotum to the head - in the stem group of the Anisozygoptera + Anisoptera (Neoconjuncta) is reconstructed, beginning with a system, which in essential characters resembles that of Epallage fatime (Euphaeidae). New acquisitions of the Neoconjuncta, Anisozygoptera and Anisoptera are described and interpreted. An interdependent evolution of the clasping apparatus + tandem linkage and the flight apparatus is discussed. Characters of both systems in the Euphaeidae and the Neoconjuncta are evaluated as synapomorphies, establishing a group Heteronoda. The Zygoptera are substantiated as a paraphyletic group. The functional morphology of the motion system of the cercal and epiproctal filaments of the Ephemeroptera has been studied for comparison. It shows strongly autapomorphic features, adapted to the display flight." (Author)] Address: Pfau, H.K., Rathenastr. 14, D-65326 Aarbergen, Germany. E-mail: clauspfau@web.de

**3035.** Reeves, D. (2002): From the president. *Austrolestes* 5: 1-4. (in English). [D. Reeves stresses on some contents of *Austrolestes*, gives extensive information on the forthcoming WdA-meeting in Australia in January 2003, and provides a (commented) key of the Australian members of the genus *Orthetrum*.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**3036.** Reeves, D. (2002): From the president. *Austrolestes* 3: 1-3. (in English). [A brief note on dragonfly habitats worth to visit in Herston, Australia, recent odonatalogical publications, 'Questions and Answers', and a new frog book are published.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**3037.** Reeves, D. (2002): From the president. *Austrolestes* 4: 1-4. (in English). [D. Reeves introduces the issue No. 4 of *Austrolestes*, and stresses the autumn species *Cordulephya pygmaea*. Under the aspect of climate change, the notes of Deniss's disappointing dragonfly summer may be of some interest: some of the creeks ceased running, and water tables of standing waters falls at app. 1 meter down to extraordinary drought conditions. Thus, some species could not be traced. The issue closes with some thoughts on future improvement and development of *Austrolestes*.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**3038.** Reeves, D. (2002): Key to the males of *Diphlebia* (Amphipterygidae). *Austrolestes* 4: 3. (in English). [The key is a reproduction from Watson et al. (1991): *The Australian Dragonflies*.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**3039.** Reeves, D. (2002): Species profile: *Cordulephya pygmaea*. *Austrolestes* 4: 2. (in English). [The endemic Australian genus *Cordulephya* is introduced, and a key for identifying adults is provided. A few notes on habitat and habits of *C. pygmaea* are given.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**3040.** Reeves, D. (2002): Species profile: Jade Hunter - *Austrogomphus ochraceus* (Selys, 1869). *Austrolestes* 5: 3. (in English). [Some information on the habits of this stream-dwelling species are outlined.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**3041.** Reeves, D. (2002): Species profile: *Telephlebia cyclops* Tillyard. *Austrolestes* 3: 4. (in English). [The genus *Telephlebia* is briefly introduced, and (the crepuscular) *T. cyclops* is presented with emphasize on roosting behaviour at day.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**3042.** Rehn, A.; Paulson, D. (2002): *Orthemis discolor* from Arizona. *Argia* 14(2): 11. (in English). [The specimens were caught 22 August 1977 in Arizona, USA. *O. discolor* museum material is compared with *O. ferruginea*, and colour differences in preserved specimens are outlined.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**3043.** Reinhardt, K.; Köhler, G. (2002): Bedeutung aktueller Befunde der Verhaltensökologie für den Artenschutz. *Naturschutz und Landschaftsplanung* 34(6): 171-180. (in German with English summary). [Exemplified on the basis of most recent research on grasshopper (meta-)population ecology and behaviour, the authors make a highly significant contribution on conservation of insect populations. Klaus Reinhardt, a well known German odonatologist, makes in this paper some references to odonatological research too.] Address: Reinhardt, K., Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: bgykr@leeds.ac.uk

**3044.** Reinhardt, R.; Findeis, T.; Fischer, U. (2002): "Grünes Band" Sachsen - der sächsisch-bayerische Grenzstreifen. *Mitt. sächs. Ent.* 60: 14-20. (in German). [The former boundary between GDR and FRG developed to a 'green band' with a high species diversity including numerous highly endangered species. A survey of the stretch between Sachsen and Bayern yielded in 28 Odonata. Only the red listed species are documented.] Address: Reinhardt, R., Burgstädter Str. 80a, D-09648 Mittweida, Germany. E-mail: Reinhardt-Mittw@t-online.de

**3045.** Relyea, R.A. (2002): Costs of Phenotypic Plasticity. *American Naturalist* 159(3): 272-282. (in English). ["Phenotypically plastic organisms display alternative phenotypes in different environments. It is widely appreciated that possessing alternative phenotypes can affect fitness. However, some investigators have suggested that simply carrying the ability to be plastic could also affect fitness. Evolutionary models suggest that high costs of plasticity could constrain the evolution of optimal phenotypes. However, costs (and limits) of plasticity are primarily hypothetical. Little empirical evidence exists to show that increased plasticity leads to reduced growth and development, leads to increased developmental instability, or limits the ability of organisms to produce more extreme phenotypes. I used half-sib families of larval wood frogs (*Rana sylvatica*) reared in outdoor mesocosms to examine how tadpoles altered behavioral, morphological, and life-historical traits in response to larval dragonfly predators (*Anax longipes*). The predators induced lower activity and the development of relatively large tails and small bodies in wood frogs. As a result, wood frogs experienced reduced growth and development. I then examined whether tadpole sibships with higher plasticity experienced fitness costs (above and beyond the costs of expressing a particular phenotype) and whether they were limited in producing extreme phenotypes. Fitness effects of plasticity were widespread. Depending on the trait examined and the environment experienced, increased plasticity had either positive effects, negative effects, or no effects on tadpole mass, development, and survivorship. I found no relationship between increased plasticity and greater developmental instability. There was also no evidence that sibships with increased plasticity produced less extreme phenotypes; the most extreme trait states were always produced by the most plastic genotypes. This work suggests that costs of plasticity may be pervasive in nature and may substantially impact the evolution of optimal phenotypes in organisms that live in heterogeneous environments." (Author)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburg, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**3046.** Relyea, R.A. (2002): Local population differences in phenotypic plasticity: predator-induced changes in wood frog tadpoles. *Ecological Monographs* 72(1): 77-93. (in English). ["Taxa that are divided into separate populations with low levels of interpopulation dispersal have the potential to evolve genetically based differences in their phenotypes and the plasticity of those phenotypes. These differences can be due to random processes, including genetic drift and founder effects, or they can be the result of different selection pressures among populations. I investigated population-level differences in predator-induced phenotypic plasticity in eight populations of larval wood frogs (*Rana sylvatica*) over a small geographic scale (interpopulation distances of 0.3-8 km). Using a common-garden experiment containing predator and no-predator environments, I found population differences in behavior, morphology, and life history. These responses exhibited a habitat-related pattern: the four populations from closed-canopy ponds did not differ from each other in any of their phenotypes whereas the four populations from open-canopy ponds did differ from each other in these traits. This phenotypic pattern matches the pattern of competitors and predators found in these two types of ponds. Based on two years of pond surveys, the four closed-canopy ponds contained very similar competitor and predator assemblages while the assemblages of the four open-canopy ponds were more diverse and highly variable among open-canopy ponds. When combined with past studies, which demonstrate that predators and competitors select for alternative behavioral and morphological traits, these patterns suggest that the population differences may have arisen via natural selection and not via random mutation or drift. In a second experiment, I cross-transplanted two of the populations into each other's ponds to determine if the populations were locally adapted to the conditions of their native pond (using low and high competition crossed with the presence or absence of a lethal predator). The populations continued to exhibit phenotypic differences, and one of the two populations tested exhibited superior growth in its native pond. This suggests that some wood frog populations are adapted to the local conditions of their natal pond and that localized selection by predation and competition may be the underlying mechanism. Collectively, these experiments indicate that taxa that are divided into discrete populations and face different predator and competitor environments can evolve different phenotypically plastic responses." (Author) Odonate predators were aeshnid and libellulid dragonflies, not further specified.] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburg, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**3047.** Relyea, R.A.; Yurewicz, K.L. (2002): Predicting community outcomes from pairwise interactions: integrating density- and trait-mediated effects. *Oecologia* 132: 569-579. (in English). ["[...] many species change their behavior and morphology with different predators and competitors and, thus, change their per-capita interaction rates (i.e. trait-mediated interactions). Our objective was to use a simple experimental community of two predators (larval dragonflies, *Anax longipes*, and larval salamanders, *Ambystoma tigrinum*), two prey (larval green frogs, *Rana clamitans*, and larval bullfrogs, *R. catesbeiana*), and a shared prey resource to determine whether we can predict interactions in a reassembled community by combining our knowledge of density- and trait-mediated interactions. We combined



pairwise laboratory experiments on predation rates and predator-induced behaviors with a mesocosm experiment to examine density- and trait-mediated effects. We used a factorial combination of no predators, caged Anax (to induce anti-predator traits without changing prey density), and lethal Anax crossed with no predators, caged *Ambystoma*, and lethal *Ambystoma*. The species interactions in the reassembled community were qualitatively predictable based on the pairwise experiments. Lethal Anax preyed upon *Ambystoma* and green frogs while lethal *Ambystoma* only preyed upon green frogs. Anax also reduced the activity of the green frogs; this caused a decrease in salamander predation on green frogs, a decrease in green frog acquisition of resources, and an increase in bullfrog acquisition of resources. *Ambystoma* had no effect on green frog activity, no effect on resource acquisition by green frogs, and no effect on resource acquisition by bullfrogs. These results suggest that we can better understand how species interact in natural communities if we have a more detailed understanding of trait-mediated mechanisms. However, if predicting the structure of large communities requires identifying how each species alters its traits in the presence of all other species along with altering density, improving our predictive ability may be a prohibitively large undertaking." (Authors)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**3048.** Röhn, C. (2002): *Écologie de Lestes dryas* Kirby, 1890 et de *Sympetrum flaveolum* (L., 1758) dans le sud-ouest de l'Allemagne. *Martinia*, Hors Série 4: 109-114. (in French with English and German summaries). ["The most important habitats colonised by *L. dryas* in south-western Germany are extensively managed fishponds, small waterbodies and marshes. As a rule the shallow parts of the waters are well developed. In most cases strong oscillations of the water level were observed. The most attractive plant communities for *L. dryas* are the *Caricetum rostratae*, the *Caricetum vesicariae*, the *Caricetum gracilis* and the community of *Glyceria fluitans*. The colonised plant communities are 40 to 100 cm high and cover between 20 and 90 %. *S. flaveolum* prefers marshes which are normally dominated by sedges or rushes as well as extensive silting up areas of lakes and ponds. Strong oscillations of the water level and the existence of extensive areas with shallow water are essential for the presence of this species. Open water surfaces without vegetation are of no importance. The most attractive plant communities for *S. flaveolum* are the *Caricetum gracilis*, the *Caricetum distichae* and the *Caricetum vesicariae*. These communities are 40 to 100 cm high and cover between 50 and 95 %." (Author)] Address: Röhn, C., Mettnauweg 4, D-88048 Friedrichshafen, Germany

**3049.** Rose, J.S. (2002): Dragonfly days (Lower Rio Grande Valley). *Argia* 14(2): 5-6. (in English). [Texas, USA; brief report of records from a few localities including the rare *Aeshna psilus*.] Address: not stated

**3050.** Rowe, D.K.; Konui, G.; Christie, K.D. (2002): Population structure, distribution, reproduction, diet, and relative abundance of koaro (*Galaxias brevipinnis*) in a New Zealand lake. *Journal of the Royal Society of New Zealand* 32(2): 275-291. (in English). ["[...] Overall, the diet of lake-dwelling koaro was dominated by purse caddis larvae (*Paroxythira* sp.), but small fish (<70 mm

also fed extensively on *Daphnia*, whereas larger ones (>90 mm) fed on Odonata larvae, snails, and common bullies. [...]"] (Authors)] Address: Rowe, D. K., National Institute of Water and Atmospheric Research Limited, NIWA, P.O. Box 11 115, Hamilton, New Zealand. E-Mail: d.rowe@niwa.cri.nz

**3051.** Rowe, R. (2002): Rearing dragonflies. *Austrolestes* 3: 2-3. (in English). [Based on a long year experience with rearing Odonata, R. Rowe provides significant information for successful odonate rearing from the egg stage to the imago. Special emphasis is given to the provision of food, and the feeding of early stage larvae.] Address: Richard.Rowe@jcu.edu.au

**3052.** Rowe, R.J. (2002): Agonistic behaviour in final-instar larvae of *Agriocnemis pygmaea* (Odonata: Coenagrionidae). *Australian Journal of Zoology* 50(2): 215-224. (in English). ["Larval agonistic displays are reported from *Agriocnemis pygmaea*, a small coenagrionid damselfly. Twenty-five major displays were distinguished. The behavioural repertoire of *A. pygmaea* is broadly consistent with published information on other coenagrionid larvae. The 'abdomen lift' behaviour, largely restricted to smaller instars of other examined species, occurs with some frequency in final-instar *A. pygmaea*. The use of larval agonistic display characters in phylogenetic analysis is discussed." (Author)] Address: Rowe, R.J., School of Tropical Biology, James Cook University, Townsville, QLD, 4811 Australia

**3053.** Rudolf, V.; Rödel, M.-O. (2002): Tree-hole breeding frogs in the Upper Guinea rain forest, West Africa. *Verhandlungen der Gesellschaft für Ökologie*, Cottbus 2002: 160. (in English). ["In West African rain forests two tree-hole breeding frogs have been recorded so far: a small ranid, *Phrynobatrachus guineensis* (SVL: 17-22 mm), and a larger hyperoliid species, *Acanthixalus* nov. sp. (SVL: 33-40 mm). *P. guineensis* tadpoles develop in small (2-900 ml) tree-holes and empty snail shells, whereas *A. sp.* selects tree-holes with at least 10 l (up to several hundred l) water volume. *P. guineensis* tadpoles are suspension-feeders and rasps, (20 d from hatching to metamorphosis). *A. sp.* tadpoles are carnivorous (>3 month to metamorphosis). Water filled tree-holes are a limited resource, however holes of intermediate size are not used by any frog for reproduction. Distribution in *P. guineensis* seems to be limited by predation and desiccation risk (selecting tree-holes with water presence at least 20 d, while being eliminated in larger holes that are used by dragonfly larvae). Only the largest tree-holes provide a water persistency period, long enough to assure metamorphosis in *A. sp.* In *P. guineensis* spawning events were clearly positively correlated with time a certain tree-hole is occupied by males. Tadpole densities in this species were extremely high ( $x = 0.5$  tadpoles/ml; max: 2 tadpoles/ml). Intraspecific competition significantly negatively affect developmental patterns in *P. guineensis* tadpoles. Neither *P. guineensis*, nor *A. sp.* seems to exhibit any kind of brood-care." (Authors)] Address: rudolf @biozentrum.uni-wuerzburg.de

**3054.** Sahlen, G.; Suhling, F. (2002): Relationships between egg size and clutch size among European species of Sympetrinae (Odonata: Libellulidae). *International Journal of Odonatology* 5(2): 181-191. (in English). ["A negative relationship between clutch size and egg size is generally expected. However, no such trade

off has been reported in Odonata. In this paper we analyse relationships between egg size and clutch size in the dragonfly subfamily of Sympetrinae using material from Norway, Sweden, Germany and France. Clutch size varied within and among the species, and only maximum clutch size was comparable between species. Both egg length and width varied among species. Moreover, mean egg length differed significantly intraspecifically among individual clutches of all species. We found mean egg length to be negatively correlated to clutch size, confirming the trade off between egg size and clutch size across species. Clutch size was positively correlated to female size, but egg size was not." (Authors)] Address: Sahlen, G., Applied Wetland Ecology, School of Business and Engineering, Halmstad University, P. O. Box 823, SE-301 18 Halmstad, Sweden. E-mail: goran.sahlen@set.hh.se

**3055.** Samraoui, B.; Weekers, B.H.H.; Dumont, H.J. (2002): The *Enallagma* of the western and central Palearctic (Zygoptera: Coenagrionidae). *Odonatologica* 31(4): 371-381. (in English). ["Six populations of the *E. cyathigerum* complex from North Africa, Europe and West and Central Asia were examined, mainly using DNA analysis and scanning electron microscopy. The taxa *deserti* and *risi* are geographic ssp. to *E. cyathigerum*: although males can unequivocally be identified from their superior anal appendages, their 18 S rDNA and intergenic spacers ITS 1 and 2 are identical. Moreover, morphological intermediates have become known between *deserti* and *cyathigerum*, and between *risi* and *cyathigerum*. The habitat choice (predatory fish tolerated but with difficulty) and salinity tolerance of all 3 are similar as well. It is concluded that they share a common origin, and only recently started to diverge." (Authors) Outgroup analysis: *E. parvum* (India), *E. nigridorsum*, and *E. granti* (both Socotra Island, Yemen)] Address: Samraoui, B., Laboratoire de Recherche des Zones Humides, Université d'Annaba, 4 rue Hassi-Beida, Annaba, Algeria. E-mail: bsamraoui@hotmail.com

**3056.** Samways, M.J. (2002): A strategy for the national red-listing of invertebrates based on experiences with Odonata in South Africa. *African Entomology* 10 (1): 43-52. (in English). ["The IUCN Red List of Threatened Species is widely recognized as an authoritative compilation of globally threatened taxa. From an invertebrate perspective it presents a challenging dilemma. As all species are given equal credence, a worm has the same exposure as a whale. Yet there are several million species of invertebrates, thus putting great onus on invertebrate conservationists. South African Odonata species have received considerable conservation focus and have been used to test the most recent IUCN categories and criteria of threat. The importance of overcoming both the taxonomic and perception challenges in invertebrate conservation are discussed. The categorization process is also discussed. Recommendations for South African national red-listing are made, with special reference to the dynamics of such red-listing. A simplified strategy is finally presented, which includes a suggestion for compiling a list of potential focal taxa which in the first instance are not categorized. The species on this list then become a core in field searches, both during wide-scale atlassing and during more focussed threat category assessments." (Author)] Address: Samways M.J., Invertebrate Conservation Research Centre, Dept Zool. & Entomol., University of Na-

tal, P/Bag X01, Scottsville 3209, Pietermaritzburg, South Africa. E-mail: samways@un.ac.za

**3057.** Schmid-Araya, A.; Hildrew, G.; Robertson, A.; Schmidt, P.E.; Winterbottom, J. (2002): The importance of Meiofauna in food webs: evidence from an acid stream. *Ecology*, 83(5): 1271-1285. (in English). ["Seasonal food webs were constructed for the whole invertebrate assemblage (meio- and macrofauna) inhabiting Broadstone Stream (southeast England). High and uniform taxonomic resolution was applied in a dietary analysis, by resolving the complete benthic community to species, including the meiofauna, protozoa, and algae. Meiofauna accounted for 70% of all species in the summary web and for 73% and 63% of those in the summer/autumn and spring webs, respectively. The web structure changed between summer/autumn and winter/spring, due to differences in species composition. Many stream invertebrates fed on meiofauna and organic matter. Addition of meiofauna to the Broadstone web increased the percentage of intermediate species. Seasonal webs contained between 54 (spring 1997) and 86 (autumn 1996) interactive taxa and 229-378 trophic links. Marked differences in web complexity were found between the summer/autumn and winter/spring periods. Meiofauna accounted for most of the links in the web with a high proportion of intermediate-intermediate links in summer and autumn (0.421-0.440) and also of intermediate-basal links during winter and spring (0.509 0.628). In general, the summary web showed that intermediate species and basal resources were numerically dominant components in this stream. Web connectance rose slightly between summer (0.052) and winter (0.061) and increased further in spring (0.079), coinciding with a reduction in species number. A high fraction of detritivores was combined with omnivorous predators, many of which supplemented their diets with organic matter and, depending on season, with algae and invertebrate eggs. In addition, a wide range of feeding modes was found among meiofaunal species. The diversity of the Broadstone community suggests that the impact of top predators tends to dissipate. A low proportion of top predators in the web was combined with a low mean number of prey items, other than detritus, in their guts (large predators, 1.08-1.26 prey/individual gut; small-sized tanypods, 2.15-2.32 prey/individual gut). Dietary similarity was highest in autumn and winter 1996, and observed feeding links of the most common predatory species showed low overlap in their diets. The web architecture of this stream is reticulate and complex, and the patterns observed in these seasonal webs differed from previous stream webs, resulting in low connectance, high linkage density, long food chains, and a high proportion of intermediate species and of intermediate-intermediate links. The food web derived from Broadstone Stream clearly demonstrates that the meiofauna increases web complexity and thus, taking into account their functional diversity, may be crucial to the understanding of food web properties and ecosystems processes in streams." (Authors) *Cordulegaster boltonii* is a top predator; for more details see OAS 2211.] Address: Schmid.Araya, J.M., School of Biological Sciences, Queen Mary, University of London, Mile End Road, London E1 4NS, UK. E-mail: J.M.Schmid-Araya@qmw.ac.uk

**3058.** Schmitt, H. (2002): Introduction à l'inventaire des odonates des environs de Barbezieux (Charente). *Martinia*, Hors Série 4: 52. (in French). [France; 13

common odonate species are listed.] Address: Schmitt, H., La Champagne-Barret, F-16300 Barbezieux, France

**3059.** Schöll, F.; Goldschmidt, B. (2002): Die Binger Kribben - ein durch Stromregulierungsmaßnahmen geschaffener Auenbiotop. *Fauna Flora Rheinland-Pfalz* 9(4): 1421-1447. (in German with English summary). [Rheinland-Pfalz, Germany; 7 odonate taxa from the locality are listed.] Address: Schöll, F., Bundesanstalt für Gewässerkunde, Kaiserin-Augusta-Anlagen 15-17, D-56068 Koblenz, Germany

**3060.** Sefton, B. (2002): Egret pigging out of dragonflies. *Wild Bird Magazine*, Jan-Feb. 2002: (in English). [Argia 13(4), page 15, documents an observation of the hunting behaviour of an Egret, which successfully snapped flying dragonflies, but didn't recognize an Anisoptera just perching in front of it.] Address: not stated

**3061.** Söndgerath, D.; Braune, E. (2002): Skalenübergreifende Modellierung der Populationsdynamik von Libellen. *Verhandlungen der Gesellschaft für Ökologie*, Cottbus 2002: 308. (in German). [A model to simulate processes of odonate dispersal (in Namibia, Africa) are briefly outlined.] Address: Söndgerath, Dagmar, Institut für Geoökologie, Technische Universität Braunschweig, Langer Kamp 19c, D-38106 Braunschweig, Germany. E-mail: d.soendgerath@tu-bs.de

**3062.** Sprandel, G. (2002): Florida migration tales. *Argia* 13(4): 11-12. (in English). [St. Joseph Peninsula, Gulf County, Florida, USA; "In the evening of 2 October 1999 when the mosquitoes were thick and Anax were flying, I allowed mosquitoes to bite my legs to see if I could attract dragonflies, and had six Anax pick mosquitoes from my leg. This is no longer recommended due to arboviral encephalitis." Additional information are provided referring roosting areas of migrating Odonata (Anax junius, Tramea lacerata, T. carolina, Pantala flavescens), predation by birds, road kills by collision with vehicles, reflections about the unknown destination of the migrations, and some interesting reflections about potential methods to get information on the origin of the migrations.] Address: Sprandel, G., Florida Fish and Wildlife Conservation Commission, 620 S. Meridian St., Tallahassee, Florida 32399-1600, USA. E-mail: sprandg@fwc.state.fl.us

**3063.** Srivastava, D.S.; Melnychuk, M.C. (2002): Ground to canopy distribution of bromeliad-dwelling *Mecistogaster modesta* larvae (Odonata: Pseudostigmatidae) in a Costa Rican rainforest. *IDF-Report* 4(1): 27-30. (in English). ["Larvae of *M. modesta* occur only in bromeliads. We quantified the vertical distribution of larvae in a Costa Rican tropical wet forest, from ground to canopy. Approximately 171 larvae per hectare are estimated to occur in this primary forest, most at intermediate heights above the ground. Only 4% were found in the canopy proper. These distributions reflect mainly spatial patterns in both the size and abundance of bromeliads, although there may also be subtle vertical differences in habitat quality." (Authors) IDF and WdA promoted this study.] Address: Srivastava, D.S., Department of Zoology, University of British Columbia, Vancouver B.C., Canada V6T 1Z4. E-mail: srivast@zoology.ubc.ca

**3064.** Stange, G.; Stowe, S.; Chahl, J.S.; Massaro, A. (2002): Anisotropic imaging in the dragonfly median ocellus: A matched filter for horizon detection. *Journal of*

*Comparative Physiology A-Sensory Neural & Behavioral Physiology* 188(6): 455-467. (in English). ["It is suggested that the dragonfly median ocellus is specifically adapted to detect horizontally extended features rather than merely changes in overall intensity. Evidence is presented from the optics, tapetal reflections and retinal ultrastructure. The underfocused ocelli of adult insects are generally incapable of resolving images. However, in the dragonfly median ocellus the geometry of the lens indicates that some image detail is present at the retina in the vertical dimension. Details in the horizontal dimension are blurred by the strongly astigmatic lens. In the excised eye the image of a point source forms a horizontal streak at the level of the retina. Tapetal reflections from the intact eye show that the field of view is not circular as in most other insects but elliptical with the major axis horizontal, and that resolution in the vertical direction is better than in the horizontal. Measurements of tapetal reflections in locust ocelli confirm their visual fields are wide and circular and their optics strongly underfocused. The ultrastructure suggests adaptation for resolution, sensitivity and a high metabolic rate, with long, widely separated rhabdoms, retinulae cupped by reflecting pigment, abundant tracheoles and mitochondria, and convoluted, amplified retinula cell plasma membranes." (Authors)] Address: Stange, G., Centre for Visual Sciences, Research School of Biological Sciences and ANU Electron Microscopy Unit, Australian National University, P.O. Box 475, Canberra, ACT, 0200, Australia. E-Mail: gert.stange@anu.edu.au

**3065.** Stavenga, D.G. (2002): Colour in the eyes of insects. *Journal of Comparative Physiology A-Sensory Neural & Behavioral Physiology* 188(5): 337-348. (in English). ["Many insect species have darkly coloured eyes, but distinct colours or patterns are frequently featured. A number of exemplary cases of flies and butterflies are discussed to illustrate our present knowledge of the physical basis of eye colours, their functional background, and the implications for insect colour vision. The screening pigments in the pigment cells commonly determine the eye colour. The red screening pigments of fly eyes and the dorsal eye regions of dragonflies allow stray light to photochemically restore photoconverted visual pigments. A similar role is played by yellow pigment granules inside the photoreceptor cells which function as a light-controlling pupil. Most insect eyes contain black screening pigments which prevent stray light to produce background noise in the photoreceptors. The eyes of tabanid flies are marked by strong metallic colours, due to multilayers in the corneal facet lenses. The corneal multilayers in the gold-green eyes of the deer fly *Chrysops relictus* reduce the lens transmission in the orange-green, thus narrowing the sensitivity spectrum of photoreceptors having a green absorbing rhodopsin. The tapetum in the eyes of butterflies probably enhances the spectral sensitivity of proximal long-wavelength photoreceptors. Pigment granules lining the rhabdom fine-tune the sensitivity spectra." (Author)] Address: Stavenga, D.G., Department of Neurobiophysics, University of Groningen, 9747 AG, Groningen, The Netherlands. E-Mail: stavenga@phys.rug.nl

**3066.** Steglich, R.; Müller, J. (2002): Eine wertvolle kleine Libellen-Sammlung (Odonata) aus den Jahren 1923 bis 1944 im Heimatnaturgarten Weißenfels (Coll. Beuthan). *Entomol. Mitt. Sachsen-Anhalt* 9(2): 37-41. (in German). [The collection of Odonata included some



very remarkable species from Sachsen-Anhalt, Germany. *Nehalennia speciosa* is new for this Federal State, some more species are interesting indicators to assess and to date the impact of water pollution on odonate assemblages (*Gomphus vulgatissimus*). The importance of this collection which covers a period with very few information on the German odonate fauna is outlined. Of special interest are records of *Coenagrion mercuriale* and *Epiteca bimaculata*.] Address: Steglich, Rosmarie, Quittenweg 53, 39118 Magdeburg, Germany

**3067.** Taketo, A. (2002): Notes on recent information of odonate fauna in Ishikawa and Fukui Prefectures, Honshu. Tombo 44: 29-30. (in Japanese with English summary). [Information on 13 species are given. In the English summary an record of *Sympetrum cordulegaster* (teneral male early in July), a teneral female of *Pantala flavescens* (late in October, 2001), and a population, counting 300 individuals, of *Gomphus postocularis* in a concrete ditch running through the streets of Fukui City are high lighted.] Address: Taketo, A., 1-19, Ishibiki 1-chome, Kanazawa City, 920, Japan

**3068.** Tarr, T.L.; Babbitt, K.J. (2002): Effects of habitat complexity and predator identity on predation of *Rana clamitans* larvae. *Amphibia-Reptilia* 23(1): 13-20. (in English). ["We examined the microhabitat distribution of green frog larvae (*Rana clamitans*) and two common predacious insect genera at 27 wetlands in southern New Hampshire to determine if it was related to the presence of vegetation. *Rana clamitans* and hemipterans (*Belostoma* spp.) were rarely captured in non-vegetated microhabitats. Larval odonates (*Aeshna* spp.) were captured more frequently in vegetated microhabitats but the difference was not significant. In a laboratory experiment, we tested the effects of plant density on the survival of *R. clamitans* larvae exposed to either *Belostoma flumineum* or *Aeshna mutata*. When no cover was available, survival of *R. clamitans* tadpoles was very low when exposed to either predator. *Belostoma flumineum* was a less effective predator than *A. mutata*, and survival rates of tadpoles did not differ between high and low plant density when exposed to this predator. In contrast, survival of tadpoles was significantly higher in the high density vegetation treatment compared to the low density treatment when exposed to *A. mutata*. Although plant structure can reduce predation on *R. clamitans* larvae, the level of structure necessary to significantly mediate predation may depend largely on the foraging mode of the predator." (Authors)] Address: Tarr, Tracy L., Department of Natural Resources, University of New Hampshire, Durham, NH, 03824, USA. E-Mail: kbabbitt@christa.unh.edu

**3069.** Theischinger, G. (2002): Preliminary keys for the identification of larvae of the Australian Petaluridae, Archipetalidae, Austropetalidae, Telephlebiidae & Aeshnidae (Odonata). The Murray-Darling Freshwater Research Center. Identification & Ecology Guide No. 42: I-IV, 102 pp. (in English). [The Petaluridae, Archipetalidae, Austropetalidae, Telephlebiidae and Aeshnidae represent 56 of the recognised Australian species in 18 genera. "It is the aim of this presentation to facilitate the identification of all known larvae of several groups of Australian dragonflies whose identification up to now would have required a rather large number of papers, some of them containing misleading errors. There is also strong emphasis on the still existing gaps in our knowledge. To establish and confirm family iden-

tification, an updated version of the family key presented by Hawking & Theischinger (1999) is given at the beginning. In addition there are, for each of the five families concerned, a taxonomic overview, a brief diagnosis and when appropriate a key to genera and species followed by more detailed generic and specific treatments. Whereas the genus lists given for each family and the species lists given for each genus are alphabetical, the more detailed treatments of genera and species are arranged in an order of detected similarity which may or may not reflect phylogenetic relationships." Taxonomic notes and diagnoses under higher taxa only cover the Australian members. "Measurements and descriptions are given from last instar larvae (L) or from final instar exuviae (E). Most illustrations are given from final instar exuviae. As colouration of individuals may be variable in life due to specific conditions in the habitat and as colouration of preserved specimens may reflect the ways or methods of collection and preservation, colours are not given in the descriptions [...]. Generally pubescence is rather weak in all taxa and does not appear particularly useful for diagnoses. It is omitted in illustrations of most larvae or exuviae but presented and specified in some detail illustrations and descriptions. Smoothness or dentation of labial palps may to some degree be effected by conditions of habitat and food and possibly others. Generally only the most reliable characters are used in keys and diagnoses. In spite of that the keys may be of limited use for identifying specimens other than final instar larvae and exuviae. All diagnoses are made up in the same style facilitating comparison with taxa of the same rank and confirmation of the results obtained from running the keys." In addition, colour pictures of the following species (larvae or imagos) are presented: *Austropetalia tonyana*, *Hemianax papuensis*, *Petalura ingentissima*, *Austroaeshna flavomaculata*, *Archipetalia auriculata*, *Antipodophlebia asthenes*, *Telephlebia godeffroyi*, *Austroaeshna atrata*, *Austroaeshna inermis*, *Dendroaeshna conspersa*, *Petalura gigantea*, *Austropetalia patricia*, *Acanthaeshna victoria*, *Austroaeshna unicornis*, and *Anax guttatus*.] Address: Murray Darling Freshwater Research Centre, P.O. Box 921, Albury, 2640, Australia

**3070.** Theischinger, G.; Brown, G.R. (2002): The larva of *Huonia melvillensis* Brown & Theischinger (Anisoptera: Libellulidae). *Odonatologica* 31(3): 319-322. (in English). [The larva of *H. melvillensis* - the species is known only from Melville Island, off the northern coast of Australia - is described from 5 final instar exuviae from the type locality.] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

**3071.** Thomas, B. (2002): Temperaturrekorde in den 1990er Jahren und früher Beginn von Flugzeit und Fortpflanzung bei häufigen Libellenarten in Nordwestdeutschland (Odonata). *Libellula* 21(1/2): 25-35. (in German, with English summary). ["As another fingerprint of climate change, data on the flying season of dragonflies are related to the average air temperatures. In the district of Viersen, Northrhine-Westphalia, Germany, the temperature from March to August rose from 13,1 °C in 1951-1980 to 14,4 °C in 1990-1999. The dragonfly data compared here were collected during the 1980s and 1990s. On the average, in the 17 most widespread species the earliest records of flight and reproduction dated nearly two weeks earlier in the 1990s. The shift was stronger and more frequent in species

with an early starting flying season: the reproductive periods of *Pyrrhosoma nymphula*, *Coenagrion puella*, *Ischnura elegans*, *Libellula depressa*, and *L. quadrimaculata* started 20-28 days earlier than in the 1980s. From September onward there were no obvious trends, regarding neither the average air-temperatures nor shifts of the flying seasons." (Author)] Address: Thomas, Barbara, Biologische Station Krickenbecker Seen e.V., Krickenbecker Allee 17, D-41334 Nettetal, Germany. E-mail: barbara-thomas@web.de

**3072.** Thompson, D.J.; Fincke, O.M. (2002): Body size and fitness in Odonata, stabilising selection and a meta-analysis too far?. *Ecological Entomology* 27(3): 378-384. (in English). [Sokolovska et al. (2000) (see OAS 1947) concluded that "there is a general fitness benefit to large size in odonates". In this paper, Thompson & Fincke critically re-analyze the meta- data and conclusions. They conclude that of the eight species for which studies provide comparable data on lifetime mating success, only five reported statistics for both longevity and mating rates, the two major fitness components comprising lifetime mating success. Hence, only five of the species listed in table A1 (Sokolovska et al., 2000) could be used correctly to address the question of possible trade-offs between longevity and mating rate with respect to size [...]. Given the multiple weaknesses of the analysis, the conclusion of Sokolovska et al. (2000) that 'large size is associated with increased lifetime reproductive success in odonates of both sexes' is at best overstated and at worst misleading. Indeed, as a taxon, the Odonata seem to be an exception to any trend for selection on large size; the advantage of small size for aerial manoeuvrability probably counters any large size advantage in many species (Fincke et al., 1997). Future meta-analyses may be used fruitfully to determine trends with respect to selection for size and phylogeny, mating systems, or the degree and direction of sexual size dimorphism, however the application of the technique demands a knowledgeable and critical reading of the studies in the literature. It remains unclear whether even a meta-analysis can handle the dual possibility of stabilising and directional selection acting within a taxon. Finally, lifetime mating success should not be equated with lifetime reproductive success. The latter usually refers to the number of eggs fertilised by males or laid by females. The use of either measure as a fitness correlate remains untested for most species. For *Megaloprepus coerulatus*, a highly territorial species in which males are under strong sexual selection on body size, neither male fertilisation success nor female clutch size was a good predictor of realised fitness among mated individuals (Fincke & Hadrys, 2001). In both sexes, larval ecology constrains selection on adult size. Future studies designed to identify contrasting selective pressures acting on body size in insects at both the adult and immature stages of their life history are critical to clarify the true picture of how body size affects fitness in organisms with a complex life cycle. As pointed out by Sokolovska et al. (2000), far more emphasis is needed on the larval stage of most odonates. After all, any selection on adult size of odonates begins when they are still in the water." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**3073.** Ubukata, H. (2002): A record of *Rhipidolestes aculeatus yakushimaensis* Asahina f. *kyushuensis* from Kagoshima Prefecture. *Bulletin of The Hokkaido Odonatological Society* 14: 17-18. (in Japanese). [teneral male, 3-V-1991] Address: Ubukata, H., Hokkaido University of Education at Kushiro, Dept Science Education, Shiroyama 1-15-55, Kushiro, 085, Japan. E-mail: ubukata@kus.hokkyodai.ac.jp

**3074.** Ubukata, H. (2002): Dragonflies collected at Banna-dake on Ishigaki Island in November. *Bulletin of The Hokkaido Odonatological Society* 14: 16. (in Japanese). [Japan; *Ischnura senegalensis*, *Orthetrum sabina*, *Crocothemis servilia*, *Diplacodes trivialis*] Address: Ubukata, H., Hokkaido University of Education at Kushiro, Dept Science Education, Shiroyama 1-15-55, Kushiro, 085, Japan. E-mail: ubukata@kus.hokkyodai.ac.jp

**3075.** Vaughan, D. M. (2002): Potential Impact of Road-Stream Crossings (Culverts) on the Upstream Passage of Aquatic Macroinvertebrates. US Forest Service Report, San Dimas Technology and Development Center, March 21, 2002.: 15 pp. (in English). [On page 5 it is stated that some endemic damselflies of Hawaii are protected in some stream reaches by culverts or waterfalls which keep out mosquitofish (see Polhemus 2001).] Address: www.xerces.org

**3076.** Vick, G.S. (2002): Preliminary biodiversity assessment of the odonate fauna of the Takamanda Forest Reserve, Cameroon. IDF-Report 4(1): 1-10. (in English). [IDF helped Otto Mesumbe (Cameroon Dragonfly Project; CDP) to study the Odonata of the Takamanda-Mawne Forest Reserves, a region likely to be one of the highest importance for odonate diversity in Africa. The results of this excursion, and two additional collections are listed and crossreferenced with locality data. In addition some interesting information are given on the CDP, Cameroon as a hot spot region for dragonfly diversity in Africa, relict elements in the fauna, and African Calopterygidae.] Address: Vick G.S., Crossfields, Little London, Tadley, Hants RG26 5ET, UK

**3077.** Viessmann, R. (2002): Libellen - Odonata. Pflanzen und Tiere in Rheinland-Pfalz - Berichtsjahr 2001 - Heft 12: 179-191. (in German). [Compilation of dragonfly records from different habitats situated in Rheinland-Pfalz, Germany. Of faunistic interest are the records of *Coenagrion mercuriale*, *Erythrogonia najas*, *Ischnura pumilio*, *Lestes barbarus*, *L. virens*, *Sympetma fusca*, *Aeshna affinis*, *Anax parthenope*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Thecagaster bidentata*, *Crocothemis erythraea*, *Libellula fulva*, and *Orthetrum brunneum*.] Address: Viessmann, R., Gängelstockweg 8, D-67295 Bolanden, Germany

**3078.** Vorndran, I.C.; Reichwaldt, E; Nürnberger, B. (2002): Does differential susceptibility to predation in tadpoles stabilize the *Bombina* hybrid zone?. *Ecology* 83(6): 1648-1659. (in English). ["Despite substantial divergence, the European toads *Bombina bombina* and *Bombina variegata* (*Anura: Discoglossidae*) interbreed freely wherever their parapatric distributions adjoin. Natural selection that stabilizes the resulting hybrid zones should rest in part on the adaptation to different breeding habitat of the pure taxa. While *B. bombina* lays its eggs in semipermanent ponds, *B. variegata* is a typical puddle breeder. Here, we investigate whether selection for rapid larval development in *B. variegata* has resulted in the loss of effective antipredator defenses, thus exc-

cluding this species from predator-rich ponds. We collected adults from four populations in Romania (two for each taxon) and reared the offspring from four crosses per population in the laboratory either in the presence or in the absence of caged odonate predators (*Aeshna cyanea*). In predation trials, we found no taxon difference in mortality rate among tadpoles that had been reared with predators. The resilience of *B. variegata* tadpoles may have been due to their remarkable phenotypic plasticity. In both taxa, predator presence led to the development of a higher tail fin, which has been shown to reduce predation rates in other amphibians. This response was much stronger in *B. variegata* than in *B. bombina*. Moreover, differences between the two *B. variegata* populations in terms of laboratory predation rates and levels of plasticity correlated with predator abundance at the collection sites so as to suggest local adaptation in predator defenses. Finally, delayed metamorphosis in the predator-induced morphs of both taxa implies a cost to the defense. Given the heterogeneity of temporary habitat in terms of desiccation rate and predator occurrence, the greater amount of phenotypic plasticity in *B. variegata* fits predictions of life history theory. At the same time, our results leave the question unresolved as to why this species avoids ponds." (Authors)] Address: Nürnberger, Beate, Zoologisches Institut, Ludwig-Maximilians-Universität, Karlstr. 23, D-80333 München. Germany: E-Mail: nurnbb@zi.biologie.uni-muenchen.de

**3079.** Walia, G.K.; Sandhu, R. (2002): Chromosomal data on seven species of genus *Orthetrum* (Libellulidae Anisoptera Odonata). *Bionature* 22(1): 7-12. (in English). ["Cytogenetical analysis on seven species of genus *Orthetrum* [...] from North and North-east Indian states have been carried out. Among these, *Orthetrum glaucum*, *O. prunosum neglectum*, *O. sabina sabina*, *O. taeniolatum* and *O. triangulare triangulare* possess diploid numbers 25 m, that is typical libellulid number. [...] *O. luzonicum* and *O. japonicum internum* show variation from this number in having  $2n=23$ , without m chromosomes. All the species possess XO-XX type sex determining mechanism. Variation in chromosome number, total chromosome length (TCL),  $m : X$  & longest autosome: X ratios have been studied for the first time in this genus." (Authors)] Address: Sandhu, R., Dep. Zool., Punjabi Univ., Patiala-147 002, Punjab, India

**3080.** Wataji, M.; Ohta, K.; Kurauchi, Y.; Uemura, T. (2002): A new record of *Anax nigrofasciatus nigrofasciatus* from Hokkaido. *Bulletin of The Hokkaido Odonatological Society* 14: 1-3. (in Japanese). [Record of a female at 26 August 2001.] Address: not stated in English

**3081.** Werth, C. (2002): Faunistische und wasserchemische Erstuntersuchung an sekundären Stillgewässern der Südpfalz. Diplomarbeit. Zool. Inst. für Ökologie und Parasitologie, Universität Karlsruhe: 132 pp. (in German). [On a broad ecological basis, bio-ecological and hydrochemical factors of 19 water bodies in the Bienwald-region (Rheinland-Pfalz, Germany) were sampled. The study aims to get information on the development of these water bodies in the framework of their function as food habitats of the White Stork (*Ciconia ciconia*), a species once extinct but now re-established. Heteroptera, water-Coleoptera, molluscs, amphibians, and Odonata were surveyed. A total of 22 odonate species was collected including species of thermic preferred waters as *Lestes barbarus* and Cro-

preferred waters as *Lestes barbarus* and *Crocothemis erythraea*, or rare species as *Brachytron pratensis*.] Address: Werth, Christine, Mittelberg 4, D-76571 Gaggenau, Germany

**3082.** Westermann, K.; Westermann, E. (2002): Das Große Granatauge (*Erythromma najas*) am Schlüchtsee - erster Bodenständigkeitsnachweis für den Schwarzwald. *Naturschutz südl. Oberrhein* 3: 189-192. (in German, with English summary). [At lake Schlüchtsee (County of Waldshut, southeastern Black Forest, Baden-Württemberg, Germany), 914 m a.s.l., a large population of *E. najas* was found. This first proof of reproduction obtained for the Black Forest is likewise the highest altitude record in Baden-Württemberg and Germany.] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**3083.** Westermann, K. (2002): Phänologie der Emergenz bei der Gemeinen Weidenjungfer (*Chalcolestes viridis*) an südbadischen Altrheinen. *Naturschutz südl. Oberrhein* 3: 201-214. (in German, with English summary). [A systematic sampling of exuviae near the town of Weisweil (County of Emmendingen, Federal state of Baden-Württemberg, Germany) totalled in app. 38 000 exuviae of *C. viridis*. "The earliest start of emergence was noticed on 23 June 1998. Along one section with a very high abundance of emerging and adult imagines, emergence always started only in late July. At this site emergence finished in four years around 20 September. In 1999, a year of high floods, imagines emerged regularly also along other sections until mid September. The median of different sections varied, in the extremes it dated before mid July and on 31 August. Within 800 m linear distance between sections the median shifted significantly according to lower water temperature in two years of the study towards later dates. The duration of the emergence is described by two variables. The peak of emergence is defined as the interval between the first and third quartile, the main periods of emergence as the interval between the dates when 10% and 90% of all imagines emerged, respectively. In this study the two variables reached average values of 12 and 22 days respectively in 17 samples. Within all samples the number of emerged imagines can be described by the logistic model of growth. Median, peak of emergence and main period of emergence are the more useful variables to describe the emergence, rather than the frequently used EM50 - Index. In the early period of emergence a higher proportion of females emerge, in total more males emerged." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**3084.** Wichard, W.; Arens, W.; Eisenbeis, G. (2002): Biological atlas of aquatic insects. Edition 1. Apollo-Books, Stenstrup. ISBN 87-88757-60-9: i-iv; 339 pp. (in English). [This atlas gives an overview of the numerous adaptations of aquatic insects in an aquatic environment. 12 orders of aquatic insects are covered including Odonata (chap. 2.3, pp. 38-61). Bibliographical references, an index of scientific names, and a subject index are included. It was written for graduate students and research professionals in the field. 148 picture plates are included as well as 150 line drawings, graphs and diagrams. These SEM photographs give a fascinating insight into a lot of morphological structures of larval Odonata including e.g. an emerging prolarva of a Sym-



petrum sp.] Address: Apollo books, Kirkeby Sand 19, DK-5771 Stenstrup, Denmark. W-mail: apollobooks@vip.cybercity.dk

**3085.** Wildermuth, H. (2002): Artenschutz im Spannungsfeld zwischen Forschung und Umsetzung - Beispiel Libellen (Odonata). Artenschutzreport 12: 1-6. (in German with english summary). ["Conservation of animal species requires interaction between applied research and realisation of projects. This is exemplified by the dragonflies (Odonata), an insect order that is represented by about 80 species in Central Europe. Research related to dragonfly conservation comprises quantified ecofaunistic surveys with evidence of autochthony, ecological analyses of limiting niche factors, mainly of larvae, ecophysiological studies of habitat recognition by adults and investigations of habitat use as well as population biology and dispersal. Thereby, research concentrates on threatened species. The realisation of conservation projects is based on the results of research aimed at single species or species communities. Preservation of primary biotopes, especially of rare larval habitats, must obtain priority. Secondary biotopes such as water bodies in partly drained moorland, gravel excavations or man-made ponds may also be of some importance for numerous species. However, most of them need continuous management or regeneration. The rotary management of small ponds enables the establishment of a mosaic of all succession stages, which changes in space and time on a confined area, thus providing permanent habitats for a high diversity of aquatic organisms. Success in species preservation ultimately depends less on research than more on the good will of all the people concerned and on the high qualities of the conservancy actors." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**3086.** Wildermuth, H. (2002): Kadaver von Somatochlora flavomaculata als Rendezvous-Platz für Skorpionfliegen (Mecoptera: Panorpidae; Odonata: Corduliidae). Libellula 21(1/2): 65-69. (in German, with English summary). ["A pair of *S. flavomaculata* was found dead in an orb-web of *Larinioides cornutus* suspended above a pond. The carcasses were obviously not, or not completely, eaten by the spider and therefore attracted some flies and scorpionflies (*Panorpa communis*). Up to five *Panorpa* individuals comprising both sexes assembled simultaneously on the carcasses. The dragonflies were probably trapped shortly after the male had grasped the female in flight for copulation above the oviposition site and served subsequently as rendezvous for scorpionflies."(Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**3087.** Wildermuth, H.; Knaus, P. (2002): The impact of incidental summer snowfall on two alpine metapopulations of *Somatochlora alpestris* (Selys) (Anisoptera: Corduliidae). Odonatologica 31(1): 55-63. (in English). ["In the course of a 2-yr mark-resighting study on *S. alpestris* at 2000 m a.s.l. in the Central Alps of Switzerland snow fell during the beginning of the reproductive period in July 2000. The snow cover was up to 30 cm thick and remained for about 8 days. Only 3% of the individuals marked as teneral and 4% of those marked as matures before the cold spell were resighted afterwards. In 1998 (a season without snow) the corresponding resighting proportions amounted 10% and 54%

respectively. In 2000, at a second study site at 1700-1800 m, 11 % of the individuals marked as matures before the cold spell were found again. It is concluded that, unlike the aquatic stages, the imagines of *S. alpestris* are not well adapted to survive cold periods with snowfall lasting more than a few days. Various survival strategies focused on egg and larval development of the sp. are discussed with respect to adaptation to a subarctic climate." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**3088.** Yokoi, N.; Mitamura, T. (2002): Description of a new *Macromia* species from Central Laos (Odonata: Corduliidae). Tombo 44 : 9-10. (in English with Japanese summary). [*M. vangviengensis* sp. n. is described from central Laos. The new species is characterized (differentiated from species of the *M. clio*-group) by its smaller size, developed triangular projection on the 10 th abdominal segment and the absence of the antehumeral band. Holotype : Male, Ban Phon-Ngam (18° 55' N, 102° 27' E), Vangvieng, central Laos, 28-VI-1994, T. Mitamura leg. The specimen will be deposited in the Swedish Museum of Natural History.] Address: Yokoi, N., 2-37-11 Kaisei, Koriyama, Fukushima, 963-8851 Japan; Mitamura, T., 3-20 Youkodai, Yanagawa, Fukushima, 960-0760 Japan

**3089.** Yokoyama, T. (2002): A record of *Aeschnophlebia longistigma* from Tobetsu-cho. Bulletin of The Hokkaido Odonatological Society 14: 11. (in Japanese). [A female was caught at 13 July, 2001.] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**3090.** Yokoyama, T. (2002): Discovery of *Aeshna mixta* soneharai Asahina in Tokachi subprefecture, Hokkaido. Tombo 44: 34. (in Japanese with English summary). [The northern limit of the range of *A. mixta* sonehara in Japan is Asashikawa-shi, Hokkaido (Anzai, 1997), while the eastern limit was considered in the Hidaka Province, Hokkaido (Fukumoto, 1987; Itoh, 1993). In 2001, the author confirmed the species in the Tokachi Province, which turns out to be the new most eastern distributional record in this species in Japan.] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**3091.** Yokoyama, T. (2002): Larval duration of *Somatochlora uchidai* Foerster. Bulletin of The Hokkaido Odonatological Society 14: 5-10. (in Japanese). [The life history of *S. uchidai* is documented in considerable detail in different tabs.] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**3092.** Young, M.E. (2002): Dragonflies: they're ravenous, a little scary and oh-so-helpful: Bugs have an appetite for pests and no real drawbacks, experts say. The Dallas Morning News 21 July 2002: (in English). [This is a popular account on Odonata in a newspaper; the article is documented in *Argia* 14(3): 21-22] Address: myoung@dallasnews.com

**Thanks to all who contributed to this issue of OAS!**  
A special thank to Viola Clausnitzer for linguistic help.

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: martin@lindeboom.de and Martin Schorr, Schulstr. 7B D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: martin.schorr@foea.de

Published in Rheinfelden, Germany and printed in Tübingen, Germany.  
ISSN 1438-0269

## 1997

- 3093.** Carletti, B.; Terzani, F. (1997): Descrizione di *Pseudagrion simplicilaminatum* spec. nov. sella Repubblica del Congo (Odonata: Coenagrionidae). Opusc. zool. flum. 152: 1-7. (Italian with English summary). ["The new species is described and illustrated, and its affinities with *P. flavipes leonensis* Pinhey, 1964 and *P. thenartum* Fraser, 1955 are outlined and discussed. Holotype ♂: Kintele, 6-IX-1978, paratypes ♂: Kintele, 5-I-1980, II-1980, III-1980, XII-1980; — Voka, I-1980; — Djili, XII-1979; — Loufoula, I-1980." (Authors)] Address: Carletti, B., Viale Raffaello Sanzio 5, I-50124 Firenze, Italy
- 3094.** Fujimoto, K. (1997): New Record of *Neurothemis* from Inomote Island of the Ryukyus. *Aeschna* 33: 27-28. (in Japanese with English summary). [*Neurothemis* sp. and *Rhyothemis phyllis* are documented along with weather maps.] Address: not stated in English
- 3095.** Katatani, N.; Muraki, A. (1997): Records of the Odonata taken in Palau, Part I. *Aeschna* 33: 1-10. (in Japanese with English summary). [5 species were collected from 27 Feb. to 1 March 1996 on Palau (Carolinean Islands, SE of the Philippines). *Agriocnemis femina* (Brauer 1868), *Ischnura senegalensis* (Rambur 1842), *Teinobasis palauensis* Lieftinck 1962, and *Hemicordulia lulico* Asahina 1940 were illustrated. The latter is compared with *Hemicordulia mindana* Needham & Gyger 1937 from the Ryukyus. *I. senegalensis* was detected for the first time on Palau, and the previously unknown ♀ of *T. palauensis* is illustrated and described for the first time.] Address: Muraki, A., Shigino-nishi 3-4-2-309, Jôtô-ku, Osaka C., Osaka 536, Japan
- 3096.** Kitagawa, K. (1997): Records of the Odonata from Penang Island, Malaysia. *Aeschna* 33: 11-18. (in Japanese with English summary). [32 species were taken in 1995 and 1996, of which 17 species are new records from Penang Island. These records total the known species to 54. *Prodasineura collaris* (Selys 1860), *P. notostigma* (Selys, 1860), *Calicnemia chaseni* (Laidlaw 1928), *Microgomphus chelifera* Selys 1858, and *Orchithemis pulcherrima* Brauer, 1878 are documented by back and white photos, and in the case of *Prodasineura* species with drawings of the synthorax.] Address: Kitagawa, K., Imaiti 1-11-6, Asahi-ku, Osaka C., Osaka, 535-0011, Japan
- 3097.** Kitagawa, K. (1997): Records of the Odonata from Sarawak, Malaysia]. *Aeschna* 34: 5-10. (in Japanese with English summary). [In Dec. 1990, 27 odonate species from Kuching were brought on record. Drawings illustrate the labrum of ♀ *Vestalis amaryllis* and *V. atropa*. Black and white photos refer to *Prodasineura dorsalis*, *Amphicnemis wallacei*, *Coeliccia coomansi*, *Indaeschna grubaueri*, *Brachygonia oculata*, and *Euphaea* sp.] Address: Kitagawa, K., Imaiti 1-11-6, Asahi-ku, Osaka C., Osaka, 535-0011, Japan
- 3098.** Kitagawa, K.; Sugitani, A.; Hayashi, K.; Masaki, N.; Muraki, A.; Katatani, N. (1997): Records of the Odonata of Hong Kong, Part IV. *Aeschna* 34: 11-21. (in Japanese with English summary). [In June, July, and Oct. 1996, a total of 69 species was recorded, of which *Cercion sexlineatum* is a new addition to the Hong Kong odonate fauna.] Address: Kitagawa, K., Imaiti 1-11-6, Asahi-ku, Osaka C., Osaka, 535-0011, Japan
- 3099.** Kohama, T. (1997): Odonata from Kohama Island, the Ryukyus. *Aeschna* 33: 19-20. (in Japanese with English summary). [On 20 Sept., 1985, 8 odonate species - in total new to the Island - were recorded.] Address: not stated in English
- 3100.** Kohama, T. (1997): Odonata from Shimoji Island of Aragusuku Islands, the Ryukyus. *Aeschna* 33: 21-22. (in Japanese with English summary). [On 18 July, 1985, 6 odonate species were recorded.] Address: not stated in English
- 3101.** Moriyasu, A. (1997): A record of the larvae of *Macromia daimoji* OKUMURA from Shikoku, Japan. *Aeschna* 34: 36. (in Japanese). [29-XII-1996; documentation of the habitat.] Address: not stated in English
- 3102.** Moriyasu, T. (1997): Larval development of *Macromia daimoji* OKUMURA in nature. *Aeschna* 33: 31-36. (in Japanese with English summary). [Kurashiki-city, Okayama Pref., Japan; the study documents extensively the larval growth of *M. daimoji*; larval development lasts 2 years including 9 instars.] Address: not stated in English
- 3103.** Naraoka, H. (1997): A list of dragonflies in Hotokeuma marsh, Aomori Prefecture (Insecta, Odonata). *The Journal of The Natural History of Aomori* 2: 19-21. (in English translation of Naoya Ishizawa in *Digest of Japanese Odonatological Short Communications* 8, 1998). [The history of a water body near Misawa City, Japan is briefly outlined along with a list of 34 odonate species recorded.] Address: Naraoka, H., 36-71, Motoizumi, Fukunoda, Itayanagi-cho, Kita-gun, Aomori Prefecture, 038-3661, Japan

**3104.** Schmidl, J. (1997): Adephege Wasserkäfer in schwäbischen Niedermooren - Faunistische Ergebnisse von Aufsammlungen in Kleingewässer-Neuanlagen der Natur- und Artenschutzprogramme. (Coleoptera: Halipilidae, Noteridae, Dytiscidae, Gyrinidae). Ber. naturforsch. Gesell. Augsburg 56: 6-17. (in German, with English summary). [Bayern, Germany; *Sympecma fusca*, *Brachytron pratense*, *Aeshna grandis*, *A. juncea*, *Somatochlora flavomaculata*, and *Sympetrum striolatum* are listed from different localities in Sept. 1995.] Address: Schmidl, J., Lettenstr. 8, D-90562 Kalchreuth, Germany

**3105.** Sugimura, M. (1997): Migrant species of the Odonata into Kochi Prefecture recorded in the first half of the 1990's. *Aeschna* 33: 23-25. (in Japanese with English summary). [*Anaciaeschna jaspidea*, *Anax guttatus*, *Brachydiplax chalybea*, *Sympetrum cordulegaster*, *S. fonscolombii*, *Hydrobasileus croceus*, and *Tholymis tillarga* are treated.] Address: Sugimura, M., 9-7, Uyamasatsuki-cho, Nakamura City, Kochi Prefecture, 787, Japan

**3106.** Tabata, O. (1997): New Record of *Zyxomma obtusum* SELYS from Inomote Island of the Ryukyus. *Aeschna* 33: 29-30. (in Japanese with English summary). [*Z. obtusum* was recorded at three dates in 1996.] Address: Tabata, O., Shoubuen-cho 79-18, Kamigamo, Kita-ku, Kyoto C., Kyoto 603-8064, Japan

**3107.** Tone, S.; Yagi, T. (1997): Records of the exceptional migration of *Anax guttatus* (Burmeister) and *Tramea virginia* (Rambur) out of seasons in 1994 at Mie Prefecture, central Japan. *Aeschna* 34: 29. (in Japanese with English summary). [This is a detailed account on migrating *A. guttatus* and *T. virginia* in dependence of weather conditions.] Address: Yagi, T., Otobe 2113-102, Tsu C., Mie 514-0016, Japan

**3108.** Yoshida, M. (1997): A study on the migration of Odonata for extending their habitats. *Aeschna* 33: (in Japanese with English summary). [Japan; the paper compiles the ability of different odonate species to colonise new water bodies from published studies.] Address: not stated in English

## 1998

**3109.** Bernabei, S.; Di Girolamo, I.; Iavarone, I. (1998): Alcune note sul popolamento macrobentonico del fiume Arone (Lazio, Italia). *Riv. Idrobiol.* 37: 203-209. (in Italian with English summary). [The checklist of macrozoobenthos of the River Arrone, Italy includes 11 species of Odonata. Of interest are *Pyrrhosoma nymphula* and *Onychogomphus uncutus*. No additional odonatological details are given.] Address: Bernabei, S., Istituto Superiore di Sanita, Laboratorio di Igiene Ambientale, Viale Regina Elena 299, I-00191 Roma, Italy

**3110.** Cordero Rivera, A.; Pérez, F.J.E. (1998): Mating frequency, population density and ♀ polychromatism in the damselfly *Ischnura graellsii*: an analysis of four natural populations. *Etologia* 6: 61-67. (in English with Spain summary). ["The maintenance of ♀ polychromatism in *I. graellsii* is addressed by reanalysing data from two natural populations studied by Cordero (1992, *J. Anim. Ecol.*, 61:769-780) and two additional populati-

ons. We used mark-resighting methods to estimate mating frequency by ♀ morphs. Results indicate that ♀ mating probability is positively related to ♂ density in three populations, but androchrome (♂-like ♀♀) only mated less often than gynochromes in one sample. ♀ morphs did not differ in size and oviposition frequency. Nevertheless, among populations, androchrome frequency was positively related to an index of ♂ density. We suggest that population density might have an effect on the maintenance of ♀ morphs in *I. graellsii*, but this does not seem to be because androchrome ♀♀ avoid matings. A more accurate analysis of the benefits and costs of mating in polychromatic damselflies is needed." (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidad de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**3111.** Deliry, C. (1998): Nouveaux articles ou études concernant les libellules dans la région Rhône-Alpes. *Sympetrum piémontais* 38: 2-3. (in French). [France; regional odonatological bibliography covering the period 1996/98 and abstracting in most cases unpublished expertises.] Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France

**3112.** Glotzhober, R. (1998): Tiger seen in Ohio's Hill Country. *WildOhio*. Spring 1998. *WildOhio* (Ohio Division of Wildlife newsletter) Spring 1998: 17. (in English). [Ohio, USA; *Cordulegaster erronea*] Address: Glotzhober, R., Ohio Natural history society, 1982 Velma Ave., Columbus OH 43211-2497, USA. E-mail: bglotzhober@ohiohistory.org

**3113.** Naraoka, H. (1998): Establishment of *Pseudothemis zonata* to central and south of Aomori. *Gekkan-Mushi* 342: 45- (in Japanese). [5. July 1998; published records from Aomori Pref., Japan are compiled, and the current range extension is discussed with special emphasis to global warming. A translation of the paper is published in *Digest of Japanese Odonatological Short Communications* 14] Address: Naraoka, H., 36-71, Motoizumi, Fukunoda, Itayanagi-cho, Kitatsuguru-gun, Aomori Prefecture, 038-3661, Japan

**3114.** Taketo, A. (1998): On the Odonate fauna of Ishikawa and Fukui Prefectures in 1998. *Tombo* 41: 33-36. (in Japanese with English summary). [Two adult ♂♂ of *Trigomphus ogumai* were captured at Daishoji, Ishikawa Pref., Japan at its northern range limit on the Japan Sea side. New locality records of rare species, include *Sympecma p. paedisca* (a coastal pond at Hakui / Ishikawa), *Nihonogomphus viridis* (Nata River / Ishikawa), *Lyriothemis pachygastra* (Mihama/Fukui), and *Onychogomphus viridicosta* (Kanazu, Fukui). *Indolestes peregrinus* is spreading into the Kaga district/Ishikawa; oviposition into young rice stem has repeatedly been observed at Daishoji. Influenced by the climatic conditions of 1998, seasonal appearance of several Odonata was advanced considerably: e. g. mating and oviposition of *Enallagma boreale circulatum* were observed in early May at a pond in a hilly region of Komatsu. The succession of the odonate fauna in newly formed ponds in Kanazawa, was documented by mainly collecting exuviae. Within 6 years, 46 species were recorded from this sanctuary. Both northern (e. g. *Coenagrion lanceolatum*) and southern (e. g. *Anaciaeschna martini*) species coexist in these ponds.] Address: Taketo, A., 1-19, Ishibiki 1-cho, Kanazawa City, 920, Japan



- 3115.** Aoki, T.; Kondoh, S. (1999): A note on reproductive behaviour of *Sympetrum striolatum imitoides* BARTENEV in Kobe. *Aeschna* 35: 37-40. (in Japanese with English summary). [Compared with other Japanese *Sympetrum*-species, with the exception of *S. uniforme*, pre-reproductive behaviour of ♂ *S. striolatum imitoides* seems to be unique. Their continuous hover flight starts just before ♀♀ arrive at the water for oviposition (about 10:30 J.S.T.), and lasts for about an hour. At the same time other ♂♂ wait for ♀♀ perching around the pond. Apparently two tactics for mating are used.] Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: taoki@ma3.justnet.ne.jp
- 3116.** Clausnitzer, V. (1999): Dragonfly (Odonata) records of Kawamega Forest, western Kenya, with notes on the ecology of rain forest species. *Journal of East African Natural History* 88 (2003): 17-23. (in English). [The list of 51 recorded Odonata includes ten new records for Kenya. "Some of the species have their centre of distribution in West Africa. Ecological notes on different adaptation strategies of rain forest dragonflies are given, mainly focusing on visibility and flight behaviour of the ♂♂. Seasonality patterns of the observed dragonflies and distinct behavioural features of selected species, e.g. *Hadrothemis* and *Gynacantha* are described." (Author)] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: we-sche@mail.uni-marburg.de
- 3117.** Deliry, C. (1999): Nouveaux articles ou études concernant les libellules dans la région Rhône-Alpes. *Sympetrum piémontais* 39: 9-11. (in French). [France; regional odonatological bibliography covering the period 1997/98 and abstracting unpublished expertises in most cases.] Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France
- 3118.** Deliry, C. (1999): Nouveaux articles ou études concernant les libellules dans la région Rhône-Alpes. *Sympetrum piémontais* 42: 17-21. (in French). [France; regional odonatological bibliography covering the period 1997-2000 and abstracting unpublished expertises in most cases.] Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France
- 3119.** Desmeules, M. (1999): Compte-rendu littéraire: Les Odonates du Québec. Par Jean-Guy Pilon et Denise Lagacé. 1998. Corporation Entomofaune du Québec, Chicoutimi, Québec. 367 pages. ISBN 2-9802763-2-4. *Nouv'Ailes* 9(3): 12. (in French) [Review] Address: Publisher: Entomofaune du Québec, 637, blvd Talbot, suite 108, Chicoutimi, QC G7H 6A4, Canada
- 3120.** Futahashi, R. (1999): Notes on unusual connection and copulation in some species of dragonflies. *Aeschna* 36: 47-56. (in Japanese with English summary). [25 cases of interspecific connection and copulation, 8 cases of triple-connection, and 4 cases of ♂-♂ tandems are documented.] Address: not stated in Japanese
- 3121.** Futahashi, R.; Futahashi, H. (1999): Records of large scale migration of *Sympetrum cordulegaster* (SELYS) and *Sympetrum depressiusculum* (SELYS) in 1997 and emergence of both species in 1998 at Toyama Pref. *Aeschna* 36: 33-42. (in Japanese with English summary). [Many migratory adults of both species were found during a period between 6 Oct. and 10 Nov. 1997 at the reclaimed land of Kairyumachi Sinmamoto City Toyama Pref. Japan. Some immature specimen were likewise found there during 18 June and 7 Aug. 1998. "Some of them seemed to be very immature or just emerged. This fact suggests that these species emerged there although neither larvae nor exuviae have been found." Intermediate specimens between *S. depressiusculum* and *S. frequens* were recorded at the same locality.] Address: not stated in Japanese
- 3122.** Haase, P. (1999): Zoonosen, Chemismus und Struktur regionaler Bachtypen im niedersächsischen und nordhessischen Bergland. *Ökologie und Umweltsicherung* 18. 157 pp., appendix. (in German with English summary). [From 1996 to 1999 limnological investigations on upper courses of near natural brooks of the mountainous areas of Lower Saxony and northern Hesse (Germany) were carried out. The aim of these studies was the development and description of a regional typology of brooks. In total more than 200 macrozoobenthos species including *Cordulegaster boltonii* and *Thecagaster bidentata* were found.] Address: Univ.-Gesamthochschule Kassel, Fachgebiet Landschaftsökologie und Naturschutz, Nordbahnhofstr. 1a, D-37213 Witzenhausen, Germany
- 3123.** Hujihara, H.; Adati, T. (1999): Records of the emergence of *Macromia daimoji* OKUMURA from Asida river at Hiroshima Prefecture. *Aeschna* 36: 57-58. (in Japanese). [Japan; five records from May and June 1998 are documented.] Address: not stated in English
- 3124.** Hutchinson, R. (1999): Rayon Entomologie: Corbet, P.S. 1999. *Dragonflies: Behaviour and ecology of Odonata*. Comstock Publishing Associates, Ithaca NY. 829 pp. *Nouv'Ailes* 9(3): 7. (in French) [Review of Philip Corbet's outstanding book.] Address: Hutchinson, R., 12, chemin de la Savane, apt. 12, Gatineau (Québec), Canada, J8T 1P7
- 3125.** Itoh, S. (1999): A ♂ *Aeshna juncea* (L.) that misidentified a dead branch as a female. *Aeschna* 35: 51. (in Japanese). [Photodocumentation] Address: Itoh, S., Kinoshita 4-9-7-102, Wakabayashi-ku, Sendai-shi, Miyagi, 984-0047 Japan
- 3126.** Katatani, N.; Muraki, A. (1999): Records of the Odonata taken in Palau, Part II. *Aeschna* 35: 9-22. (in Japanese with English summary). [The Libullidae of Palau, Caroline Islands are treated in some detail. Observations were made from 27 Feb. to 1 Mar. 1996. "*Agrioptera cardinalis* is forest-hunting insects and is chiefly confined to lower altitudes. Adults are usually most abundant near the seacoast. The mature ♂♂ hold territories in shady places of jungle marshes and pools behind the beach. ♀♀ may wander far from their breeding places, congregating in sunlit spots and clearings. Further, many individuals settle on the branches of mangroves [...]. *Neurothemis t. terminata* is a very common and widespread species, occurring in both grassland and marsh. As to extent of brown wing color, ♂♂ form a homogeneous series. ♀♀ have androchromatic wings and heterochromatic wings." ♀♀ with androchromatic wings dominate on heterochromatic in Palau. "♂♂ of *Rhyothemis phyllis vitellina* have two large brown spots on base of hind wing separated by opaque

yellow coloring. On the other hand ♀♀ are with polychromatic wing pattern and very variable as to extent of dark marking." *Ischnura senegalensis* and *Orthetrum s. sabina* are added new to the list of Odonata of Palau, now totalling in 20 species. Colour patterns of ♂ synthorax, ♂ genitalia and caudal appendices of *Agrionoptera cardinalis* Lieftinck 1962 (Palau) are compared with *A. sanguinolenta* Lieftinck, 1962 (Truk, Guam), and *A. insignis* (Rambur 1842) (Iriomoete Islands, Palawan Islands, Mindanao, Philippines).] Address: Muraki, A., Shigino-nishi 3-4-2-309, Jôtô-ku, Osaka C., Osaka 536, Japan

**3127.** Kawashima, I.; Itoh, S. (1999): Notes on the last instar larva of *Somatochlora alpestris* (Selys, 1840) (Odonata, Corduliidae) from Hokkaido, Northern Japan. *Aeschna* 36: 25-31. (in English, with Japanese summary). [The external morphology of the last instar larva of *S. alpestris* from Hokkaido, Japan is described and illustrated in detail.] Address: Kawashima, I., Nagasawa 1-50-9, Yokosuka-shi, Kanagawa, 239-0842 Japan

**3128.** Kishi, K. (1999): Records of the Odonata in Bali Island, Indonesia. *Aeschna* 35: 23-35. (in Japanese with English summary). [Ten collecting trips to Bali between Dec. 1984 and April 1991 totaled in 42 odonate species; additional material referred in the paper rises the number of Odonata to 44. The author discusses the difference in faunal composition between the western and eastern part of Bali; four odonate taxa are known only from the western part. The records are documented in detail, some of the species are illustrated with black and white photos.] Address: not stated in English

**3129.** Kitagawa, K.; Ichii, H. (1999): Records of the Odonata from Southern Thailand. *Aeschna* 36: 59-68. (in Japanese with English summary). [62 species were taken at Trang, southern Thailand in 1991. The list includes an undescribed *Macromia*, which is illustrated by drawings and a black and white photo. In addition, *Tetrathemis irregularis hyalina* Kirby, *Drepanosticta khao-chongensis*, *Euphaea pahyapi*, *Aciagrion borneense*, *Rhinagrion mima*, *Macrogomphus borikhanensis*, *Megalogomphus sumatranus*, *Macromia chaiyaphumensis*, and *Macromia cupricincta* are stressed or documented by black and white photos.] Address: Kitagawa, K., Ima-iti 1-11-6, Asahi-ku, Osaka C., Osaka, 535-0011, Japan

**3130.** Kitagawa, K. (1999): Rediscovery of *Lin-aeschna polli* from Borneo. *Aeschna* 35: 41-42. (in Japanese). [*L. polli* was recorded in March 1997 at Kimanis Road (Crocker Range), Sabah, Borneo, Malaysia.] Address: Kitagawa, K., Ima-iti 1-11-6, Asahi-ku, Osaka C., Osaka, 535-0011, Japan

**3131.** Lissak, W. (1999): Erstnachweis für Bodenständigkeit des Südlichen Blaupfeils (*Orthetrum brunneum*) im Landkreis Göppingen. *Naturkundliche Mitteilungen Landkreis Göppingen* 18: 4-5. (in German). [clay pit near Ottenbach, Landkreis (county) Göppingen, Baden-Württemberg, Germany; 12.07.1990; in 1991 the habitat was filled with building rubble.] Address: Lissak, W., Schubartstr. 12, D-73092 Heiningen, Germany. E-mail: W.Lissak@naturschutzzentrum-schopfloch.de

**3132.** Maibach, A.; Meier, C. (1999): 11. Libellen-Symposium in Neuchâtel, 21.11.1998. *Nachrichten des Schweizer Zentrum für die Kartographie der Fauna* 17: 34-38. (in German, French and Italian). [Summaries of the following lectures are presented: 1. Beat Oertli : Alti-

tude et diversité des Odonates 2. Antoine Gander: Suivi des populations des larves de libellules dans un décapage expérimental de roselière inondée de la Grande Caricaie. (Groupe d'étude et de gestion de la Grande Caricaie; GEG). 3. Riccardo Pierallini: Le libellule delle Bolle di Magadino. *Aggiornamenti sull'inventoria degli Odonati in Ticino. Gruppo di lavoro «Libellule Ticino»* 1998. 4. Stefan Kohl: Reisebericht vom 3. Alp-Adriatischen Libellensymposium in Kroatien. 5. Alain Maibach : Suivi de la colonisation d'un étang amortisseur de crues pour les libellules 1993-1998 - étang de Suchy (VD) 6. Peter Knauss: Beobachtungen zur Populationsökologie von *Somatochlora alpestris* 7. Irene Flöss: Struktur- und Raumnutzung von *Somatochlora flavomaculata* in einer zürcherischen Moorlandschaft 8. Hansruedi Wildermuth: Die Paarung von *Somatochlora alpestris* 9. Gerhard Vonwil: Überwachung von Libellenbeständen - Möglichkeiten und Grenzen 10. Ernst Grüter: Einige Dias zur Eiablage von *Coenagrion mercuriale*] Address: CSCF, Terreaux 14, CH-2000 Neuchâtel, Switzerland

**3133.** Matsuda, I. (1999): A record of *Rhyothemis variegata imperatrix* SELYS with developed dark marks of the wings. *Aeschna* 35: 45-46. (in Japanese). [A black and white photo documents the ♀ with the dark wings caught at 11 July 1997.] Address: not stated in Japanese

**3134.** Moriyasu, T. (1999): A record of larva of *Macromia daimoji* OKUMURA from Oita Prefecture, Kyushu, Japan. *Aeschna* 35: 52. (in Japanese). [A brief documentation of the record of a larval *M. daimoji* along with a picture of the habitat are presented.] Address: not stated in English

**3135.** Moryasu, T. (1999): Notes on moulting and regeneration of an anterior leg in the larvae of *Macromia daimoji* OKUMURA. *Aeschna* 36: 43-45. (in Japanese). [Japan; the moulting is documented by 11 black and white photos.] Address: not stated in Japanese

**3136.** Nishida, T. (1999): The Odonata in the United States of America, mainly in the State of Michigan. *Aeschna* 36: 1-20. (in Japanese with English summary). [61 odonate species are documented in most cases for Michigan and in some cases for California, Oregon, and Florida, USA. The record of *Libellula vibrans* seems to be a new state record for Michigan. Many species are documented with colour photos.] Address: not stated in Japanese

**3137.** Ozono, A. (1999): A record of *Tholymis tillarga* from Nara Prefecture. *Gekkan-Mushi* 342: 44. (in Japanese). [Japan, 18 and 25 Sept. 1998; a translation of the paper is published in *Digest of Japanese Odonatological Short Communications* 14] Address: Ozono, A., 5-7-5, Myomihigashi, Habikino City, 576-0012, Japan

**3138.** Pinratana, A.; Hämäläinen, M. (1999): Checklist of dragonflies recorded at Doi Inthanon. *Malangpo* 16: 150-154. (in English). [The checklist of Doi Inthanon mountain, Chiang Mai prov., Thailand, totals to 117 odonate species. A brief history of odonatological research in the region is outlined; some of the species are commented, and the phenology of each species is presented.] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

- 3139.** Schmidt, B. (1999): Effizienzkontrolle von Besucherlenkungsmaßnahmen an naturnahen Fließgewässern - tierökologische Untersuchungen an der mittleren Jagst. Landesamt für Umweltschutz Baden-Württemberg, Naturschutz-Info 2/99: 16-19. (in German). [The paper summarises the results of an (unpublished) extensive study to analyse and assess the impacts of canoeing on the fauna of the river Jagst, Baden-Württemberg, Germany. Special emphasis is given to birds and Odonata. Scrapping on ground causes drift of larvae, leaving the canoe causes death of larvae by trampling, driving the boats can influence the emergence of Odonata by crippling or alerting predators. Some more detailed results of this study can be taken from the paper of Schorr (2000) (see OAS 1943).] Address: Schmidt, B., Sandöschstr. 28; D-88048 Friedrichshafen, Germany. E-mail: Schmidt-empire@gmx.de
- 3140.** Suda, S. (1999): A record of *Macromia urania* Ris from Taiwan. *Aeschna* 35: 43. (in Japanese). [A ♂ *M. urania* was caught at 27 June 1997, a ♀ at 11 July 1997; the habitat (Chii-Man-Ru) is documented with a photo.] Address: not stated in Japanese
- 3141.** Yeh, W.C. (1999): Notes on three aeshnid species from Thailand. *Malangpo* 16: 144-145. (in English). [First records for Thailand are *Anax indicus* Lieftinck 1942 and *A. panybeus* Hagen 1867; *Petaliaeschna pinratana* Yeh, 1999 is synonymized with *P. flavipes* Karube, 1999. The species / specimens are discussed and described in detail. The discussion includes a specimen of *A. indicus* from Nepal (Phewa Tal, Pokhara, 25. Sept. 1986, coll. G.S. Vick). In addition, misidentifications resp. illustrations of *A. guttatus* in papers of Laidlaw (1921) and Kennedy (1934) are documented, which turned out to be *A. indicus*.] Address: Yeh, W.-C., Division of Forest Protection, Taiwan Forestry Research Institute, 53 Nanhai Road, Taipei, Taiwan, R.O.C. E-mail: wcyeh@serv.tfri.gov.tw
- 3142.** Yokoi, N. (1999): Dragonflies of Central Laos in mid-summer. *Malangpo* 16: 146-149. (in Japanese with English summary). [The paper documents in detail the results of an excursion to Laos from 30 July to 4 Aug. 1998. In total, 50 species were collected, among them, 24 are new records for Laos. The current (1999) checklist of the Odonata of Laos totals to 123 species. Figures of *Argiocnemis rubeola* Selys, 1877 (this taxon is considered a ssp. of *A. rubescens* Selys, 1877), *Pseudagrion pruinatum* (Burmeister 1839), *Devadatta ducatrix* Lieftinck 1969, *Orolestes* sp., and *Macromia* sp. are presented.] Address: Yokoi, N., 2-37-11, Kaisei, Koriyama, Fukushima, 963-8851, Japan
- 3143.** Yokoyama, T. (1999): Notes on the duration of egg stages on some dragonflies in Hokkaido. *Aeschna* 35: 49-50. (in Japanese). [Latin names of the 16 species are not given.] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan
- 3144.** Yoshida, M.; Yagi, T.; Futahashi, R. (1999): Early Records of some Odonata in 1998 at central Japan. *Aeschna* 36: 21-24. (in Japanese). [Phenological data of 26 odonate species are presented.] Address: Yagi, T., Otobe 2113-102, Tsu C., Mie 514-0016, Japan
- 3145.** Aoki, T. (2000): Evidence of rapid decreasing of Aka-tombo in Kobe. *Symnet* 8: 3-4. (in English). [Japan; revisiting localities known to harbour great populations of *Sympetrum frequens* in 1999 showed, that abundance has decreased dramatically, or the species may even have disappeared.] Address: Aoki, T., Rokko Island High School, Naka 4-chome, Koyo-cho, Higashinada-ku, Kobe, 658-0032, Japan. E-mail: tao-ki@ma3.justnet.ne.jp
- 3146.** Arai, Y. (2000): A report on night oviposition of *Lestes temporalis* Hanseman [sic]. *Gekkan-Mushi* 358: 5. (in Japanese). [Japan, *Lestes temporalis* Selys 1883] Address: Arai, Y., 1233-2, Oaza Sueno, Yorii-machi, Osato-gun, Saitama Pref., 369-12, Japan.
- 3147.** Barlow, A.E. (2000): Additions to the checklist of odonata from New Jersey. *Argia* 12(3): 21-25. (in English). [6 new additions total the list of Odonata of New Jersey, USA to 178; Sussex County with 132 species is probably the hot spot of odonate diversity in the USA.] Address: Barlow, A.E., 10 Belle Court, Budd Lake, NJ 07828, USA. e-mail: a.barlow@smtphost.elsevier.com
- 3148.** Barlow, A.E. (2000): Observation of Odonata utilizing ants as prey. *Argia* 12(3): 32-33. (in English). [USA; New Jersey; the feeding behaviour of *Erythemis simplicicollis*, *Plathemis lydia*, and *Pachydiplax longipennis* on ants (*Formica exsectoides*) is described; exclusively ♀♀ (12 subsequent visits of the anthill) where observed to use ants as prey.] Address: Barlow, A.E., 10 Belle Court, Budd Lake, NJ 07828, USA. E-mail: a.barlow@smtphost.elsevier.com
- 3149.** Beckemeyer, R. (2000): Dragonfly dogs: canine collecting companions. *Argia* 12(3): 35-36. (in English). [R. Beckemeyer reports on experiences with his Labrador retriever spotting and chasing Odonata.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net
- 3150.** Beckemeyer, R. (2000): Some arcane dragonfly publications from the past. *Argia* 12(3): 36-37. (in English). [The paper refers to some hidden dragonfly tales, some referring to very personal interests of the author: Aman, P. 1883-1884. "Essai sur le vol des Insectes, Rev. Sci. net. Montpellier. 3rd Ser. n et III. Lamborn, R.H. (Editor) 1890. Dragon flies vs mosquitos. Appleton. New York. Randolph, V. 1925. Life among the dragonflies. Little Blue Book No. 818. Haldeman-Julius. Girard, Kansas. Tillyard, R.J. 1917. The biology of dragonflies. Cambridge University Press. Cambridge. (chapter on Odonata and aviation) The paper also refers to a list of the Odonata of the state New York (W. Beutemiller) and the observation of a mass migration of Odonata on 2 June 1880 at Weymouth, Massachusetts] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net
- 3151.** Beckemeyer, R.J. (2000): Some county Odonata records for Kansas and Nebraska for 1999 and 2000. *Argia* 12(3): 27-28. (in English). [USA; Kansas, Nebraska; of some interest is the rediscovery of *Telebasis salva* in Kansas.] Address: Beckemeyer, R.J.,



957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**3152.** Behrstock, R.A. (2000): Results of a brief odonate survey at East Sandia Spring, Reeves Co., Texas, including a new state record of Paiute dancer (*Argia alberta*, Kennedy, 1918). *Argia* 12(3): 13-15. (in English). [The paper lists the Odonata from the Balmorhea State Park (region), Texas, USA, and discusses the attempts to (re)discover *Argia leonorae* Garrison, 1994.] Address: Behrstock, R.A., 9707 S.Gessner #3506, Houston, TX, 77071-1032, USA. E-mail: rbehrstock@aol.com

**3153.** Cannings, R.; Cannings, S. (2000): Post-meeting field trip. *Argia* 12(3): 6-7. (in English). [The 2000-DSA-post-meeting field trip resulted in some most southern range records, and in the extremely rare *Somatochlora brevicincta*.] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street Victoria, British Columbia V8W 9W2. Canada. E-mail: rcannings@royalbcmuseum.bc.ca

**3154.** Cashatt, T. (2000): Hine's Emerald workshop 2000. *Argia* 12(3): 8-10. (in English). [July 12-14, 2000, a workshop to train 38 field biologists to recognize the federally listed *Somatochlora hineana* and its habitats was organised in Door County, Wisconsin, USA. The training sessions consisted of class room instructions as well as field trips to breeding sites in Door Co.] Address: Cashatt, E.D., Illinois State Museum, 1920 10 1/2 St., Springfield, IL 62703, USA. E-mail: cashatt@museum.state.il.us

**3155.** Chazal, A.C. (2000): Two Virginia records for *Enallagma weewa*. *Argia* 12(3): 26-27. (in English). [USA; Virginia; detailed documentation of two records of *E. weewa*.] Address: Chazal, Anne, Virginia Dept of Conservation and Recreation, Div. Natural Heritage, Richmond, Virginia, USA

**3156.** Cordero Rivera, A. (2000): An analysis of multivariate selection in a non-territorial damselfly (Odonata: Coenagrionidae). *Etologia* 8: 37-41. (in English with Spain summary). ["The relationship between fitness and phenotypic traits (body, thorax and wing length, head width and date of emergence) was studied in a sample of 187 ♂♂ and 113 ♀♀ of *I. graellsii* by means of a multivariate regression analysis of selection. ♂ fitness was estimated as lifetime mating success divided into three multiplicative episodes: lifespan, visits / lifespan and matings/visit (mating efficiency). In ♀♀, reproductive success was estimated from the lifetime number of ovi-positions divided into lifespan, visits / lifespan and ovi-positions/visit. Results indicated the absence of directional selection but highly significant nonlinear selection was observed in both sexes in respect to the date of emergence and body proportions. These results suggest that selection acts simultaneously on the multivariate phenotype and several traits should therefore be included in the selection analysis." (Author)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**3157.** Donnelly, N. (2000): Farangpo 2000 - Hong Kong, Thailand and Cambodia. *Malangpo* 17: 160-162. (in English). [Odonatological report of a trip to these 3 Asian countries.] Address: Donnelly, T., 2091 Partridge

Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**3158.** Donnelly, T.W. (2000): Change in *Cannaphila insularis* common name. *Argia* 12(3): (in English). [Verbatim: "The Common Names Committee of the DSA has changed the common name of *C. insularis* (Libellulidae) from Narrow-winged Skimmer to Gray-waisted Skimmer. This change was to accommodate the necessity of giving *Cannaphila vibex* a common name, as the latter species was recently reported from Nuevo Leon, Mexico, and thus will be included in the new dragonfly manual by Needham, Westfall, and May (in which numerous species found in the northernmost Mexican states and the Caribbean islands will first be given English names). The name "narrow-winged skimmers" is being retained for the genus *Cannaphila*, and the most obvious field mark of *C. insularis*, the gray pruinosity at the base of the black abdomen of mature ♂♂, is now featured in its common name."] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**3159.** Donnelly, T.W. (2000): Dot-map project - hung up on *Lestes*! *Argia* 12(3): 31-32. (in English). [The author takes *Lestes disjunctus*, *forcipatus*, and *australis* for three distinct species. Due to insufficient identification keys (in the past) this taxonomic problem causes difficulties to map the three taxa in USA. Additional problems refer to taxa which intergrade (*Aeshna interrupta* vs. *A. lineata*; *Sympetrum semicinctum* vs. *S. occidentale*; *Erythemis simplicollis* vs. *E. collocata*; *Epithecica costalis* vs. *E. petechialis*; *Amphiagrion saucium* vs. *A. "abbreviatum"*.)] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**3160.** Donnelly, T.W. (2000): Farangpo 2000 - Hong Kong, Thailand, and Cambodia. *Argia* 12(3): 18-21. (in English). [The most interesting species from different localities in Hong Kong, Thailand, and Cambodia are dealt with.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**3161.** Donnelly, T.W. (2000): History of American Odonata studies - Edmund M. Walker. *Argia* 12(3): 33-35. (in English). [This is an additional contribution to the serie of important North American odonatologists written by N. Donnelly with a significant contribution on his personal cooperation with E. Walker: "There are dozens (perhaps hundreds) of odonatists who can truly say that he was the most helpful, enthusiastic, and inspirational odonatist that they have ever known."] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**3162.** Donnelly, T.W. (2000): Late records in the northeastern United States and eastern Canada. *Argia* 12(3): 28. (in English). [Causes for the late records may be a late start of flying season due to bad weather conditions or the absence of violent weather in August.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**3163.** Donnelly, T.W. (2000): Na-Nick of the north strikes again - a visit to Churchill, Manitoba. *Argia* 12(3): 12-13. (in English). [Manitoba, Canada; 9 species were collected including *Aeshna septentrionalis*. A brief note on roosting site selection of *A. sitchensis* (warm,

gravel road and others), and *A. septentrionalis* (large granite glacial boulders). Species started to fly at temperatures of 14°C.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**3164.** Dunkle, S. (2000): Fun in Oz. *Argia* 12(3): 15-18. (in English). [This is a nice talk on Odonata based on a four month trip to Australia, and how to spot them.] Address: Dunkle, S., Biol. Dept, Collin County Community College, 2800 E, Spring Creek Parkway, Plano, TX 75074, USA

**3165.** Futahashi, R.; Futahashi, H.; Araki, Y (2000): Supposed records on migration of *Sympetrum depressusculum* (SELYS). *Aeschna* 37: 28-30. (in Japanese). Address: not stated in English

**3166.** Glotzhober, B. (2000): Bernie V. Counts Jr., Ohia, dead at 42. *Argia* 12(3): 3-4. (in English). [obituary] Address: Glotzhober, R., Ohio Natural History Society, 1982 Velma Ave., Columbus OH 43211-2497, USA. E-mail: bglotzhober@ohiohistory.org

**3167.** Hämäläinen, M. (2000): Additions and corrections to dragonfly lists of five protected areas in Thailand. *Malangpo* 17: 156-157. (in English). [Additions to previously reported Odonata of Khao Yai National Park, Khao Soi Dao Wildlife Sanctuary, Doi Suthep - Pui national Park, Phu Kradung National Park, and Doi Inthanon National Park are made. Some species reported are critically discussed.] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**3168.** Hämäläinen, M.; Yeh, W.-C. (2000): *Polycanthagyna ornithocephala* - again a new aeshnide to the Thai fauna. *Malangpo* 17: 158-159. (in English). [2 ♀♀ of *P. ornithocephala*, new additions to the Thai fauna, were caught at Kanchanaburi province, Kroeng Kra Via alt 22 Oct. 1999. One of the specimens is described in detail, and the species' distribution is briefly outlined. The species is compared with *P. erythromelas* and *P. melanictera*. In addition, habitat and habits are briefly described. *Tetracathagyna waterhousi*, a likewise rare species in Thailand, is reported from the same place from 2 May 2000.] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**3169.** Hernández, J.M. (2000): Geographic distribution of *Crocothemis servilia* (Drury) (Odonata: Libellulidae) in Cuba. *Argia* 12(3): 28-29. (in English). [The Asiatic *C. servilia* was first recorded on Cuba in Dec. 1994; the present knowledge, based on collection of the author in successive years, is documented.] Address: Hernández, J.M.R., Apartado Postal 2004, Sancti-Spiritus, Cuba CP 60100

**3170.** Hutchings, G. (2000): DSA annual meeting, 27 July - 1 August 2000, British Columbia. *Argia* 12(3): 4-6. (in English). [Canada, British Columbia; this report includes lists of species collected in the framework of the meeting.] Address: Hutchings, G., 971 Arundel Drive, Victoria BC, Canada V9A 2C4

**3171.** Ishizawa, N. (2000): Aka-tombo at Otemachi in 1999. *Symnet* 8: 9-10. (in English). [Counts of *Sympetrum frequens*, *S. infuscatum*, and *S. darwinianum* are presented and discussed. "It is likely that because

of continuation of the climate change, the period of descent from highlands in *S. frequens* may be later than usual.".] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozava City, Saitama Pref., Japan. E-mail: isizawa7@mars.ccn.ne.jp

**3172.** Ishizawa, N. (2000): Articles on Aka-tombo in newspapers. *Symnet* 8: 2-3. (in English). [Finding a note in a more popular book on insects on a migratory swarm of *Sympetrum frequens* at June 21, 1973, the register of the regional newspaper was consulted to find out more details on this mass swarm. Disappointingly, only very few information on the migration were to extract from the newspapers. Some additional notes on articles with information of Odonata are listed, and the reasons are discussed why so little information on Odonata is present in newspapers.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozava City, Saitama Pref., Japan. E-mail: isizawa7@mars.ccn.ne.jp

**3173.** Ishizawa, N. (2000): *Sympetrum frequens* at Omori Pond (3). *Symnet* 8: 10-11. (in English). [In *S. frequens* more fertilized eggs were found in mid autumn than in early or late autumn. Data on larval growth, size of sexes at emergence, and the start of reproduction period are presented.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozava City, Saitama Pref., Japan. E-mail: isizawa7@mars.ccn.ne.jp

**3174.** Ishizawa, N. (2000): Thermoregulation in calopterygid damselflies. *Nature & Insects* 35(11): 14-17. (in Japanese). [This is a detailed survey of the thermoregulation in *Mnais pruinosa costalis* and *Calopteryx cornelia* in Japan. Mean thoracic temperature, mean weight, thoracic length, and wing loading are measured and compared. "In the orange-wing ♂, the relation of the temperature of thorax (Tth) to the ambient temperature in the sun was highly correlated and the regression coefficient was larger than 1.0, while in the hyaline-wing ♂, those coefficients were lower, and Tth of the latter was highly thermoregulated. So was the immature hyaline-wing ♂, too [...]. The experiment (the bodies except wings were covered and exposed to the light of 75 W halogen lamp from over 25 cm) proved that wing colour did not affect thoracic temperatures. Immature adults thermoregulated their thoracic temperatures rather lower than mature adults. Tth of the hyaline-wing ♂ increased higher than the orange-wing ♂, probably due to their lighter weight and the scantiness of pruinescence. In orange-wing ♂♂ their bodies were heavily pruinose and this may reflect the sunshine and keep Tth not so high in the direct sunshine. But due to it they can not be superior to hyaline ♂♂ at small sunlit spaces in the shaded areas, while hyaline-wing ♂♂ are superior in such areas. The ♀ of *M. p. costalis* has a relatively large thorax and this may be common among damselflies. This may be helpful for ovipositing ♀♀ to prevent from losing Tth in the water. In a ovipositing ♀ of *Cercion sieboldii*, Tth was lower by 3.8°C than that of her partner, and the difference was far larger than that (0.2°C) of other pairs ovipositing on the surface of water. ♀♀ of *M. p. costalis*, of which wing loading is larger are said to perch on the canopies of trees in the daytime except during oviposition to maintain high Tth. In ♂♂ of *C. cornelia*, they perch nearby streams or on boulders stuck out from the streams, so their Tth are low and their wing beat frequency is small. But their wing loading is light and they can fly easily, though they are not so agile." A translation of the paper is available from Naoya Ishiza-

wa, or IDF.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozawa City, Saitama Pref., Japan. E-mail: isizawa7@mars.ccn.ne.jp

**3175.** Kano, K.; Yokoi, N. (2000): On the plant worms of Odonata. *Nature & Insects* 35(11): 6-9. (in Japanese (translated in English by Naoya Ishizawa)). [A parasitic fungus belonging to the Clavicipitaceae, Ascomycota was found on *Sympetrum infuscatum*, Yasato-cho, Ibaraki Pref, Japan. The paper describes the infection route and compiles reports with information on "plant worms" on Odonata. A translation of the paper is available from Naoya Ishizawa, or IDF.] Address: Yokoi, N., 2-37-11 Kaisei, Koriyama, Fukushima, 963-8851 Japan

**3176.** Karube, H. (2000): Records of the New Caledonian Odonata. *Aeschna* 37: 37-42. (in Japanese). [26 species are listed; *Isosticta robustior*, *Caledopteryx maculata*, *Oreaeschna dominatrix*, *Synthemis miranda*, *Synthemis fenella*, and *Metaphya elongata* are documented by black and white photos.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan

**3177.** Kitagawa, K. (2000): The Odonata of Thailand taken by Mr. Jyun Hase. *Aeschna* 37: 33-36. (in Japanese with English summary). [In 1991, 15 odonate species were collected at Khao Yai, Central Thailand. 3 species, *Ceriaton azureum*, *Lathrecista a. asiatica*, and *Zyxomma petiolatum*, are new additions to the odonate fauna of Khao Yai.] Address: Kitagawa, K., Imai 1-11-6, Asahi-ku, Osaka C., Osaka, 535-0011, Japan

**3178.** Kitching, R.L. (2000): Food webs and container habitats: The natural history and ecology of phytotelmata. Cambridge Univ. Press, New York. ISBN 0-521-77316-4: xiii + 431 pp. (in English). ["[...] An annex (p. 301-384) is a bestiary. Phylum by phylum, from Platyhelminthes to Chordata, it gives a brief account of each major taxon, for some at the level of phylum, for some arthropods down to the level of family. It provides a classification, down to the level of species, of some of the taxa (Annelida, Crustacea, Odonata, Culicidae, Chironomidae, Ceratopogonidae, Psychodidae, Phoridae, Syrphidae, Coleoptera, Acari, and frogs) in tables. This classification was a brave undertaking because it seems to be the first to attempt a listing for the fauna of all phytotelmata. [...]" (Book review of J. H. Frank, Entomology & Nematology Dept., University of Florida, Gainesville, FL 32611-0630, USA; published in *Florida Entomologist* 84(3): 461-462, 2001).]

**3179.** Kitowski, I. (2000): The food of Mantagu's Harrier (*Circus pygargus*) in the post-fledging period on the carbohydrate peat-bog near Chelm. *Walory Przyrodnicze Chelmskiego Parku Krajobrazowego i Jego Najbliższych okolic*: 177-182. (in Polish with English summary). [Chelm (51°08N 27°37E), Poland; "Odonata indet." account to 1,7% of the diet.] Address: not stated

**3180.** Kowalik, W.; Stryjecki, R. (2000): The invertebrates macrofauna of the Chelm Landscape Park peat-bog pools with special regard to the water mites (Hydracarina). *Walory Przyrodnicze Chelmskiego Parku Krajobrazowego i Jego Najbliższych okolic*: 165-176. (in Polish with English summary). [Poland; Odonata are not detailed at the genus or species level.] Address: not stated

**3181.** Lauder milk, E. (2000): New Kentucky records. *Argia* 12(3): 26. (in English). [USA, Kentucky; *Enallagma daeckii*, *Telebasis byersi*] Address: Lauder milk, E.L., 199 Meadow View Drive, '3, Frankfort, KY 40601, USA. E-mail: Ellis.Laudermilk@mail.state.ky.us

**3182.** Maibach, A.; Meier, C. (2000): 12. Libellen-Symposium in Neuchâtel, 27.11.1999. *Nachrichten des Schweizer Zentrum für die Kartographie der Fauna* 19: 38-42. (in German, French and Italian). [Summaries of the following lectures are presented: 1. T. Maddalena: *Novità dal Ticino - Gruppo di Lavoro «Libellule Ticino»* 2. N. Dulka: *Approche autécologique de trois espèces de Coenagrionidae (Odonata: Zygoptera) en Suisse Occidentale (Coenagrion puella, C. pulchellum, Enallagma cyathigerum)* 3. Ch. Keim: *Recolonisation par les Odonates des gravières du Verney (Martigny, VS) asséchées en 1998* 4. B. Oertli: *Prédiction des peuplements d'Odonates des étangs suisses*. 5. H. Wildermuth: *Das Rotationsmodell zur Pflege von kleinen Libellengewässern - Rückblick auf 15 Jahre Praxis*. 6. H. Humbert-Droz & S. Dubouchet: *Suivis spatial et temporel d'une population d'Orthetrum brunneum sur la Seymaz (GE)*. 7. R. Hoess: *Libellenbeobachtungen im Kanton Bern in Zusammenhang mit dem Jahrhunderthochwasser vom Mai 1999*] Address: CSCF, Terreaux 14, CH-2000 Neuchâtel, Switzerland

**3183.** Matsumura, T.; Uéda, T. (2000): A report on the vertical distribution of Aka-tombo on Akausage, Fukui Pref. and marking survey of *Sympetrum frequens*. *Symnet* 8: 6-8. (in English). [The distribution of *S. frequens*, a species known to disperse in summer to higher altitudes, was studied along a transect at 14 different elevations. The abundance increased significantly above 1000m a.s.l. Additional data are presented for *S. infuscatum*, *S. darwinianum*, and *S. eroticum*. Marking of 709 specimens of *S. frequens* resulted in a recapture of an individual 72 km apart from the marking locality.] Address: Ueda, T., Ishikawa Agricultural College, Suetsumu, Nonoichi, Ishikawa Pref., 921, Japan

**3184.** Mauffry, B.; Roble, S.; Tennessen, K. (2000): New state records of Odonata for West Virginia in the collection of the late Paul D. Harwood. *Argia* 12(3): 29-31. (in English). [USA; West Virginia; Based on a collection of app. 5000 specimens, three new state records could be added to the list of West Virginia Odonata: *Lestes inaequalis*, *Pantala flavescens*, and *Pantala hymenaea*. Some of the voucher specimens and publications of Harwood are critically discussed.] Address: Mauffray, B., 4525 N.W. 53rd Lane., Gainesville, FL 32653, USA. E-mail: iori@afn.org

**3185.** Nakai, K. (2000): Watching a migration of Aka-tombo in swarms. *Symnet* 8: 2. (in English). [Japan; 27 July, 1991 a swarm of migrating *Sympetrum frequens* was observed. It is described in detail. The number of the involved (mature) specimens is estimated at 800000 per hour.] Address: Nakai, K., Tsubata-machi, Kahoku-gun, Ishikawa Pref., Japan

**3186.** Nikula, B. (2000): Bog hopping and stream sloshing in the Maine woods. *Argia* 12(3): 10-12. (in English). [84 odonate species were collected in end of June, 2000 in the northeastern part of Maine, USA. *Anax longipes* is an addition to the Maine Odonata list. *Somatochlora hineana* could - contrary to 1999 - not be traced, but the quite recently described *Neurocordulia michaeli* Brunelle, 2000 was. The most interesting spe-



cies are listed locality-wise.] Address: Nikula, B., 2 Gilbert Lane, Harwich Port, MA 02646, USA. e-mail: ode-news@capecod.net

**3187.** Paulson, D. (2000): New records from Washington and Idaho. *Argia* 12(3): 25-26. (in English). [Records of *Coenagrion interrogatum*, *Aeshna subarctica*, *Nehalennia irene*, and *Epitheca spinigera* are documented in detail.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**3188.** Sasamoto, A.; Ushijima, K (2000): Records of the Odonata collected at Kathmandu Valley, in Nepal. *Aeschna* 37: 1-12. (in Japanese with English summary). [Between 1997 and 1999, 50 species were recorded. Some are illustrated by black and white photos (*Rhincocypha trifasciata*, *Coeliccia renifera*, *Ceriagrion fallax*, *Gynacanthaeschna sikkima*, *Cephalaeschna masoni*, *Aeshna petalura*, *Anaciaeschna donaldi*, *Scalmogomphus bistrigatus*, *Macromia moorei*, *Sympetrum haematoneura*) or drawings (*Aciagrion olympicum*, aberrant *Crocothemis* sp.).] Address: not stated in English

**3189.** Tabata, O.I. (2000): A Record of *Lyriothemis elegantissima* Selys from Tokunosima Island. *Aeschna* 37: 27. (in Japanese). [Japan, 13-VII-1999] Address: Tabata, O., Shoubuen-cho 79-18, Kamigamo, Kita-ku, Kyoto C., Kyoto 603-8064, Japan

**3190.** Thiele, V.; Berlin, A.; Wichert, R. (2000): Zur Kenntnis zoologischer Taxa (Avifauna, Lepidoptera, Trichoptera, Odonata, Saltatoria) im Bereich von Knochenhauerwiese und Galgenbruch (Hansestadt Rostock). *Archiv der Freunde der Naturgeschichte in Mecklenburg* 39: 85-104. (in German). [Mecklenburg-Vorpommern, Germany; 20 odonate species are listed for three localities. The list includes *Aeshna viridis* and *Leucorrhinia pectoralis*.] Address: Thiele, V., biota, Am Augraben 2, D-18273 Güstrow, Germany

**3191.** Tsubuki, T. (2000): A record of *Sympetrum darwinianum* at the Yunomaru heights. *Symnet* 8: 8-9. (in English). [Japan; some altitudinal records of (mature) *S. darwinianum*, and observations on pre-reproductive *S. frequens* are reported.] Address: not stated

**3192.** Tsubuki, T. (2000): Observation on *Sympetrum frequens* and *Sympetrum darwinianum* at Soja City, Okayama Pref. in the early November. *Symnet* 8: 9. (in English). [Japan; faunistic data on the two species] Address: not stated

**3193.** Tsubuki, T. (2000): Seasonal fluctuations of Aka-tombo in the peripheries of Mogusayama, Hino City, Tokyo in 1997. *Symnet* 8: 11-13. (in English). [Japan; detailed documentation of seasonality of *Sympetrum frequens*, *S. infuscatum*, *S. speciosum*, *S. darwinianum*, and *S. eroticum* between July and December 1997.] Address: not stated

**3194.** Ueda, T. (2000): "The Japanese" and dragonflies. *Symnet* 8: 1. (in English). [The paper documents the title pages of the journal "The Japanese" which first was published in 1888, the 21th year of the Meiji era. Obviously it was a nationalistic magazine aimed to try to avoid europeanism in Japan. Some of the items of the journal referring to Odonata are briefly noted, and the special relationship between Japan (Akit-sushima - Country of Dragonflies) and dragonflies is

briefly outlined.] Address: Ueda, T., Ishikawa Agricultural College, Suematsu, Nonouchi, Ishikawa Pref., 921, Japan

**3195.** Ugai, S. (2000): Hybrid records of dragonflies in Japan. *Nature & Insects* 35(11): 18-22. [The paper documents and compiles extensively hybrids between odonate species in Japan. A translation of the paper is available from Naoya Ishizawa, or IDF.] Address: not stated

**3196.** Ushiyama, M. (2000): Rescue works of larvae in swimming pools. *Symnet* 8: 5. (in English). [The author describes the situation of school ponds in Japan used for swimming purposes; cleaning of the ponds prior emergence of Odonata leads to the destruction of the dragonfly population. The author describes who it may be possible to combine the functions "swimming pond for pupils" and "habitat of Odonata".] Address: not stated

**3197.** Wagner, D.L. (2000): Dragonfly and damselfly workshop, University of Connecticut. *Argia* 12(3): 8. (in English). [Report from a workshop organised in May 2000.] Address: Wagner, D.L., Ecol. & Evol. Biology, U. Box 42, Univ. Connecticut, Storrs, CT 06269, USA. E-mail: dwagner@uconnvm.uconn.edu

**3198.** Watanabe, K. (2000): *Coeliccia* of Thailand and Malaysia. *Nature & Insects* 35(11): 2-5. (in Japanese (translated in English by Naoya Ishizawa)). [The paper lists all known species of the genus *Coeliccia* in table along with the countries they occur. Areal maps and information on altitudinal distribution of *C. didyma* (Selys 1863), *C. pounyi* Fraser 1924, *C. loogali* Fraser 1932, *C. chromothorax* (Selys 1891), and *C. doisuthensis* Asahina 1984 are presented. *C. cyanomelas* Ris 1912, *C. flavicauda* Ris 1912, and *C. ryukyuensis* Asahina 1951 are discussed from the evolutionary point of view. A translation of the paper is available from Naoya Ishizawa, or IDF.] Address: not stated

**3199.** Watanabe, Y. (2000): Attachment apparatus of dragonfly eggs. *Nature & Insects* 35(11): 10-13. (in Japanese (translated in English by Naoya Ishizawa)). [Eggs are enclosed by a gelatinous substance which is interpreted as an adaptation to protect the eggs. The substance is discussed from an evolutionary point of view. Eggs and their specific attachment apparatus are documented for the followings species: *Ischnura asiatica*, *Copera annulata*, *Anax parthenope julius*, *Stylurus annulatus*, *Asiagomphus amamiensis*, *Gomphus postocularis*, *Nihonogomphus viridis*, *Sinictinogomphus clavatus*, *Onychogomphus forcipatus*, *Sympetrum frequens*, *Epitheca bimaculata sibirica*, and *Deielia phaon*. A translation of the paper is available from N. Ishizawa, or IDF.] Address: Watanabe, Yoko, 4-14, Nishida-cho, Nishinomiya City, Hyogo Pref., 662-0034, Japan

**3200.** Yokoyama, T. (2000): Notes on the durations of the egg stages on some dragonflies in Hokkaido 2. *Aeschna* 37: 22-26. (in Japanese). [*Mnais pruinosa*, *Lestes sponsa*, *Sympecma paedisca*, *Coenagrion e-cornutum*, *C. hylas*, *Enallagma circulatum*, *Nehalennia speciosa*, *Gomphus postocularis*, *Davidius moiwanus*, *Trigomphus melampus*, *Oligoaeschna pryeri*, *Aeshna juncea*, *A. nigroflava*, *Somatochlora viridiaenea*, *S. arctica*, *S. alpestris*, *Cordulia aenea*, *Epitheca bimaculata*, *Lyriothemis pachygastra*, *Sympetrum frequens*, *S. darwinianum*, *S. infuscatum*, *S. eroticum*, *Sympetrum kun-*

ckeli, S. risi, S. flaveolum, Sympetrum danae, Leucorhinia intermedia.] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**3201.** Yoshida, M. (2000): Collecting and breeding data of some odonate larvae, 3rd report. *Aeschna* 37: 13-21. (in Japanese with English summary). [Japan; 19 species are treated.] Address: not stated in English

**3202.** Yoshida, M. (2000): Dispersive record of *Boyeria maclachlani* (SELYS) at Yahagi River. *Aeschna* 37: 28. (in Japanese). Address: not stated in English

**3203.** Zschunke, R. (2000): Untersuchungen zum Einfluss des Wetters auf das Verhalten der Gebändernten Prachtlibelle (*Calopteryx splendens*) unter besonderer Berücksichtigung der Reviermännchen. Diplomarbeit im Fachbereich Biologie (Zoologie) der Universität des Saarlandes. 100 pp. (in German). [River Nied, Saarland, Germany; Effects of weather on *C. splendens* were surveyed in 1999; special emphasis was given to territorial ♂♂. Meteorological data (air-temperature, 400 - 700nm - radiation, UV-radiation, wind speed, relative atmospheric humidity, and rain / precipitation) were measured continuously. These data were plotted against the dynamic of the population and the behaviour of selected specimens. Air temperature and visible radiation determined the behaviour of *C. splendens* predominately. Wind velocity influenced the behaviour. Atmospheric humidity was equal at maturation places and territories; there was no indication that teneral specimens prefer places with higher humidity than mature specimens. In addition, this M.Sc. includes observations on behaviour of *C. splendens* during the solar eclips of 11/08/1999, and many additional information on population dynamics, sex-ratio, roosting site selection, diurnal activity, etc. This study provides highly significant information on the influence of weather on the behaviour of Odonata.] Address: Zschunke, R. E-mail: rasz@gmx.de

## 2001

**3204.** Abbott, J. (2001): The 2001 DSA annual meeting at Junction, Texas. *Argia* 13(3): 2-4. (in English). [*Erythemis peruvia* - new to the USA - was collected at the South Llano River State park, Texas. In addition species lists from several localities in Texas and New Mexico, USA are provided.] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**3205.** Akagi, M. (2001): Observation on a swarming aka-tombo. *Symnet* 9: 5. (in English). [Japan, Miyauchi, Tottori, Pref.; July 3, 2001, report on an aggregation of *Sympetrum frequens*.] Address: Akagi, M., Nichinancho, Hino-gun, Tottori Prefecture, Japan

**3206.** Araki, Y.; Futahashi, R. (2001): Record of collecting and breeding of larvae of *Anax guttatus* in Toyama Prefecture. *Aeschna* 38: 35-38. (in Japanese with English summary). ["We collected some larvae of *A. guttatus* at Daimon-machi and Asahi-machi, Toyama Prefecture in October and November 1998. This is probably the northernmost record of the larvae of this tropical migratory species in Japan. According to our

breeding data the egg period was 11 to 19 days, and the larvae period was 55 to 88 days. Hence, the larvae we collected outdoors are supposed to have been originated from the eggs laid in August and September 1998 In 1998 autumn, we found many adults of *Anax guttatus* but it was not easy to find the larvae mainly because of the difficulty in identifying young larvae. But we also speculate that the eggs or the young larvae of this species could not adequately adapt themselves to the cold climate of the late autumn in the Hokoku district because no late-stage larvae was found through our repeated research in October and November at Shimmato-city and Himi-city (Toyama Prefecture) where we observed its reproductive behavior many times since September."] Address: not stated in English

**3207.** Barlow, A.E. (2001): Second annual report of the new Jersey Odonata Survey including a state record and numerous county records. *Argia* 13(3): 18-22. (in English). [*Somatochlora kennedyi* was discovered on June 7, 2001 in New Jersey, USA. 36 additional species to counties are briefly discussed.] Address: Barlow, A.E., 10 Belle Court, Budd Lake, NJ 07828, USA. E-mail: a.barlow@smtphost.elsevier.com

**3208.** Beckemeyer, R. (2001): "How far to Wiwili?" "Quince Minutos! (Fifteen minutes)" a Nicaraguan adventure. *Argia* 13(3): 9-14. (in English). [This is an extensive report of collecting Odonata in the mud of Nicaragua.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**3209.** Brockhaus, T. (2001): Libellen (Odonata). In: Verein zur Förderung von Landschaftspflege und Naturschutz & Stadtverwaltung Chemnitz, Umweltamt (Hrsg.): Pflanzen-Tiere-Lebensräume in Chemnitz. Ein Arten- und Biotopschutzkonzept: 178-188. (in German). [37 odonate species are known to occur in Chemnitz, Sachsen, Germany. The species - including historical data - are listed in a table. 24 species are discussed in detail, the distribution of some is mapped.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**3210.** Brown, G. (2001): Rhode Island update. *Argia* 13(3): 22. (in English). [Current results of odonatological mapping of Rhode Island, USA are presented including details on *Aeshna mutata*.] Address: Brown, Virginia, The Nature Conservancy, 159 Waterman Avenue, Providence, RI, 02906, USA

**3211.** Buidin, C. (2001): Premiere mention de *Sympetrum (Sympetrum) semicinctum* Say (Odonata: Libellulidae par la Côte-Nord du Saint-Laurent. *Fabriques* 26(2): 82. (in French). [Quebec, Canada; 1 ♀, 9-IX-2000.] Address: Buidin, C., 1 ch. du Grand Ruisseau, Riviere-Saint-Jean, QC, G0G 2N0, Canada

**3212.** Daigle, J.J. (2001): Cades cove dragonfly bioblitz II. *Argia* 13(3): 6. (in English). [Report from a regional meeting including a list of twelve new species for the Great Smoky Mountains National Park, Tennessee, USA.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@netally.com

**3213.** Deliry, C. (2001): *Sympetrum piémontais* n°1 à 46. Un retour sur les activités du GRPLS .... *Sympetrum piémontais* 47: 12-15. (in French). [The French "Groupe de Recherche et de Protection des Libellules

"Sympetrum" is definitely one of the most active dragonfly associations within our community of odonatologists. This paper compiles the essentials of the work starting in 1986/87 and is a significant document of dragonfly research in France.] Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France

**3214.** Donnelly, N. (2001): There are definitely no flying fishes on the road to Mandalay. *Argia* 13(3): 15-18. (in English). [Report from a collecting trip to Myanmar / Burma.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**3215.** Futahashi, M.; Fukui, M; Yoshida, M.; Yokoyama, T. (2001): Breeding records of eggs and larvae of *Sympetrum depressiusculum* (Selys, 1841). *Aeschna* 38: 24-26. (in Japanese with English summary). [The authors outline that "previous breeding records regarded most of the offspring of *S. depressiusculum* caught in Japan as hybrids between *S. depressiusculum* and *S. frequens*." To obtain "genuine *S. depressiusculum*", specimens thought to have just reached the coastal area of Japan from overseas were caught. Eggs reared to the imago proved to be typical *S. depressiusculum*.] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**3216.** Futahashi, R.; Futahashi, H.; Araki, Y. (2001): Observation of copulation and oviposition of *Sympetrum cordulegaster*. *Aeschna* 38: 39-40. (in Japanese with English summary). [Records of copulation behaviour of *S. cordulegaster* in Japan are rare. The authors present photographs of the copulation and oviposition ("Flying-oviposition into the water") of this species.] Address: not stated in English

**3217.** Gianti, M. (2001): Segnalazioni faunistiche italiane. *Coenagrion mercuriale* ssp. *castellani* Roberts, 1948 (Odonata: Coenagrionidae). *Boll. Soc. ent. ital.* 133(3): 267. (in Italian). [*C. castellanii* is for the first time recorded for Piemonte, N Italy (1 ♂, 2 ♀♀, Salmour/CN, 13-VI-1999). Its distribution in Italy is briefly outlined.] Address: Gianti, M., Via Divisione Cuneese 17, I-12023 Garaglio CN, Italy

**3218.** Hachiya, K. (2001): Seasonal fluctuations of adult *Sympetrum frequens* and *Sympetrum infuscatum* at rice paddies in Hokkaido. *Symnet* 9: 6-9. (in English). [In 1998 and 1999, the emergence and pre-reproductive period of *Sympetrum frequens* and *S. infuscatum* was studied near Sapporo, Hokkaido, Japan.] Address: Hachiya, K., Kuriyama-cho, Yubari-gum, Hokkaido, Japan

**3219.** Higashi, K. (2001): Kotee of dragonflies and quails. *Symnet* 9: 1-2. (in English). [Japan; "Kotee is said to be an art of moulding on a plaster wall with only a trowel by a plasterer." This paper reports extensively on a kotee representing dragonflies.] Address: Higashi, K., Department of Applied Biological Sciences, Faculty of Agriculture, Saga University, Honjyo-machi 1, Saga, 840-8502, Japan. E-mail: higashik@cc.saga-u.ac.jp

**3220.** Ikezaki, Y. (2001): The extinct and seriously endangered species of insects in Nagasaki prefecture. *Nature & Insects* 36(11): 23-25. (in Japanese with English title). [Japan, the list of 5 insect species includes *Mortonagrion Hirosei*, and *Libellula angelina*.] Address: not stated

**3221.** Ishizawa, N. (2001): Capture of a ♀ *Sympetrum frequens* Selys with highly reflective wings. *Gekkan-Mushi* 370: 31-32. (in Japanese). [I captured a ♀ *S. frequens* of which wings were highly reflective at Mikajima, Horinouchi, Tokorozawa City, Saitama Prefecture on September 18, 2001. It was fine, and the air temperature was 29.113 at 2:50 p.m. The dragonfly perched on a rope, and was rather inactive in flight. The abdominal dorsum was dark brown; body weight: 301 mg, abdominal length: 28.7 mm, fore wing: 35 mm, hind wing: 33.5 mm, the total weight of four wings: 11 mg, rather heavier than those of ordinary ones (8.9+1.3 mg, n=16). The wings were glistening like those of teneral soon after emergence. The body sizes were not so different from ordinary ones except the fore wings. The ♀ had a large fore wings for its body, because such a dragonfly of which fore wings exceed 35 mm is rarely seen. I compared the dragonfly with ordinary ones on the effect of wings on body temperature by irradiating them with a halogen lamp (75W) from over 20 cm apart. Fig. 1 shows the changes of the odds of the body temperatures of the same ♀♀ before and after cutting off wings at intervals of 30seconds. Body temperatures (Tb) were measured with a thermocouple (diameter, 0.05 mm) connected to a digital thermometer by inserting the probe to the center of the 1 thorax, 1 mm up the mesothoracic spiracle. The starting Tb was 25°C (some specimens 23.5°C) at 22-24°C of indoor temperature. The odds of Tb of the highly reflective ♀ was 3.3 °C for 3 minutes, higher than those of the ordinary ones (1.3 ±0.4, n=10). I don't know why it was so high, however, the haemolymph might have remained inside the wings, absorbing the radiation heat of the lamp, and it might have been taken into the thorax. That might have raised the body temperature. In the same case as this, I saw a ♂ of the species at Sawairi in Mt. Nyugasa, Nagano Prefecture (1,450 m a.s.l.) (Ishizawa, 1988: *Nature & Insects* 23 (13): 28). The ♂ was not so active and weak in flight. If Tb was high, it must have flown actively, however, curiously it did not. Did it only look weak in fluttering because of the high reflection? Such cases have been reported; one ♂ and one ♀ of *S. frequens* were caught by Takasaki (1996: *Symnet* (5): 8), one ♂ by Udono (1997: *Symnet* (6): 4), and the dragonflies were said to be not so different from ordinary ones besides the physically high reflection. (Taken from *Digest Jap. Odonatol.* Short Comm. No. 12, February, 2002; fig 1 and photo 1 are omitted.)] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozawa City, Saitama Pref., Japan. E-mail: isizawa7@rivo.mediatti.net

**3222.** Ishizawa, N. (2001): Early reproductive behaviours in *aka-tombo* in Honshu. *Symnet* 9: 13. (in English). [Japan; August records of oviposition of *Sympetrum frequens* and *S. infuscatum* are compiled.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozawa City, Saitama Pref., Japan. E-mail: isizawa7@mars.ccn.ne.jp

**3223.** Jones, C.D. (2001): Ontario hosts the first Great lakes Odonata meeting. *Argia* 13(3): 4-6. (in English). [Report from the meeting held from July 3-6, 2001 including some species collected in the framework of the meeting.] Address: Jones, C.D., Box 182, Lakefield, Ontario, K0L 2H0, Canada. E-mail: colin.jones@mnr.gov.on.ca

**3224.** Kawasima, I. (2001): A Record of *Somatochlora clavata* OGUMA, from Gifu City, Gifu Prefecture.



- Aeschna 38: 8. (in Japanese). [Japan, a record of *S. clavata* from 22 Oct. 1996 is documented along with the cooccurring species.] Address: not stated in English
- 3225.** Kawasima, I. (2001): The Records of Odonata from Mikasa City, Sorachi Province, Hokkaido. *Aeschna* 38: 17-23. (in Japanese with English summary). [Japan; 28 species are listed.] Address: not stated in English
- 3226.** Keiper, J.B.; Casamatta, D.A. (2001): Benthic organisms as forensic indicators. *Jl N. Am. benthol. Soc.* 20(2): 311-324. (in English). ["Forensic entomology is the use of the presence or absence of specific sarcophagous insect life stages to gain information on the time since death, cause of death, and other facets of criminal investigation. ... It is especially useful in providing important supporting evidence during investigations of mysterious or suspicious deaths." Based on literature, a review is given of 5 forensic odonate records, pertaining to the larvae of *Calopteryx*, *Argia*, *Ischnura*, *Zoniagrion*, and *Gomphus*, all from the USA. Records of *Ischnura* and *Gomphus* were associated with human remains.] Address: Keiper, J.B., Dept Invert. Zool., Cleveland Mus. Nat. Hist., 1 Wade Oval Dr., University Circle, Cleveland, OH 44106, USA. E-mail: jkeiper@cmnh.org
- 3227.** Khrokalo, L.A. (2001): [Environmental separation of dragonfly larvae (Insecta: Odonata) in some regions of Ukraine]. *Biologia*, (Kiew?) 14(2): 183-186. (in Russian). [36 odonate species were recorded at 7 localities; they are analysed according to their abundance. The list includes rare European species or species near the boundaries of their ranges as *Lestes virens*, *Erythromma viridulum*, *Brachytron pratense*, *Aeshna cyanea*, *Aeshna viridis*, *Anaciaeschna isocetes*, *Epithea bimaculata*, *Sympetrum flaveolum*, *S. meridionale*, *Leucorrhinia albifrons*, *L. pectoralis*, *L. rubicunda*, and *Leucorrhinia caudalis*.] Address: Khrokalo, L.A., Dept Zool., Fac. Biol., Shevchenko Univ., Volodymirska 64, UKR-01033 Kiev, Ukraine
- 3228.** Kitagawa, K. (2001): The Odonata of the paddy field in Sri Lanka collected by Mr. Terunobu HIDAHA. *Aeschna* 38: 41-43. (in Japanese with English summary). [11 common odonate species from Sri Lanka are documented.] Address: Kitagawa, K., Imai 1-11-6, Asahi-ku, Osaka C., Osaka, 535-0011, Japan
- 3229.** Kondoh, S. (2001): Notes on dragonflies in Rokko Island, an artificial island in Kobe, Hyogo Pref., Japan. *Aeschna* 38: 1-7. (in Japanese with English summary). [Between Sep. 1991 and Dec. 1999, 26 odonate species were recorded.] Address: Kondoh, S., 1-214-719, Koyo-cho, Naka 2-chome, Higashinada-ku, Kobe City, 658 Japan
- 3230.** Kumashiro, B.R.; Nishida, G.M.; Beardsley, J.M. (2001): Listings of new state records of immigrant insects in the Hawaiian Islands for the years 1991-1998. *Proc. Hawaii, ent Soc.* 35: 157-169. (in English). [*Crocothemis servilia* is listed for 1994] Address: Kumashiro, B.R., Hawaii Dept Agric., P.O. Box 22159, Honolulu, HA 96823-2159, USA
- 3231.** Liu, R.K. (2001): The symbolic importance of insects in jewelry. *Trans. Am. ent. Soc.* 127(32): 167-171. (in English). ["5 insect orders are symbolically important in jewelry, viz. Homoptera, Coleoptera, Lepidoptera, Odonata, and Diptera, of which the portrayals of butterflies are the most numerous. In the dragonfly, its importance symbolically was probably due to its swift flight and the capacity of rapid change of direction. Thus, Native Americans equate it to the whirlwind, swiftness and activity. By Plains Indians, who used its image on shirts, it was regarded as a spirit helper in warfare. The dragonfly is also used in the jewelry of the Navajo and Zuni. There is a XII dynasty Egyptian dragonfly amulet, but its significance is unknown. It is the emblem of summer for Chinese, who also regard the dragonfly as a symbol of instability and weakness, almost matched by the Japanese regard of it as denoting irresponsibility and unreliability, but both these cultures use its image in adornment. Western jewelers employed it as a motif in 19th and 20th century jewelry."] Address: "Ornament" Ed. Office, P.O. Box 2349, San Marcos, CA 92079, USA
- 3232.** Nagayama, S. (2001): Memories on dragonflies. *Symnet* 9: 3-5. (in English). [This is a very personal report on the dragonflies of the childhood, and the relations between man and dragonflies. Special emphasis is given to methods catching them by hand or using a rod and line.] Address: Nagayama, S., Tatsuguchi-cho, Nomi-gun, Ishikawa Prefecture, Japan
- 3233.** O'Brien, M. (2001): *Somatochlora tenebrosa* at Ives Road Fen, Lena Wee Co, Michigan (Corduliidae). *Argia* 13(3): 22-24. (in English). [The paper updates the present knowledge on the occurrence of *S. tenebrosa* in Michigan; the new habitat of the species traced on July 1, 2001 is described in some detail.] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfbrien@umich.edu
- 3234.** Paulson, D. (2001): *Hetaerina pilula* from Costa Rica. *Argia* 13(3): 24. (in English). [21-II-1967] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu
- 3235.** Paulson, D. (2001): Maine Trip. *Argia* 13(3): 15. (in English). [Records made end of June 2001 include species which seem to extend their ranges.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu
- 3236.** Paulson, D. (2001): *Orthemis schmidtii* is a widespread species. *Argia* 13(3): 24-25. (in English). [*Orthemis schmidtii* Buchholz 1950 was found in the collection of D. Paulson from Ecuador, Guatemala, Costa Rica, Peru, Venezuela, Trinidad, Surinam, and Brazil. *O. ferruginea*, *O. discolor*, and *O. schmidtii* are compared to each other.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu
- 3237.** Pusch, M.; Köhler, S.; Wanner, S.; Ockenfeld, K.; Hoffmann, A.; Brunke, M.; Grünert, U.; Kozerski, H.-P. (2001): Ökologisch begründetes Bewirtschaftungskonzept für die Spree unter dem Aspekt der bergbaubedingten Durchflußreduktion. *Berichte des Leibniz-Institut für Gewässerökologie und Binnenfischerei Berlin* 11. 244 pp. (in German). [River Spree, Brandenburg, Germany; the larval abundance of *Gomphus vulgatissimus* in relation to the distance from the shore line and the degree of naturality was investigated. It is concluded that a reduction of the water volume will lead to a drying

out of the habitats near the shore line with a drastic impact on larval abundance and probably the conditions of eggs to develop.] Address: Pusch, M., Institut für Gewässerökologie und Binnenfischerei im Forschungsverbund Berlin e.V., Müggelseedamm 310, D-12561 Berlin, Germany. E-mail: pusch@igb-berlin.de

**3238.** Rodrigues, G.G.; Scharf, B.W (2001): Review of benthic invertebrate fauna in extremely acidic environments (pH < 3). *Mine Water and the Environment* 20: 114-121. (in English). ["Some benthic invertebrate species are able to colonise habitats in extremely acidic waters. We compiled a list of acid-resistant benthic invertebrates from the literature and extended it by studying extremely acidic mining lakes in eastern Germany. Acid-resistant species were registered for some habitats with pH < 3, such as volcanic-lakes, acid strip streams, and acidic mining lakes. Twenty nine taxa were found in waters with pH below 3. Diptera comprised 48.3% of the total number of taxa, followed by Coleoptera with 10.3%, Trichoptera 10.3%, Ephemeroptera, Megaloptera, and Plecoptera each with 6.9%, and Odonata, Hirudinea, and Acari each with 3.5%. Chironomus (Diptera: Chironomidae) were the most common genus in extremely acidic environments with 9 species. [...]"] (Authors) *Coenagrion mercuriale* is reported from a mining lake near Grünewalde, Brandenburg, Germany (13°34'E 51°30'N) with a pH value of 3. Comment: It should be considered that *C. mercuriale* in Brandenburg is extremely rare, only one locality is known (Mauersberger 2000), and that the described habitat should be quite exceptional for this species. The general discussion on acid water tolerance of Odonata by the authors ignores most significant literature on the subject, and even the fact that there are many bog dwelling species in Germany or world wide. In addition, none of the publications on the odonate fauna of the brown coal mining lakes in eastern Germany is considered.] Address: Rodrigues, G.G.; Scharf, B.W., UFZ - Centre for Environmental Research Leipzig-Halle, Dept of Inland Water Research, Magdeburg, Brückstr. 3 a, D-39114 Magdeburg, Germany. E-mail: rodrigues@gm.ufz.de

**3239.** Rose, J.S. (2001): Dragonfly days. *Argia* 13 (3): 6-7. (in English). [The report from a dragonfly meeting in May 2001 in Weslaco, Texas, USA, includes species records.] Address: Rose, J.S., Biology Dept, Box 90338, Duke University, Durham, NC 27708, USA. E-mail: jsr6@duke.edu

**3240.** Sasamoto, A. (2001): Records of the Odonata collected from Sichuan of China by Kyoto University Butterfly Research Club. *Aeschna* 38: 13-16. (in Japanese with English summary). [Five taxa are documented with black and white photos or drawings: *Megalestes distans* Needham 1930, *Anisogomphus maacki* (Selys, 1872), *Bayadera melanopteryx* Ris 1912, *Orthetrum melania* (Selys, 1883), which is treated by some authors as a subspecies of *Orthetrum triangulare* (Selys, 1878), and *Planaeschna* sp.] Address: not stated in English

**3241.** Sergio, F.; Bijlsma, R.G. (2001): *Falco subbuteo* Hobby. *BWP Update* 3(3): 133-156. (in English). [New information on food of the hobby, yielded by intensive studies conducted in Great Britain, France, Netherlands, Germany, and Italy are compiled. Dragonflies play an important role as food, *Cordulegaster*

*boltonii* is communicated as a prey example from UK. Prey remains at the nest and under perches account near Groningen, the Netherlands to 7,2%, and in a study area comprising a border region of Belarus and Poland to 52% of all prey items. "A perch-hunting third-caller-year ♀ captured 142 insects with 301 attempts between 07.51 and 19.21 hours on 31 Aug.-2 Sept., 1997, mostly *Aeshna* and *Sympetrum* species." (probably near Groningen).] Address: Sergio, F., Raptor Conservation Research Unit, Museo Tridentino di Scienze Naturali, Via Calepina 14, 38100 Trento, Italy. E-mail: Fabrizio.sergio8@tin.it

**3242.** Tennesen, K. (2001): A visit to the Mississippi museum of natural science. *Argia* 13(3): 25-26. (in English). [Brief report on two lectures held at the new established museum. The huge metal fence that leads to the front doors is including motifs of large metal dragonflies and mayflies painted black.] Address: Tennesen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktennesen@aol.com

**3243.** Tsubuki, T. (2001): Group migration of *Sympetrum frequens* at Toshima-ku, Tokyo in early summer. *Symnet* 9: 9. (in English). [An early summer migration (27 June 2001) of *S. frequens* at Toshima-ku, Tokyo, Japan is reported in detail.] Address: Tsubuki, T., Jumonji middle and highschool, Toshima-ku, Tokyo, Japan

**3244.** Tsubuki, T. (2001): Shelters for bad weathers in *Sympetrum* species. *Symnet* 9: 11-12. (in English). [Information on resting sites and behaviour of *Sympetrum eroticum*, *S. frequens*, and *Sympetrum pedemontanum elatum* under bad weather conditions (rain, overcast) are described in detail.] Address: not stated

**3245.** Tsubuki, T.; Sumiko, I.; Noriko, O. (2001): *Sympetrum infuscatum* and *Sympetrum frequens* at the Yunomaru Heights in early August, 2000. *Symnet* 9: 8. (in English). [Japan; some notes on diurnal and seasonal change of abundance of *S. infuscatum* and *S. frequens* near the Jizo pass (about 1650 m a.s.l.) are reported.] Address: Tsubuki, T., Jumonji middle and highschool, Toshima-ku, Tokyo, Japan

**3246.** Ueda, T. (2001): One example of oviposition site of *Sympetrum frequens*. *Symnet* 9: 10. (in English). [An oviposition in a river habitat of the standing water dwelling *S. frequens* is documented.] Address: Ueda, T., Ishikawa Agricultural College, Suematsu, Nonoichi, Ishikawa Pref., 921, Japan

**3247.** Ueda, T. (2001): Two cases of evening migration in *Sympetrum frequens*. *Symnet* 9: 12-13. (in English). [Kanazawa City, Japan; Sept.11, 1989; Sept. 21, 1994.] Address: Ueda, T., Ishikawa Agricultural College, Suematsu, Nonoichi, Ishikawa Pref., 921, Japan

**3248.** U.S. Fish and Wildlife Service (2001): Hine's Emerald Dragonfly (*Somatochlora hineana*) Recovery Plan. Fort Snelling, MN. 120 pp. (in English). [Verbatim: EXECUTIVE SUMMARY Hine's Emerald Dragonfly Recovery Plan Current Status: The Hine's emerald dragonfly, *Somatochlora hineana*, was listed as endangered in January 1995. Extant Hine's emerald dragonfly populations are currently known to persist in Illinois, Wisconsin, Michigan, and Missouri. The Illinois population is the most genetically diverse, and the Wisconsin populations are the largest and presumably most secu-

re. Information on the status of the Michigan and Missouri populations is limited because of their recent discoveries. Historically known from Ohio and Indiana, it is thought to be extirpated from these states. Habitat Requirements and Limiting Factors: The Hine's emerald dragonfly occupies marshes and sedge meadows fed by calcareous groundwater seepage and underlain by dolomite bedrock. In general, these areas are characterized by the presence of slowly flowing water and nearby or adjacent forest edges. Known occupied habitats are currently restricted to the lower Des Plaines River valley, in Illinois; northeastern Door County and Cedarburg Bog, Wisconsin; areas of the Hiawatha National Forest, in the Upper Peninsula of Michigan, three areas in the Lower Peninsula of Michigan, and at three fens in Missouri. Loss of this already rare and restricted habitat to agriculture, commercial and industrial development is the primary cause of the species' decline. Loss of remaining habitat from the same pressures, combined with successional change in the existing habitats and disruption of ecological and hydrological processes, are threats to surviving populations. Recovery Objectives: The objective of this recovery plan is to restore the Hine's emerald dragonfly to viable populations so that it may be removed from the Federal list of Endangered and Threatened Wildlife and Plants. Recovery Criteria: Each of the two Recovery Units contains a minimum of three populations composed of at least three subpopulations. Each subpopulation contains a minimum of 500 reproductive adults for 10 consecutive years. Within each subpopulation, there are at least two breeding habitat areas, each fed by separate seeps and/or springs. For each population, the habitat supporting at least three subpopulations should be legally or formally protected and managed for Hine's emerald dragonfly, using long-term protection mechanisms such as watershed protection, deed restrictions, land acquisition, or nature preserve dedication. In addition, mechanisms protecting the up gradient groundwater watershed should also be in place. Actions Needed: 1. Protect and manage extant populations 2. Conduct studies 3. Conduct searches for additional Hine's emerald populations 4. Conduct an information and education program 5. Conduct a reintroduction and augmentation program 6. Review and track recovery progress Total Cost of Recovery: The total estimated cost for the recovery actions outlined in this plan is \$13,163,000. These recovery actions will benefit not only the Mine's emerald dragonfly, but entire natural communities and other environmental amenities such as drinking water. Many of the actions described in this recovery plan are already funded by existing programs in agency and private organization budgets. The cost estimate represents expenditures over a 20 year time period. Date of Recovery: Full recovery of this species could occur within 10 years of initially meeting the recovery criteria for delisting. It is anticipated that recovery could occur as soon as 2019. This recovery plan has been prepared by the Mine's emerald dragonfly Recovery Team under the leadership of Dr. Dan M. Johnson with assistance in writing the document by Deanna Zercher of the Illinois Natural History Survey in Champaign, Illinois.] Address: U.S. Fish and Wildlife Reference Service 5430 Grosvenor Lane, Suite 110 Bethesda, Maryland 20814 301-492-6403 or 1-800-582-3421

**3249.** Utzeri, C. (2001): Il sapore delle libellule. *Linnea* 35: 149-150. (in Italian). [Carlo Utzeri is reflecting on the taste of dragonflies on the opportunity of a pub-

lication in the newspaper "La Stampa", issue 28-05-2001 written by Dr. Edoardo Raspelli.] Address: Utzeri, C., Dipartimento di Biologia Animale e dell'Uomo, Università di Roma "La Sapienza", Viale dell'Università 32, I-00185 Roma, Italy. E-mail: carlo.utzeri@uniroma1.it

**3250.** Worthen, W.B. (2001): New dragonfly records for Sierra County, New Mexico. *Argia* 13(3): 14-15. (in English). [The collecting of Odonata in July 2001 resulted in 17 species.] Address: Worthen, W.B., Biology Dept, Furman University, Greenville, SC 29613, USA. E-mail: worthen@furman.edu

**3251.** Yanoviak, S.P. (2001): The macrofauna of water-filled tree holes on Barro Colorado Island, Panama. *Biotropica* 33(1): 110-120. (in English). ["The fauna of water-filled tree holes in neotropical forests is not well documented. Cumulatively, 54 macroinvertebrate and 5 vertebrate taxa were found in artificial and natural tree holes censused over four wet seasons on Barro Colorado Island, Panama. Most of the species were in the insect order Diptera, occurred as aquatic larvae in tree holes, and were detritivore/omnivores. Half (49%) of the collected species are considered specialists in this and similar container habitats, and three invertebrate taxa were previously unknown from tree holes. Successional patterns were weak in the tree holes, but some taxa predictably colonized holes shortly after they were filled. The mosquito *Culex urichii* was more common and abundant in artificial than in natural tree holes; occurrence frequencies and densities of most other taxa were similar between hole types. [...] *Libellula* sp. was a very rare occupant in natural tree holes on BCI; the only natural tree hole occurrence of *Libellula* sp. was in large, highly insulated holes of a recently fallen *Platydictyon* clegans near a stream; however, this species sometimes colonized large artificial holes located in treefall gaps and was common in moats surrounding greenhouses. Larvae of the remaining five species of odonates - "*Gynacantha membranalis*, *Triacanthagyna dentata*, *Mecistogaster linearis*, *M. ornata*, and *Megaloprepus caerulatus*" - (along with larvae of the mosquito *Toxorhynchites theobaldi* and *Dendrobates auratus* tadpoles), were the top predators in tree holes. The behavior and ecology of these odonate species have been studied extensively by O. Fincke and S.P. Yanoviak." (Author)] Address: Yanoviak, S.P., Dept Zool., Univ. Oklahoma, Norman, Oklahoma 73019. USA

**3252.** Yokoyama, T. (2001): Notes on the duration of the egg stages of some dragonflies in Hokkaido. *Aeschna* 38: 9-12. (in Japanese). [Data of 27 odonate species from Hokkaido, Japan are presented.] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**3253.** Yoshida, M. (2001): Collecting and breeding data of some odonate larvae, 4th report. *Aeschna* 38: 27-34. (in Japanese with English summary). [Japan; 26 species are treated.] Address: not stated in English

**3254.** Zasybkina, I.A.; Ryabukhin, A.S. (2001): Amphibiotic insects of the Northeast of Asia. Pensoft, Sofia-Moscow & Backhuys, Leiden. ISBN 954-642-138-3 (Pensoft) & 90-5782-089-7 (Backhuys): vii+183 pp.- [An annotated list is presented of the 24 odonate taxa known to occur in NE Asia. Their regional distribution and habitat types are stated, and an exhaustive bibliography is provided. The records are not critically discussed as *Coenagrion lunulatum* and *C. vernale* nom.



nud. and *Sympetrum danae* and *S. scoticum* are treated each as valid species. *Enallagma antiquum* Barteneff, 1911 is also listed; the status of this taxon is unknown and not described in the paper of Barteneff listed in the bibliography.]

**3255.** Zawadzka D.; Zawadzki J. (2001): Breeding populations and diets of the Sparrowhawk *Accipiter nisus* and the Hobby *Falco subbuteo* in Wigry National Park (NE Poland). *Acta Ornithol.* 36: 25-31. (in English with Polish summary). [The diet composition of the two species was studied by the analysis of pellets and prey remains. Sparrowhawks fed on birds (97% of prey items, 99% of food biomass) and insects (43% of prey, 1% of biomass). Sparrowhawks specialized in forest birds, positively selecting *Parus* spp., *Turdus* spp., *Picidae* and *Ficedula* spp. Hobbies hunted mainly birds of open habitats (*Alauda arvensis*) and woodland (*Anthus trivialis*). As usually, Odonata are among the prey of the Hobby, but they account only 3,7 % of the prey items and 0,1% of the biomass. Surprisingly, in one case even Sparrowhawks preyed on Odonata.] Address: Zawadzka D., Zawadzki J., 25 Czerwca 68b/15, 26-600 Radom, Poland

## 2002

**3256.** Adriaens, T (2002): Dragonflies of the northern part of Western Flanders: status, importance and conservation. *Gomphus* 18(1-2): 15-40. (in Dutch, with English and French summaries). ["The odonatofauna of the north of the province West-Flanders (Belgium) is relatively well-known. This article deals with historical and recent distribution of observed species (31 in total) and aims to determine the most important sites (species diversity, rarity) for dragonflies. Sites were clustered in respect to species composition using TWINSPLAN software. Division levels were then displayed in a GIS-environment, so as to get an idea about the usefulness of the current ecodistricts in interpreting distribution patterns of dragonflies in the region. The Houtland ecodistrict, a region of pleistocene sands, appeared most species diverse, with the Bell Heather Reserve fen (Zevenkerke) displaying the highest species richness in the region (22 species). No less than three Red List species were recorded in this district, the latter probably being extinct: *Cordulia aenea*, *Leucorrhinia dubia*, and *Coenagrion pulchellum*. The ecodistrict "dunes" is important for the vulnerable *Ischnura pumilio*. It is suggested that ecodistricts might be too detailed for interpreting dragonfly distribution. Finally we present ideas for maintaining and managing populations of some delicate species." (Author) The following species are discussed in detail: *Sympecma fusca*, *Lestes barbarus*, *Ischnura pumilio*, *Coenagrion pulchellum*, *Cercion lindenii*, *Erythromma najas*, *Gomphus pulchellus*, *Cordulia aenea*, *Crocothemis erythraea*, *Leucorrhinia dubia*, and *Sympetrum fonscolombii*.] Address: Adriaens, T., Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: tim.adriaens@instnat.be

**3257.** Adriaens, T (2002): Verslag van de excursie naar Den Diel en het Buitengoor (Mol) op 19 augustus 2001. *Gomphus* 18(1-2): 41-43. (in Dutch, with French summary). [Belgium; in spite of quite unfavourable weather condition, 21 odonate species were recorded. The

list includes the rare or threatened species *Ceragrion tenellum*, *Erythromma najas*, *Orthetrum coerulescens*, and *Sympetrum depressiusculum*.] Address: Adriaens, T., Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: tim.adriaens@instnat.be

**3258.** Anonymus (2002): Erläuterung zur Titelseite: Prachtlibelle. *Hydrologie und Wasserbewirtschaftung* 46(6): 312. (in German). [A ♀ *Calopteryx virgo meridionalis* was printed on the journal's front page. Brief remarks on the species and on the Odonata in southern Europe (compiled from G. Jurzitza's book) are added.] Address: not stated

**3259.** Baker-Schommer, M. (2002): What's in a name? Understanding the Latin names of dragonflies. *Dragonfly news* 42: 10-14. (in English). [Origins and meanings of the names of UK's Odonata are outlined basing on the book of H. Fliedner "Die Bedeutung der wissenschaftlichen Namen europäischer Libellen" - *Libellula* suppl. 1, 111 pp., 1997.] Address: not stated

**3260.** Beckemeyer, R. (2002): George H. Bick, Honorary member, the Dragonfly Society of the Americas. *Argia* 14(3): 4-5. (in English). [R. Beckemeyer introduces the recognition of Dr. George H. Bick as Honorary Member of DSA, and briefly outlines some mile stones in his odonatological work.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**3261.** Beckemeyer, R. (2002): Some Odonata records for the Oxley Nature Center, Tulsa County, Oklahoma. *Argia* 14(3): 12-13. (in English). [USA, a brief survey of a pond and the insect collection of the Center resulted in many new County records.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**3262.** Bedjanic, M.; Salamun, A. (2002): Additional notes on the last larval instar of *Epopthalmia vittata cyanocephala* Hagen, 1867 from Sri Lanka (Odonata: Corduliidae). *Opusc. zool. flumin.* 204: 1-6. (in English). [The original description of the larva (cf. M. Bedjanic, 2000, *Odonatologica* 29: 57-61) is supplemented on the basis of appreciable fresh material, collected in Oct. 2001 in northern and central Sri Lanka. The measurements, illustrations and additional descriptions of some morphological features of the exuviae are presented and a considerable variation in the peculiarly shaped labial palps is pointed out. The current knowledge of the larval forms in the genus is briefly outlined, and comments on ecology, distribution and adult phenology of the endemic *E. v. cyanocephala* are supplied.] Address: Bedjanic, M., Fram 117/A, SI-2313 Fram, Slovenia. E-mail: matjaz.bedjanic@guest.arnes.si

**3263.** Behrstock, R.A. (2002): First known U.S. population of the Tropical Sprite *Nehalennia minuta* (Selys) (Odonata: Coenagrionidae). *Argia* 14(3): 9-10. (in English). [In January 2000, *N. minuta* was first recorded for the USA in Florida. Additional specimens of the species were found on 26 February 2002 at Key West, Florida. The species is compared morphologically with *N. pallidula*. Co-occurring species are briefly outlined.] Address: Behrstock, R.A., 9707 S.Gessner #3506, Houston, TX, 77071-1032, USA. E-mail: rbehrstock@aol.com

- 3264.** Bramati, J. (2002): Vergnügungssüchtige Libellen? Was treibt Männchen von *Calopteryx splendens* (Gebänderte Prachtlibelle) in eine Riesenrutsche?. *mercuriale* 2: 26- (in German). [Two cases where *C. splendens* ♂♂ were observed in a glass covered slide of a swimming pool.] Address: Bramati, J., Hauptstr. 111, D-74595 Langenburg, Germany
- 3265.** Bried, J. (2002): Miscellaneous Mississippi. *Argia* 14(3): 17-18. (in English). [Mississippi, USA; special emphasis is given to the records of *Ischnura prognata*, *Dromogomphus spinosus*, *D. spoliatus*, and *Argia fumipennis*.] Address: Bried, J., Mississippi State University, Dept Biol. Sciences, Rm 130 Harned, PO Box GY, Mississippi State, MS 39762, USA
- 3266.** Brook, J.; Brook, G. (2002): Small Red-eyed Damselfly proven breeding in Kent. *Dragonfly news* 42: 17. (in English). [*Erythromma viridulum*, 29/07/2002, near Dartford, Kent, UK; some additional records are also documented.] Address: not stated
- 3267.** Brunel, C. (2002): Les Odonates de Picardie. État d'avancement de l'inventaire. *Martinia Hors Série* 4: 9-12. (in French). [The paper compiles and discusses historical and more recent data (up to the end of the 1980th) on the 48 odonate taxa of the Picardie which comprises the departments Somme, Aisne, and Oise located in northwestern France.] Address: Brunel, Christine, 8, rue de Général Frère - Appt. 7, F-80080 Amiens, France
- 3268.** Buchwald, R.; Schiel, F.-J. (2002): Möglichkeiten und Grenzen gezielter Artenschutzmaßnahmen in Mooren - dargestellt am Beispiel ausgewählter Libellenarten in Südwestdeutschland. *Telma* 32: 161-174. (in German, with English summary). [Conservation management measures for *Leucorrhinia pectoralis*, *Ceragrion tenellum*, and *Nehalennia speciosa* are presented. These dwellers of mires are used to discuss prospects and limits of special management action plans. "As the primary habitats of these species are destroyed partly or even completely throughout Central Europe, management measures are mandatory. The following prerequisites are necessary: detailed knowledge of biology and ecology of the target-species, its specificity for the habitat-type mire, consideration of possible other objects of protection, adequate abiotic conditions (especially hydrology and trophic status), monitoring of the resulting effects, and information of the public. In intact primary habitats, management measures have to be omitted. On the other hand, conservation of mires can not be limited to the protection of dynamic processes and of abiotic resources, but has to take into consideration the needs of mire species and species-groups as well." (Authors)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de
- 3269.** Buczyński, P.; Serafin, E. (2002): Wazki Parku Krajobrazowego Pojezierza Iławskiego. Zespół Parków Krajobrazowych w Jerzwa<sup>3</sup>dzie, Jerzwa<sup>3</sup>d: 31 pp. (in Polish). [Between 1998 and 2002, P. Buczynski surveyed the Odonata of the landscape park of the Iławskie lakes, located in the northern part of Poland. This nice booklet which is directed to the visitors of the park, bases on the results resp. the checklist of the survey. Additional information of dragonfly morphology and biology, Latin and Polish names of the Odonata, habits, how to observe Odonata, threats, and an identification key of the regional dragonfly imagoes are the main contents of the booklet.] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl Wydawca Zespół Parków Krajobrazowych w Jerzwa<sup>3</sup>dzie 14-233 Jerzwa<sup>3</sup>d 67, Poland. tel./fax 089 758 85 27 e-mail: park-jeziorak@pro.onet.pl www.jezioro.com.pl
- 3270.** Bulánková, E.; Halgos, J. (2002): Characteristic macroinvertebrates of temporal waters of the Morava wetland. *Verhandlungen der Gesellschaft für Ökologie, Cottbus* 2002: 269. (in English). [The Odonata of the Morava (March) wetland (designated as a 'wetland of international importance' under the 'Ramsar' Convention in 1993) was surveyed in 1999 and 2001-2002. The fauna is differed according to the habitat types "temporal waters" (*Lestes barbarus*, *L. viridis*, *L. dryas*, *Coenagrion pulchellum*, *Cordulia aenea*), "fens" (*Lestes virens*, *L. viridis*, *L. sponsa*, *Aeshna isosceles*, *Libellula quadrimaculata*, *Sympetrum flaveolum*, *Sympetrum pedemontanum*), and "riparian flood plain and extra flood plain palustrine wetlands", "spring palustrine wetlands", and "summer and autumnal palustrine wetlands" (no Odonata).] Address: Bulankova, Eva, Institute of Ecology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B-II, SK-84215 Bratislava., Slovakia. E-mail: Bulankova@nic.fns.uniba.sk
- 3271.** Busch-Nowak, A. (2002): Schlupf einer *Libellula depressa* im Oktober. *mercuriale* 2: 22-23. (in German). [Baden-Württemberg, Germany; on 6 October, 2001, a freshly emerged *L. depressa* was found; questions of voltinism are discussed.] Address: Busch-Nowak, A., Eichenbaumstr. 4 D.74564 Tiefenbach, Germany. Alexanderbusch-Nowak@web.de
- 3272.** Cating, P.M. (2002): Pygmy Snaketail (*Ophiogomphus howei*), new to Canada. *Argia* 14(3): 11-12. (in English). [June 22, 2002, St. John River, New Brunswick, Canada. The habitat and co-occurring Odonata are described.] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, Canada. E-mail: brownell@achilles.net
- 3273.** Chanpaisaeng, J.; Khunwiset, S. (2002): Survey of Odonata adults at Ao Luk, Krabi province, Thailand. *Malangpo* 19: 191. (in English). [From July to October 2001, 11 odonate taxa were recorded in the western part of southern Thailand, some 800 km from Bangkok. They are listed in a tab. Imagoes were collected at three habitats at Ao Luk, at a palm garden, a community forest, and slopes of a hill forest.] Address: Jariya Chanpaisaeng and Sirikanya Khunwiset, Department of Entomology, Faculty of Agriculture, Kasetsart University, Bangken, Bangkok 10900, Thailand
- 3274.** Che Salmah, M. R.; Abu Hassan, A.; Azmi, M. (2002): Safe pre-emergence herbicides for dragonflies (Libellulidae) in the rice fields. *Malangpo* 19: 186-190. (in English). [The herbicides Propanil, Quiclorac, and Bensulfuron were applied as pre-emergence treatments in an experimental rice plots. The population of libellulids - in the plots - different at the genus level were found to be higher and significantly different in the herbicide treated plots compared to control plots that were manually weeded twice in the season. "The herbicides were considered safe for the libellulids and presumably for other macroinvertebrates in the rice fields."]

Address: Che Salmah, Md Rawi; Abu Hassan, Ahmad, School of Biological Sciences, Universiti Sains Malaysia, 11800 Minden, Penang, Malaysia Azmi Man, Malaysian Agriculture Research Institute, Bertam, Seberang Perai, Malaysia

**3275.** Clarke, D. (2002): Growth and autumnal decline of feeding in captive-reared first-year larvae of the Azure Hawker *Aeshna caerulea* (Ström). *J. Br. Dragonfly Society* 18(1/2): 9-12. (in English). ["In temperate latitudes, larvae of Odonata show a decline in rate of development and food intake in late summer autumn in preparation for surviving adverse winter conditions. I was able to characterize this by monitoring the production of faecal pellets by larvae of *A. caerulea*. Faecal pellet production correlates with prey intake (Corbet 1999: p.105). The results appear to confirm expectations that seasonal factors are involved in the regulation of the life-history of this species. The study also enabled comparisons to be made with field observations of larval growth-rates." (Author)] Address: David Clarke, Tullie House Museum & Art Gallery, Carlisle CA3 8TP

**3276.** Coppa, G. (2002): Gestion et protection des milieux aquatiques. *Martinia Hors Série* 4: 13-15. (in French). [Conservation measures for the Odonata of bog and fen moors in northern France are briefly outlined. The paper includes a map with localities of special importance resp. conservation status for Odonata in the region Champagne-Ardenne.] Address: Coppa, G., 1, rue du Courlis, F-08350 Villers-sur-Bar, France

**3277.** Cordoba-Aguilar, A. (2002): Sensory trap as the mechanism of sexual selection in a damselfly genital trait (Insecta: Calopterygidae). *American Naturalist* 160: 594-601. (in English) ["During copulation, males of some calopterygid damselfly species displace the sperm stored in the spermatheca: the male genital appendages enter into the spermathecal ducts and physically remove sperm. In *Calopteryx haemorrhoidalis*, the genital appendages are too wide to penetrate the spermathecae, but males use a different mechanism in which the aedeagus stimulates the vaginal sensilla that control spermathecal sperm release. Since these sensilla are used during egg fertilization and oviposition, it was hypothesized that this function evolved before the male stimulatory ability. I investigated this using *Hetaerina cruentata*, a species whose position in the Calopterygidae phylogeny is more basal than *Calopteryx*. Given this position and having determined that males of this species are not able to displace sperm of their conspecific females during copulation, it was expected that *H. cruentata* females would eject sperm when stimulated with the aedeagi of *C. haemorrhoidalis* but not when stimulated with the aedeagi of their conspecifics. This prediction was confirmed. In order to investigate the widespread nature of this result, some other Calopteryx species *Calopteryx xanthostoma* and *Calopteryx virgo* were investigated. The results were similar to those of *H. cruentata*: conspecific males were unable to stimulate their females, but females ejected sperm when stimulated with *C. haemorrhoidalis* aedeagi. Morphometric analysis suggests that the mechanistic explanation for the stimulatory ability of *C. haemorrhoidalis* genitalia is that the aedeagal region that makes contact with the vaginal sensilla is wider in *C. haemorrhoidalis* than in the other species. These results suggest that the sensory "bias" shown and shared by *H. cruentata*, *Calopteryx splendens*, *C. virgo*, and *C. haemor-*

*rhoidalis* females represents an ancestral condition and that the male stimulatory ability is absent in the evolutionary history of the clade. These pieces of evidence as well as another one presented elsewhere, which indicates that *C. haemorrhoidalis* males vary in their stimulatory ability, constitute the three criteria for a case of sexual selection via exploitation of a female sensory bias. These results also provide support to the sensory trap hypothesis that indicates that the female bias in this case, egg fertilization and oviposition evolved in a context different from sexual selection. Considering that the male genital appendages responsible for physically removing spermathecal sperm in other calopterygids are present in *C. haemorrhoidalis*, I suggest that males were once able to displace spermathecal sperm physically. Such ability may have been later impeded by a reduction in size of the spermathecal ducts. Possibly, one of the latest events in this sequence is the male's stimulatory ability. This hypothetical series of events suggests a coevolutionary scenario in which the central actor is the sperm stored in the spermathecae."] (Author) Address: Cordoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**3278.** Correia, A.M. (2002): Niche breadth and trophic diversity: feeding behaviour of the red swamp crayfish (*Procambarus clarkii*) towards environmental availability of aquatic macroinvertebrates in a rice field (Portugal). *Acta Oecologica* 23: 421-429. (in English). [*P. clarkii* (Girard 1852), "an alien species in Portugal, may have dramatic effects on aquatic communities by depleting all food resources available, just after its introduction. The purpose of this study was to evaluate, through the concept of niche breadth, whether the diet of this species reflected the temporal changes of aquatic macroinvertebrate availability once it is acclimated. Petraitis' index of niche breadth and Herrera's trophic diversity index were used to evaluate the trophic behaviour of *P. clarkii* towards available resources over time and intraspecifically (size classes and sex) in a rice field in Portugal. Results from this study showed that the consumption of aquatic macroinvertebrates by *P. clarkii* reflected their seasonal availability. The high values of niche breadth and trophic diversity indicated resource use according to trophic availability, diversified diets and different individual exploitation of resources regardless of size or sex. These findings suggest that in habitats where *P. clarkii* is already acclimated, it adjusted its trophic behaviour to the seasonal availability of aquatic macroinvertebrates. The large niche breadth and high trophic diversity presented by *P. clarkii* enables it to successfully expand its range to new areas, when other environmental conditions are favourable, as has been observed in Portugal and worldwide." (Author) In autumn, "Lestidae" belong to the diet of *P. clarkii*.] Address: Correia, Alexandra Manjal, Centra de Biologia Ambiental (CBA), Department Zoologia (Museu Bocage), Museu Nacional de Historia Natural, Universidade de Lisboa, R. Escola Politecnica, 58, 1269-102 Lisbon, Portugal: E-mail: amarcal@fc.ul.pt

**3279.** Curry, J. (2002): Observations on *Neurocordulia*. *Argia* 14(3): 13-14. (in English). [From June to August 1999, *N. molesta* and *N. yamaskanensis*, were observed. Both species are extremely rare in Indiana, USA. They started their flight activities shortly before dusk, flying with an extraordinary speed. This short period of



time before getting dark, was used to pair and to feed. The author wonders how these Odonata could capture prey at such low levels of light, and how they could feed sufficiently in such a short period of time. There is evidence that the biomass over the river is as dense as a "soup" of small insects filling the air (based on collecting insects with a net driving with a boat on the river). "Based on this experience, I can't help wondering if the Shadowdragons were foraging by flying through the "soup" of tiny insects and scooping them up with their legs without ever targeting individual prey. The long spines of the tibiae could form a very nice net for sweeping tiny insects from the air. This would be similar to what some marine mammals do when plowing through a concentration of algae or krill with their mouths open. If so, the questions about how shadowdragons see prey in low light, why they never deviate the flight path while foraging, and how they are able to feed themselves in only 20 or 30 minutes would be answered." Address: Curry, J., Biology Dept, Franklin College, 501 E. Monroe Street, Franklin, IN 46131-2598, USA. E-mail: CURRYJ@franklincoll.edu

**3280.** Daigle, J.J. (2002): Nicj-at-night: episode II. *Argia* 14(3): 14-15. (in English). [In Aug. 2002, 56 odonate species, 27 new to Nicaragua, were caught near Bartola.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**3281.** Deliry, C. (2002): Études générales, dossiers et suivi des sites (à jour: septembre 2002). *Sympetrum piémontais* 49: 2-8. (in French). [France, Rhône-Alpes, Ain, Hautes-Alpes, Ardèche, Drôme, Isère, Loire, Rhône, Savoie, Haute-Savoie; very brief reports on odonatalogical research activities at 46 habitats in different Departments in France are outlined; the focus is set on species of Appendix II and IV of the European Habitat Directive.] Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France. www.sympetrum.org

**3282.** Deliry, C. (2002): Nouveaux articles, études ou notes concernant le libellules dans la région Rhône-Alpes-Dauphiné. *Sympetrum piémontais* 49: 11. (in French). [List of 22 papers or expertises referring to the odonate fauna of southeastern France.] Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France. www.sympetrum.org

**3283.** Deliry, C. (2002): Rapport moral 2001. *Sympetrum piémontais* 49: 21-22. (in French). [Some historical data on Odonata in the region of Grenoble, France are documented along with some recent records from 2001 from different Departments in France including data on *Coenagrion mercuriale*, *Leucorrhinia caudalis*, *L. albifrons*, *Oxygastra curtisii*, *Boyeria irene*, and others.] Address: Deliry, C., La Paluette, 2338 route de Belley, F-38490 Aoste, France. www.sympetrum.org

**3284.** Donnelly, T.W. (2002): DSA northeastern field trip to the Tug Hill Plateau, New York. *Argia* 14(3): 6. (in English). [50 species were found in a - from the odonatalogical point of view - poorly known region of the New York state, USA.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**3285.** Dunkle, S.W. (2002): Minter J. Westfall, Jr., Honary member, the Dragonfly Society of the Americas. *Argia* 14(3): 4. (in English). [Sid Dunkle very personally introduces into the recognition of Minter Westfall as

Honary Member of DSA.] Address: Dunkle, S., Biol. Dept, Collin County Community College, 2800 E. Spring Creek Parkway, Plano, TX 75074, USA. E-mail: SDunkle@cccdd.edu

**3286.** Endlein, T. Strohm, E.; Poethke, H.-J. (2002): Reproduction in a heterogeneous landscape: The consequences of habitat quality for reproduction and larval development in a damselfly. *Zoology (Jena)* 105 (Suppl. 5): 17. (in English). [Verbatim: "A landscape provides a heterogeneous mosaic of unsuitable and more or less suitable habitat patches. The differences in habitat quality affects survival and other fitness parameters of individuals and therefore oviposition of adults varies among habitats. In this study, we investigated variations in reproduction and larval development of the damselfly *Coenagrion puella* (Coenagrionidae: Odonata) in three neighbouring ponds (A, B, D in the following) in Bavaria/Germany. We examined (1) the density of egg laying ♀♀ as a measure of the number of eggs laid per pond, (2) the number of emerging adults, and (3) the size of the exuviae at each pond. The number of ovipositing ♀♀ was recorded by observation. Surprisingly, much more ♀♀ laid their eggs in D, the smallest of the three ponds compared to A and B. To count the number of emerging larvae a gauze fence was used as an emergence substrate that allowed standardised collection of exuviae. At D, 22 times more larvae emerged per meter shore line than from each of the large ponds. To compare the success of development in the different ponds we calculated the proportion of successfully developing larvae (estimated total number of eggs laid into a pond divided by the estimated total number of emerging adults). The smallest pond showed the highest estimated success, though the variance was high. The length of the tibia and praementum of a sample of ♂ exuviae was measured with high precision (1/1000 mm). Exuviae at pond D were significantly larger than exuviae at pond A and B over the whole emergence period. In conclusion, unexpectedly the smallest pond seems to offer the best conditions for larval development and survival for the damselflies and is preferred by ovipositing ♀♀. The causes for these small scale differences in habitat quality are not yet known." Address: Endlein, T., Ecological Station Fabrikschleichach and Department of Animal Ecology and Tropical Biology Theodor-Boveri-Inst., University of Würzburg, 97074 Würzburg, Germany. E-mail: endlein@biozentrum.uni-wuerzburg.de

**3287.** Feldwieser, G. (2002): Doppelter Irrtum: Männchen von *Lestes viridis* (Gemeine Weidenjungfer) ergreift Männchen von *Enallagma cyathigerum* (Gemeine Becherjungfer). *mercuriale* 2: 25. (in German). [The accompanying picture documenting the linkage between a ♂ *Chalcolestes viridis* with a ♂ *E. cyathigerum* can be seen at www.SGlibellen.de.] Address: Feldwieser, G., Gönningerstr. 27, D-72793 Pfullingen, Germany

**3288.** Feldwieser, G. (2002): Paarungsrade von *Aeshna cyanea* (Blaugrüner Mosaikjungfer) benutzt anderes Paarungsrade der gleichen Art als Sitzunterlage. *mercuriale* 2: 26- (in German). [The picture which documents the situation can be seen at www.SGlibellen.de.] Address: Feldwieser, G., Gönningerstr. 27, D-72793 Pfullingen, Germany

**3289.** Feldwieser, G. (2002): Zu einer Beobachtung von *Leucorrhinia rubicunda* (Nordische Moosjungfer) im

Raum Reutlingen. mercuriale 2: 6-7. (in German). [Documentation of two specimens of the regional very rare *L. rubicunda* from the former military training area NSG Listhof, Baden-Württemberg, Germany from 25. and 26. May 2001.] Address: Feldwieser, G., Gönningerstr. 27, D-72793 Pfullingen, Germany

**3290.** Freeland, J.R.; Conrad, K.F. (2002): Genetic similarity within and among populations of the Variable and Azure damelflies (*Coenagrion pulchellum* and *C. puella*). *Hydrobiologia* 479(1-3): 69-73. (in English). ["In the first half of this century, seven species of the damselfly genus *Coenagrion* regularly bred in Britain. Since that time, two of these species have become extinct, and three currently have highly restricted distributions. Of the remaining two species, *C. puella* is both common and abundant, but *C. pulchellum*, while more common than most *Coenagrion* species, is experiencing a national decline in Britain. The reasons for the decline of *C. pulchellum* are poorly understood, and therefore its future in Britain is difficult to predict. The aim of this study was to investigate genetic relationships among populations of *C. puella* and *C. pulchellum*. We obtained mitochondrial sequence data from 36 *C. puella* and *C. pulchellum* individuals collected from five different sites across central England. These revealed three haplotypes with high overall similarity. Hybridisation between *C. puella* and *C. pulchellum* was suggested by (1) The sharing of a haplotype between *C. puella* and *C. pulchellum*, and (2) The fact that morphological characters of sympatric *C. puella* and *C. pulchellum* populations are not always species-specific. More research is required before we can determine whether or not hybridisation is playing a role in the decline of *Coenagrion* species in the U.K." (Authors)] Address: Freeland, Joanna R., Dept of Biological Sciences, Open University, Walton Hall, Milton Keynes, Buckinghamshire, MK7 6AA, U.K.

**3291.** Fuhlendorf, S.D.; Englea, D.M.; Arnoldb, D.C.; Bidwella, T.G. (2002): Influence of herbicide application on forb and arthropod communities of North American tallgrass prairies. *Agriculture, Ecosystems and Environment* 92: 251-259. (in English). ["The primary approach used for reducing "weeds" in the native grasslands of the North American Great Plains is the application of a broadleaf-selective herbicide, which could have important implications to native plant and arthropod diversity. The objectives of this study were to identify the influence of herbicides on the forb and arthropod community composition, richness, and density, and determine relationships among the forb and arthropod communities in a tallgrass prairie of the North American Great Plains. In 1994, arthropod and forb communities were evaluated in eight treatment units and then a broadleaf-selective herbicide was applied to four of these units. Sampling of arthropod and forb communities were sampled under similar conditions in 1995 for post-treatment effects. These communities were highly variable across years regardless of treatment (herbicide and no herbicide). The herbicide treatment caused a reduction in overall forb dominance the year after treatment. Species richness increased from 1994-1995 in both treatments but the increase was less in the herbicide treatment. The herbicide application had no overall effect on forb species composition. The lack of effect of herbicide on the forb community composition coupled with a significant effect on species richness suggests that an important effect of herbicide application was a reduction of rare forbs. Analysis of these

tallgrass communities did not yield significant differences in arthropod abundance or richness between grasslands treated with a herbicide and grasslands not treated with a herbicide. The arthropod community was defined by extreme variability across years reflecting extreme fluctuations regardless of herbicide application." (Authors) "*Coenagrionidae*" are among the sampled taxa.] Address: Fuhlendorf, S.D.. Department of Plant and Soil Sciences, Oklahoma State University, Stillwater, OK 74078-6028, USA . E-mail: fuhlend@mail.pss.okstate.edu

**3292.** Gassmann, D.; Hämäläinen, M. (2002): A revision of the Philippine subgenus *Risiocnemis* (*Igneocnemis*) Hämäläinen (Odonata: Platycnemididae). *Tijdschrift voor Entomologie* 145: 213-266. (in English). ["Descriptions and diagnoses of both sex of all 15 previously recognized species are provided, and five new taxa are described: *R. antoniae* sp. n. and *R. rubricercus* sp. n. from northeastern Mindanao, *R. pistior* sp. n. from southeastern Mindanao, and *R. kaiseri* sp. n. and *R. nigra* sp. n. from Samar. The ♀♀ of 11 species are described for the first time. Keys to ♂♂ and ♀♀ are provided. Based on extensive new collections from across the Philippine archipelago, the distribution of all species is mapped. Characters of the ♂ ligula and appendages and the ♀ prothorax were studied by scanning electron microscopy." (Authors)] Address: Gassmann, D., Inst. of Evolutionary and Ecological Sciences, Leiden University, c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: gassmann@naturalis.nnm.nl

**3293.** Geppert, C.; Müller, J.; Xylander, W.E.R. (2002): Marking of insects for finding them again at night. *Zoology (Jena)* 105 (Suppl. 5): 17. (in English). [Verbatim: "Marking of insects for the purpose of ecological studies has been used since 1920 (3). These methods only enable researchers to find insects again during daylight. Markings that allow to study the nocturnal behaviour of insects have been used and tested only occasionally due to the difficult procedures (1,2, 4). To investigate the roosting site behavior of odonates, we developed a marking method that can be used quickly on a large number of individuals without harming them. From the end of May until the end of August 2001 a total of 1907 damselflies, *Calopteryx splendens* Harris 1782 (1203 F and 704 E and 1659 dragonflies of different species (1067 F and 565 E were marked in the open cast mining area Berzdorf, about 5 km from Görnitz/Saxony. The following substances for marking were tested: 1) colored substances, applied to the thorax and/or the abdomen (Night pen, UHU neon glue, Pilot super color whit, Jenzi Tages-leuchtfarbe), 2) adhesive foils, applied to the thorax and/or the wings (glow-in-the-dark paper, reflecting foil), 3) substances for injection, injected into segments of the abdomen (Visible Implant Fluorescent Elastomer System). A 8 W/12 V UV fluorescent light (black light) was used for the detection of the insects at night. The following criteria were used to evaluate the marking procedures: good adhesion to the insect body, quick application, short drying period, low impairment of the insects, strong fluorescence at night as well as visibility during the day. These criteria were best met by the viscous paint "Jenzi Tages-leuchtfarbe". The outstanding feature of the paint was a maximum fluorescence at night of up to 4 meters distance. Marked insects showed no impairment in their behavior and could be observed during matings. With

the help of this method it was possible to find 125 out of 1,872 marked *C. splendens* again at night. While this only constitutes a recapture rate of 6.6%, it is high considering the extremely difficult circumstances of the nocturnal search. 1 Heller, K.-G. & O. von Helversen (1990): Survival of a phaneropterid bush-cricket studied by a new marking technique (Orthoptera: Phaneropteridae). *Entomol. Gener.* 15 (3): 203-208. 2 Hunger, H. & W. Röske (2001): Short range dispersal of the Southern Damselfly (*Coenagrion mercuriale*, Odonata) found experimentally using UV fluorescent ink. *Z. Ökologie Naturschutz* 9, 181-187. 3 Stonehouse, B. (1978): Animal marking. University Park Press, Baltimore. 4 Wheye, D. & P. R. Ehrlich (1985): The use of fluorescent pigments to study insect behaviour: investigating mating patterns in a butterfly population. *Ecol. Entomol.* 10, 231-234.]" Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany. E-mail: Naturmuseum.GR.Dr.Xylander@t-online.de

**3294.** Glotzhober, R.C.; McShaffrey, D. (Eds) (2002): The dragonflies and damselflies of Ohio. Ohio Biological Survey Bulletin New Series Volume 14 Number 2: ix + 364 pp. - (in English). [This manual, based on Ohio, will work for Ontario to Tennessee, and from Missouri to New Jersey. In addition to the 162 Ohio species, 18 are found in neighboring states that are included in the keys (larvae: to the genus level, imagoes: to the species level). The book is organized in three parts resp. 17 chapters (I: Natural history, Collection and preservation of Odonata, History of Ohio odonatology, How to use the book; II: Photographing Odonata; III: Identification keys), and references, and six appendices. The book is lavishly illustrated, with 460 line drawings and wing scans. State maps show the distribution of all the species in Ohio at the county level, and the monographic descriptive accounts includes generous information on the natural history of each species. There are 88 color photos of adults; my impression is that some of them are reproduced too dark. In spite of this, they give me - unexperienced in North American Odonata - a significant impression of many species from Ohio. This is a heavy weighted, helpful, and very complete regional fauna with a lot of significant information on Odonata. (M. Schorr).] Address: \$40 plus shipping and handling (\$5) and Ohio Tax (\$2.30 if applicable). Send cheque to Ohio Biological Survey, Inc., P.O. Box 21370, Columbus, OH 43221-0370, USA

**3295.** Goffart, P. (2002): Compte-rendu de l'excursion sur l'Ourthe moyenne, de Marcourt à Hotton, due 26 juin 2002. *Gomphus* 18(1-2): 50-52. (in French with Dutch summary). [Belgium; 9 odonate species were recorded; main emphasis was given to *Oxygastra curtisii* which was recorded at six stretches of the river Ourthe. Foraging behaviour of a ♂, and oviposition of a ♀ are described. In addition, records of the stream dwelling species *Gomphus pulchellus*, *G. vulgatissimus*, and *Onychogomphus forcipatus* are briefly commented upon.] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

**3296.** Gonseth, Y.; Monnerat, C. (in Zusammenarbeit mit: Rene Hoess, Christian Keim, Tiziano Maddalena, Alain Maibach, Claude Meier, Peter Weidmann, Hansruedi Wildermuth) (2002): Rote Liste der gefährdeten Libellen der Schweiz. Hrsg. Bundesamt für Umwelt, Wald und Landschaft, Bern, und Schweizer Zent-

rum für die Kartographie der Fauna, Neuenburg. BUWAL-Reihe Vollzug Umwelt: 46 pp. (in German, with Italian, French and English summaries). ["The Red List 2002 of the Swiss Dragonflies has been established applying the criteria and using the threatened species categories proposed by the IUCN (2001). The procedure used was adapted from GARDENFORS & al. (2001). Of the 72 native species of the Swiss fauna, 26 (36%) are threatened, while 12 (17%) are potentially endangered (NT). Out of the 72 species listed in the Red List, 2 are at present extinct in Switzerland (RE), 12 are nearly extinct (CR), 7 are endangered (EN) and 5 are vulnerable (VU). Species of marshes and of gravel banks along rivers are the most threatened. The Red List 2002 replaces the one published in 1994 (MAIBACH & MEIER in DUELLI 1994) and based on different criteria. This explains the rather important differences between the two, differences that essentially concern the proportion of species included in the categories of least threat. The comparison of the Red List 1994 and the Red List 2002 shows most convincingly the evident degradation of the situation where the most threatened species are concerned: two have not been observed for ten years and five others have suffered a severe decline." (Authors) The species included in the list are briefly discussed.] Address: BUWAL, Dokumentation, CH-3003 Bern, Schweiz.. E-Mail: docu@buwal.admin.ch. Bestellnummer VU 9011-D (gratis)

**3297.** Grand, D. (2002): La faune odonatologique de la fontaine vaclusienne du Lamalou (Hérault). *Martinia Hors Série* 4: 23-26. (in French). [The odonate fauna of the headwaters of the rivers Argens (n = 10) and Lez (n = 13) (taken from literature data) is compared with the fauna of the headwater of the Lamalou (n = 30). The habitat is described in detail and some species are discussed. *Coenagrion mercuriale* - a species of special conservation concern in Europe - is dominant. The emergence and sex-ratio of exuviae (♂♂: 49% of 233 exuviae) of *Boyeria irene* are outlined, and the oviposition behaviour of *Cordulegaster boltonii* is described likewise including a note on sex-ratio (♀: 58,2% of 337 collected exuviae).] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

**3298.** Grand, D. (2002): Sur la distribution de *Macromia splendens* (Pictet, 1843) en région méditerranéenne française: complément et synthèse. *Martinia Hors Série* 4: 17-22. (in French). [The paper documents efforts to trace *M. splendens* in the French mediterranean region including some localities published in the 19th and early 20th century. *M. splendens* was found only at the Ardèche whilst e.g. the species was lost for the type locality at the Lez near Montpellier. Co-occurring species are listed and some remarks on the behaviour and the habitat of *M. splendens* are made.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

**3299.** Greff, N.; Manach, A.; Tillier, P. (2002): Atlas des Odonates de Bretagne. État d'avancement et éléments de réflexion. *Martinia, Hors Série* 4: 59-77. (in French with English summary). [Distribution maps of 55 odonate species for the region of Brittany in western France (Departments: Côtes-d'Armor, Finistère, Île-et-Vilaine, Loire-Atlantique, Morbihan) are presented.] Address: Greff, N., Ossée, F-38510 Sermerieu, France.



**3300.** Grillet, E.M.; Legendre, P.; Borcard, D. (2002): Community structure of Neotropical wetland insects in Northern Venezuela. I. Temporal and environmental factors. *Arch. Hydrobiol.* 155(3): 413-436. (in English). ["The temporal distribution of aquatic insects in relation to habitat conditions was assessed in some northern Venezuelan Neotropical wetlands. The hypothesis that abiotic and biotic factors interacting in time may simultaneously explain the community structure of aquatic organisms was evaluated. Larval insects were sampled over a one-year period in five wetland types; 13 variables were quantified to describe each habitat. Partial redundancy analysis was used on insect abundance data to partition the variance into four components: a) pure environmental variation without seasonal effect, b) seasonal variation of environmental factors, c) pure temporal factors (months), and d) unexplained variation. Our results showed that pure and temporally-structured environmental factors (a + b) explained between 30 % and 58 % of the variation of insect abundances within wetlands, whereas pure temporal factors also significantly contributed 13 % -29% to variation in taxa abundance. Physical factors (rainfall and water depth), wetland trophic state (phytoplankton), and water chemistry (mainly CO<sub>2</sub> and alkalinity) were significantly associated to community structure variability. We hypothesize that the interplay of trophic conditions, related chemical conditions, wetland duration, and insect life history patterns, all of which are mediated by seasonal fluctuation in rainfall, could largely account for the temporal distribution of the insect taxa in these wetlands.."] (Authors) Odonata are treated at the family level.] Address: Grillet, Maria Eugenia, Laboratorio de Biología de Vectores. Instituto de Zoología Tropical. Facultad de Ciencias. Universidad Central de Venezuela, Apartado 47058, Caracas 1041-A, Venezuela. E-mail: mgrillet@strix.ciens.uvc.ve

**3301.** Grillet, E.M.; Legendre, P.; Borcard, D. (2002): Community structure of Neotropical wetland insects in Northern Venezuela. II. Habitat type and environmental factors. *Arch. Hydrobiol.* 155(3): 437-453. (in English). ["This study examined the spatial distribution of wetland insects in relation to selected environmental variables in northeastern Venezuela. Sampling was carried out over two sampling periods (rainy and dry season) in seven wetland types (brackish and freshwater herbaceous swamps, mangrove swamps, freshwater ponds, clear-cut marsh forests, small irrigation canals, and swamp forests), covering three environmental gradients (salinity, aquatic vegetation type, and habitat permanence). Using the partial redundancy analysis, we determined that occurrence and abundance of insects was significantly ( $P < 0.05$ ) accounted for by the relative contributions of pure environmental (29-34 %) and habitat type-related (12-15 %) variations among wetlands. Water chemistry (salinity), wetland trophic state (phytoplankton), habitat heterogeneity (aquatic vegetation type), and habitat physical features (depth and habitat permanence) were significantly associated to community structure. Insect richness was higher in the less saline, more vegetated, and less temporary wetlands. Our findings add to previous results suggesting that adversity, productivity, heterogeneity and permanence of the habitat represent important axes along which Neotropical wetland insect communities are organized." (Authors) Odonata are treated at the family level.] Address: Grillet, Maria Eugenia, Laboratorio de Biología de Vectores. Instituto de Zoología Tropical. Facultad de Ciencias.

Universidad Central de Venezuela, Apartado 47058, Caracas 1041-A, Venezuela. E-mail: mgrillet@strix.ciens.uvc.ve

**3302.** Hämäläinen, M. (2002): The species list of Thai dragonflies increases steadily - an update. *Malangpo* 19: 176-179. (in English). ["*Anaciaeschna martini* (Aeshnidae), *Macromia arachnomima* (Corduliidae) and *Nesoxenia lineata* (Libellulidae) are recorded from Thailand for the first time. Preliminary comments are presented on several other species new to Thailand, so far identified to genus level only. References to recent papers (published in 1999-2002), reporting additions to the Thai odonate fauna, are also given." (Author)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**3303.** Harrison, S.S.C.; Harris, I.T. (2002): The effects of bankside management on chalk stream invertebrate communities. *Freshwater biology* 47: 2233-2245. (in English). ["1. Communities of aquatic macroinvertebrates and the terrestrial adult phases of aquatic insects were investigated from short stretches of English chalk streams with two different bankside vegetation types: simply structured grazed grass (grazed) and structurally complex herbaceous vegetation with scattered trees (ungrazed). Macroinvertebrates were sampled in spring, summer, autumn and winter 1996-97 from three aquatic habitats: mid-channel gravel, patches of the aquatic macrophyte *Ranunculus* and marginal emergent macrophytes. The terrestrial adult phases of aquatic insects were sampled in spring, summer and autumn from bankside vegetation. 2. Total macroinvertebrate abundance did not differ between stretches with different bankside vegetation. Taxon richness of mid-channel gravel was, however, significantly higher in ungrazed compared with grazed stretches and Shannon diversity ( $H'$ ) of mid-channel gravel and marginal vegetation was significantly higher in ungrazed compared with grazed stretches. Total abundance, taxon richness and  $H'$  of the terrestrial adult phases of aquatic insect were significantly higher from the bankside vegetation of ungrazed compared with grazed stretches. 3. Ordination of communities of aquatic macroinvertebrates and terrestrial adults demonstrated that individual families of both groups were generally more abundant in ungrazed stretches. Many more families were significantly associated with ungrazed stretches than with grazed stretches. 4. This investigation has shown that high structural diversity of bankside vegetation along lowland chalk streams is accompanied at the reach scale by increased diversity of both aquatic macroinvertebrates and the terrestrial adult phases of aquatic insects. The conservation potential of such streams may thus be lowered by management practices that result in the removal or simplification of bankside vegetation along extensive stream stretches." (Authors) *Calopteryx splendens* was significantly associated with ungrazed margins.] Address: Harrison, S., Department of Zoology and Animal Ecology, University College Cork, Lee Mailings, Prospect Row, Mardyke, Cork, U.K. E-mail: s.harrison@ucc.ie

**3304.** Heitz, A. (2002): Habitat und Eiablage von *Coenagnon scitulum* (Gabel-Azurjungfer) an einem Fundort in Ost-Frankreich. *mercuriale* 2: 3-6. (in German). [In 2000, a population of *C. scitulum* near Passavant la Rochère, 38 km sw Epinal, Département Haute

Saone, France was traced. Habitat, oviposition behaviour, and identification features are outlined.] Address: Heitz, A., Moosweg 15, D-77749 Hohberg, Germany.

**3305.** Hoess, R. (2002): Odonata found in Chiang Mai, northwestern Thailand, in May 2002. *Malangpo* 19: 180-185. (in English). [A total of 67 odonate species was collected in Chiang Mai city and its surroundings in northwestern Thailand in May 2002. Additional 11 species were identified by sight records. Exuviae representing app. 20 species were found, but not yet identified. The localities are described, and the species are documented locality wise.] Address: Hoess, R., Normanenstr. 35, CH-3018 Bern, Switzerland

**3306.** Hunger, H. (2002): "Keuchheitsgürtel": Überreste eines Männchens verhindern weitere Paarung eines Weibchens von *Ischnura elegans* (Große Pechlibelle). *mercuriale* 2: 25- (in German). ["Chastity belt": Remains of a ♂ *I. elegans* abdomen on a ♀ prevented additional copulations. The picture which documents this curious situation can be seen at [www.SGlibellen.de](http://www.SGlibellen.de).] Address: Hunger, H., August-Ganther-Str. 16, D-79117 Freiburg, Germany. E-mail: [Holger.Hunger@inula.de](mailto:Holger.Hunger@inula.de)

**3307.** Hunger, H.; Kunz, B. (2002): Phänologische Daten. *mercuriale* 2: 27-29. (in German). [Phenological data (2000-2002) from Baden-Württemberg (a few additional from Bayern and Saarland), Germany, of the following species are documented: *Gomphus pulchellus*, *Anax imperator*, *A.parthenope*, *Aeshna cyanea*, *Cordulegaster boltonii*, *Sympetrum fonscolombii* (Bad.-W., Saarland), *S. meridionale* (Bayern), *S. striolatum*, *Sympetma fusca*, *Coenagrion puella*, *Enallagma cyathigerum*, *Ischnura elegans*, *Libellula depressa*, *L. quadrimaculata*, *S. sanguineum*, and *S. vulgatum*.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: [kunzFOTOGRAFIE@t-online.de](mailto:kunzFOTOGRAFIE@t-online.de)

**3308.** Jacquemin, G. (2002): Les odonates de Lorraine: rôle bio-indicateur, protection. *Martinia, Hors Série* 4: 79-84. (in French). [In the framework of FFH-Directive of the EU, the author outlines the situation of dragonflies in 1995 in the Lorraine, western France. He describes the site-protection and legal situation of the Odonata, discusses the data basis, and compiles a list of regional Odonata.] Address: Jacquemin, G., Biologie des Insectes, Université H. Poincaré, Nancy 1, BP 239, F-54506 Vandoeuvre-lès-Nancy, France

**3309.** Janzen, J.-W. (2002): Arthropods in Baltic Amber. *Ampyx Verlag, Halle/Saale*. ISBN 3-92795-14-8. 167 pp. (in Bilingual in English and German). [Based on extensive collection material, this book introduces into the arthropod orders represented in Baltic amber. Each order is briefly characterised and documented by excellent colour photos. A head and wings of zygopteran Odonata are presented on page 91 of the book.] Address: Ampyx-Verlag, Dr. A. Stark, Seebener Str. 190, D-06114 Halle/Saale, Germany. E-mail: [ampyxstark@aol.com](mailto:ampyxstark@aol.com)

**3310.** Kano, K.; Karube, H. (2002): Endophytic oviposition into leaves by *Agriomorpha fusca* from Vietnam. *Gekkan-Mushi* 381: 45-46. (in Japanese). [Silver Cloud Mountains, Cuc Phuong national Park, May 1999; the oviposition took place above the water level; after a heavy rain in next day, the leaves were flooded. A translation of the paper is published in *Digest of Japanese Odonatological Short Communications* 14]

Address: Kano, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**3311.** Katbeh-Bader, A.; Amr, Z.; Schneider, W. (2002): Odonata of Jordan. *Fragmenta entomologica* 34(1): 147-170. (in English). ["A total of 47 species of Odonata are reported from Jordan based on this study and previous records in literature. More than 600 Odonata specimens collected between 1974 and 2001 were examined and found to belong to 29 species. *Onychogomphus macrodon* and *Chalcolestes parvidens* are recorded for the first time. Several rare species known previously from only one or two sites are recorded from new localities. Number of specimens examined, collecting sites, dates of collecting, and the distribution of species in Jordan and the world is given for each species. Remarks about the status, biology or ecology of species are also provided." (Authors)] Address: Schneider, W., Hess. Landesmus., Zool. Abt., Friedensplatz 1, D-64283 Darmstadt, Germany. E-mail: [w.schneider@hlm.de](mailto:w.schneider@hlm.de)

**3312.** Ketelaar, R. (2002): Odonata in the Netherlands, 2001. *Atropos* 17: 58-59. (in English). [This is a brief but competent account on essential records of Odonata in 2001 in the Netherlands. Records are organised according to the phenology and the weather conditions of the year. The species commented are listed as follows: *Pyrrhosoma nymphula*, *Sympetma fusca*, *Coenagrion lunulatum*, *Lestes barbarus*, *Erythromma najas*, *Sympetrum flaveolum*, *S. fonscolombii*, *Aeshna affinis*, *Anax parthenope*, *Ophiogomphus cecilia*, and *Onychogomphus forcipatus*.] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: [ketelaar@vlinderstichting.nl](mailto:ketelaar@vlinderstichting.nl)

**3313.** Ketelaar, R. (2002): The recent expansion of the Small Red-eyed Damselfly *Erythromma viridulum* (Charpentier) in The Netherlands. *J. Br. Dragonfly Society* 18(1/2): 1-8. (in English). [It seems most likely that *E. viridulum* became established in the Netherlands during the early years of the 1970th. The paper documents in detail records prior and after the first proof of a reproductive population in the country. Today, *E. viridulum* is one of the most abundant species in The Netherlands. Habitat choice, phenology, and the patterns of expansion are outlined. The colonization of the Waddensea Islands also gives significant information to understand the potential of *E. viridulum* to disperse, and the most recent colonization of Great Britain.] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: [ketelaar@vlinderstichting.nl](mailto:ketelaar@vlinderstichting.nl)

**3314.** Khunwiset, S.; Chanpaisaeng, J. (2002): A survey of Odonata adults and larvae in Thong Pha Phum district, Kanchanaburi province, Thailand. *Malangpo* 19: 192-194. (in English). [Verbatim: "Thong Pha Phum area in Kanchanaburi province in western Thailand has a high biodiversity, since it is within the precincts of 3 biogeographical regions (North, South and Central) joined together. It can be classified by ecological and biogeographical factors into 3 ecoregions i.e., Tenasserim-South Thailand Semievergreen Rain Forest, Kayah-Karen Montane Rain Forest and Chao Phraya Lowland Moist Deciduous Forest. Nearness of the Andaman Sea and surrounding mountain ranges provide plenty of rainfall in this region. The survey stu-

dying and collecting Odonata adults and larvae was carried out monthly during 6 months between March 2002-August 2002 at streams in the following 5 localities: Pongpuron, Ban Lampilok, Ban Prajammai, Ban Patsaduklang and Maenamnoi. A total of 44 species of adult Odonata belonging to 36 genera in 11 families were collected by using sweep net. Larvae were collected in March 2002. The material has been identified to the family level only. They represent 7 families: Chlorocyphidae, Euphaeidae, Lestidae, Coenagrionidae, Aeshnidae, Gomphidae and Libellulidae. The streams studied have high water level and currency, which moved larvae when the heavy rain occurred." Address: Jariya Chanpaisaeng and Sirikanya Khunwiset, Department of Entomology, Faculty of Agriculture, Kasetsart University, Bangken, Bangkok 10900, Thailand

**3315.** Klaus, D. (2002): Bericht von der Tagung Sächsischer Entomologen im Jahre 2002. Entomol. Nachr. Ber. 46(3): 209-211. (in German). [Dr. Thomas Brockhaus gave a lecture on the current status of the Odonata fauna of Saxonia, scheduled to be published in 2004. New data of 2003 should be added, and special emphasis will be given to the impacts of the flood on the Odonata in the River Elbe catchment in summer 2002.] Address: Klaus, D., Heimstätten 10, D-04571 Rötha, Germany

**3316.** Knijf, G. de; Lambrechts, J. (2002): Verslag van de excursie naar de vallei van de Zijpbeek en de Mechelse heid op zaterdag 30 juni 2001. Gomphus 18 (1-2): 43-46. (in Dutch with French summary). [Belgium; a total of 21 odonate species was observed. The list includes *Ceriagrion tenelleum*, *Ischnura pumilio*, *Cordulegaster boltonii*, *Somatochlora flavomaculata*, *Orthetrum coerulescens*, and *Leucorrhinia dubia*.] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**3317.** Koch, H.-M. (2002): Drei Lestiden an einem künstlichen Tümpel auf der Alb in 705 m üNN. mercuriale 2: 23. (in German). [Baden-Württemberg, Germany; *Lestes sponsa*, *L. barbarus*, *Lestes virens vestalis*; in addition, an attempt of an *A. cyanea* ♂ to copulate with a ♀ of *A. juncea* is reported.] Address: Koch, H.-M., Krämerstr. 40, D-72764 Reutlingen, Germany. E-mail: koch.druckerei@t-online.de

**3318.** Koch, H.-M. (2002): Nachweis einer 2. Generation bei mehreren Libellenarten. mercuriale 2: 23. (in German). [Baden-Württemberg, Germany; in December 2001, a water body was created. It was rapidly colonized in 2002 by Odonata. Exuviae of *Enallagma cyathigerum*, *Ischnura elegans*, and *Sympetrum fonscolombii* were found indicating a second generation resulting from egg depositions in early summer 2002.] Address: Koch, H.-M., Krämerstr. 40, D-72764 Reutlingen, Germany. E-mail: koch.druckerei@t-online.de

**3319.** Krech, M. (2002): Zur Verbreitung von *Epitheca bimaculata* (Charpentier, 1825) in Mecklenburg-Vorpommern. Archiv der Freunde der Naturgeschichte in Mecklenburg 41: 77-86. (in German). [In 2001 and 2002, *E. bimaculata* was surveyed in the catchments of the rivers Rechnitz, Trebel, and Peene, Mecklenburg-Vorpommern, Germany. The species was traced in the marshy stretches of the rivers resp. mires run through by rivers ("Durchströmungsmoore, Flusstalmoore"). Oxbow lakes and (small) peat ponds exploited by hand

were the preferred habitats. The water bodies are in most cases eutrophic or even polytrophic and lack submerged vegetation. The river bank vegetation is well developed; the fish population density seems to be high.] Address: Krech, M., Auf der Großen Mühle 7, D-99198 Erfurt, Germany

**3320.** Kunz, B. (2002): Partnersuche mit Todesfolge: Ein kurioser Zwischenfall im Paarungsvorspiel bei *Onychogomphus forcipatus forcipatus* (Kleine Zangenlibelle). mercuriale 2: 24. (in German). [The behaviour of a ♀ along a rendez-vous place at the river Jagst, Baden-Württemberg, Germany is described; a curious example of ♀ mortality is reported: an accident during a rapid flight caused the splitting of a leave of *Sparganium* sp., when the ♀ flow against the leave. The head of the dragonfly was caught in the crack. The ♀ couldn't rescue herself from this situation.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de

**3321.** Kunz, B. (2002): Zwei ungewöhnliche Larvenbeobachtungen von *G. vulgatissimus*. mercuriale 2: 21-22. (in German). [(1) An obviously unhurt larva of *G. vulgatissimus* was found dead in the crack of a weir; it is suspected that the specimen moved to this crack due to disturbance by bathing people which hindered the specimen to emerge, and tried out. (2) An extremely prolonged emergence of two larvae of *G. vulgatissimus* from the River Jagst, Baden-Württemberg, Germany is reported and (physiological) mortality factors during emergence are discussed.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de

**3322.** Lambrechts, J.; Knijf, G. de (2002): Verslag van de excursie naar de vallei van de Drie Beken te Diest op zaterdag 9 juni 2002. Gomphus 18(1-2): 46-50. (in Dutch with French summary). [Belgium; a total of 17 odonate species was observed. The list includes *Ischnura pumilio*, *Lestes dryas*, *L. barbarus* (teneral), and *Erythromma najas*.] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**3323.** Leconte, M. (2002): Comptes rendues des Rencontres Odonatologiques d'Aquitaine des 25 et 26 mai 2002 à l'Atelier-Gîte de Saugnacq-et-Muret (49). Société française d'ontonologie: La lettre des sociétés 29: 7-8. (in French). [Report of an excursion to several localities with records of *Leucorrhinia* sp.; *L. albifrons* and *L. pectoralis* could be traced. *L. caudalis* was missing. The records are briefly documented along with co-occurring odonate species.] Address: Leconte, M., Quartier du Caü, F-64260 Arudy, France

**3324.** Lederer, P. (2002): Damsel fly "pancake net" made with fiberglass screening material. Argia 14(3): 18-19. (in English). [A technical solution to avoid wet nets while catching Zygoptera is presented.] Address: Lederer, P.T., 33 Hamden Avenue, Staten Island, NY, 10306, USA

**3325.** Lin, Qi-Bin; Nel, A.; Huang, D.-Y. (2002): Phylogenetic analysis of the Mesozoic dragonfly family Liupanshaniidae (Insecta: Aeshnoptera: Odonata). Cretaceous Research 23(4): 439-444. (in English). ["The Chinese Lower Cretaceous dragonfly genus *Guyuaneschnidia* Lin, 1982, originally considered to be an Aeshnidae, is redescribed and transferred to the family



Liupanshaniidae Bechly et al., 2001. A phylogenetic analysis of the family is presented." (Authors)] Address: Lin, Qi-Bin, Nanjing Institute of Geology and Palaeontology, Academia Sinica, Nanjing, 210008, PR China

**3326.** Lissak, W. (2002): Neue Funde von *Orthetrum brunneum* (Südlicher Blaupfeil) im Lias-Vorland der Schwäbischen Alb (Lkr Göppingen). *mercuriale* 2: 18-19. (in German). [Baden-Württemberg, Germany; documentation of regional records of *O. brunneum* starting in 1990.] Address: Lissak, W., Schubartstr. 12, D-73092 Heiningen, Germany. E-mail: W.Lissak@natur-schutzzentrum-schopfloch.de

**3327.** Machado, A.B.M. (2002): *Neuraeschna tapajonica* sp. n. from the Amazonian region of Brazil (Odonata: Aeshnidae). *Lundiana* 3(1): 29-30. ["The new species is described and illustrated from a single ♂ (Brazil, Para, Itaituba, X-1977; deposited in Author's collection). It belongs to the dentigera-group.] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federale de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil

**3328.** Marinov, M. (2002): Dragonflies (Odonata: Insecta) in the Bulgarian Wetlands - Current Status, Distribution and their Importance as Bio-indicators. Proceedings of the Asian Wetland Symposium 2001 "Bringing Partnerships into Good Wetland Practices", 27-30 August 2001, Penang, Malaysia. ISBN 983-8614-230-8. 10 pp. (in English) [Dragonfly species in Bulgaria are overviewed and their importance for the protection of the wetlands is briefly discussed. Wetlands are one of the main subjects of the conservation activities in the country. Here a short historical review is given and their current conservation status is outlined. The main wetlands groups are overviewed according to their dragonfly fauna established up to now. As dragonflies could play a considerable role in wetlands management, some suggestions for monitoring programmes and using dragonflies as bio-indicators are provided." (Author)] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mg\_marinov@yahoo.com. Distributor: Penerbit University Sains Malaysia Co-operative Bookshop Ltd., University Sains Malaysia, 11800 USM Pulau Pinang, Malaysia

**3329.** Matsuda, S.; Hiasa, M.; Sugihara, K.; Miyashita, M. (2002): Discovery of *Mortonagrion hirosei* from the mainland of Kyushu (Coenagrionidae). *Tombo* 44: 13-18. (in Japanese with English summary). [*M. hirosei* was discovered at two localities in 1998 for the first time from the main land of Kyushu, Japan. "Both sites are seaside marshes where reed bushes grow. We found andromorphic (homoeochromatic) ♀♀ at each locality. Although the distance between these two localities is only 2 km, the ratio of homoeochromatic ♀♀ differed greatly between them, being ca 1% at Mikoyama-shinden, and ca 50% at Otome-shinden. As the difference can be regarded as being genetically determined, the population of each local habitat should be conserved with no changes occurring in the type ratio." (Authors)] Address: not stated in English

**3330.** Mauersberger, R.; Bönsel, A.; Matthes, H. (2002): *Anax parthenope* in Seenlandschaften entlang der Pommerschen Eisrandlage in Nordost-Deutschland (Odonata: Aeshnidae). *Libellula* 21(3/4): 145-165. (in German, with English summary). ["From the lake-land-

scapes of Mecklenburg and northern Brandenburg, Germany, 146 localities of *A. parthenope* are listed, including 29 formerly published records. Completion of development was recorded at 28 waters. In one part of the area of investigation, the UNESCO-Biosphere Reserve 'Schorfheide-Chorin', *A. parthenope* is recorded from 15 % of the lakes. In the region, distribution and abundance of the species fluctuate considerably. Especially a cold winter with deficits in the supply of oxygen below the ice cover caused a strong temporary decline in population size. If these fluctuations are not taken into account, an increase of population size from 1989 until 2002 can be assumed. Stratified clear-water lakes with a constantly balanced oxygen supply in the littoral region constitute a persistent habitat in NE Germany. Moreover, *A. parthenope* is able to colonize for a limited time numerous lakes of all trophic levels and all sizes, as long as they are bordered by reed belts." (Authors)] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-mail: FoerdervereinUeckermark.Seen@t-online.de

**3331.** Mauersberger, R.; Petzold, F. (2002): Seen als Habitate für *Onychogomphus forcipatus forcipatus* im Jungpleistozängebiet Nordost-Deutschlands (Odonata: Gomphidae). *Libellula* 21(3/4): 101-144. (in German, with English summary). [Brandenburg, Mecklenburg, Germany; *O. forcipatus* reproduces in 62 of 600 lakes, examined by the authors from 1989-2001. The habitat requirements can be described as follows: "volume (much) more than 30 000 m<sup>3</sup> balanced oxygen proportion throughout the year without deficiency below ice cover often supplied by ground water in forested areas and without an outflow; accordingly with a high long-term water level amplitude low trophic state: total phosphorus mostly less than 25 mg/m<sup>3</sup> surf zones with mineral sediment, usually at east or southeast banks exposed to wind inhabited parts of the shore are bare of vegetation or covered with thin reed belts up to 60 culms/m<sup>2</sup> (e.g. Meso-Phragmitetum). At the optimum habitat - mesotrophic ground-water lakes - *O. forcipatus* and *G. vulgatissimus* are the dominant anisopteran species." (Authors)] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-mail: FoerdervereinUeckermark.Seen@t-online.de

**3332.** Merritt, R.W.; Cummins, K.W.; Berg, M.B.; Novak, J.A.; Higgins, M.J.; Wessell, K.J.; Lessard, J.L. (2002): Development and application of a macroinvertebrate functional-group approach in the bioassessment of remnant river oxbows in southwest Florida. *J. N. Am. benthol. Soc.* 21(2): 290-310. (in English). [Calcosahatchee River, SW Florida, USA; includes information on voltinism and larval habits for *Argia*, *Enallagma*, *Ischnura*, *Aphylla*, *Anax*, *Boyeria*, *Epithea*, *Brachymesia*, *Erythemis*, *Erythrodiplax*, *Miathyria*, *Pachydiplax*, and *Perithemis*.] Address: Merritt, R.W., Dept Ent., Fish. & Wildlife, Michigan St. Univ., East Lansing. MI 48824, USA

**3333.** Misof, B. (2002): Diversity of Anisoptera (Odonata): Inferring speciation processes from patterns of morphological diversity. *Zoology* 105: 355-365. (in English). ["With roughly 2500 described species Anisoptera are among the species-poor suborders within insects. [...] In this analysis phylogenetic research is integrated with comparative approaches to investigate possible explanations of differential speciation rates within this suborder. A short review of phylogenetic work based on

morphological characters is compared to published molecular Sistergroup comparisons are used to elucidate whether a) sexual selection, b) duration of life cycles, or c) differentiation in body size, have had a detectable effect on speciation rate. In all three analyses effects of distributional range and latitudinal distribution were controlled. These analyses suggest sexual selection promotes speciation and an increase in body size is positively correlated with speciation rate. The evolutionary significance of these results is discussed and experimental approaches that should advance our understanding of anisopteran diversity are suggested." (Author)] Address: Misof, B., Department of Entomology, Zoological Research Institute and Museum Alexander König, Adenauerallee 160, D-53113 Bonn, Germany E-mail: b.misof.zfmk@uni-bonn.de

**3334.** Moore, N.W. (2002): The dragonflies of a Cambridgeshire pond and its surroundings in 2001. *J. Br. Dragonfly Society* 18(1/2): 13-22. (in English). [The author visited a pond at Swavesey in Cambridgeshire on most days during the flying season (30 April to 15 November) of 2001. "As a result the records for that year are more complete than for any previous year since the pond was dug in 1983 (Moore, 1987) and thus seem worth recording. An additional reason for publishing the records for 2001 is that the flying season followed the wettest winter ever recorded and it was interesting to discover, whether this had had any noticeable effect on the dragonfly fauna of the pond. This paper provides a summary of my observations, which are related to other observations made on the pond since 1983 (Moore, 1987, 2002 and unpublished). The nature of the pond's dragonfly fauna is outlined, and the value and limitations of such studies is discussed." (Author)] Address: Moore N.W., The Farmhouse, 117 Boxworth End, Swavesey, Cambridge CB4 5RA, United Kingdom

**3335.** Moroz, M.; Maksimenkov, M.V.; Czachorowski, S.; Buczynski, P. (2002): Results of the investigation of aquatic insects (Insecta: Collembola, Ephemeroptera, Odonata, Trichoptera, Heteroptera, Coleoptera) of the Biosphere Reserve "Sporovskii". *Natural Resources 2* (National Academy of Sciences of Belarus. Ministry of Natural Resources and Environmental Protection. Scientific Edition): 88-94. (in Russian, with English summary) [Belorussia; 11 odonate taxa were traced, among them *Calopteryx splendens*, *Erythromma najas*, *Nehalennia speciosa*, *Epitheca bimaculata*, and *S. sanguineum*.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3336.** Mulnet, D. (2002): Développement larvaire de *Leucorrhinia dubia* dans deux biotopes de tourbières. *Martinia*, Hors Série 4: 85-90. (in French). [A population of *L. dubia* in a high bog near the Puy de Dôme, Auvergne, France, was surveyed for the development time in two different habitat types: one was covered densely with *Sphagnum* mosses, while the second type was characterised by a quite sparsely vegetation and a free water column. Larval developments in type 1 lastes 5 years, while in type 2 emergence took place after three years. ] Address: Mulnet, D., 330 Rue Vercingétorix, F-63110 Beaumont, France

**3337.** Mulnet, D. (2002): Étude comparative de l'émergence de plusieurs espèces d'Odonates de tour-

bière. *Martinia*, Hors Série 4: 91-108. (in French). [Emergence patterns differed for 1986, 1990, and 1991 of *Leucorrhinia dubia*, *Pyrrhosoma nymphula*, *Libellula quadrimaculata*, *Somatochlora arctica*, *Lestes* sp., *Aeshna juncea*, and *A. cyanea* are presented and discussed in detail] Address: Mulnet, D., 330 Rue Vercingétorix, F-63110 Beaumont, France

**3338.** Mulnet, D. (2002): Utilisation pratique des modèle de capture recapture: application à une population de *Leucorrhinia dubia*. *Problèmes méthodologiques concrets et perspectives. Martinia* Hors Série 4: 39-48. (in French). [A study to estimate the size of a population of *L. dubia* in a bog near the Puy de Dôme, Auvergne, France is used to discuss in very detail the accuracy of population estimation methods.] Address: Mulnet, D., 330 Rue Vercingétorix, F-63110 Beaumont, France

**3339.** Murray, C. (2002): Dragonflies - ancient animals under threat. *Atropos* 17: 19-25. (in English). [This is a general account on factors threatening Odonata, including brief remarks on habitat destruction, pollution, inappropriate habitat management, alteration of site hydrology, and global climate change] Address: Murray, Charlotte, English Nature North Mercia team, Attingham park, Shrewsbury, SY4 4TW, UK

**3340.** Naraoka, H. (2002): Reproductive behaviour of *Lestes temporalis* Hanseman [sic] (Odonata, Lestidae). *Gekkan-Mushi* 381: 38-41. (in Japanese). [The oviposition of *Lestes temporalis* Selys 1883 at night and the egg deposition frequency in dependence of air-temperature are reported. A translation of the paper is published in *Digest of Japanese Odonatological Short Communications* 14.] Address: Naraoka, H., 36-71, Motoizumi, Fukunoda, Itayanagi-cho, Kitatsuguru-gun, Aomori Prefecture, 038-3661, Japan

**3341.** O'Brien, M. (2002): Highlights from the Great Lakes Odonata meeting, Higgins Lake MI, July 1-4, 2002. *Argia* 14(3): 6-9. (in English). [The dragonfly records of different trips are outlined; records of *Somatochlora hineana* and *Aeshna sitchensis* are of some interest.] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

**3342.** Orioux, G.; Laleure, J.-C. (2002): Les Odonates de la Loire et de l'Allier dans le département de la Nièvre. *Martinia*, Hors Série 4: 49-51. (in French). [Between 1983 and 1993 a total of 35 odonate species was recorded. The species composition of the channel, the branches, and standing waters within the floodplain are briefly compared] Address: Orioux, G., 25, rue Gambetta, F-58000 Nevers, France

**3343.** Orszaghova, Z.; Suplatova, M.; Orszagh, I. (2002): Changes in food composition of the tree sparrow (*Passer montanus*) nestlings. *Biologia* (Bratislava) 57(2): 251-259. ["Using the neck ring method we gathered two hundred and ninety-nine samples of food for nestlings of the tree sparrow (*Passer montanus*) at two sites (the Biological station and the alder forest in the National Nature Reserve Sur). The samples were divided into 12 animal (Gastropoda, Arachnida, Odonata, Mantodea, Saltatoria, Homoptera, Heteroptera, Megaloptera, Lepidoptera, Coleoptera, Formicoidea, Diptera) and 3 vegetable (grains of wheat, pea and fragments of various plant species) food groups. Soft-bodied Arachnida, beetle larvae and butterfly caterpillars predomina-

ted in the food of the youngest nestlings throughout the breeding season. With increasing age the food contained more hard-bodied arthropods and harder components of plants and their seeds. In May, 55 diet samples for the nestlings consisted mainly of butterfly caterpillars (25%), leaf hopper larvae (21%) and beetles (19%), the animal to vegetable component ratio (A:V) was 99.1%:0.9%. In June, spiders (20%) and beetles (20%) were the most frequent items in 108 samples. Three quarters of the beetles were larvae of *Spercheus emarginatus* (Spercheidae), and wheat grains represented 25%, the A:V ratio amounted to 69.7%:30.3%. In July one hundred and four food samples were collected, including praying mantes (*Mantis religiosa*) forming 28.5% of the material, Saltatoria 24.6%, and Arachnida 12%. The other diet groups were represented by lower percentages - the A:V ratio being 97.9%:2.1%. In August, 32 samples were collected, with beetles predominating in the food (28.8%), and a high proportion of *Sialis* sp. related larvae (26.4%) and Arachnida (24%). The A:V ratio was 99%:1%." (Author]

**3344.** Parr, A. (2002): First and last dates. Dragonfly news 42: 17-18. (in English). [Compilation of early records of several odonate species in UK in spring 2002.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**3345.** Parr, A. (2002): The southern Skimmer *Orthetrum brunneum* (Fonscolombe). *Atropos* 16: 31-33. (in English). [The discovery of *O. brunneum* on Guernsey rises the possibility to discover the species on the mainland of Great Britain too. Therefore, some information on range expansion on the European continent, identification features, and the biology of the species are provided.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

**3346.** Paulson, D. (2002): New state records of *Enallagma* from Minnesota and New Hampshire. *Argia* 14(3): 12- (in English). [USA, *Enallagma clausum* (Minnesota, 30 May 1977); E. doubleday (New Hampshire, 7 July 1974)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**3347.** Paulson, D. (2002): Philip S. Corbet, Honary member, the Dragonfly Society of the Americas. *Argia* 14(3): 5-6. (in English). [Dennis Paulson introduces into the recognition of Dr. Philip Corbet - "the preeminent odonatologist of our time" - as Honary Member of DSA, and briefly outlines some mile stones in his odonatological work. Special emphasize is given to the fact that Philip unhesitatingly shared his knowlege and ideas with many students and colleagues over the years, and to his inspiration to his colleagues.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**3348.** Perrin, V. (2002): Highlights of the early season. Dragonfly News 42: 16- (in English). [Compilation of odonate records in 2002 with special emphasis on phenology from differend localities in UK] Address: not stated

**3349.** Petrulevicius, J.K.; Nel, A. (2002): A new libelluloid dragonfly from late Paleocene deposits in Argentina (Odonata: Italoansida). *Eur. J. Entomol.* 99: 485-489. (in English). ["A new genus and species of "libellu-

loid" dragonfly, *Jujusia maizgorda* gen. n., sp. n., of the clade Italoansida Bechly, 1996, from the late Paleocene, Maiz Gordo Formation, north-western Argentina, is described. Its phylogenetic relationships within the clade Cavilabiata Bechly, 1996 are discussed." (Authors)] Address: Petrulevicius, J.K., Departamento Cientifico Paleozoologia Invertebrados, Museo de La Plata. Paseo del Bosque, s/n. 1900 La Plata, and CONICET, Argentina. E-mail: levicius@mnhn.fr

**3350.** Petzold, F. (2002): Beobachtungen zum Verhalten von *Aeshna crenata* und *A. grandis* an einem Gewässer in Westsibirien (Odonata: Aeshnidae). *Libellula* 21(3/4): 79-100. (in German, with Russian and English summaries). [Sedelnikowo (56°57N 75°16E), NE part of administration district of Omsk, Russia; the behaviour of the coexisting species was observed from 1999-2001 at a man-made water body that was constructed as watering-place for cattle. "*A. grandis* was numerically the more dominant species; however, no interspecific interactions were noted. The reproductive activities of both species concentrated on a section of the water with highly structured vegetation and a great amount of dead wood. Both species preferred dead wood for oviposition but *A. crenata* used other kinds of dead and fresh plant material as well." ♀ refusal behaviour against ♂ mates is discribed. "Matings were not seen in *A. crenata* and only rarely in *A. grandis*. [...] More ♂♂ than ♀♀ of *A. crenata* and clearly more ♀♀ than ♂♂ of *A. grandis* were present at water. The activity of ♀ *A. crenata* lasted four hours per day and was significantly shorter than the eight hours spent by *A. grandis*." (Author)] Address: Petzold, F., Pappelallee 73, D-10437 Berlin, Germany. E-mail: falkpetzold@web.de

**3351.** Petzold, F.; Wildermuth, H. (2002): Massiver Wassermilbenbefall bei *Cordulia aenea* (Hydrachnida: Arrenurus; Odonata: Corduliidae). *Libellula* 21(3/4): 167 - 173. (in German, with English summary). ["A population of *C. aenea* heavily parasitized by larvae of *Arrenurus* sp. was found at a moorland lake in northern Germany in May 2002. The parasites attached in clusters, mainly to the pleural membrane ventrally on abdominal segments 7, 8 and 9. The findings are discussed in the frame of earlier observations on parasitized corduliids with corresponding interpretations that go back as far as to the 18th century." (Authors)] Address: Petzold, F., Pappelallee 73, D-10437 Berlin, Germany. E-mail: falkpetzold@web.de

**3352.** Pfeiffer, B. (2002): *Williamsonia fletcheri* encountered in Vermont. *Argia* 14(3): 10-11. (in English). [June 4, 2002, Washington County, Vermont, USA] Address: Pfeiffer, B., 113 Bartlett Rd, Plainfield VT, 05667, USA

**3353.** Purse, B. (2002): Conservation of the southern damselfly in Britain. *Biodiversity Technical Series* 1: 10 pp. (in English). [*Coenagrion mercuriale* is the only odonate species to have a national Species Action Plan (SAP) within the UK Biodiversity Action Plan. In the UK it is basically restricted to a few sites in Anglesey, West Wales, Gower, Devon, the New Forest, and the Itchen and Test valleys. Amongst these it occurs in three quite different habitat types: small lowland heathland streams, water-meadow ditches and calcareous fenland. In 1996/97 a Steering Group was set up to coordinate research and implement the SAP. A PhD was completed by Beth Purse, working under the direction



of Dr David Thompson at Liverpool University, to investigate the species on heathland sites. A second PhD study is now underway to investigate the ecology of the species in its other contrasting habitats: chalk stream, watermeadow and fen. The Environment Agency has recently published a superb illustrated booklet Conservation of the southern damselfly in Britain, R7D Leaflet W1-021/L, (contact 01793 860512 or publications@wrcplc.co.uk), which summarises Beth Purse's results. Other current research has involved collecting DNA samples from all known UK sites. Analysis should show what links, if any, exist between the somewhat discrete populations in their varying habitats.] Address: Environment Agency, Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol BS32 4UD, UK.

**3354.** Quintana, A.T.; López, C.N. (2002): New locality records for Odonata in Pico Cristal National Park, Cuba. *Argia* 14(3): 15-16. (in English). [9 species were observed in 2001.] Address: Quintana, A.T., Univ. De Oriente, Santiago, Cuba

**3355.** Ring, S.; Kraus, F.B.; Schierwater, B.; Hadrys, H. (2002): Evolutionary ecology and genetic diversity measures in dragonflies. *Zoology (Jena)* 105 (Suppl. 5): 73. (in English). [Verbatim: "Dragonflies provide key model systems not only to study the evolution of mating systems (Fincke & Hadrys 2001, *EVOLUTION* 55: 762) but also to address the issue of how to define operational taxonomic units in conservation biology (conservation units). Field studies on dragonfly diversity and abundance in a variety of European, African, North and South American habitats have been combined with genetic diversity measures by means of multiple nuclear and mitochondrial DNA sequence markers (including ITS1, ITS2, C01, CO2, D-loop, ND1, 16S rDNA, and Hox genes) and neutral DNA markers (microsatellites, RAPDs). Information on both data sets helps to detect ecological and evolutionary effects on population networks and species assemblages, e.g. demographic patterns of habitat fragmentation, bottleneck effects and habitat shift processes. For example, within the European members of the riverine damselfly family Calopterygidae the identification of taxonomic units is very controversial and varies from 3 to 200 reproductive entities. Despite the high number of different phenotypes, sequence analyses of four DNA loci show very low genetic diversity within and between the proposed species/subspecies. This incongruence suggests recent speciation processes. Reconstruction of habitat preferences suggests that recent habitat shifts correlate with differences in the phenotype. In a second study on the keeled skimmer *Orthetrum coerulescens* the genetic consequences of a local bottleneck have been quantified. The latter revealed a significant number of private alleles for the largest population within a local network. These alleles were lost after the breeding site was dredged and a significant mode shift in allele frequencies (typical for a genetic bottleneck) took place. This demonstrates, that despite the fast recovery potential in terms of effective population (within 2 generations) and a network of smaller populations in the surrounding, a large self-perpetuating dragonfly population was affected by a cryptic loss of genetic diversity. We acknowledge support from the DFG and BMBF."] Address: Hadrys, H., Ecology and Evolution, ITZ, Tierärztliche Hochschule Hannover, 30559, Hannover, Germany. E-Mail: heike.hadrys@ecolevol.de

**3356.** Rosche, L. (2002): Dragonflies and damselflies of Northeast Ohio. *Cleveland Mus. Nat. Hist., Cleveland/OH*. ISBN 0-9717460-0-1. vii, 94 pp. (in English). [I assume, this book was planned as a guide directed to a public interested more generally in dragonflies, and to motivate it to get more and more interested in the Odonata. Larry Rosche documents the species that occur in a region that is - as J.B. Keiper states in his foreword - "fantastically rich with aquatic habitats. Fens, bogs, marshes, lakes, streams, springs and other wonderful ecosystems exist within an hour's drive of any northeastern Ohio city or town. In these areas, you can easily find a species-rich and abundant odonate fauna whose patrolling of territories, mating activities, predatory efforts and other behaviors will offer many rewarding observations. Use this guide and put names on those species you see." The book should also be useful elsewhere in the Great Lakes Region of USA and Canada, as most of the 124 species found in the scope of the book are found in Michigan, Indiana, Wisconsin, Minnesota, and Illinois as well as Ontario. The book is filled with lots of hints on identification, biology and habitat information; special emphasis is given to the phenology, and it is useful to get information on the regional rarity of the species. In general, the illustrations (most seem to be watercolor or color-pencil realized by three artists with different styles: Jacqueline Haley, Jennifer Brumfield and David Metcalf) depict the species well enough for identification. The digital images of the bluet reference guide on page 90 are very nice: The placement of all the bluets on one page is a great idea that enables the user to compare the species in one view. Some of the illustrations (Aeshnidae, Gomphidae) look digitally mounted using a morphological construction kit. It is hard to assess with the view of a European whether the illustrations fit to the reality. I think some of the artwork lacked detail in some cases, some of the perspectives seemed to distort terminal genitalia of the damselflies (way too big), some of the colors were too muted, or in the case of the *Argia* or *Hetaerina americana*, the bodies looked like pinned. Some of the paintings - especially the clubtails - lack in contrast and details. The wire-comb binding allows the pages to lie flat, which is great. However, the cover pages will be easily ripped or bent by repeated use in the field, so a plasticized cover is recommended. The book is attractive and reasonably priced, and I think it will deserve a spot on your shelf or in your backpack when travelling through NE Ohio. (M. Schorr)] Address: Publishers: Cleveland Mus. Nat. Hist., 1 Wade Oval, University Circle, Cleveland, OH 44106-1767, USA. Price: US \$ 18.95 net

**3357.** Samolag, J. (2002): New records of *Coenagrion armatum* (Charp.) and *Sympetrum fonscolombii* (Selys) (Odonata: Coenagrionidae, Libellulidae) in the Wielkopolska region. *Wiad. ent.* 21(1): 51-52. (in Polish, with English title). [*C. armatum*: 2 ♂, S of lake Lusowskiego and SE of Lusówko, 7-V-2000; *S. fonscolombii*: 1 ♂, SW of Młodasko, 22-X-2000. The habitats are briefly characterised, the accompanying odonate species are listed, and the occurrence of the 2 species in Poland is briefly outlined.] Address: Samolag, J., Ul.Poznanska 72, PO-62080 Tamowo Podgorne, Poland

**3358.** Schiel, F.-J. (2002): Entwicklungsnachweis von *Lestes virens vestalis* (Kleine Binsenjungfer) in der Oberrheinebene südwestlich von Baden-Baden. *mercuro*

riale 2: 2-3. (in German). [In 2001, near Sinzheim, Baden-Württemberg, Germany, the regional very rare *L. virens* was recorded. Its habitat is described in some detail.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**3359.** SGL Baden-Württemberg (2002): Vereinsnachrichten. mercuriale 2: 30-40. (in German). [Includes a discussion on the potential and importance of ♀♀ in colonisation of water bodies (Sternberg, K. H. Hunger: Ja, wo fliegen sie denn?!?), Systematics of German Odonata (Kunz, B. R. Jödicke), soldes ("Schwarzes Brett"), the minutes of the meeting of the society, a membership list etc. ] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de

**3360.** Stoverock, M.; Schierwater, B.; Soendergerath, E.; Braune, E.; Suhling, F.; Martens, A.; Richter, O.; Hadrys, H. (2002): Understanding the dynamics of biodiversity in African dragonflies: Genetic approaches. *Zoology (Jena)* 105 (Suppl. 5): 74. (in English). [Verbatim: "Present-day patterns of biodiversity among ecosystems have arisen over time through a variety of natural and anthropogenic factors. Understanding these factors may provide crucial insights into the effects of future environmental changes. One basic requirement here is to understand and follow population structures and dynamics, for which estimates of gene flow and genetic diversity become a sine qua non. We use molecular genetic data from the mitochondrial and nuclear genome to monitor the genetic composition of defined key species under various demographic and ecological settings. Four different DNA sequence markers allow the straightforward detection of taxonomic units at the population to genus level. Microsatellites offer insights into intrapopulation structures. The genetic data provide first insights into the genetic structure, viability and dispersal potential of natural populations which differ in habitat selection, abundance, life cycle parameters and dispersal behaviour. The combination of multiple genetic markers also provides information on different evolutionary time scales and therefore accounts for the historical dimension of changes in biodiversity. The data will be used in mathematical simulation studies that will model the dynamics of dragonfly biodiversity in African dragonflies. We acknowledge support from the BMBF (BIOLOG Africa #01LC0024).] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**3361.** Szállassy, N.; Bárdosi, E.; Szabó, Z.D.; Dévai, G. (2000): Fluctuating asymmetry and mating success in mated and solitary *Ischnura elegans* (Zygoptera: Coenagrionidae) males. *Hidrológiai Közlöny* 81: 514-516. (in Hungarian with English summary). ["The hypothesis that the more symmetrical are the wings, the greater is the success the individuals achieve in pairing was tested. [...] Neither reproductive success nor body size were correlated significantly with wing asymmetry."] Address: Szállassy, N., Dept of Ecol. Hydrobiol., University of Debrecen, Egyetem tér 1, HU-4032 Debrecen, Hungary. E-mail: szallassy@tigris.klte.hu

**3362.** Tarboton, W.; Taboton, M. (2002): A fieldguide to the Dragonflies of South Africa. Private publication, 2002. 97 pages. ISBN 0-620-29887-1. 97 pp. (in English). ["This colourful little fieldguide treats all 90

species of Anisoptera found in the Republic of South Africa. Following a brief introduction to classification, behaviour and identification methods, the larger part of the book is devoted to species identification. Brief texts on occurrence and identification are accompanied with distribution maps and 34 colour plates. The latter are composed of scans of specimens, the majority of which is of very fresh individuals, showing the life colours. The layout of the plates is attractive and roomy, with on average 7 scans on each plate. Distinctive features are indicated, sometimes elucidated with simple line-drawings, and the scans are sufficiently clear for the user to compare and find additional characters himself. On average there are about 3 scans per species, e.g. a dorsal aspect of both sexes and a lateral aspect of one, allowing an impression of the variability. The book is augmented with 29 photographs of free-living dragonflies, including some of the most stunning pictures of African species ever published (e.g. *Anax tristis* ♀ in flight and ovipositing). With the wealth of illustrations, identification becomes surprisingly straightforward, and the user is helped further with simple pictorial keys to families and gomphid and libellulid genera. The accessible image-oriented concept of the book is highly innovative in a group where we are used either to complicated technical keys or photoguides using field photos, allowing only limited views of characters and variation. The example is definitely one to be followed, especially in the species-rich faunas of the tropics where the scans-approach is perhaps the only way to do justice both to the diversity of Odonata and the growing interest for them. It is to be hoped the authors are planning a similar book for the Zygoptera!" (K.D. Dijkstra, taken from Phaon 2003:01, 11 March 2003).] Address: The book can be ordered for 200 rand, which includes postage (approx. 23 euro/US dollar) from: Russel Friedman Books cc, P O Box 73, Halfway House 1685, SOUTH AFRICA; attention Shelley Tel 027 -11-702-2300; Fax 027-11-702-1403; Email: shelleyrh@mighty.co.za Website: vwww.rfbooks.co.za

**3363.** Versonnen, B.; Knijf, G. de; Vercruyse, W.; Verhaeghe, W.; Van Wichelen, T. (2002): Four observations and first successful reproduction of *Sympetrum meridionale* (Selys, 1841) in Belgium. *Gomphus* 18(1-2): 3-13. (in Dutch, with English and French summaries). ["After nearly a century of absence, *S. meridionale* was seen 3 times in 2000 and once in 2001. There was an observation at Rekem (Limburg) on 20/06/2000, one at Harchies (Hainaut) on 25/06/2000 and one at Zelzate (East-Flanders) also on 25/06/2000 and finally one at Stekene (East-Flanders) on 01/08/2001." The specimens "of 2000 were young: twice a young ♂ (Rekem and Zelzate) and one freshly emerged ♀ at Harchies. Especially this last observation proves that *S. meridionale* was able to reproduce successfully in Belgium. Very remarkable was the predation on a young ♂ at Zelzate by a domestic cat." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**3364.** Wasscher, M. (2002): Canal damselfly *Cercion lindenii* (Selys) - a species to look out for. *Atropos* 16: 62-63. (in English). [Some information on range extension on the European continent, identification features, and biology are provided, because the possibility exists to discover *C. lindenii* on the mainland of Great Britain in near future.] Address: Wasscher, M., Minstraat 15bis,

NL-3582 CA Utrecht, The Netherlands, E-mail: m.wascher@broekhuis.nl

**3365.** Weihrauch, F. (2002): Ein Weibchen von *Enallagma cyathigerum* als Unterwasser-Prädator der Großen Weidenrindenlaus (Odonata: Coenagrionidae; Homoptera: Lachnidae). *Libellula* 21(3/4): 175-180. (in German, with English summary). ["A ♀ *E. cyathigerum* was observed feeding on larvae of *Tuberolachnus salignus* (Gmelin), on an accidentally submerged willow twig during a subsurface walk, possibly with the aim of oviposition. Seven or eight of the obviously soaked and half-drowned aphids were consumed within five minutes. This observation is discussed, and a list of other records from the literature of Homoptera as odonate prey is given. This is apparently the first published record of an imaginal dragonfly foraging under water." (Author)] Address: Weihrauch, F., Hengelerstr. 9, D-80637 München, Germany. E-mail: Florian.Weihrauch@t-online.de

**3366.** Weihrauch, F. (2002): *Enallagma* versus *Vespa*. *mercuriale* 2: 17-18. (in German). [Detailed description of the preying of a *Vespa* sp. upon *Enallagma cyathigerum*. Special emphasis is given to the habit of the *Vespa* to secure the damselfly from the surface of the water.] Address: Weihrauch, F., Hengelerstr. 9, D-80637 München, Germany. E-mail: Florian.Weihrauch@lbp.bayern.de

**3367.** Westermann, K. (2002): Die Abundanz schlüpfender Libellen in einem südbadischen Altrheingebiet. *Naturschutz südl. Oberrhein* 3: 215-244. (in German, with English summary). ["Within six years of research 192 000 exuviae of dragonflies were collected along two sections of side streams (2.6 km long, 10 to 50 m wide) of the river Rhine near the village of Weisweil (County Emmendingen; Baden-Württemberg, SW Germany). Thus the successful reproduction of 34 dragonfly species could be proven. The occurrence of all species is shown in classes of abundance, spanning six orders of magnitude. 1 The most common species is *Cercion lindenii* with a maximum abundance of 15 000 emerged imagines along 50 m of the stream. The species was found in perfect habitat in a 32 to 40 m wide section of the river, where eutrophic water is running with a regular speed of 0.1 to 0.2 m/s. Here also *Platycnemis pennipes*, *Ischnura elegans* and other species reach high abundance. Optimal habitat for *Pyrrosoma nymphula* exists along shallow sections, where there is no fish. Other species that reach their highest classes of abundance when emerging in shallow sections, are *Aeshna cyanea*, *Brachytron pratense*, *Libellula fulva*, *Sympetrum vulgatum* and *S. sanguineum*. *Gomphus pulchellus* is widely distributed in the study area and along other side streams, and reaches classes of abundance that can presumably exceed those of artificial lakes in gravel pits. Along old side streams *Calopteryx splendens*, *Chalcolestes viridis*, *Platycnemis pennipes*, *P. nymphula*, *Coenagrion puella*, *C. lindenii*, *Erythromma najas*, *Ischnura elegans*, *G. pulchellus*, *G. vulgatissimus*, *B. pratense*, *L. fulva*, and *S. striolatum* probably find optimal habitat in the southern Upper Rhine plains. Due to the large number of waters more species have also huge populations. The dragonfly communities of various stream sections can differ enormously. The biggest difference was found between a slowly and steadily running old side stream and the upper section of a cool, wide source; river ("Gießen") with summer

temperatures of 14 to 17°C. While *P. nymphula*, *C. viridis*, and *Coenagrion puella* have large populations at the Gießen every year, *P. pennipes*, *C. lindenii*, *I. elegans* and other species almost entirely fail. Results obtained in this study show the current status of dragonflies in typical waters called "Altrhein" (old) side stream and "Gießen" (source river). Changes and losses in the dragonfly communities might occur as soon as the "Integrated Rhine Program" (a programme to manage high floods of the river Rhine) will come into effect." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**3368.** Westermann, K. (2002): Schlupf einer *Gomphus vulgatissimus* im August. *mercuriale* 2: 20-21. (in German). [Documentation of a late seasonal record (9. August 2002) of *G. vulgatissimus* from an oxbow of River Rhine near Weisweil, Baden-Württemberg, Germany.] Address: Westermann, K.; Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**3369.** Westermann, K. (2002): Zur Phänologie der Emergenz bei der Gebänderten Prachtlibelle (*Calopteryx splendens*) an südbadischen Altrheinen. *Naturschutz am südl. Oberrhein* 3: 193-200. (in German, with English summary). [Along old side streams of the river Rhine in South Baden the emergence of *C. splendens* lasts until late August or the first days of September and thus at least six weeks longer than according to data given in the literature for the Federal state of Baden-Württemberg, Germany. High floods and rainfall shortly before emergence probably lead to considerable temporal shifts in the emergence and losses in the population.] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**3370.** Woodward, G.; Hildrew, A.G. (2002): Body-size determinants of niche overlap and intraguild predation within a complex food web. *Journal of Animal Ecology* 71: 1063-1074. (in English). ["1. Body-size may be an important feature of the structure of food webs. Detailed food web data are however scarce, particularly those including ontogenetic dietary shifts within species. We examined the predator guild in a well characterized food web, that of Broadstone Stream (UK), to assess the importance of body-size within and among species in relation to intraguild predation and niche overlap. 2. In agreement with recent food web theory, mutual predation and cannibalism were frequent and occurred in many pairwise permutations. This intraguild predation was strongly asymmetric, being determined by relative body-size within and among species, and seasonal 'ontogenetic reversals' in trophic status arose when generations overlapped. 3. Predator size determined dietary overlap, with ontogenetic shifts often outweighing taxonomic differences. Small predators had the narrowest diets, regardless of species, and were limited to feeding on a restricted subset of the total prey size-spectrum. Niche overlap decreased as pairwise differences in body-size increased among and within species. Overlap in diet also tracked seasonal changes in resource availability, being highest in summer, when prey were abundant and small, and declining progressively over time, as prey became scarcer and/or larger. The small predators also became more detritivorous as prey abundance declined and the larger prey species attained size-refugia. 4. The body-size



constraints driving feeding relationships within the predator guild, in terms of both resource partitioning and intraguild predation, lend support to recent niche models of food web structure (Warren 1996; Williams & Martinez 2000). The highly interconnected food web of Broadstone Stream appeared to be structured by relatively simple rules, with seasonal and ontogenetic shifts in the size-spectrum accounting for most of the changes in predator diet and trophic position. Encounter rate in time (prey and predator mobility) and space (microhabitat use) and foraging mode also influenced prey vulnerability and niche overlap, but were secondary to the effect of body-size." (Authors) Key predator is *Cordulegaster boltonii*; thus, some focus of the study lies on this species.] Address: Woodward, G., School of Biological Sciences, Queen Mary University of London, Mile End Road, London, E1 4NS, UK. E-mail: Guy-Woodward@hotmail.com

**3371.** Woodward, G.; Hildrew, A.G. (2002): Differential vulnerability of prey to an invading top predator: integrating field surveys and laboratory experiments. *Ecological Entomology* 27: 732-744. (in English). ["1. A new top predator, the dragonfly *Cordulegaster boltonii*, invaded Broadstone Stream (U.K.) in the mid-1990s. This provided a rare opportunity to assess the impact of a new, large carnivore on a community that has been studied since the 1970s and has one of the most detailed food webs yet published. The vulnerability of the resident species to the invader was assessed by integrating experiments, which examined discrete stages in the predation sequence, with empirical survey data. 2. Although the new predator preyed on nearly every macro-invertebrate in the food web, vulnerability varied considerably among prey species. Size-related handling constraints initially set the predator's diet, resulting in strong ontogenetic shifts, with progressively larger prey being added while small prey were retained in the diet, as predators grew. Within the size range of vulnerable prey, encounter rate limited the strength of predation, with mobile, epibenthic species being most at risk. Contrary to most studies of interactions between freshwater predators (usually stoneflies) and prey (usually mayflies), the new predator did not elicit avoidance responses from its prey, probably because it combined a highly cryptic feeding posture with an extremely rapid attack response. 3. The invader exploited its prey heavily in experiments, even at prey densities orders of magnitude above ambient. In the field, electivity reflected prey availability, as determined by mobility and microhabitat use, rather than prey abundance or active predator choice. Consequently, the invader had skewed effects within the prey assemblage, with sedentary, interstitial species being far less vulnerable than more active, epibenthic species, some of which, including a previous top predator, have declined markedly since the invasion. 4. By examining the predation sequence in detail and integrating surveys with experiments, species traits and system characteristics that determine the strength of trophic interactions may be identified, and their potential importance in natural food webs assessed. In so doing, greater insight can be gained into which species (and systems) will be most vulnerable to invading or exotic predators, an imperative in both pure and applied ecology." (Authors)] Address: Woodward, G.; Department of Zoology and Animal Ecology, University College Cork, Cork, Ireland. E-mail: g.woodward@ucc.ie

**3372.** Xylander, W.E.R. (2002): Bericht des Staatlichen Museums für Naturkunde Görlitz für die Jahre 1999-2001. *Abh. Ber. Naturkundemus. Görlitz* 74(1): 47-158. (in German). [This impressive report on the activities of the staff of the museum in Görlitz, Sachsen, Germany includes some odonatological activities. Most prominent are the organisation of a meeting of the society of German speaking odonatologists in 2001 and the intensive surveys of the odonate fauna of the brown coal mining region of Berzdorf.] Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany. E-mail: Naturmuseum.GR.Dr.Xylander@t-online.de

**3373.** Xylander, W.E.R.; Richter, M. (2002): Erstnachweis der Pokalazurjungfer *Cercion lindenii* (Selys, 1840) (Odonata, Coenagrionidae) für den Freistaat Sachsen. *Abh. Ber. Naturkundemus. 74(2)*: 273-282. (in German with English summary). [Germany; "*C. lindenii* was recorded for the first time in Saxony in July 2002 at the Knappensee about 15 km south of the Brandenburg border. The Knappensee was formed by lignite mining and flooded about 1945. The lake exhibits a rich submerged vegetation dominated by *Myriophyllum spicatum* and a fragmented peripheral reed vegetation, especially at those sites where *C. lindenii* was found; this corresponds with the habitat characteristics from other localities. The adult density was low compared to other sites in Germany. Morphometric data show that the population from the Knappensee corresponds to those of the eastern population in Germany (from Brandenburg) in that the specimens are larger than individuals from western populations. However, the Saxon specimens even exceeded the data of Brandenburg *C. lindenii* regarding all morphometric parameters." (Authors)] Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany. E-mail: Naturmuseum.GR.Dr.Xylander@t-online.de

**3374.** Yagi, T. (2002): *Aeshna juncea* male copulated with a dead female. *Gekkan-Mushi* 381: 45. (in Japanese). [pond on Mt. Daisetsu at Kamikawacho, Hokkaido, Japan, 20. August 2000; a translation of the paper is published in *Digest of Japanese Odonatological Short Communications* 14] Address: Yagi, T., 2113 O-tobe, Tsu City, 514-0016, Japan

**3375.** Yourth, C.P.; Forbes, M.R.; Baker, R.L. (2002): Sex differences in melanotic encapsulation responses (immunocompetence) in the damselfly *Lestes forcipatus* Rambur. *Can. J. Zool.* 80(9): 1578-1583. (in English, with French summary). ["A few studies have shown that ♂ and ♀ invertebrates differ in immunity and that these differences appear related to differences in sexual dimorphism and gender differences in life histories. Melanotic encapsulation of foreign objects in insects is one form of immunity. *L. forcipatus* is moderately sexually dimorphic, and much is known about patterns of mass gain in congeners relating to differences in life history between ♂♂ and ♀♀. In this study, ♀♀ were more immunoresponsive than ♂♂ under controlled temperatures, following emergence, and at a time when parasitic mites were challenging these hosts. However, ♂♂ and ♀♀ that overlapped in mass at emergence did not differ in their immune responses. ♂♂ in better condition at emergence were more immunoresponsive than lighter ♂♂, but this relation was not found in ♀♀. Sex differences in immune expression

may have implications for how ♀♀ versus ♂♂ are able to deal with challenges from parasites, under varying environmental conditions.] Address: Baker, R.L., Dept Zoo., Erindale Coll., Univ. Toronto, Mississauga, ON, L6L 2C6. Canada. e-mail: rbaker@credit.erin.utoronto.ca

## 2003

**3376.** Abro, A. (2003): The composition of sperm bundles in *Aeshna juncea* (L.) (Anisoptera: Aeshnidae). *Odonatologica* 32(2): 153-157. (in English). [Using light and electron microscopy, sperm packing has been studied in the large sperm bundles of *A. juncea*. "Each large bundle is built up of variously-sized smaller bundles which probably reflects the intracyst formation procedure. It is proposed that initially there is a gathering of immature sperm cells into small bundles at several sites within the testicular cyst, and secondly all sperm heads are bundled together. This construction of subunits may be of importance to bundle break-down and release of individual sperm cells after transfer to the ♀ reproductive organs." (Author)] Address: Abro, A., Department of Anatomy, University of Bergen, Arstadveien 19, N-5009 Bergen, Norway

**3377.** Baird, J.M.; May, M.L. (2003): Fights at the dinner table: Agonistic behavior in *Pachydiplax longipennis* (Odonata: Libellulidae) at feeding sites. *Journal of Insect Behavior* 6(2): 189-216. (in English) ["Aggressive behavior of *Pachydiplax longipennis* during foraging was quantified by observing focal individuals on arrays of artificial perches. *Pachydiplax* apparently aggressively defend, for up to several hours at a time, one or a few feeding perches. Seventeen percent of all behaviors included agonistic actions, e.g., chasing or physical contact. The frequency of interactions was correlated positively with ambient temperature, solar radiation, prey density, and density of other dragonflies. Both sexes initiated and responded to intra- and interspecific aggression; intraspecific interactions were more intense, however. Males had significantly higher interaction rates and fighting success than females, and intraspecific male-male contests were particularly intense. When prey were visibly localized, contest winners commonly gained perches closer to the prey swarm, and aggressive behavior was apparently correlated with feeding opportunity. Despite the frequency of aggression, these dragonflies allocated only about 19 s, on average, to agonistic behavior during 30-min observation periods. This and other costs appear small compared to foraging benefits of occupying a favorable perch, although at a very high interaction intensity high energy costs and lower intake reduce the net energy gain." (Authors) Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu

**3378.** Beckemeyer, R. (2003): Are beetle dogs smarter than dragonfly dogs? A challenge from the past. *Argia* 14(4): 21. (in English). [In *Argia* 12(3), R. Beckemeyer (see OAS 3146) reported on his dog and its useful help to trace Odonata. In a note from 1911 in the *Entomological News*, he found the story of a setter dog, who very efficiently helped to collect beetles, some ne-

ver would have been collected without the help of this dog.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**3379.** Beckemeyer, R. (2003): Dragonflies infiltrate Texas butterfly festival. *Argia* 14(4): 18-19. (in English). [Brief report on the odonatological results of the trip to Texas, USA.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**3380.** Beckemeyer, R. (2003): New Harmony, Indiana - a stop along interstate 64 of historical interest to odonatists. *Argia* 14(4): 19-20. (in English). [During a trip across the USA, the author visited New Harmony, a town, where Thomas Say, the father of US-American entomology, spent many years of his life. R. Beckemeyer visited a museum with much information on Say, and provides some additional information on Say.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**3381.** Beynon, T. (2003): Dragonfly conservation from the BDS. *Atropos* 19: 70-71. (in English). [Coenagrion mercuriale; status quo report on research and conservation activities in UK] Address: Beynon, T.G., 34 Church Lane, Checkley, Stoke-on-Trent ST10 4NJ, UK

**3382.** Blaskovic, T.; Bulánková, E.; Síbl, J. (2003): First record of *Cordulegaster heros* ssp. *heros* Theischinger, 1979 (Cordulegastridae, Odonata) from Slovakia. *Biologia, Bratislava* 58(2): 293-294. (in English). [C. *heros* is added new to the Slovakian list of Odonata. 9 records of *C. heros* from the Borská nížina lowland in 2002 along with re-examined material collected in 1980, 1991, and 1998, are documented in detail.] Address: Bulankova, Eva, Institute of Ecology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B-II, SK-84215 Bratislava., Slovakia. E-mail: Bulankova@nic.fns.uniba.sk

**3383.** Bowman, N. (2003): Reports from Coastal Stations - 2002: Eccles-on-Sea, Norfolk. *Atropos* 18: 63. (in English). [United Kingdom; *Erythromma viridulum*, *Anaciaeschna isosceles*] Address: not stated

**3384.** Brockhaus, T. (2003): *Pantala flavescens* (Fabricius) in Khumbu Himal, Nepal (Anisoptera: Libellulidae). *Notul. odonatol.* 6(1): 2-3. (in English). [Report on the observation of *P. flavescens* in the Mount Everest region in April and May 2000; *Crocothemis erythraea* is recorded from Phakding.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**3385.** Brockhaus, T. (2003): Ein weiteres Vorkommen von *Aeshna subarctica elisabethae* (Walker, 1908) [sic] in Sachsen (Odonata, Aeshnidae) und Hinweise zur Libellenfauna der Natura-2000-Lebensraume 7110, 7140 und 7150. *Entomologische Nachrichten und Berichte* 47(1): 27-30. (in German with English summary) [Adults and exuviae of *A. subarctica elisabethae* Djaikonov, 1922 were found in a transition mire in the south of the "Muskauer Heide" (Germany, Saxony) near the Polish border in 2001 and 2002. The habitats are described, co-occurring Odonata (including *Ophiogomphus cecilia*, *Somatochlora arctica*, *Leucorrhinia pectoralis*, *L. rubicunda*, and *Sympetrum depressiusculum*), and a list

of the known Saxonian localities of *A. subarctica* is given. The potential as bioindicators of the odonate fauna of the NATURA-2000-habitats 7110 (bogs), 7140 (transition mires), and 7150 (Rhynchosporion) is discussed.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**3386.** Brooks, S. (2003): Dragonflies. life series. ISBN 0 565 09189 8. 96 pp. (in English). [In general, I think, we are living in times with overboarding information. The same goes for odonatology. Browsing OAS, one will find more and more papers intensifying the study of details on many subjects of odonatology. That's science, and it is necessary to do so. On the other hand, one needs time to handle all these details. The outstanding book of Philip Corbet helped to do so in a very significant part of odonatology, but it is a heavy weight in any sense. Steve Brooks explicitly refers to Corbet's book, and to Jill Silsby's fine book introducing odonate species diversity. In his new book "Dragonflies", S. Brooks compiles the essentials of current knowledge in odonatology on 96 pages. He directs precise information on a reader more generally interested in dragonflies. "Most of us are aware of dragonflies and damselflies. Their aerial agility and vivid colours are evocative of the long, hot days of summer, of shimmering lakes and dappled shade by trickling streams. But fewer people will have looked beyond the flash of blue, red, green or yellow to consider what each dragonfly is doing. This book takes you into the world of these fascinating insects and introduces you to their complex lifestyles - from the ferocious larval stages, lurking amongst plants and debris in lakes and rivers, to the breathtaking adults swooping after prey or fighting rivals to defend their territories." All information are organised in brief chapters. This also helps the advanced odonatologist to update his knowledge, and it is done in a language easy to read. The book is furnished with brilliant photographs. If one intends to motivate people's interest in dragonflies by a book, one should take Steve Brook's book. It is a really excellent book, and moderate in price (app. 15,- Euro). Of course, it should not be missing from your own odonatological library. (M. Schorr)] Address: The Natural History Museum Publishing, Cromwell Road, London, SW7 5BD, United Kingdom

**3387.** Brown, V. (2003): Rhode Island Odonata Atlas 2002 summary. *Argia* 14(4): 9-10. (in English). ["The fifth season of the Rhode Island Odonata Atlas was characterized by low water, a marked increase in records of southern species, a dearth of river species, and a change of place for both the project and the collection." *Williamsonia lintneri*, *Gomphaeschna antilope*, *Enallagma weewa*, *Somatochlora georgiana*, *S. linearis*, *Cordulegaster maculata*, *C. diastatops*, *Pantala flavescens*, and *P. hymenaea* are discussed in detail.] Address: Brown, Virginia, The Nature Conservancy, 159 Waterman Av., Providence, RI, 02906, USA.

**3388.** Buczynski, P. (2003): Remarks on the paper by W. BAZYLUK about dragonflies of the vicinities of Siemich. *Nowy Pam. Fizjogr., Warszawa* 2003 (2002) 1(2): 207-208. (in Polish with English summary). [Basing on original material of W. BAZYLUK (2002) (compare OAS 2873) deposited in the Museum and Institute of Zoology Polish Academy of Sciences, Warszawa it can be stated, that *Sympetma fusca* was confused with

*S. paedisca*. A small collection of larvae collected in the same area by W. BAZYLUK in 1950 adds *Coenagrion hastulatum* and *C. pulchellum* to the regional list.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3389.** Butler, S.G. (2003): The larva of *Phyllomacromia trifasciata* (Rambur, 1842) (Anisoptera: Macromiidae). *Odonatologica* 32(2): 159-163. (in English). [Description and illustration of a ♀ final instar larva from NW Madagascar; discussion of the generic affinities of *Phyllomacromia*.] Address: Butler S.G., Red Willow, All Stretton, Shropshire SY6 GHN, United Kingdom. E-mail: sgbutler@talk21.com

**3390.** Cade, M. (2003): Reports from Coastal Stations - 2002: Portland, Dorset. *Atropos* 18: 49-51. (in English). [Verbatim: "[...] *Sympetrum fonscolombi* was the main Odonata immigration highlight. After an early single at Bottomcombe Quarry on 22 May, there were three ♂♂ at Yeolands Quarry on 24 June and at least four ♂♂ and a ♀ on ponds in the Bird Observatory garden from 28 June to 6 July [...]. Despite egg-laying being observed at the latter site, the only later record involved a single ♂ seen nearby on 31 July. A Ruddy Darter *S. sanguineum* was recorded at Culverwell on 31 August, which was the first record for Portland Bill."] Address: not stated

**3391.** Cham, S. (2003): Small Red-eyed damselfly *Erythromma viridulum* (Charpentier) records in 2002. *Atropos* 19: 19-24. (in English). ["The colonisation of Britain by *E. viridulum* continued apace during 2002 with records coming from many more new sites across southern and south-east England. From the original sightings at the Essex coastal sites this species is now being recorded in increasing numbers further inland. The range has spread from the most northerly records in Norfolk down through Suffolk, Essex, Kent and Sussex to the most south-westerly records on the Isle of Wight. From the number of sites recorded, the main thrust inland appears to be north of the Thames estuary with the species recorded in Hertfordshire and again in Bedfordshire. [...]" (Author)] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com

**3392.** Clancy, S. (2003): Reports from Coastal Stations - 2002: Dungeness area, Kent. *Atropos* 18: 56-58. (in English). [United Kingdom; *Erythromma viridulum*, *Anax parthenope*, *Calopteryx splendens*, *Sympetrum fonscolombii*] Address: not stated

**3393.** Clarke, D. (2003): Blue Southern Hawker spotted. *Dragonfly news* 43: 35- [Aeshna cyanea; "I had almost forgotten about Mike Averill's appeal [...] when on 26 October I found myself watching a hawker quartering a forest ride in the Eden valley, Cumbria, in low mid-day sunshine. Fortunately, it settled to bask on low vegetation and I was able to approach undetected. The size and shape of the (yellow) dorsal patches on its thorax showed it to be a ♀ Southern Hawker. However, it was a very unusual one: all its dorsal abdominal markings were a clear blue, when this colour should have been restricted to the last segments! The sides of the thorax were the usual greenish yellow. I have not seen another like it before or since." (Author)] Address: David Clarke, david.clarke19@virgin.net



- 3394.** Clarke, D. (2003): Cumbria produces the goods! *Dragonfly news* 43: 35. (in English). ["[...] (*Aeshna mixta*) were duly seen in September (in the best weather of the season!), and in at least three different localities. At one site in the Lindale area the species was evidently in some numbers, and mating was seen. It also seems likely that the remaining sectors of the Lancaster-Kendal canal may be one of the routes for this dragonfly's northward movements. My note had also mentioned four other species as 'desirables', at least two of which were reported: singles of Emperor and Broad-bodied Chaser were noted (in August), again in this southern extremity of the county. [...]"] (Author)] Address: not stated
- 3395.** Clausnitzer, V. (2003): Dragonfly communities in coastal habitats of Kenya: indication of biotope quality and the need of conservation measures. *Biodiversity and Conservation* 12(2): 333-356. (in English). ["This study highlights the species diversity of Odonata from coastal forests in southern Kenya, identifying indicator species for certain habitat types and emphasising the importance of conserving the last remaining coastal forest areas. A total of 78 species were recorded from coastal habitats in southern Kenya in this study; five species for the first time in eastern Africa. Dragonfly communities relative to different habitat types from indigenous forest to cultivated landscapes are described and compared. The forest species are often confined to coastal forests of East Africa. They are stenotopic and highly sensitive to disturbance. With increasing habitat disturbance the species richness increases at first, but most of the colonisers are eurytopic species that are common and widely distributed in Africa. The species assemblages between different habitat types in the disturbed landscape are more or less the same; the beta-diversity is much lower than in different habitat types of the natural coastal landscape. In the end, management implications are briefly discussed."] (Author)] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de
- 3396.** Clausnitzer, V.; Peters, G. (2003): Identity and distribution of the little known *Aeshna meruensis* (Odonata: Aeshnidae). *International Journal of Odonatology* 6(1): 9-15. (in English). ["Status and records of *Aeshna meruensis* are published for the first time. This species has been confused with *A. rileyi* for a long time, although A.R. Waterston separated and labelled specimens of both species in the collection of the Natural History Museum, London, as early as 1974. *A. meruensis* is known from seven localities in East Africa so far, but the authors anticipate a wider distribution."] (Authors)] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle, Germany. E-mail: violacl@gmx.de
- 3397.** Clausnitzer, V. (2003): Rediscovery of *Amani-podagrion gilliesi*, with notes on habitat, behaviour and conservation (Odonata: Megapodagrionidae). *International Journal of Odonatology* 6(1): 1-8. (in English). ["*A. gilliesi* was known previously only from four ♂♂ collected in 1959 and 1962 in the Usambara Mountains, south-east Tanzania. Recently it has been rediscovered at two shady streams in that area. The species is not living in swamps, as previously stated, but is apparently restricted to a small area in the Amani-Sigi Forest. Data on its ecology, behaviour and reproductive habitat are presented for the first time."] (Author)] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle, Germany. E-mail: violacl@gmx.de
- 3398.** Clausnitzer, V. (2003): The synonymy of the East African *Notogomphus cataractae* Consiglio, 1978 and *N. immisericors* Campion, 1923 with *N. lectyhus* Campion, 1923. *Odonatologica* 32(1): 85-87. (in English). ["Based on the examination of the holotypes of the 3 taxa and on fresh material from Kenya, these appear conspecific. Consequently, *N. cataractae* and *N. immisericors* are placed in synonymy of *N. lectyhus*."] (Author)] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de
- 3399.** Cordoba-Aguilar, A. (2003): Predicting mechanisms of sperm displacement based on genital morphometrics in the Calopterygidae (Odonata). *Journal of Insect Behavior* 16(1): 153-167. (in English) [...] "It is widely accepted that detailed studies of the copulatory interaction of males and females are the basis for outlining the coevolutionary trajectories that both sexes have followed [...]. Unfortunately, the study of copulatory mechanisms has been hampered by a number of practical reasons and consequently, our knowledge is limited to a few animal taxa within which the best known are the Odonata insects. [...] The main aim of this paper is to characterize the different copulatory mechanisms calopterygids utilize on the basis of genital morphometry. I test this by examining a set of calopterygids whose copulatory mechanisms have been documented. Using the same morphometric analysis, I then propose the likely mechanisms in a set of calopterygids whose mechanisms are unknown." (Author) Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx
- 3400.** Cross, I. (2003): Tiger beetle predation on adult Common Hawker [sic!]. *Dragonfly News* 43: 33. (in English). [13-9-2002, Puddletown Forest, Dorset, UK; a teneral *Sympetrum striolatum* was drawn into the burrow of a larval Green Tiger Beetle (Coleoptera: Cicindelidae).] Address: not stated
- 3401.** Dana, D. (2003): Quite a few Southern Hawkers from a garden pond. *Dragonfly News* 43: 33. (in English). [Isle of Wight; detailed report on *Aeshna cyanea* in a garden pond including some remarks on emergence damages. "In fact last year a ♂ came into the lounge via the French doors, looked at the television, left and returned for another look."] Address: not stated
- 3402.** Darke, J.; Hayden, J. (2003): Reports from Coastal Stations - 2002: Skomer Island NNR, Pembrokeshire. *Atropos* 18: 68- (in English). [United Kingdom; Verbatim: "Six species of Odonata were recorded, the highlight being the first record of Banded Demoiselle *Calopteryx splendens* for the island on 15 September. Thirty-seven Migrant Hawker *Aeshna mixta* were recorded between 6 August and 14 October. There were also ten sightings of Emperor *Anax imperator* and nine of Common Darter *Sympetrum striolatum* between 1-23 September. Both of these species are known to breed on the island. Common Blue Damselfly *Enallagma cyathigerum* and Blue-tailed Damselfly *Ischnura elegans* were recorded again."] Address: not stated

- 3403.** Deussen, M.; Voigt, H.; Zinke, J. (2003): Gomphidenfunde an der Elbe im Dresdener Stadtgebiet (Odonata). *Entomologische Nachrichten und Berichte* 47 (1): 51-52 (in German) [Records of Gomphus vulgatissimus and Ophiogomphus cecilia along the River Elbe in the area of the town of Dresden, Saxony, Germany made in 2002, are documented. The habitats are described in detail.] Address: Voigt, H., Grundstr. 152, D-01324 Dresden, Germany
- 3404.** Dewick, S. (2003): Reports from Coastal Stations - 2002: Bradwell-on-Sea, Essex. *Atropos* 18: 59-61. (in English). [United Kingdom; a list of 19 odonate species is communicated including *Erythromma viridulum* and *Brachytron pratense*] Address: not stated
- 3405.** Donnelly, T.W. (2003): Problems with *Tetragoneuria*!. *Argia* 14(4): 10-11. (in English). [The author outlines the history of *Tetragoneuria* / *Epitheca* in USA. New records of "*Epitheca costalis*" in Ohio, cause the continuation of the current discussion on the taxonomic status of the taxa *E. cynosura* and *E. costalis*. There is a lot of intergradation between both taxa, and a solution of the problem seems not to be in sight.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 3406.** Ellenrieder, N. von; Muzón, J. (2003): Description of the last larval instar of *Aeshna* (*Marmaraeschna*) *pallipes* Fraser, 1947 (Anisoptera: Aeshnidae). *Odonatologica* 32(1): 95-98. (in English). ["The last larval instar is described and illustrated, based on reared specimens from Argentina (Salta and La Rioja provinces). The species differs from the only other *Marmaraeschna* larva known, *A. (M.) brevicercia*, by the antennae surpassing anterior margin of labrum, lateral spine of abdominal segment IX as long as segment X, and ♂ basal lamina of epiproct with rounded tip and half as long as epiproct. Both *pallipes* and *brevicercia* larvae differ from other *Aeshna* larvae by the U-shaped apical excision of epiproct and the marginal tubercles on sides of ligula medial cleft." (Authors)] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C. C. 712, AR-1900, La Plata, Argentina. E-mail: ellenr@iipla.edu.ar
- 3407.** Fleck, G. (2003): Contribution à la connaissance des Odonates de Guyane française. Les larves des genres *Argyrothemis* Ris, 1911 et *Oligoclada* Karsch, 1889 (Insecta, Odonata, Anisoptera, Libellulidae). *Ann. Naturhist. Museum Wien* 104B: 341-352. (in French, with German and English summaries). [Le Petit Saut, French Guyana; the larvae of *Argyrothemis argentea* Ris, 1911, *Oligoclada abbreviata* (RAMBUR, 1842), and *O. pachystigma* KARSCH, 1889 are described and illustrated. In Nov. 2001, both species of the genus *Oligoclada* were frequently found in artificial water reservoirs with strongly fluctuating water levels. The taxon *O. abbreviata* *limnophila* Machado & Machado, 1993 (*Odonatologica* 22: 479-486) is critically discussed.] Address: Fleck, G., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleck@mnhn.fr
- 3408.** Garner, P. (2003): An odd pair - Scarce Blue-tailed Damselfly. *Dragonfly news* 43: 34. (in English). ["We have just one breeding site for [...] *Ischnura pumilio* in Herefordshire. I first discovered the colony in 1999 confined to a small seepage in an abandoned area of Stretton Sugwas Gravel Pit, which is situated in the centre of the county, very close to the city of Hereford. On 2nd June 2002 [...]. I observed a most unusual mating attempt. A ♂ *Pyrrhosoma nymphula* grabbed an *aurantiaca* phase I. *pumilio* behind the neck with its anal claspers. Originally, I assumed The Large Red was attacking The Scarce Blue-tail, but it persisted and I quickly realised what was happening. The Scarce Blue-tail convulsed and wriggled, then paused and briefly kept quite still, then it fanatically twisted, arched itself and wriggled violently for almost a minute. The Large Red Damselfly hung on and after that there were several still periods [...], in between more twisting and wriggling. They remained united for about five minutes before the Large Red let go and flew off leaving the poor Scarce Blue-tail in a state of 'shock' on the stem of a spike-rush. [...]"] (Author)] Address: Peter Garner, West Malvern, Wares, UK
- 3409.** Harp, G.L. (2003): First records for the USA and Arkansas. *Argia* 14(4): 3-4. (in English). [2 Nov. 2000, Cypress National Preserve, *Triacanthagyna septima* was recorded for the first time in the USA. In addition, *Ischnura prognata* and *Nehalennia integricolis*, recorded at two different localities, were new for Arkansas.] Address: Harp, G.L., 3206 Maplewood Terrace, Jonesboro, AR, 72401, USA. E-mail: glharp@mail.as-tate.edu
- 3410.** Hedström, I.; Sahlén, G. (2003): An extended description of the larva of *Megaloprepus caerulatus* from Costa Rica (Odonata: Pseudostigmatidae). *International Journal of Odonatology* 6(1): 1-8: 23-31. (in English). ["The larva of *Megaloprepus caerulatus* is described and illustrated from specimens collected near the northern border of Barbilla National Park on the Costa Rican Caribbean slope. Habits and characters of larvae of three different size classes obtained from artificial tree holes permit the identification of small (body length 4 mm, excluding the caudal lamellae) larvae up to the final stadium. New diagnostic characters include the shape of the prementum and head." (Authors)] Address: Sahlén, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, S-752 36 Uppsala, Sweden. E-mail: goran.sahlen@zoologi.uu.se
- 3411.** Hepper, D. (Ed.) (2003): Spelling of *fonscolombi*. *Dragonfly news* 43: 35. (in English). [Documentation of contributions of different authors on the correct spelling of *Symepterus fonscolombii* according the rules of nomenclature.] Address: Hepper, D. (Ed.), 12 Three Stiles Road, Farnham, Surrey GU 9 7DE, UK. E-mail: David.Hepper@Local-Software.co.uk
- 3412.** Hernández, J.M.R. (2003): Odonata of the Sierra las Damas, Sancti-Spiritus Province, Cuba. *Argia* 14(4): 16-18. (in English). [In 2001, 27 odonate species were recorded. They are listed and briefly commented.] Address: Hernández, J.M.R., Apartado Postal 2004, Sancti-Spiritus, Cuba CP 60100
- 3413.** Hornung, J.P.; Rice, C.L. (2003): Odonata and wetland quality in southern Alberta, Canada: a preliminary study. *Odonatologica* 32(2): 119-129. (in English). [The study was realised in Brooks, from May until Sept. 1999. "Sixteen study sites were each visited 7 times to survey adult dragonflies and aquatic macroinvertebrates, record environmental parameters, collect water samples, record vegetative characteristics, and assess beef cattle grazing influences. 25 odonate species were

recorded, of which *Ischnura verticalis* is new to Alberta. A significant negative correlation was detected between cattle presence (measured as percent stems grazed surrounding the wetland) and odonate species richness ( $p = 0.022$ ;  $r^2 = 0.322$ ), teneral species richness ( $p = 0.018$ ;  $r^2 = 0.337$ ), and the Shannon-Weiner diversity indices ( $p = 0.060$ ;  $r^2 = 0.230$ ) of the study sites. In addition, vegetation species richness and odonate species richness show a positive correlation ( $p = 0.066$ ;  $r^2 = 0.221$ ). A logistic regression establishes that the absence of *Coenagrion angulatum*, *Enallagma ebrium*, and *Aeshna interrupta* is associated with high cattle impacts, or low vegetation species richness. This study outlines the effect that cattle can have on wetland odonate species diversity and recommends that measures are taken to protect wetlands, while offering an incentive and reasonable cost/benefit ratio to both rangeland and wetland managers." (Authors)] Address: Hornung, J.P., 751 General Services Building, University of Alberta, Edmonton, Alberta, T6G2H1, Canada

**3414.** Hunter, I. (2003): Reports from Coastal Stations - 2002: Elms Farm, Icklesham, East Sussex. *Atropos* 18: 55-56. (in English). [United Kingdom; Verbatim: "The Odonata highlight was the arrival of Small Red-eyed Damselfly *Erythromma viridulum*. They were first noticed on 10 August when seven were present. This rose to a maximum of 125, including 30 pairs, at the main site plus 10 at other sites on 19 August. The resultant close examination of all damselflies led to Red-eyed Damselfly *E. najas* being located and photographed for the first time on 18 August; it was recorded on four subsequent dates. Both Migrant Hawker *Aeshna mixta* and Common Darter *Sympetrum striolatum* were still being seen on suitable days in November."] Address: not stated

**3415.** Hutchings, G.E. (2003): A list of the Odonata of Athabasca sand dunes Provincial Wilderness Park, Saskatchewan. *Argia* 14(4): 4-8. (in English). [2500 odonate specimens, collected in August 2002, resulted in 22 species. "*Aeshna tuberculifera* is a very significant range extension for North America with previous records in Canada being from southern Ontario and the British Columbia / Alberta border in the southern Rocky Mountains."] Address: Hutchings, G.E., 971 Arundel Dr., Victoria, B.C., Canada, V9A-2C4. E-mail: sea-trek@islandnet.com

**3416.** Inoue, K. (2003): Report on the 1st Symposium of the S.I.O. Regional Office in east Asia (SIO-ROEA). *Notul. odonatol.* 6(1): 10-11. (in English). [The Symposium was held in the National Science Museum, Daejeon, Korea during 26-29 My 2002. 51 odonatologists from Belgium, China, Germany, Japan, Korea, Russia, and Taiwan have attended. Eleven oral presentations and three posters were presented.] Address: Inoue, K., 5-9 Fuminosato 4-chome, Abeno-ku, Osaka 545, Japan

**3417.** Johnson, A. (2003): Two new species for Iowa. *Argia* 14(4): 4-5. (in English). [July, 2002; Iowa, USA; *Somatochlora linearis*, *Libellula incesta*; in addition the rare *Sympetrum ambiguum* is dealt with.] Address: not stated

**3418.** Kamimura, Y. (2003): Effects of repeated mating and polyandry on the fecundity, fertility and maternal behaviour of ♀ earwigs, *Euborellia plebeja*. *Animal Behaviour* 65: 205-214. (in English). [I examined mul-

iple mating and its function in ♀ earwigs, *Euborellia plebeja* (Dermaptera: Ani-solabididae). Like other earwigs, ♀♀ of this species care for their eggs and intermittently lay eggs in clutches (iteroparity). Analysis of two polymorphic allozyme loci revealed that wild-caught adult ♀♀ laid clutches with low within-brood genetic relatedness (0.210), indicating that ♀♀ were promiscuous under natural conditions. Rearing experiments in the laboratory revealed that: (1) repeated mating with a single ♂ increased ♀ fecundity (number of clutches laid) and hence the number of hatchlings produced; (2) estimated sperm number was positively correlated with hatchability; (3) when frequency of mating was controlled, polyandry enhanced hatchability, although this effect was not statistically significant; (4) duration of maternal care varied for clutches with low hatchability, and -sometimes exceeded the mean interclutch interval. Thus, although a possible benefit of polyandry is suggested, the greater beneficial effect of repeated mating on ♀ fecundity can explain polyandrous mating in this species. Because ♀ earwigs invest considerable effort in brooding their clutches, it may be adaptive to suppress oviposition unless stored sperm ensures high fertility." (Author) The results are discussed stressing sperm removal behaviour of Odonata.] Address: Kamimura, Y., Laboratory of Animal Ecology, Dept of Biol., Tokyo Metropolitan Univ., Minamiosawa 1-1, Hachioji, Tokyo 192-0397, Japan. E-mail: kamimu@comp.metro-u.ac.jp

**3419.** Kano, K. (2003): Dragonflies reacted to rotating fans. *Boso no Konchu* 29: 40. (in Japanese). [Japan; *Matrona basilaris*, *Boyeria maclachlani*; a translation of the paper is published in *Digest of Japanese Odonatological Short Communications* 14] Address: Kano, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**3420.** Karjalainen, K.; Hämäläinen, M.; Hulden, L. (2003): *Aeshna mixta* funnen i Finland och annat intressant. *Nord. Odonatol. Soc. Newsl.* 8-9(1): 6-8. (in Swedish with English summary) ["*Aeshna mixta* found in Finland and other interesting records: Migrated individuals of *A. mixta* were recorded in Finland for the first time in August-September 2002. Confirmed observations are available from several sites along the southern coast of the country (in Porvoo, Helsinki, Espoo, Kirkkonummi and Pohja), most of them from bays of the sea. The nearest autochthonous populations of *A. mixta* occur in the Riga region in Latvia, and this area might be the source of the migration to Finland. Records made by Doppler weather radar show that large insects flew from Estonia towards Helsinki in many occasions at the end of July and the beginning of August, in afternoons when southeastern winds prevailed; these insects probably were migrating *A. mixta*. A population of *Nehalennia speciosa* was found in N: Tammisaari (Ekenäs); the previous Finnish record dates back to 1981. The new "provincial records" of Finnish dragonflies made since the 1997 update in *Nord. Odonatol. Soc. Newsl.* 3(1): 10-11 are listed." (Authors) These provincial records refer to *Coenagrion puella*, *Ischnura pumilio*, *Aeshna subarctica*, *A. viridis*, *Epithea bimaculata*, *Sympetrum sanguineum*, *Leucorrhinia pectoralis*, and *Libellula fulva*. Address: Karjalainen, S., Tyrskykuja 3 B 15, FIN-02320 Espoo, Finland. E-mail: sk@korento.net

**3421.** Knill-Jones, S. (2003): Reports from Coastal Stations - 2002: Isle of Wight. *Atropos* 18: 51-52. (in



English). [United Kingdom; Verbatim: "Single Red-veined Darter *Sympetrum fonscolombi* were seen at Wheelers Bay on 16 June and at Culver Cliff on 17 July. A Hairy Dragonfly *Brachytrichon pratense* was observed at Bouldnor Forest on 16 May and a Downy Emerald *Cordulia aenea* was seen on Elmsworth Farm Pond, Newtown, on 1 June. There are now seven new sites for Small Red-eyed Damselfly *Erythromma viridulum* and over 200 were seen on Sandown canoe lake in the summer."] Address: not stated

**3422.** Lagos, A.R.; Oliveira, C.H.P.; Gomes, V.S.M.; Alves, M.A.S. (2003): Predation on *Philaethria wernickei* (Röber) by *Anax concolor* Br. in Parque Nacional da Restinga de Jurubatiba, Rio de Janeiro, SE Brazil (Lepidoptera: Nymphalidae; Anisoptera: Aeshnidae). *Notul. odonatol.* 6(1): 11. (in English). [In March 2002, a ♀ *A. concolor* was noticed preying on the butterfly, *P. wernickei*. The dragonfly was seen eating the butterfly's head. After this, it flew off with its prey to a shrub, where, by the time the authors caught it, it had completely consumed the butterfly's head. *Philaethria* is considered as presumably unpalatable and/or aposematic. However, the possible unpalatability of *P. wernickei* apparently does not affect the voracious *A. concolor*, and the tropical kingbird, *Tyrannus melancholicus* (Vieillot) (Tyrannidae). Therefore, it seems the unpalatability of *Philaethria* spp. may not affect all predators.] Address: Alves, M.A.S., Ecologia, IBRAG, Universidade do Estado do Rio de Janeiro, Rua Sao Francisco Xavier 524, BR-20550-011 Rio de Janeiro, RJ, Brazil. E-mail: masa@uerj.br

**3423.** Machado, A.B.M. (2003): *Neoneura moorei* spec. nov. from the amazonian region of Brazil (Zygoptera: Protoneuridae). *Odonatologica* 32(1): 89-93. (in English). ["The new species is described and illustrated from 3 ♂♂ and 3 ♀♀ collected in the state of Rondonia, Brazil (holotype ♂, allotype ♀: Ji-Parana, II-1961, deposited in the author's collection). By the arrangement of the decumbent process of the dorsal branch of the superior appendages it belongs to the *N. maria*-group whose species had never been found in Brazil. It differs from the other species of this group by its color pattern, by the structure of the 6<sup>th</sup> superior appendages and shape of the ♀ posterior prothoracic lobe." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil

**3424.** Maezono, Y.; Miyashita, T. (2003): Community-level impacts induced by introduced largemouth bass and bluegill in farm ponds in Japan. *Biological Conservation* 109: 111-121. (in English). ["Largemouth bass *Micropterus salmoides* and bluegill *Lepomis macrochirus* have been introduced into many countries and have become cosmopolitan exotic species. However, only a few studies show their impact on introduced communities. To investigate their impact, we performed natural snapshot experiments in 15 farm ponds in Saitama prefecture, eastern Japan. We selected 10 and 5 small ponds in similar environmental conditions, but with and without exotics, respectively. The numbers of fish, crustaceans, and nymphal odonates were smaller in ponds where exotics were found and some species were considered to be locally extinct in several ponds. On the other hand, the numbers of benthic organisms, i.e. tadpoles, chironomids, chaoborids, and Oligochaeta

were more abundant in ponds with exotics. These two groups of organisms were separated clearly on the first axis of DCA, which indicates that this difference was mainly induced by bass predation. This result suggests a trophic cascade in which top-down effects induced by exotics propagated to fish, crustaceans, and nymphal odonates directly and to some benthic organisms indirectly. Therefore, when one is to conserve native organisms, attention should be paid not only to direct negative effects, but also to indirect effects propagating to various trophic levels. Because farm ponds are typical Japanese small lentic systems having rich biodiversities and bass and bluegill have been shown to change farm pond communities widely, conservational treatments including eradication of exotic fish should be conducted immediately." (Authors)] Address: Maezono, Y., Laboratory of Biodiversity Science, School of Agriculture and Life Sciences, The University of Tokyo, Tokyo 113-8657, Japan. E-mail: zephyrus@es.a.u-tokyo.ac.jp

**3425.** Malikova, E.I.; Ivanov, P.Yu (2003): The larva of *Shaogomphus schmidti* (Asahina, 1956) (Anisoptera: Gomphidae). *Odonatologica* 32(2): 165-169. (in English). [The exuviae from Primorye and the Amur Region, Russia is described, illustrated and compared with *S. postocularis epophthalmus* (Selys).] Address: Malikova, E.I.; Department of Zoology, Blagoveshchensk State Pedagogical University, Lenina Street 104, RUS-675000 Blagoveshchensk, Amurskaya oblast, Russia. E-mail: helen@amur.ru

**3426.** Manolis, T. (2003): *Dragonflies and Damselflies of California*. California Natural History Guides 72 (ISBN 0-520-23567-3). 201 pp. (in English). [A field guide has to introduce its subject to the reader. Thus, adult dragonfly anatomy, behaviour (feeding, antipredator, and reproduction behaviour, thermoregulation, dispersal), life cycles and larvae of dragonflies, family and subfamily key to dragonfly larvae, distribution (including a brief overview into Californian geographic regions), watching and identifying of dragonflies, taxonomy and nomenclature, "About the Maps", and family and subfamily key to adult dragonflies form the basement of this field guide on the first 36 pages. Species accounts refer to 108 odonate species known to occur in California (pages 39 -179): In a monographic style, each species is described in detail and compared with similar species. Its behaviour is briefly outlined, the habitat described, and the flight season given. In addition, the distribution is outlined in detail. A checklist of Californian Odonata, species of hypothetical occurrence, a glossary, references, and an index complete the book. The heart of the book are 40 plates of a breathtaking quality. They slightly resemble Dan Powell's plates in his book "Guide to the dragonflies of Great Britain", but they seem to be more precise in a scientific sense. Each species is illustrated, and details necessary to separate it from similar species are added on the plates. This book is a further addition to the (in most cases) excellent books on the North American Odonata currently published. My personal impression is, that it will be a precise and reliable tool to identify the Californian Odonata. I am fascinated from the artwork of Tim Manolis, and I can't stop thinking that the plates of the book should exist in an enlarged version for study rooms. My personal opinion is that Tim Manolis talent urgently should be used to prepare a new edition of Sid Dunkle's excellent book (*Dragonflies through binoculars*), which was disappointing in terms of the stamp like photo-

graphic illustrations. The book on Californian Odonata is priced 17,- US Dollar; this seems to me extremely good value compared with the quality of the book. (M. Schorr)] Address: University of California Press, Publicity Dept, 2120 Bekeley Way, Berkeley CA 94720, USA

**3427.** Mauffray, B. (2003): Georgia summary. *Argia* 14(4): 5- (in English). [Status report on odonatological activities in Georgia, USA. The contribution include addresses of three web sites, and a note on the discovery of *Gomphus adelphus* cf.] Address: Mauffray, B., 4525 N.W. 53rd Lane., Gainesville, FL 32653, USA. E-mail: [iori@afn.org](mailto:iori@afn.org)

**3428.** Moore, J. (2003): Norman Winfried Moore. *Odonatologica* 32(1): 9-18. (in English). [A biography of Dr N.W.Moore (born 24 Feb. 1923) emphasize on matters concerning the study of Odonata and nature conservational activities. His bibliography (1939-2002) comprises of app. 135 odonatological titles, but ca 45 papers on pesticides and environment are omitted.] Address: Moore, J., Department of Zoology, University of Cambridge, Downing Street. Cambridge, CB2 3EJ, United Kingdom

**3429.** Müller, Z.; Jakob, T.; Toth, A.; Devai, G.; Szalassy, N.; Kiss, B.; Horvath, R. (2003): Effect of sports fisherman activities on dragonfly assemblages on a Hungarian river floodplain. *Biodiversity and Conservation* 12(1): 167-179. (in English). ["We studied the dragonfly fauna along a 15 km stretch of the floodplain of the regulated, first-order river Tisza, Hungary. Data on captured and observed adults, larvae and exuvia were recorded. Observations were made from May to October 1998 and 1999 on 34 species, which is 52% of the Hungarian fauna. Classification on the basis of faunistic similarity revealed that habitat-level differences, associated with various degrees of physical anthropogenic impact on bank vegetation, can exceed variation among the water bodies of different types (backwater, pond, marsh, canal, river). The richest sites were dominated by structurally diverse macrophyte vegetation, while flowing waters (river and canal) were poorest in species. Odonata were found to be reliable indicators of small-scale habitat patterns, reflecting vegetation differences even within single water bodies where the sampling spots were arranged just a few hundred metres apart. Along a gradient of utilisation intensity, the species number of Odonata assemblages and the summed relative abundance of the five rarest species of the study area decreased linearly with increasing fragmentation of the marginal vegetation. Sports fisherman activities, implying disruption of the littoral marsh zone by establishment of clearings and excessive trampling of the banks, can also be monitored by dragonfly faunistic investigations. Our results demonstrate that conservation of these varied floodplain water bodies requires the control of sports fishing activity, suggesting that (i) to maintain the representative odonate fauna of the water bodies, some non-fragmented shores must be provided; and (ii) permanent fishing stands should not exceed 8 m mean width and should be separated by at least 12 m of intact riparian sections." (Authors)] Address: Müller, Z., Debrecen University, Department of Ecology, H-4010, Debrecen, Hungary. E-mail: [muller@tigris.klte.hu](mailto:muller@tigris.klte.hu)

**3430.** Muzlanov, Yu. A. (2003): The pattern of distribution of defects of wing venation in the Banded Agrion

(*Calopteryx splendens*). *Russian Journal of Developmental Biology* 34(1): 51-56. (in English). ["The distribution of morphological structures was studied in wings of *C. splendens* from different intrapopulation groups. Damselflies of odd years of emergence are characterized by a more stable pattern of ontogenetic processes according to the mean total number of venation defects. The sharply increased level of radiation in summer 1986, which coincided with the flight of damselflies, could have caused hereditary defects expressed in a sequence of generations of even years of emergence. Apparently, most alternative features of wing venation in damselflies can be considered as markers of stability of the ontogenetic processes, which reflect, to a great extent, genotypic features of the organisms in a population. A possible mechanism has been described, which explains the proposed topological model of formation of the venation defects of different types. The increase in mean frequencies of defects can suggest an enhanced development over the aberrant epigenetic trajectories, which may lead to the elimination of these organisms under the influence of various agents, i.e., to the stabilizing selection in a population. The results obtained suggest that defects of venation arise on the stochastic basis and their frequency increases upon destabilization of ontogenetic processes not only by the environmental factors, but also by genetic stress. Venation defects can be successfully used in population biomonitoring." (Author)] Address: Muzlanov, Yu. A., Zarevskii Secondary School, Zarya, Mikhailovskii raion, Ryazan oblast, 391728 Russia

**3431.** Nobes, G. (2003): Small Red Damselfly *Ceragrion tenellum* in Norfolk. *Atropos* 19: 75-76. (in English). [Verbatim: "[...] *C. tenellum* was first reported breeding in Norfolk on 3 August 1955 (Durrant 1960) when a small colony was found, including several pairs seen in copula, at Seaming Fen. However, Ken Durrant (pers. comm.) says that as far back as 1937 he knew of a colony of this species at this site, when it was present in large numbers for many years. This small Norfolk Wildlife Trust Reserve, near Dereham, is still the only known site in the county for this species and is apparently also the only extant one in East Anglia. In recent years sightings have continued in very small numbers, though in some years there have been no records and the long-term future of the colony has been in doubt. Thus it is heartening to report that a ♂ of this species was seen on 15 July 2002 flying around the small Sphagnum moss pools where it breeds [...]."] Address: Nobes, G., Springside, Carbrooke, Thetford, Norfolk, IP25 6SQ, UK

**3432.** Nobes, G. (2003): Southern Emerald Damselfly *Lestes barbarus* (Fabr.) - The first British record. *Atropos* 18: 3-6. (in English). [On 30/07 and 7/08/2002, *L. barbarus* was recorded at Winterton Dunes, Norfolk, UK. This first mainland record for UK is documented in detail. A comment of Adrian Parr is added.] Address: Nobes, G., Springside, Carbrooke, Thetford, Norfolk, IP25 6SQ, UK

**3433.** O'Brien, M.; Bright, E.; Kielbaso, M.A. (2003): The Odonata of the Huron Mountains, Marquette Co., Michigan. *Bulletin of American Odonatology*: 1-22. (in English). [The Odonata fauna of the Huron Mountains - 26 localities were visited - was surveyed during 1996 - 2002. This survey, combined with specimens from earlier collectors resulted in a total of 79 species known

from the area, which is nearly half of Michigan's known Odonata species. In addition, 9 species are new records for Marquette County. Each of the species is briefly commented (habitat, habits), the records are documented locally wise.] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

**3434.** Odin, N. (2003): Reports from Coastal Stations - 2002: Landguard Bird Observatory, Suffolk. *Atropos* 18: 61-62. (in English). [United Kingdom; *Aeshna mixta*, *Sympetrum striolatum*] Address: not stated

**3435.** Padeffke, T.; Suhling, F. (2002): Temporal priority and intra-guild predation in temporary waters: an experimental study using Namibian desert dragonflies. *Ecological Entomology* 28(3): 340-347. (in English) ["1. Intra-guild predation between early larval instars of two co-existing dragonflies, *Sympetrum fonscolombii* and *Trithemis kirbyi*, was investigated with respect to temporal advantage and growth. Three situations were simulated experimentally: (1) *Sympetrum fonscolombii* began development 11 days before *T. kirbyi*. (2) *Trithemis kirbyi* began development 11 days before *S. fonscolombii*. (3) Both species began on the same day. 2. With a temporal advantage of 11 days to the second species, the resulting larval density of the respective first species was significantly higher than that of the second species. 3. Without a temporal advantage, the survival of *S. fonscolombii* was higher than that of *T. kirbyi*, and *S. fonscolombii* had a larger size due to faster growth than *T. kirbyi*. Hence, it is assumed that survival depended on early oviposition as well as on larval growth. 4. To test the relevance of the laboratory results, observations at artificial ponds in the Namibian semi-desert were conducted. *Trithemis kirbyi* was the first species colonising these ponds while *S. fonscolombii* arrived 15 days later. In field samples, many more *Trithemis* larvae than *Sympetrum* larvae were found, a pattern similar to the laboratory experiments in which *T. kirbyi* enjoyed a temporal advantage." (Authors) Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**3436.** Parfitt, A. (2003): Reports from Coastal Stations - 2002: Minsmere RSPB Nature Reserve, Suffolk. *Atropos* 18: 62. (in English). [*Erythromma viridulum*, *Calopteryx splendens*, *Sympetrum fonscolombii*, *S. striolatum*] Address: not stated

**3437.** Parr, A. (2003): First & last dates 2002. *Dragonfly News* 43: 24-25. (in English). [Phenological data of numerous species in Great Britain are documented.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

**3438.** Parr, A. (2003): Migrant dragonflies in 2002 including recent decisions and comments by The Odonata Record Committee. *Atropos* 18: 18-24. (in English). [Of special interest is the first record of *Lestes barbarus* on the mainland of UK. Brief comments on *Ischnura pumilio*, *Erythromma viridulum*, *Aeshna mixta*, *Anax parthenope*, *Crocothemis erythraea*, and *Sympetrum fonscolombii* are made. A sighting of *Epithecina bimaculata* was not accepted by the Records committee.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

**3439.** Parr, A. (2003): Migrants & vagrants 2002. *Dragonfly News* 43: 22-23. (in English). [Information identical with OAS 3424] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

**3440.** Parr, A. (2003): Odonata Records Committee Update. *Atropos* 19: 73. (in English). [Verbatim: "Since the last issue of *Atropos* the following record has been formally accepted: Lesser Emperor *Anax parthenope* ♂ near Netherfield, Nottinghamshire, on 16 July 2002 (R. Woodward). This is the third record in five years from a small area of Nottinghamshire centred loosely on the National Water Sports Centre. In Britain 'repeat' sightings of Lesser Emperor are generally from key coastal sites such as Dungeness, Kent, though on the near Continent other favoured inland localities are known. At present there is no evidence of breeding, but with its great expanses of open water this particular region does seem attractive to the species."] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**3441.** Parr, M.J. (2003): Evelyn D.V. Prendergast (1918-2001). *International Journal of Odonatology* 6(1): 95-98. (in English). [obituary] Address: Parr, M., Little Island, Stembidge, Martock, Somerset TA12 6BW, UK. e-mail: mmc3@parr37.freeseerve.co.uk

**3442.** Paulson, D. (2003): Comments on the *Erythrodiplax connata* (Burmeister, 1839) group, with the elevation of *E. fusca* (Rambur, 1842), *E. minuscula* (Rambur, 1842), and *E. basifusca* (Calvert, 1895) to full species (Anisoptera: Libellulidae). *Bull. American Odonatology* 6(4): 101-110. (in English). ["The *E. connata* group is revised, based on examination of 855 specimens. *E. connata* of Borror (1942) is divided into four species: *E. connata* (Burmeister, 1839), *E. fusca* (Rambur, 1842), *E. minuscula* (Rambur, 1842), and *E. basifusca* (Calvert, 1895). *E. fusca* and *E. minuscula* had been previously considered subspecies of *E. connata*, while *E. basifusca* is resurrected for northern populations of *E. connata*. The remaining species of Borror's *connata* group - *E. abjecta* (Rambur, 1842), *E. atroterminata* Ris, 1911, *E. cauca* Borror, 1942, *E. cleopatra* Ris, 1911, *E. ines* Ris, 1911, *E. justiniana* (Selys, 1857), *E. media* Borror, 1942, *E. melanorubra* Borror, 1942, and *E. paraguayensis* (Förster, 1905) - are considered valid, with the addition of *E. bromeliicola* Westfall, 2000. A population in the Andes of Argentina is similar to *E. fusca* but is possibly specifically distinct. *Diplax portoricana* Kolbe, 1888, is probably a synonym of *E. justiniana* rather than *E. connata*, and *Diplax fraternata* Hagen, 1873, is considered a nomen nudum rather than a synonym of *E. connata*." (Author)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**3443.** Paulson, D. (2003): Flame-tailed Pondhawk common name for *Erythemis peruviana*. *Argia* 14(4): 22- (in English). [The first USA record of this species in Texas in 2001, makes it necessary to proclaim a common name of *E. peruviana*: Flame-tailed Pondhawk] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**3444.** Paulson, D. (2003): Where to go on your next dragonfly trip. *Argia* 14(4): 20-21. (in English). [D. Paulson presents a map of the counties in USA with less



than 10 species of Odonata recorded.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**3445.** Paulson, D.R. (2003): *Teinobasis budeni* sp. nov. from Pohnpei, Eastern Caroline Islands, Micronesia (Odonata: Coenagrionidae). *International Journal of Odonatology* 6(1): 33-37. (in English). ["*T. budeni* sp. nov. is described from Pohnpei, Federated States of Micronesia. Holotype ♂: Micronesia, Pohnpei, Sokehs, Nanpil River headwaters, 01 July 2001; allotype ♀: same locality, 03 February 2001, both leg. D.W. Buden; to be deposited in FSCA, Gainesville, FL, USA. The new species belongs in the Fortis-group and differs from all species in that group by characters of the ♂ appendages, ♀ ovipositor, hind prothoracic lobe, and coloration of immatures." (Author)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**3446.** Paulson, D.R.; Buden, D.W. (2003): The Odonata of Pohnpei, Eastern Caroline Islands, Micronesia. *International Journal of Odonatology* 6(1): 39-64. (in English). ["A collection of 448 Odonata specimens made on Pohnpei, Caroline Islands, Micronesia, in 2001-2002 allows a reassessment of the fauna of this small, isolated island. There are 15 species, including six species of the zygopteran genus *Teinobasis*, which apparently speciated in situ, an unusually great diversity for such a small island. One of these species was undescribed. A revised key to the *Teinobasis* of Pohnpei is included, the larvae of three species of *Teinobasis* are compared, and the ♀♀ of *T. aerides* and *Pacificothemis esakii* are described for the first time. The three odonate species represented by adequate series, *T. ariel*, *T. fortis*, and *Hemicordulia haluco*, appear to increase in body size with elevation. The island still has all of its natural habitats, although native upland forests continue to decrease as more land is cleared for agriculture. All of the odonate species seem secure at this time, although *T. nigrolutea* appears to be less common now than in the past." (Authors)] Address: Buden, D.W., Division of Natural Sciences and Mathematics, College of Micronesia-FSM, P.O. Box 159, Kolonia, Pohnpei FM 96941, Micronesia. E-mail: donbuden@comfsm.fm

**3447.** Peters, G. (2003): Buchbesprechungen: Harald Heidemann & Richard Seidenbusch (2002): *Die Libellen Deutschland. Reihe: Die Tierwelt Deutschlands und der angrenzenden Meeresteile ("Dahl-Reihe")*, Teil (Odonata II). Goecke & Evers, Keltern. ISBN 3-931374-07-6. *Entomologische Nachrichten und Berichte* 47(1): 241-242. (in German) [Review of the publication abstracted in OAS No. 2957] Address: Peters, G., Museum für Naturkunde, Institut für Systematische Zoologie, Invalidenstr. 43, D-10115 Berlin, Germany. E-mail: thekla.kauffmann@rz.hu-berlin.de

**3448.** Peterson, M. (2003): WDA:s andra internationella symposium om Odonatologi. *Nord. Odonatol. Soc. Newsl.* 8-9(1): 4-5. (in Swedish with English summary) [Brief and personal report on the WDA symposium held in Gällivare, Sweden in 2001. Some emphasis is given to the (unsuccessful) attempt to trace *Somatochlora sahlbergi*. Address: Peterson, M.; Åbymovägen 35, S-616 30 Åby, Sweden. E-mail: martin.peterson@mbox391.swipnet.se

**3449.** Peterson, M. (2003): Samtliga svenska Leucorrhiniarter representerade i en enda lokal. *Nord. Odo-*

*natol. Soc. Newsl.* 8-9(1): 10. (in Swedish with English summary title) [All five Swedish *Leucorrhinia* species found in the same small lake in western Sweden: *L. albifrons*, *L. caudalis*, *Leucorrhinia dubia*, *Leucorrhinia rubicunda*, and *L. pectoralis* were found at Lillesjön, ca. 60 km north of Göteborg, Sweden.] Address: Peterson, M. Åbymovägen 35, S-616 30 Åby, Sweden. E-mail: martin.peterson@mbox391.swipnet.se

**3450.** Peterson, M. (2003) Trollsändan i nordisk folketro. *Nord. Odonatol. Soc. Newsl.* 8-9(1): 11-12. (in Swedish with English summary) ["The dragonfly in Nordic folklore: There are many myths around the dragonfly in the folklore all over the world. The Nordic countries are no exemption. Many local names for Dragonfly are very interesting and a lot of similarities are found between the Nordic dragonfly folklore." (Author)] Address: Peterson, M.; Åbymovägen 35, S-616 30 Åby, Sweden. E-mail: martin.peterson@mbox391.swipnet.se

**3451.** Pietsch, T. (2003): Nachweis der Grünen Flußjungfer, Keiljungfer (*Ophiogomphus cecilia* Fourcroy, 1785) im südlichen Sachsen-Anhalt im NSG "Forst Bibra" (Burgenlandkreis. *Entomol. Mitt. Sachsen-Anhalt* 11(1): 3-6. (in German). [Bad Bibra, Sachsen-Anhalt, Germany; on 3 July 2002, a specimen of *O. cecilia* was found away from running waters on a wind sheltered meadow (*Bromion erecti*).] Address: Pietsch, T., Friedrich-List-Str. 25, D-06110 Halle/Saale, Germany. E-mail: saale-unstrut@t-online.de

**3452.** Prather, B.; Prather, I. (2003): First Colorado record of *Celithemis elisa*. *Argia* 14(4): 3. (in English). [17 July, 2001, 18 June, 2002, 20 July, 2002, Boulder County, and 18 June, 2002, Longan County, USA] Address: not stated

**3453.** Purse, B.V.; Thompson, D.J. (2003): Reproductive morphology and behaviour in *Coenagrion mercuriale* (Charpentier) (Zygoptera: Coenagrionidae). *Odonatologica* 32(1): 29-37. (in English). ["The reproductive morphology and behaviour of ♂ and ♀ at the northern edge of the species range, in Britain are described. Copula duration was relatively short and occurred in tussocks around the stream and oviposition usually occurred in tandem. Although there was no significant relationship between body size and clutch size, large clutches were only found in the largest individuals and larger ♀♀ produced larger, and thus better-provisioned eggs. Examination of the dimensions of the aedeagus and the ♀ sperm storage organs revealed that ♂♂ could remove rival sperm from both the bursa copulatrix and spermatheca consistent with the presence of extensive proximally oriented microspination with sperm masses on the surface of the aedeagi. ♀ store sperm from previous matings and a few partition clutches between consecutive oviposition episodes. The fulfilment of these ecological and behavioural pre-requisites and the predominance of mate guarding during oviposition suggests that sperm competition by sperm displacement is prevalent in this species and constitutes a substantial selection pressure." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**3454.** Rehn, A.C. (2003): *Oligoclada teretidentis* spec. nov. from eastern Ecuador (Anisoptera: Libellulidae). *Odonatologica* 32(2): 171-175. (in English). ["The

new sp. is described and illustrated (holotype ♂ allotype ♀: Ecuador, Orellana prov., forested shore of oxbow lagoon near Rio Tiputini, approximately 1 km. NW of Biological Research Station, Parque Nacional Yasuni, II-X-2001; deposited in UMMZ, Ann Arbor, MI, USA). Species is peculiar in having a large yellowish patch on the ventral mesepisternum and by discrete lateral bands of pruinosity on synthorax (these bands yellow in ♀♀) and, in the ♂, by the ventral, rounded tooth at 1/2 length of cercus." (Author)] Address: Rehn, A.C., 2817 G Street Apartment 1, Sacramento, California 95816, USA

**3455.** Reinhardt, K. (2003): Aspects of the reproductive behaviour and physiology in three north American Gomphidae species (Anisoptera). *Notul. odonatol.* 6(1): 4-8. (in English). ["Field and laboratory observations on the reproduction of *Gomphus externus*, *G. graslinellus*, and *Progomphus obscurus* are presented from Illinois, United States. Mating of *G. externus* in the field took 12 min. 2 phases were distinguished, the first consisted of tapping movements of the ♂ hamulus, the second of pumping movements of the ♀ abdomen. The ovary yielded 5100 eggs of which 690 were laid during hand-held oviposition in the laboratory. Only eggs laid by the ♀ but not the ones dissected from the ovary developed a sticky jelly coat around themselves. Eyespots of developing embryos were visible after 13 days. This ♀ had stored approximately 200 thousand sperm (about 160 bundles) in her spermatheca. The sperm were still mobile 3 days after mating. A comparison of the penis horn length and the length of the spermathecal tubes revealed that ♂♂ cannot reach the end of the spermathecal tubes. A *G. graslinellus* ♀ was observed to employ the dipping mode of oviposition. After oviposition she had approximately 1 million sperm remaining. ♀♀ of both species showed no muscle contraction response when the cerci were touched with water, but responses to water differed between the 2 ♀ on segments 9 and 10. ♂ *P. obscurus* perched on the sandy ground along the bank without territorial behaviour though ♂♂ were observed to follow other ♂♂. The penis morphology of *P. obscurus* was similar to members of the genus *Gomphus*.] Address: Reinhardt, K., Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: bgykr@leeds.ac.uk

**3456.** Relyea, R.A.; Hoverman, J.T. (2003): The impact of larval predators and competitors on the morphology and fitness of juvenile treefrogs. *Oecologia* 134: 596-604. (in English). ["Studies of phenotypic plasticity typically focus on traits in single ontogenetic stages. However, plastic responses can be induced in multiple ontogenetic stages and traits induced early in ontogeny may have lasting effects. We examined how gray treefrog larvae altered their morphology in four different larval environments and whether different larval environments affected the survival, growth, development, and morphology of juvenile frogs at metamorphosis. We then reared these juveniles in terrestrial environments under high and low intraspecific competition to determine whether the initial differences in traits at metamorphosis affected subsequent survival and growth, whether the initial- phenotypic differences converged over time, and whether competition in the terrestrial environment induced further phenotypic changes. Larval and juvenile environments both affected treefrog traits. Larval predators - *Anax*. sp. - induced relatively deep tail fins and short bodies, but there was no impact on

larval development. In contrast, larval competitors induced relatively short tails and long bodies, reduced larval growth, and slowed larval development. At metamorphosis, larval predators had no effect on juvenile growth or relative morphology while larval competitors produced juveniles that were smaller and possessed relatively shorter limbs and shorter bodies. After 1 month of terrestrial competition among the juvenile frogs, the initial differences in juvenile morphology did not converge. There were no differences in growth due to larval treatment but there were differences in survival. Individuals that experienced low competition as tadpoles experienced near perfect survival as juvenile frogs but individuals that experienced high competition as tadpoles suffered an 18% decrease in survival as juvenile frogs. There were also morphological responses to juvenile competition, but these changes appear to be due, at least in part, to allometric effects. Collectively, these results demonstrate that larval environments can have profound impacts on the traits and fitness of organisms later in ontogeny." (Authors)] Address: Relyea, R.A. & J.T. Hoverman, Department of Biological Sciences, University of Pittsburgh, Pittsburgh, PA, 15260 USA. E-mail: relyea@pitt.edu

**3457.** Sadler, D. (2003): Water rail predating dragonflies. *Dragonfly News* 43: 33. (in English). [9-X-2002, Pagham Harbour, West Sussex, UK; *Rallus aquaticus* (Aves) preyed successfully on *Aeshna mixta* and *Sympetrum striolatum* roosting on branches by jumping vertically toward the dragonflies.] Address: not stated

**3458.** Sahlén, G. (2003): Nordisk Odonata møde 28-30 juni 2002 vid Gadevang, Sjælland, Danmark. *Nord. Odonatol. Soc. Newsl.* 8-9(1): 13-17. (in Swedish with English summary) [Some personal reflections and memories from the 2002 Nordic Odonatological Society meeting in Gadevang, Denmark: The paper includes some photographs of the participants and *Libellula fulva*, and a list of the 24 odonate species collected at 10 localities. Of special interest are records of *Nehalennia speciosa* and *Leucorrhinia pectoralis*. Address: Sahlén, G., Höskolan i Halmstad, SET, Box 823, SE-301 18 Halmstad. E-mail: goran.sahlen@set.hh.se

**3459.** Samraoui, B.; Weekers, P.H.H.; Dumont, H.J. (2003): Two taxa within the north African *Lestes virens* complex (Zygoptera: Lestidae). *Odonatologica* 32(2): 131-142. (in English). ["A study of *Lestes "virens"* in Algeria, based on SEM, size analysis, and molecular analysis of nuclear ribosomal DNA genes (18S, 5.8S) and spacers (ITS1 and 2), reveals the presence of two taxa that can be separated by the length and sequence of their ITS1 and their adult coloration, but not by molecular features in their 18S and 5.8S genes, the ITS2 spacer, and morphology. This contrasts with the *Enallagma cyathigerum*-gro, where geographically defined morphological differences were unaccompanied by differences in ITS1 and ITS2. Previous ecological data had shown the first lestid to be a summer, and the second an autumnal reproducer. The red autumnal species is here named *Lestes numidicus* sp. n. (holotype ♂, allotype ♀: Algeria, Lac des Oiseaux, X-1993; deposited in IRSN, Brussels); the status of the green summer species is discussed. It probably corresponds to *L. virens*, but this is likely to be a hybrid taxon, resulting from the postglacial introgression of *L. numidicus* with a taxon invading from the East, via the Iberian Peninsula.

*L. virens vestalis* from France is likely to be introgressed as well. In case this hypothesis is confirmed, the first junior synonym available, *L. marikovskii* (Belyshev) from Kazakhstan, applies to the taxon extending from Kazakhstan-Tajikistan to Central Europe." (Authors)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

**3460.** Samways, M.J. (2003): Conservation of an endemic odonate fauna in the Seychelles Archipelago. *Odonatologica* 32(2): 177-182. (in English). ["The odonate species richness of the granitic islands of Seychelles, a biodiversity hotspot, is significantly correlated to island size. The larger islands also have the highest elevations and hence the most streams from cloud catching as well as from downpours. The Seychelles odonate fauna can be divided into 2 groups: (1) endemic species, and, (2) geographically--widespread eurytopic, vagile species. The endemic species are elevational fugitives that need high-elevation forest cover, even if secondary. They are remarkably tolerant of temporary drying out of streams. In contrast, the widespread species occur at low elevations, are pool species, and are tolerant of removal of forest cover. They emigrate when the pools dry out. Conservation of the endemic taxa depends on maintaining cloud-catching forest, although evidence suggests that their populations are maintained even where the forest is partly alien invasive trees or secondary regrowth.] Address: Samways, M.J., Department of Conservation Ecology and Entomology, University of Stellenbosch, Private Bag XI, Matieland 7602, South Africa. E-mail: samways@sun.ac.za

**3461.** Samways, M.J. (2003): Threats to the tropical island dragonfly fauna (Odonata) of Mayotte, Comoro archipelago. *Biodiversity and Conservation* 12(9): 1785-1792 (in English) "The dragonfly fauna of the 374 km<sup>2</sup> island of Mayotte in the western Indian Ocean comprises some widespread African species and some Comoro endemics, and is a biodiversity hotspot. This dragonfly assemblage is under threat from increasing human impact as it creeps up the water courses from the periphery of the island towards the centre. Among these impacts are indigenous tree removal and replacement growth by alien vegetation. An even greater impact and threat is detergent input into streams. The intensity of this impact is so great that the streams and rocks become white. To date, although often the wings and bodies of odonates become stained white with detergent, the dragonfly assemblage appears remarkably tolerant of this impact. However, there is differential impact, with loss of island endemic species in the most impacted areas. In contrast, the geographically widespread and eurytopic species continue to thrive in these impacted areas, at least in the short term. It is urgent to change people's water-usage behaviour, both for their benefit and for the endemic dragonfly assemblage." (Author) Address: Samways M.J., Invertebrate Conservation Research Centre, Dept Zool. & Entomol., University of Natal, P/Bag X01, Scottsville 3209, Pietermaritzburg, South Africa. E-mail: samways@un.ac.za

**3462.** Sasamoto, A. (2003): Aberrant wing colouration in a *Neurothemis fluctuans* (Fabr.) ♂ (Anisoptera: Libellulidae). *Notul. odonotol.* 6(1): 12. (in English). [The brown wing markings in the ♂ are one of the distinctive features of the wide spread Asian *N. fluctuans*. The brown area in the forewing extends from wing base to

close to pterostigma, whereas in the hindwing, at the costal side it reaches almost the same level as in the forewing, but at the margin it bends towards the wing base. In immature stage the spots are pale yellowish, becoming gradually darker with maturity. In the ♀, the wing colouration is variable: from almost colourless to such resembling the ♂. On May 2, 2001, the author captured an aberrantly coloured ♂ at Pondok Tanjung, Perak, in peninsular Malaysia. Its forewing is similar to a typical ♂, but the hindwing colouration is much different. Only 2 or 3 costal cells are patchy brown, the remaining area of the standard spot being pale yellow. The colouration is symmetrical in both wings. Specimens with "normal" and aberrant wing colouration are figured.] Address: Sasamoto, A., 190-4 Yakuoji Tawaramoto-cho, Shiki-gun, Nara pref., 636-0341, Japan

**3463.** Schmidt, E. (2003): Die Torf-Mosaikjungfer *Aeshna juncea* (L., 1758) (Odonata, Aeshnidae) an Tontümpeln und an Gartenteichen im West-Münsterland und in Essen, ein ökologisches Rätsel. *Verh. Westd. Entomol. Tagung 2001*: 75-80. (in German). [Discussion of records of *A. juncea* at "atypical" habitats (clay pits, garden ponds). These habitats are compared with the typical habitats of the species in the region (transition mires, bogs). Proximate factors seem to be the structure of the vegetation, the ultimate factor may be the microclimate.] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**3464.** Scott, D.A. (2003): Reports from Coastal Stations - 2002: Dursey Island, Co. Cork. *Atropos* 18: 68-69. (in English). [United Kingdom; *Sympetrum striolatum*] Address: not stated

**3465.** Sibley, F. (2003): 60 species in 60 ponds. *Argia* 14(4): 11-16. (in English). [Schuyler and Tempkins County, New York, USA; the paper focusses on locality / habitat frequency of the species, and discusses a lot of factors which could be responsible for species distribution.] Address: Sibley, F.C., 25 Shirley Street, Naugatuck, CT, 06770, USA. E-mail: fcs@george.peabody.yale.edu

**3466.** Spence, B. (2003): Reports from Coastal Stations - 2002: The Spurn Area, East Yorkshire. *Atropos* 18: 64-65. (in English). [United Kingdom; *Aeshna cyanea*, *Libellula depressa*, *Sympetrum fonscolombii*] Address: not stated

**3467.** Srygley, R.B. (2003): Wind drift compensation in migrating dragonflies *Pantala* (Odonata: Libellulidae). *Journal of Insect Behavior* 6(2): 217-232. (in English) ["Tailwind drift compensation serves to maximize a migrant's flight distance on a given amount of energy, and crosswind drift compensation serves to hold a course true and minimize the distance flown. With full or part compensation, airspeeds are predicted to increase with greater crosswind drift. To test whether migrating dragonflies compensated for wind drift, I measured the velocity and heading of *Pantala hymenaea* and *P. flavescens* in natural flight over a lake and the ambient wind speed and direction. *P. hymenaea* flew north-easterly (58°), whereas *P. flavescens* flew significantly more east-north easterly (74°) throughout the day. *Pantala* spp. demonstrated part compensation for changes in crosswind drift within individuals (mean compensation = 54%, P = 0.0000), evidence for use of a ground reference to correct for drift when flying over water. Among individuals, *P. flavescens* compensated for crosswind



drift. P. hymenaea overcompensated and then drifted downwind on one morning and compensated for cross-wind drift on the next. As predicted from optimal migration theory, airspeed (5.0 m/s for both species with no tailwind) decreased with tailwind velocity both among individuals (data for both species pooled [n = 19], P < 0.0001) and within each individual as it crossed the lake (P = 0.0016)." (Author) Address: Srygley, R.B., Dept of Zool., University of Oxford, South Parks Road, Oxford OX 1 3PS, UK; bob.srygley /@zoo/ogy. oxford, ac. uk

**3468.** Sykes, T. (2003): Reports from Coastal Stations - 2002: Gibraltar Point, Lincolnshire. *Atropos* 18: 64. (in English). [United Kingdom; *Aeshna mixta*, *Sympetrum fonacolumbii*] Address: not stated

**3469.** Szállassy, N.; Bárdosi, E.; Szabó, Z.D.; Szép, T.; Dévai, G. (2003): Fluctuating asymmetry, survival and mating success in ♂ *Libellula fulva* Müller (Anisoptera: Libellulidae). *Odonatologica* 32(2): 143-151. (in English). ["The studies were conducted at Kutas canal near Ártánd, Hungary. In order to reveal whether there is any relationship between wing fluctuating asymmetry and mating success in mated (observed at least once in wheel position) and solitary ♂♂ (not involved in pairing during the study period), 106 ♂♂ were marked and their wing length between arculus and pterostigma measured. Mated ♂♂ had more symmetrical forewings, but in the case of hindwings there were no differences between solitary and mated individuals. The survival rate did not differ between the 2 groups and it was constant over time. The probability of recapture was higher in mated ♂♂ and varied with time. The number of hours spent with observation did not explain the variation in the recapture rate." (Authors)] Address: Szállassy, N., Department of Ecology and Hydrobiology, University of Debrecen, Egyetem tér 1, HU-4032 Debrecen, Hungary. E-mail: szallassy@tigris.klte.hu

**3470.** Szállassy, N.; Bárdosi, E.; Zoltán, S.D.; Tibor, S.; Dévai, G. (2002): Fluctuating asymmetry, survival and mating success in males of dragonfly *Orthetrum coerulescens* (Odonata: Libellulidae). *Hidrológiai Közlemény* 82: 125-127. (in Hungarian, with English summary) [The studies were conducted in a population along a slow flowing creek. Survival rate of unpaired ♂♂ differed significantly from that of paired ones on the first 2 days after marking; in both paired and unpaired ♂♂ it became constant later. Recapture rate differed in the 2 groups and changed in time. Neither the forewings nor the hindwings differed significantly in their fluctuating asymmetry values between the paired and the unpaired ♂♂.] Address: Szállassy, N., Dept Ecol. Hydrobiology, Univ. of Debrecen, Egyetem tér 1, HU-4032 Debrecen, Hungary. E-mail: szallassy@tigris.klte.hu

**3471.** Tagg, D. (2003): Raising *Brachytron* Larvae. *Dragonfly news* 43: 34. (in English). ["In May 1999 a ♀ *Brachytron* was ovipositing in the small pond at Sparr Rough nr Wisborough Green. She seemed to lay exclusively into dead soggy stems of the rush *Juncus effuses*, laying ar or just below the water surface. In one stem she appeared to have deposited at least 8 eggs. I took this home and kept it in a jar of water and in fact 19 larvae hatched out 3 weeks later, all neatly synchronised on the same day. They were given plenty of *Daphnia* and *Cyclops*, but within a month, although tiny and delicate-looking, they started eating each other in the traditional dragonfly manner! I returned some to the

pond and concentrated on keeping four individuals. Two died for no apparent reason in the winter of 2001/2001 but the other two flourished and grew on schedule for hatching in May 2001. In April one killed and ate the other, although they were of a similar age and until then had avoided one another. They had eaten aquatic worms, Chironomid larvae and damselfly nymphs. Water Hoglouse were also taken but usually tackled when the *Asellus* were moulting. *Brachytron* larvae are much more sluggish than *Aeshna* larvae, clinging to the same piece of weed or debris and hardly moving for days at a time. They cling tightly to a finger if fished out of the water." (Author)] Address: Don Tagg, Farnham, Surrey, UK

**3472.** Taylor, P. (2003): Dragonfly conservation from the BDS. *Atropos* 18: 35-36. (in English). [This is a brief history of the British Dragonfly Society and its objectives with special reference on conservation activities.] Address: Taylor, Pam, Decoy Farm, Decoy Rd, Potter Heigham, Norfolk, NR29 5LX, UK

**3473.** Tol, J. van.; Müller, R. (2003): Forest damselflies of the Philippines, their evolution and present status, with the description of *Drepanosticta moorei* spec. nov. from Luzon (Zygoptera: Platystictidae). *Odonatologica* 32(1): 39-45. (in English). ["*D. moorei* sp. n. (holotype ♂: Philippines, Luzon, Nueva Viscaya. Sta Fe, Atbo River, 550-800 m, 10-VI-1991, in RMNH) is described, and illustrated. It is closely related to *D. belyshevi* Hämäläinen from the Philippines. Some general remarks on the historical biogeography and the present status of the family are made. The current distribution of the family (SE Asia. Middle and northern South America) presumably dates back to the Upper Cretaceous." (Authors)] Address: Tol, J. van, National Museum of Natural History, P.O. Box 9517, NL-2300 RA Leiden, The Netherlands. E-mail: tol@nmm.nl

**3474.** Troake, P. (2003): Reports from Coastal Station - 2001: Rye Harbour SSSI, East Sussex. *Atropos* 18: 54-55. (in English). [UK; *Brachytron pratense*, *Sympetrum striolatum*, *Aeshna mixta*] Address: not stated

**3475.** Tunmore, M. (2003): Reports from Coastal Stations - 2002: The Lizard, Cornwall. *Atropos* 18: 48-49. (in English). [Verbatim: "It was not a notable year for Odonata. Twelve Red-veined Darter *Sympetrum fonscolombei* were recorded at Predannack on 4 June, including a pair in cop; numbers increased to 30 there on 27 June and a ragged individual was seen on 3 August. At another site on Goonhilly Downs two were seen on 23 June. Late examples of Emperor *Anax imperator* and Golden-ringed Dragonfly *Cordulegaster boltonii* were seen on 17 and 28 October respectively."] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK

**3476.** Vick, G.S. (2003): Notes on the genus *Notogomphus* Selys, 1858 in Cameroon with the description of two new species (Anisoptera: Gomphidae). *Odonatologica* 32(1): 47-60. (in English). ["Twelve *Notogomphus* specimens from Cameroon were available for analysis. Previously only *N. spinosus* Karsch was known from the country; its holotype and allotype have been re-examined and comments are included. *N. maryae* sp. n. (holotype ♂: SW Province. Mt Kupe, Nhiangse. 25-VI-1998 and *N. moorei* sp. n. (holotype ♂: SW Province, Kodmin, 15-XII-1998 are described. The types are in the author's collection. A key to separate the 3 species

is provided." (Author)] Address: Vick G.S., Crossfields, Little London, Tadley, Hants RG26 5ET, UK

**3477.** Viessmann, R. (2003): Libellen - Odonata. Pflanzen und Tiere in Rheinland-Pfalz - Berichtsjahr 2002 - Heft 13: 189-201. (in German). [Compilation of dragonfly records from different habitats situated in Rheinland-Pfalz, Germany. Of faunistical interest are the records of *Coenagrion mercuriale*, *C. pulchellum*, *Erythromma najas*, *Ischnura pumilio*, *Lestes barbarus*, *L. virens*, *Sympetma fusca*, *Brachytron pratense*, *Aeshna affinis*, *Anaciaeschna isosceles*, *Anax parthenope*, *Crocothemis erythraea*, *Libellula fulva*, *Orthetrum brunneum*, and *Sympetrum fonscolombii*.] Address: Viessmann, R., Gängelstockweg 8, D-67295 Bolanden, Germany. E-mail: viessmann@freenet.de

**3478.** Vischer, M.; Binot-Hafke, M. (2003): Artenhilfsprogramme der Bundesländer: Fauna. Natur und Landschaft 78(2): 56-63. (in German with English summary) ["In Germany there are currently 239 conservation action plans and programmes for 153 taxa groups which are (at least partially) financed and supported by the German regional states (Länder). 55 % of the programme's involve not only population records and conservation measures, but also evaluation and monitoring activities. Most programmes take vertebrates in consideration (76 %), especially birds. The present article is followed by tables of plans, programmes and measures implemented, sorted both by species group and regional state. These tables also indicate the degree of success as reported by the regional states." Special conservation action plans referring to Odonata are existing in Baden-Württemberg ("15 priority odonate species"), Bavaria (*Coenagrion lunulatum*, *C. mercuriale*, *C. ornatum*, *Nehalennia speciosa*, *Leucorrhinia pectoralis*), Bremen (*Aeshna grandis*, *A. viridis*, *Anaciaeschna isosceles*), Hamburg ("threatened odonate species"), and Thüringen (*C. mercuriale*, *C. ornatum*).] Address: Binot-Hafke, Margret, Bundesamt für Naturschutz, Fachgebiet 11.1 Zoologischer Artenschutz, Konstantinstr. 110, D-53179 Bonn, Germany

**3479.** Wain, B. (2003): A nice day out! Bill Wain in Oz. Dragonfly News 43: 20-21. (in English). [Report on observing *Petalura hesperia* south of Perth, Australia. A brief note on oviposition (?) of a ♀ *Petalura* sp. on a dark blue roof of a car is made.] Address: not stated

**3480.** Wallace, I. (2003): Late winter nymph of *Sympetrum fonscolombii* from N. Wales. Dragonfly news 43: 34. (in English). [Verbatim: "On 13.2.2001 I took a mature nymph of *S. fonscolombii* from a shallow, two year old pool constructed on the reclaimed pit heap at Point of Ayr Colliery (grid reference SJ12-83-). [...] The nymph is 17 mm long with wing pads stretching to the end of the 7th segment, and showing venation. It might have emerged successfully if not collected, but temperature data from the nearby Bidston Weather Observatory (available on the WWW) indicates that there was quite a severe cold spell at the start of March 2001, the most severe for the entire 2000/ 2001 winter, with several successive days of minimum temperatures lower than -2°C; a soil temperature data logger operated as part of studies on the Sandhill Rustic Moth at nearby Gronant, by Adrian Spalding also recorded sub-zero soil temperatures during that cold spell. Adrian Parr informs me that an adult was taken at Heysham on 30.6.2001, which as the crow flies is about 50 miles ac-

ross Liverpool Bay. Tantalisingly this could have been locally bred, but Adrian thinks it could also have been from an early spring 2001 migration. [...]"] Address: Wallace, I., Liverpool Museum, William Brown Street, Liverpool L3 8EN, UK. Ian.Wallace@nmgm.org

**3481.** Watanabe, M.; Mimura, Y. (2003): Population dynamics of *Mortonagrion hirosei* (Odonata: Coenagrionidae). International Journal of Odonatology 6(1): 65-78. (in English). ["The mark-and-recapture method was used to study the population dynamics of the endangered brackish water species, *Mortonagrion hirosei*, in a small reed community of an estuary in the warm-temperate zone of Japan. The flying season was from late May to early August. The age structure showed that newly emerged adults always stayed in the reed community and the maiden flight did not involve leaving the colony area. Although reed communities were abundant in the estuary, it appears possible that none or only very few of the individuals emigrated. Thus, both sexually immature and mature adults coexisted in the same reed community. The average distance covered by daily movements was 1.7 and 3.3 m for immature and mature ♂♂ respectively, which were longer than those for ♀♀. Since the average durations of the immature and reproductive periods were respectively about 5 and 30 days in both sexes, the individuals may have moved less than 110 m throughout their life span, which corresponds to twice the length of the habitat. The estimated daily number of adults in the community was about 200 in 2000 and 500 in 2001. As the population was isolated, the estimated input of new individuals into the population had to be the number of individuals emerging. Thus, the total number of adults in both years was estimated to be about 5,000 and 6,000 respectively." (Authors)] Address: Watanabe, M., Institute of Biological Sciences, University of Tsukuba, Tsukuba 305-8572, Japan. E-mail: watanabe@kankyo.envr.tsukuba.ac.jp

**3482.** Weihrauch, F.; Weihrauch, S. (2003): Spring Odonata from Alentejo (Portugal), Andalusia and Extremadura (Spain). Opusc. zool.flumin. 207: 1-18. (in English) ["An annotated list of 25 species recorded on the wing or as exuviae during 2 journeys to SW Iberia in spring 1999 and 2001 is presented. 3 more species were recorded as larvae. Phenological data were compared with data from the literature, obtaining particularly noteworthy early records for *Gomphus simillimus*, *Cordulegaster boltonii*, *Brachythemis leucosticta*, and *Sympetrum striolatum* for the region. For most species recorded, additional notes on biology or an assessment of abundance and distribution in the region in spring are given. The status of *Paragomphus genei*, *Anax ephippiger*, *C. boltonii*, *Oxygastra curtisii*, *Macromia splendens*, *B. leucosticta*, *Sympetrum fonscolombii*, and *S. striolatum* is discussed. *Brachytron pratense* was not encountered at localities with former records given in the literature and the possible extinction of the outstanding population in the Goto Donana is apprehended."] (Authors) Address: Weihrauch, F., Hengelerstr. 9, D-80637 München, Germany. E-mail: Florian.Weihrauch@t-online.de

**3483.** Wildermuth, H. (2003): Fortpflanzungsverhalten von *Somatochlora arctica* (Zetterstedt) (Anisoptera: Corduliidae). Odonatologica 32(1): 61-77. (in German with English summary). ["The reproductive behaviour in relation to structural habitat resources was studied at

mountain bogs of the Centra] Alps (Tyrol, Austria). The ♂♂ searched for mates at small clearings in coniferous forests where numerous scattered oviposition sites were hidden in dense vegetation, using 3 tactics: (1) they scanned the oviposition sites by slow flights at low height over large vegetated areas (scan flight). (2) they patrolled restricted areas with frequent hover stops while chasing any intruder (patrol flight), (3) they dived repeatedly into gaps of emergent vegetation, searching for ♀♀ close to the water (dive flights). 62% of the ♀♀ remained undiscovered by ♂♂. 11% fled successfully and 27% accepted copulation (n = 139). The copulation was always initiated in the air or on the ground when both partners plunged into the vegetation following a clash. Immediately after the take off and possibly after intra♂ sperm translocation the tandem assumed the wheel position. The pairs often circled over the clearings for several minutes and perched on sunlit branches of spruce or pine trees. 0.8-12 m above ground (mean 2.75 m. n = 20). During copulation that lasted 31-150 min (mean 85 min. n = 14) rhythmic pumping movements of the 6 basal abdominal segments with frequencies from 0.14 to 0.36 Hz were observed. Copulation terminated by disengagement of the genitalia, then the partners separated immediately or after a short tandem flight. Oviposition never followed directly upon copulation and always occurred unguarded. The oviposition sites were selected carefully at shallow puddles among emergent vegetation. Eggs were laid by touching soaked moss or turf mud with the tip of the abdomen during rhythmic dipping flight movements with mean frequency of 0.61 Hz. One oviposition bout lasted 1-3 min and featured an egg flow of 1.7-4.5 eggs per s. Ovipositing ♀♀ were sometimes successfully attacked by frogs (*Rana temporaria*). and ♂♂ were occasionally found in orb-webs of spiders (*Araneus* sp.), however, predation risk was low at rendez-votis sites. Sperm competition is discussed with respect to behaviour during copulation and to the morphology of ♂ and ♀ genitalia." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch


**3484.** Willmann, R. (2003): Die phylogenetischen Beziehungen der Insecta: Offene Fragen und Probleme. Verh. Westd. Entomol. Tagung 2001: 1-64. (in German). [Compilation of current knowledge, questions, and problems on the phylogenetic relationships among insecta including the Odonata.] Address: Wittmann, R.,

Inst. Zoologie und Anthropologie, Univ. Göttingen, Berliner Str. 28, D-37073 Göttingen

**3485.** Worthen, W.B. (2003): Nested-subset structure of larval odonate assemblages in the Enoree River basin, USA. *International Journal of Odonatology* 6(1): 79-89. (in English). ["Communities have a nested-subset structure if the species found in species-poor assemblages are also found in progressively more species-rich assemblages. This nested-subset structure can be caused by differential colonization rates among species, differential extinction rates among species, or nested niche space. In this study, the assemblages of larval odonates in the Enoree River of South Carolina (USA) and nine of its tributaries were found to have statistically significant nested-subset structure. In addition, the degree of nestedness in these ten streams correlated with several chemical and physical variables. Nestedness was correlated with pH, turbidity, and concentrations of silica, bicarbonate, and calcium; suggesting that differential extinction in response to environmental stress may play a role in structuring these assemblages. However, nestedness also correlated with a crude measure of habitat homogeneity. Drainages with a heterogeneous mix of substrate types (cobbles and sand) maintained different sets of species from site to site, and had the lowest nestedness scores. Drainages with exclusively sandy substrates were dominated by burrowing species at all sites, and showed the strongest nested-subset patterns. As such, nested-subset structure in these assemblages is related to both chemical and physical parameters." (Author)] Address: Worthen, W. B., Dept of Biology, Furman University, Greenville, SC, USA, 29613. E-mail: worthen@furman.edu

**3486.** Zhou, W. (2003): *Macromia hamata* sp. nov. from Guizhou, China (Odonata: Corduliidae). *International Journal of Odonatology* 6(1): 91-93. (in English). [*M. hamata* (holotype ♂: 01 August 2001, Fanjingshan, Guizhou, China) is described and illustrated from a single ♂, deposited at the Zhejiang Museum of Natural History.] Address: Zhou Wenbao, Zhejiang Museum of Natural History, Jiaogonglu 71, Hangzhou 310012, China

**Thanks to all who contributed to this issue of OAS!**  
A special thank to Klaus Reinhardt, Sheffield for linguistic help.

ISSN 1438 - 034X		ISSN 1438-034X	
<b>Literature Data Base ODOLIT v. 1.0</b> Schorr and Lindeboom 2003 18750 records Search with index: full text index, conditions Fields: author(s), year, title, source, pages, species names, geography, keywords	<b>Literaturdatenbank ODOLIT Version 1.0</b> Schorr und Lindeboom 2003 18750 Datensätze Suche über Index, Volltextindex, Bedingungen Datenfelder: Autor(en), Jahr, Titel, Quelle, Seiten, Artnamen, Geographie, Schlagworte		
<b>World Species List Odonata v. 2.0</b> Schorr, Lindeboom and Paulson 2003 Data base with 5567 species (22 families) Search with index: full text index, conditions Fields: species, original name, synonyms, genus, family, order	<b>Weltartenliste der Libellen Version 2.0</b> Schorr, Lindeboom und Paulson 2003 Datenbank mit 5567 Arten (22 Familien) Suche über Index, Volltextindex, Bedingungen Datenfelder: Art, Originalname, Synonyme, Gattung, Familie, Ordnung		
<b>Dragonfly Photos v. 1.0</b> Data base with 157 dragonfly photos Search with index: full text index, conditions Fields: photograph, species, family, notes (keywords, geography, date)	<b>Libellenphotos Version 1.0</b> Datenbank mit 157 Libellenaufnahmen Suche über Index, Volltextindex, Bedingungen Datenfelder: Photograph, Artname, Familie, Anmerkungen (Schlagworte, Geographie, Datum)	<b>Dragonfly Research 1.2003</b>  Literature Data Base World Species List Dragonfly Photos Phylogenetic System	
<b>Phylogenetic System</b> Bechly 1998 HTML version (start with d:\system\system.htm where d: is the CD-ROM drive indicator)	<b>Phylogenetisches System</b> Bechly 1998 HTML-Version (starten mit d:\system\system.htm wenn d: Ihr CD-ROM-Laufwerk ist), in Englisch		
<b>Editors/Herausgeber</b> Martin Schorr, Schulstr. 7b, D-54314 Zerf, Germany Martin Lindeboom, Postfach 1348, D-72074 Tübingen, Germany		Editors / Herausgeber: Schorr & Lindeboom	

For more details see: <http://www.demopoly.de/dragonflyresearch>



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: martin@lindeboom.de and Martin Schorr, Schulstr. 7B D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: martin.schorr@foea.de

Published in Rheinfelden, Germany and printed in Tübingen, Germany.  
ISSN 1438-0269

1997

- 3487.** Adamovic, Z.R.; Vijatov, S.T. (1997): Morphometric distinction of *Platynemis pennipes nitidula* Brullé, 1832 from *P.p. pennipes* Pallas, 1771 (Odonata: Platynemididae). *Acta entomol. serb.* 2(1/2): 61-75. (in English with Serbian summary). ["The statistical examination confirmed that the males and females of *P. p. nitidula* have significantly wider hind tibiae than the males and females of the nominate subspecies *P. p. pennipes*. The ratio: maximum width of hind tibia / length of median tibial spine of the males and females of *P.p. nitidula* are significantly larger than that of the nominate subspecies. Distribution of two subspecies was discussed." (Authors)] Address: Vijatov, S.T., Institute for Medical Research, P.O. Box 721, 11001 Beograd, Serbia
- 3488.** Elsner, O. (mit Beiträgen von Fischer-Leipold, O.; Meyer, N.; Reiser, B; Uhlenhaupt, H.; Weber, K.) (1997): Ökologische Untersuchungen zu Keupersandsteinbrüchen im Landkreis Haßberge. *Ber. naturforsch. Ges. Bamberg* 71: 69-154. (in German). [Bavaria, Germany; 7 quarries were surveyed for their flora and fauna; records of *Coenagrion hastulatum*, *Leucorrhinia dubia*, *Orthetrum brunneum*, *Sympetrum danae*, *S. flaveolum*, and *Cordulia aenea* are of some interest. Management measures are proposed. ] Address: Elsner, O., Inst. für Vegetationsk. und Landschaftsökologie, Georg-Eger-Str. 1b, D-91334 Hemhofen/Zeckern, Germany
- 3489.** Hilfert, D.; Rüppell, G. (1997): Early morning oviposition of dragonflies with low temperatures for male avoidance (Odonata, Aeshnidae, Libellulidae). *Entomol. gen.* 21(3): 177-188. (in English with German summary). ["The relationship between oviposition by females and the beginning of male flight activity, on the one hand, and air temperature and time of day, on the other, was investigated in Northern Germany, in Southern France and in Japan. Females of some Anisoptera species, as females of *Orthetrum cancellatum*, *Aeshna cyanea*, and *A. mixta*, avoid further matings by appearing before the males at oviposition sites, when air temperature are still low. In contrast, the females of *Anax imperator* are able to defend themselves against males successfully. Females of the Aeshnidae in S-France and in Japan fly to oviposition with higher air temperatures than the females of Aeshnidae in N-Germany. In the Zygoptera examined here (*Ischnura elegans*, *Coenagrion puella*), there is no such male avoidance strategy involving oviposition at lower temperature to avoid males. Here the beginning of oviposition and male flight activity is determined by the mating system." (Authors)] Address: Rüppell, G. Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany
- 3490.** Jödicke, R. (1997): Die Verbreitung von *Sympetrum sinaiticum tarraconense* Jödicke (Odonata, Anisoptera: Libellulidae). *Opusc. zool. flum.* 155: 1-7. (in German, with English summary). ["A map is provided which demonstrates the occurrence of this Iberian taxon in the Mediterranean parts of Spain. 18 localities are compiled, ranging from Andalusia to the Pyrenees. There seems to be no recent contact with the nominate ssp. from northern Africa." (Author)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: r.joedicke@t-online.de
- 3491.** Prasad, M. (1997): Additions to the odonate fauna of Mizoram, northeastern India. *Opusc. zool. flumin.* 154: 7-10. (in English). [12 odonate species are added to the fauna of Mizoram, totalling the list of species to 44. Descriptive note on the following species are given: *Aciagrion borneense*, *Calicnemia miniata*, *C. eximia*, *Lestes dorothea*, *Caliphaea confusa*, *Anisopleura comes*, *Euphaea ochracea*, *Merogomphus martini*, and *Idionyx imbricata*.] Address: Prasad, M., Zool. Survey of India, M-Block, New Alipore, Calcutta - 700 053, India
- 3492.** Prasad, M. (1997): Further additions to the odonate fauna of Arunachal Pradesh, eastern India. *Opusc. zool. flum.* 154: 1-6. (in English). [21 species are added to the fauna of the state, totalling the odonate fauna of the Arunachal Pradesh to 77 species. Descriptive notes are provided for *Aciagrion olympicum*, *Ischnura rufostigma mildredae*, *Coelliccia renifera*, *Megalestes major*, *Onychogomphus risi*, *Orthetrum japonicum internum*, and *Sympetrum orientale*.] Address: Prasad, M., Zool. Survey of India, M-Block, New Alipore, Calcutta - 700 053, India
- 3493.** Tremblay, A.; Lucotte, M. (1997): Accumulation of total mercury and methyl mercury in insect larvae of hydroelectric reservoirs. *Can. J. Fish. Aquat. Sci.* 54: 832-841. (in English with French summary). ["Mean total mercury (Hg) and methyl mercury (MeHg) concentrations in insect larvae from hydroelectric reservoirs were 3-5 times (up to 10 times) higher than in their counterparts from natural lakes. Taxonomic differences, which may be related to feeding behavior, and substrate type (lake sediment or flooded soils) together explained a large part of the total variability of total Hg ( $r^2 = 0.64$ ) and MeHg ( $r^2 = 0.79$ ) concentrations in insects. MeHg concentrations in flooded soils increased from 0.3-2 ng Hg.g dry weight<sup>-1</sup> after 1-2 years of flooding to 15-2 ng Hg.g dry weight<sup>-1</sup> after 16 years of impound-

ment. Total Hg and MeHg concentrations in insect larvae followed a similar pattern, but only weak correlations of both total Hg and MeHg concentrations were found between flooded soils and insect larvae, suggesting that factors other than MeHg content of flooded soils also affect the accumulation of these compounds in insects. Our results indicate that suspended particulate matter eroded from flooded soils by wave and ice action and bacterial activity enhanced by the release of labile carbon and nutrients from the flooded soils may indirectly transfer MeHg from flooded soils to insect larvae." (Authors) Mercury concentration in Odonata is presented in several tables and graphs.] Address: Tremblay, A., Chaire de recherche en environnement, Université du Québec à Montréal, C.P. 8888, succursale Centre-Ville, Montréal, QC H3C 3P8, Canada. E-mail: tremblaa@envir.hydro.qc.ca

**3494.** Vizslán, T.; Pingitzer, B. (1997): Adatok Magyarország szitakötő - faunájához (Odonata) II. Folia hist. nat. Mus. matraensis 22: 99-108. (in Hungarian with brief English summary) [43 species from 94 Hungarian localities are documented.] Address: Vizslán, T., Kitabel P. u. 32/C. Fru 2, HU-9400 Sopron, Hungaria

**3495.** Wong, A.; McQueen, D.J.; Williams, D.D.; Demers, E. (1997): Transfer of mercury from benthic invertebrates to fishes in lakes with contrasting fish community structures. Can. J. Fish. Aquat. Sci. 54: 1320-1330. (in English with French summary). ["We examined the flow of mercury (Hg) from benthic invertebrates to fishes in lakes with contrasting fish community structure. The study was carried out in two whole lakes in south-central Ontario in 1992. Both were remote from direct sources of contamination and were chosen because of their physical and chemical similarities. Although the fish communities in the two lakes were qualitatively similar, the total number of fishes in Ranger Lake was an order of magnitude smaller than that in Mouse Lake. As a result of the lower net predation from benthivorous fishes, documented in earlier studies, Ranger Lake benthic invertebrate populations were significantly higher. However, benthic invertebrate taxa in Mouse Lake were generally larger and had higher Hg concentrations. This was partly attributed to the stunted growth of Mouse Lake fishes, which did not allow them to prey on larger benthos as a result of gape limitations. Despite the lower Hg concentrations in Ranger Lake benthos, total benthic invertebrate Hg pools were higher in this lake as a result of its higher total benthic invertebrate biomass. However, the transfer of total Hg from benthic invertebrates to fishes was higher in Mouse Lake due to the higher consumption rates of benthivorous fishes." (Authors) Data of biomasses, mean individual wet mass, Hg concentration, and mean Hg pool for "Odonata" are presented in tables.] Address: Wong, A.H.K., Division of Life Sciences, University of Toronto at Scarborough, 1265 Military Trail, Scarborough, ON M1C 1A4, Canada. E-mail: alwong@lakc.scar.utoronto.ca

## 1998

**3496.** Faton, J.M. (1998): Les libellules du Tricastin. Le Courrier des Epines drômoises 85: 12-15. (in French). [Tricastin (44.35N 4.76E) is situated in the Rhône-Alpes-region in France. The author outlines so-

me records of faunistic interest, e.g. *Coenagrion mercuriale*, *Oxygastra curtisii*, *Sympetrum depressiusculum*, and *S. pedemontanum*. Some focus is set on the development of two newly created water bodies south of the nature reserve "L'Étang Saint-Louis" near Suze-la-Rousse; a checklist of 33 odonate species is documented.] Address: Faton, J.-M., Réserve Naturelle des Ramières, les Garis, F-26120 La Baume Cornillane, France. E-mail: Fatonjm@aol.com

**3497.** Gottschalk, H.-J. (1998): Beitrag zur Odonaten-Fauna im Niederungsgebiet der Nebel. Naturschutzarbeit in Mecklenburg-Vorpommern 41(1/2): 46-50. (in German). [Mecklenburg-Vorpommern, Germany; between 1992 and 1994, 36 odonate species were recorded.] Address: not stated

**3498.** Ketcheniev, H.A.; Haritonov, Yu. (1998): Identification key for the dragonflies of the Caucasus. Karbaidino-Balkarskiy University, Nal'chik. ISBN 5-7558-0017-0. 118 pp. (in Russian). [This identification key includes both imagines (focus) and larvae. The species in some cases are briefly commented. Some general information on Odonata and a bibliography comprising of 74 titles are added too.] Address: Haritonov, A.YU.; Laboratory of Insect Ecology, Biological Institute of the Siberian Branch of the Academy of Sciences, Frunze str. 11, RUS-630091 Novosibirsk, Russia

**3499.** Siva-Jothy, M.T.; Hadrys, H. (1998): A role of molecular biology in testing ideas about cryptic female choice. In: R. DeSalle & B. Schierwater (Eds.): Molecular approaches to ecology and evolution. Birkhäuser. Basel: 37-53. (in English). ["If cryptic female choice exists, observations on mating behaviour will not reflect the actual patterns of paternity. Genetic profiling techniques are needed to identify patterns of paternity (and sperm storage) that deviate from expectations based on behavioural observations. Our chapter addresses this problem in two parts. The first provides a critical review of the concept of cryptic female choice leading to a set of criteria required to demonstrate its occurrence. Second, we explore the repertoire of molecular methods available to answer certain questions about cryptic female choice in insects. The potential and limitations of polymerase chain reaction-based single locus and multilocus DNA fingerprint techniques are discussed along with the different options of analysing the data. Two case studies illustrate that sperm storage and usage in odonates might enable females to control paternity." (Authors)] Address: Siva-Jothy, M.T., Department of Animal and Plant Sciences, University of Sheffield, Sheffield, S10 2TN, UK. E-mail: m.siva-jothy@sheffield.ac.uk

**3500.** Wain, W.H.; Wain, C.B. (1998): Observations on the Odonata of Silhouette, Seychelles archipelago. Phelsuma 6: 27-31. (in English). [Between 17 to 24th Nov. 1997, 14 odonate species have been recorded from Silhouette. The species are documented locality-wise and discussed in detail.] Address: Wain, W.H. & C.B., The Haywain, Hollywater Road, Bordon, Hants, GU35 0AD, United Kingdom

## 1999

**3501.** Brooks, S.J. (1999): Odonata: the dragonflies and damselflies (45 species in 9 families). In: Barnard,

P.C. (Ed.): Identifying British insects and arachnids. An annotated bibliography of key words: 30-32. (in English). [S. Brooks briefly introduces into the order, and lists and comments on 9 books covering Odonata.] Address: Brooks, S.J., Entomology, The Natural History Museum, Cromwell Road, London, SW7 5BD, UK

**3502.** Goldstein, M.L.; Bloom, P.H.; Sarasola, J.H.; Lacher, T.E. (1999): Post-migration weight gain of Swainson's Hawks in Argentina. *Wilson Bull.* 111(3): 428-432. (in English). ["Whether hawks forage or fast en route to Argentina, or whether specific stopover habitats are regularly used is not known. The extent of predation on airborne dragonflies and other flying insects during migration is also unknown. Nevertheless, if migrating hawks used only stored fat they might arrive in the pampas in poor condition. Hawks have been reported arriving in Argentina in such weak condition that they were picked up by hand. None of these birds, however, were checked for contaminants." For more details on Swainson's Hawk predation on dragonflies, see: Jaramillo, A. (1995): Swainson's hawks and dragonflies. *Argia* 7(4): 3, Jaramillo, A. (1993): Wintering Swainson's hawks in Argentina: Food and age segregation. *Condor* 95: 475-479, and Rudolph, D.C.; Fisher, C.D. (1993): Swainson's hawk predation on dragonflies in Argentina. *Wilson Bulletin* 105: 365-366.] Address: Goldstein, M.L., Texas A&M Univ., Dept. of Wildlife and Fisheries Sciences, 210 Nagle Hall, College Station, TX 77843-2258. E-mail: mgoldstein@tamu.edu

**3503.** Kano, K.; Miyahata, T. (1999): Evening foraging and thermal behavior in a male of *Trithemis aurora* (Burmeister). *Nature & Insects* 36(11): 32. (in Japanese). ["We sighted evening foraging and thermal behavior in a male of *Trithemis aurora* (Burmeister). We happened to see an individual of *Trithemis aurora* perching on a tip of stem of grass, of which height was 1.6 meter, at a foot path between fallow rice paddies at Oyasu, Kunigami-gun, Okinawa Prefecture in the evening of July 1, 2001. The place is not a suitable habitat of the dragonfly usually, and I aimed my camera at the dragonfly, that raised its abdomen upward. It often took off for preying small insects, and returned to the same tip of the grass, and took often obelisk posture to exposure its body to the setting sun. There were several tall grasses near the perch, and when the perch was shaded, the dragonfly changed its perch to the perch in the sunshine and took the same posture. In the hot daytime dragonflies usually take obelisk posture for avoidance of rising body temperature, however this time, the behavior was for raising body temperature in the cool evening. We stayed there from 6:30 to 7:20 p.m., L, and when the sun set, the dragonfly flew away for roosting." (Taken from the translation of Naoya Ishizawa in *Digest of Japanese Odonatological short Communications* 12).] Address: Miyahata, T., 2: 9-20-9 mitsumata-cho, Maebashi City, Gunma Pref., 371-0018, Japan

**3504.** Kano, K. (1999): Morning and evening swarms in *Chlorogomphus brunneus brunneus* Oguma near the seashore. *Yosegaki* 102: 40. (in Japanese). [Swarming behaviour - in most cases - of females is described in detail. In general, the swarms are feeding aggregations, in a few cases seizures of females by a male was observed. (more details can be taken from the translation of Naoya Ishizawa in *Digest of Japanese Odonatological short Communications* 12).] Address: Kano, K., 5-19-

17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**3505.** Ram, R.; Prasad, M. (1999): On the collection of Odonata from Arunachal Pradesh, India. *Rec. zool. Surv. India* 97: 113-132. (in English). [92 species and subspecies from Arunachal Pradesh, NE India are checklisted and commented in detail with focus on the species distribution. 15 species are new stated records. Remarks on morphology of *Aciagrion pallidum* Selys 1891 and *Ceriagrion olivaceum* Laidlaw, 1914 are made.] Address: Prasad, M.; Zool. Surv. India, M-Block, New Alipore, Calcutta-700053, India

**3506.** Sabarth, A. (1999): Bedeutung von Substrat und Versandung für die Verteilung des Makrozoobenthos in naturnahen Heidebächen. *Dissertation, TU Braunschweig*: 98 pp. (in German). [The macrozoobenthos of three sand bottomed streams in the Lüneburger Heide (Niedersachsen, Germany) were surveyed with special emphasis on the habitat choice of the species in different sediment types, submerged snags, and alder roots. (Covering with) sand sediments was one of the most important factors to explain the (low) abundance of species. *Calopteryx splendens*, *C. virgo*, *Cordulegaster boltonii*, and *Ophiogomphus cecilia* have been recorded at the sampling sites. *O. cecilia* is vulnerable against sand sediment cover, and its abundance can be explained by the depth of cumulated sand sediment.] Address: not stated; Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

## 2000

**3507.** Bach, L. (2000): Auswirkungen von Revitalisierungsmaßnahmen an dem Heidebach Ise auf dessen Libellenfauna. *Angewandte Landschaftsökologie* 37: 267-270. (in German with English summary). [Niedersachsen, Germany; monitoring the effects of revitalisation effects on the odonate fauna between 1991 and 1999, it was found that rheophilous species were favoured significantly; this refers especially to *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Cordulegaster boltonii*, *Calopteryx splendens*, and *Platycnemis pennipes*. In total, 36 odonate species could be observed, of which 18 regularly were autochthonous. Year by year, larvae of rheophilous species spread over more stretches of the river, and adults could be observed in greater abundances.] Address: Bach, L., Hamfhofsweg 125b, D-28357 Bremen, Germany. E-mail: lotharbach@aol.com

**3508.** Bass, D. (2000): A preliminary study of aquatic macroinvertebrates from two springs in the Pontotoc Ridge Nature Preserve, Oklahoma. *Proceedings of the Oklahoma Academy of Science* 80: 105-109. (in English). [Little is known regarding the spring invertebrate fauna in Oklahoma, USA. The purpose of this investigation was to collect baseline data concerning the physicochemical conditions of the water and to determine distributions of macroinvertebrates in spring-brooks resulting from 2 springs (Pot Spring (34.4973°N, 96.6022°W) and Coal Creek Cave Spring (34.5247°N, 96.6014°W)) emerging on the property. *Argia* sp., *Cordulegaster* sp., *Hetaerina* sp., and *Lestes* sp. are listed in a table and classified according Surber Net Sample



Number and downstream distance from the spring.] Address: Bass, D., Biology Dept, University of Central Oklahoma, Edmond, Oklahoma 73034, USA.

**3509.** Buczynski, P.; Czachorowski, S.; Pakulnicka, J. (2000): Do small man-made water bodies can be a substitute habitat for the lake littoral benthos? In: Cerbin, S. (Ed.): Bottom Fauna of lakes. Materials of the VII Polish Benthological Workshop, Jezioro Wielkopolski National Park: 45-47. (in Polish). [The Odonata, Trichoptera, and Coleoptera of some gravel and sand pits near Olsztyn, Lublin-region, Poland were investigated. Emphasis is given to the fauna of different stages of vegetation succession. A total of 37 odonate species were found, but not details are given. A German translation of the paper is available from P. Buczynski.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3510.** Buczynski, P. (2000): Jak larwy wazek (Odonata) przezywaja wysychanie drobnych zbiorników? In: Czczuga, B. & J.L. Rybak (Eds): XVIII Zjazd hydrobiologów Polskich w Białymstoku. Szacunek dla wody. Materiały zjazdowe. 4-8. IX 2000. Polskie Towarzystwo hydrobiologiczne zakład biologii ogólnej am w Białymstoku: 33-34. (in Polish). [How do larvae of Odonata survive in drying out pools? Records on *Libellula depressa* and *Ischnura pumilio* - characteristic species of temporary water bodies - are referred: The larvae search successively for the most moisty places; shortly before the pools are totally drying out, they crawl in fissures. If it shouldn't rain, these specimens would die too. Larvae of *Coenagrion puella* and *Libellula quadrimaculata* protected themselves under a layer of *Lemna minor*, while *Aeshna cyanea* was found under leaves on the bottom of a pool. Here, they were able to survive a period of 3-4 weeks of drying out. A German translation of the abstract is available from P. Buczynski.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3511.** Clausnitzer, V. (2000): Interspecific competition in rainforest dragonflies (Tetratheminae, Libellulidae). Poster, 13. Jahrestagung der Deutschen Gesellschaft für Tropenökologie, 1.-3. März 2000 in Würzburg; <http://www.biozentrum.uni-wuerzburg.de/zoo3/gtoe/>: 1 pp. (in English). [Verbatim: It is generally hold that "displays of closely related species are clearly distinct so as to minimize the chance of confusion between species" (Krebs & Davies, 1993, p. 363). The similarity in morphology, colouring and behaviour of sympatric rainforest Tetratheminae does not fit this considerations. The territorial behaviour of two *Notiothemis* and one *Tetrathemis* species was studied in a West Kenyan rainforest. Males establish territories at small pools and keep them for several days. The territories are visited by females either for egg-laying or mating; males would approach any female and try to copulate, species determination being tactile only. Within *Notiothemis* inter- and intraspecific competition for the pools is nearly identical, *Tetrathemis* is inferior to the former. The number of territorial males depends on the pool circumference and vegetation cover; the number of territorial *Tetrathemis* being significantly correlated on presence or absence of *Notiothemis*. For both *Notiothemis* species the territory size is larger than for *Tetrathemis*. Neither behaviour nor colouring shows reduction of am-

biguity between the species. The inter- and intraspecific aggression is very similar; species recognition is by contact only. To minimise disturbance for approaching females the territorial male keeps all potential competitors away. In West African rainforests even more species of the Tetratheminae inhabit the same habitats, all showing very similar behavioural and colouring patterns. It remains unclear how such different species have evolved. Literature: Krebs, J. R. & Davies, N. B. (1993): An introduction to behavioural ecology. 420 pp. Blackwell Scientific Publications, Oxford.] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle / Saale, Germany. E-mail: violacl@gmx.de

**3512.** Czachorowski, S.; Buczynski, P.; Majewski, T.; Malek, J.; Monko, M.; Rudowska, K.; Rykowski, D. (2000): Wstępne badania chruscików i wazek okolic Górowa Iławeckiego (Północna Polska). In: Czczuga, B. & J.L. Rybak (Eds): XVIII Zjazd hydrobiologów Polskich w Białymstoku. Szacunek dla wody. Materiały zjazdowe. 4-8. IX 2000. Polskie Towarzystwo hydrobiologiczne zakład biologii ogólnej am w Białymstoku: 40-41. (in Polish). [Trichoptera and Odonata of the environs of Górowo Iławeckie (NE Poland): In the framework of a monitoring of anthropogen caused changes in the fauna of water bodies, in May 1998 and in July 1999, 30 odonate species including *Calopteryx virgo*, *Libellula fulva*, *Leucorrhinia dubia*, *L. albifrons*, and *L. pectoralis* were recorded.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3513.** Czerniawska-Kusza, I.; Kochanowski, T. (2000): Characteristics of a benthos in chalk-marl excavations in the Opole city. In: Cerbin, S. (Ed.): Bottom Fauna of lakes. Materials of the VII Polish Benthological Workshop, Jezioro Wielkopolski National Park: 77-78. (in Polish). [Poland; the water bodies are dominated by a submerged vegetation and *Stratiotes aloides*. Odonata have been sampled, but no details are given] Address: not stated

**3514.** Domek, P.; Joniak, T. (2000): Benthic fauna and water trophy in three dystrophic lakes in the Drawa National Park (northern Poland). In: Cerbin, S. (Ed.): Bottom Fauna of lakes. Materials of the VII Polish Benthological Workshop, Jezioro Wielkopolski National Park: 81-84. (in Polish). [Poland; *Enallagma cyathigerum*, *Ischnura elegans*, *Pyrrhosoma nymphula*, *Cordulia aenea*, and *Leucorrhinia* sp. are listed in a table for two of the three investigated lakes.] Address: Domek, P.; Joniak, T., Zakład Ochrony Wód, Uniwersytet im A. Mickiewicza, ul. Drzymaly 24, PL-60-613 Poznan, Poland

**3515.** Emilyamma, K.G.; Radha-Krishnan, C. (2000): Odonata (Insecta) of Parambikulam Wildlife Sanctuary, Kerala, India. *Rec. zool. Surv. India* 98(1): 157-167. (in English). [Palakka district of Kerala, India; the paper combines checklisting the Odonata of the wildlife sanctuary by providing an identification key of the known species (n=25).] Address: Emilyamma, K.G., Western Ghats Field Res. Stn, Zool. Surv. India, Calicut-673002, India

**3516.** Henson, S. (2000): First & last dates for 1998 & 1999. *Dragonfly news* 37: 14-16. (in English). [Phenological data of the Odonata of UK are listed in a table.] Address: Henson, S., 10 Shotesham Road, Poringland, Norwich NR14 7LE, UK

- 3517.** Kriegel, P. (2000): I love Dragonflies. *Dragonfly news* 38: 11. (in English). [Dragonfly poem.] Address: Kriegel, Patricia, 2600 SW 80th, Oklahoma City, Oklahoma 73159, USA
- 3518.** Lewandowski, K. (2000): Wazki (Odonata) drobnych zbiorników wodnych. In: Czeczuga, B. & J.L. Rybak (Eds): XVIII Zjazd hydrobiologów Polskich w Białymstoku. Szacunek dla wody. Materiały zjazdowe. 4-8. IX 2000. Polskie Towarzystwo hydrobiologiczne zakład biologii ogólnej am w Białymstoku: 151-152. (in Polish). [Odonata of small pools. Between 1986 and 1990, in the environs of Olsztyn, Lomza, and in the marshes of Biebrza, Poland, Odonata were collected. Some examples are outlined to document specific abundances in the very water-bodies, and the frequency of occurrence of selected species in the region. Some species of special interest are highlighted. A German translation of the abstract is available from P. Buczynski.] Address: Lewandowski, K., Katedra Ekologii i Ochrony Środowiska, Uniwersytet Warmińsko-Mazurski w Olsztynie, Poland
- 3519.** Lounaci, A.; Brosse, S.; Ait Mouloud, S.; Lounaci-Daoudi, D.; Mebarki, N.; Thomas, A. (2000): Current knowledge of benthic invertebrate diversity in an Algerian stream: a species check-list of the Sebaou river basin (Tizi-Ouzou). *Bull. Soc. Hist. nat. Toulouse* 136: 43-55. (in English, with French summary). [Between 1984 and 1996, 23 sampling sites along the Sébaou River and its tributaries (N Algeria), covering a large range of altitudinal, discharge, and topographic features, were surveyed for their fauna. *Onychogomphus costae* and *O. uncatulus* are recorded from the Aissi Wadi. The latter species is restricted to the altitudes below 140 m. ] Address: Thomas, A., CESAC, UMR 5576 CNRS, Univ. Paul Sabatier, 118 rue de Narbonne, F-31062 Toulouse, France
- 3520.** Machado, A.B.M. (2000): Studies on neotropical Protoneuridae, 10. *Forcepsioneura lucia* sp. n. from Parque Estadual Rola Moça, Minas Gerais, Brazil (Odonata, Zygoptera). *Bolm Mus. Biol. Prof. Mello-Leitao (N.S.)* 11/12: 127-134. (in English with Portuguese summary). [The new species is described, illustrated, and compared with *F. garrisoni*, *R. itatiaiae*, and *F. sancta*. Holotype ♂, allotype ♀, 7 paratypes: Brazil, Minas Gerais, Ibirite, alt. 1000 m, various dates: Oct. / Dec. - 1980 / 1984. Some notes on ecology (it is possible that the larvae live on humid leaf litter on the forest floor) and conservation are provided. The ♂♂ of the genus - comprising of currently known five species - are keyed.] Address: Machado, A.B.M., Depto Zool.-Ent., Inst. Cienc. Biol., UEMG, Caixa Postal 256, BR-31270-901 Minas Gerais, MG, Brasil
- 3521.** Meadows, D.W. (2000): Effect of bison trampling on aquatic invertebrates in streams on Antelope Island, Utah. The Ecological Society of America, 85th Annual meeting August 6-10, 2000 Snowbird, Utah, Document: LAU-3-56-31 WA-3-84-2: (in English). [Verbatim: Trampling of riparian habitats by large herbivores can have significant impacts on aquatic communities. I examined numerous environmental variables and aquatic invertebrate community composition from paired trampled and untrampled sites in eight first or second order streams on Antelope Island, in the Great Salt Lake, Utah. Percent mud and sand substrates were more common in trampled sites in most streams, while percentage cover of aquatic vegetation was lower in trampled sites. Of the twenty taxa common enough to be analyzed statistically, five showed no difference in untrampled vs trampled areas, seven had consistent differences across streams, and eight had stream x trampling level interactions. Annelid worms, ostracods, the beetle *Helophorus*, and the snail *Physella* were more common in trampled areas while the odonate *Argia*, the beetle *Agabus*, the snail *Stagnicola*, the dipteran *Dixa*, hydrophilid beetles, limnephilid caddisflies, and simuliid and chironomid flies were more common in untrampled areas. These results can mostly be explained by direct trampling effects and indirect interactions of bison trampling affecting environmental features and substrate composition. These results suggest the need for managers and ranchers to control access of bison to riparian zones as is necessary for cows and sheep, even though bison wander more and spend much less total time in riparian zones.] Address: Meadows, D.W., Weber State University, Ogden, UT 84408 USA
- 3522.** Merrill, I. (2000): Scotland 2000 - in search of four-winged wonders and much, much more. *Dragonfly news* 38: 12-15. (in English). [Report on a trip to Scotland, UK from 29. June - 4. July 2000. Some emphasis is given to birds and dragonflies.] Address: Merrill, I., 20 Ashford Road, Whitwick, Coalville, Leics., LE67 5GD, UK
- 3523.** Mielewczyk, S. (2000): Larvae of dragonflies (Odonata) of the Great Poland National Park and changes in their composition. In: Cerbin, S. (Ed.): *Bottom Fauna of lakes. Materials of the VII Polish Benthological Workshop, Jezioro Wielkopolski National Park*: 13-17. (in Polish). [The odonate fauna of different habitats within the borders of the National Park is briefly outlined. Emphasis is given to historical data.] Address: Mielewczyk, S., Polska Akademia Nauk, Zakład Badan Środowiska Rolniczego i Lesnego, ul. Bukowska 19, PL-60-809 Poznan, Poland
- 3524.** Moore, N. (2000): Applying IUCN criteria to assess threats to British dragonflies. *Dragonfly news* 37: 19-20. (in English). [Conservation actions are more urgently required for some species than others, priorities have to be worked out so that the limited manpower and financial resources can be used to best effect. 20 odonate species are classified according to the criteria to assess the degree of threat of extinction in UK.] Address: Moore N.W., The Farmhouse, 117 Boxworth End, Swavesey, Cambridge CB4 5RA, United Kingdom
- 3525.** Parr, A. (2000): Dragonfly news for 1999 - Migrants & vagrants. *Dragonfly news* 37: 12-13. (in English). [UK; *Erythromma viridulum*, *Anax parthenope*, *Pachydiplax longipennis*, *Sympetrum fonscolombii*, *S. flaveolum*] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk
- 3526.** Perrin, V.; Clarke, D. (2000): Can BAPs benefit dragonflies? - experiences from Cumbria & Cambridgeshire. *Dragonfly news* 37: 17-18. (in English). [Biodiversity Action Plans (BAP) aim to preserve species of special concern under an EU-level (*Coenagrion mercuriale*) or a more national or regional context. In Cumbria BAP-drafts for *Coenagrion pulchellum* and *Leucorrhinia dubia* have been written. In Cambridgeshire *Libellula fulva* is a candidate for an BAP; the status of *Platycnemis pennipes*, *Coenagrion pulchellum*, and *Brachytron pra-*

tense should be monitored.] Address: Perrin, V., 13 Pettitts lane, Dry Drayton, Cambridgeshire CB3 8BT, UK. E-mail: valperrin@dial.pipex.com

**3527.** Perrin, V. (2000): Dragonfly news for 1999 – Resident's round-up. *Dragonfly news* 37: 11-12. (in English). [UK; phenological data of *Pyrrhosoma nymphula*, *Erythromma najas*, *Coenagrion pulchellum*, *Brachytron pratense*, *Aeshna mixta*, and *Sympetrum striolatum* from different British regions are documented. The current status of *Aeshna caerulea*, *Somatochlora arctica*, and *Leucorrhinia dubia* is briefly exemplified. "Mobbing" behaviour of *Calopteryx splendens* against an ovipositing female of *Anax imperator* is described. Mixed pairing between *Libellula fulva* and *L. quadrimaculata* is reported. Northward range extension of *Sympetrum sanguineum* is outlined.] Address: Perrin, V., 13 Pettitts lane, Dry Drayton, Cambridgeshire CB3 8BT, UK. E-mail: valperrin@dial.pipex.com

**3528.** Pintor, L.M.; Soluk, D.A. (2000): Understanding the interaction of crayfish and the Hine's Emerald Dragonfly larvae coexisting in crayfish burrows. The Ecological Society of America, 85th Annual meeting August 6-10, 2000 Snowbird, Utah, Document: LAU-3-56-31: (in English). [Verbatim: Biotic interactions, such as predation, can have significant influences on population dynamics, community structure, and the behaviors of organisms. Odonates are a group of organisms in which predation has been a major factor shaping the observed life histories and behaviors. While most studies have focused on the effect of vertebrate fish predators and intraguild predation, crayfish are another predator present in many aquatic systems that can have an effect on larval Odonate populations. Habitat duration can also influence larval Odonate communities by limiting the species that can maintain populations in variable environments. It can also effect the strength of biotic interactions between those organisms that persist. *Somatochlora hineana* inhabits small, ephemeral streamlets that experience seasonal drying; a situation intolerable for many larval Odonates. Field studies indicate that larvae use active crayfish burrows to survive through periods of drought. Crayfish are predators of dragonfly larvae, which raises the question of how these organisms coexist in burrows. To resist predation, *S. hineana* larvae may simply be distasteful or crayfish may fail to recognize them as prey. Lab experiments were conducted to establish whether a direct predator-prey relationship exists between *S. hineana* larvae and the crayfish, *Cambarus diogenes*. Results show that *C. diogenes* readily consume *S. hineana* and other dragonfly larvae, and are only limited by the size of the larvae relative to its own size. To further investigate predation by crayfish inside burrows and whether larvae avoid active burrows, we conducted a field exclusion experiment manipulating the presence of crayfish in burrows. Preliminary results of a repeated-measures analysis shows no significant difference between treatments ( $p=0.87$ ), indicating that the presence of crayfish has no effect on *S. hineana* larval densities within burrows. This suggests either that larvae may not be able to discriminate between burrows with crayfish present/absent, or that the cost may not be high, relative to the benefits attained by inhabiting the burrow. *S. hineana* larvae probably exhibit unique behaviors that allow them to avoid predation by crayfish within burrows.] Address: Pintor, L.M.; Soluk, D.A., University of Illinois, Urbana-Champaign, Champaign, IL 61820, USA

**3529.** Ram, R.; Chandra, K.; Yadav, K. (2000): Studies on the Odonata fauna of Andaman and Nicobar Islands. *Rec. zool. Surv. India* 98(3): 25-60. (in English). [India; 58 species are listed resp. documented in detail, keyed, and discussed, incl. 8 species that are new to the fauna of the Archipelago, of which *Cratilla metallica* is for the first time recorded from the Indian territory. Address: Ram, R., Zool. Surv. India, M-Block, New Alipore, Calcutta-700053, India

**3530.** Rasch, P.; Trapp, M. Ein Fließgewässer im urbanen Umfeld. Analyse des ökologischen Zustandes des unteren Belmer Baches (Osnabrück, Niedersachsen) anhand des Makrozoobenthos. *Osnabrücker Naturwissenschaftliche Mitteilungen* 28: 167-190. (in German with English summary). ["The organic pollution of the lower Belmer Bach can be attributed to its agriculturally intensively used drainage area. Already before entering the urbanized region, the macrozoobenthos is poor in species due to saprobic pollution and the structural poverty of the waterbed and the banks. When comparing the species numbers of a reference sampling plot located before the urban region and a sampling plot situated within this region, hardly any differences could be ascertained. The longitudinal isolation and the rise in temperature of app. 1 °C in the urban brook section negatively influence its fauna; this, however, is compensated by the varied riparian vegetation and the greater structural diversity of the waterbed due to hydraulic engineering. A rise in temperature of app. 5 °C a continuous inflow of suspended matter from a sewageworks reduce the macrozoobenthos to few dominant taxa." (Authors) *Calopteryx splendens*, *Ischnura elegans*, *Letes sponsa*, *Chalcolestes viridis*, and *Zygoptera* are listed represented samples from May 1996, and May, July, and Sept. 1997.] Address: Rasch, P., Fachgebiet Ökologie, FB Biologie/Chemie, Universität Osnabrück, Barbarastr. 11, D-49069 Osnabrück, Germany

**3531.** Rutkowski, D.H. (2000): Dziemna i nocna zawartosc przewodów pokarmowych larw wazek równokrzydłych (Odonata, Zygoptera) w litoralu jeziora Kuc. In: Czeczuga, B. & J.L. Rybak (Eds): XVIII Zjazd hydrobiologów Polskich w Białymstoku. Szacunek dla wody. Materiały zjazdowe. 4-8. IX 2000. Polskie Towarzystwo hydrobiologiczne zakład biologii ogólnej am w Białymstoku: 226. (in Polish). [Daily site change in preying *Zygoptera* larvae in the litoral of lake Kuc. The diurnal and nocturnal dwellings of larval *Enallagma cyathigerum*, *Erythromma najas*, and *Ischnura elegans* were studied in a mesotrophic lake. During day time, Chironomidae and Ephemeroptera dominated as prey, while during night Cladocera were preferred. Preyed biomass in night was higher than on day. This is explained by a compromise between avoiding being preyed by fishes and searching for prey.] Address: Rutkowski, D.H., Zakład Hydrobiologii, Instytut Zoologii, Uniwersytet Warszawski, Poland

**3532.** Stav; G.; Kotler, B.P.; Blaustein, L. (2000): Direct and indirect effects of the predatory dragonfly nymph *Anax imperator* on green toad *Bufo viridis* tadpoles. The Ecological Society of America, 85th Annual Meeting, August 6-10, 2000 Snowbird, Utah, This abstract is being presented at: 9:00 AM in session: Oral Session #38: Amphibian Ecology, Document: GIL-3-56-2: (in English). [Verbatim: We conducted an artificial pool experiment to assess effects of the predatory dragonfly nymph *Anax imperator* on green toad *Bufo viridis*



tadpoles. We ran three treatments (with six replicate pools each): (1) free *Anax* (direct effects on mortality); (2) caged *Anax* (indirect effects on behavior, development and individual growth rates); and (3) control (no *Anax*). We added 15 liters (10 cm depth) of water to each pool. After five days, we added 30 three-day old tadpoles, all hatched from the same egg string. Caged *Anax* were fed with tadpoles three times a week. The experiment ran from 11 April through 4 August. Free *Anax* eliminated 90% of the tadpoles within three days and all of them within six days. Caged *Anax* had no effect on the spatial distribution of tadpoles. However, caged *Anax* caused tadpoles to metamorphose earlier to a larger size (both statistically significant), and to obtain lighter color. This study shows that *Anax* has a very strong direct effect on the population of *Bufo* tadpoles. Future experiments will be designed to determine whether the prey responses to the predator are reactions to predation or the result of extra organic matter in this treatment (consequence of *Anax* feeding and secretion).] Address: Stav, G., Ben-Gurion University of the Negev, Sede-Boqer Campus, 84990, Israel

**3533.** Sudhaus, W.; Peters, G.; Balke, M.; Manegold, A.; Schubert, P. (2000): Die Fauna in Berlin und Umgebung: Veränderungen und Trends. Sitzungsber. Gesell. naturforsch. Freunde Berlin (N.F.) 39: 75-87. (in German). [The paper compiles recent range changes of different faunal groups with special emphasis on the region around Berlin, Germany. Günther Peters contributes several odonatological examples referring to *Symptetrum pedemontanum*, *Stylurus flavipes*, *Anax imperator*, *A. parthenope*, and *A. ephippiger*.] Address: Peters, G., Museum für Naturkunde, Institut für Systematische Zoologie, Invalidenstraße 43, D-10115 Berlin, Germany. E-mail: thekla.kauffmann@rz.hu-berlin.de

**3534.** Zawal, A.; Mrowinski, P. (2000): Zsynchronizowany wylot *Cordulia aenea* (Linnaeus, 1758). In: Czeczuga, B. & J.L. Rybak (Eds): XVIII Zjazd hydrobiologów Polskich w Białymstoku. Szacunek dla wody. Materiały zjazdowe. 4-8. IX 2000. Polskie Towarzystwo hydrobiologiczne zakład biologii ogólnej am w Białymstoku: 300. (in Polish). [Synchronized emerging of larvae of *Cordulia aenea*. Between 10.00 to 17.00 h, along a 50m<sup>2</sup> great stretch of a *Carex*-belt, 48 specimens emerged at 02/05/1999. The process of emerging lasted in the mean app. 5 hours. Emerging was induced by a high water temperatures in the shallow zone of the pool from 9°C at 9.00 h to 22°C at 16.00 h. The day prior and after emerging was overcast with low water temperatures; no emerging could be observed.] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Waska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

## 2001

**3535.** Adams, M.J.; Pearl, C.A.; Bury, R.B.; Nebeker, A.V. (2001): Introduced fish increases survival of introduced bullfrogs. Ecological Society of America Annual Meeting, 86th Annual Meeting in Madison, WI, August 2001: 41. (in English). [Verbatim: We hypothesized that nonnative bluegill (*Lepomis macrochirus*) are facilitating the survival of nonnative bullfrogs (*Rana catesbeiana*)

through an indirect effect mediated by dragonfly larvae (Aeshnidae) in western North America. Aeshnid larvae were capable of high predation rates on bullfrog larvae in laboratory experiments and reduced survival to zero in field enclosures with either native fish (*Richardsonius balteatus*) or no fish. Adding bluegill increased survival of bullfrog larvae from zero to 20% when aeshnids were present but had no effect when aeshnids were absent. Field surveys at 57 permanent ponds in Oregon and Washington revealed higher bullfrog abundance and lower predaceous macroinvertebrate abundance when nonnative fish were present but this pattern was weak. We conclude that bluegill facilitate survival of bullfrog larvae in PNW ponds but field surveys suggest that other factors may have more important effects on bullfrog distribution and abundance.] Address: Adams, M. J.; Pearl, C.A.; Bury, R.B.; Nebeker, A.V., USGS Forest & Rangeland Ecosystem Science Center, Corvallis, OR 97330 US Environmental Protection Agency, Corvallis, OR 97330, USA

**3536.** Anonymus (2001): Bienenfresser überbringt seiner Partnerin eine Libelle. Kosmos & Natur, Juni 2001: 6-7. (in German). [The courtship behaviour of the bee-eater (*Merops apiaster*) is pictured: a male juggles a *Libellula quadrimaculata* in front of a female.] Address: natur media GmbH, Belfortstr. 8, D-81667 München, Germany

**3537.** Bernard, R. (2001): Badania biologii i rozmieszczenia wazek (Odonata) prowadzone w Zakładzie Zoologii Ogólnej UAM w Poznaniu. Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materiały zjazdowe, Spala, 14 - 16 wrzesnia 2001, Poznan: 20-21. (in Polish). ["Research activities of the Department of General Zoology at the Adam Mickiewicz University with special emphasis to the biology and distribution of Odonata". - Odonatological research in Poznan, Poland, dates back more than 70 years. J. Urbanski, J. Musial, and R. Bernard are odonatologists well known abroad of Poland. More recent research focus on mapping the Polish dragonflies to prepare distribution maps of the Polish Odonata, and the ecology of selected species as *Nehalennia speciosa*, *Cercion lindenii*, and species with range extensions as *Aehna affinis*, and *Anax ephippiger*. A German translation of the paper is available by P. Buczynski, or the IDF.] Address: Bernard, R., Dept of General Zoology, Adam Mickiewicz University, Fredry 10, PL-61-702 Poznan, Poland; E-mail: rbernard@main.amu.edu.pl

**3538.** Bönsel, A.; Höning, D. (2001): Die Zukunftsfähigkeit nationaler Schutzkategorien. Zeitschrift für angewandte Umweltforschung 14: 268-277. (in German with English summary). [The paper critically reflects the recent situation of German nature conservation activities with special emphasis on protected areas. Some odonatological examples underline success and failure of species directed actions plans. Many examples document that it will not be possible to save the species exclusively in protected areas. This requires special measures outside of protected areas.] Address: Bönsel, A., Vasenbusch 15, D-18337 Gresenhorst, Germany. E-mail: andre.boensel@gmx.de

**3539.** Bowler, J. (2001): New Odonata records from Seychelles 1998-2000. Phelsuma 9: 56-57. (in English). [13 species from the islands of Aride, Grande Soeur, Praslin, La Digue, and Curieuse are briefly annotated.]

Address: Bowler, J., Shepherds's Cottage, Heylipol, Tیره, Scotland PA77 6TY, UK

**3540.** Brendonck, L.; Michels, E.; De Meester, L.; Riddoch, B. (2001): Temporary pools are not 'enemy-free'. *Hydrobiologia* 486: 147-159. (in English). ["Temporary pools are traditionally considered as refuges where the conspicuous anostracans are protected from predation. While this is true for the size-selective predation by fish, there is compelling evidence that invertebrate predation is an important biotic stress regulating temporary pool communities. In rock pools in southeastern Botswana, we studied the impact of some suspected invertebrate predators on populations of the freshwater anostracan *Branchipodopsis wolffi* by means of observations and manipulative experiments. In a survey of 45 pools, the relationship between *B. wolffi* natural population sizes and the abundance of suspected predators were never negative for turbellarians and mosquito larvae. When dragonfly larvae, notonectids or tadpoles were present, the anostracan populations were generally non-existent or very small. In enclosure experiments with turbellarians, there was a significant effect of predation within one hour of the start; the average daily predation rate was about 1/4 anostracan per turbellarian. Anostracans from a pool with few turbellarians were slightly less vulnerable than those from a turbellarian-rich pool. Furthermore, there was an indication of males being predated on more than females. With dragonfly larvae and notonectids, the predation effect was marked with all six anostracans in an experiment eaten in less than one day by a single predator (predation rate: about one anostracan every 2 h per predator). In a behavioral study, both sexes of *B. wolffi* avoided swimming above sediment that held more turbellarians than the open patches; there was no evidence for chemical communication with respect to this behavior." (Authors)] Address: Brendonck, L., Laboratory of Aquatic Ecology, K.U. Leuven, De Beriotstraat 32, B-3000, Leuven, Belgium. E-Mail: Luc.Brendonck@bio.kuleuven.ac.be

**3541.** Buczynski, P. (2001): Wpływ intensywnego rolnictwa na wazki (Odonata): przykład okolic Krzczoczowa (Wyzyna Lubelska). *Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materiały zjazdowe, Spala, 14 - 16 września 2001, Poznan: 22.* (in Polish). ["Odonata and intensive agriculture exemplified for the region of Krzczoczów (Wyzyna Lubelska)". Between 1998 and 2000, 37 odonate species could be observed. Compared to other areas in the Lublin region, app. 10-20 species are lacking. Most of the taxa are concentrated on habitats in the small floodplains and meadows of the rivers, while the bordering areas are inhabited only by few species. A German translation of the paper is available by P. Buczynski, or the IDF.] Address: Buczynski, P., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3542.** Faton, J.-M. (2001): Le libellules de la forêt de Saou. *Le Courrier des Epines drômoises* 103: 37. (in French). [A total of 27 odonate species (not listed in this paper) are known from the Saou-woods (Drôme, France). Three habitats are described in more detail: The standing water body of Le Pas de Lestang is habitat of *Lestes barbarus*, *Ischnura pumilio*, *Coenagrion scitulum*, and *Sympetrum flaveolum*. The water courses of La Vèbre au Pertuis and the Lauzens are inhabited by

*Cordulegaster boltonii immaculifrons*, and *Onychogomphus f. forcipatus*.] Address: Faton, J.-M., Réserve Naturelle des Ramières, les Garis, F-26120 La Baume Cornillane, France. E-mail: Fatonjm@aol.com

**3543.** Gaines, K.H. (2001): Are 'sinkholes' aptly named? Larval odonate ecology and adult species diversity in southeastern New Mexico. *Ecological Society of America Annual Meeting, 86th Annual Meeting in Madison, WI, August 2001: 281.* (in English). [Verbatim: The Bitter Lake National Wildlife Refuge is an unusual complex of alkaline salt flats interspersed with wetlands and water-filled sinkholes. Recent collections of over ninety species of adult dragonflies and damselflies on the refuge suggest that the highest diversity of odonates in New Mexico may occur in this relatively small area. The composition of the resident breeding population and the factors that contribute to the observed adult species diversity were unknown. In order to resolve these issues, odonate exuviae, larvae, and adults were collected periodically at more than thirty-five sinkholes exhibiting a wide range of physical and biological characteristics. Habitat data (water chemistry, aquatic vegetation, and fish species assemblages) were also collected at each sinkhole and used to determine ecological correlates of larval species diversity and distribution. Exuviae of one odonate species were the only exuviae found at many of the sinkholes surveyed, indicating larval tolerance of a wide range of ecological conditions. In contrast, exuviae of several species observed as adults throughout the refuge were found at only a few sinkholes, suggesting larval stenotopy (primarily with respect to water salinity) and thus limited suitable breeding habitat availability for those species. The composition of species breeding successfully at sinkholes did not correspond to the adult species composition found to date, indicating that these sinkholes may indeed represent sinks for dispersing individuals rather than sources of species diversity.] Address: Gaines, Karen, Dept Biol., Univ. of New Mexico, Castetter Hall, Albuquerque NM 87131, USA. E-mail: kgaines@umm.edu

**3544.** Gossum, H. van; Stoks, R.; De Bruyn, L. (2001): Male mate choice for female colour morphs: frequency and method dependence. *Animal behaviour* 61: F31-F34. (in English). [The authors compile current studies and theories on male mate choice, and discuss constraints of study design. This paper is a welcome provisional appraisal on the subject, and offers some insight in studies necessary in near future.] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**3545.** Hermans, J.T. (2001): The dragonfly fauna of the Weerterbos. *Natuurhistorisch Maandblad* 91: 270-274. (in Dutch with English summary). [The Netherlands; "During a field survey weekend on 9 and 10 June 2001, members of the Natuurhistorisch Genootschap observed 19 different species of dragonfly. Six of these were present in large numbers: *Calopteryx splendens*, *Pyrrhosoma nymphula*, *Ischnura elegans*, *Coenagrion puella*, *Anax imperator*, and *Libellula quadrimaculata*. Over the past four years (1998-2002), 37 dragonfly species have been observed, 20-25 of which can be regarded as permanent or occasional residents. The most unusual species found was *Calopteryx virgo* whose occurrence is restricted to some parts of the Oude

Graaf brook." (Author)] Address: Hermans, J.T.; Herestraat 21, NL-6067 ER Linne, The Netherlands

**3546.** Herrmann, J. (2001): Aluminium is harmful to benthic invertebrates in acidified waters, but at what threshold(s)? *Water Air Soil Pollut.* 130(1/4): 837-842. (in English). [The paper compiles and assesses literature on acidification effects related to the contributing impact of increased aluminium levels at low pH on benthic invertebrates. The evidence on *Enallagma* sp., *Soma-tochlora cingulata*, and *Libellula julia* (Mackie, 1989; Correa et al., 1987; Rockwood et al., 1990) indicates, the odonate larvae are relatively resistant.] Address: Herrmann, J., Freshw. Ecol. Group, Dept Biol. & Environ. Sci., Univ. Kalmar, P.O. Box 905, S-391 82 Kalmar, Sweden

**3547.** Jacquemin, G. (2001): Les marais salés de Lorraine. Premier bilan entomologique (Bescançon 1999). *Bulletin de la société lorraine d'entomologie* 8: 6-11. (in French). [Starting in 1992, the halophilous entomofauna of the Lorraine (France) region was surveyed. A total of more than 400 species, including 31 halophilous species was traced. The list of species includes 28 Odonata; none of these species can be classified as halophilous. *Lestes dryas*, *Coenagrion mercuriale*, *Libellula fulva*, and *Orthetrum coerulescens* are listed as remarkable species. No locality data is given.] Address: Jacquemin, G., Biologie des Insectes, Université H. Poincaré, Nancy 1, BP 239, F-54506 Vandoeuvre-lès-Nancy, France

**3548.** Kano, K. (2001): Dragonflies preserved in amber. *Gekkan-Mushi* 345: 5-7. (in Japanese). [The author briefly introduces into Japanese fossils (taken from layers of the later Miocene, the later Pliocene, and the later Pleistocene) and the process of fossilization in amber. He reports on collection material of the Kuji Amber Museum, Kuji City, Iwate Pref., Japan representing material from Domenica and Kaliningrad (Russia). (for more details see Digest of Japanese Odonatological Short Communications 12).] Address: Kano, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**3549.** Kano, K. (2001): Dragonflies prey on cicadas, *Moganmia minuta* Matsumura. *Nature & insects* 36(1): 35. (in Japanese). ["I sighted *M. minuta* was preyed on by an expectedly lot of species of dragonflies at Kainan, Ishigaki island, on May 2- 5, 1995. It was cloudy and occasionally rainy. This cicada appears from March to July on Ishigaki island; the body length: 2.2-2.3 cm, the smallest in Japan, and it sings on ziiiiiii on leaves of sugar cane. It feeds on the sap from veins of leaves, and perches on the upper side in action and at rest on the underside. So far there have been a few report made on cicadas as prey of dragonflies; *Platypleura kaempferi* Fabricius by *Ictinogomphus clavatus* (Fabricius) (Corbet, 1999), *Graptopsaltria nigrofusca* Motschulsky by *Anotogaster sieboldii* (pers. com. Kurashina). Most of preys are Dipterans and *Moganmia minuta* of Hemipteran may be a rare case. I found a male *Asiagomphus yayeyamensis* (Oguma) subduing and eating a *M. minuta* at grass field in a branch stream of the Miyara River on Ishigaki island on May 2. The dragonfly bit the head of the prey and subdued the cicada, then chewing it, removing the wings onto the ground and finished consumption for five minutes. On that day two species were seen that preyed on *M. minuta* beside the dragonfly; *Orthetrum s. sabina* (Drury) and *O. pruinosum*

*neglectum* (Rambur). In general, there are two modes of foraging; one is midair foraging and the other, gleaning (Corbet, 1999). In Anisopteran dragonflies, they adopt mostly midair foraging and in Zygopteran, gleaning, glean small insects such as aphids perching on grasses. The above three species usually take the midair foraging mode, by darting to flying insects from their perches, however, in the afternoon on May 5 *O. s. sabina* attacked *M. minuta* that perched on a leaf of Japanese pampas grass, and the latter flew away with a scream. Thereafter I saw the dragonfly approached and attacked twice on *M. minuta* perched on grasses. In this case, dragonflies searched and attacked the preys perching on the upper side of leaves of grasses, though they usually hide underside of leaves. In gleaning capture success may be lower and not so more effective than midair foraging. It was cloudy and occasionally rainy, and flying insects were not seen, therefore the dragonflies took the mode of gleaning." (Taken from Digest of Japanese Odonatological Short Communications 12, 2002)] Address: Kano, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**3550.** Knijf, G. de (2001): Libellen in Vlaams-Brabant: stand van zaken van het verspreidingsonderzoek. *Brakona jaarboek 2000*: 53-57. (in Dutch). [Odonata in Vlaams-Brabant: the current status of the mapping project - On a fundament of 39000 records, the current status of the knowledge on the odonate fauna of Vlaams-Brabant, Belgium is discussed. A total of 67 species is mapped; in the period between 1990-1999, 59 species could be recorded. Many species are discussed and all species are documented in a table. Their presence in three different periods and their grid-frequencies are outlined.] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**3551.** Kowalczyk, J.K.; Szczepko, K. (2001): Inwentaryzacja entomofauny terenów porolnych w fazie renaturyzacji w zachodniej części Kampinoskiego P.N.. *Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materiały zjazdowe, Spala, 14 - 16 września 2001, Poznan*: 40. (in Polish). [After abandonment of agriculture, the western part of the Polish Kampinoski Nationalpark was restored. In 1998, 25 odonate species were recorded; *Sympetrum pedemontanum* is the only odonate species listed.] Address: Kowalczyk, J.K., Muzeum Przyrodnicze UL, ul. Kilinskiego 101, PL-90-011 Łódź, Poland

**3552.** Kurzatowska, A.; Pakulnicka, J.; Czachorowski, S. (2001): Badania entomologiczne w Katedrze Ekologii i Ochrony Środowiska UWM w Olsztynie. *Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materiały zjazdowe, Spala, 14 - 16 września 2001, Poznan*: 41-42. (in Polish). [Among the entomological surveys of the Department of Ecology and Environmental protection of the UWM Olsztynie, Poland, 16 are of odonatological content.] Address: Kurzatowska, Alicja, Katedrze Ekologii i Ochrony Środowiska UWM w Olsztynie, Poland

**3553.** Kuska, A. (2001): Entomologia amatorska na Górnym Śląsku. *Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materiały zjazdowe, Spala, 14 - 16 września 2001, Poznan*: 42. (in Polish). [Poland; the importance of amateur research on insects is exemplified using among



others the paper of Sakwiewicz & Zak (1966) on the Silesian Odonata.] Address: Kuska, A., Katedra Nauk Biologicznych AWF, Katowice, ul. Raciborska 1, Poland

**3554.** Letowski, J. (2001): Aktualne kierunki badan entomologicznych w Zakladzie Zoologii UMCS. Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materialy zjazdowe, Spala, 14 - 16 wrzesnia 2001, Poznan: 46-47. (in Polish). [Current research activities at the Dept of Zool., Marie Curie-Sklodowska University, Lublin, Poland, including Pawel Buczynski's impressive studies on Odonata are briefly outlined.] Address: Letowski, J., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland

**3555.** Margolis, B.E.; Raesly, R.L.; Shomway, D.L. (2001): The effects of beaver-created wetlands on the benthic macroinvertebrate assemblages in two Appalachian streams. *Wetlands* 21(4): 554-563. (in English). [The effects of beaver impoundments on the benthic macroinvertebrate assemblages were examined in 2 small streams in Somerset Co., Pennsylvania and Garrett Co., Maryland, USA. Cordulegaster was among the dominant taxa above the impoundment, Chromagrion, Calopteryx, Boyeria, Erythemis, and Plathemis occurred below the impoundment, and Gomphus and Epitheca within it. The presence of submerged aquatic vegetation was responsible for the Chromagrion and Boyeria occurrence below the impoundments. Generally, taxonomic and functional changes in benthic macroinvertebrate assemblages of the beaver-altered streams were a results of direct (impoundment) and indirect (changes in temperature, water chemistry, plant growth) alterations of the stream environment.] Address: Margolis, B.E., New Jersey Dept. Envir. Prot., Bureau Freshw. & Biol. Monitoring, P.O. Box 427, Trenton, NJ 08625-0427, USA)

**3556.** McPeck, M.A.; Turgeon, J.; Thum, R.; Stoks, R. (2001): Generating biodiversity: The phylogeography of a North American insect radiation. *Ecological Society of America Annual Meeting, 86th Annual Meeting in Madison, WI, August 2001*: 156. (in English). [Verbatim: Recent phylogenetic analyses have shown that two lineages of North American Enallagma damselflies (Odonata: Coenagrionidae) radiated very recently to give 18 extant species, and ecological studies have demonstrated that multiple habitat shifts occurred as part of this radiation. We are now using phylogenetic analyses using a 940 bp mtDNA fragment to reconstruct how speciation proceeded during this radiation. The phylogenetic relationships and geographic distributions of 54 haplotypes identify E. hageni as the ancestor of one radiating lineage. These data also show that E. hageni is comprised of disjunct Continental and Atlantic races that are indicative of restrictions to separate refuges during the last glacial period. Nine new species arose by at least three different speciation mechanisms from the Continental hageni race as it expanded its range following glacial retreat, but no new species arose from the Atlantic race. Three coastal plain endemics show very low genetic diversity and were each derived by a few populations differentiating from the Continental hageni in a local area. Three other widely distributed species show substantial polyphyletic origins within the Continental hageni. Parallel speciation events driven by habitat shifts appear to have created two of these species, and sharply contrasts with the apparent lack of ecologi-

cal differentiation in the third. These results taken with previous studies suggest that both ecological and non-ecological speciation mechanisms can simultaneously drive radiation events.] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: rob-by.stoks@bio.kuleuven.ac.be

**3557.** Mocek, B.; Mikat, M. (2001): The second contribution to the knowledge of the dragonfly fauna (Odonata) in the Nature Monument "Na Plachte", eastern Bohemia, Czech Republic. *Acta Mus. reginaehradecensis (A)* 28: 135-142. (in Czech, with English summary). [Compared with records made between 1997-2000, the number of thermophilous species (e.g. Aeshna affinis, Anaciaeschna isocles) has increased, while some psychrophilous taxa (species preferring lower temperatures) have disappeared (Leucorrhinia pectoralis, L. dubia). 5 species were added to the list, totalling now at 37 species.] Address: Mocek, B., Regional Museum of Eastern Bohemia, Dept Natural History, Eliscino Nábřeží 465, CZ-50001 Hradec Králové, Czech Republik. E-mail: mvc@mvc.anet.cz

**3558.** Monnerat, C. (2001): Prolongement de la periode de vol de certains odonates en octobre 2001. *Bull. romand Ent.* 19(2): 95-106. (in French with english summary). [An extension of the flying period in western Switzerland was noticed in October 2001 in several species, most particularly in Enallagma cyathigerum, Ischnura elegans, and I. pumilio. Bad weather conditions in September did not cause a significant mortality, and favourable weather in October favoured the adult longevity. The 2001 evidence is compared with 4990 observations made during 1989-2000, 99 of which were made in October. In addition, phenological of Calopteryx splendens, Chalcolestes viridis, Lestes sponsa, Sympecma fusca, Aeshna cyanea, A. grandis, A. juncea, A. mixta, Somatochlora arctica, Orthetrum brunneum, Sympetrum fonscolombii, S. pedemontanum, S. sanguineum, S. striolatum, and S. vulgatum are documented.] Address: Monnerat, C., Centre suisse Cartogr. Faune, Terreaux 14, CH-2000 Neuchatel, Switzerland. E-mail: christian.monnerat@cscf.unine.ch

**3559.** Napiórkowska-Kowalik, J.; Letowski, J. (2001): Stan poznania entomofauny Lublina. *Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materialy zjazdowe, Spala, 14 - 16 wrzesnia 2001, Poznan: 50-51.* (in Polish). [The authors document the present knowledge on the entomofauna of the town of Lublin, Poland. Within the borders of the town, at present 28 odonate species could be traced. ] Address: Letowski, J., Dept of Zool., Marie Curie-Sklodowska University, Akademicka 19, PL-20-033 Lublin, Poland

**3560.** Piotrowski, W. (2001): Wyniki badan entomologicznych w Poleskim Parku Narodowym do konca 2000 r.. *Polskie Towarzystwo Entomologiczne: 44 Zjazd, Polskiego Towarzystwa Entomologicznego, Materialy zjazdowe, Spala, 14 - 16 wrzesnia 2001, Poznan: 54-55.* (in Polish). [While in 1994, no odonate species were known for the Poleskie Nationalpark, Poland, 51 species had been recorded in the succeeding period up to 2000.] Address: Piotrowski, W., Poleski park Narodowy, Urszulin, Poland

**3561.** Rolando, A. Boano, G. (2001): Aggressive interactions and demographic parameters in Libellula fulva

(Odonata, Libellulidae). *Advances in Ethology* 36: 253-254. (in English). [Verbatim: Male aggressive interactions and demographic parameter of the dragonfly *Libellula fulva* were studied for four years at a low marshy site in north-western Italy. Individuals were caught and marked with white marking fluid. Perching males attacked every dragonfly passing near the perch. The mean conspecific attack distance was significantly longer than the heterospecific one and this suggests that males were able to discriminate among species, at least partially. Sex ratio was very biased toward males and adult females were in fact rather rare. Life span estimates were similar to field observations, both suggesting most males stayed alive for less than 10 days. Male aggressive behaviour may be viewed as an adaptation to a sexual environment where the time for reproduction is very short and the probability of meeting a partner is very low. Such an aggressive behaviour may enhance the probability of males catching and copulating with females which are flying through the site. It is significant that the releaser of aggressive attacks, as demonstrated by experimental tests, is the moving individual, not the individual per se. Weather conditions influenced male behaviour, attack distance being significantly and positively related to light intensity. We believe the aggressive pattern observed in *Libellula fulva* cannot be properly classed as territoriality. In this case, in fact, the classical "defence of resources" approach does not work because males did not defend any resources located inside their hypothetical territories. We suggest aggressive interactions may be, in reality, mere attempts to catch females.] Address: Rolando, A. & G. Boano, Dipartimento di Biologia Animale e dell'Uomo, Turin University, Italy

**3562.** Stav, G.; Kotler, B. P.; Blaustein, L. (2001): Effect of risk of predation on two temporary pool species (*Bufo viridis* and *Culiseta longiareolata*). *Ecological Society of America Annual Meeting, 86th Annual meeting in Madison, WI, August 2001*: 211. (in English). [Verbatim: Green toad (*Bufo viridis*) tadpoles and mosquito larvae (*Culiseta longiareolata*) are highly vulnerable to predation by the dragonfly nymph, *Anax imperator*. We assessed various responses of tadpole and mosquito larva to caged *Anax* in artificial pools. We compared responses in seven treatments (five replicate pools each) of various combinations of presence or absence of: one caged *Anax*, 30 *Bufo* tadpoles and 100 *Culiseta* larvae. Caged *Anax* were fed with 1 tadpole and 3 mosquito larvae once a week. *Culiseta* females oviposited more in pools without *Bufo*. *Bufo* were more prevalent farther from *Anax* in the absence of *Culiseta*, but closer to *Anax* when *Culiseta* were also present. *Culiseta* larvae did not respond spatially to caged *Anax* in the absence of *Bufo*, but when *Bufo* were present, they were more prevalent closer to the predator. The presence of *Culiseta*, but not *Anax*, affected time to and size at metamorphosis, and survival of *Bufo* tadpoles. Both the presence of *Anax* and water turbidity affected color of *Bufo* tadpoles. When *Anax* was present or when water was cloudy, *Bufo* tadpoles were lighter in color. In the lab, lighter colored tadpoles were more vulnerable to *Anax* in clear water, while no difference was found in cloudy water. This study shows the complexity of predation risk on prey species, and its potential effect on temporary pool community.] Address: Blaustein, L., Life Science Department and Mitrani Center for Desert Ecology, Blaustein Institute for Desert Research, Ben-Gurion University, Sede-Boqer Campus, 84990, Is-

rael Community Ecology Laboratory, Institute of Evolution, University of Haifa, 31905, Israel

**3563.** Steglich, R. (2001): Libellen (Odonata). In: *Arten- und Biotopschutzprogramm Sachsen-Anhalt, Landschaftsraum Elbe. Berichte des Landesamtes für Umweltschutz Sachsen-Anhalt, Sonderheft 2/2001*: 342-352. (in German). [The Federal State of Sachsen-Anhalt, Germany elaborated an extensive study (comprising more than 700 pages) for habitat and species conservation in the floodplain of the River Elbe. Rosmarie Steglich contributed the chapter on Odonata. The odonatalogical importance of the region is outlined, and some consideration on research activities necessary to solve some open questions on the status of rare species are made. *Aeshna affinis*, *A. viridis*, *Lestes barbarus*, *Erythromma viridulum*, *Ophiogomphus cecilia*, *Calopteryx splendens*, *Epitheca bimaculata*, *Stylurus flavipes*, *Gomphus vulgatissimus*, and *Leucorrhinia pectoralis* are commented. In addition, the paper contains a list of unpublished expertises with odonatalogical data, and distribution maps of *A. affinis*, *L. barbarus*, *A. viridis*, *E. viridulum*, *O. cecilia*, and *C. splendens*.] Address: Steglich, Rosmarie, Quittenweg 53, 39118 Magdeburg, Germany

**3564.** Stevens, L.E.; North, E.; Meretsky, V.J. (2001): Wings and mucus in space and time: Patterns of invertebrate biogeography in Grand Canyon. *Ecological Society of America Annual Meeting, 86th Annual meeting in Madison, WI, August 2001*: 349. (in English). [Verbatim: Taxa with vastly differing vagility may encounter similar dispersal challenges in complex terrain over evolutionary time. Diverse topography and Pleistocene-Holocene climate changes have affected invertebrate biogeography in the Grand Canyon region. Museum collections and published data allowed us to examine the biogeographic role of Grand Canyon as a barrier/filter, corridor, refuge, or null effect. We studied the distribution of landsnails, Odonata, Orthoptera, semi-aquatic Heteroptera, butterflies, and bees. Grand Canyon is a barrier/filter that limits the northward expansion of desert species, and a southern boundary for some Rocky Mountain taxa. The neoregional inner Grand Canyon desert is depauperate and has low levels of endemism, a conclusion supported by the distribution of 31 semi-aquatic Heteroptera, 110 butterflies and skippers, 38 Colorado River chironomid midge species. Butterfly diversity in the desert (42 taxa) is lower than that on either rim (58 and 77 species on the South and North rims, respectively), and that in southern Arizona. The positive relationship between butterfly diversity and elevation is likely an artifact of the small, isolated area of low desert habitat, the evolutionarily brief time (10,000 yr) it has supported desert vegetation, and the long-linear habitat shape. Similar patterns exist among 20 landsnail taxa, with only one endemic snail at one inner canyon spring. However, more than 60 percent of invertebrate taxa are affected by the Grand Canyon as a biogeographic feature. ] Address: not stated

**3565.** Stoks, R.; McPeck, M.A.; Turgeon, J.; Thum, R. (2001): Intercontinental phylogeography of an insect radiation and its ecological implications. *Ecological Society of America Annual Meeting, 86th Annual meeting in Madison, WI, August 2001*: 212. (in English). [Verbatim: Phylogenetic reconstructions provide historical hypotheses for the development of biodiversity in an ecological context. We are investigating the diversification

of one clade of *Enallagma* damselflies on three continents. Based on mtDNA data, this clade appears to have originated in eastern North American lakes containing fish -10 million years ago, with 38 extant North American species. Moreover, about half of these species are derived from the radiation of two lineages in association with the last glacial period (15,000 years ago). Most of these new species are found only in fish lakes, but at least two independent adaptive habitat shifts into fishless waters where large dragonflies are the top predators also occurred. Substantial morphological evolution associated with adapting to dragonfly predation was associated with these habitat shifts. Interestingly, the three Eurasian and one North African *Enallagma* species are derived from an ancestor that split from the North American clade ~900,000 years ago. These four species are also derived from a radiation event that occurred at the same time as the North American radiation. The morphology of one Eurasian species that is distributed from Spain to Russia is very similar to the fishless-lake species of North America, but this species is found in both fish and fishless waters. These data suggest a number of testable hypotheses about differences in the role of fish predation in structuring littoral communities on the two continents.] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

## 2002

**3566.** Akkermans, R.W. (2002): Dragonflies in the Roermond urban area. *Naturhistorisch Maandblad* 91: 103-107. (in Dutch, with English summary). ["A two-year survey of the urban area of the city of Roermond, The Netherlands found 22 species of dragonfly. There are three different water systems within the Roermond urban area: the river Meuse, the river Roer and the Maasnielderbeek brook, each with its own typical dragonfly community. The Meuse system has the smallest number of species, but houses rheophile species like *Calopteryx splendens* and *Platycnemis pennipes*. The Roer, a small river, has a wide spectrum of species, dominated by rheophile species like *C. splendens*, *P. pennipes*, and *Gomphus vulgatissimus*, the latter a red-listed species. The Maasnielderbeek is a brook which was converted to a series of more or less static ponds in the process of urban expansion. These static ponds house the largest numbers of species within the Roermond urban area, including especially species of stagnant water like *C. puella*, *Pyrrhosoma nymphula*, *Aeshna mixta*, and *Sympetrum striolatum*. Finally, the urban area includes a number of garden ponds. These were found to house only the most common species present in the surrounding areas, and added no further species to the survey." (Author)] Address: Akkermans, R.W., Wilhelmialaan 47, NL-6042 EL Roermond, The Netherlands

**3567.** Alonso-Eguia, L.P.E.; Gonzalez-Soriano, E.; Gutierrez-Yurrita, P.J. (2002): Listado y distribución de los odonatos de la Cuenca del Río Moctezuma, Centro-Occidente de México (Insecta: Odonata). *Folia Entomologica Mexicana* 41(3): 347-357. (in Spanish with English summary). ["The Moctezuma basin is located in junction of three North American freshwater ecoregions:

1) Springs in the headwaters of Río Verde, 2) Rivers and streams in Tamaulipas-Veracruz and 3) Watersheds of the Lerma river system and has been considered as a zone of top priority for the National Board for the knowledge and Use of the Biodiversity (CONABIO). The high deterioration rate of the aquatic ecosystems of the Moctezuma river system make necessary to promote and reinforce this kind of studies to gather information concerning the biological conservation of the ecosystem ecological processes that give biological identity of the area. The main purpose of this study was to know the species of odonata and their distribution in the river Moctezuma Basin. Seventy eight species of Odonata belonging to 36 genera and 10 families were recorded; the family Libellulidae and Coenagrionidae, *Argia* genus in particular, are of special interest due to their great number of species. Four species are new records for Guanajuato, four for Hidalgo and one for San Luis Potosí. *Progomphus belyshevi* is striking for its rarity to this region; *Hetaerina americana* and *Macrothemis pseudimitans* were the more distributed species in the basin. Approximately 70% of the species are limited to one or two localities; 78.5% of Zygoptera and 59.2% of Anisoptera are of neotropical affinity." (Authors)] Address: Gutierrez-Yurrita, P.J., Biología, Facultad de Ciencias Naturales, Universidad Autónoma de Querétaro, Centro Universitario s/n, Cerro de las Campanas, Santiago de Querétaro, QRO, 76010, México; E-Mail: yurrita@sunserver.uaq.mx

**3568.** Bamnowska, A.; Zawal, A. (2002): Odonate fauna of Binowskie Lake. All-Poland scientific conference "Insect conservation in Poland", Abstracts of papers. *Pol. Tow. Ent., Poznani & Univ. Warmirisko-Mazurski, Olsztyn*: 29. (in Polish). [The odonate fauna of the Binowskie lake near Szczecin in NW Poland is composed of largely common species as *Enallagma cyathigerum* (dominance: > 10%), and *Coenagrion puella*, *C. pulchellum*, *Erythromma najas*, *Ischnura elegans*, and *Platycnemis pennipes* (dominance: each > 5%). No additional species are mentioned.] Address: Polskie Towarzystwo Entomologiczne, Ul Dabrowskiego 159, PO-60-594 Poznan

**3569.** Barnett, H.K.; Richardson, J.S. (2002): Predation risk and competition effects on the life-history characteristics of larval Oregon spotted frog and larval red-legged frog. *Oecologia* 132(3): 436-444. (in English). ["We conducted an artificial pond experiment to test hypotheses about the effects of competition and non-lethal predator cues on metamorphic characteristics of sympatric Oregon spotted frogs (*Rana pretiosa*) and red-legged frogs (*R. aurora*) in southwestern British Columbia. Tadpoles were exposed to the presence or absence of one another, two density levels and to the presence or absence of predacious odonate larvae (*Aeshna palmata*) isolated in enclosures. In the artificial pond study, *R. aurora* were significantly larger at metamorphosis (12%) and exhibited only slightly longer larval periods when exposed to *Aeshna*. In the presence of *R. pretiosa*, they significantly decreased time to metamorphosis, and were significantly larger at metamorphosis (12%) than those reared alone. *Rana pretiosa* in treatments with *R. aurora* were somewhat larger at metamorphosis when a non-lethal predator was present, and in treatments where *R. pretiosa* were alone with a predator tadpole mass at metamorphosis was smaller than those in the absence of *Aeshna*, but these results were not statistically significant. Both species reduced activity



and moved away from the predator in the presence of an enclosed dragonfly larva in the laboratory. Most tadpole mesocosm experiments have found that the trade-off between size and timing of metamorphosis is extremely important to amphibians, but we suggest that the trade-off discussed in traditional amphibian models may not apply to species like *R. pretiosa* that are exposed to the same grape-limited predators upon reaching metamorphosis." (Authors)] Address: Barnett, Heidy, Department of Forest Sciences, University of British Columbia, 3041-2424 Main Mall, Vancouver, BC, V6T 1Z4 Canada; E-Mail: Heidy.Barnett@ci.seattle.wa.us

**3570.** Bechly, G.; Sach, V.J. (2002): An interesting new fossil dragonfly (Anisoptera: Libellulidae: "Brachydiplacini") from the Miocene of Germany, with a discussion on the phylogeny of Tetrathemistinae and a fossil list for the locality Heggbach. *Stuttgarter Beiträge zur Naturkunde Serie B (Geologie und Paläontologie)* 325: 1-11. (in English with German summary) ["A new dragonfly species, *Parabrachydiplax miocenica* n. gen. n. sp. (Anisoptera: Libellulidae), is described from the early Middle Miocene of Heggbach in southern Germany. The holotype was collected by the priest J. PROBST in 1865 and represents the earliest record of fossil insect remains from the Upper Freshwater Molasse of Baden-Württemberg. The phylogenetic position of this new genus and species is discussed. It is a very primitive Libellulidae of the subfamily Tetrathemistinae, and can be attributed within the latter taxon to a basal grade within the clearly paraphyletic tribus "Brachydiplacini". The accompanying fauna and flora of *Parabrachydiplax miocenica* n. gen. n. sp. is presented, based on a newly revised fossil list for the locality Heggbach." (Authors)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**3571.** Bechly, G.; Ueda, K. (2002): The first fossil record and first New World record for the dragonfly clade Chlorogomphida (Insecta: Odonata: Anisoptera: Araripechlorogomphidae n. fam.) from the Crato Limestone (Lower Cretaceous, Brazil). *Stuttgarter Beiträge zur Naturkunde Serie B (Geologie und Paläontologie)* (328): 1-11. (in English). ["A new dragonfly is described from the Lower Cretaceous limestones of the Crato Formation (Brazil): *Araripechlorogomphus muratai* n. gen. n. sp. (Araripechlorogomphidae n. fam.) which clearly belongs to the chlorogomphid clade within Anisoptera. It is the first fossil record of Chlorogomphida and also the first New World record of this dragonfly group that is now exclusively distributed in East Asia. The phylogenetic and biogeographic implications of this new discovery, are discussed. As consequence of the phylogenetic analysis the new higher taxa Cristotibiata, Paucipostnodalia, Eubrachystigmata, Neobrachystigmata, Paneurypalpidomorpha, Eurypalpidomorpha, and Eurypalpidiformia are introduced. A monotypic family Juracordulidae n. fam. is established for the genus *Juracordulia*, and the genus *Prohemeroscopus* is transferred from Nannogomphidae to a new monotypic family *Prohemeroscopidae* n. fam. within Paucipostnodalia as sister-group of Eubrachystigmata." (Authors)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**3572.** Bernard, R.; Buczynski, P.; Tonczyk, G. (2002): Status, threats to, and conservation of the odonate fau-

na of Poland. All-Poland scientific conference "Insect conservation in Poland", Abstracts of papers. *Pol. Tow. Ent., Poznani & Univ. Warmirisko-Mazurski, Olsztyn*: 8-9. (in Polish). [The summary refers on current activities of Polish odonatologists preparing an distribution atlas of the odonate fauna, on most recent odonatological phenomenes as range extensions of southern species to Poland, and on considerations to focus conservation activities on habitats and specialized species. A German translation of the paper is available from IDF or P. Buczynski.] Address: Polskie Towarzystwo Entomologiczne, Ul Dabrowskiego 159, PO-60-594 Poznani

**3573.** Biber, E. (2002): Habitat analysis of a rare dragonfly (*Williamsonia lintneri*) in Rhode Island. *Northeastern Naturalist* 9(3): 341-352. (in English). ["*W. lintneri* is a rare dragonfly species restricted to southern New England and some northern states. In 1999, I tested the hypothesis that upland development around wetlands reduces habitat suitability for *W. lintneri* through increased nutrient runoff. I examined 27 wetlands and analyzed water quality and depth data, the composition of aquatic invertebrate assemblages, and land use patterns. Sites where *W. lintneri* was present did not differ in water quality from sites where it was absent (i.e., null sites). However, *W. lintneri* sites had significantly deeper levels of water throughout the summer, were dry for shorter periods of time, and had significantly lower levels of development in the surrounding uplands than did null sites. These results suggest that both hydrologic cycle and upland development are important in limiting the local distribution of this species." (Author)] Address: Biber, E., Yale School of Forestry and Environmental Studies, 370 Prospect Street, New Haven, CT, 06511, USA. E-Mail: eric.biber@aya.yale.edu

**3574.** Brauckmann, C.; Herd, K.J. (2002): Insekten-Funde aus dem Westfalium D (Ober-Karbon) des Piesberges bei Osnabrück (Deutschland). Teil 1: Palaeoptera. *Osnabrücker Naturwissenschaftliche Mitteilungen* 28: 27-69. (in German with English summary). ["In this first part of a monograph on the hitherto known fossil insects (exclusively Blattodea) from Westphalian D beds of the Piesberg quarry near Osnabrück (Lower Saxony, Germany) the palaeopteran taxa are described. They are distributed among the Palaeodictyoptera (*Homoioptera kortumi* n. sp., *Breyeria brevis* n. sp., *B. bistrata* Brauckmann, 1995, *B. solida* Brauckmann & Herd, 2000, *Hasala inferiorsaxonica* Brauckmann, 1995), Megasecoptera (*Aspidothorax tristrata* n. sp., *A. aestatis* Brauckmann, 1991, *Pyebrodia martinsnetoi* n. gen. n. sp.), Diaphanopteroidea (*Piesbergala leipnerae* n. gen. n. sp.), and Odonatoptera (*Erasipterella piesbergensis* Brauckmann, 1983)." (Authors)] Address: Brauckmann, C., Institut für Geologie und Paläontologie, TU Clausthal, Leibnizstr. 10, D-38678 Clausthal-Zellerfeld, Germany. E-mail: Carsten.Brauckmann@tu-clausthal.de

**3575.** Buczynski, P.; Czachorowski, S.; Serafin, E.; Szczepanski, W. (2002): Is a nature reserve the optimal place for conservation of aquatic insects?: an example of dragonflies and caddisflies (Odonata, Trichoptera) in the "Kosno Lake" Nature Reserve. All-Poland scientific conference "Insect conservation in Poland", Abstracts of papers. *Pol. Tow. Ent., Poznani & Univ. Warmirisko-Mazurski, Olsztyn*: 30-31. (in Polish). [The nature Reserve 'Kosno Lake' (app. 53.34N 20.19E) was surveyed for its odonate fauna. Within the borders of the reserve,

14 species, and outside the bords 30 species could be recorded. It is concluded that the area of the nature reserve should be expanded. A German translation of the paper is available from P. Buczynski.] Address: Polskie Towarzystwo Entomologiczne, Ul Dabrowskiego 159, PO-60-594 Poznani

**3576.** Buczynski, P.; Lewandowski, K. (2002): Is a period of 200 years sufficient for dragonfly exploration of a region: exemplified on dragonflies of the Northpolish lake district. All-Poland scientific conference "Insect conservation in Poland", Abstracts of papers. Pol. Tow. Ent., Poznani & Univ. Warmirisko-Mazurski, Olsztyn: 31-32. (in Polish). [The paper outlines some milestones in odonatological survey of the Polish lake district. In spite of the fact, that it is explored quite intensify, some periods are nearly without any odonate data. Thus, it will not be possible to analyse the importance of some ancient human exploitation activities on the fauna in a more regional scale, or it will not be possible to analyse the range extensions of some southern species in the last decades. The paper can be understood as an appeal for a long term monitoring of the fauna.] Address: Polskie Towarzystwo Entomologiczne, Ul Dabrowskiego 159, PO-60-594 Poznani

**3577.** Buskens, R.; Mars, H. de (2002): Attention for moorland pools in Limburg. *Naturhistorisch Maandblad* 91: 195-201. (in Dutch, with English summary). [The ecological value and the variation in moorland pools in terms of their ecohydrological position in the context of the landscape in Limburg, The Netherlands are outlined. Some typical species including the Odonata are briefly annotated.] Address: Buskens, R.; Mars, H. de, Royal Haskoning, Postbus 1754, NL-6201 BT Maastricht, The Netherlands

**3578.** Buss, D.F.; Baptista, D.F.; Silveira, M.P.; Nesimian, J.L.; Dorville, L.F.M. (2002): Influence of water chemistry and environmental degradation on macroinvertebrate assemblages in a river basin in south-east Brazil. *Hydrobiologia* 481: 125-136. (in English). ["Benthic macroinvertebrate assemblages, water chemistry variables and environmental degradation were investigated in an Atlantic Forest region in Brazil. Seven sites of the Guapimirim river basin were studied during three sampling periods based on the rain regime: end of wet season (May 1998), dry season (August 1998), and wet season (January 1999). Four substrates were collected at each site: sand, stony substrates, litter in pool areas and litter in riffle areas. Relationships between macroinvertebrate assemblages, water chemistry variables and environmental degradation were examined using canonical correspondence analysis (CCA). According to CCA, concentrations of dissolved oxygen and chloride, and the environmental degradation, measured by the Riparian Channel Environment index, exhibited the strongest relationship to macroinvertebrate assemblages. Overall, the loss of community diversity measured by the Shannon Index along the degradation gradient was observed. Some taxa were shown to be sensitive to water pollution, especially among Plecoptera, Trichoptera, Coleoptera and some Ephemeroptera, while others such as Simuliidae, Odonata and molluscs were tolerant to moderate levels of pollutants. The Chironomidae were the only group tolerant to a high level of pollutants and degradation." (Authors)] Address: Buss, D.F., Laboratorio de Avaliacao e Promocao da Saude Ambiental, Departamento de Biologia, IOC, FIOCRUZ,

Av. Brasil 4365, Manginhos, CEP 21045-900, Rio de Janeiro, RJ, Brazil. E-Mail: buss@centroin.com.br

**3579.** Carron, G. (2002): *Leucorrhinia albifrons* (Burmeister, 1839), nouvelle espece de libellule (Odonata) pour le canton de Geneve. *Bull. romand Ent.* 20(1): 45-49. (in French). [1 male, Moulin-de-Vert(Cartigny), 17-VIII-2000. This is the first record for the canton of Geneva, Switzerland. The habitat is described in detail.] Address: Carron, G., C.P. 250, CH-2002 Neuchâtel, Switzerland

**3580.** Catling P.M. (2002): Decline of *Gomphus fraternus fraternus* (Odonata: Gomphidae) in Lake Erie. *Great Lakes Entomologist* 34(1) (2001): 1-7. (in English). ["Collections and literature reports indicate that *Gomphus fraternus fraternus* was abundant on the shoreline of Lake Erie prior to 1960, and "tens of thousands" were reported at Long Point Bay. After 1960 there were no reports from the shoreline, although there have been a number of comprehensive studies that have included the shoreline area and a number of Odonata specialists have also visited the Lake Erie shoreline regularly. A survey of portions of the Lake Erie shoreline, including the Long Point Bay area in 1999 and 2000, during the established peak and late peak flight period in southwestern Ontario, did not result in any observations. It is concluded that *G. fraternus* has declined substantially in Lake Erie and is possibly extirpated from the lake. The decline appears to have occurred between 1950 and 1960, and thus approximates the mid-1950s decline of burrowing mayflies in Lake Erie, which has been associated with warm weather oxygen depletion and pollution. Although it may never be possible to precisely determine the cause of the decline of *G. fraternus*, it is likely that a number of factors are involved including climatic warming, pollution, changes to the shoreline, other effects of shoreline development, and introduced species." (Author)] Address: Catling P.M., 2326 Scrivens Drive, R.R. No. 3, Metcalfe, ON, KOA 2P0, Canada

**3581.** Cordero, A.; Andres, J.A.. (2002): Male coercion and convenience polyandry in a calopterygid damselfly. *Journal of Insect Science*, 2:14: 7 pp. ["Copulation in odonates requires female cooperation because females must raise their abdomen to allow intromission. Nevertheless in *Calopteryx haemorrhoidalis haemorrhoidalis* males commonly grasp ovipositing females and apparently force copulations. This has been interpreted as a consequence of extreme population density and male-male competition. We studied this behavior at two sites on a river that had different densities over three years. As predicted, at high densities most matings were forced (i.e. not preceded by courtship), but at low density most were preceded by courtship. Courtship matings were shorter at high density, but density did not affect the duration of forced matings. Females cooperated in forced matings even if they had very few mature eggs. Furthermore, females mated more times if they experienced higher male harassment during oviposition, and at low density second and subsequent matings were more likely to be forced. We interpret these results to mean that females engage in "convenience polyandry", because they gain more by accepting copulation than by resisting males. The results also suggest that females might trade copulations for male protection, because under extreme population density harassment by males is so intense that they

can impede oviposition." (Authors) This paper includes three videos that can be accessed at <http://insect-science.org/2.14>

**3582.** Costa, J.M.; Lourenco, A.M.; Vieira, L.P. (2002): *Micrathyria pseudhypodidyma* sp. n. (Odonata: Libellulidae), com chave das especies do genero que ocorrem no Estado do Rio de Janeiro. *Neotrop. Ent.* 31(3): 377-389. (in Portuguese, with English summary). [The new species is described, illustrated, and compared with *M. hypodidyma*. Holotype ♂: Brazil, Rio de Janeiro, Restinga de Marambaia, 1942; paratypes: 2 ♂♂, Goiás State; deposited at UFRJ. The congeners (*M. almeidai*, *M. artemis* Ris, *M. atra*, *M. borgmeieri*, *M. catenata*, *M. hesperis*, *M. mengeri*, *M. hypodidyma*, *M. ocellata*, *M. pirassunungae*, *M. pseudeximia*, *M. spinifera*, *M. spuria*, *M. stawiarskii*, *M. ungulata*) from the state of Rio de Janeiro are illustrated, keyed, and commented.] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: [jcosta@unisys.com.br](mailto:jcosta@unisys.com.br)

**3583.** Dathe, W.; Piechocki, R. (2002): Juan Cristóbal Gundlach - una vida para la ciencia, una vida en 'modestia biblica'. In: Dathe, W. & R.M. González López (Ed.): *Johann Christoph Gundlach (1810-1896). Una naturalista en Cuba / Naturforscher auf Cuba*. ISBN. 3-925347-65-8.: 125-136. (in German and Spanish). [Wilfried Dathe and Rosa María González López edited a book on the Cuban naturalist J.C. Gundlach, born in Marburg, Germany. 11 chapters treat several aspects on the person Gundlach, and on his scientific vita. Special emphasis is given to birds, amphibs, molluscs, and the flora. The book includes a commented translation of his autobiography and a list of his correspondance as far as it was to trace. Regrettably, few information on Gundlach's entomological activities are given. Gundlach co-operated with H. A. Hagen by shipping specimens; Hagen's publications on the Cuban Odonata are based substancially on the collections of Gundlach, and his accompanying descriptions of the dragonflies in life condition (!) (compare: Hagen, H.A. (1867): *Die Neuropteren der Insel Cuba*. *Stettiner entomol. Zeitung* 28: 215- 232; Hagen, H.A. (1868): *The odonata-fauna of the island of Cuba*. *Proceedings of the Boston society for natural history* 11: 289- 294; Hagen, H.A. (1868): *Odonaten Cubas*. *Stettiner entomol. Zeitung* 29: 274-287). In addition, Gundlach published a comprehensive work on the Odonata of Cuba by himself (Gundlach, J.C. (1888): *Contribución á la entomología Cubana*. *Neurópteros*. Habana, Alvarez & Co. 2: 189-281). This publication was failed to notice for long years. P.P. Calvert traced it, and commented critically on Gundlach's publication (see: Calvert, P.P. (1919): *Gundlach's work on the odonata of Cuba, a critical study*. *Transactions of the American entomological society* 45: 335- 396; Calvert, P.P. (1921): *On Gundlach's work and on Enallagma pollutum and E. vesperum*. *Ent. news* 32: 32). In a chapter (pages 125-136) the correspondance of Gundlach with Carl Robert von Osten Sacken, Herman August Hagen, and Philip Reese Uhler is outlined. This interesting book - priced 24,50 Euro - can be obtained by W. Dathe.] Address: Dathe, W., Hegelstr. 73, D-06114 Halle/Saale, Germany. E-mail: [wilfried.dathe@gmx.de](mailto:wilfried.dathe@gmx.de)

**3584.** Dolny, A.; Miszta, A.; Parusel, J. (2002): Dragonfly conservation perspectives in the Czech and Polish parts of the Upper Silesia. All-Poland scientific con-

ference "Insect conservation in Poland", Abstracts of papers. *Pol. Tow. Ent., Poznani & Univ. Warmirisko-Mazurski, Olsztyn*: 33-34. (in Polish). [The odonate fauna of the Czech-Polish border region is analyzed in terms of common conservation measures for the odonate fauna. Two main data pools exist: one from the beginning of the 20th century, and one resulting from studies between 2000 and 2002. It is concluded that most nature reserves (n=189) in the region are insufficient to protect Odonata. Only 23 nature reserves aim to conserve aquatic habitats. The restoration of water bodies with the rare and threatened *Stratiotes aloides* would give the opportunity to re-establish *Aeshna viridis* in the region.] Address: Available from *Pol. Ent. Soc. Polskie Towarzystwo Entomologiczne, Ul Dabrowskiego 159, PO-60-594 Poznani*

**3585.** Dorda, D. (2002): *Biotope und Schutzgebiete der Kreisstadt Homburg. Ein Beitrag zum kommunalen Umweltschutz. Kreis- und Universitätsstadt Homburg (Hrsg.)*. ISBN 3-924653-30-5: 73 pp. (in German). [Saarland, Germany; *Aeshna juncea* is mentioned for the valley of the Lambsbach.] Address: Kreis- und Universitätsstadt Homburg, Rathaus, Am Forum 5, D-66424 Homburg, Germany

**3586.** Evans, H.E. (2002): A review of prey choice in Bembicine sand wasps (Hymenoptera: Sphecidae). *Neotropical Entomology* 31(1): 1-11. (in English). ["The prey of 132 species of Bembicini (Hymenoptera) that have been studied is reviewed. About three quarters of the species prey on Diptera, and it is believed that fly predation is ancestral in the group. Eleven species make occasional or regular use of other insects as prey in addition to Diptera (Lepidoptera, Hymenoptera, Neuroptera, Odonata, and/or Homoptera), while 21 species of five genera prey on insects of these same five groups with no use of Diptera. It is hypothesized that this represents an evolutionary progression, whereby populations have experienced shortages of dipterous prey in the past and have broadened their sensory focusing to include other groups of flying insects. Behavior initially learned has, over time, been reinforced genetically to produce the currently observed radiation in prey choice within the group." (Author)] Address: Evans, H.E., Dept. Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, CO, 80523-1177 USA

**3587.** Fagan, W.F.; Siemann, E.; Mitter, C.; Denno, R.F.; Huberty, A.F.; Woods, H.A.; Elser, J.J. (2002): Nitrogen in insects: Implications for trophic complexity and species diversification. *American Naturalist* 160(6): 784-802. (in English). ["Disparities in nutrient content (nitrogen and phosphorus) between herbivores and their plant resources have lately proven to have major consequences for herbivore success, consumer-driven nutrient cycling, and the fate of primary production in ecosystems. Here we extend these findings by examining patterns of nutrient content between animals at higher trophic levels, specifically between insect herbivores and predators. Using a recently compiled database on insect nutrient content, we found that predators exhibit on average 15% greater nitrogen content than herbivores. This difference persists after accounting for variation from phylogeny and allometry. Among herbivorous insects, we also found evidence that recently derived lineages (e.g., herbivorous Diptera and Lepidoptera) have, on a relative basis, 15% - 25% less body



nitrogen than more ancient herbivore lineages (e.g., herbivorous Orthoptera and Hemiptera). We elaborate several testable hypotheses for the origin of differences in nitrogen content between trophic levels and among phylogenetic lineages. For example, interspecific variation in insect nitrogen content may be directly traceable to differences in dietary nitrogen (including dilution by gut contents), selected for directly in response to the differential scarcity of dietary nitrogen, or an indirect consequence of adaptation to different feeding habits. From some functional perspectives, the magnitude rather than the source of the interspecific differences in nitrogen content may be most critical. We conclude by discussing the implications of the observed patterns for both the trophic complexity of food webs and the evolutionary radiation of herbivorous insects." (Authors). Predatory Odonata (n=2) were tested against herbivory Ephemeroptera (n=3) ((tab. 1). Within ordinal groups, mean predator N content always exceeded the corresponding herbivore mean. The difference between Odonata and Ephemeroptera was 2.20%. The mean within-order difference was 1.34%. More details may be available at <http://www.nceas.ucsb.edu/ecostoichiometry>.] Address: Fagan, W.F., Department of Biology, University of Maryland, College Park, Maryland 20742, USA. E-mail: [bfagan@glue.umd.edu](mailto:bfagan@glue.umd.edu)

**3588.** Faton, J.-M. (2002): Le libellules de la mare du vallon de Combau. Le Courrier des Epines drômoises 109: 51. (in French). [A survey of the locality, situated in the Drôme-region (France) at 1350 asl, resulted in 8 odonate species.] Address: Faton, J.-M., Réserve Naturelle des Ramières, les Garis, F-26120 La Baume Cornillane, France. E-mail: [Fatonjm@aol.com](mailto:Fatonjm@aol.com)

**3589.** Feiber, A.L.; Rangarajan, J.; Vaughn, J.C. (2002): The evolution of single-copy Drosophila nuclear 4f-rnp genes: Spliceosomal intron losses create polymorphic alleles. *Journal of Molecular Evolution* 55(4): 401-413. (in English). ["This study provides the first report in which spliceosomal intron losses within a single-copy gene create functional polymorphic alleles in a population. 4f-rnp has previously been shown to be a nuclear gene that is localized on the X chromosome in *D. melanogaster* and to have eight short spliceosomal introns. An insect species survey was done via polymerase chain reaction (PCR) amplification and sequencing of a 1028-bp gene fragment spanning introns 4-8, which are located in the 3' half of the gene. The results show that 4f-rnp and (thus far) introns 7 and 8 are at least as old as order Odonata, an early-diverging insect line. Unexpectedly, several species within the dipteran family Drosophilidae were found to contain two differently sized 4f-rnp gene sequence variants, owing to precise inframe intron losses. Results of single-male *D. melanogaster* PCR analyses show that the two gene size variants are allelic and that the intron loss mechanism appears to be biased toward the 3' end of the gene. A stable potential stem-loop has been identified in *D. melanogaster*, predicted to fold the 4f-rnp mRNA 3' terminus into a natural primer for subsequent reverse transcription into cDNA. When results are displayed in a phylogenetic context, multiple independent intron loss events are identified. These observations support a model in which frequently occurring cDNAs have led to numerous independent intron losses via homologous recombination/gene conversion during 4f-rnp gene evolution. The results provide insights into the evolution of intron loss and may lead to improved understanding of

the dynamics of this process in natural populations." (Authors)] Address: Vaughn, J.C., Dept of Zoology, Miami University, Oxford, OH, 45056, USA. E-Mail: [vaughnjc@muohio.edu](mailto:vaughnjc@muohio.edu)

**3590.** Fleck, G. (2002): Contribution à la connaissance des odonates de Guyane française. Notes sur les genres *Epigomphus* Hagen, 1854 et *Phyllocycla* Calvert, 1948 (Anisoptera, Gomphidae). *Bull. Soc. Entomol. France* 107: 493-501. (in French, with English summary). ["The larva of *Epigomphus hylaeus* Ris, 1916, and the true larva of *Phyllocycla neotropica* Belle, 1970, are described and illustrated for the first time. The differences with the other known larvae of these genera are listed. For both genera, a key in French and in English is given to separate the unambiguously known ultimate instars larvae. The previously unknown female of *Phyllocycla neotropica* is briefly described and illustrated. A reared larva of *Phyllocycla modesta* Belle, 1970, yielded a female showing a thoracic color pattern different from that of the allotype described by Belle (1970)."] (Author)] Address: Fleck, G., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [fleck@mnhn.fr](mailto:fleck@mnhn.fr)

**3591.** Fleck, G.; Nel, A. (2002): The first isophlebioid dragonfly (Odonata: Isophlebioptera: Campterothlebiidae) from the Mesozoic of China. *Palaeontology* 45(6): 1123-1136. (in English). ["*Bellabrunetia catherinae* gen. et sp. nov., the first Chinese Mesozoic isophlebioid dragonfly, is described. This fossil is the first known Isophlebioptera with well-preserved body structures, demonstrating that the fore- and hindwings are of very different size and shape in Campterothlebiidae, and that the female Campterothlebiidae had an endophytic way of oviposition, unlike the Isophlebiidae." (Authors)] Address: Fleck, G., Laboratoire d'Entomologie and CNRS UMR 8569, Muséum National d'Histoire Naturelle, 45 rue Buffon, F-75005, Paris, France. E-Mail: [fleck@mnhn.fr](mailto:fleck@mnhn.fr), [anel@mnhn.fr](mailto:anel@mnhn.fr)

**3592.** Fleck, G. (2002): Une larve d'Odonate remarquable de la Guyane française, probablement *Lauro-macromia dubitalis* (FRASER, 1939) (Odonata, Anisoptera, 'Corduliidae'). *Bulletin de la Société Entomologique de France* 107(3): 223-230. (in French, with German and English summary). [From French Guyana, a last instar larva of the neotropical "cordulid" *Lauro-macromia* Geijskes, 1970 - probably *L. dubitalis* - is described in detail. The "larvae show well-developed lateral spines on abdominal segments 3 to 9 which is unusual for cordulegastrid-like or libellulid-like larvae. In the libellulid-like larvae, the lateral spines are generally confined on segments 8 and 9. Traditionally the genus *Lauro-macromia* was considered to be a member of the Gomphomacromiinae sensu Davis & Tobin (1985). The features of the larva clearly demonstrate that the genus *Lauro-macromia* cannot be considered as a Gomphomacromiidae sensu Carle (1995) because of the presence of raptorial setae on the labial palp which are a clear synapomorphic character to the "Macromiid-Cordulid-Libellulid-Complex" sensu Carle, 1995 (= *Valvulida* sensu Lohmann, 1996) (= *Trichodopalpida* sensu Bechly, 1996)."] (Author)] Address: Fleck, G., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [fleck@mnhn.fr](mailto:fleck@mnhn.fr)

**3593.** Geraeds, R.P.G.; Schaik, V.A. van (2002): Observations on the distribution and ecology of the Club-

tailed dragonfly (*Gomphus vulgatissimus*) along the river Roer. *Natuurhistorisch Maandblad* 91: 113-118. (in Dutch with English summary). [*G. vulgatissimus* has always been a rare species in the province of Limburg, The Netherlands. "During an intensive inventory in 2000 and 2001, however, 1597 exuviae of this species were found along the river Roer. Observations on the adult dragonflies were also recorded. The species can be found along the entire river. The greatest densities of exuviae were found between Herkenbosch and Roermond. Here, the larvae find ideal conditions in slow-flowing muddy parts of the river. Most larvae emerge vertically and close to the waterline (0-0.5 m). They seem to prefer emerging among the vegetation. The average length of the exuviae was 29.5-30mm." (Authors)] Address: Geraeds, R., Julianalaan 46, NL-6042 JH Roermond, The Netherlands

**3594.** Gibbons, L.K.; Reed, J.M.; Chew, F.S. (2002): Habitat requirements and local persistence of three damselfly species (Odonata: Coenagrionidae). *Journal of Insect Conservation* 6(1): 47-55. (in English). ["Habitat requirements and population persistence were investigated in three damselfly species, all coastal plain pond specialists: *Enallagma recurvatum*, *E. laterale*, and *E. pictum*. Because of geographic restriction, two are of special concern to conservation, *E. recurvatum* and *E. laterale*. We surveyed more than 70 ponds on Cape Cod, Massachusetts, and collected adult presence-absence data during the summers of 1999 and 2000. We achieved a detection rate approaching 100% for each species by visiting each pond up to three times. We looked for relationships between the presence of each damselfly species and presence of specific aquatic vegetation, the presence of the other *Enallagma* species, and the number of ponds within various distances of the 72 surveyed ponds. Using stepwise logistic regression, we found the following significant associations: *E. recurvatum* with the rush *Juncus militaris*; *E. laterale* with water lilies (*Nuphar variegatum* and *Brasenia schreberi*) the damselfly *E. pictum*, and the number of ponds within 2 km; and *E. pictum* with the water lily *Nymphaea odorata*, the damselfly *E. laterale*, and the number of ponds within 1.5 km and 2.5 km. Presence-absence data were used to calculate turnover and local extinction rates for each species between the two years. *E. recurvatum*'s turnover and local extinction rates (33.3% and 41% respectively) were much higher than either *E. laterale* (9.8%, 11.5%) or *E. pictum* (7.7%, 10%). These results suggest that *E. recurvatum* occurs in a metapopulation, and that patch colonization rates might be important to local population persistence." (Authors)] Address: Reed, J.M., Dept Biol., Tufts Univ., Medford, MA 02155, USA. E.mail: mreed@tufts.edu

**3595.** Goldschmid, U.; Grotzer, C. (2002): Anlage und Management eines Teiches als ökologische Ausgleichsmaßnahme: Das Tritonwasser auf der Wiener Donauinsel. *Denisia* 3: 25-45. (in German with English summary). ["In 1989 the Department of Water Res decided to set up an about 2 ha large pond. It was to fulfil exclusively ecological functions and to serve as a further stepping-stone in a chain of humid biotopes. Special consideration was given to the demands amphibious animals, water- and reed-birds and dragonflies make on a water body. The design of the pond and its environment were derived from the ecological requirements as: well structured shoreline with bays, islands

and peninsulas; flat riparian zones; deep water zones which will not freeze; high structural diversity by initial plantings of submerged and emergent vegetation. The construction work was carried out during winter of 1989/90. The basin of the pond was sealed with a 30 cm-thick layer of clay. The substratum ranges along the gradient from sands to coarse gravel. The gradients of the slopes reach a maximum of 1:2, but are at an average of 1:5 to 1:10. Parts of the pond are separated by gravel ridges into several individual sections, which get an individual character from a hydrologic and faunistic point of view. The pond was filled via a feeding pipeline from the New Danube. Initial plantings were carried out, mainly with a variety of marsh and aquatic plants. These endemic plants were taken from several detention reservoirs of Vienna's rivers. The succession processes and colonization by animals and the increase of plants are subjected to a scientific long-term monitoring project." (Authors)] Address: Goldschmid, Ulrike, Wilhelminenstrasse 93, MA 45 - Wasserbau, A-1160, Wien, Austria. E-Mail: gol@m45.magwien.gv.at

**3596.** Harding, D.; Thompson, J. (2002): Habitat use by the Seychelles fineliner damselfly (*Teinobasis alluaudi*) on Silhouette island, Seychelles. *Phelsuma* 10: 35-40. (in English). [In 2002, research on the island located 4 sites for this species providing new data on appearance, vegetation use by teneral and adults, colour development, and oviposition. Apparent preference for alien vegetation (*Clidemia hirta*, *Paraserianthes falcataria*) is attributed to males preferring an open vegetation structure.] Address: Harding, D., Sch. Biol. Sci., Univ. Sussex, Palmer, Brighton, BN1 9QJ, UK

**3597.** Heijligers, H. (2002): Boekbespreking: Libellen van Noordwest Europa. Determinatie, Verspreiding, Biotoopvoorkeur en Bedereiding van de libellensoorten van Noordwest-Europa. *Natuurhistorisch Maandblad* 91: 240. (in Dutch). [This is a brief book review of Wendler, A. & J.-H. Nüss. Vertaling: Willem Schipper. Bewerking: Arjan Stroo, Marcel Wasscher & Wendy Schuurmans, 2002. 136 pp. Jeugdbonduitgeverij, Utrecht. ISBN 90-5107-031-4.] Address: not stated

**3598.** Houston, W.A.; Duivenvoorden, L.J. (2002): Replacement of littoral native vegetation with the ponded pasture grass *Hymenachne amplexicaulis*: Effects on plant, macroinvertebrate and fish biodiversity of backwaters in the Fitzroy River, Central Queensland, Australia. *Marine & Freshwater Research* 53(8): 1235-1244. (in English). ["Changes in plant and macroinvertebrate communities were found following replacement of extensive zones of floating-attached/submergent native vegetation within Fitzroy River backwaters by the major environmental weed *Hymenachne amplexicaulis* (Poaceae). Impacts of *H. amplexicaulis* on native littoral flora and fauna (macroinvertebrates and fish) were assessed by comparing three sites previously supporting native vegetation and now invaded by *H. amplexicaulis* with nearby stands of native backwater vegetation. Plant biomass of *Hymenachne* plant beds was 30-fold greater than native plant beds, whereas plant species diversity (richness) was significantly less. Macroinvertebrate communities of *Hymenachne* beds were significantly lower in abundance of insect orders Ephemeroptera, Hemiptera and Odonata, while Coleoptera were more abundant in *Hymenachne* beds. Non-metric multidimensional scaling ordination of macroinvertebrate family abundance and composition data showed that

Hymenachne plant beds had a different assemblage to that in native plant beds. In common with other studies of weed invasions, an increased abundance of some vertebrate fauna was observed (in this case an introduced fish species *Xiphophorus maculatus* comprised 75% of fish captured in Hymenachne beds compared with 0% in native plant beds). Change in vegetation structure was implicated as an important factor influencing macroinvertebrate and fish faunal composition, and with potential to impact on waterbird habitat values of wetlands." (Authors)] Address: Houston, W.A., Centre for Environmental Management, Central Queensland University, Rockhampton, QLD, 4702, Australia. E-Mail: w.houston@cqu.edu.au

**3599.** Huguet, A.; Nel, A.; Martinez-Delclos, X.; Bechly, G.; Martins-Neto, R. (2002): Preliminary phylogenetic analysis of the Protanisoptera (Insecta: Odonatoptera). *Geobios* 35(5): 537-560. (in English). ["The Permian suborder Protanisoptera (Insecta: Odonatoptera) is revised and a new phylogenetic hypothesis proposed after analyses based on wing venation and different outgroups. After our study the families Camptotaxineuridae and Kaltanoneuridae are excluded from the Protanisoptera. After a new phylogenetic analysis, the family Permaeschnidae is redefined and the families Pholidoptilidae, Polytaxineuridae, Callimokaltaniidae and Hemizygoteridae are restored, as already proposed for the latter three families by Bechly (1996). The new genus *Proditaxineura* is described. The genus *Gondvanoptilon* ROSLER et al., 1981 is excluded from the Meganisoptera: Erasipteridae and re-included in the Permaeschnidae, as already proposed by Bechly (1998). *Permaeschna proxima* MARTYNOV, 1931 is considered as a junior synonym of *Permaeschna dolloi* MARTYNOV, 1931. *Pholidoptilon camense* ZALESSKY, 1931 is excluded from *Permaeschna* MARTYNOV, 1931 and the genus *Pholidoptilon* ZALESSKY, 1931 is restored. *Ditaxineurella stigmalis* MARTYNOV, 1940 is excluded from the Hemizygoteridae and considered as a Protanisoptera Incertae sedis." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**3600.** Jacunski, L.; Teszner, L.; Templin, J.; Napiórkoska, T. (2002): The case of oligomely in the larvae of the dragonfly *Aeshna grandis* L.. *Przegląd Zoologiczny* 46: 91-93. (in Polish with English summary). [A larva of *Aeshna grandis* with five legs (2/3) is documented and discussed.] Address: Teszner, Lidia, Zakład Zoologii Bezkręgowców, Instytut Biologii Ogólnej i Molekularnej, Uniwersytet M. Kopernika, ul. Gagarina 9, PL-87-100 Torun, Poland. E-mail: teszner@biol.uni.torun.pl

**3601.** Ketelaar, R. (2002): The status of the Northern Damselfly *Coenagrion hastulatum* in the Netherlands, a characteristic dragonfly of non-disturbed shallow lakes (Odonata). *Ned. faun. Meded.* 16: 1-10, col. phot. excl.. (in Dutch, with English summary). ["Between 1980-2000, the species disappeared from 7 localities, at present 16 populations are known in the southern and eastern Netherlands. These are reviewed, and circumstantial evidence is presented on the wandering of individuals over a distance of at least ca 2km."] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: ketelaar@vlinderstichting.nl

**3602.** Knötzsch, G. (2002): Das Auftreten mediterraner Libellenarten im Eriskircher Ried. *Naturschutz zwischen Donau und Bodensee* 1: 37-42. (in German). [Baden-Württemberg, Germany; a monitoring of Odonata starting in the end of the 1980th proves that so called mediterranean species as *Aeshna affinis*, *Crocothemis erythraea*, and *Sympetrum fonscolombii* meanwhile belong to the characteristic and permanent fauna of the area. It can be assumed that global warming is one of the main reasons of the range extensions of these species. The author outlines in some detail the ecological factors responsible for the occurrence of *A. affinis* in the area: this species depends on the high flood of lake Constance, and builds up large populations in a year with high flood, while it may lack in dry summers. Records of *Sympetrum meridionalis* in August 2002 are very remarkable. In addition, records of *Lestes barbarus*, *C. erythraea*, and *S. fonscolombii* are reported in detail, and a check-list comprising of 45 odonate species is added. The Eriskirchener Ried is definitely a "Prime Dragonfly Area" in (Western) Europe.] Address: Knötzsch, G., Friedrichstr. 44, D-88045 Friedrichshafen, Germany.

**3603.** Koperski, P. (2002): Factors determining diversity in diet composition: multivariate analysis of a guild of epiphytic predators. *Arch. Hydrobiol.* 155(2): 291-314. (in English). ["The diet composition of five species of epiphytic predators (the larval damselfly *Enallagma cyathigerum*, larval midge *Ablabesmyia monilis*, larval caddisfly *Cyrnus flavidus* and leeches *Erbobdella octoculata* and *E. nigricollis*), inhabiting *Stratiotes aloides* in the shallow littoral of three Polish lakes, was analysed using multivariate methods. The gut contents of individuals living in experimental mesocosms were also analysed to test the behavioural effects of the stimuli released by larger predators - fish and aquatic insects. The main aims of the study were: to determine the most important interactions between particular members of the guild of epiphytic predators, to explain interactions between the above and their feeding resources and to characterize the effects of experimentally simulated predatory pressure. A further aim was also to test if the diversity in dietary composition caused by intrinsic, species-specific feeding preferences is higher or lower than that caused by anti-predator changes in their feeding behaviour. To design the data matrix, the dietary composition of each of 595 individuals was characterised by 28 variables, designing at the numbers or percentage of prey taxa and prey ecological groups as well as the cumulative metrics and indices. [...] Individual dietary composition has customarily been seen as depending more markedly on the presence of stimuli from larger predator than on taxonomic specifics. The dietary compositions of the three insect species studied were more similar in natural conditions than in experimental habitats. The dietary composition of *E. nigricollis* was more distinct from the diets of the other species, and significantly different even from that of the congeneric species *E. octoculata*. Diets of leeches diverged more significantly in various feeding habitats than those of insect larvae. Moreover, the diversity to the dietary compositions of particular species feeding in natural lake conditions was lower than that to the composition noted for conspecifics feeding in different habitats." (Author)] Address: Koperski, P., Department of Hydrobiology, Institute of Zoology, Warsaw University, Banacha 2, 02-097 Warszawa, Poland. E-mail: koper@hydro.biol.uw.edu.pl



- 3604.** Kozak, A.; Zawal, A. (2002): Comparison of dragonfly communities in the open-land and forest small water bodies. All-Poland scientific conference "Insect conservation in Poland", Abstracts of papers. Pol. Tow. Ent., Poznani & Univ. Warmirisko-Mazurski, Olsztyn: 42. (in Polish). [In both water body types - located near Binowo, Poland - *Coenagrion puella* was the dominant species. The similarity of the dragonfly fauna of different sample localities accounted to 30-50%. The nearby situated open-land water bodies influenced the composition of the small forest water bodies, e.g. *A. viridis* - definitely no species of wooded habitats - could be observed in the forest water body.] Address: Available from Polskie Towarzystwo Entomologiczne, Ul Dabrowskiego 159, PO-60-594 Poznan
- 3605.** Kury, D.; Bauer-Stingelin, K. (2002): Änderungen der Libellengemeinschaft in der Zurlindengrube Pratteln zwischen 1986 und 1996. Mitt. naturf. Gesell. beider Basel 6: 15-22. (in German with English summary). [A comparison is made between the 1986 and 1996 odonate assemblages of the abandoned gravel pit, canton Basel-Landschaft, Switzerland. The alterations are probably due to management measures, aiming at the re-institution of some early succession stage habitats.] Address: Bauer-Stingelin, Fraumattstr. 51, CH-4410 Liestal, Switzerland
- 3606.** Laurila, A.; Pakkasmaa, S.; Crochet, P.-A.; Merila, J. (2002): Predator-induced plasticity in early life history and morphology in two anuran amphibians. *Oecologia* 132(4): 524-530. (in English). ["Predation pressure during early life stages is often high, but few studies have examined antipredator responses at these stages. We studied the effects of an egg predator (leech, *Haemopsis sanguisuga*) and two tadpole predators (dragonfly larvae, *Aeshna* spp.; and three-spine stickleback, *Gasterosteus aculeatus*) on the timing of hatching and morphology of hatchlings and young tadpoles in two anuran amphibians (*Rana arvalis* (RA) and *R. temporaria* (RT)) in a factorial laboratory experiment. We also compared the responses of two geographically separated RA populations on the Baltic island of Gotland and in Uppland on the Swedish mainland. We found inconsistent evidence for the predictions that the presence of an egg predator induces earlier hatching, and the presence of a larval predator delays hatching. RT hatched later in the presence of stickleback than in the control treatment, but RA hatched earlier, less developed and at smaller size in the leech, dragonfly, and stickleback treatments. There was no indication of predator-induced morphology in hatchlings of either of the species. However, young RA tadpoles had shorter tails and deeper bodies in the stickleback treatment and RT had shorter tails in the leech, dragonfly and stickleback treatments. Irrespective of treatment, RA from Gotland hatched with relatively longer bodies than Uppland individuals and had relatively deeper and short tails as young tadpoles. Our results highlight the diversity of induced responses to predators in anuran amphibians: predator presence affects the timing of hatching and morphology of young tadpoles, but these responses vary depending on the species and predator considered." (Authors)] Address: Laurila, A., Dept of Population Biology, Uppsala University, Norbyvagen 18D, 75236, Uppsala Sweden. E-Mail: anssi.laurila@ebc.uu.se
- 3607.** Lucas, M.J. (2002): Spinning Jenny and Devil's darning needle. ISBN 0-9544035-09: viii + 88 pp. (in English). [This attractive book - including 25 colour illustrations - on anthrop-odonatology is structured in the following main chapters: "Folknames" (pp.1-12), "Folklore, myth and legend" (pp. 13-20), "Literature, poetry and music" (pp. 39), "Illustrations, sculpture and carvings" (pp. 40--62), "Art nouveau" (pp. 63-64), "Religion" (pp. 65--66), "Food, medicine and decorations" (pp. 67-68), "Stamps" (pp. 69-76), and "Miscellaneous" (pp. 77--79). The Bibliography comprises more than 150 references. The presented evidence from various fields is not exhaustive (e.g. music and stamps), but even so, the book gives a wealth of (introducing) information.] Address: Lucas, M. Jill., 8 Camborne Dr., Fixby, Huddersfield, Yorks., HD2 2NF, UK
- 3608.** Malkmus, R. (2002): Die Verbreitung der Libellen Portugals, Madeiras und der Azoren. *Nachr. naturwiss. Mus. Stadt Aschaffenburg* 106: 117-143. (in German with English summary). [64 odonate taxa are known from continental Portugal, from the Madeira archipelago 6 species, and from the Azores 4 species. The "continental" species are mapped on the basis of the UTM grid, while the rest is only listed. The maps were prepared after critically revising museum specimens and published data. They include museum-, literature-, and field-collection-data of the author.] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany
- 3609.** Malkmus, R. (2002): Weitere Funde von *Macromia splendens* (Pictet) in Portugal (Anisoptera: Corduliidae). *Nachr. naturwiss. Mus. Aschaffenburg* 106: 144-147. (in German with English summary). [Six additional records from northeastern Portugal resulting from trips in 1997 and 2000 enhance the known distribution of *M. splendens* on the Iberian peninsula in a significant way. The localities - situated along the rivers Tâmega, Tua, Côa, and Anguiera - are described in detail, co-occurring species (e.g. *Gomphus graslinii* and *Oxygastra curtisii*) are listed.] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany
- 3610.** Meurgey, F. (2002): Contribution a la connaissance des odonates de la Guadeloupe (Antilles Françaises): signalement de *Tholymis citrina* (Hagen, 1876) et resultats des prospections 2001. *Bull. Soc. Sci. not. Quest Fr. (N.S.)* 24(3): 135-145. (in French with English summary). [The results of an odonatological survey in Guadeloupe Island, Lesser Antilles (Dec. 2001-Jan. 2002) are reported; 13 localities are described and mapped, and 16 species (including a first record of *T. citrina*) are listed. So far, 31 species were recorded from the island.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12 rue Voltaire, F-44000 Nantes, France
- 3611.** Meurgey, F. (2002): Nouveau site de reproduction pour *Gomphus vulgatissimus* (Linné, 1758) en Loire-Atlantique (Odonata, Gomphidae). *Bull. Soc. Sci. not. Quest Fr. (N.S.)* 24(4): 215-217. (in French with English summary). [La Sevre, near Clisson, France; the locality is described and information on the occurrence of the species in the department is provided.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12 rue Voltaire, F-44000 Nantes, France
- 3612.** Mitra, T.R. (2002): Geographic distribution of Odonata (Insecta) of eastern India. *Memoirs of the Zoological Survey of India* 19(1): 208 pp. (in English). [294 odonate species and subspecies are known to occur in eastern India. The geographic scope of eastern India

includes the fauna of the states Arunachal, Pradesh, Assam, Bihar, Manipur, Mizoram, Nagaland, Orissa, Sikkim, Tripura, and West Bengal. The monograph compiles the available odonatological information, contains keys for the identification of the species, their variations from the reference collections present in the Zoological Survey of India, compiles descriptions available in the Fauna of British India volumes, and outlines the geographical distribution in detail. "It also embodies description of new species of *Calicnemia* and *Gomphidia* and five indeterminate species, females of *Agriocnemis nana*, *Indothemis limbata limbata*." This is a little bit obscure, because *C. sudhaae* and *G. leonoraee* were described in Mitra, T.R. (1994): Observations on the habits and habitats of adult dragonflies of eastern India with special reference to the fauna of West Bengal. Rec. zool. Survey India (Occ. pap.) 166: 1-40. The indeterminate taxa are *Crocothemis indica* Sahní, 1964 = *C. servillia* (Drury, 1773), *Crocothemis misrai* Baijal and Agarwal, 1956 = *Trithemis aurora* (Burmeister, 1839), *Orthetrum ganeshii* Mehrotra, 1961 and *O. chandrabali* Mehrotra, 1961 = *Orthetrum triangulare* (Selys, 1878), and *Ictinogomphus distinctus* Ram (1985) = probably a synonym of *Ictinogomphus rapax* (Rambur, 1842), *Bradinyoga saintjohanni* Baijal & Agarwal, 1955 = *Bradinyoga saintjohanni geminata* (Rambur, 1842). The geographic distribution of the taxa is discussed in detail. A bibliography and an index contribute significantly to this valuable and commendable publication.] Address: Mitra, T.R., "M" Block, New Alipore, Kolkata 700 053, India

**3613.** Monnerat, C.; Gonseth, Y. (2002): Jahresbericht 2001. Odonata 2000. Nachrichten des Schweizer Zentrum für die Kartographie der Fauna 23: 6-7;-23-24. (in German and French). [In the framework of preparing the Red List of endangered Swiss Odonata, trends of population development of selected species were analyzed using a statistic program. The results were compared with the opinion and field experiences of dragonfly experts. A special survey of the rare *Brachytron pratense* was realized to check the trends. It is concluded that the opinion of the experts fits best to the reality. In addition, some so called data sheets on *Ceragrion tenellum*, *Sympetma paedisca*, *Gomphus similimus*, *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis*, *Calopteryx virgo*, *C. splendens*, *Sympetrum flaveolum*, *Lestes dryas*, *L. virens*, *Eitheca bimaculata*, *Coenagrion mercuriale*, and *Ophiogomphus cecilia* were prepared for publication in 2002. Furthermore, an update of the dragonfly atlas of Switzerland was discussed with the experts, and its scope was defined.] Address: Monnerat, C., Centre suisse Cartogr. Faune, Terreaux 14, CH-2000 Neuchâtel, Switzerland. E-mail: christian.monnerat@cscf.unine.ch

**3614.** Mustow, S.E. (2002): Biological monitoring of rivers in Thailand: Use and adaptation of the BMWP score. *Hydrobiologia* 479: 191-229. (in English). ["The performance of the BMWP biotic score, which is based on macroinvertebrates (including Odonata), in accurately classifying 23 sites on the River Ping system in northern Thailand, was assessed through comparison with physical and chemical data. Sites were located on the main River Ping, a highly polluted tributary (Kha Canal), a relatively unpolluted tributary (River Taeng) and an upland stream tributary system (River Klang). Data were collected between December 1990 and September 1993. The purpose of the research was to determine

whether the BMWP score, originally developed in the U.K., could be employed successfully in Thailand and potentially also in other subtropical and tropical developing countries. Biological monitoring techniques such as the BMWP score are low-tech, rapid means of assessing water quality, and involve significantly lower financial costs than chemical monitoring techniques. The BMWP score was capable of distinguishing between sites that were heavily impacted by organic pollution and relatively unpolluted sites, and showed some potential to identify lower levels of pollution. The overall performance was considered to be similar to that recorded in the U.K. It was noted during the study that several of the taxa used in the BMWP score were absent in Thailand and that other taxa were present that would potentially be useful indicators. The BMWP score was therefore modified by removing 15 taxa not present in Thailand and adding 11 replacement taxa. Also, in the modified score, 6 sets of families were combined due to taxonomic difficulties and 7 odonatan families were allocated lower scores. The modified procedure, named the BMWPTHAI score, did not significantly alter the way in which sites were classified, but was easier to use. There is strong potential for application of the BMWPTHAI score in Thailand and other developing countries, although some further testing is first recommended." (Author)] Address: Mustow, S.E., White Young Green Environmental, Arndale Court, Headingley, Leeds, LS6 2UJ, UK. E-Mail: stephen.mustow@wyg.com

**3615.** Muzlanov, Yu.A. (2002): Chronological dynamics of the distribution of wing venation anomalies in intrapopulation groups of *Calopteryx splendens* Harr. damselflies. *Ekologiya* (Moscow) 3: 209-214. (in Russian with English summary). ["The long-term dynamics of the number of full (normal) veins, venation anomalies, and linear parameters of the wings of *C. splendens* males from neighboring population groups were analyzed. Correlation analysis showed that some of the anomalies may emerge in addition to the full veins, whereas others are formed instead of them. The demoiselles from even-year generations had a significantly greater number of developmental abnormalities. This may have been caused by the sharp increase in the radiation level in the summer of 1986 due to the Chernobyl accident, which could have resulted in significant hereditary disorders manifested in the succession of generations of this genetic group. The emergence of venation abnormalities in demoiselle wings is a stochastic process, strengthened by both environmental and genetic stress. These anomalies may be considered as markers of the stability of ontogenetic processes, which greatly reflect the specific genotypic traits of individuals within a population. The analysis of average values for venation abnormalities in demoiselle wings is a more precise instrument for assessing ontogenetic stability than the levels of fluctuating asymmetry and general phenotypic variance." (Author)] Address: Muzlanov, Yu.A., Zarevskaya Secondary School of General Education, Zarya, Ryazan Russia

**3616.** Negishi, J.N.; Inoue, M.; Nunokawa, M. (2002): Effects of channelisation on stream habitat in relation to a spate and flow refugia for macroinvertebrates in northern Japan. *Freshwater Biology* 47(8): 1515-1529. (in English). ["1. The effects of channelisation on macroinvertebrates were examined in relation to a spate and flow refugia. Habitat components that can function as flow refugia were identified in a small, low-gradient

stream in northern Hokkaido, Japan. 2. Macroinvertebrates and their habitat characteristics (depth, current velocity and substratum) were sampled and measured in natural and channelised sections on three occasions: before, during and immediately after a spate. For macroinvertebrate sampling and habitat measurements, five (riffle, glide, pool, backwater and inundated habitats) and three (channelised-mid, channelised-edge and inundated habitats) habitat types were classified in the natural and channelised section, respectively. 3. The rate of velocity increase with discharge was compared among habitat types to determine which habitat types were less affected by increased discharge. The rate was the highest in riffles followed by glides and channelised-mids. Backwaters maintained low current velocity even at high flow. In addition, current velocity in both natural and channelised inundated habitats was low relative to other habitat types during the spate. 4. Through the spate, total density of macroinvertebrates in channelised-mids and taxon richness in both channelised-mids and edges decreased. In the natural section, however, such a significant decrease was not found except for taxon richness in pools. This indicated that the spate had a greater impact on assemblages in the channelised section. Riffle assemblages exhibited a rapid recovery immediately after the spate, suggesting the existence of flow refugia in the natural section. Among the habitat types we examined, backwaters and inundated habitats appeared to have acted as flow refugia, because these habitats accumulated macroinvertebrates during the spate. 5. The lower persistence of the macroinvertebrate assemblage in the channelised section was attributable to the lower availability of flow refugia such as backwaters and inundated habitats. Our results emphasised the importance of considering flow fluctuations and refugia in assessing the effects of channelisation. In addition, the lateral heterogeneity of stream channels should be considered in stream restoration and management." (Authors) "Davidius" ist listed in table 4.] Address: Negishi, J.N., Dept Forest Sci., Fac. Agriculture, Hokkaido Univ., Sapporo, Japan. E-mail: artp1496@nus.edu.sg

**3617.** Nel, A.; Huguet, A. (2002): Revision of the enigmatic Upper Carboniferous insect *Campyloptera eatoni* Brongniart, 1893 (Insecta: Odonatoptera). *Organisms Diversity & Evolution* 2(4): 313-318. ["*Campyloptera eatoni* Brongniart, 1893, the type species of the type genus of the Upper Carboniferous family Campylopteridae Handlirsch, is redescribed. It is not a Megasecoptera as previously supposed, but an Odonatoptera with a specialized wing venation. Although it has a more basal position than the Meganeuridae because of the absence of any nodal or subnodal structure, it has acquired a simple vein MA and a widening area between MP and CuA, convergently with the highly derived Discoidalia clade that includes the modern Odonata. A new diagnosis is given for Campylopteridae and its type genus, *Campyloptera* Brongniart. *Campylopteroidea* Rohdendorf, 1962 falls as a new junior synonym under *Odonatoptera* Martynov, 1932." (Author)] Address: Nel, A., Laboratoire d'Entomologie, CNRS UMR 8569, Museum National d'Histoire Naturelle, 45 Rue Buffon, F-75005, Paris, France. E-Mail: anel@mnhn.fr

**3618.** Nokkola, A.; Laukkanen, A.; Nokkola, C. (2002): Mitotic and meiotic chromosomes in *Somatochlora metallica* (Cordulidae, Odonata). The absence of localized centromeres and inverted meiosis. *Hereditas* 136(1): 7-

12. (in English). ["Spermatogonial metaphase chromosomes were examined in two dragonfly species, *Somatochlora metallica* (Cordulidae) and *Aeshna grandis* (Aeshnidae), and the behaviour of male meiotic chromosomes was studied in *S. metallica*. Both in *S. metallica* and *A. grandis* the male mitotic metaphase chromosomes from cells treated with colchicine consisted of two; equidistantly aligned chromatids, showing no primary constriction. In meiosis the chromosomes of *S. metallica* males showed telokinetic activity during the first meiotic division, and kinetic activity was restricted in the middle parts of chromosomes during the second division. The kinetic behaviour of the chromosomes both in mitosis and meiosis showed that they were holocentric. One chiasma arises interstitially in each bivalent in *S. metallica* male meiosis. The chiasmata retain their interstitial position at metaphase I and do not terminalize. At metaphase I bivalents co-orient with homologous telomere regions towards the opposite poles. Thus genuine dyads segregate at the first anaphase. Meiosis in these male dragonflies is thus pre-reductional or conventional, not post-reductional or inverted, as has been previously proposed." (Authors)] Address: Nokkala, S., Laboratory of Genetics, Department of Biology, University of Turku, FIN-20014, Turku, Finland. E-mail: seppo.nokkala@utu.fi

**3619.** Novelo-Gutierrez, R. (2002): Two new Mexican larvae of the genus *Erpetogomphus* Hagen in Selys (Odonata: Gomphidae). *Journal of the New York Entomological Society* 110(3-4): 370-375. ["Detailed descriptions and illustrations of the larvae of *Erpetogomphus* *boa* Selys and *E. cophias* Selys, are provided. Comparison with other larvae of the *crotalinus*-subgroup (sensu Garrison, 1994) is also included. Both species are easily separable by general body coloration, length and shape of ligula, and details of male's epiproct." (Author)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx

**3620.** Ocharan, R.; Ocharan, F.J. (2002): Odonatos del Valle de Cuatango (Alava). *Boletín de la Asociación Española de Entomología* 26(1-2): 97-110. (in Spanish with english summary). ["Complete data about 39 species of Odonata collected from 1994 to 1996 in the Valley of Cuatango and certain localities in its surroundings (Alava, North of Spain) are given; this is one of the "valleys of transition" between the atlantic Cornisa Cantabrica and the mediterranean Valley of Ebro River. A bibliographical revision of the previous records of Odonata in the province of Alava is offered. The records for *Gomphus vulgatissimus* and *Oxygastra curtisi* noticeably increase their distribution areas already known in the Iberian Peninsula." (Authors)] Address: Ocharan, R., Area de Zoología. Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, C/ Catedrático Rodrigo Uria s/n., 33071, Oviedo, Asturias, Spain. E-Mail: rocharan@correo.uniovi.es

**3621.** Oo, T.T.; Storch, V.; Becker, N. (2002): Studies on the bionomics of *Anopheles dirus* (Culicidae: Diptera) in Mudon, Mon State, Myanmar. *Journal of Vector Ecology* 27(1): 44-54. (in English). ["This study examined some environmental factors influencing the larval habitats of *Anopheles dirus* (breeding in wells) in Mudon, Myanmar, from May 1998 to March 2000. The lar-



val/pupal density was found to be directly proportional to rainfall and indirectly proportional to the well water level. Shade, vegetation and debris on the surface of well water were important factors influencing the abundance of the aquatic stages of *An. dirus*. Salinity had an inverse correlation with the larval and pupal density. Other mosquito species associated with *An. dirus* were identified. Important predators of the mosquito larvae were larvivorous fish, damselfly and dragonfly nymphs. All wells examined were lined with lateritic rocks. Chemical analysis of water samples from wells was conducted." (Authors)] Address: Becker, N., German Mosquito Control Association/KABS, Ludwigstr. 99, 67165, Waldsee, Germany Germany

**3622.** Pilgrim, E.M.; Roush, S.A.; Krane, D.E. (2002): Combining DNA sequences and morphology in systematics: testing the validity of the dragonfly species *Cordulegaster bilineata*. *Heredity* 89: 184-190. (in English). [Morphological techniques are combined with DNA sequences to determine the taxonomic status of *C. bilineata*. The latter and *C. diastatops* are very similar in morphological features, therefore the status of *C. bilineata* as a valid species is in question. Here, male morphological measurements and internal transcribed spacer 1 (ITS-1) sequences of rDNA are compared between the two taxa. "The male hamule measurements (where copulation occurs) show little difference between the taxa in question, but the anal appendage measurements (where the 6 first contacts the female) show marked divergence between the two taxa. Cluster analysis with these anal appendage measurements correctly assigns almost all individuals measured into their respective taxon. PCR amplification products of ITS-1 display a -50 bp size difference between *C. bilineata* (n = 4) and *C. diastatops* (n = 5) regardless of collection site. Sequence data or these amplifications show 51 bp missing in one locus in the ITS-1 of *C. bilineata* relative to *C. diastatops*. A lone population of *C. diastatops* from Wisconsin has three individuals with ITS-1 products that match the size of both *C. bilineata* and *C. diastatops*. One individual from this population appears to yield two ITS-1 amplification products that match both *C. bilineata* and *C. diastatops*. Although this population may be evidence for hybridization between the 2 taxa, such hybridization is not necessarily sufficient to disqualify the validity of a separate species designation for *C. bilineata*. Morphology and ITS-1 sequences depict a high degree of divergence that is consistent with species-level differences." (Authors)] Address: Pilgrim, E. M., Dept Biol., Utah St. Univ., Logan, UT 84322, USA

**3623.** Richardson, J.M.L. (2002): Burst swim speed in tadpoles inhabiting ponds with different top predators. *Evolutionary Ecology Research* 4(5): 627-642. (in English). ["Selection is likely to favour anti-predator strategies that are effective against predators encountered frequently. Larval anuran communities fall along a gradient of pond permanency and pond permanency also affects the type of top predator (including Odonata) present. These environmental factors combine to create distinct categories of pond types. In this study, I quantified the predator avoidance trait burst swim speed and related traits for 14 anuran species found in three pond types and within three taxonomic families. Absolute swim speed differed significantly among species and among taxonomic families. Inclusion of size in the model revealed a three-way interaction between size, habitat and taxonomic family. Tail beat frequency and body

shape differed significantly among species, but with no pattern by family or habitat. Functional relationships among traits also did not differ among family by habitat groups. The evolution of swim speed was significantly correlated with the evolution of increased size. In general, these results suggest that anurans have invaded new pond types using multiple mechanisms to cope with the predators that are present." (Authors)] Address: Richardson, J., Department of Zoology, University of Toronto, 25 Harbord St., Toronto, ON, M5S 3G5, Canada. E-mail: jmlr@zool.utoronto.ca

**3624.** Sabo, J.L.; Power, M.E. (2002): Numerical response of lizards to aquatic insects and short-term consequences for terrestrial prey. *Ecology* 83(11): 3023-3036. (in English). [Experiments with reduced (-) and ambient (+) subsidies in Mendocino Co., California, USA have shown that relative changes in lizard (*Sceloporus occidentalis*) abundance in - subsidy and + subsidy treatments were consistent with relative odonate abundance (e.g. *Argia* spp., *Archilestes californicus*, "*Ophiogomphus bicolor*" (?)), which represent one of the lizard's most common prey types (~20% by biomass).] Address: Sabo, J.L., Dept Biol., Arizona St. Univ., P.O. Box 871501, Tempe, AZ 85287-1501, USA

**3625.** Samways, M.J. (2002): Caring for the multitude: Current challenges. *Biodiversity & Conservation* 11(2): 341-343. (in English). [The author comments on some current challenges from the conservation resp. biodiversity point of view. Among others, dragonflies are used to focus on taxonomic problems (most of the invertebrates are undescribed) and the function of umbrella species to preserve biodiversity. Some relections are made on the importance of giving vernacular names to and red listing of invertebrates, the importance of soil dwelling organisms on the ecosystem-level, and the importance of invertebrates in general for "ecosystem health".] Address: Samways M.J., Invertebrate Conservation Research Centre, Dept Zool. & Entomol., University of Natal, P/Bag X01, Scottsville 3209, Pietermaritzburg, South Africa. E-mail: samways@un.ac.za

**3626.** Schlee, J. (2002): Zur Libellenfauna der Rieselfelder Windel in Bielefeld-Senne. *Ber. naturwiss. Ver. Bielefeld und Umgebung* 42: 355-364. (in German). [In 1997, nature conservation measures including creating some water bodies on the the sewage farm Windel near Bielefeld, Nordrhein-Westfalen, Germany were started. Between 1998 and 2001, odonate surveys were made to access the effects of the conservation measures. In total, 27 odonate species could be observed including *Sympetrum flaveolum*, *S. fonscolombii*, *Brachytron pratense*, *Gomphus pulchellus*, *Orthetrum coerulescens*, *Ischnura pumilio*, *Cordulia aenea*, and *Erythromma viridulum*. In 2002, *Sympecma fusca* reproduced in the sewage farm (pers. comm. of the author).] Address: Schlee, J., c/o Biol. Station Gütersloh / Bielefeld e.V., Niederheide 63, D-33659 Bielefeld, Germany. E-mail: BioStationGT-BI@t-online.de

**3627.** Schlüpmann, M. (2002): Zönosen der Odonaten stehender Kleingewässer im Hagener Raum - Artenzahlen, ihre Ermittlung und die Abgrenzung von Libellengemeinschaften. *Decheniana* 155: 59-76. (in German, with English summary). [Nordrhein-Westfalen, Germany; 312 stagnant ponds within the area of the town of Hagen and their odonate fauna were analysed. Statistics was applied to define affinities between spe-

cies groups, and to develop odonate coenoses.] Address: Schlüpmann, M., Hierseier Weg 18, D-58119 Hagen, Germany. E-mail: Martin.Schluepmann@t-online

**3628.** Stevens, M.; Riedel, H.-W. (2002): Verbreitung der Larven der Quelljungfern (Cordulegaster) (Odonata, Cordulegastridae) im Raum Bergisch Gladbach. *Decheniana* 155: 105-112. (in German, with English summary). [Nordrhein-Westfalen, Germany; in the framework of saprobial examinations of 75 sample sites along running waters, *Cordulegaster boltonii* was recorded at 7 sample sites, while *Thecagaster bidentata* was traced only one time. These records are mapped together with literature data and records from unpublished expertises and a Ms thesis. The localities are described in detail, and the regional distribution of the species is discussed.] Address: Riedel, H.-W., Stadt Bergisch Gladbach, Fachbereich Umwelt und Technik, Wilhelm-Wagner Platz, D-51429 Bergisch Gladbach, Germany

**3629.** Switzer, P.V. (2002): Territory quality, habitat selection, and competition in the Amberwing Dragonfly, *Perythemis tenera* (Say) (Odonata: Libellulidae): population patterns as a consequence of individual behavior. *J. Kans. ent. Soc.* 75(3): 145-157. (in English). ["Basic habitat selection theory predicts that individuals will prefer relatively high quality habitats over low quality habitats. This preference may affect settlement patterns, with higher quality habitats being occupied first and more frequently. If locations vary in quality and good locations are limited, individuals may compete for the best locations rather than settle in lower quality sites. Thus, any factors which influence the number of individuals in an area may potentially affect patterns of habitat occupation. In this study, I tested these ideas using the settlement and fighting patterns of a territorial dragonfly, *P. tenera*. Females consistently arrived later and departed earlier than males. Male and female arrival, and male departure, was correlated with temperature, with earlier arrivals and later departures on warm days. More males were present at the pond as the summer progressed and on warmer days, but the number of females was not related to date or temperature. The amount of fighting for territories increased as the number of males increased. Individuals tended to occupy high quality sites (i.e., sites with a higher number of matings per minute occupied) first within a day, and were more likely to occupy low quality sites when the number of males on the pond was relatively high. The locations that were occupied first during a day were of relatively higher quality and more likely to be occupied by site-faithful males (i.e., males returning to their previous day's location) than those occupied later in the day. Finally, higher quality sites were occupied more often, had more fighting on them, and had a higher proportion of escalated fights than lower quality sites. These results indicate that patterns of competition and habitat occupation are a result of relationships among local breeding population size, individual behavior (e.g., preference for sites and reaction to environmental conditions), and habitat availability and quality." (Author)] Address: Switzer, P.V., Eastern Illinois Univ., Dept Biol, Sci., Charleston IL 61920; USA. E-mail: cfpvs@eiu.edu

**3630.** Sy, T.; Schulze, M. (2002): Die Libellenfauna der Steckbyer Heide im Naturschutzgebiet "Steckby-Lödderitzer Forst" (Insecta, Odonata). *Naturwissen-*

*schaftliche Beiträge Museum Dessau* 14: 56-71. (in German). [Catchment of River Elbe, Sachsen-Anhalt, Germany; in 1999 and 2000, 34 (including 24 autochthonous) odonate species were collected. The study aimed to get information on conservation measures necessary to protect the biodiversity of the area. The following species are discussed in detail: *Lestes barbarus*, *L. virens*, *Aeshna affinis*, *Anaciaeschna isocetes*, *Cordulegaster boltonii*, *Ophiogomphus cecilia*, and *Leucorrhinia pectoralis*.] Address: Sy, T., RANA-Büro für Ökologie und Naturschutz, Am Kirchtor 27, D-06108 Halle (Saale), Germany

**3631.** Ternois, V. (2002): Un paradis pour les libellules. Situé au coeur de la Chamgagne humide, l'étang du Grand Verdat est un site naturel remarquable pour l'étude des libellules. Quarante espèces y sont recensées. *L'est Eclair*, 06.09.2002: 3. (in French). [This report in a French newspaper refers to the Odonata of the lake Grand Verdat. *Sympetrum danae* is introduced with a picture.] Address: Ternois, V., route de Sauvagny, F-52220 Anglus, France

**3632.** Walia, G.K.; Sandhu, R. (2002): Comparative chromosome data on twenty three species of family Coenagrionidae (Zygoptera: Odonata). *Bionature* 22(2): 79-97. (in Chinese with English summary). ["Karyological investigations have been carried out on 23 species of seven genera belonging to family Coenagrionidae. These have been collected from states of North-west and North-East India during pre-monsoon and post-monsoon seasons. Among these; 21 are male species and 4 are female species. In males, 16 species reveal  $2n=27$  as diploid chromosome number and  $2n=25$  in remaining five species. In females, all the species possess  $2n=28$  as diploid chromosome number. All the species have XO-XX type sex determining mechanism. Autosomal fragmentation has been observed in *Agriocnemis obscura* (female) [= *Agriocnemis rubescens* Selys, 1877], *Ceriagrion coromandelianum* (male), *Coenagrion dyeri* (female) [= *Cercion calamorum* (Ris 1916)], *Pseudoagrion decorum* (male) and *Pseudoagrion rubriceps* (male & female). Chromosome number varies from 27-60 in gonial metaphase plates. Sex element could not be differentiated in the fragmented stages. Behaviour and morphology of chromosomes during meiosis have been studied and compared within family and within genera." (Author)] Address: Sandhu, R., Department of Zoology, Punjabi University, Patiala, 147 002, India

**3633.** Westhuis, W.; Fritzlar, F. (2002): Tier- und Pflanzenarten, für deren globale Erhaltung Thüringen eine besondere Verantwortung trägt. *Landschaftspflege und Naturschutz in Thüringen* 39(4, Sonderheft): 97-135. (in German). [Against the background of global responsibility of the state of Thüringen, Germany for fauna and flora, W. Zimmerman introduces to *Coenagrion mercuriale* and *C. ornatum*.] Address: Zimmermann, W., Thomas-Müntzer-Str. 5, D-99423 Weimar, Germany

**3634.** Woodward, G.; Hildrew, A.G. (2002): The impact of a sit-and-wait predator: Separating consumption and prey emigration. *Oikos* 99(3): 409-418. (in English). ["Reviews of the impact of invertebrate predators in enclosure/exclosure experiments suggest that much of the apparent depletion of prey is due to prey emigration induced by the predators. However, these generalisati-

ons derive mainly from studies of invertebrate predators that are predominantly active searchers (usually stoneflies) and of prey with strong avoidance responses (mainly mayflies). We examined the impact of a large sit-and-wait predator, the nymph of the dragonfly *Cordulegaster boltonii*, which has recently invaded Broadstone Stream as a new top predator. Field enclosure / enclosure experiments were conducted to assess the impact of the invader on the benthos. Depletion of prey varied seasonally and among taxa, and was highest when prey density and encounter rates were high. Mobile prey, although least likely to show a statistically significant response because of high exchange rates, were those most strongly depleted. Experimental channels were used to separate the relative contribution of consumption and emigration to total impact for the two most depleted prey species. Depletion of prey was due solely to consumption and predators did not induce emigration. We therefore urge caution in making generalisations about the impacts of invertebrate predators, since sit-and-wait and searching predators potentially have very different impacts." (Authors)] Address: Woodward, G., Dept of Zoology and Animal Ecology, Univ. College Cork, Cork, Ireland. E-Mail: g.woodward@ucc.ie

**3635.** Worthen, W.B. (2002): The structure of larval odonate assemblages in the Enoree River basin of South Carolina. *Southeastern Naturalist* 1(3): 205-216. (in English). ["Odonate larvae were collected at 127 sites in the Enoree River and nine of its tributaries in the summers of 1999 and 2000. Mean odonate abundance, species richness, and Simpson's diversity were compared across tributaries and the main channel of the Enoree River with one-way ANOVA. These indices were significantly lower in Brushy Creek, Rocky Creek, and the Upper Enoree than in the other streams (Tukey multiple comparison test,  $p < 0.05$ ). These three streams also differed from the others in species composition (MANOVA  $p < 0.0001$ ), as measured by changes in the relative abundances of the five most abundant species: *Progomphus obscurus*, *Boyeria vinosa*, *Macromia illinoensis*, *Cordulegaster maculata*, and *Ophiogomphus mainensis*. For example, *O. mainensis* was nearly absent from Brushy, Rocky, and the Upper Enoree, but was a significant component of the assemblages in other streams. *Cordulegaster maculata* was rare in Rocky Creek but dominated the Upper Enoree where other species were less abundant. Brushy, Rocky, and the Upper Enoree are areas of either rapid residential development or known industrial contamination. The different structure of odonate assemblages in these streams may reflect the impact of these local anthropogenic effects." (Author)] Address: Worthen, W.B., Biology Department, Furman University, Greenville, SC, 29613, USA. E-Mail: worthen@furman.edu

**3636.** Zhang Y.-C.; Liu, B.; Zheng, Z.-m.; Li, L. (2002): DNA extraction and RAPD-PCR of insect specimens preserved with different methods. *Acta Entomologica Sinica* 45(5): 693-695. (in Chinese with English summary). ["Genomic DNA were extracted and amplified using the polymerase chain reaction and arbitrary primers from specimens of seven insect species: *Chrysomela vigintipunctata* (Scopoli) (Coleoptera: Chrysomelidae), *Harmonia axyridis* Pollard and *Coccinella septempunctata* Linnaeus (Col.: Coccinellidae), *Agrotis ypsilon* (Rottemberg) (Lepidoptera: Noctuidae), *Crocothemis servilia* Drury (Odonata: Libellulidae), and *Oxya abentata*

Willmense and *O. chinensis* (Thunberg) (Orthoptera: Caltantopidae). Of the specimens assayed, some had been naturally dried, some oven-dried and the remainder had been preserved in alcohol. The results suggest that, with respect to DNA extraction, oven-dried specimens and those preserved in alcohol are better than naturally dried specimens. Extraction of DNA using the CTAB method was easier, and more economical than other methods." (Authors)] Address: Zhang Ying-Chun, College of Life Science, Shaanxi Normal University, Xian, 710062, China. E-Mail: yingchunzcn@yahoo.com.cn

**3637.** Zimmermann, W. (2002): Checkliste der Libellen (Odonata) Thüringens. Stand 31.10.2002. *Checklisten Thüringer Insekten und Spinnentiere* 10: 5-11. (in German). [This is an update of Zimmermann's 1993-list, rising the number of Thuringian species by 9 to a total of 62 Odonata. More recent activities to study and map the odonate fauna of Thuringia, Germany are outlined. The species are listed and classified according to their regional abundance and the status (autochthonous, invasive, range extension). A few species are briefly commented.] Address: Zimmermann, W., Thomas-Müntzer-Str. 5, D-99423 Weimar, Germany

**3638.** Zimmermann, W. (2002): Zur Libellenfauna der Hochmoore und Sauer-Zwischenmoore des Thüringer Waldes. *Naturschutzreport* 19: 101-115. (in German). [The paper summarizes long lasting researches of the odonate fauna of 10 bogs and transition mires in Thüringen, Germany, starting in the 1960th. A total of 19 species was found, 14 are to consider as autochthonous. *Aeshna juncea*, *Somatochlora alpestris*, *S. arctica*, and *Leucorrhinia dubia* are considered on the regional level as characteristic odonate species for bogs and transition mires. These species are annotated in detail. Very intensive surveys of the Saukopfmoor result in an nearly constant species spectrum over 30 years. *L. dubia* is the eu-dominant species in the total of the surveyed habitats.] Address: Zimmermann, W., Thomas-Müntzer-Str. 5, D-99423 Weimar, Germany

**3639.** Zurek, R. (2002): Upper Vistula River: Response of aquatic communities to pollution and impoundment. VIII. Zooseston. *Polish Journal of Ecology* 50(2): 201-221. (in English). ["Zooseston of the Vistula River section almost 340 km long was investigated in the years 1997/98. In 99 samples collected 90 species of rotifers, 16 cladocerans, 9 copepods and other animals belonging to: Harpacticoidea, Oligochaeta, Nematoda, Chironomidae, Odonata, Simuliidae, Tardigrada and Coelenterata were found. Multiple regression analysis showed that the number of rotifers is significantly correlated with basic chemical indicators of water trophic state - phosphate, nitrate and nitrite as well as with the number of copepods which are usually predators. The numbers of copepods depends on the availability of possible prey, i.e. rotifers and cladocerans. Multiple regression confirmed known dependence of cladocerans from trophic conditions. Clustering of similarity matrices showed complex structure of sestonic assemblages on rhithral-potamal gradient additionally modified by hydrotechnical constructions. These constructions broke old river continuum. Ordination of sites gave complex pattern not only representing a simple gradient rhithral - potamal but also all transient stages caused by hydrotechnical construction (large dam reservoir) or by inflows of polluted waters from the tributaries. Ecologi-



cal meaning of principal component ordination for river zooseston assemblages is not simple and might be susceptible of various interpretations." (Author)] Address: Zurek, R., Karol Starmach Institute of Freshwater Biology, Polish Academy of Sciences, str. Slawkowska 17, 31-016, Cracow, Poland. E-Mail: zurek@zbw.pan.krakow.pl

## 2003

- 3640.** Abbott, J.C.; Behrstock, R.A.; Larsen, R.R. (2003): Notes on the distribution of Odonata in the Texas Panhandle, with a summary of new state and county records. *Southwestern Naturalist* 48(3): 444-448. (in English). ["Previously, no Odonata have been reported from 44 Texas counties (17%), mainly from the northern Panhandle. Adult dragonflies and damselflies collected since September of 1999 are reported from 24 sites in 14 counties throughout the Texas Panhandle. A total of 35 species is discussed, representing 73 new county records and 4 new state records. First records of Odonata are included for 6 counties." (Authors)] Address: Abbott, J.C., Section of Integrative Biology, University of Texas, Austin, TX, 78712, USA. E-Mail: jcabbott@mail.utexas.edu USA
- 3641.** Adams, M.J.; Pearl, C.A.; Bury, R.B. (2003): Indirect facilitation of an anuran invasion by non-native fishes. *Ecology Letters* 6(4): 343-351. (in English). ["Positive interactions among non-native species could greatly exacerbate the problem of invasions, but are poorly studied and our knowledge of their occurrence is mostly limited to plant-pollinator and dispersal interactions. We found that invasion of bullfrogs is facilitated by the presence of co-evolved non-native fish, which increase tadpole survival by reducing predatory macroinvertebrate densities. Native dragonfly nymphs in Oregon, USA caused zero survival of bullfrog tadpoles in a replicated field experiment unless a non-native sunfish was present to reduce dragonfly density. This pattern was also evident in pond surveys where the best predictors of bullfrog abundance were the presence of non-native fish and bathymetry. This is the first experimental evidence of facilitation between two non-native vertebrates and supports the invasional meltdown hypothesis. Such positive interactions among non-native species have the potential to disrupt ecosystems by amplifying invasions, and our study shows they can occur via indirect mechanisms." (Authors)] Address: Adams, M.J., Forest and Rangeland Ecosystem Science Center, USGS, 3200 SW Jefferson Way, Corvallis, OR, 97331, USA. E-Mail: MichaelAdams@usgs.gov
- 3642.** Allen, P. (2003): Cuba 20 March - 5 April 2000. *Argia* 15(1): 16-17. (in English). [The paper lists some odonate species from the hills of Pinar del Rio Province, western Cuba from a trip in April 2000.] Address: Allen, P., Little Thatch, North Gorley, Fordingbridge Hants SP6 2PE, UK
- 3643.** Altwegg, R. (2003): Hungry predators render predator-avoidance behavior in tadpoles ineffective. *Oikos* 100(2): 311-316. (in English). ["Behavioral responses of prey to their predators can critically alter community dynamics. Whether or not a prey responds, clearly depends on the effectiveness of that response. The effectiveness on the other hand is predicted to depend on predator behavior. Actively searching predators can render the behavioral responses in their prey ineffective. Nevertheless, most studies investigating the optimal reaction of prey treated predators as immobile elements of the environment. I experimentally manipulated activity of poolfrog (*Rana lessonae*) tadpoles by keeping them at low and high food levels, and exposed them to three species of invertebrate predators (*Aeshna cyanea*, *Anax imperator*, and *Dytiscus marginalis*), whose activity also was manipulated through different food levels. Satiated, less active predators were more likely to kill hungry, more active tadpoles, but hungry predators killed hungry and satiated tadpoles about equally often. This result suggests that reducing their activity is a more effective strategy for tadpoles if the predators themselves are less active. On the other hand, against hungry, highly motivated predators, the behavioral avoidance strategies were essentially ineffective. Antipredator behavior is generally thought to stabilize the dynamics of predator-prey systems. The results presented here, however, suggest that the community dynamical consequences of antipredator behavior also critically depend on decisions made by predators." (Author)] Address: Altwegg, R., Dept of Biology, Univ. of Victoria, Victoria, BC, V8W 3N5, Canada. E-Mail: altwegg@uvic.ca
- 3644.** Angelibert, S.; Giani, N. (2003): Dispersal characteristics of three odonate species in a patchy habitat. *Ecography* 26: 13-20. (in English). ["Dispersal has a potentially profound effect on the dynamics of populations especially when a population occupies a patchy habitat. Ponds surrounded by terrestrial landscape are an example of patchy distribution of physical conditions and constitute "islands" for odonates. Few studies have focussed on dispersal in odonates. We have used the direct method of dispersal observing (capture-mark-recapture technique) in order to estimate the degree of linkage in three patchy populations of odonate localised on three ponds. We also examined the differences in dispersal ability within and among three species (*Coenagrion puella*, *C. scitulum*, and *Libellula depressa*). The ponds were situated in southwest France on a limestone plateau. In this arid area, these ponds constitute the only surface water available and are relatively sparsely distributed. The size of the ponds ranged from 48 to 79 m<sup>2</sup> and they were 200 and 775 m apart. We demonstrated that three factors influence the dispersal ability of these odonates. The first is represented by the abiotic factors and especially weather conditions. This determines the number of days that dispersal is possible. The second is interspecific differences. We showed that sensitivity to weather conditions, species size and species behaviour influence dispersal ability. The third factor is the intraspecific characteristics. We demonstrated that there are differences in dispersal ability according to sex and age. To conclude, we discuss the importance of pond management to maintain the existing odonate populations and to facilitate introduction of new populations in this region where little exchange occurs between ponds." (Authors)] Address: Angelibert, S. CESAC UMR 5576, Bcjr 4R3, Univ. Paul Sabatier, 118 Route de Narbonne, F-31062 Toulouse, Cedex, France. E-mail: angelibe@cict.fr
- 3645.** Anonymus (2003): Migrant insect summary (May to August 2003). A summary of some of the highlights by the telephone information service InsectLine.

Atropos 20: 42-45. (in English). [UK; Records of the following species are briefly commented: *Anax parthenope*, *Erythromma viridulum*, *Libellula depressa*, *Sympetrum flaveolum*, *S. fonscolombii*, *Lestes barbarus*.] Address: not stated

**3646.** Aspöck, H. (2003): 25 Jahre Österreichische Entomologische Gesellschaft. *Denisia* 8: 279-319. (in German with English summary). [The paper outlines the history of the Austrian entomological society and includes plenty photographs with many well known entomologists. Odonatologists seem to have had no significant role in founding the society. Only Günther Theischinger, now Australia, is pictured several times.] Address: Aspöck, H., Abt. Medizinische Parasitologie, Klinisches Institut für Hygiene der Universität Wien, Kinderspitalgasse 15, A-1095 Wien, Austria. E-mail: horst.aspoeck@univie.ac.at

**3647.** Beckemeyer, R. (2003): Short-term economic troubles and the potential destruction of irreplaceable taxonomic and biodiversity treasures: the University of Nebraska-Lincoln catastrophe. *Argia* 15(2): 16-17. (in English). [In response of budget shortfalls, all research divisions of the Nebraska State Museum, which also harbours a collection of Odonata and current activities on odonatalogical subjects including a mapping project, were "scrapped". Roy Beckemeyer is drawing a very pessimistic picture of the future of entomological research in USA due to economic problems continuing across the USA.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**3648.** Bernard, M.F.; Fordyce, J.A. (2003): Are induced defenses costly? Consequences of predator-induced defenses in Western toads, *Bufo boreas*. *Ecology* 84(1): 68-78. (in English). ["Induced defenses are widespread in nature, and in amphibian larvae they are often expressed as altered behavior and changes in tail shape, color, and size. Theory predicts that induced defenses should be costly in the absence of a predator threat. No costs have been found for these defenses after metamorphosis. In this study, we tested for induced defenses in western toads, *Bufo boreas*, and measured larval and postmetamorphic consequences of these responses. Larvae were raised in either the presence or absence of nonlethal predator cues (including *Aeshna* sp.). Defense response of these larval treatments were measured during the larval stage and shortly after metamorphosis using both predator bioassays and quantification of the putative chemical defense common in toads, bufadienolides. We found no differences in larval morphology, growth rate, or development rate between the predator and control treatments. In the larval bioassays, some types of invertebrate predators consumed significantly fewer of the *B. boreas* larvae that were reared with predator cues compared to the control treatments. Bufadienolides were not present in *B. boreas* larvae. In the postmetamorphic bioassays, tiger salamanders (*Ambystoma tigrinum*) had longer handling times when consuming *B. boreas* that had developed in larval environments without predator cues compared to predator-treatment *B. boreas*. However, postmetamorphic *B. boreas* from predator cue larval environments had significantly higher concentrations of bufadienolides than did those from larval environments without predators, suggesting that these defenses are ineffective against tiger salamanders. Our results demonstrate

that there is plasticity in the chemical defenses of toads and suggest that induced larval defenses may incur costs that are only apparent after metamorphosis." (Authors)] Address: Bernard, M.F., Section of Evolution and Ecology, Center for Population Biology, University of California, Davis, California 95616 USA. E-mail: mfbenard@ucdavis.edu

**3649.** Bernard, R. (2003): *Aeshna crenata* Hag., a new species for the fauna of Latvia (Anisoptera: Aeshnidae). *Notul. odonatol.* 6(1): 8-10. (in English). [In 2001 *A. crenata* was discovered in a small area in NE Lithuania (Bernard, 2002, *Opusc. zool, flumin.* 202). In order to solve the puzzle of its range in this part of Europe, intensive searches were carried out in July 2002 in SE Estonia, SE Latvia and NE Lithuania (northward of the known localities). Only 1 locality of *A. crenata* was found, in the Rezekne district in Latvia: 2 small forest lakes (A, B), 400 m distant, 4.8-5.1 km NW of Andrupene, 2.15-2.65 km W of western shores of S part of Viraudas Lake, 56°13'10" N, 27°20'25"-50" E. The habitats are described along with the co-occurring odonate species including the rare *Nehalennia speciosa*.] Address: Bernard, R., Department of General Zoology, Adam Mickiewicz University, Fredry 10, PL-61-702 Poznan, Poland; E-mail: rbernard@main.amu.edu.pl

**3650.** Bick, F.H. (2003): At-risk Odonata of conterminous United States. *Bull. American Odonatol.* 7(3): 41-56. (in English). [U.S. species at risk, their distribution, habitat, and conservation status are outlined: *Enallagma pictum*, *E. recurvatum*, *Ischnura gemina*, *Nehalennia pallidula*, *Neoneura aaroni*, *Aeshna persephone*, *Stenogomphus consanguis*, *Gomphus diminutus*, *G. sandrius*, *G. septima*, *G. westfalli*, *Ophiogomphus acuminatus*, *O. arizonicus*, *O. australis*, *O. edmundo*, *Progomphus bellei*, *Stylurus potulentus*, *S. townesi*, *Cordulegaster sayi*, *Macromia margarita*, *Somatochlora hineana*, *S. calverti*, *S. margarita*, *S. ozarkensis*, *Williamsonia lintneri*, *Libellula jesseana*.] Address: Bick, G.H., 141 W. Columbus St., Port Angeles, WA 98362, USA

**3651.** Biggs, K. (2003): *Illotum thermometer*. *Argia* 15(2): 18-19. (in English). [Kathy Biggs correlates the behaviour of *Sympetrum illotum* with air-temperature.] Address: Biggs, Kathy, 308 Bloomfield Road, Sebastopol CA, 95472, USA. E-mail: bigsnest@sonic.net

**3652.** Bocanegra, O.R.; Lewis, J.M. (2003): A preliminary list of the Odonata of Terrell county, Texas. *Argia* 15(1): 11-13. (in English). [USA; a total of 46 species (including *Libellula comanche* from 21 May 1996) was collected at three localities in 2001 and 2002.] Address: Bocanegra, O.R., U.S.Fish and Wildlife Service, 711 Stadium Drive, Suite 252, Arlington, Texas 76011, USA

**3653.** Böhm, K. (2003): Erster Fortpflanzungsnachweis von *Anax parthenope* in Nordrhein-Westfalen (Odonata: Aeshnidae). *Libellula* 22(1/2): 31-34. (in German, with English summary). [Germany; "In summer of 2002, three exuviae were collected at a pond in Düsseldorf (51°21' N, 6°44' E). The late emergence date is interpreted as an indication for a bivoltine development." (Author)] Address: Böhm, K., Erich-Müller-Str. 6, D-40597-Düsseldorf, Germany

**3654.** Botsch, H.-J. (2003): Aktualisierung der Stadtbiotopkartierung Würzburg. *Berichte des bayerischen Landesamtes für Umweltschutz* 171: 76-78. (in German). [In 1983, for the first time the habitats in the town

of Würzburg, Bavaria, Germany were mapped and assessed for nature conservation purposes. In 2000 and 2001, the mapping was renewed. The odonatological results are very briefly commented: 55 water bodies harbouring 22 species were surveyed. Only *Gomphus vulgatissimus* is specified.] Address: Botsch, H.-J. E-mail: helmut.botsch@lfu.bayern.de

**3655.** Brackenbury, J. (2003): Escape manoeuvres in damselfly larvae: Kinematics and dynamics. *Jour. exp. Biol.* 206(2): 389-397. (in English). ["The kinematics and hydrodynamics of rapid escape manoeuvres executed by final-stage larvae of *Enallagma cyathigerum* were investigated using videography combined with a simple wake-visualisation technique. Two kinds of escape manoeuvres were identified: first, a 'rapid flex', comparable with the rapid C-start of fish, and, second, a 'rapid twist' that involves a helical contraction of the body inducing motion in the yaw, pitch and roll planes. In both cases, the initial flexion phase is concerned with re-orientating the body, the extensional phase with acceleration of the body in the new direction. The behaviour of the caudal fin during twist indicates considerable independence of movement and aspect control within the three constituent lobes. Dye deposited beneath the resting larvae showed a thrust jet shed into the wake at the end of the extension phase. The estimated momentum of the ring vortex containing the jet was similar to that imparted to the body at the start of the translational phase. Similarities between the swimming dynamics of damselfly larvae and fish are discussed, as well as the wider implications of these findings to other aquatic invertebrates whose normal, steady swimming appears to be based on unsteady manoeuvres." (Author)] Address: Brackenbury, J., Department of Anatomy, University of Cambridge, Downing Street, Cambridge, CB2 3DY, UK. E-Mail: jhb1000@cam.ac.uk

**3656.** Braun, M.; Braun, U.; Müllen, T. (2003): Zum Vorkommen der Kleinen Zangenlibelle (*Onychogomphus forcipatus*) an der unteren Lahn und an der Ahrmündung. *Fauna Flora Rheinland-Pfalz* 10(1): 273-277. (in German). [Rheinland-Pfalz, Germany; new records from the river Lahn, resulting from June 2003, and the river Ahr (17. July 2003) are briefly documented and discussed.] Address: Braun, M., SGD Nord, Stresemannstr. 3-5, 56068 Koblenz, Germany

**3657.** Braune, E. (2003): Live and get dry: A spatially explicit population model for Namibian Odonata. *Verhandlungen der Gesellschaft für Ökologie* 33: 297. (in English). [Verbatim: Within the scope of a BIOTA Southern Africa subproject a model for the dispersal of dragonflies in the arid regions of western Namibia was developed. The aim of this model is to predict changes in the diversity of Odonata under changing habitat conditions. These changes may be induced e.g. by intensive use of water resources or by climate change and may lead to a reduction of habitat quality and quantity. The modeling system consists of three parts: First, on the local level, habitat suitability models based on a one-year-monitoring program were calculated using logistic regression. Parameters used were biotic and abiotic parameters recorded during the monitoring, e.g. vegetation diversity, as well as parameters derived from remote sensing data based on LANDSAT 7 ETM+ satellite images like the density of open waters in the surrounding of the investigation sites or the NDVI. The second part of the model consists of a population dynamic mo-

del based on discrete difference-equations described by extended Leslie-matrices. The parameters of the model are formulated as dependent on food availability in the aquatic habitat. Interspecific competition in the larval stage of the dragonflies is also incorporated. This model depicts the typical life-cycle of tropical-centered dragonflies with a pattern of multivoltinism. Finally, the third part of the model combines the habitat suitability models and the population dynamics via a grid-based approach. In each grid cell the population dynamics is calculated in dependence of the respective habitat quality. Dispersal processes are modeled by a stochastic distribution of mature and immature adults in dependence of the relative population density and the suitability of the habitat. During the dispersal process there is a differentiation between long-distance and short-distance dispersal, so that even habitats in greater distances can be occupied provided that they exhibit a better habitat quality. By applying different scenarios of changing habitat quality, e.g. grazing cattle reducing the vegetation diversity, or habitat quantity, e.g. building of dams in the upper course of a river reducing, the available amount of water downstream, to the grid-based replication of the landscape, this model system offers the possibility to analyze the spatio-temporal development of Namibian Odonata and the consequences of changes in the environment. This grid-based formulation of a landscape can be used to apply different scenarios of changing habitat quality or quantity. So e.g. the destruction of habitats or of the vegetation diversity by grazing cattle can be simulated. Another possible scenario is the building of dams leading to a reduction of the available amount of water downstream. This model system offers the possibility to analyze the spatio-temporal development of Namibian Odonata and the consequences of changes in the environment.] Address: Braune, Eva, Institute of Geocology, Technical University of Braunschweig, Germany. E-mail: e.braune@tu-bs.de

**3658.** Bried, J. (2003): Notes on an *Epiaeschna heros* feeding swarm. *Argia* 15(2): 19-20. (in English). [Noxubee National Wildlife Refuge, Mississippi, USA; "Obviously these ±128 Swamp Darners weren't making an effort to avoid intraspecific competition. It seemed more the opposite. Have studies shown competitive facilitation within adult odonate populations? In other words, is there documented proof that individuals within a species work together to perpetuate their own population, such as by finding greater predator protection strength in numbers or by increasing foraging capacity?"] Address: Bried, J., Mississippi State Univ., Dept Biol. Sci., Rm 130 Harned, PO Box GY, Mississippi State, MS 39762, USA. E-mail: jasonbried@hotmail.com

**3659.** Bried, J.; Bennett, L.; Brown, R. (2003): Requesting Mississippi Odonata information. *Argia* 15(2): 22-23. (in English). [The odonate fauna of Mississippi, USA is poorly known. Data on Odonata are urgently requested.] Address: Bried, J., Mississippi State University, Dept Biol. Sciences, Rm 130 Harned, PO Box GY, Mississippi State, MS 39762, USA. E-mail: jasonbried@hotmail.com

**3660.** Briers, R.A.; Biggs, J. (2003): Indicator taxa for the conservation of pond invertebrate diversity. *Aquatic Conservation* 13(4): 323-330. (in English). ["1. Ponds are a valuable re for the conservation of freshwater biodiversity, but are often extremely numerous in a given



area, making assessment of the conservation value of individual sites potentially time consuming. 2. The use of indicator taxa, the species richness of which is representative of total site species richness, may provide one way to improve the efficiency of survey work. However, such indicators are poorly developed for freshwater systems. 3. A data set was used describing the occurrence of macroinvertebrate taxa in ponds in Oxfordshire, UK, to assess the extent to which variation in the species richness of selected taxa most consistently represented variation in all other taxa. 4. Coenagriidae (Odonata) and Limnephilidae (Trichoptera) reflected the variation in species richness of other taxa most consistently, with Coenagriidae showing the best overall performance as an indicator taxon. 5. For both suggested indicator taxa, selection of sites based solely on the presence of at least one species of indicator would represent over 95% of all species recorded across all sites. 6. Further investigation in different geographical regions is necessary to establish whether these relationships are consistent over a wider area." (Authors)] Address: Briers, R.A. Inst. of Biological Sciences, University of Wales, Edward Llwyd Building, Aberystwyth, Ceredigion, SY23 3DA, UK. E-Mail: rob@aber.ac.uk

**3661.** Brockhaus, T.; Fischer, U. (2003): Übersicht zur "Entomofauna Saxonica" unter besonderer Berücksichtigung der FFH-Arten und der "vom Aussterben bedrohten Arten" in Sachsen. 3. Libellen-Odonata. Mitt. Sächs. Entomol., Suppl. 1: 38-40. (in German). [The paper briefly outlines dragonfly research activities in Sachsen, Germany, reaching back to 1743. Odonata are assessed as one of the best surveyed insect groups in Sachsen. The present status of geographical coverage and "white gaps" are documented. Some species are very briefly discussed. Starting in the 1990th, records of mediterranean species are increasing in a remarkable way. Populations of running water dwellers are spreading in significant way due to improvement of water quality.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**3662.** Buczynski, P. (2003): *Aeshna affinis* (Vander L.) (Odonata: Aeshnidae) in the valley of River Bug in the year 2000. Wiad. entomol. 22(1): 48-49. (in Polish). [On 11. Aug. 2000, *A. affinis* was recorded at three localities along the river Bug: Dorohusk, Uhanka ad Dorohusk, and Gródek ad Hrubieszów. These localities are briefly described, and the occurrence of *A. affinis* in south-eastern Poland is discussed. A German translation of the paper is available from IDF or the author.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3663.** Buczynski, P. (2003): New locality of *Orthetrum coerulescens* (Fonscolombe, 1837) (Odonata: Libellulidae) in the southeastern Poland. Wiad. entomol. 22(1): 49-50. (in Polish). [On 25. Aug. 2001, a male *O. coerulescens* was recorded at Wieprów Ordynacki ad Tomaszów Lubelsi. The locality is briefly described, and the rarity of the species in southeastern Poland is discussed. It is assumed that the potential habitats are insufficiently surveyed for the species. A German translation of the paper is available from IDF or the author.] Address: Buczynski, P., Dept of Zool., Marie Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3664.** Buden, D.W.; Miller, J.Y. (2003): The butterflies of Pohnpei, eastern Caroline Islands, Micronesia. Pacific Science 57(1): 1-8. (in English). ["14 species of butterflies are recorded from Pohnpei, Micronesia, seven for the first time. None is endemic to the island; all are widely distributed in the western Pacific, including parts of Indo-Australia, with many extending into or beyond southeastern Asia. A long history of plant introductions and agricultural experimentation may have facilitated dispersal of butterflies to the island and provided a broad selection of host plants for those arriving otherwise unassisted. At least one, and possibly two or more, unidentified species apparently confined to deep forest habitats were seen but not collected during this study. Compared with the local odonate fauna, the butterflies of Pohnpei differ in reaching their greatest abundance and species diversity in the lowlands, in lacking endemic species, and probably in having a higher turnover rate." (Authors)] Address: Buden, D.W., Division of Natural Science and Mathematics, College of Micronesia-FSM, Kolonia, P.O. Box 159, Pohnpei, FM 96941, Micronesia. E-Mail: donbuden@comfsm.fm

**3665.** Burbach, K. (2003): Verbreitung und Habitate von *Leucorrhinia albifrons* in Bayern (Odonata: Libellulidae). Libellula Supplement 4: 105-132. (in German, with English summary). ["*L. albifrons* has been observed in at least 29-32 locations in 15 areas in Bavaria, Germany. Since 1995 the species has been recorded at only five locations. Three of these observations are from confirmed breeding sites; the other two are of a single male. At one of the breeding sites the species has probably been extirpated due to changes in habitat structure. The two remaining breeding sites have been known since 1993 and 1998, respectively. Characteristic habitat factors are low nutrient levels, the presence of vegetation immediately below the water surface and the (near) absence of fish. pH-value is apparently of little significance, since *L. albifrons* is known to occur in acidic as well as in calcareous bodies of water. The aquatic vegetation differs accordingly: whereas under calcareous conditions stoneworts (Characeae) and pondweeds (Potamogeton spp.) may be predominant, under acidic conditions floating sphagnum mats are common. Probable causes for the decline of the species are the eutrophication of breeding sites and the introduction of fish. The latter occurs even in smaller bodies of water, which are not suitable for stocking with fish. Especially the introduction of fish spp. which churn up the pond bottom or destroy vegetation (carp, grass carp) is likely to have contributed to the significant decline. Suggestions for the protection of the species are presented. The implementation of a monitoring programme for the last remaining populations is proposed." (Author)] Address: Burbach, K., Griesfeldstr. 5a, D-85354 Freising E-Mail: klaus.burbach@gmx.de

**3666.** Burmeister, E.-G.; Börzsony, L. (2003): *Polythore spaeteri*, spec. nov. from the Peruvian tropical rainforest (Panguana), with remarks on its ecology (Odonata, Zygoptera, Polythoridae). Spixiana 26(1): 43-48. (in English). ["A new species of *Polythore* from the area of Panguana (Prov. Huanuco, Peru) is described and compared with species of the groups of *Polythore* (Bick & Bick 1985, 1986, 1990a, 1990b). The coloration of wings in ♂♂ and ♀♀ and the structure of the penis differ from all other species. The observation of ♂♂ and ♀♀ in tandem or copula can open some aspects into the aquatic biotopes of the larvae. Larvae of *Polythore*

have not been described." (Authors)] Address: Burmeister, E.-G. Zoologische Staatssammlung München, Münchhausenstr. 21, D-81247, München, Germany

**3667.** Carvalho, A.D.L.; Salgado, L.G.V. (2002): Description of the larva of *Aeshna pauloi* Machado, 1994 (Odonata, Aeshnidae), with a key to the identification of the known larvae of the genus occurring in the states of Rio de Janeiro and Sao Paulo, Brazil. *Boletim Museu Nacional Rio de Janeiro Zoologia* 485: 1-8. (Portuguese, with English summary) ["The ultimate instar larva of *Aeshna pauloi* Machado, 1994 is described and figured, based on material from southeastern Brazil. A key to the known larvae of the genus occurring in the states of Rio de Janeiro and Sao Paulo, Brazil, is appended." (Authors)] Address: Carvalho, A.D.L., Departamento de Entomologia, Museu Nacional/UFRJ, Quinta da Boa Vista, Sao Cristovao, 20940-040, Rio de Janeiro, RJ, Brazil

**3668.** Cating, P.M. (2003): How important are dragonflies to Swallow-tailed Kites? *Argia* 15(1): 14-16. (in English). [On the opportunity observing *Elanoides forficatus* (Aves) preying on *Epiaeschna heros* cf. in southern Florida, USA on 20 April 2001, the author compiles all available information on the subject.] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, Canada. E-mail: brownell@achilles.net

**3669.** Catling, P.M. (2003): Exuviae from under the bridge - A threat to dragonfly collections? *Argia* 15(1): 18. (in English). [The paper reports on the loss of exuviae by the dermestid beetle *Anthrenus* sp.. Some considerations on preserving collections of dried material are made.] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, Canada. E-mail: brownell@achilles.net

**3670.** Clausen, W. (2003): Die Bestandsentwicklung von *Coenagrion ornatum* in Ostwestfalen, Nordrhein-Westfalen (Odonata: Coenagrionidae). *Libellula* 22 (1/2): 1-10. (in German with English summary). ["An isolated population at the NW border of its range, at ditches near Stewede (52°24'51"N, 8°29'30"E) NE Osnabrück was monitored from 1990 to 2002. After a harsh frost period without snow and total freezing of most of the ditches in winter 1995 to 1996 there was a drastic decline. Additionally, because of a reduction of mowing intensity, the ditches were overgrown with reeds and the population tended to be extinct. Extra mowing near mid-May 2002 at some parts of the ditches brought back a little population" (Author)] Address: Clausen, W., Zur Bockwindmühle 60, D-32351 Stewede, Germany. E-Mail: WernerClausen@freenet.de

**3671.** Combes, S.A.; Daniel, T.L. (2003): Flexural stiffness in insect wings. II. Spatial distribution and dynamic wing bending. *Jour. exp. Biology* 206(17): 2989-2997. (in English). ["The dynamic, three-dimensional shape of flapping insect wings may influence many aspects of flight performance. Insect wing deformations during flight are largely passive, and are controlled primarily by the architecture and material properties of the wing. Although many details of wing structure are well understood, the distribution of flexural stiffness in insect wings and its effects on wing bending are unknown. In this study, we developed a method of estimating spatial variation in flexural stiffness in both the spanwise and chordwise direction of insect wings. We measured dis-

placement along the wing in response to a point force, and modeled flexural stiffness variation as a simple mathematical function capable of approximating this measured displacement. We used this method to estimate flexural stiffness variation in the hawkmoth *Manduca sexta*, and *Aeshna multicolor*. In both species, flexural stiffness declines sharply from the wing base to the tip, and from the leading edge to the trailing edge; this variation can be approximated by an exponential decline. The wings of *M. sexta* also display dorsal/ventral asymmetry in flexural stiffness and significant differences between males and females. Finite element models based on *M. sexta* forewings demonstrate that the measured spatial variation in flexural stiffness preserves rigidity in proximal regions of the wing, while transferring bending to the edges, where aerodynamic force production is most sensitive to subtle changes in shape." (Authors)] Address: Combes, S.A., Department of Biology, University of Washington, Seattle, WA, 98195, USA. E-Mail: scombes@u.washington.edu

**3672.** Corbet, P.S. (2003): Reproductive behaviour of Odonata: the history of a mystery. *International Journal of Odonatology* 6(2): 185-193. (in English) ["The main, externally visible components of odonate reproductive behaviour were known from published accounts for about 300 years before sperm displacement during copulation was first described. The latter discovery, revealed by Jonathan Waage in 1979, revolutionised the interpretation of odonate reproductive behaviour, allowing it for the first time to be interpreted convincingly in the context of sexual selection and the evolution of mating systems. This insight has been a prerequisite for elegant, ongoing work on mechanisms of sperm displacement and sperm precedence in Odonata." (Author)] Address: Corbet, P.S., Crean Mill, Crean, St Buryan, Cornwall, TR19 6HA, UK. E-mail: pscorbet@crean-mill.u-net.com

**3673.** Cordoba-Aguilar, A.; Salamanca-Ocana, J.C.; Lopezaraiza, M. (2003): Female reproductive decisions and parasite burden in a calopterygid damselfly (Insecta: Odonata). *Animal behaviour* 66: 81-87. (in English). ["There is currently a gap in sexual selection theory about how much the environment drives female mating decisions. We present field data that suggest that female sexual behaviour in the damselfly *Calopteryx haerorrhoidalis* is influenced by parasite burden. Male wing pigmentation in *Calopteryx* is a sexually selected trait that signals a male's ability to cope with eugregarine parasites (an intestinal parasite that feeds on the adult's ingested food). Because adult *C. haerorrhoidalis* females also show wing pigmentation, we examined whether this trait is similarly influenced by parasite burden and whether it may signal the female's reproductive value. Male *C. haerorrhoidalis* defend riverine substrates that females use for oviposition. After copulation and during oviposition, females are guarded by the copulating male against intruder males. Alternatively, females may avoid mating and 'steal' an oviposition site within a male's territory. In the present study, we found that the amount of female wing pigmentation was negatively correlated with the number of eugregarines present. Females with more parasites produced fewer eggs, survived fewer days, spent less time during courtship, 'inspected' fewer males before mating, had a lower mating success, were guarded for less time during oviposition and engaged in fewer 'stealing' events during oviposition. The reduced egg production and survival of

heavily infected females may result from eugregarine depletion of the females' consumed food reserves. Thus, to offset reduced longevity, heavily infected females may accept a mating more rapidly and mate with fewer males. 'Stealing' behaviour may be related to the female's differential use of sperm from some males, particularly high-quality males. Interestingly, males that mated with low-pigmented females showed greater variance in wing pigmentation than did males that mated with high-pigmented females. Possibly, female wing pigmentation may signal a female's reproductive value, which provides females with longer mate-guarding episodes and reduced interference from intruder males. This study points out one possible constraint, intestine parasites, that females may face during mating decisions. Because females in bad condition mate with males in both good and bad condition, this constraint may be pervasive enough to weaken the intensity of selection for a male sexually selected trait, wing pigmentation, and help to maintain its variation in phenotypic expression." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: [acordoba@uaeh.reduaeh.mx](mailto:acordoba@uaeh.reduaeh.mx)

**3674.** Córdoba-Aguilar, A. (2003): A description of male and female genitalia and a reconstruction of copulatory and fertilisation events in *Calopteryx haemorrhoidalis* (Vander Linden) (Odonata: Calopterygidae). *Odonatologica* 32(3): 205-214. (in English). ["The genitalia have a "design" remarkably similar to those of other representatives of the family. The main female structures are the bursa copulatrix, a T-shaped spermatheca, a pair of vaginal plates bearing a variable number of mechanoreceptive sensilla, and a ganglion located at the VIII abdominal segment. The 6 intromittent organ is a curved, sclerotised aedeagus that ends in a distal penis head. This latter structure bears 2 lateral appendages which are covered by recurved spines. A construction of the fertilisation and copulatory events is proposed based on descriptive and experimental evidence in other zygopterans as well as in this species. The female genital anatomy suggests fertilisation occurs in the manner proposed for other odonates. Experimental evidence shown in this work suggests that, during fertilisation, the egg stimulates the mechanoreceptive sensilla and elicits contractile activity of the muscles that surround the sperm storage organs (SSOs). The contractile activity is likely to be mediated by the VIII abdominal segment ganglion. As a consequence of the muscular contractions, the SSOs eject sperm which arrive to the site where the egg is and fertilise it. During copulation, the aedeagus "imitates" the presence of an egg in the vaginal plates and stimulates the mechanoreceptive sensilla inducing spermathecal sperm ejection. It is likely that spermathecal sperm is ejected to the bursa copulatrix where it is removed by the penis head and lateral appendages. After this sperm displacement process, the copulating male's sperm, stored in the seminal vesicle, is transferred, through a canal-like passage, by the aedeagus to the SSOs. Since females exhibit a considerable intra- and inter-individual variation in sensillum distribution and number on the plates, it is discussed whether this may have an adaptive significance in terms of retaining more control over stored sperm for females during male stimulation." (Author)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Ap-

do. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: [acordoba@uaeh.reduaeh.mx](mailto:acordoba@uaeh.reduaeh.mx)

**3675.** Córroba-Aguilar, A. (2003): A note on territorial and mating behaviour in the dragonfly *Pseudoleon superbus* (Hag.) (Anisoptera: Libellulidae). *Notul. odonatol.* 6(1): 10. (in English). ["[...] Here I provide a short report on this species' sexual behaviour which was observed in Plan del Rio, Veracruz on June 9, 2002, from 13:00 to 15:00 h. Individuals of both sexes were seen in the river that surrounds this locality. Five males were seen patrolling each of five different ponds of varying diameter (3-20 m) and shallowness (0.30-3.0 m) which were fed by the river. [...] males were overtly aggressive against conspecific whenever these appeared on the pond, they were chased over distances as long as 30 m. Males also showed fidelity for concrete sites on the ponds. Given these activities, this species seems to exhibit territorial behaviour. During observations, two females were seen arriving to two ponds at different times (13:30 and 13:56 h resp.). They were taken with no apparent pre-copulatory courtship by the territorial male. Copulation was in the air and took 5 and 7 seconds for each pair. Soon after this, females went directly to sites with submerged vegetation and started an in-flight oviposition. [...] mating males showed non-contact guarding during oviposition. During this, copulating males chased approaching males (number of males chased for each male: 3 and 5, resp.). In one occasion, a male chased a conspecific male and while this pair was some metres away from the pond, another male took the ovipositing female in copulation which lasted 5 seconds. The female continued oviposition even when the previous copulating male came back after 58 seconds, but no copulation ensued." (Author)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: [acordoba@uaeh.reduaeh.mx](mailto:acordoba@uaeh.reduaeh.mx)

**3676.** Couteyen, S.; Papazian, M. (2003): Contribution a la connaissance des Odonates de l'île de la Reunion 6. Description de la larve de *Coenagriocnemis reunienensis* (Fraser, 1957) (Odonata, Coenagrionidae). *Entomologiste* 59(1-2): 9-12. (in French with English summary). [The larva of the endemic *C. reunienensis* is described. Some information on the biology of the species is included.] Address: Couteyen, S., 188 Chemin Nid Joli, F-97430, Le Tampon, La Reunion, France

**3677.** Mauersberger, R., (2003): *Crocothemis erythraea* recorded in northeastern Germany (Odonata: Libellulidae). *Libellula* 22(1/2): 55-60. (in German, with English summary). [Three males of *C. erythraea* were observed on July 29, 2002, and one male on June 17, 2003 at glacial formed lakes near Rheinsberg (53,1°N) resp. near Neustrelitz (53,4°N), Brandenburg, Germany. The specimen activity pattern were focused on shallow bays with dense structures consisting of *Ceratophyllum*, *Myriophyllum*, *Utricularia*, and *Nymphaea*, together with other dragonfly species e.g. *Leucorrhinia caudalis*. It is to be considered as the northernmost records in Germany.] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-Mail: [foerdervereinUckermaerk.Seen@t-online.de](mailto:foerdervereinUckermaerk.Seen@t-online.de)

**3678.** Crumrine, P.W.; Crowley, P.H. (2003): Partitioning composition of risk reduction in a dragonfly-fish intraguild predation system. *Ecology* 84(6): 1588-1597.



(in English). ["Risk to prey imposed by intraguild predation (IGP) can be influenced by a number of factors, yet to date, few studies have measured the contributions of these factors to overall risk. A three-species IGP system with larvae of the dragonfly *Anax junias* as IG (top) predators, larvae of the dragonfly *Plathemis lydia* as IG prey (intermediate predators), and fathead minnow hatchlings (*Pimephales promelas*) as shared prey was used to estimate the contribution of the following three factors to shared-prey mortality rate in combined predator treatments: (1) the trophic effect of the IG predator on IG prey density; (2) the effect of reduced shared prey consumption by the IG prey in the presence of the IG predator; and (3) the effect of alternative prey for the IG predator. These factors were integrated into a model of multiple predator effects. To quantify minnow mortality, *P. promelas* were exposed to *A. junius* only, *P. lydia* only, *A. junius* and *P. lydia*, or neither in a two-by-two factorial design. Additional treatments, in which one or both predators were unable to feed, were used to isolate behavioral (activity level) changes in dragonfly larvae. When predators preyed in combination on *P. promelas* their impact was less than that of the summed effects of the two predators, each in the absence of the other a result termed risk reduction. *A. junius* consumed a significant number of *P. lydia* when they were present (i.e., IGP), and behavioral interactions between *A. junius* and *P. lydia* were asymmetric. The presence of *A. junius* caused *P. lydia* to become less active, while the presence of *P. lydia* elicited a diet shift in *A. junius* to include some *P. lydia*. Interactions between predator species, specifically IGP, influenced prey survival. Trophic and behavioral effects of IGP were similar in magnitude. These results highlight the importance of trophic and behavioral interactions in predator-prey systems and also suggest that effects of multiple predators may not be predictable based on the sum of individual effects. Determining the effects of multiple predators requires the identification of mechanisms that contribute to nonadditive prey responses." (Authors)] Address: Crumrine, P.W., Department of Biology and Center for Ecology, Evolution and Behavior, University of Kentucky, Lexington, Kentucky 40506-0225 USA. E-mail: pwcumO@uky.edu

**3679.** Czaplak, D. (2003): A *Phyllocycla* in Texas. *Argia* 15(1): 18-19. (in English). [On 25 May 2002, at Santa Ana NWR, Hidalgo County, Texas, USA, a female *Phyllocycla* was photographed. Due to the unclear taxonomic status of *P. breviphylla* and *P. elongata*, it was at present not possible to identify the specimen. In any case, the taxa is a new addition to the odonate fauna of USA.] Address: Czaplak, D., 13641 Amnassador Drive, Germantown MD 20874, USA. E-mail: Dma3@aol.com

**3680.** Daigle, J.; Thom, T. (2003): 2003 Eglin AFB, Florida meeting. *Argia* 15(2): 8-9. (in English). [Eglin Air Force Base in Niceville, Florida is known to many odonatologists, yes it is: Remember the MOAB (Massive Ordinance Air Burst), the huge bomb which was tested before the Iraq war, and which's power of destruction was send on your television screen several times a day. One of the astonishing things of the country is, that the Air Force Base is employing an aquatic biologist - Theresa Thom - to inventory the invertebrates of the air base. The meeting intended to help surveying the Odonata, including a new *Ophiogomphus* still to describe.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**3681.** Daigle, J.; Mauffray, B.; Beaton, G. (2003): 2003 SE meeting at Lafayette, Georgia. *Argia* 15(2): 9-10. (in English). [The regional meeting held in late May 2003 intended to contribute to the knowledge of the odonate fauna of three counties (Chattooga, Dade, Walker County) in the extrem northwest of Georgia, USA. Two new state records (*Arigomphus villosipes*, *Lestes eurinus*) and several second state records succeeded. Some emphasis ist given to *Gomphus lineatifrons*.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**3682.** de Araujo-Coutinho, C.J.P.; Viviani Cunha, A.; Serra-Freire, N.M.; de Mello, R.P. (2003): Evaluation of the impact of *Bacillus thuringiensis* serovar israelensis and temephos, used for the control of *Simulium* (*Chirostilbia*) *pertinax* Kollar, 1832 (Diptera, Simuliidae) on the associated entomofauna, Paraty, state of Rio de Janeiro, Brazil. *Memorias do Instituto Oswaldo Cruz* 98(5): 697-702. (in English). ["The study was set up to evaluate the impact of two commercial larvicide formulations, *Bacillus thuringiensis* serovar israelensis base (Bti) at 15 ppm/l min and temephos at 0.03 ppm of active ingredient, used to control *Simulium pertinax* populations, on associated non-target entomofauna occupying the same breeding sites. The experiments were carried out on the Pedra Branca and Muricana rivers, on the slopes of Serra do Mar massif, municipality of Paraty, state of Rio de Janeiro, Brazil. B. t. i. was applied to the river Pedra Branca and temephos to the river Muricana. On both rivers, treatment and control sections were labeled as such, each one with two observation posts: slow moving water and fast water regions respectively. Artificial substrata was used to evaluate the abundance of associated entomofauna. Attached immature stages of arthropods were removed from both of its surfaces fortnightly. Were collected, from the two rivers, 28 477 specimens of the entomofauna associated with *S. pertinax*. The families Hydropsychidae, Chironomidae, Bactidae, Simuliidae, Blephariceridae and Megapodagrionidae were represented. These was an impact of temephos on the entomofauna associated with *S. pertinax* only in Simuliidae and Chironomidae, and to B. t. i. only in Simuliidae. However, the reduction in their numbers was not statistically significant." (Authors)] Address: de Araujo-Coutinho, C.J.P., Laboratorio de Simulideose e Oncocercose, Departamento de Entomologia, Instituto Oswaldo Cruz-Fiocruz, Av. Brasil 4365, 21045-900, Rio de Janeiro, RJ, Brazil. E-Mail: coutinho@ioc.fiocruz.br

**3683.** De Marmels, J. (2003): *Lamproneura lucerna* gen. nov., sp. nov. from Venezuela, and *Cyanallagma ferenigrum* sp. nov., a remarkable new species from Brazil (Odonata: Protoneuridae, Coenagrionidae). *Int. Jour. Odonatology* 6(2): 99-107. ["*Lamproneura lucerna* gen. nov., sp. nov. (Protoneuridae) is described from a male from the Turimiquere mountains, in northeastern Venezuela. Penis morphology places the new genus close to *Forcepsioneura*, *Psaironeura* and *Roppaneura*. The first Venezuelan record of the genus *Phasmoneura* (*P. exigua* (Selys 1886) is presented. *Cyanallagma ferenigrum* sp. nov. (Coenagrionidae) is described from a ♂ and a ♀ from Mato Grosso, Brazil. Morphologically, this species seems to bridge the gap between the *A-dustum*-group of *Acanthagrion* and southeastern *Cyanallagma*." (Author)] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univers. Central de

Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com

**3684.** Deliry, C. (2003): Nouveaux articles, études ou notes concernant les libellules dans la région Rhônes-Alpes-Dauphiné. *Sympetrum piémontais* 51: 1-2. (in French). [France; 15 publications containing information on Odonata, nearly exclusively unpublished expertises, are compiled.] Address: Deliry, C., 20, rue de la Manine, F-38510 Morestel, France. E-mail: president@sympetrum.org

**3685.** Deliry, C. (2003): Nouvelles espèces dans les départements. *Sympetrum piémontais* 51: 2. (in French). [France: Ain, Hautes-Alpes, Ardèche, Drôme, Isère, Loire, Rhône, Savoie, Haute-Savoie; the species are listed without additional information.] Address: Deliry, C., 20, rue de la Manine, F-38510 Morestel, France. E-mail: president@sympetrum.org

**3686.** Devin, S.; Piscart, C.; Beisel, J.N.; Moreteau, J.C. (2003): Ecological traits of the amphipod invader *Dikerogammarus villosus* on a mesohabitat scale. *Archiv für Hydrobiologie* 158(1): 43-56. (in English). ["Since 1995, *Dikerogammarus villosus* SOWINSKI, a Ponto-Caspian amphipod species, has been invading most of Western Europe's hydrosystems. *D. villosus* geographic extension and quickly increasing population density has enabled it to become a major component of macrobenthic assemblages in recipient ecosystems. The ecological characteristics of *D. villosus* on a mesohabitat scale were investigated at a station in the Moselle River. This amphipod is able to colonize a wide range of substratum types, thus posing a threat to all freshwater ecosystems. Rivers whose dominant substratum is cobbles and which have tree roots along the banks could harbour particularly high densities of *D. villosus*. A relationship exists between substratum particle size and the length of the individuals, and spatial segregation according to length was shown. This allows the species to limit intra-specific competition between generations while facilitating reproduction. A strong association exists between *D. villosus* and other Ponto-Caspian species, such as *Dreissena polymorpha* and *Corophium curvispinum*, in keeping with Invasional Meltdown Theory. Four taxa (*Coenagrionidae*, *Calopteryx splendens*, *Corophium curvispinum* and *Gammarus pulex*) exhibited spatial niches that overlap significantly that of *D. villosus*. According to the predatory behaviour of the newcomer, their populations may be severely impacted." (Authors)] Address: Devin, S., Laboratoire B.F.E., Equipe de Démocologie, Université de Metz, Avenue du Général Delestraint, Campus Bridoux, 57070, Metz, France. E-Mail: devin@sciences.univ-metz.fr

**3687.** Dijkstra, K.-D. (2003): Dragonflies and damselflies (Odonata) in Bwindi Impenetrable and Semliki National Parks, Uganda. Final report for the project: "Biogeography and ecology of dragonflies (Odonata) of South and West Ugandan forests", 1 September 2003. In collaboration with: Viola Clausnitzer, Philipps-University of Marburg, Marburg, Germany and John Joseph Kisakye & Derek Pomeroy, Makerere University Institute for Environment and Natural Resources, Kampala, Uganda: 8 pp. (in English). [65 species from Bwindi Impenetrable, and 91 species from Semliki National Parks are listed in tables and briefly commented according to their (biogeographical) range, ecology, sampling locality. The species composition of both

parks is compared, and some remarkable species including some new to science are briefly discussed.] Address: Dijkstra, K.-D., Gortestraat 11, 2311 MS Leiden, The Netherlands, kddijkstra@hetnet.nl

**3688.** Dijkstra, K.D.; Lempert, J. (2003): Odonate assemblages of running waters in the Upper Guinean forest. *Archiv für Hydrobiologie* 157(3): 397-412. (in English). ["In order to describe the assemblages of adult Odonata of running waters in the Upper Guinean forest, 36 sites in Liberia and Ghana were analysed using Non-metric Multidimensional Scaling. Five groups were identified, which correspond with different assemblages in the sequence of habitats from small streams to large rivers. Taxonomically related species demonstrate distinct ecological segregation within this gradient, occupying different sections of running waters, or different microhabitats therein. The balance of sun and shade, resulting from a varying degree of habitat openness, is thought to be an important factor in habitat selection, but it is difficult to distinguish from other factors associated with stream size. Anthropogenic opening of stream habitat (e.g. by deforestation or damming) can downscale the present fauna, i.e. result in the invasion of species of downstream habitats (more open) and the disappearance of upstream (dense forest) species." (Authors)] Address: Lempert, J., Vereinsstr. 41, D-20357 Hamburg, Germany. E-mail: jochen.lempert@gmx.de

**3689.** Dijkstra, K.-D. (2003): Problems in Chlorocypha classification: four cases from West Africa and a discussion of the taxonomic pitfalls (Odonata: Chlorocyphidae). *International Journal of Odonatology* 6(2): 109-126. (in English). ["The taxonomy of *Chlorocypha* species is problematic due to variability and the paucity of morphological characters. Subspecies *radix* of *C. glauca* is raised to specific rank. *C. sharpae* is found to be a synonym of *C. luminosa*. The synonymy of *C. jejuana* with *C. luminosa* is rejected. The former species is similar to the Southern African *C. consueta* and differences are stated. *C. dispar ovulosa*, *Libellago dispar fraseri* and *C. mutans* are synonyms of *C. pyriformosa*, although the lost type series of *fraseri* appears to have contained immature specimens of *C. dispar*. Trends in African chlorocyphid variation, subsequent taxonomic pitfalls and suggested guidelines to deal with them are discussed. The main problems are age and environment related melanization intensity, dark patterns caused by reversible temperature-induced colour change, especially in teneral, and the switch between reddish and bluish colours in species with bicoloured abdomens." (Author)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**3690.** Donnelly, N. (2003): Dragonflies as hitchhikers? A puzzling record of *Gomphus graslinellus* from eastern New York. *Argia* 15(1): 17-18. (in English). [On 14-VIII-1996, *G. graslinellus* was recorded in Newsburgh River, New York, far away from its known most eastern localities in Ohio, USA. N. Donnelly questions, if the specimen might have hitchhiked on a truck coming from the Midwest to New England. He refers to additional cases of possible hitchhiking: *Epiaeschna heros* in Panama, and *Pachydiplax longipennis* on an oil rig in the North Sea, Europe.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

- 3691.** Donnelly, N. (2003): Northeastern Great Plains - a side trip on the way to California. *Argia* 15(2): 14-15. (in English). [Some highlights from several places in North Dakota, USA are briefly documented; emphasis is given to the Leucorrhinias.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 3692.** Drost, C.A.; Paxton, E.H.; Sogge, M.K. Whitfield, M.J. (2003): Food habits of the Southwestern Willow Flycatcher during the nesting season. *Studies in Avian Biology* (26): 96-103. (in English). ["The food habits and prey base of the endangered Southwestern Willow Flycatcher (*Empidonax traillii* extimus) are not well known. We analyzed prey remains in 59 fecal samples from an intensively-studied population of this flycatcher at the Kern River Preserve in southern California. These samples were collected during the nesting season in 1996 and 1997 from adults caught in mist nets, and from nestlings temporarily removed from the nest for banding. A total of 379 prey individuals were identified in the samples. Dominant prey taxa, both in total numbers and in percent occurrence, were true bugs (Hemiptera), flies (Diptera), and beetles (Coleoptera). Leafhoppers (Homoptera: Cicadellidae), spiders (Araneae), bees and wasps (Hymenoptera), and dragonflies and damselflies (Odonata) were also common items. Diet composition was significantly different between years, due to a large difference in the numbers of spiders between 1996 and 1997. There was also a significant difference between the diet of young and adults, with the diet of young birds having significantly higher numbers of odonates and beetles. There was a trend toward diet differences between males and females, but this was not significant at the  $P = 0.05$  level." (Authors)] Address: Drost, C.A., U.S. Geological Survey, Southwest Biological Science Center, Colorado Plateau Field Station, 2255 North Gemini Drive, Flagstaff, AZ, 86001, USA
- 3693.** DuBois, R.B. (2003): Unreliability of taxonomic keys to larval Leucorrhinia. *Argia* 15(1): 13-14. (in English). [Applying taxonomic keys to identify *Leucorrhinia intacta* and *L. proxima* from northern Wisconsin, USA, resulted in a failure to separate the specimens in a correct way.] Address: DuBois, R.B., DNR, 6250 S. Ranger Road, Brule WI 54820, USA
- 3694.** Dumont, H.J. (2003): Odonata from the Republic of Mongolia and from the Autonomous Region of Inner Mongolia. *International Journal of Odonatology* 6 (2): 127-146. (in English). ["Thirty-five dragonfly species are reported from Mongolia and Inner Mongolia. Three are first records (*Coenagrion johanssoni*, *Erythromma najas humerale* Selys 1887, *Sympetrum speciosum haematoneura* Fraser). A non-parametric test is used to determine the total number of species to be expected. It suggests that the current number of 62 may be asymptotically complete, except for some specific zones like the Bulgan valley in the south-west, and the upper catchment of the Amur River, which have a distinctive fauna. From a biogeographic point of view, the Mongolian fauna is predominantly of impoverished Eurosibirian extraction. The south of Mongolia (the Gobi) and adjacent Inner Mongolia are, however, enriched with a significant fraction of East-Mediterranean and Irano-Turanian species, taking advantage of the Dzungarian corridor(s). This is particularly true of the fauna found in the small cis-Altai 'exclave' of the extreme south-west of the country. True Oriental species are rare, but East Palaearctic species (e.g. of the genus *Cercion*) are well-represented, especially south and east of the Gobi desert, which itself remains in need of further exploration." (Author) *Coenagrion lunulatum*, *Cercion v-nigrum*, *Orthetrum brunneum lineostigma*, *Sympetrum speciosum haematoneura*, and *S. hypomelas* are figured, and discussed in detail.] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be
- 3695.** Dunkle, S. (2003): Minutes of the 2003 DSA meeting. *Argia* 15(2): 21-22. (in English). [20-21 June 2003, Williams, California] Address: Dunkle, S., Biol. Dept, Collin County Community College, 2800 E, Spring Creek Parkway, Plano, TX 75074, USA
- 3696.** Dyrz, A.; Flinks, H. (2003): Nestling food of the congeneric and sympatric Rusty-margined and Social flycatchers. *Journal of Field Ornithology* 74(2): 157-165. (in English). ["We studied the food of nestling Rusty-margined (*Myzotetes cayanensis*) and Social flycatchers (*M. similis*) in 1998 and 1999 at Barro Colorado Island, Panama. Food samples were taken from nestlings by fecal analysis and the neck-collar method. In both species most food items were beetles, winged ants, dragonflies, spiders, and seeds of *Miconia* spp. Water animals (mainly backswimmers, freshwater snails, and dragonfly larvae) constituted 7.8%-13.5% of animal prey. The nestlings of the Social Flycatcher received significantly more flying insects, while the proportion of fruits and seeds was significantly higher in the diet of Rusty-margined Flycatcher nestlings. Length of animal prey varied from 4-25 mm in the Rusty-margined Flycatcher and 2-50 mm in the Social Flycatcher, and the length of fruits and seeds were 4-11 mm and 2-19 mm, respectively. The average length of animal food was larger in the Rusty-margined Flycatcher despite its slightly smaller size. The number of broods with nestlings or fledglings present in the study area was positively correlated with the abundance of fruits in the Social Flycatcher." (Authors)] Address: Dyrz, A., Department of Avian Ecology, Wroclaw University, Sienkiewicza 21, 50-335, Wroclaw, Poland. E-Mail: dyrz@biol.uni.wroc.pl
- 3697.** Ellenrieder, N. von; Garrison, R.W. (2003): A synopsis of the genus *Triacanthagyna* (Odonata: Aeshnidae). *International Journal of Odonatology* 6(2): 147-184. (in English) ["This synopsis of adult *Triacanthagyna* includes the revalidation of two species thought to be synonyms (*T. nympha* and *T. obscuripennis*), the description of a new species (*T. williamsoni*; type locality: Peru, Tingo Maria), keys to both sexes, illustrations of diagnostic characters, and distribution maps of all species. A phylogenetic assessment of the nine species is included, using outgroup comparison and parsimony algorithm. The cladistic analysis shows *Triacanthagyna* to be partitioned into two monophyletic groups: (1) two species lacking humeral, interpleural and metapleural dark stripes on pterothorax and with male cerci narrowing gradually at tip (*T. septima* and *T. obscuripennis*), and (2) six species with male cerci bearing subbasal teeth (*T. satyrus*, *T. caribbea*, *T. ditzleri*, *T. williamsoni*, *T. nympha* and *T. trifida*)." (Authors)] Address: Ellenrieder, Natalia von, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, CA, 90007, USA. E-Mail: odo\_nata@hotmail.com



- 3698.** Ellenrieder, N. von (2003): A synopsis of the Neotropical species of 'Aeshna' fabricius: The genus *Rhionaeschna* Förster (Odonata: Aeshnidae). *Tijdschrift voor Entomologie* 146(1): 67-207. (in English). [This study includes a revisionary, phylogenetic and biogeographical analysis of Neotropical components of *Aeshna* Fabricius characterized by a midventral tubercle on abdominal sternum I. Phylogenetic relationships of the Neotropical species of *Aeshna* were inferred based on 39 adult characters. Ingroup taxa included 68 out of the 85 species currently assigned to *Aeshna*, and two species each of *Andaeshna* De Marmels and *Anaciaeschna* Selys. *Oreaeschna dictatrix* Lieftinck was chosen as outgroup. The strict consensus tree obtained after successive weighting revealed that *Aeshna* is not monophyletic; some of its species are more closely related to *Anaciaeschna* or *Andaeshna*. The name *Aeshna* should consequently be restricted to the Holarctic group including the type species *Aeshna grandis* Fabricius. In the present synopsis the generic name *Rhionaeschna* Förster is assigned to the New World group characterized by the presence of a conical tubercle on abdominal sternum I, comprising 39 species formerly assigned to *Aeshna*. The synopsis includes keys to adults of both sexes, diagnoses, biological notes, distribution maps and more than 400 diagnostic illustrations. *Rhionaeschna demarmelsi* sp. n. is described, *R. maita* Förster is considered a junior synonym of *R. brevifrons* (Hagen), *R. planaltica* (Ris) is considered a valid species, not a synonym of *R. variegata* (Fabricius), *R. planaltica* (Calvert) is raised to specific rank, 'Aeshna' *williamsoniana* Calvert, formerly included in the subgenus *Hesperaeschna* Cockerell, is excluded from *Rhionaeschna*, and lectotypes are designated for *R. maita*, *R. intricata* (Martin), *R. multicolor* (Hagen), *R. bonariensis* (Rambur), *R. diffinis* (Rambur), and *R. peralta*. Females of three species and larvae of 16 species are still unknown. *Rhionaeschna* occurs from southern Argentina to southern Canada, but is primarily Neotropical with its highest diversity along the Andean mountain range between Venezuela and Bolivia. It is absent from the Amazon basin, only three species occur north to the Neotropical region. The sister group of *Rhionaeschna* includes some African species of 'Aeshna' (*A. rileyi* Calvert, *A. subpupillata* McLachlan and *A. moori* Pinhey). *Rhionaeschna* plus the African clade constitute the sister group of *Andaeshna*, *Anaciaeschna*, *Anax* Leach, *Hemianax* Selys and several species of 'Aeshna' of uncertain affinities (i.e. *A. affinis* Vander Linden, *A. brevistyla* Rambur, *A. ellioti* Kirby, *A. mixta* Latreille, *A. isoceles* Muller and *A. williamsoniana*); the phylogenetic relationships within this complex are not yet known and their resolution is beyond the scope of this study. *Rhionaeschna* is absent from the Brazilian shield. Its related species and genera ('*A. rileyi*', '*A. subpupillata*', '*A. moori*' in Africa; '*A. brevistyla*' in Australia and New Zealand, *Andaeshna* in the Andes and '*A. williamsoniana*' in Central America, '*A. isoceles*' and highest species numbers of *Anaciaeschna*, *Hemianax* and *Anax* species in the Indo-Australian region) display a low diversity in Africa, which suggests a trans-Pacific rather than trans-Atlantic (Gondwanian) track, as has been hypothesized for other groups of similarly distributed odonates." (Author)] Address: Ellenrieder, Natalia von, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, CA, 90007, USA. E-Mail: [odonata@hotmail.com](mailto:odonata@hotmail.com)
- 3699.** Ellenrieder, N. von; Muzón, J. (2003): Description of the last larval instar of *Ischnura fluviatilis* Selys (Coenagrionidae). *Bull. American Odonatology* 7(3): 57-60. [The last larval instar of *I. fluviatilis* is described and compared with the species distributed in South America which larvae are known, i.e., *I. capreola* and *I. ramburii*. In addition, a modification of the Westfall & May (1996, *Damselflies of North America*, Scientific Publ.) larval key is proposed." (Author)] Address: von Ellenrieder, Natalia, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, 90007 CA, USA. E-mail: [odonata@hotmail.com](mailto:odonata@hotmail.com)
- 3700.** Ferreira-Peruquetti, P.; Trivinho-Strixino, S. (2003): Notas sobre relações foréticas entre espécies de Chironomidae e Odonata do Estado de São Paulo, Brasil. *Entomotropica* 18(2): 149-151. (in Portuguese, with English summary). [The note reports phoresy between larvae of Chironomidae and larvae of Odonata in streams of Campos do Jordão and Luiz Antônio (São Paulo State, Brazil). *Thienemanniella* sp. Kieffer, 1911 (Orthocladiinae: Corynoneurini) was attached on *Argia modesta*, and *Rheotanytarsus* Thienemann & Bause, 1913 (Chironominae: Tanytarsini) on *Elasmotheremis cannacrioides*, *Heteragrion* sp., and *Castoreschna* sp.] Address: Ferreira-Peruquetti, Patrícia, Trivinho-Strixino, Susana, Universidade Federal de São Carlos, Departamento de Hidrobiologia, Laboratório de Entomologia aquática, C.P. 676, CEP 13565-905, São Carlos, SP, Brasil
- 3701.** Fleck, G.; Bechly, G.; Martinez-Delclos, X.; Jarzembowski, E.; Coram, R.; Nel, A. (2003): Phylogeny and classification of the Stenophlebioptera (Odonata: Epiproctophora). *Ann. Soc. Entomol. France* 39(1): 55-93. (in English with French summary). [The Juraheterophlebiidae, new family of the "heterophlebioid" lineage, the Henrotayiidae, new family of the "anisopteroid" lineage, the Prostenophlebiidae and the Liassostenophlebiidae, new families of the Stenophlebioptera, and three new genera and species of the Stenophlebiidae are described from the Mesozoic of Germany, Spain, England, Kazakhstan, and Mongolia. The phylogenetic positions of the families Erichschmidiidae and Gondvanogomphidae are discussed. A tentative phylogenetic analysis of the Anisopteromorpha is proposed. This significantly extends our knowledge on the palaeogeographical distribution of the Stenophlebioptera and the Epiproctophora ("dragondamselflies")." (Authors)] Address: Nel, A., Entomologie, CNRS UMR 8569, Museum National d'Histoire Naturelle, 45 Rue Buffon, F-75005, Paris, France. E-Mail: [anel@mnhn.fr](mailto:anel@mnhn.fr)
- 3702.** Freeland, J.R.; May, M.; Lodge, R.; Conrad, K.F. (2003): Genetic diversity and widespread haplotypes in a migratory dragonfly, the common green darner *Anax junius*. *Ecological Entomology* 28(4): 413-421. (in English). [1. Species that undertake regular two-way migration may be expected, through population connectivity, to exhibit some level of genetic similarity over broad spatial scales. Although seldom following two-way migration, highly mobile insect species tend to exhibit either low haplotype diversity and no phylogeographic structuring, or relatively high haplotype diversity and pronounced phylogeographic structuring. 2. This study reveals the first wide-scale genetic characterization of a migratory dragonfly, *A. junius*. Unusually for insects, north-south two-way migration is common in this species, although not obligatory. In at least part of its

range, some individuals follow an extended developmental period and overwinter in a state of diapause. 3. Mitochondrial sequence data were obtained from 92 *A. junius* individuals collected from 35 sites across Canada, U.S.A., and Mexico. These revealed 38 haplotypes, some of which were extremely widespread, although the majority (27 haplotypes) was found in only one individual. In contrast to previous studies on mobile insects, the overall pattern was of relatively high haplotype diversity in the absence of phylogeographic structuring. 4. Migrants and non-migrants, which sometimes shared haplotypes, were distributed across multiple genetic lineages. This suggests that, contrary to some earlier assertions, developmental pathways in this species may be plastic. Such plasticity would allow highly mobile species to adapt to a range of environmental conditions, and may be key to the widespread distribution of multiple haplotypes." (Authors)] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu

**3703.** Gilard, B. (2003): Nouvelles des région. SFO Auvergne (03, 15, 43, 63). Société française d'odonatologie. La lettre des sociétaires 33: 8-9. (in French). [The distribution of *Coenagrion lunulatum* is very restricted in France; the main population is concentrated to the region of the Auvergne. The author briefly outlines the current status of the species. In addition, he lists some interesting observations from the departments of Cantal, Haute-Loire, and Puy-d-Dôme.] Address: Gilard, B., 10, place du 8 mai, F-63490 Sauxillanges, France

**3704.** Glotzhober, R.C.; Chapman, E. (2003): Second location for two rare Odonata in Ohio, *Nannothemis bella* and *Ladona julia*, (Odonata: Libellulidae) discovered at Singer Lake Bog, Summit County, Ohio. *Great Lakes Entomologist* 34(2) (2001): 63-66. ["Previously [...] *L. julia* and *N. bella* were known in Ohio from only one extant population each: *L. julia* from extreme northwest Ohio in Williams County and *N. bella* from west-central Ohio in Champaign County. During the summer of 2000 populations of each of these species were found in close proximity to each other at Singer Lake, a wetlands complex in southern Summit County in northeastern Ohio. This new location is also home to a population of another rare Ohio dragonfly, *Dorocordulia libera* (Odonata, Corduliidae) that was discovered during 1999. The Singer Lake wetlands are proving to be a very significant habitat for Ohio Odonata." (Authors)] Address: Glotzhober, R.C., Ohio Historical Society, 1982 Velma Avenue, Columbus, OH, 43211-2497, USA

**3705.** Gronowski, T. (2003): Dragonflies (Odonata) of the Łuknajno Lake nature reserve. *Parki Narodowe i Rezerваты Przyrody* 22(4): 543-548. (in Polish with English summary). [In 2001 and 2002, 26 odonate species were sampled in the Łuknajno Lake nature reserve (Great Masurian Lakes, NE Poland). This lake is a small (680 ha) and shallow, eutrophic lake, with a rich and diverse emergent and submerged vegetation, and which occupies 20% of the lake area. Most of the dragonfly species are widespread and common in Poland, but *Anax parthenope* and *Anaciaeschna isocela* are rare in the north-east part of the country. An additional rare species is *Leucorrhinia pectoralis*.] Address: Gronowski, T., Zakład Zoologii Uniwersytet Warszawski, ul. Banacha 2, 02 - 097, Warszawa, Poland. E-mail: gronowski@biol.uw.edu.pl

**3706.** Günther, A. (2003): Eiablage von *Sympetrum vulgatum* auf ein parkendes Auto (Odonata: Libellulidae). *Libellula* 22(1/2): (in German with English summary). ["A tandem pair was observed placing eggs onto the metallic-green bonnet of a car that was parked in a sunlit place. Less than 50 eggs could be found on the car." (Author)] Address: Günther, A., TU Bergakademie, IÖZ, AG Biologie/Ökologie, Leipziger Straße 29, D-09599 Freiberg, Germany. E-Mail: andre.guenther@ioez.tu-freiberg.de

**3707.** Guerbaa, K. (Ed.) (2003): Atlas des libellules du Limousin. *Epops*, Hors Série 1: 110 pp. (in French). [In the beginning of the 20th century, René Martin surveyed the odonate fauna of the Limousin region in France. With focus on these data, the results of a mapping project referring to the period of 1980 to 2001 are presented and discussed. More than 15000 species/location data sets are used to provide distribution maps. These are briefly commented. The style of the small book is very sophisticated: Black and white drawings - in most cases realised by Catie Faurie - and some black and white photographs build a very harmonic unit with the brief but competent textes. The book can be obtained by the Société Limousine d'Odonatologie et la SEPOL, 11, Rue Jauvion, F-87000 Limoges, France. Please add 10,- Euro to your order.] Address: Guerbaa, K., 1, rue de la Madonnette, F-87250 Bessines-sur-Gartempe, France

**3708.** Haas, F.; Waloszek, D.; Hartenberger, R. (2003): *Devonohexapodus bocksbergensis*, a new marine hexapod from the Lower Devonian Hunsrück Slates, and the origin of Atelocerata and Hexapoda. *Organisms Diversity & Evolution* 3(1): 39-54. (in English). ["We describe a new arthropod (approximately 75 mm long) from the Lower Devonian (Lower Emsian) Hunsrück Slates near Bundenbach, western Germany. The specimen is from an isolated piece of rock found on the quarry dump, precluding precise resolution of stratigraphic age. The Hunsrück Slates are marine sediments with a rich fauna of exclusively marine taxa, suggesting that our fossil was also marine. The animal has a small head with large compound eyes and long, filiform, myocerate antennae. Its trunk is divided distinctly into a thorax with three segments and three pairs of slender legs, and a post-thoracic domain composed of 35-40 limb-bearing segments of which the anteriormost are paired, stout, and ventrally-oriented leglets; the 3 ultimate limb-bearing segments bear longer, posteriorly-oriented and apparently specialised appendages. The overall appearance of the new form is reminiscent of Archaeognatha or Odonata. It is interpreted as a representative of the Hexapoda because of the possession of a three-segmented thorax and three pairs of legs that are clearly distinct from the posterior set. The large number of leg-bearing post-thoracic segments discriminates it from the Insecta, which possess 11 "abdominal" segments maximally, originally also leg-bearing. The formal systematic classification of the organism is: (Hexapoda (*Devonohexapodus bocksbergensis*+Insecta ("entognaths"+Ectognatha))). The morphology of the fossil and its environment suggest that the hexapody of hexapods did not evolve as an adaptation to terrestrial locomotion, but was already developed in the marine habitat. No terrestrial arthropods have changed their original tagmosis for biomechanical reasons, for example, no "myriapods" have reduced their leg numbers or modified their trunk to evolve a thorax and ab-

domen similar to insects. Walking exclusively on uniramous prosomal legs in the Chelicerata also occurred well before terrestrialization of this other euarthropodan group. It is not unlikely that the last common ancestor of the Hexapoda was large and that the small size of extant "entognaths" evolved due to reduction in their stem lineage. Being marine, the new fossil also has considerable impact on hypotheses about the early evolution of Atelocerata ("myriapods"+Hexapoda). For example, if their last common ancestor was aquatic, terrestrialization took place at least twice and tracheal breathing probably evolved independently in both taxa after terrestrialization." (Authors)] Address: Haas, F., Section for Bio-systematic Documentation, University of Ulm, Helmholzstr. 20, D-89081, Ulm, Germany. E-Mail: haas.smns@naturkundemuseum-bw.de

**3709.** Haden, G.A.; Shannon, J.P.; Wilson, K.P.; Blinn, D.W. (2003): Benthic community structure of the Green and Colorado rivers through Canyonlands National Park, Utah, USA. *Southwestern Naturalist* 48(1): 23-35. (in English). ["We sampled the aquatic benthos at 6 remote sites on the Colorado and Green rivers through Canyonlands National Park, Utah, USA. This study provides the first published description of benthic standing mass, invertebrate community composition, and primary carbon for this portion of the Colorado River system. High suspended sediment concentrations prohibited growth of primary producers. The primary carbon for benthic invertebrates was terrestrial organic matter. The invertebrate community was composed of 49 taxa, mostly mayflies, caddisflies, and diptera, which were dominated by filterer/collector species. A smaller portion of the community was made up of predatory stoneflies and odonates. Standing mass of invertebrates on cobble substrates within a given site was stable over the multiyear sample period (1993 through 1996) and was comparable with other southwestern streams (overall mean = 0.41 g/m<sup>2</sup> ash-free dry mass +/- 0.01 SE). Invertebrate standing mass at each site was controlled by the availability of primary carbon. Primary carbon availability was controlled by supply to the site and retention within the site. Both aspects might be influenced by anthropogenic alteration of the river basin and discharge patterns upstream of the study site." (Authors)] Address: Haden, G.A., Dept of Biological Sciences, Northern Arizona University, P.O. Box 5640, Flagstaff, AZ, 86011, USA. E-Mail: Allen.Haden@nau.edu

**3710.** Hagen, H. von (2003): Artspezifische Exuvienhaltungen bei der Emergenz von drei Libelluliden auf Mallorca (Odonata: Libellulidae). *Libellula* 22(1/2): 25-29. (in German with English summary). ["At agricultural irrigation tanks, exuviae of *Selysiothermis nigra* were fixed to the substrate by their legs only, whereas *Crocothemis erythraea* and *Orthetrum cancellatum* additionally have contact with their abdomen two. The latter differ in the symmetry of the leg positions." (Author)] Address: von Hagen, H., Akazienweg 28, D- 58452 Witten, Germany. E-Mail: H.vonHagen@web.de

**3711.** Haines, T.A.; May, T.W.; Finlayson, R.T.; Mierzykowski, S.E. (2003): Factors affecting food chain transfer of mercury in the vicinity of the Nyanza site, Sudbury River, Massachusetts. *Environmental Monitoring & Assessment* 86(3): 211-232. (in English). ["The influence of the Nyanza Chemical Waste Dump Superfund Site on the Sudbury River, Massachusetts, was assessed by analysis of sediment, fish prey organisms,

and predator fish from four locations in the river system. Whitehall Reservoir is an impoundment upstream of the site, and Reservoir 2 is an impoundment downstream of the site. Cedar Street is a flowing reach upstream of the site, and Sherman Bridge is a flowing reach downstream of the site. Collections of material for analysis were made three times, in May, July, and October. Sediment was analyzed for acid-volatile sulfide (AVS), simultaneously-extracted (SEM) metals (As, Cd, Cr, Hg, Pb, Sb, Zn), and total recoverable Hg. The dominant predatory fish species collected at all sites, largemouth bass (*Micropterus salmoides*), was analyzed for the same suite of metals as sediment. Analysis of stomach contents of bass identified small fish (yellow perch *Perca flavescens*, bluegill *Lepomis macrochirus*, and pumpkinseed *Lepomis gibbosus*), crayfish, and dragonfly larvae as the dominant prey organisms. Samples of the prey were collected from the same locations and at the same times as predator fish, and were analyzed for total and methyl mercury. Results of AVS and SEM analyses indicated that sediments were not toxic to aquatic invertebrates at any site. The SEM concentrations of As, Cd, and Cr were significantly higher at Reservoir 2 than at the reference sites, and SEM As and Cd were significantly higher at Sherman Bridge than at Cedar St. Sediment total Hg was elevated only at Reservoir 2. Hg was higher at site-influenced locations in all fish species except brown bullhead (*Ameiurus nebulosus*). Cd was higher in bluegill, black crappie (*Pomoxis nigromaculatus*), and brown bullhead, and Cr was higher in largemouth bass fillet samples but not in whole-body samples. There were no seasonal differences in sediment or prey organism metals, but some metals in some fish species did vary over time in an inconsistent manner. Predator fish Hg concentration was significantly linearly related to weighted prey organism methyl Hg concentration. Largemouth bass Hg was significantly lower at Reservoir 2 in our study than in previous investigations in 1989 and 1990. High concentrations of inorganic Hg remain in river sediment as a result of operation of the Nyanza site, and fish Hg concentrations in river reaches downstream of the site are elevated compared to upstream reference sites. However, the differences are relatively small and Hg concentrations in largemouth bass from the site-influenced locations are no higher than those from some other, nearby uncontaminated sites. We hypothesize that this results from burial of contaminated sediment with cleaner material, which reduces bioavailability of contaminants and possibly reduces methylation of mercury." (Authors)] Address: Haines, T.A., Leetown Science Center, Orono Field Station, U.S. Geological Survey, Orono, ME, USA. E-Mail: haines@maine.edu

**3712.** Hamada, N.; Oliveira, S.J. de (2003): Food items of larvae of *Rimanella arcana* (Needham, 1933) (Odonata: Amphipterygidae) in Central Amazonia, Brazil. *Entomotropica* 18(2): 153-155. (in English, with Portuguese summary). ["The objective of the present study was to determine the prey of *R. arcana* larvae by means of stomach content analyses. A total of 39 larvae were dissected; three of them (7.7%) had empty stomachs. The following taxa were present in the stomach content of *R. arcana*: Diptera: Simuliidae (83.3%), Chironomidae (61.1%), Empididae (5.6%); Trichoptera: Hydroptilidae (19.4%), Hydropsychidae (8.3%); Ephemeroptera: Baetidae (8.3%); Lepidoptera: Crambidae (2.8%), and Acarina (5.6%). Simuliidae and Chironomidae were the most frequent food items of *R. arcana* lar-



vae, and both families also were the most abundant in the riffles and waterfalls of the study area." (Authors)] Address: Hamada, Neusa, Coordenação de Pesquisas em Entomologia, Instituto Nacional de Pesquisas da Amazonia, Caixa Postal 478, CEP 69011-970 Manaus, AM, Brazil. E-mail: nhamada@inpa.gov.br.

**3713.** Hawking, J.H.; New, T.R. (2003): Interpreting dragonfly diversity to aid in conservation assessment: Lessons from the Odonata assemblage at Middle Creek, north-eastern Victoria, Australia. *Journal of Insect Conservation* 6(3) (2002): 171-178. (in English). ["In order to evaluate single-occasion sampling in compiling inventories for Odonata, larvae were sampled on 20 occasions from 1987-1990 at a site on Middle Creek, north-eastern Victoria, and adults sought also on each visit to more fully evaluate the diversity of the assemblage, and limitations of depending on a single life stage for this purpose. A total of 18 species (7 Zygoptera, 11 Anisoptera) included 15 species collected as larvae and 16 as adults. Few species were common as larvae, and about half the 2806 specimens identified were *Austrogomphus cornutus* Watson. *Orthetrum caledonicum* (Brauer) and *Ischnura heterosticta* (Burmeister) were also abundant, and these three species were also the most common as adults. The number of species obtained ranged from 2-9 on different occasions, and represent different 'habitat groups' within the local fauna. The Middle Creek odonate fauna appears to be much richer than that of a nearby site on the Kiewa River (12 species), and reasons for this are discussed. Seasonal variation in species representation and relative abundances are noted. Any single sample occasion provided insufficient knowledge of the total assemblage to interpret odonate diversity reliably." (Authors)] Address: New, T.R., Department of Zoology, La Trobe University, Bundoora, Vic., 3083, Australia

**3714.** Herbeck, J.T.; Novembre, J. (2003): Codon usage patterns in cytochrome oxidase I across multiple insect orders. *Journal of Molecular Evolution* 56(6): 691-701. (in English). ["Synonymous codon usage bias is determined by a combination of mutational biases, selection at the level of translation, and genetic drift. In a study of mtDNA in insects (including Odonata), we analyzed patterns of codon usage across a phylogeny of 88 insect species spanning 12 orders. We employed a likelihood-based method for estimating levels of codon bias and determining major codon preference that removes the possible effects of genome nucleotide composition bias. Three questions are addressed: (1) How variable are codon bias levels across the phylogeny? (2) How variable are major codon preferences? and (3) Are there phylogenetic constraints on codon bias or preference? There is high variation in the level of codon bias values among the 88 taxa, but few readily apparent phylogenetic patterns. Bias level shifts within the lepidopteran genus *Papilio* are most likely a result of population size effects. Shifts in major codon preference occur across the tree in all of the amino acids in which there was bias of some level. The vast majority of changes involves double-preference models, however, and shifts between single preferred codons within orders occur only 11 times. These shifts among codons in double-preference models are phylogenetically conservative." (Authors)] Address: Herbeck, J.T., JBP Center for Comparative Molecular Biology and Evolution, Marine Biological Laboratory, Woods Hole, MA, 02543, USA. E-Mail: herbeck@mbl.edu

**3715.** Hoess, R. (2003): Ist *Sympetrum meridionale* in der Schweiz heimisch? Funde von 1998-2002 und Anmerkungen zu Habitat, Phänologie, Verhalten und Morphologie (Odonata: Libellulidae). *Libellula* 22(1/2): 61-86. (in German, with English summary). ["*S. meridionale* has been evidenced in Switzerland annually since 1998 with a total of 41 records from 20 localities. No large scale immigration was noticed although records exist from different parts of Northern and Western Switzerland. Reproduction is sure or probable at several waters. At four localities, the species was present in several years during this period. Individuals found in Eastern Switzerland in 2002 probably originate from a larger population near Chavornay in Western Switzerland. With one exception, parasitic mites on the wings were not recorded before 2002. Ecological and phenological data are summarized. Copulation and oviposition are described as well as eggs and exuviae from reared specimens. Diagnostic features of the imago are stressed out in order to facilitate future recording. Documentation by collecting voucher specimens or photographing is considered important and necessary." (Author)] Address: Hoess, R., Normannenstrasse 35, CH-3018 Bern, Schweiz. E-Mail: ReneHoess@lst.ch

**3716.** Johansson, F.; Brodin, T. (2003): Effects of fish predators and abiotic factors on dragonfly community structure. *Journal of Freshwater Ecology* 18(3): 415-423. (in English). ["We compared the community structure of odonates (Odonata) in 13 waters in northern Sweden, which differed with respect to fish presence and abiotic factors. Richness and abundance of odonates were estimated by collecting exuviae during the whole emergence season of 1999. Redundancy analysis revealed that fish presence influenced the community composition of the odonate larvae. While species richness per sample was not affected by the presence of fish, total abundance of odonates was higher in waters without fish. In waters with fish, *Aeschna juncea* and *Leucorrhinia dubia* showed lower abundances, whereas *Erythromma najas* and *Cordulia aenea* showed higher abundances. The abundances of *Coenagrion hastulatum*, *Libellula quadrimaculata*, and *Leucorrhinia rubicunda* did not differ between waters with and without fish. Of the six abiotic factors analyzed only water acidity was associated with odonate community structure." (Authors)] Address: Johansson, F., Department of Ecology and Environmental Science Animal Ecology Group, Umea University, 90187, Umea, Sweden. E-Mail: frank.johansson@eg.umu.se

**3717.** Johansson, F. (2003): Latitudinal shifts in body size of *Enallagma cyathigerum* (Odonata). *Journal of Biogeography* 30: 19-34. (in English). [Body size pattern for populations of *E. cyathigerum* across a south-north transect covering localities in Spain, Belgium, Sweden, and Norway was sampled. In total 253 newly emerged adults were collected from fourteen localities. "Body size was measured using thorax length, length of right front wing and length of right hind tibia. These body size estimates were thereafter related to latitude and mean temperature in January and July. Body size showed a U-shaped pattern with latitude, being large at low and high latitudes and small at intermediate latitudes. The same U-shaped pattern was found for mean January and July temperature, with large animals at low and high temperatures. The U-shaped relationship between body size and latitude is suggested to be a combination of two effects: (1) the length of the season favourable

for growth and development, and (2) variation in life cycle length with latitude." (Author)] Address: Johansson, F., Dept of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Limed, Sweden. E-mail: frank.johansson@eg.umu.se

**3718.** Jordan, S.; Simon, C.; Polhemus, D. (2003): Molecular systematics and adaptive radiation of Hawaii's endemic damselfly genus *Megalagrion* (Odonata: Coenagrionidae). *Systematic Biology* 52(1): 89-109. (in English). ["Damselflies of the endemic Hawaiian genus *Megalagrion* have radiated into a wide variety of habitats and are an excellent model group for the study of adaptive radiation. Past phylogenetic analysis based on morphological characters has been problematic. Here, we examine relationships among 56 individuals from 20 of the 23 described species using maximum likelihood (ML) and Bayesian phylogenetic analysis of mitochondrial (1,287 bp) and nuclear (1,039 bp) DNA sequence data. Models of evolution were chosen using the Akaike information criterion. Problems with distant outgroups were accommodated by constraining the best ML ingroup topology but allowing the outgroups to attach to any ingroup branch in a bootstrap analysis. No strong contradictions were obtained between either data partition and the combined data set. Areas of disagreement are mainly confined to clades that are strongly supported by the mitochondrial DNA and weakly supported by the elongation factor 1alpha data because of lack of changes. However, the combined analysis resulted in a unique tree. Correlation between Bayesian posterior probabilities and bootstrap percentages decreased in concert with decreasing information in the data partitions. In cases where nodes were supported by single characters bootstrap proportions were dramatically reduced compared with posterior probabilities. Two speciation patterns were evident from the phylogenetic analysis. First, most speciation is interisland and occurred as members of established ecological guilds colonized new volcanoes after they emerged from the sea. Second, there are several instances of rapid radiation into a variety of specialized habitats, in one case entirely within the island of Kauai. Application of a local clock procedure to the mitochondrial DNA topology suggests that two of these radiations correspond to the development of habitat on the islands of Kauai and Oahu. About 4.0 million years ago, species simultaneously moved into fast streams and plant leaf axils on Kauai, and about 1.5 million years later another group moved simultaneously to seeps and terrestrial habitats on Oahu. Results from the local clock analysis also strongly suggest that *Megalagrion* arrived in Hawaii about 10 million years ago, well before the emergence of Kauai. Date estimates were more sensitive to the particular node that was fixed in time than to the model of local branch evolution used. We propose a general model for the development of endemic damselfly species on Hawaiian Islands and document five potential cases of hybridization (*M. xanthomelas* X *M. pacificum*, *M. eudytum* X *M. vagabundum*, *M. orobates* X *M. oresitrophum*, *M. nesiotus* X *M. oahuense*, and *M. mauka* X *M. paludicola*)." (Authors)] Address: Jordan, S., Laboratoire d'Ecologie Alpine, UMR CNRS 5553, Université Joseph Fourier, 38041, B.P. 53, Grenoble Cedex 9, France. E-Mail: steve.jordan@ujf-grenoble.fr

**3719.** Kämpf, H. (2003): Entwicklung von vier Gomphiden-Arten in einem Baggersee in Nordbayern (Odonata: Gomphidae). *Libellula Supplement* 4: 99-104. (in

German, with English summary). ["From 5 May 2001 to 15 July 2001, the almost daily collecting of gomphid exuviae at a 150 m-strip of the banks of a gravel-pit lake near Neuses, Upper Franconia, Bavaria, Germany, for the first time provided the record of the joint development of *Gomphus flavipes*, *G. pulchellus*, *G. vulgatisimus*, and *Ophiogomphus cecilia* in standing waters." (Author)] Address: Kämpf, H., Am Eichenwald 22a, D-91301 Forchheim, Germany

**3720.** Kalkman, V.J.; Wasscher, M.; Pelt. G.J. Van (2003): An annotated checklist of the Odonata of Turkey. *Odonatologica* 32(3): 215-236. (in English). ["In addition to the checklist, species of which the taxonomic status has changed, or with significant changes in the known distribution, are annotated. At present a total of 96 species (6 of which are divisible into 2 or more subspecies) are now known to occur in Turkey with certainty, and at least 15 species and an additional 5 subspecies are to be expected. *Ischnura fountainei* is new to the Turkish fauna. The sole Turkish record of *Ophiogomphus cecilia* pertains to *O. reductus* which is here mentioned for the first time from Turkish territory." (Authors)] Address: Kalkman, V.J., National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nnm.nl

**3721.** Kauppinen, J.; Mappes, J. (2003): Why are wasps so intimidating: field experiments on hunting dragonflies (Odonata: *Aeshna grandis*). *Animal Behaviour* 66: 505-511. (in English). ["The mechanisms of aposematism (unprofitability of prey combined with a conspicuous signal) have mainly been studied with reference to vertebrate predators, especially birds. We investigated whether dragonflies, *Aeshna grandis*, avoid attacking wasps, *Vespula norvegica*, which are an unprofitable group of prey for most predators. As a control we used flies that were painted either black or with yellow and black stripes. The dragonflies showed greater aversion to wasps than to flies. Black-and-yellow-striped flies were avoided more than black ones, suggesting that aposematic coloration on a harmless fly provides a selective advantage against invertebrate predators. There was no significant difference in reactions to black-painted and black-and-yellow wasps, indicating that, in addition to coloration, some other feature in wasps might deter predators. In further experiments we offered dragonflies artificial prey items in which the candidate warning signals (coloration, odour and shape) were tested separately while other confounding factors were kept constant. The dragonflies avoided more black-and-yellow prey items than solid black or solid yellow ones. However, we found no influence of wasp odour on dragonfly hunting. Dragonflies were slightly, but not significantly, more reluctant to attack wasp-shaped prey items than fly-shaped ones. Our results suggest that the typical black-and-yellow stripes of wasps, possibly combined with their unique shape, make dragonflies avoid wasps. Since black-and-yellow stripes alone significantly decreased attack rate, we conclude that even profitable prey species (i.e. Batesian mimics) are able to exploit the dragonflies' avoidance of wasps." (Authors)] Address: Mappes, J., Dept of Biological and Environmental Science, University of Jyväskylä, P. O. Box 35, FIN-40014 University of Jyväskylä, Finland. E-mail: mappes@byl.jyu.fi

**3722.** Kemp, D.J.; Alcock, J. (2003): Lifetime resource utilization, flight physiology, and the evolution of contest

competition in territorial insects. *Am. Nat.* 162: 290-301. (in English). ["Adaptationist analyses of animal contests have contributed much to our understanding of behavioral evolution. One class of contest, however, the war of attrition, has proven difficult to interpret. In wars of attrition involving aerial displays, there is evidence that asymmetries in performance parameters such as flight energetics may be important determinants of contest resolution. This paradigm is not universal, however, and we presently lack a framework for understanding why certain biophysical parameters are important only in some cases. One possibility is that the relevance of these parameters is determined by evolutionarily conserved life-history-scale patterns of resource allocation and acquisition. We evaluated this hypothesis by investigating the correlates of competitive success in two territorial insects that exemplify markedly different lifetime patterns of resource utilization. We found that in the bot fly *Cuterebra austeni*, an extreme capital breeding species that depends entirely on energy acquired during its immature stages, territorial residency was most strongly correlated with a size-independent measure of energetic availability. In contrast, residency in the tarantula hawk wasp *Hemipepsis ustulata* was best predicted by variation in body size per se. Adult *H. ustulata* are able to supplement their larval-derived nutrient capital in the manner of an income breeder, and fuel reserves were independent of age and actually correlated negatively with residency in this species. These results underscore how the study of sexually selected phenomena may be enriched by an explicit consideration of life-history principles." (Authors) Odonata are discussed at several contexts.] Address: Alcock, J., Department of Biology, Arizona State University, Tempe, Arizona 85287-1501, USA. E-mail: j.alcock@asu.edu

**3723.** Ketelaar, R. (2003): Libellen vliegen vroeger en noordelijker: Een gevolg van klimaatsverandering? *Levende Natuur* 104(3): 83-85. (in Dutch with English summary). ["Dragonflies are flying earlier and expanding northwards: An effect of climate change?: A balance of Dutch dragonflies in terms of changes in distribution shows that the number of increasing and decreasing species are approximately equal. However, it appears that species with a mainly southern distribution dominate the increasing group. The decreasing group consists mainly of more stenotopic species. Northern species generally decrease in The Netherlands. Not only changes in distribution are apparent, it is also shown that dragonflies have shifted their flight season. In an analysis for ten common species it is evidenced that for nine species the peak flight season is nowadays much earlier than in 1980, in some cases two weeks earlier. Climate change (especially warmer summers) is thought to be one of the driving factors behind these processes and this is shortly discussed." (Author)] Address: Ketelaar, R., Vlinderstichting, 6700 AM, Postbus 506, Wageningen, Netherlands. E-Mail: robert.ketelaar@vlinderstichting.nl

**3724.** Klausnitzer, B. (2003): Gesamtübersicht zur Insektenfauna Deutschlands. *Entomologische Nachrichten und Berichte* 47(2): 57-66. (in German with English summary). [The "Entomofauna Germanica", presenting the first complete and up-to-date overview of the German insect fauna with a total of 1327 pages, documents 33466 species from 30 orders. A decline in species numbers from north to south is fairly striking, for example in Auchenorrhyncha, Heteroptera, Neuroptera,

Coleoptera and Hymenoptera. In almost all studied groups Bavaria is the federal state with the highest species numbers; Baden-Württemberg frequently holds second rank. According Müller & Schorr (2001), the Odonata contribute to the German fauna 80 species; in the meantime, *Boyeria irene* found in Bavaria, has to be added to the German check-list.] Address: Klausnitzer, B., Lannerstr. 5, D-01219 Dresden, Germany

**3725.** Kleukers, R.; Reemer, M. (2003): Veranderingen in de Nederlandse ongewerveldenfauna. *Levende Natuur* 104(3): 86-89. (in Dutch with English summary). ["Changes in the Dutch invertebrate fauna: Until now range changes in Dutch invertebrates were only documented for a few, large and conspicuous species, e.g. *Argiope bruennichi*, *Volucella zonaria* and *Phanoptera falcata*. For the first time now a substantial part of the Dutch fauna was analysed, in a pilot study relying heavily on the expert judgement of the specialists of European Invertebrate Survey-The Netherlands. In total 1331 species of Apidae, Asilidae, Carabidae, Formicidae, Mollusca, Odonata, Orthoptera and Syrphidae were studied. In this paper we focus on the 339 species of which the northern border of the range runs through The Netherlands. No less than 101 species of this group have expanded their range to the north in the 20th century, especially in the groups Odonata, Syrphidae and Mollusca. In total 63 species were found to have retreated to the south, especially the Apidae. The expanding species of most groups are mainly eurytopic species, characteristic for disturbed, cultivated habitats. The declining species are mainly stenotopic species restricted to nature reserves. The Carabidae are an exception, as the expanding ground beetles seem to be mostly stenotopic." (Author)] Address: Kleukers, R., EIS-Nederland, 2300 RA, Postbus 9517, Leiden, Netherlands. E-Mail: eis@naturalis.nnm.nl

**3726.** Knijf, G. de; Anselin, A.; Goffart, P. (2003): Trends in dragonfly occurrence in Belgium (Odonata). *Proc. 13th Int. Coll. EIS, September 2001(2003)*: 33-38. (in English). ["The group 'Gomphus' collected 65 000 records of 69 species of Odonata, more or less equally scattered over Belgium. The best-investigated areas are the northern part and some river valleys in the south. Most hot spots can be found in the northeastern part, with a maximum of 48 species for 25 km<sup>2</sup>. Remarkable is the fact that 50% of the species occurs in less than 7% of the 5 km grid cells (UTM). We determined trends in occurrence by comparing three periods: before 1950, 1950-1989 and 1990-2000. Four species show a clear decline over the three periods, eight species give evidence of a historical decline but survive on a limited number of sites and eight species also display a historical decline but have been increasing during the last decade. Six species show a (very) clear increase over the three periods and two species display their increase only during the last ten years." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Klinkiekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**3727.** Kühn, J.; Gutser, D. (2003): Beobachtung einer *Boyeria irene* bei Mittenwald, Oberbayern (Odonata: Aeshnidae). *Libellula* 22(1/2): 41-48. (in German, with English summary). [On 17 June 2002, a mature male of *B. irene* was watched extensively from little distance but could not be caught. It was hunting persistently on a clearance at an altitude of 1135 m (47°27,5'N 11°14'E),



southern Bavaria, Germany. This is the first observation of *B. irene* reported from Germany, and the 81th recorded odonate species in Germany. Possible immigration routes as well as the early date of the record are briefly discussed.] Address: Kuhn, J., Max-Planck-Institut für Verhaltensphysiologie, Abt. Winckler, D-82319 Seewiesen. E-mail: kuhn@mpi-seewiesen.mpg.de

**3728.** Lajeunesse, M.J.; Forbes, M.R. (2003): A comparison of structural size and condition in two female morphs of the damselfly *Nehalennia irene* (Hagen) (Zygoptera: Coenagrionidae). *Odonatologica* 32(3): 281-287. (in English). ["Female colour polymorphism in coenagrionid damselflies is genetically determined for the 4 species so far studied. No size differences between female morphs have been reported. In another species, size differences between morphs do exist but the genetic basis of the polymorphism has not been explored. In *N. irene*, 2 female morphs exist: one is similar to the male in both colour and pattern (the androchrome), whereas the other differs from the male (the more common gynochrome). No differences are shown in lengths of wing, femur or tarsus between androchromes and gynochromes, nor any differences in multivariate estimates of size or in wet mass corrected for these size estimates were found. The study controls for time of season, which is known to influence the size of emerging temperate damselflies. The results concur with results from other spp. where the genetic basis of colour polymorphism is known." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**3729.** Landwer, B. H. P.; Sites, R.W. (2003): Redescription of the larva of *Gomphus militaris* Hagen (Odonata: Gomphidae), with distributional and life history notes. *Proc. Entomol. Soc. Washington* 105(2): 304-311. (in English). ["The final larval instar of *G. militaris* is described, diagnosed, and figured from exuviae and larval specimens from Missouri, Texas, and Kansas. A previous description was erroneously attributed to *G. militaris*, but actually pertained to *Arigomphus lentulus*. Thus, the use of many previously published characteristics to identify this species will result in misidentification. Larvae of *G. militaris* were common and widespread in ponds in the prairie region of Missouri. We report data on life history based on larval and adult collections." (Authors)] Address: Landwer, B., Entomology Museum, Department of Entomology, and Center for Agroforestry, University of Missouri, Columbia, MO 65211, USA. E-mail: bhl065@mizzou.edu.

**3730.** Lohr, M. (2003): *Crocothemis erythraea* auch in Niedersachsen (Odonata: Libellulidae). *Libellula* 22 (1/2): 35-39. (in German, with English summary). [On 26-VIII-2000, a male *C. erythraea* was found in a former gravel pit near Holzminden (51°49'N, 9°26'E), Niedersachsen, Germany. In 2001 and 2002 additional observations of the species in several gravel pits of the upper Weser floodplain (located in Nordrhein-Westfalen) were made. These findings are briefly discussed in the context of the recent range extensions of other thermophilous Odonata species (*Cercion lindenii*, *Aeshna affinis*, *Anax parthenope*).] Address: Lohr, M., Fachgebiete Tierökologie und Landschaftsökologie, Fachhochschule Lippe und Höxter, An der Wilhelmshöhe 44, D-37671 Höxter, Germany. E-Mail: mlohr@fh-hoexter.de

**3731.** Mackenzie, R.A.; Kaster, J.L. (2003): A preservative-free emergent trap for the isotopic and elemental analysis of emergent insects from a wetland system. *Great Lakes Entomologist* 35(1) (2002): 47-51. (in English). ["This study reports a cost-effective, live emergent trap designed for the preservative-free use in both biogeochemical and ecological analyses of emerging insects. The trap proved to be advantageous in several ways. First, the simple design made the trap time-efficient since it was easy to set-up, change, and maintain. Second, live sampling not only provided uncontaminated organisms for elemental and stable isotopic analyses, it minimized disfigurement. This resulted in rapid and easy handling, as well as identification, of adult insects. Finally, trap avoidance by ephemeropterans and odonates, a common problem encountered in the literature, was minimal and organisms from both insect orders were successfully collected." (Author)] Address: Mackenzie, R., The Center for Great Lakes Studies at the Water Institute, University of Wisconsin-Milwaukee, 600 E. Greenfield Ave., Milwaukee, WI, 53204, USA

**3732.** Maczey, N. (2003): *Calopteryx splendens* und Straßenverkehr - Beobachtungen an einer Autobahnbrücke (Odonata: Calopterygidae). *Libellula* 22(1/2): 15-18. (in German with English summary). ["In 1998, during a short period of fierce wind, more than 30 specimens of *C. splendens* were recorded as traffic victims alongside a motorway crossing the river Dosse in Brandenburg, Germany. This surprisingly high number demonstrates that - under certain circumstances - local insect populations may be negatively influenced by heavy traffic." (Author)] Address: Maczey, N., Hospitalstr. 46, D-53840 Troisdorf, Germany. E-Mail: N.Maczey@cabi.org

**3733.** Maeto, K.; Kougo, K.; Kotani, E.; Miyata, H.; Sugimura, M. (2003): Geographical analysis of Odonata habitats in the Shimanto River basin, Shikoku, Japan. *Japanese Journal of Entomology* 6(1): 27-41. (in Japanese with English summary). ["We conducted a correspondence analysis (CA) of 88 species of Odonata (dragonflies) observed at 455 grid sites (ca. 0.5 kmX0.5 km) in the Shimanto River basin and adjacent areas in Shikoku, Japan. Multiple regression analyses of the two main axes of the CA ordination on the geographical features (altitude, relief) and vegetation of grid sites indicated that the degree of relief and the areal proportion of paddy fields were the main determinants of the species distribution of Odonata. The species were classified into 5 groups by k-means clustering based on the coordinate axes. Groups I and II mostly consisted of lentic species inhabiting ponds, marshes and paddy fields of flat lands. Groups III and IV were composed of lentic species mainly inhabiting marshes and paddy fields and lotic species in slow streams. Group V consisted of lotic species inhabiting mountain streams and spring s. Habitat requirements for the species appearing in the Red List of Kochi Prefecture are also discussed." (Authors)] Address: Maeto, K., Laboratory of Entomology, Faculty of Agriculture, Kobe University, Rokkodai-cho 1-1, Nada-ku, Kobe, 657-8501, Japan

**3734.** Malkmus, R. (2003): Die prächtige Smaragdlibelle - ein Juwel unter Portugals Libellen. *Natur & Museum* 133(7): 207-212. (in German). [The paper briefly compiles the present knowledge on the ecology (including an original observation of oviposition) and the dist-

ribution of *Macromia splendens* in Portugal. ] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany

**3735.** March, J.G.; Benstead, J.P.; Pringle, C.M.; Lukymis, M. (2003): Benthic community structure and invertebrate drift in a Pacific island stream, Kosrae, Micronesia. *Biotropica* 35(1): 125-130. (in English). ["Tropical Pacific island streams have poorly understood communities that deserve scientific attention. We examined benthic macroinvertebrates and fishes of the Inem River on Kosrae, Federated States of Micronesia. Larval chironomids, lepidopterans, odonates, and freshwater shrimps dominated the benthos and drift. Diel periodicity in drift was not evident. Nine fishes, two shrimps, and one snail species were identified. Kosrae's stream fauna appears even more depauperate than other Pacific high islands, possible due to its extreme isolation." (Authors)] Address: March, J.G., Department of Biology, Washington and Jefferson College, 60 South Lincoln St., Washington, PA, 15301, USA; E-Mail: jmarch@washjeff.edu USA

**3736.** Marinov, M. (2003): Chorology, biological and habitatic comments of the insects from the genus Odonata in Bulgaria. PhD thesis, University of Sofia, Institute of Zoology: 196 pp., 4 app.. (in Bulgarian). ["It summarizes the results either published, state and private collections as well as original information by the author received during the whole 119-years period (1892-2001) of the development of the odonatology in Bulgaria. The thesis consists of 11 chapters. 1. INTRODUCTION. Short general description of the Order Odonata and reasons for using dragonflies as subject of the investigation. 2. PHYSICO-GEOGRAPHIC REVIEW OF BULGARIA. Consequently situation, state borders, territory area, relief, geology and geomorphology, climate and water resources of Bulgaria are developed as abiotic factors influencing Odonata distribution pattern in Bulgaria. 3. ODONATOLOGICAL INVESTIGATIONS IN BULGARIA. Three periods are outlined according to the number of the publications published per year and the main contributions. Dragonflies are considered as well faunistically investigated insect group in Bulgaria. The main gaps are in regional investigations, species ecology and biology, dragonfly utility as bioindicators, population investigations. 4. GOALS AND OBJECTIVES. 5. MATERIAL AND METHODS. 6. RESULTS. Here each species is given with individual information about: 1) synonym list; 2) faunistic and taxonomic problems (if any); 3) biology and ecology (what is known for Bulgaria); 4) overall species distribution mapped for Europe and referenced for the rest of the area; 5) UTM map for the species' distribution in Bulgaria; 6) phenology and vertical distribution graphs. 7. DISCUSSION. Comments are given on the species' phenology, zoogeographic affiliation, distribution according to the main biotopes and habitats in Bulgaria as well as individual position in the First Conservation List developed for Bulgarian Odonata species. 8. CONCLUSIONS. Fourteen conclusions represent the main contributions made to the studying of Bulgarian Odonata fauna. 9. DEDUCTIONS. Fifteen deductions are given. They point the attention to some problems not solved during the current investigation and are given as some of the main tasks for future investigations. 10. REFERENCES. 11. ACKNOWLEDGEMENTS." (Author)] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mgmarinov@yahoo.com

**3737.** Masius, P. (2003): *Nehalennia speciosa* auf der Insel Usedom (Odonata: Coenagrionidae). *Libellula* 22 (1/2): 1-14. (in German with English summary). [In June 2001 the *N. speciosa* was recorded at a bog south of Ahlbeck, Island of Usedom, Mecklenburg-Vorpommern, Germany. The habitat is briefly described, and co-occurring odonate species are given.] Address: Masius, P., Erlanger Straße 69, D-95444 Bayreuth, Germany. E-Mail: Snoopy123dag@gmx.net

**3738.** May, M.; Corbet, P. (2003): Gathering useful information about the seasonal ecology of *Anax junius*. *Argia* 15(2): 15-16. (in English). ["A large question mark hangs over the movements and destination of adults of *Anax junius* after they fly southwards from southern Canada and northern states of the US in fall. Likewise, little is known about the northernmost latitude in North America at which resident populations of larvae can overwinter. It is likely to take a very long time if such information is going to be accumulated solely by chance observations. Much better that a planned survey could be undertaken that offers a high likelihood of early success. The knowledge that some populations of *A. junius* (occupying the same pond) have two components, one resident and one migratory, derives from a classic study by Robert Trotter in southern Ontario (Trotter 1971). [...] John Matthews, who is a student of John Abbot's at the Univ. of Texas, is currently looking ponds in Ontario, where Trotter worked, and in Texas. This approach has a lot of potential, despite its difficulties. I'm pretty sure that no one has studied the life history of any odonate species over a latitudinal and climatic range as great as that of *A. junius*, and no one has tied in phenology over such a range with migratory behavior. There's a chance to do something pretty unique here, if people can help us find additional suitable sites or even, if you're really interested and like working in mucky places on baking hot and miserably cold days, helping with." (Authors)] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu

**3739.** McKee, D.; Harvey, I.; Thomas, M.; Sherratt, T.N. (2003): Mite infestation of *Xanthocnemis zealandica* in a Christchurch pond. *New Zealand Jour. Zool.* 30 (1): 17-20. (in English). ["Infestation of the common red-coat damselfly *Xanthocnemis zealandica* (McLachlan) with larval water mites (*Arrenurus* spp.) was examined in a single Canterbury population during November-December 2001. Teneral (immature adult damselflies) of both male and female morphs (androchrome and gynochrome) showed a similar prevalence of infestation, higher than the prevalence of infestation found in mature adults. As anticipated, mature adult males were more frequently infested than mature females, but there was no evidence that infestation reduced the mating activity of males. Up to 62 mites were found per infested host, although mean mite burdens were not significantly related to the size, gender or morph of the hosts." (Authors)] Address: McKee, D., School of Biological and Biomedical Sciences, University of Durham, Durham, DH1 3LE, UK. E-Mail: dermot.mckee@durham.ac.uk

**3740.** Mead, K. (2003): *Dragonflies of the North Woods*. Kollath-Stensaas Publishers. ISBN 0-9673793-6-9. 212 pp. (in English). [This attractive and very useful field guide covers the "northwoods" areas of Minnesota, Wisconsin, Michigan (USA), and western Ontario (Ca-

nada). It treats 102 Anisoptera only, except that six of the most common damselflies are illustrated and briefly described. This book can be assessed as an advanced field guide, that focus on identifying Anisoptera, and that goes beyond descriptions of species; it dwells on the problems of distinguishing similar species. Two pages are devoted to the thoracic patterns of *Aeshna*, showing color variants, followed by 30 additional pages on the Aeshnidae (they must be a favorite group of Kurt Mead). A second focus was set on the genus *Leucorhinia* with many useful advices for correct identification of the different stages of the very species. Fieldmark arrows point out the best distinguishing characteristics. Size-bars on the colour photos show the dragonfly's actual body length. This guide is very well illustrated with excellent - app. 200 - photographs. Throughout the text there are thoughtful and provocative behavioural observations, which will guide the user to becoming a good observer and not just an identifier. In addition you will find between the lines some useful information how to swing your net ... Quite unique is a chapter entitled "Binoculars for 'Dragonflying'"; binoculars are listed brand-wise with dates enabling persons interested in buying one for dragonflying to make a useful pre-selection. This is an excellent guide, with a didactical concept that could be interesting for other countries too. (Martin Schorr) Address: Mead, K., 6388 Lax Lake Rd., Finland, MN 5560, USA. <http://www.dragonfliesofthenorthwoods.com/>

**3741.** Meßlinger, U.; Winterholler, M. (2003): Bestandssituation und Ökologie von *Coenagrion lunulatum* in Franken (Odonata: Coenagrionidae). *Libellula Supplement 4*: 43-58. (in German, with English summary). [Between 1986 and 1995, 25 records of *C. lunulatum* have been documented for Bavaria between 1986 and 1995. In the following years, the species could be confirmed only at three localities. At one of these habitats further investigations regarding water chemistry, vegetation and biology of the species were carried out between 1998 and 2003. Effects of climatic change are discussed as a possible reason for the dramatic decline of *C. lunulatum* within Bavaria.] Address: Meßlinger, U., Am Weiherholz 43, D-91604 Flachslanden, Germany. E-Mail: [u.messlinger@t-online.de](mailto:u.messlinger@t-online.de)

**3742.** Meßlinger, U.; Faltin, I. (2003): Verbreitung und Ökologie von *Coenagrion ornatum* in Westmittelfranken (Odonata: Coenagrionidae). *Libellula Supplement 4*: 19-42. (in German, with English summary). [On the basis of confirmed indications for a regional distribution of *C. ornatum*, in the year 2001 a full-coverage search for the species was carried out in western Middle Franconia. "Altogether 734 creek and ditch sections were visited, and *C. ornatum* was recorded at 55 of those waters. The core population discovered in 1997 in the upper River Altmühl valley extended over 28 sites, being one of the greatest populations of the species within Bavaria. In the catchments of the Rivers Zenn, Wörnitz, Wieseln, Sulzach and Tauber *C. ornatum* was reported for the first time. All populations along these rivers were small or very small. A presentation of the current regional distribution of the species is given. Essential factors of habitat and the influence of the management of inhabited waters and adjacent meadows are discussed. The results of the study indicate knowledge gaps concerning the actual distribution of *C. ornatum*, emphasizing the probability of undiscovered populations in hitherto insufficiently investigated running water systems outsi-

de western Middle Franconia." (Authors)] Address: Meßlinger, U., Am Weiherholz 43, D-91604 Flachslanden, Germany. E-Mail: [u.messlinger@t-online.de](mailto:u.messlinger@t-online.de)

**3743.** Mirza, R.S.; Chivers, D.P. (2003): Influence of body size on the responses of fathead minnows, *Pimephales promelas*, to damselfly alarm cues. *Ethology* 109(8): 691-699. (in English). ["A wide diversity of aquatic organisms release chemical alarm cues upon encountering or being attacked by a predator. These alarm cues can be used by nearby individuals to assess local predation risk. Receivers warned by chemical alarm cues gain a survival benefit when encountering predators. Animals that are in the same prey guild (i.e. that co-occur and share the same predators) may learn to recognize each others' chemical alarm cues. This ability may confer an adaptive advantage if the prey animals are vulnerable to the same predators. However, if the prey grow to different sizes and as a consequence are no longer vulnerable to the same suite of predators, then there should no longer be an advantage for the prey to respond to each others' alarm cues. In this study, we exposed small and large fathead minnows (*Pimephales promelas*) to cues from syntopic injured damselfly larvae (*Enallagma boreale*), cues from injured mealworm larvae (*Tenebrio molitor*) and to distilled water. Small minnows exhibited antipredatory behaviour and increased shelter use in response to injured damselfly cues but not to the controls of injured mealworm or distilled water. On the contrary, large minnows exhibited no significant change in shelter use in response to any of the injured cues. These data demonstrate that fathead minnows exhibit an antipredator response to damselfly alarm cues, but only when minnows are small and members of the same prey guild as damselfly larvae. These results demonstrate the considerable flexibility in the responses to heterospecific alarm cues." (Authors)] Address: Mirza, R.S., Dept of Biology, Pennsylvania State University, 208 Mueller Laboratory, University Park, PA, 16802, USA. E-Mail: [rsm12@psu.edu](mailto:rsm12@psu.edu)

**3744.** Montero Moreno, J.R. (2003): A note on *Thaumatoneura inopinata* McLachlan 1897 in Rio Chiarria Costa Rica with a list of Costa Rican Megapodagrionidae. *Argia* 15(1): 17. (in English). [*T. inopinata* was recorded twice along waterfalls of Rio Chiarria near Turrialba in Feb. 1998 and in Oct. 1999.] Address: Montero Moreno, J.R., P.O. box 1913-1000, San Jose, Costa Rica

**3745.** Morales, M. E.; Wesson, D.M.; Sutherland, I.W.; Impoinvil, D.E.; Mbogo, C.M.; Githure, J.I.; Beier, J.C. (2003): Scientific note determination of *Anopheles gambiae* larval DNA in the gut of insectivorous dragonfly (Libellulidae) nymphs by polymerase chain reaction. *Journal of the American Mosquito Control Association* 19(2): 163-165. (in English). ["We examined the predator-prey relationship between larvae of the malaria mosquito *Anopheles gambiae* and nymphs of the dragonfly (Libellulidae). Studies were conducted to determine whether polymerase chain reaction (PCR) can be used to detect DNA of *An. gambiae* in the gut of libellulid nymphs, and to determine how long after feeding on *An. gambiae* that mosquito DNA remains detectable by PCR. Total DNA was extracted from the gut contents of libellulid nymphs by using 2 types of DNA extraction methods. The target sequence for the diagnostic PCR was the intergenic spacer regions of the ribosomal DNA gene locus. These sequences were analyzed by using



An. gambiae complex-specific primers. After analyzing nymphal gut contents with PCR at regular postfeed intervals, a 390-base pair product could be amplified. The presence of mosquito larvae was visually confirmed for up to 40 min after feeding. Regardless of the number of mosquito larvae ingested, libellulid gut contents could be amplified or visually seen up to 1 h of digestion. This result indicates the nymphs have a high rate of digestion and that PCR with An. gambiae complex primers will be best utilized within 1 h after feeding as a detection system. This study confirmed that dragonfly nymphs feed well on anopheline larvae, and that mosquito DNA, although rapidly digested, can be successfully recovered and detected from within nymphal digestive tracts." (Authors)] Address: Morales, Maria E., Department of Tropical Medicine, 1430 Tulane Avenue, University School of Public Health and Tropical Medicine, Tulane University, New Orleans, LA 70112, USA.

**3746.** Moroz, M.; Czachorowski, S.; Lewandowski, K. (2003): Preliminary investigation of water insects of the Reserve "Prostyr" (Belarus). Parki nar. Rez. przyr. 22: 117-124. (in Polish with English summary). [Reserve "Prostyr", Belarus (51°56'N 26°05'E); Calopteryx virgo, Lestes dryas, Aeshna grandis, Sympetrum flaveolum, S. pedemontanum.] Address: Moraz, M., Inst. Zool., Belarussian Academy of Sciences, Akademicheskaja 27, Minsk 220072, Belaruss. E-mail: morozm@biobel.bas-net.by

**3747.** Moss, M.O.; Gibbs, G. (2003): Colour on the wings of Calopteryx damselflies. Quekett Journal of Microscopy 39(5): 491-497. (in English). ["The blue colour on the wings of the males of the two species of English damselflies of the genus Calopteryx is associated entirely with the veins and is a structural colour. Studies of the fine structure of sections of the veins of the banded demoiselle (C. splendens) by scanning electron microscopy have revealed a regular layered structure which could account for the blue colour by constructive interference as incident light is reflected by these layers. The dull brown pigment (described as an ommochrome) present in the membrane of the wing enhances the perceived intensity of the reflected blue light by absorbing the rest of the incident light." (Authors)] Address: Moss, M.O., School of Biological and Life Sciences, University of Surrey, Guildford, Surrey, GU2 7XH, UK

**3748.** Mrowinski, P.; Zawal, A. (2003): The new localities of Aeshna subarctica elisabethae Djak., 1922 in the Western Pomerania region. Wiad. entomol. 22(1): 47-48. (in Polish). [Poland; Równina Nowogardzka, UTM: VV95, 5-22-VIII-1999; Pojezierze Szczecineckie, UTM: XV03, 12-VI-2001.] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Waska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**3749.** Muth, M. (2003): Aeshna caerulea im Landkreis Oberallgäu: Bestandssituation, Entwicklungsgewässer und Gefährdung (Odonata: Aeshnidae). Libellula Supplement 4: 71-97. (in German, with English summary). ["A. caerulea was monitored in the years 2000 and 2001 in the Allgäu Alps of the Bavarian Oberallgäu District, the distribution centre of the species within Bavaria and Germany. Thirty-one potential breeding habitats in subalpine bogs and minerotrophic ponds were

investigated. At altitudes between 1190 m and 1840 m above sea level the species was recorded at 16 localities. The bog and water types inhabited by A. caerulea in the region are characterized. Current populations and potential threats to the species by grazing cattle, wallowing red deer, and climate changes are discussed." (Author)] Address: Muth, M., Im Stiftallmeyer 4, D-87439 Kempten, Germany. E-Mail: muth.kempten@t-online.de

**3750.** Niehuis, M. (2003): Fund der Nordischen Moosjungfer - Leucorrhinia rubicunda (L.) - in der Südpfalz (Insecta: Odonata). Fauna Flora Rheinland-Pfalz 10(1): 279-284. (in German). [NSG Jockgrimer Tongruben, Rheinland-Pfalz, Germany; a record of L. rubicunda dated 4-VI-2003 is documented and discussed in detail. In addition, new records in southern Rheinland-Pfalz of the very rare L. caudalis are given.] Address: Niehuis, M., Inst. Naturwiss., Biologie, Universität Koblenz-Landau, Standort Landau, Im Fort 7, D-76829 Landau, Germany

**3751.** Novelo-Gutiérrez, R.; González-Soriano, E. (2003): The larva of Lestes alfonsoi González & Novelo (Zygoptera: Lestidae). Odonatologica 32(3): 289-294. (in English). ["Detailed description and illustrations are provided. A comparison with other Mexican larvae of the genus and a key to separate species are also included. Larva of L. alfonsoi seems not to be related to any of the known larvae of the genus, although it shares more features in common with the larva of L. alacer." (Authors)] Address: Gonzalez-Soriano, E., Depto Zoología, Inst. Biol., Universidad Autónoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: e-soriano@mail.ibiologia.unam.mx

**3752.** Ogden, T.H.; Whiting, M. (2003): Genomic tissue library of Odonata: A call for specimens. Argia 15(2): 20-21. (in English). [Website: <http://odonata.byu.edu>; "... We have two immediate purposes for the obtained odonate specimens. First we want to investigate the relationships of the basal pterygote lineages (Ephemeroptera, Odonata, and Neoptera). The phylogenetic position of Odonata among the other orders has been controversial, and three main theories exist: (1) placement as sister group to Ephemeroptera (=Paleoptera); (2) placement as the most basal pterygote lineage; and (3) placement as sister to Neoptera. Second, we plan to address the higher-level phylogeny of Odonata using DNA sequence information combined with morphological data. Our goal, for the next year, is to sequence a wide range of exemplar taxa for multiple genes (~ 8 markers), combine this information with morphological data (collaboration with Andy Rehn), and use these data to gain new insights into odonate systematics and evolution. [...]" (Authors)] Address: T. Heath Ogden and Michael Whiting, Department of Integrative Biology, Brigham Young University, Provo, Utah 84602, USA, <heathogden@byu.edu> Department of Integrative Biology and Bean Life Science Museum, Brigham Young University, Provo, Utah 84602, USA, <michaelwhiting@byu.edu>

**3753.** Ogden, T.H.; Whiting, M.F. (2003): The problem with "the Paleoptera Problem:" sense and sensitivity. Cladistics 19(5): 432-442. (in English). ["While the monophyly of winged insects (Pterygota) is well supported, phylogenetic relationships among the most basal extant pterygote lineages are problematic. Ephemeroptera and Odonata represent the two most basal extant lineages

of winged insects, and determining their relationship with regard to Neoptera (remaining winged insects) is a critical step toward understanding insect diversification. A recent molecular analysis concluded that Paleoptera (Odonata + Ephemeroptera) is monophyletic. However, we demonstrate that this result is supported only under a narrow range of alignment parameters. We have further tested the monophyly of Paleoptera using additional sequence data from ISSrDNA, 28S rDNA, and Histone 3 for a broader selection of taxa and a wider range of analytical methodologies. Our results suggest that the current suite of molecular data ambiguously resolve the three basal winged insect lineages and do not provide independent confirmation of Odonata + Neoptera as supported via morphological data." (Authors)] Address: Ogden, T.H., Department of Integrative Biology, Brigham Young University, 401 WIDE, Provo, UT 84602-5255, USA. E-mail: heathogden@byu.edu

**3754.** Orr, A.G. (2003): A guide to the dragonflies of Borneo: Their identification and biology. Natural history publications (Borneo). Kota Kinabalu. ISBN 983-812-069-3. 195 pp. (in English). [With 275 named species so far recorded and doubtless many more yet to be discovered, Borneo has one of the richest and most exciting dragonfly faunas in the world. More than 40% of species occur nowhere else, making it the most distinctive sub-region of Sundaland. It is home to such spectacular species as *Tetracanthagyna plagiata*, the heaviest of all dragonflies, many beautiful picture-winged chlorocyphids and euphaeids, and high-altitude endemics such as *Matronoides cyaneipennis* restricted to Mount Kinabalu and nearby mountains. Species are figured by photographs, generally taken in nature, and half-wing coloured drawings (25 plates). Many are figured by both methods. About 60% of known species are shown, including almost all the distinctive and common species likely to be encountered by a casual visitor. Particular attention is given to the identification of the common but difficult medium-sized red dragonflies. The text augments the illustrations and provides - family- and species-wise - useful information on biology. Introductory chapters discuss structure and general biology, ecology and conservation, faunistics and biogeography and collecting techniques and photography. There is a complete and up to date checklist. Illustrated keys to families of adults give the reader an understanding of the structures used in classifying dragonflies and augment the usefulness of the illustrations of entire insects. Main larval forms are shown.] Address: Natural history publications (Borneo) SDN. BHD. A913, 9th Floor, Phase 1, Wisma Merdeka, P.O. Box 15566, 88864 Kota Kinabalu, Sabah, Malaysia. www.nhpborneo.com

**3755.** Orr, B. (2003): Review: Dragonflies of Victoria. *Austrolestes* 7: 1. (in English). [Review of: Theischinger, G.; Hawking, J.H. (2003): Dragonflies of Victoria: an identification guide to adult and larval dragonflies (Odonata). *Coop. Res. Cent. Freshw. Ecol.*, Albury / NSW. ISBN 1-876144-49-1. iv+65 pp.] Address: not stated

**3756.** Ott, J. (2003): Libellen im Stadtgebiet von Ludwigshafen. *Pollichia-Kurier* 19(2): 10-11. (in German). [The Schleusenloch situated near the town of Ludwigshafen, counts to the best investigated water bodies in Rheinland-Pfalz, Germany; the author reports on the history of the habitat. Special emphasis is given to the impacts caused by fishing, e.g. by introducing gras

carps to eliminate the vegetation in fishing waters. Nevertheless some odonate species (e.g. *Gomphus pulchellus*) profit from trampling by fishers and bather / swimmer. In addition he outlines the serious difficulties for Odonata to find suitable habitats in towns and agglomerations. A nice episode on puzzling people with dragonflies with numbers on their wings is added.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**3757.** Parr, A. (2003): Views and Reviews of books, publications, products and services: Dragonflies by Steve Brooks. *Atropos* 20: 55. (in English). [Review of the books abstracted as OAS 3386.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**3758.** Paulson, D. (2003): Down under again -- drought, dragonflies, and WDA. *Argia* 15(2): 12-14. (in English). [On the traces of the 1998 trip to Australia, Dennis Paulson and Netta Smith revisited some of the localities in January 2003. They report on the differences between the two years, which may be caused primarily by the severe drought in Australia in 2003. Some new places were visited, the most interesting species are documented. And a brief report on some essentials of the WDA meeting in Beechworth, NE Victoria is given.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**3759.** Petzold, F. (2003): Nachweise von *Onychogomphus forcipatus forcipatus* an Seen in Schweden (Odonata: Gomphidae). *Libellula* 22(1/2): 49-54. (in German, with English summary). ["As *O. f. forcipatus* has been mainly been found at lakes in northern Germany, there was no evidence for this in Sweden. During the years of 1993, 1997 and 2002 there have been records of *O. forcipatus* at a total of five lakes in the southern part of central Sweden. At three lakes exuviae were recorded. All localities were lakes with tied into bigger waterscapes by over-ground affluxes and runoffs. The places of its evidence were mostly parts of the shore with no vegetation and stony, gritty ground. At one lake were findings of exuvia in a shallow and lee cove formed of detritus and mud and surrounded with *Carex*."] Address: Petzold, F., Pappelallee 73, D-10437 Berlin, Germany. E-Mail: falkpetzold@web.de

**3760.** Prud'Homme, E. (2003): Nouvelles des région. Département de Charente (16). *Société française d'odonatologie. La lettre des sociétaires* 33: 10-11. (in French). [Brief report on current odonatological activities including records of *Gomphus graslinii* and *Oxygastra curtisii*.] Address: Prud'Homme, E., rue des Colporteurs, F-16230 Nanclars, France. E-mail: eric.prud-homme6@wanadoo.fr

**3761.** Purse, B.V.; Hopkins, G.W.; Day, K.J.; Thompson, D.T. (2003): Dispersal characteristics and management of a rare damselfly. *Jour. Appl. Ecol.* 40: 716-728. (in English). ["1. *Coenagrion mercuriale* is a rare damselfly in Britain and mainland Europe and has been declining in the last 30 years. It has specialized habitat requirements and has been viewed, traditionally, as a poor disperser. Knowledge of its dispersal ability was considered in its Biodiversity Species Action Plan as essential for the formulation of appropriate conservation management strategies. 2. Mark-release-recapture studies of *C. mercuriale* in two large UK heathland popula-

tions were undertaken. Mature adults had a low rate of movement within continuous areas of habitat (average < 25 m movement), low emigration rates (1-3-11 -4%) and low colonization distances (maximum 1 km), all comparable to similarly sized coenagrionids. 3. Movements were more likely within than between patches of suitable habitat over short to medium distances (50-300 m). Between-patch movements were more likely between patches that were close together. Scrub barriers reduced dispersal. 4. The probability of dispersal between two recaptures depended on the length of the time interval between them. *C. mercuriale* performed considerable between-patch movements within a small fraction (1-2 days) of its mean mature adult life span (7-8 days). 5. Qualitative comparison of field colonization distances measured here and distances between UK sites occupied by *C. mercuriale* revealed that empty sites within large clusters of sites would probably be recolonized rapidly and dispersal events would be frequent. However, such events would occur rarely within small isolated sites or clusters of sites, leaving local populations prone to extinction. 6. Synthesis and applications. These data show that management effort should be directed towards maximizing the likelihood of *C. mercuriale* recolonizing sites naturally within 1-3 km of other populations (particularly within large clusters). Scrub boundaries should be removed between existing populations and empty, but suitable, sites to facilitate stepping-stone dispersal movements." (Authors)] Address: Purse, Bethan V., Institute for Animal Health, Pirbright Laboratory, Ash Road, Pirbright, Surrey GU24 0NF, UK. E-mail: beth.purse@bbsrc.ac.uk

**3762.** Purse, B.V.; Thompson, D.J. (2003): Emergence of the damselflies, *Coenagrion mercuriale* and *Ceragrion tenellum* (Odonata: Coenagrionidae), at their northern range margins, in Britain. *Eur. J. Entomol.* 100: 93-99. (in English). ["Emergence of *Coenagrion mercuriale* and *Ceragrion tenellum* was examined in a mixed population at their northern range margin in Britain. Mortality at emergence was quantified in *C. mercuriale*. Consistent with their larval diapause characteristics, both species had an asynchronous emergence pattern, typical of "summer" species. Daily emergence of *C. mercuriale* was positively correlated with the duration of sunlight on the previous day (controlling for season) and its emergence period was found to be shorter than that observed in its core populations in Central and Mediterranean Europe. No differences were found between the patterns of emergence of the sexes in either species. Sex ratio at emergence differed significantly from 1:1 (at 1.35 : 1 -males : females) in *C. mercuriale* but not in *Ceragrion tenellum* (at 1.04 : 1). Body size at emergence declined more steeply with time in females than in males of *C. mercuriale* because large size may confer a greater reproductive advantage in females (larger females may be more fecund) than males in non-territorial odonates. Percentage mortality of *C. mercuriale* at emergence was low (4.9% including deformed individuals), the main cause of mortality being deformity." (Authors)] Address: Purse, Beth, Population and Evolutionary Biology Research Group, Nicholson Building, University of Liverpool, School of Biological Sciences, Liverpool, L69 3GS, UK. E-mail: beth.purse@bbsrc.ac.uk

**3763.** Reeves, D. (2003): Obituary: Dr D.A.L. (Allen) Davies. *Austrolestes* 7: 3. (in English). [Some personal recollections resulting from a long lasting friendship with

Allen Davies.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**3764.** Reeves, D. (2003): Species profile - *Aeshna brevistyla* Rambur, 1842 - Blue-spotted Hawker. *Austrolestes* 7: 2. (in English). [*Adversaeschna brevistyla* (Rambur 1842) is briefly described, figured by a b & w photograph, and endophytic oviposition behaviour is noted. ] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**3765.** Reinhardt, K.; Samietz, J. (2003): Libellenfunde in Ostkasachstan (Odonata). *Entomologische Nachrichten und Berichte* 47(2): 71-76. (in German with English summary). ["During two excursions to East Kazakhstan 25 species of Odonata were recorded from 21 sites. A *Macromia* species whose exuviae resemble those of *M. bartenevi* represents the first record of the genus for Kazakhstan. The exuviae are illustrated and appear to differ morphologically from *M. amphigena fraenata*, raising doubts about the recently claimed synonymy of *M. bartenevi* with *M. amphigena fraenata*. Records of *Calopteryx cf. splendens*, *Coenagrion lunulatum*, *Libellula depressa*, *L. quadrimaculata*, *Leucorrhinia pectoralis*, and *Sympetrum flaveolum* reported from Eastern Kazakhstan in 1906 were confirmed. Six species were recorded from the surroundings of Ust-Kamenogorsk for the first time. Presumably, *Ischnura pumilio*, *Orthetrum brunneum*, and *L. depressa* were frequently overlooked and are more widespread than presently assumed." (Authors)] Address: Reinhardt, K., Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: bgykr@leeds.ac.uk

**3766.** Relyea, R.A. (2003): How prey respond to combined predators: a review and an empirical test. *Ecology* 84(7): 1827-1839. (in English). ["Studies of phenotypic plasticity frequently ask how organisms respond to a change in their environment, but most organisms do not experience single environmental changes. Therefore, we need to move to the next step and understand how organisms respond to combinations of environmental changes. Recent studies of predator-induced plasticity have addressed how prey respond to different combinations of predators. I briefly review 22 studies of combined predator effects on prey phenotypes and identify four factors that make it difficult to interpret the results of these studies: (1) uncontrolled prey consumption, (2) a low number of prey traits, (3) a low number of predator combinations, and (4) confounded predator composition and total predator density. I address these challenges in an experiment that examined how wood frog tadpoles (*Rana sylvatica*) altered 12 behavioral, morphological, and life historical traits in response to four different caged predators ("*Erythemis* sp.", *Belostoma*, *Dytiscus*, and *Anax junius*). The predators were present alone at low density, alone at high density (2X), or combined into six pairwise combinations. When each predator was alone (at either low < or high density), tadpoles discriminated among different predators and produced predator-specific phenotypes. The doubling of predator density rarely induced more extreme prey phenotypes. When predators were combined, the tadpoles generally developed phenotypes that were similar to those induced by the more risky predator alone (90% of all traits examined, at either low or high density). These results suggest that tadpoles per-



ceive the risk of combined predators as being similar to the risk of the most dangerous predator in the pair, and not as a summed or averaged predation risk. The actual risk from these predator combinations remains to be tested. This appears to be the first study to take a comprehensive approach that controls prey consumption, examines a large number of prey traits, uses a large number of predator combinations, and separates the effects of predator composition and predator density. There is a clear need for more such studies to determine whether these results can be generalized to other taxa." (Author)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburgh, Pennsylvania 15260, USA. E-mail: relyea@pitt.edu

**3767.** Relyea, R.A. (2003): Predators come and predators go: the reversibility of predator-induced traits. *Ecology* 84(7): 1840-1848. (in English). ["While numerous studies have been conducted on the ecology and evolution of phenotypic plasticity, to really understand plasticity we need to expose organisms to different environments over several ontogenetic stages. In this way, we can examine whether organisms change their phenotypic strategy over ontogeny, whether there are developmental windows that constrain the development of plastic traits, and whether behavior is more reversible than morphology if the environment reverts back to its original state. I addressed these questions by examining predator-induced plasticity in gray treefrog tadpoles (*Hyla versicolor*). Using aquatic mesocosms, I reared tadpoles with a constant absence of predators, a constant presence of predators (*Anax longipes*), and the addition or removal of predators at three different times during their larval period. Tadpoles changed their phenotypic strategy over ontogeny; early in ontogeny they responded to predators by hiding, reducing their activity, and developing relatively deep tail fins. Later in ontogeny the tadpoles no longer employed behavioral defenses but relied on a combination of greater mass, deeper tails, and shorter bodies. The phenotypic changes were inducible throughout most of ontogeny, suggesting that there were few developmental windows. Activity, tail depth, and body depth were highly reversible early in ontogeny but less reversible later in ontogeny; because hiding was only used early in ontogeny, I could not assess its reversibility. This reversibility should affect not only the induced species, but will likely transmit the effects throughout the larger ecological community." (Author)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburgh, Pennsylvania 15260, USA. E-mail: relyea+@pitt.edu

**3768.** Rose, J.S. (2003): Dragonfly days, 16 - 19 May, 2003. *Argia* 15(2): 10-12. (in English). [Valley Nature Centre, Weslaco, Texas, USA; the paper lists odonate species from several places in the region including *Perrithemis domitia*, which is very rare in USA.] Address: Rose, J.S., Biology Dept, Box 90338, Duke University, Durham, NC 27708, USA. E-mail: jsr6@duke.edu

**3769.** Schleuter, M.; Haybach, A. (2003): Das Makrozoobenthos des Mains in den Jahren 1992-2001 - Eine Artenliste. *Lauterbornia* 48: 45-56. (in German with English summary). [10 odonate taxa are listed from river Main, Bavaria, Germany.] Address: Schleuter, M.; Haybach, A., Referat Tierökologie, Bundesanstalt für gewässerkunde, Kaiserin-Augusta-Anlagen 15-17, D-56068 Koblenz, Germany

**3770.** Schlüpmann, M. (2003): Zur Verbreitung, Phänologie, Ökologie und Einnischung des Plattbauches (*Libellula depressa* Linnaeus, 1758), des Vierflecks (*L. quadrimaculata* Linnaeus, 1785) und des Blaupfeils (*Orthetrum cancellatum* (Linnaeus, 1758)) im Raum Hagen (Insecta: Odonata: Libellulidae). *Dortmunder Beitr. Landeskunde, Naturwiss. Mitt.* 36/37: 113-162. (in German, with English summary). [On the fundament of an extensive odonatological survey in the region of the town Hagen, Nordrhein-Westfalen, Germany, habitat parameters for the three species were analysed in very detail. The focus is set on regional distribution, phenology, reproduction habitats in general and in detail (structure of vegetation, hydrochemical factors), competition effects of the three species, and conservation measures.] Address: Schlüpmann, M., Hierseier Weg 18, D-58119 Hagen, Germany. E-mail: Martin.Schluempmann@t-online

**3771.** Sirot, L.K.; Brockmann, H.J.; Marins, C.; Mutschett, G. (2003): Maintenance of a female-limited polymorphism in *Ischnura ramburi* (Zygoptera: Coenagrionidae). *Animal Behaviour* 66: 763-775. (in English). ["Colour" polymorphisms can be maintained in a population if all morphs have equal fitness on average, if fitness is frequency dependent or if fitness functions cross for some environmental or social variable. We studied female-limited colour polymorphism in the Rambur's fork-tail damselfly, *Ischnura ramburi*, in which one female morph looks like the male. The most commonly cited hypotheses to explain this polymorphism involve an advantage to andromorphs of avoiding costly matings through male mimicry. An alternative hypothesis argues that males learn the most common morph and that the polymorphism is maintained by a rare-morph advantage of mating avoidance, irrespective of male mimicry. We tested predictions of the male mimicry hypothesis, learned mate recognition hypothesis (LMR) and two new hypotheses. We used censuses and a mark-resight study to estimate density, sex ratio, morph frequency and mating frequencies. We observed interactions to test for male mimicry and female competition and to evaluate the frequency of mating attempts. Andromorphs were less likely than gynomorphs to receive mating attempts in encounters with males, but did not mate less frequently, or attack males or interrupt oviposition by other females more frequently. Contrary to the LMR hypothesis, the rarer morph was more likely to receive mating attempts. Andromorph frequency was greater in older females than in younger females, suggesting higher mortality or dispersal of gynomorphs. Our results support a modification of the male mimicry hypothesis, the signal detection hypothesis. Together with past studies, our results suggest that the female morphs may be alternative mating avoidance strategies." (Authors)] Address: Sirot, Laura, Dept of Zoology, University of Florida, 223 Bartram Hall, Gainesville, FL, 32611-8525. USA. E-mail: lsirrot@zoo.ufl.edu

**3772.** Stellmach, M. (2003): Landesweite naturschutzfachliche Bewertung der Auen im Rahmen des Auenprogramms Bayern. <http://www.bayern.de/lfu/tatbericht>: 27 pp. (in German). [The publication outlines a method to assess the Bavarian (Germany) floodplains. Odonata are among the indicator species: e.g. *Sympetrum flaveolum* (species of alternating water levels) and *S. pedemontanum* (species of early phases of vegetation succession).] Address: michael.stellmach@lfu.bayern.de

**3773.** Stewart, T. W.; Shumaker, T.L.; Radzio, T.A. (2003): Linear and nonlinear effects of habitat structure on composition and abundance in the macroinvertebrate community of a Large River. *Am. Midi. Nat.* 149: 293-305. (in English). ["We used an experiment and regression analyses to quantify effects of spatial variation in habitat structure abundance on a riverine macroinvertebrate community under winter conditions." Concrete slabs with different numbers of stones attached to upper faces were placed in the James River, Nelson County, Virginia, USA, and retrieved after 28 days "Erpetogomphus sp. nymphs were equally abundant in high and very high cover treatments, but were virtually absent in no cover, low cover, and intermediate cover treatments. Soft substratum is critical habitat for this burrowing taxon, and suitable quantities of particulate matter were apparently not present until stones covered almost the entire slab face and provided interstices where paniculate matter accumulated." (Authors)] Address: Stewart, T. W., Department of Biological Sciences, Ohio University, Athens 45701, USA

**3774.** Stoks, R.; McPeck, M.A.; Mitchell, J.L. (2003): Evolution of prey behavior in response to changes in predation regime: damselflies in fish and dragonfly lakes. *Evolution* 57(3): 574-585. (in English). ["In a large behavioral experiment we reconstructed the evolution of behavioral responses to predators to explore how interactions with predators have shaped the evolution of their prey's behavior. All *Enallagma* damselfly species reduced both movement and feeding in the presence of coexisting predators. Some *Enallagma* species inhabit water bodies with both fish and dragonflies, and these species responded to the presence of both predators, whereas other *Enallagma* species inhabit water bodies that have only large dragonflies as predators, and these species only responded to the presence of dragonflies. Lineages that shifted to live with large dragonflies showed no evolution in behaviors expressed in the presence of dragonflies, but they evolved greater movement in the absence of predators and greater movement and feeding in the presence of fish. These results suggest that *Enallagma* species have evolutionarily lost the ability to recognize fish as a predator. Because species coexisting with only dragonfly predators have also evolved the ability to escape attacking dragonfly predators by swimming, the decreased predation risk associated with foraging appears to have shifted the balance of the foraging/predation risk trade-off to allow increased activity in the absence of mortality threats to evolve in these lineages. Our results suggest that evolution in response to changes in predation regime may have greater consequences for characters expressed in the absence of mortality threats because of how the balance between the conflicting demands of growth and predation risk are altered." (Authors)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**3775.** Stoks, R.; McPeck, M.A. (2003): Predators and life histories shape *Lestes* damselfly assemblages along a freshwater habitat gradient. *Ecology* 84(6): 1576-1587. (in English). ["Survey data from New England showed that assemblages of *Lestes* damselflies are organized along the entire gradient of pond permanence and predator presence. One assemblage occupies vernal ponds lacking large dragonfly predators and fish; four are largely confined to temporary ponds that typi-

cally contain dragonfly predators; one dominates fishless permanent ponds and lakes where dragonflies are the top predators; and one dominates permanent ponds and lakes where fish are the top predators. We determined the role of life history and predation in maintaining this striking pattern by conducting a series of transplant experiments in the field and a laboratory experiment manipulating presence and absence of local predators. Life history (1) shaped the ability of species to cope with drying regime, thereby excluding temporary-pond *Lestes* from vernal ponds and permanent-water *Lestes* from temporary ponds, and (2) generated size differences among species due to differences in the timing of hatching. This mediated the exclusion of temporary-pond *Lestes* from permanent water bodies through asymmetric intraguild predation by permanent-water *Lestes*. Dragonfly predation on permanent-water *Lestes* had an indirect positive effect on the survival of temporary-pond *Lestes*; however, this effect apparently is too small to allow coexistence of both *Lestes* groups. Predation by large dragonfly larvae excluded the *Lestes* species of vernal ponds from temporary ponds, and differential vulnerability to large dragonfly larvae and fish shaped the reciprocal dominance of *L. eurinus* and *L. vigilax* in fishless and fish-containing permanent water bodies, respectively. Taken together, these results show that life history constraints and predation both shape the distributions of *Lestes* species along the pond permanence gradient in New England. We discuss the importance of this freshwater habitat gradient in shaping local and regional species diversity." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**3776.** Suhling, F.; Richter, O. (2003): Mathematical modeling of priority effects and intraguild predation with applications to Namibian Odonata populations. *Verhandlungen der Gesellschaft für Ökologie* 33: 169. (in English). [Verbatim: The model presented in this paper allows the study of the survival of populations in dependence on the intensities of cannibalistic interactions and intraguild predation, on the density of unspecific prey, on specific growth rates, and on temporal priority in colonization. Moreover, we study the question under which circumstances populations of predators may coexist. The parameter values used in this study are mainly derived from ongoing laboratory and field studies on the dragonfly assemblage of temporary freshwater ponds in the Namibian semi-desert. These assemblages may consist of up to about 25 species, mostly of the family Libellulidae, of which, however, only about ten species colonize temporary pools, i.e. lay eggs. Although all successful colonizers show rapid development some, such as *Pantala flavescens* and *Sympetrum fonscolombii*, grow faster than others, e.g. *Trithemis kirbyi* and *Crocothemis erythraea*. Our model includes age and size structure in form of partial differential equations, which is a compromise between simplistic model approaches in form of ordinary differential equations and individual based models. The classical model for the development of size structured populations based on a partial differential equation for the size density distribution as a function of time was extended to include cannibalism, intraguild predation among two populations and foraging behaviour in form of size dependent functional response curves. The mathematical formulation of intra- and interspecific predator-prey interactions in size-structured populations lead

to integrals taking into account the interaction of all possible combinations of size classes. Introducing predation and cannibalism into the model leads thus to a system of coupled integro-differential equations, which are solved numerically by finite difference techniques. Models of this form possess a well-defined mathematical structure and are capable of capturing essential aspects of the interaction of age or size-structured populations. Figure 1 one shows as an example of model behaviour the effect of a "cohort splitting" occurring under shortage of nutrient resources due to intraspecific cannibalism. In this case, large larvae prey on small larvae of the same population and are thus able to survive and develop. The analysis of the model behaviour leads to the following conclusions 1. Cannibalism is a decisive factor of survival under scarce nutrition resources 2. Age cohorts of populations of different growth rates do not coexist under scarce nutrient resources 3. Foraging behaviour determines the window of opportunity for coexistence.] Address: Richter, O., Institute for Geocology, Technical University of Braunschweig, Germany. E-mail: o.richter@tu-bs.de

**3777.** Suhling, F.; Padeffke, T.; Johansson, F.; Richter, O. (2003): Mechanisms creating odonate community structure in desert wetlands. *Verhandlungen der Gesellschaft für Ökologie* 33: 282. (in English). [Verbatim: Temporary ponds in the Namibian semi-desert may be visited by a large number of dragonfly species even if the ponds are widely isolated from other aquatic habitats. At artificial ponds we identified 26 species, of which, however, only some colonised the ponds, i.e. laying eggs. The colonisers can be separated into two major groups. Group 1 consists of residents in the area, such as *Trithemis kirbyi* or are facultative migrants entering the area in small numbers, e.g. *Crocothemis erythraea* and *Orthetrum chrysostigma*. Species of group 2 are obligate migrants, which perform often long distance dispersal, normally in large aggregations, as obligate part of their life cycle [1], e.g. *Pantala flavescens* and *Sympetrum fonscolombii*. During two successive years almost exclusively migrants emerged successfully from the artificial ponds. Studies with early stadium larvae revealed that larvae of the migrants (group 2) are more active and have higher food intake than larvae of group 1; consequently the initial growth of the migrants was faster [2]. Fast growths allow species of group 2 to develop successfully under the conditions of temporary wetlands with short duration. Moreover, differences in growth should affect the outcome of interspecific interactions because size differences are the major driver for intraguild predation in dragonfly larvae [3, 4]. We tested the hypothesis that the larvae of the migrant *S. fonscolombii* grow faster and will be the superior predator to the larvae of the resident *T. kirbyi* when the eggs of both species are laid at the same time and place, because size differences of two or more instars will cause an increased mortality due to predation in a two-species interaction experiment [5]. We found that under these conditions *T. kirbyi* became almost extinct. However, the interaction between migrants and residents may also be altered by temporal differences in oviposition at a given habitat, i.e. temporal priority. At our artificial ponds we observed first ovipositions of *T. kirbyi* 11 days before those of *S. fonscolombii*. We therefore tested the hypothesis that the species that arrives first at the water (i.e. has temporal priority) is a superior predator to the later arriving species. We found that *T. kirbyi* survives and even dominates the competitive superior *S. fonscolombii* when the latter was introduced to the system 11 days later than *T. kirbyi*. References: [1] Corbet PS (1999) *Dragonflies: Behaviour and Ecology of Odonata*. Harley Books, Colchester. [2] Johansson F, Suhling F (subm.) Behaviour and growth of dragonfly larvae along a permanent to temporary water habitat gradient. [3] Anholt BR (1994) Cannibalism and early instar survival in a larval damselfly. *Oecologia* 99, 60-65. [4] Wissinger SA (1989) Seasonal variation in the intensity of competition and predation among dragonfly larvae. *Ecology* 70, 1017-1027. [5] Padeffke T, Suhling F (2003) Temporal priority and intra-guild predation in temporary waters: an experimental study using Namibian desert dragonflies *Ecol. Entomol.*: in press.] Address: Suhling F., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**3778.** Switzer, P.V.; Eason, P.K. (2003): Space use in territorial amberwing dragonflies: are residents female maximizers or neighbor minimizers?. *Behavioral Ecology and Sociobiology* 54(4): 321-328. (in English). [Residents of mating territories interact with different categories of conspecifics: females, nonneighbor males, and neighbor males. Interaction with these different types of conspecifics is likely to have different costs and benefits; for example, interactions with females will be beneficial, while interactions with neighbors are more likely to be costly. In this study, we investigated patterns of intrusions and space use in territorial male amberwing dragonflies (*Perithemis tenera*) to test the idea that residents will adjust their use of space to maximize their beneficial interactions with conspecifics while minimizing their costly interactions with conspecifics. Because territories were arranged linearly around the edge of a pond, each resident had two neighbors, one of which was often closer to the focal resident than the other. Residents experienced more intrusions by neighbors and fewer intrusions by females on the side of their closer neighbor. Residents generally perched on the side of their territory that experienced the fewest intrusions by neighbors and the most intrusions by females, but the pattern was more strongly related to neighbor intrusions than female intrusions. Subsequent to pursuits of neighbors and females, residents tended to shift their perches away from where they pursued neighbors but toward where they pursued females. Nonneighbor intrusions were not affected by neighbor proximity, nor did residents adjust their space use in response to nonneighbor intrusions. Our results suggest that residents do adjust their space use in response to intrusions by conspecifics, that their adjustment depends on the type of conspecific that intruded, and that residents may be using a simple decision rule such as "move away from male intrusions, move closer to female intrusions" to adjust their within-territory space use.] (Authors)] Address: Switzer, P.V., Eastern Illinois Univ., Dept Biol, Sci., Charleston IL 61920; USA. E-mail: cfpvs@eiu.edu

**3779.** Sy, T. (2003): Zur Libellenfauna des Naturschutzgebietes "Reudnitz" in der Dahleener Heide (Odonata). *Entomologische Nachrichten und Berichte* 47(1): 19-26. (in German, with english summary). [Sachsen, Germany; 13 water bodies of different trophic level were surveyed in 1999 and 2000. A total of 30 odonate species was recorded, including several rare species. *Lestes virens*, *Coenagrion hastulatum*, *Aeshna affinis*, *Cordulegaster boltonii*, *Orthetrum coerulescens*, *Leucorrhinia albifrons*, *L. rubicunda*, and *L. dubia* are dis-



cussed in detail.] Address: Sy, T., RANA-Büro für Ökologie und Naturschutz, Am Kirchtor 27, D-06108 Halle (Saale), Germany

**3780.** Taylor, J. (2003): Backyard dragonflies in Perth. *Austrolestes* 7: 4. (in English). [Australia; "Two years ago we moved to our present house in the western suburbs. It has a large swimming pool in full sun that has not been turned into a dragonfly pond as yet. This summer I had the idea that I could make the pool dual purpose -pool and pond. At the beginning of February I purchased a pair of kiddies plastic pool/sandpits in the form of scallop shells and floated them in the pool. They were not stable, so I tied rubber foam pipe insulation around the edge, to hold them level while swimmers used the pool. The ponds were filled with tap water and I added some lilies and material netted from local lakes to seed them with pond fauna. Initially there was a problem with midge and mosquito larvae, but these were soon controlled with a few gambia fish. The fish are no longer needed, since there are now ample insect predators. I don't know how much these ponds have influenced visiting dragonflies - but there are always dragonflies present and almost every day in late March and early April I have seen mating pairs laying eggs in the ponds."; *Orthetrum caledonicum*, *Diplacodes haematodes*, *Hemicordulia australiae*, *H. tau*, *Trapezostigma stenoloba*, *Pantala flavescens*, *Hemianax papuensis*, *Ischnura aurora*, *Xanthagrion erythroneurum*. "It is interesting that in the early stages of the ponds, dragonflies did not seem to recognise them as being any better than the pool for laying eggs in. But now they lay there almost exclusively. *Xanthagrion* persistently tried to lay on the creepy crawly pipe, *Hemicordulia* lays anywhere, even on glazed tiles. *Trapezostigma* makes a single plunge to dip its abdomen into the pool and then flies off. [...]". This pool is compared with a shady pool overhung by a huge gum tree. "When going out at night with a torch to look for emerging adults I found that *Hemianax* larvae have an interesting nocturnal behaviour of gently jetting themselves through open water over two metres deep, presumably to catch unsuspecting planktonic life. When caught in the torchlight they zip off at great speed." (Author)] Address: not stated

**3781.** Tennessen, K. (2003): Minter J. Westfall, Jr. passed away. *Argia* 15(2): 2-5. (in English). [Minter Westfall (28 January 1916 - 20. July 2003) had an enormous influence on odonatology worldwide, and especially on today leading North-American odonatologists. Ken Tennessen, Mike May, Jerrell Daigle, Carl Cook, Bill Mauffray, and Nick Donnelly (in his introduction into the current issue of *Argia*) contributed some personal stories of a rich common odonatological life with Minter Westfall.] Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktennessen@aol.com

**3782.** Thakoor, S.; Chahl, J.; Srinivasan, M.V.; Young, L.; Werblin, F.; Hine, B.; Zornetzer, S. (2003): Bioinspired engineering of exploration systems for NASA and DoD. *Artificial Life* 8(4) (2002): 357-369. (in English). ["A new approach called bioinspired engineering of exploration systems (BEES) and its value for solving pressing NASA and DoD needs are described. Insects (for example honeybees and dragonflies) cope remarkably well with their world, despite possessing a brain containing less than 0.01% as many neurons as the human brain. Although most insects have immobile eyes with

fixed focus optics and lack stereo vision, they use a number of ingenious, computationally simple strategies for perceiving their world in three dimensions and navigating successfully within it. We are distilling selected insect-inspired strategies to obtain novel solutions for navigation, hazard avoidance, altitude hold, stable flight, terrain following, and gentle deployment of payload. Such functionality provides potential solutions for future autonomous robotic space and planetary explorers. A BEES approach to developing lightweight low-power autonomous flight systems should be useful for flight control of such biomorphic flyers for both NASA and DoD needs. Recent biological studies of mammalian retinas confirm that representations of multiple features of the visual world are systematically parsed and processed in parallel. Features are mapped to a stack of cellular strata within the retina. Each of these representations can be efficiently modeled in semiconductor cellular nonlinear network (CNN) chips. We describe recent breakthroughs in exploring the feasibility of the unique blending of insect strategies of navigation with mammalian visual search, pattern recognition, and image understanding into hybrid biomorphic flyers for future planetary and terrestrial applications. We describe a few future mission scenarios for Mars exploration, uniquely enabled by these newly developed biomorphic flyers." (Authors)] Address: Thakoor, Sarita, Jet Propulsion Laboratory, Caltech, Pasadena, CA, 91109, USA. E-Mail: sarita.thakoor@jpl.nasa.gov

**3783.** Trapero Quintana, A.; Naranjo López, N. (2003): Revision of the order Odonata in Cuba. *Bulletin of American Odonatology* 7(2): 23-39. (in English). [The list of the Odonata of Cuba is updated to 81 species. The species are annotated. In addition, the paper contains a brief history on studying Cubanian Odonata, an analysis of the altitudinal distribution of the odonate species, remarks to zoogeographic relationships, endemic species, and distribution maps on a regional level.] Address: Trapero Quintana, A., Departamento de Biología de la Universidad de Oriente, Santiago, Cuba

**3784.** Tunmore, M. (2003): A Stowaway Southern Oak Bush-cricket *Meconema meridionale* and other observations from Holland. *Atropos* 20: 59-60. (in English). [*Chalcolestes viridis*, *Coenagrion lunulatum*, and *Erythromma viridulum* are listed without site information.] Address: Tunmore, M., 36 Tinker Lane, Meltbam, Huddersfield, West Yorkshire HD7 3ES, UK

**3785.** Valley, S. (2003): 2003 DSA annual meeting in Williams, CA and post meeting trip to Owens Valley, June 19-25. *Argia* 15(2): 5-8. (in English). [The paper includes some information about the business meeting of DSA, the lectures, and focus on the results of several field trips. Species list of the following localities are presented: Bear Creek, Colusa County, Pope Creek, Napa County, Guenoc Pond, Lake County, Putah Creek, Yolo/Solano county, Big Chico Creek and Cherry Hill Campground, Butte County, Horseshoe Lake in Bidwell Park, New York Creek, ? County, a grass lake, El Dorado County, Markleeville, Alpine County, Monitor Pass, Mono County (?), and several places in Inyo County. Some emphasis is given to records of *Tanypteryx hageni* and *Cordulegaster deserticola* Cruden, 1969 (Obviously, this taxa is a good species rather a syn. of *C. dorsalis*, for K. Tennessen reported several morphological differences between these two taxa). The paper also list all participants.] Address: Valley, S., 1165 SW

Lawrence, Albany, OR, 97321, USA. E-mail: svalley@comcast.net

**3786.** Van Buskirk, J.; Anderwald, P.; Lüpold, S.; Reinhardt, L.; Schulera, H. (2003): The lure effect, tadpole tail shape, and the target of dragonfly strikes. *Journal of Herpetology* 37(2): 420-423. (in English). ["Tadpoles of many species develop enlarged tail fins in the presence of insect predators, but the function of this response is not known. Because large tails do not improve swimming performance, we tested the hypothesis that the tail attracts predator strikes away from the more vulnerable head and body region. We first confirmed the assumption that attacks to the tail are less dangerous: Living tadpoles escaped from dragonfly larvae only 10% of the time when the strike landed on the head and body but 29.4% of the time when struck on the tail. We then constructed model tadpoles having four tail shapes: normal, predator-induced, and 50% shallower and 50% deeper than normal. The models were presented to dragonflies and the location at which the insect's labium struck the model was noted. Models having the predator-induced tail sustained 16% fewer strikes to the head and body than did models with the non-induced tail, lending credibility to the hypothesis that the tail acts as a lure. Models with an unnaturally large tail were attacked more often on the body than was the predator-induced model, which may create stabilizing selection on tail shape." (Authors)] Address: Buskirk, J. van, Institute of Zoology, University of Zürich, CH-8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

**3787.** Vick, G.S. (2003): Obituary David Allen Lewis Davies. *Odonatologica* 32(3): 295-301. (in English). [D.A.L. Davies, 18 March 1923 - 2 March 2003] Address: Vick G.S., Crossfields, Little London, Tadley, Hants RG26 5ET, United Kingdom

**3788.** Walker, J.; Smentowski, J. (2003): Tachoptery thoreyi (Hagen), Somatochlora tenebrosa (Say) and S. hineana Williamson - observations from Missouri. *Argia* 15(1): 6-11. (in English). [On the opportunity for searching Somatochlora hineana in Missouri, USA, information on Tachopteryx thoreyi, S. tenebrosa, and S. hineana are compiled from literature data and personal communications. Special emphasis is given to habitat, oviposition, and larval habitats.] Address: Walker, Jane, Washington University Tyson Research Center, P.O. Box 258, Eureka, MO 63025, USA. E-mail: walker@biology.wustl.edu

**3789.** Wang, Z.-g. (2003): A new species of the genus Sinocnemis (Odonata: Platycnemididae) from Henan Province of China. *Entomotaxonomia* 25(1): 1-3. (in Chinese with English summary). ["The paper reports a new species of the genus Sinocnemis Wilson et Zhou. Type specimens are preserved in the Henan Academy of Science, China. Sinocnemis henanese, sp. nov. Measurements (mm): Abd. apprxapp. ♂ 35 mm apprx38 mm, ♀ 32 mm apprx34 mm. Hind-wing ♂ 28 mm apprx32 mm, ♀ 30 mm apprx32.5 mm. This species is similar to Sinocnemis yangbingi Wilson et Zhou, but differs from the latter as follows: 1) Pronotum of ♂ and ♀ with two yellowish round spots; 2) no small stripe at the upper posterior corner of the mesepimeron of synthoax; 3) lateral margin of abdominal segments 3 apprx4 with long yellowish stripe; 4) terminal margin of distal segment of penis with a apophysis. Holotype: ♂, Mt. Baiyun, Song County, Henan Province, 06-VIII-

1996, coll. WANG Zhi-guo. Paratypes: 1 ♀ Jiyuan County, Henan Province, 17-V-1987, coll. XI-AO Jian-guang; 2 ♂♂, 1 ♀ Lushan County, Henan Province, 22-VI-1990, coll. WANG Zhi-guo." (Author)] Address: Wang Zhi-guo, Henan Academy of Science, Zhengzhou, Henan, 450002 China

**3790.** Watson, E.J.; Carlton, C.E. (2003): Spring succession of necrophilous insects on wildlife carcasses in Louisiana. *Journal of Medical Entomology* 40(3): 338-347. (in English). ["Seven fresh animal carcasses were monitored throughout decomposition in a mixed flat-wood forest in East Baton Rouge Parish, LA from 1 April to 1 July 1999. Succession patterns of necrophilous insects were documented for the following: one Louisiana black bear (threatened species), two white-tailed deer, two alligators, and two swine as the experimental reference. Our results suggest variation in the species composition of necrophilous insects among animal carcass types. A total of 93 arthropod species, from 46 families and three classes, were manually collected from the seven carcasses. Only 19 insect species were collected on all four animal types and were represented by eight families: Coleoptera: Histeridae, Nitidulidae, Silphidae, Staphylinidae; Diptera: Calliphoridae, Muscidae, Piophilidae, Sepsidae. Eleven of the 46 families were not collected at either alligator site but were observed at bear, deer, and swine carrion: Coleoptera: Cleridae, Dermestidae, Geotrupidae, Scarabaeidae; Diptera: Micropezidae, Sarcophagidae, Syrphidae; Hymenoptera: Apidae; Lepidoptera: Nymphalidae; and Odonata: Libellulidae. Residency and succession patterns of necrophilous insects are presented for each animal type with particular emphasis on selected fly (Calliphoridae, Muscidae, Piophilidae, Stratiomyidae) and beetle species (Cleridae, Dermestidae, Histeridae, Nitidulidae, Silphidae, Staphylinidae)." (Authors)] Address: Carlton, C.E., Department of Entomology, Louisiana State University, Baton Rouge, LA, USA. E-Mail: ewatson@agctr.lsu.edu

**3791.** Weihrauch, F.; Schorr, M. (2003): Bibliographie der odonatologischen Literatur Bayerns 1996-2002 (Odonata). *Libellula Supplement* 4: 133-142. (in German, with English summary). ["A list of 107 references is given, covering relevant odonatological literature from this period of time for the state of Bavaria, Germany. Not considered in this list were articles concerning fossil dragonflies and unpublished diploma theses and reports." (Authors)] Address: Weihrauch, F., Hengelerstr. 9, D-80637 München, Germany. E-Mail: florian.Weihrauch@t-online.de

**3792.** Weihrauch, F. (2003): Emergenzstudien an Cordulegaster b. boltonii von einem niederbayerischen Waldbach (Odonata: Cordulegastridae). *Libellula Supplement* 4: 3-18. (in German, with English summary). ["Between 1996 and 2003 the emergence was studied at the Schallerbach, a forest rivulet near Siegenburg (48°45'N, 11°44'E) in Lower Bavaria, Germany. The period of emergence lasted from 24 May to 13 June. Exuviae hung preferably on twigs of spruce trees and on the bark of pine trees, to a height of 6 m above water level and 4.2 m from the shore. The mean distances of from the water were 112 cm (s.d. ±105 cm) horizontally and 198 cm (s.d. ±114 cm) vertically (n=76). Additional behavioural observations included oviposition, male "dunking" and precopulatory action." (Author)] Address:

Weihrauch, F., Hengelerstr. 9, D-80637 München, Germany. E-Mail: Florian.Weihrauch@t-online.de

**3793.** Weihrauch, F.; Burbach, K.; Hölken, U.; Netz, H.J.; Stettmer, C. (2003): Neue Nachweise von *Orthetrum albistylum* aus Bayern (Odonata: Libellulidae). *Libellula Supplement* 4: 59-70. (in German, with English summary). ["Within Central Europe, the range of *Orthetrum albistylum* (Selys) hitherto was confined to the southern parts, reaching Germany only in the extreme southwest, in the Upper Rhine Valley and at Lake Constance. Besides, there existed only five other German records of the species taken in Bavaria as single, obviously migrating individuals. In the years 1999-2002 we were able to take a number of new records of the species, including successful reproduction, at three localities in Bavaria. Obviously *O. albistylum* was able to establish at least temporary bridgeheads of possibly northern Italian origin in this region north of the Alps. Possible migration routes and an extension of range of the species in Central Europe are discussed."] (Authors) Address: Weihrauch, F., Hengelerstraße 9, D-80637 München, Germany. E-Mail: Florian.Weihrauch@t-online.de

**3794.** Werking-Radtke, J. (2003): Eingriffsregelung - Wirkungen von Kompensationsmaßnahmen. *LÖBF-Mitteilungen* 2/2003: 62-69. (in German). [Against the background of the German legal rules (§19 BNatSchG) to compensate impacts caused by the construction of a road, so called "compensation area-pools" were declared to focus compensation measures from several impacts on one - greater - area instead to have several small and isolated areas. The paper critically assesses the efforts of one of these "pools" in the county of Steinfurt, Nordrhein-Westfalen, Germany. 18 odonate species could be recorded; the species spectrum coincides with the typical regional odonate fauna. Therefore, it is concluded that water body-based measures have been successful. Nonetheless, a sustainable effort of the measures will not be given due to fast growing, expansive scrubs which will shade the bankside of the water bodies. This will cause the loss of several typical odonate species.] Address: Werking-Radtke, Jutta, Dezerinat: Biomonitoring und Erfolgskontrolle, LÖBF NRW, Castroper Str. 312-314, D-45665 Recklinghausen, Germany. E-mail: jutta.werking-radtke@loebf.nrw.de

**3795.** Willigalla, C.; Menke, M.; Kronshage, A. (2003): Naturschutzbedeutung von Regenrückhaltebecken. Dargestellt am Beispiel der Libellen in Münster/Westfalen. *Naturschutz und Landschaftsplanung* 35(3): 83-89. (in German, with English summary). [Nordrhein-Westfalen, Germany; "In the city of Münster rain storage ponds have been constructed since 1980 to temporarily store peak flow discharge and large amounts of surface effluents. A dragonfly inventory of all rain storage ponds identified 27 species (61 % of a total of 44 species occurring in the city area of Münster), with 22 classified as (potentially) permanent settlers and five species as guests. Beside species frequently occurring at all types of water habitats of the city area a number of specialised species could be found. The earlier comprise *Cercion lindenii*, *Erythromma najas*, *Ischnura pumilio*, and *Aeshna grandis*, more specialised species are *Lestes dryas*, *Somatoclora metallica*, and *Orthetrum brunneum*. The colonisation depends on the one hand on light conditions and vegetation structure of the ponds, on the other side on the spatial relationship to

other important dragonfly biotopes in Münster. The study shows that rain storage ponds in urban areas significantly contribute to the protection of mainly ubiquitous species but also support some more specialised species, at least as 'side-habitats' as referred to in the concept of metapopulations. Finally, the study proposes management and development measures for the establishment of rain storage ponds." (Authors) Address: Willigalla, C., c/o Willigalla Ökologische Gutachten, Franz-List-Str. 103, D-14624 Dallgow, Germany. E-mail: christoph@willigalla.de

**3796.** Willigalla, C. (2003): New data on dragonflies (Odonata) of the Masurian lakelands. *Wiad. entomol.* 22(1): 50. (in Polish). [NE Poland; data resulting from a survey of four localities in June 2001 are briefly documented.] Address: Willigalla, C., c/o Willigalla Ökologische Gutachten, Franz-List-Str. 103, D-14624 Dallgow, Germany. E-mail: christoph@willigalla.de

**3797.** Wilson, K.D.P.; Reels, G.T. (2003): Odonata of Guangxizhuang Autonomous Region, China, part I: Zygoptera. *Odonatologica* 32(3): 237-279. (in English). [Taxonomic and faunistic information is provided on the Zygoptera of Guangxi Zhuang Autonomous Region, China. *Megalestes haul* sp. n. (holotype: ♂, Shiwandashan), *M. tuska* sp.n. (holotype: ♂, Dayaoshan), *Rhipidolestes laui* sp.n. (holotype: ♂, Cenwanglaoshan), *Calicnemia haksik* sp.n. (holotype: ♂, Cenwanglaoshan), *Coelicia galbina* sp.n. (holotype: ♂, Longrui), and *Drepanosticta magna* sp.n. (holotype: ♂, Cenwanglaoshan) are described. *Sinolestes truncata* Needham is synonymised with *Sinolestes edita* Needham. The hitherto unknown ♂ of *Indocypha katharina* (Needham) and ♀ of *Schmidtiphaea vietnamensis* (van Tol & Rozendaal) are described. *Devadatta ducatrix* Liefstinck, *Euphaea guerini* Rambur, *Euphaea superba* Selys, *Schmidtiphaea vietnamensis* van Tol & Rozendaal, *Indocnemis ambigua* (Asahina), *Calicnemia miles* (Laidlaw), and an undescribed species of *Drepanosticta* are recorded from China for the first time. The status of Guangxi as an important centre of odonate biodiversity is discussed."] (Authors) Address: Wilson, K.D.P., Flat 20, 6 Mansfield Road, The Peak, Hong Kong, China. E-mail: wilsonkd@netvigator.com

**3798.** Wong, A.; Smith, M. L.; Forbes, M. R. (2003): Differentiation between subpopulations of a polychromatic damselfly with respect to morph frequencies, but not neutral genetic markers. *Molecular Ecology* 12(12): 3505-3513. (in English). [*Nehalennia irene* "has two distinct female colour morphs. Individuals of one morph have male-like colouration and pattern (androchromes), whereas gynochromes are different from males and androchromes in these respects. In several damselflies, such female-limited polychromatism is attributable to a single genetic locus. We developed six polymorphic genetic markers, which were codominant, to test for genetic differentiation in *N. irene*, collected from two sites located 8 km from one another in eastern Ontario, Canada. Based on three censuses spanning a 10 year period (1992-2001), morph ratios differed consistently and significantly between these two sites. However, subpopulations at these sites were not genetically differentiated with respect to the putatively neutral markers. Our results suggest that site differences in morph ratios of female *N. irene* cannot be explained by genetic drift, but are consistent with spatially variable selection operating on different morphs, perhaps mediated by male



density. Alternatively, morph type may be a plastic trait and cues for induction may differ between sites." (Authors)] Address: Wong, A., Dept of Molecular Biology and Genetics, Biotechnology Building, Cornell University, Ithaca, NY 14853 USA. E-mail: aw246(@)cornell.edu

**3799.** Yates, N. (2003): Worldwide Dragonfly Association 3rd International Symposium of Odonatology. *Austrolestes* 7: 2-3. (in English). [This is a compact report on the WDA symposium held in January 2003 in Beechworth, Australia.] Address: not stated

**3800.** Zavodska, R.; Sauman, I.; Sehnal, F. (2003): Distribution of PER protein, pigment-dispersing hormone, prothoracicotropic hormone, and eclosion hormone in the cephalic nervous system of insects. *Journal of Biological Rhythms* 18(2): 106-122. (in English). ["Investigations performed on adult insects revealed that putative components of the central pacemaker, the protein Period (PER) and the pigment-dispersing hormone (PDH), are immunocytochemically detectable in discrete sets of brain neurons throughout the class of Insecta, represented by a bristletail, mayfly, damselfly, 2 locust species, stonefly, 2 bug species, goldsmith beetle, caddisfly, honeybee, and 2 blowfly species. The PER-positive cells are localized in the frontal protocerebrum and in most species also in the optic lobes, which are their only location in damselfly and goldsmith beetle. Additional PER-positive cells occur in a few species either in the deuto- and tritocerebrum or in the suboesophageal ganglion. The PER staining was always confined to the cytoplasm. The PDH immunoreactivity consistently occurs in a cluster of perikarya located fronto-ventrally at the proximal edge of the medulla. The mayfly and both locust species possess additional PDH neurons in 2 posterior cell clusters at the proximal edge of the medulla, and mayfly, waterstrider, and 1 of the blowfly species in the central brain. PDH-positive fibers form a fanlike arrangement over the frontal side of the medulla. Two or just 1 bundle of PDH-positive fibers run from the optic lobe to the protocerebrum, with collaterals passing over to the contralateral optic lobe. Antisera to the prothoracicotropic (PTTH) and the eclosion (EH) hormones, which in some insects regulate the molting and ecdysis rhythms, respectively, typically react with a few neurons in the frontal protocerebrum. However, the PTTH-positive neurons of the mayfly and the damselfly and the EH-positive neurons of the caddisfly are located in the suboesophageal ganglion. No PTTH-like antigen was detected in locusts, and no EH-like antigens were detected in the damselfly, stonefly, locusts, and the honeybee. There are no signs of colocalization of the PER-, PDH-, PTTH-, and EH-like antigens in identical neurons." (Authors)] Address: Sehnal, F., Institute of Entomology, Czech Academy of Sciences, Branisovska 31, 370 05, Ceske Budejovice, Czech Republic. E-Mail: sehnal@entu.cas.cz

**3801.** Zawal, A. (2003): Dragonflies (Odonata) of nature reserve "Dolina Pieciu Jezior" ("Valley of Five Lakes") (Drawskie Lake District). *Parki nar. Rez. przyr.* 22: 101-106. (in Polish with english summary). [The odonate fauna of the nature reserve "Valley of Five Lakes" (Poland) was investigated in 1999 and 2000. The list of 29 species (basing on a collection of 1264 specimens) includes species as *Coenagrion lunulatum*, *Brachytron*

*pratense*, *Aeshna viridis*, *Somatochlora flavomaculata*, and *Epitheca bimaculata*. *Calopteryx splendens*, *Lestes virens*, and *Libellula fulva* are probably not autochthonous. Dominant species are *Coenagrion hastulatum* (due to the dystrophic character of many water bodies), *C. puella*, *Ischnura elegans*, and *Erythromma najas*. *Erythromma viridulum* recently reach edin the region the north-eastern boundaries of its range.] Address: Zawal, A., Uniwersytet Szczecinski, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Waska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**3802.** Zawal, A. (2003): Dragonflies (Odonata) of two small water bodies from Szczecin Landscape Park "Puszcza Bukowa". *Parki Narodowe i Rezerваты Przyrody* 22(3): 441-448. (in Polish, with english summary). [Poland; in 1999 and 2000, 28 odonate species, in most cases eurythopic species, were collected. *Platycnemis pennipes* and *Anaciaeschna isocetes* were found only as adults. *Coenagrion puella*, *Erythromma najas*, and *Ischnura elegans* totalled to over 70% of the collected specimens. The dystrophic lake Weglinek was characterised by a high number of species, but without any dominant species.] Address: Zawal, A., Uniwersytet Szczecinski, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Waska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**3803.** Zawal, A.; Janicki, D. (2003): Pasożytowanie larw wodopójek z rodzaju *Arrenurus* na imagines wazek pochodz'cych z okolic Barlinka. In: *Zoologia na progu XXI wieku. Streszczenia referatów i plakatów ogólnopolskiej konferencji.* - [Zoologie an der Schwelle des XXI Jahrhunderts. Zusammenfassungen der Vorträge und Poster der allpolnischen Tagung]. Polskie Towarzystwo Zoologiczne, Uniwersytet Miko<sup>3</sup>aja Kopernika w Toruniu, Toruń: 257-258. (in Polish). [*Arrenurus* water mites as parasites of imagines of different odonate species in the environ of Barlinek, Poland - 557 odonate specimens from 24 species were collected. A total of 2218 specimens of water mites are reported. The infection rate is outlined for the following species as follows: *Enallagma cyathigerum* (56,5%), *Coenagrion puella* (53,6%), *Ischnura elegans* (46,9), and *Coenagrion pulchellum* (41,9%). Only two anisopteran species were infected: *ordulia aenea* (14,3%) and *Sympetrum sanguineum* (4%). In most cases, females were parasitised more intensively than males. Separated according the odonate topography, the mites preferred the following regions: Metathorax: 910, mesothorax: 464, abdominal segment 1: 371, abdominal segment 2: 200, abdominal segment 3: 63.] Address: Zawal, A., Uniwersytet Szczecinski, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Waska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**Thanks to all who contributed to this issue of OAS!**  
A special thank to Naoya Ishizawa, Pawel Buczynski, and Wolfgang Schneider, and! Viola Clausnitzer, Halle for linguistic help.

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: martin@lindeboom.de  
and Martin Schorr, Schulstr. 7B D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: martinschorr @onlinehome.de

Published in Rheinfelden, Germany and printed in Tübingen, Germany.  
ISSN 1438-0269

## 1997

- 3804.** Jansen, W.; Steiner, R.; Peissner, T.; Hövel, S.; König, A.; Rahmann, H. (1997): 4.3 Libellen. In: Böcker, R. (Ed.): Erfolgskontrolle im Naturschutz am Beispiel des Moorkomplexes Wurzacher Ried. Agrarforschung in Baden-Württemberg 28: 142-172. (in German). [Bad Wurzach (9.53E 47.54N), Baden-Württemberg, Germany; this fen bog is one of the most important in the middle range mountain region of Germany. Many habitat management measures have been realised to improve habitat quality. In spite of the importance of this fen bog, quite few older data on Odonata are available. Contrarily, in the 1990th, data on Odonata were extensively collected. To assess the measures and to make a prognosis on population development in the near future, key stone species (e.g. *Aeshna subarctica elisabethae*, *Somatochlora arctica*, *Lestes virens*, *Nehalennia speciosa*, *Coenagrion hastulatum*, *Leucorrhinia pectoralis*, *L. dubia*, *L. rubicunda*) were monitored. Without open water surfaces, many typical species will disappear. Conflicts between the management task to restore an undisturbed high bog (with a close sphagnum-vegetation and few typical odonate species) and a high bog with (small) peat ponds exploited by hand (high odonate diversity) are discussed. It is proposed to create suitable water bodies by peat cutting realising the so-called 'rotation model' of H. Wildermuth.] Address: Rahmann, H., Inst. Zool., Univ. Stuttgart, Garbenstr. 30, D-70599 Stuttgart, Germany
- 3805.** Knüttel, H.; Lunau, K. (1997): Farbige Augen bei Insekten. Mitteilungen der deutschen Gesellschaft für allgemeine und angewandte Entomologie 11(1-6): 587-590. (in German with English summary). ["Conspicuous, bright colorations of insect compound eyes may be caused by two different mechanisms resulting in different functions: 1) A thin layer of bright, light scattering pigment inside the pigment cells bordering cornea and crystalline cones may determine the eye's outer appearance when seen through the transparent dioptric apparatus. The insect's vision is not influenced by this phenomenon (STAVENOA 1979). The cornea transmits light equally well for all wavelengths involved in vision. As examples *Ischnura elegans* (Odonata: Coenagrionidae) and *Lathyrrophthalmis aeneus* (Diptera: Syrphidae) are presented. 2) Interference filters in the cornea cause colorful, metallic reflections. Transmission measurements of single cornea lenses revealed that the interference filters act as color filters by reducing transmission of light in a small limited waveband. These filters influence vision, because they change the spectral composition of visual stimuli. Results of transmission measurements of cornea lenses of *Heptatoma pellucens FABRICIUS* (Diptera: Tabanidae) and *Poecilobothris nobilitatus* Linné (Diptera: Dolichopodidae) are given." (Authors).] Address: Lunau, K., Institut für Zoologie, Universitätsstr. 31, D-93040 Regensburg, Germany
- 3806.** Matthews, J.V.; Telka, A. (1997): Insect Fossils from the Yukon. In: H.V. Danks and J.A. Downes (Eds.), *Insects of the Yukon. Biological Survey of Canada (Terrestrial Arthropods)*, Ottawa. 1034 pp: 911-962. (in English). [Verbatim: [...] Odonata. Despite the thickly sclerotized character of certain parts of adult damselflies and dragonflies, the only fossils identified to date are the distinctive mandibles. The odonate mandibles are so distinct that there may be a potential for identification at least to the family level. Their occurrence in Yukon samples is rare mainly because many of the samples studied to date represent treeline or tundra environments, not the types of habitat in which dragonflies and damselflies are abundant. One of the samples from Rock River (Table 2) contains a fragment of the genital apparatus of an odonate, but such fossils are very rare. Odonate larvae possess sclerotized and very distinctive mouthparts which one might expect to preserve as fossils, but to date none has been recovered from Yukon samples. [...] Address: Matthews, J.V., Ohana Productions, 23 Sherry Lane Nepean, Ontario, Canada K2G 3L4

## 1998

- 3807.** Bergeson, D.G. (1998): Whooping Crane monitoring in Wood Buffalo National Park. *Research Links* 6(3): 1, 10. (in English). [Odonata sampled in feeding ponds of Whooping Cranes (*Grus americana*) are *Aeshna* sp. and *Ophiogomphus* sp. For more details see: Bergeson, D.G.; Bradley, M.; Holroyd, G. (2001): Food items and feeding rates for wild Whooping Crane colts in Wood Buffalo National Park. *Proc. North American Crane workshop* 8: 36-39.] Address: not stated
- 3808.** Costa, J.M.; Araújo, B.J. de (1998): Catalogue of the types of Odonata in the Museu Nacional, Rio de Janeiro, Brazil. *Publções avuls. Muse. nac., Rio de Janeiro* 76: 1-30. (in Portuguese, with English summary). [Holo- or paratype material referring to 87 species and subspecies are deposited in the odonatological collection of the Museu Nacional, Rio de Janeiro, Brasil and

are documented in detail. A gazetteer with coordinates of the collection localities is listed in an appendix.] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisys.com.br

**3809.** Hänggi, A. (1998): Bewertungen mit Indikatorarten versus Erfassung des gesamten Artenspektrums - ein Konfliktfall?. Laufener Seminarbeiträge 8/98: 33-42. (in German). [The author demonstrates significant different results in assessing the nature conservation value of exact the same habitat when using either spiders, Carabidae, amphibs, Odonata, and the vegetation, respectively.] Address: Hänggi, A., Naturhist. Mus. Basel, Abt. Zool., Augustinergasse 2, CH-4001 Basel, Switzerland

**3810.** Torralba Burrial, A.; Ortega Martínez, M. (1998): Libélula comedora de ranas. Boletín de la Sociedad Entomología Aragonesa 21: 14. (in Spanish with English summary). [Miramón, Spain, 13.09.1997; a larva of *Anax imperator* got a firm hold with a leg of an adult *Rana perezi*.] Address: Torralba Burrial, A., Av. Menéndez Pidal no 9, 2F, ES-22003 Huesca, Spain

## 1999

**3811.** Houpert, G. (1999): Excursion entomologique au lieu-dit "les Pontances", pelouse calcaire de Jezainville (54) le 6 juin 1998. Bull. Soc. Lorraine Ent. 6: 23-25. (in French). [Lorraine, France, *Calopteryx splendens*, *C. virgo* are recorded] Address: not stated

**3812.** Rückriem, C.; Roscher, S. (1999): Empfehlungen zur Umsetzung der Berichtspflicht gemäß Artikel 17 der Fauna-Flora-Habitat-Richtlinie. Angewandte Landschaftsökologie 22: 456 pp. (in German with English and French summary). ["Recommendations on the implementation of the reporting obligations according to article 17 of the Habitats Directive of the EU. "This work consists of two major parts: The first part deals with the requests on the implementations of the reporting obligations as they can be derived from the Habitats Directive. The different levels involved are mentioned, as the Natura 2000 Sites, the Member States and the European Union. For anyone interested in the Habitats Directive and its implementation basic information is provided. In the second part (chapter 3-6) detailed proposals for the implementation of the reporting obligations are made. This part is addressed mainly to experts responsible for the implementation and, at a later stage, for the performing of the reports. The major aim of the proposals made is to provide a basis for discussion and to encourage future work on this topic. Further expert discussions and amendments are needed in order to establish an appropriate, standardized, and cost-effective procedure for the reports. Based on a proposal for the reporting procedure, standards for parameters, methods and criteria for the evaluation of the conservation status of habitat types are explained. Detailed suggestions for the reporting procedure as it could be performed at a particular NATURA 2000 Site are made for 17 habitat types. For the implementation and the use of geographic information systems (GIS) the reporting procedure suggestions are made which are based on the

experiences gained in the project. The suggestions are explicitly designed to minimize the reporting efforts as far as possible." (Authors) On pages 378-380 the standards referring to the Odonata are outlined.] Address: Rückriem, C., c/o Bundesamt für Naturschutz, Konstantinstr. 110, D-53179 Bonn, Germany

**3813.** Vonwil, G. (1999): Jahresbericht 1998. Kontrollprogramm Natur und Landschaft Kanton Aargau. Libellen. Aargau, Baudepartement, Sektion Natur und Landschaft, Grundlagen und Berichte zum Naturschutz 19: 13. (in German). [Switzerland; the paper briefly reports on surveys to control the efficiency of habitat restoration or improvement measures for dragonflies. Some emphasis is given to the Odonata of running waters, the drift of *Ophiogomphus cecilia*, *Leucorrhinia caudalis*, impacts of weather conditions on the species dwelling temporary ponds, the occurrence of mediterranean species, and the duration of flood to ensure the successful development of *Sympetrum*-species. But, no detailed results are given.] Address: Baudepartement des Kantons Aargau, Abteilung Landschaft und Gewässer, Sektion Natur und Landschaft, Entfelderstr. 22, CH-5001 Aargau, Switzerland

## 2000

**3814.** Cham, S. (2000): Proof of breeding. *Darter* 20: 14. (in English). [*Sympetrum striolatum* is used as example to map and demonstrate the differences in the distribution in UK if different between "proven / probable breeding", "possible breeding / adults only".] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com

**3815.** Costa, J.M.; Machado, A.B.M.; Lencioni, F.A.; Santos, T.C. (2000): Diversidade e distribuição dos Odonata (Insecta) no estado de São Paulo, Brasil: Parte 1 - Lista das espécies e registros bibliográficos. *Publ. Avul. Mus. Nac.*, Rio de Janeiro 80: 1-27. (in Portuguese, with English summary). [The checklist of São Paulo totals to 251 odonate species. Information is organized family wise, and notes to some selected species are included. The paper contains lists with localities including coordinates and altitudinal information, collections with voucher specimens, and bibliographic notes. A brief history of odonatological surveys in the state of São Paulo, and an extensive bibliography complete this paper.] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisys.com.br

**3816.** De Jong, T.H. (2000): Soortenbeschermingsplan voor Krabbescheer en Groene glazenmaker. *Prov Utrecht, Utrecht*: 48 pp. (in Dutch). [Species conservation action plan for *Stratiotes aloides* and *Aeshna viridis* in the Netherlands: The distribution, habitat ecology, and the biology of the water aloe and *A. viridis* in the Netherlands are described and analysed in detail. The reasons responsible for their decline and the management measures are outlined.] Address: Available from: Ecologisch onderzoek en Groene regelgeving, Provincie Utrecht, P.O. Box 80300, NL-3508 TH Utrecht, The



Netherlands. (Coordinator: Jandirk Kievit: jandirk.kievit@provincie-utrecht.nl)

**3817.** Dolný, A. (2000): On the use of dragonflies (Odonata) for biological monitoring of water quality. Acta Fac. Rer. nat. Univ. ostraviensis (Biol.-Ecol.) 192: 89-104. (in Czech, with English summary). [Czech Republic; Calopteryx splendens, C. virgo, Lestes sponsa, Platycnemis pennipes, Enallagma cyathigerum, Erythromma najas, Ischnura elegans, Aeshna grandis, Somatochlora metallica, Libellula quadrimaculata, and Sympetrum vulgatum are considered as good bioindicators to assess water saprobity.] Address: Dolný, A., Dept Biol. & Ecol., Fac. Nat. Sci., Univ. Ostrava, Chittusihó 10, CZ--71000 Ostrava, Czech Republic

**3818.** Glandt, D.; Kaplan, K.; Keuck, T.; Kipp, M. (2000): Pflege- und Entwicklungsplan für das Naturschutzgebiet "Deipe Briäke" im Kreis Steinfurt (Nordrhein-Westfalen). Metelner Schriftenreihe für Naturschutz 9: 21-57. (in German with English summary). [Germany; baseline investigations for preparing a management plan for an acid, nutrient-poor water body included Odonata. In 1996 and 1997, 17 odonate species were recorded. Additional records from 1985, and data base records for the same locality, increase the list of the odonata to 24 species. The records of Lestes barbarus, Erythromma viridulum, Leucorrhinia dubia, Sympetrum sanguineum, and S. flaveolum are briefly discussed.] Address: Glandt, D., Biologisches Institut Metelen e.V., Samberg 65, D-48629 Metelen, Germany

**3819.** Jeyaprakash, A.; Hoy, M.A. (2000): Long PCR improves Wolbachia DNA amplification: wsp sequences found in 76% of sixty-three arthropod species. Insect Mol Biol 9(4): 393-406. (in English). ["Bacteria belonging to the genus Wolbachia are associated with a variety of reproductive anomalies in arthropods. Allele-specific polymerase chain reaction (= Standard PCR) routinely has been used to amplify Wolbachia DNA from arthropods. While testing the two-spotted spider mite Tetranychus urticae and other arthropods known to be infected with Wolbachia, Standard PCR frequently produced false negatives, perhaps because the DNA from the arthropod host interfered with amplification by Taq DNA polymerase. Long PCR, which uses two enzymes (Taq and Pwo), consistently amplified Wolbachia DNA and a sensitivity analysis indicated that Long PCR was approximately six orders of magnitude more sensitive than Standard PCR in amplifying plasmid DNA spiked into insect genomic DNA. A survey indicated that 76% of sixty-two arthropod species and two subspecies in thirteen orders tested positive for the Wolbachia wsp sequence by Long PCR, which is considerably higher than the rate of 16.9% obtained previously for the ftsZ sequence using Standard PCR (Werren, J.H., Windsor, D. and Gao, L. (1995a) Proc R Soc Lond B 262: 197-204). A subsample of Long PCR products from fourteen arthropod species and two subspecies were sequenced, both directly and after cloning. Two A- and eleven B-Wolbachia strains were detected and their wsp sequences displayed a maximum of 23.7% sequence divergence at this locus. Two new groups (named Fus and Ten) were identified in addition to nineteen reported earlier (Zhou, W, Rousset, F. and O'Neill, S.L. (1998) Proc R Soc Lond B 265: 1-7; van Meer, M.M.M., Witteveldt, J. and Stouthamer, R. (1999) Insect Mol Biol 8: 399-408), because they displayed more than 2.5% sequence divergence from other Wolbachia wsp se-

quences. PCR products from seventeen of twenty-nine (59%) arthropod species analysed could not be sequenced directly due to apparent infection by multiple Wolbachia strains. The wsp sequences cloned from two such species (Plutella xylostella and Trichoplusia ni) indicated both A- and B-Wolbachia were present in a single individual. Hence, superinfection also may be more widespread than the 1.2% incidence previously estimated." (Authors) Perithemis tenera was positively tested for Wolbachia super-group B.] Address: Jeyaprakash, A., Department of Entomology and Nematology, PO Box 110620, University of Florida, Gainesville, FL 32611, USA. E-mail: ajey@gnv.ifas.ufl.edu

**3820.** Kano, K. (2000): Male-male tandem formation in dragonflies. Yosegaki 99: 3053-3054. (in Japanese). [Japan; Boyeria maclachlani] Address: Kano, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**3821.** Muzon, J.; Ellenrieder, N. von (2000): Estado de conservación de los Odonata en Argentina. In: Bertoniatti, C. & J. Corcuera (Eds.): Situación ambiental Argentina 2000. Fundacion vida silvestre Argentina. Buenos Aires: 184-186. (in Spanish). [Brief report on the current knowledge and the situation of the Odonata in Argentina against the background of dragonfly conservation.] Address: Fundacion vida silvestre Argentina, Defensa 251, piso 6°K (1065) Buenos Aires, Argentina. www.vidasilvestre.org.ar

**3822.** Schmidt, E. (2000): Odonata (Imagines). In: Hannemann, H.-J., B. Klausnitzer & K. Senglaub (Hrsg.): Stresemann - Exkursionsfauna von Deutschland. Wirbellose: Insekten. 9. Aufl.: 74-90. (in German). [Revised edition of a determination key on the species level of the German Odonata.] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**3823.** Schmidt, E. (2000): Odonaten, Libellen. In: Schaefer, M. (Hrsg.): Brohmer - Fauna von Deutschland. 20., überarb. Aufl. Quelle & Meyer. Wiebelsheim: 245-256. (in German). [Revised edition of a determination key on the species level for imagines and on the family level for larvae of the German Odonata.] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**3824.** Sudo, S.; Tsuyuki, K.; Tani, J. (2000): Wing morphology of some insects. JSME - International Journal, Ser. C. Mechanical systems, machine elements and manufacturing 43(4): 895-900. (in English). ["This paper describes detailed wing morphology of some kinds of insects. The structural properties of dragonfly, fly, and mosquito wings were studied. Microscopic observations on the insect wings were examined with a scanning electron microscope. The surface roughness of the insect wings was measured by a three-dimensional, optical shape measuring system. The roughness distribution on the wing surface was presented for some kinds of insects. Some functional principles underlying insect wing design were revealed by the measurements of surface roughness and microscopic observations." (Authors)] Address: Sudo, S., Iwaki Meisei Univ., Dept Mech. Engn., Iino 5-5-1, Iwaki, Fukushima 9708551, Japan

**3825.** Verrell, P. (2000): Methoxychlor increases susceptibility to predation in the salamander Ambystoma macrodactylum. Bulletin of Environmental Contaminati-

on & Toxicology 64: 85-92. (in English). [Exposure of young long-toed salamanders to non-lethal and ecologically-realistic concentrations of MXC may negatively impact their survival. Contaminated eggs hatch prematurely to produce larvae that move little and are susceptible to predation (*Aeshna* sp.). The author obtained no evidence that compromised cardiovascular performance may be responsible for these effects.] Address: Verrill, P., School of Biological Sciences, Washington State University, Pullman, WA 99164-4236, USA

**3826.** Zhang, J. (2000): The discovery of aeschnidiid nymphs (Aeschniidae, Odonata, Insecta). Chinese Science Bull. 45(11): 1031-1038. (in English). [Aeschnidiid nymphs are characterised, and discussed with focus on phylogenetic relationships and bioecological characteristics. Fossil nymphs known from China, Mongolia, Russia and Brazil, and arranged in the family Aeschniidae are, unrelated to this family. The known five Chinese "species" with descriptions based on fossil nymphs (four genera in the Gomphidae) were transferred to the Aeschniidae. These specimens turned out to belong to one species, *Sinaeschnidia cancellosa*. This is a geographically widespread species from the "Jehol biota" of East Asia and appeared in the latest Late Jurassic age.] Address: Zhang, J., Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China. E-mail: jfzhang@nigpas.ac.cn

## 2001

**3827.** Allen, J.; Humphries, T. (2001.): Are you a dragonfly? Kingfisher, London. ISBN 0-7534-5346-0. 31 pp. (in English). [This book, dedicated to kids, tells the story of *Aeshna cyanea* from egg to imago. Childrens are motivated to slip into the skin of a dragonfly and to experience all stages of a dragonfly's live with it's eyes.]

**3828.** Cordero Rivera, A.; Andrés, J.A. (2001): Estimating female morph frequencies and male mate preferences of polychromatic damselflies: a cautionary note. Animal behaviour 61: F1-F6. (in English). ["In all populations studied, the frequency of androchromes changed greatly between days, but only in the *I. elegans* population was a significant correlation found between androchrome frequency and date (Kendall's rank correlation coefficient:  $T = -0.33$ ,  $N=25$ ,  $P<0.05$ ). The coefficient of variation of androchrome frequency was 18% for *I. elegans*, 26-73% for *I. graellsii*, 110% for *I. pumilio* and 61-76% for *C. tenellum*. Sample sizes of fewer than 100 females will rarely be a good estimate of the true population frequency. It is only above this that the frequency tends to become independent of sample size. Male preference for female colour morphs has been studied in 12 *Coenagrionidae* and one *Calopterygidae* species (listed in Table 1). Some studies have presented live tethered females to males and recorded whether males responded in a sexual or nonsexual way to the model. Other studies used immobile models (either dead or alive, paired or not) glued or pinned to the tip of a stem. Finally, a few followed male-female interactions in free-living specimens (Sirot 1999), or used small cages where males were allowed to choose between two females (Van Gossum et al. 1999). We have calculated the percentage of males that showed sexual

interest to androchrome models, excluding males that did not respond. This measure of male interest in androchromes does not correlate with the frequency of this morph in the population (all experiments: Spearman correlation:  $r_s = -0.14$ ,  $N=19$ ,  $P=0.566$ ; experiments with live models (tethered, glued or pinned) presented one at a time:  $r_s = -0.46$ ,  $N=10$ ,  $P=0.184$ ; all experiments with dead models:  $r_s = 0.14$ ,  $N=7$ ,  $P=0.758$ )."] (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**3829.** Danielzik, K. (2001): Natura 2000 in Nordrhein-Westfalen. insecta 7: 90-102. (in German). [Germany, Nordrhein-Westfalen; some notes referring to *Leucorrhinia pectoralis* and *Coenagrion mercuriale* are made.] Address: Danielzik, J., Auf der Kämpe 11, D-46244 Bottrop, Germany. E-mail: muscidaejd@gmx.de

**3830.** Fartmann, T.; Gunnemann, H.; Salm, P.; Schröder, E. (2001): Berichtspflichten in Natura-2000-Gebieten Empfehlungen zur Erfassung der Arten des Anhangs II und Charakterisierung der Lebensraumtypen des Anhangs I der FFH-Richtlinie. Angewandte Landschaftsökologie 42: 725 pp, Appendix. (in German with English summary). ["Intensive studies of the natural habitat types listed in Annex I and the populations of the species listed in Annex II of the Habitats Directive were conducted in eight study areas of the continental biogeographic region of Germany as part of two research and development projects of the Federal Agency for Nature Conservation. These studies had two primary goals: first of all, to assess methods for the standardized registration of the species listed in Annex II as required by the reporting obligations according to article 17 of the Habitats Directive and to recommend species-specific methods. Secondly, to subject habitat types of Annex I to a more exhaustive, and particularly ecological characterization. Methods are suggested for the evaluation of the conservation status of the 96 plant and animal species listed in Annex II that presently occur in Germany, as well as six further species listed in Annexes IV and V as required by the reporting obligations. These methods are based in part on our own studies. For each species the relevant ecological characteristics required for its registration, the habitat requirements, and the factors of its endangerment are briefly described. In a second step, methods judged to be appropriate are presented and discussed. In the final recommendation, the selected methods are described in more detail with regard to their practical application, the data acquisition periods and their frequency, as well as the time requirements. The recommended methods should be able to produce reproducible results, to allow conclusions about the development of populations in the protected sites and have a neutral cost-benefit relationship. In the presentation and the discussion, the methods are differentiated into those for recording species or populations and those for recording their habitats. All suggestions pertain to the surveillance of the species' conservation status in Natura 2000 sites. The ecological characterization of the FFH habitat types was primarily made by floristic surveys that encompassed a total of 44 different types. [...]"] (Authors) The Odonata are treated in chapter 4.3.6 on pages 323-355. *Aeshna viridis* (Petra Salm), *Coenagrion mercuriale* (Wolfgang Röske), *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis* (Rüdiger Mauersberger), *Stylurus flavipes*, *Ophiogom-*

phus cecilia (P. Salm, Ole Müller), and *Oxygastra curtisii* (Klaus-Guido Leipelt).] Address: Schröder, E., c/o Bundesamt für Naturschutz, Mallwitzstr. 1-3, D-53170 Bonn, Germany

**3831.** Galdean, N.; Callisto, M.; Barbosa, F.A. (2001): Biodiversity assessment of benthic macroinvertebrates in altitudinal lotic ecosystems of Serra do Cipó (MG, Brazil). *Revista brasileira de biologia* 61(2): 239-248. (in English, with Portuguese summary). ["Five lotic systems of Serra do Cipó, south-east Brazil, were investigated in order to assess the existing diversity of benthic macroinvertebrates, habitats-microhabitats, and the available trophic resources. For each river the communities of benthic macroinvertebrates and the composition of some taxonomic groups (Plecoptera, Ephemeroptera, Trichoptera and Diptera Chironomidae) were analysed: the community with Bivalvia, Sphaeriidae, Oligochaeta and Ephemeroptera-Baetidae (being supposed a closed relation Bivalvia-Oligochaeta based on the process of bioturbation and enrichment of sediment in organic matter) in Tanque River; the macrofauna associated to aquatic macrophytes from rivers Peixe and Preto do I-també reflecting the reaction of the ecosystems versus the quantities of nutrients which originate from the farmlands; the lithoreophilic communities of Cipó River; the community depending on deposits of leaves and filamentous algae in Congonhas Stream; the very rich community of the moss clumps in the Indaiá Stream. A proposal for biological zonation of Cipó River and some comments about the importance of the analysed benthic macroinvertebrates in the biological production of the aquatic communities were done." (Authors) Odonata are mentioned on the order level only.] Address: Callisto, M., Laboratório de Limnologia/Ecologia de Bentos, Departamento de Biologia Geral, Universidade Federal de Minas Gerais, ICB, C.P. 486, CEP 30161-970, Belo Horizonte, MG, Brazil. E-mail: callisto@mono.icb.urmg.br

**3832.** Kesel, A.B. (2001): The ultralight aerofoils of insects - an evolutionary masterpiece. *Zoology - Analysis of Complex Systems* 103(3-4): 222-229. (in English). ["The development of wings can be regarded as the key innovation in the course of insect evolution. They make locomotion in a three-dimensional space possible, a world wide spreading and the inhabitation of almost all biotopes. Due to their low mass and high stability, wings can be interpreted as ultralight aerofoils. To guarantee the enormous mechanical demands of flight, the material and its geometrical arrangement are of crucial importance. The wings are part of the cuticular exoskeleton of the insects. This cuticle is a helicoidal fibre reinforced material of crystalline biopolymers, embedded in a protein matrix. Apart from providing the necessary stability, the ingenious structure design induces excellent aerodynamic performance. The statics as well as the aerodynamic quality of the highly complex system wing are supported throughout all hierarchic levels by a series of fine structures." (Author) Anax junius] Address: Kesel, A.B., Univ. Saarland, Dept Zool. Tech. Biol. & Bion., D-66041 Saarbrücken, Germany

**3833.** Lan, S.; Sun, M. (2001): Aerodynamic force and flow structures of two airfoils in flapping motions. *Acta Mechanica Sinica (English Series)* 17(4): 310-331. (in English). ["Aerodynamic force and flow structures of two airfoils in a tandem configuration in flapping motions axe studied, by solving the Navier-Stokes equations in

moving overset grids. Three typical phase differences between the fore- and aft- airfoil flapping cycles are considered. It is shown that: (1) in the case of no interaction (single airfoil), the time average of the vertical force coefficient over the downstroke is 2.74, which is about 3 times as large as the maximum steady- state lift coefficient of a dragonfly wing; the time average of the horizontal force coefficient is 1.97, which is also large. The reasons for the large force coefficients are the acceleration at the beginning of a stroke, the delayed stall and the "pitching-up" motion near the end of the stroke. (2) In the cases of two-airfoils, the time-variations of the force and moment coefficients on each airfoil are broadly similar to that of the single airfoil in that the vertical force is mainly produced in downstroke and the horizontal force in upstroke, but very large differences exist due to the interaction. (3) For in-phase stroking, the major differences caused by the interaction are that the vertical force on FA in downstroke is increased and the horizontal force on FA in upstroke decreased. As a result, the magnitude of the resultant force is almost unchanged but it inclines less forward. (4) For counter stroking, the major differences are that the vertical force on AA in downstroke and the horizontal force on FA in upstroke are decreased. As a result, the magnitude of the resultant force is decreased by about 20 percent but its direction is almost unchanged. (5) For 90 degrees - phase-difference stroking, the major differences axe that the vertical force on AA in downstroke and the horizontal force on FA in upstroke axe decreased greatly and the horizontal force on AA in upstroke increased. As a result, the magnitude of the resultant force is decreased by about 28% and it inclines more forward. (6) Among the three cases of phase angles, inphase flapping produces the largest vertical force (also the largest resultant force); the 90 degrees -phase-difference flapping results in the largest horizontal force, but the smallest resultant force." (Authors)] Address: Lan S.L., Beijing Univ. Aeronaut. & Astronaut., Inst. Fluid Mech., Beijing 100083, Peoples R China

**3834.** Mauch, E.; Wittling, T. (2001): Die Makroinvertebraten von Lech und Wertach im Stadtgebiet von Augsburg. *Berichte des naturwissenschaftlichen Vereins für Schwaben - Sonderbericht 2001*: 209-214. (in German). [The river Lech is a southern tributary of the river Danube in Bavaria, Germany, the Wertach is a tributary of the Lech. The checklist of the macrozoobenthos includes four odonate species. For a more detailed paper of the odonate fauna of the Lech see Kuhn 2001 (OAS 2137).] Address: Mauch, E., Mühlangerstr. 11, D-86424 Dinkelscherben, Germany. E-mail: Erik.Mauch.Verlag@t-online.de

**3835.** Mizera, F.; Bernath, B.; Kriska, G.; Horvath, G. (2001): Stereo videopolarimetry: Measuring and visualizing polarization patterns in three dimensions. *Journal of Imaging Science and Technol.* 45(4): 393-399. (in English). ["Because the human eye is practically blind to the polarization of light, biologists dealing with polarization vision of animals, or engineers designing robots using polarization- sensitive computer vision to enhance contrast in the optical environment need a technique to image the spatial distribution of polarized light in the visual environment. Recently, different kinds of imaging polarimetry were developed to measure the polarization patterns of objects and natural scenes in a single, two-dimensional, wide field of view. As a further development of this technique, we report here on the realization



of the addition of depth to scenes imaging the distribution of polarized light: One kind of stereo videopolarimetry was designed to measure and visualize in three dimensions the polarization patterns in nature and to mimic the ability of animal-eyes to receive visual information from a binocular field of view. We demonstrate the power of stereo videopolarimetry on an applied problem representing (in parallel view stereo format) a three-dimensional object, a car with a shiny bodywork and also having strong reflection polarization. The technical difficulties and hitches of stereo videopolarimetry as well as the importance of the distance of observation, the role of the angle of view, the influence of the color of the object, and the possibility to state differences between metallized and non-metallized paints are discussed." (Authors)] Address: Horvath, G., Lorand Eotvos Univ., Dept Biol. Phys., Pazmany Setany 1, H-1117 Budapest, Hungary

**3836.** Pérez-Bote, J.L.; Carpi, B.L. (2001): Nuevas aportaciones al catálogo odonológico de Extremadura (Odonata). Boletín de la Sociedad Entomológica Aragonesa 29: 97-98. (in Spanish). [47 species including new additions (*Diplacodes lefebvrei*, *Orthetrum nitidinode*) are checklisted for the Extremadura in southern Spanish.] Address: Pérez-Bote, J.L., Área de Biología Animal, Facultad de Ciencias, Universidad de Extremadura, 06071 Badajoz. Spanish. E-mail: jlperez@unex.es

**3837.** Rademacher, M. (2001): Untersuchungen zur Vegetationsdynamik anthropogener Kiesflächen der Oberrheinebene unter Berücksichtigung landschafts-ökologischer und naturschutzfachlicher Belange. Inaugural-Dissertation, Fakultät für Biologie der Albert-Ludwigs-Universität Freiburg i.Br.: VI, 311 pp. (in German). [In the applied part of this Ph-thesis, which focusses on the vegetation of gravel pits, Odonata are mentioned on several opportunities.] Address: Rademacher, M., c/o Heidelberger Technology Center, Peter-Schumacher-Str. 8, D-69181 Leimen, Germany

**3838.** Schmidt, B.R.; Amezcua, A. (2001): Predator-induced behavioural responses: Tadpoles of the neotropical frog *Phyllomedusa tarsius* do not respond to all predators. Herpetological journal 11(1): 9-15. (in English). ["Many species show behavioural responses to predators that reduce predation mortality but are assumed to be costly. We tested whether an induced behavioural response is predator-specific and whether the strength is related to the risk of being killed by a predator. We used tadpoles of the neotropical frog *Phyllomedusa tarsius* as prey, and larvae of an aeshnid dragonfly and belostomatid bugs as predators. Belostomatids killed twice as many tadpoles within 24 hours as aeshnids did. Tadpoles reduced activity in the presence of aeshnids by 30% but did not respond at all to the more dangerous belostomatids. Tadpoles did not show spatial avoidance of predators. We favour the explanation that tadpoles of *P. tarsius* did not respond to belostomatids because belostomatids are encountered too rarely for evolution to favour an induced response to belostomatids." (Authors)] Address: Schmidt, B.R., Univ Zürich, Inst. Zool., Winterthurerstr. 190, CH-8057 Zürich, Switzerland

**3839.** Straka, V. (2001): Vázky (Odonata) národnej prírodnej rezervácie Raksianske Raselinisko. *Naturae Tutela* 6: 103-104. (in Slovakian). [Slovakia; nature reserve Raksianske Raselinisko; checklist of 7 odonate

species including *Coenagrion ornatum*.] Address: Straka, V., Slovenské národné múzeum - Múzeum Andreja Kmet'a, Ul. A. Kmet'a 20, 03601 Martin, Slovakia

**3840.** Timm, H.; Ivask, M.; Möls, T. (2001): Response of macroinvertebrates and water quality to long-term decrease in organic pollution in some Estonian streams during 1990-1998. *Hydrobiologia* 464: 153-164. (in English). [47 sampling sites in the area of 4 (mostly pig) farms were studied. *Calopteryx splendens* was represented in 9%, and *Gomphus vulgatissimus* in 3% of 1394 samples.] Address: Timm, H., Vortsjarv Limnol. Stn, Inst. Tool. & Bot, Estonian Agric. Univ., EE-61101 Rannu, Tartumaa, Estonia

**3841.** Torralba Burrial, A.; Ocharan, F.J. (2001): Un caso llamativo de supervivencia en *Libellula quadrimaculata* L., 1758 (Odonata: Libellulidae). *Boletín de la Sociedad Entomológica Aragonesa* 29: 104. (in Spanish with English summary). [Oviedo (Asturias, Spain), between May and June of 2000; a male *L. quadrimaculata* survived in the field during a minimum of 10 days without the right forewing.] Address: Ocharan, F.J., departamento de Biología de Organismos y Sistemas. Universidad de Oviedo. E-33071 Oviedo, Spain: E-mail: focharan@oonreo.uniovi.es

**3842.** Weidmann, P. (2001): Naturschutzgebiet Siechenstuden: Artenvielfalt 10 Jahre nach seiner Gestaltung. *Libellen. Jber. naturf. Ges. Graubünden* 110: 71-76. (in German). [In 1993 and 1998, 29 species were evidenced in the Nature Reserve "Siechenstuden", Maienfeld. canton Grisons, Switzerland: alt. 520 m, surface ca 7 ha. Flight periods are stated for all species. *Chalcolestes viridis*, *Pyrrhosoma nymphula*, *Ischnura pumilio*, *Anax imperator*, *Crocothemis erythraea*, *Symphetrum pedemontanum*, and *S. depressiusculum* are commented, and changes in the species composition between the years discussed.] Address: Weidmann, P., Falknisstr. 15. CH-7000 Chur, Switzerland

**3843.** Wilson, K.D.P. (2001): *Orthetrum poecilops* Ris - A marine dragonfly of conservation priority. *Porcupine* 22: 5-9. (in English). [Porcupine is the Newsletter of the Dept of Ecol. and Biodiv. of the Univ. of Hong Kong. It contains a highly interesting compilation on the ecology, biology, distribution, synonymie, and identification of *O. poecilops*. The species is one of the very few odonate species which develops in brackish water. It is concluded that none of the few localities of the species is represented in the network of special protected areas in Hong Kong. The conservation of this "global rarity" should be considered a high priority.] Address: Wilson, K.D.P., Flat 20, 6 Mansfield Road, The Peak, Hong Kong, China. E-mail: wilsonkd@netvigator.com

**3844.** Worthen, W.B.; Haney, D.C.; Cuddy, C.C.; Turgeon, V.L.; Andersen, C.B. (2001): The effect of an industrial spill on the macrofauna of a South Carolina stream: Physiological to community-level responses. *Journal of Freshwater Ecology* 16(3): 467-477. (in English). ["In 1985, a waste retention pond ruptured at a galvanizing facility and spilled 75,700 liters of HCl and other contaminants into the groundwater above the Upper Enoree River in South Carolina, USA. In 1999, we examined the residual effects of this spill by surveying the water chemistry and biota in the main channel of the Upper Enoree River and uncontaminated tributaries. We also transplanted yellowfin shiners (*Notropis lutipinnis*) to channel and tributary sites and monitoring

their survivorship and the histological condition of their gills. The two upstream sites were significantly different in chemical composition from downstream sites and control tributaries.[...] The abundance and diversity of salamanders, fish, and macroinvertebrates correlated with these changes in water chemistry. Yellowfin shiners transplanted to the headwater site died within 24 hours, and fish in channel sites had significantly higher mortality than fish transplanted to tributary sites. At the tissue level, the size and density of gill pavement cells were significantly lower in fish transplanted into the two headwater sites closest to the spill compared to other channel and tributary sites. Thus, this spill continues to exert a significant effect on the chemistry and biota of the Upper Enoree River. [...] On average, invertebrate communities in the channel were similar to invertebrate communities in the tributaries and in other streams in the county. The channel sites had significantly fewer crayfish than tributaries and other county sites, but most other means were comparable. A total of 1256 macroinvertebrates was collected in the Upper Enoree, representing eight orders. Odonates accounted for 49.8% of the total sample, with a disproportionate number of *Progomphus obscurus* ( $n = 228$ ) and *Cordulegaster maculata* ( $n = 222$ ). (Authors)] Address: Worthen, W.B., Dept of Biology, Furman University, Greenville, SC29613 USA. E-mail: worthen@furman.edu

## 2002

**3845.** Anderson, D.; Anderson, K. (2002): Dragonfly review. Muntjac - Newsletter of the Bedfordshire Natural History Society 129: 5. (in English). [Brief report on some seasonal highlights (*Erythromma viridulum*, *Platycnemis pennipes*) in Bedfordshire, UK, and some administrative notes.] Address: Anderson, D., 88 Eastmoor Park, Harpenden, Herts. AL5 1BP, UK. E-mail: dandkk@andersonharp.freeserve.co.uk

**3846.** Bernard, R.; Buczyński, P.; Tończyk, G. (2002): Present state, threats and conservation of dragonflies (Odonata) in Poland. *Nature Conservation* 59 (2004) : 53-71. (in English). ["72 species of dragonflies have been recorded in Poland so far. The present state of knowledge of Odonata is generally moderate and unequal with reference to the particular regions. The main current topics in Polish Odonatological studies are briefly presented. The current picture of dragonfly fauna has been drawn, with special attention to the increased abundance and the broadened ranges of some Mediterranean and southeastern species (e.g. *Aeshna affinis*, *Orthetrum albistylum*), and to the falling numbers, the increasing scatter of localities and the narrowing ranges of some other species, mainly stenotopic (e.g. *Nehalennia speciosa*, *Coenagrion armatum*, *Coenagrion ornatum*). Threats and their mechanisms of affecting dragonflies are analysed in all the main water habitats in Poland. The species typical of small running waters and habitats connected with *Sphagnum* are the most endangered. It must be stressed, however, that generally the state of Polish dragonfly fauna is fairly good. The main forms of conservation of dragonflies, currently used or proposed for use in Poland, are analysed: passive (species and territorial protection, red list, umbrella species) and active (reintroduction, creating new waterbodies, interference in succession of wa-

terbody). The choice of species protected in Poland is partly inappropriate in comparison with the present situation of dragonfly fauna. The Polish Red List, comprising 16 species, is discussed in comparison with the red lists of other European countries. It is stressed that no species has become extinct in Poland. The proposed list of umbrella species for particular habitats is given. The Wildermuth's rotation model is suggested for the management of some habitats. All issues described in the article are presented synthetically and illustrated with the data and examples from Poland." (Authors)] Address: Bernard, R., Department of General Zoology, Adam Mickiewicz University, Fredry 10, PL-61-702 Poznań, Poland; E-mail: rbernard@main.amu.edu.pl

**3847.** Callisto, M.; Moreno, P.; Barbosa, F.A.R. (2002): Habitat diversity and benthic functional trophic groups at Serra do Cipó, southeast Brazil. *Revista Brasileira de Biologia* 61(2): 259-266. (in English with Portuguese summary). ["The assessment of the diversity of habitats and the characterisation of the functional trophic groups of benthic macroinvertebrate communities of some rivers of Serra do Cipó (MG) were the main objectives of this study. The available trophic resources and the types of substrata were characterised along with the structure and composition of their using functional trophic groups. Serra do Cipó is a watershed divisor of the São Francisco and Doce River basins, including a series of streams and rivers, of good water quality and well preserved ecological characteristics. Samples were collected in Cipó, Peixe and Preto do I-també rivers, besides the Indaiá and Capão da Mata streams at 26 sampling stations, during the rainy (February) and dry (October) seasons of 1998, using Kicking nets of 0.125 mm mesh size. The group of collectors (Baetidae, Leptophlebiidae and Leptohyphidae) was the most abundant, followed by collector-predators (Hydrophilidae, Ceratopogonidae, Chironomidae-Tany-podinae), and detritivorous-herbivores (Oligochaeta). The riparian vegetation, together with the aquatic macrophytes, are the substrata containing the highest richness of functional trophic groups and the higher habitat diversity. The results suggest that the use of functional trophic groups, together with habitat evaluation, are efficient tools in the evaluation of the diversity of benthic macroinvertebrates, particularly in altitudinal lotic ecosystems." (Authors) There are two passing references to Odonata.] Address: Callisto, M., Laboratório de Limnologia/Ecologia de Bentos, Departamento de Biologia Geral, Universidade Federal de Minas Gerais, ICB, C.P. 486, CEP 30161-970, Belo Horizonte, MG, Brazil. E-mail: callisto@mono.icb.ufmg.br

**3848.** Catling, P.M.; Jones, C.D.; Pratt P. (2002): Ontario Odonata. Including observations for the year 2001. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 208 pp. (in English). ["This 208-page book is part of a series in odonate fauna of Ontario and details observations made in 2001. The nineteen individually authored reports include selected topics such as records from Petroglyphs Provincial Park, the lilypad forktail *Ishnura kellicotti*, black saddlebags *Tramea lacerata*, ebony jewelwing *Calopteryx maculata*, and mass aggregations of multiple species of dragonflies. Each article includes an and a list of references. The book highlights a list of contributors and their respective institutions. The text is written in English with an appendix of observations of Odonata in 2001, tables, illustra-

tions, and photographs, some of which are in color. Users of this book will include entomologists with interest in North American dragonflies and damselflies." Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, ON, K0A 2P0, Canada; E-Mail: brownell@achilles.net

**3849.** Cordero, A. (2002): Influencia de la selección sexual sobre el comportamiento reproductor de los odonatos. In: M. Soler (Ed.): Evolución. La base de la Biología. Editorial Proyecto Sur, Granada. 2002.: 497-507. (in Spanish). [The paper compiles the recent knowledge on the influence of sexual selection on the reproductive behaviour of odonata. Basis of the compilation is an extensive analysis of published odonate studies. A table shows the influence of several variables on the reproductive success by species.] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spanish. E-mail: acordero@uvigo.es

**3850.** Costa, N.E.M. (2002): Entomophilately: Insects in philatelic art. *Bioikos* (Campinas) 16(1-2): 61-67. (in Portuguese with English summary). ["The use of insect design in the art of philately is analyzed from 80 postage stamps that are to be found in the Ethnobiology Laboratory Collection at Feira de Santana State University. These stamps come from 12 countries and insect species represented on them are distributed in seven taxonomic orders. Lepidoptera and Coleoptera are the two most represented orders with philatelic designs. The former contributes with 51 postage stamps, which are classified in 10 families and 46 identified species. The latter shows up with 17 postage stamps, which are classified in 8 families and 16 identified species. Through this entomophilatelic art Post Offices develop an environmental education by arousing in the public a liking for the study of entomology, as well as to make the presence of insects and other invertebrates more acceptable in daily life." (Author)] Address: Costa, N.E.M., Departamento de Ciências Biológicas, Universidade Estadual de Feira de Santana, Km 03, BR 116, Av. Universitaria, 44031-460, Feira de Santana, BA, Brazil. E-Mail: eraldont@uefs.mail.br

**3851.** Couteyen, S.; Papazian, M. (2002): Les Odonates de la Réunion. *Éléments de biogéographie et de biologie, atlas préliminaire, reconnaissance des espèces, synthèse bibliographique.* *Martinia* 18(3): 79-106. (in French with English summary). [The paper compiles the present knowledge on the Odonata of La Réunion, Indian Ocean. Maps of the 18 species are presented, and information of the biogeographic origin, altitudinal distribution, and biology of the species are provided, and a key for the images and a bibliography are added.] Address: Couteyen, S., 188 chemin Nid Joli, F-97430 Le Tampon, La Réunion, France

**3852.** de Souza, F.G.M.; Takeda, A.M. (2002): Spatial and temporal variation of Odonata larvae associated with macrophytes in two floodplain lakes from the upper Parana River, Brazil. *Acta Scientiarum Universidade Estadual de Maringá* 24(2): 345-351. (in English). ["Samples of aquatic macrophytes were collected on Guarana (*Eichhornia azurea*) and Patos (*E. crassipes* and *E. azurea*) Lakes from March 1992 to February 1993. On Guarana Lake the highest density and diversity were registered during the high water phase with dominance of *Telebasis* and *Acanthagrion*, while

dominance of *Telebasis* and *Acanthagrion*, while on Patos Lake, highest density and diversity were observed during the low water phase. The dominant taxa on Patos Lake were *Telebasis*, *Acanthagrion*, *Neoneura* (?), *Coryphaeschna adnexa*, *Miathyria*, *Diastatops intensa* and *Erythemis*. DCA and ANOVA differentiated Patos Lake mainly, because of the high abundance of *C. adnexa*, *Miathyria*, *D. intensa* and *Erythemis* which may be due to morphology of *E. crassipes* that shelters larger number of invertebrates. Water level variation of rivers influenced concentration of dissolved oxygen and pH. This variation was related the monthly fluctuation of larvae density. Difference between lakes shown in DCA analysis was chiefly due to variation of Odonata density." (Authors)] Address: de Souza, F.G.M., Universidade Comunitaria Regional de Chapeco, Av. Attilio Fontana, 591-E, Bairro Efapi, 89809-000, Chapeco, Santa Catarina, Brazil. E-Mail: gilzafranco@yahoo.com.br

**3853.** De Souza, L.O.I.; Costa, J.M. (2002): Description of three larvae of *Micrathyria* Kirby, 1889, with key to identification for the known larvae of the Brazilian species (Odonata, Libellulidae). *Arquivos do Museu Nacional Rio de Janeiro* 60(4): 321-331. (in Portuguese with English summary). ["The last instars larvae of the *Micrathyria longifasciata* Calvert, 1909, *Micrathyria spuria* (Selys, 1900) and *Micrathyria tibialis* Kirby, 1897, from Pantanal of Mato Grosso do Sul, Brazil, are described and illustrated. A key to the larvae of the known Brazilian species of *Micrathyria* Kirby, 1889 is presented." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@unisy.com.br

**3854.** Delgado, C. (2002): Spatial and temporal distribution patterns of Odonata larvae in the streams of a terra firma forest of the Central Amazon, Brazil. *Journal of Freshwater Ecology* 17(4): 555-561. (in English). ["This study was carried out from May 1995 to April 1996 in two streams within in the Adolfo Ducke Forest Reserve, located in Central Amazonia of Brazil. A total of 216 substrate samples was taken along 2000 m of each stream, starting from their origins, with the objective being to describe changes in structure of the Odonata, community as a function of distance to the origin of the stream, substrate type, and season. Larvae of 24 taxa (in most cases on the generic level) were identified. Cluster analysis revealed two groups of associated species based on substrate type, and there was evidence of seasonal and spatial patterns in the abundance and diversity of these members. These patterns were most marked in substrate occupation." (Author)] Address: Delgado, C., Instituto de Investigaciones de la Amazonia Peruana-IIAP, CP. 784, Iquitos, Peru. E-Mail: cdelgado@iiap.org.pe

**3855.** Detzel, P.; Schmieder, H.-J.; Engelking, L.; Rohl, M.; Reidl, K. (2002): Die Hülben des Albuch. 2. Untersuchungen zur Amphibien- und Libellenfauna, Bewertung aus tierökologischer Sicht sowie Pflege- und Entwicklungsmaßnahmen. *Jh. Ges. Naturk. Württemberg* 158: 223-236. (in German). [20 odonate species are reported from 10 so-called Hülben (local name for man-made small bodies of water in Ostalb, Baden-Württemberg, SW Germany). The ecological significance of the "Hülbe" odonate communities is analysed and



assessed.] Address: Detzel, P., Dreifelderstr. 31, D-70599 Stuttgart-Plieningen, Germany

**3856.** Ellenrieder, N. von; Costa, J.M. (2002): *Aeshna brasiliensis* sp. nov. (Odonata: Aeshnidae) from south and southeastern Brazil, with a redescription of its larva. *Neotrop. Ent.* 31(3): 369-376. (in English with Portuguese summary). [Holotype male: Rio Grande do Sul, Rio Tainha, alt. 900 m, 20-1-1959; allotype female: Rio de Janeiro, Itatiaia, Repressa do Planalto de Itatiaia; deposited in MNRJ. The new species resembles *A. variegata* and *A. peralta* in colour pattern of head and abdomen, but differs from them in thoracic colour pattern and in shape of cerci. The larva uniquely differs from all other known Brazilian congeners by lacking lateral spines on abdominal segment VI. The last larval stage of *A. brasiliensis* is (re-) described and diagnostic characters are illustrated. A map documents the present knowledge of distribution of the species in Brazil. *Aeshna peralta* Ris, 1918 differs morphological clearly from *A. variegata* Fabricius, 1775, and was recognised as a good species.] Address: Ellenrieder, Natalie von, Ent. Sect., Nat. Hist. Mus. Los Angeles Co., 900 Exposition Blvd, Los Angeles, CA 90007, USA

**3857.** Endersby, I.D. (2002): Australian Odonata in the international literature. *Austrolestes* 6: 1-3. (in English). [The paper compiles publications on taxonomy, ecology, and conservation of Australian Odonata in journals issued abroad Australia.] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@werple.net.au

**3858.** Endersby, I.D. (2002): The dragonflies of Norfolk Island, with the first record of *Pantala flavescens* (F.) (Odonata: Libellulidae). *Ent. mon. Mag.* 138: 241-246. (in English). [The collecting history of Norfolk Island Odonata is traced since 1915. *Agriocnemis vitienensis* is considered a juvenile (not teneral) colour form of *A. exsudans*. This species and *Ischnura aurora*, *Aeshna brevistyla*, *Hemicordulia australiae*, and *Pantala flavescens* seem to be well established on the island. Observations of specimens of *Anax* sp. and *Diplacodes* sp. are to be confirmed on the species level. The distribution within the Pacific of the Odonata found on Norfolk Island is shown in a table. The colonisation of the island is discussed, and the probability of facultative immigrants or wind-blown individuals is considered extremely small.] Address: Endersby, I.D., 56 Looker Rd, Montmorency, Vie. 3094, AU

**3859.** Fouque, C.; Corda, E.; Debot, S.; Combaz, B.; Broyer, J. (2002): The reedbed inventory, a monitoring tool for a key habitat for aquatic avifauna. *Zeitschrift für Jagdwissenschaft* 48 (Supplement): 115-129. (in English). ["For several years, a decrease in the reedbed surface areas has not only been noted in certain sectors of France but also in Europe and throughout the world. The importance of reedbeds to the fauna is obvious, notably for all paludicolous fauna for which it is a nesting place. In this context, making an inventory of all reedbeds is in line with a patrimonial approach that eventually should lead to the creation of a reedbed observatory. Thanks to the creation of a national network of observers between 1998 and 2000, in one third of the national surface area an inventory could be made of all wet reedbeds covering more than 1 hectare. Almost 1000 wetlands were identified covering a surface area of more than 7000 hectares. Two typologies were defi-

ned based on the factors obtained by multiple correspondence analyses: the first one for the wetlands containing 6 classes and the second one for the reedbeds, containing 4 classes. Reedbed habitat quality was assessed in a sample of 125 sites through an evaluation of the number of species present in two groups of indicator species, Birds and odonates. The median values for a wetland successively amount to 2 species (0 to 15 species interval) and 7 species (0 to 18 species interval). The high values of these indicators are essentially linked to the reedbed's high water level for the first group, and to the reedbed's geographic situation for the second one. Other descriptive parameters of the reedbeds and wetlands harbouring indicator species also have an effect, although they are less important from a hierarchical point of view. Bird diversity is linked to a lot of these parameters, but dragonfly diversity is not. This is the first inventory of the state of the reedbeds in the East of France. When another one is made 10 years from now, it would allow us to make an overall appraisal of the quantitative and qualitative changes affecting all reedbed-covered areas on the basis of objective knowledge." (Authors)] Address: Fouque, C., Migratory Avifauna Department, Station de la Dombes, O.N.C.F.S., 01330, Birieux, France. E-Mail: c.fouque@onc.gouv.fr

**3860.** Gorb, S.N.; Popov, V.L. (2002): Probabilistic fasteners with parabolic elements: biological system, artificial model and theoretical considerations. *Philos. Trans. R. Soc. Lond. Ser. A - Math. Phys. Eng. Sci.* 360 (1791): 211-225. (in English). ["Probabilistic fasteners are attachment devices composed of two surfaces covered with cuticular micro-outgrowths. Friction-based fasteners demonstrate high frictional forces when the surfaces come into contact. Attachment in this case is based on the use of the surface profile and mechanical properties of materials, and is fast, precise and reversible. The best-studied examples composed of parabolic elements are the wing-locking mechanism in beetles and the head arrester in dragonflies. This study combines experimental data of force measurements, obtained in an artificial model system, and theoretical considerations based on the simple model of behaviour of probabilistic fasteners with parabolic elements. Elements of the geometry in both cases correspond to the biological prototypes. Force measurements on the artificial system show that the attachment force is strongly dependent on the load force. At small loads, the increase of attachment is very slow, whereas rapid increase of attachment was detected at higher loads. At very high loads, a saturation of the attachment force was revealed. A simple explanation of the attachment principle is that with an increasing load elements of both surfaces slide into gaps of the corresponding part. This results in an increase of lateral loading forces acting on elements. High lateral forces lead to an increase of friction between single sliding elements. An analytical model which describes behaviour of the probabilistic fasteners with parabolic elements is proposed." (Authors)] Address: Gorb, S., Max-Planck-Institut für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. E-mail: stas.gorb@tuebingen.mpg.de

**3861.** Ingermann, R.L.; Bencic, D.C.; Verrell, P. (2002): Methoxychlor alters the predator-prey relationship between dragonfly naiads and salamander larvae. *Bulletin of Environmental Contamination & Toxicology* 68(6): 771-778. (in English). ["The pesticide methoxychlor (MXC; 1,1'-[2,2,2-trichloroethylidene]bis[4-methoxy]-

benzene) has been widely used as a replacement for DDT due to its lower toxicity and shorter half-life. In Canadian rivers, MXC has been applied to wetlands to control fly and mosquito larvae, particularly in the spring and summer, with target concentrations of about 0.9  $\mu\text{M}$  (0.31 mg/L). Inadvertent exposure of non-target organisms with such applications cannot be avoided and pesticides may have a variety of sublethal, but nonetheless highly deleterious, effects on amphibians. In addition, pesticides may influence predator-avoidance behaviour. Verrell (2000) has shown that exposure of *Ambystoma macrodactylum* - salamander eggs to MXC concentrations as low as 0.03  $\mu\text{M}$  leads to increased predation when larvae are combined with dragonfly naiads. We lack predator-prey studies in which both predator and prey are exposed to the pesticide. Deleterious effects of MXC on the feeding and perching of dragonfly naiads ( $n=109$  specimens of *Aeshna* sp. and one of *Anax* sp.) "were not apparent with transient exposures to concentrations below about 0.4  $\mu\text{M}$  MXC, while the startle response of *A. macrodactylum* larvae was severely compromised by transient exposures to at least 0.1  $\mu\text{M}$  MXC. This suggests that naiads should be particularly effective predators of *A. macrodactylum* larvae when both are exposed to MXC concentrations between about 0.1 and 0.4  $\mu\text{M}$ . Indeed, with a transient exposure of both dragonfly naiads and *A. macrodactylum* larvae to 0.32  $\mu\text{M}$  MXC, the amphibian larvae were at increased risk of predation. Furthermore, over the range of 0.01 to 0.32  $\mu\text{M}$  MXC, there was a linear relationship between the logarithm of MXC concentration and increased risk of larval predation by naiads. This relationship did not hold above 0.32  $\mu\text{M}$  MXC perhaps due to an MXC-induced inhibition of naiad feeding. The results of these studies indicate that relatively low concentrations of pesticides such as MXC can influence predator-prey relationships and can have significant deleterious effects on amphibian larvae beyond any direct lethal effects. Whether larvae die from direct chemical exposure or from an inability to negotiate challenges present within their local environment, such as an impaired ability to avoid predation, is inconsequential relative to the stability and/or persistence of an amphibian population. Our data underscore the importance of testing for indirect, sublethal effects of xenobiotic exposure on both individuals and populations. Analyses of the effects of xenobiotics on predator-prey interactions are prime targets for further investigation." (Authors) Address: Ingermann, R.L.; Dept Biological Sciences, University of Idaho, Moscow, ID, 83844-3051, USA

**3862.** Irle, A.; Irle, S.; Conze, K.J. (2002): Erstnachweis der Grünen Keiljungfer *Ophiogomphus cecilia* (Fourcroy, 1785) im Kreis Siegen-Wittgenstein. Beiträge zur Tier- und Pflanzenwelt des Kreises Siegen-Wittgenstein 7: 63-64. (in German). [Siegen, military training area, Nordrhein-Westfalen, Germany, 13. IX. 2000.] Address: Irle, A., Oberholzstr. 41, 57258 Freudenberg, Germany

**3863.** Jacquemin, G.; Boudot, J.-P. (2002): Les Odonates (Libellules) de la Réserve de Biosphère des Vosges du Nord: originalité du peuplement. Annales scientifiques de la Réserve de Biosphère transfrontalière des Vosges du Nord-Pfälzerwald 10: 145-158. (in French, with English and German summaries). [The paper compiles the present knowledge on the odonate fauna of the biosphere reserve in the northern Vosges, France, and outlines a brief history of odonatological sur-

veys in the region. Some species of species interest (boggy and running waters) are briefly discussed and the distribution of *Ophiogomphus cecilia* is mapped.] Address: Jacquemin, G., Biologie des Insectes, Université H. Poincaré, Nancy 1, BP 239, F-54506 Vandœuvre-lès-Nancy, France

**3864.** Jakab, T.; Muller, Z.; Devai, G.; Tothmeresz, B. (2002): Dragonfly assemblages of a shallow lake type Reservoir (Tisza-to, Hungary) and its surroundings. Acta Zool. Acad. Scient. Hungaricae 48(3): 161-171. (in English). ["The dragonfly fauna of the typical water bodies of the Reservoir Tisza-to was characterised based on a two-year study. We collected 728 imagoes, 384 larvae and 194 exuviae during the study, and there were 101 observations of imagos. We confirmed the presence of 39 species (13 Zygoptera and 26 Anisoptera). We distinguished 5 types of water bodies inside and around the Reservoir Tisza-to: leaking canals, a new inundated area of the reservoir, native water bodies inside the reservoir, in- and outflows, and River Tisza inside the reservoir. Both traditional diversity statistics and scalable diversity characterisation suggested that the most species-rich were the native water bodies, with a species-pool of 34 species; there were 30 species in the in- and outflows, while the leaking canals and the reservoir were moderately species-rich with 25 species each. The River Tisza was relatively species-poor compared to the other water bodies (12 species). Cluster analysis of the species composition revealed that the fauna of the River Tisza is clearly separated from the other water bodies. The fauna of the new inundated area, the native water bodies, and the in- and outflows were similar; these water bodies had direct connection to the reservoir. The fauna of the leaking canals was slightly different from them." (Authors)] Address: Jakab, T. Dept of Ecology and Hydrobiology, Debrecen University, P.O. Box 71, Debrecen, H-4010, Hungary. E-Mail: jakabt@kossuth-tfured.sulinet.hu

**3865.** Kropf, C. (2002): Dauermarken: Insekten. Die Lupe 3/2002: 8-12. (in German (The magazine is available in German, French, Italian, and English)). [The Swiss Federal Postoffice issued at May 1, 2002 stamps with insects. The one with a value of CHF 0.10 shows *Anax imperator*. In its magazine "Die Lupe - Das Briefmarkenmagazine" a contribution attributed to these stamps also contains a small note to and pictures of *A. imperator*.] Address: Die Schweizerische Post, Briefmarken und Philatelie, Ostermundigenstr. 91, CH-3030 Bern, Switzerland. E-mail: stamps@post.ch

**3866.** Kulkarni, P.P.; Prasad, M. (2002): [Fauna of Ujani] Insecta: Odonata. Wetland Ecosyst. Ser. zool. Surv. India 3: 91-104. (in English). [A total of 42 species (literature data and field samplings) are listed from the man-made Ujani wetland, created by damming the Bhima River in Pune district, Maharashtra, India. Locality data and brief habitat descriptions are provided.] Address: Kulkarni, P.P., Western Reg. Stn, Zool. Surv. India, Sector 29, Ravet Rd, Akurdi, Pune-411044, Maharashtra, India

**3867.** Łabędzki, A. (2002): The Odonata of the water reservoirs of Czorsztyn-Niedzica and Stromowce and the adjoining areas. Pieniny - Przyroda i Człowiek 7: 99-103. (in Polish, with English summary). [The water reservoirs are located within the borders of the Pieniny National Park, Poland. After flooding the reservoirs, the

odonate fauna was studied for four years. A total of 38 species is known to occur. Fourteen species are known from between 1973-76, 21 from autumn 1995 (prior filling the reservoir), and 24 two years after filling. According the author, the most interesting species are *Sympetma paedisca*, *Ophiogomphus cecilia* and *Anax ephippiger*. In May 1996, the latter was seen to copulate and to oviposit. Additional records of *Coenagrion lunulatum*, *Orthertrum albistylum*, and *Thecagaster bidentata*.] Address: Łabędzki, A., Akademia Rolnicza, Katedra Entomologii Lesnej, ull. Wojska Polskiego 71c, PL-60-625 Poznań, Poland. E-mail: andrzejlab@poczta.net.pl

**3868.** Martynov, V.V. (2002): Notes about some rare and Red Book insect species from reserve territories of Donetsk and Lugansk regions. *Vest. Zool.* 36(2): 68. (in Russian, with English title). [*Ukraine, Calopteryx virgo, Anax imperator*] Address: not stated

**3869.** Martynov V.V. (2002): New record of *Cordulegaster bidentatus* (Insecta, Odonata) in Ukraine. *Vestnik Zoologii* 36(3): 24. (in English). [Carpathian Biosphere Nature Reserve (Mala Ugo'ka), alt. 410 m, 19/21-VIII-2001, first record since the 1930s.] Address: not stated

**3870.** Masselot, G. (2002): La synécoparcimonie: un outil d'évaluation biologique de la qualité des eaux courantes. *Théorie et applications.* Muséum National d'Histoire Naturelle (entomologie), Paris: 417 pp, app. (in French). [For details see OAS No 4011 and 4012] Address: Masselot, G., Laboratoire d'Entomologie, Muséum National d'Histoire Naturelle, 45, rue Buffon, F-75005 Paris, France. E-mail: gm@invfinr.org

**3871.** Mayhew, P.J. (2002): Shifts in hexapod diversification and what Haldane could have said. *Proc. R. Soc. Lond. B* 269: 969-974. (in English). ["Data on species richness and taxon age are assembled for the extant hexapod orders (insects and their six-legged relatives, includes Odonata). Coupled with estimates of phylogenetic relatedness, and simple statistical null models, these data are used to locate where, on the hexapod tree, significant changes in the rate of cladogenesis (speciation-minus-extinction rate) have occurred. Significant differences are found between many successive pairs of sister taxa near the base of the hexapod tree, all of which are attributable to a shift in diversification rate after the origin of the Neoptera (insects with wing flexion) and before the origin of the Holometabola (insects with complete metamorphosis). No other shifts are identifiable amongst supraordinal taxa. Whilst the Coleoptera have probably diversified faster than either of their putative sister lineages, they do not stand out relative to other closely related clades. These results suggest that any Creator had a fondness for a much more inclusive clade than the Coleoptera, definitely as large as the Eumetabola (Holometabola plus bugs and their relatives), and possibly as large as the entire Neoptera. Simultaneous, hence probable causative events are discussed, of which the origin of wing flexion has been the focus of much attention." (Author)] Address: Mayhew, P.J., Department of Biology, University of York, PO Box 373, York YO10 5YW, UK. E-mail: pjm19@york.ac.uk

**3872.** Mielewczyk, S. (2002): Entomofauna (Odonata, Heteroptera, Coleoptera) torfowiska sfagnowego jako końcowego stadium łądowienia zbiornika dystro-

ficznego na przykładzie Niknącej Łąki (Park Narodowy Gór Stołowych). *Idee ekologiczne* 15 (Ser. Szkice) Nr. 8: 73-76. (in German, with French and English summary). [The entomofauna of the silting-up stage of a dystrophic water body in a peat bog of the National Park Gory Stołowe, Poland. Only *Aeshna cyanea* and *Somatochlora alpestris* are listed. *S. alpestris* is a rare species in Poland.] Address: Mielewczyk, S., Polska Akademia Nauk, Zakład Badań Środowiska Rolniczego i Leśnego, ul. Bukowska 19, PI-60-809 Poznań, Poland

**3873.** Monnerat, C. (2002): Déplacements chez le genre *Sympetrum* à l'automne 1999 en Suisse occidentale (Odonata, Libellulidae). *Bull. romand d'entomologie* 20: 13-27. (in French with English summary). [*Sympetrum depressiusculum*, *S. flaveolum*, *S. meridionale*, and *S. pedemontanum* have been observed at the end of August and in September 1999 in Swiss regions where they are not known to be indigenous. The possibility to colonise new habitats by such wandering or dispersing specimens is discussed.] Address: Monnerat, C. CSCF, 14 rue des Terreaux, CH-2000 Neuchâtel, Switzerland. E-mail: christian.monnerat@cscf.unine.ch

**3874.** Monnerat, C. (2002): *Lestes barbarus* (Fabricius, 1798) (Odonata: Lestidae) en Suisse: indigène ou hôte irrégulier? *Bull. soc. neuchâtel. Sci. nat.* 125: 77-91. (in French, with English and German summaries). [In 1999, *L. barbarus* was observed at a remarkable number of localities. Therefore, all information from 1846 to 1999 of *L. barbarus* in Switzerland is reviewed and assessed. It is concluded that the species is to be considered as an irregular guest in that country.] Address: Monnerat, C. CSCF, 14 rue des Terreaux, CH-2000 Neuchâtel, Switzerland. E-mail: christian.monnerat@cscf.unine.ch

**3875.** Nishida, G.M.; Beardsley, J.M. (2002): A review of the insects and related arthropods of Midway Atoll. *Occ. Pap. Bishop Mus.* 68: 25-69. (in English). [*Pantala flavescens*] Address: Nishida, G.M., Hawaii Biol. Surv., Bishop Mus., 1525 Bemice St., Honolulu, HA 96817-2704, USA

**3876.** Novelo-Gutiérrez, R. (2002): Descripción de las larvas de *Perithemis intensa* Kirby, 1889 y *P. domitia* (Drury, 1773), con notas sobre otras larvas del género en México (Odonata: Anisoptera: Libellulidae). *Folia ent. mex.* 41(3): 321-327. (in Spanish, with English summary). [The species described represent the Mexican members of the genus. The larva of *P. intensa* is the most stout and has a larger number of palpal setae than any other described congener, that of *P. domitia* is the most melanistic. The lateral border of prementum is considered a new generic diagnostic feature.] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx

**3877.** Papazian, M.; Duquef, M. (2002): Compte rendu de la mission odonatologique « Duquef 2000 » en Guyane française. *Martinia* 18(3): 113-115. (in French with english summary). [In January and February 2000, Odonata have been recorded at 12 localities in French Guyana. A total of 39 species was collected, 5 of these seem to be new records for the country.] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France



- 3878.** Papazian, M. (2002): La collection d'Odonates de Monsieur Louis Bigot. *Martinia* 18(3): 107-111. (in French with english summary). [Collections of L. Bigot from different localities around the globe are deposited in the Museum of Natural History, Mareille, France. The species of French Guyana, New Caledonia, Mayotte, Gold Coast, Gabon, and Madagascar are listed. The records of Mayotte are from Prof. Dr. A. Champeau; these data are united with literature data to a current list of the Odonata of the Archipel of the Comores.] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France
- 3879.** Papazian, M. (2002): Les Odonates de Guyane française II. Les Libellulidae: clé des genres (Odonata, Anisoptera). *Martinia* 18(3): 117-131. (in French with english summary). [27 genera of Libellulidae from French Guyana are keyed.] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France
- 3880.** Papazian, M. (2002): Odonates nouveaux pour la Guyane française II (Odonata, Coenagrionidae, Libellulidae). *Martinia* 18(3): 116. (in French with english summary). [Records of *Ischnura hastata* (Say 1839), *Orthemis regalis* Ris 1910, and *Uracis siemensii* Kirby 1897 from September and November 2000, are added as new to the fauna of French Guyana.] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France
- 3881.** Payne, J.C.; Dunley, J.E. (2002): Use of an elemental marker, rubidium, to study dispersal of aquatic insects. *Journal of the North American Benthological Society* 21(4): 715-727. (in English). ["We describe the first use of the element rubidium (Rb) to mark aquatic insects for the study of dispersal. It has been difficult to pursue research that integrates juvenile and adult life stages of aquatic insects. Most species of aquatic insects suffer high mortality during the larval phase; furthermore, larvae shed their entire exoskeletons as they emerge. Adults disperse by flying soon after emergence when they may still be fragile and difficult to handle. We demonstrate that it is possible in both controlled and natural settings to batch-mark very large numbers of aquatic dragonfly (Odonata) larvae by adding Rb as RbCl to the water in which they live. We found that the in-body concentration of Rb in odonate larvae rose to several hundred times the concentration of Rb in the water, and the high concentrations persisted in adults. Less than 1 part per million (by mass) of Rb in water was sufficient to mark odonate larvae. Rb is often used in research on dispersal of terrestrial insects, particularly crop pests, because it is relatively inexpensive and nontoxic at low concentrations. Rb is known to cause developmental problems in insects (probably through competitive binding with K) at much higher concentrations than we used, but we did not detect any evidence of toxicity at the levels used. The cost of Rb and of specimen analysis by atomic absorption spectrophotometry is moderate, compared to other marking techniques. We believe the method is an improvement over other marking techniques, and will facilitate the study of dispersal of aquatic insects, in cases where dispersing adults can be recaptured." (Authors) *Ischnura cervula*, *Enallagma boreale*, *E. carunculatum*, *Lestes congener*, *Erythemis collocata*, *Pachydiplax longipennis*, *Sympetrum costiferum*, *S. corruptum*, *Tramea lacerata*, *Rhionaeschna californica*, *Aeshna interrupta*, *R. multicolor*, *Anax junius*] Address: Payne, J.C., Dept of Zoology, University of Washington, Seattle, WA, 98195-1800, USA. E-Mail: jcpayne@u.washington.edu
- 3882.** Petrulevicius, J.F. Nel, A. (2002): New Palaeo-macromiid dragonflies from the upper Paleocene of Argentina. *Palaeontology* 45(4): 751-758. (in English). ["A new genus of palaeo-macromiid dragonflies, *Curviarculia*, based on *Curviarculia delicata* sp. nov. and *Curviarculia lamasi* sp. nov., is erected from the upper Paleocene Maiz Gordo Formation of north-western Argentina. Phylogenetic relationships within Palaeo-macromiidae are discussed, leading to a new family diagnosis." (Authors)] Address: Nel, A., Laboratoire d'Entomologie, Museum National d'Histoire Naturelle, 45, Rue Buffon, F-75005, Paris, France. E-Mail: anel@mnhn.fr
- 3883.** Prokop, J.; Nel, A. (2002): New Tertiary dragonflies from Lower Oligocene of the Ceske stredohori Mts and Lower Miocene of the Most Basin in the Czech Republic (Odonata: Anisoptera). *Acta Societatis Zoologicae Bohemicae* 66(2): 141-150. (in English). ["Two new representatives of the clade Aeshnoptera are described from the Lower Oligocene and Lower Miocene of northern Bohemia (Czech Republic), i. e. *Kvacekia infusca* gen. n. et sp. n. (Aeshnidae) and *Gomphaeschna miocenica* sp. n. (Gomphaeschnidae). *Kvacekia* gen. n. seems to be closely related to the Cenozoic genus *Oligaeschna* Piton et Theobald, 1939 and the recent genus *Oplonaeschna* Selys, 1883. *Gomphaeschna miocenica* sp. n. wing venation has particular wing coloration and distinctly different characters from all previously described species of the genus. A holarctic distribution in fossil history is proposed for both *Oplonaeschninae* and *Gomphaeschninae*." (Authors)] Address: Prokop, J.; Department of Zoology, Charles University, Vinicna 7, CZ-128 44, Praha, 2, Czech Republic; E-Mail: jprokop@natur.cuni.cz
- 3884.** Reeves, D.M. (2002): Book review: Theischinger, G. (2000): Preliminary keys for the identification of larvae of the Australian Gomphides (Odonata). Cooperative Research Centre for Freshwater Ecology Identification Guide No. 28, I-IV, 48pp. *Austrolestes* 6: 3-4. (in English). [Review if the book abstracted as OAS 2216.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au
- 3885.** Reeves, D.M. (2002): Lucid key review: Dragonflies of the World - Interactive identification to Sub-families. Jill Silsby and John Trueman, CSIRO Publishing, Collingwood.. *Austrolestes* 6: 4. (in English). [For a review of the book compare OAS 2187.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au
- 3886.** Reimchen, T.E.; Nosil, P. (2002): Temporal variation in divergent selection on spine number in threespine stickleback. *Evolution* 56(12): 2472-2483. (in English). ["Short-term temporal cycles in ecological pressures, such as shifts in predation regime, are widespread in nature yet estimates of temporal variation in the direction and intensity of natural selection are few. Previous work on threespine stickleback (*Gasterosteus aculeatus*) has revealed that dorsal and pelvic spines are a defense against gape-limited predators but may be detrimental against grappling insect predators. In this study, we examined a 15-year database from an endemic population of threespine stickleback to look for evidence of temporal shifts in exposure to these diver-

gent predation regimes and correlated shifts in selection on spine number. For juveniles, we detected selection for increased spine number during winter when gape-limited avian piscivores were most common but selection for decreased spine number during summer when odonate predation was more common. For subadults and adults, which are taken primarily by avian piscivores, we predicted selection should generally be for increased spine number in all seasons. Among 59 comparisons, four selection differentials were significant (Bonferroni corrected) and in the predicted direction. However, there was also substantial variability in remaining differentials, including two examples with strong selection for spine reduction. These reversals were associated with increased tendency of the fish to shift to a benthic niche, as determined from examination of stomach contents. These dietary data suggest that increased encounter rates with odonate predation select for spine reduction. Strong selection on spine number was followed by changes in mean spine number during subsequent years and a standard quantitative genetic formula revealed that spine number has a heritable component. Our results provide evidence of rapid morphological responses to selection from predators and suggest that temporal variation in selection may help maintain variation within populations. Furthermore, our findings indicate that variable selection can be predicted if the agents of selection are known." (Authors)] Address: Reimchen, T.E., Department of Biology, University of Victoria, P.O. Box 3020, Victoria, BC, V8W 3N5, Canada. E-Mail: reimchen@uvic.ca, pnosila@sfu.ca

**3887.** Relyea, R.A. (2002): The many faces of predation: How induction, selection, and thinning combine to alter prey phenotypes. *Ecology* 83(7): 1953-1964. (in English). ["Populations in nature face a number of factors that can alter their traits and subsequent performance. Predation is one factor that can have widespread effects on the mean trait value in a prey population because predators can impact prey traits through a number of processes. Predators can directly induce prey phenotypes through visual and chemical cues, predators can indirectly alter prey phenotypes by thinning the prey population (thereby reducing competition), and predators can cause selection on prey phenotypes through nonrandom killing. Ecologists are beginning to understand each of these three processes in isolation, but these processes act on prey phenotypes simultaneously, and we lack information on the relative importance of these processes in determining the final phenotype of prey. I used a system of gray treefrog tadpoles (*Hyla versicolor*) and dragonfly predators (*Anax longipes*) to determine the separate and combined impacts of induction, thinning, and selection on the behavior, morphology, and growth of tadpoles reared in aquatic mesocosms. Using combinations of hand thinning, cues emitted from caged predators, and lethal predators, I demonstrated that the impact of lethal predators on growth was mediated primarily through thinning, the impact on morphology was primarily through induction, and the impact on behavior was affected similarly through thinning and induction. Surprisingly, while we know from numerous studies that the dragonflies kill tadpoles nonrandomly, selection did not have a significant impact on the final phenotypes of the tadpoles. This work appears to be the first study that identifies the relative magnitudes of the three predatory processes on a suite of prey phenotypes. The three processes can have opposing or supporting effects, the relative magni-

tudes of which likely differ among systems, illustrating why we often observe contradictory results when we examine the impact of lethal predators on prey phenotypes. Thus, it is important that we identify the mechanisms underlying the outcomes of predation, rather than simply observing the outcomes and then inferring which processes are responsible." (Author)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**3888.** Ribeiro, R.P.; Hayashi, C.; Martins, E.N. (2002): Aquatic systems evaluation under controlled conditions. *Acta Scientiarum Universidade Estadual de Maringa* 24(4): 987-996. (in Portuguese with english summary). ["The present experiment was conducted to evaluate three different diets for *Leporinus macrocephalus* post-larvae (Garavello & Britski) (Characiformes, Anostomidae) in controlled aquatic systems. Data were subjected to path coefficient analysis, consisting of multiple regression expansion, when complex interrelations are involved. The selected dependent variables were gut repletion degree (GR), phytoplanktonic organisms biomass (FITV) and spineless organisms biomass, plus odonata egg (ZOOV). The results allow the conclusion that the methodology was efficient to evaluate the diets inside the complex aquatic system, and the variables' selection, as well as the proper data collection, show relevance in the results quality." (Authors)] Address: Hayashi, C., Departamento de Zootecnia, Universidade Estadual de Maringa, Av. Colombo, 5790, 87020-900, Maringa, PR, Brazil. E-Mail: rpribeiro@uem.br

**3889.** Rohr, J.R.; Madison, M. (2002): *Notophthalmus viridescens* (eastern red-spotted newt). Predation. *Herpetological Review* 33(2): 122-123. (in English). [No significant predation on adult *N. viridescens* has been documented in the wild. Adult newts were placed in a minnow trap overnight; and the loss of specimens or of limbs and tails are discussed. Fishes and larval Odonata were ruled out as predators, while snapping turtles (*Chelydra serpentina*) turned out to be most probably the newts predators.] Address: Rohr, J.R., Department of Biological Sciences, Binghamton University, Binghamton, NY, 13902, USA. E-Mail: jrohr@uky.edu

**3890.** Schulz, R.; Thiere, G.; Dabrowski, J.M. (2002): A combined microcosm and field approach to evaluate the aquatic toxicity of azinphosmethyl to stream communities. *Environ. Toxicol. Chem.* 21(10): 2172-2178. (in English). ["The potential effects of this organophosphate insecticide in a combined microcosm and field approach (Lourens R., S Africa) are evaluated. The 2 strongest treatments (concentrations 19.2 and 4.9 µg/l) resulted in a significantly reduced invertebrate density, but *Aeshna* sp. remained unaffected."] Address: Schulz, R., Zool. Inst., Techn. Univ., Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: R.Schulz@tu-bs.de

**3891.** Steglich, R.; Gentz, P.-L. (2002): *Libellenatlas Landeshauptstadt Magdeburg*. Umweltamt Magdeburg: 112 pp. (in German). [48 odonate species are presented in a monographic way: picture of each species, distribution map, note on typical characters, habitat, biological notes, threat.] Address: Umweltamt der Stadt Magdeburg, Mittelstr. 66, D-39114 Magdeburg, Germany. E-Mail: umweltamt@magdeburg.de

**3892.** Switzer, P.V. (2002): Individual variation in the duration of territory occupation by males of the dragonfly *Perithemis tenera* (Odonata: Libellulidae). *Annals of the Entomological Society of America* 95(5): 628-636. (in English). ["In the dragonfly *Perithemis tenera* Say, males defend territories around oviposition sites and defense of a site is critical for reproductive success. This study first demonstrated that individual males varied consistently in how long they defended a particular territory within a day (their "tenure") and in the quality of the sites they defended. I then investigated a number of factors that may have affected territory tenure and may have led to the observed variation among males. Territory occupations that ended "voluntarily" were significantly longer than those that ended because the male was evicted from his territory. For voluntary desertions, tenure duration was unrelated to age, wing length, the amount of time the male fought that day, or site quality. However, tenure durations were longer for males that arrived earlier in the day than for those that arrived later, and consistent differences existed among males in arrival time. Furthermore, tenure durations were longer when males had successfully mated than when they did not mate; available evidence suggests that this pattern may be because mating success causes them to stay longer. Thus, the results suggest that the problem of explaining tenure duration in *P. tenera* can be largely broken down into identifying factors that affect a male's likelihood of being evicted and his relative arrival time. Overall, males that defended better sites and males that had longer wings were territorial for fewer total days. Of these two factors, site quality seems to have a larger effect than wing length on the number of days, suggesting that males may incur an increased cost by defending sites that are more attractive to other males." (Author)] Address: Switzer, P.V., Department of Biological Sciences, Eastern Illinois University, Charleston, IL, 61920, USA; E-Mail: cfpvs@eiu.edu USA

**3893.** Thierry, C.; Dommanget, J.-L. (2002): Inventaire cartographique des odonates de France (Programme INVOD). Bilan 1982-2000. *Martinia* 18, Suppl. 1: 68 pp. (in French with English summary). [App. 800 persons contributed 130000 records to the French odonate mapping scheme. On a regional scale (Ile-de-France, Champagne-Ardenne, Picardie, Centre, Haute-Normandie, Basse-Normandie, Bourgogne, Nord-Pas-de-Calais, Lorraine, Alsace, Franche-Comté, Pays-de-Loire, Bretagne, Poitou-Charentes, Aquitaine, Midi-Pyrénées, Limousin, Rhône-Alpes, Auvergne, Languedoc-Roussillon, Provence-Alpes-Côte-d'Azur, and Corse) some statistical analyses of the records from 1985 - 2000 are presented.] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**3894.** Thompson, J.E.; Ankney, C.D. (2002): Role of food in territoriality and egg production of Buffleheads (*Bucephala albeola*) and Barrow's Goldeneyes (*Bucephala islandica*). *Auk* 119(4): 1075-1090. (in English). [oas 14 "Buffleheads (*Bucephala albeola*) and the North American population of Barrow's Goldeneyes (*Bucephala islandica*) typically breed in boreal and montane regions where food is less available relative to most habitats used by temperate nesting ducks. We investigated diets and digestive organ morphology of sympatrically breeding female Buffleheads and Barrow's Goldeneyes in central British Columbia. Because those congeners exhibit interspecific aggression in defense of breeding territories, we predicted that competition for

food could be a principal factor in evolution of that behavior. We also hypothesized that breeding Buffleheads would show greater variation in digestive organ morphology than Barrow's Goldeneyes because of their smaller body size and consequently greater reliance on their diet to meet nutritional requirements for egg production. Both species fed predominantly on aquatic insects during all reproductive periods, particularly larvae of damselflies (Zygoptera), midges (Chironomidae), and phantom midges (Chaoborinae). Plant foods, primarily seeds of submergent and emergent vegetation, generally represented <15% of diets in both species. Diets of breeding female Buffleheads and Barrow's Goldeneyes were similar throughout reproduction, hence competition for food has likely been a factor in evolution of territorial aggression between those species. The digestive tract morphology of Buffleheads was more variable than that of Barrow's Goldeneyes suggesting that the former relied more on dietary nutrients during reproduction than did their larger congener." (Authors)] Address: Thompson, J.E., Ducks Unlimited Canada, 10720-178 Street, No. 200, Edmonton, AB, T5S 1J3, Canada. E-Mail: jthompson@ducks.ca

**3895.** Tsunoda, W. (2002): External morphology of the giant water bugs, *Diplonychus japonicus* VUILLEFROY and *D. major* ESAKI (Hemiptera: Belostomatidae), in Fukushima and Kanagawa Prefecture. *Science Report of the Yokosuka City Museum* (49): 23-34. (in English). ["*Diplonychus japonicus* and *D. major* are two morphologically closely related species. It is difficult to distinguish them from each other simply by size and body color. Therefore, I carefully compared these two species with regard to external morphology in the hope of identifying sufficient morphological differences to separate the two. Generally *D. major* is bigger than *D. japonicus*, but some individuals of *D. major* are smaller than the bigger ones of *D. japonicus*. A further difference concerns proboscis length, which in *D. japonicus* is longer than in *D. major*. In the field, *D. major* feeds on dragonfly nymphs and larval amphibia, while *D. japonicus* feeds mainly on snails such as Physidae. Therefore, the different proboscis lengths appear to represent morphological adaptations to their different feeding habits." (Author)] Address: Tsunoda, W., Yokosuka City Museum, Yokosuka, 238-0016, Japan

**3896.** Turgeon, J.; McPeck, M.A. (2002): Phylogeographic analysis of a recent radiation of *Enallagma* damselflies (Odonata: Coenagrionidae). *Molecular Ecology* 11(10): 1989-2001. (in English). ["A phylogenetic hypothesis revealed two recent radiations among species of *Enallagma* damselflies, and extensive ecological work suggests that both adaptive and nonadaptive processes are involved in these radiations. We analysed the geographical pattern of genetic variability at 868 bp of mitochondrial DNA (mtDNA) among 283 individuals of 5 species displaying little ecological differentiation to identify the ancestral lineage, support their independent evolutionary trajectories and identify historical events and the underlying mechanism for one of these radiations. Nested clade analysis results clearly support a past event of range fragmentation in *E. hageni*. These Atlantic and Continental *hageni* races experienced distinct dispersal histories and still maintain nearly nonoverlapping ranges All four other species derive from the Continental *hageni*. Whereas three species endemic to the Atlantic coastal plain show little genetic variation, *E. ebrium* shared several haplotypes with the Con-



tinental hageni. Contrasting levels of genetic differentiation between *E. hageni* and *E. ebrium* in geographical areas associated with distinct events of *E. hageni*'s recent history support the recent origin of this species. Altogether, our results are compatible with a process of radiation via divergence in mate recognition systems within the Continental hageni race following secondary contacts between putative refugial races." (Authors)] Address: Turgeon, Julie.; Departement debiologie, Universite Laval, Quebec City, Quebec, G1K 794 Canada. E-Mail: julie.turgeon@bio.ulaval.ca

**3897.** Veenstra-Quah, A. (2002): Dragonfly nymphs with Dipterian 'Hitch-hikers': An example of phoresy found in Dandenong Creek. *Victorian Naturalist* (South Yarra) 119(5): 229-231. (in English). ["A phoretic association was observed between larvae of *Rheotanytarsus juliae* (Diptera: Chironomidae) and larvae of *Austroaeschna unicornis unicornis* (Odonata: Aeshnidae) collected from one site near the headwaters of Dandenong Creek, Victoria." (Author)] Address: Veenstra-Quah, Anneke, Faculty of Science and Technology, Deakin University, 221 Burwood Highway, Burwood Campus, Burwood, Victoria, 3125, Australia. E-Mail: vquah@deakin.edu.au.

**3898.** Verdcourt, B. (2002): Additions to the Wild Fauna and Flora of the Royal Botanic Gardens, Kew. *Kew Bulletin* 57(4): 1007-1022. (in English). [UK; 2/06/2002, *Brachytron pratense*] Address: Verdcourt, B., Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AB, UK

## 2003

**3899.** Amweg, E.L.; Stuart, D.L.; Weston, D.P. (2003): Comparative bioavailability of selenium to aquatic organisms after biological treatment of agricultural drainage water. *Aquatic Toxicology* 63(1): 13-25. (in English). ["Selenium (Se) is naturally abundant in the soils of the western San Joaquin Valley, California, USA. Intense agricultural activity in this region requires irrigation which leaches Se into surface waters draining to the San Joaquin River. Se water contamination and subsequent accumulation in wildlife is a serious problem in the Central Valley of California, and the subject of increasingly intensive regulatory action. Algal-bacterial selenium reduction (ABSR) is a potential new treatment approach to reduce Se in agricultural drainage, and an ABSR demonstration facility was examined with respect to its Se removal efficiency and effect on Se bioavailability and bioaccumulation. Water samples were taken to study treatment effects on Se speciation. Invertebrate tissue Se concentrations in the ABSR ponds were monitored for 2 years. Laboratory-based algal bioaccumulation tests and in situ microcosms with a variety of invertebrates were also used to address differences in Se bioavailability before and after ABSR treatment. The ABSR system removed about 80% of the total influent Se; however, microbial and algal activity produced selenite and organic Se, the combined concentration of which increased 8-fold during treatment. As a result of the greater bioavailability of selenite and organic Se, relative to the selenate of the influent, treatment contributed to greater Se concentrations in effluent-exposed organisms. ABSR-treated water

produced Se concentrations in biota 2-4 times greater than organisms exposed to untreated water. The bioavailability of Se in the treated water was 2-10 times greater than Se in the influent. The shift to more bioavailable Se forms due to biological treatment is inherent in system design, and makes it difficult to weigh the ecological benefits of a reduction in total Se loadings from a regional perspective against the greater toxicological risk to biota in the vicinity of the effluent." (Authors) Ischnura sp.] Address: Amweg, E.L., Dept of Integrative Biology, University of California, 3060 Valley Life Sciences Bldg., Berkeley, CA, 94720-3160, USA. E-Mail: eamweg@socrates.berkeley.edu

**3900.** Anlauf, A.; Kleinwachter, M.; Eggers, T.O. (2003): Modification of groynes and guide dykes at Elbe riverbanks: Impact of construction on the habitats of animals. Oral presentation at the Conference: Lowland River Rehabilitation, NCR & RIZA (Wageningen, September/October 2003) [Modifizierung von Buhnen und Leitwerken im Uferbereich der Elbe: Einfluss auf die Habitatbildung für Tiere] & Poster: 1 p. (in English). ["The river Elbe in Germany between the Czech Republic and the weir in Geesthacht has a length of 685 km and is characterized by about 6900 groynes and 300 km of stone-fixed embankments and dykes. The development of the embankment is strongly influenced by these constructions. Nevertheless many banks appear to have natural conditions. In the last years some special modifications of groynes and guide dykes were built in the field at different sections of the River Elbe. The aim of the investigations on different types of groynes, i.e. with an angle shape or with gaps in the groyne body is to change the hydromorphological regime in the groyne fields and increase structural dynamics. Similar aims are described from the banks behind guide dykes, which are constructed with gaps or tube outlets. The modifications showed direct influences on the appearance of species. The succession of different habitat types for fish, macrozoobenthos or carabid beetles in modified constructions is compared to conventionally regulated riverbanks. The results lead us to recommendations for the rehabilitation of riverbanks without abandonment of the constructions necessary for navigation." (Authors). The distribution pattern of *Stylurus flavipes* within a groyne field is presented. This species lives only in sandy-silty substrate within the groyne field; abundances at sample site are demonstrated.] Address: Eggers, T., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: t.eggers@tu-bs.de

**3901.** Arai, Y. (2003): A Countrywide Survey of Red Dragonflies. Introduction, aim of survey, methods, and results. In: Arai, Y. (Ed): *A Countrywide Survey of Red Dragonflies*. Musashino Satoyama Research Group, Institute of Agriculture and Natural environments. 47 pp. Translation: Ishizawa, N., Tokorozawa City, Japan: 3-12. (in Japanese). [Japanese are said to have a special relationship to (red) dragonflies. To get detailed information on and using this relationship, a questionnaire was developed and circled to more than 3000 persons. The focus was set on *Sympetrum frequens* and *Pantala flavescens*. Countrywide operating new media and the internet were used to inform and to motivate people. App. 300 questionnaires were returned, and reasons responsible for this quite disappointing result are discussed. Most interesting data are of phenological character which give a good impression on emergence,

emergence habitat, first records, and oviposition in different regions in Japan.] Address: Arai, Y., 1233-2, Oaza Sueno, Yorii-machi, Osato-gun, Saitama Pref., 369-12, Japan

**3902.** Arai, Y. (2003): Problems on *Pantala flavescens* and *Sympetrum frequens*. In: Arai, Y. (Ed): A Country-wide Survey of Red Dragonflies. Musashino Satoyama Research Group, Institute of Agriculture and Natural environments. 47 pp. Translation: Ishizawa, N., Tokorozawa City, Japan: 13-18. (in Japanese). [Browsing published information on *P. flavescens* and *S. frequens*, result in the ever same answers on e.g. distribution of the species in Japan, sensitive to cold, overwintering, time of larval development, dispersal, or migration (*P. flavescens*) and pre-reproductive habitats and behaviour and the reasons for decreasing populations of *S. frequens*. The author analyzes these information against the background of empirical based knowledge, and rises questions and methods to give correct answers. There are many questions which in part easily could be solved if odonatologists or universities would cooperate and participate in an action plan to survey both species.] Address: Arai, Y., 1233-2, Oaza Sueno, Yorii-machi, Osato-gun, Saitama Pref., 369-12, Japan

**3903.** Arnaboldi, F. (2003): Note sur les Odonates de Finlande. *Martinia* 19(2): 71-80. (in French with English summary). [In June and July 2002, the author recorded 35 odonate species in Finland, including *Nehalennia speciosa*, *Coenagrion puella*, *Ophiogomphus cecilia*, *Orthetrum coerulescens*, *Leucorrhinia pectoralis*, and *L. albifrons*. These species are briefly commented and their records are mapped. All records are listed locality-wise (scale: National parks) in a table.] Address: Arnaboldi, F., ONF Cellule d'Appui Ecologique F-78125 Poigny-la-Forêt, France. E-mail: fred.arnaboldi@wanadoo.fr

**3904.** Arnaboldi, F. (2003): Observation récente de *Nehalennia speciosa* (Charpentier, 1840) en Finlande - note sur son habitat. *Martinia* 19(3): 109-118. (in French with English summary). [Lacking records of *N. speciosa* for 21 years, the species was rediscovered in Finland at 16.VII.2002, 12 km north-east from its last known locality in the nature reserve Näsebyfladan. The habitat - helophytes in brackish water! - is described in detail.] Address: Arnaboldi, F., ONF Cellule d'Appui Ecologique F-78125 Poigny-la-Forêt, France. E-mail: fred.arnaboldi@wanadoo.fr

**3905.** Aziz, K.; Bowles, D.E. (2003): Predation of *Hagenius brevistylus* Selys on *Libellula luctuosa* Burmeister. *Argia* 15(3): 7-8. (in English). [16. July 2003, Spring Lake, San Marcos River, Hays County, Texas, USA; detailed description of devouring *L. luctuosa* by *H. brevistylus*.] Address: Aziz, K., Texas Parks & Wildlife Department, River Studies Program, P.O.Box 1685, San Marcos, Texas 78667, USA

**3906.** Bass, D. (2003): A comparison of freshwater macroinvertebrate communities on small Caribbean islands. *Bioscience* 53(11): 1094-1100. (in English). ["An ongoing survey of macroinvertebrates inhabiting the relatively unstudied freshwater habitats on 14 small Caribbean islands was initiated in 1991. These collections have yielded almost 200 species; when these species are combined with collections previously made by other researchers, a total of at least 328 freshwater macroinvertebrates are now known from these islands. The dominant taxa on the islands include several species of

snails, shrimps, mayflies, dragonflies, damselflies, beetles, and other insects. Many of these species have fairly widespread distributions across the islands. Most stream species are associated with leaf packs, and most pond species are associated with aquatic macrophytes. As is typical of tropical island systems, the macroinvertebrate faunas of these islands are sparse, most likely because of their oceanic origin, their small size, and the frequent disturbances to their freshwater environments." (Author) The islands studied in this investigation include Barbados, Tobago, Grenada, St. Lucia, Dominica, Montserrat, Nevis, St. Kitts, Saba, Antigua, Cayman Brae, Little Cayman, Grand Cayman, and Guanaja. A total of 39 odonate species represented at the listed islands is compiled; the species are not specified.] Address: Bass, D., Department of Biology, University of Central Oklahoma, Edmond, OK, 73034, USA. E-Mail: dbass@ucok.edu

**3907.** Blair, N.; Loose, J.L.; Burne, M.R. (2003): A field guide to the dragonflies and damselflies of Massachusetts. Massachusetts Division of Fisheries & Wildlife, Natural Species & Endangered Species Program: 197 pp. (in English). [The book begins with a key to odonate families, and continues with an introduction into odonate life history and biology, advice how to observe Odonata, and some information on conservation issues. The focus of the book was set to the identification of the Odonata, but without binomical identification keys. Each of the 165 species described includes color photos of males, and, in many cases, females. Additional drawings illustrate *Lestes* terminal appendages, abdomen tips of *Enallagma*, *Ischnura*, and *Argia*, *Aeshna* thoracic stripes in color, *Gomphus* terminal appendages, and *Somatochlora* terminal appendages. These drawings are very well done and may be the single most useful part of the guide. Each species is briefly described, incl. its range and status in North America, habitat, phenology, and some useful notes in finding the species. Larval sketches are included for each family. This is an excellent book and will be the most important guide to all of New England and many additional northeastern states in USA. The guide has a sturdy spiral binding, enabling it to lie flat This is an additional, welcome contribution to the library of North American books on Odonata. (Martin Schorr)] Address: Order from Massachusetts Division of Fisheries & Wildlife, Natural Species & Endangered Species Program, Route 135, Westborough MA 01581. \$20 postpaid. (508 - 792 - 7270 ext 200)

**3908.** Bowler, J. (2003): The Odonata of Aride Island Nature Reserve, Seychelles: patterns in seasonal abundance and breeding activity. *Opusc. zool. flumin.* 210: 1-22. (in English). ["The abundance and breeding activity were recorded over the course of a year. Observational data were collected on repeated weekly transects, conducted at 3 times of day, through both wet and dry sections of the low-lying coastal plateau from Feb. 1998 to Jan. 1999. A total of 11 species was recorded, including *Ceriatagrion glabrum* which accounted for almost half of all sightings. Numbers were highest in the period Feb.-Apr. at the end of the wetter NW monsoon and declined thereafter during drier conditions, although species diversity remained similar throughout the year. Odonata became more closely tied to remaining patches of open water during the dry season. More of them were encountered at midday than on the morning and evening transects, although individual

spp. exhibited a range of diurnal activity patterns. Egg-laying was recorded for 7 species." (Author)] Address: Bowler, J., Shepherd's Cottage, Heylipol, Isle of Tiree, Argyll, PA77 6TY, UK

**3909.** Brook, G. (2003): Identification of the exuvia of the Small Red-eyed Damselfly *Erythromma viridulum* (Charpentier). *J. Br. Dragonfly Society* 19(1/2): 40-43. (in English). [The paper provides useful characters to separate *E. viridulum* exuviae from exuviae of *E. najas* and *Cercion lindenii*.] Address: Brook, G., 12 Burgess Hall Drive, Leeds, Maidstone, Kent ME 17 1SH, UK

**3910.** Brook, J.; Brook, G. (2003): The Willow Emerald Damselfly *Chalcolestes viridis* (Vander Linden) in Kent: a case of mistaken identity. *J. Br. Dragonfly Society* 19(1/2): 51-54. (in English). [Re-examination of a collection of lestad exuviae from 29th June, 1992, Cliffe marshes, Kent, UK, proved that a specimen identified as *Lestes dryas* was *Chalcolestes viridis*. This seems to be the first record and prove of reproduction of this species on the British mainland.] Address: Brook, J. and G., 12 Burgess Hall Drive, Leeds, Maidstone, Kent ME17 1SH, UK

**3911.** Buchwald, R. (2003): *Cordulegaster bidentata* (Gestreifte Quelljungfer) im südlichen Feldberg-Gebiet (Schwarzwald): höchstgelegenes Vorkommen in Deutschland außerhalb der Alpen. *mercuriale* 3: 28-30. (in German). [Between 1994 and 2003, alkaline fens of the southern Schwarzwald-region in Baden-Württemberg, Germany have been extensively surveyed for vegetation and the odonate fauna. Only few habitats are used by *Thecagaster bidentata*. These habitats are described in detail.] Address: Buchwald, R., INU, Hochschule Vechta, Driverstr. 22, D-49377 Vechta, Germany. E-mail: rainer.buchwald@uni-vechta.de

**3912.** Buczyński, P. (2003): Dragonflies (Odonata) of an artillery range in Nowa Deba (Sandomierska Basin). *Nowy Pam. Fizjogr.* 2(1-2): 15-29. (in Polish with English summary). [A compilation of papers and surveys in 1998 and 1999 resulted in 57 odonate species. This military training area is of considerable value to conserve the Polish dragonfly fauna. The list of species include *Sympetma paedisca*, *Coenagrion armatum*, *Erythromma viridulum*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Aeshna affinis*, *A. viridis*, *Orthetrum albistylum*, *Sympetrum depressiusculum*, *S. meridionale*, *Leucorrhinia albifrons*, *L. caudalis*, and *L. pectoralis*.] Address: Buczyński, P., Dept of Zool., Mariae Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3913.** Buczyński, P. (2003): Dragonflies (Odonata) of the Landscape Park of the Iława Lake District. *Rocz. nauk. Pol. Tow. Ochr. Przyr. "Salamandra"* 7: 65-85. (in Polish with English summary). [In the years 1998-2002 the dragonflies of the Landscape Park of the Iława Lake District were studied (N Poland, 53°37'-53°51' N, 19°22'-19°41' E). This park (25279 ha) with a diverse, postglacial relief is mainly covered with forests (62%) and lakes (19%). Small running waters, located in forests, and peatbogs are numerous, small waterbodies and ponds (situated on meadows) are less numerous. The 47 dragonfly species collected represent approximately 65% of the national odonate fauna (Mielewczyk 1990, 1997) and 77% of fauna of the lake districts of NE Poland. The forest character and geographical position are the natural factors limiting the dragonfly species

richness of this area. These are also the reasons why Mediterranean and/or open biotope species do not find it suitable for development. Of special interest are: *Sympetma fusca*, *S. paedisca*, *Coenagrion lunulatum*, *Erythromma viridulum*, *Aeshna juncea*, *A. subarctica elizabethae*, *A. viridis*, *Somatochlora arctica*, *Orthetrum coerulescens*, *Sympetrum pedemontanum*, *Leucorrhinia albifrons*, and *L. pectoralis*.] Address: Buczyński, P., Dept of Zool., Mariae Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3914.** Buczyński, P.; Czachorowski, S.; Serafin, E.; Szczepański, W. (2003): Is a nature reserve the best form to protect invertebrates? - On the example of dragonflies and caddisflies (Insecta: Odonata, Trichoptera) of the Lake Kośno Reserve. *Acta Biol. Univ. Daugavp.* 3(2): 125-132. (in English). [Poland; in July 2001 a total of 31 odonate species was collected within (n= 14) and outside the borders (n= 30) of the nature reserve.] Address: Buczyński, P., Dept of Zool., Mariae Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3915.** Buczyński, P.; Czachorowski, S.; Moroz, M.; Stryjecki, R. (2003): Odonata, Trichoptera, Coleoptera, and Hydrachnidia of springs in Kazimierski Landscape Park (Eastern Poland) and factors affecting the characters of these ecosystems. *Acta Hydrobiologica, Cracow Suppl.* 5: 13-29. (in English). [Selected arthropod taxa were studied in 8 springs of the Kazimierski Landscape Park (SE Poland). The springs are characterized by morphology, hydrology, water chemistry, and fauna. The list of species includes 10 Odonata recorded as imagos. None of these odonate species is a typical spring species.] Address: Buczyński, P., Dept of Zool., Mariae Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3916.** Buczyński, P. (2003): Recenzje: Heidemann, H. & R. Seidenbusch (2002): *Die Libellenlarven Deutschlands*. ISBN 3-911374-07-6. *Wiad. entomol.* 22: 185-186. (in Polish). [Review of the book on the odonate larvae of Germany which represents the current status of knowledge.] Address: Buczyński, P., Dept of Zool., Mariae Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3917.** Buczyński, P. (2003): Recenzje: Schorr, M. & M. Lindeboom (Red.): *CD-ROM Dragonfly Research 1*. 2003. ISSN 1438-034X. *Wiad. entomol.* 22: 168. (in Polish). [Review of the first issue of *Dragonfly Research*.] Address: Buczyński, P., Dept of Zool., Mariae Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**3918.** Bueno, A.A.P.; Bond-Buckup, G.; Ferreira, B.D. (2003): Estrutura da comunidade de invertebrados bentônicos em dois cursos d'água do Rio Grande do Sul, Brasil. *Revista Brasileira de Zoologia* 20(1): 115-125. (in Portuguese, with English summary). [Community structure of benthic invertebrates in two watercourses in Rio Grande do Sul State, southern Brazil. The macrobenthic communities from two watercourses in Rio Grande do Sul State, Brasil, were sampled with a Surber sampler, monthly, from September 1999 to August 2000, in one of the creeks forming Tainhas River (29°15'30,2"S, 50°B'12,5"W), around São Francisco de



Paula city and in Mineiro Creek (29°30'0,2"S, 50°46'50"W), around Taquara city. "At each sampling point, physical and chemical variables of the waters were registered. [...]. Dissolved oxygen, pH and stream speed were very similar for both environments, whilst conductivity had extreme values. Insects, crustaceans, acari, and molluscs dominated in the samples. Abundance, richness and diversity indexes in Tainhas subsidiary had relatively higher average values than Mineiro Creek. Similarity matrix groupings between sampling units indicate three groups. Our research revealed important characteristics of the ecology and distribution of benthic invertebrates, information that can subsidise future environmental monitoring in the region of São Francisco de Paula and Taquara." (Authors) In table 2 absolute and relative frequencies of the taxa, including "Coenagrionidae" are presented.] Address: Bueno, Alessandra, Departamento de Zoologia, Instituto de Biodiversidade, PPC Biologia Animal, Universidade Federal do Rio Grande do Sul, Ave. Bento Gonçalves 9500, prédio 43435, 91 SOT-970 Porto Alegre, Rio Grande do Sul, Brasil. E-mail: alebueno@ufrgs.br, ginabb@ufrgs.br

**3919.** Büttger, H.; Finch, O.-D. (2003): Libellenzöosen an Krebscherengraben der südlichen Wesermarsch unter besonderer Berücksichtigung der FFH-Art "Aeshna viridis" EVERSMANN, 1936 (Insecta: Odonata). Oldenburger Jahrbuch 103: 317-331. (in German with English summary). ["In the southern part of the Wesermarsch district in Lower Saxony, Germany the coenoses of dragonflies of 21 ditches were examined during the summer 2001. Several structural parameters of the ditches and the vitality of Stratiotes aloides were measured. A total of 17 dragonfly species was recorded, two of which occur only in the vicinity of the examined ditches. Coenagrion pulchellum, red listed as "endangered" in Germany, was the dominant species. Brachytron pratense, also "endangered", was present with a few individuals. A. viridis is "threatened of extinction" in Lower Saxony as well as nation-wide. This species was recorded at six ditches with a maximum of four individuals. At single ditches six to thirteen species were established. A. viridis is a strictly protected species of common interest" according to the European Flora-Fauna-Habitat Directive (FFH). Therefore, monitoring is strongly recommended for this species. Conservation measures for the stenotopic dragonfly should include careful, regular and yearly alternating maintenance of ditches. Populations of Stratiotes aloides hopefully can be managed in this way and simultaneously the discharge conditions, which are important for agricultural purposes, will be secured." (Authors)] Address: Finch, O.-D., Universität Oldenburg Fk 5 / Bio-, Geo- und Umweltwissenschaften, AG Terrestrische Ökologie, D-26111 Oldenburg, Germany. E-mail: oliver.d.finch@uni-oldenburg.de

**3920.** Burt, J. (2003): Aquatic macroinvertebrates of an intermittent stream in the arid Hajar Mountains, Oman. Tribulus 13(2): 14-22. (in English). ["Aquatic macroinvertebrates were collected from six habitats in two permanently flowing sites to Wadi Qahfi, northern Oman. A total of 38 taxa were identified, many to taxonomic levels previously unrecorded for aquatic fauna in Arabia. Overall richness was comparable between airt habitats sampled. While very little regional information is available for identification of aquatic macroinvertebrates, the combination of regional descriptive information with foreign keys for aquatic stages has proven to be a

valuable approach. Recommendations are made for appropriate levels of classification for the major taxonomic groups, and references are provided to assist in identification." (Author) The possibilities to identify Odonata are briefly discussed, and in Tab. 3 as result of the survey, Gomphidae (indet.), Paragomphus, Libellulidae (indet.), and Coenagrionidae (indet.) are listed.] Address: Burt, J., Dept natural & Quantitative Sciences, Zayed Univ., PO Box 19282 Dubai, U.A.E. E-mail: John.Burt@zu.ac.ae

**3921.** Bußmann, M. (2003): Die Wiederbesiedlung der oberen Ennepe durch die Blauflügel-Prachtlibelle Calopteryx virgo (L., 1758) (Odonata, Zygoptera). Natur und Heimat 65(4): 109-117. (in German). [The upper reaches of the river Ennepe (Nordrhein-Westfalen, Germany) was surveyed for C. virgo on 17 June 1997 and repeated on 26/ 27 June 2002. The species spread closer to the epirhithral and krenal of the river. Population density had increased. The current extension of habitat use is documented and extensively discussed.] Address: Bußmann, M., Amselweg 18, D-58285 Gevelsberg, Germany

**3922.** Buttstedt, L. (2003): Wiederbesiedlung der mittleren Unstrut und unteren Helme in Thüringen durch stenöke Fließgewässerarten. Thüringer Faunistische Abhandlungen 9: 73-76. (in German with English summary). [Following a significant improvement of the water quality of the rivers Unstrut and Helme (Thüringen, Germany), in the mid of the 1990s Calopteryx splendens and Platycnemis pennipes could be re-observed. Their populations grow very strong in the succeeding years, and both species are common now. In 2003, exuviae, larvae, and imagines of Gomphus vulgatissimus could be traced along the Unstrut and the lower reach of the Helme. Imagines of Ophiogomphus cecilia have been observed along the Unstrut in 2003 too. It is supposed that the recolonisation process originating from Elbe and Saale now has reached northern Thuringia.] Address: Buttstedt, L., Ziegeleistr. 26, D-06536 Roßla, Germany

**3923.** Cabela, A.; Chovanec, A.; Ellinger, N.; Gressler, S.; Grötzer, C.; Pascher, K.; Raab, R.; Straif, M.; Teufl, H. (2003): Maßnahmenkatalog für die neu geschaffenen Uferstrukturen auf der Donauinsel. Denisia 10: 215-226. (in German with English summary). ["The results obtained in the Danube Island Monitoring Programme are the basis for management measures which should contribute to improve the migration linkages on the island itself and to provide new habitats particularly in the northern and central parts of the Danube Island." (Authors) Management measures from the odonatological point of view are discussed.] Address: Raab, R., Anton Bruckner-Gasse 2/2, A-2232 Deutsch-Wagram, Austria. E-mail: rainer.raab@gmx.at

**3924.** Cham, S. (2003): Factors influencing the distribution of the White-legged Damselfly Platycnemis pennipes (Pallas) in Great Britain. J. Br. Dragonfly Society 19(1/2): 15-23. (in English). [P. pennipes is common and widespread throughout much of central and eastern Europe. In Britain it occurs south of the Wash (latitude 53 °N), and its distribution is associated with linear habitats, i.e. the larger rivers and their tributaries. It is absent from Ireland. It occurs in 6.4 per cent of the 10km squares from which Odonata records are available. This paper examines some of the factors influen-

cing the distribution of *P. pennipes* with reference to its often-quoted susceptibility to pollution. Heavy boat traffic (along the River Great Ouse in Bedfordshire and Huntingdonshire) seems to have no negative effect on the species. The study concludes that there is little evidence to support the view that the species is more susceptible to pollution than other species. It would appear to be more influenced by the habitat and the structure of bankside vegetation.] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford MK45 4ER, UK

**3925.** Chelmick, D. (2003): A significant migration of the Red-veined Darter *Sympetrum fonscolombii* (Selys) in southern Spain. *J. Br. Dragonfly Society* 19(1/2): 35-36. (in English). ["In October 2002, near the port of Tarifa, situated in Andalucia at the southern-most tip of Spain, the author observed a significant migration of the Red-veined Darter *Sympetrum fonscolombii* (Selys). During a two and half hour period between 1500h and 1730h local time, an estimated total of 450,000 individual insects were observed migrating along the coast." (Author)] Address: Chelmick, D., 31 High Beech Lane, Haywards Heath, West Sussex RH16 1SQ, UK

**3926.** Chovanec, A.; Schiemer, F. (2003): Die Donauinsel in Wien als ökologischer Korridor? Untersuchung der Besiedlung neu geschaffener Uferstrukturen im Stauraum Freudenau - Hintergrund, Projektidee und zusammenfassende Darstellung. *Denisia* 10: 27-51. (in German with English summary). ["During the construction of the hydroelectric power plant Vienna-Freudenau, the previously straight shoreline of the 21 km long Danube Island was restructured by creating backwaters, coves, gravel banks, and pools. This paper describes the design and the results of a four year monitoring programme investigating the colonisation and successional processes at the study sites. The results show that the sites isolated from the Danube serve as stepping stone biotopes and breeding ponds for dragonflies, amphibians and reptiles. Rheophilic fish species colonise side channels connected with the Danube and indicate a longitudinal connectivity on a landscape scale due to a corridor function of the Danube Island." (Authors)] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, A-1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

**3927.** Clausnitzer, H.-J. (2003): Wie effektiv sind Naturschutzgebiete? Untersuchungen am Beispiel der Libellen (Odonata) im Landkreis Celle (Niedersachsen). *Braunschweiger naturkundliche Schriften* 6(4): 789-798. (in German with English summary). [A total of 53 odonate species are reproducing regularly in the district Celle, Germany. 28 of these species are listed as "Endangered" in the German Red List of threatened or vulnerable Odonata. 14 of these endangered dragonflies are found mainly within the boundaries of nature reserves, 6 species are evenly distributed in and outside nature reserves, and 8 species build up their greatest populations outside nature reserves. Protected by nature reserves are bog and fen dwelling species, while species of other biotopes (e.g. species of running waters) have greater populations outside of nature reserves. But even the latter areas (ponds) are in possessions of the public sector and looked after by nature conservation authorities. In general, the situation of endangered species is more unfavourable outside of protected areas.] Address: Clausnitzer, H.-J., Eichenstr. 11, D-29348 Eschede, Germany

**3928.** Clausnitzer, V.; Martens, A.; Suhling, F. (2003): From desert to forest: diversity of African Odonata. *Gesellschaft für Tropenökologie*. 16. Jahrestagung in Rosstock. Abstracts: 32. (in English). [Verbatim: The two dragonfly projects of BIOTA (Biodiversity Transect Analysis in Africa; E07 and S08) work on diversity patterns of dragonflies in eastern and southwest Africa. Main topics of the joined studies are the effects of habitat fragmentation on species composition and genetic isolation, changes in diversity patterns along natural and anthropological gradients and adaptations to seasonal habitat conditions. Results of these studies are used to define indicator species and monitoring programmes for habitat quality and rapid assessments. Nearly all species found in Namibia are common in savannah habitats in East Africa and even West Africa as well. Most of these species are migratory and colonise seasonal wetlands even in an otherwise very dry matrix (temporal and spatial). The genetic variation between East and Southwest African populations of such species, e.g. *Crocothemis erythraea* or *Trithemis kirbyi* is very small. Species with adaptations to distinct habitats, e.g. forests or spring brooks on the other hand show genetic differences between isolated populations. *Coryphagrion grandis*, which occurs in the fragmented coastal forest regions of East Africa, shows high sequence diversity between populations, which correlates with the distance and therefore age of the single forest fragments. Our results from the BIOTA transect from east to southwest Africa allow biogeographic discussions about past and present distribution patterns of dragonflies and about shifts in biodiversity patterns with changing climatic and/or environmental conditions. Results of both projects also indicate that Odonata are good indicators for assessing anthropogenic impacts on inland waters.] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de

**3929.** Clausnitzer, V. (2003): *Teinobasis alluaudi* Martin, 1896 from mainland Africa: notes on ecology and biogeography (Zygoptera: Coenagrionidae). *Odonatologica* 32(4): 321-334. (in English). ["New records of *T. alluaudi* have been made from coastal forests of Kenya and Tanzania and from Pemba and Zanzibar Islands, Tanzania. Habitat and reproduction of this species are described. The systematic status of *T. alluaudi*, *T. a. berlandi* Schmidt, 1951 and *T. malawiensis* Pinhey, 1966 are discussed." (Author)] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de

**3930.** Costa, J.M.; Oldrini, B.B. (2003): Descrição da fêmea de *Argyrothemis argentea* (Odonata, Libellulidae). *Iheringia, Sér. Zool.* 93(3): 271-276. (in Portuguese with English summary). ["The female of *Argyrothemis argentea* Ris, 1911 is described and illustrated for the first time. New records expand the distribution range of the species to Central West Region of Brazil." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@univsys.com.br

**3931.** Cuvelier, J. (2003): Die Falsche geangelt - Teil I. *mercuriale* 3: 39. (in German). [NSG Teverener Heide, Lk. Heinsberg, Nordrhein-Westfalen, Germany; 31. VII.2003, mixed pair of a male *Sympetrum sanguineum* and a female *Crocothemis erythraea*.] Address: Cuve-

lier, J., An der Linde 28, D-52511 Geilenkirchen, Germany

**3932.** Daigle, J.J. (2003): *Metaleptobasis minteri* spec. nov. from Ecuador (Zygoptera: Coenagrionidae). *Odonatologica* 32(4): 371-374. (in English). ["The new species is described from eastern Ecuador (holotype male and allotype female, in copula: Ecuador, Napo prov., Primavera, Lake Taracoa lakeshore and nearby areas, 26-VIII-1978, deposited in the FSCA, Gainesville, FL, USA). Males are distinguished from its congeners by the slender paraprocts, and both males and females can be distinguished by their very small laterally directed thoracic horns." (Author)] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@netally.com

**3933.** D'Amico, F. (2003): Densités et sex-ratio à l'émergence d'*Aeshna juncea* (L., 1758) dans différentes mares pyrénéennes. *Martinia* 19(2): 43-49. (in French with english summary). ["Between mid-July and mid-August 2000, 141 exuviae of *A. juncea* have been sampled at different sampling sites (each 10 m<sup>2</sup>) from six shallow ponds (1160-2040 m a.s.l.), grouped in 4 sites of Western Pyrénées. According to sites, densities of exuviae varied between 0.1 - 5.5 individuals per square meter whilst the range in sex-ratios was 33.3 - 50.0 % males (mean global sex-ratio = 46.04 % males)." (Author)] Address: D'Amico, F., Université de Pau & des Pays de l'Adour, LEM-IBEAS, BP1155, F-64013 Pau Cedex, France. E-mail: frank.damico@univ-pau.fr

**3934.** David S. (2003): Results of the monitoring of the dragonflies (Insecta : Odonata) in the catchment of the Pariz stream (SW Slovakia). *Ekológia (Bratislava)* 22, Supplement 2): 320-332. (in English with Slovakian summary). [Between 2000 and 2002, in the Pariz stream catchment a monitoring of the dragonflies and their habitats was realised. A total of 34 species were recorded, 17 of these are registered in the Slovak Red List, and 8 species are protected by law in the Slovak Republic. The most endangered and rare species in the study area are *Coenagrion scitulum*, *Libellula fulva*, *Brachytron pratense*, *Epitheca bimaculata*, and *Soma-tochlora flavomaculata*. 26 odonate species prefer stagnicolous water habitats, only *Calopteryx splendens* and *Platycnemis pennipes* are rheophilous. *Crocotemis erythraea*, *Anaciaeschna isosceles*, and *Aeshna mixta* are considered as migrant species. The dragonfly community structure and the types of habitat are described using of CANOCO statistical packages (indirect gradient analysis, procedure PCA, DCA). The stagnicolous *Lestes-Sympetrum-Aeshna* and the eurytopic *Orthetrum-Libellula depressa* odonatocoenosis but no rheophilous communities were identified. The importance of the man-made water habitats (sand-pits, marshland-pit, drain-streams and ponds) for Odonata is stressed.] Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. E-mail: stanislav.david@savba.sk

**3935.** David S. (2003): The Bioindication of Anthropogenic Changes Water Biotops (extractive sites) Using the Dragonflies (Insecta: Odonata). In: Olah, B. (ed.): IV. Ekologicke dni, SEKOS pri SAV - Ekologicke stiidie V., Banska Stiavnica, 7.-8. oktober 2003. SEKOS, Banska Stiavnica: 174-184. (in Slovakian with English summary). ["During the years 1986-2003, the monitoring of the dragonflies and their extractive sites habitats

(gravel pits, moorland pits and silty pits in some localities was realised. From different parts of Slovakia) we selected 7 localities. There were 39 species (n = 1539 specimens) of dragonflies recorded. Six of them are protected by law in the Slovak Republic and 16 species are registered in the Slovak Red List." The nature-conservation value of disturbed habitats is high due to the highest values of diversity and equitability. "The species data and 4 environmental variables (altitude, water surface area, depth of water and vegetation cover) at 7 sites were analysed by methods of Principal component analysis (PCA) and Canonical correspondence analysis (CCA), using CANOCO software. The ordination methods established the importance of current condition of the habitats but not of the way of their formation or disturbance." The altitude limits species diversity. The sensitivity of the dragonflies on environmental factors of the localities was confirmed. Dragonflies are suitable indicators of the current succession stage of aquatic habitats.] Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. E-mail: stanislav.david@savba.sk

**3936.** De Block, M.; Stoks, R. (2003): Adaptive sex-specific life history plasticity to temperature and photoperiod in a damselfly. *Journal of Evolutionary Biology* 16(5): 986-995. (in English). ["We investigated four predictions about how temperature, photoperiod and sex affect the life history plasticity and foraging activity of *Chalcolestes viridis*. (i) As predicted, increased temperatures increased foraging activity and growth rates, but in contrast with the prediction, late photoperiod (high time stress) did not affect foraging activity and growth rate. (ii) Unexpectedly, the increase in growth rate at increasing temperatures was not larger under high time stress. (iii) As predicted, age and size at emergence decreased at higher temperatures and at the late photoperiod. Temperature-induced life history shifts were direct or the result of behavioural growth mediation depending on the temperature range. Photoperiod-induced life history shifts were direct. (iv) As predicted, males emerged before females but at a smaller size. The degree of sexual size dimorphism was influenced by the joint effects of temperature and photoperiod. We could only detect genetic variation in size plasticity to photoperiod. The match between the sex-specific life history responses to temperature and photoperiod and predictions by relevant optimality models suggests adaptive life history plasticity to these variables." (Authors)] Address: De Block, M., Evolutionary Biology Group, University of Antwerp, Groenenborgerlaan 171, B-2020, Antwerp, Belgium. E-Mail: mdeblock@ruca.ua.ac.be

**3937.** De Marmels, J. (2003): Odonatos. In: M. Aguilera, A. Azócar & E. González Jiménez (Eds.): *Biodiversidad en Venezuela I*. ISBN 980-379-051-X: 312-325. (in Spanish). [The paper compiles information on general biology and ecology of the order, contributes a brief history of odonatological study of the Venezuelan species, totals the number of known species to 484 species, and outlines the geographical distribution and the conservation status of several species.] Address: De Marmels, J., Inst. Zool. Agrícola, Fac. Agronomía, Universidad Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com



- 3938.** Deliry, C. (2003): Nouveaux articles, études ou notes concernant les libellules dans la région Rhônes-Alpes-Dauphiné. *Sympetrum piémontais* 52: 2-3. (in French). [France; 34 publications containing information on Odonata, nearly exclusively unpublished expertises, are compiled.] Address: Deliry, C., 20, rue de la Manine, F-38510 Morestel, France. E-mail: president@sympetrum.org
- 3939.** Dolný, A. (2003): Dragonflies (Insecta: Odonata) of four nature reserves in Śląskie Voivodship (Polish part of Upper Silesia) - the results of a preliminary study. *Natura Silesiae Superioris* 7: 93-103. (in Polish, with English and German summaries). [40 Odonata species were found in four nature reserves in the southern part of Poland. *Crocothemis erythraea* has been recorded for the first time since 1922. *Orthetrum albistylum* seems to expand its range. Among other species, records of *Sympetrum depressiusculum*, *Leucorrhinia albifrons*, and *L. pectoralis* are noteworthy.] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic. E-mail: Ales.Dolny@osu.cz
- 3940.** Dolný, A. (2003): Faunistical data on endangered and protected dragonflies (Insecta: Odonata) in the Polish part of Upper Silesia (Opolskie and Śląskie voivodships). *Natura Silesiae Superioris* 7: 89-91. (in English, with Polish and German summaries). [Poland; records of the following odonate species are documented: *Aeshna juncea*, *Cordulegaster boltonii*, *Somatochlora alpestris*, *S. arctica*, *Orthetrum brunneum*, *O. coerulescens*, *Leucorrhinia albifrons*, *L. pectoralis*, *Stylurus flavipes*, *Ophiogomphus cecilia*.] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic. E-mail: Ales.Dolny@osu.cz
- 3941.** Dolný, A.; Blaskovic; Síbl, J.; Bulánková, E.; Matejka, P. (2003): On the occurrence of *Libellula fulva* Müller in the Czech Republic and Slovakia (Odonata: Libellulidae). *Opusc. zool.flumin.* 212: 1-14. (in English). ["All Czech (3) and Slovak (24, incl. 14 new) localities are listed and, whenever possible, the respective habitats are described. The regional distribution of the species is mapped. Its habitat choice in the region is compared with that elsewhere in central and eastern Europe." (Authors)] Address: Bulankova, Eva, Institute of Ecology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B-II, SK-84215 Bratislava., Slovakia; tel.+ 421-7-728 922, e-mail: Bulankova@nic.fns.uniba.sk
- 3942.** Dommangeat, J.-L. (2003): Rubrique bibliographique. *Martinia* 19(4): 164-168. (in French). [Additions to the French odonatological bibliography covering publications of 2000-2003 are made.] Address: Dommangeat, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France
- 3943.** Donath, H. (2003): New data on the dragonflies (Odonata) of North-Eastern Poland. *Wiad. entomol.* 22(3): 188-189. (in Polish). [A total of 35 odonate species from 14 localities in NE-Poland visited in June 2002 are documented. The list of species include *Onychogomphus forcipatus*, *Epitheca bimaculata*, *Leucorrhinia albifrons*, and *L. pectoralis*.] Address: Donath, H., Caule Nr. 1, D-15926 Zieckau, Germany
- 3944.** Donath, H. (2003): Verstärktes Auftreten südlich verbreiteter Libellenarten. *Biologische Studien*, Luckau 32: 100-102. (in German). [The current situation of the southern distributed species *Erythromma viridulum*, *Anax ephippiger*, *A. parthenope*, *Aeshna affinis*, *Sympetrum fonscolombii*, *S. striolatum*, *Crocothemis erythraea*, and *Orthetrum brunneum* in the northwest of Niederlausitz, Brandenburg, Germany, is discussed. This region was intensively surveyed for Odonata starting in 1976. None of the mentioned species could traced between 1976 and 1985, while some of them are common now or are colonising more and more water bodies.] Address: Donath, H., Caule Nr. 1, D-15926 Zieckau, Germany
- 3945.** Donnelly, N. (2003): Common name for *Enallagma vernale*. *Argia* 15(3): 17. (in English). ["Vernal Bluet"] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 3946.** Donnelly, N. (2003): *Lestes disjunctus*, *forcipatus*, and *australis*: a confusing complex of North American damselflies. *Argia* 15(3): 10-13. (in English). ["Few North American damselflies have given so much difficulty as the *Lestes disjunctus* complex. Frequent collections of these insects in southern New York have convinced me that the subspecies *australis* Walker 1952 should be elevated to species status. Extensive correspondence and discussion with fellow odonatists has convinced me that the most difficult diagnosis in the complex is the separation of males of *forcipatus* and *australis*. I present here what I hope will be a clarification of the diagnoses of these three difficult species. [...]"] (Author)] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 3947.** Donnelly, T.W. (2003): Distribution of North American Odonata. Part I: Aeshnidae, Petaluridae, Gomphidae, Cordulegastridae. *Bull. American Odonatology* 7(4): 61-90. (in English). [Introduction to the Odonata mapping project in USA; dot map presentation of 150 taxa; taxa, species or subspecies of special interest are discussed.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 3948.** Down, R. (2003): A first trip to Thailand. *Malangpo* 20: 200-201. (in English). [Brief report on a stay in the Chiang Mai-region in northern Thailand with some odonate highlights of different habitats.] Address: Down, Rory, 6 Bramley Avenue, Coulsdon, Surrey CR5 2DP, UK
- 3949.** Elegem, B. van; Knijf, G. de (2003): An exceptional dragonfly community in the polder of Kruikebe, Bazel and Rupelmonde (East-Flanders, Belgium). *Gomphus* 19(1): 13-29. (in Dutch with English and French summaries). ["The polder of Kruikebe, Bazel and Rupelmonde, Belgium is one of the main open areas in the valley of the river Scheldt. This area was investigated on its Odonata fauna during spring and early summer of 2000. A total of 22 Odonata species were observed and 4 of them are included in the Red list of Flanders: *Brachytron pratense*, *Libellula fulva*, *Cordulia aenea*, and *Erythromma najas*. The presence of these species is a good indication of a dragonfly community of lowland peatbogs. *Libellula fulva* is the most common Anisoptera in spring and the species has its main

stronghold in Flanders at the creek of Rupelmonde. Due to a lack of visits in July and especially August we expect that several other species, especially from the genera *Aeshna* and *Sympetrum* could be found in this polder." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**3950.** Ellenrieder, N. von (2003): *Agnophilogenia* Kennedy 1940 [sic], a junior synonym of *Philogenia* Selys 1862 (Zygoptera: Megapodagrionidae). *Odonatologica* 32(4): 387-391. (in English). ["*Agnophilogenia* Kennedy is shown to be a junior synonym of *Philogenia* Selys based on a comparison of diagnostic characters of the holotype female of its only known species, *A. monotis*, with those of *Philogenia* species. An analysis of the described species of *Philogenia* suggests that *P. tinalandia* Bick & Bick represents a junior synonym of *P. monotis* (Kennedy). The male holotype of *P. tinalandia* is illustrated and compared with the female holotype of *A. monotis*." (Author) Kennedy, C.H. (1941): *Agnophilogenia monotis*, new genus and species of dragonfly from humid northwestern Ecuador (Odonata: Megapodagrionidae). *Ann. ent. soc. Am.* 34: 490-494.] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C. 712, AR-1900, La Plata, Argentina. E-mail: ellenr@ilpla.edu.ar

**3951.** Faton, J.-M. (2003): Avancement de la prospection dans la Drôme et découverte de trois nouvelles espèces dans le département : *Coenagrion caerulescens* (Fonscolombe, 1838), *Gomphus graslinii* Rambur, 1842 et *Hemianax ephippiger* (Burmeister, 1839). *Martinia* 19(2): 61-64. (in French with English summary). [Between 1998 and 2002, 65 odonate species could be recorded at 197 localities previously not surveyed for Odonata. *Coenagrion caerulescens*, *Gomphus graslinii*, and *Anax ephippiger* are new additions to the odonate fauna of the Département Drôme, France.] Address: Faton, J.-M., Réserve Naturelle des Ramières, les Garis, F-26120 La Baume Cornillane, France

**3952.** Feldwieser, G. (2003): Abdomen-Akrobatik. *mercuriale* 3: 40. (in German). [A female *Lestes barbarus* was unable to copulate due to a deformation of the abdomen.] Address: Feldwieser, G., Gönningerstr. 27, D-72793 Pfullingen, Germany

**3953.** Feldwieser, G. (2003): Das lästige Anhängsel .... *mercuriale* 3: 40. (in German). [A male *Calopteryx virgo* was hindered to fly by his complete exuviae attached to his left hind wing.] Address: Feldwieser, G., Gönningerstr. 27, D-72793 Pfullingen, Germany

**3954.** Feldwieser, G. (2003): Neue Libellendaten aus dem NSG "Listhof" bei Reutlingen. *mercuriale* 3: 31. (in German). [Records of the following species are briefly documented: *Ischnura pumilio*, *Anax parthenope*, *Crocothemis erythraea*, *Leucorrhinia dubia*, *Orthetrum brunneum*, and *Sympetrum fonscolombii*.] Address: Feldwieser, G., Gönningerstr. 27, D-72793 Pfullingen, Germany

**3955.** Ferreira-Peruquetti, P.S.; Fonseca-Gessner, A.A. (2003): Comunidade de Odonata [Insecta] em áreas naturais de Cerrado e monocultura no nordeste do Estado de São Paulo, Brasil: relação entre o uso do solo e a riqueza faunística. *Revista Brasileira de Zootaxia* 20(2): 219-224. (in Portuguese, with English summary). ["Odonata community on natural areas of Cerrado

and monoculture of northeastern SSo Paulo State, Brazil: relationship between land use and richness. Stream ecosystems may be strongly influenced in different ways by land use. The effects of land-cover patterns on Odonata community were studied in eight streams and seven lakes-dams of northeastern São Paulo State. The pattern analyzed was monoculture (sugar cane) vs. nature reserve in terms of Odonata species richness and similarity. Eighty-five Odonata species were sampled. The species richness was higher in the monoculture (33 species) than nature reserve (30 species) and 22 species were common to both areas. There was not verified relationship between land use and physical or chemical characteristics of the streams or lakes-dams water. These results suggest that some Odonata species are benefited and other affected by anthropogenic actions, although more studies are necessary to evaluate this hypothesis. There were ten new records for São Paulo State [*Neoneura sylvatica*, *Coryphaeschna adnexa*, *Erythemis haematogastra*, *E. mithroides*, *Micrathyria longifasciata*, *M. pseudeximia*, *Planiplax machadoi*, *Lauromacromia* sp., *Tibiagomphus* sp. and *Aeschnosoma* sp.]."] Address: Ferreira-Peruquetti, Patrícia, Departamento de Hidrobiologia, Universidade Federal de São Carlos. Caixa Postal 676, 13565-905 São Carlos, São Paulo, Brasil. E-mail: patricia@iris.ufscar.br

**3956.** Fleck, G. (2003): Contribution à la connaissance des odonates de Guyane française: notes sur les larves des genres *Orthemis*, *Diastatops* et *Elgia* (Anisoptera: Libellulidae). *Odonatologica* 32(4): 335-344. (in French, with English summary). ["The ultimate instar larvae of *Orthemis aequilibris* and of *O. biolleyi* are described and illustrated for the first time. The penultimate instar of the supposed larva of *Diastatops pullata* is described and illustrated. *D. pullata* is considered again as a valid species. *Elgia leptostyla* has peculiar setae on the occiput." (Author)] Address: Fleck, G., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleck@mnhn.fr

**3957.** Fleck, G.; Nel, A. (2003): Revision of the Mesozoic family Aeschnidiidae (Odonata: Anisoptera). *Zoologica* 153: 172 pp. [Content of the book: 1. Introduction; 2. Adult and larval morphology of the Aeschnidiidae; 3. Systematic Palaeontology; 3.1 Taxa previously attributed to Aeschnidium: Genus *Aeschnidium* Westwood, 1854, *Aeschnidium bubas* Westwood, 1854, *Aeschnidium antiquum* (Brodie, 1845), Genus *Misofaeschnidium* gen. n., *Misofaeschnidium densum* (Hagen, 1862), Genus *Sinaeschnidia* Hong, 1965 stat. rest., *Sinaeschnidia martinezdelclosi* sp. n.; 3.2 Taxa previously attributed to *Urogomphus*: Genus *Urogomphus* Handlirsch, 1906, *Urogomphus giganteus* (Münster in Germar, 1839); *Urogomphus*(?) species undetermined, Genus *Lithoaeschnidium* Nel & Martínez-Delclòs, 1993 stat. rest., *Lithoaeschnidium viohli* Nel & Martínez-Delclòs, 1993 stat. rest., Genus *Brunetaeschnidium* gen. n., *Brunetaeschnidium nusplingensis* (Bechly, 1998) comb. n., *Brunetaeschnidium* sp.; 3.3 Other genera previously described: Genus *Aegyptidium* Schlüter & Hartung, 1982, *Aegyptidium aburasiensis* Schlüter & Hartung, 1982, Genus *Aeschnidiella* Zalesky, 1953, *Aeschnidiella kabanovi* Zalesky, 1953, Genus *Aeschnidiopsis* Tillyard, 1917, *Aeschnidiopsis flindersiensis* (Woodward, 1884), Genus *Bergeriaeschnidia* Nel, Bechly & Martínez-Delclòs, 1996, *Bergeriaeschnidia inexpectata* Nel et al., 1996 stat. rest., *Ge-*

nus Gigantoaeschnidium Nel & Martínez-Delclòs, 1993, Gigantoaeschnidium ibericus Nel & Martínez-Delclòs, 1993, Genus Iberoaeschnidium Nel & Martínez-Delclòs, 1993, Iberoaeschnidium conguensis Nel & Martínez-Delclòs, 1993, Genus Leptaeschnidium Pritykina, 1977, Leptaeschnidium latum Pritykina, 1977, Leptaeschnidium araripina (Carle & Wighton, 1990) comb. n., Genus Lleidoeschnidium Nel & Martínez-Delclòs, 1993, Lleidoeschnidium valloryi Nel & Martínez-Delclòs, 1993, Lleidoeschnidium maculatum sp. n., Genus Malmaeschnidium Nel & Martínez-Delclòs, 1993, Malmaeschnidium mayeri Nel & Martínez-Delclòs, 1993, Genus Nannoaeschnidium Nel & Martínez-Delclòs, 1993, Nannoaeschnidium pumilio Nel & Martínez-Delclòs, 1993, Genus Santanoptera Martill & Nel, 1996, Santanoptera gabbotti Martill & Nel, 1996, Genus Solnhofenia Bechly, 2000, Solnhofenia stoebeneri Bechly, 2000, Genus Tauropteryx Pritykina, 1993, Tauropteryx krassilovi Pritykina, 1993, Genus Stylaeschnidium Zhang & Zhang, 2001, Stylaeschnidium rarum Zhang & Zhang, 2001, Genus Dracontaeschnidium Zhang & Zhang, 2001, Dracontaeschnidium orientale Zhang & Zhang, 2001; Descriptions of new genera: Genus Angloaeschnidium gen. n., Angloaeschnidium toyei sp. n., Cf. Angloaeschnidium toyei, Angloaeschnidium montreuili sp. n., ? Angloaeschnidium lacuai sp. n., Genus Cooperaeschnidium gen. n., Cooperaeschnidium durandi sp. n., Genus Delclosaeschnidium gen. n., Delclosaeschnidium magnum sp. n., Genus Diastatopsaeschnidium gen. n., Diastatopsaeschnidium reneeheiko sp. n., Genus Jarzembowskiaeschnidium gen. n., Jarzembowskiaeschnidium polandi sp. n., Genus Kessleraeschnidium gen. n., Kessleraeschnidium simonae sp. n., Genus Rossaeschnidium gen. n., Rossaeschnidium patriciae sp. n., Genus Coramaeschnidium gen. n., Coramaeschnidium minimum sp. n., Genus Kimmeridgebrachypteraeschnidium gen. n., Kimmeridgebrachypteraeschnidium etchesi sp. n.; 3.5 Undetermined new genera and species; 3.6 List of genera and species of Aeschnidiidae; 4. Phylogenetic analyses; 4.1 Method; 4.2 Position of the Aeschnidiidae relative to the Anisoptera, 4.2.1 Previous works, 4.2.2 New analysis, 4.2.3 List of characters, 4.2.4 List of taxa, 4.2.4.1 Outgroups, 4.2.4.2 Ingroup, 4.2.5 Results, 4.3 Phylogenetic analysis of the Aeschnidiidae, 4.3.1 Previous works, 4.3.2 Excluded taxa, 4.3.3 Included taxa (in alphabetic order), 4.3.4 Outgroups, 4.3.5 List of character states, 4.3.6 Results; 5. Conclusions, Acknowledgements, References] Address: E.Schweizerbart'sche Verlagsbuchhandlung, Science Publishers, Johannesstr. 3A D-70176 Stuttgart, Germany

**3958.** Forrest, P.J. (2003): Southern Emerald Damselfly *Lestes barbarus*. *Atropos* 21: 81. (in English). [Documents the third British record of *L. barbarus* for 21 August 2004 at Sandwich Bay, Kent. The second record (female, 20 July 2003, Winterton Dunes, Norfolk) is documented on plate 5 in the same issue of *Atropos*.] Address: Forrest, P.J., Flat 3, No. 8 Chandos Square, Broadstairs, Kent, CT10 1QN, UK

**3959.** François, R.; Delasalle, J.-F.; Spinelli, F. (2003): Observations d'*Ischnura pumilio* (Charpentier, 1825) dans des champs inondés de la Somme et de l'Oise. Bilan des connaissances en Picardie et mentions récentes dans les départements du Pas-de-Calais, de Seine-Maritime et du Val-d'Oise. *Martinia* 19(3): 83-91. (in French with English summary). [In 2001, the Picardie (France) was struck by a huge flood. As a conse-

quence many habitats suitable for *I. pumilio* developed. The species, in most cases unknown to the region or very scarce, colonised these habitats.] Address: François, R., Bureau d'étude ECOTHEME, 185 rue Georges Latapie, F-60490 Ressons-sur-Matz, France. E-mail: ecotheme@free.fr

**3960.** Gardiner, B.O.C. (2003): A brief note on Cambridge butterflies January to 15 August 2002. *Entomologist's Record & Journal of Variation* 115(1): 26-27. (in English). [Passing note on dragonflies.] Address: Gardiner, B.O.C., 2, Highfield Avenue, Cambridge, CB4 2AL, UK

**3961.** Garrison, R.W.; Ellenrieder, N. von; O'Brien, M. (2003): An annotated list of the name-bearing types of species-group names in Odonata preserved in the University of Michigan, museum of zoology. Occasional papers of the museum of zoology, University of Michigan 736: 73 pp. (in English). ["This catalog presents a listing of all species-group names associated with Odonata specimens currently housed in the type collection in the University of Michigan Museum of Zoology (UMMZ), Ann Arbor, MI. The names represent species described by P.P. Calvert, L.K. Gloyd, F. Förster, M.A. Lieftinck, C.H. Kennedy, F. Ris, E.B. Williamson and others, and transcription of data labels, reference and current status have been included. A lectotype is designated for *Argia cyathigera* Navás in order to stabilize that name. The following are new synonyms: *Mecistogaster garleppi* Förster, 1903 = *Mecistogaster buckleyi* McLachlan, 1881; *Argia augustana* Navás, 1934 = *Argia medullaris* Hagen in Selys, 1865; *Argia dagnina* Förster, 1914 = *Argia indicatrix* Calvert, 1902; *Argia machadina* Förster, 1914 = *Argia difficilis* Selys, 1865; *Argia medinensis* Navás, 1935 = *Argia gerhardi* Calvert, 1909. Of 389 names, 85 are considered junior synonyms." (Authors) Taxa of the following families are treated: Amphipterygidae, Calopterygidae, Chlorocyphidae, Dicteriadidae (Heliocharitidae), Polythoridae, Lestidae, Perilestidae, Megapodagrionidae, Platystictidae, Protoneuridae, Pseudostigmatidae, Platynemidae, Coenagrionidae, Aeshnidae, Gomphidae, Cordulegastridae, Corduliidae, Libellulidae. The paper is more than a study on nomenclature and taxonomy, for it contains many detailed information on localities and collecting details indispensable for workers in the history of odonatology.] Address: Garrison, R.W., Research Associate, Natural History Museum of Los Angeles County, Exposition Boulevard 900, CA 90007, USA. E-mail: rwgarrison@earthlink.net

**3962.** Gibson, V. (2003): Communication between the sexes at the end of copulation: a study of three species of Anisoptera. *J. Br. Dragonfly Society* 19(1/2): 44-46. (in English). ["There are many aspects of signalling that we know little about. For example how does a female signal to a male in tandem that she has completed oviposition? What signals are exchanged between the sexes at the end of copulation?" (Miller, 1995). Using a camcorder, sequences of *Aeshna mixta*, *A. juncea*, and *Sympetrum striolatum* have been analysed to find answers to these questions. It was found that "wing clapping behaviour" in *A. mixta* and *A. juncea*, "wing touching behaviour" in *A. mixta*, and "wing lifting" in *S. striolatum* can be interpreted as signals between the partners of the tandem. "The wing lifting behaviour described here provides a possible answer to the question 'how does the female indicate to the male that she is



ready to oviposit?' The video sequences seen in slow playback [...] do seem to show that the female action of wing touching and lifting is a definite signal to the male. Since uncoupling and flight soon follow, it is possible that it is a 'ready to oviposit' signal. The case is strongest for *S. striolatum*, where the male's wings are positively lifted rather than stroked, and where uncoupling and flight occur almost immediately on the cessation of wing lifting. This behaviour does not seem to be referred to elsewhere. The significance of the wing clapping is less obvious, but it is clearly a signal from the male to the female. Occurring, as it did, shortly before wing lifting, it might mean 'I have finished sperm transfer'. The third and last stage in prolonged copulation is the transfer of sperm within the female, although the stage is not as clear in darters as in some other Odonata (Miller, 1995). The male has no control over this stage and may be anxious to depart to avoid predators and interference from other males. Again, this behaviour does not seem to be referred to elsewhere." (Author)] Address: Gibson, V., 76 Pexton Road, Sheffield S4 7DA, UK

**3963.** Goddard, D. (2003): Inverted emergence recorded in the Common Darter *Sympetrum striolatum* (Charpentier). *J. Br. Dragonfly Society* 19(1/2): 39. (in English). [Verbatim: On Sunday 18 August 2002, whilst leading the British Dragonfly Society afternoon walk around the Bennerley Marsh recording area, we came to the de-acidification pits where the group looked for exuviae. I came across the inverted exuvia of *S. striolatum* which was attached to a dried leaf of a *Bulrush Typha latifolia* approximately 150mm above the water level. This is the first time that I have observed such an indication of inverted emergence in this particular species and I have not come across this being noted in any of the literature.] Address: Goddard, D., 30 Cliffe Hill Avenue, Stapleford, Nottingham NG9 7HD, UK

**3964.** Goddard, D. (2003): The domestic cat: a new dragonfly predator. *J. Br. Dragonfly Society* 19(1/2): 39. (in English). [Verbatim: On Saturday 10 August 2002, at approximately 1430h GMT, I witnessed what I thought was a very unlikely dragonfly predator. Two of our domestic cats acted together to chase a Migrant Hawker *Aeshna mixta* Latreille which was hawking over our garden pond. The chase took two or three minutes and the *A. mixta* did not seem to want to leave the area despite being chased by the cats. It eventually settled on the vegetation around the edge of the pond it was at this point that one of the cats pounced and caught the insect and consequently killed it. Once they had killed the insect they just left it on the lawn.] Address: Goddard, D., 30 Cliffe Hill Avenue, Stapleford, Nottingham NG9 7HD, UK

**3965.** Goffart, P.; Fichet, V. (2003): Compte-rendu de l'excursion du 16 juin 2003 à l'Étang de Virelles. *Gomphus* 19(1): 39-40. (in French with Dutch summary). [Belgium; 16 species including *Epitheca bimaculata*, *Somatochlora flavomaculata*, *Anax parthenope*, *Sympetrum fonscolombii*, and *Erythromma najas* are briefly discussed.] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

**3966.** Goffart, P. (2003): Compte-rendu de l'excursion sur l'Ourthe moyenne, de Noiseux à Durbuy, du 21 juin 2003. *Gomphus* 19(1): 36-38. (in French with Dutch summary). [Belgium; 17 odonate species were recor-

ded; main emphasis was given to *Oxygastra curtisii* which was recorded from several stretches of the river Ourthe. In addition, records of the stream dwelling species *Gomphus pulchellus*, *G. vulgatissimus*, *Onychogomphus forcipatus*, and *Cercion lindenii* are briefly commented upon.] Address: Goffart, P., Unité d'Écologie et de Biogéographie, 5, Place Croix-du-Sud, B-1348 Louvain-la-Neuve, Belgium. E-mail: goffart@ecol.ucl.ac.be

**3967.** Gonzáles-Soriano, E.; Córdoba-Aquilar, A. (2003): Sexual behaviour in *Paraphlebia quinta* Calvert: male dimorphism and a possible example of female control (Zygoptera: Megapodagrionidae). *Odonatologica* 32(4): 345-353. (in English). ["The sexual behaviour and a case of male phenotypic dimorphism in *P. quinta* are described: black-winged (BW) males and hyaline-winged (HW) males. Similar to other territorial odonate species, some males defended a space that females used for oviposition while other males acted as satellites. Copulation took place in 2 stages which differed in abdominal movement orientation and duration. Copulation duration varied between morphs and was frequently disrupted. During disruption, the genitalia of both sexes disengaged although the tandem position (the male's abdominal appendices grasping the female's prothorax) was maintained. Disruptions, which took place during the first stage (a stage during which displacement of rival sperm occurs in most odonate species), were sometimes followed by emissions of sperm from the vagina. Male morphs exhibit striking behavioural differences: HW males do not defend territories, but BW males do, and the former copulate for longer and show more copulatory disruptions. Some stages of female behaviour are described and suggested as instances during which females may be exerting mate choice: females copulated on fewer occasions with HW males, copulations with this morph were longer but ovipositions were not, and sperm emissions (possibly, sperm from previous mates) and copulatory disruptions of BW males were less frequent. Because of these differences, it is suggested this is a unique species to test current ideas of female control in an insect order in which the idea of male "control" has been traditional." (Authors)] Address: Gonzalez-Soriano, E., Depto Zoologia, Inst. Biol., Universidad Autonoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**3968.** Gossum, H. van; Sánchez, R.; Cordero Rivera, A. (2003): Observations on rearing damselflies under laboratory conditions. *Animal Biology* 53(1): 37-45. (in English). ["Rearing damselflies under laboratory conditions is a promising means of solving a variety of biological questions. Therefore, in order to improve the success of future researchers we felt the need to indicate potential difficulties in carrying out rearing experiments. Laboratory crosses were obtained using virgin animals originating from natural populations in Belgium and Spain. Resulting offspring was maintained, under laboratory conditions, in small aquaria until emergence and in insectaries as adults. Our results show that keeping damselflies during their entire life cycle under artificial conditions can be very difficult. We suggest that future researchers should change water regularly, supply sufficient food, and rear animals at low density or even individually. Furthermore, suggestions are given on type of food, advisable laboratory conditions and female oviposition methodology." (Authors)] Address: Gossum, H.

van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgoosum@ruca.ua.ac.be

**3969.** Grand, D.; Roché, B. (2003): Complément à la faune des Odonates de Corse et nouvelles observations de *Somatochlora metallica meridionalis* Nielsen, 1935 (Odonata, Anisoptera, Corduliidae). *Martinia* 19(2): 57-60. (in French with english summary). [In July 2002, four new localities of *S. meridionalis* in southern Corsica, France could be traced. Records of *Chalcolestes parvidens* and *Somatochlora flavomaculata* are added, the presence of *Paragomphus genei* and *Orthetrum anceps* could not confirmed.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

**3970.** Grand, D. (2003): L'africain *Trithemis annulata* (Palisot de Beauvois, 1805) s'installe en Languedoc (Odonata, Anisoptera, Libellulidae). *Martinia* 19(4): 158-160. (in French, with English summary). [In August 2003, *T. annulata* was discovered in the French départements of Aude and Hérault. The habitats are briefly described, and the records are discussed as an additional example of range extensions of African species as a consequence of global warming.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

**3971.** Grand, D. (2003): Observation tardive de Libellules au Maroc. *Martinia* 19(4): 148. (in French). [Centre of Marrakech, Morocco; 24-XII-2002; *Sympetrum fonscolombii*, *Sympetrum striolatum* cf. *Trithemis annulata*, *T. kirbyi*] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

**3972.** Guerbaa, K.; Hennequin, E. (2003): Mise en place d'un suivi des peuplements d'Odonates de la tourbière de la Ferrière (Communes de Davignac et Bonnefond, Corrèze). Premiers résultats après deux ans. *Martinia* 19(3): 99-107. (in French with English summary). [To control the efficiency of habitat development measures in the Ferrière peat-bog, the Odonata were surveyed. The preliminary results are documented. In general, the odonate fauna is in a process of consolidation, but typical species as *Leucorrhinia dubia* could be recorded.] Address: Guerbaa, K., Conservatoire Régional des Espaces Naturels du Limousin, 6 ruelle du Theil, F-87510 Saint-Gence, France

**3973.** Hämäläinen, M. (2003): *Cryptophaea*, a new euphaeid genus and three new species of Caloptera damselflies from Thailand (Odonata: Euphaeidae, Calopterygidae). *Zool. Med. Leiden* 77(25): 441-454. (in English). ["The euphaeid specimens from Doi Suthep (North Thailand) identified and redescribed by Asahina in 1987 as *Schmidtphaea schmidi* are not conspecific with the holotype of *S. schmidi* Asahina, 1978, from Manipur (North-east India), but represent a distinct new species described as *Cryptophaea saukra* gen. & spec. nov. *Bayadera vietnamensis* van Tol & Rozendaal, 1995 and *Schmidtphaea yunnanensis* Davies & Yang, 1996, are transferred to the genus *Cryptophaea* gen. nov. *Anisopleura trulla* spec. nov. from South Thailand is described and "*Caliphaea confusa* sensu Asahina, 1985" from Doi Inthanon (North Thailand) is described as *C. angka* spec. nov.] Address: Hämäläinen, M., Department of Applied Biology, P.O. Box 27, FIN-00014 University of Helsinki, Finland. E-mail: matti.hamalainen@helsinki.fi

**3974.** Hämäläinen, M. (2003): The 150 year anniversary of Selys' Synopsis des Caloptérygines. *Malangpo* 20: 196-200. (in English). [The paper acknowledges the outstanding work of Baron Michel-Edmond de Selys Longschamps (1813-1900) with special emphasis on the "Synopsis des Caloptérygines". The paper outlines the classification system and regional coverage of the species. App. 230 taxa have been known to Selys. At present, the number of the known Caloptera is already over 450 species. Many taxa await description, and the number of species in Caloptera is believed to pass the limit of 500 species.] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**3975.** Hatchings, G. (2003): Another dot on the map - *Aeshna tuberculifera* from north-central Saskatchewan. *Argia* 15(3): 9-10. (in English). [Canwood, Saskatchewan, Canada; continuation of range extension of *A. tuberculifera*.] Address: Hatchings, G. E-mail: sea-trek@islandnet.com

**3976.** Hatchings, G. (2003): Observations of an ovipositing dragonfly frenzy in the rain. *Argia* 15(3): 8-9. (in English). [Oviposition of dozens of *Aeshna eremita* was taking place in a real down-pour, but it was "also fairly dark with the thick, black clouds covering the sun low on the horizon. This downpour which must have been like large water-filled balloons to a dragonfly's wing, didn't slow down their hectic flight but did cause some to do these somersaults in mid-air. I could easily make out their complete flips and the reason they perform mis - to rid themselves of the water they had accumulated, flinging it off in all directions. It was cool to see this at such close proximity and as a backdrop, the sound of thunder and the flash of lightning. [...] (Author)] Address: Hatchings, G. E-mail: sea-trek@islandnet.com

**3977.** Hatchings, G. (2003): Where do dragonflies go when they die? *Argia* 15(3): 9. (in English). [Saskatchewan, Canada, 24.VIII. 2003; several adults with tattered outer wing margins plunged onto the surface only to be trapped by the surface tension, where they end stuck upside down. "Now, I'm sure many of us have seen this behaviour and have noted how these dragonflies almost seem Osprey-like in how they can extract themselves from the surface, somersault in the air [...], and carry on. I've seen mating or battling pairs perform this stunt with bom leaving the water eventually either singly or attached as a copulating pair. However, these observations I made in late August of aged individuals appeared almost as if they intended to remain here to die. At this latter site on the large lake, I observed two individuals about 15 metres offshore, plunge in and remain fluttering upside down on the surface for up to 15 minutes [...]. Their fluttering frequency diminished to the point where they eventually cooled down and become almost totally motionless." (Author)] Address: Hatchings, G. E-mail: sea-trek@islandnet.com

**3978.** Hayashi, F.; Dobata, S.; Arai, Y. (2003): Countrywide genetic map of DNA of migratory *Pantala flavescens*. In: Arai, Y. (Ed): A Countrywide Survey of Red Dragonflies. Musashino Satoyama Research Group, Institute of Agriculture and Natural environments. 47 pp. Translation: Ishizawa, N., Tokorozawa City, Japan: 24-32. (in Japanese). [To get information on the population genetics of *P. flavescens* in Japan, the DNA of 33 specimens from Japan, and additional 7 from the Mariana

Islands, Cambodia, and South Korea was analyzed. The primarily results suggest, that the species is highly migratory, and populations of it from oceanic islands far south of Japan toward the Indochina Peninsula have genetic exchanges to each other, as well as those in Japan.] Address: Arai, Y., 1233-2, Oaza Sueno, Yorii-machi, Osato-gun, Saitama Pref., 369-12, Japan.

**3979.** Hazet, G. (2003): Contribution à la connaissance de la faune odonatologique de l'île-au-Moine (Commune de Martot, département de l'Eure). *Martinia* 19(3): 97-98. (in French with English summary). [At the confluence of the river Eure into the Seine, 11 odonate species could be found.] Address: Hazet, G., 24, rue Martin, F-76320 Caudebec-lès-Elbeuf, France

**3980.** Heidemann, H. (2003): Analyses d'ouvrages: - Landschaft in neuer Bestimmung / Russische Truppenübungsplätze, par Horst Beutler. 2000 - Die Libellen Baden-Württembergs, Band 2, par Klaus Sternberg et Rainer Buchwald. 2000. *Martinia* 19(3): 119-120. (in French). [reviews] Address: Heidemann, H., Au in den Buchen 66, D-76646 Bruchsal, Germany

**3981.** Herren, B. (2003): Erstnachweis von *Sympetrum fonscolombii* (Sel.) in den Vereinigten Arabischen Emiraten (Anisoptera: Libellulidae). *Notul. odonat.* 6(2): 24. (in German). [1 male, Fujairah National Dairy Farm nr Dibba; 27 Jan. 2003.

**3982.** Hubble, D.S.; Hurst, D. (2003): Management of small dug ponds for Odonata conservation and colonization in an area of valley mire and wet heathland (Bourne Valley, Dorset). *J. Br. Dragonfly Society* 19(1/2): 24-34. (in English). ["Since 1996, and possibly earlier, around 30 small ponds have been dug for nature conservation purposes at a variety of locations within a six hectare area of valley mire and wet heath within the Bourne Valley Local Nature Reserve, Dorset. The site is nationally important for its dragonfly community, supporting 65 per cent of British species of Odonata, and is also noted for its other heathland flora and fauna, including all six British reptile species. To investigate the pattern of colonization over time by Odonata and other aquatic fauna, six ponds were sampled with all Odonata, Trichoptera, Coleoptera and newts (*Triturus*) identified and recorded. Odonata were more abundant and diverse in ponds six or more years old. Coleoptera also increased with age of pond, while Trichoptera decreased. Overall abundance and diversity of aquatic fauna were closely related with the greatest increases within the first three years after pond creation. After this, there was less increase in overall abundance and diversity and changes in community structure were seen. Therefore, to maximize the biodiversity of Odonata and other aquatic invertebrates, a full spectrum of pond ages is required. As some fill and dry, others are newly dug and there is a continual rotating succession of pond habitats. As well as increasing structural diversity within the pond system, more specific aims of heathland pond management are presented which may promote colonization by diverse Odonata populations." (Authors)] Address: Hubble, D.S., Ecological Monitoring & Research, 7 Ainsley Gardens, Eastleigh, Hampshire, UK

**3983.** Ishizawa, N. (2003): Population dynamics in *Sympetrum frequens* at the Okumusashi Hills. In: Arai, Y. (Ed): A Countrywide Survey of Red Dragonflies. Musashino Satoyama Research Group, Institute of Agriculture and Natural environments. 47 pp. Translation: Ishi-

zawa, N., Tokorozawa City, Japan: 38-43. (in Japanese). [*S. frequens* is said to spend its pre-reproduction period in highlands in summer far away from the breeding grounds in the lowlands. This widely accepted description of seasonal habitat change is questioned because of recent observations of summering in lowlands. (1) The author compiles the current status of knowledge. (2) He reports on his survey made at three sections of different altitude in Hanno City, Saitama Pref., Japan. Three transects were surveyed ten times between July and October 2002. Observation of first and last records, changes of population density at each of the three transects, perching on electric wires, migration, maturity, oviposition at high elevations, and co-occurring *Sympetrum*-species are documented and discussed.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozawa City, Saitama Pref., Japan. E-mail: isizawa7@rivo.mediatti.net

**3984.** Iwabuchi, S.; Ukawa, Y. (2003): Survey of Red Dragonflies by using Internet. In: Arai, Y. (Ed): A Countrywide Survey of Red Dragonflies. Musashino Satoyama Research Group, Institute of Agriculture and Natural environments. 47 pp. Translation: Ishizawa, N., Tokorozawa City, Japan: 19-23. (in Japanese). [The paper outlines the concept and the technical equipment of the countrywide survey of red dragonflies in 2002. For more details see: <http://map.edb.miyakyo-u.ac.jp/akatombo/>] Address: Ukawa, Y., Environmental Education Research Center of Miyagi University of education, Japan

**3985.** Jacquemin, G.; Boudot, P. (2003): Le deuxième Symposium International d'Odonatologie de la W.D.A. («Worldwide Dragonflies Association») en Suède (22-27 juillet 2001). *Martinia* 19(2): 68-70. (in French). [Brief report of the WdA symposium in Gällivare, Sweden including some remarks on records made in the framework of a post symposium trip to Finland.] Address: Jacquemin, G., Biol. d. Insectes, Université H. Poincaré, Nancy 1, BP 239, F-54506 Vandoeuvre-lès-Nancy, France

**3986.** Jezierska-Madziar, M.; Gromadzińska-Graczyk, H.; Golski, J.; Dziurba, A. (2003): Zoobenthos of the Warta River oxbows as an important fish food. Abstracts of papers and posters presented at the 19th Symposium of Polish hydrologists, Fac. Biol., Univ. Warsaw, 9-12 Sept. 2003: 70. (in Polish). [passing reference to Odonata only.] Address: Katedra Rybactwa Śródlądowego Akwakultury, AR im. Augusta Cieszkowskiego w Poznaniu, ul. Wojska Polskiego 28, PL-60-625 Poznań, Poland. E-mail: madziar@owl. au.poznan.pl

**3987.** Jödicke, R.; Tol, J. van (2003): Case 3253 - *Libellula aenea* Linnaeus, 1758 (currently *Cordulia aenea*) and *L. flavomaculata* Vander Linden, 1825 (currently *Somatochlora flavomaculata*; Insecta, Odonata): proposed conservation of usage of the specific names by the replacement of the lectotype of *L. aenea* with a newly designated lectotype. *Bulletin of Zoological Nomenclature* 60(4): 272-274. (in English). ["The purpose of this application is to conserve, under Article 74.1 of the Code, the current usage of the names of two dragonfly species. In 1758, Linnaeus established the name *Libellula aenea* for three specimens. These have subsequently been recognized as belonging to two species: *L. aenea* and *L. flavomaculata* Vander Linden, 1825. In 1956, Fraser designated one of Linnaeus's specimens as the lectotype of *L. aenea*. However, the



specimen he designated was the one used by Vander Linden to denote his species *L. flavomaculata*. Fraser's action made *L. aenea* a senior objective synonym of *L. flavomaculata*. It is proposed that one of Linnaeus's specimens other than the one selected by Fraser be designated as the lectotype of *L. aenea*, thus conserving prevailing usage of both names." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: r.joedicke@t-online.de

**3988.** Joniak, T.; Klimaszyk, P.; Domek, P. (2003): A comparative analysis of humus lake macrofauna communities in Drawieński and Wielkopolski national parks. Abstracts of papers and posters presented at the 19th Symposium of Polish hydrologists, Fac. Biol., Univ. Warszaw, 9-12 Sept. 2003: 71. (in Polish). [Poland; Lake Głodne Jezioro III (0,65 ha), Lake Głodne Jezioro IV (0,42 ha), Drawieński National Park, Lake Głębokie (0,5 ha); *Enallagma cyathigerum*, *Ischnura elegans*, *Pyrrhosoma nymphula*, *Cordulia aenea*, and *Somatochlora metallica* are listed.] Address: Joniak, T., Zakład Ochrony Wód, Uniwersytet im. A. Mickiewicza, ul. Drzymały 24, PL-60-613 Poznań, Poland. E-mail: tjoniak@hoga.pl

**3989.** Kalkmann, V.; Ketelaar, R.; Weide, M. van der (2003): Libellen (Odonata) in de Periode 1998-2002. In: EIS-Nederland, De Vlinderstichting en de Nederlandse Vereniging voor Libellenstudie (Hrsg.). Waarnemingen-verslag dagvlinders, libellen en springhanen: 31-53. (in Dutch). [Netherlands; distribution maps resp. maps with records of 64 Odonata are documented and discussed.] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: ketelaar@vlinderstichting.nl

**3990.** Kano, K. (2003): An attempt of interspecific tandem formation with a female of *Planaeschna milnei* (Selys) by a male of *Boyeria maclachlani* (Selys). *Boso no Konchu* No. 31: 5. (in Japanese). ["On September 14, 2003, I saw a female of *P. milnei* ovipositing at a river at Obuta, Chonan-machi, Chosei-gun, Chiba Pref., Japan. It was attacked by a patrolling male of *B. maclachlani*, and fell onto the stream each other. The male struggled to copulate with the female for about 2 minutes, but it did not succeed and flew away. The female was unable to alight from the water and was carried away by the stream. Both species usually differ their habitat each other; in *P. milnei* in upper reaches of a stream and in *B. maclachlani* in the mid stream. My observation spot is a junction of a branch stream and the mid stream of the river, where both habitats might have been connected. I think the male might have mistaken the female for a conspecific female." (Taken from Digest of Japanese Odonatological Short Communications 15; edited and translated by ISHIZAWA, Naoya).] Address: Kano, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**3991.** Kano, K. (2003): Copulating flight of a male *Boyeria maclachlani* (Selys) with an inactive female. *Gekkan-Mushi* 394: 25-26. (in Japanese). ["I saw a male *B. maclachlani* attempting copulation on an inactive congener female at the Obuta river at Chonan-machi, Chosei-gun, Chiba Pref., Japan on August 15, 1998. On that day it was fine, and around noon males flew about at the river and approached females for copulation. At 3:00 p.m. I found on the bank an inactive female with its four wings cut at the middle of them, only main

veins left. I picked it up and released it, however, it fell on the ground without fluttering. When put on a rotten log, which is a suitable oviposition substrate, a male appeared after a while took her into tandem formation to fly off. The male attempted to copulate with her, pulling her near him. They fell on to the water, struggling and somehow took tandem formation on the surface of the water. They flew up from the water and perched on a bamboo stem near my observation spot. When I approached it flew up and disappeared." (Taken from Digest of Japanese Odonatological Short Communications 15; edited and translated by ISHIZAWA, Naoya).] Address: Kano, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**3992.** Kano, K. (2003): Male-male tandem formation in *Boyeria maclachlani* (Selys). *Boso no Konchu* 31: 5. (in Japanese). [River at Obuta at Chonan-machi, Chosei-gun, Chiba Pref., Japan; on September 14, 2003, a perched male-male tandem of *B. maclachlani* was observed. The connected male was dead. Its head was twitched oppositely, however, the pseudopupils were still fresh on the green compound eyes. Its right foreleg hung on its right forewing. (Taken from Digest of Japanese Odonatological Short Communications 15; edited and translated by ISHIZAWA, Naoya).] Address: Kano, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**3993.** Kiauta, B. (2003): A note on the Odonata collection of the Rev. Father Gabriel Strobl (1946-1925) in the Benedictine Abbey at Admont, Austria. *Notul. odonat.* 6(2): 14-19. (in English). ["A brief description is provided of a collection containing 62 European and 119 non-European species, mostly from Austria and northern Italy, but also from various regions of Africa, Asia and the Americas. [...] The note does not provide a taxonomic review of this collection; its sole objective is to draw attention to the valuable material in the Natural History Museum of the Benedictine Abbey at Admont. The Museum and all its collections were assembled by Strobl singlehandedly between 1866 and 1910." (Author)] Address: Kiauta, B., P.O. Box 256, NL-3720 AG Bilthoven, The Netherlands

**3994.** Klaus, D. (2003): Tagung Sächsischer Entomologen am 11.10.2003 Dresden (Gemeinschaftsveranstaltung des Landesverbandes Sachsen der Entomofaunistischen Gesellschaft e.V. und des Staatlichen Museums für Tierkunde in Dresden). *Mitt. Sächs. Entomol.* 65: 11-13. (in German). [In the framework of the scheduled 'Dragonfly fauna of Saxonia', Dr. Thomas Brockhaus gave a lecture on the current status of the Odonata fauna of Saxonia, Germany. New data of 2003 should be added, and special emphasis is given to the range extensions of *Gomphus vulgatissimus* and a new record of *Leucorrhinia caudalis*.] Address: Klaus, D., Heimstätten 10, D-04571 Rötha, Germany

**3995.** Koch, H.-M. (2003): Emergenz mehrerer Arten an einem einjährigen Gewässer. *mercuriale* 3: 31-35. (in German). [Insee, NSG Listhof, Baden-Württemberg, Germany; the emergence of the following species is documented in detail: *Anax imperator*, *Sympetrum striolatum*, *Sympecma fusca*, *Lestes sponsa*, *Libellula depressa*, *Orthetrum cancellatum*, and *O. brunneum*.] Address: Koch, H.-M., Krämerstr. 40, D-72764 Reutlingen, Germany. koch.druckerei@t-online.de

- 3996.** Korytcińska, M.; Tończyk, G. (2003): Odonate fauna of the Liwiec river (Południowopodlaska and Środkowomazowiecka Lowlands). Abstracts of papers and posters presented at the 19th Symposium of Polish hydrologists, Fac. Biol., Univ. Warszaw, 9-12 IX. 2003: 88. (in Polish). [The odonate fauna of the Południowopodlasla floodplain is hardly known. In 2000 and 2002, 12 localities along the river Liwiec, a left tributary of the river Bug (Poland), were sampled for Odonata. A total of 11 species was recorded, among them *Stylurus flavipes*, and *Ophiogomphus cecilia*. Dominant species have been *Calopteryx splendens*, *C. virgo*, *Platycnemis pennipes*, and *Gomphus vulgatissimus*.] Address: Korytcińska, Małgorzata, Katedra Ekologii i Ochrony Środowiska, Akademia Podlaska, Siedlce, ul. B. Prusa 12, PL-08-110 Siedlce, Poland. E-mail: gosiak@ap.siedlce.pl
- 3997.** Krech, M.; Lindner, I. (2003): Die Bedeutung von Sekundärgewässern als Lebensraum seltener und gefährdeter Libellenarten am Beispiel der Ziegeleiteiche Pölchow (Landkreis Bad Doberan). *Archiv der Freunde der Naturgeschichte in Mecklenburg* 42: 87-100. (in German). [A five year study of the odonate fauna in clay pits near Pölchow, Mecklenburg-Vorpommern, Germany resulted in 31 odonate species. Among the species most noteworthy are *Leucorrhinia caudalis*, *L. pectoralis*, *Libellula fulva*, and *Erythromma viridulum*. The emergence of *Brachytron pratense* (2003) and *Cordulia aenea* (2001) is documented in detail. Conservation measures are discussed.] Address: Krech, M., Ziolkowskistr. 11, D-18059 Rostock, Germany
- 3998.** Krech, M.; Biele, S. (2003): Reproduktionsnachweise der Zierlichen Moosjungfer (*Leucorrhinia caudalis* Charpentier, 1840) im Warnowtal mit Anmerkungen zum aktuellen Verbreitungsstatus der Art in Mecklenburg-Vorpommern. *Archiv der Freunde der Naturgeschichte in Mecklenburg* 42: 101-107. (in German). [*L. caudalis* is autochthonous in a 12 years old, groundwater-fed clay pit near Pölchow, Mecklenburg-Vorpommern, Germany. Phenology, emergence-habitat, and co-occurring odonate species are described, and threats are discussed.] Address: Krech, M., Ziolkowskistr. 11, D-18059 Rostock, Germany
- 3999.** Krekels, R. Jong, T. de (2003): Krabbescheer en Groene glazenmaker in de provincie Utrecht. *Prov. Utrecht, Utrecht*: 15 pp. (in Dutch). [*Stratiotes aloides* and *Aeshna viridis* in the province of Utrecht, the Netherlands: This attractive, richly illustrated booklet, outlines the biology and distribution of the 2 taxa in the province, and presents detailed suggestions for conservation management measures directed to the *Stratiotes* vegetation, which is mandatory for the persistence of the *A. viridis* population.] Address: Available from: Ecologisch onderzoek en Groene regelgeving, Provincie Utrecht, P.O. Box 80300, NL-3508 TH Utrecht, The Netherlands. (Coordinator: Jandirk Kievit: jandirk.kievit@province-utrecht.nl)
- 4000.** Kunz, B. (2003): Die Falsche geangelt - Teil II. *mercuriale* 3: 39. (in German). [Saarbergweiher, LK. Schwäbisch Hall, Baden-Württemberg, Germany; 04.IX.2003; mixed pair between a male *Sympetrum sanguineum* and a female *S. danae*.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de
- 4001.** Kunz, B. (2003): Mehrere Beobachtungen von *Sympetrum meridionale* in NO-Württemberg. *mercuriale* 3: 36. (in German). [Lk Schwäbisch Hall, Baden-Württemberg; three records of *S. meridionale* are briefly documented] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de
- 4002.** Kunz, B.; Hunger, H. (2003): Phänologiedaten 2003 einiger Libellen aus Mitteleuropa. *mercuriale* 3: 41-42. (in German). [Records refer to the following species from Switzerland and Baden-Württemberg, Germany: *Calopteryx virgo*, *Anax parthenope*, *Libellula depressa*, *Libellula quadrimaculata*, *Orthetrum cancellatum*, *Crocothemis erythraea*, *Sympetrum fonscolombii*, *S. pedemontanum*, *S. striolatum*, and *Leucorrhinia pectoralis*.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de
- 4003.** Leroy, T. (2003): *Coenagrion lunulatum* (Charpentier, 1840) et *Coenagrion hastulatum* (Charpentier, 1825): espèces nouvelles pour le département de l'Aveyron (Odonata, Zygoptera, Coenagrionidae). *Martinia* 19(4): 154-157. (in French, with English summary). [2-VI-2002, Curières, Dept. Aveyron, France. With focus on *C. lunulatum* and the region of Aubrac, the distribution of the species is discussed.] Address: Leroy, T., Le Bourg, F-63210 Heume-l'Eglise, France. E-mail: thierryleroy@caraimail.com
- 4004.** Lissak, W. (2003): Beitrag zur Libellenfauna im nördlichen Vorland der Schwäbischen Alb. *mercuriale* 3: 12-19. (in German). [Report on the present status of many odonate species resulting on a mapping scheme starting in the mid of the 1980s. Changes in the faunal composition and abundance (range declines, range extensions, global warming) are documented and discussed.] Address: Lissak, W., Schubartstr. 12, D-73092 Heiningen, Germany. E-mail: W.Lissak@naturschutzzentrum-schopfloch.de
- 4005.** Lodge, R.J.; Freeland, J.R. (2003): The use of Odonata museum specimens in questions of molecular evolution. *Odonatologica* 32(4): 375-380. (in English). ["Studies of population genetics and phylogenetics require samples from individuals representing a variety of species and populations. Collecting the necessary individuals may be problematic, particularly for seasonal, rare, or geographically remote organisms. Museum collections therefore provide a potentially valuable resource, and the widespread use of polymerase chain reactions (PCR) means that target regions of DNA can be amplified from very small amounts of tissue. Here modifications to DNA extraction techniques are described that have allowed the authors to extract, amplify, and sequence a portion of mitochondrial DNA from parts of single dragonfly legs taken from museum specimens up to 80 yrs old. It is anticipated that in future these techniques will be applied to a range of odonate studies, including questions of conservation genetics." (Authors)] Address: Freeland, J.R., Dept of Biological Sciences, Open University, Walton Hall, Milton Keynes, MK7 6AA, United Kingdom. E-mail: J.R.Freeland@open.ac.uk
- 4006.** Lohr, M. (2003): Étude faunistique des Odonates des plaines alluviales de l'Allier et de quelques affluents au nord-ouest de Moulins (Départements de l'Allier, du Cher et de la Nièvre). *Martinia* 19(4): 123-148. ["The results of a field survey on Odonata realized

between 1995 and 2002 in the alluvial floodplains of the lower Allier valley as well as in those of some tributaries are presented. The Odonata population of different types of habitats were studied during 10 field trips by observing adults and collecting exuviae at 65 sampling sites. The total number of species observed within the present study amounts 50, at least 40 of them are autochthonous. The study results of the Odonata population are presented for each type of aquatic habitat. The importance of the investigated area for conservation and protection of Odonata and alluvial ecosystems even at European level can be derived - among other things - from the extraordinary richness of the Odonata population. This richness is particularly demonstrated by the Odonata population of the main channel of the river Allier, where 19 autochthonous species were observed, 6 of them belonging to Gomphidae. The author discusses the possibilities of conservation and protection of the lower Allier alluvial floodplains. Finally the results are considered with regard to regeneration measures for other alluvial floodplains in Central Europe." (Author)] Address: Lohr, M., Fachhochschule Lippe und Höxter, Fachgebiete Tierökologie und Landschaftsökologie, An der Wilhelmshöhe 44, D-37671 Höxter, Germany. E-mail: mlohr@fh-hoexter.de

**4007.** Lucas, B. (2003): Overwintering of larvae of the Common Darter *Sympetrum striolatum* (Charpentier) in the north of England. *J. Br. Dragonfly Society* 19(1/2): 1. (in English). [On 10 December 2001, larvae of *Sympetrum spec.* with only 1.5mm in length were traced. Both *Sympetrum striolatum* and *S. sanguineum* are recorded from the site. "During 2001, both species had an extended flying season in this area, which may account for non-diapause eggs being laid so late in the year. The larval growth of overwintering *S. striolatum* has been recorded at a pond in the New Forest [...]. However, at the same time of year these larvae were twice the size of the Yorkshire ones, i.e. 3mm in length. Research to discover whether such small larvae could withstand a Yorkshire winter was undertaken. I decided to measure the larvae approximately every two weeks. This entailed pond dipping, measuring the larvae at home and then returning them to the pond. On only two occasions did thick ice inhibit access to open water. It was assumed that, as the larvae were only 1.5mm in length when first collected, they were in the second stadium, i.e. the first stadium after the prolarva. As expected, from 10 December 2001 to the end of February 2002, no growth took place. The rate of growth of the larvae until emergence of the adult insect matched that of the New Forest larvae, but was three to four weeks later in the year, this time difference being constant throughout the study. On 13 July 2002, no larvae were found and in fact *S. striolatum* was on the wing. Further visits have been made and exuviae collected. All were *S. striolatum*. Therefore, it seems safe to assume that none of the larvae recorded were *S. sanguineum*." (Author)] Address: Lucas, B., 8 Camborne Drive, Fixby, Huddersfield, West Yorkshire HD2 2NF, UK

**4008.** Martens, A.; Jödicke, R.; Suhling, F. (2003): An annotated checklist of the Odonata of Namibia. *Cimbebasia* 18: 139-160. (in English). ["This paper presents an annotated checklist of the Odonata of Namibia, which provides information for each recorded species on: World distribution, previous published records, detailed distribution within Namibia and specific notes where appropriate. To date, 102 species of Odonata

have been recorded from Namibia. Additionally, 9 species have been recorded from Botswana and Zambia at stretches of the Chobe/Linyanti and the Zambezi Rivers forming the Namibian borders. These species are also taken into account in the checklist. As many other species are recorded in Angola, in close proximity to the Namibian border further species are to be expected. In addition to the checklist, we further present some general distributional patterns of Namibian Odonata, being: (a) tropical running water species, mainly restricted to the northern or northeastern perennial rivers, (b) tropical species not restricted to running waters, but adapted to more humid environmental conditions, (c) species adapted to arid conditions; being mobile, having opportunistic habitat selection and rapid development, and being widespread in Namibia, (d) species of permanent waters occurring at isolated spots within Namibia, and (e) southern, subtropical species, restricted to the south." (Authors)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**4009.** Martens, A. (2003): Reproductive behaviour of African Odonata - a review. *Cimbebasia* 18: (in English). ["This paper presents a review of the reproductive behaviour of African Odonata, outlines our current knowledge, and further defines priorities for gathering information required to understand biodiversity patterns and evolution of mating systems. To date, information on reproductive behaviour is available for approximately 130 of the 850 species of Odonata known from Africa. A full bibliography of published papers in this field is provided. The aim of this paper is to stimulate systematic collection of previously unpublished observations and to encourage a broader approach to behavioural ecology by including experiences and observations of entomologists who regard themselves as non-specialists in this field. Priorities are defined, with special attention being given to the description and analysis of: (1) reproductive habitats, (2) species-specific behavioural patterns, (3) plasticity of behaviour within a species, (4) the search for behavioural patterns on a higher taxonomic level, and (5) placing behaviour in an ecological context." (Author)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**4010.** Martens, A.; Suhling, F. (2003): The barbed inflorescences of the grass *Setaria verticillata* (L.) Paliot de Beauvois (Poaceae) as a lethal trap for dragonflies (Odonata). *Cimbebasia* 18: 243-246. (in English). ["At a pond below the Von Bach Dam near Okahandja, Namibia, adults of the libellulid anisopteran dragonflies *Crocothemis erythraea* (Brullé) and *Diplacodes lefebvrei* (Rambur) were observed being trapped by flowering stands of *Setaria verticillata* (Poaceae). The spiny seeds of this grass offer a means of seed dispersal by animals. As this species grows beside water, this grass serves fortuitously as a trap for adult dragonflies, especially males, which often use such conspicuous, upright structures as perching sites. Other published accounts of the same phenomenon from throughout the World are summarised." (Authors)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de



- 4011.** Masselot, G.; Nel, A. (2003): Les Odonates sont-ils des taxons bio-indicateurs? *Martinia* 19(1): 7-40. (in French with English summary). ["From a definition of the « biological indicator » concept, which covers very different uses (bio-monitoring, sentinel organisms, bio-informative species), a critical review of the significant contributions using Odonata is carried out. Autochthony of Odonata is discussed. Some synecoparsimony analyses are proposed, which expose a new method to study the relations between Odonata and macrophytes. These tend to show that this relation is not an association, but rather simply a « synecosis », and that many problems do not authorize, in the current state of knowledge, to establish a reliable tool for description of hydrosystems bioassessment, resting on the only conjunction between freshwater macrophytes and Odonates. Complementary studies, including both the whole of the freshwater entomocoenosis for example, and analysis tools that do not introduce neither preliminary scenarisation (ad hoc hypotheses), nor methodological bias, must be undertaken as prerequisites to elaborate a biomonitoring tool for freshwater hydrosystems assessment." (Authors)] Address: Masselot, G., Laboratoire d'Entomologie, Muséum National d'Histoire Naturelle, 45, rue Buffon, F-75005 Paris, France. E-mail: gm@invfinr.org
- 4012.** Masselot, G. (2003): Présentation succincte de la thèse : «La synécoparcimonie: un outil d'évaluation biologique de la qualité des eaux courantes. Théorie et applications». *Martinia* 19(1): 5-6. (in French with English summary). [This is a brief presentation of a thesis titled «Synecoparsimony: a freshwater biomonitoring tool. Theory and applications», comprising 417 pp and appendices, and presented at the Laboratoire d'Entomologie, Muséum National d'Histoire Naturelle, Paris, France. A facsimile of the thesis' cover is documented.] Address: Masselot, G., Laboratoire d'Entomologie, Muséum National d'Histoire Naturelle, 45, rue Buffon, F-75005 Paris, France. E-mail: gm@invfinr.org
- 4013.** Mayer, J. (2003): Zur Libellenfauna des NSG Schopflocher Moor ("Tongrube"). *mercuriale* 3: 4-5. (in German). [The peat bog, in the past years excavated for peat cutting and clay mining, was revitalised. The colonisation by Odonata is briefly outlined with special emphasis on the peat bog species. *Aeshna juncea*, *Sympetrum danae*, and *Libellula quadrimaculata* are reproducing, and a dispersing *Leucorrhinia dubia* was observed.] Address: Mayer, J., Dorfstr. 57, D-73061 Ebersbach-Rößwälden, Germany. JohannesDMayer@web.de
- 4014.** Mead, K. (2003): Findings of the 2003 Great Lakes Odonata Meeting. *Argia* 15(3): 1-3. (in English). [Report and list of collected species from the 2003 Great Lakes Odonata Meeting held in Finland, Minnesota, USA.] Address: Mead, K., 6388 Lax Lake Rd., Finland, MN 5560, USA
- 4015.** Meurgey, F. (2003): Comptage d'exuvies et observations relatives à l'émergence d'*Aeshna juncea* (L., 1758) en Haute-Savoie. *Martinia* 19(3): 92. (in French). [Ste Foy Tarentaise, Haute-Savoie, France, 2800 a.s.l.; the emergence habitat of *A. juncea* is described.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr
- 4016.** Meurgey, F. (2003): Les Odonates dans le régime alimentaire de la Cigogne blanche (*Ciconia ciconia*) - nouvelle donnée en Loire-Atlantique. *Martinia* 19(3): 108. (in French). [The stomach of a dead White stork found in August contained 95% of Odonata, nearly exclusively *Sympetrum* sp.. *Sympetrum* is the most abundant species around lake Grand-Lieu in August, and the White stork is known to feed opportunistically.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr
- 4017.** Meuris, L. (2003): Merkwaardige waarnemingen bij de voortplanting van de Bloedrode heidelibel (*Sympetrum sanguineum*). *Gomphus* 19(1): 33-35. (in Dutch with English and French summaries). [Belgium; observations of reproduction behaviour of *Sympetrum sanguineum*.] Address: Meuris, L., Van Bockstaelestraat 7, B-9050 Ledeborg, Belgium. E-mail: Luc.meuris@pan-dora.be
- 4018.** Mey, D. (2003): Vorkommen und Beobachtungen zur Verhaltensweise der Feuerlibelle *Crocothemis erythraea* Brullé, 1832 (Odonata: Libellulidae) in Thüringen. *Veröffentlichungen Naturkundemuseum Erfurt* 22: 137-148. (in German with English summary). [Since 2001, *C. erythraea* has been recorded in Thuringia, Germany at three habitats: in the gravel pits near Herrenhof in Central Thuringia, at Silbersee lake in the Hainich National Park in Western Thuringia, and at the former peat-cutting pit near Mühlberg in Central Thuringia. At the two latter water bodies, mating, copula, oviposition, and territoriality of the species was observed. Larvae or exuviae were not found. The records are documented and discussed in detail. Co-occurring odonate species - including *Coenagrion mercuriale* and *Leucorrhinia pectoralis* - are listed in an table.] Address: Mey, D., Karl-Hermannstr. 3, D-99848 Wutha-Farnroda, Germany
- 4019.** Michoński, G. (2003): The first record of *Sympetrum depressiusculum* (Sélys, 1841) (Odonata: Libellulidae) in the Western Pomeranian Lakeland. *Wiad. entomol.* 22(3): 187-188. (in Polish). [Poland, Lutkowo near Dobrzany (15°23N 15°22E), 14.X.2001, 1 male *S. depressiusculum*] Address: not stated
- 4020.** Mielewczyk, S. (2003): The study of entomofauna (Odonata, Hemiptera, Heteroptera, Coleoptera) of the "Niknaça Łąka" peatbog in Stołowe Mountains National Park. *Szczelinc* 7: 59-72. (in Polish, with English summary). [The paper seems to be quite identical with that of Mielewczyk (2002); see OAS 3872.] Address: Mielewczyk, S., Polska Akademia Nauk, Zakład Badań Środowiska Rolniczego i Leśnego, ul. Bukowska 19, PL-60-809 Poznań, Poland
- 4021.** Miller, P.; Miller, K. (2003): East African dragonflies. A guide for residents, students and visitors, with colour plates and keys.. *Nature Kenya*, Nairobi. ISBN 9966-9921-3-8: X + 263 pp., 8 col. pls incl. (in English). [Peter Miller, outstanding odonatologist of the past century and teacher for many of us, together with his wife Kate spent a significant time of his life studying African Odonata. He planned to intensify these studies and to write a book on African dragonflies, but was sadly no more in the situation to finish it. On the basis of his and their common ideas, Kate Miller prepared a book in the memorial of Peter. The book intends "to aid appreciation and conservation of dragonflies of East Africa. It

was written for School and University students and other residents in Kenya, Tanzania and Uganda, and also for visitors". Unique in its scope, it provides all the basic information required by a student of African odonate ecology, biology and behaviour, including a checklist of East African species, a key to the families and genera, and a very informative glossary. 30 selected species are introduced in a monographic way. Each species is depicted by a colour photo, and morphological characters are outlined. Much hitherto unpublished information by the authors is provided. The didactical concept of this book is unique and an authoritative example for introduction into the study of Odonata or any other group of insects. It should not be missing from any odonatological library. The following species have been selected for presentation: *Phaon iridipennis*, *Umma saphirina*, *Lestes virgatum*, *Chlorocypha trifaria*, *Platycypha caligata*, *Pseudagrion melanicterum*, *P. hageni*, *Mesocnemis singularis*, *Platycnemis congolensis*, *Chlorocnemis marshalli*, *C. pauli*, *Elatoneura glauca*, *Ictinogomphus ferox*, *Notogomphus leroyi*, *Paragomphus genei*, *Aeshna ellioti*, *Anax imperator*, *Gynacantha bullata*, *Phyllomacromia funicularia*, *P. nyanzana*, *Brachythemis lacustris*, *B. leucosticta*, *Crocothemis erythraea*, *Hadrothemis coacta*, *Orthetrum trinacria*, *Palpopleura lucia*, *Pantala flavescens*, *Rhyothemis notata*, *Tetrathemis polleni*, and *Tholymis tillarga*.] Order: Price £ 20.- net.: Prepaid orders to be sent to: Mrs A.K. Miller, 68 Blenheim Dr., Oxford, OX2 8DQ, UK

**4022.** Misof, B.; Fleck, G. (2003): Comparative analysis of mt LSU rRNA secondary structures of Odonates: structural variability and phylogenetic signal. *Insect Molecular Biology* 12(6): 535-548. (in English). ["Secondary structures of the most conserved part of the mt 16S rRNA gene, domains IV and V, have been recently analysed in a comparative study. However, full secondary structures of the mt LSU rRNA molecule are published for only a few insect species. The present study presents full secondary structures of domains I, II, IV and V of Odonates and one representative of mayflies, *Ephemera* sp. The reconstructions are based on a comparative approach and minimal consensus structures derived from sequence alignments. The inferred structures exhibit remarkable similarities to the published *Drosophila melanogaster* model, which increases confidence in these structures. Structural variance within Odonates is homoplastic, and neighbour-joining trees based on tree edit distances do not correspond to any of the phylogenetically expected patterns. However, despite homoplastic quantitative structural variation, many similarities between Odonates and *Ephemera* sp. suggest promising character sets for higher order insect systematics that merit further investigations." (Authors)] Address: Misof, B., Dept of Entomology, Researchinstitute Alexander König and Museum of Zoology, Adenauerallee 160, D-53113 Bonn, Germany. E-mail: b.misolf.zfmk@uni-bonn.de

**4023.** Moncomble, M. (2003): Première observation de la reproduction d'*Epitheca bimaculata* (Charpentier, 1825) en Poitou-Charentes et mise à jour des départements mentionnant cette espèce (Odonata, Anisoptera, Corduliidae). *Martinia* 19(4): 149-153. (in French, with English summary). [On 10-V-2003, *E. bimaculata* was traced near Poitou-Charentes, Dept. Vienne, France. The habitat is described in detail, co-occurring odonate species are listed, and the distribution of *E. bimaculata* in France is compiled and discussed.] Address: Mon-

comble, M., 5, Thublier de Vielleneuve, F-17600 Saint-Romain-de-Benêt, France. E-mail: mathieu-oncomble@tiscali.fr

**4024.** Moore, N.W. (2003): Four long term studies on dragonfly populations. *J. Br. Dragonfly Society* 19(1/2): 2-7. (in English). [Few long term studies on dragonfly populations have been published anywhere in the world. The author summarizes those four that have been undertaken since 1949. "1. A small canalized river (the Portbury River) in the Gordano valley, Avon (previously Somerset), 1949-1952. General studies on the behaviour and ecology of dragonflies and development of the transect technique. In these studies quantitative observations were confined to Anisoptera. References: Moore (1953a, 1953b) 2. Water-filled bomb craters, Arne Heath, Dorset, 1954-1960. Studies on dragonfly behaviour, notably on highest steady density. Reference: Moore (1964) 3. Experimental ponds, Woodwalton Fen National Nature Reserve Cambridgeshire (previously Huntingdonshire). Intensive observations 1962-1988, less intensive 1989 onwards. Studies on changes in populations due to serai development and management of the ponds, and on territorial behaviour. References: Moore (1991, 1995, 2001) 4. Large pond in small private nature reserve, Swavesey, Cambridgeshire. 1984 onwards. Studies on population changes due to habitat development and on the origins of the fauna, on territorial behaviour, and on the behaviour of immature insects. References: Moore (2000, 2001, 2002a,b)." All these sites were revisited during the years after starting the intensive studies. Major changes are briefly discussed.] Address: Moore N.W., The Farmhouse, 117 Boxworth End, Swavesey, Cambridge CB4 5RA, UK

**4025.** Müller, J. (2003): RosMariea Steglich zum 60. Geburtstag. *Entomol. Mitt. Sachsen-Anhalt* 11(2): 84-86. (in German). [This is a brief curriculum vitae of Rosmarie Steglich, currently one of the most profiled odonatologists in the Federal state of Sachsen-Anhalt, Germany, and a specialist for Gomphidae.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**4026.** Müller, J. (Red.) (2003): Programm & Abstracts der 22. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen, 14.-16. März 2003 in Dessau/Elbe, Sachsen-Anhalt. *pedemontanum* 4: 50 pp. (in German / English). [The following lectures have been held in Dessau: Ott, J.: Die Ausbreitung mediterraner Libellenarten nach Deutschland, Mittel- und Nordeuropa - Zusammenstellung aktueller Daten im Hinblick auf einen Klimawandel; Donath, H.: Veränderungen der Odonatenfauna der nordwestlichen Niederlausitz vor dem Hintergrund des Klimawandels; Schiel, F.-J.: Die Libellenfauna der Oberhainauen als Spiegelbild der historischen Verhältnisse und des rezenten Ausbauszustandes; Westermann, K.: Auswirkungen der Hochwasser 1995 und 1999 auf Libellenbestände von Fließgewässern der südbadischen Rheinniederung; Bulankova, E.: Distribution of "FFH-Annex species" of dragonflies (Odonata) in Slovakia and their ecological status; Zimmermann, W. & L. Buttstedt: Ökologische Beobachtungen an vergesellschafteten Subpopulationen von *Coenagrion ornatum* und *C. mercuriale* in der Helme-Unterstrut-Aue; Schmidt, E.: Zur Habitat-Präferenz einiger Sommer-Libellenarten in den Elbauen im Raum Dessau im Hinblick auf den Einfluß von Beweidung mit Großvieh; Clausnitzer, H.-J.: Ausbreitung von *Ceriagrion* te-

nellum und *Orthetrum coerulescens* in der Südheide; Brauner, O.: Beobachtungen zum Vorkommen und zur Reproduktion der Südlichen Mosaikjungfer *Aeshna affinis* in Brandenburg; Lohr, M.: Die Libellenbesiedlung des Unteren Allier nördlich Moulins - naturnahes Vorbild für vergleichbare mitteleuropäische Flüsse; Mauersberger, R.: Erste Antworten auf die Frage, warum *Anax parthenope* im Norden Brandenburgs klare und im Süden trübe Seen besiedelt; Leipelt, K.G.: Habitatspezifisches Driftverhalten der Larven von *Cordulegaster*-Arten: Erklärung für ihre Einnischung?; Kuhn, J.: *Nehalennia speciosa* - eine Schlüsselart im Moornaturschutz; Brockhaus, T.: Die Bestandsentwicklung ausgewählter Libellenarten in Sachsen während der vergangenen 200 Jahre; Burkart, W.: Der Libellen wegen nach Norden? - Ergebnisse langjähriger Libellenbeobachtungen auf der Ostseeinsel Gotland; Martens, A.: Die Wüste lebt! - Verbreitungsmuster der Libellen Namibias in Raum und Zeit; Rüppele, G.: Der Flug der Libellen und seine Bedeutung als Einnischungsmechanismus; Wildermuth, H.: Libellen in der Vorreiterrolle bei der Pflege und Gestaltung von Naturschutzgebieten - ein Beispiel aus der Schweiz; Behrends, T.: Ergebnisse dreijähriger Untersuchungen und Populationsentwicklung naturschutzfachlicher Zielarten in der halboffenen Weidelandschaft Hoeltigbaum bei Hamburg; Serfling, C.: Artenhilfsprogramm für die Libellenarten *Coenagrion mercuriale* und *C. ornatum* in Thüringen; Fliedner, T.: Entwicklung von *Sympetrum pedemontanum* vom Ei bis zum Imaginalschlupf am Sihsee (Schweiz); Jödicke, R.: An welche Libellenart dachte Linné, als er *Libellula aenea* beschrieb?; Kunz, B. & R. Jödicke: *Onychogomphus costae*: Portrat eines ibero-maghrebischen Endemiten; Lohr, M.: Zur Ausbreitung von *Crocothemis erythraea* in der nordrhein-westfälischen und niedersächsischen Oberweserniederung; Mauersberger, R.: Zur Kenntnis der potentiell natürlichen Fischfauna der Seentypen NO-Deutschlands als gedankliche Basis für den Libellenschutz; Richter, M.: Untersuchungen zu Habitatansprüchen und Morphometrie von *Cercion lindenii*; Workshop Fische, Fischerei und Libellenschutz (Konzept und Koordination: Kuhn, J., Seewiesen; Moderation: Martens, A., Karlsruhe); Clausnitzer, H.J.: Teichwirtschaft und Libellen; Clausnitzer, H.-J.: *Aeshna viridis* und Angelsport; Keil, R.: Der Einfluß traditioneller Nutzungsformen der karpenteichwirtschaft auf das Vorkommen und die Entwicklung von Libellen; Martens, A.: Koexistenz von Libellen und Fischen - die evolutionsökologische Perspektive; Ott, J.: Die ökologischen Folgen von Fischbesatz auf Libellenzönosen von Kiesgruben; Schmidt, E.: 20 Jahre GdO: Der offizielle Startpunkt am 4.9.1982 in Bonn; Schnabel, H.: Quantitative Untersuchungen zum Schlupf von Libellen an Fischteichen; Weihrauch, F.: Ein Baggersee mit reicher Libellenfauna trotz intensiver Angelfischerei; Wildermuth, H.: Inwieweit beeinträchtigen Fische die Libellenfauna kleiner Moorgewässer] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.Jmuel-ler@t-online.de

**4027.** Muzlanov, Yu.A. (2003): The pattern of distribution of defects of wing venation in the banded agrion (*Calopteryx splendens*). *Ontogenez* 34(1): 61-66. (in Russian with English summary). [The distribution of morphological structures was studied in wings of the banded agrion (*Calopteryx splendens* Harr.) from different intrapopulation groups. Dragon flies of odd years of emergence are characterized by a more stable pattern of ontogenetic processes according to the mean total

number of venation defects. The sharply increased level of radiation in summer 1986, which coincided with the flight of dragon-flies, could have caused hereditary defects expressed in a sequence of generations of even years of emergence. Apparently, most alternative features of wing venation in dragon-flies can be considered as markers of stability of the ontogenetic processes, which reflect, to a great extent, genotypic features of the organisms in a population. A possible mechanism has been described, which explains the proposed topological model of formation of the venation defects of different types. The increase in mean frequencies of defects can suggest an enhanced development over the aberrant epigenetic trajectories, which may lead to the elimination of these organisms under the influence of various agents, i.e., to the stabilizing selection in a population. The results obtained suggest that defects of venation arise on the stochastic basis and their frequency increases upon destabilization of ontogenetic processes not only by the environmental factors, but also by genetic stress. Venation defects can be successfully used in population biomonitoring." (Author)] Address: Muzlanov, Yu.A., Zarevskii Secondary School, Zarya, Mikhailovskii Raion, Ryazan Oblast, 391728, Russia

**4028.** Nachtigall, W. (2003): 'Aufflug, mit dem Widerstand' bei der Blauflügel-Prachtlibelle *Calopteryx virgo* (Odonata: Calopterygidae). *Entomologia Generalis* 26(4): 241-251. (in German with English summary). [It is shown that - contrary to equal phasic up to antiphase beating of the fore- and hindwings at normal flight and in mating flight (a.o. ANDERS & RÜPPELE 1996) - during quick vertical starts, all wings beat rapidly and synchronously downward. Model measurements using flow visualisation show that hereby a downward travelling vortex ring, very similar to that of a white cabbage butterfly's vertical take-off (ELLINGTON 1980), is generated. When parameters are measurable, calculations using approximation parameters show that an upward directed reaction force corresponding up to double body weight is generated, thus catapulting the insect vertically into the air. The very next wing-beat already shows a pronounced phase shift which permits lift generation. Thereby the possibility of flying by drag generation, that was indicated by RÜPPELE (1985, 1989) but not analysed in terms of flow mechanics was proved using a flight situation that was measurable and the parameters of which could be calculated." (Author)] Address: Nachtigall, W., Allgemeine Biologie, Universität des Saarlandes, D-66041, Saarbrücken, Germany

**4029.** Nagasaka, T.; Motobayashi, T.; Nakagawa, M. (2003): Relation of the rice planting period to the quantity of occurrence of *Sympetrum frequens*. In: Arai, Y. (Ed): A Countrywide Survey of Red Dragonflies. Musashino Satoyama Research Group, Institute of Agriculture and Natural environments. 47 pp. Translation: Ishizawa, N., Tokorozawa City, Japan: 33-37. (in Japanese). [The effects of temporal drainage, irrigation, and harvest of rice plants on *S. frequens* in the paddy fields of the Field Museum Honcho, Field Science Center, University of Agriculture and Technology, Tokyo, Japan are described.] Address: Nagasaka, T., Faculty of Agriculture, Tokyo University of Agriculture and Technology, Japan

**4030.** Naraoka, H. (2003): An early emergence of *Sympetrum frequens* from Aomori City in April. *Ce-*



lastrina 38: 92-93. (in Japanese). [In April, 2003, one teneral *S. frequens* has been found unseasonably at a residence area of Aomori City (morning edition of The Toa Nippou dated April 17). This individual emerged by three months earlier than usual, emerging one month earlier than *Ischnura asiatica* that emerges in early May, and which is the earliest among Odonata in Aomori Prefecture, Japan. (Taken from Digest of Japanese Odonatological Short Communications 15; edited and translated by ISHIZAWA, Naoya).] Address: Naraoka, H., 36-71 Aza Motoizumi, Oaza Fukunoda, Itayanagi-machi, Kita-tsugaru-gun, Aomori Pref., 038-3661, Japan

**4031.** Naraoka, H. (2003): Changes of the body colour of *Nehalennia speciosa* (Coenagrionidae: Odonata). *Gekkan-Mushi* 388: 38-40. (in Japanese) [The cyclo-morphosis of *N. speciosa* is documented with colour photos. Colour change of the adults was observed by breeding the damselflies in a cage of nylon mesh net soon after emergence. The body colour changed successively day by day, and the velocity of the change varied by individual. Seven stages for the male and nine stages for the female colour change were found and documented in a table and colour photographs. Survivorship of a male lasted in maximum 34 days, and for two females 41 days. The specimens in the cage were provided twice a day with plentiful of small insects. (Taken from Digest of Japanese Odonatological Short Communications 15; edited and translated by ISHIZAWA, Naoya).] Address: Naraoka, H., 36-71 Aza Motoizumi, Oaza Fukunoda, Itayanagi-machi, Kita-tsugaru-gun, Aomori Pref., 038-3661, Japan

**4032.** Novelo-Gutierrez, R. (2003): The larva of *Palaeonema domina* Calvert, 1903 (Odonata: Platystictidae). *Transactions of the American Entomological Society* 129(1): 71-75. (in English). ["A detailed description and illustrations of the larva of *P. domina* are provided. *P. domina* shows the most complex color pattern, and is the least setose larva of the three known species of the genus." (Author)] Address: Novelo-Gutierrez, R., Instituto de Ecología, A.C. Departamento de Entomología, 91000, Apartado Postal 63, Xalapa, Veracruz, Mexico. E-Mail: novelor@ecologia.edu.mx

**4033.** Olthoff, M.; Ikemeyer, D. (2003): Zur Libellenfauna der Moore und Heiden im Westmünsterland. Untersuchungen in ausgewählten Schutzgebieten des Kreises Borken. *LÖBF-Mitteilungen* 3/2003: 12-17. (in German). [43 odonate species have been recorded in the the peatbogs and fens situated in the Landkreis Borken, Nordrhein-Westfalen, Germany. *Lestes virens*, *Coenagrion hastulatum*, *C. lunulatum*, *Ceriagrion tenellum*, *Aeshna juncea*, *A. subarctica elisabethae* Djakov, 1922, *Somatochlora arctica*, *Sympetrum danae*, *Leucorrhinia dubia*, *L. pectoralis*, and *L. rubicunda* are briefly commented.] Address: Ikemeyer, D., Biologische Station Zwillbrock e.V., Zwillbrock 10, D-48691 Vreden, Germany. E-mail: info@bszwillbrock.de

**4034.** Orr, B. (2003): Rendzvous Kanchanaburi. *Malango* 20: 202-205. (in English). [Report of a common trip to Thailand of the currently most profiled odonatologists involved in Thai Odonata (Matti Hämäläinen, Annua Pinratana) and Bert Orr (Odonata of Borneo) including some species highlights of different localities in the Kanchanaburi region, and some private annotati-

ons.] Address: Orr, B., 26 Currimundi Rd, Caloundra, Q4551, Australia

**4035.** Ott, J. (2003): Das Biosphärenreservat "Pfälzerwald - Vosges du Nord" - eine multifunktionale Ressource zwischen verschiedenen urbanen Zentren: im Spannungsfeld zwischen Biodiversitätsschutz und Nutzung. In: Venturelli, R.C.; Müller, F. (Eds.): *Paesaggio culturale e biodiversità. Principi generali, metodi, proposte operative*. Firenze: 179-205. (in German with Italian summary). [The biosphere, situated in French-German border region, is of outstanding importance as culture landscape and as habitat for many highly specialised species. Many of them are depending of special land use regimes. The paper briefly summarizes and discusses the current situation of the biosphere and outlines measures which will guarantee a sustainable development of the region. Some key-stone species including Odonata are listed.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O. GmbH@t-online.de

**4036.** Parr, A. (2003): Guides to Odonata from various regions of the world. *Atropos* 20: 48-53. (in English). [The paper compiles dragonfly books available (with a few exceptions) from different book sellers.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4037.** Parr, A. (2003): Migrant and dispersive dragonflies in Britain during 2002. *J. Br. Dragonfly Society* 19(1/2): 8-14. (in English). [The following species are discussed in detail: *Calopteryx virgo*, *C. splendens*, *Lestes barbarus*, *Ischnura pumilio*, *Erythromma viridulum*, *Aeshna mixta*, *Anax imperator*, *A. parthenope*, *A. ephippiger*, *Libellula quadrimaculata*, *Orthetrum coerulescens*, *Crocothemis erythraea*, *Sympetrum striolatum*, *S. fonscolombii*, and *S. danae*. Candidates for new British species should be *Chalcolestes viridis* and *Sympetma fusca*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4038.** Paulson, D. (2003): Another tribute to Minter. *Argia* 15(3): 17-18. (in English). [Obituary of Minter Westfall.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**4039.** Payne, J.C. (2003): Dispersal and dynamics of dragonfly communities in a lake network. Dissertation, Dept Biol., University of Washington: 146 pp. (in English). [In a network of desert lakes in eastern Washington State, USA, the population dynamics of dragonflies was studied. The dissertation comprises of four main chapters: "I. DRAGONFLY POPULATION DYNAMICS AT A LANDSCAPE SCALE: I studied the temporal and spatial variability in dragonfly populations [...], and investigated the causes of the variability. The simultaneous trapping of 25 lakes allowed temporal and spatial trends to be investigated. Four lakes were trapped in the 1960s and again in the 1990s, and an additional 21 lakes were simultaneously trapped in the late 1990s. I found that although the species pool was relatively stable over a 30-year period, the abundance of dragonflies varied greatly between lakes, years and species. Populations of rare species were more variable than common species. Predatory fish such as bass and carp had a strong negative impact on most dragonfly species but rainbow trout, which are stocked in

study area lakes, did not, perhaps because they do not reach high densities. Application of the toxin rotenone to lakes for the purpose of killing unwanted fish appeared to allow the recovery of some dragonfly species. Lastly, I argue that the scale of most dragonfly studies appears to be too small to answer questions about population dynamics.

II. USE OF AN ELEMENTAL MARKER, RUBIDIUM, TO STUDY DISPERSAL OF AQUATIC INSECTS (see OAS 3881 in this issue).

III. MEASURING THE RATIO OF IMMIGRANT TO RESIDENT BREEDERS IN A DRAGONFLY POPULATION: In a patchy landscape, the persistence of a metapopulation of animals or plants depends on the exchange of individuals between sub-populations via dispersal. However, not all populations in patchy landscapes are metapopulations; in some cases demographic or environmental forces are more important than the degree of connectivity between sub-populations. Unfortunately, it is difficult to estimate dispersal rates or to estimate the impact of dispersers, particularly for populations of small animals that cannot be easily marked, have high mortality in early life, and may be very mobile. This experiment was designed to measure the relative contribution of residents versus immigrants to reproduction in a dragonfly population in a highly dynamic, patchy landscape. I marked all of the resident larval dragonflies in a lake with an internal chemical marker, rubidium, that persists through emergence (i.e. between larval and adult life stages). Subsequently I collected breeding dragonflies at the marked lake and at several other lakes close by to investigate the relative exchange rates of breeding adults. The proportion of dragonflies that were residents was surprisingly low: only 9.8 % (61 out of 619) adult dragonflies captured at the pond were marked. A sample of 747 adults from 3 neighboring lakes within 3.2 km of the marked lake captured only four marked dragonflies, all at a lake less than 100 meters away. There were significant differences between taxonomic families: 30-60% of the breeding dragonflies of the family Libellulidae were residents, whereas fewer than 10% of the smaller Coenagrionidae and the larger Aeshnidae were residents. There were also differences between the sexes: there were fewer resident males than females in every species where I caught marked individuals, suggesting that dispersal rates of males are greater than dispersal rates of females. The design of the experiment did not allow me to distinguish between several possible interpretations, including that many of the native dragonflies may have dispersed.

III. MEASURING THE RATIO OF IMMIGRANT TO RESIDENT BREEDERS IN A DRAGONFLY POPULATION Abstract In a patchy landscape, the persistence of a metapopulation of animals or plants depends on the exchange of individuals between sub-populations via dispersal. However, not all populations in patchy landscapes are metapopulations; in some cases demographic or environmental forces are more important than the degree of connectivity between sub-populations. Unfortunately, it is difficult to estimate dispersal rates or to estimate the impact of dispersers, particularly for populations of small animals that cannot be easily marked, have high mortality in early life, and may be very mobile. This experiment was designed to measure the relative contribution of residents versus immigrants to reproduction in a dragonfly population in a highly dynamic, patchy landscape. I marked all of the resident larval dragonflies in a lake with an internal chemical marker, rubidium, that persists through emergence (i.e. between larval and adult life stages). Sub-

sequently I collected breeding dragonflies at the marked lake and at several other lakes close by to investigate the relative exchange rates of breeding adults. The proportion of dragonflies that were residents was surprisingly low: only 9.8 % (61 out of 619) adult dragonflies captured at the pond were marked. A sample of 747 adults from 3 neighboring lakes within 3.2 km of the marked lake captured only four marked dragonflies, all at a lake less than 100 meters away. There were significant differences between taxonomic families: 30-60% of the breeding dragonflies of the family Libellulidae were residents, whereas fewer than 10% of the smaller Coenagrionidae and the larger Aeshnidae were residents. There were also differences between the sexes: there were fewer resident males than females in every species where I caught marked individuals, suggesting that dispersal rates of males are greater than dispersal rates of females. The design of the experiment did not allow me to distinguish between several possible interpretations, including that many of the native dragonflies may have dispersed to breed elsewhere or died after emergence, or a large number of immigrants may have come in to breed. Nevertheless, it appears that immigration is very important to the population dynamics of dragonflies in some ponds, suggesting that some dragonfly communities may be characterized by metapopulation dynamics.

IV. THE INTERACTION OF STOCHASTIC DISPERSAL EVENTS WITH FOOD WEB DYNAMICS DURING THE FORMATION OF NEW DRAGONFLY COMMUNITIES: Metapopulation theory highlights the importance of organism movement and rare colonization events to population dynamics and community structure. However, the theory is simplistic in its treatment of species interactions, and evidence for the importance of metapopulation dynamics in nature is mixed. Furthermore, a large number of experiments have shown that inter-species interactions, particularly predation, can outweigh other factors in determining population dynamics and community composition. This experiment was an attempt to weigh the relative importance of dispersal dynamics versus food web interactions in determining the species composition of new communities. I created a set of widely-separated artificial ponds in a natural landscape inhabited by 20 species of dragonflies, and manipulated predation rates and dispersal distances to evaluate their influence on colonization success by dragonflies of different sizes. The body size of a predator can be a predictor of 1) its trophic level in a food web and 2) the scale of its movement in a landscape. Dragonflies of 3 taxonomic families colonized the ponds and there were differences between the families in their propensity to colonize isolated ponds. I found that the effects of predation dominated the community composition once dragonflies had arrived in the new habitat, and the identity of the top predator was important. However, the outcome of competition between large and medium-sized dragonflies depended on order of arrival (a so-called "priority effect"). Mid-sized species were particularly susceptible to predation. They gained an advantage by arriving first, and appeared to follow a strategy that increased the probability of discovering isolated ponds before potential predators did. In short, the species composition of new communities was determined by food web dynamics, but the strength and direction of some food web interactions depended on the timing of stochastic dispersal events whose probability was determined by the spatial layout of a pond and the dispersal behavior of the species involved." (Author) This dis-

sertation is rich in material, well organised, and written in a language quite easy to read.] Address: Payne, J.C., Department of Zoology, University of Washington, Seattle, WA, 98195-1800, USA. E-Mail: jcpayne@u.washington.edu

**4040.** Peters, A. (2003): Dragonfly conservation from the BDS: return of the Southern damselfly *Coenagrion mercuriale* (Charp.) to an historic site in Dorset. *Atropos* 20: 16-19. (in English). [On 26 June 2003, a male *C. mercuriale* was recorded at Scotland Pond. This water body is situated on New Mills Heath, which is part of Hartland SSSI and NNR, in Purbeck, south Dorset, UK. To enable recolonisation of the locality from the nearest known population of *C. mercuriale* about a mile west of the site, habitat recovery measures (scrub clearance) had been made in February 2003. The Southern Damselfly was last recorded at the site in 1969.] Address: Peters, Angela, Purbeck Estates Ecologist, The National Trust, Countryside Office, Middle Beach, Swanage, Dorset, BH19 3AX. UK. E-mail: angela.peters@nationaltrust.org.uk

**4041.** Petrick, W. (2003): Tag der Artenvielfalt 2003 in Wanninchen - bemerkenswerte Ergebnisse. *Biologische Studien, Luckau* 32: 25-28. (in German). [Brandenburg, Germany; The so-called Day of Biodiversity - initiated by the magazine GEO - was held on 28. / 29. VI.2003. Remarkable Odonata have been *Cordulegaster boltonii*, *Leucorrhinia albifrons*, and *L. dubia*.] Address: Petrick, W., Egsdorf, Dorfstr. 44, D-15926 Luckau, Germany

**4042.** Petrulevicius, J.F.; Nel, A. (2003): A new libellulid dragonfly (Insecta: Odonata: Italoansida) from the late Paleocene of Argentina. *Geobios* 36(4): 401-406. (in English). ["A new genus and species of "libellulid" dragonfly, *Austrolibellula noroestenia* nov. gen., nov. sp., of the group Italoansida, BECHLY, 1996, is described. The specimen comes from the Maiz Gordo Formation (late Paleocene) that crops out in northwestern Argentina. Its phylogenetic relationships within Cavilabiata BECHLY, 1996 are discussed." (Authors)] Address: Petrulevicius, J.F., Laboratoire d'Entomologie, Museum National d'Histoire Naturelle, 45, Rue de Buffon, 75005, Paris, France. E-Mail: levicius@mnhn.fr

**4043.** Petrulevicius, J.F.; Nel, A. (2003): Oldest petalurid dragonfly (Insecta: Odonata): a Lower Cretaceous specimen from south Patagonia, Argentina. *Cretaceous Res.* 24(1): 31-34. (in English). [*Argentinopetalia archangelskyi* gen. n., sp. n. from the Baquero Group, Anfiteatro de Ticó Formation, is described.] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**4044.** Pfeiffer, B. (2003): Two new dragonflies for Vermont. *Argia* 15(3): 14. (in English). [USA, Vermont, *Aeshna subarctica*, *Libellula cyanea*] Address: Pfeiffer, B.; E-mail: Bryan@VermontBirdTours.com

**4045.** Pianalto, S.; Cuenin, C. (2003): Données nouvelles pour *Sympetrum pedemontanum* (Allioni, 1766). Contribution à la faune des Odonates du Languedoc-Roussillon. *Martinia* 19(2): 50. (in French). [At 11 VIII 2002, *S. pedemontanum* was traced in the Parc national des Cévennes, France.] Address: Pianalto, Silvie, L'école, F-48110 Le Pompidou, France

**4046.** Pinratana, A. (2003): Editorial. *Malangpo* 20: 195. (in English). [Bro. A. Pinratana highlights some odonatological activities in 2003 reporting on new records for the Thai odonate fauna, and the (negative) changes of one of the most important Thai habitats for Odonata, the Siribhum waterfall (Doi Inthanon in Chiang Mai).] Address: Pinratana, Bro Amnuay, Saint Gabriel's College, Bangkok 10300, Thailand

**4047.** Ponel, P.; Papazian, M. (2003): Une belle localité à Odonates en Sardaigne: le lac Baratz. *Martinia* 19(3): 93-96. (in French with English summary). [In the north of Sardinia, Province Sassari, Italy, *Brachythemis leucosticta* was recorded. On 2.VI.2001 at lake Baratz, a total of seven Odonata including *Ischnura genei*, *Coenagrion scitulum*, and *Paragomphus genei* were found.] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France

**4048.** Pont, B. (2003): Quelques observations de Libellules de Guadeloupe. *Martinia* 19(4): 161-163. (in French, with English summary). [Guadeloupe, Desirade Islands (French West Indies), France; 9 taxa along with habitat descriptions are briefly discussed.] Address: Pont, B., Montée du village, F-38150 Anjou, France

**4049.** Poulton, B.C.; Wildhaber, M.L.; Charbonneau, C.S.; Fairchild, J.F.; Mueller, B.G.; Schmitt, C.J. (2003): A longitudinal assessment of the aquatic macroinvertebrate community in the channelized lower Missouri River. *Environmental Monitoring & Assessment* 85(1): 23-53. (in English). ["We conducted an aquatic macroinvertebrate assessment in the channelized reach of the lower Missouri River, and used statistical analysis of individual metrics and multimetric scores to identify community response patterns and evaluate relative biological condition. We examined longitudinal site differences that are potentially associated with water quality related factors originating from the Kansas City metropolitan area, using data from coarse rock substrate in flowing water habitats (outside river bends), and depositional mud substrate in slack water habitats (dike fields). Three sites above river mile (RM) 369 in Kansas City (Nebraska City, RM=560; St. Joseph, RM=530; Parkville, RM=377) and three below (Lexington, RM=319; Glasgow, RM=228; Hermann, RM=94) were sampled with rock basket artificial substrates, a qualitative kicknet method, and the Petite Ponar. We also compared the performance of the methods used. A total of 132 aquatic macroinvertebrate taxa were collected from the lower Missouri River; one third of these taxa belonged to the sensitive EPOT insect orders (Ephemeroptera, Plecoptera, Odonata, and Trichoptera). Rock baskets had the highest mean efficiency (34.1%) of the methods, and the largest number of taxa was collected by Ponar (n=69) and kicknet (n=69) methods. Seven of the 15 metrics calculated from rock basket data, and five of the nine metrics calculated from Ponar data showed highly significant differences (ANOVA, P<0.001) at one or more sites below Kansas City. We observed a substantial reduction in net-spinning Trichoptera in rock habitats below Kansas City (Lexington), an increase in relative dominance of Oligochaeta in depositional habitats at the next site downstream (Glasgow), and lower relative condition scores in rock habitat at Lexington and depositional habitat at Glasgow. Collectively, these data indicate that some urban-related impacts on the aquatic macroinvertebrate community are occurring. Our results suggest that the methods and assessment



framework we used in this study could be successfully applied on a larger scale with concurrent water and sediment chemistry to validate metrics, establish impairment levels, and develop a specific macroinvertebrate community index for the lower Missouri River. We recommend accomplishing this with longitudinal multi-habitat sampling at a larger number of sites related to all potential s of impairment, including major tributaries, urban areas, and points." (Authors)] Address: Poulton, B.C., Columbia Environmental Research Center, U.S. Geological Survey, Columbia, MO, USA. E-Mail: barry-poulton@usgs.gov

**4050.** Raab, R. (2003): Die Besiedlung neu geschaffener Uferstrukturen im Staubereich Freudenau (Wien, Niederösterreich) durch Libellen (Insecta, Odonata). *Denisia* 10: 79-99. (in German with English summary). [" From 1998 to 2001 the dragonfly fauna at nine new study sites along the restructured Danube shoreline as well as at the Tritonwasser on the Danube Island were observed in the course of 81 field trips. In all 14130 individuals and 29 species of dragonflies respectively were found at the nine new sites. Most frequent was *Ischnura elegans* with 55% of all individuals followed by *Platycnemis pennipes* with 20%. In the whole period from 1990 to 2001 39 species were observed at the Tritonwasser. In 2000 and 2001 *Leucorrhinia pectoralis* one of Europeans most threatened dragonfly species and listed in the Annex II of the Habitats Directive was found in a small autochthonous population at the Kreimellacke. With the results of the dragonfly fauna, the whole Danube Island is classified a good ecological status. Considering only the nine new sites, the ecological status would be moderate because of the relatively small number of autochthonous and sensitive autochthonous species as well as the small range of the Odonate Habitat Index (OHI). The straight structureless shoreline of the Danube is of no use for the dragonflies. The fourth year of investigation clearly showed that not only pools but also side channels and coves could be of importance for many dragonfly species if constructed right. The restructure measurements on the shoreline of the Danube Island are not sufficient enough to support a good corridor function of the Danube Island for dragonflies. Additional constructions of larger pools, for example the planned Phönixteich in the northern part of the Danube Island, are necessary to provide long-term suitable habitats also for highly threatened dragonfly species and also to improve the corridor function of the Danube Island." (Author)] Address: Raab, R., Anton Bruckner-Gasse 2/2, A-2232 Deutsch-Wagram, Austria. E-mail: rainer.raab@gmx.at

**4051.** Rackow, H. (2003): Beobachtungen von *Sympecma paedisca* (Sibirische Winterlibelle) an einem ungewöhnlichen Fundort. *mercuriale* 3: 6-8. (in German). [*S. paedisca* used a rain storage pond near Hohenwiel, Baden-Württemberg, Germany, as habitat in autumn 2000 and 2002. The habitat and the co-occurring odonate species, including *S. fusca*, are described. The next known locality of *S. paedisca* is located 5,5 km from Hohenwiel.] Address: Rackow, H., Virchowstr. 26, D-78224 Singen, Germany. E-mail: HartmutRackow@web.de

**4052.** Radford, P. (2003): The Azure Damselfly *Coenagrion puella* (L.) attacking the Common Blue Butterfly *Polyommatus icarus* (Rottemburg). *J. Br. Dragonfly Society* 19(1/2): 37. (in English). ["At c. 1230h GMT on 6

June 2003, at Westhay Moor Reserve, Somerset, UK I observed a mature male *C. puella* fly towards a male *P. icarus*, which was flying low over a grassy patch adjoining a reed-bed by a lake. The damselfly flew repeatedly at the butterfly, buffeting it at times, and so preventing it from settling. This aggressive behaviour, which occurred during a brief sunny spell, continued for one minute, after which the butterfly flew off. Male *C. puella* were numerous in the area at the time (several were in either the ring or tandem position) but, apart from the one individual, they all disregarded the Common Blue Butterfly." Possible reasons of this behaviour are discussed. It is believed that "the visual impact of the butterfly's relatively large blue wing expanse could have triggered sexual attraction."] Address: Radford, P., Crossways Cottage, West Bagborough, Taunton, Somerset TA4 3EG, UK

**4053.** Reeves, D. (2003): Australian crepuscular dragonflies. *Austrolestes* 8: 4. (in English). [23 species are listed and their behaviour is briefly described.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**4054.** Reeves, D. (2003): Book review: Dragonflies by Steve Brooks. ISBN 0 565 09189 8. *Austrolestes* 8: 3-4. (in English). [Review of the book abstracted as OAS 3386.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**4055.** Reeves, D. (2003): Species Profile: *Hemianax papuensis* Burmeister, 1839) Australian Emporor. *Austrolestes* 8: 1. (in English). [Brief information on distribution and morphology of the species.] Address: Reeves, D., 30 Bramston Tce, Herston, QLD 4006, Australia. E-mail: denissreeves@uq.net.au

**4056.** Rehn, A.C. (2003): Phylogenetic analysis of higher-level relationships of Odonata. *Systematic Entomology* 28(2): 181-240. (in English). ["This is the most comprehensive analysis of higher-level relationships in Odonata conducted thus far. The analysis was based on a detailed study of the skeletal morphology and wing venation of adults, complemented with a few larval characters, resulting in 122 phylogenetically informative characters. Eighty-five genera from forty-five currently recognized families and subfamilies were examined. In most cases, several species were chosen to serve as exemplars for a given genus. The seven fossil outgroup taxa included were exemplar genera from five successively more distant odonatoid orders and suborders: Tarsophlebiidae (the closest sister group of Odonata, previously placed as a family within 'Anisozygoptera'), Archizygoptera, Protanisoptera, Protodonata and Geroptera. Parsimony analysis of the data, in which characters were treated both under equal weights and implied weighting, produced cladograms that were highly congruent, and in spite of considerable homoplasy in the odonate data, many groupings in the most parsimonious cladograms were well supported in all analyses, as indicated by Bremer support. The analyses supported the monophyly of both Anisoptera and Zygoptera, contrary to the well known hypothesis of zygopteran paraphyly. Within Zygoptera, two large sister clades were indicated, one comprised of the classical (Selysian) Calopterygoidea, except that Amphipterygidae, which have traditionally been placed as a calopterygoid family, nested within the other large zygopteran clade comprised of Eraser's 'Lestinoidea' plus 'Coenagrionoidea'

(both of which were shown to be paraphyletic as currently defined). *Philoganga* alone appeared as the sister group to the rest of the Zygoptera in unweighted cladograms, whereas *Philoganga* + *Diphlebia* comprised the sister group to the remaining Zygoptera in all weighted cladograms. 'Anisozygoptera' was confirmed as a paraphyletic assemblage that forms a 'grade' towards the true Anisoptera, with *Epiophlebia* as the most basal taxon. Within Anisoptera, *Petaluridae* appeared as the sister group to other dragonflies." (Author)] Address: Rehn, A.C., 2817 G Street Apartment 1, Sacramento, California 95816, USA

**4057.** Rejl, J.; Mikát, M. (2003): *Orthetrum brunneum*, new species for East Bohemia. *Acta Mus. reginaehradecensis* (A) 29: 81-82. (in Czech, with English summary). [Czech Republic; 2 males of *O. brunneum* are listed from Hustirany (distr. Nachod) and Hradec Králové (July 2001).] Address: Rejl, J., Agentura Ochrány Přírody a Krajiny, Bozeny Nimcové 2625, CZ-53002 Pardubice, Czech republic

**4058.** Reum, D. (2003): Reproduktionsnachweise der Westlichen Keiljungfer (*Gomphus pulchellus* Sélys, 1840) in Thüringen (Odonata, Gomphidae). *Mitt. Thüringer Entomologenverb.* 9(1): 2-5. (in German). [13.VI. 2001, Immelborn, Wartburgkreis, Thüringen, Germany; first proof of reproduction (6 exuviae) in Thüringen. The habitats (gravel pits) are described, and the current range extension of *G. pulchellus* is discussed.] Address: Reum, D., Brunnebweg 4, D-36448 Liebenstein, Germany

**4059.** Rowe, R.J. (2003): Agonistic behaviour in final-instar larvae of *Austrocnemis splendida* (Odonata: Coenagrionidae), and a challenge to the 'Agriocnemidinae'. *Australian Journal of Zoology* 51(1): 51-59. (in English). ["Larval agonistic displays are reported from *Austrocnemis splendida*, a small coenagrionid damselfly. 16 major displays were distinguished. The agonistic behaviour repertoire of *A. splendida* is contrasted with published information on other coenagrionid larvae, especially with *Agriocnemis pygmaea*, putatively a member of the same subfamily. Marked differences in larval display behaviour between *A. splendida* and *A. pygmaea* provide evidence against a close relationship between these species. No support is found for including *A. splendida* in the Agriocnemidinae. It is postulated that the Agriocnemidinae are an artificial construct, its components linked through convergence in form of the reduced wing structures of these very small dragonflies." (Author)] Address: Rowe, R.J., School of Tropical Biology, James Cook University, Townsville, QLD, 4811, Australia; E-Mail: richard.rowe@jcu.edu.au

**4060.** Rowell, K.; Blinn, D.W. (2003): Herbivory on a chemically defended plant as a predation deterrent in *Hyalella azteca*. *Freshwater Biology* 48(2): 247-254. (in English). ["1. We investigated whether a population of the freshwater amphipod, *Hyalella azteca*, which consumed plants with defensive secondary compounds, reduced predation as reported for terrestrial and marine systems. 2. Field observations in Montezuma Well, U.S.A., indicated a strong association between the emergent macrophyte, *Berula erecta* and *H. azteca*. We hypothesised that this geographically isolated population of sedentary amphipods was able to consume roots of the chemically defended *B. erecta* as a deterrent against predation. *Berula erecta* is in the family *Apiaceae*,

which commonly produce coumarins that deter herbivory in terrestrial systems. 3. *Hyalella azteca* consumed roots of *B. erecta* at a significantly greater rate than alternative macrophyte substrata in Montezuma Well. Additionally, *H. azteca* moulted at a significantly higher rate when consuming *B. erecta* compared with a diet of periphyton. 4. Two insect predators (*Telebasis salva* and *Belostoma bakeri*) with different feeding strategies were used to assess the effects of a *B. erecta* diet on predation rates in the laboratory and in Montezuma Well. *Hyalella azteca* was preyed on at a significantly lower rate by both predators when given a strict diet of *B. erecta* roots compared with a diet of periphyton. 5. This is the first experimental evidence that predation on a freshwater herbivore, *H. azteca*, was reduced when it consumed a chemically defended plant." (Authors)] Address: Rowell, Kirsten, Department of Biological Sciences, Northern Arizona University, Flagstaff, AZ, 86011, USA. E-Mail: dean.blinn@nau.edu

**4061.** Sandkühler, J.; Brockmüller, N. (Red.) (2003): Erprobungs- und Entwicklungsvorhaben "Halboffene Weidelandchaft Höltigbaum. Stiftung Naturschutz Schleswig-Holstein (Hrsg.): 46 pp. (in German). [The influence of free ranging cattle on the ecosystem against the background of nature conservation measures to maintain landscape heterogeneity, are tested. Odonata are mentioned on pages 24/25; species of temporary pools (*Lestes barbarus*, *Ischnura pumilio*) and more southern distributed species (*Sympetrum striolatum*) are stressed.] Address: Stiftung Naturschutz Schleswig-Holstein, Eschenbrook 4, D-24113 Molfsee, Germany. [www.stiftung-naturschutz-sh.de/hoeltigbaum/](http://www.stiftung-naturschutz-sh.de/hoeltigbaum/)

**4062.** Sasamoto, A. (2003): Description of *Devadatta glaucinotata* spec. nov. from Laos (Zygoptera: Amphipterygidae). *Odonatologica* 32(4): 381-386. (in English). [holotype male: Phatang, Vang Vieng area, central Laos, 20-IV-2002; deposited at NSMT, Tokyo]; the new species is described, illustrated, and compared with the allied species. Special emphasis is given to *D. duca-trix* from Vietnam.] Address: Sasamoto, A., 190-4 Yakuoji, Tawaramoto-cho, Shiki-gun, Nara pref. 636-0341, Japan

**4063.** Sauseng, M.; Pabst, M.-A.; Kral, K. (2003): The dragonfly *Libellula quadrimaculata* (Odonata: Libellulidae) makes optimal use of the dorsal fovea of the compound eyes during perching. *Eur. J. Entomol.* 100: 475-479. (in English). ["We studied visual orientation and perching behaviour of a territorial libellulid dragonfly species, *L. quadrimaculata*. The studies were performed during sunny, cloudless conditions at a pond in southern Styria, Austria, from May to July of 2001 and 2002. Individual males were observed for periods of 3 to 4 weeks. We measured dragonfly's horizontal orientation relative to the solar azimuth, and vertical orientation relative to the solar altitude. The measurements indicated that the males had a favourable view of the sky during perching. In addition, the relative amounts of ultraviolet (UV) and blue-violet radiation in scattered light (not direct sunlight) were calculated for the whole sky and for the section of the sky viewed by the fovea. Our results show that the dorsal fovea is directed preferentially toward a section of the sky away from the sun, with less radiation but a higher UV and blue-violet saturation. The present findings fit in well with the hypothesis, based on optical and physiological data, that the fovea, which is sensitive only to blue and UV radiation, is

optimally suited to the detection of small, rapidly flying insects against the blue sky. The findings supply the first behavioural correlates of this foveal specialisation." (Authors)] Address: Sauseng, M., Institute of Zoology, Karl-Franzens-University Graz, A-8010 Graz, Austria. E-mail: manuela.sauseng@stud.uni-graz.at

**4064.** Schanowski, A. (2003): Ein Fund von *Sympetrum meridionale* am mittleren Oberrhein. *mercuriale* 3: 36. (in German). [12.VIII.2003, w Rheinmünster-Stollhofen, Lk Rastatt, Baden-Württemberg] Address: Schanowski, A., Lilienstr. 6, D-77880 Sasbach, Germany.

**4065.** Schiel, F.-J.; Leinsinger, H. (2003): Neufunde und Schlupfbeobachtungen von *Gomphus flavipes* (Asiatische Keiljungfer) an badischen Altrheinen. *mercuriale* 3: 8-12. (in German). [Detailed documentation (phenology, biotop parameters) of records of *S. flavipes* along the river Rhine; co-occurring Gomphidae are *Onychogomphus forcipatus*, *Gomphus vulgatissimus*, *G. pulchellus*, and *Ophiogomphus cecilia*.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**4066.** Schiel, F.J.; Röske, W.; Hunger, H. (2003): Schutzgemeinschaft Libellen in Baden-Württemberg - Mitgliederversammlung am 29. März 2003 in Schopfloch. *mercuriale* 3: 43-48. (in German). [Report on a remarkable broad spectrum of activities of the SGL in Baden-Württemberg, Germany. The report includes a resolution directed against the stocking of grass carp in water bodies.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**4067.** Schindler, M.; Fesl, C.; Chovanec, A. (2003): Dragonfly associations (Insecta: Odonata) in relation to habitat variables: a multivariate approach. *Hydrobiologia* 497: 169-180. (in English). ["In a dragonfly survey, carried out in a lowland wetland area in eastern Austria, a total of 19 resident species was recorded. Multivariate statistical procedures were used to analyse the relationship between dragonfly assemblage patterns and environmental variables. Besides widespread and euryoecious species with unspecific habitat requirements two dragonfly associations were identified: on the one hand species mainly occurring at temporary natural and near-natural ponds characterised by rush and reed vegetation, on the other hand species preferring permanent waters such as the artificial waterbodies in the investigation area characterised by floating macrophytes. Water persistence and the existence of floating macrophytes determined the formation of species assemblages." (Authors)] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, A-1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

**4068.** Schultz, H.; Waringer, J.A.; Chovanec, A. (2003): Assessment of the ecological status of Danubian floodplains at Tulln (Lower Austria) based on the Odonata Habitat Index (OHI). *Odonatologica* 32(4): 355-370. (in English). ["The ecological status of waterbodies situated in a Danubian floodplain section at Tulln (Lower Austria) was assessed by a dragonfly survey using the OHI approach suggested by CHOVANEC & WARINGER (2001, Regulated Riv. Res. Management 17: 493-507). The investigation was carried out at 28 standing water bodies and 2 reference sites situated directly at the Danube. Stretches of 100 m shorelength

were mapped and the "Representative Spectrum of Odonata Species" (SCHMIDT, 1985, *Odonatologica* 14: 127-133) was recorded. Only autochthonous species were used for the assessment procedure. A total of 11 Zygoptera and 20 Anisoptera species was recorded, 29 of them autochthonous. Site-specific Odonata Habitat Indices ranged from 1.72 to 3.67. The OHI of the only reference site where Odonata were detected directly at the Danube was 1.38. The mean OHI for the whole floodplain section was 2.79. These figures indicate a relatively high level of habitat diversity. By comparing this status quo with reference conditions derived from the overall habitat situation before the regulation and from old species inventories dating back to the 19th century, the status of the Tulln floodplain section was ranked as class II ("good ecological status") in a 5-tiered classification scheme." (Authors)] Address: Waringer, J.A., Institute of Ecology and Conservation Biology, University of Vienna, Althanstr. 14, A-1090 Vienna, Austria

**4069.** Seidenbusch, R. (2003): Lorenz'sche Prägung. *Agrion* 7(1): 4-5. (in English). [autobiographic note] Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany

**4070.** Serafin, E.; Buczyński, P. (2003): The importance of fishponds for aquatic insects, exemplified by dragonflies (Odonata) and caddisflies (Trichoptera) in ponds of the Lublin region. Abstracts of papers and posters presented at the 19th Symposium of Polish hydrologists, Fac. Biol., Univ. Warszaw, 9-12 Sept. 2003: 168. (in Polish). [The importance of Polish fish ponds for nature conservation purposes is outlined; some of the ponds surveyed harbour odonate species as *Coenagrion armatum*, *Sympetrum pedemontanum*, *Aeshna affinis*, *A. viridis*, *Leucorrhinia albifrons*, *L. pectoralis*, and *Sympetrum pedemontanum*.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**4071.** Shimoyamada, T.; Murayama, W.; The Katsushika Society of Odonatology (2003): Survey of dragonfly larvae in swimming pools of Primary Schools in metropolis. In: Arai, Y. (Ed): A Countrywide Survey of Red Dragonflies. Musashino Satoyama Research Group, Institute of Agriculture and Natural environments. 47 pp. Translation: Ishizawa, N., Tokorozawa City, Japan: 44-47. (in Japanese). [In the Katsushika-ku-region, Japan, in 2000 to 2002 swimming pools of primary schools were surveyed for their macrozoobenthos with special emphasis to Odonata. In most cases larvae of *Anax parthenope julius* and *Orthetrum albistylum speciosum*, and in few cases *Sympetrum* sp. (*frequens*, *darwinianum*, *infuscatum*, *baccha*) were traced.] Address: not stated

**4072.** Sibl, J.; Seginkova, A.; Bulánková, E. (2003): Dragonflies (Odonata) of the Malý Dunaj branch and its side arm Klátovské rameno (Danubian Plain, southwestern Slovakia). *Entomofauna carpathica* 14(2002): 55-58. (in Slovakian, with English summary). [In 2000 - 2001, the dragonfly fauna was studied at 24 localities along the main course of the Malý Dunaj branch and its tributary Klátovské rameno. One locality was investigated at Vá sky Dunaj (this name is used for the section of the Váh River between its confluence with Malý Dunaj branch and its confluence with the Dunaj (Danube) River. The number of species totalled to



29 dragonfly species. The occurrence of several dragonfly species considered rare in Slovak Republic, was confirmed in the study area: *Stylurus flavipes*, *Libellula fulva*, *Epiptera bimaculata*.] Address: Sibl, J., J. Stanislava 15, 84105 Bratislava, Slovakia. E-mail: sibl@changenet.sk

**4073.** Sibley, F. (2003): Nicaragua without the mud. *Argia* 15(3): 5-7. (in English). [The paper briefly outlines the results of a collection trip to Nicaragua in 2003. 70 species, 10 new to the country, brings the Nicaraguan list to approx. 150-160 odonate species.] Address: Sibley, F.C., 25 Shirley Street, Naugatuck, CT, 06770, USA. E-mail: fcs@george.peabody.yale.edu

**4074.** Smith, G.R.; Vaala, D.A.; Dingfelder, H.A. (2003): Distribution and abundance of macroinvertebrates within two temporary ponds. *Hydrobiologia* 497: 161-167. (in English). ["We investigated the distributions of macroinvertebrates within two temporary ponds (Spring Peeper Pond and Taylor-Ochs Pond) in central Ohio and examined what environmental factors may be driving those distributions. We sampled macroinvertebrates in Spring Peeper Pond three times from May to July 2001, and Taylor-Ochs Pond two times from May to June 2001. Macroinvertebrate distributions were significantly aggregated on all sampling dates in both ponds. Bivalve abundance in Spring Peeper Pond was higher in shallower water. The distribution of bivalves in Taylor-Ochs Pond was not correlated with any variable we measured. Dragonfly nymph abundance in Taylor-Ochs Pond decreased between the first and second sampling dates, whereas in Spring Peeper Pond no factor examined was correlated with dragonfly nymph density. Snail densities in Spring Peeper Pond were negatively related to dissolved oxygen and depth. In Taylor-Ochs Pond, snail abundance was positively related to temperature. The densities of damselfly nymphs in Spring Peeper Pond were positively related to dissolved oxygen and depth and declined across the study. In Spring Peeper Pond, hemipteran densities were negatively related to depth and increased across the study. Damselfly nymphs and hemipterans were not common enough in Taylor-Ochs to analyze. In general, the abiotic and biotic factors we examined explained relatively little (<37% in all cases) of the within pond distribution of the macroinvertebrates in our two study ponds." (Authors) Address: Smith, G.R., Department of Biology, Denison University, Granville, OH 43023 USA. E-mail: smithg@denison.edu

**4075.** Sparmberg, H.; Bößneck, U. (2003): Die Schutzgebiete der Landeshauptstadt Erfurt (Thüringen) Teil IX: Flora und Fauna des GLB "Feuchtwiese Schwansee". Veröffentlichungen Naturkundemuseum Erfurt 22: 91-113. (in German with English summary). [Thüringen, Germany; *Enallagma cyathigerum*, *Symptetrum striolatum*, and *S. vulgatum* are listed.] Address: Bößneck, U., Stadtverwaltung Erfurt, Umwelt- und Naturschutzamt, Staffenbergallee 18, D-99085 Erfurt, Germany

**4076.** Sternberg, K. (2003): *Anax ephippiger* (Schabrackenlibelle) - das Leben eines afrikanischen Nomaden in Baden-Württemberg. *mercuriale* 3: 2-4. (in German). [Brief introduction into the ecology of *A. ephippiger*, with emphasis on the situation in west- and central Europe.] Address: Sternberg, K., Schillerstr. 15, D-

76297 Stutensee, Germany. E-mail: k.sternberg@t-online.de

**4077.** Stewart, T.W.; Shumaker, T.L.; Radzio, T.A. (2003): Linear and nonlinear effects of habitat structure on composition and abundance in the macroinvertebrate community of a large river. *American Midland Naturalist* 149(2): 293-305. (in English). ["We used an experiment and regression analyses to quantify effects of spatial variation in habitat structure abundance on a riverine macroinvertebrate community under winter conditions. Concrete slabs (0.21 m<sup>2</sup>; n=24) with different numbers of stones (mean individual stone surface area=6.44 cm<sup>2</sup>) attached to upper faces were placed in the James River and retrieved after 28 d. Macroinvertebrate abundance and taxonomic richness on slabs were significantly positively related to stone abundance. Total macroinvertebrate abundance and abundance of oligochaetes (*Nais* spp.), Asiatic clams (*Corbicula fluminea*), caddisflies (*Leptoceridae*), riffle beetles (*Elmidae*) and stoneflies (*Strophopteryx* sp.) were linearly related to stone abundance. However, nonlinear relationships occurred between stone abundance and macroinvertebrate taxonomic richness and between stone abundance and abundance of dragonflies (*Erpetogomphus* sp.), caddisflies (*Hydropsychidae*), chironomids (*Eukiefferiella* spp.), mayflies (*Ephemerelellidae*) and stoneflies (*Taeniopteryx* sp.). Nonlinear relationships were usually characterized by dramatic increases in macroinvertebrate abundance and taxonomic richness across a gradient of increasing stone abundance when abundance was low (0-43 stones/0.08 m<sup>2</sup> slab face; 0-40% of slab face covered by stones), but weak responses to additional stones at higher stone abundance (84-160 stones / 0.08 m<sup>2</sup>; 89-96% cover). These nonlinear relationships reflected similar nonlinear relationships between abundance of stones and particulate matter. We conclude that small quantities of habitat structure have significant positive effects on macroinvertebrate abundance and diversity in the James River during winter. At a local scale, habitat structure promotes macroinvertebrate colonization and retention by increasing habitat diversity. Stones and similar physical objects also indirectly benefit macroinvertebrates by trapping particulate matter that provides animals with food and additional habitat." (Authors)] Address: Stewart, T.W., Department of Natural Sciences, Longwood University, Farmville, VA, 23909, USA

**4078.** Stoks, R.; McPeck, M.A. (2003): Antipredator behavior and physiology determine *Lestes* species turnover along the pond-permanence gradient. *Ecology* 84(12): 3327-3338. (in English). ["Identifying key traits that shape trade-offs that restrict species to only a subset of environmental gradients is crucial to understanding and predicting species turnover. Previous field experiments have shown that larvae of *Lestes* damselfly species segregate along the entire gradient of pond permanence and predator presence and that differential predation risk and life history constraints together shape their distribution. Here, we report laboratory experiments that identify key differences in behavior and physiology among species that structure their distributions along this gradient. The absence of adaptive antipredator behavioral responses against large dragonfly larvae and fish of *Lestes* dryas, the only species to inhabit predator-free vernal ponds that dry each year, is consistent with its high vulnerability to predation and probably the key trait that excludes it from parts of the gra-

dient with predators. The reciprocal dominance of two other *Lestes* species in permanent waters dominated by either dragonflies or fish can be explained by the lack of effective antipredator behaviors against dragonflies and fish, respectively. Maximal growth rates did not differ among *Lestes* along the gradient. However, in the natural predator environment of vernal ponds (only conspecific cannibals), the vernal-pond *Lestes* had higher growth rates than the other *Lestes* suggesting that this excludes other *Lestes* from vernal ponds. Similarly, *Lestes* species that inhabit temporary ponds (i.e., ponds that dry intermittently every few years but not every year) had a higher growth rate than the fishless permanent-pond *Lestes* in the presence of the syntopic dragonfly predator. These growth differences among *Lestes* in predator treatments were not due to differences in food intake, but due to differences in physiology. The vernal-pond *Lestes* converted more assimilated food into body mass compared to the other *Lestes* in the presence of conspecific larvae, and the temporary-pond *Lestes* had a higher conversion efficiency than the fishless permanent-pond *Lestes* in the presence of the syntopic dragonfly predators. In contrast, reductions in growth rate within species in the presence of syntopic predators were both physiologically and behaviorally mediated. The interplay between behavior and physiology may be a common feature of the growth/predation-risk trade-off, and their joint study is therefore critical to mechanistically link phenotype, performance, and community assembly along the freshwater habitat gradient." (Authors)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeck@dartmouth.edu

**4079.** Suhling, F.; Jödicke, R.; Schneider, W. (2003): Odonata of African arid regions - are there desert species? *Cimbebasia* 18: 207-224. (in English) ["This paper reviews current knowledge of desert-inhabiting Odonata in Africa. By comparing literature data of countrywide and some regional African Odonata surveys we identify typical desert dragonflies and analyse traits enabling them to survive in desert conditions. Two criteria are used in order to differentiate such species, viz. endemism in deserts and widespread occurrence in desert areas. Very few endemics occur in the Sahara, Arabian and Somalian Deserts of Africa, almost all occurring in permanent waters. In southern African arid regions no desert endemics are known, and most of the widespread desert-dwelling species do not appear to be restricted to deserts, their main habitats being in savanna wetlands. All are shown to be common over most of the Afrotropical and/or southern Palaearctic Regions. In contrast to most endemics, widespread species colonise a broad spectrum of aquatic habitats, including ephemeral waterbodies. Some traits allow Odonata to exist in deserts. Typically desert species are highly mobile and multivoltine, i.e. they have up to four or five, sometimes overlapping, annual generations, allowing them to develop in temporary wetlands. Many species are opportunistic with respect to the type of aquatic habitat they colonise. A cluster analysis on presence/absence data for 529 dragonfly species reveals that, among dragonfly assemblages in deserts, most are similar to each other, but differ from those in non-desert regions in Africa. Thus, it is concluded that there are typical dragonfly assemblages of desert wetlands that are similar in the African and the Arabian Deserts. Based on research, Odonata assemblages of some typical wetlands in the Sahara and Namib De-

serts are described." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**4080.** Sutton, P.G. (2003): Recent problems regarding the collection of voucher specimens. *J. Br. Dragonfly Society* 19(1/2): 47-50. (in English). [This is a very well balanced encounter reflecting the necessity of collecting voucher specimens. Biodiversity is not endangered by collecting, and - from the ethical point of view - "it must be assumed that those who object to the collection of voucher specimens do so with the welfare of that specimens at heart."] Address: Sutton, P.G., Habitat Conservation Officer, Amateur Entomologists' Society, 2 Fir Tree Close, Flitwick, Bedfordshire MK45 1NZ, UK

**4081.** Taily, M., (2003): Univoltine development in *Libellula depressa* in Belgium. *Gomphus* 19(1): 31-32. (in Dutch with english and French summaries). [The univoltine development of *L. depressa* is documented in a small (4x4 m) and new (1 year old) garden pool.] Address: Taily, M., Hoonakkerdreef 35, 8791 Waregem, Belgium. E-mail: marc.taily@pandora.be

**4082.** Takasaki, Y. (2003): *Ceriagrion nipponicum* A-sahina from Aichi Prefecture, II. Nature of Irrigation pond 38: 1-8. (in Japanese). [The known localities of the endangered species *C. nipponicum* in the Aichi Pref., Japan (n= 63; only 7 are existing in 2003) are documented in a map. The dispersal ability (2-3 km) of the species is outlined in detail. (Taken from Digest of Japanese Odonatological Short Communications 15; edited and translated by ISHIZAWA, Naoya).] Address: Takasaki, Y., 1-14, Fujimori, Meito-ku, Nagoya City, 465-0026, Japan

**4083.** Tennessen, K. (2003): Bolivia V: A dry season endeavor. *Argia* 15(3): 3-5. (in English). [Report of a collecting trip to Bolivia in August of ? in the northern Santa Cruz Department and the southern Beni Department.] Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktennessen@aol.com

**4084.** Theischinger, G. (2003): Coerrections to "Dragonflies of Victoria" by G. Theischinger and J.H. Hawking. *Austrolestes* 8: 4. (in English). [A few corrections are listed.] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

**4085.** Theischinger, G.; Hawking, J.H. (2003): *Dragonflies of Victoria: an identification guide to adult and larval dragonflies (Odonata)*. *Coop. Res. Cent. Freshw. Ecol.*, Albury/NSW. ISBN 1-876144-49-1: iv+65 pp. (in English). ["An identification guide, designed for non-professional and professional entomologists. The dichotomous keys are accompanied by figs of diagnostic characters, to aid the identification of both adults and larvae known to occur in Victoria, Australia (76 species). Colour photographs of most species are also provided." For an extensive review see the following *Verbatim* from *Austrolestes* 7: Orr, B. (2003): "Dragonflies of Victoria is a slim A5 (21x15cm) volume of 64 pages, soft-bound and produced to a high standard on glossy paper. It is easily carried into the field, just fitting into the more capacious map pockets found on cargo trousers, but is best protected by a plastic bag if treated in this way. Following an introductory section including a checklist of Latin and vernacular names and a very compact but exceptionally clear illustrated guide to a-

dult and larval morphology, the book is essentially a collection of illustrated keys to suborders, families and the 80 species of Odonata recorded from Victoria and neighbouring regions of southern NSW. Separate keys cover both adults and larvae. The adults, mostly living, of nearly all species and the living larvae of over fifty species are illustrated by 136 thumbnail photographs. The dichotomous keys are exceptionally user-friendly. The language is simple and direct. Most key couplets are accompanied by identically labelled diagrams placed immediately to the right of the text. Photo references are provided for each species. A large number of the adult diagrams are taken from Watson et al, 1991, 'The Australian Dragonflies' and the new adult diagrams are after the same style. Larval diagrams are also clear and accurate. The photographs are of mixed quality, but at least give the reader a good idea of the general appearance of each species. For the novice especially they provide an invaluable confidence-building boost when using the keys, for no matter how well constructed, all dichotomous keys suffer from the problem that one false answer can lead the user well astray. For the dragonfly watcher, as opposed to the collector with a specimen in the hand, it would be beneficial if size ranges and habitat preferences were also given for each species. To readers not familiar with other recent works of these authors the higher classification used in the checklist may be confusing. Four family names, the Telephlebitidae, Austrocorduliidae, Cordulephyidae and Hemicorduliidae are not to be found in Jill Silsby's widely read 'Dragonflies of the World'. These are used without justification or explanation of how they relate to better-known schemes. Although I do not dispute the validity of these groupings, it is debatable if novel family-group names should be introduced in a key intended for popular use. The vernacular English names suggested in the checklist may not be to everyone's taste. However they are presented unobtrusively and may at least provide inspiration for those who see the need for such names. This list is, after all, neither authorized nor immutable and anyone wishing to dabble in popular nomenclature can do so, using if they wish, this list as a basis for forming new vernacular names. In summary this is an excellent little book which achieves its main aims very well. It contains a great amount of information compressed into a very small space. The quality of the drawings and text is very high. It suffers from only a very few typographic errors. It will be useful throughout Victoria and the southern part of New South Wales. Given its size it may seem a little expensive, but this is more than compensated by the amount of information it provides. Available from Murray Darling Freshwater Research Centre, P.O. Box 921, Albury, N.S.W. 2640. \$38.50 (incl. GST) + \$2.30 p/p. Phone (02) 6058 2300; fax (02) 6043 1626. Address: Orders to: Murray Darling Freshw. Res. Cent., P.O. Box 921, Albury, NSW 2640, Australia

**4086.** Theischinger, G. (2003): Dragonfly News from Cape York Peninsula. *Austrolestes* 8: 2-3. (in English). [The paper contains different notes on the history of the discovery of *Nannophya paulsoni* Theischinger, 2003, the questionable status of *pymaea* in Australia (it should be omitted from checklists and replaced by *N. paulsoni*), a first record of *Notolibellula bicolor* Theischinger & Watson, 1977 in eastern Queensland, and the attraction of *Austrocnemis maccullochi* (Tillyard, 1926) by a UV light. Though several coenagrionid and libellulid species had been seen in the same habitat,

only *A. maccullochi* was attracted.] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

**4087.** Thipaksorn, A.; Jamnongluk, W.; Kittayapong, P. (2003): Molecular evidence of *Wolbachia* infection in natural populations of tropical odonates. *Current Microbiology* 47(4): 314-318. (in English). ["*Wolbachia* are endosymbiotic bacteria that cause reproductive alterations in numerous arthropod species. Using a PCR-based method, we found that, out of 33 odonate species, four species (*Agriocnemis femina*, *Pseudagrion pruinatum*, *Brachythemis contaminata*, *Neurothemis tullia*) were infected with *Wolbachia*. This finding represents the first record of *Wolbachia* infection in tropical odonates. Identical *wsp* gene sequences were found in the *Wolbachia*-infected common odonate species, *Agriocnemis f. femina*, collected from different locations in Thailand. The infection frequencies in several natural populations suggest that replacement of uninfected populations by *Wolbachia*-infected ones has recently occurred in this damselfly species." (Authors)] Address: Kittayapong, P., Center for Vectors and Vector-Borne Diseases, Faculty of Science, Mahidol University, Rama 6 Road, Bangkok, 10400, Thailand. E-Mail: grpkt@mahidol.ac.th

**4088.** Thipaksorn, A.; Kittayapong, P.; Jamnongluk, W.; Thirakhupt, V.; Milne, J.R.; Sindhusake, C.; Poonchaisri, S. (2003): Record of *Wolbachia* infection in zygopteran odonates. *Malangpo* 20: 206-209. (in English). ["The genus *Wolbachia* comprises rickettsia-like bacterial endosymbionts in a group of Alpha subdivision of proteobacteria that cause reproductive alterations in numerous arthropod species. [...] The infection by *Wolbachia* bacteria in odonate insects was first recorded in *Perithemis tenera*, by Jeyaprakash and Hoy (2000)." In 2003, Thipaksorn et al. (2003) reported a first recorded of *Wolbachia* infection in two zygopteran species and two anisopteran species. We caught 33 odonate species from rice fields in 36 provinces around of Thailand and screened *Wolbachia* infection by long PCR procedure with *wspL* primers. *Agriocnemis femina*, *Pseudagrion pruinatum*, *Brachythemis contaminata*, and *Neurothemis tullia* representing 12.12% (4/33) of the recorded species have been infected with *Wolbachia*. "A phylogenetic analysis of *Wolbachia* strains found in infected odonates, including the strain from the odonate, *Perithemis tenera*, and two previously published A group *Wolbachia* strains (Jeyaprakash and Hoy, 2000; Zhou et al., 1998) was conducted. All procedures used for phylogenetic reconstruction (maximum parsimony, maximum likelihood and neighbor-joining methods) place all odonate *Wolbachia* strains in a monophyletic group with those of B group *Wolbachia*. The *wsp* gene sequences of *A. femina* and *B. contaminata* were in the Pip subgroup with 100% of sequences, while the *wsp* gene sequences of *N. tullia* and *P. pruinatum* were identical and in the same Con subgroup as those of *Perithemis tenera*. The low *Wolbachia* infection frequencies and identical *wsp* gene sequences in related odonate species that are not closely related suggest that *Wolbachia* might have recently invaded rice field odonate populations through some means of horizontal transmission. Identical *wsp* gene sequences were found from all three positive populations of *A. femina* collected from different regions of Thailand may supports the hypothesis that *Wolbachia*-infected damselflies spread into uninfected populations. Further stu-



dy should be done to investigate the rates at which *Wolbachia*-infected damselflies could spread into uninfected populations." (Authors)] Address: Kittayapong, P., Department of Biology, Faculty of Science, Mahidol University, Rama VI Road, Bangkok 10400, Thailand

**4089.** Thipaksorn, A.; Kittayapong, P.; Milne, J.R.; Thirakhupt, V.; Sindhusake, C.; Ponbngaisri, S. (2003): Records of rice field Odonata from Thailand. *Notul. Odonat.* 6(2): 20-24. (in English). ["Records (1998-2000) of 29 species, from 47 localities in 36 provinces are listed, and the abundance of some species is discussed." (Authors)] Address: Thipaksorn, A., Department of Biology, Faculty of Science, Mahidol University, Rama VI Road, Bangkok 10400, Thailand. E-mail: athipaksorn@scientist.com

**4090.** Torralba Burrial, A.; Ocharan, F.J. (2003): Cambio en la posición de reposo de *Lestes virens* (Odonata: Lestidae) por efecto de una lluvia fuerte. *Boln Soc. ent. aragon.* 32: 233. (in Spanish with English summary). [Spain; 2 resting males of *L. virens* folded up the wings in a heavy rain shower the way most other zygoptera do rather than holding them half open in the Lestidae mode.] Address: Ocharan, F.J., departamento de Biología de Organismos y Sistemas. Universidad de Oviedo. E-33071 Oviedo, Spanish: E-mail: focharan@oonreo.uniovi.es

**4091.** Torralba Burrial, A.; Ocharan, F.J. (2003): Emergencia tardía y voltinismo en *Sympetrum fonscolombei* (Odonata: Libellulidae). *Boletín de la Sociedad Entomología Aragonesa* 33: 279-280. (in Spanish, with English summary). [Numerous specimens of *S. fonscolombei* emerged in Ilche (Huesca, NE Spanish) on "2001.10.02". This is interpreted as an evidence of the existence of several annual generations of this species in the area.] Address: Ocharan, F.J., departamento de Biología de Organismos y Sistemas. Universidad de Oviedo. E-33071 Oviedo, Spanish: E-mail: focharan@oonreo.uniovi.es

**4092.** Torralba Burrial, A.; Ocharan, F.J. (2003): Predación per peces sobre *Anax imperator* asociada a la reproducción de éste (Odonata, Aeshnidae). *Boletín de la Sociedad Entomología Aragonesa* 32: 219-220. (in Spanish with English summary). ["The predation by the non-native fish, *Micropterus salmoides*, on *A. imperator* is reported. The attacks are associated with the dragonfly reproductive activity and represent a reproductive cost that effects, for different reasons, both sexes." (Authors)] Address: Ocharan, F.J., departamento de Biología de Organismos y Sistemas. Universidad de Oviedo. E-33071 Oviedo, Spanish: E-mail: focharan@oonreo.uniovi.es

**4093.** Torralba Burrial, A.; Ocharan, F.J. (2003): ¿Coches como hábitat para libélulas? Algunos machos de *Crocothemis erythraea* creen que sí. *Boletín de la Sociedad Entomología Aragonesa* 32: 214-215. (in Spanish with English summary). [Male *C. erythraea* mistake white and grey tops of cars for water surfaces in the Huesca province (NE Spain). The receiving antenna of the car radio was used as a perch.] Address: Ocharan, F.J., departamento de Biología de Organismos y Sistemas. Universidad de Oviedo. E-33071 Oviedo, Spain: E-mail: focharan@oonreo.uniovi.es

**4094.** Truscott, L.A.C. (2003): Common Blue Damselfly *Enallagma cyathigerum* (Charpentier) capturing the

Rush Veneer *Nomophila noctuella* (Denis & Schiffermüller), a pyralid moth, as a prey item. *J. Br. Dragonfly Society* 19(1/2): 38. (in English). [Verbatim: On 8 June 2003, at Bake Fishing Lakes, Trerulefoot, Cornwall, UK, I observed *E. cyathigerum* capturing *N. noctuella*. The damselfly quickly alighted, possibly because of the weight of the prey, and had already removed one of the moth's forewings. However, not much time was spent tackling the prey and the damselfly flew off after about twenty seconds without the Rush Veneer. This (attempted) prey item is by far the largest I have ever noted. This is not a large moth (the wing length of this individual was only approximately 10mm), but it is still huge compared with the tiny prey items normally caught by this and other damselflies. Adrian Parr (pers. comm.) has mentioned that there are some records of damselflies taking larger prey, such as *Lestes sponsa* tackling a crane-fly. However, in most of the literature referring to the diet of adult Odonata, the prey of damselflies is usually described as small flies or similar, so prey of this size would appear to be very unusual.] Address: Truscott, L.A.C., 59 Cremyll Road, Torpomot, Cornwall PL11 2DZ, UK

**4095.** Tsubaki, Y. (2003): The genetic polymorphism linked to mate-securing strategies in the male damselfly *Mnais costalis* Selys (Odonata: Calopterygidae). *Population Ecology* 45(3): 263-266. (in English). ["Alternative male mate-securing strategies are widespread among animal taxa, but there are few well-documented examples of genetic polymorphisms for them. In the Japanese calopterygid damselfly *Mnais costalis*, males occur as either orange-winged territorial fighter males, or clear-winged non-territorial sneaker males. It has previously been suggested that this behavioral polymorphism is genetically controlled. However, there was no direct evidence for this. By rearing two groups of larvae from the same female but sired by different male morphs, I show that differential morph development is genetically controlled and consistent with a single-locus two-allele autosomal genetic polymorphism." (Author)] Address: Tsubaki, Y., Biodiversity Conservation Research Group, National Institute for Environmental Studies, 305-8253 Tsukuba, Japan

**4096.** Vamosi, S.M. (2003): Predation sharpens the adaptive peaks: Survival trade-offs in sympatric sticklebacks. *Annales Zoologici Fennici* 39(3): 237-248. (in English). ["This study tests whether living in different lake habitats in benthic and limnetic sticklebacks (*Gasterosteus aculeatus* complex) has resulted in divergence of antipredator traits and habitat-associated survival trade-offs. Adult benthics were larger than limnetics, had poorly developed defensive armour and showed no tendency to school with conspecifics. Limnetics, in contrast, were smaller, had well developed defensive armour and demonstrated strong schooling behaviour. In littoral arenas, juvenile limnetics were significantly more vulnerable than juvenile benthics to predation by adult benthics and backswimmers (*Notonecta* sp.) but not dragonfly larvae (*Aeshna* sp.). This pattern was reversed in open water arenas when adult benthics and limnetics were exposed to diving avian predators, double-crested cormorants (*Phalacrocorax auritus*). These findings show that divergence in antipredator traits between benthic and limnetic sticklebacks has accompanied divergence in foraging traits, resulting in survival trade-offs in addition to those previously observed for foraging success and growth rates across habitats."

(Author)] Address: Vamosi, S.M., Dept of Zoology, University of Toronto, 25 Harbord Street, Toronto, ON, M5S 3G5 Canada. E-Mail: vamosi@zoo.utoronto.ca

**4097.** Vanappelghem, C.; Fernandez, E. (2003): Nouvelle localité pour *Macromia splendens* (Pictet, 1843) au Portugal (Odonata, Anisoptera, Macromiidae). *Martinia* 19(2): 65-67. (in French with English summary). [July 2000, Rio Côa, near Castel Bom (Province of Guarda, northeastern Portugal)] Address: Vanappelghem, C., 14, rue Brûle Maison, F-59000 Lille, France

**4098.** Vasileva, Gergana; Gibson, D.I.; Bray, R.A. (2003): Taxonomic revision of *Joyeuxilepis* Spassky, 1947 (Cestoda: Amabiliidae): Redescriptions of *J. biuncinata* (Joyeux & Baer, 1943), *J. decacantha* (Fuhrmann, 1913) and *J. pilatus* Borgarenko & Gulyaev, 1991. *Systematic Parasitology* 56(1): 17-36. (in English). ["Two species of *Joyeuxilepis* Spassky, 1947 are redescribed from *Tachybaptus ruficollis* in Bulgaria: *J. biuncinata* (Joyeux & Baer, 1943) and *J. pilatus* Borgarenko & Gulyaev, 1991. The syntypes of *J. decacantha* (Fuhrmann, 1913) from *Podiceps cristatus* in Sweden and voucher specimens of *J. pilatus* (identified as '*Tatria decacantha*') from *T. ruficollis* in England (new geographical record) from the British Museum (Natural History) Collection are also re-described. The voucher specimens and cysticercoids of *Tatria* spp. from dragonfly nymphs (*Pyrrhosoma nymphula*, *Enallagma cyathigerum*) in Wales recorded by Rees (1973) were re-examined. Previous records of *J. biuncinata*, *J. decacantha* and *J. pilatus* are critically analysed in view of the present results. The major reliable diagnostic characters for species of *Joyeuxilepis* are presented and the distinguishing criteria for the three species studied are re-evaluated." (Authors)] Address: Vasileva, Gergana, Parasitic Worms Division, Department of Zoology, Natural History Museum, Cromwell Road, London, SW7 5BD, UK

**4099.** Vercoetere, B. (2003): *Calopteryx splendens* in the valley of the Dyle: a recent expansion? *Gomphus* 19(1): 3-12. (in Dutch with english and French summaries). [Belgium. "In Flanders, *C. splendens* is rather rare. Till recently this was also the case in the Dyle valley, but at present this species appears in great number south of Leuven. This paper gives details about the history of this recent expansion and of the habitat improvement leading to it." (Authors)] Address: Vercoetere, B. Leuvense baan 65, B-3220 Holsbeek, Belgium. E-mail: B.Vercoetere@haskoning.be

**4100.** Vick, G. (2003): Obituary: David Allen Lewis Davies. *J. Br. Dragonfly Society* 19(1/2): 55-56. (in English). Address: Vick G.S., Crossfields, Little London, Tadley, Hants RG26 5ET, United Kingdom

**4101.** Villenave, J.; Cloupeau, R. (2003): Première donnée d'*Ophiogomphus cecilia* (Geoffroy in Fourcroy, 1785) sur les berges de la Mayenne dans le département du Maine-et-Loire (Odonata, Anisoptera, Gomphidae). *Martinia* 19(2): 51-55. (in French with english summary). [Records of *O. cecilia* in western France are restricted to the river Loire. This record from the Mayenne (Saint-Aubin Island, north of Angers, Maine-et-Loire, France) seems to be the first record in a running water of France not belonging to the Loire river system. A total of 13 odonate species was recorded at the sampling site. Records include *Gomphus simillimus* and *Orthetrum albistylum*. The dominant species of the river

Mayenne was *Gomphus pulchellus*.] Address: Villenave, Johanna, 12, rue H. Broutelle, F-44000 Nantes, France

**4102.** Virbickas, J.; Pliuraite, V. (2003): The species composition of macrozoobenthos in small Lithuanian rivers. *Acta zool. lithuan.* 12(3): 254-264. (in English, with Lithuanian summary). [4 odonate species are reported from 5 (out of the 12) rivers studied during 1996-2001. Among these, *Calopteryx splendens* is frequent, while larval *Epitheca bimaculata* is considered very rare, encountered in the Brazuole R. only. The data are compared with data from small rivers in the Kaliningrad region (Russia).] Address: Virbickas, J.; Pliuraite, V., Inst. Ecol., Akademijos 2, LIT-2600 Vilnius, Lithuania

**4103.** Wang, H.; Zeng, L.; Liu, H.; Yin, C. (2003): Measuring wing kinematics, flight trajectory and body attitude during forward flight and turning maneuvers in dragonflies. *Journal of Experimental Biology* 206(4): 745-757. (in English). ["A robust technique for determining the wing kinematics, body position and attitude of a free-flight dragonfly is described. The new method is based on a projected comb-fringe technique combined with the natural landmarks on a dragonfly, allowing us to establish the local body-centered coordinate system with high accuracy, and to measure the body attitude at any instant. The kinematic parameters, including wing-beat frequency, flapping angle, angle of attack, torsional angle and camber deformation, required no assumptions to be made with respect to wing geometry, deformability (except the assumption of rigid leading edges) or bilateral wing symmetry. Two typical flight behaviors, forward flight and turning maneuvers, of dragonflies *Polycanthagyna melanictera* Selys were measured and analyzed." (Authors)] Address: Wang, H., State Key Laboratory of Precision Measurement Technology and Instruments, Department of Precision Instruments, Tsinghua University, Beijing, 100084, China. E-Mail: whao98@mails.tsinghua.edu.cn

**4104.** Wappler, T. (2003): Systematik, Phylogenie, Taphonomie und Paläoökologie der Insekten aus dem Mittel-Eozän des Eckfelder Maeres, Vulkaneifel. *Clausthaler Geowissenschaften* 2: VIII, 241 pp. (in German, with English summary). [The Odonata are represented with seven records from the Middle Eocene fossil site Eckfelder maar, Rheinland-Pfalz, Germany. The records are presented and discussed. *Euarchistigma?* *superstes* n. sp. is described, compared and discussed in detail from the phylogenetic point of view with the recent *Thaumatoneura inopinata* from Costa Rica.] Address: Wappler, T., TU Clausthal, Inst. Geol. u. Paläontologie, Leibnizstr. 10, D-38678 Clausthal-Zellerfeld, Germany

**4105.** Werner, D.; Pont, A.C. (2003): Dipteran predators of simuliid blackflies: A worldwide review. *Medical & Veterinary Entomology* 17(2): 115-132. (in English). ["Haematophagous female blackflies (Diptera: Simuliidae) are serious biting pests and obligate vectors of vertebrate pathogens, namely filarial *Dirofilaria*, *Mansonella*, *Onchocerca* and protozoal *Leucocytozoon*. Immature stages of Simuliidae inhabit lotic waterways, the sessile larvae filter-feeding and often forming a large proportion of the benthic biomass, usually aggregated in well-oxygenated sections of streams, rivers, waterfalls and spillways. Simuliid control practices depend on larvicidal chemicals, biological products (bacteria, ne-

matodes) and environmental modification. The potential use of predators for biological control of Simuliidae has not been exploited. Predators of Simuliidae include examples of at least 12 families of Diptera and other pre-deaceous arthropods (Crustacea and insects: Coleoptera, Odonata, Plecoptera, Trichoptera), invertebrates (notably Turbellaria), as well as browsing fish. Diptera impacting upon simuliid populations comprise mainly Chironomidae, Empididae and Muscidae, although several other families (Asilidae, Dolichopodidae, Phoridae, Drosophilidae, Scathophagidae) play a significant role as predators. Details of predator and prey species and life stages are presented, by zoogeographical region, including the prevalence of cannibalism among Simuliidae." (Authors)] Address: Werner, D. Humboldt-Universität zu Berlin, Institut für Biologie, Invalidenstr. 43, D-10115, Berlin, Germany. E-Mail: h0662cer@rz.hu-berlin.de

**4106.** Wildermuth, H. (2003): Der Schlupf von *Epitheca bimaculata* (Zweifleck). *mercuriale* 3: 20-28. (in German). [Detailed documentation of the emergence of a reared female larva of *E. bimaculata* in the laboratory.] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**4107.** Wildermuth, H. (2003): In der Not frisst der Teufel Fliegen .... *mercuriale* 3: 37. (in German). [The importance to import prey into a garden pond to maintain a population of *Aeshna cyanea* larvae is documented.] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**4108.** Wildermuth, H. (2003): Mosaikjungfer auf Fliegenjagd in der Morgendämmerung. *mercuriale* 3: 38. (in German). [Switzerland; early morning - preying on aggregations of small Diptera by *Aeshna cyanea* cf. is described.] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**4109.** Worthen, W.B. (2003): Survey of odonates of Congaree Swamp National Monument, Richland Co., South Carolina. *Argia* 15(3): 14-16. (in English). [Congaree Swamp national Monument, Richland County, South Carolina, USA; 41 species including 16 new county records for Richland County.] Address: Worthen, W.B., Dept of Biology, Furman University, Greenville, SC29613 USA. E-mail: worthen@furman.edu

**4110.** Zambo, J.M.; Maret, T.J. (2003): Direct and indirect effects of acidification on amphibians and their invertebrate predators. *Journal of the Pennsylvania Academy of Science* 76: 143. (in English). [Verbatim: Many studies have been done on the direct effects of acidity on amphibians, but little research has been conducted on the indirect effects of acidity on the interactions between amphibians and their predators. This study examined the effects of pH on the hatching success, hatching size, and hatching time of wood frogs (*Rana sylvatica*) and green frogs (*R. clamitans*) as well as the effects of pH on predation on different sizes of *R. sylvatica*, *R. clamitans*, and American toad (*Bufo americanus*) tadpoles by dragonfly naiads (families Corduliidae and Aeshnidae). The percentage of eggs that hatched and the time it took them to hatch was significantly influenced by pH for *R. clamitans*, but not *R. sylvatica*. Size of tadpoles at hatching was not significantly affected by pH for either species. The percentage of tadpoles attacked was dependent on the size of the tadpole

for *R. sylvatica* only and was not significantly influenced by pH for any species.] Address: Zambo, J.M., Department of Biology, Shippensburg University, Shippensburg, PA, 17257, USA

## 2004

**4111.** Abro, A. (2004): Structure and function of the male sperm ducts and female sperm-storage organs in *Aeshna juncea* (Anisoptera: Aeshnidae). *Odonatologica* 33(1): 1-10. (in English). ["By the use of light and electron microscopy, the micro-anatomy of the S genital ducts and the 9 reproductive organs have been surveyed. Sperm bundles transmitted from the testis through the vas deferens become embedded in a carrier jelly and also have additional substances bound to them; obviously the sperm cells are undergoing maturation. In the 9 9, sperm bundles in carrier jelly appear to be deposited in the vaginal canal and, particularly, in the receptaculum seminis, the latter serving for long-term conservation. It seems possible that agents emitted from the posterior accessory glands to the vaginal surface near the genital aperture diffuse forwards, reaching the receptacle entrance. Here they presumably induce a liquefaction of the jelly and break-down of sperm bundles, thus releasing individual sperm cells. Free sperm cells are expected to accumulate in the anterior accessory sacs which they leave during fertilization. The morphological changes taking place in the sperm after transfer to the 9 genital tract appear ambiguous." (Author)] Address: Abro, A., Department of Anatomy, University of Bergen, Jonas Lies vei 91, N-5009 Bergen, Norway

**4112.** Aguillard, D. (2004): Breaking news- *Paltotemis lineatipes* explosion in California. *Argia* 16(1): 28. (in English). [USA, California, 29 March 2004] Address: not stated

**4113.** Askew, R.R. (2004): *Dragonflies of Europe* - Revised edition in paperback. ISBN 0 946589 75 5: 308 pp. (in English). [When in 1992 I travelled to Italy and Greece for odonatological purposes, I had to make a quite difficult decision: Should I take Askew's weighty book along or should I leave it at home? In the future there will be no such problem: The revised edition of R.R. Askew's "The Dragonflies of Europe" will be released in a new, slightly reduced, paperback format (232 x 168 mm), and will fit into everybody's backpack. But, after browsing the book there will be an additional question: Is it worth being taken to the field? My personal opinion is that the chance to write an up to date book on European Odonata was missed.

After its publication fifteen years ago, this book was almost unanimously considered as the finest handbook ever produced on European Odonata. More than 3000 copies of the original hardback edition have been sold! In the revised edition, the author has made a few corrections and changes to the original text, which covered 114 species of Odonata breeding in Europe and added a new Preface and an updating Supplement. The Introduction, which seems to me unchanged, is followed as in the first edition by the chapters Life History, The Adult Dragonfly, The Distribution of European Dragonflies, Morphology of the Adult Dragonfly, The European Species of Odonata including an updated Check-



list, and finally Keys to the Final-Instar Larvae of European Odonata

The Systematic section includes keys to the suborders, families, genera, and species, species accounts with clear descriptions and details on biology, flight periods, and distribution of all species found in Europe, with distribution maps with national boundaries as they were in 1988. The status of information in all aspects is that of the first edition, except the updated checklist. Nevertheless, in the revised edition the excellent plates of the first edition have lost their brilliance.

The chapter on larvae is now followed by a Supplement, intended as the up date of the first edition in paperback format. R.R. Askew provides new information under the following headings: Nomenclature, Orthography, Thermoregulation, American species observed in Europe, Accidental Introductions into Europe (these are species imported together with aquatic plants for aquaria and which emerged in greenhouses), Other species newly recognized in Europe, Species new to British Isles, Expansion of recorded ranges within Europe, Other new distribution records, and Contraction of recorded ranges. As a supplement to the chapter References, the author lists more than 100 references on European Odonata published after 1988.

The supplement with numerous line-drawings is followed by a new index to English and scientific names, including all species, subspecies and synonyms cited in the revised text. An additional colour plate (number 30) depicts adults of the five "new" records and one from North America.

R.R. Askew has added a further ten resident species, and several adventures to the European checklist of species. The serious problems with this revised edition are starting here: A new species of the European fauna (*Sonjagaster helladica*, Lohmann 1993) described after the first edition of the book is omitted with the exception of a footnotelike note on page 213. Species not illustrated in the first edition like *Ischnura hastata*, *I. saharensis* and *Platycnemis subdilitata* (both from Canary Islands), and *I. fountaineae* are likewise not illustrated in the revised edition. *P. subdilitata* is not mentioned in the chapter of species newly recognized in Europe, but listed in the chapter of new distribution records. Serious examples of inadequate representation of important species in a book on European Odonata are *Boyeria cretensis* Peters 1991 and *Coenagrion intermedium* Lohmann, 1990. In the case of *B. cretensis* the differences between *B. irene* and *cretensis* are briefly described; for a drawing of *B. cretensis* there is a cross reference (!) to a paper of J.-P. Boudot and – in addition – not to the original description! In the case of *C. intermedium*, the species status is discussed, but *C. ponticum* is illustrated! *Somatochlora meridionalis* Nielson 1935 is accepted as a good species, but no illustration or any description of the morphological differences to *S. metallica* are given. In the revised edition of a book claiming to cover the European dragonfly fauna, the reader can expect a complete list of species and illustrations of all European species.

It remains a real secret to me what kind of useful information is intended in the chapter "Other new distribution records" which is a list of species and distributional information from different sources: Many information remain on a more regional scale while some contain quite precise information on the locality level. What kind of criteria to select or to omit records were chosen remains really unclear. Additions to the Odonata of France are reduced to information on Corsica (Chapter "Re-

cent literature"). The distribution maps and the accompanying texts of the first edition were in need of revision. The list of localities presented can not be a substitute of up-dated distribution maps.

The supplementary plate illustrates *Anax immaculifrons*, *A. junius*, *Orthetrum sabina*, *O. taeniolatum*, *Sympetrum sinaiticum*, and *Trithemis festiva*; the pictures are looking quite fine, and will be appreciated especially in cases of the very rarely pictured species like *A. immaculifrons* and *S. sinaiticum*. *Somatochlora borisi* is illustrated as black and white drawing and with a colour photo on the title page of the book. Being not acquainted with *A. immaculifrons* I cannot judge on the colours of the picture on plate 30, but I believe they are too pale (compare e.g.: <http://www.asia-dragonfly.net/picSearch-Species.php?Species=104> 3)

There remains a certain kind of sadness: the revised edition of a really outstanding book turns out to me as nearly completely unuseable if you are the happy owner of the first edition. If you didn't have had the chance to buy Askew's book, now you have it. But don't expect a book that keys or covers all European odonate species. (Martin Schorr) Address: Harley Books, Martins, Great Horkeley, Colchester, Essex CO6 4AH, UK. E-mail: [harley@keme.co.uk](mailto:harley@keme.co.uk). £30,- net.

**4114.** Barlow, A.E. (2004): Adverse weather and its impact on Odonata flights seasons. New record late dates from New Jersey. *Argia* 15(4): 21-22. (in English). [Flight season extensions for several species are listed.] Address: Barlow, A.E., 10 Belle Court, Budd Lake, NJ 07828, USA. e-mail: [a.barlow@njodes.com](mailto:a.barlow@njodes.com)

**4115.** Beckemeyer, R. (2004): Aerobic Anisoptera & zooming Zygoptera: Odonata flight from A to Z. *Argia* 15(4): 6-8. (in English). ["Key facts: (1) Wing Loading is just the weight of the insect divided by the total area of its wings. (2) The wing loading indicates the average differential pressure that the air must exert on the wings to support the insect in flight. (3) Lower wing loadings mean the insect can fly at lower speeds." (Author)] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: [royb@southwind.net](mailto:royb@southwind.net)

**4116.** Beckemeyer, R. (2004): Aerobic Anisoptera & zooming Zygoptera: Odonata flight from A to Z. Part 2. Dragonfly wings: responding to pressure. *Argia* 16(1): 4-9. (in English). ["Key facts: Wing loading indicates the average differential pressure that must be generated by aerodynamic forces acting on the wing to support it in flight. The actual pressure distribution across the chord of the wing from leading to trailing edge is not uniform, but has a large peak "suction" (pressure lower than atmospheric) area near the leading edge. Insect wings reflect this pressure distribution in having their corrugated longitudinal veins (costa, subcosta, radius) clustered near the costal margin (leading edge). Wings can only generate lift if they are inclined at a leading edge up (positive) angle of attack, or if they have a positive camber (convex dorsal curvature). A wing with positive camber will generate more lift than a flat wing at the same angle of attack." (Author) *Anax junius*] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: [royb@southwind.net](mailto:royb@southwind.net)

**4117.** Beckemeyer, R. (2004): Some Odonata records for the midwest and west for 2003. *Argia* 16(1): 26. (in English). [USA, Oklahoma, Idaho, Illinois, Kansas] Ad-

dress: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**4118.** Beckemeyer, R.J. (2004): Notes on the behavior and mechanics of scooping oviposition in *Libellula composita* (Hagen) (Anisoptera: Libellulidae). *Odonatologica* 33(1): 11-23. (in English). ["Females were observed ovipositing, both alone and in tandem, in Chaves County, New Mexico, United States. The female oviposits by scooping water droplets into the air with the tip of her abdomen. This mode of oviposition is common in many Libellulinae, but this is the first report of a female using it in tandem as well as in solo oviposition. The female *L. composita* also grips the male abdomen with her legs during post-copulatory oviposition flight, a behavior previously reported only in subfamilies Trameinae and Zygonychinae. Possible functional significance of this flight behavior is discussed based on observations and analyses of the mechanics of the oviposition process that are evident in photographs." (Author)] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**4119.** Brook, J.; Brook, G. (2004): The past breeding evidence of Willow Emerald Damselfly *Chalcolestes viridis* (Vander Linden) in Kent. *Atropos* 21: 3-6. (in English). [An exuviae of *C. viridis* was found 29th June, 1992, at Cliffe marshes, Kent, UK. This seems to be the first record and prove of reproduction of this species on the British mainland. The species could not be traced in summer 2003 at the given locality. A comment of Adrian Parr stresses the possibility of additional records in UK, and notes that an adult was caught in the 1980th in Sussex near Hastings.] Address: Brook, J. and G., 12 Burgess Hall Drive, Leeds, Maidstone, Kent ME17 1SH, UK

**4120.** Buchwald, R. (Ed.) (2004): Tagungsband. 23. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen (GdO). 19.-21.03.2004. Oldenburg. 44 pp. (in German) [Begrüßung: R. Buchwald, Institut für Naturschutz und Umweltbildung, HS Vechta; M. Fansa & U. Beichle, Landesmuseum Natur und Mensch, Oldenburg; P. Buczyński: Bug-Aue: Libellenparadies am südöstlichen Rand Mitteleuropas; A. Günther: Die Wiederbesiedlung des Flusssystemes der oberen Freiburger Mulde durch Libellen; H. Schlumprecht: Die Libellenfauna im Obermairtal (Nordbayern); M. Ewers & R. Buchwald: *Orthetrum coerulescens* zwischen Weser und Ems - Bestandssituation, Ökologie und Schutzmöglichkeiten; E. Schmidt: Zur Odonatenfauna von Freizeit-Angelteichen im Westmünsterland; K. Westermann: Zur Mortalität von *Lestes viridis* während der Emergenz; J. Ott: Zur Populationsökologie von *Aeshna isosceles* - vergleichende Ergebnisse zweier Fang-Wiederfang-Studien; A. Martens: Paarungssysteme bei Libellen - aktueller Kenntnisstand und offene Fragen; H. Wildermuth: Sequenzielle Mehrfachpaarung beim gleichen Vierfleckpaar (*Libellula quadrimaculata*) - Zufall oder Gesetzmäßigkeit?; T. & H. Fliedner: Repetitive Kopula bei *Sympetrum pedemontanum* am Sihlsee bei Einsiedeln (Schweiz) im Sommer 2003; K. Schenk: Fortpflanzungsstrategien bei Libellen: Risikostreuung, Habitatwahl und Qualität der Nachkommen; K. Sternberg: Stammesgeschichtliche Aspekte der Habitatselektion bei Libellen; R. Buchwald, A. Manzi & H. Hunger: Habitatwahl von *Lestes dryas* und *Sympetrum flavolum* in mittelitalienischen Karst-Hochebenen; B. Trockur: Aspekte der Habitatwahl bei *Epithea bimacu-*

*lata* - Analyse der Eiablageorte und Exuvien-Fundstellen; R. Zschunke: Untersuchungen zur Abhängigkeit der Habitatnutzung und der Flugaktivität von mikrometeorologischen Bedingungen bei *Calopteryx splendens*; T. Lieckweg: Zur Verbreitung westafrikanischer Libellen - Ökofaunistische Untersuchungen zur Libellenfauna von Ghana, Togo, Benin, Nigeria und Kamerun; R. Zschunke: Landungen auf heiß und kalt - sind Libellen lernfähig? (Videobeitrag); M. Hartung: Reisebericht mit Landschaftsaufnahmen und Libellenphotos von den Philippinen; A. Bönsel: Erste Ergebnisse von Kartierung und Monitoring der FFH-Libellenarten in Mecklenburg-Vorpommern; F.-J. Schiel: Bilanz des Artenschutzprojekts *Leucorrhinia pectoralis* in Baden-Württemberg; R. Mauersberger, F.-J. Schiel & K. Burbach: Verbreitung und Bestandssituation von *Leucorrhinia caudalis* in Deutschland; R. Stephan, W. Bena & W. Xylander: Untersuchungen zu *Leucorrhinia albifrons* in der Görlitzer Heide/Westpolen; W. Röske: Artenschutz mit Tradition: *Coenagrion mercuriale* in Baden-Württemberg; K. Burbach: Schutzkonzeption für *Coenagrion ornatum* und *Coenagrion mercuriale* in Bayern; M. Schorr: Anmerkungen zum Vorkommen der Gekielten Smaragdlibelle (*Oxygastra curtisii*) in Deutschland und Luxemburg; H. Wildermuth: *Nehalennia speciosa* in der Schweiz ausgestorben - und in Europa?; M. Binot-Hafke & H. Haupt: Weiterentwicklung bundesweiter Roter Listen: Diskussionsstand zum Kriteriensystem (mit Diskussion); Poster: C.-J. Conze: Der aktuelle Kenntnisstand zu den vom Aussterben bedrohten Libellenarten in NRW; V. Sohni & O.-D. Finch: Bedeutung eines renaturierten Hochmoor-Restes bei Oldenburg (Oldb.) für die Libellenfauna; J. Arlt & J. Ruddek: Libellenbeobachtungen während der Trockenzeit in Gambia; E. Gärtner, U. Karsch, K.-P. Pryswitt, H. Scherzer: Libellenfauna im NSG Helstorfer Moor (Hannoversche Moorgeest) - Lebensraum der Zwerglibelle (*Nehalennia speciosa*); H. Hunger: GIS-gestützte Auswertungen und neue Rote Liste der Libellen Baden-Württembergs] Address: Buchwald, R., INU, Hochschule Vechta, Driverstr. 22, D-49377 Vechta, Germany. E-mail: rainer.buchwald@uni-vechta.de

**4121.** Buczyński, P. (2004): Gorb, S.N.; Pavljuk, R.S.; Spirus, Z.D. (2000): Odonata of Ukraine. A faunistic overview. *Vestnik zoologii*, Suppl. 15. 154 pp.. *Wiadomości Entomologiczne* 22(1): 18. (in Polish). [Detailed and critical review of the book on the Ukrainian Odonata.] Address: Buczyński, P., Dept of Zool., Mariae Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**4122.** Buczyński, P.; Zawal, A. (2004): New data about the occurrence of protected dragonflies Odonata in north-western Poland. *Chrońmy Przyrodę Ojczystą* 60(1): 53-66. (in Polish with English summary). ["New data about the occurrence of *Aeshna viridis*, *Leucorrhinia albifrons*, *L. caudalis* and *L. pectoralis* are given. The material was collected in the years 1998-2001, from nine sample sites (Fig. 1): Krajnik (meadows at the River Odra), Binowo (Binowo Lake), Czermnica (a forest dystrophic water body), Żabowo (a forest dystrophic water body), Potczyn-Zdrój ("Valley of Five Lakes" nature reserve - Krąg Lake and Długie Lake), Lubowo (Lubicko Wielkie Lake), Borne-Sulinowo (forest dystrophic water body and transitional peat bog). Based on new records and on literature it can be stated that *L. albifrons* and *L. pectoralis* are relatively common in the north-western Poland (Fig. 2), whereas *A. viridis* and *L.*

caudalis are known from few localities. It may partially be the result of highly incomplete knowledge about the dragonfly fauna of the area. The characteristics of its habitat and the state of nature indicate that in fact the species may be much more frequent there. The mentioned species are protected in Poland due to their presence in the Annex II to Bern Convention, which reflects the situation in western Europe in 1970s. They are undoubtedly endangered. *L. caudalis* is on the Polish Red List of Threatened Animals in Poland in the category "Near Threatened", *A. viridis* and *L. albifrons* in "Least Concern", and *L. pectoralis* is not included on the List. Therefore their protection is being questioned. But the situation of the mentioned species in Germany, Czech Republic and Slovakia is serious (Tab. 1). Poland is the westernmost country of Central Europe, where the populations of the species are stable and little endangered. [...] The situation puts a great responsibility on Poland to preserve and protect the species. Besides, threats to dragonflies in Poland are similar to those in western Europe, though they are not as intensive. It is hard to forecast their progress. For that reason the monitoring of highly endangered species is desirable." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**4123.** Caldwell Rinehart, S.; Hovemann, A.C. (illust.) (2004): *Eliza and the dragonfly*. Dawn Publications. ISBN-58469-059-3: 32 pp. (in English). ["Eliza and the Dragonfly" is not primarily an instructive book (apart from two pages in the end of the book), but is designed to introduce children to the joys of actually looking for dragonflies. It develops attitudes more than it instructs. The book is richly illustrated with water-colour sketches of a little girl, her aunt, some friends, and dragonflies (named "Horace"). The illustrations might be more impressionistic than children appreciate. The strength of the book is the tying together of the pond habitat for the nymph and its development into a flying insect. Is this a children's book? I really don't know. But I do know that I enjoyed all the pictures and I do not want to miss it in my library. (Martin Schorr)] Address: Dawn Publ., 12402 Bitney Springs Road, Nevada City, CA 95959, USA. E-mail: nature@dawnpub.com

**4124.** Carvalho, A.L.; Salgado, L.G.V. (2004): Two new species of *Aeshna* in the punctata group from southeastern Brazil (Anisoptera: Aeshnidae). *Odonatologica* 33(1): 25-39. (in English). ["Based on material from the states of Rio de Janeiro and Minas Gerais, *A. serrana* sp. n. (holotype male: Serra do Subaio, Teresopolis, Rio de Janeiro State) and *A. itatiaia* sp. n. (holotype male: Brejo da Lapa, Itamonte, Minas Gerais State) are described and illustrated. The type material is to be deposited in the Museu Nacional and in the Instituto de Biologia, UFRJ, Rio de Janeiro. Morphological features of the 2 new species are compared in a table and SE Brazilian members of the punctata group (that includes also *A. decessus*, *A. eduardoi* and *A. punctata*) are keyed." (Authors) Note: The great revision of the genus *Aeshna* in Southamerica by N. von Ellenrieder (2003) (see OAS ..) was not considered in this publications. It is quite reasonable that both sp. n. have to be transferred to the genus *Rhionaeschna*.] Address: Carvalho, A.L., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro

(UFRJ), Caixa Postal 68044, BR-21944-970 Rio de Janeiro, RJ, Brazil. E-mail: alagoc@acd.ufrj.br

**4125.** Catling, P.M.; Carriere, S.; Johnson, D.; Fournier, M. (2004): Dragonflies of the Northwest Territories, Canada: new records, ecological observations and a checklist. *Argia* 16(1): 9-13. (in English). [oas 14: (1) New records for the Northwestern Territories (NWT) are: *Stylurus notatus*, *Somatochlora minor*, *Aeshna canadensis*, *Lestes forcipata*, and *Enallagma ebrium*. (2) *Aeshna eremita* consuming biting insects: Traversing an open bog, specimens of *A. eremita* flew in to glean mosquitos, deer flies, horse flies, and blackflies mostly from the top of the head or the shoulders of one of the authors. (3) *A. eremita* adapting foraging behaviour to specific prey: *A. eremita* was observed to prey on *Lestes disjunctus*. (4) *A. eremita* capturing and feeding on *A. juncea*: A female *A. eremita* preyed on a male *A. juncea*. (5) Hilltopping of *Lestes congener*: *L. congener* was found on the top of hills, no specimens could be traced at the pools located app. 200 m apart. (6): Birds feeding on dragonflies hit by cars: The numbers of dragonflies per mile killed by car collisions on a sunny day of July ist astimated to several hunderts. Of 110 species examined in a mile of a highway *Aeshna eremita* represented 60%, *A. juncea* 30%, and *A. interrupta lineata* 10%. The killed specimens were quickly devoured by birds as ravens and gulls. (7) Directional movement of *Aeshna* species: *Aeshna* sp. (in most cases *A. eremita*) "on average crossed one hundred meter of road every minute". (8) Dependence of endangered bird on dragonflies: "At certain times dragonflies make up to 80% of the food of endangered Whooping Cranes (*Grus americanus*) (9) Dragonfly outing a success: On 19 July 2003, the first NWT dragonfly outing was held at the Northern Frontier Visitors Centre, Yellowknife. Almost 100 people (Families, childrens etc.) participated. 13 odonate species were traced and demonstrated. (10) Dragonflies and biodiversity protection: The results of the NWT Biodiversity Action Plan (including 209 odonate species) are advertised to be published on <http://www.wildspecies.ca>. (11) Checklist of the dragonflies of the NWT: The checklist includes 40 species.] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, Canada. E-mail: brownell@achilles.net

**4126.** Cham, S.A. (2004): *Dragonflies of Bedfordshire*. Bedfordshire Natural History Society, Luton. ISBN 0-9506521-7-2: 145 pp. (in English). [Regional dragonfly books have a long lasting tradition in UK. To see the evolution of this kind of books, Steve Cham's book is a good example: starting in the 1970th as a kind of "handmade" regional fauna it developed to a highly professional designed book using the latest digital and mapping technology. Species distribution mapping of dragonflies is presented in a special, highly informative chapter. The book covers the usual introducing chapters as morphology and (regional) habitats. It informs on predators and field technics to survey Odonata. The phenology of species is documented in most impressive graphs, and dragonfly recording in Bedfordshire is outlined. The 32 Bedfordshire species are documented monographically giving information on distinctive features, habitat, the past and current distribution in Bedfordshire, conservation status, highly informative field notes, and the flight period. Excellent colour pictures of the species, sometimes larvae, and excellent maps of the species distribution in UK / Ireland and in Bedford-



shire provide highly welcome information. I am really impressed by this book. (Martin Schorr)] Address: Bedfordshire Natural History Society, Bedford Museum, Castle Lane, Bedford MK40 3XD, UK. Orders of the book should be directed to Peter Glenister: E-mail: PEGlenister@ukonline.co.uk. The book is priced £ 24.50.

**4127.** Cleary, D.F.R.; Mooers, A.O.; Eichhorn, K.A.O.; Tol, J. van; Jong, R. de; Menken, S.B.J. (2004): Diversity and community composition of butterflies and odonates in an ENSO-induced fire affected habitat mosaic: a case study from East Kalimantan, Indonesia. *Oikos* 105(2): 426-448. (in English). ["Little is known about the diversity of tropical animal communities in recently fire-affected environments. Here we assessed species richness, evenness, and community similarity of butterflies and odonates in landscapes located in unburned isolates and burned areas in a habitat mosaic that was severely affected by the 1997/98 ENSO (El Niño Southern Oscillation) event in east Kalimantan, Indonesian Borneo. In addition related community similarity to variation in geographic distance between sampling sites and the habitat/vegetation structure Species richness and evenness differed significantly among landscapes but there was no congruence between both taxa. The species richness of butterflies was, for example, highest in sites located in a very large unburned isolate whereas odonate species richness was highest in sites located in a small unburned isolate and once-burned forest. We also found substantial variation in the habitat/vegetation structure among landscapes but this was mainly due to variation between unburned and burned landscapes and variation among burned landscapes. Both distance and environment (habitat/vegetation) contributed substantially to explaining variation in the community similarity (beta diversity) of both taxa. The contribution of the environment was, however, mainly due to variation between unburned and burned landscapes, which contained very different assemblages of both taxa. Sites located in the burned forest contained assemblages that were intermediate between assemblages from sites in unburned forest and sites from a highly degraded slash-and-burn area indicating that the burned forest was probably recolonised by species from these disparate environments. We, furthermore, note that in contrast to species richness (alpha diversity) the patterns of community similarity (beta diversity) were highly congruent between both taxa. These results indicate that community-wide multivariate measures of beta diversity are more consistent among taxa and more reliable indicators of disturbance, such as ENSO-induced burning, than univariate measures." (Authors).] Address: Tol, J. van, National Museum of Natural History, P.O. Box 9517, NL-2300 RA Leiden, The Netherlands

**4128.** Cook, C.; Laudermilk, E.L. (2004): *Stylogomphus sigmastylus* sp. nov., a new North American dragonfly previously confused with *S. albistylus* (Odonata: Gomphidae). *International Journal of Odonatology* 7(1): 3-24. (in English). ["Previously, the genus *Stylogomphus* in North America was believed to contain only a single species, *S. albistylus*. We present evidence for recognizing a second species, *S. sigmastylus* sp. nov.: holotype male, allotype female: Big Swan Creek, near Gordonsburg Church of Christ, Lewis County, Tennessee, 11 June 1990, C. Cook leg., deposited in the Florida State Collection of Arthropods. The biology, distribution and morphology of the new species are described,

and *S. albistylus* is re-described and figured to differentiate between the two species. *S. sigmastylus* sp. nov. males primarily differ from *S. albistylus* by having a more divaricate epiproct with widely flaring apices and a "U" shaped median cleft; shorter, thicker cerci basal of ventrolateral denticles with width and length approximately equal; ventrolateral denticles located at ca 1/3 appendage length; and posterior hamules with apex carinae thicker. The new species occurs mainly west of the Appalachian Mountains, predominantly in Arkansas, Kentucky, Missouri and Tennessee. The two species are parapatric in an area from southwestern Virginia south to North Carolina, west to northwestern Alabama and north to south-central Kentucky.] Address: Cook, C., 1 469 Crailhope Road, Center, KY 42214, USA. E-mail: bugman@scrtc.com

**4129.** Corbet, P.S. (2004): Ballistic defaecation by anisopteran larvae (Odonata): a way to increase foraging success? *International Journal of Odonatology* 7(1): 25-32. (in English). ["The article considers the phenomenon of ballistic defaecation by odonate larvae, exhibited by certain Anisoptera but not by any Zygoptera, and explores two possibilities: (1) that ballistic defaecation in Anisoptera may correlate with increased foraging success (the 'Wudkevich Hypothesis') by distancing the prey's alarm pheromone, persisting in the pellet after defaecation, from the larva's ambush site; and (2) that its absence in Zygoptera may correlate with their much richer repertoire of intraspecific agonistic behaviour, perhaps reflecting the need to change, and compete for, ambush sites more often. Attention is drawn to kinds of information that could throw light on the Wudkevich Hypothesis and to the design of experiments that would sustain or refute it; and mention is made of the possible implications for larvae of Zygoptera of their ability to learn to modify their antipredation behaviour in response to chemical cues emitted by their predators or by injured conspecifics." (Author)] Address: Corbet, P. S., Crean Mill, Crean, St Buryan, Cornwall, TR19 6HA, UK. E-mail: pscorbet@creanmill.u-net.com

**4130.** Daigle, J.J. (2004): Hunt for Red October. *Argia* 16(1): 15-16. (in English). [Report of a February 2003 trip to Florida, USA. Of special interest are records of "The red *Orthemis*" (*Orthemis ferruginea* cf. and a second taxon) and larvae of *Nehalennia pallidula*.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**4131.** De Block, M.; Stoks, R. (2004): Life-history variation in relation to time constraints in a damselfly. *Oecologia* 140(1): 68-75. (in English). ["Although variation within populations in plasticity to time constraints is expected with regard to hatching date, empirical studies are largely lacking. We studied life-history responses to time constraints manipulated by photoperiod and associated with hatching date in larvae of the damselfly *Lestes viridis* for two populations with a different hydroperiod. In a common garden experiment, early- and late-hatched larvae from both populations were reared at two photoperiods mimicking the start and the end of the egg-hatching season. In a reciprocal transplant experiment, early- and late-hatched larvae from both populations were reared in both ponds. In all these experiments, larvae were reared from egg hatching until adult emergence. Within both populations, larvae reared at the photoperiod indicating a late time point in the growing season, reduced development time to compensate

for their perceived shorter development period. Growth rate, however, did not respond to photoperiod, resulting in a lower mass at emergence. As expected, both in the laboratory and in the field, larvae from eggs that hatched later in the season generally had a shorter development time and a faster growth rate, resulting in a higher mass at emergence compared to early-hatched larvae. This may explain the intriguing seasonal increase in mass at emergence in this species, and affect the predictions of optimality models. None of these life-history responses differed between the two populations, despite clear differences in time constraints linked to hydroperiod, suggesting the robustness of the observed patterns. Given the ubiquity of asynchronous hatching in nature, and the adaptive value of the observed differences between early- and late-hatched larvae, we expect the effects of hatching date on life-history plasticity to be widespread." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robbly.stoks@bio.kuleuven.ac.be

**4132.** Delord, K.; Kayser, Y.; Cohez, D.; Befeld, S.; Hafner, H. (2004): Fluctuations in chick diet of the Squacco Heron *Ardeola ralloides* in southern France: changes over the last 30 years. *Bird Study* 51(1): 69-75. (in English). ["Aims To determine the diet composition of chicks and its variations in 2000 and 2001. To look for any changes over the last 30 years. Methods: Chick regurgitates were analysed to determine which Order contributed most to the diet, by frequency and by biomass. Results: During 2000 and 2001 chick diet was dominated by insects (92% and 70% by biomass, respectively), mainly Coleoptera (60% and 41%) and Orthoptera (27% in both years). The dry mass of Orthoptera, Coleoptera adults, Odonata and amphibians differed significantly between breeding sites, months and years. The proportion of invertebrates (in biomass) increased from 36.5% in 1970 and 31% in 1971 to 95% in 2000 and 90% in 2001 whereas the proportion of amphibians decreased in the same time from 49% and 33% in 1970 and 1971 to 5.0% and 9.5% in 2000 and 2001, respectively. Conclusion: The proportion of prey types differed between colony sites and months. Major changes were found in the diet composition between the early 1970s and 2000s. The possible hypotheses for the observed differences are discussed." (Authors)] Address: Delord, K., Station Biologique Tour du Valat, Le Sambuc, F-13 200 Arles, France

**4133.** Donnelly, T.W. (2004): Distribution of North American Odonata. Part II: Macromiidae, Corduliidae and Libellulidae. *Bull. American Odonatology* 8(1): 1-32. (in English). [Dot map presentation of 165 taxa; species or subspecies of special interest are discussed.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**4134.** Dwayne, L.S.; Thomas, A.W.; Makepeace, H.S. (2004): New Canadian and provincial odonate records for New Brunswick. *Argia* 16(1): 22-24. (in English). [Canada, New Brunswick, *Gomphus abbreviatus*, *Neurocordulia obsoleta*, *Gomphus vastus*, *Aeshna clepsydra*, *Argomphus furcifer*, *Hetaerina americana*.] Address: not stated

**4135.** Eason, P.K.; Switzer, P.V. (2004): The costs of neighbors for a territorial dragonfly, *Perithemis tenera*.

*Ethology* 110(1): 37-47. (in English). ["Past researchers have often considered neighbors to be beneficial to territorial residents, particularly compared with non-neighbor conspecific competitors. However, neighbors have the potential to be costly to residents in terms of both defensive costs and lost resources. In this study, we assessed the relative costs of defending a mating territory against neighbors and non-neighbors for the dragonfly *Perithemis tenera*, comparing across males with different numbers of contiguous neighbors; we also examined the possibility that the presence of contiguous neighbors might reduce the detection of potential mates. When neighbors were present, residents experienced a greater total number of intrusions by males; this increase in intrusions was due to higher numbers of intrusions by neighbors, as the number of intrusions by non-neighbor males did not differ. Residents with immediately adjacent neighbors also made more sorties toward neighbors than did residents whose nearest neighbors territories were not immediately adjacent. Interestingly, although the number of visits by females did not vary with the presence of neighbors, residents with neighbors made fewer sorties toward females than did residents without neighbors. Our results suggest that defensive costs increased when neighbors were present, that residents with neighbors may have missed opportunities to acquire mates, and thus that living with neighbors can be costly in this species." (Authors)] Address: Switzer, P.V., Eastern Illinois Univ., Dept Biol, Sci., Charleston IL 61920; USA. E-mail: cfpvs@eiu.edu

**4136.** Egan, D. (2004): Lawsuit filed to establish habitats for dragonfly. *Argia* 16(1): 13-14. (in English). [A coalition of conservation groups has filed suit in a federal district court in Washington D.C., over its claims the federal government is not doing enough to help the endangered *Somatochlora hineana*.] Address: degan@journalssentinel.com

**4137.** Fincke, O.M. (2004): Polymorphic signals of harassed female odonates and the males that learn them support a novel frequency-dependent model. *Animal Behaviour* 67(5): 833-845. (in English). ["For mate-searching species, the learned mate recognition (LMR) hypothesis assumes that sexual harassment favours signal variation among females, which exploits the receiver ability of males. The model predicts that coevolving males have responded to the female sexual foil by learning to recognize female variants as potential mates. I translate the LMR hypothesis into the language of signal detection theory to explain its novelty as a dynamic, coevolutionary, negative frequency-dependent selection model. Due to gene environment interactions, males cueing to the morph detected most often should generate positive but often asymmetrical, detection-dependent harassment towards females. Females are expected to sort to an ideal free distribution where harassment costs are equal. At equilibrium, morph fitness, but not necessarily morph frequency, is predicted to be equal. The LMR hypothesis is consistent with recent experimental data and the distribution of colour polymorphisms in the Odonata, predicts general conditions favouring variation in sexual signals, and provides a novel mechanism for speciation via sexual signalling." (Author)] Address: Fincke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Fleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

- 4138.** Fliedner, H.; Fliedner, T. (2004): Enten auf Libellenjagd. Libellennachrichten 11: 7. (in German). [Switzerland, Höhi Wispile near Gstaad, 05.09.2003; a domestic duck was observed successfully hunting an *Aeshna juncea* male.] Address: Fliedner, H., Louis-Segelken-Str. 106, D-28717 Bremen, Germany
- 4139.** Foster, S.E.; Soluk, D.A. (2004): Evaluating exuvia collection as a management tool for the federally endangered Hine's emerald dragonfly, *Somatochlora hineana* Williamson (Odonata: Cordulidae). *Biological Conservation* 118(1): 15-20. (in English). ["Reliable population density estimates are crucial for monitoring endangered species. Many species are difficult to capture or range over large areas, making direct monitoring of populations through capture or observation extremely challenging. In such cases, indirect methods of assessing populations can be the only source of reliable information. We examined whether the discarded exoskeleton of the last larval instar (exuvia), left behind when dragonflies emerge into the adult stage, could be used to predict larval densities and provide life history information for the federally listed endangered, Hine's Emerald Dragonfly (*Somatochlora hineana*). Using standardized protocols, we collected exuvia within six 2 x 2 m plots in an ephemeral wetland in Door County, Wisconsin during spring and summer of 1999 and 2000. *S. hineana* is a "summer emerger", with more than 95% of the emergence occurring from late June until mid-July. Based on time of emergence and the flight period, adults appear to live a month or longer. The sex ratio at emergence did not differ significantly from a 1:1 ratio and emergence was synchronous between the sexes. Estimates of larval population density using exuvial data were similar to those obtained through intensive direct sampling for larvae. Exuvial collections provide a reliable estimate of larval population density, help link larval ecology to adult ecology and are a useful tool for assessing habitat suitability. Although sampling exuviae requires repeated searching on particular sites, less expertise and fewer people are required for this type of sampling, indicating that exuvial surveys can be a very effective tool for monitoring populations of endangered dragonflies." (Authors)] Address: Foster, S.E., Illinois Natural History Survey, Center for Aquatic Ecology, 607 East Peabody Drive, Champaign, IL 61820, USA. E-mail: sfoster@utm.utoronto.ca
- 4140.** Fothergill, K.; Keebaugh, J.; Austin, M. (2004): First records of Pacific spiketail, *Cordulegaster dorsalis*, in Idaho. *Argia* 16(1): 16-18. (in English). [Ada county, 29 June 2003; Cassia county, 22 July, 2003] Address: Fothergill, K., Red Willow Research, Inc. 780 Falls Av. #390, Twin Falls, ID 83301, USA
- 4141.** Garrison, R.W. (2004): An analysis of the *Psaironeura tenuissima* complex, including synonymy of *P. machadoi* De Marmels with *P. bifurcata* Sjöstedt (Zygoptera: Protoneuridae). *Odonatologica* 33(1): 83-89. (in English). ["A review of the exclusively South American components of the genus *Psaironeura* Williamson shows that only 2 species are involved, *P. bifurcata* (Sjöstedt), and *P. tenuissima* (Selys). *P. machadoi* De Marmels is considered a synonym of *P. bifurcata*. Illustrations of the variability within the appendages, keys to males, and comments on the taxonomy of the group are included." (Author)] Address: Garrison, R.W., Research Associate, Natural History Museum of Los Angeles County, Exposition Boulevard 900, CA 90007, USA. E-mail: rwgarrison@earthlink.net
- 4142.** Hämäläinen, M. (2004): The 150 year anniversary of Selys' Synopsis des Caloptérygines. *Argia* 15(4): 8-11. (in English). [see OAS 3974; Malangpo 20: 196-200] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi
- 4143.** Hawking, J.; Suhling, F.; Wilson, K.; Theischinger, G.; Reels, G. (2004): Underwater and epilithic oviposition by Australian Aeshnidae (Odonata). *International Journal of Odonatology* 7(1): 33-36. (in English). ["[...] We observed *Notoaeschna sagittata* totally submerged ovipositing on bare rock in the fast current of a rapid. *Dendroaeschna conspersa* oviposited also underwater, but into wood submerged in very clear water." (Authors)] Address: Hawking, J.H., Murray-Darling Freshwater Research Centre, Cooperative Research Centre for Freshwater Ecology, P.O. Box 921, Albury, NSW 2640, Australia. E-mail: John.Hawking@csiro.au
- 4144.** Hayley, S. (2004): The Dragonfly: Masterpiece of Design!. *Design Science Association - newsletter*, Feb. 21, 2004: 1. (in English). [Verbatim: "February's meeting will be dedicated to showcasing one of God's most unique creatures in the insect world: dragonflies! Descriptive terms like fastest flyer in the insect world, best vision of any insect, jewels of the insect world and camouflage and defense tactic expert might seem a bit overstated at first, but these are entirely fitting statements when the details of their anatomy and physiology are studied. These creatures are truly fascinating, with nearly 5,000 known species (worldwide) and 450 of these present in North America. Much remains a mystery about their behavior and life history, but the number of people interested in these insects of the order Odonata is growing rapidly and will probably cause an explosion in knowledge concerning dragonflies in the next few years. Therefore, we need to warn you that one of speaker Steve Hayley's goals in presenting this program will be to convert all those in attendance into amateur odonatists! Come prepared to start your own journey of studying and observing these creatures that so clearly demonstrate the beauty, design, order, purpose, complexity, precision and detail that are such a clear testimony of our Creator! Also, please note that: Jarred Vallorani of Answers in Genesis will be on hand to bring us up to date on the progress of the AIG Museum project, and to speak briefly on the upcoming Portland-area AIG Creation Conference." A colour photo of *Anax junius* is presented.] Address: not stated
- 4145.** Hummel, S. (2004): New county records for Iowa - 1999 to 2003. *Argia* 16(1): 18-22. (in English). [The update of the Iowa, USA checklist of Odonata includes 241 new county records for 71 species in 53 of Iowa's 99 counties.] Address: Hummel, S., P.O. Box 121, Lake View, IA, 51450, USA
- 4146.** Jödicke, R.; Langhoff, P.; Misof, B. (2004): The species-group taxa in the Holarctic genus *Cordulia*: a study in nomenclature and genetic differentiation (Odonata: Corduliidae). *International Journal of Odonatology* 7(1): 37-52. (in English). ["Two *Cordulia* species have been described so far, the Eurasian *C. aenea* and the North American vicariant *C. shurtleffii*. The names *amurensensis*, *tatica*, *turfosa*, *laubmanni*, *linaeana* and *aenae-turfosa* are available in the synonymy of *C. aenea*. Out



of these, only the name *amurensis* is deemed to denote a separate taxon, which is currently regarded as a weakly defined Far East subspecies. A molecular analysis of nuclear ITS I sequences of specimens representing all three taxa *aenea*, *amurensis* and *shurtleffii* shows a clear differentiation which suggests a recognition of three separate taxa with full biological species rank. The morphological and distributional differentiation between *C. amurensis* and *C. aenea* requires further investigation. The molecular approach based on the variability of nuclear ITS I sequences appears promising for further taxonomic studies within dragonflies." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: r.joedicke@t-online.de

**4147.** Johansson, F.; Suhling, F. (2004): Behaviour and growth of dragonfly larvae along a permanent to temporary water habitat gradient. *Ecological Entomology* 29(2): 196-202. (in English). ["1. Freshwaters form a gradient from small temporary waters to large permanent waters. Identifying and examining traits that restrict the distribution of species along this gradient are crucial to the understanding of community structure in these habitats. 2. Using dragonfly larvae species, differences in traits important for growth and survival were studied. 3. The traits were studied in a series of laboratory experiments using two pairs of dragonfly species that coexist in the Namibian semi-desert. One species pair was from the most temporary part of the water permanence gradient and the other species pair from an intermediate part of the gradient. 4. As predicted, activity, capture rate, and growth rate were significantly greater in the two temporary water species. Contrary to the prediction made in the work reported here, species differences in microhabitat selection were not related to the species' habitat origin. Cannibalism did not differ between species. 5. The results lend support to the hypothesis that selection has favoured certain combinations of trait values and that these traits are important for a successful life in temporary and permanent waters." (Authors)] Address: Johansson, F., Department of Ecology and Environmental Science, Animal Ecology Group, Umeå University, 90187 Limed, Sweden. E-mail: frank.johansson@eg.umu.se

**4148.** Kéry, M.; Juillerat, L. (2004): Sex ratio estimation and survival analysis for *Orthetrum coerulescens* (Odonata, Libellulidae). *Canadian Journal of Zoology* 82(3): 399-406. (in English, with French summary). [oas 14 "There is controversy over whether uneven sex ratios observed in mature dragonfly populations are a mere artifact resulting from the higher observability of males. Previous studies have at best made indirect inference about sex ratios by analysis of survival or recapture rates. Here, we obtain direct estimates of sex ratio from capture recapture data based on the Cormack Jolly Seber model. We studied *O. coerulescens* at three sites in the Swiss Jura Mountains over an entire activity period. Recapture rates per 5-day interval were 3.5 times greater for males (0.67, SE 0.02) than for females (0.19, SE 0.02). At two sites, recapture rate increased over the season for males and was constant for females, and at one site it decreased with precipitation for both sexes. In addition, recapture rate was higher with higher temperature for males only. We found no evidence for higher male survival rates in any population. Survival per 5-day interval for both sexes was estimated to be 0.77 (95% CI 0.75 0.79) without significant si-

te- or time-specific variation. There were clear effects of temperature (positive) and precipitation (negative) on survival rate at two sites. Direct estimates of sex ratios were not significantly different from 1 for any time interval. Hence, the observed male-biased sex ratio in adult *O. coerulescens* was an artifact resulting from the better observability of males. The method presented in this paper is applicable to sex ratio estimation in any kind of animal." (Authors)] Address: Kéry, M., CEFE/CNRS, 1919 Route de Mende, F-34033 Montpellier, France. E-Mail: kery@cefe.cnrs-mop.fr

**4149.** Kosterin, O.E. (2004): Odonata of the Daurkiy State Nature Reserve area, Transbaikalia, Russia. *Odonatologica* 33(1): 41-71. (in English). ["Data were recorded in 1995-1997. An annotated list of species contains a full reference to the specimens collected, notes on biotope preferences, and relative abundance of species. For some species, taxonomic notes and data on variation are given. Among the 31 species, there are the Manchurian *Cercion v-nigrum* Needham and *Anisogomphus maacki* (Selys), previously thought to range westwards up to Blagoveshchensk only. *Anax parthenope* Selys and *Pantala flavescens* Fabr. proved to occur in Transbaikalia. The Chinese/Mongolian *Ophiogomphus spinicornis* Selys enters the Russian territory in southern Transbaikalia, Baikal region and southern Tuva." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**4150.** Lencioni, F.A.A. (2004): *Telagrion nathaliae* spec. nov. (Zygoptera: Coenagrionidae). *Odonatologica* 33(1): 91-98. (in English). ["Both sexes of the new species are described and illustrated. Holotype male: Brazil: Sao Paulo state, Jacarei, Fazenda Santana do Rio Abaixo, alt. 608 m, 07-11-1999, deposited in author's collection; allotype and paratypes from the same locality. It differs from *T. macilentum* by the male cerci possessing elongate, ventrally-directed projections, and by being straight in lateral view. 6 Brazilian species are keyed." (Author)] Address: Lencioni, F.A.A., Rua dos Ferroviarios, 55 - Jardim Mesquita, BR-12300-000 Jacarei, S.P., Brazil. E-mail: odonata@zygoptera.bio.br

**4151.** Lopau, W. (2004): Die Libellenfauna der Kykladen / Griechenland. *Naturkundliche Reiseberichte* 20: 59 pp. (in German). [The Kyklads, a group of islands in the central Aegean Sea in the Mediterranean Sea, are part of the territory of Greece. W. Lopau researched in 2002 extensively on the odonate fauna of the following islands: Anáfi, Ändros, Delos, Ios, Kea, Kimolos, Kithnos, Mikonos, Milos, Naxos, Páros, Santorini, Serifos, Sifnos, Siros, and Tinos. After a brief history of odonatological records referring to the Kyklads, the odonate fauna of each of the islands is documented considering old and new records. Each of the 29 taxa is commented in a monographic way, the distribution of the species is mapped, and a regional odonatological bibliography is added. This paper is an additional highly significant contribution of Wolfgang Lopau to the knowledge of the Greek and European odonate fauna.] Address: Orders: Kappes, W., Winsbergring 5, D-22525 Hamburg, Germany

**4152.** Marco, P. de; Cardoso Peixoto, P.E. (2004): Population dynamics of *Hetaerina rosea* Selys and its relationship to abiotic conditions (Zygoptera: Caloptery-

gidae). *Odonatologica* 33(1): 73-81. (in English). ["Aspects of population dynamics were tested against temperature, insolation and moisture. The monthly abundance of *H. rosea* was estimated utilizing a scan method based on 49 fixed areas in 30-min intervals from 0800 to 1700 h during the day. The daily male activity pattern is characterized by a sharp increase at 0900 h with continuous density until 1430 h, followed by a sharp decrease after 1600 h. A correlation between peak densities was observed during the year and high period of photoperiod and low evapotranspiration suggesting possible ways males can adjust their emergence periods to optimize water loss with longer reproduction periods of activities." (Authors)] Address: Marco, P. de, Laboratório de Ecologia Quantitativa, DBG, Universidade Federal de Vicosa, BR-36571-000, Vicosa, MG, Brazil. E-mail: pdemarco@mail.ufv.br

**4153.** McMillan, V.E.; Arnold, R.M. (2004): Oviposition behavior and substrate utilization by *Lestes* congener (Odonata: Lestidae). *International Journal of Odonatology* 7(1): 53-63. (in English). ["Here we describe tandem oviposition (contact guarding) in *L. congener* and the use of dry stems of the sedge *Eleocharis obtusa* as oviposition substrates at a pond in New York State. Pairs formed away from the pond, then flew to *Eleocharis* patches on dry land 0.5-3 m from the water's edge. Some copulations occurred at or near oviposition sites; these pairs began ovipositing immediately afterwards. Eggs were placed singly in a line of incisions down the length of the plant stem, and several to many different pairs might utilize a single stem over a period of time. However, less than 1 % of the surface area of such stems possessed incision scars, although, in regions of stems with a high density of incisions, some eggs were close enough to be touching. Lone males were present in small numbers at the pond, but male harassment of tandems was minimal and we observed no female take-overs. Some females remained to complete oviposition alone after being deserted by their mates. Lone females were most common in late afternoon, when few lone males remained at the pond and take-over risks were small." (Authors)] Address: McMillan, Victoria E., Department of Biology, Colgate University, 13 Oak Drive, Hamilton, NY 13346, USA. E-mail: vmcmillan@mail.colgate.edu

**4154.** Medland, J. (2004): Reports from Coastal stations - 2003: Guernsey, Channel Islands. *Atropos* 21: 37-39. (in English). [Verbatim: It is 25 years since the last survey of Odonata in Guernsey. Prior to this the only list was compiled in 1892. The 1978 results indicated that only six species were present: *Calopteryx virgo*, *Ischnura elegans*, *Pyrrhosoma nymphula*, *Aeshna mixta*, *Anax imperator*, and *Sympetrum striolatum*. Since this time there has been a considerable reduction in suitable habitat with two large wetland areas being drained. It was feared that at least *C. splendens* and *I. elegans* had become extinct. It was against this rather bleak background that Barry Wells and I made an attempt to survey all possible sites to determine the current status of those species still remaining. A teneral *I. elegans* on 19 April was unusually early with the next record for the species not being until 25 May. Two fresh Emperor exuviae on 26 May were the forerunners of a synchronized emergence over the next 11 days totalling 44 individuals from a small garden pond. A male *Libellula depressa* at the same site on 7 June was the first record for Guernsey. On 13 June two new damselfly species

were found: *Enallagma cyathigerum* and *Erythromma viridulum*. The latter was the first record for the Channel Islands. Both these species were seen in modest numbers at several sites with ovipositing noted later in the summer. Hard work and perseverance paid off the following week with a small population of *Orthetrum cancellatum* being located at a west coast site. It later transpired that the species had been present but not reported in 2001. The same site was then visited on a regular basis and on 12 July single male *Anax parthenope* and *Sympetrum fonscolombei* were found and photographed. Two days previously a probable male Lesser Emperor had been seen at another site. Both these vagrants were new for the Channel Islands. *S. striolatum* and *A. mixta* were found to be widespread and present at all suitable sites. The last new species to be found was a single male *Chalcolestes viridis* on 10 August. Only one individual was seen at the site with all sightings from a small area of *Phragmites* and *Salix*. It was last reported on 20 September. Despite extensive searching there were no records of *C. splendens* and only a tantalising glimpse of a single 'red' damselfly. All in all a very productive and rewarding first year's effort. Habitat creation and improvement is planned with more mapping work to locate further sites. The excellent atlas work being done by our French colleagues in Manche, Normandy is a constant reminder of those species which could one day colonise the Island.] Address: not stated

**4155.** Meurgey, F.; Perron, C. (2004): *Anax amazili* new for Guadeloupe and notes on other rare species (French West Indies). *Argia* 16(1): 24. (in English). [*Ischnura hastata*, *Anax amazili*, *A. concolor*, *Tramea binotata*] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**4156.** Meurgey, F.; Perron, C. (2004): First French record for *Anax junius* (Drury, 1773). *Argia* 16(1): 25-26. (in English). [Not unexpected, likewise spectacular is a record of *A. junius* in France. The specimen was taken at Pointe St-Gildas, Dept. Loire-Atlantique, without further information.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**4157.** Meurgey, F.; Perron, C. (2004): Newly discovered Odonata localities in the Dominican Republic (West Indies). *Argia* 16(1): 25. (in English). [Seven odonate species - all previously known from the Dominican Republic - are documented. *Scapania frontalis* was hit by the car of the authors.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**4158.** Nelson, B.; Thompson, R. (2004): The natural history of Ireland's dragonflies. The national Museums and Galleries of Northern Ireland. ISBN 0 900761 45 8: 454 pp. (in English). [In this comprehensive study of the Irish odonate fauna, the authors combine their knowledge and research based on twenty years of field studies with new information gleaned from an extensive four year study carried out by the Dragonfly Ireland Project. The book covers all aspects of dragonfly biology and ecology, and the history of odonatological research in Ireland. There are comprehensive accounts of all re-

sident and migrant species, an in-depth description of the major odonate habitats and a gallery section, illustrating and describing over fifty sites in detail. Additional chapters include information on how to study and how to photograph Odonata. There is an extensive bibliography listing all currently known publications on the subject. The highly informative text is written for the keen naturalist. In a monographic style each species is described and compared with similar species. Behaviour, habitat, life cycle, and distribution in Ireland are presented. All these facts are interpreted and critically discussed. This publication is lavishly illustrated throughout, with over 300 outstanding colour photographs of habitats, larvae, and adults of all resident and migrant species found in Ireland. This attractive book is sold for 30,- Euro and is worth its price. The book is a highly significant contribution to the knowledge of the European odonate fauna and should not be missing in any odonatological library. (Martin Schorr)] Address: Ulster Museum, Botanic Gardens, Belfast, Northern Ireland BT9 5AB, UK

**4159.** Parr, A. (2004): Migrant update for 2003. Dragonfly news 45: 20. (in English). [Great Britain; *Lestes barbarus*, *Erythromma viridulum*, *Sympetrum fonscolombii*, *S. flaveolum*, *S. danae*, (range extensions), *S. pedemontanum* c.f., *Anax parthenope*, *Anaciaeschna isoceles*, *Orthetrum coerulescens*, *Libellula depressa* (range extension to Scotland).] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4160.** Paulson, D. (2004): *Lestes forficula* new record from Cayman Islands. *Argia* 16(1): 26. (in English). [Red Bay, Grand Cayman, 5-7 Oct. 1983] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**4161.** Petchey, O.L.; Downing, A.L.; Mittelbach, G.G.; Persson, L.; Steiner, C.F.; Warren, P.H.; Woodward, G. (2004): Species loss and the structure and functioning of multitrophic aquatic systems. *Oikos* 104(3): 467-478. (in English). ["Experiments and theory in single trophic level systems dominate biodiversity and ecosystem functioning research and recent debates. All natural ecosystems contain communities with multiple trophic levels, however, and this can have important effects on ecosystem structure and functioning. Furthermore, many experiments compare assembled communities, rather than examining loss of species directly. We identify three questions around which to organise an investigation of how species loss affects the structure and functioning of multitrophic systems. 1) What is the distribution of species richness among trophic levels; 2) from which trophic levels are species most often lost; and 3) does loss of species from different trophic levels influence ecosystem functioning differently? Our analyses show that: 1) Relatively few high-quality data are available concerning the distribution of species richness among trophic levels. A new data-set provides evidence of a decrease in species richness as trophic height increases. 2) Multiple lines of evidence indicate that species are lost from higher trophic levels more frequently than lower trophic levels. 3) A theoretical model suggests that both the structure of food webs (occurrence of omnivory and the distribution of species richness among trophic levels) and the trophic level from which species are lost determines the impact of species loss on ecosystem functioning, which can even vary in the

sign of the effect. These results indicate that, at least for aquatic systems, models of single trophic level ecosystems are insufficient for understanding the functional consequences of extinctions. Knowledge is required of food web structure, which species are likely to be lost, and also whether cascading extinctions will occur." (Authors) *Cordulegaster boltonii*] Address: Woodward, G., School of Biological Sciences, Queen Mary University of London, Mile End Road, London, E1 4NS, UK. E-mail: GuyWoodward@hotmail.com

**4162.** Rantala, M.J.; Ilmonen, J.; Koskimäki, J.; Suhonen, J.; Tynkkynen, K. (2004): The macrophyte, *Stratiotes aloides*, protects larvae of dragonfly *Aeshna viridis* against fish predation. *Aquatic Ecology* 38(1): 77-82. (in English). ["Predation could be one force determining which contemporary species occupy a certain habitat. *Aeshna viridis* is an endangered dragonfly species with a larval distribution strongly associated with lakes where the water plant, water soldier, *Stratiotes aloides*, occurs. In this study, the larvae were almost exclusively found in patches of *S. aloides*. To study larval association with *S. aloides* further, we conducted a series of laboratory experiments. Behavioural experiments indicated that larvae preferred *S. aloides*. *Aeshna viridis* larvae were nocturnal and rather inactive. Larvae on *S. aloides* were less susceptible to predation by the perch, *Perca fluviatilis*, than larvae on another water plant, *Myriophyllum alterniflorum*. According to our study it seems that occurrence of *S. aloides* may limit the distribution of *A. viridis*, and the protection of refuges may be essential in planning the conservation of this endangered species." (Authors)] Address: Rantala, M.J., University of Jyväskylä, Department of Biological and Environmental Science, P.O. Box 35, FIN-40014, University of Jyväskylä, Finland; Current address: Department of Biology, University of California, Riverside, CA 92521, USA. E-mail: marrant@st.jyu.fi

**4163.** Rasmussen, J. (2004): Recent dragonfly news from Denmark. *Atropos* 21: 79-80. (in English). [Range extensions of *Anax imperator* and *Erythromma viridulum*; *Anaciaeschna isoceles* was included into the Danish Red List as vulnerable, but has made a significant comeback in the recent years; three localities for *Coenagrion armatum* are known; some new localities of the rare *C. lunulatum* have been discovered in 2003; second Danish record of *Sympetrum pedemontanum* in 2002 (west of Jutland); a migration of darters (*Sympetrum sanguineum*, *S. flaveolum*, *S. danae*) has been recorded in mid-August 2003 by a small lake in the centre of Copenhagen.] Address: Rasmussen, J., Stockholmsgade 13 I tv, 2100 Ø, Denmark

**4164.** Rehfeldt, G. (2004): Diel pattern of activity, mating, and flight behaviour in *Onychogomphus uncatus* (Odonata: Gomphidae). *International Journal of Odonatology* 7(1): 65-71. (in English). ["The behaviour of *O. uncatus*, including flight and mating activity, was studied at a fast-flowing irrigation canal. During the day, males perched in sections of the canal with a strong current and a turbulent water surface. During short flights, interactions with other con-specific and hetero-specific males occurred, particularly with *Orthetrum coerulescens*. Under conditions of high population density, the frequent occurrence and disturbances by this species often resulted in male *O. uncatus* leaving a particular section of the canal. In the late afternoon and evening, males concentrated on ground perches in the



vicinity of the water. The reproductive system of *O. uncatatus* was found to be 'encounter limited'. The operational sex ratio of imagines at the water was always strongly biased in favour of the males. Individual females were observed at the water during the morning and evening hours. Following pair formation there was a prolonged period of copulation away from the water. Most pair formations were observed in the morning and evening hours. They took place over water, and in the evening hours also away from the water." (Author)] Address: Rehfeldt, G., Fasanenstraße 3, D-38102 Braunschweig, Germany. E-mail: g.rehfeldt@tu-bs.de

**4165.** Schmidt, E (2004): Die Alten Fahrten" des Dortmund-Ems-Kanals im Westmünsterland, ein spezifischer, wertvoller und gefährdeter anthropogener Stillwassertyp mit Auen-Charakter am Beispiel der Odonatenfauna - eine Aufgabe für den Naturschutz (Insecta, Odonata). Verh. Westd. Entomologentag 2002: 179-186. (in German). [Nordrhein-Westfalen, German; "Alte Fahrten" are remains of the former Dortmund-Ems-canal. Because they are linked with the new canal, they are influenced by the movement of water produced by the cargo ships using these new canals. The odonate fauna - 28 species could be recorded over a period of 10 years - is comparable with that of oxbows. Typical species are *Gomphus vulgatissimus*, *G. pulchellus*, and *Cercion lindenii*. Noteworthy species are the regional rare *Coenagrion pulchellum* and *Aeshna grandis*. *Crocothemis erythraea* was traced in 2002 and 2003.] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**4166.** Smallshire, D.; Swash, A. (2004): Britain's Dragonflies. WildGuides. Old Basing. ISBN 1-903657-04-0: 168 pp. (in English). [This is a photographic guide to the Odonata of Britain and Ireland, covering all 57 species recorded and 10 potential vagrants. 55 full colour plates depict males, females, immatures and e.g. colour forms. These plates are produced using the latest digital image technology, combining (high quality!) colour pictures of different specimens against a common background. This looks quite "naturally", but I hesitate to say there is any advantage for identification of the species; to present the species in this way, is - of course - a matter of taste. I think, most of the plates are printed a little bit too dark. There are two particular strengths of the book: (1) the British species (imagines and larvae) are arranged in "picture tables" so that you can compare the species at a glance. Significant identification features are optically stressed in the accompanying text. (2) The colour plates are presenting pictures of immature stages which are missed in most of the European identification guides. The (optical) concept of this book is quite unusual; it is stressing on field identification of the species. And if you want to know what a dragonfly really is, look at page 5 of the book. The pricing of the book (£ 15,-) is fair. (Martin Schorr)] Address: WildGuides Parr House, 63 Hatch Lane, Old Basing, Hampshire RG24 7EB, United Kingdom. www.wildguides.co.uk

**4167.** Suhling, F.; Schütte, C.; Müller, O. (2004): *Nesiothemis farinosa*: description of the final stadium larva (Odonata: Libellulidae). International Journal of Odonatology 7(1): 73-78. (in English). ["A written description and illustrations of the final stadium larva of *Nesiothemis farinosa* are presented, based on larvae and exuviae collected in Namibia. The larvae were reared in the

laboratory until emergence. Additionally, information on larval microhabitat, behaviour and development is provided." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**4168.** Suutari, E.; Rantala, M.J.; Salmela, J.; Suhonen, J. (2004): Intraguild predation and interference competition on the endangered dragonfly *Aeshna viridis*. *Oecologia* 140(1): 135-139. (in English). ["We examined the effects of intraguild predation (IGP) and interference competition on an endangered dragonfly, *A. viridis*. *A. viridis* is rare in Europe due to the decrease in suitable habitats harboring the macrophyte *Stratiotes aloides* L. *Stratiotes* plants are the principal oviposition substrate for *A. viridis* females and protect the larvae of *A. viridis* from fish predation. In our study lakes *A. viridis* larvae are sympatric with larvae of *Aeshna grandis* and *Aeshna juncea*. The susceptibility of *A. viridis* larvae to IGP by similar-sized larvae of *A. grandis* and *A. juncea* was tested in a laboratory predation experiment. Microhabitat use of *A. viridis* and *A. grandis* was studied in the laboratory to determine the possible effects of interference competition on the spatial distribution of *A. viridis* larvae. Our results show that at least in laboratory conditions, *A. viridis* is susceptible to IGP and interference competition. In competition, *A. grandis* larvae dominated the middle and outer portion of *S. aloides* rosettes whereas *A. viridis* stayed in the inner parts. When *A. grandis* larvae were absent, *A. viridis* colonized the middle and outer parts of the rosettes. We conclude that asymmetric predation between odonate larvae of equal size can be intense, and that both IGP and interference competition affect *A. viridis*. Although natural habitat complexity diminishes their impact, these interactions may nevertheless influence the distribution of *A. viridis* in *S. aloides* waters and restrict its microhabitat use in *S. aloides* rosettes." (Authors)] Address: Suutari, Erna, Dept of Biol. and Environmental Science, University of Jyväskylä, P.O. Box 35, Jyväskylä, 40014, Finland. E-mail: ermasuut@byti.jyu.fi

**4169.** Switzer P.V. (2004): Fighting behavior and prior residency advantage in the territorial dragonfly, *Perrithemis tenera*. *Ethology, Ecology & Evolution* 16(1): 71-89. (in English with Italian summary). ["Many factors, including residency status, body size, age, and energetic reserves, have been implicated as possibly determining the winner in animal contests. In this study I investigated which of these factors were correlated with the outcomes of naturally-occurring territorial contests between male amberwing dragonflies (*P. tenera*). Amberwing contests consist of non-contact interactions and are characterized by a series of distinct stages that represent different levels of escalation. Prior residents did tend to win, but interestingly this residency advantage only occurred in interactions that were not escalated. For both non-escalated and escalated interactions, body size (wing length) did not influence the outcome. Age was correlated with outcome for escalated interactions, with the younger of the pair tending to win. Winning males had also spent less time in male-male interactions both the day of the interaction and during their entire life, suggesting that energy reserves may also affect the outcome of contests. In contrast to escalated interactions, age and time spent in male-male interactions was not related to the outcome of non-escalated interactions. The difference between the two opponents' sizes, ages, and time spent in previous male-male inte-

ractions did not correlate with duration or escalation level of contests. These results suggest that non-escalated interactions may occur when intruders are simply assessing the quality of the site. Contests that do not escalate, and thus the prior residency advantage, are probably a result of the intruder not challenging for ownership because the value of the territory is too low." (Author)] Address: Switzer, P.V., Eastern Illinois Univ., Dept Biol, Sci., Charleston IL 61920; USA. E-mail: cfpvs@eiu.edu

**4170.** Tennesen, K.J. (2004): *Acanthagrion aepiolum* sp. nov. from South America (Odonata: Coenagrionidae). *International Journal of Odonatology* 7(1): 79-86. (in English). ["The new species - holotype male, Bolivia, Department of Santa Cruz, Nuflo de Chavez Prov., stream 11.8 km E of San Javier (16°17'S, 62°37'W), 16 November 1998, leg. K.J. Tennesen; deposited in El Museo de Historia Natural "Noel Kempff Mercado", Santa Cruz, Bolivia - has been confused with *Acanthagrion ascendens*. Abdominal segment 10 in males is higher than in *A. ascendens* and the second segment of the genital ligula lacks the two setal patches distinctive of *A. ascendens*. *A. luteum* is synonymized with *A. ascendens* [new synonymy]."] (Author)] Address: Tennesen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktennesen@aol.com

**4171.** Tennesen, K.J. (2004): Obituary: Minter Jackson Westfall, Jr.. *Odonatologica* 33(1): 99-103. (in English). [M. J. Westfall (28 Jan. 1916 - 20 July 2003)] Address: Tennesen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktennesen@aol.com

**4172.** Tsubaki, Y.; Hooper, R.E. (2004): Effects of eugregarine parasites on adult longevity in the polymorphic damselfly *Mnais costalis* Selys. *Ecological Entomology* 29(3) : 361-366. (in English). ["1. The relationship between the abundance of midgut parasites (eugregarine trophozoites) and the survival of hosts (field-collected damselflies, *Mnais costalis*) was investigated under laboratory conditions. 2. Males of *M. costalis* are morphologically and behaviourally polymorphic, typically existing as clear-winged non-territorial sneaks and orange-winged territorial fighters (the latter are larger in size). The survival cost of eugregarine infection for the two morphs was compared. 3. Orange-winged males showed shorter longevity compared to clear-winged males when they were fed at levels lower than the natural feeding rate, or when they were deprived of food. In contrast, morph longevity did not differ when they were fed until satiation every day. 4. Within each morph, the survival of damselflies was negatively correlated with the parasite abundance except when damselflies were fed until satiation. 5. The results suggest that the abundance of eugregarine parasites exerts a substantial cost, which is associated with the maintenance of alternative mating strategies, together with the higher developmental cost and energy expenditure of the fighter morph." (Authors)] Address: Tsubaki, Y., Biodiversity Conservation Research Group, National Institute for Environmental Studies, Onogawa, Tsukuba 305-8506, Japan. E-mail: Tsubaki@nies.go.jp

**4173.** Vance-Chalcraft, H.D.; Soluk, D.A.; Ozburn, N. (2004): Is prey predation risk influenced more by increasing predator density or predator species richness in stream enclosures? *Oecologia* 139(1): 117-122. (in English). ["The direct lethal impacts and the indirect ef-

fects predators have on prey characteristics, such as behavior, have fitness consequences for the prey. Whether the level of predation risk that prey face in the presence of multiple predator species can be predicted from a null model that sums the risk from each predator species in isolation is unclear. In field enclosures, we tested whether the predation risk experienced by *Stenonema* mayfly larvae from a dragonfly larva (*Boyeria vinosa*) and a hellgrammite (*Corydalus cornutus*) together matched the predictions of the multiplicative risk model. We then compared whether any deviations from the models predictions were larger in the presence of two predator species than in the presence of an equivalent density of individuals from either predator species alone, to determine if unique effects arise for the prey in the presence of multiple predator species. We also determined if prey moved preferentially into predator-free refuge spaces or decreased their movement in the presence of predators. *Stenonemas* risk of predation was reduced compared to the models prediction, but no unique multiple predator species effects were present because this risk reduction was comparable in magnitude to the level exhibited in the presence of each predator species alone. The prey did not move into predator-free refuge spaces in the presence of predators in the field enclosures. Thus, these predators appear to interfere interspecifically and intraspecifically, which may facilitate the coexistence of the predators and the prey." (Authors)] Address: Vance-Chalcraft, Heather D., School of Integrative Biology, University of Illinois, Urbana, IL 61801, USA. Email: h.vance-chalcraft@ttu.edu

**4174.** Vukusic, P.; Wootton, R.J.; Sambles, J.R. (2004): Remarkable iridescence in the hindwings of the damselfly *Neurobasis chinensis chinensis* (Linnaeus) (Zygoptera: Calopterygidae). *Proceedings of the Royal Society: Biological Sciences* 271(1539): 595-601. (in English). ["The bright green dorsal iridescence of the hindwings of *Neurobasis chinensis chinensis* males, very rare in Odonata, is known to play a significant role in their courtship behaviour. The mechanism responsible for such high contrast and spectrally pure colour has been investigated and found to be optical interference, producing structural colour from distinct laminations in the wing membrane cuticle. The ventral sides of these iridescent wings are dark brown in colour. In a single continuous membrane of wing cuticle, this is an effect that requires a specialized structure. It is accomplished through the presence of high optical absorption ( $k = 0.13$ ) within two thick layers near the ventral surface of the wing, which leads to superior dorsal colour characteristics. By simultaneously fitting five sets of optical reflectivity and transmissivity spectra to theory, we were able to extract very accurate values of the complex refractive index for all three layer types present in the wing. The real parts of these are  $n = 1.47, 1.68$  and  $1.74$ . Although there is often similarly significant dorsal and ventral colour contrast in other structurally coloured natural systems, very few system designs comprise only a single continuous membrane." (Authors)] Address: Wootton R.J., School of Biological Sciences, University of Exeter, Exeter EX4 4PS, UK

**4175.** Watanabe, M.; Matsuoka, H.; Taguchi, M. (2004): Habitat selection and population parameters of *Sympetrum infuscatum* (Selys) during sexual mature stages in a cool temperate zone of Japan (Anisoptera: Libellulidae). *Odonatologica* 33(2): 169-179. (In English) ["The mark-and-recapture method was used to

study the population parameters of sexually mature adult *S. infuscatum* in a forest-paddy field complex in the cool temperate zone of Japan. After emergence, they moved into the forest gaps, and they remained and fed exclusively in the forest gaps throughout their lives. Mature males captured outnumbered mature female on each sampling day in the paddy fields, but not in the gaps. However, the estimated daily numbers in both habitats and/or the whole survey area roughly indicated a 1:1 sex ratio. The estimated daily survival rates and daily immigrations showed that females were apt to stay in the forests, while males sometimes dispersed, though females in the paddy fields tended to have a long-range flight. In the morning, some of the paired couples flew to the paddy fields in tandem and oviposited on the wing; these were so-called flyers. The rest remained in the forests the entire day; these were designated as perchers. The forest gaps were thus important for the life cycle of this species both as feeding and roosting sites." (Authors)] Address: Watanabe, M., Institute of Biological Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan. E-mail: watanabe@kan-kyo.envr.tsukuba.ac.jp

**4176.** Watts, P.C.; Wu, J.H.; Westgarth, C.; Thompson, D.J.; Kemp, S.J. (2004): A panel of microsatellite loci for the Southern Damselfly, *Coenagrion mercuriale* (Odonata: Coenagrionidae). *Conservation Genetics* 5 (1): 117-119. ["Of the 40 loci tested, 11 loci amplified spurious bands and 14 loci were monomorphic. We were able to develop, therefore, fifteen polymorphic loci that resolved distinct alleles within the expected size range. Numbers of alleles varied between 2 and 7 at the dinucleotide microsatellites and 2 and 6 at the trinucleotide loci (Table 1). Observed and expected heterozygosities varied between 0.233-0.732 and 0.291-0.799 respectively (Table 1. Three loci (LIST4-023, LIST4-030, LIST4-035), showed significant ( $P < 0.05$ ) deviations from expected Hardy-Weinberg conditions, although these heterozygote deficits were all non-significant ( $P > 0.05$ ) after correction for multiple testing. Only 4 of the 105 locus comparisons were ( $P < 0.05$ ) out of linkage disequilibrium (LJST4-034-LIST4-002,  $P = 0.043$ ; LIST4-037-UST4-002,  $P = 0.030$ ; LIST4-058-LIST4-053,  $P = 0.031$ ; LIST4-034-LIST4-060,  $P = 0.031$ ). Given the large number of tests involved, however, these loci are probably not significantly linked but further samples are required to confirm this. We are presently using these loci to examine the genetic structure of the southern damselfly in the UK." (Authors)] Address: Watts, P.C., School of Biol. Scien., The Biosciences Building, Crown Street, University of Liverpool, Liverpool, L69 7ZB, UK. E-mail: p.c.watts@liv.ac.uk

**4177.** Watts, P.C.; Thompson, D.J.; Kemp, S.J. (2004): Cross-species amplification of microsatellite loci in some European zygopteran species (Odonata: Coenagrionidae). *International Journal of Odonatology* 7(1): 87-96. (in English). ["Microsatellites have been infrequently used for genetic analysis of odonate species. Here, we report four microsatellite loci that are polymorphic in *Coenagrion mercuriale*. Furthermore, we examine the success of cross-species amplification of a panel of 19 microsatellite loci that were developed from *C. mercuriale* in seven other European odonate species. PCR with microsatellite primers is more likely to be achieved in species that are closely related to the species used for marker isolation. Overall, 10 microsatellite loci amplified interpretable PCR products (seven

loci were variable) in both *C. puella* and *C. pulchellum*, whilst two loci were variable in *Ischnura elegans*. These markers should facilitate genetic research into these zygopteran species." (Authors)] Address: Watts, P.C., School of Biological Sciences, The Biosciences Building, Crown Street, University of Liverpool, Liverpool L69 7ZB, UK. E-mail: p.c.watts@liv.ac.uk.

**4178.** Wennemann, L. (2004): Neue Aspekte der kulturellen Entomologie. *Verh. Westd. Entomologentag 2002*: 129-136. (in German). [The journal *Digest of Cultural Entomology* briefly is introduced including a table of contents according the four issues released until 1997. The paper of Carlos Bonet Betoret on "Two Odonata citations in ancient Mesopotamian literature" was published 1993 in *Cultural entomology Digest* 1(1): 15-16.] Address: Wennemann, L., Napoleonsweg 39, D-45721 Haltern am See, Germany. E-mail: wennemann@t-online.de

**4179.** White, H.; Donnelly, N. (2004): George Beatty passes away. *Argia* 15(4): 26. (in English). [George H. Beatty, III, died in Lemont, PA, USA on January 13, 2004 at the age of 80.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**4180.** Worthen, W.B.; Gregory, S.; Felten, J.; Hutton, M.J. (2004): Larval habitat associations of *Progomphus obscurus* at two spatial scales (Odonata: Gomphidae). *International Journal of Odonatology* 7(1): 97-109. (in English). ["*P. obscurus* is one of the most abundant dragonflies in South Carolina, USA. We collected dragonfly larvae from 127 sites in the Enoree River and nine of its tributaries, and correlated the abundance of *P. obscurus* larvae with physical and chemical characteristics of these streams. As expected for this burrowing species, larval abundance varied among streams and was significantly correlated with mean silica concentrations and the proportion of sandy-bottom sites in these streams. We also examined habitat associations on a smaller spatial scale. We sampled *P. obscurus* larvae by kick-seine from fine sand, coarse sand, and pebble sediment types in five sites in the Enoree River basin. Larvae were collected, preserved in 75% EtOH, and their body lengths were measured. Sediment samples were collected and Ro-tapped, and mean particle size was calculated. Larvae were present in a greater fraction of the 'fine sand' samples than 'pebble' samples. In addition, abundance was inversely correlated with mean particle size. Mean larvae size was weakly correlated with mean particle size, and inversely correlated with larval abundance. This species is associated with sandy-bottom streams and fine sandy sediments within streams. Changes in sediment characteristics resulting from channelization, increased flooding, and increased stream flow could change sediment composition and impact the abundance of this common dragonfly species." (Author)] Address: Worthen, W.B., Dept of Biology, Furman University, Greenville, SC29613 USA. E-mail: worthen@furman.edu

**Thanks to all who contributed to this issue of OAS!**  
A special thank to Naoya Ishizawa, Pawel Buczyński, and Wolfgang Schneider, and Klaus Reinhardt, Sheffield for linguistic help.





# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: martin@lindeboom.de and Martin Schorr, Schulstr. 7B D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: martinschorr @onlinehome.de

Published in Rheinfelden, Germany and printed in Tübingen, Germany.  
ISSN 1438-0269

## 1997

**4181.** Haarstad, J. (1997): The dragonflies of selected eastern Minnesota rivers. Report submitted to the Minnesota Department of Natural Resources: 83 pp. (in English). ["During the summer of 1992 I visited 25 rivers and streams in eastern Minnesota collecting dragonfly exuviae and adults. Streams visited in the Northeast were the Gooseberry (1 site), Baptism (3 sites), Manitou (1 site), Temperance (4 sites), Cascade (2 sites), Stony (1 site), Kawishwi (1 site), and St. Louis (3 sites). Streams visited in Eastcentral Minnesota were the St. Croix (12 sites), Kettle (5 sites), Snake (7 sites), Crooked Creek (1 site), Little Sand (1 site), Sand (2 sites), Rock Creek (1 site), Sunrise (1 site), Groundhouse (1 site), Ann (1 site), and Rum (2 sites). Streams visited in the Southeast were the Cannon (4 sites), Zumbro (5 sites), Whitewater (2 sites), Root (8 sites) and Mississippi (5 sites). A total of 33 species of riverine dragonflies were collected. Species of Gomphidae included Hagenius brevistylus, Dromogomphus spinosus, Ophiogomphus earolus, O. colubrinus, O. howei, O. rupinsulensis, x O. sabrinus, Hylogomphus adelphus, H. viridifrons, Gomphurus externus, G. fraternus, G. lineatifrons, G. vastus, G. ventricosus, Gomphus exilis, G. graslinellus, G. lividus, G. quadricolor, G. spicatus, Arogomphus cornutus, Stylurus amnicola, S. notatus, and S. spiniceps. Species of Aeshnidae included Anax junius, Aeshna umbrosa, Basiaeshna janata, Boyeria grafi-ana, and B. vinosa. Species of Cordulegastridae included Cordulegaster maculata and C. obliqua. Species of Macromiidae included Didymops transversa and Macromia illinoensis. Species of Corduliidae included Cordulia shurtleffi, Epicordulia princeps, Epitheca canis, E. spinigera, Neurocordulia yamaskenensis, Somatochlora minor, and S. elongata. Libellulidae (primarily Plathemis lydia, Libellula pulchella, L. luctuosa) were noted but generally not collected since most occur abundantly at ponds and marshes. Also noted was the presence of the damselflies Calopteryx aequabilis, C. maculata, and Hetaerina americana." (Author)] Address: <http://files.dnr.state.mn.us/ecologicalservices/nongame/projects/consgrantreports/1997Haarstadsign.pdf>

**4182.** Hassan, S.T.S. (1997): Action thresholds of wet paddy arthropods for pest management decision-making in Malaysia. *Pertanika J. Trop. Agric. Sci.* 20(1): 65-74. (in English). ["Action thresholds to aid pest population management decision-making of 11 categories of wet paddy arthropods are suggested in terms of mean population density per hill and proportion of infestation (P(I)) of the field sampling units. [...] The respective va-

lues for pests are: 3.38, 0.92 (*Nephotettix* spp.), 6.28, 1.00 (*Nilaparvata lugens*), 1.37, 0.72 (*Cnaphalocrocis medinalis*- *Pyalidae*), 2.42, 0.90 (*Recilia dorsalis*), 3.81, 0.97 (*Sogatella furcifera*), and for predators are: 3.89, 0.98 (*Cyrtorhinus* sp.), 2.39, 0.85 (*Anatrichus pygmaeus*- *Diptera*), 2.02, 0.82 (*Odonata*), 1.65, 0.81 (*Casnoidea lividipennis*), 1.61, 0.64 (*Authaor*) (*Paederus fuscipes*), and 1.60, 0.69 (spiders). P(I) is significantly ( $P < 0.001$ ) affected by arthropod category and growth stage of the crop. The observed P(I) indicated high fits (most  $r^2 > 0.90$ ) to clumped- and Poisson-based distribution models."] Address: Hassan, S.T.S., Jabatan Biologi, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia

**4183.** Kneitz, G. (Projektleitung); Zumkowski-Xylander, H.; Oerter, K. (Koord.) (1997): "Minimierung der Zerschneidungseffekte von Straßenbauten am Beispiel von Fließgewässerquerungen bzw. Brückenöffnungen". Endbericht zum Forschungsvorhaben FE 02.158.G 94 L der Bundesanstalt für Straßenwesen: 313pp. + Anhang- (in German). [The effect of bridges as barriers for dispersing animals was surveyed at 20 running waters across Germany. Dispersion ability of Anisoptera is nearly unaffected by bridges, while Zygoptera are influenced by barrier effects. Minimum width of 2.5 m enable Anisoptera and Calopteryx spec. to cross bridges following the running water. Serious effects are caused by car traffic, especially by heavy goods vehicles. Heavy air motion caused by these cars results in a sideways drift of the specimens and increased the risk of collisions. Dispersal of Zygoptera was effected by air motion caused by a tunnel effect due to suction or heavy headwind.] Address: Bundesanstalt für Straßenwesen (BASt), Brüderstraße 53, D-51427 Bergisch Gladbach, Germany. E-mail: [info@bast.de](mailto:info@bast.de)

**4184.** Ziemba, M. (1997): Ehemalige Tonabgrabungen im Ravensberger Hügelland: erhaltenswerte Sekundärbiotope mit hohem ökologischen Wert - ein weiteres Beispiel. *Ber. naturwiss. Ver. Bielefeld und Umgebung* 38: 293-312. (in German). [A few water bodies located in a former clay pit have been surveyed for Odonata. The list of species includes some red-listed Odonata of the Federal State Nordrhein-Westfalen (Germany).] Address: Ziemba, M., Biologische Station Gütersloh / Bielefeld e.V., Niederheide 63, D-33659 Bielefeld, Germany

**4185.** Kosterin, O.E. (1998): Important findings of the dragonfly (Odonata) fauna of the Dahurian Nature Reserve and its environs. Problems of Entomology in Russian. Theses for XI Congress of Russian Entomological Society, Sanct-Petersburg, 1998 - Vol. 1): 210-211. (in Russian). [Verbatim: "Until recently the odonofauna of the steppen Transbaikalia was insufficiently studied. (Gorb et al., 1996) reported on a finding of 17 species in the Dahurian Nature Reserve (an extreme south of the Chita Province), of which *Aeshna serrata* Hag. found much more easterly of its previous easternmost finding on the Baikal longitude. In summer 1995-1996 in the same region we managed to find 30 species. Two localities were studied: the Onon River valley in the environs of the village Nizhnii Tsasuchei (the steppen zone but with an unique pine forest) and Torei Lakes (the dry steppe zone). In both localities 19 species were found: *Lestes dryas*, *L. sponsa*., *Sympetma paedisca*, *Coenagrion armatum*, *C. ecornutum*, *C. lanceolatum*, *C. lunulatum*, *Erythromma najas*, *Enallagma cyathigerum risi* Schmidt, *Ischnura elegans*, *Aeshna mixta*, *A. serrata*, *Pantala flavescens*, *Leucorrhinia intermedia*, *Libellula quadrimaculata*, *Sympetrum danae*, *S. flaveolum*, *S. (vulgatum) imitans*., *S. pedemontanum*. 10 species were found only in the Onon valley: *Cercion v-nigrum*, *Coenagrion glaciale*, *Aeshna crenata*, *A. juncea*, *Ophiogomphus spinicornis*, *Anisogomphus maacki*, *Stylurus flavipes*, *Epitheca bimaculata*, *Somatochlora graeseri*, *S. (metallica) exuberata*. Only one species, *Anax parthenope*, was recorded in the Torei Lakes depression (lake Nizhnii Mukei); besides, *Sympetrum depressiusculum* was reported for this depression (Gorb et al., 1996) but not found by us. The odonofauna of the Onon valley is much more rich thanks to a diversity of intrazonal biotopes and the river presence while the Torei Lakes depression, bearing only more or less mineralized lakes, is poor of species. Unexpected are the findings of two Manshurian species, *C. v-nigrum* and *A. maacki*, known earlier no west of Blagoveshchensk (Malikova, 1995). Thus, they penetrate along the Onon valley to the steppen Transbaikalia and, probably, inhabit all the Amur River basin. Proved is the presence in Transbaikalia of southern species *P. flavescens*, which was reported earlier for the village Pokrovka at the Shilka and Argun' Rivers junction (Selys Longchamps, 1887), and *A. parthenope*, which has been observed visually by B.F. Belyshev (1973) at Lake Gusinoe. A Chinese-Mongolian species *O. spinicornis* is hereby for the first time reliably reported for Russia. Analysis of collections revealed that this species inhabit also the southern coast of Baikal and the northern Ubsu-Nur Hollow in the southern Tuva Republic. The author expresses his gratitude to V.A. Brinikh, a Director of the State Nature Reserve "Dauriskii" for a great help in work and to E.I. Malikova (Blagoveshchensk) for valuable consulting."] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**4186.** Lotzing, K. (1998): Ergebnisse von Bestandserfassungen zur Libellen-Fauna (Odonata) in ausgewählten Biotopen am Südrand der Magdeburger Börde. Abh. Ber. Mus. Naturk. Magdeburg 20: 19-35. (in German). [Alt-Landkreis Staßfurt, Sachsen-Anhalt, Germa-

ny; a total of 36 odonate species resulting from collection made between 1970 to 1995 is documented in a table and briefly discussed.] Address: Lotzing, K., Am Hollschen Bruch 4c, D.39435 Unseburg, Germany

**4187.** Resetarits, W.J. (1998): Differential vulnerability of *Hyla chrysoscelis* eggs and hatchlings to larval insect predators. Journal of Herpetology. 32(3): 440-443. (in English). [Analysis of variance revealed a highly significant effect of treatments on the survival of *Hyla* tadpoles. Mean tadpole survival was 97.5% in the predator-free controls, but was reduced to 62.5% with dragonfly naiads (*Pachydiplax longipennis*) and to 0.84% with dytiscid larvae (*Ilybius* sp.). Tukey's procedure showed that both the dragonfly and dytiscid treatments were significantly different from the controls, and that the dytiscid treatment was significantly different from the dragonfly treatment. Dragonfly naiads and dytiscid larvae were both significant predators of newly hatched *Hyla* tadpoles in the experiment, but the predation rate by dytiscid larvae was much greater than that of dragonfly naiads. There was also a highly significant effect of treatments on the survival of *Hyla* eggs. Mean egg survival was 97% in the controls and 89% in the dragonfly treatment, but was reduced to only 16% in the presence of dytiscid larvae. In contrast to the results for tadpoles, the control and dragonfly treatments were not significantly different from each other, but the dytiscid treatment was significantly different from both the dragonfly treatment and the control. Therefore, only dytiscid larvae were important predators on the eggs of *H. chrysoscelis*.] Address: Resetarits, W.J., Jr., Cent. Aquatic Ecol., Illinois Nat. History Survey, 607 E. Peabody Dr., Champaign, IL 61820, USA.

**4188.** Wilson, K. (1998): New Hong Kong dragonfly. Porcupine 17: 9. (in English). [Verbatim: *Macrodiplax cora*, a dragonfly newly recorded for Hong Kong in May 1997 (see Porcupine! 16: 5), is a widespread species found in three zoogeographical areas - the Ethiopian, Oriental and Australasian regions. It is highly migratory with populations established on islands in the Indian and Pacific Oceans. The larvae are salt tolerant with populations occurring in lagoons and estuaries. The genus *Macrodiplax* is both tropical and neotropical and closely allied to *Pantala* which is also found throughout the tropics. *Macrodiplax cora* and *Pantala flavescens* are perhaps today's most successful dragonflies in terms of numbers and distribution.] Address: Wilson, K.D.P., Flat 20, 6 Mansfield Road, The Peak, Hong Kong, China. E-mail: wilsonkd@ntlworld.com

**4189.** Zeidler, A.; Burkl, G. (1998): Ökologische Studien zur Bewertung der Flußauengewässer. Münchener Beiträge zur Abwasser-, Fischerei- und Flußbiologie 51: 283-300. (in English). [Odonata were among the organisms used to classify and assess seven alluvial water bodies in Bavaria, Germany. No species list is documented.] Address: not stated

## 1999

**4190.** American Museum of Natural History (1999): Know your local dragonflies. The center hosts a summer odonate workshop. American Museum of Natural History. Center for Biodiversity Conservation Newsletter



Fall 1999/Winter 2000: 6- (in English). [Report on a course in June 1999 introducing into ecology and identification of Odonata and chaired by Mike May.] Address: American Museum of Natural History. Center for Biodiversity Conservation, Central Park West at 79th Street, New York, NY 10024-5192, USA. E-mail: biodiversity@amnh.org

**4191.** Bulet, P.; Hetru, C.; Dimarcq, J.-L.; Hoffmann, D. (1999): Antimicrobial peptides in insects; structure and function. *Developmental and Comparative Immunology* 23: 329-344. (in English). ["Antimicrobial peptides appear to be ubiquitous and multipotent components of the innate immune defense arsenal used by both prokaryotic and eukaryotic organisms. During the past 15 years a multitude of these peptides have been isolated largely from insects. In spite of great differences in size, amino acid composition and structure, most of the antimicrobial peptides from insects can be grouped into one of three categories. The largest category in number contains peptides with intramolecular disulfide bonds forming hairpin-like  $\beta$ -sheets or  $\alpha$ -helical  $\beta$ -sheet mixed structures. The second most important group is composed of peptides forming amphipathic  $\alpha$ -helices. The third group comprises peptides with an overrepresentation in proline and/or glycine residues. In general, the insect antimicrobial peptides have a broad range of activity and are not cytotoxic. Despite a wealth of information on structural requirements for their antimicrobial activity, the mode of action of these peptides is not yet fully understood. However, some data suggest the existence of two types of mode of action: 1. through peptide-lipid interaction or 2. through receptor-mediated recognition processes. This review presents the main results obtained during the last four years in the field of antimicrobial peptides from insects with a special focus on the proline-rich and cysteine-rich peptides." (Authors) *Aeshna cyanea*.] Address: Institut de Biologie Moléculaire et Cellulaire, Unité Propre de Recherche du CNRS 9022, 15 Rue René Descartes, 67084 Strasbourg, Cedex, France. <http://www.atheris.ch/pdf/Dev-Complmm-1999.pdf>

**4192.** Cham, S. (1999): Working together! Using DARTER and DMAP. *Darter* 19: 10-11. (in English). [Software to store data and to create distribution maps are demonstrated using *Calopteryx splendens* in Bedfordshire, UK.] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com

**4193.** Cham, S. (Red.) (1999): News from the regions. *Darter* 19: 6-10-14-15. (in English). [oas 15: Cham, S.: News from East Anglia; Clarke, D.: News from North England; Averill, M.: News from the Midlands; Jones, S.: News from Cornwall; Taylor, P.: News from Norfolk; Smith, B.: News from Scotland; Smith, I.D.: Recording in Wales. The was forward!] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com

**4194.** Coughlan, C. (1999): Dragonflies. Pebble Books. ISBN 0-7368-0238-X: 24 pp. (in English). [First reading children book on dragonflies introducing into primary odonate morphology.] Address: Capstone Press, 151 Good Council Drive, P.O. Box 669, Mankato, Minnesota 56002, USA

**4195.** D'Andrea, M. (1999): La fauna odonatologica della provincia di Arezzo, Italia centrale (Odonata). *Bol-*

*lettino dell'associazione Romana di entomologia* 54: 1-30. (in Italian, with English summary). [The odonofauna of the province of Arezzo has been studied only sporadically in the past. Between 1986 to 1993, 106 sites have been sampled. The records total in 42 species, 10 of which are new to the region.] Address: D'Andrea, M., Musei di Storia Naturale dell'Università di Firenze, Sezione Zoologica "La Specola", Via Romana 17, I-50125 Firenze, Italy

**4196.** Entekin, S.; Golladay, S.; Ruhlman, M.; Hedman, C. (1999): Unique steephead stream segments in southwest Georgia: invertebrate diversity and biomonitoring. *Proceedings of the 1999 Georgia Water Resources Conference*, held March 30-31, 1999, at University of Georgia. Kathryn J. Hatcher, editor, Institute of Ecology, The University of Georgia, Athens, Georgia: 4 pp. (in English). ["The steephead streams we studied are springfed, relatively high gradient, and have greater substrate diversity than is typical of most Coastal Plain streams. The study objectives were: 1) to describe the physical characteristics of the streams and quantify the seasonal biodiversity in several streams draining managed forestlands, and 2) test and adapt rapid bioassessment methods. Our results show these streams to have high invertebrate diversity throughout the year with the highest occurring in winter and early spring. The streams and their valleys had a regionally unique assemblage of plants and animals. Bioassessment values indicated water quality to be fair to good when sampling with the fixed area modified Hess sampler and good to excellent when sampling multiple habitats using a D-frame kicknet. The values were calculated using the rapid assessment methods adapted by Save-Our-Stream (SOS) and the Hilsenhoff Family Biotic Index (FBI). The results of the bioassessment values indicate that the streamside management zones (SMZs) implemented in these areas of silvicultural activity are effective in maintaining adequate water quality standards and supporting diverse and abundant aquatic life." (Authors). *Calopterygidae*, *Cordulegasteridae*, and *Gomphidae* are listed in table 1. The total density of individuals / m<sup>2</sup> was 699 in summer, 322 in winter, and 361 in early spring] Address: Entekin, Sally, Jones Ecological Research Center, Rte 2 Box 2324, Newton, GA 31770, USA.

**4197.** Goodyear, K.L.; McNeill, S. (1999): Bioaccumulation of heavy metals by aquatic macro-invertebrates of different feeding guilds: a review. *The Science of the Total Environment* 229: 1-19. (in English). ["The available literature on heavy metal bioaccumulation by freshwater macro-invertebrates has been analysed. A very uneven data distribution was found. Ephemeroptera and Diptera are the most commonly investigated orders of insect larvae, whilst many orders are not represented at all. The collector/gatherer and predator feeding guilds are more frequently investigated than other guilds. Furthermore, Zn, Cu, Pb and Cd are the most intensively researched heavy metals, and only infrequent investigations of other metals are documented. Relationships between metal concentrations in the animals and levels in sediments and waters were determined from the pooled data for three feeding guilds. No one relationship represents how each metal interacts within the feeding guilds. Each of the four metals Zn, Cu, Pb and Cd displays a unique relationship between metal concentrations in sediments or waters with those in individual feeding guilds of macro-invertebrates, indica-

ting the relative importance of different sources of metals to the different feeding types. Biomagnification of Zn, Cu, Pb and Cd has been demonstrated not to occur between these guilds." (Authors)] Address: Goodyear, K.L., Applied Geochemistry Research Group, Royal School of Mines, Imperial College, South Kensington, London, SW7 2BP,

**4198.** Harding, P. (1999): Dragonfly recording in the wider context. *Darter* 19: 4. (in English). [Several species recording schemes exist in the UK; they are enumerated, and possibilities to cooperate with the Odonata mapping scheme are briefly outlined.] Address: not stated

**4199.** Henson, S. (1999): First & last dates for 1998 and 1999. *Dragonfly News* 36: 9-12. (in English). [List of species with phenological data from Great Britain.] Address: Henson, S., 10 Shotesham Road, Poringland, Norwich NR14 7LE, UK

**4200.** Holmes, R.T.; Likens, G.E. (1999): Organisms of the Hubbard Brook Valley, New Hampshire. Agriculture Forest Service Northeastern Forest Service, Northeastern Research Station, General Technical Report NE-257: 37 pp. (in English). ["Lists the organisms, both plant and animal, that have been identified by scientists engaged in multidisciplinary ecological research in the Hubbard Brook Valley, New Hampshire, during the past three decades. The Valley encompasses the Hubbard Brook Experimental Forest, Mirror Lake, and other areas within the White Mountain region of Grafton County. The species lists included in this report are relatively complete for vascular plants, amphibians, birds, fish, mammals, phytoplankton, and zooplankton, and partially complete for insects, molluscs, and non-vascular plants." (Authors) Odonata are treated on the genus level.] Address: [http://www.fs.fed.us/newtownsquare/publications/technical\\_reports/pdfs/1999/gtrne257.pdf](http://www.fs.fed.us/newtownsquare/publications/technical_reports/pdfs/1999/gtrne257.pdf)

**4201.** Johnson, I. (1999): Dragonfly recording and Conservation. *Darter* 19: 3. (in English). [Appeal to get interested in odonate larvae too.] Address: not stated

**4202.** Leslie, H.A.; Pavluk, T.I.; bij de Vaate, A.; Kraak, M.H.S. (1999): Triad Assessment of the Impact of Chromium Contamination on Benthic Macroinvertebrates in the Chusovaya River (Urals, Russia). *Archives of Environmental Contamination and Toxicology* 37(2): 182-189. (in English). ["The impact of chromium (Cr) contamination on the benthic macroinvertebrate community (including "Odonata") of the Chusovaya River in the Ural Mountains of Russia was assessed using a triad approach. The triad consisted of chemical analysis of the contamination in various environmental compartments, examination of the benthic macroinvertebrate community structure, and analysis of ecotoxicological effects on the caddisfly *Hydropsyche pellucidula* (Trichoptera). Chemical analyses of water, sediments, and detritus indicated that the main contaminant present was indeed Cr and that the level of the Cr contamination near the point source, a severely polluted dead tributary, was extremely high: Downstream Cr concentrations were about 450 times higher in water and 25 times higher in sediments compared with a clean reference site upstream. The contamination at the mouth of the tributary was even more severe: 800 times more Cr in water and 50 times more Cr in sediments. Benthic macroinvertebrate community structure was

studied using artificial substrates colonized in situ. Lower species richness was observed at the downstream site compared with the upstream site. Larvae of *H. pellucidula* collected from the contaminated site on the river bioaccumulated large amounts of Cr and exhibited physical abnormalities. The incidence of tracheal gill damage was significantly higher than at a reference site on the nearby Reshotka River, as was the incidence of discoloration of the anal papillae of these animals. The application of a triad demonstrated that the observed extreme Cr contamination had an adverse effect on aquatic life in the Chusovaya River, both at the community level (reduced diversity) and at the level of individuals (sublethal effects on surviving individuals)." (Authors)] Address: Leslie, H.A., Department of Aquatic Ecology and Ecotoxicology, ARISE, University of Amsterdam, Kruislaan 320, 1098 SM Amsterdam, The Netherlands

**4203.** Linhart, J. (1999): Phytophilous macrofauna in the *Stratiotes aloides* vegetation of the Lake Lukie, Poland. *Acta Universitatis Palackianae olomucensis, Facultas Rerum naturalium, Biologica* 37: 67-76. (in English). ["On 14th July 1999, a small tentative investigation into the composition of phytophilous macrofauna in the *Stratiotes aloides* vegetation was conducted in the Lake Lukie, Poland. Altogether 22 main (33 recognized) invertebrate taxa were found. Out of these, only 7 taxa represented more than 1 % share on the total abundance - Chironomidae, Cladocera, Oligochaeta, Cyclopoida, Trichoptera, Isopoda and Gastropoda; chironomid larvae being by far the most abundant (almost 72 % of the total abundance). Representatives of groups Hydroida, Bivalvia, Hirudinea, Araneida, Hydrachnellae, Ostracoda, Anisoptera, Ceratopogonidae, Ephydriidae, Stratiomyidae and Coleoptera were found only occasionally (2-16 individuals per m<sup>2</sup>). The total abundance of phytophilous macroinvertebrates (> 300 µm) was estimated to be 8,328 ind. m<sup>2</sup> for epiphytic invertebrates and 11,800 ind. m<sup>2</sup> for all animals (including mining Chironomidae). An interesting feature was an enormous infection of *S. aloides* leaves by the mining chironomid larvae. These miners comprised about 40 % of all chironomid larvae found in the samples. I have estimated a number of mining Chironomidae in 1 plant to be 579 on average (15.6 ind.gn1 plant dry weight). It has been suggested that the quadrat sampling method underestimated numbers of highly active animals dwelling in macrovegetation - Cladocera, Copepoda, predators (Odonata, Heteroptera, Coleoptera)." (Author)] Address: Linhart, J., Department of Zoology and Anthropology, Natural Science Faculty, Palacký University, T. Svobody 26, 771 46 Olomouc, Czech Republic. E-mail: [linhart@prfnw.upol.cz](mailto:linhart@prfnw.upol.cz)

**4204.** Martens, A. (1999): *Buchbesprechungen: Corbet, P.S. (1999): Dragonflies: Behaviour and Ecology of Odonata. Lauterbornia* 37: 247. (in German). [oas 6; Review of P.S. Corbet's book, see OAS 1566] Address: Martens, A., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

**4205.** Missfeld, S.; Schleef, J. (1999): Untersuchungen zur Libellenfauna des "Pölinxer Grund" (Kreis Höxter). *EGGE-WESER* 12: 3-18. (in German). [Nordrhein-Westfalen, Germany; 19 odonate species could be recorded in 1996. *Lestes barbarus*, *Cordulia aenea*, and *Aeshna juncea* are of special regional interest.] Address: Schleef, J., c/o Biol. Station Gütersloh / Bielefeld

e.V., Niederheide 63, D-33659 Bielefeld, Germany. E-mail: BioStationGT-BI@t-online.de

**4206.** Moore, N.; Colston, A. (1999): The dragonflies and damselflies of Wicken Fen. Guides to Wicken Fen 13: 3 pp. (in English). [The 26 odonate species ever known to occur in Wicken Fen, UK are listed in a table and their current status in the area is briefly commented. To enable an easy identification of the Coenagrionidae, an illustration of the Wicken Fen's blue damselflies is added.] Address: Colston, A., Wicken Fen NNR, Lode Lane, Wicken, ELY, Cambs, CB7 5XP, UK

**4207.** Moore, N. (1999): Under Threat! Norfolk Hawker (*Aeshna isosceles*). *Darter* 19: 2. (in English). [Brief introduction into the current distribution and threat of *Anaciaeschna isosceles*; appeal for mapping the distribution of the species in the UK.] Address: Moore N.W., The Farmhouse, 117 Boxworth End, Swavesey, Cambridge CB4 5RA, United Kingdom

**4208.** Parr, A. (1999): Migrant dragonfly project.. *Darter* 19: 5. (in English). [The objects of the project are outlined, and some interesting data from the project are dealt with.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4209.** Perrin, V. (1999): Here today and here tomorrow? Knowing our key sites. *Darter* 19: 12-13. (in English). [Introduction into the UK Odonata key site project.] Address: Perrin, V., 13 Pettitts lane, Dry Drayton, Cambridgeshire CB3 8BT, UK. E-mail: valperrin@dia1.pipex.com

**4210.** Steffens, W.P.; Smith, W.A. (1999): Status survey for special concern and endangered dragonflies of Minnesota: population status, inventory and monitoring recommendations. Final report submitted to the Natural Heritage and Nongame Research Program, Minnesota Department of Natural Resources: 54 pp- (in English). ["Status determination surveys for Hine's emerald dragonfly (*Somatochlora hineana*), Saint Croix snaketail (*Ophiogomphus susbehcha*), and extra-striped snake-tail (*O. anomalus*) were conducted throughout eastern, central, and northern Minnesota. Threats to these rare species were evaluated, and conservation and population status recommendations for Minnesota dragonflies are presented. Baseline data on other dragonflies in under-surveyed habitats are reported, including several state records and numerous county records. Several collections of damselflies are also reported along with county distribution information, and recommendations for future Odonata surveys and monitoring are offered." (Authors)]. [http://www.dnr.state.mn.us/ecologicalservices/nongame/projects/researchreports/abstracts/insect\\_s/steffenssmith1999.html](http://www.dnr.state.mn.us/ecologicalservices/nongame/projects/researchreports/abstracts/insect_s/steffenssmith1999.html)

**4211.** Sykes, T. (1999): Getting to grips with the Southern Damselfly. *Dragonfly News* 36: 8-9. (in English). [Report from two workshops in July 1999 referring to *Coenagrion mercuriale* in the UK. ] Address: Sykes, T., Environ. Agency, Colvedene Court, Wessex Way, Colden Common, Hants, SO21 1WP, UK

**4212.** Zherikhin, V.V. (1999): Cladistics in palaeontology: Problems and constraints. AMBA projects AM / PFICM98/L99: Proceedings of the First International Palaeontological Conference, Moscow 1998. In: AMBA/AM/PFICM98/1.99: 193-199. (in English). ["Cla-

distics was originally developed as a method of analysis of the present-day diversity pattern, and some problems are arising when it is applied to the palaeontological record. The most important difficulties are connected with 1. the different time scales (phylogenetic scale in cladistics, geological or physical scales in palaeontology where neither paraphyletic taxa nor chronotaxa can be excluded accurately); and 2. the different basic levels for establishment of terminal branches (the single present-day level in cladistics and numerous successive levels in palaeontology). Both modified versions of cladistics and complementary methods have to be developed to describe fossil biodiversity in an adequate manner." (Author) Several references are made to Odonata.] Address: Zherikhin, V.V., Palaeontological Institute, 123 Profsoyuznaya St., 117868 GSP Moscow, Russia

## 2000

**4213.** Bonet Betoret, C. (2000): Expansión de *Tritheimis annulata* en Europa en los años 80 y 90 (Odonata). *Boletín de la Sociedad Entomología Aragonesa* 27: 85-86. (in Spanish). [Iberian peninsula, France. The paper compiles and discusses from literature date records of *T. annulata*.] Address: Bonet Betoret, C., Lintera, 28, ES-46001 Valencia, Spain

**4214.** Caley, K.J. (2000): Temperate Feet in Tropical Waters. *Porcupine* 21: 23-24. (in English). [Brief report on a students excursion in Hong Kong, China, with focus on marine fauna. A black & white drawing of *Rhincocypha perforata* illustrates the "stream day", but no additional information is given.] Address: Caley, K.J., Dept Ecol Biodiversity & Universitas 21, Virtual School of Biodiversity, School of Biol. Sciences, Univ. Nottingham, UK

**4215.** Campbell, J. (2000): The status of the Ruddy Darter *Sympetrum sanguineum* (Müller) in Oxfordshire. *Darter* 20: 4. (in English). [Increasing knowledge and range extension of *S. sanguineum* are outlined and mapped.] Address: not stated

**4216.** Cham, S. (2000): Co-occurrence mapping with DMAP. *Darter* 20: 5. (in English). [Two examples of coincidences are mapped: (1) Odonate species diversity in the UK and Ireland and (2) *Calopteryx splendens* and *Platycnemis pennipes* in Bedfordshire.] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com

**4217.** Cham, S. (Red.) (2000): News from the regions. *Darter* 20: 6-8, 10-13. (in English). [Taylor, P.: News from Norfolk; Averill, M.: News from the Midlands; Clarke, D.: News from North England; Marshall, H. & D. Clarke: Hot news from Cumbria; Gladwin, T. & C. Shepperson: Dragonfly recording in Hertfordshire; Smith, B.: News from Scotland; Jones, S.: News from Cornwall; Halls, J.: Buckinghamshire Dragonfly Atlas] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com

**4218.** Clopton, R.E. (2000): Apicomplexa: Eugregariorida. The Genera. Order Eugregariorida Léger, 1892. In J. J. Lee, G. F. Leedale, & P. Bradbury (Eds.): *The Illustrated Guide to the Protozoa*, 2nd ed., Vol. 1. Society of Protozoologists, Lawrence, Kansas, U.S.A.



689 pp: 205-288, 353-369. (in English). [The genus *Odonaticola* Sakar & Haldar, 1981 known to host *Brachythemis contaminata* is described and illustrated.] Address: <http://science.peru.edu/gregarina/assets/images/Clopton2002IIIGuideGregspreprint.pdf>

**4219.** Confiant, R. (2000): *Mamzelle* Dragonfly. ISBN 0374199329: 169 pp. (in English). [A novel about a girl trapped working in the cane fields of Martinique. She is later forced to move from her village to the island's politically restive capital where her aunt introduces her to the unsavory business of nightlife among the mulatto elite. Translated from the French by Linda Coverdale. The author is a winner of the French Prix Novembre.]

**4220.** Grawe, F. (2000): Tag der Artenvielfalt im Kreis Höxter. *Egge-Weser* 13: 63-74. (in German). [In the framework of the so-called "Day of Biodiversity" (3. June, 2000), 30 odonate taxa including *Lestes barbarus*, *Lestes virens*, and *Aeshna affinis* could be traced. No precise locality data are dealt with.] Address: not stated

**4221.** Kampa, E.; Artemiadou, V.; Lazaridou-Dimitriadou, M. (2000): Ecological quality of the River Axios (N. Greece) during spring and summer, 1997. *Belgian Journal of Zoology* 130 (supplement 1): 21-27. (in English). ["This study examines the applicability of five European biotic indices combined with the measurements of physicochemical parameters in order to determine the water quality at ten sites along the Greek part of the river Axios during the high flow (spring) and low flow season (summer) in 1997. The river Axios is situated in northern Greece, west of the city of Thessaloniki. [...] The Greek part of the river Axios receives mainly agricultural runoff but also urban sewage and industrial wastes." Physicochemical parameters were measured in situ. The benthic macroinvertebrates - including Odonata -, sampled with the 3 min kick/sweep method, were identified to the lowest possible taxonomic level, but not documented in this paper. "The faunal composition was typical of a lowland river, i.e. the zoobenthos was not very diverse. The quality of the water was influenced by human activities during both seasons. The deterioration in water quality during spring was due to excess suspended solids of diffuse agricultural origin, and during summer was due to organic pollution. Lower discharge and impoundment accentuated this deterioration. Overall, changes in physicochemical parameters were in agreement with the results of the biological data, despite their instant nature. However, some problems arose with regard to the applicability of the European biotic indices, thus emphasizing the need to develop a Greek Biotic Index." (Authors)] Address: Lazaridou-Dimitriadou Maria, Dept. of Zoology, School of Biology, Aristotle University of Thessaloniki, 54006 Thessaloniki, Greece. E-mail: [mlazarid@bio.auth.gr](mailto:mlazarid@bio.auth.gr)

**4222.** Kumar, A. (2000): Fauna of Renuka Wetland: Odonata (adults). *Wetland Ecosyst. Ser. zool. Surv. India* 2: 45-53. (in English). [The odonate fauna (37 species) of Renuka Lake, Himachal Pradesh, India, is keyed and field notes are provided.] Address: Kumar, A., Northern Regional Stn., Zool. Surv. India, Dehra Dun-248195, India

**4223.** Kumar, A. (2000): Fauna of Renuka Wetland: Odonata (larvae). *Wetland Ecosyst. Ser. zool. Surv. India* 2: 55-62, 4 pls. (in English). [The odonate larvae (37 known species), occurring in Renuka Lake, Himachal Pradesh, India, are keyed and their structural features

are illustrated. Regional habitat preferences are listed in a table.] Address: Kumar, A., Northern Regional Stn., Zool. Surv. India, Dehra Dun-248195, India

**4224.** Lempert, J. (2000): *Libellen und Literatur XXIV*. *Libellennachrichten* 4: 12. (in German). [Extracts from two books referring to Odonata: (1) Arnold Zweig *Elegie über Blumensträuße in: Mädchen und Frauen*, Berlin 1931) and (2) Peter Huchel: *Ausgewählte Gedichte Suhrkamp Frankfurt* 1973.] Address: Lempert, J., Ve-reinsstr. 41, D-20357 Hamburg, Germany

**4225.** Lucas, M.J. (2000): The history and distribution of the Emperor dragonfly *Anax imperator* (Leach) in Yorkshire. *Darter* 20: 6- (in English). [Documentation of the range extension of *A. imperator* in Yorkshire, UK.] Address: Lucas, M. Jill., 8 Camborne Dr., Fixby, Huddersfield, Yorks., HD2 2NF, UK

**4226.** Museum Victoria (2000): Dragonflies and damselflies. Museum Victoria Information sheet 10178: 1 page. (in English). [Brief characterisation of Odonata (morphology, biology) (].] Address: Museum Victoria, GPO Box 666E, Melbourne 3001, Victoria, Australia. [www.museum.vic.gov.au/infosheets/10178.pdf](http://www.museum.vic.gov.au/infosheets/10178.pdf)

**4227.** Parr, A. (2000): Migrant dragonflies - Climate change, the new millennium, and all that. *Darter* 20: 3- (in English). [A. Parr compiles some highlights of records from the more recent past, and discusses some challenges for research on migrating Odonata in the future.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: [Adrian.parr@bbsrc.ac.uk](mailto:Adrian.parr@bbsrc.ac.uk)

**4228.** Perrin, V. (2000): The key sites register - an update. *Darter* 20: 8-9. (in English). [Information of important dragonfly habitats (n= app. 450) from 26 counties in the UK are available.] Address: Perrin, V., 13 Pettitts lane, Dry Drayton, Cambridgeshire CB3 8BT, UK. E-mail: [valperrin@dial.pipex.com](mailto:valperrin@dial.pipex.com)

**4229.** Salur, A.; Kiyak, S. (2000): On the systematic and faunistic studies of Anisoptera species (Insecta: Odonata) of Kizilirmak River Basin (Kayseri Province). *Gazi University Journal of Science* 13(3): 829-841. (bilingual in Turkish and English). [267 anisopteran specimens collected in the Kizilirmak river basin situated on the border of Kayseri province, Turkey represent 14 species including *Stylurus flavipes lineatus*. 6 species are new records for the fauna of Central Anatolia and all are new for the fauna of Kayseri.] Address: Salur, A., Gazi University, Arts & Sciences Faculty of Corum, Biology Department, 19030 Corum. Turkey. E-mail: [alisalur@gazi.edu.tr](mailto:alisalur@gazi.edu.tr)

**4230.** Salur, A.; Kiyak, S. (2000): On the systematic and faunistic studies of Zygoptera species (Insecta: Odonata) of Kizilirmak River Basin (Kayseri Province). *Gazi University Journal of Science* 13(3): 843-854. (bilingual in Turkish and English). [246 zygopteran specimens collected from 13 localities in the Kizilirmak river basin situated on the border of Kayseri province, Turkey represent 13 species. 5 species are new records for the fauna of Central Anatolia and 10 of them are new for the fauna of Kayseri.] Address: Salur, A., Gazi University, Arts & Sciences Faculty of Corum, Biology Department, 19030 Corum. Turkey. E-mail: [alisalur@gazi.edu.tr](mailto:alisalur@gazi.edu.tr)

**4231.** Samusenko, I. (2000): Preservation of White Stork (*Ciconia ciconia* L.) population in Belarusian Polesia. MAB Young Scientist Research Project. Final Report. <http://www.unesco.org/mab/capacity/mys/99/Samusenko/FinRep.pdf>: 38 pp. (in English). [Belarus; Odonata are among the prey of White storks but play a minor role as food.] Address: Samusenko, Irina, Institute of Zoology, Belarus National Academy of Sciences (NASB), Academichnaya Street 27, 220072 Minsk, Belarus. E-mail: ring@biobel.bas-net.by)

**4232.** Sliva, J.; Marzelli, M.; Pfadenhauer, J. (2000): Renaturierung von landwirtschaftlich genutzten Niedermooren und abgetorften Hochmooren. Schriftenreihe des Bayerischen Landesamt für Umweltschutz 148: 160 pp- (in German). [Brief report on some Odonata of the Eittinger Moos, Bayern, Germany.] Address: Pfadenhauer, J., Lehrstuhl für Vegetationsökologie, TU München, Am Hochanger 6, D-85350 Freising-Weihenstephan, Germany

**4233.** Tomokuni, M.; Saito, Y. (2000): Dragonflies (Insecta, Odonata) of the garden of the Imperial Palace, Tokyo, Japan. Mem. natn. Sci. Mus., Tokyo 36: 7-18. (in Japanese, with extensive English summary). [The Imperial Palace occupies an area of 115 ha in the centre of Tokyo, with a well-preserved vegetation and a variety of aquatic habitats. During 1987-1988, and 1996-1999, 27 odonate species were evidenced. Their status and the current condition of the respective habitats are described. Special emphasis is given to some regional relict populations of *Ceriagrion nipponicum*, *Trigomphus melampus*, and *Aeschnophlebia longistigma*, which survived within the boundaries of the garden but were extinct outside.] Address: Tomokuni, M., Dept Zool., Natn. Sci. Mus., 3-23-1 Hyakunincho, Shinjuku-ku, Tokyo, 169-0073, Japan. E-mail: tomokuni@kahaku.go.jp

**4234.** Wilson, D.P (2000): *Aciagrion tillyardi* Laidlaw (Odonata: Zygoptera) a damselfly new to Hong Kong. Porcupine 21: 9-11. (in English). ["The dragonfly fauna of Hong Kong was comprehensively detailed in Wilson (1997). In this account 107 species were treated. A species of damselfly, *A. tillyardi*, discovered at Pat Sing Leng on 21 May 2000, brings the total odonate fauna known from Hong Kong to 108 species. A full description is provided here, with details of material and a full discussion of synonymy." (Author)] Address: Wilson, K.D.P., Flat 20, 6 Mansfield Road, The Peak, Hong Kong, China. E-mail: wilsonkd@ntlworld.com

## 2001

**4235.** Beutel, R.G.; Gorb, S.N. (2001): Ultrastructure of attachment specializations of hexapods (Arthropoda): evolutionary patterns inferred from a revised ordinal phylogeny. J. Zool. Syst. Evol. Research 39: 177-207. (in English with German summary). ["Attachment devices of representatives of most higher taxa of hexapods were examined. Short descriptions of tibial, tarsal and pretarsal adhesive structures for each order are presented. In their evolution, hexapods have developed two distinctly different mechanisms to attach themselves to a variety of substrates: hairy surfaces and smooth Pelexible pads. The Pelexible properties of pad material guarantees a maximal contact with surfaces, regardless of

the microsculpture. These highly specialized structures are not restricted to one particular area of the leg. They may be located on different parts, such as claws, derivatives of the pretarsus, tarsal apex, tarsomeres, or tibia. The 10 characters of the two alternative designs of attachment devices (smooth and hairy) were coded and analysed together with a data matrix containing 105 additional morphological characters of different stages and body parts. The analysis demonstrates, that similar structures (arolium, euplantulae, hairy tarsomeres) have evolved independently in several lineages. Nevertheless, some of them support monophyletic groups (e.g. Embioptera + Dermaptera; Dictyoptera + Phasmatodea + Grylloblattodea + Orthoptera; Dictyoptera + Phasmatodea; Hymenoptera + Mecoptera; Neuroptera + Strepsiptera + Coleoptera). Other structures such as claw pads (Ephemeroptera), balloon-shaped ever-sible pads (Thysanoptera), or fossulae spongiosae (Reduviidae) are unique for larger or smaller monophyletic units. It is plausible to assume that the evolution of Pight and the correlated necessity to cling to vegetation or other substrates was a major trigger for the evolution of adhesive structures. Groups with a potential to evolve a great variety of designs of adhesive pads are Hemiptera and Diptera. Even though characters of the adhesive pads are strongly subject to selection, they can provide phylogenetic information. The results of the cladistic analyses are largely congruent with current hypotheses of hexapod phylogeny. A sister-group relationship between Diplura and Insecta and between Zygentoma (excl. Tricholepidion) and Pterygota is confirmed. Plecoptera are probably the sistergroup of the remaining Neoptera. Dermaptera are the sistergroup of Embioptera and Dictyoptera the sistergroup of Phasmatodea. Paurometabola excl. Dermaptera + Embioptera are monophyletic. A sistergroup relationship between Zoraptera and a clade comprising Paraneoptera + Endopterygota is only supported by weak evidence. Coleoptera + Strepsiptera are the sistergroup of Neuroptera and Hymenoptera the sistergroup of Mecoptera." (Authors) *Enallagma cyathigerum*, *Lestes barbarus*, *Anax imperator*] Address: Gorb, S., Max-Planck-Institut für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. E-mail: stas.gorb@tuebingen.mpg.de

**4236.** Bubinas, A.; Jagminiene, I. (2001): Bioindication of ecotoxicity according to community structure of macrozoobenthic fauna. Acta zool. Lituan. 11(1): 90-96. (in English with Lithuanian summary). [87 species of benthic macroinvertebrates (incl. *Calopteryx splendens*, *Stylurus flavipes*, *Gomphus vulgatissimus*, *Libellula quadrimaculata*, *Aeshna grandis*) were identified in the riparian zone of the Nemunas River, Lithuania. 4 species groups were discerned with reference to their pollution sensitivity. The Odonata are referable to the second most sensitive group.] Address: Inst. Ecol., Akademijos 2, 2600 Vilnius, Lithuania

**4237.** Clarke, D. (2001): Resilience of Azure Hawker larva: an unintended "experiment". Dragonfly News 39: 18-19. (in English). [UK, drought resistance of larval *Aeshna caerulea*.] Address: Clarke, D., Burnfoot, Cumwhitton, Carlisle, Cumbria CA4 9EX, UK

**4238.** Clarke, D. (2001): The first day in the life of a Southern Hawker. Dragonfly News 40: 13. (in English). [Report on a long lasting post-emergence pre-maiden flight period of *Aeshna cyanea* in a garden pond near

Carlisle, UK.] Address: Clarke, D., Burnfoot, Cumwhitton, Carlisle, Cumbria CA4 9EX, UK

**4239.** Clausnitzer, V. (2001): Libellen und Literatur XXVIII. Libellennachrichten 6: 14. (in German). [Extract from the book "Redmond O'Hanlon: Kongofieber. München. 1999"] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: viola@cl@gmx.de

**4240.** Hunger, H. (2001): Libellen und Literatur XXVI. Libellennachrichten 5: 14-16. (in German). [Extract from the book Gerd Gaiser: "Schlußball. Aus den schönen Tagen der Stadt Neu-Spuhl." Carl Hauser-Verlag. München. 1958. 212 pp."] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), Am Pfahlgraben 8, D-79276 Reute, Germany

**4241.** Kriegel, P. (2001): Friendly Dragonfly. Dragonfly news 40: 14. (in English). [Dragonfly poem.] Address: Kriegel, Patricia, 2600 SW 80th, Oklahoma City, Oklahoma 73159, USA

**4242.** Lau, M. (2001): Interesting Odonates from Hong Kong Island. Porcupine 23: 4. [Verbatim: On 11 May 2001, one *Calicnemia sinensis* was found near a forest stream along Mount Parker Road at about 140 m. Two *Drepanosticta hongkongensis* were found near a small stream at about 210 m. Several *Drepanosticta hongkongensis* and two *Sinosticta ogatai* were found along a forest stream south of Quarry Gap from 180-260 m. According to Wilson (1997b) *C. sinensis* is a regionally rare species with restricted local distribution. It has been recorded from five sites in Hong Kong (Wilson, 1997) and this Mt. Parker record represents the sixth site. Both *D. hongkongensis* and *S. ogatai* are believed to be endemic (but see Reels article in this issue of Porcupine!) and have never been recorded on Hong Kong Island (Wilson, 1997b). Their presence in the Mount Butler area is hence of conservation interest.]. Address: not stated

**4243.** Lempert, J. (2001): Libellen und Literatur XXV. Libellennachrichten 5: 14. (in German). [Extract from the book "Ottfried Preussler: Der Kleine Wassermann. Stuttgart. 1958".] Address: Lempert, J., Vereinsstr. 41, D-20357 Hamburg, Germany

**4244.** Mackenzie Dodds, R. (2001): How a dream came true: ten years of dragonflies and the public at Ashton Water. Dragonfly News 39: 19-22. [Brief history of The National Dragonfly Museum, Ashton Mill, UK, which regrettably closed its doors in the meantime (see Dragonfly News 41: 22)] Address: Mackenzie Dodds, R., The National Dragonfly Museum, Ashton Mill, near Oundle, Peterborough PE8 5LZ, UK

**4245.** Martin, M. (2001): Environmental monitoring in Baden-Württemberg with special reference to biocoenotic trend-monitoring of macrozoobenthos in rivers and methodical requirements for evaluation of long-term biocoenotic changes. Aquatic Ecology 35(2): 159-171. ["Biomonitoring methods from a comprehensive study of man-made impacts on urban and on the near-natural environment are presented. Part of the environmental monitoring in Baden-Württemberg is a biocoenotic trend-monitoring project on macrozoobenthos in running waters which has resulted in a database enabling long-term trend assessment of biocoenosis in diverse rivers and streams in the future. About 561 species of

macrozoobenthos have been recorded (21 species for the first time in Baden-Württemberg). Data are analysed for different purposes: methodological requirements for aquatic trend-biomonitoring, status of endangerment according to the Red Data Book, and first assessment of faunistic long-term changes in the River Rhine. Calculation of cumulative species numbers over number of samples offers sampling success and therefore represents a good way to show how sure or complete results of a given faunistic approach are at a given time. One sample provides less than 25% of the fauna recorded within a three years period of quarterly inspections. To collect the main fraction (90%) of species, it takes 3 years of quarterly collections if all species recorded only once during the whole period are neglected. Several rare species were recorded within the project. 34% of mayflies, stoneflies and caddisflies are endangered. The River Rhine and its changes in faunal composition within the last century is the example to illustrate the principle of biocoenotic trend-monitoring. The more recent samples of the macrobenthic fauna of the River Rhine indicate an improved quality and diversity because of improved water quality. Several species, indicative of good water quality have returned, and invasion of neozoans is still high, too. However, with respect to extinct species of macrozoobenthos, especially stoneflies, mayflies and caddisflies, mentioned by former authors, there is still a marked absence of indigenous species in the River Rhine." (Author)] Address: Marten, M., Landesanstalt für Umweltschutz Baden Württemberg, Griesbachstr. 1, D-76185 Karlsruhe, Germany. E-mail: michael.marten@lfuka.lfu.bwl.de

**4246.** Parr, A. (2001): Dragonfly news for 2000 - Migrants & Vagrants. Dragonfly News 39: 13-15. (in English). [UK; *Erythromma viridulum*, *Aeshna mixta*, *Anax imperator*, *A. parthenope*, *Libellula depressa*, *L. quadrimaculata*, *Crocothemis erythraea*, *Sympetrum fonscolombii*, *S. flaveolum*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4247.** Reels, G.T. (2001): Two Hong Kong endemics sunk at Wutongshan. Porcupine 23: 5- (in English). [*Sinosticta ogatai* and *Drepanosticta hongkongensis* (Platystictidae) previously only known from Hong Kong have been discovered on the slopes of Wutongshan in Shenzhen. Both were found in good numbers in wooded ravines on the north-facing slopes of the 944 m mountain, just over the border from Sha Tau Kok, during a field visit on 16-17 May.2001.] Address: not stated

**4248.** Smallshire, D. (2001): A warning for those "bitten by the bug"! Dragonfly News 40: 14- (in English). [Verbatim: Thankfully, we often hear of people who get bitten metaphorically by the dragonfly 'bug', but here is a tale of the unfortunate consequences of being literally bitten by a dragonfly. Those who have handled our larger dragonflies will be well aware that an adult in the hand will often try to nip a finger if it comes close enough. A BDS member (who will remain nameless!) at the Smallhanger field meeting in July was curious about how strong such a bite would be. When the chance came to try out the mandibles of a Golden-ringed Dragonfly held by another member, a finger was proffered. The bite was obviously more painful than expected, because the finger was withdrawn sharply but unfortunately, and to everyone's horror, the dragonfly's head came with it! I've never heard of this happening



me with it! I've never heard of this happening before, but to avoid a repeat I suggest that anyone desperate for a quick nip should ensure that both mandibles and legs are allowed to connect with the same finger!] Address: Dave Smallshire, 8 Twindle Beer, Chudleigh, Newton Abbot, TQ13 OJP, UK

**4249.** Smallshire, D. (2001): Criteria for proof of breeding in dragonflies. *Dragonfly News* 39: 17-18. (in English). [Suggested categories: Confirmed breeding: exuvia or newly emerged adult; probable breeding: larva, ovipositing female, or copulating pair (Zygoptera only); present: all other records.] Address: Smallshire, D., 8 Twindle Beer, Chudleigh, Newton Abbot, TQ13 OJP, UK

**4250.** Staniczek, A. H. (2001): Der Larvenkopf von *Oniscigaster wakefieldi* McLachlan, 1873 (Insecta: Ephemeroptera: Onscigastridae). Dissertation, Fakultät für Biologie, Eberhard-Karls-Universität Tübingen. 165 pp. (in German, with English summary). [The larval head of the New Zealand mayfly *Oniscigaster wakefieldi* is investigated, a mayfly which is thought of as plesiomorphic in many respects. Based on a broad comparison with other mayfly species, it is aimed to reconstruct the groundplan of the larval head of mayflies. Emphasis is laid on the anatomy and functional morphology of the larval mouthparts and the homologization of their muscles. The results indicate the presence of an anterior articulation complex of the mandible that is made up of two points of mandibular attachment to the cranium in the groundplan of Ephemeroptera. These attachment points are compared with the condition in the relic silverfish *Tricholepidion gertschi* and other *Zygentoma*. It is shown that in the *Zygentoma* there is a similar articulation complex present. This correspondence is regarded as a groundplan character of Dicondylia. The character transformation from the monocondylous mandibles of Ectognatha to the dicondylous mandible of Odonata and Neoptera is interpreted in its functional and phylogenetic context. The alterations of the mandible and its muscles are correlated with changes in the construction and position of the anterior tentorial arms and the lateral cranium. None of the investigated mandibles show traces of segmentation. Thus the hypothesis of a tripartite telognathic mandible in the groundplan of insects is rejected. The fused galeolacinia of mayfly larvae is compared to the ones of the Odonata. The different ways of interpretation of these results are discussed. The findings of this study, together with all previously discussed characters, are used for a phylogenetic analysis to unravel the phylogenetic affinities between the three basal groups of the Pterygota (Ephemeroptera, Odonata, Neoptera). The data point to a sistergroup relationship between the Ephemeroptera and all other pterygote insects, the Metapterygota. kationsdatum: 07.11.2001] Address: <http://w210.ub.uni-tuebingen.de/dbt/volltexte/2001/310/>

**4251.** Steffens, W.P. (2001): Status Survey for *Ophiogomphus anomalus* Harvey, and early-season dragonfly inventory of western Superior National Forest Rivers. Submitted to: Superior National Forest and Minnesota DNR Natural Heritage and Nongame Research Program: 12 pp. (in English). [Status surveys for the Special Concern dragonfly, *Ophiogomphus anomalus*, were conducted on selected rivers in northeastern Minnesota, along with an inventory of other early-season river dragonflies. *Ophiogomphus anomalus* were confirmed on the upper St. Louis River in St. Louis County, but no

new occurrences were found. Additional evidence of developmental abnormalities in northern Minnesota dragonfly larvae was found at several locations.] Address: <http://www.dnr.state.mn.us/ecologicalservices/nongame/projects/researchreports/abstracts/insects/steffens-2001.html>

**4252.** Taylor, G.K. (2001): Mechanics and aerodynamics of insect flight control. *Biol. Rev.* 76: 449-471. (in English). [Insects have evolved sophisticated flight control mechanisms permitting a remarkable range of manoeuvres. Here, I present a qualitative analysis of insect flight control from the perspective of flight mechanics, drawing upon both the neurophysiology and biomechanics literatures. The current literature does not permit a formal, quantitative analysis of flight control, because the aerodynamic force systems that biologists have measured have rarely been complete and the position of the centre of gravity has only been recorded in a few studies. Treating the two best-known insect orders (Diptera and Orthoptera) separately from other insects, I discuss the control mechanisms of different insects in detail. Recent experimental studies suggest that the helicopter model of flight control proposed for *Drosophila* spp. may be better thought of as a facultative strategy for flight control, rather than the fixed (albeit selected) constraint that it is usually interpreted to be. On the other hand, the so-called 'constant-lift reaction' of locusts appears not to be a reflex for maintaining constant lift at varying angles of attack, as is usually assumed, but rather a mechanism to restore the insect to pitch equilibrium following a disturbance. Differences in the kinematic control mechanisms used by the various insect orders are related to differences in the arrangement of the wings, the construction of the flight motor and the unsteady mechanisms of lift production that are used. Since the evolution of insect flight control is likely to have paralleled the evolutionary re-arrangement of these unsteady aerodynamic mechanisms, taxonomic differences in the kinematics of control could provide an assay of the relative importance of different unsteady mechanisms. Although the control kinematics vary widely between orders, the number of degrees of freedom that different insects can control will always be limited by the number of independent control inputs that they use. Control of the moments about all three axes (as used by most conventional aircraft) has only been proven for larger flies and dragonflies, but is likely to be widespread in insects given the number of independent control inputs available to them. Unlike in conventional aircraft, however, insects' control inputs are likely to be highly non-orthogonal, and this will tend to complicate the neural processing required to separate the various motions.] Address: Taylor, G., Department of Zoology, Oxford University, South Parks Road, Oxford, OX1 3PS, UK. (E-mail: [graham.taylor@zoo.ox.ac.uk](mailto:graham.taylor@zoo.ox.ac.uk))

**4253.** Taylor, P. (2001): Mixed pairs. *Dragonfly News* 40: 13-14. (in English). [Great Britain; male *Sympetrum sanguineum* x female *Leucorrhinia dubia*; male *Libellula fulva* x female *L. quadrimaculata*; teneral female *Sympetrum striolatum* (sitting on its exuvia) x male *S. sanguineum*.] Address: Taylor, Pam, Decoy Farm, Decoy Rd, Potter Heigham, Norfolk, NR29 5LX, UK

**4254.** Tóth, S. (2001): Checklist of dragonflies of Somogy county (Insecta: Odonata). *Natura Somogyiensis* 1: 93-99. (in Hungarian, with English summary). [55 odonate species can be proved in Somogy county, 87%

of the dragonfly fauna in Hungary. Of special interest are *Aeshna viridis*, *Stylurus flavipes*, *Leucorrhinia caudalis*, *L. pectoralis*, *Ophiogomphus cecilia*, and *Coenagrion ornatum*.] Address: Toth, S., Széchenyi u. 2, H-8420 Zirc, Hungaria. E-mail: flycatcher@freemail.hu

**4255.** Wirsing, T. (2001): Libellenkartierung am Altmühlsee und der nahen Seeumgebung im Jahr 2000. Altmühlbericht 8: 72-91. (in German). [Bayaria, Germany; records of 30 odonates species are documented in detail. The succession of the present odonate fauna compared with records from 1984 and 1988 is briefly outlined.] Address: Wirsing, T., Zeilitzheimer Pfad 21, D-97332 Volkach, Germany. E-mail: wiedehopf@web.de

## 2002

**4256.** Bechly, G. (2002): Description of a new species of *Nannogomphus* (Insecta: Odonata: Nannogomphidae) from the Upper Jurassic Solnhofen Limestone in Germany. *Stuttgarter Beiträge zur Naturkunde, Serie B (Geologie und Paläontologie)* 339: 1-6. (in English with German summary). ["A new species of *Nannogomphidae*, *Nannogomphus buergen* n. sp., is described from the Upper Jurassic Solnhofen Limestones of Germany. The diagnosis of the genus is amended with a list of autapomorphics." (Author)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**4257.** Blasius, B.J.; Merritt, R.W. (2002): Field and laboratory investigations on the effects of road salt (NaCl) on stream macroinvertebrate communities. *Environmental Pollution* 120(2): 219-231. [Short-term exposure to road salt did not significantly affect stream macroinvertebrate communities.] Address: Blasius, B.J., Southern Nevada Water Authority 243 Lakeshore Road, Boulder City, NV 89005, USA

**4258.** Bohra, C. (2002): Analytical studies on the food and feeding habits of tropically distinct aquatic odonate larvae of Udhuwa Lake in Santal Pargana, Jharkhand, India. In: Kumar, A. (Ed.): *Current trends in odonatology*. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 207-220. (in English). ["This investigation showed a special food preference of odonate larvae which was conducted in a lake during the year of 2000. This study revealed the fact that odonates are primarily carnivorous and feed on cladocera, copepoda, rotifera, rhizopoda, aquatic insects, fish fries and other animal life present in the surroundings. According to observations, the food preference of Zygoptera larvae is: Rhizopoda > Cladocera > Aquatic insects > Rotifers > Copepoda > Algae while the food preferences of Anisopteran larvae is utterly different being - Cladocera > Rotifera > Aquatic insect > Copepoda > Algae > Rhizopoda." (Author)] Address: Bohra, C., Pollution Research Laboratory, Dept of Zoology, B.S.K. College, Barharwa-816101 (Jharkhand), India

**4259.** Boudot, J.-P. (2002): Étude de la faune des odonates de la zone natura 2000 "Vallée du Madon - Vallée du Br'non - Carrière de Xeulley". Rapport: 108 pp- (in French). [This is a detailed and sound expertise

on the odonate fauna of a Natura 2000 site south of Nancy, France. The Madon is a tributary of the River Moselle, and a hotspot of Odonata dwelling running waters and river habitats. Special emphasize is given to *Oxygastra curtisii*, *Onychogomphus forcipatus*, *Gomphus vulgatissimus*, *Cercion lindenii*, *Libellula fulva*, *Ischnura pumilio*, *Orthetrum brunneum*, and *Orthetrum coerulescens*. Detailed maps of the localities of these species within the Natura 2000 site, and in northeast France are provided. In an appendix all Odonata recorded during the field studies (n = 32 species) are documented in detail. ] Address: Boudot, J.-P., Centre de Pédologie Biologique, 17, rue Note-Dame de Pauvres, B.P. 5, F-54501 Vandoeuvre-lès-Nancy, France. e-mail: boudot@cpb.cnrs-nancy.fr

**4260.** Craves, J.A.; O'Brien, D.S. (2002): *Dromogomphus spoliatus* (Odonata: Gomphidae): new for Michigan. *The Great Lakes Entomologist* 35(2): 115-116. (in English). [25-VIII-2002, Huron River, Wayne County, Michigan, USA] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

**4261.** Daniel, B.A.; Molur, S.; Walker, S. (2002): Conservation assessment and management plan (CAMP) process: a tool to provide strategic guidance for the management of threatened Odonata. In: Kumar, A. (Ed.): *Current trends in odonatology*. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 169-188. (in English). [The paper introduces into dragonfly conservation (strategies) with special emphasis on Red lists. The criteria of IUCN for assessing the status of species are outlined in detail.] Address: Daniel, B.A., Zoo Outreach Organisation, P.O. Box #1683, Peelamedu, Coimbatore-641004, India

**4262.** Fenoglio, S.; Badino, G.; Bona, F. (2002): Benthic macroinvertebrate communities as indicators of river environment quality: an experience in Nicaragua. *Revista de Biología Tropical* 50(3-4): 8 pp. (in English). ["Biotic indexes are one of severas types of measures that are routinely used in biological monitoring in temperate streams and offer interesting possibilities to assess the environmental quality of rivers in the neotropics. Macroinvertebrate communities of seven southeastern Nicaraguan streams were monitored and seven ecological indexes were applied. The results suggest that information from the Índice Biótico Esteso (I.B.E.) is closely correlated to the results of other methods, but the I.B.E. index is easier to apply as well as avoiding high costs and time-consuming procedures. A calibration of the method is necessary for rapid assessment approaches in the neotropics." (Authors) Odonata are listed on the genus-level.] Address: Fenoglio, S., Univ. di Torino - Dip. di Biologia Animale e dell'Uomo, Via Ace. Albertina 17. Torino, Italy. E-mail: fenoglio@mfn.unipmn.it

**4263.** Haldar, D.P.; Biswas, S. (2002): On the structure and life history of three new species of septate gregarines (Apicomplexa: Conoidasida) from odonates of West Bengal. In: Kumar, A. (Ed.): *Current trends in odonatology*. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 357-377. (in English). [*Odonatkola platypitnerita* sp. n. from *Orthetrum sabina*, *O. bengalensis* from *Trithemis aurora*, and *O. contaminata* from *Brachythemis contaminata* are described from West Bengal, India.] Address: Haldar, D.P., Protozoology Labora-

tory, Dept of Zoology, University of Kalyani, Kalyani-741235, West Bengal, India

**4264.** Hellebuyck, V.J. (2002): *Paltothemis nicolae* spec. nov., a new dragonfly from El Salvador (Odonata: Libellulidae). *Revta nicarag. Ent.* 59/62: 5-15. (in English with Spanish summary). [Both sexes are described, illustrated and compared with *P. cyanosoma* and *P. lineatipes*. Holotype male: El Salvador, Quebrada Piedra de Afilar, 5.5 km S of Tacuba, 19-IV-1986; deposited at FSCA, Gainesville/FL, USA.] Address: Hellebuyck, V.J., 1277 Lincoln St., Sherbrooke, QC, J1H2H8, Canada

**4265.** Hellmund, M.; Hellmund, W. (2002): Erster Nachweis von Kleinlibellen-Eiogen (Insecta, Zygoptera, Lestidae) in der mitteleozänen Braunkohle des ehemaligen Tagebaues Mücheln, Bfd. Neumark-Nrd (Geiseltal, Sachsen-Anhalt, Deutschland). *Hallesches Jahrb. Geowiss., Reihe B*, 24: 47-55. (in German, with English summary). ["In May 2001 geological and paleontological research was done in the opencast pit Mücheln, Neumark-Nord. During this effort egg-sets of fossil damselflies (Zygoptera, Lestidae) were found in the (?) Upper Middle Eocene brown coal (= MP 13) of the Geiseltal, the first record in this famous site ever found. In contrast to earlier treated specimens originating from the Messel pit near Darmstadt, whose sediments belong stratigraphically to the Lower Middle Eocene (= MP 11), the described new specimen is around 2.5 mio. a younger. The producer of the Geiseltal egg-sets presumably is a member of the family Lestidae, whereas the Messel specimens were made by individuals of the family Coenagrionidae, respectively Platycnemidae. [...] It is striking that the recently found egg-sets are the only evidence for the entire order Zygoptera over decades of collecting in the pits of the Geiseltal district. Corresponding larva or imagines were never observed. This fact may be due to biostratigraphical reasons on the one hand, but also because of the fact that such filigree and small objects may have been overlooked on the dark substratum during fossil excavations. It has to be underlined once more that the endophytic reproductive strategy of certain damselflies is at least successfully practised since the Paleogene until today. A lot of analogs can be observed in the recent Odonatafauna." (Authors) Egg sets of the recent *Lestes virens*, *L. sponsa*, and *Chalcolestes viridis* in the Köln-Bonn region, Nordrhein-Westfalen, Germany are illustrated in detail.] Address: Hellmund, M., Martin-Luther-Universität Halle-Wittenberg, Inst. Geol. Wiss. und Geiseltalmuseum, Domstr. 5, D-06108 Halle/Saale, Germany. E-mail: hellmund@geologie.uni-halle.de

**4266.** Hellmund, M.; Hellmund, W. (2002): Neufunde und Ergänzungen zur Fortpflanzungsbiologie fossiler Kleinlibellen (Insecta, Odonata, Zygoptera). *Stuttgarter Beiträge zur Naturkunde (B)* 319: 1-26. (in German, with English summary). ["A specimen from the Lower Miocene of Berzdorf (Lusatia, Saxony) was recently discovered during field work in an open coal mine. The other specimens described and figured here have also a Lower Miocene Age (MN5) and originate from the locality Randecker Maar (Southwest Germany). In both sites, Berzdorf and Randecker Maar, the fossil egg-sets are the only evidence for the presence of the Suborder Zygoptera in the fossil insect fauna, due to biostratigraphical reasons. Because of the rapid decomposition of such filigree animals after death, they rarely become fossil. For the first time, egg-sets of the „Lestid Type"

are documented in a monocotyledon leaf. A detailed overview of the hitherto published specimens of fossil egg-sets is compiled." (Authors)] Address: Hellmund, M., Martin-Luther-Universität Halle-Wittenberg, Inst. Geol. Wiss. und Geiseltalmuseum, Domstr. 5, D-06108 Halle/Saale, Germany. E-mail: hellmund@geologie.uni-halle.de

**4267.** Ishimoda-Takagi, T.; Nakamura, Y.; Takamori, H. (2002): On the tropomyosin isoforms contained in odonate muscles. *Zoological Science (Tokyo)* 19(12): 1436. (in English). [Verbatim: We have investigated heterogeneity of muscle tropomyosin obtained from various species of insects to understand generality of insect tropomyosin isoforms. However, we did not investigate yet tropomyosin obtained from Odonata, which is one of phylogenetically primitive insect and of which wing-beat depends on the action of both direct and indirect flight muscles. In the present study, we examined tropomyosin isoforms included in muscles of 4 species of the odonate, *Anax nigrofasciatus*, *Orthetrum albistylum*, *Pantala flavescens*, and *Calopteryx japonica*. Four to five kinds of tropomyosin isoforms were detected electrophoretically in each species. One kind of tropomyosin isoforms were detected exclusively in the flight muscles of all species. We also examined tropomyosin isoforms included in the larvae of *A. nigrofasciatus* and *C. japonica*. However, the flight muscle specific-isoform was not detected in the larval muscles of both species.] Address: Ishimoda-Takagi, T., Department of Biology, Tokyo Gakugei University, Koganei, Tokyo, 184-8501, Japan

**4268.** Jödicke, R. (2002): Libellen sammeln auf Reisen: Tips für eine Minimalausrüstung und geeignete Methoden. *Libellennachrichten* 7: 9-11. (in German). [Advice, how to collect Odonata on trips.] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: r.joedicke@t-online.de

**4269.** Kadoorie Farm and Botanic Garden (in collaboration with Shenzhen Fairy Lake Botanical Garden. The National Forest Park Office of Shenzhen Special Economic Zone Government) (2002): Report of a Rapid Biodiversity Assessment at Wutongshan National Forest Park, Shenzhen Special Economic Zone, China, 16 to 17 May 2001. *South China Forest Biodiversity Survey Report Series* 11: 20 pp. (in English). [Verbatim: Dragonflies. 17 dragonfly species were recorded (tab. 6). The stream at Xiaowutongshan, with more gentle flow and smaller rocks, yielded more species than the cascade-boulder stream at Dawutongshan. Table 6. Dragonflies recorded in Shenzhen Wutongshan National Forest Park on 16-17 May 2001. Sequence follows Schorr et al. (2001a, 2001b). Species 1. *Mnais mne* 2. *Neurobasis chinensis* 3. *Rhinocypha perforata* 4. *Philoganga vetusta* 5. *Euphaea decorata* 6. *Agriomorpha fusca* 7. *Drepanosticta hongkongensis* 8. *Sinosticta ogatai* 9. *Coelliccia cyanomelas* 10. *Copera marginipes* 11. *Leptogomphus elegans* 12. *Hydrobasileus croceus* 13. *Orthetrum glaucum* 14. *Orthetrum triangulare* 15. *Tramea virginia* 16. *Trithemis aurora* 17. *Zygonyx iris* The most interesting findings were the records of *Drepanosticta hongkongensis* and *Sinosticta ogatai*. These two species of global conservation concern (Fellowes et al., in press) were previously thought to be endemic to Hong Kong (Reels, 2001). *Mnais mne*, *Philoganga vetusta*, *Agriomorpha fusca* and *Leptogomphus elegans* are globally restricted, and known from a limited



number of sites in Hong Kong (Fellowes et al., in press), but do not appear to be highly restricted within South China. *Zygonyx iris* is also of potential global concern, due to its narrow global range. All dragonfly and damselfly species found in this survey have been recorded in Hong Kong. (Fellowes, J.R., Lau, M.W.N., Dudgeon, D., Reels, G.T., Ades, G.W.J., Carey, G.J., Chan, B.P.L., Kendrick, R.C., Lee K.S., Leven, M.R., Wilson, K.D.P. and Yu Y.T., in press. Wild animals to watch: terrestrial and freshwater fauna of conservation concern in Hong Kong. Memoirs of the Hong Kong Natural History Society 25.)] Address: www.kfbg.org.hk/download/No11Wutongshan0501Web.pdf

**4270.** Khaliq, A. (2002): Potential of dragonflies as bio-control agents of insect pests of rice. In: Kumar, A. (Ed.): Current trends in odonatology. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 1-26. (in English). ["The feeding capacity of 11 dragonfly species on some insect pests of rice in a day (10 hours) was determined by forced feeding. The adults consumed [...] on yellow stem borers, white stem borers, hairy caterpillars, rice skippers, white-backed planthoppers, white leafhoppers, green leafhoppers, rice bugs, cicadellid leafhoppers and grasshoppers (*Oxya* spp.) respectively in 10 hours. The females of all the species proved to be the most voracious feeders as compared with their males, *Orthetrum sabina* was most voracious feeder followed by *O. prunosum neglectum*, *O. triangulare triangulare*, *O. glaucum*, *Crocothemis seivillia*, *O. erythraea*, *Pantala flavescens*, *Palpopleura sexmaculata sexmaculata*, *Sympetrum commixtum*, *Acisoma panorpoides panorpoides* and *Trithemis festiva*. The population density of dragonflies was maximum from middle of August to the end of September. However, it was at peak from last week of August to 3rd week of September. The population then declined as the crop matured and the pest population become low. The studies on the seasonal abundance of insect pests of rice, namely rice skippers, grasshoppers, green leafhoppers, white leaf hoppers, hairy caterpillars, rice bugs, rice stem boms and *Poophilus* species were conducted at four localities, i.e. Hajeera, Mandhole, Harighale, and Banipasari during the crop season 1996-97. The population of rice skippers and grasshoppers was somewhat higher than other insect pests. However, the population of different insect pests was higher from the 2nd week of August to the 4th week of September. The population then decreased afterwards as the crop matured. The efforts were made to evaluate the feeding potential of dragonflies in the field cages. They did not show any activity and interest in their prey due to their captivity. In view of this dragonfly attitude, the relationship between the population of dragonflies and insect pests of rice was observed by the multiple linear regression equation. The statistical analysis revealed that the dragonflies had negative regression coefficient with the population density of all the insect pests. It indicated that the pest population was decreased with the corresponding increase in dragonflies population. However, their feeding behaviour was not similar at all the localities but differed from locality to locality." (Author)] Address: Khaliq, A., Dept of Entomology, University of Arid Agriculture, Murree Road, Rawalpindi, Pakistan

**4271.** Kovacs, T.; Ambrus, A.; Juhasz, P. (2002): Ephemeroptera, Odonata and Plecoptera larvae from the river Tisza in the year of cyanid pollution (2000). *Folia hist.-nat. Mus. matraensis* 26: 169-178. (in Eng-

lish). [This paper provides data on 43 Ephemeroptera, 12 Odonata and 6 Plecoptera species from the Hungarian section of the Tisza River. A total of 12 odonate species is listed, *Erythromma najas*, *Anaciaeschna isosceles*, *Anax imperator*, *Somatochlora metallica*, and *Orthetrum cancellatum* are recorded from the Tisza for the first time.] Address: Kovacs, T., Matra Mus., Kossuth u. 40, HU-3200 Gyöngyös, Hungary

**4272.** Kovacs, T.; Ambrus, A.; Juhasz, P. (2002): Ephemeroptera and Odonata larvae from the river Ipoly (Hungary). *Folia hist.-nat. Mus. matraensis* 26: 163-167. (in English). [Records of 7 odonate species are provided from the Hungarian section of the Ipoly River, including *Stylurus flavipes* and *Ophiogomphus cecilia*.] Address: Kovacs, T., Matra Mus., Kossuth u. 40, HU-3200 Gyöngyös, Hungary

**4273.** Kumar, A. (2002): Comparative studies on ecoenergetics of nymphs of Anisoptera and Zygoptera (Odonata) in the river Mayurakshi in Santal Pargana, India. In: Kumar, A. (Ed.): Current trends in odonatology. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 272-279. (in English). ["Ecological energetics [...] have been estimated from January to December, 2000. The calorific values of anisopteran nymphs was recorded minimum in January ( $6.004 \pm 0.080$  K cal/g dry wt.) and maximum in July ( $6.510 \pm 0.555$  k cal/g dry wt). The zygopteran nymphs also showed variations and found maximum in June ( $5.955 \pm 0.080$  k cal/g dry wt.) and minimum in January ( $5.515 \pm 0.105$  k cal/g dry wt.). The possible factors responsible for these fluctuations in energetics have also been extensively discussed in the text." (Author)] Address: Kumar, A., Northern Regional Stn., Zool. Surv. India, Dehra Dun-248195, India

**4274.** Kumar, A. (2002): Ecology of larval odonates in lentic freshwater ecosystems. In: Kumar, A. (Ed.): Current trends in odonatology. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 115-150. (in English). [Wetlands of Santal Pargana, India; "The present investigation deals with the seasonality, species diversity, richness of species and secondary productivity of larval odonates as well as the various abiotic factors of the surroundings from January to December, 2000. The anisopteran larvae showed trimodal peaks whereas zygopteran larvae exhibited bimodal in their seasonality during the period of study. The species diversity varied between 0.332 to 1.918 bits and between 0.672 and 1.902 bits in anisopteran and zygopteran larvae respectively. The biomass of the larvae was recorded maximum in September (0.553 g/haul) whereas minimum was in April (0.212 g/haul). The net growth of the population varied between 0.0087 g. dry wt./cub. met. /day to 0.0005 g.dry wt./cub.met/day having positive growth in the population. The product moment correlation coefficient for biomass of larval population with different abiotic factors of water were also computed and dissolved oxygen (DO) showed marked correlation with the biomass of the Odonata larvae ( $r=0.898$ ;  $p>0.05$ )."] (Author)] Address: Kumar, A., Northern Regional Stn., Zool. Surv. India, Dehra Dun-248195, India

**4275.** Kumar, A. (2002): Functional morphology of rectal gills and oxygen consumption by dragonfly nymphs in aquatic ecosystems. In: Kumar, A. (Ed.): Current trends in odonatology. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 189-206. (in English). ["The present article elaborates the structure of respiratory

organs and oxygen uptake by dragonfly larvae in freshwater ecosystems. Gills were found in branchial chamber which have filled the maximum posterior part of the abdominal cavity. The rectal gills were observed in six rows and recorded their tracheal supply from four to six main longitudinal tracheal trunks. The oxygen consumption by the 3rd and 5th instar nymphs of dragonfly was also estimated and found that oxygen uptake was directly dependent upon the body size and age group of the larvae. The average oxygen uptake (mlO<sub>2</sub>/larvae/hr.) was 0.0112 ± 0.0015 for 3rd instar larvae whereas it was 0.0160 ± 0.0020 for 5th instar larvae. It was also observed that the 5th instar larvae utilized about 0.0048 ml O<sub>2</sub>/individual/hr. more oxygen than the 3rd instar larvae." (Author)] Address: Kumar, A., Northern Regional Stn., Zool. Surv. India, Dehra Dun-248195, India

**4276.** Kumar, A. (2002): Odonate diversity in Jharkhand state with special reference to niche specialization in their larval forms. In: Kumar, A. (Ed.): Current trends in odonatology. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 297-314. (in English). [India; factors constraining the habitats of the regionally known 109 species are discussed.] Address: Kumar, A., Northern Regional Stn., Zool. Surv. India, Dehra Dun-248195, India

**4277.** Kumar, A. (Ed.) (2002): Current Trends in Odonatology. Delhi: Daya. ISBN: 8170352746: 377 pp. [Contents: Foreword. Preface. 1. Potential of dragonflies as bio-control agents of insect pests of rice/Abdul Khaliq. 2. A Community structure of Odonata of the South West province of Cameroon with the description of *Phyllogomphus corbetiae* spec. nov. (Anisoptera: Gomphidae) /G.K. Vick. 3. Endocrinology of Odonata / D.B. Tembhare. 4. Ecology of larval Odonates in lentic freshwater ecosystems/Arvind Kumar. 5. Biology of Odonata of Indian sub-continent: a review/B. Suri Babu and A. Kumar. 6. Conservation assessment and management plan (CAMP) process: a tool to provide strategic guidance for the management of threatened Odonata/B.A. Daniel, Sanjay Molur and Sally Walker. 7. Functional morphology of rectal gills and oxygen consumption by dragonfly nymphs in aquatic ecosystem /Arvind Kumar. 8. Analytical studies on the food and feeding habits of tropically distinct aquatic Odonata larvae of Udhwa Lake in Santal Pargana, Jharkhand, India/ Chandan Bohra. 9. Odonata diversity in Western Himalaya, India/M. Prasad. 10. Description of territoriality and reproduction of *Agriocnemis pygmaea* (Rambur, 1842) (Zygoptera: Coenagrionidae) / B. Suri Babu. 11. Comparative studies on eco-energetics of nymphs of anisoptera and zygoptera (Odonata) in the river Mayurakshi in Santal pargana, India / Arvind Kumar. 12. Synopsis of progress in taxonomical studies on Odonata in India/A.R. Lahiri. 13. Odonata diversity in Jharkhand state with special reference to Niche specialization in their larval forms/Arvind Kumar. 14. Trophic biology and energy contents of larval Odonates]

**4278.** Kumari, P. (2002): Species composition and seasonal fluctuations in biomass of zygopteran nymphs in a wetland of Santal Pargana, India. In: Kumar, A. (Ed.): Current trends in odonatology. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 329-356. (in English). ["The present investigation has been made on the systematics, faunistic composition, and community structure and biomass estimation of zygopteran larvae.

During the present observation, altogether 22 species belonging to 9 genera under 4 families were recorded. The maximum production of the larvae was found in summer and monsoon months when positive increase in biomass was recorded. The maximum production rate was recorded in October (0.060 g/cub m/day) and minimum (0.004 g/cub m/day) in January. It was also found that the production of these larvae is governed by complex extrinsic and intrinsic physical, chemical and biological factors discussed in the text." (Author) Larvae of the following species are illustrated: *Elatoneura campioni*, *Copera marginipes*, *Pseudagrion rubriceps*, *P. laidlawi*, *Ceriagrion coromandelianum*, *Ischnura aurora*, *I. senegalensis*, *Rhodischnura nursei*, *Agriocnemis pygmaea*, *Bayadera indica*, *Neurobasis chinensis*, and *Rhinocypha unimaculata*.] Address: Kumari, Poonam, Dept of Zoology, S.G. Women's College, Sheikpura-811105, Bihar, India

**4279.** Kunz, B. (2002): Libellen und Literatur XXX: Tombo - Libellen in Kinderbüchern. Libellennachrichten 7: 8-9. (in German). [Extract from three books (1) *Der Mühlendorf*. Folke Tegethoff. F. Schneider-Verlag, 1987, ISBN 3-505-09635-0, (2) *Da ist ein Haar in meinem Dreck - Eine Wurmgeschichte*. Gary Larson, Goldmann, 8/2000, ISBN 3-442-30819-4, and (3) *Zwei Ameisen reisen nach Australien*. Jackie Niebisch, Ravensburger, 1999, ISBN 3-473-34995-X.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de

**4280.** Lahiri, A.R. (2002): Synopsis of progress in taxonomical studies on Odonata in India. In: Kumar, A. (Ed.): Current trends in odonatology. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 280-296. (in English). [Basing on Fraser odonate fauna of the British India, the author compiles and briefly discusses succeeding taxonomic additions and amendments of the list of Indian Odonata. App. 70 species have been described as new since the publication of Fraser's handbook and referring to the geographic scope of this book.] Address: Lahiri, A.R., Zoological Survey of India, "M" Block New Alipur, Calcutta - 700 053, India

**4281.** Lang, H.; Lang, C.; Raab, R. (2002): Erfassung der Quelljungfervorkommen auf Wiener Stadtgebiet. 13 pp. (in German). [Detailed documentation of records of *Thecagaster bidentata* and *Cordulegaster heros* in Vienna, Austria.] Address: Raab, R., Anton Bruckner-Gasse 2/2, A-2232 Deutsch-Wagram, Austria. E-mail: rainer.raab@gmx.at. <http://www.wien.gv.at/ma22/pool/doc/quelljungfer.pdf>:

**4282.** Lempert, J. (2002): Libellen und Literatur XXIX: Tombo - Libellen in Japan 1. Libellennachrichten 7: 7-8. (in German). [Extract from the book "Lafacadio Hearn: Izumo. Blicke in das unbekannt Japan. Frankfurt a.M. 1910." A note on catching dragonflies by children, and a note on wooden dragonflies as a toy.] Address: Lempert, J., Vereinsstr. 41, D-20357 Hamburg, Germany

**4283.** Lienenbecker, H.; Möller, E. (2002): Das Hücker Moor bei Spenge (Kreis Herford/NRW). Zur Naturgeschichte eines ehemaligen Torfstichgebietes. Berichte des naturwissenschaftlichen Verein für Bielefeld und Umgebung 42: 249-313. (in German). [Biological data referring to the Hücker Moor, located near Spenge, Nordrhein-Westfalen, Germany, are compiled as completely as possible, and the history of its investigation is outlined. Odonata (p. 295) have been not surveyed

systematically. A record of *Lestes virens* is very briefly discussed, and some more common species are mentioned.] Address: Möller, E., A.B.Ö.L., Biologiezentrum Bustedt, D-32120 Hiddenhausen, Germany. E-mail: eckhard.moeller@teleos-web.de

**4284.** Liljaniemi, P.; Vuori, K.-M.; Ilyashuk, B.; Luotonen, H. (2002): Habitat characteristics and macroinvertebrate assemblages in boreal forest streams: relations to catchment silvicultural activities. *Hydrobiologia* 474: 239-251. (in English). ["We compared the stream habitat characteristics and macroinvertebrate assemblages of boreal headwater streams in both the Finnish and the Russian parts of a single river basin, the Koitajoki River. Over the last 50 years, the Finnish side of the catchment has been managed using modern forestry techniques, whereas Russian side has remained nearly unexploited and is near to its natural state. Differences in silvicultural activities were observed to contribute to differences in habitat structure. The channel habitats were in fairly natural state in the Russian reference streams, whereas the impacted Finnish sites were cleared and straightened. In comparison with the impacted channels, the abundance of coarse woody debris (CWD) was 10-100-fold higher in the reference streams. Implications on the forestry-induced deterioration of water quality were also observed. On the contrary, only small differences in macroinvertebrate assemblages were detected. Despite the lower amount of retentive structures (CWD), significantly higher relative abundance of shredders was observed in the forestry-impacted streams. Otherwise the zoobenthic communities were quite similar in the two subcatchments. [...]"] No reference to the Odonata is made in the main text. In an appendix, 4 odonate species are listed: *Calopteryx virgo*, *Cordulegaster boltonii*, and *Somatochlora metallica* from both countries, *Platycnemis pennipes* from Finland only.] Address: Liljaniemi, P., Dept Biol. & Envir. Sci., Univ. Jyväskylä, P.O. Box 35, FIN-40351 Jyväskylä, Finland. E-mail: liljanie@cc.jyu.fi

**4285.** Long, S.M.; Abang, F.; Rahim, K.A.A. (2002): The macroinvertebrate community of the fast flowing rivers in the Crocker Range National Park Sabah, Malaysia. ASEAN Review of Biodiversity and Environmental Conservation (ARBEC) July-September 2002: 8 pp. (in English). ["The macroinvertebrate community of the fast flowing rivers of the Crocker Range Park examined consists mainly of insects. All the six rivers surveyed demonstrated excellent water quality. The assemblages of taxa reported from the study sites are considered as that typical of the macroinvertebrate fauna in tropical rivers. Out of the existing ten orders of insects that contain aquatic species, a total of 7 orders of aquatic insect species were encountered in the rivers surveyed. These are Ephemeroptera, Odonata, Plecoptera, Hemiptera, Coleoptera, Trichoptera and Diptera. In addition to these insects, the hexapodan Collembola was also encountered. The overall macroinvertebrate density ranges from 71 to 303 individuals per 1m sq and all sampling sites were found to sustain at least three groups of taxa with the exception of Sg. Tikolud, which only contains the dipteran chironomids. The dipteran chironomid fauna was dominant and found at all stations and forms the highest density of up to 250 individuals per m<sup>2</sup> in Sg. Tandulu and Balayo." (Authors)] Address: [www.arbec.com.my/pdf/art12julysep02.pdf](http://www.arbec.com.my/pdf/art12julysep02.pdf)

**4286.** Mackenzie Dodds, R. (2002): Goodbye National Dragonfly Museum ... welcome to the Dragonfly Project. *Dragonfly News* 41: 22. [Report on the unfavourable situation of The National Dragonfly Museum, Ashton Mill, UK, and current perspectives.] Address: Mackenzie Dodds, R., The National Dragonfly Museum, Ashton Mill, near Oundle, Peterborough PE8 5LZ, UK

**4287.** Mancinelli, G.; Costantini, M.L.; Rossi, L. (2002): Cascading effects of predatory fish exclusion on the detritus-based food web of a lake littoral zone (Lake Vico, central Italy). *Oecologia* 133: 402-411. (in English). ["An enclosure experiment was carried out in the reed-dominated littoral zone of a volcanic lake (Lake Vico, central Italy) to test whether the impact of predatory fish on benthic invertebrates cascades on fungal colonisation and breakdown of leaf detritus. The abundance, biomass, and Shannon diversity index of the invertebrate assemblage colonising *Phragmites australis* leaf packs placed inside: (1) full-exclosure cages, (2) cages allowing access only to small-sized fish predators, and (3) cageless controls, were monitored over a 45-day period together with the mass loss and associated fungal biomass of leaf packs. The species composition of the fungal assemblage was further assessed at the end of the manipulation. In general, invertebrate predators did not show any significant response to fish exclusion, either on a trophic guild or on a single taxon level. In contrast, the exclusion of large predatory fish induced a diverse spectrum of changes in the abundance and population size-structure of dominant detritivore taxa, ultimately increasing the biomass and Shannon diversity index of the whole detritivorous guild. These changes corresponded with significant variations in leaf detritus decay rates as well as in the biomass and assemblage structure of associated fungal colonisers. Our experimental findings provide evidence that in Lake Vico effects of fish predators on invertebrate detritivores influence the fungal conditioning and breakdown of the detrital substrate. We conclude that in lacustrine littoral zones predator-driven constraints may structure lower trophic levels of detritus-based food webs and affect the decomposition of leaf detritus originated from the riparian vegetation." (Authors) The biomass of "Odonata ssp (larval stages)" totalled to 0,66%.] Address: Rossi, L., Department of Genetics and Molecular Biology, Ecology Area, University of Rome "La Sapienza", Via dei Sardi 70, I-00185 Rome, Italy. e-mail: loreto.rossi@uniroma1.it

**4288.** Michal, A., (2002): Feeding ecology of Central European bat community. IXth European Bat Research Symposium Le Havre 26-30 August 2002: 22- (in English). ["Trophic ecology of 16 bat species living sympatrically in SE Czech Republic was studied by means of faecal analysis of netted animals. Food supply was studied using a light trap, sweeping and beating. The collected material enabled to assess main foraging strategies of bats, detailed seasonal dynamics of trophic niches and their overlaps in sympatry, foraging success of particular species etc. *E. serotinus*, *E. nilssonii*, *M. brandtii*, *M. mystacinus*, *M. daubentonii*, *N. leisleri*, *N. noctula* and *P. pipistrellus* s.l. can be classified as aerial hawkers, while *M. myotis* is a ground gleaner. Some food items (Odonata and Ephemeroptera larvae) in the diet of *M. daubentonii* indicate the use of water-surface gleaning. *M. nattereri*, *M. emarginatus*, *M. bechsteini*, *P. auritus* and *P. austriacus* are foliage gleaners. Two species do not fit well in any of these groups and their



groups and their strategies can be called slow hawking (*B. barbastellus*) or slow hawking/hovering/gleaning (*R. hipposideros*). Comparing food supply and the diets of bats, we can state opportunistic foraging of most species in the frame of their morphological and echolocation constraints. On the other hand, a trend of selectivity was found in several species which preferred hunting of relatively big species of Lepidoptera in summer, although small species distinctly prevailed in the food supply. Considerable differences were recorded in the foraging success rate, flying activity and weight changes between *P. auritus* and *M. daubentonii* - representatives of the groups applying different foraging strategies - foliage gleaning and aerial hawking. Compared to *M. daubentonii*, *P. auritus* is able to forage more effectively very early in the spring and late in the autumn, it shows higher flying activity during these periods and its weight grows earlier in spring." (Author)] Address: Michal, A., Agency of Nature Conservation and Landscape Protection of the Czech Republic, Kali nická 4-6, CZ-130 23 Praha, Czech Republic. E-mail: andreas@nature.cz

**4289.** Mitra, T.R. (2002): Note on zoogeography of Odonata (Insecta) of Nicobar Islands, Indian Ocean. *Rec. zool. Surv. India* 100(3/4): 183-188. (in English). [32 species are checklisted and their biogeographic affinities are discussed.] Address: Mitra, T.R., 208 Raja Ram Mohan Roy Rd, Calcutta-700 008, India

**4290.** Neumann, M.; Dudgeon, D. (2002): The impact of agricultural runoff on stream benthos in Hong Kong, China. *Water Research* 36: 3103-3109. (in English). ["We investigated three small streams in the New Territories of Hong Kong, China. In each stream, we compared the benthic macroinvertebrate fauna of one site immediately upstream of an area of agricultural land (market gardening) with a second site immediately downstream. Each pair of sites was <300m apart. Samples were taken at the end of the dry season (March 2000) and again (April 2000) just after heavy rainfall had caused runoff from the fields. The total number of taxa at the downstream sites was the same as that in the upstream sites in March. In April, the total taxon richness was lower at the downstream localities although this difference was statistically significant in only one stream. The acute toxic effect of runoff became clearer when focusing on the group of sensitive benthic fauna. The grouping was done by ranking the relatively physiological tolerance to organotoxins following the relevant literature (*Bull. Environ. Contam. Toxicol.* 67 (2001) 360). All streams showed a significant downstream decrease in the number of sensitive taxa in April, while in two of three streams the number of relatively tolerant taxa increased. Ordination (by n-MDS) confirmed this pattern. It revealed a marked temporal trend in all streams resulting from a decrease of sensitive taxa downstream that was not apparent at the upstream sites. The size of the observed effects varied among streams, and may have reflected differences in the composition of the agricultural runoff." (Authors) 7 odonate taxa are listed in table 1 including *Euphaea decorata* and *Zygonyx iris*.] Address: Naumann, M., Department of Limnology, Zoological Institute, Technical University Braunschweig, Fasanenstrasse 3, D-38092 Braunschweig, Germany

**4291.** Nikula, B.; Sones, J.; Stokes, D.; Stokes, L. (2002): *Beginner's guide to dragonflies*. Little, 1 Brown

& Co., Boston-New York-London. ISBN 0-316-81679-5: 161 pp. (in English). [Photographic identification guide, covering app. 115 North American odonate species. For each species are provided a concise description, notes on behaviour, information on habitat and flight season, a colour portrait, and a distribution map.] Address: Nikula, B., 2 Gilbert Lane, Harwich Port, MA 02646, USA. e-mail: odenews@capecod.net

**4292.** NSW Fisheries (2002): Adams emerald dragonfly *Archaeophya adamsi*. *Fishnote NSW* 1072 [www.fisheries.nsw.gov.au/thr/species/pdf/fn-adams-emerald-dragonfly.pdf](http://www.fisheries.nsw.gov.au/thr/species/pdf/fn-adams-emerald-dragonfly.pdf): 2 pp. (in English). [*A. adamsi* is one of Australia's rarest dragonflies. "Only five adults have ever been collected, and the species is only known from a few sites in the greater Sydney region. Some remaining areas of habitat are under threat from urban, industrial and agricultural development. Adams emerald dragonflies are listed as a vulnerable species in NSW." The species is depicted and described, habitat and ecology are briefly outlined, the known localities are mapped, and conservation action measures are proposed.] Address: Threatened Species Unit, Port Stephens Fisheries Centre Private Bag 1, Nelson Bay, NSW 2315, Australia. E-mail [tsadmin@fisheries.nsw.gov.au](mailto:tsadmin@fisheries.nsw.gov.au). Website: [www.fisheries.nsw.gov.au](http://www.fisheries.nsw.gov.au)

**4293.** Oglęcki P., Popek, Z., Wasilewicz M. (2002): Występowanie fauny bezkręgowej i pierwotniaków w zróżnicowanych morfologicznie siedliskach rzeki Wkry. In: Kozłowski S., Kuśmierczyk J., Kamola M (red.), *Bug. Rzeka która łączy. Ekologiczny Klub UNESCO - Pracownia na Rzecz Bioróżnorodności, Piaski*: 123-129. (in Polish). [The occurrence of invertebrates and protozoans in morphological differentiated habitats in the River Wkra. Three odonate taxa are listed.] Address: Oglęcki P., Katedra Inżynierii Wodnej i Rekultywacji Środowiska SGGW Warszawa, Poland

**4294.** Ott, J. (Red.) (2002): Abstracts of the 21th meeting of the "Gesellschaft deutschsprachiger Odonatologen", 22.3.-24.3.2002, Worms. *Gesellschaft deutschsprachiger Odonatologen*: 82 pp- (in German / English). [Abstracts of the 21th meeting of the "Gesellschaft deutschsprachiger Odonatologen", 22.3.-24.3.2002, Worms: Dr. Rüdiger Mauersberger, Petra Salm & Stefan Bausch (Steinhöfel u.a.): "Zu Verbreitung und Habitatspektrum von *Aeshna viridis* in Nord-Brandenburg" Klaus-Jürgen Conze (Essen): "Hinter dem Horizont der FFH-Libellen - Überlegungen zu einer bundesweiten Datensammlung" Holger Hunger (Reute): "GIS-gestützte Untersuchungen zu den FFH-Libellen Baden-Württembergs" Martin Schorr (Zerf): "Repräsentativität der Odonata: Anhang II der FFH-Richtlinie" Lecures I: Dr. Frank Suhling & Dr. Andreas Martens: "Trockenflüsse und Folienteiche -Libellenforschung in Namibia" Peter Knaus & Dr. Hansruedi Wildermuth: "Ortstreue und Mobilität in zwei alpinen Metapopulationen von *Somatochlora alpestris*" Jochen M. Müller & Dr. Heiko Bellmann: "Coenagrion hylas und das Tiroler Lechtal" Prof. Dr. Eberhard Schmidt: "Auswirkungen der verregneten Sommer 2000 und 2001 auf die Odonatenfauna" Christoph Willigalla: "Die Libellenfauna der Regenrückhaltebecken der Stadt Münster" Franz-Josef Schiel: "Emergenzuntersuchungen an zwei Populationen von *Ophiogomphus cecilia* in der baden-württembergischen Oberrheinebene" Heiko Stuckas: "Gomphus vulgatissimus und *Ophiogomphus cecilia* an der Schwarzen Elster" Dr. Pawel Buczynski & Grzegorz Tonczyk: "Gefähr-

dete Libellen in Polen - Stand 2001" Dr. Dick Groenendijk: "Habitat characteristics and conservation of the Beautiful Demoiselle (*Calopteryx virgo*) in the Netherlands" Robert Ketelaar: "Habitat choice of the Norfolk damselfly (*Coenagrion armatum*) in Sweden, Norway and The Netherlands" Dr. Gilles Jacquemin & Dr. Jean-Pierre Boudot: "Libellen und ihre Biotope in Marokko" Dr. Hansruedi Wildermuth: "Raumbezogenes Fortpflanzungsverhalten der Arktischen Smaragdlibelle (*Soma-tochlora arctica*)"

Evening-Presentations: Hans-Joachim Clausnitzer: "Afrikanische Waldlibellen" Bernd Kunz: "Libellenimpressionen aus Tunesien" Dr. Wolfgang Zessin: "Bericht über das SIO-Symposium in Novosibirsk" und Infos zum SIO-Symposium in Schwerin 2004 Dr. Reinhard Joedicke: "Bericht vom WDA-Symposium in Schweden" Dr. Reinhard Jödicke & Bernd Kunz: "Gefangen zwischen Meer und Wüste: Endemiten im Maghreb"

Lectures II Gerrit Joop: "Gestresste Libellen: Auswirkungen natürlicher Feinde" Dirk Johannes Mikolajewski: "Fressen oder gefressen werden: Prädationsvermeidung bei *Leucorrhinia*-Larven" Dr. Andreas Martens & Dr. Hansruedi Wildermuth: "Blutsauger auf den Flügeln: Gnitzen als Parasiten europäischer Libellen" Prof. Dr. Philip Corbet: "Recent developments in odonatology" Rainer Raab: "Renaturierungsmaßnahmen an Flüssen im Stadtgebiet von Wien: Libellen als Bioindikatoren zur Überprüfung ihrer Wirksamkeit" Milen Marinov: "Ecological niches and adaptation of dragonflies to their habitats in Bulgaria" Klaus Guido Leipelt: "Im Osten nichts Neues? Verteilungsmuster von *Cordulegaster*-Arten auf griechischen Inseln" Andre Günther: "Reproduktionsverhalten von *Neurobasis kaupii*" Dr. Jürgen Ott: "Brauchen Libellenlarven wirklich Wasser?" Dr. Wolfgang Zessin: "Eine neue interessante Libellengattung (*Trigonophlebia*, Anisozygoptera) aus dem Lias Mitteleuropas" Cornelia Geppert: "Ruheplatzverhalten von *Calopteryx splendens* in der Nacht"

Poster-Presentations: Thomas Endlein, Erhard Strohm & Prof. Dr. H. J. Poethke: "Reproduction in a heterogeneous landscape - The consequences of habitat quality for reproduction and larval development in a damselfly" Vincent J. Kalkman, Wolfgang Lopau & Gert Jan van Pelt: "Mapping Turkish dragonflies" Dietrich Kern: "Libellen in spätmittelalterlichen Handschriften" Gerold Laister: "Wieder vital? - Libellenbestand sieben Jahre nach der Renaturierung" Tammo Lieckweg, Dr. Oliver-D. Finch & Rolf Niedringhaus: "Langjährige Änderungen der Libellenfauna einer ökologisch restaurierten Agrarlandschaft" Uwe Lingenfeider: "Faunistisch-ökologische Untersuchungen an Fließwasserlibellen der Wieslauter (Pfalz)" Massimo Salvarani, Prof. V. Parisi, Maurizio Pavesi, Maria Elena Ferrari: "Odonata community on Derivatore del Canale Naviglio Taro" Noemi Szállassy, Erika Bárdosi, Zoltán D. Szabó, Beáta Nagy, Prof. Dr. György Devai: "Survival and mating success in males of *Libellula fulva* Müller, 1764" Prof. Dr. Eberhard Schmidt: "Emergenzprofile für *Gomphus vulgatissimus* am Dortmund-Ems-Kanal im Westmünsterland" Prof. Dr. Eberhard Schmidt: "Winteraufenthalt von *Sympecma fusca* am Brutgewässer im Westmünsterland" Barbara Thomas: "Libellen im Kreis Viersen (NRW): Früher Beginn von Flugzeit und Reproduktion in den 90er Jahren" Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**4295.** Parr, A. (2002): Migrant & Vagrants 2002. *Dragonfly News* 41: 16-17. (in English). [Great Britain; *Erythromma viridulum*, *Aeshna mixta*, *Anax parthenope*, *Orthetrum brunneum* (at Guenersey), *Sympetrum fonscolombii*, *S. vulgatum*] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4296.** Prasad, M. (2002): Odonata diversity in Western Himalaya, India. In: Kumar, A. (Ed.): *Current trends in odonatology*. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 221-254. (in English). [Western Himalaya is defined as the region ranging from Jammu and Kashmir, Himachal Pradesh to Kumaon and Garhwal in Uttar Pradesh. A total of 155 taxa is compiled in a table. Typical habitats in the region are characterised by odonate species.] Address: Prasad, M.; Zool. Surv. India, M-Block, New Alipore, Calcutta-700053, India

**4297.** Ring, S.; Kraus, F. B.; Schierwater, B.; Hadrys, H. (2002): Evolutionary ecology and genetic diversity measures in dragonflies. *Poster, Deutsche Zoologische Gesellschaft 2002*: (in English). ["Results and discussion: The microsatellite analysis for *O. coerulescens* revealed 5 private alleles exclusively present in the CdV population. These alleles were lost after the dredging and a significant mode shift in allele frequencies took place which is typical for bottleneck situations (Fig. 1, Levins 1970; Luikart et al. 1998). Despite considerable gene flow between populations the alleles could not be recovered by the surrounding subpopulations (F-statistic). Due to the fact that the CdV population recovered very fast (2 generations) this cryptic loss of genetic diversity will remain undetected by traditional monitoring techniques. Sequence data for *C. splendens* and *C. haemorrhoidalis* populations on the contrary showed no to very little (<0.5%) intraspecific genetic diversity despite a broader geographic scale including various geographic phenotypes (Tab. 1). On the supposed subspecies level sequence divergence was also minimal, whereas depending on the marker a genetic variation of up to 15.7% could be detected among species (Fig. 2). The genetic homogeneity of all 3 markers tested is not congruent with data for other species and opposes our expectation based on the high number of geographical phenotypes within this family compared to other Odonata groups (Vogler & DeSalle 1994, Watanabe & Chiba 2001). The postglacial recolonization hypothesis presents a possible explanation for the low sequence divergence on the intraspecific and subspecies level suggesting recent habitat shifts and rapid radiation of the European *Calopteryx* clade (Hewitt 1993)."] (Authors)] Address: Ring, Sabine, ITZ, Ecology & Evolution, TiHo Hannover, Bünteweg 17d, 30559 Hannover, Germany. (see: <http://ecolevol.de/posters/AGSchi6-sabine.ppt>)

**4298.** Roy, S.P. (2002): Trophic biology and energy contents of larval odonates with special reference to their role in the management of aquatic ecosystems. In: Kumar, A. (Ed.): *Current trends in odonatology*. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 315-328. (in English). ["The present article deals with the seasonal variations in the energy contents, productivity in terms of g/m<sup>2</sup>/month/year, food and feeding biology and foraging ratio (FR) of *Mesogomphus lineatus* Selys, *Cordulegaster* sp. (Anisoptera: Odonata) and *Ischnura* sp. (Zygoptera : Odonata) of a fish pond of Bhagalpur (Bihar, India). The maximum calorific values of *M. lineatus*"]

tus Selys and Cordulegaster sp. ( $5.487 \pm 0.003$  Kcal/g dry weight and  $5.430 \pm 0.00$  Kcal/g ash-free dry weight) was recorded in September. However, the minimum calorific value ( $4.133 \pm 0.09$  Kcal/g dry weight) was recorded in January. The calorific values of *Ischnura* sp. ( $3.706 \pm 0.032$  Kcal/g dry weight and  $3.470 \pm 0.034$  Kcal/g ash-free weight) was measured. It was investigated that the calorific values of these larvae varied from instar to instar, month to month and upon the physiological state of the animals. The annual productivity was measured as 2.414g dry wt/cub. met/year with monthly productivity being 0.210 g dry wt/cub. met/month. The gut content analysis of the larval odonates revealed that the Rotifera, Cladocera, Rhizopoda and aquatic insects form the maximum percentage of food items in *Ichnura* sp. but in *M. lineatus* Selys and *Cordulegaster* sp. Rhizopoda were recorded in very small quantity and other food items such as Rotifera, Cladocera, Copepoda, aquatic insects and other animal tissues were found in maximum percentage in the foregut. Due to the utilization of food present at various trophic levels of the food chains, they have regulatory impact in the management of the aquatic ecosystems as well as their mere presence indicates healthy and non-contaminated environments." (Author)] Address: Roy, S.P., University Department of Zoology, T.M. Bhagalpur University, Bhagalpur-812007, Bihar, India

**4299.** Schuster, C.; Bellstedt, R.; Göring, M.; Müller, U.; Samietz, R. (2002): Die Flora und Fauna des Flächennaturdenkmales "Gewässerschutzgebiet Hörsel" im Landkreis Gotha mit Anmerkungen zu Pflege- und Entwicklung. Abhandlungen und Berichte des Museums der Natur Gotha 22: 59-80. (in German). [Thuringia, Germany; *Aeshna cyanea*] Address: Bellstedt, R., Museum der Natur Gotha, Parkallee 15, D-99867 Gotha, Germany

**4300.** Stirpari, N. de L.; Henry, R. (2002): The invertebrate colonization during decomposition of *Eichhornia azurea* KUNTH in a lateral lake in the mouth zone of Paranapanema River into Jurumirim Reservoir (Sao Paulo, Brazil). *Braz. J. Biol.* 62(2): 293-310. (in English with Portuguese summary). ["The invertebrate colonization during decomposition of *Eichhornia azurea* was observed in a lateral lake in the mouth zone of Paranapanema River into Jurumirim Reservoir in two periods of the year. The litter bags method was used for measuring the decomposition rate as well as to evaluate the invertebrates colonization. Forty-two litter bags, measuring 15 - 20 cm in size and 2 mm mesh net, were incubated in situ. Six litter bags (three for colonization and three for decomposition measurements) were removed after the 1st, 3rd, 7th, 14th, 28th, 56th and 72nd days of incubation. After each day, the material was carefully cleaned for detritus removal and invertebrate (including Odonata) sampling. The biological material was fixed with 4% formaline and then sorted and identified. The remaining plant material was dried in an oven (at 60°C) and weighed. A fast material loss occurred during the first 24 hours and the decomposition rate was higher during the rainy season than in the dry season. A peak on invertebrate density (110 ind.g.DW 1) on the remaining detritus of *Eichhornia azurea* was recorded in the 56th day of dry season, when the polyphenol concentration of plant detritus was 0.57 UDO.g.DW 1. In the rainy season, higher density was found in the 28th day of incubation, when the polyphenol concentration was 4.36 UDO.g.DW 1. Apparently, the reduction in the

polyphenol concentration was followed by an increase in invertebrate densities. The majority of the species observed in the detritus belongs to the collector group that was dominant after the 7th and 14th days in the rainy and dry seasons, respectively." (Authors)] Address: Henry, R., Departamento de Zoologia, Instituto de Biociências, Unesp, C.P. 510, CEP 18618-000, Botucatu, São Paulo, Brazil. E-mail: rhenry@ibb.unesp.br

**4301.** Suri Babu, B.; Kumar, A. (2002): Biology of Odonata of Indian sub-continent: a review. In: Kumar, A. (Ed.): Current trends in odonatology. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 151-168. (in English). ["A review on the biological studies on Odonates during 1985-2001 from Indian subcontinent is provided. The information on the egg stage, larval growth, larval habit and habitat, emergence, reproductive behaviour of adults, parasites and predators of adults have been dealt in detail in the text." (Authors)] Address: Kumar, A., Northern Regional Stn., Zool. Surv. India, Dehra Dun-248195, India

**4302.** Suri Babu, B. (2002): Description of territoriality and reproduction of *Agriocnemis pygmaea* (Rambur, 1842) (Zygoptera: Coenagrionidae). In: Kumar, A. (Ed.): Current trends in odonatology. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 255-272. (in English). ["The territoriality and reproductive behaviour of *A. pygmaea* has been studied in detail in a perennial pond "Dalpat Sagar", Jagdalpur Bastar District, Madhya Pradesh, India. The territoriality is strongly demonstrated by some of the males. Males copulate both isochromatic and heterochromatic forms of females with equal consideration. Precopulatory courtship display is present and brief 4 to 7 Sec (mean: 4.2, N = 9). Intramale sperm translocation has occurred only after the seizure of the female and lasted for 12-18 Sec (mean : 15.35, N = 8). The copulatory wheel was formed during the perched condition; and stage I lasted for 20 to 42 min (mean: 28.05 N =14). While stage II lasted for 2 to 6 min (mean: 4.75, N = 14). The oviposition is endophytic and performed both in tandem and female alone. Behavioural comparisons at various levels have been drawn with the other members of the family Coenagrionidae." (Author)] Address: Suri Babu, B., Forensic Science Laboratory, Police Control Room, Jagdalpur-494001 (M.P.), India

**4303.** Taylor, P. (2002): Small Red-eyed Damselfly in Norfolk. *Dragonfly News* 41: 20. (in English). [VIII 2001, UK, Norfolk, *Erythromma viridulum*] Address: Taylor, Pam, Decoy Farm, Potter Heigham, Norfolk, NR29 5LX, UK

**4304.** Tembhare, D.B. (2002): Endocrinology of Odonata. In: Kumar, A. (Ed.): Current trends in odonatology. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 83-114. (in English). ["The advancement made in the field of endocrinology of Odonata is thoroughly reviewed since its inception. Hanström (1940), in true sense, laid the foundation of odonate endocrinology. [...] As a result, now an extensive literature on the histology, histochemistry and ultrastructure of the endocrine system and hormonal regulation of metamorphosis, diapause, reproduction, osmotic, water and ionic balance and carbohydrate, lipid and protein metabolism is available." (Author)] Address: Tembhare, D.B., Dept Zool., Nagpur Univ. Campus, Amravati Road, Nagpur-440010, Maharashtra, India



**4305.** Vick, G.K. (2002): A community structure of Odonata of the South-West Province of Cameroon with the description of *Phyllogomphus corbetae* spec. nov. (Anisoptera: Gomphidae). In: Kumar, A. (Ed.): Current trends in odonatology. Daya Publishing House. Delhi. ISBN 81-7035-274-6: 27-82. (in English). ["A checklist of the dragonflies of the South-West Province of Cameroon, based upon field work undertaken between 1995 and 1998, and a survey of historical records, is given. Notes on seasonal occurrence, habitat requirements and taxonomy are provided. As new is described: *P. corbetae* sp.n. (holotype male. Kumba, outlet stream from Barombi Mbo, 20-IX-1997; allotype female: Limbe, Bimbia, Elephant River, 4-VII-1996)."] (Author) This is a quite curious paper for it was already published as Vick, G.S. (1999): A checklist of the Odonata of the south-west province of Cameroon, with description of *Phyllogomphus corbetae* spec. nov. (Anisoptera: Gomphidae). *Odonatologica* 28(3): 219-256. Compared with the 1999 paper, contents remained unchanged, tables were slightly rearranged within the text.] Address: Vick G.S., Crossfields, Little London, Tadley, Hants RG26 5ET, United Kingdom

**4306.** Zimmermann, W. (2002): Libellen (Odonata). In: M. Görner, [Ed.], Thüringer Tierwelt. ArbeitsGr. Artenschutz Thüringen, Jena, ISBN 3-00-010168-3: 263-273. (in German). [The book intends to introduce into biodiversity of Thuringia, Germany. The chapter on the Odonata gives a sound impression on the biology of the dragonflies with special emphasize on the regional situation. The paper contains also remarks on conservation measures, the history of odonatological research in Thuringia, and a checklist of the 61 odonate species known to be found in this Federal State.] Address: Zimmermann, W., Thomas-Müntzer-Str. 5, D-99423 Weimar, Germany

### 2003

**4307.** Anderson, A.R.; Petranka, J.W. (2003): Odonate predator does not affect hatching time or morphology of embryos of two amphibians. *Journal of Herpetology* 37(1): 65-71. (in English). ["Many larval amphibians respond to predators by developing broad tail fins that increase maneuverability and reduce predation risk. Recent evidence also indicates that amphibian embryos may adaptively alter their time at hatching in the presence of a predator, but the generality of this phenomenon is unknown. We examined whether embryos of the Wood Frog (*Rana sylvatica*) and Spotted Salamander (*Ambystoma maculatum*) would alter hatching time, hatching synchrony, or body morphology in the presence of a larval predator. Using a 2 × 2 factorial design, we exposed developing embryos to four experimental treatments that varied in predation risk: unfed *Anax junius* (an odonate predator), fed *A. junius*, conspecific larvae, or water. Response variables were central tendency (mean or median) and variation (CV or range) for hatch time and developmental stage and four linear body dimensions that were used to detect changes in morphology. Effect sizes were small (< 0.36), and none of the response variables differed significantly among treatments, suggesting that embryos of these species do not respond strongly to the presence of a predator. This and other studies indicate that the response of

amphibian embryos to predators varies both within and between taxa, although the adaptive significance of such variation is poorly resolved. We discuss the possible roles of developmental constraints and natural selection in explaining the lack of strong responses of *Rana* and *Ambystoma* embryos to a dangerous larval predator." (Authors)] Address: Petranka, J.W.; Department of Biology, University of North Carolina, Asheville, North Carolina 28804, USA. E-mail: petranka@cs.unca.edu

**4308.** Ballantyne, A.P.; Brett, M.T.; Schindler, D.E. (2003): The importance of dietary phosphorus and highly unsaturated fatty acids for sockeye (*Oncorhynchus nerka*) growth in Lake Washington a bioenergetics approach. *Can. J. Fish. Aquat. Sci.* 60: 12-22. (in English). ["Juvenile sockeye salmon (*Oncorhynchus nerka*) in Lake Washington experience very high growth rates, but the mechanisms regulating their growth rates are poorly understood. The potential for food quality limitation of growth was tested using a coupled bioenergetics and mass balance model. Sockeye and zooplankton prey species were analyzed for their fatty acid composition. Ratios of phosphorus to carbon (P:C) for both sockeye and zooplankton were obtained from the literature. Based on sockeye stomach contents and zooplankton weights, diets of zooplankton biomass were calculated and monthly values of specific fatty acids and P:C ratios in the diet were derived. An increase in highly unsaturated fatty acids, especially in the liver, was observed with increased fork length up to smoltification size, with a subsequent decrease in smolts and kokanee. Measurements of docosahexaenoic (DHA) in daphnids were significantly lower than in cyclopoids. Model predictions suggest that sockeye are not limited by the availability of phosphorus or eicosapentaenoic acid (EPA) in their diet but may experience limited growth because of DHA deficiencies. Thus, the ability and efficiency of sockeye at elongating 18:3  $\omega$ 3, 18:4  $\omega$ 3, and EPA to DHA may be of critical importance to lacustrine growth and production. ... Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) contents (% total fatty acids) of various freshwater and marine prey taxa of salmonids (revised from Higgs et al. 1995 and references therein). Odonata: 9.4%." (Authors); Address: Ballantyne, A.P. Department of Civil and Environmental Engineering, University of Washington, Seattle, WA 98195, USA. E-mail: apb14@duke.edu. <http://faculty.washington.edu/mtbrett/2003BallantyneCJFAS.pdf>

**4309.** Bechly, G.; Dietl, G.; Schweigert, G. (2003): A new species of *Stenophlebia* (Insecta: Odonata: Stenophlebiidae) from the Nusplingen Lithographic Limestone (Upper Jurassic, SW Germany). *Stuttgarter Beiträge zur Naturkunde, Serie B (Geologie und Paläontologie)* 338: 1-10. (in English with German summary). ["A new dragonfly species, *Stenophlebia rolffuggeri* n. sp. (Odonata: Stenophlebiidae), is described from the Nusplingen Lithographic Limestone in SW Germany. It is the fourth dragonfly species recorded from this Upper Jurassic fossil locality." (Authors)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**4310.** Bedjanic, M.; Salamun, A. (2003): Large golden-ringed dragonfly *Cordulegaster heros* Theischinger 1979, new for the fauna of Italy (Odonata: Cordulegasteridae). *Natura Sloveniae* 5(2): 19-29. (in English with Slovenian summary). ["The species has been re-

corded at three localities in the extreme eastern part of the Friuli-Venezia Giulia region, north-eastern Italy, thus bringing the number of Italian dragonfly species to 89. The distribution of *C. heros* in Slovenia and Italy is mapped and discussed within the zoogeographical point of view. Additionally, the collected faunistic data on other dragonfly species and sympatric occurrence of endangered frog species *Rana latastei* Boulenger are given. Due to inclusion of *C. heros* and *R. latastei* to the Annexes II and IV of the Habitat Directive of EU, the conservation of their habitats in Italy and western Slovenia is proposed within the European network of protected areas NATURA 2000." (Authors)] Address: Bedjanic, M., Kolodvorska 21b, SI-2310 Slovenska Bistrica, Slovenia. E-mail: matjaz.bedjanic@guest.arnes.si

**4311.** Bergsten, J.; Ekkerholm, P.; Hellquist, S.; Hilszczanski, J.; Nilsson, A.; Pettersson, R.; Werner, T. (2003): Insekter och spindeldjur från Romelsön. *Natur i Norr, Umeå* 22(2): 65-87. (in Swedish). [Six odonate species collected 20-22 June 2003 at the island of Romelsön, Sweden are listed.] Address: Johannes.Bergsten@eg.umu.se

**4312.** Bojsen, B.H.; Jacobsen, D. (2003): Effects of deforestation on macroinvertebrate diversity and assemblage structure in Ecuadorian Amazon streams. *Archiv für Hydrobiologie* 158(3): 317-342. (in English). ["The effects of deforestation on stream macroinvertebrate faunas were studied at twelve sites located in an area of fragmented rainforest in the Ecuadorian Amazon. The most pronounced changes in habitat characteristics with reduced riparian canopy cover were a reduced amount of litter detritus on the streambed and an increased periphyton biomass. Alpha diversity decreased with the degree of deforestation. Beta diversity was also lower in deforested than forested sites, indicating that macroinvertebrate composition among the forested sites were more heterogeneous than among the deforested sites. Total macroinvertebrate density increased with decreasing canopy cover, and with increasing periphyton biomass. The relative density of Ptilodactylidae, Tanypodinae, Euthyplociidae, Libellulidae and Megapodagrionidae were positively related with either canopy cover or litter detritus. A marked effect on the trophic structure of the macroinvertebrate fauna was found. The relative density of collectors decreased with canopy cover and the amount of litter detritus, while the relative density of predators increased. Shredder abundance was low and unrelated with canopy cover. Temporal variability in the macroinvertebrate data were greater in the deforested sites than in the forested sites. Using two-way indicator species analysis (TWINSPAN) and principal components analysis (PCA) riparian canopy cover was found important structuring the macroinvertebrate assemblages. Litter detritus associated with particulate organic material was the main variable related with the PCA ordination axes." (Authors)] Address: Jacobson, D.; Freshwater Biological Laboratory, University of Copenhagen, 51 Helsingorsgade, DK-3400 Hillerød, Denmark

**4313.** Borkowski, A. (2003): Obserwacje entomologiczne (Lepidoptera, Odonata) w rezerwacie przyrody "Torfowisko pod Zielencem" w Sudetach. *Przyroda Sudetów Zachodnich* 6: 119-129. (in Polish, with German summary). [Entomological observations (Lepidoptera, Odonata) in the nature conservation area of "Torfowisko pod Zielencem" (formerly: "Seefeldler bei Reinerz") in

the Sudeten. Compared with the odonate fauna documented by S. Mielewczyk (1969): Odonatenlarven einiger Sphagnum-Moore Polens. *Bull. entomol. Pologne* 39(1): 2-81, the species composition remained unchanged. All the typical peat bog species also could be found in 1998-2002. *Aeshna subarctica elisabethae*, *Somatochlora alpestris*, *S. arctica*, and *Leucorrhinia dubia* are discussed in some detail.] Address: Borkowski, A., Auf dem Huckstein 25, D-53117 Bonn, Germany. E-mail: abolep@aol.com

**4314.** Chovanec, A.; Fesl, C.; Kollar, H.P. (2003): Notes on the dragonfly community of a temporary pond near Vienna, Austria (Odonata). *Opusc. zool. flumin.* 215: 1-9. (in English). ["The systematic investigations conducted (1998-2002) at a temporary pond 1.5 km S of Vienna (alt. 185m, surface ca 1.5 ha, max. depth ca 1.0 m) indicate a relationship between the annual duration of water persistence and the total number of species. They also suggest that a longer water persistence in late spring and early summer favours high abundances of the characteristic pond dwellers, *Lestes barbarus* and *L. dryas*, but a statistically significant correlation could not be ascertained." (Authors)] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, A-1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

**4315.** Clausnitzer, V. (2003): Odonata of African humid forests - a review. *Cimbebasia* 18: 173-190. (in English). ["In this review, distribution patterns and diversity of dragonflies are discussed in respect to the geological and climatic history of African forests. The review focuses primarily on the humid forests of eastern Africa, but equally applies elsewhere in Africa. The ecology of forest dragonflies, which is as diverse as the broad spectrum of aquatic habitats in the forests, is outlined. The need for further research on all topics related to the ecology of forest dragonflies is stressed. Forest dragonflies are most often stenotopic and highly sensitive to habitat disturbance and have a high potential as indicator species. The conservation of African humid forests is discussed and possible steps towards their protection proposed." (Author)] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de

**4316.** Corbet, P.S. (2003): A positive correlation between photoperiod and development rate in summer species of Odonata could help to make emergence date appropriate to latitude: a testable hypothesis 1. *J. entomol. soc. Brit. Columbia* 100: 3-17. (in English). ["In the western Nearctic and the Palearctic Regions several species of Odonata occur, without evident gaps in distribution, from latitude 50° N northwards to the Arctic Circle (66°30' N) and beyond. The decline in incident solar radiation along this latitude gradient does not appear to be reflected, as might be expected, in progressively later emergence, despite the progress of metamorphosis being dependent on ambient temperature. On the contrary, reports indicate that, in some species, northernmost populations may emerge at least as early as, and sometimes even earlier than, more southerly populations, suggesting that some mechanism exists that enables larval developmental rate to compensate for latitude. Reported responses by late-stadium larvae to photoperiod, placed in the context of seasonal changes of photoperiod at different latitudes, make it plausible to postulate the existence of a single, fixed response to photoperiod that would continuously adjust

developmental rate to latitude, at least between 50° and 70° N. In Odonata such a response, to be effective, would be confined to species possessing a Type-2 or Type-3 life cycle, in which more than one stadium precedes metamorphosis in spring or early summer. The hypothesis proposed here does not invoke genetic heterogeneity of response in populations at different latitudes, such as has been detected in certain other insects. The response predicted by the hypothesis may complement, rather than substitute for, other mechanisms of seasonal regulation. Steps are described by which the hypothesis could be tested in Odonata." (Author)] Address: Corbet, P.S., Crean Mill, Crean, St Buryan, Cornwall, TR19 6HA, UK. E-mail: pscorbet@creanmill.u-net.com

**4317.** Corbet, P.S. (2003): Ecological perspectives of African Odonata. *Cimbebasia* 18: 167-172. (in English). ["The distribution and seasonal ecology of African Odonata are determined by the habitats available and their seasonal continuity, which in turn reflect seasonal patterns of rainfall. Rainfall within the tropics is determined by the periodic passage of the Inter-Tropical Convergence Zone; at Africa's northern and southern extremities the climate is Mediterranean. Life cycles of African Odonata reveal two dichotomies: temperate versus tropical, and regulated versus unregulated. Examples are provided of life-cycle strategies of species occupying temporary waters in the tropics. Hypotheses regarding their method of dispersal and dry-season survival are reviewed, and ways are suggested whereby useful information about their seasonal ecology may be obtained." (Author)] Address: Corbet, P.S., Crean Mill, Crean, St Buryan, Cornwall, TR19 6HA, UK. E-mail: pscorbet@creanmill.u-net.com

**4318.** Córdoba-Aguilar, A.; Uhia, E.; Cordero Rivera, A. (2003): Sperm competition in Odonata (Insecta): the evolution of female sperm storage and rival's sperm displacement. *Journal of Zoology, London* 261: 381-398. (in English). ["Odonates are well known for the ability of the males to displace sperm stored in the female's spermstorage organs during copulation. By this means, copulating males are able to increase their fertilization success. This ability has been used as an example to illustrate a conflict of interests between the sexes in which males have evolved sperm-displacement mechanisms whilst females have presumably evolved means to avoid sperm displacement. The present review has four aims: (1) to describe the copulatory mechanisms used during sperm displacement; (2) to analyse the causes of sperm usage patterns; (3) to discuss this information using current hypotheses on conflict between the sexes; (4) to illuminate topics for further research. Four copulatory mechanisms are described: sperm removal (physical withdrawal of stored sperm), sperm repositioning ('pushing') of rival sperm to sites where its use will be least likely), female sensory stimulation to induce sperm ejection, and sperm flushing (displacement of sperm using the copulating male's sperm). Sperm-precedence studies in Odonata are scarce and their values vary considerably between species. In those species in which sperm-displacement is incomplete, the last copulating male obtains a high but variable short-term fertilization success which decreases with time. Some male and female factors affecting sperm precedence patterns are mentioned: (1) male variation in genital morphology; (2) duration of copulation influenced by the male (the lon-

ger the copulation, the more stored sperm displaced); (3) adaptations of the sperm-storage organs that allow the female to manipulate the sperm she has received (i.e. avoiding sperm displacement, re-distributing sperm masses, favouring sperm located in certain sites and ejecting sperm after copulation). We suggest that male and female odonates have co-evolved at the level of genital function with the control of stored sperm as the focus of the conflict. The benefits for males in this co-evolution lie in maximizing their fertilization success. However, it is not clear what females obtain from storing sperm and making it unreachable during sperm displacement. Two hypothetical benefits that females may obtain for which some evidence has been gathered are genetic diversity and viability genes. It is finally suggested that odonates can become excellent subjects of study for testing current ideas related to sexual conflict and speciation processes through sexual selection." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uah.reduaeh.mx

**4319.** Cross, W.F.; Benstead, J.P.; Rosemond, A.D.; Wallace, J.B. (2003): Consumer-resource stoichiometry in detritus-based streams. *Ecology Letters* 6: 721-732. (in English). ["Stoichiometric relationships between consumers and resources in detritus-based ecosystems have received little attention, despite the importance of detritus in most food webs. We analysed carbon (C), nitrogen (N), and phosphorus (P) content of invertebrate consumers (including *Lanthus* sp.), and basal food resources in two forested headwater streams (one reference and the other nutrient-enriched). We found large elemental imbalances between consumers and food resources compared with living plant-based systems, particularly in regard to P content, which were reduced with enrichment. Enrichment significantly increased nutrient content of food resources (consistent with uptake of N and P by detritus-associated microbes). P content of some invertebrates also increased in the enriched vs. reference stream, suggesting deviation from strict homeostasis. Nutrient content varied significantly among invertebrate functional feeding groups, orders and, to some extent, size classes. Future application of stoichiometric theory to detritus-based systems should consider the potential for relatively large consumer-resource elemental imbalances and P storage by insect consumers." (Authors)]. Address: Cross, W.F., Institute of Ecology, University of Georgia, Athens, GA 30602, USA. E-mail: cross@sparc.ecology.uga.edu

**4320.** Csabai, Z.; Boda, P.; Móra, A.; Müller, Z. (2003): Aquatic beetles, aquatic and semiaquatic bugs, dragonfly and caddisfly larvae from 32 backwaters in the Upper-Tisza-region, NE Hungary (Coleoptera: Hydradephaga, Hydrophiloidea; Heteroptera: Nepomorpha, Gerromorpha; Odonata; Trichoptera). *Folia historico naturalia musei Matraensis* 27: 217-235. (in English). [Records of 26 odonate species from Hungary are listed.] Address: Csabai, Z., University of Pécs, Department of General and Applied Ecology, Ifjúság útja 6, PÉCS, H-7624. Hungaria. E-mail: csabaizoltan@freemail.hu

**4321.** De Celis, J.F.; Diaz-Benjumea, F.J. (2003): Developmental basis for vein pattern variations in insect wings. *Int. J. Dev. Biol.* 47: 653-663. (in English). ["The



venation patterns characteristics of different insect orders and of families belonging to the same order possess enormous variation in vein number, position and differentiation. Although the developmental basis of changes in vein patterns during evolution is entirely unknown, the identification of the genes and developmental processes involved in *Drosophila* vein pattern formation facilitates the elaboration of construction rules. It is thus possible to identify the likely changes which may constitute a source of pattern variation during evolution. In this review, we discuss how actual patterns of venation could be accounted for by modifications in different Pterygota of a common set of developmental operations. We argue that the individual specification of each vein and the modular structure of the regulatory regions of the key genes identified in *Drosophila* offer candidate entry points for pattern modifications affecting individual veins or interveins independently. Assuming a general conservation of the processes involved in different species, the transitions between different patterns may require few changes in the regulatory gene networks involved." (Author) Several references are made to Odonata.] Address: De Celis, J.F., Centro de Biología Molecular Severo Ochoa, Universidad Autónoma de Madrid, Spain. E-mail: mail:jfdecelis@cblm.uam.es

**4322.** Dijkstra, K.-D. (2003): A review of the taxonomy of African Odonata - finding ways to better identification and biogeographic insight. *Cimbebasia* 18: 191-206. (in English). ["The taxonomy of the approximately 850 species of sub-Saharan African Odonata is relatively well-known, probably due to the impoverished nature of the fauna as compared to that of other tropical regions. The need for revisions, study of higher classification, comprehension of (often clinal, environmentally induced) variability and knowledge of larvae, phylogeny and biogeography are stressed. Taxonomic priorities are discussed for each family. Supportive activities include the production of identification manuals for a broader public, the accumulation of supplementary material and the conservation of existing collections. A list of genera with estimated numbers of species, taxonomic status and references is provided, as well as a list of important regional works.] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**4323.** Dijkstra, K.-D.; Martens, A.; Parr, M.J. (2003): African Odonatology - past, present and future. *Cimbebasia* 18: 161-166. (in English). [The paper introduces into history of African odonatology, current research activities, contains an outlook on research to have done, and presents PHAON (Pinhey's Heritage African Odonata Network) which is a loose cooperation of odonatologists with special interest in African Odonata and which is chaired by K.-D. Dijkstra.] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**4324.** Donnelly, N. (2003): Show us your tattoos! *Argia* 15(4): 27-28. (in English). [The story of a tattoos with a *Hetaerina* is told.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**4325.** Duinen, G.-J. van; Brock, A.M.T.; Kuper, J.T.; Leuven, R.S.; Peeters, T.M.J.; Roelofs, J.G.M.; Velde, G. van der; Verberk, W.C.; Esselink, H. (2003): Do

restoration measures rehabilitate fauna diversity in raised bogs? A comparative study on aquatic macroinvertebrates. *Wetlands Ecology and Management* 11(6): 447-459. (in English). ["To assess whether raised bog restoration measures contribute to the conservation and restoration of the fauna diversity, macroinvertebrate species assemblages were compared between water bodies created by rewetting measures and water bodies which have not been subject to restoration measures, but are remnants of former peat cuttings and trenches used for buckwheat culture in the past. The restoration sites were inhabited by characteristic raised bog species and rare species, but their numbers were higher at the remnant sites not affected by restoration management. A considerable number of characteristic and rare fauna species were only found at the remnant sites. The remnant sites included considerably more variation in macroinvertebrate species assemblages and had a higher cumulative species richness. The number of characteristic macroinvertebrate species was not clearly related to the presence of a characteristic raised bog vegetation. In restoration sites numbers of rare and characteristic species per site tended to increase with the time elapsed after rewetting. However, restoration measures will not automatically result in restoration of a more or less complete macroinvertebrate species spectrum, as restoration measures have so far resulted in habitats for only a limited number of the characteristic species. When planning restoration measures, it is recommended to protect the populations of rare and characteristic species present in the area, as these populations may become the sources for colonization of rewetted sites. Safeguarding habitat diversity during the restoration process and restoration of different elements of the habitat diversity of complete raised bog systems will result in the characteristic fauna diversity being conserved and restored more successfully." (Authors) *Ceriatrion tenellum* and *Coenagrion lunulatum* are listed in tab. 4.] Address: Duinen, G.-J.A. van, Bargerveen Foundation, University of Nijmegen, The Netherlands Department of Environmental Studies, University of Nijmegen, The Netherlands. E-mail: duinen@sci.kun.nl

**4326.** Ferreira, S.; Grosso-Silva, J.M. (2003): Confirmação da presença de *Brachytron pratense* (Müller, 1764) (Odonata, Aeshnidae) em Portugal continental. *Boletim de la Sociedad Entomologia Aragonesa* 33: 272- (in Portuguese with Spanish summary). [The species was first reported in 1937 from Coimbra. Here, several specimens from Aveiro (27-III-2002) and Ovar (9-III-1997) are documented.] Address: Ferreira, S., Rua Rogerio Oliveira Monteiro 426, PT-4475-841 Silva Escura, Portugal

**4327.** Fliedner, H. (2003): Libellen und Literatur XXXIV. *Libellennachrichten* 10: 8-9. (in German). [A brief text on Odonata from Maria Sibylla Merian is documented in: KÜHN, D. (2002): *Frau Merian! Eine Lebensgeschichte*. S. Fischer Verlag, Frankfurt / M., S. 85.] Address: Fliedner, H., Louis-Seegelken Str., D-28717 Bremen, Germany

**4328.** Geraeds, R.P.G. (2003): The river Roer offers perspectives for dragonflies of running water. *Natuurhistorisch Maandblad* 92: 223-227. (in Dutch with English summary). ["The river Roer houses populations of seven species of dragonfly associated with running water, viz. *Calopteryx splendens*, *Platynemis penni-*

pes, *Cercion lindenii*, *Gomphus vulgatissimus*, *G. pulchellus*, *Stylurus flavipes*, and *Ophiogomphus cecilia*. This makes the river Roer unique in the Netherlands. The most important causes of this variety of dragonflies are the improved water quality, morphology and natural dynamics of the Dutch Roer basin. Unlike the German situation, the river Roer is allowed to meander in most of its Dutch basin. This has resulted in a great morphological variety, providing suitable habitats for dragonfly larvae. It is expected that the circumstances for dragonflies of running water will further improve. The policy of the "Roer en Over-maas" water board aims at further improvement of the water quality and preservation of the unique meandering character of the river Roer. In addition, the Ministry of Agriculture, Nature Management and Fisheries has initiated a procedure to designate the valley of the river Roer as a special conservation area under the EU Habitat Directive." (Authors)] Address: Geraeds, R.P.G., Julianalaan 46, NL-6042 JH Roermond, The Netherlands

**4329.** Geske, C. (2003): Die Tier- und Pflanzenarten der Anhänge II und IV der Fauna-Flora-Habitat-Richtlinie in Hessen - Rechtliche Vorgaben, Rahmenbedingungen und Stand der Umsetzung in Hessen. Jahrbuch Naturschutz in Hessen 8: 115-123. (in German). [This paper is of some interest, for the odonate fauna of Hessen, Germany is known quite bad. It contains unpublished records of *Coenagrion mercuriale*, *Ophiogomphus cecilia*, and *Leucorrhinia pectoralis*, and outlines current activities for mapping these species in Hessen.] Address: Geske, C., Hess. Dienstleistungszentrum für Landwirtschaft, Gartenbau und Naturschutz (HDLGN), Europastr. 10-12, D-35394 Gießen, Germany.

**4330.** Glupov, V.V.; Kryukova, N.A.; Khodyrev, V.P.; Sokolova, Yu.Ya (2003): Endocytobionts of haemocytes of *Aeshna juncea* L. dragonfly (Odonata). Eurasian entomological journal 2: 131-132. ["In haemocytes of *Aeshna juncea* dragonfly larvae endocytobionts were found. After haemocyte monolayer staining endocytobionts were visualized in light microscope as dark-red inclusions contrasting to the surrounding haemocyte cytoplasm being blue in colour. EM analysis showed that the most of endocytobionts are look elongate in shape. An infected haemocytes contain microorganisms are surrounded by multilayer envelopes, residing in a special compartments very often, but not always filled with homogenous matrix. Presumably, these compartments represent the sites of bacteria multiplication, since several bacteria can be usually recognized within each vacuoles. Great number of coated vesicles, multivesicular bodies and an empty membrane profiles can be observed in the area of the cell being occupied by endosymbionts indicating the participation of host cell lysosomal system in the formation of endosymbiont-containing compartment. It is stated that only plasmatocytes and, sometimes, granulocytes bear endocytobionts of dragonfly haemocytes. The isolated microorganisms were identified as bacteria of the genus *Pseudomonas*. The number of dragonfly larvae containing *Pseudomonas* bacteria reached 73-78% of the whole population in natural water basins of Novosibirsk region in 1997. Water temperature rising up to 28°C in laboratory experiment caused to the mortality increasing of the infected larvae up to the 73-79%, whether mortality of the uninfected larvae population did not exceed the 5-7%. Analysis of the fresh cadaverous and alive insects shows big amount of *Pseudomonas* bacteria inside the hae-

mocytes and the lymph. Laboratory experiments proved that the occurrence of *Pseudomonas* does not depend on such reactions of the larvae cellular response as encapsulation. We suppose that the bacteria of the genus *Pseudomonas* are the normal bacterial endocommensals, which could be pathogenic under a certain stress factor(s), and influence on the regulation of population dynamics of the hosts." (Authors)] Address: Glupov, V.V., Laboratory of insect pathology, Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Frunze street 11, Novosibirsk 630091 Russia

**4331.** Goffart, P.; Fichet, V. (2003): Compte-rendu des observations d'espèces prioritaires d'Odonates en Wallonie durant la saison 2002, dans le cadre du programme d'Inventaire et Surveillance de la Biodiversité (ISB). *Gomphus* 19(2): 55-64. (in French, with English and Dutch summaries). ["Report on Odonate priority species observations in Wallonie (Southern Belgium) during 2002 flight-season, as part of the « Biodiversity Survey and Monitoring » program. This report give an account of the observations made in 2002 by the *Gomphus* Working Group collaborators about Odonata priority species, pointed out in the "Biodiversity Survey and Monitoring" program in Wallonie because of their great rarity and/or decline. It also present collected informations dealing with southern species. New reproductive populations were discovered for the following species: *Lestes dryas*, *Coenagrion mercuriale*, and *Somatochlora arctica*. Moreover, new data on the reproduction of scarce southern species have been collected, viz. *Lestes barbarus* and *Sympetrum fonscolombii*." (Authors)] Address: Goffart, P., Observatoire de la Faune, de la Flore et des Habitats, Centre de Recherche de la Nature, des Forêts et du Bois, Avenue de la Faculte d'Agronomic, 22, 5030 Gembloux, Belgium. E-mail: p.goffart@mrw.wallonie.be

**4332.** Gonseth, Y.; Monnerat, C. (2003): Recent changes in distribution of dragonflies in Switzerland. In: Reemer, M., Helsdingen, P.J. van & R.M.J.C. Kleukers (red.) 2003. Changes in ranges: invertebrates on the move. Proceedings of the 13th international colloquium of the European Invertebrate Survey, Leiden 2-5 september 2001: 23-31. (in English). ["Based on the number of sites where a given species has been found in the periods 1970-1998 and 1999-2000, trends were calculated for each species. The results show that since 1994 3 species have disappeared from Switzerland, 9 species have declined, 2 species have increased, and 64 species have remained stable. *Crocothemis erythraea*, *Lestes virens*, *Nehalennia speciosa*, *Sympetrum depressiusculum*, and *S. pedemontanum* are discussed as examples of the different trend categories. It is concluded that the conservation of threatened species should not only focus on their last remaining habitats, but also on increasing the number of favourable sites."] Address: Gonseth, Y.; Monnerat, C., Centre Suisse Cartogr. Faune, Terreaux 14, CH-2000 Neuchâtel, Switzerland.

**4333.** Gottschalk, K.; Stübing, S. (2003): Libellen - "Teufelsnadeln" oder wilde Schönheiten? Naturschutzring Nordhessen e.V. & Philippi-Gesellschaft zur Förderung der Naturwissenschaften e.V. (Hrsg.): Naturschutzgebiete in Hessen. schützen-erleben-pflegen. Band 2. Stadt Kassel, Landkreis Kassel und Schwalm-Eder-Kreis. ISBN 3-932583-07-8: 45-49, -245-246. (in German). [Hessen, Germany; the authors introduce into

the order, highlighting some records from different regional Nature Conservation Areas (NCA), and list 49 species in a table.] Address: Cognito, Westendstr. 23, D-34305 Niedenstein, Germany. [www.cognito.de](http://www.cognito.de)

**4334.** Greenwood, M.T.; Wood, P.J. (2003): Effects of seasonal variation in salinity on a population of *Enochrus bicolor* Fabricius 1792 (Coleoptera: Hydrophilidae) and implications for other beetles of conservation interest. *Aquatic Conserv: Mar. Freshw. Ecosyst.* 13: 21-34. (in English). ["During the spring and summer, taxa more frequently associated with mild-brackish and freshwater were recorded for the first time including *Ischnura elegans* and *Aeschna mixta* (Odonata) together with *Notonecta viridis* and *Sigara stagnalis* (Hemiptera)."] (Authors)] Address: Greenwood, M.T., Dept of Geography, Loughborough University, Loughborough, Leicestershire, LE11 3TU, UK. E-mail: [m.t.greenwood@lboro.ac.uk](mailto:m.t.greenwood@lboro.ac.uk)

**4335.** Grzywocz, J. (2003): Contribution to the knowledge on the dragonfly fauna in Poland. *Acta ent. sil.* 11(1-2): 97-99. (in Polish with english translation of the title). [Records of 13 species are documented: *Sympetma paedisca*, *Erythromma viridulum*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Onychogomphus forcipatus*, *Anaciaeschna isocetes*, *Anax parthenope*, *A. ephippiger*, *Thecagaster bidentata*, *Orthetrum albistylum*, *O. brunneum*, *O. coerulescens*, and *Sympetrum fonscolombii*.] Address: not stated

**4336.** Hammer, J.; Linke, R. (2003): Assessments of the impacts of dams on the DuPage River. The Conservation Foundation, Naperville: 48 pp. (in English). [Illinois, USA. "Over the last fifteen years The Conservation Foundation and others have worked hard to improve and protect the quality of the DuPage River watershed. Many improvements have been seen both in water quality and the increased level of awareness people have for the river and river issues. Many more people view the river as an important part of the ecosystem and amenity in their community. Although great strides have been made, there is still much to do to meet the water quality goals of the Clean Water Act of fishable and swimmable. Some of the greatest constituents of concern are nutrients, sediment and habitat alteration. Dams can increase the impacts of all three, with the greatest consequences to aquatic habitat. This study has collected data that indicates that dams on the DuPage River are a significant contributor to the overall degradation of native aquatic species and their habitat. Water quality sampling performed as part of the study indicates that these low-head dams probably do not significantly exacerbate the existing, system-wide water quality problems of the DuPage River. As discussed in Sections 2 through 5 of this report, three of the five dams within the study area do not provide any useful function other than they maintain a flat water pool and create the sound of rushing water, both of which are usually considered attractive to many people visiting the public areas around these dams. Moreover, all of the dams (the ones at Channahon and Hammel Woods in particular) create an elevated safety hazard to the people using the river, be it for fishing, swimming, or boating. Dam owners and local decision makers should actively consider options to address these safety and ecological concerns so that the safety of the general public and patrons to these facilities is improved and the health of the watershed's natural resources are preserved.

The next four sections of the report are organized into separate assessment reports for each of the four dams included in this study. Information on potential alternatives, their benefits, drawbacks and associated costs has been included to provide decision makers and stakeholders with as much site-specific information as possible to make the most informed decision as to how to manage the dams to ensure a safe and healthy future for residents, visitors and the river." (Authors) 14 odonate taxa are listed in table 1.9. <http://www.theconservationfoundation.org/tcf/wp/assessmentofdupageriverdams.pdf>] Address: The Conservation Foundation, 10S404 Knoch Knolls Road, Naperville, IL 60565, USA

**4337.** Hermans, J.T.; Maanen, B. van (2003): Dragonflies of the Beegderheide area: survey findings from 2001 to 2002. *Natuurhistorisch Maandblad* 92: 126-133. (in Dutch with English summary). ["The adult dragonfly fauna of all the moorland pools of the Beegderheide area was monitored by the first author throughout the period from 1984 to 2001. In addition, eleven pools were examined for dragonfly larvae by the Limburg Water Authority in 2002. In 2001, 27 species of dragonfly were observed in the area, while the total number of species observed between 1984 and 2001 is 35. The status of the Beegderheide dragonflies is surveyed in table II. Fifteen species are regarded as wanderers or irregular guests, nineteen species are permanent inhabitants and one species (*Coenagrion lunulatum*) seems to have disappeared. The most common dragonflies of the Beegderheide are *Lestes vrens*, *Enallagma cyathigerum*, *Pyrrhosoma nymphula*, *Anax imperator*, *Libellula quadrimaculata*, and *Sympetrum danae*. Adults of *Lestes sponsa* and *Coenagrion puella* were also common, but their larvae were rather rare, suggesting the existence of very local, larger populations from which the adults disperse. *Ceragrion tenellum* was rediscovered as larvae at two locations in 2001 and four in 2002. Larvae of *Aeshna juncea* were still found in the area, although no adults were seen in 2001. A very interesting finding was that of larva of *Leucorrhinia pectoralis*. In addition, the larvae survey revealed several 'new' reproductive sites of *Lestes viridis*, *C. tenellum*, *Sympetrum sanguineum*, and *Leucorrhinia dubia*. There were no great shifts in the dragonfly species composition between 1984 and 2001, (table II) The pools at the Beegderheide area are very important for several species of dragonfly, and pool restoration measures taken during the last five years have had a favourable effect on the dragonfly fauna. The activities were implemented on a small scale to achieve greater habitat diversity by saving parts of the vegetation structure, especially at peat fens. It is essential that this process is continued to maintain the area's characteristic dragonfly community." (Authors)] Address: Hermans, J.T.; Hertestraat 21, NL-6067 ER Linne, The Netherlands

**4338.** Holland, P. (2003): Damselfly forensics. *Bulletin of the Amateur Entomologists' Society*, 62 (Feb. 2003): 33-36. (in English). [Cooper, G., P.L. Miller & P.H.W. Holland published in 1996 a study titled "Molecular genetic analysis of sperm competition in the damselfly *Ischnura elegans* (Vander Linden). *Proc. R. soc. London (B)* 263: 1343-1349". The present paper gives an insight in the questions underlying the study (sperm removal in Zygoptera, paternity, development of a paternity test, frequency of matings) and describes the



work in laboratory.] Address: Holland, R., Purlieu, Porthleven, Halston, Cornwall TR13 9LT, UK

**4339.** Iwamura, K. (2003): La famille Souris et la mare aux libellules. Paris. ISBN 2 211 07077 9: 32 pp. (in French). [A family of mice decided to spend a nice summer day at a dragonfly pond. This is a most lovely children book lavishly illustrated with wonderful pictures. The book was translated from the Japanese by Irène Schwartz.] Address: Kaléidoscope, l'école des loisirs, 11, rue de Sèvres, Paris 6e, France

**4340.** Jacobs, L. (2003): Dragonflies. Blackbirch Press. ISBN 1-4103-0042-0: 24 pp. (in English). [This book is directed to childrens or young juveniles. It is lavishly illustrated throughout, with excellent colour photographs of Wen-Kuei (Taiwan). The presented information covers the usual subjects as eating and being eaten, cleaning, mating, larval growth, emergence etc.] Address: Thomson Gale, World Headquarters, 27500 Drake Road, Farmington Hills, MI 48331, USA

**4341.** Jansen, W.; Tham, J.; Koch, M. (2003): Die aquatische Invertebratenfauna des Moorkomplexes Wurzacher Ried (Landkreis Ravensburg): Biodiversität, habitatspezifische Artengemeinschaften, Rote-Liste-Status und Zielarten-Konzeption. Stuttgarter Beiträge zur Naturkunde, Serie A (Biologie) 655: 1-19. (in German with English summary). ["Between 1991 and 1996 we collected aquatic macroinvertebrates (MIB) from 28 water bodies within the Wurzacher Ried", a south German bog and fen complex of 17 km<sup>2</sup> area that has been awarded the European Diploma for nature reserves. In this baseline study, we documented 581 species of MIB. The three orders Trichoptera, Coleoptera, and Diptera, with more than 120 species each, contributed substantially to the biodiversity among the MIB. The relatively high proportion of specialized bog species among the Trichoptera (12%), the Coleoptera (21 %), and the Odonata (23%) is indicative of the generally natural state of the Wurzacher Ried. In addition to most of the bog specialists, numerous other endangered species were identified, resulting in a relatively high proportion of Red Data book species to the total number of species found. For Gastropoda and Odonata, this proportion amounted to 42 % and 58 %, respectively. The six types of water bodies differentiated in this study based on their water chemistry and vegetation (raised bog, acid transitional fen, neutral transitional fen, fen, bog forest, and streams) showed typical MIB communities that could be distinguished taxonomically at both the order and species level. Within each of the six types of water bodies we found further community differences that mainly correlated with structural features as, for example, the area of the open water. Based on our findings and literature data, we identified target/indicator species to facilitate the evaluation of future changes in the aquatic habitats of the Wurzacher Ried." (Authors)] Address: Jansen, W., Freshwater Insutute, DFO, 501 University Cres, Winipeg, MB, R3T 2N6, Canada. E-mail: wjansen@nscons.ca

**4342.** Jödicke, R. (2003): Mid-winter occurrence of dragonflies in southern Tunisia (Insecta: Odonata). *Kaupia - Darmstädter Beiträge zur Naturgeschichte* 12: 119-128. (in English, with German and French summaries). ["In January and early March 2000, 14 odonate species were recorded in freshwater habitats in the provinces of Tozeur, Kebili and Gabes. Compared with

the situation in spring and autumn, adult Odonata were very rare. It is supposed that ten species are on the wing throughout the year. The presence of adults of *Ichnura fountaineae*, *I. saharensis*, *Anax parthenope*, *Crocothemis erythraea*, *Orthetrum chrysostigma*, and *Trithemis annulata* during mid-winter is reported here for the first time within the borders of the West Palearctic. *Sympetrum sinaiticum* is the only univoltine species; all the others are multivoltine. Eight species emerged during mid-winter, indicating an absence of diapause in the larval stage under the subtropical desert climate in southern Tunisia." (Author)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: r.joedicke@t-online.de

**4343.** Kefford, B.J.; Papas, P.J.; Nuggeoda, D. (2003): Relative salinity tolerance of macroinvertebrates from the Barwon River, Victoria, Australia. *Marine and Freshwater Research* 54(6): 755-765. (in English). ["Salinity levels are rising in many freshwater environments, yet there are few direct measurements of salinity tolerance of organisms likely to be salt sensitive. The relative salinity tolerance to artificial seawater of macroinvertebrates from the Barwon River in Victoria, Australia, was assessed by measuring the 72-h lethal concentrations required to kill 50% of individuals (LC50). LC50 values ranged from an electrical conductivity of 5.5 to 76 mS cm<sup>-1</sup> (mean 31 mS cm<sup>-1</sup>, n = 57) and followed a log-normal distribution. The most salt-sensitive groups tested were Baetidae (LC50 value range: 5.5 6.2 mS cm<sup>-1</sup>), Chironomidae (10 mS cm<sup>-1</sup>) and several soft-bodied non-arthropods (Oligochaeta, Gastropoda, Nematomorpha, Tricladida and Hirudinea; 9 14 mS cm<sup>-1</sup>). Other groups, from least to most tolerant, were non-baetid Ephemeroptera (>12.6 15 mS cm<sup>-1</sup>), Plecoptera (>12.6 >20 mS cm<sup>-1</sup>), Trichoptera (9 >26 mS cm<sup>-1</sup>), Corixidae (18 26 mS cm<sup>-1</sup>), non-corixid Hemiptera (33 44 mS cm<sup>-1</sup>), Coleoptera (19 54 mS cm<sup>-1</sup>), Hydracarina (39 mS cm<sup>-1</sup>) and Odonata (30 55 mS cm<sup>-1</sup>), and macrocrustaceans (Decapoda, Isopoda and Amphipoda; 38 76 mS cm<sup>-1</sup>)." (Author)] Address: ben.kefford@rmit.edu.au

**4344.** Knijf, G. de; Demolder, H. (2003): De Vroege glazenmaker (*Aeshna isocetes*) in Wallonie: eerste waarneming sedert 1993. *Gomphus* 19(2): 65-71. (in Dutch, with English and French summaries). ["*A. isocetes* in Wallonia: first observation since 1993. On the 8th of June 2003, three territorial males of *A. isocetes* have been seen in the valley of Laclaireau in Buzenol (Lorraine, Belgium). This was the first observation of this Red list species since 1993 in the Walloon part of Belgium and a new species for the ecoregion Lorraine. The habitat consists of 5 ponds which are connected with each other. The ponds have a good riparian vegetation of *Phragmites australis*, *Typha spec.* and sedges (*Carex*). We presume that this small population was established only very recently and has been colonised by individuals coming from the northeast of France, where an expansion of *A. isocetes* has been observed since 1990. This new site should be the only present population in the Walloon part of Belgium." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**4345.** Knijf, G. de (2003): Verslag van de excursie van 15 juni 2003 naar de Limburgse Hoge Kempen (Ruw-mortelsven - Kruisven -Vallei van de Asbeek - Vallei van de Zijbeek). *Gomphus* 19(2): 90-92. (in Dutch,

with French summary). [Two mires (Ruwmortelsven, Kruisven) and two running waters including their alluvia (Asbeek, Zijpbeek), all located in the High Limburgian Campine, have been surveyed for their odonate fauna. (1) Ruwmortelsven: 15 species including *Lestes virens*, *Sympecma fusca*, *Ceriagrion tenellum*, and *Leucorrhinia rubicunda*. (2) Kruisven: 7 species including *L. virens*. (3) Asbeek: 19 including *Erythromma najas*, *C. tenellum*, *Cordulegaster boltonii*, *Cordulia aenea*, *Somatochlora flavomaculata*, *Orthetrum coerulescens* (> 300 ex.), *Crocothemis erythraea*, and *L. rubicunda*. (4) Zijpbeek (Gaarvijver): species of interest are: *S. fusca*, *C. tenellum*, *C. boltonii*, *S. flavomaculata*, and *O. coerulescens*.] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be

**4346.** Kosterin, O.E.; Zaika, V.V. (2003): Odonatological expeditions to the Tyva Republic (Tuva) 2000-2002. IDF-Report 5: 1-44. (in English). [This is an extensive report with detailed descriptions both of the country and its dragonfly fauna based on trips in 2000, 2001, and 2002 to the Tuva Republic, Russia. Records of 36 species from 22 localities are documented in detail and discussed. Taxonomic annotations referring to *Calopteryx splendens*, *Enallagma cyathigerum/risi*, *Ophiogomphus spinicornis*, *Somatochlora metallica* ssp. *abocanica*, and *S. exuberata* are made.] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**4347.** Kovács, T.; Ambrus, A. (2003): Data to the Odonata fauna of the Szigetköz. *Folia historica naturalia musei Matraensis* 27: 73-80. (in English). [Between 1999 and 2002, 46 odonate species were collected at 31 Hungarian localities. Of special interest are the nationally rare or protected species *Coenagrion scitulum*, *Anaciaeschna isosceles*, *Stylurus flavipes*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Epithea bimaculata*, *Libellula fulva*, *Sympetrum depressiusculum*, *Leucorrhinia pectoralis* cf.] Address: Ambrus, A., Hortobágy National Park, Directorate, Thematic Information Centre of Nature Conservation, H-9495 Kópháza, Jurisich M. u. 16, Hungary

**4348.** Kuprian, M.; Winkel, S. (2003): NABU-Naturschutzprojekt "Klesberger Weiher". *Jahrbuch Naturschutz in Hessen* 8: 142-144. (in German). [Revitalisation measures resulted in an significant increase in faunal composition of a water body near Steinau, Hessen, Germany. The few notes stress also on *Sympetrum fonscolombii* and *Ischnura pumilio*.] Address: Winkel, Sibylle, Pommernstr. 7, D-63069 Offenbach, Germany

**4349.** Lamberigts, M. (2003): Diatoms, macroinvertebrates and water quality of the Beegderheide moorland pools. *Natuurhistorisch Maandblad* 92: 112-125. (in Dutch with English summary). ["The Beegderheide nature reserve was originally a sand dune landscape, and includes overthirty moorland pools. Eutrophication and natural succession have resulted in the pools being choked by vegetation. Various restoration measures have recently been successfully implemented: organic sediment has been removed and the borders of the pools have been restructured. The Limburg Water Authority has been monitoring the Beegderheide moorland pools since 1987 as part of its water quality survey. The

article outlines the changes in water chemistry found in these studies, particularly relating to the pH, nutrient status and buffer capacity of a number of soft-water moorland pools in the Beegderheide. The restoration measures have improved the environmental conditions and yielded favourable changes in animal and plant communities. Recovery of the specific, valuable circumstances found in moorland pools seems to have been successful, and the restoration measures have resulted in greater habitat diversity. The macroinvertebrate community proved to be species-rich, with many rare species characteristic of peat bogs. During the first year after the completion of the restoration, the relatively rich diatom flora indicated disturbance, some nutrient enrichment and a somewhat increased calcium buffering. In the following year, the diatom community in most of the pools became very poor in terms of species as well as numbers, with species indicating acid and nutrient-poor conditions abundant in some of the pools. The system seems to be lacking in buffer capacity. Acidification is to be expected in these areas, where acid deposition is high and the catchment soil is poor in lime and other easily dissolved minerals that provide a buffer against acid precipitation. The effects of future changes should be followed by continued chemical and biological monitoring, which should help to finetune the restoration activities to prevent further acidification." (Author) 19 odonate species including *Ceriagrion tenellum*, *Leucorrhinia rubicunda* and *L. pectoralis* are listed.] Address: Lamberigts, Monique, Barend van Maanen & Bert Pex, Zuiveringschap Limburg, Postbus 314, 6040 AH Roermond

**4350.** Legrand, J. (2003): Sur le genre malgache *Isomma*, I. hieroglyphicum Selys, male, female, larve et description d'une nouvelle espece (Odonata, Anisoptera, Gomphidae, Phyllogomphinae). *Revue française d'entomologie (N.S.)* 25(1): 43-54. (in French, with English summary). ["The genus *Isomma* has been described by Selys on a single female from Madagascar. Later he described the male on a specimen belonging to Rene Martin whose collection is preserved in MNHN Paris. Till now only a few specimens were known and the genus was erroneously placed among Gomphinae. The genus and the first species, *I. hieroglyphicum*, are redescribed and illustrated [...]. A new species, *Isomma elouardi*, also from Madagascar, is described.] Address: Legrand, J., 10, rue du Chemin de fer, F-94110 Arcueil, France

**4351.** Martens, K. (Ed.); [Dumont, H.J.] (2003): Bibliography of Henri J. Dumont. *Hydrobiologia* 500(1-3): 1-21. (in English). [The bibliography lists 349 publications, including some 80 odonatological papers. As far as I could trace, only two odonatological titles are missing: Dumont, H. (1996): The dragonfly fauna of the Caspian Basin. *Selysia* 24(1): 9-10, and Dumont, H.J. (2003): Odonata from the Republic of Mongolia and from the Autonomous Region of Inner Mongolia. *International Journal of Odonatology* 6(2): 127-146.] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

**4352.** Meuris, L. (2003): Na zeer lange afwezigheid terug *Glassnijder* (*Brachytron pratense*) in de Damvallei. *Gomphus* 19(2): (in Dutch, with English and French summaries). ["*Brachytron pratense* back in the Damvallei after a long absence. On June 19th 2002 a perching

male *B. pratense* has been reported from the peat-bogs of the Damvallei (Laarne, East-Flanders, Belgium). The previous observation dates from 73 years back. In other marshy areas along the Flemish section of the river Scheldt, there have also been some recent observations of the Hairy Dragonfly. It seems that *Brachytron* numbers are increasing in the Scheldt Valley. A similar tendency has recently become apparent in the neighbouring regions of France, Germany and the Netherlands. In this specific case, the observed *Brachytron* probably was a wanderer. Its origin remains uncertain. To establish any populations in the Flemish Scheldt Valley, one should search for exuviae in the areas surrounding the recent observations." (Author)] Address: Meuris, L., August Van Bockxstaelestraat 7, 9050 Gent, Belgium. E-mail: Luc.meuris@pandora.be

**4353.** Mitra, T.R. (2003): Ecology and biogeography of Odonata with special reference to Indian Fauna. Records of the Zoological Survey of India, Occasional Paper 202: 1-41. (in English). [This paper is a brief, compilatory introduction into odonatology with special emphasis on Indian biogeography. CONTENTS Introduction, Short History of Odonata, Adaptations in different phases of life Probable ecology of fossil Odonata Conspectus of ecology of modern Odonata (adults, larvae) Ecology and geographical distribution. 1. Hill and montane forms 2. Nonmontane forest forms 3. Insular forms 4. Xerophilic forms 5. Paraxerophilic forms Species occurring in physiography based ecosystems Himalayan ecosystems Fauna of Eastern Himalaya Fauna of Western Himalaya Fauna of Meghalaya-Mikir hill region Fauna of Purbanchal Fauna of peninsular uplands Fauna of Western Ghats Nilgiris and Deccan plateau Fauna of the Central upland Fauna of the Eastern Ghats Island Fauna of Indo-Ganga-Brahmaputra Plain Fauna of Brahmaputra valley including fauna of indeterminate localities of "Assam" Ecology and faunal affinities Discussion Simrany Acknowledgements References] Address: Mitra, T.R., 208 Raja Ram Mohan Roy Rd, Calcutta-700 008, India

**4354.** Mizutani, A.; Chahl, J.S.; Srinivasan, M.V. (2003): Insect behaviour: Motion camouflage in dragonflies. *Nature* 423, vom 5. Juni 2003: 604. (in English). ["Most animals can skilfully conceal themselves when stationary, but they may become apparent as soon as they move. Here we use stereo cameras to reconstruct the movements in three dimensions of dragonflies (*Hemianax papuensis*), and show that these insects actively use motion camouflage to disguise themselves as stationary during territorial aerial manoeuvres. Deployment of this sophisticated technique by the oldest airborne predator tricks the victim's retina into perceiving the stalker as stationary even while it darts about in pursuit." (Authors)] Address: Mizutani, Akiko, Centre for Visual Science, Research School of Biological Sciences, Australian National University, PO Box 475, Canberra, ACT 2601, Australia. E-mail: akiko@bio-robotics.anu.edu.au

**4355.** Nunn, M. (2003): Libellen und Wasserkäfer im Nürnberger Reichswald - Untersuchungen der Standortbedingungen von Moosjungfern (Odonata: Leucorrhinia). *Galathea - Berichte des Kreises Nürnberger Entomologen e.V.* 19 (3): 95-114. [The habitat requirements of *Leucorrhinia dubia* and *L. pectoralis* were examined in 10 ponds in the Reichswald of Nürnberg, Bavaria, S Germany. In addition to these, 19 other o-

don. species were also recorded. Low pH values (conditioning the growth of the indispensable *Sphagnum* vegetation) are of principal importance. The role of predators is relatively insignificant, but the temporary drying-out and/or the presence of fish are decisive factors precluding the *Leucorrhinia* breeding.] Address: Nunn, M., Eintrachtstr. 50, D-90409 Nürnberg, Germany

**4356.** ODNAT (2003): Les listes rouges de la nature menacée en Alsace. Les libellules. Collection Conservation, Strasbourg. ISBN 2 9520048 0 3: 130-149. (in French). [29 odonate species are listed as threatened in Alsace, France.] Address: not available

**4357.** O'Grady, E.W.; May, M.L. (2003): A phylogenetic reassessment of the subfamilies of Coenagrionidae (Odonata: Zygoptera). *Journal of Natural History* 37 (23): 2807-2834. (in English). ["We reanalyzed subfamily divisions of Coenagrionidae phylogenetically using morphological characters. Characters historically and currently used to divide Coenagrionidae, as well as previously unpublished characters, were carefully defined or redefined and coded. Many characters traditionally used in coenagrionid taxonomy were found to be continuously distributed rather than falling into discrete states. Nevertheless, it is just these characters on which most subfamily distinctions are based, we regarded it as essential to try to assess their effects in phylogenetic analysis. Therefore, character states for continuously distributed morphometric characters were determined using a clustering algorithm. We also present trees that exclude these characters, however. Cladistic analysis indicates that, of the existing subfamilies, only the apophyletic Agriocnemidinae is monophyletic. Shortest trees were markedly shorter than ones in which all current subfamilies were constrained to be monophyletic. Cladistic analysis using characters of Davies and Tobin (1984) and Fraser (1957) alone to define subfamilies resulted in poorer resolution and failed to support monophyly of any of the current subfamilies, as did alternative character weightings. Even a phenetic comparison using discriminant analysis failed to support the existing taxonomy. Our phylogeny suggests the existence of several possible clades within Coenagrionidae, but none are strongly supported by bootstrap analysis or decay index values. Coenagrionidae as a whole is polyphyletic in our shortest trees, although trees supporting a monophyletic Coenagrionidae are only slightly longer. We conclude that subfamilies should not be recognized within Coenagrionidae until well-supported subdivisions are demonstrated." (Authors)] Address: O'Grady, Elyse, Department of Entomology Rutgers University 93 Lipman Drive New Brunswick, New Jersey 08901-8524 USA elyseogrady@hotmail.com

**4358.** Osada, M.; Matsumura, T. (2003): The record of *Enallagma boreale circumlatum* Selys (Coenagrionidae: Odonata) in Minamirokuroshi, Oono-shi, Fukui Prefecture. *Bulletin of the Fukui City Museum of Natural History* 50: 70. (in Japanese, with English translation of the title). [Japan; 29.VI.2001 and 30.VI.2003]

**4359.** Parr, A. (2003): Migrant dragonflies in 2003, including recent decisions and comments by the Odonata Records Committee. *Atropos* 21: 28-34. (in English). [UK; *Calopteryx virgo*, *C. splendens*, *Lestes barbarus*, *Chalcolestes viridis*, *Erythromma viridulum*, *Anax ephippiger*, *A. imperator*, *A. parthenope*, *Aeshna grandis*, *A. mixta*, *Anaciaeschna isocles*, *Cordulia ae-*



nea, *Sympetrum danae*, *S. fonscolombii*, *S. flaveolum*, *S. pedemontanum*, *S. sanguineum*, *S. striolatum*, *Libellula depressa*, *L. fulva*, *Orthetrum cancellatum*, *O. coeruleescens*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4360.** Parr, A. (2003): Migrant news of early 2003. *Dragonfly News* 44: 13. (in English). [UK; *Anax ephippiger*, *A. parthenope*, *Sympetrum fonscolombii*, *S. flaveolum*, *Lestes barbarus*, *Erythromma viridulum*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4361.** Perrin, V. (2003): Highlights of the 2003 early season. *Dragonfly News* 44: 12-13. (in English). [Compilation of odonate records in 2003 with special emphasis on phenology from different localities in the UK.] Address: Perrin, V., 13 Pettitts lane, Dry Drayton, Cambridgeshire CB3 8BT, UK. E-mail: valperrin@dial.pipex.com

**4362.** Revenga, C.; Kura, Y. (2003): Status and Trends of Biodiversity of Inland Water Ecosystems. 3.3.1 Odonata (dragonflies and damselflies). Secretariat of the Convention on Biological Diversity, Montreal, Technical Series no. 11. ISBN: 92-807-2398-7: 32. (in English). [General account on odonate diversity and conservation priority of regional faunas.] Address: <http://www.biodiv.org/doc/publications/cbd-ts-11.pdf>

**4363.** Ricono, K. (2003): Das Marscheider Bachtal - Biotoppflege- und -entwicklungsplan in einem FFH-Gebiet. *Charadrius* 39(1-2): 99-101. (in German). [Nordrhein-Westfalen, Germany; 20 odonate species are known to occur within boundaries of the site, only *Erythromma viridulum*, *Ischnura pumilio*, and *Calopteryx virgo* are listed.] Address: Ricono, Karin, Stadt Wuppertal, Ressort Umweltschutz, D-42269 Wuppertal, Germany

**4364.** Robert B. DuBois, R.B.; Smith, W.A. (2003): Odonata Research. The Ecological Inventory and Monitoring Program Bureau of Integrated Science Services: 15-18. (in English). [<http://maps.botany.wisc.edu/Atri/AboutAtri/eim/EIMAnnualReport.pdf>]

**4365.** Sane, S.P. (2003): Review: The aerodynamics of insect flight. *The Journal of Experimental Biology* 206: 4191-4208. (in English). ["The flight of insects has fascinated physicists and biologists for more than a century. Yet, until recently, researchers were unable to rigorously quantify the complex wing motions of flapping insects or measure the forces and flows around their wings. However, recent developments in high-speed videography and tools for computational and mechanical modeling have allowed researchers to make rapid progress in advancing our understanding of insect flight. These mechanical and computational fluid dynamic models, combined with modern flow visualization techniques, have revealed that the fluid dynamic phenomena underlying flapping flight are different from those of non-flapping, 2-D wings on which most previous models were based. In particular, even at high angles of attack, a prominent leading edge vortex remains stably attached on the insect wing and does not shed into an unsteady wake, as would be expected from non-flapping 2-D wings. Its presence greatly enhances the forces generated by the wing, thus enabling

insects to hover or maneuver. In addition, flight forces are further enhanced by other mechanisms acting during changes in angle of attack, especially at stroke reversal, the mutual interaction of the two wings at dorsal stroke reversal or wing wake interactions following stroke reversal. This progress has enabled the development of simple analytical and empirical models that allow us to calculate the instantaneous forces on flapping insect wings more accurately than was previously possible. It also promises to foster new and exciting multidisciplinary collaborations between physicists who seek to explain the phenomenology, biologists who seek to understand its relevance to insect physiology and evolution, and engineers who are inspired to build micro-robotic insects using these principles. This review covers the basic physical principles underlying flapping flight in insects, results of recent experiments concerning the aerodynamics of insect flight, as well as the different approaches used to model these phenomena." (Author) Odonata are referred on several opportunities.] Address: Sane, Sanjay P., Department of Biology, University of Washington, Seattle, WA 98195, USA. E-mail: sane@u.washington.edu

**4366.** Solem, J. (2003): You should have seen the one that got away! *Argia* 15(4): 27. (in English). [Verbatim: On a hot summer day, my husband, Bob, fellow enthusiast June Tveekrem, and I spent an afternoon visiting reservoir sites for odonates. At Pigtail boat landing on Triadelphia Reservoir in central Maryland, we were getting our gear assembled and checking out nearby odes when two young men with fishing rods came over and inquired what we were catching. Bob explained our quest; men we started down the path while they stayed in the parking lot to fish. We had not gone more than 100 yards when we heard yelling: "I've got one." "Do you want to see it?" "It's a big one!" After debating briefly how they could have actually caught a dragonfly when they didn't have a net, we started back, moving swiftly with Bob in the lead. When June and I arrived, Bob was kneeling on the ground extracting something from under his net. It was a female *Nasiaeschna pentacantha*. How had it been captured? As one fisherman dangled his lure over the water, the dragonfly zoomed up and grabbed the artificial 3 inch yellow minnow. (Talk about her eyes being bigger than her stomach!) The young man flipped the lure back on shore with the dragonfly still clinging to it. When Bob came up, the odonate and the lure were still on the ground so he clapped a net over them. It was the first female of the species we had had in hand so June took numerous photos, and the proud young man asked us to take his picture with the dragonfly and the lure. Eventually, we set the odonate on a shrub; later, when we returned, she was gone. Not only was this one of our most intriguing odonate experiences, but August 19 was also a new late date for the species for most part of the state.] Address: not stated

**4367.** Terzani, F.; Marconi, A. (2003): Descrizione della femmina di *Agriocnemis angustirami* Pinhey, 1974 e qualche osservazione sul maschio. (*Insecta*, Odonata, Coenagrionidae). *Quaderno di studi e notizie di storia naturale della Romagna* 17(Suppl.): 1-4. (in Italian with English summary). [Sierra Leone; a female - taken in copula - is described and illustrated for the first time. In addition, some descriptive notes on, and figures of the male are provided.] Address: Terzani, F., Mus. Zool., "La Specola", via Romana 17, I-50125 Firenze, Italy

- 4368.** Van de Meutter, F. (2003): 150 jaar libellengeschiedenis in de Maten (Genk): een reis doorheen de tijd. *Gomphus* 19(2): 79-89. (in Dutch, with English and French summaries). ["150 years of history of Odonata in de Maten (Genk, Belgium): a travel through time. Based on data spanning the past 150 years, we make a reconstruction of the history of the dragonfly fauna of the nature reserve 'de Maten' (Genk). These data were compared with data of the present dragonfly community. During the studied period of 150 years, 54 species of dragonflies were recorded in the reserve of which 18 have gone extinct by now. Recently, another 3 species succeeded in colonizing 'de Maten'. These 3 species presumably are not very choosy in their habitat requirements. Finally, the present status of some red-list species that still occur in de Maten is discussed." (Author) The locality once inhabited such species as *Nehalennia speciosa* and *Oxygastra curtisii*.] Address: Van de Meutter, F., Arthur De Greefstraat 36, 3000 Leuven, Belgium. E-mail: frank.vandemeutter@bio.kuleuven.ac.be
- 4369.** Van Lieshout, F.; Peelers, E.; Franken, R.; Kuiper, R. (2003): The river Allier as an ecological reference for the "Border Meuse"? *Natuurhistorisch Maandblad* 92: 10-16. (in Dutch with English summary). ["An ecological comparison was made between the section of the river Meuse that forms the border between the Netherlands and Belgium (the so-called "Border Meuse") and the Allier River in France, in order to assess the suitability of the river Allier as a reference for the ecological recovery to be expected in the Border Meuse after the implementation of the current reconstruction plans. Special attention was given to the macroinvertebrate community and its functional aspects, such as preference for flowing water and feeding ecology. The macroinvertebrate community in the Allier was found to include more families requiring good water quality. Furthermore, the Border Meuse community included only a few of the typical families with a preference for flowing water. Possible explanations for these differences are the lack of suitable habitats and the poor water quality in the Border Meuse. The Border Meuse community also includes very few sediment-inhibiting detritivores. This might be caused by the poor condition of the sediment, which is contaminated with heavy metals and organic micropollutants. Finally, several exotic species" - including *Dikerogammarus villosus*; see OAS 3686 for its negative effects on Odonata - "were found to have colonised the Border Meuse, which might have a dramatic effect on the native macroinvertebrate community. A comparison of the present data with historical data on the Border Meuse indicated that many species that prefer flowing water have disappeared, and that there used to be far more detritivores as well. The present study, along with previous research on the Border Meuse, revealed a number of bottlenecks for ecological recovery. The first is the poor water quality, but as water quality is improving, this may not be too serious. The second problem is the lack of habitat diversity, and the third is the unnatural discharge variations caused by the dam at Lixhe in Belgium. New bottlenecks identified by the present study are the polluted sediment and the presence of exotic species. Since the reconstruction project does not address these two impediments, they may undermine the expected ecological recovery of the Border Meuse." (Authors) While in the Allier "*Calopterygidae*" and "*Gomphidae*" are present, these taxa are not represented in the Border Meuse. Only "other Odonata" taxa are represented in both rivers.] Address: Floor van Lieshout, Edwin Peelers & Rob Franken, Waenigen Universiteit Leerstoelgroep Aquatische Ecologie en Waterkwaliteitsbeheer, Postbus 8080, 6700 DD Wageningen, The Netherlands
- 4370.** Vanreusel, W.; Cortens, J. (2003): Uitzonderlijk vroege waarnemingen van de Gewone bronibel (*Cordulegaster boltonii*). *Gomphus* 19(2): 51-54. (in Dutch, with English and French summaries). ["Exceptionally early recordings of the Golden-ringed dragonfly {*Cordulegaster boltonii*}. During fieldwork in the East of Flanders, we observed *Cordulegaster boltonii* on different locations in the National Park "Hoge Kempen". Several recordings were done early in the year. In 2003, the earliest observation was on May 7. This is more than 3 weeks before the earliest known recording in Belgium, Germany and the Netherlands. This is exceptional since the phenology of dragonflies is usually relatively constant. It could be interesting to pay more attention to this species in spring." (Authors)] Address: Vanreusel, W., & Cortens, Joeri, Onderzoeksgroep Dierenecologie, Universiteit Antwerpen, Campus Drie Eiken, Universiteitsplein 1, 2610 Wilrijk, Belgia. E-mail: wouter.vanreusel@ua.ac.be
- 4371.** Westermann, K.; Westermann, E. (2003): Ein Fortpflanzungsnachweis des Großen Granatauges (*Erythromma najas*) bei Hinterzarten im Schwarzwald in einer Meereshöhe von 1010 m NN. *Naturschutz am südlichen Oberrhein* 4(1): 89-90. (in German, with English summary). ["In the year 2003, *E. najas* reproduced successfully in a pond near Hinterzarten (Black Forest) at 1010 m a.s.l. In a second pond nearby, at 1001 m a.s.l., a tandem was spotted during oviposition. This is the highest altitude at which reproduction of the species was ever recorded in Baden-Württemberg and Germany." (Authors)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de
- 4372.** Westermann, K. (2003): Erster Bodenständigkeitsnachweis der Pokaljungfer (*Cercion lindenii*) für den höheren Schwarzwald. *Naturschutz am südlichen Oberrhein* 4(1): 87-88. (in German, with English summary). [Germany, Baden-Württemberg. "In the year 2003, *C. lindenii* emerged successfully in the Black Forest near St. Märgen (county of Breisgau-Hochschwarzwald) at 845 m a.s.l. The emergence site is the highest one known in Baden-Württemberg and in Germany. Most likely, the water does not support an autochthonous population but is being recolonised by migrating individuals stemming from the Upper Rhine Valley." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de
- 4373.** Westermann, K. (2003): Schlüpfabundanz und Schlüpfhabitat des Frühen Schilffjägers (*Brachytron pratense*) im Naturschutzgebiet Rheinniederung Wyhl-Weisweil. *Naturschutz am südlichen Oberrhein* 4(1): 99-112. (German, with English summary) [Germany. "In the nature reserve 'Rheinniederung Wyhl-Weisweil' (county of Emmendingen, Baden-Württemberg) with a total area of 1350 ha, exuviae of *B. pratense* were collected quantitatively as far as possible. At least 48 waters were inhabited by the species, with a total count of at least 400 freshly emerged imagoes. The highest abundances found were 39 exuviae/100m resp. 21 exu-

viae/50 m of water body length. Five waters yielded more than 50% and 15 waters more than 75% of all exuviae recorded. The population as a whole appears to be stable, supported by a few densely populated waters and a multitude of waters with medium or low abundances. *B. pratense* is common along spring fed waters ("Gießen"), ground water fed ponds, oxbows, excavated pools and backwaters of the Rhine river. All of these water types are stagnant or only slowly flowing and have extended zones of shallow water - these are probably the crucial habitat factors. The abundances of exuviae rise with the width of the zones of shallow water. Very shallow waters prone to sporadic desiccation are avoided. The habitat used for emergence and its usage during the process of emergence are described in detail." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**4374.** Westermann, K. (2003): Zum Schlüpfsubstrat der Gebänderten Prachtlibelle (*Calopteryx splendens*) an südbadischen Altrheinen. *Naturschutz am südlichen Oberrhein* 4(1): 95-98. (in German, with English summary). [Germany, Baden-Württemberg; "Larvae *C. splendens* preferred several reed species for emergence. Shrubs thriving along the shoreline were used only sporadically. In most cases the imagoes emerged on the lower surface or on the edges of the substrate. Accordingly, the angle between larva and the horizontal line ranged from 90° to 180°. On a bridge made of concrete with a rough surface, the ceiling (180°) was clearly preferred over diagonal parts of the bridge. Vertical pillars and foundations, however, were usually avoided." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**4375.** Westermann, K. (2003): Zum Status der Großen Königlibelle (*Anax imperator*) im höheren Schwarzwald. *Naturschutz am südlichen Oberrhein* 4(1): 81-85. (in German, with English summary). [Germany, Baden-Württemberg. "Hitherto, useful data about occurrences of *A. imperator* in higher elevations of the Black Forest were very scarce. Successful reproduction was shown for the species in a pond at 830 m a.s.l. during two years, and, in the year 2003, in two ponds at 900 and 915 m a.s.l., respectively. In three more ponds at altitudes of up to 944 m a.s.l., ovipositions were observed. *A. imperator* was found almost exclusively in ponds with turbid or humic water, in which the water temperatures climb markedly during the summer. The waters were furnished with dense vegetation made up of floating-leaved aquatic macrophytes or at least with low reed vegetation." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**4376.** Westermann, K. (2003): Zur Konkurrenz zwischen der Pokaljungfer (*Cercion lindenii*) und der Hufeisen-Azurjungfer (*Coenagrion puella*) an Altrheinen bei Weisweil (Landkreis Emmendingen). *Naturschutz am südlichen Oberrhein* 4(1): 91-94. (in German, with English summary). [Germany, Baden-Württemberg. "The once predominant damselfly species *C. puella* has become much less abundant in the backwaters of the Rhine river following the immigration of another Coenagrionid species, *C. lindenii*, which has established very large populations over the course of one or two decades. In backwaters which remain cool during the

summer or which are shallow, as well as in small water bodies, *C. lindenii* has remained scarce so that *C. puella* could maintain its original population sizes. A collapse of the *C. lindenii* populations following a major flood event led to a significant rise in the population sizes of *C. puella*. The data presented here support the hypothesis brought forward repeatedly that *C. puella* has become largely replaced by *C. lindenii* in many waters of the Upper Rhine valley in southern Baden." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**4377.** Westneat, M.W.; Betz, O.; Blob, R.W.; Fezzaa, K.; Cooper, W.J.; Lee, W.-K. (2003): Tracheal Respiration in Insects Visualized with Synchrotron X-ray Imaging. *Science* 299, 24 January 2003: 558-560. (in English). ["...We observed this mechanism of active tracheal respiration in some members of diverse groups of endopterygote insects (beetles, butterflies, flies) as well as in Hemiptera, Orthoptera, Dermaptera, Blattodea, and more basal insect lineages such as Odonata. The spectacular diversity of insects likely includes a range of respiratory mechanisms, some of which depend on the compression and expansion of the tracheal system in a lung-like manner as the means to exchange gases with the environment." (Authors)] Address: Westneat, M.W., Department of Zoology, Field Museum of Natural History, Chicago, IL 60605, USA. E-mail: mwestneat@fieldmuseum.org

**4378.** Winkel, S.; Gall, M.; Kuprian, M. (2003): NABU-Artenschutzprojekt Helm-Azurjungfer. *Jahrbuch Naturschutz in Hessen* 8: 136-138, 230. (in German). [Four recent discoveries of *Coenagrion mercuriale* in Hessen, Germany are briefly presented and measures for conservation outlined. For more details see: <http://hessen.nabu.de/modules/presseservicehessen/index.php?sow=10>] Address: Gall, M., Bahnhofstr. 47, D-35510 Butzbach-Ostheim, Germany

**4379.** Winterholler, M. (2003): Rote Liste gefährdeter Libellen (Odonata) Bayerns. *Berichte des Bayerischen Landesamtes für Umweltschutz* 166: 59-61. (in German). [Bayern, Germany; revised red list of endangered Odonata] Address: Winterholler, M., Liebig-Str. 30, D-85354 Freising, Germany

**4380.** Wootton, R.J.; Herbert, R.C.; Young, P.G.; Evans, K.E. (2003): Approaches to the structural modelling of insect wings. *Philosophical Transactions: Biological Sciences* 358(1437): 1577-1587. (in English). ["Insect wings lack internal muscles, and the orderly, necessary deformations which they undergo in flight and folding are in part remotely controlled, in part encoded in their structure. This factor is crucial in understanding their complex, extremely varied morphology. Models have proved particularly useful in clarifying the facilitation and control of wing deformation. Their development has followed a logical sequence from conceptual models through physical and simple analytical to numerical models. All have value provided their limitations are realized and constant comparisons made with the properties and mechanical behaviour of real wings. Numerical modelling by the finite element method is by far the most time-consuming approach, but has real potential in analysing the adaptive significance of structural details and interpreting evolutionary trends. Published examples are used to review the strengths and weak-



nesses of each category of model, and a summary is given of new work using finite element modelling to investigate the vibration properties and response to impact of hawkmoth wings." (Authors) The paper contains references to Odonata.] Address: Wootton, R.J., School of Biol. Sciences, University of Exeter, Hatherly Laboratories, Prince of Wales Road, Exeter EX4 4PS, UK

**4381.** Zakaria, T. (2003): CIA used dragonfly, catfish as spy gadget models. *Argia* 15(4): 27. (in English). [Verbatim from *Argia* 15(4): 27: "CIA USED DRAGONFLY, CATFISH AS SPY GADGET MODELS from the web. Original article by Tabassum Zakaria (from Reuters, article appeared 28 Oct 2003) LANGLEY, Va. (Reuters) - The CIA once built a mechanical dragonfly to carry a listening device but found small gusts of wind knocked it off course so it was never used in a spy operation. The agency also tested a 24-inch-long rubber robot catfish named "Charlie" capable of swimming inconspicuously among other fish and whose mission remains secret. Charlie and the dragonfly were among spy gadgets displayed at CIA headquarters in an exhibit to mark the 40th anniversary of the Directorate of Science and Technology. It is not open to the public. "Charlie's mission is still classified, we can't talk about it," Toni Hiley, curator of the CIA museum, told Reuters on a tour of the exhibit "All we can say is he's our work on aquatic robotic technologies." After seeing the life-like "insectothopter," Hiley jokes that she cannot look at a dragonfly the same way anymore. In the 1970s the CIA had developed a miniature listening device that needed a delivery system, so the agency's scientists looked at building a bumblebee to carry it. They found, however, that the bumblebee was erratic in flight, so the idea was scrapped. An amateur entomologist on the project then suggested a dragonfly and a prototype was built that became the first flight of an insect-sized machine, Hiley said. A laser beam steered the dragonfly and a watchmaker on the project crafted a miniature oscillating engine so that the wings beat, and the fuel bladder carried liquid propellant. Despite such ingenuity, the project team lost control over the dragonfly in even a gentle wind. "You watch them in nature, they'll catch a breeze and ride with it. We, of course, needed it to fly to a target. So they were never deployed operationally, but this is a one-of-a-kind piece," Hiley said."]

## 2004

**4382.** Abro, A. (2004): The female seminal receptacle and accessory glands in *Pyrrhosoma nymphula* (Sulzer) (Zygoptera: Coenagrionidae). *Odonatologica* 33(3): 237-244. (in English). ["Sperm, transmitted to the female as individual filamentous cells suspended in a liquid medium, are discharged into a thick-walled pouch, the receptaculum seminis, on the dorsum of the vaginal canal. Spermatozoa soon appear concentrated in a single, smaller, pear-shaped accessory sac, the spermatheca, attached to the receptaculum-vagina junction. Particular cells in the wall of the accessory sac secrete a material that is thought to be added to the sperm concentrate. The purpose of the accessory sac is to serve as a store of spermatozoa for use in fertilization. A pair of posterior accessory glands has each an efferent duct that opens into the distal region of the vaginal canal; these ducts are provided with an elaborate muscular

apparatus probably serving as a pump; in fresh material, efferently directed peristaltic waves have been observed. The glands are presumed to contribute to the investment of the eggs. The apical domains of the glandular epithelial cells contain intraplasmic assemblages of multiplying bacteroids. They are likely to be transferred to the ooplasm and thereby transmitted to a new generation." (Author)] Address: Abro, A., Division of Anatomy, Departments of Biomedicine, University of Bergen, Jonas Lies vei 91, N-5009 Bergen, Norway

**4383.** Apodaca, C.K.; Chapman, L.J. (2004): Adult Zygoptera of Kibale National Park, Uganda: habitat associations and seasonal occurrence. *Odonatologica* 33(2): 129-146. (in English). ["In this study, a 10-month survey of four aquatic sites in Kibale National Park, Uganda was used to quantify seasonal and spatial variation in both limnological features of the sites and adult damselfly assemblage structure. Of the 4 limnological characters measured dissolved oxygen was the most variable among sites, ranging from an average of 1.01 mg l<sup>-1</sup> in the interior of the Rwembaita Swamp (a papyrus-dominated wetland) to 6.71 mg l<sup>-1</sup> in an inflowing tributary of the swamp. Species richness was similar among sites and did not correlate with dissolved oxygen concentration. However, site was a significant predictor of occurrence for some spp. This suggests that site effects are important, and that a combination of site-specific environmental characters may underlie the observed distributional patterns. Seasonal fluctuation in rainfall was not a good predictor of Zygoptera activity. Several species were active in both the wet and dry seasons. Surprisingly, adult *Proischnura subfurcatum* were detected year-round in the hypoxic waters of the Rwembaita (papyrus) Swamp and did not occur at any other sites in the larval or adult phase, suggesting that this species is a swamp specialist." (Authors)] Address: Apodaca, C.K., Fairbanks Fish and Wildlife Field Office, 101 12th Ave., Box 17, Room 222, Fairbanks, AK 99701-6236, USA. E-mail: ChrissyApodaca@fws.gov

**4384.** Apodaca, C.K.; Chapman, L.J. (2004): Larval damselflies in extreme environments: behavioral and physiological response to hypoxic stress. *Journal of Insect Physiology* 50(9): 767-775. (in English). ["The extensive papyrus (*Cyperus papyrus*) swamps of East and Central Africa form a habitat of great ecological importance due to their extent, the extreme and chronic hypoxia of the interior swamp, and the unique assemblages of water-breathing insects that characterize these communities, including zygopteran (damselfly) larvae. The major goal of this study was to quantify physiological and behavioral responses of gilled and gill-less damselfly larvae of a papyrus swamp specialist, *Proischnura subfurcatum*, to low-oxygen conditions. Gill autotomization was common in *P. subfurcatum* of the Rwembaita Swamp in Kibale National Park, Uganda, with one to three gills missing from 56% of the specimens surveyed. We examined behavioral (ventilation activity and vertical migration) and physiological (metabolic rate) response to hypoxia in gilled and gill-less *P. subfurcatum*. Behavioral response to progressive hypoxia indicated that gill-less individuals rely more on use of wing sheaths (lifting and spreading) than gilled *P. subfurcatum* larvae. However, both morphs migrated to the surface to gain contact with atmospheric air under extreme hypoxia. On average, the rate of oxygen consumption of gill-less individuals was 51% lower than that of gilled individuals. This observed metabolic de-

pression in gill-less *P. subfurcatum* may be attributed to the loss of major respiratory appendages. However, the apparent ability of both gilled and gill-less individuals to maintain their metabolic rates to a similar critical tension suggests other mechanisms may compensate for loss of gills, though not enough to mediate metabolic depression." (Authors)] Address: Apodaca, Christine, Fairbanks Fish and Wildlife Field Office, 101 12th Avenue, Box 17, Room 222, Fairbanks, AK 99701-6236, USA. E-mail: chrissyapodaca@fws.gov

**4385.** Artiss, T. (2004): Phylogeography of a facultatively migratory dragonfly, *Libellula quadrimaculata* (Odonata: Anisoptera). *Hydrobiologia* 515(1-3): 225-234. (in English). ["The biogeography of a widely distributed dragonfly (*Libellula quadrimaculata*) was examined via a phylogenetic analysis of 416 bp of the mitochondrial cytochrome oxidase I subunit (COI). Phylogenetic analyses under parsimony and minimum evolution produced trees with similar topologies, and revealed strong support for three clades corresponding to populations in Asia, Europe and North America. However, resolution was poor within clades, and genetic distances between populations within continents was quite low (1.2%). Several populations of this species are known to engage in periodic mass migrations, and it is possible that introgression from gene flow due to the mobility of this species has obscured phylogenetic patterns within continents. I was unable to test for phylogenetic patterns coincident with historical glacial refugia given the lack of phylogenetic patterns within continents. However, given that some sequence divergence was observed between populations within continents, it is possible that phylogenetic patterns exist, and subsequent studies should make use of larger data sets, and molecular data from faster evolving genes. Despite the propensity for periodic, short distance migrations in *L. quadrimaculata*, gene flow appears to be limited and does not influence the phylogenetic relationships of populations between continents." (Author)] Address: Artiss, T., Lakeside School, 14050 1st Ave NE, Seattle, WA-98125, U.S.A. E-mail: thomas.artiss@lakesideschool.org

**4386.** Assis, J.C.F. de; Carvalho, A.L.; Nessimian, J.L. (2004): Composição e preferência por microhabitat de imaturos de Odonata (Insecta) em um trecho de baixada do Rio Ubatiba, Maricá-RJ, Brasil. *Rev. Bras. entomol.* 48(2): 273-282. (in Portuguese, with English summary). ["Composition and microhabitat preferences of Odonata (Insecta) immatures in a lowland section of the Rio Ubatiba, Maricá-RJ, Brazil. Monthly sampling was held from May, 1999 to May, 2000 in the Rio Ubatiba, a lowland river situated at Maricá district, Rio de Janeiro State, Brazil. Seven different substrates were collected along fifty meters. A total of 1,279 larvae of Odonata were collected and identified in 27 species, belonging to five families. The most numerous species were *Acanthagrion lancea* (Selys, 1876), *Hetaerina auripennis* (Burmeister, 1839), *Micrathyria hesperis* Ris, 1911 and *Telabasis filiola* (Perty, 1834). The greatest number of individuals were found in "riparian plants in depositional areas". In general, the species recorded showed habitat preferences: *Dythemis multipunctata* Kirby, 1894, *Erythrodiplax* sp., *M. hesperis*, *T. filiola*, *A. lancea*, *Erythemis* sp., *Coryphaeschna adnexa* (Hagen, 1861) and *H. auripennis* seem to prefer organic substrates and *Brechmorhoga* sp., *B. praecox* (Hagen, 1969) and *Progomphus complicatus* Selys, 1854, inorganic substrates." (Authors)] Address: Carvalho, A., Departamento

de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro (UFRJ), Brasil. E-mail: alagoc@acd.ufrj.br

**4387.** Averill, M. (2004): New from Worcestershire. *Darter* 21: 9. (in English). [Records of some interesting species are referred. The population of *Gomphus vulgatissimus* along the river Severn seems to drop.] Address: Averill, M., 49 James Road, Kidderminster, Worcs., DY10 2TR, UK

**4388.** Baber, J.M.; Fleishman, E.; Babbitt, K.; Tarr, T. (2004): The relationship between wetland hydroperiod and nestedness patterns in assemblages of larval amphibians and predatory macroinvertebrates. *Oikos* 107(1): 16-27. (in English). ["Assemblages exhibit nested distributional patterns if the species found in species-poor locations also occur in progressively richer locations. We investigated patterns of nestedness in assemblages of larval amphibians and predatory macroinvertebrates in 42 isolated freshwater wetlands in southern New Hampshire, USA. These wetlands varied markedly in hydroperiod and we predicted that nestedness would be relatively weak because changes in disturbance processes (the relative threat of desiccation and predation) along the hydroperiod gradient often generate distinct assemblages. Contrary to expectations we found that both amphibian and macroinvertebrate assemblages were strongly nested not only with respect to species richness but also with respect to hydroperiod and wetland size, which were positively correlated. We attribute our results to the increased colonization rates and decreased extinction rates associated with increasing hydroperiod, and to concomitant increases in wetland size, habitat heterogeneity / complexity, and possibly water temperature. Moreover, the impact of predatory fishes on species richness and composition of amphibians and macroinvertebrates was relatively minor. We found that amphibians had a significantly lower degree of nestedness than macroinvertebrates, suggesting that a higher proportion of amphibian species found in species-poor assemblages was unlikely to occur in species-rich assemblages of amphibians (e.g. wood frogs and spotted salamanders). The degree of nestedness appeared to be influenced primarily by hydroperiod and wetland size for amphibians, whereas nestedness of macroinvertebrates was influenced by unknown factors (possibly water temperature) in addition to hydroperiod and wetland size. The high degrees of nestedness observed in amphibian and macroinvertebrate assemblages imply that protection of larger, more permanent wetlands may be more important for conserving native biological diversity than protection of smaller, non-permanent wetlands. However, non-permanent wetlands are used by several species of conservation concern that often do not occur in larger and more permanent wetlands." (Authors)] Address: Baber, M.J., Dept of Natural Resources, Univ. of New Hampshire, 215 James Hall, Durham, NH 03824, USA. E-mail: matthew.baber@unh.edu

**4389.** Baranowska, A.; Zawal, A. (2004): Dragonflies (Odonata) of the Binowskie Lake in the Szczeciński Landscape Park. *Parki Narodowe i Rezerваты Przyrody* 23: 111-120. (in Polish with English summary). [Between 1999 - 2000, a total of 34 dragonfly species were collected. *Calopteryx splendens*, *Lestes dryas*, and *Sympteryx danae* were represented by adults only, and were regarded as immigrants. "The odonate fauna

of the area comprises primarily of eurytopic species with *Enallagma cyathigerum* (dominant) and *Ischnura elegans*, *Erythromma najas*, *Coenagrion pulchellum*, *C. puella*, and *Platycnemis pennipes* (subdominants), the most abundant species, which contributed together to more than 70% of the collection. Due to a high habitat complexity, *Platycnemis pennipes*, a rheophile species occurring also in lentic waters with abundant vegetation, and *Orthetrum cancellatum*, inhabiting mainly extensive lentic areas with poor vegetation, were quite frequent. There were also species such as *Lestes sponsa*, *L. virens*, *Coenagrion hastulatum*, *Aeshna juncea*, *Somatochlora flavomaculata*, and *Libellula fulva*, that are associated with peat bogs and/or dystrophic habitats. The first three of the above listed species inhabited exclusively sites in a peaty cove (stations 7 and 8)(Table 1). The sites located on a small beach (stations 9 and 10) provided a single larva of *Anax imperator* (an Ethiopian - Mediterranean species) and a single larva of *Aeshna viridis* (a protected species, associated with *Stratiotes aloides*)." (Authors)] Address: Anna Baranowska, Andrzej Zawal: Katedra Zoologii Bezkręgowców i Limnologii, Uniwersytet Szczeciński, ul. Waska 13, 71 415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**4390.** Barlow, A.E. (2004): Third report of the New Jersey Odonata Survey - including one state record, numerous county records and corrections of previous literature. *Argia* 15(4): 16-21. (in English). [USA, New Jersey; new state record: *Sympetrum danae*. The records are documented species wise.] Address: Barlow, A.E., 10 Belle Court, Budd Lake, NJ 07828, USA. E-mail: a.barlow@njodes.com

**4391.** Batty, P. (2004): Addendum to Scottish Report: Dragonflies in Argyll. *Darter* 21: 6. (in English). [Scotland, UK; *Somatochlora metallica*, *Aeshna cyanea*] Address: Batty, Pat, Kirnan Farm, Kilmichael Glen, Lochgilphead, Argyll, PA31 8QL, UK. E-mail: battypatm@hotmail.com

**4392.** Beckemeyer, R.J. (2004): Measurements of total fresh mass for some species of Odonata from Kansas and Missouri, United States. *Notulae Odonatologicae* 6(3): 33-34. (in English). [Kansas, Missouri, USA; mass data of the following odonate taxa are given: *Lestes disjunctus australis*, *Argia apicalis*, *Enallagma basidens*, *E. civile*, *E. exsulans*, *E. vesperum*, *Ischnura posita*, *Ischnura verticalis*, *Anax junius*, *Dromogomphus spinosus*, *Gomphus externus*, *G. militaris*, *Macromia illinoensis*, *M. pacifica*, *Epithea princeps*, *Celithemis eponina*, *Dythemis fugax*, *Erythemis simplicicollis*, *Erythrodiplax umbrata*, *Libellula luctuosa* Burmeister, *L. pulchella*, *Pachydiplax longipennis*, *Pantala flavescens*, *Perithemis tenera*, *Plathemis lydia*, *Sympetrum corruptum*, *Tamea lacerata*, and *T. onusta*.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**4393.** Bedjanic, M. (2004): Odonata fauna of Sri Lanka: research state and threat status. *International Journal of Odonatology* 7(2): 279-294. (in English). ["Altogether 116 odonate species are known from Sri Lanka. The level of endemism is high - 53 taxa or 45.7% are confined to the island. The Chlorocyphidae, Euphaeidae, Protoneuridae, Platystictidae, Gomphidae and Corduliidae consist of almost exclusively endemic taxa. The odonate fauna of Sri Lanka is still insufficiently

known. Knowledge on distribution, biology and taxonomy of adults and especially larval forms is very poor. An assessment of threat status showed that it is very endangered due to habitat destruction. A list of 47 endangered odonate taxa has been compiled. It consists of exclusively endemic taxa and comprises more than 80% of described species confined to the island. Altogether 20 species are preliminary put in the IUCN categories 'extinct' (EX) and 'critically endangered' (CR) and are urgently proposed for inclusion in the IUCN Red List. Future Odonatological research priorities and recommendations are given. Special attention should be devoted to the work dealing with taxonomy of larval forms and adults. Serious faunistic mapping should cover the whole island and should be focused on still preserved areas. Simultaneously also the research of biology of selected species and research of seasonal phenology of adult Odonata should be carried out. Effective nature conservation measures in declared protected areas as well as the establishment of new protected areas and corridors in the Wet zone is of biggest importance for effective long-term preservation of a rich endemic fauna and flora of Sri Lanka, including odonates." (Author)] Address: Bedjanic, M., Kolodvorska 21b, SI-2310 Slovenska Bistrica, Slovenia. E-mail: matjaz.bedjanic@guest.arnes.si

**4394.** Behrstock, R.A.; Danforth, D.; Upson, S. (2004): Yaqui dancer (*Argia calcooki*, Daigle 1995), new distributional records for northeastern Mexico and the U.S.. *Argia* 16(2): 11-16. (in English). [Brief introduction into the biodiversity of the genus *Argia* and problems of their correct determination. Special emphasis is given to specimens photographed on 8-IX-1998 at San Bernardino, National Wildlife Refuge, Cochise County, SE Arizona, USA, which turned out to be *Argia carlcooki* new for USA and northern Mexico. The identification key of R. Garrison (1994) is extended and amended by this species. Numerous drawings and colour photos help with identification of *A. carlcooki* and resembling species.] Address: Behrstock, R.A., 9707 S.Gessner #3506, Houston, TX, 77071-1032, USA. E-mail: rbehrstock@cox.net

**4395.** Beketov, M.A. (2004): Comparative sensitivity to the insecticides Deltamethrin and Esfenvalerate of some aquatic insect larvae (Ephemeroptera and Odonata) and *Daphnia magna*. *Russian Journal of Ecology* 35(3): 200-204. (in English). ["Sensitivity to the pyrethroids deltamethrin and esfenvalerate (aqueous solution) and LC50 have been determined in acute (96-h) toxicological tests on mayfly larvae (*Cloeon dipterum* and *Caenis miliaria*), damselfly larvae (*Lestes sponsa* and *Cordulia aenea*), and juveniles from a laboratory culture of *Daphnia magna*. Sensitivity to deltamethrin increases in the series *C. aenea* (Odonata) < *D. magna* (Cladocera) < *L. sponsa* (Odonata) < *C. miliaria* (Ephemeroptera) < *C. dipterum* (Ephemeroptera), and that to esfenvalerate, in the series *C. aenea* < *D. magna* < *L. sponsa* < *C. miliaria* < *C. dipterum*. The values of LC50 about 0.01 µg/l determined for mayfly larvae are below those known for various hydrobionts from the literature, indicating a very high sensitivity of these insects to pyrethroids." (Author)] Address: Beketov, M.A., Institute of Animal Systematics and Ecology, Siberian Division, Russian Academy of Sciences, ul. Frunze 11, Novosibirsk, 630091 Russia



**4396.** Benstead, J.P.; Pringle, C.M. (2004): Deforestation alters the resource base and biomass of endemic stream insects in eastern Madagascar. *Freshwater Biology* 49: 490-501. (in English). ["1. Rainforest streams in eastern Madagascar have species-rich and diverse endemic insect communities, while streams in deforested areas have relatively depauperate assemblages dominated by collector-gatherer taxa. We sampled a suite of benthic insects and their food resources in three primary rainforest streams within Ranomafana National Park in eastern Madagascar and three agriculture streams in the park's deforested peripheral zone. We analysed gut contents and combined biomass and stable isotope data to examine stream community responses to deforestation in the region, which is a threatened and globally important hotspot for freshwater biodiversity. 2. Gut analyses showed that most taxa depended largely on amorphous detritus, obtained either from biofilms (collector-gatherers) or from seston (microfilterers). Despite different resource availability in forest versus agriculture streams, diets of each taxon did not differ between stream types, suggesting inflexible feeding modes. Carbon sources for forest stream insects were difficult to discern using  $\delta^{13}\text{C}$ . However, in agriculture streams dependence on terrestrial carbon sources was low relative to algal sources. Most insect taxa with  $\delta^{13}\text{C}$  similar to terrestrial carbon sources (e.g. the stonefly *Madenemura*, the caddisfly *Chimarra* sp. and *Simulium* blackflies) were absent or present at lower biomass in agriculture streams relative to forest streams. Conversely, collector-gatherers (*Afroptilum* mayflies) relied on algal carbon sources and had much higher biomass in agriculture streams. 3. Our analyses indicate that a few collector-gatherer species (mostly Ephemeroptera) can take advantage of increased primary production in biofilms and consequently dominate biomass in streams affected by deforestation. In contrast, many forest stream insects (especially those in the orders Plecoptera, Trichoptera and Diptera) depend on terrestrial carbon sources (i.e. seston and leaf litter), are unable to track resource availability and consequently decline in streams draining deforested landscapes. These forest-specialists are often micro-endemic and particularly vulnerable to deforestation. 4. The use of consumer biomass data in stable isotope research can help detect population-level responses to shifts in basal resources caused by anthropogenic change. We also suggest that restoration of vegetated riparian zones in eastern Madagascar and elsewhere could mitigate the deleterious effects of deforestation on sensitive, endemic stream taxa that are dependent on terrestrial carbon sources." (Authors) *Libellula* sp. is listed in table 2.] Address: Benstead, J.P., The Ecosystems Center, Marine Biological Laboratory, Woods Hole, Massachusetts 02543, MA, U.S.A. E-mail: jbenstead@mbl.edu

**4397.** Berger, C. (2004): *Dragonflies*. Stackpole Books. ISBN 0-8117-2971-0: 134 pp. (in English). [This field guide focuses not on the species descriptions, but in the introductory material, which covers slightly more than half of the entire (thoroughly treated and illustrated) book. Beginning with life history, Cynthia Berger continues with chapters on flight, territoriality, mating, oviposition, prey capture, thermal regulation, migration, construction of a dragonfly pond, etc.. The remainder of the book is devoted to the identification of 27 odonates from eastern US, four Zygoptera and 23 Anisoptera. The author aims to facilitate identification of the more common species encountered in the eastern US, it is

not intended to provide a complete identification key. Each of the 27 species has a page or two, an attractive colored picture, and discussion of habitat and behaviour. The species provided should facilitate to recognize any odonate at least at the family level. The author finishes with a list of useful books, contact addresses, organizations, web sites, and field equipment. This is an easy to read introduction in Odonata which will help many people to get more closely interested in dragonflies. (Martin Schorr)] Address: Stackpole books, 5067 Ritter Rd, Mechanicsburg, PA 17055-6921, USA. [www.stackpolebooks.com](http://www.stackpolebooks.com)

**4398.** Bernard, R.; Ivinskis, P. (2004): *Orthetrum brunneum*, a new species in Lithuania. *Acta Zoologica Lituonica* 14(3): 31-36. (in English, with Lithuanian summary). [*O. brunneum*, "was recorded in two localities in the years 2001-2003. The northernmost position of these localities, probably of the whole species' range, is shown and discussed with reference to climate-related changes in the range and numbers of this species and some other species. The habitat is described and discussed in comparison with the data from central Europe. The establishing of more permanent populations of *O. brunneum* in these latitudes is questionable; its occurrence in Lithuania seems to be dependent on allochthonous nomadic individuals." (Authors)] Address: Bernard, R., Department of General Zoology, Adam Mickiewicz University, Fredry 10, PL-61-702 Poznań, Poland; E-mail: [rbernard@main.amu.edu.pl](mailto:rbernard@main.amu.edu.pl)

**4399.** Béthoux, O.; Galtier, J.; Nel, A. (2004): Earliest evidence of insect endophytic oviposition. *Palaios* 19 (4): 408-413. (in English) ["The knowledge of fossil plant-insect interactions is almost entirely restricted to evidences of feeding behavior. Records of endophytic oviposition are relatively scarce, with previous earliest reports from the Middle to the early Late Triassic. Nevertheless, several Paleozoic insect taxa have been suspected of this reproductive behavior, but without any direct evidence. Specimens of *Calamites cistii* (Sphenophyta; Pennsylvanian, France) are described showing endophytic cavities, located in the outer cortex of the stem, a tissue that is rarely preserved. This new record shifts the appearance of this behavior back 60 Ma. Possible tracemakers are representatives of the Odonoptera (Odonata and related extinct taxa), Palaeodictyopteroidea (extinct palaeopterous orders), and Archaeorthoptera (Orthoptera and related extinct orders). The antiquity of the insect endophytic oviposition behavior suggests that it could have been important during the emergence and diversification of the insect group." (Authors)] Nel, A., *Lab. Ent. Mus. Natn. Hist. Nat.*, 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**4400.** Beukema, J.J. (2004): Recognition of conspecific females by males of *Calopteryx haemorrhoidalis* (Vander Linden) (Zygoptera: Calopterygidae). *Odonatologica* 33(2): 147-156. (in English). ["Males of calopterygid damselflies appear to court females of other (related, sympatric) species only rarely. Apparently, females of this group bear species-specific characteristics that release sexual behaviour in conspecific males only. Sympatric *Calopteryx* species usually differ conspicuously in pigmentation (colour, transparency, darkness) of their wings. Female *C. haemorrhoidalis* differ from all other European species by the presence of a dark distal zone in the hindwings. - The relative value of various

(manipulated) sets of female wings for elicitation of male courtship was assessed using choice experiments. *C. haemorrhoidalis* males did not court wingless females of their own species nor did they court conspecific females with wings of the sympatric *C. xanthostoma*. However, the presence of a single wing of a conspecific female was sufficient to elicit courtship behaviour. Choices between 2 female models (presented simultaneously to territorial male individuals) revealed that the presence of a contrasting dark zone was an important distinguishing characteristic, whereas too high a transparency (a single wing as opposed to a set of 2 or 4 wings pressed against each other) greatly diminished the value of a model. The need for the presence of a dark zone will be effective in precluding courtship of females of other sympatric species. The need for sufficiently low transparency will put a check on courtship attempts of immature females." (Author)] Address: Beukema, J.J., Royal Netherlands Institute for Sea Research, P.O. Box 59, NL-1790 AB Den Burg, Texel, The Netherlands. E-mail: janb@nioz.nl

**4401.** Beynon, T. (2004): Book Review: Dragonflies of Bedfordshire. ISBN 0950652172. J. Br. Dragonfly Society 20(2): 83-84. (in English). [oas 15] Address: Beynon, T.G.; 34 Church Lane, Checkley, Stoke-on-Trent, Staffordshire ST10 4NJ, United Kingdom

**4402.** Beynon, T. (2004): Dragonfly Conservation from the BDS. *Atropos* 22: 63-64. (in English). ["[...] If you check the website [www.dragonsoc.org.uk](http://www.dragonsoc.org.uk) you will see a number of "Management Fact Files" on individual species. These collate the most up-to-date information, including case studies where possible. This is a major project for the Conservation Officer, and we decided to start with the rarest and most threatened, and then proceed 'downwards' to the commonest. When complete we have been promised funding to produce a book for conservationists and land managers. A new edition of *Managing Habitats* is being worked upon to fill the gap before the definitive book appears." (Author)] Address: Beynon, T., 34 Church Lane, Checkley, Stoke-on-Trent, Staffordshire, STW 4N, UK

**4403.** Beynon, T.G.; Goddard, D.P. (2004): Notes on the oviposition and flight attitude of the Brilliant Emerald *Somatochlora metallica* (Vander Linden) in Scotland. *J. Br. Dragonfly Society* 20(2): 77-78. (in English). ["...differences may exist in the oviposition behaviour of *S. metallica* in the two areas of Britain in which it occurs. Fox observed oviposition into Sphagnum lawns and damp peat in Scotland, whereas females were observed dropping eggs onto the water surface in southern England. Thus *S. metallica* may adopt one of two different oviposition behaviours. These may be determined by differences in the substrate into which the eggs are being released. Alternatively, these differences may be a function of two disjunct British populations, each of which may be the result of separate postglacial colonizations. ..." (Authors)] Address: Beynon, T.G.; 34 Church Lane, Checkley, Stoke-on-Trent, Staffordshire ST10 4NJ, United Kingdom

**4404.** Biswas, S.; Chatterjee, M.; Haldar, D.P. (2004): New Species of *Odonaticola* Sarkar et Haldar, 1981 (Apicomplexa: Conoidasida) from Dragonflies (Insecta: Odonata) in West Bengal, India. *Acta Protozoologica* 43: 183-191. (in English). ["Descriptions of four new species of the genus *Odonaticola* Sarkar et Haldar,

1981 (Apicomplexa: Conoidasida) from dragonflies (Insecta: Odonata) in the family Libellulidae in West Bengal are presented. These include: *Odonaticola bradinyoga* sp. n. from *Bradinyoga geminata*; *O. aspinosa* sp. n. from *Crocothemis servilia servilia*; *O. abhoyapura* sp. n. from *Pantala flavescens* and *O. amojya* sp. n. from *C. s. servilia*." (Authors)] Address: Biswas, S., Protozoology Laboratory, Department of Zoology, University of Kalyani, Kalyani, West Bengal, India

**4405.** Blust, M. (2004): Vermont DSA gathering - county counts are big winner. *Argia* 16(2): 8-9. (in English). [USA; brief report on the meeting a few results from fieldwork in the framework of the meetin in 2004 (no additional date available)] Address: not stated

**4406.** Bocanegra, O.R. (2004): First record of *Tetragoneuria spinosa* for Texas. *Argia* 15(4): 23-24. (in English). [Davy Crockett National Forest, Houston County, Texas, USA: 13 March 2003] Address: Bocanegra, O.R., U.S.Fish and Wildlife Service, 711 Stadium Drive, Suite 252, Arlington, Texas 76011, USA

**4407.** Boronka, R. (2004): 2004 Great Lakes Odonata meeting. *Argia* 16(2): 9-10. (in English). [USA, Ohio, 23-26. June 2004; a few field notes are outlined.] Address: Boronka, Renee, Center for Conservation & Biodiversity, Cleveland Museum of natural History, USA

**4408.** Bouchard, R.W. (2004): Chapter 5. Odonata (Dragonflies & Damselflies). In: Guide to aquatic macroinvertebrates of the Upper midwest. Water Resources Center, University of Minnesota, St. Paul, MN. 208 pp: 63-73. (in English). [Introduction in larval morphology, and key on the family level.] Address: <http://wrc.coafes.umn.edu/VSMP/pdf/GuideContentsForeward.pdf>; .... /pdf/GuideChapter5.pdf

**4409.** Boudot, J.-P.; Grand, D.; Grebe, B.; Hacet, N.; Marinov, M. (2004): Description of the female of *Somatochlora borisi* with distributional notes on the species (Odonata: Corduliidae). *International Journal of Odonatology* 7(3): 431-438. (in English). ["The morphology of the hitherto unknown female of *Somatochlora borisi* is described and illustrated basing upon eight adults from Bulgaria, Greece and Turkey. A key is provided which allows the determination of the females of all West Palaearctic *Cordulia* and *Somatochlora* spp. A list of the presently known localities and a distribution map show the range of the species as currently known. The species is new to Turkey." (Authors)] Address: Boudot, J.-P., Centre de Pédologie Biologique, 17, rue Note-Dame de Pauvres, B.P. 5, F-54501 Vandoeuvre-lès-Nancy, France. e-mail: [boudot@cpb.cnrs-nancy.fr](mailto:boudot@cpb.cnrs-nancy.fr)

**4410.** Bowman, N. (2004): Reports from Coastal Stations - 2003: Eccles-on-Sea, Norfolk. *Atropos* 21: 65-66. (in English). [UK; *Anax parthenope*, *Erythromma viridulum*] Address: not stated

**4411.** Boyero, L.; Bosch, J. (2004): Multiscale spatial variation of stone recolonization by macroinvertebrates in a Costa Rican stream. *Journal of Tropical Ecology* 20: 85-95. (in English). ["The process of stone recolonization by macroinvertebrates was studied at different spatial scales in a stream in Costa Rica. A hierarchical design was used with riffles nested into reaches, and individual stones nested into riffles. Macroinvertebrate abundance and taxon richness varied at riffle scale, although patterns of variation seemed to change with

time of recolonization, and taxonomic composition varied mostly at reach scale. Patterns of variation of background communities and macroinvertebrate drift at different spatial scales suggest that the contribution of these two sources of colonists to stone recolonization depends on spatial scale. Macroinvertebrate abundance was related to local environmental variables during recolonization, but taxon richness was related to the local environment only in the very first stage of the process. The need for explicitly determining the appropriate spatial scale in the study of substrate recolonization is emphasized." (Authors) "Zygoptera" are listed in Appendix 1 and 2.] Address: Boyero, L., Museo Nacional de Ciencias Naturales (CSIC), José Gutiérrez Abascal 2, 28006 Madrid, Spain. E-mail: luz@mncn.csic.es

**4412.** Braun, M. (2004): Was die Natur so alles zu bieten hat - Von den naturkundlichen Wanderungen des Hunsrückvereins - 2003. Hunsrückverein, Jahresheft 2004: 77-84. (in German). [Some passing notes referring to Odonata observed in the eastern region of the middle range mountain Hunsrück, the so-called Soonwald, Rheinland-Pfalz, Germany.] Address: Braun, M., SGD Nord, Stresemannstr. 3-5, 56068 Koblenz, Germany

**4413.** Braune, E. (2004): Dispersal of Namibian dragonflies: Population dynamics in a changing landscape. Abstracts: 5th International Symposium on Tropical Biology. SATELLITE EVENTS: 6th International Symposium on the Chrysomelidae; Workshop on African Odonata (Edited by Bernhard A. Huber); Zoologisches Forschungsinstitut und Museum Alexander König, Adenauerallee 160, 53113 Bonn, Germany: 142. (in English). [Verbatim: In the arid and semi-arid regions of western Namibia water is one of the most limiting and limited resources for biodiversity. Climate change is supposed to increase the problems rising from water deficiency. Due to their aquatic/terrestrial life cycle dragonflies may serve as indicator organisms for changes in the water balance, as they are affected through loss of potential habitats. I developed a model for the prediction of the dispersal of Odonata. The model incorporates a population dynamic model based on extended Leslie matrices. The development rates and the survival rates are mainly dependent on the available food in the aquatic habitat. Inter- and intraspecific competition between the larval stages as a mechanism of density dependent population regulation is also included in the model. The model reproduces population dynamic patterns which are typical for tropical-centered dragonflies. The population dynamic model is embedded in a landscape model developed for three regions (in the biomes Namib desert, Nama karoo and tree and shrub savanna). The spatial realisations are grid-based models with extensions of 50\*50 km with a cell size of 1 km<sup>2</sup>. Three different landscape parameters, representing the different habitat preferences of the modelled species *Pantala flavescens*, *Crocothemis erythraea* and *Paragomphus genei*, are used to describe the landscape: presence of water, aquatic vegetation diversity and riverbeds as guidelines. These parameters were gained using both GIS Information and expert knowledge. Different scenarios describing the effects of climate change are realised by dynamic modelling of the landscape parameters. With this model it is possible to simulate reactions of dragonfly populations on landscape changes due to water shortage and to investigate which landscape requirements must be met to avoid regional

extinction.] Address: Braune, E., Institute of Geocology, TU Braunschweig, Langer Kamp 19c, 38106 Braunschweig, Germany. E-mail: e.braune@tu-bs.de

**4414.** Brauns, M.; Garcia, X.-F.; Pusch, M.; Walz, N. (2004): Beitrag zur Litoralfauna der großen Seen in Brandenburg. *Lauterbornia* 49: 43-72. (in German, with English summary). [In the framework of a project on the implementation of the European Water Framework Directive in the Federal State Brandenburg, Germany, the invertebrate fauna of 31 lakes covering more than 50 ha each was examined in the eu littoral and litoprofundal zones. A total of 254 species or higher taxa have been sampled. These, and literature data are compiled in a table. Most of the Odonata (n=51) are from literature sources, while only 15 taxa have been collected using the sampling method of the authors. ] Address: Brauns, M., Institut für Gewässerökologie und Binnenfischerei im Forschungsverbund Berlin e.V., Müggelseedamm 310, D-12561 Berlin, Germany. E-mail: brauns@igb-berlin.de

**4415.** Briggs, M.W. (2004): Dragonfly lampshades by Louis Comfort Tiffany. *Argia* 16(2): 20-22. (in English). [L.C. Tiffany (1848-1933), master of stained-glass medium and leading proponent in the U.S. of Art Nouveau movement.] Address: Briggs, Martha Wren, Art librarian Emeritus, C.W. Post College of L.I.U.; no address stated

**4416.** Brockhaus, T. (2004): Entwicklungszyklen und morphometrische Differenzierungen in einer Larvenpopulation von *Platycnemis pennipes* (Pallas) (Zygoptera: Platycnemidae). *Odonatologica* 33(3): 315-325. (in German, with English summary). ["A larval population was studied (1994-1996) on the Zschopau river, Saxony, Germany. In 325 larvae head widths and wing-sheath lengths were measured, and the abdominal segments that were partly or completely covered by the wing-sheaths were counted. Within the population, there was much size variation throughout the yr. This is interpreted in terms of co-occurrence of the univoltine and semivoltine cohorts. The semivoltine F-0 larvae were larger than the univoltine of the same stage. There are more males than females in the larval population." (Author)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**4417.** Brockhaus, T. (2004): Interspezifische Konkurrenz zwischen *Sympetrum fonscolombii* und *Orthetrum cancellatum* in Mitteleuropa? (Odonata: Libellulidae). *Libellula* 23(1/2): 77-86. (in German, with English summary). ["In 2003, both spp. were observed as common at the pond 'Beuthenteich' (district Stollberg/Erzgebirge, Saxony, Germany). Apart from imaginal records, also larvae of both spp. were sampled. The head widths of 80 larvae of *O. cancellatum* were measured. For seven larvae of *S. fonscolombii* the total length, the head widths and the number of abdominal segments covered by the wing cases were determined. A larva of *S. fonscolombii*, found on 31 August 2003, was damaged partially by predation. The developmental cycles of both species are discussed under the aspect of interspecific competition of the larvae. It is suggested that in 2003 the sp. had three imaginal and two larval generations. However, one can also suggest a retarded development of *S. fonscolombii* because of the presence and the predatory or competitive effect of larger *O. cancellatum*"]



tum larvae in higher densities." (Author)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**4418.** Brooks, S.; Lewington, R. (2004): Field Guide to the Dragonflies and Damselflies of Great Britain and Ireland. British Wildlife Publishing. Revised edition. ISBN 0 9531399 0 5: 160pp. (in English). [This latest edition of this popular field guide in Britain (first published in 1997) includes minor revisions to the text, but more significantly the addition of two species recently added to the British list: *Lestes barbarus* and *Chalcolestes viridis*. This book covers a wide range of topics; there is a sound introduction to the life history of the Odonata and their ecology, and also a section on good dragonfly sites throughout Britain and (to a lesser degree) Ireland, selected by people with local experience. About two thirds of the book comprises an identification guide, which includes a short section on larvae. Richard Lewington's artwork is of outstanding high quality, with illustrations typically showing the male and female in dorsal view, with one additional lateral view. Clearly distinct colour forms are also illustrated, and close up views show critical structural features where these are of help to species identification. A small-scale map illustrates the distribution of each species. The text to accompany the illustrations covers identification features, ecology and conservation aspects. Mark Tunmore writes in *Atropos* 22 (2004: 55): "The crisp and detailed illustrations combined with authoritative text ensure that it remains an essential publication for British Odonata enthusiasts." And more than this, it is of high interest for the odonatologists on the European continent too, especially due to its illustrations of all the *Anax* species. As happened in France last year, *Anax junius* can be expected in every western European country, and you should not miss it. (Martin Schorr)] Address: British Wildlief Publishing, Lower Barn Rooks Farm, Rotherwick, Hook Hampshire RG27 9BG, UK. www.britishwildlife.com

**4419.** Brown, G. (2004): Rhode Island Odonata atlas season summary, 2003. *Argia* 15(4): 14-16. (in English). [To fill taxonomic and geographic gaps, the atlas project was continued for a sixth season. Two new state records (*Stylurus spiniceps*, *Neurocordulia obsoleta*) could be added to the list of Rhode Island Odonata. Additional records of special regional interest are documented.] Address: Brown, Virginia, The Nature Conservancy, 159 Waterman Avenue, Providence, RI, 02906, USA

**4420.** Buczyński, P.; Lewandowski, K. (2004): Long studied „terra incognita” - the state of knowledge of dragonflies (Odonata) of the lakelands in north-eastern Poland. *Wiad. entomol.* 23(2): 97-111. (in Polish, with extensive English summary). [“Sixty one species of dragonflies were found in the lakelands in NE Poland during about 200 years of studies. The history of studies and the state of knowledge are presented. The list of species recorded in four macroregions and numbers of species known from 18 mesoregions are given.” (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**4421.** Buczyński, P.; Serafin, E. (2004): Is the incorporation of the "Krowie Bagno" marsh into the Poleski National Park well-founded? - on the basis of Odonata,

tional Park well-founded? - on the basis of Odonata, aquatic Coleoptera and Trichoptera. *Wiad. entomol.* 23 (Suppl. 2): 125-126. (in Polish, with English summary). [The recent conservational value of this Polish area assessed on the basis of the Odonata, Coleoptera, and Trichoptera is high. *Sympecma paedisca*, *Nehalennia speciosa*, *Aeshna juncea*, *A. viridis*, *Leucorrhinia albifrons*, *L. caudalis*, and *L. pectoralis* are highlighted. A total of 36 odonate species was recorded in 2003.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**4422.** Bukowsky, N.; Mauersberger, R. (2004): 70 Jahre Naturschutzgebiet (NSG) Thymen. *Naturschutz und Landschaftspflege in Brandenburg* 13(2): 52-55. (in German). [Brandenburg, Germany; 38 odonate species are listed in a table, and the records of 1969 are compared with that of 1994.] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-mail: FoerderevereinUeckermark.Seen@t-online.de

**4423.** Bulankova, E.; David, S. (2004): Die Verbreitung der in den Anhängen II und IV der FFH-Richtlinie aufgeführten Libellen in der Slowakei und ihr ökologischer Status (Odonata). *Libellula* 22(3/4) (2003): 127-138. (in German with English summary). [“In Annex II and IV 16 dragonflies species are included, 8 of which have been recorded in Slovakia: *Coenagrion mercuriale*, *C. ornatum*, *Leucorrhinia albifrons*, *L. pectoralis*, *Ophiogomphus cecilia*, *Gomphus flavipes*, *Sympecma paedisca*, *Cordulegaster heros*. Records of *C. mercuriale* and *L. albifrons* are of historical interest and in the Red List of plants and animals of Slovakia these species are therefore included in the category "Extinct". Records of the "Endangered" species *S. paedisca*, *L. pectoralis* and *O. cecilia* are still made at present. The "Vulnerable" species *C. ornatum* and *G. flavipes* have been recorded in the recent years in Slovakia too. Large populations of *G. flavipes* were found in the Maly Dunaj River (Danube River basin) and its occurrence was confirmed in the River Morava (March River basin) also. Some new localities of the occurrence of the species *Coenagrion ornatum* are in the Danube River basin too. The newest findings of the threatened species *Cordulegaster heros*, which was not included into the Check list of Odonata of Slovakia until now, is important from the european point of view. Our findings indicate the natural character of some biotopes in Slovakia and their high faunistic value.” (Authors)] Address: Bulankova, Eva, Institute of Ecology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B-II, SK-84215 Bratislava., Slovakia; E-mail: Bulankova@nic.fns.uniba.sk

**4424.** Buss, D.F.; Baptista, D.F.; Nessimian, J.L.; Engler, M. (2004): Substrate specificity, environmental degradation and disturbance structuring macroinvertebrate assemblages in neotropical streams. *Hydrobiologia* 518: 179-188. (in English). [“Structure and composition of benthic macroinvertebrate assemblages were investigated in seven sampling sites with a gradient of environmental integrity and water quality conditions. Composite samples of the four most representative substrates were collected in order to characterize the riffle-pool dynamic in each sampling site. Spatial and temporal variability of macroinvertebrate assemblages were analyzed at two scales: using substrates and grouping samples for comparing sampling sites. Distri-

bution of macroinvertebrates was influenced primarily by substrate type, but also by environmental integrity, water quality and sampling period. Species occurrence was highly dependent on substrate type. At local spatial scale, environmental degradation measured by the Riparian Channel Environmental Inventory and water chemistry were the determinants of assemblage patterns. We evaluated to which extent the substrates were influenced by environmental integrity and water chemistry, and we found that degradation influenced significantly the macroinvertebrate fauna on the four substrate types, although they were not responding to the same variables. Our results show that qualitatively communities were not influenced by seasonal changes, but abundance was stochastically dependent on rainfall." (Authors) On the genus level, seven odonate taxa are listed in table 2 as dwellers of pool litter.] Address: Buss, D.F., Laboratório de Avaliação e Promoção da Saúde Ambiental, Departamento de Biologia, IOC, FIOCRUZ, Av. Brasil 4365, Manguinhos, Rio de Janeiro, RJ, CEP 21045-900, Brazil. E-mail: buss@centroin.om.br

**4425.** Butler, S.G. (2004): Description of the last instar larva of *Onychogomphus aequistylus* Selys, 1892 (Anisoptera: Gomphidae). *Odonatologica* 33(2): 189-194. (in English). ["An ultimate male final instar larva from NW Madagascar is described and illustrated. Other, smaller larvae collected at the site are used for both support and comparison. Comparisons with the exuviae of 7 other species of the genus *Onychogomphus* are also provided." (Author)] Address: Butler S.G., Red Willow, All Stretton, Shropshire SY6 GHN, United Kingdom. E-mail: sgbutler@talk21.com

**4426.** Cade, M. (2004): Reports from Coastal stations - 2003: Portland, Dorset. *Atropos* 21: 47-50. (in English). ["As far as dragonflies were concerned, events in the general Observatory area were relatively quiet during the year, though an *Aeshna mixta* on 13 July was a good early record and a *Sympetrum striolatum* was caught at MV light on the night of 5 August. By contrast, a number of interesting observations were made at Yeolands and Broadcroft Quarries. A *S. fonscolombii* was observed at Broadcroft on 9 June and one or more were at Yeolands in early July. After the sightings of *Ischnura pumilio* at Yeolands in 2002, several individuals were again noted there during late June/early July, and an *Anax parthenope* was also reported on 19 July." (Author)] Address: not stated

**4427.** Cannings, R. (2004): Resources for the study of Odonata in Canada. *Newsletter of the Biological Survey of Canada (Terrestrial Arthropods)*: 25-33. (in English). [This paper provides basic information related to books, journals, internet, and societies useful to study Odonata. For a complete file see: [www.biology.ualberta.ca/bssc/news231/bsscpring2004.pdf](http://www.biology.ualberta.ca/bssc/news231/bsscpring2004.pdf)] Address: Cannings, R., Royal British Columbia Museum, 675 Belleville Street, Victoria, BC V8W 9W2, Canada. E-mail: rcannings@royalbcmuseum.bc.ca

**4428.** Carchini, G.; Pacione, T.; Tanzilli, C.; Di Domenico, M.; Solimini, A. (2004): Temporal variation of an Odonata species assemblage (Rome, Italy). *Odonatologica* 33(2): 157-168 (in English) ["The Castel Porziano estate is a well preserved coastal Mediterranean woodland, rich in still bodies of water, where odonatological studies have been taking place since the 1950s. Adult

Odonata were recorded for the entire estate in 1997 and 1998 (March-Nov.; 2 checks each month). 1,838 adults (22 species) were marked, to assess their movements. The results showed that in 1997-1998 a total of 31 species were present. This number is very close to the number (29) recorded up to 1976. Variation in species assemblage in 16 ponds was observed from 1997 to 1998. Although the overall species similarity was preserved, the number of species for each pond and the number of ponds inhabited by each species significantly increased from 1997 to 1998. In regard to the adult movements, 251 marked individuals of 13 species were re-sighted only at the same ponds where they had been marked and 30 individuals of 6 species were sighted at different ponds. Among the latter, the majority moved within a range of a few hundred metres, but some individuals were able to fly quite far, e.g. 2.7 km (*Coenagrion puella*) and 5.8 km (*Libellula depressa*). It is concluded that the assemblage variation for the entire estate was small, varying more on a decennial than on an annual scale, but for a single pond variation is wider on both time scales. The quick recolonization among ponds, due to the adult's movements, appears to be the cause of greater stability at meso-scale rather than at local scale." (Authors)] Address: Carchini, G., Dipartimento di Biologia, Università 'Tor Vergata', Via della Ricerca Scientifica, I-00133, Roma. Italy. E-mail: carchini@uniroma2.it

**4429.** Carvalho, A.L.; Salgado, L.G.V.; Werneck-de-Carvalho, P.C. (2004): Description of a new species of *Lauromacromia* Geijskes, 1970 (Odonata: Corduliidae) from Southeastern Brazil. *Zootaxa* 666: 1-11. (in English). ["*Lauromacromia pinguaba* sp. nov. is described and illustrated based on a series composed by a male and four females from Pinguaba, Ubatuba, São Paulo state, Brazil, all obtained from reared larvae. The type material is deposited in the Museu Nacional and the Instituto de Biologia, UFRJ, Rio de Janeiro. This is the first description of a female and the southernmost record for the genus. A key to the genera of Corduliidae occurring in Brazil is appended." (Authors)] Address: Carvalho, A., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro (UFRJ), Brasil. E-mail: alagoc@acd.ufrj.br

**4430.** Cattin Blandenier, M.-F. (2004): Food web ecology: models and application to conservation. Thèse présentée à la Faculté des Sciences de l'Université de Neuchâtel pour l'obtention du grade de Docteur ès sciences: 127 pp. (in English with French summary). ["Food webs are descriptions of who eats whom in an ecosystem. We propose here two different approaches to this topic. Firstly, we describe an empirical study applied to the management of fens of the Grande Caricaie (on the south bank of Lake Neuchâtel), a site of high value for nature conservation in Switzerland. Secondly, we introduce a new model explaining food-web structure, the nested-hierarchy model, which solves major problems encountered with former models. Nearly 90% of the fenlands in Switzerland have been lost during the last century. They harbour a high number of endangered species. Presently, they are threatened by brushwood encroachment and terrestrialisation due to water regulation and draining. Mowing is a commonly used management technique to prevent this succession. This management practice is beneficial for floristic diversity, but its effects on arthropods are less well known. Here, we use two different complementary approaches to

study the effect of mowing on two types of wet meadows. Firstly, we evaluate the impact of management by means of the comparison of a control and a two-year-old mown area. The results indicate that mowing reduces the less mobile spiders and species linked to litter or dead reeds, including rare species. Secondly, in order to measure the impact of mowing on the ecosystem structure and functioning, we adopt a food-web approach in the same wet meadows. Our results demonstrate that mowing has different consequences depending on the trophic group and level. It increases the total number of taxa, an increase particularly beneficial to species of the first trophic level. The impact on the third trophic level is hardly perceivable, because of the dominance of generalist feeders in this level. Intermediate species and particularly herbivores show the strongest change: mowing results in a shift towards more generalist herbivores and detritivores to the detriment of specialized species. This could be a particularly undesirable consequence of management. In the second part, we introduce the nested-hierarchy model, which describes foodweb structure. Though extremely complex and variable, their structure possesses basic regularities. Until now, two models have been devised for the description of trophic interactions within a natural community. Both are essentially based upon the concept of ecological niche, with the consumers organized along a single niche dimension, e.g., prey size. Unfortunately, they fail to describe adequately recent high-quality data. We propose here a new model built on the hypothesis that any species diet is the consequence of phylogenetic constraints and adaptation. Simple rules incorporating both concepts yield food webs whose structure is very close to real data. Consumers are organized in groups forming a nested hierarchy, which better reflects the complexity and multidimensionality of most natural systems. Our nested-hierarchy model emphasizes the role of phylogenetic constraints in food webs. It is an important element to be considered in the actual context of decrease in biodiversity. The relative impacts of taxonomy and adaptation in the reaction of ecosystems to species losses remains to be determined." (Author)] Address: [www.unine.ch/biblio/bc/theses\\_pdf/these\\_CattinMF.pdf](http://www.unine.ch/biblio/bc/theses_pdf/these_CattinMF.pdf)

**4431.** Chadd, R.; Hiley, A. (2004): News from Lincolnshire. *Darter* 21: 8. (in English). [Range extensions of different odonate species are documented.] Address: Chadd, R. Environment Agency (Biol. Lab.), Stepping Stone Walk, Winfrey, Winfrey Av., Spalding, Lincs., PE11 1DA, UK. E-mail: [richard.chadd@environment-agency.gov.uk](mailto:richard.chadd@environment-agency.gov.uk)

**4432.** Cham, S. (2004): Dragonfly predation by European hornets *Vespa crabro* (L.) (Hymenoptera, Vespidae). *J. Br. Dragonfly Soc.* 20(1): 1-3. (in English). [In summer 2003, an exceptionally high abundance of hornets during the year could be observed. In spite of these high abundance, on one occasion over thirty unsuccessful and no successful attempts of hornets were recorded to prey dragonflies flying at a pond during day time. One successful attack on a sitting *A. mixta* is documented (7 Sept. 2003). "Although it may be difficult for hornets to catch active dragonflies, their chances increase when prey is incapacitated in some way. Ovipositing females are more vulnerable to hornet attack when they fly in confined spaces. The Felmersham observations indicate that hornets will search out roosting dragonflies, when they may be cooler and less active

and, therefore, easier to catch." (Author)] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: [SteveCham1@compuserve.com](mailto:SteveCham1@compuserve.com)

**4433.** Cham, S. (2004): Observations on an inland population of the Small Red-eyed Damselfly *Erythromma viridulum* (Charpentier) with notes on the first discovery of larvae in Britain. *J. Br. Dragonfly Soc.* 20(1): 31-34. (in English). [Priory Country Park, Bedford, Bedfordshire, UK. The presence of *Ceratophyllum* sp. or other floating weeds may provide an indication as to where best to look for *E. viridulum*.] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: [SteveCham1@compuserve.com](mailto:SteveCham1@compuserve.com)

**4434.** Cham, S. (2004): Oviposition behaviour of the two British species of Red-eyed Damselflies *Erythromma najas* (Hansemann) and *E. viridulum* (Charpentier). *J. Br. Dragonfly Society* 20(2): 37-41. (in English). ["A study of the oviposition behaviour of *E. najas* and *E. viridulum* was carried out during July and August 2003 and 2004 at sites in Bedfordshire, UK. With the relatively recent colonization of Britain by the latter, there is very little published information on its natural history. This study presents observations on oviposition behaviour, including group oviposition in response to the threat of predation." (Author)] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: [SteveCham1@compuserve.com](mailto:SteveCham1@compuserve.com)

**4435.** Cham, S. (2004): Updates from the Dragonfly Recording Network (DRN) National Co-ordinator. *Darter* 21: 1-2. (in English). [Range extensions (*Erythromma viridulum*, *Lestes barbarus*, *Chalcolestes viridis*, *Libellula fulva*) and range contracting (*Leucorrhinia dubia*) are briefly outlined. Information on population trends of *Libellula depressa* and *Ischnura pumilio*, and habitat choice of *Cordulegaster boltonii* (chalk streams) are given. In addition, some information of recording and mapping software are provided.] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: [SteveCham1@compuserve.com](mailto:SteveCham1@compuserve.com)

**4436.** Cham, S. (Red.) (2004): News from the regions. *Darter* 21: 12-18. (in English). [oas 15: Taylor, P.: News from Norfolk; Donnithorne, N.: News from the southeast; Brook, J. & G. Brook: Addendum to the southeast report: History of *Libellula fulva* in Kent; Smallshire, D.: News from Devon; Jones, S.: News from Cornwall; News in brief ... from Gloucestershire, ... from Herefordshire, ... from Staffordshire, ...from Nottinghamshire, ...from Derbyshire.] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: [SteveCham1@compuserve.com](mailto:SteveCham1@compuserve.com)

**4437.** Clancy, S. (2004): Reports from Coastal stations - 2003: Dungeness area, Kent. *Atropos* 21: 55-57. (in English). [*Anax parthenope*, *Sympetrum fonscolombii*, *S. striolatum*, strong colony of *Erythromma viridulum* with continuing colonisation of new habitats.] Address: not stated

**4438.** Clarke, D. (2004): "Southern" dragonflies make headway in Cumbria in 2003. *Darter* 21: 6-7. (in English). [UK; information on *Brachytron pratense*, *Anax imperator*, *Libellula depressa*, and *Aeshna mixta* are provided.] Address: Clarke, D., Burnfoot, Cumwhitton, Carlisle, Cumbria CA4 9EX, UK



- 4439.** Clausnitzer, V. (2004): Critical species of Odonata in eastern Africa. *International Journal of Odonatology* 7(2): 189-206. (in English). ["From eastern Africa, ranging from Somalia and Ethiopia south to Mozambique and Zimbabwe and west to eastern Democratic Republic of Congo and Botswana, ca 500 species of Odonata are known. Comments on species and sites of conservation concern are given as well as recommendations for future research and conservation activities. Due to the rapid and ongoing destruction of forests, especially of coastal, Guineo-Congolian and Eastern Arc forests, species confined to these habitats are the most threatened." (Author)] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de
- 4440.** Clausnitzer, V.; Martens, A. (2004): Critical species of Odonata in the Comoros, Seychelles, Mascarenes and other small western Indian Ocean islands. *International Journal of Odonatology* 7(2): 207-218. (in English). [Excluding Madagascar, 33 species of conservation concern are given.] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de
- 4441.** Clausnitzer, V. (2004): Dragonflies in East Africa's coastal forests and Eastern Arc Mts indicators of habitat health and landscape history. Abstracts: 5th International Symposium on Tropical Biology. SATELLITE EVENTS: 6th International Symposium on the Chrysomelidae; Workshop on African Odonata (Edited by Bernhard A. Huber); Zoologisches Forschungsinstitut und Museum Alexander König, Adenauerallee 160, 53113 Bonn, Germany: 143. (in English). [Verbatim: The species diversity and the level of endemism in dragonflies from East Africa's coastal forests and the Eastern Arc Mts is very high. Many of the forest specialists are stenotopic, highly sensitive to habitat disturbance and confined to the coastal zone. Some of these species are relicts, indicating the former connection to central and west Africa and even to the Neotropics. Once a more or less continuous forest belt from southern Somalia to northern Natal, today's remaining coastal forests consist of highly isolated and often very tiny forest fragments. The effects of these habitat fragmentations will be briefly shown on the species community level and on the population level. With increasing forest destruction the alpha-diversity increases locally, while the beta-diversity decreases with the disappearance of the forest specialists. Most colonisers of disturbed habitats are eurytopic species, which are common and widely distributed all over Africa. The impacts of habitat fragmentation on the population level will be shown for a very ancient inhabitant of the coastal and Eastern Arc forests: *Coryphagrion grandis*, a giant damselfly and the only extant member in Africa of a family with otherwise neotropical distribution. This species is highly specialised and heavily reliant on a long-term habitat stability. The ongoing habitat destruction has already resulted in genetically isolated populations.] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de
- 4442.** cl.br. (2004): La libellula "cecilia" ritrovata a Novara. *Corriere di Novara* 30. September 2004: (in Italian). [Elisa Riservata, University of Pavia, found *Ophiogomphus cecilia* in the river Quartara, Parco del Ticino, near Novara, Italy. This record was worth for a brief contribution in the regional newspaper.] Address: not stated (a copy of the paper can be obtained by IDF or Jürgen Ott)
- 4443.** Cleary, D. F. R.; Mooers, A., Ø.; Eichhorn, K. A. O.; van Tol, J.; de Jong, R.; Menken, S. B.J. (2004): Diversity and community composition of butterflies and odonates in an ENSO-induced fire affected habitat mosaic: a case study from East Kalimantan, Indonesia. *Oikos* 105: 426-446. (in English). ["Little is known about the diversity of tropical animal communities in recently fireaffected environments. Here we assessed species richness, evenness, and community similarity of butterflies and odonates in landscapes located in unburned isolates and burned areas in a habitat mosaic that was severely affected by the 1997/98 ENSO (El Nino Southern Oscillation) event in east Kalimantan, Indonesian Borneo. In addition related community similarity to variation in geographic distance between sampling sites and the habitat/vegetation structure Species richness and evenness differed significantly among landscapes but there was no congruence between both taxa. The species richness of butterflies was, for example, highest in sites located in a very large unburned isolate whereas odonate species richness was highest in sites located in a small unburned isolate and once-burned forest. We also found substantial variation in the habitat/vegetation structure among landscapes but this was mainly due to variation between unburned and burned landscapes and variation among burned landscapes. Both distance and environment (habitat/vegetation) contributed substantially to explaining variation in the community similarity (beta diversity) of both taxa. The contribution of the environment was, however, mainly due to variation between unburned and burned landscapes, which contained very different assemblages of both taxa. Sites located in the burned forest contained assemblages that were intermediate between assemblages from sites in unburned forest and sites from a highly degraded slash-and-burn area indicating that the burned forest was probably recolonised by species from these disparate environments. We, furthermore, note that in contrast to species richness (alpha diversity) the patterns of community similarity (beta diversity) were highly congruent between both taxa. These results indicate that community-wide multivariate measures of beta diversity are more consistent among taxa and more reliable indicators of disturbance, such as ENSO-induced burning, than univariate measures." (Authors)] Address: Cleary, D.F.R., Inst. for Biodiversity and Ecosystem Dynamics, Univ. of Amsterdam, PO Box. 94766, NL-1090 GT Amsterdam, the Netherlands. E-mail: cleary@science.uva.nl
- 4444.** Conze, K.-J. (2004): Der Arbeitskreis Libellen NRW. *LÖBF-Mitteilungen* 2/2004: 50. (in German). [Brief report on the current activities of the working group Odonata in Nordrhein-Westfalen, Germany.] Address: Conze, K.-J., Listerstr. 13, D-45147 Essen, Germany. E-mail: Klaus-Juergen.Conze@t-online.de
- 4445.** [Corbet, P.S.] (2004): International Members of the ESO. *Entomological Society of Ontario Newsletter* 8(2): 9. (in English). [Verbatim: The Entomological Society of Ontario is not limited to residents of Ontario by any means. We have members across Canada and currently have about a dozen US members and half a dozen from other countries. International members were recently queried about their entomological activities abroad. Their replies will appear in the ESO newsletter

as space permits. Philip Corbet's reply is further proof that entomologists never really retire: Philip S. Corbet, Crean Mill, St Buryan, Cornwall, UK I left Canada, for a position in New Zealand, in 1974 and moved to UK in 1980. I retired from my position as Professor of Zoology and Head of the Department of Biological Sciences, University of Dundee in 1986. From then until 1996 I was given an Honorary Faculty position at the University of Edinburgh where I wrote a book *Dragonflies. Behaviour and Ecology of Odonata*, published by Cornell University Press and Harley Books (UK) in 1999. Since 1996 I have been living in an 18th Century converted mill house, the grounds of which I share with 15 species of butterfly and 11 species of dragonfly, the latter being encouraged to breed there by the presence of a pond and stream. My house is in West Cornwall, not far from Land's End where the climate is markedly milder than most of the British Isles. I devote my spare time to work for the Worldwide Dragonfly Association, travelling, and writing up (unpublished) work on mosquitoes, caddisflies and dragonflies. I also collaborate on joint research projects on dragonflies and mosquitoes. I work in a voluntary capacity for the Cornwall Wildlife Trust, serving on Council and the Executive, and chairing the Conservation Strategy Committee.] Address: Corbet, P.S., Crean Mill, Crean, St Buryan, Cornwall, TR19 6HA, UK. E-mail: pscorbet@creanmill.u-net.com

**4446.** Córdoba-Aguilar, A.; Siva-Jothy, M.T. (2004): Sperm displacement ability in *Calopteryx haemorrhoidalis* (Vander Linden): male and female roles, male limits in performance, and female neural control (Zygoptera: Calopterygidae). *Odonatologica* 33(3): 245-252. (in English). ["During copulation, *C. haemorrhoidalis* males displace the sperm of rivals stored by the female. During displacement, sperm stored in 2 spermathecae are ejected by the female as a consequence of male genitalic stimulation: the aedeagus distorts 2 vaginal plates in which mechanoreceptive sensilla are embedded. The sensilla control spermathecal sperm release and a wider aedeagus displaces more sperm. There is variation between females in their sensillum number which might also affect sperm displacement rate. The role of sensillum number and aedeagal width in sperm displacement variation in copulations whose duration was controlled was investigated. Results indicated that only aedeagal width could predict sperm displacement variation. The neural communication between the vaginal plates and both spermathecae was also examined. Previous observations suggested a "lateral" control of sperm ejection between each vaginal plate and its corresponding spermatheca. This was corroborated by stimulating the mechanoreceptive sensilla of females that underwent different surgical treatments: only those females whose vaginal plate nerves were cut, showed no volumetric decline in sperm in the corresponding spermatheca. Finally, the effect of copula duration (number of aedeagal copulatory movements) on sperm ejection was experimentally examined. In natural conditions, males perform approximately 50 aedeagal movements during copulation. There was no difference in sperm volumes between the pairs of females that were subjected to 50 and 80 aedeagal movements of stimulation using the same aedeagus. These results help to understand the nature of the spermathecal sperm displacement mechanism in this species." (Authors)] Address: Córdoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P.

69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico  
E-mail: acordoba@uaeh.reduaeh.mx

**4447.** Daigle, J.J. (2004): *Metaleptobasis lillianae* spec. nov. from Bolivia (Zygoptera: Coenagrionidae). *Odonatologica* 33(2): 195-198. (in English) ["The new species is described and illustrated. Holotype male and allotype female (in copula): Bolivia, Cochabamba Department, Chapare prov., lake 2.5 km W of Villa Tunari gate on Hwy 4, 12-XI-2001; both deposited in U.A.G.R.M. in Santa Cruz, Bolivia. Males are characterized by the knobbed shaped paraprocts, and the homochromatic females by their black ovipositor. Both can be distinguished from other congeneric species by their dark, almost black terminal abdominal segments." (Author)] Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**4448.** D'Amico, F.; Darblade, S.; Avignon, S.; Blanc-Manel, S.; Ormerod, S.J. (2004): Odonates as indicators of shallow lake restoration by liming: Comparing adult and larval responses. *Restoration ecology* 12(3): 439-446. ["Odonate assemblages were compared between replicate sets of shallow lakes that had been created and acidified by open-cast mining across a large area (2,451 ha) of southwest France (Arjuzanx, Landes); one set of lakes (n = 5) was experimentally restored by liming with calcium carbonate, whereas another group (n = 5) was left as untreated reference lakes. Both odonate adults and exuviae were sampled bimonthly during May August 1998. Elevated turbidity and conductivity in limed lakes were the only physicochemical measures differing between restored and reference lakes, because deacidification occurred naturally, even in reference lakes during the 17 years after the onset of restoration. Restoration by liming can apparently lead to effects on lake turbidity that might be considered adverse. Twenty-four and 19 odonate species occurred among adults and exuviae, respectively, but there were no significant differences in richness between restored and reference sites. However, significantly, more exuviae were collected from the reference sites (588 vs. 180), where exuvial diversity and rank abundance indicated more evenly structured assemblages than those in restored lakes. Ordination showed that adult assemblages differed significantly between restored and reference lakes, and varied highly significantly with lake turbidity. This effect occurred because a small group of generally scarce adults were characteristic of reference sites (*Chalcolestes viridis*, *Lestes virens*, *Cordulia aenae*, *Leucorrhinia albifrons*, and *Sympetrum sanguineum*). Exuviae of these same species were less abundant at restored sites, but exuvial assemblages overall did not discriminate between restored and reference lakes. We conclude that lake restoration by liming can reduce diversity and larval numbers among odonates and subtly affects adult assemblages. In this case study, adult assemblages discriminated best between the lake types involved in the experiment, but important additional information arose from exuvial abundance and structure. This study indicates that natural recovery processes after acidification in formerly open-cast areas rather than chemical intervention through liming might lead to preferable conservation outcomes." (Authors)] Address: Ormerod, S.J., Cardiff Univ, Sch Biosci, POB 915, Cardiff CF10 3TL, S Glam, Wales

- 4449.** De Block, M.; Stoks, R. (2004): Life history responses depend on timing of cannibalism in a damselfly. *Freshwater Biology* 49(6): 775-786. (in English). ["1. Cannibalism has often been suggested as an important mechanism to reach the necessary developmental stage and size before a critical time horizon is reached, but this role has been largely unexplored. We studied effects of cannibalism on the life history of the damselfly *Lestes viridis* under combinations of a time constraint (by manipulating the perceived time available in the growth season) and a biotic constraint (density). 2. Larvae had a faster development and growth rate when reared at high time stress (late photoperiod). They also had a higher growth rate and mass at emergence when cannibalism occurred (density 2 and 4). Cannibalism occurred earlier at higher density. Accelerated life history responses (faster development and growth rate) and a higher mass at emergence were dependent upon the timing of cannibalism. Responses were more pronounced or only present if cannibalism occurred early in the larval period. 3. Our data suggest that cannibalism may not only act as a lifeboat mechanism by enabling cannibals to survive detrimental ecological conditions, but may also act as a compensatory mechanism to keep life history variables near-optimal at life history transitions, even under sub-optimal conditions." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be
- 4450.** De Knijf, G. (2004): Libellen. In: Provoost, S. & Bonte, D. (red.) *Levende Duinen: een overzicht van de biodiversiteit aan de Vlaamse kust. Mededelingen van het Instituut voor Natuurbehoud* 22, Brussel: 298-311. (in Dutch, with English summary). [Flanders, Belgium; "Although dragonflies can certainly not be classified as a typical insect family of the coastal dunes, several species occur in dune slacks, pools and at the inner dune front. Twenty seven species have been recorded. Four of them are threatened in Flanders: *Sympecma fusca*, *Lestes dryas*, *Ischnura pumilio*, and *Coenagrion pulchellum*. The only population of *Coenagrion scitulum* know for Flanders, is found in the Houtsaecenouinen (De Panne). The restoration of OPEN water habitats at the inner dune front would probably increase the importance of the dune area for dragonflies in Flanders." (Author)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de.knijf@instnat.be
- 4451.** De Marco, P.; Resende, D.C. (2004): Cues for Territory Choice in Two Tropical Dragonflies. *Neotropical Entomology* 33(4): 397-401. (in English, with Portuguese summary). ["Classifications in mate systems of Odonata are generally based in the male ability to control the female access to oviposition resources. In this paper we discuss the criteria for male territory selection in the dragonflies *Perithemis mooma* Kirby and *Orthemis discolor* (Burmeister) (Libellulidae), in Viçosa, Brazil, controlling the availability of perches and aquatic vegetation. *P. mooma* males defended territories with vegetation and thus their choice was probably related to the oviposition resource of the females. *O. discolor* males preferred sites with tall perches, possibly because their choice was related to a mate-seeking resource. Interactions with another libellulid more active and aggressive, *Planiplax phoenicura* (Ris), changed the preference of *O. discolor* males to vegetated areas highlighting the influence of community composition and interactions on territorial site selection." (Authors)] Address: De Marco, P., Lab. Ecologia Quantitativa, Depto. Biologia Geral, Universidade Federal de Viçosa, 36571-000, Viçosa, MG, Brasil. E-mail: pdemarco@mail.ufv.br;
- 4452.** De Marmels, J. (2004): *Heteragrion makiritare* sp. nov., with descriptions of hitherto unknown females and larvae of other species from Venezuela (Odonata: Megapodagrionidae, Lestidae). *International Journal of Odonatology* 7(3): 439-458. (in English). ["*Heteragrion makiritare* sp. nov. is described from two males from the Pantepui region - holotype: Venezuela, Amazonas State, Marahuaka, Sima (3°43'N, 65°31'W), 1,140 m a.s.l., MIZA, no. 17250. It belongs in the species group whose paraprocts are absent in the male sex. The identity of *H. macilentum* is elucidated by examining its lectotype and a syntype, which resulted to be not conspecific. The females of *H. breweri* and *Philogenia ferox* are described for the first time. The ultimate instar exuviae of *H. bariai*, *H. breweri*, *H. chlorotaeniatum* and *H. mitratum* are figured and compared. Figures of the female intersternite of these species, and of *H. pemon*, are provided. The larva of *Sciotropis cyclanthorum*, as well as the ultimate instar exuviae of *Archilestes tuberculatus* and *Lestes apollinaris* are described and illustrated." (Author)] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com
- 4453.** Dewick, S. (2004): An update on the continued succes of Small Red-eyed Damselfly *Erythromma viridulum* (Charpentier) at its first known British sites. *Atropos* 21: 14-15. (in English). [On 17 July 1999 the first specimen of *E. viridulum* and a colony of the species were detected in "an area of unspoilt countryside in Essex", UK. The population dynamic of the succeeding years, including a decrease, is documented. Dispersal and use of terrestrial habitats are briefly discribed.] Address: Dewick, S.; Curry Farm, Bradwell-on-Sea, Southminster, Essex, CM20 7HL, UK
- 4454.** Dewick, S. (2004): Reports from Coastal Stations - 2003: Bradwell-on-Sea, Essex. *Atropos* 21: 60-63. (in English). [United Kingdom; a list of 18 odonate species is communicated including *Erythromma najas*, *E. viridulum* ("excellent year"), and *Brachytron pratense* ("disasterous year" for this species).] Address: Dewick, S.; Curry Farm, Bradwell-on-Sea, Southminster, Essex, CM0 7NL, UK
- 4455.** Dijkstra, K.-D.; Clausnitzer, V. (2004): Critical species of Odonata in Madagascar. *International Journal of Odonatology* 7(2): 219-228. (in English). ["Madagascar has approximately 175 species of Odonata. Of the Anisoptera ca 60% is endemic and of the Zygoptera almost 95%. The endemic species can roughly be separated into 'new endemics' that are probably recent arrivals from the African mainland and 'old endemics'. The latter group includes many members of the families Megapodagrionidae, Platycnemididae and Corduliidae, which are much more diverse here than on the African continent. Many of these species belong to endemic genera and appear to be restricted to rainforest habitat. The rate of deforestation on Madagascar is alarming, and therefore the majority of 'old endemics' is potentially threatened. One hundred and eleven species, 64% of the fauna, are listed as being of primary concern and



their conservation status needs to be assessed immediately. Research on Madagascar's Odonata is urgently needed in all aspects from basic inventories and systematic work to studies on ecology, biogeography and conservation related issues." (Authors)] Address: Clausnitzer, Viola, Liebenauer Str. 180, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de

**4456.** Dijkstra, K.-D.; Vick, G.S. (2004): Critical species of Odonata in western Africa. *International Journal of Odonatology* 7(2): 229-238. (in English). ["Western Africa - defined as the tropical area from Cameroon westwards - probably has the richest odonate fauna in Africa, particularly the region of (and around) the Cameroon highlands. This region is home to many relict and endemic species, such as the continent's only representatives of the families Amphipterygidae and Perilestidae. Previous selections of threatened West African Odonata have been arbitrary because it is impossible to differentiate between species that are genuinely endangered and those which are simply data-deficient. Many listed species just appear to be difficult to record or have been taxonomically confused; some 'endangered species' have already dissolved into synonymy. A revised and probably more complete selection of species requiring attention is provided, but because the source data is so scanty it remains subjective. Species in Gomphidae and Corduliidae are not included, as the knowledge of their taxonomy and distribution is particularly problematic at present. Many listed species may prove to be of minor concern once more research in the field and in the museum has been done. It is argued that if rainforest reserves (existing in most nations discussed) are maintained, the great majority of West Africa's unique Odonata will be protected. Although most rare species are probably stenotopic rainforest inhabitants, open landscapes also harbour a rich and potentially endangered odonate fauna." (Authors)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**4457.** Dijkstra, K.D. (2004): Dragonflies (Odonata) of Mulanje, Malawi. *IDF-Report* 6: 23-29. (in English). ["65 species of Odonata are recorded from Mulanje and its slopes. Only eight species dominate on the high plateau. Among them are two relict species of conservation concern: The endemic *Oreocnemis phoenix* (monotypic genus) and the restricted-range species *Chlorolestes elegans*. The absence of mountain marsh specialists on the plateau is noteworthy. Mulanje's valleys, of which Likabula and Ruo are best known, have a rich dragonfly fauna. The Eastern Arc relict *Nepogomphoides stuhlmanni* is common here." (Author)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands, dijkstra@nnm.nl

**4458.** Dijkstra, K.-D.; Kisakye, J.J. (2004): *Idomacromia jillianae* sp. nov. from Uganda (Odonata: Corduliidae). *Int. Journal of Odonatology* 7(3): 459-466. (in English). ["*Idomacromia jillianae* sp. nov. (holotype female: Uganda, Kabale District, Ruhija, 1°02'59"S, 29°45'29"E, 2,100 m a.s.l., 24 v 2003) is described on the basis of two females from Bwindi Impenetrable National Park, Uganda, and compared with the known species of this elusive genus." (Authors)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**4459.** Donnelly, N. (2004): *Erythemis simplicicollis* and *collocata* - subspecies? *Argia* 15(4): 11-13. (in English). ["On the basis of these measurements I conclude that *simplicicollis* and *collocata* are putatively subspecies, which is to say, that genes are flowing freely between western and eastern populations. Are there alternative interpretations? The species could be distinct, with no free flow of genes, and with more specimens a break into two populations might become clear. Alternatively, the two species could be distinct, but could intergrade broadly (indeed, almost universally) in a broad zone. If this is the case (which is a very uncommon case demonstrated in only a few Odonata and relatively few other organisms), then there would have to be some basis for showing the species are really distinct I have posited mis for northeastern *Enallagma cyathigerum* and *venale*, and for mid-western *Tetragonearia cynosura* and *costalis*, but in these cases there was some additional evidence (different habits, distinct habitats, coexistence of both individuals of both species in some occurrences of the two.)" (Author)] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**4460.** Donnelly, T.W. (2004): Distribution of North American Odonata. Part III: Calopterygidae, Lestidae, Coenagrionidae, Protoneuridae, Platystictidae with data sources and bibliography, parts I-III. *Bull. American Odonatology* 8(2-3): 33-99. (in English). [133 dot maps with data of 5 odonate families, *Gomphus parvidens*, and *Brachymesia furcata* are showing the present knowledge of species distribution in the USA. Some taxonomical problems resulting from intergradation between taxa are discussed, and an extensive bibliography is added.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**4461.** Dumont, H.J. (2004): Dragonflies from Azerbaijan. *Zoology in the Middle East* 31: 87-92. (in English, with German summary). ["Thirty-two species of dragonflies were recorded from Azerbaijan in late spring 2002. We estimate the true species richness to be about 45-50 species. Several of these are first records for the Caucasus region or for the Eastern Caucasus subregion. Two forms of *Calopteryx splendens* were found, separated by the valley of the lower Kura, of which only *C. splendens intermedia* occurs in the so-called southern and lower Kura. *C. s. orientalis* occurs on rivers that drain the Talysh hills directly to the Caspian, but there is some phenotypic evidence of hybridization with *intermedia* south-west of the Kura, where the lower River Vilescay approaches rather close to the Kura. A few species are salt-tolerant and may be outliers from populations further north and east. Others are derived from Iran. Two members of the *Coenagrion puella* group are recorded; they occur within 50 km of each other, so that Azerbaijan is part of the zone where the two meet. A blue male of *Aeshna cyanea* is recorded. This may be the first case in Odonata of a rare point mutation that causes wild-type green animals to occur in a blue form." (Author) colour mutation] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

**4462.** Dunkle, S.W. (2004): Critical species of Odonata in North America. *International Journal of Odonatology* 7(2): 149-162. (in English). ["Of the approximately

439 species of Odonata known from North America, north of Mexico, comments on 25 species (6%) of conservation concern are given. Species deemed to be under the most threat are *Ischnura gemina*, *Gomphus sandrius*, *Ophiogomphus australis*, *Stylurus potulentus*, and *Libellula jesseana*. Two other species not under threat, *Neurocordulia michaeli* and *Somatochlora brevicincta*, are briefly discussed because of their conservation interest. Some geographical clumping of species under threat is discussed, in southeastern Arizona, coastal New England, and the central Gulf of Mexico Coast." (Author)] Address: Dunkle, S.W.; Biology Dept, Collin County Community College, Spring Creek Campus, Plano, Texas, USA 75074. E-mail: sdunkle@ccccd.edu

**4463.** Dunkley, J. (2004): Four-spotted Chaser *Libellula quadrimaculata* form *praenubia*. *Atropos* 23: 56. (in English). [Billing gravel pit, Northamptonshire, UK, without date.] Address: Dunkley, J., 10 Stonelea Road, Sywell, Northampton, NN6 0AZ, UK

**4464.** Dyatlova, E.S. (2004): New records of *Cercion lindenii* (Odonata, Coenagrionidae) in the basins of lower Danube, Dniestr and Dnieper Rivers in the south of Ukraine. *Vestnik zoologii* 38(5): 10. (in English). [Verbatim: Detailed information on *Cercion lindenii* (Selys, 1840) was given in the second edition of "The Dragonflies of Europe" by R. R. Askew (2004). On the territory of the former USSR this Mediterranean species is known from Caucasian Black Sea coast and, probably, from Armenia (Popova, 1953). Akromovski (1975) recorded rare local population in the Armenian river Metsamor (Kalkman et al, 2004). Three specimens of *C. lindenii* were firstly recorded for Ukrainian fauna by R. S. Pavlyuk (1981) in the lower Danube (Odessa province, the vicinity of Vil'kovo). The scarce earlier data on the regional occurrence of *C. lindenii* in the lower Danube were confirmed later (Gorb, Ermolenko, 1996) in SW Ukraine, Danube delta, Odessa Province, Kilijsky District, Primorskoje village. The species was included into Ukrainian Red Book (1994) with the status of 1st category of conservation. Our investigations showed that *C. lindenii* occur much wider in Danube delta and was firstly found in the basins of other rivers (lower Dniestr and Dnieper delta). There are following new records of *C. lindenii* in the Ukraine. Odessa Province, Bolgrad District, lake Yalpug, near Vinogradovka village. 13.07.03, 2 males. Odessa Province, Ismail District, Ismail city, near "Krepost", little pond near the Danube shore. 17.07.03, female. Odessa Province, Belyaevsky District, Mayaki village, lower Dniestr river. 12.06.04, male (teneral). Cherson Province, Golopristansky District, surroundings of village Staraya Zbur'evka, zaliv "Zbur'evskij Kut". 1.08.04, male; 2.08.04, female. Cherson Province, Golopristansky District, surroundings of Golaya Pristan', Dnieper delta, Konkha River, Belogradj Island. 3.08.04, 3 males; 4.08.04, 2 female and 8 males (7 mature and 1 teneral). Active mating of damselflies was observed in this period. Hie tandems and single individuals were found above the water surface and on the semi-aquatic plants.] Address: Dyatlova, Elena, French Boulevard 37, apt 3, Odessa, Ukraine

**4465.** Dyatlova, E.S. (2004): The first record of *Coenagrion scitulum* (Odonata, Coenagrionidae) in the south-western part of Ukraine. *Vestnik zoologii* 38(5): 10. (in English). [Verbatim: *C. scitulum* is a common species in the Mediterranean region of Europe and

North Africa, extending from Spain (north-east) and Morocco to the Middle East. It is local in central Europe and very rare in the north (Askew, 2004). It can be found near ditches, dykes, weedy eutrophic ponds, small streams and frequently in water with a slight flow (Boulard, 1981). In the Ukraine it was recorded only from Crimea by a few records (Bartenev, 1912). One male (16.06.2004) and one female (18.06.2004) of this species were firstly found in the coastal part of Odessa (north-western part of the Black Sea). The distribution of this rare species in the Ukraine is much wider than it was known before.] Address: Dyatlova, Elena, French Boulevard 37, apt 3, Odessa, Ukraine

**4466.** Ellzey, K.D. (2004): First state record of *Gomphus militaris* in Louisiana. *Argia* 16(2): 24. (in English). [USA, Louisiana, 18-V-2004.] Address: Ellzey, K.D., 3416 Gum Springs Loop. Hornbeck, LA 71439, USA

**4467.** Emary, C.; Emary, L. (2004): The domestic cat: a regular dragonfly predator?. *J. Br. Dragonfly Soc.* 20(1): 22. (in English). [Two additional observations of dragonfly chasing / preying of domestic cats from UK.] Address: Emary, C., 12 Norton Crescent, Towcester, Northamptonshire NN12 6DN, UK

**4468.** Frolich-Strong, K.; Robinson, G. (2004): Odonate communities of acidic Adirondack Mountain lakes. *Journal of the North American Benthological Society* 23(4): 839-852. (in English). ["New York State's fauna is exceptionally rich in odonates (dragonflies and damselflies), whose lengthy aquatic larval phases render them susceptible to effects of lake acidification, including the loss of fish. We used a collection of benthic macroinvertebrate samples taken by the Adirondack Lakes Survey Corporation to compare odonate communities in 460 lakes. Half were from the Adirondack Mountains, where acid neutralizing capacity (ANC) is low (mean ANC = 108.0 µg/L) and Al concentrations are high (mean Al = 111.61 µg/L), and half were from the Lower Hudson Valley, where ANC is significantly higher (mean ANC = 554.6 µg/L) and Al is significantly lower (mean Al = 0.049 µg/L). Many more lakes in the Adirondack lakes were fishless (52) compared to the lower Hudson (3), and the pH in Adirondack fishless lakes was an order of magnitude lower than the pH of Adirondack lakes with fish. Ninety-nine odonate taxa were identified (86 to species). In Adirondack samples, co-occurrence patterns were correlated with presence or absence of insectivorous fish and with acidic waters. Similar patterns were not apparent in Lower Hudson Valley samples. In Adirondack samples, richness of common taxa (found in 20 lakes) was higher in lakes with fish than in lakes without fish, regardless of pH. Loss of fish may enhance the top predator role of large larval dragonflies, causing change in odonate community structure, an interpretation consistent with previous research. Acidification of Adirondack lakes appears to promote a nonrandom subset of possible odonate communities, with negative implications for regional diversity." (Authors)] Address: Frolich Strong, Karen, Conservation and Policy, Department of Biological Sciences, State University of New York at Albany, 1400 Washington Avenue, Albany, New York 12222 USA

**4469.** Gäde, G.; Marco, H.G. (2004): Adipokinetic hormones in Odonata are group-specifically distributed. Abstracts: 5th International Symposium on Tropical Biology. SATELLITE EVENTS: 6th International Symposi-

um on the Chrysomelidae; Workshop on African Odonata (Edited by Bernhard A. Huber); Zoologisches Forschungsinstitut und Museum Alexander Koenig, Adenauerallee 160, 53113 Bonn, Germany: 33. (in English). [Verbatim: "Peptides that regulate the level of circulating metabolites in energy metabolism of insects are synthesized in intrinsic neurosecretory cells of the corpora cardiaca. These neuropeptides have 8 to 10 amino acid residues, function as hormones and are named according to the specific metabolites that are affected when the neurohormone is injected into the insect or upon the stimulus of flight: i.e. adipokinetic (elicits elevation of diacylglycerols), hypertrehalosaemic (increases trehalose), and/or hyperprolinaemic (elevates proline levels). It is known that Odonata use lipids during flight and they, therefore, show an adipokinetic response to the specific hormones in the corpora cardiaca. In the current study, the adipokinetic hormone (AKH) was isolated and structurally characterized from various families of Odonata occurring in South Africa; some representatives from Europe, North America and Japan were also included. Sequences were compared to ascertain whether a specific pattern existed across families. All members from various zygopteran families, viz. Calopterygidae, Lestidae, Synlestidae, Chlorocyphidae, Platycnemididae and Coenagrionidae contain the same peptide, denoted Psi-AKH (sequence: pEVNFTPGWamide). The living fossil, the Japanese anisozygopteran species *Epiophlebia superstes*, contains the peptide denoted Ani-AKH (sequence differs from Psi-AKH: S5 instead of T5, and S7 instead of G7). Ani-AKH is also found in the anisopteran families Aeshnidae, Cordulegastridae and Corduliidae. In the anisopteran families Gomphidae and Libellulidae the main AKH peptide is Lia-AKH (sequence is similar to Psi-AKH: S7 instead of G7). Curiously, in one species of Libellulidae, the N. American *Erythemis simplicicollis*, a variant of Lia-AKH was sequenced containing a conservative L2 exchange instead of V2." (Authors)] Address: Marco, Heather G., Zoology Department, University of Cape Town, ZA-7701 Rondebosch, South Africa. E-mail: hmarco@bot-zoo.uct.ac.za

**4470.** García, G.; Dijkstra, K.D. (2004): Odonata collected in the Ankarafantsika National Park, Madagascar. IDF-Report 6: 7-22. (in English). ["Records of 33 species of Odonata from Ankarafantsika National Park are presented. Four additional species have been reported in the literature. Nineteen species are recorded from the site for the first time. The site is the largest remaining block of dry forest in Madagascar's Western Region. While 80% of Madagascar Odonata species are endemic, only 40% of the species recorded in Ankarafantsika is endemic. Moreover, the endemics recorded are mostly common throughout the island. The dry forests are thus of relatively little importance for Madagascar's diversity of Odonata." (Authors)] Address: García, G., Durrell Wildlife Conservation Trust, Les Augres Manor, Trinity, Jersey JE35BP, Channel Islands, UK, gerardo.garcia@durrell.org

**4471.** Garrison, R.W.; Ellenrieder, N. von (2004): *Orthemis sibylla*, a junior synonym of *O. ambirufa* (Odonata: Libellulidae). International Journal of Odonatology 7(3): 467-470. (in English). ["*Orthemis sibylla* is shown to be a junior synonym of *O. ambirufa*, based on a comparison of the holotype male of *O. ambirufa* with voucher specimens in the UMMZ identified as *O. sibylla* by Ris and specimens of this species from French

Guiana and Venezuela in the RWG collection. Diagnostic characters of the male holotype of *O. ambirufa* are illustrated, and compared with those of *O. lev is*." (Authors)] Address: Garrison, R.W., Research Associate, Natural History Museum of Los Angeles County, Exposition Boulevard 900, CA 90007, USA. E-mail: rwgarrison@earthlink.net

**4472.** Gerhard, A.; Janssens de Bisthoven, L.; Soares, A.M.V.M (2004): Macroinvertebrate response to acid mine drainage: community metrics and on-line behavioural toxicity bioassay. Environmental Pollution 130: 263-274. (in English). [Portugal. "The hypothesis is tested that toxicity of acid mine drainage can be detected by a selection of existing macroinvertebrate community and bioindicator metrics supplemented by toxicity tests with the local mosquitofish *Gambusia holbrooki* Girard and the shrimp *Atyaephyra desmaresti* Millet. The behavioural responses of *A. desmaresti* to acid mine drainage were recorded in the Multispecies Freshwater Biomonitor, based on behaviour and survival as parameters. Bioassessment methods were based on community diversity, structure, function, and bioindicators and supplemented by chemical analysis (temperature, pH, metals). The Biological Monitoring Working Party adapted for the Iberian Peninsula, the number of predators (Coleoptera, Hemiptera) and the number of Ephemeroptera and Trichoptera taxa differentiated the sites well. The on-line toxicity test revealed pH-dependent acute toxicity of the acid mine drainage for the shrimp (LC50-48 h: pH-AMD=5.8) and a pH-dependent decrease in locomotory activity with the lowest-observed-response-times (LORTs) within 5 h of exposure. Shrimp were more sensitive to acid mine drainage than fish (LC50-48 h: pH-AMD=4.9). A new multimetric index combining toxicity testing and bioassessment methods is proposed." (Author) Some Odonata are listed on the genus or family level including "*Epitheca* sp." for Portugal which is more than questionable.] Address: Gerhardt, A., LimCo International, An der Aa 5, D-49477 Ibbenbüren, Germany. E-mail: limco.int@t-online.de

**4473.** Gibbs, K. E.; Bradeen, B.; Boland, D. (2004): Spatial and Temporal Segregation Among Six Species of Coexisting *Ophiogomphus* (Odonata: Gomphidae) in the Aroostook River, Maine. Northeastern Naturalist 11(3): 295-312. (in English). ["Spatial and temporal segregation of six coexisting species of *Ophiogomphus* (*O. anomalus*, *O. aspersus*, *O. carolus*, *O. howei*, *O. mainensis*, and *O. rupinsulensis*) were studied in a 137.7 km reach of the Aroostook River in northern Maine. Collections of exuviae showed that *O. mainensis* was most abundant and dominated the assemblage at sites in the upper reaches of the study area and was in low numbers and percent of total *Ophiogomphus* at sites in the lower reaches of the study area. *Ophiogomphus rupinsulensis* was most abundant and dominated the assemblage at sites in the lower reaches of the study area but was absent or in low numbers and percent of total *Ophiogomphus* at sites in the upper reaches. *Ophiogomphus anomalus* and *O. carolus* were present at all sites and *O. anomalus* was generally more abundant and made up a higher percent of the total *Ophiogomphus* spp. than *O. carolus*. *Ophiogomphus howei* and *O. aspersus* were present at only a few sites in low abundance and percent of the total *Ophiogomphus*. Several species of *Ophiogomphus* coexisted as larvae in 0.20 m<sup>2</sup> areas of the substrate. There was little evi-



dence of temporal segregation among the six species. All species had short seasonal emergence periods in June. Diel emergence was during the morning and early afternoon. Timing of seasonal and diel emergence either differed little or not at all among the six species. Species that we were able to identify in all larval stages (*O. mainensis*, *O. anomalus*, and *O. howei*) were present in a wide range of instars on all sampling dates (May to October) suggesting overlapping generations and multivoltine life histories. In all six species, some larvae remained in the final instar for almost a year before emerging as adults." (Authors)] Address: Gibbs, K. Elizabeth

**4474.** Gibson, V. (2004): Wing clapping in the Blue-tailed Damselfly *Ichnura elegans* (Vander Linden). *J. Br. Dragonfly Society* 20(2): 70-72. (in English). ["Wing clapping by the male during copulation has been described in two species of Anisoptera, *Aeshna mixta* Latreille and *A. juncea* (L.) (Gibson, 2003). This behaviour is now reported from a species of Zygoptera, *I. elegans*. The manner of wing clapping differs between this damselfly and the two species of dragonflies." (Author)] Address: Gibson, V., 1 Pebley Cottages, Barlborough, Chesterfield, Derbyshire S43 4TG, UK

**4475.** Goddard, D. (2004): Dragonfly Conservation from BDS. *Atropos* 21: 82. (in English). [Brief report on the Exuviae Loan Scheme of the British Dragonfly Society.] Address: Goddard, D., 30 Cliffe Hill Avenue, Stapleford, Nottingham NG9 7HD, UK. E-mail: davidgoddard8@ntlworld.com

**4476.** González-Soriano, E.; Delgado-Hernández, O.; Harp, G.L. (2004): Biological notes on *Neoerythromma gladiolatum* Williamson & Williamson, 1930 with description of its female (Zygoptera: Coenagrionidae). *Odonatologica* 33(3): 327-331. (in English). ["The female is described and compared with that of *N. cultellatum* (Hagen in Selys, 1876). A key to separate the females of both species and notes on the taxonomy, biology and distribution of *N. gladiolatum* are provided." (Authors)] Address: Gonzalez-Soriano, E., Depto Zoologia, Inst. Biol., Universidad Autonoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail. i-biologia.unam.mx

**4477.** Graf, R.; Bolzern, H.; Rösli, T. (2004): Können auf Golfplätzen Naturschutzziele erreicht werden? - Eine Erfolgskontrolle in Holzhäusern (Kanton Zug, Schweiz). *Naturschutz und Landschaftsplanung* 36(10): 311-320. (in German with English summary). [The ecological diversity in a landscape before and after the construction of a golf course in Switzerland was surveyed including Odonata. It is stated that in general an improvement of ecological conditions has to be identified. *Crocothemis erythraea*, *Erythromma viridulum*, *Orthetrum albistylum*, *Ichnura pumilio*, *O. brunneum*, and *Sympetrum depressiusculum* are listed, indicating that at the stage of survey, immediately after the construction of the course, odonate species of early successional stages of water bodies were favoured.] Address: Graf, R., Schweizerische Vogelwarte, CH-6204 Sempach, Switzerland. E-mail: graf@vogelwarte.ch

**4478.** Gunzburger, M.S.; Travis, J. (2004): Evaluating predation pressure on green treefrog larvae across a habitat gradient. *Oecologia* 140(3): 422-429. (in English). ["The effect of a predator on the abundance of a prey species depends upon the predators abundance

and its ability to capture that prey. The objectives of this research were to evaluate the community structure of predators of green treefrog (*Hyla cinerea*) tadpoles across habitat types and evaluate the effectiveness of individual predators on *H. cinerea* tadpoles. Correspondence and cluster analyses of predator frequencies across 23 aquatic habitats indicated that the majority of variance in predator communities was due to a division between permanent and temporary habitats. Experimental work demonstrated that survival of the smallest *H. cinerea* tadpoles was significantly lower than survival of medium and large tadpoles with the most effective predators, indicating that *H. cinerea* tadpoles attain a refuge from predation at larger body sizes. We combined the effectiveness of predators in experiments with the abundance of each predator species from the predator community survey to demonstrate that predation pressure on *H. cinerea* tadpoles is higher in temporary ponds. This pattern may explain in part why this species generally breeds successfully only in permanent habitats. It also confirms that discussions about an increasing gradient of predation pressure from temporary to permanent aquatic habitats should be restricted to individual prey species for which such a gradient has been demonstrated." (Authors) *Anax junius* and *Traema lacerata* were the most effective predators on *H. cinerea*.] Address: Gunzburger, Margaret S., Department of Biological Science, Florida State University, Tallahassee, FL 32306-1100, USA. E-mail: gunz@bio.fsu.edu

**4479.** Hacet, N.; Aktaç, N. (2004): Considerations on the odonate fauna of Turkish Thrace, with some taxonomic notes. *Odonatologica* 33(3): 253-270. (in English). [The odonate fauna of Turkish Thrace (52 species / subspecies) is discussed, based on 40 taxa gathered during 1997-1999 from 86 localities. *Lestes macrostigma*, *Enallagma cyathigerum*, *Anaciaeschna isosceles antehumeralis*, *Anax ephippiger*, *Onychogomphus f. forcipatus*, *Cordulegaster i. insignis*, *Pantala flavescens*, and *Sympetrum pedemontanum* are new to this part of Turkey. Among the taxa discussed in some detail are *Calopteryx splendens amasina*, *Chalcolestes parvidens*, *Lestes v. virens* / *L. virens vestalis*, *Ichnura elegans ebneri* / *I. e. pontica*, *Gomphus vulgatissimus* / *G. schneiderii*, *Onychogomphus f. forcipatus* / *O. f. albotibialis*, *Somatochlora meridionalis*, *Libellula fulva* / *L. pontica*, and *Orthetrum c. coerulescens* / *O. c. anceps*. Some identification errors in earlier publications are corrected.] Address: Aktaç, N., Dept of Biology, Faculty of Arts and Sciences, Thrace University, TR-22030 Edirne, Turkey. E-mail: nihata@trakya.edu.tr

**4480.** Hämäläinen, M. (2004): Critical species of Odonata in Thailand and Indochina. *International Journal of Odonatology* 7(2): 295-304. (in English). ["The report provides a summary of our present knowledge of the odonate diversity (over 500 species) in the region and some general data on the habitat conservation in different countries. Thailand has the most diverse and best known odonate fauna, but knowledge of the Laotian and Vietnamese fauna has increased rapidly over the last 10 years. The conservation status of some species listed in the 1997 Action Plan is briefly discussed. No species are red-listed due to inadequate knowledge of their conservation status." (Author)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

- 4481.** Hämäläinen, M. (2004): Critical species of Odonata in the Philippines. *International Journal of Odonatology* 7(2): 305-310. (in English). ["The Philippine odonate fauna is characterized by a high percentage of endemic species, especially in Zygoptera, most of which have a very limited range. Due to the continuing loss of forests and other habitat destruction, a majority of the 300 plus known species could be red-listed, but only a few critical species are evaluated here. *Risicnemis seidenschwarzi* is added to the Red List. The need of further field surveys and taxonomic work is briefly emphasised and the present difficulties faced by field workers in the Philippines are discussed." (Author)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi
- 4482.** Hagen, H. von (2004): Erratum zu *Libellula* 22 (1/2): 25-29: Artspezifische Exuvienhaltungen bei der Emergenz von drei Libelluliden auf Mallorca (Odonata: Libellulidae). *Libellula* 23(1/2): 87-88. (in German, with English summary). ["Erratum: Species-specific postures for emergence in three Libellulidae in Mallorca (Odonata: Libellulidae) Due to technical problems, figure 1 of this article formerly published in *Libellula* 22 (2003) was printed in a disappointing quality. To do justice to the details of the original drawing, it is given again in the highest quality possible to us." (Author)] Address: von Hagen, H., Akazienweg 28, D-58452 Witten-Bommern, Germany. E-mail: h.vonhagen@t-online.de
- 4483.** Harvey, R. (2004): Reports from Coastal Stations - 2003: Minsmere RSPB Nature Reserve, Suffolk. *Atropos* 21: 64-65. (in English). [*Erythromma viridulum*, *Sympetrum danae*, and *Anaciaeschna isoceles* are briefly discussed.] Address: not stated
- 4484.** Hawking, H.H.; Theischinger, G. (2004): Critical species of Odonata in Australia. *International Journal of Odonatology* 7(2): 113-132. (in English). ["The Australian Odonata fauna is reviewed. The state of the current taxonomy and ecology, studies on biodiversity, studies on larvae and the all identification keys are reported. The conservation status of the Australian odonates is evaluated and the endangered species identified. In addition the endemic species, species with unusual biology and species, not threatened yet, but maybe becoming critical in the future are discussed and listed." (Authors)] Address: Hawking, J.H., Murray-Darling Freshwater Research Centre, Cooperative Research Centre for Freshwater Ecology, P.O. Box 921, Albury, NSW 2640, Australia. E-mail: John.Hawking@csiro.au
- 4485.** Hayden, J. (2004): Reports from Coastal Stations - 2003: Skomer Island NNR, Pembrokeshire. *Atropos* 21: 68-69. (in English). [United Kingdom; just four species of Odonata were recorded in 2003: *Enallagma cyathigerum*, *Aeshna mixta*, *Anax imperator*, and *Sympetrum striolatum*.] Address: not stated
- 4486.** Holusa, O.; Jeziorski, P. (2004): Bibliographie der odonatologischen Literatur der Tschechischen Republik, 1849 - 2000 (Odonata). *Libellula* 23(1/2): 53-76. (in German, with English summary). ["A list of 278 references of Odonatological literature from the years 1849 to 2000 for the territory of Czech Republic is presented. The list is divided into seven different topics. Not included are articles about fossil dragonflies, unpublished diploma theses, unpublished research reports and book reviews." (Authors)] Address: Holusa, O., Muzeum Beskyd, prirodovedné oddeleni, Zámecké náměstí 1264, CZ-738 01 Frydek-Mistek. E-mail: holusao@post.cz
- 4487.** Horn, R. (2004): Eine zweite Jahresgeneration bei *Crocothemis erythraea* in Deutschland während des extrem heißen Sommers 2003 (Odonata: Libellulidae)? *Libellula* 22(3/4) (2003): 139-142. (in German with English summary). ["In August and September 2003, at the end of the flight period young imagines of *C. erythraea* were recorded in the northern Hesse and southern Lower Saxony. In the light of the extremely hot summer, these records were interpreted as members of a second generation." (Author)] Address: Horn, R., Philosophenweg 32, D-34121 Kassel, German. E-Mail: Reinhard-Horn@t-online.de
- 4488.** Hovmöller, R.; Johansson, F. (2004): A phylogenetic perspective on larval spine morphology in *Leucorrhinia* (Odonata: Libellulidae) based on ITS1, 5.8S, and ITS2 rDNA sequences. *Molecular Phylogenetics and Evolution* 30(3): 653-662. (in English). ["*Leucorrhinia* (Odonata, Anisoptera, Libellulidae) consists of 14-15 species with a holarctic distribution. We have combined the morphological characters of a previous study with sequence data from the ITS1, 5.8S rDNA, and ITS2 regions of the nuclear ribosomal repeat. Cloning was used to investigate the intra-individual variation and such variation was found in all investigated species. Parsimony jackknifing was used to identify supported groups. The effect of sequence alignment and gap coding was explored by a modified sensitivity analysis. Loss of spines in *Leucorrhinia* larvae has occurred twice: once in Europe and once in North America. The role of spines as a defence against predation is discussed in a phylogenetic context." (Authors)] Address: Hovmöller, R., Department of Entomology, Swedish Museum of Natural History and Department of Zoology, Stockholm University, P.O. Box 500 07, 10405, Stockholm, Sweden. E-mail: rasmus.hovmolle@nrm.se
- 4489.** Huang, D.; Nel, A. (2004): Two new lower cretaceous dragonfly larvae from northeastern China (Anisoptera). *Odonatologica* 33(2): 199-205. (in English). ["2 larvae from the Yixian Formation are described. One of these has morphological similarities with the 'ultimate larval instars of *Sana nectes*', and the other one is of "cordulegastrid"-type. The relationships of the 'ultimate instars of *S. nectes*' and its young larvae are outlined and their identity is addressed. The "cordulegastrid"-like larva provides new data on the early evolution of the taxa involved." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr
- 4490.** Huber, A., (2004): Contribution to the knowledge of the odonate fauna of Transsylvania, Romania. *Notulae Odonatologicae* 6(3): 25-27. (in English). [30 species, collected in 1997, 1998 and 2001 from 17 localities in northern- (Szaplunca R. catchment) and eastern Transsylvania (Székely land), are brought on record. The list includes species as *Coenagrion hastulatum*, *C. ornatum*, *C. scitulum*, *Pyrrhosoma nymphula*, *Aeshna cyanea*, *Ophiogomphus cecilia*, *Somatochlora metallica*, *Leucorrhinia dubia*, and *Sympetrum danae*.] Address: Huber, A., Aggtelek National Park Directorate, Tengerszem oldal 1, H-3758 Jósavfő, Hungary
- 4491.** Hunter, I. (2004): Reports from Coastal stations - 2003: Elms Farm, Icklesham, East Sussex. *Atropos*

21: 54-55. (in English). [Verbatim: Both of the new species of Odonata recorded during 2002 reappeared in 2003. The first *Erythromma najas* were two on 29 May. In July 100 *E. viridulum* were noted on 11th with 100+ on 8 August and the last four on 14 September. *Bra-chytron pratense* was noted from 28 May with a maximum of six on 16 June. *Libellula quadrimaculata* is surprisingly scarce here, so singles on 7 & 21 July were noteworthy. The first *Aeshna mixta* was recorded on 7 August, increasing to 50+ on 12th; the peak estimate in September was 100+ on 2nd with 40+ still around on 11 October.] Address: not stated

**4492.** Hunter, M. (2004): Durham's dragonflies. *Atropos* 22: 25-29. (in English). [Durham county, UK; introduction into the odonate fauna (22 known species) and some habitats of special odonatological interest.] Address: Hunter, M., 17 Gilerdale Close, Darlington, DL3 0EE, UK

**4493.** Inoue, K. (2004): Critical species of Odonata in Japan. *International Journal of Odonatology* 7(2): 311-324. (in English). ["Japan is a small country but ranges from the subtropical to the subarctic zone. Every year during spring to autumn, many typhoons bring tropical taxa, which occasionally establish in Japan. Up to now, 215 odonate taxa have been recorded, 34 of which are regarded as critical species. Intensive research on Odonata -supported by identification guides - has been carried out mainly after 1945. The current IUCN Red List does not sufficiently reflect present knowledge of the threat status of Odonata in Japan. Therefore changes for an updated global Red List are suggested and explained. The most critical sites are situated in suburban areas and in the isolated islands; the latter host many endemics. Conservation priorities and recommendations are stated and the importance of publicity is stressed. The Division of Nature Conservation of the Japanese Society for Odonatology is currently very active, and it is expected that the activity of all 15 committees will even increase in the future. The so-called "Dragonfly Citizen Summit" has been carried out every year since 1990. With this festival the number of dragonfly lovers has increased remarkably, and the knowledge and consent on conservation of Odonata and their habitats have made a good progress." (Author)] Address: Inoue, K., 5-9 Fuminosato 4-chome, Abenoku, Osaka 545, Japan. E-mail: ks-inoue@mx2.nisiq.net

**4494.** Jödicke, R.; Boudot, J.-P.; Jacquemin, G.; Samraoui, B.; Schneider, W. (2004): Critical species of Odonata in northern Africa and the Arabian Peninsula. *International Journal of Odonatology* 7(2): 239-253. (in English). ["The region is broadly determined by desert, which forms a huge belt between the western Palaearctic and the Afrotropics. Fourteen out of the 125 odonate species recorded so far are endemics. There are two main centres of endemism in the region: the northern Maghreb and the southern Arabian Peninsula. Odonate habitats in the desert are especially endangered by dryness and pollution. Fourteen species -most of them endemics - are regarded as critical. Conservation measures are suggested." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: r.joedicke@t-online.de

**4495.** Johnson, A. (2004): 2004 DSA post-meeting trip results in new state record. *Argia* 16(2): 5-6. (in English). [USA, Iowa, Lucas County, July 2004, *Libellula*

*vibrans* Fabricius 1793] Address: Johnson, Ann, Norwalk, IA, USA. E-mail: aj@hologrambirds.com

**4496.** Johnson, A. (2004): Iowa 2003 records. *Argia* 15(4): 23- (in English). [USA; *Gomphus militaris*, *Aeshna multicolor*, *Lestes inaequalis*] Address: Johnson, Ann, Norwalk, IA, USA. E-mail: aj@hologrambirds.com

**4497.** Johnson, N.F.; Masner, L. (2004): The Genus *Thoron* Haliday (Hymenoptera: Scelionidae), Egg-Parasitoids of Waterscorpions (Hemiptera: Nepidae), with Key to World Species. *American Museum Novitates* 3452: 16 pp. (in English). [Passing reference on Odonata: <http://diglib1.amnh.org/novitates/i0003-0082-3452-01-0001.pdf>] Address: Johnson, N.F.; Department of Entomology, The Ohio State University, 1315 Kinnear Road, Columbus, OH 43212, USA. E-mail: Johnson.2@osu.edu

**4498.** Jones, P. (2004): Small Red-eyed Damselfly *Erythromma viridulum* caught at light. *Atropos* 21: 81. (in English). [Verbatim: On 29 July 2003 I checked my MV light-trap, set at Elms Farm, Icklesham, East Sussex. The night had been warm and the usual moths were logged. Only 65 species of macro-moth were recorded [...]. Of note was a single male *E. viridulum*. The trap had been set in the dark and was taken in about half an hour before there was any light in the sky. Although the species does occur on our site, this individual must have been flying after dark and could well have been a newly arrived migrant. I have caught Migrant Hawker *Aeshna mixta* in the trap on several occasions but this was a new species for the trap.] Address: Jones, P., Elms Farm, Pett Lane, Icklesham, East Sussex, TN36 4AH, UK

**4499.** Kabus, T.; Hendrich, L.; Müller, R.; Petzold, F.; Meisel, J. (2004): Limnochemie, Flora, ausgewählte Gruppen des Makrozoobenthos und Libellen im mesotroph-kalkreichen Giesenschlagsee (Mecklenburgische Seenplatte). *Naturschutzarbeit in Mecklenburg-Vorpommern* 47(1): 27-37. (in German). [Germany; in 2002, 23 odonate species have been recorded including lake-populations of *Onychogomphus forcipatus* and *Gomphus vulgatissimus*.] Address: Petzold, F., Pappelallee 73, D-10437 Berlin, Germany. E-mail: falkpetzold@web.de

**4500.** Kaiser, J.; Bellstedt, R. (2004): Der zweite Nachweis der Östlichen Moosjungfer (*Leucorrhinia albifrons*) in Thüringen. *Mitteilungen des Thüringer Entomologenverbandes* 11(2): 30-31. (in German). [gravel pit near Herrendorf, Landkreis Gotha, Thuringia, Germany, 15-VIII-2004; a corrective note with reference to the first Thuringian record of *Crocothemis erythraea* (Mey 2003) at the same locality is included: the correct date is 03-VIII-2001, not 02-06-2001.] Address: Kaiser, J., Heinoldsgasse 8, D-99867 Gotha, Germany

**4501.** Kalkman, V.J.; Pelt, G.J. van; Dumont, H.J.; Haritonov, A.Yu.; Taily, M. (2004): Critical species of Odonata in Turkey, Iran and the Caucasus. *International Journal of Odonatology* 7(2): 325-339. (in English). ["An overview is given of the present knowledge and current research on the Odonata fauna of Turkey, Iran, and the Caucasus. The occurrence of endemic taxa and of rare and possibly threatened species is discussed. The use of water from various aquatic habitats is reviewed in order to gain insight in existing and potential problems, and a number of conservation measures are proposed.



The creation of a few protected key areas for vulnerable species is considered to be the most effective measurement at short notice. Taking our restricted knowledge into account, it is concluded that only a general increase in the awareness of the necessity to deal with environmental problems, both with governmental organisations as well as with the public in the countries involved, may help solving problems regarding aquatic habitats." (Authors)] Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands. E-mail: Kalkman@naturalis.nnm.nl

**4502.** Kalkman, V.J.; Lopau, W.; Pelt, G.J. van (2004): Hitherto unpublished records of dragonflies from Turkey (Odonata). *Libellula Suppl.* 5: 65-166. (in English, with German and Turk summaries). ["Over 2000 records of 84 of the 96 species of Odonata known to occur in Turkey are presented. Many of the records were gathered during the last decades by entomologists from western Europe. Records based on material present in the collections of Naturalis (formerly the Rijksmuseum voor Natuurlijke Historie), Leiden, The Netherlands (RMNH), the Zoologisch Museum Amsterdam, The Netherlands (ZMAN), and the Natural History Museum, London, UK (NHM) are also included." (Authors)] Address: Pelt, G.J. van, Naturalis, P.O. 9517, NL-2300 RA Leiden, The Netherlands. E-mail: gj.vanpelt@wolmail.nl

**4503.** Kalkman, V.J. (2004): *Lindenia inkiti* (Bartenev, 1929) a synonym of *L. tetraphylla* (Vander Linden, 1825) (Anisoptera: Gomphidae). *Notulae Odonatologicae* 6(3): 34. (in English). [The taxonomic status of *L. inkiti* is discussed in detail; there is no reason to take it for a good species because all morphological characters are within the range of characters of *L. tetraphylla*.] Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands. E-mail: Kalkman@naturalis.nnm.nl

**4504.** Kalkman, V.J.; Kop, A.; Pelt, G.J. van; Wasscher, M. (2004): The dragonflies of the surroundings of Lake Koycegiz and the River Esen, Mugla province, SW Turkey (Odonata). *Libellula Suppl.* 5: 39-63. (in English, with German and Turk summaries). ["During a field trip in the coastal area of the Mugla province, SW Turkey, 48 species of Odonata were encountered. The data are compared with those of previous publications and unpublished material in the collections of the RMNH and of J.-P. Boudot. Of the surroundings of Lake Koycegiz 45 species are listed, seven of which had not previously been found. From the River Esen basin 28 species are listed, of which 13 are new to the area. The total number of species known from the study area has increased to 51, more than half of the number of species known to occur in Turkey. The data on distributional patterns, habitat preferences and seasonal ecology of the taxa involved are discussed." (Authors)] Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands. E-mail: Kalkman@naturalis.nnm.nl

**4505.** Katbeh-Bader, A.; Amr, Z.; Abu Baker, M.; Mahasneh, A. (2004): The dragonflies (Insecta: Odonata) of Jordan. *Denisia* 14: 309-317. (in English with German summary). [This is a review resp. compilatory paper of the 46 odonata species reported from Jordan. The conservation status is briefly discussed.] Address: Katbeh-Bader, A., Dept Horticulture and Plant Protection, Fac. Agriculture, Univ. of Jordan, Amman, Jordan

**4506.** Kenner, R.D. (2004): Chemist sees the light. *Bulletin of the Entomological Society of Canada* 36(1): 24-25. (in English). [Rex Kenner well known Canadian odonatologist gives a brief insight in his odonatological - entomological career from school day, over his profession as chemist to Assistant Curator at University of British Columbia. In a personal account he emphasises the importance of collections for documenting and studying biodiversity in Canada.] Address: Kenner, R.D., c/o Spencer Entomological Museum, University of British Columbia, Vancouver, BC, V6T 1Z4. Canada. E-mail: kenner@zoology.ubc.ca

**4507.** Khrokalo L.A. (2004): Special composition and ecological peculiarities of dragonflies (Insecta, Odonata) of the northeastern Ukraine.. Thesis, candidate of biological sciences in speciality 03.00.16 - ecology. - Kyiv National Taras Shevchenko University, Kyiv: 19 pp. (in Ukrainian, with Russian and English summaries). [Verbatim: This work is the first complex study of the dragonflies of northeastern part of Ukraine. 56 dragonflies species (including 55 ones in imaginal, 43 in larval phases) have been recorded for the area of research. Complete list of the northeastern Ukraine consists of 62 species including 6 ones reported by previous investigators only (Artobolewski, 1927a; Rodzyanko, 1895; Sharlemani & Artobolewski, 1915; Sheshchurak & Padalko, 1996; Gorb, 1991a; Gorb, 1996a). This number composes 85 % of all dragonflies species of the Ukrainian fauna. We separated the groups of the most rare (9), rare (15), common (19) and frequent (13) species according to the numbers of the specimens in our collection. 2 species (*Chalcolestes parvidens* and *Sympetrum depressiusculum*) have been first recorded for whole area of research, 18 species for Sumy, 2 species for Chernigiv, and 5 species for Cherkasy regions. "The most northern point of occurrence in the UKraine has been established for *Crocothemis erythraea*, and most eastern point for *Sympetrum pedemontanum*. The species have been divided into six seasonal groups by terms of flying periods and peculiarities of life cycles: 1) species, which overwinter in imago (2 species); 2) spring species (9); 3) spring-summer species (14); 4) summer species (7); 5) summer-autumn species (16); 6) transeasonal species (7). More precise definitions of the terms of flying periods in the UKraine have been given for 12 species (*Chalcolestes parvidens*, *Sympetrum fasca*, *Coenagrion armatum*, *Erythromma viridulum*, *Aeshna qffinis*, *Anaciaeschna isosceles*, *Anax imperator*, *Gomphus vulgatissimus*, *Cordulia aenea*, *Orthetrum albistylum*, *Sympetrum meridionale*, *Leucorrhinia rubicunda*). The analysis of seasonal distribution between the 10-day periods of months has been made for number of flying species. The beginning of fly period was registered in the second 10-day period of April; the number of flying species increased deeply during May-June; the maximum (42 species) was recorded in the middle of July; the ending of flying period was observed in the second 10-day period of October. The biotopic distribution of dragonflies larvae from 43 species on waterbodies of 18 types has been studied. The greatest number of the species showed euritopic, the smaller number stenotopic. *Calopteryx virgo*, *C. splendens*, *Stylurus flavipes*, *Gomphus vulgatissimus* were found in rivers and springs only (obligate reophyllic species). *Leucorrhinia*-species were found in lentic lakes and puddles and thus they are typical stagnophyllic forms. *Lestidae* and *Sympetrum* (*Libellulidae*) species adapted to existing in periodic waterbodies owing

to peculiarities of life cycles. The greatest species diversity (21 ones) was registered in rivers. Per one species were found in dystrophic creek of pond and open parts of reservoirs only. The analysis of the degree of similarities shown the existing of a few groups of biotopes. Stagnat dystrophic waterbodies and oligotrophic bogs complexes were separated deeply from flowing and stagnatic eutrophic waterbodies. The later were divided into complexes of periodic and permanent waterbodies. Special composition of anthropogenic waterbodies were very diversified due to variations of condition. Protection and conservation of the rare and endangered species are very actual today. The changes of the list of the dragonflies in Red Data book of Ukraine have been proposed. The finding of *Coenagrion mercuriale* in the Ukraine was not established and thus this species must be exepcted from Red Data book. *Calopteryx virgo* and *Anax imperator* must been exepcted too because a real risk of extinction of these species in the wild now and in near future isn't facing. The consideration of the five new species-candidates (*Nehalennia speciosa*, *Coenagrion lunulatum*, *Ophiogomphus cecilia*, *Cordulegaster bidentata*, *Leucorrhinia albifrons*) for making of a new list of the next edition of Red Data book of Ukraine have been proposed.] Address: Khrokalo, L.A., Dept Zool., Fac. Biol., Shevchenko Univ., Volodymirska 64, UKR-01033 Kiev, Ukraine

**4508.** Kitching, D. (2004): News from Cheshire. *Darter* 21: 8-9. (in English). ["[...] Following the major pollution incident and consequent fish kill on the River Dee in late 2000 there were concerns that the population of the Club-tailed Dragonfly *Gomphus vulgatissimus* would have suffered too. Searching for exuviae in late May 2001 soon showed that the lack of fish may well have reduced Odonate mortality as hundreds of exuviae were found rather than the usual few. Since then the population appears to have returned to the previous level. [...]". A lot of additional notes refering to different species are provided.] Address: Kitching, D., 84 Broken Cross, Macclesfield, Cheshire, SK11 8TZ, UK. E-mail: davidk@broccross.co.uk

**4509.** Kitt, M.; Reder, G. (2004): Gehäuftes Auftreten der Zierlichen Moosjungfer (*Leucorrhinia caudalis* Charpentier, 1840) am pfälzischen Oberrhein. *Fauna und Flora in Rheinland-Pfalz* 10(2): 493-507. (in German, with English summary). [New records of the very rare *L. caudalis* in Rhinland-Palatinate, Germany are documented in detail. In most cases, the species could be found at gravel pits or oxbows in the alluvium of the River Rhine. A few old records are included, including a previously unpublished first record for Hessia.] Address: Reder, Gerd, Am Pfortengarten 37, D-67592 Flörsheim-Dalsheim, Germany. E-mail: PG.Reder@t-online.de

**4510.** Knill-Jones, S. (2004): Reports from Coastal stations - 2003: Isle of Wight. *Atropos* 21: 50-51. (in English). ["There were three records of *Sympetrum fonscolombii* one at Thorncross reservoir, Brightstone, on 15 June, one on Bonchurch Beach on 19 July and one at Atherfield on 24 August. An *Aeshna grandis* was seen at Alverstone on 19 June and I observed a very late *Sympetrum danae* on Afton Down on 20 October. There have only been a handful of records of the latter species for the island." (Author)] Address: Knill-Jones, S.A., 2 School Green Road, Freshwater, Isle of Wight, PO40 9AL, UK

**4511.** Koppmann, M. (2004): Natur erleben - Kultur genießen. Das Rußweihergebiet im Naturpark Nördlicher Oberpfälzer Wald. *Naturschutz und Naturparke* 192: 2-8. (in German). [Bavaria, Germany; This paper, directed to a more general in nature interested readership, outlines a few species of special aesthetic interest, and illustrates the contribution with two beautiful pictures of dragonflies.] Address: Koppmann, M., c/o Naturpark Nördlicher Oberpfälzer Wald, Stadtplatz 38, D-92660 Neustadt an der Waldnaab, Germany. E-mail: MKoppmann@neustadt.de

**4512.** Koskimäki, J.; Rantala, M.J.; Taskinen, J.; Tynkkynen, K.; Suhonen, J. (2004): Immunocompetence and resource holding potential in the damselfly, *Calopteryx virgo* L.. *Behavioral Ecology* 15(1): 169-173. (in English). ["It is generally believed that resource holding potential reliably reflects male quality, but empirical evidence showing this is scarce. Here we show that the outcome of male-male competition may predict male immunocompetence in the territorial damselfly, *C. virgo*. We staged contests between 27 pairs of males and found that winners of the contests showed higher immunocompetence, measured as encapsulation response, compared with that of losers. Furthermore, the winners had larger fat reserves. We also collected 29 males that had not been used in staged contests, and found that in these males encapsulation response correlated positively with an individual's fat reserves. Both immunocompetence and resource holding potential seem to depend on energy reserves, suggesting a trade-off between parasite resistance and energetically costly territorial behavior. The results suggest that the outcome of male-male contest can be used to predict male quality in terms of immune defense." (Authors)] Address: Taskinen, J., Institute of Applied Biotechnology, University of Kuopio, Box 1627, FIN-70211 Kuopio, Finland. E-mail: jouni.taskinen@uku.fi.

**4513.** Kosterin, O.E.; Malikova, E.I.; Haritonov, A.Yu. (2004): Critical species of Odonata in the Asian part of the former USSR and the Republic of Mongolia. *International Journal of Odonatology* 7(2): 341-370. (in English). ["The region covered is briefly defined and characterized as relatively little disturbed. A survey of relevant Odonatological literature, including local Red Lists, is given, along with current scientific activity. Sixteen species are indicated, which deserve special attention, one of them, *Ischnura aralensis*, being the only strict endemic in the region. Some isolated populations deserving protection are indicated. Regions important for odonate protection are listed, including parts of the Russian Far East in which threatened Chinese populations find a northern refuge. Measures taken for nature protection in the countries considered are also discussed." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**4514.** Kosterin, O.E. (2004): Some Odonata collected in Aldan Ulus of Sakha (Yakutia) Republic in late June 2002. *Notulae Odonatologicae* 6(3): 27-31. (in English). ["13 species were collected in S Yakutia at the towns of Aldan and Tommot. Most of them were confined to peat-moss bogs with open larch stand (loc. 'mari') on terraces of the major Aldan R., while the main area of the Aldan Upland seems to be almost devoid of Odonata. The record of the only rheophilic species found, Ni-

honogomphus ruptus (although not its northernmost record), and of a northern boreal species *Somatochlora sahlbergi* are new for Yakutia. A list of 32 species presently known for Yakutia is given." (Author) The taxonomic status of *Enallagma cyathigerum antiquum* Bartenev 1956 is briefly discussed.] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**4515.** Krüner, U. (2004): Die Häufigkeitsverteilung der Weibchenfarben von *Ceragrion tenellum* an drei Gewässern im Naturpark Schwalm-Nette (Odonata: Coenagrionidae). *Libellula* 22(3/4) (2003): 107-117. (in German with English summary). [Nordrhein-Westfalen, Germany; three ponds were studied for different frequencies of female colour morphs in *C. tenellum*. "In 1999 - 2001, at two ponds, all four different female colour morphs were observed. The morph *typica* and the morph *intermedium* were present at each pond. At the three study ponds the characteristic morph frequencies were constant for three years. At all three ponds small numbers of the morph *intermedium* appeared with varied black colouring on the abdomen. The nine variations of the morph *intermedium* are documented." (Author)] Address: Krüner, Ulrike, Gelderner Str. 39, D-41189 Mönchengladbach, Germany. E-mail: krue-ner@t-online.de

**4516.** Krüner, U. (2004): The Sixteenth International Symposium of Odonatology of the International Odonatological Foundation S.I.O. in Benzkow bei Schwerin vom 26.07.-04.08.2004. *Libellennachrichten* 12: 12. (in German). [Brief report from the odonatological symposium held near Schwerin, Germany in July 2004.] Address: Krüner, Ulrike, Gelderner Str. 39, D-41189 Mönchengladbach, Germany. E-mail: kruener@t-online.de

**4517.** Lajeunesse, J.M.; Forbes, M.; Smith, B. (2004): Species and sex biases in ectoparasitism of dragonflies by mites. *Oikos* 106(3): 501-508. (in English). ["An important problem in understanding the evolution of parasite host range is determining the extent to which parasite fitness varies among host species and the factors affecting that fitness variation. We present a detailed investigation on the patterns of host use and successful parasitism of two dragonfly species by the ectoparasitic water mite, *Limnochares americana* Lundblad. In our field surveys, we found both species biases and sex biases in parasitism by mites, which appear explained by differences in exposure. Differential habitat use by dragonflies helped explain male biases in parasitism in both host species, but was not useful in explaining species biases in parasitism. Species biases in parasitism may be explained by more subtle variation in habitat use not explored in this study, or perhaps by differences in timing of emergence, as we found for the two dragonfly species. Despite species differences in parasitism in nature, we found that mites attached equally successfully to both dragonfly species during experimental infestations. However, mites failed to engorge more often on the dragonfly species less often used as a host in nature. This host species also was more likely to have dead mites in natural infestations as compared to the other host species, which was more often and more heavily parasitized. Our results are consistent with previous research suggesting parasites are less successful on less often used hosts. Such research has

implications for understanding determinants of host range for animal parasites." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**4518.** Lauder milk, E. (2004): 2004 DSA southeastern regional meeting, Mammoth cave, Kentucky, June 10-13. *Argia* 16(2): 8. (in English). [USA; the 47 species recorded by the meeting participants are listed.] Address: Lauder milk, E.L., 199 Meadow View Drive, #3, Frankfort, KY 40601, USA. E-mail: Ellis.Laudermilk@mail.state.ky.us

**4519.** Lingenfelder, U. (2004): Fließwasserlibellen in der Pfalz. *GNOR Info* 98: 16-18. (in German). [In the Pfälzerwald-region (Rhineland-Palatinate, Germany), 2003 62 brooks have been surveyed for their odonate fauna. The following locality-frequencies are result of the study: *Calopteryx virgo*: 95%, *Cordulegaster boltonii*: 66%, *Calopteryx splendens*: 52%, *Ophiogomphus cecilia*: 27%, *Gomphus vulgatissimus*: 8%, *Onychogomphus forcipatus*: 8%, and *Thecagaster bidentata*: 2%.] Address: Lingenfelder, U., Seebergstr. 1, D-67716 Heltersberg, Germany

**4520.** Lingenfelder, U. (2004): Zur Verbreitung der Grünen Flussjungfer - *Ophiogomphus cecilia* (Fourcroy, 1785) - in der Pfalz (Odonata: Gomphidae). *Fauna und Flora in Rheinland-Pfalz* 10(2): 527-552. (in German, with English summary). [The current regional distribution of *O. cecilia* "in the Palatinate (southern part of Rhineland-Palatinate) was researched between 1999 and 2004. Numerous previously unknown occurrences of *O. cecilia* were found. The species was recorded from the most important running waters of nearly all natural areas in the Palatinate. In addition, recordings made in some adjoining areas and observations of *O. cecilia* in the Palatinate made by other odonatologists were also compiled in this article. Findings are shown in a distribution map. This study also provides a brief survey of the distribution of the species in adjoining regions. Distribution, successful reproduction, and dispersal are discussed in short as well as recommendations for the protection of *O. cecilia* regarding the Habitats Directive." (Author)] Address: Lingenfelder, U., Seebergstr. 1, 67716 Heltersberg, Germany

**4521.** Machado, A.B.M. (2004): Studies on neotropical Protoneuridae. 15. *Amazona* gen. nov. with description of *A. juruaensis* sp. nov. (Odonata, Zygoptera). *Revista Brasileira de Zoologia* 21(2): 333-336. (in English, with Portuguese summary). ["The genus *Amazona* is erected to contain *A. ephippigera* (Selys, 1886), *A. westfalli* (Machado, 2001) and *A. juruaensis* sp. nov. The new genus is close to *Forcepsioneura* Lencioni, 1999 but differs from it mainly by the poorly-developed postero-lateral tubercles of the medium prothoracic lobe, by the dark colour of the metepimerum and of the rear of the head. *A. juruaensis* sp. nov. (holotype male, Acre, Brazil) differs from the other two species of the genus mainly by the structure of the superior anal appendages." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil

**4522.** Mackenzie Dodds, R. (2004): The Dragonfly Project: an update. *Dragonfly news* 45: 24-25. (in English). [Extensive report on teaching Odonata in the



UK.] Address: Mackenzie Dodds, R., The National Dragonfly Museum, Ashton Mill, near Oundle, Peterborough PE8 5LZ, UK

**4523.** Manolis, T. (2004): Occipital spines on male *Ophiogomphus morrisoni*. *Argia* 16(2): 23-24. (in English). [USA, California; illustration and discussion of the occipital spines. The function of the spines seems to be unknown at present.] Address: Manolis, T., 808 El Encino Way, Sacramento, CA, 95864, USA

**4524.** Marden, J.H.; Cobb, J.R. (2004): Territorial and mating success of dragonflies that vary in muscle power output and presence of gregarine gut parasites. *Animal Behaviour* 68(4): 857-865. (in English). ["Competition for mating territories in libellulid dragonflies involves aerial contests that require high levels of exertion and locomotor performance. Here we test the hypothesis that success of male *Libellula pulchella* dragonflies in territoriality and mating is affected by muscle contractile performance, and we examine how gregarine gut parasites affect muscle performance, energy reserves and territorial behaviour of their hosts. At a pond where gregarine parasites are rare, long-term territorial and mating success of males showed a significant positive association with muscle power output. At a nearby pond that had a much higher incidence and intensity of gregarine parasitism, there was no relationship between muscle performance and short-term territorial success. Instead, males assorted themselves into aggressive territory holders and submissive satellites, with the large majority of territory holders having no parasites and nearly all of the satellites parasitized. Unparasitized males showed a tight positive relationship between muscle power and fat content, which suggests that they use a known phenotypic adjustment in muscle contractile performance to allow the energy consumption rate of the flight muscles to match the rate at which energy can be mobilized from storage pools. Parasitized dragonflies showed a small decrease in average fat content and a marked change in the relationship between fat content and muscle power output. The apparent loss of the ability to match muscle contractility to the size of the energy storage pool in parasitized dragonflies suggests that gregarines may have systemic effects on signalling pathways and energy homeostasis. By indirectly choosing males that had successfully competed for territories, females consistently mated with physiologically or immunologically superior males despite large between-pond differences in male behaviour and the incidence and intensity of parasitic infection." (Authors)] Address: Marden, J.H., Dept Biol., Pennsylvania St. University, 208 Mueller Laboratory, University Park, PA 16802, USA

**4525.** Marinov, M.; Simov, N. (2004): *Somatochlora arctica* (Zett.) and *Leucorrhinia dubia* (Vander L.) new for the fauna of Bulgaria (Anisoptera: Corduliidae, Libellulidae). *Notulae Odonatologicae* 6(3): 34-35. (in English). [peatbog in "Ticha Rila", Rila Monastery National Park, 1994 m a.s.l., 42°07'N 23°28'E] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mgmarinov@mail.bg

**4526.** Marquis, O.; Saglio, P.; Neveu, A. (2004): Effects of predators and conspecific chemical cues on the swimming activity of *Rana temporaria* and *Bufo bufo* tadpoles. *Archiv für Hydrobiologie* 160(2) : 153-170. (in English). ["Behavioural observations were performed in

an olfactometer to examine the effects of chemical stimuli from predators and conspecifics on the swimming activity of two larval anurans, the common frog, *Rana temporaria*, and the common toad, *Bufo bufo*. Both species of tadpoles showed a slight but non significant reduction in swimming behaviour when confronted to chemical cues from starved sympatric predators (larval spotted salamander, *Salamandra salamandra*; larval dragonfly, *Anax imperator*). In contrast, test solutions from starved *Astacus leptodactylus*, a recently introduced predator, produced no change at all in behaviour. As a whole, significant results indicate that indirect chemical signals resulting from the preying activity of the predator are mainly used for the chemical assessment of predation risk by tadpoles. Swimming activity of *R. temporaria* and *B. bufo* tadpoles was also found to be significantly decreased in response to chemical cues released by crushed conspecifics, or by *A. leptodactylus* within the day following ingestion of conspecific tadpoles. Our results suggest that the presence of conspecific alarm substances in water and predators' waste products play a pre-eminent role in the chemical detection of predators by these larval anurans." (Authors)] Address: not available

**4527.** Martens, A. (2004): Die Solarzeit: wichtig und nicht schwer zu bestimmen. *Libellennachrichten* 12: 11-12. (in German). [In the framework of etho-ecological studies it is important to know the exact solar time. The author provides methods and links to calculate the solar time per locality within a time zone.] Address: Martens, A., Pädagogische Hochschule Karlsruhe, PF 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**4528.** Martynov, V.V.; Martinov, A.V. (2004): Interesting findings of dragonflies (Insecta, Odonata) from Ukraine. *Vestnik zoologii* 38(5): 38- (in Russian(?)). [Ukraine, records of the following species are documented: *Somatochlora alpestris*, *Aeshna juncea*, *Thecagaster bidentata*, *Brachytron pratense*, and *Chalcolestes parvidens*.] Address: not stated

**4529.** Matushkina N. A. (2004): Comparative morphology of ovipositor in some damselflies (Odonata, Zygoptera). *Vestnik Zoologii* 38(3): 53-66. (in Russian with English summary). [*Bayadera melanopteryx* (Euphaeidae), *Chalcolestes parvidens* (Lestidae), *Heteragrion alienum* (Megapodagrionidae), *Platycnemis penripes* (Platycnemididae), and *Palaemnema domina* (Platystictidae); "Comparative study was aimed to reveal differences among species of these families. The table of ovipositor characters was compiled based upon the literature data and own results, which can be used for phylogenetic analysis. Possible correlations between ovipositor features and oviposition behaviour are discussed." (Author).] Address: Matushkina N. A. c/o Gorb, S., Max-Planck-Institut für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. E-mail: stas.gorb@tuebingen.mpg.de

**4530.** Mauersberger, R.; Schiel, F.-J.; Burbach, K. (2004): Verbreitung und aktuelle Bestandssituation von *Leucorrhinia caudalis* in Deutschland (Odonata: Libellulidae). *Libellula* 22(3/4) (2003): (in German with English summary). ["*L. caudalis* is included in the species lists of 13 German federal states. However, it is considered to be extinct or lost in five of them. Within the last ten years, *L. caudalis* was recorded at 127 water bodies.

Seventy of these are situated in Brandenburg, 22 in Bavaria, 15 in Baden-Württemberg, seven in Rhineland-Palatinate, six in Mecklenburg-Vorpommern, four in Saarland and one in Hesse, Saxony and Lower Saxony, respectively. The maximum abundance hitherto discovered in Germany amounted to 1.004 emerging individuals at a 200-m-long shore sector at a lake in northern Brandenburg in 2001." (Authors)] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-mail: FoerdervereinUeckermark.Seen@t-online.de

**4531.** Mauffray, B. (2004): Georgia 2003 summary. *Argia* 15(4): 23. (in English). [Georgia, USA; new state records are *Lestes eurinus*, *Argiomphus villosipes*.] Address: Mauffray, B., 4525 N.W. 53rd Lane., Gainesville, FL 32653, USA. E-mail: iori@afn.org

**4532.** McGeeney, A. (2004): Identification of Red Darters (Part 1). *Atropos* 23: 27-32. (in English). [*Sympetrum nigrescens*, *S. striolatum*, *S. flaveolum*, *S. sanguineum*, *S. fonscolombii*, *Crocothemis erythraea*, and *Orthetrum coerulescens* are introduced, and identification characters are compiled and discussed. Several very good colour pictures show most of the species (male and female).] Address: McGeeney, A., 12 Lincolns Field, Epping, CM16 5DY, UK

**4533.** McKee, D.; Harvey, I.; Sherratt, T.N. (2004): Behaviour of male coenagrionid damselflies towards conspecific females at the water's edge (Zygoptera: Coenagrionidae). *Odonatologica* 33(3): 271-278. ["The behaviour of male *Coenagrion puella* and *Xanthocnemis zealandica* towards conspecific andromorph and gynomorph females was studied at breeding ponds in the U.K. and in New Zealand respectively. As expected, male attention directed towards copulation wheels (*C. puella*) did not depend on whether the wheel contained an andromorph or a gynomorph. Similarly, male attention directed towards tandem pairs (*C. puella* and *X. zealandica*) did not depend on whether the tandem contained an andromorph or a gynomorph. When individual andromorph and gynomorph females (*C. puella* and *X. zealandica*) were released at the water's edge they experienced similar levels of attention from males. By contrast, males (*X. zealandica*) formed significantly more tandems with gynomorphs tethered at the water's edge than with tethered andromorphs. The observations suggest that males readily identify and intercept conspecific ♀♀ at the water's edge, particularly when in motion, and that andromorphs and gynomorphs are equally susceptible to ♂ attention. Behaviour of males towards tethered females may be atypical compared to that recorded under more natural conditions." (Authors)] Address: Sherratt, T.N., Department of Biology, Carleton University, 1125 Colonel By Drive, Ottawa ON, K1S 5B6, Canada. E-mail: sherratt@ccs.carleton.ca

**4534.** McPeck, M.A. (2004): The growth/predation risk trade-off: So what is the mechanism? *The American Naturalist* 163(5) (E-article): E88-E111. (in English) ["Among damselflies in natural lakes, *Ischnura* species grow faster than coexisting *Enallagma* species, but *Enallagma* species have higher survival under predation than *Ischnura* species. This growth/predation risk trade-off apparently allows these taxa to coexist in ponds and lakes across the Holarctic. However, laboratory studies presented here show that the mechanism assumed by most theoretical and empirical studies to mediate this

trade-off, namely activity simultaneously modulating foraging returns and predation risk, does not operate in this system. *Ischnura verticalis* larvae were more active than larvae of *Enallagma* species in a short-term behavioral experiment, which explains why *Ischnura* experiences greater mortality from predation. However, this greater activity did not translate into higher feeding rates. *Ischnura verticalis* and *Enallagma* species ate comparable amounts of food in both the short-term behavioral experiment and a longer feeding and digestion experiment. In spite of no difference in the amount of food ingested or assimilated, *I. verticalis* larvae grew faster than *Enallagma* larvae because they were better able to physiologically convert assimilated food into their own biomass in the presence of mortality threats. From these studies we understand the phenotypic mechanisms determining the antagonistic patterns of relative growth and survival between these two genera, but why these patterns exist remains unclear." (Author) Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**4535.** McShaffrey, D. (2004): Swarming dragonflies in Florida. *Argia* 15(4): 25-26. (in English). [Feeding aggregation of a mixed swarm of *Miathyria marcella*, *Traema carolina*, and *Coryphaeschna ingens*. "My next stop that day was at the Archbold Biological Station. [...] Mark Deyrup, the resident entomologist, [...] said that the swarms were most likely feeding on adult fire ants. This invasive alien species is found in large numbers on the pastureland in the area, although it does poorly in the native scrub. Mark also passed along a request from Dr. Lubomir Masner at the Canadian National Collection in Ottawa to keep an eye open for flightless scelionid wasps that ride about on dragonflies. If you are ever at the Archbold Station, look Mark up. He is also the keeper of Needham's net; legend has it that anyone who touches the net will have better luck at collecting. Actually, I just made that up, but I've been getting better at collecting since I touched the net."] Address: McShaffrey, D., Dept of Biol. and Environ. Sci., Marietta College, Marietta, OH 45750, Florida

**4536.** Merrill, I. (2004): News from the Leicestershire and Rutland Dragonfly Group. *Darter* 21: 7-8. (in English). [Brief note on the activities of the dragonfly group. For more information see: <http://lrdragonfly.topcities.com>.] Address: Merrill, I., 20 Ashford Road, Whitwick, Coalville, Leics., LE67 5GD, UK. E-mail: i.merrill@btopenworld.com

**4537.** Meurgey, F. (2004): *Erythrodiplax berenice* (Drury, 1770) and *Traema calverti* Muttkowski, 1910, new species for Guadeloupe (Lesser Antilles). *Argia* 16(2): 25. (in English). [*Erythrodiplax berenice*: 10-XII-1973, Le Moule; *Traema calverti*: 31-III-2004, Ste Rose] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**4538.** Meurgey, F. (2004): New records of *Argia cuprea* and *Lestes secula* - results of the 2003 collecting trip to Nicaragua. *Argia* 16(2): 22. (in English). [Between 17-IX. und 09-X-2003, 39 species were recorded.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

- 4539.** Mikolajewski, D.J.; Johansson, F.; Brodin, T. (2004): Condition-dependent behaviour among damselfly populations. *Canadian Journal of Zoology* 82: 653-659. (in English). ["Body condition is predicted to influence behaviours such as activity, which in turn affects energy gain and survival. In this study we investigated (i) whether populations of the damselfly *Lestes sponsa* (Hansemann, 1823) differ in body condition and activity among lakes, and (ii) which body condition factors affect behaviour. We estimated last instar larval behaviour (measured as activity), body condition (measured as size, body mass, muscle mass, fat content, and time to emergence), and fish presence/absence in eight lakes. Body condition of larvae differed among lakes but the presence/absence of fish in lakes had no effect on body condition. Activity did not differ among lakes and was not affected by the presence/absence of fish in lakes. Activity was negatively related to size, body mass, muscle mass, and fat content, and positively related with time to emergence, suggesting that final-instar larvae in good condition are favouring development over growth to emerge earlier. This study highlights the importance of differences in condition among populations and among individuals." (Authors)] Address: Mikolajewski, D., Technische Universität Braunschweig, Zoologisches Institut, Ökologie, Fasanenstraße 3, D-38102 Braunschweig, Germany. E-mail: d.mikolajewski@tu-bs.de
- 4540.** Mikolajewski, D.J.; Johansson, F. (2004): Morphological and behavioral defenses in dragonfly larvae: trait compensation and cospecialization. *Behavioral Ecology* 15(4): 614-620. (in English). ["Many animals have two basic traits for avoiding being killed by a predator: behavioral modification and morphological defense. We examined the relationship between antipredator behavior and morphological defense in larvae of three closely related dragonfly species within the genus *Leucorrhinia* (*L. albifrons*, *L. dubia*, *L. rubicunda*). The three species differ with regard to their morphological defense as expressed in the length of the larval abdominal spines. Results showed that longer abdominal spines provided protection against an attacking fish predator (perch) because the probability of being rejected after an attack was significantly higher in the species with the longest abdominal spines. In contrast to other studies, the species with the strongest morphological defense did not show the least behavioral predator avoidance. Instead, the species with intermediate morphological defense showed the least predator behavioral avoidance. The results suggest that the *Leucorrhinia* system is a mixture of trait cospecialization (a positive correlation between antipredator behavior and morphological defense) and trait compensation (a negative correlation between antipredator behavior and morphological defense). Differences in the relationship between morphological and behavioral defense between species might be related to abundance patterns of the three species in lakes with and without fish predators." (Authors)] Address: Mikolajewski, D.J.; TU Braunschweig, Zoologisches Institut Ökologie, Fasanenstr. 3, D-38102 Braunschweig, Germany. E-mail: d.mikolajewski@tu-bs.de
- 4541.** Mill, P.J.; Taylor, P.; Parr, A.J. (2004): Vernacular names for British and European Dragonflies. *Atropos* 23: 33-35. (in English). [English vernacular names for 84 odonate species are proposed.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk
- 4542.** Mill, P.J.; Taylor, P.; Parr, A.J. (2004): Vernacular names for the dragonflies of north-western Europe. *J. Br. Dragonfly Society* 20(2): 73-76. (in English). [see OAS 4541] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk
- 4543.** Miller, M.N.; Fincke, O.M. (2004): Mistakes in sexual recognition among sympatric Zygoptera vary with the time of day and color morphism (Odonata: Coenagrionidae). *International Journal of Odonatology* 7(3): 471-491. (in English). ["In odonates, female specific color polymorphisms appear to be an evolutionary response to sexual harassment, but we know little about the decision rules males use when searching for variable females. For two sympatric species of *Enallagma*, we measured male responses to live female variants under field conditions, early and later in the day. In the morning, when the operational sex ratio was the most male-biased and female density the lowest, males of the polymorphic *E. civile* did not discriminate among conspecific female morphs, and reacted sexually to the andromorphic females of *E. aspersum*, a monomorphic species. Then, male *E. aspersum* did not favor conspecific females over *E. civile* morphs. Both morph types were more confusing for males than were conspecific male signals. However, after 13:00 h, males of both species made few mistakes, and *E. civile* males reacted sexually relatively less often to conspecific andromorphs, the minority morph in this population. The changes in a male's sexual response suggested that they cued to female-specific traits when females were scarce, increasing their detection of potential mates at the expense of making mistakes with heterospecific females. When females of both species were more abundant, a male's behavior was consistent with cueing to morph-specific features. Analyses of comparative data suggested that for several genera, males of polymorphic species were more likely to mistake heterospecific females as mates than males of monomorphic congeners. Our results best support the learned mate recognition hypothesis for the evolution and maintenance of female-specific polymorphisms." (Authors)] Address: Fincke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu
- 4544.** Moore, N. (2004): The early days of dragonfly recording. *Darter* 21: 3. (in English). [This is a most authoritative account on the beginning and developing of mapping Odonata in the UK.] Address: Moore N.W., The Farmhouse, 117 Boxworth End, Swavesey, Cambridge CB4 5RA, United Kingdom
- 4545.** Moore, N.W. (2004): Book Review: The natural History of Ireland's Dragonflies. ISBN 0900761458. *J. Br. Dragonfly Society* 20(2): 80-82. (in English). [review] Address: Moore N.W., The Farmhouse, 117 Boxworth End, Swavesey, Cambridge CB4 5RA, United Kingdom
- 4546.** Moskowitz, D. (2004): A new late flight date for *Lestes* congener in North America. *Argia* 15(4): 22-23. (in English). [Morris county, New Jersey, USA: 21 Nov. 2003] Address: Moskowitz, D. c/o EcolSciences, Inc. 75 Fleetwood Drive, Suite 250 Rockaway, New Jersey 07866 dmoskowi@ecolsciences.com
- 4547.** Müller, O. (2004): Steinschüttungen von Buhnen als Larval-Lebensraum für *Ophiogomphus cecilia* (Odonata: Gomphidae). *Libellula* 23(1/2): 45-51. (in



German, with English summary). ["During a quantitative sampling of macrozoobenthos in the riprap areas of groynes of the River Oder (Brandenburg, Germany), larvae of *O. cecilia* were observed in microhabitats unusual for Gomphidae. Larvae settled on the surfaces of stones of the riprap of groynes. The habitat and the investigated fauna are described. Habitat choice and behaviour of the larvae are discussed under ecological aspects.] Address: Müller, O., Birkenweg 6d, D-13206 Libbenichen, Germany. E-mail: olemueller@bioscience-art.de

**4548.** Müller, R. (2004): *Cercion lindenii* (Sélys, 1840) am Mittellandkanal - Erstnachweis für Sachsen-Anhalt (Insecta: Odonata). *Lauterbornia* 50: 79-83. (in German with English summary). [Bülstringen near Haldenleben, Sachsen-Anhalt, Germany; 27.V.2003] Address: Müller, R., c/o Planungsbüro Hydrobiologie, Augustastr. 2, D-12203-Berlin, Germany. E-mail: hydrobiologie@t-online.de

**4549.** Nicolet, P.; Biggs, J.; Foxa, G.; Hodson, M.J.; Reynolds, C.; Whitfield, M.; Williams, P. (2004): The wetland plant and macroinvertebrate assemblages of temporary ponds in England and Wales. *Biological Conservation* 120(2): 265-282. (in English). ["The biodiversity value of Northern European temporary ponds has been little recognised, and there are many gaps in our understanding of their ecology. This study investigated the wetland (including aquatic) plant and macroinvertebrate assemblages, and the physico-chemical characteristics of 71 temporary ponds in semi-natural habitats. Temporary ponds supported on average 17 (SD ± 8) wetland plant and 25 (SD ± 10) macroinvertebrate species. Over 75% of temporary ponds supported at least one uncommon (local, nationally scarce or Red Data Book) species. The number of uncommon wetland plant species and total number of macroinvertebrate species were both positively correlated with the total number of wetland plant species (richness), but there was no correlation between the number of uncommon and common macroinvertebrate species. Almost three-quarters of temporary ponds supported at least one nationally scarce macroinvertebrate and 8% supported at least one nationally scarce plant across a wide range of physico-chemical characteristics. The main environmental factor influencing the composition of temporary pond communities was water chemistry, particularly pH and alkalinity. The occurrence of facultative as well as obligate temporary pond species suggested that this habitat may play an important role in the interchange of species between waterbodies at the landscape scale." (Authors) The following odonate taxa are listed in Appendix B: *Ischnura elegans*, *Pyrrhosoma nymphula*, *Coenagrion puella/pulchellum*, *Libellula quadrimaculata*, *Aeshna juncea*, *Sympetrum sanguineum*.] Address: Nicolet, P., The Ponds Conservation Trust: Policy & Research, c/o Oxford Brookes University, School of Biological and Molecular Sciences, Gipsy Lane, Oxford OX3 0BP, UK

**4550.** Niehuis, M. (2004): Ergänzungen / Berichtigungen zu: Niehuis, M. (2003): Fund der Nordischen Moosjungfer - *Leucorrhinia rubicunda* (L.) - in der Südpfalz (Insecta: Odonata). *Fauna und Flora in Rheinland-Pfalz* 10(1): 279-284. *Fauna und Flora in Rheinland-Pfalz* 10(2): 753-754. (in German). [Additions to the records of *L. rubicunda* in Rhineland-Palatinate, Germany with a regional focus and including France and Luxembourg

are made.] Address: Niehuis, M., Im Vorderen Großthal, D-76857 Albersweiler, Germany. E-mail: Niehuis@t-online.de

**4551.** Niehuis, M.; Heilig, D. (2004): Später Nachweis der Gemeinen Keiljungfer (*Gomphus vulgatissimus*) in der Pfalz (Insecta: Odonata). *Fauna und Flora in Rheinland-Pfalz* 10(2): 703-704. (in German). [At 29-VII-2004, a nearly fresh female imago of *G. vulgatissimus* was recorded in the county Gernersheim, Rhineland-Palatinate, Germany. Normally, this species emerge early in May. The possible reasons underlying this late record are briefly discussed.] Address: Niehuis, M., Im Vorderen Großthal, D-76857 Albersweiler, Germany. E-mail: Niehuis@t-online.de

**4552.** Novelo-Gutiérrez, R.; González-Soriano, E. (2004): The larva of *Dythemis maya* Calvert, 1906 and a redescription of the larva of *D. sterilis* Hagen, 1861 with a key to the larvae of the genus (Anisoptera: Libellulidae). *Odonatologica* 33(3): 279-289. (in English). ["The last instar larva of *D. maya* is described and illustrated for the first time, based on reared material from Hidalgo, Morelos and Michoacan States, Mexico. The larva of *D. maya* is the largest of the genus and is remarkably different from other larvae, mainly by the reduced or wanting dorsal protuberances, and in the short lateral spines on the abdomen. A redescription of the larva of *D. sterilis* and some notes on other larvae of *Dythemis* are also provided, and all species are keyed." (Authors)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx

**4553.** O'Brien, M. (2004): An unusual mode of contraception. *Argia* 16(2): 24. (in English). [USA, Michigan; "[...] One unfortunate male *Gomphus quadricolor* was collected ... with the terminal abdominal segments of a female still attached to the the male's penis. I suppose that had the male lived beyond Stephen's capture, he may have been able to disengage himself, but in this instance, he was removed from the gene pool a priori. [...]" (Author)] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

**4554.** Ocon, C.S.; Rodrigues Capítulo, A. (2004): Presence and abundance of Ephemeroptera and other sensitive macroinvertebrates in relation with habitat conditions in pampean streams (Buenos Aires, Argentina). *Archiv für Hydrobiologie* 159(4) : 473-487. (in English) ["The objective of this work was to analyse the presence and abundance of Ephemeroptera and other sensitive invertebrates in two streams in the pampean area of Argentina, which have different ecological conditions. Juan Blanco stream is a pristine system and a reference site for the area while Buñirigo stream is affected by industrial effluents coming from food industries and tanneries. Biological and physico-chemical samples were taken seasonally from each stream over two years at two sites (upstream and downstream). DO, conductivity, pH, BOD, COD, heavy metals (Pb, Cr, Cu, Cd, Zn and Hg) and nutrients were measured and biotic indices were applied to determine water quality. Among the Ephemeroptera, *Caenis* cf. *argentina* (Caenidae) and *Callibaetis* cf. *fasciatus* (Baetidae) were the dominant species with maximum densities in Juan Blanco

stream. Other macroinvertebrates found in the study area and considered sensitive were *Magellomyia bruchina* (Trichoptera, Limnephilidae), *Campsurus major* (Ephemeroptera, Polymitarcyidae), *Rhinoaeschna bonariensis* and *Micrathyrina dydima* (Odonata Anisoptera) and *Diplodon delodontus delodontus* (Pelecypoda, Hyriidae) recorded at low number in Buñirigo downstream. The abundance of individuals for each species can be correlated with water quality variations in the study sites. Certain parameters like pH can influence the distribution patterns of *C. cf. fasciatus*. (Authors)] Address: Rodrigues Capitulo, A., Instituto de Limnología "Raúl A. Ringuelet", Universidad Nacional de La Plata, C.C. 712, AR-1900 La Plata, Argentina

**4555.** Odin, N. (2004): Reports from Coastal Stations - 2003: Landguard Bird Observatory, Suffolk. *Atropos* 21: 63-64. (in English). [United Kingdom; *Aeshna cyanea*, *Orthetrum cancellatum*; *Calopteryx splendens* was caught in a Heligoland trap.] Address: not stated

**4556.** Orr, A.G. (2004): Critical species of Odonata in Malaysia, Indonesia, Singapore and Brunei. *International Journal of Odonatology* 7(2): 371-384. (in English). ["Malaysia, Brunei and the Indonesian archipelago comprise a total land area of ca 1.84 million km<sup>2</sup> including ca 13,000 islands, lying entirely within the tropics. The region is bisected by Wallace's line and supports a rich Oriental fauna to the west (Sundaland) and mainly Australian elements to the east. Taxonomic studies throughout the region were greatly advanced in the first part of the last century by M.A. Lieftinck especially, but many areas remain totally unexplored. Present knowledge suggests ca 700 species occur in the region of which ca 500 are endemic. Many species are known from limited material, often a single specimen or a type series from a poorly defined locality. It is certain that many are highly stenotopic and sometimes occur naturally at low abundance. The most critical habitats are mixed-dipterocarp terra firma forests and fresh-water swamp forests, both of which exhibit high a and /? diversity and harbour a majority of stenotopic species. However all potentially critical species must presently be classified as data deficient. On present knowledge it is not possible to recommend specific action against any species or habitat. No red listings are appropriate. There is an acute need for baseline data, especially from Central Borneo. Wholesale, unregulated habitat destruction for short-term profit poses the gravest threat to the region. Formerly well-studied areas such as Java are in urgent need of reassessment." (Author)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**4557.** Orr, A.G. (2004): Territorial behaviour associated with feeding in both sexes of the tropical zygopteran, *Libellago hyalina* (Odonata: Chlorocyphidae). *International Journal of Odonatology* 7(3): 493-504. (in English). ["Territorial behaviour associated with adult odonate feeding in a Bornean rain forest under-storey is described and its underlying causes are analysed. Immature males and females of all ages of *Libellago hyalina* defended perches along a narrow trail in kerangas forest, concentrating especially around patches of sunlight. Throughout the day there was displacement of individuals as the illuminated areas moved and population levels of foragers increased, with maximal density

from 13:00 -15:00 h, but territorial success which followed physical combat could not be associated with size, sex or age. Foraging rates were also highest in this period but peaked clearly at 14:00 h. Both foraging attack rates and attack success were higher in sun patches than in shaded territories. Potential prey, mostly small Diptera < 4 mm length, were more abundant along the trail than in the surrounding forest, but were not concentrated in sunlight. It is suggested that, against the dark backdrop of the forest under-storey, prey became much more visible in sunlight, and were more easily detected and more easily captured, hence sites near sun patches were strongly contested. This behaviour constitutes a hitherto undescribed foraging strategy, which may be characterized as follows: "increasing capture success by concentrating in situations where prey visibility is enhanced by overhead sunlight against a dark background." It is suggested this strategy may be common in tropical rain forest, home to a majority of Odonata species." (Author)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**4558.** Ott, J. (2004): Die Libellenfauna des unteren Moosalbtales bei Trippstadt/Pfalz - Ergebnisse eines 6-jährigen Monitorings. *Fauna und Flora in Rheinland-Pfalz* 10(2): 581-602. (in German, with English summary). ["Between 1999 and 2004 the dragonfly fauna of the 'Moosalbtal' near Trippstadt / Palatinate was investigated as part of an ecological monitoring programme. In total 22 species were recorded during this period, some of the species belonging to the federal and national Red Lists of endangered species. Some typical species of running waters are remarkable. The area must be seen in connection with other wetland biotopes in the near vicinity and the whole Palatinate. The real value of a site for nature conservation can only be recognised by longterm monitoring of at least several years and these kinds of studies should be carried out more often." (Authors)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**4559.** Ott, J. (2004): S7.6 - Dragonflies as indicators for climatic changes - consequences for biodiversity and nature protection [ore 15.15]. *Società Italiana di Ecologia - XIV Congresso Nazionale in collaborazione con la European Section of the Society for Conservation Biology Università degli Studi di Siena. Conservazione e gestione degli ecosistemi. Programma e riassunti del XIV Congresso SItE* Editors: Carlo Gaggi, Valentina Nicolardi e Stefania Santoni Siena, Centro Didattico ale Scotte», 4-6 ottobre 2004: 26. (in English). [Verbatim: Climatic changes are meanwhile regarded as one of the main causes for species extinction and this process is still ongoing. Dragonflies were among the first taxonomic groups reacting on climatic changes: already about 15 years ago the first observations on changes in the distribution patterns of single species were made in Germany and Europe. Meanwhile northward expansions of mediterranean species to northern Europe, as well as invasions from African species into southern european countries are reported in lots of cases. Also the colonisation of biotopes in higher altitudes are documented and changes in the behaviour and in life history parameters (univoltine to bivoltine) are observed. Whereas the invasions of these southern species into the

north until recently was increasing the biodiversity in total, now also the first negative effects could be registered as the changes in the abiotic conditions of the waters - together with changes in dominance structures - could harm the coenosis of the waters (e.g. moorland biotopes) in the long term and will lead to a general change of the biocoenosis. Here the actual changes within the ecology and distribution of dragonfly species on the European level are shown and the negative effects on stenoeicous species (like *Leucorrhinia dubia*, *Somatochlora arctica* etc.) and consequences on protection measurements (e.g. landscape planning or the implementation of biotope webs according to the EC habitats directive) are pointed out] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**4560.** Parr, A. (2004): Dragonfly records from autumn 2002. *Atropos* 22: 30-31. (in English). [The paper introduces into a new scheme of the British odonatologists: Due to climate change and global warming not less than six odonate species have been recorded in the past years, range extensions of some species are significant, and changes in phenology are obvious. The new scheme refers to these phenological changes, and demonstrate some late flight dates of *Leucorrhinia dubia*, *Erythromma najas*, *Libellula quadrimaculata*, *Orthetrum coerulescens*, *Sympetrum striolatum*, and *Aeshna mixta*. *S. striolatum* was latest seen on the wings on 11 December 2001. The paper also discusses some reasons for the prolonged flight season.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4561.** Parr, A. (2004): First and last dates 2003. *Dragonfly news* 45: 18-19. (in English). [Phenological data referring to the UK in 2003.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4562.** Parr, A. (2004): Migrant dragonflies in the 21st century. *Darter* 21: 4-5. (in English). [Some recent successful colonisations of odonate species new to Great Britain demonstrate the dynamics of the European Odonata. The author risks a view into near future which species could be the next to colonise the British Isles.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4563.** Parr, A. (2004): Odonata Records Committee (ORC). *Dragonfly news* 45: 23. (in English). [Introduction into the work of the British Odonata Records Committee which checks records of rare or immigrant Odonata in the UK.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4564.** Parr, A.; Knijf, G. de; Wasscher, M. (2004): Recent appearances of the Lesser Emperor *Anax parthenope* (Selys) in north-western Europe. *J. Br. Dragonfly Soc.* 20(1): 5-16. (in English). ["For much of the 20th century, *A. parthenope* was a considerable rarity in north-western Europe. In 1983, the first individuals for 100 years were noticed in Belgium, and by the mid 1990s the species had also started to appear in The Netherlands, and Britain. Records from all of these countries are now annual, with no fewer than 33 individuals reported from the region during 1999. This paper details and analyses the occurrences of *A. parthenope*

in north-western Europe during recent years, and relates them to records of the species in other parts of northern Europe. The distribution of *A. parthenope* currently seems to be undergoing significant modification, possibly as a result of climate change. Most records in north-western Europe are apparently still of immigrants, though successful breeding was recorded in Britain during 1999 and could easily have been overlooked elsewhere. Reports from north-western Europe span a time period from late May to early September, with the greatest number of individuals appearing in July. Meteorological evidence suggests that many migratory events have a likely origin in Iberia or other regions surrounding the western Mediterranean." (Authors)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4565.** Parr, A.J. (2004): Migrant and dispersive dragonflies in Britain during 2003. *J. Br. Dragonfly Society* 20(2): 42-50. (in English). ["With a fine and hot summer and record high temperatures for the UK in August, it was no surprise that 2003 turned out to be an excellent year for dragonflies. As far as migrant and dispersive species were concerned there were many highlights. Several records were received of 'resident' species in very unusual locations, possibly in part due to the extreme weather providing favourable conditions for dispersal. Of the more traditional migrants, *Sympetrum flaveolum* reappeared in low numbers after an absence of three years, and *S. fonscolombii* and more especially *Anax parthenope* had a good year. However, the main theme was one of continuing range expansions. Following the first record for Britain during 2002, *Lestes barbarus* was again observed in eastern England, with single individuals seen at two sites. There was also a record of a possible *S. pedemontanum*. On a more local scale, several British residents continued their expansion northwards, and Scotland recorded at least two 'firsts' (*A. imperator* and *Libellula depressa*) during the course of the year." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4566.** Parr, A.J. (2004): Odonata Records Committee Update. *Atropos* 22: 60. (in English). [Four additional 2003 records of *Anax parthenope* have been accepted by the committee, totalling the British records of the species to 16 in 2003. A claimed sighting of a female *Aeshna affinis* was not accepted.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**4567.** Paulson, D.R. (2004): Critical species of Odonata in the Neotropics. *International Journal of Odonatology* 7(2): 163-188. (in English). ["This report summarizes progress that has been made during the past five years toward the understanding of Neotropical Odonata. It also presents a list of critical species and sites, threats to Odonata conservation in the region, and priorities for further research. This region, the richest in the world for Odonata, must be a focus of intense research and conservation efforts." (Author)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**4568.** Paulson, D.R. (2004): Why do some zygopterans (Odonata) perch with open wings? *International Journal of Odonatology* 7(3): 505-515. (in English).



["Zygoptera show two perching modes, one with wings closed and one with wings open. These perching modes are distributed unequally through the suborder; most Zygoptera perch with closed wings, but species in 43 genera of eight families at least occasionally - in most cases usually - perch with open wings. Alternative hypotheses to explain this dichotomy are assessed. The dichotomy does not seem to be explicable by the Phylogenetic Inertia Hypothesis (PIH), the Wing Display Hypothesis (WDH), or the Thermoregulation Hypothesis (TH). I propose a hypothesis that the opening position used by some zygopterans facilitates either more rapid takeoff or quicker orientation toward flying prey: the Quick Takeoff Hypothesis (QTH). That opening species usually take flying prey furnishes support for the QTH, although many closedwing species also take flying prey. However, as most zygopterans perch with closed wings, that behavior needs explanation too, and I propose a hypothesis that perching with wings spread may make a zygopteran more conspicuous to predators and thus may be disadvantageous: the Shiny Wing Hypothesis (SWH). Larger species are less at risk of predation than smaller species, open wings in shade should be less conspicuous than in sunlight, and the majority of zygopterans with open wings are large tropical shade perchers, furnishing support for the SWH." (Author)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**4569.** Pelt, G.J. van (2004): New records of dragonflies from Turkey (Odonata). *Libellula Suppl.* 5: 3-38. (in English, with German and Turk summaries). ["Material of 60 species of Odonata from numerous localities on the mainland of Turkey (collected in 1993, 1996, 1997, 1998, 1999, 2001) is reported upon. A list of taxa is provided, and a complete list of localities is presented. The material is preserved in the collection of the RMNH, Leiden, The Netherlands. Remarks on distribution and taxonomy are restricted to major issues, pending an overview of the odonatofauna of Turkey." (Author)] Address: Pelt, G.J. van, Naturalis, P.O. 9517, NL-2300 RA Leiden, The Netherlands. E-mail: gj.vanpelt@wolmail.nl

**4570.** Pelt, G.J. van; Kalkman, V.J. (2004): Research on dragonflies in Turkey: present status and future aims (Odonata). *Libellula Suppl.* 5: 167-192. (in English, with German and Turk summaries). ["An overview is given of our present knowledge on the dragonfly fauna of Turkey. A database has been created in order to file all published and unpublished records, and to generate distribution maps and histograms of flight periods. A summary of the taxonomical problems that remain is given, and a list of taxa of which the larvae and exuviae are insufficiently known is included. The gaps in our present knowledge are discussed, and ideas for further research and future aims are presented." (Authors)] Address: Pelt, G.J. van, Naturalis, P.O. 9517, NL-2300 RA Leiden, The Netherlands. E-mail: gj.vanpelt@wolmail.nl

**4571.** Pigkess, B.P. (2004): Rapid colonization of a newly dug pond on a Polish heathland. *J. Br. Dragonfly Soc.* 20(1): 4. (in English). [Information on the odonate fauna of an app. 1,5 year old pond, dug in the heathlands of the Cedyński Landscape Park, near Chocianów, Poland is provided. It is said, that the next pond is located in a distance of 3 km to the newly dug pond.

The species mentioned are: *Anax imperator*, *Enallagma cyathigerum*, *Sympetrum danae*, and *Lestes* sp.] Address: Pigkess, B.P., 8 Shaw Drive, Sandford, Wareham, Dorset BH20 7BT

**4572.** Polhemus, D.A. (2004): Critical species of Odonata in the Hawaiian Islands. *International Journal of Odonatology* 7(2): 133-138. (in English). ["Ten species of Hawaiian Odonata are considered to be currently at risk, all of them zygopterans belonging to the endemic genus *Megalagrion*. These species and their proposed status are as follows: *M. jugorum*, endemic to Maui and Lanai [CR, possibly EX]; *M. leptodemas*, endemic to Oahu [CR]; *M. molokaiense*, endemic to Molokai [CE, possibly EX]; *M. nesioties*, endemic to Hawaii and Maui [CR]; *M. nigrohamatum nigrolineatum*, endemic to Oahu [VU]; *M. oahuense*, endemic to Oahu [VU]; *M. oceanicum* endemic to Oahu [CR]; *M. pacificum*, formerly widespread in the lowlands on all high islands [EN]; *M. williamsoni*, endemic to Kauai [EN]; *M. xanthomelas*, formerly widespread in the lowlands on all high islands [VU]. Two species held on previous IUCN lists, *M. adytum* and *M. amaurodytum* peles, have been shown by recent surveys to be more locally abundant at remote sites than was previously realized, and are proposed to be dropped from the current Red List, since they are not immediately at risk." (Authors)] Address: Polhemus, D., Dept. of Entomology, MRC 105, Smithsonian Institution, Washington, D.C. 20560, USA. Email: bugman@bpbm.org

**4573.** Proctor, N.S. (2004): Color of emergent Elfyn Skimmers *Nannothemis bella*. *Argia* 15(4): 13. (in English). [The bodies of teneral *N. bella* have been striking lime green. This colour, blending with the green of the emergence substrat (stems of *Eleocharis* sp.), is said to be a perfect camouflage.] Address: not stated

**4574.** Prum, R.O.; Cole, J.A.; Torres, R.H. (2004): Blue integumentary structural colours in dragonflies (Odonata) are not produced by incoherent Tyndall scattering. *Journal of Experimental Biology* 207: 3999-4009. (in English). ["For nearly 80 years, the non-iridescent, blue, integumentary structural colours of dragonflies and damselflies (Odonata) have been attributed to incoherent Tyndall or Rayleigh scattering. We investigated the production of the integumentary structural colours of a damselfly the familiar bluet, *Enallagma civile* (Coenagrionidae) and a dragonfly the common green darner, *Anax junius* (Aeshnidae) using fibre optic spectrophotometry and transmission electron microscopy (TEM). The reflectance spectra of both species showed discrete reflectance peaks of 30% reflectance at 475 and 460 nm, respectively. These structural colours are produced by light scattering from closely packed arrays of spheres in the endoplasmic reticulum of box-shaped epidermal pigment cells underlying the cuticle. The observed reflectance spectra do not conform to the inverse fourth power relationship predicted for Tyndall / Rayleigh scattering. Two-dimensional (2-D) Fourier analysis of the TEM images of the colour-producing arrays reveals ring-shaped distributions of Fourier power at intermediate spatial frequencies, documenting a quasiperiodic nanostructure. The nanostructured Fourier power spectra falsify the assumption of spatial independence of scatterers that is required for incoherent scattering. Radial averages of the Fourier power spectrum indicate that the spheres are substantially nanostructured at the appropriate spatial scale to produce visible colours by

coherent scattering. However, the spatial periodicity of the arrays is apparently too large to produce the observed colour by coherent scattering. The nanospheres could have expanded substantially (50%) during preparation for TEM. Alternatively, coherent light scattering could be occurring both from the surfaces and from structures at the centre of the spheres. These arrays of colour-producing spheres within pigment cells have convergently evolved at least 11-14 times independently within the Odonata. Structural colouration from arrays in living cells has also fostered the convergent evolution of temperature-dependent colour change in numerous odonate lineages." (Authors)] Address: Prum, R.O., Department of Ecology and Evolutionary Biology, Yale University, PO Box 208105, New Haven, CT 06520, USA. E-mail: richard.prum@yale.edu

**4575.** Rathmacher, G.; Dziock, F. (2004): Libellen-Beifänge (Insecta, Odonata) aus Malaisefallen von der Mittleren Elbe. *Entomol. Mitt. Sachsen-Anhalt* 12(2): 96-102. (in German). [A total of 221 odonate specimens in 12 species were caught in 18 malaise traps located along the middle stretch of River Elbe, Sachsen-Anhalt, Germany. Dominant species was *Coenagrion puella* (n=170). Malaise traps are selective and don't represent the odonate spectrum of a sampling site.] Address: Dziock, F., UFZ Leipzig-Halle GmbH, Dept Naturschutzforschung, Permoser Str. 15, D-04318 Leipzig, Germany. E-mail: Frank-Dziock@ufz.de

**4576.** Ravenscroft, J. (2004): "Old female" form of Common Darter. *Atropos* 21: 80, plate 4. (in English). [UK; photographs demonstrate a female colour form of (a probably young) *Sympetrum striolatum* with red pigmentation about the abdominal mid-dorsal line.] Address: Ravenscroft, J., 19 Pool Close, Little Comberton, Pershore, Worcestershire, WR10 3EL, UK

**4577.** Reder, G. (2004): Nachweis der kleinen Moosjungfer - *Leucorrhinia dubia* (VD.L.) - im Oberrheingraben von Rheinland-Pfalz und Hinweise zu ihrem Vorkommen in südlichen Landesteilen (Odonata: Libellulidae). *Fauna und Flora in Rheinland-Pfalz* 10(2): 619-625. (in German, with English summary). [Offstein, Rhineland-Palatinate, Germany, 31-V to 4-VI-1992. Morphological characters to separate *L. dubia* from *L. rubicunda*, and some older records of *L. dubia* in the region are discussed.] Address: Reder, Gerd, Am Pfortengarten 37, D-67592 Flörsheim-Dalsheim, Germany. E-mail: PG.Reder@t-online.de

**4578.** Reeve, K.; Reeve, P. (2004): Recent changes in dragonfly distribution in Warwickshire. *Darter* 21: 10-11. (in English). [*Platycnemis pennipes*, *Orthetrum cancellatum*, and *Sympetrum sanguineum* are mapped. *Ischnura pumilio*, *Brachytron pratense*, *Gomphus vulgatissimus*, and *Sympetrum fonscolombii* are discussed.] Address: Reeve, P., The Outspan, Leamington Hastings, nr Rugby, Warwickshire, CV23 8DZ, UK. E-mail: peter@reeve60.freesevice.co.uk

**4579.** Reinhardt, K.; Dijkstra, K.D. (2004): Auf der Jagd nach Libellennamen in Malawi. *IDF-Report* 6: 31-34. (in German, with English summary). ["In Malawi, the Chichewa name tombolombo presumably stands for all dragonflies, all Anisoptera or all libellulids, rather than for *Philonomon luminans* only. It is possible that the low nutritional and traditional medical value may not have led yet to a diversity of names for dragonflies. Some Malawian names presented for dragonflies and their

larvae perhaps have a more generic meaning of insects, such as "bugs". The name tombolombo used in Ngoni for dragonflies is more similar to the Chichewa one than that used by the Yao (chensoa) or the Zulu in South Africa." (Authors)] Address: Reinhardt, K., 63 Huntingtower Road, Sheffield S11 7GT, United Kingdom, k.reinhardt@sheffield.ac.uk

**4580.** Röper, C. (2004): Managementplanung in Sachsen-Anhalt. *Naturschutz im Land Sachsen-Anhalt* 41(1): 3-26. (in German). [According art. 6 of the European Fauna Flora Habitat Directive, management plans have to be developed. The author introduces the activities in the Federal State Sachsen-Anhalt, Germany, and briefly outlines 4 plans including measures directed to *Coenagrion mercuriale* and *Ophiogomphus cecilia*.] Address: Röper, Christiane, Landesamt für Umweltschutz Sachsen-Anhalt, Reideburger Str. 47, D-06116 Halle/s., Germany

**4581.** Rowe, R.J. (2004): Conservation of Odonata in the South Pacific and Australasia. *International Journal of Odonatology* 7(2): 139-147. (in English). ["The conservation status of Odonata in the South Pacific Region and in Australasia is reviewed. Australian and New Zealand faunas have recently been monographed, for the rest of the region lack of data is the major handicap to concrete planning. The taxonomic status of the different island faunas and the state of habitat modification on land masses are indicated." (Author)] Address: Rowe, R.J., School of Tropical Biology, James Cook University, Townsville 4811, Australia. E-mail: Richard.Rowe@jcu.edu.au

**4582.** Ruddek, J. (2004): Die Libellen der kanarischen Inseln. Aktueller Stand der Beobachtungen zur Phänologie der Arten. Leaflet: 2 pp. (in German). [Phenological data of 10 odonate species are documented for each of the seven Canary Islands.] Address: Ruddek, J., Butendiek 34, D-28865 Lilienthal, Germany

**4583.** Rychła, A.; Buczyński, P. (2004): Wiederfund von *Leucorrhinia caudalis* in Sachsen (Odonata: Libellulidae). *Libellula* 22(3/4) (2003): 119-125. (in German with English summary). [Germany; "On 29 May 2003, imagines of *L. caudalis* were recorded in the vicinity of Weisswasser, at a water body originating from brown coal mining. This is the first record in Saxony since 1960. Additionally, two records of the rare *L. albifrons* in the area were obtained." (Authors)] Address: Rychła, Anna, ul. Osiedlowa 12, Ploty, PO-66-016 Czerwiensk, Poland. E-Mail: rychlinka@hotmail.com

**4584.** Sahlén, G.; Bernard, R.; Cordero Rivera, A.; Ketelaar, R.; Suhling, F. (2004): Critical species of Odonata in Europe. *International Journal of Odonatology* 7(2): 385-398. (in English). ["The status of the odonate fauna of Europe is fairly well known, but the current I-UCN Red List presents only six species out of ca 130, two of which are actually out of danger today. In this paper we propose a tentative list of 22 possibly declining or threatened species in the region. For the majority, reliable data of population size and possible decline is still lacking. Also 17 endemic species are listed, most occurring in the two centres of endemism in the area: the south-eastern (mountains and islands) and the western Mediterranean. These species should receive extra attention in future updates of the world Red List due to their limited distribution. The extreme variation in biomes and the human exploitation of habitats make con-

ervation planning complicated in Europe. Within the EU, the FFH directive is a working tool aiding conservation. However, the species included do not fully correspond to those on the current Red List, nor to those discussed in this paper. We believe that future conservation efforts should focus on the most valuable and threatened habitats in each sub-region. Active conservation measures could be implemented on a European scale, provided that research will establish a solid ground for such measures." (Authors)] Address: Sahlen, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, S-752 36 Uppsala, Sweden. E-mail: goran.sahlen@zoologi.uu.se

**4585.** SaintOurs, F. (2004): Notes on *Somatochlora linearis* in southeastern Massachusetts. *Argia* 15(4): 24-25. (in English). [The species, in previous years extremely rare in Mass., could be traced at many localities in 2003. Advice on habitats and field determination are outlined.] Address: <http://mothra.bio.umb.edu/Fred.html>

**4586.** Salur, A.; Ozsaraç, O. (2004): Additional notes on the Odonata fauna of Çiçekdağ (KIRSEHİR), Turkey. *Gazi University Journal of Science* 17(1): 11-19. (in bilingual in English and Turk). ["In this study, 74 Odonata specimens were collected and determined from Çiçekdağ between 2000 and 2001. Odonata specimens belonging to 21 species 15 genera of 7 families were determined. 18 species are new records for the Odonata fauna of Çiçekdağ. This study includes faunistic and distributional records of 21 species." (Authors)] Address: Salur, A., Gazi University, Arts & Sciences Faculty of Corum, Biology Department, 19030 Corum, Turkey. E-mail: [alissalur@gazi.edu.tr](mailto:alissalur@gazi.edu.tr)

**4587.** Samways, M.J. (2004): Critical species of Odonata in southern Africa. *International Journal of Odonatology* 7(2): 255-262. (in English). ["Of the 160 species in South Africa, 29 are endemic. Threats to the local odonate fauna have increased in recent years due to the growth of agriculture and impact of invasive alien trees. Currently, 13 species are red-listed as threatened. Among the activities to ameliorate threats, is a massive programme, 'Working for Water', to remove invasive alien plants. This has had an enormously beneficial effect on many of the threatened species." (Author)] Address: Samways M.J., Invertebrate Conservation Research Centre, Dept Zool. & Entomol., University of Natal, P/Bag X01, Scottsville 3209, Pietermaritzburg, South Africa. E-mail: [samways@un.ac.za](mailto:samways@un.ac.za)

**4588.** Sawabe, K.; Ueda, T.; Higashi, K.; Lee, S.-M. (2004): Genetic identity of Japanese *Sympetrum frequens* and Korean *Sympetrum depressiusculum* inferred from mitochondrial 16S rRNA sequences (Odonata: Libellulidae). *International Journal of Odonatology* 7(3): 517-527. (in English). ["The Japanese endemic *Sympetrum frequens* is considered as the insular vicariant of *S. depressiusculum*, widely distributed in the Eurasian Continent. In Korea, morphologically intermediate specimens have been collected, mixed with typical *S. depressiusculum*. The taxonomical status of these two species is thus questionable. To clarify their status, sequencing of mitochondrial 16S ribosomal RNA (rRNA) was performed on 77 specimens of *Sympetrum* species collected from Korea and Japan. The pairwise differences between 378 nucleotides of *S. frequens* and *S. depressiusculum*, including the intermediate type, revealed only minor differences (< 0.5%, average 0.48%).

The neighbor-joining phylogenetic tree indicated that all *S. frequens* and *S. depressiusculum* form one clade, suggesting that they pertain to a single species. The tree also suggests that the *S. frequens* population from Hokkaido is different from all other populations." (Authors)] Address: Ueda, T., Ishikawa Agricultural College, Suematsu, Nonouchi, Ishikawa Pref., 921, Japan

**4589.** Schenk, K.; Suhling, F.; Martens, A. (2004): Egg distribution, mate-guarding intensity and offspring characteristics in dragonflies (Odonata). *Animal Behaviour* 68 : 599-606. (in English). ["We studied how egg size, larval size and egg development time are related to oviposition site selection and mate guarding in a dragonfly assemblage of the Namib desert. Species that oviposited mainly in tandem flight (*Pantala flavescens* and *Sympetrum fonscolombii*) spread their eggs over several ponds, which we interpreted as spatial risk spreading. Other species (*Orthetrum chrysostigma*, *Trithemis kirbyi*, *T. annulata*, and *Crocothemis erythraea*) performed noncontact guarding and localized their eggs, usually in a single pond, which we interpreted as distinct habitat selection. Because long oviposition durations increase the risk of disruption by rival males, we predicted that in species that localize their eggs to a distinct oviposition habitat the first-laid eggs of a clutch should be the largest, indicating high quality. Species that perform risk spreading should distribute large eggs randomly over all oviposition sites. We tested our hypothesis at artificial ponds using experimental manipulations of oviposition. In *O. chrysostigma* and *T. kirbyi*, egg size and larval size decreased significantly with order of laying, and the time to hatch was randomly distributed. As predicted, within the clutches of *P. flavescens* and *S. fonscolombii*, egg size was randomly distributed over a clutch and we found no trend of decrease in larval size or increase in the time to hatch in relation to order of laying." (Authors)] Address: Schenk, Kamilla, Zoologisches Institut, Technische Universität Braunschweig, Fasanstraße 3, D-38092 Braunschweig, Germany. E-mail: [k.schenk@tu-bs.de](mailto:k.schenk@tu-bs.de)

**4590.** Schenk, K. (2004): Relation between egg distribution, mate guarding intensity, and offspring conditions in dragonflies (Odonata). Abstracts: 5th International Symposium on Tropical Biology. SATELLITE EVENTS: 6th International Symposium on the Chrysomelidae; Workshop on African Odonata (Edited by Bernhard A. Huber); Zoologisches Forschungsinstitut und Museum Alexander Koenig, Adenauerallee 160, 53113 Bonn, Germany: 144- (in English). [Verbatim: How is egg size, larval size, and egg development time related to oviposition site selection and mate guarding in dragonflies? My behaviour studies showed species that oviposited mainly in tandem flight spread their eggs over several ponds (spatial risk spreading). Other species performed non-contact guarding and localised their eggs usually in a single pond only (distinct habitat selection). The longer females oviposited at one place the higher the risk caused by disruption by males or increasing predation. Therefore, I proposed that in species which layed their eggs into a distinct oviposition habitat, the eggs of a clutch laid first should be the largest, which I interpret as indicator for high condition. Species that perform risk spreading should distribute large eggs randomly over all oviposition sites. The hypothesis was tested and confirmed at artificial ponds in Namibia and Germany using experimental manipulations of oviposition.] Address: Schenk, Kamilla, Zoologisches Institut, Abtei-



lung angewandte Ökologie, Technische Universität Braunschweig, Fasanenstraße 3, 38102 Braunschweig, Germany. E-mail: k.schenk@tu-bs.de

**4591.** Schiel, F.-J. (2004): Libellen in oberschwäbischen Mooren. *Oberschwaben Naturnah* 2004: 38-40. (in German). [The paper outlines the characteristic odonate fauna of high bogs in Oberschwaben, Baden-Württemberg, Germany, its threats, and possibilities for maintaining the Odonata.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**4592.** Schlotmann, F. (2004): Beobachtung einer Schabrackenlibelle - *Hemianax ephippiger* (Burmeister, 1839) - am Eich-Gimbsheimer Altrhein (Rheinessen, Rheinland-Pfalz). *Fauna und Flora in Rheinland-Pfalz* 10(2): 699-702. ["On May 4th 2003 a male imago of *Anax ephippiger* was recorded at the 'Meerwasser', a shallow pool with an extensive *Phragmites* reedbed belonging to the 'Eich-Gimbsheimer Altrhein', an oxbow lake of the Rhine river near the city of Worms (Rhinessen, Rhineland-Palatinate, Germany). Since there had been strong winds on the days before, it seems possible, that the specimen had been drifted by these winds. It is the second documented record of *A. ephippiger* in Rhineland-Palatinate where the species has been classified as an irregular immigrant." (Author)]. Address: Schlotmann, F., Bahnhofstr. 22a, D-55256 Harxheim, Germany.

**4593.** Schlumprecht, H.; Strätz, C.; Potrykus, W.; Frobel, K. (2004): Libellenverbreitung und wasserwirtschaftliche Renaturierungsmaßnahmen im oberen Maintal. Vorher-Nachher-Vergleich anhand einer Rasterkartierung. *Naturschutz und Landschaftsplanung* 36(8): 277-284. (in German with English summary). ["In the Upper Main Valley (Upper Frankonia, Bavaria) since 1991 many restoration projects have been planned and carried out by the local water authority. They included a survey of the dragonfly fauna which was compared to a former survey of FROBEL (1997; investigations from 1979 to 1993). The study investigated all water bodies in 61 squares of 1 km<sup>2</sup>, covering the 51 km reach of the Upper Main. Applied methods comprised the determination of adults by sight or caught by net, collection of exuviae, and mapping dragonflies from the shore or by canoeing. Several species classified as very rare ten years ago, like *Gomphus vulgatissimus* and *G. pulchellus*, were now found as adults or exuviae in more than 50 % of all plots, mostly in river restoration areas. Furthermore, typical species of rivers and streams such as *Onychogomphus forcipatus* and *Calopteryx virgo* have considerably increased their regional distribution (covering 36 or 20 % of all plots). This is also true for *Orthetrum brunneum*, *Brachytron pratense*, *Anax parthenope* and *Erythromma viridulum*. For the first time *Crocothemis erythraea*, *Cercion lindenii*, *Sympetrum fonscolombii*, *Onychogomphus forcipatus* and *Ophiogomphus cecilia* (listed in the EU Habitat Directive, Annex II) were identified in 2003 in the Upper Main valley. Reasons for the increased distribution and abundance of the species characteristic for natural or near-natural rivers and streams are presumably the creation of new habitats like gravel banks, cut-off meanders, coves, ponds and shallow water zones and the widening of rivers sections which took place in 21 river restoration projects of the local water authority. On

the other hand, some species declined or vanished in the survey area. Ten years ago these species were rare (i. e. they were only found in 1 to 3 plots), namely *Aeshna juncea*, *Coenagrion lunulatum*, *Lestes virens*, *L. barbarus*, *Leucorrhinia dubia*, *L. pectoralis*, *Sympetrum pedemontanum* and *Somatochlora flavomaculata*. Some of these species can be classified from their preferred habitats as bog species (i. e. species of meso- or dystrophic habitats) or from their geographical distribution as boreomontane species. At the same time, thermophilic or mediterranean species increased, such as *Crocothemis erythraea*." (Authors)] Address: Schlumprecht, H., Büro für ökologische Studien, Oberkonnersreuther Straße 6a, D-95448 Bayreuth, Germany. E-Mail kontakt@bfoes.de

**4594.** Schmidt Furier, K.; Cardoso Barreto, F.C.; De Marco, P. (2004): The rediscovery of *Leptagrion capixabae* Santos, 1965 (Zygoptera: Coenagrionidae). *Notulae Odonatologicae* 6(3): 31-33. (in English). [*L. capixabae* was only known from the holotype male, labelled "Espírito Santo - Brazil" and deposited at MNHN, Paris. Here, 4 males from Estação Biológica de Santa Lucia, Santa Teresa, Espírito Santo, Brazil (collected in 2002 and 2003) are brought on record. A photograph of the male anal appendages is also provided.] Address: De Marco, P., Laboratório de Ecologia Quantitativa, DBG, Universidade Federal de Viçosa, BR-36571-000, Viçosa, MG, Brazil.. E-mail: pdemarco@mail.ufv.br

**4595.** Schneider, W. (2004): Critical species of Odonata in the Levant. *International Journal of Odonatology* 7(2): 399-407. (in English). ["Of the 86 Odonata species so far recorded for the Levant, four are considered as endangered (*Calopteryx hyalina*, *C. syriaca*, *Ceragrion georgifreyi*, *Pseudagrion torridum hulae*), six as vulnerable (*Coenagrion vanbrinckae*, *P. sublacteam mortoni*, *Gomphus kinzelbachi*, *Onychogomphus macrodon*, *Brachythemis fuscopalliata*, *Crocothemis sanguinolenta*), and two as extinct (*Rhyothemis semihyalina syriaca*, *Urothemis edwardsi hulae*). The history of Odonatological research in the Levant is outlined. The creation of protected areas for vulnerable and endangered species is suggested and a number of suitable sites proposed." (Author)] Address: Schneider, W., Hess. Landesmus., Zool. Abt., Friedensplatz 1, D-64283 Darmstadt, Germany. E-mail: w.schneider@hlmd.de

**4596.** Schorr, M. (2004): Die Gekielte Smaragdlibelle (*Oxygastra curtisii* DALE, 1834) an der Our (Rheinland-Pfalz / Luxemburg) (Insecta: Odonata: Corduliidae) Anmerkungen zur regionalen Verbreitung. *Fauna Flora Rheinland-Pfalz* 10(2): 627-643. (in German with English summary). [The discovery of *Oxygastra curtisii* in the late 1990th along the river Our rises the question where the specimens of the founder population could originate. Possible source populations could be in France or Belgium. It is discussed that the source population should be looked for in France in the "river Meuse-Moselle-system".] Address: Schorr, M., Schulstr. 7B, D-54314 Zerf, Germany. E-mail: martinschorr@online-home.de

**4597.** Schweizer Zentrum für die Kartographie der Fauna (2004): Jahresbericht 2003. *Schweizer Zentrum für die Kartographie der Fauna Nachrichten* 27: 8-9, 28-29. (in French / German). [Brief report on the status of the Red List of Odonata and a book on the Swiss odo-

nate fauna.] Address: CSCF, 14 rue des Terreaux, CH-2000 Neuchâtel, Switzerland. E-mail: [www.cscf.ch](http://www.cscf.ch)

**4598.** Ściborska, M. (2004): Breeding biology of the citrine wagtail (*Motacilla citreola*) in the Gdańsk region (N Poland). *Journal of Ornithology* 145(1): 41-47. (in English with German summary). [Odonata (larvae and imagines) are among the prey carried by the parents to their brood] Address: Ściborska, Marta, Bird Migration Research Station, University of Gdańsk, Przebendowo 3, 84-210 Choczewo, Poland

**4599.** Scott, D.A. (2004): Reports from Coastal Stations - 2003: Dursey Island, Co. Cork. *Atropos* 21: 69-70. (in English). [UK, *Sympetrum striolatum*] Address: not stated

**4600.** Scott, M.A. (2004): Reports from Coastal stations - 2003: Longstone heritage Centre, St. Mary's, Isles of Scilly. *Atropos* 21: 39-42. (in English). [First record of *Orthetrum cancellatum*, second record of *Anax imperator*. *Sympetrum fonscolombii* on the nearby island of Annet on 21/X/2003.] Address: not stated

**4601.** Sénégas, S. (2004): Pourquoi les libellules ont le corps si long. D'après un conte zairois. *Kaléidoscope*. Paris. ISBN 2 211 075 16 9: 36 pp. (in French). [The idyll in a small village in Zaire was bothered by a dragonfly causing a domino effect of accidents. This gave rise to the boss of the village to imprison this dragonfly. It was chained up, but could escape by pulling its abdomen long and longer ... A nice story and lovely illustrated.] Address: Kaléidoscope, lutin poche de l'école des loisirs, 11, rue de Sèvres, Paris 6e, France

**4602.** Small, D. (2004): New England odonate conference April 17th 2004, Athol Massachusetts. *Argia* 16(2): 6. (in English). [148 dragonfly enthusiasts gathered the first odonatological meeting in Massachusetts, USA.] Address: not stated

**4603.** Smith, B. (2004): Report from Scotland 2002 / 2003. *Darter* 21: 5-6. (in English). [Some interesting records are documented, in most cases more southern species.] Address: not stated

**4604.** Smith, P.G. (2004): Dragonfly populations of peat-bog pools in north-east Scotland. *J. Br. Dragonfly Soc.* 20(1): 23-30. (in English). [UK, weather, abundance, *Lestes sponsa*, *Pyrrhosoma nymphula*, *Enallagma cyathigerum*, *Ischnura elegans*, *Aeshna juncea*, *Libellula quadrimaculata*, *Sympetrum danae*] Address: Smith, P.G., Lein House, Kingston, Moray IV32 7NW, UK

**4605.** Solly, F. (2004): Reports from Coastal stations - 2003: Isle of Thanet. *Atropos* 21: 57-59. (in English). [No odonate records on the Isle of Thanet, but records of *Erythromma viridulum* at Monkton Nature Reserve in North Kent, UK.] Address: not stated

**4606.** Spence, B. (2004): Reports from Coastal Stations - 2003: The Spurn Area, East Yorkshire. *Atropos* 21: 66-68. (in English). [Verbatim: It was also an excellent year for Odonata, three very unexpected new species being recorded single *Calopteryx splendens* on 15 June and 20 July, a *Anaciaeschna isosceles* on 20 July and *Cordulia aenea* on 22 July. Our local breeding *Sympetrum fonscolombii* also had a good season with at least 19 emerging. In addition, record numbers of *Anax imperator*, *Libellula quadrimaculata*, and *Orthetrum cancellatum* were seen. Lastly there was a sub-

stantial arrival of *Aeshna mixta* (58) on 31 July, increasing to 70 by 5 August.] Address: not stated

**4607.** Sternberg, K.; Sternberg, M. (2004): Veränderung der Artenzusammensetzung und erhöhte Abwanderung bei Libellen durch die Mahd der Uferwiesen zweier Fließgewässer (Odonata). *Libellula* 23(1/2): 1-43. (in German, with English summary). ["Change of species composition and increased migration rate of dragonflies due to cutting of adjacent meadows of two running waters (Odonata) At a lowland brook and a meadow ditch near Freiburg (Baden-Wuerttemberg, Germany), before cutting of adjacent meadows the damselfly assemblage at the brook comprised about 1100 individuals. During the day 89% and over night 50% of them stayed in the herbaceous, richly structured meadows up to >60 m from the bank. The ditch assemblage with about 350 individuals was found in the surrounding, monotonously structured tall oat grass meadow mainly near the water. Directly after cutting, the meadows along the brook and the ditch were almost free of damselflies, whereas the anisopteran *Orthetrum coerulescens* was still found in similar densities as before. As a result of cutting, the damselfly numbers of the brook decreased to 50% and that of the ditch to 32 %. Due to cutting, sex ratio and ratio of mature and immature damselflies changed at the brook as well as species composition and dominance relationships within the assemblages at the ditch. In the further surrounding, abundance in particular of females and numbers of flights away from the waters increased shortly after cutting. The study underlines the great importance of terrestrial habitats for dragonfly assemblages. Notes for practical nature conservation are given." (Authors)] Address: Sternberg, K., Schillerstraße 15, D-76297 Stutensee, Germany. E-mail: [Klaus-Sternberg@web.de](mailto:Klaus-Sternberg@web.de)

**4608.** Stickney, D. (2004): Water bugs & dragonflies. Explaining death to young children. The Pilgrim Press. Cleveland. ISBN 0-8298-1624-0: 23 pp. (in English). [Small illustrated booklet explaining death using the metamorphosis from the larval stage (life in the real world) to the imaginal stage (death = life in a new world).] Address: [www.pilgrimpress.com](http://www.pilgrimpress.com)

**4609.** Suhling, F.; Schenk, K.; Padeffke, T.; Martens, A. (2004): A field study of larval development in a dragonfly assemblage in African desert ponds (Odonata). *Hydrobiologia* 528: 75-85. (in English). ["Aquatic animals distributed along a habitat-permanence gradient (HPG), differ in life history (Wellborn et al., 1996. *Annual Review of Ecology and Systematics* 27: 337-363). Dragonflies that occur in hot arid regions often occur in temporary waters and consequently perform direct and rapid development. Dragonfly species of the Namibian desert do differ in their selection of habitats along the HPG and therefore may also differ in life cycle. Here, we attempt to monitor colonisation, larval growth and emergence in a temporary pond of known history. We studied the development of dragonfly species that laid eggs in artificial ponds constructed by us in March 2001. The assemblage consisted of species that originate from different habitats along the HPG. To obtain data on larval development we took samples from the ponds at 10-day intervals. Most species showed rapid development. By regressing the maximum sizes attained by larvae on each sampling date against time we estimated growth rates for five species and were there-

by able to estimate that total duration of development from oviposition to emergence ranged between 38 and 70 days. Observation of first oviposition and first emergence for three of these species corroborated our estimates based on growth rate. Of few species, which laid eggs in the ponds no larvae or adults were found. For some this may have been the result of predation whereas others may not have grown fast enough to emerge before the ponds dried up. Our results indicate that dragonflies cannot recognise whether a pond will retain water long enough for full larval development and oviposit in waters that will not allow larval development." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**4610.** Suhling, F.; Martens, A.; Marais, E. (2004): Critical species of Odonata in southwestern Africa. *International Journal of Odonatology* 7(2): 263-277. (in English). ["In this report we review the conservation status of Odonata of southwestern Africa, viz Angola, Botswana, Namibia, Zambia and Zimbabwe. In total, 287 species have been recorded of which three have been previously listed by IUCN. We consider 60 species mainly because of their endemism in the region. The majority of the species have to be categorised as 'data deficient' according to IUCN regulations. The most important freshwater habitats in the region are the extensive swamps in the Kalahari basin, such as the Okavango Delta, the Caprivi swamps and the swamps along the courses of the middle Zambezi system, which host a unique odonate community. The most important threats for species in the region include overuse of water, construction of dams in the large rivers and deforestation. We strongly recommend extensive research on the Angolan and Zambian odonate faunas, which appear to be the richest in the regions, although they are poorly investigated." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**4611.** Suhling, F.; Schütte, C.; Martens, A. (2004): Habitat selection, ecological traits and regional distribution pattern of dragonflies in arid Namibia. *Zoologisches Forschungsinstitut, und Museum Alexander Koenig, Adenauerallee 160, 53113 Bonn, Germany. 5th International Symposium on Tropical Biology: 145.* (in English). [Verbatim: Freshwaters can be classified into types with respect to the extent of drying they experience. While temporary waters limit the distribution of taxa due to harsh physical conditions (drying), perennial waters limit distribution of taxa through biotic factors. Hence, species occurring in different types of freshwaters along the gradient should differ in ecological traits, e.g. behaviour and life history. We studied adult habitat selection and behavioural and life history traits of larvae of 11 species of Namibian dragonflies. We hypothesised that species selecting different habitats along the gradient in Namibia should differ in traits studied. Three groups were identified: (1) species confined to perennial springbrooks, (2) species occurring mainly at large perennial lakes, and (3) species occurring at several types of habitats. Experimental studies revealed that perennial water species grow slower and are less active than temporary water species. The latter is normally interpreted as adaptation against large predators. Slow growth is a trade-off, which prevents species of developing in temporary waters. Because in arid Namibia perennial

freshwaters are limited we expected that species specialised to such freshwaters are rare, whereas species able to develop in temporary waters should be widespread. We produced distribution maps based on data of museum collections and own sample data, which revealed that species of type (1) and (2) are limited in distribution, while species of type (3) are widespread in the country.] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**4612.** Sukacheva, I.D.; Rasnitsyn, A.P. (2004): Jurassic Insects (Insecta) from the Sai-Sagul Locality (Kyrgyzstan, Southern Fergana). *Paleontological Journal* 38(2): 182-186. (in English). [Translated from *Paleontologicheskii Zhurnal*, No. 2, 2004, pp. 64-68. [The Jurassic insect Sai-Sagul locality (sometimes designated as Shurab 3 or Svodovoe Ruslo) is situated in southern Fergana in the Batkenskii District of the Osh Region, Kyrgyzstan, at the boundary with the Isfarinskii District of the Leninabad (Khodzhen) Region, Tajikistan. A caddisfly *Dolophilodes* (*Sortosella*) *shurabica* subgen. et sp. nov. (Philopotamidae) is described from the Jurassic of Kyrgyzstan, from the Sai-Sagul locality. The ecology and taphonomy of this locality are analyzed, and the insects described from the Sai-Sagul locality are listed. 19 fossile odonate species are listed.] Address: I. D. Sukacheva and A. P. Rasnitsyn, Paleontological Institute, Russian Academy of Sciences, Profsoyuznaya ul. 123, Moscow, 117997 Russia. E-mail: rasna@online.ru

**4613.** Sykes, T. (2004): Reports from Coastal Stations - 2003: Gibraltar Point, Lincolnshire. *Atropos* 21: 66. (in English). [UK; "...] with the reserve's fourth and fifth records for both *Calopteryx splendens* (7 & 18 August) and *Aeshna grandis* (one on 24 July, one on an unrecorded date subsequently), all arriving off the sea. Two *Brachyton pratense* on 11 June were very notable, whilst *Sympetrum fonscolombii* on 21 June (two) and 24 June were almost expected. *Aeshna mixta* peaked at a modest 200+ on 6 September." (Author)] Address: not stated

**4614.** Taily, M.; Ananian, V.; Dumont, H.J. (2004): Recent dragonfly observations in Armenia, with an updated checklist. *Zoology in the Middle East* 31: 93-102. (in English, with German summary). ["Thanks to the work of N. N. Akramowski, the Odonata fauna of Armenia had become relatively well known by the late 1940s. In recent years, an effort has been made to collect new information, and this paper reports on the most striking results. Three species new for the country, *Erythromma lindenii*, *Coenagrion scitulum*, and *Orthetrum sabina*, are listed. Specimens presumed to be *Coenagrion ornatum* actually fit the description of *C. vanbrinkae*. A number of others, viz. *Anaciaeschna isocoles*, *Anax imperator*, and *A. parthenope*, are shown to be more abundant than in earlier times, probably due to the construction of ponds and canals. In most of Armenia, hybrid populations of *Calopteryx splendens* are found, but in the south only genuine *C. s. intermedia* occurs. The paper concludes with a checklist and a discussion of why certain species are considered doubtful and have not been included."] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be



- 4615.** Taylor, P. (2004): Report of the Dragonfly Conservation Group. *Dragonfly news* 45: 20-22. (in English). [Report on current (2003) activities in the UK to study or protect Odonata.] Address: Taylor, Pam, Decoy Farm, Decoy Rd, Potter Heigham, Norfolk, NR29 5LX, UK. E-mail: ptaylor@acle.norfolk.sch.uk
- 4616.** Tchibozo, S.; Dijkstra, K.D. (2004): Rapport d inventaire préliminaire des libellules des zones humides du Sud-Bénin. IDF-Report 6: 1-6. (in French with English summary). ["Dragonflies were collected at ten localities in five counties (sous-préfectures) in southern Bénin and are presently identified. A total of 73 species were found, including 45 new records for the country. The list of the odonates of Bénin currently comprises 86 species although more than 100 can probably be expected." (Authors)] Address: Tchibozo, S., Laboratoire d écologie appliquée, Faculté des sciences agronomiques, Université d Abomey- Calavi, 04 B.p. 0385 Cotonou, Bénin, E-mail: Tchisev@avu.org
- 4617.** Tennessen, K. (2004): *Enallagma exsulans* gleaned at the water surface. *Argia* 15(4): 13. (in English). [USA, Alabama; a male *E. exsulans* preyed on *Metrobates hesperius* (Gerridae).] Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktinnessen@aol.com
- 4618.** Tennessen, K. (2004): *Hetaerina americana* in Florida. *Argia* 16(2): 7. (in English). [USA, Eglin Air Force base, 10 April 2004] Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktinnessen@aol.com
- 4619.** Tennessen, K.J.; Vogt, T.E. (2004): *Ophiogomphus smithi* n. sp. (Odonata: Gomphidae) from Wisconsin and Iowa. *Proceedings of the Entomological Society of Washington* 106(3): 540-546. (in English). ["*Ophiogomphus smithi*, n. sp., is described and illustrated from 24 males and 15 females (holotype male and allotype female from Wisconsin, Eau Claire County, confluence of South Fork Eau Claire River and Horse Creek, 12 June 1994, K. J. Tennessen). The new species resembles *O. aspersus* Morse; however, the male has shorter proximal lobes on the anterior hamules and the female has occipital horns and a shorter vulvar lamina." (Authors)] Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktinnessen@aol.com
- 4620.** Thom, T.; Daigle, J.J. (2004): 2004, Eglin AFB, Florida meeting. *Argia* 16(2): 6-7. (in English). [USA, Florida, 09 - 11 April 2004; the meeting intended to help the local biologist surveying the Odonata, and - in vain - to trace the new *Ophiogomphus* still to describe. In total 55 odonate species were recorded.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@netally.com
- 4621.** Thompson, D.J. (2004): Honest signals and female damselflies. *J. Br. Dragonfly Soc.* 20(1): 35-36. (in English). ["[...] Females arriving at the breeding site with a full clutch of eggs to lay are bound to be harassed by males until they enter tandem. The same females leaving the breeding site with no mature eggs to lay signal to males that they are not worth mating with and males believe them. Females might like to persuade males to leave them alone when they approach the breeding site, but invariably they do not. Why are they able to do it on the way out, but not on the way in? The answer would seem to be that they have an honest signal on the way out, a signal to males
- the way out, a signal to males with which they are unable to convey false information, an honest signal. When leaving a breeding site, female coenagrionid damselflies, if approached by males, bend their abdomens down outrageously, at an angle close to ninety degrees. Males seem to get the message that these females are not worth chasing. Females are quite unable to do this when they approach a breeding site because their abdomens are completely full of mature eggs such that it is impossible to bend them at such angles. So bending the abdomen at such an angle is an honest signal because it is impossible to cheat on this signal. The abdomen can only be bent to such a large extent when it is empty of mature eggs." (Author)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk
- 4622.** Thompson, D.J.; Roquette, J.R. (2004): Variation in the "mercury mark" of the Southern Damselfly *Coenagrion mercuriale* (Charpentier) in Britain. *J. Br. Dragonfly Soc.* 20(1): 17-21. (in English). [The variation of the mark on the second abdominal segment of *C. mercuriale* was checked at the four largest population centres in Britain: Preseli, New Forest, Itchen Valley, Dorset, and at three isolated sites (Oxford, Dartmoor, Anglesey). The authors presume that variation in the mercury marks is genetically determined. ] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk
- 4623.** Thompson, R.; Nelson, B. (2004): Ireland's odonates and the formation and success of the DragonflyIreland Projekt. *Atropos* 23: 3-11. (in English). [This paper introduces the history and the cooperative process among Ireland's odonatologists which resulted in the book "The natural history of Ireland's dragonflies. ISBN 0 900761 45 8" (see OAS 4158). In addition some vernacular names are discussed and listed in an appendix, and the odonate species of Ireland are highlighted.] Address: Nelson, B., Dept. of Zoology, Ulster Museum, Botanic Gardens, Belfast BT9 5AB, UK
- 4624.** Tiemann, J.S.; Gillette, D.P.; Wildhaber, M.L.; Edds, D.R. (2004): Effects of Lowhead Dams on Riffle-Dwelling Fishes and Macroinvertebrates in a Midwestern River. *Transactions of the American Fisheries Society* 133: 705-717. (in English). ["Many studies have assessed the effects of large dams on fishes and macroinvertebrates, but few have examined the effects of lowhead dams. We sampled fishes, macroinvertebrates, habitat, and physicochemistry monthly from November 2000 to October 2001 at eight gravel bar sites centered around two lowhead dams on the Neosho River, Kansas. Sites included a reference site and a treatment site both upstream and downstream from each dam. Multivariate analysis of variance indicated that habitat, but not physicochemistry, varied immediately upstream and downstream from the dams, with resultant effects on macroinvertebrate and fish assemblages. Compared with reference sites, upstream treatment sites were deeper and had lower velocities and downstream treatment sites were shallower and had higher velocities; both upstream and downstream treatment sites had greater substrate compaction than reference sites. Macroinvertebrate richness did not differ among site ty-

pes, but abundance was lowest at downstream treatment sites and evenness was lowest at upstream treatment sites. Fish species richness did not differ among site types, but abundance was highest at downstream reference sites and evenness was highest at upstream sites. [...] Although limited to one system during a 1-year period, this study suggests that the effects of lowhead dams on fishes, macroinvertebrates, and habitat are similar to those reported for larger dams, providing important considerations for riverine ecosystem conservation efforts." (Authors) *Lestidae* and *Gomphidae* are listed in tab. 2] Address: Tiemann, J., Illinois Natural History Survey, Center for Biodiversity, Champaign, Illinois 61820, USA. E-mail: jtie-mann@inhs.uiuc.edu

**4625.** Tofilski, A. (2004): DrawWing, a program for numerical description of insect wings. *Journal of Insect Science* 4(17): 5pp. (in English). ["There is usually a pattern of veins on an insect wing. This pattern is species-specific and is used taxonomically.[...] A tool is presented that enables automatic identification of vein junctions. An image of an insect wing is used to determine the wing outline and veins. The vein skeleton is obtained using a thinning algorithm. Bezier splines are fitted to both the wing outline and the vein skeleton. The splines are saved in an encapsulated postscript file. Another output file in text format contains the coordinates of vein junctions. Both the program and its source code are available under GNU General Public License at [www.cyfkr.edu.pl/~rotofilsk/drawing.html]. The program presented in this paper automatically provides a numerical description of an insect wing. It converts an image of an insect wing to a list of coordinates of vein junctions, and a wing diagram that can be used as an illustration. Coordinates of the vein junctions extracted by the program from wing images were used successfully to discriminate between males of *Dolichovespula sylvestris* and *Dolichovespula saxonica*." (Author) A wing of *Aeshna juncea* is demonstrated.] Address: Available online: [insectscience.org/4.17](http://insectscience.org/4.17)

**4626.** Tóth, S (2004): The dragonfly-fauna of the surroundings of Komló, South Hungary, No. 3. The dragonfly-fauna of Mecsekpölöskei-horgászto (Odonata). *Folia comloensis* 13: 79-86. (in Hungarian, with English summary). [Hungary; 47 species have been recorded including *Anax parthenope*, *Chalcolestes viridis*, *Coenagrion scitulum*, *Cordulegaster heros*, *Cordulia aenea*, *Somatochlora flavomaculata*, *Epithea bimaculata*, *Leucorrhinia pectoralis*, *Libellula fulva*, *Ophiogomphus cecilia*, *Pyrrhosoma nymphula interposita* Varga, 1968, and *Somatochlora metallica*.] Address: Toth, S., Széchenyi u. 2, H-8420 Zirc, Hungaria. E-mail: [flycatcher@free-mail.hu](mailto:flycatcher@free-mail.hu)

**4627.** Trapero Quintana, A.; Torres Cambas, Y.; Naranjo López, N.; Bello González, O.C. (2004): Annotated list of the odonates in the Alexander Humboldt National park, Guantanmo Province, Cuba. *Argia* 16(2): 16-19. (in English). [24 species are listed, including *Protoneura viridis* Westfall 1964 new to Cuba, and *Lestes spumarius* Hagen in Selys 1862 new to eastern Cuba. Field observations on ecology and habitat are provided.] Address: Trapero Quintana, A., Departamento de Biología de la Universidad de Oriente, Santiago, Cuba, CP 90500, Cuba

**4628.** Tunmore, M. (Compiler) (2004): Reports from Coastal stations - 2003: Kingsdown Beach, Kent. *Atropos* 21: 59-60. (in English). [*Anax parthenope*, 29 June 2003, Hope Point] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: [atropos@atroposed.freeseve.co.uk](mailto:atropos@atroposed.freeseve.co.uk)

**4629.** Turnmore, M. (2004): Dragonfly conservation from the BDS: The search for Southern damselfly *Coenagrion mercuriale* (Charp.) in Cornwall. *Atropos* 23: 45-47. (in English). [The paper reports the history of *C. mercuriale* in Cornwall, UK, and the most recent unsuccessful efforts to rediscover the species.] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: [atropos@atroposed.freeseve.co.uk](mailto:atropos@atroposed.freeseve.co.uk)

**4630.** Turnmore, M. (2004): Reports from Coastal stations - 2003: The Lizard Peninsula, Cornwall. *Atropos* 21: 43-45. (in English). ["Highlights included a *Anax parthenope* on 7 July and regular sightings of *Sympetrum fonscolombii* from 16 June to 24 August at least, including a peak of 60 on 19 August and ovipositing noted. *Orthetrum coerulescens* was discovered in suitable breeding habitat on the reserve. Small numbers of *S. fonscolombii* were also noted at the usual sites on Goonhilly Downs and Predannack in June and July." (Author)] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: [atropos@atroposed.freeseve.co.uk](mailto:atropos@atroposed.freeseve.co.uk)

**4631.** Twissel, I. (2004): County focus: Gloucestershire. Dragonflies. *Atropos* 21: 20-23. (in English). [The paper outlines some interesting or most recently sighted Odonata or Gloucestershire, UK.] Address: Twissel, Ingrid, Arfonia, The Green, Churchdown, Gloucestershire, GL3 2LE, UK

**4632.** Tynkkynen, K.; Rantala, M.J.; Suhonen, J. (2004): Interspecific aggression and character displacement in the damselfly *Calopteryx splendens*. *Journal of Evolutionary Biology* 17(4): 759-767. (in English) ["Problems in species recognition are thought to affect the evolution of secondary sexual characters mainly through avoidance of maladaptive hybridization. Another, but much less studied avenue for the evolution of sexual characters due to species recognition problems is through interspecific aggression. In the damselfly, *Calopteryx splendens*, males have pigmented wing spots as a sexual character. Large-spotted males resemble males of another species, *Calopteryx virgo*, causing potential problems in species recognition. In this study, we investigate whether there is character displacement in wing spot size and whether interspecific aggression could cause this pattern. We found first that wing spot size of *C. splendens* in populations decreased with increasing relative abundance of *C. virgo*. Secondly, *C. virgo* males were more aggressive towards large- than small-spotted *C. splendens* males. Thirdly, in interspecific contests *C. virgo* males had better territory holding ability than *C. splendens* males. These results suggest that interspecific aggression may have caused character displacement in wing spot size of *C. splendens*, because the intensity of aggression towards large-spotted males is likely to increase with relative abundance of *C. virgo* males. Thus, interspecific aggression may be an evolutionarily significant force that is able to cause divergence in secondary sexual characters." (Authors)] Rantala, M.J., University of Jy-

väskylä, Department of Biological and Environmental Science, P.O. Box 35, FIN-40014, University of Jyväskylä, Finland; Current address: Department of Biology, University of California, Riverside, CA 92521, USA. E-mail: [marrant@st.jyu.fi](mailto:marrant@st.jyu.fi)

**4633.** Tyrrell, M. (2004): Group oviposition behaviour in the Brown Hawker *Aeshna grandis* (L.). *J. Br. Dragonfly Society* 20(2): 79. (in English). ["... a group of six to eight female *A. grandis* were observed swarming around a partially submerged wooden pallet. The pallet had been present at this site for at least six months and was used as a stand by fishermen. It became clear that the females were ovipositing as a group into the submerged sections of the pallet. Despite the weather, which would not generally have allowed much activity, the hawkers were highly active, competing for space to oviposit on the pallet. A similar observation was made on 18 July 2004 at Ditchford Lakes and Meadows. Again this was during a warm (21°C), humid, but overcast afternoon. This time, activity was centred on a partially submerged broken tree trunk. It appeared that at all points where the trunk entered the water, a female *A. grandis* was ovipositing just above the water level. There were many other females swarming around and perching on nearby branches, as if waiting their turn. When one female flew away, her oviposition site was immediately taken up by one of the waiting females. This carried on for several minutes until the group broke up and dispersed. ..." (Author)] Address: Tyrrell, M., 8 Warwick Close, Raunds, Wellingborough, Northamptonshire NN9 6JH, UK

**4634.** Tyrrell, M.; Brayshaw, S. (2004): Population expansion of the Hairy Dragonfly *Brachytron pratense* (Müller) and other breeding dragonflies of the Nene Valley in Northamptonshire. *J. Br. Dragonfly Society* 20(2): 51-60. (in English). ["The River Nene valley is the primary habitat for Odonata in Northamptonshire, hosting breeding populations of 18 of the 19 resident species. A series of gravel pits, many of which are managed nature reserves, have created excellent habitats for these typical lowland species. The data from the survey reported on in this paper has been included in a report to English Nature to support the case for expansion of the Nene Valley SSSI suite with the recommendation that some pits are designated as SSSI based purely on their assemblages of dragonflies. Following an apparent decline since the 1950s, *B. pratense* is now firmly established as a breeding species in the Nene Valley gravel pits, and breeds in fishing pits, country parks, dykes and managed nature reserves. The main dispersal route into the valley appears to have been along the River Nene corridor from the Cambridgeshire gravel pits located to the north-east. The expansion during the early 1990s coincided with a general range expansion in southern England. The Hairy Dragonfly appears absent from the newer heavily commercial pits, such as Billing Aquadrome south of Northampton, where the leisure uses of the pits may be incompatible with wildlife management, and from those pits with an open aspect such as those found in the Northampton, Hardingstone and Clifford Hill areas. Confirmed breeding is concentrated to the east of Northampton, with only occasional sightings to the west. Breeding sites in Northamptonshire are associated with moderately dense emergent vegetation, floating decaying plant debris, shallow water margins and the presence of Common Club-rush, Bulrush, sedges, Reed Canary-grass and Reed Sweet-grass. Ditchford Lakes and

grass. Ditchford Lakes and Meadows Nature Reserve is the primary breeding site, based on the number of exuviae collected. Breeding has been proven at one site away from the Nene Valley gravel pits and with regular sightings at others, the indications are that the Hairy Dragonfly continues to expand its range in the county, and may soon be recorded at other suitable habitats." (Authors)] Address: Tyrrell, M., 8 Warwick Close, Raunds, Wellingborough, Northamptonshire NN9 6JH

**4635.** Uéda, T. (2004): How do the Japanese see Dragonflies. Kyoto University Press. ISBN 4-87698-638-X: 505 pp. (in Japanese). [Translation by Naoya Ishizawa: "Uéda, Tetsuyuki: Prologue. While environmental problems aggravate, instead of the Western-like view on nature which conquers nature, the Japanese view on nature attracts attention. Surely, as we love the beauties of nature and enjoy the sound of crickets, Japanese people have lived identifying ourselves with nature. We also produced the peculiar art, which describes nature in haiku poem. However, on the other hand foreigners are disgusted that there is no country, which has been destroying nature of Japan so much. Is the Japanese view on nature surely the one, which brings about coexistence with nature? It is indicated that the Japanese view on nature is so much idealistic that the Japanese do not know the real nature. For example, a raccoon dog, popular to us, is the one that appears in folklore and literature, and we know little about it as a creature. Consequently, concerning management of wild animals, we react only emotionally; saying that killing it is pitiless. Thus our view on nature seems to be much inconsistent and confused. This seems to bring on destruction of culture as well as nature. Therefore, I tried to deal with the problem of the Japanese view on nature, with which we don't deal directly everyday, moreover, to review it thoroughly through the eyes on insects. Because I thought that the essential thing can be seen in the way of coming in contact with such trifles, smallness, and in a sense, peculiarity. Fortunately, I could organize the project supported by the Nissan Science Foundation; How do the Japanese see dragonflies?: A study on the Japanese view of nature. Various experts such as literary persons, linguists, sociologists, artists as well as ecologists reviewed our world through the eyes of insects besides their own works, and held a meeting once every year. This book was accomplished based on the result of the project. My specialty is animal ecology, and I have been studying particularly the behaviours of dragonflies and their life history. I never thought that I began such research till several years before. For these ten years I have been studying *Sympetrum frequens* that is famous of migration to highlands in summer, and I came to suspect that *S. frequens* might be not only an insect but also a scenery that was brought about in the course of interaction between human being and nature. I don't know what made me think so, however, such emotion is only noise for a natural scientist. But the more I endeavor to understand *S. frequens*, the larger my emotion was strengthened. Probably it may be related to the present day situation when rice fields of the main habitat of *S. frequens* have been devastated. Probably I could see it through *akatombo*: *S. frequens*, that agricultural devastation is that of the scenery, that has been suggested concerning the importance of neighbouring nature. Another chance of starting this research was brought about by a big incident. That was Great Hanshin Earthquake. There was a report, which was a relief among a lot of miserable



news. It was a newspaper report that the lives of a couple buried under debris had been supported by the song of "aka-tombo". The report said that only the song of "aka-tombo" that the wife sang was the support of the effort for the life of the husband. At the news I wondered deeply what of the song of "aka-tombo" had produced the effort for life. As you know, the song of "aka-tombo" is none to summon up people's courage. The song might have remembered the couple of the hills and rivers where they had lived in their childhood and might have made them want to live again in such a world. Or there may be another deep meaning. Anyway, it might have been the very thing that I wanted to understand the background of the "aka-tombo" through the word of "scenery". At such time I happened to be invited to a meeting of a research by Yuma, Masahide, Center for Ecological Research, Kyoto University, one of the member of this project. The meeting was the one of a small group for the large theme: General research of Stable Society- Kyoto International Seminar hosted by Foundation of Kyoto Seminar House, presided by Yokoyama, Toshio and others, Institute for Research in Humanities, Kyoto University. This was the group beyond the domain of learning. The theme at that time was "Things break out, continue/ on the mediation", which were like the spells for scientists. Then, in January 1997, two years after the earthquake, I made a presentation on "Change from insects to the scenery in S. frequens" at the seminar house in the cedar forest slightly covered with snow at Miyama-cho, Kyoto-fu. At the meeting I met Prof. Chung, Kwang of Korean University, who said that there had been the word of scenery, however, at present it is not used. His words were so much impressive, then, I decided to review seriously the scenery. Thus this research project started with many participants as well as Prof. Chung. However, without continuous support by Nissan Science Foundation in 1997, from 1999 to 2002 we could not have completed this project, and I express my cordial thanks to the staffs of the foundation. Part I focuses on dragonflies and I will introduce how the Japanese see dragonflies, with the views of Koreans, Chinese and Taiwanese. Part II was the selected results of researches on the Japanese views on nature from various aspects. The above mentioned presentation at "The General Research on the Stable Society", which became the start of this project, is carried in the introduction as it was.

## Contents

Introduction; page 3 ff Uéda, Tetsuyuki: A red dragonfly *Sympetrum frequens* is not a mere insect but just a scene in the Japanese mind. 1. Why does *Sympetrum frequens* ascend mountains? 2. *Sympetrum frequens* became a scene in the Japanese mind 3. Commonality of the scenery 4. The future of the scenery 5. Creation of the scenery in our mind

### Part I Eyes on Dragonflies

Chapter 1; page 23 ff Yokoo, Ayako: Symbolism of dragonflies from the point of view of the change of their name Akizu, kagerou, tombau 1. The age of akizu 2. The age of kagerou 3. The age of tombau 4. Concluding remarks Column Classification of living things

Chapter 2; page 37 ff Chu, Yau-I: Folklore of dragonflies in China 1. Chinese viewpoints on dragonflies 2. Dragonflies in ancient documents 3. Dragonflies and

the living of the masses 4. Image of dragonflies in Taiwan 5. The world where peoples detest dragonflies 6. The Japanese loves dragonflies 7. The children's play with dragonflies 7. The difference between tombo and kagerou 8. Image of spiders 9. Postscript

Chapter 3; page 58 ff Chung, Kwang: Symbolism of dragonflies in Korea 1. Introduction 2. Names of dragonflies 3. The proverbs and folklore on dragonflies 4. Symbolism of dragonflies in the Korean literature 5. Postscript

Chapter 4; page 71 ff Chung, Kwang: The insects in the Annals of the Choson Dynasty and their symbolism, with particular reference to dragonflies, cicadas and ants 1. Introduction 2. The Annals of the Choson Dynasty 3. Insects in the Annals 4. Symbolism of cicadas and ants 5. Postscript Column Species of dragonflies

Chapter 5; page 95 ff Koga, Etsuko: Eyes for the beauty in dragonflies 1. Introduction 2. Dragonfly shapes and their symbolism 3. Insects of the Japanism 4. Various eyes for the beauty in dragonflies 5. Postscript

Chapter 6; page 130 ff Yokoo, Ayako: Dragonflies in Japanese modern literature 1. Introduction 2. Dragonflies in children's song 3. Dragonflies in the tanka composed by the people of the Emperor's family 4. Dragonflies written in Japanese modern literature 5. Postscript

Chapter 7; page 152 ff Saito, Shinichiro: The world of dragonfly in dialect words 1. Introduction 2. The general names of dragonflies in dialect 3. A discussion on the general names of dragonflies in dialect 4. The dialectal names of damselflies 5. The dialectal names of *Calopteryx atrata* 6. A discussion on the dialect names of damselflies and *Calopteryx atrata* 7. Problems of the dialectal names of akatombu and Ranzan Ono 8. Problems of the dialectal names of akatombu and Gosan Koshigaya 9. Postscript Column Classification by genes

Chapter 8; page 183 ff Higashi, Kazunori, Sawabe, Kyoko and Uéda, Tetsuyuki: Another red-dragonfly, *Pantala flavescens* or *Sympetrum depressiusculum* 1. Akatombu in the western Japan and in the eastern Japan 2. Japanese *Sympetrum frequens* and Korean *Sympetrum depressiusculum* 3. Akatombu in the western Japan, *Pantala flavescens* 4. Postscript Column Mitochondrial DNA and nuclear DNA Column How to analyze genes

Chapter 9; page 210 ff Uéda, Tetsuyuki: How do the Japanese see dragonflies? 1. Introduction 2. The spirit of a rice plant---The symbol of good harvests 3. From "akitsu" to "kagerofu" ---Impact of the Continental culture 4. "Akitsu" and "kagirohi" 5. Kachi-mushi ---The symbol of victory and happiness 6. Akitsu in the Meiji era ---Dragonflies symbolize Japanese themselves 7. The beginning of autumn decided by the red dragonfly ---The symbol of season 8. The departed soul ---A spiritual insect 9. Catching dragonflies ---Friends for children 10. Red dragonflies in a red sunset ---The Japanese core scenery 11. Postscript Column On the akatombu

Part II The Japanese view of nature illustrated by eyes on some insects and spiders

Chapter 10; page 239 ff Yokoo, Ayako: A view of nature featuring the vindictive spirits ---A tower erected for the repose of insects' spirits 1. Introduction 2. The towers erected for the repose of animals'spirits in Saga 3.

Customs of Saga 4. Some modern city dwellers' impressions of the memorial ceremony for insects 5. "Animal protection" in Western countries and "mushiokuri" and "hojyo" in Japan 6. Postscript

Chapter 11; page 261 ff Uéda, Tetsuyuki: A boy who catches dragonflies can not learn ---Taboos referring to dragonfly catching 1. Introduction 2. Classification of taboos on dragonfly catching 3. Dialectal names of dragonflies connected with taboos 4. Correspondence of taboos to the ecology of concerned dragonflies 5. Postscript

Chapter 12; page 286 ff Setoguchi, Akihisa: Inventing 'Gaichu' (insect pests in modern Japan) 1. Introduction 2. View of pests in the Edo period 3. View of pests in modern Japan: Agricultural pests 4. View of pests in modern Japan: Medical pests 5. Postscript

Column What is "mushi"? "Mushi" means insects.

Chapter 13; page 309 ff Yoshida, Makoto: The Japanese view of nature as shown by the *Latrodectus* spiders scare 1. Report on the progress of the *Latrodectus* spiders scare 2. Some comments on the *Latrodectus* spiders scare 3. Prove the Japanese view of nature with *Latrodectus* spiders scare 4. A new turn of the *Latrodectus* spiders scare 5. Favorable and unfavorable cultures for spiders Column *Latrodectus* found in Japan

Chapter 14; page 337 ff Saito, Shinichiro: An essay on the folklore of spiderfighting 1. Introduction 2. Spiderfighting as one of the year's pageants 3. Some old documents on the folklore of spiderfighting 4. Spiderfighting in various parts of Japan 5. Public experiments of the fighting in *Argiope bruennichii* 6. Dialectal names of *Argiope* spider in the south part of Korea 7. Spiderfighting in foreign countries 8. Comparison of biology between *Argiope amoena* and *A. bruennichii* 9. What was spiderfighting?

Chapter 15 355 Yoshida, Makoto: Ecology of spiderfighting ---Why *Argiope amoena* has been selected for spiderfighting? 1. Types and distribution of spiderfighting 2. Diversity of spiderfighting related to the distribution and density of fighting spiders 3. The unknown of spiderfighting at inland area related to the population density of *Argiope amoena* 4. Why *Argiope amoena* was chosen as the fighting spider?

Chapter 16; page 377 ff Yuma, Masahide: Changes of the Japanese view of nature as shown in haiku, composing of insects 1. Introduction 2. View onto insects in haiku

Chapter 17; page 408 ff Endo, Akira: Representation and discourses on insects in the Edo period---From the esthetics in an autumn flower to the parody on insects 1. Introduction 2. Autumn flower as Japanese esthetical tradition 3. Parody-minded discourses on insects in the Edo period 4. Disappeared insects in the culture of the Meiji era 5. Renaissance of "insect-philia" in the Taisho era

Chapter 18; page 425 ff Endo, Akira: Japanese translations of Jean Henri Fabre "Souvenirs entomologiques" and the readers ---Modern and post-modern in Renaissance of "insect-philia" 1. Introduction 2. Translators of "Souvenirs entomologiques" 3. Various readers in three booms 4. The immortal Fabre 5. Postscript: For the future of insects

Last chapter: page 465 ff Uéda, Tetsuyuki: The structure of the modern Japanese view of nature ---Insects, gods, human and nature 1. Introduction 2. The origin of the "insect-philia culture" in the Edo period 3. Changes of eye on insects 4. Science in Japan 5. Uneasiness at the "unknown" 6. Animistic sense 7. Universality of the song "akatombo" 8. Don't sing the wings of red dragonflies 9. Gods, human and nature

Postscript 489, Index 504"] Address: Kyoto University Press, 15-9 Yoshidakawara-machi, Sakyo-ku, Kyoto, 606-8305, Japan. <http://www.kyoto-up.gr.jp/body/shokai/4-87698-638-X.html>. E-mail [sales@kyoto-up.gr.jp](mailto:sales@kyoto-up.gr.jp)

**4636.** Utzeri, C.; Ercoli, C (2004): Distribution by unpaired males prolongs postcopulatory guarding duration in the damselfly *Lestes virens* (Charpentier) (Zygoptera: Lestidae). *Odonatologica* 33(3): 291-301. (in English). ["In *L. virens*, the tandem post-copulatory guarding varies from some minutes to more than 4 hours and appears correlated to the time of the day and disturbance by unpaired males. Using a multiple regression analysis, with guarding duration as the dependent variable and time of day, temperature and disturbance as the independent variables, it is shown that only disturbance significantly explains the model. An experimental test, in which early-occurring tandem males were not disturbed, while late-occurring ones were disturbed (a reverse situation of what happens in the field), showed that the latter kept their ovipositing females for significantly longer times than the former. The capability of males of varying guarding duration accordingly to the density of solitary males allows them to invest more or less time for guarding, according to the actual risk of losing sperm precedence." (Authors)] Address: Utzeri, C., Dipartimento di Biologia Animale e dell'Uomo, Università di Roma "La Sapienza", Viale dell'Università 32, I-00185 Roma, Italy; Utzeri, C., Dipartimento di Biologia Animale e dell'Uomo, Università di Roma "La Sapienza". Viale dell'Università 32, I-00185 Roma, Italy. E-mail: [carlo.utzeri@uniroma1.it](mailto:carlo.utzeri@uniroma1.it)

**4637.** Van Buskirk, J.; Aschwanden, J., Buckelmüller, I.; Reolon, S.; Rüttiman, S. (2004): Bold tail coloration protects tadpoles from dragonfly strikes. *Copeia*, 2004(3): 599-602. (in English). ["Some amphibian larvae develop brightly colored or black tail fins when reared in ponds with predaceous insects. The conspicuous tail has been proposed to lure predator strikes toward the tail and away from the more vulnerable head/body region. We tested this hypothesis by presenting model tadpoles that differed only in coloration to *Aeshna* dragonfly larvae. The models had either a dark body and pale tail, a dark spot in the middle of the tail, or a dark spot near the tip of the tail. Almost all models with plain tails were struck on the head/body, whereas those with dark spots in the tail were struck significantly more often on the tail. Because living tadpoles survive better when attacked on the tail than on the head, our results show that tail coloration can protect tadpoles from predators at close range." (Authors)] Address: Buskirk, J. van, Dept of Zoology, Melbourne University, Victoria 3010, Australia. E-mail: [joshv@unimelb.edu.au](mailto:joshv@unimelb.edu.au)

**4638.** Van de Meutter, F.; Stoks, R.; De Meester, L (2004): Behavioral linkage of pelagic prey and littoral predators: microhabitat selection by *Daphnia* induced by damselfly larvae. *Oikos* 107(2): 265-272. (in English). ["Only recently ecologists started treating the

previously separately considered benthic, littoral and pelagic zones of lake ecosystems as closely connected compartments. Here we study a link between organisms belonging to a different compartment - namely the pelagic and the littoral - through behavior in a series of laboratory experiments. Waterfleas of the genus *Daphnia* are inhabitants of the pelagic zone and suffer a high predation pressure from syntopic vertebrate predators (mainly fish). Presumably to escape this predation, they sometimes migrate in the day to the littoral to seek refuge within macrophytes and return to the pelagic at night. Zygopterans from the genus *Ischnura* do commonly co-occur in ponds with *Daphnia* and are known as opportunistic predators of *Daphnia*. In two initial experiments in microcosms in the lab we showed that *Ischnura* larvae are littoral predators strongly associated with macrophytes. Although we found that predation rates of individual *Ischnura* larvae on *Daphnia* are approximately 1.5 fold lower in macrophytes compared to open water, total predation from *Ischnura* on *Daphnia* per unit area is tenfold higher within macrophytes than in open water, making the open water a safer place for *Daphnia* with regard to *Ischnura* predation. In a third microcosm experiment we monitored horizontal distribution of *Daphnia* in the absence, presence and odor only of *Ischnura* larvae. After 2 hours, on average 10% less *Daphnia* remained within the vegetation when *Ischnura* larvae or only their odor were present compared to when *Ischnura* or their odor were absent. We interpret this as a behavioral anti-predation response of *Daphnia* to the presence of *Ischnura* larvae that seems primarily chemically mediated. The observed horizontal migration of the pelagic prey driven by the littoral predator may couple both lake compartments and may interact with the predator-prey relationships within the pelagic." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**4639.** Walsh, D. (2004): Influx of Vagrant Emperor Dragonfly *Hemianax ephippiger* in the Canary Islands. *Atropos* 22: 63. (in English). [Canary Islands, Spain, 21 February 2004, Fuerteventura, vicinity of Hotel Gorriones (near Costa Calma, on the coast in the south of the island); hundreds of *Anax ephippiger* were noticed feeding over the sandy coastal area adjacent to the beach.] Address: Walsh, D., 20 Netley Close, Ipswich, IP2 9YB, UK. E-mail: dfiv@ipswich.suffolk.sch.uk

**4640.** Walter, S. (2004): Protokoll der Beratung "Entomofauna Sayonica" am 04.03.2004. *Mitteilungen Sächsischer Entomologen* 67: 19-20. (in German). [Brief report on the current status of the planned book on the odonate fauna of Saxonia, Germany.] Address: not stated

**4641.** Ward, L.; Mill, P.J. (2004): Distribution of the Banded Demoiselle *Calopteryx splendens* (Harris) in northern England: an example of range expansion? *J. Br. Dragonfly Society* 20(2): 61-69. (in English). ["... In the north-east of England, comparison of the current distribution of *C. splendens* [...] with earlier distribution maps [...] shows that its area of occurrence appears to have increased considerably since 1961. However, when recorder effort is taken into account, most or all of the increase up to 1990 can be accounted for by the increase in the number of 10km squares for which odonate records in general have been received. By then,

21 % of the 10km squares in the 100km squares with the O.S. grid letters SE and NZ (which cover most of Yorkshire, Durham and Northumberland) had *C. splendens* records compared to an overall coverage of 94 per cent. The increase in *C. splendens* to 34 % of these squares since 1990 appears to reflect a real increase in the area of occupancy by this species in the north-east of England. ..."] (Authors)] Address: Ward, Louise, Mill, P.J., School of Biology, University of Leeds, Leeds LS2 9JT, UK

**4642.** Warfe, D.M.; Barmuta, L.A. (2004): Habitat structural complexity mediates the foraging success of multiple predator species. *Oecologia* 141(1): 171-178. (in English). ["We investigated the role of freshwater macrophytes as refuge by testing the hypothesis that predators capture fewer prey in more dense and structurally complex habitats. We also tested the hypothesis that habitat structure not only affects the prey-capture success of a single predator in isolation, but also the effectiveness of two predators combined, particularly if it mediates interactions between the predators. We conducted a fully crossed four-factorial laboratory experiment using artificial plants to determine the separate quantitative (density) and qualitative (shape) components of macrophyte structure on the prey-capture success of a predatory damselfly, *Ischnura heterosticta tasmanica*, and the southern pygmy perch, *Nannoperca australis*. Contrary to our expectations, macrophyte density had no effect on the prey-capture success of either predator, but both predators were significantly less effective in the structurally complex *Myriophyllum* analogue than in the structurally simpler *Triglochin* and *Eleocharis* analogues. Furthermore, the greater structural complexity of *Myriophyllum* amplified the impact of the negative interaction between the predators on prey numbers; the habitat use by damselfly larvae in response to the presence of southern pygmy perch meant they captured less prey in *Myriophyllum*. These results demonstrate habitat structure can influence multiple predator effects, and support the mechanism of increased prey refuge in more structurally complex macrophytes." (Authors)] Address: Warfe, Danielle, School of Zoology and Tasmanian Aquaculture and Fisheries Institute, University of Tasmania, GPO Box 252-05, Hobart, Tasmania, 7001, Australia. E-mail: Danielle.Warfe@dpiwe.tas.gov.au

**4643.** Watanabe, M.; Mimura, Y. (2004): Diurnal changes in perching sites and low mobility of adult *Mortonagrion hirosei* *Asahina* inhabiting understory of dense reed community (Zygoptera: Coenagrionidae). *Odonatologica* 33(3): 303-313. (in English). ["Shifts between perching sites, the flying behaviour as well as reproductive behaviour of adults were observed. All marked individuals inhabiting the dense reed community floor were followed from sunrise to sunset. Simultaneous observation was carried out by approximately 20 researchers. Every adult, sexually immature and mature, perched at 20 cm above the water surface within the reed community. For immature adults, about 120 flight activities were performed per day. The accumulated length of the movement was 9 m per day. When matured, the number of flight activities increased two-fold and the total length of the movement was 27 m per day. Although this species is a percher, showing little movement, increased flight activity by mature individuals caused encounters between individuals, hovering face-to-face. Few tandem flights were observed and females oviposi-



ted alone. The behaviour traits of this species at low light intensity are discussed." (Authors)] Address: Watanabe, M., Institute of Biological Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan. E-mail: watanabe@kankyo.envr.tsukuba.ac.jp

**4644.** Watts, P.C.; Rouquette, J.R.; Saccheri, I.J.; Kemp, S.J.; Thompson, R.J. (2004): Molecular and ecological evidence for small-scale isolation by distance in an endangered damselfly, *Coenagrion mercuriale*. *Molecular Ecology* 13: 2931-2945. (in English). ["*C. mercuriale* is one of Europe 's most threatened damselflies and is listed in the European Habitats directive. We combined an intensive mark-release-recapture (MRR) study with a microsatellite-based genetic analysis for *C. mercuriale* from the Itchen Valley, UK, as part of an effort to understand the dispersal characteristics of this protected species. MRR data indicate that adult damselflies are highly sedentary, with only a low frequency of inter-patch movement that is predominantly to neighbouring sites. This restricted dispersal leads to significant genetic differentiation throughout most of the Itchen Valley, except between areas of continuous habitat, and isolation by distance (IBD), even though the core populations are separated by less than 10 km. An urban area separating some sites had a strong effect on the spatial genetic structure. Average pairwise relatedness between individual damselflies is positive at short distances, reflecting fine-scale genetic clustering and IBD both within- and between-habitat patches. Damselflies from a fragmented habitat have higher average kinship than those from a large continuous population, probably because of poorer dispersal and localized breeding in the former. Although indirect estimates of gene flow must be interpreted with caution, it is encouraging that our results indicate that the spatial pattern of genetic variation matches closely with that expected from direct observations of movement. These data are further discussed with respect to possible barriers to dispersal within the study site and the ecology and conservation of *C. mercuriale*. To our knowledge, this is the first report of fine-scale genetic structuring in any zygopteran species." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**4645.** Wearing, M. (2004): A late dragonfly. *Dragonfly news* 45: 19. (in English). [Dragonfly poem.] Address: Wearing, M., Deadwater Valley Trust, Hants, UK

**4646.** Weekers, P.H.H.; Dumont, H.J. (2004): A molecular study of the relationship between the coenagrionid genera *Erythromma* and *Cercion*, with the creation of *Paracercion* gen. nov. for the east Asiatic "*Cercion*" (*Zygoptera*: *Coenagrionidae*). *Odonatologica* 33(2): 181-188. ["The ribosomal DNA genes (18S, 5.8S) and internal transcribed spacers (ITS1, ITS2) of 5 representatives of "*Cercion*" occurring in East Asia were examined and compared with west-palaearctic "*Cercion*" *lindenii*, *Erythromma najas* (2 populations), *E. viridulum*, some true *Coenagrion* species, and with *Enallagma* and *Ischnura* as outgroups. The molecular phylogenetic tree confirms the position of *H. Heidemann* & *R. Seidenbusch* (1993, *Die Libellenlarven Deutschlands und Frankreichs*, Bauer, Keltern) that *Cercion lindenii* belongs in *Erythromma*, and consequently, the binomen *Erythromma lindenii* is accepted. Regarding the "orien-

tal" group for which, under the new situation, the name *Cercion* is no longer available, the genus name *Paracercion* gen. n. is introduced. This is supported by molecular evidence and by some morphological traits. A morphological basis for setting apart the new genus from *Erythromma* is thus achieved, but its delimitation from *Coenagrion* remains to be defined." (Authors)] Address: Weekers, P.H.H., Department of Biology, University of Ghent, Ledeganckstraat 35, B-9000 Ghent, Belgium. E-mail: Peter.Weekers@UGent.be

**4647.** Westermann, K. (2004): Ausbreitungsversuche von *Lestes viridis* in den Schwarzwald - ein Beitrag zur Arealausweitung und Höhenverbreitung (*Odonata*: *Lestidae*). *Libellula* 22(3/4) (2003): 87-105. (in German with English summary). ["In the winters from 2000/2001 through 2002/2003, I examined shrubs and trees at 104 standing waters in the southern and south-western central Black Forest for traces of *Lestes viridis* egg clutches. All study sites were located higher than 700 m a.s.l. and had a size of at least 300 m<sup>2</sup>. Approximately 120 traces of egg clutches were recorded at 31 different localities, the highest of which was at 1 109 m a.s.l. Prior to this study, only seven records of imagines existed for the study area and in rare cases involved observations of oviposition behaviour. As very few traces of egg clutches were found at certain sites, they can probably be attributed to either one or only a few females. Only rarely were these traces of egg clutches fresh; instead they were usually at least several years old. Therefore, in contrast to the number of findings, it is unlikely that the species succeeded in establishing permanent populations at any one of the localities. Instead, a permanent, low-level immigration of individuals from the Rhine Valley into the study area appears to take place. However, during the exceptionally hot summer of 2003, F-0 exuviae and emerging imagines were found at three localities at 845 and 900 m a.s.l., respectively. These results describe the status of *L. viridis* at higher elevations in the Black Forest and illuminate mechanisms of both immigration into mountainous terrain and range expansion." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**4648.** White, H.; Hummel, S. (2004): 2004 Annual DSA meeting in Iowa. *Argia* 16(2): 2-5. (in English). [Report on the meeting held in July 2004 including some odonate records (e.g. *Ophiogomphus smithi* Tennessen & Vogt, 2004) taken along several trips, and brief abstracts of the lectures held.] Address: Hummel, S., P.O. Box 121, Lake View, IA, 51450, USA. E-mail: mshummel@netins.net

**4649.** Wilson, H. (2004): Perching orientation of sea-side dragonflies (*Erythrodiplax berenice*) in a Maine salt marsh. *Argia* 15(4): 14. (in English). ["[...] On five dates in 2002, I made opportunistic observations on the orientation of perched *E. berenice* with respect to the wind direction. On each occasion, the wind was either from the northeast or southwest so that a significant fetch resulted. Wind speeds varied from 5 to 10 miles per hour on each day. When I found a perched *E. berenice*, I recorded the quadrant in which its head was directed relative to the wind. For a southwesterly wind, a dragonfly with its head oriented between south and east was scored as upwind. Similarly, a dragonfly oriented between north and west was scored as downwind. Dragonflies oriented between east and north or between west and south were scored as lateral to the

south were scored as lateral to the wind. Some observations were made from upwind, others downwind and yet others lateral, eliminating any possible bias in direction of my presence on the orientation of the dragonflies. If the perching orientations were randomly distributed, one would expect a ratio of 1:1:2 for upwind, downwind and lateral orientations. The upwind and downwind orientations each include 90° of the compass and the lateral orientation includes 180° of the compass. The observed distribution is statistically different from random by a chi-square test ( $X^2 = 19.32$ ,  $p < 0.001$ ). A reasonable hypothesis for the preference of orienting into the wind is the generation of lift when *E. berenice* takes flight. If this hypothesis is true, one can draw a parallel with birds that engage in dynamic soaring over the ocean. Albatrosses and other procellariiform birds have mastered this technique in which the birds glide downwind until they lose attitude, then turn into the wind to generate lift and then turn again to continue downwind. One must be cautious in developing this analogy too far because odonate flight is much more difficult to model than albatross flight. Aside from twice as many wings, odonate wings deform in complex ways to accomplish flight. Nevertheless, for a weak flier like *E. berenice*, perching into the wind may provide a source of lift when the dragonflies take flight." (Author)] Address: Wilson, H., Dept of Biology, Colby College, 5739 Mayflower Hill Drive, Waterville, ME 04901, USA. E-mail: whwilson@colby.edu

**4650.** Wilson, K.D.P. (2004): Critical species of Odonata in China. *International Journal of Odonatology* 7(2): 409-422. (in English). ["The state of knowledge of China's Odonata is very much incomplete with many species awaiting description, especially from tropical and subtropical areas. A brief account is given of new odonate species described from China, including Taiwan, between 2000 and 2003. Information on identification guides, faunal lists and current studies, is provided. Species of Odonata, categorised as critically endangered or endangered in the 2003 IUCN Red List of threatened species, which are known to occur in China, are listed. Lists of Odonata, recommended by the IUCN Odonata Specialist Group as priority species for conservation, are updated to incorporate recently described species from China and Taiwan. Key threats to China's forest and surface waters are summarised. China has an ambitious programme to establish nature reserves and protect a high proportion of the country's natural resources. A brief account of China's protected areas and wetland conservation action plan is provided." (Author)] Address: Wilson, K.D.P., Flat 20, 6 Mansfield Road, The Peak, Hong Kong, China. E-mail: wilsonkd@ntlworld.com

**4651.** Woo, T.K. (2004): New record site of *Nannophya pygmaea* in the heart of Tai Lam Country Park. *Porcupine* 30: 3-5. (in English). ["There has been no new published record for the smallest anisopteran dragonfly, *N. pygmaea* in Hong Kong since 1996. In July 2002, a large and healthy colony of *Nannophya pygmaea* was found in the central part of Tai Lam Country Park. Over two hundred mature adults are recorded and confirmed breeding there. A further site is also reported in Luk Keng." (Author).] Address: not stated

**4652.** Woods, H.A.; Fagan, W.F.; Elser, J.J.; Harrison, J.F. (2004): Allometric and phylogenetic variation in insect phosphorus content. *Functional Ecology* 18: 103-

109. (in English). ["1. Phosphorus content was measured in adult insects and arachnids from 170 species collected in the Sonoran Desert. 2. Across insect body sizes spanning four orders of magnitude, phosphorus content was inversely related to body mass. The largest species (1 g dry) had phosphorus contents that were only about 60% (0.62% P absolute) as high as phosphorus contents of the smallest species (0.0001 g dry; 0.97% P). Negative phosphorus allometry was observed within each of seven insect orders and within arachnids. 3. Phosphorus contents of insect predators and herbivores were statistically indistinguishable. 4. More recently derived orders tended to have lower phosphorus contents with the exception of the most recently derived group (Panorpida = Diptera + Lepidoptera), which had high phosphorus contents." (Authors) Phosphorus content of Odonata is briefly discussed.] Address: Woods, H.A., Section of Integrative Biology C0930, University of Texas at Austin, Austin, TX 78712, USA. E-mail: art.woods@mail.utexas.edu

**4653.** Worthen, W.B.; Patrick, E.R. (2004): Competitive interactions affect perch-height preferences of three Odonata taxa (Coenagrionidae, Libellulidae). *International Journal of Odonatology* 7(3): 529-541. (in English). [Co-occurring odonate species often perch at different heights. We studied the effects of interspecific and intraspecific interactions on perch-height selection by *Perithemis tenera*, *Pachydiplax longipennis*, and *Enallagma* spp. by creating artificial perch stations and comparing perch selection when species perched alone or together. We also compared the frequency of perch-height use in the presence or absence of *P. tenera* and *P. longipennis* decoys (dead mounted specimens). When species perched alone, *Enallagma* spp. preferred low perches, *P. tenera* intermediate perches, and *P. longipennis* tall perches. This correlated with body mass; larger species used taller perches. Intraspecific responses to decoys were species specific; *P. tenera* showed an aggressive positive response to the presence of a conspecific decoy, whereas *P. longipennis* avoided conspecific decoys by shifting to lower perches. Interspecific effects were more consistent. The presence of living or decoy *P. tenera* at a station caused *Enallagma* to shift to lower perches. Likewise, the presence of living or decoy *P. longipennis* at a station caused *P. tenera* to shift to lower perches. Reciprocal effects were insignificant. These interactions were defined as interference competition because, in the decoy trials, perch-height shifts occurred although all four perches were available to visitors. We conclude that asymmetrical competition contributes to perch-height selection among these species." (Authors)] Address: Worthen, W.B., Dept of Biology, Furman University, Greenville, SC 29613 USA. E-mail: worthen@furman.edu

**4654.** Yates, B. (2004): Reports from Coastal stations - 2003: Rye Harbour, East Sussex. *Atropos* 21: 53-54. (in English). [*Erythromma viridulum* at Castle Water on 8 and 14th August 2003.] Address: not stated

**Thanks to all who contributed to this issue of OAS!**  
A special thank to Mathias Lohr, Jürgen Ott, Naoya Ishizawa and Pawel Buczyński, and Wolfgang Schneider, Darmstadt and Klaus Reinhardt, Sheffield for linguistic help.

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: martin@lindeboom.de  
Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105;  
E-mail: K.Reinhardt@sheffield.ac.uk  
Martin Schorr, Schulstr. 7B D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: martinschorr@onlinehome.de

Published in Rheinfelden, Germany and printed in Tübingen, Germany.  
ISSN 1438-0269

## 1997

**4655.** Fincke, O.M.; Yanoviak, S.P.; Hanschu, R.D. (1997): Predation by odonate depresses mosquito abundance in water-filled tree holes in Panama. *Oecologia* 112: 244-253. (in English). ["In the lowland moist forest of Barro Colorado Island (BCI), Panama, larvae of four common species of odonates, a mosquito, and a tadpole are the major predators in water-filled tree holes. Mosquito larvae are their most common prey. Holes colonized naturally by predators and prey had lower densities of mosquitoes if odonates were present than if they were absent. Using artificial tree holes placed in the field, we tested the effects of odonates on their mosquito prey while controlling for the quantity and species of predator, hole volume, and nutrient input. In large and small holes with low nutrient input, odonates depressed the number of mosquitoes present and the number that survived to pupation. Increasing nutrient input (and consequently, mosquito abundance) to abnormally high levels dampened the effect of predation when odonates were relatively small. However, the predators grew faster with higher nutrients, and large larvae in all three genera reduced the number of mosquitoes surviving to pupation, even though the abundance of mosquito larvae remained high. Size-selective predation by the odonates is a likely explanation for this result; large mosquito larvae were less abundant in the predator treatment than in the controls. Because species assemblages were similar between natural and artificial tree holes, our results suggest that odonates are keystone species in tree holes on BCI, where they are the most common large predators." (Authors)] Address: Fincke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**4656.** Gorb, S.N. (1997): Porous channels in the cuticle of the head-arrester system in dragon/damselflies (Insecta: Odonata). *Microscopy Research and Technique* 37: 583-591. (in English). ["The ultrastructure of the porous channels (PC) of the postcervical sclerite (SPC), which provides additional head fixation to the neck in adult odonates, was studied using TEM and high resolution SEM microscopy. Single chitin-protein microfibrils, about 0.14  $\mu\text{m}$  thick, are arranged into channels with cylinder-like shapes. The axial rod of the chitin fiber (0.04  $\mu\text{m}$  thick) is located in the center of the cylinder. The orientation of the axial rods was three-dimensionally demonstrated after dissolving the protein cover with NaOH. The PCs are arranged vertically to the surface and pass from the epidermal cells through

all the cuticular layers to the surface of the cuticle. In the exo- and endocuticle, the PCs are usually oval in cross-section and about 0.3  $\mu\text{m}$  thick. In the endocuticle, the cross-sectional area of the PCs varies widely, from 0.01-0.15  $\mu\text{m}^2$ . The shape of the PC is determined by the macromolecular organization of the chitin-protein microfibrils: the long axis of the channel is orientated parallel to the axis of the preferred orientation of the cuticular microfibrils. The microfibrils tend to follow the line of the channel very closely. In fractures orientated perpendicular to the surface, the PC resembles a ribbon-like construction, which was clearly demonstrated by casts. The strongly parallel orientation of PCs in the deep layers of the cuticle changes within the microtrichia (MT), and they begin to be curved. Numerous PCs pass through the microtrichium, and most of them end on its side wall. PCs usually contain channel filaments about 0.09  $\mu\text{m}$  thick. Usually, a single channel contained one filament, but channels located in the deep layers of the endocuticle have from one to five single filaments. The filaments were observed in the intact cuticle and in the cuticle enzymatically treated with chitinase, while in the cuticle treated with NaOH filaments were absent. The porous channel system of the odonate arrester is interpreted as a device transporting adhesive excretions from the epidermal cells to the cuticular surface." (Author)] Address: Gorb, S., Max-Planck-Institut für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. E-mail: stas.gorb@tuebingen.mpg.de

**4657.** Ohnishi, T. (1997): Ecological note on the genus *Nannophya pygmaea* Rambur (Libellulidae, Odonata) and fauna in Shonai, Toyo city, Ehime Prefecture, Japan. *Bulletin of Ehime Prefectural Science Museum* 2: 37-39. (in Japanese, with English summary). [www.sci-museum.niihama.ehime.jp/bulletin/02/06-oonoshi.pdf] Address: stated in Japanese

**4658.** Watanasit, S. (1997): Sperm displacement in the damselfly, *Xanthagrion erythroneurum* (Zygoptera: Coenagrionidae) - Variance in female sperm count and genital morphology. *J. Sci. Soc. Thailand* 23: 115-122. (in English). ["Sperm competition was examined in the non-territorial damselfly, *Xanthagrion erythroneurum* in a small freshwater lake (Forrestdale Lake reserve), which is close to city Perth, Western Australia. Mating pairs were collected along the shores of lake in 3 categories: precopula, interrupted copula and postcopula. Evidence of sperm removal in *X. erythroneurum* was found from two sources: counts of the number of sperm and penis / female genitalia morphology. Females captured during copulation had fewer sperm in their stora-



ge organ than pre- and post-copula females. These results suggest that male *X. erythroneurum* can remove rival sperm from a female's storage organ during copulation. The morphology of the penis shows that the distal appendage of the penis is a recurved flap-like structure covered with small spines. These structures suggest that the male scoops sperm from the bursa copulatrix before or during deposition of its own sperm. After removing the sperm from the previous matings, new sperm is discharged through a channel which opens on the tip of penis." (Author)] Address: Watanasit, S., Department of Biology, Faculty of Science, Prince of Songkla University, Hat Yai, Songkhla, Thailand, 90112. E-mail: wsupareg@ratree.psu.ac.th

**4659.** Watanasit, S. (1997): Size and mating success in a non-territorial damselfly *Xanthagrion erythroneurum* (Zygoptera: Coenagrionidae). *J. Sci. Soc. Thailand* 23: 61-74. (in English) ["Flight activity and reproductive behaviour of the damselfly *Xanthagrion erythroneurum* (Zygoptera: Coenagrionidae) was observed over a 2 year period (1989-1990). Marked insects were censused hourly between 0900 -1600 hs each day for 6 weeks in each year where, in addition to presence or absence, records were made of individual behaviour including mating and oviposition. Evidence for male-male behaviour was tested using models of both sexes. All observations and experiments were conducted at a focal pond close to Perth, Western Australia. Sex ratios of damselflies visiting the pond were male biased; males tended to arrive at the pond ahead of females. Sexual maturity, as indicated by the first attempts to mate were measured for both sexes. Both sexes matured within 8 days from emergence. Daily survival rate was estimated by the number of times individuals returned to the focal pond. Conservative estimates of survival were 80% for males and 70% for females. Males showed no signs of agonistic behaviour either towards other flying or perched males or towards the models of either sex. *X. erythroneurum* showed no signs of territorial behaviour. Mating behaviour involved males intercepting perched or flying females. Pairs adopted the tandem and wheel positions typical of all odonates. Oviposition immediately followed mating. Males remained with the submerged females or on the surface of the water close to the submerged female. Females remained underwater for an average of 35 mins. On emergence other males attempted to copulate with the female, adopting the tandem position for several minutes. No successful copulations were observed and males released the previously mated female within minutes. Although age had a significant effect on mating success, size (head width and wing length) of adult males and females had no effect on mating success. Both males and females close to 7 days post-emergence had the greatest chance of mating." (Author)] Address: Watanasit, S., Department of Biology, Faculty of Science, Prince of Songkla University, Hat Yai, Songkhla, Thailand, 90112. E-mail: wsupareg@ratree.psu.ac.th

## 1998

**4660.** Chou, L.-S.; Chen, C.-C.; Loh, W. (1998): Diet Analysis of the Gray-cheeked Fulvetta (*Alcippe morrissonia*) at Fushan Experimental Forest in Taiwan. *Acta Zoologica Taiwanica* 9(1): 59-66. (in English). [Odonata

totalled to 0.11 relative volume (%) of the arthropod remains identified from 626 gut flushing samples of Gray-cheeked Fulvettas at Fushan Experimental Forest, July 1994-April 1997. The frequency of occurrence was 0.32%. Most important prey were Coleoptera and Hymenoptera.] Address: Lien-Siang Chou, Department of Zoology, National Taiwan University, Taipei, Taiwan, R.O.C.

**4661.** Garrison, B.A. (1998): Bank Swallow (*Riparia riparia*). In: *The Riparian Bird Conservation Plan: a strategy for reversing the decline of riparian-associated birds in California*. California Partners in Flight. <http://www.prbo.org/calpif/htmldocs/riparianv-2.html>: (in English). [Odonata are preyed by the Bank Swallow.]

**4662.** Horner, P. (Ed.) (1998): Wildlife survey in freshwater ecosystems and adjoining terrestrial habitats on Melville Island, Northern Territory. Magnt Research Report No. 1. ISSN 1444-8939 PRINT. ISSN 1447-1981 ONLINE: 56 pp. ["Islands, comprising Bathurst and Melville Islands to the north of Darwin, Northern Territory, are of high natural and cultural significance. Separated by a narrow, fast-flowing strait, these large continental islands are approximately 70 kilometres from the mainland and are inhabited by the Tiwi people. Compared to the adjacent mainland, they include mostly pristine habitat, relatively undisturbed by European settlement and the effects of introduced plants and animals. This report presents the results of a two week field survey (3-17 October 1996) of wildlife in freshwater ecosystems on Melville Island. At the initial planning stage of the project it was intended to carry out surveys of freshwater ecosystems on both Islands, however, a funding reduction restricted field work to the larger Melville Island only. Conducted in collaboration with Aboriginal custodians, the survey aimed to assess wildlife associated with freshwater ecosystems, including the fauna occurring in the various terrestrial habitats bordering the creeks and streams on Melville Island. Results of the survey contribute to the assessment, conservation, documentation and management of the Tiwi Islands natural values, and also provide baseline data for the determination of faunal distributional patterns. Voucher specimens of most species recorded are lodged in the scientific reference collections of the Museum and Art Gallery of the Northern Territory (NTM). From the targeted faunal groups, the survey recorded 187 species on Melville Island. These were composed of 80+ aquatic insects, 49 fishes, 10 amphibians, 31 reptiles and 17 mammals. Results of particular interest include that 26 species of aquatic insects were either new or could not be identified to species with certainty. An as yet undescribed odonate (dragonfly) is the first record for the genus *Huonia* in Australia. The freshwater fish survey determined that the two drainage systems on the island (north and south) support different fish faunas, and terapontids (grunters) common elsewhere in the Northern Territory, appear to be absent from the Island. The terrestrial vertebrate survey recorded the Fawn Antechinus (a mouse-like marsupial) from the Tiwi Islands for the first time, and that colour forms of some tree snakes differed from local mainland forms and are biogeographically significant. These results indicate that the fauna of the Tiwi Islands contains many species of conservation significance. The brevity of the survey (13 days) and the inaccessibility of many potential collecting sites, means that the species lists given are incomplete. Further sur-

vey work, on both Bathurst and Melville Islands, will greatly contribute to knowledge of the Tiwi Islands natural resources." Odonata on pages 10-14.]

**4663.** Lempert, J. (1998): Zum Fortpflanzungsverhalten von Libellen (Odonata) im tropischen Regenwald von Liberia. Salon Verlag, Köln. ISBN 3-932189-63-9. Zeitvertreib. Hrsg.: Klaus G. Gaida. Bd. 2. Wo sind WIR stehegeblieben: 71-79. (in German) [In the conceptual framework of a compilation on leisure activities, Jochen Lempert contributes a selection of black and white pictures (with annotations) on Odonata in Liberia, Africa. The following species are illustrated: *Prodasineura villiersi*, *Chlorocnemis elongata*, *Chlorocypha glauca*, *C. selysi*, *C. dispar*, *Malgassophlebia bispina*, *Porpax bipunctus*, *Tetrathemis godiardi*, and *Allorrhizucha klingi*. Address: Lempert, J., Vereinsstr. 41, D-20357 Hamburg, Germany.

**4664.** Moskowitz, D.P.; Bell, D.M. (1998): *Archilestes grandis* (Great Spredwing) in Central New Jersey, with notes on water quality. Bull. American Odonat. 5(3): 49-54. (in English). ["*Archilestes grandis* has undergone extensive range expansion during this century. *A. grandis* has been documented in a wide variety of aquatic habitats often with varying degrees of degradation or contamination, and biotic indices for this species based on relative water quality tolerances tend to vary widely. Water quality data for *A. grandis* habitats is limited, particularly in the northeast. We evaluated various water quality parameters at three man-made aquatic habitats in central New Jersey that support *A. grandis*. These evaluations and those of others suggest that *A. grandis* is very tolerant of water conditions generally considered "poor" by conventional water quality indices; this apparent tolerance of *A. grandis* to degraded water quality may explain its recent range expansion. The occurrence of this species in habitats generally depauperate in other, less tolerant odonate and other macroinvertebrate species may be a useful indicator of "poor" water quality in biotic "index" systems. Moreover, the facility with which the adult odonate community of an aquatic system can be characterized suggests, as other investigators of odonates have proposed, that "odonate metrics" would be ideal for the rapid biological assessment of such ecosystems." (Authors)] Address: David P. Moskowitz and David M. Bell, EcolSciences, Inc., 75 Fleetwood Drive, Suite 250 Rockaway, New Jersey 07866, USA

**4665.** Roderick, G.K.; Gillespie, R.G. (1998): Speciation and phylogeography of Hawaiian terrestrial arthropods. Molecular ecology 7: 519-531. (in English). [The evolution of biodiversity and species on Hawaiian islands is discussed including some remarks on the odonate genus *Megalagrion*.] Address: Gillespie, R.G., Center for Conservation Research and Training, 3050 Maile Way, Gilmore 409, Univ. of Hawai'i, Honolulu, Hawaii 96822, USA. E-mail: gillespi@hawaii.edu

**4666.** Balik, I. (1999): The feeding features of the pike perch (*Stizostedion lucioperca*) population in lake Beysehir. Turkish Journal of Zoology 23: 189-194. (in English with Turkish summary). [Turkey; odonata comprised 0,4% of stomach content in pike perch.] Address: Balik, I., Egirdir Fisheries Research Institute, Egirdir, Isparta, Turkey

**4667.** Feuler, G. (1999): Two new U.A.E. damselflies: *Ceriagrion glabrum* and *Pseudagrion decorum*. Tribulus 9(2): 31. (in English). [United Arabian Emirates, Wadi Shi dam near Khor Fakkan, March 1999] Address: not stated

**4668.** Haubruge, E.; Arnaud, L.; Mignon, J.; Gage, M.J.G. (1999): Fertilization by proxy: rival sperm removal and translocation in a beetle. Proc. R. Soc. Lond. B 266: 1183-1187. (in English). ["Competition between different males' sperm for the fertilization of ova has led to the evolution of a diversity of characters in male reproductive behaviour, physiology and morphology. Males may increase sperm competition success either by enhancing the success of their own sperm or by negating or eliminating the success of rival sperm. Here, we find that in the flour beetle *Tribolium castaneum*, the second male to mate gains fertilization precedence over previous males' sperm and fertilizes approximately two-thirds of the eggs. It is not known what mechanism underlies this pattern of last-male sperm precedence; however, the elongate tubules of the female sperm storage organ may encourage a 'last-in, first-out' sperm use sequence. Here we present an additional or alternative mechanism of sperm precedence whereby previously deposited sperm are removed from the female tract by the mating male's genitalia. In addition to providing evidence for sperm removal in *T. castaneum*, we also show that removed, non-self sperm may be translocated back into the reproductive tracts of new, previously unmated females, where the translocated sperm go on to gain significant fertilization success. We found that, in 45 out of 204 crosses, sperm translocation occurred and in these 45 crosses over half of the offspring were sired by spermatozoa which had been translocated between females on the male genitalia. In the natural environment of stored food, reproductively active *T. castaneum* adults aggregate in dense mating populations where copulation is frequent (we show in three naturally occurring population densities that copula duration and intermating intervals across three subsequent matings average 1-2min). Selection upon males to remove rival sperm may have resulted in counter-selection upon spermatozoa to survive removal and be translocated into new females where they go on to fertilize in significant numbers." (Authors) Reference to Odonata is made at several places.] Address: Gage, M.J.G., Population Biology Research Group, School of Biological Sciences, University of Liverpool, Liverpool L69 3BX, UK E-mail: mgage@liv.ac.uk

## 2000

**4669.** Biggs, K. (2000): Common dragonflies of California: a beginner's pocket guide. Azalea Creek Publishing, Sebastopol/CA. ISBN 0-9677934-0-8: 96 pp. (in English). [This attractive, concisely styled field guide, covers 61 California's common species. Size, recognition in the field, habitat, known flight period, status and general distribution in California is provided for each species. The book includes a brief outline of dragonfly biology (with a Glossary), concise suggestions for dra-

gonfly watchers, and a checklist of the California odonate species.] Address: Azalea Creek Publishing, 308 Bloomfield Rd, Sebastopol, CA 5472-5161, USA

**4670.** Bortolotti, G.R.; Tella, J.L.; Forero, M.G.; Dawson, R.D.; Negro, J.J. (2000): Genetics, local environment and health as factors in uencing plasma carotenoids in wild American kestrels (*Falco sparverius*). Proceedings of the Royal Socociety, London B 267: 1433-1438. (in English). ["Carotenoids are important as pigments for bright coloration of animals, and as physiologically active compounds with a wide array of health-related functions. Carotenoid-dependent coloration may have evolved as a signal to conspecifics; however, factors that may limit availability of carotenoids are poorly known. We investigated how the acquisition of carotenoids may be constrained by availability in the environment, diet, genetic make-up and health status of wild American kestrels. Plasma concentrations of siblings at the time of fledging showed a high degree of resemblance; however, a crossfostering experiment revealed that variance was largely explained by nest of rearing, rather than nest of origin, thus indicating a low genetic component. A multivariate analysis of attributes of nestlings (sex, size, plasma proteins, immune function), parental reproduction (laying date, clutch size) and rearing conditions (brood size, size hierarchy, nestling mortality) showed only a small significant effect of leucocyte differentials on carotenoid concentrations of nestlings. A strong environmental effect on plasma carotenoids was demonstrated by levels of adult kestrels being correlated within mated pairs, and having a significant association with the abundance of voles, the primary prey species, per territory. [...] A total of 5195 prey items was observed, 5070 of which could be identified to some taxonomic level. The major components as a percentage by number (and biomass) of all prey delivered were 10.4 (47.6) small mammals, 63.5 (21.5) dragonflies 3.1 (12.8) birds, 6.4 (9.3) fogs, and 5.4 (1.8) grasshoppers (Orthoptera)." (Authors)] Address: Dept of Biology, University of Saskatchewan, 112 Science Place, Saskatoon, Saskatchewan, Canada S7N 5E2. E-mail: bortolotti@sask.usask.ca

**4671.** Brooks, K.M. (2000): Migration of polycyclic aromatic hydrocarbons (PAH) from new and used railway crossties into ballast and adjacent wetland environments. American Wood-Preservers Association 96th Annual Meeting: 34 pp. (in English). ["In 1996, an electric utility replaced weathered creosote treated railway ties with newly treated ties as part of a routine maintenance operation on a railway spur carrying coal through a wetland into a power generating facility. The wetland was considered important habitat to *Somatochlora hiemana* an endangered dragonfly. The US Fish and Wildlife Service considered the creosote treated railway ties a threat to this endangered dragonfly and required the utility to replace the treated wood ties with steel ties and to conduct a study to determine the potential risks to wetland environments associated with the use of creosote treated railway ties. Because there are many sources of polycyclic aromatic hydrocarbons associated with all forms of transportation, particularly railway lines carrying coal, a mesocosm study was used to determine the rate at which creosote derived PAH moves from treated ties into railway ballast and then into adjacent wetlands. This study included three cells containing newly treated ties, weathered (old) ties, and untreated red oak ties as a control. The mesocosms replicated

conditions, including the wetland's hydrology, found along the actual right-of-way. Concentrations of PAH were monitored quarterly in mesocosm ballast at distances of 5, 20 and 30 cm from the faces of all three types of railway ties and in sediments at distances of 0.0, 0.5 and 0.75 meters from the toe of the ballast for 555 days. The mesocosms were constructed without significant PAH contamination. Creosote was observed migrating from the newly treated ties into adjacent ballast to a distance of at least 30 cm during the summer of the first year following construction. A similar pulse of PAH was not observed in the weathered tie mesocosm. It appeared that this pulse of PAH was associated with warm ambient air temperatures experienced during July and August at the site and with solar insolation that may have significantly increased surface temperatures on the black colored ties, which act as a black body. Concentrations of PAH adjacent to the newly treated ties declined rapidly to low levels during the fall of the first year. This decline was likely associated with photochemical degradation in the dry ballast environment. A second pulse of PAH was not observed in any of the mesocosms during the second summer of monitoring and ballast concentrations remained low throughout the remainder of the study. Sediment concentrations of PAH remained low until near the end of the study when a small increase in sediment PAH was observed in the new tie mesocosm. The increase in sediment PAH attributable to the creosote treated railway ties was approximately 0.3 mg/g, which was equal to the observed atmospheric PAH deposition observed in this area. However, the observed increases were not statistically significant as a function of Distance, Treatment or Day of the study. Polycyclic aromatic hydrocarbons appeared to have migrated vertically downward to a depth of approximately 60 cm in the ballast. At the end of the study, the observed SPAH concentration was less than 0.85 mg SPAH/g dry ballast at any depth. PAH were detected in one of 16 water samples. Those samples were collected on the final day of the study. However the PAH concentrations were very low and an assessment using the sum of toxic units approach indicated that none of the samples approached concentrations associated with biological stress. Likewise, the PAH concentrations observed in the two most contaminated wetland sediment samples were not predicted to be stressful using the newly developed consensus sediment benchmark methodology of Swartz (1999). No adverse biological effects to even the most sensitive organisms were predicted at the PAH concentrations observed in wetland sediments during this study." (Author). [www.rta.org/pdf/evaluationofpolycyclic.pdf](http://www.rta.org/pdf/evaluationofpolycyclic.pdf)] Address: Brooks, K.M., Aquatic Environmental Sciences, 644 Old Eaglemount Road, Port Townsend, WA 98368. USA. E-mail: brooks@olympus.net

**4672.** Bulánková, E. (2000): Selected groups of macrozoobenthos (Odonata, Cordulegasteridae, Diptera, Blephariceridae, Dixidae, Athericidae) as bioindicators of flowing waters. Conference proceedings, "Sbornek referatu z XII. Limnologické konference, Limnologie na púelomu tisíciletí öSL, SLS, Kouty nad DĚsnou, 18.-22.IX.2000, Univerzita Palackého, Olomouc, Czech Republic: 163-166. (in Czech, with English summary). [Slovakia, Small Carpathian Mountains, Gidra creek, *Cordulegaster boltonii*] Address: Bulankova, Eva, Institute of Ecology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B-II, SK-84215 Bratislava.,



Slovakia; tel.+ 421-7-728 922, e-mail: Bulankova@nic.fns.uniba.sk

**4673.** Englund, R. (2000): Report on Aquatic Insect Monitoring of May 2000 in Pelekunu Valley, Moloka'i, Hawai'i. Contribution No. 2000-011 to the Hawaii Biological Survey July 2000: 4 pp. (in English). [Hawai'i, USA; the Pelekuni stream is one of the rare running waters nearly undisturbed by introduced species in Hawai'i, and harbours (partly abundant populations of) 5 Megalagrion species, and (the introduced) *Ischnura ramburii*.] Address: Submitted to: TNCH Moloka'i Office, P.O. Box 220 Kualapu'u, Hawai'i; Ron Englund, Hawaii Biological Survey, 1525 Bernice Street, Bishop Museum, Honolulu, Hawaii, 96817

**4674.** García-Berthou, E.; Moreno-Amich, R. (2000): Food of introduced pumpkinseed sunfish: ontogenetic diet shift and seasonal variation. *Journal of Fish Biology* 57: 29-40. (in English). ["The pumpkinseed sunfish *Lepomis gibbosus* introduced into Lake Banyoles (Spain) were predominantly littoral but there was a tendency of large fish to use deeper zones. Their diet was dominated by littoral macrobenthos, particularly amphipods (*Echinogammarus* sp.). There was ontogenetic variation in the diet, with small young-of-the-year (LF<4 cm) feeding on several littoral microcrustaceans, especially the cladoceran *Ceriodaphnia reticulata*, whereas larger fish shifted to a freshwater shrimp (*Atyaephyra desmaresti*), snails and damselfly larvae. Seasonal variation in diet was linked to resource availability, with consumption of fish eggs and plant debris in spring and summer. In autumn, pumpkinseeds were partially zooplanktivores, preying on the cladoceran *Daphnia longispina*. The diet of pumpkinseeds in Lake Banyoles and other Iberian populations shows less molluscivory than North American populations. The potential ecological impact of this successful exotic species involves mainly predation on fish eggs and molluscs." (Authors) Odonate larvae total to 2.9% of number, 6.5% of biomass, and 18.2% in frequency of occurrence in the diet of *L. gibbosus*.] Address: García-Berthou, E., Departament de Ciències Ambientals and Institut d'Ecologia Aquàtica, Universitat de Girona, E-17071 Girona, Catalonia, Spain. E-mail: caegb@fc.udg.es

**4675.** Gaskin, B.; Bass, D. (2000): Macroinvertebrates collected from seven Oklahoma springs. *Proc. Okla. Acad. Sci.* 80: 17-23. ["We collected macroinvertebrates, measured physicochemical conditions, and visually observed the microhabitats of seven springs located across Oklahoma. Fifty-four species were collected from the seven springs. No single taxon was found in all seven sites and only four species were observed in over half of the sites. This indicates that many of the macroinvertebrates occurring in these springs are not truly spring invertebrates, but are local species able to exist in these environments. The number of taxa collected was directly related to the various microhabitats present and the concentration of dissolved oxygen. Based on the macroinvertebrate community, Sorensen's similarity coefficient revealed that Boiling Springs and Big Spring were most similar, with both containing abundant microhabitats. Desperado Spring and Cattlewash Spring were least similar, having a large difference in dissolved oxygen concentrations. Four of the seven springs were sampled previously. Only 17% of macroinvertebrate species had been previously recorded from a particular site, indicating that a large turnover of species occurs in

these spring habitats." (Authors) Anax junius and additional five taxa on the genus level are listed in table 2.] Address: Bass, D., Department of Biology, University of Central Oklahoma, Edmond, OK 73034

**4676.** Hall, O.R.; Wallace, B.; Eggert, S.L. (2000): Organic matter flow in stream food webs with reduced detrital resource base. *Ecology* 81(12): 3445-3463. (in English). ["Food webs based on flows of organic matter were developed for two small streams to examine food web response to a large reduction in detrital inputs. At the study site, Coweeta Hydrologic Laboratory in the southern Appalachians, leaf litter inputs and associated microbial assemblages are the main energy source for food webs in headwater streams. We eliminated leaf litter inputs to one stream using a net placed over the first 180 m of stream from its origin. Food webs based on flow of organic matter were developed for a reference stream and the litter-excluded stream for two months, July and December of year 1 of the litter exclusion, to examine effects of leaf litter exclusion on the trophic base of the food web, size distribution of flows, predator-prey interactions, and trophic structure. Flows (mg AFDM-m22-d21; AFDM 5 ash-free dry mass) were estimated using gut content analyses for detritus and prey items, coupled with secondary production estimates. We used a whole-stream  $\delta^{13}\text{C}$  tracer method to estimate assimilation of bacteria by invertebrates. The food webs encompassed most (84-91%) of invertebrate secondary production, but 30% of the estimated total links. The primary sources of organic matter for the food web in the reference stream were leaf tissue, bacterial carbon, and animal prey, with 25-30% of total secondary production derived from each. In-stream primary production led to 1% of invertebrate secondary production. A higher fraction of food web production in the litter-excluded stream was derived from wood. Magnitudes of detrital flows were lower in the litter-excluded stream, and some taxa were missing compared to the reference stream. The fraction of predator ingestion approached 100% of total secondary production for both streams, but this predation was distributed diffusely among several taxa. Flows to predators were fewer and smaller in the litter-excluded stream, yet these flows had higher per-biomass consumption coefficients, suggesting stronger interactions among the remaining common taxa. These food webs enabled us to examine interactions among taxa in the streams; hence, we found responses of the stream ecosystem to litter exclusion that we would not have considered had we only measured changes in invertebrate population sizes or system-level changes in organic matter flow." (Authors) The paper contains notes on Odonata.] Address: Hall, R.O., Institute of Ecology, University of Georgia, Athens, Georgia 30602 USA. E-mail: bhall@uwoyo.edu

**4677.** Kazancı, N.; Dügel, M. (2000): An evaluation of the water quality of Yuvarlakçay stream, in the Köyceğiz-Dalyan protected area, SW Turkey. *Turkish Journal of Zoology* 24: 69-80. (in English, with Turkish summary). ["The longitudinal and seasonal distribution of macroinvertebrates and the physical and chemical variables of Yuvarlak Stream in the Köyceğiz-Dalyan Protected Area in South-Western Turkey were studied between April 1992 and April 1993. The diversity, frequency, dominance, abundance and similarity of macroinvertebrates through the year were recorded. In addition, the Belgian Biotic Index was used as a biological criterion for the assessment of water quality for the first

time in Turkey. According to the physico-chemical variables and the distribution of benthic macroinvertebrates, continuous slight and moderate organic pollution exists in the stream. The monitoring of the water quality of Yuvarlakçay Stream is also necessary for the protection of water quality in meromictic Lake Köyceğiz." (Authors) Odonate taxa are treated on the genus level, including "Ophiogomphus".] Address: Kazancı, N., Department of Biology, Faculty of Science, Hacettepe University, Beytepe, Ankara, Turkey

**4678.** Kazunobu, K.; Yokoi, N. (2000): On the plant worms of Odonata. *Nature & Insects* 35(11): 6-9. (in Japanese. [So-called plant worms, are parasitic fungi of the genus *Cordyceps* belonging to the Ascomycete fungi (for infected odonate species see, e.g.: <http://fruit.naro.affrc.go.jp/kajunoheya/epfdb/Deutte/Hymeno/Hodona.htm>). The authors document a plant worm found on *Sympetrum infuscatum* (Yasato-machi, Ibaraki Pref., Japan; 26-IX-1999) and discuss in general the relationship between fungus and Odonata, and, in special, the infection way of the fungus to the Odonata. An English translation of the paper is available from Naoya Ishizawa.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozava City, Saitama Pref., Japan. E-mail: [isizawa7@rivo.mediatte.net](mailto:isizawa7@rivo.mediatte.net)

**4679.** Polhemus, D.; Englund, R.; Jordan, S.; Polhemus, J. (2000): Trip report for 1999 entomological and freshwater surveys of the Smithsonian Institution and Bishop Museum expedition to the Marquesas Islands and Tahiti. Contribution No. 2000-002 to Pacific Biological Survey. Bishop Museum: 17 pp. (in English). [Detailed report from an extensive survey of the entomofauna of Marquesian Islands and Tahiti (French Polynesia) with special emphasis on Odonata. The focus is set on the taxonomic problems caused by some papers of Needham and Mumford, and new insights in taxonomic and species diversity of the Marquesas are given.] Address: Polhemus, D., Dept. of Entomology, MRC 105, Smithsonian Institution, Washington, D.C. 20560, USA. Email: [bugman@bpbm.org](mailto:bugman@bpbm.org)

**4680.** Reinhardt, K. (2000): Buchbesprechung - Gerken, Bernd & Sternberg, Klaus (1999) *Die Exuvien europäischer Libellen* (Insecta, Odonata). 354 S. Huxaria Druckerei GmbH, Verlag und Werbeagentur, Hörter 1999. *Limnologica* 30: 91-92. (in German). [book review] Address: Reinhardt, K., Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: [K.Reinhardt@sheffield.ac.uk](mailto:K.Reinhardt@sheffield.ac.uk)

**4681.** Shieh, S.-H.; Yang, P.-S. (2000): Community structure and functional organization of aquatic insects in an agricultural mountain stream of Taiwan: 1985-1986 and 1995-1996. *Zoological Studies* 39(3): 191-202. (in English, with Chinese summary). ["Changes in stream water and habitat quality of Chichiawan Stream, which flows through Wulin Farm in central Taiwan, were examined using community structure and functional organization of aquatic insects at 4 sites in 1985-1986 and 1995-1996. Long-term records of water chemistry for the study area indicate that water quality in 1995-1996 had not degraded as compared with data in 1987-1988. It was found that there were significant differences in the number of taxa and number of individuals per sample unit for samples at all sites combined between 1985-1986 and 1995-1996. In general, the number of taxa and number of individuals per sample unit were

higher in 1985-1986 than in 1995-1996 at the 4 sites. Higher relative abundances of *Baetis* spp., *Rhithrogena* ample, *Cincticostella fusca*, and *Uenoa taiwanensis* were found in 1985-1986 compared to 1995-1996, suggesting that the substrate quality of the stream had deteriorated at sites located in agricultural areas. Similar results were found between the taxonomic and functional feeding group analyses when the percentage similarity analysis was used. The functional organization and community composition of aquatic insects at sites 1 and 2 in 1995-1996 were similar to those at site 4 in 1985-1986. Site 4 is located downstream of the confluence between Chichiawan Stream and Yousheng Stream where the stream watershed has been developed for agricultural land use. Principal component analysis indicated that, in addition to the substrate quality of the stream, water temperature, dissolved oxygen, conductivity, and ammonia were the most important physico-chemical variables shaping the aquatic insect community structure in the study stream reach. The study sites in agricultural areas had poorer stream water and habitat quality. The raw cropping of orchards and vegetable farms greatly increased soil erosion and suspended solids inputs to the stream which may have been harmful to the aquatic insect communities." (Authors) In table 2 (relative composition of total aquatic insect fauna in %), *Lanthus* sp. and *Sieboldius deflexus* represent the Odonata, which are very rare in the stream samples.] Address: Ping-Shih Yang, Department of Entomology, National Taiwan University, Taipei, Taiwan 106, R.O.C. E-mail: [psyang@ccms.ntu.edu.tw](mailto:psyang@ccms.ntu.edu.tw)

## 2001

**4682.** Bass, D.; Potts, C. (2001): Invertebrate community composition and physicochemical conditions of Boehler Lake, Atoka County, Oklahoma. *Proc. Okla. Acad. Sci.* 81: 21-29. (in English). [Boehler Lake is a 2.5 ha, dystrophic beaver pond. Odonates (listed on the genus level in table 2) formed a higher proportion of the insect community, constituting 7.6% of the insects.] Address: Bass, D., Department of Biology, University of Central Oklahoma, Edmond, OK 73034

**4683.** Bielli, E.; Tesauro, M. (2001): The littoral benthon community of Lake Orta after liming: a comparison between summer 1993 and summer 1998. *J. Limnol.* 60(2): 237-239. (in English). ["At different times in recent years (before, during and after liming) we have studied the littoral macrobenthonic community in Lake Orta, and, for comparison, in Lake Mergozzo (an unpolluted lake). In this paper we compare the situations after liming in summer 1993 and in summer 1998. We found no clear difference between the summer samples in 1993 and 1998 for each site; only seasonal fluctuations were in evidence, in particular in the sites of Gozano and Pella and in Lake Mergozzo. The two lakes, however, still present marked differences in the composition of their macrobenthonic communities." (Authors) 5 odonate species are listed in table 2] Address: Bielli, Ettore, Agenzia Regionale per la Protezione Ambientale Dipartimento di Novara, Viale Roma 7e, 28100 Novara, Italy. E-mail: [e.bielli@arpa.piemonte.it](mailto:e.bielli@arpa.piemonte.it)

**4684.** Edwards, J.S.; Thornton, I.W.B. (2001): Colonization of an island volcano, Long Island, Papua New

Guinea, and an emergent island, Motmot, in its caldera lake. VI. The pioneer arthropod community of Motmot. *Journal of Biogeography* 28: 1379-1388. (in English). [Aim: To evaluate the arthropod community of Motmot in relation to primary colonization of young volcanic surfaces. Location: Motmot, an island in Lake Wisdom which occupies the caldera of Long Island, Papua New Guinea. Methods: Arthropod sampling by means of pit-fall, water and tube traps, fallout collectors, and hand collecting. Results: At least 35 species of arthropod were collected in 6 days between 23 June and 3 July 1999. Lycosid spiders and ants dominated in all areas. The predator± scavenger arthropod population is largely or entirely dependent on allochthonous input of aquatic insects from the surrounding lake. Main conclusions: Major changes in the arthropod fauna since the pioneer surveys of Ball and his colleagues in the 1970s are the loss of a strand flotsam community as the island has eroded to form a predominantly cliffed coastline. Ant and spider diversity has increased. The current colonists include a number of widespread 'tramp' species sensu Diamond." (Authors) The following Odonata have been observed. *Xiphagrion cyanomelas* (1969, 1999), *Orthetrum sabina* (1999), *Pantala flavescens* (1999), and *Tramea liberata* (1969, 1971, 1972, 1999). *Xiphagrion* was collected from spider webs, 125 specimens of *P. flavescens* emerged in a 1m<sup>2</sup> "of the surface of a low cliff about 1,5 m above lake level".] Address: John S. Edwards<sup>1</sup> and Ian W. B. Thornton<sup>2</sup> <sup>1</sup>Department of Zoology, University of Washington, Seattle, WA 98195, USA, and <sup>2</sup>Department of Zoology, La Trobe University, Bundoora, 3083 Australia

**4685.** Feuler, G. (2001): The damselfly *Pseudagrion decorum* breeding in the U.A.E.. *Tribulus* 11(1): 24. (in English). [United Arabian Emirates, Wadi Shi dam near Khor Fakkan; the oviposition behaviour is described, but no date of observation is documented.] Address: not stated

**4686.** Kovács, T.; Juhász, P.; Turcsány, I. (2001): Ephemeroptera, Odonata and Plecoptera larvae from the River Tisza (1997-1999). *Folia historico naturalia musei Matraensis* 25: 135-143. (in English). [The paper provides data on 34 Ephemeroptera, 7 Odonata (including *Stylurus flavipes* and *Ophiogomphus cecilia*) and 5 Plecoptera species from the Hungarian section of the Tisza River.] Address: Kovacs, T., Matra Mus., Kossuth u. 40, HU-3200 Gyöngyös, Hungary. E-mail: koati@matavnet.hu

**4687.** Kovacs, T.; Ambrus, A. (2001): Ephemeroptera, Odonata and Plecoptera larvae from the rivers of Rába and Lapincs (Hungary). *Folia historico naturalia musei Matraensis* 25: 145-162. (in English). [The paper provides data on 9 Odonata species from the Hungarian section of the Rába River and 4 from the Hungarian section of the Lapincs River. The data include records of *Stylurus flavipes* and *Ophiogomphus cecilia*.] Address: Kovacs, T., Matra Mus., Kossuth u. 40, HU-3200 Gyöngyös, Hungary. E-mail: koati@matavnet.hu

**4688.** Sheshurak, P. (2001): Dragonflies (Odonata) of the Regional Landscape Park "Granitno-Stepove Pobuzhza. *Vestnik Zoologii* 35(2): 22. (in Russian, with English title). [The following species are listed: *Calopteryx splendens*, *Platycnemis pennipes*, *Ischnura elegans*, *Erythromma viridulum*, *Gomphus vulgatissimus*, *Aeshna affinis*, *A. mixta*, *Libellula depressa*, *Orthetrum*

*brunneum*, *O. coerulescens*, *O. cancellatum*, *O. albistylum*, *Sympetrum flaveolum*, *S. vulgatum*, *S. striolatum*, and *S. sanguineum*.] Address: Sheshurak, P., St. Pedag. Inst. "M.V. Gogol", Nishin, Ukraine

**4689.** Walsh, S.J. (2001): Freshwater macrofauna of Florida karst habitats. In: Eve L. Kuniansky, ed., 2001, U.S. Geological Survey Karst Interest Group. Proceedings, Water-Resources Investigations Report 01-4011: 78-88. (in English). [*Cordulegaster obliqua fasciata*, *C. sayi*, *Somatochlora provocans*, *Dromogomphus armatus*, *Progomphus bellei*, and *Tachopteryx thoreyi* are listed as obligate and predominante Odonata of Florida, USA karst habitats dwelling the seeps.] Address: Walsh, S.J., U.S. Geological Survey, Florida Caribbean Science Center, 7920 NW 71st Street, Gainesville, FL 32653, USA

**4690.** Wells R.D.S.; Clayton, J.S. (2001): Ecological impacts of water net (*Hydrodictyon reticulatum*) in Lake Aniwhenua, New Zealand. *New Zealand Journal of Ecology* 25(2): 55-63. (in English). ["The ecological impacts of *Hydrodictyon reticulatum* blooms (1989-94) were studied at Lake Aniwhenua (a constructed lake) in North Island, New Zealand by collating fish, invertebrate and macrophyte data collected towards the end of a four year bloom period and following its decline. *Hydrodictyon reticulatum* had some localised impacts on the biota of the lake. Some macrophyte beds were smothered to the extent that they collapsed and disappeared, and dense compacted accumulations of *H. reticulatum* caused localised anoxic conditions while it decayed. However, fish and some invertebrates in the lake benefited from the *H. reticulatum* blooms. High numbers of *Ceriodaphnia* sp. (maximum, 5.5 x 10<sup>4</sup> m<sup>-2</sup>) were recorded amongst *H. reticulatum*, and gastropods were exceptionally abundant, the most common being *Potamopyrgus antipodarum* (maximum, 1.8 x 10<sup>5</sup> m<sup>-2</sup>). *Hydrodictyon reticulatum* was consumed by three species of common gastropods in experimental trials, with *Austropeplea tomentosa* consuming up to 1.3 g dry weight *H. reticulatum* g<sup>-1</sup>, live weight of snail day<sup>-1</sup>. Gastropods comprised the major portion of the diet of *Oncorhynchus mykiss* in Lake Aniwhenua during and after the *H. reticulatum* bloom. A marked peak in sports fishing (with exceptional sizes and numbers of fish caught) coincided with the period of *H. reticulatum* blooms and the abundant invertebrate food source associated with the blooms." (Authors) *Procordulia grayi* was only recorded after the bloom of *H. reticulatum*. Zygoptera indet. were recorded during both periods.] Address: Wells, R.D.S., National Institute of Water and Atmospheric Research, P.O. Box 11 115, Hamilton, New Zealand. E-mail: r.wells@niwa.cri.nz

## 2002

**4691.** Asaithambi, M.; Manickavasagam, S. (2002): Odonata of Annamalai University, Annamalainagar, Tamil Nadu, India. *Zoos' Print Journal* 17(2): 704-706. (in English). ["Odonata population of Annamalainagar, Tamil Nadu was surveyed and 23 species under four families and 21 genera were collected and identified. Suborder Zygoptera is represented by the family Coenagrionidae and Anisoptera by the families Libellulidae, Aeshnidae and Gomphidae. Various genera and spe-



cies collected are reported with their distribution in India." (Authors)] Address: unknown.

**4692.** Bedjanic, M. (2002): Dragonflies collected in Sri Lanka during January and February 1995 (Odonata). Opusc. zool. flumin. 205: 1-22. (in English). ["An annotated list of 53 taxa collected at 22 localities is given. The record of *Agrionemis* cf. *femina* confirms the occurrence of the taxon on the island and raises the question of the taxonomic treatment of the *A. femina* species/subspecies complex. For the endemic *Drepanosticta brincki* Lieft, known previously only from the type series, information additional to the original description is provided. Interesting new records of the endemic *Elatoneura bigemmata* Lieft., known only from the holotype male, are also presented. The allotype female is described and figured for the first time, and information additional to that in the original description of the male is given. Larval records of male of the 18 recorded endemic taxa, namely *Heliogomphus* sp., *Paragomphus henryi* (Laidl.) and *Epopthalmia vittata cyanocephala* Hag., are briefly discussed. A general analysis of the species phenology has shown that, in the "dry season" between January and March, the adults of most endemic odon. spp. of the Platystictidae, Gomphidae, and Corduliidae are absent."] Address: Bedjanic, M., Fram 117/A, SI-2313 Fram, Slovenia. E-mail: matjaz.bedjanic@guest.arnes.si

**4693.** Castro, B.; Colombi, S.D.; Flores, E.; Nery, L. (2002): Aplicación del biolarvívico *Bacillus sphaericus*-2362 (GRISELESF) para el control de la Malaria en un área de salud de la República de Honduras. Revista Cubana de Medicina Tropical 54(2): 134-141. (in Spain, with English summary). ["The results of the application of biolarvívico *Bacillus sphaericus*-2362 (GRISELESF) for the reduction of larval densities of *Anopheles albimanus* as the impact on the epidemiological situation of the disease in health area 2, Sanitary Region 1 of the Ministry of Health Care of Honduras. The biolarvívico was applied in 1999 in five health units which were the most affected by this tropical disease (Ojo del Agua, Villa de San Francisco, San Juan de Flores, Moroceli and El Jicarito). The dose used was 10 ml per square meter of effective breeding area; larval densities were estimated during biological pre- and post-treatment phases. The product showed 100 % effectiveness and a lasting effect up to four months after treatment in the 11 monitored breeding sites. This entomological impact led to a significantly statistical reduction ( $p$ *Anopheles albimanus* larva-eating fish and insects (Coleóptera, Hemiptera and Odonata). The satisfactory entomological and epidemiological results in this health area allowed recommending this biological method as part of the comprehensive programs for the control of malarial vectors in the Republic of Honduras." (Authors)] Address: <http://scielo.sld.cu/pdf/mtr/v54n2/mtr09202.pdf>

**4694.** Chitra, N.; Gunathilagaraj, K.; Soundararajan, R.P. (2002): Habitat selection for oviposition by *Pantala flavescens* (Fab.) (Libellulidae: Odonata). Zoos' Print Journal 17(2): 957-958. (in English). ["The dragonfly *Pantala flavescens* (Fab) was observed for its habitat selection for oviposition in wetland simulated condition as well as in the wetlands at the Tamil Nadu Agricultural University, Coimbatore. These dragonflies preferred paddy fields with exposed water surfaces to fields with crop cover. The maximum number of dragonflies observed were between 0900 and 1200hr. Oviposition in

female dragonflies were observed to be held by the male. The eggs were deposited randomly on water surface. The oviposition was more during months of June and July while the adult emergence were more in August." (Authors)] Address: not stated

**4695.** Craves, J.A.; O'Brien, D.S. (2002): *Ischnura hastata* (Odonata: Coenagrionidae): new for Michigan. The Great lakes Entomologist 35(2): 117-119. (in English). [17-VIII-2002; "An adult male was collected at an old quarry in Ives Road Fen Preserve, Lenawee County, Michigan; and a small population was found at a new development site in Wayne County, Michigan." (Authors)] Address: O'Brien, D.S., Rouge River Bird Observatory, Environmental Interpretive Center, University of Michigan-Dearborn, Dearborn, MI 48128, USA

**4696.** Dittmann, C. (2002): Das Naturschutzgebiet "Schwanheimer Düne" in Frankfurt am Main: eine Effizienzkontrolle. Hess. Faun. Briefe 21(2/3): 27-47. (in German, with english summary). [Hessia, Germany; to assess the effort of management measures realized between 1990 and 1999, a selected fauna was surveyed in 2000. 18 odonate species were recorded, a species turn-over was observed, but in the sum the measures were assessed as positive from the odonatological point of view.] Address: Dittmann, C., Niedwiesenstr. 35, D-60431 Frankfurt a.M., Germany

**4697.** Domingo Calabuig, J. (2002): Un segle d'evolució de l'Albufera de València a través de la seua odonofauna (Insecta, Odonata): espècies perdudes i noves. Dugastella 3: 21-27. (in Spanish with English summary). [The development of the odonate fauna in the Albufera Nature Reserve, Spain in the last hundred years is studied behind the background of landscape and environmental changes. Studying the available entomological publications (1916 ff.) allowed to detect the local extinction of some species, the establishment of lentic-adapted species without specific ecological requirements as well as two new species for the Comunidad Valenciana Odonata checklist: *Orthetrum trinacria* and *Brachythemis leucosticta*.] Address: Domingo Calabuig, J. D., Laboratori d'Entomologia, Institut Cavanilles de Biodiversitat i Biologia Evolutiva (Universitat de València), Apartat Oficial 2085. 46071 València, Spain. E-mail: [jordi.domingo@uv.es](mailto:jordi.domingo@uv.es)

**4698.** Gaunt, M.W.; Miles, M.A. (2002): An insect molecular clock dates the origin of the insects and accords with palaeontological and biogeographic landmarks. Mol. Biol. Evol. 19(5): 748-761. (in English). ["A unified understanding of >390 Myr of insect evolution requires insight into their origin. Molecular clocks are widely applied for evolutionary dating, but clocks for the class Insecta have remained elusive. We now define a robust nucleotide and amino acid mitochondrial molecular clock encompassing five insect orders, including the Blattaria (cockroaches), Orthoptera (crickets and locusts), Hemiptera (true bugs), Diptera, and Lepidoptera (butterflies and moths). Calibration of the clock using one of the earliest, most extensive fossil records for insects (the early ancestors of extant Blattaria) was congruent with all available insect fossils, with biogeographic history, with the Cambrian explosion, and with independent dating estimates from Lepidopteran families. In addition, dates obtained from both nucleotide and amino acid clocks were congruent with each other. Of particular interest to vector biology is the early date of

the emergence of triatomine bugs (99.8-93.5 MYA), coincident with the formation of the South American continent during the breakup of Gondwanaland. More generally, we reveal the insects arising from a common ancestor with the Anostraca (fairy shrimps) at around the Silurian-Ordovician boundary (434.2-421.1 MYA) coinciding with the earliest plant megafossil. We explore Tilyard's theory proposing that the terrestrial transition of the aquatic arthropod ancestor to the insects is associated with a particular plant group (early vascular plants). The major output of the study is a comprehensive series of dates for deep-branching points within insect evolution that can act as calibration points for further dating studies within insect families and genera." (Authors)] Address: Gaunt, M.W., Pathogen Molecular Biology and Biochemistry Unit, Department of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, Keppel Street, Street, London WC1E 7HT. E-mail: michael.gaunt@lshtm.ac.uk

**4699.** Gillett, M.P.T.; Gillett, C.P.D.T. (2002): A winter survey of insects and other terrestrial invertebrates on marawah Island, Abu Dhabi. *Tribulus* 12(2): 12-19. (in English). [United Arab Emirates, 27-29-XII-1998; *Anax ephippiger*, *Pantala flavescens*.] Address: Gillett, M., Dept Biochemistry, FMHS, UAE University, P.O. Box 17666, Al Ain, U.A.E. E-mail: M.gillet@uaeu.ac.ae

**4700.** Hawking, J.H.; Theischinger G. (2002): The larva of *Orthetrum balteatum* LIEFTINCK (Odonata: Libellulidae). *Linzer Biologische Beiträge* 34(2): 1511-1514. (in English). ["The supposed larva of *Orthetrum balteatum* LIEFTINCK is described from the Northern Territory, Australia, and compared with the other Australian species of *Orthetrum* NEWMAN." (Authors)] Address: Hawking, J.H., Cooperative Research Centre for Freshwater Ecology, Murray Darling Freshwater Research Centre, P.O. Box 921, Albury, NSW, 2640, Australia

**4701.** Heidemann, C. (2002): Kommentierte Libellen-Artenliste. *Biozoologische Exkursion Nordostbrandenburg SS 2002*: 35-38. (in German). [Brandenburg, Germany, summer 2002; 6 odonate species are briefly commented on.] Address: [www.uni-muenster.de/Landschaftsoekologie/agbioz/Lehre/Protokoll22002.pdf](http://www.uni-muenster.de/Landschaftsoekologie/agbioz/Lehre/Protokoll22002.pdf)

**4702.** Keats, R.A.; Osher, L.J.; Neckles, H.A. (2002): The effect of nutrient loading on an estuarine food web: A stable isotope approach. *Ecological Society of America Annual Meeting s 87*: 176. (in English). [Verbatim: Coastal ecosystems worldwide face increased nutrient enrichment from shoreline and watershed development and atmospheric pollution. Our research formed part of a larger study by the US Geological Survey of the relationship between watershed development and ecosystem integrity within a small estuary dominated by the submerged macrophyte *Ruppia maritima* (widgeon grass) in Acadia National Park, Maine. We used a stable isotope approach to characterize the natural faunal community of the estuary and to determine the response of dominant estuarine consumers to nutrient enrichment using existing in situ experimental mesocosms. The estuarine faunal community is dominated by brackish water invertebrates including midge larvae (Chironomidae), oligochaetes, damselfly larvae (*Enallagma* sp.), amphipods (*Gammarus* sp.), ostracods, and water boatmen (*Trichocorixa* sp.), and fish (*Fundulus* sp.). Experimental nutrient additions changed the community

of primary producers, with losses of *R. maritima* and increases in epiphytic and planktonic algae. Although increased nutrients did not significantly alter total invertebrate abundance and diversity, higher nutrient mesocosms had reduced densities of chironomids and greater densities of oligochaetes. Assessment of food web structure using stable isotopes showed a dependence of consumers on epiphytic algae and terrestrial detrital pools under both natural and enriched conditions. *R. maritima* and epiphytic algae were more enriched in  $\delta^{15}\text{N}$  and *R. maritima* was more depleted in  $\delta^{13}\text{C}$  in the enriched mesocosms. Experimental nutrient loading altered the composition and structure of the natural community in this estuary.] Address: Keats, Rachel, University of Maine-Orono, Orono, ME USA

**4703.** Matushkina, N.O.; Khrokalo, L.A. (2002): Identification key of the Ukrainian dragonflies: the larvae and the exuviae. Kyiv: Phytosociocentrum. ISBN 966-7938-64-6: 72 pp. (in Ukrainian). Address: Matushkina, Natalia, Department of Zoology, Biological faculty, Kyiv National Taras Shevchenko University, Ukraine. E-mail: [matushkina@list.ru](mailto:matushkina@list.ru) pr. Glushkova 2, b. 12, K680 Kyiv, Ukraine

**4704.** Moan, J.L.; Marks, J.C.; Williamson, C.; Leroy, C.J. (2002): The effect of elevated atmospheric  $\text{CO}_2$  on in-stream cottonwood decomposition and detritivore assemblages. *Ecological Society of America Annual Meeting s 87*: 215. (in English). [Verbatim: Leaf litter is an important allochthonous energy source for stream ecosystems. It has been shown in previous studies that elevated atmospheric  $\text{CO}_2$  can reduce leaf litter quality by increasing C:N ratios. We studied how elevated atmospheric  $\text{CO}_2$  affects in-stream decomposition and detritivore assemblages. In this experiment, leaves from two species of cottonwoods, *Populus fremontii* and *P. angustifolia*, grown in greenhouse chambers under elevated and ambient  $\text{CO}_2$  were collected and placed in litterbags in Beaver Creek, Arizona. Leaves grown in elevated  $\text{CO}_2$  showed a significantly slower decomposition than those grown in ambient conditions during the first harvest (7 days), but not for subsequent harvests. Significantly slower decomposition was observed for *P. angustifolia* for all four harvests. This suggests that although atmospheric  $\text{CO}_2$  may have an effect on early stages of leaf litter decomposition, three species has a greater overall effect. Over time, invertebrate abundance paralleled decomposition rates with significantly more invertebrates found on *P. fremontii* leaves over *P. angustifolia*. Invertebrate species richness increased in all treatments over time and the invertebrate assemblage shifted from dominance by chironomids to increased abundances of caddisflies and odonates.] Address: Moan, Jaina, Northern Arizona University, Flagstaff, AZ USA

**4705.** Rodrigues da Silva, E.; Jaffe, K. (2002): Expanded food choice as a possible factor in the evolution of sociality of Vespidae (Hymenoptera). *Sociobiology* 39(1): 1-12. (in English). ["A recent theory suggests that economic considerations are more important than genetic ones in the emergence and maintenance of social behavior. Evolution of social behavior in wasps, thus, could be based on the development of worker castes, which increase the efficiency of brood care and energy use of the colony. If so, social wasps should collect a larger range of prey, favoring polyethism, as social behavior should increase the adaptive value of social spe-

cies among wasps by increasing the range of prey accessible. We explored the literature and showed that the Eumeninae, which are mostly solitary, draw prey from significantly fewer orders of arthropods than wasps in the subfamily Vespinae and Polistinae, which are mainly social, supporting the hypothesis that social behavior may have emerged as a more efficient way to feed and care for the young by opening a wider range of food sources, increasing the amount of food and quality of care provided to the young. Two alternative explanations of this data are also discussed." (Authors) Odonata are listed as prey for several species of Vespinae and Polistes wasps.] Address: Rodrigues da Silva, E., UNESP, Instituto de Biociências, Departamento de Zoologia, C.P. 199, Rio Claro, Brazil. E-mail: ersilva@rc.unesp.br

**4706.** Schoeppner, N.M.; Relyea, R.A. (2002): You are what you eat: How prey discriminate among predator diets. Ecological Society of America Annual Meeting s 87: 258. (in English). [Verbatim: The evolution of predator-induced plasticity requires reliable environmental cues that convey information about predation risk. Many aquatic organisms rely on chemical cues (produced during predation events) for making phenotypic decisions and these cues differ when predators consume different prey diets. It has been hypothesized that prey should exhibit strong anti-predator responses when predators consume closely-related species but weak responses when predators consume distantly-related species (termed the "phylogenetic hypothesis"). However, tests of this hypothesis typically only include the extreme end points predators eating prey from the same species or prey from a different phylum. We reared three tadpole species (*Hyla versicolor*, *Rana sylvatica*, and *Rana catesbeiana*) in the presence of caged dragonflies (*Anax junius*) fed one of ten diets and quantified tadpole activity. The diets spanned a range of phylogenetic relatedness to include different species, different genera, different families, different orders, and different phyla. We found that while all three tadpole species could discriminate among predator diets, there was poor support for the phylogenetic hypothesis. The more distantly-related diets did not consistently produce weaker responses than the more closely-related diets in the target species. These results suggest that the chemical cues released during the predation event provides specific information about the species being consumed and that the recognition of this signal by other species is not determined solely by phylogenetic relatedness.] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**4707.** Schwarz, D. (2002): Gedichte: Wenn Libellen weinen. Verlag Neue Literatur. ISBN 3-934141-46-3: 79 pp. (in German). [Book with poems, two of them with brief reference to dragonflies.]

**4708.** Srivastava, D.S. (2002): Trophic diversity, habitat complexity and ecosystem function: Complex linkages in bromeliad insect communities. Ecological Society of America Annual Meeting s 87: 272. (in English). [Verbatim: Biodiversity loss often begins at the top level of food webs and flows down, causing concomitant loss of trophic levels. Furthermore, biodiversity loss is frequently caused by habitat changes (i.e. change in amount, type, or heterogeneity). Therefore, two questions are key to understanding the effects of species loss

on ecosystem functions: (1) What is the effect of trophic diversity on ecosystem function? (2) How does trophic diversity interact with habitat changes to affect ecosystem function? These questions were examined using an aquatic insect food web in Costa Rican bromeliads. Bromeliads trap both water and detritus, and this detritus is consumed by larvae of many insect species. The rate of detrital processing by insects was examined as a critical ecosystem function for this system. All detritivore insects are preyed upon by nymphs of a single damselfly species. I examined detrital processing in bromeliads with and without this predatory trophic level. Bromeliads also vary substantially in structure, with high structural complexity (many bromeliad leaves dividing up a volume of water) or lower degrees of complexity (fewer bromeliad leaves per volume of water). The linkages between trophic diversity, habitat complexity and ecosystem function are surprisingly complex in this system. High habitat complexity decreases foraging efficiency of the detritivores (reducing detrital processing), but also reduces predation rates by damselfly nymphs, which indirectly increases detrital processing. Whether not these two effects cancel each other out depends on the equilibrium abundance of insects; that is the relative rate at which insects pupate and leave the bromeliad versus the rate at which new insects enter the bromeliad through oviposition. Increasing habitat size dampens these effects of habitat complexity.] Address: Srivastava, Diane, Dept of Zoology, University of British Columbia, 6270 University Boulevard, Vancouver, B.C., Canada V6T 1Z4. E-mail: srivast@zoology.ubc.ca

**4709.** Sunahara, T.; Ishizaka, K.; Mogi, M. (2002): Habitat size: a factor determining the opportunity for encounters between mosquito larvae and aquatic predators. Journal of Vector Ecology 27(1): 8-20. (in English). ["Occurrence patterns of mosquito immatures and insect predators in containers of various sizes were surveyed in summer (June-July) and autumn (September) of 1998 in a rural area of Saga, southwestern Japan. Mosquitoes were categorized into three types in relation to habitat size. First, *Aedes* (*Stegomyia*) spp. and *Tripteroides bambusa* occurred mostly in small containers of < 0.1 m<sup>2</sup>. Second, *Ae. japonicus* and *Culex kyotoensis* occurred in larger container sizes, compared with the first group. Third, *Cx. tritaeniorhynchus* and *Anopheles sinensis* occurred in rice fields in summer and in large containers in the autumn. Predators such as Notonectidae, Anisoptera nymphs, and *Chaoborus* sp. and a predaceous mosquito *Cx. halifaxii* occurred mainly in large (D0.1 m<sup>2</sup>) containers. The mosquitoes of the third group showed similarities with predators in the occurrence of each habitat type, and they frequently co-occurred with predators. The mosquitoes of the first group showed less similarity with predators in habitat type preference, and they rarely co-occurred with predators. The second group mosquitoes showed intermediate patterns of the first and the third groups." (Authors)] Address: Sunahara, T., Division of Parasitology, Dept of Microbiology, Saga Medical School, Nabeshima 5-1-1 Saga 849-8501, Japan

**4710.** Vance, H.D.; Soluk, D.A. (2002): Evaluating the prevalence of non-additivity for multiple predator species in aquatic systems. Ecological Society of America Annual Meeting s 87: 288. (in English). [Verbatim: Understanding whether the consumption rates of two different predator species in isolation can be summed together to predict the consumption rate when those



predator species are present simultaneously has widespread implications. Some studies have shown that the observed consumption rates match the predictions of a null model of additivity (an additive outcome) while other studies show that the observed and predicted values differ dramatically (a non-additive outcome). We address the question of how prevalent additive interactions are in comparison to non-additive interactions and discuss when additivity and non-additivity may occur. We measured the consumption of mayfly larvae (*Isonychia* sp.) under conditions of varying predator density and species composition in artificial stream tanks. Two predatory invertebrates, dragonfly larvae (*Boyeria vinosa*) and hellgrammites (*Corydalus cornutus*), and two fish, greenside darters (*Etheostoma blennioides*) and creek chubs (*Semotilus atromaculatus*) were used. The consumption of every two-predator species combination was monitored in the same controlled experimental conditions. Out of six interspecific combinations of two predator species, only one combination demonstrated even a trend toward non-additivity. The low occurrence of non-additivity observed in this study suggests the possibility that predicting the outcome of multiple predator species interactions may be easier than previously thought.] Address: Vance, Heather, University of Illinois, Urbana, IL USA

### 2003

**4711.** Ackerman, J.; Galloway, T.D. (2003): Odonata larvae in urban retention ponds in Winnipeg, Manitoba, Canada. *Proceedings of the Entomological Society of Manitoba* 59: 5-15. (in English). ["We assessed the diversity of Odonata larvae in retention ponds, a prevalent but unexplored aquatic habitat in many cities. Ten storm water retention ponds in Winnipeg were sampled for larval Odonata during the 2001 summer season. Twenty-two species were collected. Six species were common in four or more ponds: *Anax junius*, *Sympetrum costiferum*, *Lestes unguiculatus*, *Enallagma hageni*, *E. ebrium* and *E. civile*. Of the other species found, only one specimen each of 10 species was collected. There appeared to be fewer species and fewer individuals of each species in ponds where vegetation control practices had been applied. No juvenile Odonata were found in ponds where carp were present. *Anax junius* was most abundant in ponds with emergent vegetation. However, in one pond where there had been no vegetation control and where there was no emergent vegetation, the greatest number of species was collected." (Authors)] Address: Ackerman, J., 500 Camden Place, Winnipeg, Manitoba, Canada R3G 2V7. E-mail: joeackerman@hotmail.com

**4712.** Adelman, T.L.; Bialek, W.; Olberg, R.M. (2003): The information content of receptive fields. *Neuron* 40(4): 823-833. (in English). ["The nervous system must observe a complex world and produce appropriate, sometimes complex, behavioral responses. In contrast to this complexity, neural responses are often characterized through very simple descriptions such as receptive fields or tuning curves. Do these characterizations adequately reflect the true dimensionality reduction that takes place in the nervous system, or are they merely convenient oversimplifications? Here we address this question for the target-selective descending neurons (TSDNs) of the dragonfly (*Aeshna canadensis*).

Using extracellular multielectrode recordings of a population of TSDNs, we quantify the completeness of the receptive field description of these cells and conclude that the information in independent instantaneous position and velocity receptive fields accounts for 70%-90% of the total information in single spikes. Thus, we demonstrate that this simple receptive field model is close to a complete description of the features in the stimulus that evoke TSDN response." (Authors)] Address: Adelman, T.L., Department of Molecular Biology, Princeton University, Princeton, NJ, 08544, USA. E-mail: tadelman@princeton.edu

**4713.** Adeniyi, A.A.; Idowu, A.B.; Okedeyi, O.O. (2003): Levels of cadmium, chromium and lead in dumpsites soil, earthworm (*Lybrodrius violaceus*), housefly (*Musca domestica*) and dragon fly (*Libellula luctosa*). *Pakistan Journal of Scientific & Industrial Research* 46(6): 452-456. (in English). ["Chemical analyses of cadmium, chromium and lead in dumpsites soil, earthworm (*Lybrodrius violaceus*), housefly (*Musca domestica*) and *Libellula luctosa* were performed by atomic absorption spectrophotometry to estimate the degree of metal pollution in two Lagos dumpsites located at Iba Housing Estate (dumpsite A) and Soluos along LASU - Isheri road (dumpsite B). Soil pH and moisture content were also determined. Chromium was not detected (ND) in most of the samples except in the soil samples whose mean and standard deviation (SD) were 0.43 +/- 0.37 µg/g and 0.23 +/- 0.37 µg/g, respectively for dumpsites A and B, and the earthworm samples harvested from dumpsite B (1.00 +/- 1.41 µg/g). The cadmium levels were 4.00 +/- 3.16 µg/g and 7.50 +/- 6.37 µg/g for earthworm; 2.86 +/- 1.43 µg/g and 4.29 +/- 3.74 µg/g for housefly, 0.75 +/- 1.26 µg/g and 1.25 +/- 0.95 µg/g for dragonfly, respectively for dumpsites A and B. However, the concentration of lead in the invertebrates were, 130.00 +/- 112.58 µg/g and 105.75 +/- 94.44 µg/g for earthworm; 145.71 +/- 101.87 µg/g and 225.71 +/- 79.31 µg/g for housefly; 165.00 +/- 69.78 µg/g and 85.00 +/- 69.73 µg/g for dragonfly respectively for dumpsites A and B. Cadmium and lead levels were found to be higher in the invertebrates harvested from the dumpsites than those collected from the non-dumpsites. The non-dumpsite values for cadmium were 1.24 +/- 0.94 µg/g, 0.45 +/- 0.56 µg/g and 0.38 +/- 0.14 µg/g for earthworm, housefly and dragonfly, respectively. Similarly, the non-dumpsite lead levels for earthworm, housefly and dragonfly were 23.12 +/- 10.11 µg/g, 20.75 +/- 11.85 µg/g and 33.62 +/- 14.95 µg/g, respectively." (Authors)] Address: Adeniyi, A., Dept Chem Sci, Univ Lagos, PMB 1087, Lagos, Nigeria. E-mail: lekeadeniyi@yahoo.com

**4714.** Albertoni, E.F.; Palma-Silva, C.; de Assis Esteves, F. (2003): Natural diet of three species of shrimp in a tropical coastal lagoon. *Brazilian Archives of Biology & Technology* 46(3): 395-403. (in English). ["The gut content of 495 specimens of *Farfantepenaeus brasiliensis*, 131 of *F. paulensis* (Penaeidae) and 102 of *Macrobrachium acanthurus* (Palaemonidae) were analyzed to establish the composition of their diets. *F. brasiliensis* had as the most important feeding items in its diet larvae of Chironomidae, Polychaeta and *Heleobia australis* (Mollusca). For *F. paulensis*, the most important items were the same as for *F. brasiliensis*, but the order of importance of *H. australis* and Polychaeta was inverted. *M. acanthurus* had detritus as the most important item, followed by Chironomidae larvae, Odonata

nymphs, and fragments of the macroalgae *Chara*. The results showed that the three species were omnivorous, with a varied diet including both components of macrofauna of benthos and associated to the macroalgae *Chara* and plant fragments and detritus." (Authors)] Address: Albertoni, Edelti, Departamento de Ciencias Morfo-Biologicas; Laboratorio de Ecologia, Fundacao Universidade Federal do Rio Grande, Av. Italia Km 8, Campus Carreiros, 96201-900, Rio Grande, RS, Brazil

**4715.** Asaithambi, M.; Manickavasagam, S. (2003): Effect of habitat manipulation on population density of odonates in paddy ecosystem. *Entomon* 28(2): 147-152. (in English). ["Trials were conducted in a Paddy field to study the effect of habitat manipulation on the population density of odonates. The field was divided into direct sown and transplanted paddy and each was further subdivided into weeded and anweeded plots. Population of both damselfly and dragonfly naiads were counted in one m<sup>2</sup> in each plot. Results revealed that the direct sown paddy plot harboured more damselfly population than transplanted paddy plot while the dragonfly population was high in transplanted plot than in direct sown plot. Odonate population increased gradually with monsoon and declined during dry weather." (Authors)] Address: Manickavasagam, S., Department of Entomology, Faculty of Agriculture, Annamalai University, Annamalaiagar, TN, 608002, India

**4716.** Bazzanti, M.; Della Bella, V.; Seminara, M. (2003): Factors affecting macroinvertebrate communities in astatic ponds in central Italy. *Journal of Freshwater Ecology* 18(4): 537-548. (in English). ["Twenty astatic ponds near Rome were studied in order to define the relationships between physicochemical variables and macroinvertebrate communities. The main abiotic factor differentiating the ponds was the annual hydrologic cycle. Depth, surface area, and sand percentages in the sediment were higher in permanent ponds, whereas silt+clay content was higher in temporary ones. No difference was recorded in pH, conductivity and oxygen content in the water or organic matter in the sediments between the two pond types. Three main ecological assemblages were distinguished: a) generalist taxa common to both pond types; b) taxa associated with and adapted to temporary ponds; and c) taxa which seemed to prefer permanent ponds. Overall, there was no relationship between number of taxa and surface area, except for Odonata and aquatic macrophytes. A positive correlation was observed between number of macrophyte species and macroinvertebrate taxa richness, and particularly of odonates and chironomids, suggesting that an increase in aquatic vegetation species leads to an increase in microhabitats and suitable food, substrate, and/or refuge from predators. Odonata seemed also to prefer more stable and sunny ponds." (Authors)] Address: Bazzanti, M., Dept. Animal & Human Biology, Univ. "La Sapienza", viale dell'Universita 32, 00185, Rome, Italy. E-mail: marcello.bazzanti@uniroma1.it

**4717.** Bohonak, A.J.; Jenkins, D.G. (2003): Ecological and evolutionary significance of dispersal by freshwater invertebrates. *Ecology Letters* 6: 783-796. (in English). ["Traditional expectations for how widely and how often freshwater invertebrates disperse differ from empirical data. Freshwater invertebrates have been characterized as frequent, widespread dispersers, particularly those that are transported passively. Our re-

view finds that this characterization may describe the potential for dispersal in some taxa, but it is not an accurate generalization for actual dispersal rates. High variance among habitats and taxonomic groups is a consistent theme. Advances in population genetics may help resolve these issues, but underlying assumptions should be carefully tested. Further, even unbiased estimates of gene flow may not equate with individual movement, because not all dispersers survive and reproduce. Some freshwater invertebrates may exist in classic Levins metapopulations. However, other species fit into a broader metapopulation definition, where temporal dispersal via diapause is functionally equivalent to spatial dispersal. In the latter case, local extinctions and rescue effects may be rare or absent. Finally, limited dispersal rates in many taxa suggest that theories of freshwater community assembly and structure can be made more robust by integrating dispersal and local processes as joint, contingent regulators. Recent research on freshwater invertebrate dispersal has substantially advanced our basic and applied understanding of freshwaters, as well as evolutionary ecology in general." (Authors)] Address: Bohonak, A.J., Dept of Biology, San Diego State University, 5500 Campanile Drive, San Diego, CA 92182-4614, USAE-mail: bohonak@sciences.sdsu.edu

**4718.** Buden, D.W.; Paulson, D.R. (2003): The odonata of Kosrae, Eastern Caroline Islands, Micronesia. *Pacific Science* 57(4): 399-407. (in English). ["A recent collection of 69 specimens together with survey counts and incidental observations during June-July 2002 provide new information on the odonate fauna of Kosrae, Micronesia. The fauna comprises one zygopteran (*Ischnura aurora*) and six anisopterans. It appears to have remained stable with no known extinctions or colonizations over the past half century. The fauna is nearly a subset of that of Pohnpei and the islands to the west, and it comprises six widespread weedy species and one endemic, *Hemicordulia erico*. Upland aquatic habitats appear largely unexploited or underutilized by odonates, and the absence of any *Teinobasis* species on Kosrae is in marked contrast to the presence of six species on the nearest high island, Pohnpei." (Authors)] Address: Buden, D.W., Division of Science and Mathematics, College of Micronesia-FSM, Kolonia, P.O. Box 159, Pohnpei, FM 96941, Micronesia. E-mail: donbuden@comfsm.fm

**4719.** Burwell, C.J.; Theischinger, G. (2003): New distribution records and notes on the larva of *Urothemis aliena selys* (Odonata: Urothemistidae). *Australian Entomologist* 30(2): 57-64. (in English). ["The distribution of *U. aliena* Selys in Australia is presented, based primarily on specimens in Australian insect collections. Specimens collected at two SE Queensland localities, Enoggera Reservoir and Birkdale, extend its known range by almost 1000 km to the south-east. *U. aliena* is recorded for the first time from Cape York Peninsula in northern Queensland. The final instar larval exuviae of *U. aliena* is illustrated and diagnostic features are provided." (Authors)] Address: Burwell, C.J., Higher Entomology Section, Queensland Museum, PO Box 3300, South Brisbane, Qld, 4101, Australia

**4720.** Campbell, L.M.; Hecky, R.E.; Wandera, S.B. (2003): Stable Isotope Analyses of food web structure and fish diet in Napoleon and Winam Gulfs, Lake Victoria, East Africa. *J. Great Lakes Res.* 29 (Supplement 2):

243-257. (in English). ["The food web structures in Napoleon and Winam gulfs, Lake Victoria, were characterized using stable nitrogen and carbon isotope analyses. Similar biota in Napoleon Gulf had significantly lighter  $\delta^{15}\text{N}$  values and heavier  $\delta^{13}\text{C}$  values than similar biota in Winam Gulf, indicating different basal isotopic values. In both gulfs, Nile perch (*Lates niloticus*) was the top trophic predator while Nile tilapia (*Oreochromis niloticus*) was littoral and feeding at lower trophic levels. *Rastrineobola argentea* and *Yssichromis laparograma* had surprisingly high  $\delta^{15}\text{N}$  values, close to those of Nile perch, which were not consistent with the high isotopic values of their assumed zooplankton prey. *Caridina nilotica*, a freshwater shrimp, had a wide range of  $\delta^{13}\text{C}$  values but low  $\delta^{15}\text{N}$  values, consistent with their appearance in nearly all habitants in the lake, and their presence in the stomachs of most fish species. Nile perch showed an increase in  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  values with size, signifying that piscivory increases and their dietary reliance on invertebrates decreases as they mature. Stable isotope values for Napoleon Gulf biota which were adjusted for different basal values were not statistically different from those of Winam Gulf biota, suggesting that stable carbon and nitrogen isotopes fractionate consistently through trophic transfers in Lake Victoria. The stable isotope data illustrate a short food web, with the top predator Nile perch feeding on a restricted set of fish and macroinvertebrate species (including Odonata), including its own young." (Authors)] Address: Campbell, Linda, Canada Centre for Inland Waters, Environment Canada, 867 Lakeshore Rd, Burlington, Ontario L7R 4A6. E-mail: lmcampbe@ec.gc.ca

**4721.** Chahl, J.; Thakoor, S.; Le Bouffant, N.; Stange, G.; Srinivasan, M.V.; Hine, B.; Zornetzer, S. (2003): Bioinspired engineering of exploration systems: A horizon sensor/attitude reference system based on the dragonfly ocelli for Mars exploration applications. *Journal of Robotic Systems* 20(1): 35-42. (in English). ["Bio-inspired engineering of exploration systems (BEES) is a fast emerging new discipline. It focuses on distilling the principles found in successful, nature-tested mechanisms of specific crucial functions that are hard to accomplish by conventional methods, but are accomplished rather deftly in nature by biological organisms. The intent is not just to mimic operational mechanisms found in a specific biological organism but to imbibe the salient principles from a variety of diverse organisms for the desired crucial function. Thereby, we can build exploration systems that have specific capabilities endowed beyond nature, as they will possess a mix of the best nature-tested mechanisms for each particular function. Insects (for example, honey bees and dragonflies) cope remarkably well with their world, despite possessing a brain that carries less than 0.01% as many neurons as ours does. Although most insects have immobile eyes, fixed focus optics, and lack stereo vision, they use a number of ingenious strategies for perceiving their world in three dimensions and navigating successfully in it. We are distilling some of these insect-inspired strategies for utilizing optical cues to obtain unique solutions to navigation, hazard avoidance, altitude hold, stable flight, terrain following, and smooth deployment of payload. Such functionality can enable access to otherwise unreachable exploration sites for much sought-after data. A BEES approach to developing autonomous flight systems, particularly in small scale, can thus have a tremendous impact on autonomous airborne navigation of these biomorphic flyers particularly for

planetary exploration missions, for example, to Mars which offer unique challenges due to its thin atmosphere, low gravity, and lack of magnetic field. Incorporating these success strategies of bioinspired navigation into biomorphic sensors such as the horizon sensor described herein fulfills for the first time the requirements of a variety of potential future Mars exploration applications described in this paper. Specifically we have obtained lightweight (6 g), low power (<40 mW), and robust autonomous horizon sensing for flight stabilization based on distilling the principles of the dragonfly ocelli. Such levels of miniaturization of navigation sensors are essential to enable biomorphic microflyers (<1 kg) that can be deployed in large numbers for distributed measurements. In this paper we present the first experimental test results of a biomorphic flyer platform with an embedded biomorphic ocellus (the dragonfly-inspired horizon sensor/attitude reference system). These results from the novel hardware implementation of a horizon sensor demonstrate the advantage of our approach in adapting principles proven successful in nature to accomplish navigation for Mars exploration." (Authors) For more details see: [www.people.nas.nasa.gov/~aftosmis/publications/beesaiaa2004-6274.pdf](http://www.people.nas.nasa.gov/~aftosmis/publications/beesaiaa2004-6274.pdf) Address: Chahl, J., Defence Science and Technology Organization Adelaide, Australia and Australian National University, Canberra, Australia

**4722.** Chase, J.M. (2003): Strong and weak trophic cascades along a productivity gradient. *Oikos* 101: 187-195. (in English). ["Variation in the strengths of predator effects, although commonly observed in natural communities, and predicted from theoretical models, remains poorly understood in the study of food web interactions and community structure. In this study, I first showed that prey species in benthic pond food webs were highly variable in their susceptibility to predators. Some were vulnerable throughout their lives, whereas others were vulnerable as juveniles, but able to grow to a size-refuge. Next, I showed that herbivore and predator abundance increased along a natural productivity gradient among 29 ponds, and herbivore species composition shifted from dominance by vulnerable to dominance by invulnerable herbivore species along this gradient. However, there was a considerable amount of variation both in herbivore biomass and composition at intermediate productivity; some were dominated by small species and others by larger species. Finally, in situ enclosure experiments, I found that predator effects were strong and cascaded to plants in a low productivity pond and in an intermediate productivity pond dominated by small herbivore species. Alternatively, in a high productivity pond and in an intermediate productivity pond dominated by larger herbivores, I found that predator effects on prey biomass were weak, and did not cascade to plants." (Author) Michigan, USA, *Erythemis simplicicollis*, *Anax junius*, *Tramea lacerata*, *Ischnura* ssp., *Enallagma* ssp., *Lestidae*] Address: Chase, J.M., Dept Biology, Box 1137, Washington Uni., Saint Louis, MO 63130, USA. E-mail: jchase@biology.2.wustl.edu

**4723.** Chessman, B.C. (2003): New sensitivity grades for Australian river macroinvertebrates. *Marine and Freshwater Research* 54: 95-103. (in English). ["The SIGNAL biotic index for river macroinvertebrates, originally developed and tested in eastern Australia, was revised for application to the entire continent. Macroinvertebrate survey data from the National River Health Program were used to set grade numbers between 1 and



10 to represent the water-quality sensitivities of 210 taxa (including the Odonata on the family level). Grades were assigned at the taxonomic levels customarily used by government agencies (predominantly family level) and by community groups (mainly order). A new index version using these grades, SIGNAL2, was correlated with water temperature, turbidity, electrical conductivity, alkalinity, pH, dissolved oxygen, total nitrogen and total phosphorus. Because of natural spatial variation in water quality, index scores need to be interpreted in a local context or against site-specific predictions generated by the Australian River Assessment System (AUSRIVAS)." (Author)] Address: Chessman, B.C., Centre for Natural Resources, Department of Sustainable Natural Resources, PO Box 3720, Parramatta, NSW 2124, Australia. Email: bchessman@dlwc.nsw.gov.au

**4724.** Combes, S.A.; Daniel, T.L. (2003): Flexural stiffness in insect wings I. Scaling and the influence of wing venation. *Journal Experimental Biology* 206: 2979-2987. (in English). ["During flight, many insect wings undergo dramatic deformations that are controlled largely by the architecture of the wing. The pattern of supporting veins in wings varies widely among insect orders and families, but the functional significance of phylogenetic trends in wing venation remains unknown, and measurements of the mechanical properties of wings are rare. In this study, we address the relationship between venation pattern and wing flexibility by measuring the flexural stiffness of wings (in both the spanwise and chordwise directions) and quantifying wing venation in 16 insect species from six orders (including *Aeshna multicolor*, *Pachydiplax longipennis*, *Letes* sp., *Ischnura* sp.). These measurements show that spanwise flexural stiffness scales strongly with the cube of wing span, whereas chordwise flexural stiffness scales with the square of chord length. Wing size accounts for over 95% of the variability in measured flexural stiffness; the residuals of this relationship are small and uncorrelated with standardized independent contrasts of wing venation characters. In all species tested, spanwise flexural stiffness is 1-2 orders of magnitude larger than chordwise flexural stiffness. A finite element model of an insect wing demonstrates that leading edge veins are crucial in generating this spanwise chordwise anisotropy." (Authors)] Address: Combes, S.A., Dept of Biology, University of Washington, Seattle, WA, 98195, USA. E-Mail: scombes@u.washington.edu

**4725.** Crumrine, P.W. (2003): Examining the role of size structure on intraguild predation in larval odonates. *Ecological Society of America Annual Meeting* s. [cdrom] 88: 76. (in English). [Verbatim: The direction and intensity of intraguild predation (IGP) interactions are heavily influenced by size differences among interacting species. Asymmetric IGP is common when IG predators are larger than IG prey, and many empirical studies on IGP include predators with these relative size relationships. In addition to size differences between species, individuals in most natural populations of predators and prey vary in size, but few studies specifically test how size variation within species influences IGP interactions. The aim of this study was to investigate how IG predator size structure influences the survival and behavior of IG prey and shared prey. I tested for these effects in a larval odonate system by exposing shared prey (*Ischnura verticalis*) to the presence or absence of IG prey (*Pachydiplax longipennis*) and two size classes of IG predators (small or large *Anax junius*) in a 2x2x2

factorial design. Both size classes of *A. junius* significantly decreased *I. verticalis* survival and activity level, but there were no significant effects of *P. longipennis* on *I. verticalis* survival or behavior. *P. longipennis* responded differently to the two size classes of *A. junius*. *P. longipennis* survival was significantly lower when exposed to only the large size class of *A. junius*, and *P. longipennis* also decreased their activity level in the presence of large *A. junius*. Survival of the small size class of *A. junius* was also lower in the presence of large *A. junius*. These results demonstrate that different size classes of IG predators can impose varying levels of risk on IG prey and shared prey, but these effects depend on the assemblage of predators in the system. Within-species size structure adds significant complexity to IGP interactions, and studies incorporating this feature should provide a more complete understanding of how IGP influences community structure] Address: Crumrine, P.W., University of Kentucky, Lexington, KY, USA USA

**4726.** Gaines, K.H. (2003): Does size really matter? Factors affecting larval odonate diversity patterns in a desert sinkhole complex. *Ecological Society of America Annual Meeting* s. 88. August 3 - 8, 2003. Savannah International Trade & Convention Center, Savannah, Georgia: 116-117. (in English). [Verbatim: The Bitter Lake National Wildlife Refuge in southeastern New Mexico contains an unusual ecological mosaic consisting of desert scrub and grassland surrounding dozens of saline water-filled sinkholes of varying sizes, geomorphologies, and water chemistries. Nearly one hundred species of adult dragonflies and damselflies (Order Odonata) have been collected on the refuge, representing the highest diversity of odonates in the state of New Mexico. In order to characterize the distribution and diversity patterns exhibited by the breeding odonate population, thousands of exuviae (final instar larval exoskeletons) were periodically collected at over thirty sinkholes in 2000, 2001, and 2002. Multivariate analyses of sinkhole dimensions and water quality data revealed that while larger sinkholes did tend to support more diverse larval odonate communities, average winter salinity levels explained nearly 70% of the variation observed in species diversity, as species with broad larval salinity tolerances successfully bred in most sinkholes visited by adults regardless of sinkhole size. In contrast to predictions of island biogeography theory, this study suggests that in certain cases, individual species characteristics (e.g. larval stenotopy) may have a far greater influence on community diversity patterns than does habitat patch size.] Address: Gaines, Karen H., University of New Mexico-Albuquerque, Albuquerque, NM, USA. E-mail: kgaines@unm.edu

**4727.** Gassmann, D. (2003): Phylogeny and distribution of the Philippine damselfly subgenus *Risioconemis* (*Igneocnemis*) *Hämäläinen* (Odonata: Platycnemididae). Fritz (ed.): Abstracts of the 6th Annual Congress of the Gesellschaft für Biologische Systematik (GfBS, Society for Biological Systematics). *Org. Divers. Evol.* 3, Electr. Suppl. 17: 20. (in English). [Verbatim: *Risioconemis* Cowley, 1934 is the largest genus of the zygopteran subfamily Calicnemiinae in the Indo-Pacific region. The group is endemic to the Philippines, except for the Sulu Archipelago and the Palawan island chain. Members of the group are confined to small, clear creeks in shady rainforest environment, occurring from lowland up to mid-montane forest. Two subgenera with-

in the genus *Risioenemis* are currently recognized: *Risioenemis* Cowley, 1934 s. str., and *Igneocnemis* Hämäläinen, 1991. A revision of the subgenus *Risioenemis* was presented by Hämäläinen (1991). Mainly based on the large Roland A. Müller collection from the Philippines, which is now housed by the Natural History Museum in Leiden, a complete taxonomic revision of the subgenus *Igneocnemis* has recently been completed by Gassmann & Hämäläinen (2002). In total, 20 species of sg. *Igneocnemis* have been recognized, of which five were newly described. Several putative synapomorphies of *Igneocnemis* species point to the monophyly of the group. However, the monophyly of the whole genus, i.e. *Risioenemis* Cowley sensu lato, is less certain. Within the scope of a phylogenetic-biogeographical study on the Indo-Pacific Platycnemididae, the phylogeny of the *Igneocnemis* species was reconstructed based on morphological characters. The distribution patterns of the species can be explained by Tertiary island arc connections as well as by the existence of larger islands during the Pleistocene. References: Gassmann, D. & Hämäläinen, M. (2002): A revision of the Philippine subgenus *Risioenemis* (*Igneocnemis*) Hämäläinen (Odonata: Platycnemididae). *Tijdschr. Entomol.* 145: 213-266. Hämäläinen, M. (1991): The Philippine genus *Risioenemis* Cowley (Zygoptera: Platycnemididae). 1. Subgenus *Risioenemis*. *Odonatologica* 20: 151-194.] Address: Gassmann, D., Inst. Biol. Leiden, Leiden University, c/o National Museum of Natural History (Naturalis), P.O. Box 9517, NL-2300 RA Leiden, The Netherlands; e-mail: gassmann@naturalis.nnm.nl

**4728.** Glaser, F.; Mungenast, F.; Sonntag, H. (2003): Bewässerungsteiche als Lebensräume für Amphibien und Libellen am Beispiel der Trams bei Landeck (Tirol, Österreich) - Artenbestand, naturschutzfachliche Bedeutung, Schutz und Erhaltung. *Berichte des Naturwissenschaftlich-Medizinischen Vereins in Innsbruck*. 90: 165-205. (in German, with English summary). ["Trams" near Landeck (Tyrol, Austria) [...] "Regarding the 25, thereof 20 (80%) autochthonous species of dragonflies in the study area, the "Trams" represents an area of high conservation value. Remarkable is the presence of a rich "Erythromma - Anax imperator- assemblage at relatively high altitude. [...] A redundancy analysis shows that vegetation structure and pond area were the most important factors determining distribution of species." (Authors)] Address: Glaser, F., Technisches Büro für Biologie, Gabelsbergerstr. 41, A-6020, Innsbruck, Austria. E-mail: Florian.Glaser@aon.at

**4729.** Goldschmid, U.; Teuffl, H. (2003): Der Bau des Phönixteiches. Umsetzung eines Ergebnisses des Monitoring-Projektes. *Denisia* 10: 227-241. (in German, with English summary). ["Ponds are very rare in the northern part of Vienna's Danube Island, an artificial building for flood control. The lack of suitable breeding sites become more and more crucial for the population of amphibians in this area. During a three year lasting ecological monitoring it was shown, that specially the populations of species needing open ground and young ponds without a lot of shrubs and trees along the shoreline, are decreasing rapidly. To stop this loss of specimens the Viennese Department for Flood Control and River Engineering built a new big pondsystem, planned by ecologists to suit the needs of amphibians and other animals like dragonflies and birds. It is composed of one large permanent pond and 3 smaller more or less temporary ponds, all in all about 5000 m<sup>2</sup> large. Because

the ponds have no connection to the ground water, the ponds are sealed with marl. The area is completed by a huge breeding wall for kingfishers (*Alcedo atthis*) and swallows (*Riparia riparia*)." (Authors)] Address: Goldschmid, Ulrike, MA 45 - Wasserbau, Wilhelminenstr. 93, A-1160, Wien, Austria. E-mail: gol@m45.mag-wien.gv.at

**4730.** Hart, R.C.; Campbell, L.M.; Hecky, R.E. (2003): Stable isotope analyses and demographic responses counter prospects of planktivory by *Caridina* (Decapoda: Atyidae) in Lake Victoria. *Oecologia* 136: 270-278. (in English). ["*Caridina nilotica*, a freshwater atyid prawn, is a vital component of the Lake Victoria ecosystem (Uganda). Despite its important role in the food web leading to Nile perch, the diet of *Caridina* is not well understood. *Caridina* freshly collected from the inshore littoral and offshore plankton of Lake Victoria were cultured individually under laboratory conditions[...]. Stable isotope analyses (SIA,  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  signatures) of cultured shrimps were further consistent with their utilization of food type A but not D. SIA signatures of feral shrimps maintained in situ in enclosure bags with three separate potential fresh hydrophyte food sources (*Vossia cuspidata*, *Cyperus papyrus*, and *Eichhornia crassipes*) reflected *Caridina*'s probable dietary reliance on decomposed organic matter with accompanying bacterial exudates. Collections of feral shrimps from various locations yielded parallel SIA results. No support for zooplanktivory by shrimps occupying either inshore littoral/benthic or offshore planktonic habitats is provided by the 15N signatures obtained from our data, which support *Caridina*'s primary role as detritivore" (Authors). Stable isotope values for "Odonata" are given in table 5.] Address: Hart, R.C. School of Botany and Zoology, University of Natal, Private Bag X09, Scottsville, Pietermaritzburg, South Africa. E-mail: hartr@nu.ac.za

**4731.** Hovmöller, R. (2003): Evolution of pterygote insects. Perspectives on Odonata. [www2.nrm.se/en/HovmollerPerspectivesonOdonata.pdf](http://www2.nrm.se/en/HovmollerPerspectivesonOdonata.pdf): 19 pp. (in English, with Swedish summary). [For detailed papers see: OAS 11 No. 2966 and OAS 15 No. 4488.] Address: Hovmöller, R., Department of Entomology, Swedish Museum of Natural History, P.O.Box 50007, S-104 05 Stockholm, Sweden. Email: rasmus.hovmoller@nrm.se

**4732.** Hsin-Chieh Tang; Szu-Lung Chen; Ching-Feng Lin (2003): A preliminary survey of the Odonata fauna (Insecta) at Taipei Zoo, Taipei. *Taipei Zoo Bulletin* 15: 17-30. (in Chinese, with English summary). ["A survey of diversity, distribution, and habitats of the dragonfly and damselfly species (Odonata) was conducted at Taipei Zoo from February 2003 to December 2003. Totally 67 species belonging to 45 genera and 10 families were identified. There are 30 and 10 species of Libellulidae and Aeshnidae, respectively. Forty-six and 44 species were recorded at Ecopark and Adolescent physical training field, respectively. Summer from June to August is the best season to observe dragonflies and damselflies at Taipei Zoo. Lacking of larger and stable streams at Taipei Zoo, very few species inhabiting lotic habitats were founded." (Authors)] Address: Hsin-Chieh Tang, Department of Education, Taipei Zoo, Taipei, Taiwan, R.O.C.

**4733.** Huang, D.-y.; Nel, A.; Lin, Q.-b. (2003): A new genus and species of aeshnopteran dragonfly from the

Lower Cretaceous of China. *Cretaceous Res.* 24(2): 141-147. (in English). ["*Parapetala liaoningensis* gen. et sp. nov. is described from the Lower Cretaceous of China. It has a very basal position in the clade Aeshnoptera (Odonata. Petalura, Spec. 2 (1996) 402), basal or close to the Upper Jurassic family Mesuropetalidae. This discovery confirms the high diversity of this group of dragonflies during the Late Jurassic-Early Cretaceous, suggesting rapid evolution of this clade in the Early or Middle Jurassic." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**4734.** International Commission on Zoological Nomenclature (2003): Liochelidae Fet & Bechly, 2001 (1879) (Scorpionidae): Adopted as a valid substitute name for Ischnuridae Simon, 1879 in order to remove homonymy with Ischnurinae Fraser, 1957 (Insecta, Odonata). *Bull. Zoological Nomenclature* 60(2): 159-161. (in English). ["The Commission has ruled that the scorpion family name LIOCHELIDAE Fet & Bechly, 2001 (1879) is to have precedence over ISCHNURIDAE Simon, 1879, which is a homonym of the widely used damselfly name ISCHNURINAE Fraser, 1957 (Odonata). The type genus of LIOCHELIDAE is Liocheles Sundevall, 1833, which is in wide use as the valid senior subjective synonym of the long abandoned name Ischnurus C.L. Koch, 1837 (the type genus of ISCHNURIDAE Simon, 1879). ISCHNURINAE Fraser, 1957 is not to be rejected despite being a junior homonym of ISCHNURIDAE Simon, 1879." (Author)] Address: International Commission on Zoological Nomenclature, Natural History Museum, Cromwell Road, London, SW7 5BD, UK

**4735.** Jacobsen, D. (2003): Altitudinal changes in diversity of macroinvertebrates from small streams in the Ecuadorian Andes. *Archiv für Hydrobiologie* 158(2): 145-167. (in English). ["Altitudinal patterns in diversity of macroinvertebrate families at different spatial scales (stone, stream and altitude) were studied by collecting stone samples from six streams at each of the three altitudes: lowlands (400 m), midlands (2000 m) and highlands (3800 m), in the equatorial Andes of Ecuador. Stream sites were characterised by a number of physico-chemical parameters and the fauna by several indices of richness, diversity and evenness. A MDS ordination on the composition of the fauna clearly separated the streams in three groups according to altitude. The invertebrate fauna was dominated by insects, mainly Ephemeroptera, Trichoptera and Diptera at all three altitudes. Odonata and Hemiptera were relatively rich in lowland streams, scarcely present in the midland streams and absent in the highland streams (as was the case for the less diverse orders Lepidoptera and Megaloptera). Four of the five measures of stream diversity correlated significantly with altitude and temperature. In addition, seven environmental parameters were correlated with one or more of the diversity measures. Of these parameters, stream width, riparian vegetation cover and coarse detritus cover were inter-correlated with altitude and temperature. With the effect of altitude removed, the number of families, the Jack-knife richness estimate and the evenness were positively correlated with an index of physical stream stability. The effect of region (altitude) explained more of total variability in family richness than that among streams within regions. The mean number of families was 8.2, 4.9 and 4.1 per stone, 26.5, 19 and 13.3 per locality (stream), and 44, 37 and 27 per region at the three alti-

tudes, respectively. Thus, both local and regional richness decreased approximately linearly with increasing altitude. In contrast, beta diversity (taxon turnover among streams) increased with altitude. The higher richness in the lowland streams appeared at the smallest spatial scale (stone), and was therefore not due to higher betadiversity among stones within streams. Local richness was nearly linearly related to regional richness, indicating non-saturated local communities, even in lowland streams." (Author)] Address: Jacobsen, D., Freshwater Biological Laboratory, University of Copenhagen, Helsingorsgade 51, DK-3400, Hillerod, Denmark. E-mail: Djacobsen@zi.ku.dk

**4736.** Johnson, E.B.; Bierzychudek, P.; Whiteman, H.H. (2003): Potential of prey size and type to affect foraging asymmetries in tiger salamander (*Ambystoma tigrinum nebulosum*) larvae. *Canadian Journal of Zoology* 81(10): 1726-1735. (in English). ["Although competitive interactions within predator populations are known to depend on their size structure, we understand less about how these interactions are influenced by prey characteristics. Most studies of such interactions for *A. tigrinum nebulosum* larvae have used small zooplankton prey. We investigate the potential of exploitation and interference competition to influence the success of tiger salamander larvae feeding on relatively large prey, mayfly and damselfly larvae. We measured salamander foraging efficiency for a range of salamander and prey sizes and observed aggression levels of salamanders of varying size housed together. Exploitative foraging efficiency (captures per attempts) increased with salamander size but was better predicted by relative prey size (prey size as a percentage of salamander snout-vent length) than by salamander size alone; it also depended significantly on prey type. Aggression (interference) levels were higher when prey were present, and larger salamanders were more aggressive than smaller ones but did not consume more mayfly prey. Our results suggest that investigating the environmental conditions, particularly the prey characteristics, that influence size-based competitive advantages will lead to a better understanding of predator population dynamics." ] Address: Johnson, E.B., 524 W. 122nd Street, No. 4D, New York, NY, 10027, USA. E-mail: ebj2001@columbia.edu

**4737.** Johnson, J.B.; Saenz, D.; Adams, C.K.; Conner, R.N. (2003): The influence of predator threat on the timing of a life-history switch point: Predator-induced hatching in the southern leopard frog (*Rana sphenoccephala*). *Canadian Journal of Zoology* 81(9): 1608-1613. (in English). ["We tested the hypotheses that potential egg predators, crayfish *Procambarus nigrocinctus* and dytiscid *Cybister* sp. larvae, would accelerate the timing of hatching and that a larval predator, dragonfly naiad *Anax junius*, would delay hatching in the southern leopard frog (*Rana sphenoccephala*). We also tested the hypothesis that differences in response would be proportional to predator lethality. Our results indicate that our hypotheses were partially supported. The presence of an efficient egg predator (crayfish) induces hatching faster than a less efficient predator (dytiscid larvae). However, the presence of a larval predator (naiads) did not delay hatching. Eggs that developed in the presence of egg predators produced hatchlings that were shorter (total length) than those reared in the presence of larval predators or those reared in the absence of predators. We suggest that earlier hatching



times should decrease vulnerability to egg predators but result in shorter hatchlings." (Authors)] Address: Johnson, J.B., Department of Biology, Stephen F. Austin State University, Nacogdoches, TX, 75961, USA. E-mail: frogjinn@hotmail.com

**4738.** Jones, C.D. (2003): NHIC participates in the national Odonata assessment workshop. Ontario Natural Heritage Information Centre-Newsletter 8(1): 5-6. (in English). [Winnipeg, Canada, 9-X-2002; this is a brief report on the current situation on mapping the Odonata of Ontario and on assessing the current status of Odonata in their areas.] Address: Jones, C.D., Box 182, Lakefield, Ontario, K0L 2H0, Canada. E-mail: colin.jones@mnr.gov.on.ca

**4739.** Kirti, J.S.; Singh, A. (2003): Significance of male genitalic structures for differentiating three species of *Trithemis* Brauer (Libellulidae: Anisoptera: Odonata) occurring in India. *Geobios (Jodhpur)* 30(4): 259-264. (in English). [Male accessory genital structures of *Trithemis pallidinervis*, *T. aurora*, and *T. festiva* are described, illustrated and keyed.] Address: Kirti, J.S., Dept of Zoology, Punjabi University, Patiala, 147002, India

**4740.** Küry, D. (2003): Wirbellosen-Gemeinschaften der Gewässer Wildensteins. *Mitteilungen der Naturforschenden Gesellschaften Beider Basel* 7: 205-219. (in German, with English summary). ["To evaluate the success of the landscape restorations in the Wildenstein region (canton of Basel-Landschaft) the initial quality of the running and standing waters was assessed. Physico-chemical parameters showed a rather high quality of the brooks but eutrophic to hypertrophic conditions in ponds. Most of the 68 macrozoobenthos taxa in the brooks lived in the Wildensteinerbach (59 taxa) while in the Sormattbächli only 37 taxa were observed. The difference was explained with differing substrate conditions. A total of 45 macrozoobenthos taxa were determined in the ponds: 36 taxa in the Luxmatt ponds and 24 taxa in the Wildenstein pond. Compared to other ponds which are important for conservation, Luxmatt and Wildenstein ponds were poor in taxa. This could be explained with their small areas, the short period since their construction and the presence of fish populations. In both, running and standing waters, 11 species figured in the red lists of Switzerland and Southern Germany, respectively. The enhancement of habitat diversity in running waters and the reduction of the nutrients input in the ponds shall improve the conditions of the macroinvertebrate communities. A monitoring based on the present investigation will estimate the effect of the management to extensivate the farming and forestry." (Authors) The taxa lists include Odonata.] Address: Küry, D., Life Science AG, Greifengasse 7, CH-4058, Basel, Switzerland

**4741.** Legrand, J. (2003): Les odonates du Nimba et de sa région. *Mem. Mus. natn. Hist. nat.* 190: 231-310. (in French with English summary). [127 species from the Mimba region (Africa: Guinée, Côte d'Ivoire, Liberia) are treated. The (re)descriptions or descriptive notes, and the information on their ecology and distribution are provided. No endemics were encountered in the area (Guinea, Ivory Coast, Liberia), but some species seem to be located only in the slopes of the Nimba mountain. The following species are illustrated: *Gomphidia gamblesi*, *Diastatomma gamblesi*, *Chlorocnemis rossii*, *C. flavipennis*, *Microgomphus jannyae*, *Onychogomphus*

*quirkii*, *Paragomphus kiautai*, *P. tournieri*, *Phyllogomphus moundi*, and *Tragomphus christinae*. *Chlorocnemis nubilipennis rossii* Pinhey, 1969 got species rank *C. rossii* Pinhey, 1969.] Address: Legrand, J., 10, rue du Chemin de fer, F-94110 Arcueil, France

**4742.** Mackenzie, R.A.; Kaster, J.L. (2003): A preservative-free emergent trap for the isotopic and elemental analysis of emergent insects from a wetland system. *Great Lakes Entomologist* 35(1), Spring-Summer 2002 (2003): 47-51. (in English). ["This study reports a cost-effective, live emergent trap designed for the preservative-free use in both biogeochemical and ecological analyses of emerging insects. The trap proved to be advantageous in several ways. First, the simple design made the trap time-efficient since it was easy to set-up, change, and maintain. Second, live sampling not only provided uncontaminated organisms for elemental and stable isotopic analyses, it minimized disfigurement. This resulted in rapid and easy handling, as well as identification, of adult insects. Finally, trap avoidance by ephemeropterans and odonates, a common problem encountered in the literature, was minimal and organisms from both insect orders were successfully collected." (Authors)] Address: The Center for Great Lakes Studies at the WATER Institute, University of Wisconsin-Milwaukee, 600 E. Greenfield Ave., Milwaukee, WI, 53204, USA

**4743.** Marden, J.H.; Thomas, M.A. (2003): Rowing locomotion by a stonefly that possesses the ancestral pterygote condition of co-occurring wings and abdominal gills. *Biological Journal of the Linnean Society* 79(2): 341-349. (in English). ["A leading hypothesis for the origin of insect wings is that they evolved from thoracic gills that were serial homologues of the abdominal gills present in fossil pterygotes and in the nymphs of some modern mayflies, damselflies and stoneflies. Co-occurrence of thoracic wings and abdominal gills is the primitive condition for fossil pterygote insects, whereas the winged stage of modern insects almost exclusively lacks abdominal gills. Here we examine the locomotor behaviour and gill morphology of a stonefly, *Diamphipnopsis samali* (Plecoptera), which retains abdominal gills in the winged adult stage. This species can fly, but also uses its forewings as oars to accomplish rowing locomotion along the surface of water. The abdominal gills are in contact with both air and water during rowing, and their elaborately folded surface suggests an ability to contribute to gas-exchange. *D. samali* nymphs also have behaviours that place them in locations where their gills are exposed to air; they forage at night at the stream margin and within bubble curtains in rapids. These traits may exemplify an early pterygote condition in which gill and protowing function overlapped in an amphibious setting during a transition from aquatic to aerial locomotion and gas exchange. Rowing locomotion provides a novel and mechanically intermediate stage for the wings-from-gills and surface-skimming hypotheses for the origin of insect wings and flight." (Authors)] Address: Marden, J.H., Dept Biol., Pennsylvania St. University, 208 Mueller Laboratory, University Park, PA 16802, USA. E-mail: jhm10@psu.edu

**4744.** Martinez, J. C. (2003): Habitat specificity and population genetics of three dragonfly larvae in fragmented landscapes. *Ecological Society of America Annual Meeting s. [cd-rom]* 88: 219. (in English). [Verbatim: While anthropogenic land use change is a major

component of environmental change and often results in fragmentation of habitat into isolated remnant patches, habitat specialization is another important mechanism that may lead to population patchiness. My research investigates the sensitivity to extinction by fragmentation in three dragonfly species with differing degrees of habitat specialization, a habitat generalist (*Libellula quadrimaculata*), intermediate habitat specialist (*Somatochlora williamsoni*), and habitat specialist (*Somatochlora tenebrosa*). This is based on principal component analysis using multiple habitat variables. I combine population genetics, ecology, and a modeling approach to gain a more complete understanding of species' sensitivity to extinction by fragmentation. My study species appear to exhibit metapopulation dynamics in the field. Preliminary results of my metapopulation model reveal that when female adults disperse into demes at low population densities, they provide a rescue effect because female immigrants carry thousands of potential eggs with them. On the other hand, male adult dispersal may generally contribute more to gene flow between demes because of their ability to mate with multiple females (pre-mating dispersal model). Preliminary population genetic results for the intermediate habitat specialist revealed no population subdivision on a spatial scale of 300 miles when allozymes were used as molecular markers.] Address: Martinez, Jeannette C., Dept. of Ecology, Evolution and Behavior, University of Minnesota, 100 Ecology, Saint Paul, MN, USA

**4745.** Pacheco-Flores, C.; Deloya, C.; Cortes-Genchi, P. (2003): Lista de nombres de insectos en lengua Tlapaneca de la "Region de la Montana", Guerrero, Mexico (Arthropoda: Insecta). *Folia Entomologica Mexicana* 42(3): 309-320. (in Spanish, with English summary). ["During the period between September 2000 and January 2001, a collection of insects was performed on herbaceous vegetation, shrubs and trees, in coffee plantations, excrement of different animals, ant detritus (*Atta mexicana* Smith, Hymenoptera: Formicidae), dead wood and public illumination; additionally, some people that was infested by ectoparasites was examined in the localities of Malinaltepec, Acatepec, Iliatenco, and Aseradero, at the "Mountain Region" of the State of Guerrero, Mexico. All the insects obtained were presented to some native people of the region asking their name in Tlapaneco language, the meaning of the name and their importance. By this method, a total of 41 names for the adults (Dyctioptera (1), Orthoptera (2), Hemiptera (2), Odonata (1), Diptera (3), Lepidoptera (1), Siphonaptera (1), Anoplura (1), Hymenoptera (15) and Coleoptera (14)), and only nine names for immature stages of Lepidoptera, Coleoptera and Anoplura, as used in Tlapaneco, were achieved. The results presented includes the Spanish common name, the Tlapaneco name, the meaning of the word, and the known importance for this people of type of each insect. Some species of Coleoptera Melolonthidae, Scarabaeidae and Passalidae, were taxonomically determined to specific level." (Authors)] Address: Deloya, Cuauhtemoc, Dept Entomol, Inst Ecol AC, Km 2-5 Carretera Antigua Coatepec 351, Apartado Po, Xalapa, Veracruz, 91070, Mexico. E-mail: deloyac@ecologia.edu.mx

**4746.** Petrulevicius, J.F.; Nel, A. (2003): Frenguelliidae, a new family of dragonflies from the earliest Eocene of Argentina (Insecta: Odonata): phylogenetic relationships within Odonata. *Journal of Natural History* 37 (24): 2909-2917. (in English). ["The new dragonfly fami-

ly Frenguelliidae based on *Frenguella patagonica* gen. nov., sp. nov., is erected from the earliest Eocene of Patagonia (Argentina). Its phylogenetic relationships within the Zygoptera and Epiproctophora (sensu Bechly, 1996) are discussed. The new family seems to be related to Sieblosiidae from the Oligo-Miocene of Eurasia; and both could pertain to the basal lineage of Epiproctophora. These attributions are not supported by the known stratigraphic data and could be explained by the incompleteness of the fossil record of Odonata, mainly in the Triassic." (Authors)] Address: Nel, A., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**4747.** Rasmussen, N.L.; Bidwell, J.R. (2003): Influence of fish introduction on the sex ratio and size of damselfly larvae of the *Enallagma* complex. *Proc. Okla. Acad. Sci.* 83: 100-101. [Verbatim: Ponds and wetlands are often stocked with fish as a way to improve their perceived recreational value. The influence of such stocking on resident invertebrates in these systems has not been extensively investigated, although fish predation could significantly change community structure. A previous laboratory study that examined the effects of sex on the behavior of larvae of a damselfly (*Ischnura verticalis*) indicated that male larvae spent more time moving and moved greater distances than did females which could result in differential susceptibility to capture. This could have serious implications for damselfly populations subjected to predation by introduced fish, since skewed sex ratios could severely impact population viability. The purpose of this study was to determine if damselfly larvae belonging to the *Enallagma* complex exhibit differential susceptibility to fish predation between males and females. Damselfly exuviae were sampled approximately every 48 h from mid-May to mid-September from a quarter-acre pond both before and after the addition of green sunfish (*Lepomis cyanellus*). A second quarter-acre pond that remained fishless was similarly sampled. Emergence structures constructed of window screen were placed in each pond and exuviae found on these screens were collected and sorted. For approximately every 4th sampling date, all exuviae of individuals belonging to the *Enallagma* complex were sexed and their head capsule width was measured. From these samples, it was determined that between 30 and 60 individuals had to be examined in order to get a sex ratio representative of the population. The average head capsule size of the damselfly larvae was reduced after the addition of fish, with a greater decrease apparent in female larvae. However, no significant difference in sex ratio was apparent. Laboratory studies will seek to more specifically characterize any sex-specific differences in susceptibility to predation that may exist in this particular genus. Results such as these may prove useful in the management of aquatic habitats, since the introduction of fish to a previously fishless system may reduce effective population sizes and threaten the viability of some damselfly populations.] Address: Rasmussen, N.L., Department of Zoology, Oklahoma State University, Stillwater, OK 74078

**4748.** Ren, D. (2003): A new hemeroscopid dragonfly from the Lower Cretaceous of Northeast China (Odonata: Hemeroscopidae). *Acta Entomologica Sinica* 46(5): 622-628. (in Chinese). ["[...] *Abrohmeroscopus mengi* gen. et sp. nov., of the family Hemeroscopidae Pritykina, 1977, from the Lower Cretaceous Jiufotang Formation, Liaoning Province, Northeastern China, is

described and illustrated. This new genus is rather similar to *Hemeroscopus Pritykina*, 1977, but differs from the latter in the following characters: (1) hindwing anal loop is smaller, only with 6-7 cells (plesiomorphy); (2) Rspl is absent (plesiomorphy); (3) the hindwing vein CuAa is curved and has five distinct posterior branches (plesiomorphy); (4) the forewing MP is not shortened, reaching the posterior wing margin slightly beyond the level of the nodus (plesiomorphy); (5) pterostigmata more distinctly braced (plesiomorphy); (6) the hindwing area between MP and CuAa is narrow, with only one row of cells near the discoidal triangle (plesiomorphy). This is the oldest fossil record of the Hemeroscopidae in China." (Authors)] Address: Department of Biology, Capital Normal University, Beijing, 100037, China. E-mail: rendongprof@yahoo.com.cn

**4749.** Ren, D.; Liu, J.-Y.; Cheng, X.-D. (2003): A new hemeroscopid dragonfly from the Lower Cretaceous of Northeast China (Odonata: Heteroscopidae). *Acta Entomologica Sinica* 46(5): 622-628. (in English with Chinese summary). ["A new genus and species of hemeroscopid dragonfly, *Abrohemeroscopus mengi* gen. et sp. nov., of the family Hemeroscopidae Pritykina, 1977, from the Lower Cretaceous Jiufotang Formation, Liaoning Province, Northeastern China, is described and illustrated. This new genus is rather similar to *Hemeroscopus Pritykina*, 1977, but differs from the latter in the following characters: (1) hindwing anal loop is smaller, only with 6-7 cells (plesiomorphy); (2) Rspl is absent (plesiomorphy); (3) the hindwing vein CuAa is curved and has five distinct posterior branches (plesiomorphy); (4) the forewing MP is not shortened, reaching the posterior wing margin slightly beyond the level of the nodus (plesiomorphy); (5) pterostigmata more distinctly braced (plesiomorphy); (6) the hindwing area between MP and CuAa is narrow, with only one row of cells near the discoidal triangle (plesiomorphy). This is the oldest fossil record of the Hemeroscopidae in China." (Authors)] Address: Ren, D., Dept Biol., Capital Normal Univ., Beijing-100037, P.R. China. E-mail: rendongprof@yahoo.com.cn

**4750.** Rose, J.S. (2003): Ecology of exotic dragonfly species in different native assemblages. *Ecological Society of America Annual Meeting* 88: 286-287. (in English). [Verbatim: To determine whether exotic species express the same ecology under different ecological contexts or whether these contexts alter their ecology, the ecological niches of dragonfly species were quantified in three bioregions: the Everglades of south Florida, the Lower Rio Grande Valley of south Texas, and the main islands of the Hawaiian archipelago. Florida and Texas each possess many more species of dragonflies than Hawai'i, and have many more types of predators and prey as well. Some dragonfly species are indigenous to all three regions, but most to one or two; a few species occur as nonnatives in two regions, or are native in one but have invaded another. Several species in Texas appear to use shaded and dry habitats more extensively than conspecifics in Florida. In Hawai'i neither indigenous nor exotic species appear to express wider niches than their conspecifics in Texas and Florida, nor is niche overlap among species in Hawai'i perceptibly lower. However, populations of some species do appear to express different ecological niches between two or three of these regions. Nonnative species occur predominantly in altered or artificial habitats in Florida and Hawai'i; Texas has only one invading

species, which occurs in apparently undisturbed habitat.] Address: Rose, J.S., Duke University, Durham, NC, USA

**4751.** Santharam, V. (2003): 4. Indian pond-herons *Ardeola grayii* feeding on dragonflies. *Journal Bombay Natural History Society* 100(1): 108. (in English). Address: Santharam, V., Rishi Valley Education Centre, Institute of Bird Studies and Natural History, Rishi Valley, Chittoor District, 517 352, Chittoor, AP, India

**4752.** Saux, C.; Simon, C.; Spicer, G.S. (2003): Phylogeny of the dragonfly and damselfly order Odonata as inferred by mitochondrial 12S ribosomal RNA sequences. *Annals of the Entomological Society of America* 96(6): 693-699. (in English). ["The phylogenetic relationships among members of the Odonates were inferred from mitochondrial DNA 12S ribosomal RNA sequence data. These data show support for a monophyletic Anisoptera suborder, which are consistent with previous phylogenetic work performed on the group. However, the Zygoptera are paraphyletic based on mitochondrial DNA evidence. In particular, the family Lestidae appears more closely related to the Anisoptera than the Zygoptera." (Authors)] Address: Saux, Corrie, San Francisco State University, Dept of Biology, 1600 Holloway Avenue, San Francisco, CA 94132, USA

**4753.** Schlüter, T.; Kohring, R.; Gregor, H.-J. (2003): Dragonflies preserved in transparent gypsum crystals from the Messinian (Upper Miocene) of Alba, northern Italy. *Acta tool crakov.* 46(Suppl.): 373-379. (in English). ["From the Upper Miocene (Messinian) of the Alba area in Piedmont, northern Italy, are fossil dragonflies (mainly larvae) described, which were preserved in transparent gypsum crystals. The specimens belong probably to a single species (*Oryctodiplax gypsorum*), but occur in various pre-imaginal stages. This individual-rich but species-poor palaeoentomofauna appears to be almost autochthonous in origin and may have developed under hypersalinar conditions in a lagoonal environment during the Messinian salinar event" (Authors)] Address: Kohring, R., Inst. Geowiss., FU-Berlin, Malteserstr. 74-10, Haus D, D-12249 Berlin, Germany. E-mail: palaeont@zedat.FU-Berlin.de

**4754.** Sherk, T.E., Rau, G.H.; Kraft, G.F. (2003): Emergence of Plecoptera from Findley Lake, Cascade Mountains, USA. *Research Update on Ephemeroptera & Plecoptera 2003*, E. Gaino (Ed.), University of Perugia, Perugia, Italy: 407-411. (in English). ["Plecoptera were collected in emergence traps on oligotrophic Findley Lake in the coniferous forest of the Cascade Mountains from 1972 to 1975. In 1974 most of the ice and snow cover did not thaw until July 31. *Suwallia pallidula* started to emerge before the entire lake had thawed. *Suwallia pallidula*, *Podmosta decepta*, *Sweltsa borealis* and *Setvena tibialis* emerged where the benthic accumulation of forest detritus was greatest. *Isoperla sordida* emerged from a pool below the lake outlet." (Authors) *Somatochlora albicincta*, *Aeshna palmata*, and *A. umbrosa* are listed as predators of Plecoptera. ([www.u-nipg.it/maystone/PDF%202001%20proc/SHERK%20ET%20AL.%20IJM%20proceedings.pdf](http://www.u-nipg.it/maystone/PDF%202001%20proc/SHERK%20ET%20AL.%20IJM%20proceedings.pdf))] Address: Sherk, T.E., P.O. Box 331, Branford, Connecticut 06405, USA.

**4755.** Singh, R.K.; Dhiman, R.C.; Singh, S. P. (2003): Laboratory studies on the predatory potential of dragon fly nymphs on mosquito larvae. *Journal of Com-*



municable Diseases: 96-101. (in English). ["Biocontrol potential of dragonfly nymph, *Brachythemis contaminata* against the larvae of *Anopheles stephensi*, *Culex quinquefasciatus* and *Aedes aegypti* was studied under laboratory conditions. It was found that dragonfly nymph had highest predation efficacy against *A. stephensi* followed by *C. quinquefasciatus* and *A. aegypti*. Feeding rate increased with decrease in prey size / stage. Analysis of data indicated that dragonfly nymphs have good predatory potential and can be used as a biological control agent for control of mosquito breeding." (Authors)] Address: Singh, R. K., Malaria Res. Ctr., ICMR, 22 Sham Nath Marg, Delhi, 110054, India

**4756.** Soares, C.M.; Hayashi, C.; Reidel, A. (2003): Predacao de pos-larvas de curimba (*Prochilodus lineatus*, Valenciennes, 1836) por larvas de Odonata (Pantala, Fabricius, 1798) em diferentes tamanhos. *Acta Scientiarum Biological Sciences* 25(1): 95-100. (in Portuguese, with English summary). ["Predation of *Prochilodus lineatus* (Valenciennes, 1836) post-larvae by dragonfly (Pantala, Fabricius, 1978) fry in different development phases. The aim of this experiment was to evaluate the predation of dragonfly (*Pantala* sp.) fry in different development phases by the *Prochilodus lineatus* post-larvae (Characiformes, Prochilodontidae). Fifty-four dragonfly fry were distributed among eight length groups (2.54, 3.89, 6.37, 9.67, 10.98, 12.81, 18.50 e 24.50 mm), then they were also distributed among 27 aquarium (1.0 L), with constant illumination by fluorescent lamps (40 watts), and two dragonfly fry of similar size were put in each experimental unit. The *P. lineatus* post-larvae (Lt: 6.20+/-0.22 mm and Wt: 0.91 mg). 15 *P. lineatus* post-larvae were distributed in each aquarium (18:00h), each three-hour-interval (21.00, 0.00, 3.00, 6.00, 9.00, 12.00, 15.00 and 18.00h), the live post-larvae were counted and the dead ones were replaced. The physical and chemical parameters pH, dissolved oxygen, electric conductivity and temperature was measured in the beginning and in the end of the experiment, the average values of these ones were 7.83+/-1.11, 6.57+/-1.23 mg/L, 212.71+/-3.93  $\mu$ S/cm and 27.19+/-0.27°C, respectively. A quadratic effect of the dragonfly fry size on the total number of *P. lineatus* post-larvae eaten with maximum point with dragonfly larvae of 24.46mm. was observed. And a decrease in the number of post larvae eaten in time of the experimental period was also observed. It may be concluded that there was an increase in the number of *P. lineatus* post-larvae eaten with a size increase of dragonfly fry." (Authors)] Address: Soares, C.M. Dept Biol. Programa Posgrad Ecol. Ambientes Aquaticos Cont, Univ. Estadual Maringa, Av Colombo 5790, BR-87020900, Maringa, Parana, Brazil. E-mail: cmssoares@uem.br

**4757.** Stein, K.J.; Mitchell, J.C.; Smith, E.P.; Waldon, J.L. (2003): Trophic level distribution of ephemeral pool insects: Uniformity among pools. *Journal of Freshwater Ecology* 18(4): 549-556. (in English). ["We collected aquatic insects from three types of ephemeral pools (grassland, road, and woodland) in attempt to determine the trophic structure and trophic level distribution of insect communities. Each specimen was assigned to one of several trophic levels including carnivore, detritivore, herbivore, or some combination of these. Trophic level proportions were then compared for all pool classes; six of seven trophic level proportions were the same (P<0.05: except herbivores, P=0.01) in the following order of occurrence: 1) carnivores, 2) camivo-

re/detritivores, 3) detritivores, 4) detritivore/herbivores, 5) herbivores, 6) herbivore/carnivores, and 7) herbivore/detritivores. Carnivores (64.1%) and carnivore/detritivores (13.6%) accounted for 77.7% of the total insects; these consisted of odonates, dytiscids, and notonectids (58.1%), with gerrids, belostomatids, nepids, and naucorids, comprising an additional 19%. The near uniform distribution of trophic level proportion rankings found among pools regardless of surrounding habitat was independent of pool size and longevity and indicated baseline similarity. Although ephemeral pools are known for being transitory, with respect to trophic levels, they may be more ecologically stable than is implied by their name." (Authors)] Address: Stein, K.J., 20201 Lorain Rd., Suite 817, Fairview Park, OH, 44126, USA. E-mail: steinkj@earthlink.net

**4758.** Sukhacheva, G.A.; Krukova, N.A.; Glupov, V.V. (2003): On the roles of morphological and biochemical criteria in species identification: An example of dragonfly larvae of the genus *Aeshna*. *Biology Bulletin of the Russian Academy of Sciences* 30(1) : 63-68. (in English). ["Dragonflies belong to the group of organisms with numerous well-differentiated species-specific characters at the adult stage, on the one hand, and a significantly smaller number or even the absence of such characters at the early ontogenetic stages. An example of the genus *Aeshna* is used to show difficulties in revealing morphological and biochemical characters allowing identification of larval dragonflies belonging to closely related species of the family. Distinct morphometric characters can be found only in late-instar larvae. The presence of species-specific proteins in the homogenates of thoracic muscles provides the possibility of using biochemical tests for species identification of larvae. Infestation by parasites has no effects on the biochemical parameters studied. Species identification of the early-instar dragonfly larvae is still problematic." (Authors)] Address: Institute of Animal Systematics and Ecology, Siberian Division, Russian Academy of Sciences, ul. Frunze 11, Novosibirsk, 630091 Russia. E-mail: e-mail: mi@eco.nsc.ru

**4759.** Sutton, P.G. (2003): The changing fortunes of British Odonata. *Bulletin of the Amateur Entomologists' Society* 62: 52-71. (in English). [Very sophisticated compilation on British Odonata with special emphasis on the status of the species.] Address: Sutton, P.G., 2 Fir Tree Close, Flitwick Beds, MK45 1NZ, UK

**4760.** Takahara, T.; Kohmatsu, Y.; Maruyama, A.; Yamaoka, R. (2003): Effects of fish chemical cues on tadpole survival. *Ecological Research* 18(6): 793-796. (in English). ["The indirect effects of goldfish chemical cues on tadpole survival and predation by other predators (e.g. dragonfly nymph and crayfish) were tested in a field experiment. Fish chemical cues were found to affect tadpole survival when dragonfly nymphs were present. In contrast, this indirect effect was not detected in the presence of crayfish. The results from the present study found that predators, even without predation, can affect the predatory efficiency of other predators, and that the degree of such an indirect effect may differ among the foraging strategies of predators." (Authors)] Address: Takahara, T., Department of Applied Biology, Faculty of Textile Science, Kyoto Institute of Technology, Sakyo-ku, Kyoto, 606-8585, Japan. E-mail: taka02@ipc.kit.ac.jp

**4761.** Thaler, K. (2003): Partielle Inventur der Fauna von Nordtirol: Niedere Pterygota (Insecta: Palaeoptera, Paurometabola, Paraneoptera (p.p.)) (Fragmenta Faunistica Tirolensia - XVI). Linzer Biologische Beiträge 35 (2): 785-800. (in German, with English summary). ["Preliminary overview of the fauna of North Tyrol: Lower pterygote insects (Palaeoptera, Paurometabola, Paraneoptera (p.p.)) (Fragmenta Faunistica Tirolensia - XVI). The state of knowledge about "lower pterygote insects" of N. Tyrol is given from the relevant literature, together with some species records: Ephemeroptera (species number S=45), Odonata (S=60), Plecoptera (S ca. 71), Saltatoria (S ca. 65), Dermaptera (S=6), Blattariae (S=5), Psocoptera (S ca. 45), Thysanoptera (S ca. 54); in Phthiraptera only Anoplura parasitizing small mammals have been investigated." (Author)] Address: Thaler, K., Inst. Zool., Limnol. Univ., Techniker Str 25, A-6020, Innsbruck, Austria.

**4762.** Tolonen, K.T.; Hämäläinen, H.; Holopainen, I.J.; Mikkonen, K.; Karjalainen, J. (2003): Body size and substrate association of littoral insects in relation to vegetation structure. *Hydrobiologia* 499: 179-190. (in English). ["Variation in substrate association types and maximum size of aquatic insects were studied in a vegetated littoral zone of three lake basins. The basins differed from each other in trophic status, biomass of benthivorous fish, and abundance of macrophytes. Four types of substrate association - swimmers, crawlers, semisessile and burrowers, respectively - were assumed to represent decreasing vulnerability to fish predators. Large-sized species were also hypothesised to be more vulnerable to fish predators. The distributions of species traits were examined in relation to vegetation density. Inferring from "predation hypothesis" opposite selection pressures on the species traits were expected along the vegetation density. Dense macrophyte beds were thought to be dominated by invertebrate predators and open water by fish predators, since the predation efficiency of fish decreases in complex environments. In the case of invertebrate predator domination, large size and higher activity should be favoured traits among the prey species. Distribution patterns of modes of the two studied traits were explored separately for predatory and non-predatory insects. As expected, swimmers and large-sized crawlers were characteristic of the insect assemblages of dense macrophyte beds. The densities of Odonata, Corixidae, Dytiscidae, Ephemeroptera and Sialidae were higher among macrophytes than in open water, where these insect taxa were possibly depleted by fish. On the other hand, the small-sized and fairly immobile Chironomidae were the most abundant group in open water. These results support the existence of a predator transition zone among littoral vegetation, ranging from domination of invertebrate predation among the dense beds to that of fish predation in open water." (Authors)] Address: Tolonen, K.T., Dept Ecol., Karelian Institute, University of Joensuu, FIN-80101, P.O. Box 111, Joensuu, Finland. E-mail: ktolonen@cc.joensuu.fi

**4763.** Tryjanowski, P.; Karg, M.K.; Karg, J. (2003): Diet composition and prey choice by the red-backed shrike *Lanius collurio* in western Poland. *Belgian Journal of Zoology* 133(2): 157-162. (in English). ["We investigated diet and prey choice in a population of *L. collurio* living in an intensively used farmland (W Poland). Diet was estimated by three methods: collars in nestlings, and pellets and prey remains in larders. Insects, mainly Coleoptera, Hymenoptera and Orthoptera con-

stituted 97.7% of the diet, with a total of 4392 prey items identified from all samples. However, during rainy and cold days vertebrates formed an important component (up to 26.5% by biomass) of the food of the red-backed shrike. Food preference - expressed in relation to availability - was estimated for five arthropod taxa. Hymenoptera, Orthoptera and Coleoptera were more preferred prey. Heteroptera and "other invertebrates", included mainly flies, dragonflies and spiders were less preferred. For rational management of the red-backed shrike in farmland, we suggest that places with available prey (in appropriate densities), small vegetation patches and perches suited to low-expenditure hunting strategy, should be preserved, as well as established." (Authors)] Address: Tryjanowski, P., Dept of Avian Biology & Ecology, Adam Mickiewicz University, Fredry 10, PL-61-701, Poznań, Poland. E-mail: ptasiek@main.amu.edu.pl

**4764.** Utter, K.B.; Skokan, R.D.; Rivers, D.; Quinn, P.K.; Potter, J.D.; Peter, C.R.; Lund, E.A.; Knox, J.L.; Knobelmann, J.I.; Haney, J.F.; Carlson, S.C.; Bradt, S.R.; Barry, L.M. (2003): Aquatic biosurvey of the Lovell River on UNH land. *UNH Center for Freshwater Biology Research* 5(1): 1-13. (in English). ["We assessed the physical, chemical and biological conditions at two sites along the Lovell River on University of New Hampshire (UNH) - owned conservation land.[...] Macroinvertebrate bio-indices indicated either excellent water quality with no apparent organic pollution or good water quality with possible slight organic pollution." Cordulegaster is the only odonate taxa mentioned and included into the assessing scheme.] Address: Utter, Kathleen B., Center for Freshwater Biology, Dept. of Zoology, University of New Hampshire, Durham, 03824

**4765.** van Huis, A. (2003): Insects as food in sub-Saharan Africa. *Insect Science & its Application* 23(3): 163-185. (in English). ["Data on insects as food in sub-Saharan Africa were collected by reviewing the literature and conducting interviews in a number of African countries. A list of about 250 edible insect species from Africa was compiled. Of these, 78 percent are Lepidoptera (30%), Orthoptera (29%) and Coleoptera (19%), and 22 percent Isoptera, Homoptera, Hymenoptera, Heteroptera, Diptera and Odonata. Insects are rich in protein, vitamins and minerals, and a good source of iron and B-vitamins. Examples of insects being toxic are given, but often traditional methods are used to remove the poison. Whether or not insects are eaten depends not only on taste and nutritional value, but also on customs, ethnic preferences or prohibitions. The harvesting of insects is often done by women. The way of collecting depends on insects' behaviour. For example, inactivity at low temperatures enables easy catching of locusts and grasshoppers in the morning. Night flyers (termites, some grasshoppers) can be lured into traps by light and some insects like palm weevils can be attracted to artificially created breeding sites. Some species (crickets, cicadas) can be located by the sound they make. A number of tools are used to facilitate capturing such as glue, sticks, nets and baskets. Because most insects are only seasonally available, preservation by drying is often practised. Some examples of how to prepare them as food are given from important insect groups. To manage insects in the interest of food security more attention should be given to environmentally sustainable harvesting methods. They should be made better available throughout the year by developing im-

proved conservation methods or by farming this minilivestock. Considering the economic, nutritional and ecological advantages of this traditional food source, its promotion deserves more attention both from national governments and assistance programmes." (Authors)] Address: Huis, A. van, Laboratory of Entomology, Wageningen University, 6700 EH, P.O. Box 8031, Wageningen, Netherlands. E-mail: arnold@vanhuis.com

**4766.** Warkentin, I.G.; Fisher, A.L.; Roberts, S.E. (2003): Response to clear-cut logging by northern waterthrushes. *Can. J. For. Res.* 33: 755-762. (in English, with French summary). [Examination of the distribution and foraging behaviour of northern waterthrushes (*Seiurus noveboracensis*) in recently harvested and intact landscapes of Newfoundland, Canada. Available food sources - including Odonata have been investigated on the family level.] Address: Warkentin, G.; Environmental Science Biology, Memorial University of Newfoundland, Corner Brook, NL A2H 6P9, Canada. S.P. Flemming, Gros Morne National Park of Canada, Rocky Harbour, NL A0K 4N0, Canada. E-mail: iwarkent@swgc.mun.ca

**4767.** Whiting, M.F.; Bradler, S.; Maxwell, T. (2003): Loss and recovery of wings in stick insects. *Nature* 421: 264-267. (in English). ["The evolution of wings was the central adaptation allowing insects to escape predators, exploit scattered resources, and disperse into new niches, resulting in radiations into vast numbers of species. Despite the presumed evolutionary advantages associated with full-sized wings (macroptery), nearly all pterygote (winged) orders have many partially winged (brachypterous) or wingless (apterous) lineages, and some entire orders are secondarily wingless (for example, fleas, lice, grylloblattids and mantophasmatids), with about 5% of extant pterygote species being flightless. Thousands of independent transitions from a winged form to winglessness have occurred during the course of insect evolution; however, an evolutionary reversal from a flightless to a volant form has never been demonstrated clearly for any pterygote lineage. Such a reversal is considered highly unlikely because complex interactions between nerves, muscles, sclerites and wing foils are required to accommodate flight. Here we show that stick insects (order Phasmatodea) diversified as wingless insects and that wings were derived secondarily, perhaps on many occasions. These results suggest that wing developmental pathways are conserved in wingless phasmids, and that reevolution of wings has had an unrecognized role in insect diversification." (Authors) *Argia vivida* and *Ophiogomphus severus* have been used as outgroup species for the phylogenetic study of the Phasmatodea.] Address: Whiting, M.F., Department of Integrative Biology, Brigham Young University, Provo, Utah, 84602, USA

**4768.** Wishart, M (2003): A Comparative Phylogeographic Approach Toward Defining Functional Units for the Conservation of Biodiversity in Lotic Ecosystems. Thesis, Australian School of Environmental Studies, Griffith University: XVII, 165 pp. (in English). ["The conservation of lotic ecosystems has historically focused on maintaining the structural properties and processes of river systems, considered as surrogates for the protection of biological diversity. However, the geological structure of the catchment unit and the hierarchical, longitudinal nature of the rivers that drain them impose a number of potential barriers to dispersal. This creates a mosaic of aquatic islands within a terrestrial

landscape. As such the protection of biodiversity and biological processes requires considerations that extend beyond the catchment unit. Understanding the extent to which barriers limit the movement of individuals is important in developing an integrated approach toward conservation of river systems. It is also important in understanding the role of dispersal in the process of species formation and population structure. While catchment units represent the logical social, economic and often political scale upon which to manage water resources they are increasingly being defined as the appropriate functional unit for the conservation and management of freshwater ecosystems. The aim was to determine the extent to which catchment units represent the appropriate scale for the conservation of lotic biodiversity. This was done by examining the effect of catchment units on the distribution of genetic variation and population structure in four aquatic taxa among streams in the south-western Cape, South Africa. All four taxa are part of the ancient paleoendemic Gondwanaland fauna characteristic of the Cape region and reflect relative differences in dispersal. The taxa were the freshwater fish, *Galaxias zebratus* (Teleostei: Galaxiidae); the net-winged midge *Elporia barnardi* (Diptera: Blephariceridae), which given its specialised morphology and specific habitat requirements has a very limited potential for dispersal; the stonefly *Aphanicercia capensis* (Plecoptera: Notonemouridae), a species with intermediate dispersal; and the widely distributed dragonfly *Aeshna subpupillata*, with the potential for wide dispersal. Allozyme electrophoresis and direct sequencing of a fragment of the cytochrome oxidase subunit 1 (COI) region of the mitochondrial DNA were used to examine genetic structuring within and among streams in two discontinuous mountain ranges. F statistics were calculated from allele frequencies derived from allozyme electrophoresis as a measure of population subdivision and population trees constructed. Nucleotide diversity and levels of divergence were calculated among mtDNA sequence data. Genetic distance, and the relationship among haplotypes, was examined using neighbour-joining trees and an analysis of molecular variance in order to determine the effect of catchment units on dispersal, the distribution of genetic variation and population structure. Low levels of allozyme variability were observed in all four taxa, with no variable loci resolved for the stonefly *A. capensis*. Significant population structure among all sites in the two ranges in *G. zebratus*, *E. barnardi* and *A. subpupillata* highlights the effect of discontinuous habitat ( $\sim 0.70$ ,  $0.39 \pm 0.10$  and  $0.03 \pm 0.01$  respectively), while  $F_{ST}$  values among streams on Table Mountain reflect differences in the dispersal potential of the three species ( $\sim 0.70$ ,  $0.23 \pm 0.04$  and  $0$  respectively). Population trees for the Cape galaxiid *G. zebratus* and the net-winged midge *E. barnardi* revealed two highly divergent groups (Genetic Identity =  $0.41$  and  $0.73$  respectively). Both reflect poor dispersal potential, with the pattern among *G. zebratus* reflecting a pattern of connectivity between ancient drainages during periods of lower sea levels. Mitochondrial DNA data obtained from the COI region similarly revealed two highly divergent clades in populations of the Cape galaxiid *G. zebratus* ( $\sim 7\%$ ), the netwinged midge *E. barnardi* ( $\sim 5\%$ ) and the stonefly *A. capensis* ( $\sim 7\%$ ). Additional data derived from the cytochrome b region for *G. zebratus* revealed five highly divergent clades from across the species range (from  $7$  to  $17\%$ ). Congruence between monophyletic clades and catchment units in *G. zebratus* and *E. barnardi*, along with an analysis of the



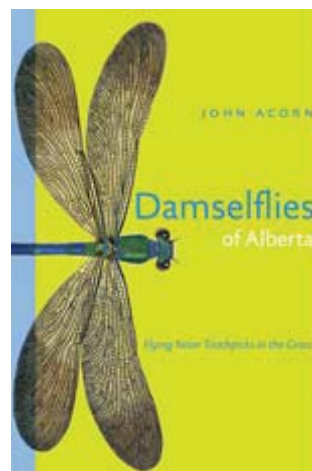
distribution of genetic variation, suggest movement is confined to within the catchment. In contrast, the distribution of haplotypes and genetic variation in *A. capensis* and *A. subpupillata* suggests movement beyond the catchment boundary. Similarities in the degree of divergence in *A. capensis* and *E. barnardi* indicate a vicariant event around 3-4 MYBP, coinciding with the erosion of the land bridge between Table Mountain and the Tottentot's Holland. Divergence among *G. zebratus*, *A. capensis* and *E. barnardi* suggests the presence of more than a single species in all three taxa. The distribution and patterns of genetic variation reflected among these taxa show general congruence with dispersal potential, thus having two important implications for conservation practices in lotic systems. The monophyletic nature of some taxa confirm the suitability of catchment based initiatives, but also suggest that current water resources developments, such as inter-basin water transfers, have the potential to undermine the evolutionary processes important in species formation. By providing a conduit for the transfer of individuals between geologically separated catchments and historically isolated populations they also provide an avenue for gene flow between genetically discrete populations, thus undermining the generation of biodiversity. For other more mobile species, the distribution of genetic variation and pattern of population sub-division indicates the effective population covers a wide geographic range such that catchment units may not represent the appropriate scale for conservation of the aquatic fauna. Results for *A. subpupillata* and *A. capensis* suggest that efforts aimed at conserving the fauna of riverine ecosystems should move beyond individual catchment considerations to incorporate reserve designs and management strategies that cover and incorporate a number of adjacent catchments. Such areas or management plans should be replicated and spread through identified phylogeographic regions. In conclusion, it is important to note that despite efforts to select taxonomically well resolved taxa, the results have revealed a number of discrete, highly divergent, genetic units in the Cape galaxiid *G. zebratus*, the net-winged midge *E. barnardi* and the stonefly *A. capensis*. The monophyletic nature and degree of sequence divergence among these units reflect populations that have experienced long periods of isolation. The levels of sequence divergence are comparable to those observed among recognized species, including the highest levels of mtDNA divergence ever recorded for an intra-specific comparison within any fish species. The results contribute to an increasing body of knowledge that recognizes the aquatic fauna of the Cape fynbos region as having a uniquely high degree of endemism, containing a large amount of as yet undescribed variation at the morphological and genetic level." (Author) This thesis is available at: <http://www4.gu.edu.au:8080/adt-root/public/adt-QGU20031125.103610/> Address: not stated

**4769.** Yanoviak, S.P.; Lounibos, L.P.; Weaver, S.C.; Tesh, R.B. (2003): Diversity of phytotelm fauna along a deforestation gradient in the Peruvian Amazon. Ecological Society of America Annual Meeting Abstracts. 88: 368. (in English). [Verbatim: Deforestation potentially alters the distribution and abundance of phytotelmata and their resident fauna. We surveyed phytotelm habitats along a deforestation gradient near Iquitos, Peru, as part of a larger study of arbovirus ecology. Mean phytotelm density was greater in cultivated areas ("chacra";  $174 \pm 33$  SD per hectare) than in secondary forest

("purma";  $28 \pm 36$ ) and primary forest ("bosque";  $25 \pm 17$ ). Fallen leaves and plant axils were the most abundant microhabitats present at all sites. Half (47%) of the colonizable microhabitats contained macroinvertebrates and mosquitoes were the most abundant occupants. In addition to the microhabitat survey, replicated phytotelm analogs (water-filled bamboo sections) were placed along the gradient and destructively sampled every two weeks. Mean species richness (ca. 3 per bamboo) and abundance (ca. 50) were similar among chacra, purma and bosque. *Trichoprosopon digitatum* was the most abundant macroinvertebrate in the bamboo sections across all sites. However, species composition of top predators differed, with *Toxorhynchites* spp. occurring more often in chacra and odonates exclusively inhabiting bosque. These differences may have cascading effects on the abundance and composition of mosquito prey along the deforestation gradient.] Address: Yanoviak, S.P., Florida Medical Entomology Lab, University of Florida, Vero Beach, FL, USA.

**4770.** Zhou, C.-f.; Zhou, K.-y. (2003): Status of phylogenetic research on the Palaeoptera (Insecta, Pterygota). *Acta Zootaxonomica Sinica* 28(2): 192-195. (in Chinese, with English summary). ["The phylogenetic position of the Palaeoptera in the Hexapoda and the relationship of this group with the Neoptera has been debated for a long time. There are three main point of view on this issue: Palaeoptera (= Ephemeroptera + Odonata) + Neoptera, Ephemeroptera + (Odonata + Neoptera), or Odonata + (Ephemeroptera + Neoptera). The first formula is supported by morphological, fossil and some molecular evidence. The second depends more on morphological characters, while the last is based on the least evidence. Finding more insects, discovering better fossils, and sequencing more genes and mitochondrial genomes may resolve this long debate." (Authors)] Address: Zhou C.-F., College of Life Sciences, Inst. of Genetic Resources, Nanjing Normal Univ., Nanjing, 210097, China. E-mail: cfzhou@eyou.com

## 2004



**4771.** Acorn, J. (2004): *Damselflies of Alberta. Flying Neon Toothpicks in the Grass.* Univ. of Alberta Press. ISBN 0-88864-419-1. 140 pp. (in English). [J. Acorn describes the 22 species that are native to the Canadian province Alberta. Exhaustively researched, yet written in an accessible, personal style, the author's enthusiasm for these 'flying neon toothpicks' is compelling. More than a field guide, this is a passionate investigation into one of nature's winged marvels of the wetlands. This fascinating book can be ordered at [www.uap.ualberta.ca/UAP.asp?lid=41&bookid=512](http://www.uap.ualberta.ca/UAP.asp?lid=41&bookid=512)] Address: University of Alberta Press, Ring House 2, Edmonton, AB, Canada, T6G 2E1

**4772.** Aguirre-Leon, G.; Aquino-Cruz, O. (2004): Hábitos alimentarios de *Kinosternon herrerai* Stejneger 1925 (Testudines: Kinosternidae) en el Centro de Veracruz, Mexico. *Acta Zoológica Mexicana* (n.s.) 20(3): 83-98. (in Spanish, with English summary). ["The feeding habits of Herrera's mud turtle (*Kinosternon herrerai*) were studied from October 1999 through September 2000 in the southern limits of its range, in streams near Xalapa, Veracruz. Turtles were captured by hand and using baited traps, and stomach contents were flushed with water from 48 adults. Frequency of occurrence, numeric frequency, and volume percentage of 21 food items found by examination of stomach contents showed that this turtle primarily consumed decapod crustaceans (*Procambarus* sp.), animal material, plant material, adult anurans (*Eleutherodactylus* sp. *Rana* sp., and *Bufo marinus*), *Ficus* sp. fruits, dragonfly larvae, and anuran tadpoles. These turtles are omnivorous, but ingested a higher proportion of animal material than plant (females 92% vs. 52%; males 85.7% vs. 52.4%). *Kinosternon herrerai* is a generalist feeder throughout all seasons showing an opportunistic response in the exploitation of some food items such as anuran eggs. Trophic diversity of both sexes varied among seasons (Herrera's diversity index: 2.77 to 16.65 for females, and 3.3 to 15.24 for males), yet females showed some seasonal diet specialization during summer, and males during spring and winter, when trophic diversity values were lower for each sex. Diet similarity between males and females were measured using the simplified Morisita index was higher in summer and winter (0.67 and 0.66) compared to spring and fall (0.60 and 0.55), suggesting some seasonal resource partitioning takes place between males and females in this species." (Authors) (<http://www.ecologia.edu.mx/azm/documentos/203/F-Aguirre.pdf>) Address: Aguirre-León, G., Instituto de Ecología, A.C. Departamento de Biodiversidad y Ecología Animal. Km 2.5 Carretera Antigua a Coatepec No. 351, Congregación El Haya 91070, Xalapa, Veracruz, MÉXICO [aguirreg@ecologia.edu.mx](mailto:aguirreg@ecologia.edu.mx)

**4773.** Anonymus (2004): New Conservation Status for the Dragonflies of Canada. *The Reeder* 12(3): 5. (in English). [Verbatim: The Manitoba Conservation Data Centre (MBCDC) gathers and stores information on Manitoba's plants and animals. It is part of a network that maintains information about the diversity of species in North and South America. The MBCDC has developed lists of plants, animals, and plant communities found in Manitoba. It assigns each species or community a conservation status rank. This is based on how rare the species or community is in Manitoba. It then collects detailed information on where each is found. Recently, the National General Status Working Group (NGSWG) produced new ranks for dragonflies and damselflies in Canada. The new report (Wild Species 2005) includes ranks for the same species reviewed in Wild Species 2000. Approximately 5,000 species have been added. This includes vascular plants, freshwater mussels, crayfish, tiger beetles, and marine fishes. An attempt is being made to include more invertebrates in the list. Manitoba Conservation has been helping the NGSWG prepare their Wild Species reports. The NGSWG Web site ([www.wildspecies.ca](http://www.wildspecies.ca)) allows you to view and search the general status ranks for each province and territory and for Canada as a whole. The general status of each of the 209 species of dragonflies and damselflies (odonates) in Canada was included in the new report. Over the past few decades, hundreds of volunteers have been studying, collecting and identifying species

been studying, collecting and identifying species of dragonflies and damselflies. Results of their work were used in these assessments. This illustrates how dedicated naturalists can make a significant contribution to increase the existing knowledge about a group of species. It is noteworthy that this assessment of Canada's odonata also engaged experts from other countries - making it an international conservation effort. The dragonflies and the damselflies together make up the order odonata. The odonata are ancient and distinctive insects. They have many primitive insect features, such as unspecialized chewing mouthparts. They also have specialized body parts reflecting their way of hunting and feeding. For example, their eyes have up to 25,000 lenses that give them nearly 360-degree vision. While they beat their wings only up to 30 times per second (other insects can beat their wings more than 1,000 times per second), they have been clocked flying at more than 50 kilometres per hour and can make a 90-degree turn at full speed.] Address: Dr. James R. Duncan, Manager, Biodiversity Conservation Section, Wildlife and Ecosystem Protection Branch, Canada. E-mail: [jduncan@gov.mb.ca](mailto:jduncan@gov.mb.ca)

**4774.** Bass, D. (2004): Diurnal stream drift of benthic macroinvertebrates on the small Oceanic Island of Dominica, West Indies. *Caribbean Journal of Science* 40 (2): 245-252. (in English). ["An investigation was conducted to determine if invertebrate drift occurred in streams of small oceanic islands. Two nets were placed 14-15 May 2001 in midstream of the Check Hall River on the Caribbean island of Dominica. Each net was checked and its contents were emptied every three hours for a 24-hour period. Results of this study indicate that only some invertebrates are undergoing drift. Although the number of taxa present in those samples did not vary much during the 24-hour study, the number of individuals found in the samples collected during darkness was approximately four times higher than in the daylight samples, indicating diel periodicity. Common taxa captured in drift samples included Baetidae, Leptohyphes, Smicridea cariba, and Simulium. Because freshwater benthic populations on small oceanic islands are difficult to establish, they often occur in low numbers, possibly resulting in little competition for resources. In this situation, drift is greatly reduced because it is not necessary to seek other resources. The production compensation model suggests that organisms occurring in the drift represent the excess production of that population. Alternatively, tropical streams are frequently low in nutrients and unable to support large populations. This may lead to increased competition for the limited resources and that may cause invertebrates to drift to locate new resources. Losses of invertebrates through downstream drift may be balanced via upstream movement by others in the population. Further studies addressing these hypotheses are necessary to completely explain the invertebrate drift observed in this stream on Dominica." (Author) The samples include *Argia concinna*.] Address: Biology Department, University of Central Oklahoma, Edmond, Oklahoma, USA 73034. E-mail: [dbass@ucok.edu](mailto:dbass@ucok.edu)

**4775.** Berra, E.; Forcella, M.; Giacchini, R.; Marziali, L.; Rossaro, B.; Parenti, P. (2004): Evaluation of enzyme biomarkers in freshwater invertebrates from Taro and Ticino river, Italy. *Annales de Limnologie* 40(3): 169-180. (in English). ["Benthic macroinvertebrates are an essential component of freshwater environments.

The ecotoxicological risk of benthic communities, estimated through the assay of biochemical markers, can be used as an early warning signal for environment alterations. In this work the activities of a number of enzymes, regarded as potential biomarker of exposure to pollutants (catalase, acetylcholinesterase, glutathione-S-transferase) was determined in homogenates of whole organisms. Specimens were collected in the rivers Taro and Ticino, northern Italy, in stony bottom reaches in five and three stations respectively. The orders of aquatic Insects Diptera, Plecoptera, Odonata, Ephemeroptera and Trichoptera, the Crustacea Amphipoda, and Annelida Oligochaeta were examined. Additional enzymes, such as NADP-dependent malate dehydrogenase, isocitric dehydrogenase, glucose-6-phosphate dehydrogenase, alcohol dehydrogenase, and lactate dehydrogenase were considered in the study. Results emphasize significant differences among taxa concerning the specific activity of most enzymes." (Authors)] Address: Parenti, P., Dept Environm Sci, Univ Milan, Piazza Sci 1, I-20126, Milan, Italy. E-mail: paolo.parenti@unimib.it

**4776.** Biggs, K. (2004): Common dragonflies of the Southwest. Azalea Creek Publishing, Sebastopol: 160 pp. (in English). [121 common odonate species represented in the six southwestern US states north of Mexico are pictured and briefly described. In addition brief notes on habitat, phenology, and distribution are given. A checklist includes all known regional species.] Address: Azalea Creek Publishing, 308 Bloomfield Rd., Sebastopol, CA 95472. azalea@sonic.net

**4777.** Bönsel, A. (2004): Hinweise zur Verbreitung von *Epitheca bimaculata* CHARPENTIER, 1825 (Odonata) und zu ökologischen Habitatparametern in der nordostdeutschen Jungmoränenlandschaft. Entomologische Nachrichten und Berichte 48(3/4): 191-198. (in German, with English summary). ["In 2000 to 2003, 86 lakes of different sizes in the young moraine landscape of north-eastern Germany were checked for occurrences of *E. bimaculata*. 32 waters proved to be inhabited by the species, which was autochthonous in 28 of the water bodies. Autochthonous occurrence of 19 additional species of dragonflies in the same lakes was proven. The most common species was *Brachytron pratense*, occurring in 94% of the waters, followed by *Cordulia aenea*, *Coenagrion pulchellum*, *Erythromma najas*, and *Orthetrum cancellatum*, each occurring in more than 50% of the waters. Waters with an average water surface of 9,62 ha and an average depth of 2,92 m were preferred. 89% of the waters were not thermally stratified, 46% were polytrophic, 40% eutrophic and 14% mesotrophic. In all waters submerged structures were present, in 82% of the waters consisting of the stalks of *Nuphar lutea* and *Nymphaea alba*. Calcium contents was strikingly high in all waters, with an average content of 68,79 mg/l. In the study area, negative influences such as destruction of submerged vegetation caused by air-born acids were buffered by Ca-, Mg- and K-ions in historical as well as in recent times. Therefore, the young moraine landscape of northeastern Germany can also in future be regarded as the recent core area of *Epitheca bimaculata*." (Author)] Address: Bönsel, A., Vasenbusch 15, D-18337 Gresenhorst, Germany. E-mail: andre.boensel@gmx.de

**4778.** Brenden, T.; Murphy, B.R. (2004): Experimental assessment of age-0 largemouth bass and juvenile

bluegill competition in a small impoundment in Virginia. North American Journal of Fisheries Management 24(3): 1058-1070. (in English). ["Previous research has found that early ontogenetic stages of largemouth bass *Micropterus salmoides* and bluegills *Lepomis macrochirus* may compete for food resources in small impoundments in northern-latitudes. We experimentally assessed whether competition also might occur in a southern-latitude system by stocking fish allopatrically and sympatrically in 1.0-m<sup>3</sup> cages within a small impoundment in Virginia and monitoring fish growth and diets. Although growth was not significantly different between bluegills stocked with and without largemouth bass, largemouth bass grew significantly larger when stocked alone than when stocked with bluegills. Although bluegills maintained similar diets in terms of sizes, numbers, and types of items consumed, largemouth bass stocked alone consumed fewer but larger items than those stocked with bluegills. Further, largemouth bass consumed higher volumetric proportions of Diptera larvae and Odonata nymphs when stocked alone than when stocked with bluegills. Of these two items, only Diptera larvae constituted a large portion of bluegill diets. Competition between largemouth bass and bluegills apparently occurs in both southern- and northern-latitude small impoundments. Competition with bluegills may result in a competitive juvenile bottleneck for largemouth bass in regions where overwinter mortality is size related, which could affect management (i.e., stocking, establishing harvest regulations) of small-impoundment fisheries." (Authors)] Address: Brenden, T., Sch. Nat. Resources & Environm., Univ Michigan, 212 Museum Annex, Ann Arbor, MI, 48109, USA. E-mail: tbrenden@umich.edu

**4779.** Brockhaus, T. (2004): Buchankündigung: Libellenfauna Sachsen. insecta 9: 34. (in German). [Announcement for the new book on the odonate fauna of Saxonia, Germany scheduled to be released early in 2005.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**4780.** Brockhaus, T. (2004): Interspezifische Konkurrenz zwischen *Sympetrum fonscolombii* und *Orthetrum cancellatum* in Mitteleuropa? (Odonata: Libellulidae). *Libellula* 23(1-2): 77-86. (in German, with English summary). ["In 2003, both spp. were observed as common at the pond 'Beuthenteich' (district Stollberg/Erzgebirge, Saxony, Germany). Apart from imaginal records, also larvae of both spp. were sampled. The head widths of 80 larvae of *O. cancellatum* were measured. For seven larvae of *S. fonscolombii* the total length, the head widths and the number of abdominal segments covered by the wing cases were determined. A larva of *S. fonscolombii*, found on 31 August 2003, was damaged partially by predation. The developmental cycles of both species are discussed under the aspect of interspecific competition of the larvae. It is suggested that in 2003 the sp. had three imaginal and two larval generations. However, one can also suggest a retarded development of *S. fonscolombii* because of the presence and the predatory or competitive effect of larger *O. cancellatum* larvae in higher densities." (Author)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**4781.** Brodin, T.; Johansson, F. (2004): Conflicting selection pressures on the growth/predation risk trade-off in a damselfly. *Ecology* 85(11): 2927-2932. (in Eng-



lish). ["Activity is an important behavioral trait that in most animals mediates a trade-off between obtaining food for growth and avoiding predation. Active individuals usually experience a higher encounter rate with food items and predators and, as a consequence, grow faster and suffer higher predation pressure than less active individuals. We investigated how predator-induced mortality and growth of the damselfly *Coenagrion hastulatum* depend on activity at the level of the genotype. Larvae from six different *C. hastulatum* families were reared in two different predator treatments: predator present or absent. Families differed in activity, and active families grew to a significantly larger size than less-active families. Within families there was a plastic response to predators. Larvae reared without predators were more active and grew larger than larvae reared with a non-lethal predator. In the presence of a lethal predator the active families experienced higher mortality than the less active families. The results illustrate that the growth/predation-risk trade-off was mediated by activity and clearly show a cost of antipredator behavior. They also suggest that variation in activity level might be genetically regulated and could explain why *C. hastulatum* are abundant in aquatic systems both with and without potential predators." (Authors)] Address: Brodin, T., Dept Ecol. & Environm. Sci., Umea Univ., S-90 187 Umea, Sweden. E-mail: tomas.brodin@eg.umu.se

**4782.** bsb (2004): Die Libellen und ihr Maler. Der Bund 22. Dez. 2004: 15. (in German). [Newspaper report on the exhibition of the work of Paul André Robert in Biel, Switzerland] Address: [http://194.209.226.170/pdfarchiv/bund/2004/12/22/30015Kultur20\\_0412221.pdf](http://194.209.226.170/pdfarchiv/bund/2004/12/22/30015Kultur20_0412221.pdf)

**4783.** Buczyński, P.; Moroz, M. (2004): *Aeshna affinis* vander Linden and *Sympetrum depressiusculum* (Selys) found in Belarus (Anisoptera: Aeshnidae, Libellulidae). *Notulae Odonatologicae* 6(4): 37-39. (in English). ["The 2 species were found in 2001 in the 'Prypyatski' National Park (southern Belarus). *S. depressiusculum* is new for the country, *A. affinis* has been recorded for the first time since a single record in 1933. Localities are described and the distribution of the species is discussed." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**4784.** Buczyński, P. (2004): The dragonflies (Odonata) of Polesie National Park and its protection zone: new data and the summary of studies conducted in the years 1985-2003. *Parki Narodowe i Rezerваты Przyrody* 23: 381-394. (in Polish, with English summary). [New records of 43 species are given from Polesie National Park situated north of Lublin, Poland. "Ophiogomphus cecilia and *Libellula fulva* are new for the park. Odonatological studies conducted in the years 1985-2003 are summed up. The park was studied very well and data about the protection zone are rich but incomplete. Among 56 species found in general, 52 occurred in the park. 9 species protected by law (of 15), 8 from national Red list (of 16), 8 from regional Red list (of 15), one species from the Red list of IUCN (of 1), 6 from annexes of Bern Convention and Habitats Directive (of 7) were found. The dragonfly communities of lakes, fens, peat bogs, small water bodies and ponds were the most valuable. The fauna of rivers was highly impacted due to the river regulations. Despite anthropogenic changes of the environment it can be concluded

that the current situation of the dragonfly fauna is still very good. This is the result of good preservation of some habitats and traditional use of many changed habitats: extensive agriculture, hand peat exploitation and fish breeding. Therefore, the conservation of dragonflies demands the setback of changes in natural habitats (mainly eutrophication and falling of ground water level) as well as the continuation of traditional use in habitats that are transformed or created by man." (Author) Records of the following species are briefly discussed: *Coenagrion armatum*, *Nehalennia speciosa*, *Gomphus vulgatissimus*, *Leucorrhinia albifrons*, and *L. caudalis*.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**4785.** Buczyński, P.; Tończyk, G. (2004): The importance of national parks for the protection of dragonflies (Odonata) in Poland. *Parki Narodowe i Rezerваты Przyrody* 23: 357-380. (in Polish, with English summary). [The paper compiles data of the dragonfly fauna of the Polish National Parks (NP). It is based on literature data for 21 parks as well as on original data from 12 parks (Biebrzański, Bieszczadzki, Drawieński, Gorczański, Gór Stołowych, Kampinoski, Roztoczański, Słowiński, Świętokrzyski, Tatrzański, Wielkopolski, Wigierski NP). There are no data available about two recently created parks: Ujście Warty and Magurski NP. 70 species (97% of the national odonate fauna) of dragonflies are represented within the borders of the National Parks. Dragonfly assemblages associated with peat bogs, small water bodies, and rivers are well but not satisfactorily protected. In the most parks there are no protective activities directed to the Odonata. Only Bory Tucholskie and Drawieński NP run special studies in the framework of establishing schemes for fauna protection.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**4786.** Buden, D.W. (2004): The Odonata of Pakin, Ant, Mokil, and Pingelap atolls, Eastern Caroline Islands, Micronesia. *Micronesica* 37(1): 145-155. (in English). ["Seven species of Odonata are recorded from among Pakin, Ant, Mokil, and Pingelap atolls, Eastern Caroline Islands, Micronesia - one Zygoptera (damselfly), *Ischnura aurora*; and six Anisoptera (dragonflies), including *Anax guttatus*, *Agrionoptera sanguinolenta*, *Diplacodes bipunctata*, *Pantala flavescens*, *Tholymis tillarga*, and *Tamea transmarina*. None is endemic to the islands, but *A. sanguinolenta* is known to breed only in Chuuk and Pohnpei states, east-central Micronesia; the six others are widely distributed in Oceania and the Indo-Australian region, and in some cases well beyond. The largest number of species recorded on any one of the four atolls is five each on Mokil and Pingelap-six each if unconfirmed records of *A. guttatus* are accepted. Multiple surveys on Ant and Pingelap atolls reveal differences in species composition on the two atolls, but no marked seasonal variations. Evidence of breeding was obtained for all but the two least common species (*I. aurora* and *D. bipunctata*) and data suggest that breeding occurs year-round." (Author)] Address: Buden, D.W., Division of Natural Sci. & Mathematics, College of Micronesia-FSM, P.O. Box 159, Kolonia, Pohnpei FM 96941, Micronesia. E-mail: donbuden@comfsm.fm

- 4787.** Burrial, A.T.; Ocharan, F.J. (2004): Frogs as prey of dragonflies. *Notulae Odonatologicae* 6(4): 42-44. (in English). [Anax imperator larvae were found catching and eating small, living frogs, *Rana perezi*.] Address: Burrial, A. T. Dept Biol. Organism and Sistemas, Univ. Oviedo, E-33071, Oviedo, Spain. E-mail: antoni-otb@hotmail.com
- 4788.** Buttstedt, L.; Zimmermann, W.; Kleemann, R. (2004): Erstnachweis der Feuerlibelle (*Crocothemis erythraea* Brullé, 1832) in Sachsen-Anhalt. *Pedemontanum* 5: 7-8. (in German). [C. erythraea was proofed for the first time in Sachsen-Anhalt, Germany near Katharinenrieth (Landkreis Sangershausen) between June and August 2003. The records are documented along with a list of co-occurring odonate species] Address: Zimmermann, W., Thomas-Müntzer-Str. 5, D-99423 Weimar, Germany
- 4789.** Caldwell, J.P.; de Araujo, M. C. (2004): Historical and ecological factors influence survivorship in two clades of phytotelm-breeding frogs (Anura: Bufonidae, Dendrobatidae). *Miscellaneous Publications Museum of Zoology University of Michigan* 193: 11-21. (in English). ["Throughout Amazonia, Brazil nut trees (*Lecythidaceae*, *Bertholletia excelsa*) produce a grapefruit-sized fruit with a thick, woody pericarp that is functionally indehiscent; each fruit contains 25 or more seeds (Brazil nuts). After falling to the ground, the fruit capsules are chewed open and emptied of their seeds by agoutis (genus *Dasyprocta*). The empty capsules remain on the forest floor and fill with rainwater. Five Amazonian frog species in two clades, Dendrobatidae and Bufonidae, and two insects with predaceous larvae use Brazil nut capsules for some aspects of reproduction. These small microhabitats lack some kinds of predators (fish) but have others (insects) and can have limited food and low oxygen levels. Interactions among tadpoles and insect larvae and the possible effects of food limitation and anoxia were studied at three sites in Brazil. *Bufo castaneoticus* deposits clutches of eggs that are small compared to most other species in the genus (mean number of eggs: 178 at one locality and 234 at another locality). Survivorship of eggs of *Bufo castaneoticus* at all sites was low. Mean volume of water in the capsules at two localities was 110.9 ml and 132.4 ml; thus, eggs and larvae are crowded, presumably leading to anoxia, especially in the absence of rainfall. An experiment in which tadpoles were raised with and without food revealed that metamorphosis does not occur in unfed tadpoles; thus, food limitation may decrease growth and survivorship. Damselfly larvae occur significantly more frequently with tadpoles of *Bufo* than in all capsules in the samples. These factors appear to provide a competitive release for *Bufo* tadpoles; reduction of tadpole density may increase the probability that some individuals will survive. If they are the first colonizers, the predaceous tadpoles of *Dendrobates* can eliminate predators from the capsules. More basal clades of dendrobatids have detritivorous tadpoles that are not capable of eliminating predators from the capsules. Although they primarily use small forest pools and stream edges for tadpole deposition, tadpoles of *Allobates femoralis* and *Colostethus* sp. were transported occasionally to Brazil nut capsules, where their survivorship was low compared to *Dendrobates*. The propensity of individuals in basal clades for depositing some tadpoles in phytotelmata may have led in part to the evolution of use of phytotelmata by the derived *Dendrobates* once a predaceous tadpole evolved. Occasional deposition of tadpoles in phytotelmata by basal dendrobatids may represent a transitional step from obligate tadpole deposition in forest streams or pools to facultative phytotelm tadpole deposition to obligate phytotelm deposition (*Dendrobates*)."] Address: Caldwell, Janalee, Sam Noble Oklahoma Museum Nat Hist, Univ Oklahoma, Norman, OK, 73072, USA. E-mail: caldwell@ou.edu
- 4790.** Callisto, M.; Goulart, M.; Medeiros, A.O.; Moreno, P.; Rosa, C.A. (2004): Diversity assessment of benthic macroinvertebrates, yeasts, and microbiological indicators along a longitudinal gradient in Serra do Cipó, Brazil. *Braz. J. Biol.* 64(4): 743-755. (in English, with Portuguese abstract). ["The main goals of this study were: 1) to evaluate the structure, diversity, and functional trophic group composition of benthic macroinvertebrate communities; 2) to characterize water quality in the headwaters of the Doce river watershed, based on physical, chemical, and biological parameters (benthic macroinvertebrates, fecal coliforms, heterotrophic bacteria, and yeasts); and 3) to contribute to the knowledge of the structure and function of longitudinal gradients in lotic ecosystems in Brazil. A total of 60 benthic macroinvertebrate taxa were identified, the dominant group being the aquatic insects, with 50 families distributed in 8 orders. The dry period presented higher values of taxonomic richness and total density of benthic macroinvertebrates. A decreasing gradient was observed in these variable values from the 3rd order stretch down to the 6th order stretch. The highest Shannon-Wiener diversity values were found in the rainy period in the 3rd order stretches, which presented well-developed riparian forest. Besides the 3rd order stretches, the Pielou evenness index values were also high in the 6th order stretch. The collectors, together with the scrapers, predominated in the benthic macroinvertebrate communities in all river stretches, except in the 2nd, 4th, and 5th order stretches in the rainy period, where communities were dominated by filterers. The shredders and predators presented low densities for all river stretches. All microbiological variables presented low levels. Due to the high counts of heterotrophic bacteria and coliforms, the studied river stretches presented inadequate potability but adequate balneability levels. The results suggest that the structure, diversity, and composition of the benthic macroinvertebrate communities are influenced by the trophic resource availability, seasonality, and sediment heterogeneity. The microbiological results of this study allow inferring that the waters from Serra do Cipó have excellent potential for recreational use and as future sources of water for human consumption." (Authors) The list of taxa includes Odonata on the family level.] Address: Callisto, M., Laboratório de Ecologia de Bentos, Departamento de Biologia Geral, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, C.P. 486, CEP 30161-970, Belo Horizonte, MG, Brazil, e-mail: callisto@icb.ufmg.br
- 4791.** Cammaerts, R. (2004): Taxonomic studies on African Gomphidae (Odonata, Anisoptera) 2. A revision of the genus *Neurogomphus* Karsch, with the description of some larvae. *Belgian Jour. Entom.* 6(1): 91-239. (in English). ["A revision of the genus *Neurogomphus* is presented. 17 species and two distinct subspecies are recognised, i.e. *N. fuscifrons* Karsch, 1890, *N. agilis* (Martin, 1908), *N. martinus* (Lacroix, 1921), *N. uelensis* Schouteden, 1934, *N. vicinus* Schouteden, 1934, *N.*

wittei Schouteden, 1934, *N. chapini* (Klots, 1944), *N. featheri* Pinhey, 1967, *N. pallidus* Cammaerts, 1967, *N. pinheyi* Cammaerts, 1968, *N. angustisigna* Pinhey, 1971, *N. alius* sp. n., *N. paenulensis* sp. n., *N. cocytius* sp. n., *N. zambeziensis* sp. n., *N. carlcooki* sp. n., *N. chapini lamtoensis* subsp. n., *N. dissimilis* sp. n. and *N. dissimilis malawiensis* subsp. n. The genus is divided into two subgenera, of which *Mastigogomphus* (type-species: *Oxygomphus chapini* Klots, 1944) is new. Of the former described species, all but one (*Karschiogomphus ghesquierei* Schouteden, 1934) remain valid, but their names were often erroneously applied to unrelated taxa. Synonymy lists give evidence of this great amount of confusion. Nevertheless, the accurate status of five of the taxa here recognised as well as of some females (*N. sp. cf. zambeziensis* from Tanzania and sp. indet. A, B, C, D) awaits further collecting of material. Generic larval characters are specified for the first time and the larvae of some species are described, among others that of *N. alius* as well as the supposed larvae of *N. cocytius*, *N. zambeziensis* and *N. featheri*. Information about the biology of the larvae is reviewed." (Author)] Address: Cammaerts, R., Serv. Syst. and Ecol. Anim., Free Univ. Brussels, CP 160-13,50 Av FD Roosevelt, B-1050, Brussels, Belgium. E-mail: rcammaer@ulb.ac.be

**4792.** Chapman, L.J.; Schneider, R.J.; Apodaca, C.; Chapman, C.A. (2004): Respiratory ecology of macroinvertebrates in a swamp river system of East Africa. *Biotropica* 36 (4): 572-585. (in English). ["Hypoxia (oxygen scarcity) is widespread in tropical freshwaters, particularly in dense swamps, and may be an important factor structuring benthic macroinvertebrate communities. Macroinvertebrates show a diversity of respiratory modes ranging from atmospheric breathing to tracheal gill breathing, and these adaptations affect their ability to use hypoxic water. The objectives of this study were to (a) describe the benthic macroinvertebrate community from ten swamp and river sites in Kibale National Park, Uganda, (b) determine the degree to which dissolved oxygen explains variation in abundance of respiratory groups (taxa with a similar respiratory mode) among sites, and (c) test for significant seasonal variation in the abundance of the numerically dominant respiratory groups. Macroinvertebrates from monthly collections over a two-year period were identified to the lowest taxonomic level necessary to place them in functional respiratory groups. Across all sites, both the relative and absolute abundance of atmospheric breathers (e.g., pulmonate snails and nepids) and mantle/ctenidia breathers (primarily fingernail clams) were negatively correlated with dissolved oxygen, while the abundance of tracheal gill breathers (e.g., anisopterans and zygopterans) was positively correlated with dissolved oxygen. We did not detect significant seasonal trends in catch per unit effort of numerically dominant respiratory groups. Dissolved oxygen concentration was a good predictor of the abundance of some respiratory groups and may be a key factor in maintaining the structure and diversity of these assemblages." (Authors) Address: Chapman, Lauren J., Department of Zoology, University of Florida, Gainesville, Florida 32611, USA. E-mail: lauren.chapman@mcgill.ca

**4793.** Chovanec, A.; Waringer, J.; Raab, R.; Laister, G. (2004): Lateral connectivity of a fragmented large river system: assessment on a macroscale by dragonfly surveys (Insecta: Odonata). *Aquatic Conservation: Ma-*

*rine & Freshwater Ecosystems* 14(2): 163-178. (in English). ["1. The ecological status of floodplain areas along the Austrian section of the Danube was assessed by an approach based on dragonfly surveys. Although this river section contains a relatively high portion of the river-type-specific alluvial floodplain areas, most of them are influenced by river regulation and damming. 2. A key element of the assessment procedure, which is oriented towards the new EC Water Framework Directive, is the Odonate Habitat Index. 3. Classification of ecological status is based on the comparison between the status quo and reference conditions derived from a historical situation minimally influenced by human activities. 4. Data from 408 sites from 14 investigation areas were used. Ten of the 14 areas were ranked in class II (good ecological status) within the five-tiered system, which is the level of ecological status targeted in the directive. One area corresponds to the reference condition (class I, high ecological status), and three areas do not meet the quality objective (class III, moderate ecological status). A total of 49 species were found along the whole section, which represents 82% of the river-type-specific reference list." (Authors)] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, A-1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

**4794.** Clausnitzer, V. (2004): Diversity and species composition of Odonata as indicators of biotope quality of East African rain forests and their replacement communities. Project ID: 01 LC 0025 (BIOTA AFRICA E07) 01.05.2001-30.04.2004: 2 pp. (in English). [Verbatim: The principal aim of this project is a comparative study of ecology, diversity and biogeography of dragonflies (Insecta: Odonata) in primary, secondary and fragmented rain forests and different wetland habitats in East Africa. To achieve this an identification key for the dragonflies of eastern Africa is prepared and distribution data as well as data on species specific habitat requirements are collected. These will be used for further applied studies, e.g. the development of indicator systems for environmental disturbances. Results: Utilising both, aquatic and terrestrial habitats, the large, predominantly diurnal dragonflies, who can be readily observed and in most cases easily identified in the field, can contribute much to the evaluation of environmental quality. They are known to be very sensitive to structural habitat quality and thus can be a valuable tool to evaluate landscape degradation and have been used as indicator species. The amphibious larvae of dragonflies are critical in regard to water quality and aquatic morphology of streams. The adults are sensitive to habitat structure and are excellent indicators of river disturbance, e.g. changes in habitat structure. Within this project a throughout inventory of East African dragonflies in various habitats and the collection of species specific ecological data is aimed at. Current activities: Data collection has been started in different areas in Kenya, Uganda and Tanzania. In most areas visited, new records for the could be made and a lot of data on various ecological aspects could be collected. The PhD student John Joseph Kisakye, (Makerere University, Kampala, funded through the BIOTA programme) works on dragonflies in different forests. In cooperation with a GEF project in southern Tanzania it is planned to have Master's projects on the impact of habitat degradation on dragonflies from 2002. Coastal forests in Kenya: During the last year coastal forests of Kenya were surveyed to a large extend. Coastal forests are listed as important areas in terms of conservation for East Africa [1]



and are a major centre of endemism in Africa [2, 3]. Coastal forest areas of Kenya and Tanzania are the primary habitat for a number of highly localised dragonfly species (endemics and/or of unique taxonomy). Detailed studies were carried out on the ecology of the two dendrolimnetic species *Coryphagrion grandis* and *Hadrothemis scabrifrons*. Dragonfly communities relative to different habitat types from indigenous forests to cultivated landscapes were described. Most of the forest species are confined to coastal forests of East Africa, being stenotopic and highly sensitive to disturbance. With increasing habitat disturbance eurytopic species which are common and widely distributed in Africa colonise the habitats. The species assemblages between different habitat types (stream, swamp, pool) in the disturbed landscape are identical, the beta-diversity being very low, although the diversity of single localities may increase after habitat disturbances. Publicity work: Species check-lists for several National Parks and other protected areas of Kenya have been prepared and were presented to the corresponding authorities. Information boards on the local dragonflies were prepared for some visitor centres (Saiwa Swamp NP, Mt. Elgon NP, Arabuke Sokoke Forest, Nairobi NP). For 2002 a small dragonfly workshop is planned in the Institute of Environmental and Natural Resources, Makerere University, Kampala. Cooperations: Dragonflies are included in a Wildlife Conservation Society (WCS) project in Tanzania "Southern Highlands Conservation Programme" and in a DANIDA funded project on IBA fs in Uganda. Within all projects national reference collections are build up and local scientists trained. First negotiations have started with Ethiopia to include dragonflies in a planned inventory of insects. Together with BIOTA S08 species assemblages in arid habitats, colonisation strategies in seasonal habitats and population genetics of species with a panafrikan distribution and different dispersal types are comparatively studied. Odonatologists working in Africa are linked through the recently started PHAON (Pinhey's Heritage African Odonata Network), which proves to be an excellent tool to exchange views and data, discuss results and present projects. In cooperation with other scientists an atlas for African Odonata and a mapping programme are long term aims. Publications The identification key of East African dragonflies will be published in 2002 or 2003. A regional report on dragonflies of Eastern Africa for the IUCN Odonata Specialist Group has been recently prepared. At least one new species waits for description, while a number of other projects need more field work. Following recent manuscripts could be finished: Clausnitzer, V. 2001a. Notes on the species diversity of East African Odonata, with a checklist of species. *Odonatologica* 30:49-66 Clausnitzer, V. 2001b. Notes on *Trithemis bifida* and *T. donaldsoni* (Odonata: Libellulidae). *International Journal of Odonatology* 4:179-189 Clausnitzer, V. in press. Reproductive behaviour and ecology in the dendrolimnetic *Hadrothemis scabrifrons*. *The International Journal of Odonatology*. Clausnitzer, V., Lindeboom, M. submitted. Natural history and description of the dendrolimnetic larvae of *Coryphagrion grandis*. Clausnitzer, V. submitted. Dragonfly communities in coastal habitats of Kenya: indication of biotope quality and the need of conservation measures. References 1. Stuart, S. N., Adams, R.J., Jenkins, M. S. 1990. Biodiversity in sub-saharan Africa and its islands - conservation, management and sustainable use. IUCN, Gland & Cambridge 2. Fjeldsa, J., and Lovett, J.C. 1997. Geographical patterns of old and young species in African

forest biota: the significance of specific montane areas as evolutionary centres. *Biodiversity and Conservation* 6: 325-346 3. Kingdon, J. 1989. *Island Africa*. Princeton University Press, Princeton] Address: Clausnitzer, Viola, Graefestr. 17, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de; <http://www.biota-africa.de/Library/abstracts/pdf/east/E07-abstract.pdf>

**4795.** Clopton, R.E. (2004): *Calyxocephalus karyopera* g. nov., sp. nov. (Eugregarinorida: Actinocephalidae: Aactinocephalinae) from the Ebony Jewelwing Damselfly *Calopteryx maculata* (Zygoptera: Calopterygidae) in Southeast Nebraska, U.S.A.: Implications for mechanical prey-vector stabilization of exogenous gregarine development. *Comparative Parasitology* 71(2): 141-153. (in English). ["*Calyxocephalus karyopera* g. nov., sp. nov. (Apicomplexa: Eugregarinorida: Actinocephalidae: Actinocephalinae) is described from *C. maculata* collected along Turkey Creek in Johnson County, Nebraska, U.S.A. *Calyxocephalus* gen. n. is distinguished by the form of the epimerite complex: a terminal thick disk or linearly crateriform sucker with a distal apopetalus calyx of petaloid lobes and a short intercalating diamerite (less than half of the total holdfast length). The epimerite complex is conspicuous until association and syzygy. Association occurs immediately before syzygy and is cephalolateral and biassociative. Gametocysts are spherical with a Conspicuous hyaline coat. Lacking conspicuous sporoducts they dehisce by simple rupture. Oocysts are axially symmetric, hexagonal dipyramidic in shape with slight polar truncations, bearing, 6 equatorial Spines, 1 at each equatorial vertex and 6 terminal spines obliquely inserted at each pole, 1 at each vertex created by polar truncation. The ecology of the *C. karyopera*-*C. maculata* host-parasite system provides a mechanism for mechanical prey-vector Stabilization of exogenous gregarine development and isolation." (Author)] Address: Clopton, R.E.; Dept Nat Sci, Peru State Coll, Peru, NE, 68421, USA. E-mail: [rclopton@oakmail.peru.edu](mailto:rclopton@oakmail.peru.edu)

**4796.** Costa, J.M.; Pujol-Luz, J.; Regis, L.P.B. (2004): Descrição de larva de *Zenithoptera anceps* (Odonata, Libellulidae). *Iheringia, Sér. Zool.* 94(4): 421-424 (in Portuguese, with English summary) [The larva of *Z. anceps* Pujol-Luz, 1993 is described and figured for the first time. A comparison among the known larvae of Palpopleurinae is presented. A key to the larvae of the neotropical genera of Palpopleurinae is added.] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: [jcosta@unisys.com.br](mailto:jcosta@unisys.com.br)

**4797.** Cothran, R. (2004): Precopulatory mate guarding affects predation risk in two freshwater amphipod species. *Animal Behaviour* 68(5): 1133-1138. (in English). ["Contact mate guarding may increase predation risk in the presence of active, size-selective predators by increasing the apparent size or decreasing the escape ability of an individual. These same characteristics may, however, make paired individuals less vulnerable to sit-and-wait, non-size-selective predators. Because the costs and benefits associated with mate guarding are likely to depend on local ecological conditions, species or populations should vary in the duration of the guarding phase. In this study, I investigate whether precopulatory mate guarding increases an individual's pre-

dition risk for two freshwater amphipod species within the *Hyalella azteca* species complex that experience different predators. When larval dragonflies, *Anax junius* and *Tamea lacerata*, were used as predators in laboratory trials, single, unpaired individuals were more likely to be consumed than paired individuals. Conversely, predatory fish consumed paired females more often than single females. Therefore, the short precopulatory mate guarding duration observed in the species that co-occurs with predatory fish may be due to habitat-specific, predator-driven costs associated with precopulatory mate guarding. Furthermore, the predation cost associated with precopula was greater for females than males when predatory fish were used as predators, implying that intersexual conflict over the duration of the guarding period may be more intense for the species that co-occurs with predatory fish." (Author)] Address: Cothran, R., Dept Zool, Univ Oklahoma, Norman, OK, 73019, USA. E-mail: podman@ou.edu

**4798.** Cowell, B.C.; Remley, A.H.; Lynch, D.M. (2004): Seasonal changes in the distribution and abundance of benthic invertebrates in six headwater streams in central Florida. *Hydrobiologia* 522(1-3): 99-115. (in English). ["Seasonal variations in invertebrate assemblages at two sites (upstream and downstream) on six central Florida headwater streams were compared by sampling at quarterly intervals with core and dip net samplers. Two of the streams were reclaimed following phosphate mining (app. 6 yr prior to this study), two received runoff from mined lands, and two were disturbed by agriculture and/or residential developments. Physical and chemical characteristics of the reclaimed streams differed markedly from those of the non-reclaimed streams; principal differences between the streams were in current velocity, percent organic matter (POM), Mn, conductivity and alkalinity. Annual mean densities of meiofauna and smaller macrofauna for the 12 stream sites ranged from 20 896 to 175 212 m<sup>2</sup> and the mean for all sites was 56 492 m<sup>2</sup> reclaimed streams and one of the streams influenced by agriculture had annual means of less than 40 000 m<sup>2</sup>- to 5-fold lower than the other streams. Fall and winter core densities were 2.4-fold greater than those for spring or summer when drought and low dissolved oxygen prevailed. Meiofauna comprised 68-91% of the core sample invertebrates in reclaimed streams but only 43-62% in the non-reclaimed streams; principal functional groups were: gathering collectors -61.5%, predators -19.3% and filtering collectors -15%. The taxonomic composition of the reclaimed streams was predominated by crustaceans (60-71%) while chironomids and annelids were more abundant (71-92%) in the non-reclaimed streams. Dip net sampling added 21 larger macrofauna species (Odonata, Hemiptera and Coleoptera) to our list of taxa, producing a total of 209 species. Species richness and diversity (H' and N2) indices were lower in the reclaimed streams, but evenness was more variable. The Czekanowski-Dice-Sorensen similarity index showed that the reclaimed stream sites were quite similar to each other, but differed markedly from the other stream types; there was large variation both within and between seasons. For central Florida headwater streams, drought appears to have a larger influence on invertebrates than the type of land use, however this relationship should be confirmed using streams of similar hydrology." (Authors)] Address: Cowell, B., Dept Biol., Univ. S. Florida, Tampa, FL, 33620, USA. E-mail: cowell@chuma1.cas.usf.edu

**4799.** Czachorowski, S. (2004): Badania ważek, chrząszczy i chruścików na obszarach chronionych (Urszulín, 21-23 maja 2004 r.). *Parki Narodowe i Rezerwaty Przyrody* 23: 535-537. (in Polish). [Brief report on a meeting held in Urszulín, northeast of Lublin, Poland including some odonatalogical remarks] Address: Czachorowski, S., Ecology and Protection of Environment, Pl. Łódzki 3, PL-10-719, Poland

**4800.** De Block, M.; Stoks, R. (2004): Cannibalism-mediated life history plasticity to combined time and food stress. *Oikos* 106: 587-597. (in English). ["There is increasing awareness that combinations of biotic and time stress interact in shaping life history plasticity. Despite being widespread and abundant, the role of cannibalism in linking both types of constraints to life history plasticity has been largely neglected. Moreover, no studies disentangled direct (due to the extra meal) and indirect (due to the elimination of the competitor) life history effects of cannibalism, and little is known about their differential dependency on these constraints. We studied effects of cannibalism on the life history of the damselfly *Lestes viridis* under combinations of time stress (by manipulating the perceived time available in the growth season) and food stress. We reared larvae per two and disentangled direct and indirect effects of cannibalism by preventing cannibalism in half of the cups and by manipulating the per capita food increase after cannibalism. Cannibalism was more frequent under both time stress and food stress and our results show it may help cannibals to compensate for the negative effects of these constraints imposed on life history. Both direct and indirect benefits of cannibalism (increased development and growth rates, larger mass at emergence) were dependent on the timing of cannibalism, being more pronounced or only present when cannibalism occurred early. Moreover, we found that the ecological constraints (time stress and food stress) also differentially shaped some of the direct and indirect effects. Given the differential context-dependency of direct and indirect effects and the fact that direct and indirect life history effects may be both important in shaping life history, disentangling these effects is critical to mechanistically understand under which conditions cannibalism is expected to be adaptive or not." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**4801.** Dijkstra, K.-D.; Kalkman, V.J. (2004): Een odonatalogische excursie naar Zuid-Nederland, een halve eeuw later. *Entomologische Berichten (Amsterdam)* 64 (5): 157-161. (in Dutch, with English summary). ["An odonatalogical excursion to the southern Netherlands, half a century later. From 26 August to 1 September 1951 an illustrious company of odonatalogists, including P.S. Corbet, D.C. Geijskes, K. Lems, M.A. Lieftinck, C. Longfield, and L.S. Wolfe, made a bicycle tour along 'classic'-sites for dragonflies in the south of The Netherlands. In 2001, exactly 50 years later, the authors repeated this excursion. Comparison of the results of both trips illustrates nicely how half a century of changes in the Dutch landscape, environment and climate have affected the odonate fauna." (Authors)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**4802.** Donath, H. (2004): Neue Funde der Großen Moosjungfer (*Leucorrhinia pectoralis*) im Naturpark Nie-

derlausitzer Landrücken. Biologische Studien Luckau 33: 90-91. (in German). [8 Brandenburg, Germany; new localities with records of *L. pectoralis* are briefly documented.] Address: Donath, H., Caule Nr. 1, D-15926 Zieckau, Germany

**4803.** Donath, H. (2004): Neue Naturschutzgebiete in der Luckauer Region. Biologische Studien Luckau 33: 5-12. (in German). [New nature conservation areas in the county Dahme-Spreewald, Brandenburg, Germany are introduced. Several references to the Odonata are made.] Address: Donath, H., Caule Nr. 1, D-15926 Zieckau, Germany

**4804.** Dumont, H.J. (2004): Distinguishing between the East-Asiatic representatives of Paracercion Weekers & Dumont (Zygoptera: Coenagrionidae). Odonatologica 33(4): 361-370. (in English). ["Eight species occurring in Japan and continental East Asia are separated by the morphology of their male terminalia and by the structure of the female pronotum and adjacent laminae mesostigmatales. Paracercion barbatum is confirmed as a good species, probably restricted to China, where it co-occurs with *P. impar* and other species. The continental East Asian *P. v-nigrum* is suggested to share a common ancestor with the Japanese *P. sieboldii*. On chorological grounds, the latter should not exist in Taiwan. Both sexes of all species are keyed." (Author) Not included in the revision are the taxa *C. luzonicum* Asahina, 1968, *C. malayanum* (Selys, 1876), *C. pendulum* (Needham & Gyger, 1939), and *C. yunnanensis* Zhu & Han, 2000.] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

**4805.** Echols, K.R.; Tillitt, D.E.; Nichols, J.W.; Se-cord, A.L.; McCarty, J.P. (2004): Accumulation of PCB congeners in nestling tree swallows (*Tachycineta bicolor*) on the Hudson River, New York. Environmental Science & Technology 38(23): 6240-6246. (in English). ["Tree swallows were used as a sentinel species to monitor the contamination and bioavailability of polychlorinated biphenyls (PCBs) in the Hudson River watershed. Several tree swallow nest box colonies around and downstream from Hudson Falls, NY were studied. Tree swallow eggs, adults, and 5-, 10-, and 15-day-old nestlings were collected and analyzed for 103 PCB congeners. Emergent insects collected by net (primarily Odonata) or as a food bolus (primarily Diptera) taken from the mouths of adult tree swallows returning to the nest were analyzed in the same manner. Total PCB concentrations (wet weight) in eggs from two contaminated sites ranged from 9000 to 25 000 ng/g and accumulated to 32 000 and 96 000 ng/g in 15-day-old nestling at two contaminated sites. The congener patterns of PCBs in eggs, nestlings, and adults were compared to those found in emergent insects (Odonata and Diptera) using principal components analysis. The PCB patterns of the biota differed from that of Aroclor technical mixtures. PCB patterns in adult tree swallows were similar to those in eggs, while the patterns in dietary insects were similar to nestling tree swallows. Uptake rate constants were determined for tree swallow nestlings and compared between the two contaminated sites. The estimated PCB congener uptake rate constants were 0.008-0.02 d<sup>-1</sup> based on uptake in nestlings until day 15 post-hatch. The rate constants were comparable between the two study areas and may be used to predict nestling contamination at other locations. Our studies confirm

the utility of nestling tree swallows to evaluate localized PCB contamination." (Authors)] Address: Tillitt, D.E., Columbia Environm. Res. Ctr., US Geol. Survey, 4200 New Haven Rd, Columbia, MO, 65201, USA. E-mail: dtillitt@usgs.gov

**4806.** Englund, R.A.; Arakaki, K. (2004): Rapid Biological Inventories of Streams in the Ala Wai Watershed, Oahu Island, Hawai'i. Final Report prepared for: Oceanit Laboratories, Inc., 1001 Bishop Street, ASB Tower 2970, Honolulu, Hawai'i 96813, USA. Contribution No. 2004-007 to the Hawaii Biological Survey: 16 pp. (in English). [...] With a few notable exceptions, the aquatic macrofauna found within the Ala Wai watershed was comprised largely of invasive alien species. Except in the highest reaches of the Ala Wai watershed, aquatic habitats were found to be highly disturbed; this was a result of the effects of urbanization that includes stream diversions and miles of concrete channelization. The worst form of channelization found during these surveys was the flat-bottom concrete lined channels such as those found in lower Pälolo Stream, where stream temperatures were increased by 23° F because of channelization. No native aquatic species were found in concrete-lined stream channels. A complete loss of channel heterogeneity and riparian vegetation cover result in increased water temperatures that are lethal to native species. [...] (Authors) 6 (invasive) odonate species are listed.] Address: <http://hbs.bishopmuseum.org/pdf/alawai.pdf>

**4807.** Fenoglio, S.; Bo, T.; Cucco, M. (2004): Small-scale macroinvertebrate distribution in a riffle of a neotropical rainforest stream (Rio Bartola, Nicaragua). Caribbean Journal of Science 40(2): 253-257. (in English). ["Streams are highly heterogeneous environments in which habitat characteristics vary drastically over small distances, but little information is available in this context about Neotropical systems. In this work, we analyse the relationship between taxonomical composition and functional organization of stream benthic communities and some environmental variables in a single riffle of the Rio Bartola, Nicaragua. Current velocity, position in the streambed, and substratum composition evidently influence invertebrate density and taxonomical richness. We investigate the functional organisation of the communities, reporting that collectors are the most represented functional feeding group, while shredders are almost absent." (Authors) Four odonata taxa are listed on the genus level.] Address: University of Eastern Piedmont, Via Cavour 84 I-15100 Alessandria, Italy. E-mail: fenoglio@uniupmn.it

**4808.** Fleck, G. (2004): La larve du genre *Cyanothemis* Ris, 1915 (Odonata: Anisoptera: Libellulidae). Consequences phylogénétiques. Ann. Soc. Ent. France 40 (1): 51-58. (in French, with English summary). ["The larva of the genus *Cyanothemis* Ris, 1915 is described and illustrated for the first time. The comparison of the larva and adult of *Cyanothemis* with those of *Lepthemis* Hagen, 1861 and *Rhodothemis* Ris, 1911 suggests that these three genera are closely related, filling a phylogenetic gap which nearly goes back a century. The genus *Acisoma* Rambur, 1842, even if more derived, has to be considered as belonging to the clade (*Cyanothemis* + *Lepthemis* + *Rhodothemis*). The genera *Nannophya* Rambur, 1842 and *Nannothemis* Brauer, 1868, put traditionally into *Brachydiplacinae* and not into *Sympetrinae*, could be the adelphotaxa of the clade



(Acisoma + Cyanothemis + Lephthernis + Rhodothemis). Studying wing venation in systematics and phylogeny was till now preponderant, but seems to be limited for the Libellulidae." (Author)] Address: Fleck, G., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleck@mnhn.fr

**4809.** Fleck G.; Bechly G.; Martínez-Delclòs X.; Jarzembowski E. A.; Nel A. (2004): A revision of the Upper Jurassic-Lower Cretaceous dragonfly family Tarsophlebiidae, with a discussion on the phylogenetic positions of the Tarsophlebiidae and Sieblosiidae (Insecta, Odonoptera, Panodonata). *Geodiversitas* 26(1): 33-60. (in English with French summary). ["The Upper Jurassic-Lower Cretaceous dragonfly family Tarsophlebiidae is revised. The type species of the type genus Tarsophlebia Hagen, 1866, *T. eximia* (Hagen, 1862) from the Upper Jurassic Solnhofen Limestones, is redescribed, including important new information on its head, legs, wings, anal appendages and male secondary genital apparatus. The type specimen of Tarsophlebiopsis mayi Tillyard, 1923 is regarded as an aberrant or unusually preserved Tarsophlebia eximia. One new species of Tarsophlebia and three new species of Turanophlebia are described, i.e. Tarsophlebia minor n. sp., Turanophlebia anglicana n. sp., T. mongolica n. sp., and T. vitimensis n. sp. A new combination is proposed for Turanophlebia neckini (Martynov, 1927) n. comb. The phylogenetic relationships of the Mesozoic Tarsophlebiidae are discussed on the basis of new body and wing venation characters. The present analysis supports a rather derived position for the Tarsophlebiidae, as sister group of the the Epiproctophora rather than of (Zygoptera + Epiproctophora). Also, through the present discussion, the Oligo-Miocene family Sieblosiidae seems to be more closely related to the Epiproctophora than to the Zygoptera. But the present study and previous analyses suffer of the lack of informations concerning the more inclusive groups of Odonoptera, viz. Protozygoptera, Triadophebiomorpha, Protanisoptera, etc. The significance of the tarsophlebiid secondary male genital apparatus for the reconstruction of the evolution of odonate copulation is discussed." (Authors)] Address: Fleck, G., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleck@mnhn.fr

**4810.** Forbes, M.R.; Muma, K.E.; Smith, B.P. (2004): Recapture of male and female dragonflies in relation to parasitism by mites, time of season, wing length and wing cell symmetry. *Experimental and Applied Acarology* 34(1-2): 79-93. (in English). ["For aquatic mites parasitic on dragonflies, completion of their life cycle depends on their being returned to appropriate water bodies by their hosts, after completion of engorgement. We examined whether differences among hosts in timing of emergence or phenotypic attributes might affect their probability of return to an emergence pond, and hence success of mites. Parasitized males and females of the dragonfly *Sympetrum obtrusum* (Hagen) did not differ in overall recapture rates. Females that had wing cell symmetry and emerged early were more likely to be recaptured than females that emerged later or had wing cell asymmetry, but there were no consistent relations between these variables and parasitism by mites. No such relations between wing cell asymmetry, emergence date, and recapture likelihood were found for males. Using randomization tests, we found that mean intensities of *Arrenurus planus* (Marshall) mites at host emergence were the same for recaptured females and fema-

les not recaptured; however, males that were recaptured had lower mean intensities of mites at emergence than males not recaptured. Further, mature females carried more mites than mature males, and the latter had fewer mites than newly emerged males not recaptured. Biases in detachment of engorging mites do not explain the differences in parasitism between mature males and females, nor the differences in mite numbers between mature males and newly emerged males that were not recaptured. Rather, heavily parasitized males appear to disperse or die and are not recaptured, which should have implications for dispersal of mites and fitness of male hosts." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**4811.** Freitag, H. (2004): Composition and longitudinal patterns of aquatic insect emergence in small rivers of Palawan Island, the Philippines. *Inter. Rev. Hydrobiol.* 89(4): 375-391. (in English). ["This study presents the first emergence trap samples from streams in the Philippines and Greater Sunda. Aquatic insect emergence from two small rivers and longitudinal patterns including estuaries are compared. A decline of total emergence towards estuaries was observed, affecting all major orders. Diptera, namely Chironomidae, dominated all sites. High abundances in Ceratopogonidae, Odonata, and Coleoptera were found, compared to other emergence studies from tropical and temperate latitudes. Ephemeroptera displayed a highly variable contribution to the emergence from Palawan as well as in other comparative studies either supported by the appropriate conditions for certain functional groups or limited by environmental variables such as pH. Trichoptera are likely to tolerate a wider range of environmental conditions and they are consequently able to fill further niches where Ephemeroptera are under-represented. Except for scarce abundances of Plecoptera observed in this and other studies from the tropics, no substantial differences in emergence composition at order level existed between temperate and tropical rivers, however, with a remarkable local variation. Components of riparian and non-aquatic insects and non-emergent fauna contributing to the collections are discussed based on trap features. [...] Odonata occurred at all sites apart from estuaries in low numbers. The highest numbers were found at PR1 (98 a -1 m -2), and CR3 (73 a -1 m -2). *Rhinocypha humeralis* SELYS, 1873 (Chlorocyphidae) was frequent in the middle course (CR3, CR4) of the CR while *Prodasineura palawana* LIEFTINCK, 1948 (Protoneuridae) was dominant in the site PR1. A third species, *Coelliccia* sp. (Platycnemididae) was trapped once at CR1 (Table 2)." (Author)] Address: Freitag, H., Martin-Luther-University Halle-Wittenberg, Institute of Zoology, D-06099 Halle, Germany. In cooperation with Western Philippines University, Puerto Princesa Campus, Aquatic Science & Technology Department, Santa Monica, Puerto Princesa City, PH 5300 Palawan, the Philippines. E-mail: hendrik.freitag@gmx.de

**4812.** Gade, G.; Auerswald, L.; Predel, R.; Marco, H.G. (2004): Substrate usage and its regulation during flight and swimming in the backswimmer, *Notonecta glauca*. *Physiological Entomology* 29(1): 84-93. (in English). ["The metabolites that are generally used by insects during exercise are present in quite different concentrations in the haemolymph of the backswimmer *N. glauca* L. Lipids are most abundant (between 10 and 20

mg/mL), whereas carbohydrates (2-3 mg/mL) and proline (approximately 1 mg/mL) are at very low concentrations. Injection of an extract of conspecific corpora cardiaca causes pronounced hyperlipaemia in the backswimmer. A neuropeptide with the same effect was isolated from the corpora cardiaca in a single high-performance liquid chromatography (HPLC) step; the primary sequence was deduced from mass spectrometric measurements (matrix-assisted laser desorption/ionization-time of flight and electrospray quadrupole time-of-flight mass spectrometry) of whole corpora cardiaca, and the mass was confirmed in the HPLC fraction that had adipokinetic activity. The biologically active octapeptide has the sequence pGlu-Val-Asn-Phe-Ser-Pro-Ser-Trp amide, which was characterized previously from the corpora cardiaca of *Anax imperator*, and denoted Anaim-adipokinetic hormone (AKH). The synthetic Anaim-AKH peptide causes lipid mobilization when injected at a dose of 1 pmol into *N. glauca*. When other synthetic AKH members that occur in Hemiptera are injected into *N. glauca* at the same dose, the hyperlipaemic responses are significantly lower than after injection of Anaim-AKH. Because only lipids increase upon activity, such as continuous swimming for 1 h or during a 1-h rest period after a 3-min flight episode in the laboratory, it is assumed that Anaim-AKH serves as a true adipokinetic hormone in the backswimmer during bouts of natural swimming and flight." (Authors)] Address: Gade, G., Zoology Dept, Univ. of Cape Town, Rondebosch, 7701, South Africa. E-mail: ggade@botzoo.uct.ac.za

**4813.** Geraeds, R.P.G.; Schaik, V.A. van (2004): The dragonfly *Onychogomphus forcipatus*, a new species for the Netherlands? Findings of a few exuviae along the river Roer. *Naturhistorisch Maandblad* 93: 33-35. (in Dutch, with English summary). ["During a dragonfly survey along the river Roer, four exuviae of *Onychogomphus forcipatus* were found at three locations along the river Roer. The first exuvium was found on 5 July, south of Melick. The second and third exuviae were found on 12 July, west of Melick, both in the same location. The fourth was found on 9 August, also south of Melick. *Onychogomphus forcipatus* is not regarded as a native species in the Netherlands. There were only two reliable observations in the Netherlands in the 20th century, viz., in 1947 and 1995. Observations of this species along the river Roer in 2000 and the new findings of the three exuviae in 2003 show that *O. forcipatus* may have established itself along the river Roer. Since the larvae take three years to develop, it is likely that the larvae that emerged in 2003 are the offspring of the animals observed in 2000." (Authors)] Address: Geraeds, R.P.G., Julianalaan 46, NL-6042 JH Roermond, The Netherlands

**4814.** Gewecke, M.; Odendahl, A. (2004): Der Bewegungsapparat der Antennen des Großen Blaupfeils *Orthetrum cancellatum* (Odonata: Libellulidae). *Entomologia Generalis* 27(2): 73-86. (in German, with English summary). ["The antenna of *O. cancellatum* is composed of 6 segments, scapus, pedicellus, and 4 segments of the flagellum. Only the two proximal ones can be moved actively by muscles. The axis of the caput-scapus-joint and the axis of the scapus-pedicellus-joint are nearly parallel with each other. Thus the antenna can be moved above the frontal rim of the compound eye, forward-down or backward-up. The pedicellus-flagellum-joint is as like a socket joint passively movable in all directions. During flight the relatively stiff flagellum

is pushed backward by the head wind. These movements can be perceived by the organ of Johnston within the pedicellus. The muscles and sense organs of the antenna are innervated by the antennal nerve, originating from the deutocerebrum." (Authors)] Address: Gewecke, M., Inst. Zool. Abt. Neurphysiol., Univ. Hamburg, Martin-Luther-King Platz 3, D-20146, Hamburg, Germany

**4815.** Gossum, H. van; Stoks, R.; De Bruyn, L. (2004): Conspicuous body coloration and predation risk in damselflies: are andromorphs easier to detect than gynomorphs? *Belg. J. Zool.*, 134(2/1): 37-40. (in English). ["The coexistence of multiple female colour morphs in damselflies remains poorly understood. Typically, one of the female morphs is coloured like the male (andromorph), while the other morphs are not (gynomorphs). Andromorphs, by resembling males, are thought to benefit from avoiding male harassment. Some authors have proposed that this benefit is offset by a higher probability of detection for andromorphs compared to gynomorphs owing to differences in body colouration. We experimentally tested detectabilities of the different female colour morphs using human observers as model predators. In contrast to expectation, detection probabilities for andromorphs and gynomorphs were equal. We discuss the use of survival probabilities to test for differences in predation rate between female morphs and consider whether human predators are representative models for the natural predator guild of the studied damselfly." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robbystoks@bio.kuleuven.ac.be

**4816.** Gossum, H.V.; Adriaens, T.; Dumont, H.; Stoks, R. (2004): Sex- and morph-specific predation risk: Colour or behaviour dependency? *Eur. J. Entomol.* 101(3): 373-377. (in English). ["The coexistence of discrete morphs within a species, with one morph more conspicuous than the other(s) is often thought to result from both sexual selection and predation. In many damselflies, sexual dimorphism occurs jointly with multiple female colour morphs. Typically, one morph is coloured like the male (andromorph), while the other(s) is not (gynomorph(s)). The mechanisms contributing to the maintenance of such female polymorphism in damselflies remain poorly understood, especially the role of predation. We tested the detectability of two different female colour morphs of the damselfly, *Enallagma cyathigerum*, using human observers as model predators; andromorphs were detected more frequently than gynomorphs. Field data on mortality of males and the two different female morphs due to predation or drowning were also collected, and these observations support morph-specific mortality. In natural populations predation risk was higher in males than females; gynomorphs, however, were more prone to predation than andromorphs. Differences in behaviour between morphs, rather than colour, may explain this result." (Authors)] Address: Gossum, H.V. van, Evolutionary Biology Group, University of Antwerp, Groenenborgerlaan 171, B-2020 Antwerp, Belgium; e-mail: Hans.VanGossum@ua.ac.be

**4817.** Groenendijk, D. (2004): Dragonflies and damselflies in Dutch limestone quarries. *Naturhistorisch Maandblad* 93: 95-99. (in Dutch, with English summary). ["Marl pits in the province of Limburg are of great entomological importance. Their sheltered situation and

the continuing marl-stone extraction provide a special dynamic and warm habitat. So far, 37 dragonfly species have been recorded in these quarries, many of them relatively rare in the rest of the Netherlands. Most of these are species characteristic of poorly vegetated seepage areas or have a southern distribution. Reproduction of *Sympecma fusca*, *Cercion lindenii*, and *Crocothemis erythraea* has been observed in pools with a rich vegetation, while *Ischnura pumilio*, *Orthetrum brunneum*, and *Orthetrum coerulescens* were found to reproduce in seepage areas with shallow ponds and small streams. Most of the recorded dragonfly species need the dynamic situation found in these quarries. Conserving this special habitat and its fauna requires a tailored approach, involving the maintenance of geomorphological and hydrological processes after marl-stone extraction ends." (Author)] Address: Groenendijk, D., De Vlinderstichting, Postbus 506, NL 6700 AM Wageningen, The Netherlands

**4818.** Hachmöller, B.; Kneis, P.; Schrack, M.; Stolzenburg, U. (2004): Ein neuer Nachweis der Vogel-Azurjungfer (*Coenagrion ornatum* Selys, 1850) in Sachsen. *Mitteilungen Sächsischer Entomologen* 69: 10-12. (in German). [Germany, Sachsen, east of Meißen, August 2004; the species inhabited two ditches. Habitat and co-occurring odonate species are described.] Address: Hachmöller, B., Staatliches Umweltfachamt Radebeul, Wasastr. 50, D-01445 Radebeul, Germany.

**4819.** Hämäläinen, M. (2004): Caloptera damselflies from Fujian (China), with description of a new species and taxonomic notes (Zygoptera: Calopterygoidea). *Odonatologica* 33(4): 371-398. (in English). ["Based on literature records and the examination of an extensive Odonata collection made in Fujian in 1930-1940's (now in RMNH, Leiden), 21 species of Caloptera (Calopterygoidea) are recognized as occurring in Fujian province in eastern China. The Fujian Caloptera material (ca. 860 specimens of 18 species) in RMNH is enumerated. The following taxonomic decisions are presented: *Caliphaea nitens* Navas, 1934 is removed from synonymy with *Bayadera melanopteryx* Ris, 1912(!) and ranked as a valid species, distinct from *C. consimilis* McLachlan, 1894. The lectotype of *Vestalis smaragdina* Selys, 1879 is designated. *Vestalis velata* Ris, 1912 (syn. *V. virens* Needham, 1930) is ranked as a good species, while the "hyaline winged form of *V. smaragdina velata*" (sensu Asahina, 1977) is described as a new sp. *Vestalis venusta* sp. n. *Bayadera continentalis* Asahina, 1973 from Fujian and *B. ishigakiana* Asahina, 1964 from the Ryukyus are treated as full sp. and not as ssp. of *B. brevicauda* Fraser, 1928 from Taiwan. *Bayadera melania* Navas, 1934 is synonymized with *B. melanopteryx* Ris, 1912. Some preliminary taxonomic comments (to be discussed in detail elsewhere) are presented: *Calopteryx grandaeva* Selys, 1853 is a probable synonym of *C. atrata* Selys, 1853, whereas *C. atrocyana* (Fraser, 1935) is a good sp. *Matrona basilaris* Selys, 1853 and *M. nigripectus* Selys, 1879 appear to be distinct sp. *Mnais tenuis* Oguma, 1913 and *M. andersoni* McLachlan in Selys, 1873 are also better treated as separate sp. Faunistic notes include: *Libellago lineata* (Burmeister, 1839) is recorded from Fujian province for the first time. Old records of *Psolodesmus mandarinus* McLachlan, 1870 and *Euphaea compar* McLachlan, 1870 (synonym of *E. formosa* Hagen in Selys, 1869) from Amoy Island near the Fujian coast are considered doubtful." (Author)] Address: Hämäläinen M., Dept Ap-

plied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**4820.** Hayashi, F.; Dobata, S.; Futahashi, R. (2004): Macro- and microscale distribution patterns of two closely related Japanese *Mnais* species inferred from nuclear ribosomal DNA, its sequences and morphology (Zygoptera: Calopterygidae). *Odonatologica* 33(4): 399-412. (in English). ["Much variation occurs in morphology and colouration among individuals of Japanese *Mnais* species. It has been noted that 2 groups of *Mnais* often cohabit a stream in western Japan. There is, however, no clear morphological difference in male appendages and penis between the 2 groups, and this makes it difficult to determine their taxonomic status. In this study, to clarify the relationships between the sympatric species on both small (along a stream) and large (across Japan) geographic scales, sequences of the internal transcribed spacers 1 and 2 (ITS 1 and 2) of nuclear ribosomal DNA are compared. Base substitutions occurred at 4 sites of 223 bps of the ITS1 region, and by their combinations, the four sequence types could be distinguished among a total of 800 individuals. In the ITS2 region (total 411 bps including 5.8S rRNA region), all examined individuals had the same sequence. The geographical distribution of each ITS1 sequence type and morphological data of wings and a pterostigma suggest that Japanese *Mnais* includes 2 distinct species, *M. strigata* Selys, 1853 and *M. costalis* Selys, 1869. Their distribution ranges overlap widely in western Japan, where *M. strigata* is usually found at smaller and upper streams than *M. costalis*." (Author)] Address: Hayashi, F., Dept Biol., Tokyo Metropolitan Univ., Minamiosawa 1-1, Tokyo, 1920397, Japan. E-mail: fhayashi@comp.metro-u.ac.jp

**4821.** Heidecke, F. (2004): *Aeshna mixta* (Latreille, 1805), Herbst-Mosaikjungfer. *Naturwissenschaftliche Beiträge Museum Dessau* 16: title cover, 93. (in German). [Brief characterisation of *A. mixta* on the basis of literature data.] Address: Heidecke, F., Schachtstr. 27, D-06406 Bernburg, Germany. E-mail: Libellenforscher@web.de

**4822.** Heidecke, F.; Lindemann, K. (2004): Die Bestandssituation der Odonatenfauna des Paupitzscher Sees im Jahre 2002. *Naturwiss. Beitr. Museum Dessau* 16: 49-62. (in German, with English summary). [Germany, Sachsen-Anhalt; 20 odonate species were collected in 2002 in a brown coal mining lake. The odonate composition of the different succession stages of the oligotrophic lake is discussed.] Address: Heidecke, F., Schachtstr. 27, D-06406 Bernburg, Germany. E-mail: Libellenforscher@web.de

**4823.** Heidecke, F.; Heidecke, H. (2004): Die Taufwiesenberge - ein vergessenes Schutzgebiet zwischen Kiesabbau und Renaturierung. *Pedemontanum* 5: 8-10. (in German). [Sachsen-Anhalt, Germany; 25 autochthonous species, and dispersing *Aeshna affinis* and *Libellula fulva*. Of special interest is the record of *Leucorrhinia pectoralis*.] Address: Heidecke, F., Schachtstr. 27, D-06406 Bernburg, Germany. E-mail: Libellenforscher@web.de

**4824.** Heidecke, F.; Lindemann, K. (2004): Erster Reproduktionsnachweis von *Crocothemis erythraea* (Brullé, 1832) (Odonata: Libellulidae) in der Goitzsche bei Bitterfeld in Sachsen Anhalt im Jahre 2003. *Naturwissenschaftliche Beiträge Museum Dessau* 16: 63-64.



(in German). [Germany, Sachsen-Anhalt, 26/05/2003; records of exuviae of *C. erythraea*. In 2004, imagines of the species were seen approx. 7 km from the above locality.] Address: Heidecke, F., Schachtstr. 27, D-06406 Bernburg, Germany. E-mail: Libellenforscher@web.de

**4825.** Heijligers, H. (2004): Boekbesprekingen: De nederlandse Libellen. *Natuurhistorisch Maandblad* 93: 16. (in Dutch). [book review of the book on the dutch odonata edited by the Nederlandse vereniging voor libellenstudie in 2002] Address: Heijligers, H., Godsweerderstraat 2, NL-6041 GH Roermond, The Netherlands. E-mail: bureau@nhgl.org

**4826.** Herberholz, J.; Sen, M.M.; Edwards, D.H. (2004): Escape behavior and escape circuit activation in juvenile crayfish during prey-predator interactions. *Journal of Experimental Biology* 207(11): 1855-1863. (in English). ["The neural systems that control escape behavior have been studied intensively in several animals, including mollusks, fish and crayfish. Surprisingly little is known, however, about the activation and the utilization of escape circuits during prey-predator interactions. To complement the physiological and anatomical studies with a necessary behavioral equivalent, we investigated encounters between juvenile crayfish and large dragonfly nymphs in freely behaving animals using a combination of high-speed video-recordings and measurements of electric field potentials. During attacks, dragonfly nymphs rapidly extended their labium, equipped with short, sharp palps, to capture small crayfish. Crayfish responded to the tactile stimulus by activating neural escape circuits to generate tail-flips directed away from the predator. Tail-flips were the sole defense mechanism in response to an attack and every single strike was answered by tail-flip escape behavior. Crayfish used all three known types of escape tail-flips during the interactions with the dragonfly nymphs. Tail-flips generated by activity in the giant neurons were predominantly observed to trigger the initial escape responses to an attack, but non-giant mediated tail-flips were often generated to attempt escape after capture. Attacks to the front of the crayfish triggered tail-flips mediated either by the medial giant neuron or by non-giant circuitry, whereas attacks to the rear always elicited tail-flips mediated by the lateral giant neuron. Overall, tail flipping was found to be a successful behavior in preventing predation, and only a small percentage of crayfish were killed and consumed." (Authors)] Address: Herberholz, J., Dept Biol, Georgia State Univ, POB 4010, Atlanta, GA, 30303, USA. E-mail: biojhh@langate.gsu.edu

**4827.** Hilfert-Rüppell, D (2004): Optimierung des Fortpflanzungsverhaltens: wichtige Einflussgrößen auf Territorialität und auf Paarungen von europäischen Prachtlibellenmännchen (Odonata: Zygoptera). Dissertation TU Braunschweig; <http://opus.tu-bs.de/opus/volltexte/2004/567/>: 216 pp. (in German, with English summary). ["The aim of this study was to find out, which influences contribute to the variability and optimisation of the reproductive behaviour of *C. splendens splendens* in Germany and in Southern France as well of *C. haemorrhoidalis* in Southern France. This approach allowed for the detection of variation in reproductive behaviour among species and geographic regions. In my experiments, the main determinant for the reproductive behaviour was success through copulations. Males left their territories after a unsuccessful predation attempt by

frogs or waterspiders, when they had become territorial only shortly before the attack. Males showed more site fidelity when they had courted or copulated with a female in their territory before the attack, probably because of the higher resource value. Males with or without copulation did not differ in their morphology. The amount of success of males to form a mating wheel from a tandem correlated positively with preceding courtship. After copulations, males showed more territorial flights and displayed versus other males more often. In enclosure-experiments males with an early copulation experience achieved a higher number of further copulations, while male quality (fat, size, wingspot) did not differ significantly between males with or without mating. Northern *Calopteryx splendens splendens* showed a more frequently alternative reproductive behaviour (ARB) than the southern ones. Winner of fights did not differ in their morphology from losers. The experiment showed a significant effect of preceding copulations on duration and outcome of male-male fights. Contests between the same opponents were determined more quickly after a mating than without mating experience. Males which had previously lost a fight won the contest with the same opponent after a copulation in significantly more cases." (Author)] Address: Hilfert-Rüppell, Dagmar, An der Wasserfeuchte 32, D-38162 Cremlingen, Germany

**4828.** Holroyd, P.A.; Bown, T.M.; Schankler, D.M. (2004): *Auroralestes*, gen. nov., a replacement name for *Eolestes* Bown and Schankler, 1982, a preoccupied name. *Journal of Vertebrate Paleontology* 24(4): 979. (in English). [Verbatim: A recent internet search revealed the homonymy of the generic name *Eolestes*, proposed by Bown and Schankler (1982:52) for the early Eocene erinaceid lipotyphlan *Eolestes simpsoni* (Bown, 1979). The erinaceid species was first described by Bown (1979:61) as *Leipsanolestes simpsoni*, and Bown and Schankler (1982) assigned it to a new genus. The generic name *Eolestes* was erected by Cockerell (1940: 104) for an Eocene dragonfly from the Florissant Formation of Colorado, *Eolestes synthetica* (Order Odonata). The generic name *Eolestes* is preoccupied, and we therefore propose the replacement name *Auroralestes* (based on the root *Aurora*, goddess of the dawn) for the erinaceid genus, giving *Auroralestes simpsoni* for *Eolestes simpsoni*. Literature cited: Bown, T.M. 1979. *Geology and mammalian paleontology of the Sand Creek facies, lower Willwood Formation (lower Eocene), Washakie County, Wyoming*. Geological Survey of Wyoming, *Memoir* 2: 1-151; Bown, T.M. & D. Schankler. 1982. A review of the *Proteutheria* and *Insectivora* of the Willwood Formation (lower Eocene), Bighorn Basin, Wyoming. *U.S. Geological Survey Bulletin* 1523: 1-79; Cockerell, T.D.A. 1940. A dragon-fly from the Eocene of Colorado; Odonata, Agrionidae. *Entomol. News* 51: 103-105.] Address: Holroyd, Patricia, Museum of Paleontology, University of California, Berkeley, California 94720 U.S.A. E-mail: pholroyd@uclink4.berkeley.edu

**4829.** Holusa, O.; Jeziorski, P. (2004): Bibliographie der odonatologischen Literatur der Tschechischen Republik, 1849 - 2000 (Odonata). *Libellula* 23(1-2): 53-76. (in German, with English summary). ["A list of 278 references of odonatological literature from the years 1849 to 2000 for the territory of Czech Republic is presented. The list is divided into seven different topics. Not included are articles about fossil dragonflies, unpublished diploma theses, unpublished research reports and book

reviews." (Authors)] Address: Holusa, O., Muzeum Beskyd, prirodovedné oddeleni, Zámecké námesti 1264, CZ-738 01 Frydek-Mistek. E-mail: holusao@post.cz

**4830.** Hunger, H. (2004): Naturschutzorientierte, GIS-gestützte Untersuchungen zur Bestandssituation der Libellenarten *Coenagrion mercuriale*, *Leucorrhinia pectoralis* und *Ophiogomphus cecilia* (Anhang II FFH-Richtlinie) in Baden-Württemberg. Dissertation zur Erlangung des Grades des Doktors der Naturwissenschaften am Institut für Naturschutz und Umweltbildung (INU) der Hochschule Vechta. Dragonfly Research 2. ISSN 1438-034X. IX, 229 pp, Anlagen. (in German, with English summary) ["In the thesis, I focus on the current condition and trends of all known populations of *C. mercuriale*, *L. pectoralis*, and *O. cecilia* in Baden-Württemberg (southwestern Germany). These 3 Odonata species are protected under European law (listed in annex II of the habitats directive). Vector- and raster-based GIS methods play an important role in the analysis of the data. A synoptic discussion of the results leads to concrete recommendations for action plans for protection of the species. As a starting point, all accessible data on the species' occurrences and population sizes were compiled and digitised. To gain additional insight into certain aspects of *C. mercuriale* population biology, field experiments were carried out using a unique method of marking the animals with UV ink and searching for them at night with a portable black light lamp. The recapture rate was 35% (140 out of 305 specimens), however, only 11 animals had moved away from the place where they had been marked. The maximum distance of their movement was 300 m. The longest period between marking and last recapture was 16 days. In three instances, marked individuals were found in copula at night. Employing the Lincoln index, the results of mark-recapture experiments showed that the actual population size was 2 to 2.5 times higher than the numbers estimated by conventional field methods. The sex ratio of animals marked was 713 males : 152 females (82:18). The recapture rate on the fifth day after marking was significantly lower for females (3%) than for males (11%). The hypothesis that fertilized females emigrate more frequently than males and thus play a key role in colonization and recolonization events is discussed. The results confirm empirical knowledge that, in the study area, *C. mercuriale* shows only very little tendency to emigrate from its home waters. In the GIS-based habitat model for *C. mercuriale*, a groundwater model and land use data for the Upper Rhine valley were employed. A preference analysis was used to detect "high density areas" with a positive electivity index and a statistically significant  $\chi^2$  deviation measure, in which the species occurs at an elevated frequency. In the natural geographic region "Freiburger Bucht" (214 km<sup>2</sup>) "high density regions" lay within grassland in which the groundwater table was 2 m or less below the surface, and within farmland where the groundwater table was 1 m or less below the surface. In the "Offenburger Rheinebene" (851 km<sup>2</sup>) they lay within grassland in which the groundwater table was 1,5 m or less below the surface; farmland, even in areas with high groundwater levels, was not to be classified as a "high density region" probably due to the predominance of corn fields. These model results were very plausible. Additional data analyses demonstrated that the model cannot be used for the adjacent natural geographic regions because these have different landscape-related characteristics. The raster-based dispersal model for *C. mercuriale*

took into consideration: on the species level, biological information (dispersal behaviour); on the patch level, information on the size of the subpopulations (emigration rate); and on the landscape level, information on the quality and spatial configuration of the matrix (definition of the cost surface). Land use data and a slope model were incorporated into the design of the cost surface. The model output allowed for a differentiated interpretation of the degree of isolation between individual subpopulations. An "optimistic scenario" (few large metapopulations) was contrasted with a "neutral scenario" (distinct size reduction and fragmentation of the metapopulations). By combining the "high density areas" of the habitat model with the dispersal model zones for *C. mercuriale*, three "suitability classes" were calculated. They indicate where measures for the stabilisation of the metapopulations are most urgent and, at the same time, promising. To document the habitats of *L. pectoralis*, biotypes were mapped in the most significant areas with species occurrences in Upper Swabia (prealpine region of South-Germany). A comparison between digital aerial photographs from 1996 and 2001 allowed the detection of habitat changes caused by vegetative succession. In order to model the long distance dispersal of *L. pectoralis*, the slope model was used as a cost surface. The possible role of cost paths as migration routes was discussed. A "cost distance matrix" was calculated to quantify the spatial relationship between the individual areas occupied by the species. For *O. cecilia*, a series of measurements taken from a data catalogue of the Landesanstalt für Umweltschutz Baden-Württemberg revealed that in many bodies of flowing water the water quality has markedly improved throughout the past two decades. This circumstance, combined with intensified search efforts and possibly climatic factors has probably led to an increase in the number of known populations during the last few years. Metapopulation structure and trends in the overall population size are described in detail in the chapter, "Current status of the studied Odonata species and recommendations for their protection". In addition, concrete recommendations for the species' protection, the implementation of the monitoring programmes, and the compilation of the reports regulated by the habitats directive are given. The thesis ends with a discussion of methods, focusing on the applied approach and the GIS methods used. I conclude that, given careful planning and data evaluation, advanced GIS models, such as habitat and dispersal models, are generally of high value for issues of nature conservation." (Author) Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), August-Ganther-Straße 16, D-79117 Freiburg, Germany. E-mail: Holger.Hunger@inula.de

**4831.** Jänicke, M. (2004): Libellen (Odonata) der Gewässer um Gera. Veröffentlichungen Museum für Naturkunde der Stadt Gera, Naturwissenschaftliche Reihe 31: 57-59. (in German). [town of Gera, Thuringia, Germany; compilation of, in most cases prior 1997-data, including some recent records of *Leucorrhinia dubia*, *L. rubicunda*, *Aeshna affinis*, and *Coenagrion lunulatum*.] Address: Jänicke, M., Am Tonteich 4, D-07607 Eisenberg, Germany

**4832.** Jergentz, S.; Mugni, H.; Bonetto, C.; Schulz, R. (2004): Runoff-related endosulfan contamination and aquatic macroinvertebrate response in rural basins near Buenos Aires, Argentina. Archives of Environmental

Contamination & Toxicology 46(3): 345-352. (in English). ["Information in the open literature about the fate and effects of pesticides in small streams from agricultural areas of Argentina is very rare. The objective of the present work was to study the pesticide contamination and potential biological effects in basins that have undergone intense agricultural activity, mainly related to the cultivation of soybeans. Three streams (Maguire, Helves, and Horqueta) with a low-flow discharge (0.1 and 0.2 m<sup>3</sup>/s) in March close to the city of Arrecifes were studied during the period of maximum insecticide application, between February and April 2001. Various sampling devices were installed to trap suspended: particles, runoff, and floodwater plus sediment throughout the study period. The suspended-particle samples were analyzed for the insecticides endosulfan (END), chlorpyrifos, and cypermethrin. Water chemistry and the macroinvertebrate communities were assessed on four occasions and the organismic drift was measured continuously. Following a 184-mm rainfall on March 1, 2001, beta-endosulfan concentrations up to 318 and 43 µg/kg were measured from suspended-particle samples from Horqueta and Helves, respectively. No END contamination was detected in Maguire. Chlorpyrifos and cypermethrin were not detected in any of the streams. A significant decrease in the average macroinvertebrate species density was observed in Horqueta (from 12.8±0.5 to 9±0.7 species; ANOVA, p<0.05) and Helves (from 10.8±1.7 to 3.3±1.3 species; p<0.001) following the same rainfall event at the beginning of March, while the species density in Maguire remained constant at 7.9±0.3 species. The runoff primarily reduced species abundances of Odonata and Ephemeroptera significantly (p<0.01) in Horqueta and Helves but not in Maguire. A greater drift of Smicridae (Trichoptera) and Ephemeroptera occurred in Helves and Horqueta during this runoff event, while no changes in the macroinvertebrate drift were detectable in Maguire. This study highlights the potential pesticide effects on macroinvertebrate communities in Argentinian rural streams. It is suggested that a small wetland area formed by Maguire between the agriculturally used catchment and the sampling site contributes to the absence of contamination and effects at this site." (Authors)] Address: Jergentz, S., Tech. Univ. Braunschweig, Zoological Institut, Fasanenstr. 3, D-38092, Braunschweig, Germany. E-mail: s.jergentz@tu-bs.de

**4833.** Joop, G.; Rolff, J. (2004): Plasticity of immune function and condition under the risk of predation and parasitism. *Evolutionary Ecology Research* 6(7): 1051-1062. (in English). ["Ecological immunology attempts to elucidate the causes of the large variation in immunity and resistance observed in natural populations. Here we report on a novel experiment that investigated how the risks of parasitism and predation altered investment in immunity and condition in insects during larval development. The study organism is the damselfly *Coenagrion puella*, the parasite is a water mite and the predators are engaged *Aeshna cyanea* dragonflies. Our experiments show that females increase their investment in a cellular as well as a humoral component of the immune system in the presence of natural enemies. By contrast, males do not show such alteration. However, males show altered condition under the risks of parasitism and predation. Our results highlight the importance of species interactions for the plasticity of immune function." (Authors)] Address: Rolff, J., Department

of Animal and Plant Sciences, University of Sheffield, S10 2TN Sheffield, UK. E-mail: JOR@sheffield.ac.uk

**4834.** Jurzitza, G.; Roeder, L. (2004): *Thermothemis madagascariensis* (Rambur): Some observations on its habitat and reproductive behaviour (Anisoptera: Libellulidae). *Notulae Odonatologicae* 6(4): 39-42. (in English). ["The species is peculiar to Madagascar, where it is restricted to forest ponds at elevations above 900 m. Based on colour field photographs, both sexes (adult) are redescribed. The reproductive behaviour is characterized by scooping oviposition and by incidental multiple guarding. Some records of *Crocothemis striata* Lohmann are appended." (Authors)] Address: Reinmuthstr 27, D-76187, Karlsruhe, Germany. E-mail: gjurzit33@t-online.de

**4835.** Kadoya, T.; Suda, Shin-ichi; Washitani, I. (2004): Dragonfly species richness on man-made ponds: effects of pond size and pond age on newly established assemblages. *Ecological Research* 19(5): 461-467. (in English). ["We studied the abundance and species richness of adult dragonflies in 11 artificial ponds which were recently established (within 2 years). We found that the adult dragonfly assemblage patterns were influenced by pond size as well as pond age. The species richness was positively correlated with the pond size, which was because the distributional patterns of species were significantly nested according to pond area. The species richness was highly correlated with pond age in association with the vegetation cover within ponds. It was suggested that the species richness was enhanced by the increasing immigration rate of species which favor well-vegetated ponds." (Authors)] Address: Kadoya, T., Dept Ecosyst. Studies, Inst. Agr. and Life Sci., Bunkyo Ku, Univ. Tokyo, 1-1-1 Yayoi, Tokyo, 1138657, Japan. E-mail: aa47143@mail.ecc.u-tokyo.ac.jp

**4836.** Karanovic, T.; Reddy, Y.R. (2004): First record of *Phyllognathopus bassoti* Rouch, 1972 from India, with remarks on the family Phyllognathopodidae Gurney, 1932 (Crustacea, Copepoda, Harpacticoida). *Annales de Limnologie* 40(2): 121-132. (in English). ["*P. bassoti*, originally described from Long Island, Papua New Guinea, and later reported from the Philippines, is found for the first time in India. This subterranean species is redescribed and its ecology and zoogeography are discussed. Also, the systematics of the family Phyllognathopodidae is discussed and a key to genera and species is given. As a result of the taxonomic analysis, three species are here synonymized: *Phyllognathopus insularis* Chappuis, 1940 and *P. camptoides* Bozic, 1965 with *P. chappuisi* Delachaux, 1924; and *P. volcanicus* Barclay, 1969 with *P. viguieri* (Maupas, 1892). It has been observed that odonate nymphs prey on adults and copepodids of *P. bassoti*, an interaction not known until now." (Authors)] Address: Karanovic, T., Western Australian Museum, Francis Street, 6000 Perth, WA, Australia. E-mail: karanovic@museum.wa.gov.au

**4837.** Karlsson, T. (2004): Tva nya trollslandor (Odonata) for Ostergotland Gungflymosaikslanda (*Aeshna subarctica*) och gron mosaikslanda (*A. viridis*). *Entomologisk Tidskrift* 125(4): 201-204. (in Swedish, with English summary). ["Two new provincial records of dragonflies (Odonata) for Ostergotland – *A. subarctica* and *A. viridis*. [...] During 2004 new provincial records for *A. subarctica* and *A. viridis* have been made in Oster-



gotland, 30-40 km south of the city Linköping, Sweden. The species are likely to be found in several localities in Ostergotland. With these two new records, 48 species of dragonflies have been found in Ostergotland." Address: E-mail: tommykarlsson715@hotmail.com

**4838.** Karube, 2004 (2004): *Heliogomphus chaoi* spec. nov., a new dragonfly from southern Vietnam (Anisoptera: Gomphidae). *Odonatologica* 33(4): 433-436. (in English). ["The new species is described, illustrated and compared with the similar *H. selysii* Fraser. Holotype male: S Vietnam, Laidong prov., 15 km from Bao Lok to Ho-chi-minh, 6-V-1997; deposited in Kanagawa Prefectural Museum of Natural History, Odawara, Japan." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**4839.** Keskinen, E. (2004): Post-embryonic growth and fine-structural organization of arthropod photoreceptors A study involving selected species of insects and crustaceans. Oulu University Press; ISBN 951-42-7560-8 (PDF) <http://herkules.oulu.fi/isbn9514275608/>: 64 pp. (in English). [Arthropod photoreceptors are versatile sense organs. Any investigation of these organs has to consider that their structure and functional limitations at the moment of fixation depend on many factors: species, sex, developmental and nutritional state of the animal, time of day and ambient light. The microscopic image of an arthropod photoreceptor is always a sample frozen in time and space. Quite often publications on arthropod photoreceptors only provide the name of the species studied, but nothing beyond that. At least the developmental status of the study animals ought to be noted, possibly even the sex and body size. Forty publications on insect and 54 on crustacean photoreceptors were checked for the information that was given about the investigated animals: Out of these papers 40% provide only information on the name of the studied species and nothing else. The aim of this thesis, thus, was to investigate, to what extent the developmental state and the sex of the animal as well as the ambient light conditions affect the structure of the eye of a given species. Five species of arthropods were chosen: (a) the semi-terrestrial isopod *Ligia exotica* and two aquatic Branchiuran fishlice, *Argulus foliaceus* and *A. coregoni*, to represent the Crustacea, and (b) the stick insect *Carausius morosus* and the spittle bug *Philaenus spumarius*, both terrestrial, to represent the Insecta. The addition of new ommatidia was studied in a paper on *L. exotica*, which also dealt with the site of newly added ommatidia. It was found that all of these species had two sessile, large compound eyes firmly positioned on their heads (but fishlouse compound eyes were bathed in haemocoelic liquid). In all species, the compound eye was found to be of the apposition type. The gross structural organization of the ommatidia stayed approximately the same during the whole postembryonic development. Lateral ocelli of the *A. coregoni* nauplius eye changed from elongated to spherical between the metanauplius and the 8th stage pre-adult. The sex of the specimens was not found to affect the structure of the eye. In all species, it turned out that the larger the animal and hence the eye, the better its sensitivity. The addition of new ommatidia in the *L. exotica* compound eye was concluded to take place in the anterior and ventral marginal areas of the eye." (Author) Several references to Odonata are made.] Address: Keskinen, Essi, Faculty of Science, Department of Bio-

logy, University of Oulu, P.O.Box 3000, FIN-90014 University of Oulu, Finland

**4840.** Kirti, J.S.; Singh, A. (2004): Studies on secondary male genitalia of the type species of some dragonflies (Odonata: Anisoptera: Libellulidae). *Zoos' Print* 19 (6): 1505-1511. (in English). ["The secondary male genitalic characters of 11 type species of family Libellulidae have been examined and studied in considerable details. The taxonomic significance of the genitalic features of these species has been highlighted." (Authors)] Address: Kirti, Jagbir S., Dept Zool, Punjab Univ, Patiala, Punjab, 147002, India. E-mail: archuspeak@yahoo.co.in

**4841.** Kjaerstad, G. (2004): Dammer med nasjonal verdi i Levanger og Verdal. Norges teknisk-naturvitenskapelige universitet Vitenskapsmuseet. *Zoologisk notat* 2004-3: 17 pp. (in Norwegian). [The fauna - including 7 odonate taxa - of four Norwegian water bodies is listed.] <http://www.ntnu.no/vmuseet/zoolavd/zoolnotat-3-04.pdf>

**4842.** Kohnert, S.; Perry, S.F.; Schmitz, A. (2004): Morphometric analysis of the larval branchial chamber in the dragonfly *Aeshna cyanea* Müller (Insecta, Odonata, Anisoptera). *Journal of Morphology* 261(1): 81-91. (in English). ["The aquatic larvae of anisopteran dragonflies possess tracheal gills located in the rectum. Using stereological methods, we estimated the morphometric diffusing capacity for oxygen across the gill epithelium, i.e., from rectal water to the gill tracheoles, in the larvae of *Aeshna cyanea*. A 271-mg larva has a total branchial surface area of app. 12 cm<sup>2</sup>. Tracheoles make up 6% of the epithelial volume of the gills; the harmonic mean thickness of the water-tracheolar diffusion barrier is 0.27 m and consists mainly of cuticle. The calculated DMO<sub>2</sub> is 23.0 l min<sup>-1</sup> g<sup>-1</sup> kPa<sup>-1</sup>, which, using published values for oxygen consumption in a similar species, would result in a mean driving pressure of 0.2 kPa at rest and 1.3 kPa during activity. Since these driving pressures are similar to those reported for other arthropods, we conclude that the DMO<sub>2</sub> of the gill is not rate-limiting for aerobic metabolism in *Aeshna cyanea* larvae." (Authors)] Address: Schmitz, Anke, Institut für Zoologie, Rheinische Friedrich-Wilhelms-Universität Bonn, Poppelsdorfer Schlo, 53115 Bonn, Germany. E-mail: ankeschmitz@uni-bonn.de

**4843.** LaFiandra, E.M.; Babbitt, K.J. (2004): Predator induced phenotypic plasticity in the pinewoods tree frog, *Hyla femoralis*: Necessary cues and the cost of development. *Oecologia* 138(3): 350-359. (in English). ["Predator-induced defenses can result from non-contact cues associated with the presence of a feeding predator; however, the nature of the predator cue has not been determined. We tested the role of two non-contact cues, metabolites of digestion of conspecific prey released by the predator and alarm pheromones released by attacked conspecific prey, in the development of inducible defenses by exposing pinewoods tree frog (*Hyla femoralis*) tadpoles to non-lethal dragonfly (*Anax junius*) larvae fed either inside experimental bins or removed from the bins for feeding to eliminate alarm pheromones. The costs associated with the development of the induced morphology were also investigated by providing the tadpoles with two food levels intended to provide adequate or growth limiting resources. The generalized morphological response of *H. femoralis* tadpoles to predators included the development of bo-

dies and tails that were both deeper and shorter, smaller overall body size, and increased orange tail fin coloration and black tail outline. Metabolites of digestion were sufficient to initiate development of inducible defenses; however, the combination of metabolites and alarm cue resulted in a greater response. Furthermore, growth and development were slowed in tadpoles that expressed the induced morphology; however, this growth cost was insufficient to preclude the development of the induced morphology when food resources were low. These results indicate that two aspects of the indirect predator cue work together to trigger a morphological anti-predator response." (Authors)] Address: Babbitt, Kimberly J., Department of Natural Resources, University of New Hampshire, 226 James Hall, Durham, NH, 03824, USA. ; E-mail: kbabbitt@cisunix.unh.edu

**4844.** Lam, E. (2004): Damselflies of the Northeast. A comprehensive identification guide to the damselflies of the Northeast, from Canada to Virginia. ISBN 6-9754015-0-5: 96 pp. (in English). [This book covers 69 species and subspecies, more than half of all North American damselflies north of Mexico. Introductory chapters are devoted to damselfly anatomy, behaviour, life cycle, identification and sampling methods. More than 300 detailed paintings, drawings and photos, range maps, and advice to similar species enable a competent identification of the species, even without the usual binomic keys which are omitted in this book. This is an absolutely lovely book, and it deserves to be in the library of anyone interested in worldwide Odonata. (Martin Schorr)] Address: Biodiversity Books, P.O. Box 353, Eastchester, NY 10709, U.S.A.

**4845.** Lambert, T.D.; Howard, J.; Plant, A.; Soffe, S.; Roberts, A. (2004): Mechanisms and significance of reduced activity and responsiveness in resting frog tadpoles. *Journal of Experimental Biology* 207(7): 1113-1125. (in English). ["Hatchling *Xenopus laevis* tadpoles spend most of their time attached to objects or the water surface by mucus secreted by a gland on the head. While attached, swimming activity and responsiveness to swim-initiating stimuli are reduced over long periods of time. We have investigated the mechanisms and significance of this apparent long-term inhibition. In behavioural experiments we show, firstly, that innervation of the cement gland and GABAA-mediated inhibition are necessary for attachment to reduce responsiveness, and secondly, that denervation of the cement gland increases tadpole activity and increases their predation by damselfly nymphs (Zygoptera). To investigate the neuronal pathway from the cement gland to GABAA inhibition, we have devised an immobilized, inverted tadpole preparation where a weight attached to the mucus simulates the force as it hangs. Simulated attachment reduces responsiveness and spontaneous fictive swimming activity. We have recorded the activity and responses of trigeminal neurons innervating the cement gland. They are spontaneously active and simulating attachment results in a sustained increase in this activity. We propose that hanging from a mucus strand increases firing in cement gland afferents. This leads to tonic GABA inhibition that reduces tadpole activity and responses, and leads to fewer attacks by predators." (Authors)] Address: Lambert, T., Inst. Physiol., Univ. Hohenheim, Garbenstr 30, D-70593, Stuttgart, Germany. E-mail: lambert@uni-hohenheim.de

**4846.** Laurila, A.; Jarvi-Laturi, M.; Pakkasmaa, S. Merila, J. (2004): Temporal variation in predation risk: stage-dependency, graded responses and fitness costs in tadpole antipredator defences. *Oikos* 107(1): 90-99. (in English). ["Temporal variation in predation risk may be an important determinant of prey antipredator behaviours. According to the risk allocation hypothesis, the strongest antipredator behaviours are expected when periods of high risk are short and infrequent. We tested this prediction in a laboratory experiment where common frog *Rana temporaria* tadpoles were raised from early larval stages until metamorphosis. We manipulated the time a predatory Aeshna dragonfly larva was present and recorded behavioural responses (activity) of the tadpoles at three different time points during the tadpoles' development. We also investigated how tadpole shape, size and age at metamorphosis were affected by temporal variation in predation risk. We found that during the two first time points activity was always lowest in the constant high-risk situation. However, antipredator response in the two treatments with brief high-risk situation increased as tadpoles developed, and by the third time point, when the tadpoles were close to metamorphosis, activity was as low as in the constant high-risk situation. Exposure to chemical cues of a predation event tended to reduce activity during the first time period, but caused no response later on. Induced morphological changes (deeper tail and shorter relative body length) were graded the response being stronger as the time spent in the proximity of predator increased. Tadpoles in the brief risk and chemical cue treatments showed intermediate responses. Modification of life history was only found in the constant high-risk treatment in which tadpoles had longer larval period and larger metamorphic size. Our results indicate that both behavioural and morphological defences were sensitive to temporal variation in predation risk, but behaviour did not respond in the manner predicted by the risk allocation model. We discuss the roles of concentration of predator chemical cues and prey stage-dependency in determining these responses." (Authors)] Address: Evolutionary Biol. Ctr. Dept Populat. Biol., Uppsala Univ, Norbyvagen 18D, SE-75236 Uppsala, Sweden. E-mail: anssi.laurila@ebc.uu.se

**4847.** Lederbogen, D.; Rosenthal, G.; Scholle, D.; Trautner, J.; Zimmermann, B.; Kaule, G. (2004): Allmendweiden in Südbayern: Naturschutz durch landwirtschaftliche Nutzung. *Angewandte Landschaftsökologie* 62: 469 pp, Anlagen. (in German, with English summary). [Bavaria, Germany. *Orthetrum coerulescens* and *Coenagrion mercuriale* were favoured by using pastures (comprising also calcareous fen meadows) as litter meadows rather than abandoning or grazing them. Factors influencing the survival of populations are discussed. In an appendix all odonate species of the surveyed spots are compiled. This list includes species as *Nehalennia speciosa* and *Aeshna subarctica elisabethae*.] Address: Inst. Landschaftsplanung und Ökologie, Universität Stuttgart, Keplerstr. 11, D-70174 Stuttgart

**4848.** Lefevre, K.L.; Muehter, V.R. (2004): Competition for mating resources in a territorial damselfly (Odonata: Calopterygidae). *Studies on Neotropical Fauna & Environment* 39(2): 159-165. (in English). ["The factors that determine contest outcomes among territorial male animals are complex and much debated. This study investigated how breeding resource availability and body size influence territorial contests of *Hetaerina miniata*.

In our marked population, some males were territory owners while others were part of a wanderer contingent. Male territoriality was not correlated with availability of oviposition substrate. We predicted that territory owners would have an advantage in disputes. Removal experiments demonstrated that owners won significantly more territorial contests than did wanderers, and whereas males were significantly larger than females, male territorial status did not depend on body size. However contest outcome was not based solely on ownership because experimentally removed individuals regained their territories from new owners (intruders). We suggest that intrinsic resource holding potential based on other morphological and physiological factors, such as energy reserves, may govern male competitive ability." (Authors)] Address: Lefevre, Kara., Dept Biol. Queen's Univ., Kingston, Canada.

**4849.** Lin, Q.; Zhang, S.; Huang, D. (2004): *Fuxiaeschna hsiufunia* gen. nov., spec. nov., a new Lower Cretaceous dragonfly from northwestern China (Aeshnoptera: Rudaeschnidae). *Odonatologica* 33(4): 437-442. (in English). ["The new genus and species are described and illustrated from the Luohandong Formation of Huating Co., Gansu province, P.R. China, from a single, almost complete specimen. Holotype No. 123518, probably a female, deposited at IGPAS, Nanjing, China." (Authors)] Address: Lin, Q., Nanjing Inst. Geol. and Palaeontol., Chinese Acad. Sci., 39 E Beijing Rd, Nanjing, 210008, China

**4850.** Lohr, M.; Proess, R.; Schorr, M.; Zimmermann, M. (2004): Reproduktionsnachweise für *Oxygastera curtisii* am luxemburgisch-deutschen Grenzfluss Our (Odonata: Corduliidae). *Libellula* 23(3/4): 173-178. (in German, with English summary). [Documentation of reproduction of the very rare *O. curtisii* along the river Our.] Address: Lohr, M., An der Kirche 22, D-37671 Hörter, Germany. E-mail: mlohr@fh-hoexter.de

**4851.** Machado, A.B.M. (2004): Studies on Neotropical Protoneuridae. 14. The female of *Neoneura gaida* Racenis, 1953 (Odonata: Protoneuridae). *Lundiana* 5 (1): 41-42. ["The female of *Neoneura gaida* Racenis, 1953 is described and illustrated. It is very close to that of *N. cristina* Racenis, 1955 but can be separated from it by the shape of the posterior pterothoracic lobe." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil

**4852.** Macías, M.; Green, A.J.; Sánchez, M.I. (2004): The diet of the Glossy Ibis during the breeding season in Doñana, Southwest Spain. *Waterbirds* 27(2): 234-239. (in English). ["We present the first detailed study of the diet of Glossy Ibis (*Plegadis falcinellus*) in Europe, from an expanding breeding colony in Doñana, southwest Spain. In 2000, fecal samples, mainly from adults, were collected from 15 nests. In 2001, 36 regurgitates were collected, mainly from large chicks. Fecal contents were dominated by aquatic beetles and dragonfly larvae, which were present in 100% and 93% of samples respectively. Regurgitates contained mainly aquatic beetles (41% by aggregate percent, mainly *Cybister* spp.), dragonfly larvae (29%, mainly *Sympetrum fonscolombii*, *Aeshna mixta*, and *Anax imperator*), Sharp-ribbed Salamanders (*Pleurodeles waltii*, 12%) and Carp (*Cyprinus carpio*, 7%). The absence of vertebrate and

other hard remains from feces was presumably due to their excretion in pellets. Thus fecal analysis is not a suitable method to investigate the food of the Glossy Ibis. The results suggest that there may be no major difference in the diet of breeding adults and their chicks, and that the recent increase in numbers of this ibis in Doñana is not explained by the abundance of introduced Red-swamp Crayfish (*Procambarus clarkii*) in the breeding area." (Authors)] Address: Green, A., Dept of Applied Biology, Doñana Biological Station, Avenida María Luisa s/n, 41013 Sevilla, Spain. E-mail: ajgreen@ebd.csic.es

**4853.** Maezono, Y.; Miyashita, T. (2004): Impact of exotic fish removal on native communities in farm ponds. *Ecological Research* 19(3): 263-267. (in English). ["Introduced largemouth bass (*Micropterus salmoides* spp.) and bluegill (*Lepomis macrochirus* spp.) are thought to threaten native aquatic organisms worldwide and hence their eradication has recently begun in Japan. Our previous studies suggested that the removal of largemouth bass increases native fish, shrimp, dragonflies, and exotic crayfish, but decreases macrophytes. To test this prediction, we removed the exotic fishes by draining farm ponds and compared the numbers of these organisms before and after the drain, as well as between drained and undrained ponds. The number of dragonfly *Pseudothemis zonata*, crayfish, shrimp, and goby increased rapidly after the drain, but the coverage of macrophyte declined. The reduction in macrophyte is assumed to be caused by increased herbivory by crayfish. The number of exuviae of damselfly *Cerion calamorum* and the total number of species of odonate also decreased after the drain. These decreases can be due to the reduction of macrophyte because reduced odonate species are known to use macrophytes as oviposition sites. Therefore, the removal of largemouth bass has a potential to cause negative effects on some native organisms. We propose that reduction of exotic crayfish should be considered when eradicating the exotic fishes." (Authors)] Address: Maezono, Y., Sch. Agr. and Life Sci. Lab. Biodivers. Sci., Univ Tokyo, Tokyo, 1138657, Japan. E-mail: zephyrus3@nifty.com

**4854.** Mahlendorf, B.; Martens, A. (2004): *Anax guttatus* (Burm.) new to the Maldives Islands, Indian Ocean (Anisoptera: Aeshnidae). *Notulae Odonatologicae* 6(4): 44. (in English). [Angagam South Ari Atoll, 3-XI-2003; on 28-XI-2003, *Tramea limbata* was photographed at light] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**4855.** Mantel, S.K.; Salas, M.; Dudgeon, D. (2004): Foodweb structure in a tropical Asian forest stream. *Journal of the North American Benthological Society* 23(4): 728-755. (in English). ["A food web based on the gut contents of consumers (invertebrates and fishes) in pools of Tai Po Kau Forest Stream (TPKFS), Hong Kong (southern China), indicated the importance of periphyton and fine organic particles; coarse particulate organic matter was a less important food source despite its higher relative abundance in this shaded hillstream. Stable isotope analysis of consumer tissues was undertaken to confirm this result. IsoSource software was used to model n-isotope and >n + 1-sources, so that the relative contribution of the potential food sources could be determined. Results of an IsoSource mixed model of  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  stable isotope signatures



of primary consumers generally supported evidence from gut content analyses about the importance of autochthonous resources. Inconsistencies between the results of gut content analysis and isotope signatures of consumer tissues occurred in a few cases but could be explained either by small sample size or the wide range of feasible solutions provided by the isotopic mixed model. Both techniques were needed to resolve the trophic position of omnivores. For instance, the gut contents of balitorid loaches indicated that they were primarily herbivorous but their stable isotope signatures revealed a significant dependence on animal food. Considerable overlap in the diets of predatory fishes and invertebrates (odonates, perlid stoneflies, palaemonid shrimps) was confirmed by both gut contents and stable isotope analyses. This finding, along with a lack of intraguild predation, resulted in a short mean and maximum food-chain length, high links per species, and high connectance for the TPKFS food web when compared with literature reports of other stream food webs. Periods of spate-induced disturbance during the wet season and limited algal productivity in TPKFS might also have contributed to the short food chains. Inconsistent levels of resolution for different taxonomic groups within the food web may have generated artefacts of low linkage complexity, high predator-prey ratio, and a small number of basal and intermediate species, a pattern that has been confirmed for stream food webs elsewhere. Our study is the first example of a food web based on complementary analyses of gut contents and stable isotope signatures for any tropical stream. This combined approach is recommended for future studies of food webs, especially in habitats where omnivores are an important component of the community." (Authors)] Address: Mantel, S.K., E-mail: [sukhkaur@graduate.hku.hk](mailto:sukhkaur@graduate.hku.hk); Dudgeon, D., Department of Ecology & Biodiversity, The University of Hong Kong, Pokfulam Road, Hong Kong, China. E-mail: [ddudgeon@hkucc.hku.hk](mailto:ddudgeon@hkucc.hku.hk)

**4856.** Marinov, M. (2004): Dragonflies (Insecta: Odonata) of the Eastern Rhodopes (Bulgaria and Greece). In: Beron P., Popov A (eds). Biodiversity of Bulgaria. 2. Biodiversity of Eastern Rhodopes (Bulgaria and Greece). Pensoft & Nat. Mus. Natur. Hist., Sofia: 221-235. (in English). [This is a thorough review of the odonatological information on the Eastern Rhodopes. A total of 46 dragonfly species from 118 sites is given. These are about 92% of the expected 50 species, which use the region for reproduction, maturity, or during migration. At least 8 other species could be found as accidental immigrants from adjacent territories. Short zoogeographical analysis is made and a characterization of the most important habitats for preserving Odonata populations is given.] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: [mgmarinov@mail.bg](mailto:mgmarinov@mail.bg)

**4857.** Mathew, G.; Shamsudeen, R.S.M.; Chandran, R.; Brijesh, C.M. (2004): Insect fauna of Peppara Wildlife Sanctuary, Kerala, India. Zoos' Print. 19(11): 1680-1683. (in English). [Two unidentified zygopteran species are listed.] Address: Mathew, G., Div. Entomol., Kerala Forest Res. Inst., Peechi, Kerala, 680653, India. E-mail: [mathew@kfri.org](mailto:mathew@kfri.org)

**4858.** Matushkina, N. (2004): Comparative morphology of ovipositor in some damselflies (Odonata, Zygoptera). Vestnik Zoologii 38(3): 53-66. (in Russian, with English summary). ["Representatives of 5 Zygoptera families: *Bayadera melanopteryx* (Euphaeidae), *Chalco-*

*lestes parvidens* (Lestidae), *Heteragrion alienum* (Megapodagrionidae), *Platycnemis pennipes* (Platycnemididae), and *Palaemnema domina* (Platystictidae) were studied [...] aimed to reveal differences among species of these families. The table of ovipositor characters was compiled based upon the literature data and own results, which can be used for phylogenetic analysis. Possible correlations between ovipositor features and oviposition behaviour are discussed." (Authors)] Address: Gorb, S., Max-Planck-Institut für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. E-mail: [stas.gorb@tuebingen.mpg.de](mailto:stas.gorb@tuebingen.mpg.de)

**4859.** Mauco, L.; Favero, M. (2004): Diet of the common tern (*Sterna hirundo*) during the nonbreeding season in Mar Chiquita Lagoon, Buenos Aires, Argentina. Ornithologia Neotropical 15(1): 121-131. (in English). [S. *hirundo* "breeds widely across the Northern Hemisphere in colonies all along North America, Europe and Asia. Common terns breeding in the Atlantic coast of North America migrate during the boreal winter to the Southern Hemisphere, showing a wide nonbreeding distribution that includes the Atlantic coasts of Argentina and Brazil. The coast of Buenos Aires Province (Argentina) constitutes the main wintering area of the species in South America. In Mar Chiquita Lagoon, their diet was assessed by the analysis of regurgitated casts collected on nonbreeding grounds. A total of 538 pellets were analyzed, containing 1092 prey. About 88% by number of prey were fish, 11.4% were adult insects and 0.5% were crustaceans. Adult Coleoptera, Odonata, Orthoptera, Hemiptera and Lepidoptera was the main insects found in the [...]." (Authors)] Address: Mauco, Laura, Lab, Vertebrados Dept Biol. Fac. Ciencias Exactas & Nat., Univ. Mar del Plata, Funes 3250, RA-7600, Mar Del Plata, Argentina. E-mail: [Imauco@mdp.edu.ar](mailto:Imauco@mdp.edu.ar)

**4860.** Mauersberger, R. (2004): 15 Libellen. In: Lükkepohl, M. & M. Flade (Hrsg.): Das Naturschutzgebiet Stechlin. Rangsdorf. ISBN 3-9807627-8-5: 138-147. (in German). [Lake Stechlin, Brandenburg, Germany; Between 1992 and 2003, a total of 53 odonate species - 88% of all species of Brandenburg and 66% of the German odonate fauna - was recorded. *Nehalennia speciosa*, *Aeshna subarctica elisabethae*, *A. viridis*, *Onychogomphus forcipatus*, *Gomphus vulgatissimus*, *Orthetrum coerulescens*, *Crocothemis erythraea*, and *Leucorrhinia albifrons* are discussed in some detail. All species are checklisted and briefly commented in a table.] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-mail: [FoerderevereinUeckermark.Seen@t-online.de](mailto:FoerderevereinUeckermark.Seen@t-online.de)

**4861.** Meier, C. (2004): Artenschutzmaßnahmen für gefährdete Tierarten im Kanton Zürich. Aktionsplan Helmazurjungfer (*Coenagrion mercuriale*). Fachstelle Naturschutz, Kanton Zürich: 15 pp. (in German). [The paper compiles the conservation status and the known records of *C. mercuriale*, provides a map with regional records (Kanton Zürich, Switzerland), and make suggestions for a species action plan.] Address: [www.naturschutz.zh.ch](http://www.naturschutz.zh.ch)

**4862.** Mengelkoch, J.M.; Niemi, G.J.; Regal, R.R. (2004): Diet of the nestling Tree Swallow. Condor 106(2): 423-429. (in English). ["Dietary samples from nestling Tree Swallows (*Tachycineta bicolor*) in northwestern Minnesota were compared to invertebrate availability as measured by aerial tow nets. The majority of the

biomass in the nestlings' diet was adult insects with larval stages of aquatic origin (including Odonata), while absolute numbers of insects of both aquatic and terrestrial origin were similar. Orders of invertebrates in the diet and available were similar in number but not in biomass. Diet showed little variation by time of day, date of sampling or the age of the nestling. The mean number of odonates in the nestling Tree Swallows' diet increased exponentially as the percentage of open water and open water + cattail marsh increased within a 400-m foraging radius." (Authors)] Address: Niemi, G.J., Dept Biol., Univ. Minnesota, Duluth, MN, 55812, USA. E-mail: gniemi@nrri.umn.edu

**4863.** Mielewczyk, S. (2004): State of research and threats facing the entomofauna of Toporowe Ponds in the Tatra National Park. *Parki Narodowe i Rezerwaty Przyrody* 23: 527-534. (in Polish, with English summary). [The history of study of the Odonata, Hemiptera: Heteroptera and Coleoptera: Adepaga of the Toporowe Ponds in Tatra National Park, Poland is outlined. Special emphasis is given to the negative impacts of mallards (*Anas platyrhynchos* L.) on the entomofauna of the ponds. The mallard faeces cause the eutrophication of the ponds. The resulting intensive algal development completely eliminates Corixidae and Dytiscidae.] Address: Mielewczyk, S., Polska Akademia Nauk, Zakład Badań Środowiska Rolniczego i Leśnego, ul. Bukowska 19, 60 809 Poznań, Poland

**4864.** Mielewczyk, S. (2004): Study methods of aquatic entomofauna with taking protected areas into consideration. *Parki Narodowe i Rezerwaty Przyrody* 23: 519-526. (in Polish, with English summary). [Some personal annotations referring sampling methods to study Odonata, Heteroptera, and aquatic Coleoptera are made.] Address: Mielewczyk, S., Polska Akademia Nauk, Zakład Badań Środowiska Rolniczego i Leśnego, ul. Bukowska 19, 60 809 Poznań, Poland

**4865.** Mikołajewski, D.J.; Rolff, J. (2004): Benefits of morphological defence demonstrated by direct manipulation in larval dragonflies. *Evolutionary Ecology Research* 6(4): 619-626. (in English). ["Many prey species evolved morphological structures to hold off predators. As morphology and behaviour are frequently entwined, it is very difficult to demonstrate the assumed defence benefit of the morphological traits. Using a novel approach of directly manipulating morphological defence in larval dragonflies, we demonstrated that spines were an effective morphological defence against predatory fish. Our results showed that the survival probability of larval dragonflies being attacked from behind was four-fold higher in larvae possessing spines than in larvae without spines. However, spines were ineffective against attacks from the front. We discuss the relevance of our study for understanding inducible defence." (Authors)] Address: Mikołajewski, D.J., Zool Inst. Ökol, TU Braunschweig, Fasanenstr 3, D-38102, Braunschweig, Germany. E-mail: d.mikolajewski@tu-bs.de

**4866.** Ministerium für Umwelt und Naturschutz, Landwirtschaft und Verbraucherschutz NRW (Hrsg) (2004): *Lebensräume und Arten der FFH-Richtlinie in NRW. Beeinträchtigungen, Erhaltungs- und Entwicklungsmaßnahmen, Bewertung des Erhaltungszustandes.* Herausgeber: Ministerium für Umwelt und Naturschutz, Landwirtschaft und Verbraucherschutz NRW, Schwannstraße 4, D-40476 Düsseldorf, Germany; V,

170 pp. (in German). [*Leucorrhinia pectoralis* and *Coenagrion mercuriale* - listed as appendix II species of the European Habitat Directive - and found in Nordrhein-Westfalen, Germany are treated in this handbook and briefly characterised. Note that *C. ornatum* is also listed in app. II and occurring in NRW but is missing in this report.] Address: [http://www.natura2000.munlv.nrw.de/ffh-broschuere/ffhbroschue\\_re.pdf](http://www.natura2000.munlv.nrw.de/ffh-broschuere/ffhbroschue_re.pdf)

**4867.** Mishra, P.K.; Dongre, S.D.; Pathak, N.; Patel, S.; Panse, U. (2004): Bio-control of mosquito vector with special reference to dragon fly nymph *Aeschna* [sic]. *Journal of Experimental Zoology, India* 7(2): 353-355. (in English). ["Population regulation in mosquitoes can be extremely complex. Therefore there is a need to control the mosquito more effectively using environmental measures. Over forty different biocontrol agents on mosquito have been recorded till now and among them fishes, insects and parasites show promising results. The present paper reports the use of a dragonfly nymph in mosquito control programme." (Authors)] Address: Mishra, P.K., Dept Zool., JH Govt PG Coll, Betul, 460001, India

**4868.** Motta, R.L.; Uieda, V.S. (2004): diet and trophic groups of an aquatic insect community in a tropical stream. *Braz. J. Biol.* 64(4): 809-817. (in English, with Portuguese abstract). ["The diet and trophic groups of an assemblage of aquatic insects were studied in a tropical stream. Genera of the orders Ephemeroptera, Odonata, Plecoptera, Lepidoptera, and Hemiptera showed feeding specialization. Others, such as Trichoptera, Coleoptera, and Diptera, showed great diet variation with genera of different trophic groups. Seasonal variation of insect diet, evident only for some genera of the orders Trichoptera, Lepidoptera, Coleoptera, and Diptera, was due to the differences observed in community composition and to generalist habits of these genera. However, the seasonal comparison of trophic groups showed no significant statistical differences. The great importance of organic matter, a non-limited resource, in the diet of Ribeirão do Atalho aquatic insects may be the explanation for the trophic stability in this community organization." (Authors) Odonata are treated on the genus level.] Address: Uieda, Virginia S., Departamento de Zoologia, Instituto de Biociências, Universidade Estadual Paulista, C.P. 510, CEP 18618-000, Botucatu, SP, Brazil

**4869.** Mousa, S.; Abdel-Aziz, F. (2004): Seasonal activity of insect fauna associated with sweet potato and its correlation with agronomic practices in Egypt. *Journal of Entomological Research (New Delhi)* 28(2): 117-126. (in English). ["Surveys conducted over two successive seasons showed that 20 insect species belonging to orders viz, Homoptera, Lepidoptera, Hemiptera, Orthoptera, Thysanoptera, and Coleoptera attack sweet potato. The homopterans were the dominant insects. The total of beneficial insects associated were thirteen species belonging to six orders viz., Coleoptera, Odonata, Hemiptera, Diptera, Dermaptera, Neuroptera. The early planting date harboured the lowest number of insect species, while the late planting increased the population. The variety NcSu925 (Kafr El-Zyat) was the most resistant to all groups of insects studied." (Authors)] Address: Mousa, S., Plant Protect. Res. Inst., Agr. Res. Ctr., 7 Nadi El Said St, Giza, Egypt

- 4870.** Mrowiński, P.; Zawal, A. (2004): Preliminary studies of dragonflies (Odonata) of Barlinecko-Gorzowski Landscape Park. *Parki Narodowe i Rezerwy Przyrody* 23: 471-518. (in Polish, with English summary). [Poland; 39 species including *Sympecma paedisca*, *Coenagrion lunulatum*, *Cercion lindenii*, *Erythromma viridulum*, *Aeshna viridis*, *Aeshna subarctica elisabethae*, *Brachytron pratense*, *Ophiogomphus cecilia*, *Cordulegaster boltonii*, *Somatochlora flavomaculata*, *Epithecica bimaculata*, *Libellula fulva*, and *Leucorrhinia pectoralis* are listed. Special emphasis is given to the dominance of selected species as *Ischnura elegans* and *Platycnemis pennipes*, and a comparison with odonate records from the 1930th is made.] Address: Zawal, A., Zakład Zoologii Bezkręgowców i Limnologii, Uniwersytet, Szczeciński, ul. Wąska 14, 71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl
- 4871.** Müller, J. (2004): Literatur. pedemontanum 5: 12-14. (in German). [76 new odonatalogical papers are added to the list of publications referring to Sachsen-Anhalt, Germany] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.Jmueller@t-online.de
- 4872.** Müller, J.; Steglich, R. (2004): Verzeichnis (Checkliste) der Libellen (Odonata) des Landes Sachsen-Anhalt und deren Gefährdungseinschätzung - Stand: Dez. 2004. *Pedemontanum* 5: 1-6. (in German). [Sachsen-Anhalt, Germany; checklist of species; classification according Red List status.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de
- 4873.** Müller, J.; Steglich, R. (2004): Zur Entwicklung der Vorkommen der Flussjungfern (Gomphidae) in Sachsen-Anhalt. *Pedemontanum* 5: 10-12. (in German). [Update of new records of *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, and *Stylurus flavipes* in Sachsen-Anhalt, Germany from the rivers Elbe, Saale, and Unstrut.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de
- 4874.** Ocharán, F.J.; Torralba Burrial, A. (2004): La relación entre los odonatos y la altitud: el caso de Asturias (norte de España) y la península Ibérica (Odonata). *Boletín de la Sociedad Entomológica Aragonesa* 35: 103-116. (in Spanish with English summary). [The trade-off "between the distribution of Odonata and altitude is studied for Asturias (northern Spain), by means of profiles of corrected frequencies, and is compared with bibliographical data for the rest of the Iberian Peninsula and other areas. Decreasing species richness of Odonata with increasing altitude across an altitude gradient is the general pattern. However, some species are limited to high altitude (*Sympetrum flaveolum*) or have a predominantly high-altitude distribution range (*Aeshna juncea*, *Lestes dryas*, *Lestes sponsa*). Other species live only at very low altitude (like the thermophilic *Crocothemis erythraea*) or predominantly in low areas (*Calopteryx haemorrhoidalis asturica*, *Orthetrum cancellatum*, *Onychogomphus uncatus*). Some species have a wide altitudinal range which covers the whole altitude gradient (*Pyrrhosoma nymphula*, *Coenagrion puella*, *Enallagma cyathigerum*, *Cordulegaster boltonii*, *Sympetrum striolatum*), and others seem to follow this pattern too (*Ischnura graellsii*, *Aeshna cyanea*). Habitat preferences and the relationship of some environmental factors with the altitude and the distribution of Odonata in Asturias are discussed, especially the differences with the altitudinal data known for the Iberian Peninsula. *Calopteryx virgo meridionalis* seems indifferent to altitude between 0 and 1000 m, where it disappears, thus it is not a montane species. The implications of the presence of *Aeshna juncea* at a low altitude pond (230 m above sea level) are discussed." (Authors)] Address: Ocharan, F.J., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: focharan@oonreo.uniovi.es
- 4875.** Olowo, J.P.; Chapman, L.J.; Chapman, C.A.; Ogutu-Ohwayo, R. (2004): The distribution and feeding ecology of the characid *Brycinus sadleri* in Lake Nabugabo, Uganda: implications for persistence with Nile perch (*Lates niloticus*). *African Journal of Aquatic Science* 29(1): 13-23. (in English). ["Coincident with a rapid increase in numbers of introduced predatory Nile perch (*Lates niloticus*) in lakes Victoria, Kyoga, and Nabugabo of east Africa was a dramatic decline in populations of many native fishes. However, a few species, including the characid *Brycinus sadleri*, have shown remarkable resilience. This study examined how the distribution and foraging behaviour of *B. sadleri* in Lake Nabugabo may facilitate their persistence with Nile perch. Both *B. sadleri* and Nile perch were most abundant in exposed areas offshore (20m) as opposed to wetland areas. However, we found evidence for a strong diel shift in activity and modest changes in the habitat use of *B. sadleri* that may contribute to persistence with Nile perch. In general, *B. sadleri* actively foraged during the daylight hours and remained quiet during the night. Nile perch began foraging during the early evening and were more active during the night than during the day. By early morning the proportion of full stomachs in Nile perch was low, though there was evidence of a low level of feeding activity during the day. Stomach contents of *Brycinus sadleri* indicated a shift from surface to benthic feeding as light levels increased, which appears to decrease their susceptibility to predation by Nile perch during the daylight hours." (Authors) The diet includes also Odonata.] Address: Chapman, Laureem, Department of Zoology, University of Florida, Gainesville, Florida 32611, United States of America. E-mail: lchapman@zoo.ufl.edu
- 4876.** Orr, A.G.; Butler, S.G.; Hämäläinen, M.; Kemp, R.G. (2004): Insecta: Odonata. In: Yule, C.M. & Yong, H.S. (Eds.) (2004) *Freshwater Invertebrates of the Malaysian Region*. Academy of Sciences Malaysia. 861 pp. ISBN 983-41936-0-2: 409-442. (in English). [Published by: Academy of Sciences Malaysia, 902-4, Jalan Tun Ismail, 50480 Kuala Lumpur, Malaysia. www.akedemisains.gov.my] Address: Yule, Catherine, Dept Science, Monash University Malaysia, 2 Jalan Kolej, Bandar Sunway, Petaling Jaya 46150, Selangor, Malaysia. E-mail: catherine.yule@artsci.monash.edu.my
- 4877.** Ottino, P.; Giller, P. (2004): Distribution, density, diet and habitat use of the otter in relation to land use in the Araglin valley, southern Ireland. *Biology and environment: Proceedings of the Royal Irish Academy* 104B(1): 1-17. (in English). [Odonata are represented as diet, but it is not clear if this is primary food of the otters or secondary food of otter's prey as fishes, frogs or birds.] Address: Giller, P., Department of Zoology, Ecology and Plant Science, University College Cork, Lee



Maltings, Prospect Row, Cork Ireland. E-mail: p.giller@ucc.ie

**4878.** Parris, M.J.; Davis, A.; Collins, J.P. (2004): Single-host pathogen effects on mortality and behavioral responses to predators in salamanders (Urodela: Ambystomatidae). *Canadian Journal of Zoology* 82(9): 1477-1483. (in English, with French summary). ["Pathogens can alter host behavior and affect the outcome of predator-prey interactions. Acute phase responses of hosts (e.g., a change in activity level or behavioral fever) often signal an infection, but the ecological consequences of host behavioral changes largely are unexplored, particularly for directly transmitted (i.e., single-host) pathogens. We performed three experiments to test the hypothesis that a pathogen, *Ambystoma tigrinum* virus (ATV), alters host behavior of Sonoran tiger salamanders (*Ambystoma tigrinum* *stebbinsi* Lowe, 1954) and enhances predation. In the first experiment, salamander larvae exposed to ATV experienced 48% lower mortality from dragonfly *Anax junius* (Drury, 1773) larvae than those in controls. Second, uninfected and infected larvae exposed to the nonlethal (caged) presence of predators did not significantly differ in their distance from the predator. Infected salamanders significantly increased their activity level relative to those in controls in predator-free conditions. Finally, ATV-infected larvae preferred significantly warmer temperatures than uninfected larvae, but larvae reared at the thermal maximum for the virus all died. High host activity level yet retention of effective antipredator responses likely benefits ATV because this single-host pathogen relies on host survival for transmission. Preference for warmer temperatures may be associated with the host response to pathogens and may help fight infection." (Authors)] Address: Parris, M., Dept Biol., Memphis State Univ., Memphis, TN, 38152, USA. E-mail: mparris@memphis.edu

**4879.** Parzefall, J.; Garcia, R.; Tolasch, C. (2004): Biologie, Gefährdung und Schutz der Späten Adonislilbelle *Ceriagrion tenellum* De Villers im Hamburger Raum. *Artenschutzreport* 15: 36-38. (in German with English summary). [In 2000, successful reproduction of *C. tenellum* in the Fischbeker Heide, a protected area near Hamburg, Germany, has been recorded from a 30 m long and up to 1.20 m deep bog pond, and in 2002 in an additional one of 5 x 2 m. Both habitats are fed by small sources causing a weak current in the ponds, which surface is covered with app. 90 % of *Sphagnum*. The emergence period started in mid June and ended 38 days later. The larvae climbed up to about 3 cm on stems of *Eriophorum spec.* The males exhibited short fights, but were nonterritorial. Oviposition was performed in tandem position into the *Sphagnum* mosses. The larvae concentrated in the upper part of the *Sphagnum* layers. In 2000, the larval population was calculated as 16.000 specimens.] Address: Parzefall, J., Zool. Institut & Zool. Museum der Universität Hamburg, Martin-Luther-King Platz 2, D-20146 Hamburg, Germany

**4880.** Pessacq, P.; Muzón, J. (2004): Description of the Final Stadium Larva of *Hetaerina rosea* Selys (Zygoptera: Calopterygidae). *Studies on Neotropical Fauna and Environment* 39(3): 239-242. (in English). [The description is based on specimens collected in Corrientes and Buenos Aires provinces, Argentina.] Address: Pessacq, P., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712,

AR-1900 La Plata, Argentina. E-mail: pessacq@ilpla.edu.ar

**4881.** Petrulevicius, J.F.; Nel, A. (2004): A new damselfly family from the Upper Palaeocene of Argentina. *Palaeontology* 47(1): 109-116. (in English). ["A new family of damselflies, based on *Latibasalia elongata* gen. et sp. nov. and *L. quispeae* gen. et sp. nov., is erected from the Upper Palaeocene Maíz Gordo Formation, north-western Argentina. *Latibasaliidae* fam. nov. can be included in the Zygoptera: Caloptera: Eucaloptera: Amphipterygida: Amphipterygoidea. Its phylogenetic relationships within the clade Eucaloptera Bechly, 1996 are discussed. Within Amphipterygoidea, *Latibasaliidae* could be closely related to *Pseudolestidae* or to the 'thaumatoneurid' genera *Petrolestes* and *Congqingia* because they share the absence of secondary antenodal crossveins of first and second rows and the absence of antesubnodal crossveins. These characters could be potential synapomorphies of these taxa but they are somewhat homoplastic within the Zygoptera." (Authors)] Address: Nel, A., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**4882.** Petrulevicius, J.F.; Nel, A. (2004): Recognition of the first fossil lestoïd damselfly in south America (Insecta: Zygoptera): Biogeographic and phylogenetic remarks. *Journal of Paleontology* 78(4): 798-801. (in English). [Argentina; *Promegalestes singularis* n. sp. is described and figured. *Promegalestes* n. gen. is the third genus of *Lestinoidea* discovered in South America. The two other lestoïd damselflies are recent "derived" *Lestidae* (*Lestes*, *Archilestes*). *Promegalestes* is not directly related to them and perhaps corresponds to a distinct family. It is the oldest and probably the "most basal" known *Lestinoidea*. No information contradicts its possible attribution as sister group of [*Megalestidae* + *Lestidae*.] Address: Nel, A., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**4883.** Phoenix, J.; Zinke, J. (2004): Neue Nachweise von *Cordulegaster bidentata* SELYS, 1843 (Odonata, Cordulegasteridae) im sächsischen Teil des Elbsandsteingebirges (Sächsische Schweiz). *Entomologische Nachrichten und Berichte* 48(1): 175-178. (in German, with English summary). [This is a detailed compilation of current records of *Thecagaster bidentata* in the region called Sächsische Schweiz, Saxonia, Germany.] Address: Phoenix, J., Goethestr. 22, D-01824 Königstein, Germany

**4884.** Polhemus, D.A.; Englund, R.A.; Allen, G.R. (2004): Freshwater Biotas of New Guinea and Nearby Islands: Analysis of Endemism, Richness, and Threats. Final Report Prepared for: Conservation International, Washington, D.C. Bishop Museum Technical Report 31, Contribution No. 2004-004 to the Pacific Biological Survey: II, 62 pp. ["Effective conservation of regional biotas requires accurate information on the distribution, endemism, local richness, and taxonomic composition of species assemblages across multiple geographic scales. This is especially true in the Melanesian region, which contains ten percent of the world's biota on its numerous islands scattered across thousands of kilometers between Fiji and the Moluccas. Although certain important biotic components within this region, such as birds, have been reasonably surveyed, many others,

particularly freshwater organisms, remain poorly understood. To this end, a systematic survey program for freshwater fishes and invertebrates on New Guinea and nearby islands was undertaken over the last 10 years, involving an array of research organizations with long-standing interests in Melanesia, including the Bishop Museum, Smithsonian Institution, the Indonesian science ministry (LIPI), the Papua New Guinea National Museum and Gallery, and Conservation International. This work has also been augmented by partnerships with private sector entities operating in the region, most notably Chevron Niugini and P. T. Freeport Indonesia. These surveys have revealed previously unsuspected levels of species richness and endemism among New Guinea freshwater organisms, and the remarkable number of new species discovered during these surveys has also highlighted the fact that similar knowledge gaps and potentially similar levels of undocumented freshwater biodiversity remain through much of the rest of Melanesia beyond New Guinea. To the extent that they are now understood, Melanesian freshwater biotas appear to be characterized by foci of high endemism clustered around tectonic provinces within individual large islands, such as New Guinea, or on geologically allied groups of smaller islands, such as the Louisiades and Solomons. In lotic systems, such as streams and rivers, this endemism frequently displays a marked turnover in species elements along the length of individual catchments, linked to segregation of individual species by altitude, water temperature, substrate, bed profile and terminal reach salinity gradients. By contrast, lentic systems often harbor suites of localized endemic species centered around individual lakes or wetland complexes. Although known in a broad sense based on scattered collections made during the past 200 years and distributed among major museums, freshwater biotas of islands in the Melanesian region remain for the most part under-surveyed and poorly characterized taxonomically. Although the overall condition of freshwater ecosystems in the New Guinea region is currently excellent, there are obvious threats to the biota that tend to manifest themselves on local rather than regional scales. These threats may be grouped into three general categories: 1.) physical alteration of habitat; 2.) utilization of biotic resources, and 3.) invasive species. Threats from habitat alteration to freshwater ecosystems include but are not limited to industrial logging, shifting cultivation, oil palm plantations, mining, petroleum development, and hydroelectric schemes. Utilization of biotic resources such as the live aquarium fish trade or the harvest of native fish for food are deemed a much lower threat. While invasive species have not yet caused large-scale perturbations to freshwater systems they are a looming threat that is becoming increasingly problematic." (Authors) Numerous colour pictures of Odonata are included.] Address: [www.bishopmuseum.org/research/pbs/pdf/ci-png.pdf](http://www.bishopmuseum.org/research/pbs/pdf/ci-png.pdf)

**4885.** Popova, O.N. (2004): Intraspecific taxonomy of *Sympetrum pedemontanum* (Müller, 1766) (Anisoptera: Libellulidae). *Odonatologica* 32(2): 207-216. (in English). ["An analysis of a large series of specimens from Eurasia showed a strong morphological variability. It is of an individual, modificatory, or clinal nature, rather than a geographical one. Thus, 2 continental subspecies, *S. p. intermedium* Belyshev, 1955 and *S. p. kurentzovi* Bely., 1956, should be suppressed as they cannot be defined by any taxonomically significant differences. The insular subspecies, *S. p. elatum*, inhabiting

Sakhalin, the Kurile and the Japanese islands, however, can be separated. It is concluded that *S. pedemontanum* has only 2 subspecies: continental *S. p. pedemontanum* and the insular *S. p. elatum*." (Author) The author outlines the correct authorship of the taxon being Müller, 1766, and not Allioni, 1766.] Address: Popova, O.N., Institut Sistemati i Zkologii Zhivotnykh, 630091 Novosibirsk, Ul. Frunse 11, Russia. E-mail: [pc@eco.nsc.ru](mailto:pc@eco.nsc.ru)

**4886.** Ramanujam, M.E.; Verzhutskii, B. (2004): The prey of the greater false vampire bat *Megaderma lyra* E. Geoffroy at Kaliveli, Tamil Nadu. *Zoos' Print* 19(10): 1655-1656. (in English). [Faecal analysis.] Address: Ramanujam, M.E.; Pitchandikulam Bio. Resource Ctr. Gratitude Avian Rehabilitat, ECTDEF Project, Auroville, Pondicherry, 605101, India. E-mail: [tdef@auroville.org.in](mailto:tdef@auroville.org.in)

**4887.** Reborá, M.; Piersanti, S., Gaino, E.; (2004): Visual and mechanical cues used for prey detection by the larva of *Libellula depressa* (Odonata Libellulidae). *Ethology, Ecology & Evolution* 16(2): 133-144. (in English). ["Cues used for the detection of prey by the larva of *Libellula depressa* (Odonata Libellulidae) were investigated. Nymphs (alive and recently dead) of the mayfly *Cloeon dipterum* (Ephemeroptera Baetidae) and dummies were used as prey models. The responses of the larva to stimulations of different kinds and intensity, in different areas around the body, were tested in the laboratory in six different behavioural experiments. From the statistical analysis of the data (Pearson Chi-square and one-way ANOVA) it emerged that: (i) chemical cues seem not to be involved in the detection of the prey or, if they are involved, they are negligible in comparison with other kinds of stimuli; (ii) the larva of *L. depressa* utilizes mechanical and visual cues for the release of the predatory labial strike, and either one of these cues is effective for labial strike elicitation; (iii) mechanical stimuli have a predominant role in predation; (iv) the larva of *L. depressa* can rely on a non-contact mechanical sense for the detection of the prey. The importance of mechanical and visual cues is discussed in relation to the pond bed habitat of this species." (Authors)] Address: Gaino, E., Univ. Perugia, Dipartimento Biol. Anim. & Ecol., Via Elce Sotto, I-06123 Perugia, Italy. E-mail: [gaino@unipg.it](mailto:gaino@unipg.it)

**4888.** Reinhardt, K. (2004): Neue Libellenliteratur. *Entomologische Nachrichten und Berichte* 48(1): 17-18-68-69. (in German). [Detailed and critical but very competent reviews of a current CD ROM and three books: Schorr & Lindeboom (2003), Brooks (2002), Silsby (2001), and Tarboton & Tarboton (2002).] Address: Reinhardt, K., Dept Animal & Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: [K.Reinhardt@sheffield.ac.uk](mailto:K.Reinhardt@sheffield.ac.uk)

**4889.** Riaz, H.; Khawaja, B.A. (2004): The description of the naiads of *Orthetrum*, *Trithemis* and *Sympetrum* (Odonata: Libellulidae) from Sindh Province. *Pakistan Journal of Biological Sciences* 7(3): 419-422. (in English). [Larvae of *Orthetrum*, *Trithemis*, and *Sympetrum* collected from the various locations of the Sindh Province of Pakistan are described at the genus level.] Address: Riaz H., Pest Warning and Quality Control of Pesticides, Pakpattan, Pakistan. E-mail: [riazhussain37@hotmail.com](mailto:riazhussain37@hotmail.com)

**4890.** Robinson, B.A. (2004): An Inventory of Aquatic Macroinvertebrates and Calculation of Selected Biotic Indices for the U.S. Army Atterbury Reserve Forces Training Area near Edinburgh, Indiana, September 2000 August 2002. Prepared in cooperation with the Indiana Army National Guard, Scientific Investigations Report 2004-5010, U.S. Department of the Interior, U.S. Geological Survey: 19 pp. (in English). ["At the request of the Indiana Army National Guard Environmental Protection Office, macroinvertebrate samples were collected by the USGS at 16 sites within the Camp Atterbury study area between September 2000 and August 2002. The data were combined, and duplicate and ambiguous taxa were removed to develop an inventory of macroinvertebrates in the streams at Camp Atterbury. This inventory and the taxonomic list produced for each site provide base-line data to evaluate environmental changes if future macroinvertebrate samples are collected at Camp Atterbury or if physical changes are made within or upstream from the study area. In this inventory, 173 distinct taxa have been identified; of those, 156 distinct taxa are from the Phylum Arthropoda. The orders with the greatest number of identified distinct taxa are Diptera, Coleoptera, Ephemeroptera, and Trichoptera. One of the species identified in the Camp Atterbury samples was *Cordulegaster maculata* Selys (a twin-spotted spiketail dragonfly). This species, while not listed as endangered or threatened at the State or Federal level, is recognized by IDNR as being rare enough to warrant special concern (Indiana Department of Natural Resources, 2002). Three biotic indices were calculated to evaluate what the macroinvertebrate data may indicate regarding surface-water-quality conditions at Camp Atterbury the Ephemeroptera, Plecoptera, Trichoptera Richness Index; the Hilsenhoff Biotic Index; and the Invertebrate Community Index. The composition of the macroinvertebrate community at a site is used in these indices to provide insight regarding surface-water quality. The Ephemeroptera, Plecoptera, Trichoptera Richness Index is a measure of the abundance of these three pollution-sensitive insect orders within a sample. The EPT values calculated for the macroinvertebrate samples collected at Camp Atterbury range from 5 to 15, with more than 75 percent of the values within the range of 7 to 11. The lowest value of 5 came from a qualitative sample collected at site A4 in 2002. This low value could be taken as an indicator of degraded water quality at this site compared to the other sites. At site A4, however, a Surber sample collected in 2000 produced an EPT value of 11, and a duplicate sample collected in 2002 produced an EPT value of 10. Therefore, the low value generated from the 2002 qualitative sample at site A4 seems to have resulted from natural variation within the macroinvertebrate community or the sampling and analysis process and may not be a true indicator of poor water quality. The Hilsenhoff Biotic Index evaluates surface-water quality at a site, using pollution-tolerance values of individual taxa identified in a sample. For Camp Atterbury, Hilsenhoff Biotic Index scores were calculated for the three artificial-substrate samples collected in 2002. Samples collected at sites A5 and B2 indicated fair water quality, whereas the sample collected at site B3 indicated poor water quality. The Invertebrate Community Index was developed to aid in the evaluation of surface-water-quality conditions at sites where artificial-substrate and qualitative macroinvertebrate samples have been collected. This index was applied to evaluate environmental conditions at the three sites where artificial-substrate samples were col-

lected in 2002. Results derived from samples collected at sites A5 and B2 indicate good water quality, whereas the Invertebrate Community Index score calculated for site B3 placed water quality between the good and fair categories. The Hilsenhoff Biotic Index score and the Invertebrate Community Index score calculated for site B3 indicate that water-quality conditions are slightly degraded. The calculated scores, however, simply may reflect the relatively small drainage area of this site compared to other sampling sites in the study area and that flow periodically approaches zero." (Author) 9 odonate taxa are listed in table 2] Address: <http://water.usgs.gov/pubs/sir/2004/5010/sir20045010.pdf>

**4891.** Rodrigo Fonseca, A.; Moreno Sanches, N.; Moisés Quintilhiano, D.; da Fonseca, M.C.; da Silva, E.S. (2004): Levantamento de espécies de Odonata associadas à tanques de piscicultura e efeito de *Bacillus thuringiensis* var. *israelensis* sobre ninfas de *Pantala flavescens* (Fabricius, 1798) (Odonata: Libellulidae). *Acta Scientiarum. Biological Sciences* Maringá 26(1): 25-29. (in Portuguese, with English summary). ["Odonata species survey associated with pisciculture tanks and *Bacillus thuringiensis* var. *israelensis* effect on *P. flavescens* (Fabricius, 1798) nymphs. Several pisciculture stations that deal with fingerlings or ornamental fishes rearing have presented some problems with larvae preying, post-larvae and fingerlings by Odonata Order insect nymphs. Thus, the aim of this work was to survey the Odonata species present in fish-raising tanks in two towns of the Midwest region of Minas Gerais, and also to evaluate the effect of *Bacillus thuringiensis* var. *Barjac israelensis* on *Pantala flavescens* nymphs (Fabricius, 1798) (Odonata: Libellulidae). Fortnightly collections were performed over a three month period. The adult insects were captured with entomological nets and the nymphs with fine mesh sieves, coupled to wooden handles. The captured nymphs were taken to the laboratory where they were individualized in 2L plastic foam boxes and sealed in its upper extremity with tulle. Soon after the adults emergence, they were killed, packed into envelopes and sent to be identified. The laboratory experiments were conducted in an acclimatized room at  $25 \pm 2^\circ\text{C}$ , RH of  $70 \pm 10\%$  and 12-hour photophase. Second instar *P. flavescens* nymphs were packed individually into plastic foam boxes containing 500mL of chlorine free water each one. When they were in the third, fifth and seventh instars, they were treated with *B. thuringiensis* var. *israelensis* through the microbial product Vectobac® in granulate formulation. The product was directly applied to the rearing container water at the concentration denoted for the control of culicidae larvae, two superior concentrations, two inferior and also another one, where the product was not applied. The evaluations were done at 24, 48 and 72 hours after the product application, recording the dead insects number in each treatment. In both experiments, the nymphs were fed with Culicidae larvae and new-born fishes of the species *Poecilia cf. vivipara* Schneider, 1801. The following species were identified: *Ischnura fluvialis* Selys, 1876; *Aphylla theodorina* (Navas, 1933); *Brachymesia furcata* (Hagen, 1861); *Erythrodiplax fusca* (Rambur, 1842); *Miathyria marcella* (Selys, 1857); *Micrathyria almeidai* Santos, 1945; *Micrathyria hesperis* Ris, 1911; *Orthemis discolor* (Burmeister, 1839); *Perithemis moorma* Kirby, 1889 and *P. flavescens*. There were no significant microbial product effects on the studied species." (Authors)] Address: Rodrigo Fonseca, A., Fundação Educacional de Divinópolis Funedi, Universidade Esta-



dual de Minas Gerais, Centro de Pós-graduação e Pesquisa, Campus Universitário, s/nº, Jardim Belvedere II, 35500-970, Divinópolis, Minas Gerais, Brasil. E-mail alysson@funedi.edu.br

**4892.** Rödel, M.-O.; Rudolf, V.H.W.; Frohshammer, S.; Linsenmair, K.E. (2004): Life history of a West African tree-hole breeding frog, *Phrynobatrachus guineensis*, Guibe & Lamotte, 1961 (Amphibia: Anura: Petropedetidae). *Miscellaneous Publications Museum of Zoology University of Michigan* 193: 31-44. (in English). ["This article is based on field data gathered through the years 1999 to 2002 in Tai National Park, Ivory Coast. From May 2000 to September 2002 we monitored breeding sites on a nearly daily basis. In total we have 49,818 data sets covering 89 natural and 57 artificial breeding sites. *P. guineensis* occurs in primary rainforest and reproduces in water-filled tree-holes, fruit capsules and snail shells. Density of potentially suitable tree-holes ranged between 0 and 167 tree-holes per hectare in different parts of the forest. Breeding sites showed a clumped distribution and were situated exclusively in drier parts of the forest. Highest density of breeding sites used through a particular period was 23 per hectare. Water volume of oviposition sites ranged from 4 to 900 ml. Based on mark-recapture data, we calculated a mean population size of 49 reproducing males in an area of approximately five hectares. Breeding activity was highest during the rainy seasons and close to zero during drier parts of the year. Adult males had a total reproductive period of about one month. The longest interval from first to last capture was 193 days for a male, and 130 days for a female. Only 2.3% of known frogs survived the long dry season of about three months. Most males stayed only for a single day at a particular breeding site. The longest period that a male continuously remained at a breeding site was 23 days. We observed turnover rates of up to 75% in use of breeding sites between successive rainy seasons. Most often, only single males occupied a breeding site. However, occasionally up to six males shared the same hole. Territorial behavior was rarely observed among males. Adult frogs did not provide parental care. Mean clutch size was 18.7 eggs. Tadpoles hatched after five days, and larval development ranged from 15 to 28 days (mean 20.6 days). Mean tadpole density was 0.6 tadpoles/ml; the highest density was two tadpole s/ml. Mean tadpole mortality was 44.7%. Predation and desiccation accounted each for about one quarter of the mortality, the remainder was for unknown reasons. The presence of aquatic predators prevent *P. guineensis* from using larger tree-holes that are less prone to desiccation. When fly and dragonfly larvae were present, tadpole mortality raised to 75-100% per tree-hole." (Authors)] Address: Rödel, M.-L., Dept Anim. Ecol. & Trop. Biol. Bioctr., Univ. Würzburg, Hubland, D-97074, Würzburg, Germany. E-mail: roedel@biozentrum.uni-wuerzburg.de

**4893.** Rolff, J.; Siva-Jothy, M.T. (2004): Selection on insect immunity in the wild. *Proceedings of the Royal Society of London - Series B: Biological Sciences*. 271 (1553): 2157-2160. (in English). ["The strength of selection on immune function in wild populations has only been examined in a few vertebrate species. We report the results from a study measuring selection on a key insect immune enzyme, phenoloxidase (PO), in a wild population of the damselfly *Calopteryx xanthostoma*. We followed individually marked males from the pre-

reproductive adult phase and recorded their lifetime mating success. We found positive selection on PO activity in response to an immune insult, but no selection on wing-spot quality, a trait actively displayed to females during courtship. We suggest that positive selection on PO activity in the year of study may be explained by annual fluctuations in parasite loads." (Authors)] Address: Rolff, J., Department of Animal and Plant Sciences, University of Sheffield, S10 2TN Sheffield, UK. E-mail: JOR@sheffield.ac.uk

**4894.** Rolff, J.; Meutter, F. van de; Stoks, R. (2004): Time constraints decouple age and size at maturity and physiological traits. *American naturalist* 164(4): 559-565. (in English). ["Life-history theory predicts changes in age and size at maturity in response to constraints in animals with complex life cycles. A critical underlying assumption is that only these traits are optimized during ontogeny. However, it is not clear how altered life histories mechanistically translate into survival and fecundity. Here we present data from damselflies reared from egg to adult under day lengths mimicking the start or end (time constrained) of the season at high and low food level. These data show that an important component of immunity is suppressed under time-constrained development as well as under low food conditions and that fat storage is affected only by food availability. Intriguingly, the physiological responses are partly decoupled from age and size at maturity, which indicates that the predictive value of traits such as age and size at maturity might well be restricted." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**4895.** Rowe, R.J. (2004): Agonistic behaviour in final-instar larvae of *Episynlestes cristatus*, *Synlestes tropicus* and *Chorismagrion risi* (Odonata: Synlestidae), and relationships within the 'Lestioidea'. *Australian Journal of Zoology* 52(2): 169-181. (in English). ["Larval agonistic displays are reported from three sympatric synlestid damselflies: *Episynlestes cristatus*, *Synlestes tropicus* and *Chorismagrion risi*. There were strong similarities between the species in the observed displays. Repertoires of all three species contained elements otherwise known only from larval Lestidae (conventionally interpreted as a member of the sister group to the Synlestidae). In night-time observations under infrared illumination different displays, some similar to those of coenagrionids, occurred. On the basis of similarities in larval displays I conclude that *Chorismagrion risi*, regarded on adult characters as an enigmatic form, is a member of the Synlestidae and that the Synlestidae and Lestidae are closely allied." (Author)] Address: Rowe, R.J., Sch. Trop. Biol., James Cook Univ., Townsville 4811, Australia. E-mail: Richard.Rowe@jcu.edu.au

**4896.** Sadeghi, S.; Dumont, H. (2004): First record of *Libellula fulva pontica* Selys, 1887 (Odonata, Anisoptera) from Iran. *Zoology in the Middle East*. 32: 116-117. (in English). [4-IX-2001, Hafar-e-Sharghi, Khoozestan province, SW Iran.] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

**4897.** Sampaio, A.; Cortes, R.; Leao, C. (2004): Yeast and macroinvertebrate communities associated with leaf litter decomposition in a second order stream. *Internat. Rev. Hydrobiol.* 89(5/6): 453-466. (in English).

["The composition of yeast and macroinvertebrate communities was studied on black alder, blue gum eucalyptus and English oak leaves decaying in a stream during a six-month period. ANOVA analysis showed significantly different values ( $p < 0.0001$ ) of yeast and macroinvertebrate densities among the three leaf litters. Some yeast species [...] were present in all litter types. Other yeasts were restricted to a specific type of litter. Macroinvertebrates were dominated by collectors-gatherers on oak and eucalyptus leaves. Shredders reached highest densities in alder leaves." (Authors) Olo river, Serra do Alvao, NE Portugal; Boyeria irene is listed in table 2.] Address: Sampaio, Ana, CETAV Depart. de Engenharia Biológica e Ambiental, University of Trás-os-Montes e Alto Douro, Apartado 1013, 5001 911 Vila Real, Portugal. E-mail: [asampaio@utad.pt](mailto:asampaio@utad.pt)

**4898.** Samways, M.J.; Taylor, S. (2004): Impacts of invasive alien plants on Red-Listed South African dragonflies (Odonata). *South African Journal of Science* 100(1): 78-80. (in English). ["This paper gives an overview of the threats to dragonflies (including damselflies) (Odonata), globally and nationally Red-Listed by the IUCN, in South Africa. All the globally Red-Listed species are endemic to South Africa. Invasive alien plants, especially Australian Acacia trees along water-courses, are by far the most important threat to these endemic species. Removal of the invasive alien trees is likely to increase considerably the prospects for the long-term survival of these species. In contrast, the nationally Red-Listed species that are not globally Red-Listed are threatened overall more by natural vagaries of weather than by invasive alien plants." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: [samways@sun.ac.za](mailto:samways@sun.ac.za)

**4899.** Samways, M.J. (2004): Monopodding in *Leslinogomphus angustus* Martin (Anisoptera: Gomphidae). *Odonatologica* 33(4): 443-444. (in English). ["The long abdominal segment 10 in *L. angustus* is used as a monopod to support itself while it perches on horizontal stems and twigs in the shade of bushes or trees." (Author)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: [samways@sun.ac.za](mailto:samways@sun.ac.za)

**4900.** Schilder, R.; Marden, J.H. (2004): A hierarchical analysis of the scaling of force and power production by dragonfly flight motors. *Journal of Experimental Biology* 207(5): 767-776. (in English). ["Maximum isometric force output by single muscles has long been known to be proportional to muscle mass<sup>0.67</sup>, i.e. to muscle cross-sectional area. However, locomotion often requires a different muscle contraction regime than that used under isometric conditions. Moreover, lever mechanisms generally affect the force outputs of muscle-limb linkages, which is one reason why the scaling of net force output by intact musculoskeletal systems can differ from mass<sup>0.67</sup>. Indeed, several studies have demonstrated that force output by intact musculoskeletal systems and non-biological systems is proportional to motor mass<sup>1.0</sup>. Here we trace the mechanisms that cause dragonflies to achieve a change from muscle mass<sup>0.67</sup> scaling of maximum force output by single flight muscles to mass<sup>1.0</sup> scaling of dynamic force output by the intact dragonfly flight motor. In eight species of dragonflies, tetanic force output by the basalar muscle during isometric contraction scaled as muscle mass-

0.67. Mean force output by the basalar muscle under dynamic conditions (workloops) that simulated in vivo maximum musculoskeletal performance was proportional to muscle mass<sup>0.83</sup>, a significant increase in the scaling exponent over that of maximum isometric force output. The dynamic performance of the basalar muscle and the anatomy of its lever, consisting of the second moment of area of the forewing ( $d_2$ ) and the distance between the muscle apodeme and the wing fulcrum ( $d_1$ ), were used to analyze net force output by the integrated muscle-lever system (Find). The scaling of  $d_2$  conformed closely to the expected value from geometric similarity (proportional to muscle mass<sup>0.31</sup>), whereas  $d_1$  scaled as muscle mass<sup>0.54</sup>, a significant increase over the expected value from geometric similarity. Find scaled as muscle mass<sup>1.036</sup>, and this scaling exponent was not significantly different from unity or from the scaling exponent relating maximum load-lifting by flying dragonflies to their thorax mass. Thus, the combined effect of a change in the scaling of force output by the muscle during dynamic contraction compared to that during isometric contraction and the departure from geometric similarity of one of the two lever arm lengths provides an explanation for how mass<sup>1.0</sup> scaling of force output by the intact musculoskeletal system is accomplished. We also show that maximum muscle mass-specific net work and power output available scale as mass<sup>0.43</sup> and mass<sup>0.24</sup>, respectively." (Authors)] Address: Schilder, R., Department of Biology, Pennsylvania State University, 208 Mueller Laboratory, University Park, PA, 16802, USA. E-mail: [rjs360@psu.edu](mailto:rjs360@psu.edu)

**4901.** Schilder, R.; Marden, J. (2004): Diabetic Dragonflies: hyperglycaemia and insulin response differences in *L. pulchella* dragonflies suffering from a protozoan gut parasite. *FASEB Journal* 18(4-5): Abst. 452.3.. (in English). ["We study the effects of a protozoan (gregarine) gut parasite on protein expression, metabolism and locomotory performance of *Libellula pulchella* dragonflies. Freshly caught parasitized *L. pulchella* males show significantly higher hemolymph glucose levels. This hyperglycaemia can also be induced in healthy individuals by exposing them to gregarine excretory / secretory (E/S) products. Our current working hypothesis is that the hyperglycaemia is induced by an immune-response driven insulin resistance in the flight muscles. Western blot analyses of p38-mitogen activated kinase (p38 MAPK), a protein involved in cell signaling during inflammatory responses of the immune system, show that it is chronically phosphorylated in flight muscles of parasitized individuals. Chronic activation of p38-MAPK has been shown to negatively affect insulin function in vertebrate skeletal muscle. Healthy dragonflies injected with insulin show a significant decrease in hemolymph glucose levels, while insulin treated parasitized individuals show a significant increase in hemolymph glucose levels. While the exact nature of the proposed insulin resistance needs further exploration, this host-parasite interaction shows a potential to become a model system to study possible causes and effects of type II diabetic phenotypes caused by inflammation." (Authors)] Address: Schilder, R., Biology, Penn State University, 208 Mueller labs, State College, PA, 16802, USA. E-mail: [rjs360@psu.edu](mailto:rjs360@psu.edu)

**4902.** Schmidt, E. (2004): Der Zweifleck Epithea bimaculata fliegt wieder an der Mittelalbe (Odonata). *Entomologische Nachrichten und Berichte* 48(1): 51-52. (in German). [28./29-V-2003, Kliekener Alte Elbe, Sach-

sen-Anhalt, Germany. The habitat and the behaviour of *E. bimaculata* are described in detail. Field characters to discriminate *E. bimaculata* from *Libellula quadrimaculata* are outlined and very welcome. In addition, co-occurring odonate species are listed and patterns of (regional) distribution are discussed.] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**4903.** Schmidt, E. (2004): Die Auswirkungen von Stauhaltungen auf die Libellen-Fauna eines ausgebauten Flachlandbaches, der Issel bei Wesel/Niederrhein (Odonata: Calopterygidae). *Entomol. Generalis* 27(2): 87-104. (in German with English summary). [Along the canalized brook of Issel (Nordrhein-Westfalen, Germany), a total of 25 odonate species was recorded within a decade from 1994 to 2003. Only *Calopteryx splendens* was abundant, while the rest of the species are immigrants or rare breeders in low abundance. *C. splendens* seems to be favoured by a dam which cascades the water and which provides therefore suitable enrichment which oxygen and compensation of unsuitable temperatures along the stretch of the brook. An additional factor, rapid flow at temporary high flood or high water level in winter combined with lacking shelter of (dense) vegetation, seems to be tolerated by *C. splendens* only, because the larvae are able to cling close to the remaining plants.] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**4904.** Schneider, W. (2004): Friedrich Moritz Brauer's and Johann Jakob Kaup's types of dragonflies (Insecta: Odonata) in the Hessisches Landesmuseum Darmstadt. *Kaupia* 13: 77-87. (in English, with German summary). ["The present status of 40 type specimens of 18 nominal dragonfly taxa described by F. M. Brauer and J. J. Kaup in three publications between 1866 and 1867 is presented. These taxa - here listed according to their original generic assignment - are: *Neurobasis kaupi* Brauer, 1867, *Rhinocypha ustulata* Kaup in Brauer, 1867, *Gynacantha rosenbergi* Kaup in B., 1867, *Diplax cora* Kaup in B., 1867, *Diplax denticauda* Brauer, 1867, *D. thoracanta* Brauer, 1867, *Perithemis duivenbodei* Brauer, 1866, *Agrionoptera quatuornotata* Brauer, 1867, *Libellula pectoralis* Kaup in B., 1867, *L. coronata* Kaup in B., 1866, *Polyneura decora* Kaup in B., 1866, *P. ramburii* Kaup in B., 1866, *Neurothemis pseudosophronia* Brauer, 1867, *N. innominata* Brauer, 1867, *N. diplax* Brauer, 1867, *Celithemis pygmaea* Brauer, 1867, *Tramea loewii* Kaup in B., 1866, and *T. rosenbergi* Brauer, 1866. The types are deposited in the insect collections of the Hessisches Landesmuseum, Darmstadt (Germany) and the Natural History Museum, Vienna (Austria)."] (Author)] Address: Schneider, W., Hess. Landesmus., Zool. Abt., Friedensplatz 1, D-64283 Darmstadt, Germany. E-mail: w.schneider@hlmd.de

**4905.** Sharifi, M.; Hemmati, Z. (2004): Variation in the diet of Mehely's Horseshoe Bat, *Rhinolophus mehelyi*, in three contrasting environments in western Iran. *Zoology in the Middle East* 33: 65-72. (in English). ["The diet of *R. mehelyi* was investigated through analysis of droppings collected from three maternity roosts in northern Zagros, mid-Zagros and the northern Mesopotamian plain. Moths (Lepidoptera) dominated in all areas (34.9-69.5% volume). The second most important food items in the northern Mesopotamian plain and the mid-Zagros are beetles (Coleoptera, 12.6-28.2% volume), while in northern Zagros Homoptera (16% volume) are

the next important food items. The diet of *R. mehelyi* in northern Zagros is characterized by a low proportion of Coleoptera (10%) and the presence of more diverse prey species (12 categories). In the northern Mesopotamian plain and in mid-Zagros, the food items consist mainly of lepidopteran and coleopteran species with fewer additional prey species. Species groups occurring only in the diet of Mehely's Horseshoe Bat in the northern Zagros are Odonata, Trichoptera, Dictyoptera and Acarina." (Authors)] Address: Sharifi, M., Fac. Sci Dept Biol., Razi Univ, Kermanshah, 67149, Iran. E-mail: sharifimozafar@hotmail.com]

**4906.** Shukla, A. N.; Shrivastava, S. (2004): Species diversity of macrozoobenthos: A tool for monitoring water pollution of Gandhisagar Reservoir, M.P., India. *Biological Memoirs* 30(1): 7-13. (in English). ["Limnological studies on Gandhisagar Reservoir (GSR) were undertaken during July 2001 to June 2003. Species diversity index of macrozoobenthos was applied for the monitoring of water pollution of the reservoir. Total 109 species of macrozoobenthos (including Odonata) were recorded. The number, however, varied at different study sites. The order of decrease in diversity index was Dam > Rampura > Basai. Further, it gradually decreased from shallower zone to deeper profundal zone. Low macrozoobenthic diversity was observed during rainy season, which may be due to pollution inputs of run-off water and a decline in dissolved oxygen and transparency. The diversity index was greater in summer months, which may be attributed to the breeding season in nutrient rich and oxygenated habitats. Thus, GSR may be designated as beta-mesosaprobic as it exhibits fluctuating pattern a feature of moderately polluted water." (Authors)] Address: Sch. Studies Zool. Limnol. and Environm. Biol. Unit., Vikram Univ., Ujjain, Madhya Pradesh, 456010, India

**4907.** Simaika, J.P.; Cannings, R.A. (2004): *Lestes disjunctus* Selys and *L. forcipatus* Rambur (Odonata: Lestidae): Some Solutions for Identification. *J. Entomol. Soc. Brit. Columbia* 101: 131-139. (in English). ["Five species of the damselfly genus *Lestes* live in British Columbia, Canada, and of these, *Lestes forcipatus* Rambur and *L. disjunctus* Selys are the most similar and most difficult to separate morphologically. Females can be readily distinguished by the size of the ovipositor, but males are difficult to separate. In British Columbia, *L. disjunctus* is the more common, widespread and familiar species. Before 1998, *L. forcipatus* specimens were mistaken for those of *L. disjunctus* because the former is primarily an eastern North American species and because most *Lestes* species are usually identified using male characters. With the discovery that *L. forcipatus* is part of the western fauna, an evaluation of the relative status of the two species in British Columbia is necessary. The best method for separating the two species uses the length of the anterior lamina (part of the secondary genitalia) as a unique character or as part of ratios using other measurements. In addition, in at least western North America, *L. forcipatus* males are more pruinulent than those of *L. disjunctus*, especially on the thorax. Identification using the pruinulence pattern was tested in the field and is recommended as a simple and accurate method for western North America. Soaking Odonata specimens in acetone, a common technique used to preserve colours, damages surface pruinulence and should not be used to preserve mature, pruinulent adults, including those of *Lestes* spe-



cies. To identify *L. disjunctus* and *L. forcipatus* males treated in acetone, it may be necessary to calculate ratios based on various character measurements. Future research should investigate spatial and temporal differences between the species, as well as modes of interspecific communication." (Authors)] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street, Victoria, British Columbia, CA V8W 9W2

**4908.** Sohni, V.; Finch, O.-D. (2004): Die Libellen eines regenerierten Restmoores in Nordwestdeutschland (Insecta: Odonata). *Drosera* 2004: 119-135. (in German, with English summary). ["Dragonflies of a regenerated bog relict in northwest Germany (Insecta: Odonata) We examined the odonate assemblages of 11 water systems situated within a protected remnant peat bog in the north-eastern part of Cloppenburg district, Lower Saxony in summer 2001. A total of 30 species was recorded, representing half of the species known to occur between the rivers Ems and Weser. 13 species (45%) are listed in the Red Data Books of either Germany and/or Lower Saxony. Two species, *Ceriagrion tenellum* and *Aeschna subarctica*, are listed as endangered, with the former being confirmed to reproduce within the study site. Species richness at the water systems ranged from 5 to 18 species per system. Besides high densities of eurytopic species like *Lestes sponsa* and *Pyrrosoma nymphula*, we found some stenotopic species confined to acidic bogs occurring in lower numbers. The number of bog specialists found in our study area is in concordance with the situation of other bogs in early stages of regeneration. Regeneration of the investigated bog was initiated by measures in 1988. Subsequent measures like the sealing of drainages increased the ratio of bog specialists vs. generalist species in the study area. The occurrence of *Ceriagrion tenellum* and *Aeschna subarctica* justifies taking measures in the future." (Authors)] Address: Finch, O.-D., Universität Oldenburg Fk 5 / Bio-, Geo- und Umweltwissenschaften, AG Terrestrische Ökologie, D- 26111 Oldenburg, Germany. E-mail: oliver.d.finch@uni-oldenburg.de

**4909.** Storfer, A.; White, C. (2004): Phenotypically plastic responses of larval tiger salamanders, *Ambystoma tigrinum*, to different predators. *Journal of Herpetology* 38(4): 612-615. (in English). ["Studies of prey responses to different predators are needed to investigate costs and benefits of particular antipredator responses and to unravel community-level effects on phenotypic plasticity. We reared laboratory-bred larvae of Arizona Tiger Salamanders, *Ambystoma tigrinum nebulosum* with either of two common predators, diving beetle larvae (*Dytiscus* sp.) or dragonfly naiads (*Anax junius*). Relative to controls, salamander larvae in both predator treatments had shorter snout-vent lengths and deeper tails; these differences may be related to increased swimming ability. In addition, larvae reared with dragonfly naiads had shorter tails than those reared with diving beetle larvae, possibly in response to different predator foraging strategies or differences in strength of selection imposed by each. Salamander larvae from predator treatments weighed less than controls, with salamanders reared with dragonflies weighing the least. This suggests that salamanders respond more strongly to dragonfly naiads than diving beetles and that dragonflies may be a more important predator. Thus, salamander larvae may distinguish between different predators, highlighting the utility of studying effects of multiple predators on phenotypic plasticity of prey." (Authors)] Address: Storfer, A.T., School of Biological Sciences, Washington State University, Pullman, WA 99164, USA. E-mail: astorfer@wsu.edu

(Authors)] Address: Storfer, A.T., School of Biological Sciences, Washington State University, Pullman, WA 99164, USA. E-mail: astorfer@wsu.edu

**4910.** Strobbe, F.; Stoks, R. (2004): Life history reaction norms to time constraints in a damselfly: differential effects on size and mass. *Biological Journal of the Linnean Society* 83(2): 187-196. (in English). ["Optimality models predict that, under a time constraint, organisms should accelerate development, and preferably so by increasing growth rate, to keep size at emergence constant. Unfortunately, most tests did neglect genetic constraints and interchanged mass with body size which may explain mixed support for some of the models' predictions. We imposed time constraints on full sibling larvae of the damselfly *Enallagma cyathigerum* by manipulating day length regimes. Under a time constraint, larval development and growth rate based on size indeed were faster. This made it possible to keep size at emergence constant, despite the shorter development time. Interestingly, under a time constraint, growth rate based on mass was not increased and larvae had a lower mass at emergence. We see two reasons for this difference between body mass and size. First, size is fixed at emergence, while mass can still increase in many insects. Secondly, genetic constraints may have contributed to different responses for size and mass. In general, our results strongly suggest discriminating between size and mass when testing life history responses." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**4911.** Strong, K.F.; Robinson, G. (2004): Odonate communities of acidic Adirondack Mountain lakes. *Journal of the North American Benthological Society* 23 (4): 839-852. (in English). ["New York State's fauna is exceptionally rich in odonates, whose lengthy aquatic larval phases render them susceptible to effects of lake acidification, including the loss of fish. We used a collection of benthic macroinvertebrate samples taken by the Adirondack Lakes Survey Corporation to compare odonate communities in 460 lakes. Half were from the Adirondack Mountains, where acid neutralizing capacity (ANC) is low (mean ANC = 108.0 µg/L) and Al concentrations are high (mean Al = 111.61 µg/L), and half were from the Lower Hudson Valley, where ANC is significantly higher (mean ANC = 554.6 µg/L) and Al is significantly lower (mean Al = 0.049 µg/L). Many more lakes in the Adirondack lakes were fishless (52) compared to the lower Hudson (3), and the pH in Adirondack fishless lakes was an order of magnitude lower than the pH of Adirondack lakes with fish. Ninety-nine odonate taxa were identified (86 to species). In Adirondack samples, co-occurrence patterns were correlated with presence or absence of insectivorous fish and with acidic waters. Similar patterns were not apparent in Lower Hudson Valley samples. In Adirondack samples, richness of common taxa (found in 20 lakes) was higher in lakes with fish than in lakes without fish, regardless of pH. Loss of fish may enhance the top predator role of large larval dragonflies, causing change in odonate community structure, an interpretation consistent with previous research. Acidification of Adirondack lakes appears to promote a nonrandom subset of possible odonate communities, with negative implications for regional diversity." (Authors)] Address: Strong, Karen, Program in Biodiversity, Conservation and Policy, Dept

of Biological Sciences, State University of New York at Albany, 1400 Washington Avenue, Albany, New York 12222 USA. E-mail: klstrong@gw.dec.state.ny.us

**4912.** Sun, M.; Lan, S. (2004): A computational study of the aerodynamic forces and power requirements of dragonfly (*Aeshna juncea*) hovering. *Journal of Experimental Biology* 207(11): 1887-1901. (in English). ["Aerodynamic force generation and mechanical power requirements of a dragonfly (*A. juncea*) in hovering flight are studied. The method of numerically solving the Navier-Stokes equations in moving overset grids is used. When the midstroke angles of attack in the downstroke and the upstroke are set to 52degree and 8degree, respectively (these values are close to those observed), the mean vertical force equals the insect weight, and the mean thrust is approximately zero. There are two large vertical force peaks in one flapping cycle. One is in the first half of the cycle, which is mainly due to the hindwings in their downstroke; the other is in the second half of the cycle, which is mainly due to the forewings in their downstroke. Hovering with a large stroke plane angle (52degree), the dragonfly uses drag as a major source for its weight-supporting force (approximately 65% of the total vertical force is contributed by the drag and 35% by the lift of the wings). The vertical force coefficient of a wing is twice as large as the quasi-steady value. The interaction between the fore- and hindwings is not very strong and is detrimental to the vertical force generation. Compared with the case of a single wing in the same motion, the interaction effect reduces the vertical forces on the fore- and hindwings by 14% and 16%, respectively, of that of the corresponding single wing. The large vertical force is due to the unsteady flow effects. The mechanism of the unsteady force is that in each downstroke of the hindwing or the forewing, a new vortex ring containing downward momentum is generated, giving an upward force. The body-mass-specific power is 37 W kg<sup>-1</sup>, which is mainly contributed by the aerodynamic power." (Authors)] Address: Sun, M., Inst. Fluid Mech., Beijing Univ. Aeronaut and Astronaut, Beijing, 100083, China. E-mail: sunmao@public.fhnet.cn.net

**4913.** Svensson, E.; Kristoffersen, L.; Oskarsson, K.; Bensch, S. (2004): Molecular population divergence and sexual selection on morphology in the banded demoiselle (*Calopteryx splendens*). *Heredity* 93: 423-433. (in English). ["The importance of sexual selection in population divergence is of much interest, mainly because it is thought to cause reproductive isolation and hence could lead to speciation. Sexually selected traits have been hypothesized to diverge faster between populations than other traits, presumably because of differences in the strength, mechanism or dynamics of selection. We investigated this by quantifying population divergence in eight morphological characters in 12 south Swedish populations of a sexually dimorphic damselfly, the banded demoiselle (*Calopteryx splendens*). The morphological characters included a secondary sexual character, the male melanized wing spot, which has an important function in both inter- and intrasexual selection. In addition, we investigated molecular population divergence, revealed by amplified fragment length polymorphism (AFLP) analysis. Molecular population divergence was highly significant among these Northern European populations (overall  $F_{st}=0.054$ ; pairwise population  $F_{st}$ 's ranged from ~0 to 0.13). We found evi-

dence for isolation-by-distance ( $r=0.70$ ) for the molecular markers and a significant correlation between molecular and phenotypic population divergence ( $r=0.39$ ). One interpretation is that population divergence for the AFLP loci are affected by genetic drift, but is also indirectly influenced by selection, due to linkage with loci for the phenotypic traits. Field estimates of sexual and natural selection from two of the populations revealed fairly strong sexual selection on wing spot length, indicating that this trait has the potential to rapidly diverge, provided that variation is heritable and the observed selection is chronic." (Authors)] Address: Svensson, E., Sect. Animal Ecol., Dept Ecol., Lund Univ., SE-223 62 Lund, Sweden. E-mail: erik.svensson@zoekol.lu.se

**4914.** Taira, H.; Kuranishi, R. (2004): Freshwater benthic macroinvertebrates at the upper reaches of the Koito-gawa River. *Journal of the Natural History Museum & Institute Chiba Special Issue 7*: 47-86. [Toyofusa, Kimitsu-shi, Chiba, central Japan; field collections carried out from April 2002 through December 2003; a total of 104 taxa includes also Odonata.] Address: Taira, H., 3-30-16-403 Imai, Chuou Ku, Chiba, 2600834, Japan

**4915.** Taverner, J.; Cham, S.; Hold, A. (2004): *The Dragonflies of Hampshire*. Pisces Publications. ISBN 1 874357 26 9: 144 pp. (in English). [This is the first ever book devoted entirely to the dragonfly fauna of Hampshire, produced by a team of dragonfly experts, drawn largely from the county, whose knowledge and experience ensure that the information is reliable and as comprehensive as possible. The book has seven main sections: The geology and hydrology of Hampshire. The human influence on dragonflies. Habitat types. A systematic list of species covering distribution, major localities, population sizes, flight times, early and late dates. Key sites including maps. Conservation in Hampshire. Dragonfly recording in Hampshire plus a full bibliography. Photographs and distribution maps for every species. Photographs of habitat types.]

**4916.** Tennessen, K.J. (2004): *Cordulegaster talaria* n. sp. (Odonata: Cordulegastridae) from west-central Arkansas. *Proceedings of the Entomological Society of Washington* 106(4): 830-839. (in English). [*C. talaria* "is described from specimens collected in the Ouachita Mountains in western Arkansas. The new species is related to *C. bilineata* (Carle) and *C. diastatops* (Selys). The ventral teeth of the male cerci are separated by a larger gap in *C. talaria* (0.77-0.89 mm) than in the other species (0.52-0.73 mm). The anterolateral yellow mark on abdominal segment 4 is elongate and extends to the anterior margin whereas in *C. diastatops* it usually does not reach the anterior margin and in *C. bilineata* it is abbreviated to absent." (Author)] Address: Tennessen, K., 1949 Hickory Ave. Florence, AL 35630, USA. E-mail: ktennessen@aol.com

**4917.** Teplitsky, C.; Plenet, S.; Joly, P.; (2004): Hierarchical responses of tadpoles to multiple predators. *Ecology* 85(10): 2888-2894. (in English). ["The impact of multiple factors on the expression of phenotypic plasticity has been poorly studied. The simultaneous presence of factors inducing diverging responses may result either in a trade-off between the responses or in a hierarchy of responses. Inducible defenses offer a suitable model to investigate these alternatives. Inducible defenses evolve in response to variability in predation risk. Here, we investigated the impact of the nonlethal

presence of both pursuing (fish, *Gasterosteus aculeatus*) and sit-and-wait (dragonfly larvae, *Aeshna cyanea*) predators on tadpole morphology in two frogs (*Rana dalmatina* and *R. ridibunda*). Predation tests showed that *Aeshna* were the more dangerous of the two predators for the tadpoles of both species. In both species, induced responses differed according to predator type. In the presence of fish, tadpoles invested in both tail muscle depth and tail length. In the presence of dragonfly larvae, the investment was made in tail fin depth. When faced with the two types of predators simultaneously, the response was similar to that expressed in the presence of *Aeshna* alone, suggesting a hierarchy of response according to predation risk. Such a hierarchy of response could result from selection against the phenotype induced by the other predator" (Authors)] Address: Teplitsky, Celine, Dept Populat Biol, Evolut Biol Ctr, Norbyvagen 18D, SE-75236, Uppsala, Sweden. E-mail: cteplit@univ-lyon1.fr

**4918.** Tessier, C.; Cattaneo, A.; Pinel-Alloul, B.; Galanti, G. (2004): Biomass, composition and size structure of invertebrate communities associated to different types of aquatic vegetation during summer in Lago di Candia (Italy). *J. Limnol.* 63(2): 190-198. (in English). ["We compared the biomass, taxonomic composition, and size distribution of invertebrates (including Odonata) associated to emergent (*Schoenoplectus lacustris*), submerged (*Myriophyllum spicatum*), and floating leaved (*Trapa natans*) vegetation at two depths (surface and water column) during summer in Lago di Candia, Italy. Invertebrate biomass was positively related to epiphyton biomass (Chl-a). *M. spicatum* supported higher invertebrate biomass per unit of plant weight than *S. lacustris* whereas *T. natans* was somewhat intermediate. Depth did not affect invertebrate biomass significantly. Surface sections of *M. spicatum* and *T. natans* supported invertebrate communities with similar taxonomic composition dominated by oligochaetes and ostracods. Large hirudineans and gastropods characterized the communities on the water column sections of *M. spicatum*. *S. lacustris* and the water column sections of *T. natans* (composed of stems and aquatic roots) were supporting invertebrate communities dominated by copepod nauplii and lacking large organisms. Changes in aquatic vegetation in Lago di Candia following harvesting of *T. natans* and removal of submerged vegetation by the invasion of the rodent coypu (*Miocastor coypus*) may affect the invertebrate biomass of its littoral zone." (Authors)] Address: Cattaneo, Antonia, Département de Sciences Biologiques, Université de Montréal, C.P. 6128, succursale Centre Ville, Montréal, Québec, Canada H3C 3J7. E-mail: antonia.cattaneo@umontreal.ca

**4919.** Theischinger, G. (2004): Affinities and status of some genus-group taxa in Australian Gomphidae (Anisoptera). *Odonatologica* 33(4): 413-421. (in English). ["Relevant and mainly structural characters of *Austrogomphus* s. str., *Austroepigomphus* Fraser, *Pleio-gomphus* Watson, *Xerogomphus* Watson and *Zephyrogomphus* Watson, all considered by J.A.L. Watson (1991, *Invertebr. Taxon.* 5: 289-441) as subgenera of *Austrogomphus* Selys, are described and illustrated. On the basis of this information it is suggested that *Austroepigomphus* and *Zephyrogomphus* should be elevated to generic rank, that *Pleio-gomphus* should keep its position as a subgenus of *Austrogomphus*, and that *Xerogomphus* should be regarded as a subgenus of *Austroepigomphus*. Some morphological details of the

previously undescribed male of what is now *Zephyrogomphus longipositor* (Watson) are given." (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

**4920.** Thomas, A.L.R.; Bompfrey, R.J. (2004): Dragonfly flight: free-flight and tethered flow visualizations reveal a diverse array of unsteady lift-generating mechanisms, controlled primarily via angle of attack. *Journal of Experimental Biology* 207: 4299-4323. (in English). ["Here we show, by qualitative free- and tethered-flight flow visualization, that dragonflies fly by using unsteady aerodynamic mechanisms to generate high-lift, leading-edge vortices. In normal free flight, dragonflies use counterstroking kinematics, with a leading-edge vortex (LEV) on the forewing downstroke, attached flow on the forewing upstroke, and attached flow on the hindwing throughout. Accelerating dragonflies switch to in-phase wing-beats with highly separated downstroke flows, with a single LEV attached across both the fore- and hindwings. We use smoke visualizations to distinguish between the three simplest local analytical solutions of the Navier Stokes equations yielding flow separation resulting in a LEV. The LEV is an open U-shaped separation, continuous across the thorax, running parallel to the wing leading edge and inflecting at the tips to form wingtip vortices. Air spirals in to a free-slip critical point over the centreline as the LEV grows. Spanwise flow is not a dominant feature of the flow field spanwise flows sometimes run from wingtip to centreline, or vice versa depending on the degree of sideslip. LEV formation always coincides with rapid increases in angle of attack, and the smoke visualizations clearly show the formation of LEVs whenever a rapid increase in angle of attack occurs. There is no discrete starting vortex. Instead, a shear layer forms behind the trailing edge whenever the wing is at a non-zero angle of attack, and rolls up, under Kelvin Helmholtz instability, into a series of transverse vortices with circulation of opposite sign to the circulation around the wing and LEV. The flow fields produced by dragonflies differ qualitatively from those published for mechanical models of dragonflies, fruitflies and hawkmoths, which preclude natural wing interactions. However, controlled parametric experiments show that, provided the Strouhal number is appropriate and the natural interaction between left and right wings can occur, even a simple plunging plate can reproduce the detailed features of the flow seen in dragonflies. In our models, and in dragonflies, it appears that stability of the LEV is achieved by a general mechanism whereby flapping kinematics are configured so that a LEV would be expected to form naturally over the wing and remain attached for the duration of the stroke. However, the actual formation and shedding of the LEV is controlled by wing angle of attack, which dragonflies can vary through both extremes, from zero up to a range that leads to immediate flow separation at any time during a wing stroke." (Authors)] Address: Thomas, A., Dept of Zoology, Oxford University, South Parks Road, Oxford, OX1 3PS, UK. E-mail: Adrian.thomas@zoo.ox.ac.uk

**4921.** Tibor, K.; Ambrus, A.; Juhász, P.; Bánkuti, K. (2004): Larval and exuvial data to the Odonata fauna of Hungary. *Folia historici naturalia musei Matraensis* 28: 97-110. (in Hungarian, with brief English summary). [54 species from 363 sampling places; records resulting from 25.05.1988 to 30.11.2002.] Address: Ambrus, A., Hortobágy National Park, Directorate, Thematic Information Centre of Nature Conservation, H-9495 Kóphá-



za, Jurisich M. u. 16, Hungary. E-mail: aambrus@yahoo.com

**4922.** Torralba Burrial, A.; Ocharán, F.J. (2004): Costras salinas sobre libélulas monegrinas (Odonata). Boletín de la Sociedad Entomológica Aragonesa 35: 281-282. (in Spanish with English summary). [Symptetrum fonscolombii females found at saline lakes in Los Monegros (Aragon, NE Spain) exhibited white spots of salt on their abdomens. It is concluded that after touching the abdomen on the water surface to oviposit, the water evaporates, and the remaining salt crystals form the white spots.] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**4923.** Torralba Burrial, A.; Ocharán, F.J. (2004): Fallo en la emergencia en *Aeshna juncea* (Odonata: Aeshnidae). Boletín de la Sociedad Entomológica Aragonesa 35: 279. (in Spanish with English summary). [peat-bogs of the Anayet (Sallent de Gállego, Huesca, NE Spain), 19-VII-2003; three of the wings were caught in the remains of the exuvia, the left hindwing was completely expanded.] Address: Torralba Burrial, A., Depart. Biol. Organismos y Sist., Univ. Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**4924.** Torralba Burrial, A.; Ocharán, F.J.; (2004): Pareja heterospecífica en el género *Lestes* Leach, 1815 (Odonata: Lestidae). Boletín de la Sociedad Entomológica Aragonesa 35: 297-298. (in Spanish with English summary). [Bandaliés, Huesca, NE Spain, 13-VII-200; a heterospecific tandem between a *Lestes sponsa* male and a *L. barbarus* female is reported.] Address: Torralba Burrial, A., Departamento de Biología, Organismos y Sistemas, Univ. Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**4925.** Torralba-Burrial, A.; Ocharan, F.J. (2004): De Monstruos y Prodigios (11): Deformación abdominal en *Lestes viridis* (Van der Linden, 1825) (Odonata: Lestidae). Boln. S.E.A. 34: 274. (in Spain). [Spain; a specimen with a laterally deformed abdomen is pictured and described.] Address: Torralba Burrial, A., Depart. de Biología de Organismos y Sistemas, Univ. de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**4926.** Trapero Quintana, A.D.; Naranjo López, J.C. (2004): Clave de identificación para los adultos de las especies del orden Odonata presentes en Cuba. Boln. S.E.A. 35: 171-180. (in Spanish, with English summary). ["A set of 26 updated dichotomous keys is given for the taxonomical identification of the 84 infrageneric taxa of the Odonata reported from the Cuban archipelago, following a chronological analysis of all records of species of that order from the country. The keys in general permit the identification of taxa below the order and up to the species level, including the subspecies recognised in the literature." (Authors)] Address: Trapero Quintana, A., Departamento de Biología de la Universidad de Oriente, Patricio s/n, Santiago, CP 90500, Cuba

**4927.** Trockur, B. (2004): Untersuchungen zur Habitatwahl von *Epitheca bimaculata* CHARPENTIER 1825. Dissertation zur Erlangung des Grades des Doktors der Naturwissenschaften am Institut für Naturschutz und Umweltbildung (INU) der Hochschule Vechta Dragonfly Research 2. ISSN 1438-034X: 291 pp. (in German, with English summary). ["The dissertation focuses on the

habitat selection of the Two-spotted Dragonfly *E. bimaculata* (Corduliidae). Important aspects of the chapter dealing with the faunistical-ecological and phenological data base are: comparison of the study sites in the Central Valley of the River Saar (esp. bayous, ponds) and the biosphere reserve Schorfheide-Chorin (small lakes), increase in the amount of newly detected occurrences in both study regions owing to an optimised and intensified search strategy, characteristics as a typical spring species (start of emergence in the first half of May) with a short emergence period and a flight period until the end of June/beginning of July, and relations between emergence and flight period and weather characteristics. The females select submersed habitat elements near the water surface in the open water of the breeding sites (floating leaf of plants such as *Nuphar lutea*, large areas with submersed plants, e.g. *Myriophyllum* spp., *Ceratophyllum* spp. and *Elodea canadensis*, reeds standing in the water, or woody debris) for the deposition of the egg strings containing more than 1,000 eggs. The analysis of the oviposition sites shows marked differences between the stem habitats. In several cases a repeated neighbouring, thus double concentrated oviposition took place and frequently it was observed on the edges of submersed vegetation just below the water surface. These parts of the water bodies used as oviposition sites are also primary triggers of habitat selection for mature males, because in most cases these males ready for reproduction use the same habitat elements for orientation within the territories, which are sometimes continuously occupied for several hours. Perching behaviour and thus habitat selection of the males can be influenced by strong wind, shadow by groves at the shoreline, or the presence of other dragonflies which occupy perching sites in a similar way and are dominant over *Epitheca*. The lack of an exact congruence of perching and oviposition sites is discussed as well as the potential correlation between differences in niche specialisation between younger and older larvae. Also, the frequently observed orientation of territorial males towards the edges of submersed vegetation is discussed. The behaviour in larval stages 1-3 is, above all, characterized by the selection of submersed, vertical habitat elements located near the water surface. Some weeks older larval stages switch to a predominantly or at least partially benthic and night-active life style. Special interest was paid to the documentation and analysis of emergence sites, and on habitat selection of the F-0-larvae, as indicated by the sites where the exuviae were found. For this purpose, quantitative, spatially precise documentation data taken over many years at the biggest population in the Saarland, the analysis of accumulations of exuviae (amount and extent), correlations between the finding sites of the exuviae and various habitat elements (positive correlation with *Nuphar lutea*) and the depth of the water bodies (negative to the maximal depth), and changes over the course of the six intensive study years are used. In addition to the comparison with other stem habitats, emergence substrates, distance from the shoreline and height of the emergence sites are treated. The duration of the larval period of usually two or three years was deduced from the analysis of potential sibling pools, the characteristics of pools of exuviae found within very short distance of each other, and the often both highly stenotope and synchronized behaviour of the emergent F-0-larvae are taken into account as well. In a comprehensive, synecological synopsis, different hypotheses about the ecological requirements of the

species are developed and discussed. In this context, the population ecological view of the known occurrences in reference to the mobility and dispersal ability is taken into consideration. Aspects of stenotopy and synchronisation are evaluated and compared with other species. The observed behaviour and the habitat selection are related to the visually identifiable habitat factors. The role of potentially effective ultimate factors in the water body is discussed. The availability of vertical habitat element near the surface and the ecological conditions in the fish dominated biocoenosis are found to be the most important factors. The negative biotopes and the observed effects of changes or systematic manipulations of the habitat configuration at some occurrences are included into these considerations. The special role of fish and the ecological adaptation of the *Epitheca* larvae to the fish-dominated biotope, the ecological comparison and the syntopy with *Leucorrhinia caudalis* and *Cordulia aenea* are discussed in the context of the synecological demands of the species. Subsequently, a new classification, exceeding the common classification of the occurrences in stem-, secondary- and male-habitats, is proposed, and the different metapopulation levels and a promising search strategy are discussed. In a separate chapter about aspects of nature conservation, the current classification in the Red List of Germany (endangered), the proposal to include the species in a nation-wide monitoring programme, the high diversity of dragonflies at the *Epitheca* waters, the function as an indicator species, the coexistence with other species, threat factors and components of the management of the species and a protection concept are treated." (Author)] Address: Trockur, B., Schulstr. 4, D-66636 Tholey-Scheuern, Germany. E-mail: Bernd-Trockur@gmx.de

**4928.** Ueda, T.; Kinoshita, E.; Ishihara, K. (2004): Habitat use by the Tiny Dragonfly, *Nannophya pygmaea* RAMBUR, and conservation of its habitat in a hillside marsh. *Japanese Journal of Conservation Ecology* 9: 25-36. (in Japanese, with English summary). ["To propose conservation plans for *N. pygmaea*, we investigated its habitat use in a paddy field at the bottom of a valley in the hill country around Kanazawa City, Ishikawa Prefecture, Japan. The field, which had an area of 1200 m<sup>2</sup> and was located at the top of a terraced paddy field, was plowed every spring but was not used for rice cultivation. There were four plant communities, corresponding to varying water levels on the ground, which was plowed annually. One of the four communities, which included annual plants, extended along the spring-fed hillside outside of the plowed area. Mature males primarily occupied Communities 1 and 2, and immature males and females were distributed in other terrestrial parts. The distribution of mature males was relatively similar, especially in Community 2, across the years investigated. Although emergence occurred in Community 2 every year, in Community 1, it was observed in 2002, but not in 2001 and may not in 2003. This yearly difference corresponded to the precipitation observed during the previous summer. Thus, the emergence from Community 1 may reflect larval survival, which probably depended on the degree and length of the dry period in relation to precipitation. Individuals that seemed to have dispersed from the paddy population were seen in several fallow fields up to 1.5 km away from the paddy. Based on these results, we considered *N. pygmaea* to be an opportunistic species that has adapted to small temporary marshes. We propose a con-

servation plan for *N. pygmaea* that incorporates creating biotope networks by plowing abandoned paddy fields." (Authors)] Address: Ueda, T., Ishikawa Agricultural College, Suematsu, Nonouchi, Ishikawa Pref., 921, Japan. E-mail: ueda@ishikawa-c.ac.jp

**4929.** Uzarski, D.G.; Burton, T.M.; Genet, J.A. (2004): Validation and performance of an invertebrate index of biotic integrity for Lakes Huron and Michigan fringing wetlands during a period of lake level decline. *Aquatic Ecosystem Health & Management* 7(2): 269-288. (in English). ["Our goal was to develop an invertebrate-based index of biotic integrity that was robust to water level fluctuations and applied to broad classes of lacustrine wetlands across wave-exposure gradients. Our objectives were to evaluate the performance and test the robustness of our preliminary index (e.g., Burton et al., 1999) at a range of water levels, eliminate any problems with the index of biotic integrity, remove the preliminary status, test the index on similar wetlands of Lake Michigan, and establish stressor: ecological-response relationships. Twenty-two sites, both open- and protected-fringing lacustrine marshes of Lake Huron and Michigan were selected for study. Correspondence analysis and Mann-Whitney U tests were used to test the robustness of existing metrics and search for additional metrics. Wilcoxon Signed Rank tests were used to determine if metrics were responding to inter-annual water level fluctuation. Principal components analysis and Pearson correlations were used to establish stressor: ecological response relationships. Analyses confirmed the utility of most of the metrics suggested in our preliminary index, but we recommended several improvements. With improvements, the index was able to place all sites in a comparable order of disturbance that we placed them a priori based on adjacent landuse/landcover, limnological parameters and observed disturbances. The improved index worked very well from 1998 through 2001 despite the substantial decreases in lake level over this time-period. Analyses of 2001 data collected from similar fringing wetlands along the northern shore of Lake Michigan suggested that the index could also be used for fringing wetlands of northern Lake Michigan. We are confident that our index is ready for implementation as a tool for agencies to use in assessing wetland condition for Lakes Huron and Michigan fringing wetlands." (Authors) The index includes Odonata. For details see: <http://www.deq.state.mi.us/documents/deq-ogl-mglpf-Burton.pdf>] Address: Uzarski, D.G., Annis Water Resources InstLake Michigan Ctr, Grand Valley State Univ, 740 W Shoreline Dr, Muskegon, MI, USA

**4930.** Valladares Díez, L.F.; García Criado, F.; Vega Moreno, F.J.; Carbajo, D.M. (2004): Estudio de la fauna de Odonatos de los humedales de Salburua (Vitoria-Gasteiz). Convenio de colaboración entre el Centro de Estudios Ambientales del Ayuntamiento de Vitoria-Gasteiz y el Dr. Luis Felipe Valladares Díez, del Departamento de Biología Animal de la Universidad de León (año 2003): 42 pp. (in Spanish). [27 odonate species are discussed in detail.] Address: <http://www.vitoria-gasteiz.org/ceac/siam/estudios/00-04/odonsa lb03c.pdf>

**4931.** Vega, F.J.; García-Criado, F.; Valladares, L.F. (2004): Odonatofauna del Espacio Natural Hoces del Alto Ebro y del Rudrón (Burgos, España). *Boln. S.E.A.* 34: 147-150. (in Spanish, with English summary). ["The paper is intended as a preliminary study of the Odonata

fauna of the Hoces of Alto Ebro y del Rudrón Nature Reserve (northern Burgos, Spain). Four sites representative of different types of aquatic habitats were sampled in the spring and summer of 2001. 22 species were collected, most of them (72.7%) in stagnant water environments. Two species, *Ceragriion tenellum* and *Gomphus pulchellus* are recorded for the first time from the province of Burgos. The Reserve can be considered as an area of special interest for the conservation of Odonata because of the high species richness values and the presence of *Coenagrion scitulum*." (Authors)] Address: Vega, F.J., Departamento de Biología Animal, Facultad de Ciencias Biológicas y Ambientales, Universidad de León. 24071 León, Spain. E-mail: dbafvm@unileon.es

**4932.** von der Ohe, P.C.; Liess, M. (2004): Relative sensitivity distribution of aquatic invertebrates to organic and metal compounds. *Environmental Toxicology & Chemistry* 23(1): 150-156. (in English). ["In the field, a multitude of species can be exposed to numerous toxicants; thus, the sensitivity of individual species to particular toxicants must be known to predict effects and to analyze changes in species composition. For most species, no information about their toxicant sensitivity is available. To address this limitation, we have grouped the available information to assign sensitivities to aquatic invertebrate taxa relative to *Daphnia magna*. With respect to organic compounds, most taxa of the orders Anisoptera, Basommatophora, Coleoptera, Decapoda, Diptera, Ephemeroptera, Eulamellibranchiata, Heteroptera, Hirudinea, Isopoda, Oligochaeta, Prosobranchia, Trichoptera, Tricladida, and Zygoptera are less sensitive than *D. magna*. Some taxa of the Amphipoda, Plecoptera, and Cladocera (other than *D. magna*) are significantly more sensitive. For organic compounds, approximately 22% of the investigated taxa were more sensitive than *D. magna*. Most taxa of the orders Amphipoda, Basommatophora, Diptera, Ephemeroptera, Eulamellibranchiata, Heteroptera, Isopoda, Oligochaeta, and Tricladida are significantly less sensitive than *D. magna* to metal compounds. The taxa belonging to the Crustacea, with the exception of the order Isopoda, are much more sensitive. For metal compounds, approximately 30% of the investigated taxa were more sensitive than *D. magna*. Hence, *D. magna* is among the most sensitive taxa regarding both groups of toxicants. The sensitivities for several taxa are listed, and use of the relative sensitivity distribution to link toxicant effects in mesocosm studies and field investigations is discussed." (Authors)] Address: Dept Chemical Ecotoxicology, UFZ Centre for Environmental Research, Permoserstr. 15, 04318, Leipzig, Germany. E-mail: peter.vonderohe@ufz.de

**4933.** Wakakuwa, M.; Ozaki, K.; Arikawa, K. (2004): Immunohistochemical localization of Papilio RBP in the eye of butterflies. *Journal of Experimental Biology* 207 (9): 1479-1486. (in English). ["We recently identified a novel retinoid binding protein, Papilio RBP, in the soluble fraction of the eye homogenate of the butterfly *Papilio xuthus*, and demonstrated that the protein is involved in the visual cycle. We now have localized the protein in the Papilio eye by light and electron microscopic immunohistochemistry using a monospecific antiserum produced against artificially expressed Papilio RBP. We found strong immunoreactivity in the primary as well as secondary pigment cells and in the tracheal cells. The pigment cells have long been regarded as an

important site of the visual cycle, and this view is further supported by the present result. Interestingly, the cytoplasm and nuclei of these cells were equally labeled, indicating that the protein exists in both the cytoplasm and the nucleus. We conducted a survey for the existence of the Papilio RBP-like proteins in other insects including several species of butterflies, dragonflies, cicadas, grasshoppers and honeybees. Anti-Papilio RBP immunoreactivity was confirmed in the proteins isolated only from butterflies belonging to the superfamily Papilionoidea and not from other species. In all insects tested, however, fluorescing proteins were clearly detected, suggesting that these insects also have similar retinol-binding proteins." (Authors)] Address: Arikawa, K., Grad. Sch. Integrated Sc.i, Yokohama City Univ, Yokohama, Kanagawa, 2360027, Japan. E-mail: arikawa@yokohama-cu.ac.jp

**4934.** Wang, Z.J. (2004): The role of drag in insect hovering. *Journal of Experimental Biology* 207(23): 4147-4155. (in English). ["Studies of insect flight have focused on aerodynamic lift, both in quasi-steady and unsteady regimes. This is partly influenced by the choice of hovering motions along a horizontal stroke plane, where aerodynamic drag makes no contribution to the vertical force. In contrast, some of the best hoverers - dragonflies and hoverflies - employ inclined stroke planes, where the drag in the down- and upstrokes does not cancel each other. Here, computation of an idealized dragonfly wing motion shows that a dragonfly uses drag to support about three quarters of its weight. This can explain an anomalous factor of four in previous estimates of dragonfly lift coefficients, where drag was assumed to be small. To investigate force generation and energy cost of hovering flight using different combination of lift and drag, I study a family of wing motion parameterized by the inclined angle of the stroke plane. The lift-to-drag ratio is no longer a measure of efficiency, except in the case of horizontal stroke plane. In addition, because the flow is highly stalled, lift and drag are of comparable magnitude, and the aerodynamic efficiency is roughly the same up to an inclined angle about 60degree, which curiously agrees with the angle observed in dragonfly flight. Finally, the lessons from this special family of wing motion suggests a strategy for improving efficiency of normal hovering, and a unifying view of different wing motions employed by insects." (Author)] Address: Wang, Z. Jane, Cornell Univ, Ithaca, NY, 14853, USA. E-mail: jane.wang@cornell.edu

**4935.** Wendzonka, J. (2004): Dragonflies (Odonata) of the Kaszuby lobelian lakes. *Parki Narodowe i Rezerwaty Przyrody* 23: 395-410. (in Polish, with English summary). [Poland; 13 lakes characterised by *Lobelia dortmanna*, *Isoetes lacustris*, and *Litorella uniflora* are surveyed for their odonate fauna. The list of 35 species includes *Brachytron pratense*, *Aeshna subarctica elisabethae*, *Epithea bimaculata*, *Leucorrhinia albifrons*, and *L. pectoralis*. The species are grouped according their dominance and frequency along the 13 lakes. *E-nallagma cyathigerum* (dystrophic lakes) and *Erythromma najas* (degraded, eutrophic lakes) are dominant species, respectively.] Address: Wendzonka, J., ul. Graniczna 17, 63 800 Gostyń, Poland. E-mail: wendzonka@wp.pl

**4936.** Wilson, K.D.P. (2004): New Odonata from South China. *Odonatologica* 33(4): 423-432. (in English). ["*Rhinocypha chaoi* sp. n. (holotype male Dading-



shan, Guangdong), *Megalestes discus* sp. n. (holotype male: Mangshan, Hunan). *Rhipidolestes chaoi* sp. n. (holotype male: Mangshan, Hunan), *Calicnemia chaoi* sp. n. (holotype male: Pengshan, Guangdong) and *Macromia unca* sp. n. (holotype male: Maoping, Guangdong) are described from the Shikengkong area of northern Guangdong province and Southern Hunan in Southern China." (Author)] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: wilsonkd@ntlworld.com

**4937.** Wilson, K.D.P. (2004): Odonatological bibliography of Dr Hsiu-Fu Chao (Xiufu Zhao) 1946-1999. *Odonatologica* 33(4): 358-360. (in English). [53 papers are listed.] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: wilsonkd@ntlworld.com

**4938.** Xylander, W.E.R.; Bender, J. (2004): Animal species and zoocoenoses of former open cast lignite mines in Eastern Germany - Aspects of mining, reclamation and conservation. *Peckiana* 3: 155-165. (in English). ["The importance of lignite mine sites for conservation in eastern Germany is considered on the basis of zoological data from terrestrial and aquatic habitats. This importance results from high species richness (e. g. dragonflies, carabid beetles) in few cases, but chiefly from secondary habitats for endangered xerophilic and psammophilic species that occur mainly on sites of early successional stages (e.g. amphibia, reptilia, birds, grasshoppers). These species (many of which are listed in the national or federal Red Data books) have become extinct in other areas due to prevention of landscape dynamics, whereas the impacts of lignite mining constitute the dynamics these species need; this is the major importance of mine sites for conservation. Dynamics, however, stops when mining activity finishes and succession proceeds; succession leads to habitat changes, resulting in many cases in the extinction of the most valuable species for conservations whereas others - less important from a conservational point of view - come up; zoological examples are given for this process. On the other hand reclamation and post-mining activities themselves may have impacts on valuable habitats and species. How reclamation is done and what targets are finally realised depend on different types of decisions; the motivation and consequences for conservation of such decisions are discussed." (Authors)] Address: Xylander, Dr. W., Staatliches Museum für Naturkunde Görlitz, PF 300154, D-02806 Görlitz, Germany. E-mail: Willi.Xylander@SMNG.SMWK.Sachsen.de

**4939.** Yamauchi, M.M.; Miya, M.U.; Nishida, M. (2004): Use of a PCR-based approach for sequencing whole mitochondrial genomes of insects: two examples (cockroach and dragonfly) based on the method developed for decapod crustaceans. *Insect Molecular Biology* 13(4): 435-442. (in English). ["Recent development of a PCR-based approach for sequencing vertebrate mitochondrial genomes has attracted much attention as being more rapid and economical than traditional methods using cloned mtDNA and primer walking. Such a method has not been available for insect mitochondrial genomes, despite widespread use of them for the molecular phylogenetic, biogeographical and population genetic markers. A recently developed PCR-based approach for sequencing whole mitochondrial genomes of decapod crustaceans, which included the design of

many versatile PCR primers for the latter, was applied with the same primers sets to mitochondrial genomes of two insects, smokybrown cockroach *Periplaneta fuliginosa* (Serville, 1839) and skimmer dragonfly *Orthetrum triangulare melania* (Selys, 1883). Almost the entire region of the two mitochondrial genomes was successfully sequenced. Features of the two mitochondrial genomes are described and the usefulness of this PCR-based approach for sequencing insect mitochondrial genomes demonstrated." (Authors)] Address: Yamauchi, M., Ocean Res InstNakano Ku, Univ Tokyo, 1-15-1 Minamidai, Tokyo, 1648639, E-mail: ymm@ori.u-tokyo.ac.jp

**4940.** Yanoviak, S.P.; Fincke, O.M. (2004): Sampling methods for water-filled tree holes and their artificial analogues. In: Leather, S. (Ed.): *Insect Sampling in Forest Ecosystems*. Blackwell. *Methods in Ecology*. 320 pp. ISBN: 0632053887: (in English). Address: Fincke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**4941.** Yip, J.Y.; Corlett, R.T.; Dudgeon, D. (2004): A fine-scale gap analysis of the existing protected area system in Hong Kong, China. *Biodiversity & Conservation* 13(5): 943-957. (in English). ["As well as being one of the most densely populated areas on Earth, Hong Kong also has the highest percentage of protected areas (38% of the 1098 km<sup>2</sup> land area) of any administrative region in the Asia Pacific. Overlay of field records from a biodiversity survey of eight taxa (amphibians, reptiles, mammals, breeding birds, ants, butterflies, dragonflies and rare vascular plants) in 1 km grid squares with protected areas indicated that over half of the 623 species of conservation concern (globally, regionally, or locally restricted species) were under-represented. Ants, butterflies and reptiles were most poorly represented. The hotspots of different taxa also received differing levels of protection. Hong Kong's protected areas are biased towards high-altitude habitats, so the under-represented species are mostly associated with the lowland habitats (freshwater wetlands, abandoned agriculture and feng shui woods). Since the restricted species are scattered and the hotspots of different taxa do not overlap, a large protected area network will be required to represent all species. This indicates the challenge that will be encountered in the conservation of many other parts of Asia that support burgeoning human populations, and where landscapes are increasingly human-dominated." (Authors)] Address: Yip, J.Y., Department of Ecology and Biodiversity, The University of Hong Kong, Pokfulam Road, Hong Kong, Hong Kong SAR, China. E-mail: yyipc@graduate.hku.hk

**4942.** Yoshita, S.; Minami, Y.; Ueda, T. (2004): Water chemistry of several habitats of a Tiny Dragonfly, *Nannophya pygmaea* Rambur. *Jpn. J. Environ. Entomol. Zool.* 15: 13-17. (in Japanese, with English summary). ["Marsh water was chemically analyzed in four habitats of *N. pygmaea* in Ishikawa Prefecture, Japan. Somewhat acidic water (pH 5.7-6.4) was observed in one marsh, while the others often showed a higher value of pH (6.0-10.4). This result implies that suitable pH range for a habitat of the species is fairly wide including such a higher category, rather than recognized so far. Enrichment of mineral constituents such as Ca<sup>2+</sup> compared to rainwater suggested that the marsh water was mainly supplied with ground water." (Authors)] Address:

Ueda, T., Ishikawa Agricultural College, Suematsu, No-noichi, Ishikawa Pref., 921, Japan. E-mail: ueda@ishikawa-c.ac.jp

**4943.** Yurewicz, K.L. (2004): A growth/mortality trade-off in larval salamanders and the coexistence of intraguild predators and prey. *Oecologia* 138(1): 102-111. (in English). ["Behavioral and morphological traits often influence a key trade-off between resource acquisition and vulnerability to predation, and understanding trait differences between species can provide critical insight into their interactions with other species and their distributions. Such an approach should enhance our understanding of the criteria for coexistence between species that can interact through both competition and predation (i.e. intraguild predators and prey). I conducted a common garden experiment that revealed strong differences between three guild members (larval salamanders *Ambystoma laterale*, *A. maculatum*, and *A. tigrinum*) in behavior, morphology, and growth in the presence and absence of a shared top predator (the larval dragonfly *Anax longipes*). All three species also reduced their activity and modified their tail fin depth, tail muscle length, and body length in response to non-lethal *Anax*. Species that act as intraguild predators were more active and could grow faster than their intraguild prey species, but they also suffered higher mortality in laboratory predation trials with *Anax*. I also used survey data from natural communities to compare the distribution of *Ambystoma* species between ponds differing in abiotic characteristics and predatory invertebrate assemblages. An intraguild prey species (*A. maculatum*) was found more reliably, occurred at higher densities, and was more likely to persist late into the larval period in ponds with more diverse invertebrate predator assemblages. Taken together, these results indicate that top predators such as *Anax* may play an important role in influencing intraguild interactions among *Ambystoma* and ultimately their local distribution patterns." (Authors)] Address: Yurewicz, K., Department of Biological Sciences, University of Notre Dame, Notre Dame, IN, 46556, USA. E-mail: kyurewic@nd.edu

**4944.** Zawal, A. (2004): Parasitizing of dragonflies by water mite larvae of the genus *Arrenurus* in the neighbourhood of Barlinek (NW Poland). *Zoologica Poloniae* 49(1-4): 37-45. (in English with Polish summary). [25 odonate species were infected by 2218 water mite larvae of the genus *Arrenurus*. Preferred hosts - the proportion of specimens infected is noted in brackets - were *Enallagma cyathigerum* (56.5%), *Coenagrion puella* (53.6%), *Ischnura elegans* (46.9%), and *Coenagrion pulchellum* (41.9%). Only two Anisoptera species were infected (*Cordulia aenea*, 14.3%; *Sympetrum sanguineum*, 4.0%). Body parts preferred were: proximal part of metathorax (910 larvae), mesothorax (464 larvae), first abdominal segment (371 larvae), and second abdominal segment (200 larvae).] Address: Zawal, A., Department of Invertebrate Zoology and Limnology, University of Szczecin, PL-71-415 Szczecin, Waska 14, Poland. E-mail: zawal@univ.szczecin.pl

**4945.** Zawal, A. (2004): Synchronized adult emergence of *Cordulia aenea* (Linnaeus, 1758) (Odonata: Corduliidae). *Acta Biol. Univ. Daugavp.* 4(2): 81-83. (in English). [On 02 May, 1999 a synchronized adult emergence of *C. aenea* was observed from 10.00 to 17.00 o'clock in the small dystrophic lake near Czermnica (Nowogard district), Poland. On an area about 50 m<sup>2</sup>,

emergence of 48 specimens was observed. "This lake is a small, interforest reservoir. Emergences has been in sedges on the sunny bank of lake. On the shady bank no emergence of this dragonfly was observed. The increase of temperature was stimulus for simultaneous emergency. During this time the temperature in the shallow sunny literal increased from 9°C to 22°C. The day after and the day before, which were cloudy days, any emergence was not observed, what showed the increase of temperature was an impulse for simultaneous emergency. The full emergence lasted five hours on an average." (Author)] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Wąska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**4946.** Zhu, H. Q. (2004): In memory of Hsiu-Fu Chao (Xiufu Zhao) (17 May 1917 - 2 May 2001). *Odonatologica* 33(4): 355-357. (in English). Address: Zhu H.-q., Dept Biol., Shanxi University 42-38, Taiyuan 030006, Shanxi, China

## 2005

**4947.** Abbott, J.C. (2005): Dragonflies and Damselflies of Texas and the South-Central United States: Texas, Louisiana, Arkansas, Oklahoma, and New Mexico. Princeton University Press. ISBN: 0-691-11364-5 (paper) 0-691-11363-7 (cloth): VIII, 344 pp. (in English). [This guide to the Odonata of the south-central United States covers 263 species, representing more than half of the North American fauna. The area of coverage significantly overlaps with other regions of the country making this book a useful aid in identifying the dragonflies and damselflies in any part of the United States, Canada or northeastern Mexico. All 85 damselfly and 178 dragonfly species found in the region are distinguished by photographs, numerous line drawings, keys, and detailed descriptions to help with identification. Features include: Discussions of habitats, zoogeography, and seasonality Details on dragonfly and damselfly life history and conservation An introduction on studying and photographing dragonflies and damselflies An entire section devoted to the external anatomy of dragonflies and damselflies Species accounts organized by family into sections on size, regional and general distribution, flight season, identification, similar species, habitat and biology and ecology Range maps for each species, as well as an extensive bibliography and a list of resources for further study] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabott@mail.utexas.edu

**4948.** Anonymus (2005): Wild Corner. Porcupine 32: 25. (in English). [The feature "Wild Corner" presents some interesting sightings in Hong Kong. The following observations on Odonata are presented: "Pseudagrion microcephalum laying eggs at a rehabilitated freshwater pond of Mai Po Nature Reserve. One *Macrodiplax cora* was seen at Luk Keng marsh (near mangrove) on 29 September, and both sexes of this species were seen at Mai Po throughout October. *Gynacantha subinterrupta* was seen at Mai Po on 10 November and 5 December (both were male individuals)."]

**4949.** Block, M. De; Stoks, R (2005): Pond drying and hatching date shape the tradeoff between age and size at emergence in a damselfly. *Oikos* 108(3): 485-494. (in English). ["The trade off between age and size at emergence, which plays a central role in life history theory, is hypothesized to be more pronounced under stressful conditions, especially when these conditions are combined. Empirical evidence for this is equivocal. We tested the hypothesis by imposing combinations of two types of time stress (pond drying and late hatching date) in larvae of the damselfly *Lestes viridis*. Larvae from a temporary pond and a permanent pond population were reared in outdoor tubs from egg hatching until emergence. Unexpectedly, larvae did not accelerate their life history in response to simulation of pond drying. Instead, larvae reared in temporary tubs generally had a slower development and growth than larvae reared in permanent tubs. Probably deteriorating growth conditions in temporary tubs associated with higher densities and lower food levels caused this pattern. In agreement with a higher time stress in late hatched larvae, they generally had faster development and growth than larvae that hatched early in the season. Drying regime and hatching date shaped the covariation pattern between age and size at emergence, but the tradeoff was only apparent when time stress was relaxed. The tradeoff between age and size at emergence was only present in early hatched larvae, especially in permanent tubs (lowest time stress). Conversely, in late hatched larvae there was a strongly negative relationship between age and size at emergence, especially in temporary tubs (highest time stress). Our results support an alternative hypothesis that deteriorating growth conditions (i.e. pond drying) may decouple the tradeoff under time stress. The absence of a tradeoff in more time-stressed late hatched larvae can be explained by their higher intrinsic growth rates, independent of deteriorating growth conditions. We hypothesize that the pattern of less clear tradeoffs under the imposed types of time stress may be general." (Authors)] Address: De Block, Marjan, Dept of Biological Sciences, Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: marjan.deblock@dartmouth.edu

**4950.** Blust, M. (2005): Citrine Forktail Confirmed In VT. The Boghaunter. Occasional News about the dragonflies and damselflies of Vermont 4(1): 1,2. (in English). [*Ischnura hastata* was proved in 2004 for Vermont, USA. Three county records are briefly documented] Address: [www.wingsenvironmental.com/boghaunter/Boghaunter%20-%20Vol.%204%20No.%201.pdf](http://www.wingsenvironmental.com/boghaunter/Boghaunter%20-%20Vol.%204%20No.%201.pdf)

**4951.** Bönsel, A. (2005): Ökologische Analyse der Libellen- und Heuschreckentaxozönosen (Odonata & Saltatoria) in nordostdeutschen Regenmooren und deren Umgebung - als Grundlage zur Entwicklung von Landschaftsplanungszielen. *Rostocker Materialien für Landschaftsplanung und Raumentwicklung* 6: 129 pp. (in German, with English summary). ["The first hypothesis, that in the beginning of the 21st century, disturbed rain bogs in the young moraine landscape of North-Eastern Germany are more rich in structures and species than the surrounding cultivated landscape, could be verified in this ecological analysis. 96 sites were sampled for dragonflies, 46% of which were located in rain bogs and 54 % in the surrounding cultivated landscape. Sampling for grasshoppers was conducted at 76 sites, 41 % in rain bogs and 59 % in the surrounding landscape. 37 vegetation types were mapped, on average 12 of these

occurred in rain bogs and 16 in the surrounding cultivated landscape. Disturbed rain bogs are structure-rich habitats with a closely interlocking mosaic of different ecological conditions. 35 species of dragonflies with altogether 6318 individuals, and 21 species of grasshoppers with altogether 4486 individuals could be proven. In disturbed rain bogs, more species and, above all, more individuals of dragonflies and grasshoppers were found than in the surrounding landscape. A comparison of diversity values between disturbed rain bogs and the surrounding landscape using the SHANNON-WEAVER-Index didn't show significant differences for dragonflies and grasshoppers. A comparison of larger landscape units with such indices was not of additional value, since species and individuals were not homogeneously distributed in space. No species of dragonflies or grasshoppers could be assigned to a single category of dominance over all sampling sites; the same is true for species' constancy. Frequent high abundances of individuals were reached only by highly constant species, and mainly in disturbed rain bogs. Species turnover was higher for dragonflies and grasshoppers in the surrounding landscape than in rain bogs in both years of the study, though only for dragonflies the difference was significant. Species turnover in 73 years was calculated and structural diversity was compared between historical and actual times using the work of RABELER (1931) on the „Göldenitzer Moor". In this disturbed rain bog, RABELER counted 16 vegetation types, whereas in this study 23 vegetation types were found. This difference can be used to explain species turnover rates of 32 % in dragonflies and 61 % in grasshoppers. It became clear, that today man is the dominating ecological factor, determining species richness and species poverty in the young moraine landscape of North-Eastern Germany. By extensive agrarian land use, he creates extensive landscapes poor of species and individuals, whereas in originally species-poor rain bogs, he creates habitats rich in species and individuals by changing intensities of disturbance. Most species of dragonflies showed highest abundances in eutrophic waters, grasshoppers in oligotrophic sites, and both taxa in sites with moderate disturbance intensity. It is assumed, that under those conditions interlocking of ecological conditions is optimal for all ontogenetic stages. Coincidences between presence of dragonflies or grasshoppers and vegetation type or other ecological factors could not be proven for any species, this verifying the second hypothesis. For verification of the third hypothesis, saying that species diversity on terrestrial islands such as disturbed rain bogs is less determined by area, but by duration of existence of preferred conditions and by presence of constant species with high abundances, this work gives clear indications. Abundant species might be decimated by predators and/or parasites, thereby enabling their existence. Intraspecific competition causes dismigration of numerous individuals, though resources do not have to be depleted. Specialized species can unfold undisturbed in such habitats and fill their niches completely, therefore disabling even ubiquitous species to invade them. According to the latest amendment of the Federal Law of Nature Conservation, landscape planning was assigned two completely new functions. An European network of protected areas is to be developed for sustainable conservation of Middle-European biodiversity by planning. Based on data from environmental observation, a report on the success of the employed means is to be delivered in regular intervals. From the results of this work can be derived, that



conservation of biodiversity is not necessarily combined with the development of a network of protected areas. The actual sense of the network should be understood as development of a net of ecotope mosaics, an interlocking of different ecological conditions, micro- and mesoclimata, different trophic level and disturbance intensities that are representative for a landscape unit. In future, instead of rare species and vegetation types, sites with high abundances of constant species should be criteria for conservation areas or linking biotopes. The widespread habit of focussing on rare species should be changed, since most rare species have always been rare - rareness is a natural evolutionary phenomenon. In future, landscape planning should try to link its aims with those of other planning disciplines, in order to e.g. integrate moderate disturbances within different landscape units. Overall structures with moderate disturbances occurring at regular intervals could be created by provision of areas at transition zones between different forms of land use. For those, landscape planning could develop specific measures of maintenance and development in accordance with edaphic conditions and in coordination with land owners and -users. By a restriction of planning to specific measures of revitalisation for the small number of conservation areas, and otherwise allowing succession, high costs for the maintenance of decentred conservation areas could be avoided. Extended hydrological buffer zones around intact and revitalized rain bogs lead to permanently high water levels, creating a mosaic of different stages of succession and thereby enabling existence of numerous species and, particularly, individuals. If Middle-European biodiversity is to be preserved, landscape planning will have to concentrate on area-wide measures in the long term, since this diversity is a product of land use in the Middle-European cultivated landscape. Agricultural politics and agrarian legislation will have to be altered fundamentally for realization of these aims; otherwise agriculture will stay the evident originator for losses of habitat- and species diversity." (Author)] Address: Bönsel, A., Vassenbusch 15, D-18337 Gresenhorst, Germany. E-mail: andre.boensel@gmx.de

**4952.** Borchelt, K. (2005): Dragonfly. Kidhaven Press. ISBN 0-7377-1770-X: 32 pp. (in English). [Four chapters with information on Odonata are directed to kids. Nice colour photos are accompanying the text.]

**4953.** Case, T.J.; Holt, R.D.; McPeck, M.A.; Keitt, T.H. (2005): The community context of species borders: ecological and evolutionary perspectives. *Oikos* 108: 28-46. (in English). ["Species distributional limits may coincide with hard dispersal barriers or physiological thresholds along environmental gradients, but they may also be influenced by species interactions. We explore a number of models of interspecific interactions that lead to (sometimes abrupt) distribution limits in the presence and absence of environmental gradients. We find that gradients in competitive ability can lead to spatial segregation of competitors into distinct ranges, but that spatial movement tends to broaden the region of sympatry between the two species, and that Allee effects tend to sharpen these boundaries. We generalize these simple models to include metapopulation dynamics and other types of interactions including predator/prey and host-parasite interactions. We derive conditions for range limits in each case. We also consider models that include coevolution and gene flow and find that character displacement along environmental gradients can

lead to stable parapatric distributions. We conclude that it is essential to consider coevolved species interactions as a potential mechanism limiting species distributions, particularly when barriers to dispersal are weak and environmental gradients are gradual." (Authors) References are made to the genus *Enallagma*.] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**4954.** Catling, P.M.; Cannings, R.A.; Brunelle, P.M. (2005): An annotated checklist of the Odonata of Canada. *Bulletin of American Odonatology* 9(1): 1-20. (in English). [As current as October 2004, 208 odonate species are known to occur in Canada. These species are checklisted, vernacular names in English and French are added, the occurrence of each species in one of 13 Canadian provinces is tabled, and a selected bibliography is added.] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, Canada. E-mail: brownell@achilles.net

**4955.** Clausnitzer, V.; Dijkstra, K.-D. (2005): The dragonflies (Odonata) of Ethiopia, with notes on the status of endemic taxa and the description of a new species. *Entomologische Zeitschrift* 115(3): 117-130. (in English, with German summary). ["In March 2004 the authors undertook a survey of Odonata in the highlands of central and southwest Ethiopia, as well as along some Rift Valley lakes. The endemic species were the main target, as almost no information other than descriptions existed. Some type localities were visited, as were other habitats, to gather information on the species' distribution, habitat requirements and conservation status. 29 sites were sampled and 69 species recorded. Of 11 known endemics, 9 were found, all at sites other than their type localities. One new species assumed to be endemic was found, and is described as *Paragomphus crenigomphoides* sp. nov. A revised checklist of Ethiopian Odonata is presented: 96 species have been reliably recorded. *Ischnura hilli* Pinhey, 1964 and *Enallagma caputavis* Terzani & Carletti, 1998 are considered synonyms of *I. abyssinica* Martin, 1907 and *Pseudagrion niloticum* Dumont, 1978 respectively. The taxonomy and nomenclature of an undescribed *Aeshna* species (near *A. meruensis* Sjöstedt, 1909 and *A. yemenensis* Waterston, 1985), *Notogomphus ruppeli* (Selys, 1857) (frequently spelt as *N. rueppeli*) and *Orthetrum kollmannspergeri* Buchholz, 1995 (probably confused with Asian *O. taeniolatum* (Schneider, 1845)) are discussed. Ethiopia's odonate fauna is compared with that of other East African highlands: It is impoverished (especially forest species) but rich in endemics." (Authors)] Address: Clausnitzer, Viola, Graefestr. 17, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de

**4956.** Cordero Rivera, A. (Ed.) (2005): Abstracts Book 4th WDA International Symposium of Odonatology, Pontevedra 26-30 July 2005. Vigo: 88 pp. (in English). [Oral contributions Corbet, P.S. Forests as habitats for dragonflies (Odonata): 15 Orr, A.G.: Odonata in Bornean tropical rain forest formations: diversity, endemism and implications for conservation management: 15 Samways, M.J.: Threat levels to odonate assemblages from invasive alien tree canopies: 16 Sahlen, G.: Specialists vs. generalists among dragonflies - the importance of forest environments to form diverse species pools: 17 Taylor, P.D.: Movement behaviors of odonates in heterogeneous forest landscapes: 18 Paul-

son, D.: The importance of forests to neotropical dragonflies: 18 Fincke, O.M.: Habitat use by pseudostigmatid damselflies: their future in fragmented forests: 19 Clausnitzer, V. & Dijkstra, K.D.: What matters to tropical forest dragonflies? African impressions: 20 Hadrys, H.: Historical and recent population genetics: Any news to tell us about the impact of fragmentation on afrotropical forest odonates?: 20 Thompson, D.J. & Watts, P.C.: The structure of the *Coenagrion mercuriale* populations in the New Forest, southern England: 21 Watanabe, M.: Mate location and competition for mates in relation to sunflecks of forest floors: 22 Fincke, O.M.: Lack of innate recognition of species or morph identity in *Enallagma* damselflies: 23 Van Gossum, H., Beirinckx, Kirsten, Forbes, M. & Sherratt, T.: Large-scale variation in female morph frequencies of the polychromatic damselfly *Nehalennia irene*: 23 Hilfert-Rüppell, D.: Documenting odonate behaviour by drawing from films: 24 Matushkina, N.: Ovipositor and egg-laying behaviour of Odonata: phylogenetic implications: 25 Rüppell, G.: Flashes in flight: communication between odonate males: 26 Sanchez-Guillen, Rosa Ana & Cordero Rivera, A.: Pre- and postmating mechanisms of reproductive isolation between *Ischnura graellsii* and *I. elegans* (Odonata: Coenagrionidae): 26 Schenk, K.: Does ovaries composition vary between species with different mate-guarding intensities?: 27 Olberg, R. & Worthington, Andrea: Dragonfly prey capture: Vision, decision, and flight: 27 Cordero Rivera, A.: Copulatory behaviour in hybrid matings between *Calopteryx haemorrhoidalis* and *C. splendens*: 28 Cordoba-Aguilar, A.: Sperm ejection as a cryptic female choice mechanism in odonates: 29 Serrano-Meneses, M. A., Szekely, T. & Cordoba-Aguilar, A.: Survival and mating success of American Rubyspots in relation to body size (Odonata: Calopterygidae): 29; Szalassy, Noemi, Szabo, Z.D., Nagy, H. Beata: Differences in survival of mated and unmated males of *Libellula fulva*: a four year study: 30; Günther, A.: Female reproductive behaviours of different Chlorocyphid species in the Oriental-Australian region: 31 Spector, S. & Naszkecki, P.: The global dragonfly assessment: 31; Karube, H.: Why are endemic Odonates endangered in oceanic islands Ogasawara?: 32; Riservato, Elisa & Bogliani, G. Dragonflies of riverine habitats: assessment as indicators of biodiversity and environmental integrity: 33; Kadoya, Taku; Suda, Shin-ichi, Washitani, Izumi & Tsubaki, Yoshitaka: Spatial heterogeneity of the dragonfly assemblages in the landscape scale: assessments using newly created small ponds as traps in the catchment area of lake Kasumigaura: 33; Lorenzo Carballa, Olalla & Cordero Rivera, Adolfo Fecundity and fertility of parthenogenetic *Ischnura hastata*: 34; Susa, Koichi & Watanabe, Mamoru: Habitat selection and Egg production in *Sympetrum infuscatum* females living in a forest paddy field complex: 35; Martens, A. & Suhling, F.: Ecology of Odonata inhabiting permanent Namibian desert springs: 36; Watanabe, Yoko.: Artificial parthenogenesis in *Aeshna nigroflava* Martin: 37; Weirauch, F., Olias, M., Bedjanic, M., Marinov, M. & Salamun, A.: Distribution and overlap of ranges of *Lestes parvidens* and *L. viridis* in southeastern Europe (Odonata: Lestidae): 37; Hawking, J.H.: Odonata larvae and drought in Australia: Ecological development for life in an unpredictable climate: 38; Suhling, F. & Sahlen, G.: The influence of environment and phylogeny on the determination of morphological, behavioural and life history traits in dragonfly larvae: 39; Marais, E.: Quaternary environmental change along the Western Escarpment of Africa and the distribution of Namibian Odonata: 40; Holusa, O.: The occurrence of *Cordulegaster* sp. in Czech Republic: result of influence of habitat ecological factors in different biogeographical regions?: 41; Khrokalo, Lyudmyla, Prokopov, G.: Notes on Crimean Odonata (Crimea, Ukraine): 42; Schütte, K.: Biogeography and habitat affinity of the odonata fauna of SE Madagascar: 42; Contreras-Garduno, J. & Cordoba-Aguilar, A.: Population differences in sexual selection intensity and immune response in two contrasting forest environments in the damselfly *Hetaerina americana* (Zygoptera: Calopterygidae): 43; Goffart, P.; Fichet, V.; de Schaetzen R.; Baugnee J-Y.; Lebrun, Ph. & Dufrene, M.: Southern dragonflies expanding in Wallonia (South Belgium): a consequence of global warming?: 44; Bouwman, J., Groenendijk, D. & Plate, C.: The Dutch Dragonfly Monitoring Scheme: results and trends: 44; Conze, K.-J.: Dragonfly monitoring in Northrhine Westfalia, Germany: 45; De Knijf, G. & Anselin, Anny: When south goes north: mediterranean Odonata conquer Flanders (North Belgium): 46; Kalkman, V.: Towards an atlas of European odonates: 47; Tsubaki, Y.: Mapping potential habitats using environmental surrogate measures: Importance of forests for dragonflies in Japan: 48; Giere, Sandra & Hadrys, Heike: Genetic consequences of habitat specialisation and cryptic speciation in the genus *Trithemis*: 48; Ott, J.: The effects of Climatic Changes for the distribution of dragonflies in Europe and their possible effects on the biocoenosis of the waters: 49; Ubukata, H. & Sakoda, T.: Optimization of environmental monitoring schedule using adult dragonflies: 50; Matthews, J.H. Climate impacts on a North American dragonfly: evolutionary vs. ecological responses: 50; Dijkstra, K.D.: Flying Colours: Five years of research on Odonata in tropical eastern Africa: 51; Kjer, K.M.; Carle, F.L. & May, M.L.: A preliminary phylogenetic hypothesis of Odonata, based on multiple molecular and morphological data sets: 52; Leipelt, K.G.: Ecomorphology of legs in larval and adult Anisoptera: 52; Dijkstra, K.D.: Critical and consequent taxonomy in Odonata: the European perspective: 53; Fursov, V.: Aquatic egg-parasitoids (Hymenoptera) of dragonflies and other arthropods: unique life and flight under water: 54; Carvalho, Alcimar do Lago: On some paintings of Odonata from the late Middle Ages (14th and 15th centuries): 55; Sathe, T.V.; Mundale, Mandar; Bhosale, Y. A. & Margaj, G.S.; Impact of dragonflies on population suppression of paddy pests in agroecosystem of Kolhapur district, India: 56; Karube, H., Kata-tani, N. & Kitagawa, K.: On the genus *Dubito gomphus* Fraser, 1940, their true status and characters: 56; Thomas, M., Gunasekaran and Mohan, D.: Comparative studies on the genital and sub-genital abdominal segments of five species of dragonflies (Anisoptera: Odonata): 57 Graca, M.A.S.: Allochthonous organic matter as a food resource for aquatic invertebrates in forested streams: 57 Poster presentations 1. E.; Preliminary observations of reproductive behavior in *Ari-gomphus villosipes* (Anisoptera: Gomphidae): 59; 2. Nagy, H. Beata; Laszlo, Zoltan; Szalassy, Noemi; Szekely, Annamaria & Devai, G.: Site fidelity, mating success and reproductive strategies in males of *Libellula fulva* (Odonata: Libellulidae): 60; 3. Sathe, T.V.; Bhoje, P.M., Kavane, P., Shinde, K.; Yadav, R.P. & Pandharbale, A.R.: Mating behaviour in damselfly *Ischnura senegalensis* (Rambur): 61; 4. Schenk, Kamilla: Egg distribution, mate-guarding intensity and offspring conditions in dragonflies: 61 5. Contreras-Garduno, J., Buzatto, B., Najera, Karla & Cordoba-Aguilar, A.: Fat reserves and wing spot size, but not wing spot and body co-

lour intensity, are related to male success during territorial contests in *Hetaerina americana*: 62; 6. Mihokovic, N. & Slavikovski, Ana: The effect of thermal pollution on dragonfly populations: 62 7. Rodriguez-Guntin, I.; Perez-Bilbao, A.; Gonzalez, A.; Alonso, A. & Garrido, J.: Evaluation of the odonata community in Galician rivers (NW Spain) that are affected by hydroelectric power stations: 63 8. Timm, Janne & Hadrys, Heike: Comparative molecular genetic analysis of the population structures and dynamics of two aeshnid species (Odonata: Aeshnidae) in Namibia: 63 9. Van Gossum, H., Sanchez-Guillen, Rosa Ana & Cordero Rivera, A.: Hybridisation and inheritance of female-limited colour polymorphism in two ischnurid damselfly species (Odonata): 64 10. Wargel, Antonia, Giere, Sandra & Hadrys, Heike: Genetic consequences of a man-made bottleneck in *Orthetrum coerulescens*: A microsatellite system to study fine scale population dynamics: 65 11. Gonzalez de Castro, Ines, Van Gossum, H. & Cordero Rivera, A.: The effect of larval density on female polychromatism and body size in *Ischnura graellsii*: 65; 12. May, M. L.: Preliminary results of a multi-year study of phenology and development of *Anax junius* in Maryland, U.S.A.: 66 13. Sanchez-Guillen, Rosa Ana & Cordero Rivera, A.: Relative frequency of *Ischnura elegans* and *I. graellsii* (Odonata: Coenagrionidae) in the Galician coast: 66; 14. Alonso, A.; Garrido, J.; Perez-Bilbao, A.; Gonzalez, A. & Rodriguez-Guntin, I.: Present dragonflies in gAs Gandaras de Budinoh. Site of Community Importance (Nature 2000 Network): 67; 15. Ferreira, Sonia & Grosso-Silva, J. M.: Present knowledge on the Odonata of Serra da Estrela Natural Park (Portugal): 68 16. Ferreira, Sonia, Grosso-Silva, J.M., Soares-Vieira, Patricia & Sousa, P.: Odonata of continental Portugal: mapping the knowledge and identifying geographical gaps: 68; 17. Oppel, S.: Dragonflies and damselflies of a montane tropical rainforest in Papua New Guinea: 69; 18. Sathe, T.V.; Shinde, K.; Bhoje, P.M., Thite, H.S. & Patil, R.G.: Biodiversity of dragonflies (Odonata) from Western ghats of Maharashtra, India: 70; 19. Soares-Vieira, Patricia, Grosso-Silva, J.M. & Ferreira, Sonia: On the available data concerning the Odonata of Peneda-Geres National Park (NW Portugal): 70; 20. Azpilicueta, Monica; Rey Rano, C., Docampo Barrueco, F., Rey Muniz, X.C., Cordero Rivera, A.: A preliminary analysis of odonate species richness in Galiza (NW Spain): 71; 21. Cano-Villegas, F.J. & Ferreras-Romero, M.: Contribution to knowledge of the biology of *Onychogomphus costae* Selys, 1885 (Odonata: Gomphidae) in southern Spain: 71; 22. Torralba Burrial, A. & Ocharan, F.J.: Pond water regime and competition as key factors in the presence and life history of two *Lestes* damselflies (Odonata: Lestidae): 72; 23. Khrokalo, Lyudmyla & Matushkina, Natalia: Expansion of *Crocothemis erythraea* in Ukraine: 72; 24. Kurauchi, Yohei & Ubukata, H.: Sensitivity and economy of monitoring the environment of a large lake using adult dragonflies: 73; 25. Termaat, T., Ketelaar, R. & de Vries, H.: Flight peak trends for dragonflies from the Netherlands: 74; 26. Watanabe, Yoko: Morphological characteristics of odonate eggs and early instar larvae specific to taxa: 74 27. Ferreras-Romero, M., Cano-Villegas, F.J. & Rubio-Soler, M. Isabel: Interannual change measurement of the Odonata community existing in a Mediterranean river which put up with the by-product of a heavy mining accident happened in April 1998 (river Guadiamar, Andalusia, southern Spain): 75; 28. Rodriguez-Linares, G.; Garrido, J.; Bendicho, C.; Lavilla, I.: Relationships between the concentrations of heavy metals in dragonfly

larvae and Louro river sediments: 76; 29. Rodriguez-Linares, G.; Garrido, J.; Bendicho, C. & Lavilla, I.: Evaluation of three species of dragonfly larvae as biomonitors of heavy metals: 77; 30. Fernandez-Martinez, M.: Dragonfly folklore in Galicia, Northwest Iberian Peninsula: 77 31. de Marmels, J.: A new genus of Coenagrionidae (Odonata, Zygoptera) from the Pantepui region of Venezuela, with descriptions of four new species: 78 32. Mihokovic, N.: WAPODOKEY: 79; 33. Ashok, Jagtap; Shinde, Kiran & Sathe, T.V.: A comparative study of haemocytes in male and female of the dragonfly *Crocothemis servilia* Drury: 79 Informal presentations: Hawking, J.H.: Reflections on the 2003 International Odonatology Symposium, Beechworth, Australia: 80 Author index: List of participants: 84] Address: [http://webs.uvigo.es/c04/webc04/WDA/ProgramAbstracts4thWDA Symposium.pdf](http://webs.uvigo.es/c04/webc04/WDA/ProgramAbstracts4thWDA%20Symposium.pdf)

**4957.** Cordoba-Aguilar, A. (2005): Possible coevolution of male and female genital form and function in a calopterygid damselfly. *Journal of Evolutionary Biology* 18(1): 132-137. (in English). ["In this paper some evolutionary changes of genitalia in the damselfly *Calopteryx haemorrhoidalis* are investigated by determining their current and past function. *Calopteryx haemorrhoidalis* males stimulate females by aedeagal frictioning on a set of vaginal sensilla. The aedeagus is considerably variable and positively correlates with volumes of ejected sperm from the spermatheca. Interestingly, females show a significantly reduced sensillum number compared with other family members. Here I explore whether there existed directional selection for aedeagal width at its evolutionary onset; and whether the sensillum reduction evolved to make sperm ejection less effective. Using *C. haemorrhoidalis* aedeagi in females whose species retained the ancestral conditions (no stimulatory ability and large sensillum numbers), *Hetaerina cruentata* and *C. xanthostoma*, my results corroborated these assumptions: variation in aedeagal width inversely correlated with sperm ejection rate while sperm ejection was higher in species with high sensillum numbers. A suggested coevolutionary interpretation of these results in *C. haemorrhoidalis* is that aedeagal width was favoured which was followed by a sensillum reduction." (Author)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biológicas, Univ. Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: [acordoba@uaeh.reduaeh.mx](mailto:acordoba@uaeh.reduaeh.mx)

**4958.** De Block, M.; Stoks, R. (2005): Fitness effects from egg to reproduction: bridging the life history transition. *Ecology* 86(1): 185-197. (in English). ["Although complex life cycles are widespread, we know little about how constraints in the larval stage influence adult fitness. Most models assume a tight coupling of larval conditions and adult fitness through size and timing of the life history transition. However, there are few empirical tests of this assumption. We combined an experimental manipulation of larval environment with a subsequent study of adult fitness, measured as lifetime mating success. Individuals of the damselfly *Lestes viridis* were followed from the egg stage to adult reproduction and death. Under time constraints, emergence occurred earlier, but in late-hatched larvae, this did not result in a lower size. Under nutritional constraints, emergence occurred later, and size was reduced. Variation in survival to maturity was better explained by larval constraints than by emergence traits, whereas both larval constraints and emergence traits explained variation in life-



time mating success. Sexes reacted differently to larval constraints, and the coupling of larval constraints to adult fitness also was sex specific. Our results indicate that larval constraints do not necessarily carry over to adult fitness through size and timing of transition, and that carryover effects may be sex specific. This may explain the existence of hidden costs that become visible after maturation and may explain part of the unexplained variation in selection studies on adults." (Authors) Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robbystoks@bio.kuleuven.ac.be

**4959.** Deliry, C. (2005): Nouvelles références. *Symptetrum piémontais* 55: 2. (in French). [France; 26 publications containing information on Odonata, nearly exclusively unpublished expertises, are compiled.] Address: Deliry, C., Chalet 37, Village des pêcheurs, F-38390 Montalieu, France. E-mail: president@symptetrum.org

**4960.** Dmitriew, C.; Rowe, L. (2005): Resource limitation, predation risk and compensatory growth in a damselfly. *Oecologia* 142(1): 150-154. (in English). ["Periods of poor nutrition during early development may have negative fitness consequences in subsequent periods of ontogeny. In insects, suppression of growth and developmental rate during the larval stage are likely to affect size and timing of maturity, which in turn may lead to reduced reproductive success or survivorship. In light of these costs, individuals may achieve compensatory growth via behavioural or physiological mechanisms following food limitation. In this study, we examined the effects of a temporary period of food restriction on subsequent growth and age and size at maturity in the larval damselfly *Ischnura verticalis*. We also asked whether this temporary period of reduced nutrition affected subsequent foraging behaviour under predation risk. *I. verticalis* larvae exposed to a temporary food shortage suffered from a reduced growth rate during this period relative to a control group that was fed ad libitum. However, increased growth rates later in development ensured that adult body size measurements (head and pronotum widths) did not differ between the treatments upon emergence. In contrast, adult dry mass did not catch up to that of the controls, indicating that the increased growth rates for size dimensions occur at the cost of similar gains in mass. Predators reduced foraging effort of larvae, but this reduction did not differ between control larvae and those previously exposed to poor nutrition." (Authors)] Address: Dmitriew, C., Dept Zool., Univ Toronto, Toronto, ON, M5S 3G5, CA. E-mail: dmitriew@zoo.utoronto.ca

**4961.** Ellenrieder, N. von; Garrison, R.W. (2005): Case 3294: *Gynacantha Rambur, 1842* and *Triacanthagyna Selys, 1883* (Insecta, Odonata): proposed conservation of usage by designation of *Gynacantha nervosa Rambur, 1842* as the type species of *Gynacantha*. *Bulletin of Zoological Nomenclature* 62(1): ?. (in English). ["The purpose of this application, under Article 70.2 of the Code, is to conserve the accustomed usage of the names *Gynacantha Rambur, 1842* and *Triacanthagyna Selys, 1883* for two genera of aeshnid dragonflies. The names are objective synonyms but are currently in use for two distinct groups of species. It is proposed that *Gynacantha nervosa Rambur, 1842* should be designated as the type species of *Gynacantha* to conserve the accustomed usage of these two

generic names." (Authors)] Address: Ellenrieder, Natalie von, Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C. 712, AR-1900, La Plata, Argentina. E-mail: ellenr@ilpla.edu.ar

**4962.** Erös, T.; Schmera, D.; Cser, B.; Csabai, Z.; Murány, D. (2005): Composition of macroinvertebrate assemblages in two submontane streams - The influence of stream order and riffle-pool structure. *Acta Biol. Debr. Oecol. Hung* 13: 85-94. (in Hungarian, with English summary). ["We examined the seasonal assemblage composition and biomass pattern of macroinvertebrate assemblages in two streams of the Börzsöny mountain in riffle and pool habitat types. Clear similarities and differences in species composition were found between riffles and pools. Biomass values showed significant differences between seasons. Biomass was higher in the second order stream in between stream comparisons and in riffles in between riffle-pool comparisons, although these differences were not significant in each season. Composition based on mass percentage was determined largely by Ephemeroptera, Trichoptera, Amphipoda, Coleoptera, Chironomidae, and other Diptera groups, showing large differences between seasons and habitat types. Multivariate analyses showed that riffle-pool habitat structure predominantly determined the similarity of the assemblages based on mass percentage, however seasonal and between stream differences also contributed to differences in assemblage composition." (Authors) *Calopteryx virgo*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*] Address: Erös, T., VITUKI Környezetvédelmi és Vízgazdálkodási Kutató Intézet Kht, Budapest, Hungary

**4963.** Foote, L.A.; Rice, C.L. (2005): Odonates as biological indicators of grazing effects on Canadian prairie wetlands. *Ecological Entomology* 30(3): 273-283. (in English). ["1. Aquatic macro-invertebrates have frequently been used as biological indicators in lotic environments but much less commonly so in lentic habitats. Dragonflies and damselflies (Order Odonata) satisfy most selection criteria for lentic bioindicators of grazing impacts. 2. Intensive cattle grazing affects most of the Canadian prairie pothole region but the effects of grazing on wetlands are poorly understood. 3. Here the vegetation structure and invertebrate community composition of 27 prairie potholes in Alberta, Canada were studied and compared. Wetlands were evenly divided into three treatments of different grazing regimes. 4. Removal of emergent vegetation by cattle grazing decreased odonate abundance and reproductive effort. Shorter *Scirpus acutus* stems resulted in significantly fewer damselflies (Suborder Zygoptera) and lower reproductive efforts. 5. Overall odonate diversity was affected by the height of key plant species, highlighting the importance of the vegetation structure of both emergent vegetation for breeding and adjacent upland vegetation for nocturnal roosts. Wetland vegetation structure was more important than vegetation composition to the life history of odonates. 6. Wetland water quality parameters of nitrogen, phosphorus, total dissolved solids (TDS), and chlorophyll-a concentration did not change due to the presence of grazing cattle at wetlands so water quality influences were rejected as mechanisms of change. 7. Larval odonate diversity and abundance was positively correlated with overall aquatic macro-invertebrate diversity and abundance, hence it was concluded that the larval odonate community can be an accurate bioindicator of intactness and diversity

of overall aquatic macro-invertebrate communities in Canadian prairie wetlands." (Authors)] Address: Lee Foote, A., Department of Renewable Resources, GSB 7-51, University of Alberta, Edmonton, Alberta T6G 2H1, Canada. E-mail: lee.foote@ualberta.ca

**4964.** Grimaldi, D.; Engel, M.S. (2005): Evolution of the Insects. Cambridge University Press. ISBN-13 978-0-521-82149-0 hardback: (in English). [Chapter 6 (pp 173-187) relates to the Odonatoptera.]

**4965.** Gysels, F.G.M.; Stoks, R (2005): Threat-sensitive responses to predator attacks in a damselfly. *Ethology* 111(4): 411-423. (in English). ["The threat sensitivity hypothesis predicts that prey species assess and adjust their behaviour flexibly in accordance with the magnitude of the threat imposed by a predator. We tested this hypothesis with regard to escape behavior and thanatosis (feigning of death to escape predation) in larvae of the damselfly *Ischnura elegans*. We manipulated the perceived predation threat of the larvae by changing three factors: lamellae autotomy (an escape strategy where animals sacrifice a body part when grasped by a predator; lamellae present or absent), kairomone type (odors released by predators; control, dragonfly kairomones or fish kairomones), and population of origin (fishpond or fishless pond). We demonstrated that thanatosis increased survival both when confronted with dragonfly and fish predators. We could show, for the first time, costs of past autotomy to be predator-dependent: larvae without lamellae suffered higher predation mortality but only in the presence of a dragonfly predator and not in the presence of a fish predator. This is in accordance with the observed reduced escape speed of larvae after autotomy, which may affect escape probability toward dragonfly predators but not to the very fast fish predators. Unexpectedly, kairomone type did not affect the escape response of the larvae. In accordance with the threat sensitivity hypothesis, after an unsuccessful attack, larvae without lamellae had a higher frequency to enter thanatosis than larvae with lamellae and larvae from the fishpond showed longer thanatosis durations than larvae from the fishless pond. Consistent with the hypothesis, the reaction of the larvae to a simulated attack depended jointly on lamellae status and population. In fishless ponds, larvae with lamellae swam away more frequently than larvae without lamellae; in fishponds both groups almost never swam away and relied mostly upon immobility. Given the obvious benefits of adaptively varying escape responses we hypothesize this threat sensitivity to be widespread. Moreover, we argue that former inconsistencies between studies with regard to escape behavior may have been partly because of such adaptive variation." (Authors)] Address: Gysels, Freya; Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**4966.** Hernandez, K.M.; Reece, B.A.; McIntyre, N.E. (2005): Effects of anthropogenic land used on Odonata (dragonflies and damselflies) in Playas of the Southern High Plains. International Association of Landscape Ecology Annual Symposium (US-IALE). March 12-16, 2005 in Syracuse, New York. <http://iale.esf.edu/pdfs/IALEProgram2005.03.11.pdf>: 93. (in English). [Verbatim: Playas are ephemeral wetlands that are the only source of freshwater on the Southern High Plains, making them of vital importance to aquatic and amphibious

animals. Playas are also highly threatened from anthropogenic land use (chiefly agriculture, which decreases hydroperiod through increased sedimentation). We are examining the ecology of odonates in playas that differ in surrounding land use (cropland vs. grassland). Preliminary analyses of odonate diversity have revealed a high degree of overlap between cropland and grassland playas (not surprising in a highly mobile taxon). There appears to be a threshold playa size that supports maximal odonate richness, which may reflect a tradeoff between water depth and emergent vegetation that is required for oviposition. Since agriculture effectively reduces playa depth, this tradeoff may be mitigated, which has important implications for odonate community structure in the Southern High Plains.] Address: Hernandez, Kyle M. , Howard Hughes Medical Institute, Dept of Biological Sciences, Lubbock, Texas, 79409-3131, USA. E-mail: kyle.hernandez@ttu.edu

**4967.** Hickling, R.; Roy, D.B.; Hill, J.K.; Thomas, C.D. (2005): A northward shift of range margins in British Odonata. *Global Change Biology* 11: 1-5. (in English). ["Many species are predicted to shift their ranges to higher latitudes and altitudes in response to climate warming. This study presents evidence for 37 species of nonmigratory British dragonflies and damselflies shifting northwards at their range margins over the past 40 years, seemingly as a result of climate change. This response by an exemplar group of insects associated with fresh water, parallels polewards range changes observed in terrestrial invertebrates and other taxa." (Authors)] Address: Hickling, Rachael, NERC Centre for Ecology and Hydrology: Monks Wood, Abbots Ripton, Huntingdon, Cambridgeshire PE28 2LS, UK. E-mail: rhic@ceh.ac.uk

**4968.** Johnson, J.; Valley, S. (2005): The Odonata of Oregon. *Bulletin of American Odonatology* 8(4): 100-122. (in English). ["87 species of Odonata are listed from Oregon, USA. General distribution, habitat preference, flight period, and county records are presented for each species. A brief history of odonatological research conducted in Oregon is presented. Five species are discussed as likely additions to the odonate fauna." (Authors)] Address: Johnson, J., 3003 Unander Avenue, Vancouver, WA 98660, USA. E-mail: jtjohnson@comcast.net

**4969.** Kutrup, B.; Çakir, E.; Yilmaz, N. (2005): Food of the Banded Newt, *Triturus vittatus ophryticus* (Bertold, 1846), at different sites in Trabzon. *Turkish Journal of Zoology* 29: 83-89. (in English, with Turkish summary). [Odonata are listed as prey of the Banded newt in Turkey.] Address: <http://journals.tubitak.gov.tr/zoology/issues/zoo-05-29-1/zoo-29-1-11-0401-7.pdf>

**4970.** Leipelt, K.G. (2005): Behavioural differences in response to current: implications for the longitudinal distribution of stream odonates. *Archiv für Hydrobiologie* 163(1): 81-100. (in English). ["Different longitudinal distribution patterns occur in closely related running water species. However, the mechanisms that underlie this phenomenon are poorly studied. In European Cordulegaster species (Odonata) two different longitudinal distribution patterns occur: species like *C. bidentata* and *C. insignis* are limited to springs and springbrooks, whereas species like *C. boltonii* and *C. picta* are less restricted and occur from springs to larger streams and rivulets. To find an explanation for these patterns, expe-

periments in artificial streams were carried out to reveal differences in larval response to current between species of the two types. Larval *C. bidentata* and *C. insignis* showed a higher proneness to drift compared to *C. boltonii* and *C. picta*. Furthermore, *C. bidentata* and *C. insignis* avoided renewed drifting after a forced drift event less effectively and, exposed to strong current, travelled longer distances. It is concluded that, compared to the other pair of species, the behavioural traits of *C. bidentata* and *C. insignis* are less effective to withstand strong hydraulic stress, which restricts the distribution of these species to habitats with low discharge and current velocity, namely springs and springbrooks." (Author)] Address: Leipelt, K.G., Inst. Geoökologie, Technische Univ. Braunschweig, Langer Kamp 19c, D-38106 Braunschweig, Germany. E-Mail: k.leipelt@tu-bs.de

**4971.** Lencioni, F.A.A. (2005): Damselflies of Brazil. 1 - Non-Coenagrionidae families. 332 pp. (in Bilingual in English and Portuguese). ["The book begins with an introductory chapter containing illustrations of all diagnostic characters, collection, preservation techniques, and identification keys for families and genera. Each species account includes original literature citation, synonymies, references to described larvae, and diagnostic illustrations, usually of the caudal appendages and/or wing scans. The last chapter includes an extensive, up-to-date bibliography and glossary. More than 1000 diagnostic illustrations (of which almost 300 are original) for the 153 species of non-Coenagrionidae species are included which should make identification of the damselfly fauna of Brazil considerably easier than was previously possible." The species are treated in a monographic style containing the following items: Data on Original description; data on imago (if male and female are described); type locality; where the types are housed; synonymy; distribution in South America; distribution in Brazil; data on larvae (described or not and where); data on revision. The glossary includes 156 entries in English and Portuguese (in Portuguese with the English word or expression) and the bibliography refers to app. 120 papers. This publication is available from the author and is priced US \$ 60 plus shipping.] Address: Lencioni, F.A.A., Rua dos Ferroviários 55, Jardim Mesquita, BR-12300-000, Jacareí, S.P., Brazil. E-mail: odonata@iconet.com.br. Orders should be directed to the following e-mail address: odonata@zygoptera.bio.br

**4972.** Maes, D.; Van Dyck, H. (2005): Habitat quality and biodiversity indicator performances of a threatened butterfly versus a multispecies group for wet heathlands in Belgium. *Biological Conservation* 123(2): 177-187. (in English). ["We analyzed whether a single species (i.e., the threatened Alcon Blue butterfly *Maculinea alcon*) was a useful indicator for the quality and area of wet heathlands in Belgium. During a survey of 18 wet *Erica tetralix* heathlands, we identified 624 species from 20 different taxonomic groups. Sites with the single indicator species *M. alcon* were significantly richer in typical wet heathland species and in Red List species but did not show significant differences in biotope quality (i.e., the number of different typical wet heathland biotope attributes) than sites without. In addition, we used a multispecies indicator approach including a group of nine species from five different taxonomic groups (each two birds, dragonflies, butterflies, vascular plants, and one grasshopper). High quality sites (5-9 species from the multispecies indicator group present) tended to have

more Red list species than low quality sites (0-4 species from the multispecies indicator group present) but did not expose differences in overall species richness, typical wet heathland species or in biotope quality. The number of species in this umbrella group, however, was positively correlated with both the diversity of typical wet heathland species and with biotope quality. Furthermore, the complementary information of the species in the multispecies indicator group usefully signalled distinctions in biotope area and configuration, vulnerability to fragmentation, eutrophication, desiccation and contained species of different trophic levels; this was not the case for *M. alcon* as a single indicator species. We discuss the use of a single indicator and of a multispecies group as conservation umbrella and advocate a much wider use of combined knowledge from different taxonomic groups in conservation planning and evaluation." (Authors)] Address: Van Dyck, H., Biodiversity Research Centre, Catholic University of Louvain, Unité d'Ecologie et de Biogéographie, Croix du sud 4, B-1384 Louvain-la-Neuve, Belgium. E-mail: vandyck@ecol.ucl.ac.be

**4973.** Maes, D.; Bauwens, D.; Bruyn, L. de; Anselin, A.; Vermeersch, G.; Landuyt, W. van; Knijf, G. de; Gilbert, M. (2005): Species richness coincidence: conservation strategies based on predictive modelling. *Biodiversity and Conservation* 14: 1345-1364. (in English). ["The present-day geographic distribution of individual species of five taxonomic groups (plants, dragonflies, butterflies, herpetofauna, and breeding birds) is relatively well-known on a small scale (5x5 km squares) in Flanders (north Belgium). These data allow identification of areas with a high diversity within each of the species groups. However, differences in mapping intensity and coverage hamper straightforward comparisons of species-rich areas among the taxonomic groups. To overcome this problem, we modelled the species richness of each taxonomic group separately using various environmental characteristics as predictor variables (area of different land use types, biotope diversity, topographic and climatic features). We applied forward stepwise multiple regression to build the models, using a subset of well-surveyed squares. A separate set of equally well-surveyed squares was used to test the predictions of the models. The coincidence of geographic areas with high predicted species richness was remarkably high among the four faunal groups, but much lower between plants and each of the four faunal groups. Thus, the four investigated faunal groups can be used as relatively good indicator taxa for one another in Flanders, at least for their within-group species diversity. A mean predicted species diversity per mapping square was also estimated by averaging the standardized predicted species richness over the five taxonomic groups, to locate the regions that were predicted as being the most species-rich for all five investigated taxonomic groups together. Finally, the applicability of predictive modelling in nature conservation policy both in Flanders and in other regions is discussed." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**4974.** Mastrantuono, L.; Mancinelli, T. (2005): Littoral invertebrates associated with aquatic plants and bioassessment of ecological status in Lake Bracciano (Central Italy). *J. Limnol.*, 64(1): 43-53. (in English) ["Lake Bracciano is a large and deep volcanic lake which plays



an unquestionable role for drawing water source and for fishing and recreational activities. The existence of a project aimed at increasing the amount of water drawn from the lake suggested the advisability of undertaking an ecological analysis of the invertebrate community associated with aquatic plants in order to obtain a detailed knowledge of its composition, biodiversity and quantitative structure, and to provide a set of basic and essential information for defining the ecological status in the littoral zone and for future bioassessments in the lake ecosystem. A good water quality, approaching oligotrophy, was evidenced both from data on aquatic vegetation, which showed the extensive colonization of Charales (down to a depth of about 20 m), and from faunal parameters such as high species richness and diversity values, presence and abundance of bioindicator taxa (mainly cladocerans and gastropods), abundances of total fauna. Nevertheless, a considerable disappearance of the reed thicket due to the intense shore management for recreational purposes have negatively influenced the colonization of the more shallow and productive waters, so evidencing a negative trend of the littoral quality." (Authors) The checklist of species includes *Erythromma lindenii* and *Trithemis annulata*.] Address: Mastrantuono, Luciana, Dept. of Animal and Human Biology, Univ. "La Sapienza", Viale dell'Università 32, 00185 Rome, Italy. E-mail: luciana.mastrantuono@uniroma1.it

**4975.** Mauersberger, R.; Bauhaus, S.; Salm, P. (2005): Zum Vorkommen der Grünen Mosaikjungfer (*Aeshna viridis* Eversmann) im Nordosten Brandenburgs (Odonata: Aeshnidae). *Naturschutz und Landschaftspflege in Brandenburg* 14(1): 17-24. (in German). [60 sites with *A. viridis* have been found between 1987 and 2003 in a region of 3500 km<sup>2</sup> situated in Brandenburg, Germany. The habitats are characterised in detail. A rare exception of an oviposition in *Sparganium emersum* is described and discussed.] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-mail: FoerdervereinUeckermark.Seen@t-online.de

**4976.** Mauffrey, B.; Beaton, G. (2005): The distribution of dragonflies and damselflies (Odonata) in Georgia. *Bulletin of American Odonatology* 9(2): 21-66. (in English). ["We present a list of 173 odonate taxa (170 species) from Georgia, USA. Four taxa are newly added to the state list: *Calopteryx amata*, *Argia fumipennis violacea*, *Enallagma caecum*, and *Gomphus australis*. Several species listed in recent publications are removed from the list: *Lestes forcipatus*, *Gomphus crassus*, *G. septima*, *Cordulegaster diastatops*, *Epitheca spinigera*, *Erythrodiplax umbrata*, *Ladona exusta*, and *Libellula jesseana*. Synonyms and unsupportable older species records are discussed." (Authors)] Address: Beaton, G., 320 Willow Glen Drive, Marietta, GA 30068, USA. E-mail: giffbeaton@mindspring.com

**4977.** Mikolajewski, D.J.; Brodin, T.; Johansson, F.; Joop, G. (2005): Phenotypic plasticity in gender specific life-history: effects of food availability and predation. *Oikos* 110: 91-100. (in English). ["If environmental conditions vary, plasticity in life-history traits is predicted. A recent model indicates that males and females should differ in life-history traits, because sexes differ in optimal attributes depending on species ecology. In this study we test the impact of two biotic factors in combination (presence/absence of predators and low/high

food level) on gender specific life-history traits in the damselfly *Coenagrion puella* (Odonata). Results show that predator presence and low food density decreased activity in both sexes. Additionally, individuals with less food grew more slowly, emerged later, remained smaller and had a higher mortality. At low food densities, however, and in contrast to former investigations, individuals from treatments with predator presence were the same size or larger than individuals without predators. Gender had a strong impact on larval activity and life-history traits and sexes differed in development. Females were less active and took longer to complete development, but emerged at a larger size, weight and fat content. This study highlights the importance of gender specific approaches in life-history research." (Authors)] Address: Johansson, F., Dept of Ecology & Environmental Sci., Animal Ecol. Group, Umea Univ., 90187 Limed, Sweden. E-mail: frank.johansson@eg.umu.se

**4978.** Nel, A.; Petrulevicius, J.F.; Gentilini, G.; Martínez-Delclòs, X. (2005): Phylogenetic analysis of the Cenozoic family Sieblosiidae (Insecta: Odonata), with description of new taxa from Russia, Italy and France. *Geobios* 38(2): 219-233. (in English with French summary). ["We describe the following Sieblosiidae: an unnamed gen. and sp. A from the Miocene of Italy, *Miostenolestes zherikhini* nov. gen., nov. sp., *Paraoligolestes stavropolensis* nov. sp., *Stenolestes fasciata* nov. sp. (all from the Miocene of North Caucasus), *Stenolestes* (?) *adygeianensis* nov. sp. (Oligocene of North Caucasus), and *Stenolestes cerestensis* nov. sp. (Oligocene of France). The genus *Sieblosia* Handlirsch, 1906 is restored. A new phylogenetic analysis of the Sieblosiidae is proposed. The two taxa gen. and sp. A and *Oligolestes* fall in most inclusive positions in the same clade with the Sieblosiidae. Within the Sieblosiidae sensu stricto, the two clades (*Paraoligolestes* + *Parastenolestes* + *Stenolestes*) and (*Parastenolestes* + *Stenolestes*) are the best supported. The family Sieblosiidae seems to be restricted to the Oligocene-Miocene of Europe." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**4979.** Oertel, N.; Nosek, J.N.; Andrikovocs, S. (2005): Macroinvertebrates in the littoral zone of the Hungarian Danube section (1998-2000). *Acta Biol. Debr. Oecol. Hung* 13: 159-185. (in Hungarian, with English summary). [The paper lists 16 odonate taxa including *Stylurus flavipes*, *Brachytron pratense*, and *Somatochlora metallica*.] Address: Oertel, N., Hungarian Danube Research Station of the Hungarian Academy of Sciences, H-2131 Göd, Jávorka S. u. 14, Hungary

**4980.** Opper, S. (2005): Odonata of the Crater Mountain Wildlife Management Area, Papua New Guinea. *IDF-Report* 7: 1-28. (in English, with German summary). ["The odonate fauna of Papua New Guinea (PNG) is species rich but poorly studied. Geographic ranges, ecology, and thus conservation status of many species are unknown. In this study I provide an inventory of two sites within the largest formally protected forest area in PNG, the Crater Mountain Wildlife Management Area. I sampled odonates for a total of 112 days in a pristine forest site and for 36 days in a traditional garden village, and worked with local communities to increase the awareness of dragonflies in the area. I found a total of 78 species (60 Zygoptera, 18 Anisoptera) from 13 families, including at least six currently undescribed spe-

cies. The pristine rainforest hosted more species (61) than the village (37), and a longer sampling period was required to reach an approximately equal level of the total species richness. I calculated species accumulation curves for both areas and found that 100 sampling days were required in the pristine forest, whereas 35 sampling days appeared sufficient in the modified forest. More than two-thirds of all species recorded in the pristine forest were observed in less than half of all the sampling sessions, indicating that species might be both rare and occur only during certain times of the year. The number of species recorded per sampling session indicated some seasonality in the odonate fauna of the pristine forest, which should be considered in future studies. The study suggests that modification of tropical rainforests will lead to a loss of species richness. Conservation of odonates in PNG is therefore dependent on the preservation of primary rainforests, which requires the education of native people living in these areas. Dragonflies were well known among local people inhabiting the study area, but did not play a major role in their culture. More work on dragonflies is needed to describe the diversity of the PNG odonate fauna." (Author)] Address: Opiel, S., Wildlife Conservation Society, PO Box 277, Goroka, EHP, Papua New Guinea. E-mail: steffen.opiel@gmx.net

**4981.** Petrulevicius, J.F.; Nel, A. (2005): Austroperilestidae, a new family of damselflies from early eocene of Argentina (Insecta: Odonata). Phylogenetic relationships within Odonata. *Journal of Paleontology* 79(4): 658-662. (in English). ["The new dragonfly family Austroperilestidae n. fam. based on Austroperilestes hunco n. gen. and sp. is erected from early Eocene of Patagonia (Argentina). Its phylogenetic relationships within the Zygoptera (sensu Bechly, 1996) are discussed. The new family seems to be related to Perilestidae, with a Neotropical and Afrotropical recent distribution." (Authors) Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrn1.mnhn.fr

**4982.** Pfeifer, B. (2005): Operation Rubyspot comes to VT. The Boghaunter. Occasional News about the dragonflies and damselflies of Vermont 4(1): 6. (in English). [New records due to intensified investigation of *Hetaerina americana* in Vermont, USA are documented] Address: [www.wingsenvironmental.com/boghaunter/Boghaunter%20-%20Vol.%204%20No.%201.pdf](http://www.wingsenvironmental.com/boghaunter/Boghaunter%20-%20Vol.%204%20No.%201.pdf)

**4983.** Pfeifer, B. (2005): The Vermont Ode data project. The Boghaunter. Occasional News about the dragonflies and damselflies of Vermont 4(1): 7. (in English). [Basics of a odonatological mapping scheme for Vermont, USA are outlined, and the data set necessary is briefly documented.] Address: [www.wingsenvironmental.com/boghaunter/Boghaunter%20-%20Vol.%204%20No.%201.pdf](http://www.wingsenvironmental.com/boghaunter/Boghaunter%20-%20Vol.%204%20No.%201.pdf)

**4984.** Pfeifer, B. (2005): Vermont 2004 Season summary. The Boghaunter. Occasional News about the dragonflies and damselflies of Vermont 4(1): 3-4. (in English). [Noteworthy records of Odonata in 2004 are compiled and briefly commented on.] Address: <http://www.wingsenvironmental.com/boghaunter/Boghaunter%20-%20Vol.%204%20No.%201.pdf>

**4985.** Piorski, N.M.; Alves, J.; Machado, M.R.B.; Correia, M.M. (2005): Feeding and ecomorphology of two species of piranhas (Characiformes: Characidae)

from the Viana Lake, Maranhão state, Brazil. *Acta Amazonica* 35(1): 63-70. (in Portuguese, with English summary). [A sample composed of 249 specimens of *Serrasalmus* aff. *brandtii* and *Pygocentrus nattereri* was studied in order to identify diet composition and feeding strategies. The results indicated that fish was the main food item in the stomach contents of the two species, followed by plant material, especially in *P. nattereri*. The species use several food resources simultaneously. A multivariate analysis of the ecomorphological index indicated that the species are discriminated by swimming ability, water column position and relative prey size. Odonata are a significant part of food in both species.] Address: Piorski, N.M., Departamento de Oceanografia e Limnologia/UFMA. Campus do Bacanga. Av. dos Portugueses, s/n. CEP 65085-580, São Luís - MA. E-mail: [piorski@ufma.br](mailto:piorski@ufma.br)

**4986.** Purse, B.V.; Thompson, D.J. (2005): Lifetime mating success in a marginal population of a damselfly, *Coenagrion mercuriale*. *Animal Behaviour* 69(6): 1303-1315. (in English). ["In scrambling species, where males obtain matings by actively searching for females, the timing and location of mating may be more important to females than choice of males based on phenotype. Since their activity rates are constrained by climate, variation in lifetime reproductive success in marginal populations of scrambling insects may be governed primarily by stochastic processes, limiting the role of selection. Using multivariate analysis, we examined activity patterns and lifetime mating success (LMS) in a marginal British population of *Coenagrion mercuriale*, a rare, scrambling damselfly, versus that in a core population of a similarly sized scrambling congeneric. Time spent at the breeding site and mating efficiency were the most important factors explaining variation (<75% correct predictions) in LMS in both species, whereas body size, age, and day of entry to the mature population were unimportant. This suggests that LMS in these scrambling species is governed by sexual and natural selection as well as stochastic processes such as weather. However, in *C. mercuriale*, daily mating and activity rates were highly constrained by poor environmental conditions (and increased with sunlight and temperature). Breeding site visits were so curtailed that an equal distribution of LMS between the sexes was observed. Selection in marginal populations of *C. mercuriale* may operate upon traits that confer endurance ability in poor environmental conditions rather than body size, life span or age. Climatic variation across species' ranges will in turn generate geographical variation in mating behaviour, in the intensity of sexual selection and the type of traits selected." (Authors)] Address: Purse, B.V., TALA Research Group, Department of Zoology, South Parks Road, Oxford OX1 3PS, U.K.

**4987.** Reels, G. (2005): Book reviews: Field Guide to the Dragonflies of Hong Kong 2nd Edition. by Keith D.P. Wilson, 383 pages, softcover. Cosmos Books Ltd, Hong Kong, 2004. *Porcupine* 32: 20-21. [Verbatim: The first edition of this landmark field guide, which appeared in the shops late last year, went completely unremarked in *Porcupine*! That is unfortunate, since this book, now in its second edition, has set a new standard for field guides of the local fauna. The author, Keith Wilson, worked in Hong Kong for the Agriculture, Conservation and Fisheries Department from 1991 until 2003, and it is under the auspices of AFCD that this fine field guide has been published. The book was written in collabora-

tion with AFCD's Dragonfly Working Group, whose survey work has resulted in four new species records for Hong Kong, including one undescribed gomphid, since its establishment in 2001. However, no-one should be under any doubt that this book is first and foremost the result of one man's efforts. Wilson's first book on the subject (*Hong Kong Dragonflies*) was published in 1995 and listed 102 species for the territory. It was a truly ground-breaking work, with no local antecedents, but its large, floppy landscape format, coupled with the fact that species descriptions rarely appeared on the same page as their photographs, made it confoundingly unwieldy, and hopeless as a field guide. This was followed in 2002 by the mystifyingly pointless *Hong Kong Flying Colour: Dragonflies* booklet - another AFCD collaboration (and I beseech them not to repeat it) - which contained photographs of most Hong Kong species, but no text. The peril of producing this kind of anti-information, with no clues on habitat associations or diagnostic features of particular species, was brought sharply into relief for me when I reviewed the results of a dragonfly survey conducted in a disturbed lowland pond and marsh mosaic by an environmental consultant who had made his identifications from the photographs in *Flying Colour*: many dragonflies look superficially similar, and the hapless consultant had included several stream specialists and many other highly improbable species in his impressive-looking but tragically flawed list. Fortunately, such calamitous failures of identification should now be a thing of the past, as anybody armed with *Field Guide to the Dragonflies of Hong Kong*, and a good dose of common sense, ought to be capable of making a decent fist of putting a name to most dragonflies they encounter in Hong Kong. An impressive total of 112 species has now been recorded in the SAR, and all of them are illustrated in this 2nd edition. Good, clear photographs of adult males and females are provided in most cases, along with useful information on distinguishing features, biometrics, habitat and distribution. This information is backed up with excellent, user-friendly keys to adults at sub-order, family, genus and species levels. There is also a handy pull-out photo index, a check-list, and a section on additional species which could be expected to occur locally. The layout is compact and attractive. Best of all, it fits easily into a field bag. One could wish for a more robust, hard-back production, and a less cursory treatment of the larvae, but otherwise this has all that one might reasonably ask of a field guide to adult dragonflies.]

**4988.** Reinhardt, R. (2005): 1. Ergänzung zu: Reinhardt, R. & Klausnitzer, B. (2002): *Bibliographie über Sachsens Insekten - ein 300jähriger Überblick*. *Mitteilungen Sächsischer Entomologen* 57: 1-182. *Mitteilungen Sächsischer Entomologen* 70: 20-40. (in German). [This addition to the bibliography of the Saxonian entomological literature lists numerous unpublished odonological papers (expertices, theses etc.)] Address: Reinhardt, R., Burgstädter Str. 80a, D-09648 Mittweida, Germany. E-mail: Reinhardt-Mittw@t-online.de

**4989.** Relyea, R.A. (2005): The impact of insecticides and herbicides on the biodiversity and productivity of aquatic communities. *Ecological Applications* 15(2): 618-627. (in English). ["Pesticides constitute a major anthropogenic addition to natural communities. In aquatic communities, a great majority of pesticide impacts are determined from single-species experiments conducted under laboratory conditions. Although this is an

essential protocol to rapidly identify the direct impacts of pesticides on organisms, it prevents an assessment of direct and indirect pesticide effects on organisms embedded in their natural ecological contexts. In this study, I examined the impact of four globally common pesticides (two insecticides, carbaryl [Sevin] and malathion; two herbicides, glyphosate [Roundup] and 2,4-D) on the biodiversity of aquatic communities containing algae and 25 species of animals. Species richness was reduced by 15% with Sevin, 30% with malathion, and 22% with Roundup, whereas 2,4-D had no effect. Both insecticides reduced zooplankton diversity by eliminating cladocerans but not copepods (the latter increased in abundance). The insecticides also reduced the diversity and biomass of predatory insects (including *Anax junius*) and had an apparent indirect positive effect on several species of tadpoles, but had no effect on snails. The two herbicides had no effects on zooplankton, insect predators, or snails. Moreover, the herbicide 2,4-D had no effect on tadpoles. However, Roundup completely eliminated two species of tadpoles and nearly exterminated a third species, resulting in a 70% decline in the species richness of tadpoles. This study represents one of the most extensive experimental investigations of pesticide effects on aquatic communities and offers a comprehensive perspective on the impacts of pesticides when nontarget organisms are examined under ecologically relevant conditions." (Author)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**4990.** Robb, T.; Forbes, M.R. (2005): On understanding seasonal increases in damselfly defence and resistance against ectoparasitic mites. *Ecological Entomology* 30(3): 334-341. (in English). ["1. Defence against parasites and pathogens can be essential, yet not all hosts respond similarly to parasitic challenge. Environmental conditions are thought to explain variation in host responses to parasites. 2. *Lestes forcipatus* damselflies emerging later in the season have shown higher resistance to the mite, *Arrenurus planus*, than hosts emerging earlier. This study was undertaken to determine whether variation in environmental temperatures characteristic of early vs. late emergence times, degree or costs of mite parasitism, and/or size of newly emerged adults could explain seasonal variation in defence and resistance to ectoparasitic mites. 3. In this study damselflies from early vs. late emergence groups differed in size at emergence and mite intensity. In general, early hosts were larger and had more mites than later hosts. However only experimental temperatures experienced by damselflies at emergence influenced defence and resistance against mites and not host size or degree of parasitism. 4. More specifically, hosts from early and late emergence groups did not differ in defence and resistance when held at the same temperatures in incubators. Housing at a high temperature, indicative of later in the season, was associated with higher defence and resistance for damselflies from both early and late emergence groups. 5. These results indicate that daily temperatures in relation to emergence timing can account for seasonal increases in resistance for this temperate insect. Seasonal increases in resistance may be expected for other temperate insect-parasite associations and should have important implications for the phenology of parasites and for seasonal variation in parasite-mediated selection." (Authors)] Address: Robb, Tonia, Dept of Biology, 209 Nesbitt Building, Carleton



University, 1125 Colonel By Drive, Ottawa, Ontario, K1S 5B6, Canada. E-mail: trobb@connect.carleton.ca

**4991.** Rouquette, J.R.; Thompson, D.J. (2005): Habitat associations of the endangered damselfly, *Coenagrion mercuriale*, in a water meadow ditch system in southern England. *Biological Conservation* 123(2): 225-235. (in English). ["[...] We obtained estimates of density of mature adult *C. mercuriale* during an intensive mark-release-recapture study over 7.65 km of a water meadow ditch network in the Itchen Valley, Hampshire. Detailed habitat information was also collected, including a variety of physical variables, and data about the in-channel and bankside vegetation. *C. mercuriale* density and movement were analysed in relation to habitat variables and local population size using Generalized Linear Models. Mean adjacent population density was the single most important factor determining density. However the species was also associated with a number of habitat features, the most important of which were: a channel substrate consisting primarily of silt, wide underwater ledges (berms), in-channel emergent dicots, and bankside monocots. The presence of trees was negatively associated with damselfly density. Mean net lifetime movement was greatest from sections with low density, with smaller than average berms, and with deeper water. The causes and consequences of these findings are discussed in relation to the conservation and management of this rare species." (Author)] Address: Rouquette, J.R., The Biosciences Build., School of Biological Sciences, University of Liverpool, Crown Street, Liverpool L69 7ZB, UK. E-mail: jimrouquette@hotmail.com

**4992.** Ruffini, I. (2005): Donnersberg. *Pollichia-Kurier* 21(1): 26. (in German). [Brief amateur report from a tripp in the Donnersberg region, Rheinland-Pfalz, Germany with emphasis on *Aeshna affinis* and *Sympetma fusca*.] Address: not stated

**4993.** Savage, A.A.; Broomfield, L.C.; Whittington, R.M. (2005): Changes in the littoral macroinvertebrate assemblages of Oak Mere from 1980 to 1998. *Journal of Natural History* 39(17): 1307-1326. (in English) ["Data on the macroinvertebrate assemblages of Oak Mere, England are presented for the period 1980 to 1998. There was a marked fall in species richness and numbers of individuals associated with a fall in surface level. Correlations between surface level, areas of vegetation and aspects of the macroinvertebrate assemblages are demonstrated." (Authors) The paper includes some data on Odonata.] Address: Savage, A.A., School of Life Sciences, Keele University, Staffordshire, UK

**4994.** Suhling, F.; Sahlén, G.; Kasperski, J.; Gaedecke, D. (2005): Behavioural and life history traits in temporary and perennial waters: comparisons among three pairs of sibling dragonfly species. *Oikos* 108: 609-617. (in English). ["Identifying and examining traits that influence the distribution of species is crucial to the understanding of community structure. Theory predicts that traits should differ between species that live in temporary and permanent waters because of differing major environmental variables; viz drying out and predator presence, respectively. Species, however, will also be influenced by their evolutionary history, i.e. by the traits of their common ancestors. We studied differences in life history and behaviour traits in a series of laboratory experiments using pairs of dragonfly species out of

three genera of Namibian Libellulidae with one species from each type of habitat. As predicted, growth rates were significantly higher in the temporary water species compared to the permanent water species. Activity and foraging, in contrast, differed between the genera, but did not differ between the habitat types. Hence, our study implies that the behavioural traits are influenced by phylogenetic inertia rather than by the habitat variables, while growth rate is adapted to the habitat. We argue that in all three genera one species has diverged recently from a sister species that lives in the original habitat of the genus, which may be temporary waters in *Crocothemis* and in *Orthetrum*, and permanent waters in *Trithemis*. The behavioural traits may therefore be less well adapted. Rapid growth may be the more relevant trait because it is crucial to survival in temporary waters." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**4995.** Tarboton, W.; Taboton, M. (2005): A fieldguide to the Damselflies of South Africa. 96 pp. (in English). [This excellent book is a companion volume to the dragonfly fieldguide which was published in 2002. It covers the 67 damselfly species found in South Africa.] Address: Tarboton, W., P.O. Box 327, Modimolle 0510, South Africa. E-mail: wtarbotn@iafrica.com

**4996.** Teplitsky, C.; Plenet, S.; Lena, J.-P.; Mermet, N.; Malet, E.; Joly, P. (2005): Escape behaviour and ultimate causes of specific induced defences in an anuran tadpole. *Journal of Evolutionary Biology* 18(1): 180-190. (in English). ["Induced defences, such as the predator avoidance morphologies in amphibians, result from spatial or temporal variability in predation risk. One important component of this variability should be the difference in hunting strategies between predators. However, little is known about how specific and effective induced defences are to different types of predators. We analysed the impact of both pursuing (fish, *Gasterosteus aculeatus*) and sit-and-wait (dragonfly, *Aeshna cyanea*) predators on tadpole (*Rana dalmatina*) morphology and performance (viz locomotive performance and growth rate). We also investigated the potential benefits of the predator-induced phenotype in the presence of fish predators. Both predators induced deeper tail fins in tadpoles exposed to threat of predation, and stickleback presence also induced longer tails and deeper tail muscles. Morphological and behavioural differences resulted in better escape ability of stickleback-induced tadpoles, leading to improved survival in the face of stickleback predation. These results clearly indicate that specific morphological responses to different types of predators have evolved in *R. dalmatina*. The specific morphologies suggest low correlations between the traits involved in the defence. Independence of traits allows prey species to fine-tune their response according to current predation risk, so that the benefit of the defence can be maximal." (Authors) ] Address: Teplitsky, C., Dept Populat Biol, Evolutionary Biol Ctr, Norbyvagen 18D, SE-75236, Uppsala, Sweden. E-mail: celine.teplitsky@ebc.uu

**4997.** The IUCN Species Survival Commission (Compiler: W. Darwall, K. Smith, T. Lowe & J.-C. Vié) (2005): The Status and Distribution of Freshwater Biodiversity in Eastern Africa. Occasional Paper of the IUCN Species Survival Commission 31: 36 pp. (in English).

[Chap. 2.1.3 (page 9) is directed to the Odonata.]: [www.iucn.org/themes/ssc/pubs/pubs/EastAfricalowres.pdf](http://www.iucn.org/themes/ssc/pubs/pubs/EastAfricalowres.pdf)

**4998.** Tuno, N.; Okeka, W.; Minakawa, N.; Takagi, M.; Guiyun, Y. (2005): Survivorship of *Anopheles gambiae sensu stricto* (Diptera: Culicidae) larvae in western Kenya highland forest. *J. Med. Entomol.* 42(3): 270-277. (in English). ["The western Kenya highland has been experiencing dramatic landuse changes in the past three decades. Landuse change has been hypothesized to be one of the mechanisms for malaria epidemics in African highlands because it can alter the physical and chemical characteristics of mosquito breeding habitats. One important landuse change in western Kenya highland is deforestation. The current study examined the effects of forestation or deforestation on the survivorship of *Anopheles gambiae* larvae and colonization of other aquatic insects in larval habitats in Kakamega forest (elevation 1,500 - 1,700 m above sea level), western Kenya. We found that the survivorship of *An. gambiae* larvae was reduced from 55 to 57% in habitats fully exposed to sunlight (open habitats) to 1 - 2% in habitats with full forest canopy coverage (forest habitats) and partial canopy coverage (forest edge habitats) in two out of three trials. The average daily water temperature of the open habitats was app. 3 - 3.4 C higher than the forest habitats. Insect species in the orders of Diptera, Coleoptera, and Odonata colonized the larval habitats, but the three habitat types differed greatly in the animal assemblage. Canonical correspondence analysis found that water temperature and amount of leaf litter were the significant variables associated with animal assemblages. Redundancy analysis revealed that openness and the presence of predatory animals were significantly related to *An. gambiae* survivorship. This result suggests that deforestation facilitates the survival of the immature stage of *An. gambiae* in the highland." (Authors)] Address: Tuno, N., Tropical Medicine, Nagasaki University, Nagasaki 852-8523, Japan

**4999.** Uhía, E.; Cordero Rivera, A. (2005): Male damselflies detect female mating status: importance for postcopulatory sexual selection. *Animal Behaviour* 69 (4): 797-804. (in English). ["The existence of postcopulatory sexual selection is now clearly established in many animal species. In Odonates, males remove sperm during copulation from the bursa copulatrix and (when physically accessible) from the spermatheca. We used these model organisms to test the relative importance of sperm competition and cryptic female choice for copulation duration in laboratory experiments. If long copulations evolved only because of sperm competition, males should prolong copulation with previously mated females, and use this extra time to remove/displace the stored sperm. In species without a spermatheca (or when it is physically inaccessible), copulation duration should be similar in mated and virgin females. The cryptic female choice hypothesis predicts that copulations should be prolonged (acting as copulatory courtship) when males cannot physically remove sperm from the spermatheca but not if females do not have a spermatheca. We found that male damselflies can detect the mating status of females probably using chemical sensilla in their genitalia. Copulation duration with mated females was almost twice as long as with virgins in species with a spermatheca, but this behaviour was probably not the result of sperm competition, because in our model species, males could not remove sperm from this organ. The duration of copulation did not inc-

rease in species without a spermatheca. We conclude that even in odonates, where sperm removal is widespread, females have retained control over sperm reserves in their spermatheca(e), and males prolong copulation with mated females to elicit rival sperm ejection and/or to induce females to use their sperm in fertilization." (Authors)] Address: Cordero Rivera, A., Depart. de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: [acordero@uvigo.es](mailto:acordero@uvigo.es)

**5000.** Van de Meutter, F.; Stoks, R.; De Meester, L. (2005): Spatial avoidance of littoral and pelagic invertebrate predators by *Daphnia*. *Oecologia* 142: 489-499. (in English). ["Studies on spatial avoidance behaviour of predators by prey often ignored the fact that prey typically face multiple predators which themselves interact and show a spatial pattern in abundance and predation rates (PRs). In a series of laboratory experiments, we investigated predation risk (PRI) and horizontal migration of the cladoceran *Daphnia magna* between open water and vegetation in response to two important invertebrate predators with a contrasting spatial distribution: pelagic *Chaoborus* and vegetation-associated *Ischnura*. As expected, PRI by *Chaoborus* was higher in open water due to higher numbers and higher PRs of *Chaoborus*, while for *Ischnura*, PRI was highest in the vegetation due to higher densities, despite lower PRs of *Ischnura*. In accordance with this, *Daphnia* moved into the vegetation in the presence of the pelagic *Chaoborus* alone. In the presence of *Ischnura* alone, however, *Daphnia* showed no response. We hypothesize this may be the result of a constitutive behaviour of *Daphnia* to avoid pelagic fish, which impedes a response to the open water. In the combined predator treatment, *Daphnia* migrated to the open water zone. The increased risk of predation in the vegetation, due to a facilitating effect of *Chaoborus* on *Ischnura* PRs is believed to have caused this migration of the *Daphnia*. This response of *Daphnia* declined through time and *Daphnia* moved toward the vegetation. A decline in the activity of the *Ischnura* larvae through time may have switched the risk balance in favour of the vegetation environment." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: [robby.stoks@bio.kuleuven.ac.be](mailto:robby.stoks@bio.kuleuven.ac.be)

**5001.** Wallaschek, M. (2005): Beiträge zur Insektenfauna der Altmark: 4.1 Libellen (Odonata). *Entomol. Mitt. Sachsen-Anhalt* 13(1): 7-10. (in German). [Germany, Sachsen-Anhalt, 3 water bodies between Schwiesau and Zichtau; a total of 15 odonate species was recorded in 2004.] Address: Wallaschek, M., Agnes-Gosche-Str. 43, D-06120 Halle (Saale), Germany

**5002.** Ward, L.; Mill, P.J. (2005): Habitat factors influencing the presence of adult *Calopteryx splendens* (Odonata: Zygoptera). *European Journal of Entomology* 102(1): 47-51. (in English). ["1. In Great Britain the distribution of the riverine damselfly *C. splendens* is predominantly southern. However, the last decade has seen records of the species in previously unoccupied areas in the northeast of England, prompting speculation regarding northward range expansion. The current study is the first to quantify the physical features of the habitat that influence the presence of *C. splendens*. 2. A field survey was carried out on the physical characteristics of habitat supporting *C. splendens* along a secti-

on of the River Wharfe, West Yorkshire, U.K. Adult *C. splendens* were marked uniquely for individual identification in order to assess the occurrence of the species within different habitat patches of the study area. 3. A multiple logistic regression was used to identify the significant habitat variables in explaining the occurrence of adult *C. splendens*. 4. The most important habitat factor in determining the presence of *C. splendens* was the height of the vegetation at the edge of the river. Significant negative relationships were found between the presence of *C. splendens* and tree coverage along the bank, and between its presence and increased bank height. 5. The distribution of *C. splendens* is affected by the natural physical features of the habitat, anthropogenic disturbance and the behaviour of the species itself. 6. The importance of quantitative habitat data in species conservation, particularly with regard to range expansion, is discussed." (Authors)] Address: Mill, P., School of Biol., L.C. Miall Building, Univ. Leeds, Leeds, LS2 9JT, UK. E-mail: p.j.mill@leeds.ac.uk

**5003.** Wendzonka, J. (2005): Klucz do oznaczania dorosłych wazek (Odonata) Polski. Odonatrix 1, Suppl. 1: 1-26. (in Polish, with English summary). ["Identification key to the imagines of Polish dragonflies (Odonata). - The present study is a part of the project "The Atlas of distribution of dragonflies (Odonata) in Poland". It contains a key for the identification of 75 dragonfly species of which 72 ones were recorded from the area of Poland. *Coenagrion mercuriale* and *Gomphus pulchellus* were mistakenly recorded in Poland in the past, however, together with *Lestes macrostigma* they are really possible to find. Thanks to the simple structure of the key, as well as the right selection of features and notations, it is easy to use for people without experience in this field. This publication is first of all directed to them." (Author)] Address: Wendzonka, J., ul. Palacza 18B/326,60-241 Poznań, Poland. E-mail: wendzonka@wp.pl

**5004.** Wildermuth, H. (2005): Dragonflies of the mont Ventoux region, Provence, France (Odonata). Opusc. zool. flumin. 220: 1-12. (in English). ["An annotated list of 32 species is presented, comprising records of adults, exuviae or larvae, made in July 2000 and 2003 and in June 2004 at 16 localities in a 600 km<sup>2</sup> area N of Mont Ventoux. The dragonfly fauna of this mountainous region, characterized by large forests, vineyards and other agricultural land, comprises chiefly spp. of running waters: Along with *Onychogomphus forcipatus*, *O. uncatatus*, and *Cordulegaster boltonii*, which all develop in the few source-fed brooks and permanent rivers, *Boyeria irene* is of major importance. Most species typical for stagnant water bodies, such as *Enallagma cyathigerum*, *Anax imperator*, and *Crocothemis erythraea*, breed in a single large fish pond used for angling. *Ceragrion tenellum*, *Libellula fulva*, and *Sympetrum pedemontanum* are of special interest for this region, where stagnant waters are mostly present as man-made irrigation tanks and small reservoirs that are scattered over the area." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**5005.** Wildermuth, H.; Gonseth, Y.; Maibach, A. (Hrsg) (2005): Odonata. Die Libellen der Schweiz. Fauna Helvetica 12. ISBN 2-88414-024-7: 398 pp. (in German). [This is a sophisticated and very well balanced book on the Swiss odonate fauna, which treats 84 spe-

cies and discusses additional taxa. It is a tribute to the famous Swiss artist and odonatogogist Paul André Robert, who's unpublished wonderful and detailed paintings of dragonflies are used for illustration (species, not painted by Robert are added using painting from Askew's book on the European Odonata). A brief and very readable introduction into the biology of Odonata is followed by brief characterisations of the habitats. A focus is set on the distribution of the species, which are mapped, and the turn over of species distribution. All species are treated in a monographic way highlighting the general and Swiss distribution, development of populations, emergence and phenology, habitats of imagines and larvae, threat, and conservation measures. The book is closed by an extensive odonatalogical bibliography and the list of contributors. A French edition of the book is also available. This book is a must in every odonatalogical library, even if you don't read German or French. (Martin Schorr)] Address: orders (CHF 60.-): CSCF, Terraux 14, CH-2000 Neuchâtel, Switzerland. www.cscf.ch; or: info@collection-robert.ch

#### **Dragonfly Research 2 (ISSN 1438-034x) available now!**

- The CD-ROM contains the following pdf files with two German dissertations:
  - TROCKUR, Bernd 2004: Untersuchungen zur Habitatwahl von EPITHECA BIMACULATA CHARPENTIER 1825 (291 pp.).
  - HUNGER, Holger 2004: Naturschutzorientierte, GIS-gestützte Untersuchungen zur Bestandssituation der Libellenarten COENAGRION MERCURIALE, LEUCORRHINIA PECTORALIS und OPHIOGOMPHUS CECILIA (Anhang II FFH-Richtlinie) in Baden-Württemberg (229 pp. + app., maps).
- Worldlist of Odonata Version 3.0 (database with 5608 species)
- Pictures of Odonata Version 1.1 (database mit 164 pictures)
- Odonatological bibliography ODOLit Version 1.1 (21191 Data files)

Dragonfly Research 2 can be obtained from Martin Schorr, Schulstr. 7B, 54314 Zerf, Germany (50,-Euro + shipping).

Please contact: martinschorr@onlinehome.de

**Thanks to all who contributed to this issue of OAS!**  
A special thank to Jürgen Ott, Naoya Ishizawa, Pawel Buczyński, Wolfgang Schneider, and Andreas Martens.



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: martin@lindeboom.de  
Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105;  
E-mail: K.Reinhardt@sheffield.ac.uk  
Martin Schorr, Schulstr. 7B D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: martinschorr@onlinehome.de

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

## 1997

**5006.** Baker, R.L.; Smith, B.P. (1997): Conflict between antipredator and antiparasite behaviour in larval damselflies. *Oecologia* 109: 622-628. (in English). ["Larval damselflies resist infestation by parasitic larval mites by exhibiting behaviours such as grooming, crawling, swimming, and striking at host-seeking mites. Larval damselflies are known to increase time spent in these behaviours in the presence of mites but reduce time spent in these behaviours in the presence of fish predators. The presence of both fish and larval mites presents an obvious conflict: a larval damselfly may actively avoid parasitism by mites, thus increasing its risk of predation, or it may reduce its activity when fish are present, thus increasing its risk of parasitism. We analysed the behaviour of larval *Ischnura verticalis* in an experiment where we crossed presence and absence of fish with presence and absence of larval mites. Presence of mites induced a large increase in activity of larval *I. verticalis* but fish had no effect and there were no interpretable interactions between effects of mites and fish. Subsequent experiments indicated that larval *I. verticalis* in the presence of both mites and fish were more likely to be attacked and killed by fish than those exposed only to fish. The high activity level of *I. verticalis* larvae in the presence of both fish and mites may suggest that costs of parasitism are high, or that under field conditions it is rare for larvae to be in the immediate presence of both fish predators and potentially parasitic mites." (Authors)] Address: Baker, R.L., Dept Zool., Erindale Coll., Univ. Toronto, Mississauga, ON, L6L 2C6, Canada. e-mail: rbaker@credit.erin.utoronto.ca

**5007.** Grether, G.F. (1997): Survival cost of an intersexually selected ornament in a damselfly. *Proc. R. Soc. London (B)* 264: 207-210. (in English). ["Ornaments could evolve as honest indicators of fighting ability, provided they have costs that make deceptive signalling unprofitable. I tested for such costs by manipulating the size of the intrasexually selected wing spots of male *Hetaerina americana* and monitoring survival in the field. Males with enlarged spots had higher mortality rates than both unmanipulated and sham-manipulated controls. Natural wing spot size correlated positively with longevity, which suggests that higher quality males

develop larger spots." (Author) Available at: <http://www.eeb.ucla.edu/Faculty/Grether/PDF/Grether1997.pdf>  
Address: Grether, G.F., Department of Ecology, Evolution, and Marine Biology, University of California, Santa Barbara, CA 93106, USA. E-mail: lifesci.lscf.ucsb.edu

**5008.** Liu, R. K. (1997): Dragonfly Brooches. *Ornament* 20(4): 24-25. (in English). [A small collection of dragonfly brooches in a magazin / Journal of "art of personal adornment" is presented, and a little focus is set on the jewelry of the Zuni people.] Address: not stated

## 1998

**5009.** Ferreras Romero, M. (1998): Preparando la lista roja de los odonatos en Andalucía. *Zoologica baetica* 9: 107-116. (in Spanish, with English summary). [Andalucian Red List of odonate species.] Address: Ferreras-Romero, M., Departamento de Biología Animal (Zoología), Facultad de Ciencias, Universidad de Córdoba, Avda. San Alberto Magno s/n, E-14004 Córdoba, Spain. E-mail: ferreras@teleline.es

**5010.** Menzel, P.; D'Aluisio, F. (1998): Man eating bugs: the art and science of eating insects. ISBN 1-58008-022-7: 192 pp. (in English). [One chapter of this fascinating book is directed to the catching and preparing as human food of dragonflies on Bali, Indonesia.]

**5011.** Post, W. (1998): Advantages of coloniality in female Boat-tailed grackles. *Wilson Bull.* 110(4): 489-496. (in English). [Female Boat-tailed Grackles (*Quiscalus major*) (Aves) were foraging independently of each other, most of the food items brought to nests were arthropods that were widely dispersed in and around the study area. The most important (by frequency occurrence) dietary items collected from nestlings (n = 290 items from 43 nests, 25 Apr-1 Jun) were: adult Odonata, mainly Libellulidae, 16%; adult Diptera, mainly Stratiomyidae, 14%; Arachnida, mainly Lycosidae, 15%; Odonata naiads, 7%; adult Coleoptera, 8%; Orthoptera, mainly Acrididae, 7%; fish (Menidia and Fundulus), 4%; larval Diptera, mainly Stratiomyidae, 4%. Nestlings also received vertebrates. Available from: [www.elibrary.unm.edu/sora/Wilson/v110n04/p0489-p0496.pdf](http://www.elibrary.unm.edu/sora/Wilson/v110n04/p0489-p0496.pdf)] Address: Post, W., Charleston Museum, 360

Meeting Street, Charleston, SC 29403; E-mail: grackler@aol.com

**5012.** Spencer, N.J.; Thomas, B.W.; Mason, R.F.; Dugdale, J.S. (1998): Diet and life history variation in the sympatric lizards *Oligosoma nigriplantare polychroma* and *Oligosoma lineocellatum*. *New Zealand Journal of Zoology* 25: 457-463. (in English). [Dietary preferences in the sympatric lizards *O. n. polychroma* (n= 140) and *O. lineocellatum* (n= 153) were analyzed by stomach check. There were some differences in diet, although both species consumed a wide range of prey, including Odonata. Odonata are of minor importance as prey for both lizard taxa; in app. 1% of stomachs dragonflies are represented.] Address: Spencer, N.J., Landcare Research, Private Bag 1930, Dunedin, New Zealand. E-mail: spencern@landcare.cri.nz.

### 1999

**5013.** Dickerson, D.D.; Reine, K.J.; Herrmann, K.L. (1999): Wetland turtle habitats potentially impacted by USACE reservoir operations. Technical Note EMRRP-SI-04, U.S. Army Engineer Research and Development Center, Vicksburg MS. 12 pp. (in English). [The species data sheets contain notes on Odonata as prey of two of the turtle species.] Address: Available at: <http://el.erdc.usace.army.mil/elpubs/pdf/si04.pdf>

**5014.** Sherratt, T.N.; Thomas, C.J.; Conrad, K.F.; Willson, K.H.; Harvey, I.F. (1999): Landscape approaches in ecotoxicology. *Aspects of Applied Biology* 53 (Challenges in Applied Population Biology): 227-234. (in English). ["A mark-recapture study of odonates was conducted in Cheshire, UK to estimate the degree to which odonate populations at ponds were connected by dispersal. The probability of individuals of each species moving between ponds declined exponentially with the distance between ponds. Using these relationships, we parameterised a simple simulation model, which indicated that the odonate populations around some ponds ("keystone ponds") could be much more important than others in mediating the recovery of odonates after exposure to a toxic agrochemical. On the basis of this result we quantified the attributes of every pond above 10 m<sup>2</sup> in both Cheshire and County Durham, using a GIS of Ordnance Survey 1:25000 scale digital vector map data. By incorporating the observed dispersal characteristics into this GIS, we have developed a tool which is capable of estimating the rate of odonate colonisation of any pond in these counties, hence their ability to recover from a toxic perturbation." (Authors)] Address: Conrad, K.F., Division of Plant and Invertebrate Ecology, Rothamsted Research, Harpenden, Hertfordshire, AL5 2JQ, UK. E-mail: kevin.conrad@bbsrc.ac.uk

**5015.** Zivic, I.; Markovic, Z.; Brajkovic, M. (1999): A contribution to the knowledge of Odonata (Insecta: Odonata) larvae of the Pusta Reka River. *Acta entomologica serbica* 4 (1/2): 1-10. ["Over the period 1998-1999 limnological investigations of macrozoobenthos of the Pusta Reka River, the left tributary of the South Morava River, were done with special emphasis to Odonata larvae. Out of 11 localities throughout investigated river Odonata larvae were found in 7 localities of pebble-stony and muddy bottom. Dragonflies occur in the zoobenthos of the Pusta Reka River with five species (*Calopteryx splendens* Harris 1782, *Ophiogomphus cecilia*

Fourcroy 1785, *Onychogomphus forcipatus* Linne 1758, *Gomphus vulgatissimus* Linne, *Cordulegaster boltonii* Donovan 1807). The most frequent (8.04% in the whole sample) and the most numerous species was *Ophiogomphus cecilia*." (Authors)] Address: Zivic, I., Faculty of Biology, University of Belgrade, Studentski trg 16, YU-11000 Belgrade, Serbia

### 2000

**5016.** Kalbfus, W.; Kopf, W.; Seitz, G.; Butz, L. (2000): Report on the investigations of the rivers Szamos and Theiß (Hungary) after the cyanide accident. Instructed by the Bavarian State Ministry for Regional Development and Environmental Affairs. [www.bayern.de/LFW/aktuelles/neuesausdemlfw/ungarn/UngarnBerichtenglisch3.pdf](http://www.bayern.de/LFW/aktuelles/neuesausdemlfw/ungarn/UngarnBerichtenglisch3.pdf): 14 pp. (in English, with German summary). ["The accident on 30th of January 2000 in the AURUL goldmine near Baia Mare (Romania) caused an extraordinary decrease of the fish-fauna in the Hungarian rivers Szamos and Tisza accompanied by high economic losses. It is, however, not an easy task to assess the ecological dimension of environmental damage. The first impression implied that all life in the rivers has been extinguished by cyanide, which is extremely toxic. However about 1 month after the disaster this hypothesis could not be confirmed by the Bavarian expert group. The zoological investigation of the underwater fauna revealed living macro- and microorganisms, which were typical for these river sites. It can be assumed that these organisms survived the pollution and did not re-populate the river bottom from tributaries. The conditions of oxygen-saturation in the river Tisza indicate the existence of physiologically active phytoplankton. The water samples and the sediments of river Szamos and river Tisza had a specific ecotoxic potential. No acute toxic effect to bacteria, algae and the crustacean *Daphnia* (zooplankton, fish-fodder) could be detected. However the growth of macrophyte was proved to be strongly inhibited by the samples originated from river Szamos. The concentration of heavy metals in the water samples as well as in the sediments indicate a contamination at high to at least very high concentrations in the river Szamos, which had an effect on the downstream river Tisza. Residues of cyanides could not be detected. The analysis of some persistent organic chemicals in the sediment indicates, that Szamos and Tisza are not polluted by these substances." (Authors) The study includes notes on Odonata.] Address: Bayer. Landesamt für Wasserwirtschaft, Kaulbachstr. 37, D-80539 München, Germany

**5017.** Lemly, A.D.; King, R.S. (2000): An insect-bacteria bioindicator for assessing detrimental nutrient enrichment in wetlands. *Wetlands* 20(1): 91-100. (in English). ["Field and laboratory studies were conducted to evaluate the use of bacterial growth on aquatic insects as a metric for determining the existence of nutrient impacts in wetlands. Results from field investigations indicated that elevated concentrations of nitrate and phosphate were associated with growth of filamentous bacteria on insect body surfaces and that there were significantly fewer mayflies (Ephemeroptera) in the nutrient-enriched wetland. Laboratory investigations confirmed a strong linkage between bacterial growth and reduced survival of mayflies. Survival was examined for individuals with bacterial infestation ranging

from 0% to 60% body coverage. A threshold for catastrophic mortality was present at about the 25% level of coverage; there were very few survivors above that level. Based on these findings, the diagnostic endpoint for the bioindicator is 25% body coverage by bacterial growth, a level that signifies major differences in insect populations in the field and is also easy to detect visually. This study provides evidence that the insect-bacteria bioindicator is a reliable tool for assessing nutrient impacts on wetland macroinvertebrate communities. The bioindicator could be useful in the development of a Wetland Bioassessment Protocol." (Authors) Bacterial growth on Odonata is documented in table 1. Available from [www.trout.forprod.vt.edu/fishpubs/lemly2000\\_04.pdf](http://www.trout.forprod.vt.edu/fishpubs/lemly2000_04.pdf) Address: Lemly, A.D., United States Forest Service, Southern Research Station, Coldwater Fisheries Research Unit, Department of Fisheries and Wildlife Sciences, Virginia Tech University, Blacksburg, Virginia, USA 24061-0321

**5018.** Nikoh, N.; Fukatsu, T. (2000): Interkingdom host jumping underground: Phylogenetic analysis of entomoparasitic fungi of the genus *Cordyceps*. *Mol. Biol. Evol.* 17(4): 629-638. (in English). ["Most members of the ascomycetous genus *Cordyceps* are endoparasitic fungi of insects and other arthropods, but about 20 of the 300 described species are parasitic to hart's truffles, *Elaphomyces* spp. In order to understand the evolution of host specificity and the process of interkingdom host jumping in *Cordyceps*, we investigated the phylogenetic relationships of 22 representatives, including 4 truffle parasites and 18 insect parasites, based on nuclear and mitochondrial rDNA sequences. Five monophyletic groups were identified in both nuclear and mitochondrial phylogenies. In three of the five clades, the members utilized hosts from the same insect group, suggesting that the endoparasite-host connections have been conserved to some extent. On the other hand, it was also shown that major host shifts between distantly related insects must have occurred repeatedly. Notably, phylogenetic analyses strongly suggested that parasites of hart s truffles originated from parasites of cicada nymphs during the evolution of the *Cordyceps*. The common habitats of cicada nymphs and hart s truffles, deep underground and associated with tree roots, suggest that the interkingdom host jumping from Animalia to Fungi might have been promoted by the overlapping ecological niche of the unrelated hosts. This finding provides an impressive case of a drastic host shift in favor of the host habitat hypothesis." (Author) The paper has a passing reference to the Odonata.] Address: Fukatsu, T., National Institute of Bioscience and Human-Technology, Agency of Industrial Science and Technology, Tsukuba, 305-8566, Japan. E-mail: [fukatsu@nibh.go.jp](mailto:fukatsu@nibh.go.jp)

**5019.** Soldan, T. (2000): Book review: Gorb, S. (1998): Functional morphology of the head arrester system in Odonata. *Zoologica* 148; ISBN 3-510-55035-8. *European Journal of Entomology* 97: 46. (in English). [extensive review of the book.] Address: Soldan, T., Institute of Entomology, Academy of Sciences of the Czech Republic, Branisovska 31, CZ-370 05, Ceske Budejovice Czech Republic

**5020.** Akani, G.C.; Ogbalu, O.K.; Luiselli, L. (2001): Life history and ecological distribution of chameleons (Reptilia, Chamaeleonidae) from the rain forests of Nigeria: conservation implications. *Animal Biodiversity & Conservation* 24(2): 1-15. (in English). [Odonata belong to the diet of 3 of the 4 chameleon species. Available at: <http://www.bcn.es/museocienciasfitxers/imatges/FitxerContingut1406.pdf>] Address: Luiselli, Luca Maria, F.I.Z. V., via Olona 7, I 00198 Rome, Italy. E mail: [lucamlu@tin.it](mailto:lucamlu@tin.it)

**5021.** Bauhus, S. (2001): Vorkommen und Status der mediterranen Libellenarten *Aeshna affinis* Vander Linden und *Crocothemis erythraea* (Brullé) in Westfalen (Odonata). *Natur und Heimat* 61(3): 73-82. (in German). [Records of both species in Nordrhein-Westfalen, Germany are compiled and critically discussed in detail. Some emphasis is given to global warming as trigger for range extensions and the role of floodplains as dispersal corridor on the regional scale.] Address: Bauhus, S., Hansaplatz 9, D-48155 Münster, Germany. E-mail: [bauhus.bloecher@t-online.de](mailto:bauhus.bloecher@t-online.de)

**5022.** Felipe-Bauer, M.L.; de Oliveira, S.J. (2001): Lista dos Exemplares Tipos de Ceratopogonidae (Diptera, Nematocera) Depositados na Coleção Entomológica do Instituto Oswaldo Cruz, Rio de Janeiro, Brasil. *Mem. Inst. Oswaldo Cruz, Rio de Janeiro* 96(8): 1109-1119. ["List of the Type Species of Ceratopogonidae (Diptera, Nematocera) Deposited in the Entomological Collection of Instituto Oswaldo Cruz, Rio de Janeiro, Brazil. A list of all type specimens of the Family Ceratopogonidae, present in the Entomological Collection of Instituto Oswaldo Cruz, Rio de Janeiro, RJ, Brazil is presented. This list includes the genera *Bahiahelea*, *Culicoides*, *Dasyhelea*, *Downeshelea*, *Forcipomyia*, *Leptoconops*, *Mallochohelea*, *Monohhelea*, *Neobezzia*, *Palpomyia* and *Sphaerohelea*." (Authors) *Pterobosca macfieii* Costa Lima 1937 is host of Odonata.] Address: Felipe-Bauer, M.L., Laboratório de Díptera Coleção Entomológica, Departamento de Entomologia, Instituto Oswaldo Cruz-Fiocruz, Av. Brasil 4365, 21045-900, Rio de Janeiro, RJ, Brasil

**5023.** Garcia, M.A.; Diez, C.E.; Alvarez, A.O. (2001): The impact of Feral Cats on Mona Island wildlife and recommendations for their control. *Caribbean Journal of Science* 37(1-2): 107-108. (in English). [Puerto Rico; cats prey also on Odonata. Available at: <http://caribjsci.org/epub1/nota.pdf>] Address: Garcia, M.A., Bureau of Fisheries and Wildlife, Department of Natural and Environmental Resources P.O. Box 9066600, San Juan PR 00906-6600

**5024.** Greeney, H.F. (2001): The insects of plant-held waters: a review and bibliography. *Journal of Tropical Ecology* 17: 241-260. (in English). ["Phytotelmata habitats have been the focus of much research and are utilized by a wide variety of taxa. In the past 15 years numerous studies in many geographic regions and covering various types of phytotelmata have greatly increased our understanding of these unique habitats. The most recent summary of phytotelmata inhabitants included over 20 families of insects. A review of the literature and extensive work in lowland Ecuador shows the family level diversity is in fact at least twice that reported earlier. A reassessment of previous phytotelmata classification schemes, as well as an extensive bibli-



ography, is provided." (Author) The compilation includes the Odonata too.] Address: Greeney, H.F., Dept of Entomology, University of Arizona, Tucson, Arizona 85721, USA

**5025.** Hartung, M. (2001): Zur Zoogeographie der Odonata von Neuguinea. *Phylodrom-Journal* 1: 63-69. (in German, with English summary). [A more general introduction to the odonate fauna of New Guinea.] Address: Hartung, M., Wehnerstr. 20a, 12277 Berlin, Germany. E-mail: aeh.matthias.hartung@t-online.de

**5026.** Jessat, M. (Koord.) (2001): Entomologische Besonderheiten der Bergbaufolgefläche "Phönix Nord" im Altenburger Land (Odonata, Orthoptera, Hymenoptera, Coleoptera, Neuroptera, Lepidoptera, Diptera). *Mitt. Thür. Entomologenverband* 8(2): 48-57. (in German, with brief English summary). [Thuringia, Germany; *Anax parthenope*, *Anaciaeschna isoceles*, and *Sympetrum pedemontanum* are listed and discussed.] Address: Kipping, J., Ringstr. 5/6, D-04600 Altenburg, Germany. E-mail: jenskippping@hotmail.com

**5027.** Jordan, S.D. (2001): Molecular Systematics and Phylogeography of Hawaii's Megalagrion damselflies. Ph.D. University of Connecticut. Advisor: Dr. Chris Simon: 108 pp. (in English). [I have used mitochondrial and nuclear DNA sequence data to explore the phylogenetic relationships of species in Hawaii's marvelous Megalagrion damselfly radiation. These damselflies occupy a wide diversity of habitats. Results indicated that Megalagrion species relationships agree with some hypotheses of previous workers. In particular the monophyly of several species groups was supported by the molecular data, and traditional taxonomy appears to be adequate. However, molecular data also contradicted and clarified the established notions in several key ways. First, two sequential bursts of evolution may have been responsible for the some of the remarkable ecological diversity in the genus. Analysis of mitochondrial DNA under a local molecular clock suggested that these rapid speciation events coincided with the emerging availability of suitable habitats on Kauai and Oahu. Second, the traditional problematic phylogenetic placement of several species is probably due to the rapid pace of the radiation that produced these species, leaving few informative characters on key internal branches. The phylogeography of the species *M. xanthomelas* and *M. pacificum* was explored using mitochondrial sequence data from 157 individual damselflies. I sought to understand the demographic and historical processes responsible for the current distribution of genetic variation in these two species, and found that current patterns of female genetic diversity correspond to Pleistocene island connections. Finally, I evaluated the usefulness of three different methods for performing Nested Clade Analysis (NCA), with reference to real and theoretical examples. Data from Hawaiian damselflies indicate that Method 2 NCA is susceptible to problems when population sample sizes are small or unbalanced, and when hypothesized population boundaries vary." (Author) For more details see: <http://www.lib.umi.com/dissertations/preview/3034016>] Address: Jordan, S.D., Dept of Biol., Bucknell Univ., Lewisburg, PA 17837 USA. E-mail: [sjordan@bucknell.edu](mailto:sjordan@bucknell.edu), <http://www.facstaff.bucknell.edu/sdjordan/jordan.html>

**5028.** László, F.; Csányi, B.; Literáthy, P. (2001): Cyanide and heavy metal accidental pollution in the

Tisza River basin: Consequences on water quality monitoring and assessment. *Proceeding MTM-III - Accidental pollution in the Tisza River Basin: 65-70.* (in English). ["An accidental industrial spill of high cyanide concentration, originating - due to dike failure from a storage pond of a mining company in Baia Mare (Romania) caused disastrous pollution on 30 January 2000. The total volume of the accidental spill was approximately 100 000 m<sup>3</sup> containing around 100 tons of cyanide. [...] On the 10th of March 2000 another serious accident occurred in the upper Tisza region in Romania. Bursting the dike of a storage pond caused the discharge of 20 000 tons of ore slurry containing high concentration of lead, copper and zinc. [...] Since the cyanide pollution has passed the Hungarian part of the river Tisza, we have found live specimens of all macro-invertebrate taxa recorded previously in the given sections. These results so far show that some of the macro-invertebrate fauna of the river Szamos and Tisza has survived the cyanide pollution. Characteristic surviving species include [...] larvae of river Odonata species (*Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Stylurus flavipes*, *Platycnemis pennipes*, *Calopteryx splendens*) [...].] Address: László, F., Water Resources Research Centre Plc. (VITUKI), H-1095 Budapest, Kvaszay J. út 1., Hungary

**5029.** Legrand, J. (2001): *Ordre des odonates.* In: J.-M. Elouard & F.-M. Gibon. [Eds], *Biodiversité et biotypologie des eaux commentées de Madagascar.* Inst. Rech. Develop, [etc.], Paris. ISBN none: 113-130. (in French). [This is a comprehensive review of the odonate fauna of Madagascar, including concise chapters on morphology and biology, a regional bibliography, and a checklist of the hitherto known species of Madagascar, Seychelles, Mauritius, Comores, Reunion, and Rodrigues.] Address: Legrand, J., 10, rue du Chemin de fer, F-94110 Arcueil, France

**5030.** Okudaira, M.; Sugimura, M.; Ishida, S.; Kojima, K.; Aoki, T. (2001): *Dragonflies of the Japanese Archipelago in Color.* Hokkaido University Press. ISBN 4-8329-0292-X: xxxvi, 641pp. (in English). [This is a fully colour-illustrated catalogue of the 197 Japanese Odonata including adults and early stages. The species are illustrated on 310 colour plates (true-to-life coloration) with specimens (contrasting photographs of male/female, teneral/mature, seasonal, and exceptional forms) and even hybrids, 42 plates of colour photos (habitats, behaviour of species), 33 pages of line drawings of the larvae, and text figures. The identification facilitated by a key and each species is treated in a monographic way: scientifique name, Japanese name, bibliographic note of the original description, description of the adult, description of the larva, distribution.] Address: Hokkaido University Press. Sapporo. Japan

**5031.** Pringle, L.; Marstall, B. (2001): *A Dragon in the Sky.* Orchard Books. New York. ISBN: 0531303152: 64 pp. (in English). [Pringle's "A Dragon in the Sky" is aimed at the young teen-ager, and is designed to explain the life of a typical dragonfly. The book is carefully researched and detailed in text and art. The reader follows one individual of green darner, *Anax*, from his birth in a swamp in New York to mating and death in a Florida pond. Specific incidents in his life are augmented with more general information about dragonflies and damselflies. Sidebars give facts about other creatures that share his habitats. Information on raising dragonfly

nymphs for study is added, and several web sites are suggested for further information. In Marshall's watercolor-and-oil paintings, soft greens and browns predominate.] Address: Orchard Books, 95 Madison Av., New York, NY 10016

**5032.** Salmoiraghi, G.; Gumiero, B.; Pasteris, A.; Prato, S.; Bonacina, C.; Bonomi, G. (2001): Breakdown rates and macroinvertebrate colonisation of alder (*Alnus glutinosa*) leaves in an acid lake (Lake Orta, N Italy), before, during and after a liming intervention. *J. Limnol.* 60(1): 127-133. (in English). [The effectiveness of the liming intervention on Lake Orta, the speed of leaves decay and of colonisation processes by macrobenthonic fauna were studied on alder leaves (*A. glutinosa*) placed on the bottom of the lake and recovered after appropriate time intervals. Experiments were performed at two sites (North and South) and two depths (-3 and 18 m), during three successive winters: 1988-1989 (pre-liming), 1989-1990 (liming), 1990-1991 (post-liming). Two main results emerged: 1) alder leaves, which are known to have a medium to high decaying speed in a number of aquatic environments, behave in Lake Orta as a low speed species. Decaying processes in the three years are significantly different only in station N3, where the mean breakdown rate in 1988-1989 is more than twice that measured in the two subsequent winters. 2) The species richness of colonising benthic fauna is low: the community is made up almost exclusively of Chironomidae, which form 70 to 100% of the whole population; among them, the genus *Phenopsectra* is always present, while *Tanytarsus* was collected only during the first year and in the less deep sampling sites. The mean population abundances were higher before liming." (Authors) The list of taxa includes "Coenagion sp.".] Address: Dipartimento di Biologia Evoluzionistica Sperimentale, Università degli Studi di Bologna, Via Selmi 3, 40126 Bologna, Italy. E-mail: salmo@ambra.unibo.it

## 2002

**5033.** Anonymus (2002): Ausstellungen: "Libellen - Faszination in Form & Farbe", fotografiert von Jens Kaiser, Gotha. Mitt. Thür. Entomologenverband 9(1): 26. (in German). [Announcement of an exhibition of dragonfly photographs in Gotha, Thuringia, Germany, 13. April - 30 June 2002.] Address: not stated

**5034.** Baumgartner, H. (2002): Les marais et leur protection en Suisse. Office fédéral de l'environnement, des forêts et du paysage (OFEFP) (Ed.), : 68 pp. (in Italian, French, German). [This is a lavishly illustrated handbook on the bog and mires in Switzerland with information on Odonata too. Available in Italian, French or German language: <http://www.umwelt-schweiz.ch/buwal/shop/files/pdf/phphH7pBM.pdf>] Address: Distribution: OFCL/BBL, CH-3003 Berne, Switzerland. E-Mail: [verkauf.zivil@bbl.admin.ch](mailto:verkauf.zivil@bbl.admin.ch).

**5035.** Berger, C. (2002): Attracting aerial acrobats to your yard - attracting dragonflies. *National Wildlife* 40(3). (in English). [For the full paper see: <http://www.nwf.org/nationalwildlife/article.cfm?issueID=42&articleID=478>]

**5036.** Carletti, B.; Terzani, F. (2002): Nota sul Cordulegaster *trinacriae* (Waterston, 1976) (Insecta, Odonata,

Cordulegasteridae). *Quad. Studi Star. nat. Romagna* 16 (Suppl.): 1-4. (in Italian with English summary). [Abdominal segments 8-10 of adult *C. trinacriae* and *C. b. boltonii* are figured and compared.] Address: Carletti, B., Viale Raffaello Sanzio 5, 1-50124 Firenze, Italy

**5037.** da Rosa, I.; Canavero, A.; Maneyro, R.; Naya, D.E.; Camargo, A. (2002): Diet of four sympatric anuran species in a temperate environment. *Bol. Soc. Zool., Uruguay* 13: 12-20. (in English with Spanish summary). [The diet of four sympatric anurans species was studied, from October 1998 to November 1999, in a temperate Neotropical environment (Espinas Stream, Maldonado, Uruguay). A total of 387 individuals were collected and their stomach prey content, examined (186 *Physalaemus gracilis*, 88 *Leptodactylus ocellatus*, 96 *Hyla p. pulchella* and 17 *Bufo gr. granulosus*). The main prey items were: coleopterans, spiders and acari for *L. ocellatus*; dipterans, spiders, coleopterans, hemipterans, and acari for *H. p. pulchella*; formicids for *B. gr. granulosus*; and collembolans, acari and formicids for *P. gracilis*. *Leptodactylus ocellatus* and *H. p. pulchella* showed the highest diet amplitude, *P. gracilis* occupied a middle position, and *B. gr. granulosus* presented the lowest diet amplitude value. According to prey items attributes, a Sit-and-wait foraging strategy is proposed for *L. ocellatus* and *H. p. pulchella*, and an active capture strategy for *B. gr. granulosus*. Seasonal analysis indicated that, except for *P. gracilis*, all the other predator species increased their diet richness during the cold season, mainly because each predator included new preys. This result, probably related to seasonal changes in prey availability, may indicate that species trophic behavior change along the year, and so, do not allow to locate a species in fixed place between generalist and specialist extremes." Odonata were captured by *L. ocellatus* and *H. p. pulchella* during the cold season.] Address: da Rosa, Inés, Section Zoología Vertebrados, Facultad de Ciencias, Universidad de la Republica, I-gua 4225, CP 11400, Montevideo, Uruguay, [ines@fcien.edu.uy](mailto:ines@fcien.edu.uy)

**5038.** Dommangeat, J.-L.; Mashaal, M. (2002): Les libellules d'Outre-mer. *Insectes OPIE* 125(2): 8-10. (in French). [The odonate fauna (expressed as number of species/families) is compiled for the French possessions of Saint-Pierre-et-Miquelon, Guadeloupe & Martinique, Guyane, La Reunion & Mayotte, New Calédonie, Wallis-et-Futuna, Polynésie française, and Tahiti. Available at: [http://www.inra.fr/Internet/Hebergement/OPIE-Insectes/pdf/i125\\_libellules.pdf](http://www.inra.fr/Internet/Hebergement/OPIE-Insectes/pdf/i125_libellules.pdf)] Address: Dommangeat, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**5039.** Fellowes, J.R.; Lau, M.W.N.; Dudgeon, D.; Reels, G.T.; Ades, G.W.J.; Carey, G.J.; Chan, B.P.L.; Kendrick, R.C.; Lee K.S.; Leven, M.R.; Wilson, K.D.P.; Yu Y.T. (2002): Wild animals to watch: terrestrial and freshwater fauna of conservation concern in Hong Kong. *Memoirs of the Hong Kong Natural History Society* 25: 123-159. (in English). [For comparable free contents see: <http://www.hku.hk/ecology/bs/pages/html/intro01.html>] Address: Dudgeon, D., Dept Ecology & Biodiversity, The University of Hong Kong, Pokfulam Road, Hong Kong, China. E-mail: [ddudgeon@hkucc.hku.hk](mailto:ddudgeon@hkucc.hku.hk)

**5040.** Fenoglio, S.; Agosta, P.; Bo, T.; Cucco, M. (2002): Field experiments on colonization and movements of stream invertebrates in an Apennine river (Vi-

sone, NW Italy). *Hydrobiologia* 474: 125-130. (in English). ["Macroinvertebrates continuously redistribute themselves in the riverbed. A knowledge of the colonization mechanisms and movement patterns is very important for an understanding of processes of restoration of lotic environments, particularly of inland waters with severe pollution. We tested the colonization patterns of stream macroinvertebrates in the Visone River, a tributary of the highly contaminated Bormida River (NW Italy). We placed six groups of traps in the riverbed, each group consisting of three traps: the C trap allowed colonization from all directions, while the D and U traps allowed access only from downstream and upstream respectively. The C traps were the most colonized substrates, both in number of individuals and taxa. The U traps were more colonized than the D traps, demonstrating the great importance of movements directed downstream. We report data on taxonomic and seasonal differences in the colonization process." (Authors) Appendix 1 documents the occurrence of Odonata (e.g. *Boyeria irene*, *Cordulegaster boltonii*, *Calopteryx splendens*) in the traps.] Address: Fenoglio, S., University of Eastern Piedmont, Dept. Sciences and Adv. Tech., via Cavour 84, 15100 Alessandria, Italy. E-mail: fenoglio@unipmn.it

**5041.** Haacks, M.; Lehmann, A. (2002): Some observations on dragonflies (Insecta: Odonata) throughout New Zealand. *The Weta* 24(1): 13-17. (in English). [Records of the following species are commented and mapped: *Xanthocnemis zealandica*, *Ischnura aurora*, *Austrolestes colenonis*, *Uropetala carovei*, *Adversaeschna brevistyla*, *Anax papuensis*, *Procordulia grayi*, and *P. smithii*] Address: Haacks, M., Herderstr., 22085 Hamburg, Germany. E-mail: Haacks@geowiss. uni-hamburg.de

**5042.** Hauswirt, L.; Loos, G.H.; Joest, R. (2002): Übersicht über die Libellen (Odonata) des Kreises Soest - eine kommentierte Artenliste (Stand: Oktober 2002). *ABUinfo* 25/26: 34-37. (in German). [Nordrhein-Westfalen, Germany; commented checklist of 47 odonate species.] Address: not stated

**5043.** Jarzembowski, E.; Nel, A. (2002): The earliest damselfly-like insect and the origin of modern dragonflies (Insecta: Odonatoptera: Protozogyoptera). *Proceedings of the Geologists Association* 113(2): 165-169. (in English). ["The first Carboniferous protozogyopteran is formally described from the late Westphalian Coal Measures of southern England. *Bechlya ericrobinsoni* gen. et sp. nov. (Bechlyidae fam. nov.) is the oldest representative of a lineage which includes all living dragonflies and damselflies. This discovery shows that small, damselfly-like forms co-existed with the giant dragonflies of the Euramerican coal swamps." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**5044.** Joest, R. (2002): Neue Lebensräume für Libellen. Auswirkungen von Gestaltungsmaßnahmen in Feuchtwiesengebieten und Auenlebensräumen im Kreis Soest auf die Libellenfauna. *ABUinfo* 25/26: 22-33. (in German). [Nordrhein-Westfalen, Germany; detailed presentation of the monitoring results from six localities newly created starting in 1991. A total of 38 species was traced.] Address: not stated

**5045.** Khrokalo, L.A.; Davydenko, E.V. (2002): Notes on dragonflies (Insecta: Odonata) of Dnipropetrovsk region. *Ecology & Noospherology* 2(1/2): 91-94. (in English, with Ukrainian and Russian summaries). [A commented list of 14 species from Andriyivka, Novomoskovsk district recorded in 2000, with a checklist of the 21 species hitherto known from the region of Dnipropetrovsk, the Ukraine.] Address: Khrokalo, L.A., Dept Zool., Fac. Biol., Shevchenko Univ., Volodymirska 64, UKR-01033 Kiev, Ukraine

**5046.** Macaulay, D. (2002): Survey of Odonata in the Canadian Shield Natural Region of Northeastern Alberta II. 2001 Survey of La Butte Creek and Fidler-Greywillow Wildland Parks. Prepared for the Alberta Natural Heritage Information Centre, Parks and Protected Areas Division, Alberta Community Development. March 18, 2002: 15 pp. (in English). ["During the odonate survey conducted in the summer of 2001 a total of 22 odonate species were collected [...]. Though most species collected are common across Canada, three of the species (*Calopteryx aequabilis*, *Leucorrhinia glacialis* and *Somatochlora cingulata* c.f.) are uncommon in Alberta. *C. aequabilis* is an uncommon species that inhabits the boreal forest and the other two are range extensions from central Alberta. With further sampling several more riparian, boreal and wetland specialists will likely be found." (Author). For the full paper see: [http://www.cd.gov.ab.ca/preserving/parks/anhic/docs/odonate\\_re\\_portlabuttefidler.pdf](http://www.cd.gov.ab.ca/preserving/parks/anhic/docs/odonate_re_portlabuttefidler.pdf)]

**5047.** Matushkina, N.O.; Khrokalo, L.A. (2002): Identification key of the Ukrainian dragonflies: the larvae and the exuviae. Kyiv: Phytosociocentrum. ISBN 966-7938-64-6: 72 pp. (in Ukrainian). [This identification key is well organised and illustrated with many black and white illustrations. These will be welcome to everyone even when uncommon with the Ukrainian language.] Address: Matushkina, Natalia, Department of Zoology, Biological faculty, Kyiv National Taras Shevchenko University, pr. Glushkova 2, b. 12, K680 Kyiv, Ukraine. E-mail: matushkina@list.ru

**5048.** Nel, A.; Marie, V.; Schmeissner (2002): Revision of the Lower Mesozoic dragonfly family Triasolestidae [Tillyard, 1918] (Odonata: Epiproctophora). *Annales de Paléontologie* 88(4): 189-214. (in English). ["*Germanophlebia magnifica* gen. nov., sp. nov. is described from the German Lower Liassic. The new genus *Sogdopterites* is established for *Sogdoptera legibile* [Pritykina, 1980]. The Triassic and Liassic family Triasolestidae is revised and [Bechly, 1997] tribes and subfamilies are rejected after a new phylogenetic analysis. The relationships of Triasolestidae within the Epiproctophora: Isophlebioptera are discussed." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**5049.** SaintOurs, F. (2002): Drainage to dragonflies: Conservation of aquatic invertebrates in rivers and streams of eastern Massachusetts. *New England Society for Conservation Biology. Conservation Perspectives: Fall 2002 Issue* (<http://www.nescb.org/epublications/fall2002/saintours.html>): 9 pp. (in English). [Against the background of river degradation, the importance and problems of Odonata as bioindicators are outlined.] Address: SaintOurs, F., Department of Biology, Univer-



sity of Massachusetts Boston, USA. E-mail: fred.saintours@umb.edu

**5050.** Sudo, S.; Tsuyuki, K. (2002): Biomechanics of flying insects and air flows. *Nagare* 21(2): 142-152. (in Japanese, with English translation of the title and figures). [<http://www.nagare.or.jp/nagare/21-2/21-2-t05.pdf>

The following translation of Odonata-related issues was made by Naoya Ishizawa: Introduction This report deals with the relation of biomechanics of flying insects, Odonata, Hymenoptera and Diptera to air flows, concentrating our aims on their wing morphology and wing beating based on authors' experience.

Symbols: c: wing span; f: Hz; fi: wing beat frequency; L: body length; l: wing length; m: body mass; P (f): power of components of wing beat frequency; S: wing area; t: time; u, v, w: speed components of each direction of x, y, z; V: three dimensions composite speed; x, y, z: frame of reference.

Devices of experiments and Methods 2.1 Microobservation of wing morphology of insects by a scanning electron microscope and a non-contact three dimensional curved surface measurement 2.2 Measurement of wing beating of insects Thoracic skeleton vibration was measured by an optical displacement detector and FFT analyzer. Wing movement in free flying insects was analyzed on three dimensions by two high-speed video cameras, synchronous device, recorders, motion grabber, monitors and personal computers. The frame of reference of x, y, x and the space of measurement had been set numerically, then insects were released in it and their free flying was analyzed. Wing beat sounds of free flying hymenopteran insects were measured by a noise-meter and frequencies and wave of the signals were analyzed through FFT analyzer. 2.3 Air flows around insects were measured with a wind tunnel (wind speed was available within 0.5-10m/sec.) and three dimensional PIV system. The test section was 200 mm\*300mm made of transparent acrylic resin.

Flying organs of insects Fig. 3 shows the cross sections of costae of the forewing of *Sympetrum infuscatum*. The costae at the basal part were developed well in the direction of up and downward, due to that the power operates chiefly up and downward at the basal part in wing beating. The costae so far from the nodus toward the wing tip stick out sharply forward. This is due to the faster wing speed at the tip and decreases air resistance. Thus, costae of dragonflies are most suitable forms for cope with the power that works at each of them. Fig. 4 shows the three dimensions of upper and down side of the wing of *Sympetrum frequens*. The height of the wing surface was larger at the basal part of the wing. Roles of the wave structure of the wing were increase of strength, shock absorber and lowering of fluid resistance. The posterior edge of the wing curve toward underside at the cross section and has a camber, and the characteristic seems to be common among insects. The height difference between the basal part and the wing tip suggests that at the former rigidity works high and at the latter flexibility works most, and this brings the wings deformed easily. There are many micro spines on the wing membrane of Diptera. The spines seem to tilt toward the air flows that were generated on the surface of the wing, and have a role of libretti. In Odonata, such spines exist on wing veins, but not on the membrane. 4. Wing beat and the wing beat frequency 4.2 Wing beat frequency The wing beat frequency of *Vespa simillima xanthoptera* was 105 Hz. Valensi number  $Va=S?/v=Strouhal\ number* Reynolds$

number, ( $?=2\pi fi$ ) and kinematic viscosity of the air. It is clear that Valensi number is proportional to the body length. The equation of wing beat frequency is shown below;  $fi=Km-1/6$ , K is a parameter valuable by insects. 4.3 Wing beat Fig. 12 shows the trajectories of fluttering wing tips in *S. infuscatum*. It is generally known that trajectory of wing tips of insects draws the character of 8, however, especially insects of Odonata, Hymenoptera and Diptera shows remarkable diversity of the trajectory. Fig. 14 shows the composite speed and its equation is shown below;  $V=(u^2+v^2+w^2)$  Wing beat of insects has a function of complicated controlling with deformation of wings. 5. Air flows around wingbeating insects We measured the changes of air speed produced by wing-beat and the changes of wingbeat at the basal part synchronously, putting a live dragonfly in a stationary air speed, which made the dragonfly beat wings. Fig. 16 shows the range of wing beat?, changes of air speed u and correlation coefficient between them  $Ru?$  in *Sympetrum kunkeli* that was fluttering in the stationary air flow ( $U0=1.75m/sec$ ). In nature, dragonflies do not always flutter in flight, they fly with repeating fluttering and gliding alternatively. Fig. 17 shows wingbeat of *Pantala flavescens* in the air flow of 2.1m/sec. It fluttered 14-15 times during 0.5-0.6sec. and glided for 0.3-0.4 sec. Speed vector in fluttering *Crocothemis servilia mariannae*, body length  $L=46.6$  mm, examined with PIV system is shown in Fig. 18. The measuring points were set at 14 mm (nodus) from the basal part of left wings. The forewing is stroking downward, with the hindwing reaching the bottom. Fig. 18 (a) suggests that large speed upward air flow is a lift and the wave of speed vector backward shows the change of speed produced by fluttering. Fig. 18 (b) shows speed vector of upward stroking of wings. Thus, it is cleared that dragonflies fly with their wings deformed, changing angles of wing stroking and the phase of wing beat of fore and hind wings.] Address: Sudo, S., Faculty of Systems Science and Technology, Akita Prefectural University, Yurihonjo 015-0055 Japan. E-mail: sudou@iwakimu.ac.jp

**5051.** Terzani, F. (2002): Ricerche odonatologiche in Toscana. 8. La *Lindenia tetraphylla* (van der Linden, 1825) (Insecta, Odonata, Gomphidae). *Quad. Studi Star, nat. Romagna* 16 (Suppl.): 5-6. (in Italian, with English summary). ["Several specimens, taken in 1995 and 1996 at a locality between Torre del Lago Puccini and Viareggio (LU), are brought on record. The last previous record of *L. tetraphylla* in Tuscany, Italy is from 1938."] Address: Terzani, F., Museo di Storia Naturale dell'Universita di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

## 2003

**5052.** Barker, J. (2003): The Odonata of the Absetzbecken Hohenau-Ringelsdorf, Lower Austria in summer 2002.. <http://www.auring.at/pdf/Odonata.pdf>: 10 pp. (in English). [Records of 34 species, and unconfirmed or species to expect are briefly commented. ] Address: not stated

**5053.** Bernier, C. (2003): A la rencontre des libellules. *Les Cahiers Techniques de la Gazette des Terriers* 104: 76 pp. (in French). [Nice book directed to young odonatologists with lavish illustrations and comic strips.] Address: <http://www.fcpn.org/>

- 5054.** Galina, A.B.; Hahn, N.S. (2003): Comparação da dieta de duas espécies de *Triportheus* (Characidae, Triportheinae), em trechos do reservatório de Manso e lagoas do rio Cuiabá, Estado do Mato Grosso. *Maringá* 25(2): 345-352. (in Portuguese, with English summary). [The diet of two species of *Triportheus* (Pisces) in Manso Reservoir and lagoons of Cuiabá River, Mato Grosso do Sul, Brazil contains also Odonata. ] Address: Hahn, Norma Segatti, Departamento de Biologia, Nupélia, Programa de Pós-Graduação em Ecologia de Ambientes Aquáticos Continentais, Universidade Estadual de Maringá, Av. Colombo, 5790. 87020-900, Maringá, Paraná, Brasil. E-mail: hahnns@nupelia.uem.br
- 5055.** Hodgkison, S.; Hero, J.-M. (2003): Seasonal, sexual and ontogenetic variations in the diet of the 'declining' frogs *Litoria nannotis*, *Litoria rheocola* and *Nyctimystes dayi*. *Wildlife Research* 30(4): 345-354. (in English). ["Faecal analyses were used to investigate the diets of the endangered frogs *Litoria nannotis*, *L. rheocola* and *Nyctimystes dayi* in Tully Gorge, North Queensland. Comparisons of diet and food availability indicate that these species feed indiscriminately on a range of terrestrial and aquatic invertebrates (including Odonata). Changes in morphology and foraging behaviour significantly influenced diet composition and created subtle shifts in the degree of selectivity displayed in prey choice. Interspecific differences in numeric and volumetric diet composition were attributed to variations in gape size and microhabitat selection. Within the diets of *L. nannotis* and *L. rheocola*, a decline in prey selectivity observed during the dry season reflected a reduction in foraging activity. Differences in the gape size and foraging behaviour of males and females of *L. nannotis* were responsible for sex-specific differences in diet composition. *L. nannotis* also displayed an ontogenetic shift in prey size and type. As snout vent length increased, *L. nannotis* consumed fewer, but larger prey and increasingly discriminated against dipterans, dipteran larvae and hemipterans. Importantly, *L. nannotis*, *L. rheocola* and *N. dayi* demonstrated the capacity to compensate for fluctuations in food availability by feeding on less lucrative prey." (Authors) For the full paper see: [http://www.griffith.edu.au/school/asc/ppages/academic/mhero/E ndgFrogs/docs/Hodgkinson%20%20Hero%20%20Wildlife%20Research%202003.pdf](http://www.griffith.edu.au/school/asc/ppages/academic/mhero/E%20ndgFrogs/docs/Hodgkinson%20%20Hero%20%20Wildlife%20Research%202003.pdf) Address: Hodgkison, S., School of Environmental and Applied Sciences, Griffith University, PMB 50 Gold Coast Mail Centre, Qld 9217, Australia
- 5056.** Hofer, U.; Baur, H.; Bersier, L.-F. (2003): Ecology of three sympatric species of the genus *Chamaelo* in a tropical upland forest in Cameroon. *Journal of Herpetology* 37(1): 203-207. (in English). [At Mount Kupe, at lower transitional forests (NN 900m), 0.06 Odonata (number of individuals per hour of sampling) have been recorded. For the full paper see: <http://www.conservation.unibe.ch/dynpart/Files/Publication/44/HoferJHerp2003.pdf>] Address: Hofer, U., Dept Vertebrates, Natural History Museum, Bernastr. 15, CH-3005 Bern, Switzerland.
- 5057.** Jenkins, R.A.; Jenkins, J.M. (2003): *Triacanthagyna trifida* (Odonata: Aeshnidae): New state record of dragonfly from South Carolina, U.S.A.. *Entomological News* 114(4): 233-234. (in English). [1 female, Richland Co., Columbia, SC; 14-VIH-2003, totalling the South Carolina odonate fauna to 110 species.] Address: Jenkins, R.A., Dept Forest Resources, Clemson Univ, 261 Lehotsky Hall, Clemson, SC, 29634, USA. E-mail: robertj@clemson.edu
- 5058.** Lambrechts, J.; Guelinckx, R. (2003): Een overzicht van bijzondere waarnemingen in Zuidoost-Brabant in 2003. *Brakona Jaarboek 2003*: 21 pp. (in Dutch). [The report includes sightings of Odonata. For details see: <http://www.velpe-mene.be/files/jaarboek-2003artikeljorg&robin.pdf>] Address: Lambrechts, J., Zuurbemde 9, B-3380 Glabbeek, Belgium. E-mail: Jorg-lambrechts@hotmail.com
- 5059.** Macaulay, D. (2003): Survey of Odonata in the Canadian Shield Natural Region of Northeastern Alberta II. 2002 Survey of Colin-Cornwall Wildland Park. Prepared for the Alberta Natural Heritage Information Centre Parks and Protected Areas Division, Alberta Community Development. *Alberta Lepidopterists' Guild March 31, 2003*: 19 pp. (in English). [A total of 17 odonate species were collected during the survey of 2002 at Colin-Cornwall Wildland Park. [...] Though most species collected are common across Canada, four of them (*Calopteryx aequabilis*, *Leucorrhinia glacialis*, *Soma-tochlora albicincta*, and *S. minor*) are uncommon in Alberta. *C. aequabilis* is an uncommon species that inhabits the boreal forest, and *L. glacialis* represents a range extension from central Alberta. Both *S. albicincta* and *S. minor* are uncommon residents of the Canadian Shield ecoregion. With further sampling it is expected that several more riparian, shield and wetland specialists will likely be found." (Author) For the full paper see: <http://www.cd.gov.ab.ca/preserving/parks/anhic/docs/odonatereportcolin%20cornwallfinal.pdf>]
- 5060.** Martynov, V.V.; Martynov, A.V. (2003): Interesting finds of dragonflies (Odonata) in the south east of Ukraine. *Vestnik Zoologii* 37(2): 80. (in Russian). [Records of *Anax ephippiger*, *Onychogomphus forcipatus*, *Crocothemis erythraea*, *Sympetrum fonscolombii*] Address: not stated
- 5061.** Mesquita, D.O.; Colli, G.R. (2003): Geographical variation in the ecology of populations of some Brazilian species of *Cnemidophorus* (Squamata, Teiidae). *Copeia* 2003(2) : 285-298. (in English). [*Cnemidophorus ocellifer* and *C. parecis* prey also on Odonata.] Address: Colli, G.R., Dept. de Zoologia, Inst. de ciencias Biológicas, Univ. de Brasília, 70910-900 Brasília, Distrito Federal, Brazil. E-mail: grcolli@unb.br
- 5062.** Orizaola, G.; Brana, F. (2003): Oviposition behaviour and vulnerability of eggs to predation in four newt species (genus *Triturus*). *Herpetological Journal* 13(3): 121-124. (in English). ["Most animals develop some kind of parental care in order to protect eggs or offspring from predation. Female newts (genus *Triturus*) protect eggs from predators by wrapping them individually in plant leaves. We studied oviposition characteristics of four newt species inhabiting the northern Iberian Peninsula (marbled newt, *Triturus marmoratus*; alpine newt, *T. alpestris*; palmate newt, *T. helveticus* and Bosca's newt, *T. boscai*). All of these species are able to wrap their eggs in aquatic plants in laboratory experiments, but - whereas *T. marmoratus*; *T. alpestris* and *T. helveticus* wrapped more than 90% of their eggs - *T. boscai* covered only half of the eggs completely with leaves. *T. boscai* is found in running waters more frequently than the other species, and lays larger eggs relative to female size, as is typical of running water urodeles. A parallel experiment exposing newt eggs to

predation by larvae of the dragonfly *Aeshna cyanea*, demonstrated the protective value of wrapping behaviour. About half of the unwrapped eggs were consumed, whereas protected eggs remained almost unattacked." (Authors) Available at: <http://www.popbiol.ebc.uu.se/pdf/HerpJ2003a.pdf> Address: Orizaola, G., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, c/ Catedrático Rodrigo Uria s/n, 33071, Oviedo, Spain. E-mail: [orizaola@correo.uniovi.es](mailto:orizaola@correo.uniovi.es)

**5063.** Roush, S.A.; Amon, J.P. (2003): Repopulation of restored wetland habitat by odonata (dragonflies and damselflies). *Ecological Restoration* 21(3): 174-179. (in English). [Usa, Ohio; "Each of the restored wetlands supported a wide variety of Odonata (Tab. 1). We found 26 species total, with nine to 15 species at each site. Eight species *Archilestes grandis*, *Argia moesta*, *Celithemis elisa*, *Ischnura hastata*, *Lestes disjunctus australis*, *L. unguiculatus*, *Perithemis tenera*, and *Sympetrum vitinum* were collected only once in our surveys, but notably were found at restored sites. While none of the species we found are rare, the Ohio Odonata Survey notes that several, such as *A. grandis*, *I. hastata*, and *L. congener*, are not widely collected. Some species were found in only one type of restored wetland habitat. For example, *Argemomphus vittosipes*, *L. congener*, *L. disjunctus australis*, and *A. moesta* occurred in the seasonal marsh and nowhere else. Five species of dragonflies *Aeshna umbrosa*, *Libellula semifaciata*, *Somatochlora tenebrosa*, *S. rubicundulum*, and *S. vitinum* were found only in the restored fens. In addition, we found [...] *Amphiagrion sautium*, *A. grandis*, and *L. unguiculatus* only in the restored fens. We found *C. elisa*, *P. tenera*, and *S. semicinctorum* only in the restored groundwater marsh. Walker & Corbet (1975) noted that species such as *S. tenebrosa*, *A. saucium*, *L. unguiculatus*, and *S. semicinctorum* are restricted to spring-fed habitats and/or temporary pools. While our data support that finding, not all species we found at our fen sites were restricted to fens." (Authors)] Address: Amon, J.P., Dept Biol. Sc., Wright State Univ., Dayton, OH 45435-0001, USA. E-mail: [james.amon@wright.edu](mailto:james.amon@wright.edu)

**5064.** Samways, M. (2003): Southern African Invertebrate. Linking to other Specialist Groups and beyond. *Species* 40: 19. (in English). [Verbatim: [...] Among our current collaborative activities are the recent compilations on the globally red-listed Odonata of Africa and the national red list of Odonata of South Africa. Threats to the globally-threatened South African Odonata species have been identified, with invasive alien trees being the major overall threat. Luckily, this problem is being addressed through the Working for Water Programme which is removing invasive, alien trees, particularly in the Western Cape, where most endemic species occur. [...] The Group is also engaged in a mapping process. Part of this is the mapping of South African Odonata species with Steven Piper at the University of Natal as a collaborative project with the University of Stellenbosch, and using a spatialrelational database. Driven by Justin Gerlach, we are also working closely with the Seychelles Nature Protection Trust for the conservation of invertebrates in the Seychelles. [...] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: [samways@sun.ac.za](mailto:samways@sun.ac.za)

**5065.** Sandin, L. (2003): Benthic macroinvertebrates in Swedish streams: community structure, taxa richness,

and environmental relations. *Ecography* 26: 269-282. (in English). [Odonata occurred at 97 (= 15.4%) of 628 randomly selected streams. 29 species were identified, but only *Erythromma najas* is mentioned.] Address: Sandin, L., Dept Envir. Assessment, Swedish Univ. Agric. Sci., P.O. Box 7050, SE-750 07 Uppsala, Sweden)

**5066.** Sinitshenkova, N.D. (2003): Main ecological events in aquatic insect history. *Acta zool. cracov.* 46 (Suppl.): 381-392. (in English). [The history of the adaptations to the aquatic life is traced from the Carboniferous to the Cretaceous. There are no Carboniferous insects with any obvious adaptations to aquatic life. The meganeurids could be proposed, but since their larvae are completely unknown, a terrestrial mode of life was suggested. In the Permian the aquatic insects became diverse and probably colonized lotic and lentic habitats. Wootton's suggestion that the insects inhabited first the running waters is questioned. Periodically flooded habitats are the most probable biotops of ancestral aquatic insects. First "aquatic odonate species" are known from the Upper Triassic of Australia.] Address: Sinitshenkova, N.D., Palaeontol. Inst., Russ. Acad. Sci., ul. Prosoyuznaya 123, RUS-117997 Moscow GSP-7, Russia. E-mail: [ninasin@mail.ru](mailto:ninasin@mail.ru)

**5067.** Tam, T.W. (2003): Four new dragonfly records for Hong Kong. *Hong Kong Biodiversity* 5: 8-9. (in English, with brief Chinese summary). [Hong Kong, China; four new odonate species were recorded at the start of the 2003 dragonfly flying season: *Anax nigrofasciatus nigrofasciatus*, *Cephalaeschna klotsi*, *Pseudagrion prunosum frasei*, and *Trithemis pallidinervis*. The records are documented and the specimens are pictured. For details see: <http://www.hkbiodiversity.net/newsletters/HKBOnewsletter5.pdf>] Address: not stated

**5068.** Terzani, F. (2003): Segnalazioni faunistiche italiane: *Calopteryx haemorrhoidalis* (Vander Linden, 1825) (Odonata: Calopterygidae). *Boll. Soc. ent. ital.* 135(3): 189. (in Italian). [male, Val d'Aosta: Gressoney (alt. 1400 m), VII-1970.] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: [agrion@katamail.com](mailto:agrion@katamail.com)

**5069.** Terzani, F. (2003): Segnalazioni faunistiche italiane: *Cordulegaster bidentata* Selys, 1843 (Odonata: Cordulegasteridae). *Boll. Soc. ent. ital.* 135(3): 189. (in Italian). [1 male, Val d'Aosta: Chatillon, torr. Promiod (alt. 1750 m), 7-VII-2000.] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: [agrion@katamail.com](mailto:agrion@katamail.com)

**5070.** Thompson, D.J.; Rouquette, J.R.; Purse, B.V. (2003): Ecology of the Southern Damselfly. *Conserving Natura 2000 Rivers Ecology Series No. 8.* English Nature, Peterborough. ISBN 1 85716 714 7: 26 pp. (in English). [In UK, *C. mercuriale* "is on the northern margin of its range. It has disappeared from, or is on the edge of extinction, in seven European countries along its northern boundaries, and is declining in three others, including Britain. In Britain there are three main centres of population the heathlands of Mynydd Preseli in Pembrokeshire and the New Forest, and the water meadow ditch systems of the Itchen and Test valleys. There are also small populations on the Dorset heaths, Dartmoor, East Devon pebble beds, Gower and two fens in Ox-



fordshire and Anglesey. The species is sensitive to a number of habitat factors. A requirement for a thermally sensitive microclimate is reflected in broad-scale habitat use (for example, use of shallow, sun-exposed, permanently flowing water bodies indicated by perennial, herbaceous, aquatic vegetation), and in habitat use for oviposition and emergence. The southern damselfly is semi-voltine in Britain, with a shorter larval growth period and flight period than in mainland European populations. Seasonal regulation is probably achieved by a facultative autumn diapause in the penultimate larval instar. Dispersal distances are relatively poor, which means that the already highly fragmented British populations are likely to become even more fragmented, with implications for its conservation. The main cause of the decline in the southern damselfly in Britain has been the use of unsympathetic grazing regimes in key habitats over long periods." (Authors). Available at: [www.english-nature.org.uk/lifeinukrivers/publications/damselfly%20.pdf](http://www.english-nature.org.uk/lifeinukrivers/publications/damselfly%20.pdf) Address: English Nature, Northminster House, Peterborough, PE1 1UA, UK

**5071.** Thompson, D.J.; Purse, B.V.; Rouquette, J.R. (2003): Monitoring the Southern Damselfly, *Coenagrion mercuriale*. Conserving Natura 2000 Rivers Monitoring Series No. 8, English Nature, Peterborough: 17 pp. (in English). [The report suggests monitoring methods that can be used to determine whether *C. mercuriale* populations are in favourable condition, and what conservation action is necessary for their survival. For the full paper see: [www.english-nature.org.uk/lifeinukrivers/publications/damselfly%20monitoring.pdf](http://www.english-nature.org.uk/lifeinukrivers/publications/damselfly%20monitoring.pdf)] Address: Purse, Beth, Population and Evolutionary Biology Research Group, Nicholson Building, University of Liverpool, School of Biological Sciences, Liverpool, L69 3GS, UK. E-mail: [beth.purse@bbsrc.ac.uk](mailto:beth.purse@bbsrc.ac.uk)

**5072.** Vick, G.S. (2003): Biodiversity Assessment of the Odonate Fauna of Takamanda Forest Reserve, Cameroon. SI/MAB Series 8: 73-82. (in English). [The paper reports sampling efforts between 1997 and 2001 (locally wise checklist in Appendix 1), and discusses the Reserve as "diversity hotspot" and zoogeographical aspects of its odonate fauna. For the full paper see: <http://nationalzoo.si.edu/ConservationAndScience/MAB/researchprojects/appliedconservation/westafrika/Takamandabook/Chapter5.pdf>] Address: Vick G.S., Crossfields, Little London, Tadley, Hants RG26 5ET, UK

## 2004

**5073.** Anholt, B.R.; Negovetic, S.; Som, C.; Rauter, C. (2004): Predator complement determines the relative success of tadpoles of the *Rana esculenta* complex. Ecological Society of America Annual Meeting Abstracts 89: 19- [Verbatim: The hybridogenetic european waterfrog, *Rana esculenta*, is an obligate sexual parasite of its host, *R. lessonae*, across large regions of its distribution. *R. esculenta* is a superior competitor to *R. lessonae* in a wide range of conditions and is also a larger, more fecund frog than *R. lessonae*. In the absence of conditions that favour *R. lessonae* we expect that *R. esculenta* should competitively exclude *R. lessonae* and then go extinct for lack of mates. Amphibians have been found to segregate among habitats along an axis of pond permanence that determines the apex predator in the system. We therefore examined the change in frequency of the two taxa from the larval

stage to metamorphosis in water bodies that did or did not support fish. We found that in the absence of fish and the presence of large invertebrate and amphibian predators, the frequency of *R. lessonae* increased relative to *R. esculenta* from the larval stage to metamorphosis while in the presence of fish and absence of other predators, the opposite was true. This observation was supported in a laboratory experiment where we found that *R. esculenta* was more vulnerable to predation by dragonfly larvae. Differences in vulnerability were associated with differences in activity level of the two taxa in the presence of caged predators. These results suggest that the two taxa are adapted to different predator complexes and the hybridogenetic system is maintained by occasional dispersal between dissimilar water bodies.] Address: Anholt, B.R., Dept Biology, University of Victoria, PO Box 3020, Victoria, BC, V8W 3N5, Canada. E-mail: [banholt@uvic.ca](mailto:banholt@uvic.ca)

**5074.** Arai, Y. (2004): A countrywide survey of Red Dragonflies in 2003: Introduction, Aims of survey and methods, Results. In: Arai, Y. [Ed.]: [A countrywide survey of Red Dragonflies in 2003]. Musashino Satoyama Research Group & Institute of Agriculture and Natural Environments, Yorii-cho, Saitama: 1-18. (in Japanese, translated into English by Ishizawa, N.). [In Japan, about 20 dragonfly species are called *aka-tombo*, comprising species of the genus *Sympetrum* and *Pantala flavescens*. The survey intends to generate interest among people for dragonflies and to maintain this interest, and to get insight into the migration of species by broadening the cover of observation places in Japan. Questionnaires were circulated, analysed for the phenological data. A meeting was held on 31-I-2004, and some of the lectures are documented with special reference to relationships of farmers, rice paddy fields and dragonflies.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozava City, Saitama Pref., Japan. E-mail: [isizawa7@rivo.mediatti.net](mailto:isizawa7@rivo.mediatti.net)

**5075.** Arai, Y. (2004): Occurrence of *Sympetrum* frequens from Yorii-machi. In: Arai, Y. [Ed.]: [A countrywide survey of Red Dragonflies in 2003]. Musashino Satoyama Research Group & Institute of Agriculture and Natural Environments, Yorii-cho, Saitama: 23-27. (in Japanese, translated into English by Ishizawa, N.). [Population density of *S. frequens* has decreased over the past decades. Alternation of rice paddy field cultivation is responsible for the population trend.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozava City, Saitama Pref., Japan. E-mail: [isizawa7@rivo.mediatti.net](mailto:isizawa7@rivo.mediatti.net)

**5076.** Barbarin, J.-P. (2004): Les odonates (libellules) des tourbieres du nord-est Camtalien (site NATURA 2000 FR 8301056) ecologie et recherche de *L. pectoralis* (Charpentier, 1825) sur le site du Jolan (SÉGUR-LES-VILLAS, 15). <http://www.shnao.net/Doc/Barbarin/memoireJPB.pdf>: 52 pp. (in French). [Cantal, France; detailed report referring to the rare *Leucorrhinia pectoralis* and the co-occurring odonate species.] Address: Barbarin, J.-P., Université Blaise-Pascal, Clermont II, 24, avenue des Landais, 63000 Clermont-Ferrand, France

**5077.** Beldon, P.A.; Downer, V.J.; Luck, J.C.; Prendergast, H.D.V.; Sadler, D. (2004): The Dragonflies of Sussex: A Guide to their Distribution and Conservation. Essendon Press. ISBN 0-9525549-1-7: 81 pp. [County faunas are becoming increasingly popular and it is

refreshing to see the publication of this new work dealing with Sussex dragonflies. The idea of local lists dealing with the Sussex fauna and flora is not new. Undoubtedly the most comprehensive early work was The Victoria County History of the Counties of England: Sussex, Volume 1, which was published in 1905. This contained extensive annotated lists of plants and animals recorded from the county, each order being assigned to a different specialist. The section on Odonata, included within the Neuroptera, was written by the well-known Hastings naturalist the Rev. E.N. Bloomfield. In his introduction to the dragonfly section he states, "We have a fair record, but to complete the possible list *Orthetrum caerulescens*, Fabr. [Keelred Skimmer], should be looked for on boggy heaths, *Aeschna juncea*, Linn. [Common Hawker], around ponds, especially in fir woods, and *Erythromma najas*, Hansem. [Red-eyed Damselfly], over sluggish water, where no doubt they await discovery; while it is quite possible that the little *Agrion mercuriale*, Charp. [Southern Damselfly], may be hiding its charms amongst the rank herbage of some boggy stream." Although Southern Damselfly *Coenagrion mercuriale* appears to be genuinely absent from Sussex, the other three have indeed been recorded from the County. This latest book essentially presents the results of a survey carried out between 1989-2003 by members of the Sussex Dragonfly Recording Group, combined with data sent in by many visiting naturalists. Pre-1989 data is also plotted on each distribution map and is discussed briefly. A map of the county shows the total number of records received, in three categories by tetrads (2 x 2km squares). Following the Contents page are chapters entitled "Foreword", "Introduction", "The Sussex scene" and "Dragonfly recording", followed by the main species accounts. This latter section occupies 75% of the book and deals with the 12 damselfly and 17 dragonfly species that are currently regarded as permanent breeding residents in the County. Each species has been allocated a double page and is accompanied by a distribution map and several colour photographs. Although not intended to be an identification guide, the photos serve to point the recorder in the right direction, but for accurate determinations it is necessary to refer to detailed descriptions elsewhere. The maps show the modern administrative boundary between East and West Sussex, but not the City of Brighton or the boundary between Watsonian Vice-counties 13 and 14. Each map shows the eight differently coloured geological zones and labelled 10km grid lines, although to determine the 100km grid square code letters (SU, SZ, TQ, TV) it is necessary to refer to the map on pages 6 or 11. The maps also show rivers with major tributaries so that species associated with the different catchment areas can be identified at a glance. Records are plotted on a 1km grid square basis and are divided into three categories, distinguished by differently coloured spots: "pre-1989", "1989-2003 present only" and "1989-2003 probable/possible breeding". Chapter 5, "Species lost and won", discusses species not currently regarded as resident and breeding, including Scarce Emerald Damselfly *Lestes dryas*, which was apparently established at Powdermill Reservoir, near Brede, during the 1940s, and several species currently regarded as migrants. The final chapter, "Acknowledgements and credits", contains a comprehensive list of more than 200 contributors and compilers. A separate chapter giving a Sussex checklist, with synonymy, would have aided the collation of species with little or no breeding history in the County. Nevertheless

it is possible to compile a list by carefully extracting data from Chapters 4 and 5. There is plenty of room for 100km grid square code letters on each distribution map and it is hard to understand why these were omitted. The absence of a general index is also somewhat frustrating. However, these are but minor points of criticism and certainly should not deter naturalists from purchasing this excellent book." Peter Hodge, *Atropos* 26: 39-40.]

**5078.** Bernard, B.; Buczyński, P.; Mielewczyk, S.; Tończyk, G. (2004): Odonata / Wążki. In: Głowaciński, Z. & J. Nowacki (Ed.): *Polska czerwona księga zwierząt - Bezkręgowce* [Polish Red Data Book of Animals - Invertebrates]. 448 pp: 52-60. (in Polish, with English introduction and summaries). [Data sheets of 5 odonate species: *Coenagrion armatum* (Buczyński, P.), *Nehalennia speciosa* (Bernard, B.), *Cordulegaster boltonii* (Bernard, B.), *Somatochlora alpestris* (Mielewczyk, S.), *S. arctica* (Buczyński, P. & G. Tończyk) are presented. Habitat, distribution (instructive maps), and threat factors for each species are outlined. Each chapter is concluded by an English summary.] Internet version available at: [www/iop.krakow.pl/pckz](http://www/iop.krakow.pl/pckz). Address: Published and distributed by: Instytut Ochrony Przyrody, Polska Akademia Nauk, al. Adama Mickiewicza 33, 31-120 Kraków, Poland

**5079.** Biologische Station für den Enepe-Ruhr-Kreis (2004): *Faunistische Untersuchungen 2001 - 2004 im Naturschutzgebiet Ruhraue bei Hattingen-Winz Stadt Hattingen, Ennepe-Ruhr-Kreis. Verein zur Förderung des Naturschutzes im Ennepe-Ruhr-Kreis e.V.*: 62 pp. (in German). [Nordrhein-Westfalen, Germany; on pages 30 - 32, the odonate fauna of 10 sampling localities is documented in tables.] Address: Biologische Station im EN-Kreis, Loher Str. 85, D-58256 Ennepetal, Germany

**5080.** Böhm, K. (2004): Zur Entwicklung und Phänologie von *Crocothemis erythraea* in Nordrhein-Westfalen: Nachweis einer zweiten Jahresgeneration? (Odonata: Libellulidae). *Libellula* 23(3/4): 153-160. (in German, with English summary). ["In summer 2003 two emergence cohorts were recorded at a pond in Düsseldorf (51°12'N, 6°44'E), Germany. The first cohort emerged in May and June, and the second from the end of July to mid-September. This is interpreted as a second annual generation originating from ovipositions of the first cohort. With 513 individuals the second generation was twice as large as the first and showed an emergence peak in the first half of August." (Author)] Address: Böhm, K., Erich-Müller-Straße 6, D-40597 Düsseldorf, Germany

**5081.** Bogdanovic T.; Durbesic, P.; Mikuska, J. (2004): Dragonfly fauna (Odonata) of the Baranja surroundings (Croatia). *PRVI KONGRES hrvatskih znanstvenika iz domovine i inozemstva (1 ; 2004 ; Zagreb, Vukovar). Zbornik sa etaka postera znanstvenih novaka, prikazanih u inozemstvu 2002., 2003. i 2004. godine / Prvi kongres hrvatskih znanstvenika iz domovine i inozemstva, Zagreb-Vukovar, 15-19. studenoga 2004.; <glavni i odgovorni urednik Zlatko Kniewald>. Zagreb : Akademija tehničkih znanosti Hrvatske, 2004. ISBN 953-7076-05-9 : 18. (in English). [48 species were recorded between 1997 - 2003 at 30 localities. Additions to the regional odonate fauna are: *Coenagrion ornatum*, *Anax ephippiger*, *Libellula fulva*, *Orthetrum coerulescens*, and *Sympetrum flaveolum*. Dominant species*

are: *Aeshna mixta*, *C. puella*, *Ischnura elegans*, *O. albistylum*, *S. striolatum*, subrecent species are: *Lestes macrostigma*, *S. danae*, *S. depressiusculum*, and *S. fonscolombii*.] Address: Fac. Philosophy, University of Osijek, Croatia

**5082.** Bogdanovic T.; Mikuska, J. (2004): Dragonfly fauna in Repas Forest. PRVI KONGRES hrvatskih znanstvenika iz domovine i inozemstva (1 ; 2004 ; Zagreb, Vukovar). Zbornik sa etaka postera znanstvenih novaka, prikazanih u inozemstvu 2002., 2003. i 2004. godine / Prvi kongres hrvatskih znanstvenika iz domovine i inozemstva, Zagreb-Vukovar, 15-19. studenoga 2004. <glavni i odgovorni urednik Zlatko Kniewald>. Zagreb: Akademija tehničkih znanosti Hrvatske, 2004. ISBN 953-7076-05-9: 19. (in English). [Verbatim: Between June and September 2000, 6 locations of the Re-pa - forest complex were surveyed for their odonate fauna. A total of 42 species were found: *Calopteryx virgo*, *C. splendens*, *Chalcolestes viridis*, *Lestes barbarus*, *L. virens*, *L. sponsa*, *L. dryas*, *Sympecma fusca*, *Platycnemis pennipes*, *Erythromma najas*, *E. viridulum*, *Coenagrion ornatum*, *C. pulchellum*, *Enallagma cyathigerum*, *Ischnura pumilio*, *Aeshna mixta*, *A. affinis*, *A. viridis*, *Anax imperator*, *A. parthenope*, *Brachytron pratense*, *Stylurus flavipes*, *Gomphus vulgatissimus*, *Somatochlora metallica*, *S. flavomaculata*, *Epithea bimaculata*, *Libellula quadrimaculata*, *L. fulva*, *L. depressa*, *Orthetrum cancellatum*, *O. albistylum*, *O. coerulescens*, *Crocothemis erythraea*, *Sympetrum striolatum*, *S. vulgatum*, *S. meridionale*, *S. anguineum*, and *Leucorrhinia pectoralis*. Dominant species are: *Calopteryx splendens*, *Platycnemis pennipes*, *Coenagrion puella*, *Ischnura elegans*, *Anaciaeschna isosceles*; subrecent species are: *Chalcolestes viridis*, *Coenagrion ornatum*, *Brachytron pratense*, and *Stylurus flavipes*.] Address: Fac. Philosophy, University of Osijek, Croatia

**5083.** Bogdanovic T.; Mikuska, J.; Durbesic, P. (2004): Dragonfly fauna of Kopačkiri wetlands. PRVI KONGRES hrvatskih znanstvenika iz domovine i inozemstva (1 ; 2004 ; Zagreb, Vukovar). Zbornik sa etaka postera znanstvenih novaka, prikazanih u inozemstvu 2002., 2003. i 2004. godine / Prvi kongres hrvatskih znanstvenika iz domovine i inozemstva, Zagreb-Vukovar, 15-19. studenoga 2004. <glavni i odgovorni urednik Zlatko Kniewald>. Zagreb : Akademija tehničkih znanosti Hrvatske, 2004. ISBN 953-7076-05-9: 20. (in English). [Verbatim: Between 1997 and 2001, 15 localities of the Kopački Rit Nature Park were surveyed for their odonate fauna. A total of 48 species were found, including *Coenagrion ornatum*, *Anax ephippiger*, *Libellula fulva*, *Orthetrum coerulescens*, and *Sympetrum flavolum*. Dominant species are: *Aeshna mixta*, *Coenagrion puella*, *Ischnura elegans*, *Orthetrum albistylum*, and *Sympetrum striolatum*. Subrecent species are: *Lestes macrostigma*, *Sympetrum danae*, *S. depressiusculum* and *S. fonscolombii*.] Address: Fac. Philosophy, University of Osijek, Croatia

**5084.** Buczyński, P. (2004): Dragonflies (Odonata) from Poland in the collection of Museum and Institute of Zoology of Polish Academy of Sciences in Warsaw. Nowy Pam. Fizjogr., Warszawa, 3 (1-2): 15-26. (in Polish, with English summary). [Four of the five collections on Odonata deposited in the Museum and Institute of Zoology of Polish Academy of Sciences (MiIZ PAN) are discussed: the specimens by KRÜGER from Szczecin and the Baltic coast (1913-21) - the part of the voucher

specimen collection for the paper of the dragonflies of Pomorze (KRÜGER 1925); 2) the material by BAZYLUK from the vicinity of Siemień in Western Polesie (1929-50), the majority was published by BAZYLUK (1947, 2002) and BUCZYŃSKI (2003); 3) unpublished material from the Srodkowomazowiecka Lowland (1954-55); 4) unpublished material from 12 regions in different parts of the country, collected by researchers of MiIZ PAN (1945-50). All localities are mapped, and in total 46 odonate species are documented and discussed. Of special interest are *Sympecma paedisca*, *Aeshna affinis*, *Orthetrum albistylum*, and *Sympetrum fonscolombii*. The specimens of *S. paedisca* from the KRÜGER collections - wrongly published as *S. fusca* - are the oldest recorded ones of this species in north-western Poland. This is another example of wrong identification of this species (cf. BUCZYŃSKI 2003). There are also some old records of species like *Erythromma viridulum*, which in the past decade has been expanding its range in some European regions, or *Lestes barbarus*, often classified as "mediterranean species".] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**5085.** Buczyński, P.; Tończyk, G. (2004): Reviews: Askew, R.R. 2004: The dragonflies of Europe (revised edition). *Wiad. entomol.* 23(4): 213-214. (in Polish). [Detailed critical review of the revised edition of the classical book of Askew 1988.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**5086.** Buczyński, P.; Kitowski, I.; Rozwalka, R. (2004): Submerged part of the nests of European Bittern, *Botaurus stellaris* (L.), as a substrate for benthic macroinvertebrates. *Acta biol. Univ. Daugavp.* 4(2): 77-80. (in English). [Representatives of 12 taxa - nearly all predators - were found at a pond complex in SE Poland, including *Aeshna mixta* and *Sympetrum vulgatum*. The Hirudinea (*Erpobdella octoculata*) and the Dytiscidae (Coleoptera) were dominant. Habitat conditions of the nest fauna and its forming are discussed.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**5087.** Buczyński, P. (2004): The introductory estimation of the present state and the threat to the invertebrates of the Elk district. 3.1.4 Dragonflies (Odonata). In: Kistowski, M. & J. Mosdorf (Red.): *Zasoby i zagrożenia środowiska przyrodniczego w powiecie elkim i mieście Niemenczyn. Raport 2004.* Wyższa Szkoła Finansów i Zarządzania w Białymstoku, Białystok: 370-376. (in Polish and English). [Elk, Poland is a classic locality known by the work of le Roi (1911), who collected there 41 odonate species. In 2003, a new survey of 13 localities in the Elk surroundings yielded 22 odonate species, among them *Sympecma paedisca* and *Leucorrhinia caudalis*.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**5088.** Burbach, K.; Schiel, F.-J. (2004): Beobachtungen zur Ausbreitungsfähigkeit von *Nehalennia speciosa* (Odonata: Coenagrionidae). *Libellula* 23(3/4): 115-126. (in German, with English summary). [In the years 2003



and 2004, *N. speciosa* was recorded at four newly created water bodies in southern Germany. The initial colonization of these habitats can probably be attributed to individuals that emigrated from larger populations at distances of up to 11.5 km. In addition, observations of single individuals aside of suitable habitats demonstrate that the species is capable of colonizing new habitats." (Authors)] Address: Burbach, K., Griesfeldstr. 5a, D-85354 Freising, Germany. E-mail: klaus.burbach@gmx.de

**5089.** Che Salmah, M.R.; Abu Hassan, A.; Ameilia, Z.S. (2004): Odonate communities (Odonata: Insecta) in a tropical river basin, Malaysia. *Wetland Science* 2(1): 1-9. (in Chinese, with English summary). ["Odonata larvae were sampled from 16 tributaries of Kerian River in the Kerian River Basin (KRB) using a kick sampling technique from September 1998 to May 1999 encompassing both rainy and dry seasons. The distribution of odonate genera was significantly different ( $F_{15,46} = 3.99$ ) among rivers in both seasons ( $F_{15,16} = 4.70$ ) at  $P = 0.05$ . However, no seasonal influence was detected. Protoneuridae and Libellulidae were the most dominant families in this basin. Other families Gomphidae, Coenagrionidae, Macromiidae, Chlorocyphidae and Calopterygidae, were common but Aeshnidae and Eupheidae were rare. Several common species, *Prodasineura autumnalis*, *Brachythemis contaminata*, *Macromia gerstaeckeri*, *Paragomphus*, *Orthetrum brunneum* [sic], *Rhinocypha quadrimaculata* and *Copepla marginipes* were identified. The calculated values of biological indices (H', D, E, R 1 and R2) showed that the dragonfly fauna in this river basin was slightly poor. Varied physico-chemical parameters of the river possibly as a result of human activities in surrounding areas were found to influence the distribution of the dragonfly larvae in the KRB. This study showed that the KRB provided favorable habitats for Protoneuridae and Libellulidae. Two most dominant species *Prodasineura autumnalis* and *Brachythemis contaminata* were obviously favoured by slightly acidic water of the Kerian river tributaries."] Address: Che Salmah, M.R., School of Biological Sciences, University Sains Malaysia, 11800 Minden, Pulau Pinang, Malaysia

**5090.** Ciechanowski, M.; Kowalczyk, J.K.; Zieliński, S. (2004): Niektóre inne grupy bezkręgowców (Porifera; Turbellaria; Hirudinea; Aranei; Insecta: Odonata, Orthoptera, Heteroptera, Homoptera, Neuroptera, Coleoptera, Lepidoptera, Diptera) [Some other taxa of invertebrates (Porifera; Turbellaria; ....)] *Acta Bot. Cassub.* 4: 90-97. (in Polish). [6 odonate species are listed.] Address: Ciechanowski, M., Katedra Ekologii i Zoologii Kręgowców Uniwersytetu Gdańskiego, Al. Legionów 9, 80-441 Gdańsk, Poland. E-mail: mattiech@kkinet.pl

**5091.** Clausnitzer, V. (2004): Odonata. Species 42: 34-35. (in English). [Report of the chair of the The IUCN Odonata Specialist Group on current activities with special emphasis on the book project "Guardians of the watershed". For the full paper see: <http://www.iucn.org/webfiles/doc/SSC/SSCwebsite/Species/Species42Full.pdf>] Address: Clausnitzer, Viola, Graefestr. 17, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de

**5092.** Corbi, J.J.; Jancso, M.A.; Trivinho-Strixino, S.; Fragoso, E.N. (2004): Occurrence of *Oligochaeta* living on larvae of Odonata from Ipeúna (Sao Paulo State, Brazil). *Biota Neotropica* 4(2): 3 pp. (in English, with

Portuguese summary). ["The occurrence of oligochaetes species living on larvae of Odonata is reported for the first time. There were found *Nais variabilis* (Piguet, 1906) (Oligochaeta: Naididae) and *Chaetogaster diastrophus* (Gruithuisen, 1828) (Oligochaeta: Naididae) living on *Elasmothermis cannaerioides* (Calvert, 1906) (Anisoptera: Libellulidae) and on *Mnesarete* (Cowley, 1934) (Zygoptera: Calopterygidae)."] (Authors)] Available at: [www.biotaneotropica.org.br/v4n2/pt/abstract?short-communication+BN03304022004](http://www.biotaneotropica.org.br/v4n2/pt/abstract?short-communication+BN03304022004). Address: Corbi, J.J. Laboratório de Entomologia Aquática, Departamento de Hidrobiologia, Universidade Federal de São Carlos, C. Postal 676, São Carlos, SP, Brasil. E-mail: [pjcorbi@iris.ufscar.br](mailto:pjcorbi@iris.ufscar.br)

**5093.** Cordero Rivera, A.; Andrés, J.A.; Córdoba-Aguilar, A.; Utzeri, C. (2004): Postmating sexual selection: allopatric evolution of sperm competition mechanisms and genital morphology in calopterygid damselflies (Insecta: Odonata). *Evolution* 58(2): 349-359. (in English). ["Postmating sexual selection theory predicts that in allopatry reproductive traits diverge rapidly and that the resulting differentiation in these traits may lead to restrictions to gene flow between populations and, eventually, reproductive isolation. In this paper we explore the potential for this premise in a group of damselflies of the family Calopterygidae, in which postmating sexual mechanisms are especially well understood. Particularly, we tested if in allopatric populations the sperm competition mechanisms and genitalic traits involved in these mechanisms have indeed diverged as sexual selection theory predicts. We did so in two different steps. First, we compared the sperm competition mechanisms of two allopatric populations of *Calopteryx haemorrhoidalis* (one Italian population studied here and one Spanish population previously studied). Our results indicate that in both populations males are able to displace spermathecal sperm, but the mechanism used for sperm removal between both populations is strikingly different. In the Spanish population males seem to empty the spermathecae by stimulating females, whereas in the Italian population males physically remove sperm from the spermathecae. Both populations also exhibit differences in genital morphometry that explain the use of different mechanisms: the male lateral processes are narrower than the spermathecal ducts in the Italian population, which is the reverse in the Spanish population. The estimated degree of phenotypic differentiation between these populations based on the genitalic traits involved in sperm removal was much greater than the differentiation based on a set of other seven morphological variables, suggesting that strong directional postmating sexual selection is indeed the main evolutionary force behind the reproductive differentiation between the studied populations. In a second step, we examined if a similar pattern in genital morphometry emerge in allopatric populations of this and other three species of the same family (*Calopteryx splendens*, *C. virgo* and *Hetaerina cruentata*). Our results suggest that there is geographic variation in the sperm competition mechanisms in all four studied species. Furthermore, genitalic morphology was significantly divergent between populations within species even when different populations were using the same copulatory mechanism. These results can be explained by probable local coadaptation processes that have given rise to an ability or inability to reach and displace spermathecal sperm in different populations. This set of results provides the first direct evidence of intraspecific

evolution of genitalic traits shaped by postmating sexual selection." (Authors) Available at: [http://webs.uvigo.es/adolfo.cordero/PDF/Evolutionvol58pp349-359\(2004\).pdf](http://webs.uvigo.es/adolfo.cordero/PDF/Evolutionvol58pp349-359(2004).pdf) Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: [acordero@uvigo.es](mailto:acordero@uvigo.es)

**5094.** David, S. (2004): The dragonflies (Insecta: Odonata) of the eastern part of the Nizké Beskydy and Poloniny Mís. (NE Slovakia). Biosférické Rezervácie na Slovensku V. (edit. R. Midriak) Zborník referátov, z 5. národnej konferencie o biosférických rezerváciách SR, konanej 29.-30. 9. 2004 v Novej Sedlici: 115-123. (in Slovakian, with English summary). [Between 1993 and 2004, a total of 33 odonate species were recorded from 43 localities situated in the regions LPA Východné Karpaty and NP Poloniny mainly, Slovakia. The dominance structure of the community is presented. *Aeshna cyanea* is present at approximately 30% of the localities; most species occur only at very few localities. Of some interest are records of *Sympetrum fonscolombii*, *Thecagaster bidentata*, *A. caerulea*, and *Somatochlora flavomaculata*.] Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. E-mail: [stanislav.david@savba.sk](mailto:stanislav.david@savba.sk)

**5095.** Dijkstra, K.D. (2004): Odonates (Libellules et Demoiselles). Louette, M., Meirte, D., Jocqué, R. (Eds): La faune terrestre de l'archipel des Comores. Studies in Afrotropical Zoology 293: 251-252. (in French). [Brief introduction into the odonate fauna of the Comore Islands. 7 publications on Odonata are listed on page 426 which is less than 50% of the papers cited in Lindboom & Schorr (2004): Literaturodatenbank ODOLit Version 1.1. Dragonfly Research 2 (ISSN 1438-034X).] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: [Dijkstra@naturalis.nm.nl](mailto:Dijkstra@naturalis.nm.nl)

**5096.** Douillard, E.; Durand, O.; Gabory, O.; Samson, N. (2004): Du nouveau sur le cycle biologique et l'état des populations de la Cordulie à corps fin (*Oxygastra curtisii* Dale, 1834) dans les Mauges (Maine-et-Loire). MAUGES NATURE Bulletin de synthèse N°6: 63-67. (in French). [Exuviae of the species have been collected and the emergence habitats are described. A total of 102 imago has been marked, ten of them could be recaptured. In addition, the paper presents phenological data and a list of co-occurring odonate species.] Address: C.P.I.E. Loire et Mauges/Carrefour des Mauges, maison de pays "La Loge", BP 25, F-49600 Beaupréau, France. E-mail: [cpie-loire-et-mauges@pays-des-mauges.com](mailto:cpie-loire-et-mauges@pays-des-mauges.com)

**5097.** Driemeyer, J. (2004): Man(n) kanns ja mal versuchen .... mercuriale 4: 36-37. (in German). [Pairing attempt between 2 male *Calopteryx splendens*; 31-V-2003, Emmerbach near Münster, Nordrhein-Westfalen, Germany] Address: Driemeyer, J., Falkenweg 7, D-48167 Münster, Germany. E-mail: [Jdriemeyer@t-online.de](mailto:Jdriemeyer@t-online.de)

**5098.** Dumont, H.J. (2004): A note on dragonflies collected at light in a forest in the Ivory Coast (West Africa). Bulletin S.R.B.E./K.B. V.E. 140: 66-67. (in English). [Discussion of dragonfly specimens collected at a series of light traps, primarily designed to collect moths, in a forest in the south-east of the Ivory Coast by Dr. U. Dall'Asta (Tervuren Museum, Belgium) (23 Jan 1996-12

Feb 1996), at 13 stations across the Forêt Classée de Bossematié. 9 species have been caught, in most cases *Tholymis tillarga*. "Night-flying in dragonflies is often linked to long-distance migratory movement and is prompted at the maiden flight or occurs at a very general age. Some species, however, may end up in light traps after having been disturbed while roosting at night, and may not normally be night-active at all. This may apply to about half of the present species list!"] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: [Henri.Dumont@rug.ac.be](mailto:Henri.Dumont@rug.ac.be)

**5099.** Englund, R.A. (2004): Report for the 2003 Pacific Biological Survey, Bishop Museum. Austral Islands, French Polynesia, Expedition to Rurutu and Tubuai. Prepared for: Délégation à la Recherche, (Ministère de la Promotion des Ressources Naturelles), B.P. 20981 Papeete, Tahiti, Polynésie française. <http://www.bishopmuseum.org/research/pbs/pdf/australs2003.pdf>: V, 38 pp. (in English, with French summary). ["From 9-28 November 2003, staff from the Pacific Biological Survey (PBS) of the Bishop Museum in cooperation with other biologists conducted biological surveys in the Austral Islands of Tubuai and Rurutu as part of an [...] inventory and evaluation of biodiversity, a research program conducted in French Polynesia [...]. The objectives of this biodiversity assessment of the Austral Islands were: 1) to assess the native aquatic insect fauna and describe the overall biodiversity of this fauna, 2) to assess the biodiversity and status of Heteroptera and other important endemic phytophagous insects in native forest areas, 3) to assess the impacts or lack of impacts of introduced aquatic species on native stream biota, 4) to qualitatively assess the impacts of introduced species, feral ungulates, urbanization, on native insects, and 5) to provide museum specimens and an information baseline for future researchers. Significant findings of these surveys include a pristine native freshwater fauna lacking introductions of non-indigenous fish, amphibians, or aquatic reptiles on Rurutu, but two harmful invasive fish species were widespread on Tubuai. Tubuai is apparently the only Austral Island currently having introduced freshwater fish species. On Tubuai, alien fish were found in all aquatic habitats sampled with only one exception at the large cascade below the Mt. Panee summit; this was the highest elevation area on Tubuai with flowing water. This cascade flowed into a series of stair-step pools that were too steep and high gradient for introduced fish to access, and was a potential refuge area for native species that could be negatively impacted by introduced fish, such as endemic damselflies. Numerous undescribed and several described aquatic insect species were found on both Rurutu and Tubuai, including new species and range extensions of Heteroptera (true bugs), Diptera (aquatic flies), and Odonata (dragonflies and damselflies), and Coleoptera (beetles). One of the most important aquatic findings during this expedition was a new species of large endemic damselfly found on Rurutu only in undiverted, forested, and fast-flowing streams. It is possible that endemic damselflies have been eliminated on Tubuai by invasive fish species, though more intensive surveys are required to verify this. Although generally uncommon and not found in many French Polynesia islands, one species of native aquatic Coleoptera (beetles), *Rhantus* new sp. near *schchereri* was found at Tamatoa Stream in the lower elevation still-water *Hibiscus tiliaceus* areas. Aquatic in-

sects in the orders Ephemeroptera, Plecoptera, and Trichoptera (EPT) orders were not found on Tubuai or Rurutu. Areas that should receive the highest conservation priority on Rurutu include the makatea forest at Plateau Papanai with a mixed *Dodonea viscosa* shrubland forest that is one of the largest and most intact in French Polynesia, harboring unique species of biogeographically important endemic insects. A gully below the summit of Mt. Taatioe with the endangered *Cyrtandra elisabethae* plants and new species of green planthopper is of world-wide conservation and biogeographic importance and contains the largest patches of remnant native upland forest remaining on Rurutu, and with it the greatest native insect biodiversity on Rurutu. This area should be immediately fenced to keep grazing cattle out, and weeding could reduce the encroaching invasive plant species. The lack of action in protecting these forest patches from grazing cattle and other feral ungulates will certainly lead to the demise of native plants on Rurutu and the extinction of the unique insects associated with them. The native species found on both islands are important on a worldwide basis, and the conservation of this rich biodiversity is a critical component of the Polynesian culture found on these islands. It is of global significance to preserve the native biodiversity found on the Austral Islands to allow a greater understanding of the natural biological processes of dispersal and colonization of the fauna to these remote and isolated island areas." (Author)] Address: Englund, R.A., Pacific Biological Survey, Bishop Museum Honolulu, Hawaii i 96817

**5100.** Faria, R.G.; Araujo, A.F.B. (2004): Syntopy of two *Tropidurus* Lizard species (Squamata: Tropiduridae) in a rocky cerrado habitat in central Brazil. *Braz. J. Biol.* 64(4): 775-786. (in English, with Portuguese summary). [The diet (n=255) of the lizard *Tropidurus oreadicus* also contained one Odonata individual; <http://www.scielo.br/pdf/bjb/v64n4/22977.pdf>] Address: Faria, R.G., Dept Zoologia, Inst. Biologia, Univ. de Brasília, CEP 70910-900, Brasília, DF, Brazil. E-mail: renatogf@unb.br

**5101.** Fleck, G. (2004): Contribution à la connaissance des Odonates de Guyane française. Les larves de *Macrothemis pumila* Karsch, 1889 et de *Brechmorhoga praedatrix* Calvert, 1909. Notes biologiques et conséquences taxonomiques (Anisoptera: Libellulidae). *Ann. Soc. entomol. Fr.* (n.s.) 40(2): 177-184. (in French, with English summary). ["The larvae of *Macrothemis pumila* Karsch, 1889 and *Brechmorhoga praedatrix* Calvert, 1909 are described and illustrated for the first time. The larva of *M. pumila* greatly differs from any other known larvae of the genus, with numerous characters not listed in the diagnosis of Ramirez & Novelo-Gutiérrez (1999). Its position within the genus is discussed. The larva of *B. praedatrix* is easily recognised from other known larvae of the genus through its prominently developed and acute dorsal hooks on abdominal segments 2 to 9. Its seems to be dependent on a waterplant of fast running water, *Mourera fluviatilis* Aublet, 1775." (Author) For a full paper see: [http://zoologie.umh.ac.be/asef/pdf/20044002/full/FleckASEF200440\(2\)177-184.pdf](http://zoologie.umh.ac.be/asef/pdf/20044002/full/FleckASEF200440(2)177-184.pdf)] Address: Fleck, G., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleck@mnhn.fr

**5102.** Fliedner, H. (2004): Flügel als Sonnenreflektoren bei *Lestes viridis*? (Odonata: Lestidae). *Libellula* 23

(3/4): 179-182. (in German, with Latin and English summary). ["On 19 October 2004 at noon, on the first sunny day after a rainy period, a female *Lestes viridis* was seen basking with its wings closed behind the abdomen. This unusual wing position is interpreted as due to thermoregulatory reasons." (Author)] Address: Fliedner, H., Louis-Seegelken Str., D-28717 Bremen, Germany. E-mail: H.Fliedner@t-online.de

**5103.** Futahashi, R.; Hayashi, F. (2004): Genetic analysis on *Sympetrum frequens* based on DNA sequences. In: Arai, Y. [Ed.]: [A countrywide survey of Red Dragonflies in 2003]. Musashino Satoyama Research Group & Institute of Agriculture and Natural Environments, Yorii-cho, Saitama: 42-46. (in Japanese, translated into English by Ishizawa, N.). [34 specimens from 24 Japanese localities and 4 from 2 localities in Korea were used for mitochondrial DNA analysis. In sum, the results show that *S. frequens* is a highly dispersive species far more than expected.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozawa City, Saitama Pref., Japan. E-mail: isizawa7@rivo.mediatte.net

**5104.** Gaines, K.H. (2004): Stable isotope analysis reveals complexity at different spatial scales in desert sinkhole food webs. *Ecological Society of America Annual Meeting Abstracts* 89: 171-172. (in English). [Verbatim: The Bitter Lake National Wildlife Refuge in southeastern New Mexico contains dozens of saline sinkholes in a desert scrub and grassland matrix. Most of these sinkholes support aquatic macroinvertebrate communities dominated by larval dragonflies and damselflies (Order Odonata), and some sinkholes also support populations of two rare fish species. In order to determine how the food webs in these sinkholes are structured, I collected fish, larval odonates and other aquatic insects, snails, amphipods, macroalgae, and macrophytes from pairs of sinkholes with and without fish in different locations in the sinkhole complex. These materials were then submitted for stable carbon and nitrogen isotope analysis. Results from these analyses suggest that superficially similar habitat patches separated by as little as twelve meters can support communities with significantly different diversities and trophic structures, and that the spatial scale at which food webs are examined may determine the degree of complexity perceived in a landscape.] Address: Gaines, Karen H., Univ New Mexico, Albuquerque, NM, 87131, USA. E-mail: kgaines@unm.edu

**5105.** Ghassemzadeh, F (2004): Limnological studies of Bazangan Lake, northeast Iran. *Ecological Society of America Annual Meeting Abstracts* 89: 177. (in English). [Verbatim: The Bazangan Lake is the largest natural lake in northeast Iran. It is located between 60°29 east longitudinal and 36°17 north latitudinal. This lake is in a temperate area with low rainfall (200mm). The climate is dry and hot from June to September. The mean and the maximum depth of the lake are 6 and 11 meters respectively. Its surface area is about 690,000 square meters. Major environmental factors were measured at five stations. Five samples have been collected from each station. Water and air temperatures, salinity, conductivity, pH, viscosity and soluble reactive phosphorous were measured seasonally during a period of one year. The biota of the lake was monitored by recording the abundance and distribution of zooplankton and phytoplankton. Conductivity of the water is about 20,000 umhos/cm and pH is about 8. Thermal



stratification happened from end of June to the end of July. Thermocline was occurred at 4.25 to 6 meters depth. Major groups of algae identified in the lake including Chlorophyta, Cyanophyta and Diatoms. The zooplankton of the lake was few in species, but rather large population of them are present in some stations. The main identified species were: cladocera, Diaptomus, rotifera, Hexarthra, Branchionus, Synchaeta; Cladocera, Daphnia and chironomid, Chironomus. Collembola. Corixid, Trichocorixa are found along the shore. Much less common species was harpacticoid and a few cyclopoid. The littoral region contains a relatively sparse fauna although some species are present in high numbers such as hemiptera, odonata and coleoptera. The lake is hyposaline oligotrophic with low phytoplankton and zooplankton communities. It is concluded that salinity, low food as well as viscosity are the important factors for low diversity of organisms in this lake which providing less amount of food for fish in the lake. Therefore the diversity and abundance of fishes in the lake are also low.] Address: Ghassemzadeh, F., Azad Univ Mashhad, Mashhad, Iran

**5106.** Gilbert, R. (2004): The Disjunctive Dragonfly: A Study of disjunctive method and definitions in contemporary English-language Haiku. *Studies in English Language and Literature* 47: 27-66. (in English). [For the full paper see: <http://www.iyume.com/research/dragonfly/DisjunctiveDragonfly.htm>] Address: not stated

**5107.** Gunzburger, M.S. (2004): The role of tadpole predation in the habitat distribution and hybridization of two species of treefrogs. *Ecological Society of America Annual Meeting Abstracts 89 2004*: 193. (in English). [Verbatim: Closely related species that occur sympatrically often have mechanisms to partition niche space and maintain species identity. *Hyla cinerea* and *H. gratiosa* are sister taxa that are sympatric throughout the southeastern United States. These species have different breeding habitat preferences: *H. cinerea* prefers permanent ponds while *H. gratiosa* only breeds in fishless ponds. Occasionally viable, fertile hybrids between these species form that may introgress into both parental species. The objective of this research was to evaluate the importance of tadpole predation in the habitat distribution of these two closely related species and their hybrids. Predation experiments were performed using large mesocosms to evaluate survival and behavior of *H. cinerea*, *H. gratiosa*, and hybrid tadpoles in response to permanent pond (sunfish) and temporary pond (odonate naiad) predators. Small sized tadpoles of both species have similar survival and behavior with odonates, but with sunfish predators *H. gratiosa* tadpoles hide in refuges less and suffer greater predation than *H. cinerea* tadpoles. Hybrid tadpoles showed intermediate survival values between *H. cinerea* and *H. gratiosa* with odonates, but had extremely low survival with sunfish despite the fact that they adopt appropriate antipredator behavior. These results demonstrate that tadpole predation may be the mechanism leading to the habitat distribution of *H. cinerea* and *H. gratiosa*. Hybrid introgression may be a more significant threat to populations of *H. gratiosa* than *H. cinerea* because hybrid tadpoles are more likely to survive in temporary pond habitats with *H. gratiosa* tadpoles.] Address: Gunzburger, Margaret, Florida State Univ, Tallahassee, FL, 32306, USA

**5108.** Hadrys, H.; Melber, A. (2004): Biodiversität und Artenschutz: Paradebeispiel Libellen. *Stiftung Tierärztliche Hochschule Hannover. Forschung fürs Leben 2004*: 32-34. (in German, with English summary). ["Biodiversity and conservation biology: dragonflies, the classic example. More than 1 million species of insects have been identified, making these animals the most successful on Earth. Insects comprise the greatest portion of biodiversity in the animal kingdom. One of the most important groups of insects used for developing conservation strategies and as a bioindicator for quality and stability of environments is the order Odonata (dragonflies and damselflies). Due to the odonates complex reproduction behaviour and very specific habitat preferences, progressive anthropogenic changes to the environment have severe consequences on many odonates. For example, numerous species exist only in small isolated populations. The genetic diversity, i.e. adaptability, of a species and the survival of single populations is much more rapidly detectable at the genotypic level than by phenotypical methods. Based on genetic information, it is also possible to quickly identify isolation processes that threaten a population. Molecular genetic methods are becoming increasingly important for animals conservation in that they provide essential information on the condition of populations, species and habitats. This is demonstrated by the following study on the biodiversity of African dragonflies." (Authors)] Address: <http://www.tiho-hannover.de/service/presse/forsch/biodiversitaetumwelt.pdf>

**5109.** Hammond, J.I.; Sih, A. (2004): Investigating the response in spatial distributions when predators and prey are free to interact. *Ecological Society of America Annual Meeting Abstracts 89 2004*: 202. (in English). [Verbatim: Hundreds of studies have focused on the habitat and patch usage of predators and prey, with results establishing the overall pattern that predators tend to aggregate in areas with more prey while prey tend to avoid areas with higher predation risk. Almost all of these studies have eliminated the behavior of one player (e.g. the predator) by fixing it in space and therefore constraining its ability to respond to shifts in space use by the other player (e.g. the prey). Therefore, what spatial associations emerge if predators and prey are allowed to freely interact with each other? Surprisingly, we know little theoretically or empirically about these interactions. Simple theory constructed in a world where patches only differ in the level of a prey's resource, predicts predators should aggregate in the high resource areas while prey should tend to favor those patches as well. Thus the distributions result in a positive association. Using pairs of *Aeshna* dragonfly nymphs as predators and groups of *Hyla regilla* tadpoles consisting of either middle, late, or mixed stage individuals as prey, the spatial distributions of the predator and prey were examined in isolation and together. Interesting patterns emerge with late stage tadpoles shifting their spatial distributions from high densities in the high resource area without predators to a more even distribution with predators. Middle stage tadpoles and predators tend to have similar spatial distributions when isolated and together. Furthermore when the predators and prey were together, a significant negative spatial correlation was present between late stage tadpoles and predators regardless of the prey group type, which is contrary to initial theoretical predictions.] Address: Hammond, J.I., Univ Calif Davis, Davis, CA, 95616, USA

- 5110.** Harrison, S.S.C.; Pretty, J.L.; Shepherd, D.; Hildrew, A.G.; Smith, C.; Hey, R.D. (2004): The effect of instream rehabilitation structures on macroinvertebrates in lowland rivers. *Journal of Applied Ecology* 41: 1140-1154. (in English). [The analysis of data includes "Calopterygidae"; for a full paper see: <http://www.le.ac.uk/biology/staff/cs152/JAE04.pdf>] Address: Harrison, S., Department of Zoology, Ecology and Plant Sciences, University College, Cork, Lee Maltings, Prospect Row, Cork, Ireland. E-mail: s.harrison@ucc.ie
- 5111.** Hayashi, F.; Arai, Y. (2004): Dispersal modes and population genetic structures of *Pantala flavescens*. In: Arai, Y. [Ed.]: [A countrywide survey of Red Dragonflies in 2003]. Musashino Satoyama Research Group & Institute of Agriculture and Natural Environments, Yorii-cho, Saitama: 47-58. (in Japanese, translated into English by Ishizawa, N.). ["[...] Thus, *P. flavescens* in the non-overwintering region was kept high in genetic diversity despite seasons and localities. This fact suggests that mass and frequent dispersal may occur by migrating for all directions and for a long distance immediately after emergence. It is unlikely for this species that it has fixed migration routes from overwintering regions to Japan and within Japan. Instead, they may come from all over the East Asia randomly. *P. flavescens* is also known to fly over the ocean in a great number [...]."] (Authors)] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozava City, Saitama Pref., Japan. E-mail: isizawa7@rivo.mediatti.net
- 5112.** Herberholz, J.; Sen, M.M.; Edwards, D.H. (2004): Escape behavior and escape circuit activation in juvenile crayfish during prey predator interactions. *J. Exp. Biol.* 207: 1855-1863. (in English). ["The neural systems that control escape behavior have been studied intensively in several animals, including mollusks, fish and crayfish. Surprisingly little is known, however, about the activation and the utilization of escape circuits during prey predator interactions. To complement the physiological and anatomical studies with a necessary behavioral equivalent, we investigated encounters between juvenile crayfish and large dragonfly nymphs in freely behaving animals using a combination of high-speed video-recordings and measurements of electric field potentials. During attacks, dragonfly nymphs rapidly extended their labium, equipped with short, sharp palps, to capture small crayfish. Crayfish responded to the tactile stimulus by activating neural escape circuits to generate tail-flips directed away from the predator. Tail-flips were the sole defense mechanism in response to an attack and every single strike was answered by tail-flip escape behavior. Crayfish used all three known types of escape tail-flips during the interactions with the dragonfly nymphs. Tail-flips generated by activity in the giant neurons were predominantly observed to trigger the initial escape responses to an attack, but non-giant mediated tail-flips were often generated to attempt escape after capture. Attacks to the front of the crayfish triggered tail-flips mediated either by the medial giant neuron or by non-giant circuitry, whereas attacks to the rear always elicited tail-flips mediated by the lateral giant neuron. Overall, tail flipping was found to be a successful behavior in preventing predation, and only a small percentage of crayfish were killed and consumed."] (Authors)] Address: Herberholz, J., Department of Biology, Georgia State University, Atlanta, GA 30303, USA. E-mail: biojhh@langate.gsu.edu
- 5113.** Higler, B. (2004): Yellow-legged dragonfly. In: Bloemmen, M.; Van der Sluis, T. (Eds.): *European corridors: strategies for corridor development for target species*. ISBN 90-767662-16-3: 21-22. (in English). [Species data sheet with information on *Stylurus flavipes*] Address: ECNC, P.O. Box 90154, NL-5037 AA Tilburg, The Netherlands
- 5114.** Hunger, H. (2004): Ungewöhnliche Larven- bzw. Exuvienfunde von *Calopteryx virgo* und *Onychogomphus f. forcipatus*. *mercuriale* 4: 32-33. (in German). [A larva of the reophilous *C. virgo* was collected in a bog water (24-VII-2004) in the Federseemoor, Baden-Württemberg, Germany. (The reophilous) *O. forcipatus* did successfully develop in a dried-up water separated from a gravel pit with permanent water near Hartheim, Baden-Württemberg; 27-VII-2004.] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), August-Ganther-Straße 16, D-79117 Freiburg, Germany
- 5115.** Huysentruyt, F.; Adriaens, D.; Teugels, G.G.; Devaere, S.; Herrel, A.; Verraes, W.; Aerts, P. (2004): Diet composition in relation to morphology in some African anguilliform clariid catfishes. *Belg. J. Zool.* 134(1): 25-30. (in English). [The fish diet includes Odonata.] Address: Huysentruyt, F., Univ. Gent, Vertebrate Morphology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: frank.huysentruyt@rug.ac.be
- 5116.** Ishizawa, N. (2004): Population dynamics and changes of maturity degree in *Sympetrum frequens* at the Okumusashi Hills. In: Arai, Y. [Ed.]: [A countrywide survey of Red Dragonflies in 2003]. Musashino Satoyama Research Group & Institute of Agriculture and Natural Environments, Yorii-cho, Saitama: 29-41. (in Japanese, translated into English by Ishizawa, N.). [This study presents very detailed results on the seasonal changes (July - October) of relative ovarian maturity degree, degree of pruinescens on ventral abdomen and smoking degree of wings in females.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozava City, Saitama Pref., Japan. E-mail: isizawa7@rivo.mediatti.net
- 5117.** Kabus, T.; Hendrich, L.; Müller, R.; Petzold, F.; Meisel, J. (2004): Nährstoffarme, basenarme Seen (FFH-Lebensraumtyp 3130, Subtyp 3131) in Brandenburg und ihre Besiedlung durch Makrophyten, ausgewählte Gruppen des Makrozoobenthos und Libellen. *Naturschutz und Landschaftspflege in Brandenburg* 13 (1): 4-15. (in German). [Characterisation of oligotrophic to mesotrophic standing waters by its faunal composition including Odonata] Address: Petzold, F., Pappelallee 73, D-10437 Berlin E-Mail: falkpetzold@web.de
- 5118.** Karube, H.; Futahashi, R.; Hayashi, F. (2004): A preliminary report on DNA analysis of the endemic dragonflies in the Ogasawara Islands. *Res. Rep. Kanagawa prefect. Mus. nat. Hist.* 12: 55-57. (in Japanese, with English title). [*Rhinocypha ogasawarensis*, *Indolestes boninensis*, *Boninagrion ezoin*, *Hemicordulia ogasawarensis*] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp
- 5119.** Karube, H.; Yakita, R. (2004): Record of *Traema basilaris burmeisteri* Kirby from Ishigaki-jima. *Tombo* 47: 11. (in Japanese, with English title). [Japan; 11.VI.1999] Address: Karube, H., Kanagawa Prefect.

Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**5120.** Karube, H. (2004): Vietnamese Odonata collected in 1992-2003 surveys I. Aeshnidae. Tombo 47: 1-11. (in English). [Twenty one aeshnid species are recorded from Vietnam, with description of *Planaeschna viridis* sp. nov. from Bach Ma National Park, C. Vietnam. Females of *Planaeschna tamdaoensis* and *Planaeschna bach-maensis* are first described.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**5121.** Kita, H.; Kobayashi, F. (2004): Mass occurrence of *Sympetrum* frequens from a stream. In: Arai, Y. [Ed.]: [A countrywide survey of Red Dragonflies in 2003]. Musashino Satoyama Research Group & Institute of Agriculture and Natural Environments, Yorii-cho, Saitama: 28. (in Japanese, translated into English by Ishizawa, N.). [Mooka City, Tochigi Prefecture, Japan; the occurrence of the species at an atypical habitat without reproduction suitability is briefly discussed.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozavva City, Saitama Pref., Japan. E-mail: isizawa7@rivo.me-diatti.net

**5122.** Kitt, M. (2004): Das Makrozoobenthon der Fließgewässer im Biosphärenreservat Pfälzerwald". In: Bund für Umwelt und Naturschutz Deutschland, Landesverband Rheinland-Pfalz e.V. (Ott, J.: Hrsg): Biodiversität im Biosphärenreservat Pfälzerwald - Status und Perspektiven. Mainz. ISBN 3-9804353-4-2: 91-107. (in German, with French and English summaries). ["The running waters of the Pfälzerwald mountains (South-western Germany, bordering on France) are, with respect to their geological and structural particularities, strongly shaped by this natural geographic region. In contrast to most other German mountain brooks, they are characterized by their naturalness and by their quality of water. Unfortunately, knowledge about their invertebrate communities is sparse. This paper gives an overview of the data and facts available to date. The results are discussed briefly." (Author) The checklist of the regional rheophilous odonate fauna is definitely very incomplete.] Address: BUND; Gärtnergasse 16, D-55116 Mainz, Germany

**5123.** Kudela, M.; Dolny, A.; Barta, D.; Blaskovic, T., Bulankova, E. (2004): First records of *Leucorrhinia caudalis* (Odonata, Libellulidae) in Slovakia. Biologia 59(2): 152. (in English). [Slovakia, Podunajská rovina Plain: 1. Cicov, Cicivské mrtve rameno (8272 = grid reference number of the Databank of Slovak fauna), 110 m a.s.l., 28.V.2003, 2 copulae and 1 male; 29.V.2003, 186 males, 6 copulae; 1 exuvium; 5.VI.2003, 18 males. 2. Medved'ov, Opatovské jazierko (8272), 110 m a.s.l., 5-VI-2003, 1 male] Address: Bulankova, Eva, Institute of Ecology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B-II, SK-84215 Bratislava., Slovakia. E-mail: Bulankova@nic.fns.uniba.sk

**5124.** Kunz, B.; Riexinger, W.-D. (2004): Der Kocher zwischen Untergroningen und Gaildorf: Rückkehr der Gomphiden. mercuriale 4: 25-26. (in German). [Checks of the River Kocher, Baden-Württemberg starting in 1989 demonstrate the recovery of the odonate fauna of this formerly heavily polluted river. Typical riverine Odonata are now represented by good numbers, and even *Ophiogomphus cecilia* could be recorded.] Ad-

dress: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de

**5125.** Kunz, B. (2004): Hat die Mahd der umliegenden Wiesen eine Auswirkung auf die Lokalpopulation von *Coenagrion ornatum*? mercuriale 4: 33-35. (in German). [Impacts and effects of mowing habitats of the very rare *C. ornatum* are discussed in considerable detail. Some emphasis is given to the diurnal habitat use of the imagines and possible impacts by mowing in phases of reduced mobility.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de

**5126.** Kunz, B.; Hunger, H. (2004): Phänologiedaten 2004 einiger Libellen aus Mitteleuropa. mercuriale 4: 38-40. (in German). [Notes are given to *Sympecma fusca* (emergence of the new generation while adults were still on the wing), *Coenagrion ornatum* (high abundance in 2004), *Ischnura elegans* (early emergence in Saarland), *Ischnura pumilio* (emergence in 16-V-2004), *Pyrrosoma nymphula* (very early emergence at 31-III-2004), *Boyeria irene* (two records near Friedrichshafen, Lake Constanze), *Gomphus pulchellus* (late emergence), *Gomphus vulgatissimus* (early emergence on 6-V-2005 river Elbe near Magdeburg, Sachsen-Anhalt, and river Jaagst near Hohenlohe, Baden-Württemberg), *Crocothemis erythraea*, *Libellula quadrimaculata*, *Sympetrum fonscolombii*] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de

**5127.** Lin, W.-L.; Yeh, C.-C. (2004): Large insect diet of the Brown Hawk Owl *Ninox scutulata* in the Central Taiwan. *tè you sen wù yen jo* (Research on applied biology) 6(2): 19-26. (in English). [The brown hawk owl prefers hunting near road lamps, since a substantial number of insects are attracted under light. Odonata total to 2,2% of the biomass consumed by this owl species.] Address: www.db.tesri.gov.tw/protect/UploadPic/0470110328/047011032819/047011032819pdf.pdf

**5128.** Lissak, W. (2004): Ein Fund von *Orthetrum albistylum* im nördlichen Albvorland. mercuriale 4: 24-25. (in German). [Heiningen, LK Göppingen, MTB 7323/2, Baden-Württemberg, Germany, 25-VII-2004] Address: Lissak, W., Schubartstr. 12, D-73092 Heiningen, Germany. E-mail: W.Lissak@naturschutzzentrum-schopfloch.de

**5129.** Lissak, W. (2004): Larve von *Cicindela sylvicola* erbeutet ein Männchen von *Orthetrum brunneum* (Coleoptera: Cicindelidae; Odonata: Libellulidae). *Libellula* 23(3/4): 89-92. (in German, with English summary). ["A male *O. brunneum* was seized on its wing-tips by a larva of the tiger beetle *C. sylvicola*. Due to its size, the dragonfly could not be dragged into the narrow larval burrow and escaped after it had been picked up by the observer. A list of published records of similar interactions between Odonata and tiger beetle larvae is given."] Address: Lissak, W., Schubartstr. 12, D-73092 Heiningen, Germany. e-mail: W.Lissak@naturschutzzentrum-schopfloch.de

**5130.** Lopez del Castillo, P.; Naranjo Lopez, C.; Fernandez Triana, J.L.; Gonzalez Lazo, D.; Trapero Quintana, A.; Perez Ozoria, J. (2004): Insectas acuaticas del Parque nacional "La Bayamesa", Cuba. *Boln Soc. ent. aragon.* 35: 225-231. (in Spanish, with English summary). [The aquatic insect fauna (n=64), including 6 odo-



nate taxa, was surveyed at 16 localities (alt. 750 and 1752 m) in June 2003 and Feb. 2004.] Address: Lopez del Castillo, P., Empresa Nacional para La Conservación de la Flora y la Fauna, Parque Nacional Turquino, Granma, Cuba

**5131.** Lorenz, A., Feld, C.K.; Hering, D. (2004): Typology of streams in Germany based on benthic invertebrates: Ecoregions, zonation, geology and substrate. *Limnologica* 34(4): 379-389. (in English). ["Based on 390 benthic invertebrate samples from near-natural streams in Germany we defined eight stream type groups by Non-metric multidimensional scaling (NMS). The taxa lists were restricted to Mollusca, Ephemeroptera, Odonata, Plecoptera, Coleoptera and Trichoptera species and evaluated on presence/absence level. At genus level, streams located in the lowlands differ from streams in lower mountainous areas and the Alps, while the two latter groups were undistinguishable. At species level, a clear separation of different stream size classes is visible in the lowlands; a second gradient is related to the bottom substrate. Streams in the Alps can be distinguished from streams in lower mountainous areas at species level. Within the lower mountainous regions a size gradient is detectable, a less obvious gradient indicates catchment geology. The resulting bottom-up stream typology is compared to other stream typological systems in Germany." (Authors)] Address: Lorenz, A., University of Duisburg-Essen, Institute of Ecology, Dept of Hydrobiology, Universitätsstr. 5, D-45117 Essen, Germany

**5132.** Mao Sun; Shi Long Lan (2004): A computational study of the aerodynamic forces and power requirements of dragonfly (*Aeshna juncea*) hovering. *J. Exp. Biol.* 207: 1887-1901. (in English). ["Aerodynamic force generation and mechanical power requirements of a dragonfly (*Aeshna juncea*) in hovering flight are studied. The method of numerically solving the Navier Stokes equations in moving overset grids is used. When the midstroke angles of attack in the downstroke and the upstroke are set to 52° and 8°, respectively (these values are close to those observed), the mean vertical force equals the insect weight, and the mean thrust is approximately zero. There are two large vertical force peaks in one flapping cycle. One is in the first half of the cycle, which is mainly due to the hindwings in their downstroke; the other is in the second half of the cycle, which is mainly due to the forewings in their downstroke. Hovering with a large stroke plane angle (52°), the dragonfly uses drag as a major source for its weight-supporting force (approximately 65% of the total vertical force is contributed by the drag and 35% by the lift of the wings). The vertical force coefficient of a wing is twice as large as the quasi-steady value. The interaction between the fore- and hindwings is not very strong and is detrimental to the vertical force generation. Compared with the case of a single wing in the same motion, the interaction effect reduces the vertical forces on the fore- and hindwings by 14% and 16%, respectively, of that of the corresponding single wing. The large vertical force is due to the unsteady flow effects. The mechanism of the unsteady force is that in each downstroke of the hindwing or the forewing, a new vortex ring containing downward momentum is generated, giving an upward force. The body-mass-specific power is 37 W kg<sup>-1</sup>, which is mainly contributed by the aerodynamic power." (Authors)] Address: Mao Sun, Institute of Fluid Mechanics, Beijing University of Aeronautics &

Aeronautics, Beijing 100083, People's Republic of China. E-mail: sunmao@public.fhnet.cn.net)

**5133.** Matsuzaki, Y. (2004): Aka-tombo from the western region of Saiama Prefecture. In: Arai, Y. [Ed.]: [A countrywide survey of Red Dragonflies in 2003]. *Musashino Satoyama Research Group & Institute of Agriculture and Natural Environments, Yorii-cho, Saitama: 19-22.* (in Japanese, translated into English by Ishizawa, N.). [Populations trends in the 1990th and early 21. century of 13 taxa of the genus *Sympetrum* from western region of Saiama Prefecture, Japan are reported and discussed.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozava City, Saitama Pref., Japan. E-mail: isizawa7@rivo.mediatte.net

**5134.** Mauersberger, R. (2004): Bibliographie der Odonatologen in der DDR: die Jahre 1984 bis 1990 und Beiträge zur Libellenfauna anderer Länder (Odonata). *Libellula* 23(3/4): 137-151. (in German, with English summary). ["In the years 1984 to 1990, 154 papers on Odonata were published by odonatologists of the former German Democratic Republic (GDR). The maximum number of publications per year rised to 33 in 1989. Additionally, between 1956 and 1990 25 articles on the odonate fauna of other countries were published by those workers." (Author)] Address: Mauersberger, R., Bahnhofstraße 24, D-1 7268 Templin, Germany. E-mail: FoerdervereinUckermaerk.Seen@t-online.de

**5135.** Maybury, W.J.; Lehmann, F.-O. (2004): The fluid dynamics of flight control by kinematic phase lag variation between two robotic insect wings. *J. Exp. Biol.* 207: 4707-4726. (in English). ["Insects flying with two pairs of wings must contend with the forewing wake passing over the beating hindwing. Some four-winged insects, such as dragonflies, move each wing independently and therefore may alter the relative timing between the fore- and hindwing stroke cycles. The significance of modifying the phase relationship between fore- and hindwing stroke kinematics on total lift production is difficult to assess in the flying animal because the effect of wing-wake interference critically depends on the complex wake pattern produced by the two beating wings. Here we investigate the effect of changing the fore- and hindwing stroke-phase relationship during hovering flight conditions on the aerodynamic performance of each flapping wing by using a dynamically scaled electromechanical insect model. By varying the relative phase difference between fore- and hindwing stroke cycles we found that the performance of the forewing remains approximately constant, while hindwing lift production may vary by a factor of two. Hindwing lift modulation appears to be due to two different fluid dynamic phenomenons: leading edge vortex destruction and changes in strength and orientation of the local flow vector. Unexpectedly, the hindwing regains aerodynamic performance near to that of the wing free from forewing wake interference, when the motion of the hindwing leads the forewing by around a quarter of the stroke cycle. This kinematic relationship between hind- and forewing closely matches the phase-shift commonly used by locusts and some dragonflies in climbing and forward flight. The experiments support previous assumptions that active neuromuscular control of fore- and hindwing stroke phase might enable dragonflies and other functionally four-winged insects to manipulate ipsilateral flight force production without further changes in wing beat kinematics." (Authors)] Address: Lehmann,

F.-O., Department of Neurobiology, University of Ulm, Albert-Einstein-Allee 11, 89081 Ulm, Germany. E-mail: fritz.lehmann@biologie.uni-ulm.de

**5136.** Mayer, G. (2004): Die Kleine Zangenlibelle *Onychogomphus forcipatus* (L. 1758) am unteren Lech. *Berichte naturwissenschaftlichen Vereins für Schwaben* 108: 94-98. (in German). [Current records of *O. forcipatus* are documented from along the river Lech south of Augsburg, Bavaria, Germany.] Address: Mayer, G., Am Harfenacker 10, D.86136 Friedberg, Germany

**5137.** McCauley, S. (2004): The role of dispersal and habitat selection in odonate species distributions. *Ecological Society of America Annual Meeting Abstracts* 89 2004: 331. (in English). [Verbatim: Species' distributions are affected by both local conditions and regional processes, including dispersal. A transition in the top predator community from fish to invertebrate predators is a critical gradient in aquatic communities. While the local factors affecting species distributions across this gradient are well studied, there has been less work on how dispersal and habitat selection affect the development of local communities along this gradient. This study relates dispersal and habitat selection (measured by colonization rates) to species' distributional breadths across a top predator gradient. To measure dispersal and colonization, 29 artificial ponds were established in 2002 and monitored through 2003. These artificial ponds (cattle watering tanks) were placed at varying distances of up to two kilometers from three lakes with alternative top predators (sunfish, minnow, and invertebrate predators) in a landscape context where species distributions in the surrounding natural ponds had been monitored for several years. Dispersal was quantified by adult censuses. In two years of sampling, 23 species of adult dragonfly were observed at tanks. Colonization was measured by collecting and identifying larvae from the tanks in three surveys each year. Fourteen species of dragonfly larvae colonized tanks. Distance from natural lakes did not affect species richness of either dispersers or colonists at tanks. There were, however, high levels of species turn-over between tanks near lakes and far from lakes and turn-over increased with distance. Results also found dispersal rates and distances were positively related to species' habitat breadth. Habitat generalists also colonized tanks at significantly greater rates than habitat specialists. These results suggest that differential dispersal and habitat selection between habitat specialists and generalists is an important mechanism in determining species distributions.] Address: McCauley, Shannon, Univ Michigan, Ann Arbor, MI, 48109, USA.

**5138.** Mikolajewski, D.J.; Leipelt, K.G.; Conrad, A.; Giere, S.; Weyer, J. (2004): Schneller als gedacht: einjährige Larvalentwicklung und 'slow life style' bei *Leucorrhinia caudalis* (Odonata: Libellulidae). *Libellula* 23(3/4): 161-171. (in German, with English summary). ["Few is known about the biology of larval *L. caudalis*. In this study, we present data on the larval development, activity, and habitat selection. We sampled larvae in a lake in Brandenburg, Germany, between spring 2002 and autumn 2004 and recorded their size distribution. Additionally, we measured the activity of 70 larvae in the laboratory in presence and absence of perch, but no significant differences were found. In contrast to former studies, larval *L. caudalis* showed an univoltine life cycle, although possessing a low activity. We dis-

cuss our data in relation to the 'slow-fast life style'-concept." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**5139.** Mikihiro, O. (2004): Population dynamics in *Pantala flavescens* on the Daito Islands and Tokunoshima Island. In: Arai, Y. [Ed.]: [A countrywide survey of Red Dragonflies in 2003]. Musashino Satoyama Research Group & Institute of Agriculture and Natural Environments, Yorii-cho, Saitama: 59-62. (in Japanese, translated into English by Ishizawa, N.). [Seasonal changes of abundance, reproduction and effects of typhoons are described in detail.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozavva City, Saitama Pref., Japan. E-mail: isizawa7@rivo.mediatti.net

**5140.** Müller, J.; Steglich, R. (2004): Rote Liste der Libellen (Odonata) des Landes Sachsen-Anhalt. 2. Fassung, Stand: Februar 2004. *Berichte des Landesamtes für Umweltschutz Sachsen-Anhalt* 39: 212-216. (in German). [Sachsen-Anhalt, Germany; update of the Red list of endangered Odonata.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**5141.** Müller, R.; Kabus, T.; Hendrich, L.; Petzold, F.; Meisel, J. (2004): Nährstoffarme kalkhaltige Seen (FFH-Lebensraumtyp 3140) in Brandenburg und ihre Besiedlung durch Makrophyten und ausgewählte Gruppen des Makrozoobenthos. *Naturschutz und Landschaftspflege in Brandenburg* 13(4): 132-143. (in German). [Characterisation of hard oligo-mesotrophic waters (calcareous lakes) by its faunal composition including Odonata.] Address: Petzold, F., Pappelalle 73, D-10437 Berlin E-Mail: falkpetzold@web.de

**5142.** Osterwalder, R. (2004): Gomphiden-Nachweise an Fließgewässern im Kanton Aargau (Schweiz) und angrenzenden Gebieten 1993-2001. *mercuriale* 4: 6-16. (in German). [The paper summarises in detail one of last runing monitoring programmes directed to European odonate species. Records of exuviae are detailed for *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Gomphus vulgatissimus*, and *G. simillimus*, and for six river stretches in Switzerland. Additional notes are made on the impact of the wash of moving boats or ships on individuals emerging near the waterline, sex-ratio, differences in species spectrum of the rivers surveyed, the longitudinal differences of records of imagines and exuviae, and recording & sampling methods. The records of the exuviae of the four species and in addition of *G. pulchellus* are mapped.] Address: Osterwalder, R., Obere Haitweiden 6, CH-5642 Mühlau, Switzerland. E-mail: r.osterwalder@mysunrise.ch

**5143.** Ott, J. (2004): Probleme im Biosphärenreservat Pfälzerwald aus Sicht der Entomologie. In: Bund für Umwelt und Naturschutz Deutschland, Landesverband Rheinland-Pfalz e.V. (Ott, J.: Hrsg): *Biodiversität im Biosphärenreservat Pfälzerwald - Status und Perspektiven*. Mainz. ISBN 3-9804353-4-2: 108-123. (in German, with French and English summaries). [The present knowledge of the distribution and endangerment of several insect groups (among them: Odonata) in the biosphere reserve (BSR) Pfälzerwald, Rheinland-Pfalz, Germany is analysed, and their importance for all planning projects is pointed out. "A special entomological mapping of the BSR, covering all major and important groups, is lacking. There is no synopsis and evaluation

of existing data of museums, collections of universities and private persons, publications and the grey literature available. But such a general perspective is the basis and precondition of any serious assessment of the endangerment of the species and of any landscape planning, environmental impact assessment or monitoring programme (e.g. according to the EC habitats directive). Some causes of endangerment - especially focusing on insects - are listed and their consequences are pointed out. From the point of view of entomological nature conservation a more intensive data collection, their documentation in a central institution, the coordination of the activities with the French part of the BSR, more species protection programmes for highly endangered species and the integration of insects in environmental education is proposed and asked for." (Author)] Address: BUND; Gärtnergasse 16, D-55116 Mainz, Germany

**5144.** Pardey, A.; Rauers, H.; Weyer, K. van de; Thomas, B. (2004): Gräben in Nordrhein-Westfalen. Empfehlungen zur Unterhaltung aus naturschutzfachlicher Sicht. Mitt. LÖBF 4/04: 40-46. (in German). [The importance of ditches as habitat is outlined with special reference to ditch management measures. Prominent members of the ditch fauna in Nordrhein-Westfalen, Germany are *Coenagrion mercuriale* and *C. ornatum*. For details see: <http://www.loebf.nrw.de/Willkommen/Aktuelles/Publikationen/LOEBFMitteilungen/Mitteilung-042004/AusdemInhalt/0404pardeyrauersweyers4046.pdf>] Address: Pardey, A., LÖBF NRW, Biotopschutz und Biotopverbund, Castroper Str. 30, D-45665 Recklinghausen, Germany. E-mail: andreas.pardey@loebf.nrw.de

**5145.** Petzold, F.; Martin, P. (2004): *Limnochares aquatica* als Parasit von *Leucorrhinia albifrons* (Hydrachnida: Limnocharidae; Odonata: Libellulidae). *Libellula* 23(3/4): 93-97. (in German, with English summary). ["Males of *L. albifrons* were found parasitised by larvae of the water mites *Arrenurus* sp. as well as *Limnochares aquatica* in June 2003 in a fen water in northern Brandenburg, Germany. This is the first record of an anisopteran dragonfly as host of the water mite genus *Limnochares* in Central Europe." (Authors)] Address: Petzold, F., Pappelallee 73, D-10437 Berlin, Germany, E-mail: falkpetzold@web.de

**5146.** Piganeau, G.I.; Gardner, M.; Eyre-Walker, A. (2004): A broad survey of recombination in animal mitochondria. *Mol. Biol. Evol.* 21(12): 2319-2325. (in English). ["Recombination in mitochondrial DNA (mtDNA) remains a controversial topic. Here we present a survey of 279 animal mtDNA data sets, of which 12 were from asexual species. Using four separate tests, we show that there is widespread evidence of recombination; for one test as many as 14.2% of the data sets reject a model of clonal inheritance and in several data sets, including primates, the recombinants can be identified visually. We show that none of the tests give significant results for obligate clonal species (apomictic parthogens) and that the sexual species show significantly greater evidence of recombination than asexual species. For some data sets, such as *Macaca nemestrina*, additional data sets suggest that the recombinants are not artifacts. For others, it cannot be determined whether the recombinants are real or produced by laboratory error. Either way, the results have important implications for how mtDNA is sequenced and used." (Authors)] The study includes *Libellula quadrimaculata*.] Address:

Piganeau, G.I., Centre for the Study of Evolution, School of Life Sciences, University of Sussex, Brighton, UK. E-mail: gwenael.piganeau@obs-banyuls.fr.

**5147.** Reichen-Robert, E.; Robert, A. (2004): Die Libellen und der Maler Paul-André Robert. Fondation Collection Robert, Bienne. ISBN 3-9522989-0-5: 18 pp. (in German). [This is the guide through the exhibit (5 Dec. 2004 - 10 Apr. 2005) of dragonfly illustrations of the famous Swiss artist, P.-A. Robert (1901-1977) in German language; a French edition is also available. The paper contains a brief biographic outline, annotations on his odonatological work, and some reproductions of illustrations of Odonata including colour pictures of the larvae of *Calopteryx haemorrhoidalis* and *Eitheca bimaculata*.] Address: Stiftung Sammlung Robert, 26 promenade de la Suze, CH-2501 Biel-Bienne

**5148.** Rodenkirchen, J. (2004): Die Libellen des Neffelbaches bei Zülpich. *Decheniana* 157: 119-125. (in German, with English summary). [Along the Neffelbach (Zülpich, North Rhine-Westphalia, Germany) seven wetlands have been created; each with different numbers of pools. They were established in the last 30 years and extend along a distance of six kilometers. The centre of the area is the Füssenicher See. In this area 39 species of Odonata have been observed, among them *Leucorrhinia pectoralis*. *Crocothemis erythraea* has been observed over a period of eleven years and has to be regarded as a native species in North Rhine-Westphalia.] Address: Rodenkirchen, J., Rövenicher Str. 3, D-50374 Erstadt-Scheuren, Germany

**5149.** Rust, C. (2004): Petite Camargue alsacienne, Libellenparadies in der südlichen Oberrheinebene. *mercuriale* 4: 2-5. (in German). [The current knowledge on the odonate fauna of this famous nature reserve in Alsace, France is compiled in a table. *Coenagrion mercuriale* is a new addition to the fauna, and of special concern with reference of the European network Natura 2000.] Address: Rust, C., 4, rue de l'ancre, F-688330 Huninge, France. E-mail: chrigirust@yahoo.de

**5150.** Safi, K.; Kerth, G. (2004): A comparative analysis of specialization and extinction risk in temperate-zone bats. *Conservation Biology* 18(5): 1293-1303. (in English). [The percent volume of Odonata in the prey of bats is compiled in appendix 1. Available at: [www.zool.unizh.ch/Research/AnimalBehaviour/Koenig/Researchgroups/BatResearch/Vespertilio/j.1523-1739.2004.00-155.x.pdf](http://www.zool.unizh.ch/Research/AnimalBehaviour/Koenig/Researchgroups/BatResearch/Vespertilio/j.1523-1739.2004.00-155.x.pdf)] Address: Kerth, G., Universität Zürich, Verhaltensbiologie, Zoologisches Institut, Winterthurerstr. 190, CH-8057 Zürich, Switzerland

**5151.** Samwald, O. (2004): Die Libellenfauna eines rückgebauten Bachlaufes bei Rudersdorf im südlichen Burgenland, Österreich (Odonata). *Joannea - Zoologie* 6: 247-256. (in German, with English summary). ["The dragonfly community of the rivulet Lahn was investigated along a 750 m transect in the year 1993. The Lahnbach was formerly a straight canal and at the beginning of the 1990s this canal was more naturally formed. Between 13th May and 28th September a total of 24 Odonata species were found. The high number of species could be explained by the co-existence of running and standing water. Therefore Odonata species preferring both rivers (*Calopteryx virgo*, *C. splendens*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*) and ponds (*Erythromma najas*, *Anax imperator*, *Orthetrum cancellatum*) could be detected. *Platycnemis pennipes*



was found to be the most abundant species. Also many species (*Erythromma viridulum*, *Orthetrum albistylum*, *O. brunneum*, *Crocothemis erythraea*) with a more southerly distribution could be observed in comparatively high numbers." (Author)] Address: Samwald, O., Übersbachgasse 51c/6, A-8280 Fürstenfeld, Austria. E-mail: [ottosamwald@aon.at](mailto:ottosamwald@aon.at)

**5152.** Samways, M. (2004): Southern African Invertebrate. Species 41: 21-22. (in English). [Verbatim: [...] What has been really surprising, and encouraging, is that some species of damselfly (Odonata) that were thought to be extinct have reappeared. They must have had remnant populations in remote localities, which have been source populations to colonize areas cleared of invasive aliens. Three species of damselfly, the harlequin sprite, the cape bluet and the ceres stream damsel, have reappeared, having not been seen for decades despite intensive searches. This bodes extremely positively for the invasive alien clearing programme. [...] (Pseudagrion newtoni, Enallagma polychromaticum, Metacnemis angusta)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: [samways@sun.ac.za](mailto:samways@sun.ac.za)

**5153.** Schiel, F.-J.; Hessner, W.; Ebel, C. (2004): Neufunde von *Somatochlora alpestris* im Nordschwarzwald. *mercuriale* 4: 22-24. (in German). [New records of the species from the "Gründenschwarzwald", Baden-Württemberg, Germany from July 2004 are documented.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: [Franz-Josef.Schiel@INULA.de](mailto:Franz-Josef.Schiel@INULA.de)

**5154.** Schiel, F.-J. (2004): Spätfund kleiner *Gomphus pulchellus*-Exuvien. *mercuriale* 4: 35. (in German). [Possible explanations for a very late emergence of *G. pulchellus* at the Mindelsee, Baden-Württemberg are discussed considering aspects of a prolonged larval development due to intraspecific competition, or a far to year emergence in 2004 "scheduled" in 2005.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: [Franz-Josef.Schiel@INULA.de](mailto:Franz-Josef.Schiel@INULA.de)

**5155.** Schindler, S.; Kiliyas, A. (2004): Rückzug der Grünen - Beobachtungen und Schutz der Grünen Moaikjungfer. Hausarbeit am Gymnasium Templin: 44 pp. (in German). [Brandenburg, Germany; between 1999 and 2004, 26 odonate species have been recorded in a water body dominated by *Stratiotes aloides*. Generell aspects of morphology and biology of Odonata are compiled, and observations on *Leucorrhinia pectoralis* and *Aeshna viridis* are reported with some detail. This is a very interesting paper of two school leaving examen-students, and a hopefully start in an odonatological career. Available at: [www.ipn.uni-kiel.de/projekte/buw/Libges.pdf](http://www.ipn.uni-kiel.de/projekte/buw/Libges.pdf)] Address: not stated

**5156.** Schmidt, E. (2004): Klimaerwärmung und Libellenfauna in Nordrhein-Westfalen - divergente Fallbeispiele. *Entomologie heute* 16: 71-82. (in German, with English summary). [Several examples are outlined to distinguish between range extensions induced by global warming and improved availability of habitats by anthropogenic activities.] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**5157.** Speight, M.C.D. (2004): Insect records from the Connemara (Co. Galway) and Mayo (Co. Mayo) National Parks, western Ireland. *Bull. Ir. biogeog. Soc.* 28: 31-60. (in English). [Malaise trap; *Pyrrhosoma nymphula*, *Lestes sponsa*] Address: Speight, M.C.D., Natn. Parks & Wldl., 7 Ely Place, Dublin-2, Ireland

**5158.** Starr, F.; Starr, K.; Loope, L.L. (2004): New arthropod records from Kaho'olawe. Bishop museum occasional papers 79: 50-54. (in English). [Verbatim: Odonata: Aeshnidae: *Anax junius* (Drury) New island record. Previously known from all the main islands except Ni ihau and Kaho olawe (Nishida, 2002). Material examined: KAHO OLAWA: 1, Keanakeiki Beach, resting on kiawe (*Prosopis pallida*) foliage behind sand dune, 10 ft [3 m], 07 Oct 2003, Starr, Starr, King, Tokishi, & Busby 031007-2. Odonata: Libellulidae *Pantala flavescens* (Fabricius) New island record. Previously known from Kure, Midway, French Frigate Shoals, and all the main islands except Kaho olawe (Nishida, 2002). Material examined: KAHO OLAWA: 1, Kaukukapapa Beach, flying near wetland at north end of beach, 10 ft [3 m], 07 Oct 2003, Starr, Starr, King, Tokishi, & Busby 031007-1.] Address: Atarr, F., United States Geological Survey Biological Resources Division, P.O. Box 369, Makawao, Hawai'i 96768, USA

**5159.** Sternberg, K. (2004): Mit Küchensieb und Frisbee-Scheibe auf der Suche nach verborgenen Smaragden. *mercuriale* 4: 17-21. (in German). [The paper summarizes 30 years of experience in searching and finding(!) the rare *Somatochlora arctica* in Germany. Beside some more or less amusing stories (damaging of the car by tourists, criminalising of odonatological work, etc.), a lot of hints on efficient sampling of the larvae of *S. arctica* are given. In addition, morphological features to identify the larvae of *S. arctica* and *S. alpestris* in the field are presented in a table. This is a publication very worth reading.] Address: Sternberg, K., Schillerstr. 15, D-76297 Stutensee, Germany. E-mail: [k.sternberg@t-online.de](mailto:k.sternberg@t-online.de)

**5160.** Suttle, K.B.; Power, M.E.; Levine, J.M.; McNeely, C. (2004): How fine sediment in riverbeds impairs growth and survival of juvenile salmonids. *Ecological Applications* 14(4): 969-974. (in English). ["Although excessive loading of fine sediments into rivers is well known to degrade salmonid spawning habitat, its effects on rearing juveniles have been unclear. We experimentally manipulated fine bed sediment in a northern California river and examined responses of juvenile salmonids and the food webs supporting them. Increasing concentrations of deposited fine sediment decreased growth and survival of juvenile steelhead trout. These declines were associated with a shift in invertebrates toward burrowing taxa unavailable as prey and with increased steelhead activity and injury at higher levels of fine sediment. The linear relationship between deposited fine sediment and juvenile steelhead growth suggests that there is no threshold below which exacerbation of fine-sediment delivery and storage in gravel bedded rivers will be harmless, but also that any reduction could produce immediate benefits for salmonid restoration." (Authors) Odonata are treated on the family level.] Address: Suttle, K.B., Dept Integrative Biol., University of California, Berkeley, California 94720-3140 USA. E-mail: [kbsuttle@socrates.berkeley.edu](mailto:kbsuttle@socrates.berkeley.edu)

**5161.** Switzer, P.V. (2004): Fighting behavior and prior residency advantage in the territorial dragonfly, *Perithemis tenera*. *Ethol. Ecol. Evol.* 16: 71-89. (in English). ["Many factors, including residency status, body size, age, and energetic reserves, have been implicated as possibly determining the winner in animal contests. In this study I investigated which of these factors were correlated with the outcomes of naturally-occurring territorial contests between male amberwing dragonflies (*P. tenera*). Amberwing contests consist of non-contact interactions and are characterized by a series of distinct stages that represent different levels of escalation. Prior residents did tend to win, but interestingly this residency advantage only occurred in interactions that were not escalated. For both non-escalated and escalated interactions, body size (wing length) did not influence the outcome. Age was correlated with outcome for escalated interactions, with the younger of the pair tending to win. Winning males had also spent less time in male-male interactions both the day of the interaction and during their entire life, suggesting that energy reserves may also affect the outcome of contests. In contrast to escalated interactions, age and time spent in male-male interactions was not related to the outcome of non-escalated interactions. The difference between the two opponents' sizes, ages, and time spent in previous male-male interactions did not correlate with duration or escalation level of contests. These results suggest that non-escalated interactions may occur when intruders are simply assessing the quality of the site. Contests that do not escalate, and thus the prior residency advantage, are probably a result of the intruder not challenging for ownership because the value of the territory is too low." (Author)] Address: Switzer, P.V., Eastern Illinois Univ., Dept Biol, Sci., Charleston IL 61920; USA. E-mail: cfpvs@eiu.edu

**5162.** Tam, T.W.; Wilson, K.D.P.; Wong, J.K.; Kwan, B.S.P. (2004): A dragonfly species new to science found in Hong Kong. *Hong Kong Biodiversity* 7: 13. (in English, with Chinese summary). [*Fukienogomphus* sp., for details see: [www.hkbiodiversity.net/newsletters/HKBOnewsletter7.pdf](http://www.hkbiodiversity.net/newsletters/HKBOnewsletter7.pdf)] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: wilsonkd@ntlworld.com

**5163.** Terzani, F.; Marconi, A. (2004): Description of *Pseudagrion mascagnii* n. sp. from Sierra Leone (Insecta Odonata Coenagrionidae). *Quaderno di studi e notizie di storia naturale della Romagna* 19: 141-146. [The new species is described, illustrated, and its affinities are discussed. Holotype male, allotype female (probably in copula?): Sierra Leone, Western Area, Regent, no date; deposited in MZF, Firenze.] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**5164.** Thomas, A.L.R.; Taylor, G.K.; Srygley, R.B.; Nudds, R.L.; Bomphrey, R.J. (2004): Dragonfly flight: free-flight and tethered flow visualizations reveal a diverse array of unsteady lift-generating mechanisms, controlled primarily via angle of attack. *J. Exp. Biol.* 207: 4299-4323. (in English). ["Here we show, by qualitative free- and tethered-flight flow visualization, that dragonflies fly by using unsteady aerodynamic mechanisms to generate high-lift, leading-edge vortices. In normal free flight, dragonflies use counterstroking kinematics, with a leading-edge vortex (LEV) on the fo-

rewing downstroke, attached flow on the forewing upstroke, and attached flow on the hindwing throughout. Accelerating dragonflies switch to in-phase wingbeats with highly separated downstroke flows, with a single LEV attached across both the fore- and hindwings. We use smoke visualizations to distinguish between the three simplest local analytical solutions of the Navier Stokes equations yielding flow separation resulting in a LEV. The LEV is an open U-shaped separation, continuous across the thorax, running parallel to the wing leading edge and inflecting at the tips to form wingtip vortices. Air spirals in to a free-slip critical point over the centreline as the LEV grows. Spanwise flow is not a dominant feature of the flow field spanwise flows sometimes run from wingtip to centreline, or vice versa depending on the degree of sideslip. LEV formation always coincides with rapid increases in angle of attack, and the smoke visualizations clearly show the formation of LEVs whenever a rapid increase in angle of attack occurs. There is no discrete starting vortex. Instead, a shear layer forms behind the trailing edge whenever the wing is at a non-zero angle of attack, and rolls up, under Kelvin Helmholtz instability, into a series of transverse vortices with circulation of opposite sign to the circulation around the wing and LEV. The flow fields produced by dragonflies differ qualitatively from those published for mechanical models of dragonflies, fruitflies and hawkmoths, which preclude natural wing interactions. However, controlled parametric experiments show that, provided the Strouhal number is appropriate and the natural interaction between left and right wings can occur, even a simple plunging plate can reproduce the detailed features of the flow seen in dragonflies. In our models, and in dragonflies, it appears that stability of the LEV is achieved by a general mechanism whereby flapping kinematics are configured so that a LEV would be expected to form naturally over the wing and remain attached for the duration of the stroke. However, the actual formation and shedding of the LEV is controlled by wing angle of attack, which dragonflies can vary through both extremes, from zero up to a range that leads to immediate flow separation at any time during a wing stroke." (Authors) Additional information: <http://users.ox.ac.uk/~zool0206/dragon.html>] Address: Thomas, A., Dept Zoology, Oxford Univ., South Parks Rd, Oxford, OX1 3PS, UK. E-mail: Adrian.thomas@zoo.ox.ac.uk

**5165.** Tończyk, G.; Pakulnicka, J. (2004): Aquatic insects (Odonata, Heteroptera, Coleoptera) of Łódź: preliminary results. In: P. Indykiewicz & T. Barczak, [Eds], *Fauna miast Europy Środkowej 21. wieku*, Logo, Bydgoszcz: 95-101. (in Polish, with English summary). [Poland; A commented checklist is presented of 41 odonate species. Of particular interest are *Aeshna affinis*, *Somatochlora arctica* and *Orthetrum brunneum*.] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii, Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland

**5166.** Voigt, J.; Wolf, J.; Zinke, J. (2004): *Somatochlora arctica* in der Dresdner Heide, Sachsen (Odonata: Corduliidae). *Libellula* 23(3/4): 131-136. (in German, with English summary). ["Records of *S. arctica* are provided from the hilly region of Saxony. Apart from a short characterization of the recording sites, an indication of possible additional habitats in surrounding areas is given." (Authors)] Address: Voigt, H., Grundstraße 152,

D-01324 Dresden, Germany. E-mail: voigt@nature-concept.de

**5167.** Vonesh, J.R. (2004): Sequential predator effects across three life-stages of the African treefrog, *Hyperolius spinigularis*. Ecological Society of America Annual Meeting Abstracts 89 2004: 525-526. (in English). [Verbatim: Due to their complex life cycles, amphibians may interact with different predators during different life-stages. These predators may occur in different habitats and thus may not interact directly. However, sequential predators in complex life histories may influence each other indirectly, through effects on prey size, density, and behavior. Here I examine the effects sequential predators on three stages (egg, larval, and post-metamorph) of the African treefrog *Hyperolius spinigularis*. This study was conducted at the Amani Nature Reserve, in the East Usambara Mountains of Tanzania. I monitored the density and survival of arboreal *H. spinigularis* clutches in the field to estimate how much egg-stage predation by another treefrog reduced the input of tadpoles into the pond. I then conducted experiments to determine; (1) how such reductions in initial larval density influence larval survival and size and age at metamorphosis in the presence and absence larval predators, dragonfly larvae, and (2) how plasticity in size/age at metamorphosis affects encounters with post-metamorphic predators, fishing spiders. Reductions in larval density by both egg- and larval-stage predators increased size at metamorphosis. Larger size had immediate benefits, as larger metamorphs had higher survival in encounters with fishing spiders. Thus, density-mediated effects of early predators gave rise to trait-mediated risk reduction in encounters with later life-stage predators.] Address: Vonesh, J.R., Dept Zool, Univ Florida, Gainesville, FL, 32611, USA

**5168.** Wang, Z.J. (2004): The role of drag in insect hovering. *J. Exp. Biol.* 207: 4147-4155. (in English). ["Studies of insect flight have focused on aerodynamic lift, both in quasi-steady and unsteady regimes. This is partly influenced by the choice of hovering motions along a horizontal stroke plane, where aerodynamic drag makes no contribution to the vertical force. In contrast, some of the best hoverers dragonflies and hoverflies employ inclined stroke planes, where the drag in the down- and upstrokes does not cancel each other. Here, computation of an idealized dragonfly wing motion shows that a dragonfly uses drag to support about three quarters of its weight. This can explain an anomalous factor of four in previous estimates of dragonfly lift coefficients, where drag was assumed to be small. To investigate force generation and energy cost of hovering flight using different combination of lift and drag, I study a family of wing motion parameterized by the inclined angle of the stroke plane. The lift-to-drag ratio is no longer a measure of efficiency, except in the case of horizontal stroke plane. In addition, because the flow is highly stalled, lift and drag are of comparable magnitude, and the aerodynamic efficiency is roughly the same up to an inclined angle about 60°, which curiously agrees with the angle observed in dragonfly flight. Finally, the lessons from this special family of wing motion suggests a strategy for improving efficiency of normal hovering, and a unifying view of different wing motions employed by insects." (Author)] Address: Wang, Z. Jane, Theoretical & Applied Mechanics, Cornell University, Ithaca, NY 14853, USA. E-mail: jane.wang@cornell.edu

**5169.** Westermann, K. (2004): Kleinräumige Unterschiede des durchschnittlichen Emergenzzeitpunktes bei *Lestes viridis* an einem Altrhein. *mercuriale* 4: 27-29. (in German). [Different insolation duration is discussed to be responsible for the phenological difference in small-scale emergence patterns of *Chalcolestes viridis* along an app. 50 m stretch of a river bank.] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**5170.** Wildermuth, H. (2004): *Nehalennia speciosa* in der Schweiz: ein Nachruf (Odonata: Coenagrionidae). *Libellula* 23(3/4): 99-113. (in German, with English summary). ["*N. speciosa* was recorded in Switzerland from 1867 to 1990, found at 17 localities that concentrated on the canton Zürich in the eastern Swiss Plateau. Until the first half of the seventies of the 20th century a number of small populations and some large ones were known. After 1976 they all became extinct or broke down to a large extent. Only at one locality that was monitored regularly a much reduced population survived during 14 years but never recovered. It is suggested that *N. speciosa* became extinct because of desiccation of its formerly already damaged habitats in the very long dry summer 1976 combined with changes in the vegetation due to slow eutrophication. Considering the fact that it is also extinct or highly endangered in the neighbouring countries of Switzerland and in view of the strong regressive tendencies of the sp. in Central Europe, its future in the Alpine region depends largely on the conservation of the last large populations known to exist in southern Bavaria." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**5171.** Wildermuth, H. (2004): Wie haben die Libellen den trockenheißen Sommer 2003 überstanden? *mercuriale* 4: 29-31. (in German). [The impacts and effects of the hot summer 2003 on the very well known and monitored dragonfly population of the "Drumlinlandschaft" near Zürich, Switzerland is described and discussed in detail. Although, the abundance of many species decreased in 2003, none of the species disappeared. Obviously, in spite of many habitats fallen dry, microhabitats have been available which enabled some specimens to develop to imago. Conservation measures (e.g. blocking of ditches) realised in the past years have been successfully because water was retained in the locality.] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**5172.** Wilson, K.A.; Magnuson, J.J.; Lodge, D.M.; Hill, A.M.; Kratz, T.K.; Perry, W.L.; Willis, T.V. (2004): A long-term rusty crayfish (*Orconectes rusticus*) invasion: dispersal patterns and community change in a north temperate lake. *Canadian Journal of Fisheries and Aquatic Sciences* 61(11): 2255-2266. (in English). ["Rusty crayfish (*Orconectes rusticus*) were first observed in Trout Lake, Wisconsin, in 1979 and took 19 years to completely disperse around the littoral zone, advancing at an average rate of 0.68 km/year<sup>1</sup>. With the invasion of rusty crayfish, we found that fishes that share prey taxa with crayfish declined in numbers over time, but piscivorous fish species did not change in abundance. Snails declined from >10 000 to <5 snails·m<sup>2</sup> in one of the first invaded areas. Mean abundance of Odonata, Amphipoda, and Trichoptera decreased significantly lake-wide. Resident crayfish species nearly disappeared,



although total crayfish abundance, driven by high abundances of rusty crayfish, continued to rise. Submerged macrophyte species richness declined by as much as 80% at some locations. Together these responses demonstrate dramatic long-term changes in the littoral zone biota of Trout Lake. Continued invasions of similar lakes in the region suggest that these impacts are occurring on a region-wide basis with potentially irreversible effects on communities and ecosystems. Only through long-term natural experiments such as this study can researchers ascertain the full extent of invasions and their impacts on community and ecosystem process that respond at spatial and temporal scales not captured in mesocosm studies.] Address: Hill, Anna, M., Dept Biology, The Univ. of Louisiana at Monroe, Monroe, Louisiana 71209. USA. E-mail: hill@ulm.edu

**5173.** Zawal, A.; Buczyński, P.; Pietrzak, L. (2004): Aquatic invertebrates of the lowland peatbog Krepski Bagno (northwestern Poland). In: L. Wolejko & J. Jasnowska. [Eds], The future of Polish mires. Agriculture University of Szczecin, Szczecin: 199-204. (in English, with Polish summary). [In 2003, 12 odonate species were recorded in the peatbog dominated by a vegetation of willow shrubs and reed (*Carex* sp. div.)] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Wąska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**5174.** Zawal, A.; Buczyński, P.; Mrowiński, P. (2004): Dragonflies (Odonata) of some small water bodies in the vicinity of Nowogard (the Szczecin Coastal Region). *Wiad. entomol.* 23(4): 197-213. (in Polish, with English summary). [During 1999-2000, 33 odonate species were recorded in small water bodies in the vicinity of Nowogard (N Poland), among them *Sympetma paedisca*, *Aeshna subarctica elisabethae* and five species of the genus *Leucorrhinia*. "The composition and structure of dragonfly communities are analysed in the paper, as well as their dependence on selected natural and anthropogenic factors. The literature data about dragonflies of the Szczecin Coastal Region are summarised. Because of the occurrence of some protected and red listed dragonfly species, the setting up of a reserve is proposed at one of the localities." (Authors)] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Wąska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**5175.** Zimmermann, W.; Kipping, J. (2004): Zur Frage des Vorkommens von *Nehalennia speciosa* in Thüringen (Odonata: Coenagrionidae). *Libellula* 23(3/4): 127-130. (in German, with English summary). ["Two published records of *N. speciosa* from E-Thuringia are critically discussed. These only known records of the species from Thuringia are considered as accidentally misidentified *Ischnura pumilio*. Consequently, *N. speciosa* has not been included in the checklist of Thuringian Odonata." (Authors)] Address: Zimmermann, W., Th.-Müntzer-Str. 5, D-99423 Weimar, Germany. E-mail: wolfgang.zimmermann.we@t-online.de

## 2005

**5176.** Abidemi Fabunmi, F.; Segun Salawu, A. (2005): Is Yorùbá an endangered language? *Nordic*

*Journal of African Studies* 14(3): 391-408. (in English). [The Yorùbá language belongs to the West Benue-Congo of the Niger-Congo phylum of African languages (Williamson and Blench 2000: 31). Apart from Nigeria with about 30 million Yorùbá speakers, Yorùbá is still spoken in Togo, Republic of Benin, Ghana, Sudan, Sierra-Leone, and Côte D Ivoire. Outside Africa, a great number of speakers of the language are in Brazil, Cuba, including Trinidad and Tobago. Yorùbá is regarded as one of the major languages of Nigeria. The Yorùbá word for dragonfly is "Lámilámi" - *Bradinopyga strachani* (Kirby 1900). For the full paper see: <http://www.njas.helsinki.fi/pdf-files/vol14num3/fabunmi.pdf>] Address: Abidemi Fabunmi, F., Obafemi Awolowo Univ., Nigeria

**5177.** Adite, A.; Winemiller, K.O.; Fiogbe, E.D. (2005): Ontogenetic, seasonal, and spatial variation in the diet of *Heterotis niloticus* (Osteoglossiformes: Osteoglossidae) in the So River and Lake Hlan, Benin, West Africa. *Environmental Biology of Fishes* 73: 367-378. (in English). ["The African bonytongue, *Heterotis niloticus* (Osteoglossidae), is an important fisheries and aquaculture species in West Africa. This species has frequently been characterized either as an omnivore, insectivore or detritivore, the latter, in part, because of its benthic feeding habitats and possession of a gizzard (thick-walled pyloric stomach). We examined diets of two populations of *H. niloticus* in the So River in southern Benin. A population from the river channel and seasonally flooded marginal plains was dominated by juvenile and subadult size classes. Adults size classes were common in a second population from Lake Hlan, a natural lake in the river floodplain located upstream from the channel study region. *Heterotis* of all sizes consumed a variety of food resources, ranging from aquatic invertebrates to small seeds. Aquatic invertebrates (including Odonata) composed a large proportion of the diets of juveniles, and adults consumed a mixture of aquatic invertebrates, seeds, and detritus. Seasonal dietary variation was observed in both populations, and diet breadth was not significantly different between populations. Aquatic invertebrates remained significant in diets of larger size classes; diets of fish between 100 and 200 mm began to include seeds and detritus, with a marked increase in the volumetric proportion of detritus in diets of fish between 300 and 400 mm in Lake Hlan and between 500 600 mm in the river. Relative gut length was inversely related to body size, which supports the notion that *Heterotis* is an omnivore and not a specialized detritivore. The thick-walled gizzard of *Heterotis*, which generally contained sand, probably aids digestion of seed coats. Because *Heterotis* consume mostly invertebrates and grass seeds in shallow waters of seasonal aquatic habitats and lakes in the river floodplain, foraging success and fishery production should be strongly dependent on the annual flood pulse." (Authors)] Address: Winemiller, K.O., Section of Ecology and Evolutionary Biology, Texas A&M University, 2258 TAMU, College Station, USA. E-mail: k-winemiller@tamu.edu

**5178.** Ameline, M.; Houard, X. (2005): Bilan cartographique. Le Bal du CERCION. Bulletin annuel de liaison du Collectif d'études régional pour la cartographie et l'inventaire des Odonates de Normandie (ISSN 1771-5288) 1: 3-17. (in French). [The distribution of 54 odonate species in the Normandy, France is mapped based on records from 1980 to 2004. In addition very brief information is given to the palaeartic distribution, the phenology, and the habitats of the species.] Address:

Liaison du Collectif d'études régional pour la cartographie et l'inventaire des Odonates de Normandie, 2bis rue Bachelet, F-76350 Oissel-sur Seine, France.

**5179.** Anonymus (2005): Gebänderte Prachtlibelle. Briefmarken von *Calopteryx splendens*. Insektenkurier 84: 20-21. (in German). [Brief description of *C. splendens*, and documentation of eight stamps with *C. splendens* as motive.] Address: not stated

**5180.** Anonymus (2005): Références bibliographiques normandes. Le Bal du CERCION. Bulletin annuel de liaison du Collectif d'études régional pour la cartographie et l'inventaire des Odonates de Normandie (ISSN 1771-5288) 1: 25-30. (in French). [Odonatological bibliography that covers published and unpublished work on the Odonata of the Normandy, France.] Address: Liaison du Collectif d'études régional pour la cartographie et l'inventaire des Odonates de Normandie, 2bis rue Bachelet, F-76350 Oissel-sur Seine, France.

**5181.** Anonymus (2005): Torf-Mosaikjungfer. *Aeshna juncea*. Insektenkurier 85: 33. (in German). [Brief description of *A. juncea*, and documentation of 2 stamps with *A. juncea* as motive.] Address: not stated

**5182.** Anonymus (2005): Wild corner: Invertebrates. Porcupine 32: 25. [Verbatim. Samson So and Fion Cheung saw a *Labrogomphus torvus* at a small tributary of Hok Tau Reservoir on 4 September 2004. This dragonfly is regarded as rare by Wilson (2003). Samson So reported the following sightings of dragonflies: *Pseudagrion microcephalum* laying eggs at a rehabilitated freshwater pond of Mai Po Nature Reserve. One *Macrodiplax cora* was seen at Luk Keng marsh (near mangrove) on 29 September, and both sexes of this species were seen at Mai Po throughout October. *Gynacantha subinterrupta* was seen at Mai Po on 10 November and 5 December (both were male individuals).]

**5183.** Arrington, D.A.; Winemiller, K.O.; Layman, C.A. (2005): Community assembly at the patch scale in a species rich tropical river. *Oecologia* 144(1): 157-167. (in English). ["In tropical floodplain rivers, communities associated with structurally complex habitats are disassembled and reassembled as aquatic organisms repeatedly colonize new areas in response to gradual but continuous changes in water level. Thus, a neutral model reflecting random colonization and extinction dynamics may be sufficient to predict assemblage patterns at the scale of local habitat patches. If water level fluctuations and associated patch dynamics are sufficiently predictable, however, community assembly on habitat patches also may be influenced by species-specific responses to habitat features and/or species interactions. We experimentally manipulated structural complexity and proximity to source habitat (which influences colonization rate) of simulated rocky patches in the littoral zone of a tropical lowland river and demonstrate significant effects of both factors on species density of fishes and macroinvertebrates. Interspecific variation in vagility significantly affected assemblage response to habitat complexity. In a second experiment, created habitat patches were sampled over time intervals ranging from 1 day to 36 days to examine temporal dynamics of community assembly. A null-model test revealed that assemblage structure became increasingly non-random, concomitant with increasing species density, over time. Community dynamics in newly formed habitat patches appeared to be dominated by dispersal,

whereas in older patches, abundances of individual species increasingly were influenced by habitat characteristics. These data suggest that species-specific responses to environmental variation resulted, in part, because of species interactions. We conclude that community assembly in shallow habitats of this tropical lowland river is influenced by physical habitat characteristics, the spatial distribution of habitat patches, and species interactions as habitats are saturated with individuals." (Authors) Odonata are mentioned on several occasions.] Address: Arrington, D.A.; Perry Institute for Marine Science, 100 N US Hwy 1, Jupiter, FL 33477, USA. E-mail: aarrington@perryinstitute.org

**5184.** Avellinese, E.; Utzeri, C. (2005): Le libellule della Riserva Naturale Regionale Monterano (Roma) (Odonata). In: Quadro delle conoscenze del territorio della Riserva Naturale Regionale "Monterano" (al settembre 2005) a cura di F.M. Mantero (direttore): 15 pp. (in Italian). [Records of 37 odonate species are documented in detail and briefly discussed. <http://www.parchilazio.it/riserva.monterano/piano/8.pdf>] Address: <http://www.parchilazio.it/riserva.monterano/doc.html>

**5185.** Bady, P.; Dolédec, S.; Fesl, C.; Gayraud, S.; Bacchi, M.; Schöll, F. (2005): Use of invertebrate traits for the biomonitoring of European large rivers: the effects of sampling effort on genus richness and functional diversity. *Freshwater Biology* 50: 159-173. (in English). ["1. Studies on biodiversity and ecosystem function require considering metrics for accurately describing the functional diversity of communities. The number of taxa (richness) is commonly used to characterise biological diversity. The disadvantage of richness as a measure of biological diversity is that all taxa are taken into account on an equal basis regardless of their abundance, their biological characteristics or their function in the ecosystem. 2. To circumvent this problem, we applied a recently described measure of biological diversity that incorporates dissimilarities among taxa. Dissimilarities were defined from biological traits (e.g. life history, morphology, physiology and behaviour) of stream invertebrate taxa and the resulting biological diversity index was considered as a surrogate for functional diversity. 3. As sampling effort is known to affect the number of taxa collected within a reach, we investigated how change in functional diversity is affected by sampling effort. We used stream invertebrate community data from three large European rivers to model accumulation curves and to assess the number of samples required to estimate (i.e. closeness to the maximal value) functional diversity and genera richness. We further evaluated the precision of estimates (i.e. similarity of temporal or spatial replicates) of the total functional diversity. 4. As expected, richness estimates were strongly dependent on sampling effort, and 10 replicate samples were found to underestimate actual richness. Moreover, richness estimates showed much variation with season and location. In contrast, functional diversity had greater accuracy with less sampling effort and the precision of the estimates was higher than richness both across sampling occasions and sampling reaches. These results are further arguments towards conducting research on the design of a biomonitoring tool based on biological traits." (Authors) The statistical analysis includes also Odonata ("*Calopteryx*").] Address: Bady, P., UMR CNRS 5023, LEHF, Univ. Lyon, 43 Boul. du 11 novembre 1918, F-69622 Villeurbanne Cedex, France. E-Mail: pierre.bady@univ-lyon1.fr

- 5186.** Barkov, D.V.; Kurashov, E.A. (2005): The importance of the Baikal amphipod *Gmelinoides fasciatus* (Stebbins) for the structure of the macrozoobenthos in the littoral zone of the Valaam island in Lake Ladoga. *Izledovano v Rossii* ("Researched in Russia") 2005: 820-833. (in Russian). [Five habitat types were sampled: a) surface of the littoral, b) sandy sediment, c) sediment consisting of sand/pebble, d) rock without algal growth and e) rock with algal growth. Out of the 53 species sampled in the benthos 4 were Odonata. None of them were found in e). Single individuals of *C. concinnus* are reported from samples in a), c) and d) and of *C. hastulatum* in c) and d). *Sympetrum flaveolum* was commonly found in c) and d) and *Platycnemis pennipes* commonly in d) but individually in a), b) and c). Biomass is used as a measure of the macrozoobenthic community structure. The influence of the *Gmelinoides fasciatus* on Odonata (and other taxa) is not further detailed. The Odonata identification reference is not mentioned and the meaning of the abundance classes not provided. Available from <http://zhurnal.ape.relarn.ru/articles/2005/079pdf>] Address: Barkov, D.V., Institute of lake monitoring of the RAN (possibly Russian Academy of Sciences), 191605 St. Petersburg, ul. Sevast'yanova 9, Russia. E-mail: barklay@inbox.ru
- 5187.** Bellstedt, R. (2005): Buchbesprechung: Zimmermann, W., F. Petzold & F. Fritzlar (2005): Verbreitungsatlas der Libellen (Odonata) im Freistaat Thüringen. *Naturschutzreport*, Jena 22: 1-224. *Mitteilungen des Thüringer Entomologenverbandes* 12(2): 69-70. (in German). [Book review; see OAS 5334] Address: Bellstedt, R., Museum der Natur Gotha, Parkallee 15, D-99867 Gotha, Germany
- 5188.** Bemmerle, B. (2005): *Zygonyx torridus* auf La Gomera, Kanarische Inseln (Odonata: Libellulidae). *Libellula* 24(3/4): 249-256. (in German, with English summary). ["Since the first records of *Z. torridus* from La Gomera, Canary Islands, Spain, in the early 20th century, no further records had been published until now. This study compiles current records of this species from the island. Information about seven other Odonata species recorded in the island within the last 30 years are given." (Author)] Address: Bemmerle, B., Freibergstr. 1, D-71691 Freiberg, Germany
- 5189.** Bermúdez Rivas, C. (2005): Clave para los imágos de los géneros de Libellulidae (Odonata: Anisoptera) del valle del Cauca, Colombia. *Boletín del Museo de Entomología de la Universidad del Valle* 6(1): 7-22. (in Spanish, with English summary). [21 genera of the Libellulidae are keyed. Available at: <http://entomologia.univalle.edu.co/boletin/Odonata.pdf>] Address: Bermúdez Rivas, C., Universidad del Valle. Departamento de Biología. Grupo de Investigaciones Entomológicas (GIE). Cali, Colombia. E-mail: draconianfly@gmail.com
- 5190.** Bernard, R.; Wildermuth, H. (2005): Verhaltensbeobachtungen an *Nehalennia speciosa* in Bezug auf Raum, Zeit und Wetter (Odonata: Coenagrionidae). *Libellula* 24(3/4): 129-153. (in German, with English summary). ["The behaviour of *N. speciosa* was studied at five small bog lakes in NW Poland with regard to habitat use, diurnal activity and influence of the weather. In total we discerned 22 behavioural elements some of which were considered in the context of different environmental situations. The imagines stayed almost exclusively in a narrow belt of thin-leaved sedges at the edge of the open water or in corresponding vegetation of adjacent shallow water bodies. The diurnal pattern of the localization of imagines in the vertical profile of the vegetation is described, stressing their movement downwards from the late forenoon and upwards in the late afternoon. Reproductive activity started in the morning, peaked around two hours before solar noon, and decreased rapidly in the early afternoon. Generally, pre-copula and copula lasted longer in the morning than in the afternoon. Calm, warm and rather humid atmospheric conditions with subdued or sporadically interrupted insolation proved optimal for the species' activity, whereas wind, strong precipitation, and temperatures below ca 15°C as well as above ca 23-24°C with strong insolation were unsuitable. In light rain and under a cloudy sky - provided that conditions were calm and temperatures were around 20°C - activity was diminished but not completely suppressed. It is inferred that imagines of *N. speciosa* are morphologically and ecologically adapted to habitats with obtrusive obstacles to flight, a humid microclimate and small spatial compass." (Authors)] Address: Bernard, R., Institut für Umweltbiologie, Abteilung Allgemeine Zoologie, Adam-Mickiewicz-Universität, Umultowska 89, PO-61-614 Poznan, Poland. E-mail: rbernard@amu.edu.pl
- 5191.** Beutler, H. (2005): Libellenfunde in einigen CORINE-Biotopgebieten Estlands (Odonata). *Libellula* 24(1/2): 47-53. (in German, with English summary). ["22 Odonata - species, recorded in June 2001 at 8 different sites in Estonia are reported and briefly discussed. Remarkable aspects were the late emergence of *Epitheca bimaculata* and *Leucorrhinia caudalis* as well as the mass-emergence of *Libellula quadrimaculata* and *Orthetrum cancellatum* in brackish water reeds of the Baltic Sea. Furthermore, the great importance of the many peat bogs for the protection of the European dragonfly fauna within the network 'Natura 2000' is pointed out. Once again *Anax imperator* was recorded breeding in the Nigula peat bog. It is supposed that the species has been breeding there persistently at least since 1989." (Author)] Address: Beutler, H., Kirschallee 3b, D-15848 Stremmen, Germany. e-mail: horstbeutler@freenet.de
- 5192.** Block, M. de; Geenen, S.; Jordaens, K.; Bäckeljau, T.; Stoks, R. (2005): Spatiotemporal allozyme variation in the damselfly, *Lestes viridis* (Odonata: Zygoptera): gene flow among permanent and temporary ponds. *Genetica* 124(2): 137-144. (in English). ["Several insect species seem to persist not only in permanent but also in temporary ponds where they face particularly harsh conditions and frequent extinctions. Under such conditions, gene flow may prevent local adaptation to temporary ponds and may promote phenotypic plasticity, or maintain apparent population persistence. The few empirical studies on insects suggest the latter mechanism, but no studies so far quantified gene flow including both pond types. We investigated the effects of pond type and temporal variation on population genetic differentiation and gene flow in *Lestes viridis* in northern Belgium. We report a survey of two allozyme loci (*Gpi*, *Pgm*) with polyacrylamide gel electrophoresis in 14 populations from permanent and temporary ponds, and compared these results with similar data from the same permanent populations one year before. The data suggested that neither pond-drying regime, nor temporal variation have a substantial effect on population genetic structuring and did not provide evidence for stable population differentiation in *L. viridis* in nor-



thern Belgium. Gene flow estimates were high within permanent and temporary ponds, and between pond types. Our data are consistent with a source-sink metapopulation system where temporary ponds act as sinks in dry years, and are quickly recolonized after local population extinction. This may create a pattern of apparent population persistence of this species in permanent and temporary ponds without clear local adaptation." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**5193.** Blust, M. (2005): Six new Vermont dragonflies. VES NEWS. The Newsletter of the Vermont Entomological Society 49: 7, 15. [Vermont, USA; the sightings of the six new state records - *Nasiaeschna pentacantha*, *Enallagma laterale*, *Rhionaeschna mutata*, *Epiaschna heros*, *Gomphus abbreviatus*, *Stylurus amnicola* - are briefly documented.] Address: www.VermontInsects.org

**5194.** Brauner, O. (2005): Vorkommen, Entwicklung und Verbreitung von *Aeshna affinis* in Brandenburg (Odonata: Aeshnidae). *Libellula* 24(3/4): 191-219. (in German, with English summary). ["Presence of *A. affinis* was confirmed at 147 different sites in the German federal state of Brandenburg, including two sites in Berlin. From a total number of 266 observations, 264 were made in the period between 1992 and 2005. In 2000, the reproduction of the species was confirmed for the first time in Brandenburg. Since then each year evidences of successful reproduction were observed in a total of 32 ponds. Most of these ponds were temporary and featured wide fluctuations in water level. In some ponds *A. affinis* was recorded continuously over several years. The hitherto highest abundance was reached in the year 2002. In this year the species was seen at 64 sites. A relative accumulation of observations occurred, by at this time far fewer observers, in 1994 and 1995. All records from Brandenburg are shown in a map. The 145 different observation sites since 1992 are distributed over 84 5.5x5.5 krh-squares of German topographic maps. From 1992 to 1999, records were known from 20, and after 2000 from 71, corresponding squares." (Author)] Address: Brauner, O., R.-Breitscheidstr. 62, D-16225 Eberswalde, Germany. E-mail: oliverbrauner@web.de

**5195.** Bried, J.T. (2005): Community and conservation ecology of dragonfly and damselfly adults in Mississippi wetlands. Thesis Submitted to the Faculty of Mississippi State University, Dept of Biological Sciences: [http://www.msstate.edu/courses/ge14/students/BriedThesis.pdf] Address: Bried, J.T., Dept Biol. Sciences, Mississippi State University, PO Box GY, MS State, MS 39762, USA. E-mail: e-mail: jtb117@msstate.edu

**5196.** Bried, J.T.; Ervin, G.N. (2005): Distribution of adult Odonata among localized wetlands in east-central Mississippi. *Southeastern Naturalist* 4: (in English). ["We measured species richness and composition of adult Odonata and inferred habitat preferences among man-made wetland sites and surrounding tracts of natural bottomland forest. Cumulative species richness and composition were described by proportion coefficients and beta-diversity indices. The three man-made sites provided open space resources and more species were observed in each than in the floodplain forest. Twenty-nine of 42 species documented over a four-month peri-

od were observed in only one or two of the four wetlands studied. Large differences in species assemblages between the immediately adjacent ditch and marsh sites were the best evidence for high habitat affinity because distance and structural barriers to movement were absent. Such compositional asymmetry may reflect differential vegetative and reproductive suitability of the habitats. Results suggest that the open canopy wetlands supported high relative diversity of adult Odonata and that distinct odonate assemblages were found among different habitat types in this floodplain wetland complex." (Authors)] Address: Bried, J.T., Department of Biological Sciences, Mississippi State University, PO Box GY, MS State, MS 39762, USA. E-mail: e-mail: jtb117@msstate.edu

**5197.** Bried, J.T. (2005): Species of adult Odonata from three natural areas in Mississippi. *Journal of the Mississippi Academy of Sciences* 50(4): 231-232. (in English). ["Altogether, 77 species were caught or seen across all natural areas in 2003-04. This total is nearly 60% of the odonates currently known to occur in Mississippi (Abbott, 2005)." Available at: www.msstate.edu/courses/ge14/BriedOdonatesJMAS.pdf] Address: Bried, J., Mississippi State University, Dept Biol. Sciences, Rm 130 Harned, PO Box GY, Mississippi State, MS 39762, USA. E-mail: jasonbried@hotmail.com

**5198.** Brownnett, A. (2005): A re-examination of the status of the Norfolk Damselfly *Coenagrion armatum* (Charpentier): a species of Odonata now presumed extinct in Britain. *J. Br. Dragonfly Society* 21(1): 21-26. (in English). [On the basis of museum specimens (n=75), published papers, and correspondance between odonatologists, the fate of *C. armatum* in Britain is analysed in great detail. Discovered in 1903, the species inhabited the British Islands at least until 1958.] Address: Brownnett, A., 28 Colesbourne Road, Brookside, Bloxham, Banbury, Oxfordshire OX15 4TB, UK

**5199.** Brunet, L. (2005): Observer et conserver des odonates. Le Bal du CERCION. Bulletin annuel de liaison du Collectif d'études régional pour la cartographie et l'inventaire des Odonates de Normandie (ISSN 1771-5288) 1: 20-21. (in French). [Introduction into observation and storing of odonates and their exuviae.] Address: Liaison du Collectif d'études régional pour la cartographie et l'inventaire des Odonates de Normandie, 2bis rue Bachelet, F-76350 Oissel-sur Seine, France

**5200.** buglife (2005): Dragonflies. www.buglife.org.uk. (in English). [This is a very nice leaflet with a poster on the backside giving a lot of general information on Odonata.] Address: Buglife, 170A Park Rd, Petersborough, Cambridgeshire, PE1 2UF, UK

**5201.** Carchini, G.; Domenico, M.D.; Chiarotti, F.; Tanzilli, C.; Pacione, T. (2005): Fluctuating asymmetry, body size, reproductive period and life time mating success of males of *Cercion lindeni* (Odonata: Coenagrionidae). *Eur. J. Entomol.* 102(4): 707-712. (in English). ["Mating success is linked to reproductive success in males, but parameters influencing it are poorly known. The relationships between lifetime mating success (LMS), fluctuating asymmetry (FA), body size (SIZE), reproductive period (RP) and emergence date (MD) of males of *Cercion lindeni* were investigated. Males were marked and photographed in their pre-reproductive period, and their matings monitored. RP was assumed to be the period between the MD and the last sighting of

each individual. Three different FA measures and the size of each individual were determined. The results showed that the individuals not present at the pond during the reproductive period had a higher FA (but not for meristic characters) than those present. For those individuals actually involved in reproductive activity, LMS was only positively correlated with RP, which was negatively related with MD, and this with SIZE." (Authors). Available at: <http://www.eje.cz/pdfarticles/1060/eje102-4707Carchini.pdf>] Address: Carchini, G., Dipart. di Biol., Università "Tor Vergata", Viale della Ricerca Scientifica, I-00133 Roma, Italy. E-mail: [archini@utovrm.it](mailto:archini@utovrm.it)

**5202.** Clausnitzer, V. (2005): Odonata Specialist Group. Species 43: 24. (in English). [Verbatim. The special issue of the International Journal of Odonatology Guardians of the watershed; Global status of dragonflies: critical species, threat and conservation, was used as a base for assessing a number of dragonflies for the IUCN Red List. Consequently nearly all dragonfly species listed previously on the IUCN Red List have been reassessed and numerous additions were made. All assessments were made, checked and submitted to the IUCN SSC Red List Programme by Dr. Frank Suhling and myself. In total, there was an increase from 155 to 350 dragonflies listed as Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened or Data Deficient. However, of previously listed species, 20 species were reassessed as Least Concern. About 6% of the global dragonflies are currently regarded as threatened. The listed species are regionally distributed as follows: 97 from Africa and the Orient, eight from islands in the Indian Ocean, 36 from North America, 10 from Hawaii, 65 from South and Middle America, 11 from Europe, 26 from Asia (excluding Japan and Sri Lanka), 32 from Japan, 20 from Sri Lanka, 25 from Australia, 19 from South Pacific islands, one from St. Helena, with the extinct species being originally from St. Helena Island. A member of the Odonata Specialist Group, Vincent Kalkman, participated in the IUCN Sampled Red List Index (SRLI) Species Selection Workshop, held at the Zoological Society of London, in March. One hundred dragonflies will be selected randomly from the global list for inclusion in the SRLI. In July there will be a meeting of the Odonata Specialist Group during the Symposium of the World Wide Dragonfly Association in Spain. Sacha Spector from the American Museum of Natural History will hopefully attend this meeting to discuss plans for a global dragonfly assessment, in co-operation with Piotr Naszkrecki of Conservation International.] Address: Clausnitzer, Viola, Graefestr. 17, D-06110 Halle/Saale, Germany. E-mail: [violacl@gmx.de](mailto:violacl@gmx.de)

**5203.** Collar, D.C.; Near, T.J.; Wainwright, P.C. (2005): Comparative analysis of morphological diversity: Does disparity accumulate at the same rate in two lineages of centrarchid fishes? *Evolution* 59(8): 1783-1794. (in English). ["Evolutionary lineages differ with regard to the variety of forms they exhibit. We investigated whether comparisons of morphological diversity can be used to identify differences in ecological diversity in two sister clades of centrarchid fishes. Species in the Lepomis clade (sunfishes) feed on a wider range of prey items than species in the Micropterus clade (black basses). [...]" (Authors) The diet of both species includes Odonata (Tab. 1)] Address: Collar, D.C., Section of Evolution and Ecology, University of California, Davis, California 95616, USA. E-mail: [dccollar@ucdavis.edu](mailto:dccollar@ucdavis.edu)

**5204.** Commission of zoological nomenclature (2005): OPINION 2110 (Case 3253): *Libellula aenea* Linnaeus, 1758 (currently *Cordulia aenea*) and *L. flavomaculata* Vander Linden, 1825 (currently *Somatochlora flavomaculata*; Insecta, Odonata): usage of the specific names conserved by the replacement of the lectotype of *L. aenea* with a newly designated lectotype. *Bulletin of zoological nomenclature* 62(2): 99-100. (in English). ["The Commission has ruled that the current usage of the names of two dragonfly species, *Libellula aenea* Linnaeus, 1758 (currently *Cordulia aenea*) and *L. flavomaculata* Vander Linden, 1825 (currently *Somatochlora flavomaculata*), is conserved by the replacement of the lectotype of *L. aenea* with a newly designated lectotype. In 1956, Fraser had designated one of Linnaeus's specimens as the lectotype of *L. aenea*. However, the specimen he designated was the one used by Vander Linden to denote his species *L. flavomaculata* and this action made *L. aenea* a senior objective synonym of *L. flavomaculata*." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: [r.joedicke@t-online.de](mailto:r.joedicke@t-online.de)

**5205.** Conrad, A. (2005): *Adalia bipunctata* als Beute von *Gomphus flavipes* (Coleoptera: Coccinellidae; Odonata: Gomphidae). *Libellula* 24(3/4): 237-239. (in German, with English summary). ["On 8-IX-2005 an adult male *C. flavipes* was observed and photographed consuming an adult ladybird *A. bipunctata* at the River Oder near Frankfurt (Oder), Germany." (Author)] Address: Conrad, A., Crauhöfer Straße 8, D-38640 Goslar, Germany. E-mail: [axelconrad@gmx.de](mailto:axelconrad@gmx.de)

**5206.** Crick, K. (2005): Variations in key features of the final instar larvae and exuviae of the Common Blue Damselfly *Enallagma cyathigerum* (Charpentier). *J. Br. Dragonfly Society* 21(1): 27-36. (in English). ["Some features used for species identification of final instar larvae and exuviae in published keys have proved to have levels of variability beyond that currently defined. This paper seeks to address those variations as they apply to *E. cyathigerum*, outlining in detail specific variations found through close examination of 253 individuals collected from a number of water bodies in the Blackwater Valley on the border of Hampshire and Berkshire. The features addressed include the species-specific characteristics of the caudal lamellae, the prementum and the short spine on the outer surface of the anterior palpal seta. The current published keys have proved to be very useful but their interpretation requires considerable dedication, at least when they are first put to the test. This report proposes a format for a mainly pictorial approach to an identification key for damselfly larvae." (Author)] Address: Crick, K., 29 Village Way, Yateley, Hampshire GU46 7SE, UK

**5207.** Crumrine, P.W. (2005): Size structure and substitutability in an odonate intraguild predation system. *Oecologia* 145(1): 132-139. (in English). ["Interactions between different size classes of predator species have the potential to influence survival of prey species in intraguild predation (IGP) systems, but few studies test for these effects. Using a substitutive design in a field setting, I measured the effects of two size classes of IG predators (large and small larvae of the dragonfly *Anax junius*) on the mortality of IG prey (larvae of the dragonfly *Pachydiplax longipennis*). I also examined whether combinations of large *A. junius* and *P. longipennis* and small *A. junius* and *P. longipennis* had sub-

stitutable effects on shared prey (larvae of the damselfly *Ischnura verticalis*). The presence of both size classes of *A. junius*, when alone and in combination with *P. longipennis*, significantly increased mortality of *I. verticalis*. In the presence of *P. longipennis*, large and small *A. junius* had similar effects on the mortality of *I. verticalis*, and effects of size-structured assemblages of *A. junius* were similar to the effects of each size class alone at the same density. The effects of the two size classes of *A. junius* on *P. longipennis* differed, and *P. longipennis* mortality was lower when exposed to size structured assemblages of *A. junius* than when exposed to only large *A. junius* at the same density. Results were similar to those in a laboratory study, although the effect of *P. longipennis* on *I. verticalis* was much lower in the field setting. These results demonstrate that interactions between different size classes of IG predators promote the survival of IG prey and highlight the importance of within-species size structure as a characteristic that may promote the coexistence of predators in IGP systems." (Author)] Address: Crumrine, P.W., Dept of Natural Sciences, Longwood University, Farmville, VA 23909, USA. E-mail: crumrinepw@longwood.edu

**5208.** Cuong, D.M. (2005): *Davidius monastyrskii* spec. nov., a new dragonfly from northern Vietnam (Anisoptera: Gomphidae). *Odonatologica* 34(3): 285-289. (in English). ["The male of the new species is described, illustrated and compared with the closely related *D. fruhstorferi* Martin. Holotype male: Vietnam, Bac Can province, Ba Be, IV-1997; deposited in Zoology Collection, Vietnam National University, Hanoi." (Author)] Address: Cuong, D.M., Hom thu so 16, Buu Dien 10210, 35 Thai Thinh, Hanoi, Vietnam. E-mail: cuongdm@hotmail.com

**5209.** Daguet, C. (2005): Dragonflies and damselflies in your garden. English nature. ISBN 1 85716 877 1: 28 pp. (in English). [[http://www.english-nature.org.uk/pubs/publication/PDF/webDrago\\_nflies.pdf](http://www.english-nature.org.uk/pubs/publication/PDF/webDrago_nflies.pdf)] Address: Daguet, Caroline, English Nature North Mercia Team, Attingham Park, Shrewsbury SY4 4TW, UK

**5210.** Daguet, C. (2005): From the conservation of a dragonfly. *Dragonfly News* 48: 3-4. (in English). [Brief reports on current activities of BDS including the preparation of two leaflets, the monitoring of *Coenagrion mercuriale*, and the participation on the colloquium on West-European Odonata near Nantes, France in June 2005.] Address: Daguet, Caroline, English Nature North Mercia Team, Attingham Park, Shrewsbury SY4 4TW, UK

**5211.** Daraż, B. (2005): *Owady Ziemi Dubieckiej w obiektywie* [Insects of the Dubiecko Country focused with a lens]. Kresowy Dom Sztuki, Dubiecko: 47 pp. (in Polish). [This is a small booklet lavishly illustrated with colour photos of insects, one third of them covering Odonata. Dubiecko is a village located in the floodplain of the river San in southern Poland 30 km west of Przemyśl. Of special interest is *Nehalennia speciosa*.] Address: Towarzystwo Przyjaciół Ziemi Dubieckiej, ul. Krasickiego 3, 37-750 Dubiecko, Poland. [www.tpzd.republika.pl](http://www.tpzd.republika.pl)

**5212.** David, S.; Tóthová, G. (2005): Occurrence of dragonfly *Leucorrhinia caudalis* (Charpentier, 1840) in Slovak Republic. In: Theory and practice in landscape ecological planning, 21.5.2004, Nitra. ISBN 80-8050-791-0: 29-33. (in Slovakian, with English summary). [2003, *L. caudalis* was found for the first time in Slova-

kia at two localities (Danube oxbow lakes, Podunajská rovina plane). In 2004, a 3rd locality was detected in E Slovakia (Latorica oxbow lakes, Latorická rovina plane). The species is depicted, its distribution in Slovakia mapped, and the new locality / habitat described and pictured.] Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. E-mail: stanislav.david@savba.sk

**5213.** De Block, M.; Stoks, R.; De Bruyn, L. (2005): Egg hatching patterns within and among populations of a damselfly occupying permanent and temporary ponds. *Archiv für Hydrobiologie* 163(2): 195-209. (in English). ["Although opposing selection forces cause drastic differences in community structure between temporary and permanent ponds, some species are able to persist in both pond types. Little is known about the underlying life history strategies that enable species to do so. This is especially true for embryonic development times. Here, we describe within and among population variation in natural egg hatching patterns of the damselfly *Lestes viridis* that occurs in both pond types. In general, egg hatching was synchronous both within and among populations. A two-year field monitoring study showed consistent regional differences in egg hatching and earlier egg hatching in temporary ponds. A common garden and two full-sib experiments suggested that differences in hatching dates among populations and families were not completely driven by differences in environmental conditions, but may have a genetic basis. Although the pattern of earlier egg hatching in temporary ponds, as observed in the field monitoring, is adaptive, it was not fully repeatable in the common garden experiment. This suggests that this pattern is caused by more benign environmental conditions at the temporary ponds relative to the permanent ponds, and not an adaptation to pond type. ] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**5214.** De Knijf, G.; Tailly, M. (2005): Ei-afleg bij de Blauwe glazenmaker (*Aeshna cyanea*): enkele merkwaardige observaties. *Gomphus* 20(1): 21-26. (in Dutch, with English and French summaries). ["Oviposition from *A. cyanea*: some remarkable observations: Three remarkable observations of oviposition by *A. cyanea* are described. 1) on rocks forming a dam in full sunshine, at an at the time of observation dry pond, 2) in dead wood and bark of an elder (*Sambucus nigra*) at more than 4 m from the waterside and 3) in moss (*Amblystegium varium*) at 0,20 m above the water in mosses at 0,30 m above and 0,40 m from the waterside. Thus *A. cyanea* seems not to be linked strictly to water for its oviposition, but shows a predilection for moist, shadowed substrats like mosses, dead plants, branches, wood, mud and soil. The water level at the moment of hatching (shortly after the winter) is generally higher, so the prolarvae are at that time already in the water or have only a short distance to go; probably they are capable of jumping or creeping some meters to reach the water if necessary." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**5215.** Dodelin, C (2005): Les odonates de Normandie de Gadeau de Kerville à nos jours .... Le Bal du CERCION. Bulletin annuel de liaison du Collectif d'études régional pour la cartographie et l'inventaire des



Odonates de Normandie (ISSN 1771-5288) 1: 2. (in French). [Brief introduction into the history of faunistic odonatological work in the Normandy, France.] Address: Liaison du Collectif d'études régional pour la cartographie et l'inventaire des Odonates de Normandie, 2bis rue Bachelet, F-76350 Oissel-sur Seine, France

**5216.** Dumont, H.J.; Vanfleteren, J.R.; De Jonckheere, J.F.; Weekers, P.H.H. (2005): Phylogenetic relationships, divergence time estimation, and global biogeographic patterns of calopterygoid damselflies (Odonata, Zygoptera) inferred from ribosomal DNA sequences. *Systematic Biology* 54(3): 347-362. (in English). [The calopterygoid superfamily (Calopterygidae + Hetaeriniidae) is composed of more than twenty genera in two families: the Calopterygidae (at least 17) and the Hetaeriniidae (at least 4). Here, 62 calopterygoid (ingroup) taxa representing 18 genera and 15 outgroup taxa are subjected to phylogenetic analysis using the ribosomal 18S and 5.8S genes and internal transcribed spacers (ITS1, ITS2). The five other families of calopterygoid affinity (Polythoridae, Dictyriidae, Amphipterygidae, Euphaeidae, and Chlorocyphidae) are included in the outgroup. For phylogenetic inference, we applied maximum parsimony, maximum likelihood, and the Bayesian inference methods. A molecular phylogeny combined with a geographic analysis produced a well-supported phylogenetic hypothesis that partly confirms the traditional taxonomy and describes distributional patterns. A monophyletic origin of the calopterygoids emerges, revealing the Hetaeriniid clade as sister group to the Calopterygidae *sensu stricto*. Within Calopterygidae, seven clades of subfamily rank are recognized. Phylogenetic dating was performed with semiparametric rate smoothing by penalized likelihood, using seven reference fossils for calibration. Divergence time based on the ribosomal genes and spacers and fossil constraints indicate that Calopteryginae (10 genera, approximately 50% of all Calopterygidae taxa studied here), Vestalinae (1 genus), and Hetaeriniidae (1 genus out of 4 studied here) started radiating around 65 Mya (K/T boundary). The South American Iridictyon (without distinctive morphology except for wing venation) and Southeast Asian Noguchiphaea (with distinctive morphology) are older (about 86 My) and may be survivors of old clades with a Gondwanian range that went extinct at the K/T boundary. The same reasoning (and an even older age, ca. 150 My) applies to the amphipterygids Rimanelia and Pentaplebia (South America Africa). The extant Calopterygidae show particular species and genus richness between west China and Japan, with genera originating between the early Oligocene and Pleistocene. Much of that richness probably extended much wider in preglacial times. The Holarctic Calopteryx, of Miocene age, was deeply affected by the climatic cooling of the Pliocene and by the Pleistocene glaciations. Its North American and Japanese representatives are of Miocene and Pliocene age, respectively, but its impoverished Euro-Siberian taxa are late Pliocene-Pleistocene, showing reinvasion, speciation, and introgression events. The five other calopterygoid families combine with the Calopterygidae and Hetaeriniidae to form the monophyletic cohort Caloptera, with Polythoridae, Dictyriidae, and Amphipterygidae sister group to Calopterygoidea. The crown node age of the latter three families has an age of about 157 My, but the Dictyriidae and Polythoridae themselves are of Eocene age, and the same is true for the Euphaeidae and Chlorocyphidae. The cohort Caloptera itself, with about 197 My of age, goes back to the

early Jurassic. [Biogeography; Calopterygidae; dating; divergence times; damselflies; internal transcribed spacers; odonata; phylogeny; phylogeography; 18S and 5.8S ribosomal DNA.] (Authors) Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

**5217.** Dunn, R.; Budworth, D. (2005): Dragonflies in Derbyshire. Status and distribution 1977-2000. Derbyshire & Nottinghamshire Entomological Society: 52 pp. (in English). [This softback booklet contains a history of recording in Derbyshire, the status of each species, a small number of habitat and species photographs and a full set of 1 km distribution maps (22 odonate species). The booklet is a welcome contribution to an European distribution atlas of Odonata.] Address: available (£ 4,50 incl. P+P) from Mr K. Moore, 10 Montrose Court, Stapleford, Notts NG9 8LJ, UK

**5218.** Dyatlova, E.S. (2005): The dragonflies of the southwestern Ukraine. M.Sc. thesis, Faculty of Biology, I.I. Mechnikov University of Odessa: 80 pp, 44 pp appendix. (in Russian). [This thesis consists of two parts, a faunistic one and one with detailed investigations into the ecology and biology of selected species. Between 2002 and 2004 dragonflies were recorded from 41 sites. These sites were mainly situated in the valleys and floodplains of the major rivers and streams entering the Black Sea at its northwestern coast, including the rivers Danube and Dniestr. Forty of the previously recorded 51 Ukrainian species were found with several new county records, Lestes dryas, Coenagrion ornatum, C. scitulum, Erythromma lindenii, Anax imperator, Gomphus vulgatissimus, Libellula fulva, L. depressa, Symptetrum flaveolum, and S. pedemontanum are of special interest. All records are detailed in the appendix. Based on these new findings and a comparison of the literature, suggestions are provided for conservation priorities of the Ukrainian odonate species in the form of a risk scale. The second part provides information of several unrelated observations such as the variability of wing patterns in the Calopteryx splendens complex (including the record of androchrome females), the variation in the male genitalia of Orthetrum coerulescens anceps and a chapter on meticulously described cases of wing anomalies in Platycnemis pennipes, Ischnura pumilio and Orthetrum brunneum. There is also a chapter on population biology. It describes the seasonal variation over three months in the sex ratio and colour morph ratios of Ischnura elegans and Coenagrion pulchellum at two sites. For the analysis of the colour morphs, more than 1200 and 200 individuals, respectively, of the two species were captured, scanned and their colour identified by commercial computer software.] Address: Dyatlova, Elena Sergeyevna, Institute of Zoology, Faculty of Biology, I.I. Mechnikov University of Odessa, Odessa, Ukraine

**5219.** Emiliyamma, K.G.; Radhakrishnan, C.; Muhammed Jafer Palot (2005): Pictorial handbook on common dragonflies and damselflies of Kerala. Kolkata, Zoological Survey of India. ISBN 81-8171-067-3.: viii, 68 pp. [Contents: Preface. Table 1. Diversity of odonata (Insecta) in India/Kerala. Biology. Structure of an adult odonate (Imago). External Morphology. Breeding environments of odonates. Systematic account: 1. Ceriagrion cerinorubellum. 2. Ceriagrion coromandelianum. 3. Pseudagrion microcephalum. 4. Pseudagrion rubriceps ru-

briceps. 5. *Aciagrion occidentale*. 6. *Ischnura aurora aurora*. 7. *Agriocnemis pygmaea*. 8. *Copera marginipes*. 9. *Copera vittata*. 10. *Neurobasis chinensis chinensis*. 11. *Vestalis apicalis apicalis*. 12. *Vestalis gracilis gracilis*. 13. *Rhinocypha (Heliocypha) bisignata*. 14. *Libellago lineata indica*. 15. *Euphaea fraseri*. 16. *Ictinogomphus rapax*. 17. *Gynacantha dravida*. 18. *Tetrathemis platyptera*. 19. *Brachydiplax sobrina*. 20. *Cratilla lineata*. 21. *Lathrecista asiatica asiatica*. 22. *Orthetrum chrysis*. 23. *Orthetrum luzonicum*. 24. *Orthetrum pruinotum neglectum*. 25. *Orthetrum sabina sabina*. 26. *Potamarcha congener*. 27. *Acisoma panorpoides panorpoides*. 28. *Brachythemis contaminata*. 29. *Bradino-pyga geminata*. 30. *Crocothemis servilia servilia*. 31. *Diplacodes trivialis*. 32. *Neurothemis fulvia*. 33. *Neurothemis intermedia intermedia*. 34. *Neurothemis tullia tullia*. 35. *Rhodothemis rufa*. 36. *Trithemis aurora*. 37. *Trithemis festiva*. 38. *Trithemis pallidinervis*. 39. *Palpopleura sexmaculata sexmaculata*. 40. *Rhyothemis variegata variegata*. 41. *Pantala flavescens*. 42. *Tramea limbata similata*. 43. *Tholymis tillarga*. 44. *Zygomma petiolatum*. 45. *Aethriamanta brevipennis*. 46. *Urothemis signata signata*. Appendix. References and further reading.]

**5220.** Ferreira, S.; Weihrauch, F. (2005): Annotated bibliography of Odonatological literature from continental Portugal, Madeira, and the Azores (Odonata). *Libellula* 24(1/2): 109-128. (in English, with Portuguese and German summaries). [An annotated bibliography of odonatological literature from Portugal is presented, comprising 144 references from the years 1797 to 2005.] Address: Ferreira, Sónia, CIBIO/UP - Centre de Investigate em Biodiversidade e Recursos Geneticos, Universidade do Porto, Campus Agrário de Vairao, P-4485-661 Vairão, Portugal. E-mail: hiporame@gmail.com

**5221.** Gäde, G.; Marco, H.G. (2005): The adipokinetic hormones of Odonata: A phylogenetic approach. *J. Insect Physiology* 51(3): 333-341. (in English). ["Adipokinetic neuropeptides from the corpora cardiaca of the major families of all three suborders of the Odonata were identified by one or more of the following methods: Isolation of the peptides from a methanolic extract of the corpora cardiaca by liquid chromatography, peak monitoring by fluorescence of the Trp residue and comparison of the retention time with those of known synthetic peptides of Odonata. Hyperlipaemic bioassays of the HPLC-generated fractions either in *Locusta migratoria* or, in a few cases, in *Anax imperator* or *Orthetrum julia*. Sequencing of the isolated, bioactive HPLC fraction by Edman degradation. Mass spectrometric measurement of the isolated, bioactive fraction. Sequence assignment revealed that the investigated Odonata species always contain only one adipokinetic peptide. This is always an octapeptide. The suborder Zygoptera contains the peptide code-named Psein-AKH, the Anisozygoptera and the families Aeshnidae, Cordulegastridae and Macromiidae of the Anisoptera contain Anaim-AKH, whereas Gomphidae, Corduliidae (with the exception of *Syncordulia gracilis*) and Libellulidae contain Libau-AKH; one species of Libellulidae has Erysi-AKH, a very conservative modification of Libau-AKH (one point mutation). When these structural data are interpreted in conjunction with existing phylogenies of Odonata, they support the following: Zygoptera are monophyletic and not paraphyletic. Anisozygoptera and Anisoptera are sister groups and contain the ancestral

Anaim-AKH which is independently and convergently mutated to Libau-AKH in Gomphidae and Libellulidae. The Corduliidae are of special interest. Only Corduliidae sensu stricto appear to contain Libau-AKH, other species placed into this family by most authorities contain the ancestral Anaim-AKH. Possibly, assignments of AKHs can untangle the paraphyly of this family." (Authors)] Address: Gäde, G.; Zoology Department, University of Cape Town, Private Bag, Rondebosch 7701, South Africa

**5222.** Garner, P. (2005): The Dragonflies of Herefordshire. Herefordshire Biological Records Centre: app. 70 pp. (in English). ["Herefordshire, as one of the most picturesque and unspoilt counties in lowland Britain is rich in wildlife. With magical rivers like the Wye and Lugg running through the heart of it and with an abundance of ponds and lakes it is a haven for dragonflies, and yet until 20 years ago it was largely unrecorded. This book is the product of 20 years of recording in which Peter Garner gives an intimate and personal account of Herefordshire's 27 species of which all but 3 have been proven or are likely to be breeding. "The Dragonflies of Herefordshire" will appeal to those who have a general love of the countryside, as well as dedicated dragonfly experts. Hopefully, even those who know more about dragonflies than Peter will still be interested by some of the detail of his observations, by the speculation of his hypotheses, and above all by the distribution of records from what was very likely, the least well recorded county in the country. Several records are of special note because Herefordshire is on the edge of their range: this applies to the Scarce Bluetailed Damselfly, Red-eyed Damselfly, Downy Emerald, Brown Hawker, Migrant Hawker, Golden-ringed, Black-tailed Skimmer, Ruddy and Black Darters." (Publisher)] Address: To order your copy, please send a cheque payable to "Herefordshire Council" to: The Dragonflies of Herefordshire Booklet Herefordshire Biological Records Centre, P. O. Box 144, Hereford. HR1 2YH. UK

**5223.** Gassmann, D. (2005): The Phylogeny of Southeast Asian and Indo-Pacific Calicnemiinae (Odonata, Platycnemididae). *Bonner zoologische Beiträge* 53(1/2) (2004): 37-80. (in English). ["Phylogenetic relationships of Southeast Asian and Indo-Pacific damselflies of the subfamily Calicnemiinae (Odonata: Platycnemididae) are examined by cladistic analyses using morphological characters. The strict consensus cladogram of the resulting equally most parsimonious trees supports the monophyly of the Papuan genus *Idiocnemis* Selys, the Philippine genus *Risioctnemis* Cowley and its subgenera, but leaves the basal relationships of the African genera and the Palawan genus *Asthenocnemis* Lieftinck partly unresolved. A preferred phylogenetic hypothesis is presented showing a well supported 'Indo-Pacific clade' consisting of Philippine, New Guinean and Solomon island taxa, and as sister group *Asthenocnemis*. *Risioctnemis* turns out to be a sister group of *Lieftinckia* / *Salomocnemis* (Solomon Islands), the sister taxon of those being the central New Guinean *Arrhenocnemis* Lieftinck. Together, these form a monophyletic group with the remaining Papuan taxa. *Idiocnemis leonora* Lieftinck is transferred to *Rhyacocnemis* Lieftinck comb. nov. The possible effects of taxon sampling are discussed." (Author).] Address: Gassmann, D., Institute of Evolutionary and Ecological Sciences, Leiden University, c/o National Museum of

Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: gassmann@naturalis.nnm.nl

**5224.** Gassmann, D. (2005): Phylogenetic systematics and historical biogeography of Malesian Calicnemiine damselflies (Odonata, Platycnemididae). Thesis Leiden University: without pagination. (in English, with Dutch summary). ["The aim of the present study was to reveal phylogenetic relationships within the damselfly subfamily Calicnemiinae (Odonata, Platycnemididae) as a basis for a historical-biogeographic scenario for the Malesian species. Beside that, taxonomic revisions at subgeneric and species-group level contribute to our knowledge of the diversity of the group. Chapter 1 and Chapter 2 together contain a taxonomic revision of the damselfly genus *Idiocnemis* Selys, 1878, from New Guinea and surrounding islands. [...] In Chapter 3, the subgenus *Ignecnemis* Hämäläinen, 1991, of the Philippine genus *Risioecnemis* Cowley, 1934, is revised. [...] In Chapter 4 the phylogenetic relationships of South-east Asian and Indo-Pacific Calicnemiinae are examined by cladistic analyses using morphological characters. A parsimony analysis, based on 88 characters and including 84 taxa, was performed resulting in 732 equally most parsimonious trees. [...] Chapter 5 places the Calicnemiinae in a context with other groups of freshwater organisms in Malesia." (Author)] Address: Gassmann, D., Institute of Evolutionary and Ecological Sciences, Leiden University, c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: gassmann@naturalis.nnm.nl

**5225.** Gohmert, J.; Martens, A. (2005): Der Sonnenbarsch *Lepomis gibbosus* als Prädator von Kleinlibellen bei der Eiablage (Teleostei: Centrarchidae; Odonata: Coenagrionidae). *Libellula* 24(1/2): 55-62. (in German, with English summary). ["In the summer of 2004 at a man-made lake near Karlsruhe, Germany, predation of *L. gibbosus* on *Erythromma viridulum* and *E. lindenii* was observed and recorded with a video camera. Four out of 15 observed attacks by *L. gibbosus* were successful. In eight cases, a fish appeared all of a sudden and jumped after a tandem of damselflies during oviposition. In six cases, a fish approached very slowly until it was very close to its prey and then suddenly snapped at the damselflies. In one case, the predator approached slowly, but the tandem recognised it and escaped before the fish was able to attack it." (Authors)] Address: Gohmert, Jana, Forsthausweg 4, D-64569 Nauheim, Germany. E-mail: jana.gohmert@web.de

**5226.** Grossmann, M. (2005): Tiere, Pflanzen und Pilze im Nationalpark „Hainich“ - Stand und Bilanz der bisherigen Erfassungen. *Landschaftspflege und Naturschutz in Thüringen* 42(3): 92-97. (in German). [Thuringia, Germany; the wood dominated National Park harbours a total of 34 odonate species (not specified in the article), including *Leucorrhinia pectoralis* and *Crocothemis erythraea*.] Address: Grossmann, M., Verwaltung Nationalpark Hainich, Bei der Marktkirche 9, D-99947 Bad Langensalza, Germany

**5227.** Günther, A. (2005): *Anax ephippiger* in Europa - immer Invasionen in eine Sackgasse? (Odonata: Aeshnidae). *Libellula* 24(3/4): 241-247 (in German, with English summary) ["From the end of September to early October 2004, massive migrations of immature *A. ephippiger* were observed at the Black Sea coast of Bulgaria. Their origin from a summer generation in Eu-

rope is considered as most likely. The first and most numerous aggregations were migrating ahead of a heavy rainfall front from the north-west. During daylight, the dragonflies migrated partly at altitudes of 50 m and more. The number of individuals, the direction and the intensity of the migration make a successful return into the core area of the species plausible." (Author) Address: Günther, A., TU Bergakademie Freiberg, IÖZ, AG Biologie/Ökologie, Leipziger Str. 29, D-09599 Freiberg, Germany. E-mail: andre.guenther@ioez.tu-freiberg.de

**5228.** Hadrys, H.; Schroth, W.; Schierwater, B.; Streit, B.; Fincke, O. (2005): Tree hole odonates as environmental monitors: Non-invasive isolation of polymorphic microsatellites from the neotropical damselfly *Megaloprepus caerulatus*. *Conservation Genetics* 6(3): 481-483. (in English). ["Because of their complex mating behaviour and life cycle (alternating aquatic and terrestrial stages) odonates provide important model systems for environmental monitoring, evolutionary ecology, and conservation genetics. Many odonate species are endangered and call for the use of non-invasive molecular studies. In *M. caerulatus* we have identified polymorphic microsatellite loci by means of the randomly amplified microsatellite technique (RAMS; Ender et al. 1996). Using the DNA from each a single leg of three unrelated individuals we screened 63 RAPD primers for small size banding patterns. A total of 95 RAPD profiles was hybridized with digoxigenin labelled di- and trinucleotide repeats (GAn, GTn, CAn and AATn) and 36 RAPD fragments harbouring microsatellite motifs were isolated. Cloning and sequencing of positive fragments revealed five polymorphic microsatellite loci. Since *M. caerulatus* is a viable bio-indicator for primary rainforests the microsatellite system can be used to study the effects of forest fragmentation on population viability." (Authors)] Address: Hadrys, Heike, ITZ, Ecology & Evolution, TiHo Hannover, Bünteweg 17d, D-30559, Hannover, Germany. E-mail: heike.hadrys@ecolevol.de

**5229.** Hancox, J. (2005): Disappointing year for dragonflies. *Potteric Carr Nature Reserve. Recorder - an annual review of recording on the reserve* 8: 4. (in English). [Yorkshire, UK; 18 odonate species are briefly discussed. For a full paper see: <http://www.potteric-carr.org.uk/jan2005.pdf>] Address: Hancox, J., 57 Braithwell Road, Ravenfield, Rotherham S65 4LH, UK. E-mail to hancoxj@aol.com

**5230.** Hartman, K.; Kaller, M.; Howell, J.; Sweka, J. (2005): How much do valley fills influence headwater streams? *Hydrobiologia* 543(1-3): 91-102. (in English). ["Valley fill mining has the potential to alter headwater stream habitat in many areas in the eastern United States. In valley fill mining, overburden is removed to expose underlying coal seams. The overburden is then deposited in the adjacent valley. The deposited overburden from mining increases sedimentation, increases stream conductivity, and alters hydrologic regimes downstream of the fill. Changes in downstream communities are not well documented. However, it was suspected the increased sedimentation and conductivity would have deleterious effects upon the downstream macroinvertebrate communities. In southern West Virginia, four pairs of streams, each consisting of a fill and a reference stream, were selected as representative of watersheds experiencing valley fill mining. Stream pairs were selected for similar environmental conditions, with



one stream having a valley fill in its headwaters. Each stream was sampled by replicate Surber samples (n=9 per stream). Water chemistry and sediment measurements also were taken at each location. Valley fill streams experienced significantly higher specific conductance ( $p < 0.01$ ), but did not have elevated levels of fine sediment. Fills exhibited elevated levels of Na, K, Mn, Mg, Ca, Ni and Fe relative to reference streams. Additionally, valley fill streams demonstrated significantly lower densities of Ephemeroptera, Coleoptera, Odonata, Non-insects, Scrapers, and Shredders ( $p < 0.03$ ) than reference streams. Further, Ephemeroptera richness was negatively related to specific conductivity and many of the richness metrics were negatively related to metals, both of which were generally elevated in fill streams. It appears that at the minimum, valley fills increase specific conductance and metals in streams and this or some other unqualified factors structure the macroinvertebrate community downstream of the valley fill. However, given the level of disturbance in valley fills, it is surprising how little differences existed between fills and reference stream biota." (Authors)] Address: Hartman, Kyle, Division of Forestry, Wildlife & Fisheries Program, West Virginia University, 322 Percival Hall, Morgantown, WV, 26506-6125, USA. Email: hartman@wvu.edu

**5231.** Hofmann, B.; Martens, A. (2005): Eine Fang-Wiederfang-Studie zur Ortstreue und Kurzstreckenausbreitung von *Sympetrum sanguineum* (Odonata: Libellulidae). *Libellula* 24(1/2): 63-72. (in German, with English summary). ["In the summer of 2004, 117 males and three females were marked at two canals in the Upper Rhine floodplain south of Karlsruhe, Germany. 14 males (11.7%) were recaptured, one to 14 days after marking. Eleven individuals were recaptured at another canal section. The data suggest that *S. sanguineum* does not have a site fidelity." (Authors)] Address: Hofmann, Bernadette, Turnhallenstr. 1, D-77866 Rheinau-Freistett, Germany. E-mail: BernadetteHofmann@web.de

**5232.** Illingworth, A. (2005): Lesser Emperors ovipositing in Yorkshire. *Dragonfly News* 48: 20. (in English). [*Anax parthenope*, 23th July 2005, Farnham Gravel Pits lake Knaresborough, North Yorkshire, UK.] Address: Illingworth, A., Chelmer, Ripley R Knaresborough, North Yorkshire

**5233.** Ishizawa, N. (2005): The response to rotating objects by *Anotogaster sieboldii* (Selys) males, Pt 2 (Anisoptera: Cordulegastridae). *Odonatologica* 34(3): 211-218. (in English). ["It has been reported that the response to rotating objects by *A. sieboldii* males indicates recognition of the objects as females. The influences of colour, size and rotation velocity (RV) of discs on hovering ratio (HVR) were studied with experiments using a small electric rotating device. Among the rotating discs with white, yellow, orange, red, green, or blue alternating with black, the one with green elicited the highest HVR (98%), whereas the HVR to the yellow/black disc was lowest (32%). This suggests that yellow has a role as a warning coloration against predators rather than being involved in intraspecific recognition. - In the relationship of the HVR to RV of the green/black disc, the HVR reached a peak around 20-25 Hz. In relation of HVR to the size of the disc, the larger the diameter of the disc, the higher was the HVR, and when different sizes of discs were put side by side, *A. sieboldii* males had a tendency to respond to the lar-

ger disc of the pair.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozavva City, Saitama Pref., Japan. E-mail: isizawa7@rivo.mediatli.net

**5234.** Jarvis, K.J.; Haas, F.; Whiting, M.F. (2005): Phylogeny of earwigs (Insecta: Dermaptera) based on molecular and morphological evidence: reconsidering the classification of Dermaptera. *Systematic Entomology* 30(3): 442-453. (in English). ["Dermaptera (earwigs) is a cosmopolitan order of insects, the phylogenetic relationships of which are poorly understood. The phylogeny of Dermaptera was inferred from large subunit ribosomal (28S), small subunit ribosomal (18S), histone-3 (H3) nuclear DNA sequences, and 43 morphological characters. Sequence data were collected for thirty-two earwig exemplar taxa representing eight families in two suborders: Hemimeridae (suborder Hemimerina); Pygidicranidae, Anisolabididae, Labiduridae, Apachyidae, Spongiphoridae, Chelisochidae and Forficulidae (suborder Forficulina). Eighteen taxa from ten additional orders were also included, representing Ephemeroptera, Odonata, Orthoptera, Phasmida, Embiidina, Mantodea, Isoptera, Blattaria, Grylloblattodea and Zoraptera. These data were analysed via direct optimization in poyunder a range of gap and substitution values to test the sensitivity of the data to variations in parameter values. These results indicate that the epizotic Hemimerus is not sister to the remaining Dermaptera, but rather nested as sister to Forficulidae + Chelisochidae. These analyses support the paraphyly of Pygidicranidae and Spongiphoridae and the monophyly of Chelisochidae, Forficulidae, Anisolabididae and Labiduridae." (Authors)] Address: Jarvis, K.J., Dept of Integrative Biology, Brigham Young University, Provo, Utah, USA

**5235.** Jeffries, M.; Eales, H.T.; Storey, G. (2005): Distribution and habitat of the Banded Demoiselle *Calopteryx splendens* (Harris) in Northumberland. *J. Br. Dragonfly Society* 21(1): 1-7. (in English). [Recent range expansions of *C. splendens* in Northumberland, UK are discussed with special emphasis on methodical problems (e.g. the documentation of negative records). Analysis of habitats with positive and negative records respectively show no significant differences; thus recent climate change must be responsible for the range expansions as observed with additional (odonate) species too.] Address: Jeffries, M., Division of Environmental Management, Ellison Building, Northumbria University, Newcastle upon Tyne NE1 8ST, UK

**5236.** Jenkins, D.K. (2005): Population studies of the Southern Damselfly *Coenagrion mercuriale* (Charpentier) in the New Forest. Part 9. The Crockford streams, 20 years on. *J. Br. Dragonfly Society* 21(1): 8-13. (in English). ["Following detailed monitoring of *C. mercuriale* in the Crockford area of the New Forest between 1985 and 1994, a follow up survey was carried out in 2004 to assess the effect of changes to the climate and habitat over the intervening years. Population numbers in all the sections of the stream system studied were at higher levels than previously recorded and were still increasing in mid June, when poor weather intervened." (Author)] Address: Jenkins, D.K., 7 Lakewood Road, Ashurst, Southampton SO40 7DH, UK

**5237.** Keat, S.; Thompson, D.J.; Kemp, S.J.; Watts, P.C. (2005): Ten microsatellite loci for the Small Red-eyed Damselfly *Erythromma viridulum* (Charpentier). *Molecular Ecology Notes* 5(4): 788-790. (in English).

["*E. viridulum* is the first recorded example of a migrant damselfly establishing colonies in the British Isles. To examine the population genetic structure of *E. viridulum*, a partial genomic library enriched for CA microsatellite loci was constructed. Of the 42 loci tested, 19 amplified spurious bands and 13 were monomorphic, leaving 10 polymorphic loci that resolved distinct alleles within the expected size range. The number of alleles ranged between two (LIST14-021, LIST14-40) and eight (LIST14-002). Observed and expected heterozygosities varied between 0.000-0.698 and 0.045-0.688, respectively." (Authors)] Address: Watts, P., Animal Genomics Laboratory, The Biosciences Building, School of Biological Sciences, Liverpool University, Crown Street, Liverpool L69 7ZB, U.K. E-mail: p.c.watts@liv.ac.uk

**5238.** Kipping, J. (2005): Wiederfund von *Somatochlora flavomaculata* (Vander Linden, 1825) (Odonata: Corduliidae) für Thüringen. *Entomol. Nachrichten und Berichte* 49(1): 47-48. (in German). [NSG "Restloch Zechau", Thuringia, Germany, 02.07.2003 & 14.07.2004] Address: Kipping, J., Fockestr. 19, D-04275 Leipzig, Germany. E-mail: jens-kipping@t-online.de

**5239.** Kunz, B. (2005): *Boyeria irene* in Tunesien (Odonata: Aeshnidae). *Libellula* 24(1/2): 39-46. (in German, with English summary). ["New data from three field trips between 2000 and 2002 regarding the occurrence of the species in northern Tunisia are given, providing the first evidence that Tunisian *Boyeria* populations pertain actually to *B. irene*. Besides, a brief description of the habitats as well as some biological notes are given." (Author)] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de

**5240.** Lambrechts, J. (2005): De libellenfauna van het gebied Houterenberg-Pinnekeswijer (Tessenderlo, West-Limburg). *Gomphus* 20(1): 3-16. (in Dutch, with English and French summaries). ["In 2000 and 2001 the nature reserve Houterenberg - Pinnekeswijer (Tessenderlo, Limburg, Belgium) was inventoried for dragonflies, as part of a study to elaborate a management plan. The collected data are treated in this article, as well as a number of later collected records by warden Bart Govaere. In total 24 dragonfly species were found, from which the following six are the most interesting from a faunistic point of view: *Coenagrion lunulatum*, *Leucorrhinia rubicunda*, *Lestes virens*, *Sympetma fuscica*, *Cordulia aenea* and *Ischnura pumilio*. Especially the oligotrophe "ven" 'De Pinnekeswijer' is of great interest for dragonflies, housing populations of the first 5 mentioned species." (Authors)] Address: Lambrechts, J., Zuurbemde 9, B-3380 Glabbeek, Belgium. E-mail: natuur@aeolus-milieu.be or Jorglambrechts@hotmail.com

**5241.** Leelapaibul, W.; Bumrungsri, S.; Pattanawiboon, A. (2005): Diet of wrinkle-lipped free-tailed bat (*Tadarida plicata* Buchanan, 1800) in central Thailand: insectivorous bats potentially act as biological pest control agents. *Acta Chiropterologica*, 7(1): 111-119. (in English). ["Insectivorous bats are major predators of nocturnal insects and have the potential to act as biological pest control agents in farmlands. The objective of the present study was to establish the diet of the guano bat, *Tadarida plicata*. The study was carried out at the Khao Chong Pran Cave, which houses 2.6 million bats, and is surrounded by rice fields. A total of 1,925 faecal pellets were collected from 385 bats during their mor-

ning return from January to December 2002. Faecal analysis indicated that *T. plicata* fed on at least nine insect orders: Homoptera (28.4%), Lepidoptera (20.8), Hemiptera (16.4), Coleoptera (14.4), Diptera (7.0), Hymenoptera (6.6), Odonata (6.0), Orthoptera (0.5) and Psocoptera (0.1). Light traps indicated that Coleoptera (41.2%), Homoptera (25.3), Hemiptera (18.8) and Diptera (12.7) were the most abundant insects in the study area. Homopterans, most of which were white-backed planthopper (*Sogatella* sp., Delphacidae) had the highest percentage frequency of occurrence in the bats diet indicating that *T. plicata* potentially plays an important role in controlling this major crop pest. The presence of macropterous planthoppers and a large proportion of moths in its diet suggests that *T. plicata* feeds on windborne migrant insects at high altitude. Female bats fed significantly more on lepidopterans and coleopterans and less on damselflies than males. The diet diversity index of lactating females was higher than pregnant females. Diet did not differ significantly between the dry and rainy seasons for either sex." (Authors)] Address: Bumrungsri, S., Department of Biology, Faculty of Science, Prince of Songkla University, Hat Yai, Songkhla, Thailand. E-mail: sara.b@psu.ac.th

**5242.** Lohr, M. (2005): Das Naturschutzgebiet "Auf dem Berenbruch" bei Fürstenau. *Beiträge zur Naturkunde zwischen Egge und Weser* 17: 92-97. (in German). [Nordrhein-Westfalen, Germany; 22 odonate species are listed and briefly commented. Species conservation measures directed to the tree frog (*Hylas arborea*) favoured odonate species as *Lestes dryas* and *Sympetrum flaveolum*, dwelling ephemeral waters.] Address: Lohr, M., An der Kirche 22, D-37671 Hörter, Germany. E-mail: mlohr@fh-hoexter.de

**5243.** Lohr, M. (2005): Libellenbeobachtungen in Südpotugal (Odonata). *Libellula* 24(1/2): 87-107. (in German, with English summary). ["During a three-weeks' trip in May 2003, the southern Portuguese districts Algarve and Baixo Alentejo were visited. At 36 investigated localities 39 spp. were recorded in total. Reproduction was proved for 31 spp. by records of exuviae. The dragonfly communities of different types of water bodies are described, and noteworthy observations concerning the geographical range of some species are presented in detail. *Selysiotthemis nigra* is new for Portugal, exuviae were found near Faro. Furthermore, remarkable records of *Lestes dryas*, *Coenagrion sdtulum*, *Gomphus graslinii*, *Macromia splendens*, and *Oxygastera curtisii* from southwestern Portugal are discussed in the context of their distribution in the Iberian peninsula. The dragonfly communities of southern Portuguese rivers are characterized by a high species diversity. The distribution of some species found in these rivers is restricted to southwestern Europe, many species mainly inhabit this area. Hence, the responsibility of Portugal for the conservation of rivers that are still unaffected by barrages is very high." (Author)] Address: Lohr, M., FH Lippe und Hörter, Fachgebiet Tierökologie und Landschaftsökologie, An der Wilhelmshöhe 44, D-37671 Hörter, Germany. E-mail: mlohr@fh-luh.de

**5244.** Long, R. (2005): A further Channel Islands record of Southern Migrant Hawker. *Atropos* 26: 55-56. (in English). [Jersey, UK; 8 August 2004, *Aeshna affinis*] Address: Long, R., Ozarda, Les Hammonnets, St. John, Jersey, Channel Islands, JE3 4FP, UK

**5245.** Loos, G. (2005): Verslag van de excursie van 12 juni 2004 naar het Vennengebied van Ravels-Poppel. *Gomphus* 20(1): 27-29. (in Dutch, with French summary). [This is a brief report from an excursion to the "Vennengebied van Ravels-Poppel", Belgium on 12-VI-2004. 21 odonate species including *Sympecma fusca* and *Leucorrhinia rubicunda* at Leiven, *Sympetrum flavolum* at Witgoor, and *Coenagrion pulchellum*, and *Brachytron pratense* at Zwart Water have been sighted.] Address: Loos, G., Kanaaldijk 1, B-2380 Revels, Belgium

**5246.** Luttbeg, B.; Hammond, J.; Sih, A. (2005): How predators and prey distribute themselves across space: comparing empirical data to alternative models of movement rules. ESA Annual Meeting, Montréal, Canada. August 2005: (in English). [Verbatim: While many studies have examined how prey distribute themselves in response to predators or how predators distribute themselves in response to prey, surprisingly few theoretical or empirical studies have examined how the two interact. How predators and prey distribute themselves is potentially shaped by the distributions of their 1) own species and 2) the other species, and 3) the distribution of resources and shelter across space. We present an examination of how these three factors affect the movement rules of prey (Pacific tree frog tadpoles, *Hyla regilla*) and predators (dragonfly nymphs, *Aeshna palmata*) in an experimental arena with two food patches that differ in the amount of prey's resource. Predator and prey distributions between the two patches were recorded at regular intervals over 3 hours and the minimum rates of movements between the patches were calculated. These data were compared to alternative models of how the probability of a prey or predator's switching patches depends on combinations of the proportion of prey, the proportion of predators, and the level of resources in the patch prior to individuals moving or not moving between patches. The relative evidence from the data for each of the alternative models were quantified using a model comparison approach utilizing Akaike Information Criteria. We find that prey movement between patches is primarily a positive function of the proportion of predators and prey in their current patch; i.e., that prey avoid both predators and competitors, but pay less attention to resources per se. For predators, their probability of movement decreased as the level of the prey's resource increases. That is, the predators appear to be basing their movement more on the distribution of the prey's resource than the distribution of prey and other predators. This surprising result matches a theoretical prediction that in a predator-prey race, predators should match the distribution of the prey's resource while prey should distribute themselves uniformly across patches. We compare these results to other metrics of how predators and prey are distributed, such as spatial overlap and coincidence.] Address: Luttbeg, B., University of California, Davis, Davis, CA

**5247.** Machado, A.B.M. (2005): *Schizocordulia* gen. nov. related to *Aeschnosoma* Selys with description of the female and additional data on the male of *Schizocordulia rustica* (Selys) comb. nov. (Odonata, Corduliidae). *Rev. Bras. Zool.* 22(3): 775-779. (in English, with Portuguese summary). ["The monotypical genus *Schizocordulia* is created for *Schizocordulia rustica* (Selys, 1871) comb. nov. known from a single male from Bahia, Brazil lacking the anal appendages. The female is described and the redescription of the male made by

GEISJKES (1970)] is completed by the description and illustration of the penis, the anal appendages and the pilose plate. The main characters separating the new genus from the closely related *Aeschnosoma* Selys, 1870 are the bifid male inferior appendage, the very long internal branch of the hamulus, the presence of a pilose plate on the male 7<sup>th</sup> abdominal segment, and the large and complex *vaivula vulvae* of the female. The study was based on 33 males and 2 females, which allowed an evaluation of the intraspecific variations in *Schizocordulia rustica*." (Author) The correct authorship of the species should be "Hagen in Selys, 1871" (Martin Schorr). For the full paper see: <http://www.scielo.br/pdf/rbzool/v22n3/26203.pdf> Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil

**5248.** Malkmus, R. (2005): Libellen an den Bergbächen des Mount Kinabalu. *Natur und Museum* 1/2005: 6-15. (in German). [The author gives a concise description of the odonate fauna of Mount Kinabalu. Current knowledge totals the checklist of Odonata to 60 species. A brief history of dragonfly research in Mount Kinabalu is followed by a description of the faunas of different altitudes, and special emphasis is given to the riverine and the sun spot species. Many species are pictured by colour photographs. A closing chapter is directed to the relationship of the native people and dragonflies (e.g. usage as food).] Address: Malkmus, R., Schulstr. 4, D-97859 Wiesthal, Germany

**5249.** McCauley, S. (2005): Dispersal limitation and local performance: Interactions across life-history stages and consequences for species' distributions in anisopteran odonates.. 90th Annual Meeting in Montréal, Canada August 2005: (in English). [Verbatim: In many freshwater taxa, species' distributions are related to a habitat permanence gradient that is associated with a transition in the top predator community. Most studies of species' distributions across this gradient have focused on the role of trade-offs in local performance. However, for species which have limited abilities to withstand habitat drying, dispersal limitation may also be an important mechanism determining their ability to utilize habitats which dry regularly. I assessed the relative importance of local performance and dispersal limitation and how these processes may interact to determine species distributions in dragonfly species. I used a contrast of habitat specialist species restricted to permanent lakes with large bodied fish as top predators, and species with generalist distributions, occurring across the permanence and top predator gradient, to assess the role of local performance and dispersal limitation mechanisms in shaping species' distributions. I compared one aspect of local performance in habitat specialists and generalists - their vulnerability to alternative top predator types. I also compared larval traits expected to affect this and other aspects of local performance including larval activity levels and growth rates. I experimentally contrasted the effects of dispersal limitation in habitat specialists and generalists and related dispersal behavior to adult morphology. Dispersal limitation is a dominant mechanism structuring the breadth of species' distributions in these species. However, larval traits associated with species restricted to permanent lakes with large bodied fish predators were negatively related to adult traits that facilitate dispersal. These results suggest that traits affecting performance in diffe-



rent life-history stages may reinforce each other to shape species' distributions in this system.] Address: McCauley, Shannon, 1 University of Michigan, Ann Arbor, MI, USA

**5250.** McCreddie, J.W.; Ihle, D.T.; Adler, P.H. (2005): Biodiversity of larval damselflies and dragonflies (Insecta: Odonata) in the Lower Mobile/Tensaw Delta, Alabama. *Southeastern Naturalist* 4(2): 321-334. (in English). ["16 species of odonates, representing 9.2% of Alabama's odonate fauna, were collected from flowing waters 10 450 m wide in the poorly surveyed Mobile/Tensaw Delta of Baldwin County over a one-year period. The number of species was positively correlated with the number of specimens per site, with sites nearest Mobile Bay having fewer species, possibly reflecting higher salinities. Odonate assemblages in large flows of the Delta are unpredictable in terms of species co-occurrence, and fit a model of non-equilibrium community structure." (Authors)] Address: McCreddie, J., University of South Alabama, Department of Biological Sciences. E-Mail: [jmccread@jaguar1.usouthal.edu](mailto:jmccread@jaguar1.usouthal.edu)

**5251.** Mey, D. (2005): Libellen (Odonata). In: Nationalpark Hainich Verwaltung (Hrsg.): Artenbericht 2005. Tiere, Pflanzen und Pilze im Nationalpark Hainich. Kenntnisstand zum 31.12.2004: 19-20. (in German). [Thuringia, Germany; checklist of the Odonata of the National Park Hainich. Available at: <http://www.nationalpark-hainich.de/media/downloads/AB2005Teil1.pdf>] Address: Nationalpark Hainich Verwaltung, Bei der Marktkirche 9, D-99947 Bad Langensalza, Germany

**5252.** Michaletz, P.; Doisy, K.; Rabeni, C. (2005): Influences of productivity, vegetation, and fish on macroinvertebrate abundance and size in Midwestern USA impoundments. *Hydrobiologia* 543(1): 147-158. (in English). ["The influences of productivity, vegetation coverage, and benthivorous fish abundance on macroinvertebrate abundance and mean size were examined in Midwestern USA impoundments. While impoundment productivity was not strongly related to total abundance and mean size of macroinvertebrates, it was related to specific taxa. As productivity increased, Ephemeroptera and Odonata abundance decreased and Diptera abundance increased. Despite the shift in taxonomic composition, mean individual size of the macroinvertebrate community varied little with changes in impoundment productivity. Relationships between macroinvertebrates and benthivorous fish were mixed. Macroinvertebrate abundance, especially Diptera, increased with increases in bluegill *Lepomis macrochirus* Rafinesque abundance and decreased with increases in channel catfish *Ictalurus punctatus* (Rafinesque) (which are stocked annually) abundance. Fish were not related to the mean size of macroinvertebrates. Macrophyte coverage was not related to macroinvertebrate abundance or mean size. Overall, macroinvertebrate abundance was mostly related to productivity and benthivorous fish in these impoundments. Mean size of macroinvertebrates did not differ with productivity, fish abundance, or macrophyte coverage." (Authors)] Address: Michaletz, P., Missouri Department of Conservation, 1110 South College Avenue, Columbia, MO, 65201, USA, Email: [Paul.Michaletz@mdc.mo.gov](mailto:Paul.Michaletz@mdc.mo.gov)

**5253.** Michels, U. (2005): Bemerkenswerte Nachweise im Makrozoobenthos der Weißen Elster. *Entomologische Mitteilungen Sachsen-Anhalt* 13(2): 79-81. (in

German). [Sachsen-Anhalt, Germany; *Calopteryx splendens*] Address: Michels, Ute, LIMNO-PLAN GbR, Bauernweg 8, D-15741 Bestensee, Germany

**5254.** Mitchell, F.L.; Lasswell, J.L. (2005): A Dazzle of Dragonflies. Peter N. Nevaumont Books (Texas A&M University Press). ISBN 1-58544-459-6: 224 pp. ["A Dazzle of Dragonflies" is a large, beautiful book that contains well-written information about dragonfly natural history, prehistory, and folklore. It also provides instructions on catching, collecting, rearing, photographing, and scanning odonates, as well as tips on creating a water garden to attract them. The abundant photos are in most cases exceptional, and the numerous other images, such as various wing patterns, eyes, and abdomens, are the result of scanning. These pictures are arranged or layouted as special kind of "Dragonfly Art", and as not otherwise to expect, they appear dead. But to see the wing venation is very fascinating. To scan wings is even better than to prepare black and white drawings of wing venation, cause you get the colours of the veins or pterostigma too. For me, the chapter on preserving Odonata is path breaking for the kind of documentation of specimens in collections. It is neither a field guide nor a scientific treatise: more than a hundred dragonflies are pictured in this coffee-table book, and best you browse it in your leisure time simply to enjoy our favourite beasts.

It is a little bit curious from the German point of view that Odonata are called "Hatzpferd", a name said to be still common for dragonflies among German people. The (nice) story of the Hatzpferd is told, but looking in Google for this expression, provides exactly zero hits. That's the situation: Checking Schäfer, Liselotte (1947): *Deutsche Synonymik der Libelle*. Dissertation an der Philosophischen Fakultät der Philipps-Universität zu Marburg. 303 pp., who compiled all the expressions in Germany referring to dragonflies, none hit the "Hatzpferd". There is only one quite similar from Blankenese near Hamburg: "Hetzepferd".

In spite of this: I don't want to miss this book. It is a very special one among the many books on dragonflies published in the past few years. (Martin Schorr)

**5255.** Moliár, A.; Ambrus, A. (2005): Odonata and aquatic beetle records from the hanság habitat reconstruction area. *Acta Biol. Debr. Oecol. Hung.* 13: 115-120. (in Hungarian, with English summary). ["The Nyirkai-Hany Habitat Reconstruction project was started in 2001 at the SE area of Hanság by the Fertő-Hanság National Park Directorate to extend and enhance the wetland habitat types of the area. The habitat reconstruction took place in three different beds successively involving 430 hectares. This paper presents the results of the Odonata monitoring started in the first year of flooding and beetle surveys of 2003-2004 years. The first years of the freshly flooded wetlands was characterized mainly by the large number of the widely distributed, generalist species, such as *Orthetrum cancellatum*, *Ischnura elegans* and later *Sympetrum vulgatum*, *Orthetrum albistylum* and *Noterus crassicornis*, *Noterus clavicornis*, *Hydrobius fuscipes* (Coleoptera). There were established small wetlands out of the directly flooded areas, by the increasing ground water table, filtered through the peat soils. These small water bodies support special, rich macroinvertebrate communities in dense vegetation and free of fish situation containing populations of such species as *Anaciaeschna isosceles*, *Brachytron pratense*, *Libellula quadrimaculata*, *Ischnura pumilio*, *Coenagrion pulchellum*, *Sympecma*

fusca (Odonata), *Hydrochus crenatus*, *Enochrus quadripunctatus* (Coleoptera)." (Authors)] Address: Ambros, A., Hortobágy National Park, Directorate, Thematic Information Centre of Nature Conservation, H-9495 Kópháza, Jurisich M. u. 16, Hungary

**5256.** Müller, R.; Hendrich, L.; König, B.; Schleuter, M. (2005): Das Makrozoobenthos der Unteren Havel zwischen Ketzin und Brandenburg unter besonderer Berücksichtigung der Auswirkungen des Wellenschlags. Abstracts. Jahrestagung 2005. Deutsche Gesellschaft für Limnologie. Karlsruhe: 87-88. (in German). [First results of a study along the River Havel, Brandenburg, Germany with reference of the impacts and effects of waves and the wash of moving boats or ships are presented. Records of three odonate species are checklisted but without focus on the potential impacts of boats.] Address: Schleuter, M., Bundesanstalt für Gewässerkunde, Kaiserin-Augusta-Anlagen 15-17, D-56068 Koblenz, Germany

**5257.** Muséum d'histoire naturelle de Nantes (2005): Program and abstracts from the oral communications of the West-European odonatological meeting, Val de la Pommeraiie (France), June 24th - 27th, 2005. Muséum d'histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France: 20 pp, app. (in French and English). [The remarkable meeting under the leadership of the French odonatologists convened the representatives of the Belgian, English, French, and German dragonfly societies. The following lectures were held: P. S. CORBET - *Sympetrum*: a genus offering research opportunities; J. OTT - Dragonflies and Climatic Changes: recent observations of range expansions in Europe and their possible ecological effects.; F. HERBRECHT - Dragonflies of rock quarries in the Armorican Massif; E. DOUILLARD - Contribution to knowledge on life-cycle and population survey of *Oxygostra curtisii* (DALE, 1834) in the Mauges (department of Maine-et-Loire); A. DUBOS, J. PELLET et A. MAIBACH - Efficiency of the creation of a group of forest ponds on the Odonata community; G. De KNYF, A. ANSELIN - Some aspects of distribution of Odonata in Belgium; D. GRAND - Odonata from Corsica: latest studies and synthesis; V. KALKMAN - Towards an atlas of European Odonata; F. RAGUENES - The Dragonfly's House in Chaille-sous-Ormeaux; D. GRAND - Endemic dragonflies from New-Caledonia; P. MACHET - Dragonflies from French Guyana History, now and the future; F. MEURGEY - Characteristics of the odonofauna and of aquatic habitats of the French West Indies, Guadeloupe & Martinique; F. MEURGEY - Odonata of French overseas territories. Synthesis of current knowledge 1999 - 2005; P. MACHET - Dragonflies from French Polynesia 1- History and now. 2- The Society Islands; K. GUERBAA - Results from six years of Odonatological survey on two pools in the Longeyroux peat bog (Correze, France); E. RISERVATO - Dragonflies larval ecology in Ticino Park (North of Italy); D. GRAND - *Sympetrum vulgatum ibericum* OCHARAN, 1985; a new taxa in France; K.-D. B. DIJKSTRA - Critical and consequent taxonomy in Odonata: the European perspective; Round table: West-European situation of *Coenagrion mercuriale* (Charpentier, 1840)] Address: Meurgey, F., Muséum d'histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5258.** Muzón, J.; Garré, A. (2005): Description of the last instar larva of *Erythrodiplax paraguayensis* (Anisop-

tera: Libellulidae). *Rev. Soc. Entomol. Argent.* 64(1-2): 85-91. (in English, with Spanish summary). [The last instar larva of *E. paraguayensis* (Förster) is described and illustrated, based on Iberá (Corrientes, Argentina) specimens. A comparative analysis of all hitherto known larvae from Argentina is provided." (Authors) Available at: <http://www.scielo.org.ar/pdf/rsea/v64n1-2/v64n1-2a14.pdf>] Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina. E-mail: muzon@ilpla.edu.ar

**5259.** Nekaris, K.A.I. (2005): Foraging behaviour of the slender loris (*Loris lydekkerianus lydekkerianus*): implications for theories of primate origins. *Journal of Human Evolution* 49(3): 289-300. (in English). [Members of the Order Primates are characterised by a wide overlap of visual fields or optic convergence. It has been proposed that exploitation of either insects or angiosperm products in the terminal branches of trees, and the corresponding complex, three-dimensional environment associated with these foraging strategies, account for visual convergence. Although slender lorises (*Loris* sp.) are the most visually convergent of all the primates, very little is known about their feeding ecology. This study, carried out over 10 ½ months in South India, examines the feeding behaviour of *L. lydekkerianus lydekkerianus* in relation to hypotheses regarding visual predation of insects. Of 1238 feeding observations, 96% were of animal prey. Lorises showed an equal and overwhelming preference for terminal and middle branch feeding, using the undergrowth and trunk rarely. The type of prey caught on terminal branches (Lepidoptera, Odonata, Homoptera) differed significantly from those caught on middle branches (Hymenoptera, Coleoptera). A two-handed catch accompanied by bipedal postures was used almost exclusively on terminal branches where mobile prey was caught, whereas the more common capture technique of one-handed grab was used more often on sturdy middle branches to obtain slow moving prey. Although prey was detected with senses other than vision, vision was the key sense used upon the final strike. This study strongly supports the notion that hunting for animal prey was a key ecological determinant in selecting for visual convergence early on in primate evolution. The extreme specialisations of slender lorises, however, suggest that early primates were not dedicated faunivores and lend further support to the emerging view that both insects and fruits were probably important components of the diet of basal primates, and that exploitation of fruits may account for other key primate traits." (Authors)] Address: Nekaris, K., Oxford Brookes University, School of Social Sciences and Law, Department of Anthropology, Nocturnal Primate Research Group, Oxford OX3 0BP, United Kingdom.

**5260.** Nel, A.; Petrulevicius, J.F.; Gentilini, G.; Martínez-Delclòs, X. (2005): Phylogenetic analysis of the Cenozoic family Sieblosiidae (Insecta: Odonata), with description of new taxa from Russia, Italy and France. *Geobios* 38(2): 219-233. [We describe the following Sieblosiidae: an unnamed gen. and sp. A from the Miocene of Italy, *Miostenolestes zherikhini* nov. gen., nov. sp., *Paraoligolestes stavropolensis* nov. sp., *Stenolestes fasciata* nov. sp. (all from the Miocene of North Caucasus), *Stenolestes* (?) *adygeianensis* nov. sp. (Oligocene of North Caucasus), and *Stenolestes cerestensis* nov. sp. (Oligocene of France). The genus *Sieblosia* Handlirsch, 1906 is restored. A new phylogenetic ana-

lysis of the Sieblosiidae is proposed. The two taxa gen. and sp. A and *Oligolestes* fall in most inclusive positions in the same clade with the Sieblosiidae. Within the Sieblosiidae sensu stricto, the two clades (*Paraoligolestes* + (*Parastenolestes* + *Stenolestes*)) and (*Parastenolestes* + *Stenolestes*) are the best supported. The family Sieblosiidae seems to be restricted to the Oligocene Miocene of Europe." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**5261.** Niehuis, M. (2005): Schlupfnachweise zweier bemerkenswerter Libellenarten (Südliche Mosaikjungfer / *Aeshna affinis* und Gemeine Keiljungfer / *Gomphus vulgatissimus*) im Süden von Rheinland-Pfalz (Odonata: Aeshnidae et Gomphidae). Fauna und Flora in Rheinland-Pfalz 10(3): 1125-1130. (in German). [*Aeshna affinis*: Jockrimer clay pits, Landkreis Germersheim, Rhineland-Palatinate, Germany, 23-VI-2005; *Gomphus vulgatissimus*, Odenbach/Glan, Landkreis Kusel, 12-V-2005; Neue Lauter, Landkreis Germersheim, 2-V-2005, both Rhineland-Palatinate, Germany.] Address: Niehuis, M., Im Vorderen Großthal, D-76857 Albersweiler, Germany. E-mail: [Niehuis@t-online.de](mailto:Niehuis@t-online.de)

**5262.** Novelo-Gutiérrez, R. (2005): La larva de *Enallagma novaehispaniae* Calvert 1902 (Odonata: Zygoptera: Coenagrionidae). Folia Entomol. Mex. 44(2): 219-224. (in Spanish, with English summary). ["A detailed description and illustration of the last instar larva of *E. novaehispaniae*, is provided. The main distinctive features exhibited by this species are: Third antennal segment less than twice as long as the first; one premental seta on each side of midline; four palpal setae; epi- and paraprocts strongly pigmented, and with tips rounded." (Author)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: [novelor@ecologia.edu.mx](mailto:novelor@ecologia.edu.mx)

**5263.** Ogden, T.H.; Whiting, M.F.; Wheeler, W.C. (2005): Poor taxon sampling, poor character sampling, and non-repeatable analyses of a contrived dataset do not provide a more credible estimate of insect phylogeny: a reply to Kjer. Cladistics 21: 295-302. (in English). ["The wealth of data available for phylogenetic analysis of the insect orders, from both morphological and molecular sources, is steadily increasing. However, controversy exists among the methodologies one can use to reconstruct ordinal relationships. Recently, Kjer (2004) (Aligned 18S and insect phylogeny. Syst. Biol. 53, 506-514) presented an analysis of insect ordinal relationships based exclusively on a single source of information: 18S rDNA sequence data. Kjer claims that his analysis resulted in a more credible phylogeny for the insect orders and strongly criticized our previous phylogenetic results. However, Kjer only used a subset of the data that are currently available for insect ordinal phylogeny, misrepresented our analyses, and omitted other analyses we have published on insect ordinal phylogeny. In our estimation, Kjer did a poor job of representing the current state of affairs in insect ordinal phylogenetics. Furthermore, we examine a number of analytical issues that are relevant not only for insect phylogeny, but systematics as a science, such as: repeatability and objectivity, locating alignment boundaries, secondary structure, goodness of fit measure, epistemological coherence, practicality and homology." Odonata are refe-

renced at many occasions.] Address: Ogden, T.H., Department of Integrative Biology, 401 WIDB, Brigham Young University, Provo, Utah 84602 USA. E-mail: [heathogden@byu.edu](mailto:heathogden@byu.edu)

**5264.** Orizaola, G.; Brana, F. (2005): Plasticity in newt metamorphosis: the effect of predation at embryonic and larval stages. Freshwater Biology 50: 438-446. (in English). ["1. Some organisms under variable predator pressure show induced antipredator defences, whose development incurs costs and may be associated with changes to later performance. This may be of especial relevance to animals with complex life histories involving metamorphosis. 2. This study examines the effect of predation environment, experienced both during embryonic and larval stages, on palmate newt (*Triturus helveticus*) metamorphosis. Newt eggs were raised until hatching with or without exposure to chemical cues from brown trout (*Salmo trutta*), and larval development was monitored in the presence or absence of the cues. 3. Exposure to predator cues during the embryonic stage resulted in higher growth rates at the larval stage, reduced time to metamorphosis and size at metamorphosis. Metamorphs also had narrower heads and shorter forelimbs than those from predator-free treatments. In contrast, exposure to predator cues during the larval stage did not affect metamorph characteristics. 4. These results indicate that developing embryos are sensitive to predator chemical cues and that the responses can extend to later stages. Reversion of induced defences when predation risk ceased was not detected. We discuss the possible adaptive significance of these responses." (Authors) Odonata are treated in the discussion of the results of the study. Available at: <http://www.popbiol.ebc.uu.se/pdf/FreshwaterBiology2005.pdf>] Address: Orizaola, G., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, c/ Catedrático Rodrigo Uria s/n, 33071, Oviedo, Spain. E-mail: [orizaola@correo.uniovi.es](mailto:orizaola@correo.uniovi.es)

**5265.** Ott, J. (2005): Die Große Moosjungfer *Leucorrhinia pectoralis* (Charpentier, 1825) - erneuter Nachweis für Rheinland-Pfalz (Odonata: Libellulidae). Fauna und Flora in Rheinland-Pfalz 10(3): 921-926. (German, with English summary) [Eppenbrunn, Landkreis Südwestpfalz, Rhineland-Palatinate, Germany, 22-VI-2005; detailed documentation of a record of this regionally very rare dragonfly.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: [L.U.P.O.GmbH@t-online.de](mailto:L.U.P.O.GmbH@t-online.de)

**5266.** Ott, J. (2005): Klimaänderung - auch ein Thema und Problem für den Biodiversitätsschutz im grenzüberschreitenden Biosphärenreservat Vosges du Nord und Pfälzerwald?. Ann. Sci. Rés. Trans. Vosges du Nord-Pfälzerwald 12: 127-142. (in German, with French and English summaries). [Concise review - including some odonatological examples - of current knowledge on effects of climate change on biodiversity.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: [L.U.P.O.GmbH@t-online.de](mailto:L.U.P.O.GmbH@t-online.de)

**5267.** Parr, A. (2005): Dragonfly news update. Atropos 26: 26-27. (in English). [Interesting UK odonate sightings in 2005 are briefly alighted, with some emphasis to *Libellula fulva*, *Sympetrum fonscolombii*, *Anax parthenope*, and *Erythromma viridulum*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: [Adrian.parr@bbsrc.ac.uk](mailto:Adrian.parr@bbsrc.ac.uk)



- 5268.** Parr, A. (2005): First dates for 2005. *Dragonfly News* 48: 18. (in English). [Phenological data of odonatalogical sightings in UK (late dates for 2004, first dates for 2005).] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: [Adrian.parr@bbsrc.ac.uk](mailto:Adrian.parr@bbsrc.ac.uk)
- 5269.** Parr, A. (2005): Guides to Odonata from various regions of the world. *Dragonfly News* 48: 21-24. (in English). [compilation of dragonfly books currently available.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: [Adrian.parr@bbsrc.ac.uk](mailto:Adrian.parr@bbsrc.ac.uk)
- 5270.** Parr, A. (2005): Migrant dragonfly update. *Dragonfly News* 48: 19. (in English). [Up-to-date records in UK of *Sympetrum fonscolombii* and *Anax parthenope*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: [Adrian.parr@bbsrc.ac.uk](mailto:Adrian.parr@bbsrc.ac.uk)
- 5271.** Parr, A. (2005): Odonata records committee update. *Atropos* 26: 28. (in English). [2004 records of *Anax parthenope* and *Aeshna affinis* in UK are documented.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: [Adrian.parr@bbsrc.ac.uk](mailto:Adrian.parr@bbsrc.ac.uk)
- 5272.** Parr, A.J. (2005): Migrant and dispersive dragonflies in Britain during 2004. *J. Br. Dragonfly Society* 21(1): 14-20. (in English). ["2004 was not an outstanding year for migration, perhaps in part because of the rather variable weather during the summer. In particular *Sympetrum fonscolombii* fared poorly. Some significant arrivals were however noted, especially during the month of August. High points of 2004 included a scattering of *Anax parthenope* throughout England during the course of the summer, a small influx of *Sympetrum flavolum* to the east coast, and more spectacularly, a sighting of *Crocothemis erythraea* in Cumbria, this record complementing one from Guernsey in the Channel Islands. A *Aeshna affinis* was also seen in the Channel Islands, this time on Jersey. Perhaps the real highlight of 2004 was the continued consolidation of our new colonist species. *Erythromma viridulum* showed a major expansion of its inland range, and further immigration was also noted. While breeding has still to be proven, it is also becoming increasingly probable that *Lestes barbarus* is establishing itself both in Kent and Norfolk." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: [Adrian.parr@bbsrc.ac.uk](mailto:Adrian.parr@bbsrc.ac.uk)
- 5273.** Pix, A. (2005): Die Libellen der Ballertasche mit Gedanken zur thermischen Faunendrift. *Göttinger naturkundliche Schriften* 6: 41-54. (in German, with English summary). [Lower Saxony, Germany; the gravel pit "Ballertasche" harbours 38 odonate species. Special emphasis is given to the "succession specialists" and the "thermophilic species". The faunal composition of the gravel pits demonstrates the generally and nationally observed trend in the direction towards thermophilic species. *Orthetrum brunneum* is classified as an umbrella species for early stages of succession in gravel pits with slow running seepage waters; in the context of nature conservation measures, it is assessed as more useful as *Bombina variegata* (Amphibia), a species of priority conservation concern.] Address: Pix, A., Mönchehofstr. 1, D-34127 Kassel, Germany
- 5274.** Postler, E.; Postler, W.; Kilimann, N. (2005): Entwicklungsnachweise von *Gomphus flavipes* im Datteln-Hamm-Kanal und im Rhein-Herne-Kanal (Odonata: Gomphidae. *Libellula* 24(1/2): 83-86. (in German, with English summary). ["On 23-VII-2004 an exuvia of *G. flavipes* was found at the Datteln-Hamm-Kanal (North Rhine-Westphalia, Germany). This is the first evidence for reproduction of this species in a navigable canal. Due to intensification of the search, in addition two exuviae of *G. flavipes* were found at the Rhein-Herne-Kanal (North Rhine-Westphalia, Germany) on 29-VII and 02-VIII-2004." (Authors)] Address: Postler, Elisabeth, Hammer Straße 39, D-59174 Kamen, Germany. E-mail: [w.postler@t-online.de](mailto:w.postler@t-online.de)
- 5275.** PRESSKIT (2005): Newspaper articles, reviews, author photo & bio for Common Dragonflies of California &/or Kathy Biggs and her Bigsnest Wildlife Pond. (in English). [<http://www.sonic.net/~bigsnest/Pond/dragons/presskit.html>]
- 5276.** Reels, G. (2005): Book reviews: Field Guide to the Dragonflies of Hong Kong. 2nd Edition by Keith D.P. Wilson, 383 pages, softcover. Cosmos Books Ltd, Hong Kong, 2004. *Porcupine* 32: 20-21. (in English). [The new field guide includes now 112 odonate species.] Address: not stated
- 5277.** Relyea, R.A.; Auld, J.R. (2005): Predator- and competitor-induced plasticity how changes in foraging morphology affect phenotypic trade offs. *Ecology* 86(7): 1723-1729. (in English). ["Studies of phenotypic plasticity frequently demonstrate functional trade-offs between alternative phenotypes by documenting environment-specific costs and benefits. However, the functional mechanisms underlying these trade-offs are often unknown. For example, predator-induced traits typically provide superior predator resistance but slower growth, while competitor-induced traits provide better growth but inferior predator resistance. While the mechanisms underlying predator resistance have been identified, the mechanisms underlying differential growth have remained elusive. To determine whether competitor and predator environments affect individual growth by induced changes in foraging morphology, we raised wood frog tadpoles (*Rana sylvatica*) under a factorial combination of competitors and predators (*Anax junius*) and assessed changes in mouthparts that might affect growth. In general, competitors induced relatively larger oral discs, wider beaks, and longer tooth rows, while predators induced relatively smaller oral discs, narrower beaks, and shorter tooth rows. These effects were interactive; the largest competitor-induced responses occurred under high predator density and the largest predator-induced responses occurred under low competition. Further, one of the tooth rows that commonly appeared under low predation risk was frequently absent under high predation risk. These discoveries suggest that predator and competitor environments can have profound effects on prey foraging structures and that these effects set up growth trade-offs between phenotypes that favor the evolution of phenotypically plastic responses." (Authors) Available at: <http://www.pitt.edu/~jra10/Relyea%20&%20Auld%202005.pdf>] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburg, Pennsylvania 15260, USA. E-mail: [rarelyea@pitt.edu](mailto:rarelyea@pitt.edu)
- 5278.** Rettig, K. (2005): Später Schlupftermin der Blaugrünen Mosaikjungfer (*Aeshna cyanea*) in Ostfries-

land. Beiträge zur Fauna und Flora Ostfrieslands 239: 22. (in German). [Germany, Lower Saxony; late emergence at 31-VIII-2005 from a garden pond] Address: Rettig, K., Danziger Str. 11, D-26725 Emden, Germany

**5279.** Riedel, F. (2005): Lepidopterenfauna im Jagsttal. Naturkundlichen Beiträge des Deutschen Jugendbund für Naturbeobachtung 35: 29-42. (in German). [Baden-Württemberg, Germany; records of the following species are briefly documented: *Onychogomphus forcipatus*, *Anax parthenope*, *Crocothemis erythraea*, and *Erythromma viridulum*.] Address: Riedel, F., Hagenbach 2, 74219 Möckmühl, Germany. E-mail: Riedel@students.uni-marburg.de

**5280.** Robinson, C. (2005): Life-Cycle. Dragonfly News 48: 30. (in English). [poem] Address: not stated

**5281.** Rohr, J.R.; Crumrine, P.W. (2005): Effects of an herbicide and an insecticide on pond community structure and processes. *Ecological Applications* 15(4): 1135-1147. (in English). ["Virtually all species live within complex food webs, and many of these organisms are exposed to contaminants. However, we know little about how community processes, such as competition and predation, influence susceptibility to contaminants or how different types of contaminants shape communities. The objective of our study was to determine how realistic concentrations of the herbicide atrazine and the insecticide endosulfan influence the structure of a pond community when the presence of common community members was manipulated. We employed a factorial design in mesocosms to evaluate the effects of pesticide treatments (25 µg/L of atrazine, 10 µg/L of endosulfan, solvent control; two pulses separated by two weeks) and the presence or absence of wood frog tadpoles (*Rana sylvatica*), adult snails (*Planorbella trivolvis*), and caged dragonfly larvae (*Anax junius*) on a freshwater community. Tadpoles, snails, and chironomid larvae, *Polypedilum* sp. (Dipterans), all competed for periphyton. As a result, tadpoles reduced the survival, mass, and reproduction of snails; snails reduced the growth, development, inactivity, and dragonfly avoidance of tadpoles; snails and tadpoles reduced the abundance of chironomid larvae; and chironomid larvae reduced snail mass. The adverse effect of snails on tadpole growth and behavior was greater in the presence of the caged tadpole predator, *A. junius*. Neither pesticide affected dragonfly survival, but endosulfan directly reduced zooplankton (*Daphnia*), and atrazine indirectly reduced chironomid abundance. Atrazine also directly decreased periphyton, and endosulfan decimated chironomid larvae, resulting in indirect increases and decreases in competition for both snails and tadpoles, respectively. Consequently, relative to endosulfan, atrazine tended to decrease snail mass and reproduction and reduce tadpole mass, development, inactivity, refuge use, and dragonfly avoidance. However, the indirect effects of pesticides depended upon the presence of heterospecifics. The indirect benefit of endosulfan on snail mass was greater in the presence of caged dragonfly larvae, and endosulfan's indirect benefit on tadpole mass was greater in the absence of snails. The effect of pesticides on tadpole activity depended on both caged dragonflies and snails. Thus, environmentally realistic concentrations of pesticides directly and indirectly shaped species responses and community composition, but the initial composition of the community influenced these pesticide effects. These results empha-

size the importance of quantifying the effects of contaminants within complex natural communities." (Authors)] Address: Rohr, J.R., 101 Morgan Building, Dept of Biology, University of Kentucky, Lexington, Kentucky 40506-0225 USA

**5282.** Ruf, J. (2005): Tier- und Pflanzenarten der Flutmulde Gottenheim. *Naturschutz am südlichen Oberrhein*, Beiheft 1: 27-29. (in German). [Baden-Württemberg; Germany; records of 22 odonate species including *Orthetrum albistylum* are documented] Address: Ruf, J., Belchenstr. 15, D-79115 Freiburg, Germany

**5283.** Sánchez-Guillén, R.A.; Van Gossum, H.; Cordero Rivera, A. (2005): Hybridization and the inheritance of female colour polymorphism in two ischnurid damselflies (Odonata: Coenagrionidae). *Biological Journal of the Linnean Society* 85(4): 471-481. (in English). ["Female-limited polychromatism is frequent in many species of Odonata. *Ischnura elegans* has three colour morphs: one male-like coloured (androchrome) and two additional gynochrome brown morphs (*infuscans* and *rufescens-obsolata* morphs). A total of 19 progenies obtained from once-mated females were reared in the laboratory in three generations. Results indicate that the colour morphs are controlled by the same genetic system as previously described for *I. graellsii*, i.e. an autosomal locus with female-limited expression and with three alleles with a hierarchy of dominance ( $p_a > p_i > p^o$ ). Five interspecific crossings between female *I. graellsii* and male *I. elegans*, five crossings between hybrid females and male *I. elegans* and one crossing between female *I. graellsii* and a hybrid male further confirmed that the genetic system is the same in both species. A survey of morph frequencies in north-west Spain revealed that *I. elegans* shows high variability in androchrome frequency (4-91%) between nearby populations, whereas in *I. graellsii* androchromes never are the majority morph (5-40%). The highest androchrome frequency in *I. graellsii* was found in populations closest to a locality where both species have hybridized, and that now has the highest androchrome frequency of *I. elegans*. We hypothesize that *I. elegans* genes have been incorporated into the genome of *I. graellsii* resulting in increased androchrome frequency in the latter species. Low androchrome frequency in *I. elegans* seems also related to the influence of *I. graellsii* genes. Therefore, we suggest that hybridization between both taxa is contributing to the temporal maintenance of contrasting androchrome frequencies in nearby populations." (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**5284.** Sanderson, R. A.; Eyre, M. D.; Rushton, S. P. (2005): Distribution of selected macroinvertebrates in a mosaic of temporary and permanent freshwater ponds as explained by autologistic models. *Ecography* 28(3): 355-362. (in English). ["We investigated the aquatic macroinvertebrate fauna of 76 ponds and small pools in an urban fringe landscape, and related the presence of ten species to measures of water permanence, pond area and environmental conditions using logistic models. The incidence of all the species was strongly associated with variation in hydroperiod, but patterns were more variable with the other explanatory variables. To determine whether the presence of a species at neighbouring ponds increased its probability of occurrence at

a pond we constructed a series of autologistic models, that differed from the aspatial logistic model in that they included a spatial autocovariate in the predictor terms. The improvement of model fit on inclusion of this autocovariate, measured as the decline in deviance compared to the aspatial models, was determined across a range of lag distances. In seven of the ten species, the autologistic models explained the incidence of the species amongst the ponds better than the aspatial models. Spatial effects were typically over short distances (<200 m) before declining, but in two species appeared to reach an asymptote, and we propose that variation in dispersal ability is the most likely factor producing these spatial effects. We conclude that it is essential that some measure of spatial autocorrelation is considered when evaluating the distribution of aquatic macroinvertebrates at small or medium scales." (Authors)] Address: Sanderson, R.A., Inst. for Research in Environment and Sustainability, Devonshire Bldg, Univ. Newcastle, Newcastle upon Tyne, NE1 7RU, UK. E-mail: r.a.sanderson@newcastle.ac.uk)

**5285.** Sasamoto, A.; Cuong, D.M. (2005): New records of Odonata from Vietnam. *Notulae odonatologicae* 6(5): 50-51. (in English). [Records of the following species are documented: *Prodasineura coerulescens*, *Agriocnemis pygmaea*, *Ceriagrion azureum*, *Epophthalmia elegans*, *Acisoma panorpoides*, *Hylaeothemis clementia*, and *Tetrathemis irregularis*.] Address: Cuong, D.M., Hom thu so 16, Buu Dien 10210, 35 Thai Thinh, Hanoi, Vietnam. E-mail: cuongdm@hotmail.com

**5286.** Schader, H. (2005): Tümpelanlagen der GNOR. Positive Entwicklung in der Rheinebene östlich von Neustadt/Weinstraße. *GNOR Info* 101: 28-30. (in German). [Brief report of the 'Gesellschaft für Naturschutz und Ornithologie in Rheinland-Pfalz' (GNOR), Germany with a few notes on the odonate fauna (including *Sympetrum pedomontanum*, *Orthetrum brunneum*, *Lestes barbarus*).] Address: Schader, H., Obere Jakobstr. 5, D-67550 Worms, Germany.

**5287.** Schenk, K.; Söndgerath, D. (2005): Influence of egg size differences within egg clutches on larval parameters in nine libellulid species (Odonata). *Ecological Entomology* 30(4): 456-463. (in English). ["In libellulids, egg size differs between species and populations. There are also size differences within egg clutches of individual females. Past experiments suggest that there are two different types of egg clutches in libellulids. Egg size decreases significantly during oviposition in species that perform non-contact guarding during oviposition. In contrast, in species ovipositing in tandem, egg size is randomly distributed. This study deals with the possible consequences of egg size variation within the different egg clutch types. The study examined whether there is a correlation between egg development time, offspring sex or larval size and egg size. The current experiments were conducted in Namibia and Germany. Five non-contact guarding and four tandem guarding libellulid species were used. In some species larger eggs needed more time to develop, in some species no correlation between egg size and egg development time could be found, whereas in other species larger eggs developed faster. The sex ratio was biased towards females in *Leucorrhinia dubia* and in *Sympetrum striolatum* and egg size was not associated with gender. In both egg clutch types larger eggs resulted in larger larvae. In this study, evidence was found that the effects of egg size diminished with progressing larval develop-

ment under good conditions. However, it is possible that the effects may have a greater influence under harsh circumstances." Authors)] Address: Schenk, Kamilla, Zoologisches Institut, Technische Universität Braunschweig, Fasanenstraße 3, D-38092 Braunschweig, Germany. E-mail: k.schenk@tu-bs.de

**5288.** Scher, O.; Thiéry, A. (2005): Odonata, Amphibia and Environmental Characteristics in Motorway Stormwater Retention Ponds (Southern France). *Hydrobiologia* 551(1): 237-251. (in English). ["Water and its protection against pollution is an urgent priority for all countries around the world. In that context, France, through its Water Law in 1992 obliged the motorway companies to build stormwater retention ponds along roads in order to protect the water resource from transport pollution and to control water flow during rainstorms. We propose to evaluate how much these ponds can be attractive for aquatic species and then evaluate their role in regional biodiversity. Six retention ponds, localized in the Mediterranean region, were investigated during one year (March 2002 March 2003) for their chemical and biological characteristics such as bottom type, trace metal composition, water quality and phyto-cenose composition. These variables were recorded and correlated with species richness of amphibian and dragonfly communities. Stormwater retention ponds showed a high concentration of copper and zinc in top sediment layer and herbicides in water column. Dragonfly richness was higher in ponds with a natural bottom than ones with an artificial bottom (PEHD membrane) while amphibian richness was more sensitive to the structure of the surrounding landscape. These habitats appeared to be very attractive for Odonata species and tend to favorize uncommon species present in the survey region such as *Ischnura pumilio* and *Erythromma viridulum*. Amphibian were found to be representative of anthropophilous guild." (Authors)] Address: Scher, O., Laboratoire de Biologie Animale, Université de Provence, E.R. Biodiversité et Environnement, Case 18, F-13331 Marseille, France. E-mail: olivier.scher@net-courrier.com

**5289.** Schiel, F.-J.; Westermann, K. (2005): Daten der Schwarzen Heidelibelle (*Sympetrum danae*) in der südlichen Oberrheinebene. *Naturschutz am südlichen Oberrhein, Beiheft* 1: 30-31. (in German). [Regional breeding habitats of *S. danae* are situated in the higher middle range mountain of Schwarzwald, Baden-Württemberg, Germany; occasionally, the species disperses to the floodplain of River Rhine on the foothills of the Schwarzwald. Such observations are compiled.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**5290.** Schmidt, B. (2005): Erste Beobachtungen von *Boyeria irene* am Bodensee (Odonata: Aeshnidae). *Libellula* 24(1/2): 31-37. (in German, with English summary). ["On 9 and 29-VI-2004, respectively, an adult male was observed for longer periods in Friedrichshafen at the shore of Lake Constance. These are the second and third record of the species in Germany. The origin of the individuals is discussed in detail but remains unknown." (Author)] Address: Schmidt, B., Alpenstraße 27, D-88045 Friedrichshafen, Germany. E-mail: b.schmidt@friedrichshafen.de

**5291.** Schmidt, B.; Strang, I. (2005): Seltene Libellen am Bodensee - Arten der Flüsse und Brandungsufer.



AGBU e.V. (Hrsg.), Thema des Monats August 2005, [www.bodensee-ufer.de](http://www.bodensee-ufer.de), Konstanz.: 3 pp. (in German). [Baden-Württemberg, Germany; *Boyeria irene*, *Ophiogomphus cecilia*, *Gomphus vulgatissimus*, and *Onychogomphus forcipatus* are briefly discussed.] Address: <http://www.bodensee-ufer.de/Inhalt/TdMLibelleAug05-final.pdf>. Address: Schmidt, B., Alpenstraße 27, D-88045 Friedrichshafen, Germany. E-mail: [b.schmidt@friedrichshafen.de](mailto:b.schmidt@friedrichshafen.de)

**5292.** Schmidt, E. (2005): Zur Libellenfauna eines kleinen Laubfrosch-Schutzgebietes bei Coesfeld (Westmünsterland, Nordrhein-Westfalen). *Entomologie heute* 17: 27-38. (in German, with English summary). [Germany; between 2003 and 2005, the survey of the odonate fauna of tree frog (*Hyla arborea*, Amphibia) waters resulted in a total of 28 species. Odonata with special indicatorious function are species dwelling habitats with temporary water conditions and borders with alternating water levels and reed vegetation (e.g. *Lestes dryas*).] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**5293.** Schneider, T.; Brauner, O.; Reichling, A. (2005): Entwicklungsnachweis von *Crocothemis erythraea* und Funde von *Aeshna affinis* im Odertal Südostbrandenburgs (Odonata: Libellulidae, Aeshnidae). *Libellula* 24(1/2): 73-82. (in German, with English summary). ["In two ponds of a gravel pit complex near Eisenhüttenstadt the reproduction of *C. erythraea* was proved in 2004. A total of 17 exuviae were collected. In the closer surroundings of the waters imagines were observed on several occasions, with a maximum of 15 males and six females on 26-VI-2004. In addition, during surveys of the western banks of River Oder between Eisenhüttenstadt and Frankfurt/Oder up to 12 males of *A. affinis* were observed. The observations represent the second proofs of *C. erythraea* reproduction in Brandenburg. The first records of *A. affinis* in the valley of River Oder go along with numerous proofs in recent years from other regions of Brandenburg." (authors)] Address: Schneider, T., Arnold-Knoblauch-Ring 76, D-14109 Berlin/Wannsee, Germany. E-mail: [karin.thomas.schneider@gmx.de](mailto:karin.thomas.schneider@gmx.de)

**5294.** Schorr, K. (2005): Neufunde der Gestreiften Quelljungfer - *Cordulegaster bidentata* (Sélys, 1843) - im Landkreis Daun (Odonata: Cordulegasteridae). *Fauna und Flora in Rheinland-Pfalz* 10(3): 1131-1134 (in German). [Rhineland-Palatinate, Germany; 30-VI-2005] Address: Schorr, K., Im Engelstal 9, D-67657 Kaiserslautern, Germany

**5295.** Schorr, M. (2004): Die Libellen, die Kanuten, die Bachstelze und der Tod. *mercuriale* 4: 36. (in German) [Anecdotal observation of a wagtail (*Motacilla alba*) (Aves) preying on *Calopteryx splendens*. During passages of boats, the bird was disturbed and unable to catch the damselflies. After passage of boats, it again was able to prey (successfully) on damselflies.] Address: Schorr, M., ÖSTLAP, Schulstr. 7B, 54314 Zerf, Germany. E-mail: [martinschorr@onlinehome.de](mailto:martinschorr@onlinehome.de)

**5296.** Schütte, C.; Joop, G.; Mikolajewski, D.J.; Mosch, E.C.; Schenk, K.; Wohlfahrt, B. (2005): Die FFH-Art *Coenagrion mercuriale* (Charpentier, 1840) (Odonata: Coenagrionidae) im Niedermoorgebiet Großes Bruch" in Niedersachsen. *Braunschweiger Naturkundliche Schriften* 7(2): 345-354. (in German, with English summary). ["In 2004 the odonate fauna of a degenera-

ted lowland moor, the Großes Bruch, was explored. This lowland moor is located at the frontier between Lower Saxony and Saxony-Anhalt in northern Germany. The dragonfly association is valued and missing species are named. 23 species were found including the Natura 2000-species *C. mercuriale*. Habitat appropriateness and the potential of dispersal of this species are discussed." (Authors)] Address: Schütte C., Zool. Inst., TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany

**5297.** Sherratt, T.N.; Beatty, C.D. (2005): Island of the clones. *Nature* 435: 1039-1040. (in English). [Brief introduction into the work of Adolfo Codero and co-workers on parthenogenesis of *Ischnura hastata* on the Azore Islands. Current knowledge on odonate parthenogenesis and perspectives on future work - especially on the sex reversal in the genus *Nesobasis* on the Fijian Islands - are discussed. For the full paper see: <http://chat.carleton.ca/~cbeatty/SherrattBeatty2005NatureNV.pdf>] Address: Sherratt, T.N., Department of Biology, Carleton University, 1125 Colonel By Drive, Ottawa ON, K1S 5B6, Canada. E-mail: [sherratt@ccs.carleton.ca](mailto:sherratt@ccs.carleton.ca)

**5298.** Stacey, G. (2005): An unexpected peril. *Atropos* 26: 46-47. (in English). [An unsuccessful emergence of *Libellula depressa* is described.] Address: Stacey, G., 19 Minster View, Warminster, Wiltshire, BA12 8TD, UK

**5299.** Stoks, R.; De Block, M.; McPeck, M.A. (2005): Alternative growth and energy storage responses to mortality threats in damselflies. *Ecology Letters* 8(12): 1307-1316. (in English). ["The role of physiology in mediating the growth/predation risk trade-off has been largely ignored. We examined effects of predation risk on relationships between growth and storage molecules in *Enallagma aspersum* and *Ischnura verticalis* damselfly larvae that differ in this trade-off. In laboratory and field experiments, both species had similar growth and mortality rates and similar concentrations of storage molecules in the absence of mortality threats. However, in the presence of dragonfly predators *Ischnura* larvae had higher mortality rates and grew faster than *Enallagma* larvae. Consistent with the difference in growth rate, *Enallagma*'s total protein concentrations decreased under predation risk while those of *Ischnura* did not. Glucose and glycogen concentrations were not affected, while triglyceride concentrations were lower under predation risk in *Enallagma* but not in *Ischnura*. Species differences at the physiological level to the presence of mortality threats may be crucial to understanding patterns in metamorphic and post-metamorphic traits." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: [robby.stoks@bio.kuleuven.ac.be](mailto:robby.stoks@bio.kuleuven.ac.be)

**5300.** Stoks, R.; Nyström, J.L.; May, M.L.; McPeck, M.A. (2005): Parallel evolution in ecological and reproductive traits to produce cryptic damselfly species across the holarctic. *Evolution* 59(9): 1976-1988. ["The damselfly genus *Enallagma* originated in the Nearctic, and two Nearctic lineages recently underwent radiations partly associated with multiple independent habitat shifts from lakes dominated by fish predators into lakes dominated by dragonfly predators. A previous molecular study of four Palearctic morphospecies and all representative Nearctic species identified the presence of

two cryptic species sets, with each set having Palearctic and Nearctic representatives. However, the cryptic species within each set are not sibling species. Here, we present quantitative data on ecologically important larval morphologies and behaviors involved in predator avoidance and on adult male morphological structures involved in mate recognition to quantify the phenotypic relationships among these cryptic species sets. For the adult stage, our data indicate strong parallel evolution of the structures involved in specific mate recognition the male cerci. For the larval stage, morphometric analyses show that the Palearctic species evolved a nearly identical morphology to the sibling-clade members in the Nearctic that live in waters where dragonflies are the top predators. This implicates the importance of dragonfly predation in the history of the Palearctic clade. Behavioral analyses suggest population differentiation in response to the actual predator environment in the Palearctic clade, consistent with the species differentiation seen in the Nearctic. Our results suggest parallel evolution of adult traits that influence specific mate choice and larval traits that influence ecological performance underlie the striking similarity of *Enallagma* species across continents. This concurrent parallel evolution in both stages of a complex life cycle, especially when both stages do not share the same selective environment, may be a very unusual mechanism generating cryptic species." (Authors) ] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**5301.** Stoks, R.; De Block, M.; Van de Meutter, F.; Johansson, F. (2005): Predation cost of rapid growth: behavioural coupling and physiological decoupling. *Journal of Animal Ecology* 74: 708-715. (in English). ["1. Despite its prominent role in life-history theory, there is no direct empirical evidence for a behaviourally mediated predation cost of rapid growth. Moreover, we know little about how digestive physiology may also influence the shape of the growth/predation risk trade-off function. 2. We determined the role of behaviour and digestive physiology in experiments in which damselfly larvae were induced to grow slowly or rapidly by manipulating photoperiod (time stress), and exposure to a fish predator. 3. We showed that larvae under time stress grew more rapidly. Rapid-growing larvae had a higher foraging activity and a higher growth efficiency. 4. Under predation risk, larvae not only had a lower foraging activity but also a lower growth efficiency. 5. Rapid-growing larvae (i.e. those under time stress) balanced the growth/predation risk trade-off differently and took more risk in the presence of a predator, which resulted in a behaviourally mediated higher predation cost compared to slow-growing larvae. Their higher growth efficiency, however, made this cost smaller compared to a completely behaviourally mediated rapid-growth strategy. 6. Our results provide the first explicit experimental proof of a behaviourally mediated predation cost of rapid growth. Besides a behavioural coupling of growth and predation risk, resulting in the well-known trade-off, we also found a partial decoupling of these two processes by digestive physiology." (Authors).] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**5302.** Sudo, S.; Tsuyuki, K.; Kanno, K. (2005): Wing characteristics and flapping behavior of flying insects.

*Experimental Mechanics* 45(6): 550-555. ["This paper is concerned with the flapping characteristics and the structure dynamics of insect wings. The flapping behavior of some insects is studied using a three-dimensional motion analysis system. The experimental system is composed of two high-speed video cameras, a motion grabber, and a personal computer. The three-dimensional representation of insect flapping can be gained by the system. The extrinsic skeleton vibration produced by insect flapping is examined with the optical displacement detector system. The structural properties of some insect wings are also studied by a three-dimensional, optical shape measurement system. Some functional principles underlying insect wing design are revealed by the measurements of surface roughness and flapping analysis." (Authors)] Address: Sudo, S., Faculty of Systems Science and Technology, Akita Prefectural University, Yurihonjo 015-0055 Japan

**5303.** Suhling, F. (2005): Libellen in Namib und Karoo: Welche Faktoren steuern die Zusammensetzung von Lebensgemeinschaften? Abstracts. Jahrestagung 2005. Deutsche Gesellschaft für Limnologie. Karlsruhe: 20. (in German). [Overview on current studies of the Namibian odonate fauna. For details see the many papers of F. Suhling and co-workers.] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**5304.** Taily, M. (2005): Verslag van de excursie naar het Hageven en Plateaux op zondag 22 augustus 2004. *Gomphus* 20(1): 29-31. (in Dutch, with French summary). [22 August, 2004, Hageven and Plateaux (the Netherlands). A total of 22 odonate species have been observed. The list of species includes *Lestes dryas* (first record for Hageven) and *L. virens* (missed after 1981). Additional species remarkable are *Ceriagrion tenellum*, *Sympetrum depressisuculum*, and *S. pedemontanum*.] Address: Taily, M., Hoonakkerdreef 35, 8791 Waregem marc.taily@pandora.be

**5305.** Tetzlaff, M. (2005): Der Sommer der Trauerseeschwalben. *Der Falke* 52(12): 368-374. (in German). [Picture showing a chick of *Chlidonias niger* (Aves) fed with a *Zygoptera*.] Address: not stated

**5306.** Tol, J. van (2005): Revision of the Platystictidae of the Philippines (Odonata), excluding the *Drepanosticta halterata* group, with descriptions of twenty-one new species. *Zool. Med., Leiden* 79(2): 195-282. (in English). ["Thirty-one species of the family Platystictidae of the Philippines are revised, i.e. all species recognised, excluding the species of the *Drepanosticta halterata*-group. The following new taxa are described: 16 species in *Drepanosticta* Laidlaw: *D. acuta* spec. nov., *D. aurita* spec. nov., *D. centrosaunis* spec. nov., *D. dados* spec. nov., *D. flavomaculata* spec. nov., *D. furcata* spec. nov., *D. hermes* spec. nov., *D. krios* spec. nov., *D. luzonica* spec. nov., *D. malleus* spec. nov., *D. myzouris* spec. nov., *D. paruatia* spec. nov., *D. pistor* spec. nov., *D. quadricornu* spec. nov., *D. rhamphis* spec. nov., *D. trachelocele* spec. nov., two in *Protosticta* Selys, viz. *P. lepteca* spec. nov. and *P. plicata* spec. nov. and three in *Sulcosticta* gen. nov., viz. *S. striata* spec. nov., *S. pallida* spec. nov. and *S. viticula* spec. nov. The status of eleven previously described nominal taxa is established. One, *D. septima* Needham & Gyger, is doubtfully considered a synonym of *D. mylitta*.

Cowley. Based on a preliminary phylogenetic analysis, the species of Drepanosticta are divided into informal species groups. Most species of the Philippines have affinities to species of Sulawesi, the Moluccas and New Guinea. Several species confined to Palawan have sister-group relationships with species from Borneo. The affinities of various other species confined to the Sulu archipelago, are unsettled as yet. The species of Platystictidae here assigned to Protosticta Selys are presumably not closely related to the type species, *P. simplicinervis* Selys from Sulawesi. However, a better placement has to await a more detailed phylogenetic study of the family. For three species the new genus *Sulcosticta* gen. nov. is erected. These species are closely allied based on the structure of the appendages, but should have been assigned to different genera if based on the present generic definitions. Many species here described have small distributional ranges, a common phenomenon in Platystictidae. Since most forests in the Philippines are heavily under threat or have already disappeared in the last fifty years, several taxa described in this paper should be considered under threat of immediate extinction." (Author)] Address: Tol, J. van, National Museum of Natural History, P.O. Box 9517, NL-2300 RA Leiden, The Netherlands

**5307.** Tóthová, G.; David, S. (2005): Dragonflies (Odonata) in the area of Kráľovský Chlmec (SE Slovak Republic). In: Theory and practice in landscape ecological planning, 21.5.2004, Nitra. ISBN 80-8050-791-0: 164-170. (in Slovakian, with English summary). [The study summarises the results of a Master thesis based on material collected between 2001 and 2003 in the vicinity of the town Kráľovský Chlmec. 34 sites (situated in the LPA Latorica) have been sampled resulting in a total of 36 odonate species. *Brachytron pratense*, *Epitheca bimaculata*, *Stylurus flavipes*, and *Orthetrum coerulescens* are endangered and protected in Slovakia through their inclusion in the Slovak Red List, the protected regulation and the Annex II to Bern Convention. The dragonfly community structures were described using indirect principal component analysis (PCA). Of some interested is the record of *Somatochlora meridionalis* at the northern border of its range.] Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. E-mail: stanislav.david@savba.sk

**5308.** Trapero Quintana, A. D.; Torres Cambas, Y.; González Soriano, E. (2005): Estudio del comportamiento de oviposición de *Protoneura capillaris* (Rambur, 1842) (Odonata: Protoneuridae). *Folia Entomol. Mex.* 44(2): 225-231. (in Spanish, with English summary). ["A study on the ovipositing behaviour of the Cuban endemic damselfly *P. capillaris* was carried out at the Dos Bocas stream, north of the city of Santiago de Cuba. The study was carried from 9 to 20 June of 2004 between 08:00 to 16:00 local time. A peak of ovipositing activity occurred between 12:30 to 13:30h. The oviposition behaviour lasts on average 54 min. During oviposition in tandem the males continued flapping their wings. Some factors affect the oviposition behavior, such as wind and intra and interspecific interference by other males and / or other tandems." (Authors)] Address: Gonzalez-Soriano, E., Depto Zoología, Inst. Biol., Universidad Autónoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**5309.** Tunmore, M. (2005): New Southern Damselfly colony discovered. *Atropos* 26: 54-55. (in English). [Sourton, Dartmoor National Park, Cornwall, UK; 11 July, 2005] Address: Tunmore, M., 36 Tinker Lane, Melt-ham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: atropos@atroposed.freeseerve.co.uk

**5310.** Turgeon, J.; Stoks, R.; Thum, R.A.; Brown, J.M.; McPeck, M.A. (2005): Simultaneous quaternary radiations of three damselfly clades across the Holarctic. *American Naturalist* 165(4): E78-E107. (in English). ["If climate change during the Quaternary shaped the macroevolutionary dynamics of a taxon, we expect to see three features in its history: elevated speciation or extinction rates should date to this time, more northerly distributed clades should show greater discontinuities in these rates, and similar signatures of those effects should be evident in the phylogenetic and phylodemographic histories of multiple clades. In accordance with the role of glacial cycles, speciation rates increased in the Holarctic *Enallagma* damselflies during the Quaternary, with a 4.25× greater increase in a more northerly distributed clade as compared with a more southern clade. Finer-scale phylogenetic analyses of three radiating clades within the northern clade show similar, complex recent histories over the past 250,000 years to produce 17 Nearctic and four Palearctic extant species. All three are marked by nearly synchronous deep splits that date to approximately 250,000 years ago, resulting in speciation in two. This was soon followed by significant demographic expansions in at least two of the three clades. In two, these expansions seem to have preceded the radiations that have given rise to most of the current biodiversity. Each also produced species at the periphery of the clade's range. In spite of clear genetic support for reproductive isolation among almost all species, mtDNA signals of past asymmetric hybridization between species in different clades also suggest a role for the evolution of mate choice in generating reproductive isolation as species recolonized the landscape following deglaciation. These analyses suggest that recent climate fluctuations resulted in radiations driven by similar combinations of speciation processes acting in different lineages." (Authors) [http://www.journals.uchicago.edu/AN/journal/issues/v165n4/4\\_0696/40696.html](http://www.journals.uchicago.edu/AN/journal/issues/v165n4/4_0696/40696.html)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**5311.** Urgelles, R.; Dorn, N.; Trexler, J. (2005): The spatial distribution and relative abundance of larval dragonflies found in the freshwater marshes of the Florida Everglades. *ESA Annual Meeting, Montréal, Canada.* August 2005: 202. (in English). [Verbatim: Aquatic macroinvertebrates are essential tools for characterizing habitat quality since they are sensitive indicators of environmental stressors, such as altered hydrology and nutrient enrichment. Long-term monitoring of aquatic macroinvertebrates such as Anisoptera can be used to assess the progress of restoration initiatives, such as the one being conducted in the Florida Everglades. We present the first comprehensive spatial and temporal survey of dragonfly communities for Everglades freshwater marshes and use statistical methods to analyze the relationship between these assemblages and environmental variables. From 1997 to 2004, we collected and identified the naiads of 15 species of dragonfly from 20 sites (each composed of replicate ha plots) across broad spatial scales, encompassing wet and dry



season dynamics. In a preliminary analysis of two years of data, 2002 and 2003, we identified 13 dragonfly species and described their distributions and relative abundance based on their spatial extent (# of sites at which they were collected) and density (annual average # individuals/m<sup>2</sup>). Two species, *Celithemis eponina* and *Libellula needhami*, dominated the assemblage at most sites and showed considerable inter-annual dynamics. *C. eponina* annual average densities increased in 18 out of 20 sites from 2002 to 2003, while *L. needhami* decreased in density in 15 out of 20 sites. Since 2003 was a wetter year throughout the ecosystem than 2002, these shifts in dominance may indicate a greater ability by *C. eponina* to tolerate conditions associated with lengthening hydroperiod. At a site highly stressed with anthropogenic nutrient-enrichment, the normally dominant *C. eponina*, was completely absent, and *Pachydiplax longipennis*, a species that is at low densities or absent from all other sites, dominated the assemblage with extremely high densities. We are currently analyzing the remaining years and looking at longer-term responses of dragonfly assemblages to dry-down and re-wetting conditions. Address: Urgelles, R.; Dorn, N.; Trexler, J., Florida International University, Miami, FL, USA

**5312.** Van de Meutter, F. (2005): De Zuidelijke overlibel (*Orthetrum brunneum* Fonscolombe, 1837): een schuchtere nieuwkomer in Vlaanderen. *Gomphus* 20 (1): 16-20. (in Dutch, with English and French summaries). ["Northern expansion of *O. brunneum* in Flanders. The Southern skimmer is a recent newcomer to the Flemish fauna. Its colonization of Flanders started synchronic with other dragonfly species of Mediterranean origin, probably energized by several consecutive warm summers at the end of the last century. The colonization process itself, however, differs from that of the other newcomers by being much slower and by occurring far inland, close to the easterly border. Despite a growing number of observations, and the recent colonization of the provinces of Antwerp and Vlaams-Brabant, still reproduction could not yet be proven in Flanders." (Author)] Address: Van de Meutter, F., Laboratory of Aquatic Ecology (K.U.Leuven) Ch. De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: Frank.vandemeutter@bio.kuleuven.ac.be

**5313.** Van de Meutter, F.; Stoks, R.; De Meester, L. (2005): The effect of turbidity state and microhabitat on macroinvertebrate assemblages: a pilot study of six shallow lakes. *Hydrobiologia* 542: 379-390. (in English). ["Shallow lakes can occur in two alternative stable states, a clear-water state and a turbid state. This is associated with separate assemblages of fish, zooplankton and plants. Little is known about whether macroinvertebrate assemblages differ across both stable states. This study investigated this in a connected set of three turbid and three clear-water shallow lakes. To overcome confounding effects of differences in spatial structure of macrophytes in turbid and clear-water lakes, we sampled three microhabitats that occurred in both alternative stable states: open water, sago pondweed (*Potamogeton pectinatus*) and reed (*Phragmites australis*). Univariate analyses indicated no differences in the number of organisms, taxon richness or diversity between turbid and clear-water lakes. Multivariate analysis, however, showed significant differences in the macroinvertebrate community structure of both stable states. Nine taxa explained a significant amount of the va-

riation between both lake types, of which seven preferred the clear-water lakes. The number of organisms and the taxon richness were higher in reed than in the other microhabitats, but diversity and evenness did not differ among the microhabitats. Multivariate analyses could separate all three microhabitats. Eight taxa, mainly detritus feeders and collector gatherers, explained most of the variation in the data and preferred the reed microhabitat. The effects of stable state (6.8% explained variance) and microhabitat (13.1% explained variance) on the macroinvertebrate assemblages were largely independent from each other (1.5% shared variance). Although macroinvertebrates are not implemented in the initial theory of stable states, our results show clearly different assemblages across both stable states." (Authors) *Erythronema*, *Ischnura*, *Libellula*, and *Sympetrum* are treated on the genus level.] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U. Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**5314.** Van de Meutter, F.; De Meester, L.; Stoks, R. (2005): Water turbidity affects predator prey interactions in a fish damselfly system. *Oecologia* 144(2): 327-336. (in English). ["Community structure may differ dramatically between clear-water and turbid lakes. These differences have been attributed to differences in the cascading effect of fish on prey populations, owing to the reduced efficiency of fish predation in the presence of macrophytes. However, recent theoretical ideas suggest that water turbidity may shape predator prey interactions, and it is predicted that prey will relax its antipredation behaviour in turbid water (H1). As a result, the nature of predator prey interactions is expected to shift from both direct and indirect in clear water to dominantly direct in turbid water (H2). We tested these ideas in a fish damselfly predator prey system. In a first behavioural experiment, we looked at antipredation behaviour of damselfly larvae isolated from habitats that differ in turbidity, in the presence of fish in clear and turbid water. As predicted in H1, the larvae were more active in turbid than in clear water. In a complementary enclosure experiment, we reared larvae in a clear-water pond and a turbid pond, respectively, and manipulated the origin of the larvae (clear-water, turbid pond), fish presence (absent, present), and vegetation density (sparse, abundant). In both ponds, fish had a direct negative effect on survival of the larvae, which was mitigated in the presence of vegetation. In the fish treatment, the change in average body mass tended to be higher in the turbid pond than in the clear-water pond, suggesting indirect effects of fish were mitigated in the turbid pond. This was supported by a negative effect of fish on the effective growth rate of larvae in the clear pond, but not in the turbid pond. These results are compatible with the idea that predator prey relationships are mainly governed by direct effects in turbid water, and by direct and indirect effects in clear water." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**5315.** Van de Meutter, F.; De Meester, L.; Stoks, R. (2005): Water turbidity affects predator prey interactions in a fish damselfly system. *Oecologia* 144(2): 327-336. (in English). ["Community structure may differ dramatically between clear-water and turbid lakes. These differences have been attributed to differences in the cas-

cading effect of fish on prey populations, owing to the reduced efficiency of fish predation in the presence of macrophytes. However, recent theoretical ideas suggest that water turbidity may shape predator prey interactions, and it is predicted that prey will relax its antipredation behaviour in turbid water (H1). As a result, the nature of predator prey interactions is expected to shift from both direct and indirect in clear water to dominantly direct in turbid water (H2). We tested these ideas in a fish damselfly predator prey system. In a first behavioural experiment, we looked at antipredation behaviour of damselfly larvae (*Ischnura elegans*) isolated from habitats that differ in turbidity, in the presence of fish in clear and turbid water. As predicted in H1, the larvae were more active in turbid than in clear water. In a complementary enclosure experiment, we reared larvae in a clear-water pond and a turbid pond, respectively, and manipulated the origin of the larvae (clear-water, turbid pond), fish presence (absent, present), and vegetation density (sparse, abundant). In both ponds, fish had a direct negative effect on survival of the larvae, which was mitigated in the presence of vegetation. In the fish treatment, the change in average body mass tended to be higher in the turbid pond than in the clear-water pond, suggesting indirect effects of fish were mitigated in the turbid pond. This was supported by a negative effect of fish on the effective growth rate of larvae in the clear pond, but not in the turbid pond. These results are compatible with the idea that predator prey relationships are mainly governed by direct effects in turbid water, and by direct and indirect effects in clear water." (Author)] Address: Van de Meutter, F., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: frank.vandemeutter@bio.kuleuven.ac.be

**5316.** Van Doorslaer, W.; Stoks, R. (2005): Growth rate plasticity to temperature in two damselfly species differing in latitude: contributions of behaviour and physiology. *Oikos* 111(3): 599-605. (in English). ["Plasticity in growth rate may be driven by behavioural and physiological mechanisms. Although these underlying mechanisms have direct implications for the importance of ecological and physiological costs associated with rapid growth, the contribution of behaviour and physiology to temperature-mediated plasticity in growth rate has largely been neglected. We studied the temperature-dependence of growth rate and its underlying behavioural and physiological mechanisms in two congeneric damselfly species that differ in latitudinal distribution. Larvae were reared from the egg stage at three temperatures (17°C, 22°C and 27°C). Within each species, growth rates showed a quadratic response curve with an optimum at 22°C. Behaviour, as measured by food intake, and physiology, as measured by growth efficiency and heartbeat as proxy for metabolic rate, jointly contributed to this temperature-induced plasticity in growth rate. At each temperature, growth rates were higher in the northern species. In line with the few other studies that compared northern and southern populations, both an increased food uptake and growth efficiency caused this pattern. Together with previous studies that focused on the population level, our results tentatively suggest that not only the latitudinal patterns in growth rate but also the mechanistic basis are similar at the species and at the population level." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**5317.** van Doorslaer, W.; Stoks, R. (2005): Thermal reaction norms in two Coenagrion damselfly species: contrasting embryonic and larval life-history traits. *Freshwater Biology* 50(12): 1982-1990. (in English). ["1. We studied the temperature-dependence of important life-history traits both at the embryonic (egg hatching success, embryonic development time and hatchling size) and the larval stage (larval growth rate, larval survival and larval size after 100 days) using full-sib families of two congeneric damselflies, *Coenagrion hastulatum* and *Coenagrion puella*, that differ in latitudinal distribution. Larvae were reared in the laboratory from the egg stage at four temperatures (12, 17, 22 and 27°C). 2. The observed patterns of thermal plasticity in embryonic traits showed that the northern species was more successful than the southern species at lower temperatures, in line with the pattern of temperature adaptation in thermal reaction norms. 3. At the larval stage, we found no consistent pattern of latitudinal compensation. The thermal family reaction norms indicate, however, the potential for latitudinal compensation to evolve. We observed an ontogenetic shift in thermal optima for larval growth rate, with a higher optimal temperature for growth rate during the first 2 weeks of the larval stage. 4. This is the first indication of the existence of latitudinal compensation at the interspecific level in an invertebrate; it is stage-specific, being present only in the embryonic stage. We argue that compensation in the embryonic stage may be much more likely than in the larvae and stress the importance of including more than one life-history stage when drawing conclusions about the adaptiveness of patterns in thermal reaction norms." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**5318.** Van Gossum, H.; Stoks, R.; De Bruyn, L. (2005): Lifetime fitness components in female colour morphs of a damselfly: density- or frequency-dependent selection?. *Biological Journal of the Linnean Society* 86: 515-523. ["In many damselfly species mature females exhibit colour polymorphism: one female morph resembles the conspecific male (androchrome) while the others do not (gynochromes). Hypotheses for the maintenance of such polymorphisms differ mainly as to whether they are based on density- and/or frequency-dependent selection and on the nature of the frequency dependence. We collected lifetime fitness data (individual lifespan, number of copulations and number of ovipositions) for female morphs of the damselfly *Ischnura elegans* from 15 insectaries differing in population parameters (density, sex ratio and ratio of andro- to gynochromes). Both density and frequency affected a specific set of the studied fitness components. While morph frequency influenced lifespan, sex ratio influenced the number of copulations, and density affected lifespan and the number of ovipositions. Clearly, discrepancies among studies may be generated if the studied fitness components differ. Our final fitness estimate, the number of ovipositions, was only influenced by density, thereby not supporting frequency-based hypotheses. Contrary to expectation under the current density-based hypothesis, androchromes compared to gynochromes had a lower number of ovipositions at high density. We discuss our findings in the light of mechanisms maintaining the female polymorphism." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, Universi-

ty of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**5319.** Van Gossum, H.; De Bruyn, L.; Stoks, R. (2005): Male harassment on female colour morphs in *Ischnura elegans* (Vander Linden): Testing two frequency-dependent hypotheses (Zygoptera: Coenagrionidae). *Odonatologica* 34(4): 407-414. (in English). ["In many Zygoptera species females occur in different colour morphs, with one morph coloured like the 6" (andromorph), while the others are not (gynomorph). Two hypotheses have been proposed to explain frequency-dependent harassment of female morphs. According to the first, males should prefer the more frequent of the 2 female morphs (learned-mate recognition hypothesis). According to the second, males should prefer andromorphs more if their frequency relative to male increases, but not so for gynomorphs which always should be attempted to mate with on encounter (mimicry hypothesis). Here, it is reported on a re-analysis of earlier published data on morph-specific harassment for *I. elegans*, which allows examination of the 2 proposed hypotheses. The data were collected in 8 insectaries with different ratios of males and female morphs. As reported earlier, male harassment is highest on the most common female morph supporting the learned-mate recognition hypothesis. The ratio of andromorphs to males had no morph-specific effects in amounts of male harassment, wherefore the data suggest rejection of the mimicry hypothesis." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**5320.** Van Gossum, H.; De Bruyn, L.; Stoks, R. (2005): Reversible switches between male and female mating behaviour by male damselflies. *Biology Letters* 1: 268-270. (in English). ["For many animal groups, both sexes have been reported to attempt to mate with members of their own sex. Such behaviour challenges theories of sexual selection, which predict optimization of reproductive success. We tested male mate choice between opposite- and same-sex members in the damselfly *Ischnura elegans*. Binary choice experiments were conducted following exposure periods in insectaries with only males or with both sexes present. We show that switches in choice between the opposite sex and the same sex can be induced and reversed again by changing the social context. We argue that the observed reversibility in male male- and female-directed mating behaviour is maladaptive and a consequence of strong selection on a male's ability to alter choice between different female colour morphs." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**5321.** Wallaschek, M. (2005): Die Libellen (Odonata) zweier Stillgewässer in Halle-Dölau. *Entomologische Mitteilungen Sachsen-Anhalt* 13(2): 88-93. (in German). [Sachsen-Anhalt, Germany; 19 species are listed for two rain storage ponds.] Address: Wallaschek, M., Agnes-Gosche-Str. 43, D-06120 Halle (Saale), Germany

**5322.** Waringer, J.; Chovanec, A.; Straif, M., Graf, W.; Reckendorfer, W.; Waringer-Löschenkohl, A.; Waidbacher, H.; Schultze, H. (2005): The Floodplain Index - habitat values and indication weights for molluscs,

dragonflies, caddisflies, amphibians and fish from Austrian Danube floodplain waterbodies. *Lauterbornia* 54: 177-186. (in English). ["A new method for assessing the ecological status of river/floodplain-systems is presented. The approach ("Floodplain Index") is based on the requirements of biological assessment laid down in the EU Water Framework Directive by integrating the following indicator groups: molluscs, caddisflies, dragonflies, amphibians, and fish. For these groups, the habitat values and indication weights are given and the calculation procedure is briefly discussed." (Authors)] Address: Waringer, J., Limnological Dept, Institute of Ecology and Conservation Biology, University of Vienna, Althanstr. 14, A-1090 Vienna, Austria

**5323.** Watts, P.C.; Kemp, S.J.; Saccheri, I.J.; Thompson, D.J. (2005): Conservation implications of genetic variation between spatially and temporally distinct colonies of the endangered damselfly *Coenagrion mercuriale*. *Ecological Entomology* 30(5): 541-547. (in English). ["1. Good conservation management is underpinned by a thorough understanding of species' historical and contemporary dispersal capabilities along with the possible adaptive or neutral processes behind any spatio-temporal genetic structuring. These issues are investigated with respect to *C. mercuriale* the only odonate species currently listed in the U.K.'s Biodiversity Action Plan in east Devon where its distribution has become fragmented. 2. The two east Devon *C. mercuriale* populations, only 3.5 km apart, have accumulated strong differences in frequencies of alleles at 14 micro-satellite loci as a consequence of poor adult dispersal and drift. There is no contemporary migration between sites. 3. A genetic signature of population decline at both sites corresponds with known demographic reductions. *C. mercuriale* in east Devon are now significantly genetically less diverse than those from a population stronghold in the Itchen Valley. 4. Colonies would benefit from improved connectivity between areas and possibly by a transfer of individuals from other ecologically similar areas. 5. Because *C. mercuriale* has a semivoltine life cycle throughout the U.K., the possibility that alternate-year cohorts are reproductively isolated is explored. Genetic differentiation among cohorts is an order of magnitude less than between sites, suggesting that some larvae delay their development into adults for a year and recruit to a different cohort. 6. To our knowledge, this is the first study to document migration and gene flow between alternate-year cohorts in a species of odonate. From a conservation standpoint, the cohorts do not require separate management." (Authors)] For the full paper see: <http://www.genomics.liv.ac.uk/animal/RESEARCH/PDF/WATTS113.pdf> Address: Watts, P., Animal Genomics Laboratory, The Biosciences Building, School of Biological Sciences, Liverpool University, Crown Street, Liverpool L69 7ZB, U.K. E-mail: p.c.watts@liv.ac.uk

**5324.** Webb, J. (2005): Dragonfly Conservation from the BDS. *Atropos* 26: 48-49. (in English) [The relevance of Odonata as bioindicators is briefly outlined.] Address: not stated.

**5325.** Werth, C.; Marten, M.; Taraschewski, H. (2005): Ökologische Untersuchungen an anthropogenen Kleingewässern - Makrozoobenthos in Wechselwirkung mit Makrophyten und Fischbesatz. *Lauterbornia* 54: 149-167. (in German, with English summary). ["Investigations of water chemistry and macrozoobenthos



were performed at 19 small water bodies in Southern Palatinate (Germany) in 2001. 22 Heteroptera, 52 Coleoptera, 22 Odonata, and 18 Mollusca species were identified, among those also particularly endangered species according to the red List Germany (Binot & al. 1998), like *Dytiscus semisulcatus* (O. F. Müller 1776), *Hydrophilus piceus* (Linnaeus, 1758), *Haliplus furcatus* (Seidlitz, 1887) and *Lestes barbarus* (Fabricius, 1787). Interactions between macrozoobenthos, macrophytes and fish population are discussed." (Authors)] Address: Werth, Christine, Mittelberg 4, D-76571 Gaggenau, Germany. E-mail: C.werth@web.de

**5326.** Westermann, E.; Westermann, K. (2005): Erfolgreiche Fortpflanzung der Braunen Mosaikjungfer (*Aeshna grandis*) am Windfällweiher, 966 m NN. Naturschutz am südl. Oberrhein, Beiheft 1: 33. (in German). [Very little evidence of successful reproduction of *A. grandis* in the high altitudes in the southern Black Forest, Baden-Württemberg, Germany exists; on 20-VII-2003, an exuvia of the species was found and in VIII 2003, many ovipositioning females were observed.] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**5327.** Westermann, E.; Westermann, K. (2005): Großer Bestand der Hufeisen-Azurjungfer (*Coenagrion puella*) in Wiesengraben des NSG Elzwiesen. Naturschutz am südlichen Oberrhein, Beiheft 1: 32. (in German). [A larva of the reophilous *C. virgo* was collected in a bog water (24-VII-2004) in the Federseemoor, Baden-Württemberg, Germany. (The reophilous) *O. forcipatus* did successfully develop in a dried-up water separated from a gravel pit with permanent water near Hartheim, Baden-Württemberg; 27-VII-2004.] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**5328.** Westermann, K. (2005): Erfolgreiche Fortpflanzung des Frühen Schilffjägers (*Brachytron pratense*) in Wiesengraben des NSG Elzwiesen. Naturschutz am südlichen Oberrhein, Beiheft 1: 32. (in German). [Baden-Württemberg, Germany; 30-V-2004] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**5329.** Westermann, K. (2005): Erfolgreicher Schlupf des Plattbauchs (*Libellula depressa*) in einem Wassertank. Naturschutz am südl. Oberrhein, Beiheft 1: 33. (in German). [Baden-Württemberg, Germany; description of a garden tank as reproduction habitat of *L. depressa*.] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**5330.** Wildermuth, H. (2005): Beitrag zur Larvalbiologie von *Boyeria irene* (Odonata: Aeshnidae). *Libellula* 24(1/2): 1-30. (in German, with English and French summaries). ["Larvae of *B. irene* were studied with respect to morphology, morphometry, ethology and ecology shortly before the emergence period and during the flying season in the northern Provence, France. In all larval stadia the colour pattern varied considerably; besides bright beige individuals also almost black ones existed. The last five stadia could be determined by the relative length of the wing sheaths but not by the absolute body length or head width. Ultimate stadia were present in great number in June but only sparsely in July; clearly defined cohorts could not be recognized. The larval development is supposed to take usually two years, and three years exceptionally. Emergence occur-

red at night. It is inferred that the larvae are definitely adapted to current water with respect to their behaviour but morphologically only to a restricted scale. In the northern Provence they inhabit exclusively permanent rivers, with small spring-fed streams harbouring the largest population densities. They stayed mainly among pebbles and under large stones, and only rarely in other microhabitats as submerged root felts or plant debris. The sp. was most frequently found together with *Cordulegaster boltonii*, *Onychogomphus uncatatus*, and *O. f. fordipatus*. The larval biology and the habitat preference of the Provençal populations of *B. irene* are compared with those of Switzerland where they occur at lake shores, and with those of other spp. of the genus.] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**5331.** Wildermuth, H. (2005): Kleingewässer-Management zur Förderung der aquatischen Biodiversität in Naturschutzgebieten der Agrar- und Urbanlandschaft. Wirkungskontrolle am Beispiel Libellen im Schweizer Mittelland. *Naturschutz und Landschaftsplanung* 37(7): 193-201. (in German, with English summary). ["The study describes how the aquatic flora and fauna could be protected and promoted by suitable shaping and management, using the example of the 'Drumlinlandschaft Zürcher Oberlauf', which is the relic of an originally wide-stretched moorland in the Swiss Midland. After abandoning the extensive use of bedding and peat around 1950 the peat cuttings and ditches became widely overgrown reducing diversity and population sizes of aquatic organisms. In the course of 35 years of protection activities peat cuttings have been regenerated and maintained according to the rotation principle; ditches have been renewed, extended and retained in spatial and temporal sections, and measures were conducted for the regeneration of raised bogs. Efficiency controls showed that the species diversity of aquatic organisms (water plants, amphibia, water insects) could be conserved to a large extent. Additionally some species could be resettled in new partial areas. Monitoring controls concentrated on dragonflies which were mapped applying semi-quantitative methods. From the 49 species identified 23 regularly and eight species sporadically reproduce in the area. In the first year up to 28 species were found around to the newly created ponds and streams. At the longer existing ponds 26 species were identified in the sampling year 2004, including species requiring advanced succession stages. Two of them, *Lestes virens* and *Leucorrhinia pectoralis*, are considered as 'threatened with extinction' in Switzerland. On the basis of the exuvia the study explains how the partial population of the metapopulation of *L. pectoralis* developed and spread out during the last 20 years. In order to sustainably maintain the study suggests to establish a regional network of regenerated peat cuttings." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**5332.** Williams, L.R.; Bonner, T.H.; Hudson, J.D.; Williams, M.G.; Leavy, T.R.; Williams, C.S. (2005): Interactive effects of environmental variability and military training on stream biota of three headwater drainages in western Louisiana. *Transactions of the American Fisheries Society* 134: 192-206. (in English). ["We collected fishes and macroinvertebrates seasonally from eight headwater streams in three different drainage basins (the Red, Calcasieu, and Sabine rivers) crossing

Peason Ridge Training Area in west-central Louisiana. Peason Ridge is part of the Fort Polk military training facility. We used multivariate analyses to test the effects of physical variables (i.e., current velocity, depth, and substrate), time (seasonal variability), drainage basin, and military training activities on assemblage structure. Tributaries of the Red River had the highest gradient and were predominated by shallow, swift-flowing runs with sandy substrates. Southern tributaries of the Calcasieu and Sabine rivers were of lower stream gradient and contained deep, sluggish runs and pools with large amounts of woody debris and silt. Fish assemblages were structured primarily by military training and drainage basin. Faunal differences among drainage basins probably reflect differences in stream gradient. Fish assemblages in tributaries of the Sabine River were less diverse and showed evidence of historical degradation. Macroinvertebrate assemblages also were structured primarily by military training but had a strong seasonal component related to their short life cycles and high seasonal turnover. In contrast to fishes, macroinvertebrate assemblages were similar among drainages. Because military training was most intense in the Red River basin, its significance in these models probably represents differences in stream gradient among the basins because we found no negative effect on stream biota resulting from current training activities. Rather, historical logging and the resultant siltation coupled with isolation of populations by reservoirs." (Authors) Odonata are treated on the family level.] Address: Williams, L.R., School of Natural Resources, Ohio State University, 2021 Coffey Road, Columbus, Ohio 43210, USA

**5333.** Yoshimura, M.; Okochi, I. (2005): A decrease in endemic odonates in the Ogasawara Islands, Japan. *Bulletin of the Forestry and Forest Products Research Institute* 4(1) (No.394): 45-51. (in English, with Japanese summary). ["There are many endemic species in the Japanese Ogasawara Islands. However, many of these endemic species are likely to disappear as a result of reduction of habitat and the introduction of exotic species. Odonates are included within this category of species at risk. If the decrease in endemic odonates is due to a decrease in aquatic habitat, we have only to provide artificial ponds to conserve these species. In this study, we provided artificial ponds as a habitat for odonates in Chichi-jima and Ani-jima, Ogasawara Islands. We then examined the possibility of protection and enhancement of odonate populations. Endemic odonates were found in the natural ponds of Ani-jima and Ototojima. In Ani-jima, they could be collected both in the artificial and natural ponds. The artificial pond could provide habitat for endemic odonates. However, in Chichi-jima, few odonates could be collected both in the artificial and natural ponds. Here, invasive species, such as *Gambusia affinis* and *Anolis carolinensis*, are found, which considered to prey upon odonate larvae and adults. Extermination of invasive species may be necessary to conserve the endemic odonates in Chichi-jima." (Authors) Available at: <http://www.ffpri.affrc.go.jp/abs/kanko/394-3.pdf>] Address: Yoshimura, M., Kansai Research Center, Forestry and Forest Products Research Institute (FFPRI), 68 Nagaikyutaro, Momoyama, Fushimi, Kyoto 612-0855, Japan. E-mail: yoshi887@ffpri.affrc.go.jp

**5334.** Zimmermann, W.; Petzhold, F.; Fritzlar, F. (2005): *Verbreitungsatlas der Libellen (Odonata) im*

*Freistaat Thüringen. Naturschutzreport 22: 224 pp.* (in German, with English summary). [The present atlas summarises field surveys, literature reviews and reviews of museum collections of odonates in the Free State of Thuringia/Germany. The history of dragonfly faunistics in Thuringia begun in 1807. Its further development can largely be traced from museum collections and recently from detailed field surveys and faunistic publications. Field surveys were carried out mainly between 1990 and 2004. 120 people contributed to the data collection. The existing literature on Thuringian odonates (101 publications and 178 unpublished surveys) is also reviewed as are museum collections (15). Together the three sources resulted in 37,581 records from 3,296 sites distributed over 444 grid cells (scale 1:25000). This represents a coverage of 76 % (Total: 588 squares). Sixty-two dragonfly species have been recorded in Thuringia to date. Among these, several species of the highest European protection status have stable populations, such as *Somatochlora alpestris*, *Coenagrion ornatum*, and *C. mercuriale*. All data, maintained in a geographical information system at the Thuringian State Department for Environment and Geology, are available to local authorities and nature protection offices. The value of water bodies to dragonflies are analysed per landscape unit: Maps specifying the water quality in each of the landscape units of Thuringia are compared to species numbers. For each species recorded in Thuringia the following information are presented: number of records, the proportional occupancy of grid cells, habitat, basic life-history, indications of population increases or declines (status of extinction risk). Additionally, a graph is provided showing the distribution points in the periods of before 1944, 1944-1984, 1985-2005, respectively, and phenology and altitudinal distribution. Each species and its habitats are depicted in a photograph. Further chapters address faunistic problems, corrections of earlier indications, species potentially expected in Thuringia, the importance of dragonflies in nature protection, specifically under the EU Habitats Directive as well as the description of dragonfly communities in running waters, in swamps/peat bogs, ponds, drainage ditches in agricultural areas, and water bodies in gravel pits. Finally, there are chapters on the increased occurrence of southern species, on migrating dragonflies, on fossil records from Thuringia and a list of local vernacular dragonfly names.] Address: Thüringer Landesanstalt für Umwelt und Geologie, Prüssingstr. 25, D-07745 Jena, Germany. [www.tlug-jena.de](http://www.tlug-jena.de)

**5335.** Zucchi, H.; Zucchi, K. (2005): Zum Einfluss verrohrter Bachabschnitte auf Drift und Aufwanderung der Limnofauna unter besonderer Berücksichtigung der Flohkrebse (Gammaridae). *Natur und Landschaft* 80 (12): 519-527. (in German, with English summary). [Breenbach, Lower Saxony, Germany, 1991; *Platycnemis pennipes* and *Enallagma cyathigerum* are listed. One specimen of *P. pennipes* was drifted downwards during the day.] Address: Zucchi, H., FH Osnabrück, Fakultät für Agrarwissenschaften und Landschaftsarchitektur, Oldenburger Landstr. 24, D-49090 Osnabrück, Germany. E-mail: [H.Zucchi@fh-osnabrueck.de](mailto:H.Zucchi@fh-osnabrueck.de)

**Thanks to all who contributed to this issue of OAS!**  
A special thank to Jürgen Ott, Naoya Ishizawa, Pawel Buczyński, Wolfgang Schneider, Mathias Lohr, Bernd Kunz, Hansruedi Wildermuth and Andreas Martens.

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: martin@lindeboom.de  
Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105;  
E-mail: K.Reinhardt@sheffield.ac.uk  
Martin Schorr, Schulstr. 7B D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: martinschorr@onlinehome.de

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

1997

**5336.** Cios, S. (1997): O lipieniach Wdy. Cz. II. Pstrąg i Lipień 5(1): 1-5. (in Polish). [On the graylings of the River Wda. Part II.: The stomach content of 55 fish specimens was analysed referring to a segment of river Wda between Kasparus and Tlen in northern Poland. 5 odonate taxa including Gomphus vulgatissimus and Ophiogomphus cecilia were found. Calopteryx sp. was the dominant odonate taxa among the fish prey.] Address: not stated

**5337.** Kasuya, E.; Edanami, K.; Ohno, I. (1997): Territorial conflicts in males of the dragonfly *Orthetrum japonicum japonicum* (Odonata: Libellulidae): the role of body size. Zool. sci. 14(3): 505-509. (in English). ["The relationship between body size and the results of territorial conflicts was studied in males of the dragonfly, *O. japonicum japonicum*. Territorial residents were larger than intruders in body width, but not in hind wing length. Winners of territorial conflicts were larger than losers in body width, but not in hind wing length. This difference was attributed to the fact that residents were larger than intruders. The results of territorial conflicts were more strongly affected by the role of the opponents (resident or intruder) than by the difference in their body sizes. Territorial males arrived at the territorial sites earlier than non-territorial ones on a given day. The body size of males arriving at the study area earlier in a day was not larger than that of males arriving later." (Authors)] Address: Kasuya, E., Laboratory of Biology, Faculty of Education, Niigata University, 2-8050 Ikarasi, Niigata 950-21, Japan

**5338.** La Porta, G. (1997): Odonati delle Pozze. Biometria degli stadi pre-imaginali. *Libellula depressa*, *Aeshna cyanea*, *Anax imperator*. Corso die laurea in Scienze Biologiche. Univerità degli Studi die Perugia, Facoltà di Scienze MM.FF.NN: 91 pp. (in Italian). [Biometric study referring to *Aeshna cyanea*, *Anax imperator*, and *Libellula depressa*. For the full paper see: <http://www.bio.unipg.it/staff/gianandrea/download/pdf/Odonata.pdf>] Address: not stated

**5339.** Louarn, H.; Cloarec, A. (1997): Insect predation on pike fry. Journal of Fish Biology 50(2): 366-370.

(in English). ["Laboratory tests evaluated the predatory impact of the macroinvertebrates *Erythromma najas* larvae, *Notonecta glauca* (Heteroptera: Notonectidae), *Ilyocoris cimicoides* (Heteroptera: Naucoridae), *Libellula depressa* larvae, *Dytiscus marginalis* larvae (Coleoptera: Dytiscidae) and *Anax imperator* larvae on 3-, 12-, 21- and 30-day-old pike fry *Esox lucius*. All these insect predators captured and ate pike fry during the test, although the numbers killed varied among species. *Dytiscus marginalis*, *A. imperator* and *Notonecta glauca* were the most Voracious predators." (Authors)] Address: Cloarec, A., Ethologie-Evolution-Ecologie, CNRS UMR 373, Université de Rennes I, Campus de Beaulieu, 35042 Rennes cédex, France

**5340.** McCollum, S.A.; Leimberger, J.D. (1997): Predator-induced morphological changes in an amphibian: predation by dragonflies affects tadpole shape and color. *Oecologia* 109: 615-621. (in English). ["Predator-induced defenses are well studied in plants and invertebrate animals, but have only recently been recognized in vertebrates. Gray treefrog (*Hyalachrysoxcelis*) tadpoles reared with predatory dragonfly (*Aeshna umbrosa*) larvae differ in shape and color from tadpoles reared in the absence of dragonflies. By exposing tadpoles to tail damage and the non-lethal presence of starved and fed dragonflies, we determined that these phenotypic differences are induced by non-contact cues present when dragonflies prey on *Hyla*. The induced changes in shape are in the direction that tends to increase swimming speed; thus, the induced morphology may help tadpoles evade predators. Altering morphology in response to predators is likely to influence interactions with other species in the community as well." (Authors)] Address: McCollum, S.A.; Department of Zoology, Duke University, Box 90325, Durham, NC 27708-0325, USA

**5341.** Nicoletti, F. (1997): American Kestrel and Merlin migration correlated with Green Darner movements at Hawk Ridge. The Loon (Winter 1996-97): 216-220. (in English). [Duluth, Minisota, USA; during September 1995, counts of dragonflies with focus on *Anax junius*, and birds of prey were made. More than 10000 individuals of *A. junius*, and 1106 of American Kestrels and 131 Merlins were counted. 28,8% of the Kestrels, and 14 % of the Merlins were seen feeding on dragonflies



as the moved from north to south. The percentage of kestrels feeding increased as the day progressed. The author outlines that dragonflies are a primary food source for migrating kestrels, especially immature oenes. Information of additional species of hawks feeding on Odonata are given.] Address: Nicoletti, F., P.O. Box 3074, Duluth, MN 55803, USA

## 1998

**5342.** Alcocer, J.; Escobar, E.; Lugo, A.; Peralta, L. (1998): Littoral benthos of the saline crater lakes of the basin of Oriental, Mexico. *International Journal of Salt Lake Research* 7(2): 87-108. (in English). ["Two saline crater lakes in the basin of Oriental, Puebla-Tlaxcala-Veracruz, were investigated for littoral benthic macroinvertebrates. Fifty taxa were identified with the oligochaetes, amphipods, chironomids and leeches the dominant organisms. These four taxa made up to 99 per cent in both number and biomass. *Limnodrilus hoffmeisteri*, *Hyalella azteca*, *Tanytus (Apelopia) sp.* and *Stictochironomus sp.* were the most abundant organisms. Unlike other saline lakes which have a littoral benthos dominated by chironomids, *Alchichica* and *Atexcac* were dominated by oligochaetes (70–73 per cent). The gastropod, *Physa sp.*, was found up to a salinity of 8 g L<sup>-1</sup>; in other studies, it has been found in lower salinities. *L. hoffmeisteri* is also a typical inhabitant of freshwater lakes, particularly of deep waters. It was dominant in the shallow, saline waters of the two lakes studied. Salinity did not affect species richness. *Alchichica*, the most saline of the six crater lakes of Puebla (salinity, 7.4 g L<sup>-1</sup>), had 30 per cent more species than the freshwater lakes, and double the species number of *Atexcac*. It seems the main factor controlling species richness and the density and biomass of organisms in *Alchichica* and *Atexcac* is the presence of aquatic vegetation. It does this by increasing habitat heterogeneity and providing food and protection against predators." (Authors) *Aeshna dugesii*] Address: Alcocer, J., Limnology Lab., Environmental Conservation and Improvement Project, UIICSE, UNAM Campus Iztacala, Av. de los Barrios s/n, Los Reyes Iztacala, Tlalnepantla, Edo. de Mexico, 54090, Mexico

**5343.** Koperski, P. (1998): Co jedzą drapieżne owady litoralne? (What do the predatory, littoral insects eat?). *Wiad. Ekol.* 44(2): 95-130. (in Polish, with English summary). [The paper compiles recent knowledge on the predator-prey interactions of animal communities in littoral habitats. It classifies predatory insects on the family or suborder scale according to life style and prey. It also discusses many studies on the order level including those on Odonata and their prey. ] Address: Koperski, P., Department of Hydrobiology, Institute of Zoology, Warsaw University, Banacha 2, 02-097 Warszawa, Poland. E-mail: koper@hydro.biol.uw.edu.pl

**5344.** Kouamélan, P.E.; Teugels, G.G.; Gourène, G.; Ollevier, F.; Thys van den Audenaerde, D.F.E. (1998): The effect of a man-made lake on the diet of the African electric fish *Mormyrus rume Valenciennes, 1846* (Osteoglossiformes; Mormyridae). *Hydrobiologia* 380(1-3): 141-151. ["The diet of 223 specimens of *Mormyrus rume* (Mormyridae) from the Bia River on which a hydroelectric dam was built in 1959, was studied in relation to

locality, season and fish size. A feeding index was computed by combining the occurrence, numerical and weight percentages of the items identified in the stomach contents. This index showed that *M. rume* in the river ate principally invertebrates, especially chironomid larvae. In contrast, *M. rume* from the man-made lake contained mostly phytoplankton. This difference was statistically significant. In the lake, chironomid larvae and Bacillariophyceae constituted the main source of the diet of young fish. In larger specimens, *Chaoborus sp.* formed the main part of the diet. No significant temporal variation occurred in the dietary composition. The overall food composition was similar in each locality of the Bia River from one period to another." (Authors) The paper includes records of Odonata as diet of fishes.] Address: Kouamélan, P.E., Section of Ecology and Aquaculture, 1Katholieke Universiteit Leuven, B-3000 Leuven, Belgium

**5345.** McWilliam, H.A.; Death, R.G. (1998): Arboreal arthropod communities of remnant podocarp-hardwood rainforest in North Island, New Zealand. *New Zealand Journal of Zoology* 25: 157-169. (in English). ["Arboreal arthropod communities from three reserves of podocarp-hardwood rainforest in the North Island, New Zealand, were sampled continuously between June 1995 and May 1996 using omnidirectional window traps. Diptera made up 34% of the total number of arthropods captured, whereas Coleoptera contributed 12% and Araneae 11% to the total catch. The relative abundance and species richness of Diptera peaked in spring, Coleoptera in summer, and Araneae in autumn. Multivariate analysis of overall community structure suggests that season is the dominant determinant of community structure in the arboreal arthropod communities of these forest patches, whereas site, and to a lesser extent tree species, have minor effects. Given that 863 morphospecies were collected, the conservation value of small forest patches for forest-dwelling arthropods in New Zealand should not be underestimated." (Authors) 3 specimens of Odonata were caught in December and January in the canopy at Keebles Bush and Pakohu Scenic Reserve, New Zealand.] Address: McWilliam, H.A., Taranaki Regional Council, Private Bag 713, Stratford, New Zealand

**5346.** Rogers, D.C. (1998): Aquatic macroinvertebrate occurrences and population trends in constructed and natural vernal pools in Folsom, California. In: C.W. Witham, E.T. Bauder, D. Belk, W.R. Ferren Jr., and R. Ornduff (Editors). *Ecology, Conservation, and Management of Vernal Pool Ecosystems – Proceedings from a 1996 Conference*. California Native Plant Society, Sacramento, CA: 224-235. (in English). [The paper includes some odonate taxa. Available at: <http://www.vernal-pools.org/proceedings/rogers.pdf>] Address: not stated

**5347.** Smithers, C.N. (1998): A species list and bibliography of the insects recorded from Norfolk Island. *Technical Reports of the Australian Museum* 13: 1-55. (in English). ["Nearly 700 species of insects are listed as having been recorded from Norfolk Island and a bibliography of more than 200 papers is provided from which the records have been obtained. This paper is intended to be a working document which, it is hoped, will make it largely unnecessary for subsequent workers to repeat time-consuming literature searches." (Author) *Agriocnemis exsudans*, *Adversaeschna brevistyla*, *Ischnura aurora*, and *Hemicordulia australiae* are represen-

ted on the Norfolk Island.] Address: Smithers, C.N., Entomology Department, Australian Museum, 6 College Street, Sydney NSW 2000, Australia

## 1999

**5348.** Anonymus (1999): Flugwunder Libelle. Pico. Kinderzeitschrift der Steyler Missionare 6/1999: 36-37. (in German). [Brief popular article on dragonflies for children.] Address: Redaktion Pico, PF 2460, D-41311 Nettetal, Germany

**5349.** Chao, H.-f. (1999): A study of Chinese dragonflies of the family Chlorogomphidae, with descriptions of two new species and first description of the male sex of a known species (Anisoptera: Chlorogomphidae). Wuyi Sci. J. 15: 1-11. (in Chinese with English summary). [A checklist (with bibliographic annotations) of the Chinese Chlorogomphidae is provided. *Sinurogomphus montanus* sp. n., *Chloropetalia usignata* sp. n., and male allotype of *Sinurogomphus urolobatus* Chen are described and illustrated. The data on type material are not stated in the English text.] Address: Author deceased

**5350.** Cios, S. (1999): Wędkowanie w Finlandii. Cz. I. Lipienie z Merikarvianjoki. Pstrąg i Lipień 7(21): 10-12. (in Polish). [Fishing in Finland. Part I. Graylings of the River Merikarvian: The stomach content of six fish specimens was analysed referring the a segment of the lower course of the river Merikarvian. 14 larvae of *Onychogomphus forcipatus* were found.] Address: not stated

**5351.** Cios, S. (1999): Wędkowanie w Finlandii. Cz. II. Lipienie z Iijoki i Oudonjoki. Pstrąg i Lipień 7(21): 12-16. (in Polish). [Fishing in Finland. Part II. Graylings of the River Ii and Oudon: *Somatochlora* sp. is listed as prey.] Address: not stated

**5352.** Hong, S.-J.; Woo, H.-C.; Lee, S.-U.; Huh, S. (1999): Infection status of dragonflies with *Plagiorchis muris* metacercariae in Korea. The Korean Journal of Parasitology 37(2): 65-70. (in English). ["*Plagiorchis muris* has been found in both house and field rats as well as in humans. The infection status of the second intermediate hosts of *P. muris* is prerequisite in understanding their biological features in an ecosystem. Six species of dragonflies were caught in a wide range of areas in Korea; and they were *Sympetrum darwinianum*, *S. eroticum*, *S. pedomontanum*, *S. infuscatum*, *Pantala flavescens*, *Calopteryx atrata*, and *Orthetrum albistylum speciosum*. The occurrence of *P. muris* metacercariae in dragonflies was nationwide with various infection rates. The metacercarial burden of *P. muris* in the surveyed areas was the highest in *S. eroticum* followed by *S. darwinianum*, *S. pedomontanum*, and *C. atrata*. The highest infection rate by *P. muris* metacercariae was found in *S. darwinianum* followed by *S. eroticum*. The metacercarial burden was particularly heavy in the dragonflies found in Hamyang-gun and Kosong-gun, Kyongsangnam-do. It is, therefore, likely that dragonflies play a significant role as the second intermediate host in the life cycle of *P. muris* in Korea." (Authors)] Address: Hong, S.-J., Department of Parasitology,

Chung-Ang University Faculty of Medicine, Seoul 156-756, Korea

**5353.** O'Brien, M. (1999): Collecting Odonata Exuviae. Entomology Notes 26: o.P.- (in English). [Introduction into the collecting of exuviae.] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

**5354.** Olsvik, H. (1999): Øyestikkervisitt i Østfold 7.-11. juli 1999. Natur i Østfold 19(1): 10-16. (in Norwegian). [For the full paper see: [http://www.toyen.uio.no/botanisk/nbf/ofa/nio200001/2-oyenstikker\\_e.pdf](http://www.toyen.uio.no/botanisk/nbf/ofa/nio200001/2-oyenstikker_e.pdf)] Address: Olsvik, H., N-6694 Foldfjorden, Norway. E-mail: haolsvik@frisurf.no

**5355.** Stoks, R.; De Block, M.; Van Gossum, H.; Valck, F.; Lauwers, K.; Verhagen, R.; Matthysen, E.; De Bruyn, L. (1999): Lethal and sublethal costs of autotomy and predator presence in damselfly larvae. *Oecologia* 120(1): 87-91. (in English). ["We studied the costs of lamellae autotomy with respect to growth and survival of *Lestes sponsa* damselfly larvae in field experiments. We manipulated predation risk by *Aeshna cyanea* dragonfly larvae and lamellae status of *L. sponsa* larvae in field enclosures and compared differences in numbers, size and mass of survivors among treatments. In the absence of a free-ranging *A. cyanea* larva, about 29% of the *L. sponsa* larvae died. This was probably due to cannibalism. The presence of a free-ranging *A. cyanea* reduced larval survival by 68% compared to treatments in which it was absent or not permitted to forage on *L. sponsa* damselflies. Across all predator treatments, lamellae autotomy reduced survival by about 20%. The mean head width and mass of survivors was lower in the enclosures with a free-ranging *A. cyanea* compared to the other two predator treatments. This suggested that larvae grew less in the presence of a free-ranging predator, indicating that increased antipredator behaviours were more important in shaping growth responses than reduced population density. Mass, but not head width, of survivors was also reduced after autotomy. The fitness consequences of these effects for the adults may be pronounced. In general, these field data strongly suggest that lamellae autotomy affects population regulation of damselflies." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**5356.** Teixeira, R.L.; Giovanelli, M. (1999): *Ecologia de Tropidurus torquatus* (Sauria: Tropiduridae) da Restinga de Guriri, Sao Mateus, ES. *Rev. Brasil. Biol.* 59(1): 11-18. (in Portuguese, with English summary). ["Ecological aspects of the collared lizard, *T. torquatus*, were studied monthly in a sandy coastal plain of south-eastern Brazil, from February 1996 to March 1997. We collected 108 specimens [...]. Based on the frequency of occurrence, major food items found in the stomach contents of *T. torquatus* were: ants (85.7%), beetles (32.4%), bees (31.4%), termites (22.8%), spiders (20.9%) and flowers (20.0%). Based on the relative number of prey ingested, main food items were: ants (41.2%), and termites (40.8%). Total number of prey found in the stomachs of the collared lizard was 2,903, which varied in individual stomachs from 1 to 268 (mean = 27.6; SD = 36.2). Most of the time *T. torquatus* is a sit-and-wait predator. Its opportunistic feeding behavior, including

invertebrates, small vertebrates (other lizard species), and vegetables (flowers and seeds), may contribute to the success of this lizard in colonizing a diversity of habitats." (Authors) Table 2 documents Odonata as very rare prey of female *T. torquatus*.] Address: Teixeira, R.L., Rua Bernardino Monteiro, 75, Centro, CEP 29650-000, Santa Teresa, ES, Brasil.

## 2000

**5357.** Alcántara B.F.; García T.J.; Padilla P.P.; Delgado V.C. (2000): Dosis letales de DIPTEREX 80 % P.S para el control de náyadas de *Gomphaeschna* sp., *Tramea cophysa* y *Tramea calverti* (Odonata, Aeshniidae). *Folia Amazónica* 10(1-2): 73-79. (in Spanish, with English summary). [Larvae of *Gomphaeschna* sp., *Tramea cophysa*, and *T. calverti* were manipulated in the laboratory to determine LD<sub>50</sub> of the phosphonate-based insecticide Dipterex 80 % P.S. (Trichlorfon) 0,0 dimethyl (2,2,2-trichloro-1-methylhydroxy) phosphonate. *Gomphaeschna* sp. was significantly more sensitive against the insecticide than *Tramea* spp.] Address: Instituto de Investigaciones de la Amazonía Peruana - IIAP. Programa de Investigación de Ecosistemas Acuáticos. Centro Regional de Investigaciones de Loreto. Av. Abelardo Quiñones km. 2,5. Apartado 784

**5358.** Buckley, T.R.; Simon, C.; Flook, P.K.; Misof, B. (2000): Secondary structure and conserved motifs of the frequently sequenced domains IV and V of the insect mitochondrial large subunit rRNA gene. *Insect Molecular Biology* 9(6): 565-580. (in English). ["We have analysed over 400 partial insect (including *Aeshna cyanea*) mitochondrial large subunit (mit LSU) sequences in order to identify conserved motifs and secondary structures for domains IV and V of this gene. Most of the secondary structure elements described by R. R. Gutell et al. (unpublished) for the LSU were identified. However, we present structures for helices 84 and 91 that are not recognized in previous universal models. The portion of the 16S gene containing domains IV and V is frequently sequenced in insect molecular systematic studies so we have many more sequences than previous studies which focused on the complete mitochondrial LSU molecule. In addition, we have the advantage of investigating several sets of closely related taxa. Aligned sequences from thirteen insect orders and nine secondary structure diagrams are presented. These conserved sequence motifs and their associated secondary structure elements can now be used to facilitate the alignment of other insect mit LSU sequences." (Authors)] Address: Buckley, T.R., Institute for Molecular Systematics, School of Biological Sciences, Victoria University of Wellington, Wellington, New Zealand. E-mail: tbuckley@duke.edu

**5359.** Cannings, R.A.; Cannings, S.G.; Ramsey, L. (2000): *The Dragonflies* (Insecta: Odonata) of the Columbia Basin, British Columbia: Field surveys, collections development and public education. ISBN 0-7726-4008-4: 287 pp. (in English). [Table of Contents: Overview of the Project. Introduction to the Dragonflies of the Columbia Basin. Dragonfly Habitat in the Columbia Basin. Biogeography and Faunal Elements. Systematic Review of the Fauna. Suborder Zygoptera (Damsel-flies). Suborder Anisoptera (Dragonflies). The Effects of

Human Activity on Dragonfly Populations. Recommendations for Future Inventory, Research and Monitoring. References. Appendix 1: Checklist of Columbia Basin Dragonflies. Appendix 2: Columbia Basin Odonata and Their Faunal Elements. Appendix 3: Project Participants. Species Distribution Maps and Collecting Data. This highly welcome, great publication on the Odonata of BC, Canada is free available on the internet: <http://www.livinglandscapes.bc.ca/cbasin/wwwdragon/pdf/dragonflies4.pdf>] Address: Royal British Columbia Museum, 675 Belleville Street, Victoria, British Columbia, Canada

**5360.** Clarke, D. (2000): Dragonflies: dashing icons of Cumbria's insect biodiversity. *Cumbrian Wildlife* No. 57: (in English). [Popular introduction into dragonflies with many very fine black & white drawings. Available at: <http://www.wildlifetrust.org.uk/cumbria/Publications/Cumbrian%20Wildlife%20Articles/CW57-Dragonflies.pdf>] Address: David Clarke, Tullie House Museum & Art Gallery, Carlisle CA3 8TP

**5361.** Hassan, K.S.; Habeeb, M.A.; Al-Mousawi, N.J. (2000): Occurrence of aquatic insects with algae in Basrah Province. *Marina Mesopotamica* 15(1): 137-143. (in English). ["The presence of aquatic insects together with algae was studied over a period from March - September 1997, in nine stations scattered throughout Basrah Province. 19 species of insects belonging to five orders were collected along with 32 algal species in four classes. Some of the aquatic insects were highly restricted in the nine stations, whereas others were more widely distributed throughout the area." *Anax* sp. and *Ischnura evansi* are listed.] Address: Hassan, K.S., Department of Biology, College of Science, University of Basrah, Basrah, Iraq

**5362.** Hussain, R.; Riaz, M. (2000): Description of the naiads of *Gomphidia t-nigrum* Selys and *Anax parthenope* Selys (Anisoptera: Odonata). *Int. Jour. Agriculture & Biology*. 2(1-2): 167-168. (in English). [The larvae of *G. t-nigrum* and *A. parthenope* collected from various localities of the Sindh Province, Pakistan are described and illustrated] Address: Hussain, R., Pest Warning and Quality Control of Pesticides, Burewala, Punjab-Pakistan, Department of Zoology, University of Azad Jammu & Kashmir, Muzaffarabad, Pakistan

**5363.** Moor, F.C. de; Barber-James, H.M.; Harrison, A.D.; Lugo-Ortiz, C.R. (2000): The macroinvertebrates of the Cunene River from the Ruacana Falls to the river mouth and assessment of the conservation status of the river. *African Journal of Aquatic Science* 25: 105-122. (in English). ["The proposed construction of a second hydroelectric power-generating dam on the Cunene (Kunene) River on the Namibia-Angola border, more than 100km downstream of the Ruacana hydroelectric power plant, will have a major influence on the aquatic biota of this river. In order to assess the potential impact of this impoundment a more detailed inventory of the biota in the river prior to this development was needed. Unfortunately the river presently does not represent an entirely undisturbed system as the operation of the Ruacana hydroelectric power station since 1970 has had a long-term effect on its biota. In the low-flow mid-summer season in particular, large areas of the river become irregularly inundated and exposed, sometimes on a daily basis, making them unsuitable for macroinvertebrate colonisation. There are six impound-



ments along the Cunene River upstream of the Ruacana Falls in Angola. These, however, do not have any major disruptive effects on daily flow variation in the Cunene River in Namibia although whole system biological consequences could be considerable but are unstudied. The Cunene River has a diverse freshwater fish fauna but, prior to the surveys reported here, the aquatic macroinvertebrates had been poorly studied. Surveys conducted by staff of the Department of Water Affairs (DWA) of Namibia and the Albany Museum, Grahamstown, in 1997 and 1998 have resulted in 216 aquatic macroinvertebrate species being recorded from Ruacana to the river mouth. The lower Cunene River, flowing through a very arid region, is biogeographically isolated and therefore highly vulnerable to change. The biota recorded reflects a fauna of widespread species and several elements of tropical origin. Several undescribed species may reflect some endemics but because of limited knowledge of the tropical rivers, this cannot be ascertained with certainty. From the aspect of conservation, the river contains a diversity of species with an abundance of filter-feeding species. Further surveys conducted during different seasons will undoubtedly record more taxa." (Authors) Tab. 7 includes 12 Odonata-taxa collected in 1997 and 1998.] Address: de Moor, F.C., Department of Freshwater Invertebrates, Albany Museum, Grahamstown 6139, South Africa 2111a Berg Road, Fish Hoek, Cape Town 7975, South Africa. E-mail: f.demoor@ru.ac.za

**5364.** Pinder, A.M.; Halse, S.A.; Shiel, R.J.; McRae, M.J. (2000): Granite outcrop pools in south-western Australia: foci of diversification and refugia for aquatic invertebrates. *Journal of the Royal Society of Western Australia* 83: 149-161. (in English). ["Pools and streams on granite outcrops in south-western Australia are reliably filled, but highly seasonal, freshwater habitats that support a diverse array of aquatic invertebrates. A recent biological survey of the wheatbelt has more than doubled the number of invertebrates, to at least 230 species, known from these habitats. Granite outcrops contribute significantly to endemism in the aquatic fauna of the inland south-west and have particular conservation value for about 50 species, mostly rotifers, microcrustaceans, phreodrilid oligochaetes and chironomid midges, restricted to them. Outcrops may also be important for the wider aquatic invertebrate fauna as a freshwater habitat, if salinity in the Western Australian wheatbelt continues to increase." (Authors) 11 odonate species are listed in the appendix.] Address: Pinder, A.M., Department of Conservation and Land Management, CALMScience, PO Box 51, Wanneroo WA 6946, Australia. E-mail: adrianp@calm.wa.gov.au

**5365.** Pires, A.M.; Cowy, I.G.; Coelho, M.M. (2000): Benthic macroinvertebrate communities of intermittent streams in the middle reaches of the Guadiana Basin (Portugal). *Hydrobiologia* 435: 167-175. (in English). [The order-wise abundance including Odonata is shown per sample site (n=7). An ordination diagram is presented for the Gomphidae, based on canonical correspondence analysis for these sites.] Address: Coelho, M.M., Cent. Biol. Ambiental, Depto Zool., Fac. Cienc. Lisboa, Campo Grande Bloco C2-3° Piso, PT-749-016 Lisboa, Portugal. E-mail: mmcoelho@fc.ul.pt

**5366.** Ramsay, L.; Cannings, R.A. (2000): Dragonflies at Risk in British Columbia. In: L. M. Darling (Ed.) *Proceedings of a Conference on the Biology and Ma-*

*agement of Species and Habitats at Risk*, Kamloops, B.C., 15 - 19 Feb., 1999. Volume One. B.C. Ministry of Environment, Lands and Parks, Victoria, B.C. and University College of the Cariboo, Kamloops, B.C. 490pp.: 89-93. (in English). ["In 1993, British Columbia's dragonflies and damselflies (Order Odonata) were listed and ranked as to their conservation status in the province, based upon the knowledge at the time. Inventory efforts were then focused on the species considered at risk, in order to more accurately determine their status and to identify specific sites for conservation. For 3 years, surveys were conducted in 5 regions of the province: the northeast corner, the Lower Mainland, southern Vancouver Island, the Okanagan, and the Columbia Basin. During the course of these surveys, known ranges of many species were extended, knowledge of habitat requirements increased, and 3 new species were confirmed for the province. While many of the targeted species were found only sparsely or not at all, a number of them were discovered to be more abundant than previously thought, and their conservation ranks were changed accordingly." (Authors)] Address: Ramsay, Leah R., British Columbia Conservation Data Centre, Ministry of Environment, Lands and Parks, P.O. Box 9344, STN PROV GOVT, Victoria, BC, V8W 9M1, Canada. E-mail: Leah.Ramsay@gems4.env.gov.bc.ca

**5367.** Reece, B.A. (2000): Early instar growth and survivorship in the common Baskettail Dragonfly *Epi-theca cynosura* (Anisoptera: Corduliidae). Thesis. Master of Science in Biological Sciences. Faculty of the Department of Biological Sciences. East Tennessee State University: 58 pp. (in English). ["Egg masses of *E. cynosura* were collected from Bays Mountain Park, Tennessee, USA, in June, 1999. Newly hatched individuals were placed into enclosures and sampled at scheduled time intervals throughout the summer. Enclosures were exposed to combinations of high and low densities and presence/absence of a second-year class *E. cynosura* predator. Survivorship, mean head widths, and mean dry masses were compared across treatments. Due to poor recovery of early-instar larvae, survivorship showed no significant differences in mortality among treatments. The predator present treatment caused significantly smaller head widths and dry masses only on days 42 and 55. The density treatment had a significant effect on larval growth from day 28 through day 86 (end of the experiment). Larvae from low density treatments had larger head widths and dry masses. The effects observed within the density treatments were likely to have resulted in a cohort split. Those individuals in the low density treatment followed a univoltine life history, and high density individuals followed a semivoltine life history. Density is probably a very important factor influencing the voltinism of *E. cynosura* at Bays Mountain Lake." (Author) available at: [http://etd-submit.etsu.edu/etd/theses/available/etd-0717100-1346\\_55/unrestricted/ReeceB0817.pdf](http://etd-submit.etsu.edu/etd/theses/available/etd-0717100-1346_55/unrestricted/ReeceB0817.pdf)] Address: not stated

**5368.** Reeves, W.K.; Jensen, J.B.; Ozier, J.C. (2000): New faunal and fungal records from caves in Georgia, USA. *Journal of Cave and Karst Studies* 62 (3): 169-179. (in English). [George, USA; verbatim: Order Odonata. Family Cordulegasteridae. *Cordulegaster* sp. (trogloxene). Washington Co.: Tennille Lime Sinks, 24 May 2000. Comments: These sand dwelling odonates were common in the Tennille Lime Sinks stream. Family Gomphidae. *Progomphus obscurus* (Rambur) (trogloxene). Washington Co.: Tennille Lime Sinks, 24

May 2000. Comments: These sand dwelling odonates were common in the Tennille Lime Sinks stream.] Address: Reeves, W.K., Department of Entomology, 114 Long Hall, Clemson University, Clemson, SC 29634 USA. E-mail: wreeves@clemson.edu

**5369.** Saint-Jacques, N.; Harvey, H.H.; Jackson, D.A. (2000): Selective foraging in the white sucker (*Catostomus commersoni*). *Can. J. Zool.* 78: 1320-1331. (in English, with French summary). [The feeding ecology of the fish *C. commersoni* was surveyed; the diet also includes Odonata.] Address: Jackson, D.A. Dept Zoology, University of Toronto, Toronto, ON M5S 3G5, Canada. E-mail: jackson@zoo.utoronto.ca

**5370.** Vizslán, T. (2000): Anatok a Cserehát Odonata faunájához. *Folia hist. not. Mus. matraensis* 24: 133-137. (in Hungarian with English summary). [Compilation of 37 odonate species recorded from 41 Hungarian localities. The list includes records of *Coenagrion ornatum* and *C. scitulum*.] Address: Vizslán, T., Kitaibel P. u. 32/C. Fru 2, HU-9400 Sopron, Hungaria

**5371.** Zhou, W.; Li, Z.-z. (2000): *Scalmogomphus guizhousis* sp. nov. and *Lamelligomphus parvulus* sp. nov., two new dragonflies from China (Anisoptera: Gomphidae). *Wuyi Science Journal* 16: 18-21. (in Chinese, with English summary). [Two new species are described: *Scalmogomphus guizhousis* sp. nov.: Holotype: male, paratype: female 18-VI-2000, Guizhou, Huangguo shu. collected by Zhou Wenbao. The species is closely related to *Scalmogomphus falcatus* Chao. *Lamelligomphus parvulus* sp. nov.: Holotype: male, allotype: female paratype 1 male, 2 females. Collected by Li Zi-zhong, 10-VII-2000, Yunnan, xiaguan. The species is allied to *Lamelligomphus formosanus* (Matsumura). The type specimens are deposited in the Zhejiang Museum of Natural History.] Address: Zhou Wenbao, Zhejiang Museum of Natural History, Jiaogonglu 71, Hangzhou 310012, China

## 2001

**5372.** Acharyya, S.; Mitsch, W.J. (2001): Macroinvertebrate diversity and its ecological implications in two created wetland ecosystems. *Annual reports (Olentangy River Wetland Research Park)* : 65-76. (in English). ["The study was conducted in 2 experimental basins in a created wetland – Olentangy River Wetland Research Park at The Ohio State University, a 30-acre research facility at Columbus, Ohio, Oct. 10-29, 2000. Both the basins are 1 ha each. One of the experimental wetland basins was originally planted and the other basin was unplanted. After a period of 7 years, both the basins are under vegetated cover. The unplanted basin has a dominance of cattail or Typha. These are perched wetlands with water being pumped in continuously from the Olentangy River." Macroinvertebrata including Odonata are communicated on the genus level. available at: <https://kb.osu.edu/dspace/bitstream/1811/375/1/macroinvertebrate+00.pdf>] Address: not stated

**5373.** Davies, P.; Cook, L.; Risdon, M.; Walker, R. (2001): Stream biological research at Warra. *Tasforests* 13(1): 101-107. (in English). ["An active program of stream biological research is being pursued in the War-

ra – Southern Forests area, with several aims: characterisation of instream biological communities and processes, quantification of forestry-related impacts, development of aquatic bioassessment of forest sustainability, and development of methods to mitigate impacts. Several aspects and results of this research are described." (Authors) The species mentioned include *Austroaeschna hardyi*.] Address: Davies, P., School of Zoology, University of Tasmania, GPO Box 252-05, Hobart 7001, Tasmania

**5374.** Holder, H. (2001): The influence of habitat structure on peatland Odonata at local and landscape spatial scales. Thesis Master of Science (Biology), Acadia University, Spring Convocation: 179 pp. (in English). [The full paper is available at: <http://www.collectionscanada.ca/obj/s4/f2/dsk3/ftp04/MQ58426.pdf>. Of some interest are attempts to use an harmonic radar equipment to follow dispersal and to survey the mobility of *Leucorrhinia hudsonica*.] Address: Holder, M., Kingsley, Andrea, 4605 Hwy'12, Kentville, Nova Scotia B4N 3V8, Canada. E-mail: kingsley.holder@ns.sympatico.ca

**5375.** Johansson, F.; Nilsson, A. (2001): Trollsländor och vattenskalbaggar i Umeå uthamn. *Natur i Norr, Umeå* 20(2): 82-84. (in Swedish). [Sweden; eight odonate species are documented] Address: Johansson, F., Department of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**5376.** McClure, C. (2001): Abundance and distribution variation of dragonflies in a salt marsh in response to hydrology and daily ambient temperature. Undergraduate Thesis under the direction of Dr. Robert R. Christian, Department of Biology, East Carolina University: 36 pp. (in English). [Table 1 lists 15 taxa identified and counted in the Virginia Coastal Reserve Brownsville marsh USA. "The most prolific species was *Eythrodiplex berenice*. It was found in 87.5% of all samplings. The next two most common species were *Ischnura ramburii* and *Libellula lydia*, seen in 37.5% and 28.75% of samples respectively. The rest of the species were observed in 15% of samples or less." For the full paper see: <http://www.vcrlter.virginia.edu/thesis/McClure2001.pdf>] Address: not stated

**5377.** O'Meara, M. (2001): The Dragonflies of Waterford City & County. A catalogue and atlas of the Dragonflies of Waterford to the end of the twentieth century. *Fauna of County Waterford Series No. 4 - Odonata*. ISBN 0-9540303-3-8: 16 pp. (in English). [The 17 odonate species hitherto known from this county in the southern part of the Republic of Ireland are mapped and commented. The paper is available at: <http://www.waterfordcoco.ie/council/categories/publications/artic184/dragon.pdf>] Address: Waterford Wildlife, 153 St. John's Park, Waterford, Ireland.

**5378.** Salmah, M.R.C.; Hassan, S.T.S.; Hassan, A.A. (2001): Local movement and feeding pattern of adult *Neurothemis tullia* (Drury) (Odonata: Libellulidae) in a rain fed rice field. *Tropical Ecology* 41(2): 233-241. (in English). ["The movements of *Neurothemis tullia* (Drury) (Odonata: Libellulidae) adults were studied in a rain fed rice field using the mark-release-recapture technique. Both male and female dragonflies were widely distributed within their home range of approximately 30 m radii. Adult movements were highly localized and the longest distance travelled was about 130 m. Diurnal feeding

pattern was studied by examining gut contents. Some individuals had taken preys as early as 0730 hr. Feeding activity however, peaked at 1030 hr and at 1730 hr. Daily food intake was highly variable between sexes and within hours of the day. Females fed more actively in the morning and their body weights were heavier than that of males at all hours of the day. Active feeding activity of both sexes reflected effective predation." (Authors)] Address: Che Salmah Md. Rawi, Malaysia. E-mail: csalmah@usm.my

**5379.** Soares, C.M.; Hayashi, C.; Esper Amaro de Faria, A.C. (2001): Influência da disponibilidade de presas, do contraste visual e do tamanho das larvas de *Pantala* sp. (Odonata, Insecta) sobre a predação de *Simocephalus serrulatus* (Cladocera, Crustacea). *Acta Scientiarum Maringá* 23(2): 357-362. (in Portuguese, with English summary). ["Influence of prey availability, visual contrast and size of dragonfly (*Pantala* sp.) larvae (Odonata, Insecta) on the predation of *Simocephalus serrulatus* (Cladocera, Crustacea). The influence of prey availability, visual contrast and size of dragonfly (*Pantala* sp) larvae on the predation of cladocerans (*Simocephalus serrulatus*) is provided. Twentyfour dragonfly naiads (12.57±0.05 mm and 100.01±9.16 mg) were employed to study the relation between predation rate and availability of cladocerans and visual contrast. 5, 10, 15 and 20 cladocerans/L were placed in 1L transparent and black plastic lined aquariums. Cladocerans (1.63±0.21 mm and 0.78 mg) were counted and replaced hourly for five consecutive hours. Twenty-four naiads of different sizes were placed in 50mL recipients to study effects of size of dragonfly larvae. Each larvae received 20 cladocerans; counting and reposition of individuals consumed every ten minutes during two consecutive hours were undertaken. Quadratic effect ( $p < 0.02$ ) in predation rate was reported, with an increase in prey availability: 21.67; 39.00; 42.44 and 49.67% were reported for densities of 5, 10, 15 and 20 cladocerans/L respectively. Predation rate ( $p < 0.02$ ) was higher in dark wall aquariums (42.67%) than in those with transparent walls (33.72%). Size of dragonfly larvae had a quadratic effect on the predation of cladocerans and highest value occurred with 13.23 mm naiads. While high prey availability increases predation rate, predation is higher in aquariums with dark walls and 13.23 mm-long larvae have the highest predation rate." (Authors)] Address: Soares, C.M., Departamento de Biologia, Programa de Pós-Graduação em Ecologia de Ambientes Aquáticos Continentais, Universidade Estadual de Maringá, Av. Colombo, 5790, 87020-900, Maringá, Paraná, Brasil. E-mail: cmsouares@uem.br

**5380.** U.S. Fish & Wildlife Service (2001): *Somatochlora hineana*. Recovery plan. U.S. Fish & Wildlife Service, 5430 Grosvenor Lane, Suite 110, Bethesda Maryland 20814, USA.: 120 pp. [Available at: <http://www.fws.gov/midwest/Endangered/insects/hed/hedplan.pdf>]

**5381.** Yourth, C.P. (2001): Ecological immunology in lestad damselflies: explaining variation in immune defense against parasitic water mites. Thesis. Master of Science. Dept Zoology, University of Toronto: 75 pp. (in English). ["This thesis tests predictions of the emerging theory of ecological immunology using variation in immune expression of *Lestes dryas* Kirby, *L. forcipatus* Rambur, *L. unguiculatus* Hagen, and *L. congener* Hagen to a generalist parasitic water mite, *Arrenurus planus* Marshall. Immune responses of the four lestad species were

compared as they relate to prevalence and intensity of mite infection; these measures of parasitism did not fully explain among-species variation. Within-species variation in immunity of *L. forcipatus* was related to time of season, but not to host body size or asymmetry, measures of host condition. When *L. forcipatus* were allowed to respond to Sephadex beads at a fixed temperature across season, no seasonal pattern in immunity was observed and a positive correlation between condition and immune response in males was detected. These results implicate seasonal variation in temperature as being a major factor in determining immune responsiveness of lestad damselflies." (Author). The thesis is available at: <http://www.collectionscanada.ca/obj/s4/f2/dsk3/ftp05/MQ63244.pdf>]

**5382.** Zhu, H.-q. ; Zhang, X.-x. (2001): A new species of the genus *Planaeschna* from Shanxi province. China (Odonata: Aeschnidae). *Wuyi Sci. J.* 17: 6-9. (in Chinese, with English summary). [*Planaeschna shanxiensis* sp. nov. is described and illustrated. Holotype female: Xing-he (river), Yangcheng xian, Shanxi, China. 8-IX-2000; allotype male: Hou-hui gou, Ling xian, Shanxi, China. 2-VII-1986; paratypes of both sexes. The new species is compared with *P. milnei*, *P. risi*, and *P. suichangensis*. It is considered conspecific with the taxon described by J.G. Needham (1930, *Zool. sin.* [A] 11: 84-85) as "*P. milnei* Selys.] Address: Zhang, X.-x., Shanxi Acad. Agric. Sci., Taiyuan-030006. P.R. China

## 2002

**5383.** Ali, M.H.; Anon, M.R.; Mohammed, H.H. (2002): The seasonal variations of abundance and biomass of the two odonate naiads *Ischnura evansi* Morton (Odonata: Coenagrionidae) and *Brachythemis fuscopalliata* Selys (Odonata: Libellulidae) in the Qarmat Ali region, Basrah. *Marina Mesopotamica* 17(2): 405-415. (in English). ["The abundance and biomass of the naiads of two odonate species, *Ischnura evansi* and *Brachythemis fuscopalliata*, in the Qarmat Ali region near Basrah have been investigated. Field samples were taken monthly with a plankton net for the period Dec. 1994 – Nov. 1995. During different months, the population structure may be monomodal, bimodal, or trimodal. The mean density of *I. evansi* was higher (196 individuals/m<sup>3</sup>) than that of *B. fuscopalliata* (168 individuals/m<sup>3</sup>) and two peaks of density were observed in December 1994 and in May 1995. Minimum values of density were recorded at temperature ranges above 25°C (26-34°C). The mean monthly biomass (B) for *B. fuscopalliata* was higher (869 mg dry weight/m<sup>3</sup>) than that of *I. evansi* (284 mg DW/m<sup>3</sup>)."] (Authors)] Address: Ali, M.H., Marine Science Centre, University of Basrah, Basrah, Iraq

**5384.** Batcher, M.S. (2002): New England Plant Conservation Program: *Saururus cernuus* L. Lizard's Tail. Conservation and Research Plan for New England. For: New England Wild Flower Society, 180 Hemenway Road, Framingham, MA 01701, USA: 1, 34 pp. (in English). [This study contains the interesting information that Odonata sometimes landed on pollen spikes of *Saururus cernuus*, and worked as pollinator in a broad sense: When struck, a flower spike would send off a cloud of pollen. Based on these observations, it is conc-



cluded that wind and insect-mediated wind pollination were the primary methods of pollinations in *S. cernuus*. For the full paper see: <http://www.newfs.org/conserve/pdf/Saururuscernuus.pdf> Address: Batcher, M.S., Consulting Ecologist and Environmental Planner, 1907 Buskirk-West Hoosick Rd., Buskirk, NY 12028

**5385.** Center for Biological Diversity (? (> 2002)): Candidate Petition Project: Insects. Petitions to list as federally endangered species. <http://www.biologicaldiversity.org>: 215 pp. (in English). [The US document contains the individual petitions for 27 insect species and one arachnid species to be listed as federally endangered species under the Federal Endangered Species Act. Odonata included are: *Megalagrion nigroharmatum nigrolineatum*, *M. leptodemas*, *M. nesiotas*, *M. oceanicum*, *M. xanthomelas*, and *M. pacificum*. Each of the species sheets compiles excessively all information relevant for conservation measures: Taxonomy, distribution, morphology, behaviour, habitat, population status, listing criteria, bibliography.] Address: <http://www.biologicaldiversity.org/swcbd/Programs/bdes/cp/petitions/insects.pdf>

**5386.** Clopton, R.E. (2002): Phylum Apicomplexa Levine, 1970: Order Eugregarinorida Léger, 1900. In: Lee, G. Leedale, D. Patterson & P. C. Bradbury (Eds.): Illustrated Guide to the Protozoa, 2nd edition. Society of Protozoologists, Lawrence, Kansas.: 205-288. (in English). [Odonate hosts of the Eugregarinorida are documented.] Address: Clopton, R.E.; Dept Nat Sci, Peru State Coll, Peru, NE, 68421, USA. E-mail: [rclopton@oakmail.peru.edu](mailto:rclopton@oakmail.peru.edu)

**5387.** Cotterill, F.P.D. (2002): Mammal collections and biodiversity conservation in the Ikelenge Pedicle, Mwinilunga district, North west Zambia. Occasional Publications in Biodiversity 10: 20 pp. (in English). ["[...] The second part of the paper highlights the biodiversity of this region and discusses its conservation. The biogeography of the Ikelenge pedicle is discussed with respect to its exceptional biodiversity. A review of indicator species of vertebrates, Lepidoptera and Odonata emphasizes the global and national significance of the area's biodiversity resulting from the dominant influence of forest species of Guineo-Congolian affinity and also from those species endemic to the area. The presence of these endemics provides evidence for a region of endemism." (Authors) Odonata with bioindicatorial value are listed in App. 1.] Address: Biodiversity Foundation for Africa, P.O. Box FM730, Famona, Bulawayo, Zimbabwe

**5388.** Craves, J.A. (2002): A preliminary list of the Odonata of Wayne Co.. Michigan Birds and Natural History 9(1): 7-15. (in English). [Michigan, USA; records of 48 odonate species are documented.] Address: Craves, Julie A., Rouge River Bird Observatory, Natural Areas Dept., University of Michigan-Dearborn, Dearborn, MI 48128

**5389.** Evans, R. (2002): Conservation assessment for selected dragonflies of the Allegheny National Forest. USDA Forest Service, Eastern Region December 2002: 35 pp. (in English). ["The objective of this document is to provide background information and review the conservation status for several odonate species in the Allegheny National Forest. These species were chosen based upon their rarity in the Allegheny National Forest and the State of Pennsylvania. The following species

are the focus of this report: *Helocordulia uhleri*, *Soma-tochlora elongata*, *Gomphus adelphus*, *G. descriptus*, *G. fraternus*, *G. quadricolor*, *G. viridifrons*, *Ophiogomphus mainensis*, and *Stylurus scudderii*. These species are found primarily in wetlands, rivers, and streams. Primary threats to these species include degradation of water quality by resource extraction, changes in riparian vegetation due to forest management practices, and sedimentation and pollution of streams from agricultural inputs into watersheds. Management considerations include protecting high quality streams in the Allegheny National Forest from future impacts. These species should continue to be monitored in Allegheny National Forest streams, and survey efforts should be expanded to document the ranges of these species." (Author) available from: [http://www.fs.fed.us/r9/wildlife/tes/ca-overview/docs/insects\\_electeddragonflies.pdf](http://www.fs.fed.us/r9/wildlife/tes/ca-overview/docs/insects_electeddragonflies.pdf) Address: Evans, R., Western Pennsylvania Conservancy, 209 Fourth Avenue, Pittsburgh, PA 15222, USA

**5390.** Fourcassié, V.; Oliveira, P.S. (2002): Foraging ecology of the giant Amazonian ant *Dinoponera gigantea* (Hymenoptera, Formicidae, Ponerinae): activity schedule, diet and spatial foraging patterns. Journal of Natural History 36: 2211-2227. (in English). [The list of food items collected by workers of *Dinoponera gigantea* in Amazonian rainforest in north Brazil, in December 1999 includes one odonate specimen.] Address: Oliveira, P.S., Departamento de Zoologia, Universidade Estadual de Campinas, C.P. 6109, 13083-970 Campinas SP, Brazil. E-mail: [ps@unicamp.br](mailto:ps@unicamp.br)

**5391.** Holmström, N. (2002): Trip Report: La Gomera. 1-8 Dec. 2002. <http://www.seawatching.net/reports/Gomera/LaGomera2002.pdf>: 8 pp. (in English). [Verbatim: *Ischnura saharensis*: 2 – at the Park of San Sebastián 5/12. Considered by some to be a form of *Ischnura elegans*, [...] *Anax imperator*: 3 – at Playa Santiago 4/12. 6 – at the Park of San Sebastián 5/12. A colourful and heavily built dragonfly! Best viewed through binoculars rather than by eye. *Sympetrum fonscolombii*: 3 – at the Park of San Sebastián 5/12. 1 – at the La Laja area 6/12. Easier to get close to and be seen stationary than the Emperor, which is more vigilant and difficult to get close. *Orthetrum* sp.: 2 – at San Sebastián 2/12. Several at Playa Santiago 4/12. 3 – at the La Laja area 6/12. All observations were of the same species, however, we couldn't identify it. According to the literature it was an *Orthetrum* species. At La Laja we spotted one bluish male.] Address: Holmström, N., Öja Björkebo, S-640 40 Stora Sundby, Sweden. E-mail: [niklas@seawatching.net](mailto:niklas@seawatching.net)

**5392.** Jones, C.D. (2002): NHIC participates in the national Odonata assessment workshop. Ontario Natural Heritage Information Centre-Newsletter 6(1): 8-10. (in English). [Laurentian Lodge, Algoma District, Ontario, Canada, 3 to 6-VII-2001; this is a report on the meeting with information on fieldwork (including a record of the rare *Ophiogomphus anomalus*) and some lectures.] Address: Jones, C.D., Box 182, Lakefield, Ontario, K0L 2H0, Canada. E-mail: [colin.jones@mnr.gov.on.ca](mailto:colin.jones@mnr.gov.on.ca)

**5393.** Li, X.-F.; Ren, D. (2002): First discovery of male *Rudialeschna limnobia* Ren, 1996 and its venational variability. Acta Zootaxonomica Sinica 27(3): 486-490. (in Chinese, with English summary). [The male *R. limnobia* is described and illustrated. The variability of wing venation at the intraspecific level is discussed. The ma-

terial studied was collected at the Late Jurassic Yixian Formation in the Liaoning Province, China.] Address: Ren, D., Dept Biology, Capital Normal University, Beijing 100037, China. E-mail: rendongprof@yahoo.com

**5394.** Mauersberger, R. (2002): Der Referenzzustand - Merkmale naturnaher Seen-Ökosysteme am Beispiel von NO-Deutschland. NNA-Berichte 2/2002: 65-76. (in German, with English summary). ["The former, not by man influenced situation of a glacial lake shall be equated as the reference state within the meaning of a good ecological state in the sense of the European Water Framework Directive. This reference state must not be universal for all lakes but has to be specialized for every lake as an individual. Subsequently the parameters for the determination of the reference state are listed: \* Former (by geological conditions determined) hydrological lake type (original dimension of its tributary, water exchange rate, existence of surface inflows and outflow and ground water touch) \* Original trophic, humic and alkalinity State \* Original poison agents concentrations (in relation to the geogen level) \* Hydraulic caused bank structure as a result of long term water level amplitude \* Impairment by human building activities \* Near natural distribution and quality of Sediments and the condition of lake associated swamps and bogs \* Near natural dead tree structures in the littoral \* Typical Vegetation: structures, species composition and maximum growing depth according to the original trophic, humic and alkalinity State of the lake \* Near natural ichthyofauna contingent upon original hydrological lake type and trophic State \* Presence of character species in the benthic fauna e.g. Odonata and Mollusca" (Author)] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-mail: FoerderevereinUeckermark.Seen@t-online.de

**5395.** McGlynn, T.P.; Hoover, J.R.; Jasper, G.S.; Kelly, M.S.; Polis, A.M.; Spangler, C.M.; Watson, B.J. (2002): Resource heterogeneity affects demography of the Costa Rican ant *Aphaenogaster araneoides*. Journal of Tropical Ecology 18: 231-244. (in English). [On page 233, a passing reference of Odonata as prey / food of ants is made. Available at: [www.home.sandiego.edu/~tmcglynn/documents/2002JmcGlynnAphaeno1.pdf](http://www.home.sandiego.edu/~tmcglynn/documents/2002JmcGlynnAphaeno1.pdf)] Address: McGlynn, T.P., University of San Diego, Department of Biology, 5998 Alcalá Park, San Diego, CA 92110, USA

**5396.** Mizota, K. (2002): A check list of insects in Kinkazan Island, Miyagi Pref., Northeastern Japan: A bibliographical survey. Miyagi University of Education Report of Environmental Education 5: 69-78. (in Japanese). [Japan, the list includes 8 odonate species] Address: not stated in English

**5397.** Olthoff, M.; Ikemeyer, D. (2002): Vorkommen von Libellen und Heuschrecken in Feuchtwiesen. Untersuchungen in ausgewählten Schutzgebieten des Kreises Borken. LÖBF-Mitteilungen 1/2002: 24-30. (in German). [Nordrhein-Westfalen, Germany; in 2000, 23 water bodies with a total of 28 species have been surveyed for their odonate fauna. Colonisation history, dragonfly succession of the ponds, effects / impacts by trampling of cattle, the importance for determining the odonate fauna of shrubs, relative near to source habitats, and altering levels of water table are discussed.] Address: Ikemeyer, D., Biologische Station Zwillbrock

e.V., Zwillbrock 10, D-48691 Vreden, Germany. E-mail: [info@bszwillbrock.de](mailto:info@bszwillbrock.de)

**5398.** Page, J. (2002): Dragonfly dramas: Desert whitetails and Flame skimmers cavort in the sinkholes of New Mexico's Bitter Lake Refuge. Smithsonian 32 (10): 20, 22. (in English). [Verbatim: "Gomphid!" someone shouted, and the little thing with the gleaming fuselage hovered, then sped away. I was standing on the whitish gypsum-rich hardpan that passes for soil in the desert about 15 miles north of Roswell, New Mexico. The air around me was filled with mostly unidentified flying objects. I now knew that this yellow-and-black creature was a Gomphid, a genus of dragonfly. But many of the dozens of other Odonata, the general scientific name for dragonflies and damselflies, which flew aerial gymnastics around me, remain nameless. This particular location—the Bitter Lake National Wildlife Refuge—hosts a great variety of these curious creatures. My expert guide, Robert R. Larsen, is a well-built man who carries a big white net as comfortably as many men carry a briefcase. By training a botanical illustrator and by preference a biological "investigator," Larsen was the scientist to whom the managers of the Bitter Lake National Wildlife Refuge turned when they identified an unusually large number of Odonata species helicoptering around the sinkholes of the refuge in 1998. With funds from the state Game and Fish Department, Larsen—a resident of Roswell who had been analyzing the plant life of the refuge—netted more than 50 species of dragonfly and some 30 species of damselfly. They included the largest dragonfly found in the United States (*Anax walsinghami*) and one of the nation's smallest damselflies (*Ischnura hastata*). An easy way to distinguish between a dragonfly and a damselfly is to observe the wings: the rear, or posterior, pair of dragonfly wings are broader than the front, or anterior, pair, while both sets of a damselfly's wings are essentially equal in size. Other distinguishing characteristics include the eyes of the damselfly, which are on opposite sides of its head, while dragonfly eyes are typically closer together, sometimes even connected. These bulging and usually colorful organs have up to 30,000 facets. Both creatures, however, enjoy expanded peripheral vision, a formidable feature for a predator, which both dragonflies and damselflies become early on in their lives. "I'm really glad the larvae aren't huge, or that I'm not really small," said Karen Gaines, a graduate student at the University of New Mexico who has been studying Odonata larvae at the refuge. Most dragonfly larvae, which are aquatic for one to two years, are utterly insatiable, eating everything they come across, including tadpoles, fish, and mosquito and other insect larvae. They even eat their own siblings. Eventually, the larva climbs out of the water; its outer "skin," or exoskeleton, splits open, it pulls its telescoped abdomen out of the casing and it gradually extends to full length. Within one to two hours, the wings clear, dry out and open up. After its wings harden, over the course of several hours to several days, the creature will become a remarkable aerialist. Some species can fly up to 35 miles per hour. Their wings work independently, so they can hover and change direction instantaneously. Some species are migratory and, with the wind's help, may travel hundreds of miles. Adult life is relatively brief, typically a matter of weeks, though some species can live for as long as a year. The time is spent voraciously feeding on mosquitoes, assorted moths and butterflies, and mating, a complex affair that turns a pair into an ac-

robotic and often airborne pretzel. Larsen reports seeing a large dragonfly carry off a minnow, a sight so remarkable that other scientists have questioned him on it. While I was standing right next to her, Karen Gaines swished her net in the air and caught a *Gomphus militaris* with the wing of a damselfly still hanging from its mouth. (Additional excellent detail about the biology of Odonata is covered in *Dragonflies of the World* by Jill Silsby, a new book published by Smithsonian Institution Press.). So why are there so many Odonata here? At first glance, their presence seems unlikely. After all, Bitter Lake lies at the northern edge of the Chihuahuan Desert, a refuge known mostly for its birdlife, especially its spectacular winter flocks of snow geese and sandhill cranes. It is a flat landscape lying west of a long low ridge called Comanche Hill. The Pecos River runs along the ridge, and the refuge itself contains many lakes left over when the river took a new course. The alkaline lakes for which the refuge is named are indeed bitter, making it the kind of place Louis L'Amour heroes steer clear of. Right where the Chihuahuan Desert meets the shortgrass prairie, Larsen told me, is an extremely diverse habitat for plant species. In addition to freshwater sloughs, ponds, marshes, springs, ditches and a half-mile-long stream known as the Lost River, the refuge contains more than 60 sinkholes. This is ideal habitat for dragonflies. Sinkholes are just as they sound—places where soluble bedrock dissolves, creating cavities or holes in the surface. Groundwater then often fills the hole. The process is typically slow, but local legend has it that one of the refuge's sinkholes formed overnight beneath a parked bulldozer. Some sinkholes here are but a few feet across, though one is large enough—about an acre—to be called (with a bit of exaggeration) Lake St. Francis, 70 feet deep with beautiful blue and Caribbean-green water. These sinkholes have become aquatic "islands" in this arid desert habitat. Sinkhole conditions differ a great deal. Some have steep, naked gypsum sides; others have reeds and grasses that grow right up to the water's edge. In some sinkholes, the water is so saline that it supports red and green algae blooms. Other sinkholes are saltier than seawater and invite species of dragonflies and damselflies usually found in estuaries, although the nearest seashore is a thousand miles away. The unique blend of conditions in each sinkhole creates entirely different ecosystems, even though one sinkhole may be only ten feet from another. As a result, each sinkhole, Gaines explained, seems to have its own special array of Odonata, and some species breed only in a single sinkhole. (Sinkholes also host the only known populations of certain other animal species, such as the last genetically pure species of the extraordinarily salt-tolerant Pecos pupfish and certain springsnails and amphipods.) "It's a natural outdoor laboratory," Gaines said. She keeps track of this confusing and colorful aerial menagerie with a little biological sleuthing. Gaines regularly places little ladders of wire mesh leading from the edge of sinkholes into the water. Because Odonata leave their larval casing on the ladder as they crawl out, she can identify which species breed in the Bitter Lake sinkholes and which migrate here after breeding elsewhere. Nearby Roswell may be a mecca for UFOs, but the dedicated scientists here at Bitter Lake have a pretty good handle on what's flying around. Already, I can spot the fluttering flight of the desert whitetail (*Libellula subornata*) and the bright red body of the flame skimmer (*L. saturata*). I was struck by how much these Odonata folk sounded like bird-watchers, singing out the name of a

dragonfly they see whizzing by for but an instant. Indeed, the common names of these creatures are just as exciting as bird names—or more so. After all, where's the poetry in spotting a crow or a snipe? But imagine spotting an Eastern amberwing, a seaside dragonlet or a Halloween pennant during a single outing at your neighborhood pond. And if your life list included the Comanche skimmer, the desert forktail and the black saddle bags, wouldn't your chest swell with pride?]

**5399.** Subramanian, K.A. (2002): When Dragons Fly .... Resonance October 2002: 69-79. (in English). [Introduction into the biology of Odonata. For a full paper see: <http://www.ias.ac.in/resonance/Oct2002/pdf/Oct2002p69-78.pdf>] Address: Subramanian, K.A., Centre for Ecological Sciences, Indian Institute of Science, Bangalore 560 012, India. Email: [subbu@ces.iisc.ernet.in](mailto:subbu@ces.iisc.ernet.in)

## 2003

**5400.** Cannings, S.G. (2003): Status of Olive Clubtail *Stylurus olivaceus* (Selys) in British Columbia. B.C. Ministry of Sustainable Resource Management, Conservation Data Centre, Victoria BC. Wildlife Bulletin No. B-112: 19 pp. (in English). ["The Olive Clubtail (*Stylurus olivaceus*) is a dragonfly of warm streams and lakes in western North America. In British Columbia, the species is restricted to a few lakes and warm streams in the Thompson, Kettle and Okanagan valleys. Recent observation or collection records are not known from the Thompson River. Little is known of the biology of the species and no real trend information is available. Possible threats include shoreline development (including loss of riparian vegetation), pesticide contamination, eutrophication and predation by introduced fish. Recommendations include more focused inventory, basic research into the species' biology, maintenance of natural shorelines where possible and control of introduced predatory fish." (Author)] Address: Cannings, S., Royal British Columbia Museum, 675 Belleville Street, Victoria, British Columbia, Canada

**5401.** Cannings, S.G. (2003): Status of Western River Cruiser *Macromia magnifica* McLachlan in British Columbia. B.C. Ministry of Sustainable Resource Management, Conservation Data Centre, Victoria BC. Wildlife Bulletin No. B-111: (in English). ["The Western River Cruiser, *Macromia magnifica* McLachlan, is a large, boldly patterned dragonfly of warm, clear streams and lakes in western North America. In British Columbia, the species is restricted to a few lakes and warm streams in the Fraser Valley, Shuswap Lake, Okanagan Valley and Christina Lake areas. Recent observation or collection records are not known from the Fraser Valley and Shuswap Lake. Little is known of the biology of the species and no real trend information is available. Possible threats include shoreline development (including loss of riparian vegetation), pesticide contamination, eutrophication and predation by introduced fish. Recommendations include more focused inventory, basic research into the species' biology, maintenance of natural shorelines where possible and control of introduced predatory fish."] Address: Cannings, S., Royal British Columbia Museum, 675 Belleville Street, Victoria, British Columbia, Canada



**5402.** Commission of Zoological Nomenclature (2003): OPINION 2037 (Cases 3120 and 3120a) - LIOCHELIDAE Fet & Bechly, 2001 (1879) (Scorpiones): adopted as a valid substitute name for ISCHNURIDAE Simon, 1879 in order to remove homonymy with ISCHNURINAE Fraser, 1957 (Insecta, Odonata). Bulletin of Zoological Nomenclature 60(2): 159-161. ["The Commission has ruled that the scorpion family name LIOCHELIDAE Fet & Bechly, 2001 (1879) is to have precedence over ISCHNURIDAE Simon, 1879, which is a homonym of the widely used damselfly name ISCHNURINAE Fraser, 1957 (Odonata). The type genus of LIOCHELIDAE is Liocheles Sundevall, 1833, which is in wide use as the valid senior subjective synonym of the long abandoned name Ischnurus C.L. Koch, 1837 (the type genus of ISCHNURIDAE Simon, 1879). ISCHNURINAE Fraser, 1957 is not to be rejected despite being a junior homonym of ISCHNURIDAE Simon, 1879." (Authors)]

**5403.** Conseil General des Landes; Parc naturel régional des Landes de Gascogne (2003): Bilan des inventaires entomologiques réalisés dans les forêts galeries des leyres de 1999 à 2002 (Rhopalocères, odonates et orthoptères). <http://www.cg40.fr/doc/environforet-leyreentomo.pdf>: 20 pp- (in French). [The total of 35 odonate species includes also *Coenagrion scitulum*, *C. mercuriale*, *Onychogomphus uncatus*, *Gomphus similimus*, *Somatochlora flavomaculata*, *Sympetrum meridionale*, *Leucorrhinia albifrons*, and *Leucorrhinia pectoralis*. For some primary results see: <http://www.cg40.fr/doc/environforetleyre03.pdf>]

**5404.** De Knijf, G. (2003): Libellen (Odonata) in de provincie Antwerpen: een belangrijke taak weggelegd voor het provinciale natuurbeleid. Antwerose koepel voor natuurstudie • Jaarboek 2002: 51-63. (in Dutch). [60 of the 66 odonate species of the Flame region in Belgium have been recorded in the Antwerp province.] Address: De Knijf, G., Instituut voor Natuurbehoud en Libellenwerkgroep Gomphus, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: [geert.de.knijf@instnat.be](mailto:geert.de.knijf@instnat.be)

**5405.** Ekestubbe, K.; Dannelid, E.; Rosén, C.; Wenngren, J. (2003): Inventering av trollsländor i Stockholms län åren 2000-2001. Södertörnsekologerna Rapport 2003:1 ISSN 1651-856X: 62 pp. (in Swedish). [Detailed documentation with tables and maps of an odonate inventarisation in the surroundings of Stockholm, Sweden. For the full paper see: <http://www.sodertornsekologerna.org/Trollsländerapporten-omslagrattadtext-20040127pluskartor.pdf>]

**5406.** Gainsbury, A.M.; Colli, G.R. (2003): Lizard assemblages from natural Cerrado enclaves in southwestern Amazonia: The role of stochastic extinctions and isolation. *Biotropica* 35(4) : 503-519. (in English, with Spanish summary). ["We used null model analyses to investigate the existence of structure in lizard assemblages from open vegetation enclaves in Rondonia, southwestern Amazonia, in relation to species richness, species co-occurrence, diet (including Odonata), and size overlap. These enclaves presumably have been isolated since the Holocene, providing a history of long-term isolation. We assumed that the presence of structure in lizard assemblages from the Rondonia enclaves is consistent with the notion that extinctions are a deterministic process, some species being more prone to extinction than others. We grouped enclaves into four

categories: latosol cerrado, sandy cerrado, transitional forest, and rocky field. We collected 14 Cerrado lizard species, consisting of five families in all sampled areas. Analyses of species richness, co-occurrence, diet overlap, and size overlap patterns suggested lack of organization in the assemblages. The assemblages from the rocky fields of Guajará Mirim and the sandy cerrados in Vilhena were significantly structured in diet overlap, whereas the remaining assemblages lacked structure. This probably resulted from phylogenetic inertia and not from ecological interactions. Our results suggest that extinctions proceeded in a stochastic fashion and that historical factors had a dominant role in shaping lizard assemblages in detriment of present-day ecological factors. In addition, we identified endemic species in the enclaves as well as a tight association between unique ecogeographic features of the landscape and species occurrences. We propose that conservation measures in the region must adequately preserve these features to ensure the survival of the species." (Authors)] Address: Colli, G.R., Departamento de Zoologia, Universidade de Brasília, 70910-900, Brasília DF, Brazil. E-mail: [gcolli@unb.br](mailto:gcolli@unb.br)

**5407.** Gassmann, D. (2003): Phylogeny and distribution of the Philippine damselfly subgenus *Risioecnemis* (*Igneocnemis*) Hämäläinen (Odonata: Platycnemididae). Fritz (ed.): 6th GfBS Annual Congress abstracts. *Org. Divers. Evol.* 3, *Electr. Suppl.* 17 (2003): 20. (in English). [Verbatim: *Risioecnemis* Cowley, 1934 is the largest genus of the zygopteran subfamily Calicneminae in the Indo-Pacific region. The group is endemic to the Philippines, except for the Sulu Archipelago and the Palawan island chain. Members of the group are confined to small, clear creeks in shady rainforest environment, occurring from lowland up to mid-montane forest. Two subgenera within the genus *Risioecnemis* are currently recognized: *Risioecnemis* Cowley, 1934 s. str., and *Igneocnemis* Hämäläinen, 1991. A revision of the subgenus *Risioecnemis* was presented by Hämäläinen (1991). Mainly based on the large Roland A. Müller collection from the Philippines, which is now housed by the Natural History Museum in Leiden, a complete taxonomic revision of the subgenus *Igneocnemis* has recently been completed by Gassmann & Hämäläinen (2002). In total, 20 species of sg. *Igneocnemis* have been recognized, of which five were newly described. Several putative synapomorphies of *Igneocnemis* species point to the monophyly of the group. However, the monophyly of the whole genus, i.e. *Risioecnemis* Cowley sensu lato, is less certain. Within the scope of a phylogenetic-biogeographical study on the Indo-Pacific Platycnemididae, the phylogeny of the *Igneocnemis* species was reconstructed based on morphological characters. The distribution patterns of the species can be explained by Tertiary island arc connections as well as by the existence of larger islands during the Pleistocene. References: Gassmann, D. & Hämäläinen, M. (2002): A revision of the Philippine subgenus *Risioecnemis* (*Igneocnemis*) Hämäläinen (Odonata: Platycnemididae). *Tijdschr. Entomol.* 145: 213-266. Hämäläinen, M. (1991): The Philippine genus *Risioecnemis* Cowley (Zygoptera: Platycnemididae). 1. Subgenus] Address: Gassmann, D., Institute of Evolutionary and Ecological Sciences, Leiden University, c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: [gassmann@naturalis.nnm.nl](mailto:gassmann@naturalis.nnm.nl)

- 5408.** Hussain, R. ; Ahmed, K.B. (2003): Damselfly naiads (Odonata: Zygoptera) of Sindh–Pakistan. *Int. Jour. Agriculture & Biology*. 5(1): 53-56. (in English). [Lestes, Pseudagrion, Ceriagrion and Ischnura spp., are described and illustrated.] Address: Ahmed, K.B., Pest Warning and Quality Control of Pesticides, Burewala, Punjab–Pakistan, Department of Zoology, University of Azad Jammu & Kashmir, Muzaffarabad, Pakistan
- 5409.** Lange, L. (2003): Die Kleine Pechlibelle *Ischnura pumilio* (Charpentier, 1825) und die Speer-Azurjungfer *Coenagrion hastulatum* (Charpentier, 1825) - zwei für die Marschen des Kreises Steinburg seltene Libellenarten. *Bombus* 3(55-57): 217-218. (in German). [Schleswig-Holstein, Germany; documentation of two records of the rare *I. pumilio* from a ditch system in the Altenmoor at 29-VIII-2000 and the lake Brake at 30-V-2002. Records of *C. hastulatum* in 2002 are discussed with reference to the high water table level in this year.] Address: Lange, L., Deichreihe 21, D-25599 Wewelsfleth, Germany.
- 5410.** López Cazorla, A.; Durán, W.; Tejera, L. (2003): Alimentación de la ictiofauna del río Sauce Grande, provincia de Buenos Aires, Argentina. *Biología Acuática* 20: 73-79. (in Spanish). [Argentina; the diet of the fishes includes 4 odonate taxa: *Ischnura* sp., *Oxyagrion hempeli*, *Andinagrion peterseni*, *Rhionaeschna bonariensis*.] Address: Departamento de Biología, Bioquímica y Farmacia, UNS. San Juan 670 (8000) Bahía Blanca, Argentina. E-mail: acazorla@criba.edu.ar
- 5411.** Macaulay, D.; Dunne, S. (2003): Survey of the odonate fauna in Caribou Mountains Wildland Park. Prepared for: Alberta Natural Heritage Information Centre, Parks and Protected Areas Division, Alberta Community Development: 24 pp. (in English). [For a full paper see: <http://www.cd.gov.ab.ca/preserving/parks/ahnic/docs/CarbouOdeRep.final.pdf>] Address: not stated
- 5412.** Norma-Rashid, Y. (2003): Some biological aspects and an unique habitat choice of damselfly *Indocnemis orang* Foerster (Odonata: Platycnemididae) from Malaysia. *Entomologia Sinica* 2003 (2): ["The hemimetabolous preliminary studies on the life cycle of *Indocnemis orang* is here reported for the first time, being completed in 6 instars for a minimum duration of 69 days. It can be classified as a stenotopic species being sensitive to biotope requirements but having tolerance towards fluctuating water qualities during its developmental process. The need for caution in the interpretation of bioindicator species for habitat assessment and biomonitoring is here both indicated and discussed." (Author)] Address: not stated
- 5413.** Prokop, J.; Fleck, G.; Nel, A. (2003): New dragonflies from the Lower Miocene (Ottunagian/Karpatian) of the Cypris Shale in western Bohemia (Odonata: Libellulidae). *Neues Jahrbuch für Geologie und Paläontologie - Monatshefte* 2003 (9): 561-576. [New libellulid dragonflies described from the Cypris Shale (Lower Miocene) of the Cheb and Sokolov basins in western Bohemia (Czech Republic), are i.e. *Prorhynchthemis bubiki* n. g. et n. sp. (possibly *Rhynchthemistinae*) and a further new species *Onychothemis rihai* n. sp. (possibly *Onychothemistinae*.)] Address: Fleck, G., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleck@mnhn.fr
- 5414.** Reuber A. Brandão, R.A.; Garda, A.; Braz, V.; Fonseca, B. (2003): Observations on the ecology of *Pseudis bolbodactyla* (Anura, Pseudidae) in central Brazil. *Phyllomedusa* 2(1): 3-8. (in English). ["Data on diet, activity, habitat use, and anti-predator behavior are presented for a population of *Pseudis bolbodactyla* in central Brazil. The most common diet items were diurnal plant-associated insects. *Pseudis bolbodactyla* shows both diurnal and nocturnal activity and uses mainly areas with aquatic vegetation (submerged and emergent). Individuals detect predators visually and through vibrations in the water." (Authors) The discussion give information on Odonata as diet of this reptile species. ] Address: Brandão, R.A., Coordenação de Assuntos Fundiários (DICRI), Diretoria de Ecosistemas (DIREC), Instituto Brasileiro do Meio Ambiente (IBAMA), Avenida L4 Norte, 70 910-900, Brasília, DF, Brazil. E-mail: reuberbrandao@yahoo.com.br.
- 5415.** Sanzone, D.M.; Meyer, J.L.; Marti, E.; Gardiner, E.P.; Tank, J.L.; Grimm, N.B. (2003): Carbon and nitrogen transfer from a desert stream to riparian predators. *Oecologia* 134: 238-250. (in English). ["Adult aquatic insects emerging from streams may be a significant source of energy for terrestrial predators inhabiting riparian zones. In this study, we use natural abundance  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values and an isotopic  $\delta^{15}\text{N}$  tracer addition to quantify the flow of carbon and nitrogen from aquatic to terrestrial food webs via emerging aquatic insects. We continuously dripped labeled  $\delta^{15}\text{N-NH}_4$  for 6 weeks into Sycamore Creek, a Sonoran desert stream in the Tonto National Forest (central Arizona) and traced the flow of tracer  $\delta^{15}\text{N}$  from the stream into spiders living in the riparian zone. After correcting for natural abundance  $\delta^{15}\text{N}$ , we used isotopic mixing models to calculate the proportion of  $\delta^{15}\text{N}$  from emerging aquatic insects incorporated into spider biomass. Natural abundance  $\delta^{13}\text{C}$  values indicate that orbweb weaving spiders inhabiting riparian vegetation along the stream channel obtain almost 100% of their carbon from in-stream sources, whereas ground-dwelling hunting spiders obtain on average 68% of their carbon from in-stream sources. During the 6-week period of the  $\delta^{15}\text{N}$  tracer addition, orb-web weaving spiders obtained on average 39% of their nitrogen from emerging aquatic insects, whereas spider species hunting on the ground obtained on average 25% of their nitrogen from emerging aquatic insects. To determine if stream subsidies might be influencing the spatial distribution of terrestrial predators, we measured the biomass, abundance and diversity of spiders along a gradient from the active stream channel to a distance of 50 m into the upland using pitfall traps and timed sweep net samples. Spider abundance, biomass and richness were highest within the active stream channel but decreased more than three-fold 25 m from the wetted stream margin. Changes in structural complexity of vegetation, ground cover or terrestrial prey abundance could not account for patterns in spider distributions, however nutrient and energy subsidies from the stream could explain elevated spider numbers and richness within the active stream channel and riparian zone of Sycamore Creek." (Authors) Figure 3 includes Zygoptera and Anisoptera.] Address: D. M. Sanzone, D.M., The Ecosystems Center, Marine Biological Lab, Woods Hole, MA 02543 USA. E-mail: dsanzone@mbl.edu
- 5416.** Shoemaker, P.; O'Carroll, D. (2003): Biological and silicon modeling of moving target detection in in-

sects. 20040050646 Tanner Research, Inc., Pasadena, CA, F49620-01-C-0030 Report No.(s): AD-A420888; AFRL-SR-AR-TR-04-0147; No Copyright; Avail: CASI; A04, Hardcopy <http://www.sti.nasa.gov/Pubs/star/star-0408.pdf>: 55 pp. (in English). ["In this project, we studied the physiology of a class of visual neurons that we have labeled small target, movement detectors (STMDs), which respond selectively to small moving visual targets. In-vivo intracellular recordings were made in several model species (the hoverfly *Eristalis tenax* and the dragonflies *Hemicordulia tau* and *Aeshna multicolor*), while subject to moving visual displays. We found some STMD neurons are capable of responding selectively to small moving targets against moving cluttered backgrounds. We characterized the receptive field properties of a class of small-field STMDs that we labeled elementary small target movement detectors' (ESTMDs), which may be an early stage in a hierarchy of STMD processing. Models were developed for aspects of the processing performed by STMD neurons, and tested in simulations. In 59 particular, a model for the ESTMD was developed and implemented in analog VLSI silicon." (Authors)] Address: to purchase from: <http://www.stormingmedia.us/88/8880/A888024.html>

**5417.** Sirot, L.K. (2003): The evolution of insect mating structures through sexual selection. *Florida Entomologist* 86(2): 124-133. (in English). ["Mating structures are of interest to a wide range of biologists because, in many taxa, mating structures are incredibly diverse and range widely in elaboration even between closely related species. As a result of this diversity, mating structures have been useful in species identification. Historically, the evolution of diverse mating structures has been attributed to post-zygotic selection for pre-zygotic isolation to avoid production of hybrid offspring. More recently, sexual selection has been proposed as an alternative explanation for the rapid diversification of mating structures. Mating structures could diversify between populations through sexual selection if sexual selection acted differently on mating structures in different populations. Eberhard (1985) wrote a comprehensive book explaining how sexual selection could result in the diversification of mating structures and providing examples to support the hypothesis, but none of the examples were experimental tests of the hypothesis. Since 1985, a few studies have experimentally tested this hypothesis. However, there have been no empirical studies that connect intraspecific selection with interspecific diversification. In this paper, I review the reproductive isolation and sexual selection hypotheses and two recent experimental tests of the sexual selection hypothesis. Then, I provide a description of a system that may allow one to establish a connection between sexual selection on mating structures within a species and diversification of mating structures between species." (Author) *Calopteryx haemorrhoidalis* was selected as example to test the hypothesis.] Address: Sirot, Laura, Department of Zoology, University of Florida, 223 Bartram Hall, Gainesville, FL 32611, USA

**5418.** Stroo, A. (2003): Het ruggengraatloze soortenbeleid. *Nieuwsbrief European Invertebrate Survey - Nederland* 36: 8-14. (in Dutch). [Critical comment on species conservation action plans politics in The Netherlands with special reference to the regulations of the European Fauna-Flora-Habitat directive. The paper includes a list of rare / red listed Odonata in The Netherlands] Address: not stated

**5419.** Theischinger, G. (2003): A new species of *Nannophya* Rambur from Australia (Odonata: Libellulidae). *Linzer Biologische Beiträge* 35: 661-666. (in English). ["*Nannophya paulsoni* sp. n. (male holotype: Yirrkala Mission, Arnhem Land, Northern Territory, Australia) is described after material from the type locality and from Cape York Peninsula, Queensland. The species is illustrated and compared with the described species of *Nannophya* RAMBUR."] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

**5420.** Theischinger, G. (2003): The larva of *Choristhemis olivei* (Tillyard) (Odonata: Synthemistidae). *Linzer Biologische Beiträge* 35: 657-660. (in English). ["The supposed larva of *C. olivei* is described from north-eastern Queensland, Australia, and compared with other Australian species of Synthemistidae."] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

**5421.** Wykle, K. (2003): Beautiful Dancers: West Virginia's Dragonflies. *West Virginia Wildlife Magazine Summer 2003*: (in English). [Verbatim: "Beautiful Dancers: West Virginia's Dragonflies. By Jennifer Wykle: Sometimes you don't even realize they're around. A buzz by your head or a mysterious rustle of grass is the only evidence they may give of their presence. Until one day, you're on the river fishing and one of these interesting creatures lands right on your canoe. Then there's no mistake—it's a dragonfly! Dragonflies and damselflies belong to the order of insects called Odonata. Representatives from five families of dragonflies and three families of damselflies live in West Virginia. The adults have two pairs of wings and are surprisingly maneuverable when airborne. If you have ever tried to catch one you wonder how they always seem to vanish into thin air! Of the approximately 435 species in North America, 144 of these have been documented in West Virginia. As we survey different areas and cover more ground, additional species will be added to the state list. Dragonflies and damselflies are surprisingly easy to tell apart. When perched, dragonflies hold their wings out flat to the side while most damselflies fold their wings above their body. Generally, the large eyes of the dragonflies will touch each other while damselfly eyes are smaller and spread much further apart. Dragonflies are generally larger and much stronger fliers than damselflies and can be found considerable distances from water. Damselfly flight can be very erratic and they are almost always found over water or perched on overhanging vegetation. To make discussions easier, both groups are often lumped together and called dragonflies or odonates. Dragonflies have been around a long time - about 300 million years. Fossil records reveal that some dragonflies had wingspans of nearly three feet! The dragonflies that existed with the dinosaurs 180 million years ago are virtually the same in structure as dragonflies that fly today. Like most insects, dragonflies have three life stages: the egg, larva and adult. Eggs are deposited in or around water and the larvae are fully aquatic, equipped with gills. Larvae, depending on size and food availability, prey on other insect larvae, small fish and salamanders. Depending on the species and environmental conditions, time of transformation can vary greatly. Some species may live as larvae for only a month while others may spend eight years in the water. Adult dragonflies can live from one to nine months, depending on the species. Adults are



voracious predators taking insect prey while on the wing. Adults feed on a variety of flying insects such as mosquitoes, gnats and even other dragonflies. Like most groups of animals in the state, some dragonflies are extremely common while others are rare and hard to find even in their ideal habitats. They are rare in West Virginia either due to lack of appropriate habitat (the state lies on the edge of their range) or they are rare throughout their range. One such species, the Elusive Clubtail, fits the latter description. It had been considered a historically occurring species until it was spotted last June on one of the Ohio River islands. This species is extremely rare in some areas such as Pennsylvania and Massachusetts where it is considered lost from the state's fauna. Another surprise species was discovered this past summer. A tiny bright red damselfly was found at Green Bottom Wildlife Management Area in Cabell County hovering over duckweed. Appropriately called the Duckweed Firetail, the nearest known population occurs in central Kentucky. The Spadderdock Darner is another rare species making its home in West Virginia. This one is hard to miss with its bright blue eyes and blue markings up and down its abdomen. It likes fishless ponds and wetland areas and has only been found in two areas of the state. While a number of Odonates are hard to spot, there are many common species that can be observed on a nice sunny afternoon on the river or around your backyard pond. The Common Whitetail, with its black banded wings and white abdomen, patrols nearly all still or slow-moving bodies of water in the state. Along with this species you can find the Common Green Darner, a large dragonfly with a green thorax and blue-striped abdomen. Another common species and one of the most striking, the Ebony Jewelwing damselfly, has solid black wings with an iridescent green body. As it flutters along a variety of stream habitats, its appearance is unmistakable. Because odonates are an indicator of good water quality, they provide a measure of overall stream and wetland health. Unfortunately, habitat destruction and decreased water quality are ever growing threats here in West Virginia and around the globe. We need to preserve our aquatic areas because they are necessary for the survival of not only dragonflies, but for a wide variety of plants and animals. Dragonflies and damselflies are just one of the many unique groups of animals living here in the Mountain State. Go out and enjoy their brilliant colors and interesting flight patterns. They are a part of our state's rich biodiversity and are one of many groups that help to make our outdoor experience special. Jennifer Wykle is the DNR's state Zoologist stationed in Elkins." Available at: <http://www.wvdnr.gov/Wildlife/Magazine/Archive/03Summer/BeautifulDancers.shtml>] Address: not stated

**5422.** Yamamoto, M.; Isogai, K.; Yamasaki, M. (2003): Measurement of unsteady aerodynamic forces acting on a tandem airfoil configuration oscillating in hover mode. 6 pp. (in English). [Available at: <http://svl-www.aero.kyushu-u.ac.jp/en/paper/workshop2003.pdf>] Address: Department of Aeronautics and Astronautics, Kyushu University, Fukuoka, Japan

**5423.** Zhou, W. (2003): *Rhipidolestes fascia* spec. nov. and *Rhipidolestes lii* spec. nov. two new dragonflies from Guizhou, China (Zygoptera: Megapodagrionidae). *Wuyi Journal of Science* 19: 95-98. (in English, with Chinese summary). [*R. fascia* spec. nov. (holotype male: Ghishui, Guizhou, 18-V-2000) and *R. lii* spec.

nov. (holotype male, Kishui, Guizhou, 8-VI-2000) are described and illustrated. The type specimens are deposited in the Zhejiang Museum of History, Hangzhou, China.] Address: Zhou Wenbao, Zhejiang Museum of Natural History, Jiaogonglu 71, Hangzhou 310012, China

## 2004

**5424.** Bacquet, P. (2004): Observations d'*Hemianax ephippiger* (Burmeister, 1839) dans la région de Montpellier (Département de l'Hérault) (Odonata, Anisoptera, Aeshnidae). *Martinia* 20(1): 45. (in French). [21-II-2004, Palavas-les-Flots, Hérault, France, sighting of two *A. ephippiger* cf.; 3-III-2004, Montpellier, Hérault, France, female *A. ephippiger*.] Address: Bacquet, P., 50, rue du Faubourg Boutonnet, Apt 207, F-34000 Montpellier, France

**5425.** Bairl, E.; Lohr, M. (2004): Nouvelles observations de *Trithemis annulata* (Palisot de Beauvois, 1805) dans le département de l'Hérault (Odonata, Anisoptera, Libellulidae). *Martinia* 20(1): 15. (in French). [Valley of the river Orb near Sévignac, Département Hérault, France, June 1999.] Address: Lohr, M., FH Lippe und Höxter, Fachgebiet Tierökologie und Landschaftsökologie, An der Wilhelmshöhe 44, D-37671 Höxter, Germany. E-mail: [mlohr@fh-luh.de](mailto:mlohr@fh-luh.de)

**5426.** Baker, R.L.; Leung, B.; Forbes, M.R. (2004): Diet of nymphs affects normal wing development in *Ischnura verticalis* (Odonata: Coenagrionidae). *Canadian Entomologist* 136: 749-751. (in English). ["In laboratory experiments it was shown that more than 50% of adults emerging from field-collected larvae that were since penultimate stage fed terrestrial enchytraeid worms (Haplotaxida: Enchytraeidae) had strongly curled, twisted, or only partly extended wings, and were unable to fly. The controls fed *Daphnia* were all normal. It is suggested that the diet of nothing but worms provides an insufficient amount of a particular nutrient or precursor (possibly chitin), or that it provides too much of another."] Address: Baker, R.L., Dept Zoo, Erindale Coll., Univ. Toronto, Mississauga, ON, L6L 2C6, Canada. E-mail: [rbaker@credit.erin.utoronto.ca](mailto:rbaker@credit.erin.utoronto.ca)

**5427.** Bernier, C.; Guilloux, G. (2004): Évaluation du peuplement odonatologique d'un canal d'irrigation dans le nord des Bouches-du-Rhône. *Martinia* 20(1): 29-42. (in French, with English summary). [In 2003, the emergence of Odonata along the Alpines canal, Eyragues, France was surveyed. Between the 14th May and 28th August, on a length of 325 meters of the canal, 10 samples resulted in 2410 exuviae (= 3,7/m<sup>2</sup>) belonging to 5 different species (including *Calopteryx* sp. and *Platycnemis* sp.). The data referring *Gomphus similimus*, *Onychogomphus uncatus*, and *Boyeria irene* are presented by phenology and abundance. Preferred emergence habitats are described.] Address: Bernier, C., 11 rue Porteyguière, F-13630 Eyragues, France. E-mail: [christophe.bernier@euziere.org](mailto:christophe.bernier@euziere.org)

**5428.** Buden, D.W.; Paulson, D.R. (2004): The Odonata of Chuuk, eastern Caroline Islands, Micronesia. *Opusc. zool. flumin.* 217: 1-11. (in English). ["9 species of adult Odonata were collected from among 5 volcanic

lagoon islands and 3 atolls in Chuuk, Micronesia, during Dec. 2002-July 2003. *Anax guttatus*, *Macrodiplax cora*, and *Tramea transmarina* are reported from Chuuk for the first time, and the first odonate records are presented for Namonuito, Houk, and Satawan atolls. *Teinobasis carolinensis* is the only species endemic to these islands, but *Agrionoptera sanguinolenta*, resident also in Pohnpei, is represented in Chuuk by the endemic *A. s. pusilla*. (Authors)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**5429.** Carchini, G.; Solimini, A.; Ruggiero, A. (2004): Habitat characteristics and Odonata diversity in Central Italy ponds. 1st European Pond Workshop, Geneva 28-29 October 2004: 10- (in English). [Verbatim: In Mediterranean Italy natural lakes are not abundant because of the high permeability of the rocks (mainly limestone) and to the drainage of wetlands made in the last two centuries for agricultural purposes. Therefore ponds represent an important habitat type for the conservation of the odonate fauna. Ponds have often been preserved, and in some cases newly created, for watering of game or herds, particularly in mountain areas. However, this use may conflict with the conservation of a diversified odonate fauna. The aim of this study is to report on habitat requirements of Odonata of mountain ponds of Central Italy and to compare these results with those of a similar work on flatland ponds. 31 ponds, ranging from 1014 to 2004 m a.s.l., were qualitatively sampled for odonate larvae twice during 1998 summer, and a total of 14 species were collected, ranging from 0 to six species for pond. Several physical, chemical and biotic habitat variables were measured for each pond. A multiple regression analysis showed that the species number was affected positively by the amount of pond hydrophytae coverage and negatively by the amount of  $\text{NH}_4$  concentration. The remaining variables did not enter the regression model, but some showed significant correlations with the selected ones. Particularly, hydrophytae coverage was negatively correlated with Chl-a concentration and positively with helophytae and frog presence; ammonium concentration was positively correlated with altitude, Chl-a, frog presence and the origin of the pond (higher  $\text{NH}_4$  values in artificial ponds). A Canonical Correspondence Analysis gave a more detailed insight into the relations between Odonata (assessed as species presence/absence) and habitat variables. The lack of Odonata in several ponds was related to increasing values of  $\text{NH}_4$ , Chl-a and altitude. Among the remaining habitat variables two main groups were identified: the first included helophytae, newt and hydrophytae and corresponded to seven odonate species, the outermost with preference for astatic ponds: *Lestes dryas* and *Sympetrum flaveolum*. The second included depth, frog and fish, and corresponded to *Cercion lindeni*, *Ischnura elegans* and *Enallagma cyathigerum*, all *Coenagrionidae* of permanent water. Combining these results with others obtained by studying a set of ponds in a flatland game reserve, we noted: 1) the mountain ponds showed less odonates species, 2) the abundance of vegetation, inside and around the pond, increased the number of species while the eutrophication decreased it, 3) the presence of fish, newt or frog did not reduce the odonate diversity strongly, 4) the intensive use of ponds for game or herd watering could damage vegetation and shift the equilibrium of the pond toward a condition of high turbidity (= high Chl-a), causing a reduction of the odonate diversity.] Address:

Carchini, G., University of Tor Vergata, Department of Biology, via della Ricerca Scientifica, 00133, Roma, Italy. E-mail: carchini@uniroma2.it

**5430.** Clausnitzer, V. (2004): Subproject E07: Diversity and species composition of Odonata as indicators of biotope quality of East African rain forests and their replacement communities. BIOTA East Africa. Biodiversity in conversion The influence of fragmentation and disturbance on the biodiversity of East African highland rain forests. Final Report Phase I (2001-2004): 87-100. (in English). [<http://biota-africa.de/Library/paperseast/finalreport.pdf>] Address: Clausnitzer, Viola, Graefestr. 17, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de

**5431.** Collectif (2004): In memoriam Lucien Kerautret, 14 octobre 1935 - 9 février 2004. *Martinia* 20(1): 3-6. (in French). [Obituary with some personal notes of different odonatologists and a bibliography of the odonatalogical work of L. Kerautret.] Address: c/o Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**5432.** Cornall, T.D.; Egan, G.K. (2004): Measuring horizon angle from video on a small unmanned air vehicle. 2nd International Conference on Autonomous Robots and Agents. December 13-15, 2004 Palmerston North, New Zealand: 339-344. (in English). ["This article details the work of the authors towards the goal of using video processing for autonomous flight control of small unmanned aircraft (UAVs). The work reports on procedures that were designed by the authors to determine the roll of an aircraft from video imagery of the horizon, using video and computing equipment small and light enough to be carried by the aircraft. Theory and results of tests using simulated horizon views are given and discussed. Preliminary results from real flights are also given and discussed." (Authors) Reference to Odonata is made.] Address: Cornall, T.D., Dept of Electrical and Computer Systems Engineering, Monash University, Melbourne, Australia. E-mail: terry.cornall@eng.monash.edu.au

**5433.** Crowhurst, R. (2004): 10. Optimal foraging in libellulid naiads. 2004 Entomological Society of Ontario Annual Meeting, Brock University: 12. (in English). [Verbatim: Optimal foraging theory predicts that an organism will attempt to maximize its energy intake by choosing prey that offer the highest caloric value per unit of handling time (time to catch and consume). I placed hungry dragonfly larvae (Odonata: Anisoptera: Libellulidae) individually in an environment with several types of naturally co-occurring prey. I observed which were the first three prey consumed, also noting the number of pursuits, strikes, as well as those prey that were within striking distance but were ignored by the naiads. Dragonfly larvae ate more isopods and amphipods relative to daphnia, clams and chironomids. Average dry mass of individual isopods and amphipods were the largest of the five prey items offered. Therefore, dragonfly nymphs appear to select larger prey items. However, isopods and amphipods also took the greatest length of time to catch and consume, and thus handling time does not appear to determine prey choice. However, prey choice did not follow a fixed pattern. Rather, prey choice varied between individual dragonflies and also within individuals from one replicate to the next. Keywords: Odonata, optimal foraging theory,

predation] Address: Crowhurst, Rachel, Brock University, 500 Glenridge Ave., St. Catharines, ON, Canada

**5434.** d'Aguilar, J. (2004): Les descriptions originales des odonates d'Europe, 11. Burmeister, Hermann Carl Conrad (1807-1892). *Martinia* 20(3): 150-158. (in French). [Brief information on Burmeister and reproduction of some pages of the "Handbuch der Entomologie" with odonatalogical content.] Address: d'Aguilar, J., 7, rue Adrien Lejeune, F-93170 Bagnolet, France

**5435.** de Oliveira Roque, F.; Trivinho-Strixino, S.; Jancso, M.; Fragoso, E.N. (2004): Records of Chironomidae larvae living on other aquatic animals in Brazil. *Biota Neotropica*. 4 (2): 1-9. (in English, with Portuguese summary). [Commensalism of Chironomidae including three cases on *Argia* sp. are compiled] Address: Trivinho-Strixino, Susana, Universidade Federal de São Carlos, Departamento de Hidrobiologia, Laboratório de Entomologia aquática, C.P. 676, CEP 13565-905, São Carlos, SP, Brasil

**5436.** Deschanel, M. (2004): Observations d'Odonates dans la montagne ardéchoise. *Martinia* 20(4): 196. (in French). [France, brief list of taxa recorded on altitudes between 1200 and 1500 m a.s.l.] Address: Deschanel, M., Banne, F-07510 Mazan-l'Abbaye, France.

**5437.** Dijkstra, K.-D.; Hämäläinen, M.; Kalkman, V.J. (2004): PHAON and ECHO: communicating about Odonata of the Old World tropics. *Agrion* 8(2): 22-28. (in English). [incl. long list of records from Peninsular Malaysia] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nm.nl

**5438.** Dommanget, J.-L. (2004): Analyse d'ouvrage. *Martinia* 20(3): 159-160. (in French). [Review of the second edition of Askews book "The Dragonflies of Europe".] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**5439.** Dommanget, J.-L. (2004): *Calopteryx haemorrhoidalis* (Vander Linden, 1825) dans le département de l'Aveyron (Odonata, Zygoptera, Calopterygidae). *Martinia* 20(4): 204. (in French). [13-VI-2003, Saint-Romede-Tarn, France] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**5440.** Dommanget, J.-L.; Brusseau, G. (2004): Découverte en Corse d'un individu mort de *Cordulegaster boltonii* (Donovan, 1807) (Odonata, Anisoptera, Cordulegasteridae). *Martinia* 20(4): 179. (in French). [Ile of Corsica, France; the record of *C. boltonii* (10-VIII-1995, Sainte Lucie de Porto Vecchio) is a new addition to the Corsian odonate Fauna.] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**5441.** Dommanget, J.-L. (2004): In memoriam Marc Bernard. *Martinia* 20(3): 120. (in French). [Obituary for one of the founding members of the Société française d'odonatologie.] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**5442.** Dommanget, J.-L. (2004): Reconnaissance d'*Anax junius* (Drury, 1773) et note sur sa récente découverte en France (Odonata, Anisoptera, Aeshnidae). *Martinia* 20(1): 17-20, 52. (in French, with English summary). [Identification features for *A. junius* and *A. imperator* are compared in a table and illustrated.]

Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**5443.** Dommanget, J.-L. (2004): Rubrique bibliographique. *Martinia* 20(4): 206-210. (in French). [References from 2001 - 2004 referring to the Odonata in France are compiled.] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**5444.** Faton, J.-M.; Deliry, C. (2004): Surveillance de la population de *Coenagrion mercuriale* (Charpentier, 1840) dans la Réserve naturelle nationale des Ramiers du Val de Drôme (Odonata, Zygoptera, Coenagrionidae). *Martinia* 20(4): 163-179. (in French, with English summary). [Between 1995 and 2003 a population of *C. mercuriale* was monitored in southeastern France. The data are presented with reference to phenology and the importance of selected stretches / habitats for the survival / persistence of the regional metapopulation.] Address: Deliry, C., 20, rue de la Manine, F-38510 Morestel, France. E-mail: president@sympetrum.org

**5445.** Fleck, G.; de Marmels, J.; Grand, D. (2004): La larve de *Tholymis citrina* Hagen, 1867 (Odonata, Anisoptera, Libellulidae). *Bull. Soc. ent. Fr.* 109(5): 455-457. (in French, with English summary). ["The last instar larva is described and illustrated. The differences with *T. tillarga* are listed. A generic diagnosis is proposed." (Authors)] Address: Fleck, G., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleck@mnhn.fr

**5446.** Grand, D. (2004): *Anax tristis* Hagen, 1876, le géant de Mayotte. *Martinia* 20(2): 77-82. (in French, with English summary). [Mayotte, Comoros Islands, was visited between 20 and 22-I-2003; new additions to the odonate fauna are: *Philonomon luminans*, *Anax tristis*, *Agriocnemis exilis*, and *Ischnura senegalensis*.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

**5447.** Grand, D. (2004): *Calopteryx h. haemorrhoidalis* (Vander Linden, 1825), une espèce accidentelle du département du Doubs (Odonata, Zygoptera, Calopterygidae). *Martinia* 20(4): 205. (in French). [17-VII-2004, Chapelle-des-Bois, France. The brief note also contains information on two addition habitats with e.g. *Aeshna subarctica elisabethae* and *Leucorrhinia albifrons*.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

**5448.** Grand, D. (2004): *Calopteryx haemorrhoidalis occasi* Capra, 1945 Le grand retour lyonnais (Odonata, Zygoptera, Calopterygidae). *Martinia* 20(1): 43-45. (in French, with English summary). ["After more than 150 years, *C. haemorrhoidalis occasi* has reappeared in the east of Lyon region (France). A population counting tens of individuals was discovered in August 2003 on the Rizan stream, north of Meyzieu city." (Author)] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

**5449.** Grand, D. (2004): Compte rendu odonatalogique d'un voyage à l'île de la Réunion. *Martinia* 20(2): 67-75. (in French, with English summary). [January 2003, record of 17 Odonata species at 18 spots on the island of Réunion. Brief comments are given referring to biology and distribution. More detailed observations focus on the egg-laying and emergence of *Coenagrion reuniensis*, on the larval habitats, mating and ovi-



position of *Pantala flavescens* and, finally, on the territorial behaviour and eggs-laying of *Tholymis tillarga*. (Author)] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

**5450.** Grand, D. (2004): *Neurothemis stigmatizans* (Fabricius, 1775) un nouveau libellulidé néocalédonien. *Martinia* 20(3): 140. (in French). [New Caledonia, Jan. 1984, deposited in the collection of the Muséum d'Histoire naturelle de Lyon, France.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

**5451.** Grand, D. (2004): Quelques libellules de la Principauté d'Andorre. *Martinia* 20(3): 131-132. (in French, with English summary). ["While visiting Andorra in summer 2003, the author recorded 10 species at altitudes between 1780 m and 2380 m a.s.l. *Cordulegaster b. boltoni* was seen on a stream at about an altitude of 1000 m. Breeding of *Ischnura pumilio*, *Libellula depressa* and *Aeshna cyanea* is confirmed at 1780 m, while the two latter species were also observed at 2380 m.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France

**5452.** Guerbaa, K.; Olive, M. (2004): Les odonates de la Réserve naturelle de la torbière des Dauges: résultats de l'étude menée en 2003 (dépt de la Haute-Vienne). *Martinia* 20(3): 133-139. (in French, with English summary). ["From May to August 2003, an odonatological survey of Dauges peat bog natural reserve was realized, with two main objectives : a global inventory of species and studies on population sizes of *Somatochlora arctica* (Zetterstedt, 1840)."] (Authors)] Address: Guerbaa, K., Société Limousine d'Odonatologie, 11, rue Jauvion, F-87000 Limoges, France

**5453.** Gurliat, P. (2004): Contribution à la connaissance des odonates de l'Erdre et de ses affluents. *Martinia* 20(3): 125-130. (in French, with English summary). [The odonate fauna of the river Erdre was surveyed along a stretch of 85 km in the Départements Maine-et-Loire and Loire-atlantique, France. At 57 localities, a total of 48 species was found. ] Address: Gurliat, P., 11 rue André Clément, F-44100 Nantes, France

**5454.** Horth, L. (2004): Predation and the persistence of melanic male mosquitofish (*Gambusia holbrooki*). *Journal of evolutionary biology* 17: 672-679. (in English). ["The empirical reasons for the persistent rarity of a genotype are typically complex and tedious to identify, particularly in nature. Yet rare morphs occur in a substantial fraction of phenotypic polymorphisms. A colour polymorphism has persisted for decades in the eastern mosquitofish, yet why this is so remains obscure. Here, I report the results of (1) intensive sampling at 45 natural sites to obtain the frequency distribution of the melanic (black) mosquitofish morph in Florida, (2) predation trials, conducted independently in mesocosms, with three different predatory species and (3) two mark-recapture studies, conducted in nature. This work (1) documents the rarity of melanic mosquitofish in nature, (2) demonstrates that melanic males experience a selective advantage over silver males in the presence of predators, (3) indicates no difference in the colour morphs survival at a natural site essentially devoid of these predators, although suggesting a higher rate of recapture for melanic males at a site rife with predators. Overall, selective predation appears to contribute to the persistence of the melanic morph, despite its rarity in

nature."] (Author) An libellulid species (not determined) was used to conduct the experiments. Dragonfly larvae consumed highly significantly more silver than black males.] Address: Horth, Lisa, Section of Evolution and Ecology, University of California Davis, 1 Shields Ave., Davis, CA 95616, USA. E-mail: lahorth@ucdavis.edu

**5455.** Ilbert, N.; Menegaux, J. (2004): Observations d'Odonates en Guadeloupe (Petites Antilles françaises). *Martinia* 20(4): 180. (in French). [In Dec. 2001, 11 odonate species resp. taxa were recorded at 8 localities on Guadeloupe, Lesser Antilles, France.] Address: Ilbert, N., 14 rue des Bleuets, F-40100 Dax, France. E-mail: nilbert@nomade.fr

**5456.** Isogai, K.; Fujishiro, S.; Saitoh, T.; Yamamoto, M.; Yamsaki, M.; Matsubara, M. (2004): Unsteady three-dimensional viscous flow simulation of a dragonfly hovering. *AIAA Journal* 42(10): 2053-2059. ["In order to clarify the basic aerodynamic mechanisms of the hovering flight of the dragonfly, numerical simulations of the unsteady viscous flow around a tandem wing configuration have been performed using a three-dimensional Navier-Stokes code. The flow simulations are conducted for *Anax parthenope julius* as a typical dragonfly model. The total lifting force and specific necessary power predicted by the present simulation show close agreement with those observed experimentally for the present dragonfly model. The present code is further validated by comparing the results of the simulation with the experimental values of total lift and stroke-plane angle obtained using a robot."] (Authors)] Address: Isogai, K., Kyushu University, Fukuoka 812-8581, Japan

**5457.** Jourdain, B. (2004): Découverte de *Macromia splendens* (Pictet, 1843) en Gironde (Odonata, Anisoptera, Macromiidae). *Martinia* 20(4): 194-196. (in French, with English summary). [18-VI-2004, river Dronne, Chamadelle, Gironde, France] Address: Jourdain, B., Les Vergers, 8, rue du Docteur Roux, F-33320 Esysines, France. E-mail: jourdainbr@aol.com

**5458.** Jourde, P. (2004): Densités remarquables d'Odonates en val de Seugne (Département de Charente-Maritime). *Martinia* 20(1): 7-12. (in French, with English summary). [Founding on a sample of exuviae, population densities of *Sympetrum sanguineum* / meridionale, *Aeshna mixta*, and *Libellula fulva* were estimated. A total of app. 1.8 Million specimens for the locality (app. 370 ha) was calculated] Address: Jourde, P., LPO, La Corderie Royale, BP 263, F-17305 Rochefort Cedex, France

**5459.** Kauhala, K.; Saeki, M. (2004): 5.4 Raccoon dog *Nyctereutes procyonoides* (Gray, 1834). Least concern (2004). In: Sillero-Zubiri, C., M. Hoffmann & D.W. Macdonald (Eds.): Status Survey and Conservation Action Plan Canids: Foxes, Wolves, Jackals and Dogs. IUCN/SSC Canid Specialist Group: 136-142. (in English). [The diet of raccoon dogs occasionally also includes Odonata.] Address: <http://www.canids.org/species/Raccoondog.pdf>

**5460.** Kefford, B.J.; Papas, P.J.; Metzeling, L.; Nugogoda, D. (2004): Do laboratory salinity tolerances of freshwater animals correspond with their field salinity?. *Environmental Pollution* 129(3): 355-362. (in English). ["The degree to which laboratory derived measures of salinity tolerance reflect the field distributions of fresh-

water biota is uncertain. In this paper we compare laboratory-derived acute salinity tolerance (LC50 values) of freshwater macroinvertebrates (range 5.5–76  $\mu\text{S}/\text{cm}$ ) and fish (range 2.7–82  $\mu\text{S}/\text{cm}$ ) from southeastern Australia with the salinity from which they have been collected in the field. Only 4% of the macroinvertebrates were collected at salinity levels substantially higher than their 72-h LC50 obtained from directly transferring animals from low salinity water to the water they were tested (direct transfer LC50). This LC50 value was correlated with the maximum salinity at which a species had been collected. For common macroinvertebrates, the maximum field salinity was approximated by the direct transfer 72-h LC50. For adult freshwater fish, 21% of species were collected at salinities substantially greater than their acute direct transfer LC50 and there was a weak relationship between these two variables. Although there was a weak correlation between the direct transfer LC50 of early life stages of freshwater fish and the maximum field salinity, 58% of the field distribution were in higher than their LC50 values. In contrast, LC50 determined from experiments that acclimated adult fish to higher salinity (slow acclimation) provided a better indication of the field distribution: with only one fish species (7%) being in conflict with their maximum field salinity and a strong positive relationship between these variables. This study shows that laboratory measures of acute salinity tolerance can reflect the maximum salinity that macroinvertebrate and fish species inhabit and are consistent with some anecdotal observations from other studies." (Authors) Odonata accounted 12% of the total of 49 macroinvertebrate taxa available with laboratory LC50 and MFD. "Capsule": Acute laboratory salinity tolerances relate to maximum salinity where organisms occur in nature.] Address: Kefford, B.J., Department of Biotechnology and Environmental Biology, RMIT University, PO Box 71, Bundoora, 3083, Victoria, Australia. E-mail: ben.kefford@rmit.edu.au

**5461.** Kjer, K.M. (2004): Aligned 18S and insect phylogeny. *Syst. Biol.* 53(3): 506-514. (in English). ["The nuclear small subunit rRNA (18S) has played a dominant role in the estimation of relationships among insect orders from molecular data. In previous studies, 18S sequences have been aligned by unadjusted automated approaches (computer alignments that are not manually readjusted), most recently with direct optimization (simultaneous alignment and tree building using a program called "POY"). Parsimony has been the principal optimality criterion. Given the problems associated with the alignment of rRNA, and the recent availability of the doublet model for the analysis of covarying sites using Bayesian MCMC analysis, a different approach is called for in the analysis of these data. In this paper, nucleotide sequence data from the 18S small subunit rRNA gene of insects are aligned manually with reference to secondary structure, and analyzed under Bayesian phylogenetic methods with both GTR+I+G and doublet models in MrBayes. A credible phylogeny of Insecta is recovered that is independent of the morphological data and (unlike many other analyses of 18S in insects) not contradictory to traditional ideas of insect ordinal relationships based on morphology. Hexapoda, including Collembola, are monophyletic. Paraneoptera are the sister taxon to a monophyletic Holometabola but weakly supported. Ephemeroptera are supported as the sister taxon of Neoptera, and this result is interpreted with respect to the evolution of direct sperm transfer and the evolution of flight. Many other relationships are

well-supported but several taxa remain problematic, e.g., there is virtually no support for relationships among orthopteroïd orders. A website is made available that provides aligned 18S data in formats that include structural symbols and Nexus formats." (Author) The analysis also includes Odonata.] Address: Kjer, K.M., Department of Ecology Evolution and Natural Resources, 14 College Farm Road, Cook College, Rutgers University, New Brunswick, NJ 08901, USA. E-mail: kjer@aesop.rutgers.edu

**5462.** Knijf, G. de (2004): *Somatochlora arctica* (Zetterstedt, 1840) espèce nouvelle pour la Picardie (Odonata, Anisoptera, Corduliidae). *Martinia* 20(1): 21-23. (in French, with english summary). ["A female of *S. arctica* was captured in June 2003 in the "Marais de la Souche", an alkaline peat moor near the city of Laon (Aisne Département, North France). There is no proof of a local population but this should not be excluded, given the inaccessibility of the biggest part of the "Marais"."] (Author) In addition, some remarkable species as *Leucorrhinia caudalis*, *L. pectoralis*, *Somatochlora flavomaculata*, *Libellula fulva*, *Anaciaeschna isocoela*, *Ceragrion tenellum*, and *Coenagrion pulchellum* were collected too] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**5463.** Leroy, T. (2004): Les Odonates du département du Cantal: état des connaissances. *Martinia* 20(4): 181-193. (in French, with English summary). ["This article makes an assessment of 2752 observations realized from 1994 to 2003. For each of the 63 species (65 taxa) recorded, data such as the number of records, the number of localities, the frequency and the distribution are given. Comments are more detailed for about 40 species. The Cantal department appears to have rich and diverse Odonata populations, in relation to its geographical situation and its well conserved natural habitats." (Author) Address: Leroy, T., Le Bourg, F-63210 Heume-l'Eglise, France. E-mail: thierry-leroy@caramail.com

**5464.** Leroy, T.; Giraud, A. (2004): *Platycnemis latipes* Rambur, 1842 et *Gomphus graslinii* Rambur, 1842: deux nouvelles espèces pour la région Auvergne (Odonata, Zygoptera, Platycnemididae, Anisoptera, Gomphidae). *Martinia* 20(1): 25-28. (in French, with English summary). [France, records of both species from 2003 are documented and discussed.] Address: Leroy, T., Le Bourg, F-63210 Heume-l'Eglise, France. E-mail: thierry-leroy@caramail.com

**5465.** Leroy, T. (2004): Sur la présence de *Platycnemis acutipennis* (Sélys, 1841) en altitude dans le Massif Central. *Martinia* 20(3): 107-113. (in French, with English summary). [*P. acutipennis* prefers habitats (in most cases running waters or habitats in flood plains) in lower altitudes. A survey in the Massif Central, France found 30 localities situated higher than 600 m a.s.l.. Stagnant water bodies are preferred, but population density is low. The results of the study are compared with literature data.] Address: Leroy, T., Le Bourg, F-63210 Heume-l'Eglise, France. E-mail: thierry-leroy@caramail.com

**5466.** Libois, R.; Laudelout, A. (2004): Food niche segregation between the Malachite Kingfisher, *Alcedo cristata*, and the Pied Kingfisher, *Ceryle rudis*, at Lake Nokoué, Bénin. *Ostrich* 75(1&2): 32-38. (in English).

[Dragonflies belong to the diet of the Pied kingfisher.] Address: Libois, R., Unité de recherches zoogeographiques, Institut de Zoologie, Université de Liege, Quai Van Beneden 22, B-4020 Liege, Belgium. E-mail: Roland.Libois@ulg.ac.

**5467.** Lin, S.-C.; Chen, C.-S. (2004): Egg and larval developments of the Taiyal Darner *Aeshna petalura taiyal* Asahina (Odonata, Aeshnidae) at the Mt. Hohuan. *Endemic Species Research* 6(1): 29-38. (in Chinese, with English summary). ["*A. petalura taiyal* Asahina, 1938 is an endemic subspecies of dragonfly in Taiwan. It occurs widely in the mountain areas above 1,500m in elevation. Its larval habitat has been adversely affected by human activities, such as pond construction, water pollution, and fish releasing. This study was conducted between 1997-2000 to study egg and larval developments of the Taiyal darner in the Mt. Hohuan area. The results showed that the period of egg stage was about ten months. Eggs were laid at the end of summer, overwintered in a diapause condition, and hatched in the following spring. The larval voltinism showed univoltine or semivoltine at the two different sampling sites of the study area. The egg and larval stages were fairly long, and its habitat consisted of both aquatic and terrestrial environments, easily disturbed by human activities. For conservation of the Taiyal darner, it is recommended to protect whole lake and its adjacent environments." (Authors)] Address: Lin, S.-C., Endemic Species Research Institute, Chichi, Nantou, Taiwan

**5468.** Liu, Y.; Gao, X.-T.; Yuan, F.; Wang, C.; Guo, D.-S. (2004): Faunal analysis and distribution of dragonflies in Beijing area. *Journal of Beijing Normal University (Natural Science)* 40(3): 375-379. (in Chinese, with English summary). [China; between 2001 and 2003, a total of 50 odonate species was recorded.] Address: Liu, Y., Ministry of Education, Key Laboratory for Biodiversity and Engineering, Beijing Normal University, 100875, Beijing, China.

**5469.** Luglia, M.; Luglia, T. (2004): *Sympetrum fonscolombii* (Sélys, 1840) victime de *Gerris costae* Herrich-Schaeffer, 1853 dans un lac alpin (Odonata, Libellulidae; Hemiptera, Gerridae). *Martinia* 20(3): 141-144. (in French, with English summary). [17-VII-2003, Achard lake, Isère, France; a female *S. fonscolombii* was preyed by *Gerris costae*.] Address: Luglia, M., La Fontaine de Durefort, F-84390 Sault, France

**5470.** Machet, P. (2004): Liste actualisée des odonates de la Guyane française. *Martinia* 20(3): 145-149. (in French, with English summary). ["Following a study begun in 1985 with 96 recorded species, examination of thousands of specimens and detailed analysis of the bibliography, the author presents an up-dated list of French Guyana Odonata. This list counts 246 known species. Some taxa remain unidentified at the species level." (Author)] Address: Machet, P., L'êtré Delangle, F-61140 La Chapelle d'Andaine, France

**5471.** Machet, P.; Duquef, M. (2004): Un visiteur inattendu, et de taille! ... *Hemianax ephippiger* (Burmeister, 1839) capturé à la Guyane française. *Martinia* 20(3): 121-124. (in French, with English summary). [*A. ephippiger* "has been found in February 2003 in French Guiana. It is the first record of this cosmopolitan species in South America and for the whole American Continent. The note relates the adventure involved in capturing this Darner and briefly presents the originality of

this discovery." (Authors)] Address: Machet, P., L'êtré Delangle, F-61140 La Chapelle d'Andaine, France

**5472.** Makihara, H.; Kitajima, H.; Goto, H.; Kato, T.; Makino, S. (2004): An evaluation of predation impact of the introduced lizard *Anolis carolinensis* on the endemic insect fauna of the Ogasawara Islands based on insect collection records and feeding experiments, with special reference to longicorn beetles (Insecta: Coleoptera: Cerambycidae). *Bulletin of the Forestry and Forest Products Research Institute* 3(2) (No.391): 165-183. (in Japanese, with English summary). ["In the Ogasawara Islands, [...] the population of the invasive lizard *Anolis carolinensis* has been growing since it was artificially introduced in the 1960s. As the lizard is diurnal and preys upon various small animals, there is rising concern that it endangers the survival of endemic insect species. In order to estimate the impact of *A. carolinensis* on the insect fauna, observations were made on the feeding behavior of the lizard under field or captive conditions. Of the insects provided as food, relatively small species (e.g. beetles smaller than 2 cm in body length) were eaten by the caged lizard, while larger species escaped predation. In Hahajima Is., where the lizard proliferated in the 1990s, we compared the numbers of longicorn beetles collected during our research trips before (in 1983, 1985 and 1986) and after (in 1995, 1996, and 1997) the proliferation. None of the 11 nocturnal species surveyed showed a marked decline in the number of collected specimens in 1995 to 1997. In contrast, we collected no specimens of three out of five diurnal species in the same period. These results suggest that the invasive lizard is responsible for a recent, marked decline of the population of at least some diurnal small insects by intensively feeding on them." (Authors) The study includes also feeding experiments with dragonflies.] Address: Makihara, H., Dept of Global Forest Research, Forestry & Forest Products Research Institute (FFPRI), 1 Matsunosato, Tsukuba, Ibaraki 305-8687, Japan. E-mail: makihara@ffpri.affrc.go.jp

**5473.** Mantel, S.K.; Dudgeon, D (2004): Effects of *Macrobrachium hainanense* predation on benthic community functioning in tropical Asian streams. *Freshwater Biology* 49(10): 1306-1319. (in English). ["1. *Macrobrachium hainanense* is a large predatory palaemonid shrimp, present at high densities in pools of low-order forested streams in Hong Kong. The present study investigated the impacts of *M. hainanense* on benthic community structure and functions in pools of two streams: Tai Po Kau Forest Stream and Tai Shing Stream. 2. Repeated whole-pool experiments involving shrimp density manipulations (removal, control and addition) were conducted in both streams between October 2000 and April 2002, and included a wet (May to September) and two dry (October to April) seasons. The three objectives of the study were to determine the effects of *M. hainanense* predation on benthic macroinvertebrate (including Odonata) abundance and species richness, rates of leaf litter breakdown because of effects on detritivores, and periphyton standing stocks by way of an effect on herbivores. 3. Wet season results showed consistent reductions in benthos densities and species richness following heavy rainfall, irrespective of shrimp manipulation. These results suggested that spate-induced disturbances might override biotic effects and play a dominant role in structuring benthic communities in stream pools in Hong Kong. 4. No significant, reproducible effects on any of the response variables



measured in either stream were found during the dry season. Litter breakdown was reduced in the absence of shrimps during one experiment only, suggesting it might be a type I error. These results signified no effect of shrimp removal on benthic communities, or on the functional processes of litter breakdown, or on periphyton accumulation. The large scale of the experimental units (8–40 m<sup>2</sup>), refuge availability, and the presence of benthic predatory fishes that cropped excess prey made available by removal of *M. hainanense*, may have contributed to the lack of any effect, despite the abundance of the predatory shrimps." (Authors)] Address: Dudgeon, D., Department of Ecology and Biodiversity, The University of Hong Kong, Pokfulam Road, Hong Kong SAR, China. E-mail: ddudgeon@hkucc.hku.hk

**5474.** Medianero, E.; Samaniego, M. (2004): The community of aquatic insects associated with contaminated waters in the Rio Curundú, Republic of Panama. *Folia Entomol. Mex.* 43(3): 279-294. (in Spanish, with English summary). ["From March 2000 to March 2001, samples of aquatic insects and of physicochemical variables were obtained from the riverbed of Rio Curundú (Panama). The objectives of the study were (1) to identify aquatic insects resident in waters of different levels of contamination; (2) to assess the diversity of insect communities from the source to the estuary of the river; and (3) to evaluate the effects of rainfall on annual patterns of insect abundance. Fifty-seven taxa were collected. Most of insects were associated with levels of biochemical need of oxygen (BNO) between 7.4 and 13.05 mg/l. However, some insect genera were associated with BNO levels of 62.5 and 188.5 mg/l. There was a relation between BNO and insect genera (chi-squared = 1674,  $p < 0.007$ ). The diversity of insect communities decreased from the source to the estuary of the river. There was also a negative linear relation between rainfall and insect abundance ( $F = 10.49$ ,  $p < 0.0078$ ,  $r = -0.70$ )."] (Authors) Odonata are treated at the family / genus level.] Address: Samaniego, M., Instituto Smithsonian de Investigaciones Tropicales. Apartado 169, Balboa, Ancón, República de Panamá. E-mail: samaniem@tivoli.si.edu

**5475.** Meurgey, F.; Dommaget, J.-L. (2004): *Erythrodiplax berenice* (Drury, 1770) nouvelle espèce pour la Guadeloupe. *Martinia* 20(2): 58. (in French). [Female, Le Moule, 10-XII-1973] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5476.** Meurgey, F.; Levasseur, M. (2004): Note sur quelques Odonates de République Dominicaine (Grandes Antilles). *Martinia* 20(1): 16. (in French). [II-2001; seven species are listed. *Scapanea frontalis* is a road kill.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5477.** Meurgey, F. (2004): Nouvelle localité marocaine pour *Sympetrum meridionale* (Sélys, 1841). *Martinia* 20(1): 28. (in French). [Marocco, region Essaouira, w Talmezt, 2 males, 3 & 6-IX-2002] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5478.** Meurgey, F. (2004): Nouvelles données pour *Triacanthagina caribbea* Williamson, 1923 en Guade-

loupe (Antilles françaises). *Martinia* 20(3): 114. (in French). [In March 2004, a female and an exuvia of the species were collected. Habitat and co-occurring odonate species are briefly outlined.] Address: Meurgey, F., Muséum d'Hist. nat. Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5479.** Meurgey, F. (2004): Observations sur la reproduction de *Rhionaeschna psilus* (Calvert, 1947), *Tramea binotata* (Rambur, 1842) et *Lestes tenuatus* Rambur, 1842 en Guadeloupe. *Martinia* 20(2): 59-65. (in French, with English summary). [Documentation of the reproduction behaviour of the mentioned three species.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5480.** Meurgey, F. (2004): Première observation d'*Anax junius* (Drury, 1773) en France (Odonata, Anisoptera, Aeshnidae). *Martinia* 20(1): 13-15. (in French, with English summary). [First record of *A. junius* for the continental Europe and for France; Pointe St Gildas, 14-IX-2003] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5481.** Meurgey, F. (2004): Reproduction d'*Anax concolor* Brauer, 1865, d'*A. longipes* Hagen 1861 et d'*A. amazili* (Burmeister, 1839) en Guadeloupe (Basse-Terre). *Martinia* 20(2): 55-58. (in French, with English summary). ["Some informations are given about the breeding status of *A. concolor* in Guadeloupe, as well as about a first record of *A. amazili* and *A. longipes* for this island. Exuviae belonging to *A. longipes* have also been collected on the Basse-Terre part ; this is also the first record of this species in Guadeloupe.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5482.** Meurgey, F. (2004): Sur la collection d'Odonates de Guyane française du Muséum d'Histoire Naturelle de Nantes. *Martinia* 20(4): 197-198. (in French, with English summary). ["The author presents a list of Odonata collected in French Guiana in 2003, as well as a revized list of specimens belonging to an old collection of Nantes natural history museum." (Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5483.** Meurgey, F. (2004): Sur une petite collection d'odonates de Polynésie française. *Martinia* 20(2): 83-84. (in French, with English summary). [6 taxa, in most cases from Tahiti, some from Faaa and Moorea, preserved in the odonate collection of the Natural History Museum in Nantes, France are documented.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5484.** Meurgey, F. (2004): *Tramea calverti* Muttkowski, 1910 nouvelle espèce pour la Guadeloupe. *Martinia* 20(2): 66. (in French). [31-III-2004, Sainte Rose, Basse-Terre.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

- 5485.** Mikat, M.; Mocek, B.; Zamecnik, J. (2004): Results of entomological research of the locality "Slavikovy ostrovy" near Pfelouc town (eastern Bohemia, Czech Republic). *Acta Mus. reginaehradecensis* (A) 30: 101-121. (in Czech, with English summary). [Checklist of 23 odonate species recorded in 2000 and 2001.] Address: Mikat, M., Muz. vychodnich Cech, Eliscino nabr. 465, CZ-500 01 Hradec Kralove, Czech Republic
- 5486.** Mora, A.; Csabai, Z.; Müller, Z. (2004): Contribution to the dragonfly, aquatic beetle and caddisfly fauna of the Jászság, Hungary (Odonata, Coleoptera: Hydradephaga and Hydrophiloidea, Trichoptera). *Folia historico naturalia musei Matraensis* 28: 149-156. (in English). [A total of 17 odonate species is documented.] Address: Mora, A., Univ. Debrecen, Dept Hydrobiol., H-4032 Debrecen, Egyetem sq. 1., Hungary. E-mail: mar-nold@dragon.klte.hu
- 5487.** Mortensen, L.M.; Richardson, J.M.L. (2004): 26. The effects of chemical cues on the foraging of damselfly larvae *Enallagma antennatum* (Odonata: Zygoptera). 2004 Entomological Society of Ontario Annual Meeting Brock University: 20. (in English). [Verbatim: The trade-off between foraging rate and minimizing predation risk is ubiquitous in nature. To achieve an optimal balance in this trade-off, potential prey must have a method of predator detection that allows discrimination between risky and non-risky environments. Damselfly larvae typically respond to the presence of a predator by reducing foraging rates. In this study, we explore the way in which larvae of *Enallagma antennatum* use visual and chemical cues effects to assess predation risk. In trials comparing visual and chemical cues, damselfly larvae reduced foraging only in response to chemical cues. Further experiments revealed that damselfly larvae respond to chemical cues from predators that have recently fed on conspecific or familiar heterospecific prey items damselflies also reduced foraging in the presence of cues from injured conspecifics. Thus, damselfly larvae are able to distinguish between different chemical cues and appear to respond to these different chemical cues in a manner consistent with associated risk.] Address: Mortensen, L.M., Department of Biological Sciences, Brock University, 500 Glenridge Ave., St. Catharines, ON, Canada
- 5488.** Mrowiński, P.; Zawal, A. (2004): Preliminary studies of dragonflies (Odonata) of Barlinecko-Gorzowski Landscape Park. *Parki Narodowe i Rezerваты Przyrody* 23(2): 471-480. (in Polish, with English summary). [Poland; samples in 2000 totaled to 5471 specimens representing 39 odonate species. Dominance and locality-frequency for each species are documented in a table. The dominant species is *Ischnura elegans*, a representative of eurytopic species which, in general, dominated the water bodies surveyed. Mesotrophic lakes are characterised by *Platycnemis pennipes*. A comparison with the paper of MÜNCHBERG (1932) shows no significant changes of regional faunal composition. *Sympetma paedisca*, *Ophiogomphus cecilia*, *Aeshna viridis*, *Leucorrhinia pectoralis*, *Erythromma lindenii*, and *Cordulegaster boltonii* are of special interest to dragonfly conservation in Poland.] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Wąska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl
- 5489.** Njiru, M.; Okeyo-Owuor, J.-B.; Muchiri, M.; Cowx, I.G. (2004): Shifts in the food of Nile tilapia, *Oreochromis niloticus* (L.) in Lake Victoria, Kenya. *African Journal of Ecology* 42: 163-170. (in English, with French summary). ["Studies of the food of introduced Nile tilapia, *Oreochromis niloticus* (L.) with respect to size, habitat and season were conducted between November 1998 and October 2000 in Kenyan waters of Lake Victoria. Stomach contents of 1980 specimens collected by demersal trawl and seining were analysed. Nile tilapia originally known to be herbivorous, feeding mostly on algae has diversified its diet to include insects, fish, algae and plant materials. The major diet of fish <5 cm total length was zooplankton whereas bigger fish included a wider range of food items in their diet. There was spatial variation in diet with insects and algae dominating in the gulf and open water habitats respectively. There was no seasonal variation in the food items ingested and diel feeding regime indicated that *O. niloticus* is a diurnal feeder. The shift in diet could be due to ecological and environmental changes in Lake Victoria, which have been associated with changes in composition and diversity of fish and invertebrate fauna, emergence and dominance of different flora including water hyacinth *Eichhornia crassipes* (Mart.) Solms-Laub., and algae communities. The feeding habit of *O. niloticus* is discussed in the context of changes occurring in the lake." (Authors) Odonata comprise 1.1% of the gut content of 1980 Nile tilapia analysed during the period Nov. 1998 to Oct. 2000.] Address: Njiru, M., Kenya Marine and Fisheries Research Institute (KMFRI), PO Box 1881, Kisumu City, Kenya. E-mail: rmnjiru2002@yahoo.com
- 5490.** Palmer, C.G.; Muller, W.J.; Gordon, A.K.; Scherman, P.A.; Davies-Coleman, H.D.; Pakhomova, L.; de Kock, E. (2004): The development of a toxicity database using freshwater macroinvertebrates, and its application to the protection of South African water resources. *South African Journal of Science* 100: 643-650. (in English). [reference on *Enallagma* sp. in table 1.] Address: Muller, W.J., Unilever Centre for Environmental Water Quality, Institute for Water Research, Rhodes University, P.O. Box 94, Grahamstown 6140, South Africa. E-mail: nikite@iwr.ru.ac.za
- 5491.** Pont, B. (2004): Contribution à la connaissance des Odonates de Guadeloupe et de Martinique. *Martinia* 20(4): 199-204. (in French, with English summary). ["Odonatological observations realized in Martinique and Guadeloupe in October 2003 are presented. The habitats visited are described. Fifteen species, already known in French West Indies, were recorded. Behaviour and population size are reported for each of them." (Author)] Address: Pont, B., Montée du village, F-38150 Anjou, France
- 5492.** Prévost, O.; Moncomble, M. (2004): Nouvelles données sur les odonates du département de la Vienne. *Martinia* 20(3): 115-119. (in French, with English summary). [The list of odonate species in the Département Vienne, France counts 60 species including the new additions *Epithea bimaculata* and *Sympetrum danae*. These species, and *Platycnemis latipes*, *Ischnura pumilio*, *Sympetrum vulgatum*, and *Sympetrum fonscolombii* are commented on.] Address: Prévost, O., 28, rue de Poitiers, F-86130 Jaunay-Clan, France

- 5493.** Ramsay, L.; Cannings, R.A. (2004): Determining the status of British Columbia's dragonflies. T.D. Hooper, editor. Proceedings of the Species at Risk 2004 Pathways to Recovery Conference. March 2-6, 2004, Victoria, B.C. Species at Risk 2004 Pathways to Recovery Conference Organizing Committee, Victoria, B.C.: 1-12. (in English). ["To demonstrate how inventory provides information for assigning conservation status ranks, we looked at the changes in these ranks over a nine-year period. Preliminary conservation status ranks were assigned to British Columbia's dragonflies and damselflies (Class Insecta: Order Odonata) in 1993. Subsequently, we focused inventory efforts on the species considered to be at risk in order to more accurately determine their status. From 1996 to 2003, concentrated surveys were conducted throughout much of the province. During these surveys, known ranges of many species were extended, knowledge of habitat requirements increased, and five new species were confirmed for the province. Many of the targeted species were more abundant than previously thought, and their conservation ranks were changed accordingly. Others were found only rarely or not at all. Ranking poorly known species is challenging, particularly if samples are small or habitats are difficult to access. By increasing our knowledge of these species and their requirements, we can assign them more accurate ranks, thus ensuring that conservation efforts will target the species and habitats that truly require them." (Authors)] Address: Ramsay, Leah, British Columbia Conservation Data Centre, Ministry of Sustainable Resource Management, 395 Waterfront Crescent, Box 9358, Stn Prov Govt, Victoria, BC, V8W 9M2, Canada. E-mail leah.ramsay@gems4.gov.bc.ca
- 5494.** Santos Ferreira Peruquetti (2004): Odonata (Libélulas) do município de Luís Antônio, São Paulo, Brasil: Relação com o uso do solo e riqueza faunística. Tese. Universidade Federal de São Carlos: 49 pp- (in Portuguese, with English summary). [The odonate fauna of a sugarcane monoculture and a more natural area are compared; faunal similarity between both areas is low.] Address: not stated
- 5495.** Silsby, J. (2004): Grand places. *Agrion* 8(2): 18-19. (in English). [reminiscences from odonatological overseas trips] Address: Silsby, Jill., 37, Astoria House, 116 Hight Street, Purley, Surrey CR8 2XT, UK. E-mail: Jillsilsby1@btinternet.com
- 5496.** Srinivasan, M.V.; Zhang, S. (2004): Visual motor computations in insects. *Annual Review of Neuroscience* 27: 679-696. (in English). ["With their relatively simple nervous systems and purpose-designed behaviors and reflexes, insects are an excellent organism in which to investigate how visual information is acquired and processed to guide locomotion and navigation. Flies maintain a straight course and monitor their motion through the environment by sensing the patterns of optic flow induced in the eyes. Bees negotiate narrow gaps by balancing the speeds of the images in their two eyes, and they control flight speed by holding constant the average image velocity as seen with their two eyes. Bees achieve a smooth landing on a horizontal surface by holding the image velocity of the surface constant during approach, thus ensuring that flight speed is automatically close to zero at touchdown. Foraging bees estimate the distance that they have traveled to reach a food source by integrating the optic flow experienced en route; this integration gives them a visually driven "odometer." Insects have also evolved sophisticated visuomotor mechanisms for pursuing prey or mates and possibly for concealing their own motion while shadowing objects of interest." (Authors) Dragonflies are referred to several occasions, especially in the context of motion camouflage.] Address: Srinivasan, M.V., Center for Visual Science, Research School of Biol. Sciences, Australian National University, P.O. Box 475, Canberra, A.C.T. 2601, Australia. E-mail: M.Srinivasan@anu.edu.au
- 5497.** Svidersky, V.; Plotnikova, S. (2004): On structural-functional organization of dragonfly mushroom bodies and some general considerations about purpose of these formations. *Journal of Evolutionary Biochemistry and Physiology* 40(6): 608-624. (in English). ["Anatomy as well as (for the first time) the fine structure have been studied of the mushroom bodies located in protocerebrum of the supraesophageal ganglion of dragonflies the most ancient flying insects on Earth. Used in the work are larvae of the last age (prior to winging), in which the mushroom body structure has already been completely formed and corresponds to that in imago. The total organization of the dragonfly mushroom bodies has been established to be more primitive than that of other insects studied so far. This involves both the number of interneurons (Kenyon cells) present in the mushroom bodies and the character of anaptic connections formed by these cells. There is confirmed the absence in dragonflies of the mushroom body calyces that in opinion of some authors are obligatory input gates into these structures. Peculiarities of the neuropil structure in the area of the absent calyces are studied in detail. For the first time in insects there are revealed the direct (without additional synaptic switching) pathways forming the afferent input from optic lobes into the mushroom body calyx area. Also detected are the direct pathways going from the mushroom bodies to the abdominal chain ( efferent output ). A possible functional significance of these findings as well as the general role of mushroom bodied in control of some forms of insect behavior are discussed." (Authors)] Address: Sechenov Institute of Evolutionary Physiology and Biochemistry, Russian Academy of Sciences, St. Petersburg, Russia
- 5498.** Thakoor, S.; Morookian, J.M.; Chahl, J.; Butler Hine, B.; Zornetzer, S. (2004): BEES: Exploring Mars with Bioinspired Technologies. *Computer* 37(9) (ISSN: 0018-9162): 38-47. (in English). [To enable autonomous flight, the authors apply bioinspired engineering of exploration systems technology to the development of bioinspired visual navigation sensors integrated on small flyers. They drew their inspiration for these BEES designs from insects, which use ingenious strategies, including optic flow, for navigating successfully in three dimensions. Distilling these principles from biology enables the development of efficient, compact, yet sophisticated autopilots for robotic aircraft embarking on planetary exploration missions. Their bioinspired sensor suite consists of dragonfly-inspired ocelli for flight stabilization and attitude referencing; honeybee-inspired optic flow for terrain following, lateral-drift containment, and localization; and sun and sky polarization-based compassing." (Authors)] Adresse: not stated
- 5499.** Torralba-Burrial, A.; Ocharan, F.J. (2004): Costras salinas sobre libélulas monegrinas (Odonata). *Boln. S.E.A.* 35: 281-282. (in Spanish). ["Sympetrum



fonscolombii females found at saline lakes in Los Mo-negros (Aragon, NE Spain) showed white spots of salt on their abdomens, due to water evaporation. This species touches the water surface with its abdomen to ovi-posit, and when the water evaporates the salt forms the white spots." (Authors)] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**5500.** Wada, S.; Wada, Y. (2004): The first records of the migratory species, *Sympetrum fonscolombii* from Fukui Prefecture, Japan. Bull. Fukui City Mus. Nat. His. 51: 65-66. (in Japanese with English summary). ["In Oc-tober and November 2004, some adults of the migrato-ry species, *S. fonscolombii* were found at coastal ponds in Fukui City, Fukui Prefecture, Honshu, Japan. [...]"] (Authors)] Adress: not stated in English

**5501.** Wolski, L.F.; Trexler, J.C.; Nelson, E.B.; Philip-pi, T.; Perry, S.A. (2004): Assessing researcher impacts from a long-term sampling program of wetland com-munities in the Everglades National Park, Florida, U.S.A.. *Freshwater Biology* 49(0): 1381-1390. (in Eng-lish). ["1. Long-term monitoring requires repeated visits to a study site, greatly increasing the potential for cu-mulative visitation effects. For ecological studies in ge-neral, and for monitoring in particular, data must be evaluated for confounding artefacts from researcher presence. We compared aquatic communities at long-term sampling plots (nine sites, each with three plots, studied continuously from 6 to 22 years) in the Everglades National Park to previously unsampled reference plots adjacent to them to assess the effects of resear-cher visitation on the flora and fauna. 2. We identified two criteria that are sensitive to local habitat heteroge-neity for assessment of visitation impacts. First, the long-term plots must differ from adjacent reference plots by a magnitude that exceeded variation among plots separated by equal or greater distance (i.e. the difference is greater than expected by scaling of com-munity change proportional with distance); and second, multiple reference plots must consistently differ in direc-tion (e.g. greater abundance or less abundance) from adjacent long-term plots. We also tested for increased heterogeneity among samples from long-term plots compared with those not previously visited. 3. We found no evidence of researcher effects on fish or macroinver-tebrates, and only weak evidence for alteration of e-mergent plants and periphyton floating mats. Our failure to document visitor impacts may result from either low visitation rate or the dynamic nature of the wetlands studied." (Authors) The paper also includes information on different odonate species.] Address: Trexler, J., De-partment of Biological Sciences, Florida International University, Miami, FL, U.S.A. 2: South Florida Natural Resources Center, Everglades National Park, State Road, Homestead, FL, U.S.A. E-mail: trexlerj@fiu.edu

**5502.** Yang, L.; Gao X.; Yuan, F.; Wang, C.; Guo D. (2004): Faunal analysis and distribution of dragonflies in Beijing. *Journal of Beijing Normal University (Natural Science)* 40(3): 375-370. (in Chinese, with English summary). [According to the survey of dragonflies in Beijing from 2001-2003, a total of 50 species of Odonata were reported, belonging to 2 suborders, 8 families and 25 genera. 29 species are Palaearctic (58 %); 10 species (20 %) to the Oriental realm; the remaining 11 species are cosmopolitan (22 %). Three distribution ty-

pes of Odonata in this area are classified based on ha-bitat differences of hydrological features, water quality and aquatic vegetation in Beijing. They are plain type, mountain type and widespread.] Address: Yang, Liu, Ministry of Education Key Laboratory for Biodiversity and Engineering, Beijing Normal University, 100875, Beijing, China

**5503.** Yanoviak, S.P.; Fincke, O.M. (2004): Sampling methods for water-filled tree holes and their artificial analogues. In: Leather, S. (Ed.): *Insect Sampling in Fo-rest Ecosystems*. Blackwell. *Methods In Ecology*. 320 pp. ISBN: 0632053887: (in English). ["In summary, wa-ter-filled tree holes are tractable habitats for ecological and behavioral studies; sampling their insect fauna is a relatively simple process, and the use of artificial holes is an inexpensive way to increase sample size and control multiple factors for experiments. The extent to which inferences from tree hole data have a more ge-neral application for freshwater systems remains to be seen. Nevertheless, given their important ecological ro-le, these aquatic microhabitats merit much more atten-tion than they have received, especially in tropical fo-rests." (Authors)] Address: Fincke, O.M., Dept Zool., U-niv. Oklahoma, 730 Van Vleet Oval, Room 314, Nor-man, OK 73019, USA. E-mail: fincke@ou.edu

**5504.** Zhang, D.-Z.; Zheng, Z.-M. (2004): Research progress and status on Odonata of China. *Journal of Shaanxi Normal University (Natural Science Edition)* 32 (Suppl.): 97-100. (in Chinese, with English summary). [The paper provides a Chinese focus on the increase of odonatological knowledge.] Address: Zhang, D.-z., Col-lege of Life Science, Shaanxi Normal University, Xi'an 710062, Shaanxi, China

**5505.** Zhou, X.; Zhou, W.-b. (2004): A new species of the genus *Heliocypha* from Yunnan province of Chi-na (Odonata: Chlorodyphidae). *Wuyi Journal of Science* 20: 136-138. (in Chinese, with English summary). [*Heli-ocypha yunnanensis* sp. nov. is described from a holo-type male, Malipo County, Wenshan Miaozu Autono-mous Region, Yunnan Province, 20-VII-2003; paratype female: same data as holotype male.] Address: Zhou Wenbao, Zhejiang Museum of Natural History, Jiao-gonglu 71, Hangzhou 310012, China

## 2005

**5506.** Abbott, J.; Svensson, E.I. (2005): Phenotypic and genetic variation in emergence and development time of a trimorphic damselfly. *J. Evol. Biol.* 18: 1464-1470. (in English). ["Although colour polymorphisms in adult organisms of many taxa are often adaptive in the context of sexual selection or predation, genetic correlations between colour and other phenotypic traits expressed early in ontogeny could also play an important role in polymorphic systems. We studied phenotypic and genetic variation in development time among female colour morphs in the polymorphic damselfly *Ischnura elegans* in the field and by raising larvae in a common laboratory environment. In the field, the three different female morphs emerged at different times. Among laboratory-raised families, we found evidence of a significant correlation between maternal morph and larval development time in both sexes. This suggests that the phenotypic correlation between

phenotypic correlation between morph and emergence time in the field has a parallel in a genetic correlation between maternal colour and offspring development time. Maternal colour morph frequencies could thus potentially change as correlated responses to selection on larval emergence dates. The similar genetic correlation in male offspring suggests that sex-limitation in this system is incomplete, which may lead to an ontogenetic sexual conflict between selection for early male emergence (protandry) and emergence times associated with maternal morph." (Authors)] Address: Svensson, E., Section for Animal Ecology, Ecology Building, Lund University, SE-223 62 Lund, Sweden. E-mail: erik.svensson@zoekol.lu.se.

**5507.** Aguilar, J. d' (2005): Les descriptions originales des Odonates d'Europe 12. Brullé, Gaspard Auguste (1809 - 1873). *Martinia* 21(4): 81-88. (in French, with English summary). ["This 12th article is devoted to Hermann Gaspard Auguste Brullé who did much work on arthropods. Notably, he described *Crocothemis erythraea* and the subspecies *Calopteryx virgo festiva* and *Platycnemis pennipes nitidula*." (Author)] Address: d'Aguilar, J., 7, rue Adrien Lejeune, F-93170 Bagnolet

**5508.** Allen, E.W.; Prepas, E.E.; Gabos, S.; Strachan, W.M.; Zhang, W. (2005): Methyl mercury concentrations in macroinvertebrates and fish from burned and undisturbed lakes on the Boreal Plain. *Canadian Journal of Fisheries and Aquatic Sciences* 62(9): 1963-1977. (in English, with French summary). ["Methyl mercury (MeHg) concentrations in macroinvertebrates (including Odonata, e.g. *Cordulia shurtleffi*) and fish were compared among five lakes in burned catchments and five reference lakes on the western Canadian Boreal Plain to determine the influence of forest fire on MeHg bioaccumulation. Two years after fire, MeHg concentrations in five of six aquatic taxa were similar in burned and reference lakes. Among a larger set of 12 lakes, MeHg concentrations in biota were negatively correlated with lake water pH, trophic status, and hardness, reflecting a pre-existing gradient in water chemistry. Bio-magnification of MeHg (as determined by regression of MeHg concentration on baseline-adjusted  $\delta^{15}N$ ) was negatively correlated with lake water chlorophyll a concentration. A subsequent logging experiment interrupted by fire provided an opportunity to compare pre- and post-fire MeHg concentrations in aquatic biota. Three months after fire, biota MeHg concentrations had decreased by 32%–50%, and lake water ammonium concentrations had increased 11-fold relative to the previous year. In this nutrient-rich setting, fire may lower MeHg concentrations in aquatic biota over the short-term by inducing an increase in lake productivity that dilutes MeHg at the base of the food web." (Authors)] Address: unknown

**5509.** Anholt, B.R.; Negovetic, S.; Rauter, C.; Som, C. (2005): Predator complement determines the relative success of tadpoles of the *Rana esculenta* complex. *Evolutionary Ecology Research* 7: 733-741. (in English). ["Question: Does the identity of the apex predator in a system predict the relative success of closely related amphibian larvae? Organisms: Larvae of the hybridogenetic European frog, *Rana kl. esculenta*, and its sexual host, *R. lessonae*. Site: Three ponds supporting predatory fish and four ponds without fish but containing large invertebrate (dragonflies) and amphibian predators in northern Switzerland. Background: *Rana*

*esculenta* is a better competitor than *R. lessonae* in a wide range of conditions and is also a larger, more fecund frog than *R. lessonae*. Under most conditions, models predict competitive exclusion of *R. lessonae* followed by extinction of *R. lessonae*. Methods: In the field, we measured the change in frequency of the two taxa from the larval stage to metamorphosis. In the laboratory, we measured the activity of the two taxa and measured their vulnerability to odonate predators. Conclusions: In the presence of fish, the frequency of *R. lessonae* declined relative to *R. esculenta* from the larval stage to metamorphosis. In the absence of fish and presence of other predators, the opposite was true. *Rana esculenta* was more active than *R. lessonae* and more vulnerable to predation. The two taxa are adapted to different predator complexes and the hybridogenetic system is maintained by occasional dispersal between dissimilar water bodies.] Address: Anholt, B.R., Dept Biology, University of Victoria, PO Box 3020, Victoria, BC, V8W 3N5, Canada. E-mail: banholt@uvic.ca

**5510.** Anonymus (2005): Blauflügel-Prachtlibelle. *Calopteryx virgo*. *Insektenkurier* 86: 31-32. (in German). [Brief description of *C. virgo*, and documentation of 8 stamps with *C. virgo* as motive.] Address: Sabish, J., Adolf-Damaschke-Str. 3, 73037 Göppingen

**5511.** Anonymus (2005): Wild Corner: Invertebrates. *Porcupine* 33: 23. (in English). [Luk Keng marsh, Hong Kong, China, 2005; records of *Macrodiplax cora*, *Paracercion calamorum dyeri*, *Pseudagrion microcephalum*] Address: not stated

**5512.** Barbarin, J.-P.; Boitier, E.; Bronnec, F. (2005): Observations récentes de *Libellula fulva* dans le département du Puy-de-Dôme (Odonata: Libellulidae). *Arvernensis* 35-36: 9-12. (in French). [The distribution of *L. fulva* in the Auvergne, France with special emphasis on historical and recent records in the Department Puy-de-Dôme is outlined.] Address: Barbarin, J.-P., Société d'Histoire naturelle Alcide-d'Orbigny, 12 place des Écoles, F-63160 Billom, France. E-mail: jpbarbarin@shnao.net

**5513.** Bernard, R.; Wildermuth, H. (2005): *Nehalennia speciosa* (Charpentier, 1840) in Europe: a case of a vanishing relict (Zygoptera: Coenagrionidae). *Odonatologica* 34(4): 335-378. (in English). ["Based on all available data, the former and present distribution in Europe is presented and critically analysed. The sp. is extinct or has only survived at single or small clustered and isolated localities in many parts of the western borderlands of its former Eurasian area that extended from Belgium to Japan. It is continuously declining, especially W and S of the line running through the Baltic States, N and E Poland and S Belarus. The attached basic data from Asia reveal incomplete knowledge, but probably indicate a better situation in the eastern part of the range. The main aspects of the ecology and biology are outlined and discussed. Special attention is paid to the elements helpful in understanding the deep regress of the sp., i.e. to its habitat on a macro- and microscale as well as to its life-strategy. The high level of stenotopy and the highly specialized habitat-related behaviour, resulting in successful use of a narrow niche, are emphasized. These aspects make the sp. vulnerable in the face of high anthropogenic pressure in Europe. Limited dispersal abilities augment the danger of local extinction. The main threats are presented and some essential conser-

vation measures are proposed." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**5514.** Bernard, R.; Wildermuth, H. (2005): Verhaltensbeobachtungen an *Nehalennia speciosa* in Bezug auf Raum, Zeit und Wetter (Odonata: Coenagrionidae). *Libellula* 24(3/4): 129-153. (in German, with English summary). ["The behaviour of *N. speciosa* was studied at five small bog lakes in NW Poland with regard to habitat use, diurnal activity and influence of the weather. In total we discerned 22 behavioural elements some of which were considered in the context of different environmental situations. The imagines stayed almost exclusively in a narrow belt of thin-leaved sedges at the edge of the open water or in corresponding vegetation of adjacent shallow water bodies. The diurnal pattern of the localization of imagines in the vertical profile of the vegetation is described, stressing their movement downwards from the late forenoon and upwards in the late afternoon. Reproductive activity started in the morning, peaked around two hours before solar noon, and decreased rapidly in the early afternoon. Generally, precopula and copula lasted longer in the morning than in the afternoon. Calm, warm and rather humid atmospheric conditions with subdued or sporadically interrupted insolation proved optimal for the species' activity, whereas wind, strong precipitation, and temperatures below ca 15°C as well as above ca 23-24°C with strong insolation were unsuitable. In light rain and under a cloudy sky - provided that conditions were calm and temperatures were around 20°C - activity was diminished but not completely suppressed. It is inferred that imagines of *N. speciosa* are morphologically and ecologically adapted to habitats with obstrusive obstacles to flight, a humid microclimate and small spatial compass." (Authors)] Address: Bernard, R., Institut für Umweltbiologie, Abteilung Allgemeine Zoologie, Adam-Mickiewicz-Universität, Umultowska 89, PO-61-614 Poznan, Poland. E-mail: rbernard@amu.edu.pl

**5515.** Blakely, T.J.; Chadderton, W.L.; Harding, J.S. (2005): The effect of rotenone on orchard-pond invertebrate communities in the Motueka area, South Island, New Zealand. DOC Research & Development Series 220. Department of Conservation, Wellington: 26 pp. ["Rotenone is a naturally derived (organic) fish toxicant used widely in fisheries management. However, because of the non-specific nature of rotenone, nontarget animals may also be poisoned. The aim of this study was to determine whether past rotenone poisoning has had detectable effects on pond invertebrate communities and, if so, whether there is any evidence of community recovery. Water-chemistry parameters and invertebrate and plankton communities were investigated in a one-off survey of 18 orchard ponds around Motueka, South Island, New Zealand. Ponds were classified as either rotenone-free (pest fish present or pest fish absent) or rotenone addition, where rotenone had been used to eradicate pest fish species 6 months, 1 year and 3 years prior to our survey. We found few differences in water chemistry, physical conditions, or invertebrate taxonomic richness between groups of ponds. pH was circumneutral in all ponds, while conductivity ranged from 112-193 µS25/cm. Zooplankton diversity did not differ between groups: a total of 35 macroinvertebrate taxa were recorded from the 18 ponds, with 12-15 taxa found in each treatment group. However, there were subtle differences in macroinvertebrate and zooplank-

ton community composition. Our results indicated that invertebrate communities in the poisoned study-ponds were able to recover quickly; however, the impact of rotenone on benthic invertebrates is still uncertain, and the results of this study should be interpreted with caution as they were confounded by other variables, such as adjacent land-uses. Ponds in this study were dominated by pollution-tolerant taxa, and were already subjected to a cocktail of chemicals used on the adjacent orchards. Thus, the effect of rotenone may be undetectable in our ponds but more severe in pristine systems." (Authors) The study includes / discusses results from *Xanthocnemis zealandica* and *Austrolestes colensonis*. An additional three species are listed in appendix I and II.] Address: [http://www.doc.govt.nz/Publications/004~Science-and-Research/D\\_OC-Research-and-Development-Series/PDF/drds220.pdf](http://www.doc.govt.nz/Publications/004~Science-and-Research/D_OC-Research-and-Development-Series/PDF/drds220.pdf)

**5516.** Bo, T; Fenoglio, S. (2005): Sulla presenza di alcuni macroinvertebrati bentonici rari o interessanti nei torrenti e fiumi dell'Appennino piemontese. *Riv. Piem. St. Nat.* 26: 123-128. (in Italian, with English summary). [Italy; *Cordulegaster boltonii*] Address: Bo, T., Dipartimento di Scienze dell'Ambiente e della Vita, Università del Piemonte Orientale, via Bellini 25, I-15100 Alessandria, Italy

**5517.** Bolnick, D.I.; Preisser, E.L. (2005): Resource competition modifies the strength of trait-mediated predator-prey interactions: a meta-analysis. *Ecology* 86: 2771-2779. (in English). ["Only a fraction of the individuals in a given prey population are likely to be killed and consumed by predators. In contrast, nearly all individuals experience the chronic effects of predation risk. When threatened by predators, prey adopt defensive tactics whose costs can lead to reduced growth, maturation rates, survivorship, fecundity, or population density. This nonconsumptive impact of predation risk on prey is known as a "trait-mediated interaction" (TMI) because it results from changes in prey traits such as behavior or physiology. Ecological theory suggests that the strength of TMI effects will reflect a balance between the conflicting demands of reproduction vs. predator avoidance. Competitor density and resource availability are expected to alter the balance between these conflicting forces. We conducted a meta-analysis of experimental studies that measured TMI effect size while varying competitor and/or resource density. The threat of predation had an overall negative effect on prey performance, but the strength of this effect varied with the level of competition. High competition exacerbated the negative effect of intimidation on prey density but moderated the negative effect of intimidation on prey life history and growth. We discuss these results in light of previously published theoretical expectations. Our results highlight the variable and context-dependent nature of interspecific interactions." (Authors) The study includes odonatological material. For details see: <http://www.esapubs.org/archive/ecol/E086/149/appendix-A.htm>] Address: Bolnick, D.I., Sect. Integrative Biology, University of Texas at Austin, Austin, Texas 78712 USA

**5518.** Boudot, J.-P. (2005): Die Prachtilibellen Europas. Gattung *Calopteryx*. Par Georg Rüppell, Dagmar Hilfert-Rüppell, Gunnar Rehfeldt & Carsten Schütte. *Martinia* 21(3): 135-136. (in French). [book review] Address: Boudot, J.-P., Centre de Pédologie Biologique, 17, rue Notre-Dame de Pauvres, B.P. 5, F-54501



Vandoeuvre-lès-Nancy, France. e-mail: boudot@cpb.cnrs-nancy.fr

**5519.** Bowman, N. (2005): Reports from Coastal stations - 2004: Eccles-on-Sea, Norfolk. *Atropos* 24: 70-71. (in English). [Verbatim: The year was similarly rather dull for Odonata with the exception of Small Red-eyed Damselfly *Erythromma viridulum* records. Apart from the resident population there were a number of waves of immigrants; the largest of these peaked on 4 September when c.100 individuals were present. Of the damselflies present on 4 September over 90% were unattached males and just five pairs were in tandem. This contrasted markedly with the 2001 immigration, when of the 170 present at its peak some 90% was accounted for by pairs in tandem with spare males representing the remaining 10%.] Address: not stated

**5520.** Bried, J.T.; Krotzer, S. (2005): New species records for Mississippi: An expected dragonfly and an unexpected damselfly. *Journal of the Mississippi Academy of Sciences* 50(4): 233-234. (in English). [USA; detailed documentation of the records of *Arigomphus lentulus* and *Lestes forclicula*. Winds associated with Hurricane Ivan on 16.IX.2004 are supposed to be responsible for the records of *L. forclicula*.] Address: Bried, J.T., Mississippi State University, Mississippi State, MS 39762, USA

**5521.** Cade, M. (2005): Reports from Coastal stations - 2004: Portland, Dorset. *Atropos* 24: 54-55. (in English). [A single *Sympetrum fonscolombii* at 16-VI-2004 was the only immigrant dragonfly recorded during the year.] Address: not stated

**5522.** Cai, D.; Liu G.; Li D. (2005): Discriminant analysis of 3 genera of Odonata by nonparametric methods. *Journal of south China University of tropical agriculture* 11(4): 15-19. (in Chinese, with English summary). ["Using the length of abdomen, hindwing, pterostigma of hindwing, superior appendage, inferior appendage, and the 10th abdomen as quantitative variables, a discriminant analysis of the adult of *Nannophopsis*, *Orthetrum*, and *Pantala* (Odonata, Libellulidae) was carried out by nonparametric methods. The results showed that nonparametric discriminant analysis was very effective in separating the adults of these three genera, and the total error count estimate was 0.0095 either by cross validation or by resubstitution." (Authors)] Address: Cai, D., Coll. of Environment & Plant Protection, SCUTA, Danzhou, Hainan, 571737, China.

**5523.** Cannings, R.A.; Simaika, J.P. (2005): *Lestes disjunctus* and *L. forcipatus* (Odonata: Lestidae): An evaluation of status and distribution in British Columbia. *J. entomol. Soc. Brit. Columbia* 102: 57-63. (in English). ["Of the five species of the damselfly genus *Lestes* that live in British Columbia, *Lestes forcipatus* Rambur and *L. disjunctus* Selys are the most difficult to separate morphologically. Females can be readily distinguished by the size of the ovipositor, but males are difficult to separate. In British Columbia, *L. disjunctus* is more common, widespread and familiar. Before 1998, when it was first reported in BC, specimens of *L. forcipatus* were misidentified as *L. disjunctus* because the former is known mainly from eastern North America and most *Lestes* species are usually most readily identified using male characters. The identities of museum specimens of the two species were checked and corrected by us as necessary. Ecological and behavioural observations

and up-dated distribution maps of the species are presented. Throughout its range in BC, *L. forcipatus* is mostly sympatric with *L. disjunctus* but lives in a narrower range of habitats and localities mostly cool sedge marshes and fens. The two species show some temporal and behavioural separation." (Authors)] Address: Cannings, R., Royal British Columbia Museum, 675 Belleville Street, Victoria, British Columbia, Canada

**5524.** Carchini, G.; Solimini, A.G.; Ruggiero, A. (2005): Habitat characteristics and odonate diversity in mountain ponds of central Italy. *Aquatic Conservation: Marine and Freshwater Ecosystems* 15(6): 573-581. (in English). ["1. In central Italy mountain ponds represent an important habitat for the conservation of dragonflies; however, human disturbance of these fragile environments is threatening the stability of their biodiversity. 2. Thirty-one ponds, ranging in altitude from 1014 to 2004 m, were qualitatively sampled for odonate larvae twice during 1998. On each occasion a range of physical, chemical and biotic habitat variables were also measured. 3. The mountain ponds sampled had fewer species of Odonata than lowland ponds, and there was a large presence of pioneer species. 4. Multiple regression analysis showed that the number of odonate species was positively affected by the amount of macrophyte coverage of the pond surface and negatively affected by increasing ammonium concentration. 5. A Canonical Correspondence Analysis revealed that species number decreased with altitude, chlorophyll a and phosphorus concentrations. The presence/absence of each odonate species was weakly related to the habitat variables. 6. The intensive use of ponds for livestock watering results in damage to the peripheral vegetation, which tends to cause high turbidity and lower macrophyte coverage of the pond water. The inevitable outcome in these situations is a reduction of the odonate diversity." (Authors)] Address: Carchini, G., University of Tor Vergata, Department of Biology, via della Ricerca Scientifica, 00133, Roma, Italy. E-mail: carchini@uniroma2.it

**5525.** Chazal, A.C. (2005): Lepidoptera and Odonata surveys of Colonial National Historical Park, James City, Surry, and York counties, Virginia. *Natural Heritage Technical Report 05-05*. Virginia Dept of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. Unpublished report submitted to Colonial National Historical Park. May 2005 : 49 pp. (in English). ["[...] Between May-July 2003 and April-October 2004, DCR-DNH conducted surveys over 18 days covering 17 different habitats, which were categorized into 6 habitat types: developed areas, fields, forested uplands, forested wetlands, marshes, and water (i.e. freshwater ponds). [...] 42 species of Odonata were observed. [...] The field habitats also had the highest species diversity and second highest totals (forested wetlands had higher totals) for Odonata. [...] 5 watch-listed species were observed: *Aaron s Skipper* (*Poanes aaroni*), *Anax longipes*, *Sympetrum ambiguum*, *Ischnura prognata*, and *Telebasis byersi*. All of these watch-listed species are considered common to very common and secure across their global ranges. The results of this survey represent 37 new county records for Lepidoptera and 26 for Odonata. Species accumulation curves indicate that further surveys for Lepidoptera and Odonata may increase the known fauna of COLO." (Author)] Address: <http://www.nps.gov/applications/nature/documents/1Report%20Odonates%20COLO.pdf>

- 5526.** Clancy, S. (2005): Reports from Coastal stations - 2004: Dungeness area, Kent. *Atropos* 24: 60-62. (in English). [*Anax parthenope*, *Sympetrum fonscolombii*, *Calopteryx splendens*, strong colony (max. 250 individuals, 30 couples) of *Erythromma viridulum* with continuing colonisation of new habitats.] Address: not stated
- 5527.** Clausnitzer, V.; Dijkstra, K.D. (2005): Honouring Nobel Peace Prize winner Wangari Maathai: *Notogomphus maathaiae* sp. nov., a threatened dragonfly of Kenya's forest streams (Odonata: Gomphidae). *International Journal of Odonatology* 8(2): 177-182. (in English). ["*Notogomphus maathaiae* sp. nov. (holotype male: Kenya, Western Province, Mt Elgon District, Mt Elgon, Rongai River, 2,361 m a.s.l., 1°02'19.4"N, 34°45'20.5"E, 06 vi 2000) is described from a series of 8 males and 3 females collected at montane forest streams in Kenya. The status and biogeography of this and other montane species are discussed." (Authors)] Address: Clausnitzer, Viola, Graefestr. 17, D-06110 Halle/Saale, Germany. E-mail: violacl@gmx.de
- 5528.** Córdoba Aguilar, A.; Cordero Rivera, A. (2005): Evolution and ecology of Calopterygidae (Zygoptera: Odonata): Status of knowledge and future research perspectives. *Neotropical Entomology* 34(6): 861-879. (in English, with Portuguese summary). ["We review the studies of evolution and ecology in the Calopterygidae. Adults are easily distinguished for their pigmented wings and territorial behaviour. Three genera have been well studied: *Hetaerina*, *Calopteryx* and *Mnais*. Larvae develop in riverine aquatic environments. Selection operates at this stage to produce large muscle mass for adults. The adult spends some days until sexually ready. During this time, it feeds extensively to produce muscle fat for egg production and flight. However, gregarine parasites may ingest the fat reserves. Males may use two mating tactics or strategies that may be genetically (*Mnais*) or environmentally (*Calopteryx* and *Hetaerina*) determined: territoriality and nonterritoriality. In *Mnais*, these strategies appear balanced in fitness terms. Males of *Calopteryx*, *Mnais* and *Phaon* show a precopulatory courtship that is not the case for *Hetaerina*. Male wing pigmentation seems to signal how good the male is to deal immunologically with parasites to females during the male courtship. During copulation, males displace the sperm the female has stored in the storage organs from previous matings. There is an enormous variation in male sperm displacement mechanisms and ability, and in genitalic morphology in both sexes. This variation possibly results from a coevolutionary game between the sexes to control stored sperm. After copulation, males guard females apparently to avoid that other males take the female in copulation. Our review suggests sources for research in this family." (Authors)] Address: Córdoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx
- 5529.** Costa, J.M. (2005): *Chalcopteryx machadoi* sp. n. da região norte do Brasil (Zygoptera: Polythoridae) with a key to the species of the genus. *Lundiana* 6(suppl.): 37-40. (in Portuguese, with English summary). ["*C. machadoi* n. sp. from northern Brasil (Zygoptera, Polythoridae). A new species, is described and illustrated from a single male collected in the state of Pa-
- ra, Brazil (holotype male : Santo Antonio do Taua, 8.I.1999) and deposited in the Museu Nacional, Rio de Janeiro, Brazil. This species can be distinguished from others by the colour pattern of the wings. In *Chalcopteryx machadoi* sp. n. the four wings are hyaline. An identification key is provided for the species of the genus." (Author)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@univsys.com.br
- 5530.** Cottureau, V. (2005): Recherche d'une relation entre Odonates, pratiques piscicoles et végétation. *Martinia* 21(3): 91-107. (in French, with English summary). [In the Brenne Natural Regional Park, France, 24 ponds with different intensity levels of fish farming were studied for the trade-offs between farming practise, vegetation structure and odonate fauna. Nutrient deposition and hydrophytic plants are the most important parameters influencing odonatological communities.] Address: Cottureau, Valérie, 34 rue Henride montherlant, F-56000 Vannes, France. E-mail: lierre@netcourrier.com
- 5531.** Daguet, C. (2005): Dragonfly Conservation from the BDS. Key sites. *Atropos* 25: 70-71. (in English). [Brief report on the current activities of the British Dragonfly Society to document Odonata data sets from monitored localities.] Address: Daguet, Caroline, English Nature North Mercia Team, Attingham Park, Shrewsbury, Shropshire SY4 4TW, UK. E-mail: caroline.daguet@english-nature.org.uk
- 5532.** Darblade, S.; Ducout, B. (2005): Première observation de *Trithemis annulata* (Palisot de Beauvois, 1805) dans le département des Landes (Odonata, Anisoptera, Libellulidae). *Martinia* 21(3): 123-125. (in French, with English summary). [2-VII-2005; at two localities several males and immature males of *T. annulata* were observed. This note on a most recent range extension of the species in France contains also a brief description of the habitats and a checklist of the co-occurring species.] Address: Darblade, Stéphanie, 4 allée des Mimosas, F-40140 Soustons, France. E-mail: s.darblade@tiscali.fr
- 5533.** Dayton, G.H.; Saenz, D.; Baum, K.A.; Langerhans, R.B.; DeWitt, T.J. (2005): Body shape, burst speed and escape behavior of larval anurans. *Oikos* 111: 582-591. ["Variation in behavior, morphology and life history traits of larval anurans across predator gradients, and consequences of that variation, have been abundantly studied. Yet the functional link between morphology and burst-swimming speed is largely unknown. We conducted experiments with two divergent species of anurans, *Scaphiopus holbrookii* and *Rana sphenoccephala*, to examine how behavior and morphology influence predator (*Anax junius*) vulnerability, and whether tadpole shape is related to burst-swimming performance. *S. holbrookii*, a species that typically uses ephemeral pools, was more active, exhibited slower burst speeds, and was more susceptible to predation than *R. sphenoccephala*, a species associated with more permanent aquatic sites. Our analysis of morphology and burst speed defined a shared axis of shape variation associated with burst-swimming speed regardless of species. Tadpoles with a deeper tail fin and muscle and a smaller body produced faster speeds. The nature and breadth of the morphology /speed relationship suggests

it may represent a generalized ecomorphological paradigm for larval anurans." (Authors)] Address: Dayton, G.H., Section of Ecology and Evolutionary Biology, Dept of Wildlife and Fisheries Sciences, Texas A&M Univ., Tamus 2258, College Station, TX 77843-2258, USA. E-mail: gdayton@tamu.edu

**5534.** De Marco, P.; Vianna, D.M. (2005): Distribuição do esforço de coleta de Odonata no Brasil – subsídios para escolha de áreas prioritárias para levantamentos faunísticos. *Lundiana* 6 (suppl.): 13-26. (in Portuguese, with English summary). ["Distribution of Odonata sampling effort in Brasil – basis for choosing priority areas for faunistic inventories: There is an urgent need to prioritize conservation areas, so that the invested resources protect as much biodiversity as possible, especially in developing countries. A way to select such areas is to estimate the biodiversity distribution but this strategy is constrained by the lack of knowledge and/or by the inaccessibility of the available information on species distribution. Based on a database on Odonata distribution in Brazil, it is shown that the sampling-effort and the largest numbers of recorded odonate species and genera are concentrated in areas with large number of researchers. The 6203 records employed here are distributed in only 29% of the national territory. The species richness is concentrated mainly in the states of Rio de Janeiro, Minas Gerais and São Paulo, in the Amazon River varzea and in some isolated points, such as Cuiabá (Mato Grosso state). We suggest that the sampling and inventory efforts are increased for Odonata, especially in the Brazilian northeast and areas in the Brazilian and Guyana Shields, for which there is practically no information available." (Authors)] Address: De Marco, P., Laboratório de Ecologia Quantitativa, Universidade Federal de Viçosa, 36570-000, Viçosa, MG, Brasil. E-mail: pdemarco@ufv.br

**5535.** De Marco, P.; Latini, A.O.; Resende, D.C. (2005): Thermoregulatory constraints on behavior: Patterns in a neotropical dragonfly assemblage. *Neotropical Entomology* 34(2): 155-162. (in English, with Portuguese summary). ["Odonate species are classified in terms of their thermoregulatory behavior into flier and percher categories. Larger perchers could be more efficient thermoregulators in sunny sites and smaller perchers depend more on air temperature. In this paper, an analysis of the behavioral temporal budget of an odonate neotropical assemblage was performed to determine the role of body size on territorial defense and general behavioral strategies. This analysis revealed three groups based on time budget. The first and second groups contained the species that remained perched for most of the activity time, but species of the first group differ from the second group by the larger proportion of transition flights. The third group contained species which were usually observed patrolling or in reproductive activities. The larger species spent more time in patrol and territorial defense activities, while smaller species remained perched. Larger dragonflies, with better thermoregulatory abilities could spend more time in reproductive activities. The behavioral classification of fliers and perchers is considered extremely useful but could oversimplify the behavioral patterns among species that have a wide body size variation. It is proposed that a behavioral continuum associated with the body size variation in perchers could explain some patterns of species interactions in odonate communities." (Au-

thors)] Address: De Marco, P., Depart. Biologia Geral, Universidade Federal de Viçosa, Minas Gerais, Brazil

**5536.** De Marmels, J.; Garrison, R.W. (2005): Review of the genus *Leptagrion* in Venezuela with new synonymies and descriptions of a new genus, *Bromeliagrion*, and a new species, *B. rehni* (Zygoptera: Coenagrionidae). *Canadian Entomologist* 137: 257-273. (in English, with French and Spanish summaries). ["Type material of poorly known taxa currently placed under the genera *Leptagrion* Selys and *Tagrion* Selys is reviewed, illustrated, and correctly associated with currently known specimens in collections. The following changes are made: *Leptagrion beebeanum* Calvert and *Leptagrion fernandezianum* Racenis are placed and keyed in a new genus, *Bromeliagrion* De Marmels gen. nov.; *Bromeliagrion rehni* Garrison sp. nov. is described from Ecuador. The following synonymies are proposed: *Leptagrion auriceps* St. Quentin is a junior synonym of *Leptagrion macrurum* (Burmeister); *Leptagrion autazensis* Sjöstedt is a junior synonym of *Aeolagrion flammeum* (Selys); *Leptagrion rufum* Selys is a junior synonym of *Anisagrion inotatum* (Selys); and *Leptobasis tenax* St. Quentin is a junior synonym of *Tagrion longum* Selys." (Authors)] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**5537.** Deans, M. (2005): Reports from Coastal stations - 2004: Basdsey Peninsula, Suffolk. *Atropos* 24: 68-69. (in English). ["Odonata were poorly represented with one *Aeshna mixta* and *Sympetrum striolatum* occasionally trapped at MV light (singles on 12, 17 & 26 September)."] Address: not stated

**5538.** Deliz Quiñones, K.Y. (2005): Water quality assessment of a tropical freshwater marsh using aquatic insects. Thesis M.S., Biology, University of Puerto Rico, Mayagüez Campus: 127 pp. (in English, with Spanish summary). [Laguna Cartagena, located in the municipality of Lajas, is the only natural freshwater lagoon of Puerto Rico. The lagoon gives refuge to many animal and plant species, some of them endemic and endangered. Agriculture in contiguous lands has caused sedimentation and eutrophication, affecting not only the hydrology of the lagoon but also its capacity to sustain a high diversity of aquatic life. To restore the lagoon, its actual condition was assessed based on the physical-chemical [...] and biological characteristics (aquatic insects) of two sites on the southwestern section of the lagoon. A total of 67 insect species in 33 families were collected, including 17 odonate taxa. For the full paper see: <http://grad.uprm.edu/tesis/delizquinones.pdf>] Address: Deliz Quiñones, Katherine Y., no further details

**5539.** Della Bella, V.; Bazzanti, M.; Chiarotti, F. (2005): Macroinvertebrate diversity and conservation status of Mediterranean ponds in Italy: water permanence and mesohabitat influence. *Aquatic Conserv. Mar. Freshw. Ecosyst.* 15: 583-600. (in English). ["1. In Italy small water bodies, especially temporary ones, have been little studied. As a consequence, their conservation value as a biodiversity resource is often overlooked despite Mediterranean temporary waters being listed as a priority habitat in the Habitats Directive (92/43/EEC). 2. A monitoring programme was designed to determine which factors influence pond species richness,



and to analyse the variation in macroinvertebrate community structure within and among ponds. Three main contrasting mesohabitats (macrophyte beds, littoral sediments and central sediments) were defined within 21 ponds (8 permanent and 13 temporary) along the Tyrrhenian coast of Italy near Rome, from which invertebrate macrofauna was collected in March, May and June 2002. 3. The main environmental factors influencing the number of species in ponds were hydroperiod length, depth, surface area, dissolved oxygen concentration and macrophyte species richness. Temporary ponds contained a smaller number of taxa than permanent ponds, but both types of ponds supported similar numbers of rare and threatened species. The total number of species, and in particular Coleoptera, Odonata, and Hemiptera, was higher in macrophyte beds than in both littoral and central sediments. 4. Multivariate analysis (non-metric multidimensional scaling) showed that the overall variation in assemblage composition was greater between temporary and permanent ponds than among mesohabitats, suggesting that environmental variables, such as hydroperiod, have a stronger effect on macroinvertebrate communities than substratum type. 5. In terms of species of conservation interest, this study suggests that both pond types and all mesohabitats should be considered in order to obtain a correct evaluation of pond conservation value." (Authors) The list of Oonata includes 16 species.] Address: Valentina Della Bella, Department of Animal and Human Biology, University of Rome La Sapienza, Viale dell'Universita` 32, 00185 Rome, Italy. E-mail: valentina.dellabella@uniroma1.it

**5540.** Dewick, S. (2005): Reports from Coastal stations - 2004: Bradwell-on-Sea, Essex. *Atropos* 24: 65-67. (in English). [United Kingdom; a list of 19 odonate species is communicated including *Erythromma najas*, *E. viridulum* ("well down in numbers from the extreme abundance in 2003"), and *Brachytron pratense* ("better than recent years".] Address: Dewick, S.; Curry Farm, Bradwell-on-Sea, Southminster, Essex, CM0 7NL, UK

**5541.** Dijkstra, K.-D.; Branson, A.; Lewington, R. (2005): A proposal for European standard names for the Odonata of Europe, Turkey and north-west Africa. *Atropos* 25: 37-43. [Existing and proposed British and Irish, and American names of the regional odonate fauna are compared in a table.] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**5542.** Dijkstra, K.D. (2005): A review of continental Afrotropical *Ceriagrion* (Odonata, Coenagrionidae). *J. Afrotrop. Zool.* 2: 3-14. ["The taxonomy of the *Ceriagrion* species of continental tropical Africa is discussed and a key provided. *C. annulatum* is not synonymous with *C. sanguinostigma*, but *Argiocnemis umbargae* is considered a junior synonym of *C. annulatum*, and *C. platystigma* with *C. sanguinostigma* of *C. varians*. The oriental genus *Argiocnemis* does not occur in Africa. The identities of *C. citrinum* and *C. ignitum* are clarified and the first records of *C. ignitum* and *C. mourae* since their descriptions are provided. The taxonomy of the complex of species including *C. hamoni*, *C. moorei*, *C. sakejii*, *C. suave* and possibly some Malagasy species remains unresolved, although at least *C. hamoni* and *C. moorei* are suspected to be conspecific with *C. suave*. The variability of *C. glabrum* is addressed in relation to the taxon *longispinum*." (Author)] Address: Dijkstra,

K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**5543.** Dijkstra, K.-D. (2005): Taxonomy and identification of the continental African *Gynacantha* and *Heliaeschna* species (Odonata: Aeshnidae). *International Journal of Odonatology* 8(1): 1-32. (in English). ["The taxonomy of the *Gynacantha* and *Heliaeschna* species from continental Africa is problematic, and available keys are unsatisfactory. 'Traditional' characters such as venation and 'innovative' ones like abdominal denticulation are evaluated and their variability is measured and discussed. *G. quadrina* is a synonym of *G. africana* and not of *G. vesiculata*, *G. ochraceipes* is regarded a synonym of *G. vesiculata*, *G. victoriae* of *G. bullata*, *G. flavipes* and *G. sevastopuloi* of *G. nigeriensis*, *G. zuluensis* of *G. usambarica*, and *H. ukerewensis* of *H. trinervulata*. Analysis of the complex of large *Heliaeschna* species provides no basis for separating species and *H. lanceolata*, *H. libyana* and *H. mymondi* are treated as synonyms of the single variable species *H. fuliginosa*. The first records of *G. immaculifrons* and of specimens near *H. longfieldae* since their descriptions are provided. The probable male of *H. longfieldae* is diagnosed. Remarkable heterogeneity of characters in *G. manderica*, *G. villosa* and *H. longfieldae* is described. This may have taxonomic relevance, but study of more specimens is required. Afrotropical *Gynacantha* species can be assigned to three groups: the *africana*-, *bispina*- and *bullata*-groups. It is suggested that *Gynacantha* and *Heliaeschna* may not be monophyletic and that the *africana*-group may be more closely related to African *Heliaeschna* than to the other *Gynacantha* groups. Keys to the species of *Gynacantha* and *Heliaeschna* are provided for both sexes. Identification is still tentative for females of some species." (Author)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**5544.** Dinger, E.C.; Cohen, A.E.; Hendrickson D.A.; Marks, J.C. (2005): Aquatic invertebrates of Cuatro Ciénegas, Coahuila, México: Natives and exotics. *Southwestern Naturalist* 50: 237-281. (in English, with Spanish summary). [A recent survey of benthic macroinvertebrates of the Cuatro Cienegas basin found 118 species in the 21 sites collected. Four exotic macroinvertebrates that could threaten the native biota were found within or near the basin. The list includes 24 taxa, in most cases identified on the species level] Address: Dinger, E.C., Merriam-Powell Center for Ecological Research, Department of Biology, Northern Arizona University, Box 5640, Flagstaff, AZ 86011, USA. E-mail: ecd2@dana.ucc.nau.edu

**5545.** Dobson, C. (2005): Odonata names. *Atropos* 24: 82. (in English). [Contribution to the discussion of vernacular names in Odonata.] Address: Dobson, C., 3 St. Hugh's Drive, Langworth, Lincoln, LN3 5DB, UK

**5546.** Dommanget, J.-L. (2005): Analyse d'ouvrage: Odonata. *Les Libellules de Suisse*. *Martinia* 21(4): 77-79. (in French). [Extensive review of Wildermuth, H. et al. (2005) (see OAS 5005).] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**5547.** Dommanget, J.-L.; Meurgey, F. (2005): Rencontres odonatologiques ouest-européennes, Nantes, Vallet (Loire-Atlantique, France), 24-27 juin 2005. Premier bilan. *Martinia* 21(3): 123-129. (in French, with English summary). [Report of the west European mee-

ting held in Nantes and Vallet, France between 24 and 27 June, 2005. The paper includes some records from field trips] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**5548.** Dommanget, J.-L. (2005): Une population de *Coenagrion mercuriale* (Charpentier, 1840) à proximité de Saint-Affrique (Département de l'Aveyron) (Odonata, Zygoptera, Coenagrionidae). *Martinia* 21(4): 69-75. (in French, with English summary). ["A population of *C. mercuriale* has been discovered and studied in the neighbourhood of Saint-Affrique, France. The habitat consists of a main brook flowing through a meadow and of a brooklet flowing along the edge of a road. The main features of the odonatological population are presented, and the possible influence of a busy road that separates this population in two parts is discussed." (Author)] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**5549.** Dudley, S. (2005): Vernacular names for British and European dragonflies. *Atropos* 24: 80-82. (in English). [Extensive outline on vernacular names in Odonata.] Address: Dudley, S., 3 Crowtree Cottages, Farcet Fen, Huntingdonshire, PE7 3DL, UK

**5550.** Duncan, J.R. (2005): Manitoba Dragonfly Survey. Citizen's Monitoring Guide. <http://www.naturenorth.com/dragonfly/MB%20Dragonfly%20Survey%20Guide%202005%20all.pdf>: 40 pp. (in English). [Handbook directed to coworkers in the the Manitoba (Canada) dragonfly survey project including a checklist of the regional odonate fauna, colour pictures, advise on morphological important features etc.] Address: Wildlife & Ecosystem Protection Branch, Manitoba Conservation Box 24, 200 Saulteaux Crescent, Winnipeg, MB R3J 3W3

**5551.** Eldredge, N.; Thompson, J.N.; Brakefield, P. M.; Gavrillets, S.; Jablonski, D.; Jackson, J.B.C.; Lenski, R.E.; Lieberman, B.S.; McPeck, M.A.; Miller III, W. (2005): The dynamics of evolutionary stasis. *Paleobiology* 31(2): 133-145. (in English). ["The fossil record displays remarkable stasis in many species over long time periods, yet studies of extant populations often reveal rapid phenotypic evolution and genetic differentiation among populations. Recent advances in our understanding of the fossil record and in population genetics and evolutionary ecology point to the complex geographic structure of species being fundamental to resolution of how taxa can commonly exhibit both short-term evolutionary dynamics and long-term stasis." (Authors) The paper contains a section on *Enallagma*.] Address: Eldredge, N., Division of Paleontology, American Museum of Natural History, Central Park West at Seventy-ninth Street, New York, New York 10024. E-mail: [epunkeek@amnh.org](mailto:epunkeek@amnh.org)

**5552.** Ellenrieder, N. von; Garrison, R.W. (2005): A synopsis of the South American genus *Gomphomacromia* (Odonata: Gomphomacromiinae). *International Journal of Odonatology* 8(1): 81-96. (in English). ["*Gomphomacromia mexicana* is shown to be a junior synonym of *G. chilensis* based on a comparison of the holotype male with the original description of *G. chilensis* and specimens identified as that species from Chile. Examination of a large series of specimens from central and southern Chile and Argentina identified both as *G. paradoxa* and *G. etcheverryi* shows the proposed diagnostic characters for the two taxa variable, thus *G. etcheverryi* is considered a junior synonym of *G. para-*

*doxa*. Illustrated keys, distribution maps and a cladistic analysis for the four known species of the genus are provided." (Authors)] Address: Ellenrieder, Natalie von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: [odonata@hotmail.com](mailto:odonata@hotmail.com)

**5553.** Ellenrieder, N. von (2005): Taxonomy of the South American genus *Phyllopetalia* (Odonata: Austropetaliidae). *International Journal of Odonatology* 8(2): 311-352. (in English). ["This synopsis of adult *Phyllopetalia* includes the synonymy of four genera (*Phyllopetalia* senior subjective synonym of *Rheopetalia*, *Odontopetalia*, *Eurypetalia* and *Ophiopetalia*), four species and one subspecies (*P. apicalis* senior subjective synonym of *Rheopetalia rex* and *R. apicalis decorata*, and *P. pudu* senior subjective synonym of *Ophiopetalia araucana*, *O. auregaster* and *O. diana*). *P. excrescens* and *F. alta-rensis* are redescribed, and a neotype is designated for the latter. Keys to adults, illustrations of all diagnostic characters, and distribution maps of all species are provided." (Author)] Address: Ellenrieder, Natalie von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: [odonata@hotmail.com](mailto:odonata@hotmail.com)

**5554.** Ferreras-Romero, M.; Fründ, J.; Márquez-Rodríguez, J. (2005): Sobre la situación actual de *Lestes macrostigma* (Eversmann, 1836) (Insecta: Odonata) en el área de Doñana (Andalucía, sur de España). *Boln. Asoc. esp. Ent.* 29(3-4): 41-50. (in Spanish, with English summary). ["In recent years, in the Doñana protected area (southern Spain), true or apparent extinction of several dragonfly and damselfly populations have taken place. *L. macrostigma*, was frequently recorded in the recent past, and considered common in some localities. Possible causes of the present state are briefly discussed." (Authors)] Address: Ferreras-Romero, M., Departamento de Ciencias Ambientales (Zoología), Universidad Pablo de Olavide, Ctra. de Utrera km. 1, 41013 Sevilla, Spain. E-mail: [ferreras@teleline.es](mailto:ferreras@teleline.es)

**5555.** Fincke, O.M.; Jödicke, R.; Paulson, D.R.; Schultz, T.D. (2005): The evolution and frequency of female color morphs in Holarctic Odonata: why are male-like females typically the minority? *International Journal of Odonatology* 8(2): 183-212. (in English). ["We compiled data on the occurrence and frequency of distinct female variants among Holarctic Odonata and interpreted the data in light of harassment-based hypotheses. The major source of male confusion for male mimicry hypotheses is predicted to be signal similarity between andromorphs and male distractors; for the learned mate recognition hypothesis (LMR), it is predicted to be variation in female signals. Mapping morphism state onto molecular phylogenies of *Ischnura* and *Enallagma* failed to resolve the general ancestral female condition. However, it appeared that the andromorphic state may be ancestral in one case, and that blue structural colors were ancestral to orange and green pigmentations. Of the polymorphic species surveyed, 13% had more than two morphs, 4% had multiple heteromorphs but no andromorph, and 7% of 'monomorphic' congeners were functionally polymorphic because developmental variants mate. Such female signal variation lies beyond the scope of simple male mimicry, but nevertheless should exacerbate a male's problem in searching for mates. Andromorphs were the majority morph in at least some populations of 17% of the species for

which data were available. Andromorph frequencies of *Enallagma* species were generally higher than in *Ischnura* species, as expected if *Ischnura* andromorphs have higher signal apparency. Andromorph frequency varied significantly across habitats and species, as expected if per capita harassment and signal apparency vary among habitats. Quantification of signal apparency and per capita harassment across populations and among species is required to more rigorously test the extent to which variation in signal crypsis can explain observed variation in morph frequencies." (Authors)] Address: Finke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**5556.** Fischer, U. (2005): Entomofaunistisches Monitoring im Rahmen der Umsetzung der EU-FFH-Richtlinie im Freistaat Sachsen - Untersuchungszeitraum 2004/2005. Mitt. Sächs. Entomol. 72: 20-24. (in German). [Sachsen, Germany; brief assessment of the current status of *Stylurus flavipes* and *Leucorrhinia albifrons*.] Address: Fischer, U., Anton-Günther-Str. 12, D-08340 Schwarzenberg, Germany

**5557.** Forrest, P.J. (2005): Southern Emerald Damselfly *Lestes barbarus* (Fabr.) at Sandwich Bay, Kent. *Atropos* 24: 24-25. (in English). [*L. barbarus* was intensively surveyed throughout July and August 2004 at Sandwich Bay, Kent, UK. The population accounted at least 15 specimens on 5-VIII-2004.] Address: Forrest, P.J., Flat 3, No. 8 Chandos Square, Broadstairs, Kent, CT10 1QN, UK

**5558.** Gaedecke, D.; Kasperski, J. (2005): Die natürlichen Grundwasseraustritte in der Naukluft und ihrer Umgebung (Namibia): Hydrogeologische Situation und ökologische Bewertung. Diplomarbeit. Institut für Umweltgeologie. Technische Universität Carolo-Wilhelmina zu Braunschweig: 12 + 92 pp. (in German, with English summary). ["The study of permanent spring discharges with special focus on the hydrogeological situation and ecological valuation, took place in the karstified Naukluft and Tsaris Mountains (central Namibia). In a total area of about 2500 km<sup>2</sup> 31 effluent seepages were sampled and investigated. The inspected springs varied from small water filled pools without vegetation to large spring brooks, stretching for several kilometres, and fringed by a forest. All analysed water samples fulfilled the Namibian standards for drinking water and held no risk to health. This classification only refers to the physico-chemical characteristics of the water samples, as a bacterial investigation did not yet take place. Referring to the Namibian guideline for the evaluation of drinking water (1991) six samples were of excellent water quality, the other 25 samples were of good quality. According to the WHO (2004) 23 samples fulfilled the requirements of drinking water. Applying the German drinking water decree (TVO, 2003) only nine water samples can be declared as drinkable. We suppose that all examined springs are fed by groundwater from aquifers which lay just below the surface. These aquifers seemed to have a low retention capacity and are mainly influenced by air temperature. In addition the aquifers consist of at least two groundwater levels which are probably not connected with each other. The inferior groundwater level might be fossil (boreholes up to 120 m). In order to test the suitability of Odonata as bioindicators for the quality of Namibian springs its distribution was correlated with test results and the local factors.

The potential diversity of the Odonata consists of nine Zygoptera and 21 Anisoptera species. During the field work 25 of these species were identified in the investigation area which can be deemed to be an isolated habitat. The physico-chemical properties of the spring waters did not seem to be a limiting factor for the distribution of the Odonata. Due to the almost unknown relations between environmental factors and the occurrence of species respectively communities no bioindicator could be defined. To strengthen the results of this study a hydrogeological, climatical and biological monitoring is needed." (Authors)] Address: c/o Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**5559.** Gamble, D.L.; Washburn, S.W.; Mitsch, W.J. (2005): Macroinvertebrate abundance and diversity in two ten-year-old created wetlands. 2004 Annual report (Olentangy River Wetland Research Park): 109-124. (in English). [For details see: <https://kb.osu.edu/dspace/bitstream/1811/5903/1/%2804%29+2.13+Macroinverts.pdf>] Address: not stated

**5560.** Garrison, R.W.; Ellenrieder, N. von (2005): *Neuragrion mysticum* (Odonata: Megapodagrionidae) demystified. *Canadian Entomologist* 137: 169-173. (in English, with French summary). ["Based on circumstantial evidence, *Neuragrion mysticum* Karsch, 1891 is considered a junior synonym of *Heteropodagrion sanguinipes* Selys, 1885. Annotated wing scans for *H. sanguinipes* and *Mesagrion leucorrhinum* Selys, 1885, species originally compared to *N. mysticum*, are provided." (Authors)] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**5561.** Gawroński, A. (2005(2004)): New localities of dwarf dragonfly *Nehalennia speciosa* (Odonata: Coenagrionidae) in northern Poland. *Przegląd Przyrodniczy* 15(1-2): 126-127. (in Polish, with English summary). [Two new localities (Bytów, Chojnice) with records from 2003 and 2004 of *N. speciosa* in Poland are documented. The habitats are briefly described.] Address: not stated

**5562.** González-Soriano, E. (2005): The female of *Paltothermis cyanosoma* Garrison (Odonata: Libellulidae). *Folia Entomol. Mex.* 44 (Suppl. 1): 107-110. (in English, with Spanish summary). [The female of *P. cyanosoma* is described and illustrated. A key to separate all species of *Paltothermis* is given.] Address: Gonzalez-Soriano, E., Depto Zoología, Inst. Biol., Universidad Autónoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@ibiologia.unam.mx

**5563.** Grand, D. (2005): *Calopteryx haemorrhoidalis asturica* Ocharan, 1983: Nouvelle sous-espèce pour la faune de France (Odonata, Zygoptera, Calopterygidae). *Martinia* 21(4): 180. (in French). [Records of the subspecies of *C. haemorrhoidalis asturica* are documented, and the subspecific status is discussed with reference to wing coloration variability and "intermediate" forms between *C.H. asturica* and *C.h. occasi*.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France



- 5564.** Grand, D. (2005): Nouvelles observations en France de *Trithemis annulata* (Palisot de Beauvois, 1805) (Odonata, Anisoptera, Libellulidae). *Martinia* 21 (4): 167-168. (in French, with English summary). [Report on the spreading of *Trithemis annulata* to Pyrénées-Atlantiques, Landes and Languedoc regions, in the south of France.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France
- 5565.** Grebe, B.; Baierl, B.; Baierl, E. (2005): Libellen der Flusstäler Nordost-Griechenlands. Erstnachweis von *Somatochlora borisi* für Griechenland (Odonata: Corduliidae). *Libellula Supplement* 6: 1-14. (in German, with English summary). ["In late May 2001, forty species were recorded from a total of 30 localities in NE Greece, mainly from the catchment of the River Evros. *S. borisi* was recorded from three localities in the E Rhodopes. The species occurred in shady natural rivers with slowly running water." (Authors)] Address: Grebe, B., Oberdorfallee 7a, D-53909 Zülpich, Germany. E-mail: burkhard.grebe@t-online.de
- 5566.** Gregory, M.B. (2005): Microhabitat preferences by aquatic invertebrate influence bioassessment metrics in piedmont streams of Georgia and Alabama. Proceedings of the 2005 Georgia Water Resources Conference, held April 25–27, 2005, at the University of Georgia. Kathryn J. Hatcher, editor, Institute of Ecology, The University of Georgia, Athens, Georgia.: 6 pp. (in English). ["The U.S. Geological Survey analyzed macro-invertebrate samples from woody debris and riffle habitats in 10 small Piedmont streams in Georgia and Alabama to determine if habitat preferences influence commonly used invertebrate community metrics. Eighty-seven commonly used metrics were compared, and 11 (13%) were found to be significantly different between habitats. Woody debris habitat had slightly higher taxa richness, whereas riffles had higher overall abundances and densities. Abundance metrics that differed significantly were Ephemeroptera, Plecoptera, and Trichoptera (EPT), Trichoptera, Corbicula, collector-gatherer, filtering-collector, and total abundance. Richness metrics that were significantly different were midge, Diptera, omnivore, and shredder. Corbicula richness (1 species) was the only richness metric that scored higher in riffle habitats. These results indicate that Piedmont biomonitoring studies that do not sample riffle habitat may underestimate sensitive EPT taxa because of a lack of habitat availability rather than changes in water-quality conditions. Furthermore, this study indicates the possible need for a correction factor to be applied to ecological condition metrics used by the State of Georgia that adjusts for the presence or absence of riffle habitat in Piedmont streams." (Author) The study includes a record of *Boyeria vinosa*.] Address: Gregory, M.B., U.S. Geological Survey, 3039 Amwiler Road, Suite 130, Peachtree Business Center, Atlanta, Georgia 30360-2824
- 5567.** Günther, A. (2005): Nachweise von in den Anhängen der Fauna-Flora-Habitat-Richtlinie gelisteten Libellenarten im Kreis Freiberg. *Mitteilungen des Naturschutzinstitutes Freiberg* 1: 29-34. (in German). [Saxonia, Germany; all the available data of *Ophiogomphus cecilia*, *Leucorrhinia albifrons*, and *L. pectoralis* are compiled.] Address: Günther, A., Naturschutzinstitut Freiberg, Waisenhausstraße 10, D-09599 Freiberg, Germany. E-mail: a.guenther@abo.freiepresse.de
- 5568.** Guerbaa, K.; Lolive, N. (2005): Redécouverte de *Somatochlora flavomaculata* (Vander Linden, 1825) dans le département de la Haute-Vienne (Odonata, Anisoptera, Corduliidae). *Martinia* 21(3): 108. (in French). [Crouzille, Saint-Sylvestre, France, 1 male, 7/2003; Roussac, larva, 2003; Pioffray, Blond, 7/2004, autochthonous population of *S. flavomaculata*.] Address: Guerbaa, K., Société Limousine d'Odonatologie, 11, rue Jauvion, F-87000 Limoges, France
- 5569.** Gusztak, R.W.; MacArthur, R.A.; Campbell, K. L. (2005): Bioenergetics and thermal physiology of American water shrews (*Sorex palustris*). *Jour. Comp. Physiol. B* 175: 87-95. (in English). ["Rates of O<sub>2</sub> consumption and CO<sub>2</sub> production, telemetered body temperature (T<sub>b</sub>) and activity level were recorded from adult and subadult water shrews (*Sorex palustris*) over an air temperature (T<sub>a</sub>) range of 3–32 °C. Digesta passage rate trials were conducted before metabolic testing to estimate the minimum fasting time required for water shrews to achieve a postabsorptive state. Of the 228 metabolic trials conducted on 15 water shrews, 146 (64%) were discarded because the criteria for inactivity were not met. Abdominal T<sub>b</sub> of *S. palustris* was independent of T<sub>a</sub> and averaged 38.64±0.07 °C. The thermoneutral zone extended from 21.2 C to at least 32 C. Our estimate of the basal metabolic rate for resting, postabsorptive water shrews (96.88±2.93 J g<sup>-1</sup> h<sup>-1</sup> or 4.84±0.14 ml O<sub>2</sub> g<sup>-1</sup> h<sup>-1</sup>) was three times the mass-predicted value, while their minimum thermal conductance in air (0.282±0.013 ml O<sub>2</sub> g<sup>-1</sup> h<sup>-1</sup>) concurred with allometric predictions. The mean digesta throughput time of water shrews fed mealworms (*Tenebrio molitor*) or ground meat was 50–55 min. The digestibility coefficients for metabolizable energy (ME) of water shrews fed stickleback minnows (*Culaea inconstans*) and dragonfly nymphs (*Anax* spp. and *Libellula* spp.) were 85.4±1.3% and 82.8±1.1%, respectively. The average metabolic rate (AMR) calculated from the gas exchange of six water shrews at 19–22 °C (208.0±17.0 J g<sup>-1</sup> h<sup>-1</sup>) was nearly identical to the estimate of energy intake (202.9±12.9 J g<sup>-1</sup> h<sup>-1</sup>) measured for these same animals during digestibility trials (20 °C). Based on 24-h activity trials and our derived ME coefficients, the minimum daily energy requirement of an adult (14.4 g) water shrew at T<sub>a</sub> = 20 °C is 54.0 kJ, or the energetic equivalent of 14.7 stickleback minnows.] Address: Gusztak, R.W., Department of Zoology, University of Manitoba, Winnipeg, Manitoba, R3T 2N2, Canada. E-mail: campbelk@ms.umanitoba.ca
- 5570.** Han, B.-y. (2005): Differences in composition and dynamic of insect and mite community among three types of tea gardens. *Journal of Tea Science* 25: 249-254. (in Chinese, with English summary). ["From July 2002 to July 2003, a survey on the species richness and abundance of insects and mites in the tea plant, the aerial space above the tea plant and on the ground from organic, non-pollution and common tea gardens were conducted in Magushan Mountains in the Southern Anhui Province. In total, 29018 individuals of 79 species from 41 families were recorded from a common tea garden, 35117 individuals of 81 species from 41 families were recorded from a non-pollution tea garden, and 12727 individuals of 102 species from 57 families were recorded from an organic tea garden. The tea green leafhopper, *Empoasca vitis*, abundance and its percentage accounted for the total abundance in organic, non-pollution and common tea garden were 5176

and 40%, 14049 and 40% as well as 17590 and 60%, respectively. Wasps, ground beetles, tiger beetles, rove beetles and ladybugs are the major natural enemies in tea gardens, whose species richness and abundance in organic, non-pollution and common tea garden were 40 and 2620, 33 and 1898 as well as 29 and 1610, respectively. In all the three types of tea gardens, species richness was higher from March to April and from September to October, and was lower from late November to middle January. Insect and mite abundance was high from April to June and from September to October, and was lower from July to August due to the warm weather as well as from December to January due to the cold weather. The abundance in the common tea garden fluctuated more than in other two types of tea gardens. Though the Insect and mite abundance was highest in the non-pollution tea garden, the pests did not cause serious damage because of the appropriate forecast and control. In the organic tea garden, the abundance was the lowest, while the species richness was the highest, and the energy paths were complicated and the community may be stable. At the present stage, most of the organic tea gardens in China are established among the mountains where vegetation is flourishing and biodiversity is high, such ecosystems may enhance natural control." (Author) Table 1 also contains "Libellulidae".] Address: HAN Bao-yu, Key Laboratory of Tea Chemical Engineering of Ministry of Agriculture; Tea Research Institute, Chinese Academy of Agricultural Sciences, Hangzhou 310008, China

**5571.** Hanschitz-Jandl, W. (2005): Erstfund von *Gomphus flavipes* an der bayerischen Donau (Odonata: Gomphidae). *Libellula* 24(3/4): 227-232. (in German, with English summary). ["On 20-VI-2005 the species was found for the first time emerging at the Bavarian section of River Danube. The locality and the circumstances of the record are described. Further records of Gomphidae are given from the River Danube and its floodplain in the Deggendorf district of Lower Bavaria, where now all five Gomphid species occurring in Bavaria have been recorded." (Author)] Address: Hanschitz-Jandl, W., Edenhofenstr. 7, D-94469 Deggendorf, Germany. E-mail: hanschitz-jandl@web.de

**5572.** Harris, A.; Foster, R. (2005): Vascular plant and odonate survey. Voyageurs National Park. Prepared for: The Great Lakes Network Inventory and Monitoring Program. Great Lakes Network Report GLKN/2005/01: 48 pp. (in English). [Minnesota, USA; "In 2004 we conducted surveys for odonate and vascular plant species in Voyageurs National Park. [...] 31 species of odonates (dragonflies and damselflies) were observed in the park. A preliminary list of potential species for the park was developed which includes odonate species known to occur in the park plus those expected to occur. We estimate that approximately 23-31% of 101-133 potential species is known from the park. Georeferenced locations of new and significant species are provided, as is a revised checklist of the vascular plants of Voyageurs National Park. A preliminary list of potential odonate species for the park is provided as well." (Authors) Available at: <http://www1.nature.nps.gov/im/units/glnk/Vascular%20Plant%20and%20Odonate%20Survey%20of%20Voyageurs%20National%20Park.pdf>]

**5573.** Harvey, R. (2005): Reports from Coastal stations - 2004: Minsmere RSPB Nature Reserve, Suffolk.

*Atropos* 24: 69-70. (in English). [*Anaciaeschna isoceles*, *Erythromma viridulum*] Address: not stated

**5574.** Hayashi, F.; Dobata, S.; Futahashi, R. (2005): Disturbed population genetics: Suspected introgressive hybridization between two *Mnais* damselfly species (Odonata). *Zoological Science* 22: 869-881. (in English). ["*Mnais costalis* and *M. pruinosa* are damselflies (Odonata: Calopterygidae) with low dispersal abilities, both during their aquatic stream-living immature stage and their flying adult stage. A previous nuclear DNA (nDNA) sequencing and morphology study showed that these two species are very closely related, and cohabit widely in western Japan. The two species, however, segregate microhabitats along a stream: *M. costalis* lives in the lower reaches, and *M. pruinosa* in the upper reaches. In this study, our analyses were based on mitochondrial DNA (mtDNA), which usually mutates faster and is more variable among individuals than nDNA, and which is inherited maternally. We found that most COI haplotypes were shared between the two species, and that for most study sites interspecific riverine genetic structures were not clarified by mtDNA analysis. Incongruent population genetic structures based on nDNA and mtDNA suggested hybridization and introgression of mtDNA between the two species." (Authors)] Address: Hayashi, F., Department of Biology, Tokyo Metropolitan University, Minamiosawa 1-1, Hachioji, Tokyo 192-0397, Japan. E-mail: fhayashi@comp.metro-u.ac.jp

**5575.** Helb, H.-W. (2005): Faunistische Untersuchungen im Aschbach-Tal des nördlichen Pfälzerwaldes bei Kaiserslautern - Erfassung der Libellen (Odonata), der Heuschrecken (Saltatoria), der Laufkäfer (Coleoptera, Carabidae) und der Vögel (Aves) als Beitrag zum Gewässerpflege- und -entwicklungsplan. *Annales scientifiques de la Réserve de Biosphère transfrontalière* 12 (2004-2005): 43-75. (in German, with French and English summaries). [Rhineland-Palatinate; 15 taxa are listed including *Ceriatrigon tenellum* which is recommended to be verified] Address: Helb, H.-W., Technische Universität Kaiserslautern, Fachbereich Biologie, Abt. Ökologie, Postfach 3049, D-67653 Kaiserslautern, Germany

**5576.** Helfrich-Förster, C. (2005): Organization of endogenous clocks in insects. *Biochemical Society Transactions* 33(5): 957-961. (in English). ["Insect and mammalian circadian clocks show striking similarities. They utilize homologous clock genes, generating self-sustained circadian oscillations in distinct master clocks of the brain, which then control rhythmic behaviour. The molecular mechanisms of rhythm generation were first uncovered in the fruit fly *Drosophila melanogaster*, whereas cockroaches were among the first animals where the brain master clock was localized. Despite many similarities, there exist obvious differences in the organization and functioning of insect master clocks. These similarities and differences are reviewed on a molecular and anatomical level." (Author) The paper includes references to Odonata resp. *Ischnura elegans*.] Address: Helfrich-Förster, Charlotte, Institut für Zoologie, Universität Regensburg, Universitätsstr. 31, D-93040 Regensburg, Germany. E-mail: charlotte.foerster@biologie.uni-regensburg.de

**5577.** Hoess, R. (2005): Libellen. *Berner Naturschutz* 7/2005: 8 pp. (in German). [Introduction into the regional odonate fauna and habitats of the region Bern,

Switzerland with focus on threats and conservation measures.] Address: Hoess, R., Normannenstrasse 35, CH-3018 Bern, Switzerland

**5578.** Hoess, R.; Rezbanyai-Reser, L. (2005): Libellen aus der Sammlung des Natur-Museum Luzern, insbesondere über Funde von zehn Arten an Lichtfanganlagen (Insecta: Odonata). Entomologische Berichte Luzern 54: 61-68. (in German). [The paper compiles 32 odonate species stored in the collection of the Natur-Museum Luzern, Switzerland. 10 species were caught by light traps, one (*Libellula quadrimaculata*) was caught in a pitfall trap. The records by traps are discussed in some detail.] Address: Hoess, R., Normannenstr. 35, CH-3018 Bern, Switzerland. E-mail: ReneHoess@1st.ch

**5579.** Hofmann, T.A.; Mason, C.F. (2005): Habitat characteristics and the distribution of Odonata in a lowland river catchment in eastern England. Hydrobiologia 539(1): 137-147. (in English). ["The influence of habitat characteristics on the distribution of larval and adult Odonata communities in a lowland river in eastern England was studied. There was a longitudinal distribution of Odonata, with larval assemblages being influenced directly by marginal flow velocity, biochemical oxygen demand (BOD) and phosphate concentrations and indirectly by shade and cover of floating vegetation. Adult populations responded directly to shade, reed cover, amenity-managed land use and bank height, and indirectly to BOD and ammonia concentrations. Distribution patterns were strongly associated with both natural changes along the river system and management impacts. River management practices locally disrupted the natural displacement of species along the river, but whilst some forms of human interference on river systems were beneficial to species richness, the effects on stenotopic species were disadvantageous. To conserve Odonata management emphasis should be on the maintenance of suitable conditions for river specialists." (Authors)] Address: Hofmann, Tanja, Department of Biological Sciences, University of Essex, Wivenhoe Park, Colchester, Essex, CO4 3SQ, UK. E-mail: tahofmp@essex.ac.uk

**5580.** Hopeman, M.M.; Abramson, Z.R. (2005): Sexual dimorphism in the Dark-winged damselfly *Calopteryx maculata*. University of Michigan Undergraduate Research Forum 2: 28-38. (in English). ["Pronounced sexual dimorphisms are suggestive of sexual selection. In *C. maculata*, a pronounced sexual dimorphism is seen in the degree of wing pigmentation; males have significantly darker wings than females. Territoriality in *C. maculata* makes it difficult to discern the function of sexual dimorphism. Previous studies have suggested that the degree of male wing pigmentation in a related species *C. haemorroidalis* may serve as a sexual signal to females or other males indicating their genetic quality. Various studies have shown that males of the species *C. haemorroidalis* with a higher degree of wing pigmentation are more likely to defend a territory, obtain more matings, have fewer gut parasites, and have larger fat reserves. In contrast, we found that there is no correlation between the degree of wing pigmentation and male mating or territorial success in *C. maculata*. We found that females were selective of territories but not of males. Our results suggest that the degree of wing pigmentation may play a role in species recognition by females." (Authors)] Address: Hopeman, Marga-

ret, c/o Finke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**5581.** Houard, X.; Archeray, C. (2005): Première observation en Normandie de *Sympetrum pedemontanum* (Allioni, 1766) à Lyons-la-Forêt (Eure) dans le bassin de l'Andelle (Odonata, Anisoptera, Libellulidae). *Martinia* 21(4): 151-156. (in French, with English summary). [The record of a *S. pedemontanum* specimen (21-VII-2005), "in Lyons-la-Forêt" in the "Eure" department (Northern Normandy, France), represents an outstanding event worthy enough to feed the debate on the climate change issue and the species dispersion. The new record of this species in Normandy should motivate the norman odonatologists in their regional atlas project." (Authors)] Address: Houard, X., CREN de Haute-Normandie, rue Pierre de Coubertin, BP424 76850 S'-Etienne-du-Rouvray Cedex, France. E-mail: x.houard@cren-haute-normandie.com

**5582.** Hunter, I. (2005): Reports from Coastal stations - 2004: Elms Farm, Icklesham, East Sussex. *Atropos* 24: 59-60. (in English). [A first record of *Erythromma viridulum* at the locality with a population peak of 140 individuals is documented.] Address: not stated

**5583.** Jacquemin, G. (2005): A propos de l'identification à distance des Odonates adultes. *Martinia* 21(4): 47-50. (in French, with English summary). ["Many current odonatological surveys are led by naturalists coming from birdwatching, trying to use the same visual identification methods. Considering the dangers of identification with binoculars in odonatology, the author stresses the necessity to make absolutely reliable identifications, by "catching-releasing" the specimens, everytime it is possible. Identification with binoculars must be used very carefully, only when capture has not been possible, and only by very experienced odonatists. Identification keys with binoculars are therefore useless, and even dangerous for inexperienced people." (Author)] Address: Jacquemin, G., Biologie des Insectes, Université H. Poincaré, Nancy 1, BP 239, F-54506 Vandoeuvre-lès-Nancy, France

**5584.** Jarman, N. (2005): Reports from Coastal stations - 2004: Kingsdown Beach and St. Margaret's at Cliffe, Kent. *Atropos* 24: 62-63. (in English). [A female *Erythromma viridulum* was observed at 29-VIII-2004 on the ornamental pond in the grounds of Walmer Castle.] Address: not stated

**5585.** Jeschke, J.M.; Tollrian, R. (2005): Effects of predator confusion on functional responses. *Oikos* 111: 547-555. (in English). ["When confronted with a swarm of their prey, many predators become confused and are less successful in their attacks. To shed light on the ecological, ethological and evolutionary consequences of predator confusion, we here investigate its effects on predator functional responses. We develop the first functional response model that considers confusion and compare it (1) qualitatively as well as (2) quantitatively to empirical data from two predator / prey systems, *Aeshna cyanea* / *Daphnia magna* (Crustacea) and *Chaoborus obscuripes* (Diptera) / *Daphnia obtusa*. (1) The qualitative comparisons show that, contrary to common belief, confusion does not necessarily lead to a dome-shaped functional response. The response can alternatively remain qualitatively unchanged and be affected only quantitatively. A non-dome-shaped respon-



se is thus no indication for the absence of predator confusion. The same is true for other swarming effects reducing foraging success, such as early warning of approaching predators. Our results hence question studies that have equated the absence of a dome-shaped response with the absence of a swarming effect. Our results also resolve the apparent paradox that swarming effects are quite common while dome-shaped functional responses are rather uncommon. (2) There is a good quantitative match between a parameterized version of our model and the empirically measured functional response in the *Chaoborus-Daphnia* system, suggesting that all crucial factors in this system are captured by the model." (Authors)] Address: Jeschke, J.M., Inst. of Ecosystem Studies, P.O. Box AB, Millbrook, NY 12545-0129, USA E-mail: jonathan.jeschke@gmx.net

**5586.** Jödicke, R. (2005): Bemerkungen zu *Coenagrion intermedium* (Odonata: Coenagrionidae). *Libellula Supplement 6*: 15-24. (in German, with English summary). ["The taxonomic history of this inhabitant of the island of Crete, Greece, is reviewed. During a fieldtrip to Crete in the second half of May 2000 I recorded *C. intermedium*, which was widespread and abundant. Additional measurements as well as notes on coloration, niche specificity and reproductive behaviour are given." (Author)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: IJOediting@aol.com

**5587.** Johansson, F.; Crowley, P.; Brodin, T (2005): Sexual size dimorphism and sex ratios in dragonflies (Odonata). *Biological Journal of the Linnean Society* 86(4): 507-513. (in English). ["Sexual size dimorphism and biased sex ratios are common in animals. Rensch's rule states that sexual size dimorphism (SSD) would increase with body size in taxa where males are larger than females and decrease with body size in taxa where females are larger. We tested this trend in dragonflies (Odonata) by analysing body size of 21 species and found support for Rensch's rule. The increase in SSD with increasing size among species can be explained by sexual selection favouring large males. We also estimated the slope of the relationship between sex ratio and size ratio in populations of the 21 species. A negative slope would suggest that the larger sex suffers from high mortality in the larval stage, consistent with riskier foraging. The slope of this relationship was negative, but after correcting for phylogenetic non-independence with independent contrasts the relationship was no longer statistically significant, perhaps because of phylogenetic inertia or low sample size." (Authors)] Address: Johansson, F., Dept of Ecology & Environmental Science, Animal Ecology Group, Umea Univ., 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**5588.** Jordan, S.; Simon, C.; Foote, D.; Englund, R. A. (2005): Phylogeographic patterns of Hawaiian Megalagrion damselflies (Odonata: Coenagrionidae) correlate with Pleistocene island boundaries. *Molecular Ecology* 14: 3457-3470. (in English). ["The Pleistocene geological history of the Hawaiian Islands is becoming well understood. Numerous predictions about the influence of this history on the genetic diversity of Hawaiian organisms have been made, including the idea that changing sea levels would lead to the genetic differentiation of populations isolated on individual volcanoes during high sea stands. Here, we analyse DNA sequence data

from two closely related, endemic Hawaiian damselfly species in order to test these predictions, and generate novel insights into the effects of Pleistocene glaciation and climate change on island organisms. *Megalagrion xanthomelas* and *Megalagrion pacificum* are currently restricted to five islands, including three islands of the Maui Nui super-island complex (Molokai, Lanai, and Maui) that were connected during periods of Pleistocene glaciation, and Hawaii island, which has never been subdivided. Maui Nui and Hawaii are effectively a controlled, natural experiment on the genetic effects of Pleistocene sea level change. We confirm well-defined morphological species boundaries using data from the nuclear EF-1 $\alpha$  gene and show that the species are reciprocally monophyletic. We perform phylogeographic analyses of 663 base pairs (bp) of cytochrome oxidase subunit II (COII) gene sequence data from 157 individuals representing 25 populations. Our results point to the importance of Pleistocene land bridges and historical island habitat availability in maintaining inter-island gene flow. We also propose that repeated bottlenecks on Maui Nui caused by sea level change and restricted habitat availability are likely responsible for low genetic diversity there. An island analogue to northern genetic purity and southern diversity is proposed, whereby islands with little suitable habitat exhibit genetic purity while islands with more exhibit genetic diversity." (Authors)] Address: Englund, R.A., Hawaii Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, HI, 96817, USA. E-mail: englund@bishopmuseum.org

**5589.** Jourdain, B. (2005): Première mention de *Trithemis annulata* (Palisot de Beauvois, 1805) en Gironde (Odonata, Anisoptera, Libellulidae). *Martinia* 21(3): 114. (in French). [new range extension of *T. annulata* in France; 26-VI-2005, Villenave-d'Ornon, 3 males one female.] Address: Jourdain, B., Les Vergers, 8, rue du Docteur Roux, F-33320 Esyines, France. E-mail: jourdainbr@aol.com

**5590.** Kalkman, V.J. (2005): On the distribution of the genus *Ceriagrion* in the Balkans, including *C. georgifreyi*, a species new for the European fauna (Odonata: Coenagrionidae). *Libellula Supplement 6*: 25-32. (in English, with German summary). ["The distribution of *Ceriagrion* taxa occurring in the Balkans is presented. A diagnostic key for separating *C. tenellum* from *C. georgifreyi* is provided. The latter was recorded from Greece for the first time, and is an addition to the European fauna." (Author)] Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands. E-mail: Kalkman@naturalis.nnm.nl

**5591.** Kantzaris, V; Iliopoulou-Beorgudaki, J. (2005): A comparative study of the aquatic insects' fauna of four rivers in Greece. *Frensenius Environmental Bulletin* 14: 1097-1104. (in English). [The study includes Odonata on the genus level resp. *Calopteryx virgo*.] Address: Dept of Biology, Section of Animal Biology, University of Patras, 26500 Patras, Greece

**5592.** Kefford, B.J.; Papas, P.J.; Nugegoda, D. (2005): Relative salinity tolerance of macroinvertebrates from the Barwon River, Victoria, Australia. *Marine and Freshwater Research* 54(6): 755-765. (in English). ["Salinity levels are rising in many freshwater environments, yet there are few direct measurements of salinity tolerance of organisms likely to be salt sensitive. The relative salinity tolerance to artificial seawater of macroinver-

tebrates from the Barwon River in Victoria, Australia, was assessed by measuring the 72-h lethal concentrations required to kill 50% of individuals (LC50). LC50 values ranged from an electrical conductivity of 5.5 to 76  $\mu\text{S cm}^{-1}$  (mean 31  $\mu\text{S cm}^{-1}$ ,  $n = 57$ ) and followed a log-normal distribution. The most salt-sensitive groups tested were Baetidae (LC50 value range: 5.5–6.2  $\mu\text{S cm}^{-1}$ ), Chironomidae (10  $\mu\text{S cm}^{-1}$ ) and several soft-bodied non-arthropods (Oligochaeta, Gastropoda, Nematomorpha, Tricladida and Hirudinea; 9–14  $\mu\text{S cm}^{-1}$ ). Other groups, from least to most tolerant, were non-baetid Ephemeroptera (>12.6–15  $\mu\text{S cm}^{-1}$ ), Plecoptera (>12.6–>20  $\mu\text{S cm}^{-1}$ ), Trichoptera (9–>26  $\mu\text{S cm}^{-1}$ ), Corixidae (18–26  $\mu\text{S cm}^{-1}$ ), non-corixid Hemiptera (33–44  $\mu\text{S cm}^{-1}$ ), Coleoptera (19–54  $\mu\text{S cm}^{-1}$ ), Hydracarina (39  $\mu\text{S cm}^{-1}$ ) and Odonata (30–55  $\mu\text{S cm}^{-1}$ ), and macrocrustaceans (Decapoda, Isopoda and Amphipoda; 38–76  $\mu\text{S cm}^{-1}$ )." (Authors)] Address: Kefford, B.J., Department of Biotechnology and Environmental Biology, RMIT University, PO Box 71, Bundoora, 3083, Victoria, Australia. E-mail: ben.kefford@rmit.edu.au

**5593.** Kern, D. (2005): Les Libellules des manuscrits enluminés du Moyen Âge. *Martinia* 21(1): 35–42. (in French, with English summary). ["Following researches on representations of dragonflies in medieval manuscripts, the author presents 16 illustrations executed between 1234–40 and 1503–08. The descriptions of the representations are accompanied by some comments, the names of the species and the signification of these images." (Authors)] Address: Kern, D., Taxusweg 2, D-27232 Sulingen, Germany

**5594.** Kilimann, N.; Tomec, M. (2005): Die Libellen des Waldteichgeländes in Oberhausen. *Elektronische Aufsätze der Biologischen Station Westliches Ruhrgebiet* 1.9: 1–6. (in German). [Nordrhein-Westfalen, Germany; 26 odonate species are listed and some are discussed.] Address: Kilimann, N., Vinckestr.91, 44623 Herne, Germany. E-Mail: NKilimann@aol.com

**5595.** Knill-Jones (2005): Reports from Coastal stations - 2004: Isle of Wight. *Atropos* 24: 55–56. (in English). [*Erythromma viridulum* was recorded at 5 new locations; second record of *E. najas*; in addition, records of *Brachytron pratense*, *Orthetrum cancellatum*, *Sympetrum fonscolombii*, and *Anax parthenope* are documented.] Address: Knill-Jones, S.A., 2 School Green Road, Freshwater, Isle of Wight, PO40 9AL, UK

**5596.** Koch, K.; Suhling, F. (2005): Do behavioural and life-history traits vary with mate-guarding intensity in libellulid odonates? *Canadian Journal of Zoology* 83 (12): 1631–1637. (in English). ["It has been demonstrated that in libellulid dragonflies the distribution of eggs during oviposition and the offspring size vary with the type of mate guarding during oviposition (non-contact guarding and contact guarding). In this study, we investigated the hypothesis that oviposition behaviour and life-history traits also differ between these two guarding types. Therefore, we studied oviposition behaviour and life-history traits in six species of a dragonfly assemblage of the Namib Desert. Among the oviposition behaviours, oviposition duration and number of pond changes differed significantly between the guarding types. Clutch size did not differ between the guarding types, whereas some offspring characters, namely egg width, temperature sum to hatch, and larval head width, differed between the guarding types. Eggs of tan-

dem species (those performing contact guarding) were larger, which might explain differences in all other offspring characters studied; bigger eggs need a lower temperature sum for egg development, result in bigger larvae, and have a faster growth rate, all traits that might be seen as an adaptation to temporary waters, which are major habitats of the tandem species. This observation is discussed in the light of different dispersal strategies between the species performing different guarding types." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**5597.** Kraft, P.G.; Wilson, R.S.; Franklin, C.E. (2005): Predator-mediated phenotypic plasticity in tadpoles of the striped marsh frog, *Limnodynastes peronii*. *Austral Ecology* 30(5): 558–563. (in English). ["We tested the phenotypic responses of larval striped marsh frogs (*Limnodynastes peronii*) to the odonate nymph predator, *Aeshna brevistyla*. When reared in the presence of dragonfly nymphs feeding upon conspecifics of *L. peronii* larvae the tadpoles showed a strong change in morphology. Morphological changes included an increase in total tail height, but also an unexpected marked change in head-body shape. In addition, we examined how tadpole development, as well as mass and length at metamorphosis, was affected by exposure to dragonfly nymphs. Larval development of *L. peronii* was strongly influenced by exposure to the predatory behaviour of dragonfly nymphs. Predator-induced tadpoles had significantly slower developmental rates than control larvae. Although metamorphs of non-exposed *L. peronii* were approximately 33% lighter than predator-exposed metamorphs and possessed lower jump distances, after adjusting for mass there was no difference in jump distance. The newly described morphological response may assist in more accurately relating morphological plasticity to fitness." (Authors)] Address: Wilson, R.S., Physiological Ecology Laboratory, School of Integrative Biology, The University of Queensland, St. Lucia, Queensland 4072, Australia. Email: rwilson@uq.edu.au

**5598.** Krisp, H.; Maier, G. (2005): Consumption of macroinvertebrates by invasive and native gammarids: a comparison. *J. Limnol.* 64(1): 55–59. (in English). ["The Ponto-Caspian gammarids *Dikerogammarus villosus* SOVINSKIJ and *Echinogammarus ischnus* STEBBING have invaded Central-European streams in the early 1990s. Declines in macroinvertebrates have been observed since the arrival of invasive species. To elucidate the predatory impact of gammarids on the macroinvertebrate community, we conducted laboratory experiments with macroinvertebrate prey taxa and native and invasive gammarids as predators. *Dikerogammarus villosus*, which is known to be a strong predator, consumed more and a broader range of prey than *E. ischnus* or the native gammarids, *Gammarus pulex* L. and *Gammarus roeseli* GERVAIS. *Echinogammarus ischnus* consumed a somewhat higher amount of prey organisms than *G. pulex* and a higher number and a broader range than *G. roeseli*. Adult *D. villosus* consumed up to 25 mg macroinvertebrate biomass (wet weight) per day which corresponds to approximately 1/3 of their own biomass. Chironomid larvae were preferred by all gammarids tested. Taking into account that gammarids density may surpass 1000 ind  $\text{m}^2$ , our results suggest that the predatory behaviour of invasive gam-

marids, in particular of *D. villosus*, may have contributed to the decline of some macroinvertebrate taxa in some European streams." (Authors)] Address: Maier, G., Department of Experimental Ecology of Animals, University of Ulm, Albert-Einstein-Allee 11, 89069 Ulm, Germany. E-mail: gerhard.maier@biologie.uni-ulm.de

**5599.** Laister, G. (2005): *Pantala flavescens* auf Rhodos, mit einem Überblick über den Status der Art in Europa (Odonata: Libellulidae). *Libellula Supplement* 6: 33-40. (in German, with English summary). ["On 29 August 2001, a teneral female was recorded near Apolakia on Rhodes (36°02'N, 27°47'E). This represents the first record for Greece. In the Mediterranean records are extremely rare, which is in contrast to the big number of records from most parts of Asia and from North America on a similar geographical latitude. On the one hand this may reflect the barrier effect of the Sahara, i.e., prevalent wind and aridity. On the other hand it is assumed that, on the basis of a comparison with similar latitudes in Australia, *P. flavescens* is unable to survive the winter north of the Sahara. In addition, all reports on records or hints of *P. flavescens* in Europe are compiled." (Author)] Address: Laister, G., Naturkundliche Station, Neues Rathaus, Hauptstr. 1-5, A-4041 Linz, Austria. E-mail: Gerold.Laister@mag.linz.at

**5600.** Lasso, D.; Jarrín-V., P. (2005): Diet variability of *Micronycteris megalotis* in pristine and disturbed habitats of Northwestern Ecuador. *Acta Chiropterologica* 7(1): 121-130. (in English). [Odonata as diet of the bat *M. megalotis* are discussed.] Address: Jarrín-V., P., Boston University, Department of Biology, #5 Cummington Street, 02215 MA, USA. E-mail: jarrin@bu.edu

**5601.** Lehmann, A.W. (2005): Annotated bibliography of the dragonflies of Greece (Odonata). *Libellula Suppl.* 6: 85-104. (in German, with English summary). ["An annotated bibliography of Odonatological literature from Greece is presented, comprising 212 references from the years 1832 to 2004." (Author)] Address: Lehmann, A.W., Friedensallee 37, D-14532 Stahnsdorf, Germany. E-mail: gerlind.lehmann@t-online.de

**5602.** Leipelt, K.G.; Suhling, F. (2005): Larval biology, life cycle and habitat requirements of *Macromia splendens*, revisited (Odonata: Macromiidae). *International Journal of Odonatology* 8(1): 33-44. (in English). ["Information on larval biology of *Macromia splendens* was compiled and supplemented by hitherto unpublished data. Larvae inhabit mainly calm river stretches, sometimes artificial impoundments, and lentic margins of lotic sections. From the majority of records it is concluded that the larvae mainly dwell in sandy substrates in shallow water, which sometimes contains little leaf litter. Larvae occur in smaller numbers on substrates dominated by coarse detritus or on bedrock in deeper water. Larvae of *M. splendens* are able to burrow in sand, but such burrowing takes a long time, and sometimes parts of their body remain uncovered. Therefore, they are considered shallow burrowers. Based on head-width frequency distributions recorded at the Garden de Miallet, southern France, the species is believed to require two years per generation." (Authors)] Address: Leipelt, K.G., Institut für Geoökologie, Technische Universität Braunschweig, Langer Kamp 19c, D-38106 Braunschweig, Germany. E-Mail: k.leipelt@tu-bs.de

**5603.** Lemcke, C. (2005): Phänotypische Plastizität bei Kaulquappen des Europäischen Laubfrosches *Hyla*

*arborea*. Dissertation der Fakultät für Biologie der Ludwigs-Maximilian-Universität München: 87 pp. (in German and English). [For the full paper see: <http://e-doc.uni-muenchen.de/archive/00004866/01/LemckeClaudia.pdf>] Address: Lemcke, Claudia, Ludwigs-Maximilian-Universität München, Fachb. Biologie II, Großhadernerstr. 2, D-82152 Planegg/Martinsried, Germany

**5604.** Leroy, T. (2005): Nouvel inventaire des Odonates des tourbières du Cézallier en Auvergne (Départements du Cantal et du Puy-de-Dôme). *Martinia* 21(1): 3-15. (in French, with English summary). ["20 years after the first survey, a second study was realized on 8 peat-bogs of Cézallier plateau. In this five years' survey, 39 species were recorded, with 26 species breeding certainly and 6 probably. Several species untypical of peat-bogs and of southern affinity seem to have appeared since the first survey, and this raises some questions: was the sampling of the first survey not complete enough, or is this a consequence of the climate warming?" (Author)] Address: Leroy, T., Le Bourg, F-63210 Heume-l'Eglise, France. E-mail: thierry-leroy@caraimail.com

**5605.** LÖBF (2005): Natur und Landschaft in Nordrhein-Westfalen 2005. Grundlagen - Zustand - Entwicklung. *LÖBF-Mitt.* 4/05: 283 pp. (in German). [On page 142, a map with the present distribution of *Coenagrion mercuriale* in Nordrhein-Westfalen, Germany, is presented.] Address: LÖBF, Leibnitzstr. 10, 45659 Recklinghausen, Germany

**5606.** Lohr, M. (2005): *Selysiotemis nigra* (Vander Linden), new for Portugal (Anisoptera: Libellulidae). *Notulae odonatologicae* 6(6): 57-58. (in English). [9 exuviae, 23-V-2003, Faro Algarve province, Portugal.] Address: Lohr, M., FH Lippe und Höxter, Fachgebiet Tierökologie und Landschaftsökologie, An der Wilhelmshöhe 44, D-37671 Höxter, Germany. E-mail: mlohr@fh-luh.de

**5607.** Lopau, W. (2005): Bisher unveröffentlichte Libellenbeobachtungen aus Griechenland III (Odonata). *Libellula Supplement* 6: 49-84. (in German, with English summary). ["More than 850 Odonata records provided by 14 workers are listed. The data, 54 of the 76 species now known from Greece, were recorded between 01-VIM 992 and 01-IX-2001." (Author)] Address: Lopau, W., Kuhstedtermoor 26, D-27442 Gnarrenburg, Germany. E-mail: lopi-@t-online.de

**5608.** Macauley, D. (2005): Survey of the odonate fauna in Birch Mountains Wildland Park. Prepared for the Alberta Natural Heritage Information Centre. Parks and Protected Areas Division. Alberta Community Development: 22 pp. (in English). ["A total of 20 odonate species were found during the 2004 survey of the Birch Mountains WP. This represents 15 species from the Suborder Anisoptera and 5 from the Suborder Zygoptera. Most species in the area were common ones that have wide distributions across Canada. Several species, however, were rare or uncommon or are known to have restricted ranges in Alberta. Some of the uncommon species were *Calopteryx aequabilis*, *Somatochlora albicincta* and *Somatochlora minor*. *C. aequabilis* and *S. minor* were found along slow-moving streams whereas *S. albicincta* preferred isolated bog ponds. Three of the *Somatochlora* species were rare discoveries – *S. forcipata*, *S. franklini* and *S. kennedyi*. All three were



collected in boggy wetlands. One species, *Somatochlora kennedyi*, was a new discovery for the province. It was collected beside a beaver pond north of Gardiner Lake. With further sampling, it is expected that several more riparian, peatland and river specialists could be found." (Author) Available at: <http://www.cd.gov.ab.ca/preserving/parks/anhic/docs/odonatesbirch%20mts-finalmacaulay.pdf> Address: not stated

**5609.** Machado, A.B.M. (2005): *Lauromacromia bedei* sp. nov. from the State of Minas Gerais, Brazil (Odonata, Corduliidae). *Revista Brasileira de Entomologia* 49(4): 453-456. (in English, with Portuguese summary). [*L. bedei* is described and illustrated from a single male specimen collected in VI 2004 from a river within the Rio Preto State Park. The species is compared in detail with its Brazilian congeners.] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc, Biol., Universidade Federale de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil. E-mail: [angelo@icb.ufmg.br](mailto:angelo@icb.ufmg.br)

**5610.** Machado, A.B.M. (2005): Studies on Neotropical Protoneuridae. 18. *Epipleoneura janirae* sp. n. from the Amazonian region of Brazil (Odonata: Protoneuridae). *Lundiana* 6 (suppl.): 47-48. [*Epipleoneura janirae* n.sp. from the Amazonian region of Brazil (Belterra, State of Pará) is described and illustrated. This new species is related to *E. uncinata* De Marmels, 1989 for its structural characters and differs from all known species of the genus for its predominantly pale thoracic colour." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc, Biol., Universidade Federale de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil

**5611.** Matsubara, K.; Tojo, S.; Suzuki, N. (2005): Age-related changes in flight muscle mass, lipid reserves and flight capacity during adult maturation in males of the territorial damselfly *Calopteryx atrata* (Odonata: Calopterygidae). *Zoological Science* 22: 587-592. (in English). ["In the territorial damselfly *Calopteryx atrata* Selys, length of the hindwing, the wing areas and the aspect ratio did not differ significantly among age classes during the pre-reproductive period, while the body mass of males increased about 2.5 times. This is due primarily to increase in mass of thorax and abdomen. The flight muscle mass accounted for the great part of the thorax mass, and began to increase from early in the pre-reproductive period and continued increasing until sexual maturation. The average flight muscle mass of sexually matured males was about 2.4 times of that of the youngest immature ones. On the other hand, the abdomen mass and total lipids increased remarkably in the latter half of the pre-reproductive period. The average total lipid content of mature males was about tenfold of that of the youngest immature ones. The maximum lift production per flesh body mass was positively correlated with the flight muscle mass and total lipid content. Such an increase in flight muscle mass and lipid reserves resulted in the increase of maximum lift force, and probably enhanced flight performance." (Authors)] Address: Matsubara, K., Department of Applied Biological Sciences, Faculty of Agriculture, Saga University, Honjo 1, Saga 840-8502, Japan. E-mail: [mkd0335@hotmail.com](mailto:mkd0335@hotmail.com)

**5612.** Mauersberger, R. (2005): Erste Libellennachweise von der Insel Aigina (Odonata). *Libellula Suppl.*

6: 41-42. (in German, with English summary). ["As a small mountainous island near Athens, Aigina has no standing perennial waters. In October 2002 all brooks of the island were visited. Only three of them showed residual water puddles in the mouth region, at which records of six Odonata species were taken." (Author)] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-mail: [FoerdervereinUeckermark.Seen@t-online.de](mailto:FoerdervereinUeckermark.Seen@t-online.de)

**5613.** May, M.L.; Carle, F.L. (2005): *Pamita hannahdaltonae* gen. nov., sp. nov. from Baltic amber (Odonata: Amphipterygida). *International Journal of Odonatology* 8(2): 213-221. (in English). ["The first known amphipterygid-like zygopteran from amber is described. Although its provenance is not known with certainty, we feel confident in attributing it to the Baltic amber deposits of northern Europe. It thus represents the first Old World Tertiary amphipterygid and substantially extends the known geographic range of the taxon. Based on current knowledge its phylogenetic position cannot be ascertained reliably, but its possible relationships are discussed. It shares a mixture of characters with extant species including Amphipterygidae, Diphlebiidae, Thaumatoneurinae and Lestoideinae." (Authors)] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: [may@aesop.rutgers.edu](mailto:may@aesop.rutgers.edu)

**5614.** McCauley, S. (2005): Differential dispersal propensities between individuals in male *Leucorrhinia intacta* (Odonata: Libellulidae). *International Journal of Odonatology* 8(2): 223-232. (in English). ["I compared males of *L. intacta* collected at two permanent and two previously dried ponds to assess whether males colonizing formerly dried sites differed in morphology or level of mite parasitism from males at permanent sites. Males colonizing sites that had local extinctions in the previous year due to pond drying were more similar to each other in body size and levels of parasitism than to males at sites which had not dried. Males at the two permanent sites differed significantly from each other in body size and these differences appear to reflect different local conditions. Comparison of males at two adjacent sites, one permanent and one which previously dried, found that the males colonizing the previously dried site were larger, in better condition, and had lower rates and numbers of mite parasites than males at the permanent site. Results from this study suggest two non-exclusive hypotheses about dispersal and colonization in this species. First, dispersal is condition dependent in this species with size and body condition positively correlated and mite parasitism negatively correlated with dispersal. Second, some permanent sites produce more males with the characteristics associated with dispersal than other potential source populations and therefore may contribute greater numbers of individuals to the dispersal pool." (Authors)] Address: McCauley, Shannon, 830 N. University, Dept of Ecology & Evolutionary Biology, University of Michigan, Ann Arbor, MI, USA. E-mail: [mccaule@umich.edu](mailto:mccaule@umich.edu)

**5615.** McCauley, S.J. (2005): Relationship between habitat distribution, growth rate, and plasticity in congeneric larval dragonflies. *Canadian Journal of Zoology* 83: 1128-1133. (in English). ["The relationship between habitat distribution, growth rate, and plasticity was examined in the larvae of three species of dragonfly in

the genus *Libellula* L., 1758. Growth rates were compared under three conditions: in the absence of predation risk, in the presence of sunfish (*Lepomis macrochirus* Rafinesque, 1819; Pisciformes: Centrarchidae), and in the presence of invertebrate predators. I assessed how the habitat distributions of the three species of dragonfly, specifically how commonly they occur with fish, were related to growth rates and to the level of growth plasticity under different levels of perceived predation risk. There was a negative relationship between growth rate and the frequency with which species coexist with sunfish. Growth-rate plasticity was limited and does not appear to be important in determining the ability of species to coexist with alternative top predator types. Only one species exhibited growth-rate plasticity, decreasing growth in response to the predator with which it most commonly coexists but not to the species which poses the greatest predation risk. A comparison of growth rates and activity levels in the presence and absence of these predators suggests that growth and activity level parallel each other in these species." (Author) Erratum: Relationship between habitat distribution, growth rate, and plasticity in congeneric larval dragonflies, S.J. McCauley: Ref.: Can. J. Zool. 83: 1128-1133 (2005). "In the above paper on pages 1130 and 1131, the last sentence of the captions to Figs. 2, 3, and 4 should have read Species are indicated as follows: *L. pulchella* (black), *L. luctuosa* (light gray), *L. incesta* (dark gray).]" Address: McCauley, Shannon, Department of Ecology and Evolutionary Biology, University of Michigan, 830 North University Avenue, Ann Arbor, MI 48109-1048, USA. E-mail: mccaule@umich.edu

**5616.** McGeeney, A. (2005): Identification of red darters (part 2). *Atropos* 25: 34-36. (in English). [*Sympetrum vulgatum*, *S. meridionale*, *S. pedemontanum*, and *S. depressiusculum* are described and illustrated on colour plates. Morphological features suitable for identification of the taxa are compared in a table.] Address: McGeeney, A., 12 Lincolns Field, Epping, CM16 5DY, UK

**5617.** Medland, J. (2005): Reports from Coastal stations - 2004: Guernsey, Channel Islands. *Atropos* 24: 47-48. (in English). [*Crocothemis erythraea* is an addition to the Guernsey list of Odonata. Additional 10 odonate species are briefly discussed] Address: not stated

**5618.** Meurgey, F. (2005): Contribution à la connaissance des Odonates de l'archipel guadeloupéen IV. Faune de l'île de Marie-Galante (Antilles françaises). *Martinia* 21(4): 51-58. (in French, with English summary). ["The Odonata fauna of Marie-Galante is not well known. The author presents the results of prospectings realized there in 2004. 19 species were recorded, among them four that are rare or unfrequent: *Lestes tenuatus*, *Anax amazili*, *Micrathyrina didyma*, and *Tholymis citrina*." (Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5619.** Meurgey, F. (2005): Complément à l'identification d'*Anax junius* (Drury, 1773) après sa récente observation en France métropolitaine. *Martinia* 21(1): 31-34. (in French, with English summary). ["The main identification criteria are recalled for this species, and their limits of use are discussed in comparison with *A. imperator*. A criterion for female identification is given."

(Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5620.** Meurgey, F.; Weber, G. (2005): Eléments d'écologie et de répartition de *Tholymis citrina* Hagen, 1861 dans l'archipel Guadeloupéen (Antilles françaises). *Martinia* 21(3): 109-114. (in French, with English summary). [new distribution map of *T. citrina* in Guadeloupe; new record of *T. citrina* on the island of Marie-Galante; description of the habitat, copulation, and a "wedding flight" after meeting of the mates.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5621.** Meurgey, F. (2005): Étude faunistique des odonates de Martinique. DIREN Martinique/ONCFS Martinique / Société française d'odonatologie, Mai 2005: 105 pp. (in French). [The Odonata of Martinique/Lesser Antilles/France were surveyed in 2005 at 72 localities. Each locality is pictured and briefly described; the odonate species are listed locality-wise. Each species is briefly commented. Older records are included into the study too. For the full paper see: <http://www.martinique.ecologie.gouv.fr/telecharge/Etude%20faunistique%20des%20odonates%20de%20Martinique.pdf>] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5622.** Meurgey, F. (2005): Impact de la fréquentation dans un parc urbain sur une population de *Coenagrion mercuriale* (Charpentier, 1840) (Département de la Loire-Atlantique). *Martinia* 21(1): 16. (in French). [A population of *C. mercuriale* in a park of the town Procé, France established at a rivulet is impacted by pedestrians with dogs and cyclists. Small tracks cross the rivulet at several places. In spite of a permanent perturbation of the running water between March and September, and in spite of a disarrangement of adults up to 30 meter beside the rivulet, the population of the rare *C. mercuriale* seems to be stable over the period of 2001 to 2004.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5623.** Meurgey, F. (2005): Nouvelle observation de *Sympetrum vulgatum ibericum* Ocharan, 1983 en France (Pyrénées-Orientales). *Martinia* 21(3): 134-135. (in French). [Recent records in 2003 of *S. vulgatum ibericum* in the French pyrenees are documented. The distribution and dispersal ability of the taxon in Andorra and the French Pyrenees are discussed.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5624.** Meurgey, F. (2005): Observation de la ponte d'*Aeshna isocles* (Müller, 1767) dans une rivière de Charente-Maritime (Odonata, Anisoptera, Aeshnidae). *Martinia* 21(4): 80. (in French). [France; emergence of *A. isocles*, 11-VII-2004] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5625.** Meurgey, F. (2005): Annexes: Liste provisoires des odonates des départements et territoires d'Outre-mer français. *Martinia* 21(4): 85-105. (in French).

[Check-lists of Odonata in French overseas departments and territories: Guadeloupe and Martinique, French Guiana, Réunion, Mayotte, New-Caledonia, French Polynesia, and Saint Pierre and Miquelon.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5626.** Meurgey, F.; Weber, G. (2005): *Tauriphila australis* (Hagen, 1867), *Macrothemis* sp., espèce nouvelle et genre nouveau pour la Martinique (Odonata, Anisoptera, Libellulidae). *Martinia* 21(4): 157-166. (in French, with English summary). ["In a study ordered by nature authorities of Martinique in March 2005, 22 species were recorded. One species and one genus were new for the island. The species are presented with brief comments." (Authors)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5627.** Mill, P. (2005): Dragonfly conservation from the BDS. *Atropos* 24: 87-88. (in English). [Detailed report on the Rody Nature Reserve Dragonfly Pond project.] Address: Mill, P., School of Biology, L.C. Miall Building, University of Leeds, Leeds, LS2 9JT, UK. E-mail: p.j.mill@leeds.ac.uk

**5628.** Mill, P.; Taylor, P.; Parr, A. (2005): English names for British and European dragonflies - the British Dragonfly Society's perspective. *Atropos* 25: 57-59. (in English). [comment on current discussion on English names of Odonata] Address: Taylor, Pam, Decoy Farm, Decoy Rd, Potter Heigham, Norfolk, NR29 5LX, UK. E-mail: ptaylor@acle.norfolk.sch.uk

**5629.** Mitre, M. (2005): Profile: Professor Angelo Machado: The remarkable deeds of a polyvalent mind. *Lundiana* 6 (suppl.): 5-10. (in English). ["Life history" of A. Machado, Brazil, one of the most profiled south American odonatologists of current times.] Address: Maya Mitre. E-mail: mayamitre@yahoo.com.br

**5630.** Morgan, L. (2005): Reports from Coastal stations - 2004: Skomer Island NNR, Pembrokeshire. *Atropos* 24: 74-75. (in English). [Coenagrion puella is new to the island.] Address: not stated

**5631.** Muddeman, J. (2005): Some comments on the proposed new names for Odonata. *Atropos* 25: 55-56. (in English). [comments on the vernacular European English names of Odonata.] Address: Muddeman, J., C/Los Alamillos 4 esc. 23°F, ES-28260 Galapogar, Madrid, Spain

**5632.** Müller, O.; Clausnitzer, V.; Grabow, K.; Vick, G.; Suhling, F. (2005): Description of the final stadium larvae of African Gomphidia (Odonata: Gomphidae). *International Journal of Odonatology* 8(2): 233-241. (in English). ["Descriptions and illustrations of the final stadium larvae of Gomphidia bredoi, G. gamblesi and G. quarrel are presented, based on exuviae collected in Ivory Coast, Cameroon, Kenya and Namibia. The three species can be separated by the presence / absence and shape of an abdominal dorsal spine on segment 9, by the numbers of abdominal lateral spines and by several characteristic processes on the head." (Authors)] Address: Müller, O., Birkenweg 6d, D-15306 Libbenichen, Germany. E-mail: olemueller@bioscience-art.de

**5633.** Muzón, J.; Spinelli, G.R.; Pessacq, P.; Von Ellenrieder, N.; Estevez, A.L.; Marino, P.I.; Pérez Goodwin, P.J.; Angrisano, E.B.; Díaz, F.; Fernández, L.A.; Mazzucconi, S.; Rossi, G.; Salomón, O.D. (2005): Insectos acuáticos de la Meseta del Somuncura, Patagonia, Argentina. *Inventario preliminar. Revista de la Sociedad Entomológica Argentina* 64: 47-67. (in Spanish, with English summary). ["A preliminary inventory of the aquatic insects from the Somuncura plateau and its area of influence (Patagonia, Argentina) is presented. It was done on the basis of the study of collections and previous records of species belonging to the orders Ephemeroptera, Odonata, Hemiptera (Heteroptera), Trichoptera, Diptera (families Ceratopogonidae, Culicidae, and Psychodidae) and Coleoptera. Different kinds of environments were surveyed in 14 localities. 78 species grouped in 51 genera and 26 families were registered, and 33 species are new records for the area. 83 % of the registered genera are widely distributed (neotropical, american or cosmopolitan), while 41 % of the species exhibit patagonic or andean distribution." (Authors) The list includes 12 odonate species.] Address: Ellenrieder, Natalie von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: odonata@hotmail.com

**5634.** Navarrete-Heredia, J.L.; Gómez Flores, V.H. (2005): Aspectos etnoentomológicos acerca de sp. (Coleoptera: Staphylinidae) en Mascota, Jalisco, México. *Dugesiana* 12(1): 9-18. (in Spanish, with English summary). ["We provide an overview of the medical importance of (Coleoptera: Staphylinidae: Paederinae) adults from Mascota, Jalisco, México. In this region, these insects are called panchos and produce dermatological lesions due to the pederin toxins from the hemolymph. A list of home remedies is provided." (Authors) Some experimentees to check for recognising Paederus sp. take them for Odonata. Address: Navarrete-Heredia, J. L., Entomología, Centro de Estudios en Zoología, CUCBA, Universidad de Guadalajara. Apdo. Postal 234, Zapopan, Jalisco 4510, México. E-mail: glenusmx@yahoo.com.mx,

**5635.** Novelo-Gutiérrez, R.; Gómez-Anaya, J.A. (2005): Description of the larva of *Telebasis digiticollis* (Odonata: Zygoptera: Coenagrionidae). *Canadian Entomologist* 137: 61-66. (in English). ["A detailed description and illustrations of the larva of *Telebasis digiticollis* Calvert, 1902 are provided. A comparison with other larvae of the genus is made. *Telebasis digiticollis* is distinguished by 1 premental seta, 6-7 setae on the labial palp, a well-developed and convex ligula, 7-8 spiniform setae on the lateral margins of the prementum, and forceps-like male gonapophyses. The larva of *T. digiticollis* is more like that of *T. boomsmae* Garrison, 1994 than like other larvae of the genus. Larvae were found living in a lagoon densely covered by aquatic phanerogams such as *Eichhornia* sp. (Pontederiaceae) and *Typha* sp. (Typhaceae)."] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx

**5636.** Odin, N. (2005): Reports from Coastal stations - 2004: landguard Bird Observatory, Suffolk. *Atropos* 24: 67-68. (in English). [5 odonate species are briefly documented] Address: not stated



**5637.** Oertli, B.; Auderset Joye, D.; Castella, E.; Juge, R.; Lehmann, A.; Lachavanne, J.-B. (2005): PLO-CH: a standardized method for sampling and assessing the biodiversity in ponds. *Aquatic Conserv: Mar. Freshw. Ecosyst.* 15: 665-679. (in English). ["1. As ponds are now recognized as freshwater habitats clearly distinct from lakes and running waters, there is a need for standardized tools for assessing their ecological integrity and status, and particularly their biodiversity. 2. A standardized method was developed for sampling and assessing the species richness of ponds. Experiences accumulated in previous studies, together with data gathered from 80 Swiss ponds, provided the basis of the proposed method. 3. Five taxonomic groups were chosen as complementary representatives of pond inhabitants: aquatic plants, aquatic Gastropoda, aquatic Coleoptera, adult Odonata and Amphibia. 4. To sample aquatic flora, quadrats are located along transects perpendicular to the longest axis of the pond. The number of quadrats is calculated from a relationship with pond area. A nonparametric estimator (Jackknife-1) is used to estimate the true species richness from the observed richness. 5. Aquatic invertebrates (Gastropoda, Coleoptera) are collected with a hand net. Sampling is stratified within the dominant habitats. The number of samples is calculated from a relationship with pond area. As with the vegetation, the Jackknife-1 estimator is used to estimate the true species richness. 6. The species richness of adult Odonata is assessed using a standardized field survey method combining observations from early and late summer. The species richness is corrected with an abundance-based estimator (Chao1). The species richness of Amphibia is obtained from an exhaustive inventory. 7. For the assessment of biodiversity, species richness values derived from measurements are compared to values predicted for conditions that enable a high species richness. Generalized Additive Models are used to predict species richness from environmental predictors characterizing the pond. The ratio of measured richness to predicted richness allows the allocation of a quality status to each pond. Results are divided into five biological quality classes, as recommended in the EC Water Framework Directive (WFD).] Address: Oertli, B., Department of Nature Management, University of Applied Sciences of Western Switzerland, EIL HES de Lullier-Geneva, 150 route de Présinge, CH-1254 Jussy, Switzerland. E-mail: beat.oertli@etat.ge.ch

**5638.** Olberg, R.M.; Worthington, A.H.; Fox, J.L.; Bessette, C.E.; Loosemore, M.P. (2005): Prey size selection and distance estimation in foraging adult dragonflies. *Journal of Comparative Physiology A: Sensory, Neural, and Behavioral Physiology* 191(9): 791-797. (in English). ["To determine whether perching dragonflies visually assess the distance to potential prey items, we presented artificial prey, glass beads suspended from fine wires, to perching dragonflies in the field. We videotaped the responses of freely foraging dragonflies (*Libellula luctuosa* and *Sympetrum vicinum*) to beads ranging from 0.5 mm to 8 mm in diameter, recording whether or not the dragonflies took off after the beads, and if so, at what distance. Our results indicated that dragonflies were highly selective for bead size. Furthermore, the smaller *Sympetrum* preferred beads of smaller size and the larger *Libellula* preferred larger beads. Each species rejected beads as large or larger than their heads, even when the beads subtended the same visual angles as the smaller, attractive beads. Since bead size cannot be determined without referen-

ce to distance, we conclude that dragonflies are able to estimate the distance to potential prey items. The range over which they estimate distance is about 1 m for the larger *Libellula* and 70 cm for the smaller *Sympetrum*. The mechanism of distance estimation is unknown, but it probably includes both stereopsis and the motion parallax produced by head movements." (Authors)] Address: Olberg, R.M., Department of Biological Sciences, Union College, Schenectady, NY 12308, USA. Email: olberg@union.edu

**5639.** Olias, M.; Günther, A. (2005): Erster Nachweis von *Lestes (viridis) viridis* für Griechenland (Odonata: Lestidae). *Libellula Supplement* 6: 43-47. (in German, with English summary). ["At a mountain rivulet in the Halkidiki peninsula, the semispecies *L. (viridis) viridis* and *L. (v.) parvidens* were shown to occur in syn-topic populations. This is the first secure record of *L. (v.) viridis* for Greece." (Authors)] Address: Olias, M., Humboldtstraße 29, D-09599 Freiberg, Germany. E-mail: markoolias@aol.com

**5640.** Opiel, S. (2005): Habitat associations of an Odonata community in a lower montane rainforest in Papua New Guinea. *International Journal of Odonatology* 8(2): 243-257. (in English). ["I sampled odonates in pristine lower montane rainforest in Papua New Guinea over several months, recording habitat characteristics for all encounters with adult odonates. Using ordination techniques such as cluster analysis and canonical correspondence analysis I then classified the odonate fauna into assemblages correlated with environmental factors. Within the 2.5 km<sup>2</sup> study area I found 61 species and a very high ratio of Zygoptera vs Anisoptera. Cluster analysis identified seven distinct assemblages associated with permanent rivers and creeks, temporary streams, puddles, or permanent standing water. Shading, water speed and water permanence were important factors distinguishing the assemblages. Anisoptera were absent from three habitats in the forest interior with temporary water sources. Species associated with temporary water sources and other microhabitats in the forest interior are presumed to be reliant on the high and aseasonal rainfall and the humid conditions of the rainforest. These species are likely to be very intolerant towards deforestation or other disturbance, and should be regarded as indicators for intact rainforest ecosystems. 40% of all species were considered as rare, and local endemism might be high, further stressing the importance of intact rainforest for the survival of many species of Odonata." (Author)] Address: Opiel, S., Department of Biology and Wildlife, 211 Irving 1, University of Alaska Fairbanks, Fairbanks, AK 99775, USA. E-mail: steffen.opiel@gmx.net

**5641.** Orr, A.G. (2005): Pocket Guide to Dragonflies of Peninsular Malaysia. Natural History Publications: VI + 127 pp. (in English). ["Dragonflies are among the most beautiful of insects. Peninsular Malaysia and Singapore are home to more than 230 species. [...] This book figures 98.7% of species known from Peninsular Malaysia and Singapore. For most, coloured drawings of the whole insect (omitting one pair of wings) are provided. Where necessary, coloured or monochrome drawings showing diagnostic features are also included. For some species, especially small Zygoptera, only detailed structures are figured, as the general resemblance between close species is strong. A wide range of larval types is also figured."] Address: Orr, A.G., Coope-

rative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**5642.** Ott, J. (2005): Klimaänderung - auch ein Thema und Problem für den Biodiversitätsschutz im Grenzüberschreitenden Biosphärenreservat Vosges du Nord und Pfälzerwald?. *Annales scientifiques de la Réserve de Biosphère 12 transfrontalière* 12 (2004-2005): 127-142. (in German, with French and English summaries). [The review also contains some references on climate change and dragonflies.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.-GmbH@t-online.de

**5643.** Parr, A. (2005): Scarlet darters *Crocothemis* spp., in Britain. *Atropos* 25: 43-46. (in English). [Since 1995, there have been approximately six sightings of *C. erythraea* in UK, which are documented. As the possibility exists that *C. servilia* may occur in UK, this species is compared with *C. erythraea*. As *C. servilia* occurs as close as Turkey, "it is not inconceivable that natural vagrancy to Western Europe might also occur at some stage in the future."] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**5644.** Parr, A.J. (2005): Migrant dragonflies in 2004 including recent decisions and comments by The Odonata Records Committee. *Atropos* 24: 31-35. (in English). [Records of the following species are documented: *Calopteryx splendens*, *Lestes barbarus*, *Pyrrhosoma nymphula*, *Erythromma najas*, *E. viridulum* (including a map with records of 1999-2004), *Aeshna mixta*, *Anax parthenope*, *Libellula quadrimaculata*, *L. fulva*, *Crocothemis erythraea*, *Sympetrum striolatum* (some caught at a light trap), *S. fonscolombii*, *S. flaveolum*, *S. sanguineum* (caught at a light trap), and *S. danae*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**5645.** Pennington, M. (2005): Reports from Coastal stations - 2004: Shetland. *Atropos* 24: 72-73. (in English). [An immigrant *Pyrrhosoma nymphula* was photographed at a garden pond. *Libellula quadrimaculata* and *Libellula* sp. are the only additional Odonata recorded in 2004.] Address: not stated

**5646.** Pfau, H.-K. (2005): Structure, function and evolution of the 'glans' of the anisopteran vesica spermalis (Odonata). *International Journal of Odonatology* 8(2): 259-310. (in English). ["Comparative investigations of the distal part of the vesica spermalis ('glans') of the anisopteran male secondary copulatory apparatus reveal three different 'solutions' of combining the emptying-mechanism of the sperm-reservoir with a 'washing out' of sperm of the male predecessor. The responsible apparatus of the glans - actually driven by pressure-changes inside the erectile organ, which is a part of the whole vesica spermalis - is shortly apostrophized as 'two-way tap' (Gomphaeschnidae, Aeshnidae), pressure-suction pump (Austropetaliidae, Gomphidae, Petaluridae, Chlorogomphidae, Neopetaliidae, Cordulegastridae) and suction-pressure pump ('Corduliidae', Cordulephidae, Gomphomacromiidae, Synthemistidae, Libellulidae). The two types of sperm-pump are interpreted to effectuate an intensification of the sperm-jet and to serve as auxiliary devices in emptying the sperm-reservoir. On account of the opposite co-ordination of

extension and compression, the two types of sperm-pump are interpreted as alternative; no possibility could be detected to form evolutionary transitions without total loss of functions. This indicates two monophyletic groups: Petaluroidea and Libelluloidea. The phylogenetic relationships between these groups and the Gomphaeschnidae and Aeshnidae remained questionable. The different stages of evolution of the glans, which reflect phylogenetic splittings, are reconstructed. It is assumed that at the beginning a pre-gomphaeschnoid glans (or a gomphaeschnoid 'two-way tap' with tongue?) used two functional pores of ejaculation and scattered sperm on account of the erectile organ-coupled movements of the glans. Advanced glans-types of the Petaluroidea execute a three-phased delivery of sperm portions, the sperm transfer and displacement falling into the compression phase. Instead, in the Libelluloidea the sperm-transmission is two-phased and sperm-transfer and displacement are performed in the decompression phase." (Author)] Address: Pfau, H.-K., Rathenaustr. 14, D-65326 Aarbergen, Germany. E-mail: clauspfau@web.de

**5647.** Picard, L.; Meurgey, F. (2005): Découverte d'une population de *Lestes macrostigma* (Eversmann, 1836) dans le département de Loire-Atlantique (Odonata, Zygoptera, Lestidae). *Martinia* 21(3): 122. (in French). [12/13-VI-2005, Guérande, France.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5648.** Picard, L.; Meurgey, F. (2005): *Lestes macrostigma* (Eversmann, 1836) dans les marais saumâtres de Loire-Atlantique (Odonata, Zygoptera, Lestidae). *Martinia* 21(4): 139-150. (in French, with English summary). ["*L. macrostigma* is a rare Odonate in France (Dommanget, 1994). This species reproduces in salt-water marshes and more particularly in *Scirpus maritimus* formations. Although it is actually known in Vendée department, it was never found in Loire-Atlantique. Its presence is however suspected, and a deepened research in the department seemed necessary (Machet, 1990; Meurgey et al., 2000). This study was undertaken within the framework of a report of first year of Master research for Geography, heading "Terres et mers atlantique" (IGARUN, University of Nantes). The biogeographical aspect was preferred to the purely faunistic aspect. Thus, rather than to seek the species, the prospection was primarily centered on the research of the standard potential habitat, the formations with *Scirpus maritimus* (L)." (Authors)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5649.** Reinhardt, K. (2005): Sperm numbers, sperm storage duration and fertility limitation in the Odonata. *International Journal of Odonatology* 8(1): 45-58. (in English). ["The status of the Odonata as a model taxon for studying the evolution and diversity of reproductive behaviours is shown here to have declined relative to crickets and *Drosophila*. Very few available data on ejaculate size, the number of sperm stored by females and the duration of sperm storage reveal poor knowledge of these areas in the Odonata. Some observations tentatively suggest that species without direct sperm removal transfer larger numbers of sperm. Observations on the fertilization success of eggs laid by

sexually isolated females and the temporal variation in paternity were used to assess the longevity of the sperm population in the female. The generality of the claim that female odonates have full fecundity after a single mating can not be upheld. In addition, it is not clear whether any possible decrease in fertilization ability in isolated females is due to decreasing sperm quantity or quality. Costs and benefits of sperm longevity, sperm storage and multiple mating are discussed for both sexes. It is proposed that mating frequency and sperm storage duration may be linked in the Odonata. Testable predictions and ideas related to sperm biology are put forward in which odonates may be used to address general questions of evolutionary biology." (Author)] Address: Reinhardt, K., Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: K.Reinhardt@sheffield.ac.uk

**5650.** Reinhardt, R.; Klaus, D. (2005): Bericht über die Tagung Sächsischer Entomologen am 8. Oktober 2005 in Chemnitz. Mitt. Sächs. Entomol. 72: 31-32. (in German). [The report includes a brief abstract of a lecture by Thomas Brockhaus on the odonatological activities in Saxonia, Germany.] Address: Reinhardt, R., Burgstädter Str. 80a, D-09648 Mittweida, Germany. E-mail: Reinhardt-Mittw@t-online.de

**5651.** Richter, O.; Söndgerath, D.; Suhling, F.; Braune E. (2005): Impact of climate change on population dynamics and temporal patterns of benthic assemblages of rivers. In: Zerger, A. & R.M. Argent (eds.) MODSIM 2005 International Congress on Modelling and Simulation. Modelling and Simulation Society of Australia and New Zealand. ISBN 0-9758400-1-0.: 531-537. (in English). ["Seasonal cycles of temperature, water regime and day length act as "Zeitgeber" (timer) triggering stage transitions in the life cycle of organisms provoking temporal patterns of communities at different levels of organization. Climate change is both affecting temperature forcings and water regime. Mathematical models are set up to investigate the mechanisms for the change of temporal patterns in aquatic invertebrates as brought about by climate change. Based on temperature data from rivers in Northern Germany a stochastic time series model was set up. This model combines a deterministic seasonal trend, a long term linear trend and an ARMA model for the stochastic component. The model is used to generate input temperature data for population dynamic models. Based on the scenarios for climate change of the IPCC, both an elevation of temperature and alterations of parameters of the stochastic process were taken into account. Biological populations are structured by age, size and stage. Two mathematical approaches were employed. For the simulation of long term time patterns in dragonfly populations, a projection matrix model is devised, i.e. the life cycle graph is mapped into a population matrix. The model yields emergence curves of larvae and adults. Figure 1 shows a simulation example of the projection matrix model. For the simulation of the time course of length density distributions of *Gammarus pulex*, a partial differential equation was employed. Transition probabilities and growth rates were devised as a function of temperature. The models are applied to the population dynamics of two common lotic invertebrates, *Gomphus vulgatissimus* and the amphipod *Gammarus pulex*. Most global change scenarios predict temperature rises especially in higher latitudes affecting the north-south temperature gradient. The model predicts that indications of global

change should imply both a shift of geographical extension of *G. vulgatissimus* and a shift to longer cycle lengths to higher latitudes. The emergence of temporal patterns and the synchronizing effect of temperature forcing are studied in a model system comprising a predator and a prey population which are under the control of different timers. If the development of the prey is controlled by day length and temperature and the development of the predator only by temperature a desynchronisation occurs." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**5652.** Roach, J. (2005): Dragonfly migration tracked with tiny radio tags. National Geographic News, October 12, 2005: (in English). [Brief report in the popular science magazine National Geographic on current attempts to get insight to dragonfly (*Anax junius*) migration. The National Geographic Society is funding this study which uses radio tags. For a pdf of this article contact Bernd Kunz: E-mail: kunzFOTOGRAFIE@t-online.de] Address: <http://news.nationalgeographic.com/news/2005/10/1012051012dragonfly.html>

**5653.** Rudisill, T.; Bass, D. (2005): Macroinvertebrate community structure and physicochemical conditions of the Roman Nose spring system. Proc. Okla. Acad. Sci. 85: 33-42. (in English). ["Roman Nose State Park is located approximately 12 km north of Watonga, Oklahoma, in Blaine County in the Gypsum Hills of the Central High Plains ecoregion. Aquatic macroinvertebrate samples were collected and physical-chemical conditions were measured from the park's freshwater spring system during alternate months from January 2002 through November 2002. Water quality parameters measured included water temperature, dissolved oxygen, pH, alkalinity, turbidity, conductivity, nitrogen ammonia, nitrite, nitrogen, nitrate nitrogen, and phosphate. Water quality was always within acceptable parameters to support aquatic life during this period. However, possible contamination from agricultural activities and increasing human usage negatively impacted water quality. A total of 21,268 individuals from 64 taxa were collected and identified from three springs. Little Spring was the most populated both in the overall number of taxa (47) and the number of individuals (10,689). Middle Spring had significant differences in the number of individuals in the upper and lower sites. The month of November had both the highest number of individuals and taxa. Species diversity values were generally low: the values were always under 2.00 and usually increased at the lower sites. Significant differences in species diversity values were found over time in Little Spring and Middle Spring. Species similarity values were over 0.60 between springs for the combined collection times and over 0.45 between upper and lower sites of each spring for the collection times. Total species richness ranged from 37 to 47. Aquatic insects were the dominant group of invertebrates encountered throughout the study and included dipterans, ephemeropterans, odonates, coloeopterans, hemipterans, trichopterans, and collembolas. Continued work on this spring system is important to further inventory the invertebrates present and to determine if any patterns exist throughout the years, as well as to monitor the water quality trends of the springs." (Authors)] Address: Rudisill, Tracy, Department of Environmental Quality, 707, N. Robinson, Oklahoma City, OK 73101, USA



- 5654.** Russell, R.W. (2005): Interactions between migrating birds and offshore oil and gas platforms in the northern Gulf of Mexico. Final Report. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2005-009: 348 pp- (in English). ["The Gulf of Mexico is a major ecological barrier confronted by hundreds of millions of migrating birds each spring and fall. Trans-Gulf migrations evolved in the absence of natural islands that could serve as stopover sites; thus, the installation of an artificial archipelago of nearly 4000 oil and gas production platforms in the northern Gulf over the past five decades has introduced a novel and potentially important component into the en route environment of trans-Gulf bird migrants. From 1998-2000, my research group at LSU studied the ecology of trans-Gulf migration and the influence of platforms on migrants using a team of field biologists stationed on an array of platforms across the northern Gulf. [...] The objectives of this study were to quantify spring and fall trans-Gulf migrations and to evaluate the influence of offshore platforms on trans-Gulf migrating birds. [...]"] (Authors) The paper also contains references to Odonata and collecting data on Odonata (see tab. 13.4) observed in the framework of the ornithological study. For the full paper see. <http://www.gomr.mms.gov/homepg/regulate/environ/studies/2005/2005-009.pdf>] Address: U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, Public Information Office (MS 5034), 1201 Elmwood Park Boulevard, New Orleans, LA 70123-2394, USA
- 5655.** Rutherford, J.C.; Kefford, B.J. (2005): Effects of salinity on stream ecosystems: improving models for macroinvertebrates. CSIRO Land and Water Technical Report 22/05: 76 pp. (in English). ["Tab. 6. Summary of maximum salinity tolerance by lowest level of identification (species, genus or family) estimated from field observations of presence/absence using logistic regression. MFD = maximum salinity at which animal was observed in the field, outlier = salinity at which observations were ignored, 95%, 50% and 5%ile = salinity at which P = 95%, 50% and 5% of Po, count = total number of individuals in all samples, Po, á and â = model coefficients, 95%CI = confidence interval on 50%ile salinity, rms = root mean square error in predicted P" includes detailed data of 19 odonate taxa including the following species: *Ischnura heterosticta*, *Xanthagrion erythroneurum*, *Austrolestes analis*, *A. annulosus*, *Adversaeschna brevistyla*, *Hemianax papuensis*, *Austrogomphus australis*, *Hemicordulia tau*, *Diplacodes bipunctata*, *D. haematodes*, and *Orthetrum caledonicum*.] Address: Kefford, B.J., Dept Biotechnology & Environmental Biology, RMIT Univ., PO Box 71, Bundoora, 3083, Victoria, Australia. E-mail: ben.kefford@rmit.edu.au
- 5656.** Sahlen, G.; Hedström, I. (2005): The larva of *Mecistogaster linearis*, with notes on its abundance in lowland rainforest of Costa Rica (Odonata: Pseudostigmatidae). *International Journal of Odonatology* 8(1): 59-66. (in English). ["The larva of *Mecistogaster linearis* is described and illustrated from specimens collected within or near the Rio Dantas Wildlife Refuge at the north-western border of the Barbillia National Park on the Costa Rican Caribbean slope. Characters of F-0 larvae permit easy separation from *Megaloprepus caerulatus*, a species coexisting with *M. linearis*. Diagnostic characters include overall colour, shape of head, prementum and caudal gills. Exuviae may be determined using shape of mandibles. Two types of branched setae are present on tibiae and tarsi. Most are 3-branched but on front tarsi they are instead feather-shaped. It is suggested that these setae are used for eye-cleaning. *M. linearis* was a relatively rare but regularly occurring species in the study area throughout the 3-year study period."] (Authors) Address: Sahlén, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, S-752 36 Uppsala, Sweden. E-mail: goran.sahlen@set.hh.se
- 5657.** Schneider, A. (2005): Die Libellenfauna des Großen Serrahnsees und des Schweingartensees (Müritz-Nationalpark) - Inventarisierung und naturschutzfachliche Bewertung. *Naturschutzarbeit in Mecklenburg-Vorpommern* 48(2): 41-49. (in German). [Mecklenburg-Vorpommern, Germany, the publications intends to compare the present species spectrum with that of an inventarisation in the late 1960th, and to set a base-ment for a monitoring of the odonate fauna in the next years. A total of 32 species were recorded including *Leucorrhinia pectoralis*, *Epitheca bimaculata*, *Brachytron pratense*, *Coenagrion pulchellum*, *Anaciaeschna isoceles*, and *Somatochlora flavomaculata*.] Address: Schneider, Anne, Neuendorfer Str. 2c, D-17373 Uecker-münde, Germany
- 5658.** Scott, D.A. (2005): Reports from Coastal stations - 2004: Dursey Island, C. Cork. *Atropos* 24: 75-76. (in English). [*Sympetrum striolatum*] Address: not stated
- 5659.** Scott, M.A.; Scott, W.J.; Scott, T.R. (2005): Reports from coastal stations 2004: Longstone heritage Centre, St Mary's, Isles of Scilly. *Atropos* 25: 50-51. (in English). [UK; poor year for Odonata with only four species observed] Address: not stated
- 5660.** Solly, F. (2005): Reports from Coastal stations - 2004: Isle of Thanet. *Atropos* 24: 64-65. (in English). [*Sympetrum fonscolombii*, 16-VII-2004] Address: not stated
- 5661.** Sparmberg, H.; Kopetz, A.; Bößneck, U. (2005): Fauna und Flora des Feuchtgebietes zwischen Luisenhall, Nöda und Stotternheim (Stadt Erfurt und Landkreis Sömmerda/Thüringen). *Thüringer Faunistische Abhandlungen* 10: 43-101. (in German, with English summary). [Thuringia, Germany; 14 odonate species are listed from a salt meadow habitat complex. The date are compared with those of Rapp (1943), and include records of *Sympetrum flaveolum* and *Coenagrion mercuriale*.] Address: Bößneck, U., Stadtverwaltung Erfurt, Umwelt- und Naturschutzamt, Stauffenbergallee 18, D-99084 Erfurt, Germany
- 5662.** Spence, B. (2005): Reports from Coastal stations - 2004: The Spurn Area, East Yorkshire. *Atropos* 24: 71-72. (in English). [Five odonate species including *Sympetrum fonscolombii* are briefly commented.] Address: not stated
- 5663.** Srivastava, D.S.; Melnychuk, M.C.; Ngai, J.T. (2005): Landscape variation in the larval density of a bromeliad-dwelling zygopteran, *Mecistogaster modesta* (Odonata: Pseudostigmatidae). *International Journal of Odonatology* 8(1): 67-79. (in English). ["In the premon-tane rain forests of northwest Costa Rica, patches of secondary forest can contain high densities of large *Vriesea* spp. bromeliads. Such patches contain an average of  $6,470 \pm 1,080$  (s.e.) larvae ha<sup>-1</sup> of the bromeli-

ad-dwelling pseudostigmatid, *M. modesta*, ca 36x higher than larval densities that we previously reported for adjacent primary forest. Using a new method to partition landscape variation in populations, we show that secondary forest has higher larval densities than primary forest because of higher bromeliad abundance (13% of effect), greater bromeliad size (33%), and greater larval abundance in bromeliads of similar size (54%). The last effect reflects additional effects of forest type after accounting for differences in the quantity of larval habitat. We use surveys of prey communities in bromeliads and adult densities in the two forest types to show that these additional effects of forest type are more likely due to adult behaviour, not larval resource limitation. This study demonstrates that certain areas of secondary forest can be disproportionately important for *M. modesta* populations, and has implications for estimating effects of forest loss and conversion on *M. modesta*." (Authors)] Address: Srivastava, Diane S., Dept. of Zoology, University of British Columbia, 6270 University Boulevard, Vancouver, B.C. Canada V6T 1Z4. E-mail: [svrivast@zoology.ubc.ca](mailto:svrivast@zoology.ubc.ca)

**5664.** Subramanian, K.A. (2005): Dragonflies and Damselflies of Peninsular India - A Field Guide. Project Lifescape. Indian Academy of Sciences. Bangalore: 119 pp- (in English). ["The Indian subcontinent is one of the biologically richest regions of the world. Two global biodiversity hot spots, namely the eastern Himalayas and the Western Ghats, are in this region. Another biologically rich region, Sri Lanka, is just to the south of the subcontinent. The subcontinent is rich in odonates (damselflies and dragonflies); about 500 species are known. The dragonflies of the region are taxonomically well described thanks to the monumental work of Fraser. However, the natural history and distribution of most of the species is barely known. This lacuna is largely due to the lack of user-friendly field guides for amateur naturalists and students. As an initiative to generate interest in dragonflies among naturalists and students, Indian Academy of Sciences is publishing a field guide on the odonates of Peninsular India. The book is being published as part of Project Lifescape of the Academy. This project aims at producing user-friendly field guides and other resources to encourage field-based biology research among students. The book is divided into three parts. The first part gives a detailed account of the natural history of Odonata. The second part gives keys for the identification of odonate families for larval and adult stages. The third section gives species accounts for 26 damselflies and 34 dragonflies of Peninsular India. The book is lavishly illustrated with colour photographs or specimen scans of all the species described. In addition, the book also provides a checklist of odonates for the region (178 species) and a glossary of technical terms. The novelty of the book is provision of common English names of all species. The first edition of this book is entirely downloadable freely from this website." (Editor) The book is downloadable in three parts, each a PDF file: <http://www.ias.ac.in/initiat/scied/lifescape/odonates.html>].

**5665.** Suh, A.N.; Samways, M.J. (2005): Significance of temporal changes when designing a reservoir for conservation of dragonfly diversity. *Biodiversity and Conservation* 14(1): 165-178. (in English). ["While there has been much focus in biodiversity conservation that transcends place, few studies transcend time. Yet an appreciation of vegetational and hydrological successi-

on is essential for maintaining a habitat that has been created with the aim of conserving a particular group of organisms. This is a study of changes in a dragonfly assemblage over a period of 13 years at a biodiversity-rich, southern hemisphere reservoir. A total of 30 dragonfly species were recorded in this study, compared to 12 species before the reservoir was constructed in 1988, and 26 species in 1993, with 25 species resident in both 1993 and 2001. Two of these are local endemics. One other endemic was lost to succession in 1993 but reappeared in 2001. Three other species never reappeared after succession in 1993, yet six other species appeared after this date. Multivariate analyses identified structural and compositional vegetation, especially marginal forest, percentage vegetation cover, percentage shade, as the most important environmental variables determining dragonfly species composition. Other important environmental variables were grasses of tall, medium and short height categories, submerged vegetation, water flow and amount of open water. Not surprisingly, successional changes in vegetation physiognomy and in water conditions significantly increased Odonata species richness and diversity over the years. More importantly, the study shows that to maintain both high species richness, including endemics, it is essential to maintain a variety of biotopes using selective management of the marginal vegetation without allowing succession to proceed to a point where overgrowth of the bank and silting of the bottom begin to impoverish the fauna." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: [samways@sun.ac.za](mailto:samways@sun.ac.za)

**5666.** Svensson, E.I.; Abbott, J. (2005): Evolutionary dynamics and population biology of a polymorphic insect. *J. Evol. Biol.* 18: 1503-1514. (in English). ["Conspicuous heritable polymorphisms are useful to address the question if morph frequencies are stable or whether they fluctuate between generations. Ecological geneticists have studied colour polymorphisms in the past, but there are few long-term studies of genetic dynamics across multiple generations. We studied morph-frequency dynamics and female fecundity in the trimorphic blue-tailed damselfly (*Ischnura elegans*). The morphs include a male-coloured (androchrome) type of female, which is thought to be maintained by frequency-dependent sexual conflict. Morph frequencies changed significantly between years across all populations. There was evidence for directional frequency change since androchrome females increased in 9 of 10 populations across a 4-year period. There was heterogeneity between populations in their evolutionary trajectories, partly caused by population age: androchrome frequencies were initially high in young populations but gradually decreased and approached the level of old populations. We discuss the possible causes of morph-frequency fluctuations, and the role of morph-specific fecundity, dispersal and other forces influencing evolutionary dynamics in this system." (Authors)] Address: Svensson, E., Section for Animal Ecology, Ecology Building, Lund University, SE-223 62 Lund, Sweden. E-mail: [erik.svensson@zoekol.lu.se](mailto:erik.svensson@zoekol.lu.se)

**5667.** Svensson, E.I.; Abbott, J.; Härdling, R. (2005): Female polymorphism, frequency dependence, and rapid evolutionary dynamics in natural populations. *The American Naturalist* 165(5): 567-576. (in English). ["Rapid evolutionary change over a few generations has

been documented in natural populations. Such changes are observed as organisms invade new environments, and they are often triggered by changed interspecific interactions, such as differences in predation regimes. However, in spite of increased recognition of antagonistic male-female mating interactions, there is very limited evidence that such intraspecific interactions could cause rapid evolutionary dynamics in nature. This is because ecological and longitudinal data from natural populations have been lacking. Here we show that in a color-polymorphic damselfly species, male-female mating interactions lead to rapid evolutionary change in morph frequencies between generations. Field data and computer simulations indicate that these changes are driven by sexual conflict, in which morph fecundities are negatively affected by frequency- and density-dependent male mating harassment. These frequency-dependent processes prevent population divergence by maintaining a female polymorphism in most populations. Although these results contrast with the traditional view of how sexual conflict enhances the rate of population divergence, they are consistent with a recent theoretical model of how females may form discrete genetic clusters in response to male mating harassment." (Authors)] Address: Svensson, E., Section for Animal Ecology, Ecology Building, Lund University, SE-223 62 Lund, Sweden. E-mail: erik.svensson@zoekol.lu.se

**5668.** Tarr, T.L.; Baber, M.J.; Babbitt, K.J. (2005): Macroinvertebrate community structure across a wetland hydroperiod gradient in southern New Hampshire, USA. *Wetlands Ecology and Management* 13(3): 321-334. (in English). ["We conducted a field study to examine the influence of hydroperiod and concomitant changes in abiotic (wetland size, pH, conductivity, dissolved oxygen and water temperature) and biotic (predatory fish presence) characteristics on macroinvertebrate communities in isolated wetlands in southern New Hampshire. Invertebrates were sampled using dipnet sweeps in 42 wetlands with short (<4 months), intermediate (4–11 months) or long (permanent) hydroperiods in 1998 and 1999. We found that invertebrate genera richness, and to a lesser degree abundance, increased linearly along the hydrological gradient, and in response to temperature and dissolved oxygen. Relative abundance of genera also differed markedly with respect to hydroperiod. Most notably, invertebrate communities changed from Acilius-dominated communities to Notonecta-dominated communities. Invertebrate relative abundances in permanent wetlands also differed with respect to the occurrence of predatory fish. Some genera (e.g., Libellula, and Dytiscus) were more likely to occur in permanent wetlands without fish, whereas other genera (e.g., Buena, and Basiaeschna) were more likely to occur in wetlands with predatory fish. Because aquatic invertebrate communities differed markedly with respect to wetland hydroperiod, and in relation to the occurrence of predatory fish, it is essential to retain a diversity of wetlands in the landscape to ensure the long-term persistence of aquatic invertebrate biodiversity." (Authors)] Address: Babbitt, K. J., Email: kbabbitt@cisunix.unh.edu

**5669.** Teixeira, R.L.; Roldi, K.; Vrcibradic, D. (2005): Ecological comparisons between the sympatric lizards *Enyalius bilineatus* and *Enyalius brasiliensis* (Iguanidae, Leiosaurinae) from an Atlantic rain-forest area in southeastern Brazil. *Journal of Herpetology* 39(3): 504-509. (in English). ["Aspects of the ecology of the semi-

arboreal lizards *E. bilineatus* and *E. brasiliensis* were studied in a montane Atlantic forest region of Espírito Santo State, southeastern Brazil. Individuals of *E. bilineatus* were collected mainly in a coffee plantation, whereas *E. brasiliensis* was found only in the forest proper. *Enyalius brasiliensis* was significantly larger (up to 106 mm snout vent length, SVL) than *E. bilineatus* (up to 90 mm SVL). Both species were sexually dimorphic in body size, with females larger than males. The two species consumed a broad spectrum of prey but differed quantitatively in their diet composition. Ants and orthopterans dominated the diet of *E. bilineatus*, whereas *E. brasiliensis* preyed mainly on cockroaches and caterpillars. Clutch size of *E. bilineatus* varied from 2–6 (mean 5.44) and that of *E. brasiliensis* from 8–14 (mean 5.115). Ecological differences between the two species may result in differential susceptibilities to habitat perturbation, with *E. bilineatus* being more tolerant of disturbed areas and perhaps even benefitting from anthropic action, unlike the forest-dependent *E. brasiliensis*." (Authors) In table 2, one case of odonate prey in *E. bilineatus* is documented.] Address: Teixeira, R.L., Museu de Biologia Prof. Mello Leitao, Av. José Ruschi 4, 29650-000, Santa Teresa, ES, Brazil

**5670.** Ternois, V. (2005): *Leucorrhinia caudalis* (Charpentier, 1840): espèce nouvelle pour le Parc naturel régional de la Forêt d'Orient et l'Aube (Odonata, Anisoptera, Libellulidae). *Martinia* 21(3): 115-121. (in French, with English summary). [28-V-2004; documentation of the record, description of the habitat, and discussion of the regional distribution in northern France (Champagne-Ardenne).] Address: Ternois, V., CPIE du Pays de Soulaines, Domaine de Saint-Victor, F-10200 Soulaines-Dhuys, France. E-mail: cpie.pays.soulaines@wanadoo.fr

**5671.** Ternois, V.; Barande, S. (2005): *Oxygastra curtisii* (Dale, 1834) en région Champagne-Ardenne (Odonata, Anisoptera, Corduliidae). *Martinia* 21(1): 17-30. (in French, with English summary). [The authors present new records of *O. curtisii* from the Département Aube, France.] Address: Barande, S., ECOSPHERE, 3 bis rue de Remises, F-94100 St-Maur-des-Fossés, France. E-mail: ecosphere@wanadoo.fr

**5672.** Ternois, V. (2005): Sur la présence d'*Orthetrum albistylum* (Sélys, 1848) dans le Parc naturel régional de la Forêt d'Orient et le Nord-Est aubois (Odonata, Anisoptera, Libellulidae). *Martinia* 21(4): 59-68. (in French, with English summary). ["*O. albistylum* is considered as absent from Aube department. Nevertheless, observations of this species multiplied since 1998, and the author presents them.] Address: Ternois, V., CPIE du Pays de Soulaines, Domaine de Saint-Victor, F-10200 Soulaines-Dhuys, France. E-mail: cpie.pays.soulaines@wanadoo.fr

**5673.** Thirion, J.-M.; Beau, F.; Moncomble, M.; Couturier, S. (2005): Répartition de *Calopteryx haemorrhoidalis* *occasi* Capra, 1945 dans le département de la Charente-Maritime (Odonata, Zygoptera, Calopterygidae). *Martinia* 21(4): 169-174. (in French, with English summary). [*C. haemorrhoidalis occasi* was recorded in Charente-Maritime, France for the first time in June 1997. Since then, 44 new sites, mainly in the south half of the department, were found. An increase of the distribution area in the Poitou-Charentes region is interpreted as a probable consequence of climate warming.]



Address: Thirion, J.-M., Nature Environnement 17, avenue de Bourgogne, Groupe scolaire Descartes, Port Neuf, F-17000 La Rochelle, Frankreich

**5674.** Tourenq, C.; Barcelo, I.; Kumari, A.; Drew, C. (2005): The terrestrial mammals, reptiles and invertebrates of Al Wathba Wetland Reserve – A species list and status report. Terrestrial Environment Research Centre, Environmental Research & Wildlife Development Agency, P.O. Box 45553, Abu Dhabi: 29 pp. [A total of 9 species have been recorded at Al Wathba. Appendix 2 lists the following species: *Anax imperator*, *A. ephippiger*, *Pantala flavescens*, *Orthetrum sabina*, *Crocothemis erythraea*, *Diplacodes lefebvrei*, *Selysiothemis nigra*, *Trithemis annulata*, and *Ischnura evansi*.]

**5675.** Troake, P. (2005): Reports from coastal stations 2004: Gibraltar Point NNR, Lincolnshire. *Atropos* 25: 51- (in English). [UK; *Brachytron pratense* is listed without any comment] Address: not stated

**5676.** Tunmore, M. (2005): Adventures in the field: Holland and back. *Atropos* 25: 46-48. (in English). [Records of Lepidoptera and Odonata from an trip to the Netherlands in early August 2004 are briefly documented. *Enallagma cyathigerum* and *Ischnura elegans* have been attracted by light traps.] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: atropos@atroposed.freemove.co.uk

**5677.** Tunmore, M. (2005): Reports from Coastal stations - 2004: Lizard Peninsula, Cornwall. *Atropos* 24: 49-50. (in English). [2000 was a poor season for Odonata; only few records of *Sympetrum fonscolombii*.] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: atropos@atroposed.freemove.co.uk

**5678.** Urrutia, M. X. (2005): Riqueza de especies de Odonata zigoptera por unidades fisiográficas en el departamento del Valle del Cauca. *Boletín del Museo de Entomología de la Universidad del Valle* 6(2): 30-36. (in Spanish, with English summary). [Colombia; a total of 40 odonate taxa is documented, including 18 new for the department of Valle del Cauca.] Address: Urrutia, Maria Ximena, Entomología de la Universidad del Valle, Departamento de Biología, A.A. 25360 Cali, Colombia. E-mail: mxurrutia@gmail.com

**5679.** Vamosi, S.M. (2005): On the role of enemies in divergence and diversification of prey: a review and synthesis. *Can. J. Zool.* 83: 894-910. (in English, with French summary). ["Understanding the contribution of ecological interactions to the origin and maintenance of diversity is a fundamental challenge for ecologists and evolutionary biologists, and one that is currently receiving a great deal of attention. Natural enemies (e.g., predators, parasites, and herbivores) are ubiquitous in food webs and are predicted to have significant impacts on phenotypic diversity and on speciation, and extinction rates of their prey. Spurred by the development of a theoretical framework beginning in the late 1970s, there is now a growing body of literature that addresses the effects of enemy-prey interactions on the evolution of prey. A number of theoretical models predict that enemies can produce phenotypic divergence between closely related species, even in the absence of interspecific competition for resources. Effects on diversification of prey are more variable, and enemies may either en-

hance or depress speciation and extinction rates of their prey. Empirical evidences from a number of study systems, notably those involving predators and prey in aquatic environments and interactions between insects and flowering plants, confirm both predictions. There is now considerable evidence for the role of enemies, especially those that are size-selective or use visual cues when identifying suitable prey, on phenotypic divergence of sympatric and allopatric taxa. Enemies may spur diversification rates in certain groups under some circumstances, and hinder diversification rates in other cases. I suggest that further research should focus on the role of enemies in diversification of prey, with significant insights likely to be the product of applying traditional experimental approaches and emerging comparative phylogenetic methods." (Author) The paper compiles the results of Mark McPeck's studies related to the genus *Enallagma* in North America.] Address: Vamosi, S.M., Dept Biological Sciences, University of Calgary, 2500 University Drive NW, Calgary AB T2N 1N4, Canada. E-mail: smvamosi@ucalgary.ca

**5680.** van Kleef, J.; James, A.C.; Stange, G. (2005): A spatiotemporal white noise analysis of photoreceptor responses to UV and green light in the dragonfly median ocellus. *J. Gen. Physiol.* 126(5): 481-497. (in English). ["Adult dragonflies augment their compound eyes with three simple eyes known as the dorsal ocelli. While the ocellar system is known to mediate stabilizing head reflexes during flight, the ability of the ocellar retina to dynamically resolve the environment is unknown. For the first time, we directly measured the angular sensitivities of the photoreceptors of the dragonfly median (middle) ocellus. We performed a second-order Wiener Kernel analysis of intracellular recordings of light-adapted photoreceptors. These were stimulated with one-dimensional horizontal or vertical patterns of concurrent UV and green light with different contrast levels and at different ambient temperatures. The photoreceptors were found to have anisotropic receptive fields with vertical and horizontal acceptance angles of 15° and 28°, respectively. The first-order (linear) temporal kernels contained significant undershoots whose amplitudes are invariant under changes in the contrast of the stimulus but significantly reduced at higher temperatures. The second-order kernels showed evidence of two distinct nonlinear components: a fast acting self-facilitation, which is dominant in the UV, followed by delayed self- and cross-inhibition of UV and green light responses. No facilitatory interactions between the UV and green light were found, indicating that facilitation of the green and UV responses occurs in isolated compartments. Inhibition between UV and green stimuli was present, indicating that inhibition occurs at a common point in the UV and green response pathways. We present a nonlinear cascade model (NLN) with initial stages consisting of separate UV and green pathways. Each pathway contains a fast facilitating nonlinearity coupled to a linear response. The linear response is described by an extended log-normal model, accounting for the phasic component. The final nonlinearity is composed of self-inhibition in the UV and green pathways and inhibition between these pathways. The model can largely predict the response of the photoreceptors to UV and green light." (Authors)] Address: Stange, G., Centre for Visual Sciences, Research School of Biological Sciences, Australian National University, Canberra, ACT 2601, Australia. E-mail: gert.stange@anu.edu.au

- 5681.** Vasilenko, D.V. (2005): New damselflies (Odonata: Synlestidae, Hemiphlebidae) from the mesozoic Transbaikalian locality of Chernovskie Kopi. *Paleontological Journal* 39(3), translated from *Paleontologicheskii Zhurnal*, No. 3, 2005, pp. 55-58: 280-283. (in English). ["Two new genera and two new species, *Gaurimacia sophiae* gen. et sp. nov. (Synlestidae) and *Mersituria ludmilae* gen. et sp. nov. (Hemiphlebidae), are described from the Mesozoic locality of Chernovskie Kopi in eastern Transbaikalia. The Odonata assemblage of Chernovskie Kopi is analyzed." (Author)] Address: Vasilenko, D.V., Chita State University, ul. Aleksandro-Zavodskaya 30, Chita, 672039 Russia. E-mail: lab@palaeontolog.ru
- 5682.** Villa, D. (introduced by) (2005): A bill for an act entitled: "An act designating the Western Meadowhawk, *Sympetrum occidentale*, as the official insect of the State of Montana." Authorized Print Version - HB 390; <http://data.opi.state.mt.us/bills/2005/BillPdf/HB0390.pdf>: 1 pp- (in English). ["59th Legislature HB0390.01 HOUSE BILL NO. 390: "WHEREAS, the western meadowhawk combats other insect pests, and in so doing combats the spread of diseases like West Nile virus; and WHEREAS, the western meadowhawk is a master aviator of the Big Sky, able to fly forward, backward, sideways, and diagonally; and WHEREAS, this dragonfly is native to Montana, predating all human life here; and WHEREAS, to Indians the western meadowhawk symbolizes pure water and is included in Indian drawings of water; and WHEREAS, in other cultures the western meadowhawk represents durability, adaptability, power, and freedom, all of which are apt symbols of Montana, be it enacted by the legislature of the State of Montana. NEW SECTION. Section 1. State insect. The dragonfly known as the western meadowhawk, *Sympetrum occidentale*, as preferred by a vote of Montana schoolchildren, is the official Montana state insect. NEW SECTION. Section 2. Codification instruction. [Section 1] is intended to be codified as an integral part of Title 1, chapter 1, part 5, and the provisions of Title 1, chapter 1, part 5, apply to [section 1]. END"]
- 5683.** Vogelkundlicher Arbeitskreis und Arbeitskreis für Ornithologie und Naturschutz der Volkshochschule Ludwigshafen am Rhein (2005): Bisher registrierte Tiere und Pflanzen im Bereich des "Hansenbusch" unter besonderer Berücksichtigung des "Schleusenloch" an der Nordgrenze der Stadt Ludwigshafen. Eine Bestandsaufnahme für die Zeit von 1985 bis 2005. 40 Jahre Vogelkundlicher Arbeitskreis und Arbeitskreis für Ornithologie und Naturschutz der Volkshochschule Ludwigshafen am Rhein: 23 pp. (in German). [On pages 15 to 16, the brochure contains a checklist of the Odonata (34 species, compiled by Jürgen Ott, Trippstadt.)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de
- 5684.** Wang, J.-K.; Sun, M. (2005): A computational study of the aerodynamics and forewing-hindwing interaction of a model dragonfly in forward flight. *The Journal of Experimental Biology* 208: 3785-3804. (in English). ["The aerodynamics and forewing-hindwing interaction of a model dragonfly in forward flight are studied, using the method of numerically solving the Navier-Stokes equations. Available morphological and stroke-kinematic parameters of dragonfly (*Aeshna juncea*) are used for the model dragonfly. Six advance ratios ( $J$ ); ranging from 0 to 0.75) and, at each  $J$ , four forewing-hindwing phase angle differences ( $\delta$ ; 180°, 90°, 60° and 0°) are considered. The mean vertical force and thrust are made to balance the weight and body-drag, respectively, by adjusting the angles of attack of the wings, so that the flight could better approximate the real flight. At hovering and low  $J$  ( $J=0, 0.15$ ), the model dragonfly uses separated flows or leading-edge vortices (LEV) on both the fore- and hindwing downstrokes; at medium  $J$  ( $J=0.30, 0.45$ ), it uses the LEV on the forewing downstroke and attached flow on the hindwing downstroke; at high  $J$  ( $J=0.6, 0.75$ ), it uses attached flows on both fore- and hindwing downstrokes. (The upstrokes are very lightly loaded and, in general, the flows are attached.) At a given  $J$ , at  $\delta=180^\circ$ , there are two vertical force peaks in a cycle, one in the first half of the cycle, produced mainly by the hindwing downstroke, and the other in the second half of the cycle, produced mainly by the forewing downstroke; at  $\delta=90^\circ, 60^\circ$  and  $0^\circ$ , the two force peaks merge into one peak. The vertical force is close to the resultant aerodynamic force [because the thrust (or bodydrag) is much smaller than vertical force (or the weight)]. 55-65% of the vertical force is contributed by the drag of the wings. The forewing-hindwing interaction is detrimental to the vertical force (and resultant force) generation. At hovering, the interaction reduces the mean vertical force (and resultant force) by 8-15%, compared with that without interaction; as  $J$  increases, the reduction generally decreases (e.g. at  $J=0.6$  and  $\delta=90^\circ$ , it becomes 1.6%). A possible reason for the detrimental interaction is as follows: each of the wings produces a mean vertical force coefficient close to half that needed for weight support, and a downward flow is generated in producing the vertical force; thus, in general, a wing moves in the downwash-velocity field induced by the other wing, reducing its aerodynamic forces.] Address: Sun, M. Ministry-of-Education Key Laboratory of Fluid Mechanics, Institute of Fluid Mechanics, Beijing University of Aeronautics and Astronautics, Beijing 100083, People's Republic of China. E-mail: m.sun@263.net
- 5685.** Webb, J. (2005): Dragonfly Conservation from the BDS. *Atropos* 26: 48-49. (in English). [The relevance of Odonata as bioindicators is briefly outlined.] Address: not stated
- 5686.** Wildermuth, H.; Horvath, G. (2005): Visual deception of a male *Libellula depressa* by the shiny surface of a parked car (Odonata: Libellulidae). *International Journal of Odonatology* 8(1): 97-105. (in English). ["A male *L. depressa* was observed to mistake a dark-green passenger coach for a water body thus establishing his territory over the surface of the vehicle and using the radio antenna as perch. A videopolarimetric analysis of the car body showed that the light reflected from the bonnet was highly and horizontally polarized with rather similar polarizational characteristics in the red, green and blue part of the spectrum. It is concluded that the insect was deceived by the reflected horizontally polarized light resembling the corresponding pattern at a plane water surface." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch
- 5687.** Wilson, K.D.P. (2005): Odonata of Guangxi Zhuang Autonomous Region, China, part II: Anisoptera. *International Journal of Odonatology* 8(1): 107-168. ["Taxonomic and faunistic information is provided on the Anisoptera of Guangxi Zhuang Autonomous Regi-

on, China. The genus *Atratothermis* is established to receive a newly discovered libellulid species *A. reelsi* sp. nov. belonging to the subfamily Pantalinae. *Oligo-aeschna aquilonaris* sp. nov., *Periaeschna rotunda* sp. nov., *Petaliaeschna gerrhoni* sp. nov. and *Asiagomphus giza* sp. nov. are described. The first males of *Stylurus erectocornis* and *Nihonogomphus huangshaensis* and the first female of *Macrogomphus guilinensis* are described. *Diplacodes bipunctata* and *Idionyx unguiculata* are recorded from mainland China for the first time. *Somatochlora taiwana* is synonymised with *S. dido*. (Author)] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: wilsonkd@ntlworld.com

**5688.** Wilson, K.D.P. (2005): The Dragon Hunter. National Geographic Explorer September 2005: 4-9. (in English). [This is an introduction to dragonflies for kids. For details see: <http://magma.nationalgeographic.com/ngexplorer/0509/articles/mainarticle.html>. Additional material for teachers is available at: <http://magma.nationalgeographic.com/ngexplorer/0509/ax/teachersguide0509.pdf>] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: wilsonkd@ntlworld.com

**5689.** Wilson, R.S.; Kraft, P.G.; Van Damme, R. (2005): Predator-specific changes in the morphology and swimming performance of larval *Rana lessonae*. *Functional Ecology* 19(2): 238-244. (in English). ["1. We investigated the morphological responses of larval *Rana lessonae* to the presence of two predators with substantially different prey-detection and capture techniques; larval dragonflies (*Aeshna cyanea*) and the Pumpkinseed Sunfish (*Lepomis gibbosus*). 2. We also examined the functional implications of any predator-induced morphological variation on their swimming ability by assessing performance during the initial stages of a startle response. 3. We found the morphological responses of larval *R. lessonae* were dependent on the specific predator present. Tadpoles raised in the presence of dragonfly larvae preying upon conspecific tadpoles developed total tail heights 5.4% deeper and tail muscles 4.7% shallower than tadpoles raised in a non-predator environment, while tadpoles raised with sunfish possessed tails 2% shallower and tail muscles 2.5% higher than non-predator-exposed tadpoles. 4. Predator-induced morphological variation also significantly influenced swimming performance. Tadpoles raised with sunfish possessed swimming speeds 9.5 and 14.6% higher than non- and dragonfly predator groups, respectively. 5. Thus, the expression of these alternative predator-morphs leads to a functional trade-off in performance between the different environments." (Authors)] Address: Wilson, R.S., School of Integrative Biology, The University of Queensland, St. Lucia, QLD 4072, Australia. E-mail: rwilson@zen.uq.edu.au

**5690.** Worthington, A.; Haggert, K.; Loosemore, M. (2005): Seasonality of prey size selection in adult *Sympetrum vicinum* (Odonata: Libellulidae). *International Journal of Odonatology* 8(1): 169-176. (in English). ["*S. vicinum* is a sit and wait predator, which takes off and pursues small flying insects during its long flying season (July to November). We investigated whether foraging individuals become less discriminating regarding prey size selection during the fall season because the changeable fall weather has an impact on the prey population. To investigate the seasonality of prey size se-

lection, we videotaped prey capture flights of females and teneral males chasing artificial prey of known sizes (1-8 mm beads) from September to October in 2002 and 2003 in upstate New York, USA. We calculated the probability of pursuit for each bead size and measured the distance of the bead at the time of takeoff (213 presentations in 2002 and 383 presentations in 2003). We found that 2 mm beads had the highest probability of eliciting takeoff in both years and throughout the study periods. Weather conditions, especially the early first hard frost in 2003, reduced prey abundance. *S. vicinum* opportunistically pursued a wide variety of prey sizes. The probability of pursuit of larger beads (3-5 mm) increased in late fall, but *S. vicinum* never pursued 8 mm beads. The mechanism of distance perception and therefore size detection is not known in Odonata and yet *S. vicinum* in this study is showing a preference for 2 mm beads no matter what the distance of the bead from the perch." (Authors)] Address: Worthington, Andrea, Department of Biology, Siena College, Loudonville, NY 12211, USA. E-mail: Worthington@siena.edu

**5691.** Zha, L.S.; Zhang, D.-Z.; Zheng, Z.M. (2005): The genus *Gomphidia* Selys in China (Odonata, Gomphidae). *Acta Zootaxonomica Sinica* 30(4): 812-814. (in English, with Chinese summary). [The paper deals with 4 species (*G. confluens*, *G. kelloggi*, *G. kruegeri*) and 1 subspecies (*G. kruegeri fukiensis*) of the genus *Gomphidia* Selys in China. *Gomphidia interruptistria* is described as new to science. The type specimen (male, 24-VII-2004, Yaoqu, Mengla, Yunnan, China) is deposited at the Institute of Zoology, Shaanxi Normal University, Xi'an, China. A key to the Chinese species of the genus is provided.] Address: Zha, L.-S., Institute of Zoology, Shaanxi Normal University, Xi'an 710062, China. E-mail: lingshengzha@stu.snnu.edu.cn

**5692.** Zhang, D.-Z.; Zheng, Z.-M. (2005): Application of molecular genetic marker technique in Odonata studies. *Chinese Bulletin of Entomology* 42(2): 123-127. (in Chinese, with English summary). ["The techniques of molecular biology were used extensively in insects systematics in recent years. There are decades of molecular genetic markers, some of which have been used in Odonata systematics. The methods used in this aspect include Isozyme, AFLP, RAPD, DNA sequencing and DNA probe etc." (Authors)] Address: Zhang, D.-Z., 11 College of Life Sciences, Ningxia University, Yinchuan, 750021, China. E-mail: zhangdazhi22443@163.com

**5693.** Zhou, X.; Zhou, W.-b (2005): A new species of the *Indolestes* from Guizhou province of China (Odonata: Lestidae). *Wuyi Journal of Science* 21: 13-15. (in Chinese, with English summary). ["Type specimens" of *Indolestes guizhouensis* sp. nov. are deposited in the Zhejiang Museum of Natural History. "Measurements (mm): male Abd + app. 38mm, hind wing. 28mm. The new species is similar to *Indolestes gracilis* (Hagen), but can be easily separated from the latter by: 1) outer side of the hinder ocelli with two small triangular green spots; 2) abdomen azure blue marked with black, segments 3 and 4 with the apical quarter black, segment 5 with the apical third black, segment 6 with the two fifth black, segments 7 to 9 almost entirely black." (Authors)] Address: Zhou, X., Zhejiang Museum of Natural History, Hangzhou, Zhejiang 310012, China



**5694.** Zhou, X.; Zhou, W.-b.; Lu, S.-x. (2005): Two new species of Onychogomphinae (Odonata: Gomphidae) from Yunnan province, China. *Entomotaxonomia* 27(1): 1-4. (in Chinese, with English summary). [Nychnogomphus lui Zhou, Zhou & Lu 2005: Holotype: male, Malipo County, Wenshan Miaozu Autonomous Prefecture, Yunnan Province, 28-V-2000, coll. LU Sheng-xian; Paratypes: 2 males same data as holotype.; *Scalmogomphus wenshanensis* Zhou, Zhou & Lu 2005: Holotype: male, Malipo County, Wenshan Miaozu Autonomous Prefecture, Yunnan Province, 28-V-2000, coll. LU Sheng-xian; Paratype: female, same data as holotype.] Address: Zhou, W.-b., Zhejiang Mus. Nat. Hist., Gushan, Hanzhou-310012, P.R. China

**5695.** Zhu, H.-q.; Chen, S. (2005): A new species of the genus *Macromia* Rambur (Odonata: Corduliidae) from Beijing area, China. *Entomotaxonomia* 27(3): 161-164. (in Chinese, with English summary). ["*Macromia beijingensis* sp. nov. is described and illustrated from Beijing China. It is similar to *M. amphigena* fraenata Martin, different from the latter as follows: 1) base of labrum marked with a light yellow spot, and without dorsal spot on the antefrons; 2) abdominal segment X with a pair of dorsal conical spines in the male; 3) the "head" and "neck" of posterior hamulus rather robust. and with a longer apical claw; 4) abdominal segment II with the yellow stripe and lateral stripe more or less interrupted in the female, and both of the stripes on abdominal segments III, IV are always confluence. Holotype: male, Zhuijiuyu, Changping Region, Beijing, 21-VI-2002, leg. CHEN Si; Paratypes: 1 female, 05-V-2004, 1 male 25-VII-2004, Zhuijiuyu, Changping Region, Beijing City, leg. CHEN Si." (Authors)] Address: Zhu Hui-qian, Shanxi University, 42-38, Taiyuan, Shanxi 030006, China

## 2006

**5696.** Abbott, J. (2006): Dragonflies and Damselflies (Odonata) of Texas, Volume I. Lulu. Press. ISBN: 1-4116-6525-2: 328 pp. (in English). [Damselflies and Dragonflies (Odonata) of Texas is an indispensable reference to the 223 species of odonates distributed throughout the Lone Star state. Included in this volume are detailed species distribution and seasonality information arranged so that users can quickly and easily search by scientific name, county name, or flight season. A variety of articles are also included on the natural history, collection and preservation, and diversity of Texas odonates. Whether using the book to find new species records in the deserts of west Texas or perusing articles in the comfort of your home, this volume is an essential guide for both life-long and budding odonatologists alike. The following contributions are written by John Abbott: "Collection Guidelines for the Odonata Survey of Texas", "The Dragonfly Society of the Americas Guidelines for Collecting", "Specific Collecting & Preservation Instructions", "Guidelines for Field Notes & Data Recording", "History of Odonata Study in the South-central U.S.", "Odonata Field Guides, Resources, Societies, & Suppliers", "Life History & Morphology of Odonata", "Seasonality of Odonata in Texas", "Statistical Summary of Odonata in Texas", "Abundance & Distribution of Texas Odonata", "Diversity of Texas Odonata by County", "Checklist of Dragonflies & Damselflies

of Texas", "Dragonflies & Damselflies of Texas Listed by County", "Distribution Maps of Texas Odonata", "Glossary of Terms Relating to Odonata", and "Index to Maps". The following papers are from different authors: "OdonataCentral.com: A model for the Web-based Delivery of Natural History Information and Citizen Science (J.C. Abbott & D. Broglie)", "Hornsby Bend - It's Not Just Birds (G.W. Lasley)", "Turquoise-tipped Darner (*Rhionaeschna psilus*): Backyard Surprise, D. Hardy)", "The Odonata of Kerr County and the Guadalupe River System of Texas (T. Gallucci)". This competently written book is a solid basement for all future odonatological study in Texas, USA. The missing information - basically a bibliography on the Texan Odonata - will come soon, I am quite sure. (Martin Schorr)] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**5697.** AK Libellen NRW (2006): Libellen in Deutschland. 25. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen (GdO) e.V.. 17.-19. März 2006, Essen. <http://www.nua.nrw.de/oeffentl/publikat/pdfs/nuaheft18.pdf>: 53 pp. (in German, some in English). [Abstracts of the 25 meeting of the Society of German-speaking Odonatologists in Essen, 17.-19 March 2006. Free available at: <http://www.nua.nrw.de/oeffentl/publikat/pdfs/nuaheft18.pdf>] Address: Conze, K.-J., Listerstr. 13, D-45147 Essen, Germany. E-mail: Klaus-Juergen.Conze@t-online.de

**5698.** Amjad, H. (2006): Dragonflies of West Virginia. Lulu-Press. ISBN: 978-1-4116-8145-3: 163 pp. (in English). [The dragonflies of West Virginia called a "Festschrift dedicated to Carl Cook" is less a book than a collection of brief notes on dragonfly biology and other dragonfly affairs, and pictures of the species in any quality available. Compared with alternative treatises on the odonate state fauna in USA, this books lacks in nearly everything what makes a usefull contribution to odonatology: no maps, no checklists, no competent bibliography, many insufficient pictures and colour photos etc. I am very sorry, but the book on the West Virginian Odonata first has to be written. This attempt is not more than a very first draft to a solid regional fauna. (Martin Schorr) More usefull is the e-book from the same author: <http://www.wvdragonfly.us/wvdragonfly.pdf>] Address: <http://books.lulu.com/content/218176>

**5699.** Baird, I.R.C.; Ireland, C. (2006): Upright emergence in *Petalura gigantea* (Odonata: Petaluridae). *International Journal of Odonatology* 9(1): 45-50. (in English). ["During the 2003/2004 summer flying season, upright emergence of a male *Petalura gigantea* was observed and photographed in the Blue Mountains of New South Wales during an extensive survey for the species. This observation differed from the only previous illustration of a hanging back emergence style, and is compared with observations of emergence style for the other Petaluridae. While the earliest accounts illustrated or suggested a hanging back emergence style in *P. gigantea*, *Uropetala chiltoni* and *Tanypteryx hageni*, upright emergence has subsequently been documented in *T. pryeri*, *U. carovei* and *Tachopteryx thoreyi*. The observation of upright emergence in *P. gigantea* reported in this paper further suggests that upright emergence may be the norm for all petalurids. However, additional observations will be necessary to resolve the question of emergence style within the Petaluridae."]

(Authors)] Address: Baird, I.R.C., 3 Waimea St, Ka-  
toomba NSW 2780, Australia. E-mail: ianbaird@mount-  
tains.net.au

**5700.** Beckemeyer, R.J. (2006): Hind wing fragments of *Meganeuropsis* (Protodonata: Meganeuridae) from the Lower Permian of Noble County, Oklahoma. *Bulletin of American Odonatology* 9(3/4): 85-89. (in English). ["Meganeurid Protodonata of the genera *Meganeura* (Carboniferous: Commentry, France) and *Meganeuropsis* (Permian: Wellington Formation, USA) are the largest insects known to have ever flown, with wing lengths equal to or greater than 300 mm. Specimens of such wings are relatively rare. A fragment of a 38 mm by 75 mm portion of the anal region of the hind wing of a *Meganeuropsis* griffenfly from the Wellington Formation of Noble County, Oklahoma, is figured and described." (Author)] Address: Beckemeyer, R.J., Research Associate, Johnston Geology Museum, Emporia State University, Emporia, KS 66801, USA. E-mail: royb@southwind.net

**5701.** Bogunski, G. (2006): Ergebnisse der entomologischen Untersuchungen im LSG „Koberbachgrund“ bei Langenreinsdorf / Crimmitschau im Kreis Zwickauer Land im Jahre 2003. *Mitt. Sächs. Entomol.* 73: 24-40. (in German). [Sachsen, Germany; 17 odonate species are listed and briefly commented.] Address: Bogunski, G., Gartenstr. 10, 08141 Reinsdorf, Germany

**5702.** Brodin, T.; Mikolajewski, D.J.; Johansson, F. (2006): Behavioural and life history effects of predator diet cues during ontogeny in damselfly larvae. *Oecologia* 148(1): 162-169. (in English). ["A central issue in predator-prey interactions is how predator associated chemical cues affect the behaviour and life history of prey. In this study, we investigated how growth and behaviour during ontogeny of a damselfly larva (*Coenagrion hastulatum*) in high and low food environments was affected by the diet of a predator (*Aeshna juncea*). We reared larvae in three different predator treatments; no predator, predator feeding on conspecifics and predator feeding on heterospecifics. We found that, independent of food availability, larvae displayed the strongest anti-predator behaviours where predators consumed prey conspecifics. Interestingly, the effect of predator diet on prey activity was only present early in ontogeny, whereas late in ontogeny no difference in prey activity between treatments could be found. In contrast, the significant effect of predator diet on prey spatial distribution was unaffected by time. Larval size was affected by both food availability and predator diet. Larvae reared in the high food treatment grew larger than larvae in the low food treatment. Mean larval size was smallest in the treatment where predators consumed prey conspecifics, intermediate where predators consumed heterospecifics and largest in the treatment without predators. The difference in mean larval size between treatments is probably an effect of reduced larval feeding, due to behavioural responses to chemical cues associated with predator diet. Our study suggests that anti-predator responses can be specific for certain stages in ontogeny. This finding shows the importance of considering where in its ontogeny a study organism is before results are interpreted and generalisations are made. Furthermore, this finding accentuates the importance of long-term studies and may have implications for how results generated by short-term studies can be used." (Authors)] Address: Brodin, T.,

Department of Ecology and Environmental Science, Animal Ecology, Umeå University, 90187 Umeå, Sweden. Email: tomas.brodin@emg.umu.se

**5703.** Buczyński, P.; Buczyńska, E.; Kasjaniuk, A. (2006): Dragonflies (Odonata) and caddisflies (Trichoptera) of the nature reserve "Magazyn" (Western Polesie). *Parki nar. Rez. Przyr.* 24(2005): 117-130. (in Polish, with English summary). ["The nature reserve "Magazyn", with valuable aquatic and peat bog vegetation, protects the belt of marshes on the edge of the Sobibór Forests and the River Bug valley. Thirty three dragonfly species and sixteen caddisfly species were recorded within the reserve in the years 1999, 2002 and 2003. The most important habitat for the development of aquatic insects in the reserve was the permanent dystrophic water body dammed by the dike. The fauna of this habitat was similar to the fauna of peat bog lakes. The remaining habitats were of astatic character and they dried out in dry summers. The species richness of dragonfly fauna (46% of Polish fauna and 49% of the Lublin region) was associated with the following facts: many species were recognized as highly acid tolerant and the populations of the reserve were supplied with specimens from species-rich surface water that surrounds the area. The poverty of caddisfly fauna (6% of Polish fauna and 15% of the Lublin region one) results probably from specific water chemistry and poor variation in habitats. The nature reserve "Magazyn", important for the protection of flora and some groups of animals (leeches, aquatic beetles, fish, reptiles), has small significance for the protection of the examined insect groups. Nevertheless, it may play the role of an important component of the water network of middle-eastern Poland with well preserved types of marshy and aquatic habitats." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**5704.** Corbet, P.S.; Suhling, F.; Soendgerath, D. (2006): Voltinism of Odonata: a review. *International Journal of Odonatology* 9(1): 1-44. (in English). ["We classified 542 records of voltinism for 275 species and subspecies of Odonata according to three variables: geographical latitude, systematic position and habitat type. We sorted records according to voltinism – categories being three or more generations per year, two generations per year, one generation per year, one generation in two years and one generation in three or more years. We sought to correlate the voltinism of each record with latitude of the study site, thus demonstrating an overall negative correlation between voltinism and latitude. After allowing for phylogenetic similarity a negative correlation remains, although it decreases in strength after removal of taxonomic correlates, mainly between family and genus levels. A negative correlation exists at the species level within most families, with the exception of Lestidae. In genera for which we lacked data for latitudes 0-31°N/S no significant correlation between latitude and voltinism exists. In temporary waters most species complete at least one generation per year; most species in lentic perennial waters complete one generation or fewer; and the majority of species in lotic waters complete half a generation or less. We discuss the roles of exogenous and endogenous factors in influencing voltinism and identify those that may be affecting the correlation that the data reveal. We suggest projects that could improve un-

derstanding of voltinism in the context of seasonal regulation and the main types of odonate life cycle so far recognised." (Authors)] Address: Corbet, P.S., Crean Mill, St. Buryan, Cornwall TR19 6HA, UK. E-mail: mail@pcorbet.vispa.com

**5705.** Diaz de Pascual, A.; Guerrero, C. (2006): Diet of *Rana catesbeiana* (Shaw 1802: Ranidae: Amphibia) introduced into the Andes of Venezuela. 2006 Joint Meeting of Ichthyologists and Herpetologists July 12-17, 2006 : (in English). [Verbatim: Considering the predation of this invasive frog species on native amphibian population, we identified prey items in the diet of *Rana catesbeiana* in the Andes of Merida. During March to June of 2001, frogs were collected in a private Lagoon located at 3300 m of altitude by hand, nets and air-rifle. In total 337 stomach contents were examined. 474 prey items were found in their stomach content. This frog was deliberately introduced into the Andes of Merida, Venezuela in the decade of 1990 s without knowing up till now the purpose of its introduction. By the time of the preparation of this report, dense populations of the species occupy more than 20 freshwater habitats such as ponds, marshes, ditches and irrigation canals between an altitude of 1800 to 2600 m. Their population is spreading rapidly occupying all aquatic habitats available within a ratio of 4.3 Km from the dispersion center (Diaz de Pascual and Chacon-Ortiz, 2002). Individuals of this species were examined for the presence of *Batrachochytrium dendrobatidis* (Chytridomycosis) and 96% of the recently metamorphosed individuals were positive for the fungal disease (Hanselman R. et al, 2004). Frogs were dissected to get their stomachs and place the gut content on formalin 10%. They were divided in four age categories based on size as: Recently metamorphosed, juveniles, sub-adults and adults. We presented the data in terms of percentage of preys per each group category. The bullfrog diet varied among age groups: Stomachs of Recently metamorphosed individuals contained mainly Hymenoptera and Odonata, made up the proportion of 29.03% each, Diptera larvae (20.96%), Coleoptera unidentified (9.67%) and snails from Planorbidae family (8.06%). Juvenile diet consisted of Coleoptera (28.29%), Hymenoptera (22.36%), Odonata (9.21%), Homoptera (9.87%) and fish (5.26%). Sub-adult diet was composed of Coleoptera (34.26%), Hymenoptera (13.48%), Odonata (12.35%), Diptera (6.18%) and bullfrog juveniles (2.24%) and fish (6.18%). Adult bullfrogs contained juvenile and tadpoles of its own species (31.70%), fish from the species *Poecilia reticulata* (7.32%), Coleoptera (17.76%) and Odonata (14.63%). Diet differences] Address: Diaz de Pascual, Amelia, Universidad de Los Andes, Dept. Biología, Merida, Venezuela, 5101

**5706.** Dijkstra, K.-D.; Vick, G.S. (2006): Inflation by venation and the bankruptcy of traditional genera: the case of *Neodythemis* and *Micromacromia*, with keys to the continental African species and the description of two new *Neodythemis* species from the Albertine Rift (Odonata: Libellulidae). *International Journal of Odonatology* 9(1): 51-70. (in English). ["The Afrotropical 'neodythemistine' genera are an example of venation-biased classification in Odonata. This example is used to argue the bankruptcy of some traditional classifications in the order, particularly in the Libellulidae, and the need to apply alternative characters to define genera. Two groups of Afrotropical 'neodythemistines' are identified by male and female genitalia, supported by colour

patterns, and these correspond to the only two genera which we retain: *Micromacromia* and *Neodythemis*. A new classification is proposed on this basis: *Eothemis* and *Monardithemis* are synonyms of *Micromacromia*; *E. zygoptera* and *M. flava* are transferred to *Micromacromia*; *Neodythemis scalarum* is a synonym of *M. zygoptera*. *Allorrhizucha* and *Mesumbethemis* are synonyms of *Neodythemis*; *A. campioni*, *A. klingi*, *A. preussi*, *M. takamandensis* and *Micromacromia afra* are transferred to *Neodythemis*; *N. africana* and *N. gorillae* are synonyms of *N. afra*. A checklist of Afrotropical 'neodythemistine' species and a key to the continental species is provided. Two new *Neodythemis* species are described from the Albertine Rift; *N. munyaga* sp. nov. (holotype male: Uganda, Bwindi Impenetrable National Park, Buhoma, Munyaga Valley, alt. ca 1,600 m a.s.l., 17 v 2003) and *N. nyungwe* sp. nov. (holotype male: Rwanda, Nyungwe National Park, Karamba, alt. ca 1,500 m a.s.l., 28 x 1985)." (Authors)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**5707.** Endersby, I. (2006): Bibliography of Victorian Dragonflies (Insecta: Odonata). Arthur Rylah Institute for Environmental Research, Technical Report Series 157. Dept Sustainability & Environment, Melbourne. ISBN 1 74152 439 3: 33 pp. (in English). [166 papers with reference to Odonata in Victoria, Australia are compiled in this study. The literature is divided into a number of periods ranging from 'Pre-1900' to 2001-2005, and documenting in a table the progress that was made on different subjects in the regional odonatology (taxonomy, biology etc.). Each of the periods briefly focused on significant studies or odonatologists. The second part of the study lists the regional species and their relevant citations in chronological order. Part 3 lists all publications / references on Victorian Odonata.] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@mira.net

**5708.** Ferro, M.L.; Sites, R.W. (2006): Description of the larva of *Gomphidictinus perakensis* (Laidlaw) (Odonata: Gomphidae), with distributional notes. *Proceedings of the Entomological Society of Washington* 108 (1): 76-81. (in English). ["The final instar of *G. perakensis* is described and figured from exuviae and larval specimens collected in Chiang Mai, Kanchanaburi, Prachuap Khiri Khan, and Surat Thani provinces in Thailand. This large species is flattened, subovate, and the posterolateral corners of abdominal segments III-IX have an elongate, broadly-recurved flange. Distributional information is given concerning additional collections of adults, larvae, and exuviae from Thailand." (Authors)] Address: Ferro, M.L., Enns Entomology Museum, Department of Entomology, University of Missouri, Columbia, Missouri 65211, U.S.A. E-mail: spongy-mesophyll@gmail.com

**5709.** Fleck, G.; Orr, A.G. (2006): Une larve du genre remarquable *Nannophyopsis* Lefitinck, 1935. Importance pour la phylogénie de la famille (Insecta: Odonata: Anisoptera: Libellulidae). *Ann. Naturhist. Mus. Wien* 107 B: 121-130. (in French, with English and German summaries) ["A remarkable larva of the penultimate stadium of the genus *Nannophyopsis* Lefitinck, 1935, tentatively attributable to *Nannophyopsis chalcosoma* Lefitinck, 1935, is described and illustrated. It is briefly compared with that of *N. clara* (Needham, 1930). Several highly derived characters present in this larva are al-



so present in the larvae of *Diastatops Rambur*, 1842, suggesting a close relationship between these two genera presently placed in different subfamilies." (Authors)] Address: Fleck, G., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleck@mnhn.fr

**5710.** Flint, O.S.; Bastardo, R.H.; Perez-Gelabert, D.E. (2006): Distribution of the Odonata of the Dominican Republic. *Bulletin of American Odonatology* 9(3/4): 67-84. (in English). ["The Dominican Republic is known to support 19 species of damselflies (Zygoptera), of which four are endemic to the island, and 48 species of dragonflies (Anisoptera) of which three are endemic to the island. We present 173 new provincial records for 49 of the 67 known insular species. All newly reported provincial records are given with full data. For all species a complete list of reported provinces is provided. Study of the species of *Sympetrum* on the island reveals that it is *S. gilvum* not *S. illotum*. Due to lack of substantiated records we question the presence of *Hypolestes clara*, *Progomphus integer*, and *Erythemis atala* on the island." (Authors)] Address: Flint, O.S., Department of Entomology MRC-169, National Museum of Natural History, Washington, DC, 20013-7012, USA. E-mail: flinto@si.edu

**5711.** Gyssels, F.; Robby, S. (2006): Behavioral responses to fish kairomones and autotomy in a damselfly. *Journal of Ethology* 24: 79-83. (in English). ["The threat-sensitivity hypothesis predicts that prey species assess and adjust their behavior in accordance with the magnitude of the threat posed by a predator. A largely overlooked characteristic of a prey that will affect its sensitivity to predators is its history of autotomy. We studied threat-sensitive behavior to fish kairomones in larvae of *Ischnura elegans* damselflies, which had undergone autotomy, from a fishpond and from a fishless pond. In agreement with their higher perceived risk, larvae from the fishpond showed fewer rigid abdomen bends, foraged less and walked more slowly than larvae from the fishless pond. In line with their higher vulnerability to predators, larvae without lamellae spent less time foraging than larvae with lamellae. There was a decrease in swimming activity in the presence of fish kairomones except for larvae with lamellae from the fishless pond. This may reflect differences in vulnerability of larvae without lamellae between pond types. Such context-dependent responses in activity to kairomones should be kept in mind when evaluating the ability of a prey to recognize kairomones." (Authors)] Address: Gyssels, Freya c/o Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robbystoks@bio.kuleuven.ac.be

**5712.** Hasegawa, E.; Kasuya, E. (2006): Phylogenetic analysis of the insect order Odonata using 28S and 16S rDNA sequences: a comparison between data sets with different evolutionary rates. *Entomological Science* 9(1): 55-66. (in English). ["Molecular phylogenetic analyses were conducted for the insect order Odonata with a focus on testing the effectiveness of a slowly evolving gene to resolve deep branching and also to examine: (i) the monophyly of damselflies (the suborder Zygoptera); and (ii) the phylogenetic position of the relict dragonfly *Epiphlebia superstes*. Two independent molecular sources were used to reconstruct phylogeny: the 16S rRNA gene on the mitochondrial genome and the 28S rRNA gene on the nuclear genome. A comparison of

the sequences showed that the obtained 28S rDNA sequences have evolved at a much slower rate than the 16S rDNA, and that the former is better than the latter for resolving deep branching in the Odonata. Both molecular sources indicated that the Zygoptera are paraphyletic, and when a reasonable weighting for among-site rate variation was enforced for the 16S rDNA data set, *E. superstes* was placed between the two remaining major suborders, namely, Zygoptera and Anisoptera (dragonflies). Character reconstruction analysis suggests that multiple hits at the rapidly evolving sites in the 16S rDNA degenerated the phylogenetic signals of the data set." (Authors)] Address: Hasegawa, E., Department of Ecology and Systematics, Graduate School of Agriculture, Hokkaido University, Kita-ku, Sapporo, 060-8587, Japan. Email: ehase@res.agr.hokudai.ac.jp

**5713.** Hof, C.; Brändle, M.; Brandl, R. (2006): Lentic odonates have larger and more northern ranges than lotic species. *Journal of Biogeography* 33(1): 63-70. (in English). ["Aim: We analysed latitudinal range, centres of distribution and northern range boundaries of Odonata occurring in Europe and North America with respect to larval habitat (standing water = lentic and running water = lotic). As lentic water bodies are thought to be less predictable in space and time than lotic habitats, species adapted to standing waters depend on effective dispersal ability for long-term survival. If species occurring in lentic habitats have a higher propensity for dispersal, then larger range sizes in lentic than in lotic species, as well as an increase in the proportion of lentic species with latitude, would be expected. Location: Europe, North America. Methods: Distributional and habitat data were collected from published sources for all odonates of Europe and North America. Species were assigned to lentic and lotic habitats according to the habitat of the larvae. From distribution maps we estimated the latitudinal range, centre of distribution and northern range boundary of each species. Differences in these distribution variables between lentic and lotic species were evaluated using ANOVA. We related the proportion of lentic species by latitudinal interval in Europe, and by political unit (state, province) in North America, to area, altitudinal range, longitude (only for North America) and latitude by means of generalized linear models. Results: Lentic damselflies and dragonflies had larger latitudinal spans, and more northern distribution centres and range boundaries, than lotic species. The proportion of lentic species increased with latitude. These findings were consistent between continents. Main conclusions: Our results support previous findings that distribution patterns of freshwater species depend on habitat preference. Evolution of dispersal propensity according to habitat characteristics is the most likely explanation. However, at present, alternative explanations, such as an increase in lentic habitats with latitude, cannot be ruled out." (Authors)] Address: Hof, C., Dept of Animal Ecology, Faculty of Biology, Philipps-University of Marburg, Karl-von-Frisch-Str., D-35032 Marburg, Germany. E-mail: christian-hof@web.de

**5714.** Hornung, C.; Pacas, C. (2006): Investigating damselfly populations at springs in Banff National Park, Canada, with special focus on *Argia vivida*, *Amphiagriion abbreviatum*, and *Ischnura cervula* (Odonata: Coenagrionidae). *Aquatic Ecology* 40(1): 49-58. (in English). ["The objective of this study was to estimate *Argia vivida* populations, identify breeding habitat, and investigate movement of adults within Banff National Park, Al-

berta, Canada, during the summer of 2003. Mark-recapture techniques and standardized dip-net surveys were used to monitor *Argia vivida* at various life stages. A reproductive index identified which sites *Argia vivida* recognized as suitable breeding habitat, and exuvia surveys confirmed breeding sites. The basic structure of emergent and surrounding vegetation was measured to investigate the importance of available ovipositing or roosting sites and the condition of the matrix habitat. Data was recorded for *Amphiagrion abbreviatum* and *Ischnura cervula* (both Odonata: Coenagrionidae) to determine if these spring-associated damselflies were successfully breeding within Banff National Park. Comparisons were made between the highly protected Middle Springs and the heavily altered Cave & Basin Springs. Additional surveys at the Vermilion Lake cool spring and Middle Springs Bog investigated their use as breeding habitat for *Amphiagrion abbreviatum* and *Argia vivida*, respectively. Results suggest the ecological value of thermal springs extends beyond their origin to outflows and downstream pools. Conservation of *Argia vivida* must recognize the value of unobstructed thermal outflows, and consider the condition of the forested habitat surrounding springs with regard to its potential use as nocturnal roosts and dispersal corridors. *Amphiagrion abbreviatum* was confirmed breeding within Banff National Park, while no sign of breeding activity was recorded for *Ischnura cervula*." (Authors)] Address: Hornung, Christine, University of Alberta, 751 GSB, T6G 2H1, Edmonton, AB, Canada. E-mail: crhornung@hotmail.com

**5715.** Ilmonen, J.; Suhonen, J. (2006): Intraguild predation, cannibalism, and microhabitat use in *Calopteryx virgo* and *Somatochlora metallica* larvae: a laboratory experiment. *Aquatic Ecology* 40(1): 59-68. (in English). ["Intraguild predation (IGP) and cannibalism among co-occurring lotic odonate species was studied in Central Finland. A laboratory experiment was performed to assess the microhabitat use and cannibalism between intermediate and late instars of *C. virgo* larvae and predation by larger *S. metallica* larvae on the intermediate *C. virgo* instars. The experiment was run in small running-water aquaria where the larvae were able to divide their mutual habitat vertically by clinging onto artificial perches or crawling on the bottom. Life span of the small *C. virgo* larvae and attack rate on them were compared between the cannibalism and IGP treatments. The effect of predation on the activity, habitat use and spatial distribution of the small *C. virgo* larvae was examined. The IGP rate was 36%. The prey larvae spent the most of their time on the perches, whereas the *S. metallica* preferred the substrate. The large *C. virgo* larvae did not cannibalise smaller conspecifics. The presence of a predator (*S. metallica*) had no effect on the habitat use or activity of the prey (*C. virgo*) larvae. Habitat use differed more between those species than between conspecifics of different size classes of *C. virgo*. The spatial distribution between *S. metallica* and *C. virgo* showed a completely random pattern, whereas the two size classes of *C. virgo* aggregated in the vegetation. Absence of cannibalism and behavioural observations indicate that *C. virgo* may have a low tendency for intraspecific aggressions." (Authors)] Address: Email: jari.ilmonen@ymparisto.fi

**5716.** Joop, G.; Mitschke, A.; Rolff, J.; Siva-Jothy, M.T. (2006): Immune function and parasite resistance in male and polymorphic female *Coenagrion puella*.

*BMC Evolutionary Biology* 2006, 6:19. 10 pp. (in English). ["Background: Colour polymorphisms are widespread and one of the prime examples is the colour polymorphism in female coenagrionid damselflies: one female morph resembles the male colour (andromorph) while one, or more, female morphs are described as typically female (gynomorph). However, the selective pressures leading to the evolution and maintenance of this polymorphism are not clear. Here, based on the hypothesis that coloration and especially black patterning can be related to resistance against pathogens, we investigated the differences in immune function and parasite resistance between the different female morphs and males. Results: Our studies of immune function revealed no differences in immune function between the female morphs but between the sexes in adult damselflies. In an experimental infection females infected shortly after emergence showed a higher resistance against a fungal pathogen than males, however female morphs did not differ in resistance. In a field sample of adult damselflies we did not find differences in infection rates with watermites and gregarines. Conclusion: With respect to resistance and immune function 'andromorph' blue females of *Coenagrion puella* do not resemble the males. Therefore the colour polymorphism in coenagrionid damselflies is unlikely to be maintained by differences in immunity." (Authors)] Address: Joop, Gerrit, Zoologisches Institut, AG Ökologie, Technische Universität Braunschweig, Braunschweig, Germany. Email: g.joop@tu-bs.de;

**5717.** Joop, G.; Siva-Jothy, M.; Rolff, J. (2006): Female colour polymorphism: Gender and the eye of the beholder in damselflies. *Evolutionary Ecology* 20(3): 259-270. (in English). ["Damselflies provide a classic example of female colour polymorphism. Usually, one female morph resembles the blue male colour (andromorph) while one, or more, female morphs are seen as typically female (gynomorph). Damselfly species fall in two distinct groups with respect to recent developments in mimicry theory: in some species females are perfect, they match male colouration and black patterning, and in other species they are supposed to be imperfect mimics, only matching male colouration. However, the underlying assumption of one female morph looking male-like is mostly based on human vision. Therefore we investigated the black patterning and colour of the three female morphs in *Coenagrion puella*, an imperfect mimic, using image analysis. In *C. puella* the blue female morph is perceived as male-like. We found that the black patterning of such females cannot be distinguished from the other female morphs, and is clearly different from males. Furthermore, the blue colour of andromorph females differs from the blue colour of males. Intriguingly, however, the red content did not differ between blue males and females." (Authors)] Address: Rolff, J., Department of Animal and Plant Sciences, University of Sheffield, S10 2TN Sheffield, UK. E-mail: JOR@sheffield.ac.uk

**5718.** Kefford, B.J.; Zaluzniak, L.; Nuggeoda, D. (2006): Growth of the damselfly *Ischnura heterosticta* is better in saline water than freshwater. *Environmental Pollution* 141: 409-419. (in English). ["Increasing salinity has the potential to affect freshwater organisms. Yet sub-lethal effects of salinity on macroinvertebrates are poorly understood. Growth and development of *I. heterosticta* was experimentally shown to be faster in 5–20 mS/cm than 0.1–1 mS/cm, while in 35 mS/cm all indivi-

duals died. In 30 mS/cm about half died and growth was similar to the 0.1 mS/cm treatment. The salinity-growth relationship cannot be explained indirectly, that is salinity affecting the survival of their prey. Tissue content and concentration of Ca, Mg, Na and K in emerged adults showed no evidence of deficiencies at low salinity. Heart beat rate was similar across treatments, except at 35 mS/cm, where it was slower. Respiration and feeding were similar at 0.1, 10 and 30 mS/cm. While there are similarities in *I. heterosticta* and other species' salinity response, there are differences and studies on more species are urgently needed." (Authors)] Address: Kefford, B.J., Department of Biotechnology and Environmental Biology, RMIT University, PO Box 71, Bundoora, 3083, Victoria, Australia. E-mail: ben.kefford@rmit.edu.au

**5719.** Kiyoshi, T.; Sota, T. (2006): Differentiation of the dragonfly genus *Davidius* (Odonata: Gomphidae) in Japan inferred from mitochondrial and nuclear gene genealogies. *Zoological Science* 23(1): 1-8. (in English). ["To infer the differentiation of Japanese *Davidius* dragonflies, we investigated the genealogies of the mitochondrial cytochrome oxidase subunit I gene (COI) and the nuclear ribosomal RNA gene region encompassing 18S, ITS1, 5.8S, and ITS2 sequences for three species endemic to Japan-*Davidius nanus*, *D. fujijama*, and *D. moiwanus* -as well as *D. lunatus* from the Korean Peninsula. According to the mitochondrial and nuclear gene genealogies, *D. nanus* and *D. moiwanus* are closely related and are sister to the continental species *D. lunatus*, whereas *D. fujijama* differentiated from an ancestor of the other three species. Although the mitochondrial DNA data did not resolve the relationships between *D. nanus* and three *D. moiwanus* subspecies, the nuclear DNA data indicate the monophyly of *D. moiwanus* and its subspecies. The nuclear gene genealogy suggests that isolated wetlands used by larval *D. moiwanus* derive from the ancestral riverine habitats of *D. nanus* and other *Davidius* species. The COI sequence divergence among local populations was much greater in *D. moiwanus* than in *D. nanus*, which may be the result of differences in the dispersal ranges associated with the habitat types of these species." (Authors)] Address: Takuya, K., Department of Zoology, Graduate School of Science, Kyoto University, Japan. E-mail: kiyoshi@zoo.zool.kyoto-u.ac.jp

**5720.** Klaus, D.; Kaiser, C. (2006): Aktuelle Funde der Gemeinen Keiljungfer (*Gomphus vulgatissimus* [Linnaeus, 1758]) im Südraum Leipzig. *Mitt. sächs. Entomol.* 73: 19-20. (in German). [The latest known records of *G. vulgatissimus* from the environs of Leipzig, Sachsen, Germany dated from 1922. In 2005, along the river Pleiße near Rötha the species was rediscovered.] Address: Klaus, D., Heimstätten 10, D-04571 Rötha, Germany

**5721.** Koch, K. (2006): Effects of male harassment on females' oviposition behaviour in Libellulidae (Odonata). *International Journal of Odonatology* 9(1): 71-80. (in English). ["I investigated whether the level of male harassment affects females' oviposition behaviour, such that females oviposit unguarded under suboptimal conditions and/or vary oviposition duration, dip number, dip frequency or number of oviposition site changes. The study species were the libellulids *Crocothemis erythraea*, *Orthetrum chrysostigma*, *Pantala flavescens*, *Sympetrum fonscolombii*, *Trithemis annulata* and *T. kir-*

*byi ardens*. Only a few ovipositions under suboptimal conditions were observed and females hovered lower under high male harassment. However, in only a few species studied oviposition behaviour differed with the level of harassment. No evidence for a special female strategy to avoid the negative effects of males' harassment was found. Due to the great intraspecific variability females seemed to be able to react flexibly to current conditions, such as changing male density and the level of male harassment." (Author)] Address: Koch, Kamilla, Max-Planck-Institut für Limnologie Plön, August-Thienemann-Straße 2, 24306 Plön, Germany. E-mail: koch@mpil-ploen.mpg.de

**5722.** Krupp, F.; Apel, M.; Hamoud, A.; Schneider, W.; Zajonz, U. (2006): Zoological survey in the Red Sea coastal zone of Yemen. *Fauna of Arabia* 21: 11-32. (in English, with Arabian summary). [13 odonates species are documented.] Address: Schneider, W., Hess. Landesmus., Zool. Abt., Friedensplatz 1, D-64283 Darmstadt, Germany. E-mail: w.schneider@hlmd.de

**5723.** Mazerolle, M.J.; Poulin, M.; Lavoie, C.; Rochefort, L.; Desrochers, A.; Drolet, B. (2006): Animal and vegetation patterns in natural and man-made bog pools: implications for restoration. *Freshwater Biology* 51(2): 333-350. (in English). ["1. Peatlands have suffered great losses following drainage for agriculture, forestry, urbanisation, or peat mining, near inhabited areas. We evaluated the faunal and vegetation patterns after restoration of a peatland formerly mined for peat. We assessed whether bog pools created during restoration are similar to natural bog pools in terms of water chemistry, vegetation structure and composition, as well as amphibian and arthropod occurrence patterns. 2. Both avian species richness and peatland vegetation cover at the site increased following restoration. Within bog pools, however, the vegetation composition differed between natural and man-made pools. The cover of low shrubs, Sphagnum moss, submerged, emergent and floating vegetation in man-made pools was lower than in natural pools, whereas pH was higher than in typical bog pools. Dominant plant species also differed between man-made and natural pools. 3. Amphibian tadpoles, juveniles and adults occurred more often in man-made pools than natural bog pools. Although some arthropods, including Coleoptera bog specialists, readily colonised the pools, their abundance was two to 26 times lower than in natural bog pools. Plant introduction in bog pools, at the stocking densities we applied, had no effect on the occurrence of most groups. 4. We conclude that our restoration efforts were partially successful. Peatland-wide vegetation patterns following restoration mimicked those of natural peatlands, but 4 years were not sufficient for man-made pools to fully emulate the characteristics of natural bog pools." (Authors) The detailed analysis of invertebrates also includes the Odonata.] Address: Mazerolle, M.J., USGS Patuxent Wildlife Research Center, 12100 Beech Forest Road, Laurel, MD 20708-4017, U.S.A. E-mail: mmazerolle@usgs.gov

**5724.** McCarhy, J.M.; Hein, C.L.; Olden, J.D.; vander Zanden, J.M. (2006): Coupling long-term studies with meta-analysis to investigate impacts of non-native crayfish on zoobenthic communities. *Freshwater Biology* 51(2): 224-235. (in English). ["1. Biological invasions are widely recognised as a significant component of human-caused environmental change and a primary



threat to native biodiversity. The negative impacts of species invasions are particularly evident for freshwater crayfish faunas. 2. This study provides novel insight into the ecological effects of native and non-native crayfish on zoobenthic communities (with emphasis on the non-native rusty crayfish, *Orconectes rusticus*) across broad scales by combining a meta-analysis of small-scale experimental studies with a long-term observational study conducted over a 24 year period in Sparkling Lake, Wisconsin, U.S.A. (46°00'N, 89°42'W). 3. The meta-analysis summarised quantitatively the results of cage experiments for seven species of crayfish spanning four continents. We found that total zoobenthos densities (primarily Gastropoda and Diptera) were significantly lower in treatments containing crayfish relative to controls; a result that was significant for non-native crayfish but not for crayfish in their native range, perhaps owing to a small sample size. In contrast to other species, rusty crayfish were also negatively associated with Ephemeroptera. 4. Results from the time series analysis comparing temporal trends in rusty crayfish and invertebrate abundances from Sparkling Lake were consistent with the findings from the meta-analysis. Rusty crayfish were negatively correlated with the abundance of total zoobenthos, Diptera, Ephemeroptera and Odonata, as well as families of Trichoptera. 5. By coupling the results from short and long-term research, our study offers greater insight into the nature of crayfish-invertebrate interactions in aquatic systems, revealing consistent effects of invasive crayfish on native fauna. The control and management of invasive species is facilitated by the knowledge that well executed small-scale studies may be extrapolated to understand larger-scale ecological interactions." (Authors)] Address: McCarthy, Julia M., Dept Biology, Colorado State University, Fort Collins, CO 80523-1878, U.S.A. E-mail: juliamc@lamar.colostate.edu

**5725.** Meyer, M.; Proess, R.; Schneider, N. (2006): Entomologische Notizen aus Luxemburg, 2000–2004. Bull. Soc. Nat. luxemb. 106: 105-112. (in German, with English summary). [Records of *Oxygastra curtisii*, *Orthetrum coerulescens*, *Coenagrion mercuriale*, and *Lesites virens* from Luxembourg are documented.] Address: Meyer, M., Musée national d'histoire naturelle, section zoologie des invertébrés, 25 rue Munster, L-2160 Luxembourg. E-mail: zool.invert1@mnhn.lu

**5726.** Mitra, A. (2006): Current status of the Odonata of Bhutan: A checklist with four new records. Journal of renewable natural resources Bhutan 2(1): 136-143. (in English) ["Specimens of dragonflies were collected from Trashiyangtse and Pemagatshel districts of eastern Bhutan during the months of July and September 2003. One specimen of *Neurothemis fulvia* was collected on 5th September 2004 Samdrup Jongkhar district. Altogether 61 specimens of Odonata belonging to 16 species and subspecies under 13 genera and four families were listed during the present study, which revealed four new records of odonates for Bhutan viz., *Orthetrum s. sabinana*, *Acisoma p. panorpoides*, *Brachythemis contaminata* and *Neurothemis fulvia*. An up-to-date checklist of 31 species and subspecies of odonates known till date from Bhutan had also been made. However, since the collection period was too short and didn't spread over the whole year, the above list of odonata from the concerned localities remained incomplete. The survey did not cover the southern, western and central districts of Bhutan and thus does not represent a complete check-

list of Odonates of Bhutan. An extensive Odonatological survey needs to be carried out to explore the rich diversity of these elegant insects and come up with a representative checklist of Odonates for Bhutan." (Author)] Address: Mitra, A., Department of Zoology, Sherubtse College, Kanglung, Bhutan.

**5727.** Nützel, R.; Wittmann, R. (2006): Libellen in München. Herausgeber: Bund Naturschutz, Kreisgruppe München: 18 pp. (in German). [Leaflet with information on dragonflies in Munich, Germany, directed to a more broad in nature interested public. Available at: <http://www.bn-muenchen.de/service/publikationen/libellenflyer.pdf>] Address: Bund Naturschutz, Kreisgruppe München, Pettenkoferstr. 10a, 80336 München

**5728.** Oppel, S. (2006): Comparison of two Odonata communities from a natural and a modified rainforest in Papua New Guinea. International Journal of Odonatology 9(1): 89-102. (in English). ["The Odonata fauna of Papua New Guinea is species-rich, but human population growth and resulting modification of primary rainforests may lead to a loss of valuable habitat and species diversity. In this study, I compared the odonate assemblages of a natural tropical rainforest and a modified forest in order to assess the loss that could result from human forest alteration. I collected odonates and recorded habitat use at both study sites for several weeks. The assemblages were compared with similarity indices, and total species richness was estimated using a jackknife procedure. The natural forest community, with 61 species, had both a higher diversity and evenness than the village community, with 38 species. Altogether I found 78 species of 13 families, of which 21 were shared between the two areas. Among the families with more than one species, Megapodagrionidae and Libellulidae had the highest similarity between the two sites, whereas Coenagrionidae and Platynemididae had fairly dissimilar community composition. Three families occurred only in the natural forest. The most important habitats in the village were open sunny areas, artificial ditches, and small permanent creeks, compared to most running waters and the forest interior in the natural forest. Based on habitat preferences in the natural forest, species inhabiting temporary water sources under closed canopy rainforests are most vulnerable to forest modification. They comprised a third of the forest community, and I estimate that approximately 25% of natural rainforest species will disappear following human-induced forest alteration." (Author)] Address: Oppel, S., Dept Biology & Wildlife, 211 Irving 1, University of Alaska, Fairbanks, Fairbanks, AK 99775, USA. E-mail: steffen.oppel@gmail.com

**5729.** Oppel, S. (2006): Using distance sampling to quantify Odonata density in tropical rainforests. International Journal of Odonatology 9(1): 81-88. (in English). ["Quantitative data are essential for many aspects of ecological research. Several methods exist to quantify odonate abundance, but complications may arise when abundances in different habitats need to be compared. In this study, I explored a technique that can overcome the variable detectability of odonates in habitats with different visibility. Distance sampling is briefly introduced and the main assumptions are listed. I conducted line transect surveys using distance sampling protocol over several weeks in a rainforest locality in Papua New Guinea to assess the usefulness of distance sampling. The results suggested that estimates of encounter rate

and density of odonates are substantially higher when distance sampling is employed. Density in habitats with poor visibility, like the forest interior, is severely underestimated by traditional sampling methods, and this can lead to a misclassification of habitats. Distance sampling is a very useful technique for quantitative odonate sampling, but the sampling effort required for precise estimates is very high. For the rainforest locality in this study at least 15 months of intensive sampling would be required. Further limitations of distance sampling are discussed." (Author)] Address: Opiel, S., Department of Biology and Wildlife, 211 Irving 1, University of Alaska, Fairbanks, Fairbanks, AK 99775, USA. E-mail: steffen.opiel@gmail.com

**5730.** Paulson, D.R. (2006): Openwing perching in some Zygoptera (Odonata): a response to Klaus Reinhardt. *International Journal of Odonatology* 9(1): 111-118. (in English). ["Herein I respond to a critique of my paper on wing positions in Zygoptera. The author of that critique suggested that most of the hypotheses presented in that paper were flawed and questioned some of the facts brought to bear on them. In addition, he presented his own ideas in support of hypotheses I had rejected. I take this opportunity to clarify my reasoning further. Although I did not elaborate sufficiently in some cases, no statement made in my paper was incorrect. My critic and I are in agreement that this is a complicated matter, and all hypotheses continue to be worth further testing." (Author)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**5731.** Principe, R.E.; del Corigliano, M.C. (2006): Benthic, drifting and marginal macroinvertebrate assemblages in a lowland River: temporal and spatial variations and size structure. *Hydrobiologia* 553(1): 303-317. (in English). ["Aquatic macroinvertebrates living in anastomosing lowland rivers use different habitats and respond differently to the hydrological regime. In this paper, the structure and composition of benthic, drifting and marginal macroinvertebrate assemblages are analyzed in the lowland river Ctlamochita (Córdoba, Argentina). The assemblages were studied in an annual cycle; a comparison among the composition of benthos, drift and marginal fauna was carried out; and size structure of the assemblages was characterized. Samples were obtained from two sites: a rural and an urban site. In total 73 taxa of aquatic macroinvertebrates were collected. Benthos was characterized by Chironomidae and Oligochaeta; marginal fauna was mainly constituted by Coleoptera, Heteroptera, Decapoda, the Trichoptera *Nectopsyche* sp., Ephemeroptera and Odonata. Drifting assemblage was composed by macroinvertebrates from local and remote upstream benthos, and from the marginal zone. Marginal fauna diversity was higher than benthos and drift. Total biomass of the assemblages pooled together was relatively equitably among size classes. Larger size classes consisted of organisms from the marginal zone whereas the smallest ones were composed by benthic and drifting organisms. In the study area there is habitat partitioning in the lateral dimension of the river. Marginal fauna was more diverse due to the asymmetry of transport and deposit processes, which generate a heterogeneous habitat in the bankside. The relation between fine substrate and high current velocity determines an unstable habitat in the central channel, which makes colonization by benthic macroinvertebrates difficult." (Authors)] Ad-

dress: Principe, Romina Elizabeth, Departamento de Ciencias Naturales, Universidad Nacional de Río Cuarto, A.P. No. 3, X5804 Río Cuarto, BYA, Argentina. E-mail: principe@exa.unrc.edu.ar

**5732.** Proess, R. (2006): Verbreitungsatlas der Libellen des Großherzogtums Luxemburg. *Ferrantia* 47: 164 pp. (in German, with English and French summaries). ["The distribution atlas summarizes the knowledge of the dragonfly fauna in the Grand Duchy of Luxembourg. The current (after 1980) and historical distribution of the 62 species are presented in distribution maps using squares of 5 x 5 km. For each species the ecological requirements, the current and the historical distribution are discussed. The different dragonfly-habitats existing in Luxembourg are presented, and information regarding the preservation of the dragonflies are given." (Author)] Address: Proess, R., ECOTOP, 6, rue Gustave Kahnt, L-1851 Luxembourg, Luxembourg. E-mail: ecotop@pt.lu available from: Musée national d'histoire naturelle, 25, rue Münster, L-2160 Luxembourg, Luxembourg

**5733.** Raab, R.; Chovanec, A.; Pennerstorfer, J. (2006): *Libellen Österreichs*. Springer. Wien. ISBN 3-211-28926-7: X, 345 pp. (in German). [This book on Austrian Odonata, produced in collaboration with several co-authors, is characterised by a high-quality presentation, and furnished with many colour photographs, graphs and maps. Eleven chapters comprise highly readable contributions: A special recommendation should be given to the introduction into the biology of Odonata written by Johann Waringer which contains some original ideas and sketches about the eggs and the embryology of Odonata, or the respiration of the larvae. Interesting are the description of the local fauna of several regions in Austria, and the chapter on the function of dragonflies as bio-indicators. Brief accounts are given to the threat and conservation of Odonata in Austria, the data sources, and a general introduction into the climatic and geographical conditions in Austria. The 77 odonate species recorded in Austria to date are treated in a monographic style. On two or three pages a compact treatment of the Austrian Odonata is presented: The distribution in Austria is briefly described, and all available records are mapped with time-scale details. Additional information is given to the altitudinal distribution, emergence period, and phenology. The part on the habitat and biology of the species is based - in most cases - on the the book of Sternberg & Buchwald on the dragonflies of Baden-Württemberg, Germany. Only few species are treated with original data resulting from studies in Austria (e.g. *Coenagrion hylas* and [in Chapter 7.3] *Cordulegaster heros* and *Thecagaster bidentata*). Threat and conservation measures are also outlined for each species. In summary, this book is a highly welcome contribution to the knowledge of the central European Odonata. (Martin Schorr) Available at: Springer-Verlag, Tiergartenstrasse 17, D-69 121 Heidelberg, Germany. <http://www.springer.com/dal/home/life+sci?SGWID=1-10027-22-76448852-0>

**5734.** Reinhardt, K. (2006): Open questions in the evolution of openwing perching in the Zygoptera (Odonata): a comment on Dennis Paulson. *International Journal of Odonatology* 9(1): 103-110. (in English). ["In a recent paper D.R. Paulson (2004; IJO 7: 505-515) presented five hypotheses concerning the way wings are held in the Zygoptera during perching. A critical ex-

amination suggests that most of them have substantial flaws that prevent their testing. Based on Bechly's phylogeny (1998; <<http://www.bechly.de/system.htm>>) I suggest that the wing perching mode in the Odonata has changed five or six times, depending on whether the ancestral situation in the Odonata was closedwing or openwing perching, respectively. Combining parts of Paulson's hypotheses into a more plastic cost-benefit framework is suggested as an alternative approach, such as the investigation of possible trade-offs between thermoregulatory and foraging benefits and costly predation risk." (Author)] Address: Reinhardt, K., Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: K.Reinhardt@sheffield.ac.uk

**5735.** Salur, A.; Kiyak, S. (2006): An interesting dragonfly record, *Pseudagrion syriacum* (Selys, 1887), from Turkey (Odonata: Coenagrionidae). *Munis Entomology & Zoology* 1(1): 171-172. (in English). ["Material examined: 1 male, Hatay, Iskenderun (Arsuz-Kepirce), small stream, 5 m, 36°29'N 35°59' E, 15.V.2003; 6 males, 1 female, same loc. 19.V.2004 (leg. & det. A. Salur). Examined material was deposited at the Zoological Museum of Gazi University (ZMGU)."] (Authors)] Address: Salur, A., Gazi University, Çorum Sciences and Arts Faculty, Department of Biology, 19030 Çorum, Turkey. E-mail: alisalur@gazi.edu.tr

**5736.** Samways, M.J. (2006): Insect extinctions and insect survival. *Conservation Biology* 20(1): 245-246. (in English). [*Pseudagrion citricola* from South Africa is used to exemplify how improved knowledge alters the effort put into status assessment (this species was removed from the Red List). *Metacnemis angusta* - believed extinct - was rediscovered following improved field-search methods.] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**5737.** Schader, T. (2006): Tümpelanlagen der GNOR: Positive Entwicklung in der Rheinebene östlich von Neustadt/Weinstraße. *GNOR Info* 101: 28-30. (in German) [Some passing results from an amphibian based monitoring of newly created waters in Rhineland-Palatinate, Germany including the rare *Sympetrum pedemontanum*.] Address: Schader, H., Obere Jakobstr. 5, 67550 Worms, Germany

**5738.** Sformo, T.; Doak, P. (2006): Thermal ecology of interior Alaska dragonflies (Odonata: Anisoptera). *Functional Ecology* 20(1): 114-123. (in English). ["1. We examined the thermal ecology of Interior Alaska dragonflies (Odonata: Anisoptera). The relationships between mass and passive cooling rate, wing loading, minimum flight temperature (MFT) and thermoregulating ability were examined. These properties were also compared between the behavioural classes: perchers and fliers. All factors with the addition of seasonal and daily flight activity were related to generalized thermal strategies. 2. Passive cooling rate decreased while wing loading and MFT increased with mass. 3. While all species were able to elevate thoracic temperature, larger species were better able to maintain a constant temperature. 4. Both the smallest and largest species of dragonflies were capable of activity at ambient temperatures of approximately 14 °C by employing different thermal strategies: low MFT and physiological heat production, respectively. 5. For small species active in cool conditions low MFT may be favoured

cool conditions low MFT may be favoured even if accompanied by poor thermoregulating ability. By contrast, thermoregulation and specialization for high-temperature performance may be favoured in both small and large species during the warmer summer flight season. 6. The smallest and largest dragonflies in Interior Alaska have the shortest and longest daily activity periods, respectively. However this pattern does not hold for the intermediate-sized dragonflies. Thermal strategy displays no clear relationship to daily activity pattern." (Authors)] Address: Sformo, T., Department of Biology and Wildlife and Institute of Arctic Biology, University of Alaska, Fairbanks, AK 99775, USA. E-mail: rfts@uaf.edu

**5739.** Slos, S.; Stoks, R. (2006): Behavioural correlations may cause partial support for the risk allocation hypothesis in damselfly larvae. *Ethology* 112(2): 143-151. (in English). ["Prey animals are often confronted with situations that differ in predation risk. According to the risk allocation hypothesis, prey animals should adaptively allocate antipredator behaviour in accordance with the magnitude and frequency of those risk situations. According to the first prediction prey animals should increase foraging in the safe situations and decrease foraging in the dangerous situations as these situations become relatively more dangerous. The second prediction is that with increased time spent in the dangerous situations, progressively more foraging effort is shown in both the dangerous and safe situations, especially in the safer ones. Prey animals may, however, show maladaptive behaviour due to behavioural correlations across risk situations. Here we test for the first time both predictions generated by the risk allocation hypothesis while considering behavioural correlations. We reared larvae of the damselfly *Ischnura elegans*, from the egg stage, under five rearing risk conditions: (i) in isolation, (ii) in the presence of conspecific larvae, (iii) in the presence of one fish, (iv) in the presence of two fish, and (v) in the presence of two fish for 50% of the time. For each rearing risk condition, we scored their behaviour in the absence and in the presence of fish. In accordance with the first prediction, in the absence of a predator, larvae reared under increasing risk conditions increased their level of foraging. In accordance with the second prediction, in the absence of a predator, larvae that were more frequently exposed to fish during rearing, increased foraging. However, opposite to the predictions from the risk allocation hypothesis, foraging increased both with increasing rearing risk, and with increased predator exposure frequency. The observed positive behavioural correlation of foraging activity across test situations with and without fish, may generate the combination of adaptive patterns in the absence of fish and the maladaptive patterns in the presence of fish. Former studies of the risk allocation hypothesis also found, at best, mixed support, and we hypothesize that behavioural correlations across risk situations, if present, will likely cause partial deviations from model predictions.] Address: Slos, Stefanie; Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**5740.** Sokolova, Y.Y.; Kryukova, N.A.; Glupov, V.V.; Fuxa, J.R. (2006): *Systemostrema alba* Larsson 1988 (Microsporidia, Thelohaniidae) in the dragonfly *Aeshna viridis* (Odonata, Aeshnidae) from south Siberia: Morphology and molecular characterization. *Journal of Eu-*



karyotic Microbiology 53(1): 49-57. (in English). ["An octospore microsporidium was found in the nymphs of *Aeshna viridis*, collected in intermittent streams near Novosibirsk, Siberia, Russia in 2003. Spores were uniloculate and measured  $6.1 \pm 0.07 \times 3.0 \pm 0.04$   $\mu\text{m}$  on fresh smears. The polar filament was anisofilar having 10-11 anterior coils (thicker filament diam.) and 10-11 posterior (thinner filament diam.) coils. Sporophorous vesicles were persistent and measured  $12.3 \pm 0.23 \times 11.9 \pm 0.20$   $\mu\text{m}$ . The infection was restricted to the adipose tissue and caused the formation of whitish "cysts" containing mature octospores. Based on ultrastructural similarity we consider this Siberian isolate to be *Systenostrema alba*, a species described from *Aeshna grandis* collected in Sweden (Larsson 1988). Maximum likelihood, neighbor joining, and maximum parsimony analyses of the small subunit rDNA all placed *Systenostrema alba* (Accession no. AY953292) as the sister taxon to a clade consisting of *Thelohania solenopsae*, *Tubulinosema ratisbonensis*, and *T. acridophagus*." (Authors)] Address: Sokolova, Y., Institute of Cytology, Russian Academy of Sciences, St. Petersburg, 194064, Russia. E-mail: jumicro@yahoo.com

**5741.** Suhling, F.; Sahlen, G.; Martens, A.; Marais, E.; Schütte, C. (2006): Dragonfly assemblages in arid tropical environments: a case study from western Namibia. *Biodiversity and Conservation* 15: 311-332. (in English). ["Dragonflies have been proposed as indicators for the ecosystem health of freshwater wetlands. For their useful functioning as indicators it is, however, necessary to identify species compositions in specific habitats and species-habitat associations, particularly in the tropics, where such knowledge is still weak. We examined the dragonfly species composition of 133 localities in the arid environment of western Namibia. An analysis of nestedness indicated that distinct, and predictable patterns of species associations can be expected. Discriminant analyses revealed that most of the nine habitat types separated by structural and hydrological parameters are well discriminated by their dragonfly assemblages. Spring brooks in particular host a specific assemblage, which is threatened due to the habitat restriction of several species, as well as by recent habitat loss and degradation. Using a hierarchical method of several criteria we demonstrated the selection of a set of potential indicator species from the species set, most of these being useful indicators for spring brook assemblages. The conservation status of certain habitats and species is discussed. We propose that dragonflies will have a high indicator potential for threatened freshwater wetlands in such areas and may also serve as an indication of the sustainable use of water resources including evaluating measures to rehabilitate environments." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**5742.** Trockur, B.; Didion, A. (2006): Libellen im Bereich der Steinkohlen-Bergehalde der Grube Reden. *Abh. DELATTINIA* 30: 187-190. (in German, with English and French summaries). [11 dragonfly species were recorded in the area of the hard-coal mine tip Reden on the day of species diversity, July 5th 2003. 22 species are known from the Region altogether, 18 of them are indigenous. Typical for the biotops concerned are the Red List species *Ischnura pumilio*, *Orthetrum brunneum* and *Sympecma fusca*.] Address: Trockur, B.,

Schulstr. 4, D-66636 Tholey-Scheuern, Germany. E-mail: BerndTrockur@gmx.de

**5743.** Trockur, B. (2006): Zum aktuellen Kenntnisstand der Libellenfauna im Bereich Heinitz (Saarland). *Abh. DELATTINIA* 31: 57-78. (in German, with English and French summaries). ["The present evidence of nativity of *Aeshna affinis*, for the first time for the Saarland in the area of Heinitz, among other new records, is reason to look again intensely at the Odonata-fauna of the area and to summarize the results with periods of earlier investigations. It was possible to record seven new species for the Saarland of faunistical and ecological importance in the area within eight years from 1998 to 2005, all except two with proof of reproduction. With altogether 47 known species now, the area, already recognized as extremely valuable for the Saarland since the eighties, climbs to a top position in respect of the Odonata-fauna.] Address: Trockur, B., Schulstr. 4, D-66636 Tholey-Scheuern, Germany. E-mail: BerndTrockur@gmx.de

**5744.** Tynkkynen, K.; Kotiaho, J.S.; Luojumäki, M.; Suhonen, J. (2006): Interspecific territoriality in *Calopteryx damselflies*: the role of secondary sexual characters. *Animal Behaviour* 71(2): 299-306. ["Interspecific territoriality is usually interpreted to result from interspecific interference competition, although it may also originate from mistaken species recognition. In the latter case, it may be based on similarity of secondary sexual characters. In the damselfly *Calopteryx splendens*, males have pigmented wing spots as a sexual character, and males with the largest spots resemble males of another species, *Calopteryx virgo*. Probably because of this resemblance, *C. virgo* males are more aggressive towards large- than small-spotted *C. splendens* males. We examined whether wing spot size of *C. splendens* males affects territorial interactions between the species. In a removal experiment, the number of territorial *C. splendens* increased after *C. virgo* males were removed. However, interspecific territoriality was incomplete since before the removal the territories of the species partially overlapped. Wing spot size of *C. splendens* seemed to affect interspecific territoriality: before the removal territorial and nonterritorial *C. splendens* males had similar spot sizes and the distance to the nearest *C. virgo* territory increased with wing spot size of *C. splendens*. In addition, after the removal of *C. virgo*, the relation between wing spot size and the distance to the nearest old *C. virgo* territory disappeared. Our results suggest that mistaken species recognition may account for the interspecific territorial behaviour in the two species. Furthermore, interspecific territoriality may cause negative selection on wing spot size and thus may explain character displacement in wing spot size of *C. splendens* males." (Authors)] Address: Tynkkynen, K., Department of Biological and Environmental Science, P.O. Box 35, FIN-40014, University of Jyväskylä, Finland. E-mail

**5745.** Watts, P.C.; Saccerril, I.J.; Kemp, S.J.; Thompson, D.J. (2006): Population structure and the impact of regional and local habitat isolation upon levels of genetic diversity of the endangered damselfly *Coenagrion mercuriale* (Odonata: Zygoptera). *Freshwater Biology* 51(2): 193-205. (in English). ["1. *C. mercuriale* is one of Europe's most threatened damselflies. There is concern for the long-term persistence of many of its U.K. colonies because adult lifetime movement is limited, making

isolated populations susceptible to extinction. 2. Using 14 microsatellite loci we characterised levels of genetic diversity, evidence for a recent decline and the spatial genetic structure for *C. mercuriale* population in Wales, U.K. 3. Spatial isolation is not an absolute predictor of low genetic diversity at either local or regional scales. 4. One population inhabiting a remote, edge of range site is genetically impoverished with levels of variability (at microsatellite loci) among the lowest reported for any insect species. 5. Agricultural land and high ground are physical barriers to dispersal by adults. 6. Consistent with work from elsewhere, movement by mature *C. mercuriale* in Pembrokeshire is sufficient to prevent significant genetic differentiation throughout a habitat matrix of some 3-4 km if the suitable habitat sites are <2 km apart and lack barriers to movement. Even within a good habitat matrix, however, genetic isolation by distance develops within 10 km." (Authors)] Address: Watts, P.C., School of Biological Sciences, The Biosciences Building, Crown Street, University of Liverpool, Liverpool, L69 7ZB, UK. E-mail: p.c.watts@liv.ac.uk

**5746.** Wohlfahrt, B.; Mikolajewski, D.J.; Joop, G.; Suhling, F. (2006): Are behavioural traits in prey sensitive to the risk imposed by predatory fish?. *Freshwater Biology* 51: 76-84. (in English). ["1. Behavioural differences among prey species may result from evolutionary adaptations that facilitate coexistence with different predators and influence vulnerability to predators. It has been hypothesised that prey species modify their behaviour in relation to the risk posed by particular predators. 2. We examined the relationship between anti-predator behaviour and predation risk in five species of larval odonates in combination with three predatory fish species (perch, gudgeon and rudd) that differ in foraging behaviour. The odonates, *Platycnemis pennipes*, *Coenagrion puella*, *Lestes sponsa*, *Sympetrum striolatum* and *Libellula depressa*, differ with regard to their life cycle and habitat, including water depth, occurrence in temporary ponds and co-existence with fish. 3. The odonate species differed in their response to fish: (i) Two species showed a flexible response. Larval *C. puella* reduced activity in the presence of fish, regardless of species, whereas *L. depressa* altered their activity only in the presence of gudgeon. (ii) Independent of fish species, all odonates except *L. depressa* exhibited spatial avoidance of fish. This was interpreted as a more general anti-predator response. (iii) In some cases the odonates showed no response to predators and their behaviour was thus independent of predation risk. 4. Our results confirm that all odonates responded to the presence of at least some predatory fish, and that some odonate species discriminated between fish species. However, we found no significant correlation between behavioural modifications and predation risk, indicating that anti-predator responses and predation risk depend on the particular predator and the species being preyed on." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**5747.** Zuellig, R.E.; Kondratieff, B.C.; Schmidt, J.P.; Durfee, R.S.; Ruitter, D.E.; Prather, I.E. (2006): An annotated list of aquatic insects of Fort Sill, Oklahoma, excluding Diptera with notes on several new state records. *Journal of the Kansas Entomological Society* 79(81): 34-54. (in English). ["Qualitative collections of

aquatic insects were made at Fort Sill, Lawton, Oklahoma, between 2002 and 2004. Ephemeroptera, Plecoptera, Trichoptera, Odonata, Coleoptera, aquatic Heteroptera, Neuroptera, and Megaloptera were targeted. Additional records are included from a survey that took place in 1999. More than 11,000 specimens from more than 290 collections were examined. Based on the current understanding of aquatic insect systematics, 276 taxa distributed over 8 orders, 46 families, and 141 genera were identified. Twenty-three of the 276 taxa [...] are reported from Oklahoma for the first time. The three most diverse orders included Coleoptera (86 species), Odonata (67 species) and Trichoptera (59 species), and the remaining taxa were distributed among Heteroptera, (30 species), Ephemeroptera (21 species), Plecoptera (6 species), Megaloptera (4 species), and Neuroptera (3 species). Based on previous published records, many of the species collected during this study were expected to be found at Fort Sill; however, 276 taxa of aquatic insects identified from such a small geographic area is noteworthy, especially when considering local climatic conditions and the relatively small size of Fort Sill (38,300 ha). Despite agricultural practices in Oklahoma, the dust bowl days, and the development of water-based recreation at Fort Sill, a high percentage of the total known aquatic insect fauna of Oklahoma can be found in a small geographic area." (authors)] Address: Zuellig, R.E., U. S. Geological Survey, Denver Federal Center, MS 415, Denver, Colorado 80225

**Thanks to all who contributed to this issue of OAS!**  
A special thank to Werner Piper, Jürgen Ott, Naoya Ishizawa, Pawel Buczyński, Mathias Lohr, Bernd Kunz, Andreas Martens, Wolfgang Schneider, and Hansruedi Wildermuth.

### Dragonfly Research 3 (2006)

ISSN 1438-034X

Odonatological Bibliography with more than

- 23600 titels
- more than 7000 summaries including all OAS
- collection of more than 1200 pdf of original Open Access papers (this is a free service).

Key word and full text searchable database including the free FuL Reader software.

Windows® required; your hard disc should give space for files with a volume of approximately 1 GB.

Available on DVD from:

Martin Schorr, ÖSTLAP; Schulstr. 7B, 54314 Zerf, Germany, [martinschorr@onlinehome.de](mailto:martinschorr@onlinehome.de)

116,- Euro incl. taxes plus shipping

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: martin@lindeboom.de  
Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105;  
E-mail: K.Reinhardt@sheffield.ac.uk  
Martin Schorr, Schulstr. 7B D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: martinschorr@onlinehome.de

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

1997

**5748.** Arnqvist, G. (1997): The evolution of animal genitalia: distinguishing between hypotheses by single species studies. *Biological Journal of the Linnean Society* 60: 365-379. (in English). ["Rapid evolution of genitalia is one of the most general patterns of morphological diversification in animals. Despite its generality, the causes of this evolutionary trend remain obscure. Several alternative hypotheses have been suggested to account for the evolution of genitalia (notably the lock-and-key, pleiotropism, and sexual selection hypotheses). Here, I argue that thorough intraspecific studies are the key to gaining insight into the patterns and processes of genitalic evolution. Critical assumptions and predictions that may be used to distinguish between the different hypotheses are identified and discussed. However, current knowledge of selection on genitalia, or even of the degree of phenotypic and genotypic variability of genital morphology, is highly limited, allowing only a very tentative assessment of the various hypotheses. In-depth single species studies of current patterns and processes of selection on genitalia are badly needed, and a single species research program is briefly outlined." (Author) The paper includes many references to Odonata.] Address: Arnqvist, G., Dept. of Animal Ecology, University of Umeå, S-901 87 Umeå, Sweden

**5749.** Kruuk, L.E.B.; Gilchrist, J.S. (1997): Mechanisms maintaining species differentiation: predator-mediated selection in a *Bombina* hybrid zone. *Proceedings of the Royal Society B: Biological Sciences* 264(1378): 105-110. (in English). ["Mechanisms which prevent gene flow will maintain differentiation between species, and therefore contribute to biological diversity. We describe an experimental study of such mechanisms in a hybrid zone between the fire-bellied toad *Bombina bombina* and the yellow-bellied toad *B. variegata*. In this system, preference for different breeding habitats reduces the frequency of hybridization. A comparison of habitat ecology shows that the semi-permanent ponds in which *B. bombina* usually breeds have higher densities of aquatic predators than the temporary puddles typically used by *B. variegata*. We

test for behavioural adaptations in tadpoles to these different levels of predation. *B. bombina* tadpoles are significantly less active than *B. variegata*, both before and after the introduction of a predator to an experimental arena; this reduces their vulnerability as many predators detect prey through movement. Behavioural differences translate into differential survival: *B. variegata* suffer higher predation rates in laboratory experiments with three main predator types (*Triturus* sp., *Dytiscus* larvae, *Aeshna* nymphs). This differential adaptation to predation will help maintain preference for alternative breeding habitats, and thus serve as a mechanism maintaining the distinctions between the two species." (Authors)] Address: Kruuk, Loeske, Institute of Cell, Animal and Population Biolog., Uni. of Edinburgh, West Mains Road, Edinburgh EH9 3JT, UK. E-mail: loeske@tattoo.ed.ac.uk

**5750.** Williamson, D.L.; Adams, J.R.; Whitcomb, R.F.; Tully, J.G.; Carle, P.; Konai, M.; Bove, J.M.; Henegar, R.B. (1997): *Spiroplasma platyhelix* sp. nov., a new mollicute with unusual morphology and genome size from the dragonfly *Pachydiplax longipennis*. *International journal of systematic bacteriology* 47(3): 763-766. (in English). ["*Spiroplasma* strain PALS-1T from the gut of the dragonfly *Pachydiplax longipennis* was shown to be distinct from other species, groups, and subgroups of the genus *Spiroplasma* as determined by reciprocal serological metabolism inhibition and deformation tests. However, this strain cross-reacted extensively with representatives of other groups when it was used as an antigen. Electron microscopy of cells of strain PALS-1T revealed cells surrounded by a single cytoplasmic membrane. Light microscopy revealed helical cells that exhibited twisting motility rather than rotatory or flexing motility. Variations in the tightness of coiling were transmitted from one end of the helix to the other. The strain was resistant to penicillin, which confirmed that no cell wall was present. The organism grew well in M1D and SP-4 liquid media under either aerobic or anaerobic conditions. Growth also occurred in 1% serum fraction medium and in conventional horse serum medium. The optimum temperature for growth was 30°C, at which the doubling time was 6.4 h. Multiplication occurred at temperatures from 10 to 32°C. Strain PALS-1T catabolized glucose and hydrolyzed arginine but not



urea. The guanine-plus-cytosine content of the DNA was 29.61 mol%. The genome size was 780 kbp, the smallest genome size in the genus *Spiroplasma*. Strain PALS-1 (5 ATCC 51748) is designated the type strain of a new species, *Spiroplasma platyhelix*." (Authors)] Address: Williamson, D.L., Department of Anatomical Sciences, State University of New York, Stony Brook, New York 117941, USA

**5751.** Winemiller, K.O.; Adite, A. (1997): Convergent evolution of weakly electric fishes from floodplain habitats in Africa and South America. *Environmental Biology of Fishes* 49: 175-186. (in English). ["An assemblage of seven gymnotiform fishes in Venezuela was compared with an assemblage of six mormyriiform fishes in Zambia to test the assumption of convergent evolution in the two groups of very distantly related, weakly electric, nocturnal fishes. Both assemblages occur in strongly seasonal floodplain habitats, but the upper Zambezi floodplain in Zambia covers a much larger area. The two assemblages had broad diet [including Odonata] overlap but relatively narrow overlap of morphological attributes associated with feeding. The gymnotiform assemblage had greater morphological variation, but mormyriiforms had more dietary variation. There was ample evidence of evolutionary convergence based on both morphology and diet, and this was despite the fact that species pairwise morphological similarity and dietary similarity were uncorrelated in this dataset. For the most part, the two groups have diversified in a convergent fashion within the confines of their broader niche as nocturnal invertebrate feeders. Both assemblages contain midwater planktivores, microphagous vegetation dwellers, macrophagous benthic foragers, and long-snouted benthic probers. The gymnotiform assemblage has one piscivore, a niche not represented in the upper Zambezi mormyriiform assemblage, but present in the form of *Mormyrops deliciosus* in the lower Zambezi and many other regions of Africa." (Authors)] Address: Winemiller, K.O., Adite, A., Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77843, U.S.A.

#### 1998

**5752.** Lau, P.; Bosque, C.; Strahl, S.D. (1998): Nest predation in relation to nest placement in the Greater Ani (*Crotophaga major*). *Ornitologia Neotropical* 9: 87-92. (in English) [Venezuela, bird predator: only 2.5% of the prey were Odonata] Address: Lau, P., Universidad Simón Bolívar, Departamento de Biología de Organismos, Apartado 89,000, Caracas 1080A, Venezuela.

#### 1999

**5753.** Alencar, Y.B.; Hamada, N.; Magni-Darwich, S. (1999): Stomach content analysis of potential predators of Simuliidae (Diptera: Nematocera) in two lowland forest streams, Central Amazonia, Brazil. *An. soc. entomol. Brasil* 28: 327-332. (in English, with Portuguese summary). [Odonata (Gomphidae, Agrionidae, Libellulidae, Dictyriidae e Coenagrionidae) are treated in the family level.] Address: Alencar, Y.B., Instituto Nacional

de Pesquisas da Amazônia, Entomologia, Caixa postal 478, 69.011-970, Manaus, AM, Brasil.

**5754.** Englund, R.A.; Filbert, R.B. (1999): Flow restoration and persistence of introduced species in Waikele stream, O'ahu. *Micronesica* 31(2): 143-154. (in English). ["Unintentional stream flow restoration in Waikele Stream, O'ahu, Hawai'i resulted from the demise of sugar cane cultivation on O'ahu and subsequent cessation of direct surface water diversions in 1989. Previous artificial stream studies in Hawai'i have suggested that increases in the base flow of a diverted stream would displace or reduce introduced fish populations. Surveys of Waikele Stream, conducted in 1993 and 1997-1998 from the Waikele Springs area downstream to the beginning of the tidal reach found that despite an increase in stream flow, introduced fish remained abundant and native species appeared to have declined. In fact, two new introduced aquatic taxa, a dragonfly and a shrimp, had appeared. These results indicate that although restoring hydrological conditions is an important first step in overall restoration of degraded aquatic ecosystems, flow restoration alone is not a panacea, especially in O'ahu streams with naturally low discharge rates. For stream and wetland restoration to fully succeed, introduced fish and other alien aquatic species must be eradicated by methods other than simply increasing stream base flows." (Authors) Tab. 2 lists 7 Odonata species, with the exception of *Pantala flavescens* exclusively introduced species.] Address: Englund, R.A., Hawaii Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, HI, 96817, USA. E-mail: englund@bishopmuseum.org

#### 2000

**5755.** De Marco Júnior, P.; Furieri, K.S. (2000): Ecology of *Leptagrion perlongum* Calvert, 1909: a bromeliad-dweller Odonate species. *Boletim do Museu de Biologia Prof. Mello Leitão (Nova Série)* 11/12: 135-148. (in English, with Portuguese summary). ["*Leptagrion* is an Odonate genus completely associated with bromeliads in South-America. Two species are known as threatened in the Atlantic Forest, but they are still poorly studied. Here we attempt to present an overview of the general population ecology and some aspects of the natural history of one of them, *Leptagrion perlongum*, a common species in Santa Lúcia Biological Station (EBSL), Santa Teresa, ES. We gave special attention to the preferences of this species on some bromeliad species present, the general characteristics of the bromeliads where *L. perlongum* was successfully developed, and the pattern of population fluctuation during a year of study. We determined the preferences among bromeliads using an exuviae sampling, and the adult population abundance using a scan sampling in a site with high concentration of bromeliads. *L. perlongum* preferred *Vriesea jongheii*, *Neoregelia magdalenae* and *Nidularium procerum*, and avoided *V. ensiformis*. These preferences were generally explained, not only by differences in volume of water held, but also by effects of habitat preferences and plant aggregation. In 19.1% of the bromeliads exuviae were found in December 1998. The monthly emergence rate in January 1999 was 0,095 adult/bromeliad, with 7.9% of the bromeliads with new exuviae. Adult abundance rose in the rainy season

and the extension of the dry season was considered the primary regulation factor acting on this population." (Authors) Address: De Marco, P., Lab. Ecologia Quantitativa, DBG, Universidade Federal de Viçosa, 36571-000, Viçosa, MG, Brazil. E-mail: pdemarco@mail.ufv.br

**5756.** Eklöv, P. (2000): Chemical cues from multiple predator-prey interactions induce changes in behavior and growth of anuran larvae. *Oecologia* 123(2): 192-199. (in English). ["Chemical signals are used as information by prey to assess predation risk in their environment. To evaluate the effects of multiple predators on prey growth, mediated by a change in prey activity, I exposed small and large bullfrog (*Rana catesbeiana*) larvae (tadpoles) to chemical cues from different combinations of bluegill sunfish (*Lepomis macrochirus*) and larval dragonfly (*Anax junius*) predators. Water was regularly transferred from predation trials (outdoor experiment) to aquaria (indoor experiment) in which activity and growth of tadpoles was measured. The highest predation mortality of small bullfrog larvae in the outdoor experiment was due to *Anax*, and it was slightly lower in the presence of both predators, probably resulting from interactions between predators. There was almost no mortality of prey with bluegill. The activity and growth of small bullfrog larvae was highest in the absence of predators and lowest in the presence of *Anax*. In the presence of bluegill only, or with both predators, the activity and growth of small bullfrog tadpoles was intermediate. Predators did not affect large tadpole activity and growth. Regressing mortality of small bullfrog tadpoles against activity and growth of bullfrog tadpoles revealed a significant effect for small bullfrog larvae but a non-significant effect for large bullfrog larvae. This shows that the response of bullfrog tadpoles to predators is related to their own body size. The experiment demonstrates that chemical cues are released both as predator odor and as alarm substances and both have the potential to strongly alter the activity and growth of prey. Different mechanisms by which chemical cues may be transmitted to species interactions in the food web are discussed." (Author)] Address: Eklöv, P., Animal Ecology, Department of Ecology and Environmental Science, Umeå University, S-901 87 Umeå, Sweden. E-mail: Peter.Eklov@eg.umu.se

**5757.** Geest, G.H. van der; Greve, G.D.; Kroon, A.; Kuijl, S.; Kraak, M.H.S.; Admiraal, W. (2000): Sensitivity of characteristic riverine insects, the caddisfly *Cymus trimaculatus* and the mayfly *Ephoron virgo*, to copper and diazinon. *Environmental Pollution* 109: 177-182. (in English). [In fig. 3 & 4, the acute toxicity of diazinon to *Lestes* congener, and that of copper to *Zygoptera* in general are indicated.] Address: Geest, G.H. van der, Dept Aquatic Ecol. & Ecotox., Univ. Amsterdam, Kruislaan 320, NL-1098 SM Amsterdam, The Netherlands

**5758.** Kovac, T. (2000): Two rare insects from the Mátra Mountains: *Cordulegaster bidentatus* Sélys, 1843 and *Diura bicaudata* (Linnaeus, 1758) (Insecta: Odonata, Plecoptera). *Fol. hist.-nat. Mus. matraensis* 24: 129-131. (in Hungarian, with English summary). [Thecagaster *bidentata* has been unknown from the Mátra Mountains, Hungary so far. Records starting in 1996 are documented in detail.] Address: Kovacs, T., Matra Mus., Kossuth u. 40, HU-3200 Gyöngyös, Hungary. E-mail: koati@matavnet.hu

**5759.** McIntyre, P.B.; McCollum, S.A. (2000): Responses of bullfrog tadpoles to hypoxia and predators. *Oecologia* 125(2): 301-308. (in English). ["Low dissolved oxygen concentrations present numerous challenges for non-air-breathing aquatic organisms. Amphibian larvae and their predators can respond to oxygen levels by altering their behavior and physiology, but the ecological consequences of these responses are generally unknown. We conducted two laboratory experiments to study the effects of dissolved oxygen on respiratory behavior and susceptibility to predation of larval bullfrogs (*Rana catesbeiana*). In the first, we exposed small, lungless tadpoles to a predatory salamander larva (*Ambystoma tigrinum*) under high and low oxygen conditions. More tadpoles were consumed in high oxygen tanks than in low ones, presumably because salamanders remained near the surface in the low oxygen tanks while most tadpoles rested on the bottom. Tadpole activity depended on both oxygen and predator presence: swimming decreased after addition of salamanders under high oxygen, but increased under low oxygen. In the second experiment, we examined the effect of predator chemical cues on the air-breathing rate of large tadpoles with well-developed lungs under low oxygen conditions. In the presence of chemical cues produced by dragonfly larvae consuming bullfrog tadpoles, air-breathing and swimming were significantly reduced relative to controls. These experiments demonstrate the potential impact of dissolved oxygen on predator-prey interactions, and suggest that outcomes depend on the respiratory ecology of both predator and prey." (Authors)] Address: McCollum, S.A., Department of Biology, Cornell College, Mount Vernon, IA 52314, USA

**5760.** Pornsin-Sirirak, T.N.; Lee, S.W.; Nassef, H.; Grasmeyer, J.; Tai, Y.C.; Ho, C.M.; Keennon, M. (2000): Mems wing technology for a battery-powered ornithopter. The 13th IEEE Annual International Conference on MEMS, Miyazaki, Japan, January 23-27, 2000: 709-804. (in English). ["The objective of this project is to develop a battery-powered ornithopter (flapping-wing) Micro Aerial Vehicle (MAV) with MEMS wings. In this paper, we present a novel MEMS-based wing technology that we developed using titanium-alloy metal as wingframe and parylene C as wing membrane. MEMS technology enables systematic research in terms of repeatability, size control, and weight minimization. We constructed a high quality low-speed wind tunnel with velocity uniformity of 0.5% and speeds from 1 m/s to 10 m/s. We have tested and have studied the unsteady-state aerodynamics of various types of MEMS wings (including an anisopteran wing). Finally, we built lightweight ornithopters with electricpowered transmission system and have demonstrated successful free flights with flight duration ranges from 5 to 18 seconds." (Authors)] Address: Pornsin-Sirirak, T.N., Caltech Micromachining Laboratory, 136-93, Pasadena, CA 91125, USA

**5761.** Seino, M.; Kakazu, Y. (2000): Dynamic pattern formation for wings of Pterygota in an eclosion - Pattern analysis for wings with the imago. *Progress of Theoretical Physics Suppl* (1996-2002), No. 138: 600-601. (in English). ["The vein and cell patterns for the fore and hind wing of Lepidoptera, Hemiptera, Orthoptera and Odonata are analyzed and discussed. For vein patterns of them, the fractal properties are shown and the inequality between four orders is obtained. The nature of wings observed by mass distributions for fractal dimen-

sions of the vein pattern is presented." (Authors)] Address: Seino, M. & Kakazu, Y., Faculty of Science, University of the Ryukyus, Okinawa 903-0213, Japan

## 2001

**5762.** Hashimoto, H. (2001): Biomimetics research on flying insects for developing high performance, small-sized actuator. Proceedings of the school of engineering of Tokai university 41(2): 25-34. (in Japanese, with English summary). ["This paper describes the development of highperformance, small sized actuators based on the vibration mechanism of flying insects' wings. At first, the three-dimensional observation of flight muscles in some kinds of winged insects such as bees, dragonflies, and cicadae are presented. In the 3-D observation of flight muscles, sequential sections through thoraces are sliced at the thickness of 30  $\mu$  m by the rotating knife and taken photos by camera with three-dimensional internal structure microscope automatically and repeatedly. The 3-D images are reconstructed by a computer based on the digital data after recording. From the 3-D observation, it is confirmed that the winged insects can be classified into three groups at least by the differences of morphology of flight muscles. Then, relation between morphology of flight muscles and function of wings are examined experimentally. In the indirect-flight-muscle type of insects, the deflections of thoracic exoskeleton are measured under the static load. The obtained load-deflection diagrams show linear relation between them. In the direct-flight-muscle type of insects, the ultra high speed video camera is used to record the wing motion under the free flight conditions by making use of their nature of high sensitivity to light. The frequencies of wing vibration are determined from the analyses of recorded data on videotapes. It is found that the vibration frequencies depend on the wing mass in the case of losing weight and independent on it in the case of gaining weight. Finally, the application of these knowledges based on the biological experiments to the development of driving circuit and mechanism for small-sized actuator is presented." (Author) Specimens of *Orthetrum albostylum speciosum*, *Sympetrum darwini*, *S. frequens* and *Pantala flavescens* were used in this study.] Address: not transliterated into English language.

**5763.** Morita, T.; Yamano, K.; Yamamoto, Y.; Ichinose, T. (2001): Dragonfly fauna of the rainwater storage ponds in a rural landscape in Hokudan-cho, Awaji Island, Hyogo Prefecture. Landscape Planning and Horticulture 2: 51-54. (in Japanese, with English summary). ["There are many rainwater storage ponds in the Awaji Island. Especially, Hokudan-cho has more than 3000 ponds. We surveyed dragonfly fauna of 24 rainwater storage ponds from June 2000 to September 2000 in a rural area of north part of Hokudan-cho. All species were recorded for 40 minutes once a month in all ponds. In the result, 37 species were recorded and some species clearly preferred to coastal area or hilly area. However, it is suggested that some microhabitat structures influenced the distribution of dragonfly species." (Authors)] Address: Ichinose, T., Lab. of Landscape Planning, Awaji Landscape Planning and Horticulture Academy (ALPHA), Institute of Natural and Environmental Science, University of Hyogo, Nojimatokiwa 954-2, Ho-

kudan-cho, Tsuna-gun, Hyogo, Japan. E-mail: tomohiroichinose@yahoo.co.jp

**5764.** Wells, R.D.S.; Clayton, J.S. (2001): Ecological impacts of water net (*Hydrodictyon reticulatum*) in Lake Aniwhenua, New Zealand. New Zealand Journal of Ecology 25(2): 55-63. (in English). ["The ecological impacts of *Hydrodictyon reticulatum* blooms (1989-94) were studied at Lake Aniwhenua (a constructed lake) in North Island, New Zealand by collating fish, invertebrate and macrophyte data collected towards the end of a four year bloom period and following its decline. *Hydrodictyon reticulatum* had some localised impacts on the biota of the lake. Some macrophyte beds were smothered to the extent that they collapsed and disappeared, and dense compacted accumulations of *H. reticulatum* caused localised anoxic conditions while it decayed. However, fish and some invertebrates in the lake benefited from the *H. reticulatum* blooms. High numbers of *Ceriodaphnia* sp. (maximum, 5.5 x 10<sup>4</sup> m<sup>-2</sup>) were recorded amongst *H. reticulatum*, and gastropods were exceptionally abundant, the most common being *Potamopyrgus antipodarum* (maximum, 1.8 x 10<sup>5</sup> m<sup>-2</sup>). *Hydrodictyon reticulatum* was consumed by three species of common gastropods in experimental trials, with *Austropeplea tomentosa* consuming up to 1.3 g dry weight *H. reticulatum* g<sup>-1</sup>, live weight of snail day<sup>-1</sup>. Gastropods comprised the major portion of the diet of *Oncorhynchus mykiss* in Lake Aniwhenua during and after the *H. reticulatum* bloom. A marked peak in sports fishing (with exceptional sizes and numbers of fish caught) coincided with the period of *H. reticulatum* blooms and the abundant invertebrate food source associated with the blooms." (Authors) Odonata resp. *Procordulia grayi* are included in the analysis.] Address: Wells, R., National Institute of Water and Atmospheric Research, P.O. Box 11 115, Hamilton, New Zealand. E-mail: r.wells@niwa.cri.nz

## 2002

**5765.** Celik, K. (2002): Community structure of macrobenthos of a Southeast Texas sand-pit lake related to water temperature, pH and dissolved oxygen concentration. Turk. J. Zool. 26: 333-339. (in English, with Turkish summary). [Texas, USA; Barry's lake is a warm monomictic lake and no anoxic conditions were observed at any depth during the entire study period (June 1995 to February 1996, which covered climatic extremes). "A total of 50 taxa and 5614 individuals of macrobenthos were collected. The dominant organisms were *Chaoborus punctipennis* (Say), *Limnodrilus hoffmeisteri* (Claparede), and *Dero obtusa* (Udekem). The only established populations at 6.5 m were *Chaoborus punctipennis*, *Limnodrilus hoffmeisteri*, and *Chironomus* sp. Species diversity ranged from 0.9 to 3.9 and generally decreased with depth. The number of individuals increased with depth, while the species and species diversity decreased with depth." (Author) The table includes four odonate taxa.] Address: Celik, K., Department of Biology, Balikesir University, 10100 Balikesir, Turkey

**5766.** Holmen, M. (2002): Bidrag om fund og status for de i Danmark rødlistede arter af guldsmede og vandnymfer. <http://hem.passagen.se/trollslaenda/nof/pdf/odroe.pdf>: 66 pp. (in Danish, with English summa-



ry). ["A contribution on records and status for the Danish Red List dragonflies and damselflies (Odonata). This publication presents Danish records and status reviews since 1764 for the 21 species of Odonata in the Danish 1997 Red List. Records earlier than 2000 and some additional from 2000-2001 have been included. It has been compiled from studies of some major collections, literature and archived notes and by several private contributions of records. However, some additional records no doubt also exist, as not all relevant collections have been studied and not all information on Danish Odonata records have been available for this publication. Since 1991, at least 4 species have been recorded for the first time from Denmark, but their status and localities are not presented, as they are not in the 1997 Red List and at least partly would appear less relevant for the list. A brief review on previous surveys of Danish Odonata is provided." (Author) Available at: <http://hem.passagen.se/trollslaenda/nof/pdf/odroe.pdf>] Address: Holmen, M., Gadeledsvej 48, Gadevang, DK.-3400 Hillerod, Denmark. E-mail: ma@fa.dk

**5767.** Huber, A.; Kovacs, T.; Ambrus, A. (2002): Data on the Odonata fauna of North-East Hungary. *Fol. hist.-nat. Mus. matraensis* 26: 179-188. (in Hungarian, with English summary). [The Aggtelek National Park Directorate is bordered by the river Hernád, river Sajó and the state border between Hungary and Slovakia. Dragonfly collections realized between 1997 and 2001 resulted in 47 odonate species. *Coenagrion ornatum*, *Brachytron pratense*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Leucorrhinia pectoralis*, and *Sympetrum danae* are of particular interest.] Address: Huber, A., Aggteleki Nemzeti Park, Igazgatoság, Tengersizem oldal 1, HU-3758 Josvapo, Hungary

**5768.** Ichinose, T.; Morita, T. (2002): Factors influencing the distribution of dragonflies (Odonata) in the agricultural landscape in Hokudan-cho, Hyogo prefecture. *Journal of the Japanese Institute of Landscape Architects* 65: 501-506. (in English). ["There is a huge number of small irrigation ponds in the agricultural landscape of the north of Awaji Island, Hyogo Prefecture. Recently, managements of many ponds have been abandoned. However, these ponds are used as habitat by many organisms. They have an important role to maintain biodiversity in this area. Odonata were surveyed in 24 irrigation ponds in Hokudan-cho, the north of Awaji Island. Thirty-seven species were caught and/or observed from June to September 2000. The number of dragonfly species had no relation with water body area of irrigation ponds. Twenty-four ponds were classified to five types by TWINSPAN (Two-way Indicator Species Analysis). The classification of TWINSPAN was analyzed by Classification and Regression Trees using explanatory variables about environmental factors of irrigation ponds. The results showed that altitude, neighboring woodlots, water body area and water quality influenced the component of dragonfly species. Especially, it was important for species preferring edge and/or inside of woodlot that over 45 percents of pond surroundings were adjacent to woodlots. It was also suggested that surrounding land uses influenced the distribution of dragonfly species." (Authors)] Address: Ichinose, T., Lab. of Landscape Planning, Awaji Landscape Planning and Horticulture Academy (ALPHA), Institute of Natural and Environmental Science, University of Hyogo, Nojimatokiwa 954-2, Hokudan-cho, Tsuna-

gun, Hyogo, Japan. E-mail: tomohiroichinose@yahoo.co.jp

**5769.** Larivière, S. (2002): *Lutra maculicollis*. Mammalian species No. 712: 1-6. (in English). [Odonata are among the prey of the Spotted-necked Otter, Africa.] Address: not stated

**5770.** Leok, C.S.; Inoue, I.; Sato, T.; Haritani, M.; Tanimura, N.; Okada, K. (2002): Morphology of the oviduct fluke, *Prosthogonimus ovatus*, isolated from Indonesian native chickens and histopathological observation of the infected chickens. *Journal of Veterinary Medical Science* 64(12): 1129-1131. (in English). ["Chickens become infected by ingesting dragonfly or dragonfly naiads, an intermediate host, and chickens affected show inflammation of the oviduct and bursa of Fabricius." "Prosthogonimus ovatus infection was detected in 5 of 130 chickens in the oviduct and 4 chickens in the bursa of Fabricius. Scanning electron microscopy (SEM) revealed that the spines of the *P. ovatus* were densely distributed on the cuticula of the entire dorsal surface of body, but on the ventral surface, they were densely present to the level of ventral sucker but gradually decreased in density posteriorly, and they could not be seen in the posterior 1/3 area. The spines were finger-shaped and denticulate at the tip. Histopathological examination showed that polypous elevations, degeneration and exfoliation of the mucosal epithelium were detected in the bursa of Fabricius possibly by the suction of flukes, in addition to the stratification of the mucosal epithelium, and interstitial cell infiltration." (Authors)] Address: Leok, Chen Sau, Department of Medical Zoology and Laboratory of Veterinary Pathology, College of Bioresource Sciences, Nihon University, Fujisawa, Kanagawa 252-8510, Japan

**5771.** Ma, Z.-m.; Yang, Z.-z.; Mao, B.-y. (2002): A new record species of *Aristocypha Laidlaw* (1950) (Odonata: Libellaginidae) [sic] from China. *Entomotaxonomia* 24(3): 170. (in Chinese., with English title). [A. hylaryae (Fraser), 2 females, locality not transliterated, alt. 1650 m, 26-VII-1998.] Address: Ma, Z.-m., Dali Medical Coll., Dali, Yunnan-67000, China

**5772.** Svidersky, V.L.; Plotnikova, S.I. (2002): Insects and vertebrates: Analogous structures in higher integrative centers of the brain. *Journal of Evolutionary Biochemistry and Physiology* 38(5): 627-639. (in English). ["This work deals with studies on anatomical relationships, neuronal composition, and some synaptic connections that exist in the central complex (CC) in the suprasophageal ganglion in larva of dragonfly g. *Aeshna*. It has been shown that CC contains protocerebral bridge of an elongated and slightly curved cylindrical shape, fan-shaped and ellipsoid bodies of a bean-like shape and two small roundish noduli. There were revealed (stained) neurons providing both internal connections of CC and its connections with other CNS regions. Connections with tritocerebrum, the higher center of the autonomic nervous system, and subesophageal ganglion, an intermediate relay between supraesophageal ganglion and truncal brain, have been established. The existence of connections of CC with nuclei of abdominal nervous chain is suggested. Connection of ocelli with the CC has been traced. Unipolar neurons of the same type have been revealed, each of them giving collaterals to protocerebral bridge and ending as bushy terminals that form the main part of glomerule in the fan-

shaped and ellipsoid bodies. Glomeruli are arranged in rows, in which cross connections have been found. It has been established that the structure of neuropils of the fan-shaped and ellipsoid bodies represent a shielding structure described in the cerebral cortex, midbrain cortex, and cerebellar cortex of vertebrates. Thus, in insects, like in vertebrates, the shielding structures developed not only in optic centers, but also in structures performing higher integrative functions. A possible functional role of the central complex is discussed." (Authors) Address: Svidersky, V.L., Plotnikova, S.I., Sechenov Institute of Evolutionary Physiology and Biochemistry, Russian Academy of Sciences, St. Petersburg, Russia

**5773.** Takeyama, H.; Kamihogi, A.; Sato, H. (2002): The plan and design of a biotope at a school based on behavior of butterflies and dragonflies. *Journal of the Institute of Landscape Architecture, Annual Scientific Research Meeting Abstracts* 65: 32. (in English). [Verbatim: Even the role as property of the environment of the city is expected in the biotope space at the school that was established aiming at study position where understands the ecosystem of the area into the school site. We grasped the action characteristic of the dragonfly and butterfly by the 1 individual follow-up at the elementary and junior high school of the city area which possesses the biotope space at the school and periphery environment, and searched the plan and design of biotope space at the school. As the result, the case like the following became clear: it is effective to establish the biotope space at the school including the vegetable garden and swimming pool where four sides of the school sites in the school building without existing the place, to create the big tree, to plant trees in the wall of the structure, grassland with rough control is secured.] Address: Takeyama, H., Museum of Nature and Human Activities, Hyogo, Japan

**5774.** Tsachalidis, E.P.; Goutner, V. (2002): Diet of the White Stork in Greece in relation to habitat. *Waterbirds* 25(4): 417-423. (in English). ["Prey taken by breeding White Storks (*Ciconia ciconia*) were studied using pellets collected from 1993 to 1995 within its breeding area in Greece. Prey consisted of orthopterans, coleopterans, other insects, mollusks and vertebrates. The difference in the proportions of these taxa was significant among major foraging habitats (lakes, rivers, deltas and dry habitats). With the exception of the rivers, major habitats tended to group together in clusters, suggesting that similar prey types were available to the storks in common habitat types." (Authors) Odonata must be of minor importance as prey for *C. ciconia*, but are not quantified in detail.] Address: Tsachalidis, E.P., Technological Education Institute, Department of Forestry, Laboratory of Ecology and Wildlife Management, GR-66100 Drama, Macedonia, Greece. E-mail: etsaxal@teikav.edu.gr

**5775.** Wang, H.; Zeng, L.; Yin, C. (2002): Measuring the body position, attitude and wing deformation of a free-flight dragonfly by combining a comb fringe pattern with sign points on the wing. *Meas. Sci. Technol.* 13: 903-908. (in English). ["The simultaneous measurements of the body position, attitude and the wing kinematics of a free-flight insect are very important for analysing the flight performance. In this paper, a method based on combining a comb fringe pattern with sign points on the dragonfly wing has been developed to im-

prove the accuracy in body position and attitude measurement or in construction of a local body-fixed coordinate system. Meanwhile, the wing kinematics can be measured simultaneously by the comb fringe pattern method. The method has been used successfully in the measurement of a free-flight dragonfly." (Authors)] Address: Wang, H., State Key Laboratory of Precision Measurement Technology and Instruments, Department of Precision Instruments, Tsinghua University, Beijing 100084, China. E-mail: wanghao@post.pim.tsinghua.edu.cn

## 2003

**5776.** Albertoni, E.F.; Palma-Silva, C.; Esteves, F.A. (2003): Natural diet of three species of shrimp in a tropical coastal lagoon. *Brasilia archives of biology and technology* 46(3): 395-403. (in English, with Portuguese summary). ["The gut content of 495 specimens of *Farfantepenaeus brasiliensis*, 131 of *F. paulensis* (Penaeidae) and 102 of *Macrobrachium acanthurus* (Palaemonidae) were analyzed to establish the composition of their diets. *F. brasiliensis* had as the most important feeding items in its diet larvae of Chironomidae, Polychaeta and *Heleobia australis* (Mollusca). For *F. paulensis*, the most important items were the same as for *F. brasiliensis*, but the order of importance of *H. australis* and Polychaeta was inverted. *M. acanthurus* had detritus as the most important item, followed by Chironomidae larvae, Odonata nymphs, and fragments of the macroalgae *Chara*. The results showed that the three species were omnivorous, with a varied diet including both components of macrofauna of benthos and associated to the macroalgae *Chara* and plant fragments and detritus." (Authors)] Address: Albertoni, Edélti Faria, Fundação Universidade Federal do Rio Grande; Departamento de Ciências Morfo-Biológicas; Laboratório de Ecologia; Campus Carreiros; Av. Itália Km 8; 96201-900; Rio Grande, RS, Brazil

**5777.** Brux, H. (2003): Sager Meere, Heumoor, Wehsandgebiete und Lethetal - Ergebnisse und Bilanz aus sechs Jahren Untersuchungen in einem kaum bekannten Gebiet. *Natur- und Umweltschutz (Zeitschrift Mellumrat)* 2(1): 24-33. (in German, with English summary). [Niedersachsen, Germany, "In 1996-2001 investigations on flora and vegetation, birds, bats, fishes, reptiles, amphibia, grasshoppers and dragonflies were carried out. 68 red-data-book-species were recorded so far. Eutrophication and draining led to a strong decrease particularly of peat bog and submersed water plants. Appropriate countermeasures are challenging because only a small part is protected as nature reserve. However, this area is exceptionally well-suited for nature education and nature based recreation." (Author) A total of 26 odonata species including *Ceriatrigon tenelleum* and *Sympetrum depressisculum* are listed.] Address: Brux, H., IBL-Umweltplanung, Unterm Berg 39, 26123 Oldenburg, Germany

**5778.** Cannings, S.G. (2003): Status of Western River Cruiser (*Calopteryx aequabilis* Say) in British Columbia. B.C. Ministry of Sustainable Resource Management, Conservation Data Centre, Victoria BC. *Wildlife Bulletin* No. B-110: VII, 10 pp. (in English). ["Because this species is known to occur along only one short watercour-

se in the province (Christina Creek) and because this site is not secured, I recommend maintaining the provincial ranking of S1 (BCCDC 2003) and consequent Red-listing. Although there is a possibility that other populations exist, especially along the Kettle River, the probability is very small that these populations would be large or extensive enough to change the rank to another value. The threats posed by exotic fish and Eurasian water-milfoil, inappropriate recreation use, potential riparian development and pollution are also of concern in this unique stream system." (Author)] Address: Cannings, S., A68, BC Cons. Data Ctr., Resource Inven. Branch, P.P. Box 9344, Stn Prov. Govt, Victoria BC V8W 9M1, Canada

**5779.** Carchini, G.; die Domenico, M.; Pacione, T., Solimini, A.G.; Tanzilli, C. (2003): Species distribution and habitat features in lentic Odonata. *Ital. J. Zool.* 70: 39-46. (in English). ["The relationships between species assemblages and pond characteristics were investigated in a well preserved Mediterranean coastal woodland. Data on adult abundance were collected fortnightly. Pond area and depth, shade, riparian vegetation, presence of four classes of aquatic plants, presence of fish and both the distances from pond to pond and from pond to sea were considered as pond features. Results showed the presence of 23 Odonata species on 23 ponds. A Mantel test showed that the matrices of pond to pond topographic distances and that of pond to pond faunistic similarity were independent, which supports the hypothesis that the adult Odonata actively choose their breeding site. A stepwise multiple regression showed that only pond size, minimum water level and riparian vegetation had significant effects (all positive) on the total number of Odonata species in each pond. On the other hand, a canonical correspondence analysis showed that the composition of Odonata species assemblages was sensitive to almost all variables. From the point of view of Odonata conservation, both the moderate effect of *Gambusia holbrooki* and the positive effect of the riparian vegetation on the number of Odonata species appear particularly interesting for restoring or creating Odonata habitats." (Authors)] Address: Carchini, G., Dipartimento di Biologia, Università "Tor Vergata", Viale della Ricerca Scientifica, I-00133 Roma, Italy. E-mail: archini@utovrm.it

**5780.** de Bruyn, U.; Sinning, F. (2003): Kompensationsmaßnahme "Wümme-Nordarm" Bestandsaufnahme ausgewählter Insektengruppen 2002. Gutachten im Auftrag des Wasser- und Schifffahrtsamt Bremerhaven, SKN-14m Ausbau der Außenweser. Büro für Ökologie, Naturschutz und räumliche Planung, Oldenburg: 11 pp. (in German). [Niedersachsen, Germany; 19 odonata species including *Sympetrum pedemontanum* were recorded. For details see: <http://www.wsa-bremerhaven.wsv.de/kompensation/komppdf/WuemmeInsekten02.pdf>] Address: Büro für Ökologie, Naturschutz und räumliche Planung, Dipl.-Ing., Dipl.-Biol. Frank Sinning, Elisabethstr. 23, 26135 Oldenburg

**5781.** Fabbri, R.; Pavesi, M. (2003): Prima segnalazione per la Lombardia di *Chalcolestes parvidens* (Artobolovski, 1929) (Odonata, Lestidae). *Ann. Mus. civ. St. nat. Ferrara* 6: 95-96. (in Italian, with English summary). [Detailed documentation of four Italian records of *C. parvidens*] Address: Fabbri, R., Museo Civico die Storia Naturale, via De'Pisis, 24-44100 Ferrara, Italy. E-mail: r-fabbri@libero.it

**5782.** Geschke, S. (2003): Libellenkundliche Bestandsaufnahme im Kasanka National Park 12.03. bis 27.05.2003. Ein Beitrag zur Odonatenfauna Zambias. <http://www.fh-luh.de/fb9/fileadmin/archiv/StudiengangLA/ablauf/Praktikantenamt/Contents/Berichte/Ausland/LibellenZambiaStephanGeschkeklein.pdf>: 60 pp. (in German, with English summary). [Inventory of the Odonata of the Kasanka National Park, Zambia; a total of 72 species was recorded including some more related to the Congo basin. For the full paper see: <http://www.fh-luh.de/fb9/fileadmin/archiv/StudiengangLA/ablauf/Praktikantenamt/Contents/Berichte/Ausland/LibellenZambiaStephanGeschkeklein.pdf>] Address: Geschke, S., Heinrichstr. 8, 32479 Hille, Germany. E-mail: SGeschke@gmx.de

**5783.** Holly, M. (2003): Monitoring of small ponds faunal colonisation of the Bieszczady National Park. *Roczniki Bieszczadzkie* 11: 249-257. (in Polish, with English summary). [Poland; preliminary results of the monitoring of the faunal succession in five small ponds established in 1999 - 2000 are presented. Data from 2001 and 2003 also document seven (common) odonate species.] Address: Holly, M., Ośrodek Naukowo-Dydaktyczny Bieszczadzkiego Parku Narodowego, ul. Belska 7, 38-700 Ustrzyki Dolne, Poland. E-mail: marekholly@wp.pl

**5784.** Kravitz, E.A.; Hubery, R. (2003): Aggression in invertebrates. *Current Opinion in Neurobiology* 13: 736-743. (in English). ["Invertebrates are outstanding model systems for the study of aggression. Recent advances and promising new research approaches are bringing investigators closer to the goal of integrating behavioral findings with those from other disciplines of the neurosciences. The presence of highly structured, easily evoked behavioral systems offer unique opportunities to quantify the aggressive state of individuals, to explore the mechanisms underlying the formation and maintenance of dominance relationships, to investigate the dynamic properties of hierarchy formation, and to explore the significance of neural, neurochemical and genetic mechanisms in these behavioral phenomena. [...] Dominance enhances feeding opportunities in dragonflies [Baird J.M., May, M.L.: Fights at the dinner table: agonistic behavior in *Pachydiplax longipennis* (Odonata: Libellulidae) at feeding sites. *J. Insect Behav.* 16:189-216] but few physiological studies that relate specifically to aggression have been carried out using these models." (Authors)] Address: Kravitz, E.A., Department of Neurobiology, Harvard Medical School, 220 Longwood Avenue, Boston, MA 02115, USA. E-mail: edwardkravitz@hms.harvard.edu

**5785.** Laranjeiro, A.J. (2003): Estabilidade da entomofauna num mosaico de plantação de eucalipto e áreas naturais de conservação. Tese de Doutorado, Escola Superior de Agricultura Luiz de Queiroz (ESALQ), Universidade de São Paulo: XX, 142 pp. (in Portuguese, with English summary). ["Stability of the entomofauna in a region composed by eucalypt plantations and conservation areas. Due to the large spreading of commercial forests in Brazil, in the last decades, one can detect a enormous pressure from the environmentalists and the governmental agencies for evaluation studies and environmental monitoring of forestry enterprises. On the other hand, the forestry enterprises are concerned with the stability of such forests in order to ensure the goals of this agribusiness. The recent spreading of forest



planted areas give chance to a number of pests, either native or introduced ones, to start a process of colonization and adaptation. And one knows that the environmental equilibrium is fundamental for the integrated forest pest management. Therefore this research was carried out to determine the interactions among the main environments of the ecosystem where the plantations are located, as well as the influence of the silvicultural management on the insect communities of the eucalypt plantation and the neighboring natural reservoirs. The entomofauna was monitored by using light and Malaise traps in a watershed of a region with high silvicultural activity, located in the north of the State of Espírito Santo, Brazil, from 1994 to 2002." (Author) Odonata are treated on the family level. For the full paper see: <http://www.teses.usp.br/teses/disponiveis/11/11146/tde-14072003-083640/> Address: Laranjeiro, Alberto Jorge. E-mail, [ajl.equilibrio@uol.com.br](mailto:ajl.equilibrio@uol.com.br)

**5786.** Miserendino, M.L. Pizzolon, .A. (2003): Distribution of macroinvertebrate assemblages in the Azul-Quemquemtreu river basin, Patagonia, Argentina. *New Zealand Journal of Marine and Freshwater Research* 37: 525-539. (in English). ["Longitudinal and seasonal changes in physical and chemical variables, and macroinvertebrate community structure-function were examined in the Azul-Quemquemtreu river system in the subantarctic forest of Patagonia, Argentina. Patagonian mountain streams have a marked seasonal discharge pattern and may have high suspended sediment loads because of forestry and other land-use practices. The main physical differences among sites were in substrate size (boulder-pebble/ sand), mean width (3–37 m), discharge ( $<1-80 \text{ m}^3 \text{ s}^{-1}$ ), total alkalinity ( $275-1210 \text{ meq litre}^{-1}$ ) and conductivity ( $31-137 \text{ } \mu\text{S cm}^{-1}$ ). Species richness and Ephemeroptera, Plecoptera, and Trichoptera richness decreased from upstream sites to the mouth of the river system and were affected by land use. Macroinvertebrate assemblages were influenced by physical (substrate size, width, discharge, current velocity) and chemical (alkalinity and conductivity) variables, and mean density of macroinvertebrates was significantly higher at the Quemquemtreu sites than the Azul sites. Canonical Correspondence Analysis indicated that seasonal trends in macroinvertebrate community composition were related to changes in environmental characteristics of the river, especially water temperature and discharge. The composition of benthic communities in rivers of the Patagonian Andes largely reflect characteristics related to stream size, but factors at the reach scale best explain variation in abundance data. Collector-gatherers were the dominant functional feeding group at all sites. Faunas have similarities with those of New Zealand in taxonomic-functional composition, with a predominance of Chironomidae (Diptera), Leptophlebiidae (Ephemeroptera), and Gripopterygidae (Plecoptera)." (Authors) The only odonate species – *Rhinoeschna variegata* – is reported from one of the six localities sampled for macroinvertebrates.] Address: Miserendino, Laura, Laboratorio de Ecología Acuática, Universidad Nacional de la Patagonia, Sarmiento 849, 9200 Esquel, Chubut, Argentina. E.-mail: [mlau@ar.inter.net](mailto:mlau@ar.inter.net)

**5787.** Mochizuki, H.; Komaki, H.; Morita, M.; Kusamichi I. (2003): Observation of dragonfly flying in air and flow. *Transactions of Visualization Society of Japan* 23(12): 115-121. (in Japanese, with English summary). ["The flapping of a dragonfly, *Pantala flavescens*, hori-

zontally flying in a field was observed with a high speed video camera. As a result, it was clarified that a frequency of the flapping with maximum amplitude in the observation was the same order as one of the flapping in a wind tunnel. Also, it was observed that vortices regularly occurred every one cycle by flapping with large amplitude in the wind tunnel and diverged downstream with combining each other. The flow upstream of the dragonfly flapping was induced in three forms of curved flow lines into the region around the body. Furthermore, wakes were generated in horizontal, downward and upward directions according to these forms." (Authors)] Address: Mochizuki, H., Faculty of Agriculture, Kagoshima University

**5788.** Samson, N. (2003): Étude du degré de dispersion et des facteurs favorables à la reproduction de la Cordulie à corps fin, *Oxygastra curtisii* (Dale, 1834), dans les Mauges (49). Centre Permanent d'Initiatives pour l'Environnement Loire et Mauges, Maison de Pays « La Loge, F-49600 Beaupreau: 73 pp. (in French). ["L'espèce *Oxygastra curtisii* (Dale, 1834) est présente en France sur l'ensemble du territoire mais sa fréquence est moindre dans le nord. Le CPIE Loire et Mauges s'intéresse à cette espèce d'intérêt patrimonial car sa présence dans les Mauges est marquée. De cette observation est née la volonté de mener une étude plus poussée sur la Cordulie à corps fin. La problématique de cette étude est double. Il s'agit de cerner les conditions favorables à la reproduction de l'espèce ainsi que son degré de dispersion dans le paysage bocager des Mauges. Pour répondre à cette problématique, les recherches ont porté sur les lieux d'émergence et de vie des larves, le comportement des imagos ainsi que leurs déplacements dans le maillage bocager. La méthodologie mise en place a eu pour but d'aborder le plus d'étapes possibles du cycle biologique: l'émergence, par une recherche des exuvies sur des plaquettes de suivi choisies pour leurs caractéristiques favorables à la présence d'*Oxygastra curtisii*, d'après la bibliographie étudiée, les imagos matures, par la technique de capture/marquage qui permet de récolter des informations à l'échelle de la population, des sexes et de l'individu. Le suivi a lieu dans le paysage bocager, dans le but d'étudier leur comportement et le degré de dispersion, et en contexte aquatique pour observer les comportements liés plus précisément à la reproduction. 115 exuvies ont été récoltées, 102 imagos ont été marqués (80 mâles et 22 femelles), 10% de ces imagos ont été contrôlés et des comportements sexuels ont été constatés (comportements territoriaux, accouplements et pontes). La recherche des exuvies a permis de prouver la reproduction de l'espèce sur l'Evre, de déterminer la période d'émergence et les caractéristiques des sites d'émergence. Le suivi des imagos a permis de préciser le cycle biologique de l'espèce Le but final de cette étude est de prendre en compte la présence d'*Oxygastra curtisii* lors de travaux sur le bocage et les ripisylves." (L'auteur)] Address: Centre Permanent d'Initiatives pour l'Environnement Loire et Mauges, Maison de Pays « La Loge, F-49600 Beaupreau, France

**5789.** Sukhacheva, G.A.; Kryukova, N.A.; Glupov, V.V. (2003): On the roles of morphological and biochemical criteria in species identification: An example of dragonfly larvae of the genus *Aeshna*. *Biology Bulletin* 30(1): 63-68. (in English). ["Dragonflies belong to the group of organisms with numerous well-differentiated

species-specific characters at the adult stage, on the one hand, and a significantly smaller number or even the absence of such characters at the early ontogenetic stages. An example of the genus *Aeschna* is used to show difficulties in revealing morphological and biochemical characters allowing identification of larval dragonflies belonging to closely related species of the family. Distinct morphometric characters can be found only in late-instar larvae. The presence of species-specific proteins in the homogenates of thoracic muscles provides the possibility of using biochemical tests for species identification of larvae. Infestation by parasites has no effects on the biochemical parameters studied. Species identification of the early-instar dragonfly larvae is still problematic." (Authors)] Address: Sukhacheva, G.A., Siberian Division, Russian Academy of Sciences, Institute of Animal Systematics and Ecology, ul. Frunze 11, Novosibirsk, 630091, Russia. Email: mi@eco.nsc.ru

**5790.** Sutcliffe, K.E. (2003): The conservation status of aquatic insects in south-western Australia. PhD Thesis, Murdoch University: ["Freshwater ecosystems in south-western Australia have been extensively altered over the last two centuries as a result of human activities. The effect this has had on aquatic fauna, particularly invertebrates, is largely unknown because of inadequate knowledge of the pre-existing fauna. Future changes in the composition of aquatic fauna will also go undetected unless current distributions of existing species are well documented. This thesis addresses the problem by investigating the current distributions and conservation status of aquatic insects in south-western Australia from three orders: Odonata, Plecoptera and Trichoptera. Extensive distributional data was collected by identifying larval specimens from a large number of samples collected throughout the south-west as part of an Australia-wide macroinvertebrate bioassessment project. In addition, a database created from a species-level biological study of the wheatbelt region of Western Australia was utilised, and previously published records of occurrence for species within the south-west were compiled. These results were then used to assess the conservation status of each species using the IUCN red list criteria. Environmental parameters measured at time of sampling were also examined using logistic regression to determine which factors are important in influencing the distributions of aquatic insects in south-western Australia. The conservation value of sites based on Odonata, Plecoptera and Trichoptera compositions was also determined and the degree of protection provided for sites of high conservation value investigated. The high rainfall forested region of the south-west was found to be important for a large number of species, including the majority of those found to be rare and/or restricted. Overall, 37% of species were found to be threatened, with the Trichoptera containing both the greatest number and highest proportion of threatened species. Logistic regression results generally agreed with the distributions obtained for each species, with rainfall and other parameters indicative of streams in the headwaters of forested catchments being positively associated with species found to be restricted to the high rainfall region. Two parameters known to be affected by human disturbance in the south-west, conductivity and nutrient concentrations, were found to be important in determining the occurrence of many species and this could have important consequences for aquatic insect conservation. Widespread species occurring within the low rainfall region of the south-west did not show as

many significant relationships to measured environmental parameters, possibly due to their greater ecological tolerances and adaptations which allow them to persist in a low rainfall environment. The implications of results are discussed, and recommendations for the conservation and management of aquatic insects in south-western Australia are given." (Author)] see: <http://www.lib.murdoch.edu.au/adt/browse/view/adt-MU20040430.153605>

**5791.** Taborton, W. (2003): Dragonflies. Lajuma Synthesis Workshop, 9–10 May 2003; <http://www.soutpansberg.com/workshop/>: 2 pp. (in English). [Checklist of the Odonata of the Soutpansberg-region, South-Africa.]

**5792.** Tanida, Y. (2003): Locomotion by Tandem and Parallel Wings (A Note on the Flight of Dragonflies and Beetles). JSME International Journal Series B 46(2): 244-249. (in English). ["A two-dimensional analysis was carried out on the locomotion by tandem and parallel wings in relation to the free flight of dragonflies and beetles, remarking the mutual interference between fore and hind wings. The results obtained are summarized as follows: In the case of tandem wings, (1) High thrust and propulsive efficiency can be achieved when the forewing oscillates with a definite phase lag behind the hindwing, as in the case of real dragonflies, (2) Somewhat smaller amplitude of hindwing leads to optimum condition for work sharing of two wings, (3) The hard forewing does not serve for the thrust and propulsive efficiency, whereas the hard hindwing does for the augmentation of them; In the case of parallel wings, (4) The hard wing placed near the soft wing acts nearly as an infinite plate, as for the ground effect, increasing both thrust and propulsive efficiency." (Author)] Address: Tanida, Y., Univ. Tokyo, 7-17-33 Konan-dai, Kona-Ku, Yokohama 234-0054, Japan. E-mail: taniday@docomo.ne.jp

## 2004

**5793.** Argerich, A.; Puig, M.A.; Pupilli, E. (2004): Effect of floods of different magnitude on the macroinvertebrate communities of Matarranya stream (Ebro river basin, NE Spain). *Limnetica* 23(3-4): 103-114. (in English, with Spanish summary). ["In October 2000, the Matarranya River suffered an extraordinary flood with a measured flow rate of approximately 450 m<sup>3</sup>/s in the town of Vall-de-roures and a return period of about 500 years, according to the Ebro Hydrographic Confederation. The objective of this study was to determine the influence of the consequent perturbation on the structure and composition of the macroinvertebrate community and its subsequent recovery. To this end, two sites in the headwaters of the river, about which information from previous studies was available, were chosen as sampling sites. The Parrissal station, 8 km from the source with a practically natural flow regime, and at Vall-de-roures, 18 km from the source and from which part of the flow has been deviated, to be returned in summer from the waters collected in the reservoir on the Pena River. Sampling was carried out one, five and fifteen months after the flood and the data was compared with that obtained before the perturbation, (December, 1998 and February, 1999). On the other hand, we analyzed the effects of smaller floods occurring in October 1984

(Parrissal) and June 1986 (Vall-de-roures). The results point to different patterns of recovery in the two sampling points after the 2000 flood, the community density recovering more rapidly in the site less affected by anthropic intervention (Parrissal), while the biological quality of the stretch studied in Vall-de-roures involved increased taxonomic richness and greater structuring of the community. The flood events of lesser magnitude did not seem to affect the community structure in Parrissal, while in Vall-de-roures the abundance of the predominant groups varied." (Authors) Odonata are treated on the order level.] Address: Argerich, A., Departamento de Biogeoquímica Acuática. Centre d'Estudis Avançats de Blanes, CSIC. Acc. Cala Sant Francesc 14, 17300 Blanes, Spain. E-mail: alba@ceab.csic.es

**5794.** Broomhall, S.D. (2004): Egg temperature modifies predator avoidance and the effects of the insecticide endosulfan on tadpoles of an Australian frog. *Journal of applied ecology* 41: 105-113. (in English). ["1. Attention is shifting from simplistic explanations of global amphibian declines that posit a single cause (such as climate change, pesticide contamination or disease) to more complex scenarios that involve interactive effects. Temperature is a pervasive influence on frog development, particularly during the egg and larval stages. However, the effect of temperatures experienced early in ontogeny on later larval behaviour or response to agrochemicals is little known. 2. Eggs of the Australian frog *Limnodynastes peronii* were reared at two temperatures that simulate naturally occurring cool and warm temperature regimes ( $14\pm 3^{\circ}\text{C}$  and  $20\pm 3^{\circ}\text{C}$ ). Tadpoles were then exposed to sublethal concentrations of the organochlorine insecticide endosulfan, at a common temperature. Endosulfan often contaminates aquatic environments, yet its effects on Australian frogs are unknown. Tadpoles reduced feeding after 48 h of exposure to endosulfan concentrations that occur in the field (both  $0.03\mu\text{g}$  l<sup>-1</sup> and  $1.3\mu\text{g}$  l<sup>-1</sup>). Feeding remained depressed at  $1.3\mu\text{g}$  l<sup>-1</sup> endosulfan up to 9 days after tadpoles were transferred to endosulfan-free water. 3. Egg-rearing temperature and endosulfan interacted to affect tadpole length. Further, tadpoles exposed to endosulfan were significantly shorter than control tadpoles. They were also more vulnerable to capture by an invertebrate (odonate) predator than controls of the same size when tested 9 days after transfer to clean water. While warm egg-rearing temperatures significantly decreased vulnerability to capture, tadpoles were proportionally more adversely affected by endosulfan. Thus, egg-rearing temperature altered predator avoidance and changed the way in which endosulfan affected growth. Moreover, endosulfan significantly decreased feeding, growth and predator avoidance. 4. Synthesis and applications: Not only can short-term exposure to endosulfan at levels within regulatory guidelines and frequently reported in natural waterbodies influence tadpole viability, but the sensitivity of the tadpoles to this effect depends upon the thermal regimes that they encounter over their first few days of life. These data therefore suggest that existing water quality prescriptions may not provide adequate protection, while also illustrating how aspects of climate and thermal regimes might interact with pesticides to have cumulative effects on amphibian fitness." (Author)] Address: Broomhall, Sara, Richard Shine Laboratory, Biological Sciences, Heydon Laurence Building, University of Sydney, NSW 2006, Australia

**5795.** Cale, D.J.; Halse, S.A.; Walker, C.D. (2004): Wetland monitoring in the Wheatbelt of south-west Western Australia: site descriptions, waterbird, aquatic invertebrate and groundwater data. *Conservation Science W. Aust.* 5(1): 20-135. (in English). ["The Wheatbelt of south-west Western Australia contains a range of wetland types with varying salinity, including many naturally saline lakes and playas. The increase in salinity of most wetlands during the last 50 years as a result of land-clearing is a major threat to wetland biodiversity. As part of the State Salinity Strategy, a wetland monitoring program began in 1997 at 25 wetlands from locations throughout the wheatbelt. The aim of the monitoring program was to document trends in biodiversity at the 25 wetlands and relate these trends to physical conditions in the wetlands and patterns of surrounding landuse. This report summarizes existing information on the wetlands and provides, as baseline conditions, results of initial waterbird, aquatic invertebrate and groundwater monitoring. It documents the monitoring methods used and highlights the need for a long-term program. There was a strong negative relationship between aquatic invertebrate species richness and salinity. A negative relationship also existed for waterbird richness, although other factors determined numbers of species in many wetlands with salinity being a constraint on maximum potential waterbird richness rather than a determinant of the actual number of species. Further salinization is likely to change detrimentally both invertebrate and waterbird communities. Such changes are apparent in historical waterbird data from some wetlands. The ultimate cause of increased salinity in wetlands is rising groundwater, although sometimes wetlands are more directly affected by the increased surface run-off that results from high watertables in the catchment than by groundwater beneath the wetland." (Authors) The following odonate species are tabled: *Ilschnura aurora aurora*, *Ilschnura heterosticta heterosticta*, *Austroagrion coeruleum*, *Xanthagrion erythro-neurum*, *Austrolestes annulosus*, *A. aridus*, *A. analis*, *A. io*, *A. psyche*, *Hemianax papuensis*, *Aeshna brevistyla*, *Hemicordulia tau*, *Procordulia affinis*, *Orthetrum caledonicum*, *Diplacodes bipunctata*, and *Agrioptera insignis allogenae*.] Address: Cale, D.J., Science Division, Department of Conservation and Land Management, PO Box 51 Wanneroo Western Australia 6956. Email: davidca@calm.wa.gov.au

**5796.** Campos, R.E.; Fernández, L.A.; Sy, V.E. (2004): Study of the insects associated with the floodwater mosquito *Ochlerotatus albifasciatus* (Diptera: Culicidae) and their possible predators in Buenos Aires Province, Argentina. *Hydrobiologia* 524: 91-102. (in English). ["Insects associated with the floodwater mosquito *Ochlerotatus albifasciatus* (Diptera: Culicidae) were studied from intermittent puddles in temperate Argentina in an attempt to detect the main predators. 41 taxa occurred in the puddles from spring to fall. Coleoptera and Diptera were dominant and diverse. Ephemeroptera and Odonata were scarce in numbers and species, and Heteroptera occurred in low numbers of species and high abundance of individuals. The main predators of immature *O. albifasciatus* were detected on the basis of relative abundance (ISA index), ecological dominant groups, and species association ("I" index). *Liodessus* sp. and *Rhantus signatus signatus* (Coleoptera: Dytiscidae) were the most abundant predators in the puddles and *Liodessus* sp., *Lancetes marginatus* (Dytiscidae) and *Psorophora ciliata* (Culicidae) were the



most frequent. *Liodes* sp. and *O. albifasciatus* were the best associated species in all seasons.[...]" (Authors)] Address: Campos, R.E., Instituto de Limnología "Dr. Raúl A. Ringuelet", Universidad Nacional de La Plata, CC 712 (1900) La Plata, Buenos Aires, Argentina. E-mail: rcampos@ilpla.edu.ar

**5797.** Chen, X.-L. (2004): An annotated list of the name bearing type specimens of species-group names in Odonata in the Insect Collection of the Institute of Zoology, Chinese Academy of Sciences. *Pan-Pacific Entomologist* 80: 81-90. (in English). ["Species-group names of the order Odonata, including Aeshnidae, Calopterygidae, Coenagrionidae, Cordulegastridae, Euphaeidae, Gomphidae, Libellulidae, Megapodagrionidae, Platycnemididae and Synlestidae, deposited in the insect collection of the Institute of Zoology, Chinese Academy of Sciences, are listed alphabetically by species names published originally, along with an abbreviated citation to the original description, museum specimen number, sex, locality data, collector, collecting date, specimen condition and remarks where available. The type collection includes 71 name-bearing types of Odonata consisting of 39 holotypes, 10 allotypes, 12 paratypes, 1 neotype and 9 syntypes, and includes 50 species described by S. J. Navas, H. F. Chao and M. A. Lieftinck." (Author)] Address: Xiao-Lin Chen, Insect Collection, Institute of Zoology, The Chinese Academy of Sciences, Beijing, 100080, P.R.China. E-mail: xlchen@ioz.ac.cn

**5798.** Deer, L.A.; Gertz, L.; Kelley, C.; Osterrieder, K.; Rice, T.M. (2004): Dragonfly larvae (Insecta:Odonata) have high tolerance to acute metal exposure. Poster presentation at the 25th annual meetings of the Society of Environmental Toxicology and Chemistry, Portland, OR: (in English). [Verbatim. Odonates (Insecta: Odonata; dragonflies and damselflies) occupy important trophic levels in freshwater systems. They have a biphasic lifecycle, with aquatic predatory larvae and aerial terrestrial predatory adults. Additionally, odonates can reach high levels of abundance in some habitats and are important food items of both aquatic and terrestrial predators. Therefore, odonates could be exposed to aquatic toxicants from a variety of sources and could then transfer bioaccumulated toxicants to their predators. Despite their presence and importance in aquatic ecosystems, there is very little field or laboratory data regarding the impact that environmental chemicals have on odonates. We have developed methods for the laboratory maintenance and testing of odonate larvae collected from the Mobile, Alabama region. In acute toxicity tests primarily with *Erythemis simplicicollis* (Libellulidae), larvae approximately 10 mm in length were exposed in individual containers to amounts of copper and cadmium above 100 mg/L. Using immobility as the endpoint, larvae were able to tolerate high levels of both metals, with EC50 values above 25 mg/L. This species of odonate appears to be extremely resistant to metals compared in general to other common aquatic test species (e.g. *Daphnia*, *Xenopus*). High resistance to metal pollution could make odonate larvae a potential indicator of poor water quality in contaminated habitats. Their ability to withstand and accumulate high levels of metals might also put their predators at risk from ingestion of contaminated larvae or adults. We are continuing our laboratory tests with other species and other chemicals, and we are also investigating the use of these organisms as field indicators of water quality from watersheds such as the Mobile Delta.]

**5799.** Frydrychová, R.; Grossmann, P.; Truba, P.; Vítková, M.; Marec, F. (2004): Phylogeny of TTAGG telomeric repeats in insects. *Genome* 47: 163-178. (in English). ["We examined the presence of TTAGG telomeric repeats in 22 species from 20 insect orders with no or inconclusive information on the telomere composition by single-primer polymerase chain reaction with (TTAGG)<sub>6</sub> primers, Southern hybridization of genomic DNAs, and fluorescence in situ hybridization of chromosomes with (TTAGG)<sub>n</sub> probes. The (TTAGG)<sub>n</sub> sequence was present in 15 species and absent in 7 species. In a compilation of new and published data, we combined the distribution of (TTAGG)<sub>n</sub> telomere motif with the insect phylogenetic tree. The pattern of phylogenetic distribution of the TTAGG repeats clearly supported a hypothesis that the sequence was an ancestral motif of insect telomeres but was lost repeatedly during insect evolution. The motif was conserved in the "primitive" apterous insect orders, the Archaeognatha and Zygentoma, in the "lower" Neoptera (Plecoptera, Phasmoda, Orthoptera, Blattaria, Mantodea, and Isoptera) with the exception of Dermaptera, and in Paraneoptera (Psocoptera, Thysanoptera, Auchenorrhyncha, and Sternorrhyncha) with the exception of Heteroptera. Surprisingly, the (TTAGG)<sub>n</sub> motif was not found in the "primitive" pterygotes, the Palaeoptera (Ephemeroptera and Odonata). The Endopterygota were heterogeneous for the occurrence of TTAGG repeats. The motif was conserved in Hymenoptera, Lepidoptera, and Trichoptera but was lost in one clade formed by Diptera, Siphonaptera, and Mecoptera. It was also lost in Raphidioptera, whereas it was present in Megaloptera. In contrast with previous authors, we did not find the motif in Neuroptera. Finally, both TTAGG-positive and TTAGG-negative species were reported in Coleoptera. The repeated losses of TTAGG in different branches of the insect phylogenetic tree and, in particular, in the most successful lineage of insect evolution, the Endopterygota, suggest a backup mechanism in the genome of insects that enabled them frequent evolutionary changes in telomere composition." (Authors)] Address: Marec, F., Institute of Entomology ASCR, Branišovská 31, CZ-370 05, České Budejovice, Czech Republic. E-mail: marec@entu.cas.cz

**5800.** Hämäläinen, M.; Hulden, L.; Karjalainen, S. (2004): Etelänukonkorenon (*Aeshna mixta* Latreille, 1805) vaellukset Suomeen 2002-2003 (Odonata, Aeshnidae). *Sahlbergia* 8(2) (2003): 49-54. (in Finnish, with English summary; title not stated in English). ["Migrant individuals of *Aeshna mixta* were recorded for the first time in Finland in August-September 2002 and again in August-October 2003. Confirmed observations from several sites along the southern coast of the country (in N: Porvoo, N: Helsinki, N: Espoo, N: Kirkkonummi, Ab: Pohja, Ab: Karjaa) and from Åland archipelago (Al: Lemland) are listed. Most records were made in bays by the sea, but a few also at a distance of 4-6 km from the coast. The distribution *A. mixta* and its migratory tendency are briefly discussed. The nearest autochthonous populations occur in the Riga region in Latvia, and this area might be the source of the migration to Finland. Records made by Doppler weather radar show that very large insects flew from Estonia towards Helsinki in many occasions at the end of July and the beginning of August in 2002, in afternoons when south-eastern winds prevailed; apparently these insects were migrant *A. mixta*." (Authors)] Address: Karjalainen, S., Tyrskykuja 3 B 15, FIN-02330 Espoo, Finland

**5801.** Hardersen, S. (2004): The dragonflies: species, phenology, larval habitats (Odonata). In: Cerretti, P., S. Hardersen, F. Mason, G. Nardi, M. Tisato, M. Zapparoli (2004, Eds): *Invertebrati di una foresta della Pianura Padana, Bosco della Fontana*. Secondo contributo Conservazione Habitat Invertebrati, 3. Cierre Grafica Editore, Verona, 304 pp. ISBN 88-8314-335-3: 29-50. (in English, with Italian summary). ["The Odonata of the nature reserve "Bosco della Fontana" (Lombardy, Italy) were studied with special regard to their phenology. A total of 31 species were recorded. For many of these, larval habitats were identified. *Lestes sponsa* and *Aeshna affinis* were found for the first time at the nature reserve "Bosco della Fontana". The presence of *Oxygastra curtisii* [...] was reconfirmed. However, the population of this species appears to be small. The observed flight period of a number of species clearly differed from data in the literature." (Author)] Address: Hardersen, S., Centro Nazionale per lo Studio e la Conservazione della Biodiversità Forestale, Corpo Forestale dello Stato, Strada Mantova, 29, I-46045 Marmirolo (MN), Italy. E-mail: s.hardersen@libero.it

**5802.** Keeley, C.; Gertz, L.; Osterrieder, K.; Rice, T.M. (2004): Use of dragonfly larvae (Insecta:Odonata) in toxicological tests. Poster presentation at the 25th annual meetings of the Society of Environmental Toxicology and Chemistry, Portland, OR: (in English). [Verbatim: Odonates (Insecta: Odonata; dragonflies and damselflies) are important members of freshwater ecosystems as both predators and prey. They have an aquatic predatory larval stage and an aerial terrestrial predatory adult stage. Additionally, odonates can be very abundant in certain habitats and are preyed upon by a variety of aquatic and terrestrial predators. Despite their presence and importance in aquatic ecosystems, there is very little field or laboratory data regarding the impact that environmental chemicals have on odonates. Odonate larvae could be useful test organisms in toxicological research because many species are easily collected in large numbers and are of a reasonable size. However, before laboratory experiments such as acute and chronic tests can be conducted, methods for the maintenance of odonates need to be established. We have developed methods for housing and feeding odonate larvae. Using primarily *Erythemis simplicicollis* (Libellulidae), we hold larvae in individual ventilated plastic cups in order keep track of individuals and to keep food items in close proximity. Cups are contained in a filtering, recirculation system with reconstituted hard water under a 12L:12D photoperiod regime at 22°C. Larvae are fed small fish or tadpoles as food every few days. We have found that larvae can survive in these conditions and continue to grow and molt for several weeks. They require only infrequent feeding and produce little waste. We prefer that larvae spend at least one week and have one meal under these conditions before being used in toxicity tests. Our system is easy to construct and maintain and should be useful for anyone interested in maintenance of odonates or animals with similar habits.]

**5803.** Laufer, H. (2004): Zum Beutespektrum einer Population von Ochsenfröschen (Amphibia: Anura: Ranidae) nördlich von Karlsruhe (Baden-Württemberg, Deutschland). *Faunistische Abhandlungen, Dresden* 25: 139-150. (in German, with English summary). [The bullfrog (*Rana catesbeiana*), introduced in the Upper Rhine area (Baden-Württemberg, Germany), is a neo-

zoon suggested by some researchers to having negative effects on native amphibians. To examine this statement the diet was examined of 44 bullfrogs (22 males, 21 females, one young specimen) captured in the field. A total of 12 vertebrates and 65 invertebrates including two Anisoptera was found. The vertebrates were four mammals, two birds, two reptiles, three amphibians and a goldfish. A preference of native amphibians, especially of edible frog as prey could not be verified. These results prove that the bullfrog is an opportunistic omnivore eating all living animals that are smaller than itself and that it can capture.] Address: Laufer, H., Büro für Landschaftsökologie, Friedenstrasse 28, 77654 Ofenburg, Germany. E-mail: bfl.laufer @ t-online.de

**5804.** Lehmann, F.-O. (2004): The mechanisms of lift enhancement in insect flight. *Naturwissenschaften* 91: 101-122. (in English). ["Recent studies have revealed a diverse array of fluid dynamic phenomena that enhance lift production during flapping insect flight. Physical and analytical models of oscillating wings have demonstrated that a prominent vortex attached to the wings leading edge augments lift production throughout the translational parts of the stroke cycle, whereas aerodynamic circulation due to wing rotation, and possibly momentum transfer due to a recovery of wake energy, may increase lift at the end of each half stroke. Compared to the predictions derived from conventional steady-state aerodynamic theory, these unsteady aerodynamic mechanisms may account for the majority of total lift produced by a flying insect. In addition to contributing to the lift required to keep the insect aloft, manipulation of the translational and rotational aerodynamic mechanisms may provide a potent means by which a flying animal can modulate direction and magnitude of flight forces for manoeuvring flight control and steering behaviour. The attainment of flight, including the ability to control aerodynamic forces by the neuromuscular system, is a classic paradigm of the remarkable adaptability that flying insects have for utilising the principles of unsteady fluid dynamics. Applying these principles to biology broadens our understanding of how the diverse patterns of wing motion displayed by the different insect species have been developed throughout their long evolutionary history." (Author) Many references to Odonata are made.] Address: Lehmann, F.-O., Department of Neurobiology, University of Ulm, Albert-Einstein-Allee 11, 89081 Ulm, Germany. E-mail: fritz.lehmann@biologie.uni-ulm.de)

**5805.** Peterson, K.J.; Lyons, J.B.; Nowak, K.S.; Takacs, C.M.; Wargo, M.J.; McPeck, M.A. (2004): Estimating metazoan divergence times with a molecular clock. *Proceedings of the National Academy of Sciences U S A*. 101(17): 6536-6541. (in English). ["Accurately dating when the first bilaterally symmetrical animals arose is crucial to our understanding of early animal evolution. The earliest unequivocally bilaterian fossils are approximately 555 million years old. In contrast, molecular clock analyses calibrated by using the fossil record of vertebrates estimate that vertebrates split from dipterans (*Drosophila*) approximately 900 million years ago (Ma). Nonetheless, comparative genomic analyses suggest that a significant rate difference exists between vertebrates and dipterans, because the percentage difference between the genomes of mosquito and fly is greater than between fish and mouse, even though the vertebrate divergence is almost twice that of the dipteran. Here we show that the dipteran rate of molecular

evolution is similar to other invertebrate taxa (echinoderms and bivalve molluscs) but not to vertebrates, which significantly decreased their rate of molecular evolution with respect to invertebrates. Using a data set consisting of the concatenation of seven different amino acid sequences from 23 ingroup taxa (giving a total of 11 different invertebrate calibration points scattered throughout the bilaterian tree and across the Phanerozoic), we estimate that the last common ancestor of bilaterians arose somewhere between 573 and 656 Ma, depending on the value assigned to the parameter scaling molecular substitution rate heterogeneity. These results are in accord with the known fossil record and support the view that the Cambrian explosion reflects, in part, the diversification of bilaterian phyla." (Authors) The analysis includes *Enallagma aspersum* and *Lestes congener*. For a full text version of the paper see: <http://www.pubmedcentral.gov/articlerender.fcgi?tool=pubmed&pubmedid=15084738> Address: Peterson, K.J., Dept of Biological Sciences, Dartmouth College, Hanover, NH 03755, USA. E-mail: kevin.peterson@dartmouth.edu.

## 2005

**5806.** Bechly, G. (2005): A new fossil dragonfly (Anisoptera: Corduliidae) from the Paleocene Fur Formation (Mo clay) of Denmark. *Stuttgarter Beiträge zur Naturkunde - Serie B* 358: 1-7. (in English, with German summary). ["A new fossil dragonfly genus and species, *Molercordulia karinae* n. gen. n. sp. (Anisoptera: Corduliidae), is described from the Paleocene Fur Formation (Mo clay) in Denmark. Considering the rarity of Paleocene odonate fossils and the stratigraphic proximity to the important K-T boundary, this fossil, even though only fragmentarily preserved, represents an interesting contribution to our knowledge of the odonate fauna in the Early Tertiary. The new taxon is identified as oldest fossil record of Corduliidae (sensu Bechly 2002). A new character (post-oblique-vein-gap) that seems to be quite useful in dragonfly systematics is described and is proposed as independently acquired autapomorphy in Macromiidae and Haplohamulida." (Author)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**5807.** Bößneck, U. (2005): Fauna des Stadtgebietes von Erfurt, Teil I: Libellen. *Veröff. Naturkundemus Erfurt* 24: 109-145. (in German, with English summary). [oas 19.; Thuringia, Germany; "During a local faunistic investigation, 1500 new records of dragonflies were summarized and viewed critical. From 44 species a distribution map and remarks to population development and ecology in the city area of Erfurt are given. The most important habitat of dragonflies in the city area are the clay pits near Mittelhausen (north part of the city) with current records of 33 species." (Author)] Address: Bößneck, U., Stadtverwaltung Erfurt, Umwelt- und Naturschutzamt, Stauffenbergallee 18, D-99084 Erfurt, Germany

**5808.** Brodin, T. (2005): Predator effects on behaviour and life-history of prey. Doctoral thesis, Department of Ecology and Environmental Science, S-901 87 Umeå, Sweden. ISBN: 91-7305-964-1: 34 pp. (in English). ["In

this thesis I investigate predator-induced effects on behavioural and life-history characteristics of prey. At any moment a given predator is capable of attacking a small number of prey. However, the mere presence of a predator may impact a much larger number of individuals, as prey implement various behavioural and developmental mechanisms to reduce the risk of predation. It has become increasingly clear that predator induced responses have the potential to affect patterns of species abundance and distribution as well as individual fitness of prey. I study these responses by incorporating field surveys, semi-field experiments and laboratory experiments. All experiments were done in an aquatic environment using fish or large odonate larvae as predators and damselfly-or diving beetle larvae as prey. My work highlights the importance of monitoring prey behaviour when studying life-history characteristics. I show that fish presence is an important factor for determining species abundance and distribution of odonates, and that prey behaviour may be a good predictor for fish vulnerability. Larval damselflies react behaviourally to predator presence by reducing activity and/or restricting habitat use. I confirm that such anti-predator responses have positive effects on prey survival in the presence of a predator but negative effects on growth and development of prey. In addition, my results suggest that the increase in per capita food resources for surviving prey following a predation episode (i.e. thinning) can have a stronger positive effect on prey growth and development than the negative effect of anti-predator responses. I also show that the strength of an anti-predator response is dependent on resource availability of the prey, with prey responding less strongly when resources are scarce. My results also indicate that the strength of the anti-predator response of damselfly larvae depends on predator diet and larval age. Predators feeding on prey conspecifics induce a stronger behavioural response in young larva than predators that feed on prey heterospecifics do. This diet-effect was not found in larvae late in ontogeny, due to an increased activity of larva where predators consumed damselflies. Such increased larval activity can be explained as a reaction to a time-constraint. Finally, I found that activity of damselfly larvae is genetically determined and that this has led to a behavioural syndrome that might limit larval plasticity to a certain activity-range. This phenomenon may have implications for how well larvae are able to react to both biotic and abiotic changes in the environment." (Author)] Address: Brodin, T., Animal Ecology, Department of Ecology and Environmental Science, Umea University, 90187 Umea, Sweden. E-mail: tomas.brodin@eg.umu.se

**5809.** Buttstedt, L.; Zimmermann, W. (2005): Über Entwicklungsnachweise der Feuerlibelle, *Crocothemis erythraea* (Brülle, 1832), in Thüringen und Sachsen-Anhalt (Odonata). *Entomologische Nachrichten und Berichte* 49(3-4): 171-179. (in German, with English summary). ["An overview of the 24 localities of *C. erythraea* known in Sachsen-Anhalt and Thuringia, Germany in 2005 is provided. In 2003 and 2004, the authors studied six of the inhabited water bodies in detail. Development of the species at one site in Thuringia and at two sites in Sachsen-Anhalt is confirmed. The two sites with the largest number of exuviae are briefly characterized. Observations on biology and behaviour made at the rain water collection basin at Artern are communicated and discussed. The temporal pattern of emergence is documented from 69 exuviae collected in 2004. Variati-



ons in size and pigmentation of the same exuviae are described. Our records of confirmed reproduction are at approximately 51°20'N which agrees reasonably with records from Hesse, Lower Saxony, Sachsen-Anhalt, and Brandenburg." (Authors)] Address: Zimmermann, W., Thomas-Müntzer-Str. 5, D-99423 Weimar, Germany

**5810.** Carnier (2005): Gemeine Winterlibelle *Sympetma fusca* und Gebänderte Heidelibelle *Sympetrum pedemontanum* im Kreis Wesermarsch. Beitr. Naturk. Nieders. 58: 41-42. (in German). [Niedersachsen, Germany; *S. fusca*: 15-IX-1995; *S. pedemontanum*: 22-VIII-2002] Address: Carnier, T., Haasenstr. 7, D-26919 Brake, Germany

**5811.** Catling, P.M. (2005): A Potential for the Use of Dragonfly (Odonata) Diversity as a Bioindicator of the Efficiency of Sewage Lagoons. *Canadian Field-Naturalist* 119(2): 233-236. (in English). ["In order to determine whether a relationship existed between water quality and odonate fauna in sewage ponds, data were gathered at each of six ponds of similar construction and equal size and depth in an adjacent series of improving water quality at a lagoon system near Embrun in eastern Ontario. Numbers of nymphs of different species of Odonata were recorded in spring and fall, and similar data was collected on adults in June and July. The data on species presence and abundance for each of three pairs of cells in the sequence was then compared with the corresponding chemical data which included biological oxygen demand, total phosphorus, total nitrogen and suspended solids. Water quality improved through the system and species diversity in the final ponds was twice that of the ponds receiving wastewater. Numbers of individuals also increased through the system. Occurrence of *Anax junius*, *Enallagma civile* and *Ischnura verticalis* alone was associated with poorer water quality. Higher diversity including *Lestes disjunctus*, *Leucorrhinia* spp. and *Erythemis simplicicollis*, indicates higher water quality. A potential exists for Odonata species diversity, numbers of individuals and occurrence of particular species to be used as a bioindicator of water quality and a means of evaluating efficiency of a lagoon system. Advantages include data that reflects a time period rather than a point in time and also low costs." (Author)] Address: Catling, P.M., Biology, University of Ottawa, 30 Marie Curie, Ottawa, Ontario K1N 6N5 Canada; catlingp@em.agr.ca

**5812.** Céréghino, R.; Cayrou, J. (2005): Life-cycle phenology of some aquatic insects: implications for pond conservation. *Aquatic Conserv: Mar. Freshw. Ecosyst.* 15: 559-571. (in English). ["1. Life-cycles and growth patterns were determined for 21 dominant aquatic insect species in small permanent ponds in an arid, karstic region (SW France, site fr7300909 of the Natura 2000 conservation network). The species studied are widely distributed throughout Europe, but some life-cycle patterns are reported here for the first time. 2. The life-history patterns of the 21 species can be divided into five main types: (i) a semivoltine cycle spreading over 2 years; (ii) slow univoltine cycles; (iii) fast univoltine cycles; (iv) multivoltine life-cycles with a long winter generation and two or three summer generations per year; and (v) bivoltine life-cycles with two fast generations per year. Growth was either exponential over the whole developmental period for a given cohort, or divided into two or three successive periods during each of which

the growth rate was fairly constant. 3. Biodiversity estimates strongly depend on the temporal and spatial scale over which observations are made. Ponds thus provide useful models to show how life-history patterns enable many temporally segregated populations to utilize small ecosystems. Conservation frameworks should therefore carefully consider the time-frame needed to survey ponds, as many species with fast cycles could be overlooked. The spatial scale needed to manage threatened habitats and thus preserve pond networks must be broadened, rather than attempting to target individual water bodies for particular management actions." (Authors) The following Odonata are treated: *Coenagrion scitulum*, *Chalcolestes viridis*, *Libellula depressa*, *Anax imperator*.] Address: Céréghino, R., Laboratoire d'Ecologie des Hydrosystèmes, UMR 5177, Université Paul Sabatier, 118 route de Narbonne, 31062 Toulouse cedex 4, France. E-mail: cereghin@cict.fr

**5813.** Cheng, P.; Hu, J.; Zhang, G.; Xu, B.; Wu, X. (2005): The measurement of the flight gesture and the wing deformation of dragonfly in free flight. *Proceedings of SPIE -- Volume 5852 Third International Conference on Experimental Mechanics and Third Conference of the Asian Committee on Experimental Mechanics*, Chenggen Quan, Fook Siong Chau, Anand Asundi, Brian Stephen Wong, Chwee Teck Lim, Editors: 879-885. (in English(?)). ["Using the phase shifting and the grating projection method, the kinematical parameters of dragonfly in free flight were measured. In our experiment, during projecting parallel sine fringes on the dragonfly's wings with a projector, the high speed CCD TV camera (1000 frames per second) recorded the dragonfly and the fringes projected on the dragonfly's wing, then the shape of the dragonfly's wings in every frame could be gutted using SCPM (Spatial-Carrier Phase Measurement) method. According to this data, we designed a program which can show the change of the gesture of the dragonfly's wing, the 3-D figure, the contour line and the curve of any transversal of the dragonfly's wing at any given time. From the figures of the 3-D deformation, we also can see that the deformation is not completely negative, it must could be control by the dragonfly via the veins on the wing." (Authors)] Address: Cheng, P., University of Science and Technology of China, Key Laboratory of Mechanical Behavior and Design of Materials, CAS, Hefei 230027, China.

**5814.** Clistenes de Alcântara Santos, A. (2005): Feeding ecology of the Molé Trachelyopterus galeatus Linnaeus, 1766 (Siluriformes, Auchenipteridae) in the lower course of the São José and Santo Antônio Rivers (Chapada Diamantina, Bahia). *Sitientibus Série Ciências Biológicas* 5(2): 93-98. (in Portuguese, with English summary). ["The São José and Santo Antônio Rivers are representative affluents of the Paraguaçu River, although they have demonstrated different physiographic conditions and differ in their degrees of anthropogenic disturbance. In this work, the feeding ecology of *T. galeatus* was described, as well as the possible effects of the alterations previously caused by former diamond mining on the São José bed and margins. Feeding was analyzed through the Frequency of Occurrence and by the Volumetric method combined in an Alimentary Index. The niche width was then calculated. The results indicate a lesser contribution of allochthonous items in the São José River. This may be due to the effects of deforestation along its margins, which would influence species that are dependent upon

those resources. Among the parameters analyzed, the lesser proportion of allochthonous items in the diet of fish from the São José River was marked and can be considered an indirect result of previous mining activity in the area." (Authors) The diet also includes Odonata.] Address: Clisteres de Alcântara Santos, A., Laboratório de Ictiologia, Departamento de Ciências Biológicas, Universidade Estadual de Feira de Santana, Km 03, BR 116, 44031-460, Feira de Santana, Bahia, Brasil. E-mail: clister@ig.com.br

**5815.** Cordero Rivera, A.; Lorenzo Carballa, M.O.; Utzeri, C.; Vieira, V. (2005): Parthenogenetic *Ichnura hastata* (Say), widespread in the Azores (Zygoptera: Coenagrionidae). *Odonatologica* 34(1): 1-9. (in English). ["Literature and personal information on the distribution of *I. hastata* and other odon. spp. in the Azores is reported. *I. hastata* and *I. pumilio* are recorded for the first time from the islands of Corvo and Sao Jorge, respectively. *I. hastata* appears the most common and abundant sp. and its population is formed by only females (no males were ever recorded). The asexual reproduction of these populations was demonstrated by means of laboratory rearing during several generations. The dispersal ability of this sp. and the possible origin of parthenogenesis after its colonisation of the Azores are briefly discussed. The possible causes of threat are identified and the need for conservation measures is outlined." (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidad de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**5816.** Costa, J.M.; Oldrini, B.B. (2005): Diversity and distribution of Odonata (Insecta) in the State of Espírito Santo, Brazil. *Publ. Avul. Mus. Nac.*, Rio de Janeiro 107: 3-15. (in Portuguese, with English summary). [The paper lists 180 odonate species for the State of Espírito Santo, Brazil, and includes notes on some species and a basic bibliography.] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jacosta@acd.ufrj.br

**5817.** Culhane, F. (2005): The impact of forest disturbance on Odonata communities and the potential use of Odonata as indicators of environmental disturbance, Buton Island, Indonesia. Department of Zoology, Trinity College Dublin, Moderation Thesis 2005: 105 pp. (in English). ["Odonata have been shown to be sensitive and reliable indicators of environmental disturbance (e.g. Stewart & Samways, 1998). A forest stream is influenced by the nature of the catchment and reflects aspects of forest quality and disturbance. Macroinvertebrate assemblages including Odonata larvae, in streams and rivers, have been used extensively as bioindicators of forest disturbance. The aim of this project was to look at the impact of forest disturbance on communities of Odonata and the implications that might have for use of Odonata in bioindication. Seven sites on Buton Island, Indonesia were sampled over a period of five weeks in autumn 2004. GIS data were used to classify sites into disturbed or undisturbed forest. Odonata larvae were collected by kick sampling in two kinds of habitat at each site. Assessment of environmental variables of forests was carried out at the study sites. Larvae were identified to family level and then divided into morphospecies. The length of each larva was mea-

sured. Differences in species composition, diversity measures, functional groups and size frequency distribution were used to show differences between disturbed and undisturbed sites. Thirty-four morphospecies in nine families of Odonata were found. Species richness and diversity differed among sites and were lower at disturbed sites. It was found that the distribution of Zygopteran larvae differed between habitats, and between disturbed and undisturbed sites based on caudal appendage morphology, implying a potential use for caudal appendage type in biomonitoring. The width of size frequency distribution was lower at disturbed sites. Most sites contained morphospecies which were unique to it, thus, a range of habitats from pristine to moderately disturbed would conserve the greatest number of Odonata species." (Author) For the full paper see: <http://www.opwall.com/Library/Indonesia/Indonesia%20Terrestrial/Invertebrates/Fiona%20Culhane%20-The%20impact%20of%20forest%20disturbance%20on%20Odonat%85.pdf>

**5818.** DuBois, B. (2005): Damselflies of the North Woods. Kollath-Stensaas Publishers. ISBN 0-9673793-7-7: 132 pp. (in English). [This fieldguide is the damselfly companion to Kurt Mead's Dragonflies of the North Woods (see OAS 3740). Like this book, it is appropriate for a far larger area than the "north woods". It will be appropriate to large areas of Ontario in Canada, Minnesota, Wisconsin, Michigan, and Iowa. The book starts with a long, well-illustrated section on morphology, behaviour, and life history of damselflies. The 39 species recorded (plus a further 7 which may appear in the region) are individually discussed and illustrated on a two-page spread with very good photos. Diagnostic characters or structures are specifically indicated by arrows. Information is also provided on the life cycles. A graph of the flight and a range map are also given for each species. The focus of the field guide is more on colour patterns than structures. (Martin Schorr)] Address: Kollath-Stensaas Publishers. 394 Lake Avenue South, Suite 406, Duluth, MN 55802, USA

**5819.** Fabbri R.; Pavesi M. (2005): First record for Lombardy of *Chalcolestes parvidens* (Artobolevski, 1929) (Odonata Lestidae). *Ann. Mus. civ. St. nat. Ferrara* 6: 95-96. (in Italian, with English summary). [Records of *C. parvidens* are reported from Brescia and Mantova Provinces, Italy. In addition, some information on the distribution and ecology of the species are given.] Address: Fabbri, R., Museo Civico di Storia Naturale, via De' Pisis, 24 - 44100 Ferrara, Italy. E-mail: r-fabbri@libero.it

**5820.** García, A.; Báez, M.; Cabrera, A. (2005): Odonata. In: Arechavaleta, M.; Zurita, N.; Marrero, M.C., Martin, J.L. (eds.) (2005): Lista preliminar de especies silvestres de Cabo Verde. Hongos, plantas y animales terrestres. Consejería de Medio Ambiente y Ordenación Territorial, Gobierno de Canarias. ISBN 84-89729-25-5: 155 pp. (in Portuguese and Spanish). [On page 68, the Odonata of the Capverdian Islands are checklist island-wise.] Address: <http://www.gobiernodecanarias.org/cmayot/interreg/atlantico/documentos/LPESCaboVerde.pdf>

**5821.** Hayashi, F.; Tsuchiya, K. (2005): Functional association between female sperm storage organs and male sperm removal organs in calopterygid damselflies. *Entomological Science* 8(3): 245-252. (in English). ["Fe-

male damselflies in the family Calopterygidae have two sperm storage organs: a spherical bursa copulatrix and a tubular spermatheca. Male flies have a peculiar aedeagus with a recurved head with which to remove bursal sperm, and lateral spiny processes to remove spermathecal sperm. The lateral processes differ among species and populations in terms of their width relative to the spermathecal duct: the narrower processes are physically able to access spermathecal sperm, while the wider ones are not. In the present study, sperm storage patterns and aedeagal structures were compared between two calopterygid species with different spermathecal structures –*Calopteryx cornelia* and *Mnais pruinosa*– with respect to not only sperm quantity (number) but also sperm quality (viability), by using a recently developed method based on live/dead dual fluorescence. *Calopteryx cornelia* is a typical spermathecal sperm remover. In this species, viability was similar between bursal and spermathecal sperm. In contrast, in *M. pruinosa*, the spermatheca was much smaller than the bursa and often contained no sperm. Even when the spermatheca of this species did contain sperm, a high percentage of it was dead. Although the spermatheca of *M. pruinosa* has such atrophic tendencies, males have nevertheless developed long and spiny lateral processes similar to those of *C. cornelia*, suggesting the processes have functions other than spermathecal sperm removal. They possibly function as stoppers or guides for manipulating the aedeagal head to remove the sperm mass from the bursa." (Authors)] Address: Hayashi, F., Department of Biology, Tokyo Metropolitan University, Minamiosawa 1-1, Hachioji, Tokyo, 192-0397 Japan. Email: fhayashi@comp.metro-u.ac.jp

**5822.** Huber, A.; Kovacs, T.; Olajos, P. (2005): Data to the Odonata fauna of North-East Hungary II. *Folia historico naturalia musei Matraensis* 29: 111-122. (in Hungarian, with English summary). ["The authors present the results of their dragonfly collecting carried out in the territory enclosed by the river Hernád, river Sajó and the state border Hungary and Slovakia. The collecting took place between 25.06.1999 and 31.08.2004. The data come mainly from the valley of the Sajó and Hernád rivers, from the Putnok-hills and from the lowland between the Sajó and Hernád rivers. We found 47 dragonfly species in this area, 39 as larva, 37 as exuvium and 44 as imago. The following species are new in larval and exuvial form to the territory: *Sympetma fusca*, *Sympetrum pedemontanum*." (Authors)] Address: Kovacs, T., Matra Mus., Kossuth u. 40, HU-3200 Gyöngyös, Hungary. E-mail: koati@matavnet.hu

**5823.** Hufnagel, L.; Gaal, M. (2005): Seasonal dynamic pattern analysis in service of climate change research: A methodical case-study. Monitoring and simulation based on an aquatic insect community. *Applied ecology and environmental research* 3(1): 79-132. (in English). ["Our aim was to approach an important and well-investigable phenomenon – connected to a relatively simple but real field situation – in such a way, that the results of field observations could be directly comparable with the predictions of a simulation model-system which uses a simple mathematical apparatus and to simultaneously gain such a hypothesis-system, which creates the theoretical opportunity for a later experimental series of studies. As a phenomenon of the study, we chose the seasonal coenological changes of aquatic and semiaquatic Heteroptera community. Ba-

sed on the observed data, we developed such an ecological model-system, which is suitable for generating realistic patterns highly resembling to the observed temporal patterns, and by the help of which predictions can be given to alternative situations of climatic circumstances not experienced before (e.g. climate changes), and furthermore; which can simulate experimental circumstances. The stable coenological state-plane, which was constructed based on the principle of indirect ordination is suitable for unified handling of data series of monitoring and simulation, and also fits for their comparison. On the state-plane, such deviations of empirical and model-generated data can be observed and analysed, which could otherwise remain hidden." (Authors) The analysis also includes Odonata.] Address: Hufnagel, L., Department of Mathematics and Informatics, Corvinus University of Budapest, H-1118 Budapest, Villanyi ut 29.43, Hungary. E-mail: levente.hufnagel@uni-corvinus.hu

**5824.** Ichinose, T.; Morita, T.; Ishii, J. (2005): Characteristics of dispersing Odonata species on irrigation ponds of the northern part of Awaji Island, central Japan. 2 pp. (in Japanese, with English summary). ["From the beginning of July to the end of October 2003, 7 damselfly species of 3368 individuals were captured and marked on 6 irrigation ponds of the northern part of Awaji Island, central Japan. Seven species of 465 individual were recaptured or sighted on the other days. *Lestes sponsa* stayed on the same ponds significantly longer than *Coperia annulata*. Three species of 72 individuals moved to the other ponds or rice paddies. The longest dispersal of *Lestes sponsa* was around 150 m. The moving period of *Lestes sponsa* was significantly later than that of *Coperia annulata*." (Authors) For the full paper see: <http://www.geocities.jp/tomohiroichinose/presentation/rural-ichinose.pdf>] Address: Ichinose, T., Lab. of Landscape Planning, Awaji Landscape Planning and Horticulture Academy (ALPHA), Institute of Natural and Environmental Science, University of Hyogo, Nojimatokiwa 954-2, Hokudan-cho, Tsuna-gun, Hyogo, Japan. E-mail: tomohiroichinose@yahoo.co.jp

**5825.** Jenrich (2005): Die Libellenfauna im Naturschutzgebiet Rotes Moor. *Beiträge zur Naturkunde in Osthessen* 41: 25-40. (in German, with English summary). [Hessen, Germany; the 17 odonate species of the bog are briefly characterised by morphology and ecology. The development of the odonate fauna (population trends), based on investigations in 1982-1985, 2002, and 2004, is discussed. Of special interest are records of *Coenagrion hastulatum*, *Aeshna juncea*, *A. subarctica elisabethae*, *Somatochlora arctica*, *S. flavomaculata*, *Sympetrum danae*, and *Leucorrhinia dubia*. *L. pectoralis* seems to have been extinct since the 1980th.] Address: Jenrich, J., Fliegerstr. 11, D-36129 Gersfeld, Germany

**5826.** Joop, G. (2005): Maintenance of female colour polymorphism in the coenagrionid damselfly *Coenagrion puella*. Dissertation, Fachbereich für Biowissenschaften und Psychologie der technischen Universität Carolo-Wilhelmina zu Braunschweig: 116 pp. (in English, with German summary). ["How colour polymorphisms are maintained is still an unresolved question. Selection should favour the morph best adapted (Moran 1992). Furthermore, the maintenance of a polymorphic system is supposed to be costly, therefore it seems only profitable under quickly or steadily changing envi-



ronmental conditions (Moran 1992). Colour polymorphism is a common trait in damselflies, especially in female coenagrionids (Odonata: Zygoptera). This has been discussed in literature for more than 100 years and several hypotheses to explain these polymorphisms have been developed (Fig. 1). As a model organism I chose the azur damselfly, *Coenagrion puella*. In this species males are blue while females show three colour morphs, green, blue and intermediate. The question is how these female colour morphs are maintained. The focus of the presented work to answer this question is on differences in and colouration on thorax and abdomen of male and polymorphic female *C. puella*, furthermore on differences in immune parameters and reproductive strategies. For black content no differences between the female morphs were found. Males however have a smaller black content than females. In colour composition it was found that blue females are of a different blue than males, and all three female morphs differ in colour composition. The haemolymph's haemocyte numbers and Phenoloxidase activity (PO) and their regulation under the risk of predation and parasitism in the larval stage were investigated as immune parameters. Here differences between the sexes were found. This led to the question, whether there are similar differences between the female morphs. Therefore haemocyte numbers and PO in adult male and polymorphic females were investigated. Furthermore differences in mortality in the presence of a newly introduced entomopathogenic fungi and parasite numbers in the field were examined. For all these parameters no differences between the female morphs were found but differences between the sexes. For reproductive strategies it is discussed, which impact the between the morphs differing egg shapes could have on the choice of oviposition substrate. From these results the question, how this polymorphism evolved and if it evolved parallel in all coenagrionid species, arose. To answer this a new molecular phylogenetic tree of the coenagrionids was built. So far it seems that the female colour polymorphism evolved several times within this group. In summary, I conclude that none of the in figure 1 presented factors maintains this polymorphism alone, but rather a combination of all of them. If I included, that the polymorphism might have evolved several times within the coenagrionids under differing selection pressures, the question of the maintaining factors becomes even more complex." (Author)] Address: Joop, Gerrit, Zoologisches Institut, AG Ökologie, Technische Universität Braunschweig, Braunschweig, Germany. Email: g.joop@tu-bs.de

**5827.** Jourde, P. (2005): Les libellules de Charente-Maritime. Bilan de sept années de prospection et d'étude des Odonates 1999-2005. Annales de la Société des Sciences Naturelles de la Charente-Maritime, supplément, décembre 2005: 144 pp. [This regional fauna directed to the Département Charente-Maritime at the central western (Atlantic) border of France, impresses by a clear layout presenting each of the 62 species on one page. There, you find information on the distribution (with detailed maps), habitats, ecology, conservation status, phenology, and also the vernacular names in French, English, and German, and an explanation of the Latin names. As usual, and necessary for a regional fauna, the general reader is introduced by a brief biology of the Odonata, the geography of the region, and a detailed treatment of all relevant odonatological publications referring to the department. Also appended are a bibliography, checklists, an index, and many impressive

colour photos of habitats and species. The fine resolution of the maps is quite fascinating and some apparently very common European species as *Lestes sponsa*, *Aeshna cyanea*, or *Sympetrum vulgatum* appear not so common after all! This is a very sophisticated presentation of a regional fauna, and it is highly recommended to everyone interested in the Odonata of France or the distribution of the species in Europe. (Martin Schorr)] Address: Société des Sciences naturelles de Charente-Maritime, Muséum d'Histoire naturelle, 28 rue Albert 1er, F-17000 La Rochelle Prix : 20 € (+ 3 € shipping).

**5828.** Khrokalo, L.K. (2005): Annotated bibliography of the odonatological papers of Ukraine. IDF-Report 9: 1-51. (in English). [261 papers of the Odonata of Ukraine are compiled and annotated. Names of Ukrainian journals and titles are translated into English. Copies are available from IDF.] Address: Khrokalo, Lyudmila, P.O. Box 23, Kyiv-118, Ukraine 03118. E-mail: lkhrokalo@mail.ru

**5829.** Klausnitzer, B. (2005): Buchbesprechungen: Wildermuth et al (2005): Die Libellen der Schweiz. Entomologische Nachrichten und Berichte 49(3-4): 193-194. (in German). [Review of the book reviewed as OAS 5005.] Address: Klausnitzer, B., PF 202731, D-01193 Dresden, Germany

**5830.** Kövecses, J.; Sherwood, G.D.; Rasmussen, J. B. (2005): Impacts of altered benthic invertebrate communities on the feeding ecology of yellow perch (*Perca flavescens*) in metal-contaminated lakes. Can. J. Fish. Aquat. Sci. 62: 153-162. (in English, with French summary). ["Metal contamination can disrupt trophic links in food webs by altering the taxonomic composition and size structure of benthic macroinvertebrate communities. Benthic macroinvertebrates and yellow perch (*Perca flavescens*) were collected from six lakes along a gradient of cadmium (Cd) and copper (Cu) contamination in Quebec, Canada. The two most contaminated lakes had significantly lower densities of several benthic macroinvertebrate taxa and significantly lower Shannon's index than less contaminated lakes. The stomach contents of perch from the most contaminated lakes were less diverse, with a greater reliance on chironomids and (or) zooplankton than perch from other study lakes. The size of prey in perch from the most contaminated lakes did not increase with age and the mean prey size was smaller than in other, less contaminated lakes. Perch from lakes with medium to low levels of contamination weighed significantly more than perch from lakes with high levels of contamination. This reduction in growth is attributed to the increased costs of foraging on a simplified prey base in metal-contaminated systems." (Authors)] Address: Kövecses, Jennifer, Department of Biology, McGill University, 1205 Dr. Penfield, Montreal, QC H3A 1B1, Canada. E-mail: Jennifer.kovecses@elf.mcgill.ca

**5831.** Krauss, V.; Pecyna, M.; Kurz, K.; Sass, H. (2005): Phylogenetic mapping of Intron positions: A case study of translation initiation factor eIF2y. Molecular Biology and Evolution 22: 74-84. (in English). ["Eukaryotic translation initiation factor 2 (eIF2) is a G protein that delivers the methionyl initiator tRNA to the small ribosomal subunit and releases it upon GTP hydrolysis after the recognition of the initiation codon. eIF2 is composed of three subunits, a, b, and c. Subunit c shows the strongest conservation, and it confers both

tRNA and GTP/GDP binding. Using intron positioning and protein sequence alignment, here we show that eIF2y is a suitable phylogenetic marker for eukaryotes. We determined or completed the sequences of 13 arthropod eIF2y genes. Analyzing the phylogenetic distribution of 52 different intron positions in 55 distantly related eIF2y genes, we identified ancient ones and shared derived introns in our data set. Obviously, intron positioning in eIF2y is evolutionarily conserved. However, there were episodes of complete and partial intron losses followed by intron gains. We identified 17 clusters of intron positions based on their distribution. The evolution of these clusters appears to be connected with preferred exon length and can be used to estimate the relative timing of intron gain because nearby precursor introns had to be erased from the gene before the new introns could be inserted. Moreover, we identified a putative case of intron sliding that constitutes a synapomorphic character state supporting monophyly of Coleoptera, Lepidoptera, and Diptera excluding Hymenoptera. We also performed tree reconstructions using the eIF2y protein sequences and intron positioning as phylogenetic information. Our results support the monophyly of Viridiplantae, Ascomycota, Homobasidiomyceta, and Apicomplexa." (Authors) The study includes *Enallagma cyathigerum*.] Address: Krauss, V., Dept of Genetics, Uni. Leipzig, Leipzig, Germany. E-mail address: krauss@rz.uni-leipzig.de

**5832.** Kuki, N.; Okubo, K. (2005): Relationship between dragonfly communities and environmental conditions at paddy field areas in the Kamiina district, Nagano Prefecture, Central Japan. *Journal of The Japanese Institute of Landscape Architecture* 68(5): 579-584. ["The purpose of this study was to study the relationship between dragonflies in paddy areas and their environmental condition. We selected five study areas which differed in their environment (two non-consolidated paddy areas in hilly and mountainous areas, one consolidated paddy area in hilly and mountainous area, one non-consolidated paddy area in urbanized area, one consolidated paddy area in urbanized area.) in the Kamiina district, Nagano Prefecture. The number and behaviour of dragonflies were recorded by the route census method. The survey of land utilization was carried out on these areas. The number of all of the species was twenty-three. The number of species and individuals were higher in 3 hilly and mountainous areas than in 2 urban areas. Five study areas were classified into 3 hilly and mountainous area region and 2 urban areas by TWINSPAN. Dragonfly communities were classified to seven types. Each type corresponded different environment conditions of waterside, forest and others. It was confirmed that the environmental selection and behaviour of mature dragonflies corresponded to the each species character. The environmental selection of mature dragonflies were different between hilly and mountainous area and urban area. It was clear that dragonfly communities were affected by consolidation and urbanization." (Authors)] not stated in English

**5833.** Kuki, N.; Kumiko, O. (2005): Relationship between dragonfly communities and the environmental conditions at paddy field area in Kamiina district, Nagano Prefecture, Central Japan. *Journal of the Institute of Japanese Landscape architecture, Annual Scientific Research Meeting Abstracts Vol. 2005*: 122. (in English). ["The purpose of this study was to know relationship between dragonflies in paddy area and envi-

ronmental condition. We selected five various condition study areas (two non-consolidated paddy areas in hilly and mountainous areas, one consolidated paddy area in hilly and mountainous area, one non-consolidated paddy area in urbanized area, one consolidated paddy area in urbanized area.) in the Kamiina district, Nagano Prefecture. The number and behavior of dragonflies were recorded by route census method. The survey of land utilization was carried out on these areas. The number of all of the species was twenty-three. The number of species and individuals were higher in 3 hilly and mountainous areas than in 2 urban areas. Five study areas were classified into 3 hilly and mountainous area region and 2 urban areas by TWINSPAN. Dragonfly communities were classified to seven types. Each type corresponded different environment conditions of waterside, forest and others. It was confirmed that the environmental selection and behavior of mature dragonflies corresponded to the each species character. The environmental selection of mature dragonflies were different between hilly and mountainous area and urban area. It was clear that dragonfly communities were affected by consolidation and urbanization." (Authors)] Address: Kuki, N., Graduate School of Agricultural Sciences, Shinshu University, Japan

**5834.** Kurosawa, N.; Handa, M.; Imai, K.; Sasaki, Y.; Itoh, H.; Urato, H. (2005): A study on the environmental factors of nursery ponds for naiads of the rare damselfly *Coenagrion terue* in consideration of its feeding habit. *Journal of The Japanese Institute of Landscape Architecture* 68 (5): 575-578. (in Japanese, with English summary). ["C. terue living in Sawada Springs in Hitachi Seaside Park, Japan is a rare population as its habitat is near the shore while most other populations of this species are distributed in high lands. Office of Hitachi Seaside Park has been trying to conserve this population by placing ponds and repairing existing ponds in this area. We thought that providing optimal food supply for the larvae was one of the important means to maintain this population and the strength of sunlight was also an important environmental factor for nursery ponds for the naiads. In this study, to clarify which were actual species of prey on larvae and the relationship between food supply and the degree of sunlight, we examined gut contents of larvae, meiobenthos as prey in ponds, the strength of sunlight and the density of larvae. The main prey of larvae were benthic Arthropoda. Body widths of prey were limited to 100-500µm and the maximum body widths of prey were proportional to the head widths of larvae. Not only the density of larvae, but also the number of species and the density of prey tended to be lower in dark ponds than those in bright ponds." (Authors)] Address: not stated in English

**5835.** Lai, W.; Yan, J.; Motamed, M.; Green, S. (2005): Force Measurements on a Scaled Mechanical Model of Dragonfly in Forward Flight. 12th Int'l Conf. Advanced Robotics (ICAR), Seattle, Washington, USA, July 18-20, 2005: 6 pp. (in English). ["A dynamically scaled flapping-wing model has been developed to investigate the aerodynamic phenomena and flight performance of insect-scale flapping wings. The mechanism consists of two wings, each having 3 rotational degrees of freedom, mounted on a linear stage to permit translation in a fluid-filled tank. Each wing is equipped with a sensor for instantaneous measurement of the time-varying forces and torques. The setup permits one wing to be designated as the forewing and the o-

ther as the hindwing so that interactions between them can be analysed to understand flight for four-winged insects. The apparatus is versatile enough to explore a range of wing morphologies as well as operational wing trajectory parameters." (Authors)] Address: Motamed, M., Electrical and Computer Engineering Department, University of British Columbia, Vancouver, BC, Canada. E-mail: mehramm@ece.ubc.ca

**5836.** Lefebvre, F.; Poulin, R. (2005): Progenesis in digenean trematodes: a taxonomic and synthetic overview of species reproducing in their second intermediate hosts. *Parasitology* 130: 587-605. (in English). ["Precocious egg production, i.e. progenesis, has been documented for a number of species in scattered reports throughout the trematode literature. The last 2 extensive studies on the subject date from Buttner in the early 1950s (in French) and from Tang in the early 1980s (in Chinese). Overall, 43 species were then known for their ability to produce eggs at the metacercarial stage while still in the second intermediate host. Here, we update the list, and document the existence of progenesis in a total of 79 digenean trematode species, for which we provide information on the taxonomy of the hosts (including Odonata), the facultative or obligate character of progenesis, relevant references, as well as some other pertinent biological information. We then review the subject by asking 7 questions of fundamental evolutionary importance. These include: What favours progenetic development? What are the associated costs and benefits? How are progenetic eggs released from the host? While exposing the various opinions of previous authors, we attempt to give a synthetic overview and stress on the importance of the metacercarial cyst wall (whether it is present, and if so its thickness) in the evolution and the adoption of a progenetic life-cycle." (Authors)] Address: Lefebvre, F., Department of Zoology, University of Otago, P.O. Box 56 Dunedin, New Zealand

**5837.** Machado, A.B.M. (2005): Studies on neotropical Protoneuridae: 19. Two new species of *Neoneura* from Southern Brazil (Odonata, Protoneuridae). *Iheringia, Sér. Zool.*, 95(4): 405-409. (in English, with Portuguese summary). ["*Neoneura anaclara* sp. nov. and *Neoneura leonardo* sp. nov. are described and illustrated from specimens collected in Southern Brazil. These two species are unique in the genus *Neoneura* by the structure of their anal appendages." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil

**5838.** Machida, K.; Shimanuki, J. (2005): Structure analysis of the wing of a dragonfly. *Proceedings of SPIE 5852, Third International Conference on Experimental Mechanics and Third Conference of the Asian Committee on Experimental Mechanics*, Chenggen Quan, Fook Siong Chau, Anand Asundi, Brian Stephen Wong, Chwee Teck Lim, Editors: 671-676. (in English). ["It is considered that wing corrugation increases not only the warping rigidity but also the flexibility. The wing of a dragonfly has some characteristic structures, such as "Nodus", "Stigma". Nodus is located in the center of the leading edge, and stigma like a mark is located near the end of the wing. It is considered that these structures not only increase the flexibility of the wing, but also prevent fatigue fracture of wings. Therefore, to investigate the mechanism of dragonfly's wing, the configura-

tion of wing used for analyses was measured using an optical coordinate profile measuring machine and a laser microscope. Moreover, several 3-D models of the dragonfly's wing were made, and calculated by the 3-D finite element method." (Authors)] Address: Machida, K., Department of Mechanical Engineering, Tokyo University of Science 2641 Yamazaki, Noda-shi, Chiba, 278-8510, Japan

**5839.** Móra, A.; Csépes, E.; Tóth, M.; Dévai, G. (2005): Changes in spatial and temporal distribution of benthic macroinvertebrates at a cross-section of the River Tisza between Tiszamogyorós and Lónya. *Acta Biol. Debr. Oecol. Hung* 13: 131-139. (in Hungarian, with english summary). ["In 2003 benthos samples were taken six times (from March to November) at a cross-section of the River Tisza between Tiszamogyorós and Lónya, Hungary. Three sampling site were assigned within the cross-section based on the water depth and water velocity conditions: (1) at the main flow, (2) at midbed: at the half of the distance between the right and left bank and (3) close to the left bank. The changes in the spatial and temporal distribution of the assemblages of the benthic macroinvertebrates are described. The most diverse assemblages was detected at spring. The chironomids dominated the benthic fauna especially in summer. Our results show the importance of the habitats near the bank for the benthic macroinvertebrates." (Authors) Table 1 includes *Stylurus flavipes*.] Address: Móra, A., Department of Hydrobiology, University of Debrecen, H-4032 Debrecen, Egyetem tér 1., Hungary

**5840.** Nel, A.; Petrulevicius, J.F.; Martínez-Delclòs, X. (2005): New Mesozoic Protomyrmeleontidae (Insecta: Odonoptera: Archizygoptera) from Asia with a new phylogenetic analysis. *Journal of Systematic Palaeontology* 3(2): 187-201. (in English). ["The following damselfly-like protomyrmeleontid Odonoptera are described from the Mesozoic of Eurasia: *Ferganagrion kirghiziensis* gen. et sp. nov., *Paraobotritagrion* gen. nov. for *Paraobotritagrion tenuiformis* (Zessin, 1991), *Mongolagrion shartegensis* gen. et sp. nov., *Protomyrmeleon pumilio* sp. nov., *Protomyrmeleon kazakhstanensis* sp. nov., *Protomyrmeleon karatauensis* sp. nov., *Protomyrmeleon grandis* sp. nov. The wing venations of protomyrmeleontid genera are homologised and the high morphological disparity in this family suggests that the Protomyrmeleontidae had very different modes of flight and consequently occupied a wide range of palaeoenvironments. A new phylogenetic analysis suggests that the fossil record is too scarce and incomplete to solve the phylogeny of the Protomyrmeleontidae. In particular, the current division of Protomyrmeleontidae in Triassagrioninae and Protomyrmeleontinae is only weakly supported." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**5841.** Oldrini, B. B.; Mascarenhas, Bernardo, J. de A. (2005): Description of the larva of *Idiataphe longipes* (Odonata, Libellulidae, Trameini). *Iheringia, Sér. Zool.*, 95(4): 431-433. (in Portuguese, with English summary). ["The larva of *I. longipes* (Hagen, 1861) is described from five exuviae with associated teneral adults collected in Concórdia Pond, Valença, Rio de Janeiro, Brazil." (Authors)] Address: Oldrini, Barbara B., Departamento de Entomologia, Museu Nacional, Universidade Federal



do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, 20940-040 Rio de Janeiro, Brasil

**5842.** Reinhardt, K. (2005): Buchbesprechungen: Brockhaus T & Fischer, H. (2005): Die Libellen Sachsens und Zimmermann et al (2005): Verbreitungsatlas der Libellen im Freistaat Thüringen.. Entomologische Nachrichten und Berichte 49(3-4): 255-257. (in German). [Detailed review of two regional publications on the Odonata of Thuringia and Saxonia, Germany.] Address: Reinhardt, K., Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: K.Reinhardt@sheffield.ac.uk

**5843.** Rychła, A. (2005): Dragonflies -Odonata- of standing waterbodies from the Landscape Park "Łuk Mużakowa" (district Luuskie) covering species diversity and their protection. *Chrońmy Przyrodę Ojczystą* 61(6): 67-79. (in Polish, with English summary). ["This paper summarizes the investigation of dragonflies in the Landscape Protection Area (LPA) "Luk Muzakowa" in Poland. 39 species were found in 28 anthropogenic waterbodies. These waterbodies varied significantly in their physio-chemical water properties and were at different succession stages. 25 of the species developed in the investigated waterbodies. The reproductive behaviour of 3 species (*Aeshna isosceles*, *Libellula depressa* and *Orthetrum coerulescens*) was observed, but the occurrence of neither larvae nor exuviae could be found. The images of 7 species (*Calopteryx splendens*, *C. virgo*, *Sympecma fusca*, *Gomphus flavipes*, *Syrmpetrum flaveolum*, *S. pedemontanum* and *S. striolatum*) were observed. The highest species diversity (30 species) was noted in the southern part of the "Luk Muzakowa" (group E, with the youngest waterbodies). In the northern part of the LPA (group A, with the oldest waterbodies), 19 species were found. The high habitat diversity in the studied area supports the occurrence of dragonflies with various ecological requirements. Of the species documented, 3 (*G. flavipes*, *Leucorrhinia albifrons* and *L. pectoralis*) are protected by the Polish legislation and the European FFH-directive. The *L. albifrons*, *A. juncea* and *O. coendescens* are included in the Red List of dragonflies in Poland." (Author)] Address: Rychła, Anna, ul. Osiedlowa 12, Płoty, PO-66-016 Czerwieńsk, Poland. E-Mail: rychlan@op.pl

**5844.** Srinivasulu, B.; Srinivasulu, C. (2005): Diet of the Black-bearded Tomb Bat *Taphozous melanopogon* Temminck, 1841 (Chiroptera: Emballonuridae) in India. *Zoos' print journal* 20(8): 1935-1938. (in English). ["The dietary composition of *T. melanopogon* from two different habitats was analyzed following faecal pellet analysis method. Representatives of 11 insect orders and spiders (Araneidae) contributed to the diet. Forest bats fed on 1-9 insect orders and araneids indicating opportunistic feeding behaviour, while the semi-urban bats fed on 3-8 insect orders and araneids indicating selective feeding behaviour. Although both the forest bats and semi-urban bats fed on the same spectrum of insect prey they showed differential use of them. Forest bats fed predominately on Coleoptera, Homoptera, Lepidoptera, Hemiptera, Orthoptera, Odonata and Araneidae, while the semi-urban bats preferred Lepidoptera, Coleoptera, Diptera, Orthoptera, Odonata, Hemiptera, Araneidae and Homoptera. Variation in terms of consumption of a particular kind of insect prey between the sexes was evident only among the semi urban bats only with respect to the most significant prey items - coleop-

terans, lepidopterans and dipterans." (Authors)] Address: Srinivasulu, B., Wildlife Biology Section, Zoological Dept, Osmania University, Hyderabad, Andhar Pradesh 500007, India. E-mail: bharisrini@yahoo.co.in

**5845.** Stone, M.L.; Whiles, M.R.; Webber, J.A.; Williard, K.W.J.; Reeve, J.D. (2005): Macroinvertebrate communities in agriculturally impacted southern Illinois streams: Patterns with riparian vegetation, water quality, and in-stream habitat quality. *Journal of environmental quality* 34(3): 907-917. (in English). ["Relationships between riparian land cover, in-stream habitat, water chemistry, and macroinvertebrates were examined in headwater streams draining an agricultural region of Illinois. Macroinvertebrates and organic matter were collected monthly for one year from three intensively monitored streams with a gradient of riparian forest cover (6,22, and 31% of riparian area). Bioassessments and physical habitat analyses were also performed in these three streams and 12 other nearby headwater streams. The intensively monitored site with the least riparian forest cover had significantly greater percent silt substrates than the sites with medium and high forest cover, and significantly higher very fine organics in substrates than the medium and high forested sites. Macroinvertebrates were abundant in all streams, but communities reflected degraded conditions; noninsect groups, mostly oligochaetes and copepods, dominated density and oligochaetes and molluscs, mostly *Sphaerium* and *Physella*, dominated biomass. Of insects, dipterans, mostly Chironomidae, dominated density and dipterans and coleopterans were important contributors to biomass. Collector-gatherers dominated functional structure in all three intensively monitored sites, indicating that functional structure metrics may not be appropriate for assessing these systems. The intensively monitored site with lowest riparian forest cover had significantly greater macroinvertebrate density and biomass, but lowest insect density and biomass. Density and biomass of active collector-filterers (mostly *Sphaerium*) decreased with increasing riparian forest. Hilsenhoff scores from all 15 sites were significantly correlated with in-stream habitat scores, percent riparian forest, and orthophosphate concentrations, and multiple regression indicated that in-stream habitat was the primary factor influencing biotic integrity. Our results show that these drainage ditches harbor abundant macroinvertebrates that are typical of degraded conditions, but that they can reflect gradients of conditions in and around these streams." (Authors) The paper also contains a few remarks on Odonata. For details see: <http://jeq.scijournals.org/cgi/reprint/34/3/907.pdf>] Address: Stone, Mandy L., Dept of Zoology, Southern Illinois University, Carbondale, IL 62901-6501, USA. E-mail: mlstone@siu.edu

**5846.** Sy, T.; Schulze, M. (2005): Erstnachweis der Helm-Azurjungfer (*Coenagrion mercuriale*) in Sachsen (Odonata, Coenagrionidae). *Entomologische Nachrichten und Berichte* 49(3-4): 215-219. (in German, with English summary). [oas 19;The first definite record of *C. mercuriale* in Saxony, Germany is reported. On 24-VI-2005, a small population of the species was found in the Augraben ditch near Dölzig (Delitzsch district).] Address: Sy, T., RANA-Büro für Ökologie und Naturschutz, Am Kirchtor 27, D-06108 Halle (Saale), Germany. E-mail: info@rana-halle.de

**5847.** Vonesh, J.R. (2005): Sequential predator effects across three life stages of the African tree frog,

*Hyperolius spinigularis*. *Oecologia* 143(2): 280-290. (in English). ["While theoretical studies of the timing of key switch points in complex life cycles such as hatching and metamorphosis have stressed the importance of considering multiple stages, most empirical work has focused on a single life stage. However, the relationship between the fitness components of different life stages may be complex. Ontogenetic switch points such as hatching and metamorphosis do not represent new beginnings—carryover effects across stages can arise when environmental effects on the density and/or traits of early ontogenetic stages subsequently alter mortality or growth in later stages. In this study, I examine the effects of egg- and larval-stage predators on larval performance, size at metamorphosis, and post-metamorphic predation in the African tree frog *Hyperolius spinigularis*. I monitored the density and survival of arboreal *H. spinigularis* clutches in the field to estimate how much egg-stage predation reduced the input of tadpoles into the pond. I then conducted experiments to determine: (1) how reductions in initial larval density due to egg predators affect larval survival and mass and age at metamorphosis in the presence and absence of aquatic larval predators, dragonfly larvae, and (2) how differences in mass or age at metamorphosis arising from predation in the embryonic and larval environments affect encounters with post-metamorphic predators, fishing spiders. Reduction in larval densities due to egg predation tended to increase per capita larval survival, decrease larval duration and increase mass at metamorphosis. Larval predators decreased larval survival and had density-dependent effects on larval duration and mass at metamorphosis. The combined effects of embryonic and larval-stage predators increased mass at metamorphosis of survivors by 91%. Larger mass at metamorphosis may have immediate fitness benefits, as larger metamorphs had higher survival in encounters with fishing spiders. Thus, the effects of predators early in ontogeny can alter predation risk even two life stages later." (Author)] Address: Vonesh, J.R., Tyson Research Center, Washington University at St. Louis, P.O. Box 258, Eureka, MO 63025, USA

**5848.** Walloch, M.; Bellstedt, R.; Weise, R. (2005): Der Felchtaer Bach, südlich Mühlhausen, verbindendes Element zwischen dem Hainich und der Unstrut. Mühlhäuser Beiträge 28: 7-16. (in German). [Thuringia, Germany; the occurrence of *Calopteryx splendens* and *Coenagrion mercuriale* is briefly discussed. The latter species is probably not autochthonous in the Felchtaer Bach, but larvae were found in a ditch running into the F. Bach.] Address: Weise, R., Kräuterstraße 4, 99974 Mühlhausen, Germany. E-mail: info@naturfoto-weise.de

**5849.** Watts, P.C.; Daguet, C.; Thompson, D.J., Kemp, S.J. (2005): Exuviae as a reliable source of DNA for population-genetic analysis of odonates. *Odonatologica* 34: 183-187. (in English). ["Genetic analyses are widely used for a variety of ecological research, especially to aid species' conservation programs. Where genetic material is required from rare endangered species it is essential that the samples be collected non-destructively, the ultimate goal should be to develop reliable DNA extraction protocols that may be used with non-invasively collected samples. In this paper, we describe and compare three methods of DNA extraction (DNeasy tissue kit, proteinase-K/TNES and Chelex-100) that use odonate (*Coenagrion mercuriale*) exuviae

as a non-invasive source of genetic material. DNA extracted from exuviae produced consistent genotypes at five polymorphic microsatellite loci for all of the samples processed using the DNeasy tissue kit and proteinase-K/TNES methods and 4 out of the 6 exuviae treated with Chelex-100. Exuviae offer an effective source of genetic material from endangered odonates and also highly mobile species that are too difficult to catch in significant numbers. As such, we expect DNA extracted from exuviae to be widely applied to odonatological genetic research." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**5850.** Wichard, W. (2005): Zeitzegen eines alttertiären Waldes. Wasserinsekten im Baltischen Bernstein. *Biologie in unserer Zeit* 35(2): 83-89. (in German). [Odonata are relatively rarely represented in Baltic amber collections but this is little quantified. An analysis of a large collection showed that of all aquatic insects Odonata represented only 0.6% in the collection." Address: Wichard, W., Institut für Biologie und ihre Didaktik, Universität Köln, Gronewaldstr. 2, D-50931 Köln, Germany.

**5851.** Yuejin, H.; Hongqi, L. (2005): Food web and fluid in pitchers of *Nepenthes mirabilis* in Zhuhai, China. *Acta Bot. Gallica* 152(2): 165-175. (in English). [Pitchers of *Nepenthes mirabilis* in Zhuhai, Guangdong Province, China were reported to contain "Coenagrion".] Address: Yuejin Huae, Jin Hai-An High School, Zhuhai, 519041, China

**5852.** Knight, T.M.; McCoy, M.W.; Chase, J.M.; McCoy, K.A.; Holt, R.D. (2005): Trophic cascades across ecosystems. *Nature* 437: 880-883. (in English). ["Predation can be intense, creating strong direct and indirect effects throughout food webs. In addition, ecologists increasingly recognize that fluxes of organisms across ecosystem boundaries can have major consequences for community dynamics. Species with complex life histories often shift habitats during their life cycles and provide potent conduits coupling ecosystems. Thus, local interactions that affect predator abundance in one ecosystem (for example a larval habitat) may have reverberating effects in another (for example an adult habitat). Here we show that fish indirectly facilitate terrestrial plant reproduction through cascading trophic interactions across ecosystem boundaries. Fish reduce larval dragonfly abundances in ponds, leading to fewer adult dragonflies nearby. Adult dragonflies consume insect pollinators and alter their foraging behaviour. As a result, plants near ponds with fish receive more pollinator visits and are less pollen limited than plants near fish-free ponds. Our results confirm that strong species interactions can reverberate across ecosystems, and emphasize the importance of landscape-level processes in driving local species interactions." (Authors)] Address: Knight, Tiffany, Department of Zoology, University of Florida, Gainesville, Florida 32611, USA

**5853.** Anjos-Santos, D.; Costa, J.M. (2006): A revised checklist of Odonata (Insecta) from Marambaia, Rio de Janeiro, Brazil with eight new records. *Zootaxa* 1300: 37-50. (in English, with Portuguese summary). ["A list of 77 species in 37 genera and 10 families recorded in Marambaia, Rio de Janeiro, Brazil is presented. Eight species (*Hetaerina brighthwelli*, *Lestes tricolor*, *Ischnura*

fluviatilis, Leptagrion andromache, Triacanthagyna nympha, T. septima, Zonophora campanulata campanulata, and Micrathyrta borgmeieri) have been recorded for the first time for the region, enlarging the knowledge about Odonata species of Rio de Janeiro State. Comments about new records and additional relevant literature are discussed." (Authors)] Address: Anjos-Santos, Danielle, Museu Nacional, Universidade Federal do Rio de Janeiro, Departamento de Entomologia, Setor de Insetos, Aquáticos, Quinta da Boa Vista, São Cristóvão 20940-040, Rio de Janeiro, Brazil. Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@acd.ufrj.br

**5854.** Anwander, H. (2006): Libellen (Odonata) im Kalkquellmoor "Benninger Ried" bei Memmingen, Bayern. *Lauterbornia* 57: 107-112. (in German, with english summary). [Germany, Bavaria; "The mapping of dragonflies took place in the years 1997, 2000, and 2003 in connection with the faunistic monitoring for the EU-LIFE-Project Benninger Ried. During this time the focus was especially upon the development of population density of *Coenagrion mercuriale* and *Orthetrum coerulescens*, because these species are characteristic inhabitants of springs and swamps in this area. Altogether 27 species were found during the research. The extremely dry summer in 1998 was the reason for a strong decrease of *Coenagrion mercuriale* after the first mapping. Since that time the population density has been recovered - not least by damming measures, which were carried out in this time." (Author)] Address: Anwander, H., Am Sandberg 7, D-89358 Ettenbeuren, Germany

**5855.** Audet, G.N.; Blust, M.H. (2006): Odonata of the Poultney River. Abstracts of the Northeast Natural History Conference IX. April 20 – April 21, 2006. N.Y. State Mus. Circ. 70. ISBN: 1-55557-233-2: 22. (in English). [Verbatim: From September to November 2005, a study was conducted to find, identify, and map Odonate nymphs in the Poultney River of Vermont and New York. Samples were taken at various sites, from the headwaters to approximately twenty-five miles downstream, in an effort to identify the different species of Odonata that occupy the main waterway and its tributaries. Habitats included small rocky brooks, medium sized rocky rivers, and slow moving shallow reaches with silt and clay. Over three hundred individual nymphs were collected, representing more than twenty genera. Portions of the Poultney River form the border between NY State and Vermont. *Enallagma divagans*, which had previously been undocumented in the state of Vermont or nearby counties of NY, was found in this border stretch. Diversity and distribution of species will be discussed.] Address: The University of the State of New York, The State Education Department, ALBANY, NY 12230, USA; <http://www.nysm.nysed.gov/nhc/nhcabstracts2006.pdf>

**5856.** Azrina, M.Z.; Yap, C.K.; Ismail, A.R.; Ismail, A.; Tan, S.G. (2006): Anthropogenic impacts on the distribution and biodiversity of benthic macroinvertebrates and water quality of the Langat River, Peninsular Malaysia. *Ecotoxicology and Environmental Safety* 64(3): 337-347. (in English). ["A study of the impacts of anthropogenic activities on the distribution and biodiversity of benthic macroinvertebrates and water quality of the

Langat River (Peninsular Malaysia) was conducted. Four pristine stations from the upstream and 4 stations at the downstream receiving anthropogenic impacts were selected along the river. For 4 consecutive months (March–June 1999), based on the Malaysian DOE (Malaysia Environmental Quality Report 2000, Department of Environment, Ministry of Science, Technology and Environment Malaysia. Maskha Sdn. Bhd. Kuala Lumpur, 86pp; Malaysia Environmental Quality Report 2001, Department of Environment, Ministry of Science, Technology and the Environment Malaysia) water quality index classes, the upstream stations recorded significantly ( $P<0.05$ ) higher Biological Monitoring Working Party scores and better water quality indices than those of the downstream. The total number of macrobenthic taxa and their overall richness indices and diversity indices were significantly ( $P<0.05$ ) higher at the upstream stations (54 taxa) than at the downstream stations (5 taxa). The upstream of the Langat River was dominated by Ephemeroptera and chironomid dipterans while other orders found in small quantities included Trichoptera, Diptera, Plecoptera, Odonata, next term Ephemeroptera, Coleoptera, and Gastropoda. On the other hand, the downstream of the river was mainly inhabited by the resistant Oligochaeta worms *Limnodrilus* spp. and *Branchiodrilus* sp. and Hirudinea in small numbers. The relationships between the physicochemical and the macrobenthic data were investigated by Pearson correlation analysis and multiple stepwise regression analysis. These statistical analyses showed that the richness and diversity indices were generally influenced by the total suspended solids and the conductivity of the river water. This study also highlighted the impacts of anthropogenic land-based activities such as urban runoff on the distribution and species diversity of macrobenthic invertebrates in the downstream of the Langat River. The data obtained in this study supported the use of the bioindicator concept for Malaysian rivers. Some sensitive (Trichopteran caddisflies and Ephemeroptera) and resistant species (Oligochaeta such as *Limnodrilus* spp.) are identified as potential bioindicators of clean and polluted river ecosystems, respectively, for Malaysian rivers.] Address: Yap, C.K., Department of Biology, Faculty of Science, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia. E-mail: yapckong1973@yahoo.com.sg

**5857.** Bao, I.; Hu, J.-.; Yu, Y.-l.; Cheng, P.; Xu, B.-q.; Tong, B.-g. (2006): Viscoelastic constitutive model related to deformation of insect wing under loading in flapping motion. *Applied Mathematics and Mechanics* 27(6): 741-748. (in English). ["Flexible insect wings deform passively under the periodic loading during flapping flight. The wing flexibility is considered as one of the specific mechanisms on improving insect flight performance. The constitutive relation of the insect wing material plays a key role on the wing deformation, but has not been clearly understood yet. A viscoelastic constitutive relation model was established based on the stress relaxation experiment of a dragonfly wing (in vitro). This model was examined by the finite element analysis of the dynamic deformation response for a model insect wing under the action of the periodical inertial force in flapping. It is revealed that the viscoelastic constitutive relation is rational to characterize the biomaterial property of insect wings in contrast to the elastic one. The amplitude and form of the passive viscoelastic deformation of the wing is evidently depen-



dent on the viscous parameters in the constitutive relation." (Authors)] Address: Email: tongbg@gucas.ac.cn

**5858.** Batista de Pinho, J.; Esteves Lopes, L.; De Moraes, D.H.; Mendes Fernandes, A. (2006): Life history of the Mato Grosso Antbird *Cercomacra melanaria* in the Brazilian Pantanal. *Ibis* 148(2): 321-329. (in English). [In 2 of 24 stomachs of *C. melanaria*, food items of Odonata were found.] Address: Batista de Pinho, J., Núcleo de Pesquisa Ecológica do Pantanal – Instituto de Biociências, Universidade Federal de Mato Grosso, 78075-960, Cuiabá, MT, Brazil. Email: pinho@cpd.ufmt.br

**5859.** Beauger, A.; Lair, N.; Reyes-Marchant, P.; Peiry, J.-L. (2006): The distribution of macroinvertebrate assemblages in a reach of the River Allier (France), in relation to riverbed characteristics. *Hydrobiologia* 571: 63-76. (in English). ["Macroinvertebrate assemblages of large alluvial streams are poorly documented. This study identified the physical characteristics affecting the macroinvertebrates community distribution in a large alluvial river devoid of major anthropogenic impacts. It was oriented towards the influence of the characteristics of the physical habitat (velocity, depth, grain-size classes of mineral substrates, macrophytes) on macroinvertebrates (richness, density, body size, feeding habits), with particular attention to the pollution-sensitive taxa. The study was carried out in June during a period of hydrological stability. The effects of water velocity, depth and substrates on taxa were evaluated with multivariate analyses. Mineral substrates were most abundant while macrophytes accounted for only 3% of sampled habitat. Invertebrates that were present were those characteristics of the transition zone between upper and middle life reaches. Among the 63 taxa sampled, 14 were abundant. In relation to the characteristics of the physical environment, the macroinvertebrate assemblages were discriminated by substrate, velocity, and depth. Habitat exploitation, however, appeared complex. The highest community richness, EPT richness, and density were found in various substrates where the velocity ranged between 30 and 120 cm s<sup>-1</sup>, depths ranged from 16 to 50 cm. The most pollution-sensitive taxa preferred riffle habitats with velocities >70 cm s<sup>-1</sup> and substrate >64 mm. This suggests that rapid bioassessment programmes should be carried out in the mineral substrates of the geomorphological unit riffles where richness is high and density sufficient to represent the macroinvertebrate community, including pollution-sensitive taxa." (Authors) The study includes data on *Onychogomphus* and *Ophiotomphus*.] Address: Beauger, A., Laboratoire de Géographie Physique et Environnementale. GEOLAB, UMR 6042 CNRS, Uni. Clermont-Ferrand, France. E-mail: aude.beauger@univ-bpclermont.fr

**5860.** Bedjanic, M.; Conniff, K.; de Silva Wijeyeratne, G. (2006): Dragonflies of Sri Lanka and southern India. *Jetwing Eco Holidays*. Colombo. ISBN 955107908-6: 28 pp. (in English). [78 of the 117 Odonata of Sri Lanka are pictured. For the full paper see: [http://www.jetwingco.com/images/GPB%20Dragonflies%20of%20Sri%20Lanka%20\(1st%20Ed\)%202006%2005.pdf](http://www.jetwingco.com/images/GPB%20Dragonflies%20of%20Sri%20Lanka%20(1st%20Ed)%202006%2005.pdf)]

**5861.** Beirinckx, K.; Van Gossum, H.; Lajeunesse, M.; Forbes, M. (2006): Sex biases in dispersal and philopatry: insights from a meta-analysis based on capture–mark–recapture studies of damselflies. *Oikos* 113(3):

539-547. (in English). ["Sex-biased dispersal is well known for birds and mammals, typically by females and males, respectively. Little is known about general patterns of sex-biased dispersal in other animal taxa. We reviewed return rates for a model group of invertebrates (damselflies) and explored putative costs and benefits of dispersal by males and females. We used published capture–mark–recapture data and examined whether a sex bias existed in likelihood of recapture at least once, at both emergence and/or breeding sites. We assessed whether this metric of likelihood of recapture was indicative of dispersal or philopatry, and whether any emerging pattern(s) were consistent across damselfly families. Using a meta-analysis, we found a higher likelihood of recapture at least once for males than for females at both natal sites and breeding sites, which seemed attributable to higher female-biased dispersal, although female-biased mortality cannot be discounted particularly for some species. Sex biases in dispersal among damselflies may be understood based on sex differences in maturation rate and foraging behaviour, both of which should affect the costs and benefits of dispersing. This hypothesis may be useful for explaining patterns of dispersal in other animal taxa." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**5862.** Bena, W. (2006): Die Natur der Puszcza Zgorzelecka (Görlitzer Heide). *Berichte der naturforschenden Gesellschaft der Oberlausitz* 14: 1001-105. (in German). [The author gives an introduction into the heath and woodlands situated on both sites of the Polish/German border, originally known als "Görlitzer Heide". Facts are compiled more general and organized in three chapters: Situation and history of forestry, flora, and fauna. The chapter on the fauna also contains some odonate highlights, but without any detailed data.] Address: Bena, W., ul. Olszewskiego, PL-59-900 Zgorzelec, Poland. E-mail: benawald@gazeta.pl

**5863.** Bernard, R.; Buczyński, P.; Tończyk, G. (2006): Historical materials: Dr. Stefan Mielewicz (1933-2005). *Wiad. entomol.* 25(1): 43-54. (in Polish, with English summary). [Obituary and bibliography of the leading Polish odonatologist of the last four decades in the 20th century.] Address: Bernard, R., Department of General Zoology, Adam Mickiewicz University, Umultowska 89, 61-614 Poznań, PL-61-702 Poznan, Poland; E-mail: rbernard@main.amu.edu.pl

**5864.** Bernard, Y. (2006): *Trithemis annulata* (Palisot de Beauvois, 1805), nouvelle espèce pour le département des Hautes-Pyrénées (Odonata, Anisoptera, Libellulidae). *Martinia* 22(3): 133-134. (in French, with English summary). [France; in summer 2005, two male *T. annulata* were caught at the Lourdes lake. Obviously, the range extension of the species in southwestern France is not restricted to the Atlantic coast.] Address: Bernard, Y., 13 chemin de Gourion, Domaine de Peyre, F-33360 Lignan de Bordeaux. France. E-mail: ybernard@biotope.fr

**5865.** Bernauer, D.; Grabow, K.; Martens, A. (2006): Fang von Libellenlarven durch Elektrofischung (Odonata: Cordulegastridae). *Libellula* 25(3/4): 165-169. (in German, with English summary). ["On 10-X-2006, at a shallow stream near Wachenheim in the Palatinate Fo-

rest, Germany, the recording of dragonfly larvae by electrofishing was tested successfully. At two 10 m-stretches, ten and 45 larvae of *Cordulegaster boltonii*, respectively, were caught by using the standard techniques for larvae of lampreys." (Authors)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**5866.** Berry, R.; Stange, G.; Olberg, R.; van Kleef, J. (2006): The mapping of visual space by identified large second-order neurons in the dragonfly median ocellus. *Journal of Comparative Physiology A: Neuroethology, Sensory, Neural, and Behavioral Physiology*: 1-19. (in English). ["In adult dragonflies, the compound eyes are augmented by three simple eyes known as the dorsal ocelli. The outputs of ocellar photoreceptors converge on relatively few second-order neurons with large axonal diameters (L-neurons). We determine L-neuron morphology by iontophoretic dye injection combined with three-dimensional reconstructions. Using intracellular recording and white noise analysis, we also determine the physiological receptive fields of the L-neurons, in order to identify the extent to which they preserve spatial information. We find a total of 11 median ocellar L-neurons, consisting of five symmetrical pairs and one unpaired neuron. L-neurons are distinguishable by the extent and location of their terminations within the ocellar plexus and brain. In the horizontal dimension, L-neurons project to different regions of the ocellar plexus, in close correlation with their receptive fields. In the vertical dimension, dendritic arborizations overlap widely, paralleled by receptive fields that are narrow and do not differ between different neurons. These results provide the first evidence for the preservation of spatial information by the second-order neurons of any dorsal ocellus. The system essentially forms a one-dimensional image of the equator over a wide azimuthal area, possibly forming an internal representation of the horizon. Potential behavioural roles for the system are discussed." (Authors)] Address: Berry, R., Centre for Visual Sciences, Research School of Biological Sciences, Australian National University, PO Box 475, Canberra, ACT 2601, Australia. E-mail: rberry@rsbs.anu.edu.au

**5867.** Bönsel, A. (2006): Schnelle und individuenreiche Besiedlung eines revitalisierten Waldmoores durch *Leucorrhinia pectoralis* (Odonata: Libellulidae). *Libellula* 25(3/4): 151-157. (in German, with English summary). ["In 2003 a drained forest mire in Mecklenburg-Pomerania, Germany, was revitalized by damming up the water to a maximum depth of 1.3 m. Three years later a large indigenous population of *L. pectoralis* was recorded at the new water body. In spite of the cryptic situation of the revitalized habitat many individuals must have found it promptly. Forests around the habitats do not constitute dispersal barriers for the sp., which is endangered in central Europe, and large occurrences nearby are not a prerequisite for colonizing new habitats. As in this region the revitalisation of mires is associated with few conflicts of interest and only little financial support is needed, this measure is recommended for the protection and promotion of *L. pectoralis*." (Author)] Address: Bönsel, A., Vasenbusch 15, D-18337 Gresenhorst, Germany. E-mail: andre.boensel@gmx.de

**5868.** Boyero, L.; Rincón, P.A.; Bosch, J. (2006): Case selection by a limnephilid caddisfly [*Potamophylax*

*latipennis* (Curtis)] in response to different predators. *Behavioral Ecology and Sociobiology* 59(3): 364-372. (in English). ["Some organisms use morphological structures obtained by behavioural processes to lower mortality by predation. We test whether larvae of the limnephilid caddisfly *Potamophylax latipennis* (Curtis) vary their responses to the presence of different predators (*Cordulegaster boltonii*, fire salamander larvae or brown trout) by choosing organic or mineral cases. We offered both case types to larvae, and simulated differences in predation risk using water conditioned with chemicals from the different predators. Our results show that *Potamophylax* larvae detect and discriminate predators using water-borne chemical cues and alter their choice of case type according to the perceived predation risk. Moreover, the distribution of larvae bearing cases of different anti-predator value matches the spatial variation in predation risk in the field." (Authors)] Address: Boyero, L., Museo Nacional de Ciencias Naturales (CSIC), Madrid, Spain. E-mail: luz.boyero@jcu.edu.au

**5869.** Boyero, L.; Rincón, P.A.; Bosch, J. (2006): Case selection by a limnephilid caddisfly [*Potamophylax latipennis* (Curtis)] in response to different predators. *Journal Behavioral Ecology and Sociobiology* 59(3): 364-372. (in English). ["Some organisms use morphological structures obtained by behavioural processes to lower mortality by predation. We test whether larvae of the limnephilid caddisfly *Potamophylax latipennis* (Curtis) vary their responses to the presence of different predators (dragonfly naiads [*Cordulegaster boltonii*], fire salamander larvae or brown trout) by choosing organic or mineral cases. We offered both case types to larvae, and simulated differences in predation risk using water conditioned with chemicals from the different predators. Our results show that *Potamophylax* larvae detect and discriminate predators using water-borne chemical cues and alter their choice of case type according to the perceived predation risk. Moreover, the distribution of larvae bearing cases of different anti-predator value matches the spatial variation in predation risk in the field." (Authors)] Address: Boyero, L., Museo Nacional de Ciencias Naturales (CSIC), Madrid, Spain. E-mail: luz.boyero@jcu.edu.au

**5870.** Brauner, O. (2006): Einjährige Entwicklung von *Leucorrhinia pectoralis* und *Brachytron pratense* in einem Kleingewässer Nordostbrandenburgs (Odonata: Libellulidae, Aeshnidae). *Libellula* 25(1/2): 61-75. (in German, with English summary). ["In a kettle hole near Brodowin, Brandenburg, Germany in the dry and warm summer of 2001, the water body was observed to dry up completely for almost five months. Regular measurements of water conditions showed that the water reached a minimal level of less than 50 cm below ground during that time. In 2003 ten exuviae of *L. pectoralis* and five exuviae of *B. pratense* were found at this water body, indicating univoltine development for at least part of the population of both species. From similar observations at three different localities of the same region, it is likewise inferred that both species may be partly univoltine." (Authors)] Address: Brauner, O., R.-Breitscheidstr. 62, D-16225 Eberswalde, Germany. E-mail: oliverbrauner@web.de

**5871.** Bressler, D.W.; Stribling, J.B.; Paul, M.J.; Hicks, M.B. (2006): Stressor tolerance values for benthic macroinvertebrates in Mississippi. *Hydrobiologia* 573: 155-

172. (in English). ["Conceptually, tolerance values represent the relative capacity of aquatic organisms to survive and reproduce in the presence of known levels of stressors. Operationally, they represent the relative abundance and colocation of organisms and stressors. These numeric values are then used for calculating tolerance metrics. Defensibility of biological assessments using tolerance metrics is compromised if the origins of the tolerance values or technical foundations of metrics are unknown. To minimize circularity and maximize objectivity, we define stressed conditions using physical and chemical factors. Also, since single, isolated stressors in stream systems are rare, we used an approach that combines multiple physical and chemical characteristics into a single general stressor gradient. In this paper, we describe development of tolerance values for benthic macroinvertebrate taxa collected from 455 wadeable stream sites throughout Mississippi, USA, except the Alluvial Plain. Principal components analysis (PCA) was used to develop a gradient that incorporated direct (instream physical and chemical) and indirect (land use) stressors, which was then scaled from 0 to 10. Weighted averaging of the relative abundance of each taxon was used to assign tolerance values based on the point of greatest relative abundance along the stressor gradient. Tolerance values were derived for 324 (including Odonata on the genus level) of the 567 taxa collected from the study sites, and primarily represented sensitivity to agricultural influences including degradation of physical habitat and nutrient enrichment, the dominant stressors within the state. We suggest that this approach could be used in other areas of the country to develop new tolerance values, refine existing ones, and may be a useful approach for other taxonomic groups." A(uthors)] Address: Bressler, D.W., Tetra Tech, Inc., 400 Red Brook Blvd., Suite 200, Owings Mills, MD, 21117-5159, USA. E-mail: dave.bressler@tetratech.com

**5872.** Bried, J.T.; Ervin, G.N. (2006): Abundance patterns of dragonflies along a wetland buffer gradient. *Wetlands* 26: 878-883. (in English). ["Local abundance of animals with aquatic and terrestrial life stages may be useful to determine criteria for protective buffers around wetlands. Maiden flights and daily commutes of adult Odonata occur between wetland breeding area and adjacent upland habitat used for foraging, maturation, and nocturnal roosting. We measured abundance of dragonflies adjacent to a wetland in Mississippi, USA to determine if abundance varied with distance from water. Sexually mature males and combined females/prereproductive adult males (females-immatures) were recorded 10–160 m from the littoral edge of a 185 ha shallow reservoir. The number of dragonflies was dominated by *Celithemis eponina* throughout the study period. Mean abundance did not change with distance from water out to 160 m, both for all species combined and for each of three dominant species. In the assemblage, mature males outnumbered females-immatures in the 10–40 m distance, whereas the reverse occurred in the 130–160 m distance. At the species-level, there was a mixed response in the mature male: female-immature ratio, with little resemblance to the assemblage pattern. Results of this study suggest that wide buffer zones around wetlands may be essential to protect Odonata assemblages, especially females and sexually immature adults. Furthermore, odonate flight behavior may serve as a useful bio-criterion to determine the width of ecologically significant wetland buffers." A(uthors)] Address: Bried, J., The Nature Conservancy Eastern New York Chapter & Albany Pine Bush Preserve Commission, 195 New Karner Road, Albany, New York, USA 12205-4605. E-mail: jbried@tnc.org

(Authors)] Address: Bried, J., The Nature Conservancy Eastern New York Chapter & Albany Pine Bush Preserve Commission, 195 New Karner Road, Albany, New York, USA 12205-4605. E-mail: jbried@tnc.org

**5873.** Buchanan, G.M.; Grant, M.C.; Sanderson, R.A.; Pearce-Higgins, J.W. (2006): The contribution of invertebrate taxa to moorland bird diets and the potential implications of land-use management. *Ibis* 148(4): 615-628. (in English). [A meta analysis of the diet of 14 British bird species was carried out. Odonata played a minor role as food. The results differed between the species considered (in most cases small Passeriformes which are known to prey very rarely on Odonata), and with habitat preferences, which makes encounters between dragonflies and birds quite unlikely. Personal annotation: moorland Odonata are known to be preyed upon selectively by e.g. Hobby (*Falco subbuteo*).] Address: Buchanan, G.M., Royal Society for the Protection of Birds, Dunedin House, 25 Ravelston Terrace, Edinburgh EH4 3TP, UK. E-mail: graeme.buchanan@rspb.org.uk

**5874.** Buczyński, P.; Lewandowski, K.; Wissig, N. (2006): Materials to the knowledge of dragonflies (Odonata) of the River Narew valley in the vicinity of Drozdowo (north-eastern Poland). *Drozdowskie Zeszyty Przyrodnicze* 3: 5-12. (in Polish, with English summary). [Odonatological surveys in 1985-1987 and 2003 and 2004 at 32 water bodies resulted in 33 dragonfly species: of special interest are *Coenagrion lunulatum*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Aeshna juncea*, and *A. viridis*.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**5875.** Bur, S. (2006): Une nouvelle espèce d'Odonate pour le département de l'Oise: *Leucorrhinia caudalis* (Charpentier, 1840) dans le Marais de Bourneville à Marolles (Odonata, Anisoptera, Libellulidae). *Martinia* 22(2): 73-82. (in French, with English summary). ["A *L. caudalis* population was discovered in 2003 in Oise department, France. It is the first and unique record of this species for this department. The site and the context of the discovery are briefly presented, and the observations described. The author gives a brief synthesis of the distribution of the species in Picardie region and neighbouring areas and discusses the possible origin of the population discovered." (Author)] Address: Bur, S., Conservatoire des sites naturels du Limousin, 6 ruelle du Theil, F-87510 Saint-Gence, France. E-mail: sbur@conservatoirelimousin.com

**5876.** Burmeister, E.-G. (2006): Im Regenwald am Fuß der Anden. *Mitteilungen des Thüringer Entomologenverbandes* 13(1): 72-81. (in German, with English summary). [The author reports from several of his trips to the cloud forest of Panguana, Peru. On page 75 he notes 27 odonate species without details from the locality. This forest is the type locality of *Polythore spaeteri*, whose larvae have ventral abdominal gills. This is interpreted as an adaption to fluctuating water tables and changing oxygen conditions of the habitat, small rivulets. Some general remarks on oviposition of the Mesostigmatidae are added as is a list of dragonflies caught by light traps. Additional material (unpublished): V. Etscher: »Die Larve von *Polythore spaeteri* Burmeister & Börzsöny, 2003, (Insecta: Odonata: Zygopte-



ra: Polythoridae). Ein Beitrag zur anatomischen Strukturanalyse basaler Libellen und zur Artzuordnung auf molekularer Ebene« (seit April 2004) - LMU. Betreuung: E.-G. Burmeister.] Address: Burmeister, E.-G., Zoologische Staatssammlung München, Münchhausenstraße 21, D-81247 München, Germany. E-mail: Burmeister@zsm.mwn.de.

**5877.** Butler, R.G.; de Maynadier, P. (2006): Significance of littoral and shoreline habitat integrity to lacustrine damselfly conservation. Abstracts of the Northeast Natural History Conference IX. April 20 – April 21, 2006. N.Y. State Mus. Circ. 70. ISBN: 1-55557-233-2: 23. (in English). [Verbatim: Shoreline development can have significant impacts on native lacustrine biota including a variety of aquatic macroinvertebrate groups. In an effort to better understand the habitat associations and sensitivities of lacustrine damselflies (Odonata: Zygoptera), we sampled adults in littoral macrophyte habitat during two flight periods at 35 randomly selected pond and lake sites in southern Maine during 2000 and 2001. Habitat data were collected during the same period to help characterize water body, shoreline disturbance, and aquatic vegetation at each study site. Non-metric multidimensional scaling was used for ordination of damselfly assemblages, and resulting coordinates from the most stable three-axis solution were related to site variables using forward stepwise multiple regression. Our results suggest that the diversity and composition of damselfly assemblages were related to the abundance and richness of littoral zone macrophytes, extent of riparian habitat conversion, benthic substrate granularity, and habitat productivity; all variables subject to anthropogenic degradation on excessively developed waterbodies. Additionally, we developed a Habitat Tolerance Index useful for distinguishing between relative habitat specialists and generalists from among a diverse community of 19 lacustrine species. Finally, species-specific damselfly associations with multiple genera of floating and emergent macrophytes were assessed using both nonparametric correlation and multiplicative regression yielding significant relationships for 17 species, including two damselflies of regional conservation concern, *Enallagma laterale* and *E. pictum*. We conclude that the protection of littoral habitat integrity, with special emphasis on emergent and floating macrophytes, is critical to the conservation of a diverse lacustrine damselfly fauna.] Address: University of the State of New York, The State Education Dept, ALBANY, NY 12230, USA; <http://www.nysm.nysed.gov/nhc/nhcabstracts2006.pdf>

**5878.** Carvalho, A.L.; Souza, P.H.R.; Calil, E.R. (2006): Description of the larvae of *Castoraeschna colorata* (Martin, 1908) and *C. longfieldae* (Kimmins, 1929) (Insecta: Odonata: Aeshnidae), with a key to the known larvae of the genus. *Zootaxa* 1296: 19-28. (in English). ["The ultimate instar larvae of *C. colorata* and *C. longfieldae* are described and illustrated based on reared specimens from Parque Nacional das Emas, GO, and Chapada dos Guimarnes, MT, Brazil, respectively. A comparative table and an identification key for all described larvae of *Castoraeschna* (in addition: *C. castor*, *C. decurvata*, *C. tepuica*) are also presented." (Authors)] Address: Carvalho, A.L., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro (UFRJ), Caixa Postal 68044, BR-21944-970 Rio de Janeiro, RJ, Brazil. E-mail: [alagoc@acd.ufrj.br](mailto:alagoc@acd.ufrj.br)

**5879.** Castillo, L.E.; Martínez, E.; Ruepert, C.; Savage, C.; Gilek, M.; Pinnock, M.; Solis, E. (2006): Water quality and macroinvertebrate community response following pesticide applications in a banana plantation, Limon, Costa Rica. *Science of The Total Environment* 367(1): 418-432. (in English). ["Pesticides used in banana production may enter watercourses and pose ecological risks for aquatic ecosystems. The occurrence and effects of pesticides in a stream draining a banana plantation was evaluated using chemical characterization, toxicity testing and macrobenthic community composition. All nematicides studied were detected in the surface waters of the banana plantation during application periods, with peak concentrations following applications. Toxicity tests were limited to the carbofuran application and no toxicity was observed with the acute tests used. However, since pesticide concentrations were generally below the lowest LC50 value for crustaceans but above calculated aquatic quality criteria, there remains a risk of chronic toxicity. Accurate ecological assessments of pesticide use in banana plantations are currently limited by the lack of local short-term chronic toxicity tests and tests using sensitive native species. Relatively constant levels of four pesticides (imazalil, thiabendazole, chlorpyrifos and propiconazole), which had toxic effects according to the 96h hydra and 21d daphnia chronic test, were recorded in the effluent of the packing plant throughout the study, indicating that the solid waste trap used in this facility was not effective in eliminating toxic chemicals. Certain taxa, such as *Heterelmis* sp. (Elmidae), *Heteragrion* sp. (Megapodagrionidae, Odonata), *Caenis* sp. (Caenidae, Ephemeroptera), and *Smicridea* sp. (Hidropsychidae, Trichoptera), were more abundant at reference sites than in the banana farm waters, and may be good candidates for toxicity testing. Multivariate analyses of the macroinvertebrate communities clearly showed that the banana plantation sites were significantly different from the reference sites. Moreover, following the pesticide applications, all the banana plantation sites showed significant changes in community composition, with the same genera being affected at all sites and for all pesticides (terbufos, cadusafos and carbofuran). Consequently, the results presented here show that multivariate analysis of community composition was more sensitive in distinguishing pesticide effects than the toxicity tests and richness and composition measures used. We conclude that monitoring macroinvertebrate communities can be a powerful tool in the assessment of ecological effects of banana production." (Authors)] Address: Castillo, Luisa Eugenia, Sonia Miner Salari, Central American Institute for Studies on Toxic Substances (I-RET), Universidad Nacional, Heredia, Costa Rica. E-mail: [lcastill@una.ac.cr](mailto:lcastill@una.ac.cr)

**5880.** Césard, N. (2006): Des libellules dans l'assiette: les insectes consommés à Bali. *Insects* 160: 3-6. (in French). [This is an impressively illustrated article on Odonata as food of people in Bali, Indonesia. For details see: <http://www.inra.fr/internet/Hebergement/OPIE-Insectes/pdf/i140cesard.pdf>] Address: E-mail: [ncesard@wanadoo.fr](mailto:ncesard@wanadoo.fr)

**5881.** Che Salmah, M.R.; Wardhani Tribuana, S.; Abu Hassan, A. (2006): The population of Odonata (dragonflies) in small tropical rivers with reference to asynchronous growth patterns. *Aquatic Insects* 28(3): 195-209. (in English). ["The odonate larval communities in three small rivers in Penang Island were studied. Mo-

re species of dragonflies were found in the Botanical Garden and Titi Teras rivers (13 and 11 respectively) of relatively similar environmental parameters. Fewer (nine) dragonfly species were collected from the Youth Park River which has a lower dissolved oxygen (DO) and a higher biological oxygen demand (BOD), conductivity and turbidity. A mixture of sand, gravel and pebble substrate of Botanical Garden River with dense growth of submerged *Hydrilla*, grasses and *Cladias* (Araceae) provided suitable habitats for the dragonflies. The sandy substrate and relatively fast flowing water of Titi Teras River was highly preferred by gomphids. In the Youth Park River, the small community of dragonfly larvae was dominated by tolerant *Pseudagrion rubriceps*, *P. microcephalum*, *Orthetrum chrysis* and *Crocothemis servilia*. Based on the larval instar distribution of *Ictinogomphus decoratus* and *O. chrysis*, very asynchronous populations of these dragonflies occurred in each river. Young larvae were continuously introduced into the populations resulting in undulating growth rate curves. The growth rates of these two species were higher in the Titi Teras River when compared to those in other rivers. Density-dependent mortality, asynchronous cannibalism and fish predation could play important roles in regulating the larval dragonfly population in these rivers." (Authors)] Address: Che Salmah, M.R., School of Biological Sciences, Universiti Sains Malaysia, Penang, Malaysia

**5882.** Chelmick, D. (2006): Some observations of *Macromia splendens* (Pictet) in Andalusia, Spain (Anisoptera: Macromiidae). *Notulae Odontologicae* 6(7): 69-72. (in English). ["The occurrence of *M. splendens* in southern Spain is discussed; it appears to be well established on the Guadiaro river system in Andalusia. Adult, exuviae and larval observations are included. Its status on other southern Spanish river systems remains uncertain and more research work is required." (Author)] Address: Chelmick, D., 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, United Kingdom. E-mail: dgc@davidchelmick.com

**5883.** Commission of Zoological Nomenclature (2006): OPINION 2148 (Case 3294). *Bulletin of Zoological Nomenclature* 63(2): 136-137. (in English). ["The Commission has ruled that the usage of the names *Gynacantha Rambur*, 1842 and *Triacanthagyna Selys*, 1883 for two genera of aeshnid dragonflies is conserved by the designation of *Gynacantha nervosa Rambur*, 1842 as the type species of *Gynacantha*." (Authors)] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**5884.** Conze, K.-J. (2006): Libellenkartierung in der Stadt Essen. *Elektronische Aufsätze der Biologischen Station Westliches Ruhrgebiet* 6.12: 1-3. (in German). [Brief introduction into current activities in mapping the odonate fauna of the town of Essen, Nordrhein-Westfalen, Germany. The paper includes a brief commented checklist of the Odonata hitherto recorded.] Address: Conze, K.-J., Listerstr. 13, D-45147 Essen, Germany. E-mail: Klaus-Juergen.Conze@t-online.de

**5885.** Córdoba-Aguilar, A. (2006): Sperm ejection as a possible cryptic female choice mechanism in Odonata (Insecta). *Physiological Entomology* 31(2): 146-153. (in

English). ["The few odonate studies of sperm use suggest that females spend apparently more sperm than appears necessary during oviposition (sometimes females may have their sperm stores reduced to 50% after a single oviposition episode). Furthermore, some studies document that females eject sperm during and after copulation. This raises the question of whether sperm reduction may be interpreted as a cryptic female choice mechanism. Using two zygopterans, *Ischnura denticollis* Burmeister and *Enallagma praevarum* Hagen, and one anisopteran, *Pantala flavescens* Fabricius, it is shown that females mate more than once, show a marked reduction in stored sperm, and that this is by ejection of sperm before to oviposition. The extent of sperm reduction is inversely related to the number of eggs laid. When mated to the same male, females show similar reductions in sperm stores and egg load and only rarely does the vaginal duct contain sperm. This suggests that marked sperm reduction is common in this insect order and is not explained by an excess of sperm obstructing the egg passage. It is suggested that female's sperm shortage is better explained as a cryptic female choice mechanism aimed at favouring the sperm of some males. This study provides exciting research avenues for future studies of female choice in an animal taxa whose sexual biology is otherwise regarded as controlled by males." (Author)] Address: Córdoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**5886.** Costa, J.M.; De Souza, L.O.; Muzon, J. (2006): Descriptions of three new species of Odonata from Brazil. *Zootaxa* 1314: 53-68. (in English). ["Three new species are described here: *Oxyagrion zielmae* sp. nov. (Coenagrionidae) from one male collected at Costa Rica, Mato Grosso do Sul state; *Lestes fernandoi* sp. nov. (Lestidae) from a pair from Imperatriz, Maranhão state and *Perithemis capixaba* sp. nov. (Libellulidae) from one male from Mutum Preto, Espírito Santo state, all deposited at Museu Nacional, Rio de Janeiro, Brazil. *Oxyagrion zielmae* is similar to *O. pavidum* Selys, 1876 but differs by having cerci and paraprocts the same size, pterostigma long and narrow and terminal segment of genital ligula with the two lobes larger than in *O. pavidum*. *Lestes fernandoi* is compared with *L. auritus* Hagen in Selys, 1862; *L. bipupillatus* Calvert, 1909; *L. dichrostigma* Calvert, 1909; *Lestes falcifer* Sjöstedt, 1918; *L. forficula* Rambur, 1842; *L. minutus* Selys, 1862 and *L. paulistus* Calvert, 1909. The new species is most similar to *Lestes falcifer* and *L. paulistus*, but differ by the peculiar color of pterothorax, caudal appendages and genital ligula. *Perithemis capixaba* is similar to *P. mooma* Kirby, 1889 but differs by having the first segment of vesica spermalis slowly rounded, in *P. mooma* this structure is trapezoidal. Illustrated keys to new species are included." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@acd.ufrj.br

**5887.** Coupry, Y.; Nepoux, V. (2006): *Tauriphila australis* (Hagen, 1867), nouvelle espèce pour la Guyane. *Martinia* 22(3): 108. (in French). [French Guyana; 11-VIII-2002] Address: Coupry, Y., allée des Glycines, F-70170 Port sur Saône Allée des Marcassins, F-60360 Lamorlaye, France

**5888.** Couteyen, S. (2006): Effets de l'introduction de la truite arc-en-ciel (*Oncorhynchus mykiss* Walbaum, 1792) sur les populations larvaires de deux espèces de Zygoptères de l'Île de la Réunion. *Martinia* 22(2): 55-63. (in French, with English summary). ["The effect of predation by rainbow trout on the larval populations of *Coenagrion reuiniensis* (Fraser, 1957) and *Enallagma glaucum* (Burmeister, 1839) has been studied. Faced with the predator, the two species react differently: a local extinction of *C. reuiniensis* has been observed as the larval density has shifted from over 4 larvae per square metre to 0, while no significant impact of the predator on the *E. glaucum* has been recorded. The fact that 7 larvae of *C. reuiniensis* were discovered in the analysis of 30 trout stomachs' contents whereas no larva of *E. glaucum* was found, confirms the greater susceptibility of *C. reuiniensis* to the predation. These two types of response can be explained by the different larval ways of life. The larvae of *C. reuiniensis*, an endemic species, are epibenthic and usually colonise vegetationless habitats. On the contrary, the larvae of *E. glaucum*, which can also be found in Africa, hide in underwater grass-banks. This makes them difficult to reach for a predator moving in free water." (Author)] Address: Couteyen, S., 188 chemin Nid Joli, F-97430 Le Tampon, La Réunion, France. E-mail: couteyensf@vanadoo.fr

**5889.** Danks, H.V. (2006): Key themes in the study of seasonal adaptations in insects II. Life-cycle patterns. *Applied Entomology and Zoology* 41(1): 1-13. (in English). ["Recent work on selected topics of particular interest for understanding insect life-cycles is reviewed, including habitat patterns, kinds of variation, the spreading of risk and prolonged diapause, trade-offs and developmental plasticity, circannual rhythms, the concept of life cycles as developmental choices, and development or delay as the default response. Seasonal adaptations have a wider range of components than has often been appreciated. Variation in life-cycle traits, including the duration of development and the timing of emergence, can be wide, narrow, or discontinuous. Trade-offs encompass multiple simultaneous traits and are not always structured as might be expected. Diapause, cold hardiness, reproductive pattern, and other traits have evolved many times independently. Such complex interactions can be understood only by examining the detailed features of a species' habitat, because how developmental decisions are made and whether continuous development or delays are programmed reflect the predictability of habitats and the environmental signals they supply. Ecological context is important, not just mechanisms of adaptation. Therefore, although most previous studies have paid more attention to insect response than to habitat, interpreting the seasonal relevance of life-cycle patterns requires measurement and analysis for individual species of habitat characteristics and their variation, on a range of temporal and spatial scales, in much more detail than has been customary." (Author) Reference is given to *Aeshna viridis*.] Address: Danks, H.V., Group of Insect Physiology and Molecular Biology, Research Institute for Bioresources, Okayama University; Kurashiki, 710-0046, Japan

**5890.** De Knijf, G.; Anselin, A.; Goffart, P.; Tailly, M. (2006): *De Libellen van België. Verspreiding. Evolutie. Habitats.* Libellenwerkgroep Gomphus. ISBN 90-403-0249-9: 369 pp. (in Dutch, with English and German summaries). [Long years of intensive work finally resul-

ted in this impressive compilation of the knowledge on the Belgian Odonata. On approximately 150 pages, the distribution of the 69 Belgian species is documented in detail and mapped in different time scales. In a monographic style and condensed on two pages, the range of each species, the present distribution, and range extensions or range contractions are discussed extensively. Information on habitat and the phenology are added. Plenty of additional information like a history of Belgian odonatology, habitats and their characteristic Odonata, Red Lists, monitoring schemes, and an outlook on future developments of the regional odonata fauna, and many many impressive pictures and graphs which helps to interpret the data are included into this book. Vernacular names, a bibliography and very extensive summaries in English (Adrian Parr) and German (Martin Schorr) are added. This review is a brief one, but it refers to a very big book on a regional odonate fauna, and a significant contribution to the knowledge of the European Odonata. The book is recommended to everyone interested in European Odonata. Congratulations!! (Martin Schorr) Address: www.gomphus.be

**5891.** Deubel, T.; Wanke, S.; Weber, C.; Wedekind, F. (2006): Modelling and manufacturing of a dragonfly wing as basis for bionic research. design 2006 - 9th International Design Conference, Dubrovnik / Kroatien, 15.-18.05.2006. "Design Society", DS 36: Proceedings of the Design 2006 (D. Marjanovic, ed.), S. Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb 2006: 215-220. (in English). ["In nature we find many examples for highly optimised principles and solutions. The wing of the dragonfly is such a structure. The wing is very light and at the same time very stiff and has impressive aerodynamic properties. In order to understand how nature could achieve such opposed properties it was necessary to build an enlarged model to carry out further research into the aerodynamics of the single wing on the one hand and into the effects of the interferences between the four wings on the other hand in a wind tunnel. The enlarged model of the dragonfly wing was derived from cross cut sections of an actual dragonfly wing using the CAD/CAM/NC solution CATIA V5 and a NC-milling machine. In the future the findings may be useful to develop light aircraft which have a high fuel efficiency and great manoeuvrability." (Authors)] Address: Wanke, S., Saarland University, Institute of Engineering Design/CAD, Building A 4.2, POB 15 1150, D-66041 Saarbrücken, Germany. E-mail: wanke@cad.uni-saarland.de

**5892.** Dijkstra, K.-D. (2006): African Diplacodes: the status of the small species and the genus *Philonomon* (Odonata: Libellulidae). *International Journal of Odonatology* 9(2): 119-132. (in English). ["The small African species of *Diplacodes* have been confused for a long time, in part because the black mature males are difficult to separate. The holotype of *D. deminuta* belongs to the species commonly known as *D. okavangoensis*, the former name taking priority, while its paratypes belong to that known erroneously as *D. deminuta*, which is described as the new species *D. pumila*. *Philonomon* is considered a junior synonym of *Diplacodes* and the sole species, *P. luminans*, is transferred accordingly. Species identification relative to sex and developmental state is clarified: some specimens, either very old or young, will be difficult to separate without reference material." (Author)] Address: Dijkstra, K.D., Gortestraat 11,



NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**5893.** Dijkstra, K.-D.; Lewington, R. (2006): Field guide to the dragonflies of Britain and Europe. British Wildlife Publishing. ISBN-0-953-1399-4-8 (paperback): 320 pp. (in English). [This guide to the European and north African dragonflies, drawing on the knowledge of experts from throughout Europe, brings together much of the latest thinking on identifying the region's 160 species of dragonflies. Illustrated by Richard Lewington with his superb artwork, as well as more than 100 photographs, this guide is intended to enable dragonfly-watchers to identify any species they might encounter. The book has been designed to allow rapid comparison of similar species, and in most cases the artwork and text for each species are placed together. There is a general introduction, including a full glossary of terms and simple keys and tables to families and genera. A full checklist is also included at the end of the guide. In addition to the identification material there is a country-by-country section, written by regional experts. The text on each country provides a summary of the main geographical features relating to dragonfly habitats, followed by a more detailed 'tour' of some of the best places to see dragonflies. Such section is necessarily full of omissions and personal tastes, and if one would use the information, it would often not be sufficiently precise to find the relevant localities. Appendix 1 contains a discussion platform on taxonomic problems. This is a highly welcomed contribution to the debate, but it may prove less useful for a general reader of the book. On the other hand some problems are "solved" "en passant" such as *Aeshna serrata* - *A. ossiliensis* and *Coenagrion mercuriale* - *C. castellani* without discussion among the European odonatologists or any publication on this subject known to me. Appendix 2 relates to "vernacular names" - the English ones. What about the vernacular names in, say, Polish? No odonatologist in Europe is using other names than the Latin ones, otherwise it definitely would be impossible to talk about the same species. For someone outside Britain it is also difficult to understand why 'Britain' is treated separately from Europe (A Field guide to the Dragonflies of Britain and Europe), while on the other hand a large part of Europe, Russia till the Ural mountains is missing. Likewise, the north African countries and Turkey (in most parts) belong to the continents of Africa or Asia. Dear publisher: welcome in Europe! However including the species of Turkey - what of course is welcome, as for the African ones! - would have made it necessary also to include *Pseudagrion syriacum* (Selys, 1887) and *Ischnura intermedia* Dumont 1974. When I used this book and tried to identify a dragonfly from the Canary island from some brilliant photographs, I ended up with female of *Diplacodes lefebvrei* - which does not occur on the Canaries. An expert in the Canary odonate fauna by contrast, identified the specimen as a female of *Trithemis arteriosa* (which regrettably is not pictured laterally in the book). So it was not always possible to make a correct identification. Trying to read the labels of the illustrations, and even some of the text made me hope that the publisher will prepare a larger-sized edition to be used on the desk top. Yes, I think this book isn't perfect. But it is great! Nowhere you will find as much information on identification European, north African, and Turkish Odonata as in this book, including many species most of us never have seen pictured anywhere. The detailed descriptions of the species and the brilliant

colour pictures will enable you to determine most of the species without any problems. This book is indispensable for everyone interested in the European odonate fauna. Thanks KD and co-workers, Thanks Richard Lewington, Thanks dear publisher! (Martin Schorr)] Address: British wildlife Publishing, The Old Dairy, Milton on Stour, Gillingham, Dorset, SP8 5PX, UK

**5894.** Dijkstra, K.-D.; Suhling, F.; Müller, O. (2006): Review of the genus *Zygonoides*, with description of the larvae and notes on 'zygonychine' Libellulidae (Odonata). *Tijdschrift voor Entomologie* 149: 275-292. (in English). ["*Zygonoides* Fraser, 1957 – formerly considered a subgenus of *Olpogastra* Karsch, 1895 – is reinstated as a genus. It comprises *Z. fuelleborni* (Grünberg, 1902), *Z. fraseri* (Pinhey, 1956), *Z. lachesis* (Ris, 1912) and *Z. occidentis* (Ris, 1912). The latter was formerly considered a subspecies or form of *Z. fuelleborni*, but is found to be a good species near *Z. fraseri*. The larvae of *Z. fuelleborni*, *Z. fraseri* and *Z. occidentis* are described. Adult and larval characters are compared with those of the other 'zygonychine' genera *Celebothemis*, *Olpogastra*, *Onychothemis*, *Zygonychidium* and *Zygonyx*. Identification, distribution and ecology of the species are outlined." (Authors)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**5895.** Dijkstra, K.-D. (2006): The *Atoconeura* problem revisited: taxonomy, phylogeny and bio-geography of a dragonfly genus in the highlands of Africa (Odonata, Libellulidae). *Tijdschrift voor Entomologie* 149: 121-144. (in English). ["The genus *Atoconeura* previously comprised two species; one with five subspecies. Principal Component Analysis of 33 characters of 148 specimens and cladistic analysis of 28 characters revealed six discrete taxa, partly with narrowly overlapping ranges. Subspecies *aethiopica*, *kenya* and *pseudeudoxia* of *biordinata* are raised to specific rank; the synonymy of *chirinda* with *biordinata* is confirmed; *A. luxata* sp. n. is described from West Africa. A key to the species is provided and the poorly known behaviour, ecology and biogeography are discussed. The author has not witnessed oviposition; one report suggests that it may be perched, solitary and epiphytic, which is unusual within the family. The species are largely restricted to streams above 1000 m, except *A. luxata* sp. n. that is only known below that altitude, but always at the foot of highlands. Four species demonstrate a distribution pattern recalling a 'ring species' in highlands, circling Lake Victoria and the dry north of Tanzania. The phylogeny suggests an expansion of the genus from the western lowlands to the eastern highlands, or vice versa, followed by an expansion through the Albertine Rift and Eastern Arc Mts to the Kenyan and ultimately Ethiopian highlands. Especially in the case of a western origin there appears to have been a tendency of the species to occur at increasing altitudes in the course of their evolution." (Author)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**5896.** Dijkstra, K.-D.B. (2006): Taxonomy and biogeography of *Porpax*, a dragonfly genus centred in the Congo Basin (Odonata, Libellulidae). *Tijdschrift voor Entomologie* 149: 71-88. (in English). ["The tropical African genus *Porpax* is revised, five species are recognised, including the new species *P. sentipes* from Congo-Kinshasa. All species are fully diagnosed for both sexes

and new records are included. A key to the species and illustrations of important characters are provided. The peculiarities of the genus are discussed, but little is known of its ecology. *P. garambensis* and *P. sentipes* sp. n. are confined to the Congo Basin, while *P. asperipes* is also present in the adjacent Lower Guinean forest. *P. risi* is spread out across highlands in south-central Africa. *P. bipunctus* is known from four disjunct rainforest regions from Liberia to eastern Congo and has different markings in each region. This distribution coincides with Africa's main rainforest refugia and is the best example of such disjunction seen in Afrotropical Odonata so far. The species' isolation appears to be linked to an ephemeral habitat, confining it to areas with perennial and predictable rainfall." (Author)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: [Dijkstra@naturalis.nnm.nl](mailto:Dijkstra@naturalis.nnm.nl)

**5897.** Dijkstra K.-D.; Clausnitzer, V.; Vick, G.S. (2006): Revision of the three-striped species of *Phyllogomphus* (Odonata, Gomphidae). *Tijdschrift voor Entomologie* 149: 1-14. (in English). ["The taxonomy of the *Phyllogomphus* species occurring from Cameroon eastwards, characterised by three-striped sides of the thorax, has been confused by misinterpretation of the identity of the most widespread species, *P. selysi*, and substantial variation in the species. Of sixteen named taxa, only four are considered valid species after clarifying the identity of *P. selysi*, matching females to the correct males, and accounting for variation, particularly of size, colour and the morphology of the vulvar scale: *P. annulus* is not a synonym of the true *P. selysi* but of Fraser's interpretation of the latter species; *P. dundomajoricus* and *P. dundominusculus* are junior synonyms of *P. annulus*; *P. montanus*, *P. hartwigi*, *P. perisi* and *P. margaritae* of *P. coloratus*; *P. orientalis*, *P. edentatus*, *P. latifasciae*, *P. symoensi*, *P. brunneus* and *P. corbetiae* of *P. selysi*. Keys to the species and distribution maps are provided, and the taxonomy of the genus is discussed." (Authors)] Address: Dijkstra, K.D., Gortestr. 11, NL-2311 MS Leiden, The Netherlands. E-mail: [Dijkstra@naturalis.nnm.nl](mailto:Dijkstra@naturalis.nnm.nl)

**5898.** Donath, H. (2006): Blaüfögel-Prachtlibelle (*Caenopygia virgo* L.) besiedelt die Schüge. *Biologische Studien*, Luckau 35: 82-86. (in German). [The regional situation of *C. virgo* is outlined in some detail. Management of local running waters resulted in the colonisation by *C. virgo* of a few stretches along the river Schüge, Brandenburg, Germany. The factors enabling this recolonisation of the stream are discussed: primarily an alteration of the vegetation by shading.] Address: Donath, H., Caule Nr. 1, D-15926 Zieckau, Germany

**5899.** Donath, H. (2006): Die Südliche Heidelibelle (*Sympetrum meridionale* (SELYS 1841)): Erstnachweis für das Land Brandenburg. *Biologische Studien*, Luckau: 86-87. (in German). [Records of *S. meridionale* from five localities in Brandenburg, Germany from August and September 2006 are documented. These are the first records for this Federal State.] Address: Donath, H., Caule Nr. 1, D-15926 Zieckau, Germany

**5900.** Dyatlova, E.S. (2006): *Orthetrum coerulescens anceps* (Odonata, Libellulidae) in Odessa and its vicinities (Ukraine). *Vestnik zoologii* 40(3): 275-278. (in Ukrainian, with English summary). ["The absence of *O. c. coerulescens* (Fabricius, 1798) and the presence of *O. c. anceps* (Schneider, 1845) in Odessa and its vicini-

ties are shown. Some morphological characteristics of males are discussed." (Author)] Address: Dyatlova, E.S., Frantsuzkij bul'var 37, kv. 3, UKR-65044 Odessa, Ukraine

**5901.** Ellenrieder, N. von; Muzón, J. (2006): The genus *Andinagrion*, with description of *A. garrisoni* sp. nov. and its larva from Argentina (Odonata: Coenagrionidae). *International Journal of Odonatology* 9(2): 205-223. (in English). ["This study includes the description of a new species of the genus *Andinagrion*, *A. garrisoni* (holotype: Argentina, Río Caldera, Salta prov., 11 xi 2005, deposited at MLP), both from its adult and larval stages, a diagnosis of all known species, including a key to adults, synonymic lists, illustrations of diagnostic characters, and distribution maps." (Authors)] Address: Ellenrieder, Natalie von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: [odonata@hotmail.com](mailto:odonata@hotmail.com)

**5902.** Esquivel, C. (2006): *Libélulas de Mesoamérica y el Caribe - Dragonflies and damselflies of Middle America and the Caribbean*. ISBN 9968-927-13-9: 319 pp. (in Bilingual in Spanish and English). ["With an estimated total of over 500 species, Middle America and the Caribbean is one of the richest dragonfly regions in the world. However, there is very little information about them available to the general reader. For the first time ever, this book presents easy-to-read descriptions of the morphology, habitat, behaviour, larvae, and geographical distribution of all the 16 families occurring here, plus accounts on the natural history of more than 75 of their commonest species illustrated with color-photos, some of them pictured for the first time. Also included is a user-friendly Illustrated Key to all the families of this region and up-to-date, per country lists of all the species. Given the wide geographical distribution of the species treated here, both scientists and amateurs working with odonates in North and South America will also find valuable, novel information in this book." (Publisher)] Address: INBio, Santo Domingo, Heredia, Costa Rica. [www.inbio.ac.cr](http://www.inbio.ac.cr)

**5903.** Evenhuis, N.L.; Polhemus, D.A. (2006): Checklist of Odonata of Fiji. *Bishop Museum Technical Report* 35(15): 3 pp. (in English). [45 species resp. 46 taxa are listed.] Address: Polhemus, D., Dept. of Entomology, MRC 105, Smithsonian Institution, Washington, D.C. 20560, USA. Email: [bugman@bpbm.org](mailto:bugman@bpbm.org)

**5904.** Feng, H.-Q.; Wu, K.-M.; Ni, Y.-X.; Cheng, D.-F.; Guo, Y.-Y. (2006): Nocturnal migration of dragonflies over the Bohai Sea in northern China. *Ecological Entomology* 31(5): 511-520. (in English). ["A sudden increase and subsequent sharp decrease of catches of dragonflies in a searchlight trap, with *Pantala flavescens* predominating, observed at Beihuang Island in the centre of the Bohai Gulf, in 2003 and 2004, indicated a seasonal migration of these insects over the sea during the night in China. The movements were associated with the onset of fog. 2. Simultaneous radar observations indicated that the nocturnally migrating dragonflies generally flew at altitudes of up to 1000 m above sea level, with high density concentrations at about 200-300 or 500 m; these concentrations were coincident with the temperature inversion. 3. During early summer, the dragonflies oriented in a downwind direction, so that the displacement direction varied between different altitudes. In contrast, during late summer, the dragonflies

were able to compensate for wind drift, even headwind drift, so as to orient south-westward no matter how the wind changed, and thus the displacement direction was towards the south-west. 4. The duration of flight, estimated from the variation of area density derived from radar data and hourly catches in the searchlight trap through the night, was about 9–10 h. The displacement speed detected using radar was  $\sim 5\text{--}11\text{ m s}^{-1}$ . Therefore, the dragonflies might migrate 150–400 km in a single flight. 5. The dragonflies were thought to originate in Jiangsu province and they migrated into north-east China to exploit the temporary environment of paddy fields in early summer. Their offspring probably migrated back south during late summer and autumn." (Authors)] Address: Wu, Kong-Ming, State Key Laboratory for Biology of Plant Diseases and Insect Pests, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, Beijing 100094, PR China. E-mail: wkm@caascope.net.cn

**5905.** Fichet, V. (2006): Compte-rendu de l'excursion du 14 mai dans l'Avesnois "à la découverte d'*Epitheca bimaculata*". *Gomphus* 20(2): 39-40. (in French). [A large population of *E. bimaculata* is reported from an expedition to northern France.] Address: Fichet, Violaine, bservatoire de la Faune, de la Flore et des Habitats, Centre de Recherche de la Nature, des Forêts et du Bois, Avenue Maréchal Juin, 23, B-5030 Gembloux, Belgium. E-mail: V.fichet@mrw.wallonie.be

**5906.** Fichet, V. (2006): Compte-rendu des observations d'espèces prioritaires d'Odonates en Wallonie durant les saisons 2003, 2004 et 2005, dans le cadre du programme d'Inventaire et Surveillance de la Biodiversité (ISB). *Gomphus* 20(2): 13-28. (in French, with English and Dutch summaries). ["This report give an account of the observations made in 2003, 2004 and 2005 by the Gomphus Working Group collaborators about Odonata priority species, pointed out in the "Biodiversity Survey and Monitoring" program in Wallonie because of their great rarity and/or decline. It also present collected informations dealing with southern species. New populations were discovered for the following species: *Lestes virens*, *Sympetma fusca*, *Coenagrion hastulatum*, *C. mercuriale*, *C. pulchellum*, *Ceragrion tenellum*, *Aeshna subarctica*, *Brachytron pratense*, *Gomphus vulgatissimus*, *Somatochlora arctica*, *Libellula fulva*, *Orthemtrum coerulescens*, *Sympetrum pedemontanum*, and *Leucorrhinia pectoralis*. Moreover, new data on scarce southern species have been collected: *Lestes barbarus*, *Coenagrion scitulum*, *Aeshna affinis*, *Anax parthenope*, *Orthemtrum brunneum*, *Crocothemis erythraea*, and *Sympetrum fonscolombii*." (Author)] Address: Fichet, Violaine, bservatoire de la Faune, de la Flore et des Habitats, Centre de Recherche de la Nature, des Forêts et du Bois, Avenue Maréchal Juin, 23, B-5030 Gembloux, Belgium. E-mail: V.fichet@mrw.wallonie.be

**5907.** Finch, J.M.; Samways, M.J.; Hill, T.R.; Piper, S.E.; Taylor, S. (2006): Application of predictive distribution modelling to invertebrates: Odonata in South Africa. *Biodiversity and Conservation* 15(13): 4239-4251. (in English). ["The application of distributional modelling techniques to invertebrates has seldom been explored, primarily due to a lack in adequate distributional data for these taxa. Here, we have selected a simple modelling approach for the generation of distribution maps from a limited dataset, as a first step to the atlas-ing of Odonata in South Africa. The BIOCLIM-type ap-

proach was selected for this purpose, as it requires minimal data for model building and validation procedures. BIOCLIM partitions an area climatically prior to survey, and predicts species distributions on a bioclimatic basis. Conservative deterministic models were developed using point presence/absence data for each of the regions' 160 described species. These models were validated by cross-validation, and the Jaccard coefficient of similarity was used as an index of model performance. A sensitivity analysis investigated the influence of extreme values and errors in the data on predictive ability. Models identified disjunct distribution patterns and accurately predicted the restricted ranges of habitat-specialist species. However, models overstated the distribution of habitat generalists and species with distinct outlier records. For accurate predictions of broad-ranging species, it is suggested that a probabilistic approach be adopted. Nevertheless, basic distribution patterns generated through this conservative approach can be further applied to the investigation of species richness and issues relating to conservation, such as reserve design. The BIOCLIM-type approach provided a means of predicting species distributions, allowing for broad-scale atlassing and thereby providing the first step towards Odonata conservation in South Africa." (Authors)] Address: Finch, Jemma M., Discipline of Geography, University of KwaZulu-Natal, Scottsville, Pietermaritzburg, Private Bag X01, 3209, South Africa. Email: finch@sai.co.za

**5908.** Fishar, M.R.; Williams, W.P. (2006): A feasibility study to monitor the macroinvertebrate diversity of the River Nile using three sampling methods. *Hydrobiologia* 556: 137-147. (in English). ["The River Nile (Africa) is one of the world's major rivers. Its' catchment in Egypt has a population of 75,000,000. River flow is highly regulated and there are known discharges of pollutants. 1035 km of the river downstream of the Aswan high dam was studied to test the hypothesis that representative qualitative samples can be used to estimate macroinvertebrate biodiversity. Benthic macroinvertebrates are difficult to sample in large rivers and a reliable sampling strategy is required to evaluate their ecological status. Three methods for sampling have been investigated. Ekman Grab, macrophyte sweep netting and Artificial Substrate Samplers (ASS) were used to sample 15 sites from Aswan to Cairo between September 2001 and June 2002. Organisms were identified to species level where possible. Taxon accretion curves indicated that the all taxa present at a site should be collected using either 15 grab samples, 10 macrophyte samples or 5 ASS. The best time to sample was May–June. The biodiversity of macroinvertebrates in the Nile was recorded as 50 taxa with values of 7–31 at individual bank-side sites. Mid-stream biodiversity was much lower (0–19). Lowest biodiversity occurred at sites with known pollution inputs whilst highest occurred at sites with high levels of sedimentation. A regular programme for biomonitoring is recommended which will allow current status to be confirmed and future changes detected." (Authors) The mentioning in table 5 of *Neurocordulia* sp., *Amphiagrion* sp., *Plathemis* sp., *Perithemis* sp., and *Celithemis* sp. indicates that from an odonological point of view this study is not very useful.] Address: Williams, P., Department of Life Sciences, King's College, University of London, Franklin Wilkins Building, 150 Stamford Street, SE1 9NN, UK. E-mail: peter.williams@kcl.ac.uk



**5909.** Fleck, G.; Brenk, M.; Misof, B. (2006): DNA Taxonomy and the identification of immature insect stages: the true larva of *Tauriphila argo* (Hagen 1869) (Odonata: Anisoptera: Libellulidae). *Ann. soc. entomol. Fr.* (n.s.) 42(1): 91-98. (in English, with French summary). ["For many insect taxa, larval morphology plays a decisive role in various fields like taxonomy, phylogeny or ecology. However, species identification is usually based on imaginal characters and the identification of larvae depends upon an established link to unequivocally identified imagines. This taxonomic correspondence of larvae and imagines is far from being established in many odonate species. We have employed a molecular approach to link larval and adult specimens in *Tauriphila argo* (Hagen, 1869). The sequenced mt SSU gene fragments of the reared female, supposedly a *T. argo* female, and a clearly identified male specimen of the species were identical. However, the larva of the reared female clearly differed from the described *T. argo* larva, previously matched to the species. From this observation, we conclude that the previously described larva of *T. argo* does not belong to this species because of too many phenotypic differences that far exceed the generally observed intraspecific variation. It can be foreseen that the molecular approach will prove to be effective in identifying unknown larvae in many insect species. Additionally, the discrimination of sibling species or the linkage of allotypes and holotypes will become feasible with this approach." (Authors)] Address: Fleck, G., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleck@mnhn.fr

**5910.** Flenner, I.; Olne, K. (2006): Differences in exocuticle thickness in *Leucorrhinia dubia* (Odonata) larvae from habitats with and without fish. Halmstad University, School of Business and Engineering, Degree project in Biology 10p, Supervisor: Göran Sahlén, 2006-05-31: 14 pp. (in English). ["Many prey species are able to develop different morphological structures as defence against for example predators. Some of these structures are induced only by individuals exposed to a predator. This phenomenon is called phenotypic plasticity. In this paper we examine whether cuticle thickness in *L. dubia* larvae differed between specimens caught in fish containing lakes and fish-free lakes respectively. We measured the thickness of the cuticle from four different parts of the larvae; profemur, pronotum, ninth segment sternite and ninth segment tergite. Our results showed a significantly thicker exocuticle on profemur in larvae with a head width bigger than 4.5 mm caught in lakes with fish. The smaller larvae showed a tendency to have thinner exocuticle on profemur in presence of fish. We discuss the probability that the differences in exocuticle thickness on profemur could be some kind of trade-off situation. The results also showed a tendency among the large larvae; the large individuals from lakes containing fish had a slightly thicker exocuticle on pronotum than the bigger individuals from fish-free lakes." (Authors) For the full paper see: <http://dSPACE.hh.se/dspace/bitstream/2082/422/1/C-uppsatspdf.pdf>] Address: not stated

**5911.** Fliedner, H. (2006): Die wissenschaftlichen Namen der Libellen in Burmeisters 'Handbuch der Entomologie'. *Virgo - Mitteilungsblatt des Entomologischen Vereins Mecklenburg e.V.* 9: 5-23. (in German). ["This paper gives some information on the odonatological activities of Hermann Burmeister (1807-1897) and his sources and explains the meaning of the actual scienti-

fic names of the dragonflies, which are described in his 'Handbuch der Entomologie, Vol. II'. " (Author) An English version of the paper is available from the author.] Address: Fliedner, H., Louis-Seegelken Str., D-28717 Bremen, Germany. E-mail: H.Fliedner@t-online.de

**5912.** Frank, M. (2006): Erstfund der Feuerlibelle (*Crocothemis erythraea*) in Mecklenburg-Vorpommern (Odonata, Libellulidae). *Virgo, Mitteilungsblatt des entomologischen Vereins Mecklenburg* 9(1): 69-70. (in German). [Schönberg, Mecklenburg-Vorpommern, Germany; the northern most German record of *C. erythraea* dated 31-VII - 03-VIII 2006 is discussed.] Address: Frank, M., Lion-Feuchtwanger-Str. 25, 55129 Mainz, Germany. E-mail: mikel.frank@gmx.de

**5913.** Garrison, R.W. (2006): A synopsis of the genera *Mnesarete* Cowley, *Bryoplathanon* gen. nov., and *Ormenophlebia* gen. nov. (Odonata: Calopterygidae). *Contributions to Science, Natural History Museum of Los Angeles County* 506: 1-84. (in English, with Spanish summary). ["This synopsis of the exclusively South American genus *Mnesarete* includes keys to both sexes based primarily on morphology of the caudal appendage in males and the posterior margin of the prothorax and intersternite in females, diagnoses, distribution maps, and diagnostic illustrations. Two new genera, *Bryoplatbanon* (type species: *Lais globifer* Hagen in Selys) and *Ormenophlebia* (type species: *Lais imperatrix* McLachlan) are described. The following nomenclatural changes are proposed: *M. regina* (Ris), *M. rollinati* (Martin), and *M. saltuum* (Ris) are transferred to *Ormenophlebia*; and *Hetaerina borchgravi* Selys and *H. fuscibasis* Calvert are transferred to *Mnesarete*. Seven new species (*M. drepane*, *M. ebbippium*, *M. lencionii*, *M. loutoni*, *M. machadoi*, *M. rhopalon*, and *M. williamsoni*) are described. A generic key to all New World Calopterygidae and a discussion of the generic concepts of *Hetaerina* and the 24 species of *Mnesarete* are presented, and descriptions for the last larval stadium of *M. grisea* and *O. imperatrix* are provided." (Author)] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**5914.** Garrison, R.W.; Ellenrieder, N. von; Louton, J.A. (2006): Dragonfly genera of the New World. An illustrated and annotated key to the Anisoptera. The John Hopkins University Press, Baltimore: vii + 368pp. (in English). [Until now there has been no reliable means to identify the New World genera of Odonata. Now, this volume provides fully illustrated and up-to-date keys for all anisopteran genera with descriptive text for each genus, accompanied by more than 1,600 diagnostic illustrations, including wing patterns and characteristics of the genitalia, and 124 distribution maps, and covering all genera of Anisoptera occurring in North, Middle, and South America. A brief introduction into morphology of Anisoptera with excellent drawings of all morphologically relevant structures necessary to use this book, is followed by a key to the anisopteran families. Following this, each family is briefly characterized by distribution areal, number of known genera and species, and diagnostic characters. The status of family classification is compiled, indicating the current status of the discussion on its phylogenetic position. On the genus basis males and females are keyed separately. Then, each genus is briefly introduced by all information necessary

for nomenclature and taxonomic work, and listing all known species. This is followed by key references, and the distribution of the genus, including a map. The genus is described in detail using morphological structures which are illustrated. This is followed by identifying the "unique characters" of the genus. The current status on phylogenetic classification is outlined, also the potential for new species. The genus section is closed by condensed information on the habitat of the species. The volume ends with an extensive bibliography, a list of the 1626 figures with locality information, and a table with distribution information on genera by country. Dragonfly Genera of the New World is a beautifully illustrated and comprehensive guide to the taxonomy and ecology of dragonflies in North, Central, and South America. A reference of the highest quality, this book reveals their striking beauty and complexity. It is a real monumental work on odonate taxonomy and identification, and indispensable for every one working with the Odonata of the Americas. A great book. Congratulation to the authors!!! (Martin Schorr) Address: The John Hopkins University Press, 2715 North Charles Street, Baltimore, Maryland 21218-4363, USA. [www.press.jhu.edu](http://www.press.jhu.edu)

**5915.** Garrison, R.W.; Ellenrieder, N. von (2006): Generic diagnoses within a closely related group of genera: *Brechmorhoga*, *Gynothemis*, *Macrothemis*, and *Scapania* (Odonata: Libellulidae). *Canadian Entomologist* 138(3): 269-284. (in English, with French and Spanish summaries). ["Based on examination of most species of *Brechmorhoga*, *Gynothemis*, *Macrothemis*, and *Scapania*, these four genera are re-diagnosed, resulting in the following taxonomic changes: *Brechmorhoga archboldi* (Donnelly, 1970) comb. nov., *Gynothemis pumila* (Karsch, 1890) comb. nov., *Macrothemis heteronycha* (Calvert, 1909) comb. nov., and *Macrothemis calliste* (Ris, 1913) comb. nov. The male of *M. calliste* is described and illustrated for the first time." (Authors)] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail [rgarrison@cdfa.ca.gov](mailto:rgarrison@cdfa.ca.gov)

**5916.** Gassmann, D. (2006): Artenvielfalt philippinischer Libellen. *Naturwissenschaftliche Rundschau* 59 (11): 617-618. (in German). [Brief account on the biogeography of the Philippinean (odonate) fauna, endemism, and threat of odonate biodiversity.] Address: Gassmann, D., Institute of Evolutionary and Ecological Sciences, Leiden University, c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: [gassmann@naturalis.nnm.nl](mailto:gassmann@naturalis.nnm.nl)

**5917.** Ghose, K.; Horiuchi, T.K.; Krishnaprasad, P.S.; Moss, C.F. (2006): Echolocating bats use a nearly time-optimal strategy to intercept prey. *PLoS Biology* 4(5) (e108): 865-873. (in English). ["Acquisition of food in many animal species depends on the pursuit and capture of moving prey. Among modern humans, the pursuit and interception of moving targets plays a central role in a variety of sports, such as tennis, football, Frisbee, and baseball. Studies of target pursuit in animals, ranging from dragonflies to fish and dogs to humans, have suggested that they all use a constant bearing (CB) strategy to pursue prey or other moving targets. CB is best known as the interception strategy employed by baseball outfielders to catch ballistic fly balls. CB is a time-optimal solution to catch targets moving along a straight line, or in a predictable fashion—such as a ballistic baseball, or a piece of food sinking in

water. Many animals, however, have to capture prey that may make evasive and unpredictable maneuvers. Is CB an optimum solution to pursuing erratically moving targets? Do animals faced with such erratic prey also use CB? In this paper, we address these questions by studying prey capture in an insectivorous echolocating bat. Echolocating bats rely on sonar to pursue and capture flying insects. The bat's prey may emerge from foliage for a brief time, fly in erratic three-dimensional paths before returning to cover. Bats typically take less than one second to detect, localize and capture such insects. We used high speed stereo infra-red videography to study the three dimensional flight paths of the big brown bat, *Eptesicus fuscus*, as it chased erratically moving insects in a dark laboratory flight room. We quantified the bat's complex pursuit trajectories using a simple delay differential equation. Our analysis of the pursuit trajectories suggests that bats use a constant absolute target direction strategy during pursuit. We show mathematically that, unlike CB, this approach minimizes the time it takes for a pursuer to intercept an unpredictably moving target. Interestingly, the bat's behavior is similar to the interception strategy implemented in some guided missiles. We suggest that the time-optimal strategy adopted by the bat is in response to the evolutionary pressures of having to capture erratic and fast moving insects." (Authors) The paper is available at: <http://biology.plosjournals.org/archive/1545-7885/4/5/pdf/10.1371journal.pbio.0040108-S.pdf> Address: Ghose, K., Neuroscience and Cognitive Science Program, University of Maryland, College Park, Maryland, USA. E-mail: [kaushik.ghose@gmail.com](mailto:kaushik.ghose@gmail.com)

**5918.** Giere, S.; Hadrys, H. (2006): Polymorphic microsatellite loci to study population dynamics in a dragonfly, the libellulid *Trithemis arteriosa* (Burmeister, 1839). *Molecular Ecology Notes* 6(3): 933-935. (in English). ["One of the most widely distributed dragonfly species in Africa is the red-veined-drooping *Trithemis arteriosa*. It is an indicator for permanent water bodies, which are freshwater ecosystems of high environmental value especially in arid regions. For studies to determine population structures, assess species viability and monitor environmental changes, a panel of 10 polymorphic microsatellite loci was developed. The number of alleles per locus ranged from four to 12, with an observed heterozygosity ranging from 0.149 to 0.843." (Authors)] Address: Hadrys, Heike, ITZ, Ecology and Evolution, TiHo Hannover, Bünteweg 17d, D-30559, Hannover, Germany. E-mail: [heike.hadrys@ecolevol.de](mailto:heike.hadrys@ecolevol.de)

**5919.** Glotzhober, R.C. (2006): Life history studies of *Cordulegaster erronea* Hagen (Odonata: Cordulegasteridae) in the laboratory and the field. *Bulletin of American Odonatology* 10(1): 1-18. (in English). ["The life history of *C. erronea* was studied for ten years utilizing field observations of adults and both field and laboratory studies of larvae. The documented adult flight period in Ohio is from 1 June to 3 September. Adult patrolling and larval habitat utilized consists of persistent but very narrow and shallow headwater streams, fed by seeps or springs in densely forested areas. Stream areas utilized have no fish and almost no other Odonata. The only aquatic predators observed were salamander larvae and an occasional very small crayfish. Adult males patrol regular beats during the heat of mid-day, flying low over the streamlets. Multiple males patrol the same streamlets. Adult females are uncommonly seen on the

streams. Oviposition was observed between 18 June and 2 August and females made up to 370 oviposition thrusts in a single event. The author was able to establish criteria to recognize larval instars between F0 and F4 with a 92% confidence level. The larval period appears to be typically three to four years long. Some discussion and tentative hypothesis are made concerning egg development, but there is a need for direct study of the timing of hatching." (Author)] Address: Glotzhober, R., Ohio Natural history society, 1982 Velma Ave., Columbus OH 43211-2497, USA. E-mail: bglotzhober@ohiohistory.org

**5920.** Goffart, P.; Paternoster, T. (2006): Redécouverte du Leste verdoyant (*Lestes virens*) en Wallonie. *Gomphus* 20(2): 29-38. (in French, with English and Dutch summaries). ["A small population of *Lestes virens* has been found in the Hainaut county, Belgium during the summer 2005 (July to September), after more than 50 years without certified record of the species in Wallonia. It is established on three oligotrophic and acid pools on a sandy substrate lying within the forest massif to the north of the Haine valley (often called "Campine hennuyère"). Counts' tentatives gave a maximum of 14 males and 7 females, namely 21 individuals, on the 31th of August. All the females were grasped by male in tandem position and where egg-laying in *Juncus effusus* twig tips. One recently emerged male has been observed on the 11th of July. This population might have been present since a long time and been overlooked despite former prospects. Though less probable a priori, it could also result of a recent colonisation event, from populations living in neighbouring regions. The closest known, in Flanders and France, lie however at a distance of one hundred kilometres from the Hainaut site, but other populations could have been overlooked in a shorter radius." (Authors)] Address: Goffart, P., Observatoire de la Faune, de la Flore et des Habitats, Centre de Recherche de la Nature, des Forêts et du Bois, Avenue Maréchal Juin, 23, 5030 Gembloux, Belgium. E-mail: p.goffart@mrw.wallonie.be

**5921.** Grebe, B.; Hofland, R.; Rodenkirchen, J. (2006): Neue Nachweise von *Coenagrion scitulum* in Nordrhein-Westfalen (Odonata: Coenagrionidae). *Libellula* 25(1/2): 19-26. (in German, with English summary). ["More than 40 years after the first record in 1961, *C. scitulum* has been rediscovered in North Rhine-Westphalia, Germany. New records are reported from the Nonnenbach valley in the northern Eifel in 2002, and from the Neffelbach valley near Zülpich where the species was observed several times in 2005. The new localities are in the southern part of the country, at a distance of approximately 35 km between them. Unlike historical observations in Germany, which all comprised only one individual at a time, several males and ovipositing tandems were observed. Current records of *C. scitulum* from Belgium, Luxembourg and The Netherlands indicate that the sp. is expanding northwards in western Europe. Hence, an increased occurrence of *C. scitulum* in Germany and its permanent settlement in suitable habitats seems to be in prospect." (Authors)] Address: Grebe, B., Oberdorfallée 7a, D-53909 Zülpich, Germany. E-mail: burkhard.grebe@t-online.de

**5922.** Günther, A. (2006): Reproductive behaviour of *Neurobasis kaupi* (Odonata: Calopterygidae). *International Journal of Odonatology* 9(2): 151-164. (in English). ["The reproductive behaviour of *Neurobasis kaupi* was

studied for the first time in Central and South Sulawesi. The species was recorded in a wide variety of clear and fast flowing creeks, streams and rivers, mostly in forested areas. The males were territorial and defended potential oviposition sites, a limited resource. Territory owners demonstrated their presence by brief synchronized flashings of their hindwings as well as by regular inspection flights. Intruders were first driven off by short chasing flights. Longer lasting conflicts led to three different types of threatening flights, depending on the number of males involved and the level of excitation. As in other Calopterygidae males of *N. kaupi* led receptive females to potential oviposition sites. In courtship flight the male presented the upper sides of his stationary, depressed, quivering hindwings, with the hind margins broadly touching the water surface. Oviposition substrates were mostly submerged floating root mats or plants, optimally floating loosely at a depth of 5-15 cm below the water surface. The general patterns of behaviour of *N. kaupi* correspond to the known behaviour of other *Neurobasis* species. However, within this general framework there are clear differences between this species and others, especially *N. chinensis*." (Author)] Address: Günther, A., TU Bergakademie Freiberg, AG Biologie/Ökologie, Leipziger Str. 29, 09599 Freiberg, Germany. E-mail: andre.guenther@ioez.tu-freiberg.de

**5923.** Günther, A.; Olias, M.; (2006): Rote Liste Libellen Sachsens. Sächsisches Landesamt für Umwelt und Geologie (Ed.) Materialien zu Naturschutz und Landschaftspflege: 22 pp. (in German). [Sachsen, Germany; red list of Odonata.] Address: Herausgeber: Sächsisches Landesamt für Umwelt und Geologie, Zur Wetterwarte 11, 01109 Dresden, Germany. E-Mail: Abteilung4@lflug.smul.sachsen.de

**5924.** Gupta, N.; Anthwal, A.; Bahuguna, A. (2006): Biodiversity of Mothronwala Swamp, Doon Valley, Biodiversity of Mothronwala Swamp, Doon Valley, Uttarakhand. *The Journal of American Science*, 2(3): 33-40. (in English). [India; "Enallagma" and "Agrion" are listed.] Address: Gupta, N., Ecology and Environment Division, Forest Research Institute, Dehradun, Uttarakhand, 248006, India. E-mail: nutangupta100@rediffmail.com

**5925.** Hacet, N.; Aktaş, N. (2006): The Odonata of Gökçeada Island, Turkey: a biogeographical assessment. *Entomological news* 117(4): 357-368. (in English). ["This study was conducted in the years 1998, 1999 and 2003, and it is the first one on the Odonata fauna found in Gökçeada Island (northern Aegean Sea, Turkey). During the study period, 29 taxa were collected, or observed, and identified. One of the species observed on Gökçeada Island, *Lindenia tetraphylla*, is also found on the mainland of Turkey (Anatolian Peninsula, but only in five areas, Köyceğiz, Marmaris, Adıyaman, Sanlıurfa and N of Hatay). As far as Aegean islands are concerned *L. tetraphylla* is found only in Island Thasos. *Onychogomphus forcipatus albotibialis* and *Pantala flavescens*, whose distribution range in the Aegean Islands is unclear, are other zoogeographically noteworthy records. Biogeographical data is congruent with island biogeography theory (Mac Arthur and Wilson, 2001)." (Authors)] Address: Aktaş, N., Trakya University, Faculty of Arts and Sciences, Department of Biology, Tr-22030 Edirne, Turkey. E-mails: nhacet@hotmail.com; nihata@trakya.edu.tr



- 5926.** Hämäläinen, M.; Sasamoto, A.; Karube, H. (2006): Description of *Devadatta cyanocephala* sp. nov. from Vietnam (Zygoptera: Amphipterygidae). Tombo 48: 1-6. (in English). ["A new amphipterygid damselfly species, *Devadatta cyanocephala* sp. nov. (holotype male from Vietnam, Thua Thien Hue Province, Bach Ma), is described and illustrated in both sexes and compared with other In-dochinese taxa in the genus." (Authors)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi
- 5927.** Hall, M. (2006): Dragonflies. Capstone Press. Mankato. ISBN 0-7368-4252-7: 24 pp. (in English). [Book for children resp. first reading.]
- 5928.** Hansch, W.; Mailänder, S.; Riexinger, W.D.; Rosendahl, W.; Simon, T. (2006): Frankenbacher Schotter. Die Kiesgrube Ingelfinger als Geotop und Biotope - ein geplantes Naturschutzgebiet bei Heilbronn. ISBN-10: 3-00-019821-0: 46 pp. (in German). [The dragonflies are treated on pages 32 / 33; ten species are noted.] Address: Riexinger, S., Stadt Heilbronn, PF 3440, D-74024 Heilbronn, Germany. E-mail: Wolf-Dieter.Riexinger@stadt-heilbronn.de
- 5929.** Hayashi, M.; Fujiwara, J.; Shimada, T.; Yoneda, Y.; Muguruma, K.; Narita, Y. (2006): A list of insects collected from Dogo, Oki Islands, Shimane Prefecture, Japan, with notes on new records of Coleoptera and the Other Orders from the Island. Bull. Hoshizaki Green Found. 9: 245-263. (in Japanese, with English summary). [A survey from the first decade of August 2005 resulted in 305 insect species including *Paracercion calamorum*, *P. sieboldii*, and *Anotogaster sieboldii*.] Address: Hayashi, M., Hoshizaki Green Foundation, Okinoshima, 1659-5, Sono, Izumo, Shimane Pref., 691-0076, Japan
- 5930.** Hayashi, M. (2006): Aquatic Insects of Syakunouchi Park, Un'nan City, Shimane Prefecture, Japan. Bull. Hoshizaki Green Found. 9: 113-119. (in Japanese, with English summary). [42 species of aquatic insects were recorded from seven sites including 10 odonate species] Address: Hayashi, M., Hoshizaki Green Foundation, Okinoshima, 1659-5, Sono, Izumo, Shimane Pref., 691-0076, Japan
- 5931.** Heckman, C.W. (2006): Encyclopedia of South American Aquatic Insects: Odonata - Anisoptera. ISBN: 978-1-4020-4801-2 : VIII, 725 pp. ["Anisoptera, the first of two volumes on the Odonata in the series Encyclopedia of South American Aquatic Insects, encompasses the large dragonfly species. A brief review of the biology of the group includes illustrations of the main morphological features as well as explanations of alternative systems for naming the wing veins and other structures. The review is then followed by keys to facilitate identification of the adult dragonflies and the known larvae, allowing the user a high probability of identifying his specimens correctly. In addition to anatomical features, the keys include the known ranges of the species, synonyms, and citations of literature in which more information about each individual species can be obtained. These citations are compiled in an extensive bibliography. To provide the user with the best possible opportunity to distinguish the species, the keys are richly illustrated with pen and ink drawings of thousands of individual morphological structures, arranged in 797 figures." (Publisher)]
- 5932.** Herbrecht, F.; Dommange, J.-L. (2006): Sur le développement larvaire d'*Oxygastra curtisii* (Dale, 1834) dans les eaux stagnantes (Odonata, Anisoptera, Corduliidae). *Martinia* 22(2): 89-94. (in French, with English summary). [Compilation of old (literature) and new records with reproduction of *O. curtisii* in stagnant waterbodies.] Address: Dommange, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France
- 5933.** Hernandez, K.M.; Reece, B.A.; McIntyre, N.E. (2006): Effects of anthropogenic land use on Odonata in Playas of the southern high plains. *Western North American Naturalist* 66(3): 273-278. (in English). ["Playas are ephemeral wetlands that are the only source of aboveground freshwater in the southern Great Plains, making them of vital importance to aquatic and amphibious animals. Playas are also highly threatened from anthropogenic land use (chiefly agriculture, which decreases hydroperiod through increased sedimentation). We examined community structure of adult odonates (dragonflies and damselflies) in playas differing in the 2 main regional forms of surrounding land use (cropland vs. grassland). Analysis of odonate diversity revealed high overlap between cropland and grassland playas. Traditional species-area theory did not fit observed patterns, as there appears to be a threshold playa size that supports maximal odonate diversity; this nonlinear response may reflect a tradeoff between hydroperiod and availability of emergent vegetation that is required for perching and oviposition. Since agriculture effectively reduces playa depth but not size of the overall playa watershed, this may mean that cropland playas serve as "ecological traps." This property has important implications for regional odonate diversity." (Authors)] Address: McIntyre, Nancy, Dept of Biological Sciences, Purdue University, 915 W State St, West Lafayette, IN 4790, USA; E-mail nancymcintyre@ttuedu
- 5934.** Hoang, D.H.; Bae Y.J. (2006): Aquatic insect diversity in a tropical Vietnamese stream in comparison with that in a temperate Korean stream. *Limnology* 7: 45-55. (in English). ["A comparative investigation on aquatic insect diversity was conducted in a tropical stream in Southeast Asia (the Dak Pri stream in southern Vietnam; stream orders II-V, two sites per stream order) with a reference temperate stream in Northeast Asia (the Gapyeong stream in central Korea) in March 2001 and April 2000, respectively. The numbers of aquatic insect taxa in Dak Pri stream (268 species, mostly undescribed, 230 genera, 91 families, and 9 orders;  $110.5 \pm 17.1$  species per site) were about twice those in Gapyeong stream (133 species, 98 genera, 51 families, and 8 orders;  $60.3 \pm 8.5$  species per site). Coleoptera, Trichoptera, Ephemeroptera, and Diptera were the major aquatic insect orders with high taxonomic richness, and Coleoptera, Odonata, and Hemiptera contributed to the higher degree of aquatic insect diversity in Dak Pri stream. The species diversity indices of Dak Pri stream ( $4.37 \pm 0.19$ ) were higher than those of Gapyeong stream ( $3.73 \pm 0.42$ ), whereas the dominance indices of Dak Pri stream ( $0.195 \pm 0.046$ ) were lower than those of Gapyeong stream ( $0.346 \pm 0.113$ ). Collector-gatherers were predominant in both streams; shredders were more abundant in Dak Pri stream while scrapers were more abundant in Gapyeong stream. Factors affecting the higher degree of aquatic insect diversity in Dak Pri stream are discussed." (Authors) Odonata are identified on the genus level.] Address: Bae, Yeon Jae, Department of Biology, Seoul Women's University, 126

Gongneungdong, Nowon-gu, Seoul 139-774, Korea. E-mail: yjbae@swu.ac.kr

**5935.** Hölker, M.; Wagner, T. (2006): Nahrungsökologie der Wiesenweihe *Circus pygargus* in der ackerbaulich intensiv genutzten Feldlandschaft der Hellwegbörde, Nordrhein-Westfalen. *Vogelwelt* 127: 37-50. (in German, with English summary). [Germany, Nordrhein-Westfalen; A population of *C. pygargus* (Aves) was studied between 1993 and 2002. Only in 2000 a single "Aeshna spec." was among the prey observed.] Address: Hölker, M., Auf'm Alten Garten 17, D-595005 Bad Sassendorf, Germany. E-mail: manfredhoelker@freenet.de

**5936.** Hooper, I.R.; Vukusic, P.; Wootton, R.J. (2006): Detailed optical study of the transparent wing membranes of the dragonfly *Aeshna cyanea*. *Optics Express* 14(11): 4891-4897. (in English). ["The optical properties of transparent single membranes on the wings of *A. cyanea* have been investigated. These membranes comprise one central thick cuticular layer covered dorsally and ventrally with typical odonatan wax pruinosity. Optical characterisation of individual membranes reveals they can support optical guided modes comprising differential polarisation reflection. We suggest this may offer an intraspecific signalling channel. The guided modes' characteristics depend on membrane thickness and the nature of the wax pruinosity. We accurately modelled multiple optical data sets simultaneously, thereby inaugurally quantifying the roughness of the pruinosity and the complex refractive indices of the wax and the odonatan cuticle." (Authors)] Address: Hooper, I.R., School of Physics, University of Exeter, Exeter, EX4 4QL, UK. e-mail: i.r.hooper@exeter.ac.uk

**5937.** Hoshizaki Green Foundation (2006): Records on Invertebrate and Vertebrate of Reservoirs in Hirata Area, Izumo City, Shimane Prefecture, Japan. *Bull. Hoshizaki Green Found* 9: 1-12. (in Japanese, with English summary). [Between 2001 and 2003, 214 reservoirs in Hirata Area, Izumo City, Shimane Prefecture, Japan were surveyed. The list includes 35 odonate taxa, 5 of them are briefly commented: *Trigomphus melampus*, *Oligoaeschna pryleri*, *Aeschnophlebia longistigma*, *Aeshna nigroflava*, *Anaciaeschna martini*, and *Epitheca marginata*.] Address: Hoshizaki Green Foundation, Okinoshima, 1659-5, Sono, Izumo, Shimane Pref., 691-0076, Japan

**5938.** Hottenbacher, N.; Koch, K. (2006): Influence of egg size on egg and larval development of *Sympetrum striolatum* at different prey availability (Odonata: Libellulidae). *International Journal of Odonatology* 9(2): 165-174. (in English). ["Egg size differences might have an important influence on reproductive success because they may lead to different offspring conditions, hatching date or larval size. We presumed that egg size in odonates positively correlates with egg development time, and larger eggs lead to larger larvae. However, we assumed that the size benefit could only be maintained under harsh, but not under good conditions. Harsh and good conditions were simulated by different diets with specific feeding intervals; high prey level fed every day, low prey level fed every second day. The prey organisms used were *Artemia salina* and *Chironomus riparius*. The study was conducted with the libellulid *Sympetrum striolatum*. Our results showed that larger eggs caused a longer development time. Larger eggs resul-

ted in significantly larger first instar larvae. However, larger larvae maintained their size benefit only in the high prey level with *C. riparius*. We found no significant differences between low prey and high prey level within the two prey types. We therefore assume that the differences between the two prey levels in this study were not large enough. In general, *A. salina* seems to be more nutritious than *C. riparius* for the first larval stadia." (Authors)] Address: Hottenbacher, N., Zoologisches Institut, Technische Universität Braunschweig, Spielmannstraße 8, 38102 Braunschweig, Germany. E-mail: n.hottenbacher@tu-bs.de

**5939.** Hovmöller, R. (2006): Molecular phylogenetics and taxonomic issues in dragonfly systematics (Insecta: Odonata). Doctoral thesis. Stockholm University, Department of Zoology. ISBN: 91-7155-282-0: VI, 59 pp. (in English, with Swedish summary). ["Dragonflies (Odonata) are one of the ancestral groups of extant insects. They represent one of the three most basal branches in the phylogeny of winged insects. The other two groups are the Ephemeroptera, mayflies, and Neoptera, the latter which covers the remaining winged insects. The first paper is about the phylogenetic position of Odonata in relation to the other basal insect clades using 18S and 28S rDNA sequences. It was demonstrated that there are under certain parameters a strong statistical support for a sister-group relationship between Odonata and Neoptera forming the group Palaeoptera. The second paper is about the phylogeny of the Holarctic dragonfly *Leucorrhinia*. Dragonfly larvae are frequently equipped with spines on the abdomen, with great variation in spinyness between species. From an analysis of sequences of ITS and 5.8S rDNA it was found that spines have been lost at least twice in *Leucorrhinia*, in the European *L. rubicunda* and again in a clade of North American species. The third paper is on the subfamily Ischnurinae (Odonata: Coenagrionidae), a group dominated by the two larger genera *Ischnura* and *Enallagma* along with several mono- or oligotypic genera. From the presented molecular study, using mitochondrial 16S rDNA and COII sequences, it is demonstrated that Ischnurinae, and *Ischnura* are monophyletic. *Enallagma* is not monophyletic, and the genus name *Enallagma* should be restricted to the *E. cyathigerum* clade. The fourth paper is a catalogue of the genus *Coenagrion*, with full information on synonymy, type material and bibliographical data. The fifth paper is an appeal to the International Commission on Zoological Nomenclature to suppress the genus group name *Agrion*. The letter of appeal elucidates the priority of *Agrion*, and demonstrates why it has fallen out of use. A case if made for why *Agrion* should be placed on the list of unavailable names, and *Calopteryx* given full validity." (Author)] Address: Hovmöller, R., Dept of Entomology, Swedish Museum of Natural History and Dept of Zoology, Stockholm University, P.O. Box 500 07, 10405 Stockholm, Sweden

**5940.** Hunger, H.; Schiel, F.-J. (2006): Rote Liste der Libellen Baden-Württembergs und der Naturräume, Stand November 2005 (Odonata). *Libellula Suppl.* 7: 3-14. (in German, with English summary). ["The herewith presented Red List of the Odonata of Baden-Württemberg, Germany and its biogeographic regions is based on digital data analyses of about 80.700 data sets and the classification method of the German Federal Agency for Nature Conservation. Compared to the previous version of the Red List, the number of species

listed has declined considerably. The reasons for this have to be discussed carefully and can be contributed to three main factors: First, the classification method has become more objective and more concise; second, increased knowledge about some species leads to a more optimistic evaluation of their population vulnerability; and third, the improved water quality of rivers has simultaneously led to an improved habitat quality. Nevertheless, the Red List of Odonata of Baden-Württemberg still includes more than half of the species, with two species being extinct, 12 critically endangered and 11 endangered." (Authors)] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INU-LA), August-Ganther-Straße 16, D-79117 Freiburg, Germany. E-mail: holger.hunger@inula.de

**5941.** Hunger, H.; Schiel, F.-J.; Kunz, B. (2006): Verbreitung und Phänologie der Libellen Baden-Württembergs (Odonata). *Libellula Suppl.* 7: 15-188. (in German, with English summary). ["Distribution maps for all Odonata species currently or formerly known from the German federal state of Baden-Württemberg are presented in an ordinance map grid resolution of ca 6 x 6 km for the periods 1980-1995 and 1996-2005. The seasonal activity pattern of each species is shown as a diagram in 10-day-periods, with differentiation between observations of imagines, observations of reproductive activities, and records of exuviae or emergence. The vertical distribution is, likewise, differentiated between the described observation types, and shown in a diagram with 100-m-classes. The steps towards the Red List category assigned to each species are made transparent by tables. Short descriptions of preferred habitat, noteworthy observations in the five biogeographical regions, and the situation with special respect to the Red List status, vertical distribution, and phenology are given for each species." (Authors)] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INU-LA), August-Ganther-Straße 16, D-79117 Freiburg, Germany. E-mail: holger.hunger@inula.de

**5942.** Inberga-Petrovska, S.S. (2006): Sparu daudzveidiba. <http://www.biosfera.gov.lv/docgef/SabMR101-117-spares.pdf>: 16 pp. (in Latvian). [At <http://www.biosfera.gov.lv/indexEng.htm> (<http://www.biosfera.gov.lv/docgef/SabMR101-117-spares.pdf>) an identification key for the dragonflies of the North Vidzeme Biosphere Reserve, Latvia is available.]

**5943.** Jakubik, B.; Kufel, L.; Lewandowski, K. (2006): Macrobenthos differentiation among ox-box lakes of the river Bug within the Bug River Valley Landscape Park. *Teka Kom. Ochr. Kszt. Środ. Przyr.* 3: 55-59. (in English, with Polish summary). [With focus on Mollusca, the macrozoobenthos of six ox-bow lakes of varied hydrological regimes - ranging from lakes connected with the river to lakes isolated from the channel - was studied in the Bug River floodplain, NE Poland. Odonata are treated on the sub-order level.] Address: Jakubik, Beata, Inst. Biol., Univ. Podlasie, B. Prusa str. 12., PL-08-110 Siedlce, Poland. E-mail: bjakubik@ap.siedlce.pl

**5944.** Jara, F.G.; Perotti, M.G. (2006): Variación ontogenética en la palatabilidad de los renacuajos de *Bufo spinulosus papillosus* Philippi, 1902 (Anura, Bufonidae). *Cuadernos de Herpetología* 19(2): 37-42. (in Spanish, with English summary). ["We evaluated the ontogenetic variation in the palatability of *B. spinulosus papillosus* tadpoles exposed to odonate larvae of *Rhinoaeshna*

*variegata*. We exposed tadpoles to direct predation and determined the number of consumed tadpoles in 4 developmental categories. *B. spinulosus papillosus* tadpoles of categories I (stages 24-26) and II (stages 32-34) were unpalatable, while categories III (stages 38-40) and IV (stages 42-45) were progressively palatable. We observed a post-capture rejection behavior when they caught unpalatable tadpoles in categories I and II. The palatability pattern observed in *B. spinulosus papillosus* was different from related *Bufo* species (Brodie & Formanowicz, 1987; Kehr & Schnack, 1991; Lawler & Hero, 1997)." ] Address: Jara, F.G., Laboratorio de Fotobiología, CRUB-UNCOMA (CONICET), Quintral 1250, (8400) San Carlos de Bariloche, Río Negro, Argentina. E-mail: fjara@crub.uncoma.edu.ar

**5945.** Johansson, F.; Englund, G.; Brodin, T.; Gardfjell, H. (2006): Species abundance models and patterns in dragonfly communities: effects of fish predators. *Oikos* 114(1): 27-36. (in English). ["We investigated if dragonfly larvae community composition and species abundance curves are sensitive to variation in predation intensity, and whether the fit to a particular niche partitioning model could be used to make inferences about mechanisms structuring communities. The approach taken was to compare communities in lakes either having or lacking fish predation. Dragonfly species classified as active, strongly dominated the dragonfly communities in fishless lakes, and low active species dominated fishless lakes. As activity level is known to correlate with susceptibility to fish predation this indicates that these communities are structured by fish predation. Fitting relative abundance data to five niche partitioning models showed that the same model fitted data from both types of habitats (fish/no fish). This means that the observed differences in relative abundances were substitutive, i.e. the relative abundance of a rank stayed constant, even though the identity of the species having this rank changed. The best fit to data from both types of lakes was found for the random assortment model, which is usually interpreted as an indication that the community is not structured by within-guild interactions. This interpretation for fishless lakes did not seem to agree with other community measures (i.e. lowered diversity and evenness and no relationship between species richness and dragonfly biomass), which indicate that the community is structured by within-guild interactions. Moreover, a detail in the fitting procedure, the number of species included in the analysis, affected which model that fitted data best. Thus, we question if fitting niche partitioning models to data can provide mechanistic understanding of how resources are partitioned in natural communities." (Authors)] Address: Johansson, F., Department of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**5946.** Jourde, P.; Hussey, R. (2006): Première mention de *Trithemis annulata* (Palisot de Beauvois, 1805) en Charente-Maritime (Odonata, Anisoptera, Libellulidae). *Martinia* 22(2): 71-72. (in French, with English summary). [*T. annulata* has recently been mentioned from the Gironde Department, France. On 18.IX.2005, a single male was discovered along the estuary of the Gironde, in Charente-Maritime (Western France). This seems to be the present northernmost record for this expanding species.] Address: Jourde, P., LPO, La Cor-



derie Royale, BP 90263, F-17305 Rochefort, France. E-mail: philippe.jourde@lpo.fr

**5947.** Jourde, P.; Perret, B. (2006): *Sympetrum flaveolum* (L., 1758), nouvelle donnée pour le Poitou-Charentes et statut récent dans les plaines de l'Ouest de la France (Odonata, Anisoptera, Libellulidae). *Martinia* 22(3): 135-142. (in French, with English summary). ["Following sightings of this species in Charente-Maritime, a literature search was conducted to investigate its supposed presence across the low-lying regions of Western France. At present, distribution maps, published in many works for the identification of dragonflies, show a large distribution of *S. flaveolum* in France. It appears that the species is very rare in these areas, with the majority of observations being of vagrants. Consequently, species distribution maps should differentiate geographically those regions where the populations are known to breed regularly from those regions where the species is only occasional." (Authors)] Address: Jourde, P., LPO, La Corderie Royale, BP 90263, F-17305 Rochefort, France. E-mail: philippe.jourde@lpo.fr

**5948.** Juillerat, L.; Wildermuth, H. (2006): Landmilben als Libellenparasiten: Befall von *Orthetrum coerulescens* mit *Leptus* sp. (Odonata: Libellulidae; Parasitengona: Erythraeidae). *Libellula* 25(3/4): 171-184. (in German, with English and French summaries). ["During the 2001 flying season 110 mites of the genus *Leptus* were recorded on adults in five of six local populations of *O. coerulescens* in the Swiss Jura mountains. Of the host individuals 72.8 % were teneral, 24.3 % immature, and 2.9 % mature. On average 29 % of the tenerals bore mites, this proportion varying between 0 and 53 % within six local populations. The parasite load amounted to one to five mites per individual; it averaged 1.57 and did not differ significantly between sexes. Almost two thirds of the host individuals bore a single mite. Most parasites were attached to the host's legs. Infested hosts survived an average of 18.1 days from emergence and non-infested hosts 28.0 days. The observed infestation of *O. coerulescens* by terrestrial mites may reflect the superposition of the host's and parasite's preferred habitats, namely spring mires comprising mosaics of tiny seepages and streams intimately intermingled with extensively grazed fen vegetation." (Authors)] Address: Juillerat, J., Fahys 21, CH-2000 Neuchâtel, Schweiz. E-mail: juillerat.l@bluewin.ch

**5949.** Kalkman, V.; Lopau, W. (2006): Identification of *Pyrrhosoma elisabethae* with notes on its distribution and habitat (Odonata: Coenagrionidae). *International Journal of Odonatology* 9(2): 175-184. (in English). ["*Pyrrhosoma elisabethae* is one of the rarest and least known odonate taxa in Europe and is often considered to be a subspecies of *P. nymphula*. The taxon is known from eight localities, four on the Peloponnisos, Greece, three on Kérkira (Corfu), Greece, and one in southern Albania. We describe structural differences between *P. elisabethae* and *P. nymphula* in both males and females, and present a key that distinguishes these two taxa. These structural differences, combined with the lack of intermediates, suggests that *P. elisabethae* should be treated as a full species. Notes on habitat associations and flying season of *P. elisabethae* are also given." (Authors)] Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands. E-mail: Kalkman@naturalis.nnm.nlk

**5950.** Karle-Fendt, A. (2006): Erstnachweis von *Coenagrion scitulum* in Bayern (Odonata: Coenagrionidae). *Libellula* 25(3/4): 129-134. (in German, with English summary). ["In July 2006, *C. scitulum* was discovered for the first time in Bavaria, Germany. Two exuviae of the species were found in the Felmer Moos, Oberallgäu district, situated in the southwestern part of Bavaria near the border to Austria and Switzerland. These records as well as one in the Swiss-Austrian Rhine valley (2001) may indicate a recent expansion of the species to southern Germany. Possible migration routes are discussed." (Authors)] Address: Karle-Fendt, A., Hofener Straße 49, D-87527 Sonthofen, Germany

**5951.** Karube, H.; Ozono, A. (2006): Biogeography of Odonata in the Ryukyu Archipelago. *Insect and nature* 41(4): 23-29. (in Japanese, with English translation of the title). [The distribution of *Planaeschna* is mapped.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**5952.** Kasangaki, A.; Babaasa, D.; Efitre, J.; McNeillage, A.; Bitariho, R. (2006): Links between anthropogenic perturbations and benthic macroinvertebrate assemblages in Afromontane forest streams in Uganda. *Hydrobiologia* 563: 231-245. (in English). ["Relationships between environmental variables and benthic macroinvertebrate assemblages were investigated among several sites that varied in disturbance history in Bwindi Impenetrable National Park, an Afromontane site in East Africa. Environmental variables were correlated with the level of past catchment disturbance – logging, agricultural encroachment, and present tourism activity. For example, sites in medium and high disturbance categories had higher values of specific conductance and lower water transparency than low disturbance category sites, these environmental variables may therefore act indicators of ecological quality of rivers. Environmental variables such as conductivity and water transparency were found to be good predictors of benthic macroinvertebrate assemblages, with anthropogenically stressed sites having lower diversity than the reference sites. Impacted sites were dominated by tolerant taxa such as chironomid and leeches, while 'clean water' taxa such as Ephemeroptera, Plecoptera and Trichoptera dominated at minimally impacted sites. Comparison of sites with different disturbance histories provided evidence for differences in benthic macroinvertebrate communities that reflect the state of forest restoration and recovery. We recommend quarterly monitoring of water quality to act as an early warning system of deterioration and tracking ecological recovery of previously impacted sites." (Authors) Odonata are treated on the family level.] Address: Kasangaki, A., Institute of Tropical Forest Conservation, Mbarara University of Science & Technology, PO Box 44, Kabale, Uganda. E-mail: kasangaki@itfc.org

**5953.** Kawano, K.; Nakano, H.; Hayashi, M.; Yamachi, T. (2006): Aquatic Insects in the Ponds of Hirata Area (Izumo City) in Shimane Prefecture, Japan. *Bull. Hoshizaki Green Found.* 9: 13-37. (in Japanese, with English summary). [The aquatic insect fauna of irrigation ponds was surveyed in the Hirata Area of Izumo City, Shimane Prefecture, Japan between 2001 and 2003. A total of 218 ponds was sampled resulting in 108 species. The list of species includes 34 odonate species.] Address: The Firefly Museum of Toyota Town, Naka-

mura, 50-3 Toyota, Shimonoseki, Yamaguchi Pref., 750-0441, Japan

**5954.** Kéry, M.; Muñoz Lopez, S. (2006): Reconfirmation of *Gomphus graslinii*, Rambur, 1842, in Navarra and *Onychogomphus costae*, Sélys, 1885, in Aragón in 2006 (Odonata: Gomphidae). *Boletín Sociedad Entomologías Aragonesa* 39: 138. (in English, with Spanish summary). [Spain; *G. graslinii*: 13 VII 2006, Rio Salazar immediately at the upriver edge of the village of Lumbier, Navarra, at about 420 m a.s.l.. *O. costae*: 11 VII 2006, Rio Alcanadre at Ontiñena, Aragón.] Address: Kéry, M., Swiss Ornithological Institute, 6204 Sempach, Switzerland. E-mail: marc.kery@vogelwarte.ch

**5955.** Khodabandeh, S. (2006): Na<sup>+</sup>,K<sup>+</sup>-ATPase in the gut of larvae of the zygopteran, *Ischnura elegans*, and the Anisoptera, *Libellula lydia*, (Odonata): Activity and immunocytochemical localization. *Zoological Studies* 45(4): 510-516. (in English). ["Na<sup>+</sup>,K<sup>+</sup>-ATPase activity and immunolocalization were demonstrated in the gut of *Ischnura elegans* and *Libellula lydia* larvae. Localization was performed through immunofluorescence light microscopy using the IgGa5 mouse monoclonal antibody. The Na<sup>+</sup>,K<sup>+</sup>-ATPase activity was significantly higher in the hindgut than in the foregut-midgut in both species. In *I. elegans*, Na<sup>+</sup>,K<sup>+</sup>-ATPase activities were 29.44 and 5.12 iM Pi/mg/protein/h in the hindgut and foregut-midgut, while in *L. lydia*, the activities were 16.24 and 1.98 iM Pi/mg/protein/h in the hindgut and foregut-midgut, respectively. No specific fluorescence staining was observed in the cells of the foregut or midgut regions in either species. Na<sup>+</sup>,K<sup>+</sup>-ATPase was found in the malpighian tubules and rectal pad epithelium in *I. elegans*, and in the epithelium of the basal pads of the rectal gill lamellae in *L. lydia*. A consistently high immunoreactivity was observed in the sides of the lumen of malpighian tubule cells, and a positive and strong fluorescence signal was found in the basolateral sides of the pads of epithelium cells. These findings show that as in crustaceans, this antibody is useful for locating of Na<sup>+</sup>,K<sup>+</sup>-ATPase and ionocytes in insect osmoregulatory tissues. A high concentration of Na<sup>+</sup>,K<sup>+</sup>-ATPase activity in these tissues confirms their participation in osmoregulation through active ion exchange." (Author)] Address: Khodabandeh, Saber, Department of Marine Biology, Faculty of Marine Sciences, University of Tarbiat Modarres, Mazandaran, Noor, PO Box 46414-356, Iran. E-mail: surp78@yahoo.com

**5956.** Khrokalo, L. A.; Sheshurak, P. M. (2006): Flight seasonality of dragonflies (Insecta, Odonata) in northeastern Ukraine. *Vestnik Zoologii* 40(2): 145-154. (in English, with summary). [Data on seasonal flight periods of Odonata in Northeastern Ukraine (Kyiv, Chernigiv, Sumy, Chekasy and Kharkiv administrative regions) based on field observations and a review of material collected during 1992–2004 are provided. Field data by the authors (numbers of species occurring during the six seasons as adults) were compared with literature data. The study resulted in new resp. amended insights into the regional phenology of *Chalcolestes parvidens*, *Coenagrion armatum*, *Brachytron pratensis*, *Aeshna affinis*, *Anax imperator*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Cordulia aenea*, *Epitheca bimaculata*, *Sympetrum danae*, *Leucorrhinia rubicunda*, and *L. caudalis*. Flight seasonalities are depicted of 13 frequently occurring species. The regional total of 55 species can be grouped in six phenological groups.] Address: Khro-

kalo, Lyudmila, P.O. Box 23, Kyiv-118, Ukraine 03118. E-mail: lkrokalo@mail.ru

**5957.** Kipping, J. (2006): Globalisierung und Libellen: Verschleppung von exotischen Libellenarten nach Deutschland (Odonata: Coenagrionidae, Libellulidae). *Libellula* 25(1/2): 109-116. (in German, with English summary). ["Recent records from Germany of four exotic dragonfly species are provided. One individual of the Asian *Ceragrion cerinorubellum* (Brauer) was probably imported accidentally with aquatic plants to Leipzig, Saxony. Two species, including *Ischnura senegalensis* (Rambur), definitely reached Dessau, Saxony-Anhalt in the same way, whereas an adult *Pantala flavescens* (Fabricius) was brought into Saxony with bananas from Ecuador." (Authors)] Address: Kipping, J., BioCart – Ökologische Gutachten & Studien, Albrecht-Dürer-Weg 8, D-04425 Taucha, Germany. E-mail: BioCartKipping@web.de

**5958.** Kishida, O.; Nishimura, K. (2006): Flexible architecture of inducible morphological plasticity. *Journal of Animal Ecology* 75: 705-712. (in English). ["Predator-induced morphological defences are produced in response to an emergent predator regime. In natural systems, prey organisms usually experience temporal shifting of the composition of the predator assemblage and of the intensity of predation risk from each predator species. Although, a repetitive morphological change in response to a sequential shift of the predator regime such as alteration of the predator species or diminution of the predation risk may be adaptive, such flexible inducible morphological defences are not ubiquitous. We experimentally addressed whether a flexible inducible morphological defence is accomplished in response to serial changes in the predation regime, using a model prey species which adopt different defensive morphological phenotypes in response to different predator species. *Rana pirica* (Matsui) tadpoles increased body depth and tail depth against the predatory larval salamander *Hynobius retardatus* (Dunn); on the other hand, they only increased tail depth against the predatory larval dragonfly *Aeshna nigroflava* (Martin). *Rana pirica* tadpoles with the predator-specific phenotypes were subjected to removal or exchange of the predator species. After removal of the predator species, tadpoles with each predator-specific phenotype changed their phenotype to the nondefensive basic one, suggesting that both predator-specific phenotypes are costly to maintain. After an exchange of the predator species, tadpoles with each predator-specific phenotype reciprocally, flexibly shifted their phenotype to the now more suitable predator-specific one only by modifying their body part. The partial modification can effectively reduce time and energy expenditures involved in repetitive morphological changes, and therefore suggest that the costs of the flexible morphological changes are reduced." (Authors)] Address: Kishida, O., Graduate School of Fisheries Sciences, Hokkaido University, Hakodate 041-8611, Hokkaido, Japan. E-mail: kishida@fish.hokudai.ac.jp

**5959.** Kraft, P.G.; Franklin, C.E.; Blows, M.W. (2006): Predator-induced phenotypic plasticity in tadpoles: extension or innovation? *Journal of Evolutionary Biology* 19(2): 450-458. (in English). ["Phenotypic plasticity, the ability of a trait to change as a function of the environment, is central to many ideas in evolutionary biology. A special case of phenotypic plasticity observed in many

organisms is mediated by their natural predators. Here, we used a predator-prey system of dragonfly larvae and tadpoles to determine if predator-mediated phenotypic plasticity provides a novel way of surviving in the presence of predators (an innovation) or if it represents a simple extension of the way noninduced tadpoles survive predation. Tadpoles of *Limnodynastes peronii* were raised in the presence and absence of predation, which then entered a survival experiment. Induced morphological traits, primarily tail height and tail muscle height, were found to be under selection, indicating that predator-mediated phenotypic plasticity may be adaptive. Although predator-induced animals survived better, the multivariate linear selection gradients were similar between the two tadpole groups, suggesting that predator-mediated phenotypic plasticity is an extension of existing survival strategies. In addition, nonlinear selection gradients indicated a cost of predator-induced plasticity that may limit the ability of phenotypic plasticity to enhance survival in the presence of predators." (Authors)] Address: Kraft, P.G., School of Integrative Biology, University of Queensland, Brisbane, Australia. E-mail: pkraft@zoology.uq.edu.au

**5960.** Krauss, V.; Fassl, A.; Fiebig, P.; Patties, I.; Sass, H. (2006): The evolution of the histone methyltransferase gene *Su(var)3-9* in metazoans includes a fusion with and a re-fission from a functionally unrelated gene. *BMC Evolutionary Biology* 2006, 6:18: 15 pp. (in English). ["Background: In eukaryotes, histone H3 lysine 9 (H3K9) methylation is a common mechanism involved in gene silencing and the establishment of heterochromatin. The loci of the major heterochromatic H3K9 methyltransferase *Su(var)3-9* and the functionally unrelated  $\alpha$  subunit of the translation initiation factor eIF2 are fused in *Drosophila melanogaster*. Here we examined the phylogenetic distribution of this unusual gene fusion and the molecular evolution of the H3K9 HMTase *Su(var)3-9*. Results: We show that the gene fusion had taken place in the ancestral line of winged insects and silverfishes (Dicondylia) about 400 million years ago. We cloned *Su(var)3-9* genes from a collembolan and a spider where both genes ancestrally exist as independent transcription units. In contrast, we found a *Su(var)3-9*-specific exon inside the conserved intron position 81-1 of the eIF2 $\alpha$  gene structure in species of eight different insect orders. Intriguingly, in the pea aphid *Acyrtosiphon pisum*, we detected only sequence remains of this *Su(var)3-9* exon in the eIF2 $\alpha$  intron, along with an eIF2 $\alpha$ -independent *Su(var)3-9* gene. This reveals an evolutionary re-fission of both genes in aphids. *Su(var)3-9* chromo domains are similar to HP1 chromo domains, which points to a potential binding activity to methylated K9 of histone H3. SET domain comparisons suggest a weaker methyltransferase activity of *Su(var)3-9* in comparison to other H3K9 HMTases. Astonishingly, 11 of 19 previously described, deleterious amino acid substitutions found in *Drosophila Su(var)3-9* are seemingly compensable through accompanying substitutions during evolution. Conclusion: Examination of the *Su(var)3-9* evolution revealed strong evidence for the establishment of the *Su(var)3-9/eIF2 $\alpha$*  gene fusion in an ancestor of dicondylid insects and a re-fission of this fusion during the evolution of aphids. Our comparison of 65 selected chromo domains and 93 selected SET domains from *Su(var)3-9* and related proteins offers functional predictions concerning both domains in *Su(var)3-9* proteins." (Authors) The study includes *Enallagma cyathigerum*.] Address: Krauss, V.,

Dept of Genetics, Institute of Biology II, University of Leipzig, Johannisallee 21–23, 04103 Leipzig, Germany. Email: krauss@rz.uni-leipzig.de

**5961.** Kumar, R.; Hwang, J.-S. (2006): Larvicidal efficiency of aquatic predators: A perspective for mosquito biocontrol. *Zoological Studies* 45(4): 447-466. (in English). ["Biological control of mosquito larvae with predators and other biocontrol agents would be a more-effective and eco-friendly approach, avoiding the use of synthetic chemicals and concomitant damage to the environment. Manipulating or introducing an auto-reproducing predator into the ecosystem may provide sustained biological control of pest populations. The selection of a biological control agent should be based on its self-replicating capacity, preference for the target pest population in the presence of alternate natural prey, adaptability to the introduced environment, and overall interaction with indigenous organisms. In order to achieve an acceptable range of control, a sound knowledge of various attributes of interactions between a pest population and the predator to be introduced is desirable. Herein, we qualitatively review a wide range of literature sources discussing the ability of different aquatic predators to control mosquito larval populations in environments where mosquitoes naturally breed. Different predators of mosquito larvae include amphibian tadpoles, fish, dragonfly larvae, aquatic bugs, mites, malacostracans, anostracans, cyclopoid copepods, and helminths. The most widely used biocontrol agents of mosquito populations are the western mosquito fish, *Gambusia affinis*, and the eastern mosquito fish, *G. holbrooki*. The effect of these fishes on native faunal composition and their inability to survive in small containers, tree holes etc., which are ideal breeding sites of vectorially important mosquitoes, make them inefficient in controlling mosquito populations. On the basis of larvicidal efficiency, the ability to produce dormant eggs, the hatchability of dormant eggs after rehydration, faster developmental rates, and higher fecundity, various tadpole shrimp can be considered to mosquito ideal control agents in temporary water bodies and rice paddy fields. Among various predators of mosquito larvae, the cyclopoid copepods are efficient, found naturally, are safe for human beings, and are also economical in their application. The mosquito larval selectivity patterns of many cyclopoids, their adaptability to variable aquatic environments which are ideal breeding sites for mosquitoes, their resistance to starvation, and their day-night prey detection ability using hydromechanical signals make them an ideal biocontrol agent. Therefore, there is a need to test the feasibility of cyclopoid copepods by putting them into operational use as eco-compatible means of biocontrol." (Authors)] Address: Hwang, Jiang-Shiou, Institute of Marine Biology, National Taiwan Ocean University, 2 Pei-Ning Rd., Keelung, Taiwan 202, R.O.C.

**5962.** Kunz, B. (2006): Entwicklung von *Onychogomphus forcipatus unguiculatus* in einer Kiesgrube in der Provence (Odonata: Gomphidae). *Libellula* 25 (3/4): 147-150. (in German, with English and French summaries). ["On 15-V-2006 an emerging female and another exuvia were found in a gravel pit situated close to the left bank of river Durance, west of the airfield of Vinon-sur-Verdon in the Var district, southern France. This is the first record of successful development for this taxon in standing waters in France, and the second in Europe." (Author)] Address: Kunz, B., Hauptstr. 111, D-



74595 Langenburg, Germany. E-mail: libellen@berndkunj.de

**5963.** Kunz, B.; Seidenbusch, R. (2006): Erfolgreiche Larvalentwicklung bei *Sympetrum sinaiticum* trotz erheblicher Missbildung der Fangmaske (Odonata: Libellulidae). *Libellula* 25(1/2): 77-82. (in German, with English summary). ["During the analysis of a collection of final-stadium exuviae from Tunisia, a specimen of *S. sinaiticum* was detected with the left labial palp missing. Only a small part of the labial palp had begun to regenerate. Obviously the larva had been able successfully to feed, moult and emerge, in spite of this impairment." (Authors)] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: libellen@berndkunj.de

**5964.** Kunz, B.; Wildermuth, H. (2006): Prädation zwischen Libellen und Heuschrecken (Odonata; Saltatoria). *Libellula* 25 (3/4): 199-208. (in German, with English summary). ["Reciprocal predation of dragonflies and grasshoppers (Odonata, Saltatoria) — On 14-VI--1998 a nearly full-grown larva of *Tettigonia viridissima* was observed catching a flying male *Calopteryx splendens*, and on 12-VI-2005 a male *Ischnura elegans* was photographed devouring a young larva of *Phaneroptera falcata*. The hitherto available records of corresponding predation events available to us are compiled and the nutritional interrelation between Odonata and Saltatoria (Ensifera, Caelifera) is discussed." (Authors)] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: libellen@berndkunj.de

**5965.** Kunz, B.; Ober, S.V.; Jödicke, R. (2006): The distribution of *Zygonyx torridus* in the Palaearctic (Odonata: Libellulidae). *Libellula* 25(1/2): 89-108. (in English, with German summary). ["*Z. torridus* is an Oriental-Afrotropical species, whose range also covers the southern margin of the Palaearctic. All known records from the latter region are listed, mapped and discussed. Records from single localities covering a longer period of time are available for the Canary Islands, the Jordan Valley, and Spain. The known occurrence in northern Africa is restricted to Morocco and Tunisia. In southern Europe the species is rare, and several populations seem to have been lost recently. Records are known from Portugal, Spain and Italy. One visual observation originates from southwestern Turkey. A record from Iran indicates a bridge to the population on the Indian subcontinent. The species is new to the fauna of Italy, Tunisia and Turkey. (Authors)] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: libellen@berndkunj.de

**5966.** Lambrechts, J.; Guelinckx, R. (2006): De balans na het natuurherstel in Het Vinne te Zoutleeuw (Vlaams-Brabant): in één jaar van 7 naar 27 libellensoorten. *Gomphus* 20(2): 3-12. (in Dutch, with English and French summaries). ["The results after the restoration of the Vinne at Zouleeuw (province of Vlaams-Brabant) as a natural lake in Flanders: in 1 year from 7 to 27 of Odonata species. This contribution gives an overview of the dragonfly fauna (Odonata) of Het Vinne, a site in the extreme south eastern part of the province of Vlaams-Brabant (Belgium). Het Vinne was the only natural lake (> 100 hectares) in Flanders, but disappeared completely 150 years ago due to land reclamation. A nature restoration project has been undertaken by the Flemish land Agency (VLM) in 2004. As a result, the species poor plantations of poplar disappeared in fa-

vor of open water and reed marshes. The dragonfly survey undertaken in 2005 resulted in a list of 27 species for this site. The most interesting species are *Lestes dryas*, *Sympecma fusca* and *Orthetrum coerulescens*. Because of its relatively isolated location in the dry loamy region of Belgium many more species are unexpected. Worth mentioning are the big populations of *Ischnura pumilio* and *Libellula quad-rimaculata*. Also the following southern species were notified: *Lestes barbarus*, *Erythromma lindenii* and *Crocothemis erythraea*." (Authors)] Address: Lambrechts, J., Zuurbemde 9, B-3380 Glabbeek, Belgium. E-mail: Jorglambrechts@hotmail.com

**5967.** Lambrechts, J.; De Knijf, G. (2006): Libellen in het Nationaal Park Hoge Kempen. *Likona* jaarboek 2005 – n°15: 50-57. (in Dutch, with English summary). ["Since 1990, 50 dragonfly species (with populations of 45 species) or 83% of all recent Flemish species have been observed in the National Park Hoge Kempen. 14 from the 17 Red List species have been noted, and with populations of 9 species. Also all the 3 species belonging to the category 'rare' are present. We can conclude that this National Park is a real biodiversity hotspot for dragonflies in Flanders. Nearly all Red List species characteristic for oligotrophic and running waters (brooks and rivulets) are present in high numbers. Only the species typical for meso-eutrophic standing waters are lacking, due to the nearly complete absence of this habitat type in the Park. The Park is also of international importance due to the presence of *Leucorrhinia pectoralis*, a species mentioned in the Annexes II and IV of the Habitat Directive. Within the Park, the Vallei van de Zijpbeek is the most important site for dragonflies. Gravel pits can be of great importance for Odonata, also for Red List species, if they were reshaped after exploitation." (Authors)] Address: Lambrechts, J., Milieu-adviesbureau AEOLUS, Vroentestraat 2b, B-3290 Diest, Belgium. E-mail: natuur@aeolus-milieu.be

**5968.** Landwer, B.; Sites, R.W. (2006): Variability in larval characters states used to distinguish between species of *Pantala* Hagen (Odonata: Libellulidae). *Florida Entomologist* 89(3): 354-360. (in English). ["Despite widespread distributions and abundance, previously published diagnoses of the larvae of the two species of the dragonfly genus *Pantala* often were contradictory or confusing. Morphometric analysis of mensural characters and qualitative analysis of relative character states were used to determine the ability of previously published characterizations to accurately distinguish larvae of the two species. We found that many published characterizations were inaccurate or insufficient, and their use in making species level determinations would result in frequent misidentifications. In distinguishing between the two species, the most useful and reliable characteristic was the palpal setal count. However, in specimens where this count is intermediate, other characteristics may need to be evaluated." (Authors)] Address: Landwer, Brett, Enns Entomology Museum, Division of Plant Sciences, University of Missouri, Columbia, Missouri 65211, USA. E-mail: brett.landwer@mdc.mo.gov

**5969.** Latty, T.M. (2006): Flexible mate guarding tactics in the dragonfly *Sympetrum internum* (Odonata: Libellulidae). *Journal of Insect Behavior* 19(4): 469-477. (in English). ["Mate guarding—a behaviour prevalent in odonates—is a post copulatory association during which males prevent females from re-mating. Some species

use two forms of guarding: contact mate guarding, which is energetically costly but highly effective and non-contact mate guarding, which is less costly but less effective. This study aimed to determine if male *S. internum* adjust the duration of contact mate guarding according to environmental, temporal and physiological factors. There was a significant interaction between male density and season on duration of contact mate guarding. Early in the season males increased the duration of contact guarding as the density of rivals increased. Later in the season males guarded mates longer irrespective of male density. Wind and temperature did not detectably alter the duration of contact mate guarding, suggesting that the trade-off between current and future reproductive success was more important than were physiological costs." (Author)] Address: Latty, Tany, Department of Biological Sciences, University of Calgary, 2500 University drive, Calgary, Alberta, Canada T2N 1N4. E-mail: tmlatty@ucalgary.ca.

**5970.** Laurila, A.; Pakkasmaa, S.; Merilä, J. (2006): Population divergence in growth rate and antipredator defences in *Rana arvalis*. *Oecologia* 147(4): 585-595. (in English). ["Growth and development rates often differ among populations of the same species, yet the factors maintaining this differentiation are not well understood. We investigated the antipredator defences and their efficiency in two moor frog *Rana arvalis* populations differing in growth and development rates by raising tadpoles in outdoor containers in the nonlethal presence and absence of three different predators (newt, fish, dragonfly larva['*Aeshna*']), and by estimating tadpole survival in the presence of free-ranging predators in a laboratory experiment. Young tadpoles in both populations reduced activity in the presence of predators and increased hiding behaviour in the presence of newt and fish. Older tadpoles from the slow-growing Gotland population (G) had stronger hiding behaviour and lower activity in all treatments than tadpoles from the fast-growing Uppland population (U). However, both populations showed a plastic behavioural response in terms of reduced activity. The populations differed in induced morphological defences especially in response to fish. G tadpoles responded with relatively long and deep body, short tail and shallow tail muscle, whereas the responses in U tadpoles were often the opposite and closer to the responses induced by the other predators. U tadpoles metamorphosed earlier, but at a similar size to G tadpoles. There was no evidence that growth rate was affected by predator treatments, but tadpoles metamorphosed later and at larger size in the predator treatments. G tadpoles survived better in the presence of free-ranging predators than U tadpoles. These results suggest that in these two populations, low growth rate was linked with low activity and increased hiding, whereas high growth rate was linked with high activity and less hiding. The differences in behaviour may explain the difference in survival between the populations, but other mechanisms (i.e. differences in swimming speed) may also be involved. There appears to be considerable differentiation in antipredator responses between these two *R. arvalis* populations, as well as with respect to different predators." (Authors)] Address: Laurila, A., Population Biology/ Department of Ecology and Evolution, Evolutionary Biology Center, Uppsala University, Norbyvägen 18d, 75236 Uppsala, Sweden. Email: Anssi.Laurila@ebc.uu.se

**5971.** Lencioni, F.A.A. (2006): Damselflies of Brazil. 2 - Coenagrionidae families. ISBN 85-7718-034-4: 419 pp. (in English and Portuguese). ["This is the second volume of the guide to the species of Zygoptera of Brazil. This volume is organized as was the first volume, treating all 154 described species of Brazilian Coenagrionidae, and includes the following four appendices: 1. species of non-Coenagrionidae described since the publication of the 1st volume, 2. illustrations of 46 described larvae, 3. a description of the larva of *Mecistogaster asticta* Selys, 1860, including notes on its biology, 4. 43 colored images (photos and specimen scans) of Brazilian species. The book has 1570 illustrations of which 380 are original. Dr. R.W. Garrison, at my request, examined the male syntype of *Leptagrion? obsoletum* Selys, 1876, and determined this to be a senior synonym of *Helveciagrion chirihuanum* (Calvert, 1909). The status of *Leptagrion auriceps* St. Quentin, originally relegated to synonymy is re-examined and illustrated here." (Author)] Address: Lencioni, F.A.A., Rua dos Ferroviarios 55, Jardim Mesquita, BR-12300-000, Jacarei, S.P., Brazil. E-mail: odonata@iconet.com.br. Orders should be directed to the following e-mail address: odonata@zygoptera.bio.br

**5972.** Leroy, T. (2006): Évolution du peuplement d'Odonates adultes au cours d'une saison sur les rives d'un lac-tourbière d'Auvergne (France). *Martinia* 22(3): 109-118. (in French, with English summary). ["A survey of adult Odonata along the banks of a peaty lake, 1100 m a.s.l., in the Cézallier Plateau, Auvergne region, was performed from spring to autumn in 2000 and 2001. Although the specific richness in adult Dragonflies reached about 15 species during three months, from June to August, the density was high only from June to the beginning of July. *Enallagma cyathigerum* is by far the most abundant species and represents 50 to 75 % of the adult community present within the breeding locality. This prevalence is obvious from June to August so that the community appears poorly diversified and unbalanced, although the specific richness is high. The apparent population of September (autumn species) differed greatly from that of end May (spring species)." (Author)] Address: Leroy, T., Le Bourg, F-63210 Heume-l'Eglise, France. E-mail: thierry-leroy@caramail.com

**5973.** Levasseur, M. (2006): Le comportement d'immersion partielle brève et répétée en vol chez les Odonates. *Martinia* 22(3): 143-144. (in French, with English summary). ["The author comments on a few observations of male Anisoptera, touching three times the water surface in flight. This behaviour is briefly described and explanations are proposed (action not correlated to egg-laying)." (Author)] Address: Levasseur, M., 11 rue du Pont Colbert, F-78000 Versailles, France.

**5974.** Levasseur, M. (2006): Prospection odonatologique de quelques milieux intéressants de la Martinique. *Martinia* 22(2): 83-88. (in French, with English summary). ["On a journey allowing the visit of 3 wetland spots in Martinique, 15 species have been recorded. After a brief description of the sites, a synthetic table - listing the species, their behaviour and numbers - is presented. Remarks in relation with identification of some taxa and conservation of sites follow." (Author)] Address: Levasseur, M., 11 rue du Pont Colbert, F-78000 Versailles, France

- 5975.** Lieckweg, T.; Niedringhaus, R. (2006): Eine neue Sammlung westafrikanischer Odonaten des Überseemuseums Bremen. Jahrbuch des Überseemuseum Bremen 13: 67-88. (in German, with English summary). [In 2004, a collection of West African Odonata was handed over to the Überseemuseum at Bremen (Germany) to be permanently housed there. This collection of more than 2000 specimens of 131 species (60 Zygoptera, 71 Anisoptera) was acquired by U. Bröring and R. Niedringhaus between 1980 and 1983 at different localities in the West African countries of Ghana, Togo, Benin, Nigeria, and Cameroon. The present paper provides the identifications of all specimens and a brief description of the localities sampled." (Authors)] Address: Niedringhaus, R., Carl-von-Ossietzky-Universität Oldenburg, Fakultät 5, Institut für Biologie- und Umweltwissenschaften, Postfach 2503, 26111 Oldenburg, Germany; rolf.niedringhaus@uni-oldenburg.de
- 5976.** Loewen, N.; Peterson, R. (2006): Dancing dragonflies. Dragonflies in your backyard. Picture Window Books. Minneapolis. ISBN 1-4048-1142-7: 24 pp. (in English). [Introduction into dragonflies for kids.]
- 5977.** Lohr, M. (2006): Libellenbeobachtungen in Südpotugal (Odonata). Libellula 25(1/2): 117-118. (in German, with English summary). ["Due to not specifiable problems, figure 2a of this article, formerly published in Libellula 24 (2005), contained three erroneous givings. The correct presentation of this map with hitherto published records of Gomphus graslinii in Portugal is given." (Author)] Address: Lohr, M., FH Lippe und Höxter, Fachgebiet Tierökologie und Landschaftsökologie, An der Wilhelmshöhe 44, D-37671 Höxter, Germany. E-mail: mlohr@fh-luh.de
- 5978.** Longcore, J.R.; McAuley, D.G.; Pendelton, G.W.; Reid Bennatti, C.; Mingo, T.M.; Stromborg, K.L. (2006): Macroinvertebrate abundance, water chemistry, and wetland characteristics affect use of wetlands by avian species in Maine. Hydrobiologia 567: 143-167. (in English). ["Our objective was to determine use by avian species (e.g., piscivores, marsh birds, waterfowl, selected passerines) of 29 wetlands in areas with low (<200  $\mu\text{eq l}^{-1}$ ) acid-neutralizing capacity (ANC) in southeastern Maine. We documented bird, pair, and brood use during 1982-1984 and in 1982 we sampled 10 wetlands with a sweep net to collect invertebrates. We related mean numbers of invertebrates per wetland to water chemistry, basin characteristics, and avian use of different wetland types. Shallow, beaver (*Castor canadensis*)-created wetlands with the highest phosphorus levels and abundant and varied macrophyte assemblages supported greater densities of macroinvertebrates and numbers of duck broods (88.3% of all broods) in contrast to deep, glacial type wetlands with sparse vegetation and lower invertebrate densities that supported fewer broods (11.7%). Low pH may have affected some acid-intolerant invertebrate taxa (i.e., Ephemeroptera), but high mean numbers of Insecta per wetland were recorded from wetlands with a pH of 5.51. Other Classes and Orders of invertebrates were more abundant on wetlands with pH>5.51. All years combined use of wetlands by broods was greater on wetlands with pH  $\leq$  5.51 (77.4%) in contrast to wetlands with pH>5.51 that supported 21.8% of the broods. High mean brood density was associated with mean number of Insecta per wetland. For lentic wetlands created by beaver, those habitats contained vegetative structure and nutrients necessary to provide cover to support invertebrate populations that are prey of omnivore and insectivore species. The fishless status of a few wetlands may have affected use by some waterfowl species and obligate piscivores." (Authors) Odonata are treated on the family level.] Address: Longcore, J., U.S. Geological Survey, Patuxent Wildlife Research Center, 5768 South Annex A, Orono, ME 04469, USA. E-mail: JerryLongcore@usgs.gov
- 5979.** Luo, G.; Sun, M. (2006): The effects of corrugation and wing planform on the aerodynamic force production of sweeping model insect wings. Acta Mechanica Sinica 21(6): 531-541. (in English). ["The effects of corrugation and wing planform (shape and aspect ratio) on the aerodynamic force production of model insect wings in sweeping (rotating after an initial start) motion at Reynolds number 200 and 3500 at angle of attack 40° are investigated, using the method of computational fluid dynamics. A representative wing corrugation is considered. Wing-shape and aspect ratio (AR) of ten representative insect wings are considered; they are the wings of fruit fly, cranefly, dronefly, hoverfly, ladybird, bumblebee, honeybee, lacewing (forewing), hawkmoth and dragonfly (forewing), respectively (AR of these wings varies greatly, from 2.84 to 5.45). The following facts are shown. (1) The corrugated and flat-plate wings produce approximately the same aerodynamic forces. This is because for a sweeping wing at large angle of attack, the length scale of the corrugation is much smaller than the size of the separated flow region or the size of the leading edge vortex (LEV). (2) The variation in wing shape can have considerable effects on the aerodynamic force; but it has only minor effects on the force coefficients when the velocity at  $r^2$  (the radius of the second moment of wing area) is used as the reference velocity; i.e. the force coefficients are almost unaffected by the variation in wing shape. (3) The effects of AR are remarkably small: when AR increases from 2.8 to 5.5, the force coefficients vary only slightly; flow-field results show that when AR is relatively large, the part of the LEV on the outer part of the wings sheds during the sweeping motion. As AR is increased, on one hand, the force coefficients will be increased due to the reduction of 3-dimensional flow effects; on the other hand, they will be decreased due to the shedding of part of the LEV; these two effects approximately cancel each other, resulting in only minor change of the force coefficients." (Authors)] Address: Luo, G.y.; Sun, M., Ministry of Education Key Laboratory of Fluid Mechanics, Institute of Fluid Mechanics, Beihang University, Beijing, 100083, China
- 5980.** Machida, K.; Oikawa, T.; Shimanuki, J. (2006): The effect of the costal vein configuration of the wings of a dragonfly. Key Engineering Materials 326-328: 819-822. (in English). ["In generally, it is known that structures of living thing are optimized. The wings of a dragonfly are thin and light. Although it is having the structure of bearing the load produced in the case of an advanced flight such as "Flapping flight", "Glide", and "Hovering". The wings of a dragonfly are made by veins and membranes. In addition, the wings of a dragonfly have some characteristic structures, such as "Nodus". Thus, the wings of dragonfly have many complicated structures. The configuration of costal vein of the wings is different from them of other insects. So, we paid attention to the configuration of costal vein of the wings. Therefore, in this study, we researched about the effect



of costal vein. As a result, it was showed that the configuration of costal vein became bending and torsional deformation small. In addition, it was showed that the configuration of costal vein related to nodus. In this study, several 3-D models of the dragonfly's wing were made and calculated by the 3-D finite element method." (Authors)] Address: Machida, M., Tokyo University of Science, 2641 Yamazaki, Noda-shi, Chiba, 278-8510, Japan. E-mail: mac@rs.noda.tus.ac.jp

**5981.** Macken, J.E. (2006): The life cycle of a dragonfly. Milwaukee. ISBN 0-8368-6388-7 (softcover): 24 pp. (in English). [Book for children resp. first reading.]

**5982.** Marshall, J.C.; Steward, A.L.; Harch, B.D. (2006): Taxonomic resolution and quantification of freshwater macroinvertebrate samples from an Australian dryland river: the benefits and costs of using species abundance data. *Hydrobiologia* 572: 171-194. (in English). ["In studies using macroinvertebrates as indicators for monitoring rivers and streams, species level identifications in comparison with lower resolution identifications can have greater information content and result in more reliable site classifications and better capacity to discriminate between sites, yet many such programmes identify specimens to the resolution of family rather than species. This is often because it is cheaper to obtain family level data than species level data. Choice of appropriate taxonomic resolution is a compromise between the cost of obtaining data at high taxonomic resolutions and the loss of information at lower resolutions. Optimum taxonomic resolution should be determined by the information required to address programme objectives. Costs saved in identifying macroinvertebrates to family level may not be justified if family level data can not give the answers required and expending the extra cost to obtain species level data may not be warranted if cheaper family level data retains sufficient information to meet objectives. We investigated the influence of taxonomic resolution and sample quantification (abundance vs. presence/absence) on the representation of aquatic macroinvertebrate species assemblage patterns and species richness estimates. The study was conducted in a physically harsh dryland river system (Condamine-Balonne River system, located in south-western Queensland, Australia), characterised by low macroinvertebrate diversity. Our 29 study sites covered a wide geographic range and a diversity of lotic conditions and this was reflected by differences between sites in macroinvertebrate assemblage composition and richness. The usefulness of expending the extra cost necessary to identify macroinvertebrates to species was quantified via the benefits this higher resolution data offered in its capacity to discriminate between sites and give accurate estimates of site species richness. We found that very little information (<6%) was lost by identifying taxa to family (or genus), as opposed to species, and that quantifying the abundance of taxa provided greater resolution for pattern interpretation than simply noting their presence/absence. Species richness was very well represented by genus, family and order richness, so that each of these could be used as surrogates of species richness if, for example, surveying to identify diversity hot-spots. It is suggested that sharing of common ecological responses among species within higher taxonomic units is the most plausible mechanism for the results. Based on a cost/benefit analysis, family level abundance data is recommended as the best resolution for resolving pat-

terns in macroinvertebrate assemblages in this system. The relevance of these findings are discussed in the context of other low diversity, harsh, dryland river systems." (Authors) The study includes Odonata.] Address: Marshall, J.C., Qld Department of Natural Resources and Mines, 120 Meiers Road, 4068, Indooroopilly, QLD, Australia. E-mail: marshallj@nrm.qld.gov.au, jonathan.marshall@nrm.qld.gov.au

**5983.** Martens, A. (2006): Gomphidenlarven als Substrat für Wohnröhren des Flohkrebsses *Chelicorophium robustum*? (Odonata: Gomphidae; Amphipoda: Corophiidae). *Libellula* 25(1/2): 83-87. (in German, with English summary). ["*Chelicorophium robustum* is a semi-sessile amphipod of Ponto-Caspian origin which has recently spread rapidly through Central Europe. Under laboratory conditions, adults settled on final-stadium larvae of *Gomphus vulgatissimus*, *Ophiogomphus cecilia* and *Onychogomphus forcipatus*. By using other particles they built dwelling tubes similar to those of caddisfly larvae on the ventral side of the abdomen of the dragonfly larvae. This represents the first reported example of an amphipod living sporadically as an epizoon on dragonfly larvae, an association not yet recorded from the wild." (Author)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**5984.** Mauersberger, R. (2006): Verbreitung und Phänologie des Zweiflecks, *Epitheca bimaculata* Charpentier, 1825 (Odonata, Corduliidae), im Norden Brandenburgs. *Entomologische Nachrichten und Berichte* 50(1-2): 45-53. (in German). [Germany; "The author recorded *E. bimaculata* at 551 occasions in the study area between Prenzlau, Schwedt, Eberswalde and Rheinsberg (about 3500 km<sup>2</sup>), at 140 localities listed in this paper. From 1987 to 2006, breeding was observed in 88 water bodies in this lake landscape shaped during the Pleistocene. It represents the centre of distribution of the species in Germany. At the lake with the largest breeding colony, up to 394 exuviae in a year were found. The greatest recorded abundance of the species in this region was 193 exuviae along 80 meters of lake shore. *E. bimaculata* reaches a frequency of at least 29 % in 216 lakes with a water surface of more than one hectare existing in the UNESCO-biosphere reserve „Schorfheide-Chorin“ in the eastern part of the study area. The cornerstone data of adult phenology in the period 1992-2004 were as follows: earliest emerging adults, 11 May; peak emergence, 16 May; first males appearing in their territory over the water surface, 25 May; last living specimens, 24 June." (Author)] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-mail: FoerdervereinUeckermark.Seen@t-online.de

**5985.** May, B.; Blumenkamp, K. (2006): Erstnachweis einer Brut des Bienenfressers *Merops apiaster* im Kreis Mettmann 2005. *Charadrius* 41(4) (2005): 208-213. (in German, with English summary). [Germany, Nordrhein-Westfalen; 2005; Anisoptera are among the preferred prey of *M. apiaster* (Aves).] Address: May, B., Schildheider Str. 126b, D-40699 Erkrath, Germany. E-mail: buero@naturschutzzentrum-bruchhausen.de

**5986.** McCauley, S.J. (2006): The effects of dispersal and recruitment limitation on community structure of odonates in artificial ponds. *Ecography* 29(4): 585-595.

(in English). ["I examined the effects of isolation on the structure of both adult and larval dragonfly (Odonata: Anisoptera) communities forming at physically identical artificial ponds over two years. Isolation, whether measured by distance to the nearest source habitat or by connectivity to multiple sources, was significantly negatively related to the species richness of dragonflies observed at and collected in these ponds. These results indicate that dispersal and recruitment limitation acted as filters on the richness of communities at these artificial ponds. The richness of larval recruits in artificial ponds was lower than the richness of adult dispersers observed at ponds, and distance from a source habitat explained a greater fraction of the variation in larval than adult richness (83 and 50%, respectively). These results and a male biased sex-ratio in adults observed at artificial ponds suggest that isolated habitats may be more recruitment limited than observations of dispersers would suggest. A Mantel test indicated there was a spatial component to the composition of communities forming in tanks, and that distance between tanks and community dissimilarity (1-Jaccard's) were significantly positively related ( $r=0.52$ ). This pattern suggests that their position with respect to alternative source environments influenced the composition of the communities that recruited into these ponds. These results provide further evidence of recruitment limitation in this system. Results from this study highlight the importance behaviorally limited dispersal may have in taxa morphologically capable of broad dispersal and suggest that the role of dispersal and recruitment limitation may be critical in shaping community structure across habitat gradients that include variation in habitat duration." (Author)] Address: McCauley, S. J., Center for Population Biology, One Shields Avenue, 2320 Storer Hall, Univ. of California, Davis, CA 95616, USA. E-mail: sjmccauley@ucdavis.edu

**5987.** McGuffin, M.A.; Baker, R.L.; Forbes, M.R. (2006): Detection and avoidance of fish predators by adult *Enallagma damselflies*. *Journal of Insect Behavior* 19(1): 77-91. (in English). ["Reproductive success of iteroparous insects depends on their own survival as well as that of their offspring and thus adults should consider risk of predation to both themselves and their offspring when selecting a suitable place to lay eggs. We surveyed species composition of *Enallagma damselflies* from sites in eastern Ontario and found that, similar to studies in Michigan, USA, *Enallagma boreale* does not co-exist with fish, whereas *E. signatum* is apparently restricted to sites with fish. *E. ebrium* is found at fish and fishless sites. Laboratory experiments on these species showed no effect of chemical cues of fish presence on propensity to oviposit or number of eggs released. By using field enclosures, we found adult *E. ebrium* could detect and avoid fish during visits to a site, but females visiting fish sites did not significantly reduce oviposition duration." (Authors)] Address: Baker, R.L., Dept Zoo], Erindale Coll., Univ. Toronto, Mississauga, ON, L6L 2C6. Canada. e-mail: rbaker@credit.erin.utoronto.ca

**5988.** McMillan, V.E. (2006): Preliminary observations of reproductive behavior in *Arigomphus villosipes* (Selys) (Anisoptera: Gomphidae). *Bulletin of American Odonatology* 10(1): 19-22. (in English). ["I studied the behavior of the *A. villosipes* (Unicorn Clubtail) at a small artificial pond in New York State from 6 June-8 July 2002. Throughout the day males adopted perch sites

along the shoreline, typically 3 m or farther apart. Most of their time was spent perching, interrupted by brief patrols or chases of other males. Marking records showed that most males (79%) returned to the pond on one or more subsequent days. Individual males displayed only weak attachment to perch sites, often occupying two or more different areas along the shoreline over several hours on a given day. Female visits to the pond were brief and infrequent; pair formation occurred at the water, whereupon the pair left the pond to mate. Females oviposited by flying slowly over shallow water, dipping the abdomen once or twice at multiple sites; mate-guarding was never observed. Suggestions are given for future studies of this species." (Author)] Address: McMillan, Vicky, Colgate Univ., Dept. Biol., 13 Oak Dr. Hamilton, NY 13346-1398, USA . E-mail: vmcmillan@mail.colgate.edu

**5989.** Meurgey, F. (2006): A possible economic impact of libellulid larvae on production of freshwater shrimps in Guadeloupe, French West Indies (Anisoptera: Libellulidae). *Notulae Odonatologicae* 6(7): 79-80. (in English). [Tentatively impacts of *Pantala flavescens* - larvae on shrimp farming are reported.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5990.** Meurgey, F. (2006): Les Odonates du département de Loire-Atlantique Nouvelles espèces et observations récentes. *Martinia* 22(2): 65-70. (in French, with English summary). ["Since the publication (2000) of a survey of Loire-Atlantique department odonata fauna (France), new records resulting from prospecting carried out from 2000 to 2005 are presented. Three species are new for the department (*Anax junius*, *A. parthenope* and *Lestes macrostigma*) and for eight others, previously known, our knowledge on their status and distribution increased." (Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5991.** Meurgey, F. (2006): Présence ancienne de *Sympetrum danae* (Sulzer, 1776) dans le département de Loire-Atlantique (Odonata, Anisoptera, Libellulidae). *Martinia* 22(2): 82. (in French). [France; a historic record of *S. danae* is documented and discussed.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5992.** Meurgey, F. (2006): Richesse et diversité des Odonates de 51 mares de l'archipel guadeloupéen. Extrait du rapport de mission Muséum Nantes 2004. *Martinia* 22(3): 119-132. (in French, with English summary). ["A study carried out in March-April 2004 on 51 ponds of Guadeloupe archipelago, shows that 22 species of dragonflies breed regularly in this type of habitat. In a context of regular dryness and increasing urbanization, ponds of Guadeloupe tend to rarefy. A typology based on the uses and the general environment is proposed as a working tool for the future surveys." (Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5993.** Meurgey, F. (2006): Signalement de *Sympecma fusca* (Vander Linden, 1820), *Gomphus vulgatissimus* (L., 1758) et *Libellula fulva* (Müller, 1764) dans le dé-

partement des Pyrénées-Orientales. *Martinia* 22(2): 64. (in French). [France; records of the three species are documented. These records update the regional list to 52 species.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**5994.** Meurgey, F. (Coord. & Red.) (2006): Les Odonates des Départements et Collectivités d'Outre-mer français. Société française d'odonatologie. ISBN: 2950729169: 144 pp. (in French, with English summary). ["France counts 10 overseas territories distributed around the world. Mainly located in the Tropics, these territories relate to a great diversity of habitats and species. In 1999, the "Société Française d'Odonatologie" created a study group on dragonflies fauna of the French overseas territories. This group is in charge to contribute to the advance of knowledge on faunas still imperfectly known, as well from a systematic point of view as of biology and ecology. The level of knowledge of each department or territory of Overseas is not equal, since is subjected to various constraints such as the surface, accessibility and also number of species to be considered. The Nantes Museum of Natural History takes part in these studies in various manners, such as conservation of collections, missions in West Indies, publications. Since the creation of this group, 42 papers were published (31 in *Martinia* review), solely or included in a supplement (2001), and two thematic issues (2002, 2004). 179 new species could be added to the lists of the geographical areas by the members of this Group. The French Overseas departments and territories currently gather 363 species. France gathers 8% of world dragonfly fauna, and thus has an important responsibility as regards conservation of the species and their habitats." (Author)] Address: Société française d'odonatologie (SFO), 7, rue Lamartine, F-78390 Bois d'Arcy, France

**5995.** Michalski, J. (2006): *Neurobasis awamena* sp. nov. from New Guinea, with a discussion of the Sulawesi and Papuan species in the genus (Odonata: Calopterygidae). *International Journal of Odonatology* 9 (2): 185-195. (in English). [*N. awamena* "from the southern highlands of New Guinea (holotype: Pimaga area, 6°30'S, 143°30'E, 27 vii 1994, deposited at Naturalis, Leiden) is described and figured. It is distinguished from the widespread *N. australis* by its longer legs, irregular teeth on the male cerci, and the sharp demarcation of the iridescent color on the male hindwings. Its combined characters prompted a re-examination of the variability of *N. australis* throughout its range, and of the characters formerly used to distinguish the species of *Neurobasis* occurring from Sulawesi to the Bismarck Archipelago. A table comparing these species, a key, and a distribution map of the New Guinean species are provided." (Author)] Address: Michalski, J., 223 Mount Kemble Avenue, Morristown New Jersey 07960, USA. E-mail: jmichalski@easthanoverschools.org

**5996.** Mikolajewski, D.J.; Johansson, F.; Wohlfahrt, B.; Stoks, R. (2006): Invertebrate predation selects for the loss of a morphological antipredator trait. *Evolution* 60(6): 1306-1310. (in English). ["Antagonistic selection by different predators has been suggested to underlie variation in morphological antipredator traits among and within species. Direct empirical proof is equivocal, however, given the potential interrelationships of morphological and behavioral traits. Here, we tested whether

spines in larvae of the dragonfly *Leucorrhinia caudalis*, which are selected for by fish predators, are selected against by invertebrate aeshnid predators. Using a manipulative approach by cutting spines instead of making comparisons among species or inducing spines, we were able to decouple the presence of spines from other potentially covarying morphological antipredator traits. Results showed survival selection for the loss of spines imposed by invertebrate predation. Moreover, spined and nonspined larval *L. caudalis* did not differ in the key antipredator behaviors, activity level, and escape burst swimming speed. The observed higher mortality of spined larvae can therefore be directly linked to selection by aeshnid predation against spines." (Authors)] Address: Mikolajewski, D.J., Laboratory for Aquatic Ecology, Katholieke Universiteit Leuven, Charles de Bériotstr. 32, B-3000 Leuven, Belgium. E-mail: d.mikolajewski@tu-bs.de

**5997.** Miller, E.; Miller, J. (2006): Beobachtungen zum winterlichen Verhalten von *Sympecma fusca* (Odonata: Libellula 25(3/4): 119-128. (in German, with English summary). ["In the region of Starnberg (Bavaria, Germany) we found that in autumn most individuals disappeared from the surroundings of a pond and probably moved by stages to their hibernation site. They first stayed at forest edges and subsequently moved to a sunny clearing where they foraged until the first cold snap. During periods with frost and snow they were found perched on plants close to the ground and stayed immobile during snowfall. In cold they were able to move on plant stems up to temperatures of -4°C. Some individuals died because they were trapped in thawing snow, unable to climb higher. Dead individuals were recognized by their brown-red eyes." (Authors)] Address: Miller, Elfi, Miller, J., Leharstraße 6c, D-861 79 Augsburg, Germany

**5998.** Mitra, T.R. (2006): Handbook on Common Indian Dragonflies : Insecta: Odonata . ISBN 8181710886: 136 pp. (in English). [119 odonate species are described and in most cases pictured with (colour) photographs and/or hand-made paintings. In addition, some brief information of habitat, habits, and distribution are outlined. The following species are treated: 1. *Matrona basilaris basilaris* Selys. 2. *Neurobasis chinensis chinensis* Linnaeus. 3. *Vestalis smaragdina smaragdina* Selys. 4. *Vestalis gracilis* (Rambur). 5. *Vestalis apicalis apicalis* Selys. 6. *Echo margarita margarita* Selys. 7. *Euphaea cardinalis* (Fraser). 8. *Euphaea guerini masoni* Selys. 9. *Euphaea ochracea ochracea* Selys. 10. *Bayadera indica* (Selys). 11. *Anisopleura comes* Selys. 12. *Anisopleura subplatystyla* Fraser. 13. *Rhinocypha cuneata* Selys. 14. *Rhinocypha immculata* Selys. 15. *Rhinocypha bisignata* Selys. 16. *Rhinocypha bifasciata* Selys. 17. *Rhinocypha trifasciata* Selys. 18. *Rhinocypha unimaculata* Selys. 19. *Rhinocypha ignipennis* Selys. 20. *Rhinocypha spuria* Selys. 21. *Rhinocypha quadrimaculata* Selys. 22. *Rhinocypha fenestrella fenestrella* Rambur. 23. *Libellago lineata* (Burmeister). 24. *Disparoneura quadrimaculata* (Rambur). 25. *Caconeura gomphoides* (Rambur). Family Platygnemididae 26. *Cocliccia bimaculata* Laidlaw. 27. *Copera marginipes* (Rambur) 28. *Copera vittata serapica* (Selys). 29. *Copera vittata assamensis* Laidlaw. 30. *Copera ciliata* (Selys). 31. *Calicnemia miniata* (Selys). 32. *Calicnemia miles* Laidlaw. 33. *Calicnemia eximia* Selys. 34. *Lestes elatus* Hagen. 35. *Lestes viridulus* Rambur. 36. *Lestes nodalis* Selys. 37. *Lestes umbrinus*



Selys. Family Synlestidae 38. *Megalestes major* Selys. 39. *Pseudagrion microcephalum* (Rambur). 40. *Pseudagrion decorum* (Rambur). 41. *Pseudagrion rubriced* Selys. 42. *Pseudagrion hypermelas* Selys. 43. *Pseudagrion australasiae* Selys. 44. *Ceriagrion coromandelianum* (Fabricius). 45. *Ceriagrion cerinorubellum* (Brauer). 46. *Ceriagrion olivaceum* Laidlaw. 47. *Ischnura senegalensis* Rambur. 48. *Ischnura forcipata* Morton. 49. *Ischnura aurora aurora* (Brauer). 50. *Rhodischnura nursei* (Morton). 51. *Agriocnemis femina femina* (Brauer). 52. *Agriocnemis lacteola* Selys. 53. *Agriocnemis pygmaea pygmaea* (Rambur). 54. *Onychargia atrocyana* Selys. 55. *Enallagma parvum* Selys. 56. *Cercion malayanum* (Selys). 57. *Aciagrion azureum* Fraser. 58. *Aciagrion hisopa hisopa* (Selys). 59. *Aciagrion approximans* (Selys). 60. *Aciagrion pallidum* Selys. 61. *Macrogomphus montanus* Selys. 62. *Paragomphus lineatus* (Selys). 63. *Stylogomphus inglisi* Fraser. 64. *Phaenandrogomphus aureus* (Laidlaw) 65. *Onychogomphus striatus* Fraser. 66. *Ictinogomphus rapax* (Rambur). 67. *Hemianax ephippiger* (Burmeister) 68. *Anax parthenope parthenope* Selys. 69. *Anaciaeschna jaspædia* (Burmesister). 70. *Anax guttatus* (Burmeister). 71. *Gynacantha dravida* Lieftinck. 72. *Gynacantha bainbriggei* Fraser. 73. *Gynacantha bayadera* Selys. 74. *Gynacantha basiguttata* Selys. 75. *Chlorogomphus preciosus preciosus* Fraser. 76. *Chlorogomphus atkinsoni* (Selys). 77. *Anotogaster nipalensis* Selys. Family Corduliidae 78. *Epophthalmia vittata vittata* Burmeister. 79. *Macromia moorei moorei* Selys. 80. *Macrodiplax cora* (Brauer). 81. *Potamarcha congener* (Rambur). 82. *Acisoma panorpoides panorpoides* Rambur. 83. *Lathrecista asiatica asiatica* (Fabricius). 84. *Neurothemis tullia tullia* (Drury). 85. *Neurothemis fluctuans* (Fabricius). 86. *Neurothemis intermedia intermedia* (Rambur). 87. *Neurothemis fulvia* (Drury). 88. *Brachydiplax farinosa* Kruger. 89. *Brachydiplax chalybea chalybea* Brauer. 90. *Brachydiplax sobrina* (Rambur). 91. *Indothemis carnatica* (Fabricius). 92. *Tramea basilaris burmeisteri* Kirby. 93. *Tramea virginia* Rambur. 94. *Pantala flavescens* (Fabricius). 95. *Tholymis tillarga* (Fabricius). 96. *Zyxomma petiolatum* Rambur. 97. *Diplacodes trivialis* (Rambur). 98. *Diplacodes nebulosa* (Fabricius). 99. *Urothemis signata signata* Rambur. 100. *Aethriamanta brevipennis brevipennis* (Rambur). 101. *Nannophya pygmaea* Rambur. 102. *Orthetrum pruinosum neglectum* (Rambur). 103. *Orthetrum subina sabina* (Drury). 104. *Orthetrum trianguläre trianguläre* (Selys). 105. *Orthetrum chrysis* Selys. 106. *Orthetrum glaucum* (Brauer). 107. *Orthetrum taeniolatum* (Schneider). 108. *Orthetrum cancellatum cancellatum* (Linnaeus). 109. *Orthetrum japonicum internum* MacLachlan. 110. *Orthetrum luzonicum* (Brauer). 111. *Palpopleura sexmaculata sexmaculata* (Fabricius). 112. *Crocothemis servilia servilia* (Drury). 113. *Bradinyopyga geninata* (Rambur). 114. *Brachythemis contaminata* (Fabricius). 115. *Sympetrum hypomelas* (Selys). 116. *Trithemis pallidinervis* (Kirby). 117. *Trithemis aurora* (Burmeister). 118. *Trithemis festiva* (Rambur). 119. *Rhyothemis variegata variegata* (Linnaeus).] Address: Mitra, T.R., Zoological Survey of India, M-Block, New Alipore, Kolkata-70053, India

**5999.** Müller, J. (2006): Libellen als Nachhaltigkeitsindikatoren für die ökologische Gewässerqualität. halophila, Mitt.-Bl. FG Faun. u. Ökol. Staßfurt 50: 6-7. (in German). [Sachsen-Anhalt, Germany; indicator system for habitat characterisation by Odonata.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**6000.** Müller, J.; Steglich, R.; Lotzing, J.; Hahn, W. (2006): Vorläufige Mitteilung über bemerkenswerte Beobachtungen im Jahre 2005 (Odonata, Saltatoria; Aves). 1. Erneuter Fund der Gestreiften Quelljungfer *Cordulegaster bidentata* im Harz; 2. Erstnachweise von Grüner Flußjungfer *Ophiogomphus cecilia* und Feuerlibelle *Crocothemis erythraea* in der Bodeniederung als Schwalben-Nahrung. halophila, Mitt.-Bl. FG Faun. u. Ökol. Staßfurt, 49: 9-10. (in German). [1. On August 2, 2006, larvae of *Thecagaster bidentata* were recorded in the NSG Großer Ronneberg-Bielstein (Harz mountains), Wolfsbach, Sachsen-Anhalt, Germany. 2. In June 29, 2006, nestlings of *Hirundo rustica* (Aves) were tried to be fed in vain with large dragonfly imagines. Among these have been *Calopteryx splendens*, *Ophiogomphus cecilia* (Beleg in coll. JM), *Orthetrum cancellatum*, and *Crocothemis erythraea*. The latter record is the third proof of this range extending species in Sachsen-Anhalt, Germany.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.Jmueller@t-online.de

**6001.** Nel, A.; Arillo, A. (2006): The first Baltic amber dysagronine damselfly (Odonata: Zygoptera: Thaumatoeuridae: Dysagroninae). Ann. soc. entomol. Fr. (n.s.) 42(2): 179-182. (in English, with French summary). [Poland; "A new genus and species *Electrophenaolestes serafini* is described. It is the first Thaumatoeuridae recorded from an amber deposit and the second record of the family in the European Paleogene. A comparison with related genera and families is done." (Authors)] Address: Nel, A., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**6002.** Novelo-Gutiérrez, R.; Gómez-Anaya, J.A. (2006): A description of the larva of *Argia funcki* (Selys, 1854) (Odonata: Zygoptera: Coenagrionidae). Proceedings of the Entomological Society of Washington 108(2): 261-266. (in English, with Spanish summary). ["The last instar larva of *Argia funcki* (Selys) is described and illustrated. A comparison to its closest relative, *Argia lugens* (Hagen), is provided. The scalelike setae on sternite 8 and gonapophyses, and the bluntly-tipped gonapophyses easily separate *A. funcki* larva from that of *A. lugens*. The larva of *A. funcki* belongs to the group of species with ligula very prominent and one palpal seta; it is the largest of all known larvae of the genus." (Authors)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx

**6003.** Nuckowska, K.; Krzyżanowska, I. (2006): Fauna and flora in two city-centre water reservoirs in Gorzów Wielkopolski. Teka Kom. Ochr. Kszt. Środ. Przyn. 3: 153-159. (in English, with Polish summary). [Poland; 2003, 7 taxa of generally common species are listed from the two water bodies.] Address: Nuckowska, Kinga, State School of Higher Vocational Education in Gorzów, Teatralna str. 25, PL-66-400 Gorzów Wielkopolski, Poland. E-mail: kinianuc@wp.pl

**6004.** Ott, J. (2006): Der Zweifleck - *Epithea bimaculata* (Charpentier, 1825) - nun auch am Gelterswoog bei Kaiserslautern (Insecta: Odonata: Corduliidae). Fauna Flora Rheinland-Pfalz 10(4): 1339-1347. (in German, with English summary). ["*E. bimaculata* is an endange-

red corduliid dragonfly which is listed in the federal state and national red list of dragonflies, but presently obviously increasing its range. A new population from the Gelterswoog (a lake near Kaiserslautern/Rhineland-Palatinate, Germany, which is part of a nature reserve and an area according to the EC habitats directive) is reported. The circumstances of this observation are discussed as well as some nature conservation problems concerning the lake which is also used for recreation purposes." (Author)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.-GmbH@t-online.de

**6005.** Ott, J. (2006): Die Arktische Smaragdlibelle - *Somatochlora arctica* (Zetterstedt, 1840) - in der Pfalz: übersehen oder kurz vor dem Aussterben? (Insecta: Odonata: Corduliidae). Fauna Flora Rheinland-Pfalz 10 (4): 1323-1338. (in German, with English summary). ["*S. arctica* is one of the rarest dragonflies in the Palatinate and presently only one autochthonous population south of Trippstadt (near Kaiserslautern / Rhineland-Palatinate, Germany) is known to be existing. Several former breeding sites of the species were degraded or destroyed in the past but there is still in principal the possibility of a resettlement from populations of the French sites in the Northern Vosges; presently however the biotope conditions for the species in most of the waters are not adequate due to the lack of water and also effects of climatic changes. As the species could have been overlooked in some areas due to not being conspicuous an intensive mapping in the remaining 'good' biotopes is recommended which should take place as part of a special species protection programme for mooreland dragonflies in the Palatinate." (Author)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.-GmbH@t-online.de

**6006.** Ott, J. (2006): Die Südliche Binsenjunger – *Lestes barbarus* (Fabricius, 1798) - erobert den Pfälzerwald (Insecta: Odonata: Lestidae). Fauna Flora Rheinland-Pfalz 10(4): 1315-1321. (in German, with English summary). ["In 2005 *L. barbarus* was discovered for the first time in the central Palatinate forest at the nature reserve „Pfälzerwoog“ near Fischbach/Dahn (Rhineland-Palatinate, Germany), where the species meanwhile is breeding, as in 2006 a big population was registered. The reasons for settling at the water are the new and extensive open shores with a scarce *Juncus*-vegetation as a consequence of the decrease of the water table in the lake and general climatic changes in the area. The origin of the population is probably the „Bienwald“, a nature reserve situated east of the area in a distance of 20 kilometers, separated by more or less dense forests. Another new locality of *Lestes barbarus* was recently discovered near Kaiserslautern, which is located about 35 km north of the Fischbach population and 30 km west of the „Haardtrand“ or „Donnersberg“ populations." (Author)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.-GmbH@t-online.de

**6007.** Ott, J. (2006): Libellen im Bienwald -Ergebnisse der Untersuchungen im Rahmen des Naturschutzgroßprojektes - Vortrag von Dr. Jürgen Ott im Rahmen des AK Pfalz-Treffen am 11.03.2006. GNOR Info 102: 10. (in German). [Brief introduction and assessment of the odonate fauna of the Bienwald region in southern Rhineland-Palatinate, Germany.] Address: Ott, J., Friedhof-

str. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.-GmbH@t-online.de

**6008.** Parr, A. (2006): Views and Reviews: Field guide to the Dragonflies of Britain and Europe.. *Atropos* 29: 59-60. (in English). [Review of Dijkstra & Lewington 2006; see OAS 5893.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**6009.** Peacor, S.D. (2006): Behavioural response of bullfrog tadpoles to chemical cues of predation risk are affected by cue age and water source. *Hydrobiologia* 573: 39-44. (in English). ["When confronted by signals of predators presence, many aquatic organisms modify their phenotype (e.g., behaviour or morphology) to reduce their risk of predation. A principal means by which organisms assess predation risk is through chemical cues produced by the predators and/or prey during predation events. Such responses to predation risk can directly affect prey fitness and indirectly affect the fitness of species with which the prey interacts. Accurate assessment of the cue will affect the adaptive nature, and hence evolution, of the phenotypic response. It is therefore, important to understand factors affecting the assessment of chemical cues. Here I examined the effect of the age of chemical cues arising from an invertebrate predator, a larval dragonfly (*Anax junius*), which was fed bullfrog tadpoles, on the behavioural response (activity level and position) of bullfrog tadpoles. The bullfrog response to chemical cues declined as a function of chemical cue age, indicating the degradation of the chemical cue was on the order of 2–4 days. Further, the decay occurred more rapidly when the chemical cue was placed in pond water rather than well water. These results indicate a limitation of the tadpoles to interpret factors that affect the magnitude of the chemical cue and hence accurately assess predation risk. These findings also have implications for experimental design and the adaptation of phenotypic responses to chemical cues of predation risk." (Author)] Address: Peacor, S.D., Department of Fisheries and Wildlife, Michigan State University, 13 Natural Resources Building, East Lansing, MI 48824-1222, USA. E-mail: Peacor@msu.edu

**6010.** Pelný, H.-J. (2006): Erster Nachweis von *Anax parthenope* auf dem Madeira-Archipel (Odonata: Aeshnidae). *Libellula* 25(1/2): 27-30. (in German, with English summary). [30.VIII. 2005; island of Porto Santo, Madeira archipelago, Portugal] Address: Pelný, H.-J., Zieritz 2, D-29597 Stötze, Germany. E-mail: hans.pelný@web.de

**6011.** Petzold, F.; Kabus, T.; Brauner, O.; Hendrich, L.; Müller, R.; Meisel, J. (2006): Natürlich eutrophe Seen (FFH-Lebensraumtyp 3150) in Brandenburg und ihre Besiedlung durch Makrophyten und ausgewählte Gruppen des Makrozoobenthos. *Naturschutz und Landschaftspflege in Brandenburg* 15(2): 36-47. (in German). [Characterisation of eutrophic standing waters by its faunal composition including Odonata.] Address: Petzold, F., Pappelalle 73, D-10437 Berlin E-Mail: falkpetzold@web.de

**6012.** Petzold, F. (2006): Parasitierung von Libellen durch Wassermilben an einem Moorsee in Nordbrandenburg (Odonata; Hydrachnidia). *Libellula* 25(3/4): 185-198. (in German, with English summary). ["All those odonate species of which numerous individuals from the locality were investigated proved to be infested by

water mite larvae. The infestation rate of the different species amounted to 0.24 to 0.98 (mean: 0.65). In all species half of the infested individuals bore less than 15 mites. Occasionally, heavy parasite load was found, the maximum value per individual being 278 for Zygoptera (*Pyrrhosoma nymphula*) and 1136 for Anisoptera (*Corulia aenea*). With respect to the attachment sites of the mites on the dragonfly body clear differences between Zygoptera and Anisoptera were found. While in the former the parasites clung to the underside of the thorax and abdomen, in the latter they were attached ventrally to the abdomen, preferentially to S7-S9. Both, non-infested and infested as well as formerly heavily parasitized individuals participated in tandem formation in a proportion corresponding to that in the whole population. Compared with non-infested individuals, infested individuals exhibited no impairment of their reproductive behaviour." (Author)] Address: Petzold, F., Pappelallee 73, D-10437 Berlin, Germany. E-mail: falkpetzold@web.de

**6013.** Piksa, K.; Wachowicz, B.; Kwarcńska, M. (2006): Dragonflies (Odonata) of some small anthropogenic water bodies in Cracow City. *Fragmenta faunistica* 49(2): 81-89. (in English with Polish summary). [A survey of the Odonata of small anthropogenic water bodies in Cracow (southern Poland) in the years 2001–2004 resulted in records of 38 species. Of special interest are many southern and southeastern species e.g. *Aeshna affinis*, *Orthetrum albistylum*, *Sympetrum fonscolombii*, and *Crocothemis erythraea*, and tyrphobiontic and tyrphophilous species as *Coenagrion hastulatum*, *Lestes sponsa*, *S. danae*, *Leucorrhinia dubia*, and *L. rubicunda*. The importance of these secondary habitats for the conservation of dragonflies is discussed.] Address: Piksa, K., Cracow Pedagogical University, Institute of Biology, ul. Podbrzezie 3, 31-054 Kraków, Poland. E-mail: krzychu@ap.krakow.pl

**6014.** Plotnikova, S.I.; Isavnina, I.L. (2006): Data in favor of possible olfactory function of the antennal nerve and lateral lobe of protocerebrum of larva of the dragonfly *Aeshna grandis*. *Journal of Evolutionary Biochemistry and Physiology* 42(3): 338-341. (in English). ["Using staining with methylene blue of larvae of dragonflies of the genus *Aeshna* sp. (2000 animals) the antennal nerve was shown to be connected with the lateral lobe of protocerebrum with a septum, through which sensory fibers enter the lobe. Near the lateral lobe of the antennal nerve, two enlargements are found, which contain motor neurons of antennal muscle as well as the incoming sensory fibers of antennal receptors and descending lateral bundles of fibers of lobes of mushroom bodies. In the lateral lobe of protocerebrum there is revealed arborization of neurons with terminal apparatuses similar to endings of the descending neuron of the glomerular antennal tract of the domestic fly. Original Russian Text published in *Zhurnal Evolyutsionnoi Biokhimi i Fiziologii*, 2006, Vol. 42, No. 3, pp. 269–272." (Authors)] Address: Plotnikova, S.I., Isavnina, I.L., (1) Sechenov Institute of Evolutionary Physiology and Biochemistry, Russian Academy of Sciences, St. Petersburg, Russia

**6015.** Pritykina, L.N. (2006): Isophlebiid dragonflies from the Late Mesozoic of Eastern Transbaikalia (Odonata: Isophlebiidae). *Paleontological Journal* 40(6): 636-645. (in Russian, with English summary). ["Based on the study of more than 300 isophlebiid specimens

from several Late Mesozoic sites in eastern Transbaikalia (Ukurei, Tergen', Glushkovo, and Byankino formations), new genera and species are described: *Xeta olivica*, *Dahurium draco*, and *Sinitia sophia*. The insect-bearing deposits are dated Late Jurassic according to analysis of their odonofauna." (Author)] Address: Pritykina, L.N., Paleontological Institute, Russian Academy of Sciences, Profsoyuznaya ul. 123, Moscow 117997, Russia. E-mail: lab@palaeoentomolog.ru

**6016.** Proess, R. (2006): Rote Liste der Libellen Luxemburgs. 3. Fassung, 2006 (Insecta, Odonata). *Bulletin de la Société des naturalistes luxembourgeois* 107: 123-130. (in German, with English summary). ["The third, updated Red Data List including all 62 species of dragonflies (Odonata) so far recorded in Luxembourg is presented. 12 species are considered to be Regionally Extinct (RE), 1 is Critically Endangered (CR), 2 are Endangered (EN), 2 are Vulnerable (VU), 2 are Near Threatened (NT), 6 are Extremely Rare (R) and 35 others (56%) may be considered safe (LC)." (Author)] Address: Proess, R., Umweltplanungsbüro Ecotop, 6, rue Gustave Kahnt, L-1851 Luxembourg. E-mail: ecotop@pt.lu

**6017.** Reece, B.A. (2006): Growth and development of a model research organism (*Enallagma civile*, Insecta: Odonata) in Playa lakes of the southern high plains, TX. Texas Tech University, Department of Biological Sciences. Graduate Student Forum. Program and Abstracts. April 10-14, 2006: (in English). [Verbatim: Cropland agriculture and grazing grassland represent the two major land uses for the Southern High Plains of Texas. These different land uses have varying impacts on surrounding biological systems. Playa lakes (the only source of aquatic habitat in a region over 100,000 km<sup>2</sup> in area) are greatly affected by these forms of land use. In particular, hydroperiod has been shown to be significantly shortened in cropland regions due to increased sedimentation. The impacts of this disturbance have been hypothesized to affect the rate of growth of larval damselflies in playa lakes surrounded by cropland. Like many other amphibious organisms, damselflies exhibit phenotypic plasticity in growth rate in response to environmental cues about habitat longevity or quality, resulting in a tradeoff between rapid growth and large body size at adult emergence. However, this tradeoff has not been examined as a function of anthropogenic land use surrounding playas. The impacts of different surrounding forms of land use were investigated using a model organism (*Enallagma civile*) placed in field enclosures in a transfer experiment in a replicated series of playa lakes. Growth and development parameters were estimated as well as various environmental correlates such as temperature, turbidity, pH, dissolved oxygen, and prey availability. Results to date suggest that growth and development are influenced by at least some these environmental correlates. Because various population and community parameters are dictated by adult body size (such as fitness), an understanding of how human land use affects individual ontogeny can shed light on higher-order ecological properties.] Address: <http://www.orgs.ttu.edu/biologistassociation/TTUABGradForum2006.pdf>

**6018.** Reels, G.T.; Dow, R. (2006): Underwater oviposition behaviour in two species of *Euphaea* in Borneo and Hong Kong (Odonata: Euphaeidae). *International Journal of Odonatology* 9(2): 197-204. (in English).



["Submerged oviposition behaviour by female *Euphaea decorata* and *E. subcostalis* is reported. *E. decorata* descended to within 10 cm of the stream bottom and oviposited endophytically for a total of 59 min. An *E. subcostalis* female descended 3 cm to dead leaves at the stream bottom and stayed submerged for 20-25 s. Noncontact guarding by the male was observed in both cases. Submerged oviposition into substrates near to the stream bottom may be common behaviour for members of the Euphaeidae." (Authors)] Address: Reels, G.T., 1C-6-26, Fairview Park, Yuen Long, N.T., Hong Kong. E-mail: gtreels@asiaecol.com.hk

**6019.** Rollinger, F. (2006): Feuchtgebiete und Rote Listen: *Gomphus flavipes* und *Libellula fulva*. *Regulus* 11: 9. (in German). [*Stylurus flavipes* is reported as extinct in Luxembourg. In 2006, *L. fulva* established along the rivers Alzette and Kiemelbach near Schiffingen a quite strong population.] Address: Rollinger, Françoise, c/o *Regulus*-Redaktion, Kräizhäf, route de Luxembourg, L-1899 Kockelscheuer, Luxemburg

**6020.** Rouquette, J. (2006): Itchen Navigation Odonata & Butterflies Survey 2006. <http://www.hwt.org.uk/files/odonata%20and%20butterfly%20survey%202006.pdf>: 32 pp. (in English). ["The Itchen Navigation Heritage Trail Project is a major Lottery funded scheme to restore and enhance the historic, cultural and wildlife value of this historic waterway. Major engineering works will shortly be undertaken to improve the structural integrity and the wildlife value of the Navigation. This study was therefore commissioned to carry out a comprehensive survey for Odonata (dragonflies and damselflies) and butterflies. The main aims were to provide information on the existing status of the Navigation and to make recommendations on habitat enhancement to guide the engineering works. The survey has focussed particular attention on the Southern Damselfly (*Coenagrion mercuriale*), a BAP priority species that is listed on the EC Habitats Directive. The Itchen valley contains an internationally important population of this endangered species and much of the valley has been designated as an SAC with the Southern Damselfly as a key interest feature. The entire length of the Navigation was divided into 500m sections and surveyed in July 2006. The key findings are: • The Southern Damselfly was recorded at one location on the Navigation (Section 22) and a review of previous surveys has revealed that it has been recorded in low numbers at 3 further locations (Sections 14, 16 and 20). • 9 other species of Odonata were recorded, with *Calopteryx splendens* (the Banded Demoiselle) the most common species present. • 20 species of butterfly were seen. None of these are restricted to habitat in or around the Navigation, but the Navigation still has an important role to play in providing nectar sources, shelter and foodplants. None of the Itchen Navigation provides optimal habitat for the Southern Damselfly at present, but many sections could be improved with sympathetic management works. Furthermore, the Navigation can act as a corridor providing vital links between existing colonies, and as a water source for rewetting the surrounding meadows. Detailed management recommendations for the Southern Damselfly and other species are provided. Principally this involves the creation of wide shallow margins at the edge of the Navigation where broad leaved emergent vegetation can flourish. Re-profiling of the banksides is required in many places, along with tree and scrub clearance in some areas to reduce the amount of shading."] Address: Rou-

quette, J.R., 3 Arreton Close, Leicester LE2 3PP, UK. E-mail: jimrouquette@hotmail.com

**6021.** Ryazanova, G.I. (2006): Habitat choice as the defensive behavior of *Calopteryx splendens* Harris larvae (Odonata, Calopterygidae): Impact of the predator species and of the population density of damselflies. *Entomological Review* 86(4): 383-388. (in English). ["Laboratory experiments have demonstrated that the change in the height of dispersal of *Calopteryx splendens* Harris larvae on perches is a protective strategy in the presence of fish. Specificity of protective behavior of damselflies in the presence of pelagic or bottom-dwelling fishes, or of a complex of both types of fishes is described. The effectiveness of the habitat choice is reduced in the presence of the complex of fishes. The use of an optimal protective strategy by all the larvae was observed only in the case when their population density was the lowest. The increase in the population density resulted in the increased importance of intraspecific competition (cannibalism) and decreased effectiveness of protective behavior against heterospecific predators. Original Russian Text published in *Entomologicheskoe Obozrenie*, 2006, Vol. 85, No. 2, pp. 281-288." (Author)] Address: Ryazanova, G.I., Biological Faculty, Moscow Lomonosov State University, Moscow, 119992, Russia

**6022.** Šácha, D.; Bulánková, E. (2006): New records of *Aeshna subarctica elisabethae* (Odonata, Aeshnidae) from the Tatra Mountains (Slovakia). *Biologia, Bratislava* 61 (Suppl. 18): S221. (in English). [High Tatra Mts (49.07.488N, 20.03.208 E), 1379 m a.s.l.; records from 2002-2004 are documented in detail] Address: Bulankova, Eva, Institute of Ecology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B-II, SK-84215 Bratislava., Slovakia; tel.+ 421-7-728 922, e-mail: Bulankova@fns.uniba.sk

**6023.** Salur, A.; Kryak, S. (2006): Additional records for the Odonata fauna of east mediterranean region of Turkey. *Munis Entomology & Zoology* 1(2): 239-252. (in English). [52 species and subspecies are documented with details from the Turkish provinces Mersin, Adana, Hatay, Kahramanmars and Osmaniye in the east mediterranean region and collected in July-September 2002 and April-August 2003. *Ischnura intermedia* is a new record for the regional fauna.] Address: Salur, A., Hitit University, Arts & Sciences Fac. of Corum, Biology Dept, 19030 Corum. Turkey. E-mail: alisalur@gmail.com

**6024.** Schiel, F.-J.; Hunger, H. (2006): Bestandssituation und Verbreitung von *Ophiogomphus cecilia* in Baden-Württemberg (Odonata: Gomphidae). *Libellula* 25 (1/2): 1-18. (in German, with English summary). ["From 2003 to 2005, 185 sections of 81 running waters in Baden-Württemberg, Germany were surveyed for the presence of *O. cecilia*. Prior to 2003, only 19 waters were known to harbour this species. In 2005, this number had risen to 35. In at least 28 (80 %) of these waters with a total length of 188 km, *O. cecilia* was indigenous. Larger populations existed exclusively in a few waters in the region of Nordbaden, at altitudes of less than 150 m above sea level, where the density of colonised waters was also the highest in Baden-Württemberg, and in the High Rhine. All other populations were small and more or less isolated. The positive trend of the species coincides with an improvement of water quality since the 1970s. With the exception of the High Rhine

upstream of the mouth of River Aare, 'moderately contaminated' and 'critically contaminated' waters were colonised equally well. In spite of this positive population trend, the sp. is still subject to various threats: intensive management as well as inappropriate restoration of water courses, especially establishment of dense woody vegetation along the shores, and eutrophication." (Authors)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**6025.** Schiel, F.-J. (2006): Nachweis einer zweiten Jahresgeneration von *Erythromma najas* (Odonata: Coenagrionidae). *Libellula* 25(3/4): 159-164. (in German, with English summary). ["At a pond southwest of Karlsruhe (Upper Rhine valley, Germany), which was created in December 2005, eight exuviae of *E. najas* were recorded on 19-VII and 03-VIII-2006. Exuviae of *E. lindenii*, *Ischnura elegans*, *Anax imperator*, *Crocothemis erythraea* and *Sympetrum fonscolombii* were also found at this site in 2006. The pond was created in December 2005, had no connection with other waterbodies and no hydrophytes were introduced. Therefore, the exuviae collected could only have originated from eggs laid in May and June 2006. So this is the first record of bivoltine development of *E. najas* under natural conditions and the first central European record of a bivoltine life cycle of *E. lindenii* and *A. imperator*. Probably part of the population of central European coenagrionids has two generations per year, while the main cohort emerges one year after oviposition." (Author)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**6026.** Schneider, T.; Müller, O. (2006): Der Endemit *Boyeria cretensis*: Beobachtungen zur Verhaltensbiologie der Imagines (Odonata: Aeshnidae). *Libellula* 25 (3/4): 135-146. (in German, with English summary). ["Because of its very restricted distribution and its high level of stenotopy, *B. cretensis* belongs to one of the most threatened European dragonfly species. The distribution of this endemic dragonfly is restricted to rivulets with permanent water and pronounced gallery vegetation in a narrow belt between 50 and 400 m a.s.l. belonging to the thermomediterranean and mesomediterranean zone of the island of Crete. The behaviour of the species was studied at several rivulets in Crete and interpreted in connection with the biotope. The species shows a clear preference for shaded rivulets. Different strategies during patrolling, hunting and oviposition were described. The current agricultural policy of the European Community by reducing the survival of *B. cretensis* by changing the water regime of rivulets and by destruction of their gallery vegetation is discussed." (Authors)] Address: Müller, O., Birkenweg 6d, D-15306 Lindendorf OT Libbenichen, Germany. E-mail: olemueller@bioscience-art.de

**6027.** Serrano Meneses, M.A. (2006): Sexual size dimorphism in damselflies, dragonflies and birds: function and development. A thesis submitted for the degree of Doctor of Philosophy, University of Bath, Department of Biology and Biochemistry: 35 pp. (in English). [For the full paper see: <http://www.bath.ac.uk/bio-sci/biodiversity-lab/sexualconflict11.pdf>] Address: not stated

**6028.** Simaika, J.P.; Cannings, R.A. (2006): The Odonata of Hamilton Marsh. Vancouver Island, British Co-

lumbia, Canada. *Notulae Odonatologicae* 6(7): 72-79. (in English). ["Specimen and sight records of Odonata from Hamilton Marsh, a small wetland on the east coast of Vancouver Island, British Columbia, are presented. Thirty-three species [...] are listed. The biogeography of the fauna is discussed - the site lies at a crossroads of several faunal elements - and notes on behaviour, ecology, habitat structure and succession are included." (Authors)] Address: Simaika, J.P., No. 323-3969 Shelbourne Street, Victoria, British Columbia, V8N 6J5, Canada

**6029.** Srivastava, D.S. (2006): Habitat structure, trophic structure and ecosystem function: interactive effects in a bromeliad-insect community. *Oecologia* 149 (3) : 493-504. (in English). ["Although previous studies have shown that ecosystem functions are affected by either trophic structure or habitat structure, there has been little consideration of their combined effects. Such interactions may be particularly important in systems where habitat and trophic structure covary. I use the aquatic insects in bromeliads to examine the combined effects of trophic structure and habitat structure on a key ecosystem function: detrital processing. In Costa Rican bromeliads, trophic structure naturally covaries with both habitat complexity and habitat size, precluding any observational analysis of interactions between factors. I therefore designed mesocosms that allowed each factor to be manipulated separately. Increases in mesocosm complexity reduced predator (damselfly larva) efficiency, resulting in high detritivore abundances, indirectly increasing detrital processing rates. However, increased complexity also directly reduced the per capita foraging efficiency of the detritivores. Over short time periods, these trends effectively cancelled each other out in terms of detrital processing. Over longer time periods, more complex patterns emerged. Increases in mesocosm size also reduced both predator efficiency and detritivore efficiency, leading to no net effect on detrital processing. In many systems, ecosystem functions may be impacted by strong interactions between trophic structure and habitat structure, cautioning against examining either effect in isolation."(Author)] Address: Srivastava, Diane S., Department of Zoology and Biodiversity Research Centre, University of British Columbia, 6270 University Blvd., Vancouver, BC, Canada, V6T 1Z4. Email: srivast@zoology.ubc.ca

**6030.** stax (2006): Die Kleinen Boten des Klimawandels. Die Umschichtung der Lebensräume hat begonnen. In der Pfalz beobachtet der Biologe Jürgen Ott die Auswirkungen des Klimawandels an der Ausbreitung der Feuerlibelle. *Die Rheinpfalz* 242: pp? (in German). [Newspaper report on the bioindication of climatic change in the Pfälzerwald-region, Rhineland-Palatinate, Germany stressing Odonata, and the research activities of Dr. Jürgen Ott, chair of the society of the German speaking odonatologists.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O. GmbH@t-online.de

**6031.** Steglich, R.; Müller, J. (2006): Südliche Heidelibelle *Sympetrum meridionale* 2006 auch in der Magdeburger Elbaue. *halophila*, Mitt.-Bl. FG Faun. u. Ökol. Staßfurt 50: 24. (in German). [Magdeburg, Sachsen-Anhalt, Germany; Sept. 2006] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**6032.** Tennesen, K.J. (2006): Description of the larva of *Gomphus sandrius* Tennesen (Odonata: Gomphidae). Proceedings of the Entomological Society of Washington 108(2): 381-388. (in English). ["The final stadium larva of *Gomphus sandrius* Tennesen is described based on reared specimens from Tennessee. The larva is distinct from *G. exilis* Selys and *G. lividus* Selys (the only species in the subgenus *Gomphus* sympatric with *G. sandrius*) by the greater width to length ratio of abdominal segment 9 venter (mean 1.82, range 1.69–1.96 in *G. sandrius* vs. mean 1.43, range 1.23–1.57 in *G. lividus* and mean 1.40, range 1.26–1.52 in *G. exilis*). It differs further from *G. lividus* in the narrower prementum (2.40–2.90 mm vs. 3.00–3.75 mm and shorter antennal segment 3 (1.15–1.35 mm vs. 1.50–1.90 mm). The larva of *G. sandrius* is most similar to the allopatric *G. graslinellus* Walsh, but antennal segment 3 is shorter (*G. sandrius*: mean 1.25 mm, range 1.15–1.35 mm; *G. graslinellus*: mean 1.45 mm, range 1.35–1.55 mm)."] (Author)] Address: Tennesen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennesen@centurytel.net

**6033.** Ternois, V. (2006): Sur la présence d'*Oxygastra curtisii* (Dale, 1834) dans le Parc naturel régional de la Forêt d'Orient et le département de l'Aube (Odonata, Anisoptera, Corduliidae). *Martinia* 22(3): 99-107. (in French, with English summary). [New records of *O. curtisii* in the Champagne-Ardenne region are presented from 2005 for the Département Aude, France.] Address: Ternois, V., CPIE du Pays de Soulaïnes, Domaine de Saint-Victor, F-10200 Soulaïnes-Dhuys, France. E-mail: cpie.pays.soulaïnes@wanadoo.fr

**6034.** Theischinger, G.; Hawking, J. (2006): The complete field guide to dragonflies of Australia. CSIRO Publishing. ISBN 0 643 09073 8 (paperback). 366 pp. (in English) [The book covers all 30 families, 110 genera and 324 species found in Australia. Features: Full colour images of all species. Distribution maps for all species. Separate identification keys for both adults and larvae. Contents: Introduction; Species guide - Zygoptera, Species guide - Epiproctophora/Anisoptera; illustrated glossary; keys to adults; keys to larvae; checklist of species; references and further reading; index of scientific names; index of common names.] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

**6035.** Torralba-Burrial, A.; Ocharan, F.J. (2006): Dispersión y proporción sexual en la emergencia en una población de *Sympecma fusca* (Odonata, Lestidae) en Huesca (NE de España). *Bol. R. Soc. Esp. Hist. Nat. (Sec. Biol.)*, 101 (1-4): 29-36. (in Spanish, with English summary). ["Dispersal is a life-history key trait, which is usually due to the adult flight in Odonata. A population of *S. fusca*, inhabiting a temporary pond in the NE of Iberian Peninsula, was analysed by mark-recapture methods. 236 individuals (101 males, 135 females) were marked between July and October of 2000. Sex ratio at emergence was not significantly different from 1:1 and both sexes dispersed equally. They left the pond upon emergence, and returned neither to it nor its surrounding area in summer. Any marked individual was found neither in the nearest ponds (< 3 km) nor in other ponds of the shire. Overwintering individuals were observed amid the vegetation at pond edge, however there was not any marked one among them. This suggests a total absence of philopatry in this species, unlike behaviour

observed in other lestid damselflies, what is discussed." (Authors)] Address: Ocharan, F.J., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain: E-mail: focharan@oonreo.uniovi.es

**6036.** Tsubaki, Y.; Kato, C.; Shintani, S. (2006): On the respiratory mechanism during underwater oviposition in a damselfly *Calopteryx corneria* (Selys). *Journal of Insect Physiology* 52: 499-505. (in English). ["*C. cornelia* females oviposit almost exclusively underwater in forest streams. Field observation showed that the duration of uninterrupted submerged oviposition ranged between 20 and 120 min and the number of eggs laid was linearly related to the time spent underwater. By holding a damselfly under water in a small jar, we measured the maximum 'submergence potential', which was defined as the time elapsed between placing the insect underwater and asphyxiation. A series of experiments showed that there was no gender difference in the submergence potential. This was about 120 min if a damselfly was allowed to change its position while under water. The submergence potential was shorter if the damselflies were kept motionless, if air bubbles trapped on the wing surfaces were removed by coating with Vaseline or if the water was hypoxic. By contrast, submergence potential was longer if a part of the wings were kept above the water surface, or if the water was agitated using a magnetic stirrer. These results suggest that ovipositing *C. cornelia* females depend for oxygen on the physical-gill action of the thin air layer trapped on the body and wing surfaces. Respiration capacity under water is not likely to be a limiting factor for ovipositing females during the production of a single clutch." (Authors)] Address: Tsubakia, Y., Biodiversity Conservation Research Group, National Institute for Environmental Studies, Tsukuba 305-8506, Japan. E-mail: tsubaki@nies.go.jp

**6037.** Tsuyuki, K.; Sudo, S.; Tani, J. (2006): Morphology of insect wings and airflow produced by flapping insects. *Journal of Intelligent Material Systems and Structures* 17(8-9): 743-751. ["This article describes the results of some experiments concerning wing morphology and flight performance of some flying insects: cicadas, dragonflies, and gadflies. First, the wing structures of these insects are measured down to the minutest detail by a three-dimensional curve-shaped measuring system. The surface shapes of the insect wings are mapped by distinct three-dimensional images. From the three-dimensional images, correlation coefficients are calculated by comparisons of the distribution of undulation on the wings. The surface shapes and the correlation coefficients show a difference in functions for flapping flight between each wing. Second, the distribution of velocity fields around a flapping cicada and a flapping dragonfly are visualized with a PIV system to identify the airflow generated by the wings. The distribution of velocity vectors for one stroke of a dragonfly wing is explained in the article. Additionally, the difference of airflow around the wings of a dragonfly and a cicada are revealed. It is found that the flapping forewing of the dragonfly carries out an important motion in its highly efficient flight." (Authors)] Address: Tsuyuki, K., Dept of Mechanical Systems and Design Engineering, Iwaki Meisei University, Iino 5-5-1, Chuohdai, Iwaki 970-8551, Japan. E-mail: koji@iwakimu.ac.jp



- 6038.** Wallace, I.D.; Lawson, N.J.; Harvey, A.R.; Jones, J.D.C.; Moore, A.A.J. (2006): High-speed photogrammetry system for measuring the kinematics of insect wings. *Applied Optics* 45(17): 4165-4173. (in English). ["We describe and characterize an experimental system to perform shape measurements on deformable objects using high-speed close-range photogrammetry. The eventual application is to extract the kinematics of several marked points on an insect wing during tethered and hovering flight. We investigate the performance of the system with a small number of views and determine an empirical relation between the mean pixel error of the optimization routine and the position error. Velocity and acceleration are calculated by numerical differencing, and their relation to the position errors is verified. For a field of view of 40 mm x 40 mm, a rms accuracy of 30 µm in position, 150 µm/s in velocity, and 750 µm/s<sup>2</sup> in acceleration at 5000 frames/s is achieved. This accuracy is sufficient to measure the kinematics of hoverfly flight." (Authors) The paper contains many references to Odonata.] Address: Moor, A.J., School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, EH14 4AS, United Kingdom. E-mail: a.moore@hw.ac.uk
- 6039.** Wang, Y.P.; Wang, Y.H.; Lu, P.; Zhang, F.; Li, Y. (2006): Diet composition of post-metamorphic bullfrogs (*Rana catesbeiana*) in the Zhoushan Archipelago, Zhejiang Province. *Biodiversity Science* 14(5): 363-371. (in Chinese, with English summary). ["Bullfrogs are listed as one of the 100 worst invasive alien species in the world. They are generalist predators and thus may affect native species through predation. However, in previous diet studies, the food contents of bullfrogs were mostly examined at a single site. From June 30 to August 11 in 2005, we examined the diet composition of post-metamorphic bullfrogs on eight islands (Daisihan, Liheng, Xiushan, Fodu, Taohua, Xiashi, Cezi, and Putuoshan) in the Zhoushan Archipelago, Zhejiang Province, with the stomach flushing method. A total of 391 bullfrogs were measured during the study period, including 113 adults and 278 juveniles. Analyses of stomach contents showed that, for adult bullfrogs, the most important prey items (by diet volume) overall were Decapoda, Coleoptera, Odonata, Mesogastropoda, Raniformes, and Cypriniformes; while for juvenile bullfrogs, they were Decapoda, Coleoptera, Cypriniformes, Odonata, Orthoptera, Hymenoptera, Lepidoptera larvae, Mesogastropoda, and Raniformes. Moreover, prey size and diet volume increased with the body size of both adult and juvenile bullfrogs. The diet composition of primary preys of bullfrogs was significantly different among different islands. The results indicate that bullfrogs exert different predatory influences on native fauna at different sites, and that bullfrogs are generalist predators with extensive ecological impacts on native fauna." (Authors)] Address: Li, Yiming, Key Laboratory of Animal Ecology and Conservation Biology, Institute of Zoology, Chinese Academy of Sciences, Beijing, 100080, China. E-mail: liym@ioz.ac.cn
- 6040.** Weihrauch, F. (2006): Der Zahnkärppling *Gambusia holbrooki* als Prädator von Libelleneiern (Teleostei: Poeciliidae; Odonata: Libellulidae). *Libellula* 25 (3/4): 209-214. (in German, with English summary). ["At an irrigation ditch NE of El Rocío, Huelva province, Andalusia, Spain, on 18 and 21-IX-2006 repeated egg predation by swarms of *C. holbrooki* was observed during the exophytic oviposition of two *Crocothemis* erythraea females and seven *Sympetrum fonscolombii* tandems into open water. Other, endophytically ovipositing Odonata species were not bothered, as well as *C. erythraea* females that were hidden from the fish by carpets of algae or duckweed during oviposition. During all observed interactions, swarms of approximately 20-30 *C. holbrooki* chased the dragonflies immediately after the first dips, attacking the tip of the female's abdomen in a number of cases, and obviously struggling for each sinking egg. The dragonflies responded to these attacks by changing their behaviour from a chain of subsequent dips into the water to single or, at most, triple dips that were followed by rapid changes of oviposition sites. In one exactly noted case, a *S. fonscolombii* tandem performed 42 dips and 25 changes of place in almost two minutes. However, this avoidance behaviour was not successful due to the high fish density in the ditch. Judging from swallowing movements and other reactions of the fish, most eggs seen to be laid were consumed." (Author)] Address: Weihrauch, F., Jägerstr. 21A, D-85283 Wolnzach, Germany. E-mail: Florian.Weihrauch@t-online.de
- 6041.** Weihrauch, F.; Weihrauch, S. (2006): Records of protected dragonflies from Rio Tera, Zamora province, Spain (Odonata). *Boletín Sociedad Entomológica Aragonesa* 38: 337-338. (in English, with Spanish summary). ["Breeding records of *Gomphus graslinii*, *Macromia splendens*, and *Oxygastra curtisii* are provided from Rio Tera, the outlet of Lago de Sanabria, in Zamora province, Castilla y León. With 1000 m a.s.l. this site is the highest altitude at which the three spp. have hitherto been recorded. This is most probably due to the exceptionally warm waters feeding Rio Tera at the outlet that are provided by the summer stratification of the lake." (Authors)] Address: Weihrauch, F., Jägerstr. 21A, D-85283 Wolnzach, Germany. E-mail: Florian.Weihrauch@t-online.de
- 6042.** Wennemann, L. (2006): Kulturelle Entomologie: Insektenterminologie in der deutschen Sprache. *Mitt. dtsh. Ges. allg. angew. Ent.* 15: 435-438. (in German, with English summary). ["German articles in newspapers (Ruhr Nachrichten, Westdeutsche Allgemeine Zeitung, Frankfurter Allgemeine Zeitung, Die Zeit) and general journals (Audimax, Bunte, DB Mobil, Focus, DLG Mitteilungen etc.) were analyzed for their colloquial language containing entomological terms and phrases. Some examples are given here: The German term 'Fliegenfänger' (fly catcher) is used when a goalkeeper has a bad day allowing the opponent team to score avoidable goals. This example is put into the category 'Diptera' whereby the second example 'einmotten' (to put in mothballs) is put into the category 'Lepidoptera'. 'Moskitos Essen' is the name of an ice hockey team from the town Essen (Germany) and is categorized under 'Diptera'. Results show that sayings and entomological terms are often used and found in printed matters. It is obvious that terms associated with the holometabol insect orders such as Hymenoptera, Lepidoptera und Diptera are most frequently used in contrary to hemi- or paurometabol insect orders such as Blattodea, Orthoptera and Odonata. Preliminary explanations are given why certain insect orders are more frequently used than others. This paper should be a new approach to put cultural entomology into focus and to advertise for his diverse, interesting and fascinating scientific topic within the field of entomology." (Author)] Address: Wennemann, L., Jägerstr. 21A, D-85283 Wolnzach, Germany. E-mail: Wennemann.L@t-online.de

mann, L., Napoleonsweg 39, 45721 Haltern am See, Germany. E-mail: ludger.wennemann@t-online.de

**6043.** Westermann, K. (2006): Die Eiablagegehölze der Gemeinen Weidenjungfer (*Lestes viridis*) am südlichen Oberrhein und im Schwarzwald. *Naturschutz am südlichen Oberrhein* 4(2): 239-244. (in German, with English summary). [Baden-Württemberg, German; *Chalcolestes viridis* "lays its eggs into the twigs of woody plants. Until now, I have recorded 49 woody plant species used for oviposition in the southern Upper Rhine plains, and 13 species in the Black Forest. Out of these, 14 species have not been mentioned in the literature before." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**6044.** Westermann, K.; Schiel, F.-J. (2006): Einwanderungsversuche der Schwarzen Heidelibelle (*Sympetrum danae*) in die Oberrheinebene. *Naturschutz am südlichen Oberrhein* 4(2): 245-250. (in German, with English summary). ["From 1976 to 2005, 80 observations of *S. danae* were recorded for the Upper Rhine Valley in the administrative districts Rastatt, Ortenaukreis, Emmendingen, Breisgau-Hochschwarzwald, Freiburg, and Lörrach (federal state of Baden-Württemberg, SW Germany). In six cases, successful reproduction had taken place. In contrast to former times, the species is not autochthonous in the Upper Rhine Valley, but immigrates from the Black Forest and maybe from the Vosges Mountains and the Jura Mountains. The main reason for this decline is probably the almost complete loss of small waters due to hydraulic engineering. swamplands, small ephemeral depressions and ponds, can be created and managed with reasonable effort and therefore should be recreated systematically." (Authors)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**6045.** Westermann, K. (2006): Erster Bodenständigkeitsnachweis der Westlichen Keiljungfer (*Gomphus pulchellus*) für den höheren Schwarzwald. *Naturschutz am südlichen Oberrhein* 4(2): 235-237. (in German, with English summary). ["In the year 2005, we discovered the first evidence of successful reproduction of *G. pulchellus* in higher elevations of the Black Forest at a naturally-looking pond in a park in Hinterzarten at 880 m a.s.l. (Baden-Württemberg, SW Germany). This locality is the highest known reproductive site in central Europe." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**6046.** Westermann, K. (2006): Strategien frisch geschlüpfter *Lestes viridis* zur Vermeidung von Regenschäden (Odonata: Lestidae). *Libellula* 25(1/2): 47-60. (in German, with English summary). ["In detailed daily studies of the emergence of *L. viridis* it was found that newly emerged imagines use several strategies to minimize damage from rain. The most effective one is the ability of the larvae to postpone emergence during rainy or cool weather for up to 14 hours at the emergence site, or by at least one day in the water. In early and late stages of emergence, imagines are relatively insensitive to rain. Larvae attach to the emergence support at angles between 90 and 180 degrees, which frequently provides the imagines with a degree of protection from rain under leaves and oblique stems. In case of sudden onset of heavy rain, imagines are able to climb, flutter

or fly to more protected sites. It is remarkable that in case of rain most larvae choose better protected sites for emergence. Losses caused by rain were approximately 1 % of the total number of imagines emerging." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**6047.** Westermann, K.; Westermann, E. (2006): Zur Phänologie der Gebänderten Heidelibelle (*Sympetrum pedemontanum*) im NSG „Elzwiesen“ in den Jahren 2003 bis 2005. *Naturschutz am südlichen Oberrhein* 4(2): 251-257. (in German, with English summary). ["Our results show that the periods of emergence and flight activity of *S. pedemontanum* in Baden-Württemberg, Germany are much more extended than formerly known. In most cases, emergence was not notably synchronised. Reproductive activities lasted almost until the end of the flight period. The maximum life span of imagoes of *S. pedemontanum* was determined as at least 56 days." (Authors)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**6048.** Wikelski, M.; Moskowitz, D.; Adelman, J.S.; Cochran, J.; Wilcove, D.S.; May, M.L. (2006): Simple rules guide dragonfly migration. *Biology letters* 3(2): 325-329. (in English). ["Every year billions of butterflies, dragonflies, moths and other insects migrate across continents, and considerable progress has been made in understanding population-level migratory phenomena. However, little is known about destinations and strategies of individual insects. We attached miniaturized radio transmitters (ca 300 mg) to the thoraxes of 14 individual dragonflies (common green darners, *Anax junius*) and followed them during their autumn migration for up to 12 days, using receiver-equipped Cessna airplanes and ground teams. Green darners exhibited distinct stopover and migration days. On average, they migrated every 2.9G0.3 days, and their average net advance was 58G11 km in 6.1G0.9 days (11.9G2.8 kmdL1) in a generally southward direction (186G528). They migrated exclusively during the daytime, when wind speeds were less than 25 km hL1, regardless of wind direction, but only after two nights of successively lower temperatures (decrease of 2.1G0.6 8C in minimum temperature). The migratory patterns and apparent decision rules of green darners are strikingly similar to those proposed for songbirds, and may represent a general migration strategy for long-distance migration of organisms with high self-propelled flight speeds." (Authors)] Address: Wikelski, M., Department of Ecology and Evolutionary Biology, and 4Woodrow, Wilson School, Princeton University, Princeton, NJ 08544, USA. E-mail: wikelski@princeton.edu

**6049.** Wildermuth, H. (2006): Reciprocal predation involving Odonata, Asilidae and Saltatoria. *International Journal of Odonatology* 9(2): 225-234. (in English). ["A singular observation of an adult *Tettigonia viridissima* (Tettigoniidae) that captured a female *Eutolmus rufibarbis* (Asilidae) sucking a male *Lestes sponsa* (Lestidae) is reported. The reciprocal predation of Odonata, Asilidae, and Saltatoria (Ensifera, Caelifera) hitherto recorded in Europe is compiled and augmented by unpublished data on asilids as predators of odonates. Heavy predation by robberflies may occur only on grasshoppers and dragonflies; all other reciprocal predation events are occasional." (Author)] Address: Wildermuth,

H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**6050.** Wildermuth, H. (2006): Verhaltensgesteuerte Thermoregulation bei *Somatochlora flavomaculata* (Odonata: Corduliidae). *Libellula* 25(1/2): 31-46. (in German, with English summary). ["The species is a 'flier' that typically regulates its body temperature by physiological means. In a field study on the Alpine foothills it was shown that it also thermoregulates behaviourally. The flight activity ranged from 19 to 35°C ambient temperature. Below 28°C males patrolled exclusively in the sun, and basking individuals achieved optimal incident insolation by adopting an appropriate posture. Above 32.5°C active males stayed completely in the shade of trees and bushes. Between 28 and 32.5°C all transitions existed: more than half of the males patrolled partly in the shade, while the others flew either completely in the sun or entirely in the shade. As ambient temperatures rose, on their patrol stretches, males had a tendency to stay longer in the shade than in the sun. At high temperatures they often perched on the shaded side of a plant stem with their body axis pointing towards the sun. The results are discussed in the context of the relation between physiological and behavioural thermoregulation by 'fliers', especially Corduliidae." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**6051.** Worthen, W.B.; Jones, C.M. (2006): Relationships between body size, wing morphology, and perch height selection in a guild of Libellulidae species (Odonata). *International Journal of Odonatology* 9(2): 235-250. (in English). ["Ten common libellulid species perch along the shoreline of lakes and ponds in South Carolina, USA. We collected individuals at five ponds throughout summer 2005, weighed them in the field, and calculated wing loading ( $N\cdot m^{-2}$ ) and wing aspect ratios from digital photographs. We measured the perch-height preferences of these species in 'low perch' (10, 20, 30, and 40 cm) and 'high perch' (20, 40, 60 and 80 cm) experiments. Flywheel anemometers recorded wind speeds at each perch height. Species differed significantly in mean body mass, spanning nearly an order of magnitude from *Perithemis tenera* (67 mg) to *Libellula vibrans* (633 mg). There were also significant differences in wing morphology that correlated with mean mass; larger species had greater wing loadings and greater wing aspect ratios than smaller species. Species also differed significantly in their perch-height preferences in both experiments, in a manner correlating with body mass and hindwing aspect ratios. *Erythemis simplicicollis* and *P. tenera* preferred short perches, *Celithemis fasciata*, *Pachydiplax longipennis* and *Platthemis lydia* used perches of intermediate height, and *Libellula auripennis*, *L. cyanea*, *L. incesta*, *L. luctuosa*, and *L. vibrans* preferred the tallest perches. Because mean wind speed and maximum wind speed also increased with perch height, larger species may prefer taller perches to experience greater wind speed and generate more compensatory lift to offset their larger wing loadings. However, it is also possible that correlations between body mass and perch height are the result of large species competitively restricting smaller species to lower perches." (Authors)] Address: Worthen, W.B., Biology Department, Furman University, Greenville, SC 29613, USA. E-mail: worthen@furman.edu

**6052.** Xu, Q-h. (2006): A New Species of the Genus *Cephalaeschna* (Odonata: Aeshnidae) from Fujian Province, China. *Entomotaxonomia* 28(2): 94-96. (in Chinese, with English summary). [*Cephalaeschna shaowuensis*, sp. nov. is described and illustrated (Abdomen: female 54 mm, hindwing female 50 mm.). It "is closely similar to *Cephalaeschna risi* Asahina in frons/head ratio, ovipositor processes and colour pattern of synthorax, but different from the latter and other species of *Cephalaeschna* as follows: 1) body form larger; 2) ground colour of body black; 3) dorsal stripes shorter and smaller; 4) venation closer; 5) base of wing amber-yellow; 6) the abdominal colour pattern is very distinct, namely, on dorsum only segments I-II have stripes, but on sides there are different markings on segments I-IX." Holotype: female, Shaowu City, Fujian Province, 19-VII-2004, coll. XU Qi-han. The type specimen is deposited in Zhangzhou Education College, Fujian, China.] Address: Xu Qi-han, Zhangzhou Education College, Zhangzhou, Fujian 363000, China

**6053.** Xu, Q.-h. (2006): *Coeliccia mingxiensis* sp. nov. from Fujian, China (Odonata: Platycnemididae). *International journal of odonatology* 9(2): 251-254. (in English). [*Coeliccia mingxiensis* Xu, 2006; holotype male: 26-VIII-2004, Mingxi County, Fujian Province, China; deposited at Zhangzhou Education College, Fujian, China.] Address: Xu, Qi-han, Zhangzhou Education College 363000, Fujian, China. E-mail: qihanx@yahoo.com.cn

**6054.** Xu, Q.-H. (2006): The genus *Prodasineura* Cowley in China (Odonata, Protoneuridae). *Acta Zootaxonomica Sinica* 31(4): 807-810. (in English, with Chinese summary). [Nine species of the genus *Prodasineura* from China are dealt with and keys for their identification are given. *Prodasineura fujianensis* Xu, 2006 is described.] Address: Xu, Qi-han, Zhangzhou Education College 363000, Fujian, China. E-mail: qihanx@yahoo.com.cn

**6055.** Xu J.; Zhao C.; Zhang, Y.; Zhang, Y. (2006): Effect of flapping trajectories on the dragonfly aerodynamics. *Chinese Science Bulletin* 51(7): 777-784. (in English). ["The effects of translational, figure-eight and double-figure-eight flapping trajectories on the dragonfly aerodynamics were numerically studied by solving the Navier-Stokes equations. There is a common characteristic regarding the lift/drag force coefficients that the downstroke flapping provides the lift forces while the upstroke flapping creates the thrust forces for different flapping trajectories. The maximum lift force coefficient exceeds five for the translational trajectory. It is greater than six for the figure-eight and double-figure-eight flapping trajectories, which is sufficiently larger than unity under the steady state flight condition. The ellipse and double-figure-eight flapping trajectories yield the decrease of the lift force, while the figure-eight flapping trajectory yields higher lift force as well as the thrust force than the translational flapping one. During the insect flight, the wing flapping status should be changed instantaneously to satisfy various requirements. Study of the flapping trajectories on the insect aerodynamics is helpful for the design of the Micro-air-vehicles (MAVs)." (Authors)] Address: Xu, Jinliang, Micro Energy System Laboratory, Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences, Guangzhou, 510640, China. Email: xujl@ms.giec.ac.cn



- 6056.** Yang, G.-H.; Mao, B.-Y.; Zhang, D.-Z. (2006): A new species of the genus *Asiagomphus* *Asahina* from Yunnan, China (Odonata, Gomphidae). *Acta Zootaxonomica Sinica* 31(4): 811-812. (in Chinese, with English summary). [*Asiagomphus gongshanensis* sp. nov. is described and depicted. The new species is similar to *A. personatus* (Selys), but differs from the latter by its rather smaller size; 2) the lack of an antehumeral stripe on the synthorax and 3) a black anteclypeus with a central yellow spot. The specimen is deposited in the Department of Science and Chemistry, Dali College, Yunnan. Etymology: The new species is named after its type locality. Holotype male, Mt. Gaoligong, Baoshan, Yunnan, China, 31 July 2005, leg. Mao Ben-Yong] Address: Yang, Guo-Hui, Department of Science and Chemistry, Dali College, Yunnan 671000, China. E-mail: yanggh727@sina.com
- 6057.** Yeh, W.-C., (2006): Three dragonflies (Odonata) newly recorded in Taiwan. *Formosan Entomol.* 26: 187-195. (in English). [*Sinolestes edita*, *Zyxomma obtusum*, and *Macromidia ishidae* are reported from Taiwan for the first time. Morphological diagnosis of both sexes of the three species is provided, including descriptions of their habitats and ecological habits.] Address: Yeh, Wen-Chi, Division of Forest Protection, Taiwan Forestry Research Institute, 53 Nanhai Road, Taipei 100, Taiwan. E-mail: wcyeh@ftri.gov.tw
- 6058.** Yusa, Y.; Sugiura, N.; Wada, T. (2006): Predatory potential of freshwater animals on an invasive agricultural pest, the apple snail *Pomacea canaliculata* (Gastropoda: Ampullariidae), in southern Japan. *Biological Invasions* 8: 137-147. (in English). ["The apple snail *Pomacea canaliculata* is an invasive species and a serious pest of rice in many Asian countries. We studied predatory activities of various animals living in Japanese freshwater habitats, by keeping each individual of a potential predator species with 36 snails of various sizes for three days in the aquarium. Forty-six species were tested, and 26 in eight classes fed on small snails. A species of leech, crabs, the common carp, turtles, the mallard duck and the Norway rat attacked even adult snails of 20–30 mm in shell height. These findings will be helpful in identifying effective predators for biological control of the pest snail. In addition, most of the animals attacking snails are reported to be common in rivers or ponds, but few live in modernized paddy fields having little connections with natural water systems. This may be a reason why this snail maintains large populations in paddy fields but not in other freshwater habitats." (Authors) *Sieboldius albardae*, *Anotogaster sieboldii*, *Anax parthenope*, *Macromia amphigena*, and *Pantala flavescens* were tested for their predatory potential. They seem to be of minor importance as predators of the snails, and if, only for early stages of the snails.] Address: Yusa, Yoichi, Faculty of Science, Nara Women's University, Kitaouya-Nishimachi, Nara 630-8506, Japan. E-mail: yusa@cc.nara-wu.ac.jp
- 6059.** Zessin, W. (2006): Zwei neue Insektenreste (Megasecoptera, Odonoptera) aus dem Westfalium D (Oberkarbon) des Piesberges bei Osnabrück, Deutschland. *Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 9(1): 37-45. (in German, with English summary). ["Two new fossil insects, one belongs to the Megasecoptera: *Brodidiidae*, *Pyobrodia janseni* n. sp., the other to the Odonoptera: *Meganeuridae*, *Piesbergitupinae* n. subfam., *Piesbergitupus hielscheri* n. gen. et sp. from Westphalian D (Upper carboniferous) beds of the Piesberg quarry in the north of Osnabrück (Lower Saxony, Germany) are described. For *Stephanotypus schneideri* Zessin, 1983 (Odonoptera, Meganeuroptera) a new subfamily *Stephanotypinae* n. subfam. is erected." (Author)] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zooschwerin.de
- 6060.** Zhang, B.; Ren, D.; Zhou, Ch.-q.; Pang, H. (2006): New genus and species of fossil dragonflies (Insecta: Odonata) from the Yixian Formation of Northeastern China. *Acta Geologica Sinica* 80(3): 327-335. (in English). ["Two well-preserved fossil dragonflies from the Late Mesozoic Yixian Formation, Liaoning Province, China are described and assigned to a new genus, *Sopholibellula* gen. nov. in *Araripelibellulidae* Bechly, 1996, closely related to the type genus *Araripelibellula*. This new genus differs from *Araripelibellula* in the following characters: origins of RP and MA distinctly separated at arculus in both pairs of wings; anal loop wider and shorter, with Y-shaped veins inside; MA and IR2 not zigzag; several small intercalary veins present in the postdiscoidal area of hindwing; cells smaller and much more dense, especially in the apex and hind margin; bigger in size. Structures, including head, abdomen and parts of legs, were first described in details of this family." (Authors)] Address: Ren Dong, College of Life Sciences, Capital Normal University, Beijing 100037, China. E-mail: rendong@mail.cnu.edu.cn
- 6061.** Zhang, B.-L.; Fleck, G.; Huang, D.Y.; Nel, A.; Ren, D.; Cheng, X.-D.; Lin, Q.B. (2006): New isophlebioid dragonflies (Odonata: Isophlebioptera: Camptero-phlebiidae) from the Middle Jurassic of China. *Zootaxa* 1339: 51-68. (in English). ["Three new representatives of the Odonata *Camptero-phlebiidae* are described from the Middle Jurassic of Daohugou (Inner Mongolia, China), i.e. *Amnifleckia guttata* n. gen., n. sp., *Amnifleckia splendida* n. sp., and *Parabrunetia celinea* n. gen., n. sp. Their close affinities with the genus *Pteropteron* (Dogger of Kirgizia) support a similar age for the Daohugou fauna." (Authors)] Address: Ren, D., College of Life Science, Capital Normal University, 105 Xisanhuanbeilu, Haidian District, Beijing, 100037, P.R.China, China. E-mail: rendong@mail.cnu.edu.cn
- 6062.** Zhang, Zh.; Hong, Y.; Lu, L.; Fang, X.; Jin, Y. (2006): *Shenzhousia qilianshanensis* gen. et sp. nov. (Protodonata, Meganeuridae), a giant dragonfly from the Upper Carboniferous of China. *Progress in Natural Science* 16(3): 328-330. (in English). ["A new dragonfly of family *Meganeuridae* *Shenzhousia qilianshanensis* gen. et sp. nov., discovered from Ningxia Hui Autonomous Region in North China, is described in the present paper. It has an estimated wingspan of about 450–500 mm and may be the largest fossil insect in Late Carboniferous Namurian Stage discovered by far. The new species is referred to *Meganeuridae* because of the presence of the characteristic oblique vein between anterior branch of radius (RA) and posterior branch of radius (RP) near the base of RP2. It differs from other genera within the family in the following characteristics: Precostal area short and not extending to the midwing; posterior branch of subcostal vein short, merging into costal vein near the level of originating point of IR2; RP forking earlier than anterior branch of media basally; RP1+2 and RP3+4 parallel and close to each other for a long distance, and then diverge gradually surpass

midwing." (Authors)] Address: Zhang Zhijun, Department of Palaeontology, The Geological Museum of China, Beijing, 100034, China

**6063.** Zhou, X.; Zhou, W.-b. (2006): Two new species of the family Chlorocyphidae (Odonata) from China. *Entomotaxonomia* 28(1): 13-16. (in Chinese, with English summary). ["The paper reports two new species of the Family Chlorocyphidae. *Heliocypha huai*, sp. nov.: Measurements (mm): Male abdomen+anal appendages 23, hind wing 24. This species is similar to *Heliocypha malanensis* (Zhou et Bao), but differs from the latter as follows: 1) labrum black; 2) a narrow distal stripe just below the second lateral suture on thorax; 3) 2nd abdomen segment with a middorsal orange marking. Holotype: male, Jianfengling, Hainan Province, 2I-IX-1981, Coll. HUA Li-zhong; Paratype: 1 male, same date as holotype. *Indocypha chishuiensis*, sp. nov.: Measurements (mm): Male abdomen+anal appendages 24, hind wing 25. This species is closely allied to *Indocypha katharina* (Needham), but easily distinguishable by the following characters: 1) 1 reddish yellow "+" shaped marking in dorsal center of 2nd abdomen segment; 2) 1 large triangular marking on 3rd abdomen segment; 3) a pair of subapical transverse spots on 4th abdomen segments. Holotype: male, Jinshagou, Chishui City, Guizhou Province, 31-VII-2000, Coll. LI Zi-zhong. The type specimens are deposited in the Zhejiang Museum of Natural History, China." (Authors)] Address: Zhou, X., Zhejiang Museum of Natural History, Hangzhou, Zhejiang 310012, China

**6064.** Živic, I.; Markovic, Z.; Brajkovic, M. (2006): Influence of the temperature regime on the composition of the macrozoobenthos community in a thermal brook in Serbia. *Biologia, Bratislava* 61(2): 179-191. (in English). ["In contrast to cold and eurythermal waters, benthic communities of warm brooks in temperate regions have been inadequately studied. In order to investigate the effects of water thermal regime on the benthic communities of warm waters and their relationships with those of cold and eurythermic ones, the macrozoobenthos was studied at eight sites in the Toplica River, and at four sites in its tributary, the Termalni brook. Investigations were carried out seasonally from April 2000 to January 2001. Warm waters of the Termalni brook were characterized by specific macrozoobenthos assemblages that exhibited significant differences to the populations of eurythermal and cold waters of the Toplica River. The dominant taxa in the macrozoobenthos community of warm waters were mainly Gastropoda species. Moreover, benthic communities of warm waters were characterized by lower diversity and greater biomass in comparison with those of cold and eurythermal waters. The gradient of average annual temperatures represented the main ecological factor influencing changes of diversity and biomass along the course of the investigated Termalni brook. Inflow of warm waters at site T6 lead to a decrease in macrozoobenthos abundance and changes in qualitative and quantitative composition of the benthocoenosis of a highland stream, but did not significantly alter diversity." (Authors) Odonata are referred on the order-level at several occasions. In the appendix are documented records of *Cordulegaster boltonii*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, and *Orthetrum albistylum*.] Address: Zivic, Ivana, Faculty of Biology, University of Belgrade, 11000 Belgrade, Serbia and Montenegro. E-mail: ivanas@bf.bio.bg.ac.yu

**6065.** Zuanon, J.; Bockmann, F.A.; Sazima, I. (2006): A remarkable sand-dwelling fish assemblage from central Amazonia, with comments on the evolution of psammophily in South American freshwater fishes. *Neotropical Ichthyology* 4(1): 107-118. (in English). [The night-time forager, *Gymnorhamphichthys rondoni* (Rhamphichthyidae), preys on Gomphidae larvae.] Address: Zuanon, J., CPBA, Caixa Postal 478, INPA-Instituto Nacional de Pesquisas da Amazônia, 69083-970 Manaus, Amazonas, Brazil. E-mail: zuanon@inpa.gov.br

**6066.** Zuellig, R.E.; Kondratieff, B.C.; Schmidt, J.P.; Durfee, R.S.; Ruitter, D.E.; Prather, I.E. (2006): An annotated list of aquatic insects of Fort Sill, Oklahoma, excluding Diptera with notes on several new state records. *Journal of the Kansas Entomological Society* 79(1): 34-54. (in English). ["Qualitative collections of aquatic insects were made at Fort Sill, Lawton, Oklahoma, between 2002 and 2004. Ephemeroptera, Plecoptera, Trichoptera, Odonata, Coleoptera, aquatic Heteroptera, Neuroptera, and Megaloptera were targeted. Additional records are included from a survey that took place in 1999. More than 11,000 specimens from more than 290 collections were examined. Based on the current understanding of aquatic insect systematics, 276 taxa distributed over 8 orders, 46 families, and 141 genera were identified. Twenty-three of the 276 taxa [...] are reported from Oklahoma for the first time. The three most diverse orders included Coleoptera (86 species), Odonata (67 species) and Trichoptera (59 species), and the remaining taxa were distributed among Heteroptera, (30 species), Ephemeroptera (21 species), Plecoptera (6 species), Megaloptera (4 species), and Neuroptera (3 species). Based on previous published records, many of the species collected during this study were expected to be found at Fort Sill; however, 276 taxa of aquatic insects identified from such a small geographic area is noteworthy, especially when considering local climatic conditions and the relatively small size of Fort Sill (38,300 ha). Despite agricultural practices in Oklahoma, the dust bowl days, and the development of water-based recreation at Fort Sill, a high percentage of the total known aquatic insect fauna of Oklahoma can be found in a small geographic area." (Authors)] Address: Zuellig, R.E., U. S. Geological Survey, Denver Federal Center, MS 415, Denver, Colorado 80225, USA

**6067.** Clarke, G.M.; Spier-Ashcroft, F. (2006(?)): A review of the conservation status of selected Australian non-marine invertebrates. <http://www.deh.gov.au/biodiversity/threatened/action/non-marine-invertebrates/index.html>: III, 142 pp. (in English). [This review represents a first attempt to objectively assess the conservation status of a selected suite of the over 300000 Australian non-marine invertebrates. Any attempt to provide a detailed and comprehensive overview of the conservation status of such a large and diverse group is obviously impractical. The authors have taken a selection of 25 taxa (including 'Petalura species': *P. gigantea* and *P. litorea* on pages 90-94) that are representative of the diversity of our invertebrate fauna, their geographic distribution, different habitat requirements and associations and potential threats. For each selected species the following information is provided: General taxonomic status of the species, including an illustration; 2. Species survival status; 3. Species distribution – a map of current distribution is provided at the end of each synopsis overlaid with Conservation and Protected Areas; 4. Ha-

bitat details; 5. Biological overview; 6. Significance – details of the biological, ecological, and scientific significance of the species which have contributed to its inclusion in the plan; 7. Threats; 8. Conservation objectives; 9. Conservation actions already initiated for the taxon; 10. Conservation actions required for long-term conservation of the species. This section is subdivided into research and management needs. 11. A list of relevant experts who provided information. Available at: <http://www.deh.gov.au/biodiversity/threatened/action/non-marine-invertebrates/index.html>]

## 2007

**6068.** Brooks, S. (2007): The dragonflies of Europe. *Zoological Journal of the Linnean Society* 149(1): 139. (in English) [Review of the second edition of the classic book of Askew (see OAS 4113).] Address: Brooks, S.J., Entomology, The Natural History Museum, Cromwell Road, London, SW7 5BD, United Kingdom

**6069.** Burgmer, T.; Hillebrand, H.; Pfenninger, M. (2007): Effects of climate-driven temperature changes on the diversity of freshwater macroinvertebrates. *Oecologia* 151: 93-103 (in English) ["Increasing temperatures due to climate change were found to influence abundance and timing of species in numerous ways. Whereas many studies have investigated climate-induced effects on the phenology and abundance of single species, less is known about climate-driven shifts in the diversity and composition of entire communities. Analyses of long-term data sets provide the potential to reveal such relationships. We analysed time series of entire communities of macrozoobenthos in lakes and streams in Northern Europe. There were no direct linear effects of temperature and climate indices (North Atlantic Oscillation index) on species composition and diversity, but using multivariate statistics we were able to show that trends in average temperature have already had profound impacts on species composition in lakes. These significant temperature signals on species composition were evident even though we analysed comparatively short time periods of 10–15 years. Future climate shifts may thus induce strong variance in community composition." [...] "Species correlated with high Trend-Temp, and thus likely to increase both in abundance and range, were: ... *Coenagrion* sp./Zygoptera, Libellulidae indet./Anisoptera, ..."] (Authors) Address: Burgmer, Tanja; Aquatic Ecology, Institute for Botany, University of Cologne, Gyrhofstr. 15, 50931 Köln, Germany. E-mail: [tanja.burgmer@uni-koeln.de](mailto:tanja.burgmer@uni-koeln.de)

**6070.** Cordero Rivera, A. (Ed.) (2007): Forests and Dragonflies (4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005). Pensoft Series Faunistica 61, ISSN 1312-0174: 300pp. (in English). ["Over the world, forests provide diverse habitats for a range of organisms, including dragonflies and other animals, that at a first sight seem not to depend on forests. For instance, *Macromia splendens*, one of Europe's most endangered dragonflies, uses forest roads as hunting places, and larvae are sometimes found amongst tree roots. As the authors of this book show, dragonflies are highly dependent on forest cover and composition, and this is true from the boreal forests to the tropics. The aim of this book is therefore to explore the ways in

which forests affect dragonfly life, and to show that forests are much more than places where timber is produced." (Publisher) Table of content: Adolfo Cordero Rivera: Introduction: Dragonflies as forest-dependent animals 7; Corbet, P.S.: Forests as habitats for dragonflies (Odonata) 13; Graga, M.: Allochthonous organic matter as a food resource for aquatic invertebrates in forested streams 37; The Importance of Forests for Dragonflies in Different Continents: Orr, A.G.: Odonata in Bornean tropical rain forest formations: diversity, endemism and implications for conservation management 51; Paulson, D.: The importance of forests to neotropical dragonflies 79; Fincke, O.M.: Use of forest and tree species, and dispersal by giant damselflies (Pseudostigmatidae): future prospects in fragmented forests 103; Dijkstra, K.-D. & Clausnitzer, V.: Thoughts from Africa: how can forest influence species composition, diversity and speciation in tropical Odonata? 127; Sahlin, G.: Specialists vs. generalists among dragonflies - the importance of forest environments in the formation of diverse species pools 153; Tsubaki, Y. & Tsuji, N.: Dragonfly habitat maps based on landcover and habitat relation models 181; Conservation and Behavioral Issues: Samways, M.: Threat levels to odonate assemblages from invasive alien tree canopies 209; Taylor, P.: Movement behaviours of a forest odonate in two heterogeneous landscapes 225; Thompson, D.J. & Watts, Ph.C.: The structure of the *Coenagrion mercuriale* populations in the New Forest, southern England 239; Watanabe, M.: Mate location and competition for mates in relation to sunflecks of forest floors 259; Cordoba-Aguilar, A. & Contreras-Garduño, J.: Differences in immune ability in forest habitats of varying quality: dragonflies as study models 269; Hadrys, H.: The present role and future promise of conservation genetics for forest Odonates 279] Address: [www.pensoft.net](http://www.pensoft.net)

**6071.** Dallas, H.F.; Day, J.A. (2007): Natural variation in macroinvertebrate assemblages and the development of a biological banding system for interpreting bioassessment data—a preliminary evaluation using data from upland sites in the south-western Cape, South Africa. *Hydrobiologia* 575: 231-244 (in English): ["The variability of macroinvertebrate assemblages - (including Odonata on the family level) - was investigated at 27 upland reference sites in the south-western Cape, South Africa. Multivariate analyses showed that sites did not group on the basis of geomorphological zonation, i.e. mountain stream and foothill-cobble bed. When separate analyses were undertaken for mountain stream (n = 21) and foothill-cobble bed sites (n = 6), assemblages formed three and two groups, respectively. Similarity amongst groups ranged from 47% to 52%, while within-group similarity was between 54% and 67%. Environmental variables shown to contribute to this variability included distance from source, cation ratio ( $([Na^+]+[K^+])/([Na^+]+[K^+]+[Ca^{2+}]+[Mg^{2+}])$ ), pH, longitude and stream width. Whilst overall variability in the metrics of the biotic index, SASS (South African Scoring System), is high at reference sites, the interpretation of monitoring-site data using biological bands derived from a range of reference sites, ensured that variability was taken into account and that detection of disturbance at a monitoring site was not impeded. A biological banding system has been developed for upland sites in the south-western Cape, together with a list of reference or expected SASS-taxa. This list includes details pertaining to seasonality and biotope preferences. The ability to define reference conditions that take



intrinsic variability amongst reference sites into account is important for the accurate interpretation of bioassessment data." (Authors) Address: Dallas, Helen, Department of Zoology, University of Cape Town, Private Bag Rondebosch, Cape Town, Western Cape 7700, South Africa. E-mail: hdallas@botzoo.uct.ac.za

**6072.** Groeneveld, L.F.; Clausnitzer, V.; Hadrys, H. (2007): Convergent evolution of gigantism in damselflies of Africa and South America? Evidence from nuclear and mitochondrial sequence data. *Molecular Phylogenetics and Evolution* 42(2): 339-346 (in English) [Extreme large body size is rare in modern Zygoptera (damselflies). Only the South and Central American damselfly family Pseudostigmatidae and one African species, *Coryphagrion grandis*, share the morphological trait of gigantism. By means of phylogenetic analyses using two mitochondrial markers (16S rDNA and ND1) and one nuclear marker (EF1) in combination with an existing morphological data set, we trace the evolution of gigantism in damselflies. Individual and combined data sets were analyzed using the maximum parsimony, minimum evolution and maximum likelihood algorithms. Regardless of the algorithm used and the data set analyzed all principal tree topologies support a monophyly of the damselfly taxa displaying giant body size. This supports the view that the evolution of gigantism in damselflies from Africa and South America is not the result of convergent evolution due to strikingly similar habitat preferences, but rather the result of close genealogical relationship. Because modern odonates evolved before the split of Africa from Gondwanaland, the proposed phylogeny suggests that *C. grandis* represents a Gondwana relict.] Address: Hadrys, Heike, ITZ, Ecology and Evolution, TiHo Hannover, Bünteweg 17d, D-30559, Hannover, Germany. E-mail: heike.hadrys@ecolevol.de

**6073.** McCauley, S.J. (2007): The role of local and regional processes in structuring larval dragonfly distributions across habitat gradients. *Oikos* 116(1): 121-133. (in English). ["Despite the importance of community-structuring processes operating at both local and regional scales, there is relatively little work examining both forces within a single system. I used a combination of observational and experimental approaches to examine the processes structuring larval dragonfly distributions in lentic habitats that encompass a gradient of both permanence and top predator type. I compared the relative vulnerability of species to predators from different portions of this gradient to assess the role of predation as a local force structuring communities. I also assessed the role of regional processes on species' distributions by examining species' propensity to disperse to and colonize artificial ponds distributed across a landscape. In both studies I contrasted habitat specialist species, which had larvae restricted to permanent lakes, with habitat generalist species, which had larvae that occur broadly across the habitat permanence and top predator transition. Results from this work suggest that dispersal and colonization behavior were critical mechanisms restricting the distributions of habitat specialist species, but that predation may act to reinforce this pattern. The habitat specialists dispersed less frequently, colonized artificial ponds less often when they did reach them, and most moved shorter distances than the habitat generalist species. Habitat specialists were also more vulnerable than habitat generalists to an invertebrate top predator with which they do not co-exist.

Results from these studies suggest that species distributions can be shaped by processes operating at both regional and local spatial scales. The role of dispersal and recruitment limitation may be generally underestimated as a force shaping species distributions and community structure across habitat gradients in which there is a transition in both the biotic interactions and the disturbance interval across that gradient." (Author)] Address: McCauley, S. J., Center for Population Biology, One Shields Avenue, 2320 Storer Hall, Univ. of California, Davis, CA 95616, USA. E-mail: sjmccauley@ucdavis.edu

**6074.** Moseley, M. (2007): Acadian biospeleology: composition and ecology of cave fauna of Nova Scotia and southern New Brunswick, Canada. *International Journal of Speleology* 36(1): 1-21. (in English) ["The vertebrate and invertebrate fauna, environment and habitats of caves and disused mines in Nova Scotia and southern New Brunswick are provisionally catalogued and described, based on field collections made over many years. The area was glaciated and the subterranean fauna consists of non-troglobites all of which have arrived and colonised the caves during or following final recession of the Pleistocene glaciers. The statistical composition of the fauna at the higher taxonomic level is similar to that in Ontario, but is less species rich and there are some notable ecological and other differences. Porcupine dung accumulations are an important habitat in the region, constituting a cold-temperate analogue of the diverse guano habitats of southern and tropical caves. Parietal assemblages are, as in other cold temperate regions, an important component of the invertebrate fauna but here include species derived directly from dung communities: another parallel with tropical guano caves. An unanticipated finding is the number of non-indigenous species now utilising local caves. These appear to have colonised unfilled ecological niches, suggesting that post-glacial recolonisation of the subterranean habitat in Nova Scotia has been relatively delayed. Finally the general and regional significance of the subterranean fauna is briefly discussed." (Author) *Aeshna umbrosa* nymphs, *Aeshna* sp. indet. nymphs, *Cordulegaster maculata* imago, and *Macromia illinoensis* nymphs are compiled as records from the surveyed caves.] Address: Moseley, M., Research Associate, Nova Scotia Museum of Natural History, 1747 Summer Street, Halifax, Canada B3H 3A6. E-mail: moleslei@yahoo.ca

**6075.** Munyuli, M.B.T.; Luther, G.C.; Kyamanywa, S. (2007): Effects of cowpea cropping systems and insecticides on arthropod predators in Uganda and Democratic Republic of the Congo. *Crop Protection* 26(2): 114-126 (in English) ["Knowledge of the distribution, abundance, species diversity and effectiveness of indigenous natural enemies of cowpea pests in Uganda and the Democratic Republic of the Congo (DRC) is poor. Similarly, effects of insecticides commonly used by cowpea farmers on arthropod predators are not well documented in these countries, so effects of insecticides on these natural enemies were monitored in field trials with cowpea grown solely and in association with sorghum or greengram. The abundance of predators (Coccinellidae, Staphylinidae, Syrphidae, Anthocoridae, Mantidae, Dermaptera, ground beetle, predatory mite, lygaeid bugs, Anthocoridae, dragonflies and spiders) were considerably affected by insecticides and the cropping system. Polyculture had a higher index of di-

versity than monocultures. In terms of species diversity supported, there was no significant difference between cowpea/greengram and cowpea/sorghum. There was a seasonal variation in similarity (MS=0.71, long rains; MS=0.77, short rains) of the predator community supported by the cowpea cropping system, between Mulungu (DRC) and Kumi (Uganda) habitats. Lower pests pressure on cowpea crop, higher abundance of predators and higher cowpea yields were observed to be associated with cowpea/greengram cropping systems. Therefore cowpea/greengram should be promoted among other biological control conservation strategies, aiming at enhancing natural enemies in cowpea systems, through habitat manipulation. This study indicated that generalist predators, through their activities might be important natural enemies of cowpea pests in Uganda and in DRC." (Authors) Address: Munyuli, M.B.T., Makerere University Institute of Environment and Natural Resources, P.O. Box 7062, Kampala, Uganda. E-mail. [tmunyuli@yahoo.com](mailto:tmunyuli@yahoo.com)

**6076.** Nummelin, M.; Lodenius, M.; Tulisalo, E.; Hirvonena, H.; Alanko, T. (2007): Predatory insects as bioindicators of heavy metal pollution. *Environmental Pollution* 145(1): 339-347 (in English) ["Heavy metal concentrations of different predatory insects were studied near by a steel factory and from control sites. Waterstriders (Gerridae), dragon fly larvae (Odonata), antlion larvae (Myrmeleontidae) and ants (Formicidae) were analyzed by AAS. In most cases the metal concentrations were higher near the factory, but e.g. waterstriders had higher cadmium concentrations in control area. Discriminant analysis clearly reveals that all these insect groups can be used as heavy metal indicators. However, the commonly used ants were the least effective in indicating the differences between the factory and control sites. Waterstriders are good in detecting differences in iron and manganese, but seem to be poor in accumulating nickel and lead. Antlions are efficient in detecting differences in iron. Antlions and ants are effective in accumulating manganese; as well antlions are efficient in accumulating cadmium. Waterstriders are poor in accumulating lead, but antlions and ants are effective." (Authors). Address: Nummelin, M., Dept for Development Policy, Ministry for Foreign Affairs, P.O. Box 176, FIN-00161 Helsinki, Finland

**6077.** Schorr, M. (2007): Vorläufige Bibliographie der Veröffentlichungen zu den Libellen (Insecta: Odonata) in Deutschland mit Registern zu den Bundesländern und Arten (Arbeitsstand: 02. Februar 2007). *Dragonfly Research* 4: 1-246. (In German, with English abstract) [About 3600 publications referring to the German fauna of Odonata are compiled in a bibliography and keyworded by species and geography.] Address: Schorr, M., Schulstr. 7B, 54314 Zerf, Germany. E-mail. [martinschorr@onlinehome.de](mailto:martinschorr@onlinehome.de)

**6078.** Salur, A.; Mesci, S. (2007): Additional records for the Odonata fauna of Çorum province (Turkey). *Munis Entomology & Zoology* 2(1): 169-170. (in English). [Records from 7 localities representing 20 odonate species are documented.] Address: Salur, A., Hitit University Arts and Sciences Faculty Department of Biology, 19030, Corum, Turkey. E-mails: [alسالur@gmail.com](mailto:alسالur@gmail.com)

**6079.** Salur, A.; Kiyak, S. (2007): Additional records for the Odonata fauna of South-Western Anatolia - Part I: Anisoptera. *Munis Entomology & Zoology* 2(1): 63-78.

(in English). [43 species and subspecies of Anisoptera were collected in the provinces of Antalya, Aydın, Burdur, Denizli, Isparta and Muğla in South-Western Anatolia, April-September between 2000 - 2002. These records are documented in detail.] Address: Salur, A., Hitit University Arts and Sciences Faculty Department of Biology, 19030, Corum, Turkey. E-mails: [alسالur@gmail.com](mailto:alسالur@gmail.com)

**6080.** Shostell, J.M.; Williams, B.S. (2007): Habitat complexity as a determinate of benthic macroinvertebrate community structure in cypress tree reservoirs. *Hydrobiologia* 575: 389-399 (in English). ["We analyzed benthic samples (n = 128) collected from four cypress-tree population areas within a large, shallow Arkansas reservoir over a 2-year period to investigate macroinvertebrate community distribution patterns and their relation to physical and chemical parameters. The calculated biomass, abundance and diversity of the benthic macroinvertebrate community varied significantly both temporally and spatially. Variations of these variables are most likely explained by significant differences in the concentration of carbon and nitrogen in sediments across lake sites, and on a smaller scale, the presence or absence of cypress trees. Benthic macroinvertebrate abundance, biomass, and diversity significantly decreased with distance from tree." (Authors) Tab. 2 lists as an odonate species "Cynacantha sp." (sic). Address: Shostell, J.M., Department of Biology, Penn State University-Fayette, Route 119N, Uniontown, PA 15401, USA. E-mail: [jms88@psu.edu](mailto:jms88@psu.edu)

**Thanks to all who contributed to this issue of OAS!**  
A special thank to Werner Piper, Jürgen Ott, Naoya Ishizawa, Pawel Buczyński, Bernd Kunz, Andreas Martens, Wolfgang Schneider, Reinhard Jödicke, Rosser Garrison, and Rainer Rudolph.

#### Dragonfly Research 4 (2007)

ISSN 1438-034X

- (1) Bibliography on German Odonata as pdf
- (2) Odonatological Bibliography with more than
  - 24100 titles
  - more than 8500 summaries including all OAS
  - collection of more than 2100 pdf

Key word and full text searchable database including the free FuL Reader software.

Windows® required; your hard disc should give space for files with a volume of approximately 1.2 GB.

Available on DVD from:

Martin Schorr, ÖSTLAP; Schulstr. 7B, 54314 Zerf, Germany, [martinschorr@onlinehome.de](mailto:martinschorr@onlinehome.de)

119,- Euro incl. taxes plus shipping

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Landhausstr. 10, D-72074 Tübingen, Germany. Tel. ++49 (0)7071 552928; E-mail: martin@lindeboom.de  
Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105;  
E-mail: K.Reinhardt@sheffield.ac.uk  
Martin Schorr, Schulstr. 7B D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: martinschorr@onlinehome.de

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

1997

**6081.** Anholt, B.R. (1997): Sexual size dimorphism and sex-specific survival in adults of the damselfly *Lestes disjunctus*. *Ecological Entomology* 22(2): 127-132. (in English). ["(1.) A population of adult *Lestes disjunctus* (Odonata: Lestidae) was studied in eastern Ontario, Canada. Mass at sexual maturity and activity rates of individuals were measured. Population density was estimated on transects, while survival rates and population size were estimated using mark-recapture methods. (2.) There was no difference in mass of mated and unmated males. Females were more than 50% heavier than males, and were also more active than males. (3.) Males were almost eight times more abundant on transects than females, but Manly-Parr estimates of male population size were only a maximum of 2.5 times larger than estimates for females. (4.) Males were 2.5 times more likely to be resighted after marking than were females. This accounts for much of the discrepancy between transect estimates and mark-recapture estimates of relative population size. (5.) Daily survival rates of sexually mature females were not significantly less than those of males, and therefore cannot account for a change in sex-ratio from 1 : 1 at emergence to more males than females in sexually mature adults. (6.) Differences in mortality must occur prior to sexual maturity, coincident with the time during which differences in mass gain are also taking place." (Author)] Address: Anholt, B.R., Dept Biology, University of Victoria, PO Box 3020, Victoria, BC, V8W 3N5, Canada; e-mail: banholt@uvic.ca

**6082.** Asahina, S. (1997): Records of Northern Vietnamese Odonata taken by the expedition members from the National Science Museum, Tokyo. 6. Platystictidae, Megapodagrionidae, Lestidae and Synlestidae. *Bull. natn. sci. mus. Tokio Ser. A.* 23(2): 107-113. (in English). ["Seven species of northern Vietnamese damselflies are classified into four families, Platystictidae (1 new species and 1 new subspecies), Megapodagrionidae (1 new species and 1 species previously known from Lower Burma and Laos), Lestidae (1 common South Asiatic species), and Synlestidae (2 species pre-

viously known from Southwest China, etc.)." (Author) *Drepanosticta vietnamica*, *Rhipidolestes owadai*] Address: Asahina, S., 4-4-24 Takadanobaba, Shinjuku-ku, Tokyo 169, Japan

**6083.** Beschovski, V.L.; Gashtarov, V. (1997): *Selysiotthemis nigra* (Vander Linden, 1825) - a new genus and species for the Bulgarian fauna (Odonata: Anisoptera: Libellulidae). *Ent. Zschr.* 107(7): 309-310. (in English, with German summary). [First record of *S. nigra* in Bulgaria. One male specimen on 4-VI-1996 in the small floodplain of the river Melnishka, a left affluent of the river Struma near the town of Melnik.] Address: Beschovski, V.L., Inst. Zool., Bulgarian Acad. Sci., Boul. Tzar Osvoboditel 1, 1000 Sofia, Bulgaria

**6084.** Goutner, V.; Furness, R.W. (1997): Mercury in feathers of Little Egret *Egretta farzetta* and Night Heron *Nycticorax nycticorax* Chicks and in their prey in the Axios Delta, Greece. *Archives of environmental contamination and toxicology* 32(2): 211-216. (in English). ["Mercury concentrations were measured in feathers of little egret and night heron chicks and in their prey in the Axios Delta, Greece. Significantly higher concentrations occurred in night heron than in little egret in 1993. In the night heron the mercury content of feathers was negatively correlated to the size of chicks, possibly due to inhibition of growth. Mercury concentrations were higher than reported for heron feathers in seriously polluted sites in North America and Japan, but the toxic hazard is unclear. Diets differed considerably between the two species due to use of different foraging habitats and this seems responsible for different mercury contents of feathers. Mercury concentrations in the pumpkinseed sunfish *Lepomis gibbosus*, goldfish *Carrassius auratus*, and in dragonfly Odonata larvae were the highest among the prey categories. Frogs and water beetles *Dytiscidae* had moderate concentrations whereas saltwater fish and terrestrial prey had very low mercury concentrations. The implication is that the deltaic marshes are the habitat most polluted with mercury. Night heron chick feathers, freshwater fish and dragonfly larvae could be used to monitor mercury contamination in this region, but use of bird feathers alone could give misleading results if changes in diet occurred." (Authors)] Address: Goutner, V., Dept of Zoology, Aristotle-



lian University of Thessaloniki, GR-540 06, Thessaloniki, Greece

**6085.** Mori, S. (1997): Eco-up design & citizens' participation - from the cases of the dragonfly ponds in Yokohama. *Journal of the Japanese Institute of Landscape Architecture* 60(3): 245-248. (in Japanese, with English translation of the title). [No abstract available. For the full text see: <http://nels.nii.ac.jp/els/contentsdisp.php?id=ART0006477675&type=pdf&lang=en&host=cini&orderno=Z00000005400124&ppvtype=0&langsw=&no=1179656446&cp=>]

**6086.** Olsvik, H. (1997): (Trekkeyenstikker) *Hemianax ephippiger* i Norge, og mulige farste-observasjoner av (takraroeyenstikker) *Aeshna serrata*. *Insekt-Nytt* 22(4): 13-14. (in Norwegian, with English summary). ["The migratory dragonfly *Hemianax ephippiger* is reported from Norway for first time. One male was seen, but not collected, near Moss on 11.08.1995. Also, a large male dragonfly observed at Isejsen, Sarpsborg the same day, was very likely *Aeshna serrata*, not previously recorded from Norway." (Author)] Address: Olsvik, H., N-6694 Foldfjorden, Norway. E-mail: [haolsvik@frisurf.no](mailto:haolsvik@frisurf.no)

**6087.** Proess, R. (1997): Erstnachweis der Gabel-Azurjungfer (*Coenagrion scitulum* Rambur, 1842) in Luxemburg (Insecta, Odonata, Coenagrionidae). *Bull. soc. nat. luxemb.* 98: 129-131. (in German, with English summary). [First record of *C. scitulum* on 24.07.1996 in Luxembourg.] Address: Proess, R., ECOTOP, 6, rue Gustave Kahnt, L-1851 Luxembourg, Luxembourg. E-mail: [ecotop@pt.lu](mailto:ecotop@pt.lu)

**6088.** Saugestad, T. (1997): Stor torvlibelle *Leucorrhinia pectoralis* (Charpentier, 1825) funnet i Hordaland. *Insekt-Nytt* 22(4): 15-17. (in Norwegian, with English summary). [The genus *Leucorrhinia* is represent in Norway with five species, of which only *L. dubia* is common. Two males of the endangered *L. pectoralis* were recorded on 19.07. and 22.07.1997, at Leirvikvatn, Tysnes, HOY. This is the first record from West-Norway. In addition, 10 taxa also recorded at the locality are listed.] Address: Saugestad, T., Gamle Kalvedalsvei 12B, N-5019 Bergen, Norway

**6089.** Tani, J.; Qu, J.; Yamaguchi, E. (1997): Rhythmic movement of dragonfly wing model. *Transactions of the Japan Society of Mechanical Engineers. C* 63 (No. 614): 3390-3395. (in Japanese, with English summary). ["This paper describes the model for insect wing movement with the non-linear oscillator. Living things have flexibility for various environments and on the whole structures keep a function even if a part of them is out of order. Recently, biological properties of living things which are autonomous distributed-systems become the focus of attention. The synchronous phenomenon of the system is applied to insect wing model. The equations of motion for insect wings are derived at first, and then Van del Pol equation is used to produce a non-linear rhythmic force. By solving these equations a rhythmic movement of insect wing model is obtained. It is found that various autonomous vibration can be generated using this model." (Authors) For an English version see Tani et al 1998 (OAS 855).] Address: Tani, J., Tohoku Univ., Inst. Fluid Sci., Katahira 2-1-1; Sendai; Miyagi 9808577; Japan

**6090.** Yabu, S.; Nakashima, A. (1997): Ecological studies on the conservation of *Nannophya pygmaea*

Rambur populations and habitats. *Journal of the Japanese Institute of Landscape Architecture* 60(4): 324-328. (in Japanese, with English summary). [Habitat parameters of *N. pygmaea* in the surroundings of Motegi town, Tochigi Pref., Japan were surveyed. Vegetation and microhabitats within the vegetation preferred by the imagines are outlined. For details see: <http://nels.nii.ac.jp/els/contentsdisp.php?id=ART0006477726>] Address: not transliterated into English

## 1998

**6091.** Flaspohler, D. (1998): A technique for sampling flying insects. *J. Field Ornithol.* 69(2): 201-208. (in English). ["I describe a procedure for sampling flying insects. Using binoculars, a stopwatch, and a hand-held counter, an observer counts insects passing through a measurable focal volume for a set time. No insect identification skills are needed. I tested the accuracy and repeatability of the procedure under controlled conditions and found that with known limitations, it is a reliable way to sample flying insect abundance. I used the procedure to describe daily activity pattern of flying insects using a clearing adjacent to a neotropical lowland forest reserve. While flycatcher and flying insect activity patterns were not strongly correlated, similarities in activity were noted." (Author) The paper contains some references to Odonata.] Address: Flaspohler, D., Department of Wildlife Ecology, A229 Russell Labs, University of Wisconsin-Madison, Madison, Wisconsin 53706 USA

**6092.** Sudo, S.; Tsuyuki, K.; Ikohagi, T.; Ohta, F.; Shida, S.; Tani, J. (1998): Wing structure of dragonfly: 2nd report, wing and flight. *Transactions of the Japan Society of Mechanical Engineers. C* 64(No.625): 3526-3533. (in Japanese, with English summary). ["This paper is concerned with the wing structure and the aerodynamic characteristics of a flying dragonflies. The structural properties of dragonfly wings were studied through the measurements of some morphological parameters. The scanning electron microscopic observation showed the morphological characteristics of the dragonfly wing. Dragonflies (*Sympetrum infuscatum*, *S. kunckeli*) were examined in a small low-turbulence wind tunnel. In the experiment on the measurements of wing flapping, an optical displacement detector was used to measure the displacement of the dragonfly wing. In the experiment on the measurements of the velocity fluctuation, a hot-wire anemometer was used to measure the velocity field. The spectrum of dragonfly flight was revealed by the measurement of velocity fluctuation." (Authors)] Address: Sudo, S., Faculty of Systems Science and Technology, Akita Prefectural University, Yurihonjo 015-0055 Japan

## 1999

**6093.** Ellington, C.P. (1999): The novel aerodynamics of insect flight: applications to micro-air vehicles. *J. exp. Biol.* 202: 3439-3448. (in English). ["The wing motion in free flight has been described for insects ranging from 1 to 100 mm in wingspan. To support the body weight, the wings typically produce 2-3 times more lift than can

be accounted for by conventional aerodynamics. Some insects use the fling mechanism: the wings are clapped together and then flung open before the start of the downstroke, creating a lift-enhancing vortex around each wing. Most insects, however, rely on a leading-edge vortex (LEV) created by dynamic stall during flapping; a strong spanwise flow is also generated by the pressure gradients on the flapping wing, causing the LEV to spiral out to the wingtip. Technical applications of the fling are limited by the mechanical damage that accompanies repeated clapping of the wings, but the spiral LEV can be used to augment the lift production of propellers, rotors and micro-air vehicles (MAVs). Design characteristics of insect-based flying machines are presented, along with estimates of the mass supported, the mechanical power requirement and maximum flight speeds over a wide range of sizes and frequencies. To support a given mass, larger machines need less power, but smaller ones operating at higher frequencies will reach faster speeds." (Author) The paper deals mainly with Diptera, Hymenoptera and Lepidoptera, and contains only passing references to Protodonata and Odonata.] Address: Ellington, C.P., Dept of Zoology, University of Cambridge, Downing Street, Cambridge CB2 3EJ, UK. E-mail: c.ellington@zoo.cam.ac.uk

**6094.** Morse, D.H. (1999): Choice of hunting site as a consequence of experience in late-instar crab spiders. *Oecologia* 120(2): 252-257. (in English). ["Earlier experiences may play an important role in the choice of hunting sites, but their effects on the foraging repertoire of most animals remain poorly understood. I tested the role of previous flower choices (hunting sites) by penultimate-instar female crab spiders *Misumena vatia* in making subsequent patch-choice decisions. *M. vatia* is a sit-and-wait predator, and the two flower species used, ox-eye daisy *Chrysanthemum leucanthemum* and common buttercup *Ranunculus acris*, are important hunting sites. Spiders with different immediate experience showed similar abort-term (<1 day) giving-up times on the two flower species, independent of their previous substrate. However, four-fifths of the individuals that remained a day or longer tended to leave buttercups sooner than daisies, especially if they had previously occupied daisies. Thus they may directly assess the quality of a potential hunting site, perhaps in response to prey abundance, but previous experience may play a minor role as well. Of spiders that made several consecutive choices of hunting sites, those on daisies often confined these runs to daisies (one of two years); those on buttercups did not exhibit comparable fidelity. Spiders molting into the adult stage almost always subsequently chose the same flower species (either daisy or buttercup) as the one on which they molted. Thus, juvenile experiences may influence adults, the critical stage when virtually all of the spiders' reproductive resources are gathered, even if this resulted from imprinting on their molt sites rather than carrying information over the molt." (Authors)] Address: Morse, D.H., Brown Univ., Dept Ecol, & Evolutionary Biol., Box G-W, Providence RI 02912; USA. e-mail: dmorse@brown.edu

**6095.** Paulson, D. (1999): Dragonflies of Washington. Seattle Audubon Society. ISBN 0-914516-15-9: 32 pp. (in English). [This is a very condensed fieldguide with 84 colour pictures and brief information on the Odonata of Washington, USA. The species text chapters contain information on geographic distribution in Washington, their phenology, and habitat. A key, and some informa-

tion on morphology, dragonfly photography, finding and collecting dragonflies, rearing larvae, dragonfly conservation, and a glossary are added.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

## 2000

**6096.** Ishii, M.; Kanata, T.; Kobayashi, K.; Michishita, Y. (2000): Vegetation and species diversity of aquatic insects in the Ziou marsh, northern Osaka. Scientific report of the College of Agriculture, Osaka Prefecture University 52: 29-41. (in Japanese, with English summary). ["Vegetation and species diversity of aquatic insects were investigated in the Ziou Marsh in Nose Town, northern Osaka Prefecture, central Japan from April to November, 1998. A total of 60 species of vascular plants belonging to 40 families were found in the marsh. Dominant species were *Isachne globossa*, *Scirpus fuirenoides*, *Potamogeton fryeri*, *Juncus effusus* var. *decipiens*, *Haloragis micrantha*, etc. A total of 52 species of aquatic insects were observed in the water. In 20 (39%) and 22 (42%) out of the 52 species, only larvae and adults were observed respectively. Dominant species were *Notonecta triguttata*, Chironomidae sp.1, *Sigara* spp., *Gerris latiaabdominis*, and Chironomidae sp.2, *Cloeon* sp., and *Aeshna nigroflava*, representing about 80% of the total number of aquatic insects observed in this marsh. As for adult Odonata, a total of 29 species from 9 families were found in this marsh. Dominant species were *Sympetrum kunkeli*, *Nannophya pygmaea*, *Indolestes peregrinus*, *S. darwinianum*, and *Cercion calamorum*, representing about 60% of the total individuals found. Adults of the tiny dragonfly, *N. pygmaea*, were observed from May to August in this marsh, though females disappeared about half a month earlier." (Authors)] Address: Ishii, M., College of Agriculture, Osaka Prefecture University, Japan

**6097.** Uniyal, V.P.; Mitra, A.; Mathur, P.K. (2000): Dragonfly fauna (Insecta: Odonata) in Great Himalayan National Park. *Annals of Forestry* 8(1): 116-119. (in English). [India; six odonate species are listed and briefly discussed.] Address: Uniyal, V.P., Wildlife Institute of India, Post Box # 18, Chandrabani Dehradun, Uttaranchal – 248 001, India. E-mail: uniyalvp@wii.gov.in

## 2001

**6098.** Bernath, B.; Szedenics, G.; Molnar, G.; Kriska, G.; Horvath, G. (2001): Visual ecological impacts of "shiny black anthropogenic products" on aquatic insects: oil reservoirs and plastic sheets as polarized traps for insects associated with water. *Archiv für Naturschutz und Landschaftspflege* 40: 89-109. (in English). [The waste oil lake in Budapest (Hungary) deceived, attracted and killed insects in large numbers and acted as a huge insect trap for 50 years from 1951. Records of insects made between August 1997 and September 1998 also included Odonata, namely *Aeshna mixta*, *Anax imperator*, and *Sympetrum vulgatum*.] Address: Horvath, G., Biooptics Laboratory, Department of Biological Physics, Loránd Eötvös University, 1117 Buda-

pest, Pázmány Péter sétány 1, Hungary. E-mail: gh@arago.elte.hu

**6099.** Bönsel, A. (2001): Hat *Aeshna subarctica* (Walker 1908) in Nordostdeutschland eine Überlebenschance? Die Entwicklung zweier Vorkommen im Vergleich zum gesamten Bestand in Mecklenburg-Vorpommern. *Natur und Landschaft* 76(6): 257-261. (in German, with English summary). [Exuviae of *A. subarctica* have been recorded since 1995 in the Göldenitzer Moor mire in the German regional state of Mecklenburg/Western Pomerania. The abundance declined from 322 to 12 emerged individuals within 6 years. This was associated with the simultaneously observed disappearance of *Sphagnum* species. The loss of *Sphagnum* plants is due to intensive drainage and elevated nutrient availability. In the Horster Moor mire, a presumably extinct population re-established itself after restoration measures as an abundant and autochthonous population. Restoration of the Horster Moor site, where peat had previously been extracted industrially, commenced in 1986 by waterlogging of this ombrogenous bog. At first, *Sphagnum* cover developed slowly. However, a stand of *Eriophorum* species developed in shallow flooded areas with mossy bog ponds. In areas where manual peat-digging was practised, flooded *Sphagnum* grew again after the water level rose. Consequently, after 14 years of re-vegetation, *A. subarctica* has re-established itself with a major autochthonous population. However, this population remains endangered by eutrophication of its larval waters. In Mecklenburg/Western Pomerania there are currently 9 further occurrences of *A. subarctica*. These are all similarly severely endangered. Therefore, medium-term extinction of this dragonfly in north-eastern Germany appears likely.] Address: Bönsel, A., Vasenbusch 15, D-18337 Gresenhorst, Germany. E-mail: andre.boensel@gmx.de

**6100.** Derka, T.; Kováčová, J.; Bulánková, E. (2001): Substrate importance for selected macrozoobenthic communities in Rudava river. *Folia faunistica Slovaca* 6: 59-68. (in Slovakian, with English summary). ["The macroinvertebrate communities inhabiting different substrate types were investigated in a small sandy bottom river in SW Slovakia. Special attention was paid to macroinvertebrates associated with wood debris and submersed root mats of riparian trees. A total of 57 taxa of temporal fauna were recorded at two sites; the lowest number of taxa was found on the sandy substrate. The muddy substrate with detritus was also inhabited relatively poorly, whereas the most diverse was the community on the woody debris (35 taxa collected). At all substrate types, the highest biomass values were found in amphipods. Trichoptera were important on debris and the habitats associated with roots. Densities were highest on muddy habitats with detritus but the biomass was lower than that on the roots and debris. Sandy bottom showed the lowest values of densities and biomass. Woody debris and submersed roots were found to be essential for the maintenance of diversity and abundance of macroinvertebrate community." (Authors) The paper includes notes on *Calopteryx splendens*.] Address: Bulankova, Eva, Institute of Ecology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B-II, SK-84215 Bratislava., Slovakia; tel.+ 421-7-728 922, e-mail: Bulankova@fns.uniba.sk

**6101.** Han, F.-y. (2001): Study on the significant variation in the abdominal spot patterns in the male adult

*Coenagrion barbatum* Needham. *J. Shanxi Univ. (Nat. Sci.)* 24(4): 341-343. (in Chinese, with English summary). [Spot variability in the abdominal segments 2 and 8-10 was studied.] Address: Han, F.-y., Dept Life Sciences, Shanxi University, Taiyuan 030006, China

**6102.** Nakamoto; Sekioka (2001): Construction of ponds to make the environment more suitable for plants and animals. *Journal of the Japanese Society of Revegetation Technology* 27(1): 355-356. (in Japanese, with English translation of the title). [no abstract available] Address: not stated

**6103.** Papavero, N.; Ibanez-Bernal, S.I. (2001): Contributions to a Mexican history of dipterology, part 1. Entomologists and their works before the *Biologica Centrali Americana*. *Acta zoologica Mexicana (N.S.)* 84: 115-173. (in English). [This paper contains an interesting "life history" of the well known odonatologist Friedrich Moritz Brauer, Austria. A few additional information are given to Carl Eduard Adolph Gerstäcker, author of a few papers on Odonata.] Address: Ibanez-Bernal, S., Instituto de Ecología, A.C. Departamento de Entomología, km 2,5 carretera antigua a Coatepec No 351, Congregación El Haya, 91070 Xalapa Veracruz, Mexico

**6104.** Pliuraite, V. (2001): Seasonal changes of the abundance, biomass, species composition of macrozoobenthos in the rivers Merkys and Svventoji. *Ekologija* 2001(4): 16-30. (in Lithuanian, with English summary). [Lithuania, *Calopteryx splendens*, *Gomphus vulgatissimus*, and *Libellula quadrimaculata* are listed from different stretches of the rivers.] Address: Pliuraite, V., Ekologijos institutas, Akademijos g.2, LT-2600 Vilnius, Lithuania

**6105.** Ramos Elorduy, J.; Pino, J.M. (2001): Contenido de vitaminas de algunos insectos comestibles de México. *Revista de la Sociedad Química de México* 45(2): 66-76. (in Spanish, with English summary). ["The concentrations of Vitamins A, C, D, and B (thiamine, riboflavin and niacin) in 35 species of edible insects were determined. It is noted the role of these substances for the development and growth of the human organism, as well as for health. The concentrations obtained for the edible insects studied were compared with those of conventional edible products rich in these micronutrients, noting that in many cases certain species surpass the vitaminic content of various common edible products, therefore, some edible insects species can be considered as a good vitaminic source. This is the case of *Periplaneta americana* (adults) in vitamin A, *Latebraria amphipyrioides* (larvae) in vitamin C, *Achea domestica* (nymphae) in vitamin D, and *Copestylum anna* and *C. haggi* (larvae) in thiamine, riboflavin, and niacin. It is observed that the insects species studied possess more content in vitamins of the B group, It is pointed out the importance of the presence of these vitamins for the diet of peasants of the rural area of Mexico, who regularly consume insects, and even store and commercialize them." (Authors) Exclusively vitamin B was found - in low concentrations - in the larvae of *Anax* sp.] Address: Ramos-Elorduy, Julieta, Instituto de Biología, Universidad Nacional Autónoma de México. Circuito Exterior, Ciudad Universitaria, Ap. Postal 70-153, México 04510, D.F.

**6106.** Schlüpmann, M. (2001): Der Plattbauch (*Libellula depressa* LINNAEUS, 1758) – Insekt des Jahres 2001 – in Hagen. Homepage des Umweltamtes



2001 – in Hagen. Homepage des Umweltamtes der Stadt Hagen 2001: [www.umweltamt.hagen.de/umwelttipps/tippstexte/Plattbauch.pdf](http://www.umweltamt.hagen.de/umwelttipps/tippstexte/Plattbauch.pdf): 13 pp. (in German). [This is a "blueprint" of *Libellula depressa* with special emphasis on the situation in the town Hagen, Nordrhein-Westfalen, Germany. The habitat selection of the species is stressed.] Address: Schlüpmann, M., Hierseier Weg 18, D-58119 Hagen, German. E-mail: [martin-schluemann@t-online.de](mailto:martin-schluemann@t-online.de)

**6107.** Sibl, J. (2001): Contribution to the knowledge of dragonflies (Insecta: Odonata) of the National Park Muránska planina (Slovakia). *Folia faunistica Slovaca* 6: 53-58. (in Slovakian, with English summary). ["The dragonfly fauna at 36 localities was studied in the national park Muránska planina (central Slovakia) and its surroundings. The occurrence of 16 dragonfly species was recorded, or 27 when including literature records. The occurrence of *Leucorrhinia pectoralis*, which is considered rare in Slovak republic, as well as in some other European countries, was confirmed in the study area. 8 species - *Pyrrhosoma nymphula*, *Ischnura pumilio*, *Sympecma fusca*, *Leucorrhinia pectoralis*, *Crocothemis erythraea*, *Orthetrum cancellatum*, *Cordulia aenea*, *Aeshna cyanea* - were for the first time recorded from the study area." (Author)] Address: Sibl, J., J. Stanislava 15, SK 84105 Bratislava, Slovakia. E-mail: [sibl@changenet.sk](mailto:sibl@changenet.sk)

**6108.** Torres, L.; Onore, G. (2001): Diversidad de Odonata en ríos del bosque nublado Otonga y sus alrededores. In: Nieder, J. & W. Barthlott (Eds.): *Epiphytes and canopy fauna of the Otonga rain forest (Ecuador). Results of the Bonn - Quito epiphyte project, funded by the Volkswagen Foundation (Vol. 2 of 2)*. ISBN: 3-8311-1858-2: 275-300. (in Spanish, with English summary). ["Ten rivers were selected at similar altitudes: six located within the Otonga Reserve and four in agricultural areas. One semi-quantitative sampling of aquatic macro-invertebrates, in winter and summer, was undertaken, and physical and chemical parameters were measured for each river. A qualitative sampling of Odonata nymphs and adults was carried out for each river. All adult specimens were captured. Six nymphs genera and five adults genera were collected in or close the rivers studied. No correlation among the river characteristics, aquatic macro-invertebrates, and species and families of Odonata found in the rivers was observed. Although human activity exists around the rivers, this study demonstrated that those in agricultural regions were not sources of contamination that affect the macro-invertebrate fauna. The paucity of taxa in the rivers is probably due to a low percentage of organic matter." (Authors)] Address: Torres, Leticia, Museo QCAZ, Departamento de Ciencias Biológicas; Pontificia Universidad Católica del Ecuador; Avenida 12 de Octubre y Veintimilla; Apartado 17-01-2184; Quito, Ecuador

**6109.** Wheeler, W. (2001): Homology and the optimization of DNA sequence data. *Cladistics* 17: S3-S11. (in English). ["Three methods of nucleotide character analysis are discussed. Their implications for molecular sequence homology and phylogenetic analysis are compared. The criterion of inter-data set congruence, both character based and topological, are applied to two data sets to elucidate and potentially discriminate among these parsimony-based ideas." The study includes *Libellula pulchella* and *Dorocordulia lepida*.] Address: Wheeler, W., Division of Invertebrate Zoology,

American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024-5192

## 2002

**6110.** Armbruster, P.; Hutchinson, R. A.; Cotgreave, P. (2002): Factors influencing community structure in a South American tank bromeliad fauna. *Oikos* 96: 225-234. (in English). ["We examined factors influencing the structure of naturally replicated, taxonomically unrestricted communities inhabiting South American tank bromeliads. We measured aspects of plant physical structure and collected the entire macroscopic fauna of 209 bromeliads from the Yasuní Scientific Reserve in lowland eastern Ecuador. We collected a total of 11 219 individuals of 354 morphospecies. The morphospecies abundance distribution of our sample was approximated by a log-series distribution dominated by rare morphospecies (57% of the morphospecies were represented by a single individual). Six methods for estimating the total number of bromeliad associated morphospecies in our study area gave results which varied by a factor of three, illustrating that caution should be exercised in interpreting the results of any single estimator. Variation in plant volume, number of leaves, detritus content, and water volume explained 62% of the variation in morphospecies richness among plants. Finally, there was a quadratic relationship between body mass and both individual abundance and morphospecies richness in our sample. These results illustrate an important role of both biotic and abiotic factors influencing the structure of taxonomically unrestricted, ecologically defined natural communities." (Authors) 16 Odonata specimens from 8 morphospecies have been collected.] Address: Armbruster, P., Dept of Biology, 321 Marsh Life Sciences Bldg., Uni of Vermont, Burlington, VT 05405-0086, USA. E-mail: [parmbus@zoo.uvm.edu](mailto:parmbus@zoo.uvm.edu)

**6111.** Ido, T.; Goto, H. (2002): A study on the establishment and use about a school biotope - a case study on the eco-up enterprise by Dragonfly pool at Yokohama city. *J. Arch. Plann. environ. engineering* 554: 213-218. (in Japanese, with English summary). [Proposals for the improvement of environmental education on schools by dragonfly ponds are outlined.] Address: Ido, T., Dept of Architecture (Prof. Dr. Eng), Faculty of Engineering, Waseda University, Japan

**6112.** Raab, R.; (2002): Quelljungfern - Österreichs Insektenarten des Jahres 2002. *Entomologica Austriaca* 6: 3-4. (in German). ["The dragonflies of the genus *Cordulegaster* have been chosen as Austrian "Insects of the Year 2002". They are indicator species for clear springs and brooks. These animals are especially noticed because of their remarkable size and the longevity of their larvae." (Authors)] Address: Raab, R., Anton Bruckner-Gasse 2/2, A-2232 Deutsch-Wagram, Austria. E-mail: [rainer.raab@gmx.at](mailto:rainer.raab@gmx.at)

**6113.** Sauseng, M.; Pabst, M.-A.; Kral, K. (2002): Das Lauerverhalten von *Libellula quadrimaculata* (Linnaeus, 1758) (Libellulidae, Odonata). *Entomologica Austriaca* 6: 14-15. (in German, with English summary). [The visually controlled ambush behaviour of *Libellula quadrimaculata* (Linnaeus, 1758) (Libellulidae, Odonata): *L. quadrimaculata* belongs to a group of dragonflies which

"employ a special hunting strategy, exhibiting the so-called „perching" behaviour. The males perch in the sun on vegetation near the shore, waiting in ambush for potential mates or items of prey. Initial findings indicated that males settling on the perch in the morning oriented the longitudinal axes of their bodies in such a way as to have the sun behind them, and accordingly were looking away from the sun. This also happened in the afternoon. A central topic of the investigation were visual factors significant for the dragonfly when perching. In order to ascertain this, the dragonfly's line of vision relative to the sun and to the visual environment was investigated." (Authors)] Address: Sauseng, Manuela Institut für Zoologie und Institut für Histologie und Embryologie, Karl-Franzens—Universität Graz, Universitätsplatz 2, 8010 Graz, Austria. E-mail: manuela.sauseng@kfunigraz.ac.at

**6114.** Tsuyuki, K.; Sudo, S. (2002): Three-dimensional structure of a wing and flow field around a flapping dragonfly with the PIV system. Transactions of the Japan Society of Mechanical Engineers. B 68 (No.676) : 3392-3399. ["In the present paper, studies of dragonfly wing revealed the structural morphology and the aerodynamic characteristics. Some experimental studies on dragonfly wings were performed with a scanning electron micrograph, a three-dimensional curved shape measuring system and a Particle Image Velocimetry (PIV) system. Firstly, the scanning electron micrograph observed the cross section shape of a dragonfly wing. Secondly, the system for the measurement of surface shape measured the surface roughness of a dragonfly wing with  $\mu\text{m}$  order accuracy. The results of surface shape measurement revealed there are three regions on a dragonfly wing, which had different function for a wing. Lastly, the PIV system measured the flow characteristics around the dragonfly wing and the flapping dragonfly. The analysis of two-dimensional velocity fields with the PIV system clarified the existence of the large velocity areas over a dragonfly wing and the specific flows around a flapping dragonfly." (Authors)] Address: Tsuyuki, K. Department of Mechanical Engineering, IWaki Meisei University, Japan

## 2003

**6115.** Clausnitzer, V. (2003): Ecology and biogeography of the dendrolimnetic *Coryphagrion grandis*. 2. Symposium der A. F. W. Schimper-Stiftung: 1-13. (in English). ["A study on the ecology of the dendrolimnetic damselfly *C. grandis* was undertaken in coastal forests of East Africa. The results are compared with other dragonfly species, known to breed in phytotelmata as well. These ecological and additional morphological and genetic results of this study show, that the monotypic *Coryphagrion grandis*, which was placed for conveniences within the Megapodagriidae, belongs to the otherwise South and Central American Pseudostigmatidae. Although the separation from the neotropical Pseudostigmatidae occurred at least 100 million years ago, the morphology and biology *Coryphagrion grandis* is still very similar to the former. These findings support biogeographical considerations about historical forest distribution in Africa, stability of East African coastal forests and the species loss due to extinctions in West and Central Africa. Since the future of *Coryphagrion*

*grandis* depends on the survival of the last coastal and lower Eastern Arc forests in East Africa, a short conservation chapter is added in the end." (Author)] Address: Clausnitzer, Viola, Graefestr. 17, D-06110 Halle/Saale, Germany. E-mail: violacl@t-online.de

**6116.** Davis, S.; Golladay, S.W.; Vellidis, G.; Pringle, C.M. (2003): Macroinvertebrate biomonitoring in intermittent coastal plain streams impacted by animal agriculture. J. Environ. Qual. 32: 1036-1043. (in English). ["Little attention has been given to the ecology of intermittent coastal plain streams in the southeastern United States, and it is not known whether available macroinvertebrate biomonitoring methods reliably detect degradation in these streams. This study compared differences in biomonitoring metrics between reference and agricultural streams, and between the flow period (January–April) and the intermittent flow period (May–December). Percentages of crustaceans, isopods, and Ephemeroptera–Plecoptera–Trichoptera (EPT) were significantly higher at the reference site than the two most impacted sites during the flow period, probably resulting from the abundance of leaf litter and lower temperatures. During this same period, the agriculturally impacted sites had a significantly higher percentage of dipterans—a group that thrives in the silty, nutrient-rich waters. Four metrics (percent Crustacea, Isopoda, Diptera, and EPT) had no overlap between values for the most impacted and the least impacted sites during the flow period, but no metrics were able to detect more discrete differences among sites. Sites were physically and biologically similar during the intermittent period when natural stresses (i.e., stagnant water, high temperatures, low dissolved oxygen) were high, with many metrics such as percentages of dominant family, burrowers, chironomids and dipterans becoming similar at all sites. Our findings indicate that development of a better understanding of invertebrate fauna in reference conditions and of the natural variation in intermittent streams is necessary to develop effective biomonitoring programs for these systems." (Authors) The study includes a passing reference to "Odonata".] Address: S.W. Golladay, J.W. Jones Ecological Research Center, Route 2, Box 2324, Newton, GA 31770, USA. E-mail: sgollada@jonesctr.org

**6117.** Donnelly, T.W.; Parr, M.J. (2003): Odonata, Dragonflies and Damselflies. In: Goodman, S.M. & J.P. Benstead (Eds): The Natural history of Madagascar. ISBN 0-226-30306-3: 645-654. (in English). [12 of the 52 genera, and 132 of the 181 species currently known from Madagascar are endemic. The authors give a brief introduction into the regional fauna, checklist the species, and discuss them on the family level. *Ceriatagrion suave*, *Parazyxomm flavicans*, *Urothemis edwardsi*, *Trithemis haematima*, *Orthetrum austeni*, and *Pantala flavescens* are added as new to the regional checklist. Also *O. chrysostigma* (page 653) is assessed as new to Madagascar, but not checklisted. In addition, a checklist of the Odonata from the Comoro Islands is included.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**6118.** Enomoto, H.; Hamamoto, M.; Hisada, T.; Hara, K.; Ohta, Y. (2003): Free-flight simulation of *Sympetrum* frequens hovering. The Computational Mechanics Conference 2003, No.16: 83-84. (in Japanese, with English translation of the title and key words). [flapping flight,

free-flight hovering, fluid-structure, interaction analysis, shell element ] Address: not transliterated

**6119.** Gusenleitner, F. (2003): Die Entwicklung der Entomologischen Sammlungen am Biologiezentrum Linz im Zeitraum 1993 bis 2002. Beitr. Naturk. Oberösterreichs 12: 89-128. (in German, with English summary). [The Biology Centre of the Upper Austrian Museums started in 1993. Since this time 1,5 million specimens have been added to the entomological collections. The most important persons, related to the collections in this period are mentioned in short biographies. The collection also harbours Odonata.] Address: Gusenleitner, F., Biologiezentrum der Oberösterreichischen Landesmuseen, J.-W.-Klein-Str. 73, A-4040 Linz /Dornach, Austria. E-mail: f.gusenleitner@landesmuseum-linz.ac.at

**6120.** Gusenleitner, F.; Aeschl, E. (2003): Bibliographie der Wirbellosen Tiere (Vertebrata) Oberösterreichs (1991-2002). Beitr. Naturk. Oberösterreichs 12: 521-618. (in German). [Austria; 66 papers with odonological content are compiled.] Address: Gusenleitner, F., Biologiezentrum der Oberösterreichischen Landesmuseen, J.-W.-Klein-Str. 73, A-4040 Linz/Dornach, Austria. E-mail: f.gusenleitner@landesmuseum-linz.ac.at

**6121.** Gusenleitner, F.; Aeschl, E. (2003): Neu beschriebene Taxa in den Publikationen des Biologiezentrums Linz (1993–2002). Beitr. Naturk. Oberösterreichs 12: 299-345. (in German, with English summary). [2236 new taxa, including 1 order, 1 suborder, 4 families, 1 subfamily, 7 tribes, 8 sections, 7 subsections, 96 genera, and 22 subgenera, have been established in four journals of the Biology Centre of the Upper Austrian Museums, the "Linzer biologische Beiträge" (= LBB), "Stapfia", "Beiträge zur Naturkunde Oberösterreichs" (= BNO) and "Denisia". This number is composed of 119 botanical, 223 ciliate, 1 nemertine, 3 annelid, 24 arachnid, and 1866 insect names." (Authors) Some of the Odonata described as new to science have been published in the LBB.] Address: Gusenleitner, F., Biologiezentrum der Oberösterreichischen Landesmuseen, J.-W.-Klein-Str. 73, A-4040 Linz/Dornach, Austria. E-mail: f.gusenleitner@landesmuseum-linz.ac.at

**6122.** Osawa, S.; Katsuno, K. (2003): The relationship between the distribution of a vulnerable species *Ludwigia peploides* ssp. *stipulacea* and an inhabitation of Coenagrionidae in urban river. Journal of the Japanese society of revegetation technology 29(2): 343-351. (in Japanese with English summary). [The importance of *Ludwigia peploidea*. *Raven* ssp. *stipulacea* *Raven*, a vulnerable species locally distributed along the Kashio River in east Kana-gawa (Japan), as habitat for *Ischnura senegalensis*, *I. asiatica*, and *Cercion hieroglyphicum* was surveyed. *C. hieroglyphicum* and *I. asiatica* developed high abundances over *L. peploidea* ssp. *stipulacea*. Larvae density was high in sites on the slower running stream stretches with *Ludwigia*. The authors conclude that *Ludwigia* stands are of significant importance as microhabitat for the larvae. Mark-recapture investigations indicated that the max. distance of immigration was about 700 m, and nearly all of recapture individuals stayed on the identical sandbar; it is not possible to get any information from the summary which species are referred to. It is proposed to "design an arrangement of *L. peploidea* ssp. *stipulacea* community at

intervals of some hundred meters" along the Kashio River with the function as an ecological corridor for Coenagrionidae in urban areas.] Address: Osawa, S., Coll. of Bioresource Sci., Nihon Univ., Japan

**6123.** Schwarz-Waubke, M.; Schwarz, M.; Gusenleitner, F.; Gusenleitner, J.; Malicky, M.; Malicky-Ruzicka, H.; Vogtenhuber, P. (2003): Insekten-Typen am Biologiezentrum Linz. Teil I. Beitr. Naturk. Oberösterreichs 12: 407-450. (in German, with English summary). [The insect types deposited in the Biology Centre Linz (Austria) represent 1765 taxa, of which 11 taxa belong to the Odonata, all described by Günther Theischinger, some in cooperation with J.A. Watson.] Address: Schwarz-Waubke, Maria, Eben 21, A-4202 Kirchsschlag, Austria. E-Mail: schwarz-entomologie@utanet.at

**6124.** Tsuda, K., Watanabe, M.; Tominaga, S., Onjo, M.; Ichitani, K. (2003): The biogeography of the insect fauna of the Ulithi Islands, Micronesia. Kagoshima University Research Center for the Pacific Islands Occasional Papers No.39, Section 2, Report 7. The Progress Report of the 2000 and 2001 Survey of the Research Project "Social Homeostasis of Small Islands in an Island-zone": 73-75. (in English). ["Ulithi Atoll in Yap State is located in the western zone of the Federated States of Micronesia and comprises 49 islets. In a survey of Ulithi Atoll, we visited its four inhabited islands, Asor, Falalop, Fassarai, and Mogmog. Insects were collected both by day and night, and 262 species of insects from nine orders were recorded. In order to estimate the species richness and natural environment of each island, the number of species in each taxonomic order was considered. Fassarai had the greatest species richness of the four islands, while Mogmog had the least. This suggests that human inhabitation affects insect species richness, because most of Mogmog Island was used as living space." (Authors) A total of 6 odonate taxa are labelled but without any details with the exception of the number of taxa recorded on each island.] Address: Tsuda, K., Faculty of Agriculture, Kagoshima University, Kagoshima 890-0065, Japan

## 2004

**6125.** Bechev, D.N.; Stojanova, A.M. (2004): Geographic localities of invertebrates of conservation importance in the Rhodopes (Bulgaria). Trav. Sci. Univ. Plovdiv, Animalia 40(6): 19-25. (in Bulgarian, with English summary). ["Information about 21 invertebrates of conservation importance is presented. Some of the distributional data are recorded herein for the first time, while some others confirmed published localities before. The faunistic data concerned invertebrate species from the lists of: IUCN Red List, Habitat Directive DCE 92/44/EEC, Bern Convention, ESC Red List, CORINE biotopes Check-list and Law for Biodiversity of Bulgaria." (Authors) Four odonate species are considered: *Somatochlora flavomaculata*, *Coenagrion hastulatum*, *Lestes dryas*, *Cordulegaster heros*.] Address: Bechev, D.N., Department of Zoology, University of Plovdiv, 24 Tzar Assen Str., BG-4000 Plovdiv, Bulgaria. E-mail: bechev@pu.acad.bg, stanelia@pu.acad.bg

**6126.** Gentilini, G.; Bagli, L. (2004): Fossil Zygoptera and Anisoptera from the Upper Miocene of Monte



Castellaro (Pesaro, Marches, Central Italy) (Insecta Odonata Coenagrionidae, Lestidae, Sieblosiidae, Calopterygidae, Libellulidae). *Quaderno di studi e notizie di storia naturale della Romagna* 19: 17-44. (in English, with Italian language). [Seven fossil wings of zygopteran Odonata from the Upper Miocene of Monte Castellaro, Pesaro, Italy, are discussed and figured. *Deielia sarae* and *Trapezostigma barbaresii* are described as new.] Address: Gentilini, G., via Adriatica 78, I-47843 Misano Adriatico (RN), Italy. E-mail: ggentilini.adsl2003@libero.it

**6127.** Glendinning, P. (2004): The mathematics of motion camouflage. *Proc. R. Soc. Lond. B* 271(1538): 477-481. (in English). ["Motion camouflage is a strategy whereby an aggressor moves towards a target while appearing stationary to the target except for the inevitable change in perceived size of the aggressor as it approaches. The strategy has been observed in insects (including Odonata), and mathematical models using discrete time or neural-network control have been used to simulate the behaviour. Here, the differential equations for motion camouflage are derived and some simple cases are analysed. These equations are easy to simulate numerically, and simulations indicate that motion camouflage is more efficient than the classical pursuit strategy ('move directly towards the target')."] (Author)] Address: Glendinning, P., Department of Mathematics, UMIST, PO Box 88, Manchester M60 1QD, UK. E-mail: p.a.glendinning@umist.ac.uk

**6128.** Kvacek, Z.; Rajchl, M.; Böhme, M.; Dvůrák, Z.; Mach, K.; Prokop, J.; Konzalová, M. (2004): Early Miocene freshwater and swamp ecosystems of the Most Basin (northern Bohemia) with particular reference to the Bilina Mine section. *Journal of the Czech Geological Society* 59(1-2): 1-40. (in English). [Czech Republic; the paper includes information to fossil Odonata] Address: Prokop, J.; Department of Zoology, Charles University, Vinicna 7, CZ-128 44, Praha, 2, Czech Republic; E-Mail: jprokop@natur.cuni.cz

**6129.** Matsui, A.; Satoh, M. (2004): Distribution of aquatic animals in the drainage systems created by paddy farmland consolidation in Shimodate City, Ibaraki Prefecture, Japan. *Japanese journal of conservation ecology* 9: 153-163. (in Japanese, with English summary). ["Conventional paddy farmland consolidation in Japan, which aims to increase farming efficiency by improving the drainage conditions of paddy fields and independently creating irrigation and drainage canals, is thought to have negative impacts on biodiversity in rural areas. The Land Improvement Act of Japan was amended in June 2001 and requires agricultural and rural development projects to be harmonized with the environment. It is widely recognized that transforming concrete irrigation and drainage canals into earthen canals and minimizing the differences in elevation between paddy plots and drainage canals aid in the preservation of aquatic animals. However, most paddy fields that have been consolidated using conventional standards will inevitably remain intact, thus continuing to have a substantial influence on the regional environment. Therefore, at least the minimum environmental measures should be effectively implemented in consolidated paddy fields. To this end, the distribution of the aquatic animals associated with these fields requires clarification. In addition, this knowledge will be useful in determining how to effectively distribute water during the non-

irrigation season. The purpose of this study was to clarify the distribution of aquatic animals in the canal systems of main, lateral, and farm drains in the consolidated paddy fields, with a special focus on canal structure and year-round water flow in the canals. A field survey at six sites, which were selected for their different canal levels, was carried out in Shimodate City, Ibaraki Prefecture, Japan (36°21'N, 139°59'E). Sampling was conducted at monthly intervals from April 2001 to March 2002. A survey of fishes revealed that *Zacco platypus* (Oikawa) was concentrated in the main drains, while *Misgurnus anguillicaudatus* (Dojou) was found mainly in the lateral and farm drains. Among aquatic insects, *Calopteryx atlata* (Hagurotombo) was concentrated in the lateral drains, while *Onhetrum albistylum speciosum* (Shiokaratombo) was observed primarily in the farm drains. *Z. platypus* preferred gravel-bottom main drains to those made of concrete. *C. atlata* and *O. albistylum speciosum* preferred year-round water flow to seasonal flow in lateral and farm drains, respectively. In contrast, *Sympetrum infuscatum* (Noshimetombo) preferred seasonal water flow to year-round flow in farm drains. The drainage systems in the consolidated paddy fields are clearly composed of different levels of drains with peculiar physical conditions, e.g., water depth and flow velocity, each of which attracts certain aquatic animals. To enrich the biodiversity of the paddy fields, our results suggest the importance of year-round water flow and natural materials for canal beds." (Authors)] Address: Masayoshi Satoh, M., Graduate School of Life and Environmental Sciences, University of Tsukuba, I-1-I, Tenno dai, Tsukuba City, Ibaraki 305-8572, Japan. E-mail: massa@sakura.cc.tsukubii.ac.jp

**6130.** Matsu'ura, S.; Watanabe, M. (2004): Dynamics of reed community artificially established for conservation of the endangered damselfly *Mortonagrion hirosei* and odonate larvae inhabiting the community. *Japanese Journal of Conservation Ecology* 9: 165-172. (in Japanese, with English summary). ["To conserve the brackish water damselfly *Mortonagrion hirosei*, a reed community was artificially established adjacent to a small natural habitat in Mie Prefecture, Japan, in 2003. From April to November, we measured the dynamics of the reed community as well as the changes in abiotic factors in the understory of the community in which *M. hirosei* adults were active. Reeds that emerged in the artificial community were thinner and shorter than those in the natural habitat, however reed density did not differ between the two habitats. Therefore, the established reed community provided a more open habitat for *M. hirosei* adults compared to the natural habitat. Although adults of many odonate species were observed flying over both reed communities, only larvae of *Ischnura senegalensis* were collected in November in addition to those of *M. hirosei*. Because a predator of *M. hirosei* is *I. senegalensis* that should be excluded from the community, maintaining a dense reed community must be important for the conservation of *M. hirosei*." (Authors)] Address: Matsu'ura, S., Graduate School of Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan. E-mail: s0323562@ipe.tsukuba.ac.jp

**6131.** Nadobnik, J.; Agapow, L.; Korościński, B. (2004): The importance of the "Santockie Zakole" nature Reserve for preservation of biological diversity and tourism. *Teka Kom. Ochr. Kszt. Srod. Przyn.* 2004(1): 157-161. (in Polish, with English summary). [Poland, ri-

ver Warta, river Noteć; 5 species of odonata are listed.] Address: Nadobnik, J., Katedra Przyrodniczych Podstaw Kultury Fizycznej, Akademia Wychowania Fizycznego w Poznaniu, Zamiejskowy Wydział Kultury Fizycznej w Gorzowie Wlkp., ul. Bsikowskiego 13, Poland. E-mail: nadobnik@ncostrada.pl

**6132.** Palot, M.J.; Radhakrishnan, C. (2004): A note on the mock-mating behaviour in damselflies (Odonata: Insecta). *Zoos' Print Journal* 19: 1431. (in English). [India; 6-IX-2001, a male *Copera marginipes* and a female *Ceriatagrion cerinorubellum* were found in the wheel position for about 40 minutes before freeing themselves.] Address: Palot, M.J., Zoological Survey of India, Western Ghats Field Research Station, Kozhikode, Kerala 673002, India.

**6133.** Relyea, R.A. (2004): Fine-tuned phenotypes: tadpole plasticity under 16 combinations of predators and competitors. *Ecology* 85(1): 172-179. (in English) ["It is now well appreciated that most organisms can alter their phenotypes when faced with environmental variation. Decades of empirical investigations have documented hundreds of examples of phenotypic plasticity, yet most studies have focused on the presence or absence of a single environmental factor. As a result, we know little about how organisms respond to gradients of environmental factors (i.e., threshold responses vs. continuous responses), nor do we understand how organisms respond to combinations of environmental variables. I examined how larval wood frogs (*Rana sylvatica*) altered their behavior, morphology, and growth in response to combined gradients of predation and competition. Increased predation risk induced lower activity, deeper tails, and shorter bodies, which collectively caused slower growth. Increased competition caused slower growth which induced higher activity, shallower tails, and longer bodies. For both environmental gradients, the responses were frequently continuous rather than threshold responses. Moreover, predation and competition had interactive effects. Responses to predators were always larger under low competition than under high competition. Responses to competition were larger under low predation risk when predation and competition induced traits in the same direction, but larger under high predation risk when predation and competition induced traits in opposite directions. The results demonstrate that responses to phenotypically plastic traits can be fine-tuned to a wide variety of environmental combinations." (Author) *Anax junius* is a classic predator in anurans and test organism in laboratory.] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**6134.** Saito, Y.; Owada, M. (2004): Dragonflies (Odonata) of the Toikiwamatsu Imperial Villa, Tokyo, Central Japan. *Mem. natn. Sci. Mus.*, Tokyo 39: 431-438. (in Japanese, with English summary). [Between 2002 and 2004, the Odonata fauna of the garden pond of the villa was surveyed. A total of 18 species including *Anaciaeschna martini*, *Anax nigrofasciatus*, and *Rhyothemis fuliginosa* was recorded.] Address: Owada, M., Dept Zool., Natn. Sci. Mus., 3-23-1 Hyakunincho, Shinjuku-ku, Tokyo, 169-0073, Japan. E-mail: owada@kahaku.go.jp

**6135.** Sato, M. (2004): Relationship between the life cycle of dragonfly (*Usubakitombo*, *Pantala flavescens*)

and the paddy field of early-season rice culture in south Kyushu. *Rep. Kyushu Br. Crop Sci. Soc.* 70: 111-113. (in Japanese, with English translation of the title). [no abstract available] Address: Sato, M., Kagoshima Pref. Agric. Res. Cent., Okinawa Subtrop. Stn., Jpn. Int. Res. Center for Agric. Sci.

**6136.** Schindler, H. (2004): Bewertung der Auswirkungen von Umweltfaktoren auf die Struktur und Lebensgemeinschaften von Quellen in Rheinland-Pfalz. Dissertation am Institut für Naturwissenschaften der Universität Koblenz-Landau, Abt. Biologie: 266 pp. (in German). [Rheinland-Pfalz, Germany; a few records of *Thecagaster bidentata*, *C. boltonii*, and *Pyrrhosoma nymphula* are documented. see: [http://deposit.d-nb.de/cgi-bin/dokserv?idn=978166191&dokvar=d1&dokext=pdf&filename=97\\_8166191.pdf](http://deposit.d-nb.de/cgi-bin/dokserv?idn=978166191&dokvar=d1&dokext=pdf&filename=97_8166191.pdf)] Address: not stated

**6137.** Schulz, R. (2004): Field studies on exposure, effects, and risk mitigation of aquatic nonpoint-source insecticide pollution: a review. *J. Environ. Qual.* 33: 419-448. (in English). ["Recently, much attention has been focused on insecticides as a group of chemicals combining high toxicity to invertebrates and fishes with low application rates, which complicates detection in the field. Assessment of these chemicals is greatly facilitated by the description and understanding of exposure, resulting biological effects, and risk mitigation strategies in natural surface waters under field conditions due to normal farming practice. More than 60 reports of insecticide-compound detection in surface waters due to agricultural nonpoint-source pollution have been published in the open literature during the past 20 years, about one-third of them having been undertaken in the past 3.5 years. Recent reports tend to concentrate on specific routes of pesticide entry, such as runoff, but there are very few studies on spray drift-borne contamination. Reported aqueous-phase insecticides concentrations are negatively correlated with the catchment size and all concentrations of 10 g/L (19 out of 133) were found in smaller-scale catchments (100 km<sup>2</sup>). Field studies on effects of insecticide contamination often lack appropriate exposure characterization. About 15 of the 42 effect studies reviewed here revealed a clear relationship between quantified, non-experimental exposure and observed effects in situ, on abundance, drift, community structure, or dynamics. Azinphos-methyl, chlorpyrifos, and endosulfan were frequently detected at levels above those reported to reveal effects in the field; however, knowledge about effects of insecticides in the field is still sparse. Following a short overview of various risk mitigation or best management practices, constructed wetlands and vegetated ditches are described as a risk mitigation strategy that have only recently been established for agricultural insecticides. Although only 11 studies are available, the results in terms of pesticide retention and toxicity reduction are very promising. Based on the reviewed literature recommendations are made for future research activities." (Author) The study also refers to some studies of insecticide exposures on Odonata in rice fields, but they are said to have not provided clear evidence for a relationship between population parameters and insecticide exposures.] Address: Schulz, R., Zoological Institute, Technical University, Fasanenstrasse 3, D-38092, Germany. E-mail: R.Schulz@tu-bs.de

**6138.** Abbott, J.C.; Broglie, D. (2005): *OdonataCentral.com*: A model for the web-based delivery of natural

history information and citizen science. *American Entomologist* 51(4): 240-243. (in English). [Presentation and introduction into an internet page which aims to focus the North American odonatological activities.] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

## 2005

**6139.** Abro, A. (2005): The accessory glands of the female genital tract in *Aeshna juncea* (L.) and *A. grandis* (L.) (Anisoptera: Aeshnidae). *Odonatologica* 34(2): 103-110. (in English). ["The micro-anatomy of the female accessory glands in adult *A. juncea* and *A. grandis* is similar but the size of the *A. grandis* glands is clearly larger than that of *A. juncea*. The secretory cells constitute a simple columnar epithelium surrounding a cuticle-lined lumen. The glandular epithelium is provided with a peculiar system of deep, narrow, intercellular crypts bordered with microvillar cell membranes. Lipids released to the crypt lumen are presumably forced into the central gland lumen by contractions of the muscular network attached to the outside of the gland. The efferent duct of each gland that opens to the distal part of the vagina has a complicated muscular apparatus, probably serving as a pump. The secreted substances accumulate in the central gland cavity mainly during the pre-reproductive phase, which the dragonflies spend away from water. The secretion contains substances with wax-like properties and becomes darkened by osmication. Secretory cells appear to possess a limited life span; scattered cells in process of dying occur already during the early reproductive phase. In the late reproductive phase most of the glandular epithelium presents a disintegrated appearance. There is no cell renewal in the gland in the course of adult life. The pattern of cell death indicates a decomposition by apoptosis. Besides contributing to investment of the eggs, the glands presumably intervene also in other aspects of the reproductive processes." (Author)] Address: Abro, A., Division of Anatomy, Departments of Biomedicine, University of Bergen, Jonas Lies vei 91, N-5009 Bergen, Norway

**6140.** Bauer, S. (2005): Das Zielartenkonzept im Landkreis Ravensburg. *mercuriale* 5: 9-13. (in German). [Odonata are an important factor to identify targets of nature conservation tasks and to operationalise these. The Landkreis Ravensburg, Germany has developed a key stone species concept which will guide future nature conservation measures.] Address: Bauer, S., Im Tobel, 88353 Immenried, Germany. E-mail: Josef.Bauer@Landkreis-Ravensburg.de

**6141.** Boy, G (2005): Maathai's Clubtail. *SWARA* October-December 2005: 8-9. (in English). [This is an extensive report on the discovery of *Notogomphus maathai* in Kenya in 2000, and the succeeding work to describe and name the species.] Address: via Clausnitzer, Viola, Graefestr. 17, D-06110 Halle/Saale, Germany. E-mail: violacl@t-online.de

**6142.** Bried, J.T.; Bennett, L.W.; Ervin, G.N. (2005): Live mass and length-mass allometry of adult odonates collected in east-central Mississippi, United States. *O-*

*donatologica* 34(2): 111-122. (in English). ["Live mass was recorded for over 290 adult Odonata during peak flight season in Mississippi. Total live mass is reported for 19 species, along with a quantitative species subset analysis of inter- and intraspecific sex partitioned mass. Fresh mass was significantly correlated with species and sex in Anisoptera ( $p = 0.021$ ) and Zygoptera ( $p = 0.001$ ), based on separate species-level analyses of the Libellulidae ( $n = 6$  species) and Coenagrionidae ( $n = 4$  species), respectively. Total live mass also was correlated with total body length in the libellulid dragonflies ( $r^2 = 0.59-0.94$ ,  $p < 0.0001-0.03$ ) and length-mass slopes were not significantly different among species. Limitations and cautions of mass prediction via proportionate size dimension(s) are discussed, some advantages of working with adults as opposed to larvae and measuring fresh mass as opposed to dry mass are described, and further study of length-mass relationships in adult Odonata is encouraged." (Authors)] Address: Bried, J., Mississippi State University, Dept Biol. Sciences, Rm 130 Harned, PO Box GY, Mississippi State, MS 39762, USA. E-mail: jasonbried@hotmail.com

**6143.** Canales-Lazcano, J.; Contreras-Garduno, J.; Cordoba-Aguilar, A. (2005): Fitness-related attributes and gregarine burden in a non-territorial damselfly *Enallagma praevarum* Hagen (Zygoptera: Coenagrionidae). *Odonatologica* 34(2): 123-130. (in English). ["Odonata are usually infected with intestinal gregarines. Using *E. praevarum* adults, it was investigated whether: (a) both sexes differed in the degree of parasitism and immune ability (as shown by melanization of artificial, nylon-based implants in the thoracic region); and, (b) gamete production, survival and fat reserves correlated with gregarine burden. 2 sets of in-copula (to control for age) animals were used. One was used for estimation of egg and sperm, and the other for fat reserves. Survival was monitored as the time that field-captured insects survived under laboratory conditions in the absence of food. Gregarines were counted by dissection of the gut. Despite the case that females had more parasites than males, both sexes did not differ in immune ability. Eggs, but neither sperm nor fat reserves in both sexes, correlated negatively with parasite number. Survival in both sexes also correlated inversely with gregarine burden. This, however, held only for males when the analysis was performed by sex. These results are discussed in terms of the detrimental effects of gregarine on Zygoptera hosts." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**6144.** Clausnitzer, V. (2005): An updated checklist of the dragonflies (Odonata) of the Kakamega Forest, Kenya. *Journal of East African Natural History* 94(2): 239-246. (in English). ["A comprehensive checklist of dragonflies occurring in the Kakamega Forest, Kenya is given and shortly discussed. A total of 72 dragonfly species, representing 42 % of Kenya's dragonfly fauna, has been recorded from the forest. Three of these are based on literature records only. The habitat preference and affiliation with other African regions is listed for all species. Twenty species are of national importance for Kenya, since they are only found at this site within the country. For these species habitat affiliations in the Kakamega Forest are given more in detail. The dragonfly fauna of the Kakamega Forest is impoverished compa-



red to more western Guineo-Congolian rain forest areas. The effects of forest fragmentation and isolation hindering any immigration from western rain forest patches is shortly Addressed." (Author)] Address: Clausnitzer, Viola, Graefestr. 17, D-06110 Halle/Saale, Germany. E-mail: violacl@t-online.de

**6145.** Contreras Garduño, J.; Córdoba Aguilar, A.; Peretti, A.V. (2005): La elección femenina. *Ciencias* 77: 40-47. (in Spanish). [Review paper on female mate choice.] Address: Córdoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**6146.** Costa, J.M.; Regis, L.P.R.B. (2005): Description of the last instar larva of *Perithemis lais* (Perty) and comparison with other species in the genus (Anisoptera: Libellulidae). *Odonatologica* 34(1): 51-57. (in English). [The external morphology is described, illustrated and compared with that of the congeners. A note on the habitat of *P. lais* and a list of co-occurring odonate species is appended.] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@acd.ufrj.br

**6147.** Daigle, J.J. (2005): *Heteragrion bickorum* spec. nov. from Ecuador (Zygoptera: Megapodagrionidae). *Odonatologica* 34(2): 165-168. (in English). ["The new species is described and illustrated (holotype male and allotype female [pair in tandem]: Ecuador, Napo province, Limoncocha, 28-VIII-1980). The holotype and allotype are deposited in the Florida State Collection of Arthropods, Gainesville, Florida, USA." (Author)] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**6148.** Dijkstra, K.-D.B. (2005): The identity of some widespread and variable *Phyllomacromia* species, with a revised grouping of the genus (Anisoptera: Corduliidae). *Odonatologica* 34(1): 11-26. (in English). ["Many *Phyllomacromia* species appear to be more variable than was hitherto realised. This has led to the description of paler and darker forms as distinct species. Fortunately, the genus is rich in morphological characters in both sexes. *P. melania* and *P. overlaeti* were described from females and both have been allied with non-conspecific males, leading to great confusion. *P. melania* is the female of the species known as *P. funicularia* rather than that of *P. contumax*, while *P. overlaeti* matches and not *P. subtropicalis* and not *P. schoutedeni*. With the identity of these females clarified and the variation considered, many synonyms arise: *R. funicularia*, *P. bredoi* and *P. martorelli* are synonyms of *P. melania*; *P. biflava*, *P. nyanzana*, *P. bifasciata*, *P. reginae*, *P. halei* and *P. leoni* of *P. contumax*; and *P. onerata* and *P. clymene* of *P. monoceros*; and *P. subtropicalis*, *P. paludosa* and *P. royi* of *P. overlaeti*. *P. paludis* is not synonymous with *P. contumax* but with *P. paula*. The taxonomy of this large genus is briefly discussed and a new species grouping is proposed." (Author)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**6149.** Dumont, H.J.; Haritonov, A.Yu.; Kosterin, O.E.; Malikova, E.I.; Popova, O. (2005): A review of the Odonata of Kamchatka Peninsula, Russia. *Odonatologica*

34(2): 131-153. (in English). ["All knowledge of the odonate fauna of Kamchatka Peninsula (NE Asia) is reviewed, using literature data, miscellaneous collections and the results of an expedition by the authors in July 2003. In total, 27 species have become known, with *Lestes dryas*, *Coenagrion hastulatum*, *Aeshna serrata*, *Epithea bimaculata*, *Somatochlora exuberata*, *S. alpestris*, and *Leucorrhinia intermedia* here reported for the first time. *Aeshna palmata* is dismissed; *Anax junius*, twice reported in the 19th century is an American migrant that rarely reaches Kamchatka; the southern migrants. *Pantala flavescens* and *Sympetrum frequens*, are represented by one old record each, with specimens still preserved in Zool. Inst., St Petersburg. Very few more species may be expected in future, and it is concluded that the fauna is of an impoverished boreal extraction. This lack of endemism is understandable, since dragonflies could only begin invading the peninsula around 13,000 BP 7 species are Holarctic, 1 is SE Palaearctic, 5 are NE Palaearctic, 1 is an American vagrant, 1 is a sub-cosmopolitan migrant, and the remainder are transpalaearctic." (Authors)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

**6150.** Dumont, H.J.; Verschuren, D. (2005): Odonata from the Ennedi and Ounianga regions of northern Chad, with a note on the status of *Orthetrum kollmannspergeri* Buchholz, and a checklist of species currently known from the Republic of Chad. *Odonatologica* 34(3): 291-297. (in English). ["A hydrobiological survey of scarce permanent aquatic environments in the Ennedi and Ounianga regions of northern Chad yielded a small collection of 7 odonate species. It adds 3 new species to the known fauna of Chad: *Ischnura senegalensis*, *Pseudagrion hamoni*, and *Orthetrum sabina*. The presence of *O. sabina* at Ounianga represents the westernmost record of this oriental species in N. Africa. Another oriental element, *O. taeniolum*, may not exist in Africa W of the Nile, possibly being replaced there by the closely related *O. kollmannspergeri* Buchholz. The 44 species hitherto reported from the Republic of Chad likely represent only a third or less of those to be expected in the country." (Authors)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

**6151.** Dyatlova, E.S. (2005): Novye svedeniya o faune strekoz (Odonata) Odessy i ee okrestnostey [New data on Odonata fauna of Odessa and its environs]. *Zagal'na i prykladna entomologiya v Ukraini. Tezy dopovidey naukovoi entomologichnoi konferentsii prysvyachenoj pam'yati chlenacorrespondenta NAN Ukrainy professora V. G. Dolina* [General and applied entomology in Ukraine. Transactions of the scientific entomological conference devoted to the memory of Prof. V. G. Dolin] L'viv: 79-81. (in Russian). ["A short historic review of the odonatological investigation of Odessa and its surroundings (SW Ukraine) was presented. An annotated list of 37 species collected by the author in this region during 2003-2004 contained 14 that were newly discovered for Odessa and its surroundings: *Lestes dryas* first for the Odessa region, *Coenagrion scitulum* and *Orthetrum coerulescens* concepts for the SE Ukraine. (Khrokalo L. (2005): Annotated bibliography of the odonatological papers of Ukraine. IDF-Report 8:1-51)"] Address: Dyatlova, Elena Sergeyevna, Institute of Zoo-

logy, Faculty of Biology, I.I. Mechnikov University of Odessa, Odessa, Ukraine. E-mail: lena.dyatlova@gmail.com

**6152.** Dyatlova, E.S. (2005): Novye svedeniya o faune strekoz (Odonata) Odessy i ee okrestnostey [New data on Odonata fauna of Odessa and its environs]. *Zagal'na i prykladna entomologiya v Ukraini. Tezy dopovidey naukovoï entomologichnoi konferentsii prysvyachenoï pam'yati chlenacorrespondenta NAN Ukrainy profesora V. G. Dolina* (General and applied entomology in Ukraine. Transactions of the scientific entomological conference devoted to the memory of Prof. V. G. Dolin) L'viv: 79-81. (in Russian). ["A short historic review of the odonatological investigation of Odessa and its surroundings (SW Ukraine) was presented. An annotated list of 37 species collected by the author in this region during 2003-2004 contained 14 that were newly discovered for Odessa and its surroundings: *Lestes dryas* first for the Odessa region, *Coenagrion scitulum* and *Orthetrum coerulescens anceps* for the SE Ukraine." (Khrokalo L.)] Address: Dyatlova, Elena Sergeyevna, Institute of Zoology, Faculty of Biology, I.I. Mechnikov University of Odessa, Odessa, Ukraine. E-mail: lena.dyatlova@gmail.com

**6153.** Emiliyamma, K.G. (2005): On the Odonata (Insecta) fauna of Kottayam district, Kerala, India. *Zoos' Print Journal* 20(12): 2108-2110. (in English). [31 species from 12 localities are documented] Address: Emiliyamma, K.G., Western Ghats Field Research Station, Zoological Survey of India, Annie Hall Road, Kozhikode, Kerala 670002, India

**6154.** Faucheux, M. J. (2005): Vibrorécepteurs et osmorécepteurs sur les lamelles caudales de la larve de *Lestes sponsa* (Hansemann, 1823) (Odonata, Zygoptera, Lestidae). *Bulletin de la Société des Sciences naturelles de l'Ouest de la France* 27(4): 203-206. (in French, with English summary). [The caudal lamellae in the larva of *Lestes sponsa* (Odonata, Zygoptera) bear sensilla filiformia and sensilla campaniformia, which are described by means of scanning electron microscope. These sensillar types are observed for the first time on the larval caudal appendages of Odonata. The sensilla filiformia, which are stimulated by the vibrations in the water, are mecanoreceptors which detect the presence and position of predators in the space surrounding each of caudal lamellae. The sensilla campaniformia, whose function is proprioceptive, are true osmoreceptors which allow to larva to be adapted for live in waters with suitable osmotic pression." (Author)] Address: Faucheux, M.J., Laboratoire d'Endocrinologie des Insectes Sociaux, Université de Nantes, 2 rue de la Houssinière, B.P. 92208, F-44322 Nantes Cedex 03, France. E-mail: faucheux.michel@free.fr

**6155.** Faucheux, M.J.; Meurgey, F. (2005): Ontogénese de l'appareil stridulant des larves d'*Epiophlebia superstes* (Sélys, 1889) (Odonata: Anisozygoptera: Epiophlebiidae). *Bull. Soc. Sc. Nat. Ouest de la France, nouvelle série* 27(4): 183-195. (in French, with English summary). ["The development of the stridulatory apparatus has been studied in three larval stages of *Epiophlebia superstes* (Odonata, Zygoptera), using scanning electron microscopy. The pars stridens is made up of triangular zones consisting of a transverse series of ridges placed on each of the abdominal tergites 3-5 (stage A), 3-6 (stage B), 3-7 (stage C). The inner edge of the

femur of the metathoracic legs serves as a plectrum. Contrary to the general case in Insects, it is the pars stridens (abdomen) which rubs against the plectrum (femur). The stridulation has been observed in the 3 larval stages when they outside the aquatic element and are in a state of catalepsy. One may suppose that the sound emission serves an agonistic and spacing function among conspecifics." (Authors) Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**6156.** Faucheux, M.J.; Meurgey, F.; El Wahbi, Y. (2005): Odonates des environs d'Essaouira (Maroc méridional). *Bull. Soc. Sc. Nat. Ouest de la France, nouvelle série* 27(3): 122-130. (in French, with English summary). ["11 species of Odonata in the region of Essaouira (Morocco) are presented together with a few related ecological elements. The presence of *Sympetrum méridionale* (Sélys, 1841) has been pointed out for the first time in South-Western Morocco." (Authors)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**6157.** Fenoglio, S.; Bo, T.; Cucco, M. (2005): Winter prey preference of *Perlodes microcephalus* (Pictet, 1833) (Plecoptera, Perlodidae) nymphs in an Apenninic creek, northwestern Italy. *Entomological news* 116(4): 245-252. (in English). [The feeding habits of *P. microcephalus* nymphs have been investigated in Caramagna. "This large species is one of the most representative carnivorous stonefly nymphs in this area, where it is a top-bottom predator in many fishless creeks. Despite its ecological importance, little is known about its trophic ecology. In this study, we examined the gut contents of 35 nymphs during the winter of February 2005. We detected an evident trophic preference for the following taxa: Chironomidae (Diptera) as well as Psychomidae, Glossosomatidae, Hyporhyacophila sp., and other Trichoptera. This preference appears to be independent of the prey's availability in the substratum. Rheostenic taxa, also abundant and widespread in the substratum, were almost absent or seldom found in the diet of *P. microcephalus*. These results suggest that the trophic preferences of *P. microcephalus* are more dependent on prey microhabitat preference than on prey abundance." (Authors) Odonata are not represented as prey while they ("*Calopteryx* sp., *Onychogomphus* sp., *Orthetrum* sp.") are co-occurring with *P. microcephalus*.] Address: Fenoglio, S., University of Piemonte Orientale, Dipartimento di Scienze dell'Ambiente e della Vita, Via Bellini n. 25, 15100 Alessandria, Italy. E-mails: fenoglio@unipmn.it

**6158.** Ferreira, S.; Grosso-Silva, J.M.; Sousa, P. (2005): A contribution to the knowledge of the odonata of Montesinho Natural Park (NE Portugal). *Boletín Sociedad Entomológica Aragonesa* 37: 249-250. (in English, with Portuguese summary). [14 Odonata species are documented including *Coenagrion mercuriale*.] Address: Ferreira, Sónia, CIBIO/UP - Centre de Investigate) em Biodiversidade e Recursos Genéticos, Universidade do Porto, Campus Agrário de Vairao, P-4485 -661 Vairão, Portugal. E-mail: hiporame@gmail.com

**6159.** Ferreira, S.; Grosso-Silva, J. M.; Soares-Vieira, P. (2005): Miscellaneous records of dragonflies and damselflies (Insecta, Odonata) from Continental Portu-

gal. Boln. S.E.A., 36: 275-277. (in English, with Portuguese summary). [Knowledge on the distribution of twenty Odonata species in continental Portugal is broadened. Five species are recorded for the first time from the Peneda-Gerês National Park.] Address: Ferreira, Sónia, CIBIO/UP - Centre de Investigate) em Biodiversidade e Recursos Geneticos, Universidade do Porto, Campus Agrário de Vairao, P-4485-661 Vairão, Portugal. E-mail: hiporame@gmail.com

**6160.** Frank, K.-S. (2005): Juwel unserer Kulturlandschaft - der Mindelsee bei Radolfzell. *mercuriale* 5: 20-25. (in German). [The fauna and flora of lake Mindelsee situated near Lake Konstanz, Baden-Württemberg, Germany, is briefly characterised. Dragonflies currently account to 49 species; these are listed.] Address: Frank, K.-S., Naturschutzzentrum Möggingen, Mühlbachstr. 2, D-78315 Radolfzell-Möggingen, Germany. E-mail: kai-steffen.frank@bund.net

**6161.** Gonzalez-Soriano, E.; Cordoba-Aguilar, A. (2005): Male behaviour in the male dimorphic damselfly *Paraphlebia quinta* Calvert (Zygoptera: Megapodagrionidae). *Odonatologica* 34(4): 379-385. (in English). ["*P. quinta* is a tropical species with 2 male morphs: the black-winged (BW) male and the hyaline-winged (HW) male; here their sexual behaviour is described. In general, males seem to spend relatively little time in flying activities. This may be explained either by the inability to recognise conspecifics and, hence, engage in social interactions, or by the reduced energetic reserves that prevent them from engaging in expensive activities. BW males were more aggressive and site-faithful than HW males. BW defended spaces containing debris (plant and wood) against conspecifics while HW did not. BW-BW, BW-HW and HW-HW aggressive encounters were common. Despite their non-aggressive nature toward BW males, HW males behaved aggressively when faced by HW males. The distance flown by each morph from male grasping of the male until she started oviposition was measured: HW flew longer distances than BW. These differences between male morphs are compared to those found in *Mnais p. pruinosa*, another male dimorphic zygopteran. Similar to what happens in that species, both tactics in *P. quinta* are possibly maintained due to the similar reproductive and energetic costs accrued by and benefits paid to each morph." (Authors)] Address: Gonzalez-Soriano, E., Depto Zoología, Inst. Biol., Universidad Autonoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: e-soriano@mail.ibiologia.unam.mx

**6162.** Hermans, J. (2005): Review: Askew, R.R. (2004): *The Dragonflies of Europe*, revised & second edition. *Natuurhistorisch Maandblad* 94: 142. (in Dutch). [Review of the second edition of the classic book of Askew (see OAS 4113).] Address: Hermans, J.T.; Herestraat 21, NL-6067 ER Linne, The Netherlands

**6163.** Hofmann, T.A.; Mason, C.F. (2005): Competition, predation and microhabitat selection of zygoptera larvae in a lowland river. *Odonatologica* 34(1): 27-36. (in English). ["The microdistribution of 4 lotic species was investigated in the field. Microhabitat selection of *Calopteryx splendens* and *Erythromnia najas* was further examined in the laboratory, individually at different larval densities and in the presence of the other species and a predator. *E. najas*, *Ischnura elegans* and *Platycnemis pennipes* showed significant preferences

for particular aquatic macrophytes compared to others in the field, whereas *C. splendens* did not discriminate between the investigated plant species. Only limited spatial separation was apparent between the larvae of different species, as preferences for the same macrophyte species were found. When kept separate and at low densities, larvae of *C. splendens* and *E. najas* inhabited significantly different microhabitats in the laboratory. At high intraspecific abundances, spatial overlap between the two species became apparent as both increasingly occupied less preferred substrata, which is in concurrence with the ideal free distribution model of habitat selection. *E. najas* showed no change in perch selection in the presence of *C. splendens* at high densities. In this instance, intraspecific competition therefore appeared to be more important than interspecific competition with other Zygoptera in determining the microdistribution of *E. najas*. In the field, the niches of the two species may be more adequately separated on the basis of prey selection or hunting behaviour. *E. najas* also actively reacted to the presence of a predator, indicating some flexibility of response regarding perch selection." (Aurhors)] Address: Hoffmann, T.A., Dept Biol. Sci., Univ. Essex, Wivenhoe Park, Colchester, Essex, C04 3SQ, UK. E-mail: tahofmp@essex.ac.uk

**6164.** Hunger, H. (2005): Von Versuchung, Bruchlandung und eisenhaltigem Schlupfsubstrat. *mercuriale* 5: 45. (in German). [Baden-Württemberg, Germany; (1) 01-VI-2005: a male *Brachytron pratense* tried to copulate with a female *Cordulia aenea*. (2) A female *Sympetrum vulgatum* was accidentally "caught" by the strings of algae, which winded around the caput of the female. (3) *A. imperator* was found emerging 10 m away from the shore towards the open water of a lake, which suggests that larvae also can exist among the submerse vegetation in the centre of a lake.] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), August-Ganther-Straße 16, D-79117 Freiburg, Germany. E-mail: holger.hunger@inula.de

**6165.** Hunger, H. (2005): Langstreckenmarsch schlüpfbereiter *Orthetrum cancellatum*-Larven. *mercuriale* 5: 40-41. (in German). [Baden-Württemberg, Germany; a long distance emergence of *O. cancellatum* is described in detail. Measured from the shore line the distance was app. 15-16 m.] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), August-Ganther-Straße 16, D-79117 Freiburg, Germany. E-mail: holger.hunger@inula.de

**6166.** Ishida, K. (2005): Reclassification of *Rhipidolestes okinawanus* Asahina, 1951, Occurring in the Ryukyus (Odonata, Megapodagrionidae). *Japanese journal of systematic entomology* 11: 167-181. (in English). ["*Rhipidolestes okinawanus* Asahina, 1951 is reclassified into 3 species, *R. okinawanus*, *R. shozoi* sp. nov., and *R. amamiensis* sp. nov.. *R. amamiensis* inhabiting the Amami Islands is divided into 2 subspecies, *R. amamiensis amamiensis* occurring in Amami-Oshima and *R. amamiensis tokunoshimensis* subsp. nov. in Tokunoshima." (Author)] Address: Ishida, K., Seisho High-school, Gifu, Japan

**6167.** Jaletzke, M.; Walter, B. (2005): Zur Flora, Vegetation und Fauna von Karpfenzuchtanstalten in Westfalen. *Abhandlungen aus dem Westfälischen Museum für Naturkunde* 67(3): 75-90. (in German, with English summary). [A total of 27 odonate species is said to oc-



cur at two carp breeding water body complexes in Westfalia, Germany, but no details are given (for details see: Schmidt, E. (1993): Die ökologische Nische von *Sympetrum depressiusculum* (Selys) im Münsterland (Naturschutzgebiet Heubachwiesen). *Libellula* 12(3/4): 175-198.] Address: Jaletzke, Martina, Klinkenhagen 52, D-48653 Coesfeld, Deutschland

**6168.** Kandibane, M.; Raguraman, S.; Ganapathy, N. (2005): Relative abundance and diversity of Odonata in an irrigated rice field of Madurai, Tamil Nadu. *Zoos' Print Journal* 20(11): 2051-2052. (in English). [Nine Anisoptera and three Zygoptera were recorded during 2000 in an irrigated rice field of Madurai India. *Pantala flavescens*, *Diplocodes trivialis*, *Crocothemis servilia*, *Tramea limbata*, and *Agriocnemis femina femina* were the dominant species recorded in weeded and partially weeded ecosystems. They were more abundant in partially weeded rice ecosystem than in weeded rice ecosystem. Rare species like *Orthetrum sabina*, *Rhyothemis variegata*, *Neurothemis tullia*, *Anax guttatus*, and *Trithemis* sp. occurred only at the tillering stage of crop growth.] Address: Kandibane, M., Krishi Vigyan Kendra, Vriddhachalam, Tamil Nadu 606001, India

**6169.** Kikuchi, R.M.; Uieda, V.S. (2005): Composition and distribution of macroinvertebrates in different types of substrate of a stream in the Municipal District of Itatinga, São Paulo, Brazil. *Entomol. Vect.* 12(2): 193-231. (in Portuguese, with English summary). [Relationships between habit, physical conditions of the habitat (substrate, flow, turbulence) and food availability of the fauna of a tropical stream were surveyed in a tributary of the Basin of Paranapanema, located in the municipal district of Itatinga, São Paulo. Comparing substrates dominated by vegetation, rocky and sandy structures the authors found a larger density of fauna in the rocky substrate and larger diversity in the vegetation substrate. In all substrates, Insecta, and mainly Diptera, prevailed in abundance and diversity of species. In most cases, Odonata are treated on the family level.] Address: Kikuchi, Regina Mayumi, Programa de Pós-graduação em Ecologia e Recursos Naturais, Universidade Federal de São Carlos, Caixa postal 676, Rodovia Washington Luís, Km 235, CEP: 13565-905, São Carlos, SP, Brasil. E-mail: rmkikuchi@yahoo.com.br

**6170.** Koch, H.-M. (2005): Herbtschlupf von *Lestes sponsa*. *mercuriale* 5: 41-42. (in German). [A record of late emergence at *L. sponsa* near Reutlingen, Baden-Württemberg, Germany is documented. The possibility of a bivoltine development in 2005 is discussed] Address: Koch, H.-M., Krämerstr. 40, D-72764 Reutlingen, Germany. E-mail: koch.druckerei@t-online.de

**6171.** Konogaya, S.; Kobayshi, H (2005): An effect of irrigation and cultivation system on food chain in paddy water environment. *Journal of rural planning association* 24(special issue): S49-S54. (in Japanese, with English summary). ["For the purpose of examining on role of irrigation and cultivation system to paddy ecosystem, we study species and number of Odonata larvae and analyze the stable isotope ratios of the Odonata larvae and the plankton/detritus in water of paddy fields and irrigation ponds. As a results, cultivation system clearly effects to composition of species and number of Odonata larvae.  $\delta^{13}C$  indicates that *Orthetrum albistylum speciosum* larvae and *Coenagrionidae* spp. larvae which are dominant species in paddy water, de-

pend on specified food sources, each other.  $\delta^{15}N$  shows that the trophic level of Odonata larvae is higher than that of the plankton/detritus in paddy water. It is considered that analyze the stable isotope ratios application is effective to examine water ecosystem and food web in paddy." (Authors)] Address: Konogaya, S., Graduate School of Agriculture, IBARAKI Univ., Japan

**6172.** Kosterin, O.E. (2005): Western range limits and isolates of eastern odonate species in Siberia and their putative origins. *Odonatologica* 34(3): 219-242. (in English). ["*Macromia amphigena*, *Shaogomphus postocularis*, and *Sympetrum croceolum*, ranging in NE China, Korea and Japan, have isolates at the NE margins of the Altai-Sayan mountain system: all 3 in SE West Siberia, *M. amphigena* and *S. postocularis* also in southern Central Siberia and *M. amphigena* in E Kazakhstan and W Mongolia. *Ophiogomphus obscurus*, *Nihonogomphus ruptus*, and *Calopteryx japonica* have continuous ranges protruding to the West from E. Asia to the Ob ' River basin and to 60 degrees N latitude. *Coenagrion ecornutum* has a similar range but extends N in Siberia to 65 degrees N and has an isolate in the S Ural Mts. *C. lanceolatum*, *C. hylas* and *Somatochlora graeseri* reach 70 degrees N and also extend westward to the Ob ' River basin, but *C. hylas* has isolates in the Polar Urals and Bavaria, while *S. graeseri* is probably isolated in the Ural Mts. Of 4 other eastern spp. in Siberia, 2 reach 70 degrees N, but *Somatochlora exuberata* extends westwards only to the sources of the Yenisey River and *Coenagrion glaciale* to Lake Baikal, while *Cercion v-nigrum* and *Anisogomphus maacki* just penetrate into SE Transbaikalia. Thus, 11 eastern odonate species have their western limits in Siberia (defined in a narrow sense, not including the Far East). In addition, 4 have more westerly isolates, 3 in the Urals and 1 in Bavaria. Siberia also includes the eastern limits of 21 western species 24 transpalaeartic species spread far to the N and 10 species occupy S Siberia only (or just occur locally), 2 Central Asian species barely penetrate into S. Siberia. *Aeshna viridis* is a doubtful amphipalaeartic species. Numerous palaeopalynological reconstructions suggest that during the Holocene climatic optimum, a continuous belt of broad-leaved forest was restored in Siberia, providing conditions for a recolonization of Siberia by Odonata. Westward migrations of eastern species were favoured by the optimum occurring earlier in the east than in the west. Hence, many western species had no time to occupy all of Siberia and today the eastern limits of their ranges lie within the region. *M. amphigena*, *S. postocularis* and *S. croceolum* perhaps were the most stenotopic of those E. Asian species that colonized Siberia during the Holocene, and after the optimum, their ranges shrank to the peri-Altaian refugium. Their isolates there should be dated no earlier than 5-6 thousand yrs ago. *C. v-nigrum* and *A. maacki* are perhaps the least mobile of the eastern species in Siberia." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**6173.** Kunz, B. (2005): *Überschätzt. mercuriale* 5: 43. (in German). [Baden-Württemberg, Germany, 15-VI-2005; a male *Ischnura pumilio* tried to copulate with a male *Platycnemis pennipes*.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de

- 6174.** Kunz, B. (2005): Entwurf eines Metapopulationsmodells anhand zahlreicher aktueller Funde von *Sympetrum flaveolum* in der Region Hohenlohe im Jahr 2005. *mercuriale* 5: 26-32. (in German). [Baden-Württemberg, Germany; a metapopulation model for *S. flaveolum* based on an intensive survey of the local dragonfly fauna in the past two decades and including 22 localities is presented and discussed.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de
- 6175.** Kunz, B. (2005): Guten Appetit!. *mercuriale* 5: 42. (in German). [Baden-Württemberg, Germany, 31-VII-2005; a female *Enallagma cyathigerum* was devouring a male *Coenagrion puella*.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: kunzFOTOGRAFIE@t-online.de
- 6176.** Machado, A.B.M. (2005): *Neocordulia matuensis* spec. nov. from Brazil (Anisoptera: Corduliidae). *Odonatologica* 34(3): 299-302. (in English). ["The new species (male holotype: Aiuruoca, Minas Gerais, Brazil, 30-XII-1999; deposited in A.B.M. Machado collection) is described. It differs from all the congeners by having the sternal protuberance of segment 8 conical whereas in other species it is either absent or biconical." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federale de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil
- 6177.** Machado, A.B.M. (2005): *Forcepsioneura grossorum* spec. nov. from Brazil (Zygoptera: Protoneuridae). *Odonatologica* 34(2): 169-172. (in English). ["The new species (holotype male: Nova Friburgo, Rio de Janeiro, Brasil, 25-VII-2002; deposited in the author's collection in Belo Horizonte) is described, illustrated and compared with its congeners. It differs from all congeners by the unique structure of the posterior prothoracic lobe." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federale de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil
- 6178.** Machado, A.B.M. (2005): *Peruviogomphus bellei* spec. nov. from the Amazonian region of Brazil (Anisoptera: Gomphidae). *Odonatologica* 34(1): 59-63. (in English). ["The new species is described and illustrated (holotype male: Brazil, Amazonas, Tefé, I-1958, A.L. Carvalho leg., deposited in collection A.B.M. Machado). By its size, colour and structure of the anal appendages, *P. bellei* sp. n. is closest to *P. moyobambus* Klots, 1944, but it can be separated mainly by the presence of a well-developed expansion on abdominal segment 8. It differs from the other 2 congeners by the presence of a denticulated area in the mid-part of the inner hindwing margin. The significance of this character for gomphid taxonomy is discussed." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federale de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil
- 6179.** Mancî, C.O. (2005): Studiu preliminar asupra distributiei libelulelor (Insecta: Odonata) în Padurea Verde (Timisoara) si zona imediat apropiata. *Bul. inf. Entomol.* 16: 83-88. (in Romanian, with English summary). [Romania; 35 species of Odonata have been recorded in 1999, and some in 2000 and 2005.] Address: Mancî, C.O., Acad. Remus Radulet 13, bl. 119, ap. 7, Timisoara 300281, Timis County, Romania. E-mail: cosminovidiu@yahoo.com
- 6180.** Matsubara, K.; Hironaka, M. (2005): Postcopulatory guarding behaviour in a territorial damselfly, *Pseudagrion p. pilidorsum* (Brauer), for submerged ovipositing females (Zygoptera: Coenagrionidae). *Odonatologica* 34(4): 387-396. (in English). ["The postcopulatory mate guarding behaviours by territorial and non-territorial males for submerged ovipositing females were investigated in the field. After copulations, females in tandem began to oviposit at the water surface and thereafter they usually submerged completely underwater. The female often repeated the submergence and emergence at several oviposition sites. When the female submerged completely, the male released her without submergence and rested above the water surface during oviposition (non-submerged guarding), or the male submerged completely and remained in tandem, whether only at first or for the duration of the oviposition (submerged guarding). Territorial males always performed non-submerged guarding when the female oviposited inside their territories. The non-submerged guarding inside the territory might allow the territorial male both to guard the ovipositing female and to maintain his territory. On the other hand, when the female oviposited inside another male's territories, territorial and non-territorial males exhibited both non-submerged guarding and submerged guarding. Thus, *P. p. pilidorsum* males may adopt either submerged guarding or non-submerged guarding in response to change in the probability of a takeover of the emerged female by rival males inside another male's territory." (Authors)] Address: Matsubara, K., Department of Applied Biological Sciences, Faculty of Agriculture, Saga University, Honjo 1, Saga, 840-8502, Japan
- 6181.** McBean, M.C.; White, S.A.; MacGregor, J.A. (2005): Foraging behaviour of the damselfly larva *Pyrrhosoma nymphula* (Sulzer) in response to predator presence (Zygoptera: Coenagrionidae). *Odonatologica* 34(2): 155-164. (in English). ["The trade of between foraging and predator avoidance was studied. In the presence of a larva of the predatory *Aeshna juncea*, *P. nymphula* was found to reduce foraging activity significantly reduced foraging activity in response to chemical stimuli from *P. nymphula*. *A. juncea* but not in response to visual stimuli. Foraging activity was further reduced when the diet of *A. juncea* was changed from chironomid larvae to *P. nymphula*. This suggests that predators are detected chemically and are chemically labelled by their diet. Foraging activity was found to increase with starvation level after 48 h without access to food, with a further increase after 72 h of starvation. The presence of chemical stimuli from conspecific fed predators delayed the increase in foraging activity until 72 h of starvation. These results have implications for larval survival and adult reproductive fitness." (Authors)] Address: White, S.A., Division of Environmental and Evolutionary Biology, Inst. Biomed. & Life Sciences, Univ. Glasgow, Glasgow G12 8QQ, Scotland. E-mail: s.white@bio.gla.ac.uk
- 6182.** McKee, D.; Harvey, I.F.; Thompson, D.J.; Sherratt, T.N. (2005): Frequency of female colour morphs in populations of four coenagrionid damselflies (Zygoptera: Coenagrionidae). *Odonatologica* 34(1): 37-49. (in English). ["Knowledge of naturally occurring andromorph and gynomorph frequencies in populations of

coenagrionid damselflies is important for understanding the evolution of female-limited polymorphism. Here are reported the frequencies of andromorphs and gynomorphs in populations of *Coenagrion puella*, *C. mercuriale*, *Xanthocnemis zealandica* and *Ischnura fluviatilis* and a review is presented of the literature for other coenagrionid spp. It is shown that ratios of andromorphs to gynomorphs are often unequal with andromorphs generally being the uncommon morph. Significant inter- and intra-population variation in morph frequency sometimes occurs but is of low magnitude. No evidence was found for spatial segregation of andromorphs and gynomorphs. Andromorph frequency could not be significantly related with sex ratio or male density.] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**6183.** Mitchell, A.; Samways, M.J. (2005): The morphological 'forms' of *Palpopleura lucia* (Drury) are separate species as evidenced by DNA sequencing (Anisoptera: Libellulidae). *Odonatologica* 34(2): 173-178. (in English). ["*P. lucia* is a widespread African species with a checkered taxonomic history. Currently 2 'forms' or subspecies, *P.l. lucia* and *P.l. portia* are recognized, although debate over the taxonomic status of these taxa has hardly let up over the last 230 years. The 2 'forms' show distinctive wing pattern differences although other aspects of their morphology are very similar. They can occur highly sympatrically at some localities in southern Africa, as well as elsewhere, thus raising the question of whether they are two species or one perhaps with balanced polymorphism. DNA sequence data from the ITS2 and COI genes were collected from specimens of both these 'forms' to assess more rigorously the taxonomic status of these taxa. The closely related *P. deceptor* (Calvert) and *P. jucunda* (Rambur) were included in the data set to provide a baseline for comparisons. Specimens from all 4 taxa were from pools of the flood plain of the Sabie R., Kruger National Park, South Africa, and were potentially able to interbreed. Both phylogenetic analyses and comparisons of sequence divergence levels strongly support the hypothesis that the 2 'forms' of *P. lucia* are reproductively isolated and should be accorded full species status as *P. lucia* (Drury, 1773) and *P. portia* (Drury, 1773)."] (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**6184.** Miyata, T.; Kojo, T. (2005): 419 Flight characteristics of *Pantala flavescens*. JSME Bioengineering Conference and Seminar Vol. 2004, No.17: 169-170. (in Japanese, with English translation of the title). [*Pantala flavescens* aspect ratio flight characteristics distortion of wings ] Address: not transliteration into English

**6185.** Muzon, J.; Pessacq, P. (2005): Description of the last larval instar of *Ischnura ultima* Ris (Zygoptera: Coenagrionidae). *Odonatologica* 34(3): 303-306. (in English). ["The description is based on a female specimen from Argentina (Mendoza prov.) and the morphology is compared with the other *Ischnura* larvae known from Argentina, viz. *I. capreola* and *I. fluviatilis*. In addition *I. ultima* is reported here for the first time from Chile."] (Authors)] Address: Muzón, J., Inst. Limnol. "Dr.

R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina. E-mail: muzon@ilpla.edu.ar

**6186.** Muzon, J.; Lozano, F. (2005): *Acanthagrion hartei* spec. nov. from Ecuador (Zygoptera: Coenagrionidae). *Odonatologica* 34(2): 179-182. (in English). ["The new species is described and illustrated. Holotype male: Ecuador, Morona, Santiago prov., Bomboiza, 20-IX-1990, deposited in USNM, Washington. It is assigned to the apicale-group, and differs from the other species of that group by characters of the male terminalia and genital ligula."] (Authors)] Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina. E-mail: muzon@ilpla.edu.ar

**6187.** Naraoka, H. (2005): Larval development of *Coenagrion terue* (Asahina) (Odonata: Coenagrionidae) at a lowland in Aomori Prefecture, Japan. *New Entomol.* 54(1/2): 11-16. (in Japanese, with English summary). ["Larval development of *C. terue* was investigated at a lowland marsh (23m, a. s. l.) in Aomori Prefecture, Japan, during 2003 and 2004. The larvae were sampled 2-4 weeks periodically at a marsh. The rearing also was done from egg stage. *C. terue* has 10 larval instars. The larvae wintered at 7-9 instars, and the final instar appeared at next April. The duration of life cycle was 1 year (univoltine)."] (Author)] Address: Hirozi, N., 36-71 Motoizumi, Fukunoda, Itayanagi-cho, Kitatsugurugun, Aomori Pref., 038-3661, Japan

**6188.** Novelo-Gutiérrez, R. (2005): Five new *Erpetogomphus* Hagen in Selys larvae from Mexico, with a key to the known species (Anisoptera: Gomphidae). *Odonatologica* 34(3): 243-257. (in English). ["The final instars of *Erpetogomphus* bothrops *E. elaps*, *E. eutainia*, *E. liopeltis*, and *E. viperinus* are described and illustrated. Most of these are similar in many features, except *E. eutainia* which is notoriously different. A key for the separation of all known *Erpetogomphus* larvae is included."] (Author) Additional figures are provided for *E. compositus*, *E. crotalinus*, *E. lampropeltis* *matrix*, *E. agkistrodon*, *E. erici*, *E. tristani*, *E. constrictor*, *E. boa*, *E. cophias*, *E. sabaeticus*, and *E. elaps*.] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparato Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx

**6189.** Obolewski, K. (2005): Epiphytic macrofauna on water soldiers (*Stratiotes aloides* L.) in *Slupia* river oxbows. *Oceanological and Hydrobiological Studies* 34(2): 37-54. (in English). ["The taxonomic composition and biomass of phytophilous macrofauna dwelling on water soldiers in two *Slupia* River oxbows, Konski Staw (KS) and Osokowy Staw (OS), were determined in two periods (April 1 - July 23, 1981; April 20 - July 20, 2001). The KS water soldier macrofauna studied in the 1980s was comprised of 22 invertebrate taxa, while 25 to 28 taxa were recorded in 2001. The macrofauna of the two periods was dominated by gastropods and mining chironomid larvae (1981) and hirudineans (2001). The OS macrofauna studied in the springsummer of 2001 consisted of 25 taxa. The OS macrofauna was dominated in both periods by gastropods, and trichopterans were the subdominants." The list of species contains four Odonata taxa, only *Aeshna grandis* on the species level.] Address: Obolewski, K., Department of Ecology and Protection of the Sea, Pomeranian Peda-



gological University, ul. Arciszewskiego 22b, 76-200 Stupsk, Poland. E-mail: Obolewsk@pap.edu.pl

**6190.** Pardey, A.; Conze, K.-J.; Rauers, H.; Schwartz, M. (2005): Flora, Vegetation und Fauna ausgewählter Kleingewässer in der Westfälischen Bucht. Abhandlungen aus dem Westfälischen Museum für Naturkunde 67(3): 163-190. (in German, with English summary). ["Since the end of the 1970s in the Westphalian Bay (in the north of North Rhine-Westphalia, Germany) a lot of ponds had been built or reconstructed mainly for biotope and species protection purposes. In the years between 1989 and 2003 hydrochemistry, flora and vegetation of 14 ponds were examined to estimate biotope development of man made ponds and the efficiency of biotope management measures. Furthermore one or two times amphibians, dragonflies, water beetles, water bugs, mussels and water snails were recorded to get a better idea of biotope qualities. The results clarify, that every pond is an individual habitat with its special species inventory and nature protection importance, which needs individual concepts for management. On the other hand some general guidelines for management and building of ponds as nature protection areas were deduced. The comparison of data of different years makes clear, that eutrophication leads to an acceleration of succession and therefore to decreasing numbers of plant species and species of the red data list. Because of these facts the management of ponds will be a permanent task of nature protection activities." (Authors) A total of 24 odonate species was observed.] Address: Conze, K.-J., Listerstr. 13, D-45147 Essen, Germany. E-mail: Klaus-Juergen.Conze@t-online.de

**6191.** Paulson, D.R.; Von Ellenrieder, N. (2005): Synonymy of *Subaeschna* Martin, 1908 with *Gynacantha* Rambur, 1842, and a new species of *Gynacantha* from Peru (Anisoptera: Aeshnidae). *Odonatologica* 34(1): 65-72. (in English) ["*Subaeschna* Martin, 1908, is synonymized with *Gynacantha* Rambur, 1842, and its only sp., *S. francesca* Martin, 1909, becomes *Gynacantha francesca* (Martin). *G. bartai* sp. n. is described from 5 specimens (holotype male and allotype female; Peru, Madre de Dios, Explorer's Inn; deposited in the NMNH, Washington, DC, USA) from southern Peru. It is characterized by very small size, unmarked thorax, straight cerci, and abdomen constricted in male and unconstricted in female." (Authors)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu.

**6192.** Pessacq, P.; Muzon, J.; Von Ellenrieder, N. (2005): Description of the last larval instar of *Acanthagrion ablutum* Calvert (Zygoptera: Coenagrionidae). *Odonatologica* 34(1): 73-76. (in English). ["The final larval instar is here described for the first time and it is compared with the other known *Acanthagrion* larvae. It differs from them mainly in the number of palpal and premental setae and shape of head posterolateral margin." (Authors)] Address: Ellenrieder, Natalie von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: odonata@hotmail.com

**6193.** Rackow, H., (2005): Beobachtungen zum Paarungs- und Eiablageverhalten von *Ophiogomphus cecilia* an der Lauter (Rheinland Pfalz). *mercuriale* 5: 5-8. (in German). [Rheinland-Pfalz, Germany, Alsace, France; the phenology of oviposition (bias in the afternoon)

and the mating of *O. cecilia* are described and discussed.] Address: Rackow, H., Hohenstoffelstraße 73, D-78224 Singen, Germany. E-mail: HartmutRackow@web.de

**6194.** Relyea, R.A (2005): The heritability of inducible defenses in tadpoles. *J. Evol. Biol.* 18: 856-866. (in English) ["The evolution of plastic traits requires phenotypic trade-offs and heritable traits, yet the latter requirement has received little attention, especially for predator-induced traits. Using a half-sib design, I examined the narrow-sense heritability of predator-induced behavior, morphology, and life history in larval wood frogs (*Rana sylvatica*). Many of the traits had significant additive genetic variation in predator (caged *Anax longipes*) and no-predator environments. Whereas most traits had moderate to high heritability across environments, tail depth exhibited high heritability with predators but low heritability without predators. In addition, several traits had significant heritability for plasticity, suggesting a potential for selection to act on plasticity per se. Genetic correlations confirmed known phenotypic relationships across environments and identified novel relationships within each environment. This appears to be the first investigation of narrow-sense heritabilities for predator-induced traits and confirms that inducible traits previously shown to be under selection also have a genetic basis and should be capable of exhibiting evolutionary responses." (Author)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**6195.** Saito, Y.; Owada, M.; Kato, S. (2005): Dragonflies (Odonata) of the Akasaka Imperial Gardens, Tokyo, Central Japan. *Mem. natn. Sci. Mus.*, Tokyo 39: 419-429. (in Japanese, with English summary). [Between 2002 and 2004, a total of 24 Odonata species was recorded.] Address: Owada, M., Dept Zool., Natn. Sci. Mus., 3-23-1 Hyakunincho, Shinjuku-ku, Tokyo, 169-0073, Japan. E-mail: owada@kahaku.go.jp

**6196.** Schlüpmann, M.; Feldmann, R.; Belz, A. (2005): Stehende Kleingewässer im südwestfälischen Bergland: Charakteristik und Fauna am Beispiel der Libellen und der Wirbeltiere. *Abhandlungen aus dem Westfälischen Museum für Naturkunde* 67(3): 201-222. (in German, with English summary). [M. Schlüpmann provides a condensed account on some general distribution patterns of the Odonata in the middle mountain ranges of Nordrhein-Westfalen, Germany. Distribution maps of *Aeshna cyanea*, *A. mixta*, and *A. juncea* highlight some ecological/climatic factors responsible for the distribution patterns.] Address: Schlüpmann, M., Hierseier Weg 18, D-58119 Hagen, German. E-mail: martin-schluempmann@t-online.de

**6197.** Schmidt, B. (2005): Gartenfreuden mit blauen Drachen. *mercuriale* 5: 42-43. (in German). [Baden-Württemberg, Germany; (1) a tandem between a male *Aeshna cyanea* and an recently emerged male *A. affinis* is described. Attempting to get the latter into the wheel position for 30 minutes, the abdomen of *A. cyanea* finally broke between the 7th and 8th abdominal segment. (2) Catching *A. affinis* by a cat is described in detail. (3) A female *A. cyanea* tried to oviposit into the back of a *Bombina variegata* male (Amphibia).] Address: Schmidt, B., Amt für Umwelt und Naturschutz, Eckenerstr. 11, 88046 Friedrichshafen. E-Mail: b.schmidt@friedrichshafen

- 6198.** Schmidt, E. (2005): Libellen als Nutznießer von Laubfrosch-Schutzgewässern im Kreis Coesfeld/Westmünsterland. *Abhandlungen aus dem Westfälischen Museum für Naturkunde* 67(3): 223-240. (in German, with English summary). [Habitat creating and management measures directed to the tree-frog (*Hyla arborea*) in Westphalia (Nordrhein-Westfalen, Germany) also favoured dragonflies. A total of 34 species was recorded at six habitats including several rare species, and species of an early succession stage in vegetation development.] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany
- 6199.** Schneider, B. (2005): Wenn das Ende naht: Schwarz vs Groß. *mercuriale* 5: 44. (in German). [Switzerland, 16-X-, 15-XI-2005; interspecific copulations between a male *Sympetrum danae* and a female *S. striolatum* resp. *S. vulgatum* are described.] Address: Schneider, B.; Wolfbühlstr. 34a, CH-8408 Winterthur, Germany. E-mail: b.schneider@libellen.li
- 6200.** Schoeppner, N.A.; Relyea, R.A. (2005): Damage, digestion, and defence: the roles of alarm cues and kairomones for inducing prey defences. *Ecology Letters* 8: 505-512. (in English). ["Inducible defences are widely used for studying phenotypic plasticity, yet frequently we know little about the cues that induce these defences. For aquatic prey, defences are induced by chemical cues from predators (kairomones) and injured prey (alarm cues). Rarely has anyone determined the separate and combined effects of these cues, particularly across phylogenetically diverse prey types. We examined how tadpoles (*Hyla versicolor*) altered their defences when 10 different prey were either crushed by hand or consumed by predators. Across all prey types, crushing induced only a subset of the defences induced by consumption. Consuming vs. crushing produced additive responses for behaviour but synergistic responses for morphology and growth. Moreover, we discovered the first extensive evidence that prey responses to different alarm cues depends on prey phylogeny. These results suggest that the amount of information available to the prey affects both the quantitative and qualitative nature of the defended phenotype." (Authors) The laboratory study involves experiments with *Abax* sp., *Sympetrum* sp., and *Lestes* sp..] Address: Schoeppner, Nancy, Department of Biological Sciences, University of Pittsburgh, Pittsburgh, PA 15260, USA. E-mail: nschoepp@pitt.edu
- 6201.** Sipkay, C.S.; Hufnagel, L.; Gaal, M. (2005): Zoocoenological state of microhabitats and its seasonal dynamics in an aquatic macroinvertebrate assembly (Hydrobiological case studies on Lake Balaton No. 1). *Applied ecology and environmental research* 3(2): 107-137. (in English). ["In the years 2002, 2003 and 2004 we collected samples of macroinvertebrates on a total of 36 occasions in Badacsony bay, in areas of open water (in the years 2003 and 2004 reed-grassy) as well as populated by reed (*Phragmites australis*) and cattail (*Typha angustifolia*). Samples were taken using a stiff hand net. The sampling site includes three microhabitats differentiated only by the aquatic plants inhabiting these areas. Our data was gathered from processing 208 individual samples. The quantity of macroinvertebrates is represented by biovolume value based on volume estimates. We can identify taxa in abundant numbers found in all water types and ooze; as well as groups associated with individual microhabitats with various aquatic plants. We can observe a notable difference between the years in the volume of invertebrate macrofauna caused by the drop of water level, and the multiplication of submerged macrophytes. There are smaller differences between the samples taken in reeds and cattail stands. In the second half of 2003 – which was a year of drought – the *Najas marina* appeared in open waters and allowed to support larger quantities of macroinvertebrates. In 2004 with higher water levels, the *Potamogeton perfoliatus* occurring in the same area has had an even more significant effect. This type of reed-grass may support the most macroinvertebrates during the summer. From the aspect of diversity relations we may suspect different characteristics. The reeds sampling site proved to be the richest, while the cattail microhabitat is close behind, open water (with submerged macrophytes) is the least diverse microhabitat." (Authors)] Address: Sipkay, C.S., Dept of Systematic Zoology and Ecology, Eötvös Loránd University, H-1117 Budapest, Pázmány P. sétány 1/c, Hungary. E-mail: cssipkay@yahoo.com
- 6202.** Sonnenburg, H.; Hannig, K. (2005): Die Libellen (Insecta, Odonata) des Truppenübungsplatzes Haltern-Platzteil Lavesum (Kreis Recklinghausen und Kreis Borken). *Abhandlungen aus dem Westfälischen Museum für Naturkunde* 67(3): 65-75. (in German). [Nordrhein-Westfalen, Germany; the odonate fauna of the military training area totals in 31 species. Each species is briefly commented on.] Address: Sonnenburg, H., Am Gollung 100, D-37671 Hörter, Germany
- 6203.** Sonntag, H. (2005): Schlupfbiologische Freilanduntersuchungen an *Sympecma paedisca*. *mercuriale* 5: 2-5. (in German). [Tirol, Austria; emergence phenology, sex ratio, and emergence habitat of 2729 exuviae of *S. paedisca* are figured or briefly discussed. Emergence and oviposition habitat vary clearly, therefore it is supposed that the larvae must be mobile and must have dispersed by themselves.] Address: Sonntag, H., Tagwalterstr. 8/4, A-6111 Volders, Austria. E-mail: hermann.sonntag@chello.at
- 6204.** Switzer, P.V. (2005): Possible settlement benefits related to site fidelity for the territorial dragonfly, *Perrithemis tenera* (Say) (Anisoptera: Libellulidae). *Odonatologica* 34(4): 397-405. (in English). ["Site fidelity, the tendency to return to a previously occupied breeding location, is commonly observed in animals and yet often the benefit to such behavior is unclear. In this study, possible settlement benefits to site fidelity for *P. tenera* are examined. Males defend small mating territories on ponds and lakes to which they typically, but not always, return the following day. In an observational study, it was found that males did not become territorial earlier in the day when site-faithful than when switching territories. However, males switching territories were more likely to be seen examining oviposition sites (other than the site they ultimately defended) prior to becoming territorial than site-faithful males. In an experimental study, it was controlled for differences in territory and oviposition site structure, time of day, evictions and disturbance, and found that site-faithful males spent significantly less time settling on a territory prior to defending that territory than males settling at a site for the first time. Because males examining sites are probably more at risk from predators, this study suggests that site-faithful males may experience lowered settlement costs than males returning to their original territory." (Author)]

Address: Switzer, P.V., Eastern Illinois Univ., Dept Biol, Sci., Charleston IL 61920; USA. E-mail: cfpvs@eiu.edu

**6205.** Taketo, A. (2005): Discovery of *Sympetrum vulgatum imitans* Selys from the Noto Peninsula, Japan. *Memoirs of the Fukui Institute of Technology* 35: 205-207. (in English). [Mature males of *S. vulgatum imitans* were recorded for the first time in the Noto Peninsula, Central Japan, on 29 September, 2002.] Address: not stated

**6206.** Theischinger, G.; Richards, S.J. (2005): Two new species of *Drepanosticta* Laidlaw from Papua New Guinea (Zygoptera: Platystictidae). *Odonatologica* 34 (3): 307-312. (in English). [*D. antilope* sp. n. (holotype male: East New Britain, Wanui Camp, 17-III-2000) and *D. taurulus* sp. n. (holotype male: Eastern Highlands prov., Herowana, 13-XI-2001) are described. The holotypes are deposited in South Australian Museum, Adelaide. Diagnostic characters of the adults are illustrated and the affinities of both species are discussed." (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

**6207.** Tynkkynen, K. (2005): Interspecific interactions and selection on secondary sexual characters in damselflies. *Jyväskylä Studies in Biological and Environmental Science* 151: 26 pp. (in English). ["Interspecific interactions related to species recognition can cause selection and affect the evolution of secondary sexual characters. Such interactions include for example avoidance of maladaptive hybridization and interspecific aggression. In this thesis, I focus especially on interspecific aggression and on selection which it may cause on sexual characters of the damselfly, *Calopteryx splendens*. Males of *C. splendens* have pigmented wing spot as a sexual character in the middle of their wings. Large-spotted *C. splendens* males resemble another species *Calopteryx virgo*, males of which have almost completely pigmented wings. I observed character displacement in *C. splendens* males such that the wing spot size decreased with increasing relative abundance of *C. virgo*. Territorial *C. virgo* males reacted more aggressively and from greater distance towards large- than small-spotted *C. splendens* males. This suggests that the character displacement may have evolved because of the interspecific aggression arising from mistaken species recognition. Interspecific aggression causes negative survival selection on wing spot size of *C. splendens* males. In addition, interspecific aggression leads to interspecific territoriality in which large-spotted *C. splendens* males seem to have reduced ability to obtain or keep a territory. Reduced territory holding ability may have negative effects on mating success of large-spotted *C. splendens* males. This is because in contrast to other studies with *Calopteryx* species, in wild sympatric populations females did not mate with large-spotted males. My results clearly show that interspecific aggression is able to cause selection on sexual characters and thus has potential to affect the evolution of secondary sexual characters." (Author)] Address: Tynkkynen, Katja, Department of Biological and Environmental Science, P.O. Box 35, FI-40014 University of Jyväskylä, Finland

**6208.** Vanappelghem, C. (2005): Statut de *Sympetrum flaveolum* (L., 1758) (*Sympète* jaune) dans la région Nord-Pas-de-Calais. *Le Héron* 38(1-2): 107-113. (in French). [Detailed presentation of data and maps on

the distribution of *S. flaveolum* in north-western France.] Address: Vanappelghem, C., 14, rue Brûle Maison, F-59000 Lille, France. E-mail: cedvana@free.fr

**6209.** Villanueva, R.J. (2005): *Amphicnemis braulitae* spec. nov. from Camiguin Island, the Philippines (Zygoptera: Coenagrionidae). *Odonatologica* 34(1): 77-81. (in English). ["The new species is described, illustrated and compared with the other 3 species of the *Amphicnemis forcipata* Brauer-group. Holotype male: Philippines, Camiguin, Guinsiliban, Lilob, 30-IV-2003; deposited in RMNH, Leiden. A few notes on the ecology are provided." (Author)] Address: Villanueva, R.J., Biology Department, Ateneo de Davao University, 8000 Davao City, Philippines. E-mail: reaganjoseph@lycos.com

**6210.** Wahizatul Afzan, A.; Che Salmah, M.R. (2005): Adult dragonfly communities (Odonata: Insecta) in a tropical rivers of the northern peninsular Malaysia: species composition, biotope and host plant preferences. *Wetland Science* 3(3): 167-175. (in English). [A collection of Odonata in the catchment of the rivers Saleh, Setul and Serdan (district Bandar Baru, Kedah, Malaysia) resulted in 29 species. The communities are dominated by Libellulidae. The families of Coenagrionidae, Platycnemididae, and Calopterygidae were also common while Gomphidae and Chlorocyphidae were rather rare. *Neurothemis fluctuans*, *Trithemis aurora*, *Crocothemis servilia*, *T. festiva*, and *Orthetrum chrysis* were widely distributed in shaded, muddy areas, and among the Zygopteran, *Pseudagrion pruinatum* was the most dominant species in such habitats *Agriocnemis femina*, *Ictinogomphus rapax*, *Crutilla lineata*, *Lathrecista asiatica*, *Neurothemis tullia*, *Tholymis tillarga*, and *Copera ciliata* were exclusively found at Saleh River implying their preference for smaller, slow moving and polluted river with floating microphytes and a poor border vegetation. *Neurobasis chinensis* and *Vestalis gracilis* were only found in open, undisturbed, fast flowing waters of Setul and Serdang rivers.] Address: She Salmah, M.R., School of Biological Sciences, University Sains Malaysia, 11800 Minden, Penang, Malaysia. E-mail: csalmh@usm.my

**6211.** Watanabe, M.; Matsuoka, H.; Susa, K.; Taguchi, M. (2005): Thoracic temperature in *Sympetrum infuscatum* (Selys) in relation to habitat and activity (Anisoptera: Libellulidae). *Odonatologica* 34(3): 271-283. (in English). ["The thoracic temperature of adults in a forest-paddy field complex in the cool temperate zone of Japan was measured. After emergence, individuals moved into the forest gaps, where all sexually immature adults remained on perches. Both males and females controlled their thoracic temperatures against a radiant heat load in a similar manner. After maturation, some of the individuals were seen to fly in tandem over the rice paddy fields under direct sunlight for oviposition. This study evaluated the impact of the thermal environment on the perching behaviour in the forest gaps and flying behaviour in tandem in the rice paddy fields. Mean thoracic temperatures of adults were consistently higher than ambient temperatures. The difference between the high thoracic and low ambient temperature was lower among flying individuals in the rice paddy fields than in perching individuals living in the forest gaps. The control of thoracic temperature in response to ambient and radiant temperature in perching mature adults was similar to that in immature adults. In the rice paddy fields, the flying in tandem resulted in a smaller diffe-



rence between thoracic over radiation temperature in females than in males in tandem. The high degree of thermoregulation clearly allowed mature adults to be active under direct sunlight. The role of perching in the forest gaps is discussed with regard to thermoregulation." (Authors)] Address: Watanabe, M., Department of Biology, Faculty of Education, Mie University, Tsu, Mie 514-8507, Japan. E-mail: watanabe@edu.mie-u.ac.jp

**6212.** Westermann, K.; Westermann, E. (2005): Künstliche Flutmulden im NSG "Elzwiesen" als Habitat seltener Libellen. *mercuriale* 5: 33-35. (in German). [Baden-Württemberg, Germany; Groundwater fed temporary water bodies have a specialized dragonfly fauna, which became rare in the past decades due to melioration of floodplains and meadows. In the framework of high-flood protection measures, some newly created water bodies helped to retain higher portions of discharge from the running waters. In most years they dried out due to high evaporation, but in 2005 a rainy summer season provided suitable habitats for specialized dragonflies. Records and/or evidence of reproduction were given for *Ischnura pumilio*, *Aeshna affinis*, *Sympetrum danae*, *S. flaveolum*, *S. fonscolombii*, and *S. pedemontanum* and discussed.] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**6213.** Wildermuth, H. (2005): Beobachtungen zur Spätherbst- und Winteraktivität der Gemeinen Winterlibelle (*Sympecma fusca*). *mercuriale* 5: 35-39. (in German). [Switzerland; several records of *S. fusca* between 2002 and 2005 are documented with special emphasis on the microdistribution of temperatures on hibernation habitat compared with air temperatures.] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**6214.** Zessin, W. (2005): Hund als Eiablageplatz einer Edellibelle (Insecta, Odonata, Aeshnidae). *Virgo*, Mitteilungsblatt des Entomologischen Vereins Mecklenburg, 8(1): 67. (in German). [Mecklenburg-Vorpommern, Germany; in July 2004, a female *Aeshna cyanea* (unsuccessfully) tried to oviposit into the black shining fleece of a dog.] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**6215.** Paunovic, M.; Simic, V.; Jakovcev-Todorovic, D.; Stojanovic, B. (2005.): Results of investigating the macroinvertebrate community of the Danube river on the sector upstream from the Iron Gate (km 1083-1071). *Arch. Biol. Sci.*, Belgrade, 57(1): 57-63. (in English, with Serbian summary). ["The present work cites results of investigating aquatic macroinvertebrates of the Danube River on the sector upstream from the Iron Gate (KM 1083-1071). The investigated part is interesting from the hydrobiological standpoint above all due to differences of faunal composition in relation to higher sections that could be expected in view of differences in overall characteristics of the river. A rich macroinvertebrate community (84 taxa) was observed. The diversity of taxa is primarily a result of habitat diversity within the given stretch. Oligochaeta and Mollusca were the principal components." (Authors) *Pyrhosoma nymphla*, *Stylurus flavipes*, and *Onychogomphus forcipatus* are listed.] Address: Paunovic, M., Siniša Stankovic Institute for Biological Research, 11000 Belgrade, Serbia and Montenegro

**6216.** Baker, R.A. (2006): Mites on Odonates: Some early accounts and records (to 1950) from Britain. *J. Br. Dragonfly Society* 22(2): 54-57. (in English). ["Parasitic larval mites are found on the wings and bodies of odonates and exploit their hosts for food and dispersal. This has been known for over 250 years although early records show that the true relationship was misunderstood. Dragonfly and damselfly hosts are recorded from early records." (Author) This paper also contains some very interesting notes on the biography of Robert McLachlan and Robert John Tillyard] Address: Baker, R.A., Faculty of Biological Sciences, University of Leeds, Leeds, West Yorkshire LS2 9JT, UK

**6217.** Barrera Escorcia, H.; Villeda-Callejas, M.P.; Lara-Vázquez, J.A. (2006): El vuelo de las libéllulas y su utilización en la tecnología. *Revista Chapingo Serie Ciencias Forestales y del Ambiente* 12(1): 31-37. (in Spanish, with English summary). ["Dragonflies' flight, characterized by its peculiar pace and strength, has developed a particular interest in the study of their thoracic muscular structure and it's wings' constitution and shape. Due to these features, the advances in the analysis of their flight have significantly contributed to aeronautical and robotic technology." (Authors)] Address: Villeda-Callejas, M.P., Laboratorio de Zoología2; FES-Iztacala, UNAM. Av. de los Barrios Núm. 1, Los Reyes Iztacala. C. P. 54090

**6218.** Barreto, A.P.; Aranha, J.M.R. (2006): Diet of four species of Characiforms in an Atlantic Forest stream, Guaraqueçaba, Paraná, Brazil. *Rev. Bras. Zool.* 23(3): 779-788. (in Portuguese, with English summary). ["In the present study we analyzed seasonal changes in the diet, feeding behavior and food resource partitioning between juveniles and adults of four characiform species in an Atlantic Rainforest stream of the northern coast of the State of Paraná, Brazil. Samples were collected monthly between September, 1999 and August, 2000 using a variety of capture techniques and underwater observations. In general, full stomach contents were more common in juveniles than in adults. *Deuterodon langei* Travassos, 1957 was classified as an omnivorous species, with a tendency toward herbivory, *Characidium lanei* Travassos 1967 was classified as an insectivore, with a tendency toward larvophagy, *Hyphessobrycon griemi* Hoedeman, 1957 was classified as an omnivore, and *Mimagoniates microlepis* Steindachner, 1876 was classified as an insectivore, with a predominance of allochthonous insects. Juveniles and adults of all studied species showed low selectivity and high opportunism in their food selection. The high frequency of allochthonous food items in stomach contents underscores the importance of marginal vegetation in their diets, being essential for the integrity of these environments and for the preservation of coastal stream fish communities." (Authors) *C. lanei* and *M. microlepis* also feed on Odonata larvae.] Address: Barreto, A., Pontifícia Universidade Católica do Paraná, Campus Toledo, Avenida da Uniao 500, Jardim Coopagro, 85902-532 Toledo, Paraná, Brasil. E-mail: almirbarreto@pucpr.br

**6219.** Beutel, R.G.; Gorb, S.N. (2006): A revised interpretation of attachment structures in Hexapoda with special emphasis on Mantophasmatodea. *Arthropod*

Systematics and Phylogeny 64(1): 3-35. (in English). [Characters of hexapod attachment structures were analysed cladistically together with 110 additional morphological characters of immatures and adults. The results suggest the monophyly of Hexapoda, Ellipura, Diplura + Ectognatha, and Dicondylia. Lepidothrichidae is either the sister group of the remaining Dicondylia or part of a clade Zygentoma. Odonata is the sister group of Neoptera, and Plecoptera possibly the sister group of the remaining neopteran orders. [...]] (Authors)] Address: Gorb, S., Max-Planck-Institut für Entwicklungsbiologie, Spemannstr. 35, D-72076 Tübingen, Germany. E-mail: stas.gorb@tuebingen.mpg.de

**6220.** Bond, J. G.; Novelo-Gutiérrez, R.; Ulloa, A.; Rojas, J. C.; Quiroz-Martínez, H.; Williams, T. (2006): Diversity, abundance, and disturbance response of Odonata associated with breeding sites of *Anopheles pseudopunctipennis* (Diptera: Culicidae) in southern Mexico. *Environmental Entomology* 35 (6): 1561-1568. (in English). ["Odonate nymphs are important predators of the immature aquatic stages of mosquitoes. Populations of the malaria vector *Anopheles pseudopunctipennis* Theobald (Diptera: Culicidae) can be efficiently reduced by extraction of filamentous algae from river pools in southern Mexico. Here, we examined the influence of this intervention on the diversity of odonates associated with mosquito breeding pools after annual extractions of algae from river pools in a 3-km section of the Coatán River, over a period of 2 yr. Odonate sampling was performed at monthly intervals in control and treated sections of the river for 4-5 mo after extraction in both years and before extraction in 1 yr. In total, 16 species, 10 genera, and 6 families of odonates were collected. Shannon diversity index values declined significantly during a period of 1 mo in 2001 and >5 mo in 2002. However, the abundance of odonates captured was not affected by algal extraction. In contrast, year-to-year variation in the diversity and abundance of the odonate community was strongly influenced by precipitation and river volume. Despite the importance of algae in river ecology, we conclude that the mosquito control intervention resulted in minimal impact on the odonate community in southern Mexico." (Authors)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparato Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx

**6221.** Boudot, J.-P. (2006): Mise au point concernant la publication de François Meurgey sur la faune des Odonates du département des Pyrénées-Orientales. *Martinia* 22(4): 191-193. (in French, with English summary). [France; the author rectifies and completes, on the basis of data already published, the informations presented by F. Meurgey in an article mentioning new species in Pyrénées-Orientales department (*Martinia* 22(2) : 64). This refers to *Sympetma fusca* and *Libellula fulva*.] Address: Boudot, J.-P., Centre de Pédologie Biologique, 17, rue Notre-Dame de Pauvres, B.P. 5, F-54501 Vandoeuvre-lès-Nancy, France. e-mail: boudot@cpb.cnrs-nancy.fr

**6222.** Buczyńska, E.; Buczyński, P. (2006): Aquatic insects (Odonata, Coleoptera, Trichoptera) of the central part of the "Krowie Bagno" marsh: the state before restoration. *Annales Universitatis Mariae Curie-Skłodowska Lublin - Polonia LXI, 2 Sectio C*: 71-88. (in English, with Polish summary). ["In 2003 the assemblages

of selected aquatic insects (dragonflies, beetles, caddisflies) were studied within two lakes surrounded by a transitional peat bog» and a canal and ditches situated in the meliorated fen» The influence of melioration and peat bog degradation on entomofauna, its present status and the role of "Krowie Bagno" as a refugium of special care species were analysed. Thirty-seven dragonfly species, 75 beetle species, 21 caddisfly species were found. 12 special care and 8 indicator species were recorded. The fauna of lakes was typical of polyhumic ones, however, the changes associated with drying out and early stage of eutrophication were clearly seen in case of caddisfly assemblages. Melioration ditches turned out to be a refuge for the species connected with completely vanished at the study area sedge bogs. Deep and rich in vegetation canal was the main habitat for lacustrine caddisfly species. Such fauna is the result of natural water recession» transformation of the remaining ones as well as creating anthropogenic waters. "Krowie Bagno" is still the refuge of many valuable species and assemblages typical of dystrophic waters. Nevertheless, they are still endangered, some of them are partially on the wane. The aim of the «naturalization activities like free cutting, raising the level of irrpoundage conducted after 2003 is to prevent the fauna, In several years, the next planned inventory of entomofauna will discover whether such activities improve ecological relationships of the studied area or not." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**6223.** Buczyński, P.; Dijkstra, K.D.; Mauersberger, R.; Moroz, M.D. (2006): Review of the Odonata of Belarus. *Odonatologica* 35(1): 1-13. (in English) ["The literature on the Belarussian Odonata is summarised and a checklist of 60 species is provided. The record of *Coenagrion mercuriale* is not accepted as it probably pertains to a misidentified larva. The occurrence of the listed species is specified for the 6 provinces of the state. The fauna contains 3 boreal elements, *Coenagrion johanssoni*, *Aeshna caerulea* and *A. crenata*. 14 species are listed as potential additions, some of these, almost exclusively southern species, have been recorded so close to the border that their presence in Belarus is almost certain. Belarus is expected to be a stronghold for many species, which are threatened in western Europe." (Authors) Address: Buczyński, P., Dept Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**6224.** Cham, S. (2006): Aspects of dragonfly flight behaviour revealed by digital still photography. *J. Br. Dragonfly Society* 22(2): 41-53. (in English). ["Photography of free flying dragonflies reveals aspects of their behaviour that are not possible under controlled conditions. By using modern digital still cameras, with high resolution and rapid autofocusing, new opportunities for flight photography can be realised in the field." (Author)] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com

**6225.** Cham, S. (2006): In-flight cleaning behaviour by male Migrant Hawkers, *Aeshna mixta* Latreille. *J. Br. Dragonfly Society* 22(2): 33-35. (in English). [The author describes the use of the abdomen and legs as

part of a sequence of cleaning behaviour performed by male *A. mixta* while flying.] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com

**6226.** Cham, S. (2006): Development and hatching of eggs of the Common Darter, *Sympetrum striolatum* (Charpentier). *J. Br. Dragonfly Society* 22(2): 36-40. (in English). ["Eggs of *S. striolatum* develop and hatch in less than two weeks. During this time they are protected by a gel-like mass that surrounds them. Differences in the process of hatching are described." (Author)] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com

**6227.** Chang, J.-p.; Sun, Z.-s. (2006): New taxa of Gomphidae (Insecta: Odonata) in Jehol Biota from western Liaoning, China. *Global geology* 25(2): 105-111, 1 plate. (in Chinese, with English summary). [The authors describe and figure a new genus and species *Liaoningianthis latus* gen. et sp. nov., and *Liaoninglanthus* sp.. In addition, *Liogomphus yixianensis* Ren et Gao, 1996 is described in detail. All the insect fossils are collected from the lower part of the Yixian Formation (uppermost Jurassic" lower Cretaceous) in Huangbanjigou of Beipiao, western Liaoning, China.] Address: Chang, J.-p., College of Earth Sciences, Jilin University, Changchun 130061, Jilin, China

**6228.** Clausnitzer, V. (2006): Dragonflies (Odonata) of Rufiji district, Tanzania with new records for Tanzania. *Journal of East African Natural History* 95(2): 139-162. (in English) ["The dragonfly fauna of the Rufiji District was studied during several field trips in 2001–2003 covering the rainy and the dry season. A total of 73 species was recorded by capture with net and visual identification of imagos. *Ceriagrion mourae* was seen for the first time since its description from Mozambique in 1969. *Ceriagrion mourae*, *Teinobasis alluaudi*, *Gynacantha immaculifrons*, *Paragomphus magnus* and *Paragomphus sabcicus* are first records for Tanzania. *Coryphagrion grandis*, *Ceriagrion mourae*, *Teinobasis alluaudi* and *Hadrothemis scabrifrons* are globally endangered habitat specialists confined to coastal forests of Eastern Africa. The majority of the species are common and widespread and inhabits the Rufiji River and its floodplains, while a smaller proportion are only found in permanent streams draining into the Rufiji or in forest habitats. The high overall species richness is a result of the variety of habitats and their connectivity, combined with the dynamics of the floods. The habitat specialists found in Ngumburuni forest and in the forests of the Kichi and Kiwengoma Hills are globally endangered species and require special attention with regard to conservation." (Author)] Address: Clausnitzer, Viola, Graefestr. 17, D-06110 Halle/Saale, Germany. E-mail: violacl@t-online.de

**6229.** Corbet, P.S. (2006): Forests as habitats for dragonflies (Odonata). In: Rivera, AC (Ed). 2006. Forests and Dragonflies. 4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005. Pensoft Series Faunistica 61: 13-36. (in English). ["The ways in which forests can be inferred, or shown, to meet the habitat requirements of dragonflies are reviewed globally. The relationship between dragonflies and forests is examined along a latitude spectrum in the Northern Hemisphere, from the Arctic Circle to the equator, a tran-

sect along which species diversity progressively increases, and the microclimate within forest becomes steadily more permissive for occupancy by the several stages in the dragonfly life history. In mid-temperate latitudes dragonflies use forests mainly for aestivation as pre-reproductive adults, a strategy functionally similar to the siccation exhibited by tropical dragonflies in seasonal-rainfall regions. Tropical rainforest is the planet's most diverse terrestrial ecosystem, with regard to species and habitats. It provides habitats for many species of dragonflies, for some or all of their life- history stages. Many such species, and their behaviour and ecology, remain undescribed. For biologists, including odonatologists, the foremost challenge of our time is that this irreplaceable storehouse of biological information faces imminent threat of destruction before its contents can be placed on record." (Author)] Address: Corbet, P.S., Crean Mill, Crean, St Buryan, Cornwall, TR19 6HA, UK. E-mail: philipcorbet@yahoo.co.uk

**6230.** Cordero Rivera, A. (Ed.) (2006): Forest and Dragonflies, 4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005. ISBN: 9546422789. Faunistica 60: 300 pp. [Contents: Cordero Rivera, A.: Introduction - Corbet, P.S.: Forests as habitats for dragonflies (Odonata) - Graca, M.: Allochthonous organic matter as a food resource for aquatic invertebrates in forested streams. The importance of forests for dragonflies in different continents - Orr, A.G.: Odonata in Bornean tropical rain forest formations: diversity, endemicity and implications for conservation management - Paulson, D.: The importance of forests to neotropical dragonflies - Fincke, O.M.: Use of forest and tree species, and dispersal by giant damselflies (Pseudostigmatidae): future prospects in fragmented forests - Dijkstra, K.-D. & Clausnitzer, V.: Thoughts from Africa: how can forest influence species composition, diversity and speciation in tropical Odonata? - Sahlen, G.: Specialists vs. generalists among dragonflies - the importance of forest environments in the formation of diverse species pools - Tsubaki, Y. & N. Tsuji: Dragonfly habitat maps based on landcover and habitat relation models. Conservation and behavioral issues - Samways, M.: Threat levels to odonate assemblages from invasive alien tree canopies - Taylor, Ph.: Movement behaviours of a forest odonate in two heterogeneous landscapes - Thompson, D.J. & Watts, Ph.C.: The structure of the *Coenagrion mercuriale* populations in the New Forest, southern England - Watanabe, M.: Mate location and competition for mates in relation to sunflecks of forest floors - Cordoba-Aguilar, A. & Contreras-Garduno, J.: Differences in immune ability in forest habitats of varying quality: dragonflies as study models - Hadrys, H. The present role and future promise of conservation genetics for forest Odonates.] Address: Pensoft Publishers, Geo Milev Str. No. 13a, 1111 Sofia, Bulgaria. <http://www.pensoft.net>

**6231.** Dijkstra, K.D.; Clausnitzer, V. (2006): Thoughts from Africa: how can forest influence species composition, diversity and speciation in tropical Odonata?. Forests and Dragonflies. Fourth WDA International Symposium of Odonatology, Pontevedra (Spain), July 2005: 127-151. (in English). ["We introduce tropical African forests and their Odonata, and speculate how climatic oscillations and associated large-scale habitat shifts may have governed speciation across the forest-savanna ecotone, presenting several hypothetical scenarios. Ecological traits of forest species and possible reasons for their disappearance when forest is opened up are



discussed. We believe that low insolation in forest habitats and interspecific competition are key factors segregating forest and non-forest species. While openland species cannot cope with low insolation inside the forest, forest species have evolved a slow lifestyle to cope with the forest environment, but are out-competed by more aggressive non-forest species beyond forest borders. Casual field observations support this hypothesis, although the reality is likely to be more complex. Phylogenetic reconstruction of groups that straddle the habitat divide, linked to ecological observations, may elucidate evolutionary reactions to landscape change. The reaction of odonate assemblages to forest loss is studied easily in Africa's imperilled forests. Because many of these forests are believed to be relatively young and highly forest-adapted species may have very low dispersal capacities, comparative ecological research of 'forest-dependent' odonate assemblages inside and outside ancient forest refugia is recommended." (Authors)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**6232.** Dommaget, J.-L. (2006): Rubrique bibliographique. *Martinia* 22(4): 194-196. (in French). [Titles from 2004 to 2006 on French odonatology are considered.] Address: Dommaget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**6233.** Dyatlova, E.S. (2006): The Odonata of southwestern Ukraine. *Opusc. zool. flumin.* 221: 1-15. (in English). ["Based on literature and on the 2002-2005 surveys, 54 species are listed from 43 localities. New records are provided for 43 species. *Coenagrion scitulum* and *Sympetrum pedemontanum* are new to the region. The occurrence of *Calopteryx splendens ancilla* on the lower Danube (cf. A.N. Bartenev, 1912, *Ezhegod. zool. muz. imp. Akad. Nauk* 17: 281-288) is confirmed. *Erythromma lindenii*, hitherto known from the lower Danube, is recorded also from the Dnieper and Dniester basins. The SW Ukrainian populations of *Orthetrum coerulescens* are referable to *O. c. anceps*." (Author)] Address: Dyatlova, Elena, Department of Zoology, Faculty of Biology, Odessa National University, Dvoryanskaya 2, UKR-65026 Odessa, The Ukraine. E-mail: odonata@ukr.net

**6234.** Ellenrieder, N. von; Garrison, R.W. (2006): Rediscovery of *Oxyagrion bruchi* Navás from Argentina, with a description of its larva (Odonata: Zygoptera: Coenagrionidae). *The Pan-Pacific Entomologist* 83(3/4): 362-374. (in English, with Spanish and French summaries). ["*O. bruchi* is redescribed, illustrated, and diagnosed. A neotype is designated. The larva is described and compared with other known sympatric species of the genus." (Authors)] Address: Ellenrieder, Natalie von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: odonata@hotmail.com

**6235.** Faucheux, M.J. (2006): Les organes sensoriels des antennes larvaires de Libellules: les propriocepteurs et les vibrorécepteurs d'*Erythromma lindenii* (Sélys, 1840) (Odonata Zygoptera: Coenagrionidae). *Bull. Soc. Sc. Nat. Ouest de la France, nouvelle série* 28(3): 153-159. (in French, with English summary). ["The larval antennae of *E. lindenii* are short and made up of a scape, a pedicel and a fourth-segmented flagellum. They bear four types of aporous and exclusively

mechanoreceptive sensilla: spatula-shaped sensilla chaetica, curved sensilla chaetica, sensilla filiformia and sensilla campaniformia. The curved sensilla chaetica are proprioceptors which monitor the relative position of the 3rd and 4th flagellomeres. Sensilla filiformia are vibration receptors which play the major role in prey detection. The unique sensillum campaniformium on the pedicel is a proprioceptor which informs the larva of the position of the flagellum relative to the pedicel. Spatula-shaped sensilla chaetica are tactile receptors distributed on the scape and the pedicel. No chemoreceptive sensilla has been observed on the antennae." (Author) Address: Faucheux, M.J., Laboratoire d'Endocrinologie des Insectes Sociaux, Université de Nantes, 2 rue de la Houssinière, B.P. 92208, F-44322 Nantes Cedex 03, France. E-mail: faucheux.michel@free.fr

**6236.** Faucheux, M.J.; Meurgey, F. (2006): L'antenne larvaire de *Chalcolestes viridis* Van der Linden, 1825 (Insecta: Odonata: Zygoptera: Lestidae): morphologie et sensilles, comparaison avec les autres Zygoptères. *Bull. Soc. Sc. Nat. Ouest de la France, nouvelle série* 28(3): 160-167. (in French, with English summary). ["The larval antenna of *C. viridis* is made up of a scape, a pedicel and a flagellum comprising 5 segments. It bears two types of aporous sensilla: the sensilla filiformia and the curved sensilla chaetica. The sensilla filiformia appear with the scape; they are numerous on the two surfaces of the pedicel and the 5 flagellomeres. These mechanoreceptive sensilla, of different lengths, react to the slightest vibrations produced in the water by the appearance of prey; they are vibrorécepteurs. It is the second time that the curved sensilla chaetica, whose role is proprioceptive, are observed in the zygopteran larvae, these sensilla being unknown in other insects, whether larvae or adults. In *C. viridis*, they are located on the distal parts of flagellomères 1,2,3 and 4, and they record the relative position of the flagellomere with regard to one another. A comparison is carried out with the larval sensory equipment of *Erythromma lindenii* which has been previously studied." (Authors)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**6237.** Ferreira, S.; Grosso-Silva, J.M.; Sousa, P. (2006): Miscellaneous records of dragonflies (Odonata) from continental Portugal - II. *Boletín Sociedad Entomológica Aragonesa* 38: 321-322. (in English, with Spanish summary). ["The known distribution of 34 dragonfly species is extended in continental Portugal. Six species are recorded for the first time from Alvão Natural Park, *Diplacodes lefebvrei* is recorded for the first time from Sudoeste Alentejano and Costa Vicentina Natural Park, and *Coenagrion mercuriale* from Douro Internacional Natural Park." (Authors)] Address: Ferreira, Sónia, CIBIO/UP - Centre de Investigate) em Biodiversidade e Recursos Genéticos, Universidade do Porto, Campus Agrário de Vairão, P-4485-661 Vairão, Portugal. E-mail: hiporame@gmail.com

**6238.** Ferreira, S.; Grosso-Silva, J.M. (2006): On the dragonflies of Portugal - Study of a collection from the 1980s (Insecta, Odonata). *Boln. Asoc. esp. Ent.* 30 (3-4): 11-23. (in English, with Spanish summary). ["This work presents data regarding 42 species of dragonflies collected in various regions of Portugal in the 1980s. Comments are given on the relevance of the records based on current knowledge of the country's Odonata."

(Authors)] Address: Ferreira, Sónia, CIBIO/UP - Centre de Investigate) em Biodiversidade e Recursos Genéticos, Universidade do Porto, Campus Agrário de Vairao, P-4485-661 Vairão, Portugal. E-mail: hiporame@gmail.com

**6239.** Ferreira, S.; Grosso-Silva, J.M.; Lohr, M.; Weihrauch, F.; Jödicke, R. (2006): A critical checklist of the Odonata of Portugal. *International Journal of Odonatology* 9(2): 133-150. (in English). ["The Odonata checklist of continental Portugal, Madeira and the Azores includes 65 species. Besides *Sympetrum nigrifemur*, an endemic of Madeira and the Canary Islands, and the unique population of the Nearctic *Ischnura hastata* in the Azores, the species composition reflects a higher proportion of western Mediterranean and Ethiopian elements than any other European country. An isolated occurrence of *Coenagrion pulchellum* was confirmed. Due to obvious misidentifications and to the loss of voucher specimens of questionable species, 22 taxa were rejected. Future records of additional species are predicted." (Authors)] Address: Ferreira, Sónia, CIBIO/UP - Centre de Investigate) em Biodiversidade e Recursos Genéticos, Universidade do Porto, Campus Agrário de Vairao, P-4485-661 Vairão, Portugal. E-mail: hiporame@gmail.com

**6240.** Fincke, O.M. (2006): Use of forest and tree species, and dispersal by giant damselflies (*Pseudostigmatia*): future prospects in fragmented forests. In: Rivera, AC (ED). 2006. *Forests and Dragonflies*. 4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005. *Pensoft Series Faunistica* 61: 103-125. (in English). ["Phytotelmata, or water-filled plant containers, provide an important aquatic habitat in tropical forests typically depauperate of permanent ponds and lakes. As top predators in these microhabitats, species of *Pseudostigmatidae* offer a rare opportunity to measure the effects of forest plant species on the abundance and distribution of their aquatic occupants. Like the specialists of bromeliads, which depend on the presence of a small group of epiphytic plants, odonates ovipositing in water-filled tree holes and fruit husks require a non-random assortment of tree sizes and species. The size and density of microhabitats ultimately affect larval abundance, although, for most species, it remains unclear how closely adult recruitment tracks larval survivorship. Within its geographic range, *Megaloprepus* relies more heavily on primary forests than do species of *Mecistogaster* that are adapted to dryer conditions and hence are more tolerant of secondary and highly disturbed forests. An experiment with *Megaloprepus* revealed that it exhibited relatively low flight endurance, particularly in females, which rarely dispersed across open areas. Recent comparative work challenges the status of *Megaloprepus* as a monospecific genus, and suggests that many *pseudostigmatid* populations may be highly structured genetically. The larval ecology and adult behavior of *Megaloprepus* suggest that its populations should be more highly structured than those of the more vagile tree-hole aeshnids. Collectively, the data reviewed here suggest that forest fragmentation, exacerbated by less predictable threats from global warming, may pose a greater threat to *Megaloprepus* and similar species such as *Microstigma rotundatum*, than to species of *Mecistogaster*. The fate of all *pseudostigmatids* is intimately tied to that of the plant species harboring them. As predators of phytotelm mosquito larvae, some of which are disease vectors, the demise of pseudo-

stigmatids may affect not only forest food chains, but also human health." (Author)] Address: Fincke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**6241.** Guerbaa, K.; Lolive, N. (2006): Redécouverte de *Libellula fulva* Müller, 1764 en Limousin (Odonata, Anisoptera, Libellulidae). *Martinia* 22(4): 172. (in French). [France; 4 VI 2005 Cromac; 9 VI 2005 Razès] Address: Guerbaa, K., Société Limousine d'Odonatologie, 11, rue Jauvion, F-87000 Limoges, France

**6242.** Hämäläinen, M. (2006): *Vestalaria vinnula* spec. nov. from southern Vietnam (Odonata: Calopterygidae). *Zool. Med. Leiden* 80(4): 87-90. (in English). ["*Vestalaria vinnula* spec. nov.; holotype male, southern Vietnam, Lam Dong province, Biao, 1962) is described in both sexes and compared with other species of *Vestalaria* May, 1935 (= *Vestalis smaragdina*-group), which is ranked as valid genus." (Author)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**6243.** Hämäläinen, M. (2006): Suppusiipisestää pikkutyöstäkö uusi liito-orava? *Luonnon Tutkija* 110(3): 101-104. (in Finnish). [A critical discussion of the status of *Sympecma paedisca* as a species listed in the EU's Habitats Directive, given its widespread occurrence in Eastern Europe and recent northward dispersal in the Baltic States. In Finland migrant specimens, being able to overwinter successfully, have been recorded frequently along the southern coastline since 2004. The first confirmed record was made in August 2002. Most likely *S. paedisca* will become established in southern Finland in the near future. The controversy of the EU Habitat Directive requirements and the local 'non-redlisted' status of some other Finnish dragonfly species is pointed out. The absence of *Nehaeniina speciosa* from the listed EU's Habitats Directive species is queried. The text and illustrations of this article are available at <http://korento.net/Suppusiipisesta.pdf>. Matti Hämäläinen] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**6244.** Honcu, M.; Roztocil, O. (2006): Faunistic finds of dragonflies (Odonata) made during the excursions of the VIII. allstate meeting of odonatologists in Juni 2005 in the Žďárské vrchy – hills (Czech Republic). *Vážky 2005 : sborník referátu VIII. celostátního semináře odonatologu ve Žďárských vrších: seminár usporádaly ve dnech 23.-26.6.2005 Správa CHKO Žďárské vrchy, ZO CSOP Vlašim a Vlastivedné muzeum a galerie v České Lípe / editor sborníku Lubomír Hanel. - Vyd. 1. - Vlašim: ZO CSOP Vlašim, 2006. ISBN 80-86327-52-3: 7-14. (in Czech, with English summary). [Records of 26 species including *Leucorrhinia pectoralis*, *Somatochlora arctica*, *Leucorrhinia rubicunda*, and *Coenagrion hastulatum* are documented.] Address: Honcu, M., Vlastivedné muzeum v České Lípe, náměstí Osvobození 297, 470 01 Česká Lípa, Czech republic. E-mail: honcu@muzeum.clnet.cz*

**6245.** Hooper, R.E.; Plaistow, S.J.; Tsubaki Y. (2006): Signal function of wing colour in a polymorphic damselfly, *Mnais costalis*. *Odonatologica* 35(1): 15-22. (in English). ["*Mnais costalis* males exist in 2 forms specialised for the demands of 2 distinct strategies, territorial fighters and non-territorial sneaks, which give approxi-

mately equal fitness payoffs. Territorial males have orange wings, whereas typical non-territorial males are clear-winged. By simulating agonistic encounters between males it is shown that the 2 morphs showed distinct responses to the signal from orange wings: territorial orange-winged males always tried to enter contests, while clear-winged males always avoided them. On the other hand, the 2 morphs showed similar responses to the signal from clear wings: both morphs tried to attack models. Also presented are 'painted clear models' which were clear-winged males whose wings had been painted orange, and both morphs responded as if they were orange-winged models. These observations indicate that males discriminate between fighter and sneaker morphs using the colour of wings, and shows different styles of agonistic responses toward fighter and sneaker morphs. It is likely that non-territorial sneaks may gain an advantage from non-signalling because clear wings increase crypsis on another male territory, increasing their success in stealing copulations. No indication was found that clear-winged males are female mimics, or that having clear wings reduced the level of aggression directed towards them by territorial orange-winged males.] Address: Tsubaki, Y., Biodiversity Conservation Research Group, National Institute for Environmental Studies, Tsukuba 305-0053, Japan. E-mail: tsubaki@nies.go.jp

**6246.** Ishizawa, N. (2006): Changes of body temperatures in *Sympetrum frequens* (Selys) reproductive pairs (Anisoptera: Libellulidae). *Odonatologica* 35(1): 23-29 (in English) [The reproductive behaviour was divided into four phases: perching (phase I), less than 1 min from the start of copulation (phase II), more than 3 min from the start of copulation (Phase III) and more than 1 min from the start of oviposition (phase IV). The body temperature (Tb) of the male was highest in phase III, while in the female Tb was not significantly different among phases. The changes of Tb are different between the sexes, however, they are both influenced largely by the wind as well as by the air temperature, and particularly in the male the effect seems to be larger than in the ♀, possibly because of its smaller body size."(Author). Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozava City, Saitama Pref., Japan. E-mail: isizawa7@ri-vo.mediatti.net

**6247.** Jacquemin, G. (2006): The use of binoculars to identify adult Odonata. *J. Br. Dragonfly Society* 22(1): 29-32. (in English). ["Many current odonatological surveys are carried out by naturalists with a background in ornithology who employ the same visual identification methods as used by many birdwatchers. Identifications based solely on observation through binoculars must be treated cautiously and, whenever possible, should be supported by checking diagnostic features on captured specimens, which subsequently can be released. Identification keys designed for use with binoculars are of limited value and, considering the risk of misidentification, records based solely on binocular observation by inexperienced observers cannot be relied upon." (Author)] Address: Jacquemin, G., Biologie des Insectes, Université H. Poincaré, Nancy 1, BP 239, F-54506 Vandoeuvre-lès-Nancy, France

**6248.** Johannson, F.; Strasevicius, D. (2006): Trollsländor i helgolandsfällan på Stora Fjäderägg hösten 2005. *Natur i Norr* 25(1): 25-26. (in Swedish). [Sweden; in September 2005, *Aeshna juncea*, *A. caerulea*, *A.*

*grandis*, *Sympetrum vulgatum*, and *S. danae* were caught in Heligoland traps.] Address: Johannsson, F., Department of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**6249.** Jourde, P.; Lалуque, O. (2006): Comportement territorial et ponte en milieu lentique chez *Macromia splendens* (Pictet, 1843) dans le centre-ouest de la France (Odonata, Anisoptera, Macromiidae). *Martinia* 22(4): 187-190. (in French, with English summary). ["*M. splendens* is a recent discovery in Charente-Maritime. Its breeding habitats are currently under investigation in the central west region of France, which appears to be the most northernly limit for the species. During the study, a breeding site in lentic conditions was identified, whereas the species is generally considered only to reproduce in lotic environments." (Authors)] Address: Jourde, P., LPO, La Corderie Royale, BP 90263, F-17305 Rochefort, France. E-mail: philippe.jourde@lpo.fr

**6250.** Jovic, A.; Paunovic, M.; Stojanovic, B.; Milosevic, S.; Nikolic, V. (2006): Aquatic invertebrates of the Ribnica and Lepenica rivers: composition of the community and water quality. *Arch. Biol. Sci., Belgrade* 58 (2): 115-119. (in English). ["Results of investigating the community of aquatic invertebrates in the Ribnica and Lepenica Rivers (Kolubara River drainage area) are given in the present work. Forty-three taxa are recorded. In relation to other studied streams in Serbia, the investigated rivers are characterized by high diversity of macroinvertebrates. Cluster analysis indicates that the locality on the Lepenica stands apart from those on the Ribnica, which is a consequence of the difference of habitats found at them. Results of saprobiological analysis of the macrozoobenthos in the given rivers indicate that their waters belong to quality classes I and II." (Authors) Three odonate taxa are listed: *Gomphus vulgatisimus*, *Calopteryx virgo*, and *Calopteryx* sp.] Address: Jovic, A., Siniša Stankovic Institute for Biological Research, 11060 Belgrade, Serbia and Montenegro

**6251.** Knijf, G. de (2006): Libellen in België. Nieuwe kennis voor een beter beheer van hun leefgebieden. *Natuur.focus* 5(4): 129-134. (in Dutch). ["In this contribution we report on some results of the recently published book on Belgian Odonata, which is based on >65.000 observations. After setting the historical context, we first present some general results for the 69 Belgian species, e.g. the overall coverage and some changes in species composition. Especially the strong increase in several southern species is striking. The Campine region is the area with the highest species density and the only region in Flanders where nearly all Red List species occur. This list contains 17 species (or 26%) which fit into the categories 'endangered by extinction', 'endangered', and 'vulnerable'. Most Red list species live either in moderately base-rich or meso-eutrophic waters and in poor or oligotrophic fens. In a next part we give some recommendations for a better proper management of aquatic habitats. Finally we stress on the urgent necessity to start with a monitoring scheme for dragonflies in Flanders." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**6252.** Kognitzki, S.; Westermann, K. (2006): Erste Bodenständigkeitsnachweise der Fledermaus-Azur-



jungfer (*Coenagrion pulchellum*) im höheren Schwarzwald. *Naturschutz am südlichen Oberrhein* 4(2): 227-228. (in German, with English summary). ["At two ponds situated in the southeastern Black Forest at elevations of 730 resp. 830 m a.s.l., we discovered the first evidence of reproduction of *C. pulchellum* in higher elevations of the Black Forest. These are also the highest known occurrences in Baden-Württemberg, Germany." (Authors)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**6253.** Kosterin, O.E.; Vikhrev, N.E. (2006): Odonata seen for three days in a populated lowland part of Cambodia. *Malangpo* 21: 212-217. (in English). ["A report about Odonata met during three day long trips to the Siem Reap area of Cambodia on January 7-9, 2006 is given in a form of field notes. 24 species were met with, of which *Heliocypha biforata* (Selys, 1859), *Lestes concinnus* Hagen in Selys, 1862, *Aciagrion borneense* Ris, 1911, *Agriocnemis minima* Selys, 1877, *A. nana* (Laidlaw, 1914), *Ceriagrion praetermissum* Lieftink, 1929, *Diplacodes trivialis* (Rambur, 1842), *Brachydiplax chalybea* Brauer, 1868, *Brachythemis contaminata* (Fabricius, 1793), *Crocothemis servilia* (Drury, 1770), *Neurothemis tullia* (Drury, 1773), *Rhodothemis rufa* (Rambur, 1842) have not been reported for Cambodia in literature (although the published records are very scarce per se)."] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**6254.** Kriska, G.; Csabai, Z.; Boda, P.; Malik, P.; Horvath, G. (2006): Why do red and dark-coloured cars lure aquatic insects? The attraction of water insects to car paintwork explained by reflection-polarization signals. *Proc. R. Soc. B* (2006) 273: 1667-1671. (in English). ["We reveal here the visual ecological reasons for the phenomenon that aquatic insects often land on red, black and dark-coloured cars. Monitoring the numbers of aquatic beetles and bugs attracted to shiny black, white, red and yellow horizontal plastic sheets, we found that red and black reflectors are equally highly attractive to water insects, while yellow and white reflectors are unattractive. The reflection-polarization patterns of black, white, red and yellow cars were measured in the red, green and blue parts of the spectrum. In the blue and green, the degree of linear polarization  $p$  of light reflected from red and black cars is high and the direction of polarization of light reflected from red and black car roofs, bonnets and boots is nearly horizontal. Thus, the horizontal surfaces of red and black cars are highly attractive to redblind polarotactic water insects. The  $p$  of light reflected from the horizontal surfaces of yellow and white cars is low and its direction of polarization is usually not horizontal. Consequently, yellow and white cars are unattractive to polarotactic water insects. The visual deception of aquatic insects by cars can be explained solely by the reflection-polarizational characteristics of the car paintwork." (Authors) The paper includes references to Odonata.] Address: Horvath, G., Biooptics Laboratory, Department of Biological Physics, Loránd Eötvös University, 1117 Budapest, Pázmány Péter sétány 1, Hungary. E-mail: gh@arago.elte.hu

**6255.** Leroy, T. (2006): *Coenagrion lunulatum* (Charpentier, 1825) en France: répartition, abondance, élé-

ments d'écologie et de conservation (Odonata, Zygoptera, Coenagrionidae). *Martinia* 22(4): 151-166. (in French, with English summary). ["Based on a bibliographical analysis and field work realized between 2000 and 2005, this article describes what we know about *C. lunulatum* in France. This mountaneous, shy and rare species is mostly present in Auvergne region, with a short and precocious flight period. The conservation state of these populations, which are of European importance, seems reasonable, although this is a very fragile species and a number of threats remain." (Author)] Address: Leroy, T., Le Bourg, F-63210 Heumeil-Eglise, France. E-mail: thierry-leroy@caramail.com

**6256.** Levasseur, M. (2006): Découverte d'un *Paragomphus* sp. sur l'île d'Anjouan Archipel des Comores (Odonata, Anisoptera, Gomphidae). *Martinia* 22(4): 183-186. (in French, with English summary). ["During a short consulting mission on behalf of the Comorian government (form. Islamic Federal Republic, now Comorian Union), the author had the opportunity to prospect several communal water intakes. One of them located at a small dam on a "mro" (little stream) in Anjouan, supported 3 exuviae, 2 of them being immediately attributable to gomphids. After bibliographical search and inquiry to dragonfly specialists of the region, it appears that these exuviae belong to a *Paragomphus* sp. and are the first data concerning gomphids in the Comorian archipelago. To date, these exuviae are still not identified and could be those of a new species for science." (Author)] Address: Levasseur, M., 11 rue du Pont Colbert, F-78000 Versailles, France. E-mail: levasseur@magic.fr

**6257.** Lingenfelder, U. (2006): Beobachtung der Arktischen Smaragdlibelle - *Somatochlora arctica* (ZETTERSTEDT, 1840) - im südlichen Pfälzerwald (Odonata: Corduliidae). *Fauna Flora Rheinland-Pfalz* 10(4): 1211-1218. (in German, with English summary). ["In 2003, *S. arctica* has been recorded in the southern part of the Palatinate Forest for the first time. Two males of the species could be observed at a valleycomplex southwest of Eppenbrunn near the border to France. The observation is described and locality and date of the observation are briefly discussed." (Author)] Address: Lingenfelder, U., Seebergstraße 1, D-67716 Heltersberg, Germany. E-mail: u.lingenfelder@vr-web.de

**6258.** Lingenfelder, U. (2006): Nachweise des Zweifelflecks - *Epiheca bimaculata* (CHARPENTIER, 1825) - im Pfälzerwald (Odonata: Corduliidae). *Fauna Flora Rheinland-Pfalz* 10(4): 1219-1247. (in German, with English summary). ["*E. bimaculata* [...] has been recorded at six localities in the Palatinate Forest since 2001. Reproduction evidences were provided at two waters. At one of these localities *E. bimaculata* is established for at least six years. Additional observations of the species in the Palatinate were reported recently from the natural areas „Nördliche Oberrheinebene“ and „Kaiserslauterner Senke“. All known recordings in Rhineland-Palatinate are compiled, findings in the Palatinate region are shown in a distribution map. A short survey of the distribution of the species in adjoining regions is also given here. In conclusion, habitats, distribution and status in the Palatinate Forest are discussed shortly as well as problems in recording the species, of dispersal and threats." (Author)] Address: Lingenfelder, U., Seebergstraße 1, D-67716 Heltersberg, Germany. E-mail: u.lingenfelder@vr-web.de

- 6259.** Lolive, P., Kleefstra, V (2006): Découverte d'une nouvelle population à *Epitheca bimaculata* (Charpentier, 1825) en Limousin (Odonata, Anisoptera, Corduliidae). *Martinia* 22(4): 166. (in French). [21 V 2006, near Thouron (87), France, 4 exuviae; the next known locality is situated 34 km north of Thouron.] Address: Lolive, P., Société Limousine d'Odonatologie, 11 rue Jauvion, F-87000 Limoges, France.
- 6260.** Machado, A.B.M. (2006): Three new species of Heteragrion Selys, from Brazil with redescription of the holotype of *H. dorsale* Selys (Odonata, Megapodagrionidae). *Revista Brasileira de Zoologia* 23(4): 1062-1070. (in English, with Portuguese summary). [*Heteragrion luizfelipei* sp. nov. from Santa Catarina, *H. gracile* sp. nov. from Minas Gerais, and *H. mantiquireae* sp. nov. from São Paulo are described and illustrated. The color and structural characters that distinguish these species from those of Selys group 2 are discussed. The holotype of *H. dorsale* Selys, 1862 is redescribed and illustrated." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil. E-mail: angelo@icb.ufmg.br
- 6261.** Machado, A.B.M.; Bede, L.C. (2006): *Heteragrion tiradentense* spec. nov. from the state of Minas Gerais, Brazil (Zygoptera: Megapodagrionidae). *Odonatologica* 35(1): 47-54. (in English) ["The new species (holotype male: Brazil, Minas Gerais, Tiradentes, 1-XI-1999) is described and illustrated. It belongs in the group 1 of *E. de Selys-Longchamps* (1862, *Bull. Acad. Belg.* [III] 14: 5-44) and differs from the other species of the group by its small size and by the color, shape and size of its mesepisternal spot." (Authors)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil. E-mail: angelo@icb.ufmg.br
- 6262.** Mancu, C.O. (2006): Investigations on the dragonflies (Insecta: Odonata) occurring in Mures Floodplain Natural Park. *Scientific annals of the Danube delta institute, Tulcea - Romania*, 2006: 69-74. (in English, with Romanian summary). [Romania; in 2004 and 2005, the distribution of Odonata (n=36 species) in the Mures Floodplain Natural Park was mapped. Each species is presented on 2x2 km UTM-squares. *Coenagrion ornatum*, *Ophiogomphus cecilia* and *Stylurus flavipes* are of special interest as they are listed in the Habitat Directive 92/43/EEC] Address: Mancu, C.O., Acad. Remus Radulet 13, bl. 119, ap. 7, Timisoara 300281, Timis County, Romania. E-mail: cosminovidiu@yahoo.com
- 6263.** Meurgey, F. (2006): *Protoneura romanae* spec. nov. from Guadeloupe, French West Indies (Zygoptera: Protoneuridae). *Odonatologica* 35(4): 369-373. (in English). ["The new sp. is described and compared with its closest relative, *P. ailsa* Donnelly. Holotype male and allotype female: Guadeloupe, Basse-Terre, Rivière Salee, Source Sul-fureuse de Sofaïa, 1 -11-2006; both deposited in Museum of Natural History, Nantes, France." (Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr
- 6264.** Meurgey, F.; Fauchaux, M.J. (2006): Vibroreceptors and proprioceptors on the larval antennae of *Erythromma lindenii* (Selys) (Zygoptera: Coenagrionidae). *Odonatologica* 35(3): 255-264. (in English). ["The larval antennae of *E. lindenii* are short and made up of a scape, a pedicel and a fourth-segmented flagellum. They bear four types of aporous and exclusively mechanoreceptive sensilla: spatula-shaped sensilla chaetica, curved sensilla chaetica, sensilla filiformia and sensilla campaniformia. The curved sensilla chaetica are proprioceptors which monitor the relative position of the 3rd and 4th flagellomeres. Sensilla filiformia are vibration receptors which play the major role in prey detection. The unique sensillum campaniformium on the pedicel is a proprioceptor which informs the larva of the position of the flagellum relative to the pedicel. Spatula-shaped sensilla chaetica are tactile receptors distributed on the scape and the pedicel. No chemoreceptive sensilla has been observed on the antennae." (Authors)] Address: Fauchaux, M.J., Laboratoire d'Endocrinologie des Insectes Sociaux, Université de Nantes, 2 rue de la Houssinière, B.P. 92208, F-44322 Nantes Cedex 03, France. E-mail: fauchaux.michel@free.fr
- 6265.** Meurgey, F.; Fauchaux, M. (2006): Organes sensoriels des antennes de la larve de *Chalcolestes viridis* (Van der Linden, 1825) (Odonata, Zygoptera, Lestidae). *Martinia* 22(4): 167-171. (in French, with English summary). ["The larval antenna of *Chalcolestes viridis* bears two types of mechanoreceptive sensilla: sensilla filiformia and curved sensilla chaetica. Sensilla filiformia play a major role in prey detection, as vibration receptors. Curved sensilla chaetica are proprioceptors which monitor the relative position of the flagellomere which follows the one that bears them, and permit antennal positioning. The sensory equipment of *C. viridis* is compared to that of *Erythromma lindenii* (Selys, 1840) previously studied." (Authors)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr
- 6266.** Meurgey, F. (2006): La collection d'Odonates de Monsieur Max Thibault. *Martinia* 22(4): 173-182. (in French, with English summary). ["The author presents the inventory of Max Thibault's collection of Odonata, recently acquired by the Natural history museum of Nantes. A list is given with, if necessary, some brief comments about the status of some species." (Author)] Records result from the following French Départements: Finistère (29), Île-et-Vilaine (35), Maine-et-Loire (49), Morbihan (56), Sarthe (72), Île-de-France (78), Hérault (34), Alpes Maritimes (06), Rhône-et-Loire (71), Haute-Savoie (74), and haute-Corse.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr
- 6267.** Mocek, B.; Mikat, M.; Cip, D. (2006): Significant and interesting findings of dragonflies (Insecta, Odonata) in East Bohemian Region (Czech Republic). *Vážky 2005 : sborník referátu VIII. celostátního semináře odonatologu ve Žďárských vrších : seminár usporádaly ve dnech 23.-26.6.2005 Správa CHKO Žďárské vrchy, ZO CSOP Vlašim a Vlastivedné muzeum a galerie v České Lípě / editor sborníku Lubomír Hanel. - Vyd. 1. - Vlašim: ZO CSOP Vlašim, 2006. ISBN 80-86327-52-3: 15-48.* (in Czech, with English summary). [280 new faunistic data obtained mostly by the authors' entomological research during the past 5 years are presented. Data from 102 localities of East Bohemia refer to 24 species of Odonata. Of special interest are the findings of *Leu-*

corrhinia rubicunda, Orthetrum albistylum, and Sympetrum meridionale which have been recorded for the first time in the region of East Bohemia. Records of Coenagrion ornatum, Stylurus flavipes, Ophiogomphus cecilia, and Leucorrhinia pectoralis are also noteworthy. Special emphasis is given to recent range extensions of species in East Bohemia.] Address: Mocek, B., Muzeum východních Čech v Hradci Králové, Elišcino nábřeží 465, 500 01 Hradec Králové, Czech Republic. E-mail: b.mocek@muzeumhk.cz

**6268.** Moroz, M.D.; Czachorowski, S.; Lewandowski, K.; Buczyński, P. (2006): Aquatic Insects (Insecta: Plecoptera, Ephemeroptera, Odonata, and Trichoptera) of the Rivers in the Berezinskii Biosphere Reserve. Entomological Review 86(9): 987-994. (in English). ["The fauna of aquatic insects was studied in the rivers of the Berezinskii Biosphere Reserve. A total of 108 species of 4 orders were found: Plecoptera (10 species), Ephemeroptera (24), Odonata (25), and Trichoptera (49). The aquatic fauna is abundant and includes some species rare in Belarus and Europe." (Authors) [English Translation of Entomologicheskoe Obozrenie 85(4): 749-757.] ] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczynski@biotop.umcs.lublin.pl

**6269.** Müller, J.; Lotzing, J.; Steglich, R.; (2006): Zu Nahrungsökologie und Brutbiologie der Rauchschwalbe Hirundo rustica. Ornith. Ner. Mus. Heineanum 24: 101-108. (in German, with English summary). [Unseburg, Sachsen-Anhalt, Germany; the food for nestling of Hirundo rustica (Aves) included also Odonata. Food analysis was a quite good method to detect rare regional odonate species including Ophiogomphus cecilia and Crocothemis erythraea.] Address: Müller, J., Frankfurterstr. 28, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**6270.** Ott, J. (2006): Die Auswirkungen der Klimaänderung auf die Libellenfauna - aktuelle Ergebnisse aus Untersuchungen in Deutschland und Italien. BfN-Skripten 180: 45. (in German). [This is a brief summary on activities to document and analyze climate change effects on the odonate fauna including some studies lasting more than 10 years. In general, bog dwellers are effected by drying out of their habitats, while species as Crocothemis erythraea and Orthetrum cancellatum benefit from alterations of the water tables of the ponds induced by climate change.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**6271.** Parr, A. (2006): Odonata attracted to artificial light. Atropos 29: 29-38. (in English). [The author compiles records of 15 odonate species found at light sources or attracted by light with focus on UK. Species most attracted in UK seem to be Aeshna mixta, Sympetrum sanguineum, and S. striolatum. The possible migration of these species is discussed.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**6272.** Parr, A. (2006): Dragonfly news, summer 2006. Atropos 29: 45-47. (in English). [The brief report highlights some migrant species and range extensions (e.g. Erythromma viridulum, Orthetrum cancellatum). Aeshna affinis was found for the second and third time in the UK.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bu-

ry St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**6273.** Parr, A.J. (2006): Migrant and dispersive dragonflies in Britain during 2005. J. Br. Dragonfly Society 22(1): 13-18. (in English). ["The 2005 season was a rather mixed one for migrant and dispersive dragonflies, with the autumn in particular being relatively uneventful. There were, however, several highlights during the main part of the year. Most notably, Anax parthenope appeared in record numbers and, with ovipositing reported from at least three sites in England (as well as one in Ireland), the species is perhaps now starting to reliably colonize our area. Following a quiet season in 2004, Sympetrum fonscolombii was once again recorded quite widely and a limited amount of oviposition was observed, although no observations of the autumn emergence of locally-bred individuals following rapid larval development took place. In addition to sightings of unusual species, there was also evidence of the continuing range expansion of a number of our resident species such as Aeshna mixta, Libellula depressa, L. fulva, and Orthetrum cancellatum. On the negative side, following sightings during 2002—2004, there were no reports of the Lestes barbarus during the season, suggesting that the possible colonization of Britain by this species has been temporarily halted." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**6274.** Perotti, M.G.; Fitzgerald, L.A.; Moreno, L.; Puenta, M. (2006): Behavioral responses of Bufo arenarum tadpoles to odonate naiad predation. Herpetological Conservation and Biology 1(2): 117-120. (in English). ["In the presence of predators (Pantala sp.), anuran tadpoles often exhibit behavioral plasticity, which in turn reduces predation risk. We evaluated indirect effects of odonate larva predation on activity of Bufo arenarum tadpoles. We reared intact and tail-damaged larvae in three different predator treatments: (1) caged predators fed tadpoles; (2) caged predators that were starved; and (3) no predators. Both intact and damaged tadpoles were significantly less active when exposed to predator cues. There were no differences in activity between tadpoles with damaged and intact tails, however significant differences were observed between fed and starved predator treatments. Our results are consistent with other studies that have shown bufonid tadpoles reduce activity when exposed to predator cues and Address a novel contribution of southern-hemisphere bufonid, expanding the knowledge of that family in ecological experiments." (Authors)] Address: Perotti, Maria, Laboratorio de Fotobiología, Centro Regional Universitario Bariloche, Universidad Nacional del Comahue-CONICET, Quintral 1250, (8400) San Carlos de Bariloche, Río Negro, Argentina. E-mail: perottigaby@yahoo.com

**6275.** Phillips, J., (2006): Dragonflies in the Forest of Dean 1996—2005. J. Br. Dragonfly Society 22(1): 19-28. (in English). [Between 1996 and 2005, 27 Odonata species were recorded at 27 sites in and around of the Forest of Dean, West Gloucestershire (Vice County 34), UK. The result are briefly discussed. Emphasis is given to the odonatological diversity of the site.] Address: Phillips, J., Yorkleigh Cottage, Pope's Hill, Newnham, Gloucestershire GL14 1LD, UK



- 6276.** Reimer, B. (2006): Notes on distribution of Odonata at A'Subaitah. Emirates Natural History Group Al Ain Chapter Newsletter December 2006: 5-6. (in English). [UAE; 17-XI-2006; records of *Paragomphus sinaiticus*, *Trithemis kirbyi ardens*, *T. arteriosa*, *Orthetrum sabina*, *Crocothemis erythraea*, *Arabicnemis caerulea*, and probably *Arabineura khalidi* are briefly reported] Address: not stated
- 6277.** Reinhardt, R. (2006): Nachtrag der sächsischen entomofaunistischen (odonatologischen) Bibliographie (bis zum Jahre 1999) nach Erscheinen der Libellenfauna Sachsens. Mitt. Sächs. Entomol. 73: 41-42. (in German). [Additions to the Saxonian odonatological bibliography.] Address: Reinhardt, R., Burgstätter Str. 80a, D-09648 Mittweida, Germany. E-mail: Reinhardt-Mittw@t-online.de
- 6278.** Renshaw, C.E.; Bostick, B.C.; Feng, X.; Wong, C.K.; Winston, E.S.; Karimi, R.; Folt, C.L.; Chen, C.Y. (2006): Impact of land disturbance on the fate of arsenical pesticides. J. Environ. Qual. 35: 61-67. (in English). ["Increasing development of historic farmlands raises questions regarding the fate of pesticides applied when these land were in cultivation. We quantified As and Pb budgets in field soils in two orchards where arsenical pesticides were applied in the early 20th century and a third uncontaminated control field. Sequential extractions and X-ray analyses also were used to determine mineral phases. In addition, we measured metal loads in drainages adjacent to the fields and in two common macroinvertebrate (Chironomidae, Libellulidae) taxa within the wetland at the outlet of the drainages. We find that the applied As and Pb have undergone little vertical redistribution; concentrations of As and Pb in the top 25 cm of contaminated orchard soils are higher than in the uncontaminated control field. However, none of the applied lead arsenate (PbHAsO<sub>4</sub>) remains in its original mineral phase. Instead, the metals are now primarily adsorbed onto fine silt and clay-sized amorphous oxides and organic matter. Further, physical erosion associated with tilling and replanting appears to have mobilized the fine-particulate-bound As and Pb in one orchard. The remobilized metals are found in sediments in the stream channel draining the tilled orchard. It is unclear if the As and Pb transported sediments are biologically active; average macroinvertebrate metal burdens in the wetland are not elevated above those observed elsewhere in the region. However, little of the mobilized metals may have reached the wetland. These results demonstrate that land use change can significantly impact the retention of arsenical pesticides." (Authors)] Address: Renshaw, C.E., Dep. of Earth Sciences, Dartmouth College, Hanover, NH 03755, USA. E-mail: Carl.Renshaw@Dartmouth.edu
- 6279.** Robb, T.; van Gossum, H.; Forbes, M.R. (2006): Colour variation in female *Lestes disjunctus* Selys: a second example of a polymorphic lestad (Zygoptera: Lestidae). Odonatologica 35(1): 31-39. (in English) ["Coexistence of discrete female colour morphs is a common characteristic of many odon. species. Surveys have found that for some North American and European genera, half or more of the spp. show female-limited polymorphism, while in other genera, female polymorphism appears far less common among spp. One such genus is *Lestes* with reportedly only one species (*L. sponsa*) being polymorphic. Here are described andromorphs and heteromorphs for *L. disjunctus*. Female-limited polymorphism might be more common, even in this genus, than is perceived currently. female morph frequencies were estimated for 4 consecutive years: andromorphs constitute approximately 16% of mature females sampled and this proportion is fairly consistent between years. Similar to other published reports on other species, andromorphs and heteromorphs in this study population did not differ in wing length or mass. Seasonal patterns in representation of different morphs suggest that further research should be done on timing of emergence of andromorphs versus heteromorphs in this and perhaps other species." (Authors) Address: Robb, Tonia, Department of Biology, Carleton University, 1125 Colonel By Drive, Ottawa, Ontario, K1S 5B6, Canada. E-mail: trobb@connect.carleton.ca
- 6280.** Šácha, D. (2006): Results of the dragonflies (Odonata) occurrence mapping in mountains of the Liptov and Spiš regions during years 2000-2004. Folia faunistica Slovaca 11(8): 43-48. (in English). ["A research of 25 wetland localities was carried out in mountain ranges surrounding the Podtatranská kotlina valley in years 2000–2004. There were 27 species of dragonflies reported, among them 6 are protected and 12 are listed in the Slovak Red List. *Coenagrion hastulatum*, *Aeshna grandis*, *A. juncea*, *A. subarctica*, *Cordulegaster bidentata*, *Somatochlora alpestris*, *S. arctica*, *Sympetrum danae*, *Leucorrhinia dubia*, and *L. rubicunda* are among the most interesting findings. Exuvium of *L. rubicunda* is the first record of this species in the Tatra Mts." (Author)] Address: Šácha, D., Podtatranského 31, 031 01 Liptovský Mikuláš, Slovakia. E-mail: dusan.sacha@pobox.sk
- 6281.** Šácha, D. (2006): Contribution to the knowledge of dragonflies (Odonata) at the lower Liptov region. Folia faunistica Slovaca 11(8): 69-73. (in English). ["A research of 12 wetland localities was carried out in surroundings of Ružomberok in years 2001-2005. 22 species of dragonflies are reported, among them 4 are protected and 7 appear in Slovak Red List. *Sympetma fusca*, *Aeshna juncea*, *Cordulegaster bidentata*, *Orthetrum brunneum*, *O. coerulescens* and *Sympetrum danae* are among the most interesting findings. *Sympetma fusca*, *Orthetrum brunneum* and *O. coerulescens* are first time reported from Liptov. *Calopteryx splendens* is documented from surroundings of Ružomberok after more than 100 years." (Author)] Address: Šácha, D., Podtatranského 31, 031 01 Liptovský Mikuláš, Slovakia. E-mail: dusan.sacha@pobox.sk
- 6282.** Šácha, D. (2006): New data on dragonflies (Odonata) in the Poprad region. Folia faunistica Slovaca 11(8): 49-54. (in English). ["A research of 10 wetland localities was carried out in surroundings of Poprad in years 1999-2004. There were 31 species of dragonflies reported, 5 of them are protected and 12 listed in the Slovak Red List. *Coenagrion hastulatum*, *Somatochlora alpestris*, *S. arctica*, *Aeshna juncea*, *A. grandis*, *Crocothemis erythraea*, *Orthetrum brunneum*, *Sympetrum danae*, *S. fonscolombii*, and *S. pedemontanum* are among the most interesting findings. The study is bringing the first data on the occurrence of larva of *S. fonscolombii* in the Podtatranská kotlina valley. *Lestes virens*, *O. brunneum* and *S. fonscolombii* are first time reported from the Popradská kotlina valley." (Author)] Address: Šácha, D., Podtatranského 31, 031 01 Liptovský Mikuláš, Slovakia. E-mail: dusan.sacha@pobox.sk

- 6283.** Šácha, D. (2006): Results of the investigation on dragonflies (Odonata) at the region of upper and central Liptov (Slovakia). *Folia faunistica Slovaca* 11(8): 75-80. (in English). [A research of 31 wetland localities was carried out in Liptovský Mikuláš district in years 1998-2004. 31 species of dragonflies are reported, 5 of them are protected and 11 appear in Slovak Red List. *Erythromma viridulum*, *Somatochlora alpestris*, *S. arctica*, *Aeshna juncea*, *A. grandis*, *Anax parthenope* (not collected), *Crocothemis erythraea*, *Sympetrum danae* and *S. pedemontanum* are among the most interesting findings. These are brings the first data on *Lestes virens*, *Erythromma najas*, *E. viridulum* and *Anax parthenope* in Podtatranská kotlina.] Address: Šácha, D., Podtatranského 31, 031 01 Liptovský Mikuláš, Slovakia. E-mail: dusan.sacha@pobox.sk
- 6284.** Saito, Y.; Owada, M.; Kato, S.; Inoue, S. (2006): Monitoring Survey (2001-2005) of Dragonflies (Odonata) of the Imperial Palace, Tokyo, Central Japan. *Memoirs of the National Science Museum* 43: 383-406. (in Japanese, with English summary). ["Monitoring investigations on the fauna of Odonata were made at the gardens of the Imperial Palace, Tokyo, ca. 115 ha, central Tokyo, from 2001 to 2005. A total of 33 species belonging to 8 families were recorded. Similar research were carried out at the same place from 1996 to 2000, and 27 species in 8 families were recorded (Tomokuni & Saito, 2000). The following six species are recorded from the Imperial Place for the first time: *Aeschnophlebia anisoptera* Selys, *Polycanthagyna melanictera* (Selys), *Anaciaeschna martini* (Selys) (Fig. 30) and *Anax nigrofasdatus nigrofasciatus* Oguma (Fig. 31), *Libellula quadrimaculata asahinai* Schmidt (Fig. 35) and *Sympetrum kunckeli* (Selys). Three endangered species in Tokyo urban areas, *Ceriagrion nipponicum* Asahina (Figs. 9-10), *Trigomphus melampus* (Selys) (Figs. 19-21) and *Aeschnophlebia longistigma* Selys (Figs. 27-29) were discovered by the former study (Tomokuni & Saito, 2000), and they are still abundant in the Palace. *Rhyothemis fuliginosa* Selys (Fig. 41), which had also been very scarce in the urban Tokyo, was gradually increase its number from 2002-2004, and we were able to observe its outbreak in the summer of 2005." (Authors)] Address: Owada, M., Dept Zool., Natn. Sci. Mus., 3-23-1 Hyakunincho, Shinjuku-ku, Tokyo, 169-0073, Japan. E-mail: owada@kahaku.go.jp
- 6285.** Schneider, K. (2006): Hermann Burmeister (1807-1892). *Hallescher Gelehrter von Weltrang. Ent. Nachr. Ber.* 50: 248-253. (in German). [This is a concised compilation on vita and work of Hermann Burmeister from Halle, Germany, author of the "Handbuch der Entomologie", 1832, and also significantly engaged in Odonata.] Address: Schneider, Karla, Inst. Biol., Zool. Samml., Domplatz 4, D-06099 Halle (Saale), Germany. E-mail: karla.schneider@zoologie.uni-halle.de
- 6286.** Sears, J. (2006): Dragonfly conservation from the BDS. RSPB and Southern Damselfly *Coenagrion mercuriale* Conservation. *Atropos* 29: 70-71. [The author reports on activities to preserve populations of *C. mercuriale* in the UK by means of habitat management. The success of conservation efforts is monitored.] Address: not stated
- 6287.** Sinu, P.A.; Nasser, M.; Rajan, P.D. (2006): Feeding fauna and foraging habits of Tiger beetles found in agro-ecosystems in western Ghats, India. *Biotropica* 38(4): 500-507. (in English). ["Libellulidae" were found as natural enemies of *Cicindela* (*Calochroa*) *whithilli* (Hope) and *Cicindela* (*Calochroa*) *flavomaculata* Hope (*Cicindelidae*: *Coleoptera*).] Address: Sinu, P. A., Ashoka Trust for Research in Ecology and the Environment (ATREE), # 659, 5 A Main, Hebbal, Bangalore 24, India. E-mail: sinu@atree.org
- 6288.** Stoks, R.; McPeck, M.A. (2006): A tale of two diversifications: Reciprocal habitat shifts to fill ecological space along the pond permanence gradient. *The American Naturalist* 168: 50-72. (in English). ["The *Enallagma* and *Lestes* damselflies have both diversified and adapted over the past 1015 million years to the various ecological milieus found along the pond permanence gradient among North American ponds and lakes. Previous articles have explored this diversification process for *Enallagma*. In this article, we present a phylogenetic hypothesis for the North American *Lestes*, use this hypothesis to reconstruct *Lestes* diversification, and compare the diversification processes inferred for *Lestes* and *Enallagma*. The results of this study suggest that *Lestes* began in temporary ponds where large dragonflies are the top predators, while *Enallagma* began in permanent lakes where fish are the top predators. Starting from these different ancestral habitats, both genera have invaded and adapted to habitats already occupied by the other genus. Moreover, these adaptive habitat shifts involved substantial convergence on the behaviors used to deal with fish and dragonfly predation in both genera and a major life-history shift from diapausing to directly developing eggs in *Lestes*. However, in *Lestes* lineages invading fish lakes, swimming speed and morphology did not change to match those of *Enallagma* species, illustrating that reciprocal shifts between alternative selection regimes are not necessarily evolutionary opposites. Also, the greater sizes and growth rates of *Lestes* species compared to *Enallagma* species, which should impart substantial ecological advantages in competition between the genera, were shown to result from phylogenetic inheritance and not from adaptive diversification. This historical analysis of diversification raises new questions about the relationship between the macroevolutionary mechanisms driving lineage diversification and the ecological mechanisms structuring local food webs and regional species assemblages." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be
- 6289.** Takahara, T.; Kohmatsu, Y.; Maruyama, A.; Yamaoka, R. (2006): Specific behavioral responses of *Hyla japonica* tadpoles to chemical cues released by two predator species. *Current Herpetology* 25(2): 65-70. (in English). ["We experimentally examined the anti-predator behaviors of tadpoles of the Japanese tree frog, *Hyla japonica*, to chemical cues released by a cyprinid fish, *Gnathopogon elongatus elongatus*, and a dragonfly nymph, *Anax parthenope julius*. Tadpoles exposed to these chemical cues exhibited a similar reduction in activity level. In the presence of the fish chemical cues, however, the tadpoles spent more time in the bottom water layer compared to controls, but did not change their microhabitat choice in the presence of dragonfly nymph chemical cues. These findings suggest that tadpoles of *H. japonica* have predator-specific behaviors in response to chemical cues from different predators with differential foraging strategies." (Authors)]

Address: Takahara, T., Graduate School of Science and Technology, Kyoto Institute of Technology, Sakyo, Kyoto 606-8585, Japan. E-mail: taka02@kit.ac.jp

**6290.** Takemon, Y.; Yamamoto, A.; Nakashima, M.; Tanida, K.; Kishi, M.; Kato, M. (2006): Isolation of sperm vesicles from adult male mayflies and other insects to prepare high molecular weight genomic DNA samples. *Molecular Biology Reports*, Volume 33, Number 1: 65-70. (in English). ["We describe here a simple and efficient protocol for genomic DNA isolation from adult males of insects: e.g., Ephemeroptera, Odonata, Orthoptera and Dictyoptera. To minimize contamination of external DNA source, the sperm vesicles were isolated from male individuals from which high molecular weight genomic DNA was extracted. According to this protocol, the genomic DNA samples obtained were high quality (intact), and abundant enough for genotyping analyses and molecular cloning. The protocol reported here enables us to process a huge number of individuals at a time with escaping from cross-contamination, and thus it is quite useful for conducting genetic studies at least in some species of insects. The large yield of high molecular weight DNA from single individual may be advantageous for non PCR-based experiments. As a case study of the protocol, partial coding sequences of histone H3 and EF-1a genes are determined for some insects with PCR-amplified DNA fragments." (Authors) *Mnais costalis* *Pantala flavescens*] Address: Kata, M., Department of Biological Science, Osaka Prefecture University Graduate School of Science, Sakai 599-8531, Japan. E-mail: mkato@b.s.osakafu-u.ac.jp

**6291.** Taylor, P. (2006): Vagrant Emperor Anax (*Hemianax*) *ephippiger* (Burmeister, 1839) - a new breeding species for Bulgaria. *J. Br. Dragonfly Society* 22 (2): 64-68. (in English). ["In July 2004 the first British Dragonfly Society trip to Bulgaria took place, led by Dave Smallshire. The trip was hosted by Bulgarian dragonfly expert Milen Marinov and Stoyan Beshkov. On the last day, at the last site visited (a complex of river, streams and ponds near Novo Konopladi in the southwest of the country) I collected several exuviae, one of which was later identified as *Anax* (*Hemianax*) *ephippiger*. This represents the first proof of breeding for this species in Bulgaria. The history of *A. ephippiger*, with particular reference to Bulgaria, is discussed." (Author)] Address: Taylor, Pam, Decoy Farm, Decoy Road, Potter Heigham, Norfolk NR29 5LX, UK

**6292.** Thorne, A.D.; Pexton, J.J.; Dytham, C., Mayhew, P.J. (2006): Small body size in an insect shifts development, prior to adult eclosion, towards early reproduction. *Proc. R. Soc. B* 273: 1099-1103. (in English). ["Life-history theory has suggested that individual body size can strongly affect the allocation of resources to reproduction and away from other traits such as survival. In many insects, adults eclose with a proportion of their potential lifetime egg production that is already mature (the ovigeny index). We establish for the solitary parasitoid wasp *Aphaereta genevensis* that the ovigeny index decreases with adult body size, despite both initial egg load and potential lifetime fecundity increasing with body size. This outcome is predicted by adaptive models and is the first unequivocal intraspecific demonstration. Evidence suggests that a high ovigeny index carries a cost of reduced longevity in insects. Our results therefore contribute to the emerging evidence that small body size can favour a developmental shift in

juveniles that favours early reproduction, but which has adverse late-life consequences. These findings are likely to have important implications for developmental biologists and population biologists." (Authors) The paper also refers to *Coenagrion puella*.] Address: Mayhew, P.J., Department of Biology (Area 18), University of York, PO Box 373, York YO10 5YW, UK. E-mail: pjm19@york.ac.uk

**6293.** Tsubaki, Y.; Tsuji, N. (2006): Dragonfly habitat maps based on landcover and habitat relation models. In: Rivera, AC (ED). 2006. *Forests and Dragonflies*. 4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005. *Pensoft Series Faunistica* 61: (in English). ["We constructed dragonfly distributional models (logistic regression models) based on occurrence records collected in the national recording scheme of Japan. Such occurrence records have several shortcomings in that they only record what is present and not what is absent, and sampling efforts are highly variable among recording grid-squares (about 10x10 km). Moreover, the accuracy of logistic regression models is strongly influenced by the presence/absence prevalence. We developed two data screening methods to select 'reliable' species presence/absence data sets from presence-only species assemblage records: exclusion of grid-squares without enough survey efforts, and exclusion of grid-squares out of temperature range in each species. Then we tried to find out landcover-occurrence relationships within the temperature range based on logistic regression models. We obtained statistically significant models for 98 species among all dragonflies inhabiting the main four islands of Japan (128 species). Goodness-of-fit tests showed that some landcover types significantly affected the occurrence of each species. Area of broad-leaved forests within a grid-square (10x10 km) had positive effects on the occurrence of 57 species, indicating that at least 50% of dragonflies depend on forests. Our analysis also showed that landcover heterogeneity (Shannon-Wiener's  $H'$ ) had positive effects on the occurrence of most species (73 among 98 species). We showed three examples of habitat maps generated by the logistic model together with actual occurrence records. We discussed how the model performance might change in relevance to the data screenings we applied." (Authors)] Address: Tsubaki, Y., National Institute for Environmental Studies, Tsukuba, 305-8506 Japan

**6294.** Van Gossum, H.; Beatty, C.; Sherratt, T. (2006): The Zygoptera of Viti Levu and Vanua Levu, the two larger islands in the Fiji archipelago. *IDF-Report* 9: 1-14. (in English). ["In 2005 we started a study of the ecology and evolutionary history of damselflies of the genus *Nesobasis*, endemic to Fiji. In addition we made account of the species of Zygoptera present at our study sites, and made notes on the Anisoptera. In general, the odonate fauna of the Fiji archipelago is poorly studied. Here, we provide an historical overview of the knowledge on this fauna and give details of the species we encountered in August - September 2005. We made observations and collected voucher specimens for 2 species of the genus *Ischnura*, 2 of the genus *Agriocnemis*, 1 of the genus *Austrolestes*, 7 of the genus *Melanesobasis* and 25 of the genus *Nesobasis*. For *Melanesobasis* we also made account of an additional subspecies. Further, we discovered 2 species of damselfly new to science, 1 on Viti Levu and 1 on Vanua Levu, both belonging to the genus *Nesobasis*." (Au-



thors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**6295.** Van Swaay, C.A.M., Groenendijk, D. & Plate, C. (2006): Vlinders en libellen geteld. Jaarverslag 2005. Rapport VS2006.020, De Vlinderstichting, Wageningen.: 31 pp. (in Dutch). [Monitoring butterflies and dragonflies in the Netherlands in 2005 De Vlinderstichting (Dutch Butterfly Conservation) and CBS (Statistics Netherlands) coordinate the monitoring schemes for butterflies and dragonflies in the Netherlands. The butterfly scheme started in 1990, the dragonfly scheme in 1997. Method: Butterflies and dragonflies are counted using a line-transect method. Butterfly transects are visited every week, dragonfly transects once every fortnight. The length of the transects is variable and depends on habitat quality and availability. In addition, single species transects are exclusively counted for a specific threatened butterfly or dragonfly. Indices were calculated using the computer program TRIM (Trends and Indices for Monitoring Schemes). This program was developed by CBS for the analysis of time series of counts with missing observations. The butterfly indices are calculated using a weighting procedure and 1992 is now used as the first year in the trend calculation and set to a reference value of 100. The dragonfly indices are not weighted yet and 1999 is used as the first year in the trend calculation and, therefore, set to a reference value of 100. Results of 2005: [...] Again, also in 2005 dragonflies were counted every fortnight between May and September at 328 sites (figure 5). The average number of dragonflies per transect was a bit higher than in most previous years (table 2; figure 10). Like in most other years *Enallagma cyathigerum* was the most common species (over 70,000 individuals). *Ischnura elegans*, with nearly 20,000 individuals, was the most widespread species. It was seen on about 90% of the plots (table 2). For some species indices are presented (chapter 8). Again, an alarming decreasing trend was detected for *Aeshna viridis* and *Coenagrion hastulatum*. Another Red List species, *Calopteryx virgo*, still shows a positive trend. Scientific names and the Dutch vernacular names for all dragonfly species are given in chapter 10." (Authors)] Address: De Vlinderstichting, Postbus 506, 6700 AM Wageningen, Niederlande. Email: info@vlinderstichting.nl

**6296.** Wahizatul-Afzan, A.; Julia, J.; Amirrudun, A. (2006): Diversity and distribution of dragonflies (Insecta: Odonata) in Sekayu Recreational Forest, Terengganu. *Journal of Sustainability Science and Management* 1(2): 97-106. (in English). ["A rich collection of 593 individuals belonging to 44 species from 11 families of Odonata were successfully identified at Sekayu Recreational Forest, Terengganu from September until December 2005. Zygopterans (393 individuals) were found to be more abundant than anisopterans (200 individuals). However, Libellulidae (suborder Anisoptera) made up the most dominant family collected with 31.9% of total individuals recorded. *Euphaea ochracea* and *Rhincocypha limbata* were found to be the most abundant species recorded in this study. More individuals were collected from middle stream (MS) of Sungai Sekayu followed by lower stream (LS) and upper stream (US). However, ANOVA does not show significant difference among the individuals represented at each study sites as all the study areas consist of similar microhabitats."

(Authors)] Address: Wahizatul-Afzan, A., Department of Biological Science, Faculty of Science and Technology, Kolej Universiti Sains dan Teknologi Malaysia, Terengganu D. I. Malaysia

**6297.** Ward, L.; Mill, P.J. (2006): Diel activity patterns in the adult Banded Demoiselle, *Calopteryx splendens* (Harris), and the effect of weather variables. *J. Br. Dragonfly Society* 22(2): 58-63. (in English). ["Diel activity patterns of the territorial zygopteran *C. splendens* were studied in a well-established breeding population on the River Wharfe in northeast England. The effect of weather on the activity of the species was investigated. A bimodal activity curve was observed in both males and females, albeit rather more pronounced in the males. Male activity was largely influenced by reproductive behaviour, more specifically territory selection and defence, with short feeding flights within the immediate vicinity of the perch. Conversely, the activity patterns of the females incorporated more defined periods of foraging activity, quite distinct from periods of reproductive activity. The activity of the species significantly increased with increase in ambient air temperature and solar energy, whereas a significant negative relationship was found between the number of *C. splendens* in flight and increase in cloud cover, rainfall and wind speed. The observed activity patterns are discussed with reference to maximum profitability of specific activities, the physical condition of an individual and the recorded weather variables. There are implications for the long-term reproductive success of individuals where weather conditions suppress activity." (Authors)] Address: Mill, P.J., Fac. Biol. Sciences, University of Leeds, Leeds, West Yorkshire LS2 9JT, UK. E-mail: p.j.mill@leeds.ac.uk

**6298.** Westermann, K.; Westermann, E. (2006): Zum Status der Blauen Federlibelle (*Platycnemis pennipes*) im höheren Schwarzwald. *Naturschutz am südlichen Oberrhein* 4(2): 229-234. (in German, with English summary). [Baden-Württemberg, Germany; "In the higher elevations of the Black Forest, there exists an autochthonous population of *P. pennipes*, which consists of at least three large subpopulations that have been discovered so far: near Hinterzarten at 880 m a.s.l., near Titisee at 859 m a.s.l. and near Lenzkirch at 832 m a.s.l. Most waters of the southern and central Black Forest at elevations above 800 m a.s.l. are not colonized by the species. From the Upper Hotzenwald and the southeastern Black Forest, no records of the species have come to our notice." (Authors)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**6299.** Westermann, K. (2006): Auswirkungen des winterlichen Abbaus von drei Teichen des höheren Schwarzwaldes auf Libellenbestände und Makrophyten. *Naturschutz am südlichen Oberrhein* 4(2): 219-226. (in German, with English summary). [Baden-Württemberg, Germany; "In three ponds of the southern and southeastern Black Forest, the effects of partial or complete winter water discharge on the dragonfly and aquatic plant populations were studied. The fact that many species cannot tolerate regular annual discharge was confirmed. The ecological function of the nature reserve "Schluchtsee" is profoundly disturbed by the partial winter discharge, which has been conducted for several years." (Authors)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**6300.** White, D. (2006): The Keeled Skimmer *Orthetrum coerulescens* (Fabricius) at Holt Lowes, Norfolk: History and habitat use. *J. Br. Dragonfly Society* 22(1): 1-12. (in English). [The paper presents detailed results of a mark-recapture study on *O. coerulescens*, outlining flight season, fate of marked males, maturation period, non-reproductive adults, territoriality of males, size of territory, and habitat characters. Suggestions of conservation suitable habitats for the species are also outlined.] Address: White, D., 48 Caernarvon Road, Norwich, Norfolk NR2 3HX, UK

**6301.** Yanoviak, S.P.; Lounibos, L.P., Weaver, S.C. (2006): Land use affects macroinvertebrate community composition in phytotelmata in the Peruvian Amazon. 1172: 1181. (in English, with Spanish summary). ["Patches of forest in the western Amazon often are converted to small-scale subsistence plantations (chacras), which become early successional forest (purma) when abandoned. Differences in abiotic conditions and phytotelm characteristics among chacras, purmas, and adjacent forest likely influence the distribution of phytotelm colonists. We sampled the contents of natural water-filled tree holes in the three habitat types and quantified differences in the abundance, species richness and composition of their macroinvertebrate communities. We additionally placed experimental tree-hole analogs (water-filled bamboo [*Guadua* sp.] internodes) in each of the habitat types and sampled their macroinvertebrate communities over 110 d. The species composition of macroinvertebrates in both tree holes and bamboo sections differed among habitats. Larvae of damselflies and crane flies, both important predators of mosquitoes, were replaced by larvae of the predatory mosquito *Toxorhynchites* spp. in chacras. Several mosquito species were relatively more abundant in chacra habitat. Macroinvertebrate abundance and species richness were correlated with water volume in tree holes and varied over time in bamboo sections. Species richness in bamboo did not differ among the three focal habitat types, but forest tree holes contained more species than tree holes in chacras. Differences in species composition between the two types of phytotelmata largely were attributed to the short duration of the bamboo experiment." (Authors) ] Address: Yanoviak, S.P., Center for Biodefense and Emerging Infectious Diseases, University of Texas Medical Branch, 301 University Blvd., Galveston, TX 77555. USA.

**6302.** Yu, X.; Bu, W. (2006): A study on Odonata from Tianjin. *Acta scientiarum Naturalium Universitas Nankaiensis* 39(4): 83-90. (in Chinese, with English summary). [Records of 30 species resulting from 17 localities in Tianjin, China are documented. The study includes more recent studies and museum specimens.] Address: Yu, X., Inst. Entomol., Nankai Univ., Tianjin 300071, China

**6303.** Zawal A., Dyatlova E.S. (2006): Preliminary data for parasitizing on *Ischnura elegans* (Vander Linden, 1820) (Odonata, Coenagrionidae) by *Arrenurus* (Acari: Hydrachnidia) larvae from Odessa province (southwestern Ukraine). II International Symposium of Ecologists of Montenegro – Proceedings of the Symposium : 17-20. (in English). ["Of 256 specimens (160 males and 96 females) of *Ischnura elegans* from the Odessa province, 37 specimens were found with two parasitic water mite species: *Arrenurus claviger* and *A. papillator*. The prevalence (7.4%) and the intensity of infestation (1-6)

was smaller than in *Ischnura elegans* collected in Poland. The parasites preferred the metathorax and mesothorax of their hosts. In Odessa, the largest number of parasitizing larvae were collected in September, later than in Poland [...]" (Authors)] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Wąska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**6304.** Zhang, D.; Yang G.; Zheng, Z. (2006): Phylogenetic relationship of some species of Libellulinae inferred from sequences of mitochondrial cytochrome b gene (Odonata: Libellulidae). *Journal of Ningxia University (Natural Science Edition)* 27(3): 255-259. (in Chinese, with English summary). ["Partial nucleotide sequences of mitochondrial DNA cytochrome b gene from 7 species of 3 genera of Libellulinae in China were amplified by PCR and directly sequenced by silver-staining sequencing technique. The sequences were parts of Cyt b gene of mtDNA (576 base pairs in length), and in the obtained sequences, the average of A + T was about 70.2%. From every amino acid codon, the average of A + T in the third site was higher (85.4%) than the other two sites. The sequence data revealed considerable variation in 180 nucleotide sites (about 31.25%) among the analyzed individuals from 3 genera, *Orthetrum*, *Lyriothemis* and *Libellula*. We obtained homologous nuclear sequence of *Mnais maclachlani* for outgroup. The phylogenetic trees were constructed with neighbour-joining method, maximum parsimony method and Bayesian inference. The confidence of nodes in the trees was evaluated by 1 000 replicates bootstrap. The phylogenetic relationship of mitochondrial DNA suggested that *Orthetrum* was more evolutionary than *Lyriothemis* and *Libellula*. The phylogenetic relationships of the 3 genera was *Libellula* -> *Lyriothemis* -> *Orthetrum*." (Authors)] Address: Zhang, Dazhi, School of Life Science, Ningxia University, Yinchuan 750021, China

**6305.** Zhang, D.-z.; Dai, J.-x.; Zheng, Z.-m. (2006): Phylogeny of Libellulidae based on mitochondrial cytochrome b nucleotide sequences (Odonata: Anisoptera). *Sichuan Journal of zoology* 25(4): 695-699. (in Chinese, with English summary). ["In this study, fragments of mitochondrial DNA cytochrome b gene (each 576 base pairs in length) have been characterized from twenty individuals belong to 9 species from 6 genera of Libellulidae in China. These sequences were parts of Cyt b gene of mtDNA, and in the obtained sequences, A % + T % was about 69.12 %. From every amino acid codon, A % + T % in the third site was higher (86.15 %) than the other two sites. The sequence data revealed considerable variation in 216 nucleotide sites (about 37.15 %) among the analyzed individuals from 6 genera. We obtained homologous nuclear sequence of *Megalestes m aai* (damselfly) for outgroup. The phylogenetic trees were constructed with neighbour-joining method, maximum likelihood method and maximum parsimony method. The confidence of nodes in the trees was evaluated by 1000 replicates bootstrap. The phylogenetic relationship of mitochondrial DNA suggested that the Libellulidae was a monophyletic group. *Orthetrum* was more evolutionary than other genera. The phylogenetic relationships of the 6 genera was : *Pantala* and *Sympetrum* -> *Lyriothemis* -> *Acisoma* and *Crocothemis* -> *Orthetrum*." (Authors)] Address: Zhang, Dazhi, School of Life Science, Ningxia University, Yinchuan 750021, China

**6306.** Abbott, J.C. (Ed.) (2007): Dragonflies and Damselflies (Odonata) of Texas. Vol. 2. ISBN 978-0-6151-4063-6: 311 pp. (in English). [The book is a reference to the 223 species of odonates distributed in Texas, USA. Included in Volume 2 are updated and detailed species distribution and seasonality accounts arranged so that users can search by scientific name, county name, or flight season. A variety of articles are also included on the natural history, collection and preservation, and diversity of Texas odonates. Lasley, G.W.: Digital odonate photography: My personal techniques ■ Behrstock, R.A., Rose, J.S. Abbott, J.C.: First Texas record and second U.S. occurrence of the Pale-green Darner, *Triacanthagyna septima* (Selys in Sagra, 1857) (Odonata: Aeshnidae) ■ Thomas, B.: Williamson County Gold: Chandler Creek ■ Matthews, J.: What do we know about dragonfly migration on the Texas coast? ■ Hatfield, I.: The dragonflies and damselflies of the Llano Estacado: In search of new species records on the Panhandle South Plains ■ Schappert, P.: New Odonata for Bastrop County and the Stengl "Lost Pines" Biological Station ■ Statistical Summary of Odonata in Texas ■ Abundance & Distribution of Texas Odonata, J.C. Abbott ■ Diversity of Texas Odonata by County ■ Checklist of Dragonflies & Damselflies of Texas, J.C. Abbott ■ Seasonality of Odonata in Texas, J.C. Abbott ■ Dragonflies & Damselflies of Texas Listed by County; Distribution Maps of Texas Odonata ■ Appendix: Collection Guidelines for the Odonata Survey of Texas, J.C. Abbott ■ The Dragonfly Society of the Americas Guidelines for Collecting; Specific Collecting & Preservation Instructions, J.C. Abbott ■ Guidelines for Field Notes & Data Recording, J.C. Abbott ■ Odonata Field Guides, Resources, Societies, & Suppliers ■ Glossary of Terms Relating to Odonata, J.C. Abbott ■ Index to Maps] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**6307.** Baker, R.L.; McGuffin, M.A. (2007): Technique and observer presence affect reporting of behavior of damselfly larvae. *Journal of the North American Benthological Society* 26(1): 145-151. (in English). ["We experimentally tested for systematic biases in techniques commonly used to study behavior of larval aquatic insects. We determined whether larval Zygoptera responded to the presence of an observer and whether live observation missed some behaviors. We found significant differences between behaviors recorded during live observations and behaviors videotaped in the absence of an observer. All behaviors, except Rotate, were exhibited less frequently in the presence of an observer. These results suggest that larvae respond to the presence of observers as if they were predators. Live observation also missed some behaviors. The duration of Crawl Forward, which can be very subtle, and the frequency of Rotate, which can be very rapid and is easily missed, were greater when recorded from the videotape than by a live observer. Wherever possible, use of video recording systems is preferable over reliance on live observations." (Authors)] Address: Baker, R.L., Dept Zoo], Erindale Coll., Univ. Toronto, Mississauga, ON, L6L 2C6. Canada. e-mail: rbaker@credit.erin.utoronto.ca

**6308.** Baptista, D.F.; Buss, D.F.; Egler, M.; Giovanelli, A.; Silveira, M.P.; Nessimian, J.L. (2007): A multimetric index based on benthic macroinvertebrates for evaluation of Atlantic Forest streams at Rio de Janeiro State, Brazil. *Hydrobiologia* 575: 83-94. (in English). ["This study describes the application of a protocol for biological assessment of water quality at first to third order streams at Serra dos Órgãos, an area covered by Atlantic Forest in Rio de Janeiro State, Brazil. Major impacts in the region are domestic effluents and deforestation. Our main objective is to establish biocriteria for the establishment of the Serra dos Órgãos Multimetric Index (SOMI) based on benthic macroinvertebrates. We used data from previous studies, sampled by experienced biologists, from 1999 through 2002. The benthic macroinvertebrate community was sampled in 12 reference sites and seven impaired sites in three river basins: Guapimirim, Macaé and Grande, all from the same bioregion. From the 22 tested metrics, 6 were included in the SOMI (% Diptera, % Coleoptera, Family Taxa, EPT Taxa, BMWP-CETEC and % Shredders). Scores (5, 3 or 1) were developed for these metrics to allow for aggregation into the index. Seven intermediately impaired sites were used for evaluating the applicability of the multimetric index. We concluded that the SOMI is a robust easy-to-apply tool for biomonitoring programs in the Serra dos Órgãos region, south-east Brazil." (Authors) Odonata are included into the study at several parts.] Address: D. F. Baptista, D.F., Laboratório de Avaliação e Promoção da Saúde, Ambiental – FIOCRUZ/IOC, Av. Brasil, 4365, Manguinhos, Rio de Janeiro, RJ, Brasil. E-mail: darcilio@ioc.fiocruz.br

**6309.** Barta, D. (2007): Discovering the dragonfly wealth of Kerala - the God's own land - in South India: a travelogue. In: Tyagi, B.K. (Ed.): *Odonata : Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 363-366. (in English). [Brief narrative report on a trip through Kerala, India in December 2004 aiming to photograph Odonata.] Address: Barta, D., Havanska 8, Prague -7, 170 00, Czech Republic. E-mail: dnlbrt@seznam.cz

**6310.** Beattie, R. (2007): The geological setting and palaeoenvironmental and palaeoecological reconstructions of the Upper Permian insect beds at Belmont, New South Wales, Australia. *African Invertebrates* 48 (1): 41-57. (in English). ["The entomofauna of the Tatarian insect beds within the Newcastle Coal Measures at Belmont, north of Sydney, was described many years ago. A new collection contains some undescribed species, particularly beetles; a new exposure of the fossiliferous deposits is now documented. The Newcastle Coal Measures consist of sandstones, conglomerates, shales, coal and tuffs, which were deposited in the Hunter Trough. The depositional environment consisted of a series of very shallow, stagnant freshwater pools along a gravel river channel system within a regional coal swamp. A volcanic event produced a volcanic ash dump, causing a "snapshot" kill of insects, validating possible interpretation of percentages of insect fossils in ecological modelling. The pool community included Conchostraca, Permosyne beetles and extremely rare insect larvae. A community on swamp banks adjacent to the water courses was comprised of Glossopteris-dominated flora and Phyllothea, with an insect-dominated, first-level consumer community of phloem-feeding Hemiptera and possibly pollenivorous Mecoptera. A leaf-litter and bark-dwelling community included Pro-



telytroptera, Psocoptera and archostematan Coleoptera. Neuroptera, extremely rare Trichoptera, and ancestors of the Orthoptera were also present in small numbers. Adult Neuroptera fossils suggest the presence of their predatory larvae and this group, along with the Odonata, are considered to have been the predatory components within this environment. No chelicerates, tetrapods or other potential top predators have been found in this, or proximal, facies. Disruptive colour patterns in some of the insects may indicate predator-prey relationships. Of interest also is the identification of a number of Glossopteris leaves with chewed margins. If these observations are correct, they would represent one of the earliest records of this kind of ichnofossil in Australia." (Author)] Address: Beattie, R., Dept of Earth & Marine Sciences, The Australian National University, Canberra, ACT 0200 Australia, P.O. Box 320, Berry, NSW 2535 Australia. E-mail: Robert.beattie@anu.edu.au

**6311.** Beckemeyer, R.J.; Hall, J.D. (2007): The entomofauna of the Lower Permian fossil insect beds of Kansas and Oklahoma, USA. *African Invertebrates* 48(1): 23-39. (in English). ["The Lower Permian Wellington Formation fossil beds of mid-continent North America are known best for the famous Elmo, Kansas locality. The Elmo site has produced tens of thousands of specimens from which more than 150 species of insects have been described. Equally productive and more widespread geographically, but less well-known, are the Midco, Oklahoma beds located some 270 km south of Elmo. The Midco beds have also yielded tens of thousands of specimens, but the material has been less well studied, and only half as many species have been identified from there. Renewed attention has been given in recent years to both the geology and palaeontology of the Wellington Formation. The history of these insect beds is recounted and the insect faunal composition is briefly reviewed. There are nearly 200 species in 106 genera, 53 families and 21 orders. Sizes (as measured by mean forewing length) range from 1.9 mm to 330 mm, with a mean of 22 mm and a median of 12 mm. Ten of 13 species with fore wings greater than 50 mm in length are Protodonata. Most species are known from one or a few specimens (abundance ranges from 1 to just under 400 specimens per species). Of ten species for which 50 or more specimens are known, eight are Grylloblattida (and six of these Grylloblattida: Lemmatophorina), indicating that these taxa were either quite abundant or were preferentially preserved, or both. When reviewing the holotype/neotype specimens used to describe the Wellington Formation species, we find that 62% consist of fore wings, while 9% are complete specimens. However, when considering all known specimens, 48% of the species are known only by their fore wings, while 13% are now represented by complete specimens, indicating the importance of continued collecting and review of Wellington Formation insect fossils." (Authors)] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**6312.** Beukema, J. (2007): Are the observed dispersal capacities in damselfly species sufficient to cope with the ongoing rapid shift of climate zones?. In: Tyagi, B.K. (Ed.): *Odonata : Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 175-182. (in English). ["To keep up with present polewards shifts in climate zones, species have

to expand their distribution areas in polewards direction with an average speed of several kilometers per year. Therefore, their dispersal capacities and the use they make of these deserve special interest. Both results of mark-recapture studies as well as records of the time course of colonization of new water bodies would point to remarkably small proportions of populations of Zygopteran species actually moving over such distances within a flying season. Reasons are given why these observations may underestimate true dispersal capacities. Records of range shifts reveal that most Odonate species appear to be able to the present speed of polewards climate shift." (Author)] Address: Beukema, J., Royal Netherlands Institute for Sea Research, P. O. Box 59, 1790AB Den Burg, Texel, The Netherlands. E-mail: janb@nioz.nl

**6313.** Blaustein, L.; Chase, J. (2007): Interactions between mosquito larvae and species that share the same trophic level. *Annual Review of Entomology* 52: 489-507. (in English). [Ecological theory predicts, and empirical research shows, that species sharing the same trophic level as a target species (hereafter controphic species) can have large direct and indirect effects on the target species by sharing resources and/or by serving as alternative prey to predators. Yet, the roles of controphic species of mosquito larvae in affecting mosquito populations have received little attention. Published empirical evidence, although scarce, suggests that controphic species such as zooplankton and anuran larvae compete with mosquito larvae, can positively affect mosquito larvae by consuming bacteria that are pathogenic to mosquito larvae, reduce predation on mosquito larvae by serving as alternative prey, and ultimately cause increased predation on mosquito larvae by causing a numerical response in the predator. We conclude that more extensive theoretical and empirical studies in elucidating the roles of controphic species will better allow us to predict mosquito population dynamics and allow for better management of mosquitoes." (Author) The review includes data on Odonata.] Address: Blaustein, L., Community Ecology Laboratory, Institute of Evolution, Faculty of Sciences, University of Haifa, Haifa 31905, Israel. E-mail: leon@research.haifa.ac.il

**6314.** Boano, G.; Sindaco, R.; Riservato, E.; Fasano, S.; Barbero, R. (2007): *Atlante degli odonati del Piemonte e della Valle d'Aosta. Memorie della Associazione Naturalistica Piemontese* 6: 160 pp. (in Italian, with English summary). [Italy; "Atlas of the Odonata of Piedmont and Valle d'Aosta. Based on an exhaustive review of the literature, the study of several local entomological collections, and extensive unpublished data, we have written an atlas of the Odonata of Piedmont and Valle d'Aosta which presents up-to-date information on the geographic (using a 10km UTM grid) and altitudinal distribution, ecological preferences, and phenology of these insects in the two regions in question. We have analysed and mapped over 6200 records, of which about 2000 were already published in approximately fifty different sources, while the remaining 4200 (87.5%) were unpublished; these were for the most part gathered by the authors over the last 15 years. Bibliographical data is quite scattered: only 6 publications contain more than 50 records, and of these only 3 were published after Capra and Galletti's (1978) fundamental reference work. We confirmed the presence of 63 species (72 % of the national total), all of which have been recorded in the last 15 years except for *Erythromma na-*

jas. We report the first records of *Coenagrion coerulescens* for the well-investigated region of Piedmont, along with 14 new records for Valle d'Aosta: *Calopteryx splendens*, *Ischnura pumilio*, *Erythromma lindenii*, *Coenagrion tenellum*, *Aeshna mixta*, *Anax parthenope*, *Cordulia aenea*, *Libellula depressa*, *Orthetrum cancellatum*, *Crocothemys erythraea*, *Sympetrum fonscolombii*, *S. sanguineum*, *S. striolatum* and *S. vulgatum*. The rarest species (< 10 UTM squares) are (in parenthesis we indicate the ratio of total UTM squares / post-1990 UTM squares): *Erythromma najas* (1/0), *Coenagrion caerulescens* (2/2), *Leucorrhinia dubia* (3/3), *Sympetrum flavolum* (4/2), *Brachytron pratense* (4/1), *Somatochlora meridionalis* (5/3), *Aeshna grandis* (4/4), *Sympetrum vulgatum* (5/2), *Coenagrion mercuriale* (5/5), *Gomphus flavipes* (8/6), *Sympecma paedisca* (8/1), *Somatochlora alpestris* (9/9), *Oxygastra curtisii* (10/6), *Onychogomphus uncatatus* (9/9). Given the importance of protecting suitable habitats for the conservation of Odonates, we have felt it useful to provide an overview of the knowledge related to the Odonates present in Sites of Community Interest and in the protected areas of Piedmont and Valle d'Aosta." (Authors)] Address: Riservato, Elisa, Dipartimento di Biologia Animale, Università di Pavia, Piazza Botta 9, 27100 Pavia, Italy. E-mail: elisa.riservato@unipv.it

**6315.** Bogliani, G.; Hardersen, S.; Riservato E. (ed.) (2007): Riassunti delle comunicazioni presentate al "Convegno: Le libellule in Italia. Recherche e conservazione". Cascina Picchetta, Cameri. 11 e 11 febbraio 2007: 25 pp. [Abstracts of the meeting "Dragonflies in Italy. Research and conservation" held on February 11 and 11, 2007 in Cascina Picchetta, Cameri, Italy: Saluti delle autorità; Bogliani, G., Hardersen, S., Riservato, E. (Organizzatori): Saluti e obiettivi del convegno; Panella, M.: Il monitoraggio di habitat e specie nelle aree protette gestite dal Corpo Forestale dello Stato) ■ Balestrazzi, E.: Tributo a E. Bucciarelli ■ Utzeri, C.: L'odonatologia italiana: breve storia, situazione e prospettive ■ Ott, J.: Odonati e odonatologia in Germania ■ Kalkmann, V.: The European Atlas Project ■ Boano, G., Fasano, S., Riservato E., Sindaco, R.: Gli Odonati del Piemonte e della Valle d'Aosta: lo stato dell'arte ■ Balestrazzi, E., Pavesi, M.: Gli Odonati in Lombardia ■ Caroioli, M., Maiolini, B.: Odonati in Trentino ■ Festi A.: Gruppo studi odonatologici LIBELLA: storia, esperienze e risultati di 3 anni d'attività in Provincia di Bolzano ■ Terzani, F., Carletti, B.: Lo stato attuale delle conoscenze odonatologiche in Toscana ■ Hardersen, S.: Attuali conoscenze sulle libellule della Direttiva Habitat - Proposta per una collaborazione ■ Maddalena, T., Mattei-Roesli, M., Patocch, N., Pierallini, R.: La protezione degli Odonati nel Cantone Ticino (Svizzera): scelta delle specie prioritarie e elaborazione di programmi d'azione specifici ■ Riservato, E.: Ecologia degli Odonati del Parco Regionale della Valle del Ticino ■ Bogliani, G., Garavaglia, R.: Evoluzione e fenologia della comunità odonatologica in un ambiente ripristinato; APERITIVO E CENA: Con presentazione: Foto (Peèls, F.) e Filmati (Rore, M.) ■ Salamun, A., Bedjanic, M.: *Cordulegaster heros* Theischinger 1979, specie nuova per la fauna d'Italia; Carchini, G.: Colonizzazione di uno stagno per acquacoltura da parte degli Odonati ■ Fabbri, R.: Modificazioni nella comunità odonatologica nell'oasi di Punte Albere, Parco del Delta del Po ■ Di Già, I.: Risultati del monitoraggio degli odonati e dei culicidi adulti (check-list delle specie) in due zone umide della Provincia di Cuneo (Oasi di Crava Morozzo e Oasi La Madonna) - anno

2006 ■ Ferri, V., Soccini, C.: La comunità di Odonati presenti nella Riserva naturale Monticchie di Somaglia: quindici anni di monitoraggio e di iniziative di conservazione (Lombardia, provincia di Lodi) ■ Macagno, A.L.M.: Demografia di *Libellula fulva* nel Parco fluviale del Po - Tratto Torinese ■ Buchwald, R.: Le relazioni fra libellule e vegetazione - esempi di ricerche biocenologiche ■ Hardersen, S.: Telemetria di Libellule neofarfallate (Odonata: Anisoptera) ■ Terzani, F., Zinetti, F.: Odonati raccolti in alcune aree protette della provincia di Arezzo (Toscana) ■ Riservato, E.: Le libellule in Provincia di Novara. For details see: <http://www.odonata.it/pages/Abstract.pdf>

**6316.** Bots, J.; De Bruyn, L.; Adriaens, T.; Dumont, H.; Stoks, R.; Van Gossum, H. (2007): Seasonal and diurnal variation in the proportions of female morphs of the damselfly *Enallagma cyathigerum*. *Animal Biology* 57(2): 217-230. (in English). ["In many damselfly species a female-limited colour polymorphism is encountered which is assumed to be the result of sexual conflict. Typically, one morph resembles the male's body colouration (andromorph), while the other is dissimilar (heteromorph). Little is known about the extent of temporal variation in female morph proportions at the water where mating occurs. Knowledge about such variation should help to identify the factors that affect female morph proportion and the scales at which these factors operate. The objective of this study is to assess the occurrence of diurnal and seasonal variation in female morph proportions at the water for the damselfly *Enallagma cyathigerum*. Diurnal variation was evaluated at six nearby populations, while seasonal variation was examined at one of these populations. Furthermore, we considered temporal variation in female morph proportion in relation to proxies of male harassment (i.e., male density and operational sex ratio). Our findings indicate that female morph proportion varies throughout a day but is uniform on a seasonal scale. Variation in female morph proportions could not be explained by concomitant variation in male density or operational sex ratio. We suggest future study of male mate choice may consider temporal variation in female morph proportions at the water." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**6317.** Brockhaus, T.; Butler, S.G.; Kemp, R.G.; Vick, G.S. (2007): The dragonfly fauna of the Shivapuri Hills, Nepal (Odonata: zygoptera, Anisozygoptera, anisoptera). In: Tyagi, B.K. (Ed.): *Odonata : Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 63-72. (in English, with German summary). [26 species of Odonata are placed on record from the Shivapuri mountains, Kathmandu, Nepal, nine of them are briefly discussed with notes on habitats.] Address: Brockhaus, T., An der Morgensterne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**6318.** Buczyńska, E.; Buczyński, P.; Lechowski, L. (2007): Selected aquatic insects (Odonata, Heteroptera, Coleoptera, Trichoptera) of Narwiański National Park - results of preliminary studies. *Parki nar. Rez. Przyr.* 26(1): 25-40. (in Polish, with English summary). [Poland; in July 2002, 172 aquatic insect species were recorded, among them 36 Odonata species. Drought is discussed as a factor responsible for reduced regional

species diversity and abundance in 2002.] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**6319.** Buczyński, P.; Ciechanowski, M.; Kowalczyk, J.K.; Kukwa, M. (2007): Walory przyrodnicze projektowanego rezerwatu „Torfowiska źródłkowe nad Jeziorom Jaczno”. – [Nature values of the projected nature reserve „Spring peat bogs at the Lake Jaczno”]. In: W. Fałtynowicz, M. Rant-Tanajewska, T. Świerubska (Eds), Kraina Hańczy. XXXV lat Suwalskiego Parku Krajobrazowego. Materiały konferencyjne „Parki krajobrazowe w krajowym systemie ochrony obszarowej” (Szczegół 28-29 września 2006). Stowarzyszenie Miłośników Suwalskiego Parku Krajobrazowego, Malesowizna-Turtul: 41-48. (in Polish). [For odonatological details of the paper see OAS 2357.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pbuczyns@biotop.umcs.lublin.pl

**6320.** Buden, D.W.; Paulson, D.R. (2007): Odonata of Yap, Western Caroline Islands, Micronesia. Pacific Science 61(2): 267-277. (in English). [“Fifteen species of Odonata are recorded from Yap, Micronesia—two Zygoptera and 13 Anisoptera. None is endemic to Yap. *Hemicordulia lulico* occurs elsewhere only in Palau, whereas most of the other species are widespread in the western Pacific and Indo-Australian regions. *Macrodiplox cora* and *Tramea loewi*, both recorded by Lief-tinck in 1962, were the only species not encountered during this study; *Tramea loewi* remains known in Micronesia only from a single male collected in Yap by R. J. Goss in 1950. Six of the breeding species in Yap that are widespread in Indo-Australia occur no farther east in the Caroline Islands except possibly as unusual extralimital records in the cases of *Agriocnemis femina* and *Neurothemis terminata*; the four other species reaching only as far east as Yap are *Anaciaeschna jaspidea*, *Agrionoptera insignis*, *Orthetrum serapia*, and *Rhyothemis phyllis*. *Orthetrum serapia* is reported from Micronesia for the first time, although a very old single specimen record of *O. sabina* from Tobi Island may possibly pertain to *O. serapia*. The odonate fauna of the outer islands of Yap State is poorly known; only six species have been recorded from among four of the 15 island groups. In addition, *Tramea transmarina euryale* rather than *T. t. propinqua* was found to be the subspecies occurring in the Chuuk Islands, contrary to earlier publications.” (Authors)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**6321.** Cannings, R.A.; Ramsay, L.R.; Cannings, S.G. (2007): Odonata inventories in British Columbia, Canada: determining the conservation status of odonata species. In: Tyagi, B.K. (Ed.): Odonata : Biology of Dragonflies. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 137-151. (in English). [“The Order Odonata in British Columbia, Canada, is reasonably well known but, before 1996, systematic inventories were confined to small areas or even single localities. From 1996 to 2006, concentrated surveys were conducted annually throughout much of the province. The main goals of these surveys were to determine the status and habitat needs of Odonata, with an emphasis on the species considered to be at risk; to increase public awareness of dragonflies, their ecology

and conservation; and to encourage interest in dragonfly monitoring and research in the various regions. Each year, public lectures about dragonflies were given in local communities around the province and volunteer collectors from these places participated in the project. To demonstrate how such inventory provides information for assigning conservation status ranks to dragonfly species, the changes in these ranks over a nine-year period were examined. Preliminary conservation status ranks were assigned to British Columbia's Odonata species in 1993. Subsequently, inventory efforts focused on those species considered rare or at risk in order to determine more accurately their status and habitat requirements. During these surveys, the geographical distributions of many species were expanded, our knowledge of habitat preferences increased and five species were added to the provincial list. Many of the targeted species were found to be more abundant than previously thought and their conservation ranks were changed accordingly. Others were recorded only rarely or not at all. Accurately ranking poorly known species is challenging, particularly if samples are small or if much of their range is inaccessible. By increasing our knowledge of these dragonflies and their habitats, we can assign species ranks more with more confidence, thus ensuring that conservation efforts will target the species and habitats that truly require them.” (Authors)] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street Victoria, British Columbia V8W 9W2. Canada. E-mail: rcannings@royalbcmuseum.bc.ca

**6322.** Cannings, R.A. (2007): Book review: Garrison, R.W., von Ellenrieder, N. & J.A. Louton (2006): Dragonfly Genera of the New World. An Illustrated and Annotated Key to the Anisoptera. Johns Hopkins Univ. Press, Baltimore, MD. xi+368 ppp. Hardback, ISBN 0-8018-8446-2, \$99.00. Florida Entomologist 90(1): 270-271. (in English). [Extensive book review.] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street, Victoria, BC, Canada V8W 9W2

**6323.** Carballa, O.L.; Giere, S.; Cordero, A.; Hadrys, H. (2007): Isolation and characterization of microsatellite loci to study parthenogenesis in the citrine forktail, *Ischnura hastata* (Odonata: Coenagrionidae). Molecular Ecology Notes (OnlineEarly Articles). : (in English). [“The citrine forktail, *Ischnura hastata*, is an American damselfly species, widely distributed, with only-female populations also found at the Azores islands. Here we report the development of nine microsatellite loci for this species. The number of alleles per locus ranged from six to 11, with an observed heterozygosity ranging from 0.245 to 0.737. Eight of the nine loci successfully amplified in a sample of parthenogenetic females from the Azores. The developed microsatellite system will be a useful tool to investigate population structure, as well as the number of clones, the type of parthenogenesis and the origin of the parthenogenetic populations of this species.” (Authors)] Address: Carballa, Olalla Lorenzo, Evolutionary Ecology Group, Department of Ecology and Animal Biology, Universidad de Vigo, EUIT Forestal, Campus Universitario, 36005, Pontevedra, Spain. E-mail: olalla.lorenzo@uvigo.es

**6324.** Chang, X.; Zhai, B.; Liu, X.; Wang, M. (2007): Effects of temperature stress and pesticide exposure on fluctuating asymmetry and mortality of *Copera annulata* (Slys) (Odonata: Zygoptera) larvae. Ecotoxicology and



Environmental Safety 67(1): 120-127. (in English). ["Although there have been some investigations into the effects of insecticide on the level of fluctuating asymmetry (FA) of adult damselflies, the cooperative effects of environmental factors on FA of larval damselflies were known little. This paper explored effects of exposure to temperature and pesticide on larval development of the damselfly *Coperla annulata* (Selys). A conventional life history trait (mortality) and developmental instability (estimated by calculating fluctuating asymmetry of bilaterally symmetrical structures) were used to measure stresses in this paper. The results showed that temperature and different concentrations of pesticide produced significant effects only on developmental stability of some characters. The FA values of three traits decreased at lower concentrations, then increased slowly with increased insecticide doses. The FA values of four traits decreased slowly with increased temperatures. However, the interaction between different concentrations of insecticide and temperature was complicated and only produced significant effects on five traits. Insecticide treatment did not significantly affect mortality of the larvae of damselfly. However, mortality was significantly positively associated with temperature. There were significantly negative associations between mortality and the FA values of three traits. These results may be caused by higher mortality and short rearing time although we did not find the significant effects of concentrations on mortality. Therefore, we speculate FA may be induced if larval damselflies were treated during longer term and FA has potential as a more specific bioindicator of stresses if we guarantee enough longer rearing time without higher mortality under stressful environment." (Authors) Address: ZHAI Baoping, PhD, Professor, Department of Entomology, Nanjing Agricultural University, Weigang, Nanjing 210095, P.R. China. E-mail: bpzhai@njau.edu.cn

**6325.** Crick, K. (2007): Observations on final instar damselfly caudal lamellae with little or no evidence of secondary tracheae. *J. Br. Dragonfly Society* 23(1): 10-13. (in English). ["In the summer of 2006, 457 exuviae were collected from localities in Hampshire, and they produced an anomaly that occurred in four species, *Enallagma cyathigerum*, *Coenagrion puella*, *Erythromma najas* and *Pyrrosoma nymphula*. Thus samples collected from three sites before the first week in June produced 29 exuviae that exhibited little or no evidence of secondary tracheae in their caudal lamellae. [...] One of the sites did suffer a significant increase in phosphate, which caused a dropping of dissolved oxygen level. "The apparent cause of the phosphate increase was due to slurry from cows entering the water. The cows are used as a grassland management tool and had remained on site longer than planned, resulting in the need to import feed. This feed was laid out adjacent to the polluted area of water, resulting in a prolonged concentration of cattle in a confined area of the reserve." (Author)] Address: Crick, K., 29 Village Way, Yateley, Hampshire GU46 7SE, UK

**6326.** Cuffney, T.F.; M. D. Bilger, M.D.; Haigler, A.M. (2007): Ambiguous taxa: effects on the characterization and interpretation of invertebrate assemblages. *J. N. Am. Benthol. Soc.* 26(2): 286-307. (in English). ["Damaged and immature specimens often result in macroinvertebrate data that contain ambiguous parent-child pairs (i.e., abundances associated with multiple related levels of the taxonomic hierarchy such as *Baetis pluto*

and the associated ambiguous parent *Baetis* sp.). The choice of method used to resolve ambiguous parent-child pairs may have a very large effect on the characterization of invertebrate assemblages and the interpretation of responses to environmental change because very large proportions of taxa richness (73–78%) and abundance (79–91%) can be associated with ambiguous parents. To Address this issue, we examined 16 variations of 4 basic methods for resolving ambiguous taxa: RPKC (remove parent, keep child), MCWP (merge child with parent), RPMC (remove parent or merge child with parent depending on their abundances), and DPAC (distribute parents among children). The choice of method strongly affected assemblage structure, assemblage characteristics (e.g., metrics), and the ability to detect responses along environmental (urbanization) gradients. All methods except MCWP produced acceptable results when used consistently within a study. However, the assemblage characteristics (e.g., values of assemblage metrics) differed widely depending on the method used, and data should not be combined unless the methods used to resolve ambiguous taxa are well documented and are known to be comparable. The suitability of the methods was evaluated and compared on the basis of 13 criteria that considered conservation of taxa richness and abundance, consistency among samples, methods, and studies, and effects on the interpretation of the data. Methods RPMC and DPAC had the highest suitability scores regardless of whether ambiguous taxa were resolved for each sample separately or for a group of samples. Method MCWP gave consistently poor results. Methods MCWP and DPAC approximate the use of family-level identifications and operational taxonomic units (OTU), respectively. Our results suggest that restricting identifications to the family level is not a good method of resolving ambiguous taxa, whereas generating OTUs works well provided that documentation issues are Addressed." (Authors) The analysis contains some data on "*Argia* sp.".] Address: Cuffney, T.F., US Geological Survey, 3916 Sunset Ridge Rd., Raleigh, North Carolina 27607 USA. E-mail: tcuffney@usgs.gov

**6327.** Cuong, D.M. (2007): *Coeliccia hoanglienensis* spec. nov., a new platynemid damselfly from Hoang Lien mountains in the North of Vietnam (Zygoptera: platinemididae). In: Tyagi, B.K. (Ed.): *Odonata : Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 343-348. (in English). ["The new species (male holotype: Vietnam, Lao Cai Prov., Sa Pa, Cong Troi, Hoang Lien National Park, 1945 m alt., 15.VII.2005; deposited in Do M. Cuong Collection) of genus *Coeliccia* is described with illustrations and a photo in nature." (Author)] Address: Cuong, D.M., Horn thu so 16, Buu Dien 10210 - 35 Thai Thinh, Ha Noi, Vietnam. E-mail: cuongdm@hotmail.com

**6328.** Czerniawska-Kusza, I. (Ed.) (2007): XIV Ogólnopolskie Warsztaty Bentologiczne "Hydromorfologiczna ocena ekosystemów wodnych", Opole - Turawa 2007. ISBN 83-920464-1-2. Lanko, Opole: 74 pp.- (in Polish). [The following papers/abstracts contain some passing references on "Odonata": DOMEK P., DONDAJEWSKA R., GOŁDYN R.: Makrozoobentos zbiornika Antoninek narzece Cybinie. - [Macrozoobenthos of the dam reservoir 'Antoninek' on the River Cybinia]. Pp. 15-16. - KOPERSKI, P.: Obecność i presja ryb jako czynnik decydujący o składzie fauny bezkręgowców. -

[The presence and pressure of fish as factor determining the composition of invertebrate fauna]. Pp. 39-40. - KRZYŻANOWSKA, I.: Roznorodność biologiczna rzeki Pełcz na podstawie makrobentosu. - [Biodiversity in the River Pełcz basing on macrobenthos]. P. 46. - NUCKOWSKA, K.: Ocena jakości wód rzeki Santocznej a różnorodność organizmów występujących w jej wodach. - [The evaluation of the water quality of the River Santoczna and the diversity of organisms occurring in its waters]. Pp. 52-53.] Address: Czerniawska-Kusza, Izabela, Uniwersytet Opolski, Katedra Ochrony Powierzchni Ziemi, ul. Oleska 22, PL-45-052 Opole, Poland

**6329.** Dijkstra, K.-D.; Groeneveld, L.F.; Clausnitzer, V.; Hadrys, H. (2007): The Pseudagrion split: molecular phylogeny confirms the morphological and ecological dichotomy of Africa's most diverse genus of Odonata (Coenagrionidae). *International Journal of Odonatology* 10(1): 31-41. (in English) ["The continental African representatives of the genus *Pseudagrion* fall into two groups (A and B) based on their ecology and larval and adult morphology. While the B-group species are found in generally warmer habitats, which are more sunny, lentic or low-lying, the A-group representatives occur more in cooler habitats. We compared molecular genetic and ecological data of twelve species representing both groups. Mitochondrial DNA sequence analyses strongly support their segregation into two major clades and suggest the monophyly of each. High bootstrap support confirms the deep phylogenetic split. Overall, only a minority of species have been studied for each group. However, genetic distances of the species within each clade indicate that they are significantly more closely related to each other than to species of the opposite clade. We conclude that the observed ecological and morphological similarities are due to common ancestry, suggesting two independent radiations within the continental African *Pseudagrion* species. The biogeographic and palaeoecological history of the two clades remains unresolved." (Authors)] Address: Clausnitzer, Viola, Graefestr. 17, D-06110 Halle/Saale, Germany. E-mail: violacl@t-online.de

**6330.** Dijkstra, K.D.; Samways, M.J.; Simaika, J.P. (2007): Two new relict *Syncordulia* species found during museum and field studies of threatened dragonflies in the Cape Floristic Region (Odonata: Corduliidae). *Zootaxa* 1467: 19-34. (in English). ["Red List assessments often require the verification of records and taxonomy in museum collections and the field. Such research during an assessment of threatened dragonflies in the Cape Floristic Region (CFR) biodiversity hotspot, led to the discovery of two new narrow-range endemic *Syncordulia* species, bringing the known total to four in the genus. The new species, *Syncordulia legator* and *S. serendipator*, are described with emphasis on their identification, ecology and biogeography. Morphological diversity within the genus and the absence of obvious close relatives suggest an ancient and isolated presence in the CFR, emphasizing the uniqueness and conservation importance of the region's endemic odonate fauna." (Authors)] Address: Simaika, J.P., Centre for Invasion Biology, Dept of Conservation Ecology and Entomology, Stellenbosch University, P Bag X1, Matieland 7602, South Africa. E-mail: simaika@sun.ac.za

**6331.** Dijkstra, K.D.; Clausnitzer, V.; Martens, A. (2007): Tropical African *Platycnemis* damselflies (Odonata: Platycnemididae) and the biogeographical signifi-

cance of a new species from Pemba Island, Tanzania. *Systematics and Biodiversity* 5(2): 187-198. (in English). ["The damselfly, *Platycnemis pembipes* sp. nov., is described from Pemba Island (Ngezi Forest, Tanzania) and its affinities with Guineo-Congolian and Malagasy congeners are examined. For this purpose the identity and distribution of Afrotropical *Platycnemis* is reviewed, especially the taxonomically confused continental species. The Pemba species is nearly identical to some species of the Malagasy radiation of *Platycnemis*, but distant from the Guineo-Congolian species that have tropical Asian affinities. It is argued that the species is a long-distance wind-borne arrival from Madagascar, which survived due to favourable climatic conditions on Pemba. Habitats on the mainland, only 50 km further, are or have been drier and therefore seem unsuitable. The new species, living proof of a remarkable colonisation event, is under immediate threat, confined to a single stream in an imperilled forest, over 1000 km from its nearest relatives. The holotype of the enigmatic *P. mauriciana*, not recorded on Mauritius after its description, cannot originate from the island as it pertains to the European *P. latipes*. Five species recalling the Asian genus *Copera* are known in the male sex from central and western Africa; all were confused to some degree with *P. congolensis* and a key is given. The lectotype of *P. congolensis* is designated and its identity is clarified. *Platycnemis flavipes* and *P. xanthopus* are junior synonyms of *P. nyansana*. Discovery of the *P. rufipes* female showed that *P. escherichi*, known only from the female holotype, is a junior synonym of it. The generic classification of *Platycnemis* and *Copera* is not resolved, but data and hypotheses that should aid future analysis are provided." (Authors)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.

**6332.** Dijkstra, K.-D. (2007): The name-bearing types of Odonata held in the Natural History Museum of Zimbabwe, with systematic notes on Afrotropical taxa. Part 1: introduction and Anisoptera. *International Journal of Odonatology* 10(1): 1-29. (in English). ["Orthographic details of 118 name-bearing types of Odonata are provided in two parts: the first and present paper deals with Anisoptera, the second with Zygoptera. 58 types pertain to good species, although the taxonomy of at least four is problematic. The details of 11 'holotypes' of forms are also provided, although these and their names have no nomenclatory status. The taxonomy of the Afrotropical members of *Microgomphus* is discussed, as are the supinus-group of *Onychogomphus*, the fritillarius-group of *Paragomphus*, the genus *Tragomomphus*, and the basitinctagroup of *Trithemis*. *Microgomphus bivittatus* is transferred to *Lestinogomphus*, and *Tragomomphus seydeli* to *Onychogomphus*. *Heliaeschna longfieldae* is a junior synonym of *H. sembe*; *Microgomphus mozambicensis* and probably *M. schoutedeni* of *M. nyassicus*; *Onychogomphus quirikii* and *O. septemflavum* of *O. seydeli*; *Paragomphus dicksoni* of *P. cognatus*; *Aethiothemis watulikii* of *A. basilewskyi*; *Eleuthemis quadrigutta* of *E. buettikoferi*; *Malgassophlebia aequatoris*, *M. longistipes* and *M. nigeriae* of *M. bispina*; *Tetrathemis bifida* and *T. sulci* of *T. camerunensis*; *Trithemis jacksoni* of *T. arteriosa*. It was confirmed that *Gynacantha ochraceipes* is a junior synonym of *G. vesiculata*; *Macromia paludosa* of *Phyllomacromia overlaeti*; *Trithemis falconis* of *T. aequalis*; *Zygonyx ikomae* of *Z. natalensis*." (Author)] Address: Dijkstra, K.D., Gortestraat 11,

NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**6333.** Dijkstra, K.D. (2007): Gone with the wind: westward dispersal across the Indian Ocean and island speciation in *Hemicordulia* dragonflies (Odonata: Corduliidae). *Zootaxa* 1438: 27-48. (in English). ["The taxonomy and biogeography of the western representatives of the largely Papuan-Australian genus *Hemicordulia* are discussed and compared with other alate fauna including butterflies, birds, bats and other dragonflies. Specimens from Malawi, Mozambique, Réunion, South Africa, Tanzania and Uganda were compared with Indian specimens of *H. asiatica*, with which they were previously regarded conspecific. They are found to be distinct and are described as the continental *H. africana* n. sp. and those from Réunion as *H. atrovirens* n. sp. The three species were compared with *H. similis* of Madagascar and *H. virens* of Mauritius. Insufficient material of the Seychelles taxon *H. similis delicata* was available; it may represent another insular endemic species. The distribution of *Hemicordulia* is discussed in the light of the dispersal capacity of Odonata and the biogeography of taxa with similar distributions in the region, with an emphasis on the survival of 'oceanic' species on the continent. Recent (i.e. in the last few million years) trans-oceanic airborne dispersal aided by westward storms, is the most likely explanation for the distribution of the genus in Africa and the Indian Ocean islands, as well as for other winged animals of Asian affinities in the region. The world range of *Hemicordulia* is largely insular, broadly excluding continents, and *H. africana* n.sp. demonstrates 'inverted insularity': all continental sites are in proximity to large water bodies, such as the great African lakes. This pattern may be related to the climatological instability of these sites, which offer suitable cool habitat where competition is (temporarily) reduced. *Hemicordulia* prefer cool conditions, but may be vulnerable to overheating and competition with more warm-adapted species." (Author)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**6334.** Dijkstra, K.D.; Pilgrim, E.M. (2007): *Trithetrum*, a new genus of African dragonflies formerly placed in *Sympetrum* (Odonata, Libellulidae). *Journal of Afrotropical Zoology* 3: 77-81. (in English). ["Based on many morphological differences, the genus *Trithetrum* is described as distinct from *Sympetrum Newman*. The genus contains *Trithetrum congoense* (Aguesse) and *T. navasi* (Lacroix), both formerly placed in *Sympetrum*. Two males from Congo-Kinshasa constitute the first records of *T. congoense* since its description from Congo-Brazzaville." (Authors)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**6335.** Dmitriew, C.; Cooray, M.; Rowe, L. (2007): Effects of early resource-limiting conditions on patterns of growth, growth efficiency, and immune function at emergence in a damselfly (Odonata: Coenagrionidae). *Can. J. Zool.* 85(3): 310-318. (in English, with French summary). ["Periods of restricted growth during early development are expected to have detrimental effects on subsequent metrics of fitness, most prominently increases in age and decreases in size at maturity. However, in some cases, animals may compensate by altering foraging effort, growth efficiency, or patterns of re-

source allocation between critical traits prior to maturation. Yet, even when compensation for age and size is complete, brief periods of restricted growth may carry costs persisting in the long term, and compensatory tactics may themselves be costly. We investigated the long-term costs of early growth restriction and mechanisms of compensatory growth in the damselfly *Ischnura verticalis* (Say, 1839). Larvae were temporarily exposed to one of three feeding regimes in the early stages of development, after which food levels were restored. In the period of unrestricted growth prior to emergence, partial compensation for structural size in the lowest food treatment was observed, while both resource-limited groups accelerated mass gain relative to controls. Changes in food consumption and food conversion efficiency were ruled out as mechanisms for accelerating growth following diet restriction. We tested for changes in resource allocation patterns that could explain the observed compensatory growth and found that adult body shape may depend on early growth conditions in females. There was no evidence of detrimental effects on immune function at emergence, although males tended to have higher phenoloxidase activity (a measure of immunocompetence) than females." (Authors)]

**6336.** Dumont, H.J. (2007): Dragonflies from the Okavango swamps (Botswana, Southern Africa) in winter. In: Tyagi, B.K. (Ed.): *Odonata : Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 45-50. (in English). ["Geographic situation and altitude of the Okavango swamps combine to create a distinctly seasonal climate, with an outspoken cool season. The local dragonfly fauna in winter is distinctly less species-rich than in summer. Although low abundances (rare species) may slightly complicate the situation, it is probably fair to estimate the faunal impoverishment at a factor 2 to 4 (17 species were censused in July 2006, against c. 70 known from all seasons combined). The composition of the winter fauna is dominated by wide-ranging species, tolerant of strong variations in environmental conditions, but at least two *Pseudagrion* species (*P. deningi*, *P. coelestis*) appear to have taken advantage of the void created by the austral winter, and have their adult population peak in winter." (Author)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

**6337.** Fincke, O.M.; Fargevielle, A.; Schultz, T.D. (2007): Lack of innate preference for morph and species identity in mate-searching *Enallagma* damselflies. *Behav. Ecol. Sociobiol.* 61: 1121-1131. (in English). ["Insect mate recognition is often viewed as stereotypic, innate, and species-specific. However, male damselflies can learn to identify female-specific color morphs as potential mates. A suite of male mimicry hypotheses assume that heteromorphic females, which differ from males in color pattern, are more easily recognized as "female" and thus lack the inherent, anti-harassment advantage that the more male-like signal provides for andromorphs. Using two measures of male preference, we investigated whether naïve males have a preexisting sensory bias for a given morph color in *Enallagma civile*, a species that appeared to exhibit extreme plasticity in morph expression across generations within a breeding season. *E. civile* males raised in the absence of females exhibited no preference for either morph, whereas males raised with one female type ex-



hibited a learned sensory bias for that morph. Male *Enallagma* also lacked a bias toward conspecific females over a congeneric sister species. In a naturally naïve population of *Enallagma ebrium*, males reacted sexually to both morphs of *Enallagma hageni* as often as they did to conspecific females, whose thoracic spectra were nearly identical with those of *E. hageni*. Moreover, despite the similar thoracic spectra of males and andromorphs, both of which reflected UV, males rarely reacted sexually to other males. Our results falsified implicit assumptions of male mimicry hypotheses, supported learned mate recognition, and suggested a scenario for speciation via sexual conflict." (Authors)] Address: Finke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**6338.** Fleck, G.; Grand, D.; Boudot, J.-P. (2007): Description of the last stadium larva of *Somatochlora borisi*, with comparison to that of *Somatochlora metallica meridionalis* (Odonata: Corduliidae). *International Journal of Odonatology* 10(1): 43-52. (in English). ["The last instar larva of *S. borisi* is described and illustrated from a set of exuviae. It is compared to that of *S. metallica meridionalis*, which is morphologically close and syntopic. A key is provided which allows the determination of the exuviae of all West Palaearctic *Cordulia* and *Somatochlora* species." (Authors)] Address: Fleck, G., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleck@mnhn.fr

**6339.** Gassmann, D. (2007): Wanderverhalten von Libellen. *Naturwissenschaftliche Rundschau* 60(1): 38-39. (in German). [On the basis of the paper of Wikelski, M. et al (2006): Simple rules guide dragonfly migration. *Biology letters* 3(2): 325-329 (see OAS 6048) the current knowledge on dragonfly migration is briefly reviewed.] Address: Gassmann, D., Institute of Evolutionary and Ecological Sciences, Leiden University, c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: gassmann@naturalis.nnm.nl

**6340.** Gillingham, P.K.; Harvey, I.F.; Kay, S.M.; Lowe, C.D.; Narraway, C.L.; Moran, R.J.; Sudworth, S.; Watts, P.C.; Thompson, D.J. (2007): On the odonates of Queen Elizabeth Country Park, Hampshire, with emphasis on the Azure Damselfly, *Coenagrion puella* (L.). *J. Br. Dragonfly Society* 23(1): 14-19. (in English). ["13 species of odonate were recorded in the summers of 2005 and 2006 from an artificial pond at Queen Elizabeth Country Park, Hampshire, in an area of the South Downs considered to be odonatologically depauperate. Surprising visitors included both *Calopteryx* species (frequently) and a single *Sympetrum fonscolombii*. All individuals of *C. puella* were individually marked and details of their arrivals as mature individuals at the pond were recorded. The study is unique in providing, as near as possible, exact numbers of *C. puella* attempting to breed at the same site in consecutive years." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j. thompson@liv.ac.uk

**6341.** Gonzalez Soriano, E.; Novelo Gutierrez, R. (2007): Odonata of Mexico revisited. In: Tyagi, B.K. (Ed.): *Odonata : Biology of Dragonflies*. Jodhpur, Scien-

tific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 105-136. (in English). ["Odonata of Mexico, comprising one of the greatest biodiversity regions in the world, is discussed with as many as 19 species, including also one of the hitherto unrecorded genus *Ophiogomphus*, enlisted since 1996. A large number of taxonomic, geographic and other features associated with many of these species in different ecosystems are also elaborated." (Authors)] In an appendix, all taxa are listed according the Mexican states] Address: Gonzalez-Soriano, E., Depto Zoologia, Inst. Biol., Universidad Autonoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**6342.** Grand, D.; Boudot, J.-P. (2007): *Les Libellules de France, Belgique et Luxembourg*. ISBN : 2 - 914817 - 05 - 3: 480 pp. [This remarkable book presents in six chapters a sound introduction to the phylogeny, morphology, biology, and biogeography of Odonata, as well as information on predators, parasites, ecology, habitats and the relationship of Odonata to human beings and their culture. All these texts are illustrated with excellent photographs, which holds true also for the rest of the book. Chapter 5 deals with the identification of imagos and exuviae, presenting full keys for the 100 taxa treated in the book. These keys are remarkable from the didactical point of view: Important and significant morphological characters are highlighted in the drawings or photographs. The key to the imagines is definitively a genuine contribution and improvement to identification of European dragonflies and will, enable even beginners to make correct identifications. An important feature is the key to the exuviae of all species. In most cases morphological relevant structures are presented as black and white photographs, a few lacking contrast (due to poor printing quality?). Structures relevant for identification are marked with arrows, and structural/morphometric relationships ("ratios") are documented by bars. In some cases, drawings are added to help in identification. This new key will certainly improve and facilitate the identification of dragonfly exuviae. Chapter 6, providing monographs of all species treated, is the most voluminous of the book. All chapters include brilliant photographs, notes on morphological characters, possible confusions with related species, distribution maps (Europe; France on the basis of the Départements, and regions in Belgium and Luxembourg), as well information on ethology, habitat, and phenology. The appendix contains plates with the wings of the species, and a selected bibliography. This remarkable book is a must in the library of every European odonatologist. At the same time, being a concise introduction to one of Europe's most interesting faunal regions, it is of major importance to odonatologists worldwide. (Martin Schorr)] Address: Biotope SIEGE SOCIAL : 22, Boulevard Maréchal Foch - BP58 - 34140 Mèze, France. Email : siegesocial@biotope.fr

**6343.** Grant, P.B.C.; Samways, M.J. (2007): Montane refugia for endemic and red listed dragonflies in the Cape floristic region biodiversity hotspot. *Journal Biodiversity and Conservation* 16(3): 787-806. (in English). ["One of the features of many endemic organisms is that they are highly spatially restricted, and habitat specialists. The Kogelberg Biosphere Reserve (KBR) is a major centre of plant endemism within a global hotspot, the Cape Floristic Region (CFR). Dragonflies in this botanical hotspot have a range of habitat specialization from narrow-range specialists to widespread genera-

lists, with an unusually strong bias towards the specialists. A huge 53% of dragonfly individuals and 26% of taxa recorded are national endemics, and three species are Red Listed. Thus, a group of predatory insects, which are largely not dependent on plant composition, mirrors the level of habitat specialization and restricted distributions of the plants at the spatial scale of the whole reserve. Although some studies caution the use of one taxon as a surrogate for another, the results here show that at the reserve scale in this global hotspot there can be remarkable concordance, suggesting further studies on other taxa should be carried out to determine the full extent of taxonomic concordance in this irreplaceable area." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**6344.** Grozeva, M.; Marinov, M. (2007): Cytogenetic study of *Somatochlora borisi* Marinov, 2001 (Odonata: Corduliidae), and three relative species. *Acta zool. bulg.* 59(1): 53-56. (in English, with Bulgarian summary). ["The recently described species *Somatochlora borisi* Marinov, 2001 (Odonata: Corduliidae), combines morphological characters of two relative corduliide genera, *Somatochlora* and *Cordulia*. In the present study its karyotype was studied for the first time. Routine and differential (C-banding and DNA binding fluorochrome staining) cytogenetic techniques were applied. The chromosome formula of *S. borisi* includes  $2n=20+XX/XY$ . For comparison, the male karyotype of *S. metallica* (from Finland), *S. meridionalis* and *C. aenea* (from Bulgaria) were also examined. In a larva of *S. meridionalis*, the spermatogonial metaphases showed 25 chromosomes confirming  $2n=24+X$  reported earlier for the species. Some polymorphism of the chromosome size had been observed in the populations examined, but this problem needs a special study. For *S. metallica* and *C. aenea* previously reported for these species the karyotype  $2n=24+X$  and the telomeric localization of C-heterochromatin were confirmed. All the data obtained are discussed in comparison to literature cytogenetic data on the genera *Somatochlora* and *Cordulia*. The cytogenetic data confirm that *S. borisi* deviates widely from the other *Somatochlora* and *Cordulia* species and provide an additional argument to separate it in a new genus." (Authors)] Address: Grozeva, Snezana M., Institute of Zoology, 1 Tsar Osvoboditel Blvd., BG-1000 Sofia, Bulgaria. E-mail: sgrozeva@yahoo.com

**6345.** Hannon, E.R.; Hafernik, J.E. (2007): Reintroduction of the rare damselfly *Ischnura gemina* (Odonata: Coenagrionidae) into an urban California park. *Jour. Insect. Conserv.* 11(2): 141-149. (in English). ["Habitat degradation led to local extinction of the San Francisco forktail damselfly (*Ischnura gemina*) in Glen Canyon Park, San Francisco, California. In this study, we reintroduced *I. gemina* into Glen Canyon after the damselfly's habitat was restored. Upon release, we carried out a mark-release-recapture study to monitor the damselfly's population dynamics. Our data were compared to two "baseline" studies on *I. gemina*, conducted in the park prior to the damselfly's demise. Our recapture rates were significantly lower than the prior studies due to a large initial decline in marked individuals upon release. Despite a lower recapture rate, the reintroduction was initially successful since the damselflies reproduced throughout the summer and the following year. However, the population failed to persist during the se-

cond year when the habitat became degraded with excess vegetation. Future success is contingent on the continual management and upkeep of the habitat." (Authors)] Address: Hannon, E.R., Dept of Entomology, Washington State University, P.O. Box 646382, Pullman, WA 99164, USA. E-mail: hannon@mail.wsu.edu

**6346.** Hardersen, S. (2007): *Le libellule di Bosco della Fontana*. Cierre Edizioni, Verona. ISBN 978-88-8314-396-0: 64 pp. (in Italian). [The book introduces in the 32 Odonata known from the "Bosco della Fontana", Italy, giving a brief introduction into ecology and ethology of the species. All species, with the exception of *Anax parthenope*, are shown in brilliant colour photographs. Of special interest is the chapter related to telemetry using harmonic radar to follow dispersing specimens.] Address: Hardersen, S., Centro Nazionale per lo Studio e la Conservazione della Biodiversità Forestale, Corpo Forestale dello Stato, Strada Mantova, 29, I-46045 Marmirolo (MN), Italy. E-mail: s.hardersen@libero.it

**6347.** Haritonov, A.Y. (2007): The composition and history of Siberian odonate fauna. In: Tyagi, B.K. (Ed.): *Odonata : Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 73-87. (in English). ["Based on literature analysis and the latest special researches the more precise list of dragonflies taxons of Asian part of Russia, counted 129 species, is presented. The species are distributed among 7 geographical regions: Ural and Transural, West-Siberian Plain, Altai and Sayan, North of East Siberia, South of East Siberia, North of Far East, South of Far East. The ancient autochthonous odonate fauna of south part of Russian Far East is the most rich of species and is a member of Subholarctic faunistic region. The rest of territory is a member of Holarctic faunistic region and to divide into two parts: Euro-Siberian and Siberian subregions. Their odonate fauna is not rich, young and allochthonous." (Author) The paper contains the results of several taxonomic studies (dissertations in Russian language) resulting in synonymies of several taxa.] Address: Haritonov, A.Y., Institute of Animal Systematics and Ecology, Siberian Division of Russian Academy of Sciences, Frunze str. 11, Novosibirsk 630091, Russia e. mail: pc@eco.nsc.ru

**6348.** Harris, W.; Parry, G.S.; Forman, D.W. (2007): Predation of odonate larvae by Otters (*Lutra lutra*). *J. Br. Dragonfly Society* 23(1): 20-24. (in English). ["The occurrence of odonate larval remains in the faeces (spraints) of Eurasian otters (*Lutra lutra*) was assessed between March and April 2006 in two Welsh rivers. Spraints were collected individually during detailed field surveys every two weeks. Odonate remains identified as *Aeshna mixta* and *Cordulegaster boltonii* were found in 61 % (11/18) of the spraints analysed and a minimum number of 66 individual larvae (45 *Aeshna mixta* and 21 *Cordulegaster boltonii*) were estimated in these spraints. This study clearly illustrates that vertebrate predators such as otters have the potential to consume large numbers of odonate larvae and highlights the need for applied research in this neglected area of odonate and otter ecology." (Authors)] Address: Harris, W., Institute of Environmental Sustainability, School of the Environment and Society, Swansea University, Singleton Park, Swansea SA2 8PP, UK

**6349.** Hartley, M.K.; Rogers, W.E.; Siemann, E. (2007): Responses of prairie arthropod communities to

fire and fertilizer: balancing plant and arthropod conservation. *Am. Midl. Nat.* 157: 92-105. (in English). ["Fire is an important tool for limiting woody plant invasions into prairies, but using fire management to maintain grassland plant communities may inadvertently reduce arthropod diversity. To test this, we established twenty-four 100 m<sup>2</sup> plots in a tallgrass prairie in Galveston County, Texas, in spring 2000. Plots were assigned a fire (no burn, one time burn [2000], two time burn [2000, 2001]) and fertilization treatment (none, NPK addition) in a full factorial design. Fertilization treatments allowed us to examine the effects of fire at a different level of productivity. We measured plant cover by species and sampled arthropods with sweep nets during the 2001 growing season. Path analysis indicated that fertilization reduced while annual fires increased arthropod diversity via increases and decreases in woody plant abundance, respectively. There was no direct effect of fire on arthropod diversity or abundance. Diptera and Homoptera exhibited particularly strong positive responses to fires. Lepidoptera had a negative response to nutrient enrichment. Overall, the negative effects of fire on the arthropod community were minor in contrast to the strong positive indirect effects of small-scale burning on arthropod diversity if conservation of particular taxa is not a priority. The same fire regime that minimized woody plant invasion also maximized arthropod diversity." (Authors) Odonata are represented, but have been excluded from analysis.] Address: Siemann, Eviann, Department of Ecology and Evolutionary Biology, Rice University, 6100 Main St., Houston, Texas 77005 USA. E-mail: siemann@rice.edu

**6350.** Hassall, C.; Thompson, D.J.; French, G.C.; Harvey, I.F. (2007): Historical changes in the phenology of British Odonata are related to climate. *Global Change Biology* 13(5): 933-941. (in English). ["Responses of biota to climate change take a number of forms including distributional shifts, behavioural changes and life history changes. This study examined an extensive set of biological records to investigate changes in the timing of life history transitions (specifically emergence) in British Odonata between 1960 and 2004. The results show that there has been a significant, consistent advance in phenology in the taxon as a whole over the period of warming that is mediated by life history traits. British odonates significantly advanced the leading edge (first quartile date) of the flight period by a mean of  $1.51 \pm 0.060$  (SEM,  $n = 17$ ) days per decade or  $3.08 \pm 1.16$  (SEM,  $n = 17$ ) days per degree rise in temperature when phylogeny is controlled for. This study represents the first review of changes in odonate phenology in relation to climate change. The results suggest that the damped temperature oscillations experienced by aquatic organisms compared with terrestrial organisms are sufficient to evoke phenological responses similar to those of purely terrestrial taxa." (Authors)] Address: Hassall, C., Population and Evolutionary Biology Research Group, The Biosciences Building, School of Biological Sciences, University of Liverpool, Crown Street, Liverpool L69 7ZB, UK. E-mail: c.hassall@liverpool.ac.uk

**6351.** Hedström, I.; Sahlen, G. (2007): The dry season governs the reproduction of three pseudostigmatid zygoptera in Costa Rica (Odonata: Pseudostigmatidae). *International Journal of Odonatology* 10(1): 53-63. (in English). [*Megaloprepus caerulatus*, *Mecistogaster linearis*, and *M. ornata* "were surveyed during five

years, and striking differences in their reproduction patterns were shown: (1) At two study sites in seasonal, tropical semi-dry forests in Pacific Costa Rica, adult *M. ornata* could be observed throughout the year, occasionally during the dry season up to 24 individuals at one time. Larvae were found from the middle to the end of the wet season suggesting a generation time of one year. (2) At two other study sites in aseasonal tropical wet forest in Caribbean Costa Rica, adults of *M. caerulatus* were observed year round, often in rather low numbers. Larvae of this species as well as *M. linearis* appeared throughout the year. While dry periods and rainfall certainly are key factors in governing the reproductive patterns of these species in relation to the climatic regimes of their preferred life zones, it is also concluded that competition from other container dwellers, including tadpoles of poison arrow frogs, may be additional factors in explaining their seasonal variation. It is also argued that all three species seem to have a high plasticity in their life cycles and hence are able to adapt to local conditions rather than displaying the same behaviour throughout their range." (Authors)] Address: Hedström, I., Nairi Foundation, Apdo. postal 150-4021 Orotina, Costa Rica. E-mail: ingemar.hedstrom@skutan.smf.se

**6352.** Hoess, R. (2007): *Prodasineura doisuthepensis* sp. nov. from Thailand (Odonata: Protoneuridae). *International Journal of Odonatology* 10(1): 65-69. (in English). ["*Prodasineura doisuthepensis* sp. nov. from Thailand is described and figured. The holotype and two paratypes were collected by the author on 11 May 2002 on the slopes of Doi Suthep, Chiang Mai Province, Thailand (18°48'N, 98°56'E). The material will be deposited at the Naturhistorisches Museum Basel (NHMB). The female is unknown. This is the only known species of the genus with the dorsum of the synthorax almost entirely azure-blue." (Author)] Address: Hoess, R., Normannenstr. 35, 3018 Bern, Switzerland. E-mail: ReneHoess@1st.ch

**6353.** Horrigan, N.; Dunlop, J.E.; Kefford, B.J.; Zava-hir, F. (2007): Acute toxicity largely reflects the salinity sensitivity of stream macroinvertebrates derived using field distributions. *Marine and Freshwater Research* 58(2): 178-186. (in English). ["Two types of salinity tolerance information are commonly used for assessing salinity risk to freshwater organisms. These are data from laboratory experiments, usually acute (=96-h LC50) values, and field distributions. Both approaches have advantages and limitations, and their applicability to the formation of guidelines and assessment of risks is not clear. In the present study, the acute lethal tolerances (72-h LC50) and acute tolerance scores (ATS) of 37 macroinvertebrate families from Queensland, Australia, were compared with maximum field conductivities and previously derived salinity sensitivity scores (SSS). LC50 values were significantly correlated with maximal field conductivities and SSS. To investigate this relationship further, the changes in community structure related to an increase in salinity were assessed. A salinity index (SI) (based on cumulative SSS) and acute salinity index (ASI) (based on cumulative ATS) were calculated using an independent data set from south-east Queensland (429 samples) and compared with each other and actual conductivity levels. Both indices were significantly correlated with each other and followed a similar trend when plotted against actual conductivity. These results support the notion that salinity sensitivity of mac-



roinvertebrates derived from acute toxicity experiments reflects sensitivities derived using field distributions. Definition of this relationship will allow the two sources of salinity sensitivity to be combined in a weight-of-evidence approach, resulting in a more robust data set with which to estimate safe salinity concentrations." (Authors) The paper also includes data on Odonata.] Address: Dunlop, J.E., Department of Natural Resources and Water, 120 Meiers Road, Indooroopilly, Qld 4068, Australia. E-mail: jason.dunlop@nrm.qld.gov.au

**6354.** Hursthouse, D. (2007): Red-veined Darters *Sympetrum fonscolombii* at Lound, Nottinghamshire in 2006. *J. Br. Dragonfly Society* 23(1): 1-9. (in English). ["684 *S. fonscolombii*, 94 mature adults and 590 second generation adults, were recorded at the Lound gravel pits complex, Nottinghamshire, from 25 June to 23 October 2006. All except 20 were recorded from around a shallow pit." (Author)] Address: Hursthouse, D., 22 Rose Avenue, Clowne, Derbyshire S43 4NU, UK

**6355.** Irusta, J.B.; Araujo, A. (2007): Adaptationist approach of reproductive behaviour in Libellulidae: a case report on *Diastatops obscura* Fabricius. In: Tyagi, B.K. (Ed.): *Odonata : Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 223-240. (in English). ["In this chapter we discuss three topics related to reproductive behaviour in Libellulidae, specifically theoretical aspects based on data obtained from the species *Diastatops obscura* (Fabricius, 1775) in its natural environment in Northeast Brazil. First, we studied reproductive strategies, with emphasis on intrasexual competition among males in territorial areas and the interconnection and synchronism of the behaviours of both sexes. Second, we analysed the females' choice of mate, a subject of lively discussion today among odonatologists throughout the world. Finally, we studied the possible relation between male body size and reproductive success. It was shown that males compete for areas of greatest access to sexually mature females, and that females select dominant males over the satellites. In competition among males, it was observed that larger individuals are more likely to achieve more copulations than smaller and medium-size males. It was also shown that larger individuals accomplish oviposition of the females inseminated by them more often and in greater numbers, and are territorial for more days than their smaller counterparts. Accordingly, we discuss aspects related to female choice and stabilizing selection." (Authors)] Address: Irusta, J.B., Programa de Pós-Graduação em Psicobiologia, Departamento de Fisiologia - Centro de Biociências, Universidade Federal do Rio Grande do Norte. Caixa Postal 1511 - Campus Universitário, 59078-970 Natal, RN, Brasil. E-mail: banuelos@ufrnet.br

**6356.** Irusta, J.B.; Araújo, A. (2007): Reproductive tactics of sexes and fitness in the dragonfly, *Diastatops obscura*. *Journal of Insect Science* 7:24, available online: [insectscience.org/7.24](http://insectscience.org/7.24): 10 pp. (in English). ["The sexual selection strategies of territorial Odonata that do not present courtship behavior is still not completely understood, especially the role of the females. *Diastatops obscura* Fabricius (Odonata: Libellulidae) females participate in mate selection in a passive manner, allowing copulation with the first male that captures them and afterwards choosing whether to oviposit or not. This study introduces the idea of female passive choice as an adaptative tactic in intersexual selection. Also

discussed is the adaptative value of this tactic and its flexibility according to environmental conditions and reproductive strategies adopted by the males. A natural population of *Diastatops obscura* was observed in the Pitimbu River of northeast Brazil. Focal continuous and ad libitum techniques were used to record attempted copulation, copulation, and oviposition behavior, in addition to registering male territoriality. An estimate of individual reproductive success (IRS) was obtained by recording 187 reproductive events. Territorial males, mainly occupying areas near the river margin, achieved greater copulation and oviposition success (IRS = 0.371) than did satellite males (IRS = 0.028). Females that copulated with territorial males experienced, for the most part, only one copulation and oviposition event, while those that copulated with satellite males fled or performed a second copulation with a territorial male. Thus, the best tactic adopted by the *D. obscura* males was to occupy a territory providing the greatest access to females, while the females used passive choice for fitness optimization." (Authors)] Address: Irusta, J.B., Sector of Psychobiology, Department of Physiology, Federal University of Rio Grande do Norte (UFRN), Caixa Postal 1511 – Campus Universitário, 59072-970, Natal-RN, Brazil

**6357.** Joop, G.; Gillen, A.; Mikolajewski, D.J. (2007): Colour polymorphism in female *Coenagrion puella*: differences in egg shape (Odonata: Coenagrionidae). *International Journal of Odonatology* 10(1): 71-80. (in English). ["The maintenance of female colour polymorphism in coenagrionids is still an open issue. Here we ask if the three different female morphs of *C. puella* represent different reproductive traits in terms of clutch and egg size. Therefore clutch size and egg morphometry of the three female colour morphs were examined. We found that female colour morphs did not differ in clutch or egg size. However, we also found that the female morphs differ in egg shape, with the intermediate morph having more elongated eggs compared to the hetero- and andromorphic females. Our results are discussed in terms of potential different preferences in oviposition substrate." (Authors)] Address: Joop, Gerrit, Institute of Integrative Biology, Experimental Ecology, ETH Zürich, Universitätsstraße 16, ETH Zentrum, CHN J 12.2, 8092 Zürich, Switzerland. E-mail: g.joop@env.ethz.ch

**6358.** Jovic, M. (2007): About the odonata ethnic names in the Serbian linguistic area. In: Tyagi, B.K. (Ed.): *Odonata : Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 357-362. (in English). ["Vernacular names of Odonata in Serbian linguistic area are given and discussed. There are only few known expressions for odonates in the central part of Balkans. These names generally correspond with Odonata names in other European languages but it is interesting that extremely frightful associations were absent. Small number of common names of dragonflies and damselflies in the named area might be result of poorly exploration of the area, small significance of odonates in everyday life of local communities or misplacing during time." (Author)] Address: Jovic, M., Natural History Museum Belgrade, 11000 Belgrade, Serbia. E-mail: milos.jovic@nhmbeo.org.yu

**6359.** Juen, L.; Ramos Cabette, H.S.; De Marco, P. (2007): Odonate assemblage structure in relation to ba-

sin and aquatic habitat structure in Pantanal wetlands. *Hydrobiologia* 579: 125-134. (in English). ["Structural properties of aquatic habitats are the basis of several theories produced to explain the functioning of aquatic environments. We predicted a longitudinal change of ecosystem properties along the river, and also that potamal areas of the river are similar to lakes. In rivers with periodic floods we also expect a high degree of similarity due to increased environmental similarity and increase dispersal of component species. Otherwise, rivers must be conceived as a landscape element with an intrinsic hierarchical nature and dispersal among its parts are constrained by this structure. Under this view, we also could expect that different basin or different "micro-basin" could present communities that are historically different in their general properties. Here, we aimed to describe odonate larval communities in the Pantanal Mortes-Araguaia river basin in Brazil comparing the composition, species richness and community structure between lakes and rivers, and also the possible differences among river basins. The field work was done in three rivers and three lakes chosen to conform to a paired experiment, each pair in a different river basin. An aggregated sampling unit was used based on Ekman dredge and D-nets replicated on each site. We sampled 936 individuals distributed in 30 genera and a total of 34 morphotypes. There was no difference in species richness among lakes and rivers, but a marked difference among basins. Samples from the same basin present a higher similarity of the species abundance relations than among river or lake samples. We also did not observed differences in composition and community structure between large rivers and lakes, in the same basin. The results supported the concept of structural similarity between large rivers and lakes and the differences observed among basins could indicate historical events in colonization that are shaping communities characteristics." (Authors)] Address: De Marco Jr., P., Laboratório de Ecologia Teórica e Síntese, Departamento de Biologia Geral, Universidade Federal de Goiás, 74001-970 Goiânia, Goiás, Brasil. E-mail: pdemarco@icb.ufg.br

**6360.** Khodabandeh, S. (2007): Ultrastructure and osmoregulatory function of the branchial chamber in the larvae of dragonfly, *Libellula lydia* (Odonata). *Journal of agricultural science and technology* 9(2): (in English). ["The ultrastructure of the cells, Na<sup>+</sup>, K<sup>+</sup>-ATPase activity and immunolocalization were examined in the branchial chamber of *L. lydia* larvae. Na<sup>+</sup>,K<sup>+</sup>-ATPase activity and localization were performed through biochemical techniques and immunofluorescence light microscopy using a mouse monoclonal antibody IgGa5, respectively. The branchial chamber possesses six pair gills lamellae that extend into the rectal lumen. A thickened epithelial layer and a modified fat body cells layer are present at the base of the each gill lamella. Epithelial cells covered by a thin cuticle and they possess apical microvilli and baso-lateral membrane infoldings associated with mitochondria. The cytoplasm of the modified fat body cells is filled with mitochondria, glycogen and a few lipid droplets. The Na<sup>+</sup>,K<sup>+</sup>-ATPase activity was significantly higher (15.36 μM Pi mg<sup>-1</sup> protein h<sup>-1</sup>) in the branchial chamber. Na<sup>+</sup>,K<sup>+</sup>-ATPase immunofluorescence staining was observed in the epithelial layer cells of the basal pads of the rectal gill lamellae, with a consistently high immunoreactivity. These findings show that the epithelial cells present cytological features of the ionocytes, a high activity and concentration

of Na<sup>+</sup>,K<sup>+</sup>-ATPase, confirming their participation in osmoregulation through active ion exchanges." (Author)] Address: surp78@yahoo.com

**6361.** Kiran, C.G.; Kakkassery, F.K. (2007): Observations on mating and oviposition behaviour of *Tetratemis platyptera* Selys, 1878. In: Tyagi, B.K. (Ed.): *Odonata : Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 349-355. (in English). ["A detailed study was carried out of the mating and unusual oviposition behaviour of *T. platyptera* during October 2005. It was revealed that unlike other dragonflies, the female *T. platyptera* lays eggs on the twigs or leaves of plants hanging on to the water bodies, a special strategy for their larval development, and hatched nymphs were dropped into water for their further development. The total time of courtship, tandem position and wheel position are also discussed in this paper." (Authors)] Address: Kiran, C.G., Mayoaram, Pulari Nagar, Kodunganoor, P.O, Thiruvananthapuram, Kerala, India 695 013. E-mail: cgkiran@gmail.com

**6362.** Kononova, S.V.; Fursov, V.N. (2007): A Review of the Genera *Calotelea*, *Calliscelio*, and *Oxyscelio* (Scelioninae, Scelionidae, Proctotrupeoidea) from the Palaearctic Fauna. *Entomological Review* 87(1): 92-105. (in English). [*Calotelea shimurai* from Japan parasitizes eggs of *Aeshna nigroflava*, *Planaeschna milnei*, and *Boyeria maclachlani*.] Address: Fursov, V.N., Schmalhausen Institute of Zoology, National Academy of Sciences of Ukraine, Kiev, 01601 Ukraine. E-mail: root@iz.freenet.kiev.ua

**6363.** Krech, M. (2007): Reproduktionsnachweise der Asiatischen Keiljungfer (*Gomphus flavipes* Charpentier 1825) für den Unter- und Mittellauf der Unstrut in Sachsen-Anhalt und Thüringen (Odonata: Gomphidae). *Mitteilungen des Thüringer Entomologenverbandes* 14(1): 2-5. (in German). [Sachsen-Anhalt, Thüringen, Germany; a systematic survey of 20 stretches of the river Unstrut resulted in 8 new localities of the rare *Stylurus flavipes*. These records are discussed in the framework of current range extensions of this species. Some habitat characters are also discussed. In a table additional records of rheophilous species as *Calopteryx splendens*, *Gomphus vulgatissimus*, and *Ophiogomphus cecilia* are presented.] Address: Krech, M., Auf der Großen Mühle 7, D-99198 Erfurt, Germany

**6364.** Lasley, G.W. (2007): Digital odonate photography: My personal techniques. Abbott, J.C. (Ed.): *Dragonflies and Damselflies (Odonata) of Texas*. Vol. 2: 1-4. (in English). [Introduction into digital dragonfly photographing] Address: Lasley, G.W., 305 Loganberry Ct., Austin, Texas 78745, USA. E-mail: glasley@earthlink.net

**6365.** Lawniczak, M.K.N.; Barnes, A.I.; Linklater, J.R.; Boone, J.M.; Wigby, S.; Chapman, T. (2007): Mating and immunity in invertebrates. *Trends in Ecology and Evolution* 22(1): 48-55. (in English). ["Mating and immunity are intimately linked to fitness. In both vertebrates and invertebrates, recent investigations into mate choice for immunity, tradeoffs between reproduction and immunity, and the relationships between post-mating processes and immune function have revealed that mating and immunity are also intimately linked to each other. Here, we focus on invertebrates and critically examine the evidence that immunity is under se-

xual selection, both pre- and post-mating, and explore other hypotheses linking mating and immunity. We find little evidence for a consensus regarding which theories best account for the accumulating empirical data. However, we suggest that progress can quickly be made by exploiting the intrinsic strengths of invertebrate model systems." (Authors) The paper also refers to some recent odonatological papers.] Address: Lawniczak, Mara, Department of Biology, Darwin Building, University College London, London, WC1E 6BT, UK. E-mail: marakat@ucl.ac.uk

**6366.** Lin, Q.-B.; Huang, D.-Y.; Nel, A. (2007): A new family of Cavilabiata from the Lower Cretaceous Yixian Formation, China (Odonata: Anisoptera). *Zootaxa* 1469: 59-64. (in English). ["A new genus *Nodalula* gen. nov. and species *Nodalula dalingshensis* gen. et sp. nov. is described on the basis of a nearly complete specimen from the Lower Cretaceous of North-east China. Its special pattern of wing venation differs from those of the known Mesozoic Cavilabiata genera and allows us to include it in the new family Nodalulidae within the Neobrachystigmata." (Authors)] Address: Lin, Q.-B., State Key Laboratory of Palaeobiology and stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing, 210008, People's Republic of China

**6367.** Machado, A.B.M. (2007): Studies on neotropical Protoneuridae. 2. *Neoneura kiautai* spec. nov. from Southeastern Brazil (Zygoptera, Protoneuridae). In: Tyagi, B.K. (Ed.): *Odonata: Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 25-32. (in English). ["*Neoneura kiautai*, sp.n. is described and illustrated. It is close to *N. ethela* but differs mainly by the shape of the decumbent process of cercus and the colour of abdominal segments 7-10." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil

**6368.** Malkmus, R. (2007): Libellen im Tangkoko-Reservat auf Sulawesi. *Natur und Museum* 137(1/2): 12-19. (in German). [Due to its geological surface with highly permeable volcanic soils, only very few water bodies exist in the nature reserve of Tangkoko, Sulawesi, Indonesia. With the exception of phytotelmatic species, the odonate fauna is said concentrating along the single permanently running brook, the Batupatik which is situated on the northern border of the reserve. In 2002, nine for Sulawesi endemic species were recorded at this stream; these are briefly discussed and some are depicted in colour photographs. A brief introduction into historical and current odonatological research activities is given, and the Sulawesian Odonata are compared with those of Borneo and Sumatra. The following species are shown: *Neurobasis kaupi*, *Libellago xanthocyana*, *Rhinocypha frontalis*, *Celebargiolestes cinctus*, *Nososticta flavipennis*, *Pseudagrion ustum*, *Protosticta simplicinervis*, *Diplacodes trivialis*, and *Celebothemis delectollei*.] Address: Malkmus, R., Schulstr. 4, D-97859 Wiesthal, Germany

**6369.** Marinov, M.; Grebe, B.; Kutsarov, Y. (2007): *Cordulegaster insignis* (Schneider, 1845) in Bulgaria with notes on its biology and ecology. In: Tyagi, B.K. (Ed.): *Odonata: Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-

7233-482-6: 51-61. (in English). ["Bulgarian *C. insignis* finding places are summarized and mapped. Special attention on its biotope is given with emphasis on species' biology and ecology. New records from Bulgaria enlarge *C. insignis* distribution to the west. Its possible existence in even westernmost areas, like Serbia & Montenegro, is briefly discussed." (Authors)] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mgmarinov@mail.bg

**6370.** Martens, A.; Sahlen, G.; Marais, E. (2007): Abstracts - 5th WDA International Symposium of Odonatology. 43 pp: (in English). [Contents: Beatty, C.D., J.A. Andrés & T.N. Sherratt: Conspicuous coloration in males of the damselfly *Nehalennia irene* (Zygoptera: Coenagrionidae): do males signal their unprofitability to other males? (Oral) ■ Bechly, G.: New fossil Odonata from the Lower Cretaceous Crato Formation of Brazil (Oral) ■ Bots, J., B. Van Den Brande, T. Snijders, L. De Bruyn, K. Van De Vijver, W. De Coen & H. Van Gossum: Impact evaluation of a chemical contaminant (PFOS) on the survival of damselfly larvae (Poster) ■ Bots, J., H., Van Gossum, R. Smolders, W. De Coen, L. de Bruyn & S. Van Dongen: Seasonal variation in energy storage compounds between female colour morphs of the damselfly, *Enallagma cyathigerum* (Oral) ■ Bouwman, J.: An overview of the present knowledge and protection of the isolated population of *Coenagrion armatum* in the Netherlands (Oral) ■ Cannings, R.A.: Odonata inventories in British Columbia, Canada: determining the conservation status of Odonata species (Oral) ■ Clausnitzer, V.: Global Dragonfly Assessment - What do we have already and what is needed? (Plenary Seminar) ■ Contreras-Garduño, J., B. Buzatto, M.A. Serrano-Meneses & A. Córdoba-Aguilar: The red wing spot of *Hetaerina americana* males as a heightening condition dependent ornament (Oral) ■ Conze, K.-J.: Odonata in North Rhine-Westphalia, Germany (Oral) ■ Cordero-Rivera, A. & R.A. Sánchez-Guillén: Androchrome females are not preferred by males of *Ischnura elegans* even when they are the majority morph (Oral) ■ Darwall, W.: Global Biodiversity Assessments: what is their purpose and what do they involve? (Plenary Seminar) ■ De Knijf, G. & A. Anselin: Predicting the distribution of *Calopteryx splendens* in Flanders (Belgium), based on a habitat (Oral) ■ Dijkstra, K.-D.B.: Demise and rise: the biogeography of the Odonata of tropical Africa (Oral) ■ Dolný, A., P. Drozd, P. Buczynski, M. Veselý & E. Bulánková: Distribution and habitat preferences of peat-bog and fen dragonfly species in Central Europe (Oral) ■ Dow, R.A. & G.T. Reels: Preliminary results of recent faunal survey work in Sarawak, Malaysian Borneo (Oral) ■ Flenner, I., K. Olne, G. Sahlén & F. Suhling: Predator induced spine length and cuticle thickness in *Leucorrhinia dubia* - a trade-off? (Poster) ■ Garrison, R.W.: Research on the Neotropical Odonata: current results and challenges ahead (WDA Award lecture) ■ Garrison, R.W. & N. von Ellenrieder: Will the real *Argia difficilis* please stand up? (Poster) ■ Gennard, D.E. & T. Winder: Conservation value for Odonata: an intra site investigation at Gibraltar Point NNR, Skegness, UK (Oral) ■ Gorb, S.N.: Dragonfly morphology revisited: its relevance for taxonomy, ecology and bionics (Plenary Talk) ■ Groenendijk, D. & J. Bouwman: From zero to full protection in five years: the case of *Somatochlora arctica* in the Netherlands (Oral) Groenendijk, D., C. Plate, J. Bouwman & T. Termaat: The use of dragonfly trends from the Dutch Monitoring Scheme in a broader context (Oral) ■ Günther, A.: The



ornaments are similar but something is different - threat display in Sulawesi Rhinocypha and Heliocypha perforata (Oral) ■ Hardersen, S.: Telemetry of freshly emerged dragonflies (Anisoptera) (Oral) ■ Hardersen, S., E. Riservato & G. Bogliani: The congress: Dragonflies in Italy - Research and Conservation (Poster) ■ Hawking, J.H.: Larval ecology and morphology as determinants of the spatial distribution of gomphids (Odonata) in streams of northern Victoria, Australia (Oral) ■ Hilfert-Rüppell, D. & G. Rüppell: Why do not males catch up with females in pursuing flight in Calopteryx splendens? (Oral) ■ Holuša, O.: Notes to the diurnal activity of adults of Cordulegaster bidentata (Oral) ■ Holuša, O.: Notes to the distribution of Cordulegaster spp. in Central Europe (Poster) ■ Holuša, O.: Shift of the northern limit of Somatochlora meridionalis (Odonata: Corduliidae) in the Central Europe? (Poster) ■ Honkanen, M.: The impact of area, productivity and forestry on dragonfly species richness in small boreal forest lakes (Poster) ■ Iwasaki, H. & M. Watanabe: Factors affecting egg load in relation to food intake for Sympetrum infuscatum females in forest gaps during interval oviposition (Poster) ■ Johansson, F.: Coping with stress: Strategies to deal with different conditions along environmental gradients (Plenary Talk) ■ Joop, G.: Stressed damselflies: Effects of natural enemies on immunity (Oral) Kalkman, V.: Mapping European dragonflies (Oral) ■ Kalkman, V.: Studies on Old World Megapodagrionidae (Poster) ■ Karlsson, M., K. Koch & G. Sahlén: Ovariole arrangements in Libellulidae (Poster) Kipping, J.: Long-term changes in dragonfly communities of the Okavango Delta, Botswana (Oral) ■ Kjer, K., F.L. Carle & M.L. May: Odonata phylogeny: update and prospects (Plenary Talk) ■ Koch, K.: Natural selection: a major impetus for the evolution of two reproductive strategies in Libellulidae? (Oral) ■ Malikova, E.: Odonata of the Amur River (Far East of Russia) and the problem of their conservation (Oral) ■ Martens, A.: Dragonfly larvae with scoop-shaped labium as effective predators of adult dytiscid beetles: from field data on strict habitat segregation on a tropical island to experimental evidence (Oral) ■ May, M.L. & P.S. Corbet: Fliers and perchers among Odonata: dichotomy or continuum? A reappraisal (Plenary Talk) ■ Mensing, V.: Increase of Sympetrum pedemontanum in the Netherlands: the knowledge of volunteers incorporated in local water board management (Oral) ■ Müller, O.: The use of digital techniques for providing scientific drawings in arthropod taxonomy (Poster) ■ Novelo-Gutiérrez, R. & J.A. Gómez-Anaya: Odonata diversity in western Mexico (Poster) ■ Odanga, J.J.: A preliminary study of impact of anthropogenic disturbance on dragonflies' habitats along Nairobi River (Poster) ■ Oertli, B.: Prediction of Odonata diversity: a tool for the assessment of freshwater biodiversity (Oral) ■ Osawa, H. & H. Ubukata: The influence of the change in the social environment of children on their recognition of dragonflies (Poster) ■ Ott, J.: Recent effects of climatic changes on the waters of the biosphere reserve "Palatinat Forest" and consequences for the web Natura 2000 (Oral) ■ Ott, J., M. Schorr, B. Trockur & U. Lingenfelder: Species protection programme for Oxygastra curtisii in Germany (Oral) ■ Pritchard, G.: The colonization of temperate latitudes by Neotropical Zygoptera (Oral) ■ Raatikainen, K., K. Tynkkynen, E. Haukilehto, M. Häkkinen & J.S. Kotiaho: Hybridization in Calopteryx damselflies: the role of male alternative mating tactics (Oral) ■ Sahlén, G., I. Flenner & K. Olne: Forestry and dragonfly diversity: the uncertain long-time survival of specialist species in Central Sweden (Oral) ■ Sánchez-Guillén, R. A. & A. Cordero-Rivera: Con-

specific sperm precedence in Odonata (Oral) ■ Schneider, W.: Odonata of the Arabian Peninsula (Oral) ■ Schütte, K.: Biogeography of Odonata in SE Madagascar (Poster) ■ Sherratt, T.N., H. Van Gossum, C.D. Beatty, A. Rashed & J. Skevington: Female-biased sex ratios and putative sex role reversal in an island community of damselflies (Oral) ■ Simaika, J.P.: What are they to us? Valuing dragonflies as service providers (Oral) ■ Suhling, F. & O. Richter: Predicting life cycle alterations due to climate change along thermal gradients: a case study on Gomphus vulgatissimus (Oral) ■ Svensson, E.I.: Selective predation on wing colouration and sexual isolation in calopterygid damselflies (Oral) ■ Tajima, Y. & M. Watanabe: Changes in the number of spermatozoa in sperm storage organs of Ischnura asiatica female during copulation (Oral) ■ Takahashi, Y. & M. Watanabe: Frequency-dependent mating attempt to female color dimorphism in Ischnura senegalensis during diurnal oviposition activity (Oral) ■ Teramoto, Y. & M. Watanabe: Population increase of the threatened damselfly, Mortonagrion hirosei, inhabiting an artificially established reed community (Oral) ■ Termaat, T., D. Groenendijk & J. Bouwman: How to protect endangered Red List species in the Netherlands: from ecological research to conservation (Oral) ■ Termaat, T., V. Kalkman & J. Bouwman: Trends in ranges of dragonflies in the Netherlands: does climate change play a role? (Poster) ■ Termaat, T., V. Mensing, D. Groenendijk & J. Bouwman: Dragonfly protection in the Netherlands: a stepwise approach (Poster) ■ Theischinger, G.: The Gondwanan aeshnids of Australia (Oral) ■ Thompson, D.J.: Movement in dragonflies (Plenary talk) ■ Ubukata, H.: Effectiveness of the evaluation of freshwater bodies using odonate assemblage in a management project of a wetland under the stress of regional development (Oral) ■ von Ellenrieder, N. & R.W. Garrison: Dragonfly guardians of the southern wing of the Yungas mountain rain forest (Poster) ■ von Ellenrieder, N. & J. Muzón: An updated checklist of the Odonata from Argentina (Poster) ■ Ware, J.L., M.L. May & K.M. Kjer: The most speciose group of dragonflies, Libelluloidea: phylogeny, dating and phylogeography (Oral) ■ Watanabe, M.: Changes in spatial distribution and species composition of larval dragonflies in the artificial reed community established as a habitat for Mortonagrion hirosei, an endangered brackish water damselfly (Oral) ■ Wikelski, M., D. Moskowicz & M.L. May: Tracking migratory Green Darner dragonflies with radiotelemetry (Poster) ■ Wildermuth, H.: Evolutionary traps for dragonflies in man-modified landscapes - old and new facts to polarization vision (Oral) Wilson, K.D.P.: Seasonal emergence observations of odonates in tropical forest streams at Endau-Rompin, Malaysia (Poster) ■ Zessin, W. Overview of the "giant dragonflies" of the Paleozoic (Oral) ■ Zessin, W. Some German Paleozoic Meganisoptera (Odonoptera) and their finding places (Poster)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**6371.** Matthews, J. (2007): What do we know about dragonfly migration on the Texas coast?. In: Abbott, J.C. (Ed.): Dragonflies and Damselflies (Odonata) of Texas. Vol. 2: 9-11. (in English). [The author reports in detail on several occurrences of dragonfly migration (in most cases Anax junius) in Texas, USA or the Gulf of Mexico, and outlines some basics for future study of dragonfly migration in Texas.] Address: Matthews, J.,

Section of Integrative Biology, 1 University Station #C0930, The University of Texas at Austin, Austin, Texas 78712, USA. E-mail: johoma@mail.utexas.edu

**6372.** Michalski, J.; Oppel, S. (2007): *Papuagrion carcharodon* sp. nov. from southern New Guinea (Odonata: Coenagrionidae). *International Journal of Odonatology* 10(1): 81-86. (in English). ["*Papuagrion carcharodon*, a new coenagrionid from the rainforest of Papua New Guinea's Simbu Province, is described (holotype: 06°43'S, 145°05'E; 900 m a.s.l., 27 March 2004, to be deposited at Naturalis, Leiden). This new species is similar to *P. ekari* and *P. pesechem* but may be distinguished from both by the tooth-shaped lower branch of the male cerci, and the position of the tubercles on the female pronotum." (Authors)] Address: Michalski, J., 223 Mount Kemble Avenue, Morristown New Jersey 07960, USA. E-mail: jmichalski@easthanoverschools.org

**6373.** Mikolajewski, D.J.; Joop, G.; Wohlfahrt, B. (2007): Coping with predators and food limitation: testing life history theory for sex-specific larval development. *Oikos* 116(4): 642-649. (in English). ["For animals with complex life cycles, recent models of sexual size-dimorphism at maturity assume three key variables to optimise larval life history: activity in the larval stage, development time, and size at maturation. However, model predictions remain largely untested. In the territorial dragonfly *Libellula depressa* (Odonata) exhibiting a flexible development time we tested for male-biased sexual size-dimorphism and sex differences in larval activity, development time, and growth rate. Based on models we predicted that males achieved their larger size compared to females by a longer development rather than being more active. Results revealed that males took longer to develop and achieved a larger size than females but were not more active. Compared to males, females exhibited a higher growth rate which was not achieved by an activity-mediated increased food intake. We conclude that sexual size-dimorphism in species with a flexible development time is mediated by differences in developmental length but not activity. Furthermore, sexes differ in their plastic responses to food availability and predator presence making it necessary to consider sex-specific differences in testing further life history responses." (Authors)] Address: E-mail: bwolfhah@ucalgary.ca

**6374.** Miller, P.L. (2007): Dragonflies of the Madurai Kamaraj University Campus (Tamil Nadu, India). In: Tyagi, B.K. (Ed.): *Odonata : Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 273-322. (in English). ["Twenty five odonate species were observed on the Madurai Kamaraj University campus during the periods September 1987 and February 1988. Of these, proof of breeding on the campus was obtained for sixteen species and there was strong, circumstantial evidence of breeding in at least a further two species. Five bred only in permanent habitats and seven only in temporary habitats, the remainder probably doing so in both types. Sixteen species were sexually active at the largest habitat, a seasonal lake. Five further species, although commonly present, showed no sexual activity at campus sites." (Author) Special emphasis is given to oviposition behaviour.] Address: author diseased

**6375.** Mitra, A. (2007): Larval and adult behavioural patterns of some odonata species from Dehradun Valley. In: Tyagi, B.K. (Ed.): *Odonata : Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 323-341. (in English). ["Different behavioural patterns of five odonata species have been studied in and around Asan reservoir, Dehradun, India from May 1995 to April 1997. The odonate imago feeds only on living prey and predominantly on flying insects. *Orthetrum s. sabina* has been seen to detect the perching prey more accurately. The mature males of all the five species arrive at the rendezvous earlier in the season during the day than females and form the territory. Only except *Brachythemis contaminata*, the males of other four species either show aggressive behaviour and chase display (in Anisoptera) or show threat display by 'abdomen raising' or 'wing opening' (in Zygoptera). Before wheel tandem lasts for a few seconds in *Crocothemis s. servilia* and *Brachythemis contaminata* while it lasts from 2-5 minutes in *Orthetrum s. sabina*. Comparatively, in zygoptera, before wheel tandem lasts longer and intramale sperm translocation occurs at that time. The copulatory wheel generally lasts for 6-22 seconds in *Crocothemis s. servilia*; 4-15 seconds in *Brachythemis contaminata*; 15-25 minutes in *Orthetrum s. sabina*; 10-15 minutes in *Ischnura a. aurora* and 35-45 minutes in *Ceriagrion coromandelianum*. All the three anisoptera oviposit by frequent dipping of their abdomen under water surface, whereas, the two zygopterans oviposit endophytically. Among the five species, only *Ceriagrion coromandelianum* oviposits in tandem. The duration of oviposition varies from 20-30 seconds in *Crocothemis s. servilia*; 3-6 minutes in *Orthetrum s. sabina*; 4-6 minutes in *Brachythemis contaminata*; 20-25 minutes in *Ischnura a. aurora* and 20-30 minutes in *Ceriagrion coromandelianum*. Odonata larvae are generalized predators and early instars prefer *Paramoecium* spp., *Daphnia* spp., diatoms etc., while later instars prey on chironomid larvae and pupae, mosquito larvae, ephemeropteran nymphs, *Branchiura* spp., *Limnodrilus* spp. and some nematodes. *Orthetrum s. sabina* larvae shows cannibalism. The last instar of all the five species stop feeding 2-3 days before emergence. Emergence occurs in *Crocothemis s. servilia* and *Orthetrum s. sabina* during 5.00 to 7.00 hours at a height of 6-25 cm and 10-30 cm from the water level, respectively. In *Brachythemis contaminata* emergence occurs during 12.30 to 2.00 hours at a height of 2.5-10 cm. Emergence occurs in *Ischnura a. aurora* during 12.00-2.00 hours and in *Ceriagrion coromandelianum* during 3.00-5.00 hours at a height of 8-12 cm and 10-15 cm from the water level, respectively." (Author)] Address: Mitra, A., Senior Lecturer, Sherubtse College, Kanglung, Bhutan. E-mail: amitodonata@yahoo.com

**6376.** Mola, L.M. (2007): Cytogenetics of American Odonata. In: Tyagi, B.K. (Ed.): *Odonata : Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 153-173. (in English). ["The current knowledge of the cytogenetics of American odonates is reviewed. Chromosome studies have been performed in nearly 830 species and subspecies of 9 Zygoptera and 6 Anisoptera families. The species analysed were collected in 15 countries: Canada, the US and Mexico from North America; Guatemala and Costa Rica from Central America; Dominica and Jamaica from the Caribbean; and Venezuela, Surinam, Brazil, Peru, Bolivia, Chile, Argentina and Uruguay from South America. The proportion of species ana-

lysed differs from one country to another. Although the most frequent haploid numbers are 12, 13 and 14, there is a wide variation from  $n=3$  in *Macrothemis hemichlora* from Bolivia and Brazil to  $n=21$  in *Orthemis nodiplaga* from Argentina. Two distinctive characters of the order are the presence of holokinetic chromosomes and the post-reductional type of meiosis. The most frequent sex chromosome mechanism is XX/XO (female/male), the derived neo-XY system occurs in approximately 5.5% of the species, and the X1X1X2X2/X1X2Y multiple system is only present in *Micrathyrina unguolata*. The presence of a small pair of chromosomes, the m-chromosomes, is found in nearly 80% of the species. Studies of the distribution and composition of the heterochromatin are scarce. C-banding showed that autosomes usually have heterochromatic blocks in the telomeric regions, and that, in general, the sex chromosome in males is completely expositive, or shows an intermediate staining. In the few species analysed with fluorochromes, the heterochromatin seems to have a heterogeneous molecular composition. Odonata shows a high degree of karyotypic constancy at both intra- and inter-specific levels. However, polytypisms for the number of autosomes, the sex chromosome mechanism, and the size of the m-chromosomes were described in some species. Inter-specific variation in the chromosome number and/or in the sex chromosome mechanism were seen in some genera. Fusions and, less frequently, fragmentations are the main chromosome rearrangements involved in karyotype evolution." (Author)] Address: Mola, Liliana, Laboratorio de Citogenética y Evolución; Depto Ecología, Genética y Evolución; Facultad de Ciencias Exactas y Naturales; Universidad de Buenos Aires. Int. Güiraldes 2620, Ciudad Universitaria, Pabellón II, 4° Piso. (C1428EHA) Ciudad Autónoma de Buenos Aires. E-mail: limola@ege.fcen.uba.ar

**6377.** Monroy, L.P.D.; Realpe, E. (2007): Local assemblage patterns of odonates in Central Choco, Colombian Pacific. In: Tyagi, B.K. (Ed.): Odonata : Biology of Dragonflies. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 183-199. (in English). ["The dragonfly community in Central Chocó region was sampled with the aim of detecting patterns of local distribution and its relationship with the habitats' configuration. The Chocóan odonatofauna shows strong relationship with the presence of pluvial forest and it is postulated as a landscape condition for this ecological distribution pattern. The community shows relationship with variables like vegetation architecture associated to classified habitats, characteristics of aquatic environment, habitat's maturity and human impact. The species adaptability categorization is presented and features of specificity related to the habitats. Pluvial forest fragmentation, technified mining, the excessive logging constitute the main threats for the stenotopic species (*Archilestes nov. sp.*, *Leptobasis sp.*, *Metaleptobasis sp.*, *Philogenia cristallina*, *Palaemnema dentata*, *Heteragrion erythrogastrum*, *Perissolestes emotus*, *Neocordulia batesi*). These species were related with the presence of mature forest, and their abundances were always the lowest. The eurytopic species (*Erythrodiplax andagoya*, *E. famula lativittata*, *Micrathyrina dictynna*, *Zenithoptera americana*, *Ischnura hastata*) are related with lentic systems with strong anthropic intervention and their abundances showed to be much higher. For the first time, a preliminary list of 38 species for the odonatofauna of Central Chocó is presented." (Authors)] Address: Monroy, L. P.D. Zoology and Eco-

logy Aquatic Laboratory LAZOEIA Biologie Sciences Department, Universidad de los Andes Bogota, Colombia. E-mail: le-perez@uniandes.edu.co

**6378.** Needham, K.; Kenner, R. (2007): Chapter 14: Aquatic Insects. In: Davis, Neil and Rose Klinkenberg (editors). 2007. A Biophysical Inventory and Evaluation of the Lulu Island Bog, Richmond, British Columbia. Ecology Committee, Richmond Nature Park Society, Richmond, BC. Available on-line at <http://www.geog.ubc.ca/richmond/city/inventory2002.htm>: 5 pp. (in English).

**6379.** Novelo-Gutiérrez, R. (2007): The larva of *Aeshna williamsoniana* (Odonata: Anisoptera: Aeshnidae). Canadian Entomologist 139: 195-200. (in English, with French summary). ["The larva of *A. williamsoniana* Calvert, 1905 is described in detail, illustrated, and compared with other larvae of the genus and family. It is distinguished from its congeners by its granular integument, body mostly lacking hairlike setae, cerci with a row of spiniform setae along the lateroexternal margins, and dorsomedial margin of female epiproct with a row of spiniform setae. It does not particularly resemble any other larva of *Aeshna* or related genera described to date. The larval habitat is described for the first time." (Author)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx

**6380.** Ott, J. (2007): The expansion of *Crocothemis erythraea* (Brulle, 1832) in Germany - an indicator for climatic changes. In: Tyagi, B.K. (Ed.): Odonata : Biology of Dragonflies. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 201-222. (in English). [In this paper a detailed account of the northward expansion of *C. erythraea* in Germany is presented. While only a few decades ago the species was rare even in southern Germany, it is now found in nearly every federal state, in most of them autochthonous. The species conquered Germany from south to north, parallel to climatic changes in the country; similar expansions of this species are recorded in other European countries, as well as northward expansions of other southern species. The main reason for this range expansion are climatic changes, some consequences of which are discussed." (Author)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**6381.** Ott, J.; Schorr, M.; Trockur, B.; Lingenfelder, U. (2007): Artenschutzprogramm für die Gekielte Smaragdlibelle (*Oxygastra curtisii*) in Deutschland an der Our. Invertebrate Ecology and Conservation Monographs 3: 130 pp. (in German, extended (5 pp.) English & French summaries). [This is a detailed documentation of a two year study of the single German population of *O. curtisii* with special emphasis on data necessary to conserve and monitor the population.] Address: Pensoft Publishers, Geo Milev Str. No. 13a, 1111 Sofia, Bulgaria. <http://www.pensoft.net>

**6382.** Paillisson, J.-M.; Reeber, S.; Carpentier, A., Marion, L. (2007): Reproductive parameters in relation to food supply in the whiskered tern (*Chlidonias hybrida*). Journal of Ornithology 148(1): 69-77. (in English, with German summary). [France; dragonflies and beetles belong to the most commonly eaten invertebrate



prey of *C. hybrida*. Address: Paillisson, J.-M., UMR-CNRS 6553 Ecobio, Biologie des Populations et de la Conservation, Campus de Beaulieu, Université de Rennes 1, Av. du Général Leclerc, 35042 Rennes, France. Email: jean-marc.paillisson@univ-rennes1.fr

**6383.** Penalva, R.; Costa, J.M. (2007): *Garrisionia aurindae* gen. and spec. nov. from the State of Bahia, Brazil (Anisoptera: Libellulidae). *Zootaxa* 1453: 33-40. (in English). ["*Garrisionia* gen. nov. is established for *Garrisionia aurindae* sp. n. (type species, holotype male and allotype female : Brazil: Bahia, Salvador, in Museu Nacional, Rio de Janeiro). Diagnoses and illustrations are given for similar genera of the region."] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@acd.ufrj.br

**6384.** Pessacq, P.; Costa, J.M. (2007): Three New Species of *Peristicta* Hagen in Selys (Odonata: Zygoptera: Protoneuridae) from Brazil. *Neotropical Entomology* 36(1) : 46-52. (in English, with Portuguese summary). ["Three new species of *Peristicta* Hagen in Selys from Brazil are described and illustrated: *P. janiceae* from Minas Gerais State (Diamantina, Gouvêa, Lagoa Santa, Serra do Caraça, Serra do Cipó, Urobotanga), *P. jalmosi* from Goiás State (Chapada dos Veadeiros, Reserva da Universidade de Brasília) and Minas Gerais State (Urobotanga, Lagoa Santa, Ponte Nova, São João del Rey,) and *P. muzoni* from Mato Grosso State (Serra da Bodoquena). An identification key for males of *Peristicta* is presented." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@acd.ufrj.br

**6385.** Popova, O.N. (2007): The dragonflies of forest-steppe in West Siberia: fauna, ecology and biology. In: Tyagi, B.K. (Ed.): *Odonata : Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 89-104. (in English). ["Results of studying fauna, zoogeography, ecology and biology of Odonata in forest-steppe zone of West Siberia are discussed. In forest-steppe 68 species of dragonflies have been found, which is the richest in species landscape in Siberia. The highest species diversity is noted in the remote parts - the Urals and Prislair ones. The number of species common for the whole area is 44. Stationary study (in the Baraba part of West Siberian forest-steppe) of local dragonfly population made possible to obtain data on its species composition, number, biotopical distribution and structure of larvae and imago dominance and to ascertain life cycles of several mass species." (Author)] Address: Popova, O., Institute of Animal Systematics and Ecology, Siberian Division of Russian Academy of Sciences, Frunze str. 11, Novosibirsk 630091, Russia e. mail: pc@eco.nsc.ru

**6386.** Prasad Rao, R.S.; Girish, M.K.S. (2007): Road kills: Assessing insect casualties using flagship taxon. *Current Science* 92(6): 830-837. (in English). ["Roads and traffic are the central features of human development, but a severe threat to forest and wildlife. In this study we have assessed the extent of insect road kills in two national parks and a suburb-scrubland. The diversity and abundance of insect casualties were enumerated and compared across sites. Dragonflies and

butterflies were the major insect kills with higher casualties on Sunday, which is associated with increased traffic load. Butterfly road kills were represented by high species diversity. This study reveals severity of invertebrate/insect casualties on road, conservation needs and surprising new frontiers of road ecology." (Authors)] Address: R. Shyama Prasad Rao, Geen Club, No. 1456, E&F Block, Ramakrishna Nagar, Mysore 570 022, India. E-mail: rsprao101@yahoo.co.in

**6387.** Prokop, J.; Prikryl, T.; Dostal, O.; Nel, A. (2007): *Oligaeschna kvaceki* sp. nov., a new fossil dragonfly (Odonata: Aeshnidae) from the middle Oligocene sediments of northern Moravia (Western Carpathians). *Geologica Carpathica* 58(2): 181-184. (in English). ["A new species of fossil dragonfly *Oligaeschna Piton et Theobald, 1939* (*O. kvaceki* sp. nov.) is described from Middle Oligocene strata of northern Moravia and compared with all closely related species. The current record documents a rather broad distribution and probably also high abundance of *Oligaeschna* in Eurasia during the Oligocene and Miocene." (Authors)] Address: Prokop, J., Department of Zoology, Charles University in Prague, Vinicna 7, CZ-128 44 Praha 2, Czech Republic. E-mail: jprokop@natur.cuni.cz

**6388.** Querino, R.B.; Pinto, J.D. (2007): A new *Hydrophylita* (Hymenoptera: Trichogrammatidae) from the Neotropics, with a key to species. *Zootaxa* 1437: 47-54. (in English). ["*Hydrophylita neusae* n. sp. is described and illustrated. *Hydrophylita* is a small genus of Trichogrammatidae which now includes four species, all known to attack eggs of damselflies (Odonata: Zygoptera). A key to species is included and those known from the Neotropics are illustrated." (Authors)] Address: Querino, R.B., Embrapa Roraima, BR 174 Km 8, Distrito Industrial, 69301-970, Boa Vista, Roraima, Brasil. E-mail: ranyse@cpafrr.embrapa.br

**6389.** Raab, R.; Chovanec, A.; Pennerstorfer, J. (2007): *Libellen Österreichs*. X, 345 pp: ISBN: 978-3-211-33856-8. (in German). [The expensive hard cover version of this book was reviewed in OAS 5733. It was clear after its publication that the price of the book would limit its distribution among European odonatologists. With no change in contents, Springer Publishers have released a paper back edition of the book. The price was reduced to a third of the hard cover version, and there is now no longer a reason not to buy this book. (Martin Schorr)] Address: Springer Verlag GmbH, Sachsenplatz 4-6, A-1201 Wien, Austria. www.springer.at

**6390.** Röbbelen, F. (2007): *Libellen in Hamburg*. Rote Liste und Artenverzeichnis 2. Fassung. Herausgeber: Freie und Hansestadt Hamburg, Behörde für Stadtentwicklung und Umwelt, Hamburg: 23 pp. (in German). [Hamburg, Germany; red list of threatened Odonata.] Address: Herausgeber: Freie und Hansestadt Hamburg, Behörde für Stadtentwicklung und Umwelt, Stadthausbrücke 8, 20355 Hamburg. E-mail: www.bsu.hamburg.de

**6391.** Rouquette, J.R.; Thompson, D.J. (2007): Roosting site selection in the endangered damselfly, *Coenagrion mercuriale*, and implications for habitat design. *Jour. Insect. Conserv.* 11(2): 187-193. (in English). ["A successful conservation strategy for an insect species should Address the habitat requirements of all life stages and all activities performed by those life stages. In

this paper the night-time roosting habitat and behaviour of the endangered damselfly *C. mercuriale* was investigated by marking damselflies with UV fluorescent paint. Night-time observations revealed that individuals did not roost together and those that were recorded on more than one occasion did not return to the same spot each night. There was no apparent preference for roosting close to the watercourses. *C. mercuriale* roosted towards the top of the vegetation and this vegetation was considerably taller than the mean height of the vegetation in the study area. Adults were strongly associated with two tussock-forming monocots, *Juncus inflexus* and *Deschampsia cespitosa*. Differences in the abundance of these plants were shown to result in large differences in the numbers of *C. mercuriale* roosting in different parts of the site. The importance of providing these structural elements of habitat as part of a wider conservation strategy for this species is discussed." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**6392.** Rundle, S.D., Bilton, D.T.; Abbott, J.C.; Foggo, A. (2007): Range size in North American *Enallagma* damselflies correlates with wing size. *Freshwater Biology* 52(3): 471-477. (in English). ["(1.) Cross-species macroecological comparisons in freshwater invertebrates have been restricted by a lack of large-scale distributional data, and robust phylogenies. Here, we use data from the Odonata Central database to explore body length-range size and wing length-range size relationships in damselflies from the genus *Enallagma*; the recent publication of a phylogeny for this group meant that, as well as a cross-species analysis, we were able to assess relationships in a phylogenetically controlled manner. (2.) For cross-species comparisons, only wing length showed significant (positive) regression relationships with range size and occupancy, although the inclusion of body length in multiple regressions increased the fit of the models. Damselflies with larger wings relative to their body length had larger distributions, a result confirmed by a significant positive relationship between range size and residuals from the regression of wing size on body size. (3.) For the phylogenetically controlled analyses, only wing length contrast scores were significantly related to distribution patterns and entered into regression models; the significant positive relationships between wing length contrasts and both range size and occupancy contrasts suggested that evolutionary increases in wing length had occurred alongside range expansions. (4.) Together these results suggest that species of *Enallagma* with larger wings (both absolute and relative to body length) tend to be more widely distributed in North America and that the evolution of wing size may have played a role in range expansion. No such relationships were evident for body size. We discuss the potential importance of wing morphometrics for studying the evolutionary ecology of freshwater insects." (Authors)] Address: Rundle, S., Marine Biology and Ecology Research Centre, School of Biological Sciences, University of Plymouth, Plymouth, PL4 8AA, U.K. E-mail: srundle@plym.ac.uk

**6393.** Schappert, P. (2007): New Odonata for Bastrop County and the Stengl "Lost Pines" Biological Station. In: Abbott, J.C. (Ed.): *Dragonflies and Damselflies (Odonata) of Texas*. Vol. 2: 12-16. (in English). [Some an-

necdotal reports on dragonfly searching in times of the 2005/2006 drought in central Texas, USA, with emphasis on colonisation of ponds after heavy rainfall. E.g. 3 *Pachydiplax longipennis* were seen before rainfall, while only 4 hours after the rain had stopped, more the 600 specimens were observed at a pond filled again with water.] Address: Schappert, P., Stengl "Lost Pines" Biological Station, University of Texas, 401 Old Antioch Road, Smithville, TX 78957, USA. E-mail: philjs@mail.utexas.edu

**6394.** Schlotmann, F. (2007): Die Libellen (Insecta: Odonata) des Guntersblumer Unterfeldes. *Mainzer naturwiss. Archiv / Beiheft* 30: 76-87. (in German, with English summary). [Rheinland-Pfalz, Germany; "With the shift of drinking water wells in the "Unterfeld Guntersblum" by the Water Supply Rhinehesse GmbH the dragonflies of the area were monitored in the years 1994 and 1997 to 2001 as a check of compensation measures. Altogether 34 species were found under which numerous are endangered in Rhineland-Palatinate. The occurrence of *Lestes barbarus*, *Anax parthenope* and *Leucorrhinia caudalis* has to be especially pointed out. The installation of numerous small ponds as a compensation measure led to the stabilization of the dragonfly populations as well as to the new settlement of several species." (Author)] Address: Schlotmann, F., Weserstr. 11, D-55296 Harxheim, Germany. Email: frank.schlotmann@gmx.net

**6395.** Seidenbusch, R.; Heidemann, H. (2007): An experimental key for the differentiation of the exuviae of the Southern Darer *Sympetrum meridionale* (Sélys) and the Common Darer *S. striolatum* (Charpentier), with notes on the Ruddy Darer *S. sanguineum* (Müller). *J. Br. Dragonfly Society* 23(1): 25-32. (in English). ["A study was carried out to develop a diagnostic key for identification of the exuviae of [...] *S. meridionale* and *S. striolatum*. Until now, no reliable key has existed to differentiate the exuviae of these very similar species. Previous keys have suggested that they can be discriminated using dorsal and lateral spines, features which in our experience have proved to be very variable and unreliable. Therefore, we propose an experimental key which separates these species without reference to such spines. About two thirds of the exuviae of *S. meridionale* and *S. striolatum* can be separated by the ratio of the width of the submentum to the length of the mentum. The remaining third fall into an intermediate section but can be separated by using further ratios of morphological measurements. In our experience, using all the diagnostic features presented in this paper will allow exuviae of these species to be separated reliably." (Authors)] Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany. E-mail: seidenbusch@freenet.de

**6396.** Soldan, T.; Zeleny, J. (2007): Book Review: Wildermuth et al: *Odonata. Die Libellen der Schweiz. Fauna Helvetica* 12. *Eur. J. Entomol.* 104(2): 284. (in English). [Review of the book abstracted as OAS 5005.] Address: not stated

**6397.** Stav, G.; Kotler, B.P.; Blaustein, L. (2007): Direct and indirect effects of dragonfly (*Anax imperator*) nymphs on green toad (*Bufo viridis*) tadpoles. *Hydrobiologia* 579(1): 85-93. (in English). ["We conducted an artificial pond experiment to assess the direct and indirect effects of predation on *Bufo viridis* tadpoles. We ran

three treatments: free Anax (unrestrained predatory dragonfly nymph *Anax imperator*), caged Anax (non-consumptive effects), and control (no Anax). Anax showed both strong consumptive and non-consumptive effects on *Bufo* tadpoles. Free Anax eliminated all of the tadpoles within six days. Tadpoles preferred the shady side of the ponds. Caged Anax caused tadpoles to increase their spatial preferences. Tadpoles avoided the center of the pond, and in the presence of the caged predator, they were found in the center even less. Tadpoles also showed a strong preference for crowding together, and in the presence of a caged Anax, they tended to crowd more. Moreover, *Bufo* metamorphosed earlier and at a larger size in the caged Anax ponds, possibly by providing extra food resources due to the extra organic matter excreted by the predators." (Authors)] Address: Stav, G., Jacob Blaustein Institute for Desert Research, Mitrani Department of Desert Ecology, Ben-Gurion University of the Negev, Sede-Boqer Campus, 84990 Negev, Israel. Email: [gstav@tulane.edu](mailto:gstav@tulane.edu)

**6398.** Stoks, R.; De Block, M. (2007): Causes and costs of lamellae autotomy in damselfly larvae: a review. In: Tyagi, B.K. (Ed.): *Odonata: Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 241-255. (in English). ["Autotomy, the amputation of a body part at a breakage plane, is a well-known escape mechanism when animals are caught by a predator. Here, we review the ecological causes, field occurrence, and costs of lamellae autotomy in damselfly larvae. Lamellae autotomy is widespread in nature and is an important escape mechanism when caught by invertebrate predators and small fish, but has no survival advantage against large fish. However, associated with the other functions of lamellae, autotomy carries short-term costs in the form of a reduced ability to withstand low oxygen levels and high temperatures, and an increased vulnerability to conspecific and heterospecific predation. To deal with the latter, larvae show threat-sensitive antipredator behaviour after autotomy. The resulting reduced food intake together with their increased predator-induced stress, may explain negative effects on mass and size at emergence and wing asymmetry. Based on the known short-term costs, long-term costs on adult fitness and a regulatory role of autotomy in population regulation are likely, but await experimental proof." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: [robby.stoks@bio.kuleuven.ac.be](mailto:robby.stoks@bio.kuleuven.ac.be)

**6399.** Subramanian, K.A. (2007): Endemic odonates of the Western Ghats: habitat distribution and conservation. In: Tyagi, B.K. (Ed.): *Odonata: Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 257-271. (in English). ["The habitat distribution of endemic odonates of Western Ghats is studied based on field work and published literature. One hundred and seventy six species of odonates with 68 endemics are reported from the Western Ghats. The breeding habitats of 50 endemic species are known. The current field survey discovered new populations of three monotypic species from the region. Most of the endemic species are restricted to riverine habitats as compared to non-endemics. Streams flowing through evergreen forests and Myristica swamps support high diversity of endemics. Draining of Myristica swamps, diversion of streams for agricultu-

re and structural alterations are major threats to the conservation of endemic species of the region. Long term conservation of endemic odonate fauna of region should focus on conservation of riverine habitats of the region." (Author)] Address: Subramanian, K.A., Centre for Ecological Sciences, Indian Institute of Science, Bangalore- 560 012, India. E-mail: [subbu@ces.iisc.ernet.in](mailto:subbu@ces.iisc.ernet.in)

**6400.** Theischinger, G.; Richards, S.J. (2007): Three new damselfly species from Papua New Guinea (Zygoptera: Megapodagrionidae, Coenagrionidae). In: Tyagi, B.K. (Ed.): *Odonata: Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 33-43. (in English). ["Three species of damselflies from Eastern Highland Province, Papua New Guinea are described as new. They are: *Argiolestes angulatus* sp. n. (Holotype male: Mamaifu, 21-XI-1997), *Argiolestes fornicatus* sp. n. (Holotype male: Mamaifu, 29-XI-1997) and *Austroagrion kiautai* sp. n. (Holotype male: montane lake behind Mamaifu, 27-XI-1997). Diagnostic characters of the adults are illustrated and the affinities of the species are discussed. All type material is deposited at the South Australian Museum, Adelaide." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

**6401.** Thomas, B. (2007): Williamson County Gold: Chandler Creek. Abbott, J.C. (Ed.): *Dragonflies and Damselflies (Odonata) of Texas*. Vol. 2: 7-8. (in English). [USA, Texas, checklist of odonate records resulting ongoing from 2004] Address: E-mail: [Rthomas5@austin.rr.com](mailto:Rthomas5@austin.rr.com)

**6402.** Toms, R.B. (2007): Rooting the phylogenetic tree for winged insects: independent adaptations to terrestrial life. *African Invertebrates* 48(1): 203-211. (in English). ["Although numerous articles have been published on insect phylogeny using a great variety of techniques, there is no consensus on the nature of the first winged insects, the ancestors of holometabolous insects or the causes for the origin of metamorphosis. This discord has resulted in the lack of secure foundations within entomological theory. However, several recent articles provide key information which may help to resolve some of the long-standing disputes. Some biologists have argued that the first winged insects might have been amphibiotic rather than terrestrial and that metamorphosis might have originated as an adaptation to amphibiotic life. Thus entomological theory may now be passing through a paradigm shift where, for the first time, the phylogenetic tree for all insects may be firmly rooted." (Author) The paper includes references to the Odonata.] Address: Toms, R.B., Indigenous Knowledge Systems, Transvaal Museum, Northern Flagship Institution, P.O. Box 413, Pretoria, 0001 South Africa. E-mail: [toms@nfi.co.za](mailto:toms@nfi.co.za)

**6403.** Tyagi, B.K.; Kiauta, M.A.J.E. (2007): Professor Bastiaan Kiauta - an extraordinary and outstanding odonatologist. In: Tyagi, B.K. (Ed.): *Odonata: Biology of Dragonflies*. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: 1-24. (in English). [(1) Brief account on the odonatological vita of B. Kiauta with emphasis to Indian odonatology. (2) Odonatological bibliography of B. Kiauta covering 1954 - 2006.] Address: Kiauta, M., P.O. Box 256, NL-3720 AG Bilthoven, The Netherlands. E-mail: [mb.kiauta@12move.nl](mailto:mb.kiauta@12move.nl)



**6404.** Tyagi, B.K. (2007): Odonata: Biology of Dragonflies. Jodhpur, Scientific Pub., 2007, xx, 368 pp., tables, figs., ISBN 81-7233-482-6: xx, 368 ppp. (in English). [Festschrift dedicated to Prof. Dr. B. Kiauta. Contents: Foreword/Preface by Norman Moore and Kiyoshi Inoue. Acknowledgements. 1. Professor Bastiaan Kiauta - an extraordinary and outstanding odonatologist/B.K. Tyagi and M.A.J.E. Kiauta. 2. Studies on neotropical protoneuridae. 2. *Neoneura Kiautai* spec. nov. from Southeastern Brazil (Zygoptera, Protoneuridae) /Angelo B.M. Machado. 3. Three new damselfly species from Papua New Guinea (Zygoptera: Megapodagrionidae, coenagrionidae)/G. Theischinger and S.J. Richards. 4. Dragonflies from the Okavango swamps (Botswana, Southern Africa) in winter/Henri J. Dumont. 5. *Cordulegaster insignis* (Schneider, 1845) in Bulgaria with notes on its biology and ecology/Milen Marinov, Burkhard Grebe and Yordan Kutsarov. 6. The dragonfly fauna of the Shivapuri Hills, Nepal (Odonata: Zygoptera, Anisozygoptera, Anisoptera)/T. Brockhaus, S.G. Butler, R.G. Kemp and G.S. Vick. 7. The composition and history of Siberian odonate fauna/A.Yu. Haritonov. 8. The dragonflies of forest-steppe in West Siberia: fauna, ecology and biology/O.N. Popova. 9. Odonata of Mexico revisited/E. Gonzalez Soriano and R. Novelo Gutierrez. 10. Odonata inventories in British Columbia, Canada: determining the conservation status of odonata species/Robert A. Cannings, Leah R. Ramsay and Sydney G. Cannings. 11. Cytogenetics of American Odonata/Liliana M. Mola. 12. Are the observed dispersal capacities in damselfly species sufficient to cope with the ongoing rapid shift of climate zones?/J. Beukema. 13. Local assemblage patterns of odonates in Central Choco, Colombian Pacific/L. Perez. D. Monroy and E. Realpe. 14. The expansion of *crocothemis erythraea* (Brulle, 1832) in Germany - an indicator for climatic changes/J. Ott. 15. Adaptationist approach of reproductive behaviour in Libellulidae: a case report on *Diastatops obscura* Fabricius/J.B. Irusta and A. Araujo. 16. Causes and costs of lamellae autotomy in damselfly larvae: a review/R. Stoks and M. De Block. 17. Endemic odonates of the Western Ghats: habitat distribution and conservation/K.A. Subramanian. 18. Dragonflies of the Madurai Kamaraj University Campus (Tamil Nadu, India)/P.L. Miller. 19. Larval and adult behavioural patterns of some odonata species from Dehradun Valley/Amit Mitra. 20. *Coellicia hoanglienensis* spec. nov., a new platynemid damselfly from Hoang Lien mountains in the North of Vietnam (Zygoptera: Platynemididae)/Do Manh Cuong. 21. Observations on mating and oviposition behaviour of *Tetrathemis platyptera* Selys, 1878/Kiran C.G. and F.K. Kakkassery. 22. About the odonata ethnic names in the Serbian linguistic area /Milos Jovic. 23. Discovering the dragonfly wealth of Kerala - the God's own land - in South India: a travelogue/Dan Barta.] Address: Tyagi, B.K., Centre for Research in Medical Entomology (ICMR), 4-Sarojini Street, Chinna Chokkikulam, Madurai 625005 (Tamil Nadu), India. E-mail: bkjyagi@sify.com

**6405.** Wagner, H.; Ott, J. (2007): Naturschützer: Insekten sind erste Opfer. Libellen bilden ein Frühwarnsystem für Klimaänderungen. Bestand im Pfälzerwald gefährdet. Rheinzeitung vom 7.3.2007: (in German). [Interview with Jürgen Ott on Odonata as indicators of climatic change in a German newspaper.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**6406.** Ward, L.; Mill, P.J. (2007): Long range movements by individuals as a vehicle for range expansion in *Calopteryx splendens* (Odonata: Zygoptera). Eur. J. Entomol. 104(2): 195-198. (in English). ["(1.) Flight activity in zygopterans is generally restricted to short-range movements associated with foraging, reproductive activity and escape. Indeed, previous studies have suggested that *Calopteryx* species, including *C. splendens*, are relatively sedentary species, with a low tendency for long distance movements. (2.) Recent observations suggest that *C. splendens* is expanding its northern range in the UK; in the northeast the species is now well established in Northumberland and, in the northwest, has recently spread into south-west Scotland. The current study aimed to investigate the mobility and dispersal tendency of *C. splendens* in a well-established breeding population in NE England. (3.) A mark-release-recapture study was carried out on a population of *C. splendens* along a section of the River Wharfe, West Yorkshire, UK. 831 adult *C. splendens* were marked uniquely for individual identification in order to monitor the day-to-day, and overall, distance and direction of movement for each individual. Of these 381 were recaptured at least once. (4.) The majority of males (85%) and females (88%) moved a distance of 100 m or less and only five of the recaptured individuals (1.3%) moved a minimum distance in excess of 500 m. Although the median distance moved by males was greater than that for females, this was not significant. In addition, there was no significant difference in the number of either males or females moving upstream as opposed to downstream. (5.) The results are compared with those from other studies on calopterygid movement. Although most individual *C. splendens* stay within a suggested home range of approximately 300 m, clearly individuals have the potential to cover relatively long distances, and it is these latter movements that play a fundamental role in increasing the range of the species." (Authors)] Address: Mill, P.J., Fac. Biological Sciences, L.C. Miall Building, University of Leeds, Leeds, LS2 9JT, UK. E-mail: p.j.mill@leeds.ac.uk

**6407.** Watts, P.C.; Rousset, F.; Saccheri, I.J.; Leblois, R.; Kemp, S.J.; Thompson, D.J. (2007): Compatible genetic and ecological estimates of dispersal rates in insect (*Coenagrion mercuriale*: Odonata: Zygoptera) populations: analysis of 'neighbourhood size' using a more precise estimator. *Molecular Ecology* 16(4): 737-751. (in English). ["Genetic and demographic estimates of dispersal are often thought to be inconsistent. In this study, we use *C. mercuriale* as a model to evaluate directly the relationship between estimates of dispersal rate measured during capture-mark-recapture fieldwork with those made from the spatial pattern of genetic markers in linear and two-dimensional habitats. We estimate the 'neighbourhood size' ( $N_b$ ) - the product of the mean axial dispersal rate between parent and offspring and the population density - by a previously described technique, here called the regression method. Because *C. mercuriale* is less philopatric than species investigated previously by the regression method we evaluate a refined estimator that may be more applicable for relatively mobile species. Results from simulations and empirical data sets reveal that the new estimator performs better under most situations, except when dispersal is very localized relative to population density. Analysis of the *C. mercuriale* data extends previous results which demonstrated that demographic and genetic estimates of  $N_b$  by the regression method are

equivalent to within a factor of two at local scales where genetic estimates are less affected by habitat heterogeneity, stochastic processes and/or differential selective regimes. The corollary is that with a little insight into a species' ecology the pattern of spatial genetic structure provides quantitative information on dispersal rates and/or population densities that has real value for conservation management." (Authors)] Address: Watts, P. C.; School Biological Sciences, The Biosciences Building, Crown Street, University of Liverpool, Liverpool, L69 7ZB, UK. E-mail: p.c.watts@liv.ac.uk

**6408.** Watts, P.C.; Thompson, D.J.; Allen, K.A.; Kemp, S.J. (2007): How useful is DNA extracted from the legs of archived insects for microsatellite-based population genetic analyses?. *Journal of Insect Conservation* 11(2): 195-198. (in English). ["DNA obtained from museum specimens provides a historical perspective on levels of genetic diversity. Archived samples are irreplaceable so it is desirable that only parts of the specimens are used, which constrains the amount of DNA obtained from small taxa. However, at present there are no quantitative data on yields of DNA from such samples. In this paper we determine the amount of DNA that may be extracted from the legs of museum-archived specimens of the damselfly *Coenagrion mercuriale* (Charpentier) and the suitability of this DNA for PCR-amplification of nuclear genetic loci (microsatellites). We find that (i) the yield of DNA correlates with the genotyping success rate and (ii) the amount of DNA obtained from the legs decreases with time since sample collection until 1954, before which no DNA could be detected (although DNA may be present in very low quantities). This cut-off point for successful DNA extraction corresponds with the date until reliable genotypes could be obtained by routine PCR. Thus, air-dried insect legs more than 50 years old appear to have limited usefulness for studies that seek to amplify many nuclear loci without the use of other techniques that may be used to increase the possible low-quantities of template DNA present." (Authors)] Address: Watts, P.C., Marine and Freshwater Biology Research Group, The Biosciences Building, School of Biological Sciences, Liverpool University, Crown Street, Liverpool, L69 7ZB, UK. E-mail: phill@liv.ac.uk

**6409.** Weihrauch, F.; Bairl, E.; Kunz, B. (2007): 25 Jahre *Libellula*: Bibliographie, Daten und Register. *Libellula Suppl.* 8: 1-72. (in German). [Bibliography of 25 volumes and 7 supplements of *Libellula*, the journal of the Society of German-speaking odonatologists.] Address: Weihrauch, F., Jägerstr. 21A, D-85283 Wolnzach, Germany. E-mail: Florian.Weihrauch@t-online.de

**6410.** Wilson, K.D.P.; Xu, Z. (2007): Odonata of Guangdong, Hong Kong and Macau, South China, part 1: Zygoptera. *International Journal of Odonatology* 10 (1): 87-128, pls I-VIII. (in English). ["Extensive surveys for odonates were completed in protected areas throughout Guangdong Province, south China during the period 1997-2005. Previously unreported data from these surveys is presented here and, together with published data, is used to catalogue the zygopteran fauna of Guangdong. Checklists are provided for the Zygoptera of Guangdong, Macau and Hong Kong. *Sinosticta debra* sp. nov. is described from Chebaling, northeast Guangdong (holotype male 20 iv 2002, deposited at South China Agriculture University, Department of Entomology, Guangzhou). The presence of *Atroca-*

*lopteryx atrocyana* is confirmed from Chinese territory. Keys are provided for the identification of males of all known species of Rhipidolestes and Chinese Megalolestes." (Authors)] Address: Wilson, K.D.P., 118 Chatsworth Road, Brighton, BN1 5DB, UK. E-mail: kdpwilson@gmail.com

**6411.** Woodcock, T.S.; Hury, A.D. (2007): The response of macroinvertebrate production to a pollution gradient in a headwater stream. *Freshwater Biology* 52(1): 177-196. (in English). ["1. This study quantified patterns of macroinvertebrate secondary production and stored benthic organic matter along a gradient of pollution and habitat channelisation over a 3-km reach of Goosefare Brook, a first-order stream in southern Maine (U.S.A.). 2. Whole-community invertebrate production decreased from 26.4 g ash-free dry mass (AFDM) m<sup>-2</sup> year<sup>-1</sup> at the reference station to 1.1 g AFDM m<sup>-2</sup> year<sup>-1</sup> at stations with the greatest levels of pollution. Production decreased along the pollution gradient for most taxa, although decreases were partly offset by production increases in tolerant taxa. Biomass turnover rates (P/B) were less affected by the stresses than was production. 3. Differences in functional characteristics of the community were evident at stations with channelised habitat, but overall production declined in a linear pattern that mirrored the pollution gradient. Stored organic matter showed a decline along the gradient, but was also lower at channelised stations. Populations of taxa with documented pollution tolerance were more likely to maintain or increase production and P/B. 4. Decreasing biomass because of decreasing stored organic matter and lethal effects of pollutants resulted in shifts in the pathways of energy flow observed at stations exposed to moderate physical or chemical stress, to the loss of most taxa and an extreme (96%) decrease in production at the stations receiving the highest levels of metal pollution. 5. The shifting prominence of different taxa along a continuum of stress in Goosefare Brook shows that describing the nature of an impairment in a functional context requires consideration of chemical stressors, habitat alterations and food resources." (Authors) The study includes data on "*Cordulegaster*" and "*Lanthus*".] Address: Woodcock, T.S., Dept of Biology, N3022 Science Building, Wilfrid Laurier University, 75 University Ave. W., Waterloo, Ontario, Canada, N2L 3C5. E-mail: thomasw@execulink.com

**6412.** Zillich, S. (2007): Artenschutz: Libellen schützen. *BUNDmagazin* 01-07: 28-29. (in German). [Brief popular account on Odonata in the newsletter of BUND members, one of the most important organisations on nature conservation in Germany.] Address: Zillich, S., BUND- Bundesgeschäftsstelle, Am Köllnischen Park 1, D - 10179 Berlin, Germany. E-mail: severin.zillich@bund.net

**Thanks to all who contributed to this issue of OAS!**  
A special thank to Werner Piper, Reinhard Jödicke, Pawel Buczyński, and Wolfgang Schneider.

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Silberdistelweg 11, D-72113 Ammerbuch, Germany. Tel. ++49 (0)7073 300770; E-mail: martin@lindeboom.de  
Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105;  
E-mail: K.Reinhardt@sheffield.ac.uk  
Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

---

1997

1998

**6413.** Asahina, S. (1997): Records of the Northern Vietnamese Odonata taken by the expedition members from the National Science Museum, Tokyo. 5. Coenagrionidae, Protoneuridae and Platycnemididae. Bull. natn. sci. mus. Toko Ser. A. 23(1): 17-34. (in English). ["In total 24 species of northern Vietnamese damselflies referable to three zygopterid families are recorded in the fifth part of this series. Many of them seem to be rather common lowland species, but special attention is paid to the family Platycnemididae, of which 3 *Calicnemia* are illustrated including one new species and 6 of the 7 *Coeliccia* species are described as being new to science. A large-sized *Coeliccia*-like species, once treated as "*Trichocnemis* orang Foerster", is placed in the genus *Indocnemis* Laidlaw, and its largest form is treated as *I. orang*, forma *kempi* Laidlaw." (Author) *Calicnemia uenoi*, *Coeliccia tomokunii*, *C. chromothorax*, *C. uenoi*, *C. onoi*, *C. satoi*, *C. acco*] Address: Asahina, S., 4-4-24 Takadanobaba, Shinjuku-ku, Tokyo 169, Japan

**6414.** Wildermuth, H. (1997): Phänologie und Larvenhabitate von *Somatochlora flavomaculata* (VdL) in einem voralpinen Moorkomplex (Anisoptera: Corduliidae). *Libellula* 16(1/2): 17-32. (in German, with English summary). ["Based on sight observations, quantitative collections of exuviae and habitat analyses the emergence and flight period as well as the larval waters were investigated during a 13 year study near Zurich in the Swiss midlands. The emergence period lasted from the middle of May to the end of July, the flight period from the end of May to the end of September. Puddles, peat diggings and ditches revealed suitable larval habitats. These are shallow water bodies rather densely overgrown by emergent vegetation comprising different plant associations. The visual cue for the recognition of the various oviposition sites may consist of the homogeneous structure of the larval habitat indicating shallow water with organic mud ground and free of fish. The significance of male extraaquatic territories is shortly discussed with respect to habitat selection." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**6415.** Brockhaus, T. (1998): Ein Zauneidechsen Männchen (*Lacerta agilis* L., 1758) flüchtet ins Wasser. *Jahresschrift für Feldherpetologie und Ichtyofaunistik Sachsen* 5: 111-112. (in German). [Sachsen, Germany; remnant wings of *Calopteryx splendens* were found at a site the lizard *L. agilis* escaped from the approaching person.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**6416.** Mason, W.T. (1998): Macrobenthic monitoring in the Lower St. Johns River, Florida. *Environmental Monitoring and Assessment* 50(2): 101-130. (in English). ["The macrobenthos in the oligohaline 132 km reach of the Lower St. Johns River, Florida, is an unusual blend of freshwater and marine organisms within the annelid, mollusc, aquatic insect, and crustacean groups. During 1993-1994, the community composition was freshwater oriented in the 47 km (seg I) and estuarine dominated in the lower 85 km (seg II). Of the total 146 taxa (including Odonata) collected, 89% were euryecious 'eutrophic' and 'pollution tolerant' organisms. Densities ranged between 5000 and 20 000 individuals/m<sup>2</sup> ann av and maximum densities (85 000 individuals/m<sup>2</sup>) occurred in the muck substrate at the confluence of major tributaries and embayments. Throughout the lakelike seg II, benthic hypoxia existed during much of summer through fall. Biotic index values for grab, artificial substrate, and sled trawl samples reflected greatest stresses to the macrobenthos then. Both low taxonomic diversity and densities of organisms at the most downriver stations nearest the port of Jacksonville indicated that toxic substances also adversely affected the macrobenthos. Maintenance of the narrow band of littoral submerged aquatic vegetation (SAV) and adjacent shoreline riparian vegetation is important to sustain macrobenthic communities and other kinds of aquatic life in the river." (Author)] Address: Mason, W.T., Southeastern Biological Science Center, National Biological Service, U.S. Department of the Interior, Gainesville, Florida, U.S.A.



**6417.** Watanabe, M.; Taguchi, M.; Ohsawa, N. (1998): Field study on population of the damselfly *Callopteryx japonica* (Odonata) using mark-release-and-recapture method as a technique for environmental education. Bulletin of the Faculty of Education, Mie Univ, Natural Science 49: 29-37. (in Japanese, with English summary). ["In order to clarify the population dynamics of *C. japonica*, the mark-release-and-recapture method was used for the population inhabiting in a small river in cool temperate zone of Japan, 1989 and 1990. The survey on the distribution of each adult perching was also carried out. The estimated daily number of males was 500 (1989), while that of females was 480 (1989). Then the operational sex ratio in each year was likely unity. The daily estimate number of immigrants in each year was low, and the daily survival rate was high. Therefore, the populations in both years were considered to be a closed population. The perching site of the damselfly depended upon the sunlit area on the shore line of the river. Along the shore line the perching site of males was shown as a clear random distribution, due to the territorial behaviour. The survey curriculum provided the basic understanding of concepts on mark-release-and-recapture method for high school students as well as undergraduate students. The damselfly used in this study allowed for the application and extension of the skills and knowledge of field ecology. These results were discussed as a teaching material for the damselfly in view point of the environmental education." (Authors)] Address: Watanabe, M., Department of Biology, Faculty of Education, Mie University, Tsu, Mie 514-8507, Japan. E-mail: watanabe@edu.mie-u.ac.jp

#### 1999

**6418.** Allanson, M.; Georges, A. (1999): Diet of *Elseya purvisi* and *Elseya georgesi* (Testudines: Cheloniidae), a sibling species pair of freshwater turtles from eastern Australia. Chelonian Conservation Biology 3: 473-477. (in English). [Australia; the stomach content of 72 specimens collected in the Manning and Barnard Rivers (*E. purvisi*; n=41) and Bellinger River (*E. georgesi*, n=31) was surveyed for food items. Odonata were represented in 12.9% of the *E. georgesi* turtles, and in 77.3% of the *E. purvisi* turtles from Barnard River and in 47.4 from Manning River. In general only few odonate items were collected indicating that Odonata are not a really important food source for the turtles. Most important as food are Trichoptera.] Address: Georges, A., Applied Ecology Research Group and CRC for Freshwater Ecology, University of Canberra, ACT 2601, Australia. E-mail: georges@aeg.canberra.edu.au

**6419.** Carvalho, A.L. (1999): Ordem Odonata. In: D. Ismael et al., [Eds], Invertebrados de aqua doce, Vol. 4: Biodiversidade do Estado de Sdo Paulo, Brasil: sintese do conhecimento ao final do seculo XX. FAPESP, Sao Paulo: 149-155. (in Portuguese). [This chapter gives a brief general outline of odonate morphology and biology, a brief review of exploration history and of the present state of knowledge on the odonate fauna of Sao Paulo, Brasil, and a regional bibliography.] Address: Carvalho, A.L., Caixa Postal 68044, Cidade Universitaria, BR-21944-970 Rio de Janeiro, RJ, Brasil

**6420.** Furriols, M.; Garciamoreno, J.; López, J.; Mercader, J.; Montpey (1999): Faunística i distribució dels odonats d'Osona. Butll. Inst. Cat. Hist. Nat. 67: 131-140. (in Spanish, with English summary). ["The odonate fauna of Osona (Barcelona, Spain) and its distribution are presented, on the basis of data from adults obtained in 17 itineraries during the period 1988-89. Thirty-six species were detected, representing 55,4 % of those recorded from Catalonia. *Lestes viridis* and *Anax imperator* have the widest distribution and *Platycnemis latipes* and *L. viridis* are the most abundant. *Olost*, *Sora* and *El Sorreigs* are the itineraries with the largest numbers of species. Finally, some aspects of the abundance, distribution and ecology of the species present in Osona are discussed." (Authors)] Address: Turet, J., Universitat de Vic. Sagrada Família, 7. 08500-Vic. Spain. E-mail: josep.turet@uvic.es

**6421.** Gunathilagaraj, K.; Soundarajan, R.P.; Chitra, N.; Swamiappan, M (1999): Odonata in the rice fields of Coimbatore. Zoos' Print Journal 14: 43-44. (in English). [India; 16 species are checklisted.] Address: Gunathilagaraj, K., Dept Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu 641003, India

**6422.** Hedge, T.A.; Crouch, T. E. (1999): Clarification of the names *Orthetrum julia falsum* Longfield, 1955 and *O. julia capicola* Kimmins, 1957 (Odonata: Anisoptera: Libellulidae). African Entomology 7(2): 302-304. (in English). [This is a detailed discussion of nomenclatural problems of taxa within the *Orthetrum julia* complex. The authors conclude that *O. capense* Calvert, 1893 is invalid in any combination, and thus the correct names of the two subspecies of *O. julia* occurring in South Africa are stated as in the title of this publication.] Address: Crouch, T. E., Durban Natural Science Museum, Durban, 4000 South Africa

#### 2000

**6423.** Che Salmah, M.R.; Hassan, S.T.S.; Abu Hassan, A. (2000): Local movement and feeding pattern of adult *Neurothemis tullia* (Drury) (Odonata: Libellulidae) in a rain fed rice field. Tropical Ecology 41(2): 233-241. (in English, with Spanish and Portuguese summaries). ["The movements of *N. tullia* adults were studied in a rain fed rice field using the mark-release-recapture technique. Both male and female dragonflies were widely distributed within their home range of approximately 30 m radii. Adult movements were highly localized and the longest distance travelled was about 130 m. Diurnal feeding pattern was studied by examining gut contents. Some individuals had taken preys as early as 0730 hr. Feeding activity however, peaked at 1030 hr and at 1730 hr. Daily food intake was highly variable between sexes and within hours of the day. Females fed more actively in the morning and their body weights were heavier than that of males at all hours of the day. Active feeding activity of both sexes reflected effective predation." (Authors)] Address: Che Salmah, M.R., School of Biological Sciences, Universiti Sains Malaysia, 11800 Minden, Penang, Malaysia

**6424.** Conze, K.-J. (2000): AK Libellen NRW – Rundbrief 7. Arbeitskreis Libellen NRW – Rundbrief Nr. 7: 10 pp. (in German). [The currently known status of distribution of the Odonata of Nordrhein-Westfalen, Germany is documented for further discussion. Maps of 60 Odonata species are given.] Address: Conze, K.-J., Listerstr. 13, D-45147 Essen, Germany. E-mail: Klaus-Juergen.Conze@t-online.de

**6425.** Handke, K. (2000): Veränderungen in der Insektenfauna der Bremer Flussmarschen 1992-1999 - Zeichen des Klimawandels? NNA-Berichte 2/2000: 37-54. (in German, with English summary). [Based on regional faunistic investigation starting in 1982 a range extension of eight odonate species is discussed and related to climatic warming.] Address: Handke, K., Riedenweg 19, D-27777 Ganderkesee, Germany

**6426.** Petrulevicius, J.P.; Martins-Neto, R.G. (2000): Checklist of South American Cenozoic Insects. Acta Geologica Hispanica 35 (12): 135-147. (in English, with Spanish summary). [This checklist is a compilation of literature about South American Cenozoic insects. The list include 73 named insects belonging to 11 orders. Records are from the Oligocene and Pleistocene of south-eastern Brazil, late Paleocene of north - western Argentina and Paleocene-Eocene of southern Argentina. Palaeomacromia multicellulata is the only Odonata listed.] Address: Petrulevicius, J.P., Departamento Científico Paleozoología Invertebrados, Museo de La Plata, Paseo del Bosque s/n, 1900 La Plata, Argentina. E-mail: levicius@museo.fcnym.unlp.edu.ar

**6427.** Sanchez, M.I.; Green, A.J.; Dolz, J.C. (2000): The diets of the White-headed Duck *Oxyura leucocephala*, Ruddy Duck *O. jamaicensis* and their hybrids from Spain. Bird Study 47: 275-284. (in English). ["We studied the gut contents of 17 White-headed Ducks, 25 North American Ruddy Ducks and 26 hybrids between the two species collected from 14 Spanish wetlands. This is the most detailed study to date of *Oxyura* diet in the Palearctic region. Food items from at least 27 families of invertebrates (including Odonata) and at least ten families of aquatic plants were identified. The method of collection of ducks and rapid digestion of soft-bodied invertebrates may have overestimated the importance of plant matter. However, animal foods were more important, constituting 73% of aggregate volume of gullet contents. In both duck species and their hybrids, benthic chironomid larvae and pupae were the most important food item, present in 69% of gullets and 75% of gizzards, and constituting 35% of aggregate volume and 26% of aggregate percentage in gullets. Angiosperm seeds were the next most important dietary component, and crustaceans (mainly Amphipoda, Cladocera and Isopoda) and green plant material were of secondary importance. No significant differences in diet were detected between duck species, sex or age classes. Birds sampled in the breeding season had more nematodes, but these may have been parasitic. Chironomids were less abundant in Ruddy Ducks collected from northern Spain outside of the range of the White-headed Duck." (Authors)] Address: Sanchez, Marta, Estación Biológica de Doñana, Avenida de María Luisa s/n, Pabellón del Perú, 41013 Sevilla, Spain

**6428.** Hlasek, J. (2001): Dragonflies of the Trebonsko PLA and BR. Ochrana Přírody 56(3): 71-74. (in Czech, with English summary). ["More than 50 dragonfly species have been recorded in the Trebonsko Protected Landscape Area and Biosphere Reserve. Although the area includes more than 465 fishponds larger than one hectare, species richness reflects mainly the high number of different types of water reservoirs. There are more than 500 permanent pools and remainders of meanders in the nature reserves in the Luznice and Nezárka river system. Dragonflies can be found also in the watered sandpits and peatbog mines. Various types of running waters are also very important, including both rivers and the extensive network of drains between fishponds. Last but not least, many reservoirs have been created by the PLA Administration as a part of conservation programmes. In the year 1999, 23 reservoirs were built. Dragonfly fauna of the Trebonsko region includes important populations of *Coenagrion lunulatum*, *Nehalennia speciosa*, *Lestes virens*, *Ophiogomphus cecilia*, *Cordulegaster boltonii*, *Aeshna subarctica*, *A. juncea*, *Brachytron pratense*, *Leucorrhinia dubia*, *Orthetrum albistylum* and *Sympetrum danae*." (Authors)] Address: not stated

**6429.** Reyes Sánchez, E.; Alvarez, A.D. (2001): Odonatos (Insecta) depositados en el Instituto de Ecología y Sistemática, Ciudad de La Habana. Cocuyo 11: 11-15. (in Spanish). [A list of species deposited in the institut's collection is given exclusively providing information on the localities of the records.] Address: Reyes Sánchez, E., Instituto de Ecología y Sistemática, CIT-MA, Apartado Postal 8029, Ciudad de La Habana 10800, Cuba

**6430.** Willigalla, C. (2001): Die Libellenfauna im Erweiterungsgebiet der Rieselfelder Münster. Jahresbericht Rieselfelder Münster 2001: 68-76. (in German). [Nordrhein-Westfalen, Germany. In 2001 a total of 22 odonate species was recorded. These are checklisted for the 11 localities surveyed, and compared with regional records starting in 1975.] Address: Willigalla, C., Annastr. 1, 55124 Mainz, Germany. E-mail: christoph@willigalla.de

**6431.** Burkart, G.; Burkart, W. (2002): Kejsartrollslända (*Anax imperator*) på Gotland. Körkmacken 33: 10-11. (in Swedish). [Sweden, Island of Gotland, 3-VII-2002] Address: Burkart, W., Am Emel 7, D-27412 Willstedt, Germany. E-mail: weguburkart@gmx.de

**6432.** Janecek, B.; Waringer, J. (2002): Fauna Aquatica Austriaca. Katalog zur autökologischen Einstufung aquatischer Organismen Österreichs. Odonata (Libellen) - Teil III. Moog, O. (Ed.): Wasserwirtschaftskataster. Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft. Wien.: 14 pp. (in German). [checklist of Austrian Odonata; saprobian classification of the Odonata species; classification according to the biocenological regions in Austria; classification according to feeding group (all predators)] Address: Warin-

ger, J., Limnological Department, Institute of Ecology and Conservation Biology, University of Vienna, Althanstr. 14, A-1090 Vienna, Austria

**6433.** Martin Casacuberta, R. (2002): Nueva cita de *Orthetrum nitidinerve* (Selys, 1841) (Odonata: Libellulidae) para Catalunya. *Boln Soc. ent. aragon.* 30: 180. ["1 male, La Bunyola, 17-VIM989; 1 male, La Marina, same date; both localities in the Barcelona area. Bibliographic references are provided also for all earlier records from Catalonia, Spain."] Address: Martini Casacuberta, R., C/ Marti Julia, 19-23. Ir la, ES-08911 Badalona, Spain

**6434.** Petrulevicius, J.K.; Nel, A. (2002): New palaeomacromiid dragonflies from the Upper Paleocene of Argentina. *Palaeontology* 45(4): 751-758. (in English). ["A new genus of palaeomacromiid dragonflies, *Curviarculia*, based on *Curviarculia delicata* sp. nov. and *Curviarculia lamasi* sp. nov., is erected from the upper Paleocene Maíz Gordo Formation of north-western Argentina. Phylogenetic relationships within Palaeomacromiidae are discussed, leading to a new family diagnosis."] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**6435.** Ramos Hernández, J.M.; de Armas, L.F. (2002): Registros nuevos de odonatos (Insecta) para el cabo de San Antonio, extremo más occidental de Cuba. *Cocuyo* 12: 6. (in Spanish). [Península de Guanahacabibes, Provincia de Pinar del Río, Cuba; 13 Odonata species were recorded in August 2001] Address: Ramos Hernández, J.M., Apartado Postal 2204, Sancti Spiritus, provincia de Sancti Spiritus 60100, Cuba

## 2003

**6436.** Bo, T.; Fenoglio, S.; Agosta, P.; Cucco M. (2003): *Studi Trent. Sci. Nat., Acta Biol.* 80: 59: 62. (in Italian, with English summary). ["Macrozoobenthos distribution and CPOM availability in a Ligurian stream (Rio del Giovo, Sassello, Italy) - Coarse particulate organic matter represents one of the most important energetic input in lotic systems. Aim of our study was to describe the microdistribution of macroinvertebrates in a 50 m-segment of the Rio del Giovo (Sassello, SV), analysing micro-environmental characteristics and availability of coarse particulate organic matter. We noticed that CPOM amount is an important factor regulating macroinvertebrate distribution especially when it is scarce."] (Authors) The list of taxa includes *Cordulegaster boltonii* and *Onychogomphus* sp. ] Address: Bo, T., Dipartimento di Alessandria, A.R.P.A. Piemonte, Via Trotti 17, I-15100 Alessandria, Italy. E-mail: tizianobo@hotmail.com

**6437.** Burkart, G.; Burkart, W. (2003): Vinterflicksländor i april. *Körkmacken* 36: 12-13. (in Swedish). [Records of *Sympecma paedisca* (16-IV-2003) and *S. fusca* (17-IV-2003) from Gotland (Sweden; X: 6399750; Y: 1675500) are documented.] Address: Burkart, W., Am Emel 7, D-27412 Wilstedt, Germany. E-mail: weguburkart@gmx.de

**6438.** Butov, G.S.; Khitzova, L.N. (2003): On the diet of amphibians and reptiles in anthropogenic habitats of the city of Voronezh. *Vestnik VGU Voroneshski Gossu-*

*darstvennyi Universitet) Series Chemistry, Biology and Pharmaceutics* 2003(2): 108-115. (in Russian). [Diet overlap and other food interactions of four species of amphibians and reptiles were studied in the town of Voronezh (Russia). The stomach contents of *Bufo viridis*, *Pelobates fuscus*, *Rana ridibunda*, *Lacerta agilis* were examined. Odonata are mentioned to occur in all but *Bufo viridis*, in *Rana ridibunda* they were found in more than 20% of the stomach contents investigated. Odonata larvae were treated as a separate category and were only found in *Rana ridibunda*, again in more than 20% of the individuals. For Odonata and odonate larvae combined this figure varied between 10 and 27% from June to September.] Address: no details stated

**6439.** Fontenla, J.L. (2003): Libélulas (Insecta: Odonata) de Sierra de los Órganos, Cuba. *Cocuyo* 13: 28-29. (in Spanish). [35 species are listed] Address: Fontenla, J.L., Museo Nacional de Historia Natural, Cuba. E-mail: cocuyo@mnhnc.inf.cu

**6440.** Giberson, D.J.; Dobrin, M. (2003): Species composition, distribution, and seasonal patterns of dragonflies and damselflies of Prince Edward Island National Park. *Parks Canada - Technical Reports in Ecosystem Science Report* 37: IV, 30 pp. (in English, with French summary). ["Thirty-eight species of Odonata [...] were found near ponds and streams in Prince Edward Island National Park of Canada between 1997 and 1999. This figure represents about 2/3 of the species so far reported from Prince Edward Island. The Brackley to Dalvey region of the park showed the highest diversity with 36 species, compared to only 19 species in the Cavendish to Rustico area and 13 species in the Greenwich area. This diversity pattern reflects the high diversity of aquatic habitats in the Brackley to Dalvey area, compared to other park regions. The primary flight period for adult odonates was July and August, with 31 of the species found during this period, but several species were found in early June and as late as October."] (Authors) Address: Prince Edward Island National Park, 2 Palmer's Lane, Charlottetown, PEI, c1a 5v6, Canada

**6441.** Kandibane, M.; Mahadevan, N.R.; Gunathilagaraj, K. (2003): Odonata in irrigated rice ecosystem of Madurai, Tamil Nadu. *Zoos' Print* 18(7): 1155-1156. (in English). [India; 12 Odonata species are listed and briefly commented.] Address: Kandibane, M., Agricultural College and Research Institute, Madurai, TN, 625104, India India

**6442.** Roque, F.O.; Trivinho-Strixino, S.; Strixino, G.; Agostinho, R.C (2003): Benthic macroinvertebrates in streams of the Jaragua State Park (Southeast of Brazil) considering multiple spatial scales. *Journal of Insect Conservation* 7(2): 63-72. (in English). ["The study of the distribution of macroinvertebrates, considering multiple hierarchic scales and incorporating different spatial dimensions to assess the role of disturbance in aquatic environments, can contribute to conservation, environmental evaluation and improvement of analytical tools in ecology. The object of this study was to evaluate the diversity of macroinvertebrates in streams of the Jaraguá State Park (SP-Brazil), considering three spatial scales: mesohabitats, segments, and hydrographic basins with different land use parameters (forest, mixed agriculture, organic pollution and deforestation). The samples, collected with a Surber collector, were taken



in the beginning of the dry season of 1998. Analysis of data through multiple correspondence analysis showed the importance of variables in macroscale (land use) for the distribution of the fauna in general and the relevance of variability in mesoscale for some taxa in particular. The work points to the necessity of considering different levels of spatial heterogeneity for the conservation of biodiversity in the streams of the park." (Authors) Odonata are considered on the genus level.] Address: Roque, F.O., Programa de Pós Graduação em Ecologia e Recursos Naturais UFSCar, Brazil. E-mail: pfor@iris.ufscar.br

**6443.** Schulz, D. (2003): Ein weiteres Vorkommen der Östlichen Moosjungfer (*Leucorrhinia albifrons* (Burmeister 1839)) in Mecklenburg-Vorpommern. Mitteilungen der Naturforschenden Gesellschaft West-Mecklenburg 3(1): 73-74. (in German). [Landkreis Uecker-Randow, south of Torgelow, Germany; records of a few specimens in 1999, no records in 2001.] Address: Schulz, D., Paul-Holz-Ring 18, 17309 Pasewalk, Germany. E-mail: DEWSchulz@aol.com

**6444.** Staniczek, A.H. (2003): Neufund der Steinfliege *Capnopsis schilleri* Plecoptera: Capniidae in Baden-Württemberg. Mitt. ent. Ver. Stuttgart 38: 9-12. (in German, with English summary). [Baden-Württemberg, Germany, the paper contains a passing reference to *Calopteryx virgo*.] Address: Staniczek, A.H., Staatliches Museum für Naturkunde, Rosenstein 1, 70191 Stuttgart, Germany. E-mail: staniczek.smns@naturkundemuseum-bw.de

## 2004

**6445.** Akamatsu, F.; Toda, H.; Okino, T. (2004): Food source of riparian spiders analyzed by using stable isotope ratios. Ecological Research 19: 655-662. (in English). ["We analyzed the food source of riparian spiders in a middle reach of the Chikuma River, Japan, by using stable isotope ratios of carbon and nitrogen. The carbon and nitrogen isotope ratios of attached algae were higher than those of terrestrial plants, reflecting a large carbon isotope fractionation in terrestrial plants and a difference in nitrogen sources. The carbon isotope ratios of terrestrial insects were similar to those of the terrestrial plants, and the ratios of aquatic insects were scattered between those of the terrestrial plants and the attached algae. The carbon and nitrogen isotope ratios of spiders were intermediate between those of the terrestrial and aquatic insects. The two-source mixing model using the carbon isotope ratio showed that the web-building spiders utilized both the terrestrial and aquatic insects, with large contribution by the aquatic insects (54% on average with a maximum of 92% among spider's taxa collected in each zone), in the riparian area in a middle reach of the Chikuma River. The large contribution of the aquatic insects was often observed for the spiders collected near river channel (<5 m) and for the horizontal web-building spiders collected across the riparian area. The relative contribution of the aquatic insects might be related with food availability (distance from river channel) and spider's food preference reflected in their web types (horizontal vs. vertical). Our results showed that organic materials produced in the river channel, in the riparian area, and in the

terrestrial area surrounding the riparian area were mixed at the carnivorous trophic level of riparian spiders." (Authors) "The  $\delta^{13}\text{C}$  of Odonata (*Calopteryx japonica*) were lower than the average  $\delta^{13}\text{C}$  of the other aquatic insects."] Address: Toda, H., Department of Environmental Sciences, Faculty of Science, Shinshu University, 3-1-1 Asahi, Matsumoto 390-8621, Japan. Email: h-toda@gipac.shinshu-u.ac.jp

**6446.** Bechev, D.N.; Stojanova, A.M. (2004): Geographic localities of invertebrates of conservation importance in the Rhodopes (Bulgaria). Trav. Sci. Univ. Plovdiv, Animalia 40(6): 19-25. (in Bulgarian, with English summary). [With focus on the invertebrate species from the lists of: IUCN Red List, Habitat Directive DCE 92/44/EEC, Bern Convention, ESC Red List, CO-RINE biotopes Check-list and Law for Biodiversity of Bulgaria, several records are documented including *Lestes dryas*, *Coenagrion hastulatum*, *Cordulegaster heros*, and *Somatochlora flavomaculata*.] Address: Bechev, D.N., Department of Zoology, University of Plovdiv, 24 Tzar Assen Str., BG-4000 Plovdiv, Bulgaria. E-mail: bechev@pu.acad.bg

**6447.** Boyce, D.C. (2004): A review of the invertebrate assemblage of acid mires. English Nature Research Reports Number 592: 110 pp. (in English). [A briefly commented checklist of British acid mire species is presented including the Odonata which are represented by *Ceriagrion tenellum*, *Coenagrion meruriale*, *Leucorrhinia dubia*, *Aeshna juncea*, *Sympetrum danae*, and *Orthetrum coerulescens*. Surprisingly, *A. caerulea* and *Somatochlora arctica* are not considered.] Address: D C Boyce, D.C., 1 Rosemary Lane, Dulverton, Somerset, TA22 9DP, UK

**6448.** Burkart, G.; Burkart, W. (2004): Nya trollsländeobservationer (Odonata) på Gotland. Körkmacken 40: 4-5. (in Swedish). [Current records of *Sympecma fusca* and *Anax imperator* are documented and mapped.] Address: Burkart, W., Am Emel 7, D-27412 Willstedt, Germany. E-mail: weguburkart@gmx.de

**6449.** Colon-Gaud, J.-C.; Kelso, W.E.; Rutherford, D.A. (2004): Spatial distribution of macroinvertebrates inhabiting Hydrilla and Coontail beds in the Atchafalaya basin, Louisiana. J. Aquat. Plant Manage. 42: 85-91. (in English). ["Hydrilla [*Hydrilla verticillata* (L.f.) Royle] became established in the Atchafalaya River Basin (ARB) in south central Louisiana during the 1970s, and now dominates the submergent macrophyte community. We examined the potential effects of this shift in macrophyte composition on the distribution of phytomacrofauna by comparing water quality and macroinvertebrate assemblage structure in canopy and sub-canopy habitats at edge and interior locations within hydrilla and native coontail (*Ceratophyllum demersum* L.) beds during the latter stages of the 2001 flood pulse. Both plant species exhibited similar water quality characteristics during the study, with significantly higher temperature, dissolved oxygen, and pH levels in canopy habitats. Principal components analysis of log-transformed macroinvertebrate densities identified four assemblages that together accounted for 63.5% of the variation in the density data. The Gastropoda-Hydrachnida assemblage exhibited higher densities in coontail during May-June (declining river stages), and was more abundant at interior locations in both macrophyte beds during July (stable river stages). The Hemiptera-Amphipoda as-

semblage exhibited higher densities in the canopies of the two plants during both sampling periods, as did the Decapoda-Odonata assemblage in July. The Diptera-Coleoptera assemblage showed a similar trend in vertical distribution, as well as marginally higher densities in hydrilla beds. The continued spread of hydrilla throughout the ARB has reduced the diversity of macrophyte habitats available to phytophilous macroinvertebrates, and has resulted in pervasive hypoxia in the macrophyte sub-canopy over large portions of available littoral habitat, with significant impacts on the vertical distribution of littoral macroinvertebrates." (Authors)] Address: Colon-Gaud, J.-C., Department of Zoology, Southern Illinois University Carbondale, Carbondale, IL 62901-6899, USA

**6450.** De Armas, L.F. (2004): Nuevo registro de *Ceclithemis eponina* (Drury, 1773) para Cuba (Odonata: Libellulidae). Boln Soc. ent. aragon. 34: 228-229. (in Spanish, with English summary). [1 male, Bacunayagua, Matanzas prov., 9-III-2004. This is the 7th record of the N. American *C. eponina* for Cuba, and the 2nd for the province.] Address: De Armas, L.F., P.O. Box 4327, San Antonio de los Baños, La Habana-32500, Cuba

**6451.** Dogan Bora, N.; Gül, A. (2004): Feeding biology of *Silurus glanis* (L., 1758) living in Hirfanli Dam lake. Turk. J. Vet. Anim. Sci. 28: 471-479. (in English). [Stomach contents and feeding features of the European catfish, *S. glanis* living in Hirfanli Dam Lake were investigated. Recognizable organisms were found in the stomachs of 91 *S. glanis* out of 162 caught between September 1996 and August 1997. The following prey items were found: Gammarus (21.87%), Odonata (19.79%), Sander lucioperca (19.79%), Tinca tinca (18.76%), *Silurus glanis* (1.04%), and Gastropoda (1.04%). In addition, it was noted that 1.04% of the organisms found in the stomachs of *S. glanis* were Homoptera and 2.08% were the parasite Platyhelminthes.] Address: Gül, A., Department of Biology Education, Gazi Faculty of Education, Gazi University, 06500 Teknik Okullar, Ankara, Turkey.

**6452.** Hadrys, H.; Melber, A. (2004): Biodiversität und Artenschutz: Paradebeispiel Libellen. TiHo - Forschung fürs Leben. Das Forschungsmagazin der Stiftung Tierärztliche Hochschule Hannover. 2004: 32-34. (in German, with English summary). ["Biodiversity and conservation biology: dragonflies, the classic example." [...] One of the most important groups of insects used for developing conservation strategies and as a bioindicator for quality and stability of environments is the order Odonata. Due to the odonates' complex reproduction behaviour and very specific habitat preferences, progressive anthropogenic changes to the environment have severe consequences on many odonates. For example, numerous species exist only in small isolated populations. The genetic diversity, i.e. adaptability, of a species and the survival of single populations is much more rapidly detectable at the genotypic level than by phenotypical methods. Based on genetic information, it is also possible to quickly identify isolation processes that threaten a population. Molecular genetic methods are becoming increasingly important for animals conservation in that they provide essential information on the condition of populations, species and habitats. This is demonstrated by the following study on the biodiversity of African dragonflies." (Authors)] Address: Hadrys,

Heike, Institut für Tierökologie und Zellbiologie, Bunteweg 17, D-30559 Hannover, Germany. E-Mail: heike.hadrys@tiho-hannover.de

**6453.** Iwata, S.; Watanabe, M. (2004): Saline tolerance of young zygopteran larvae inhabiting the emergent plants community established in estuaries. Japanese journal of entomology. New series 7(4): 133-141. (in Japanese, with English summary). ["Eggs and young larvae of the endangered brackish water damselfly, *Mortonagrion Hirosei*, were reared under various concentration of saline water, comparing with those of *Ischnura senegalensis*, *I. asiatica* and *M. selenion*, all of which inhabited the abandoned rice paddy fields near the habitat of *M. Hirosei*, reed community. The hatchability of each species under high concentration of saline was low, and 20.PERMIL. of saline water did not allow to hatch in *I. asiatica* and *M. selenion*. The mortality of young larvae of each species was also increased with the concentration of saline, and 15.PERMIL. of saline water was harmful to survive for both *I. asiatica* and *M. selenion*. Saline seemed to affect the moulting of the young larvae. On the other hand, *M. Hirosei* and *I. senegalensis* had similar saline tolerance at egg and young larval stages. Both species were considered to survive under brackish water, and then *M. Hirosei* might be a prey of *I. senegalensis* when they co-existed in the fields. The conservation strategy for *M. Hirosei* was discussed in view point of the artificially established reed community for the larval habitat." (Author)] Address: Watanabe, Mamoru, Professor of Conservation Ecology, Graduate School of Life and Environmental Sciences, University of Tsukuba, Ibaraki 305-8572, Japan. E-mail: watanabe@kankyo.envr.tsukuba.ac.jp

**6454.** Langheinrich, U.; Tischew, S.; Gersberg, R.M.; Lüderitz, V. (2004): Ditches and canals in management of fens: opportunity or risk? A case study in the Drömling Natural Park, Germany. Wetlands Ecology and Management 12: 429-445. (in English). ["Up until the present, canals and ditches in Europe have been used to drain and thus devastate fens (lowland moors). However, in many cases, their function can be changed from drainage to irrigation and re-wetting of previously drained areas. These systems of canals and ditches are characteristic elements of the historically developed cultural landscape. Therefore, management and development plans should be oriented towards their continual maintenance. Despite the density of canals and ditches in many regions of Germany, especially of Eastern Germany, there are only a few studies to evaluate these systems of waterways, and an integrated approach towards their assessment has been totally absent. Existing approaches for typology and assessment of flowing waterbodies have been investigated in the Drömling Natural Park with regard to their applicability to such artificial canals and ditches. Special attention is given to the composition of macroinvertebrate fauna and the assessment of factors that determine it. Surprisingly, most water sectors have a high conservation value. High total numbers of species correlated well with the occurrence of endangered species. Among the macroinvertebrates, limnophilic and phytophilic species were dominant, but rheophilic fauna were also commonly present. This was caused by the intermediate status of canals and ditches, since they are neither completely flowing nor completely stagnant waterbodies. Habitat quality of these waters is determined by a small number of morphological parameters: bank

steepness, depth of bottom, substrate diversity, hydraulic structures, and the structure of surroundings. In the framework of management and development measures, they should be maintained and improved for the future. To assess water quality, the Saprobic index and the Chemical index were appropriate, but for indication of trophic status, the Macrophyte-trophic index was adequate. Estimation of ecological integrity by a multi-metric index using macroinvertebrates indicates that waterbodies are in a good status according to the demands of the European Water Framework Directive." (Authors) The study includes a regional checklist of Odonata..] Address: Langheinrich, Uta, Dept of Water Management, University of Applied Sciences Magdeburg, Breitscheidstr. 2, D-39114 Magdeburg, Germany. E-mail: uta.langheinrich@wasserwirtschaft.hs-magdeburg.de

**6455.** Maeto, K.; Sato, S. (2004): Odonata habitats in the Shimanto River Basin - *Aquabio* 26(6): 522-527. (in Japanese, with English summary). ["We studied the habitat of Odonata in the Shimanto River basin in Shikoku, Japan. We conducted a correspondence analysis (CA) of 88 species observed at 455 grid sites (ca. 0.5km\*0.5km). Multiple regression analyses of the two main axes of the CA ordination on the geographical features (altitude, relief) and vegetation of grid sites indicated that the degree of relief and the areal proportion of paddy fields were the main determinants of the species distribution of Odonata. The Odonata species appearing in the Red Data Book of Kochi Prefecture were evaluated based on their recent tendency of occurrence. Several indicator species for environmental monitoring were selected on three landscapes (i.e. mountain, hill foot and plain) according to the endangered level and the requirement of water quality of each species. (Author)] Address: Maeto, K., Laboratory of Entomology, Faculty of Agriculture, Kobe University, Rokkodai-cho 1-1, Nada-ku, Kobe, 657-8501, Japan

**6456.** Nakagawa, M.; Motobayashi, T.; Arai, Y.; Nishimura, T. (2004): Ecology of eggs of *Gynacantha japonica* Bartenev in paddy fields. *Transactions of the Japanese Society of Irrigation, Drainage and Reclamation Engineering* 72(1): 71-77. (in Japanese, with English summary). ["*G. japonica* often inhabits paddy fields and passes the winter at the egg stage in soil of paddy fields. It had been seen often, but a marked decrease in density has been reported. In this paper, dormancy and hatching conditions were studied in eggs of *G. japonica*. Diapause eggs showed relatively high tolerance against drying condition, while post-diapause eggs in spring were sensitive to drying history. Hatching of the post-diapause eggs was promoted by receiving light stimulus under ponding condition. It was considered that changes in physical conditions, especially moisture condition, of paddy fields by farm land consolidation and increase in number of fallow paddy fields may result in decrease of number in *G. japonica*." (Author)] Address: not stated in English

**6457.** Pankratius, U. (2004): Moosjungfern im Aischgrund und im Nürnberger Reichswald. *Galathea* 20(2): 75-110. (in German, with English summary). [Bavaria, Germany; *Leucorrhinia dubia*, *L. pectoralis*, and *L. rubicunda* were studied at more than 120 water bodies. Special emphasis was given to records of exuviae. The results are compared to older published regional records. Conservation measures are discussed ex-

tensively.] Address: Pankratius, U., Allensteiner Straße 6, D-90766 Fürth, Germany

**6458.** Penalver, E.; Delclos, X. (2004): Insectos del Mioceno inferior de Ribesalbes (Castellón, España). *Interacciones planta-insecto*. *Treb. Mus. Geol. Barcelona* 12: 69-95. (in Spanish, with English summary). ["This paper carries out the study of ichnofossils originated by insects found in the Lower Miocene locality of "La Rinconada", near Ribesalbes (Province of Castellón, Spain). The main fossil record is integrated by plant-insect interactions that are observed in leaves and leaflets: ovipositions, mines and a chew mark. The insect ovipositions, on leaves of *Laurophyllum*, *Caesalpinaceae* and *Populus*, show ovate to oblong eggs with 0.9-1.1 mm length and 0.2-0.3 mm width. They occur in eccentric arcs, sometimes with a zigzagged pattern. These ovipositions were produced by damselflies of the family *Coenagrionidae*. Insect mines are reported in leaves of *Laurophyllum* and *Celtis*?, and show a blotch shape in *Laurophyllum* sp., with a channel-structure, and a linear shape in *Celtis* sp.? Insect larvae, which were endophytophagous, i.e. internal plant parasites, produced these channel marks of leaf-mines. The mine patterns observed in *Laurophyllum* leaf are similar to those produced by the recent larvae of the *Nepticulidae* (Lepidoptera). Such a diverse set of plant-insect interactions are uncommon in the fossil record. In addition, one level with bioturbation, possibly produced by aquatic larval chironomids, is also described here." (Authors)] Address: Delclos, X., Dept d'Estratigrafia, Paleontologia i Geociències marines. Fac. Geologia, Martí i Franquès s/n, Universitat de Barcelona, E-08028 Barcelona. Spain. E-mail: xdelclos@geo.ub.es

**6459.** Saito, S. (2004): Nakaikemi, a miraculous Japanese peatland. How has it been saved?. *Peatlands International* 1/2004 : 36-39. (in English). [In this account directed to a more general readership, 70 odonate species are said to occur in the Nakaikemi peatland; *Anax nigrofasciatus* and *Rhyothemis fuliginosa* are depicted.] Address: Saito, S., Wo-2-1-101 Takamatsu, Kahoku City, Ishikawa Pref., 929-1215, Japan

**6460.** Schweighofer, W. (2004): Neues von den Quelljungfern (Libellen). *Lanius-Information* 13: 13. (in German). [Brief account on the occurrence of *Cordulegaster bidentata*, *C. boltonii*, and *C. heros* in the Kremsregion, Austria.] Address: LANIUS – Forschungsgemeinschaft für regionale Faunistik und angewandten Naturschutz, Hafnerplatz 12, A-3500 Krems, Austria. www.lanius.at

**6461.** Werle, S.F.; Klekowski, E.; Smith, D.G. (2004): Inversion polymorphism in a Connecticut River *Axarus* species (Diptera: Chironomidae): biometric effects of a triple inversion heterozygote. *Can. J. Zool.* 82: 118. E. (in English, with French summary). [*Gomphus* (*Hylogomphus*) *abbreviata* associated with varve clays in the Connecticut River may be *A. sp. varvestris* ("dwelling in varves") predators.] Address: Werle, S.F., Graduate Program in Organismic and Evolutionary Biology, University of Massachusetts, Amherst, MA 01003, U.S.A. E-mail: swerle@bio.umass.edu

**6462.** Zivic, I.; Markovic, Z.; Brajkovic, M. (2004): Impact of waste-waters from mind „Lece“ on diversity of macrozoobenthos in the Gazdarska Reka River, right-hand tributary of the Jablanica Reka River. *Proceedings of the 2nd Congress of Ecologists of the Republic of*



Macedonia with International Participation, 25-29.10.2003, Ohrid. Special issues of Macedonian Ecological Society, Vol. 6, Skopje: 247-251. (in English). ["Investigations of impact of wastewaters from mind „Lece“ on diversity of macrozoobenthos in the Gazdarska reka River (a right-hand tributary of the Jablanica reka River) were conducted during years 2001 and 2002. The bottom fauna was composed of 14 groups of macroinvertebrates with 73 determined taxa. The most varied groups were the insect orders Trichoptera (17 taxa), and Diptera (13), Plecoptera (11), Coleoptera (10) and Ephemeroptera (9), while the most uniform were insects belonging to classes Hirudinea, order Odonata and family Ancilidae Larvae belonging to insect orders Ephemeroptera, Plecoptera and Trichoptera were dominant in benthocenosis at first and second localities. These localities were characterized by highest values of diversity index, 3.2 and 3.0 respectively. Due to emptying of wastewater from mind „Lece“ at third locality value of diversity index abruptly dropped to 0.1 due to capacity of the river for self-purification, the variety of benthocenosis increases at localities downstream from locality 3." (Authors)] Address: Zivic, I., Faculty of Biology, University of Belgrade, 11000 Belgrade, Studentski trg 16, Serbia and Montenegro. E-mail: ivanas@bf.bio.bg.ac.yu

## 2005

**6463.** Bechly, G. (2005): A re-description of "*Stenophlebia*" casta (Insecta: Odonata: Parastenophlebiidae n. fam.) from the Upper Jurassic Solnhofen Limestone in Germany. *Stuttgarter Beiträge zur Naturkunde - Serie B* 359: 1-12. (in English, with German summary). ["The enigmatic fossil dragonfly "*Stenophlebia*" casta from the Upper Jurassic Solnhofen Limestone in Germany is re-described and its wing venation figured for the first time, based on several new specimens, including a very well-preserved specimen with perfect wing venation. Previously this taxon had to be considered as a nomen dubium within Odonata incertae sedis, because the holotype is lost and the original description is insufficient. Now, its previous attribution to the genus *Stenophlebia* and the family *Stenophlebiidae* can be clearly rejected. The species is here attributed to a new family (Parastenophlebiidae n. fam.) and genus (*Parastenophlebia* n. gen.) of Heterophlebioptera - Heterophlebioidea, representing a basal branch close to *Liassophlebiidae*." (Author)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**6464.** Beketov, M.A. (2005): Interesting records of *Nihonogomphus ruptus* (Sel.) in Novosibirsk province, western Siberia, Russia (Anisoptera: Gomphidae). *Notul. odonatol.* 6(5): 49. (in English). [In 2003 and 2004, seven adults of *N. ruptus* "were collected near the Inya River, at the Otgonka railway station (Toguchinskii district), viz. 1 teneral male (4-VI-2003), 2 males and 3 females (17-VI-2003), and 2 males (12-VI-2004). In addition, on 17-VI-2003, 7 males were caught and set free." (Author)] Address: Beketov, M.A., P.O. Box 156, RUS-630048 Novosibirsk, Russia. E-mail: mbeke-tov@mail.ru

**6465.** Beynon, T.G.; Daguet, C. (2005): Creation of a large pool for colonisation by white-faced darter *Leucorrhinia dubia* dragonflies at Chartley Moss NNR, Staffordshire, England. *Conservation Evidence* 2: 135-136. (in English). ["At a nature reserve in central England, after failure of smaller pools dug to provide long-term white-faced darter *Leucorrhinia dubia* breeding habitat, a larger 7 x 7m pool was created in 1992. Breeding by white-faced darters was confirmed in 1995 and they have since bred annually with 54 individuals recorded in 2003." (Authors)] Address: Daguet, Caroline, English Nature North Mercia Team, Attingham Park, Shrewsbury, Shropshire SY4 4TW, UK. E-mail: caroline.daguet@english-nature.org.uk

**6466.** Brockhaus, T. (2005): Verbreitung und Schutz in Mooren lebender Libellen in Sachsen (Insecta: Odonata). *Telma* 35: 111-122. (in German, with English summary). [The paper gives an overview on the current known distribution of odonate bog species in Saxonia, Germany. Distribution maps of *Aeshna subarctica* and *Somatochlora alpestris* can be correlated with present bog habitat distribution in this Federal State. In addition, the general importance of bogs as habitat of rare species and centres of dispersal is outlined.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**6467.** Cannings, R.A.; Cannings, S.G.; Ramsay, L.R.; Hutchings, G.E. (2005): Four species of Odonata new to British Columbia, Canada. *Notulae odonatologicae* 6: 45-49. (in English). ["Between 1998 and 2000, 5 odonate species were added to the list of British Columbia. The collection data for one of these, *Somatochlora kennedyi*, have been previously published by R.D. Kenner (2000, *J. ent. Soc. Br. Columb.* 97:47-49). The present known distribution, status and habitat of *Calopteryx aequabilis*, *Lestes forcipata*, *Somatochlora brevicincta*, and *S. forcipata* are discussed. *C. aequabilis* is recorded from only one locality in the extreme south of the province; it is a red-listed species of management concern. *L. forcipatus* is common in certain types of rich fens across the province; it had been overlooked previously because of its close similarity to the widespread and abundant *L. disjunctus*. *S. brevicincta* and *S. forcipata* are known mainly from eastern North America; in British Columbia each is recorded from a handful of localities in mountain and northern peatlands." (Authors)] Address: Ramsay, Leah, British Columbia Conservation Data Centre, Ministry of Sustainable Resource Management, 395 Waterfront Crescent, Box 9358, Stn Prov Govt, Victoria, BC, V8W 9M2, Canada. E-mail leah.ramsay@gems4.gov.bc.ca

**6468.** Cicort-Lucaciu, A.-S.; Ardeleanu, A.; Cupsa, D.; Naghi, N.; Dale (2005): The trophic spectrum of a *Triturus cristatus* (Laurentius 1768) population from Plopiis Mountains area (Bihor County, Romania). *North-Western Journal of Zoology* 1(1): 31-39. (in English). [Crested newts eat mainly invertebrates, but may also ingest vegetal particles, amphibian eggs or shed skins. Besides the shed skins of conspecific individuals, we have also identified shed skins of *Bombina variegata*, and even of *Lacerta agilis*. Due to the particular morphology of the habitat, the warm season brings about differences in the accessibility of different prey categories from one part to another of the Sinteu pond. This difference in the potential food spectrum alters the newts' diet, leads to a change into the "sit-and-wait"

feeding strategy, increase the number of hungry individuals, and indicates a decrease in the preying capacity of newts that prepare to leave the aquatic environment. Quantitatively, the most important prey taxa to the studied population are tadpoles and Nematocera larvae." (Authors) Larvae of Odonata account up to 16.75% of food items.] Address: Cicort-Lucaciu, A.-S.; University of Oradea, Faculty of Science, Romania, alfredcicort@yahoo.com

**6469.** DeWalt, R.E.; Favret, C.; Webb, D.W. (2005): Just how imperiled are aquatic insects? A case study of stoneflies (Plecoptera) in Illinois. *Ann. Entomol. Soc. Am.* 98(6): 941-950. (in English). ["Nearly 5,000 historical and contemporary specimen records of stoneflies (Plecoptera) from Illinois demonstrated that this fauna is highly imperiled, boding poorly for aquatic insect communities in North America and elsewhere. Losses include two extinctions of endemics and 20 extirpations of 77 total species, a rate of loss that is higher than for either mussels or fish in Illinois. Another 19 species (24.7%) were designated as critically imperiled, being known from five or fewer locations. Two families, Perlidae and Perlodidae, experienced the greatest number of losses. Species lost were mostly those with longer life cycles and direct egg hatch. Three historically hyperdiverse regions were identified and losses in all 14 natural divisions were documented. Large river habitats and historically prairie regions have experienced the greatest proportional losses of species. This scenario probably follows for Ephemeroptera, Trichoptera, and Odonata in the Midwest and in other areas with similar glacial and cultural histories." (Author) The paper contains some references to the Odonata.] Address: DeWalt, R.E., Illinois Natural History Survey, Center for Biodiversity, 607 E. Peabody Drive, Champaign, IL 61820

**6470.** Geraeds, R.P.G.; van Schaik, V.A. (2005): Vondst van een larvenhuidje van de Gewone bronlibel langs the Roer. *Natuurhistorisch maandblad* 94(12): 274-275. (in Dutch). [On 23-VII-2005, an exuvia of *Cordulegaster boltonii* was found at the river Roer, The Netherlands.] Address: Geraeds, R.P.G., Bergstraat 70, NL-6131 AW Sittard, The Netherlands

**6471.** Hubenov, Z. (2005): Entomofaunistic diversity of Bulgaria. *Acta ent. bulg.* 11(1/2): 118-132. (in Bulgarian, with English summary). [Compilation of Hexapoda diversity of Bulgaria including Odonata] Address: Hubenov, Z., Inst. Zool., Bulg. Acad. Sci., Blvd Car Osvo-boditel 1, BG-1000 Sofia, Bulgaria

**6472.** Kuprian, M.; Winkel, S.; Angersbach, R.; Flügel, H.J.; Eckstein, (2005): Monitoringprojekt Vogelsbergteiche - Erste faunistische Ergebnisse. *Jahrbuch Naturschutz in Hessen* 9: 186-2003. (in German). [Five ponds in the submontane region of Vogelsberg, Hessen, Germany, have been surveyed for their Odonata between 1989 and 2004. 25 odonate species were found; *Ischnura pumilio*, *Erythromma viridulum*, *E. najas*, *Sympetrum danae*, and *S. fonscolombii* are briefly discussed.] Address: Winkel, Sibylle, Pommernstr. 7, D-63069 Offenbach, Germany. E-mail: Si-winkel@t-online.de

**6473.** Kurstjens, G.; Gerats, R.; Hoogveld, J. (2005): Peat marsh returns to the Hamert Reserve. Restoration of the first part of the Heerenveen fenland. *Natuurhistorisch Maandblad* 94(11): 243-247. (in Dutch, with Eng-

lish summary). ["Between 1999 and 2001, the first part (36 ha) of the former Heerenveen fenland area in the De Hamert national park was restored. This fenland lies between old river dunes along the river Meuse and old sediments deposited by the river Rhine. It was part of an extensive fenland area along the Dutch-German border between the towns of Venlo and Gennep. Reclamation for agricultural purposes started about a century ago by drainage and peat harvesting. Opportunities for restoration seemed favourable because groundwater flows from the Rhine terrace are largely intact. Problems of water pollution from nearby agricultural fields were not to be expected because of the upstream position of the area. The Heerenveen fen was restored by removing the top layer of fertilised soil. Drainage was stopped by filling in ditches. The flora and fauna in the restoration area were surveyed between 2000 and 2003. Typical plants of soft water habitats, like the rare *Ranunculus ololeucos*, returned. Many amphibian species benefited from the large area of new wetland." (Authors) At least 23 Odonata species could be found. Species of early succession states of habitat development as *Ischnura pumilio* and *Sympetrum fonscolombii* are stressed.] Address: Kurstjens, G., Ecologisch adviesbureau, Col. Ekmanstr. 15, NL-6573 BM Beek-Ubbergen, The Netherlands

**6474.** Liley, D. (2005): Tree and scrub clearance to enhance habitat for the southern damselfly *Coenagrion mercuriale* at Creech Heath, Dorset, England. *Conservation Evidence* 2: 131-132. (in English). ["Scrub and trees were removed from overgrown clay pits at a nature reserve in southern England. Prior to management the maximum counts of southern damselfly *Coenagrion mercuriale* was 40-70 adults annually, but this increased to around 150-200 adults after management opened up the pools." (Author)] Address: Liley D., Footprint Ecology, Court House, Binnegar Lane, East Stoke, Wareham, Dorset BH20 6AJ, UK

**6475.** Martens, A.; Suhling, F. (2005): *Microgomphus* new to the South African Odonata fauna (Anisoptera: Gomphidae). *Notul. odonatol.* 6(5): 49-50. (in English). [Odonata exuviae were collected at the Umzimkulwana River in the Oribi Gorge Nature Reserve, Natal (KwaZulu-Natal, RSA; 30°42'S, 30°16'E) resulting in one exuvia, collected on 8-IV-1988 from a rocky, fast flowing section of the Umzimkulwana River, and showing the distinct characters of the genus *Microgomphus* Selys. Due to lack of descriptions of larvae of relevant *Microgomphus* species, it is not possible to determine the exuvia on the species level.] Address: Martens, A., Pädagogische Hochschule Karlsruhe, PF 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**6476.** Nagy, B.; Székely, A.; Szállassy, A. (2005): Site fidelity and fluctuating asymmetry in males of *Libellula fulva* (Odonata: Libellulidae). *Entomol. rom.* 10: 59-64. (in English, with Romanian summary). ["During two seasons (2002-2003), a closed *Libellula fulva* (Müller, 1764) population was studied along a small, canalized creek in Eastern Hungary. The territorial behaviour of males was observed with the mark-recapture method. A number of 169 males were marked in 2002, and 186 males in 2003. The movement of marked males was observed with binoculars, and was recorded along a 350 meter natural section of the stream that was marked every five meters with numbered sticks. The site fi-

delity of males was studied with the localisation index (LI) and site fidelity index (SFI). We found that the SFI of males that simultaneously defended three territories was high, while the LI was highest in the case of males that protected only one area. The purpose of the study was to see if male's site fidelity is related to wing asymmetry and body size. There was no correlation between male's site fidelity and the measure of wing asymmetry in 2002. In 2003, however, a significant correlation was found in the case of males which defended only one territory. There was no correlation between body size and SFI." (Authors)] Address: Nagy Beáta, Department of Taxonomy and Ecology, Babeş-Bolyai University, RO-400006 Cluj Napoca, Clinicilor str. 5-7, Romania. E-mail: nagy.beata@gmail.com

**6477.** Ozono, A.; Sakuratani, Y. (2005): The Odonata fauna in Nara prefecture, Western Honshu, Japan in 1998-2003. *Memoirs of the Faculty of Agriculture of Kinki University* 38: 71-155. (in Japanese, with English summary). [The survey of the Odonata fauna in the Nara Prefecture, western Honshu, Japan, investigated in 1998-2003, resulted in 91 species. These are mapped and listed for every municipality in which they occur.] Address: Ozono, Akira, Department of Agriculture, Kinki University 2Department of Agriculture, Kinki University

**6478.** Quiroz-Martinez, H.; Rodriguez-Castro, V.A.; Solis-Rojas, C.; Ma (2005): Predatory capacity and prey selectivity of nymphs of the dragonfly *Pantala hymenaea*. *J. Am. Mosq. Control. Assoc.* 21(3): 328-330. (in English). ["Predatory capacity and prey selectivity of nymphs of *P. hymenaea* were evaluated on larvae of the mosquito *Culex quinquefasciatus* (Diptera: Culicidae) and larvae of the midge *Chironomus plumosus* (Diptera: Chironomidae) as prey. With functional response methodology, 7 larval densities were exposed to predator individuals in a glass jar under laboratory conditions. The study was performed in 2 experiments. The 1st was a test system with each prey species alone. The 2nd tested a mixture of both prey species in a 1:1 ratio. Prey selectivity and prey capacity were significantly greater on midge larvae than on mosquito larvae." (Authors)] Address: Quiroz-Martinez, H., Laboratorio de Entomologia Facultad de Ciencias Biológicas, Universidad Autónoma de Nuevo Leon, San Nicolas de los Garza, Nuevo Leon, Mexico

**6479.** Robb, T.; Forbes, M.R. (2005): Success of ectoparasites: how important is timing of host contact?. *Biology Letters* 1: 118-120. (in English). ["Hosts often differ in their degree of parasitism and their expression of resistance. Yet very little is known about how the availability (and allocation) of resources to parasites at pre-infective stages influences their success in initiating parasitism, or in inducing and succumbing to resistance from hosts. We studied a damselfly-mite association to address how experimental variation in the age of first contact with hosts (timing) influenced subsequent parasite fitness. We demonstrate that timing influenced the ability of larval mites to make the transition to parasitism, but was not associated with measures of physiological resistance by hosts. Timing presumably relates to the availability of resources remaining for individuals to exploit their hosts. More research is needed on the importance of such factors, from variation in host resistance and parasite success and, ultimately, to the numbers and distributions of parasites on hosts." (Authors)] Address: Robb, T., Department of Biology, 209

Nesbitt Building, Carleton University, 1125 Colonel By Drive, Ottawa, Ont., Canada K1S 5B6. trobb@connect.carleton.ca

**6480.** Southwood, R.; Taylor, P.; Daguët, C. (2005): Creation of dykes on grazing marshes and effects on the Norfolk hawk Aeshna isosceles dragonfly at Ludham and Potter Heigham Marshes NNR, Norfolk, England. *Conservation Evidence* 2: 137-138. (in English). ["At a National Nature Reserve in the Norfolk Broads (eastern England), between 1986 and 1998, 1,600 m of new dykes were excavated in the winter months. Seven of these 12 dykes were subsequently colonised by Norfolk hawk Aeshna isosceles dragonflies (a UK species of conservation concern)." (Authors)] Address: Taylor, P., The British Dragonfly Society, Decoy Farm, Decoy Road, Potter Heigham, Norfolk NR29 5LX, UK

**6481.** Strätz, C.; Schlumprecht, H.; Potrykus, W.; Frobel, K. (2005): Veränderungen der Libellenfauna im oberen Maintal. Vergleich zwischen 1979 und 2003. *Ber. naturforsch. Gesell. Bamberg*: 145-186. (in German). [Between 1979 and 1993 the Odonata fauna of the river Main, Bayern, Germany intensively was surveyed. Starting in 1992, measurements to improve ecological situation of the river were realised. Thus, approximately 25 years later, the development of the regional Odonata fauna was remapped. New additions to the regional fauna are *Erythromma lindenii*, *Ophiogomphus cecilia*, *Onychogomphus forcipatus*, *Crocothemis erythraea*, and *Sympetrum fonscolombii*. Positive development should be powered by habitat improvement measures, improvement of water quality and climatic conditions. Species with significant increase of frequency are *Erythromma viridulum*, *Gomphus pulchellus*, *G. vulgatissimus*, *Calopteryx virgo*, *Pyrrhosoma nymphula*, *Brachytron pratense*, *Anax imperator*, *A. parthenope*, and *Libellula quadrimaculata*. Species of habitats in early succession status as *Ischnura pumilio* and *Orthetrum brunneum* shifted their regional distribution according to available habitats.] Address: Schlumprecht, H., Büro für ökologische Studien, Oberkonnersreuther Straße 6a, D-95448 Bayreuth, Germany. E-Mail kontakt @bfoes.de

**6482.** Szymkowiak, P.; Tryjanowski, P.; Winięcki, A.; Grobelny, S.; Kon (2005): Habitat differences in the food composition of the wasp-like spider *Argiope bruennichi* (Scop.) (Aranei: Araneidae) in Poland. *Belg. J. Zool.*, 135(1): 33-37. (in English). ["During the last few decades the wasp-like spider *Argiope bruennichi* Scopoli, 1772 expanded its wide geographical distribution in Europe. In this paper we describe and test differences in the diet composition of the wasp-like spider inhabiting a river valley (traditional habitat) and xerothermic grassland (new habitat) in Poland. From a total of 163 webs of *A. bruennichi*, 430 prey items were found, mainly insects: Coleoptera, Diptera, Homoptera, Heteroptera, Hymenoptera, Lepidoptera, Mecoptera, Odonata, Orthoptera and Neuroptera. Moreover, a semi digested specimen of the common frog *Rana temporaria* was recorded. Habitats differed significantly in the percentage distribution of eleven general food categories. Among potential influencing factors the number of caught prey was correlated only with the height of the web hub above the ground. The wasp-like spider is ecologically flexible in the use of novel food spectra and this probably allows the colonisation of new localities, as well as habitats." (Authors) The most numerous spe-



cies caught in the webs of the river valley population of *A. bruennichi* was *Ischnura elegans*. *Sympetrum sanguineum* was also among the prey of the spider.] Address: Szymkowiak, P., Department of Animal Taxonomy and Ecology, Adam Mickiewicz University, Umultowska 89, 61-614 Poznań, Poland. E-mail: szymko-wi@amu.edu.pl

**6483.** Thomas, J.A. (2005): Monitoring change in the abundance and distribution of insects using butterflies and other indicator groups. *Phil. Trans. R. Soc. B* (2005) 360: 339–357. (in English). ["Conservative estimates suggest that 50–90% of the existing insect species on Earth have still to be discovered, yet the named insects alone comprise more than half of all known species of organism. With such poor baseline knowledge, monitoring change in insect diversity poses a formidable challenge to scientists and most attempts to generalize involve large extrapolations from a few well-studied taxa. Butterflies are often the only group for which accurate measures of change can be obtained. Four schemes, used successfully to assess change in British butterflies, that are increasingly being applied across the world are described: Red Data Books (RDB) list the best judgements of experts of the conservation status of species in their field of expertise; mapping schemes plot the changing distributions of species at scales of 1–100 km<sup>2</sup>; transect monitoring schemes generate time series of changes in abundance in sample populations of species on fixed sites across the UK; and occasional surveys measure the number, boundaries and size of all populations of a (usually RDB) species at intervals of 10–30 years. All schemes describe consistent patterns of change, but if they are to be more generally useful, it is important to understand how well butterflies are representative of other taxa. Comparisons with similarly measured changes in native bird and plant species suggest that butterflies have declined more rapidly than these other groups in Britain; it should soon be possible to test whether this pattern exists elsewhere. It is also demonstrated that extinction rates in British butterflies are similar to those in a range of other insect groups over 100 years once recording bias is accounted for, although probably lower than in aquatic or parasitic taxa. It is concluded that butterflies represent adequate indicators of change for many terrestrial insect groups, but recommended that similar schemes be extended to other popular groups, especially dragonflies, bumblebees, hoverflies and ants. Given institutional backing, similar projects could be employed internationally and standardized. Finally, a range of schemes designed to monitor change in communities of aquatic macro-invertebrates is described. Although designed to use invertebrates as a bio-indicator of water quality for human use, these programmes could be extended to monitor the 2010 biodiversity targets of the World Summit on Sustainable Development." (Author)]. Address. not stated.

**6484.** van Buggenum, H.J.M.; Hannen, J.; Hermans, J.T.; Heijligers, H.W (2005): Fauna and water table drawdown in Limburg. *Natuurhistorisch maandblad* 94 (11): 253–258. (in Dutch, with English summary). ["Water table drawdown is one of the main causes of the extinction and decline of animal species in wet environments. Paradoxically, however, raising water levels to combat drawdown is currently causing a further decline of several species. For a long time, it was thought that re-establishment of the former vegetation would auto-

matically lead to a return of the original fauna. Unfortunately, the relation between the environment and the presence of animal species seems much more complex than was thought. The restoration of areas that had become desiccated in the past has often involved measures being taken over a large area and within a short time. An example is the Mariapeel, a wetland in the west of the province of Limburg, where drastic large-scale restoration measures have caused breeding and foraging areas for birds to disappear. Fortunately, fauna is now beginning to receive more attention. The article discusses the relation between measures to combat water table drawdown and water-dependent shrews, birds, dragonflies, amphibians, reptiles and land snails." (Authors) The article stresses on *Cordulegaster boltonii*, and gives a map with distribution data of *C. boltonii*, *Calopteryx virgo*, and *Orthetrum coerulescens* in the Limburg province, The Netherlands.] Address: Hermans, J.T.; Hertestraat 21, NL-6067 ER Linne, The Netherlands

**6485.** van Schaik, V.A.; Geraeds, R.P.G. (2005): Yellow-legged clubtail along the river Roer. The settlement of a new population in the province of Limburg. *Natuurhistorisch maandblad* 94(2): 33–36. (in Dutch, with English summary). ["Dragonflies along the river Roer have been monitored since 1999. Surveys in 2000 resulted in three sightings of *Stylurus flavipes*. The first exuviae of the species were found during a survey by boat in 2002. This was the first time that this species was proved to have reproduced in the river Roer. During 2002 and 2003, 46 exuviae were collected. These results show that the species has established itself along the river Roer. The dispersion of *S. flavipes* is associated with the lower reaches of larger streams. Since the river Roer is a small river, the habitat is different from those where this species is usually found in the Netherlands." (Authors)] Address: Geraeds, R.P.G., Bergstraat 70, NL-6131 AW Sittard, The Netherlands

**6486.** Verbeek, P.J.M.; Scherpenisse-Gutter, M.C. (2005): Restoration of flora and fauna at the Haselaarsbroek Nature Reserve. *Natuurhistorisch maandblad* 94(11): 232–237. (in Dutch, with English summary). ["Restoration measures taken in 1996 have transformed the Haselaarsbroek, a nature reserve in the province of Limburg, The Netherlands from an artificially forested woodland to a very rich nature reserve, whose appearance resembles its original state before the afforestation. The measures have led to a highly valuable vegetation. The seepage zone is especially interesting, featuring several hectares of newly developed peatland. Many red-listed plant species have colonised the new area. Because of its many types of water body, the area is now very rich in dragonfly species. It is probably among the richest dragonfly areas in the Netherlands, and the seepage zone is particularly important for several endangered species. Further management of the area will be crucial. A major problem is that of encroachment by tree saplings. Management in the coming years will be improved by increasing the number of grazing cattle and cutting down trees and shrubs." (Authors) 44 Odonata species are listed in Table 2.] Address: Verbeek, P.J.M., Bureau Natuurbalans-Limes divergens BV, Postbus 31070, NL-6503 CB Nijmegen, The Netherlands

**6487.** Wang, J.Z. (2005): Dissecting insect flight. *Annual Review of Fluid Mechanics* 37: 183–210. (in

English). ["What force does an insect wing generate? Finding answers to this enduring question is an essential step toward our understanding of interactions of moving objects with fluids that enable most living species such as insects, birds, and fish to travel efficiently and us to follow similar suit with sails, oars, and airfoils. We give a brief history of research in insect flight and discuss recent findings in unsteady aerodynamics of flapping flight at intermediate range Reynolds numbers (10–104). In particular, we examine the unsteady mechanisms in uniform and accelerated motions, forward and hovering flight, as well as passive flight of free-falling objects. The results obtained by "taking the insects apart" helped us to resolve previous puzzles about the force estimates in hovering insects, to elucidate basic mechanisms essential to flapping flight, and to gain insights about the efficiency of flight." (Author). This review article includes many notes on dragonflies.] Address: Wang, Z. Jane, Theoretical and Applied Mechanics, Cornell University, Ithaca, New York 14853, USA. E-mail: z.jane.wang@cornell.edu

**6488.** Williams, D.D. (2005): Temporary forest pools: can we see the water for the trees?. *Wetlands Ecology and Management* 13: 213-233. (in English). ["Temporary waters, in general, are fascinating habitats in which to study the properties of species adapted to living in highly variable environments. Species display a remarkable array of strategies for dealing with the periodic loss of their primary medium that sets them apart from the inhabitants of permanent water bodies. Survival of individuals typically depends on exceptional physiological tolerance or effective migrational abilities, and communities have their own, distinctive hallmarks. This paper will broadly overview the biology of temporary ponds, but will emphasize those in temperate forests. In particular, links will be sought between aquatic community properties, the nature of the riparian vegetation, and forestry practices. Quite apart from their inherent biological interest, temporary waters are now in the limelight both from a conservation perspective, as these habitats come more into conflict with human activities, and a health-control perspective, as breeding habitats for vectors of arboviruses. Traditionally, many temporary waters, be they pools, streams or wetlands, have been considered to be 'wasted' areas of land, potentially convertible to agriculture/silviculture once drained. In reality, they are natural features of the global landscape representing distinct and unique habitats for many species – some that are found nowhere else, others that reach their maximum abundance there. To be effective, conservation measures must preserve the full, hydroseral range of wetland types." (Author) The study includes Odonata.] Address: Williams, D.D., Surface & Groundwater Ecology Research Group, Department of Life Sciences, University of Toronto at Scarborough, 1265 Military Trail, Scarborough, Ontario, Canada M1C 1A4. E-mail: williamsdd@utsc.utoronto.ca

## 2006

**6489.** Abellán, P.; Sánchez-Fernández, D.; Millán, A.; Botell, F.; Sánc (2006): Irrigation pools as macroinvertebrate habitat in a semi-arid agricultural landscape (SE Spain). *Journal of Arid Environments* 67(2): 255-269. (in English). ["The intensification of agriculture has

resulted in the loss of many aquatic ecosystems in southern Europe. Despite this, the construction of irrigation pools and reservoirs to retain the water necessary for intensive cultivation may also provide new habitats for macroinvertebrates. The biotic and abiotic attributes of 40 such reservoirs in south-eastern Spain were studied to determine the presence of macroinvertebrates, and to discover if there is such a thing as an optimal design of an artificial pond for maximizing macroinvertebrate richness. A total of 72 macroinvertebrate taxa (including Odonata) belonging to 38 families were recorded from the pools examined. Pools constructed with low-density polyethylene covered with sand and stones contained a significantly greater species richness, abundance and diversity of macroinvertebrates than those constructed with high-density plastic materials. The treatment with algicide, and the presence of emergent and submerged vegetation, accounted for most of the deviance when modelling species richness by means of logistic regression." (Authors)] Address: Departamento de Ecología e Hidrología, Universidad de Murcia, Campus de Espinardo, 30100 Murcia, Spain. E-mail: pabellan@um.es

**6490.** Alberto Martinez, J.; Ocharan, F.J. (2006): The Odonata of the upper Narcea river (Asturias, northern Spain). *Boletín de la S.E.A.* 38: 279-285. (in Spanish, with English summary). ["In a study of the odonates of the upper reaches of the Narcea River we found 20 species, five of them previously unrecorded from the area. The populations of *Enallagma cyathigerum*, *Coenagrion puella* and *Cordulegaster boltonii* show extensive inter-individual chromatic variation. Several species show differences in the altitudinal distribution and the length of the flying season when compared with other Asturian populations. The flying season is usually shorter in the area." (Authors)] Address: Ocharan, F.J., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: focharan@oonreo.uniovi.es

**6491.** Alvarez, D.; Nicieza, A.G. (2006): Factors determining tadpole vulnerability to predators: can prior experience compensate for a suboptimal shape?. *Evolutionary Ecology* 20(6): 523-534. (in English). ["We investigated the role of constitutive morphology and previous experience in predator avoidance in two anuran species associated with different larval habitats. In *Rana temporaria*, deeper tails and larger body size conferred selective advantage against dragonfly (*Aeshna cyanea*) predation. Previous experience with predators had a positive influence on the survival of *R. temporaria* tadpoles equivalent to predator selection. By contrast, survival in *Bufo bufo* seems unrelated to tail shape or experience. This suggests that *B. bufo* lacks constitutive morphological defenses against insect predators, and that morphological and behavioral defenses could result more effective than chemical deterrents for these insect predators. A key novelty of this study is the observation that *Rana* tadpoles having prior experience with predators have an enhanced success in further encounters, and this occurs before the morphological induced defense has been established. This induced modification for *R. temporaria*, and its lack of for *B. bufo*, may be an important determinant of larval survival." (Authors)] Address: Nicieza, A.G., Univ Oviedo, Dept Funct Biol, E-33071 Oviedo, Spain. E-mail: agnic@uniovi.es

- 6492.** Andrew, R.J.; Kodhe, L.; Kurup, S.S. (2006): Fine-structural changes in the egg chorion of *Bradynopyga geminata* (Rambur) induced by paper mill effluent (Anisoptera: Libellulidae). *Odonatologica* 35(2): 187-192. (in English). ["The egg chorion of the *B. geminata* undergoes major structural changes when incubated in paper mill effluent. The exochorion becomes blemished, marred and perforated. It bunches into a granular condition and loses its jelly-like original identity. The endochorion develops cracks and is pitted with holes. The hexagonal demarcations of the endochorion plates are obliterated and replaced by a network of angular surface reticulations. The micropylar stalk and the circular basal ridge dissolve and distort the micropylar apparatus." (Authors)] Address: Andrew, R.J., Hislop Coll., Dept Zool., Civil Lines, Nagpur 440001, Maharashtra, India. E-mail: rajuaandrew@yahoo.com
- 6493.** Andrew, R.J.; Balmik, E.; Kodhe, L. (2006): Effect of paper mill effluent on the cephalic neurosecretory and midgut protease activities in the last instar larva of *Bradynopyga geminata* (Rambur) (Anisoptera: Libellulidae). *Odonatologica*. 35(3): 225-231. (in English). ["The last instar larvae were treated with sublethal concentrations of paper mill effluent (PME) for 5 days. PME inhibits the synthesis of neurohormones in the A-type cells of the medial group of the brain and in the intrinsic neurosecretory cells of the corpora cardiaca. PME also causes histomorphological changes in the corpora allata and suppress protease activity of the midgut. These findings suggest that various metamorphic and intermediary metabolic alterations caused by the PME treatment is modulated by the changes in the synthesis and secretion of the neurohormones of the cephalic neurosecretory complex." (Authors)] Address: Andrew, R.J., Hislop Coll, Dept Zool, Nagpur 440001, Maharashtra, India
- 6494.** Anonymus (2006): Libellen in Limburg: Waarnemingen gevraagd. *Natuurhistorisch maandblad* 94(4): ?. (in Dutch). [Announcement of the working atlas of the Odonata of the province Limburg, The Netherlands, and request for cooperation in the mapping work.] Address: Natuurhistorisch Genootschap, GroenHuis, Godswederstraat2, Roermond, The Netherlands
- 6495.** Anonymus (2006): *Tamea Hagen*, 1861 (Insecta, Odonata): conserved. *Bulletin of Zoological Nomenclature* 63(3): 209-210. (in English). ["The Commission has ruled that the name *Tamea Hagen*, 1861 is conserved for a group of common and widespread dragonflies by suppression of the senior objective synonym *Trapezostigma Hagen*, 1849. In addition, it is ruled that all previous fixations of type species for the nominal genus *Tamea Hagen*, 1861 before that by Kirby (1889) of *Libellula carolina* Linnaeus, 1763 are set aside." (Author)] Address: not stated
- 6496.** Anteau, M.J.; Afton, A.D. (2006): Diet shifts of lesser scaup are consistent with the spring condition hypothesis. *Canadian Journal of Zoology* 84(6): 779-786. (in English). ["We compared diets of lesser scaup (*Aythya affinis* (Eyton, 1838)) in the springs of 2000 and 2001 to those reported in the 1970s and the 1980s to determine whether forage quality has declined as predicted by the spring condition hypothesis. In Minnesota, we found that the current aggregate percentage of Amphipoda (an important food item) in lesser scaup diets was 94% lower than that reported from the same locations in the 1980s. Current mean individual prey mass of Amphipoda and *Bivalvia* in Minnesota were 86.6% and 85.1% lower than historical levels, respectively. In Manitoba, current aggregate percentages of Trichoptera and Chaoboridae in lesser scaup diets (1% and 0%, respectively) were lower than those reported from the same location in the 1970s (14% and 2%, respectively), whereas the percentage of Chironomidae (40%) was higher than that of historical levels (19%). Current mean individual prey mass of all insects, seeds, Chironomidae, and Zygoptera in Manitoba were 63.5%, 65.4%, 44.1%, and 44.9% lower than those of historical levels, respectively. The observed dietary shift from Amphipoda to less nutritious prey in Minnesota, coupled with lower mean individual prey mass in both locations, likely constitutes lower forage quality in lesser scaup diets, which is consistent with the spring condition hypothesis." (Authors)] Address: Anteau, M., US Geol Survey, No Prairie Wildlife Res Ctr, 8711 37th St SE, Jamestown, ND 58401 USA. E-mail: MAnteau@usgs.gov
- 6497.** Baixeras, J. (coord.) (2006): *Les Libèl·lules de la comunitat Valenciana*. Generalitat Valenciana. ISBN 84-482-4248-3: 170 pp. (in Spanish, with English, Portuguese and Catalan summaries). [This book "is the result of a two years study funded by the Conselleria de Territori i Habitatge of the Valencian Government in Spain. The main research institutions involved have been the Cavanilles Institute of Biodiversity and Evolutionary Biology of the University of Valencia, the Iberoamerican Center for Biodiversity of the University of Alicante and the Department of Biology of Organisms and Systems of the University of Oviedo as well as a remarkable number of external collaborators. The aims of the project have been to produce a checklist of the Valencian insects of the order Odonata, study the distribution and detect problems of conservation that may be affecting the populations. The first data of odonates of the Valencian Community correspond to works by Boscá (1916), Navás (1922) and Pardo (1942). Some species of great interest are recorded for the first time in some of these works. It is the case of *Macromia splendens*, just recorded in 1923 and *Lindenia tetraphylla*, never recorded since 1965. Later works by Docavo Alberti (1983), Navarro et al. (1988), Bonet Betoret (1990) and Domingo Calabuig (2002) gather a total number of 42 species, whose records are mainly concentrated in the province of Valencia. The present work increases the list in 16 species, completing a catalogue of 58 species that presumably will be increased in the future. During the years 2003 and 2004, 225 localities of the three Valencian provinces (Castellon, Valencia and Alicante) were visited. More than 3.000 specimens of 53 species were examined; five species known from the area were not found. Different habitats were targeted for the selection of the sampling localities, from high mountains to lowlands, from streams to lakes. Some of the species deserved some attention. It is the case of protected or scarce species like *Calopteryx virgo*, *Coenagrion mercuriale*, *C. puella*, *Gomphus simillimus*, *G. graslini*, *Oxygastra curtisii*, *Orthetrum nitidinerve* and *Zygonyx torridus*. Two interesting species, previously recorded from the area have not been found, it is the case of *Lindenia tetraphylla* and *Macromia splendens*. Some sections devoted to habitat and conservation problems in the species have been included in the book. The habitats of low altitude, mainly represented by marshes and river mouths are the aquatic ecosystems more polluted and



the occurring fauna is composed by poorly demanding species. The study confirms the expansion of *Trithemis annulata* and *Selysiothemis nigra*, at present two relatively frequent species. The conservation of the middle courses of the rivers is much better. This is the Level that shows the highest degree of transitions. Typical species associated to this habitat are *Calopteryx haemorrhoidalis*, *C. xanthostoma*, *C. caerulescens*, *Ischnura elegans*, *Ceragrion tenellum*, *Platycnemis iatipes*, *Pyrrhosoma nymphula*, *Cordulegaster bottonii*, *Onychogomphus forcipatus*, *O. uncutus*, *G. graslinii*, *G. similimus* and *Orthetrum coerulescens*. It is also possible to find a wide range of species in connection with inland pools or stagnant waters. Typical species of this group are: *Enallagma cyathigerum*, *Coenagrion caerulescens*, *C. scitulum*, *Lestes virens*, *L. barbarus*, *L. viridis*, *L. dryas*, *Ischnura graellsii*, *I. pumilio*, *Libellula depressa*, *Orthetrum cancellatum*, *Crocothemis erythraea*, *Symptetrum meridionale* and *S. striolatum*. Finally the best preserved area is found between 500 and 1.000 m altitude. This is a range only found in deep inland areas, and includes species like *I. graellsii*, *C. mercuriale*, *C. xanthostoma*, *C. virgo*, *P. latipes*, *P. nymphula*, *O. uncutus*, *O. forcipatus*, *A. affinis*, *A. cyanea*, *O. curtisii*, *O. brunneum* and *Boyeria irene*. The core of this work is represented by a collection of files devoted to the 58 species occurring in the Valencian Community. The inclusion of the species in red books and the legal status is indicated for every species. Every species includes some comments on morphology and biology, distribution, habitat and present situation of the populations, threats and conservation actions recommended by the authors when necessary. A distribution map in UTM squares of 100 km<sup>2</sup> (10x10 km) is given for every species. The records based in bibliographical data are indicated by a blue dot, the records based in our own material are indicated by a red square. The text finished with an exhaustive list of references on the theme." (Author) Address: Baixeras Almela, J., Institut Cavanilles de Biodiversitat i Biologia Evolutiva, Universitat de Valencia, Apartat de correus 2085, 46071 Valencia, Spain. E-mail: joaquin.baixeras@uv.es

**6498.** Bal, D.; Groenendijk, D. (2006): Consequences of the Habitats Directive for the legal protection of dragonflies in The Netherlands. *Brachytron* 9(1-2): 38-48. (in Dutch, with English summary). ["The European Habitats Directive offers an import framework for national legislation concerning nature conservation. Several species of dragonflies (Odonata) have been incorporated in the annexes of this directive. Of the twelve dragonfly species of Annex IV eight species are indigenous in The Netherlands. In accordance with the directive these eight species are protected by the Dutch Flora Fauna Act. Of the nine dragonfly species of Annex II, four species are indigenous in The Netherlands, but only two have populations at the moment: *Leucorrhinia pectoralis* and *Ophiogomphus cecilia*. Therefore, only for these two species Special Protection Areas will be assigned under the Nature Conservation Act, as part of the European Natura 2000 network. The conservation status of both species is 'unfavourable - bad', so measures have to be taken to ensure that the status will become 'favourable'. Several other dragonfly species will be selected as 'typical species' of habitat types and, therefore, will become an important indicator for the quality of many Dutch Nature 2000 sites." (Author)] Address: Groenendijk, D., Minist. LNV, Postbus 482, NL-

6710 BL Ede, Netherlands. E-mail: dick.groenendijk@vlinderstichting.nl

**6499.** Balik, I.; Cubuk, H.; Karasahin, B.; Ozkok, R.; Uysal, R.; Alp, (2006): Food and feeding habits of the pikeperch, *Sander lucioperca* (Linnaeus, 1758), population from Lake Egirdir (Turkey). *Turkish Journal of Zoology* 30(1): 19-26. (in English, with Turkish summary). ["The stomach contents of 986 pikeperch, collected from Lake Egirdir in Turkey were investigated between March 2001 and February 2002. Thirteen taxonomic categories were identified from the 1745 prey items analysed. It was determined that the diet of pikeperch in Lake Egirdir consisted of some fish species (*Knipowitschia* sp., *Aphanius anatoliae anatoliae*, *Gambusia affinis*, *Nemacheilus lendli*, *Carassius gibelio*, and *Sander lucioperca*), odonats (*Calopteryx splendens*), mysids (Mysis), amphipods (*Gammarus*) and dipterans (*Chironomus*). Of these prey categories, fish was more important than the others. In particular, *Knipowitschia* sp. and *A. a. anatoliae* were the primary prey for the pikeperch. The proportions of vertebrates and invertebrates in the diet composition of pikeperch in the 150-190 mm length class were found roughly equal. The importance of vertebrates (especially prey fish) in the diet of the pikeperch in Lake Egirdir increased with increasing body size of fish, but, at the same time, the importance of invertebrates decreased. Pikeperch longer than 300 mm consumed only fish, frogs and odonats. The cannibalism rate was 0.6%. In addition, it was found that the diet of the pikeperch in Lake Egirdir considerably changed from season to season." (Authors)] Address: Balik, I., Fisheries Res Inst, TR-32500 Egirdir, Isparta, Turkey

**6500.** Beutler, H.; Petrick, S.; Zimmermann, F. (2006): Neue Lebensräume und Arten der Anhänge 1 und 2 der Fauna-Flora-Habitat-(FFH)-Richtlinie in Brandenburg. *Naturschutz und Landschaftspflege in Brandenburg* 3/2006: 76-84. (in German). [fact sheet referring to *Coenagrion ornatum*] Address: Beutler, H., Kirschallee 3b, D-15848 Stremmen, Germany. E-mail: horstbeutler@freenet.de

**6501.** Bonada, N.; Rieradevall, M.; Prat, N.; Resh, V.H. (2006): Benthic macroinvertebrate assemblages and macrohabitat connectivity in Mediterranean-climate streams of northern California. *Journal of the North American Benthological Society* 25(1): 32-43. (in English). ["Drought leads to a loss of longitudinal and lateral hydrologic connectivity, which causes direct or indirect changes in stream ecosystem properties. Changes in macrohabitat availability from a riffle-pool sequence to isolated pools are among the most conspicuous consequences of connectivity loss. Macroinvertebrate assemblages were compared among 3 distinct stream macrohabitats (riffles [R], pools connected to riffles [Pc], disconnected pools [Pd]) of 19 Mediterranean-climate sites in northern California to examine the influence of loss of habitat resulting from drought disturbance. At the time of sampling, 10 sites were perennial and included R and Pc macrohabitats, whereas 9 sites were intermittent and included only Pd macrohabitats. Taxa richness was more variable in Pd, and taxa richness was significantly lower in Pd than in Pc but not R. These results suggested a decline in richness between Pc and Pd that might be associated with loss of connectivity. Lower Ephemeroptera, Plecoptera, and Trichoptera (EPT) richness relative to Odonata, Coleoptera, and Heteroptera (OCH) richness was observed for Pd than

R and Pc macrohabitats. Family composition was more similar between R and Pc than between R or Pc and Pd macrohabitats. This similarity may be associated with greater connectivity between R and Pc macrohabitats. Correspondence analysis indicated that macroinvertebrate composition changed along a gradient from R to Pc and Pd that was related to a perennial-intermittent gradient across sites. High variability among macroinvertebrate assemblages in Pd could have been related to variability in the duration of intermittency. In cluster analysis, macroinvertebrate assemblages were grouped by macrohabitat first and then by site, suggesting that the macrohabitat filter had a greater influence on macroinvertebrate assemblages than did local site characteristics. Few taxa were found exclusively in Pc, and this macrohabitat shared numerous taxa with Rand Pd, indicating that Pc may act as a bridge between R and Pd during drought. Drought is regarded as a ramp disturbance, but our results suggest that the response of macroinvertebrate assemblages to the loss of hydrological connectivity among macrohabitats is gradual, at least in Mediterranean-climate streams where drying is gradual. However, the changes may be more dramatic in and and semiarid streams or in Mediterranean-climate streams if drying is rapid." (Authors)] Address: Bonada, Nuria, Univ Lyon 1, CNRS Ecol Hydrosyst Fluviaux, F-69622 Villeurbanne, France. E-mail: nuria.bonada@univ-lyon1.fr

**6502.** Borisov, S.N. (2006): Adaptations of dragonflies (Odonata) under desert conditions. *Zoologicheskii Zhurnal* 85(7): 820-829. (in Russian, with English summary). ["Different types of adaptation in dragonflies directed to the selection of optimal habitats in the desert zone in the southern part of central Asia were revealed. The most favourable habitats for the development of larval phases are flowing and semi-flowing water bodies of irrigation systems. The life cycles in dragonflies are synchronous with seasonal climatic changes; their reproductive period is restricted to the time of optimal hygrothermal conditions. The time of flying in monovoltine species may be reduced and shifted to spring time (*Libellula q. quadrimaculata*, *Anaciaeschna isocles antehumeralis*) or, on the contrary, it becomes longer due to the prereproductive diapause, when dragonflies fly away to mountains (*Sympetrum arenicolor*, *Aeshna m. mixta*, *Sympecma gobica*, *S. paedisca*, and *S. fusca*). The vernal and autumnal peaks in the number with its significant decrease in mid-summers are characteristic of bivoltine species (*Ischnura elegans* and *I. evansi*). Species with the long imaginal state due to the asynchronous seasonal development of populations are numerous only in spring (*Anax p. parthenope* and *Lindenia tetraphylla*). The labile diurnal rhythms in the activity of dragonflies allow to avoid effects of unfavourable weather conditions. Emergence for many species takes place at night." (Author)] Address: Borisov, S.N., Russian Acad. Sci., Inst. Animal. Systemat. and Ecol., Novosibirsk 610091, Russia. E-mail: mu4@eco.nsc.ru

**6503.** Borisov, S.N. (2006): Ecological niches of species of the genus *Ischnura* (Odonata, Coenagrionidae) in oases of the Pamir-Alai. *Zoologicheskii Zhurnal* 85(8): 935-942. (in Russian, with English summary). ["With development of irrigation and oases, new habitats suitable for dragonflies appeared. In artificial reserves, unique Odonata complexes were formed. In the oases zone of the Pamiro-Alai, species of the genus *Ischnura* predominate among Zygoptera. The co-occur-

rence of *Ischnura fontainei*, *I. evansi*, *I. elegans*, *I. forcipata*, and *I. pumilio* was investigated. The divergence of ecological niches of these species is due to their adaptation to different habitats. The species that dominate in the same habitat demonstrate complementation, that is different time of its use. Hygrothermal preferences of species determine the differences in circadian rhythms and microspatial distribution of imagoes." (Author) The English version was published in. *Entomological Review*, 2006, Vol. 86, No. 6, pp. 623–631.] Address: Borisov, S.N., Russian Acad. Sci., Inst. Animal. Systemat. and Ecol., Novosibirsk 610091, Russia. E-mail: mu4@eco.nsc.ru

**6504.** Bouwman, J.H.; Kalkman, V.J. (2006): Status of the Odonata of the habitat directive in The Netherlands. *Brachytron* 9(1-2): 3-13. (in Dutch, with English summary). ["In 2004 special attention was given to the distribution of five species of Odonata - *Sympecma paedisca*, *Aeshna viridis*, *Ophiogomphus cecilia*, *Leucorrhinia pectoralis* and *Gomphus flavipes* - present on the Habitat Directive of the EU. Of the first four species all square kilometres where the species was found between 1980-2000 but not after 2000 were revisited. For *Gomphus flavipes* a search was conducted in each 5 km squares in the flood plains. The work resulted in up to date information on the distribution of the species. *Sympecma paedisca*: The reproduction takes place in the Weerribben and Kuinderplas. In the provinces of Friesland and Drenthe the individuals are seen at many different sites each autumn but until now no successful reproduction is proven. *Aeshna viridis*: The distribution of this dragonfly overlaps with that of Water soldier (*Stratiotes aloides*). In The Netherlands there are two core-areas where large stands of this plant occur and where *A. viridis* is found: in the western and northern part of the country. *A. viridis* disappeared from a few localities, but it was discovered at several new localities. The overall impression is that the species is stable. *Gomphus flavipes*: After an absence of more than 90 years the species was rediscovered in 1996. Since then the species colonised all larger rivers in the Netherlands. It is especially common along the Waal and Merwede and less so along the Lek and Nederrijn. Prior to 2004 the species was known from a few records along the IJssel. During fieldwork in 2004 it was shown that it is present along the full length of the IJssel though in low numbers. The species is largely absent from the river the Maas. This river lacks the groynes and the adjacent sandbanks which are deposited behind the groynes and which probably form the larval habitat in other rivers. Remarkable a small population is present along the Roer, a small river, which runs into the Maas. *Ophiogomphus cecilia*: The only reproduction site in The Netherlands is the river Roer. In 2002 and 2003 in total 105 exuviae were found making clear that this population is well established. Searches along the Geleenbeek, where the species was seen in 1995 and 1996 were not successful. *Leucorrhinia pectoralis*: This species is rare in most of Europe but relatively common in parts of The Netherlands. Large populations occur in the lowland peat marshes of De Weerribben and De Wieden and the Lonnerkermeer (all in the province of Overijssel). A small population is found in de lowland peat marshes in the province of Utrecht and Noord-Holland (nature reserve Het Hol). Apart from these populations the species is found at several localities in the east and south of the Netherlands and at one locality in the dunes. However, none of these localities seem to hold stable

populations." (Authors)] Address: Bouwman, J.H., Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: jaap.bouwman@vlinderstichting.nl

**6505.** Brockhaus, T. (2006): Verbreitung und Bestandsentwicklung der nach der EU-FFH-Richtlinie besonders geschützten Libellenarten in Sachsen (Insecta: Odonata). Beitr. Ent. 56(2): 433-441. (in German, with English summary). [8 out of 16 protected after law European Odonata species are occurring in Sachsen, Germany. These species are briefly introduced.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**6506.** Buczyński, P.; Stachyra, P. (2006): Libellen im Nahrungsspektrum europäischer Bienenfresser (*Meros apiaster* L.) in südostpolnischen Brutkolonien gegen Ende der Brutzeit. Poster. 25. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen, Essen: 1 p. (in German). [Odonata accounted for 42,6% of the food items in *M. apiaster* (Aves) against terminal breeding season in a south eastern Polish breeding colony near Gródek. 17 Odonata species, exclusively Anisoptera, were preyed. Preferred hunting habitats were closely situated to the breeding places, further situated water bodies were more lessly frequented.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**6507.** Butler, S.G.; Chelmick, D.G.; Vick, G.S. (2006): Descriptions of the last instar larvae of *Neodythemis hildebrandti* Karsch and *N. afra* (Ris) with comments on the status of the genus and subfamily (Anisoptera : Libellulidae, Tetrathemistinae). Odonatologica 35(3): 233-241. (in English). ["The larvae of *N. hildebrandti* (from Nosy Be, Madagascar) and *N. afra* (from Mt Kupe, Cameroon) are described, illustrated from exuviae, and compared with the larva of *N. (Allorrhizucha) klingi* (Karsch) from W Africa. Differences between the larva of *Neodythemis* and that of other known African Tetrathemistinae genera (*Malgassophlebia*, *Notiothemis* and *Tetrathemis*) are highlighted, and it is suggested that this provides support for the view that *Neodythemis* (including *Allorrhizucha*) and *Micromacromia* form a natural group, the 'neodythemistines', and that they are only distantly related to other genera in the subfamily. This provides additional evidence for the view that Tetrathemistinae is not a phylogenetically homogenous grouping within the Libellulidae." (Authors)] Address: Butler, S.G., 31 High Beech Lane, Haywards Hlth RH16 1SQ, W Sussex, UK. E-mail: sgbutler15@btopenworld.com

**6508.** Calle, P.; Kurstjens, G.; Peters, B. (2006): Dragonflies of the Gelderse Poort. Natural river landscape richer in biodiversity than expected. Brachytron 9(1-2): 49-57. (in Dutch, with English summary). ["In 2003 fieldwork was carried out to learn about the dragonfly biodiversity in the Gelderse Poort. In this area floodplain restoration projects were realised on a large scale (ca. 800 ha) since 1990. The nature reserves in the Gelderse Poort consists of floodplains with some alluvial forests and river dunes, as well as (reed) marshes in former floodplains. In total 43 species have been observed since 2000 of which 37 have populations in the area. Seven Dutch Red Listed species occur in the Gelderse Poort: *Aeshna isocoles*, *Brachytron pratense*,

*Gomphus flavipes*, *G. vulgatissimus*, *Lestes virens*, *Libellula fulva* and *Sympetma fusca*. This investigation shows the high species richness in dragonflies of natural floodplains. Recently this phenomenon was not well known in The Netherlands. The popular opinion was a rather low biodiversity in dragonflies due to regular flooding and bad water quality. Also the presence of Beavers (*Castor fiber*) has positive effects on the habitats of some species, for example on *Libellula fulva*. Males of this species use dead branches cut by Beavers as perches." (Authors)] Address: Kurstjens, G., Ecologisch adviesbureau, Col. Ekmanstr. 15, NL-6573 BM Beek-Ubbergen, The Netherlands

**6509.** Chazal, A.C. (2006): Lepidoptera and Odonata Surveys of Colonial National Historic Park, James City, Surry, and York Counties, Virginia. Technical Report NPS/NER/NRTR-2006/063: 102 pp. (in English). ["In 2003, the United States Department of the Interior, National Park Service contracted with the Virginia Department of Conservation and Recreation, Division of Natural Heritage (DCR-DNH) to conduct an inventory of the diurnal Lepidoptera and Odonata on Colonial National Historical Park (COLO), located in James City, Surry, and York counties, Virginia. Between May-July 2003 and April-October 2004, DCR-DNH conducted surveys over 18 days covering 17 different habitats, which were categorized into six habitat types: developed areas, fields, forested uplands, forested wetlands, marshes, and water (i.e. freshwater ponds). 75 species of Lepidoptera and 42 species of Odonata were observed. The field habitat, primarily classified as Planted / Cultured / Cultivated Herbaceous Vegetation, had the highest species diversity and highest total numbers for Lepidoptera. The field habitats also had the highest species diversity and second highest totals (forested wetlands had higher totals) for Odonata. The globally rare skipper, *Problemata bulenta* (Rare Skipper G2G3 S1), was reconfirmed at an existing site on COLO, but no further occurrences were found during targeted surveys for that species. Five watchlisted species were observed: Aaron's Skipper (*Poanes aaroni*), *Anax longipes*, *Sympetrum ambiguum*, *Ischnura prognata*, and *Telebasis byersi*. All of these watchlisted species are considered common to very common and secure across their global ranges. The results of this survey represent 37 new county records for Lepidoptera and 26 for Odonata. Species accumulation curves indicate that further surveys for Lepidoptera and Odonata may increase the known fauna of COLO." (Author)] Address: Chazal, Anne, Virginia Department of Conservation and Recreation, Division of Natural Heritage, 217 Governor Street, Richmond, VA 23219, USA

**6510.** Chazal, A.C. (2006): Lepidoptera and Odonata Surveys of George Washington Birthplace National Monument, Westmoreland County, Virginia. Technical Report NPS/NER/NRTR--2006/062: 82 pp. (in English). ["In 2003, the United States Department of the Interior, National Park Service contracted with the Virginia Department of Conservation and Recreation, Division of Natural Heritage (DCR-DNH) to conduct an inventory of the diurnal Lepidoptera and Odonata on George Washington Birthplace National Monument (GEWA), Westmoreland County, Virginia. Between May-July 2003 and April-September 2004, DCR-DNH conducted surveys over 13 days covering thirteen habitats which were categorized into six habitat types: beach/shoreline, developed areas, field, forest, marsh, and water (i.e., fresh-



water ponds). Fifty-one species of Lepidoptera and 37 species of Odonata were observed. The field habitats, primarily classified as Planted/Cultured/Cultivated Herbaceous Vegetation, had the highest species diversity and highest total numbers for Lepidoptera. The marsh habitats, primarily comprised of Tidal Oligohaline Marsh, had the highest species diversity and totals for Odonata. No rare, threatened, or endangered species were observed. Three watchlisted species were observed: Aaron's Skipper (*Poanes aaroni*), *Anax longipes*, and *Lestes inaequalis*. All of these species are considered common to very common and secure across their global ranges. The results of this survey represent 24 new county records for Lepidoptera and 23 for Odonata. The species accumulation curve for Lepidoptera indicates that further surveys may increase the known fauna of GEWA; however, the same type of curve for Odonata leveled off by the eighth survey indicating that further surveys may have low probability of recording new species." (Author)] Address: Chazel, Anne, Virginia Department of Conservation and Recreation, Division of Natural Heritage, 217 Governor Street, Richmond, VA 23219, USA

**6511.** Cicek, K.; Mermer, A. (2006): Feeding biology of the Marsh Frog, *Rana ridibunda* Pallas 1771, (Anura, Ranidae) In Turkey's lake district. North-Western Journal of Zoology 2(2): 57-72. (in English). ["We examined the food composition of the marsh frog, *Rana ridibunda*, populations inhabiting Turkey's Lake District. Stomach contents of 82 (32 males, 50 females) adult individuals were investigated. It was found that the species mainly fed on invertebrates and especially on terrestrial preys belonging to arthropod groups (75.17%). The most frequently consumed preys with respect to numeric proportion were Diptera (19.85%), Coleoptera (12.72%) and Hymenoptera (10.02%). There are no differences in diet between sexes and among the populations examined." (Authors) Odonata accounted for approximately 25% of food items.] Address: Cicek, K., Ege University, Faculty of Science, Biology Department, Zoology Section, TR-35100, Izmir, Turkey. E-mail: kerim.cicek@ege.edu.tr

**6512.** Cifuentes-Ruiz, P.; Vrsansky, P.; Vega, F.; Cevallos-Ferriz, S.R (2006): Campanian terrestrial arthropods from the Cerro del Pueblo Formation, Difunta Group in northeastern Mexico. *Geologica Carpathica* 57(5): 347-354. (in English). ["The Campanian assemblage of arthropods from the Cerro del Pueblo Formation in northeastern Mexico display some primitive characteristics. It consists of a small spider, a dragonfly assigned to the Libelluloidea, and cockroach *Xonpepetla rinconensis* Cifuentes-Ruiz et Vrsansky gen. et sp. nov..." (Authors)] Address: Cifuentes-Ruiz, Paulina, Univ. Nacl. Autonoma Mexico, Inst. Biol., Ciudad Univ., Mexico City 04510, DF, Mexico E-mail: paulina.cifruz@yahoo.com.mx

**6513.** Contreras-Garduno, J.; Canales-Lazcano, J.; Cordoba-Aguilar, A. (2006): Wing pigmentation, immune ability, fat reserves and territorial status in males of the rubyspot damselfly, *Hetaerina americana*. *Journal of Ethology* 24(2): 165-173. (in English). ["An explanation for courting traits is that they convey information about the bearer's condition to conspecifics, more specifically immune ability. Here we test a series of immune-based assumptions in the territorial damselfly *H. americana*, whose males bear wing pigmentation patterns,

which are maintained via male-male competition. *H. americana* males emerge and take some time to mature sexually, after which, depending on their fat reserves, may start defending territories where females arrive at for copulation. Territorial males are eventually defeated and lose their territories. This loss is a consequence of a reduction in muscular fat reserves. We tested whether: (a) territorial males had more pigmented wings, more intense melanine-based immune response (encapsulation response to a nylon filament implant) and higher fat reserves than non-territorial males; (b) pigmentation is related to immunity and fat reserves; (c) the immune response held constant in two different episodes (3 days between each) in the same male during territorial tenure; and (d) immune response and fat reserves decreased after experimentally simulated fighting event. Our results agree with current views of immune ability and courting traits: (1) territorial males had more wing pigmentation, higher immune responses and fat reserves than non-territorial males; (2) pigmentation was also correlated with immunity and fat reserves; and (3) immune response was similarly intense in the two episodes during territorial tenure. However, this response and fat reserves were considerably lower after fighting compared to that of territorial males and non-territorial males. Our work points out a link between fat reserves and immune ability which agree with previous studies in insects. Given, however, that in this species the use of wing pigmentation via male-male competition is more likely to provide information about current fat reserves than immunity, it is suggested that immune ability is only indirectly selected and may not be the information that pigmentation would convey to conspecifics." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**6514.** Cordoba-Aguilar, A.; Contreras-Garduno, J.; Peralta-Vazquez, H.; (2006): Sexual comparisons in immune ability, survival and parasite intensity in two damselfly species. *Journal of Insect Physiology* 52(8): 861-869. (in English). ["Recent evolutionary studies have suggested that females have a more robust immune system than males. Using two damselfly species (*Hetaerina americana* and *Argia tezpi*), we tested if females produced higher immune responses (as phenoloxidase and hydrolytic enzymes) had a higher survival (using a nylon implant inserted in the abdomen and measuring survival after 24 h) and fewer parasites (gregarines and water mites) than males. We also tested whether immune differences should emerge in different body areas (thorax vs. abdomen) within each sex with the prediction that only females will differ with the abdomen having a higher immune response than their thorax since the former area, for ecological and physiological reasons, may be a target zone for increased immune investment. Animals were adults of approximately the same age. In both species, females were more immunocompetent than males, but only in *H. americana* females were immune responses greater in the abdomen than in the thorax. However, there were no differences in survival and parasite intensity or the probability of being parasitised between the sexes in either of the two species. Thus, this study]ends partial support to the principle that females are better at defending than males despite the null difference in parasitism and survival." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigacio-

nes Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**6515.** Cordoba-Aguilar, A.; Mendez, V. (2006): Immune melanization ability and male territorial status in *Erythemis vesiculosa* (Fabricius) (Anisoptera: Libellulidae). *Odonatologica* 35(2): 193-197. (in English). ["Using a nylon filament implant inserted in the thorax, it was tested whether there were immune ability and size differences between territorial and nonterritorial male male that gather in lentic aquatic sites. It was found that territorial male male mounted a larger melanin-based immune response than nonterritorial male male. This is coherent with current results in other odon. and is interpreted as territorial male male being in better condition than nonterritorial male male - However, there was no size difference between the territorial and nonterritorial individuals. This suggests that size may be a poor predictor of immune ability." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**6516.** Couteyen, S.; Papazian, M. (2006): Contribution à la connaissance des Odonates de l'île de la Réunion 7. Description de la larve de *Pseudagrion punctum* (Rambur, 1842) (Odonata Zygoptera Coenagrionidae). *L'Entomologiste* 62(3-4): 97-100. (in French, with English summary). [The larva of *P. punctum*, a species from Madagascar and the Mascareignes islands, is described and compared to the larva of the continental species *P. massaicum*. Information on the biology of the species is added.] Address: Couteyen, S., Assoc Reunionnais Ecol, 188 Chemin Nid Joli, F-97430 Le Tampon, Reunion. E-mail: couteyensf@wanadoo.fr

**6517.** Couteyen, S. (2006): Évolution de la taille de *Coenagrioncnemis reuniensis* Franser, 1957, en fonction de l'altitude à l'île de la Réunion (Odonata, Coenagrionidae). *Bulletin de la Société entomologique de France* 111(4): 439-444. (in French, with English summary). ["Temperature and photoperiod influence growth and development of Odonata. Adult size is a good assessment of weight at metamorphosis. The adult size of endemic species of La Reunion, *C. reuniensis*, varies with altitude. In the island, thermal gradient is closely related with altitudinal gradient, whereas the photoperiod can be highly regarded anywhere as a regular evolution. Individuals *C. reuniensis* that who live in the higher altitude where temperature is lower, are larger and have a longer development time than individuals living in lower altitude. The possibility that these differences in growth and development could allow a sympatric speciation is discussed." (Author)] Address: Couteyen, S., Assoc Reunionnais Ecol, 188 Chemin Nid Joli, F-97430 Le Tampon, Reunion. E-mail: couteyensf@wanadoo.fr

**6518.** Craves, J.A. (2006): First Michigan specimens of *Libellula vibrans* Fabricius (Odonata: Libellulidae). *The Great Lakes Entomologist* 91: 91-93. (in English). [In 2005, two small populations were found in Wayne County, Michigan, USA.] Address: Craves, Julie, 115911 Andover Drive, Dearborn, MI 48120, USA. E-mail: jcraves@umich.edu

**6519.** Creed, R.P. (2006): Predator transitions in stream communities: a model and evidence from field studies. *Journal of the North American Benthological*

*Society* 25(3): 533-544. (in English). ["The role of predators (particularly top predators such as fish) in structuring stream communities has been debated for 2 decades. Much of the debate may have been caused by the lack of a conceptual framework for evaluating predator effects in stream communities. First, I propose a general conceptual model of the factors (abiotic, such as stream permanence and disturbance regime; biotic, such as predation) that can influence community structure, and the conditions in which these various factors would be expected to be important. Hydrologic permanence and disturbance transitions separate streams where abiotic factors are most important in determining community structure from streams with relatively benign disturbance regimes where predation may be more important. Second, I focus on the potential effect of predators in perennial streams with relatively benign disturbance regimes. Such streams are divided longitudinally into sections where different types of predators might be important in determining community structure. Large invertebrates (stoneflies, dragonflies, shrimp, and crayfish) and salamanders may be the dominant benthic predators affecting species composition in small perennial fishless streams. A transition from invertebrate. and amphibian-dominated to fish-dominated systems may occur in larger, downstream sections (predator transition 1). In addition, longitudinal transitions in fish-assemblage structure from upstream tributaries to downstream main-channel fish assemblages (predator transition 2) may affect community structure. I present evidence supporting the above model and suggest experimental approaches to test the model. This conceptual framework may help in understanding the role of specific predators in determining prey distributions in many stream communities." (Author)] Address: Creed, R.P., Appalachian State Univ, Dept Biol, Boone, NC 28608 USA. E-mail: creedrp@appstate.edu

**6520.** Crumrine, P.W. (2006): Age specific behavioral responses of odonate larvae to chemical and visual cues from predators. *Journal of Freshwater Ecology* 21(1): 9-16. (in English). ["Many aquatic organisms possess the ability to detect and respond to visual and chemical cues from predators and injured conspecifics, but relatively few studies have investigated if those responses change during development in odonates. In a laboratory experiment, I exposed 8(th) and 12(th) instar larvae of the dragonfly *Anax junius* to (1) the presence of a free-swimming fish predator (*Lepomis macrochirus*); (2) water that recently contained *L. macrochirus*; (3) water that contained crushed conspecifics; (4) water that recently contained living conspecifics; and (5) charcoal filtered tap water that contained no visual or chemical stimuli. The 12(th) instar *A. junius* moved more often, spent more time moving and spent less time perched on artificial aquatic vegetation than did 8(th) instar *A. junius*. *A. junius* moved less in the presence of fish chemical cues relative to the control. Although 8(th) and 12(th) instar *A. junius* differed in their responses to stimuli from predators, the overall response of *A. junius* to predators was not strong. The characteristic high activity level of *A. junius*, which is an advantage in fishless habitats, may limit success of this species in habitats with insectivorous fish." (Author)] Address: Crumrine, P.W., Department of Natural Sciences, Longwood University, Farmville, VA 23909, USA. E-mail: crumrinepw@longwood.edu

- 6521.** Das, P.K.; Sivagnaname, N.; Amalraj, D.D. (2006): Population interactions between *Culex vishnui* mosquitoes and their natural enemies in Pondicherry, India. *Journal of Vector Ecology* 31(1): 84-88. (in English). ["Population interactions among mosquitoes in the *Culex vishnui* subgroup, which are vectors of Japanese Encephalitis, and their natural enemies were studied in Pondicherry, India. We tested the hypothesis that the breakdown of interactions between the larvae and their natural enemies due to drought followed by rain was responsible for the sudden increase in the vector population above the threshold for disease transmission during the heavy rainy period. We randomly sampled mosquito larvae and their predators in different breeding habitats and subjected the mean densities of prey, predator, and mosquito larvae infected with parasites/pathogens to covariate analysis to understand the interaction between prey and their natural enemies in relation to environmental factors. In rice fields, neither prey nor predator showed any positive correlation with temperature, RH, or the number of rainy days. However, the pathogen/parasite of mosquito immatures showed a positive correlation with RH. Among the mosquito predators, notonectids exhibited a significant positive correlation with *Cx. vishnui* larvae. The parasitic *Romanermis iyengari* and pathogenic *Coelomomyces anopheliscus* also showed positive correlations with immatures. No parasites and pathogens of mosquito larvae were recorded in shallow water pools (SWP) or cement tanks (CT) during the study period. Important predators recorded in SWP were notonectids, damselfly nymphs, *Diplonchus indicus*, and hydrophilids. Dragonfly nymphs, Gerrids, and tadpole shrimps were recorded in CT. In CT, prey and their predators were positively correlated with RH and rainy days. In SWP, there was a highly significant correlation between prey, predators and environmental factors. We conclude that rice fields are a stable ecosystem where regular interaction occurs between larvae and their natural enemies and a sudden increase in mosquito populations is uncommon. In transient habitats, no such stability is present and they become more important as breeding habitats in terms of seasonality and number. Shallow water pools should be seriously considered for the control of these vectors." (Author)] Address: Das, P.K., Indian Council Med Res, Vector Control Res. Ctr, Indira Nagar, Pondicherry 605006, India
- 6522.** de Boer, E.P.; Wasscher, M.T. (2006): Rediscovery of *Leucorrhinia albifrons* in The Netherlands. *Brachytron* 9(1-2): 14-20. (in Dutch, with English summary). ["In late June 2005, several specimens of *Leucorrhinia albifrons* were seen on the Dellebuursterheide, a nature reserve in the province of Friesland, The Netherlands. This rare species was thought to be extinct in the Netherlands. The last record dates from 1994, also in Friesland. In the days following the rediscovery a suitable reproduction site was found where the species was seen regularly until July 12, with a maximum number of ten individuals on a single day. In addition to the sighting of several ovipositing females, a larval skin was found, thus proving successful reproduction at this site. The habitat of the reproduction site consists of a shallow oligotrophic lake of 200x100 meter in a lightly wooded heath landscape. Except for a submerged blanket of peat moss (*Sphagnum*, sp.) the vegetation is rather poor in species and indicates moderately acid circumstances. Before the nineties, this site was completely cleared of overgrown vegetation and the enriched soil was removed by the local conservation body within the framework of a recovery program. It is therefore likely that *L. albifrons* has not colonised the lake until after 1990, since the habitat previous to the undertaken recovery measurements, is considered to have been unsuitable for the species. Therefore, the origin of this population still remains unclear. In 2006 further investigation will take place to discover possible other reproduction sites, and to provide a species protection program." (Authors)] Address: It Fryske Gea, Postbus 3, NL-9244 ZN Beetsterzwag, Netherlands. E-mail: e.p.de.boer@fryskegea.nl. Wasscher, M. T. E-mail: marcel.hilair@12move.nl
- 6523.** Di Domenico, M.; Clausnitzer, V.; Carchini, G. (2006): Larval morphology of three species of the genus *Hadrothemis* Karsch (Anisoptera: Libellulidae). *Odonatologica* 35(2): 117-125. (in English). ["The larval morphology of *H. scabrifrons*, *H. coacta* and *H. camarensis* is described for the first time from specimens collected in East Africa, and a comparison among the species is given."] Address: Clausnitzer, Viola, Graefestr. 17, D-06110 Halle/Saale, Germany. E-mail: violacl@t-online.de
- 6524.** Dommange, J.-L. (2006): Préambule à l'hommage à René Martin. *Martinia* 22(1): 3-6. (in French). [Introduction into a special issue of the French odonatological journal 'Martinia', named after the famous odonatologist René Martin (1846-1925).] Address: Dommange, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France
- 6525.** Dommange, J.-L. (2006): René Martin au Blanc, hier et aujourd'hui (Département de l'Indre). *Martinia* 22(1): 45-52. (in French, with English summary). [Information referring to René Martin; the author followed some "footsteps" Martin has left in the town Blanc, France, where R. Martin had lived for approximately 35 years.] Address: Dommange, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France
- 6526.** Dommange, J.-L. (2006): Essai bibliographique sur les travaux entomologiques de René Martin (1846-1925). *Martinia* 22(1): 37-44. (in French, with English summary). [Introduction to and bibliography of René Martin covering the whole work of this author.] Address: Dommange, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France
- 6527.** D'Antonio, C.; Zeccolella, D. (2006): Nuovi insetti presenti nella Riserva Naturale di Stato "Isola di Vivara". <http://www.isoladivivara.it/press/newinsects.pdf> - 14 maggio 2006: 4 pp. (in Italian). [Italy; records of *Anax ephippiger*, *A. imperator*, and *Aeshna cyanea* are documented.] Address: D'Antonio, C., Via A. Falcone 386/b, I-80127 Napoli, Italy. E-mail: constantino.d@tin.it
- 6528.** Ellenrieder, N. von (2006): The larvae of *Teinopodagrion decipiens* De Marmels and *T. meridionale* De Marmels (Zygoptera: Megapodagrionidae). *Odonatologica* 35(3): 281-287. (in English). ["The larvae of 2 species are described and illustrated: *T. decipiens*, based on specimens from the Bolivian Yungas, and *T. meridionale*, based on specimens from the Argentine Yungas. A key to all known larvae is provided." (Author)] Address: Ellenrieder, Natalia von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: odonata@hotmail.com



- 6529.** Etscher, V.; Miller, M.A.; Burmeister, E.-G. (2006): The larva of *Polythore spaetheri* Burmeister & Börsöny, with comparison to other polythorid larva and molecular species assignment (Zygoptera: Polythoridae). *Odonatologica* 35(2): 127-142. (in English). ["The larva from the area of Panguana (Huanuco prove, Peru) is described. This constitutes the first description of a *Polythore*. P-distance measuring of a 790 bp long fragment of the mitochondrial COI gene was used as a tool for the assignment of the larva. The low degree of sequence divergences between larval and imaginal COI sequences leaves no doubt about conspecificity. The use of scanning electron microscopy gives an impression of some morphological characters not mentioned so far concerning polythorid larvae. Comparison of the *P. spaeteri* larva with the few Currently available descriptions of polythorid larvae shows that characterisation of the larvae at generic level is not possible until more larval specimens of the family are examined." (Authors)] Address: Etscher, V., Zool Staatssammlung München, Münchhausenstr 21, D-81247 München, Germany. E-mail: zsm@zsm.mwn.de
- 6530.** Ferreira-Peruquetti, P.S.; Fonseca-Gessner, A.A. (2006): Spatial distribution and seasonality of *Heliocaris amazona* Selys in a Cerrado area of Sao Paulo State, Brazil (Zygoptera : Dictyodidae). *Odonatologica* 35(1): 41-46. (in English). ["The study was conducted on 2 nature reserves in NE Sao Paulo State, SE Brazil. *H. amazona* populations naturally occur in low densities. 25 male, 2 female and 23 larvae were recorded, only at streams with riparian vegetation. All larvae were collected during the dry season and adults only during the wet season. The highest number of larvae was collected in pools having litter as substrate, but they were also found in slow and moderate velocity water. Due to their patched distribution, *H. amazona* may face high risk of local extinction and such a possibility should be taken into account in the management of both studied nature reserves." (Authors)] Address: Ferreira-Peruquetti, P.S., Praca Jardineira 24, Jardim Asteca, BR-29104500 Villa Velha, ES, Brazil. E-mail: pperuquetti@yahoo.com.br
- 6531.** Fischer, O.A. (2006): Common darter (*Sympetrum striolatum*) at a field dung yard of the riding club Eliot in Brno Bystrc (Moravia, Czech Republic). *Vážky 2005: Sborník referátů VIII. celostátního semináře o donatologù ve Žďárských vrších, ZO ĚSOP Vlašim*: 175-178. (in Czech, with English summary). ["A small swarm of dragonflies (about 30 individuals) occurred at a field dung yard containing remainders of horse stable manure in Brno-Bystrc (Moravia, Czech Republic) on September 29th, 2002. Capture of flies and oviposition by the dragonflies have been observed. Although two fishponds with cleaner water were near by available, a small pool with dark brown water in the dung yard was preferred by the dragonflies for their oviposition. Two males and one female were captured and determined as the common darter (*Sympetrum striolatum* Charpentier). Another two males of this species were captured in the following year (November 8th, 2003). The common darter had never been observed near two fishponds with cleaner water and its presence as well as its oviposition were limited to the dung yard with eutrophic water only." (Author)] Address: Fischer, O.A., Boží 3, 644 00 Brno, Czech Republik. E-mail: o.a.fischer@svscr.cz
- 6532.** Fleck, G.; Legrand, J. (2006): The larva of the genus *Nesocordulia* McLachlan, 1882, phylogenetic consequences (Odonata, Anisoptera, Corduliidae). *Revue Francaise d'Entomologie (Nouvelle Serie)* 28(1): 31-40. (in French, with English summary). ["The larva of the genus *Nesocordulia*, determined after the examination of the larval wing-pads venation, is described and illustrated for the first time. The study of the larval stage suggests that this genus is related to the African genus *Idomacromia* Karsch, 1896. A close relationship with the neotropical genus *Neocordulia* Selys, 1882 is less probable. It shares some derived characters of the head with the remarkable archaic South-American genus *Lauromacromia* Geijskes, 1970. A generic diagnosis is proposed." (Authors)] Address: Fleck, G., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleck@mnhn.fr
- 6533.** Foster, S.E.; Soluk, D.A. (2006): Protecting more than the wetland: The importance of biased sex ratios and habitat segregation for conservation of the Hine's emerald dragonfly, *Somatochlora hineana* Williamson. *Biological conservation* 127: 158-166. (in English). ["Within species habitat use may depend on age, season or sex of an individual. The distribution of males and females may vary both temporally and spatially due to differences in the costs of reproduction and the distribution of critical resources. Conservation of a species requires knowledge of the habitat use of both sexes in order to predict the population size and protect all habitats that a species requires. Adult dragonfly populations often have highly male-biased sex ratios at the breeding habitat. This bias has been attributed to females using alternative habitats to avoid male harassment, or to high female mortality. We monitored adult *S. hineana* populations, in breeding and non-breeding habitats in Door County, Wisconsin and found significant differences in habitat use between males and females. Males primarily used wetland habitats, while females primarily used dry meadows and marginal breeding habitats, only coming into wetlands to lay-eggs or find mates. We assessed food resources in the different habitats and found that high quality insect prey (primarily adult Diptera) were more available in the wetland habitat, indicating that these areas were likely a more productive foraging area for adult dragonflies. The fact that females appear to avoid the wetland habitat is consistent with the hypothesis that male harassment alters female distribution patterns. Consideration of the patterns of habitat use by *S. hineana* indicates the need to develop a broader understanding of the importance of non-wetland areas in the conservation of wetland species." (Authors)] Address: Foster, S.E., Department of Biology, University of Toronto at Mississauga, 3359, Mississauga Road, Mississauga, Ont., Canada L5L 1C6. E-mail: sfoster@utm.utoronto.ca
- 6534.** Gapud, V.P. (2006): Checklist of Philippine Odonata. *Asia Life Sciences* 15(2): 183-198. (in English). [254 species of Philippine Odonata are checked-listed, representing 154 damselflies and 100 dragonflies.] Address: Gapud, V.P., Univ. Philippines, Coll. Agr., Pest. Biol. and Biodivers. Div., Los Banos 4031, Philippines
- 6535.** Geraeds, R.P.G.; van Schaik, V.A. (2006): The skimmers of the Blankwater Reserve. A survey of the emergence of three species of skimmer. *Natuurhistorisch maandblad* 95(6): 141-146. (in Dutch, with English summary). ["The Blankwater is a nature reserve located

east of the town of Roermond, The Netherlands near the German border, which includes two large pools. In 2004, a 20 m transect on the north bank of the southern pool was surveyed for the emergence of three skimmer species, *Orthetrum cancellation*, *O. coerulescens* and *O. brunneum* in this still water body. The presence of three skimmer species in the same habitat is rare in the Netherlands. In the period of May 11 to September 4, all exuviae of emerged skimmers were collected two to three times a week. This resulted in 176 exuviae of *O. cancellation*, 246 *O. coerulescens* and 5 of *O. brunneum*. Exuviae were found on 22 different plant species, most of them on Jointed rush (*Juncus articulatus*). *O. cancellation* mostly emerged at low height in the land vegetation, with exuviae found up to 10 m from the waterline. *O. coerulescens* also emerged at low heights in the land vegetation, but nearer the waterline. The five exuviae of *O. brunneum* were found in the water vegetation, again at low heights. In total, 25 dragonfly species were observed during the survey. Exuviae of seventeen species were found along the transect." (Authors)] Address: Geraeds, R.P.G., Bergstraat 70, NL-6131 AW Sittard, The Netherlands

**6536.** Geraeds, R.P.G.; van Schaik, V.A. (2006): Dragonflies in the valley of the river Roer. Part II, true dragonflies (Anisoptera). *Natuurhistorisch maandblad* 95(11): 246-253. (in Dutch, with English summary). ["In the 2000-2005 period, the river Roer and 80 stagnant water bodies in the valley of the Roer were surveyed for the presence of dragonflies.[...]. The survey revealed the presence of 25 true dragonfly species. Very common species included *Gomphus vulgatissimus*, *Orthetrum cancellation*, *Anax imperator*, *Sympetrum sanguineum* and *S. striolatum*. *G. vulgatissimus* bred only in flowing water, while the other very common species bred in still waters. One larva of *O. cancellation* was caught in the river Roer. Common species included *Ophiogomphus cecilia*, *Stylurus flavipes*, *Gomphus pulchellus*, *Aeshna grandis*, *A. cyanea*, *A. mixta* and *Libellula depressa*. *O. cecilia* and *S. flavipes* bred only in flowing water, while exuviae of *G. pulchellus* were found at both streaming and still water bodies. The other common dragonfly species bred only in still waters. Rare species in the valley included the *Onychogomphus forcipatus*, *Somatochlora metallica*, *Cordulia aenea*, *Orthetrum coerulescens*, *Crocothemis erythraea*, *Libellula quadrimaculata*, *S. danae* and *S. vulgatum*. The river Roer is the only place where *O. forcipatus* breeds. *S. metallica* bred in slow flowing and still waters. Although no exuviae were found, it is likely that *S. metallica* breeds in a former meander of the Roer. The species was observed by this water body in several years. *C. aenea*, *C. erythraea*, *L. quadrimaculata* and *S. vulgatum* bred only in a few still waters. It is likely that *O. coerulescens* breeds in the Holsterbeek, as mating behaviour was observed there. It is uncertain whether *S. danae* is breeding in the valley of the river Roer. It is likely that the occasionally observed animals were migrants from the nearby Meinweg nature reserve. Very rare species in the survey included *Sympetrum flaveolum*, *Brachytron pratense*, *Somatochlora flavomaculata*, *Orthetrum brunneum* and *Cordulegaster boltonii*. Except for *C. boltonii* exuviae of these species were never found. A few imagos of *S. flaveolum* were spotted almost every year. *B. pratense* was spotted twice. A male (2003) and a female (2005) were seen at two different former meanders of the Roer, water bodies which look like suitable habitats for this species. *S. flavomaculata*

was also observed twice, near a stagnant water body and along the Holsterbeek brook. *O. brunneum* was observed only once along the Roer, in 2003. This was most likely a migrant from the Blankwater nature reserve. In 2005, an exuvium of *C. boltonii* was found along the Roer near Roermond. Since the river is not a suitable habitat for this species, it is most likely that this was a larva that had drifted in from upstream sections of the river in Germany. Over the 2000-2005 period, a total of 40 Odonata species were observed in the valley of the river Roer. Twenty-nine of these were observed along the river, while 26 species were mostly observed at stagnant water bodies. The largest water bodies (the former meanders of the river Roer) generally hosted the most dragonfly species. Nevertheless the stagnant water body with the largest number of species was a small pond. The Roer hosts the only population of *O. forcipatus* and one of the two populations of *O. cecilia* in the Netherlands, making this river one of the most important dragonfly habitats in the country." (Authors)] Address: Geraeds, R.P.G., Bergstraat 70, NL-6131 AW Sittard, The Netherlands

**6537.** Geraeds, R.P.G.; van Schaik, V.A. (2006): Dragonflies in the valley of the river Roer. Part I, damselflies (Zygoptera). *Natuurhistorisch maandblad* 95(9): 197-203. (in Dutch, with English summary). ["Between 2000 and 2005, the valley of the river Roer was surveyed for the presence of dragonflies. [...]. The Dutch part of the river Roer is a meandering stream with a length of 21 km, its valley including 91 stagnant water bodies. The six-year dragonfly survey covered the river and 80 of these stagnant waters. A total of 15 species of damselfly were found in the area. Very common species included *Calopteryx splendens*, *Platycnemis pennipes*, *Erythromma lindenii*, *Coenagrion puella*, *Ischnura elegans* and *Pyrrhosoma nymphula*. *C. splendens* bred only in flowing water, while *P. pennipes* and *E. lindenii* bred in flowing and still waters. The other very common damselfly species bred in still waters. Common species included *Chalcolestes viridis*, *Erythromma najas* and *E. viridulum*. Although *E. najas* and *E. viridulum* were frequently observed along the river, all three species bred only in still waters. Rare species in the Roer valley included *Sympetma fusca*, *Lestes sponsa*, *Coenagrion pulchellum* and *Enallagma cyathigerum*; they were only observed along still waters. Although a breeding site was found only for *L. sponsa*, breeding by the other three rare species is likely because they were observed at the same location in different years, or their mating and oviposition behaviour was observed. *Lestes virens* and *Ceragrion tenellum* were very rare. *L. virens* was observed at three locations, being seen at the same two ponds in 2004 and 2005. During these years, mating and oviposition behaviour were observed. The *C. tenellum* was seen only once during the survey period; two males were found by a former meander of the river Roer." (Authors)] Address: Geraeds, R.P.G., Bergstraat 70, NL-6131 AW Sittard, The Netherlands

**6538.** Gonzalez-Soriano, E.; Novelo-Gutierrez, R. (2006): *Elasmothermis aliciae* spec nov, a new dragonfly from Mexico, Belize and Costa Rica with a description of its larva and a key to the known larvae of the genus (Anisoptera : Libellulidae). *Odonatologica* 35(3): 243-253. (in English). ["The new species and its larva are described and illustrated from specimens collected in Mexico (states of San Luis Potosi and Veracruz), Belize (Toledo distr.) and Costa Rica (Heredia prov.). Holotype

male and allotype female (in copula): Mexico, Veracruz state, Rio La Palma, 25 km N of Catemaco, 28-VIII-1988; deposited at UNAM, Mexico. The species is closely related to *E. cannacrioides* Calv. with which it was formerly confused. Adults of the former are larger than those of the latter. The larva is also easily distinguished from *E. cannacrioides* by its larger size and differences in the shape of the dorsal protuberances. Notes on biology and distribution are provided and the known larvae of the genus *Elasmothemis* Westfall are keyed." (Authors)] Address: Gonzalez-Soriano, E., Depto Zoologia, Inst. Biol., Universidad Autonoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**6539.** Haas, F. (2006): Evidence from folding and functional lines of wings on interordinal relationships in Pterygota. *Arthropod Systematics & Phylogeny* 64(2): 149-158. (in English). ["The fundamental difference between palaeopterous (*Aeshna* sp., Odonata) and neopterous (*Perla* sp., Plecoptera) Pterygota is exemplified with by two recent representatives. When sitting, the *Aeshna* sp. needs quite some space, neither fore nor hind wing are protected and its silhouette is perfectly visible from all directions. The plecopteran protects its hind wings with the fore wings and may completely disappear behind a plant stalk. Evidently, neopteran insects need less space when at rest." (Author)] Address: Haas, F., Staatliches Museum für Naturkunde Stuttgart, Rosenstein 1, 70191 Stuttgart, Germany. E-mail: FabianHaas@gmx.net; www.earwigs-online.de

**6540.** Hanel, L. (2006): New species of dragonflies (Odonata) protected by the Czech law. *Vážky 2005: Sborník referátů VIII. celostátního semináře donatologů ve Žďárských vrších, ZO ĚSOP Vlašim*: 190-191. (in Czech, with English summary). ["At present, the law no.114/1992 Sb. on nature and landscape protection (amended as no. 460/2004 Sb.) is the most important tool in the protection of Czech nature and landscape. This law has been provided with a public notice no.396/1992 Sb. which, among other things, contains of particularly protected species including dragonflies. In this notice is only a single species (*Aeshna subarctica*) implicated to the category „endangered species“. This public notice was amended as no. 175/2006 Sb. In this amendment (effective from 8th May 2006) there is the list of protected dragonflies registered in the category „strongly endangered“: *Sympecma braueri*, *Ophiogomphus cecilia*, *Stylurus flavipes*, *Leucorrhinia albifrons*, *L. pectoralis*, and *L. caudalis*. (Author)] Address: Hanel, L., Správa Chráněné krajinné oblasti Blaník, Loučovice pod Blaníkem 8, 257 06, Czech Republic. E-mail: lubomirhanel@seznam.cz

**6541.** Hardersen, S. (2006): Sexual dimorphism in wing cell patterns in *Xanthocnemis zealandica* McLachlan (Zygoptera: Coenagrionidae). *Odonatologica* 35(2): 143-149. (in English). ["In many odonate species males and females differ phenotypically; the most commonly noticed characters which exhibit sexual dimorphism are size, and body, and wing colouration. Although the odonate wing venation has been studied intensively, very limited data on sexual dimorphism exist. In this study distinct cell groups in the wings of *X. zealandica* were compared between males and females. Of the 6 cell groups studied two were sexually dimorphic. Reasons for the observed differences are discussed." (Author)] Address: Hardersen, S., Centro Nazionale per lo Studio

e la Conservazione della Biodiversità Forestale, Corpo Forestale dello Stato, Strada Mantova, 29, I-46045 Marmirolo (MN), Italy. E-mail: s.hardersen@libero.it

**6542.** Heijligers, H.W.G.; van Buggenum, H.J.M. (2006): *Sympetrum meridionale*: new findings in the province of Limburg. *Natuurhistorisch maandblad* 95 (10): 225-227. (in Dutch, with English summary). ["On 29 July 2006, *S.meridionale* was discovered for the first time in the province of Limburg, The Netherlands. It was observed at two locations, one in the Zwartwater (Venkoelen) nature reserve north of the town of Venlo and one in the Haeselaarsbroek nature reserve near the village of Echt. The species had already been found in the Zeeuws-Vlaanderen region (2004) and the province of Noord-Brabant (2005)." (Authors)] Address: Heijligers, H.W.G., Lottumseweg 27, NL-5872 AA Broekhuizen, The Netherlands

**6543.** Heijligers, H.W.G. (2006): Boekbesprekingen: Libellen in Nederland. *Natuurhistorisch maandblad* 95 (12): 273. (in Dutch). [Review of the DVD from Reindoud, W. and Groot, T. de (2006): *Libellen in Nederland*. Utrecht, KNNV Uitgeverij, 2006. DVD (70 min.). ISBN 9050112315. <http://library.wur.nl>] Address: Heijligers, H.W.G., Lottumseweg 27, NL-5872 AA Broekhuizen, The Netherlands

**6544.** Hobson, C.S. (2006): Marl Pennant (*Macrodiplox baiteata*), a new coastal dragonfly in Virginia. *Banisteria* 28: 53. (in English). [Grandview Beach in Hampton, Virginia, USA, 13 July 2006] Address: Christopher S. Hobson Virginia Department of Conservation and Recreation Division of Natural Heritage 217 Governor Street Richmond, Virginia 23219

**6545.** Höttinger, H. (2006): Wiederfund der Vogel-Azurjungfer (*Coenagrion ornatum* SELYS, 1850) in Niederösterreich (Odonata, Coenagrionidae). *Beiträge zur Entomofaunistik* 7: 151-154. (in German). [At 14.6.2006, along a ditch („Waldäckergraben“ between Au and Hof; Niederösterreich, Austria) (16°34'27"E / 47°55'51"N - 16°34'23"E / 47°55'59"N; 220 m asl), two males and two females of *C. ornatum* were recorded. Additional unpublished regional records of this rare Austrian species are briefly documented.] Address: Höttinger, H., Universität für Bodenkultur Wien, Institut für Zoologie, Gregor Mendel-Straße 33, A-1180 Wien, Austria. E-mail: helmut.hoettinger(at)boku.ac.at

**6546.** Hudson, J.; Armstrong, R.H. (2006): *Dragonflies of Alaska*. ISBN: 1-57833-302-4: 48 pp. (in English). [This book may be considered as the expanded version of Armstrong et al (2007) (see OAS 6624) dedicated to the grown-up beginner in Odonata (in fact, the opposite is right because the children's book was developed from this book). A general introduction into biology and morphology of Odonata, is followed by brief monographs of the 32 Alaskan species so far known resp. represented in the book, and a general treatment on the family level. Each species is pictured by fine colour photographs, is briefly described, and the biology and habitat are very briefly outlined. Identification is facilitated by a colour photo accompanied by black & white drawings or close up photos. On a more general level the distribution ("where to expect a species in Alaska") is also outlined.] Address: [www.alaskabooks-andcalendars.com](http://www.alaskabooks-andcalendars.com)



- 6547.** Huerta, H. (2006): Nuevo registro de *Forcipomyia* (*Pterobosca*) *incubans* (Macfie) (Diptera: Ceratopogonidae) como parásito de Odonata. *Acta Zoológica Mexicana* (nueva serie): 157-158. (in Spanish, with English summary). ["This is the first record of *Forcipomyia* (*Pterobosca*) *incubans* (Macfie) on *Dythemis sterilis* Hagen (Libellulidae, Odonata) from Veracruz State, Mexico." (Author)] Address: Herón, Huerta, Lab. Entomología, INDRE, Carpio 470, Col. Santo Tomás, 11340, Mexico D.F. E-mail: cerato2000@yahoo.com
- 6548.** Huskens, K. (2006): Sierlijke witsnuitlibel op Sint-Pietersberg. Laaste waarneming uit 1970, ook uitgestorven in België. *Natuurhistorisch maandblad* 95(7): 177-178. (in Dutch). [*Leucorrhinia caudalis*, extinct in Belgium, and recorded in the Netherlands for the last time in 1970 was found near Sint-Pietersberg, a hill near Maastricht, The Netherlands on 6-VI-2006.] Address: not stated
- 6549.** Irusta, J.B.; Araujo, A. (2006): Reproductive behaviour of *Diastatops obscura* (Fabricius) in a riverine environment (Anisoptera: Libellulidae). *Odonatologica* 35(3): 289-295. (in English). ["The reproductive behaviour of this neotropical dragonfly is described in a riverine environment in NE Brazil. In areas used for reproduction, the males behave like territorial perchers in order to defend the territories that will be used by females during their oviposition. The preferences of the males in reproductive territorial selection and the variation of their reproductive strategies are analyzed from an adaptationist point of view." (Authors)] Address: Irusta, J.B., Univ Fed Rio Grande Norte, Sect. Psychobiol., Dept Physiol., Caixa Postal 1511, Campus Univ, BR-59072970 Natal, RN, Brazil. E-mail: banuelos@ufrnet.br
- 6550.** Iwamoto, H.; Inoue, K.; Yagi, N. (2006): Evolution of long-range myofibrillar crystallinity in insect flight muscle as examined by X-ray cryomicrodiffraction. *Proc. R. Soc. B* 273: 677-685. (in English). ["Insect flight muscle is known for its crystal-quality regularity of contractile protein arrangement within a sarcomere. We have previously shown by X-ray microdiffraction that the crystal-quality regularity in bumble-bee flight muscle is not confined within a sarcomere, but extends over the entire length of a myofibril (O1000 sarcomeres connected in series). Because of this, the whole myofibril may be regarded as a millimetre-long, natural single protein crystal. Using bright X-ray beams from a synchrotron radiation source, we examined how this long-range crystallinity has evolved among winged insects. We analysed O4600 microdiffraction patterns of quick-frozen myofibrils from 50 insect species, covering all the major winged insect orders. The results show that the occurrence of such long-range crystallinity largely coincides with insect orders with asynchronous muscle operation. However, a few of the more skilled fliers among lower-order insects apparently have developed various degrees of structural regularity, suggesting that the demand for skilful flight has driven the lattice structure towards increased regularity." (Authors) (*Copera annulata*) (*Colopteryx cornelia*) (*Pseudothemis zonata*) (*Macromia amphigena*)] Address: Iwamoto, H., Research and Utilization Division, SPring-8, Japan Synchrotron Radiation Research Institute, 1-1-1 Kouto, Sayo-cho, Sayo-gun, Hyogo 679-5198, Japan. E-mail: iwamoto@spring8.or.jp
- 6551.** Jinguji, H.; Tashiro, T.; Sato, T.; Tsuyuzaki, H.; Kondo, T. (2006): Effect of cultivation methods in a controlled mixing tillage of plow layer on habitat condition of the genus *Sympetrum*. *Transactions of the Japanese Society of Irrigation, Drainage and Reclamation Engineering* 74(1): 133-140. (in Japanese, with English summary). ["The study was conducted in no-till, no-puddling and conventional cultivation method rice field, respectively. We investigated larval development, emergence species and emergence patterns of *Sympetrum* in each rice field. The following results were obtained: 1. larval dragonfly populations in no-till and no-puddling rice field were higher than those in conventional rice field. 2. During 5 year period, the number of exuviae collected per 50m<sup>2</sup> in no-till, conventional, no-puddling cultivation methods were 751, 4,422, 4,272 respectively. Especially *Sympetrum frequens* was the most abundant species in no-puddling rice field. 3. Larval composition of each dominant species (*S. infuscatum*, *S. frequens*, *S. darwinianum*) in conventional and no-puddling cultivation method was characterized by a constant percentage throughout 5 years. *S. frequens* were dominant species in no-till cultivation rice field at first year, but after two years *S. infuscatum* became the most abundant species. We have shown that disturbance for puddling decreased larvae of *Sympetrum* and individuals of *S. frequens* decrease in no-till cultivation rice field." (Authors)] Address: Jinguji, H., Akita Prefectural Coll Agr, 2-2 S Ohgata Mura, Akita 0100044, Japan
- 6552.** Jinguji, H.; Tsuyuzaki, H.; Sato, T. (2006): Effect of temperature and light on egg hatching of *Sympetrum frequens*. *Transactions of the Japanese Society of Irrigation, Drainage and Reclamation Engineering* 74(3): 79-84. (in Japanese, with English summary). ["The aim of the present study is to obtain quantitative information on egg hatching with respect to temperature and light to clarify the effect of cultivation methods on *Sympetrum frequens*. Eggs of the species were collected on October in 2004 at Akita prefecture located at north of Japan, and the eggs had been laid on soil surface of paddy field till April in 2005. The eggs (3 trays with 30 eggs each) were held under four constant temperature (5°C., 10°C., 15°C. and 20°C.) with a photoperiod (L:D, 14:10; relative light intensity, 3000 Lux) and 20°C. in the dark. Cumulative hatching percentage under 20°C. with and without light was 98.9% and 95.6% respectively. The percentage under 15°C., 10°C. and 5°C. were 95.6%, 88.9% and 84.4%, respectively. These results suggest that the dragonfly do not require light for hatching, and hatching is suppressed by low temperature such as 5°C. Mean hatching days with light under 20°C., 15°C., 10°C. and 5°C. were 3.5, 4.8, 11.6 and 41.0 respectively. Reciprocal of variance of hatching day under these conditions were 0.15, 0.09, 0.03 and 0.02 respectively. These results indicate that the eggs under 20°C. and 15°C. hatched faster and more uniformly than those under 10°C. and 5°C. Based on these results, theoretical lower thermal threshold and thermal constants for hatching were estimated at 4.9°C. and 54.6 degree-days. According to these results, the effects of cultivation methods on hatching of this species were discussed." (Author)] Address: Jinguji, H., Akita Prefectural Coll, 2-2 S Ohgata Mura, Akita 0100444, Japan
- 6553.** Kaiser, M. (2006): Bemerkenswerte faunistische Beobachtungen in der Lippeaue nördlich von Bentfeld, Kreis Paderborn (Nordrhein-Westfalen) (In-

secta: Odonata, Saltatoria, Coleoptera, Lepidoptera). *Mitt. ArbGem. westf. Entomol.* 22(1): 7-18. (in German). [Germany; records of *Sympecma fusca*, *Anaciaeschna isoceles*, and *Gomphus vulgatissimus* are documented.] Address: Kaiser, C., Elise-Rüdiger-Weg 1, 48147 Münster, Germany. E-mail: matthias.kaiser@faunistik.de

**6554.** Kalkman, V.J. (2006): Key to the dragonflies of Turkey including species known from Greece, Bulgaria, Lebanon, Syria, the trans-caucasus and Iran. *Brachytron* 10(1): 3-82. (in English). ["A key and checklists is provided to the species occurring Turkey, Greece, Bulgaria, Lebanon, Syria, Armenia, Georgia, Azerbaijan and Iran. Except for a few poorly known subspecies and species all taxa occurring in this region are keyed and illustrated. Notes on taxonomic problems and information on distribution, flight period and habitat of each species is given." (Author)] Address: Kalkman, V. J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands. E-mail: Kalkman@naturalis.nnm.nl

**6555.** Kalkman, V.J.; van Pelt, G.J. (2006): New records of rare or uncommon dragonflies in Turkey (Odonata). *Brachytron* 10(1): 154-162. (in English). ["More than 130 new records are published of 29 species known to be rare or uncommon in Turkey, including the following species: *Aeshna cyanea*, *Anax immaculifrons*, *Brachythemis leucosticta*, *Ceragrion georgifreyi*, *Coenagrion lunulatum*, *C. ponticum*, *C. pulchellum*, *C. scitulum*, *Cordulia aenea*, *Crocothemis servilia*, *Gomphus davidi*, *G. vulgatissimus*, *Ischnura fontaineae*, *Lestes macrostigma*, *Leucorrhinia pectoralis*, *Libellula pontica*, *L. quadrimaculata*, *Lindenia tetraphylla*, *Onychogomphus assililis*, *O. lefebvrii*, *Pantala flavescens*, *Paragomphus lineatus*, *Pyrhosoma nymphula*, *Selysiothemis nigra*, *Sympetrum depressiusculum*, *S. pedemontanum* and *Trithemis arteriosa*. In addition, records from eastern Turkey of species predominantly known from western Turkey (being *Gomphus schneiderii* and *Cordulegaster picta*) are included. All records add important information on the distribution of these species within Turkey." (Authors)] Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands. E-mail: Kalkman@naturalis.nnm.nl

**6556.** Kalkman, V.J.; Van Pelt, G.J. (2006): The distribution and flight period of the dragonflies of Turkey. *Brachytron* 10(1): 83-153. (in English). ["Based on a database containing 9150 records (a species on a day on a locality) distribution maps and flight histograms are presented for all Turkish dragonflies. Notes are given for a small number of species." (Authors)] Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands. E-mail: Kalkman@naturalis.nnm.nl

**6557.** Kalkman, V.J.; Koese, B. (2006): Rediscovery of a population of the Common goldenring (*Cordulegaster boltonii*) near Venlo. *Brachytron* 9(1-2): 58-60. (in Dutch, with English summary). ["On March 27 2006 a larva of *C. boltonii* was caught at the brook Aalsbeek (also called Molenbeek), just east of Belfeld (AC: 207-368). This is the fifth Dutch locality where *C. boltonii* is known to reproduce. The species was already known from this locality from records made by Maus Lieftinck in 1921, 1922, 1923, 1924, 1926 and 1951 and from a record by Dirk Geijskes in 1967. It is likely that the species has been present ever since but has been overloo-

ked." (Authors)] Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands. E-mail: Kalkman@naturalis.nnm.nl

**6558.** Kalnins, M. (2006): The distribution and occurrence frequency of Gomphidae (Odonata: Gomphidae) in river Gauja. *Acta Universitatis Latviensis* 710, Biology: 17-28. (in English, with Latvian summary). ["The article contains data on four gomphid dragonfly species known in Latvia – *Gomphus flavipes*, *G. vulgatissimus*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia* and the latest data on their distribution, occurrence frequency and density of individuals. Gomphidae were obtained from macrozoobenthos samples in 1998. In total 280 quantitative and 65 qualitative samples were collected in the River Gauja from the town Taurene upstream to below Carnikava. For complete analyses, observations of adults individuals were also used based on a bibliography, unpublished (personal) observations and data from 1933 to 2005. Three species of Gomphidae, *G. vulgatissimus*, *O. forcipatus* and *O. cecilia* were recorded. Data with regard to observations of larvae / exuviae / imago stages showed that all gomphid species are encountered throughout Latvia. *G. flavipes* is infrequent for Latvia and this species has been recorded only in the Gauja. Gomphids occurred in 13.2% of obtained samples, *G. vulgatissimus* in 10%, *O. forcipatus* in 5% and *O. cecilia* in 0.7%. Ecological analysis of bottom substrate showed that *O. forcipatus* prefers a hard substrate situated in the rhithral stretches or in the rapids. The density of *G. vulgatissimus* reached 0.919 ind. m<sup>-2</sup>, and *O. forcipatus* 0.514 ind. m<sup>-2</sup>." (Author)] Address: Kalniņš, M., Department of Zoology and Animal Ecology, Faculty of Biology, University of Latvia, Kronvalda Bulv. 4, Riga LV-1586, Latvia. E-mail: martins.kalnins@dap.gov.lv

**6559.** Karlsson, T. (2006): Two new provincial records of dragonflies (Odonata) for Ostergötland - *Coenagrion johanssoni* and *Leucorrhinia caudalis*. *Entomologisk Tidskrift* 127(1-2): 35-38. (in Swedish, with English summary). [During 2005 new provincial records for *C. johanssoni* and *L. caudalis* have been made in Ostergötland, 30-40 km south of the city Linköping, Sweden. "The finding of *C. johanssoni* strengthen indications of that this species occurs further south in Sweden than previously known. The finding of *L. caudalis* fills up a gap in the known Swedish distribution. With these two new records, 50 species of dragonflies have been found in Ostergötland." (Author)] Address: Karlsson, T., Lansstyrelsen Ostergötland, Miljövårdsenheten, S-58186 Linköping, Sweden. E-mail: tommy.karlsson@e.lst.se

**6560.** Kefford, B.J.; Nuggeoda, D.; Metzeling, L.; Fields, E.J. (2006): Validating species sensitivity distributions using salinity tolerance of riverine macroinvertebrates in the southern Murray-Darling Basin (Victoria, Australia). *Canadian Journal of Fisheries & Aquatic Sciences* 63(8): 1865-1877. (in English). ["Species sensitivity distributions (SSDs) are commonly used in risk assessment and in setting water quality guidelines, yet their predictions have not been validated against loss of species with increasing pollutant concentrations in nature. We used a rapid toxicity testing method to determine the acute salinity tolerance (72 h LC50 values (concentration of salinity lethal to 50% of individuals)) of 110 macroinvertebrate taxa from the southern Murray-Darling Basin in central Victoria, Australia, and con-

struct an SSD. This SSD was compared with loss of riverine macroinvertebrates species from increasing salinity in Victoria. Macroinvertebrate species richness per individual sample, when salinity was < 9.9 mS center dot cm(-1), was invariant of salinity. However, when species richness was calculated across multiple samples above about 0.3-0.5 mS center dot cm(-1), it declined with increasing salinity. This decline was predicted from the SSD after application of a variable safety factor calculated from an exponential or quadratic equation. Our findings confirm that SSDs can predict the loss of freshwater macroinvertebrate species from increases in salinity. This suggests that SSDs may be useful more generally for other aquatic organisms, other stressors, and toxicants." (Authors) The study includes Odonata.] Address: Kefford, B.J., RMIT Univ., Sch. Appl. Sci., POB 71, Bundoora, Vic 3083, Australia. E-mail: ben.kefford@rmit.edu.au

**6561.** Ketelaar, R. (2006): Pattern and rapidity of the colonisation of *Erythromma viridulum* in The Netherlands. *Brachytron* 9(1-2): 33-37. (in Dutch, with English summary). ["*E. viridulum* is one of the southern Odonata quickly colonising large parts of Europe. The species was a very rare damselfly in The Netherlands until 1970. After 1980 it rapidly colonised The Netherlands and has become one of the most common species. It is suggested in this article that the expansion of *E. viridulum* took place via three routes an expansion northwards from Belgium, an expansion north-westwards via the Rhine valley and a possible expansion from an outpost in the north of The Netherlands. The first two routes can be tested by a close examination of German and Belgian records; the latter will probably remain suggestive." (Author)] Address: Ketelaar, R., Wilslaan 27, NL-6708 RW Wageningen, Netherlands. E-mail: whydah@wx.nl

**6562.** Matushkina, N. (2006): New records of rare Odonata in Ukraine (Insecta). *Proceedings of Zoological Museum*, 2006, Vol. 4: 155-161. (in English, with Ukrainian and Russian summaries). [Records of the following species are documented: *Calopteryx splendens taurica*, *C. sp. ancilla*, *C. intermedia*, *C. virgo*, *Chalcolestes parvidens*, *L. macrostigma*, *Coenagrion armatum*, *Erythromma lindenii*, *Stylurus flavipes*, *Crocothemis erythraea*, *Leucorrhinia rubicunda*, *L. albifrons*, *Sympetrum pedemontanum*, *S. fonscolombii*, *Libellula fulva*, and *Orthetrum coerulescens*. A questionable specimen from the *Calopteryx splendens* group is considered *C. intermedia* (this would be an addition to the species list of Ukraine), but it also may be a phenotype of *Calopteryx splendens ancilla*. Intermediate female specimens of *Chalcolestes viridis/parvidens* are documented and depicted.] Address: Matushkina, N., Kyiv National Taras Shevchenko University, biological faculty, department of zoology, Volodymyrs'ka str. 64, 01033 Kyiv, Ukraine

**6563.** Mikat, M. (2006): The atypical tandems of the dragonflies (Odonata: Lestidae) observed in the protected locality Na Plachtí (Hradec Králové, Eastern Bohemia). *Vážky 2005: Sborník referátů VIII. celostátního semináře odonatologů ve Žďárských vrších, ZO ĚSOP Vlašim: 182-189.* (in Czech, with English summary). [Atypical tandems among six species of Lestidae from Na Plachtí (Eastern Bohemia, Czech Republic) are presented: The following interspecific tandems were noticed during 2004-2005: male *Lestes barbarus* + female *L.*

*dryas*, male *L. sponsa* + female *L. virens*, male *L. viridis* + female *L. dryas*, and male *L. sponsa* + female *Erythromma najas*. Moreover tandems among conspecific males were confirmed in *L. viridis*, in *Sympecma fusca*, and among heterospecific males in *L. sponsa* + *L. dryas*, *L. dryas* + *L. sponsa*, and *L. sponsa* + *L. barbarus*. In addition a tandem formed by a male of *L. sponsa* and a dead immature male of *L. viridis* is described. A triplicate tandem (male *L. sponsa* with the tandem *L. viridis*) was observed, too.] Address: Mikát, M., Pekařova 670, CZ-500 09 Hradec Králové, Czech Republic. E-mail: marmulak.hk@tiscali.cz

**6564.** Mirza, R.S.; Ferrari, M.C.O.; Kiesecker, J.M.; Chivers, D.P. (2006): Responses of American toad tadpoles to predation cues: behavioural response thresholds, threat-sensitivity and acquired predation recognition. *Behaviour* 143(7): 877-889. (in English). ["Predation is one of the most important selective forces acting on prey animals. To respond adaptively to predation threats and increase their chances of survival, prey animals have to be able to recognize their potential predators. Even though a few studies demonstrated innate predator recognition, the vast majority of animals have to rely on learning to acquire this information. Often aquatic prey animals can learn to recognize predators when they detect conspecific alarm cues associated with cues from a novel predator. In this study, we exposed American toad (*Bufo americanus*) tadpoles to varying concentrations of chemical alarm cues (cues from injured conspecifics). We identified a concentration of cues which caused an overt antipredator response (supra-threshold concentration) and a lower concentration for which the prey failed to exhibit a response (sub-threshold concentration). In a second experiment, we attempted to condition the tadpoles to recognize the odour of larval dragonflies (*Anax* sp.) by pairing the dragonfly odour with either the sub-threshold concentration or the supra-threshold concentration of alarm cues. In both cases, the tadpoles learned to recognize the predator based on this single pairing of alarm cues and predator odour. Moreover, the intensity of the learned response was stronger for tadpoles conditioned with the supra-threshold concentration of alarm cues than the sub-threshold concentration. This is the first documented case of this mode of learning in anuran amphibians. Learned recognition of predators has important implications for survival." (Authors)] Address: Ferrari, Maud, Univ Saskatchewan, Dept Biol, 112 Sci Pl, Saskatoon, SK S7N 5E2, Canada. E-mail: maud.ferrari@usask.ca

**6565.** Mourek, J. (2006): Challenge to the participation on the monitoring of insect species of community interest. *Vážky 2005: Sborník referátů VIII. celostátního semináře odonatologů ve Žďárských vrších, ZO ĚSOP Vlašim: 154-161.* (in Czech, with English summary). ["The long term monitoring of species and habitats according to the EU Council Directive 92/43/EEC (On the conservation of natural habitats and of wild fauna and flora) is organized by the Agency for Nature Conservation and Landscape Protection of the Czech Republic. This contribution informs about the aims and the system of monitoring of insect species and summarizes the methods of monitoring for particular species. It is also intended as a challenge for the professional as well as non-professional entomologists to participate in the monitoring." (Author) References are made to the Odonata.] Address: Mourek, J., Agentura ochrany přírody a



krajiny ČR, Kališnická 4-6, 130 23 Praha 3, Czech Republic. E-mail: janmourek@nature.cz

**6566.** Muzon, J.; Pessacq, P.; Von Ellenrieder, N. (2006): Description of the female and larva of *Phyllogomphoides joaquini* Rodrigues Capitulo, 1992 (Anisoptera: Gomphidae). *Odonatologica* 35(1): 55-60. (in English). ["The female and last larval instar are described and illustrated based on specimens from Argentina (Buenos Aires province). The female is unique in the possession of a subapical tooth on each lobe of the vulvar scale, and it can be besides distinguished from *P. andromeda*, the only other *Phyllogomphoides* species found in Argentina, by the pterothoracic colour pattern. The larva differs from all known South American *Phyllogomphoides* larvae by the crenate inner margin of the labial palp." (Authors)] Address: Ellenrieder, Natalia von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: odonata@hotmail.com

**6567.** Niba, A.S.; Samways, M.J. (2006): Development of the concept of 'core resident species' for quality assurance of an insect reserve. *Biodiversity & Conservation* 15(13): 4181-4196. (in English). ["Awareness in the eyes of the public is important for involving the wider community in conservation. A dragonfly awareness trail was developed and implemented in the year 2000 at a national botanical garden in South Africa. Such a trail is not likely to always have the same number of dragonfly species either throughout the year or from one year to the next. The aim was to assess dragonfly assemblage changes that occurred along the trail over 3 years, so as to fine-tune expectations that the public may have as regards species to be seen at any particular time. A cumulative species variance for species and species-environmental relations, strongly indicated that certain measured site variables were responsible for the main variation in dragonfly species patterns over time. Habitat requirements of an odonate species may be defined primarily in terms of marginal grasses, floating and submerged vegetation, marginal herbs, sedges and reeds, and pH. Additional variables were percentage shade, exposed rock, marginal forest and water flow characteristics. Both dragonfly species richness and abundance changed over the 3 years. One of the reasons for this was a single, major disturbance, in the form of dredging the reservoir site to reverse ecological succession in 2002. Despite an impact such as this, and after accounting for vagrancy, there were in all 24 'core resident species' still to be seen along the trail from January to May. Another 11 species, including two migrants and one species lost temporarily to dredging disturbance, can be considered only as 'possibilities' on any one visit. Assurance that the 24 core species can be seen in the summer months (although only three in winter) is essential for maintaining the bona fide of such a trail, and hence conservation awareness, in the eyes of the public." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**6568.** Niba, A.S.; Samways, M.J. (2006): Remarkable elevational tolerance in an African odonata larval assemblage. *Odonatologica* 35(3): 265-280. (in English). ["The spatial patterns in species richness and abundance were investigated here at a series of reservoirs at different elevations, to establish which factors

determine species distributions along this topographic gradient. Larvae of 18 species were sampled in small reservoirs across a 1250 m elevational gradient at one latitude. Most species occurred throughout all elevations indicating that this subtropical odonate assemblage as a whole is remarkably tolerant of elevational changes. Although Anisoptera larval species richness and abundance increased significantly with increasing elevation, there was no change in Zygoptera species richness, while Zygoptera abundance decreased significantly. Species-site-variable triplots for Anisoptera and Zygoptera larvae indicated that no measured site variable on an individual basis clearly accounted for larval species assemblage distribution patterns. Nevertheless, canonical axes and their respective intra-set correlation coefficients showed that some measured site variables e.g. floating/submerged vegetation, turbidity, pH, water temperature (resulting from sunny or shade habitat conditions), marginal grasses, water depth as well as elevation to some extent, explained the main variation in species assemblage composition/distribution in a broadly similar manner for both suborders. Generally, the reservoirs recruited species from the regional pool, irrespective of the elevation of the pool. These species were all geographically widespread species that took advantage of the presence of these man-made reservoirs, and included only one national endemic. Although these artificial water bodies are not increasing the 'extent of species occurrence', they play a major role in increasing 'area of occupancy'. Furthermore, these species are remarkably vagile, habitat-tolerant, as well as elevationally-widespread. A reasonable explanation is that this assemblage is the historical survivor over many millennia of oscillating wet/dry periods and natural selection. The present-day species are those that readily recolonise pools after drought has been broken, and are pioneering residents of new water bodies over a wide elevational range." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**6569.** Nicieza, A.G.; Álvarez, D.; Atienza, E.M.S. (2006): Delayed effects of larval predation risk and food quality on anuran juvenile performance. *Journal of Evolutionary Biology* 19: 1092-1103. (in English). ["Metamorphosis can disrupt the correlation structure between juvenile and adult traits, thus allowing relatively independent evolution in contrasting environments. We used a multiple experimental approach to investigate how diet quality and larval predation risk affected the rates of growth and development in painted frogs (*Discoglossus galganoi*), and how these changes influence post-metamorphic performance. A high-energy diet entailed growth advantages only if predation risk did not constrain energy acquisition, whereas diet quality affected primarily the extension of the larval period. Predation risk influenced juvenile shape, most likely via the effects on growth and differentiation rates. Juvenile frogs emerging from predator environments had shorter legs and longer bodies than those from the nonpredator tanks. However, these morphological changes did not translate into differences in relative jumping performance. Neither size-adjusted lipid storage nor fluctuating asymmetry was significantly influenced by food quality or predation risk. Our data suggest that the post-metamorphic costs of predator avoidance during the larval phase are mostly a consequence of small size at metamorphosis." (Authors)] The experimental design

includes *Aeshna cyanea*.] Address: Nicieza, Al., Univ Oviedo, Dept Funct Biol, E-33071 Oviedo, Spain. E-mail: agnic@uniovi.es

**6570.** Novelo-Gutierrez, R. (2006): The larva of *Macrothemis ultima* Gonzalez-Soriano, 1992 (Odonata: Anisoptera: Libellulidae). *Transactions of the American Entomological Society* 132(1-2): 151-156. (in English). ["A detailed description and illustration of the larva of *M. ultima* is provided, based upon larvae reared until emergence. Its main features are: body dark brown, integument mostly bare, premental setae 7+3 or 8+4, ligula prominent, palpa setae 6, dorsal protuberances on abdomen well developed and high on 2-5, low, spine-like on 6-9, total length 15.8-16.5 mm. It appears more closely related to the larva of *M. aurimaculata* Donnelly than to others." (Author)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx

**6571.** Novelo-Gutierrez, R.; Che Salmah, M.R. (2006): The larva of *Macromia cincta* Rambur, with a key to the known *Macromia* larvae of the Malaysian Peninsula (Anisoptera : Macromiidae). *Odonatologica* 35(1): 61-66. (in English). ["A female final instar larva (reared) from the Malaysian Peninsula is described and illustrated in detail. A comparison to other larvae of the genus inhabiting this Peninsula is made, and a key is provided. The unique features in the larva of *M. cincta* are: premental setae 4+2 or 4+3, dorsal protuberances on abdominal segments 3-10, increasing gradually to the rear but suddenly reduced on 10, and the presence of a basal tubercle on the inner margin of the galeolacina." (Author)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx

**6572.** Olofsson, F. (2006): Nya provinsfynd av trolsländor från södra Norrland. *Natur i Norr*, Umeå 25(2): 107-109. (in Swedish). [Records of *Pyrhosoma* nymphula, *Cordulegaster boltonii*, *Cordulia aenea*, and *Sympetrum vulgatum* are briefly commented. A table with additional 15 regional species is added to the publication.] Address: Olofsson, F., Miljöavdelningen, Länsstyrelsen Västernorrlands län, 871 86 Härnösand, Sweden. E-mail: frans.olofsson@y.lst.se

**6573.** Oppel, S. (2006): Site fidelity and dispersal of adult *Neurobasis awamena* Michalski in tropical rainforest streams in Papua New Guinea (Zygoptera: Calopterygidae). *Odonatologica* 35(4): 331-339. (in English). ["The species inhabits swift mountain streams at montane elevations of southern Papua New Guinea. In this study the duration for which adult male and female remained at a given site in rainforest streams was determined, and the dispersal distance and direction of marked individuals leaving the site of initial observation was assessed. Territorial defence was non-exclusive and male held territories for up to 45 days. On average, male remained 9 days, female 11 days at a given site. Both sexes stayed significantly longer at sites with suitable oviposition substrates than at a site without. Mating occurred only twice during the study period, and the scarcity of mating events might explain long territory holding times. On a

daily basis male moved larger distances than female, suggesting that female remain at a site for a longer period before moving a long distance. Both sexes showed similar lifetime dispersal distances (1000-1300m), and dispersal was predominantly directed upstream. It is concluded that this unidirectional dispersal of adults may compensate for downstream drift of larvae in rapid flowing streams." (Author)] Address: Oppel, S., Univ Alaska, Dept Biol and Wildlife, 211 Irving 1, Fairbanks, AK 99775 USA. E-mail: steffen.oppel@gmail.com

**6574.** Pass, G.; Gereben-Krenn, B.-A.; Merl, M.; Plant, J.; Szucsich, N (2006): Phylogenetic relationships of the orders of Hexapoda: Contributions from the circulatory organs for a morphological data matrix. *Arthropod Systematics & Phylogeny* 64(2): 165-203. (in English). ["Discussions of phylogenetic studies based on morphological data focus mainly on results of the cladistic analysis while selection and evaluation of characters themselves are often underrepresented. Our paper seeks to address this with a survey of characters of the circulatory organs to contribute to the analysis of phylogenetic relationships of hexapod orders. The survey is based on examination of literature and includes, in addition, numerous unpublished data. Of 38 variable traits of the dorsal vessel and the various accessory circulatory organs, we selected 11 which are potentially informative at supraordinal level. They are critically discussed and coded as characters for use in comprehensive future cladistic analyses employing greater sets of morphological data. It must be stated that many features of circulatory organs for higher systematic categories are still based on one or few species for most orders of hexapods; this deficiency is due to the great methodological effort required to investigate internal organs. In general, circulatory organs of hexapods are simply organized making it difficult to discriminate homology from convergence. In addition to phylogeny, general aspects of the evolution of the circulatory system are outlined. In an appendix we provide comprehensive information on the traits, characters and the species in which they occur." (Authors)] Address: Pass, G., Department of Evolutionary Biology, University of Vienna, Althanstraße 14, 1090 Vienna, Austria. E-mail: guenther.pass@univie.ac.at

**6575.** Patankar, N.V.; Tembhare, D.B. (2006): Immunocytochemical demonstration of some vertebrate peptide hormone-like substances in the midgut endocrine cells in *Tramea virginia* (Rambur) (Anisoptera: Libellulidae). *Odonatologica* 35(2): 151-158. (in English). ["The present immunocytochemical study reveals the presence of well-defined endocrine cells, intermingled with the columnar cells of the epithelium in the midgut region of the alimentary canal of *T. virginia*. The midgut endocrine cells are of 2 types, the open-type midgut endocrine cells (OMEC) with a long tubule opening into the lumen of the midgut and close-type midgut endocrine cells (CMEC) which are spherical in shape and devoid of extending tubules. Various gastrointestinal hormone-like substances are localized in respective types of midgut endocrine cells in different regions of the midgut i.e. anterior, middle and posterior. The NPY, FMRFamide and P-endorphin were localized in the open-type while substance P, gastrin, CCK and VIP in the close-type midgut endocrine cells. The midgut endocrine cells in *T. virginia* differ from each other in their location, cytomorphological and immunocytochemical cha-

racteristics representing different types of endocrine cells. Functional significance of these myotropic and vertebrate gastrointestinal hormone-like substances in the midgut endocrine cells of *T. virginia* is discussed." (Authors)] Address: Patankar, N.V., 44 Vijaya Nagar, S Ambazari Rd, Nagpur 440022, Maharashtra, India. E-mail: entonitishapatankar@rediffmail.com

**6576.** Pedroso, N.E.; Santos-Reis, M. (2006): Summer diet of Eurasian Otters in large dams of South Portugal. *Hystrix It. J. Mamm. (n.s.)* 17(2): 117-128. (in English). [Odonata are represented in the diet of otters (*Lutra lutra*) by 0,5% of all food items.] Address: Pedroso, N. Universidade de Lisboa, Centro de Biologia Ambiental, Faculdade de Ciências da Universidade de Lisboa. Edifício C2, Campo Grande, 1749-016 Lisboa, Portugal. E-mail: nmpedroso@fc.ul.pt

**6577.** Phoenix, J.; Hentschel, W. (2006): Neue Nachweise von *Aeshna subarctica elisabethae* Djakonov, 1922 und *Somatochlora alpestris* (Selys, 1840) aus dem Böhmisches Teil des Erzgebirges [Krušné hory]. *Vážky 2005: Sborník referátu VIII. celostátního semináře odonatologu ve Žďárských vrších, ZO CSOP Vlašim, 2006: 167-174.* (in German, with Czech summary). [New records of *Aeshna subarctica elisabethae* Djakonov, 1922 and *Somatochlora alpestris* (Selys, 1840) from the Bohemian part of the Erzgebirge mountains. "The two bogdwelling dragonfly species *Aeshna subarctica elisabethae* and *Somatochlora alpestris* occur as well in the Saxonian as in the Bohemian part of the Erzgebirge [Krušné hory]. As far as we know today, the only reproductive habitats of *Aeshna s elisabethae* are restricted to a small, cross-border area in the western part of the Erzgebirge (bogs north of the village Prebuz [Frühbuss]). Concerning the distribution of *S. alpestris* in the bohemian part of the Erzgebirge there are only records from the bogs near the village Boží Dar [Gottesgab] and the bog Malé jerábí jezero [Kleiner Kranichsee] known. Because of more extended occurrence in the saxonian part (actually 16 localities, some of them in cross-border habitats) some additional still undetected localities are supposed in the bohemian part too. Therefore a special search for *S. alpestris* in suitable habitats in the higher mountain region of the Erzgebirge is suggested." (Authors)] Address: Phoenix, J., Goethestr. 22, D-01824 Königstein, Germany. E-mail: juergen.phoenix@t-online.de

**6578.** Pintor, L.M.; Soluk, D.A. (2006): Evaluating the non-consumptive, positive effects of a predator in the persistence of an endangered species. *Biological Conservation* 130(4): 584-591. (in English). ["Failure to consider both the consumptive and non-consumptive effects of predators on prey can lead to erroneous conclusions about the net effect of the relationship. The predatory devil crayfish, *Cambarus diogenes* Girard functions as an ecosystem engineer constructing extensive burrow systems through aquatic habitats. Despite crayfish posing a serious predation threat, preliminary data indicate that the federally endangered Hines Emerald dragonfly larvae, *Somatochlora hineana* Williamson regularly inhabit crayfish burrows. During late summer, *S. hineana* larval habitat dries up; leaving crayfish burrows as some of the only wetted habitats. Thus, *C. diogenes* can affect *S. hineana* through both direct, negative and indirect positive effects. We examined the positive role of crayfish burrows as drought refuges, and the threat of predation by *C. diogenes* on *S. hineana* larvae.

Monthly field sampling indicated that *S. hineana* use open channel areas in spring and early summer moving into burrow systems in mid summer when channel areas normally dry. Laboratory experiments and field observations confirmed that crayfish prey on *S. hineana* larvae. Adult crayfish were a larger predation threat than juvenile crayfish. Despite their negative predatory impact, removal of crayfish from burrows in the field did not enhance densities of *S. hineana* larvae. Although *S. hineana* may face the threat of predation in burrows, they face a greater risk of desiccation if they remain in the open channel. These results lead to the counterintuitive conclusion that the maintenance of a predator is important for conserving an endangered prey species." (Authors)] Address: Pintor, Lauren, Univ. Calif. Davis, Dept Environm. Sci. and Policy, 1 Shields Ave, Davis, CA 95616 USA. E-mail: Impintor@ucdavis.edu

**6579.** Poopathi, S.; Tyagi, B.K. (2006): The challenge of mosquito control strategies: from primordial to molecular approaches. *Biotechnology and Molecular Biology Review* 1(2): 51-65. (in English). ["Mosquito control programs worldwide have been evaluating the feasibility to implement biological control strategies by using *Bacillus sphaericus* (Bs) and/or *B. thuringiensis* serovar israelensis (Bti). A comprehensive review is presented here to assess the potentiality of biological control agents in mosquito control operation. Vector control is primordial and very essential means for controlling transmission of filariasis, malaria, Japanese encephalitis and dengue in human society. Over the last few decades, there is growing realization that alternate methods to synthetic chemical control needs to be studied and perfected. In the last decade the bacilli based mosquito larvicides popularly known as biological larvicides are becoming more popular in vector management program the world over. The toxicity to mosquito larvae is due to crystal toxins encoded by specific genes. The major advantages of these biolarvicides are reduced application cost, safety to environment, human beings, animals and other non-target organisms. This special review paper explores the importance of bacterial toxin in controlling vector mosquitoes and the tactics for managing resistance to the mosquitocidal bacteria which include rotating different mosquitocidal strains and using genetic engineering to produce new combinations of toxins. This paper also provides a focus on continuous research toward identification of novel mosquitocidal toxins suitable for use if resistance to existing toxins." (Authors) The paper refers to Singh, R.K., Dhiman, R.C. & Singh, S.P. (2003): Laboratory studies on the predatory potential of dragonfly nymphs on mosquito larvae. *Commun. Dis.* 35 : 96-101] Address: Poopathi, Subbiah, Centre for Research in Medical Entomology (Indian Council of Medical Research), Ministry of Health and Family Welfare, Govt of India, Chinna Chokkikulam, Madurai. 625002, Tamil Nadu, India.

**6580.** Rabosky, D.L. (2006): LASER: A maximum likelihood toolkit for detecting temporal shifts in diversification rates from molecular phylogenies. *Evolutionary Bioinformatics Online* 2006: 257-260. (in English). ["Rates of species origination and extinction can vary over time during evolutionary radiations, and it is possible to reconstruct the history of diversification using molecular phylogenies of extant taxa only. Maximum likelihood methods provide a useful framework for inferring temporal variation in diversification rates. LASER is a package for the R programming environment that imple-



ments maximum likelihood methods based on the birth-death process to test whether diversification rates have changed over time. LASER contrasts the likelihood of phylogenetic data under models where diversification rates have changed over time to alternative models where rates have remained constant over time. Major strengths of the package include the ability to detect temporal increases in diversification rates and the inference of diversification parameters under multiple rate-variable models of diversification. The program and associated documentation are freely available from the R package archive at <http://cran.r-project.org>." (Author) Example: Holarctic Damselfly Radiation; Turgeon et al. (2005). Available at: <http://la-press.com/crdata/files/fEBO-2-Rabosky-et-al178.pdf>] Address: Rabosky, D.L., Corson Hall, Cornell University, Ithaca, NY 14853-2701, USA. Email: DLR32@cornell.edu

**6581.** Rangde, P. (2006): Étude biographique sur la vie et l'œuvre de René Martin (1846-1925). *Martinia* 22(1): 13-35. (in French, with English summary). [The paper refers to private documents and an obituary of P.P. Calvert to give some detailed insight into life and activities of René Martin.] Address: not stated

**6582.** Reichling, A. (2006): Faunistische Besonderheiten am südlichen Randbereich des Flugplatzes Finow und am Walpurgisbruch. *Naturschutz und Landschaftspflege in Brandenburg* 3/2006: 93-97. (in German). [Brandenburg, Germany; a total of 38 odonate species includes 29 breeding and 2 probably autochthonous species. Of special reference are records of *Leucorrhinia caudalis*, *L. albifrons*, and *L. pectoralis*.] Address: not stated

**6583.** Reinhardt, K. (2006): *Macromia illinoiensis* Walsh males use shade boundaries as landmarks (Anisoptera : Macromiidae). *Odonatologica* 35(4): 389-393. (in English). ["*M. illinoiensis* males were most actively engaged in territory patrolling during noon. They were observed to avoid areas on the water surface that were shaded. Areas on the water surface that were not avoided by males were artificially shaded upon which such areas were avoided. It is concluded that males of *M. illinoiensis* may use the shade-sun boundary on the water surface as a cue of its territory boundary." (Author)] Address: Reinhardt, K., Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: K.Reinhardt@sheffield.ac.uk

**6584.** Richardson, J.L. (2006): Novel features of an inducible defense system in larval tree frogs (*Hyla chrysoscelis*). *Ecology* 87(3): 780-787. (in English). ["Organisms in aquatic ecosystems must often tolerate variable environmental conditions, including an uncertain risk of predation. Individuals that can maintain plastic defenses against predation will increase their survival when predators are present, but will not incur the costs of these defenses when the risk of predation is low and the defense is not induced. Larvae of the pond-breeding anuran *Hyla chrysoscelis* develop a conspicuous phenotype in the presence of predators consisting of a brightly colored tail and a deeper tail fin. In this study, I attempted to identify the source of the chemical signal that induces this defensive morphology in this species. I tested whether metabolites alone, originating from the prey but passing through the predator, were able to induce the same morphological response as the combination of alarm signals released directly by at-

ta-cked conspecifics, and metabolites. I used morphometric and tail conspicuousness data to assess tadpole response to the perceived risk of predation by larval odonate predators (*Anax junius*). I also tested whether this inducing cue could be recognized across species by measuring the morphological response of *H. chrysoscelis* tadpoles exposed to cues emitted when tadpoles of a closely related genus (*Pseudacris crucifer*) were consumed. Tadpoles exhibited a clean morphology in response to all cues corresponding to their relative reliability as indicators of a risk of predation. *H. chrysoscelis* tadpoles were also able to respond to cues emitted when tadpoles of a closely related genus were consumed by predators. These results illustrate that tadpoles of this species are able to respond to metabolites alone without alarm signals, and that interspecific chemical communication is a primary mechanism for predator avoidance in this inducible defense system." (Author)] Address: Richardson, J.L., Univ. Washington, Dept Biol. Struct., Box 357420, Seattle, WA 98195 USA

**6585.** Richardson, J.M.L.; Gunzburger, M.S.; Travis, J. (2006): Variation in predation pressure as a mechanism underlying differences in numerical abundance between populations of the poeciliid fish *Heterandria formosa*. *Oecologia* 147(4): 596-605. (in English). ["We explored whether a variation in predation and habitat complexity between conspecific populations can drive qualitatively different numerical dynamics in those populations. We considered two disjunct populations of the least killifish, *Heterandria formosa*, that exhibit long-term differences in density, top fish predator species, and dominant aquatic vegetation. Monthly censuses over a 3-year period found that in the higher density population, changes in *H. formosa* density exhibited a strong negative autocorrelation structure: increases (decreases) at one census tended to be followed by decreases (increases) at the next one. However, no such correlation was present in the lower density population. Monthly census data also revealed that predators, especially *Lepomis* sp., were considerably more abundant at the site with lower *H. formosa* densities. Experimental studies showed that the predation by *Lepomis gulosus* occurred at a much higher rate than predation by two other fish and two dragonfly species, although *L. gulosus* and *L. punctatus* had similar predation rates when the amount of vegetative cover was high. The most effective predator, *L. gulosus*, did not discriminate among life stages (males, females, and juveniles) of *H. formosa*. Increased predation rates by *L. gulosus* could keep *H. formosa* low in one population, thereby eliminating strong negative density-dependent regulation. In support of this, changes in *H. formosa* density were positively correlated with changes in vegetative cover for the population with a history of lower density, but not for the population with a history of higher density. Our results are consistent with the hypothesis that the observed differences among natural populations in numerical abundance and dynamics are caused in part by the differences in habitat complexity and the predator community." (Authors)] Address: Richardson, J.M.L., Brock Univ., Dept Biol. Sci., 500 Glenridge Ave, St Catharines, ON L2S 3A1, Canada. E-mail: Jean.Richardson@brocku.ca

**6586.** Rifai, L.; Amr, Z.S. (2006): Diet of the Stripe-Necked Terrapin, *Mauremys rivulata*, in Jordan. *Russian Journal of Herpetology* 13(1): 41-46. (in English). ["Stomach contents of *Mauremys rivulata* were analy-

zed by stomach flushing technique. *Mauremys rivulata* is an omnivorous species, with food items including aquatic insects and their larvae, amphibians and plants. Juvenile turtles were strictly carnivorous and larger ones shifted to a more herbivorous diet. Animal remains found in juveniles were more diverse, consisting of at least six different species of insects and amphibians, while larger animals consumed at the most three different animal species." (Authors) Odonata, preferably Anisoptera, Libellulidae represent approximately 25% of food items in adult *M. rivulata*. Juvenile terrapins also consumed adult Zygoptera.] Address: Amr, Zuhair S., Jordan Univ. Sci. & Technol., Dept Biol., POB 3030, Irbid, Jordan. E-mail: amrz@just.edu.jo

**6587.** Robb, T.; Forbes, M.R. (2006): Sex biases in parasitism of newly emerged damselflies. *Ecoscience* 13(1): 1-4. (in English, with French summary). ["There are several examples of sex-biased parasitism of invertebrate hosts. Sex biases in parasitism could be explained by differences between males and females either in exposure to or susceptibility to parasites. Our results show that for the common spreadwing damselfly, *Lestes disjunctus*, there was a female bias in mean intensity of parasitism by larval *Arrenurus pollictus* mites for newly emerged individuals sampled over emergence periods in both 2002 and 2003. This bias could not be explained by host body size and timing of emergence, factors thought to influence exposure of host larvae to larval mites. We suggest a novel explanation for sex-biased parasitism based on differences in developmental trajectories of larval male and female hosts, which should influence frequency of contact by larval mites. This explanation may help explain female-biased parasitism in other lestad damselflies, which should be exaggerated for early emerging species with compressed emergence periods. Further work is needed to test this novel explanation and determine whether it is applicable to other invertebrate host-parasite associations where parasites first come into contact with immature stages of hosts." (Authors)] Address: Robb, Tonia, Department of Biology, Carleton University, 1125 Colonel By Drive, Ottawa, Ontario K1S 5B6, Canada. E-mail: trobb@connect.carleton.ca

**6588.** Robb, T.; Forbes, M.R. (2006): Age-dependent induction of immunity and subsequent survival costs in males and females of a temperate damselfly. *BMC Ecology* 6: 13 pp. (in English). ["Background: To understand variation in resistance to parasites within host populations, researchers have examined conditions under which immunity is induced and/ or is costly. Both host sex and age have been found to influence immune expression and subsequently are likely factors influencing the costs of resistance. The purpose of this study was to examine immune expression and associated survival costs for two age groups ( newly emerged and sexually mature individuals) of the damselfly, *Enallagma boreale* Selys. Survival was assessed for experimentally challenged and control damselflies, housed initially at 22°C and then subjected to low temperatures (15°C) associated with reduced foraging activity and food deprivation. Experimental conditions emulated natural local variation in bouts of good weather followed by inclement weather (successions of days with hourly mean temperatures around 15°C and/ or rainy weather). Results: At least one of three immune traits was induced to higher levels for both newly emerged and mature *E. boreale* challenged by Lippopolysaccha-

ride (LPS) relative to saline-injected controls, when housed at 22°C. The immune traits assayed included haemocyte concentration, Phenoloxidase activity and antibacterial activity and their induction varied among ages and between males and females. For matures, those injected with LPS had lowered survivorship compared to saline-injected controls that were housed initially at 22°C and subsequently at 15°C. Newly emerged LPS-injected damselflies did not show reduced survivorship relative to newly-emerged controls, despite showing immune induction. Conclusion: Reduced longevity following induction of immunity was observed for reproductively mature damselflies, but not for newly emerged damselflies. Costs of resistance depend only partly on the immune trait induced and more on the age (but not sex) of the host. In four years, we often observed bouts of inclement weather following good days and these bouts occurred primarily during the emergence periods, but also during the flight periods, of *E. boreale*. The duration of these bouts appear sufficient to compromise survival of mature damselflies that responded immunologically to LPS challenge. We further suggest the environmental conditions likely experienced by different ages of damselflies, following resistance expression, has influenced optimal immune investment by individuals in different age classes and the likelihood of detecting costs of resistance." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**6589.** Samways, M.J. (2006): Regional response of Odonata to river systems impacted by and cleared of invasive alien trees. *Odonatologica* 35(3): 297-303. (in English). ["Invasive alien organisms are a major threat to indigenous biodiversity. Invasive alien trees (IATs) are a component of this threat to South African odonates. IATs shade out the habitat of the sun-loving odonate species. A national programme to remove IATs from river systems has been initiated in South Africa. Results from widely-separated sites show that the impacts of IATs are the same in different physiognomic areas. In turn, removal of the IATs is beneficial to a range of species from narrow endemics to widespread generalists. Indications are that this nation-wide IAT-removal programme is beneficial across a wide geographical area, leading to rapid and significant odonate assemblage recovery. The IAT-removal programme must also consider removal of alien seedlings so as not to reverse the recovery programme." (Author)] Address: Samways, M. J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**6590.** Samways, M.J.; Tarboton, W. (2006): Rediscovery of *Metacnemis angusta* (Selys) in the Western Cape, South Africa, with description of male and redescription of female (Zygoptera: Platycnemididae). *Odonatologica* 35(4): 375-378. (in English). ["*M. angusta* was described from a female type in 1863, which has since been lost. The only other specimen is another female taken in 1920 in the Western Cape, South Africa. The species was feared extinct, but a population was discovered in November 2003. The male is described here as a neotype, along with a redescription of the female as a paratype. Although the conservation status of the species has improved, it is still threatened, principally by invasive alien trees." (Authors)] Address:

Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**6591.** Samways, M.J. (2006): Open and banded wings: Hypotheses on damselfly wing position (Zygoptera). *Odonatologica* 35(1): 67-73. (in English). ["Zygoptera species either perch with their wings open or closed. The alternatives do not appear to be phylogenetically constrained, as there are sexual differences in *Ecchlorolestes peringueyi*, and population variation and individual variation in *Pseudagrion sublacteum*. Open wings would appear to be more conspicuous to predators (Shiny Wing Hypothesis). Yet there is a difference between clear and coloured, banded wings in *Chlorolestes* species. Clear wings appear to be associated with crypsis, either in open or forest habitats. For species that have banded wings (and banded bodies), those individuals that are banded are aggressively territorial to clear-winged conspecifics and are sexually more attractive to female female. Open-winged perching behaviour is associated with perching on tips of shoots and rapid escape from ground predators, supporting the Quick Takeoff Hypothesis. Conspicuous open-winged perching for banded-wing individuals appears to be a tradeoff between territorial superiority on the one hand and predation from aerial predators, particularly birds, on the other. Predation however, appears to be minor relative to the advantages gained by conspicuousness." (Author)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**6592.** Samways, M.J. (2006): National red list of South African Odonata. *Odonatologica* 35(4): 341-368. (in English). ["Using the IUCN categories and criteria, the conservation status of the South African dragonfly fauna has been assessed. IUCN recommendations for adjusting the global categories and criteria for national red listing have been taken into consideration. A total of 40 taxa are listed as threatened or near-threatened, which is 25% of the national total (160 species and subspecies). The precautionary rather than evidentiary approach is taken throughout, especially as many sp. are marginal and although not threatened globally are highly threatened locally. Nevertheless, it is clear that locally the South African odonate fauna is under severe threat, especially the stream sp. Many of the threats are synergistic, both with natural drought/flood cycles, and with other threats. Restoration of hydrological regimes and riparian conditions are promoting conservation of this odonate assemblage." (Author)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**6593.** Schilder, R.J.; Marden, J.H. (2006): Metabolic syndrome and obesity in an insect. *Proc. Natl. Acad. Sci. USA* 103(4): 18805-18809. (in English). ["Dragonflies infected with noninvasive gregarine gut parasites (Microsporidia, Apicomplexa) have reduced flight-muscle performance, an inability to metabolize lipid in their muscles, twofold elevated hemolymph carbohydrate concentrations, and they accumulate fat in their thorax in a manner analogous to mammalian obesity. Gregarine infection is associated with inappropriate responses of hemolymph carbohydrate concentration to insulin and with chronic activation in the flight muscles of p38 MAP kinase, a signaling molecule involved in

immune and stress responses. Short-term exposure to gregarine excretory/secretory products caused elevated blood carbohydrate and p38 MAPK activation in healthy individuals. These characteristics comprise a set of symptoms and processes that are known in mammals as metabolic syndrome but which have not previously been described in other animal taxa. In addition to expanding the known taxonomic breadth of metabolic disease, these results indicate that insects may be useful experimental models for studying its underlying biology and mechanisms." (Authors)] Address: Schilder, R.J., Department of Biology, 208 Mueller Laboratory, Pennsylvania State University, University Park, PA 16802

**6594.** Schmidt, E. (2006): Ein dunkelflügliges Weibchen von *Calopteryx splendens* bei Wesel/Niederrhein mit Diskussion der östlichen ssp. *ancilla* (Selys, 1853). *Beitr. Ent.* 56(2): 422-432. (in German, with English summary). [The status of *Calopteryx splendens ancilla* (Selys, 1853) is discussed in detail based on a record of a dark-winged female of the taxon near Wesel, Nordrhein-Westfalen, Germany.] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**6595.** Sniegula, S.; Johansson, F. (2006): Två nya trollsländor för Västerbotten: *Coenagrion pulchellum* och *Somatochlora flavomaculata*. *Natur i Norr* 25(2): 103-104. (in Swedish). [*Coenagrion pulchellum*: Nydalasjön, ca 4 km east of centrala Umeå (63°49'N, 20°21'E), 27-07-2006. *Somatochlora flavomaculata*: Simon in Lomtjärn, ca 1,5 km öster om Nydalasjön, 8-07-2006.] Address: Johansson, F., Dept of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**6596.** Steffens, W.P.; Smith, W.A. (2006): Description of the larva of *Somatochlora incurvata* Walker (Anisoptera: Corduliidae). *Odonatologica* 35(4): 379-383. (in English). ["The last larval instar is described and illustrated from material collected in central and southeast Wisconsin, United States, and the larval habitat is described. The larva differs from related species in the arctica group of *Somatochlora* in having a greater head width and in the dorsolateral setal patterns on abdominal tergites VI-IX. Segment IX has distinct paired dorsolateral tufts, and VIII, VII, and VI have progressively less defined to absent paired tufts. These characters distinguish the species from the most similar species, *S. forcipata*, and all others of the arctica group." (Authors)] Address: Steffens, W.P., 1993 Holm Rd, Two Harbors, MN 55616 USA. E-mail: stef0077@d.umn.edu

**6597.** Stoks, R.; De Block, M. (2006): Physiological costs of compensatory growth in a damselfly. *Ecology* 87(6): 1566-1574. (in English). ["Little is known about physiological costs of rapid growth. We successfully generated compensatory growth to time stress and transient food stress in the damselfly *Lestes viridis* and studied the physiological correlates of the resulting reduced ability to cope with starvation. We found evidence for both mechanisms proposed to underlie the physiological trade-off: compensatory growth was associated with ( 1 ) a higher metabolic rate, as indicated by a higher oxygen consumption and a faster depletion of energy storage molecules ( glycogen and triglycerides), and ( 2 ) a smaller investment in energy storage. The former may also explain why storage molecules after emergence were negatively affected by time stress and



food stress, despite the successful compensation before emergence. These deferred physiological costs of rapid growth have the potential to couple larval stresses to adult fitness irrespective of age and size at emergence, and they may partly explain why many animals do not show their maximum achievable growth rate." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**6598.** Stoks, R.; De Block, M.; Slos, S.; Van Doorslaer, W.; Rolff, J. (2006): Time constraints mediate predator-induced plasticity in immune function, condition, and life history. *Ecology* 87(4): 809-815. (in English). ["The simultaneous presence of predators and a limited time for development imposes a conflict: accelerating growth under time constraints comes at the cost of higher predation risk mediated by increased foraging. The few studies that have addressed this tradeoff have dealt only with life history traits such as age and size at maturity. Physiological traits have largely been ignored in studies assessing the impact of environmental stressors, and it is largely unknown whether they respond independently of life history traits. Here, we studied the simultaneous effects of time constraints, i.e., as imposed by seasonality, and predation risk on immune defense, energy storage, and life history in lepidopteran damselflies. As predicted by theory, larvae accelerated growth and development under time constraints while the opposite occurred under predation risk. The activity of phenoloxidase, an important component of insect immunity, and investment in fat storage were reduced both under time constraints and in the presence of predators. These reductions were smaller when time constraints and predation risk were combined. This indicates that predators can induce sublethal costs linked to both life history and physiology in their prey, and that time constraints can independently reduce the impact of predator-induced changes in life history and physiology." (Authors)] Address: Rolff, J., Department of Animal and Plant Sciences, University of Sheffield, S10 2TN Sheffield, UK. E-mail: JOR@sheffield.ac.uk

**6599.** Stübing, S. (2006): Bemerkenswerte Bestandsentwicklung einiger seltener Libellenarten in der südhessischen Rheinebene. *Collurio* 24: 69-71. (in German). [Hessen, Germany; significant population trends of formerly very rare river Odonata are documented and briefly discussed: *Stylurus flavipes*, *Ophiogomphus cecilia*, and *Onychogomphus forcipatus*: A few notes are added to *Aeshna affinis*, and *Crocothemis erythraea*.] Address: Stübing, S., Eckhardtstr. 33a, 64289 Darmstadt, Germany. E-mail: stefan.stuebing@gmx.de

**6600.** Svensson, E.I.; Eroukhmanoff, F.; Friberg, M. (2006): Effects of natural and sexual selection on adaptive population divergence and premating isolation in a damselfly. *Evolution* 60(6): 1242-1253. (in English). ["The relative strength of different types of directional selection has seldom been compared directly in natural populations. A recent meta-analysis of phenotypic selection studies in natural populations suggested that directional sexual selection may be stronger in magnitude than directional natural selection, although this pattern may have partly been confounded by the different time scales over which selection was estimated. Knowledge about the strength of different types of selection is of general interest for understanding how selective forces

affect adaptive population divergence and how they may influence speciation. We studied divergent selection on morphology in parapatric, natural damselfly (*Calopteryx splendens*) populations. Sexual selection was stronger than natural selection measured on the same traits, irrespective of the time scale over which sexual selection was measured. Visualization of the fitness surfaces indicated that population divergence in overall morphology is more strongly influenced by divergent sexual selection rather than natural selection. Courtship success of experimental immigrant males was lower than that of resident males, indicating incipient sexual isolation between these populations. We conclude that current and strong sexual selection promotes adaptive population divergence in this species and that premating sexual isolation may have arisen as a correlated response to divergent sexual selection. Our results highlight the importance of sexual selection, rather than natural selection in the adaptive radiation of odonates, and supports previous suggestions that divergent sexual selection promotes speciation in this group." (Authors)] Address: Svensson, E.I., Section for Animal Ecology, Ecology Building, Lund University, SE-223 62 Lund, Sweden. E-mail: erik.svensson@zoekol.lu.se

**6601.** Tarkowska-Kukuryk, M. (2006): Water soldier *Stratiotes aloides* L. (Hydrocharitaceae) as a substratum for macroinvertebrates in a shallow eutrophic lake. *Pol. J. Ecol.* 54(3): 441-451. (in English). ["The importance of water soldier (*Stratiotes aloides* L.) as a colonization substratum for epiphytic and mining fauna has been investigated in the shallow, eutrophic lake in East Poland. Samples were taken in May, July and October in 2000–2001. Studies focused on abundance and species diversity of phytophilous fauna of *Stratiotes aloides*, in particular on the relation between epiphytic and mining organisms and their seasonal changes. The studied zoocenosis differed significantly in terms of density and taxa number. In all studied seasons fauna inhabiting *Stratiotes aloides* showed higher abundance and species diversity than mining invertebrates. Both zoocenosis were predominated by Chironomidae larvae. The percentage of midges in epiphytic fauna decreased slightly during vegetation period, the mining fauna showed the opposite pattern. Epiphytic Chironomidae were dominated by four taxa (*Dicrotendipes* sp., *Glyptotendipes* sp., *Paratanytarsus austriacus*, *Psectocladus* sp.). The mining fauna was represented mainly by *Glyptotendipes* sp. larvae. Density and biomass of epiphytic fauna showed the positive correlation with water soldier biomass." (Author) Odonata are included into the study on the suborder level.] Address: Tarkowska-Kukuryk, Monika, Department of Hydrobiology and Ichthyobiology, University of Agriculture in Lublin, Akademicka 13, 20-950 Lublin, Poland. E-mail: monika.kukuryk@ar.lublin.pl

**6602.** Theischinger, G.; Richards, S.J. (2006): Two new species of *Nososticta* Hagen in Selys from Papua New Guinea (Zygoptera: Protoneuridae). *Odonatologica* 35(1): 75-79. (in English). ["*N. conifera* sp. n. (holotype male: Gulf prov., Lakekamu, Ivimka Camp adjacent Sapoi R., 1-XII-1996) and *N. smilodon* sp. n. (holotype male: Gulf prov., Dark-End Lumber, 5-X-1999) are described. The holotypes are deposited in South Australian Museum, Adelaide. Diagnostic characters of the adults are illustrated and the affinities of both species are discussed." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia

lia. E-mail: [gunther.theischinger@environment.nsw.gov.au](mailto:gunther.theischinger@environment.nsw.gov.au)

**6603.** Theischinger, G.; Richards, S.J. (2006): Two new Zygoptera species from Papua New Guinea (Protonuridae, Coenagrionidae). *Odonatologica* 35(2): 199-204. (in English). ["*Nososticta acudens* sp. n. and *Papuagrion nigripedum* sp. n. from Papua New Guinea are described, both from lowland rainforest in Gulf province (Dark-End Lumber 3-X-1999). Holotype male male are deposited at SAMA, Adelaide, Australia. Diagnostic characters of the adult male are illustrated and the affinities of both species are discussed." (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: [gunther.theischinger@environment.nsw.gov.au](mailto:gunther.theischinger@environment.nsw.gov.au)

**6604.** Theischinger, G.; Richards, S.J. (2006): *Argiolestes indentatus* spec. nov from Papua New Guinea (Zygoptera: Megapodagrionidae). *Odonatologica* 35(4): 385-388. (in English). ["The new species is described, diagnostic characters of the adult male are illustrated and the affinities of the sp. are discussed. Holotype male: Papua New Guinea, Golf prov., Lakekamu: lowland forest (120 m a.s.l.), 25-XI-1996; deposited in South Australian Museum, Adelaide." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: [Gunther.Theischinger@environment.nsw.gov.au](mailto:Gunther.Theischinger@environment.nsw.gov.au)

**6605.** Thomas, E.J.; John, J. (2006): Diatoms and macroinvertebrates as biomonitors of mine-lakes in Collie, Western Australia. *Journal of the Royal Society of Western Australia* 89(3): 109-117. (in English). ["Several voids created through open-cut coal mining occur near the town of Collie in the south-west of Western Australia. After mining, the voids fill with fresh water and form mostly acidic wetlands. Five of these mine-lakes were monitored in 1999 using macroinvertebrates and diatoms. On the basis of acidity and water chemistry two groups of wetlands were identified using multivariate analyses; wetlands with low pH (< 4.5), and those with comparatively higher pH (> 4.8). Distinct macroinvertebrate and diatom assemblages were characteristic of each of the wetland groups. Macroinvertebrates including *Orthetrum caledonicum* and *Megaporus solidus* were associated with the Group 1 wetlands (pH < 4.5) while *Sternopriscus browni* and *Micronecta* sp. were two of the most abundant macroinvertebrates in the Group 2 wetlands (pH > 4.8). In the Group 1 wetlands *Nitzschia paleaeformis* and *Pinnularia microstauron* were among the dominant diatom species. *Eunotia curvata* and *Tabellaria flocculosa* were two of the diatom species commonly found in the Group 2 waterbodies. While pH was one of the factors primarily responsible for the distribution of both biomonitors, diatoms appeared to be more sensitive than macroinvertebrates to acidity." (Authors)] Address: Thomas, E.J., Curtin Univ. Technol., Dept Environm. Biol., GPO Box U1987, Perth, WA 6845, Australia. E-mail: [erin.thomas@postgrad.curtin.edu.au](mailto:erin.thomas@postgrad.curtin.edu.au)

**6606.** Thompson, D.J.; Watts, Ph.C. (2006): The structure of the *Coenagrion mercuriale* populations in the New Forest, southern England. In: Rivera, AC (ED). 2006. Forests and Dragonflies. 4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005. *Pensoft Series Faunistica* 61: 239-258. (in English). [UK; *C. mercuriale* "is a poor disperser and susceptible to habi-

tat fragmentation/loss. It is protected by European legislation. An analysis of Capture-Mark-Recapture (CMR) data indicated that the population network on Beaulieu Heath in the New Forest comprised some 40 000 individuals. A nationwide genetic study indicates that the New Forest is a principal reservoir of genetic diversity for UK *C. mercuriale*. The New Forest is, however, presently best characterised as five genetic units. We found that several small, isolated populations of *C. mercuriale* in the New Forest showed substantial genetic differentiation from the principal populations on Beaulieu Heath, Setley Plain and Mill Lawn Brook. Isolation is brought about by preventing dispersal across intervening areas of unsuitable habitat such as forest, farmland or road. Although habitat loss is a principal concern for the persistence of this species, the pattern of limited movement to proximate sites highlights the need for a network of suitable habitat patches. This will also help to slow the rate of genetic erosion at peripheral sites." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: [d.j.thompson@liv.ac.uk](mailto:d.j.thompson@liv.ac.uk)

**6607.** Timm, H.; Möls, T.; Timm, T. (2006): Effects of long-term non-point eutrophication on the abundance and biomass of macrozoobenthos in small lakes of Estonia. *Proc. Estonian Acad. Sci. Biol. Ecol.* 55(3): 187-198. (in English). ["The effects of eutrophication on macrozoobenthos were studied in small Estonian lakes. Altogether, 380 sites of 107 lakes sampled repeatedly before and during/after significant n-point eutrophication were compared. The data of 1951. 167 were considered the reference samples, and the data of 1972-1995 were used as the test samples. A total of 66 macro. and megazoobenthic variables were studied. The individual weight of chironomid larvae, as well as the abundance and biomass of several animal groups, had changed significantly between the two periods. The possible reasons for the changes are briefly discussed." (Authors) "Odonata" are also treated.] Address: Timm, H., Institute of Agricultural and Environmental Sciences, Estonian University of Life Sciences, 61101 Rannu, Tartumaa, Estonia. E-mail: [ttimm@zbi.ee](mailto:ttimm@zbi.ee)

**6608.** Van de Meutter, F.; Stoks, R.; De Meester, L. (2006): Rapid response of macroinvertebrates to drainage management of shallow connected lakes. *Journal of Applied Ecology* 43(1): 51-60. (in English). ["1. Shallow lakes throughout the world are subject to drainage, either for fish harvesting or lake restoration. Lake drainage of fish lakes is known to improve macrophyte and zooplankton diversity, but the effect on the macroinvertebrate community is poorly known. 2. In the present study, we investigated temporal trends in the macroinvertebrate community following drainage of six shallow connected lakes. Diversity increased for all macroinvertebrates (family level). Recolonization of the lakes occurred within the first year after the drainage and was supplemented with a set of species that were previously rare or did not occur in the lakes. Changes in the abiotic conditions of the lakes were small and transient, except for the decline in fish. The rapid recolonization by the species occurring before drainage is attributed to the high connectivity of our system. The appearance of supplementary species may relate to lowered fish predation, suggesting that fish were a dominant factor in shaping the communities. 3. Synthesis and applicati-

ons. Lake drainage has a positive effect on the diversity and richness of macroinvertebrates in shallow connected lakes. This positive effect may be due to a decline in fish predation following lake drainage in combination with a high rate of recolonization among others via connections to non-drained lakes. Lake drainage, therefore, is probably the most cost-effective lake restoration tool in shallow connected lakes. Other restoration tools may be preferable in isolated lakes where recolonization is constrained." (Authors) The analysis includes Odonata.] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robbystoks@bio.kuleuven.ac.be

**6609.** Vonieka, P. (2006): The occurrence of dragonfly *Leucorrhinia pectoralis* (Odonata: Libellulidae) in the Jizerské hory Mountains (Northern Bohemia). *Vážky 2005: Sborník referátů VIII. celostátního semináře odonatologů ve Žďárských vrších, ZO ĚSOP Vlašim: 162-164.* (in Czech, with English summary). [Czech Republic; "The occurrence of *L. pectoralis* (1 male) in the Jizerské hory Mts. was confirmed. The species was found in peat bog Na Kotli on 14.VI.2005 (no. of mapping quadrat 5157). It is the first record of *Leucorrhinia pectoralis* in the Jizerské hory Mts. The occurrence in 930 m asl. is unusual." (Author)] Address: Vonieka, P., Severoèeské muzeum, Masarykova 11, 460 01 Liberec, Czech Republic. E-mail: pavel.vonicka@muzeumlb.cz

**6610.** Wada, S.; Wada, Y. (2006): Recent records of Odonata in Fukui and Ishikawa Prefectures, Japan. *Bull. Fukui City Mus. Nat. His.* 53: 117-128. (in Japanese, with English summary). [Documentation of records from 37 taxa, and hybrids of *Mnais costalis* & *M. pruniosa*, *Sympetrum eroticum* and *Sympetrum baccha matutinum* Ris, 1911, as well as *Sympetrum frequens* and *S. depressiusculum*] Address: Wada, S., 3-8-18 Nishikida, Fukui 918-8004, Japan

**6611.** Walsh, E.J.; Salazar, M.; Ramirez, J.; Moldes, O.; Wallace, R.L. (2006): Predation by invertebrate predators on the colonial rotifer *Sinantherina socialis*. *Invertebrate Biology* 125(4): 325-335. (in English). ["Colonies of the freshwater colonial rotifer *Sinantherina socialis* (Monogononta, Flosculariidae) have been shown to be unpalatable to a variety of small-mouthed, zooplanktivorous fishes. To test whether invertebrate predators ingest the rotifer *S. socialis*, we conducted two types of experiments: (1) Microcosm experiments in separate experiments, four invertebrate predators (i.e., dragonfly nymphs, damselfly nymphs, notonectids, and Hydra) were offered prey either singly or in combination. Prey were comprised of *S. socialis*; *Epiphanes senta*, a solitary, free-swimming rotifer; and *Daphnia magna*, a microcrustacean. In each experiment, the percent of prey surviving after 12, 18, and 24 h was recorded. (2) Paired-feeding experiments in separate experiments, predators were offered prey in a pairwise fashion, in which members of *D. magna* were alternated with a rotifer, either *S. socialis* or *E. senta*. The results of the microcosm experiments showed that, after 24 h, 60-100% prey items of *S. socialis* survived the predators, but significantly fewer individuals of *E. senta* (6-89%) and *D. magna* (< 25%) survived. When offered rotifers and individuals of *D. magna* simultaneously, predators tested consistently consumed more specimens of *Daphnia*. However, predators significantly reduced percent survival in *E. senta* but not in *S. socialis*. Preda-

tors, given a choice between the two rotifer species, all consumed significantly more specimens of *E. senta* than *S. socialis* after 24 h. In the paired-feeding experiments, three of the four predators captured members of *S. socialis*, but these colonies were frequently released rather than ingested, although in some cases colony structure was seriously disrupted. Our results suggest that the unpalatable nature of members of *S. socialis* to certain fishes extends to several invertebrate predators, but the nature of the putative factor(s) responsible for this remains unknown." (Authors)] Address: Walsh, Elizabeth J., Univ. Texas, Dept Biol. Sci., El Paso, TX 79968 USA. E-mail: ewalsh@utep.edu

**6612.** Wasscher, M.T. (2006): From NLO to NVL, 35 years of organized dragonfly study in The Netherlands. *Brachytron* 9(1-2): 21-32. (in Dutch, with English summary). ["Before 1970 some people in The Netherlands were studying dragonflies, but there was no higher organisation with newsletters and/or meetings. Since the start of the NLO on 7 March 1970, three periods of 'official' dragonfly activity can be recognised. These periods were separated by intervals of lesser activity, where no meetings were organised and few, if any, official newsletters were published. In those intervening periods, there were always youth federation members studying dragonflies, and those dragonfly lovers would then start the next period of official dragonfly study in The Netherlands. The first period commenced with the formation of the NLO during 1970, under the leadership of Bastiaan Kiauta. This period ended with the foundation of the international SIO in 1974. The second period lasted from 1979 to 1992 and was started by Marian Verdonk, with Marcel Wasscher gradually taking over her tasks. The final period, which is still on-going, started in 1994, though already in 1992 youth federation members of the NJN had started a 'Dragonfly Project' which would result in increased interest in dragonflies in The Netherlands. In 1997 both the NLO and the Dragonfly Project merged into a new dragonfly organisation, the NVL. In 2002 the Dutch Atlas was published, a milestone in dragonfly study in The Netherlands. Over the last decade, dragonflies have become an important group for nature study and nature management. This is illustrated by an official Red List, two field guides in Dutch, 22 regional and provincial study groups and over 400 members of the NVL, some of whom are also professional dragonfly workers." (Author)] Address: Wasscher, M.T., Minstr 15, NL-3582 CA Utrecht, Netherlands. E-mail: marcel.hilair@12move.nl

**6613.** Watanabe, M.; Matsu'ura, S. (2006): Fecundity and oviposition in *Mortonagrion hirosei* Asahina, *M. selenion* (Ris), *Ischnura asiatica* (Brauer) and *I. senegalensis* (Rambur), coexisting in estuarine landscapes of the warm temperate zone of Japan (Zygoptera: Coenagrionidae). *Odonatologica* 35(2): 159-166. (in English). ["Adults of the 4 species, inhabiting an estuarine landscape that includes reed communities and rice paddy fields established on water of varying saline concentration in Mie prefecture, Japan, were studied. The fecundity of *Ischnura* species was higher than that of *Mortonagrion* species. *I. senegalensis* contained the largest number of mature, submature, and immature eggs with the smallest mature egg size, whereas *M. selenion* contained the smallest number of immature eggs with the largest mature egg size. During a 3-day laboratory oviposition experiment without food, all female developed eggs, resulting in a greater number of mature



eggs than was originally contained. Most of the eggs that developed to maturity were laid by *M. selenion* and *L. asiatica*, while *M. hirossei* laid only half of the number laid by either of these. The oviposition process of the 4 species is discussed from the viewpoint of their larval habitat selection." (Authors)] Address: Watanabe, M., Univ Tsukuba, Grad Sch Life and Environm Sci, Tsukuba, Ibaraki 3058572, Japan. E-mail: watanabe@kanryo.envr.tsukuba.ac.jp

**6614.** Winkel, S.; Kuprian, M. (2006): Die Libellenfauna neu angelegter Flachgewässer im Süden der Stadt Offenbach. Jahrbuch Naturschutz in Hessen 10: 34-39. (in German). [Near the town of Offenbach, Hessen, Germany, in 1998 two shallow waters were realised as mitigation measures. These water bodies were casually monitored in 2005 and 2006 by 6 surveys. A total of 27 Odonata including many rare or threatened regional species were found. Records of *Lestes virens*, *Anaciaeschna isocoles*, *Aeshna affinis*, and *Leucorrhinia pectoralis* are stressed. Measures to protect the habitats for species of early succession stages of water bodies are outlined, including the so called rotation model.] Address: Winkel, Sibylle, Pommernstr. 7, D-63069 Offenbach, Germany. E-mail: Si-winkel@t-online.de

**6615.** Yanybaeva, V.A.; Dumont, H.J.; Haritonov, A.Yu.; Popova, O.N. (2006): The Odonata of south ural, Russia, with special reference to *Ischnura aralensis* Haritonov, 1979. *Odonatologica* 35(2): 167-185. (in English). ["The odonate fauna of S. Ural (Russia), as known from literature data and new collections, is composed of 59 species. *Coenagrion ecornutum*, *Ischnura pumilio*, *Somatochlora graeseri* and *Selysiothemis nigra* are first records for S. Ural; the presence of *Ischnura aralensis* Haritonov, 1979 (syn. *I. haritonovi* Dumont, 1997), *Aeshna cyanea*, *Anax imperator* and *Libellula depressa* is confirmed, but that of *Pyrrhosoma nymphula*, *Symplocma fusca*, *Cordulegaster boltonii* and *Libellula fulva* is not. *Aeshna undulata* Bartenev, 1909 is a probable synonym of *A. juncea* Linnaeus, 1758. *I. aralensis*, *C. ecornutum*, *Enallagma cyathigerum risi* and *S. graeseri* were found W as well as E of the Ural River, and thus are part of the fauna of Europe. Several western species reach their limit of eastward extent in S. Ural and, conversely, several eastern (Siberian) species reach their limit of westward extent there too. The range of *I. aralensis* is discussed in the light of the contractions and expansions of the Caspian-Aral lakes during the Late Pleistocene. The current disjunct positions of its colonies is understood as the result of the present phase of aridity in middle Asia." (Authors)] Address: Yanybaeva, V. A., Bashkirian State Nat Reserve, RUS-453592 Sargaya, Bashkortostan R, Russia. E-mail: bashart@bashnet.ru

**6616.** Yuan, H.-W.; Burt, D.B.; Wang, L.-P.; Chang, W.-L.; Wang, M.-K.; (2006): Colony site choice of blue-tailed bee-eaters: influences of soil, vegetation, and water quality. *Journal of Natural History* 40(7-8): 485-493. (in English). ["All bee-eaters (Family Meropidae) are cavity nesters, excavating terrestrial burrows in sites ranging from flat ground, to small mounds of soil, steep earthen banks seen in road clearings, eroded cliff faces, and river gorges. However, very little is known concerning the environmental factors that influence nest site selection in bee-eaters. We addressed abiotic and biotic issues associated with colony site choice in blue-tailed bee-eaters (*Merops philippinus*) nesting on Kin-

men Island, off mainland China, from 2000 to 2002. About 89% of the colonies were located on slopes with soils of sandy loam and the other 11% on sandy clay loam. No colony was found on clay loam, which covered 20% of the island. The sandy loam and sandy clay loam had lower soil pressure, density and moisture, which, presumably, were easier for bee-eaters to excavate and provided better drainage and ventilation for nest cavities. Bee-eaters avoided placing nest cavities in areas with dense vegetation and abandoned colony sites when they became overgrown. Vegetation would impede excavation and decrease the detectability of predators. Bee-eaters may prefer colony sites near water bodies showing water chemistries indicative of more biological productivity, especially in relation to the diversity and abundance of their major prey, dragonflies." (Authors) 13 Odonata species are listed in table 3.] Address: Ding, Tzung-Su, Natl Taiwan Univ, Sch Forestry and Resource Conservat, Taipei, Taiwan. E-mail: ding@ntu.edu.tw

**6617.** Yutaka, Y.; Sato, N. (2006): The influences of the application of organic matters as the substitution of chemical fertilizers and the reduction of agricultural chemicals on the growth and yield of rice plant and the frowning wings of Red dragonflies. *Bulletin of the Fukushima Prefecture Agricultural Experiment Station* 37: 28-39. (in Japanese, with English summary). ["The influences of the chemical fertilizers, the agricultural chemicals and the organic matters on the growth and yield of rice plant and the growing wings of red dragonflies were investigated in the cold and highland areas, especially Inawashiro Town, where the resident has an interest in the environment. The yield of brown rice in the use of organic matters, such as cattle or chicken manures and strained lees of rapeseed oil, as the substitution chemical fertilizers decreased around 10% compared with those of the popular cultivation. The reduction of yield was associated with a lower number of ears, which was caused by the suppression of tiller number on the initial growing stage. The reduction of agricultural chemicals did not affect the growth and yield of rice plant except to herbicide. However, the yield of brown rice in the field not applied herbicide was almost 30% less than that of the popular cultivation by the propagation of weed on the 3 years later. Red dragonflies grew wings from the beginning to end in July, and the peak of the number of growing wings was shown in the mid-July. The number of red dragonflies grown wings evidently decreased by the midterm drainage, and it decreased by the surface spread of the dried cattle manure used for the purpose of the constraint of weed. Then, it was suggested that the growing wings of red dragonflies was not affected by the application of chemical fertilizer and agricultural chemicals except to insecticide, but decreased by the application of an insecticide." (Author)] Address: Yutaka, Y., Fukushima Prefecture Agricultural Experiment Station, Japan

**6618.** Zawal, A. (2006): Phoresy and parasitism: water mite larvae of the genus *Arrenurus* (Acari: Hydrachnidia) on Odonata from Lake Binowskie (NW Poland). *Biological Letters* 43(2): 257-276. (in English). ["Larvae of the genus *Arrenurus* parasitize Odonata, Diptera and Coleoptera. This work describes relationships between *Arrenurus* larvae and Odonata (imagines, larvae and exuviae) in a Polish lake. The mites examined were found on 2349 adult odonates (277 female and 872 male), 805 larvae (356 female and 449 male) and 395 e-

xuviae of 34 species from Lake Binowskie and its vicinity. In total, 1128 larval water mites were collected from adult odonates, 556 from larvae, and 165 from exuviae. Water mite larvae were found on imagines of 9 species, on larvae of 12 species, and on exuviae of 9 species. Among adult of odonates only damselflies (Zygoptera) were parasitized, and a high prevalence (up to 77.8%) and intensity (up to 195 parasites per host) of parasitism were recorded. Adult females were more frequently infested than males, the preferred body parts being the thorax and the ventral side of the middle segments of the abdomen. Both phoretic and parasitic larvae of water mites were found on odonate larvae. Phoretic larvae constituted 25.8% of the total number of water mite larvae on odonate larvae. The occurrence of water mite larvae on exuviae shows their mortality when mites fail to move onto the eclosing adult odonate or when mites do not get detached from odonate larvae before their emergence from water." (Author)] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Wąska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**6619.** Zinke, J. (2006): *Cordulegaster bidentata* (Odonata) im Lausitzer Bergland (LUŽICKÉ HORY, Tschechische Republik). Erster Bodenständigkeitsnachweis an Hand von Larvenfunden. *Vážky 2005: Sborník referátu VIII. celostátního semináře odonatologu ve Žďárských vrších, ZO CSOP Vlašim, 2006: 165-166.* (in German, with Czech summary). [first proof of *C. bidentata* breeding by larval records; brief account on historical regional records of *C. bidentata* in the German/Czech border region, and documentation of larval records on 30.08.2005] Address: Zinke, J., Rietschelstraße 23, D-01069 Dresden, Germany

## 2007

**6620.** Abbott, J.C.; Mynhardt, G. (2007): Description of the larva of *Somatochlora margarita* (Odonata: Corduliidae). *International Journal of Odonatology* 10(2): 129-136. (in English). ["The larva of *Somatochlora margarita* is described from a specimen reared from the egg to the final stadium. The larva, previously unknown, is morphologically similar to the larvae of *S. calverti*, *S. filosa*, *S. ozarkensis*, and *S. provocans*. Combinations of diagnostic characters are given for distinguishing these species. Growth of this species is discussed with respect to other species of *Somatochlora* and Odonata." (Authors)] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**6621.** Abdel-Salam Shaalan, E.; Canyon, D.V.; Muller, R.; Wagdy Faried (2007): A mosquito predator survey in Townsville, Australia, and an assessment of *Diplonychus* sp. and *Anisops* sp. predatorial capacity against *Culex annulirostris* mosquito immatures. *Journal of Vector Ecology* 32 (1): 16-21. (in English). ["A twelve-month survey for mosquito predators was conducted in Townsville, Queensland, Australia, which is located in the arid tropics. The survey revealed the presence of five predaceous insects but only *Anisops* sp. (backswimmers) and *Diplonychus* sp. were common. Predatorial capacity and factors influencing this capaci-

ty were then assessed for adult *Anisops* sp. and adult and nymph stages of *Diplonychus* sp. against *Culex annulirostris* mosquito immatures under laboratory conditions. Predatorial capacity bioassays showed that adult *Diplonychus* sp. preyed upon both larval and pupal stages of *Cx. annulirostris* quite successfully. Nymphs of *Diplonychus* sp. proved to be more successful with smaller prey immatures, and *Anisops* sp adults did not prey successfully on any prey pupae. Increasing the foraging area and introducing aquatic vegetation significantly reduced the predatorial capacity of *Diplonychus* sp. nymphs, while only vegetation and not foraging area had a significant effect on adult *Diplonychus* sp. predation capacity. Overall, adult *Diplonychus* sp. proved to be a more efficient predator than *Anisops* sp., and field trials are now recommended to further assess the potential of *Diplonychus* sp. as a biocontrol agent." (Authors) Odonata are treated on the order resp suborder level.] Address: Abdel-Salam Shaalan, E., Zoology Department, Aswan Faculty of Science, South Valley University, Aswan, Egypt

**6622.** Adomssent, M. (2007): Erstnachweis der Schabrackenlibelle *Anax ephippiger* (Burmeister, 1839) für Niedersachsen (Odonata). *Entomologische Nachrichten und Berichte* 51(2): 137-139. (in German). [documentation of a record of *A. ephippiger* from 26.V-2007 along the river Ilmenau south of Bad Beversen, Niedersachsen, Germany.] Address: Adomßent, M., Universität Lüneburg, Institut für Umweltkommunikation, D-21332 Lüneburg, Germany

**6623.** Araujo, Y.; Beserra, P. (2007): Diversity of invertebrates consumed by the Yanomami and Yekuana communities from the alto Orinoco, Venezuela. *Inierciercia* 32(5): 318-323. (in Spanish, with English and Portuguese summaries). ["Invertebrates represent a rich and tempting food for the indigenous people and play an important role in the diet of these populations. The aim of this work was to make the taxonomic identification of the invertebrate species consumed by the indigenous communities Yanomami and Yekuana from the Alto Orinoco region, Amazonas State, Venezuela. Open interviews were carried out and behavioral observation made of 27 males and 9 females from 12 to 70 years old. Larvae and adult specimens of invertebrates indicated and validated as eatable were collected alive and later identified. The Yanomami consume 20 and the Yekuana 28 species of invertebrates. The Yanomami eat mainly caterpillars, larvae of scarabs and wasps, termites, ants and spiders, while the Yekuana consume earthworms, shrimps, oysters and a variety of aquatic insects. The proximity of the Yekuana communities to rivers and streams has possibly contributed to the specialization of their rich diet in aquatic insects "(including Odonata)", unlike the Yanomami communities that consume mainly terrestrial invertebrates of forest origin. The strategy of the natives in the consumption of these small animals indicates that they have a detailed knowledge of their environment and of the use and manipulation of the forest resources, to provided food to the human populations without affecting biodiversity." (Authors)] Address: Araujo, Yelinda, Bióloga, Universidad Central de Venezuela (UCV). Magíster en Ecología, Instituto Nacional de Pesquisas da Amazonia (INPA), Brasil. Investigadora, Instituto Nacional de Investigaciones Agrícolas del Estado Mérida (INIA-Mérida), Venezuela. Dirección: Apartado Postal 425, Avenida Urdaneta,

Urdaneta, Mérida, Estado Mérida, Venezuela. E-mail: yaraujo@inia.gov.ve

**6624.** Armstrong, R.H.; Hudson, J.; Hermans, M. (2007): *Dragons in the Ponds*. Nature Alaska Images (Juneau, Alaska). ISBN 978-1-57833-362-2: 32 pp.. (in English). [This book is directed towards encouraging a child's interest in Odonata. It provides a general overview of the adult and nymphal morphology, outlines the number of species, and introduce all the major North American families providing examples. This is followed by presenting the dragonflies, which were chosen as Official State Insects: Alaska - *Libellula quadrimaculata* and Washington - *Anax junius*. The majority of the book is dedicated to the life history of Anisoptera. It is full of colour photos showing nymphs feeding, adults emerging, mating, laying eggs, being preyed upon, and a number of flight shots as well (including Zygoptera). Some of these photos are really impressive. (Martin Schorr)] Address: [www.alaskabooksandcalendars.com](http://www.alaskabooksandcalendars.com)

**6625.** Baker, R.A. (2007): What was the British list like 120 years ago? Robert McLachlan's 1884 list of Odonata compared with today's lists. *J. Br. Dragonfly Society* 23(2): 52-57. (in English). ["A comparison is made between the list of Odonata from Britain recorded in 1884 and those published recently. Robert McLachlan, who published the nineteenth century list, relied on his own observations and earlier accounts, together with records of museum and private collections. The species which have become extinct and those recorded for the first time in Britain since McLachlan's paper was published, are of particular interest." (Authors)] Address: Baker, R.A., Faculty of Biological Sciences, University of Leeds, Leeds LS2 9JT, UK

**6626.** Baker, R.A.; Mill, P.J.; Zawal, A. (2007): Mites on Zygoptera, with particular reference to *Arrenurus* species, selection sites and host preferences. *Odonatologica* 36(4): 339-347. (in English). ["Larval mites of several *Arrenurus* species are found as parasites on Zygoptera. Data from Poland on prevalence, loads, and host specificity are presented. The larval mites are identified and their site selection and host preferences recorded. 7 Zygoptera species and 7 species of *arrenurid* mite have been studied. Particular attention has been paid to *Coenagrion puella* and its parasites. New host records are included." (Authors)] Address: Baker, R.A., School of Biological Sciences, University of Leeds, Leeds LS2 9JT, UL. E-mail: [pabrab@leeds.ac.uk](mailto:pabrab@leeds.ac.uk)

**6627.** Beaton, G. (2007): *Dragonflies and Damselflies of Georgia and the Southeast*. Wormsloe Foundation Nature Book. University of Georgia Press. ISBN-13: 978-0820327952 : 355 pp. (in English). ["... Organized for easy use in the field, this abundantly illustrated guide, with more than 400 color photographs, is the first to cover Georgia's Odonata. It details more than 150 species - species that are also the ones most likely to be seen throughout the U.S. Southeast north of Florida. The guide first explains dragonfly and damselfly body parts, taxonomy, life cycles, and habitats; discusses conservation issues; and offers tips on observing and photographing odonates. Later chapters, organized according to the ten odonate families, such as spreadwings, darners, spiketails, and emeralds, provide general family information followed by accounts of individual species. The beautifully illustrated species accounts

describe general appearance and key identification features, distribution, habitats, life history and behavior, and conservation. Supplementary materials include suggestions for the best places to watch odonates in Georgia, a comparative listing of species' level of endangerment, and the date range during which each species can be seen... - Included in species accounts are: beautiful, detailed photos that show odonates from angles important to determining species, sex, or age; common and scientific names; important features for field identification, with tips on distinguishing between similar-looking species; typical behavior of the species, including breeding and feeding habits; occasional commentary on taxonomy or other notable features; and, colorful quick guide, with a range map, incidence information, sizing graphics, and flight period information. Additional features include: listing of twenty ideal sites around the state for odonate watching; notes on infrequently sighted species; ratings for each odonate's conservation status, from most critically imperiled to most stable species; chronological listing of flight dates; listing of additional resources: books, organizations, Web sites, and equipment suppliers; and, a glossary and index. (Publisher)] Address: E-mail. [giffbeaton@mindspring.com](mailto:giffbeaton@mindspring.com)

**6628.** Berry, R.; van Kleef, J.; Stange, G. (2007): The mapping of visual space by dragonfly lateral ocelli. *Journal of Comparative Physiology A: Neuroethology, Sensory, Neural, and Behavioral Physiology* 193: 495-513. (in English). ["We study the extent to which the lateral ocelli of dragonflies are able to resolve and map spatial information, following the recent finding that the median ocellus is adapted for spatial resolution around the horizon. Physiological optics are investigated by the hanging-drop technique and related to morphology as determined by sectioning and three-dimensional reconstruction. L-neuron morphology and physiology are investigated by intracellular electrophysiology, white noise analysis and iontophoretic dye injection. The lateral ocellar lens consists of a strongly curved outer surface, and two distinct inner surfaces that separate the retina into dorsal and ventral components. The focal plane lies within the dorsal retina but proximal to the ventral retina. Three identified L-neurons innervate the dorsal retina and extend the one-dimensional mapping arrangement of median ocellar L-neurons, with fields of view that are directed at the horizon. One further L-neuron innervates the ventral retina and is adapted for wide-field intensity summation. In both median and lateral ocelli, a distinct subclass of descending L-neuron carries multi-sensory information via graded and regenerative potentials. Dragonfly ocelli are adapted for high sensitivity as well as a modicum of resolution, especially in elevation, suggesting a role for attitude stabilisation by localization of the horizon." (Authors)] Address: Berry, R., Research School of Biological Sciences, Australian National University, PO Box 475, Canberra, ACT 2601, Australia. E-mail: [rberry@rsbs.anu.edu.au](mailto:rberry@rsbs.anu.edu.au)

**6629.** Berry, R.P.; Stange, G.; Warrant, E.J. (2007): Form vision in the insect dorsal ocelli: An anatomical and optical analysis of the dragonfly median ocellus. *Vision Res.* 2007: 1394-1409. (in English). ["Previous work has suggested that dragonfly ocelli are specifically adapted to resolve horizontally extended features of the world, such as the horizon. We investigate the optical and anatomical properties of the median ocellus of *Hemicordulia tau* and *Aeshna mixta* to determine the ex-



tent to which the findings support this conclusion. Dragonfly median ocelli are shown to possess a number of remarkable properties: astigmatism arising from the elliptical shape of the lens is cancelled by the bilobed shape of the inner lens surface, interference microscopy reveals complex gradients of refractive index within the lens, the morphology of the retina results in zones of high acuity, and the eye has an exceedingly high sensitivity for a diurnal terrestrial invertebrate. It is concluded that dragonfly ocelli employ a number of simple, yet elegant, anatomical and optical strategies to ensure high sensitivity, fast transduction speed, wide fields of views and a modicum of spatial resolving power." (Authors)] Address: Berry, R.P., Research School of Biological Sciences, Australian National University, P.O. Box 475, Canberra, ACT 2601, Australia. E-mail: rberry@rsbs.anu.edu.au

**6630.** Beschovski, V.; Marinov, M. (2007): Fauna, ecology, and zoogeography of dragonflies (Insecta: Odonata) of Bulgaria. *Monographiae Biologicae* 82. Biogeography and Ecology of Bulgaria. ISBN-978-1-4020-4417-5: 199-232. (in English). [68 dragonfly species have been reported from Bulgaria. "According to their larval habitat, they are divided in two ecological complexes: rheophilous and limnophilous. Adaptations of both complexes are discussed. Zoogeographical characteristics are given at the genus and species level. Their vertical and horizontal distribution is outlined. Seven phenological groups are established. Their habitats are divided in 12 groups; for each group, key species and co-occurring species are listed." (Authors)] Address: Marinov, M., P.O. Box 134, BG-1000 Sofia, Bulgaria. E-mail: mgmarinov@mail.bg

**6631.** Blanke, A. (2007): The dragonfly assemblage of Santa Teresa – patterns of behaviour and habitat use in a tropical environment. Diplomarbeit. Mathematisch-Naturwissenschaftlichen Fakultät der Rheinischen Friedrich-Wilhelms-Universität Bonn: V, 124 pp. (in English, with German summary). [Brasil; "This study has focused on the role of several factors for behaviour of four Neotropical dragonfly assemblages close to each other. It was shown that in areas with identical climate, the microhabitat severely influences the diel activity pattern of some species. Theories stating interspecific changes of behaviour in relation to body size, failed to explain the great behavioural changes observed for the same species. Every species has behaved differently in each area. Some behavioural differences were significant, and lead to the assumption that microhabitat changes (i.e. spatial structure) sometimes superpose the influences of body size and species assemblage. Some observed species even showed the typical activity patterns expected from the other group, that is perching or flight respectively. A wide perceptive horizon, which is stated for the larger species in this study, seems to demand flexible behaviour, enabling the species to adapt to as many habitats as possible. Species with a narrow perceptive horizon (i.e. generalists) are also able to colonize many areas, because their requirements to the environment allow a wider spectrum of habitats. A stricter and perch-orientated behaviour pattern is supposed to be characteristic for these species." (Author)] Address: Blanke, A., Section Lower Arthropods, Alexander Koenig Research Institute and Museum of Zoology - Leibniz Institute for Terrestrial Biodiversity - Adenauerallee 160, D-53113 Bonn,

Germany. E-mail: alexander.baronrothschild@googlemail.com

**6632.** Bönsel, A.; Matthes, J.; Matthes, H.; Runze, M. (2007): Erfolgskontrollen nach Revitalisierungen von Feldsöllen in Mecklenburg-Vorpommern. Auswirkungen auf Rotbauchunke, Laubfrosch und Libellen. *Natur und Landschaft* 82: 129-136. (in German, with English summary). [The article reports on measures taken from 2001 to 2004 to revitalize 19 kettle ponds in north-eastern Germany. After revitalization measures, a zone designed to sequester nutrients was set up around each kettle pond, and partly planted with woody plants. Recolonization by *Bombina bombina*, *Hyles arborea* (both Amphibia) and dragonflies was recorded in the first vegetation period immediately after the measures, and again in 2005. The documentation shows that the nutrient sequestration zone did not prevent eutrophication. Only the revitalized ponds surrounded with peaty soil were protected sufficiently from non-point nutrient inputs, and remained mesotrophic. *B. bombina* and *H. arborea* colonized ponds regardless of eutrophication processes. Species losses were recorded between initial and follow-up monitoring only when there had been anthropogenic fish stocking, or if ponds were temporary. "Of the 34 dragonfly species recorded, most were autochthonous, and their numbers high in mesotrophic waters. Pioneer species disappeared quickly or remained only in the mesotrophic waters, with small numbers of individuals. Such dynamics were recorded in a range of rural areas. If filtering capacity and thus groundwater protection and the promotion of the two amphibian species listed in Annexes II and IV of the Habitats Directive are the targeted functional utility of kettle ponds, then the revitalization measures were a success. If, however, the goal is to maintain species-rich dragonfly populations over several years, it is essential to prevent non-point nutrient inputs via drainage water. Establishing protective planted zones did not prove successful in this regard. While this measure did prevent erosion, drainage always introduces unfiltered, nutrient-rich water. Targeted filtration of drainage water is the key requirement for kettle pond revitalization in rural landscapes." (Authors)] Address: Bönsel, A., Vasenbusch 15, 18337 Gresenhorst, Germany. E-mail: Andre.Boensel@gmx.de

**6633.** Bolek, M.G.; Janovy, J. Jr. (2007): Small frogs get their worms first: The role of nonodonate arthropods in the recruitment of *Haematoloechus coloradensis* and *Haematoloechus* complexus in newly metamorphosed Northern Leopard frogs, *Rana pipiens*, and Woodhouse's toads, *Bufo woodhousii*. *Jour. Parasitol.* 93(2): 300-312. (in English). ["Studies on the life cycles and epizootiology of North American frog lung flukes indicate that most species utilize odonates as second intermediate hosts; adult frogs become infected by ingesting odonate intermediate hosts. Newly metamorphosed frogs are rarely infected with these parasites, predominantly because they are gape-limited predators that cannot feed on large intermediate hosts such as dragonflies. We examined the role of the frog diet and potential intermediate hosts in the recruitment of the frog lung fluke, *Haematoloechus coloradensis*, to metamorphosed *Rana pipiens*, *Bufo woodhousii*, and bullfrogs (*R. catesbeiana*) from western Nebraska. Because of the uncertain validity of *H. coloradensis* as a distinct species from *Haematoloechus* complexus, morphological characters of both species were reevaluated.

ated and the life cycles of both species were completed in the laboratory. The morphological data on *H. coloradensis* and *H. complexus* indicate that they differ in their oral sucker to pharynx ratio, uterine loop distribution, and placement of vitelline follicles. However, in terms of their life cycles, both species are quite similar in their use of physid snails as first intermediate hosts, a wide range of nonodonate and odonate arthropods as second intermediate hosts, and leopard frogs and toads as definitive hosts. These results indicate that *H. coloradensis* and *H. complexus* are generalists at the second intermediate host level and might be able to infect newly metamorphosed leopard frogs and toads by using small nonodonate arthropods more commonly than other frog lung fluke species. Comparisons of population structure of adult flukes in newly metamorphosed leopard frogs indicate that the generalist nature of *H. coloradensis* metacercariae enables it to colonize young of the year leopard frogs more commonly than other *Haematoloechus* spp. that only use odonates as second intermediate hosts. In this respect, the generalist nature of *H. coloradensis* and *H. complexus* at the second intermediate host level is an avenue for the colonization of young of year frogs." (Authors) The paper contains fascinating pictures of the *H. coloradensis* cercarial attachment, creeping, and penetration behaviour on *Ischnura verticalis*.] Address: Bolek, M.G., School of Biological Sciences, University of Nebraska-Lincoln, Lincoln, Nebraska 68588, USA. E-mail: mbolek@unlserve.unl.edu

**6634.** Bolek, M.G.; Janovy, J. Jr. (2007): Evolutionary avenues for, and constraints on, the transmission of frog lung flukes (*Haematoloechus* spp.) in dragonfly second intermediate hosts. *Jour. Parasitol.* 93(3): 593-607. (in English). ["Metacercariae survival patterns and their distribution in second intermediate odonate hosts were examined for 4 species of frog lung flukes. Surveys of aquatic larvae and recently emerged teneral dragonflies and damselflies indicated that prevalence and mean abundance of *Haematoloechus* spp. metacercariae were significantly lower in teneral dragonflies than larval dragonflies, while there was no significant difference in prevalence or mean abundance of *Haematoloechus* spp. metacercariae among larval and teneral damselflies. Experimental infections of dragonflies indicated that metacercariae of *Haematoloechus coloradensis* and *Haematoloechus complexus* were located in the head, thorax, and branchial basket of dragonflies, whereas metacercariae of *Haematoloechus longiplexus* and *Haematoloechus parvipleus* were restricted to the branchial basket of these hosts. Metacercariae of *H. coloradensis*, *H. complexus*, and *H. longiplexus* infected the head, thorax, and abdomen of damselflies, but these insects were resistant to infection with *H. parvipleus*. Subsequent metamorphosis experiments on experimentally infected dragonflies indicated that most metacercariae of *H. longiplexus* were lost from the branchial basket during metamorphosis, but most metacercariae of *H. coloradensis*, *H. complexus*, and *H. parvipleus* survived dragonfly metamorphosis. These observations suggest that the observed ecological host specificity of *H. longiplexus* in semiterrestrial leopard frogs may be due to few metacercariae of *H. longiplexus* reaching these frogs in a terrestrial environment. Because of the uncertain validity of *Haematoloechus variopleus* as a distinct species from its synonym *H. parvipleus*, their morphological characters were reevaluated. The morphological data on *H. variopleus* and

*H. parvipleus* indicate that they differ in their acetabulum length and width, ovary shape, testes length, and egg length and width. Experimental infections of plains leopard frogs, northern leopard frogs, and bullfrogs with worms from bullfrogs indicate that the synonymy of *H. parvipleus* with *H. variopleus* is not warranted, and that these flukes are distinct species, i.e., *H. parvipleus* in bullfrogs and *H. variopleus* in plains leopard frogs and northern leopard frogs." (Authors)] Address: Bolek, M.G., School of Biological Sciences, University of Nebraska-Lincoln, Lincoln, Nebraska 68588, USA. E-mail: mbolek@unlserve.unl.edu

**6635.** Bouwman, J.; Groenendijk, D. (2007): New records of *Somatochlora arctica* in northwestern Lower Saxony (Odonata: Corduliidae). *Libellula* 26(1/2): 35-40. (in German, with English summary). ["During two visits to the German side of the borderland of the Province Groningen (Netherlands) and the Emsland district (western Lower Saxony, Germany) in June and July 2006 we recorded *S. arctica* at three new localities. All records pertain to adult males, up to seven at a time. These findings point to the possibility that this enigmatic and regionally rare dragonfly may be present at more sites in the northwest of Germany and the northeast of the Netherlands than hitherto supposed." (Authors)] Address: Groenendijk, D., Dutch Butterfly Conservation, P.O. Box 506, NL-6700 AM Wageningen, The Netherlands. E-mail: dick.groenendijk@vlinderstichting.nl

**6636.** Braccia, A.; Voshell, J.R.; van Christman, D. (2007): The Odonata of newly constructed ponds with life history and production of dominant species. *Aquatic Insects* 29(2): 115-130. (in English). ["The species composition of an odonate assemblage from six new ponds in Virginia, USA, was documented, and life histories and production of three dominant odonate taxa (*Anax junius*, *Gomphus exilis*, and *Enallagma civile*) were determined. The assemblage consisted of 19 species and was numerically dominated by *A. junius*, *G. exilis*, *E. civile*, and libellulids. Production of *A. junius*, *G. exilis*, and *E. civile* was  $795 \text{ mg DW m}^{-2} \text{ yr}^{-1}$ ,  $27 \text{ mg DW m}^{-2} \text{ yr}^{-1}$ , and  $236 \text{ mg DW m}^{-2} \text{ yr}^{-1}$ , respectively. Coefficients of variation for production of each species were 50.77%, which suggests that variance should be considered in production estimates, especially if results are to be compared across studies or habitats. Low density and production of the dominant species in this study may be a result of inadequate densities of food items and limited availability of preferred habitat in the newly created ponds." (Authors)] Address: Braccia, Amy, Department of Entomology, Blacksburg, Virginia, USA; E-Mail rvoshell@vt.edu

**6637.** Brauner, O. (2007): Winterbeobachtungen von Libellen auf La Gomera und La Palma, Kanarische Inseln (Odonata). *Libellula* 26(3/4): 213-232. (in German, with English summary). ["In February of the years 2001, 2004 and 2007 Odonata were observed in La Gomera, and in February 2000 and November/ December 2005 in La Palma. During these journeys, ten species were recorded at 49 sites in La Gomera, and nine species at 26 sites in La Palma. Compared to the published literature, in La Palma the first records of *Ischnura saharensis*, *Anax ephippiger*, *Sympetrum nigrifemur* and *Trithemis arteriosa* were taken. In addition, the first record of *Anax parthenope* from this island taken in June 2006 is presented. Concerning La Gomera, two new sites of *Zygonyx torridus* in the island are presented, inc-

cluding the first observations of larvae and exuviae, and *A. ephippiger* is recorded from there also for the first time. With the exception of *Z. torridus*, all recorded Odonata species were observed during February in the adult stage. In six species emergence was observed between December and February. Annotations on the phenology of the species are given." (Authors)] Address: Brauner, O., R.-Breitscheid-Straße 62, D-16225 Eberswalde, Germany. E-mail: oliver.brauner@gmail.com

**6638.** Bried, J.T.; Herman, B.D.; Ervin, G.N. (2007): Umbrella potential of plants and dragonflies for wetland conservation: a quantitative case study using the umbrella index. *Journal of Applied Ecology* 44(4): 833-842. (in English). [" 1. Shortcuts to measuring biodiversity enable prioritization of conservation effort in the face of limited time, personnel and funding. The conservation umbrella approach focuses management effort according to individual species that may confer protection to a larger community. This approach can help guide the management agenda towards attainable goals by maximizing conservation returns per unit effort. The development of the umbrella index has shown promise in identifying umbrella species in terrestrial ecosystems but has received little attention with respect to the management of wetland ecosystems. 2. We used the umbrella index to assess the umbrella potential of vascular plants and dragonflies (Odonata) from 15 wetland impoundments in northern Mississippi, USA. The presence of adult odonates was determined by repeated visual surveys and plant lists were compiled from 50 plots per site. 3. Umbrella schemes, or the sites occupied by top umbrella species, missed large numbers of beneficiary species and occurrences. With one exception, umbrella schemes failed to optimize conservation returns relative to randomized schemes in both assemblages. Also, umbrella schemes approximately equalled the performance of non-umbrella schemes both overall and for species with a low rate of occurrence. Low occurrence rates in both assemblages may have hindered umbrella index performance because the index assumes that species with moderate occurrence rates have the most umbrella potential. 4. Cross-taxon analyses (Mantel tests and McNemar tests) suggested transferability of plant and dragonfly umbrella schemes, and non-random association between the plants and dragonflies in these wetlands. 5. Synthesis and applications. Despite the questionable performance of umbrella schemes in our study, the use of a quantitative ecological tool such as the umbrella index instead of political or popularity criteria is strongly recommended for future selection of umbrella species. The results of cross-taxon analyses supported growing evidence for spatial and functional relationships between wetland macrophytes and adult odonates. We suggest that the more easily measured assemblage can be used to set priorities for wetland conservation planning in circumstances where human resources are constrained." (Authors)] Address: Jason T. Bried, J.T., The Nature Conservancy Eastern New York Conservation Office and Albany Pine Bush Preserve Commission, 195 New Karner Road, Albany, NY 12205-4605, USA. E-mail jtbried@tnc.org

**6639.** British Dragonfly Society (2007): The newsletter of the British Dragonfly Society Autumn 2007. *Dragonfly News* 52: 1-32. (in English). ["Message from the President Peter Mill; Farewell to Caroline Daguet Tim Beynon; From the Conservation Officer Katharine Par-

kes; Migrant Dragonfly Update 2007 Adrian Parr; Bonjour from Across the Pond Caroline Daguet; First Dates for 2007 Adrian Parr; BD S Diary of Events, Call for Field Meetings for 2008, BDS Members' Day 2007, York.; Conservation Projects. a Practical Example and some Useful Principles 8; Hot news'. fresh from the BDS Web Site; From the Dragonflies in Focus Officer Graham French; Broad-bodied Chaser Survey 2007 Graham French; Report of the Dragonfly Conservation Group Pam Taylor; Favourite Places: Wilson's Pits, Northamptonshire Mark Tyrrell; Field Meeting Reviews: River Dee around Aldford & Churton, Cheshire - 20th April 2007, Larvae Identification Workshop, Brandon Marsh, Warwickshire. 21st April 2007. River Nene, Northants. 26th May 2007, Spinningdale Bog, Highland, Scotland. 3rd June 2007, Garrick and Calrossie Woods, Highland, Scotland. 6th June 2007, Rubha Mor, Coigach, Scotland. 9th June 2007, A Weekend with Dragonflies'at Juniper Hall. 15-17\* June 2007, Adult Identification Workshop, Brandon Marsh Warwickshire. 16th June 2007, Chartley Moss, Shropshire. 16th June 2007. "In search of the White-faced Darter", Mointeach nan Lochain Dubha, Skye - 16th June 2007, Elvetham Heath, Hants. 17th June 2007, Loch Caol, Skye. 17th June 2007, Logierait Woods, Pitlochry, Perthshire. 21st June 2007, Countess Wear, Exeter, Devon. 22nd June 2007, Glovers Pond, Chobham Common, Surrey. 23rd June 2007, Grand Western Canal, Devon. 23rd June 2007, Upton Fen, Norfolk. 23 June 2007, Stover CP and Bovey Heathfield Devon WT Reserve - 24th June 2007, Tanera Mor, the Summer Isles, Scotland. 7th July 2007, Warren Heath, Hartley Witney, Hampshire. 15th July 2007, Tithe Farm, Marton, Warwickshire. 28th July 2007; Members' Letters & Observations: On the Reliability of Binoculars for Identification Keith Lovegrove; Golden-ringed may eat veg as well! Dave Dana, Britain's Largest Dragonfly attacks Europe's Smallest Bird Brian Easlea, Ruddy Explosion! Dave Dana; Publications & Reviews: Gossamer Wings. Mysterious Dragonflies Dagmar Hilfert-Rüppell & Georg Rüppell, 'Dragonflies' Steve Brooks, The Dragonflies of Essex Ted Benton & John Dobson, Field Guide to the Larvae and Exuviae of British Dragonflies Steve Cham; BDS Business: The Board of Trustees, BDS votes for by-law changes, Proposed change to By-laws, You Can Help!, Help needed with a new National Atlas, Site photographs wanted."] Address: BDS, c/o Hepper, D., 12 Three Stiles Rd, Farnham, Surry GU9 7DE, UK. E-mail: David.Hepper@Local-Software.co.uk

**6640.** Brockhaus, T. (2007): Überlegungen zur Faunengeschichte der Libellen in Europa während des Weichselglazials (Odonata). *Libellula* 26(1/2): 1-17. (in German, with English and Swedish summary). ["In contrast to other aquatic insect groups, no relevant discussion on the faunal history of the Odonata during the Ice Age exists. In the present paper I examine previous hypotheses regarding the postglacial settlement of dragonflies in Europe. I include a short overview of the processes during the Ice Age. Especially I write about the present state of knowledge of the climate, countryside and habitats during the Weichsel Glacial Stage. There are in East Germany extensive findings from about 33,000 years ago. But there is no fossil evidence of dragon flies from that time. In addition, in the context of present knowledge of the ecology, morphology, physiology and dispersal of Odonata, I develop a hypothesis regarding the possible dragon fly fauna of the tundra of that time. It is possible that both coldstenothermic



and eurythermic species belong to this periglacial fauna. I offer further suggestions regarding the treatment of this question that may contribute to a better understanding of ecological findings and to the history of dispersion and zoogeography of Palaearctic dragonflies." (Authors)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**6641.** Buczyński, P.; Zawal, A. (2007): Dragonflies (Odonata) of the "Szare Lake" nature reserve. *Parki Narodowe i Rezerwaty Przyrody* 26(4): 79-91. (in Polish, with English summary). [28 species of Odonata were recorded in 2004 in the "Szare Lake" nature reserve (NW Poland, West Pomeranian Lake District). Dragonfly assemblages of aquatic habitats in the reserve were analysed. Particular attention was paid to Szare Jake which is a well preserved representative of lobelian lakes. The importance of lobelian lakes for dragonfly conservation in Poland and Europe is discussed.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**6642.** Burkart, G.; Burkart, W. (2007): Die Libellenfauna der Ostseeinsel Gotland (Odonata). *Libellula* 26 (1/2): 119-142. (in German, with English and Swedish summary). ["During 17 trips between 1982 and 2006 to Gotland, we investigated 126 sites regarding the occurrence of Odonata. Altogether we recorded 36 species of Odonata in the island. Since 1998 four species, *Sympecma fusca*, *S. paedisca*, *Aeshna mixta* and *Anax imperator*, were recorded as new for Gotland. We could not confirm the presence of *Nehalennia speciosa* and *Calopteryx splendens*, which had been reported from Gotland in earlier studies." (Authors)] Address: Burkart, Gudrun, Am Emel 7, D-27412 Wilstedt, Germany. E-mail: weguburkart@gmx.de

**6643.** Butler, S.G. (2007): The larva of *Gomphidia tinigrum* Selys from Nepal (Anisoptera: Gomphidae). *Odonatologica* 36(4): 399-403. (in English). ["The final instar exuviae from the Phewa Tal lake at Pokhara, Nepal is described and illustrated and comparison is made with *Ictinogomphus rapax* larvae, inhabiting the same water body. Mention is made of the more noted differences between the SE Asian *Lindeniinae* genera." (Author)] Address: Butler, S.G., Red Willow, All Stretton, Shropshire SY6 6HN, UK. E-mail: sgbutler15@btopenworld.com

**6644.** Calle, P.; Knijff, G. de; Kurstjens, G.; Peters, B. (2007): Actuele en historische libellenfauna van de grensmaas. *Natuurhistorisch maandblad* 96(10 ): 269-277. (in Dutch, with English summary). ["Present and historic biodiversity of dragonflies in the Grensmaas floodplain: The stretch of the river Meuse between Maastricht (NL) and Maaseik (B), known as the Grensmaas, is unique to the Netherlands and Flanders because of its rapidly flowing water, gravel banks and islands. This article discusses the historic and present value of this floodplain for dragonfly species. In 2006, extensive research was done in several nature reserves along the river and in the summer streambed of the river itself, to assess the consequences for flora and fauna of 10-15 years of habitat restoration work in this floodplain. In this context, the dragonfly fauna was also surveyed, with special attention being paid to the strictly protected *Gomphus flavipes*. Data are presented for

four different periods. Before 1950, about 28 species occurred, including several typically rheophile species, like *Gomphus vulgatissimus*, *Ophiogomphus cecilia* and *Onychogomphus forcipatus*. Between 1950 and 1989, the diversity of dragonflies fell severely, due to water pollution and habitat destruction (canalisation and agricultural activities). From 1990 onwards, the dragonfly diversity increased again, due to floodplain restoration, reduced pollution and climate change. In the most recent period (1998-2006), more than 38 species were recorded in the Grensmaas floodplain, including several Red List species like *Libellula fulva* and *Sympecma fusca*. Currently, *G. stylurus* does not have a stable population in the river, but occurs as a summer migrant. Another 11 species are currently also most likely to be migrants, since their specific breeding habitat is lacking. It is expected that the dragonfly diversity will increase slightly and population sizes will grow as a result of a new large-scale floodplain restoration project, in which the width of the river bed will be enlarged to the size it had around 1850. Another major improvement will be the smaller amounts of silt in the riverbed, as silt has a negative impact on the habitat of larvae of rheophile species. Most of the silt originates from these waste which was until recently discharged untreated by the city of Liège in Belgium." (authors)] Address: Knijff, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijff@inbo.be

**6645.** Carchini, G.; Della Bella, V.; Solimini, A.G.; Bazzanti, M. (2007): Relationships between the presence of odonate species and environmental characteristics in lowland ponds of central Italy. *Ann. Limnol... Int. J. Lim.* 43(2): 81-87. (in English). ["A set of 21 ponds was sampled three times for odonate larvae during spring 2002. At the same time 17 environmental variables were recorded including area, wet phase duration, total nitrogen, total phosphorus, aquatic macrophytes and land use. A total of 16 odonate species belonging to Lestidae, Coenagrionidae, Aeshnidae and Libellulidae were recorded, and the total number of species per pond varied from zero to six. The relationships between species richness, assemblages and environmental variables were studied by simple and multiple correlation and by Canonical Correspondence Analysis (CCA). The results showed that permanent ponds were larger, deeper, had more macrophyte species, had more extensive macrophytes cover and lower concentrations of nitrogen and phosphorus than temporary ponds. Multiple regression analysis showed that the number of odonate species was positively affected firstly by the number of macrophyte species, and then by pond depth. However, pond depth appeared to be interchangeable with several other variables, such as pond area and water duration and negatively correlated with nitrogen concentration, variables which are all linked with the permanent or temporary status of the ponds. CCA analysis indicated that odonate species presence was linked with a few environmental variables, showing a tendency of Odonata to avoid ponds with higher nitrogen concentrations, with the exception of *Lestes barbarus*, a species typical of temporary water in central Italy. At the same time, the majority of species were linked with longer water phase duration and with greater macrophyte species richness. A comparison with previous studies, and in particular with those carried out in central Italy, confirmed the positive influence of macrophytes, water duration, and also the negative effect of nutrient load. However, several other variables,

in particular land use, shade, presence of fish, which were influential in other studies, were not significant in this study." (Authors)] Address: Carchini, G., Dipartimento di Biologia, Università "Tor Vergata", Viale della Ricerca Scientifica, I-00133 Roma, Italy. E-mail: archini@utovrm.it

**6646.** Carvalho, A.L. (2007): Recomendações para a coleta, criação e colecionamento de lavras de Odonata. Arquivos do Museu Nacional, Rio de Janeiro 65(1): 3-15. (in Portuguese, with English summary). ["Recommendations for collecting, rearing, and storing larvae of Odonata. The taxonomy of the dragonfly larvae of Neotropical Region is still very poor. Manuals or guides about this subject are not available yet. So, it is necessary to breeding unknown larvae for their correct identification, based on the related emerged adults, and posterior description. Methods for all the steps of the work related to the manipulation of these forms in the field and in the laboratory, specially the rearing, are presented in detail. Each procedure is discussed and associated with biological data. Alternative materials, cheap and easy to find, are preferentially indicated." (Author)] Address: Carvalho, A.L., Museu Nacional / UFRJ, Departamento de Entomologia. Quinta da Boa Vista, São Cristóvão, 20940-040, Rio de Janeiro, RJ, Brasil.

**6647.** Catling, P.M. (2007): Variation of hind-wing colour and length in *Sympetrum internum* (Odonata: Libellulidae) from the Canadian prairie provinces. Canadian Entomologist 139(6): 872-880. (in English, with French summary). ["Amber coloration, called saffroning, extends from 1 to 15 mm across the hind-wing base in females of *S. internum* from the prairie provinces but extends only from 2 to 3 mm in males. There are no substantial differences in hind-wing length between the sexes. A significant correlation was found between hind-wing length and the extent of saffroning for both males and females. Regressions of these characters against latitude and longitude revealed that (1) there is a significant decrease in hind-wing length northward for both sexes; (2) there is a significant decrease in saffroning northward that is more significant for females; (3) there is no significant effect of longitude on hind-wing length; and (4) saffroning in females significantly increases westward but there is no similar effect in males, and the trend in females is much less significant than the latitudinal trend. Within the prairie provinces, extensive saffroning is confined to the Prairie Ecozone and moderate saffroning occurs around the edges of this ecozone. The surrounding Boreal Plains Ecozone is characterized by females with very limited saffroning. There is generally extensive variation in the extent of saffroning within some Prairie Ecozone locations, ranging from limited to moderate or extensive, but limited and moderate saffroning were more frequent at most locations in the Prairie Ecozone. Various explanations for saffroning are considered. Since limited, moderate, and extensive saffroning occur together throughout an extensive area, and occur within many populations and within a group emerging at the same time, formal taxonomic recognition of individuals with moderate or extensive saffroning seems unwarranted." (Author)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, Canada. E-mail: brownell@achilles.net

**6648.** Cham, S. (2007): Field Guide to the Larvae and Exuviae of British Dragonflies. Volume 1: Dragonflies (Anisoptera). British Dragonfly Society. ISBN-13: 9780955647109: 80 pp. (in English). ["This field guide aids the identification of dragonfly larvae and exuviae without the need for keys. It is fully illustrated with close-up colour photographs of all the key distinguishing features. Includes information on where to find larvae and exuviae and emergence periods for each species." (Publisher)] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com

**6649.** Chang, X.; Zhai, B.; Wang, M.; Wang, B. (2007): Relationship between exposure to an insecticide and fluctuating asymmetry in a damselfly (Odonata, Coenagrionidae). Hydrobiologia 586(1): 213-220. (in English). ["In this study, we explored the effects of pesticide on fluctuating asymmetry (FA) levels and mortality of *Ceriagrion* sp. larvae. The results showed that the mortality of larval damselflies treated with pesticide was significantly higher than that treated with tap water which had been aerated for 48 h, but there were no significant differences among mortality of larvae treated with different concentrations of pesticide. Meanwhile, we found that the level of FA of the first tibia length, one of the seven bilaterally symmetrical traits (First femur length, First tibia length, Second femur length, Second tibia length, Third femur length, Third tibia length and Prementum width), differed significantly with different treatments, whereas the others did not show any significant differences. The Bonferroni (Dunn) *t* Tests revealed that FA of the first tibia length at  $15 \times 10^{-9}$  mg l<sup>-1</sup> was significantly higher than that at  $1.5 \times 10^{-9}$  mg l<sup>-1</sup> and control. There was no significant relationship between trait size and the absolute difference between their right and left sides. There was also no significant relationship between body size and the absolute difference between right and left sides. Trait size was significantly positively correlated with body size. FA was not associated with mortality. Therefore, we concluded that FA of the first tibia length of *Ceriagrion* sp. larvae may be induced by sublethal doses of pesticides. That is to say, its FA may be regarded as an indicator of reflecting the level of pesticide stress." (Authors)] Address: E-mail: bpzhai@njau.edu.cn

**6650.** Chaplina, I.A.; Dumont, H.J.; Haritonov, A.Yu.; Popova, O.N. (2007): A review of the Odonata of Kazakhstan. Odonatologica 36(4): 349-364. (in English). ["The odonate fauna of Kazakhstan (86 species) is reviewed, using literature data, miscellaneous collections and the results of an expedition by the authors in July 2004. *Aeshna caerulea*, *A. subarctica*, *Somatochlora graeseri* (all from the S Altai mountains), *Macromia amphigena fraenata* (Sibinskie Lakes near Ust'-Kamenogorsk), *Calopteryx samarcandica*, *Coenagrion hyalas*, and *Anormogomphus kiritchenkoi* (all based on specimens in Zool. Inst. Russ. Acad. Sei., St. Petersburg) are first records for the country." (Authors) *Calopteryx maracandica* Bartenef 1913 and *Calopteryx unicolor* Bartenef 1912 are classified as synonyms of *Calopteryx samarcandica* Bartenef 1912.] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

**6651.** Chaput-Brady, A.; Pays, O.; Lodé, T.; Secondi, J. (2007): Morphological clines in dendritic landscapes.

Freshwater Biology 52(9): 1677-1688. (in English). ["1. In complex landscapes such as river networks, organisms usually face spatio-temporal heterogeneity and gradients in geomorphological, water, ecological or landscape characteristics are often observed at the catchment scale. These environmental variables determine developmental conditions for larval stages of freshwater insects and influence adult phenotypic characteristics. Environmental clines are therefore expected to generate morphological clines. Such a process has the potential to drive gradual geographical change in morphology-dependent life history traits, such as dispersal. 2. We studied the influence of aquatic and terrestrial environmental factors on morphological variations in *Calopteryx splendens* across the Loire drainage. To investigate these effects we took explicitly into account the hierarchical structure of the river network. 3. We analysed eight morphological traits. Results showed significant body size variation between tributaries and the presence of a morphological cline at the drainage scale. We observed an effect of pH and water temperature on body size. Individuals in downstream sites were larger than individuals in upstream sites, and adults whose larval stages were exposed to alkaline pH and high temperatures during summer were larger. 4. Body size affects flight abilities in insects. Thus, our results suggest that morphological clines may generate an asymmetric dispersal pattern along the downstream-upstream axis, downstream populations dispersing farther than upstream ones. Such a process is expected to influence population genetic structure at the drainage scale if larval drift and floods do not balance an asymmetrical dispersal pattern of adults along the downstream-upstream gradient. To assess the influence of environmental gradients on the variation of life history traits it is important to understand the population biology of freshwater insects, and more generally of riverine organisms. It is also essential to integrate such data in conservation or restoration programmes." (Authors)] Address: Chaput-Bardy, Audrey, Laboratoire Paysages et Biodiversité, UFR Sciences, 2 Bd Lavoisier, 49045 Angers cedex 01, France. E-mail: audrey.chaput-bardy@univ-angers.fr

**6652.** Chatterjee, S.N.; Ghosh, A.; Chandra, G. (2007): Eco-friendly control of mosquito larvae by *Brachytron pratense* nymph. *Journal of Environmental Health* 69(8): 44-48. (in English). ["The study reported here revealed the biocontrol efficacy of aquatic nymphs of the dragonfly *Brachytron pratense* against larvae of the mosquito *Anopheles subpictus*. It was found that during a 24-hour study period, a nymph of *B. pratense* would consume (mean value of three observations) 66 fourth-instar *An. subpictus* larvae released in a water bowl containing 3 liters of pond water. The consumption rate was significantly higher ( $p < .05$ ) during the lights-on phase of the experiment than during the lights-off phase ( $t = 2.15$ ). Under field conditions, a significant decrease ( $p < .05$ ) in larval density in dipper samples was observed 15 days after the introduction of dragonfly nymphs (10 individuals) in concrete tanks. The biocontrol potential of the nymphs under field conditions was also indicated by a significant increase ( $p < .05$ ) in the density of mosquito larvae 15 days after the removal of nymphs. In the control tanks (where no nymphs were introduced), mean larval-mosquito density did not differ significantly throughout the study period ( $p > .05$ )."] (Authors).] Address: Chatterjee, S.N., Department

of Zoology, University of Burdwan, Mosquito Research Unit, Rajbati, Bardhaman, West Bengal, India

**6653.** Chelmick, D. (2007): Further observations of *Macromia splendens* (Pictet) in Andalusia, Spain (Anisoptera: Macromiidae). *Notul. odonatol.* 6(10): 109-112. (in English). ["Chelmick (2006, *Notul. odonatol.* 6: 69-72) provided information on the status of *M. splendens* in Andalusia. This paper outlines further information on the distribution, habitat and behaviour of this species in southern Spain. The paper concludes with discussion on the conservation and threats to the habitat of this internationally important species." (Author) In addition, records are documented of *Oxygastra curtisii* and *Gomphus graslinii*, species likewise protected by law.] Address: Chelmick, D.G., 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK. E-mail: dgc@david.chelmick.com

**6654.** Cicek, K.; Kermer, A. (2007): Food composition of the Marsh Frog, *Rana ridibunda* Pallas, 1771, in Thrace. *Turkish Journal of Zoology* 31(1): 83-90. (in English, with Turkish summary). [An analysis of the stomach contents of 53 (19 males, 34 females) adult individuals of *Rana ridibunda* was performed. The frog diet consisted of a wide variety of arthropods; Diptera (42.62%) and Coleoptera (21.84%) were especially prominent. Aquatic forms did not contribute much to the frog diet; Odonata were represented with less than 1% of all prey items. The prey items identified indicate that individuals of this species, like other ranids, are generalist opportunistic predators whose diet is most strongly influenced by prey availability.] Address: Cicek, K., Ege University, Faculty of Science, Biology Department, Zoology Section, TR-35100, Üzmir, Turkey

**6655.** Clausnitzer, H.-J.; Clausnitzer, C.; Hengst, R. (2007): Ergänzungen zur Ökologie von *Ceriagrion tenellum* in der südlichen Lüneburger Heide (Odonata: Coenagrionidae). *Libellula* 26(3/4): 157-160. (in German, with English summary). ["After the mild winter of 2006/2007 featuring only very few days with temperatures below 0°C, during summer 2007 *C. tenellum* was found in numbers at several ponds without flowing water, even emerging from a garden pond. The absence of frost during the preceding winter apparently enabled the development to take place in these waters." (Authors)] Address: Clausnitzer, H.-J., Eichenstraße 11, D-29348 Eschede, Germany. E-mail: H.-J.Clausnitzer@t-online.de

**6656.** Clausnitzer, H.-J.; Clausnitzer, C.; Hengst, R. (2007): Zur Ökologie von *Ceriagrion tenellum* im Bereich der nordöstlichen Verbreitungsgrenze in Niedersachsen (Odonata: Coenagrionidae). *Libellula* 26(1/2): 19-34. (in German, with English summary). ["*C. tenellum* has a south-western European distribution; hence the populations in Lower Saxony are near its north-eastern limit. These populations were surveyed from 1990 to 2006. The species lives mainly in primary habitats heathy peatlands and creeks with paludification but there are also some populations in artificial habitats. It was found in 60 localities, but not throughout the period. In the last 15 years 19 new cases of colonisation of bogs and ponds were observed. This positive trend coincided with the renaturation of the small rivers Lutter and Lachte, and with moderately cold winters. The larvae are susceptible to frost and therefore large populations are associated with running water. After the winter



of 2005/2006 that had led to a longer freezing up of many waters, there were strong losses in ponds without, or with only very small, water current up to the total extinction of a local population. Winter cold forms the limiting factor for this species in the northeastern part of its range." (Authors)] Address: Clausnitzer, H.-J., Eichenstraße 11, D-29348 Eschede, Germany. E-mail: H.-J.Clausnitzer@t-online.de

**6657.** Conn, A.T.; Burgess, S.C.; Ling, C.S. (2007): Design of a parallel crank-rocker flapping mechanism for insect-inspired micro air vehicles. Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science 221(10): 1211-1222. (in English). ["In the current paper, a novel micro air vehicle (MAV) flapping mechanism for replicating insect wing kinematics is presented. Insects flap their wings in a complex motion that enables them to generate several unsteady aerodynamic mechanisms, which are extremely beneficial for lift production. A flapping wing MAV that can reproduce these aerodynamic mechanisms in a controlled manner is likely to outperform alternative flight platforms such as rotary wing MAVs. A biomimetic design approach was undertaken to develop a novel flapping mechanism, the parallel crank-rocker (PCR). Unlike several existing flapping mechanisms (which are compared using an original classification method), the PCR mechanism has an integrated flapping and pitching output motion which is not constrained. This allows the wing angle of attack, a key kinematic parameter, to be adjusted and enables the MAV to enact manoeuvres and have flight stability. Testing of a near-MAV scale PCR prototype using a high-speed camera showed that the flapping angle and adjustable angle of attack both closely matched predicted values, proving the mechanism can replicate insect wing kinematics. A mean lift force of 3.35 g was measured with the prototype in a hovering orientation and flapping at 7.15 Hz." (Authors) Fig. 2 presents a simplified two-dimensional rigid-body linkages representing the mechanics of the Odonata wing joint.] Address: Burgess, S.C., Department of Mechanical Engineering, University of Bristol, Queen's Building, University Walk, Bristol BS8 1TR, UK. E-mail: s.c.burgess@bris.ac.uk

**6658.** Cordero-Rivera, A.; Sánchez-Guillén, R.A. (2007): Male-like females of a damselfly are not preferred by males even if they are the majority morph. *Animal Behaviour* 74(2): 247-252. (in English). ["Animals searching for prey and males searching for mates share similar problems of detection if their targets are diverse in colour or physical appearance. There is good evidence for predators switching their preferences for prey in a frequency-dependent way; predators focus on the most common form, and the decreased predation on rarer forms allows multiple forms to survive. Frequency-dependent mate selection has also been proposed to explain the maintenance of several female colour morphs in damselflies. However, the fact that one of the female morphs is coloured like a male (androchrome) and behaves similarly to males suggests the phenomenon of male mimicry in this system as an alternative explanation for the polymorphism. We compared androchrome frequencies in populations and mating pairs in *Ischnura elegans*, over a range of androchrome frequencies (8–90%). In 22 of 23 samples androchromes mated less often than expected (significantly in 13 samples). We found no evidence for males switching their preferences in a frequency-dependent way. A test

of male preference for female morphs in a population with 85% androchromes indicated that males behaved indiscriminately and did not prefer the commonest (male-like) morph. Our results support androchrome male mimicry rather than learned mate recognition by males (a purely frequency-dependent model) as the main mechanism behind the maintenance of this sex-limited colour polymorphism." (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidad de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**6659.** Czerniawska-Kusza, I. (Ed.) (2007): 14 O-gólnopolskie Warsztaty Bentologiczne: Hydromorfologiczna ocena ekosystemów wodnych. Opole-Turawa. Lanko, Opole: 74 pp. [The following odonatological papers are presented: Domek, P., R. Dondajewska & R. Gołdyn: Macrozoobenthos of the Antoninek reservoir on the Cybinia river (pp. 15-16); — Koperski, P.: The presence and pressure of fish as a factor determining the composition of invertebrate fauna (pp. 39-40); - Krzyżanowska, I.: The Pełcz river biodiversity based on macrobenthos (p. 46); - Nuckowska, K.: Water quality assessment of the Santoczna river and the diversity of organisms occurring in the water (pp. 52-53).] Address: not stated

**6660.** Daguet, C. (2007): Odonata as indicators of climate change. *Atropos* 32: 26-28. (in English). [General account on Odonata and climate change with focus on UK.] Address: Daguet, Caroline, English Nature North Mercia Team, Attingham Park, Shrewsbury, Shropshire SY4 4TW, UK. E-mail: caroline.daguet@english-nature.org.uk

**6661.** Dana, D., (2007): Unusual thoracic marking on Common Blue Damselfly *Enallagma cyathigerum*. *Atropos* 32: 58. (in English). [Colour structures of the thorax of a male *E. cyathigerum*, Isle of Wight, UK, 6-VI-2007] Address: Dana, D., 38 Yarborough Road, Wroxall, Ventnor, Isle of Wight, PO38 3EA, UK

**6662.** De Marmels, J. (2007): Una nueva especie de Heteragrion Selys, 1862, endémica de la Cordillera de la Costa, Venezuela (Odonata, Zygoptera: Megapodagrionidae). *Memorias XX Congreso Venezolano de Entomología*, San Cristobal 22 al 26 de Julio 2007: 68-69. (in Spanish, with English translation of the title). [Record of *Heteragrion* n.sp. from the "Nenri Pittier" national Park, Edo. Aragua, Venezuela. The species is similar to *H. palmichale* Hartung, 2002. The taxon is to be published in a scientific journal.] Address: De Marmels, J., Inst. Zool. Agrícola, Fac. Agronomía, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com

**6663.** Dechant, G.; Klaus, S. (2007): Erfolgreiches Brüten des Bienenfressers (*Merops apiaster* L., 1758) im Saale-Holzland-Kreis (Thüringen). *Landschaftspflege und Naturschutz in Thüringen* 44(3): 136-137. (in German). [Current records of *M. apiaster* (Aves) in Thüringen, Germany are documented together with a note on habitat choice factors as nearby situated water bodies as food resource. A picture with an odonate prey is given, and a general note on the importance of Odonata as food for the eat eater is made.] Address: Klaus, S., Lindenhöhe 5, D-07749 Jena, Germany. E-mail: siegi.klaus@gmx.de

**6664.** Dehghani, R.; Miranzadeh, M.B.; Yosefzadeh, M.; Zaman, S. (2007): Fauna aquatic insects in sewage maturation ponds of Kashan University of Medical Science 2005. *Pakistan Journal of Biological Sciences* 10(6): 928-931. (in English). [9 samples in 2005 resulted in 1032 specimens of diverse taxa. Dominance was as follows: Diptera (52%), Hemiptera (24%), Ciclopodidae (12%), Hydroacarinae (9.5%), Coleoptera (0.77%), Aranidae (0.67%), Hymenoptera (0.58%), and Odonata (0.48%).] Address: Dehghani, R., Kashan Medical Sciences University, Iran department of Environmental Health, Kashan Medical Sciences University, Kashan, Iran

**6665.** Dijkstra, K.-D. (2007): Dragonflies and Damselflies (Odonata) of Lokutu. *RAP Bulletin of Biological Assessment* 46: 21-36. (in English). [“68 mostly Guineo-Congolian running-water species were found, with remarkable range extensions, as well as new species of *Platycypha*, *Elatoneura* and *Mesocnemis*. The results indicate a healthy watershed in the Lokutu surroundings, with limited degrees of pollution and streambed erosion. If forest cover and natural stream morphology are retained, the rich dragonfly fauna will be as well. The obtained species list is especially long considering the paucity of stagnant water species and the absence of certain Congolian endemics. This is explained by the absence of their habitat and possibly by the barrier that the extensive forest surrounding Lokutu (still) poses to the dispersal of open land species. The observed richness is probably typical of the Congo Basin as a whole and other areas are expected to be even richer. Therefore the Lokutu area does not require specific conservation action. Unlike other groups traditionally surveyed in RAPs, Odonata are invertebrates, strongly tied to freshwater, that are not actively exploited by humans. This RAP proved that it is possible to rapidly obtain a clear picture of Odonate diversity, even allowing a partial description of their ecology. The rich and apparently largely natural Odonate fauna found contrasts with the impoverished and imperiled status of the other groups studied. Therefore it is recommended to use Odonata more frequently to supplement biodiversity assessments of traditional groups, especially in the Congo Basin, where sampling Odonata may show whether existing conservation priorities also protect watersheds and freshwater biodiversity.” (Author)] Address: Dijkstra, K. D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**6666.** Dijkstra, K.D. (2007): The name-bearing types of Odonata held in the Natural History Museum of Zimbabwe, with systematic notes on Afrotropical taxa. Part 2: Zygoptera and descriptions of new species. *International Journal of Odonatology* 10(2): 137-170. (in English). [“Orthographic details of 118 name-bearing types of Odonata and 11 ‘holotypes’ of forms, without nomenclatural status, are provided in two parts: the second and present paper deals with Zygoptera. The taxonomy of the gracilis-group of *Chlorocypha* and the Afrotropical members of *Prodasineura* and *Aciagrion* are discussed. *Chlorocypha fabamacula* is removed from synonymy with *C. wittei*; *Pseudagrion superbum* from *P. serrulatum*. *Chlorocypha basilewskyi* and possibly *C. hasta* are junior synonyms of *C. tenuis* – their treatment as a subspecies of *C. jacksoni* and *C. molindica* respectively is rejected; *Elatoneura tropicalis* of *E. cellularis*; *Argiocnemis dissimilis* of *A. palaeforma*; *Pseudagrion quadriculatum* of *P. superbum*; *Pseudagrion williamsi* of *P.*

*kersteni*; *Teinobasis malawiensis* of *T. alluaudi*. It was confirmed that *Chlorocnemis rossii* is a junior synonym of *C. flavipennis*; *Aciagrion congoense* of *A. africanum*; *Argiocnemis aligulae* of *A. maclachlani*; *Argiocnemis umbargae* of *Ceriagrion annulatum*; *Ischnura hilli* of *I. abyssinica*. *Africocypha ntaali* is definitely a junior synonym of *A. greyi*, but their synonymy with ‘*Libellago lacuselephantum*’ must be investigated. *Chlorocnemis montana maccleeryi* is nearer *C. abbotti* than nominotypic *C. montana*, and is raised to species level. *Aciagrion heterosticta karamoja* is nearer *A. gracile* than nominotypic *A. heterosticta*, and is raised to species level pending further revision. *Aciagrion dondonsense* sp. nov., a species formerly confused with *A. zambianse* and *A. congoense* (see above) is described. *Africallagma sinuatum* f. *fugax* pertains to a good species and is described as *A. pallidulum* sp. nov. The possible specific status of *Platycypha caligata* f. *lacus* requires further study. *Trithemis integra* sp. nov., a species formerly confused with *T. basi tincta* (see Part 1), is described. The spelling *Pseudagrion sjoestedti* (versus *P. sjostedti*) is advocated.” (Author)] Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**6667.** Dijkstra, K.-D. (2007): Dragonflies and damselflies (Odonata) of the Atewa Range. In: McCullough, J., L.E. Alonso, P. Naskrecki, H.E. Wright & Y. Osei-Owusu (Editors). *A rapid biological assessment of the Atewa Range Forest Reserve, Eastern Ghana*. *RAP Bulletin of biological assessment* 47: 50-54 (report),-137-142 (appendix). (in English). [Ghana; “A total of 72 species were found in the streams and rivers that have their headwaters within the reserve (and associated standing water habitats), although only 31 (43%) were found strictly within the reserve’s boundaries. Eight species were recorded in Ghana for the first time, of which six (75%) were recorded inside the reserve. Of these, *Atoconeura luxata* is the most significant discovery because: (1) it had not been described at the time and material taken during the RAP was included in its recently published description; (2) it is the only regionally threatened odonate found, being Red-listed as Vulnerable in western Africa; and (3) it confirms the nationally unique ‘montane’ character of the site. The results indicate a healthy watershed in the forest reserve and the surrounding area, with limited pollution and streambed erosion. This is confirmed by the presence of forest species even in more disturbed landscapes. If forest cover and natural stream morphology are retained, the present dragonfly fauna is expected to persist. However, if development activities were to entail the removal of vegetation or mineral deposits from the range, its capacity to store, buffer and filter rainwater would be seriously compromised, jeopardizing the reliable discharge of freshwater into the region’s rivers; an essential resource for millions of Ghanaians and a rich biodiversity.” (Author) Appendix 3 provides a checklist of Odonata recorded from Ghana.] Address: Dijkstra, K.D., Curator of invertebrates, National Zoological Collection of Suriname, University of Suriname, P.O. Box 9212, Paramaribo, Suriname. E-mail: Dijkstra@naturalis.nnm.nl

**6668.** Dijkstra, K.-D. (2007): Rapid survey of dragonflies and damselflies (Odonata) of North Lorma, Gola and Grebo National Forests, Liberia. *RAP Bulletin of Biological Assessment* 44: 25-28-79-85. (in English). [“During a rapid survey of the North Lorma, Gola and Grebo National Forests, 93 species of dragonflies and

damselflies were found. Seven species (*Paragomphus nigroviridis*, *Phyllogomphus moundi*, *Nesciothemis minor*, *Palpopleura deceptor*, *Tetrathemis polleni*, *Tramea limbata* and *Trithemis monardi*) were recorded in Liberia for the first time. Numbers of species and individuals seemed low, probably because the survey was at the end of the wet season, rather than towards the start. The results nonetheless indicate a healthy watershed in each forest, with limited pollution and streambed erosion. If forest cover and natural stream morphology are retained, the present dragonfly faunas are expected to persist. The most interesting species assemblage was recorded in Gola National Forest, including two species (*Sapho fumosa*, *Trithemis africana*) of conservation concern. Gola National Forest is a major diamond mining area, and the possible beneficial and detrimental impacts of these activities are discussed. Harboring typical examples of a rich Upper Guinea fauna, each forest, and especially Gola National Forest, deserves to be conserved." (Author) Address: Dijkstra, K.D., Gortestraat 11, NL-2311 MS Leiden, The Netherlands. E-mail: Dijkstra@naturalis.nnm.nl

**6669.** Dolny, A.; Pavlik, P. (2007): A phenologically interesting record of *Sympetrum striolatum* (Charp.) (Anisoptera: Libellulidae). *Notul. odonatol.* 6(9): 108. (in English). [6 January 2005, active adult *S. striolatum* female in Stramberk Botanical Garden and Arboretum (alt. 353 m), Czech Republic (49°35'20"N, 18°07'29"E)] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic. E-mail: Alnes.Dolny@osu.cz

**6670.** Donath, H. (2007): Die Entwicklung der Odonatenfauna im Gebiet des früheren Braunkohlentagebaus Schlabendorf-Süd (Land Brandenburg, Niederlausitz) über drei Jahrzehnte (Odonata). *Entomologische Nachrichten und Berichte* 51(1): 7-14. (in German, with English summary). [Germany; "From 1977 to 1991, the brown coal mine South Schlabendorf covered an area of 3269 hectare in the Lower Lusatia. The dragonfly fauna in the water-rich western part was studied before devastation from 1976 until 1982. Of the 31 species found 28 were autochthonous, 8 of which are included in the Red List of Brandenburg. Recolonisation was surveyed since 1992. Presently, 22 species reproduce in the area, among which 5 to 7 from the Red List. Before mining, summer-cool brooks and moorland were important habitats, but today springs and littoral zones of lakes in areas of open-cast mining are valuable dragonfly habitats. Compared to the situation before mining, the share of Mediterranean species rose from 2 % to 32 %, while the Eurosiberian group decreased from 54 % to 32 %." (Authors)] Address: Donath, H., Caule Nr. 1, D-15926 Zieckau, Germany

**6671.** Dow, R.A.; Choong, C.Y.; Orr, A.G. (2007): Two new species of *Chalybeothemis* from Malaysia, with a redefinition of the genus (Odonata: Libellulidae). *International Journal of Odonatology* 10(2): 171-184. (in English). ["*Chalybeothemis chini* sp. nov. from Pahang, Peninsular Malaysia, and *C. pruinosa* sp. nov. from Sarawak, Malaysian Borneo, are described from the male sex. The new species necessitate some redefinition of the previously monotypic genus, which is provided. The quiescent penis of *Chalybeothemis* is illustrated for the first time. Differences between *C. chini*, *C. fluviatilis* and *C. pruinosa* are discussed and tabulated. *C. fluviatilis* is

reported from Sarawak for the first time. Relationships of *Chalybeothemis* within the Libellulidae are discussed." (Authors)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**6672.** Dumont, H.J.; Vierstraete, A.; Vanfleteren, J.R. (2007): A revised molecular phylogeny of the Calopterygidae (Zygoptera: Calopterygidae). *Odonatologica* 36(4): 365-372. (in English). ["An updated version of an JTS-based phylogeny of the Calopteryginae, using sequences of 31 ingroup taxa, is given. The subfamily consists of 3 main clades, each with 2 subclades. Only clade 1 (*Calopteryx* s. s.) is not exclusively Asian but extends to Europe and North America. In the East-Asian clade 2, the genus *Matrona* is found to be descended from an *Atrocalopteryx*-like ancestor. Several so-called South-East Asian *Calopteryx* probably either belong to *Atrocalopteryx* or to as yet unnamed genera near *Atrocalopteryx*. *Archineura* consists of 2 species, limited to China and Indo-China, and is rather basal to clade 3. The subclade *Neurobasis-Matronoides* is worthy of further analysis." (Authors)] Address: Dumont, H. J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@rug.ac.be

**6673.** Dyatlova, E.S. (2007): On the occurrence of abnormalities in venation of dragonflies (Insecta, Odonata). *Vestnik zoologii* 41(3): 219-225. (in Russian(?), with English summary). [South-western Ukraine; abnormal wings of *Platycnemis pennipes*, *Ischnura pumilio*, *Orthetrum brunneum*, *Aeshna mixta*, and *Crocothemis erythraea* are figured and described. Possible causes of the wing abnormalities are discussed. The frequency of occurrence of aberrant veins in wings of males of *Calopteryx splendens* is described.] Address: Dyatlova, Elena Sergeevna, Institute of Zoology, Faculty of Biology, I.I. Mechnikov University of Odessa, Odessa, Ukraine. E-mail: lena.dyatlova@gmail.com

**6674.** Eda, S.; Ubukata, H. (2007): Obituary: Imato Sonehara. *Odonatologica* 36(4): 415-419. (in English). ["A brief biography of I. Sonehara (28 January 1921-12 May 2000), a science teacher and the author of "The life history of *Epitheca bimaculata sibirica* on Mt. Yatsugatake" is followed by his odonatological bibliography (1962-1996; 66 titles)." (Authors)] Address: Ubukata, H., Hokkaido University of Education at Kushiro, Dept Science Education, Shiroyama 1-15-55, Kushiro, 085, Japan. E-mail: ubukata@kus.hokkyodai.ac.jp

**6675.** Ellenrieder, N. von (2007): The larva of *Hetaerina mendezii* Jurzitza, with comments on *H. rosea* Seelys (Zygoptera: Calopterygidae). *Odonatologica* 36(4): 405-414. (in English). ["*H. mendezii* larva is described and illustrated for the first time based on specimens from Misiones Province, Argentina. Larvae of *H. rosea* from NW Argentina are found to partially differ from its original larval description, and that species is re-diagnosed. A comparative table for all known larvae of *Hetaerina* and related calopterygid genera is provided." (Author)] Address: Ellenrieder, Natalia von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: odo\_nata@hotmail.com



- 6676.** Ellenrieder, N. von; Garrison, R.W. (2007): Dragonflies of the Yungas (Odonata). A Field Guide to the Species from Argentina. Libelulas de las Yungas (Odonata) Una guía de campo para las especies de Argentina. Pensoft Series Faunistica 67, ISSN 13120174, Pensoft Publishers, Sofia-Moscow: 168 pp.. (bilingual in English and Spanish). [The Yungas are highly biodiverse cloud forests extending from Venezuela south through NW Argentina, and are considered one of the biodiversity 'hot spots' in South America. This bilingual (Spanish/English) pocket field guide, the first of its kind for any region in South America, is accompanied by 280 illustrations including detailed diagnostic drawings and numerous colour photos of live Odonata. It covers 102 taxa found in the Argentine Yungas (a relative small part of the bioregion Yungas), representing over a third of all species known from the country. The species are treated monographically providing information on identification (description of the taxa, sometimes with advise to sibling species), distribution and habitat, and behaviour. It is a little bit confusing to find in a book for identification Odonata of a relative small area five unidentified taxa: *Argia* sp. (later described as *A. yungensis*), *Triacanthagyna* sp., *Limnetron* sp., *Micrathyria* sp., and *Erythrodiplax* sp. Following the illustrations of the book "Dragonfly genera of the New World" by the same authors, *Micrathyria* sp. should be *M. divergens*. It would be very useful to untangle these shortcomings by a leaflet added to the book. My personal opinion is that many of the colour pictures are reproduced in a scale insufficiently for an identification book, or the intended didactic information. Even using a magnifying glass it is nearly impossible to see what you should see indicated by arrows! (e.g. fig. 8, differences in male and female genitalia). In general the type size of the settings is too small for odonatologists getting older and older, and whose eyes getting more worse and worse. The effectiveness of some of the pictures is quite limited (e.g. *Rhinoaeschna pallipes*, *Tramea calverti*). The numerous black & white drawings are fine. In spite of shortcomings the book is very welcome because it will help to enlarge interest in our favourite beasts among the people in South America. To stimulate dragonfly research, Pensoft offers a free shipment of the book to any private customer in South America. (Martin Schorr)] Address: Pensoft Publishers, Geo Milev Str., No 13a, 1111 Sofia, Bulgaria. www.pensoft.net
- 6677.** Ellenrieder, N. von; Garrison, R.W. (2007): Untangling some taxonomic riddles on damselfly genera (Zygoptera) from the neotropical region. IDF-Report 11: 1-34. (in English) ["Examination of type material deposited in the IRSNB (Royal Belgian Institute of Natural Sciences, Brussels, Belgium) and in the BMNH (British Museum of Natural History, London, Great Britain) allowed us to solve taxonomic riddles regarding several damselfly (Zygoptera) genera from the neotropical region. We provide notes on the status of several types, and introduce the following new synonymies: *Argia huallaga* Fraser, 1946 = *A. adamsi* Calvert, 1902; *Argia makoka* Fraser, 1946 = *A. kokama* Fraser, 1946; *Argia mollusca* Fraser, 1946 = *A. collata* Selys, 1865; *Argia trifoliata* Fraser, 1946 = *A. variegata* Förster, 1914; *Argia umbriaca* Fraser, 1946 = *A. indicatrix* Calvert, 1902; *Amphiagrion amphion* Selys, 1876 = *Ischnura verticalis* (Say, 1840); a new combination: *Oxyagrion cardinalis* Fraser, 1946 to *Leptobasis cardinalis* (Fraser, 1946); and three lectotype designations (for *Acanthagrion gracile* race? *lancea* Selys, 1876, *Acanthagrion trimaculatum* Selys, 1876, and *Leptagrion flammeum* Selys, 1876)."] (Authors). Address: Ellenrieder, Natalia von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: odo\_nata@hotmail.com
- 6678.** Englund, R.; Polhemus, D.A. (2007): *Argiolestes kula*, a new species of damselfly from eastern New Guinea (Odonata: Megapodagrionidae). Journal of the New York Entomological Society 114(3): 95-107. (in English). ["*Argiolestes kula* n. sp. is described from eastern new Guinea and nearby offshore islands (Sariba, Basilaki, Fergusson), and a comparison is provided to the closely related species *Argiolestes sidonia* Martin. Figures of the male abdominal appendages, wing venation and breeding habitat are provided, accompanied by a distribution map. A checklist of *Argiolestes* species is also included."] (Authors)] Address: Englund, R.A., Hawaii Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, HI, 96817, USA. E-mail: englund@bishopmuseum.org
- 6679.** Evenhuis, N.L. (2007): The Godeffroy Museum Catalogs in relation to Fiji terrestrial arthropods. Part I: Introduction and review of Myriapoda, Diptera, Odonata, and smaller Hexapod orders. Fiji Arthropods VII Edited by Neal L. Evenhuis & Daniel J. Bickel. Bishop Museum Occasional Papers 91: 17-28. (in English). ["Catalogs of the Godeffroy Museum in Hamburg are reviewed in relation to their listings of Fijian terrestrial arthropods. A table of names of Fijian terrestrial arthropods listed in the catalogs available for study is presented with discussion of the nomenclatural and taxonomic implications. The names of arthropods in the Blattodea, Dermaptera, Diptera, Neuroptera, Myriapoda, Odonata, Phasmida, and Trichoptera are tabulated."] (Authors)] Address: Evenhuis, N.L., Pacific Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, Hawaii 96817, USA. E-mail: neale@bishopmuseum.org
- 6680.** Fleck, G.; Costa, J. (2007): Replacement name for a homonymous dragonfly generic name (Odonata). Zootaxa 1542: 68. (in English). ["Costa and Santos (1992) proposed the genus *Santosia* with type species *Santosia marshalli* by original designation from Brazil in the dragonfly family Corduliidae (Odonata: Anisoptera). The generic name is preoccupied by *Santosia* Stål (1858) with type species *Reduvius maculatus* Fabricius, 1781 by subsequent designation in the heteropteran family Reduviidae. Thus *Santosia* Costa and Santos, 1992 is invalid under the law of homonymy, being a junior homonym of *Santosia* Stål, 1858. In accordance with article 60 of the International Code of Zoological Nomenclature, fourth edition (1999), we substitute the junior homonym *Santosia* Costa and Santos, 1992 with *Cordulisantasia* nom. nov."] (Authors)] Address: Fleck, G., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleck@mnhn.fr
- 6681.** Flenner, I. (2007): Forest lakes affected by forestry - how resilient are dragonfly communities to logging in Central Sweden? Halmstad University. School of Business and Engineering. Masters project 20p. Supervisor: Göran Sahlén. 2007-05-30: 16 pp. (in English). ["The main cause of environmental disturbance in the Fennoscandian boreal forests today is forestry. Natural disturbances are important to maintain diversity, but anthropogenic disturbance, such as forestry, differs

in many ways from the natural ones. Forestry is a big industry in Sweden and only a small remnant of old-growth forest is left. Several studies have shown an initial decrease in e.g. dragonfly diversity a few years after logging, followed by an increase up to numbers comparable with the original species number. In this study I examined whether the new, quite diverse, species composition is similar to the one present before the logging or if some species are disappearing and are replaced with other, maybe opportunistic species. Other factors such as ongoing changes in climate also will be considered. A resampling of 34 (and an additional 4) lakes that also were sampled in 1996-97 was done during summer of 2006. Analyses of data from the two sampling occasions were done. I found that even if the diversity is just temporarily affected (or not affected at all), it is not always the same species involved. This means that the diversity in a single lake can appear to be high, but the total diversity in Sweden, or Scandinavia, is declining. I also found some interesting new species for the area, such as *Nehalennia speciosa*, *Sympetma fusca* and *Aeshna mixta*." (Author) For the full paper see: <http://dSPACE.HH.SE/dSPACE/bitstream/2082/1152/1/Forest%20lakes.pdf> Address: not stated

**6682.** Fliedner-Kalies, T.; Fliedner, H. (2007): Schwyzer Moore im Wandel. 10. Libellen. Berichte der Schwyzerischen Naturforschenden Gesellschaft 15: 75-91. (in German). [Kanton Schwyz, Switzerland; the paper compiles records of Odonata from 1878 to 2006 from 22 localities with focus on records between 2001 and 2006 in eleven selected fens and bogs. A total of 49 odonate species is documented. The habitats are briefly characterized with emphasis on typical or rare species and conservation measures.] Address: Fliedner, Traute, Louis-Seegelken Str., D-28717 Bremen, Germany. E-mail: [traute.fliedner@bluewin.ch](mailto:traute.fliedner@bluewin.ch)

**6683.** Frank, M. (2007): Erneute Beobachtung der Feuerlibelle (*Crocothemis erythraea*, BRULLÉ 1832) in Nordwest-Mecklenburg. *Virgo*, Mitteilungsblatt des Entomologischen Vereins Mecklenburg, 10(1): 69-70. (in German). [Schönberg, Mecklenburg-Vorpommern, Germany, 08. August 2007] Address: Frank, M., Lion-Feuchtwanger-Str. 25, 55129 Mainz, Germany. E-mail: [mikel.frank@gmx.de](mailto:mikel.frank@gmx.de)

**6684.** Fuhrmann, K.; Jödicke, R. (2007): Die Libellensammlung im Landesmuseum für Natur und Mensch (Insecta: Odonata). *Museumsjournal für Natur und Mensch – Naturkunde – Kulturkunde – Museumskunde*, Oldenburg 2 (2006): 19-33. (in German, with English summary). [The collection contains 2293 specimens, which mainly represent species from the Weser-Ems-region, Niedersachsen, Germany. The history of the collection is outlined. An extension of the stock of regional species is intended for the next years. The paper contains some information on *Coenagrion pulchellum* in Portugal, *Orthetrum coerulescens* aniceps from Sardinia, Italy, *Sympetrum vulgatum*, and some specimens probably from Brasil.] Address: Fuhrmann, K., Landesmuseum für Natur und Mensch, Damm 38-44, D-26135 Oldenburg, Germany. E-mail: [kay.fuhrmann@natur-undmensch.de](mailto:kay.fuhrmann@natur-undmensch.de)

**6685.** Fulan, J.A.; Henry, R. (2007): Temporal distribution of immature Odonata (Insecta) on *Eichhornia azurea* stands in the Camargo Lake, Paranapanema River, São Paulo. *Revista Brasileira de Entomologia*

51(2): 224-227. (in Portuguese, with English summary). ["This study aimed to record the abundance and richness of Odonata on *E. azurea* stands, from March 2004 to March 2005, in the Camargo Lake, lateral to the Paranapanema River, São Paulo, Brasil after an extreme flood pulse, and also to investigate the controlling environmental factors on the distribution of Odonata abundance. The greatest abundance and richness occurred in the dry period, and Coenagrionidae was the most abundant and with greater genus richness during the whole study period. This high abundance possibly occurred due to its behavior, as endophytic posture and climbing behavior. Aeshnidae and Libellulidae presented low abundance especially in the dry period. The main environmental factors that affected the distribution of Odonata abundance were water surface temperature, pluviosity, and *Eichhornia azurea* biomass." (Authors)] Address: Fulan, J.A., Departamento de Zoologia, Instituto de Biociências – UNESP - Caixa Postal 510 - 18618-000 Botucatu-SP, Brasil. E-mail: [joaofulan@ig.com.br](mailto:joaofulan@ig.com.br)

**6686.** Fuselier, L.; Decker, P.; Lunski, J.; Mastel, T.; Skolness, S. (2007): Sex differences and size at emergence are not linked to biased sex ratios in the common green darner, *Anax junius* (Odonata: Aeshnidae). *Journal of Freshwater Ecology* 22(1): 107-117. (in English). ["Many species of dragonflies exhibit sexual dimorphism and biased sex ratios in adult populations. It is predicted that, in species with territorial adults, males should be larger than females at emergence. Larger male size should elevate foraging rate and lead to increased predation risk and higher male mortality during the larval stage. We tested these predictions for a territorial dragonfly, *A. junius*, using laboratory and field experiments. We measured differences in growth and foraging activity between the sexes, determined sex ratios at emergence, and measured size at emergence for female and male dragonflies. Males gained more mass than females and males spent more time in motion and moved longer distances than females in foraging trials. Males were larger than females at emergence in natural populations, but sex ratios at emergence were not significantly different from 1:1. Sex-specific growth strategies in the larval stage did not result in biased sex ratios at emergence but may be important to the reproductive success of this territorial dragonfly." (Authors)] Address: Fuselier, Linda, Biosciences Department, 1104 7th Ave South, Minnesota State University, Moorhead, Moorhead, MN, 56563, USA. E-mail: [fuselier@mnstate.edu](mailto:fuselier@mnstate.edu)

**6687.** Gaino, E.; Piersanti, S.; Reborá, M. (2007): Ultrastructural organization of the larval spiracles in *Libellula depressa* L. (Anisoptera: Libellulidae). *Odonatologica* 36(4): 373-379. (in English). ["In the last larval instar (F-0) of *L. depressa*, 2 paired spiracles, in the form of elongated eye-shaped structures, are located in the anterior region of the mesothorax segment. A fine structural analysis of these spiracles under the scanning and electron microscopes reveals that each spiracle consists of a well-developed cuticular peritreme with a dorsal-anterior lip bearing a thin laminar coat and a ventral-posterior lip bearing a filter apparatus. The filter apparatus derives from a series of folds forming discrete groups adhering to one another to delimit empty spaces and producing a honeycomb-like structure. This structure is coherent with the need to avoid entry of water when the larva is submerged. The function of these spi-

racles during the insect development is discussed, noting that in anisopteran larvae the rectal epithelium, forming the so called branchial basket, is the main respiratory organ." (Authors)] Address: Gaino, Elda, Dipartimento di Biologia Cellulare e Ambientale, Università degli Studi di Perugia, Via Elce di Sotto, 1-06123 Perugia, Italy. E-mail: gaino@unipg.it

**6688.** Garrison, R.W.; von Ellenrieder, N. (2007): The true *Argia difficilis* Selys, 1865, with the description of *Argia yungensis* sp. nov. (Odonata: Coenagrionidae). Transactions of the American Entomological Society 133(1/2): 189-204. (in English). ["*Argia yungensis* sp. nov., a new species close to *Argia difficilis*, is described. Both species are illustrated and diagnosed and their distributions mapped. They can be distinguished by the morphology of male tori, cerci and paraproct, and female prothorax. Their distributions are allopatric, with *Argia yungensis* distributed along the foothill jungle of the Yungas rain forest from NW Argentina to Peru, and *A. difficilis* from Peru and Brazil to Venezuela across the lowland Amazon forest. *Argia extranea* forficula Fraser is synonymized with *A. difficilis*, and the latter is redescribed." (Authors)] Address: Ellenrieder, Natalia von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: odonata@hotmail.com

**6689.** Garrison, R.W. (2007): *Kalocora*, a junior synonym of *Cora* (Odonata: Polythoridae). International Journal of Odonatology 10(2): 185-188. (in English, with Spanish summary). ["Supplementary specimens of the monotypic genus *Kalocora* show that diagnostic characters employed by Kennedy, based on the original description of *Cora aurea* are too variable, and therefore *Kalocora* is here relegated to synonymy under *Cora*." (Author)] Address: Garrison, R.W., Associate Insect Biostatist, Plant Pest Diagnostics, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**6690.** Göcking, C.; Menke, N. (2007): Blauhelme zwischen Ems und Emmerbach. Naturzeit im Münsterland 4(8): 29. (in German). [Generell report on the presence of *Coenagrion mercuriale* in Nordrhein-Westfalen, Germany with focus on the Münsterland-region and habitat requirements.] Address: Göcking, C., Zum Hiltruper See 9, D-48161 Münster, Germany. E-mail: gockinc@uni-muenster.de

**6691.** Goodger, D.T. (2007): Book review: The Dragonflies of Europe (revised edition) by R. R. Askew. Great Horkesley, Colchester, UK: Harley Books, 2004. 308 pp. 513 text figures, 219 colour figures. ISBN-13 978 0946589753. Zoological Journal of the Linnean Society 151(1): 218. (in English). [review] Address: not stated

**6692.** Groll, E.K. (2007): Besprechungen: WILDERMUTH, H: Die Falkenlibellen Europas - Die Libellen Europas Bd. 5... Hohenwarsleben: Westarp Wissenschaften, 2007... 540 S., 163 Schwarzweiß- und 11 Farb-Abb. (Die Neue Brehm-Bücherei; 653). ISBN: 3-89432-896-7. Beiträge zur Entomologie 57(1): 176. (in German). [Brief review of the book. This is a review of a book that until yet not has been published!!!] Address: Groll, E.K., ZALF, Eberswalder Str. 84, D-15374 Müncheberg, Germany. E-mail: groll@zalf.de

**6693.** Günther, A.; Kipping, J. (2007): Nachweise der Südlichen Heidelibelle *Sympetrum meridionale* (Selys, 1841) in Sachsen und Südostbrandenburg (Odonata: Libellulidae). Sächsische Entomologische Zeitschrift 2: 9-12. (in German, with English summary). ["During year 2006 a strong invasion of *S. meridionale* has been observed in parts of Germany. This also led to observations of this species in Saxony and southeastern Brandenburg. Seven records from Saxony and four from Brandenburg are presented here. Oviposition has been observed at two localities, but so far there is no evidence for successful development in the region." (Authors)] Address: Naturschutzinstitut Freiberg, Waisenhausstr. 10, 09599 Freiberg, Germany. E-Mail: andre.guenther@ioez.tu-freiberg.de

**6694.** Haacks, M.; Peschel, R. (2007): Die rezente Verbreitung von *Aeshna viridis* und *Leucorrhinia pectoralis* in Schleswig-Holstein – Ergebnisse einer vierjährigen Untersuchung (Odonata: Aeshnidae, Libellulidae). Libellula 26(1/2): 41-57. (in German, with English summary). ["During 2003 to 2006 the distribution and status of *L. pectoralis* and *A. viridis* in Schleswig-Holstein, Germany were surveyed. Within the framework of an obligatory monitoring protocol that has been set by the European Habitat Directive, the research was carried out by authority of the Minister for Agriculture, Environment and Rural Areas. As a result, localities of both species were found in each natural landscape. Furthermore, with respect to the two biogeographical regions, the records were almost equally distributed. Throughout Schleswig-Holstein 27 recent sites were discovered for *L. pectoralis* and 36 for *A. viridis*. So far threats for *L. pectoralis* could not be detected, whereas the loss of Water-soldier, *Stratiotes aloides*, poses the main threat for *Aeshna viridis*. However, the preconditions to conserve habitats of *A. viridis* by the protection and introduction of *S. aloides* are promising." (Authors)] Address: Haacks, M., Planungsbüro leguan gmbh, Brandstücken 20, D-22549 Hamburg, Germany. E-mail: m.haacks@leguan.com

**6695.** Hadrys, H.; Timm, J.; Streit, B.; Giere, S. (2007): A panel of microsatellite markers to study sperm precedence patterns in the emperor dragonfly *Anax imperator* (Odonata: Anisoptera). Molecular Ecology Notes 7(2): 296-298. (in English). ["Odonates were the first group of organisms where sperm competition and last male sperm precedence have been identified. With the development of 10 microsatellites for the emperor dragonfly *Anax imperator*, the function and priority patterns of the multiple sperm storage organs of females can be studied and compared between species in natural populations. In addition, two microsatellite loci developed for the sister species *Anax parthenope*, are also highly polymorphic in *A. imperator*. For the presented 12 microsatellite loci, the number of alleles per locus ranged from two to 24. Observed heterozygosity ranged from 0.07 to 0.88." (Authors)] Address: Hadrys, Heike, ITZ, Ecology and Evolution, TiHo Hannover, Bünteweg 17d, D-30559, Hannover, Germany. E-mail: heike.hadrys@ecolevol.de

**6696.** Hadrys, H.; Wargel, A.; Giere, S.; Kraus, B.; Streit, B. (2007): A panel of microsatellite markers to detect and monitor demographic bottlenecks in the riverine dragonfly *Orthetrum coerulescens* F. Molecular Ecology Notes 7(2): 287-289. (in English). ["Odonates are important indicators for monitoring anthropogenic



impacts on freshwater ecosystems. We developed a panel of microsatellite loci for the keeled skimmer *Orthetrum coerulescens*, a libellulid dragonfly inhabiting small streams. By using two different isolation techniques, nine microsatellite loci have been isolated. Screening of 209 individuals resulted in an overall number of 88 alleles, ranging from three to 19 alleles per locus. The observed heterozygosity ranged from 0.37 to 0.83. One locus showed significant deviation from Hardy-Weinberg equilibrium" (Authors)] Address: Hadrys, Heike, ITZ, Ecology and Evolution, TiHo Hannover, Bunteweg 17d, D-30559, Hannover, Germany. E-mail: heike.hadrys@ecolevol.de

**6697.** Hammond, J.I.; Luttbeg, B.; Sih, A. (2007): Predator and prey space use: dragonflies and tadpoles in an interactive game. *Ecology* 88(6): 1525-1535. (in English). ["Predator and prey spatial distributions have important population and community level consequences. However, little is known either theoretically or empirically about behavioral mechanisms that underlie the spatial patterns that emerge when predators and prey freely interact. We examined the joint space use and behavioral rules governing movement of freely interacting groups of odonate (dragonfly) predators and two size classes of anuran (tadpole) prey in arenas containing two patches with different levels of the prey's resource. Predator and prey movement and space use was quantified both when they were apart and together. When apart from predators, large tadpoles strongly preferred the high resource patch. When apart from prey, dragonflies weakly preferred the high resource patch. When together, large prey shifted to a uniform distribution, while predators strongly preferred the high resource patch. These patterns qualitatively fit the predictions of several three trophic level, ideal free distribution models. In contrast, the space use of small prey and predators did not deviate from uniform. Three measures of joint space use (spatial correlations, overlap, and co-occurrence) concurred in suggesting that prey avoidance of predators was more important than predator attraction to prey in determining overall spatial patterns. To gain additional insight into behavioral mechanisms, we used a model selection approach to identify behavioral movement rules that can potentially explain the observed, emergent patterns of space use. Prey were more likely to leave patches with more predators and more conspecific competitors; resources had relatively weak effects on prey movements. In contrast, predators were more likely to leave patches with low resources (that they do not consume) and more competing predators; prey had relatively little effect on predator movements. These results highlight the importance of investigating freely interacting predators and prey, the potential for simple game theory models to predict joint spatial distributions, and the utility of using model choice methods to identify potential key factors that govern movement." (Authors)] Address: Hammond, J.I., Department of Environmental Science and Policy, One Shields Avenue, University of California, Davis, California 95616, USA. Jhammond@ucdavis.edu

**6698.** Hardersen, S. (2007): Telemetry of Anisoptera after emergence – first results (Odonata). *International Journal of Odonatology* 10(2): 189-202. (in English). ["The behaviour of Anisoptera during the period between emergence and the onset of sexual activity is poorly known, mainly because freshly emerged adults are hard to follow. In the present study the system

RECCO<sup>®</sup> Transmitter/Receiver and custombuilt tags made from Schottky diodes and copper wire were used to monitor freshly emerged Anisoptera. The system had an average maximum detection distance of ca 85 m. Ten individuals of *Libellula fulva* were successfully tracked for up to five consecutive days. They almost exclusively utilized trees or shrubs as perches at heights ranging from 1.8 to ca 31 m. Open meadows or open river bank vegetation, which were present close to the release site, were never used for perching. Considering that human observers can reasonably detect adult anisopteran up to a height of 3 m, 92.5% of all registered perch sites were "out of reach". The maximum distances covered on the first day averaged 37.7 m and 31.1 m for males and females, respectively. Two individuals, followed for four and five days respectively, remained in relatively small areas of 480 m<sup>2</sup> - 2,500 m<sup>2</sup> for three and four consecutive days. Five tagged individuals of *Aeshna mixta* showed a very different behaviour from *L. fulva*. Already in the first hours after release, all flew distances of more than 200 m and were lost. The telemetry system used was not suitable to study this species immediately after emergence." (Authors)] Address: Hardersen, S., Centro Nazionale per lo Studio e la Conservazione della Biodiversità Forestale, Corpo Forestale dello Stato, Strada Mantova, 29, I-46045 Marmirolo (MN), Italy. E-mail: s.hardersen@libero.it

**6699.** Hays, J. J.; Clopton, R. E.; Cook, T. J.; Cook, J. L. (2007): Revision of the genus *Nubenocephalus* and description of *Nubenocephalus secundus* n. sp. (Apicomplexa: Actinocephalidae) parasitizing adults of *Argia sedula* [sic] (Odonata: Zygoptera: Coenagrionidae) in the primitive Texas Big Thicket, U.S.A. *Comparative Parasitology* 74(2): 286-293. (in English). ["*N. secundus* n. sp. (Apicomplexa: Eugregarinida) is described from adults of *A. sedulum* collected from Harmon Creek, Sam Houston State University Center for Biological Field Studies, Walker County, Texas, U.S.A. This is the second species described in the genus and confirms the generic hypothesis of *Nubenocephalus*. The generic diagnosis of *Nubenocephalus* is revised to reflect common characters of its constituent species and a previously described Asian gregarine, *Nubenocephalus mutabilis* n. comb. (= *Ancyrophora mutabilis*) is recognized as a member of the genus." (Authors)] Address: Hays, Joanna, Department of Biological Sciences, Sam Houston State University, Huntsville, Texas, U.S.A. 77341. E-mail: biotjc@shsu.edu

**6700.** Hilfert-Rüppell, D.; Rüppell, G. (2007): *Juwelenschwingen / Geheimnisvolle Libellen. Gossamer Wings / Mysterious Dragonflies*. Splendens-Verlag. ISBN-13: 9783000203893: 168 pp. (Bilingual in English and German). [In the past years, we have seen some brilliant books on Odonata, many of them furnished with impressive photography. I am tempted to write none of them is as brilliant and eye catching as this book. 264 detailed digital photos (and a few illustrations) demonstrate the life history of dragonflies with focus on the imaginal stage, and the damselflies (Calopterygidae). Hereby the authors use the didactic concept to comment on each of the pictures with brief but precise biological information, remembering a little bit of information provided to comment documentation films. The chapters are covering the following topics: Appearance, From Water to Air, Flight, Prey Capture, Threatening and Fighting, Courting, Mating Tactics, Danger, Mating, Oviposition, Larvae, Roosting. The book is written both

in German and English. Ola Fincke has written the preface, giving some insight into her odonatological vita. This book is far more than a coffee table book, nevertheless it would be very useful as gift to persons you want to convince that dragonflies are beasts worth to settle this earth. (Martin Schorr) Address: Splendens-Verlag, An der Wasserfurche 32, 38162 Cremlingen, Germany. [www.splendens-verlag.de](http://www.splendens-verlag.de)

**6701.** Hörnschemeyer, T.; Willkommen, J. (2007): The contribution of flight system characters to the reconstruction of the phylogeny of the Pterygota. *Arthropod Systematics & Phylogeny* 65(1): 15-23. (in English). ["The ability to fly is an important factor for the evolutionary success of insects. Their flight apparatus contains numerous sclerites and muscles, which represent valuable characters for phylogenetic analysis. We present a summary of the current state of knowledge on autapomorphies of the flight system of high-level taxa of the Pterygota. To date, no formal phylogenetic analysis based on flight system characters with the exception of wing venation has been presented. Nevertheless, this review shows that the wing base and the flight muscles contain valuable characters that can help to resolve current open questions of phylogenetic relationships among the Pterygota. It also becomes apparent that there are still many taxa without comprehensive descriptions of the wing base morphology." (Authors)] Address: Hörnschemeyer, T., Institut für Zoologie und Anthropologie, Abteilung Morphologie & Systematik, Berliner Str. 28, 37073 Göttingen, Germany. E-mail: [thoerns@gwdg.de](mailto:thoerns@gwdg.de)

**6702.** Hoess, R. (2007): War *Coenagrion scitulum* (Rambur, 1842) (Odonata: Coenagrionidae) einst in der Schweiz heimisch? *Mitteilungen der Entomologischen Gesellschaft Basel* 57(1): 2-9. (in German, with English summary). ["A male and a female specimen of *C. scitulum* were detected in old material of the „Zoologische Anstalt der Universität Basel“, deposited in the „Naturhistorisches Museum Basel“. They were captured in Liestal BL in 1919 (probably by A. Portmann) and the identity remained unsolved up to now. As the specimens were collected in different months and for other reasons it seems possible that the species was indigenous to Liestal at that time. New records from the cantons of Jura, Berne and Obwalden are presented. Morphological details are provided to facilitate recognition." (Author)] Address: Hoess, R., Normannenstr. 35, 3018 Bern, Switzerland. E-mail: [ReneHoess@1st.ch](mailto:ReneHoess@1st.ch)

**6703.** Holdt, E. von (2007): Bemerkenswerte Libellenfunde im Sommer 2006. *HVV-info* 1/2007 (Hannoverscher VogelschutzVerein): 23. (in German). [Niedersachsen, Germany. *Aeshna affinis*, 20-VII-2007, Hannover, Lahe; *Erythromma lindenii*, 26-VI., 11-VII-2006, Hannover, Herrenhäuser Gärten; *Crocothemis erythraea*, several localities Hannover, Ricklinger Teiche; *Orthetrum brunneum*, 2006, Hannover-Badenstedt.] Address: not stated

**6704.** Holt, C. (2007): Two female Emporax *Anax imperator* "Facing-Off". *Atropos* 32: 52. (in English). [UK; picture of two ovipositing *A. imperator*.] Address: Holt, C., 21 Aspen Gardens, Ashord, Middlessex, TW15 1ED, UK

**6705.** Hope, P. (2007): The Dragonflies of Eastern Mugla Province, Southwest Turkey. ISBN-13: 9789750196317: 232 pp. (in English). ["The province of

Mugla is situated in Southwest Turkey. 56 species of dragonfly have been recorded for this area. This book describes the species, their habitats and locations, and includes colour photos, hand-drawn location maps and distribution maps." (Publisher)]

**6706.** Horvath, G.; Malik, P.; Kriska, G.; Wildermuth, H. (2007): Ecological traps for dragonflies in a cemetery: the attraction of *Sympetrum* species (Odonata: Libellulidae) by horizontally polarizing black gravestones. *Freshwater Biology* 52: 1700-1709. (in English). ["1. We observed that the dragonfly species *Sympetrum flaveolum*, *S. striolatum*, *S. sanguineum*, *S. meridionale* and *S. danae* were attracted by polished black gravestones in a Hungarian cemetery. 2. The insects showed the same behaviour as at water: (i) they perched persistently in the immediate vicinity of the chosen gravestones and defended their perch against other dragonflies; (ii) flying individuals repeatedly touched the horizontal surface of the shiny black tombstones with the ventral side of their body; (iii) pairs in tandem position frequently circled above black gravestones. 3. Tombstones preferred by the dragonflies were in the open and had an area of at least 0.5 m<sup>2</sup> with an almost horizontal, polished, black surface and with at least one perch in their immediate vicinity. 4. Using imaging polarimetry, we found that the black gravestones, like smooth water surfaces, reflect highly and horizontally polarized light. 5. In double-choice field experiments with various test surfaces, we showed that the dragonflies attracted to shiny black tombstones display positive polarotaxis and, under natural conditions, detect water by means of the horizontally polarized reflected light. This, and the reflection-polarization characteristics of black gravestones, explain why these dragonflies are attracted to black tombstones. 6. If females attracted to the black gravestones oviposit on them, the latter constitute ecological traps for dragonflies that are not close to water." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: [hansruedi@wildermuth.ch](mailto:hansruedi@wildermuth.ch)

**6707.** Huth, J. (2007): Zur Libellenfauna der Braunkohlen-Bergbaufolgelandschaft Sachsen-Anhalts (Odonata). *Entomologische Nachrichten und Berichte* 51(2): 111-122, 160. (in German, with English summary). ["Altogether 135 stretches of water in 20 areas of brown coal post-mining landscape of Sachsen-Anhalt, Germany were studied for their odonatan fauna from 1996 to 2001. A total of 47 species of dragonflies was found (= 73 % of the recorded species of Sachsen-Anhalt). Typical species of different types of post-mining waters, ecological preferences of selected species, threat and supporting measures of dragonfly-habitats are described. Occurrence and forecast of population development for selected species are shown." (Author)] Address: Huth, J., Bürogemeinschaft MILAN, Georg-Cantor-Str. 31, D-06108 Halle (Saale). E-mail: [info@milan-halle.de](mailto:info@milan-halle.de)

**6708.** Ishizawa, N. (2007): Energy expenditure in patrolling males of *Cordulia aenea amurensis* Selys (Anisoptera: Corduliidae). *Odonatologica* 36(4): 381-397. ["The males hover frequently during patrolling flight, and fiercely chase rival males. Their patrolling flight was videotaped and analyzed. The average net-patrol flight speed (except hovering) was 161.6±30.6 cm/s faster in the morning and the evening than during the day. Also, hovering frequency was more frequent and the duration

of hovering bouts was longer in the morning and the evening than during the day. and was synchronized with patrolling flight speed. However, chasing flight was not related to patrolling or hovering and the duration of chasing bout was about 4-5 seconds with an average flight speed of  $274.6 \pm 64.7$  cm/s. The body temperatures of patrolling flight and chasing flight were significantly different; the former,  $39.8 \pm 1.4^\circ\text{C}$ , the latter was  $40.4 \pm 1.0^\circ\text{C}$ . The time budget of patrolling males based upon video pictures was calculated and the relative energy expenditure of patrolling males was estimated by standardizing the average net-patrolling flight speed as 1. Energy expenditure of the males was greater in the morning and the evening than during the day. It is assumed that energy expenditure was affected by ambient temperatures, with males changing the flight speed and duration of hovering. The males are inferior in their sex recognition and it is assumed that their frequent hovering with concurrent large energy expenditure is to enable males to distinguish females.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozavva City, Saitama Pref., Japan. E-mail: isizawa7@rivo.mediatti.net

**6709.** Ishizawa, N. (2007): Morphological variations in relation to maturation in *Pantala flavesens* (Fabricius) in central Japan (Anisoptera: Libellulidae). *Odonatologica* 36(2): 147-157. (in English). ["*P. flavesens* was investigated in open fields in a deciduous forest in an inland part of the Kanto region for 3 months from late June 2003. The sp. was estimated to be bivoltine from summer to late autumn. The size of the adults was unchanged throughout the season. The sex ratio of the population skewed towards females. Maturity degree (MD), shown as the value of body weight divided by the cube of wing length, shifted upwards until the second half of August, after which it decreased sharply. Similarly the wing loading (WL) (calculated by dividing body weight by wing area) increased until the second half of August, and decreased from September, and in early October it was not significantly different between males and females. As the relationship of body temperature to ambient temperature showed no difference between mature and immature individuals, or between sexes, with both correlation coefficients and regression coefficients being large for a flyer type species, they seemed to be easily affected by the ambient temperature." (Author)] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozavva City, Saitama Pref., Japan. E-mail: isizawa7@rivo.mediatti.net

**6710.** Iwami, T.; Kishida, O.; Nishimura, K - (2007): Direct and indirect induction of a compensatory phenotype that alleviates the costs of an inducible defense. *PLoS ONE* 2(10): e1084. doi:10.1371 / journal.pone.0001084: (in English). ["Organisms often exhibit phenotypic plasticity in multiple traits in response to impending environmental change. Multiple traits phenotypic plasticity is complex syndrome brought on by causal relations in ecological and physiological context. Larvae of the salamander *Hynobius retardatus* exhibit inducible phenotypic plasticity of two traits, when at risk of predation by dragonfly larvae (*Aeshna nigroflava*). One induced phenotype is an adaptive defense behaviour, i.e., stasis at the bottom of water column, directly triggered by the predation risk. Another one is a compensatory phenotype, i.e., enlarged external gills, for an unavoidable cost (hypoxia) associated with the induced defense. We identified two ways by which this compensa-

tory phenotype could be induced. The compensatory phenotype is induced in response to not only the associated hypoxic conditions resulting from the induced defense but also the most primary but indirect cause, presence of the predator." (Authors)] Address: Iwami, T., Center for Ecological Research, Kyoto University, Otsu, Shiga, Japan. E-mail: kinya@fish.hokudai.ac.jp

**6711.** Jödicke, R. (2007): Die Verbreitung von *Ceragrion tenellum* in Deutschland, mit Hinweisen auf sein aktuelles Vorkommen in Westniedersachsen (Odonata: Coenagrionidae). *Libellula* 26(3/4): 161-188. (in German, with English summary). ["A compilation of all known records of *C. tenellum* from Germany up to 1997 demonstrated a main area of distribution in the north-western part of the country. In the Weser-Ems region of western Lower Saxony the species currently proved to be widely distributed and very abundant. NW Germany is, in connection with the adjacent Netherlands and N Belgium, the main centre of distribution under the Atlantic climate. Here *C. tenellum* prefers peatland bogs and heathy lakes, which are common habitats in this region. With the tendency towards milder winter temperatures, population density and abundance increased. New colonizations and the presence at waters unsuitable for the species' reproduction demonstrated a high potential of expansion. There was a record of individuals dispersing as far as 780 m away from the nearest reproductive site. The flying season in 2007 began in the last third of May and lasted until mid October. In western Lower Saxony, the most frequent female colour morph was *f. erythrogastrum* at frequencies between 70.0% and 97.5%. It is argued that the species is not endangered in the northwestern parts of Germany and should therefore be removed from the Red Lists of Lower Saxony, North Rhine-Westphalia and BRD." (Author)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: reinhard.joedicke@ewetel.net

**6712.** Jonsson, M.; Johansson, F.; Karlsson, C.; Brodin, T. (2007): Intermediate predator impact on consumers weakens with increasing predator diversity in the presence of a top-predator. *Acta Oecologica* 31 (1): 79-85. (in English). ["Adding or removing a top-predator is known to affect lower trophic levels with potentially large, indirect effects on primary production. However, little is known about how predator diversity may affect lower trophic levels, or how adding or removing a top-predator influences the effects of predator diversity. Using aquatic mesocosms containing three and four trophic levels, we tested whether intermediate predator diversity affected predation on consumers and if top-predator presence influenced such effects. We found that the presence of intermediate predators suppressed the consumer population and that this suppression tended to increase with increased intermediate predator diversity when the top-predator was absent. However, with the top-predator present, increased intermediate predator diversity showed the opposite effect on the consumers compared to without a top-predator, i.e. decreased suppression of consumers with increased diversity. Hence, in our study, the loss of intermediate predator species weakened or strengthened predator-prey interactions depending on if the top-predator was present or not, while loss of the top-predator only strengthened the predator-prey interactions. Therefore, the loss of a predator species may render different, but perhaps predictable effects on the functioning of a system depending on from which trophic level it is lost and on



on the initial number of species in that trophic level." (Authors)] Address: Johansson, F., Department of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**6713.** Jordan, S.; Barluet, E.; Olaf, M.; Parsons, B.; Simon, C. (2007): Blue hawaiiense and beyond: conservation genetics and comparative phylogeography of four Hawaiian Megalagrion damselfly species (Odonata: Coenagrionidae). Proceedings of the Symposium on the Biology of Hawaiian Streams and Estuaries: Bishop Museum Bulletin in Cultural and Environmental Studies 3: 247-260. (in English). ["Hawaii's endemic Megalagrion damselflies are rivaled in their beauty and diversity only by the degree of threat posed to them by anthropogenic disturbance. In this preliminary study of phylogeography and conservation genetics, we have sequenced about 660 base pairs (bp) of the mitochondrial COII gene from 191 damselflies from four species, including 31 populations that span a gradient of endangerment. We applied phylogeographic analyses in order to understand their biogeographic history. Unlike Megalagrion xanthomelas and *M. pacificum*, *M. calliphya* and *M. hawaiiense* rarely share haplotypes between populations and between islands, even within the larger Maui Nui superisland, suggesting that these latter two species do not disperse as well across land or water. Their phylogenies also better reflect the geological history of the islands. We applied conservation genetic analyses in order to understand their genetic health. Under a conservation genetic paradigm, populations with low genetic diversity are generally considered to be at greater risk of decline and extinction than populations with high genetic diversity. Applying this principle to Megalagrion populations gave both expected and surprising results. Expected results included measurements of high diversity in most populations of *M. calliphya*, *M. hawaiiense*, and Hawaii'i Island populations of *M. xanthomelas*. Low diversity was observed in populations known to be bottlenecked or relictual, including O'ahu and Maui *M. xanthomelas*, and *M. pacificum*. Surprising results included low genetic diversity in O'ahu Ko'olau and Hawaii'i Onomea *M. hawaiiense*, Moloka'i *M. pacificum*, and West Maui *M. calliphya*. We propose that these latter three populations be monitored and managed to maximize their long-term genetic health." (Authors)] Address: Jordan, S.D., Department of Biology, Bucknell University, Lewisburg, PA 17837 USA. E-mail: sdjordan@bucknell.edu

**6714.** Juillerat, L. (2007): *Neoneura angelensis* sp. nov. from French Guyana (Odonata: Protoneuridae). International Journal of Odonatology 10(2): 203-208. (in English). ["*Neoneura angelensis* sp. nov. is described and illustrated from two males collected in French Guyana. The holotype was collected by the author on 29 December 2003 on Crique Angèle near Saut Athanase, an affluent of Approuague River and is deposited in Muséum d'Histoire naturelle in Neuchâtel (MHNN). On the basis of the structure of the cercus, this species belongs to the rubriventris-group and is close to *N. ethela*, *N. kiautai* and *N. sylvatica*, from which it is diagnosed." (Author)] Address: Juillerat, L., Suchiez 50, 2000 Neuchâtel, Switzerland. E-mail: juillerat.l@bluewin.ch

**6715.** Jung, K.-S. (2007): Odonata of Korea. Dragonflies. ISBN: 978-89-958060-3-6: 512 pp. (in Korean). [Regrettably, this opulent handbook on the Odo-

nata of Korea is completely written in Korean language. Thus, for those uninitiated to the Korean language, there is rarely more to use than the brilliant colour photos of species and habitats, and the excellent pictures of freshly killed specimens for identification. Significant morphological characters are shown by arrows, and the Korean names of the species are accompanied by the Latin ones. I suppose, this part of the book is considering exclusively the species from South-Korea, while the monographic chapter covers all Korean species, but providing no pictures from those North-Korean species not available for photographing and not occurring in South-Korea (e.g. *Leucorrhinia dubia*). The book is completed by chapters on morphology with brilliant figures, fascinating histological sections, biology, and stunning flight studies. The monographic part of the books covers 125 species on approximately 300 pages. The photography is a kind of art work, with some really great photographs. It is a pity that I can't read this book. Definitely, and in spite of this: I am really happy to have it in my library. (Martin Schorr) Copies can be purchased from the author.] Address: Jung, Kwangsu, 102-601., Dalvitmaul apt., Hwajung-dong, Koyangsi, 412-270, Gyunggido, Korea. E-mail: tootootoo@korea.com

**6716.** Kalcounis-Rueppell, M.C.; Payne, V.H.; Huff, S.R.; Boyko, A.L. (2007): Effects of wastewater treatment plant effluent on bat foraging ecology in an urban stream system. Biological Conservation 138(1-2): 120-130. (in English). ["Wastewater treatment plant (WWTP) effluent in the Cape Fear River Basin headwaters in North Carolina, USA, has influenced stream water quality and aquatic components of the stream food web. To examine effects of WWTP effluent on terrestrial predators in this system we determined prey availability, bat community structure, and bat foraging and commuting behavior at sites above and below WWTPs. We predicted an effect of effluent in the riparian habitat specialist *Perimyotis subflavus* but not the habitat generalists *Eptesicus fuscus*, *Lasiurus borealis*, or *Nycticeius humeralis*. Nocturnal insect abundance was higher upstream of the WWTPs. There were more Diptera, Coleoptera, and Lepidoptera upstream of the WWTPs whereas there were more Odonata downstream of the WWTPs. There were more *E. fuscus* upstream of the WWTPs and more *P. subflavus* downstream of the WWTPs. Despite the difference in bat community structure up-and downstream of the WWTPs, bat commuting and foraging activity levels were the same; there was no difference in the total number of echolocation sequences we recorded per night up. and downstream of the WWTPs nor was there a difference in the proportion of those sequences that contained a feeding buzz. Our results suggest the effect of anthropogenic nutrients in the stream persists through higher food web trophic levels as we found impacts on nocturnal flying insects as well as two common species of insectivorous bats. *Perimyotis subflavus* and *E. fuscus* may serve as easily tractable terrestrial bioindicators of water quality as influenced by WWTP effluent in this, and other, urban watersheds." (Authors)] Address: Kalcounis-Rueppell, M.C., Department of Biology, University of North Carolina at Greensboro, Greensboro, NC 27402, USA. E-mail: mckalcou@uncg.edu

**6717.** Kaller, M.D.; Kelso, W.E. (2007): Association of macroinvertebrate assemblages with dissolved oxygen concentration and wood surface area in selected subtropical streams of the southeastern USA. Aquatic

Ecology 41: 95-110. (in English). ["Woody debris (CWD) is an important habitat component in northern Gulf of Mexico coastal plain streams, where low gradients and low flows allow accumulation of CWD and promote low dissolved oxygen (DO) concentrations. We tested the influences of CWD and DO on stream macroinvertebrates experimentally by placing two surface area CWD treatments each in three concentrations of ambient DO in two streams in Louisiana, USA, with macroinvertebrates collected from ambient woody debris used as a control. We also sampled macroinvertebrates in benthic and woody debris habitats in three streams twice yearly over 2 years to examine the applicability of the experimental results. Total abundance, richness (generic), and Shannon–Wiener diversity were all higher in lower DO conditions during the experiment, and total abundance was higher in the larger CWD treatment. Stream sampling corroborated the relationship between higher diversity and low DO in both benthic and woody debris habitats, but the relationship between richness and low DO only was supported in benthic habitats. Few taxa correlated with DO or CWD in the experiment (5 of 21 taxa) or stream survey (2 of 54 taxa). Whereas most taxa were uncorrelated with experimentally manipulated and in-stream measured variables, we suggest these taxa respond as generalists to stream habitat and physicochemistry. Based on this experiment and stream sampling, we believe the majority of macroinvertebrates in these streams are tolerant of seasonally low DO conditions." (Authors) The taxa list includes *Argia* spp. and *Dromogomophus* spp.] Address: Kaller, M.D., School of Renewable Natural Resources, Louisiana Agricultural Experiment Station, LSU Agricultural Center, Louisiana State University, Baton Rouge, LA 70803, USA. E-mail: mkallel@lsu.edu

**6718.** Kandibane, M.; Raguraman, S.; Mahadevan, N.R. (2007): Diversity and community structure of aquatic arthropods in an irrigated rice ecosystem of Tamil Nadu, India. *Asian Journal of Plant Sciences* 6(5): 741-748. (in English). ["Inventory, diversity and community structure of aquatic arthropods between weeded and partially weeded rice ecosystems were studied in a field experiment under irrigated condition during Rabi, 2000. The research revealed that a total of 12, 2, 6 and 3 species of Odonata, Ephemeroptera, Hemiptera and Coleoptera aquatic insects were recorded, respectively. *Agriocnemis femina femina*, *Pantala flavescens*, *Crocothemis servilia*, and *Diplocodes trivialis* were the dominant species in both the ecosystems, but were significantly more dominant in partially weeded rice ecosystem. *Trithemis* sp., *Rhyothemis variegata*, *Anax guttatus* and *Lethocerus indicus* (Heteroptera) were absent in weeded rice ecosystem and rest of the species occurred in both the ecosystems. Aquatic beetles, water strider and water scorpion evinced perfect similarity through out the season. But, damselfly, backswimmer and mayfly expressed more than 0.80 similarity and perfect similarity (1.00) during early and maturity stages of crop and showed less stability during the 2nd, 3rd and 4th week. The guild of aquatic arthropods revealed the dominance of predatory groups in partially weeded rice ecosystem through out the season. Same group of aquatic arthropods had not dominated in all the weeks of crop growth, but the group of aquatic arthropods changed during various stages of crop. A total of 18 weed species were recorded in partially weeded plots." (Authors)] Address: Kandibane, M., Dept Agricult. En-

tomol., Tamil Nadu Agricultural Uni., Coimbatore. 641003, Tamil Nadu, India

**6719.** Keats, R.A.; Osher, L.J. (2007): The macroinvertebrates of *Ruppia* (Widgeon Grass) beds in a small Maine estuary. *Northeastern Naturalist* 14(3): 481-491. (in English). ["Little information exists on macroinvertebrate community composition in small, micro-tidal, *Ruppia maritima* (widgeon grass)-dominated Maine estuaries. Qualitative and quantitative assessments of the macroinvertebrate fauna of widgeon grass beds in Northeast Creek estuary (Acadia National Park, ME) are presented here. The community was dominated by euryhaline freshwater invertebrates including midge larvae (Chironomidae: *Dicortendipes*, *Cricotopus*, *Chironomus*), oligochaetes, damselfly larvae (Coenagrionidae: *Enallagma*), amphipods (Gammaridae: *Gammaurus*), gastropods (Hydrobiidae: *Hydrobia*), ostracods (Cytheridae: *Cyprideis*), and water boatmen (Corixidae: *Trichocorixa*). Macroinvertebrate abundances at the sampled sites were 35,100 individuals/m<sup>2</sup> in both August and September, and 22,200 individuals/m<sup>2</sup> in October. This study provides baseline faunal-community data that can be used in future monitoring studies." (Authors)] Address: Osher, Laurie, Department of Plant, Soil and Environmental Sciences, 5722 Deering Hall, University of Maine, Orono ME 04469-5722, USA. E-mail: laurie@maine.edu

**6720.** Kishida, O.; Trussell, G.C.; Nishimura, K. (2007): Geographic variation in a predator-induced defense and its genetic basis. *Ecology* 88(8): 1948-1954. (in English). ["Predator-induced morphological defenses are a well-known form of phenotypic plasticity, but we continue to have a limited understanding of geographic variation in these responses and its genetic basis. Here we examine genetic variation and geographic differentiation in the inducible defenses of tadpoles (*Rana pirica*) in response to predatory salamander larvae (*Hynobius retardatus*). To do so, we crossed male and female frogs from a "mainland" Japanese island having predaceous salamanders and a more isolated island not having predaceous salamanders and raised resulting offspring in the presence and absence of *H. retardatus*. Mainland tadpoles exhibited a higher capacity to express the inducible morphology (a more bulgy body) than those from the predator-free island, and expression of the bulgy morph in mainland–island hybrids produced phenotypes that were intermediate to those produced by pure crosses. In addition, parental sex had no effect on expression of the bulgy morph. Our results support the hypothesis that geographic variation in inducible defenses is linked to the additive effects of autosomal alleles that are shaped by differences in historical exposure to the inducing predator." (Authors) Odonata are referred on several times in introduction.] Address: Kishida, O., Graduate School of Fisheries Sciences, Hokkaido University, Hakodate 041-8611, Hokkaido, Japan. E-mail: kishida@fish.hokudai.ac.jp

**6721.** Kohl, S. (2007): *Cordulegaster boltonii* als Beute der Gerandeten Jagdspinne *Dolomedes fimbriatus* (Odonata: Cordulegasteridae; Araneae: Pisauridae). *Libellula* 26(3/4): 203-206. (in German, with English summary). ["In an overgrown ditch of a fen in northeastern Switzerland a female *C. boltonii* was found that was exsanguinated by a female *D. fimbriatus*. The anisopteran female constitutes by far the largest dragonfly prey of this hunting spider species hitherto documen-

ted." (Authors)] Address: Kohl, S., Seestr. 107, CH-8610 Uster, Switzerland. E-mail: stefan.kohl@bluewin.ch

**6722.** Kosterin, O.E. (2007): The first record of *Anax* on the West Siberian Plain: *A.p.parthenope* Selys in Omsk (Anisoptera: Aeshnidae). *Notul. odonotol.* 6(10): 112-115. (in English). ["A freshly emerged female was collected in the city of Omsk (55°57'N, 73°22'E) on 8-VI-2007 at an oxbow of the Irtysh River, Russia influenced by sinks of a deep ground mineral water. This is the northernmost *A. parthenope* record in Siberia and the first record in the West Siberian Plain. Perhaps presently the species is colonizing Siberia from the South. At the same locality, *Cordulia aenea* was also recorded, which was previously reported for Omsk by S.D. Lavrov (1927, *Proc. sib. Inst. Agric. Forestry* 8/3: 51-100), but it was not found there in the 1970-80s by O.E. Kosterin (1996, *Acta hydroent. latvicai*: 10-21)." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**6723.** Kunz, B. (2007): *Coenagrion hastulatum* in Hohenlohe: Fallbeispiel für das regionale Verschwinden einer Libellenart (Odonata: Coenagrionidae). *Libellula* 26(1/2): 93-106. (in German, with English summary). ["Since the beginning of faunistic work on Odonata in the Hohenlohe region (northeastern Württemberg, Germany) in the year 1984, *C. hastulatum* was on the species list. From the 1990s onwards, it became scarce. The hitherto last individual was found in 2005. In 2004, the two main habitats were included in a species protection programme of the Government of Baden-Württemberg. Activities for the local retrieval of *C. hastulatum* started in autumn 2006. Habitat changes during the last 20 years are documented and variable reasons for the decrease of the populations of *C. hastulatum* in the region are discussed." (Author)] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: libellen@berndkunz.de

**6724.** Laister, G. (2007): Die Libellenfauna der Linzer Donauauen. Entwicklung und aktuelle Situation. *Berichte f. Ökologie u. Naturschutz der Stadt Linz* 1: 65-123. (in German, with English summary). ["The dragonfly fauna of the Danube floodplains of Linz, Austria was investigated in the first half of the 1990s (Laister 1994, 1996a, 1998). This study was repeated in 2002/2003 to ascertain the current status of the populations and to detect any changes. Although the floodplains of Linz are "old" and now only manifest weak hydrodynamics, their dragonfly fauna must be regarded as very valuable. In a current mapping 39 dragonfly species could be shown to occur there, of which 32 are considered long-established. In relationship to the first mapping clear improvements could be demonstrated in regard to the species that inhabit the stretches of running water as well as in respect to those which are bound to silted up areas covered by reeds. The metapopulation concept as expanded by Sternberg (1995, 1999) for dragonflies might enable us to enhance our understanding of the high turnover rates which were registered." (Author)] Address: Laister, G., Botanischer Garten und Naturkundliche Station, Stadtgärten Linz, Roseggerstr. 20-22, 4020 Linz, Austria. E-mail: Gerold.Laister@mag.linz.at

**6725.** Larison, B. (2007): Environmental heterogeneity and alternative mating tactics in the damselfly *Protoneura amatoria*. *Behavioral Ecology* 18: 1021-1028. (in English). ["Conditional male mating strategies have been studied extensively in relation to male attributes, such as size and resource-holding potential, but few studies have considered the effects of environmental heterogeneity on the use of alternative mating tactics. In some systems, environmental heterogeneity may be the key to understanding the evolution and maintenance of such polyphenisms. I examined the influence of the physical environment on the use of alternative tactics by the damselfly *Protoneura amatoria*. Male *P. amatoria* reversibly use 2 tactics to gain matings: 1) sit and wait in the canopy for passing females or 2) hover over the water and attempt to grab females that are ovipositing in floating debris. Observations in 3 streams indicated that the use of the hovering tactic was greater under high-light than low-light conditions and at higher densities of ovipositing females. The density of ovipositing females was correlated with both the light conditions and the availability of oviposition substrate, indicating that physical factors exert indirect as well as direct influences on tactic use. Experimental manipulations showed that both males and females responded directly to light conditions and suggested that males responded directly to the density of ovipositing females. These results can be explained largely in terms of the cues and constraints inherent in different light environments. Thus, the conditional mating strategy of *P. amatoria* appears to have evolved in response to, and been maintained by, fine-scale variation in the physical environment. These findings are discussed in relation to flight dynamics and predation risk." (Author)] Address: Larison, Brenda, Department of Ecology and Evolutionary Biology, University of California, Los Angeles, 621 Charles E. Young Drive South, Los Angeles, CA 90095, USA. E-mail: blarison@ucla.edu.

**6726.** Lin, R.-S.; Yao, C.-T.; Lee, P.-F. (2007): The diet of Fairy Pitta *Pitta nympha* nestlings in Taiwan as revealed by videotaping. *Zoological Studies* 46(3): 355-361. (in English). [The nestling diet of the Fairy Pitta (*Aves*) in west-central Taiwan was studied by videotaping 8 broods from 2000 to 2002. Prey items also include Odonata.] Address: lee, P.-F., Institute of Ecology and Evolutionary Biology, and Department of Life Science, National Taiwan University, Taipei 106, Taiwan. E-mail: leepf@ntu.edu.tw

**6727.** Lingenfelder, U.; Ott, J.; Schorr, M.; Trockur, B. (2007): Die Libellenfauna (Odonata) der Our zwischen Dasburg und Wallendorf (Rheinland-Pfalz / Luxemburg). *Mainzer naturwissenschaftliches Archiv* 45: 283-311. (in German, with English summary). [In the course of a species protection programme for the Orange-spotted emerald (*Oxygastra curtisii*) ordered by the federal state of Rhineland-Palatinate, the dragonfly fauna of the river Our, which forms the border between Germany and Luxembourg, was investigated in the years 2005 and 2006 between the villages of Dasburg and Wallendorf. Altogether 26 species were found, including *O. curtisii* which currently is known in Germany and Luxembourg only at this river section of the Our. Out of these 26 dragonflies in total 12 were autochthonous in the river, for seven other species it is very likely. As one more dragonfly species was found along the Our in the 1980ies, in total 27 species have been recorded in this river section until today.] Address: Lin-



genfelder, U., Seebergstr. 1, D-67716 Heltersberg, Germany. E-mail: u.lingenfelder@vr-web.de

**6728.** Liria, J. (2007): Fitotelmata fauna on the bromeliads *Aechmea fendleri* André y *Hohenbergia stellata* Schult of the San Esteban Nacional Park, Venezuela. *Rev. peru. biol.* número especial 14(1): 33-38. (in Spanish, with English summary). ["In the present work, we characterize the associations of mosquitoes species and other invertebrates on bromeliads from San Esteban Nacional Park in Carabobo State, Venezuela. Eighteen plants of *Aechmea fendleri* (11) and *Hohenbergia stellata* (7) were sampled in rainy (September 2004) and dry (March 2005) seasons. A total of 2020 macroinvertebrates were collected. The most important was the Diptera Order, with the Families Chironomidae (43%), Chaoboridae (25%) and Culicidae (6%), and the Coleoptera, Scyrtidae (5%). In Culicidae the most abundant species were *Culex consolator* (31%), *C. neglectus* (27%) and *Wyeomyia celaenocephala* (17%). The highest abundance and richness was in dry season, when Culicidae diversity increases. The diversity and evenness was similar among season and it was highest in *H. stellata*." (Author) "Coenagrionidae" counted for 1% of total athropod abundance.] Address: Liria, J., Departamento de Biología, Facultad de Ciencias y Tecnología, Universidad de Carabobo. Campus Barbuja, Valencia, Estado Carabobo, Venezuela. E-mail: jliria@uc.edu.ve

**6729.** Lockwood, M. (2007): Rediscovery of *Symptetrum pedemontanum* (Müller in Allioni) and *S. vulgatum* (L.) in Catalonia, NE Spain (Anisoptera: Libellulidae). *Notul. odonatol.* 6(10): 115-118. (in English). ["The 2 species were rediscovered in an area of irrigated hay meadows in La Cerdanya (Catalonia, NE Iberian Peninsula) in August 2005, the first confirmed record for the former species from the Iberian Peninsula since 1959 and the first ever record for the latter for Catalonia. In 2006, a much fuller survey of the whole potential breeding area of the 2 species was carried out and in the whole area only one small breeding colony (of both species) was located. This is thought to be the only known population of *S. pedemontanum* in the Iberian Peninsula. Details of the habitat and threats to the species are given." (Author)] Address: Lockwood, M., La Devesa, 3, 1", E-17850 Besalu, Spain. E-mail: mike@walkingcatalonia.net

**6730.** Lohr, M.; Weihrach, F.; Wildermuth, H. (2007): Buchbesprechung: Grand & Boudot (2006): *Les libellules de France, Belgique et Luxembourg*. ISBN 2-914817-05-3. *Libellula* 26(3/4): 273-277. (in German). [expanded, self-important book review] Address: Lohr, M., FH Lippe und Höxter, Fachgebiet Tierökologie und Landschaftsökologie, An der Wilhelmshöhe 44, D-37671 Höxter, Germany. E-mail: mlrohr@fh-luh.de

**6731.** Lotzing, K. (2007): Massenvorkommen der Gebänderten Prachtlibelle (*Calopteryx splendens* Harris, 1782) (Insecta: Odonata) im Bereich des Mühlengrabens zwischen Tarthun und der Mündung in die Bode bei Unseburg innerhalb des Landkreises Aschersleben - Staßfurt (Sachsen-Anhalt). *Entomol. Mitt. Sachsen-Anhalt* 15(1): 33-36. (in German, with English summary). [In 1996, *C. splendens* was a rare species in the catchment of the river Bode, Sachsen-Anhalt, Germany. 10 years later, it belongs to the typical fauna of running waters perhaps because of the improvement of

water quality. Along the Mühlengraben, a tributary of the river Bode, a large population was found with abundances of up to 45 males per 100 m shore line.] Address: Lotzing, K., Am Hollschen Bruch 4c, D-39435 Unseburg, Germany

**6732.** Lowe, C.D.; Kemp, S.J.; Harvey, I.F., Thompson, D.J.; Watts, P.C (2007): Variable microsatellite loci isolated from the azure damselfly, *Coenagrion puella* (L.) (Zygoptera; Coenagrionidae). *Molecular Ecology Notes* 7(5): 880-882. (in English). ["We isolated and characterized 10 polymorphic microsatellite loci from *C. puella* as part of a study assessing reproductive success and genetic structure in an isolated population of this species. Levels of genetic diversity were assessed in 50 individuals collected from Queen Elizabeth Country Park, Hampshire, UK. The number of alleles per microsatellite loci ranged from three to 22 and the observed and expected heterozygosities varied between 0.26 and 0.84 and between 0.23 and 0.91, respectively. Two loci showed significant ( $P < 0.05$ ) heterozygote deficits, likely because of null (non-amplifying) alleles; one pair of loci was in linkage disequilibrium." (Authors)] Address: Lowe, C., Population and Evolutionary Biology Group, The Biosciences Building, School of Biological Sciences, University of Liverpool, Crown Street, Liverpool, L69 7ZB UK. E-mail: clowe@liv.ac.uk

**6733.** Machado, A.B.M. (2007): *Leptagrion afonsoi* sp.n. from the state of Minas Gerais, Brazil (Odonata: Coenagrionidae). *Lundiana* 7(2) (2006): 125-126. (in English). ["*Leptagrion afonsoi* sp.n. is described and illustrated from a single male (holotype; Caraça, Belo Horizonte, Santa Barbara). It is close to *L. dispar* Selys, 1876 and *L. elongatum* Selys but differs from them by having bifid cercus." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, MG, Brazil, Caixa Postal 31270-901. E-mail: angelo@icb.ufmg.br

**6734.** Marinov, M.; Seidenbusch, R. (2007): *Corduliochlora* gen. nov. from the Balkans (Odonata: Corduliidae). *IDF-Report* 10: 1-13. (in English). ["The adult morphology of the recently established species *Somatochlora borisi* Marinov, 2001 is outlined. The species has a unique combination of features, especially when compared to representatives of the two closest European genera, *Cordulia* Leach, 1815 and *Somatochlora* Selys, 1871 but also compared to other Holarctic genera and species within the Corduliinae (sensu Garrison et al. 2006). The extent of these morphological differences suggests that the species can not be assigned to any of the extant genera, and therefore the new genus *Corduliochlora* is being established." (Authors)] Address: Marinov, M., 80 Brookside Tce, Bryndwr, Christchurch, New Zealand. E-mail: mgmarinov@mail.bg

**6735.** Marinov, M. (2007): Odonata of the Western Rhodopes, with special reference to the wetlands North of the town of Smolyan, South Bulgaria. *Notul. odonatol.* 6(9): 97-108. (in English). ["A revised list is presented of 52 species from 90 localities in Bulgaria and Greece. *Lestes barbarus*, *L. macrostigma*, *Erythromma najas*, *Cordulegaster bidentata*, *Sympetrum flaveolum* and *S. vulgatum* are new for the region. Taxonomic notes are provided on *Calopteryx splendens* and on the status of the *Somatochlora metallica*-*S. merionalis* complex." (Author)] Address: Marinov, M., 80 Brookside

Tce, Bryndwr, Christchurch, New Zealand. E-mail: mgmarinov@mail.bg

**6736.** Mathew, G.; Shamsudeen, R.S.M.; Brijesh, C.M. (2007): Fauna of Protected Areas - 32: Insect fauna of Neyyar Wildlife Sanctuary, Kerala, India. *Zoos' Print Journal* 22(12): 2930-2933. (in English). [236 taxa of insects were recorded, of which 215 species have been identified. The list includes 6 anisopteran taxa.] Address: Mathew, G., Div. Entomol., Kerala Forest Res. Inst., Peechi, Kerala, 680653, India. E-mail: mathew@kfri.org

**6737.** Matthews, J.H.; Boles, S.; Parmesan, C.; Juenger, T. (2007): Isolation and characterization of nuclear microsatellite loci for the common green darner dragonfly *Anax junius* (Odonata: Aeshnidae) to constrain patterns of phenotypic and spatial diversity. *Molecular Ecology Notes* 7(5): 845-847. (in English). ["Fourteen polymorphic microsatellite loci were developed from an enriched genomic library of the widely distributed migratory North American [...] *Anax junius*. For a group of 22 larvae, these loci averaged 16 alleles, with individual loci ranging from nine to 29 alleles. Observed heterozygosity averaged 0.784 per locus." (Authors)] Address: Matthews, J.H., Postdoctoral Research Associate, USGS/Oregon State University, 541/738-0386, USA. E-mail: johoma@gmail.com

**6738.** Matushkina, N.; Gorb, S. (2007): Mechanical properties of the endophytic ovipositor in damselflies (Zygoptera, Odonata) and their oviposition substrates. *Zoology* 110(3): 167-175. (in English). ["Damselfly females use their ovipositor valves to saw aquatic plants in order to insert their eggs into the plant tissues. Stiffness of the plant substrata is therefore an important parameter for oviposition substrate choice by females. Using a force transducer combined with a motorised micromanipulator, the bending stiffness of the ovipositor at the axial compressional load was studied in seven European damselfly species and compared to the local stiffness of seven preferred plant substrates. The puncture force of tested plant samples ranged from 105 to 1500 mN, and their local stiffness ranged from 208 to 1776 N/m. The bending stiffness of the ovipositor was estimated as 173–409 N/m depending on the damselfly species. Using original and literature data, a significant positive correlation between mechanical properties of the ovipositor and preferred oviposition substrates was demonstrated. Possible behavioural adaptations to overcome high stiffness of plant tissues during oviposition are discussed." (Authors)] Address: Gorb, S., Evolutionary Biomaterials Group, Department Arzt, Max Planck Institute for Metals Research, Heisenbergstr. 3, D-70569 Stuttgart, Germany. E-mail: stas.gorb@tuebingen.mpg.de

**6739.** Matushkina, N. (2007): Regular egg-positioning by an aeshnid species (Odonata, Aeshnidae) with comments on its phylogenetic value. *Vestnik Zoologii* 41(5): 457-462. (in English, with Ukrainian summary). ["Prolarvae and first-instar larvae of an aeshnid anisopteran, probably *Aeshna* sp. or *Anaciaeschna isocetes*, were reared from an endophytic egg-clutch with eggs positioned in line and zigzag orders in stems and flowerstems of *Myriophyllum spicatum* in central Ukraine. Descriptions of the prolarva and the first-instar larva, the distance between neighbouring eggs in the clutch, as well as discussion on evolution of the entophytic

egg-laying behaviour in Odonata, are provided." (Author)] Address: Matushkina, Nataly, Department of Zoology, Biological Faculty, Kiev National University, Glushkov Avenue, 2, Building 12, Kiev K680, Ukraine

**6740.** Matushkina, N.A. (2007): *Selysiotthemis nigra* (Vander L.) new for the fauna of the Ukraine (Anisoptera: Libellulidae). *Notul. odonatol.* 6(10): 118-119. (in English). [15 and 22-VII-2006, Karadag Nature Reserve, Crimea province, Feodosiya district, 45°00' N, 35°15'E. In fact, Tytar (2007) found the species on 20-VII-2002 already new for Ukraine (see OAS 6795).] Address: Matushkina, N.A., Dept Zool., Fac. Biol., Kyiv National Taras Shevchenko University, Volodymyr'ska 64, UKR-01033, Kyiv, Ukraine

**6741.** Mauersberger, R. (2007): Erstnachweis von *Ceragrion tenellum* in Mecklenburg-Vorpommern (Odonata: Coenagrionidae). *Libellula* 26(3/4): 151-156. (in German, with English summary). [In 2007, a large population of *C. tenellum* was found near Mirow in the lakeland of northeastern Germany. The distance to the nearest known breeding habitat in Saxony-Anhalt and Lower Saxony was more than 100 km. The particular zoogeographic and ecological significance of this northeasternmost record of *C. tenellum* in Central Europe is discussed.] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-mail: FoerdervereinUeckermark.Seen@t-online.de

**6742.** Mauersberger, R.; Schneider, T. (2007): Schlupfbereite Larven von *Epithea bimaculata* als Opfer des Straßenverkehrs (Odonata: Corduliidae). *Libellula* 26(3/4): 193-202. (in German, with English summary). ["We report on 31 larvae of *E. bimaculata* that had been run over by cars on a road close to a forest lake in the Uckermark, northeastern Brandenburg, Germany. Almost exclusively larvae of *E. bimaculata* were affected among all Odonata species breeding in this lake, because their emergence sites were frequently situated at long distances from the water's edge, up to 22 m in our study. The mortality of larvae on their way to suitable emergence supports reached 30 % in the shore section running parallel to the road. However, under consideration of the total emergence of *E. bimaculata* in this region, we assume that the metapopulation is not currently endangered by road traffic." (Authors)] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-mail: FoerdervereinUeckermark.Seen@t-online.de

**6743.** Müller, J.; Steglich, R. (2007): Zum aktuellen Vorkommen der Hauben-Azurjungfer *Coenagrion armatum* westlich Vilhelmina/Asele Lappmark in Schwedisch Lappland (Odonata). *Entomologische Nachrichten und Berichte* 51(2): 128-130. (in German). [16.06.1999 and 07.06.2002, Malgoviken near Malgovik, approximately 10 km west of Vilhelmina, Sweden. Some diagnostic key factors are outlined.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**6744.** Müller, J.; Steglich, R. (2007): Gehören *Coenagrion armatum* und *Onychogomphus forcipatus* (Odonata) zur Libellenfauna Sachsen-Anhalts? *Entomol. Mitt. Sachsen-Anhalt* 15(1): 28-30. (in German). [The paper stresses the historical development of the Federal State Sachsen-Anhalt, Germany as prerequisite of proper localisation of ancient odonate records, some of which may be hidden in the files of adjacent Federal

States and resulting from collections prior the corrections of the frontiers between the states. A focus is set on the long lasting wrong interpretation of a "record" of *Coenagrion armatum* in Sachsen-Anhalt and the unknown status of *Onychogomphus forcipatus*. A few notes on records of *O. forcipatus* along the river Jagst, Baden-Württemberg are added.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**6745.** Nakahara, M.; Tsubaki, Y. (2007): Function of multiple sperm-storage organs in female damselflies (*Ischnura senegalensis*): Difference in amount of ejaculate stored, sperm loss, and priority in fertilization. *Journal of Insect Physiology* 53(10): 1046-1054. (in English). ["We studied changes in the number of sperm within two kinds of female sperm-storage organ in the damselfly *Ischnura senegalensis* (Odonata: Coenagrionidae): the bursa copulatrix and the spermatheca. We counted the number of sperm within each storage organ and tested their viability after a single copulation in female damselflies kept for seven days with and without oviposition. We also counted sperm and tested their viability in females that underwent an interrupted second copulation after the sperm-removal stage, and after subsequent oviposition. Our results showed that the bursa copulatrix and spermatheca have different sperm storage roles. Immediately after copulation, most eggs appear to have been fertilized with bursal sperm, which were positioned near the fertilization point. By seven days after copulation, a greater proportion of spermathecal sperm were used for fertilization, as the number of bursal sperm had decreased. We hypothesize that female damselflies use the spermatheca for long-term storage and the bursa copulatrix for short-term storage: bursal sperm are more likely to be used for fertilization but may have a higher risk of mortality due to sperm removal by a competing male and/or sperm expelling by the female, whereas spermathecal sperm are safer but will be used for fertilization only after their release from the spermatheca." (Authors)] Address: Tsubaki, Y., Biodiversity Conservation Research Group, National Institute for Environmental Studies, Tsukuba 305-0053, Japan. E-mail: tsubaki@nies.go.jp

**6746.** Nel, A.; Huang, D.-Y.; Lin, Q.-B. (2007): A new genus of isophlebioid damsel-dragonflies (Odonata: Isophlebioptera: Campteroptelebiidae) from the Middle Jurassic of China. *Zootaxa* 1642: 13-22. (in English). ["*Sinokaratawia prokopi* gen. nov., sp. nov. is the fifth representative of the Campteroptelebiidae from the Chinese Middle Jurassic Jiulongshan Formation, which corresponds to one of the most diverse fauna of isophlebioid damsel-dragonflies. The synapomorphies for the Campteroptelebiidae and Isophlebiidae are discussed." (Authors)] Address: Huang, D.-Y., Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing, 210008, P.R. China. E-mail: huangdiying@sina.com

**6747.** Niemann, U. (2007): Große Künstler der Verwandlung. Libellen bringen Farbe in Sommer. *Wormser Zeitung* vom 26.6.2007: (in German). [General account on dragonflies in regional, German newspaper.] Address: not stated

**6748.** Olberg, R.M.; Seaman, R.C.; Coats, M.I.; Henry, A.F. (2007): Eye movements and target fixation during dragonfly prey-interception flights. *Journal of Com-*

*parative Physiology A: Neuroethology, Sensory, Neural, and Behavioral Physiology* 193: 685-693. (in English). ["The capture of flying insects by foraging dragonflies is a highly accurate, visually guided behavior. Rather than simply aiming at the prey's position, the dragonfly aims at a point in front of the prey, so that the prey is intercepted with a relatively straight flight trajectory. To better understand the neural mechanisms underlying this behavior, we used high-speed video to quantify the head and body orientation of dragonflies (female *Erythemis simplicicollis* flying in an outdoor flight cage) relative to an artificial prey object before and during pursuit. The results of our frame-by-frame analysis showed that during prey pursuit, the dragonfly adjusts its head orientation to maintain the image of the prey centered on the "crosshairs" formed by the visual midline and the dorsal fovea, a high acuity streak that crosses midline at right angles about 60° above the horizon. The visual response latencies to drifting of the prey image are remarkably short, ca. 25 ms for the head and 30 ms for the wing responses. Our results imply that the control of the prey-interception flight must include a neural pathway that takes head position into account." (Authors)] Address: Olberg, R.M., Department of Biological Sciences, Union College, Schenectady, NY 12308, USA. E-mail: olbergr@union.edu

**6749.** Olias, M.; Weihrauch, F.; Bedjanic, M.; Hacet, N.; Marinov, M.; (2007): *Lestes parvidens* and *L. viridis* in southeastern Europe: a chorological analysis (Odonata: Lestidae). *Libellula* 26(3/4): 243-272. (in German, with English summary). ["In order to clarify the actual distribution and the overlap of ranges of *Lestes parvidens* and *L. viridis* in Europe, all available and credible information from records of the two species in southern and southeastern Europe was compiled. This compilation includes all literature references that clearly distinguish between the two species, which usually was not the case prior to the mid-1990s, records taken personally by the authors, and the review of museum specimens. The hitherto researched distributional range of *L. parvidens* in Europe extends from Asia minor to Corsica and Sicily in the west, and to Austria, Slovakia and the Ukraine in the north. On the other hand, the range of *L. viridis* extends from western, central and southern Europe, where it is common, to the southeast as far as the southern Greek mainland and the Black Sea coast. The first records of *L. viridis* from Turkey are documented from Turkish Thrace. In the area of overlapping ranges, which from north to south extends over more than 1,000 km in Italy as well as the Pannonian lowlands and the Balkans, numerous cases of syntopic occurrences were recorded. Although in these hybridization is not uncommon, the reproductive isolation between *L. parvidens* and *L. viridis* has reached an extent that does not allow a complete amalgamation of the two taxa any more. In conclusion, the results of our chorological analysis substantiate the status of *L. parvidens* and *L. viridis* as clearly separated, good species." (Authors)] Address: Olias, M., Humboldtstr. 29, D-09599 Freiberg, Germany. E-mail: markoolias@aol.com

**6750.** Osterwalder, R. (2007): Gomphiden-Exuvienfunde an renaturierten Uferabschnitten und neu angelegten Seitenarmen zweier Schweizer Flüsse (Odonata: Gomphidae). *Libellula* 26(1/2): 77-92. (in German, with English summary). ["Along the rivers Reuss and Aare the colonization of recently revitalized sections and newly created side branches by dragonflies, was in-



vestigated in the first years after the completion of the construction works. The study focussed on the evidence of development by exuviae findings of gomphids on eight stretches between 140 and 900 m in length where the bank reinforcements were removed or new watercourses were built in the period from 1998 to 2005 and on corresponding unchanged river sections for comparison. Exuviae of *Onychogomphus forcipatus*, *Ophiogomphus cecilia* and *Gomphus vulgatissimus* were found in varying numbers and distribution on the different sections. From these findings it is concluded that the revitalized and regenerated areas were rapidly colonized by gomphid larvae that drifted or moved actively into these habitats." (Author)] Address: Rudolf, R., Departement Bau, Verkehr und Umwelt des Kantons Aargau, Abt. Landschaft und Gewässer, Sektion Natur und Landschaft, Allmendstrasse 3, CH-8919 Rottenschwil, Switzerland. E-mail: rudolf.osterwalder@ag.ch

**6751.** Ott, J. (2007): The expansion of Mediterranean dragonflies in Europe as an indicator of climatic changes — Effects on protected species and possible consequences for the NATURA 2000 web. In: Secretariat of the Convention on Biological Diversity (2007). Emergins issues for biodiversity conservation in a changing climate. Abstracts of Poster Presentations at the 12th Meeting of the Subsidiary Body on Scientific, Technical and Technological Advice of the Convention on Biological Diversity. Montreal, Technical Series no. 29, i - viii + 112pp: 32-34. (in English). ["The invasion of southern and eurytopic species becomes obviously a general process in Germany and Middle and Northern European countries indicating the disturbance of the waters, as well as the lack of water in many countries and regions (Italy, Spain – Germany: e.g. the federal state of Brandenburg). Consequently strong changes within the European dragonfly fauna could be expected. Especially the species of moorland biotopes, springs, small brooks and alpine regions will face a strong decrease and in some regions also extinction. In the longer term this process will lead more to a decrease of biodiversity then to an increase and to a devaluation of the web NATURA 2000." (Author)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**6752.** Parkes, K. (2007): Dragonfly Conservation from the BDS. Online surveys - A success story Banded Demoiselle Survey 2006. *Atropos* 32: 62. (in English). [1300 records of *Calopteryx splendens* were received by internet in 2006. These data are mapped. 200 records, those accompanied by photographs were added to the National Dragonfly Database.] Address: Parkes, Katharine, BDS Conservation Officer, c/o Natural England (West Mids), Attingham Park, Shrewsbury SY4 4TW, UK. E-mail: katharine.parkes@naturalengland.org.uk

**6753.** Parr, A.J. (2007): Migrant and dispersive dragonflies in Britain during 2006. *J. Br. Dragonfly Society* 23(2): 40-51. (in English). ["The 2006 season saw some of the most spectacular movements of migrant dragonflies ever recorded in Britain, perhaps even exceeding those of the famous summer of 1995. In terms of sheer numbers, the highlight of the year was the profusion of *Sympetrum fonscolombii* that were reported. Approaching a thousand individuals — the highest annual total for Britain by some long way — were observed during the summer months, with many staying to

breed. Autumn emergents were later noted at over a dozen sites, some as far north as Lancashire and East Yorkshire. *Anax parthenope* also had a record-breaking year, with some 90 individuals being observed and oviposition being noted from five different areas. *Erythromma viridulum* similarly had an eventful season, showing a very major expansion of range, at least some of which seemed to involve fresh immigration. Other notable events included a major influx of *S. flaveolum* and the discovery of a female *Lestes barbarus* at an inland site on the Somerset/ Gloucestershire border. No less than four *Aeshna* affinis were also reported from southern England, there having only ever been one previous confirmed British record of this species." (Authors)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bsrc.ac.uk

**6754.** Peters, G.; Theischinger, G. (2007): Die gondwanischen Aeshniden Australiens (Odonata: Telephlebiidae und Brachytronidae). *Denisia* 20: 517-574. (in German, with English summary). ["Studying the relationships of the genus *Dendroaeschna* Tillyard led to a phylogenetic analysis of the genus *Austroaeschna* Selys, the family Telephlebiidae Cockerell and the clade *Euaeshnida* Bechly. Autapomorphies and synapomorphies are listed sequentially for each taxa involved, details are discussed and illustrated in three phylograms. The taxa *Pulchraeschna* subgen. nov. (type species: *Austroaeschna unicornis pulchra* Tillyard) and *Notoaeschnini* trib. nov. (type genus: *Notoaeschna* Tillyard) are formally established. Australian „brachytroniine aeshnids" (*Panbrachytrionoda* tax. nov.: Telephlebiidae s. nov. and *Dendroaeschna* Tillyard) are characterized in terms of their chorology and ecology. Numerous photographs of live dragonflies and prepared specimens document the diversity of morphology and coloration found among these insects." (Authors)] Address: Peters, G., Museum für Naturkunde, Institut für Systematische Zoologie, Invalidenstraße 43, D-10115 Berlin, Germany. E-mail: guenther.peters@freenet.de

**6755.** Petrovicová, K.; David, S. (2007): Dragonflies (Odonata) of the upper reaches of the Kysuca river (NW Slovakia). 8. vedecká konferencia doktorandov a mladých vedeckých pracovníkov, 18.-19. 4. 2007, FPV UKF Nitra: 391-403. (in Slovakian, with English summary). ["The dragonfly fauna of the typical water habitats of the Kysuca River was characterised based on a three-year field study (2003-2005). We collected 873 dragonfly specimens (703 imagoes, 65 larvae and 5 exuviae and so confirmed the presence of 39 species at 16 sample sites in the study area. We distinguished 3 types of water habitats inside the Kysuca inundation area: epipotamal, hyporithral and temporary small lakes in inundated area. Taxon richness and Shannon diversity ( $H'$ ) did not differ between localities different part of stretches of the Kysuca River. There was an average of 4 dragonfly species per locality. The value of diversity was low  $H' = \pm 1.4$ , but the upper limit of  $H_{max} = \pm 1.9$ . Upper limits of evenness of samples were  $e = \pm 0.9$ . Total abundance, taxon richness and  $H'$  of the small lakes in flood plane of the dragonflies were significantly higher. Taxon diversity of the dragonflies was significantly higher from the habitats with vegetation. Ordination of the species composition revealed that the fauna of the River Kysuca is clearly separated from the temporary small lakes water bodies. The lotic species assemblages from the Kysuca River *Calopteryx splendens*, *C. virgo*, *Onychogomphus forcipatus* and

virgo, *Onychogomphus forcipatus* and *Platycnemis pennipes* can be regarded as streams dragonfly communities *Gomphus - Calopteryx splendens* (virgo) although the cenobiotic species *Gomphus vulgatissimus* was not recorded by the authors." (Authors)] Address: Petrovièová, Kornélia, Hlavná 83; 95195 Obyce, Slovakia. E-mail: mefik@post.sk

**6756.** Petrulevicius, J.F.; Nel, A. (2007): Enigmatic and little known Odonata (Insecta) from the Paleogene of Patagonia and Northwest Argentina. *Ann. Soc. Entomol. fr. (N.S.)* 43(3): 341-347. (in English, with French summary). ["The findings of new specimens of Latibalsaliidae and Frenguelliidae in Northwest and Patagonia Argentina are noteworthy for the knowledge of these little known families and the explanation of their systematic position. The new findings confirm the phylogenetic position of these families. The morphology of the discoidal cell in both fore and hind wings of *Frenguelia* corresponds to the most basal epiproctophoran damsel-dragonflies, implying a Triassic age for the particular lineage of this family. The absence of any fossil record between Triassic and Eocene could be related to a highly specialized biology for these animals, maybe related to mountain rainforests as for *Epiophlebia*, unique surviving damsel-dragonfly. Lastly, the middle Eocene Italian dragonfly family Bolcathemidae Gentilini 2002 is considered as a junior synonym of the Paleocene Argentinean family Palaeomacromiidae Petrulevicius et al. 1999 supporting faunistic contact between Europe and South America during the late Cretaceous." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**6757.** Petrulevicius, J.F.; Nel, A.; Rust, J.; Bechly, G.; Kohls, D. (2007): New Paleogene Epallagidae (Insecta: Odonata) recorded in North America and Europe. Biogeographic implications. *ALAVESIA* 1: 15-25. (in English). ["Three new fossil Epallagidae: *Eodichrominae* are described, viz. *Labandeiraia* n. gen. with the two species *L. americaborealis* n. sp. (Eocene of USA), and *L. europae* n. sp. (Paleocene/Eocene of Denmark), and *Litheuphaea coloradensis* n. sp. (Eocene of USA). The pattern of distribution of this damselfly group in the Paleogene of North America and Europe is the same as for the damselfly subfamily *Thaumatoneuridae*: *Dysagrioninae* and the neuropteran *Polystoechotidae*. This pattern could correspond to Paleocene/Eocene land bridges between these continents via Greenland or Bering or to ancient Late Cretaceous groups." (Authors)] Address: Petrulevicius, J.F., Div. Cient. Paleozoología Invertebrados, Museo de La Plata, Fac. Cs. Nat., UNLP and CONICET Argentina. E-mail: levicius@museo.fcnym.unlp.edu.ar

**6758.** Piersanti, S.; Rebor, M.; Salerno, G.; Gaino, E. (2007): Behaviour of the larval dragonfly *Libellula depressa* (Odonata Libellulidae) in drying pools. *Ethology Ecology & Evolution* 19: 127-136. (in English). ["Numerous papers report that dragonfly larvae are able to survive dry periods in temperate areas. In this study, we investigated, in experimental field conditions in woodland, the behaviour of the larvae of *L. depressa*, belonging to the penultimate stadium (F-1), in a drying pond and the ability of these larvae to seek for water in dry conditions. Larval behaviour in a drying pond was studied using a small artificial pond that enabled water to flow out. Most of the larvae left the pond and, of the-

se, a higher percentage left the pool after the formation of puddles. The ability of the dragonfly larvae to move towards a nearby pond was investigated by placing them 5 m away from a natural pond, with the freedom to walk on the ground. More of the larvae released nearest the low edge of the pond, where a humidity gradient was present, were able to reach water than of those released nearest the high edge, where no humidity gradient was present. The ecological significance of the behaviour of the larvae of *L. depressa* is discussed in relation to the typical habitat of this species, represented by small, shallow ponds, and to the presence of hygrosensors in dragonfly larvae." (Authors)] Address: Rebor, Manuela, Dipartimento di Biologia Cellulare e Ambientale, Università di Perugia, 06123 Perugia, Italy. E-mail: rebor@unipg.it

**6759.** Pilgrim, E.M.; Dohlen, C.D., von (2007): Molecular and morphological study of species-level questions within the dragonfly genus *Sympetrum* (Odonata: Libellulidae). *Annals of the Entomological Society of America* 100(5): 688-702. (in English). ["This study combines morphological and molecular data to address several questions of species validity within the dragonfly genus *Sympetrum*. We compared morphological characters (genitalia and other putatively diagnostic characters) and DNA sequences from mitochondrial cytochrome oxidase I (COI) and nuclear internal transcribed spacer (ITS) regions between these disputed taxa and their close relatives. Specimens of *Sympetrum nigrescens* Lucas shared COI haplotypes with *Sympetrum striolatum* (Charpentier), and no morphological characters consistently diagnosed *S. nigrescens*, which therefore becomes a junior synonym of *S. striolatum*. Similarly, *Sympetrum occidentale* Bartenev shared identical COI and ITS sequences with *Sympetrum semicinctum* (Say), and the supposed diagnostic morphological characters overlapped with the intraspecific variation within *S. semicinctum*. *Sympetrum occidentale* becomes a junior synonym of *S. semicinctum*. In a third case, the genetic distance between *Sympetrum signiferum* Cunnings & Garrison and *Sympetrum vicinum* (Hagen) was lower than that found between most undisputed species. However, the morphological characters that distinguish *S. signiferum* from *S. vicinum* were distinct and consistent, and they supported the retention of *S. signiferum* as a valid species. In the fourth case, neither morphological nor genetic data were able to distinguish *Sympetrum janeae* Carle consistently from *Sympetrum internum* Montgomery, or *Sympetrum rubicundulum* (Say); in addition, genetic distances between individuals of *S. internum* and *S. rubicundulum* were small or nonexistent. Further studies are necessary to test the species status of *S. janeae* and its close relatives." (Authors)] Address: Pilgrim, E., NERL Student Services Contractor, Molecular Ecology Research Branch, US EPA, 26 Martin Luther King Drive Cincinnati, OH 45268, USA. E-mail: Pilgrim.Erik@epamail.epa.gov

**6760.** Rebor, M.; Piersanti, S.; Salerno, G.; Gaino, E. (2007): Water deprivation tolerance and humidity response in a larval dragonfly: a possible adaptation for survival in drying ponds. *Physiological Entomology* 32: 121-126. (in English). ["Water deprivation tolerance is investigated in the last larval stadium of *Libellula depressa* under various conditions of relative humidity (60 – 100% relative humidity; RH). Most of the larvae maintained at 100% RH emerge and, at lower RH levels

show some resistance to dehydration because they die after a mean period ranging from 1.4 days at 60% RH up to 6.7 days at 90% RH. In dual-choice chambers with humidity gradients from 63–74% RH and from 68–84% RH, larvae spend most of the time in the moist side of the chamber. In a Y-tube olfactometer, the larvae reveal a positive hygrotaxis to two airstreams carrying different amounts of water vapour (98% vs. 50%) and spend most of their time in the 'humid' arm. The ecological significance of desiccation tolerance and hygropositive response in the last larval stadium of *L. depressa* is discussed in relation to the presence of hygroreceptors in dragonfly larvae." (Authors)] Address: Rebor, Manuela, Dipartimento di Biologia Cellulare e Ambientale, Università di Perugia, 06123 Perugia, Italy. E-mail: rebor@unipg.it

**6761.** Rebor, M.; Piersanti, S.; Almaas, T.J.; Gai, E. (2007): Hygroreceptors in the larva of *Libellula depressa* (Odonata: Libellulidae). *Journal of Insect Physiology* 53: 550-558. (in English). ["Ultrastructural and electrophysiological (single-cell recordings) investigations were carried out on the coeloconic sensilla borne by the apical antenna of the larvae of *L. depressa*. These sensilla appear as pegs located in pits. One of them is a compound sensillum constituted of two fused pegs in a common pit and the other two are single pegs located in separated pits close to each other. Coeloconic sensilla show position and ultrastructural details very similar to those described in insect hygroreceptors. The electrophysiological recordings on the apical antennae of the last larval instar of *L. depressa* clearly show the presence of moist and dry cells responding antagonistically to humidity changes. This study gives the first evidence of hygroreceptors in dragonfly larvae and represents the first electrophysiological approach to larval sensilla of aquatic insects. The presence of hygroreceptors in *L. depressa* larvae is in agreement with the hygropositive behaviour shown by these insects in laboratory and field behavioural experiments." (Authors)] Address: Rebor, Manuela, Dipartimento di Biologia Cellulare e Ambientale, Università di Perugia, 06123 Perugia, Italy. E-mail: rebor@unipg.it

**6762.** Roddis, S. (2007): Southern Hawker *Aeshna cyanea* attracted to light. *Atropos* 32: 59. (in English). [The same (?) female was caught by a moth-trap on 7 and 15-VIII-2006.] Address: Roddis, S., The Hollies, Station Road, Darley Dale, Matlock, Derbyshire, DE4 2EQ, UK

**6763.** Rouquette, J.R.; Thompson, D.J. (2007): Patterns of movement and dispersal in an endangered damselfly and the consequences for its management. *Journal of applied ecology* 44(3): 692-701. (in English). ["1. *Coenagrion mercuriale* is one of Europe's rarest and most threatened damselflies. It is listed in the European Community (EC) Habitats and Species Directive and is the only odonate currently given priority status in the UK Biodiversity Action Plan. Information regarding patterns of movement and dispersal in this species is required to guide conservation and management programmes. Management is currently geared towards habitat restoration of isolated subpopulations, with little attention paid to the metapopulation and landscape context. 2. A multisite mark–release–recapture project was carried out in the valley of the River Itchen in southern England to determine the extent of movement and the factors affecting movement of mature adults of this

endangered damselfly. A total of 8708 individuals was marked. 3. The species was found to be extremely sedentary, with dispersal limited to an area of contiguous habitat. The median net lifetime movement was 31.9 m and 66% of individuals moved less than 50 m in their lifetime. Movements of greater than 500 m were rare and the longest recorded movement was 1.79 km. This makes it the most sedentary odonate that has been studied in the UK. 4. The highest recapture rates and the lowest movement distances were recorded at the most isolated site. Time between capture and recapture, and day in season had an effect on movement, and individuals travelled further on their first than on subsequent moves. There was no consistent effect of age or sex on distance moved. 5. There was strong evidence for inverse density-dependent movement, with individuals moving further in low-density than high-density populations. This is the first time that inverse density-dependent movement has, to our knowledge, been observed in a natural population of odonates. 6. Synthesis and applications. *Coenagrion mercuriale*, along with many other invertebrate species of conservation concern, lives in a management-dependent mid-successional habitat. However, the species is highly sedentary. Furthermore, patterns of movement and dispersal are strongly affected by landscape structure and population density. This means that it is unable to recolonize isolated sites and requires 'stepping stone' habitats to improve its chances of survival in the medium to long term. Suitable habitat management between sites that are beyond the dispersal distance of individuals can be used to connect or reconnect populations. Within existing sites only small sections of habitat should be managed in any one year and new areas should be created close to existing populations. The long-term persistence of *C. mercuriale* and other invertebrate species requires a landscape approach to management, with connectivity an important part of management planning. It is clear that carefully conducted studies of movement and dispersal are key components in guiding invertebrate conservation strategies." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**6764.** Salur, A.; Kiyak, S. (2007): Additional records for the Odonata fauna of South-Western Anatolia - Part II: Zygoptera. *Munis Entomology & Zoology* 2 (2): 499-510. (in English). [Records of 20 zygopteran Odonata collected between April-September in 2000. 2002 are documented in detail. The records originate from the Turkish provinces Antalya, Aydin, Burdur, Denizli, Isparta, and Mugla.] Address: Salur, A., Hitit Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 19030 Çorum, Turkey. E-mail: alisalur@gmail.com

**6765.** Samways, M.J.; Grant, P.B.C. (2007): Honing Red List assessments of lesser-known taxa in biodiversity hotspots. *Biodiversity and Conservation* 16(9): 2575-2586. (in English). ["Red Listing organisms is an iterative process involving two variables. First, the conservation status of a taxon becomes clearer as more information becomes available, and secondly, the actual status changes as the taxon becomes more threatened or less threatened. Using a 20-year database of South African dragonflies has enabled us to hone conservation assessments and to arrive at a realistic appraisal of their true conservation status. Changes in the evaluati-



on of taxa came about through improved knowledge of habitat and particularly from information on the exact flight period. This background improved the apparency of the taxa so enabling accurate conservation assessments. The temporal shortcoming was addressed in detail by focusing on the core of the Cape Floristic Region global biodiversity hotspot, and recording the phenology of species. We found that there were large differences in emergence times. While flight times may not be a source of error in the temperate northern hemisphere, they can be a major issue in low and southern latitudes. Indeed, the error can be so great that species thought to be extinct were effectively resurrected. Temporal shortcomings can only be overcome by first undertaking a presence/absence survey over time to determine the appropriate time of year for making rigorous Red List assessments. This is not a criticism of the Red Listing process per se, which, for this taxon, we found to be largely sound. However, the results do emphasize that a critical approach to methodology is a necessary foundation when searching for trend indicators from the Red List with regards to lesser-known taxa." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**6766.** Schilder, R.J.; Marden, J.H. (2007): Parasites, proteomics and performance: effects of gregarine gut parasites on dragonfly flight muscle composition and function. *Journal of Experimental Biology* 210(24): 4298-4306. (in English). ["In previous work, we found that dragonflies infected with gregarine gut parasites have reduced muscle power output, loss of lipid oxidation in their flight muscles, and a suite of symptoms similar to mammalian metabolic syndrome. Here, we test the hypothesis that changes in muscle protein composition underlie the observed changes in contractile performance. We found that gregarine infection was associated with a 10-fold average reduction in abundance of a 155 kDa fragment of muscle myosin heavy chain (MHC; 206 kDa intact size). Insect MHC gene sequences contain evolutionarily conserved amino acid motifs predicted for calpain cleavage, and we found that calpain digestion of purified dragonfly MHC produced a peptide of 155 kDa. Thus, gut parasites in dragonflies are associated with what appears to be a reduction in proteolytic degradation of MHC. MHC155 abundance showed a strong negative relationship to muscle power output in healthy dragonflies but either no relationship or a weakly positive relationship in infected dragonflies. Troponin T (TnT) protein isoform profiles were not significantly different between healthy and infected dragonflies but whereas TnT isoform profile was correlated with power output in healthy dragonflies, there was no such correlation in infected dragonflies. Multivariate analyses of power output based on MHC155 abundance and a principal component of TnT protein isoform abundances explained 98% of the variation in muscle power output in healthy dragonflies but only 29% when data from healthy and infected dragonflies were pooled. These results indicate that important, yet largely unexplored, functional relationships exist between (pathways regulating) myofibrillar protein expression and (post-translational) protein processing. Moreover, infection by protozoan parasites of the midgut is associated with changes in muscle protein composition (i.e. across body compartments) that, either alone or in combination with other unmeasured changes, alter muscle contractile performance." (Authors)] Address:

Schilder, R.J., School of Biological Sciences, 348 Manner Hall, University of Nebraska, Lincoln, NE 68588, USA. E-mail: rschilder2@unl.edu

**6767.** Schirrmacher, K.; Schiel, F.-J.; Martens, A. (2007): Einjährige Entwicklung von *Gomphus pulchellus* und *Leucorrhinia caudalis* in einem neu angelegten Gewässer (Odonata: Gomphidae, Libellulidae). *Libellula* 26(3/4): 189-192. (in German, with English summary). ["In April and May 2007, three exuviae of *G. pulchellus* and five exuviae of *L. caudalis* were recorded at a big pond that had been created in November/December 2005 in the former floodplain of the River Rhine near Karlsruhe, Germany. This is the first proof of univoltine development of both species in central Europe." (Authors)] Address: Schirrmacher Kristin, Karpfenweg 12, D-76189 Karlsruhe, Germany. E-mail: Kristin-Schirrmacher@gmx.de

**6768.** Schmitz, M. (2007): Beobachtung der Keilflecklibelle (*Aeshna isosceles*) in der Heisinger Ruhraue (Essen) - Erstnachweis im Ballungsraum Ruhrgebiet. *Natur und Heimat* 67(2): 59-63. (in German). [Nordrhein-Westfalen, Germany; 6 and 27-VI-2004 and 9-VI-2006] Address: Schmitz, M., Birkenhang 37, 42555 Velbert-Langenberg, Germany. E-mail: mich.schmitz@gmx.de

**6769.** Schneider, B.; Wildermuth, H. (2007): Erstnachweis von *Sympecma fusca* als Wirt parasitischer Wassermilben (Odonata: Lestidae; Hydrachnidia). *Libellula* 26(1/2): 113-117. (in German, with English summary). ["Five larvae of an unidentified water mite attached to the thorax of a mature male *S. fusca* were photographed on 2-vi-2006 at a pond near Winterthur, Switzerland. The observation is described in detail and we discuss the possibility that this lestad, because it hibernates in the imaginal stage, has to be regarded as an unsuitable host." (Authors)] Address: Schneider, B.; Wolfbühlstrasse 34a, CH-8408 Winterthur, Switzerland. E-mail: b.schneider@libellen.li

**6770.** Schwarz, M.; Schwarz-Waubke, M.; Laister, G. (2007): Die Grüne Keiljungfer [*Ophiogomphus cecilia* (FOURCROY 1785)] (Odonata, Gomphidae) in den Europaschutzgebieten Waldaist, Naarn, Maltsch, Tal der Kleinen Gusen, Böhmerwald und Mühlhäler (Österreich, Oberösterreich). *Beiträge zur Naturkunde Oberösterreichs* 17: 257-279. (in German, with English summary). ["*O. cecilia* has been found in all of the investigated Natura 2000 areas (Waldaist-Naarn, Maltsch, Tal der Kleinen Gusen, Böhmerwald und Mühlhäler, Austria). At the river Große Mühl only one specimen was found in 2006, and it is uncertain if *O. cecilia* breeds there. Whereas the rivers Kleine Mühl, Kleine Gusen, Maltsch, Waldaist, Kleine Naarn and Naarn proved to be important habitats for this species. In some sections of the rivers Maltsch, Waldaist, Kleine Naarn and Naarn *O. cecilia* occurs in high densities. In the investigated areas no threatening could be found. Steps for protecting *O. cecilia* are listed." (Authors)] Address: Schwarz, M., Eben 21, A-4202 Kirchschlag, Austria. E-Mail: schwarz-entomologie@utanet.at

**6771.** Schwarz, M. (2007): Wiederfund von *Soma-tochlora arctica* (ZETTERSTEDT 1840) (Odonata, Corduliidae) in Oberösterreich (Österreich). *Beiträge zur Naturkunde Oberösterreichs* 17: 303-307. (in German, with English summary). [5-VII-2006, S. arctica was found in the nature reserve "Rote Auen", Austria, and

for the first time in Upper Austria north of the Danube ("Mühlviertel"). Additional species of Odonata found at the same site are listed.] Address: Schwarz, M., Eben 21, A-4202 Kirchschlag, Austria. E-Mail: schwarz-entomologie@utanet.at

**6772.** Scoggins, M.; McClintock, N.L.; Gosselink, L. (2007): Occurrence of polycyclic aromatic hydrocarbons below coal-tar-sealed parking lots and effects on stream benthic macroinvertebrate communities. *J. N. Am. Benthol. Soc.* 26(4): 694-707. (in English). ["Parking-lot pavement sealants recently have been recognized as a major source of polycyclic aromatic hydrocarbons (PAHs) in urban stream sediments in Austin, Texas. Laboratory and field studies have shown that PAHs in sediments can be toxic to aquatic organisms and can degrade aquatic communities. After identifying increases in concentrations of PAHs in sediments below seal-coated parking lots, we investigated whether the increases had significant effects on stream biota in 5 Austin streams. We sampled sediment chemistry and biological communities above and below the point at which stormwater runoff from the parking lots discharged into the streams, thus providing 5 upstream reference sites and 5 downstream treatment sites. Differences between upstream and downstream concentrations of total PAH ranged from 3.9 to 32 mg/kg. Analysis of the species occurrence data from pool and riffle habitats indicated a significant decrease in community health at the downstream sites, including decreases in richness, intolerant taxa, Diptera taxa, and density. In pool sediments, Chironomidae density was negatively correlated with PAH concentrations, whereas Oligochaeta density responded positively to PAH concentrations. In general, pool taxa responded more strongly than riffle taxa to PAHs, but riffle taxa responded more broadly than pool taxa. Increases in PAH sediment-toxicity units between upstream and downstream sites explained decreases in taxon richness and density in pools between upstream and downstream sites." (Authors)] Address: Scoggins, M., Watershed Protection and Development Review Department, City of Austin, 505 Barton Springs Road, 11th Floor, Austin, Texas 78767 USA. E-mail: mateo.scoggins@ci.austin.tx.us

**6773.** Seidenbusch, R.; Heidemann, H. (2007): Ein neues Merkmal zur Identifikation der Larven von *Diplacodes lefebvrii* unter den paläarktischen Libellulidae (Odonata). *Libellula* 26(1/2): 107-112. (in German, with English summary). ["We present a hitherto ignored distinctive feature to separate larvae and exuviae of *D. lefebvrii* from other palaeartic Libellulidae. This feature concerns a long, strong seta on the mediobasal surface of each of the two pronotal lobes, close to the median ecdysial line. We hypothesize that this seta may probably be a genus-specific characteristic for larval *Diplacodes*. In addition, we present a new, additional distinctive feature to separate *Crocothemis* species and *S. fonscolombii* by the number of mesosternal setae." (Authors)] Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany. E-mail: seidenbusch@freenet.de

**6774.** Serrano-Meneses, M.A.; Azpilicueta-Amorin, M.; Szekely, T.; Cord (2007): The development of sexual differences in body size in Odonata in relation to mating systems. *Eur. J. Entomol.* 104(3): 453-458. (in English). ["Adult body size is the result of important environmental, maternal and/or genetic effects acting on

animals during development. Here we investigate how sexual size dimorphism (SSD) develops in seven species of Odonata: *Anax imperator*, *Cordulegaster boltonii*, *Onychogomphus uncatas*, *Oxygastra curtisii* (Anisoptera), *Cercion lindeni*, *Ischnura graellsii* and *Platycnemis acutipennis* (Zygoptera). SSD of both the last larval and adult stages of the same individuals, which were reared under laboratory conditions, was measured. The aims were to investigate (i) whether SSD develops during the larval stage, (ii) the direction of larval and adult SSD, and (iii) whether the direction of adult SSD can be predicted by the mating system of a given species (e.g. males of territorial species being larger than females and the opposite for non-territorial species). We found that although larval differences in size may be present between the sexes, these are not necessarily shown in the adult stage (they may change or disappear). Also, the mating system was not related to patterns of adult SSD. Differences in SSD in larvae may be caused by differential use of resources via differential niche-utilisation or sex-specific growth patterns. We highlight the fact that sexual selection favouring large male size and fecundity selection, which selects for large females may be acting on the observed patterns in SSD in adults." (Authors)] Address: Serrano-Meneses, M.A., Department of Biology and Biochemistry, University of Bath, Claverton Down, Bath BA2 7AY, UK. E-mail: mserrano@miranda.ecologia.unam.mx

**6775.** Serrano-Meneses, M.A.; Córdoba-Aguilar, A.; Méndez, V.; Layen, S. (2007): Sexual size dimorphism in the American rubyspot: male body size predicts male competition and mating success. *Animal Behaviour* 73 (6): 987-997. (in English). ["Sexual differences in body size are widespread among animals, and various explanations for the evolution and maintenance of sexual size dimorphism have been proposed. We investigated the effects of sexual selection and fecundity selection on the sizes of males and females, respectively, in American rubyspots, *Hetaerina americana*. Males are larger than females and have large red spots at the base of each wing that are sexually selected via male-male contests. Mating success is determined by the ownership of a territory. Large males held territories for longer and sustained longer territorial fights than small males. Territorial males obtained more copulations than nonterritorial ones. Large males also had more wing pigmentation and mated with large females. Large territorial males had high energy reserves, whereas nonterritorial males appeared to have depleted reserves. Selection analyses of body size showed disruptive selection acting on male body size, suggesting that both small and large males may be favoured in terms of mating success. We also tested whether fecundity selection acts on female size. However, female body size was unrelated to the number of eggs carried. Taken together, our results suggest that in this territorial damselfly species male-biased size dimorphism is driven by large male size in male-male competition being selectively advantageous in territory acquisition and/or maintenance. We also suggest that small size is advantageous in nonterritorial males to improve their agility in courting (or subduing) females." (Authors)] Address: Serrano-Meneses, M.A., Department of Biology and Biochemistry, University of Bath, Claverton Down, Bath BA2 7AY, UK. E-mail: mserrano@miranda.ecologia.unam.mx

- 6776.** Sethy, P.G.S.; Siddiqi, S.Z. (2007): Fauna of Protected Areas - 31: Observations on odonates in Similipal Biosphere Reserve, Mayurbhanj, northern Orissa. *Zoos' Print Journal* 22(11): 2893-2894. (in English). [India; 16 species of Odonata from 39 sampling sites are brought on record.] Address: Sethy, P.G.S., S/o-Gandharba Sethy, At-Kadei, Po-Uchapada, Via-Kotsahi, Dist.-Cuttack, Orissa 754022, India. E-mail: mail4pgs@yahoo.co.in
- 6777.** Shieh, S.-H.; Hsu, C.-B.; Wang, C.-P.; Yang, P.-S. (2007): Leaf breakdown in a subtropical stream riffle and its association with macroinvertebrates. *Zoological Studies* 46(5): 609-621. (in English). ["The relationships between the quality of leaves of 3 trees (*Machilus thunbergii*, *Schefflera octophylla*, and *Ficus erecta*) and the assemblages of macroinvertebrates were studied at a riffle section of a 3rd-order subtropical forest stream in northern Taiwan. Macroinvertebrate taxon richness and density that colonized bags of leaves of the 3 tree species did not significantly differ. Macroinvertebrate assemblages were dominated by collectors, such as non-Tanyponinae Chironomidae, Prosimulium spp., and Baetis spp., which constituted > 79% of the total fauna. Results of a principal component analysis (PCA) showed that the macroinvertebrate assemblages were associated with the incubation time of the litter bags in the stream and the fine particulate organic matter (FPOM) trapped by the leaf bags, but not with the variables of leaf litter quality. Shredders, predominantly small nemourids, accounted for only 5.7%, 7.1% and 10.8% of the total macroinvertebrate assemblages on *M. thunbergii*, *S. octophylla*, and *F. erecta*, respectively, suggesting that macroinvertebrates played only a minor role in leaf litter breakdown in this subtropical 3rd-order stream. However, the density of shredders on *F. erecta*, as a function of the weight of the leaf litter remaining, was significantly higher than that of *M. thunbergii*, possibly because of the preference of shredders for high-quality food resources. In a comparison with the temperate zone systems, the dominant taxa of shredders that colonized the leaf litter were similar, but their relative abundances were much less in this subtropical forest stream riffle." (Authors) *Calopteryx* sp. and *Mnais* sp. are very rarely present.] Address: Yang, P.-S., Department of Ecology, Providence University, 200 Chung-Chi Rd., Shalu, Taichung 433, Taiwan. E-mail: psyang@ccms.ntu.edu.tw
- 6778.** Smith, J.; Samways, M.J.; Taylor, S. (2007): Assessing riparian quality using two complementary sets of bioindicators. *Biodivers. Conserv.* 16: 2695-2713. (in English). ["Biological indicators are being increasingly used to rapidly monitor changing river quality. Among these bioindicators are macroinvertebrates. A shortcoming of macroinvertebrate rapid assessments is that they use higher taxa, and therefore lack taxonomic resolution and species-specific responses. One subset of invertebrate taxa is the Odonata, which as adults, are sensitive indicators of both riparian and river conditions. Yet adult Odonata are not necessarily an umbrella taxon for all other taxa. Therefore, we investigated whether the two metrics of aquatic macroinvertebrate higher taxa and adult odonate species might complement each other, and whether together they provide better clarity on river health and integrity than one subset alone. Results indicated that both metrics provide a similar portrait of large-scale, overall river conditions. At the smaller spatial scale of parts of rivers, Odonata were highly sensitive to riparian vegetation, and much more so than macroinvertebrate higher taxa. Odonate species were more sensitive to vegetation structure than they were to vegetation composition. Landscape context is also important, with the odonate assemblages at point localities being affected by the neighbouring dominant habitat type. Overall, benthic macroinvertebrates and adult Odonata species provide a highly complementary pair of metrics which together provide large spatial scale (river system) and small spatial scale (point localities) information on the impact of stressors such as riparian invasive alien trees. As adult Odonata are easy to sample and are sensitive to disturbance at both small and large spatial scales, they are valuable indicators for rapid assessment of river condition and riparian quality." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za
- 6779.** Sniegula, S. (2007): New records of protected dragonflies (Odonata) – *Aeshna viridis* EVERSM. and *Leucorrhinia pectoralis* (CHARP.), in the Drawsko Lake District. *Wiad. entomol.* 26(1): 57-58. (in Polish). [Poland; brief documentation of records of *Aeshna viridis* and *leucorrhinia pectoralis* recorded in 2005.] Address: not stated
- 6780.** Song, D.; Wang, H.; Zeng, L.; Yin, C. (2007): Microstructure and nanomechanical properties of the wing membrane of dragonfly. *Materials Science and Engineering A* 457: 254-260. (in English). ["Detailed investigations on the microstructure and the mechanical properties of the wing membrane of the dragonfly were carried out. It was found that in the direction of the thickness the membrane was divided into three layers rather than as traditionally considered as a single entity, and on the surfaces the membrane displayed a random distribution rough microstructure that was composed of numerous nanometer scale columns coated by the cuticle wax secreted. The characteristics of the surfaces were accurately measured and a statistical radial distribution function of the columns was presented to describe the structural properties of the surfaces. Based on the surface microstructure, the mechanical properties of the membranes taken separately from the wings of living and dead dragonflies were investigated by the nanoindentation technique. The Young's moduli obtained here are approximately two times greater than the previous result, and the reasons that yield the difference are discussed." (Authors)] Address: Song, F., State Key Laboratory of Nonlinear Mechanics (LNM), Institute of Mechanics, Chinese Academy of Sciences, Beijing 100080, People's Republic of China. E-mail: songf@lnm.imech.ac.cn
- 6781.** Strange, A.M.; Griffiths, G.H.; Hine, S.; Young, K.; Holloway, (2007): Habitat associations of the Small Red Damselfly (*Ceriatagrion tenellum*) (De Villiers) in heathland in southern England (Zygoptera: Coenagrionidae). *Journal of Insect Conservation* 11(3): 241-249. (in English). ["*C. tenellum* is classed as vulnerable (Shirt, British Red Data Book, Nature Conservancy Council, Peterborough, UK, 1987) throughout the UK, and is included in certain Local Biodiversity Action Plans (LBAPs) in the south. A large proportion of any Biodiversity Action Plan is concerned with the requirement of conservation and management programmes. In order to guide them, information about the habitat pre-



ferences of the species concerned is vital. Detailed habitat information was collected to include a variety of physical parameters particularly vegetation, both in-channel and bankside. The species was found to be primarily associated with in-channel emergent broad-leaved plants, bankside grasses and rushes, and shallow, narrow channels with dark organic substrate. The consequences of these findings are discussed in relation to the conservation and management of *C. tenellum*." (Authors)] Address: Strange, Alison M., The Landscape & Landform Research Group Department of Geography, The University of Reading, PO Box 227, Whiteknights, Reading RG6 6AB, UK. E-mail: a.m.strange@reading.ac.uk

**6782.** Strobl, P. (2007): Interessante Insektenfunde in der Altmark. (Hetroptera, Odonata, Lepidoptera, Coleoptera). Entomologische Mitteilungen Sachsen-Anhalt 15(2): 54-56. (in German) [Mahlpfluher Fenn, MTB-3536/4, Sachsen-Anhalt, Germany; a male *Cordulegaster boltonii* was recorded at 23-VI-2005.] Address: Strobl, P., Schulstr. 34, 39576 Stendal, Germany, E-mail: strobl-angepe@web.de

**6783.** Stübing, S.; Stübing, N. (2007): Flussuferläufer erbeuten Großlibellen. Der Falke 54: 272. (in German). [Los Llanos de Aridane, La Palma, Canary Islands, Spain; on 21.11.2004, Common sandpipers, *Actitis hypoleucos* (Aves) were preying on emerging *Anax imperator* and *Sympetrum fonscolombii*. Odonata as prey of the genus *Actitis* are discussed.] Address: Stübing, S., Eckhardtstr. 33a, 64289 Darmstadt, Germany. E-mail: stefan.stuebing@gmx.de

**6784.** Stübing, S.; Stübing, N. (2007): Notizen zur Entwicklung von *Anax imperator* und *Sympetrum fonscolombii* auf La Palma, Kanarische Inseln (Odonata: Aeshnidae, Libellulidae). *Libellula* 26(3/4): 233-241. (in German, with English summary). ["During late 2004, we checked altogether 19 of approximately 250 artificial irrigation reservoirs in the western part of La Palma for the occurrence of Odonata. In only two adjacent reservoirs were noteworthy numbers of *S. fonscolombii* and *A. imperator* recorded. The emergence of both species occurred on the completely homogeneous surface of the reservoir wall. About half of all *S. fonscolombii* emerged at heights of 70 to 115 cm above water level. In *A. imperator* the majority emerged at heights of 80 to 120 cm, six individuals emerging at heights of more than 400 cm to at most 520 cm above water level. Predation of Common Sandpiper *Actitis hypoleucos* on emerging dragonflies was observed repeatedly." (Authors)] Address: Stübing, S., Im Feldchen 1a, D-61209 Echzell, Germany. E-mail: stefan.stuebing@gmx.de

**6785.** Suhling, F.; Martens, A. (2007): Dragonflies and damselflies of Namibia. Gamsberg Macmillan. ISBN 978-99916-0-764-1: 280 pp. (in English). [The book describes the 127 species recorded in Namibia providing information on their distribution range, habitat, ecology and behaviour. The identification keys not only cover the Namibian species, but also those of neighbouring Botswana and southern Angola, so that 149 species are covered. The general overview of dragonfly biology and the species descriptions are extensively illustrated with 174 photographs, 27 plates with line drawings and 125 distribution maps. Each species is treated in a monographic way, providing information on identification characters and sibling species, meaning of

scientific name, distribution, ecology and behaviour, threats and conservation. A general, concise introduction on 66 pages provides information on morphology, physiology, ecology and behaviour, biogeography, regional dragonfly habitats and typical species of these habitats, and surveying of dragonflies. Closing sections of the book are a short key of dragonfly larvae, checklists of Odonata from Namibia, Botswana, and Angola, and selected bibliography, and a species index. Of course, this book is indispensable for everyone travelling through south-western Africa for odonatological reasons. (Martin Schorr)] Address: Suhling, F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de; Publisher: Gamsberg Macmillan Publishers. P.O. Box 22830, Windhoek, Namibia

**6786.** Svensson, E.I.; Friberg, M. (2007): Selective predation on wing morphology in sympatric damselflies. *The American Naturalist* 170: 101-112. (in English). ["Although predation is thought to affect species divergence, the effects of predator-mediated natural selection on species divergence and in nonadaptive radiations have seldom been studied. Wing melanization in *Calopteryx* damselflies has important functions in sexual selection and interspecific interactions and in species recognition. The genus *Calopteryx* and other damselfly genera have also been put forward as examples of radiations driven by sexual selection. We show that avian predation strongly affects natural selection on wing morphology and male wing melanization in two congeneric and sympatric species of this genus (*Calopteryx splendens* and *Calopteryx virgo*). Predation risk was almost three times higher for *C. virgo*, which has an exaggerated degree of wing melanization, than it was for the less exaggerated, sympatric congener *C. splendens*. Selective predation on the exaggerated species *C. virgo* favored a reduction and redistribution of the wing melanin patch. There was evidence for nonlinear selection involving wing patch size, wing patch darkness, and wing length and width in *C. splendens* but weaker nonlinear selection on the same trait combinations in *C. virgo*. Selective predation could interfere with species divergence by sexual selection and may thus indirectly affect male interspecific interactions, reproductive isolation, and species coexistence in this genus." (Authors) *Motacilla flava* *Motacilla alba* *Motacilla cinerea* as predators] Address: Friberg, M., Department of Zoology, Stockholm University, SE-106 91 Stockholm, Sweden E-mail: magne.friberg@zoologi.su.se

**6787.** Switzer, P.V. (2007): Using dragonflies as common, flexible and charismatic subjects for teaching the scientific process. *American Biology Teacher* 69(3): 158-164. (in English). ["Biology laboratories are usually designed around convenient and available subjects. For example, for animal laboratories "*Daphnia magna*," "*Drosophila melanogaster*," frogs, rats, and mice are common animals that are relatively easy to obtain, relatively cheap, and consequently lend themselves well to laboratory experimentation. On many campuses, however, a body of water exists - either in the form of a creek or small pond - and this water attracts numerous animals that have tremendous potential as subjects for teaching and learning. Chief among these animals are the dragonflies and damselflies. In this paper, focusing primarily on dragonflies, the author explains why dragonflies make great subjects, gives some practical advice for using them in teaching, and provides a few

specific examples of how he has used them in his introductory zoology, upper-division animal behaviour, and non-majors environmental life science classes." (Author)] Address: Switzer, P.V., Eastern Illinois Univ., Dept Biol, Sci., Charleston IL 61920; USA. E-mail: cfpvs@eiu.edu

**6788.** Tol, J. van (2007): The Platystictidae of the Moluccas and Misool (Odonata). *Deutsche Entomologische Zeitschrift* 54(1): 3-26. (in English). ["The Platystictidae of the Moluccas and Misool (Indonesia) are revised. All species are assigned to *Drepanosticta* Laidlaw. Representatives of this genus are known from the larger islands in the region, viz. Halmahera, Bacan, Obi, Ambon, Buru, Seram, and from the Kai island group. Aru is poorly studied for odonates, and no platystictids are known. Nine new species are described, viz. *Drepanosticta halmahera* sp. n., *D. rudicula* sp. n., *D. sembilanensis* sp. n. and *D. siu* sp. n., all from Halmahera; *D. bifida* sp. n. and *D. psygma* sp. n. from Bacan; *D. misoolensis* sp. n. from Misool; *D. amboinensis* sp. n. from Ambon and *D. obiensis* sp. n. from Obi. Two previously described species, *D. robusta* Fraser (Kai) and *D. moluccana* Lieftinck (Buru), are redescribed and illustrated. A key to all species is provided, as well as preliminary notes on phylogenetic relationships and biogeography. Halmahera platystictids show sister-group relationships with species from Bacan or, remarkably, Misool. The Moluccan *Drepanosticta* species are assigned to the *D. lymetta* and *D. megametta* species groups, which are also known from the Philippines and the Papuan region, and the *D. moluccana* group, presumably confined to the southern Moluccas. The role of the middle Eocene South Caroline Arc in the distributional history of the *Drepanosticta* species is discussed. (Author)] Address: Tol, J. van, National Museum of Natural History, P.O. Box 9517, NL-2300 RA Leiden, The Netherlands

**6789.** Tol, J. van (2007): The Odonata of Sulawesi and adjacent islands. Part 7. Libellago and Sclerocypha (Chlorocyphidae). *International Journal of Odonatology* 10(2): 209-248. (in English). ["The Sulawesi species of the genera *Libellago* and *Sclerocypha* are revised. *L. asclepiades*, *L. rufescens*, *L. xanthocyana* and *S. bisignata* are redescribed, and three species of *Libellago* – one with four subspecies – are described as new to science, viz. the closely allied *L. daviesi* sp. nov. from the northern arm of Sulawesi and *L. manganitu* sp. nov. from Sangihe Island, north of Sulawesi, and a complex of four mainly parapatric subspecies allied to *L. rufescens*, viz., *L. celebensis* sp. nov. from W part of Central Sulawesi, and nominotypical subspecies, *L. celebensis anoa* ssp. nov. from NE part of South Sulawesi, *L. celebensis dorsonigra* ssp. nov. from NE part of South Sulawesi, and *L. celebensis orientalis* ssp. nov. from extreme E part of South Sulawesi, E part of Central Sulawesi and Southeast Sulawesi. The status of the genus *Sclerocypha* is discussed. A key to the species of Chlorocyphidae (except *Rhinocypha*) known from Sulawesi, is provided." (Author)] Address: Tol, J. van, National Museum of Natural History, P.O. Box 9517, NL-2300 RA Leiden, The Netherlands

**6790.** Tol, J. van (2007): Book reviews. *Tijdschrift voor Entomologie* 150: 30, 38. (in English). [Reviews of the following two books: Charles W. Heckman, 2006. *Encyclopedia of South American aquatic insects: Odonata – Anisoptera*. Illustrated keys to known families,

genera, and species in South America. – Springer, Dordrecht. viii + 725 pp., 793 figures. ISBN 978-1-4020-4801-2. Price USD 299.00. Rosser W. Garrison, Natalia von Ellenrieder & Jerry A. Louton, 2006. *Dragonfly genera of the New World*. An illustrated and annotated key to the Anisoptera. – Johns Hopkins University Press, Baltimore. xiv + 368 pp., 1626 figures, 124 maps, 8 colour plates. ISBN 0801884462. Price GBP 66.00] Address: Tol, J. van, National Museum of Natural History, P.O. Box 9517, NL-2300 RA Leiden, The Netherlands. E-mail: tol@nmm.nl

**6791.** Tonczyk, G.; Jaskula, R.; Socha, G. (2007): *Platycnemis pennipes* (Pall.) as a prey of *Neoitamus cyanurus* (Loew) (Zygoptera: Platycnemididae; Diptera: Asilidae). *Notul. odonatol.* 6(10): 119. (in English). [documentation of a first known asilid predation on *Odonata* in Poland.] Address: Tonczyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i hydrobiologii, Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland

**6792.** Trigal, C.; García-Criado, F.; Alaez, C.-F. (2007): Macroinvertebrate communities of mediterranean ponds (North Iberian Plateau): importance of natural and human-induced variability. *Freshwater Biology* 52(10): 2042-2055. (in English). ["1. The effects of natural and human-induced variability on the composition of macroinvertebrate communities of 28 ponds located in the North Iberian Plateau (Spain) were studied to determine the best predictors of community structure. 2. Constrained ordination was used to identify the main factors explaining the among-pond variance in abundance (as catch per unit effort) of total macroinvertebrate and Chironomidae assemblages and trophic structure (functional feeding groups). 3. Variance partitioning showed that human disturbance (represented by a pond condition index, total phosphorus concentration and pesticides) was the best predictor of macroinvertebrate community structure, whereas factors, such as habitat and biotic variables were of secondary importance. Factors controlling the chironomid community were broadly similar to those acting on the whole community of macroinvertebrates. In contrast, trophic structure was mainly determined by habitat and biotic variables. 4. Our results show that macroinvertebrates may be used as effective indicators of the ecological status of Mediterranean ponds. The Chironomidae deserve special attention because they were the dominant group in the study ponds and the strongest explanatory variable for their distribution was degradation." (Authors) *Coenagrionidae* and *Libellulinae* are considered.] Address: Trigal, Cristina, Inst. för miljöanalys/ Dept. of Environmental Assessment, SLU/ Swedish University of Agricultural Sciences, Box 70 50, 750 07 Uppsala, Sweden. Email: christina.trigal@ma.slu.se

**6793.** Turner, A.M.; Chislock, M.F. (2007): Dragonfly predators influence biomass and density of pond snails. *Oecologia* 153: 407-415. (in English). ["Studies in lakes show that fish and crayfish predators play an important role in determining the abundance of freshwater snails. In contrast, there are few studies of snails and their predators in shallow ponds and marshes. Ponds often lack fish and crayfish but have abundant insect populations. Here we present the results of field surveys, laboratory foraging trials, and an outdoor mesocosm experiment, testing the hypothesis that insects are important predators of pulmonate snails. In laboratory foraging

trials, conducted with ten species of insects, most insect taxa consumed snails, and larval dragonflies were especially effective predators. The field surveys showed that dragonflies constitute the majority of the insect biomass fishless ponds. More focused foraging trials evaluated the ability of the dragonflies *Anax junius* and *Pantala hymenaea* to prey upon different sizes and species of pulmonate snails (*Helisoma trivolvis*, *Physa acuta*, and *Stagnicola elodes*). *Anax junius* consumed all three species up to the maximum size tested. *Pantala hymenaea* consumed snails with a shell height of 3 mm and smaller, but did not kill larger snails. *P. acuta* were more vulnerable to predators than were *H. trivolvis* or *S. elodes*. In the mesocosm experiment, conducted with predator treatments of *A. junius*, *P. hymenaea*, and the hemipteran *Belostoma flumineum*, insect predators had a pronounced negative effect on snail biomass and density. *A. junius* and *B. flumineum* reduced biomass and density to a similar degree, and both reduced biomass more than did *P. hymenaea*. Predators did not have a strong effect on species composition. A model suggested that *A. junius* and *P. hymenaea* have the largest effects on snail biomass in the field. Given that both pulmonate snails and dragonfly nymphs are widespread and abundant in marshes and ponds, snail assemblages in these water bodies are likely regulated in large part by odonate predation." (Authors)] Address: Turner, A.M., Department of Biology, Clarion University, Clarion, PA 16214, USA. E-mail: aturner@clarion.edu

**6794.** Tyrrell, M. (2007): Maintenance of the female androchrome colour polymorph in the Blue-tailed Damselfly *Ischnura elegans* (Vander Linden). *J. Br. Dragonfly Society* 23(2): 33-39. (in English). ["In order to explain the maintenance of the male-like androchrome colour form in female Zygoptera, a form that would otherwise suffer severe disadvantages through lack of recognition by males, a number of theories have been developed. Cordero & Andres (1996) reviewed these theories and concluded that a "Density Dependence" theory offered the most likely explanation. This paper reports on research into the implications for female androchrome colour forms in both low and high density populations as a test of the Density Dependence theory, and was applied to the Blue-tailed Damselfly *Ischnura elegans* (Vander Linden) in Northamptonshire. For the low and high density populations studied, mating success was found to be directly related to the proportion of each colour form in the population as a whole, with no one colour form exhibiting preferential advantages or disadvantages. Similarly there was found to be no significant difference between the mating frequencies in the two populations. These observations suggest that the female androchrome in *Ischnura elegans* is not a perfect male mimic and that the male is readily able to recognize this colour form as female." (Author)] Address: Tyrrell, M., 8 Warwick Close, Raunds, Wellingborough, Northamptonshire NN9 6JH, UK

**6795.** Tytar, V.M. (2007): *Selysiotthemis nigra* - a new species of dragonflies for the fauna of Ukraine. *Vestnik Zoologii* 41(2) : 122. (in Ukrainian, with English summary). [20.VII.2002, a female of *S. nigra* was discovered on the western part of Pokrovka (Kovalevka) village, Ochakov district, Mykolayivs'ka Oblast' (Province) (46.28.36N 31.39.33E) on the bank of Chirnino lake.] Address: Tytar, V.M., Schmalhausen Institute, University of Kiev, Ukraine

**6796.** Uboni, C.; Bessi, N.; Colla, A. (2007): Una popolazione urbana di *Cordulegaster heros* Theischinger, 1979 in Italia (Odonata, Cordulegasteridae). *Atti Mus. Civ. Stor. Nat. Trieste* 53 (2006): 207-211. (in Italian, with English summary). ["An urban population of *C. heros* in Italy - We underline the importance of a population of *C. heros* near the city of Trieste (NE Italy). This population of *C. heros* is: (i) up to now, one of the few in Italy; (ii) locally valuable since *C. heros* is listed in the annex II and IV of the Habitat Directive; (iii) situated in a very peculiar relict and urbanized habitat where *C. heros* co-occur with *C. bidentata* and *Calopteryx virgo*." (Authors)] Address: Uboni, Costanza, Museo Civico di Storia Naturale - Piazza Hortis, 4 - 34123 Trieste, Italy. E-mail: sportellonatura@comune.trieste.it

**6797.** van der Poorten, N. (2007): A note on the existence of androchrome females in *Crocothemis servilia* (Dru.) (Anisoptera: Libellulidae). *Notul. odonatol.* 6(10): 120. (in English). [20-X-2006; Hammaliya Estate, Bandarakoswatte near Kurunegala, Sri Lanka.] Address: van der Poorten, N., Hammaliya Estate, Bandarakoswatte-60424, Sri Lanka. E-mail: infor@srilanka-insects.net

**6798.** Van Gossum, H.; Beatty, C.D.; Charlat, S.; Waqa, H.; Markwell, (2007): Male rarity and putative sex-role reversal in a Fijian Islands community of damselflies (Odonata). *Journal of Tropical Ecology* 23: 591-598. (in English). ["Behavioural sex-role reversal occurs when males and females exchange their standard roles in territorial defence or parental care. One circumstance under which sex-role reversal may occur is when males are a limiting resource, so that females have to compete for access to mates. Here we report on male rarity and male and female behaviour of species within the damselfly genus *Nesobasis*, endemic to Fiji. Earlier reports suggested that, in some members of this genus, males were seldom observed and that females of these species were consequentially territorial, a phenomenon described as 'sex-role reversal'. Quantitative estimation of the ratio of adult males to females at 15 localities in 13 *Nesobasis* species (1489 individuals) indicated that males were extremely rare in some species, yet common in others. This interspecific variability in male rarity cannot be explained by elevation or habitat. Formal observations of three species with abundant males revealed that males of these species were highly territorial: they physically challenged intruders while remaining within a confined area. By contrast, in three species where males were consistently rare or absent, females were not territorial: instead, they moved widely and were primarily engaged in oviposition. While we do not know the underlying reason for the unusual rarity of males at oviposition sites in some species, it is clear that this rarity has not provided sufficient selection pressure to generate genuine sex-role reversal." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**6799.** Van Gossum, H.; Beirinckx, K.; Forbes, M.R.; Sherratt, T.N. (2007): Do current hypotheses explain continental and seasonal variation in female morph frequencies of the damselfly, *Nehalennia irene*? *Biological Journal of the Linnean Society* 90(3): 501-508. (in English). ["Female-limited colour polymorphism occurs in many damselfly species, where one morph re-



sembles the male (andromorph) and the other is dissimilar (gynomorph). Explanations for this phenomenon vary, but most assume that andromorphism has arisen in odonates, as a response to excessive male harassment. Here, we quantify the extent of continental and seasonal variation in female morph frequencies in a widely-distributed damselfly and ask whether the spatiotemporal patterns in andromorph frequency can be understood on the basis of sexual harassment theory. We sampled the damselfly, *Nehalennia irene* (Hagen) among regions across Canada, and at several sites, over the reproductive season, within Central Canada. Andromorph frequencies ranged from 0 to > 90% across Canada. In particular, sites in Western Canada had consistently high andromorph frequencies, whereas andromorph frequencies among Central sites were lower and variable and, among Eastern sites, were lower still (except one site) and relatively invariant. For populations in Central Canada, both andromorph frequencies and population densities varied significantly over time, reaching a peak mid-season. As expected, morph frequency covaried significantly with estimates of male harassment in some cases, but estimates of male harassment did not consistently account for variation in morph frequencies within all regions. Additional factors such as genetic drift may influence morph frequency at the edge of a species' range. Future work also should test, and attempt to explain causation, for seasonal variation in morph frequency." (Author)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**6800.** Van Gossum, H.; Beirinckx, K.; Forbes, M.R.; Sherratt, T.N. (2007): Continental and seasonal variation in female morph frequencies of the damselfly, *Nehalennia irene*. *Biological Journal of the Linnean Society* 90: 501-508. (in English). ["Female-limited colour polymorphism occurs in many damselfly species, where one morph resembles the male (andromorph) and the other is dissimilar (gynomorph). Explanations for this phenomenon vary, but most assume that andromorphism has arisen in odonates, as a response to excessive male harassment. Here, we quantify the extent of continental and seasonal variation in female morph frequencies in a widely-distributed damselfly and ask whether the spatiotemporal patterns in andromorph frequency can be understood on the basis of sexual harassment theory. We sampled the damselfly, *Nehalennia irene* (Hagen) among regions across Canada, and at several sites, over the reproductive season, within Central Canada. Andromorph frequencies ranged from 0 to > 90% across Canada. In particular, sites in Western Canada had consistently high andromorph frequencies, whereas andromorph frequencies among Central sites were lower and variable and, among Eastern sites, were lower still (except one site) and relatively invariant. For populations in Central Canada, both andromorph frequencies and population densities varied significantly over time, reaching a peak mid-season. As expected, morph frequency covaried significantly with estimates of male harassment in some cases, but estimates of male harassment did not consistently account for variation in morph frequencies within all regions. Additional factors such as genetic drift may influence morph frequency at the edge of a species' range. Future work also should test, and attempt to explain causation, for seasonal variation in morph frequency." (Authors)] Address: Gossum, H. van,

Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**6801.** Van Gossum, H.; Beirinckx, K.; Forbes, M.R.; Sherratt, T.N. (2007): Reproductive interference between *Nehalennia* damselfly species. *Ecoscience* 14: 1-7. (in English, with French summary). ["We tested the hypotheses that reproductive interference between 2 congeneric damselfly species influences their local population densities and the female morph ratios in one of the species. *Nehalennia irene* has 2 female types (andromorph and gynomorph), whereas *N. gracilis* exhibits only one female type. Andromorphic *N. irene* females not only resemble conspecific males in body coloration, but also resemble heterospecific females of *N. gracilis*. We predicted male *N. irene* to be most attracted to gynomorphs of *N. irene* and male *N. gracilis* to be least attracted to them. Further, if *N. gracilis* males harass andromorphic *N. irene* females excessively, then they may reduce andromorph frequencies of *N. irene* locally. Our results indicate hybridization to be prevented by a "lock-and-key" mechanism, but male *N. irene* often attempt mating with female *N. gracilis*. Contrary to prediction, andromorph frequency in *N. irene* did not depend on whether *N. irene* populations were in sympatry or allopatry with *N. gracilis*. As predicted, *N. irene* males attempted tandem formation most frequently with conspecific gynomorphs, while *N. gracilis* males made most heterospecific tandem attempts on *N. irene* andromorphs. Collectively, our results suggest that *N. gracilis* females may be frequently harassed by *N. irene* males, and that this may help explain the relative rarity of *N. gracilis*." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**6802.** Van Gossum, H., Beirinckx, K.; Forbes, M.R., Sherratt, T.N. (2007): Do current hypotheses explain continental and seasonal variation in female morph frequencies of the damselfly, *Nehalennia irene*? *Biological Journal of the Linnean Society* 90: 501-508. (in English). ["Female-limited colour polymorphism occurs in many damselfly species, where one morph resembles the male (andromorph) and the other is dissimilar (gynomorph). Explanations for this phenomenon vary, but most assume that andromorphism has arisen in odonates, as a response to excessive male harassment. Here, we quantify the extent of continental and seasonal variation in female morph frequencies in a widely-distributed damselfly and ask whether the spatiotemporal patterns in andromorph frequency can be understood on the basis of sexual harassment theory. We sampled the damselfly, *Nehalennia irene* (Hagen) among regions across Canada, and at several sites, over the reproductive season, within Central Canada. Andromorph frequencies ranged from 0 to > 90% across Canada. In particular, sites in Western Canada had consistently high andromorph frequencies, whereas andromorph frequencies among Central sites were lower and variable and, among Eastern sites, were lower still (except one site) and relatively invariant. For populations in Central Canada, both andromorph frequencies and population densities varied significantly over time, reaching a peak mid-season. As expected, morph frequency covaried significantly with estimates of male harassment in some cases, but estimates of male harassment did not consistently account for variation in

morph frequencies within all regions. Additional factors such as genetic drift may influence morph frequency at the edge of a species' range. Future work also should test, and attempt to explain causation, for seasonal variation in morph frequency." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**6803.** Walia, G.K. (2007): Cytomorphological studies on *Gynacantha milliardi* Fraser of the family Aeschnidae (Anisoptera: Odonata). *Cytologia* 72: 57-62. (in English). ["Male germ cell complement of *Gynacantha milliardi* belonging to family Aeschnidae has been investigated. Specimens were collected from Karnataka (Mangalore) state of South India. Chromosome analysis shows 2 types of spermatogenetic cycles viz., 2n male=27m; n male=14m and 2n male=25; n male=13 with XO sex determining mechanism. Karyotypic evolution of m chromosomes has been observed in the species. Meiotic behaviour of autosomes and sex chromosome has also been studied. *Gynacantha milliardi* is described for the first time in odonate cytotaxonomy." (Author)] Address: Walia, G.K., Department of Zoology, Punjabi University, Patiala-147 002 (Punjab), India. E-mail: gurinderkaurwalia@yahoo.co.in

**6804.** Wang, Z.J.; Russell, D. (2007): Effect of forewing and hindwing interactions on aerodynamic forces and power in hovering dragonfly flight. *Physical Review Letters* 99(148101): 1-4. (in English). ["Dragonflies are four-winged insects that have the ability to control aerodynamic performance by modulating the phase lag ( $\phi$ ) between forewings and hindwings. We film the wing motion of a tethered dragonfly and compute the aerodynamic force and power as a function of the phase. We find that the out-of-phase motion as seen in steady hovering uses nearly minimal power to generate the required force to balance the weight, and the in-phase motion seen in takeoffs provides an additional force to accelerate. We explain the main hydrodynamic interaction that causes this phase dependence." (Authors)] Address: Wang, Jane, Itasca Consulting Group, Inc., Minneapolis, MN 55401, USA. E-mail: zw24@cornell.edu

**6805.** Wappler, T.; Petrulevicius, J.F. (2007): *Priscalestidae*, a new damselfly family (Odonata: Lestinoidea) from the Middle Eocene Eckfeld maar of Germany. *ALAVESIA* 1: 69-73. (in English). ["We describe *Priscalestes germanica* Petrulevicius & Wappler, a new genus and species of Lestinoidea Calvert (1901) (sensu Bechly 1996) from the Eocene of Germany. The new genus represents a new family, *Priscalestidae* Petrulevicius & Wappler fam. nov., with close relationship to *Megalestidae*, *Lestidae* and the genus *Promegalestes* Petrulevicius & Nel 2004 from the late Paleocene of Argentina. The new family seems to be in a basal position with respect to the *Lestidae* because of the lack of their synapomorphies, i. e. MA strongly zigzagged and the area between IR2 and RP3/4 distally strongly widened with three rows of cells between these two veins instead of only one. The new family differs also from *Lestidae* and *Megalestidae* in the presence of two autapomorphies, i.e. (1) all secondary longitudinal veins (except IR1 and IR2) suppressed, resulting in presence of unicellular rows between IR1 and RP2, RP2 and IR2, RP3 and MA; and (2) the midfork closer to the subnodus than to the arculus. The sharing of last character with *Promegalestes* let us thinking in a close relations-

hip of these two genera." (Authors)] Address: Wappler, T., Institut für Paläontologie, Nussalle 8, 53115, Bonn, Germany. E-mail: twappler@uni-bonn.de

**6806.** Ward, L.; Mill, P.J. (2007): Spacing behaviour in larval Banded Demoiselle *Calopteryx splendens* (Harris). *J. Br. Dragonfly Society* 23(2): 58-62. (in English). ["The widely held view is that *C. splendens* larvae tend to inhabit aquatic vegetation growing on a silt substrate where they use the roots and stems for shelter and as emergence supports. However, considering the patchy distribution of aquatic vegetation in a river and the semivoltine nature of the larval life cycle this could potentially result in serious overcrowding of larvae at oviposition sites. In the current study the spacing behaviour of *C. splendens* larvae was investigated, under experimental conditions, with regard to the density of an emergent support. ... A shift in *C. splendens* from a random, approaching contagious, distribution towards a more regular pattern with increased density of dowels was observed in the current study." (Authors)] Address: Ward, Louise, Askham Bryan College, Askham Bryan, York, YO23 3FR, UK

**6807.** Ware, J.; May, M.; Kjer, K. (2007): Phylogeny of the higher Libelluloidea (Anisoptera: Odonata): An exploration of the most speciose superfamily of dragonflies. *Molecular phylogenetics and evolution* 45(1): 289-310. (in English). ["Although libelluloid dragonflies are diverse, numerous, and commonly observed and studied, their phylogenetic history is uncertain. Over 150 years of taxonomic study of Libelluloidea Rambur, 1842, beginning with Hagen (1840), [Rambur, M.P., 1842. *Neuropteres. Histoire naturelle des Insectes*, Paris, pp. 534; Hagen, H., 1840. *Synonymia Libellularum Europaeorum. Dissertation inauguralis quam consensu et auctoritate gratiosi medicorum ordinis in academia albertina ad summos in medicina et chirurgia honores.*] and Selys (1850), [de Selys Longchamps, E., 1850. *Revue des Odonates ou Libellules d'Europe* [avec la collaboration de H.A. Hagen]. Muquardt, Bruxelles; Leipzig, 1-408.], has failed to produce a consensus about family and subfamily relationships. The present study provides a well-substantiated phylogeny of the Libelluloidea generated from gene fragments of two independent genes, the 16S and 28S ribosomal RNA (rRNA), and using models that take into account non-independence of correlated rRNA sites. Ninety-three ingroup taxa and six outgroup taxa were amplified for the 28S fragment; 78 ingroup taxa and five outgroup taxa were amplified for the 16S fragment. Bayesian, likelihood and parsimony analyses of the combined data produce well-resolved phylogenetic hypotheses and several previously suggested monophyletic groups were supported by each analysis. *Macromiinae*, *Corduliidae* s. s., and *Libellulidae* are each monophyletic. The corduliid (s.l.) subfamilies *Synthemistinae*, *Gomphomacromiinae*, and *Idionychinae* form a monophyletic group, separate from the *Corduliinae*. *Libellulidae* comprises three previously accepted subfamilies (*Urothemistinae*, a very restricted *Tetrathemistinae*, and a modified *Libellulinae*) and five additional consistently recovered groups. None of the other previously proposed subfamilies are supported. Bayesian analyses run with an additional 71 sequences obtained from GenBank did not alter our conclusions. The evolution of adult and larval morphological characters is discussed here to suggest areas for future focus. This study shows the inherent problems in using poorly defined

and sometimes inaccurately scored characters, basing groups on symplesiomorphies, and failure to recognize the widespread effects of character correlation and convergence, especially in aspects of wing venation." (Authors)] Address: Ware, Jessica, Department of Entomology, Rutgers University, 93 Lipman Drive, New Brunswick, NJ 08901, USA. E-mail: jware42@rci.rutgers.edu

**6808.** Watts, P.C.; Saccheri, I.J.; Kemp, S.J.; Thompson, D.J. (2007): Effective population sizes and migration rates in fragmented populations of an endangered insect (*Coenagrion mercuriale*: Odonata). *Journal of Animal Ecology* 76: 790-800. (in English). ["1. Effective population sizes ( $N_e$ ) and migration rates ( $m$ ) are critical evolutionary parameters that impact on population survival and determine the relative influence of selection and genetic drift. While the parameter  $m$  is well-studied in animal populations,  $N_e$  remains challenging to measure and consequently is only rarely estimated, particularly in insect taxa. 2. We used demographic and genetic methods to estimate  $N_e$  and  $m$  in a fragmented population of the endangered damselfly *C. mercuriale* to better understand the contrast between genetic and field estimates of these parameters and also to identify the spatial scale over which populations may become locally adapted. 3. We found a contrast between demographic and genetic-based estimates of these parameters, with the former apparently providing overestimates of  $N_e$ , owing to substantial underestimation of the variance in reproductive success, and the latter overestimating  $m$ , because spatial genetic structure is weak. 4. The overall  $N_e$  of sites within the population network at Beaulieu Heath, the largest *C. mercuriale* site in the UK, was estimated to vary between approximately 60 and 2700. 5. While  $N_e$  was not correlated with either the total numbers of adults ( $N$ ) or the area of habitat, this parameter was always less than  $N$ , because of substantial variance in reproductive success. The ratio  $N_e / N$  varied between 0.006 and 0.42 and was generally larger in smaller populations, possibly representing some 'genetic compensation'. 6. From a simple genetic model and these data on  $N_e$  and  $m$ , it seems that populations of *C. mercuriale* have the potential to respond to localized spatial variation in selection and this would need to be considered for future genetic management of this endangered species." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**6809.** Webb, T.J.; Freckleton, R.P. (2007): Only half right: Species with female-biased sexual size dimorphism consistently break Rensch's Rule. *PLoS ONE* 2(9): e897. doi:10.1371/journal.pone.0000897. (in English). ["Background: Most animal species display Sexual Size Dimorphism (SSD): males and females consistently attain different sizes, most frequently with females being larger than males. However the selective mechanisms driving patterns of SSD remain controversial. 'Rensch's rule' proposes a general scaling phenomenon for all taxa, whereby SSD increases with average body size when males are larger than females, and decreases with body size when females are larger than males. Rensch's rule appears to be general in the former case, but there is little evidence for the rule when females are larger than males. Methodology/Principal

Findings: Using comprehensive data for 1291 species of birds across 30 families, we find strong support for Rensch's rule in families where males are typically larger than females, but no overall support for the rule in families with female-biased SSD. Reviewing previous studies of a broad range of taxa (arthropods, reptiles, fish and birds) showing predominantly female-biased SSD, we conclude that Rensch's conjecture is the exception rather than the rule in such species. Conclusions/Significance: The absence of consistent scaling of SSD in taxa with female-biased SSD, the most prevalent direction of dimorphism, calls into question previous general evolutionary explanations for Rensch's rule. We propose that, unlike several other ecological scaling relationships, Rensch's rule does not exist as an independent scaling phenomenon." (Authors) The study also includes "dragonflies and damselflies".] Address: Webb, T.J., Department of Animal and Plant Sciences, University of Sheffield, Sheffield, United Kingdom. E-mail: t.j.webb@sheffield.ac.uk

**6810.** Wildermuth, H. (2007): *Leucorrhinia pectoralis* in der Schweiz – aktuelle Situation, Rückblick und Ausblick (Odonata: Libellulidae). *Libellula* 26(1/2): 59-76. (in German, with English summary). ["The species was recorded from 1835 to 2006 at 64 localities of which 61 are situated in the Central Plateau, mainly between 400 and 600 m a.s.l., and three in the Jura mountains. It does not occur in the Alpine region. From 2000 to 2006 *L. pectoralis* was still found at twelve localities, but only four vigorous populations existed in this period: three in the canton Zürich and one in the canton Fribourg. Primary cause for the decline was the destruction of bogs by peat extraction and reclamation of agricultural land. From ca 1950 onwards the species disappeared successively in many remaining and currently protected mires because the peat cuttings became increasingly overgrown. The future existence of *L. pectoralis* in Switzerland depends on the management of small water bodies in partly exploited mires. It is necessary to regenerate overgrown peat cuttings and to maintain them at early and medium succession stages. Regeneration of partly destroyed bogs by raising the water table can also be helpful." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**6811.** Wildermuth, H. (2007): Anheftung der parasitischen Landmilbe *Leptus* sp. an *Orthetrum coerulescens* (Parasitengona: Erythraeidae; Odonata: Libellulidae). *Libellula* 26(3/4): 207-212. (in German, with English summary). ["In north-eastern Switzerland a population of *O. coerulescens* was found in which four individuals were infested with terrestrial mite larvae. One freshly emerged dragonfly bore 15 mites. Their attachment and behaviour was studied in the laboratory. Some mites were attached on peripheral body parts that are hardly supplied with hemolymph, and no growth could be noted in any individual during three days of observation. It is discussed to what extent the mite's object of attachment is alimentary or possibly mainly phoretic." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**6812.** Wildermuth, H. (2007): Polarotaktische Reaktionen von *Coenagrion puella* und *Libellula quadrimaculata* auf Erdbeerkulturen als ökologische Falle (Odonata: Coenagrionidae, Libellulidae). *Libellula* 26(3/4): 143-



150. (in German, with English summary). ["In north-eastern Switzerland, *C. puella* and *L. quadrimaculata* were found in numbers in July 2006 away from water bodies on a large strawberry field that was covered with shiny black plastic sheets between the plant rows. Both sexes exhibited typical elements of the species-specific reproduction behaviour including oviposition attempts. Obviously, they took the plastic sheets for ponds because such surfaces attract dragonflies like the similarly polarized light reflected from water surfaces. As the dragonflies lost time, energy and possibly also genetic material by their maladaptive habitat choices, they got caught in an ecological trap. In 2007 only few individuals of *C. puella* and no *L. quadrimaculata* were found on the same strawberry field. During sporadic checks of other fields with plastic sheets in the region no dragonflies were observed. Hence, such surfaces obviously attract reproductively active individuals in numbers only under special conditions, perhaps at high population densities. It is assumed that the negative effects of black shiny surfaces on dragonfly populations in a man-modified landscape is probably negligible." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**6813.** Wildermuth, H.; Martens, A. (2007): The feeding action of *Forcipomyia paludis* (Diptera: Ceratopogonidae), a parasite of Odonata imagines. *International Journal of Odonatology* 10(2): 249-255. (in English). ["Females of *Forcipomyia paludis* were studied microscopically during their feeding action on Odonata wings where they were mostly attached to main veins in the basal half of the wings. In some individuals rhythmic nodding of the head was noted. Conspicuously many midges lifted the abdominal tip every one or two minutes and from the anus fast growing gas bubbles appeared that burst after about half a second. We suppose that the insects, having punctured the host's veins with their stout proboscis, sucked much air (as well as haemolymph) from the tracheae which they had to get rid of afterwards. From these observations, combined with further indications, it is inferred that *F. paludis* acts as a true parasite of Odonata and that the association is not only phoretic as previously assumed." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**6814.** Willigalla, C. (2007): Zusammensetzung der Libellenfauna der Stadt Mainz im Zeitraum der letzten 30 Jahre (Insecta: Odonata). *Fauna Flora Rheinland-Pfalz* 11(1): 175-190. (in German, with English summary). [Rheinland-Pfalz, Germany; "In 2006 the NABU-project "Biomonitoring" researched the dragonfly species of the lentic and lotic waters in the city of Mainz. The 18 waters studied served as habitats for 36 dragonfly species. Until now, 23 species had been found in Mainz. Most of the newly detected species can be classified as mediterranean. As representatives of this group *Aeshna affinis*, *Crocothemis erythraea*, *Orthetrum brunneum*, *Sympetrum fonscolombii* and *Sympetrum meridionale* were found in 2006. Whereas there are known populations of the first four species from other regions in Rhineland-Palatinate the record of the Southern Darter is the first rediscovery of this species in Rhineland-Palatinate since 1993. Mediterranean species contribute the main proportion to the dragonfly coenosis (60%). *Aeshna affinis* and *Crocothemis erythraea* also showed the highest abundance at some waters studied. In addition to the mediterranean group, species

typical of lotic waters were observed, e. g. *Gomphus vulgatissimus*, *Gomphus flavipes* and *Onychogomphus forcipatus*. The increased number of species found in 2006 was probably caused by the improved quality of the river Rhine in terms of structure and water chemistry, climatic change and increased intensity of data collection." (Author)] Address: Willigalla, C., Willigalla - Ökologische Gutachten, Am großen Sand 22, D-55124 Mainz, Germany. E-mail: christoph@willigalla.de

**6815.** Wojtal, A.; Frankiewicz, P.; Andziak, M.; Zaleski, M. (2007): The influence of invertebrate predators on *Daphnia* spatial distribution and survival in laboratory experiments: Support for *Daphnia* horizontal migration in shallow lakes - *Internat. Rev. Hydrobiol.* 92(1): 23-32. (in English). ["The behavioural response of *Daphnia cucullata* to the presence of the pelagic invertebrate predator *Leptodora kindtii*, and the predation rate of littoral dragonfly nymphs on this species were investigated under laboratory conditions. Results of this study revealed a strong hiding response of *Daphnia cucullata* in the presence of the predatory cladoceran, *L. kindtii*, which was similar to the response of *Daphnia* in the presence of juvenile perch. This suggests that pelagic invertebrate predators may cause *Daphnia* to hide in the littoral zone which could result in increased exposure to predation by littoral invertebrates. A strong influence of dragonfly nymphs on *D. cucullata*, both in the presence and absence of macrophytes, was found. The average predation rate of Odonata larvae was about 5 prey ind<sup>-1</sup>h<sup>-1</sup> and did not differ significantly between treatments. Quantification of dragonfly pressure on *Daphnia* populations will require cross-verification with field experiments since in the natural conditions *Daphnia* seeks a shelter in the vegetation stands against predation by *Leptodora*, despite the occurrence of odonates." (Authors)] Address: Wojtal, Adrianna, Dept of Applied Ecology, University of Łódź, 90-237 Łódź, Banacha 12/16 Str. Poland. E-mail: adwoj@biol.uni.lodz.pl

**6816.** Worthen, W.B. ; Jones, C.M. (2007): The effects of wind speed, competition, and body size on perch height selection in a guild of Libellulidae species (Odonata). *International Journal of Odonatology* 10(2): 257-272. (in English). ["For eleven species of sympatric libellulids, male mean mass was positively correlated with wing aspect ratio, wing loading, and mean perch height. We tested the hypotheses that perch height selection was governed by interspecific competition or biomechanical responses to increased wind speed at higher perches. Although larger odonates might prefer higher perches to offset their increased wing loading, species' mean perch height did not correlate with changes in mean or maximum wind speeds. Rather, perch height selection is best explained by competitive interactions. Mean mass (log10 transformed) of these species are distributed in a significantly non-random manner, consistent with community-wide character displacement. Also, observations of aggressive interactions and the response to decoys of three abundant species revealed a competitive hierarchy based on body size. *Libellula luctuosa*, the largest species, avoided stations with conspecific decoys but was attracted to stations with the decoys of two smaller species. *L. incesta* avoided stations with larger *L. luctuosa* decoys, but was attracted to stations with smaller *Pachydiplax longipennis* decoys. *P. longipennis* avoided stations with conspecific and *L. incesta* decoys. *L. luctuosa* was also more successful in displacing perchers (82.4%) than *L.*

incesta (68.9%) and *P. longipennis* (46.6%). In pairwise contrasts, the larger species was always more successful at displacing the smaller species. Finally, *P. longipennis* was attacked at significantly higher rates when it perched on high perches than when it perched at lower perches. We conclude that interspecific competition causes niche partitioning of perch height in this community." (Authors)] Address: Worthen, W.B., Dept of Biology, Furman University, Greenville, SC29613 USA. E-mail: worthen@furman.edu

**6817.** Yalçın-Özdilek, S.; Solak, K. (2007): The feeding of European eel, *Anguilla anguilla* L. in the river ASI, Turkey. *Electronic Journal of Ichthyology* 1: 26-34. (in English). ["The feeding behaviour of European eel in the eastern limit of the distribution attained in the river Asi was investigated. Fish were dominant food organisms of eels especially if they are larger than 40 cm in total length. Trichoptera and Odonata larvae were also consumed by eels in the River Asi. It was observed that summer and also spring days are important feeding period for eels in the River Asi. Fish were consumed mostly in rainy seasons when river discharge is remarkably high. However, aquatic invertebrates were consumed mostly in summer days." (Authors)] Address: Yalçın-Özdilek, S., Canakkale Onsekiz Mart University, Education Faculty, Anafartalar Campus, 17100 Çanakkale, Turkey. Email: yalcin.ozdilek@gmail.com

**6818.** Yeh, W.-C.; Chiou, H.-i.; Tang, H.-C.; Wu, J.-H.; Chen, S.-L. (2007): Three species of dragonflies newly recorded to Taiwan. *Endemic species research* 9(2): 53-62. (in Chinese, with English summary). [The paper reports *Sympetrum cordulegaster*, *S. depressiusculum*, and *Rhyothemis fuliginosa*, new to Taiwan. Morphological characters, behaviour, and habitats are briefly described. In addition, colour photographs and identification keys to the species of the genera *Sympetrum* and *Rhyothemis* in Taiwan are provided.] Address: Tang, H.-C., Education Division, Taipei Zoo, Taipei, Taiwan

**6819.** Yu, W.-Y.; Li, Z.-H.; Huang, C.; et al. (2007): The species diversity of Odonata in Lushan, Jiangxi. *Chinese bulletin of entomology* 44(1): 110-115. (in Chinese, with English summary). [China, Lushan and Jiangzi provinces; 52 species were recorded in 2004 and 2005.] Address: Yu, W.-Y., Department of Life Science, Nanjing, Xiaozhuang University, Nanjing, Jiangsu 210017, China. E-mail: ywy138519@1261.com

**6820.** Yu, X.; Bu, W. (2007): Two new species of *Coenagrion* Kirby, 1890, from China (Odonata: Zygoptera: Coenagrionidae). *Zootaxa* 1664: 55-59. (in English). ["Two new species of *Coenagrion* Kirby (*Coenagrion aculeatum*, sp. nov., holotype male, China, Chongqing, Jiangjin, 23-V-2001, deposited in Life Sciences College of Hebei University, Baoding, China; and *C. tengchongensis*, sp. nov., holotype male, China, Yunnan, Tengchong, Zhengding, 1800m, 15-VIII-2006, deposited in Institute of Entomology, Nankai University, Tianjin, China) are described, and diagnostic figures of caudal appendages and genital ligulae are provided." (Authors)] Address: Bu, W., Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, 300071 China. E-mail: wenjunbu@nankai.edu.cn

**6821.** Zessin, W. (2007): Bericht über das 17. Internationale Symposium der Odonatologie in Hongkong, China, vom 31. Juli bis 9. August 2006. *Virgo*, Mitteilungsblatt des Entomologischen Vereins Mecklenburg,

10(1): 5-16. (in German). [extensiv report of the symposium including a documentation of the lectures] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**6822.** Zhou, X.; Zhou, W.-b. (2007): A new species of Protoneuridae and a new species of Coenagrionidae (Odonata) from China. *Entomotaxonomia* 29(1): 1-5. (in Chinese, with English summary). ["The type specimens are deposited in the Zhejiang Museum of Natural History. 1. *Prodasineura huai*, sp. nov.: Measurements (mm): Male: Abdomen+app length 29, hindwing length 18. This species is similar to *Prodasineura theebawi* Fraser, but differs from the latter as follows: 1) labrum blue; 2) abdomen segments 2-7 with complete basodorsal annules; 3) abdomen segments 2-5 with longitudinal yellow stripes on each side. The species is closely allied to *Prodasineura hanzhongensis* Yang, from which it differs by the labrum, base of mandible and genae blue, and antehumeral stripe narrow, not extending to the antear sinus, and penile tips with pair of long horns, and the side of the penile with pair short horns. Holotype: male, Dapu, Cuangdong Province, 08-VII-2004, coll. By ZHOU Wenbao. Etymology: The new species named to honor Prof. Dr. HUA Li-zhong. 2. *Pseudagrion daponshanensis*, sp. nov.: Measurements (mm): Male: Abdomen+app length 30, hindwing length 20. Female: Abdomen+app length 31, hindwing length 23. This species is similar to *Pseudagrion microcephalum* (Rambur), and can be distinguished from the latter by: thorax black on dorsum, with blue a narrow antehumeral stripe; superior anal appendages shorter than inferiors. Holotype: male, Dapanmount, Zhejiang Province, 08-VII-2005, 1 100 m; Paratypes: 3 males, 1 female, same data as holotype." (Authors)] Address: Zhou, W.-b., Zhejiang Museum of Natural History, Hangzhou, Zhejiang 310012, China

**6823.** Zhu, H.-q.; Yang, G.-h.; Wu, T. (2007): A new species of the genus *Perissogomphus* Laidlaw (Odonata: Gomphidae) from Yunnan, China. *Entomotaxonomia* 29(2): 81-84. (in Chinese, with English summary). [Type specimens are deposited in the Dali College, Dali, Yunnan, 671000, China. *Perissogomphus asahinai*, sp. nov.: "The new species is allied to *P. stevensi*, but differs in the following characters: 1) occiput black and with a middle yellow spot; 2) prothorax with the middle lobe black and the yellow spots at middle and side; 3) synthorax grass-green on dorsum and with a black middle stripe, but without a broad M-shaped marking; 4) abdominal segment 10 yellow and with the basal half black on dorsum; 5) superior anal appendages terminal armed with 7-8 small black spines. Length of abdomen: male: 43.0 mm, female: 42.0 mm; length of hind wing: male: 36.5 mm, female: 40.0 mm. Holotype: male, Yang-bi river, Dali City, Yunnan Province, 07-VIII-1999, leg. Yang, Zi-zhong; Paratype: 1 female: Cangshan Mountain, Dali City, Yunnan Province, 03-VI-1998, leg. No. 6. Etymology. The new species is named asahinai in honour of Dr. Syoziro Asahina." (Authors)] Address: Zhu, H.-q., Shanxi University, 42-38, Taiyuan, Shanxi 030006, China

**6824.** Braune, E.; Richter, O.; Sönderath, D.; Suhling, F. (2008): Voltinism flexibility of a riverine dragonfly along thermal gradients. *Global Change Biology* 14: 1-13. (in English). ["Potential effects of future warming should be reflected in life history patterns of aquatic organisms observed in warmer climates or in habitats that are different in ambient temperature. In the special case of the dragonfly *Gomphus vulgatissimus* (L.) (Odonata: Gomphidae) previous research suggests that voltinism decreases from south to north. We analysed data on voltinism from 11 sample sites along a latitudinal gradient from about 44°N to 53°N, comprising small streams to medium-sized rivers. Furthermore, to simulate different conditions and to allow projections for future climate change scenarios, we developed a population dynamic model based on a projection matrix approach. The parameters of the model are dependent on temperature and day length. Our field results indicate a decrease in voltinism along the latitudinal gradient from southern to northern Europe and a corresponding increase of voltinism with higher temperatures. An increase in voltinism with width of the running water implies an effect of varying habitat temperature. Under the impact of global warming, our model predicts an increased development speed, particularly in the northern part of the latitudinal gradient, an extension of the northern range limit and changes in phenology of *G. vulgatissimus*, leading to an extension of the flight season in certain regions along the gradient." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**6825.** Butler, R.G.; deMaynadier, P. (2008): The significance of littoral and shoreline habitat integrity to the conservation of lacustrine damselflies (Odonata). *J. Insect Conserv.* 12(1): 23-36 (in English) ["Human development of pond and lake shorelines may significantly impact native lacustrine biota including a variety of aquatic macroinvertebrate groups. In an effort to better understand the habitat associations and sensitivities of lacustrine damselflies, we sampled adults in littoral macrophyte habitat during two flight periods at 35 randomly selected pond and lake sites in southern Maine during 2000 and 2001. Data were also collected to help characterize water body, shoreline disturbance, and aquatic vegetation at each study site. Nonmetric multidimensional scaling was used for ordination of damselfly assemblages, and coordinates from the most stable solution were related to site variables using forward stepwise multiple regression. Our results suggest that the diversity and composition of damselfly assemblages is related to the abundance and richness of littoral zone macrophytes, extent of riparian disturbance, benthic substrate granularity, and lake productivity; all variables subject to anthropogenic degradation on excessively developed waterbodies. Additionally, we developed a Habitat Tolerance Index useful for distinguishing between relative habitat specialists and generalists from among a diverse assemblage of 19 lacustrine species. Finally, species-specific damselfly associations with multiple genera of floating and emergent macrophytes were assessed using both nonparametric correlation and multiplicative regression yielding significant relationships for 17 species, including two damselflies of

global conservation concern (*Enallagma laterale* and *E. pictum*). We conclude that the protection of littoral and shoreline habitat integrity, with special emphasis on emergent and floating macrophytes, is critical to the conservation of lacustrine biodiversity." (Authors)] Address: Butler, R.G., Department of Natural Sciences, University of Maine at Farmington, 173 High Street, Farmington, Maine 04938, USA. E-mail: butler@maine.edu

**6826.** Campero, M.; De Block, M.; Ollevier, F.; Stoks, R. (2008): Correcting the short-term effect of food deprivation in a damselfly: mechanisms and costs. *Journal of Animal Ecology* 77(1): 66-73. (in English). ["1. Mass at emergence is a life-history trait strongly linked to adult fitness. Therefore, when faced with transient food shortage in the larval stage, mass-correcting mechanisms are common. 2. These correcting mechanisms may carry costs with them. On one hand, these costs may be overestimated because they can be confounded with the direct effects of the transient food shortage itself. On the other hand, costs may be underestimated by ignoring physiological costs. Another largely neglected topic is that correcting mechanisms and costs may critically depend upon other stressors that often co-occur. 3. Here, we identify the mass-correcting mechanisms and their associated costs at emergence in the damselfly *Coenagrion puella*, after being stressed by a transient period of starvation and a subsequent exposure to pesticide stress during the larval stage. We introduce path analysis to disentangle direct costs of starvation and the mass-correcting mechanisms in terms of immune response. 4. As predicted, we found no differences in mass at emergence. Starvation directly resulted in a costly delayed emergence and a decreased immune response at emergence. Mass-correcting mechanisms included a prolonged post-starvation period, reduced mass loss at emergence and compensatory growth, although the latter only in females under pesticide stress. 5. The mass-correcting mechanisms were associated with beneficial effects on investment in immune response, but only in the absence of pesticide stress. Under pesticide stress, these beneficial effects were mostly undone or overruled, resulting in negative effects of the mass-correcting mechanisms in terms of immune response. 6. Our results stress the importance of and introduce a statistical way of disentangling direct costs of starvation and the mass-correcting mechanisms themselves, and the importance of including physiological endpoints in this kind of studies." (Authors)] Address: Campero, Melina, Laboratory of Aquatic Ecology, University of Leuven, Ch. Debériotstraat 32, B-3000 Leuven, Belgium. E-mail: melina.campero@gmail.com

**6827.** Chaves, M.L.; Rieradevall, M.; Chainho, P.; Costa, J.L.; Costa, M.J.; Prat, N. (2008): Macroinvertebrate communities of non-glacial high altitude intermittent streams. *Freshwater Biology* 53(1): 55-76 (in English) ["1. Macroinvertebrate assemblages of five non-glacial intermittent high altitude headwater streams (above 1400m - Serra da Estrela, Portugal), with dry periods of different lengths (0-3?months), were investigated in nearly undisturbed conditions to (i) examine spatial differences and identify environmental variables responsible for the observed invertebrate patterns, (ii) assess the association of dry period length with invertebrate community structure and (iii) determine the influence of using different taxonomic identification levels



(order, family and genus) to assess invertebrate community patterns. 2. More than 100 macroinvertebrate genera were identified. Insects clearly dominated these communities with more than 95% of total captures and around 95% of the total richness. Diptera were the most rich and abundant group with chironomid occurrences comprising over 70% of macroinvertebrate captures. 3. The highest taxon richness, diversity, EPT (Ephemeroptera+Plecoptera+Trichoptera) and OCH (Odonata+Coleoptera+Heteroptera) genus richness, the greatest number of exclusive and characteristic taxa identified by the Indicator Value (IndVal), and a distinct community structure shown by Canonical Correspondence Analyses (CCA), were found in the only stream that was never totally dry, with pools lasting over summer. Environmental gradients that spatially structured the macroinvertebrate communities were always related to flow variations. 4. Over time, the highest abundances found in these systems were also related to flow variations and maximum genus richness occurred in the connected pools or in isolated pools. Streams with longer dry periods presented a distinct recolonization phase, with higher abundance of the stonefly larvae *Nemoura* sp. and the presence of the chironomid larvae *Krenosmittia* sp., possibly arriving from the hyporheos. 5. Taxonomic level of invertebrate identification was vital for recognizing the characteristic taxa (IndVal) of streams yet was not critical for identifying streams with the highest macroinvertebrate richness/diversity or structuring environmental gradients. 6. Overall, this study emphasizes the variability of high altitude intermittent streams macroinvertebrate communities, despite spatial proximity. This variability was probably related to flow intermittency and hydrologic permanence, different vegetation covers and riverbed substrata. Consequently, the establishment of reference conditions should involve long-term data collections and more detailed physical characterization. Also, these findings have significant implications for accurately predicting the ecological consequences of future climate change in high altitude scenarios." (Authors)] Address: Chaves, M.L., Universidade de Lisboa, Faculdade de Ciências, Instituto de Oceanografia, Lisboa, Portugal 2: Departament d'Ecologia, Universitat de Barcelona, Barcelona, España

**6828.** Dijkstra, K.-D. (2008): The Systematist's Muse. two new damselfly species from 'Elisabetha' in the Congo Basin (Odonata: Chlorocyphidae, Platycnemididae). *Zoologische Mededelingen* 82: 15-27. (in English). ["*Platycypha eliseva* spec. nov. and *Mesocnemis saralisa* spec. nov. are described from Lokutu (formerly Elisabetha) in the Democratic Republic of Congo. The taxonomy and distribution of *Platycypha* and *Mesocnemis* are discussed and keys are provided for the males." (Author)] Address: Dijkstra, K.D., Curator of invertebrates, National Zoological Collection of Suriname, University of Suriname, P.O. Box 9212, Paramaribo, Suriname. E-mail: Dijkstra@naturalis.nnm.nl

**6829.** Huang, D.-Y.; Nel, A. (2008): Oldest 'libelluloid' dragonfly from the Middle Jurassic of China (Odonata: Anisoptera: Cavilabiata). *Neues Jahrbuch für Geologie und Paläontologie - Abhandlungen* 246(1): 63-68 (in English) ["*Juralibellula ningchengensis* gen. nov., sp. nov., type species of the new family *Juralibellulidae*, is the oldest record of the clade Cavilabiata. As sister group of the *Neobrachystigmata* in the new clade *Paraneobrachystigmata*, it demonstrates the presence of this relatively much derived subclade in the Middle Ju-

assic, suggesting a great antiquity for the Cavilabiata." (Authors)] Address: Nel, A., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**6830.** Kadoya, T.; Suda, S.; Tsubaki, Y.; Washitan, I. (2008): The sensitivity of dragonflies to landscape structure differs between life-history groups. *Landscape Ecology* 23(2): 149-158 (in English) ["Contrasting life-history strategies of long versus short pre-reproductive phases are known in adult dragonflies of temperate regions. Because the long-phase species spend a longer time in terrestrial habitats such as grasslands or woodlands during their pre-reproductive phase, we hypothesized that long-phase species would be more sensitive to landscape structure than short-phase species. To test this hypothesis, we conducted periodic censuses of adult dragonflies at small man-made ponds. We compared the two above functional groups in terms of the degree to which species occurrence depended on landscape structure. The difference among the two groups was not significant, but occurrence of long-phase species tended to depend on landscape structure. Long-phase species responded to landscape structure at larger spatial scales and showed stronger spatial autocorrelation in their occurrence among sampling ponds than short-phase species." (Authors)] Address: Kadoya, T., Department of Ecosystem Studies, Institute of Agriculture and Life Science, The University of Tokyo, 1-1-1 Yayoi, Bunkyo-ku, Tokyo 113-8657, Japan. Email: kadoya@e-mail.jp

**6831.** Kalkman, V.; Clausnitzer, V.; Dijkstra, K.D.; Orr, A.G.; Paulson, D.R.; Tol, J. van (2008): Global diversity of dragonflies (Odonata) in freshwater. *Hydrobiologia* 595(1): 351-363 (in English) ["Larvae of almost all of the 5,680 species of the insect order Odonata are dependent on freshwater habitats. Both larvae and adults are predators. The order is relatively well studied, and the actual number of species may be close to 7,000. Many species have small distributional ranges, and are habitat specialists, including inhabitants of alpine mountain bogs, seepage areas in tropical rain forests, and waterfalls. They are often successfully used as indicators for environmental health and conservation management. The highest diversity is found in flowing waters in rain forests of the tropics, the Oriental and Neotropical regions being the most speciose. This paper discusses diversity, summarises the biogeography of dragonflies in the different biogeographical regions and gives the total number of species and genera per family per biogeographical region. Examples are given of areas of particular diversity, in terms of areas of endemism, presence of ancient lineages or remarkable recent radiations but no well-based review of areas with high endemism of dragonflies is available so far. The conservation status of dragonflies is briefly discussed. Species confined to small remnants of forest in the tropics are most under threat of extinction by human activities." (Authors)] Address: Kalkman, V.J., Oude Rijnsburgerweg 28, NL-2342 BC Oegstgeest, The Netherlands. E-mail: Kalkman@naturalis.nnm.nl

**6832.** McCauley, S. (2008): Slow, fast and in between: habitat distribution and behaviour of larvae in nine species of libellulid dragonfly. *Freshwater Biology* 53(2): 253-263. (in English). ["1. Activity and microhabitat use are important factors determining species performance in habitats that differ in permanence and spe-

cies composition of top predators. This study examined the relationship between the distribution across a gradient of habitat permanence and an associated transition in the composition of top predators and the behaviour of species of larval dragonflies. It also assessed the relationship between larval behaviour, body size and the duration of the larval stage. In laboratory mesocosms the mobility of the different species was measured, as was the extent to which they associated with artificial vegetation. 2. Species mobility was positively related to their natural occurrence in habitats in which invertebrates or small-bodied fish were the top predators, and negatively related with the frequency with which species co-existed with large-bodied fish, the permanence of the habitat and the length of the larval stage. 3. Rather than falling into strict low and high mobility categories, habitat generalists that occurred across the habitat gradient, co-existing with different top predators, had variable mobility levels. In these generalists, mobility was positively related to how frequently they were found in natural habitats in which invertebrates were the top predators. 4. The extent to which species utilized the artificial vegetation in mesocosms was associated with the length of the larval period but was not associated with mobility or species habitat distribution in the field." (Autho)] Address: McCauley, S.J., Center for Population Biology, 2320 Storer Hall, One Shields Ave., University of California, Davis, CA 95616, U.S.A. E-mail: sjmccauley@ucdavis.edu

**6833.** Mellado Diaz, A.; Suarez Alonso, M.L.; Vidal-Abarca Gutierrez, M.R. (2008): Biological traits of stream macroinvertebrates from a semi-arid catchment: patterns along complex environmental gradients. *Freshwater Biology* 53(1): 1-21 (in English) ["1. The relationships between biological traits of macroinvertebrates and environmental characteristics were investigated in streams with contrasting physical, chemical or landscape level attributes. We used an ordination technique, RLQ analysis, which links an environmental table (R) with traits table (Q) through an abundance table (L) to investigate the relationship between habitat characteristics and biological traits. 2. A major environmental axis explaining the distribution of species and their distinctive biological features was obtained. This axis included variables of anthropogenic pressure (agricultural and urban uses) and natural variability (climatic and geologic) that are strongly intercorrelated in the study area, with a clear spatial component. 3. The attributes of species from frequently disturbed systems (small size, multivoltinism, diapause, ovoviviparity, etc.) were associated with semi-arid areas whereas traits common in more stable and favourable environments (large body size, semi-voltinism, isolated eggs, etc.) were found in upland forested areas. 4. The natural climatic variation was proposed as a disturbance axis of a theoretical habitat templet (driven by the intense hydrological disturbances typical of semi-arid streams), while anthropogenic pressure (mainly intensive agriculture) and high salinity, a natural consequence of geology, was proposed as an adversity axis. Different life-histories associated with contrasting environmental features were superimposed in this habitat templet. 5. The ecological–evolutionary scenario in which stream macroinvertebrates have evolved and by which their communities are organized, is closely linked to disturbance, environmental harshness and human pressure." (Authors) Odonata are treated on the genus level.] Address: Mellado Diaz, A., Departamento de Ecología e Hidrología, Universi-

dad de Murcia, CP 30100 Murcia, Spain. E-mail: amel-lado@um.es

**6834.** Miroglu, A.; Kartal, V. (2008): Additional Notes on the Odonata Fauna of Kurupelit (Samsun, Turkey). *Turk. J. Zool.* 32: 33-41. (in English). [A total of 27 species was collected in the vicinity of Kurupelit, Samsun, Turkey, - situated at the southern slope of Black Sea - between May and October 2002-2005. *Coenagrion scitulum*, *Ischnura elegans ebneri*, *Aeshna affinis*, *Anaciaeschna isosceles antehumeralis*, *Anax parthenope*, *A. ephippiger*, *Libellula depressa*, *L. fulva*, and *Orthetrum brunneum* are new additions to the Odonata fauna of Samsun.] Address: Miroglu, A., Ondokuz Mayıs University, Faculty of Science and Arts, Department of Biology, 55139, Kurupelit, Samsun, Turkey

**6835.** Nakahara, M.; Tsubaki, Y. (2008): Sperm mortality, insemination and fertilization in the damselfly *Ischnura senegalensis*: comparisons between wild and inbred populations. *Journal of Ethology* 26(1): 145-151 (in English) ["Inbreeding can have deleterious effects on individual or population fitness. To avoid fitness reduction, individuals may adopt behavioral or physiological mechanisms to reduce their investment in the production of offspring with genetically similar mates. We examined whether insemination by inbred males introduced more dead sperm than insemination by wild males by counting sperm in female *Ischnura senegalensis* (Rambur) sperm storage organs. If inbred males inseminated fewer or lowerquality sperm, females would avoid inferior sperm. Our results revealed three features of damselfly inbreeding: insemination failed in a larger proportion of inbred pairs than in wild pairs, inbred pairs showed significantly reduced fertility, and the numbers of live and dead sperm in an inbred female's sperm storage organs did not differ from those in wild females. These results suggested that neither sperm quantity nor sperm quality was responsible for low fertility to a significant extent, but some kind of female quality, such as sperm usage or storing ability, was. Although inbred pairs had lower fertility, there were no significant differences between inbred and wild pairs in the total numbers of live or dead sperm. It thus seemed that female choice at the insemination stage was responsible for low fertility rather than sperm quantity or quality measured by live-to-dead ratio." (Authors)] Address: Nakahara, Miri, National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba, Ibaraki 305-8506, Japan. E-mail: nakahara.miri@nies.go.jp

**6836.** Nel, A.N.; Fleck, G.; Garrouste, R.; Gand, G. (2008): The Odonatoptera of the Late Permian Lodève Basin (Insecta). *Journal of Iberian Geology* 34(1): 115-122. (in English, with Spanish summary). ["The discovery of numerous and very diverse Odonatoptera in the Red Late Permian Lodève Basin questions its current reconstructions of a dry to very dry palaeoclimate and palaeoenvironment. It rather suggests the presence of more or less permanent water bodies, surrounded by a diversity of terrestrial biotas. The discovery of large to very large Meganeuridae contradicts the alleged relations between the decrease of body and wing sizes of the insects during the late Permian as a direct consequence of the decrease of the oxygen atmospheric concentrations at that time." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**6837.** Pilgrim, E.M.; von Dohlen, C.D. (2008): Phylogeny of the Sympetrinae (Odonata: Libellulidae): further evidence of the homoplasious nature of wing venation. *Systematic Entomology* 33(1):159-174 (in English) ["Sympetrinae is the largest subfamily of the diverse dragonfly family Libellulidae. This subfamily, like most libellulid subfamilies, is defined currently by a few wing venation characters, none of which are synapomorphies for the taxon. In this study, we used DNA sequence data from the nuclear locus elongation factor-1a and the mitochondrial loci 16S and 12S rRNA, together with 38 wing venation characters, to test the monophyly of the Sympetrinae and several other libellulid subfamilies. No analysis recovered Sympetrinae as monophyletic, partly because of the position of Leucorrhinia (of the subfamily Leucorrhiniinae) as a strongly supported sister to Sympetrum (of Sympetrinae) in all analyses. The subfamilies Brachydiplactinae, Leucorrhiniinae, Trameiinae and Trithemistinae were also found not to be monophyletic. Libellulinae was the only subfamily supported strongly as monophyletic. Consistency indices and retention indices of wing venation characters used to define various subfamilies were closer to zero than unity, showing that many of these characters were homoplasious, and therefore not useful for a classification scheme within Libellulidae." (Authors)] Address: Pilgrim, E., U.S. Environmental Protection Agency, Molecular Ecology Research Branch, 26 Martin Luther King Drive, Cincinnati, OH 45268, U.S.A. E-mail: pilgrim.erik@epa.gov

**6838.** Trapero-Quintana, A.D.; Reyes-Rur, B. (2008): Description of the last instar larva of *Erythrodiplax fervida* (Erichson, 1848) (Anisoptera: Libellulidae), with notes on the biology of the species. *Zootaxa* 1672: 66-68. (in English). [The last stage larvae of the genus *Erythrodiplax* have been described for all species from Cuba except for *E. fervida*. The description of the species in this paper is based on records from 17 August, 2007 (an ultimate stage female larva which after eclosion was determined as *E. fervida*) in the outlet of Chalons basin, located north of Santiago de Cuba (20° 04' 13" N / 75° 48' 47" W), and on exuviae from 4 females and 2 males, collected on 4, 5 and 17, August 2007 at the margins of Chalons basin.] Address: Trapero-Quintana, A.D., Departamento de Biología. Universidad de Oriente. Ave. Patricio Lumumba. Santiago de Cuba 90500. Cuba. E-mail: atrapero@cnu.uo.edu.cu

**6839.** van Gossum, H.; Sherratt, T.N. (2008): A dynamical model of sexual harassment in damselflies and its implications for female-limited polymorphism. *Ecological Modelling* 210:1/2: 212-220. (in English). ["Female-limited polymorphism is a widespread phenomenon in damselflies. Typically, one female morph resembles the male (the andromorph), while the alternative morph(s) does not (the gynomorph(s)). Contemporary explanations for the phenomenon vary, but they generally assume that the polymorphism has arisen as a consequence of frequency-dependent selection on females to avoid excessive male harassment. Here, we quantitatively characterise two hypotheses, the learned-mate recognition hypothesis (LMR) and the male mimicry (MM) hypothesis. The LMR proposes that males learn more quickly to attack the more commonly encountered female morph in the population, so that rarer female phenotypes are harassed relatively less. By contrast, the MM proposes that when andromorphs are initially rare compared to males, then they are harassed

less than gynomorphs, due to their morphological similarity to males. We present a parameterised dynamical model of the mating system as a way of quantifying the rate of male harassment of females. We then use this information in a multi-generational model that includes selection via the differential harassment of morphs and genetic drift, as well as between-year variability in damselfly density and sex ratio. The proportions of andromorphs at selective equilibria were analytically identified. While both the LMR and the MM versions of the model predict no consistent change in the equilibrium proportion of andromorphic females with increasing damselfly density, only the MM predicts that the equilibrium proportion of andromorphs should increase with sex ratio. Under low harassment rates (e.g. low population densities and/or low male search rates) selection is absent and female morph frequencies are free to drift. The potential applications of this form of dynamical model for other systems involving sexual harassment are discussed." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**6840.** Zhang, B.; Ren, D.; Pang, H. (2008): *Telmaeshna paradoxica* gen. et sp. nov., a new fossil dragonfly (Insecta: Odonata: Anisoptera) from the Yixian Formation, Liaoning, China". *Zootaxa* 1681: 62-68. (in English). ["*Telmaeshna paradoxica* gen. et sp. nov., is described from the Upper Jurassic to Lower Cretaceous Yixian Formation, near Chaomidian Village, Beipiao City, Liaoning Province, China. It is included in the Anisoptera: Aeshnoptera: Aeshnomorpha: Panaeshnida, on the basis of the following characters: strongly elongated pterostigma; well-defined anal loop and Rspl; undulated RP2, RP3/4 and MA; divided hypertriangle and discoidal triangle; and prolonged gaff. It cannot be assigned to any described extant or extinct family of Panaeshnida, but we refrain from erecting a new family to accommodate it until more features (forewing, body characters) are known. Consequently, this new genus is provisionally retained as family uncertain. Its phylogenetic relationships within Anisoptera are discussed." (Authors)] Address: Ren, Dong, College of Life Sciences, Capital Normal University, Beijing 100037, China. E-mail: rendong@mail.cnu.edu.cn

**6841.** Zhang, B.; Ren, D.; Pang, H. (2008): New dragonflies (Insecta: Odonata: Gomphaeschnidae) from the Yixian Formation in Inner Mongolia, China. *Progress in Natural Science* 18: 59-64. (in English). ["Two fossil dragonflies from the Upper Jurassic to Lower Cretaceous Yixian Formation in Liutiaogou Village, Ningcheng County, Inner Mongolia, China are described and illustrated. They are assigned to two new genera and species, i.e., *Sophoaeschna frigida* gen. et sp. nov. and *Falsisophoaeschna generalis* gen. et sp. nov. within the family Gomphaeschnidae Tillyard & Fraser, 1940. This is the first report of Odonata from Yixian Formation in Inner Mongolia and the second record of fossil Gomphaeschnidae from China." (Authors)] Address: Ren Dong, College of Life Sciences, Capital Normal University, Beijing 100037, China. E-mail: rendong@mail.cnu.edu.cn

Thanks to all who contributed to this issue of OAS!





# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Silberdistelweg 11, D-72113 Ammerbuch, Germany. Tel. ++49 (0)7073 300770; E-mail: martin@lindeboom.de  
Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105;  
E-mail: K.Reinhardt@sheffield.ac.uk  
Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

---

## 1997

**6842.** Clark, T.E.; Samways, M.J. (1997): Sampling arthropod diversity for urban ecological landscaping in a species-rich southern hemisphere botanic garden. *Journal of insect conservation* 1: 221-234. (in English). ["Arthropods were sampled using pitfall traps, sticky traps, sweep netting, Malaise traps and visual sampling at a national botanic garden, KwaZulu-Natal, South Africa, where the taxonomic impediment is great. The aims were to compare two sites, one of native vegetation and the other of mainly exotic plants, to determine the possible localized extent of biodiversity change across the land mosaic, and to test and compare methodologies and indicator taxa and to make recommendations for ecological landscaping of a botanic garden. Species richness and evenness varied considerably with sampling technique used. From results of a single replicate of data from all trapping methods including 821 arthropod species and 3831 individuals, a number of conclusions could be drawn. Trapping procedures such as sweep netting and pitfall traps, which focus on species with restricted mobility and/or host plant requirements, indicated greatest differences in diversity between two closely located sites. Taxa varied in sensitivity to microlandscape, again depending on the extent of their mobility. Cicindelid and carabid beetles were particularly good indicators of habitat disturbance and type. The management recommendations are that in a species-rich urban botanic garden such as this, as many ecotopes as possible should be preserved or created. These should vary in topography, landscape characteristics and vegetation composition, with as much connectivity as possible. This is a feasible blanket approach to give home to a large number of nameless species and morphs. Patches of different ecotopes should not be separated by more than a few metres by expanses of mown lawn which isolates much of the fauna." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**6843.** Donnelly, T.W. (1997): A hybrid *Ophiogomphus*. *Argia* 9(4): 7. (in English). [A female hybrid between likely *Ophiogomphus rupinsulensis* (Walsh 1862) and *O. carolus* Needham 1897 from Massachusetts, USA is

discussed.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**6844.** Forbes, M.; Leung, B.; Schalk, G. (1997): Fluctuating asymmetry in *Coenagrion resolutum* (Hagen) in relation to age and male pairing success (Zygoptera: Coenagrionidae). *Odonatologica* 26(1): 9-16. (in English). ["Recent evidence suggests that fluctuating asymmetry (FA) of characters may index either stress during development of organisms, or be related to fitness of individuals following development. The Authors tested whether wing FA of *C. resolutum* was related to damselfly age and to male pairing success. It was predicted younger individuals should have higher FA on average as compared to older individuals if FA was related to damselfly survival. It was found that younger individuals had higher FA than older individuals over all sampling dates combined. However, this relation was due to the inclusion of one of three comparisons between pre-reproductive and mature insects, and was not a general phenomenon. Wing FA was not related to male pairing success. The results suggest that character FA can be related to fitness measures of damselflies, but not in a highly repeatable way. Data are also provided on seasonal changes in mite parasitism and body size that may relate to our finding FA-fitness relations restricted to one period of the flight season." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**6845.** Forbes, M.R.; Schalk, G.; Miller, J.G.; Richardson, J.M.L. (1997): Male-female morph interactions in the damselfly *Nehalennia irene* (Hagen). *Can. J. Zool.* 75(2): 253-260. (in English, with English and French summaries). ["Several hypotheses concerning factors that favour coexistence of female morphs in damselflies invoke differential attraction to (or harassment of) female morphs from mate-searching ♂♂. We designed experiments to determine whether ♂♂ were differentially attracted to either of two discrete female morphs in *N. irene*. One female morph was similar in colour and pattern to the conspecific male ("androchrome") and the other was dissimilar ("gynochrome"). ♂♂ were indiscriminate in their mating attempts. Overall, ♂♂ were more attracted to gynochrome ♀♀; however, ♂♂ that showed high response intensity to model ♂♂ were

equally likely to grasp models of the gynochrome and androchrome ♀♀. During male–female encounters in the field, androchrome ♀♀ were more likely to chase ♂♂, whereas gynochrome ♀♀ showed more refusal displays. Other direct and indirect evidence suggests that gynochrome ♀♀ may be greater targets of sexual aggression than androchrome ♀♀ while at the pond's edge, but that androchrome ♀♀ more often frequent the pond's edge. Whether or not these differences in behaviour translate into differential costs and benefits of being a particular morph is unknown." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada

**6846.** Land, M.F. (1997): Visual acuity in insects. *Annual Review of Entomology* 42: 147-177. (in English). ["The acuity of compound eyes is determined by interommatidial angles, optical quality, and rhabdom dimensions. It is also affected by light levels and speed of movement. In insects, interommatidial angles vary from tens of degrees in Apterygota, to as little as 0.24 in dragonflies. Resolution better than this is not attainable in compound eyes of realistic size. The smaller the interommatidial angle the greater the distance at which objects — prey, predators, or foliage — can be resolved. Insects with different lifestyles have contrasting patterns of interommatidial angle distribution, related to forward flight, capture on the wing, and predation on horizontal surfaces." (Author) Minimum interommatidial angles for *Anax junius*, *Sympetrum striolatum*, *Austrogomphus guerini*, *Zyxomma obtusum*, *Aeshna grandis*, and *Xanthagrion erythronurum* are documented.] Address: Land, M.F., Sussex Centre for Neuroscience, School of Biological Sciences, University of Sussex, Brighton BN1 9QG, UK

**6847.** Leung, B.; Forbes, M.R. (1997): Fluctuating asymmetry in relation to indices of quality and fitness in the damselfly, *Enallagma ebrium* (Hagen). *Oecologia* 110: 472-477. (in English). ["Fluctuating asymmetry (FA) refers to random deviations from symmetry of otherwise bilaterally symmetric traits. Researchers have hypothesized that FA should be inversely related to individual quality or fitness. In this study, we tested for FA-quality and FA-fitness relations in the damselfly, *Enallagma ebrium* (Hagen). We used wet mass of an individual as a measure of its quality and longevity as a measure of its fitness. Contrary to predictions, we found no relation between FA and quality or fitness, even after we controlled for possible confounding factors, such as measurement error and inadequate sample size." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**6848.** Proess, R.; Baden, R. (1997): Die Libellen der Fließgewässer Luxemburgs. 1. Norden und Westen des Landes (Insecta, Odonata). *Bull. soc. nat. luxemb.* 98: 113-128. (in German, with English summary). [25 localities along of eight rivers in Luxembourg were investigated in 1996. In total, 15 species were recorded.] Address: Proess, R., ECOTOP, 6, rue Gustave Kahnt, L-1851 Luxembourg, Luxembourg. E-mail: ecotop@pt.lu

**6849.** Trockur, B. (1997): Bemerkenswerte Libellenfunde im Kiesweihergebiet bei Remerschen: Wiederfund

von *Epitheca bimaculata* und Erstnachweis von *Anax parthenope* für Luxemburg (Insecta, Odonata). *Bull. soc. nat. luxemb.* 98: 105-112. (in German, with English summary). [A total of 25 species in the gravel pit region near Remerschen, Luxembourg includes *A. parthenope* new to Luxembourg and *E. bimaculata* not recorded since the 1960ies.] Address: Trockur, B., Brückenstr. 25, 66636 Tholey-Hasborn, Germany. E-mail: Bernd-Trockur@gmx.de

## 1998

**6850.** Ashkenazi, S.; Dimentman, C. (1998): Foraging, nesting, and roosting habitats of the avian fauna of the Agmon wetland, northern Israel. *Wetlands Ecology and Management* 6: 169-187. (in English). ["The foraging, nesting and roosting habitats of the avian fauna of a newly created Agmon wetland and surrounding cultivated peat land (5 km<sup>2</sup>) in the Hula Valley, northern Israel, were evaluated (January 1996–February 1997) to assess the value as a habitat and for wildlife tourism. We recorded 180 bird species [...] in different habitats (the lake, shores, cattail and reed-bed stands, trees, temporary inundated areas). The most heavily used habitat for foraging, breeding, and roosting was a large cattail stand in the southern third of the lake. The foraging habitat and diet data of 97 avian species were determined. [...]"] (Authors), and includes *Brachythemis leucosticta*, *Crocothemis erythraea*, *Zygoptera*, and *Calopteryx syriaca*.] Address: Ashkenazi, S., Ecology and Nature Conservation, P.O. Box 1057, Rosh Pinna 12100, Israel

**6851.** Matsura, T.; Nomura, K.; Komatsu, K. (1998): Ecological studies of odonate larvae living in artificial ponds in an urban area: Occurrence of larval *Sympetrum striolatum imitoides* and its life history in primary school swimming pools. *Japanese Journal of Ecology* 48(1): 27-36. (in Japanese, with English summary). ["As a part of a research program on the ecology of odonate larvae inhabiting artificial ponds, we surveyed outdoor swimming pools of primary schools in Kyoto City every late spring. During a 4 year period, 11 species of odonate larvae (*Libellulidae*, *Aeshnidae*, *Gomphidae* and *Coenagrionidae*: 7, 1, 1 and 2 species, respectively) were collected. Only larval *Sympetrum striolatum imitoides* predominated at most swimming pools. We took samples from 4 schools every late spring for 4 years and obtained the annual changes in the numbers of their larvae. This survey revealed that while larval *S. striolatum imitoides* was common in the school pools in Kyoto City, density varied from year to year. To clarify why only larvae of *S. striolatum imitoides* were dominant in the pools, their life cycle was examined at one pool. Larvae of chironomids, mayflies (*Cloeon* dipterum), water bug (*Anisops ogasawarensis*) and diving beetles as well as larval *S. striolatum imitoides* coexisted among detritus on the bottom. Especially chironomid larvae, which are preferred by larval *S. striolatum imitoides*, were present at high density. Most eggs of *S. striolatum imitoides* laid in Autumn hatched by mid winter, then the larvae reached the final instar in late May. We estimated that one third of them became adult before mid June, when the water was drained for pool-cleaning. As a reason for the dominance of larval *S. striolatum imitoides*, the following three traits may have been responsible: (i) their life cycle coincides with the off-sea-

son for the pool, (ii) ♀♀ oviposit directly into the water, and (iii) larval *S. striolatum imitoides* prey on smaller larvae of other species of dragonflies because their eggs hatch earlier than other species." (Authors)] Address: Matsura, T., Department of Biology, Kyoto University of Education, Japan

#### 1999

**6852.** Ermolenko, V. (1999): Description of rare Odonata species. In: Zagorodniuk, I. (Ed.): Invertebrate animals of Ukraine, protected by the Bern Convention. Kyiv. ISBN 966-02-1380-8: 15-24. (in Ukrainian, with English translation of titles). [Blueprints of *Sympecma paedisca*, *Aeshna viridis*, *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis*, *Ophiogomphus cecilia*, and *Stylurus flavipes* are presented together with quite rough maps of distribution of the species in Ukraine. For details see: <http://www.lucanus.org.ua/articles/inverte/bern4-invert.pdf>] Address: not stated

**6853.** Kury, D. (1999): Faszination Libellen. Veröffentlichungen aus dem Naturhistorischen Museum Basel 27: 81 pp. (in German). [The book provides an easy-to-read introduction into biology and ecology of Odonata with some brilliant, original drawings. 78 west and central European species are monographically treated: A colour picture is accompanied by information on morphology, phenology, life cycle, habitat, distribution, and threat.] Address: Naturhistorisches Museum Basel, Augustinerstrasse 2, CH-4001 Basel, Schweiz

#### 2000

**6854.** Catling, P.M.; Brownell, V.R. (2000): Damselflies and dragonflies (Odonata) of Ontario: Resource guide and annotated list. ISBN 0-9682013-1-8: 200 pp. (in English). ["The importance of damselflies and dragonflies in biodiversity protection and environmental monitoring in the province of Ontario required an update to the currently available literature. To satisfy this need, an annotated list of the 168 damselfly and dragonfly taxa recorded in Ontario is presented. For each taxon, notes are provided on conservation status, flight period, habitat, distribution by county and district, and identification. In some cases, ecological and taxonomic information is provided. Temporal and geographic occurrence is discussed and county/district distribution maps are included. Keys and illustrations are included to assist in identification of species recently added to the Ontario fauna. Sources of information are outlined, and a list of references is included that covers Ontario and surrounding regions. Potential additions to the Odonata fauna of Ontario are discussed. Information necessary for participation in counts, surveys and research projects is also presented. This guide is designed to assist both the novice and experienced researcher. It includes information available up to 1999 and the publication of Ontario Odonata, vol. I in 2000, but it does not take into account information published in the latter source." (Authors) Available at: <http://www.ontarioinsects.org/resource%20guide%202000.pdf>] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: [catinggp@agr.gc.ca](mailto:catinggp@agr.gc.ca)

**6855.** Dommangeat, J.-L. (2000): Document technique No 28: La conservation des couleurs et la préparation des libellules destinées à la collection de référence. Bulletin de l'entomofaune 22: 7 pp. (in French). [Advice is provided on the preparation and conservation of colours of voucher specimens.] Address: Dommangeat, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**6856.** Palot, M.J.; Soniya, V.P. (2000): Odonata from Courtallam, Tamil Nadu, southern India. Zoos' Print Journal 15: 301-303. (in English). [4-8 February 2000, Courtallam (Kuttralam, Western Ghats, 8°50' and 9°0' N. and 77° 10' and 77°20' E.), 14 species of Odonata were recorded, and are documented.] Address: Palot, M.J., Zoological Survey of India, Freshwater Biological Station, 1-1-300/B, Ashok Nagar, Hyderabad, Andhra Pradesh 500020, India

**6857.** Polhemus, D. (2000): Aquatic insects of the Wapoga River Area, Irian Jaya, Indonesia. Conservation International. Rapid Assessment Program 14: 37-42. (in English). [In April 1988, 25 Zygoptera species at 18 stations were sampled. These are listed in the appendix 7 of the publication.] Address: Polhemus, D., Dept. of Entomology, MRC 105, Smithsonian Institution, Washington, D.C. 20560, USA. Email: [bugman@bpbm.org](mailto:bugman@bpbm.org)

**6858.** Strong, A.M. (2000): Divergent foraging strategies of two neotropical migrant warblers: implications for winter habitat use. The Auk 117(2): 381-392. (in English). [Jamaica; Ovenbirds (*Seiurus urocapillus*) also preyed - rarely - on Odonata.] Address: Strong, A.M., Dept of Ecology, Evolution and Organismal Biology 310, Dinwiddie Hall, Tulane University, New Orleans, Louisiana 70118, USA

#### 2001

**6859.** Booth, A.J.; McKinlay, B.W. (2001): Spatial aspects of the reproductive and feeding biology of the striped robber, *Brycinus lateralis* (Pisces: Characidae), in the Okavango Delta, Botswana. African zoology 36(1): 31-40. (in English). [Okavango Delta, Botswana. Aspects of the reproductive and feeding biology of two allopatric populations of the striped robber, *Brycinus lateralis* were investigated. *B. lateralis* is an opportunistic micro-carnivore with immature fish feeding predominantly on *Daphnia* species and adults being largely insectivorous. The diet also includes adult and larval Odonata.] Address: Booth, A.J., Dept Ichthyology & Fishery Science, Rhodes University, P.O. Box 94, Grahamstown, 6140 South Africa. E-mail: [t.booth@ru.ac.za](mailto:t.booth@ru.ac.za)

**6860.** Efitre, J.; Chapman, L.J.; Makanga, B. (2001): The inshore benthic macroinvertebrates of Lake Nabugabo, Uganda: seasonal and spatial patterns. African zoology 36(2): 205-216. (in English). ["Lake Nabugabo, Uganda, is a lake of particular interest because of the unusual nature of its benthic macroinvertebrate community. In this study we quantified the spatial and temporal distribution of benthic macroinvertebrates within the lake with a focus on habitat associations in inshore areas. We focused on four inshore habitats: *Nymphaea lotus* / *Nymphaea caerulea* (water lily), *Miscanthidium violaceum*, *Vossia cuspidata* (hippo grass) and forest edge. The most notable characteristic of the Nabugabo fauna was the absence of bivalves and crustaceans and the scarcity of gastropods that made up only 1.8%



of the numerical abundance of the benthos. The numerically dominant taxa were ephemeropterans (77.7%) and dipterans (11.1%). Annelids (5.4%), odonates (2.8%) and trichopterans (1.3%) comprised a much smaller component of the benthic assemblage. Total invertebrate abundance and the abundance of major taxa did not vary significantly across months, but habitat effects were evident. The water-lily habitat was very depauperate, which may reflect the low levels of dissolved oxygen near the sediments in this habitat. Lake Nabugabo is extremely poor in salts, mean conductivity in inshore sites ranging from 22.3 to 26.4  $\mu\text{S}/\text{cm}$  and 22.6 to 37.9  $\mu\text{S}/\text{cm}$  (K25) for surface and bottom waters, respectively. The low conductivity (low concentrations of ions) in Lake Nabugabo may limit colonization by molluscs and crustaceans that, with their calcareous shells or exoskeletons, may require water with a higher mineral content." (Authors)] Address: Chapman, L.J., Dept Zoology, University of Florida, Gainesville, Florida, 32611, USA. E-mail: ljchapman@zoo.ufl.edu

**6861.** El-Moursy, A.; El-Hawagry, M.; Abdel-Dayem, M.; Fadl, H. (2001): Insect diversity in Zaranik Protected Area, North Sinai, Egypt. *The Egyptian Journal of Natural History* 3: 62-80. (in English). [Ischnura senegalensis, Anax parthenope, and Crocothemis erythraea are listed.] Address: El-Moursy, A., Entomology Dept, Faculty of Science, Cairo University Gisa, Egypt

**6862.** Goyaud, C. (2001): Atlas de répartition des Libellules (Odonata) de Vendée (1985-2000). *Le naturaliste Vendéen* 1: 19-35. (in French, with English summary). [40 naturalists contributed to an atlas on the Odonata of the Vendée, France. A map is locating each of the 58 species of Odonata.] Address: Goyaud, C., Coordonnateur de l'Atlas des odonates de Vendée, La Haute Chevallonnaire, F-85310 La Chaize-le-Vicomte, France. E-mail: Christian.goyaud@free.fr

## 2002

**6863.** Emiliyamma, K.G., Radhakrishnan, C. (2002): Additions to the Odonata (Insecta) of Thiruvananthapuram District, Kerala. *Zoos' Print Journal* 17: 914-917. (in English). ["Peters (1981) reported 26 species of Odonata from Thiruvananthapuram District of Kerala State, southern India. The present study is based on the Odonata collections made from this district, during the faunistic surveys conducted by Zoological Survey of India (Western Ghats Field Research Station, Calicut and Southern Regional Station, Chennai) in 1997, 1998 and 2001. As a result of these surveys, 27 species and subspecies of Odonata belonging to 17 genera and seven families could be collected and identified. Of these, 17 species and subspecies are new additions to the Odonata fauna of Thiruvananthapuram District. Accordingly, till date a total of 43 species and subspecies of Odonata are known from this district. A systematic list of all the 43 species recorded from the district and a systematic account of the species collected during the current surveys are provided. The specimens studied are deposited in the faunal depository of the Zoological Survey of India, Kozhikode." (Authors)] Address: Emiliyamma, K.G.

**6864.** Kopij, G. (2002): Food of the Lesser kestrel (*Falco naumanni*) in its winter quarters in South Africa. *Raptor Research* 36(2): 148-152. (in English). [In total, 2050

pellets were collected from Nov. 1997-Feb. 1998. The diet of *F. naumanni* during the non-breeding season was dominated by sun spiders. Orthopterans and beetles were also an important component, together forming 27.5% of the total number of prey items identified and 44.4% of the total wet biomass. Other arthropod groups, such as earwigs, termites, cockroaches, dragonflies (n = 2 specimens) and scolopendras constituted supplementary food. Only a few vertebrate items represented by small mammals were found.] Address: Kopij, G., Raczka 13, 49-137, Korfantow, Poland.

**6865.** Lingenfelder, U. (2002): Untersuchungen zur Libellenfauna im Stadtverband Saarbrücken. Gutachten im Auftrag des Umweltamtes des Stadtverbandes Saarbrücken: 75 pp. (in German). [23 waterbodies in the southern region of the German Federal State of Saarland were investigated in 2001 resulting in a total of 30 odonate species.] Address: Lingenfelder, U., Seebergstraße 1, D-67716 Heltersberg, Germany. E-mail. u.lingenfelder@vr-web.de

**6866.** Rowe, C.; Hopkins, W.A.; Congdon, J.D. (2002): Ecotoxicological implications of aquatic disposal of coal combustion residues in the United States: a review. *Environmental Monitoring and Assessment* 80: 207-276. (in English). ["We provide an overview of research related to environmental effects of disposal of coal combustion residues (CCR) in sites in the United States. Our focus is on aspects of CCR that have the potential to negatively influence aquatic organisms and the health of aquatic ecosystems. We identify major issues of concern, as well as areas in need of further investigation. Intentional or accidental release of CCR into aquatic systems has generally been associated with deleterious environmental effects. A large number of metals and trace elements are present in CCR, some of which are rapidly accumulated to high concentrations by aquatic organisms. Moreover, a variety of biological responses have been observed in organisms following exposure to and accumulation of CCR-related contaminants. In some vertebrates and invertebrates, CCR exposure has led to numerous histopathological, behavioural, and physiological (reproductive, energetic, and endocrinological) effects. Fish kills and extirpation of some fish species have been associated with CCR release, as have indirect effects on survival and growth of aquatic animals mediated by changes in resource abundance or quality. Recovery of CCR-impacted sites can be extremely slow due to continued cycling of contaminants within the system, even in sites that only receive CCR effluents for short periods of time. The literature synthesis reveals important considerations for future investigations of CCR-impacted sites. Many studies have examined biological responses to CCR with respect to Se concentrations and accumulation because of teratogenic and reproductively toxic effects known to be associated with this element. However, the complex mixture of metals and trace elements characteristic of CCR suggests that biological assessments of many CCR-contaminated habitats should examine a variety of inorganic compounds in sediments, water, and tissues before causation can be linked to individual CCR components. Most evaluations of effects of CCR in aquatic environments have focused on lentic systems and the populations of animals occupying them. Much less is known about CCR effects in lotic systems, in which the contaminants may be transported downstream, diluted or concentrated in downstream areas, and accumulated

by more transient species. Although some research has examined accumulation and effects of contaminants on terrestrial and avian species that visit CCR-impacted aquatic sites, more extensive research is also needed in this area. Effects in terrestrial or semiaquatic species range from accumulation and maternal transfer of elements to complete recruitment failure, suggesting that CCR effects need to be examined both within and outside of the aquatic habitats into which CCR is released. Requiring special attention are waterfowl and amphibians that use CCR-contaminated sites during specific seasons or life stages and are highly dependent on aquatic habitat quality during those periods." (Authors) References to odonates *Libellula* sp., *Enallagma* species, and *Plathemis lydia* are made.] Address: 1 University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory, Solomons, Maryland, U.S.A.; 2 University of Georgia, Savannah River Ecology Laboratory, Aiken, South Carolina, USA. E-mail: Rowe@cbl.umces.edu)

**6867.** Storozhenko, S.Yu.; Lelej, A.S.; Kurzenko, N.V.; Tshistjakov, Yu.A.; Sidorenko, V.S. (2002): Insect biodiversity of the Russian far east. *Far Eastern Entomologist* 109: 1-28. (in English, with Russian summary). [Biodiversity at the family level is documented for the Russian far east. Diversity differed across the regions. 84 odonate species are known from Russian far east.] Address: Storozhenko, S.Yu., Institute of Biology and Soil Sciences, Far Eastern Division of the Russian Academy of Sciences, Vladivostok-22, 690022, Russia

**6868.** Vaslin, M. (2002): Reproduction de l'*Anax napolitain*, *Anax parthenope* Sélys 1839, en Vendée. *Le naturaliste Vendéen* 2: 97-98. (in French, with English summary). [A freshly emerged *Anax parthenope* was observed June 17, 2001 on a sand dune in Noirmoutier island, Vendée, France.] Address: Vaslin, M., 7, chemin de l'Agas, 85690 Notre-Dame-de-Monts, France. E-mail: m.vaslin@wanadoo.fr

## 2003

**6869.** Balik, I.; Karasahin, B.; Özkök, R.; Çubuk, H.; Uysal, R. (2003): Diet of Silver Crucian Carp *Carassius gibelio* in Lake Egirdir. *Turkish Journal of Fisheries and Aquatic Sciences* 3: 87-91. (in English). [The diet of *C. gibelio* was investigated from 265 guts collected between March 2001 and March 2002. The 3998 food items were dominated by benthic and planktonic invertebrates such as Gastropods, Dipterans, Cladocerans, Copepods, and Ostracods. *Daphnia* sp. was found in 42.6% of the non-empty gut-samples. *Onychogomphus forcipatus* is said to belong to the gut content.] Address: Balik, I., Fisheries Research Institute, 32500 Egirdir, Isparta, Turkey. E-mail: i.balik@esuae.gov.tr

**6870.** Emiliyamma, K.G., Radhakrishnan, C. (2003): Fauna of protected areas - 4: Odonata (Insecta) of Indira Gandhi Wildlife Sanctuary and National Park, Tamil Nadu. *Zoos' Print Journal* 18: 1264-1266. (in English). [The Indira Gandhi Wildlife Sanctuary and National Park (10°13'08"-10°33'27"N & 76°49'02"-77°21'07"E), occupies an area of 958km<sup>2</sup> at an elevation of 340-2400m along the eastern slope of the Western Ghats in Coimbatore District, Tamil Nadu, India. Fraser (1931) reported 41 species and subspecies of Odonata from Anamalai and Mudis hills. Later, in his Fauna of British

India (1933, 1934 & 1936), Fraser added eight more species of Odonata occurring in the area. The present note deals with 22 species and subspecies of Odonata collected from these protected areas through our surveys. Of these, 10 species and one subspecies are new additions to the Odonata fauna of the area. Thus, altogether 60 species and subspecies are currently known to occur in the Park. A systematic list of all the species of Odonata known till date from this Sanctuary, and a systematic account of the 22 species and subspecies collected during our surveys are provided below. The materials studied are deposited in the faunal depository of the Zoological Survey of India, Southern Regional Station, Chennai." (Authors)] Address: Emiliyamma, K.G., Western Ghats Field Research Station, Zoological Survey of India, Kozhikode, Kerala 673002, India

**6871.** McHattie, S.D.J. (2003): Analysis of data on dispersal in southern damselflies (*Coenagrion mercuriale*). University of Liverpool BSc Zoology BIOL630: Honours Project: 41 pp. (in English). ["*Coenagrion mercuriale* is a rare species within the UK, of particular interest to conservationist groups. It is known that the damselfly is both a poor coloniser and the range over which it will travel is known to be very short. A good understanding of both how good a coloniser this species is and what distance it will travel to achieve this will help to induce more productive conservation of this endangered species; helping to recolonise nearby areas. The main objective of this study was to find correlations between size of area and movement of individuals at ten sites distributed around the Hampshire area in the South of England. Other correlations that were hoped to show relevance were that between population density and movement of individuals; correlations with rate of movement and comparisons between ♂♂ and ♀♀ with respect to distances travelled and rates of movement. It is also intended to bring light upon the issue of how far *C. mercuriale* will travel around its habitat to discover further habitats and breeding grounds. The results show that there are definitely correlations between population density and distances travelled (activity) but there are no significant differences between the studied sites with respect to rates of travel by *C. mercuriale*. It was also shown that there the sex of the individual has a significant effect on the activity of the insect but not on the rate of travel. Also, it was noted that individuals crossed the road between Upper and Lower Crockford with great hesitancy and on no occasion was an individual seen travelling further than just over one and a half kilometres. With this knowledge, and the prospect of further investigation, it is possible to ensure that the conservation of *C. mercuriale* can be maximised and habitats of suitable nature only attempted to be conserved if they are within suitable range of existing habitats." (Author)] Address: [http://www2.warwick.ac.uk/fac/sci/sbdtc/students/2006/stuart\\_mchattie/liverpool.pdf](http://www2.warwick.ac.uk/fac/sci/sbdtc/students/2006/stuart_mchattie/liverpool.pdf)

Potter, J.F. (2003): Book Reviews: Oaks, dragonflies and people: creating a small nature reserve and relating its story to wider conservation issues, Norman W. Moore, 2002. Harley Books, Colchester, UK. 132 pp., ISBN 0-946589-71-2, £15.95 (paperback). *The Environmentalist* 23: 193. (in English). [review] Address: not stated

**6872.** Rothfels, C. (2003): Royal Botanical Gardens odonate count 2003. *Ontario Insects* 9(1): 11-13. (in English). [List of 28 species (556 individuals), sighted on

25-VII-2003, Ontario, Canada.] Address: Rothfels, C.J.; crothfels@rbg.ca

**6873.** Staton, S.K.; Dextrase, A.; Metcalfe-Smith, J.L.; Di Mai, J.; Nelson, M.; Parish, J.; Kilgour, B.; (2003): Status and trends of Ontario's Sydenham river ecosystem in relation to aquatic species at risk. *Environmental Monitoring and Assessment* 88: 283-310. (in English). ["The Sydenham River in southwestern Ontario is located in the Mixedwood Plains Ecozone, which supports the greatest diversity of flora and fauna in Canada. The river historically supported a rich aquatic community that included 80 fishes and 34 species of freshwater mussels. Fourteen aquatic species native to the river (8 fishes, 5 mussels and 1 turtle) have been designated as endangered, threatened, or of special concern by the Committee on the Status of Species at Risk in Canada (COSEWIC). A multi-agency Recovery Team was formed in 1999 to ensure the continued survival of these and other rare species in the river. The Sydenham River Recovery Team is the first in Canada to adopt an ecosystem approach to recovery planning for aquatic species. Information on land use patterns, water quality trends, the physical condition of the river, and the distributions of aquatic species at risk was synthesized to gain an understanding of the overall health of the river and its major anthropogenic stresses. Seven of the species at risk have declined in distribution or abundance, and three may be extirpated. The main threat to fishes and mussels is heavy loadings of sediment, nutrients, and possibly pesticides to the river via tile drainage and overland runoff from agricultural lands. A strategy that incorporates four overall approaches (management, stewardship, research and monitoring, and awareness and outreach) was developed to recover and protect this globally significant freshwater ecosystem." (Authors) Eight species of Odonata considered to be rare in the Province of Ontario are occurring, but are not specified.] Address: Staton, Shawn, Great Lakes Laboratory for Fisheries and Aquatic Sciences, Department of Fisheries and Oceans, 867 Lakeshore Road, Burlington, ON, Canada. E-mail: StatonS@DFO-MPO.GC.CA

**6874.** Valladolid, M.; Przybylski, M. (2003): Feeding ecology of *Cobitis paludica* and *Cobitis calderoni* in Central Spain. *Folia biol. (Kraków)* 51 (Suppl.): 135-141. (in English). ["In total, 253 specimens of *Cobitis paludica* and 163 *Cobitis calderoni* were collected in the Lozoya River (Madrid, Spain) in April, May, July, September and December 1990. Both species showed high percentages of empty guts in all months. *C. paludica* fed mainly on detritus and invertebrates while *Cobitis calderoni* fed on invertebrates and unicellular algae. Preferred prey items were the larvae of Dipterans (Chironomidae, Simuliidae) and microcrustaceans, with Ephemeroptera (Caenis) in summer. *Cobitis calderoni* fed on the most abundant prey except in April and July, when it selected invertebrates. *C. paludica* selected invertebrates throughout all the months. Diet overlapping (Horn's Index) was complete except in September, when the abundance of invertebrates in both diets was similar. For the remaining months, food type (invertebrates, unicellular algae and detritus) abundance differed, minimizing the interspecific competition." (Authors) Benthos samples include *Calopteryx* sp., *Ischnura* sp., *Coenagrion mercuriale*, *Platycnemis acutipennis*, *Aeshnidae*, *Anax* sp., *Cordulegaster* sp., and *Gomphus* sp. Odonata play a minor role as diet.] Address: Valladolid, Maria, Department of Biodiversity and Evolutionary Bio-

logy, National Museum of Natural History (CSIC), c/ Jose Gutierrez Abascal 2, 28006 Madrid, Spain. E-mail: marval@mncn.csic.es

## 2004

**6875.** Anonymous (2004): Additional Observations of Odonata in Ontario during 2002. *Ontario Odonata* 5: 29-35. (in English). [The table contains 334 records in addition to those reported in *Ontario Odonata* 4.] Address: not stated

**6876.** Bracken, B.; Lewis, C. (2004): Odonata of the Britannia Conservation Area (Ottawa-Carleton), Ontario. *Ontario Odonata* 5: 15-22. (in English). ["An annotated checklist of the Odonata of the Britannia Conservation Area (BCA), Canada and immediate environs is presented for the 50 species recorded mainly from 1996 - 2003. This represents a remarkable diversity for such a small geographical area. The conservation area is much less than 1 km<sup>2</sup> with a wetland occupying approx. one fifth of this. It is situated within an urban residential landscape bordered by housing on the west and south sides and the Ottawa River to the north and east, and is 9 km. from Parliament Hill. The proximity to urban development makes this location even more interesting in that 47.2% of the 106 species recorded for Ottawa-Carleton County (OCC) have occurred here during these eight years. Six new records were added in 2003. The majority of species that have been found are common to uncommon in OCC." (Authors)] Address: Bracken, B., 711-1435 Morisset Ave. Ottawa, ON K1Z8H4, Canada. E-mail: gomphid@hotmail.com

**6877.** Bree, D. (2004): Notes on the Odonates of Petroglyphs Provincial Park and area for 2003. *Ontario Odonata* 5: 23-26. (in English). ["Updates to the checklist of the Odonata found at Petroglyphs Provincial Park, Canada during the 2003 field season are presented. Documented are 5 additional species, bringing the total to 78. Included among these five are the provincially uncommon (all ranked S3) *Arigomphus furcifer*, *Cordulegaster diastatops*, *Somatochlora walshii*, and *Nannothemis bella*. Additional documentation of other uncommon and rare species in and near the park is made, including the first confirmed breeding in Ontario of the provincially rare *Progomphus obscurus* (S1). New late and early flight dates for Peterborough County are also presented." (Author)] Address: Bree, D., Box 123, Bloomfield, ON. KOK 1G0, Canada. E-mail: dbree@post.kosone.com

**6878.** Carmichael, I.; MacKenzie, A.; Steinburg, B. (2002; Second edition 2004): Photo field guide to the Dragonflies and Damselflies of southwestern Ontario. The Friends of Pinery Park. ISBN 1-895212-06-5: 72 pp. (in English). [Spiral bound, soft cover, 4x7 inches, 72 pages each with 2 or 3 colour photos, 28 dragonflies and 31 damselflies illustrated. Colour-coded index, checklist, list of species not illustrated. CDN \$8.95, bulk orders \$5.00 each.] Address: The Friends of Pinery Park at: R.R. 2, Grand Bend, Ontario NOM 1T0, Canada. E-mail fopp@oxford.net.

**6879.** Casacuberta, R.M. (2004): Odonatos de Cataluña: catálogo y análisis geográfico. *Boln. Asoc. esp. Ent.* 28(1-2): 55-69. (in Spanish, with English summary). ["Odonata of Catalonia: catalogue and geogra-



phic analysis - This work consists of a critical catalogue of the 65 species of Odonata so far recorded from Catalonia, Spain. The most recent records of five species date back to the first half of the 20th century and the presence of these species in Catalonia, 50 years later, requires confirmation. A zoogeographical analysis was carried out along the lines proposed by St. Quentin and Ocharan. The former states that the Odonata of Catalonia are characterized by western Mediterranean (23.07%), Holomediterranean elements (21.53%) and autochthonous forms with a centre of dispersal in the eastern Mediterranean (15.38%), whilst the latter calculates the proportions as follows: Holomediterranean (23.07%), Ibero-Maghreb (23.07%), Pontic-Oriental (18.46%) and Eurosiberian (13.84%) elements.] Address: not stated

**6880.** Catling, P.M. (2004): Why are Hagenius brevistylus nymphs so distinctive? Ontario Odonata 5: 27. (in English). [Observations made 4 May 2003 along the shores of Burns Lake (45.3120° N -77.0856° W) in Griffith Tp., Renfrew Co., Canada are documented. H. brevistylus known as a "hider" was found under dead birches leaves giving some protection against visual detection by predator. The flattened body is also interpreted as morphological adaptation to use shelter as leaves.] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**6881.** Catling, P.M.; Jones, C.D.; Pratt, P. (2004): Introduction to the year 2003. Ontario Odonata summary; Observations of Odonata in Ontario during 2003. Ontario Odonata 5: 36-122. (in English). [82 observers contributed 4332 records.] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**6882.** Corbet, P.S. (2004): Foreword. Askew R.R. (2004): The Dragonflies of Europe (revised ed.). Harley Books, Colchester. ISBN: 0946589755: 6. (in English). [The foreword highlights some current odonatological events at the beginning of the third millennium.] Address: deceased

**6883.** Czerniawska-Kusza, I. (2004): Use of artificial substrates for sampling benthic macroinvertebrates in the assessment of water quality of large lowland rivers. Polish Journal of Environmental Studies 13(5): 579-584. (in English). [The paper presents the results of a comparative study between two different sampling techniques, i.e. nettings filled with brick as artificial substrates and handnet sampling. Using the Belgian Biotic Index (BBI) method along a stretch of the lower Nysa Kłodzka river (Poland) the method is said to demonstrate water quality changes of the river ecosystem in Poland. Odonata are presented on the genus level. Abstracters note: Considering the different habitat choice of Gomphidae species larvae and considering comparable studies which demonstrate that artificial substrates are rarely used by Gomphidae, it is questionable that this method is sufficient to demonstrate relationships between water quality parameters and Odonata.] Address: Czerniawska-Kusza, Izabela, Uniwersytet Opolski, Katedra Ochrony Powierzchni Ziemi, Oleska 22, PL-45-052 Opole, Poland. E-mail: Izabela.Kusza@uni.opole.pl

**6884.** Hayashi, F.; Dobata, S.; Futahashi, R. (2004): Larval morphology of the Japanese Mnais damselflies

(Odonata: Calopterygidae) distinguished by nuclear DNS (ITS 1) sequences. Tombo 47: 13-24. [A recent phylogenetic study of the Japanese Mnais damselflies (Odonata: Calopterygidae) based on DNA sequences of a nuclear ribosomal internal transcribed spacer 1 (ITS 1) and adult morphology suggested that this genus consists of two closely related species, M. strigata Selys, 1853 and M. costalis Selys, 1869 (Hayashi et al., 2004). In the present paper, we determined the ITS 1 sequence types and compared morphology of larvae. Apparent differences were found only in the shape of the lateral caudal gills, the end of which was greatly protruded in M. costalis (Figs. 1, 2), while only slightly pointed in M. strigata (Figs. 3, 4). In a population of M. strigata (from the Izu Peninsula in Shizuoka Prefecture to southern Yamanashi Prefecture) which has a unique ITS 1 sequence type, the shape of caudal gill ends was variable among individuals and often intermediate between the two species (Fig. 5). Therefore, this population of M. strigata may have a hybrid nature with M. costalis. In the larvae with regenerated gills, however, interspecific differences became unclear, and we must pay attention to identify them (Fig. 6). In the two species, the increase in gill length was greater than that in gill height, and so that larger larvae tended to have more elongated gill lamellae than smaller ones (Fig. 7). (Author)] Address: Hayashi, F., Dept of Biology, Tokyo Metropolitan University, Minamiosawa 1-1, Hachioji, Tokyo 192-0397, Japan. E-mail: fhayashi@comp.metro-u.ac.jp

**6885.** Hildrew, A.G.; Woodward, G.; Winterbottom, J.H.; Orton, S. (2004): Strong density dependence in a predatory insect: large-scale experiments in a stream. Journal of Animal Ecology 73: 448-458. [1. Empirical information about the intergenerational dynamics of stream insects is scarce, and most field experiments are conducted at small temporal and spatial scales that are inappropriate for assessing effects upon population dynamics. We performed a large-scale, intergenerational population manipulation of an abundant, stream-dwelling predator, the alderfly Sialis fuliginosa, by altering its recruitment over 3 consecutive years (it has a 2-year life cycle). 2. Experimental treatments were assigned to three contiguous 150-m stretches. Each year at least 92% of S. fuliginosa eggs, that are laid on the streamside vegetation, were removed from an upstream 'removal' stretch and transferred below an adjacent 'control' stretch to a downstream 'addition' stretch, where recruitment was thus effectively doubled. 3. Although manipulations were successful initially, the effects were transient. Strong density-dependent survival stabilized the population at a similar density in all three stretches within the first 4 months of life for the 1997 cohort and somewhat later for the 1998 cohort. Survey data suggested that intraguild predation (including cannibalism) and/or starvation, particularly early in the life cycle, might be regulating the S. fuliginosa population. 4. It is intriguing that this abundant predator, which is linked very richly within the complex Broadstone Stream food web, has a strongly stabilized population, even in the face of such a dramatic perturbation in recruitment." (Authors) The study includes many references to Cordulegaster boltonii.] Address: Hildrew, A.G., School of Biological Sciences, Queen Mary University of London, London E1 4NS, UK. E-mail: A.Hildrew@qmul.ac.uk

**6886.** Johanning, J. (2004): Libellen im Dinklager Becken. Utkiek (Mitteilungsblatt des Heimatvereins Dinklage von 1934) 31: 28-34. (in German). [Niedersachsen,

Germany; 28 species are briefly commented and some notes on regional human impacts on the odonate fauna are given (including a reference to grass carps). Interesting notes are records of *Erythromma viridulum*, *Gomphus pulchellus*, *Sympetrum fonscolombii*, and *S. flaveolum* covering a period with generally low odonatological activities in Germany. ] Address: not stated

**6887.** Jones, C.D.; Burke, P.S. (2004): Mocha Emerald (*Somatochlora linearis*), new to Ontario and Canada. *Ontario Odonata* 5: 1-4. (in English). ["*S. linearis* is reported from several sites within the Sydenham River watershed in southwestern Ontario, representing the first records for Ontario and Canada. All of the sites where *S. linearis* was found are consistent with the species' preferred habitat elsewhere in its range, suggesting that it is an overlooked resident of the province, rather than a vagrant. This species should be looked for elsewhere in southwestern Ontario, particularly in the extreme southwest and in the Niagara Peninsula region." (Authors)] Address: Jones, C.D., Box 182, Lakefield, Ontario, K0L 2H0, Canada. E-mail: colin.jones@mnr.gov.on.ca

**6888.** Kostiuk, B. (2004): Review - "Photo field guide to the Dragonflies and Damselflies of southwestern Ontario". *Ontario Odonata* 5: 28. (in English). [review] Address: Kostiuk, Brenda, 170 Sanford Ave. Ottawa, Ontario K2C 0E9, Canada

**6889.** Mathews, J.H. (2004): Report on Common Green Darner (*Anax junius*) emergence in Caledon, Ontario, during 2003. *Ontario Odonata* 5: 12-14. (in English). ["A survey of ponds in the Caledon area of southern Ontario, Canada in 2003 did not produce any overwintering *Anax junius* larvae, contrary to expectation based on earlier reports from studies in the 1960s. However overwintering larvae were discovered 70 km to the east. It appears that in some years overwintering may not occur, or may occur to a very limited extent, in parts of southern Ontario." (Author)] Address: Matthews, J.H., University of Texas, Austin, USA. E-mail: johoma@mail.utexas.edu

**6890.** Orr, A.G.; Butler, S.G.; Hämäläinen, M.; Kemp, R.G. (2004): *Insecta: Odonata*. C.M. Yule & Y.H. Sen (eds.): *Freshwater Invertebrates of the Malaysian Region*. ISBN 9834193602: 409-442. (in English). [Concise introduction into morphology of Odonata stressing regional species, and key to larvae and imagines on the family level.] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**6891.** Peacor, S.D.; Werner, E.E. (2004): How dependent are species pair interaction strengths on other species in the food web? *Ecology* 85(10): 2754-2763. (in English). ["In ecological theory species interaction strengths are typically described by constants or functions that depend on the densities of the two interacting species. However, if species' traits (phenotypes) are plastic, then modifications in these traits (induced by the presence of another species) could affect interaction strengths of the focal species with a number of other species in the system. The magnitudes of such higher-order effects on interaction strengths have not been reported and are not straightforward to measure. We present a methodology to quantify changes in consumer-resource interaction coefficients (a metric of in-

teraction strength) due to effects of predators on consumer (i.e., the prey of the predator) phenotype (e.g., nonlethal or trait-mediated effects). Application of this method to studies in diverse systems indicates that predators can strongly reduce consumer-resource interaction coefficients, often in the range of 20–80%. We use analytic and simulation models to show that effects on interaction coefficients of this magnitude can lead to trait-mediated effects that contribute more strongly than density-mediated effects to the net effects of predators on consumers and their resources, and even qualitatively change model predictions. Our results strengthen previous claims that trait-mediated effects strongly influence species interactions and suggest that recent calls to quantify interaction strengths must be broadened to include examination of the variation in interaction strengths due to their dependence on densities of other species (most notably predators) in food webs." (Authors) The study includes Odonata.] Address: Werner, E.E., Department of Biology, University of Michigan, Ann Arbor, MI, 48109 USA.

**6892.** Ramanujam, M.E.; Verzhutskii, B. (2004): Prey of the Indian pipistrelle bat *Pipistrellus coromandra* (Gray) at Auroville, Southern India. *Zoos' Print* 19(12): 1720. (in English). [Odonata contributed 0.74% of the diet of *P. coromandra*.] Address: Ramanujam, M.E.; Pitchandikulam Bio. Resource Ctr. Gratitude Avian Rehabilitation, ECTDEF Project, Auroville, Pondicherry, 605101, India. E-mail: tdef@auroville.org.in

**6893.** Rothfels, C.J. (2004): Unicorn Clubtail (*Arigomphus villosipes*: Gomphidae): new records and summary of status in Ontario. *Ontario Odonata* 5: 5-11. (in English). [Canada; "Six new 2003 records of *A. villosipes* are presented, including new regional records for Halton and York. These new records, combined with new records from 2002, represent an approximate doubling of the known extant or historical records of this rare species in Ontario. These observations are of interest because *A. villosipes* has been considered extremely rare in Ontario and a recent evaluation suggested that it had declined. All known Ontario records are summarized, as are the identification issues and habitat preferences of this *Arigomphus*. Possible explanations for the influx of new records are discussed." (range extension as a result of climatic change) (Author)] Address: Rothfels, C.J.; crothfels@rbg.ca

**6894.** Silva-Santos, P.M.; Oliveira, S.V.; Cortes, R.M. V.; Albuquerque, A.C. (2004): Natural and anthropogenic variations in a channelized water course in Centre of Portugal. *Limnetica* 23(3-4): 257-270. (in English). ["The present study took place in the Mondego River, located in the Centre of Portugal. The lower sector of the river (Lower Mondego) is largely man-made due to regularization and rectification of the channel. The objective was to assess the impacts on the aquatic communities (fishes and benthic invertebrates). Fauna inventories were performed in June and September of 2000 and 2001, together with habitat characterization. Three sampling sites were selected in this segment and compared to a reference site located upstream. It is concluded that the presence of structures such as submerged weirs and riprap, promoted the diversity, due to the physical complexity, which they introduced into the system. The dramatic flood peaks that occurred in the winter of 2000/01 also caused substantial changes in the fluvial dynamics and in the habitats: the large amount of suspended

solids transported resulted in a riverbed of unstable fine materials, and in a subsequent biological impoverishment. However, both communities displayed a high resilience to these changes; the inter-annual differences being obscured by the seasonal ones on macroinvertebrate communities." (Authors) 12 odonate taxa are listed in the appendix.] Address: Silva-Santos, P.M., Lab. Ecologia Aplicada (LEA), Universidade de Trás-os-Montes e Alto Douro, Quinta de Prados, 5000-911, Vila Real, Portugal. Email: pedross@utad.pt

**6895.** Soininen, J.; Könönen, K. (2004): Comparative study of monitoring South-Finnish rivers and streams using macroinvertebrate and benthic diatom community structure. *Aquatic Ecology* 38: 63-75. (in English). ["In southern Finland, most of the rivers are turbid and suffer from eutrophication and leaching of suspended solids from diffuse sources. We first related benthic diatom and macroinvertebrate structure to environmental factors using direct ordination. Second, benthic diatoms and macroinvertebrates were simultaneously sampled in several South-Finnish rivers and streams to compare two monitoring methods. The study sites constituted of some large, moderately nutrient rich rivers and some smaller, less eutrophic streams situated on the south coast of Finland. Diatom species distribution was most affected by conductivity, total P and latitude. Species distribution of macroinvertebrates was mostly related to channel width, conductivity and pH. For diatoms, separation of community structure between sampling stations was clear, but corresponding macroinvertebrate communities were more similar to each other. Correlation between diatom and macroinvertebrate pollution indices was rather low and insignificant  $r = 0.28$ . As a whole, variation of macroinvertebrate index values CV 4.7% among replicate samples was slightly lower than for diatom index CV 6.0%. On the contrary, community similarity between the replicate samples was slightly lower among macroinvertebrates  $r = 0.770$  due probably to their larger local scale spatial variation, sampling of more habitats and lower density compared to diatoms  $r = 0.874$ . In conclusion, multiple pressures affecting the river ecosystems at different spatial and temporal scales should lead to choosing more than one biological monitoring method with clearly identifiable responses." (Authors) *Calopteryx virgo* is included into the analysis.] Address: Soininen, J., Dept of Limnology & Environmental Protection, P.O. Box 65 (Biocenter 3, Viikki), FIN-00014 University of Helsinki, Finland. E-mail: janne.soininen@helsinki.fi

**6896.** Sutherland, D.A.; Oldham, M.J.; Jones, C.D.; Pratt, P.D. (2004): Odonata of Ontario's Hudson Bay Lowland. *Ontario Odonata* 6: 1-11. (in English). [Canada; historical and current data amount the known odonate fauna to 48 species.] Address: Pratt, P.D., 7100 Matchette Rd, La Salle, ON, Canada, N9C 2S3. E-mail: prairie@netcore.ca

**6897.** Urban, M.C. (2004): Disturbance heterogeneity determines freshwater metacommunity structure. *Ecology*, 85(11): 2971-2978. (in English). ["Metacommunity theories, which consider communities as interacting species assemblages connected by dispersal, differ in their assumptions about the importance of interspecific adaptations and environmental heterogeneity as controls of assemblage composition. I assess the relative importance of regional (dispersal) and local (abiotic and biotic environmental variation) processes in explaining

the structure of a freshwater pond metacommunity. Results did not support the hypothesis that dispersal was limited by interpatch distance. Instead, community diversity, composition, and trophic structure were best explained by local environmental variation associated with pond permanence. Many taxa were restricted either to temporary or semipermanent ponds, an outcome that suggests species trade off adaptations to disturbance with those to biotic interactions (species-sorting model) and that refutes the neutral model of interspecific equivalence. However, evidence for high dispersal rates, low-fitness habitats, and high temporal environmental variability indicated that interpatch dispersal also may influence local dynamics through mass effects. These results suggest that integrating the species-sorting and mass-effect niche assembly frameworks will provide a necessary step in the successful application of metacommunity theory.... Both odonates found in the study, *Sympetrum* and *Lestes*, only occurred in ponds containing high (>45%) macrophyte cover. Thus, habitat selection by mobile taxa may be an important means through which species track changes in pond permanence over time." (Author)] Address: Urban, M.C., School of Forestry and Environmental Studies, Yale University, 370 Prospect Street, New Haven, Connecticut 06520 USA. E-mail: urban@nceas.ucsb.edu

## 2005

**6898.** Anonymus (2005): Additional observations of Odonata in Ontario over the period 2001 - 2003. *Ontario Odonata* 6: 43-71. (in English). [Table with detailed record information on app. 100 Canadian species.]

**6899.** Bracken, B.; Lewis, C. (2005): Additions to the Odonata study area of the Britannia Conservation Area, Ottawa, ON. *Ontario Odonata* 6: 14-15. (in English). [Ontario, Canada; new additions are: *Calopteryx aequabilis*, *Enallagma geminatum*, *Gomphus fraternus*, and *Stylurus notatus*.] Address: Bracken, B., 711-1435 Morriset Ave, Ottawa, ON, K1Z 8H4, Canada. E-mail: gomphidbracken@yahoo.ca

**6900.** Bree, D. (2005): Odonate range fluctuations as illustrated by occurrence records of three species from Prince Edward County, Ontario. *Ontario Odonata* 6: 16-20. (in English). [Canada; "The appearance and disappearance of *Ischnura hastata*, *Perithemis tenera*, and *Enallagma anna* in Prince Edward County between 1999 and 2004 is documented. Appropriate habitat for all three species occurs in Prince Edward but the County was beyond the known geographic range of all as of the year 2000. Their sporadic appearance there illustrates odonate occurrence patterns for species at the edge of their range. All three species exhibit very different dispersal characteristics. *I. hastata* routinely appears and disappears at localities, even within its core range. *P. tenera*, while common within its range, is sedentary and was not known to occur outside the Carolinian zone in Ontario prior to 2001. The *E. anna* has been experiencing a recent and rapid range expansion north-eastward. All three species have shown a similar occurrence pattern within Prince Edward County - sudden, unprecedented appearance in suitable habitat, sometimes in numbers suggesting a stable breeding population, then disappearance. It is speculated that winter temperatures may be the deciding factor in preventing permanent colonization of these species in Prince Ed-



ward." (Author)] Address: Bree, D., Box 123, Bloomfield, ON. K0K 1G0, Canada. Email: dbree@kos.net

**6901.** Cating, P.M.; Jones, C.D.; Pratt, P. (2005): Introduction to the year 2004 Ontario Odonata Summary. Observations of Odonata in Ontario during 2004. Ontario Odonata 6: 72-180. (in English). [5831 records of Odonata from 2004 are documented in the database] Address: Cating, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**6902.** Catling, P.M.; Kostiuk, B.; Conner, F. (2005): Odonata collected in the vicinity of the Queen's University Biology Station at Chaffey's Lock. Ontario Odonata 6: 21-30. (in English). [A baseline collection of Odonata for future monitoring was made around Queens University Biology Station, 35 N of Kingston, Ontario, Canada. At present 54 species are known from the region. They are documented in detail.] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**6903.** Catling, P.M. (2005): More on Zebra Mussels on exuviae. Ontario Odonata 6: 40. (in English). [A Zebra Mussel attached to an exuvium of *C. cynosura* was collected downstream from the Outlet River bridge in Sandbanks Provincial Park (43.89198 N, -77.21731 W), Canada on 29 Aug. 2003. The mussel is 8 mm long and suggests that the larvae may have spent a relatively long time in the final stage. The specimen is now in the national collection (CNC).] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**6904.** Catling, P.M. (2005): Observations of possible migration of Common Baskettail, *Epiptera cynosura* (Say), in Ontario and New York. Ontario Odonata 6: 12-13. (in English). [An unidirectional movement of approximately 500 *E. cynosura* was observed on 17-V-1998 on Walpole Island in Lambton County, Ontario, Canada. On June 5, 2004 an additional major northward movement of this species was recorded near Waddington, Louisville County, New York, USA. Some of the migrating specimens were hit by cars when crossing the highway.] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**6905.** Catling, P.M. (2005): Global warming a potential explanation for the extension of known range of *Hetaerina americana*. Ontario Odonata 6: 40-41. (in English). [Four criteria are outlined to assess range changes of Odonata with regard to climatic warming: (1) the possibility of the species having been overlooked should be small. (2) the species should not be strongly associated with new or man-made habitats. (3) the range expansion should not be part of a poorly understood and very broad scale invasion. (4) the geographic distribution of data and loss or alteration of habitat should minimally influence the patterns. Range alterations of *Hetaerina americana* and *Ischnura hastata* are briefly discussed.] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**6906.** Cocroft, R.B.; Rodriguez, R.L. (2005): The behavioral ecology of insect vibrational communication. *BioScience* 55(4): 323-334. (in English). ["Vibrational communication is widespread in insect social and ecological interactions. Of the insect species that communicate using sound, water surface ripples, or substrate

vibrations, we estimate that 92% use substrate vibrations alone or with other forms of mechanical signaling. Vibrational signals differ dramatically from airborne insect sounds, often having low frequencies, pure tones, and combinations of contrasting acoustic elements. Plants are the most widely used substrate for transmitting vibrational signals. Plant species can vary in their signal transmission properties, and thus host plant use may influence signal divergence. Vibrational communication occurs in a complex environment containing noise from wind and rain, the signals of multiple individuals and species, and vibration-sensitive predators and parasitoids. We anticipate that many new examples and functions of vibrational communication will be discovered, and that study of this modality will continue to provide important insights into insect social behaviour, ecology, and evolution." (Authors) Odonata are classified as insect not using vibrations for communication.] Address: Cocroft, R.B., Biological Sciences, University of Missouri-Columbia, Columbia, MO 65211, USA. E-mail: cocrofr@missouri.edu

**6907.** De Marmels, J. (2005): La larva de *Progomphus dorsopallidus* Byers, 1934, (Odonata: Gomphidae), con una clave para identificar las larvas de otras especies del género del norte del Río Orinoco, Venezuela. *Entomotropica* 20(3): 235-238. (in Spanish, with English summary). ["The last instar larva of *Progomphus dorsopallidus* is described and illustrated based on six exuviae obtained from reared specimens. A key to the larvae of six of the eight species of the genus recorded so far from north of the Orinoco River is given." (Author)] Address: De Marmels, J., Inst. Zool. Agrícola, Fac. Agronomía, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com

**6908.** Earley, C. (2005): Gray Jay catching and eating dragonflies. Ontario Odonata 6: 40. (in English). ["A Gray Jay flew onto my still-outstretched hand grabbed the darner that I had captured and took off with it! It ate the dragonfly right in front of us." (Author): Address: E-mail: cearley@uoguelph.ca

**6909.** Foster, R.F. (2005): Review - "Damselflies of the Northeast: A guide to the species of eastern Canada and the northeastern United States". Ontario Odonata 6: 42. (in English). [Review of the book covered as OAS 4844.] Address: Foster, R.F., Northern Bioscience, 363 Vashn Horne Street, Thunder bay, Ontario Canada, P7A 3G3. E-mail: rfoster@tbaytel.net

**6910.** Hanrahan, S.A. (2005): Boris Ivan Balinsky (10 September 1905 – 1 September 1997). *African Entomology* 13(2): 390-392. (in English). [This memorial is attributed to one of the leading South-African odonatologists who in the 1950th and 1960th contributed several important papers to the knowledge of Odonata in southern Africa.] Address: Hanrahan, S.A., Animal, Plant and Environmental Sciences, University of the Witwatersrand, Johannesburg, South Africa. E-mail: shirley@gecko.biol.wits.ac.za

**6911.** Hutchinson, R.; Catling, P.M. (2005): The Canadian National Collection of Dragonflies. Ontario Odonata 6: 31-39. (in English). ["With the increasing focus on dragonflies as environmental indicators, the dragonfly section of the Canadian National Collection is assuming increasing importance. Started in 1886, the collection has grown rapidly and steadily since the 1940s as a

result of a well informed policy of general collecting by a large group of entomologists. The collection includes 14,060 mostly adult specimens on pins and 14,615 polypropylene envelopes with adults and 4,291 larval specimens preserved in alcohol for a grand total of at least 32,966 specimens. Although the collection is 95% Canadian, there is a good representation of material from other parts of the world and it is the best teaching collection in Canada. Within Canada, Ontario, the prairie provinces and Northwest Territories are particularly well represented. Principal collectors are B.E. Bowen (Ontario, Quebec), P.M. Catling (all Canada), D.F.J. Hilton (all Canada), R. Hutchinson (Quebec), J.E.H. Martin (all Canada), M.J. Oldham (Ontario) J.R. Vockeroth (all Canada), E.M. Walker (all Canada) and J.B. Wallis (all Canada). Numerous publications are based on material in the collection, and some actively used databases have been largely derived from collection material. With very broad and extensive Canadian representation, and classification by several experts and some type and cited material, the collection is a major research tool." (Authors) Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**6912.** Kosterin, O.E.; Dubatolov V.V. (2005): A dragonfly (Odonata) collection from the Bol'shekhkhtsirskii State Nature Reserve (Khabarovskii Krai, Russia). *Animal World of the Far East* 5. Fauna of Russian Far East: collected research papers. Volume 5 - Blagoveshchensk State Pedagogical University, Blagoveshchensk: 9-14. (in Russian). [25 species of Odonata are reported for the Bol'shekhkhtsirskii State Natural Reserve and the Bolshoi Ussuriiskii Island (the environs of Khabarovsk). *Sympetrum infuscatum* (Selys, 1883) is for the first time recorded for Khabarovskii Krai Province. In June-September 2004, the second author undertook an expedition to Khabarovskii Krai, mostly in the Bol'shekhkhtsirskii State Nature Reserve, aimed to inventarise the butterfly fauna of this Reserve. Along with butterflies and moths, he collected also Odonata. It should be noted that he did not specially explore any water reserve, collecting took place in woody area and concerned foraging dispersed individuals, mostly ♀♀. Some individuals were attracted by light at night. However, just 66 specimens collected appeared to represent 25 species. This is not many, but any information on exact distribution of odonate species in the southern Far East of Russia is still to be accumulated to correctly outline species ranges, and especially the data on the fauna of Nature reserves are important in view of the goal of Nature protection. So the list of materials collected is published herewith. The specimens are kept in the collection of the Institute of Systematics and Ecology of Animals of the Siberian Division of the Russian Academy of Sciences, Novosibirsk (SZMN)." (Authors) The paper also includes a brief, critical discussion of the species status of the taxon *Cordulia amurensis*.] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**6913.** Piscart, C.; Moreteau, J.-C.; Beisel, J.-N. (2005): Biodiversity and structure of macroinvertebrate communities along a small permanent salinity gradient (Meurthe River, France). *Hydrobiologia* 551: 227-236. (in English) ["Changes in the macroinvertebrate community were investigated over 10 months at four sites along a

19 km salinity gradient (0.21–2.60 g l<sup>-1</sup>) in a sixth-order stream, the Meurthe River, northeastern France. Abiotic characteristics other than salinity were similar between the sites. Macroinvertebrate taxonomic richness decreased by 30% downstream of the 1.4 g l<sup>-1</sup> sites while diversity, evenness or total abundance of taxa did not change along the gradient. In terms of functioning, a slight change in relative abundances of invertebrate feeding groups followed the salinity gradient. Eight invertebrate assemblages occurred within specific salinity distributions were identified. The exotics *Gammarus tigrinus*, *Dreissena polymorpha*, *Corbicula fluminalis* and *Corophium curvispinum*, were more abundant at the highest salinity site. These results suggest that rising salinity concentrations drastically affect the species composition, including favouring exotic species." (Authors)] Address: Beisel, J.-N., UFR SciFA, Laboratoire BFE, Université de Metz, Campus Bridoux, Av. du Général Delestraint, 57070, Metz, France. E-mail: beisel@sciences.univ-metz.fr

**6914.** Rennie, M.D.; Collins, N.C.; Purchase, C.F.; Tremblay, A. (2005): Predictive models of benthic invertebrate methylmercury in Ontario and Quebec lakes. *Can. J. Fish. Aquat. Sci.* 62: 2770-2783. (in English, with French summary). ["Multivariate analyses on benthic invertebrate methylmercury concentrations (MeHg) and water chemistry from 12 Quebec water bodies were used to guide the construction of simple, predictive models of benthic invertebrate [MeHg] in 23 lakes in Ontario and Quebec. Separate predictive models for collector–shredder and predatory benthic invertebrates were constructed using multiple regression and were assessed for their predictive utility by crossvalidation. Predatory benthic invertebrate [MeHg] was negatively related to pH and positively related to dissolved organic carbon (DOC) concentration (cross-validation  $r^2 = 0.31$ ). Collector–shredder [MeHg] was positively related to [DOC] only (cross-validation  $r^2 = 0.13$ ). Predictive utility of our models is similar to or surpasses that observed in previously published zooplankton MeHg models tested against independently collected data. Significant environmental variables and their contribution to the overall explanatory power of benthic invertebrate MeHg models are similar to those found in zooplankton models, suggesting that in both pelagic and benthic food webs, pH and DOC are important indicators of MeHg bioavailability. Although seasonal patterns in invertebrate [MeHg] were examined, none was detected. These models represent an effective means of identifying water bodies of interest for researchers and for reconstructing past benthic invertebrate [MeHg] patterns using archived water chemistry data." (Authors) "Anisoptera" are considered in this study.] Address: Rennie, M.D., Dept of Biology, University of Toronto at Mississauga, 3359 Mississauga Road N., Mississauga, ON L5L 1C6, Canada. E-mail: mrennie@utm.utoronto.ca

**6915.** Rothfels, C.; Catling, P.M. (2005): Major dragonfly migration at Hamilton. *Ontario Odonata* 6: 40. (in English). [*Anax junius*, 7-IX-2004, Hamilton, Ontario, Canada] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**6916.** Santovac, S.; Jovic, M.; Andus, L. (2005): *Sympetrum depressiusculum* (Selys, 1841) new species in the Odonata fauna of Serbia. *Arch. Biol. Sci., Belgrade*, 57 (3): 15-16. (in English). ["A single male of this spe-

cies was collected in the village of Hajdukovo on the banks of the rivulet Kireš near Lake Ludaš (N Serbia) by the first author in July, 2002. During an inspection of the Odonata collection in the Natural History Museum in Belgrade, a female of *S. depressiusculum* was identified. This specimen (NHM 600 Beo 595.7333) was collected by Aleksandra Mladenoviæ on Lake Vlasina in 1990." (Authors)] Address: Santovac, S., City Museum, 23000 Zrenjanin, Serbia and Montenegro

**6917.** Szczęsny, B. (2005): Some groups of benthic invertebrates and the physico-chemical conditions in the streams of the Magurski National Park in the Beskid Niski Mts (Northern Carpathians). *Nature Conservation* 61: 9-27: 9-27. (in English). [Poland; in the framework of a hydrochemical survey between 2001-2003 at 32 sites in the Wisloka river drainage basin (330-790 m a.s.l.) in the Magurski National Park benthos was sampled. The taxa list includes *Gomphus* sp.] Address: Szczęsny, B., Institute of Nature Conservation, Polish Academy of Sciences, Mickiewicza 33, 31-120 Krakow, Poland. E-mail: szczesny@iop.krakow.pl

**6918.** Zessin, W. (2005): Eindrücke vom XVI Internationalen Symposium der Odonatologie (S.I.O.) vom 26. Juli bis 4. August 2004 in Banzkow/Schwerin, Deutschland. *Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 8(1): 5-18. (in German). [The author and organiser of the symposium highlights some impressions from the symposium held in Germany. The paper also includes a list of species caught in the framework of the symposium field trips.] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**6919.** Zivic, I.; Markovic, Z., Ilic, J. (2005): Composition, structure and seasonal dynamics of macrozoobenthos in the Temska and Visocica Rivers (Serbia). *Archives of Biological Sciences* 57(2): 107-118. (in English). ["We investigated macrozoobenthos communities in the Temska and Visocica Rivers at 10 localities during the summer and autumn of 2001. In 46 samplings of quantitative and 10 of qualitative analysis, 101 taxa from 17 groups of macrozoobenthos are identified. The most diverse group is the order Trichoptera (28 species from nine families). Less diverse with (only one species) are Nematomorpha, Hirudinea, Odonata, and Megaloptera. At all of the chosen localities, the most common species are *Elmis aenea* (70.00%), *Ancyclus fluviatilis*, and *Baetis* sp. (60.00%). All those localities on the Visocica and Temska Rivers are very similar. The index of similarity varies from 12.5% (between Vi0 and Te0) to 70.7% (between Te1 and Te2). In the Temska River the Shannon-Weaver diversity index varies from 1.80 (at Te3) to 2.45 (at Te0). In the Visocica River, the highest diversity of macrozoobenthos is at the Vi3 locality (2.59), the lowest at Vi0 (1.40). Less diverse macrozoobenthos communities are found at the Vi0 and Te3 localities. At the same time, these localities have the highest values of Simpson's index (0.35 and 0.34, respectively)." (Authors)] Address: Živic, Ielena, Faculty of Biology, University of Belgrade, 11000 Belgrade, Serbia and Montenegro

## 2006

**6920.** Bennemann, S.T.; Capra, L.G.; Galves, W.; Shibatta, O.A. (2006): Trophic dynamic of *Plagioscion*

*squamosissimus* (Perciformes, Scianidae) in stretches under influence of the Capivara dam (Paranapanema and Tibagi rivers). *Iheringia Serie Zoologia* 96(1): 115-119. (in Portuguese, with English summary). ["*P. squamosissimus* was studied in five stretches in Paranapanema and Tibagi rivers under the influence of the Capivara reservoir. The samplings were made on a monthly basis during the 1992/1993 and 1994/1995 periods and seasonally during the 2001/2002 period. [...] A total of 993 specimens had their stomach analyzed. [...] The diet composition was compared among sampling periods and among stretches by the similarity analysis using the Bray-Curtis' coefficient. The results indicated that the consumption of food items was uniform in all periods and stretches analysed. The food items found were grouped in six categories: fishes, shrimp, Odonata, Ephemeroptera, other insect groups and "others" (plant material, detritus and rarely-found organisms). In all stretches and during all the studied periods, *P. squamosissimus* presented a carnivorous diet, and during the 2001/2002 period the item shrimp (*Macrobrachium amazonicum*) represented the largest portion of the diet. [...]"] (Authors)] Address: Bennemann, Sirlei T., Univ Estadual Londrina, Ctr Ciencias Biol, Dept Biol Anim. & Vegetal, Program Posgrad Ciencias Biol, BR-86051990 Londrina, PR, Brazil. E-mail: sirlei@uel.br

**6921.** Castillo, L.E.; Martinez, E.; Ruepert, C.; Savage, C.; Gilek, M.; Pinnock, M.; Solis, E. (2006): Water quality and macroinvertebrate community response following pesticide applications in a banana plantation, Limon, Costa Rica. *Science of the Total Environment* 367(1): 418-432. (in English). ["Pesticides used in banana production may enter watercourses and pose ecological risks for aquatic ecosystems. The occurrence and effects of pesticides in a stream draining a banana plantation was evaluated using chemical characterization, toxicity testing and macrobenthic community composition. All nematicides studied were detected in the surface waters of the banana plantation during application periods, with peak concentrations following applications. Toxicity tests were limited to the carbofuran application and no toxicity was observed with the acute tests used. However, since pesticide concentrations were generally below the lowest LC50 value for crustaceans but above calculated aquatic quality criteria, there remains a risk of chronic toxicity. Accurate ecological assessments of pesticide use in banana plantations are currently limited by the lack of local short-term chronic toxicity tests and tests using sensitive native species. Relatively constant levels of four pesticides (imazalil, thiabendazole, chlorpyrifos and propiconazole), which had toxic effects according to the 96h hydra and 21d daphnia chronic test, were recorded in the effluent of the packing plant throughout the study, indicating that the solid waste trap used in this facility was not effective in eliminating toxic chemicals. Certain taxa, such as *Heterelmis* sp. (Elmidae), *Heteragrion* sp. (Megapodagrionidae, Odonata), *Caenis* sp. (Caenidae, Ephemeroptera), and *Smicridea* sp. (Hidropsychidae, Trichoptera), were more abundant at reference sites than in the banana farm waters, and may be good candidates for toxicity testing. Multivariate analyses of the macroinvertebrate communities clearly showed that the banana plantation sites were significantly different from the reference sites. Moreover, following the pesticide applications, all the banana plantation sites showed significant changes in community composition, with the same genera being affected at all sites and for all pesticides (terbufas, cadusafos and car-



bofuran). Consequently, the results presented here show that multivariate analysis of community composition was more sensitive in distinguishing pesticide effects than the toxicity tests and richness and composition measures used. We conclude that monitoring macroinvertebrate communities can be a powerful tool in the assessment of ecological effects of banana production." (Authors)] Address: Castillo, Luisa Eugenia, Univ. Nacl. Cent. Amer. Inst. Studies Tox. Subst. IRET, Heredia, Costa Rica. E-mail: lcastill@una.ac.cr

**6922.** Catling, P.M.; Hutchinson, R.; Brunelle, P.M. (2006): Use of saltmarsh by dragonflies (Odonata) in the Baie des Chaleurs region of Quebec and New Brunswick in late summer and autumn. *Canadian Field-Naturalist* 120(4): 413-420. (in English). [nv; "During late summer and autumn, in the Baie des Chaleurs region of Quebec, 18 species of adult dragonflies were recorded during one or more visits of at least 2 hours each to 14 salt marshes. Three species, *Aeshna canadensis*, *Sympetrum danae* and *S. internum*, were present in more than half of the sites. The most abundant species was *S. internum* with over 100 seen at some locations. Adults of several species, including *Aeshna canadensis*, *A. umbrosa*, *Enallagma civile*, *E. hageni*, *Ischnura verticalis*, *Lestes disjunctus*, *Libellula quadrimaculata*, *Sympetrum danae*, *S. internum* and *S. obtrusum*, occurred in relatively high frequencies in both Baie des Chaleurs salt marshes and in those elsewhere in Acadia. Within Baie des Chaleurs observations of emergence and/or presence of larvae, as well as regional abundance, were recorded for *Aeshna canadensis*, *A. umbrosa*, *Ischnura verticalis*, *Sympetrum costiferum*, *S. internum* and *S. vicinum*. Oviposition in salt marsh pools was recorded for *Aeshna canadensis*, *Enallagma civile*, *E. hageni*, *Ischnura verticalis*, *Lestes congener* and *Sympetrum danae*. The salt marsh dragonfly fauna of Baie des Chaleurs is significantly different from that of the rest of Acadia based on frequencies predicted from the latter region. To a large extent this difference is a result of significantly increased use of salt marsh habitat by adults of six species including *Lestes congener*, *Sympetrum danae*, *Aeshna canadensis*, *S. costiferum*, *Lestes disjunctus*, and *S. internum* (in order of decreasing significance) in Baie des Chaleurs in comparison with salt marshes elsewhere in Acadia. Local amelioration of salty conditions in certain salt marshes, superimposed on regional amelioration as a result of protection from storms and saltwater dilution in the Baie des Chaleurs estuary, may contribute to an environment where adaptation can occur or where already tolerant species can exist. Dragonflies use salt marsh habitat on the northeast coast of North America more extensively than is currently documented." (Authors)] Address: Hutchinson, R., 12 Ch. de la Savane, Apartment 12, Gatineau, Québec J8T 1P7 Canada. E-mail: Raymond.hutchinson@sympatico.ca

**6923.** Hevers, J. (2006): Die entomologischen Sammlungen des Staatlichen Naturhistorischen Museums in Braunschweig. *Braunschweiger Naturkundliche Schriften* 7(3): 697-757. (in German, with English summary). ["14 entomological collections of the State Museum of Natural History which can be attributed to specific collectors and 2 collections arranged in 1946-1949 are characterized by origin, amount, and composition: 10 collections concern Lepidoptera, 2 Coleoptera, 2 Diptera, 1 Hymenoptera, and 1 Odonata. This article also gives a short history of the entomological associations

of Braunschweig and presents 18 collectors with their biographies." (Author)] Address: Hevers, J., Staatliches Nat. Hist. Museum, Pockelsstr 10, D-38112 Braunschweig, Germany

**6924.** Hicks, B.J.; Bannon, H.J.; Wells, R D.S. (2006): Fish and macroinvertebrates in lowland drainage canals with and without grass carp. *Journal of Aquatic Plant Management* 44: 89-98. (in English). ["Diploid grass carp (*Ctenopharyngodon idella* L.) were introduced to a lowland Waikato drainage canal at an initial density of 40-80 kg ha<sup>-1</sup> (83-167 fish ha<sup>-1</sup>) to control aquatic macrophytes and improve water flow. A near-by canal was left without grass carp to act as an untreated control. After 7 months, macrophytes occupied 17% of the water column in the treated canal compared to 78% in the untreated canal. Fish and macroinvertebrates in both canals were examined before and after the release of grass carp by sampling with replacement by fyke netting on seven occasions. Brown bull-head catfish (*Ameiurus nebulosus* (Lesueur)) and shortfinned eels (*Anguilla australis* Richardson) comprised most of the resident fish biomass in both canals; however, before grass carp stocking, eels were more abundant than catfish in the treated canal. There was no change in the abundance of resident fish after stocking, but young-of-the-year catfish had greater mortality and grew faster in the treated canal than in the untreated canal. Macroinvertebrates were primarily associated with aquatic macrophytes. Grass carp reduced aquatic macrophyte abundance in the treated canal by about 80%, which by inference reduced the abundance of associated macroinvertebrates, but there was no observed impact of grass carp stocking on the resident fish assemblage. We examined the relationship between head width and fish length, and from this determined that 70% of the grass carp could have escaped through the downstream retention screen. Despite this possibility, grass carp remained in the canal and effectively controlled aquatic macrophytes for 18 months." (Authors) Damselflies were included into the analysis, identifying them in one case as *Xanthocnemis zealandica*. Grass carp ingest macroinvertebrates probably as vicarious intake with the plants on which the macroinvertebrates live.] Address: Hicks, B.J. , Univ. Waikato, Sch. Sci. & Engn, Dept Biol. Sci., Ctr Biodivers. and Ecol. Res., Private Bag 3105, Hamilton, New Zealand. E-mail: b.hicks@waikato.ac.nz

**6925.** Hortwitz, R.J.; Flinders, C. (2006): Bioassessment Integration Study: Systems Ecology evaluation of US EPA Rapid Bioassessment Protocols in New Jersey (Macroinvertebrates, periphyton, fish, and habitat). Patrick Center Project #830, Project Final Report 06-06; submitted to Thomas Belton, Project Manager, New Jersey Department of Environmental Protection, Division of Science, Research and Technology, 401 East State Street, PO Box 409, Trenton, NJ 08608-1501, USA. March 6, 2006: 226 pp. (in English). ["The purpose of this project was to analyze existing fish, macroinvertebrate, and algal data to develop new methods for integrated stream bioassessment protocols. [...] 105 odonate species were seen at sampling stations (Table 3.7.1). *Calopteryx maculata* was the most common species present in 67 of the 68 samples. *Boyeria vinosa*, *Argia moesta*, *Ischnura verticalis*, and *Argia fumipennis* were present in more than 30 samples. All 61 sites had adult odonates present, although only 33 and 38 sites, respectively, had mating and ovipositing species.

Larvae were identified at 17 sites and exuvia at 25 sites. [...] *Cordulegaster obliqua*, *Ophiogomphus mainensis*, *Enallagma recurvatum*, *Stylurus scudderii*, *Libellula auripennis*, *Macromia alleghaniensis*, *E. pictum* were classified as Special Concern, while three species (*Gomphus apomyius*, *Ophiogomphus aspersus*, *Epitheca spinosa*) were classified as threatened. Most species with conservation concerns were collected from fewer than five sites, with only *M. alleghaniensis* and *E. pictum* (special concern) collected from eight sites each. Although the models were not significant ( $p > 0.23$ ), macroinvertebrate metrics and land use variables accounted for 39.3% and 47.6% of the variation in Odonate adult and larvae richness, respectively. Odonate Adult Richness was positively associated with EPA Habitat Scores (Fig. 3.7.1) ( $p=0.087$ ) and Odonate Larvae Richness was positively associated with the abundance of collector-gatherers ( $p=0.098$ ) and scrapers ( $p=0.073$ ) (Fig. 3.7.2). Both richness measures showed positive relationships with normalized macroinvertebrate family richness and Simpson's diversity metrics ( $p=0.040-0.061$ ) (Figs. 3.7.3 and 3.7.4). Regression models predicting species richness of exuvia, oviposition, and mating accounted for 23.9%, 22.3%, and 19.1%. Like larvae richness, exuvia richness was positively associated with scraper abundance while both oviposition and mating richness metrics were positively related to Chiro: EPT metrics. With the exception of odonate adult richness, regression of macroinvertebrate PCs against odonate richness metrics were not significant and did not account for much variation in odonate richness. There was a significant positive relationship between odonate adult richness and MPCA3 ( $p=0.003$ ) and MPCA4 ( $p=0.049$ ) (Fig. 3.7.5) with the model accounting for 18.6% of variation among samples ( $p=0.012$ ). Remaining odonate metric-MPCA regressions were not significant and accounted for less than 8% of variation." (Authors) Address: Horwitz, R.J., Flinders, Camille, Patrick Center for Environmental Research, The Academy of Natural Sciences, 1900 Benjamin Franklin Parkway, Philadelphia, PA 19103-1195, USA

**6926.** Joshi, P.C. (2006): Anthropogenic encroachments and population dynamics of insects in a moist deciduous forest in Uttaranchal, India. *Journal of Applied Bioscience* 32(1): 32-37. (in English). ["The species composition and community structure of insect fauna vis-a-vis various anthropogenic activities in selected habitats of a moist deciduous forest in Uttaranchal, India were studied for a period of two years. Four sites situated at an altitude ranging between 260 to 480 m from mean sea level with a range of anthropogenic activities, viz. a site with no ongoing disturbances, a naturally recovering site (deforested and replanted 25 years back), a moderately disturbed site (lightly grazed by cattle) and a severely disturbed site (artificially reforested and heavily grazed by live stock) were selected. The former three sites were mixed forests, dominated by *Shorea robusta* Gaertn. F and *Mallotus philippinensis* Muell.-Arg., and the latter site was a plantation of *Tectona grandis* Linn. F. All these sites supported a total of 150 species of insects belonging to 48 families and 9 orders. Order Lepidoptera was the most dominant order in terms of number of species and number of individuals recorded. *Eurema hecabe* Linnaeus was the most abundant species. The other abundant species included *Catopsila pomona* Fabricius (Lepidoptera), *Crocothemis servilia* (Drury) (Odonata), *Mylarbis* sp. (Heteroptera), *Catantops humilis humilii* Serv. and *Oxya ve-*

*lox* Fabricius (Orthoptera). *Udaspes folus* Cramer (Lepidoptera: Hesperidae) was the most rare species recorded from the naturally recovering site with no ongoing disturbances. The diversity, evenness, and richness of the sites tracked the intensity of the disturbances, the greatest value being associated with undisturbed site, followed by the naturally recovering site, the moderately disturbed site and, severely disturbed site. In all ecological measures, the effects of disturbances were much greater than the changes associated with seasonality. Thus it appears that insect communities are sensitive to anthropogenic disturbances and their community structure may be a viable diagnostic tool in assessing environmental conditions." (Author)] Address: Joshi, P.C., Gurukula Kangri Univ, Dept Zool & Environm Sci, Haridwar 249404, India. E-mail: prakash127@yahoo.com

**6927.** Kalka, M.; Kalko, E.K.V. (2006): Gleaning bats as underestimated predators of herbivorous insects: diet of *Micronycteris microtis* (Phyllostomidae) in Panama. *Journal of Tropical Ecology* 22: 1-10. (in English). [Anisoptera constituted >10% each of numbers of prey specimens and of biomass of the diet of *M. microtis*.] Address: Kalka, Margareta, University of Berlin (Freie Universität), Department of Zoology, Königin-Luise-Str. 1-3, D-14195 Berlin, Germany

**6928.** Kano, K. (2006): Some notes on dragonflies at Hong Kong. *Yosegaki* 122: 68-69. [*Brachythemis contaminata* and *Orthetrum sabina* displayed a polarotactic reaction along a wet asphalt road by holding territories. Taken from: *Digest Jap. Odonatol. Short Coms.* No. 20, January, 2007]

**6929.** Koperski, P.; Gołub, M. (2006): Application of new regional biotic index APODEMAC, in environmental quality assessment of lowland streams. *Polish Journal of Ecology* 54(2): 311-320. (in English). [This Polish index considers *Calopteryx* sp. and Gomphidae. Address: Koperski, P., Inst. Environm. Protect., Kolektorska 4, PL-01692 Warsaw, Poland. E-mail: Koper@hydro.biol.uw.edu.pl

**6930.** Kovacs, T.; Ambrus, A.; Juhasz, P. (2006): Lárva és exuvium adatok Magyarország Odonata faunájához II.. *Folia historico naturalis musei matraensis* 30: 167-179. (in Hungarian, with English summary). [Larval and exuvial data to the Odonata fauna of Hungary II.] This paper provides 1333 records of 49 species from 228 sites sampled between 2003 and 2006.] Address: Kovacs, T., Matra Mus., Kossuth u. 40, HU-3200 Gyöngyös, Hungary. E-mail: koati@matavnet.hu

**6931.** Kraft, P.G.; Wilson, R.S.; Franklin, C.E.; Blows, M.W. (2006): Substantial changes in the genetic basis of tadpole morphology of *Rana lessonae* in the presence of predators. *Journal of Evolutionary Biology* 19(6): 1813-1818. (in English). ["Predator-induced morphological plasticity is a model system for investigating phenotypic plasticity in an ecological context. We investigated the genetic basis of the predator-induced plasticity in *Rana lessonae* by determining the pattern of genetic covariation of three morphological traits that were found to be induced in a predatory environment. Body size decreased and tail dimensions increased when reared in the presence of preying dragonfly larvae. Genetic variance in body size increased by almost an order of magnitude in the predator environment, and the first genetic principal component was found to be highly significantly different between the two environ-

ments. The across environment genetic correlation for body size was significantly below 1 indicating that different genes contributed to this trait in the two environments. Body size may therefore be able to respond to selection independently in the two environments to some extent." (Authors)] Address: Wilson, R.S., Univ. Queensland, Sch. Integrat. Biol., Brisbane, Qld 4072, Australia. E-mail: r.wilson@uq.edu.au

**6932.** Miller, S.E. (2006): 4.3. Insects of Papua. Marshall, A.J. & Beehler, B.M. (eds.): The Ecology of Papua. Singapore. Periplus Editions: 515-531. (in English). [This is a general account on insect biodiversity of Papua. Odonata are treated citing Lieftinck 1949.] Address: not stated

**6933.** Muenz, T.K.; Golladay, S.W.; Vellidis, G.; Smith, L.L. (2006): Stream buffer effectiveness in an agriculturally influenced area, southwestern Georgia. Responses of water quality, macroinvertebrates, and amphibians. *J. Environ. Qual.* 35: 1924-1938. (in English). ["To determine useful metrics for assessing stream water quality in the Southeastern Coastal Plain, we examined differences among two buffered and three unbuffered streams in an agricultural landscape in southwestern Georgia. Potential indicators included amphibian diversity and abundance, aquatic macroinvertebrate populations, riparian vegetative structure, water quality, and stream physical parameters. Variability among sites and treatments (buffered vs. unbuffered) existed, with sites in the same treatment as most similar, and disturbances from a nearby eroding gully strongly affecting one unbuffered site. Of the invertebrate metrics examined, percentages of clingers, Ephemeroptera-Plecoptera-Trichoptera (EPT), Elmidae (Coleoptera), Crustacea (Decapoda and Amphipoda), and dipterans were found to be possible indicators of stream health for perennial streams within this region. Overall, buffered sites showed higher percentages of sensitive invertebrate groups and showed lower and more stable concentrations of nitrate N, suspended solids, and fecal coliforms (FCs). Percent canopy cover was similar among sites; however, riparian vegetative coverage and percent leaf litter were greatest at buffered sites. No differences in amphibian abundance, presence, and absence within the riparian area were apparent between sites; however, instream larval salamanders were more abundant at buffered streams. In this study, stream buffers appeared to decrease nutrient and sediment loads to adjacent streams, enhancing overall water quality. Selected benthic macroinvertebrate metrics and amphibian abundance also appeared sensitive to agricultural influences. Amphibians show potential as indicator candidates, however further information is needed on their responses and tolerances to disturbances from the microhabitat to landscape levels." (Author) A total of 23840 individual organisms were collected at the five sites including 4 odonate taxa.] Address: Muenz, Tara, J.W. Jones Ecological Research Center, Route 2 Box 2324, Newton, GA 39870, USA. E-mail: tmuenz@jonesctr.org

**6934.** Samways, M. (2006): Astonishing recovery of rare and threatened dragonflies. *Faculty of AgriSciences Newsletter (University of Stellenbosch)* 27: 1-2. (in English). [The rich endemic dragonfly fauna of South Africa has been under threat from invasive alien trees, particularly eucalypts, wattles and pines. The trees shade out the habitat, making it unsuitable for the sun-

loving, endemic species. To deal with the threats from these alien trees, a huge, nation-wide programme has been launched to remove these trees. [...]. Among the species that have made a come-back is *Syncordulia venator*, last recorded on the mountain in 1934. The remarkable *Ecchlorolestes peringueyi*, which has the strange habit of sitting perfectly camouflaged on lichen-covered boulders, has also appeared." (Author) Colour photos of both species are presented.] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**6935.** Samways, M. (2006): Astonishing recovery of rare and threatened dragonflies. *Rostrum* 68: 1. (in English). [Table Mountain, South Africa, *Syncordulia venator*, *Ecchlorolestes peringueyi*] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**6936.** Suzuki, K.; Kawashima, I. (2006): The insects illustrated in Gen'ichiro Narasaka's "Chûgyo-Zufu". *Bull. Nagoya Univ. Museum* 22: 211-247. (in Japanese, with English summary). [Insects treated in the "Chûgyo-Zufu" and illustrated by the anatomist Gen'ichiro NARASAKA (June 15, 1854 - March 19, 1934) include 21 odonate species (immatures and in some cases larvae). These were identified as well as the handwritten Japanese text was annotated by the authors. The following Odonata species were identified: *Ceriagrion melanurum*, *Ischnura senegalensis*, *Mnais nawai*, *Asiagomphus melaenops*, *Gomphus postocularis*, *Nihonogomphus viridis*, *Sinictinogomphus clavatus*, *Trigomphus citimus tabei*, *Trigomphus interruptus* or *T. ogumai*, *Anax nigrofasciatus nigrofasciatus*, *Anax parthenope julius*, *Polycanthagyna melanictera*, *Epithecina marginata*, *Epophthalmia elegans*, *Libellula angelina*, *Lyriothemis pachygastra*, *Nannophya pygmaea*, *Orthetrum albistylum speciosum*, *Orthetrum japonicum japonicum*, *Pseudothemis zonata*, and *Rhyothemis fuliginosa*.] Address: Kawashima, I., 1-50-9 Nagasawa, Yokosuka, Kanagawa, 239-0842 Japan

**6937.** Ternois, V. (2006): L'Orthétrum à stylets blancs *Orthetrum albistylum* (Selys, 1848) dans le Parc naturel régional de la Forêt d'Orient et le Nord-Est aubois: quelques précisions. *Naturelle* 1: 51-54. (in French). [Aube Dept, France; records of *O. albistylum* and *O. cancellatum* between 1998 and 2005 in the "Parc naturel régional de la Forêt d'Orient" are mapped.] Address: Ternois, V., CPIE du Pays de Soulaines, Domaine de Saint-Victor, 10200 Soulaines-Dhuys, France. E-mail: cpie.pays.soulaines@wanadoo.fr

**6938.** Tosh, C.R.; Ruxton, G.D. (2006): Artificial neural network properties associated with wiring patterns in the visual projections of vertebrates and arthropods. *American Naturalist* 168(2): E38-E52. (in English). ["We model the functioning of different wiring schemes in visual projections using artificial neural networks and so speculate on selective factors underlying taxonomic variation in neural architecture. We model the high connective overlap of vertebrates (where networks have a dense mesh of connections) and the less overlapping, more modular architecture of arthropods. We also consider natural variation in these basic wiring schemes. Generally, arthropod networks are as efficient or more efficient in functioning compared to vertebrate networks.



They do not show the confusion effect (decreasing targeting accuracy with increasing input group size), and they train as well or better. Arthropod networks are, however, generally poorer at reconstructing novel inputs. The ability of vertebrate networks to effectively process novel stimuli could promote behavioural sophistication and drive the evolution of vertebrate wiring schemes. Vertebrate networks with less connective overlap have, surprisingly, similar or superior properties compared to those with high connective overlap. Thus, the partial connective overlap seen in real vertebrate visual projections may be an optimal, evolved solution. Arthropod networks with and without whole-cell neural connections within neural layers have similar properties. This indicates that neural connections mediated by offshoots of single cells (dendrites) may be fundamental to generating the confusion effect." (Authors) The paper includes some references to Odonata. Address: Tosh, C.R., Division of Environmental and Evolutionary Biology, Institute of Biomedical and Life Sciences, University of Glasgow, Glasgow G128QQ, UK

**6939.** Toth, S. (2006): The occurrence of the rare *Corulegaster heros* in the Zselic Hill (South Transdanubian Region). *Natura Somogyiensis* 9: 141-144. (in Hungarian, with English summary). [*C. heros* is known from Soproni, Mecsek Mountains and the Őrségi Hills. The new locality in the Zselic Hills expands the known Hungarian distribution significantly.] Address: Toth, S., Széchenyi u. 2, H-8420 Zirc, Hungaria. E-mail: flycatcher@freemail.hu

**6940.** Tulonen, T.; Pihlström, M.; Arvola, L.; Rask, M. (2006): Concentrations of heavy metals in food web components of small, boreal lakes. *Boreal environment research* 11(3): 185-194. (in English). ["The concentrations of heavy metals in different food web components, such as zooplankton, benthic invertebrates and fish, were examined in small humic lakes from southern Finland. Variation in metal concentrations in zooplankton was observed between different lakes and in benthic invertebrates between different animal groups. We found a significant relationship between lakewater pH and Cd concentration in isopods (*Asellus aquaticus*), while no relationship between the humic content of lakewater and Cd or Hg concentrations was observed. Annual variation in Cd, studied over a six-year period, was correlated with the amount of discharge, which indicated the importance of the annual loading of Cd from the catchment in determining accumulation in isopods. The metal concentrations in perch (*Perca fluviatilis*) were higher in a humic and acid lake than in a slightly humic lake and may partly be explained by the varying dietary regime of perch." (Authors) Cd, Cr, and Pb load in Odonata (Coenagrionidae, Libellulidae, Aeshnidae) is documented.] Address: Tulonen, Tiina, University of Helsinki, Lammi Biological Station, Pääjärvent. 320, 16900 Lammi, Finland. E-mail: tiina.tulonen@helsinki.fi

**6941.** Tyagi, P.; Arora, M.P.; Akolkar, P.; Tyagi, R.; Arora, A. (2006): Occurrence of benthic macro-invertebrate families encountered in River Hindon in Uttar Pradesh (India). *Journal of Experimental Zoology India* 9: 209-216. (in English). ["The study includes Odonata."] Address: Tyagi, P., Mahanand Miss Harijan Coll, Dept Zool, Ghaziabad 201001, India

**6942.** Urban, M.C.; Skelly, D.K.; Burchsted, D.; Price, W.; Lowry, S. (2006): Stream communities across a rur-

al-urban landscape gradient. *Diversity and Distributions* 12: 337-350. (in English). ["Rapid urbanization throughout the world is expected to cause extensive loss of biodiversity in the upcoming decades. Disturbances associated with urbanization frequently operate over multiple spatial scales such that local species extirpations have been attributed both to localized habitat degradation and to regional changes in land use. Urbanization also may shape stream communities by restricting species dispersal within and among stream reaches. In this patch-dynamics view, anthropogenic disturbances and isolation jointly reduce stream biodiversity in urbanizing landscapes. We evaluated predictions of stream invertebrate community composition and abundance based on variation in environmental conditions at five distinct spatial scales: stream habitats, reaches, riparian corridors and watersheds and their spatial location within the larger three-river basin. Despite strong associations between biodiversity loss and human density in this study, local stream habitat and stream reach conditions were poor predictors of community patterns. Instead, local community diversity and abundance were more accurately predicted by riparian vegetation and watershed landscape structure. Spatial coordinates associated with instream distances provided better predictions of stream communities than any of the environmental data sets. Together, results suggest that urbanization in the study region was associated with reduced stream invertebrate diversity through the alteration of landscape vegetation structure and patch connectivity. These findings suggest that maintaining and restoring watershed vegetation corridors in urban landscapes will aid efforts to conserve freshwater biodiversity." (Authors) Nine Odonata genera/taxa are listed in the appendix.] Address: Urban, M.C., School of Forestry and Environmental Studies, Yale University, 370 Prospect Street, New Haven, Connecticut 06520 USA. E-mail: urban@nceas.ucsb.edu

**6943.** Werner, E.E.; Peacor, S.D. (2006): Lethal and nonlethal predator effects on an herbivore guild mediated by system productivity. *Ecology* 87(2): 347-361. (in English). ["Indirect effects propagated through intervening species in a food web have important effects on Community properties. Traditionally, these indirect effects have been conceptualized as mediated through density changes of the intervening species, but it is becoming increasingly apparent that those mediated through trait (phenotypic) responses also can be very important. Because density- and trait-mediated indirect effects have different properties, it is critical that we understand the mechanisms of transmission in order to predict how they will interact, and when or where they will be important. In this study, we examined the mechanisms and Consequences of the lethal (density-mediated) and, nonlethal (trait-mediated) effects of a larval odonate predator on a guild of four herbivore species (a larval anuran and three species of snails) and their resources. We also manipulated system productivity in order to explore the effects of environmental context on the transmission of these two types of indirect effects. We show that trait-mediated effects arising from the predator can be very strong relative to density-mediated effects on both the competing herbivores and the species composition and production of their resources. A number of these indirect effects are shown to be contingent on productivity of the system. We further present evidence that trait- and density-mediated indirect effects originating from a predator may be transmitted inde-

pendently through different routes in a food web, particularly when spatial responses of the transmitting prey are involved. Finally, effects on prey growth due to trait responses to the predator varied from negative to positive in predictable ways as a function of time and indirect effects oil the larger food web. These results indicate the important role that trait-mediated indirect effects can play in trophic cascades and keystone predator interactions, and we discuss how the mechanisms involved can be incorporated in theory." (Authors)] Address: Werner, E.E., Dept of Biology, University of Michigan, Ann Arbor, MI, 48109 USA. E-mail: eewerner@umich.edu

**6944.** Wilson, K.D.P.; Tam, R.-w. (2006): *Fukienogomphus choifongae* spec. nov. from Hong Kong and a new record of *Cephalaeschna klotsi* Asahina (Anisoptera: Gomphidae, Aeshnidae). *Odonatologica* 35(1): 81-87. (in English). ["The new species is described from NE New Territories of Hong Kong. (Holotype ♂: Wu Kau Tang, Hong Kong, 14-IV-2004; deposited with the Biodiversity Conservation Division, Agriculture, Fisheries and Conservation Department, Hong Kong). It is compared with the congeners, and notes on larval habitat are given. New records and illustrations of both sexes and exuviae of *C. klotsi* are provided from Ng Tung Chai, central Hong Kong." (Authors)] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton BN1 5DB, E Sussex, UK. E-mail: wilsonkd@ntlworld.com

**6945.** Wissinger, S.A.; McIntosh, A.R.; Greig, H.S. (2006): Impacts of introduced brown and rainbow trout on benthic invertebrate communities in shallow New Zealand lakes. *Freshwater Biology* 51(11): 2009-2028. (in English). ["1. Brown and rainbow trout have been introduced to many inland waters in New Zealand, but research on the impacts on native communities has focused mainly on streams. The purpose of this study was to compare the benthic communities of trout and troutless lakes. Based on previous studies in North America and Europe, we predicted that the benthic biomass, and especially the abundance of large invertebrates, would be lower in lakes with trout as compared to those without. We surveyed the invertebrate fauna of 43 shallow, high-elevation lakes (26 with and 17 without trout) in four geographic clusters on the central South Island and then conducted a detailed quantitative study of invertebrate biomass and community structure in 12 of these lakes. 2. Benthic community composition and diversity of lakes with and without trout were nearly identical and biomass was as high or higher in the lakes with as without trout. There was no evidence that trout have caused local extinctions of benthic invertebrates. Although the proportional abundance of large-bodied aquatic was slightly lower in lakes with than without trout, the abundance of several groups of large-bodied benthic taxa (dragonflies, caddisflies and water bugs) did not differ. 3. Our findings are in contrast to those in North American and Europe where trout introductions into previously troutless lakes have led to declines in the abundance of benthic invertebrates, especially large-bodied taxa. We propose that the modest effects of trout in New Zealand could be explained by (i) the high areal extent of submergent vegetation that acts as a benthic refuge, (ii) low intensity of trout predation on benthic communities and/or (iii) characteristics of the benthic invertebrates that make them relatively invulnerable to fish predation. 4. Regardless of the relative importance of these hypotheses, our results emphasise

that the same invertebrates occurred in all of the lakes, regardless of size, elevation and presence of trout, suggesting habitat generalists dominate the benthic fauna in shallow New Zealand lakes." (Authors)] Address: Wissinger, S.A., Allegheny Coll., Dept Biol., Meadville, PA 16335 USA. E-mail: swissing@allegheny.edu

**6946.** Azpilicueta Amorín, M.; Rey Rañó, C.; Docampo Barrueco, F.; Rey Muñiz, X.L.; Cordero River (2007): A preliminary study of biodiversity hotspots for Odonates in Galicia (NW Spain). *Odonatologica* 36(1): 1-12. (in English). ["The analysis of distribution data of Odonata in NW Spain indicates the presence of 49 species *Macromia splendens*, *Oxygastra curtisii*, *Gomphus graslini* and *Coenagrion mercuriale* are protected under the European Habitats Directive and Spanish Law. Localities of specimens collected between 1978 and 2004 were situated in UTM squares of 10x10 km to produce a map of species richness for the region. Additionally, all localities (UTM 1 x 1 km) where protected and rare species were found are introduced in a GIS system, on a map of the Natura 2000 network of the region. The results indicate that *O. curtisii* and *C. mercuriale* are common in NW Spain. As local rare taxa are identified *Brachytron pratense*, *Aeshna affinis* and *Erythromma viridulum*, because they were found in less than 10 squares, and are also relatively rare in the Iberian peninsula. As areas of special interest are selected those that include all known populations of *M. splendens*, *G. graslinii*, and *B. pratense*, all localities with at least 2 of the 4 protected species, and areas with more than 20 species. This gives a list of 24 hotspots, most of them (15) at least partially included in the Natura 2000 network. Unfortunately the analysis also reveals that the knowledge of this group is clearly fragmentary, with most records concentrated on the coastal region, and very few squares sampled more than 20 times, the minimum to obtain reliable data. Therefore a systematic sampling of the region is needed to properly identify areas with high species richness." (Authors)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**6947.** Barbarin, J.-P.; Bronnec, F.; Boitier, E. (2007): Observations de libellules rares dans le Puy-de-Dôme au cours de la saison 2006 et 2007. *Arvernis* 39-40: 13-20. (in French). [Auvergne, France; records of the following taxa are documented: *Lestes virens vestalis*, *Libellula fulva*, *Anax parthenope*, *Anaciaeschna isoceles*, *Cordulegaster bidentata*, *Leucorrhinia pectoralis*, and *Onychogomphus uncatatus*.] Address: Barbarin, J.-P., Société d'Histoire Naturelle Alcide d'Orbigny, 12 place des écoles, F-63160 Billom, France. E-mail: jp-barbarin@shnao.net

**6948.** Beatty, C.D.; van Gossum, H.; Sherratt, T.N. (2007): *Nesobasis* (Odonata: Zygoptera) species diversity and abundance: notes on an endemic damselfly genus of the island group of Fiji. *Odonatologica* 36(1): 13-26. (in English). ["Compared to other regions in the world, the islands scattered over the south-western Pacific Ocean remain largely unstudied with respect to damselfly biology. Only a few studies have been undertaken and these have been mainly of a taxonomic nature. Here, an overview is presented of the diversity, abundance, distribution and field diagnostic characteristics of species within the Fijian genus *Nesobasis*, one

of the most speciose odonate genera found in any oceanic island group in the world. 24 species (2 undescribed) were encountered during a 2-month visit in the dry season of 2005, collected from Viti Levu and Vanua Levu. This brings the total number of species currently known for the genus to 31 (of which only 21 are at present formally described). Information is provided on species diversity and abundances at the major collecting sites. For both islands the most speciose location harboured 8 species. Abundant species tended to be widespread, while less abundant species were usually restricted in occurrence to a few sites. Included are basic species descriptions and observations on reproductive activities." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp, Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**6949.** Bedjanic, M.; Conniff, K.; & deSilva Wijeyeratne, G. (2007): Dragonflies of Sri Lanka. Eco Holidays, Colombo. ISBN 978-955-1079-15-4: 248 pp. (in English). [A 248 page, A6 sized book, with colour plates for 91 of the 118 species of Dragonflies in Sri Lanka. Free download: <http://www.jetwingeco.com/index.cfm?mid=6&id=57&sid=57&iid=6&section=freedom&list=0>] Address: Bedjanic, M., Kolodvorska 21b, SI-2310 Slovenska Bistrica, Slovenia. E-mail: matjaz.bedjanic@guest.arnes.si

**6950.** Bengen, E.; Ritzau, C.; Johanning, J. (2007): Es tanzt die schöne Libelle: Libellen zwischen Weser und Ems. Schriftenreihe des Landesmuseums für Natur und Mensch Oldenburg 54: 110 pp. (in German). [This book covers a regional dragonfly fauna of 41 species bordered by the rivers Ems and Weser, Niedersachsen, Germany. Each of the species is depicted with a colour photo and locality dates. Some rather traditional introductory information is given, but enriched by some special information on the regional dragonfly names and the origin of these names. Uniquely, each species is accompanied by a poem regarding dragonflies. The lyrics is contributed by Annette von Droste-Hülshof, Goethe, Rilke and many others. This is a quite nice coffee table book, including a few faunistic relevant species (e.g. on *Erythromma viridulum* and *Sympetrum fonscolombii*).] Address: Isensee Verlag, Haarenstr. 20, 26122 Oldenburg

**6951.** Bergou, A.J.; Xu S.; Wang Z.J. (2007): Passive wing pitch reversal in insect flight. *J. Fluid Mech.* 591: 321-337. (in English). ["Wing pitch reversal, the rapid change of angle of attack near stroke transition, represents a difference between hovering with flapping wings and with a continuously rotating blade (e.g. helicopter flight). Although insects have the musculature to control the wing pitch during flight, we show here that aerodynamic and wing inertia forces are sufficient to pitch the wing without the aid of the muscles. We study the passive nature of wing pitching in several observed wing kinematics, including the wing motion of a tethered dragonfly, *Libellula pulchella*, hovering fruitfly, hovering hawkmoth and simplified dragonfly hovering kinematics. To determine whether the pitching is passive, we calculate rotational power about the torsion axis owing to aerodynamic and wing inertial forces. This is done using both direct numerical simulations and quasi-steady fluid force models. We find that, in all the cases studied here, the net rotational power is negative, signifying that the fluid force assists rather than resists the wing pitching. To further understand the generality of these res-

ults, we use the quasi-steady force model to analyse the effect of the components of the fluid forces at pitch reversal, and predict the conditions under which the wing pitch reversal is passive. These results suggest the pitching motion of the wings can be passive in insect flight." (Authors)] Address: Wang, Jane, Dept of Theoretical and Applied Mechanics, Cornell University, Ithaca, NY 14853 USA

**6952.** Bogut, I.; Vidakovic, J.; Palijan, G.; Cerba, D. (2007): Benthic macroinvertebrates associated with four species of macrophytes. *Biologia, Bratislava* 62(5): 600-606. (in English). ["Benthic macroinvertebrates associated with four species of macrophytes (*Nymphoides peltata*, *Ceratophyllum demersum*, *Polygonum amphibium* and *Carex* sp.) were investigated during two growing seasons (2001 and 2002) in the slow-flowing Eonakut Channel in the Kopački rit Nature Park in Croatia. A total of 31 macroinvertebrate taxa were found. *C. demersum*, a submerged plant with dissected leaves, supported the highest macroinvertebrate abundance, almost seven times more than *N. peltata*, a floating plant with undisseminated leaves, which harboured the lowest abundance during the research period. Chironomidae larvae (50–83%) and Oligochaeta (14–46%) were the most abundant groups recorded on all macrophyte species. Water-level fluctuation, because of its influence on the appearance and growth of aquatic vegetation, and the trophic state of water within the macrophyte stands seemed to be the main factors which affected the taxonomic composition and abundance of macroinvertebrates." (Authors) With the exception of *Carex*, all vegetation types were inhabited by odonate larvae.] Address: Bogut, Irella, Department of Biology, University of J. J. Strossmayer, Trg Ljudevita Gaja 6, HR-31000 Osijek, Croatia. E-mail: ibogut@ffos.hr

**6953.** Botelho, M.L.L.A.; Gomiero, L.M.; Braga, F.M.S. (2007): Feeding of *Oligosarcus hepsetus* (Cuvier, 1829) (Characiformes) in the Serra do Mar State Park - Santa Virginia Unit, São Paulo, Brazil. *Braz. J. Biol.* 67: 741-748. (in English, with Portuguese summary). [Odonata contribute significantly to the diet of the fish *O. hepsetus* in the Paraibuna and Grande rivers in the basin of the Paraíba do Sul River.] Address: Gomiero, L.M., Depto de Zoologia, Instituto de Biociências, Universidade Estadual Paulista – UNESP, Av. 24-A, n. 1515, CP 199, CEP 13506-900, Rio Claro, São Paulo, Brazil. E-mail: leanmg@rc.unesp.br

**6954.** Bried, J.T.; Ervin, G.N. (2007): Intraspecific models and spatiotemporal context of size–mass relationships in adult dragonflies. *J. N. Am. Benthol. Soc.* 26(4): 681-693. (in English). ["Length–mass equations are valued for their efficiency and reliability because many animals, including aquatic macroinvertebrates, show predictable correlations between mass and linear body dimensions. Our paper explores overlooked aspects of length–mass applications, including relationships for adult aquatic insects, intraspecific variation, and spatiotemporal context. We analyzed the length–mass relationship in 5 species of adult dragonfly (Anisoptera: Libellulidae: *Erythemis simplicicollis*, *Libellula incesta*, *Lydia*, *Pachydiplax longipennis*, *Perithemis tenera*) during 2 collection periods (early and late summer flight) at 3 study locations in northern Mississippi, USA. Despite narrow ranges in body and wing length, and given that dragonflies gain postemergence mass without associated changes in skeletal size, both body and wing



length showed potential for estimating individual dry mass ( $R^2$  0.5 in most cases). We also found strong associations between dry and wet length and consistent variation in individual dry mass as a percentage of individual wet mass (65% water content) in these samples. Species-level mass estimates from independently derived species-level equations were far more accurate than estimates based on previously published equations for use at higher taxonomic levels (family, order). Patterns of individual mass per unit length generally differed among study locations and, especially, collection periods. Regression models with similar slopes (i.e., similar individual differences in mass per unit length) were susceptible to length-adjusted location or time effects (i.e., elevation differences in the best-fit lines). Our study underscores the importance of intraspecific variation, taxonomic resolution, and spatiotemporal context in length-based modelling of adult dragonfly mass." (Authors)] Address: Bried, J., Mississippi State University, Dept Biol. Sciences, Rm 130 Harned, PO Box GY, Mississippi State, MS 39762, USA. E-mail: jbried@TNC.ORG

**6955.** Buczyńska, E.; Buczyński, P.; Lechowski, I.; Stryjecki, R. (2007): Fish pond complexes as refugia of aquatic invertebrates (Odonata, Coleoptera, Heteroptera, Trichoptera, Hydrachnidia): a case study of the pond complex in Zalesie Kańskie (Central-East Poland). *Nature Conservation* 64: 39-55. (in English). ["In the years 2000 and 2001 selected groups of aquatic invertebrates were studied in the fishpond complex in Zalesie Kańskie (E of Lublin, central-eastern Poland), an area well-known for its nature values. The following taxa were recorded: 45 dragonfly species, 25 waterbug species, 99 beetle species, 35 caddisfly species and 55 water mite species. Based on the groups studied, the aquatic insect fauna occurring in the ponds and in other water bodies and habitats associated with them was characterised. The occurrence of legally protected species included in appendices of the Bern Convention and the Habitats Directive, as well as from Red Lists of Poland and the Lublin region, was analysed – 5, 4, 2, 8, 14 and 13 species were recorded respectively. Based on this data, it was concluded that the fishpond complex in Zalesie Kańskie can serve as a model of an area where fish-breeding does not destabilize the balance of ecosystems – on the contrary, it helps to maintain high natural values and biological diversity. Ways of exploiting this area in a nature-friendly manner were also indicated." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**6956.** Buktenica, M.W.; Girdner, S.F.; Larson, G.L.; McIntire, C.D. (2007): Variability of kokanee and rainbow trout food habits, distribution, and population dynamics, in an ultraoligotrophic lake with no manipulative management. *Hydrobiologia* 574: 235-264. (in English). [Oregon, USA; "Crater Lake is a unique environment to evaluate the ecology of introduced kokanee and rainbow trout because of its otherwise pristine state, low productivity, absence of manipulative management, and lack of lotic systems for fish spawning. Between 1986 and 2004, kokanee displayed a great deal of variation in population demographics with a pattern that reoccurred in about 10 years. We believe that the reoccurring pattern resulted from density dependent growth, and associated changes in reproduction and abund-

ance, driven by prey resource limitation that resulted from low lake productivity exacerbated by prey consumption when kokanee were abundant. Kokanee fed primarily on small-bodied prey from the mid-water column; whereas rainbow trout fed on large-bodied prey from the benthos and lake surface. Cladoceran zooplankton abundance may be regulated by kokanee. And kokanee growth and reproductive success may be influenced by the availability of *Daphnia pulicaria*, which was absent in zooplankton samples collected annually from 1990 to 1995, and after 1999. Distribution and diel migration of kokanee varied over the duration of the study and appeared to be most closely associated with prey availability, maximization of bioenergetic efficiency, and fish density. Rainbow trout were less abundant than were kokanee and exhibited less variation in population demographics, distribution, and food habits. There is some evidence that the population dynamics of rainbow trout were in-part related to the availability of kokanee as prey." (Authors) Odonata were confined to the stomachs of rainbow trout.] Address: Buktenica, M.W., U.S. National Park Service, Crater Lake National Park, PO Box 7, Crater Lake, OR 97604, USA. E-mail: markbuktenica@nps.gov

**6957.** Butler, S.G. (2007): The larva of *Idionyx stevensi* Fraser from Nepal (Anisoptera: Corduliidae). *Odonatologica* 36(3): 285-290. (in English). ["The ♂ larval exuviae is described and illustrated from a freshly emerged individual observed in situ (Shivapuri Hills, Nepal). Comparison is provided with a larva of the same species and exuviae of *I. yolanda* (Malaysia). A note is made on the unusual arrangement of labial setae, which appears to be typical of the genus." (Author)] Address: Butler S.G., Red Willow, All Stretton, Shropshire SY6 GHN, UK. E-mail: sgbutler15@btopenworld.com

**6958.** Campero, M.; Ollevier, F.; Stoks, R. (2007): Ecological relevance and sensitivity depending on the exposure time for two biomarkers. *Environmental Toxicology* 22(6): 572-581. (in English). ["Biomarkers are widely used to assess pesticide stress, but their ecological relevance and exposure time dependent sensitivity is still heavily debated. We studied both aspects in larvae of the damselfly *Coenagrion puella*, comparing the impact of low doses of atrazine, carbaryl, and endosulfan on two key biomarkers (acetylcholinesterase [AChE] activity and fluctuating asymmetry [FA]) and their relationship with life history traits (mortality, development time, growth rate, and body size). Larvae exposed to the pesticides had, in general, longer development times. Size, growth rate, and mortality were not affected by any of the pesticides. In the long-term exposure, AChE activity was diminished by atrazine treatments and stimulated by carbaryl treatments, and was not affected in the endosulfan treatments. FA decreased with increasing endosulfan concentrations and showed no reaction to atrazine or carbaryl. Overall, short-term exposure tended to overestimate the results of long-term exposure decreasing growth rates and enhancing inhibition of AChE activity in atrazine and carbaryl treatments. In line with its ecological relevance, relationship between biomarkers and life history traits showed that AChE inhibition was positively correlated with mortality, while FA was traded off with size. These results show that caution should be exerted when using these biomarkers to assess pesticide pollution in field situations." (Authors)] Address: Campero, Melina, Katholieke Universiteit Leuven, Laboratory of Aquatic Ecology, Char-

les Deberiotstraat 32, B-3000, Leuven, Belgium. E-mail: camperop@supernet.com.be

**6959.** Catling, P.M.; Kostiuk, B.; Lewis, C.; Bracken, B. (2007): Observations on local field trips (Arnprior area) - Annual Meeting of the Dragonfly Society of the Americas, 2005. *Ontario Odonata* 7: 16-23. (in English). [The paper reports detailed field data of the local field trips that took place on 10 and 11 July 2005 covering 11 habitats in the counties Ottawa-Carleton, Lanark, and Renfrew, Ontario, Canada. [condensed versions of this article appeared in *Trail and Landscape* 40(1): 9-20 and *Argia* 17(3): 9-11].] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**6960.** Chakona, A.; Marshall, B.; Brendonck, L. (2007): The effect of fish predation on benthic macroinvertebrates in a seasonal stream in north-western Zimbabwe. *African Journal of Aquatic Science* 32(3): 251-257. (in English). ["The cumulative impact of the entire fish assemblage on benthic macroinvertebrate assemblages was investigated over four months in a removal experiment in isolated pools that persist through the dry season, in an intermittent stream in north-western Zimbabwe. Macroinvertebrate taxonomic richness did not differ significantly between sampling dates, indicating that fish removal had no effect on the zoobenthos taxa richness but led instead to large increases in the densities of certain macroinvertebrates. There was a progressive increase in the body size of Odonata in fishless pools 34 and 55 days after treatment and, by 78 days post-treatment, the proportion of large-sized odonates was significantly higher in fishless than in control pools. Peak densities of predaceous invertebrates coincided with a sharp decline in macroinvertebrate densities in the fishless pools about three months after fish removal. The values for Strauss's food selection index were low (range -0.220 to 0.180) for all macroinvertebrates, indicating random feeding by fish. Results indicate that, although fish may be important predators, they are not keystone predators because the macroinvertebrate community structure in this temporary habitat was found to be influenced by the assemblages of both vertebrate and invertebrate predators, rather than by a single keystone predator." (Authors)] Address: Chakona, A., University Lake Kariba Research Station, PO Box 48, Kariba, Zimbabwe. Email: achakona@yahoo.com

**6961.** Cuevas-Yanez (2007): Los odonatos (Insecta: Odonata) de la Hidroeléctrica de Patla (El Pozo) y del Río Tecpatlán, Zihuateutla, Puebla, México. *Dugesiana* 14(2): 83-91. (in Spanish, with English summary). ["A study of Odonata was conducted in two localities of the Municipality of Zihuateutla, Puebla, Mexico: Patla's hydroelectric facility (El Pozo) and Tecpatlán River, by monthly samplings from March 2002 to March 2003. A total of 1728 specimens (645 adults and 1083 larvae) belonging to 51 species, 31 genera and 10 families were obtained. The more abundant family, genus and species were Coenagrionidae, *Argia*, and *Palaemnema* sp., respectively. Highest richness and diversity were found at El Pozo. Two families and 14 species represent new records for Puebla state: *Mecistogaster ornata*, *Megalopterus caerulatus*, *Pseudostigma aberrans*, *Protoneura cara*, *Argia cuprea*, *A. oculata*, *Gynacantha helenga*, *Remartinia luteipennis*, *Erpetogomphus constrictor*, *E. elaps*, *Brechmorhoga praecox*, *Cannaphila insularis*, *Libellula herculea*, and *Micrathyria didyma*." (Author)] Ad-

dress: Cuevas-Yañez, Karina, Facultad de Ciencias. Univ. Autónoma del Estado de México. Instituto Literario No. 100. Col. Centro. Toluca, México, México, C. P. 50200

**6962.** Czerniawska-Kusza, I.; Szoszkiewicz, K. (2007): Biological and hydromorphological assessment of running waters: an example of the Mała Panew River. *Katedra Ochrony Powierzchni Ziemi, Uniwersytet Opolski*. ISBN: 83-920464-1-2: 71 pp. (in Polish, with English summary). [In the framework of the European Union Water Directive, the Mała Panew River in Poland was surveyed for its macrozoobenthos. Three taxa of Odonata are listed, of which *Onychogomphus* sp. is questionable according Pawel Bucziński.] Address: Czerniawska-Kusza, Izabela, Uniwersytet Opolski, Katedra Ochrony Powierzchni Ziemi, Oleska 22, PL-45-052 Opole, Poland. E-mail: Izabela.Kusza@uni.opole.pl

**6963.** Daigle, J.J. (2007): *Macrothemis meurgeyi* sp. n. from Guadeloupe (Anisoptera Libellulidae). *Odonatologica* 36(2): 191-195. (in English) ["The new species is described and figured from specimens of both sexes, collected from Guadeloupe in the Caribbean Sea. Holotype ♂: Guadeloupe, Basse Terre, Habitation Deravin, SE of Pigeon, 9-II-2006; deposited at FSCA, Gainesville/FL, USA. The species is closely related to *M. imitans* Karsch from eastern South America. The all-black abdomen can readily separate it from *M. imitans*." (Author)] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**6964.** Daigle, J.J. (2007): *Telagrion boliviensis* sp. nov. from Bolivia (Zygoptera: Coenagrionidae). *Odonatologica* 36(2): 291-294 (in English) ["The new species is described and illustrated (holotype ♂ and allotype ♀: Bolivia, Beni Department, Cercado prov., forest around Lago Los Lagartos, 2 km N of Loma Suarez, 22-VIII-2003). The flavescent/brownish wings will separate the new species from all other *Telagrion* species, which have hyaline wings. The holotype and allotype are deposited in Universidad Autonoma "Gabriel Rene Moreno" (UAGRM) in Santa Cruz, Bolivia." (Author)] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**6965.** Dakou, E.; D'Heygere, T.; Dedecker, A.P.; Goethals, P.L.M.; Lazaridou-Dimitriadou, M.; De P (2007): Decision tree models for prediction of macroinvertebrate taxa in the river Axios (Northern Greece). *Aquatic Ecology* 41: 399-411. (in English). ["In this study, decision tree models were induced to predict the habitat suitability of six macroinvertebrate taxa: Asellidae, Baetidae, Caenidae, Gammaridae, Gomphidae and Heptageniidae. The modelling techniques were applied on a dataset of 102 samples collected in 31 sites along the river Axios in Northern Greece. The database consisted of eight physical-chemical and seven structural variables, as well as the abundances of 90 macroinvertebrate taxa. A seasonal variable was included allowing the description of potential temporal changes in the macroinvertebrate taxa. Rules relating the presence/absence of six benthic macroinvertebrate taxa with the 15 physical-chemical and structural river characteristics and the seasonal variable were induced using the J48 algorithm. In order to improve the performance and the interpretability of the induced models, three optimisation techniques were applied: tree-pruning, bagging and boosting. The predictive performance of the decision

tree models was assessed on the basis of the percentage of Correctly Classified Instances (CCI) and the Cohen's kappa statistic. The results of the present study demonstrated that although the models had a relatively high predictive performance, noise in the dataset and inappropriate input variables prevented to some extent, the models from making reliable predictions. Although tree-pruning did not improve significantly the reliability of the induced models, it reduced considerably the tree complexity and in this way increased the transparency of the trees. Consequently, the induced models allowed for a correct ecological interpretation. The effect of bagging and boosting on the other hand varied considerably between the different models, as well as within different repetitions of 10-fold cross-validation in an individual model. In some cases the predictive performance was improved, in others stable or even worsened. The effect of bagging and boosting seemed to be strongly dependent on the dataset on which the two techniques were applied. Tree-pruning thus proved to have a high potential when applied in models used for decision-making of river] Address: Goethals, P.L.M., Department of Applied Ecology and Environmental Biology, Laboratory of Environmental Toxicology and Aquatic Ecology, Ghent University, J. Plateaustraat 22, B-9000 Ghent, Belgium. E-mail: peter.goethals@UGent.be

**6966.** De Knijf, G.; Anselin, A.; Goffart, P.; Tailly, M. (2007): Some aspects of Odonata distribution in Belgium. In: Levasseur, M. Dommangot G. & Jolivet, S. (eds.). Actes des Rencontres odonatologiques Ouest-Européennes 2005. Société française d'odonatologie (SFO), Bois-d'Arcy: 73-78. (in English). ["Some results of the Belgium atlas project are presented here. More than 65,000 records have been collected by 500 volunteers. Distribution data are presented for three periods in 10 x 10 km UTM squares : < 1950, 1950-1979 and >1980, and for the period 1990-2000 (the major part of the records) in 5 x 5 km squares. Due to special efforts in the '90's to obtain a high and detailed coverage of the whole country, 93.5% of all 10 x 10 km UTM squares have been investigated. During this recent period, also 63% of all 5 x 5 km squares have records. In general, Flanders, the northern part, is much better investigated than the southern part, Walonia. In total, 69 species were ever observed in Belgium, 66 of them present in the '90's. Only 2 species, *Nehalennia speciosa* and *Leucorrhinia caudalis* are now extinct. For ten species, records were missing during one of the periods. For each species, we mention the status, based on the number of occupied grid cells (5 x 5 km) since 1990. The highest species diversity can be found in the north-east of Belgium, the Campine region. Other regions with a high diversity are localised in the extreme south, the Lorraine. A map of the recent distribution is given five species. We hope that the information in this atlas will be helpful for conservation measures and as a starting point for more detailed research and monitoring." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**6967.** De Marmels, J. (2007): Thirteen new Zygoptera larvae from Venezuela (Calopterygidae, Polythoridae, Pseudostigmatidae, Platystictidae, Protoneuridae, Coenagrionidae). *Odonatologica* 36(1): 27-51. (in English). ["The ultimate instar larvae or exuviae of the following species and subspecies are described and illustrated: *Hetaerina medinae* Racenis, *Euthore f. fasciata* (Hagen),

*E. f. plagiata* Selys, *E. f. fastigiata* (Selys), *Microstigma rotundatum* Selys, *Palaemnema clementia* Selys, *Epileoneura metallica* Racenis, *Neoneura fulvicollis* Selys, *Acanthagrion imeriense* De Marmels, *A. vidua* Selys, *Argia adamsi* Calvert, *Cyanallagma laterale* (Selys), and *C. tamaense* De Marmels. A key to the known larvae of Polythoridae found in Venezuela is included. The larva of each species/subspecies is diagnosed against similar larvae of other taxa, and notes on the larval habitat are added.] Address: De Marmels, J., Inst. Zool. Agrícola, Fac. Agronomía, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com

**6968.** Dumont, H. (2007): Odonata from the Mouydir Plateau (North Central Sahara, Algeria). *Bulletin S.R.B. E./K.B. V.E.* 143: 164-168. (in English). ["Nine species of Odonata are reported from the Mouydir, a little researched desert plateau north of the Ahaggar Mountains (Algeria), and a tenth one from the Ahaggar itself. A population of *Pseudagrion hamoni* was discovered on a permanent aguelman (=lakelet) at the oasis of Tadjmut, extending the known range of that species in the central Sahara by about 500 km to the West; one old ♂ was seen at Guelta Affilal on the Assekrem plateau. *Orthetrum ransonneti* was widespread, with *Trithemis arteriosa* the most common species, and *Trithemis kirbyi* a close second, on any type of desert water. *Sympetrum sinaiticum* was not found in the Mouydir in May, but was freshly emerging from Ahaggar waters above 2000 m." (Author)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@ugent.be

**6969.** Eda, S. (2007): Critically endangered situation of the white-winged *Mnais pruinosa*, an endemic form to Boso Peninsula. 21: 25. (in Japanese). [Collection pressure on the white winged form of *Mnais pruinosa* endemic to the Boso Peninsula, Japan as threat factor is outlined.] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**6970.** Ellenrieder, N. von (2007): Some Libellulidae-larvae from the Yungas forest, Argentina: *Macrothemis hahneli* Ris, *Brechmorhoga nubecula* (Rambur) and *Dasythemis mincki clara* Ris (Anisoptera). *Odonatologica* 36(3): 263-273. (in English). ["A first description of the larva of *M. hahneli* is provided. The larva of *B. nubecula*, previously described based on a single specimen of doubtful identity, is here redescribed based on bona fide specimens belonging to that species. The larva of *D. mincki clara* is found to agree overall with that of *D. m. mincki*, differing only on some minor details probably due to geographic variation." (Author)] Address: Ellenrieder, Natalia von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: natalia.ellenrieder@g-mail.com

**6971.** Ellenrieder, N. von (2007): The larva of *Argia joergenseni* Ris (Zygoptera: Coenagrionidae). *Odonatologica* 36(1): 89-94. (in English). ["The larva of *A. joergenseni* is described and illustrated for the first time, based on specimens from NW Argentina, and compared to the sympatric larva of *A. translata*." (Author)] Address: Ellenrieder, Natalia von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2,



Salta 4400, Argentina. E-mail: natalia.ellenrieder@gmail.com

**6972.** Ellenrieder, N. von (2007): Comentario bibliográfico: Dijkstra, K-D.B. & R. Lewington. 2006. Field Guide to the Dragonflies of Britain and Europe. British Wildlife Publishing, 320 pp. ISBN 0 9531399 4 8. Rev. Soc. Entomol. Argent. 66 (1-2): 191. (in Spanish). [review] Address: Ellenrieder, Natalia von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: odonata@hotmail.com

**6973.** Ellenrieder, N. von (2007): Composition and structure of aquatic insect assemblages of Yungas mountain cloud forest streams in NW Argentina. Rev. Soc. Entomol. Argent. 66(3-4): 57-76. (in English, with Spanish review). ["Thirty three lotic environments in the Yungas mountain cloud forest of NW Argentina were sampled both in undisturbed forest areas and sites altered by human activities. Aquatic insects of 143 taxa in 55 families were collected. Cluster analysis suggested altitude as one of the main structuring variables of aquatic insect communities in these streams, and its importance was confirmed by non-metric multidimensional scaling (NMS); the environmental parameters measured that were best correlated with the ordination were altitude, water temperature, latitude and channel variables (width, percentage of large and small woody debris, of undercut banks, cobble and coarse gravel). Multi response permutation procedures (MRPP) showed streams in well preserved areas to significantly differ in their composition from streams in disturbed areas. Proportion of Elmidae and of Plecoptera individuals and number of Trichoptera taxa were the biological metrics best correlated with the local disturbance gradient, suggesting that an 'EIPT' index could be a useful component in the evaluation of the ecological status of these environments. Indicator species analyses identified some potential indicators of stream condition and disturbance factors affecting these streams." (Author) The analysis includes 23 odonate taxa.] Address: Ellenrieder, Natalia von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: odonata@hotmail.com

**6974.** Englund, R.A.; Wright, M.G.; Polhemus, D.A. (2007): Aquatic insect taxa as indicators of aquatic species richness, habitat disturbance, and invasive species impacts in Hawaiian streams. Bishop Museum Bulletin in Cultural and Environmental Studies 3: 207-232. (in English). ["In this study we provide a synthesis of numerous stream assessments in the Hawaiian Islands that began in the early 1990s and have continued to the present. Data from numerous sites within the five major high Hawaiian Islands with flowing streams (excluding Lāna'i, which lacks flowing waters) were used to assess native and introduced aquatic insect communities, the impacts of various invasive freshwater species and the threats from habitat disturbance. The primary objective of this study was to provide the first comprehensive analysis of aquatic insect populations in various urbanized and virtually pristine stream reaches on the five major Hawaiian Islands, and to assess if various suites of introduced aquatic species may be impacting aquatic insect populations. We were also interested in assessing the suitability of native aquatic insects as key indicator, flagship, or umbrella species regarding the overall health of Hawaiian aquatic ecosystems. If key indicator species can be found, then aquatic habitats with high

native biodiversity can be identified and management efforts can be made to ensure this high level of biodiversity persists. These indicator species could also be used for monitoring future rehabilitation programs on disturbed streams." (Authors) The study includes Odonata and focuses on the endemic genus *Megalagrion* demonstrating impacts of introduced Amphibia and fishes on Odonata.] Address: Englund, R.A., Hawaii Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, Hawai'i 96817, USA, E-mail: englund@bishopmuseum.org

**6975.** Fahd, K.; Florencio, M.; Keller, C.; Serrano, L. (2007): The effect of the sampling scale on zooplankton community assessment and its implications for the conservation of temporary ponds in south-west Spain. Aquatic Conservation 17(2): 175-193. (in English). ["1.) The zooplankton (rotifer and microcrustacean) assemblages of temporary ponds in the Dohana National Park (south-west Spain) have been compared in two surveys of contrasting scales that resulted in the same number of samples: an extensive survey of 36 ponds sampled in May 1998 (or widespread survey) and a survey of nine ponds sampled four times over 2 years (or cumulative survey). 2.) [...] 3.) The presence of invertebrates (Coleoptera, Odonata, Heteroptera and crayfish) and aquatic vertebrates (fish and salamanders) was recorded as an estimate of potential predator impact on zooplankton. Several pond features (water depth, conductivity, pH, chlorophyll a concentration, distance to the nearest permanent pond and to the marsh) were also measured in both surveys.[...]"] (Authors)] Address: Serrano, Laura, Department of Plant Biology and Ecology, University of Seville, PO Box 1095, E-41080 Seville, Spain E-mail: serrano@us.es

**6976.** Feulner, G.R.; Reimer, R.W.; Hornby, R.J. (2007): An updated illustrated checklist of dragonflies and damselflies of the UAE. Tribulus 17: 37-62. (in English). [The checklist of Giles (1998) (OAS 594) is updated by six additions: *Ceriatagrion glabrum*, *Pseudagrion decorum*, *Ischnura senegalensis*, *Sympetrum fonscolombii*, *Crocothemis sanguinolenta*, and *Orthetrum ransonneti*. The species are illustrated by - in some times stunning - photographs. Advice to determination, information on distribution and on habitats are additionally given.] Address: Reimer, B., UAE University - UGRU - ITS, P.O. Box 17172, Al Ain, United Arab Emirates. E-mail: bob.reimer@uaeu.ac.ae

**6977.** Futahashi, R. (2007): Recent state on taxonomy of Japanese *Mnais* species. The Nature & Insects 42(9) (Special issue: Recent trends of Odonatology): 4-7. (in Japanese). [Translation by Naoya Ishizawa: "Introduction: Genus *Mnais* is one of the most difficult group for classification. So far hypotheses of one species to four species of the genus have been advocated (Table I), and no collective view was made among researchers. The reason of confusion is based on the morphology of external reproductive organs and wing veins, which contain wide variation and overlap within the genus. Reproductive isolation was expected to be clarified indirectly by DNA analysis. Author and colleagues conducted analyses of nuclear DNA and mitochondria DNA on 900 specimens from all over Japan, and we advocated that Japanese genus *Mnais* is composed of two species, and lastly classified into *Mnais costalis* Selys, 1869 and *Mnais pruinosa* Selys, 1853. The former was named as *Nihon-kawatombo* in Japanese and the latter

was named as *Asahina-kawatombo* after Dr. Asahina. Comparison between the new hypothesis and the former hypotheses Analysis of ITS region of nuclear DNA on Japanese *Mnais* species shows 4 types of base sequence, A, B, C, D. A type is distributed widely from Hokkaido to Kagoshima Prefecture, while, other three types were distributed allotopically to western Japan. The head of A type is relatively longer for its wing length than those of other types and also its pterostigma was more slender than others. Tips of anal gill of the larvae of A type are characteristically triangular. In the western Japan A type is distributed sympatrically with other types, however, at the same river A type is distributed to lower reach and other types are to upper reach. Thus, by the morphological differences and their habitat segregation A type was classified as the different species from other types, namely, A type was named *Nihon-kawatombo*, *M. costalis* and others, B, C, D were named *Asahina-kawatombo*, *M. pruinosa* (see Table I). Translators' notice: as to problems of comparison between the new hypothesis and the former hypotheses, the following literature may be useful. Hayashi, F., Dobata, S. & Futahashi, R. 2004. Macro- and microscale distribution patterns of two closely related Japanese *Mnais* species inferred from nuclear ribosomal DNA, ITS sequences and morphology (Zygoptera: Calopterygidae). *Odonatologica*, 33: 399-412. Hayashi, F., Dobata, S. & Futahashi, R. 2005. Disturbed population genetics: suspected introgressive hybridization between two *Mnais* damselfly species (Odonata). *Zoological Science*, 22: 869-881. Address: Futahashi, R., National Institute of Sericultural & Entomological Science, Japan

**6978.** Gniatkowski, J. (2007): Wążki (Odonata) w okolicach Częstochowy. *Biuletyn Częstochowskiego Koła Entomologicznego* 6: 7-8. (in Polish, with English summary). [In the surroundings of Czestochowa, Poland, 23 odonate species - including *Leucorrhinia albifrons* - were recorded between 2005 and 2007.] Address: Gniatkowski, J., ul Oskara Lange 7/97, Czestochowa, Poland

**6979.** Grant, P.B.C.; Samways, M.J. (2007): Ectoparasitic mites infest common and widespread but not rare and red-listed dragonfly species. *Odonatologica* 36(2): 255-262. (in English) ["Freshwater ectoparasitic mites negatively alter host population dynamics by reducing survivorship, mating success, fitness and altering activity patterns. Hosts commonly include dragonflies. The Kogelberg Biosphere Reserve, South Africa, is a major hotspot for endemic dragonflies. All 38 dragonfly species in the reserve were sampled for ectoparasitic mites, but only 2 common, widespread species of Zygoptera, *Ischnura senegalensis* and *Ceriagrion glabrum*, were infested with *Arrenurus* or *Leptus* mite species. None of the endemic or red-listed dragonflies were infested. Parasitism level was 3.5% for *C. glabrum* and 38% for *I. senegalensis*. Intensity of ectoparasites on individuals was high, with about eight ectoparasitic larva per individual. Larval mites preferentially associated with individual hosts already harbouring mites. High levels of species-specific parasitism likely reflects shared environmental requirements, preferential species selection, and lack of defensive behaviours to resist infestation. Characteristic scars from previous mite attachment observed on older individuals of *I. senegalensis* indicate that a much larger percentage of the population was actually parasitized, but detached as the individual aged. That the rare and red-listed species were apparently

immune from infestation is a positive note for their conservation." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**6980.** Grehan, J.R. (2007): A brief look at Pacific biogeography: The trans-oceanic travels of *Microseris* (Angiosperms: Asteraceae). Ebach, M.C. & Tangney, R. (Eds.): *Biogeography in a Changing World.*, CRC Press, Boca Raton. Systematics Association Special Volume Series: 83-94. (in English). ["The modern revolution in biogeography did not begin with plate tectonics. It began two decades earlier when Leon Croizat established geographic distributions as the empirical foundation of evolutionary biogeography. Comparative map analysis reveals patterns that are not accessible through other methods. The biogeography of *Microseris* (Angiosperms: Asteraceae) is used to illustrate the power of geographic analysis to provide unique insights into the biogeographic distributions and relationships of organisms. Explanations of dispersal as physical movement for *Microseris* are shown to be problematic by the congruent distributions and Pacific homology of this genus with groups of diverse means of dispersal such as daisies, dragonflies, millipedes, eyebrights, and seaweeds. The role of tectonics and the historical implications of *Microseris* biogeography for molecular clock theory are briefly discussed." (Author) The chapter contains several references to dispersal of Odonata. see: <http://www.sciencebuff.org/ftponly/microseris.pdf>]

**6981.** Herath, B.; Johnson, B.; Lunski, J.; Fuselier, L. (2007): Sex-specific antipredator response in *Anax junius*, a migratory dragonfly. Abstracts: North Central Branch of the Entomological Society of America: <http://esa.ent.iastate.edu/confreg/?gridaction=viewonepresentation&year=2007&presnum=044>. (in English). [Verbatim: Odonate populations often exhibit skewed adult population sex ratios that are likely tied to sex-specific life history strategies expressed by individuals when they are aquatic larvae. Differences in mortality between the sexes of the larvae can explain skewed adult population sex ratios. In dragonflies with female-biased sex ratios at emergence, ♂♂ likely assume a higher predation risk and hence, higher mortality. Further, predation risk is directly and positively related to activity levels. We investigated whether *Anax junius* larvae show sex-specific responses to predation risk in a series of laboratory experiments. We hypothesized that ♂♂ would assume greater predation risk compared to ♀♀ when faced with either a conspecific or a fish predator. Preliminary results indicate that the sexes respond similarly to a caged predator but that ♂♂ are more active than ♀♀ in the presence of a free-swimming predator. ♀♀ are more likely to strike at the predator and ♂♂ will feed more in the presence of a predator than will ♀♀. We are expanding this project to include response to chemical cues and additional species of odonates.] Address: Fuselier, Linda, Biosciences Department, 1104 7th Ave South, Minnesota State University, Moorhead, Moorhead, MN, 56563, USA

**6982.** Jeschke, J.M.; Tollrian, R. (2007): Prey swarming: which predators become confused and why?. *Animal Behaviour* 74: 387-393. (in English). ["When confronted with a swarm of their prey, many predators become confused and are less successful in their attacks. Despite the general notion that this confusion effect is a

major reason for prey swarm formation, it is largely unknown how widespread it is and which predator or prey traits facilitate or impede it. We carried out experiments with four predator-prey systems: *Aeshna cyanea* and *Chaoborus obscuripes* larvae, but not *Libellula depressa* and *Triturus alpestris* larvae, became confused when confronted with high *Daphnia* densities. When combining this result with literature data, we found that predators became confused in 16 of the 25 predator-prey systems studied to date. Tactile predators appear to be generally susceptible, whereas visual predators are susceptible mainly when their prey is highly agile. This difference probably results from the superiority of the visual sensory system. However, while our study is an important step towards the mechanistic understanding of predator confusion, it also reveals how poor this understanding currently is." (Authors)] Address: Tollrian, R., Dept of Animal Ecology, Evolution and Biodiversity, Biological Sciences and Biotechnology, Ruhr-University Bochum, Universitätsstr. 150/ND05, D-44780 Bochum, Germany. E-mail: tollrian@rub.de

**6983.** Jiang, Y.-H.; Wang, T. (2007): Description of the larva of *Cordulegaster pekinensis* Selys from China (Anisoptera: Cordulegastriidae). *Odonatologica* 36(2): 197-200. (in English). ["The ♀ ultimate instar larva from Beijing area, China, is described and illustrated. It shares some characters with the *Cordulegaster boltonii*-group, and others with the *C. bidentata*-group, but the anal pyramid is longer than in both." (Authors)] Address: Jiang, Y.-H., Lianyungang City Yuntaixiang Culture Station, Jianguo-222064, China. E-mail: jiangyh26@yahoo.com.cn

**6984.** Jocque, M.; Graham, T.; Brendonck, L. (2007): Local structuring factors of invertebrate communities in ephemeral freshwater rock pools and the influence of more permanent water bodies in the region. *Hydrobiologia* 592: 271-280. (in English). ["We used three isolated clusters of small ephemeral rock pools on a sandstone flat in Utah, USA to test the importance of local structuring processes on aquatic invertebrate communities. In the three clusters we characterized all ephemeral rock pools (total: 27) for their morphometry, and monitored their water quality, hydrology and community assemblage during a full hydrocycle. In each cluster we also sampled a set of more permanent interconnected freshwater systems positioned in a wash, draining the water from each cluster of rock pools. This design allowed additional testing for the potential role of more permanent water bodies in the region as source populations for the active dispersers and the effect on the community structure in the rock pools. Species richness and community composition in the rock pools correlated with level of permanence and the ammonia concentration. The length of the rock pool inundation cycle shaped community structure, most probably by inhibiting colonization by some taxa (e.g. tadpoles and insect larvae) through developmental constraints. The gradient in ammonia concentrations probably reflects differences in primary production. The more permanent water bodies in each wash differed both environmentally and in community composition from the connected set of rock pools. A limited set of active dispersers was observed in the rock pools. Our findings indicate that aquatic invertebrate communities in the ephemeral rock pools are mainly structured through habitat permanence, possibly linked with biotic interactions and primary production." (Authors) Larvae of "*Corduliidae*" and "*Coenagrionidae*"

were sampled at the more permanent pools.] Address: Jocque, Merlijn, Laboratory of Aquatic Ecology, K.U. Leuven, de Bériotstraat 32, 3000 Leuven, Belgium. E-mail: Merlijn.Jocque@bio.kuleuven.ac.be

**6985.** Jones, C.D. (2007): Observations on "northern" field trips (upper Ottawa Valley) - Annual Meeting of the Dragonfly Society of the Americas, 2005. *Ontario Odonata* 7: 24-27. [During the 2005 DSA meeting in Arnprior, Ontario, Canada on 10 & 11 July 2005 areas north of Arnprior were visited. Field trip records from the six localities are reported and documented in a table. Of special interest was a *Neurocordulia michaeli*, a very rare species, and new, verified addition to the Ontario odonate fauna.] Address: Jones, C.D., Box 182, Lakefield, Ontario, K0L 2H0, Canada. E-mail: colin.jones@mnr.gov.on.ca

**6986.** Jordan, S.; Barruet, E.; Olaf, M. (2007): Blue hawaiiense and beyond: Conservation genetics and comparative phylogeography of four Hawaiian Megalagrion damselfly species (Odonata: Coenagrionidae). *Bishop Museum Bulletin in Cultural and Environmental Studies* 3: 247-260. (in English). ["Hawaii's endemic *Megalagrion* damselflies are rivaled in their beauty and diversity only by the degree of threat posed to them by anthropogenic disturbance. In this preliminary study of phylogeography and conservation genetics, we have sequenced about 660 base pairs (bp) of the mitochondrial COII gene from 191 damselflies from four species, including 31 populations that span a gradient of endangerment. We applied phylogeographic analyses in order to understand their biogeographic history. Unlike *Megalagrion xanthomelas* and *M. pacificum*, *M. calliphya* and *M. hawaiiense* rarely share haplotypes between populations and between islands, even within the larger Maui superisland, suggesting that these latter two species do not disperse as well across land or water. Their phylogenies also better reflect the geological history of the islands. We applied conservation genetic analyses in order to understand their genetic health. Under a conservation genetic paradigm, populations with low genetic diversity are generally considered to be at greater risk of decline and extinction than populations with high genetic diversity. Applying this principle to *Megalagrion* populations gave both expected and surprising results. Expected results included measurements of high diversity in most populations of *M. calliphya*, *M. hawaiiense*, and Hawai'i Island populations of *M. xanthomelas*. Low diversity was observed in populations known to be bottlenecked or relictual, including O'ahu and Maui *M. xanthomelas*, and *M. pacificum*. Surprising results included low genetic diversity in O'ahu Ko'olau and Hawai'i Onomea *M. hawaiiense*, Moloka'i *M. pacificum*, and West Maui *M. calliphya*. We propose that these latter three populations be monitored and managed to maximize their long-term genetic health." (Authors)] Address: Jordan, S., Department of Biology, Bucknell University, Lewisburg, Pennsylvania 17837, USA. E-mail: sdjordan@bucknell.edu

**6987.** Kadoya, T. (2007): Procedure for predicting the potential of species recovery using a database: dragonflies as indicator taxon in a wetland restoration. *Nature & Insects* 42(9) (Special issue: Recent trends of Odonatology): 8-11. (in Japanese). [Pre-monitoring and assessing the species potential at the surroundings of a pond to restore enables to estimate the species pool that will recover a pond.] Address: Kadoya, T., Dept



Ecosyst. Studies, Inst. Agr. & Life Sci., Bunkyo Ku, University Tokyo, 1-1-1 Yayoi, Tokyo, 1138657, Japan. E-mail: aa47143@mail.ecc.u-tokyo.ac.jp

**6988.** Kalkman, V.J. (2007): *Archboldargia scissorhandsi* sp. n. from Papua, Indonesia (Zygoptera: Coenagrionidae). *Odonatologica* 36(2): 201-206. (in English) ["The new species is described, based on a single ♂. Holotype ♂: Indonesia: Papua (formerly Irian Jaya), Pass Valley, Ibem R., 13/20-V-1999; deposited in ZMAN, Amsterdam. A key to the *Archboldargia* ♂♂ is given and some notes on the distribution of the genus are provided." (Author)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**6989.** Kalkman, V.J. (2007): *Argiolestes celebensis* sp. n. from Sulawesi, Indonesia (Zygoptera: Megapodagrionidae). *Odonatologica* 36(2): 295-299 (in English) ["The new species is described from a single ♂ (holotype ♂: Indonesia, SW Sulawesi, W of Palopo, Puncak Palopo, X-1993; deposited in RMNH, Leiden). It is the first known representative of the genus on Sulawesi." (Author)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**6990.** Kühnapfel, K.-H. (2007): Zur Vogelwelt der Kläranlage Kamen (Westfalen). *Charadrius* 42(3) (2006): 120-155. (in German). [Germany, Nordrhein-Westfalen, on page 153, *Motacilla flava* (Aves) is depicted preying upon Zygoptera.] Address: Kühnapfel, K.-H., Heidestr. 25, 59174 Kamen, Germany

**6991.** Lajeunesse, M.J. (2007): Ectoparasitism of damselflies by water mites in Central Florida. *Florida Entomologist* 90(4): 643-649. (in English). ["Little is known about the frequency of water mite ectoparasitism (Acari: Hydrachnida) within and among damselfly species of Central Florida. Here I present a field survey of the assemblage of damselflies and their water mite parasites at the Archbold Biological Station (Lake Placid, FL) during late Mar, 2006. During this period, 4 species of damselfly were abundant: *Ischnura hastata* (Say) and *Nehalennia gracilis* Morse captured only at pond sites; and *Argia fumipennis atra* Gloyd and *Ischnura ramburii* (Selys) captured at a lake site. Only pond damselflies had water mites, and 12.2% and 12.5% of *I. hastata* and *N. gracilis* were parasitized, respectively. These are 2 novel and unreported odonate-acari associations for this area. I also examined within-species differences in ectoparasitism by sex, body size, and wing-cell fluctuating asymmetry. However, these factors did not relate to the prevalence and intensity of parasitism in the field. My study indicates that brief surveys of odonates in Central Florida will likely generate novel, unreported associations with parasitic water mites—this information is important to Address the gap in natural history for southeastern distributions of North American water mites." (Author)] Address: Lajeunesse, M.J., Dept of Ecology and Evolutionary Biology, Cornell Univ., Ithaca, NY 14853-2701, USA.

**6992.** Lawal, O.A.; Banjo, A.D. (2007): A checklist of pests and visitors of *Apis mellifera adansonii* (honeybee) in the six states of southwestern Nigeria. *Apiacta* 42: 39-63. (in English). [Among a quantitative data collection of pests, visitors, and parasites from nineteen

selected bee farms in south-western Nigeria located in the three main ecological zones (Lowland Rain Forest, Savannah and Mangrove forest) also one specimen of *Aeshna* sp. was recorded.] Address: Lawal, O.A. Dept Plant Science & Applied Zoology, Olabisi Onabanjo University, Ago Iwoye, P.M.B 2002, Ogun State, Nigeria. E-mail: olusegunlawal@yahoo.co.uk

**6993.** Leitao, S.; Pinto, P.; Pereira, T.; Brito, M.F. (2007): Spatial and temporal variability of macroinvertebrate communities in two farmed Mediterranean rice fields. *Aquatic Ecology* 41: 373-386. (in English). ["The spatial and temporal variation of macroinvertebrate assemblages was studied in two Portuguese commercial rice agroecosystems under the effect of field management involving the application of pesticides and fertilizers. A faunal succession of organisms was observed on both fields. Grazers were the first to colonize the paddies after a dry period when pesticides were applied, followed by development into nymphs and by an increase in the abundance of the species after the application of fertilizers. At the end of the season when no pesticides or fertilizers were applied, the communities changed with the presence of adult predators as a result of an increase in prey. Insecticide application revealed specific taxa increase due to the lack of competition with the target organism. Macroinvertebrates tended to prefer infested field margins with aquatic, submerged vegetation, revealing a spatial distribution along the paddies. Two different sampling devices were used and proved necessary in documenting the macroinvertebrate communities (grab for benthic and hand-net for pelagic organisms)." (Authors) Records of *Crocothemis erythraea*, *Orthetrum brunneum*, *Sympetrum fonscolombii*, *Ischnura elegans*, *Libellulidae*, and *Coenagrionidae* are analysed.] Address: Leitao, S., Laboratório de Referência do Ambiente, Instituto do Ambiente, 2611-865 Amadora, Portugal. E-mail: saraleitao@yahoo.com

**6994.** Lemelin, R.H. (2007): Finding beauty in the dragon: The role of dragonflies in recreation and tourism. *Journal of Ecotourism* 6(2): 139-145. (in English). ["In some Asian countries such as China and in Japan, Odonata (dragonflies, damselflies) have a long history of being involved in recreation and leisure activities. In contemporary Japan, dragonfly enthusiasts, much like birders elsewhere, pride themselves on recognizing many different types of Odonata. In fact, numerous symposia, festivals, and sanctuaries provide Japanese dragonfly enthusiasts with the opportunity to practice and perfect their skills (Primack et al., 2000). Dragonfly gatherings (e.g., counts, educational outings) in North America and Europe are also increasing in popularity. Facilitating the growth of these recreation activities, but more specifically the viewing of dragonflies, are the availability of books and field guides (Corbet, 1999; DuBois, 2005; Dunkle, 2000; Mead, 2003; Nikula et al., 2002), associations (e.g., Dragonfly Society of the Americas, Worldwide Dragonfly Association), and websites (e.g., Digital Dragonflies). This article examines discussion surrounding insect-human relationships while highlighting the contribution of one particular insect order – Odonata (Mitchell & Lasswell 2005; Moore 1997), and the role of this flagship species in socio-cultural norms (Samways 2005) in recreational and tourism activities." (Authors)] Address: Lemelin, R. Harvey, School of Outdoor Recreation, Parks and Tourism, Lakehead Univ., Ontario, Canada

- 6995.** Leroy, T. (2007): Un nouvel Odonate remarquable en Auvergne: *Macromia splendens* (Pictet, 1843) (Odonata, Anisoptera, Macromiidae). *Martinia* 23(1): 9-11. (in French, with English summary). [Two specimens of *M. splendens* in Lot gorges in July 2006 represent the first record of this species in the Auvergne, France.] Address: Leroy, T., Le Bourg, F-63210 Heme-l'Eglise, France. E-mail: thierry-leroy@caramail.com
- 6996.** Lockwood, M.; Soler i Monzó, E.; Müller, P. (2007): Primera cita de *Cordulia aenea* Leach 1815 [sic] (Odonata: Corduliidae) para España. *Boln. S.E.A.* 41: 471-472. (in Spanish, with English summary). [The first Spanish record (Catalonia, Aran valley) of *C. aenea*, is presented. A total of 12 exuviae was found in June 2007 and then 15 days later, in July 2007, a female was captured. The situation of *Somatochlora metallica* in the area is also discussed.] Address: Lockwood, M., Grupo Oxygastra, Institució Catalana d'Història Natural, Carrer del Carme, 47; 08001 Barcelona, Spain. E-mail: mike@walkingcatalonia.net
- 6997.** Lohr, M. (2007): Sur l'habitat et la répartition de *Macromia splendens* (Pictet, 1843) et *Gomphus graslinii* (Rambur, 1842) dans la rivière de l'Hérault (département de l'Hérault). LEVASSEUR, M., DOMMANGET, G. & S. JOLIVET (Coordinateurs): Actes des Rencontres odonatalogiques Ouest-Européennes 2005. Société française d'odonatologie, Bois-d'Arcy: 115-124. (in French, with English and German summaries). ["The distribution of *M. splendens* and *G. graslinii* as well as the Odonata communities have been studied in the catchment of the Hérault River (Southern France) during two excursions realized in June / July 1999 and 2002. The two species colonize the lower and middle course of the Hérault River almost completely. *M. splendens* has also been found at the superior course, more upstream than supposed before. Distribution and ecology data of these two species in the catchment of the Hérault River are discussed in the context of their known distribution limits and published habitat preferences. The remarkable diversity of the odonate fauna and very important populations of three species appearing in the appendix 2 of the FFH directive - besides *M. splendens* and *G. graslinii* it is *Oxygastra curtisii* - underline the high ecological value of the Hérault and the importance of the protection of this watercourse." (Author) Address: Lohr, M., FH Lippe und Höxter, Fachgebiet Tierökologie und Landschaftsökologie, An der Wilhelmshöhe 44, D-37671 Höxter, Germany. E-mail: mlohr@fh-luh.de
- 6998.** Lorenzo Carballa, L.; Cordero Rivera, A. (2007): Are parthenogenetic and sexual *Ischnura hastata* damselflies equally fertile? Testing sexual conflict theories. *Ethology, Ecology & Evolution* 19(4): 291-298. (in English). ["Recent theories of sexual selection stress the importance of conflicts over reproduction in shaping the reproductive traits of ♂♂ and ♀♀. Except when the reproductive interests of both sexes coincide, which only occurs under strict monogamy, there is a conflict of interests between the sexes over the number of matings and reproductive decisions. It has been suggested that ♂♂ are selected to "harm" ♀♀ if this increases male reproductive success, even at the expenses of female fitness. One prediction of such an hypothesis is that sperm is selected to maximize the probability of fertilization, and this sometimes can cause a decrease in fertility due to polyspermy, genetic incompatibility, toxic seminal products that harm ♀♀, etc. We have tested this hypothesis by comparing the fertility rates of parthenogenetic and sexual *Ischnura hastata* populations. Our results show that sexual ♀♀ are less fertile than parthenogenetic ones, which is in agreement with the sexual conflict predictions tested in this study." (Authors)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es
- 6999.** Lozano, F.; Garre, A.; Pessacq, P. (2007): Descripción del último estadio larval de *Acanthagrion aepiolum* (Odonata: Coenagrionidae). *Rev. Soc. Entomol. Argent.* 66(1-2): 1-4. (in Spanish, with English summary). ["The Neotropical genus *Acanthagrion* Selys is composed by 41 species, eight of which have the last instar larva described. In this contribution the last instar larva of *A. aepiolum* is described based on material collected in Corrientes (Argentina) and it is compared with the larvae known for Argentina." (Authors)] Address: Lozano, F., Instituto de Limnología «Dr. Raúl A. Ringuelet» (ILPLA), C. C. 712, 1900 La Plata, Argentina. E-mail: lozano@ilpla.edu.ar
- 7000.** Malikova, E.I.; Kosterin, O.E.; Dubatolov V.V. (2007): A dragonfly (Odonata) collection from the Bolshkekhtskirskii State Nature Reserve (Khabarovskii krai, Russia). II. Seasons 2006 and 2007. *Animal World of the Far East (Blagoveshchensk)* 6: 5-9. (in English, with Russian summary). [41 odonate species from the Bolshkekhtskirskii State Nature Reserve and its close surroundings (app. 48°17-18' N 134°48-50' E) were caught in 2006 and 2007. *Stylurus occultus* (Sel., 1878) is reported for the first time for the Russian territory. *Shaogomphus schmidtii* (Asahina, 1956) was collected in 2005 outside the Reserve. Some emphasis is given to *Anisogomphus maackii* (Selys, 1872), *Trigomphus citimus* (Needham, 1931), *Shaogomphus postocularis eppophthalmus* (Selys, 1872), *Sympetrum risi* Bartenev, 1914, *Macromia daimoji* Okumura, 1949, *Stylurus flavipes* (Charpentier, 1825), and *Stylurus occultus* (Selys, 1878).] Address: Malikova, E.I.; Department of Zoology, Blagoveshchensk State Pedagogical University, Lenina Street 104, RUS-675000 Blagoveshchensk, Amurskaya oblast, Russia. E-mail: helen@amur.ru
- 7001.** Marczak, L.B.; Richardson, J.S.; Classen, M.-C. (2007): Life history phenology of *Cordulegaster dorsalis* in an ephemeral habitat in southwestern British Columbia, Canada (Odonata: Cordulegastriidae). *Canadian Field-Naturalist* 120(3): 347-350. (in English). ["The life cycle of *C. dorsalis* was studied over one year by systematic sampling of larvae in three intermittent headwater streams in southwestern British Columbia. We determined that larvae normally take three years to reach maturity, emerging throughout July and August. There is limited evidence suggesting a split cohort development, with early emergence after two years. Additionally, we tested whether larval instars were distributed randomly or if they occupied different sediment microhabitats. Smaller animals tend to be associated with smaller grained organic sediments, although there was high variation between the streams." (Authors)] Address: Marczak, Laurie, Department of Forest Sciences, University of British Columbia, 3041-2424 Main Mall, Vancouver, British Columbia V6T 1Z4 Canada. E-mail: laurie@interchange.ubc.ca

- 7002.** Marinov, M. (2007): Dragonflies of non-lotic Bulgarian wetlands. In: Michev, T.M. & M. P. Stoyneva (Eds.): Inventory of Bulgarian wetlands and their biodiversity. Part 1: Non - lotic biodiversity. 364 pp, 1 CD-ROM. (093536). ISBN 978-954-9941-09-3: 202-204. (in English). [This is an introductory treatment into the Bulgarian Odonata fauna with some emphasis to rare and threatened species, impacts on biodiversity, and activities on inventarisation of the regional fauna.] Address: Marinov, M., 80 Brookside Tce, Bryndwr, Christchurch, New Zealand. E-mail: mgmarinov@mail.bg
- 7003.** McCauley, S.J.; Wehrly, K.E. (2007): Zebra mussel, *Dreissena polymorpha* (Pallas), attachment to Odonata larvae. *Odonatologica* 36(1): 63-69. (in English). ["The attachment of zebra mussels to anisopteran larvae in a lake where the mussels have recently invaded was documented. Fifty-one larvae were collected and the majority (63%) had been colonized by one or more zebra mussels. Some dragonfly larvae were heavily infested, carrying up to 8 zebra mussels and more than their own mass in attached zebra mussels. Potential ramifications of zebra mussel attachment on larval dragonflies are discussed and a framework for future research on these effects is suggested." (Authors)] Address: McCauley, S.J., Center for Population Biology, University of California, Davis, CA 95616, USA. E-mail: sjmccauley@ucdavis.edu
- 7004.** McPeck, M.; Brown, J.M. (2007): Clade age and not diversification rate explains species richness among animal taxa. *The American Naturalist* 169(4): E97-E106. (in English). ["Animal taxa show remarkable variability in species richness across phylogenetic groups. Most explanations for this disparity postulate that taxa with more species have phenotypes or ecologies that cause higher diversification rates (i.e., higher speciation rates or lower extinction rates). Here we show that clade longevity, and not diversification rate, has primarily shaped patterns of species richness across major animal clades: more diverse taxa are older and thus have had more time to accumulate species. Diversification rates calculated from 163 species-level molecular phylogenies were highly consistent within and among three major animal phyla (Arthropoda, Chordata, Mollusca) and did not correlate with species richness. Clades with higher estimated diversification rates were younger, but species numbers increased with increasing clade age. A fossil-based data set also revealed a strong, positive relationship between total extant species richness and crown group age across the orders of insects and vertebrates. These findings do not negate the importance of ecology or phenotype in influencing diversification rates, but they do show that clade longevity is the dominant signal in major animal biodiversity patterns. Thus, some key innovations may have acted through fostering clade longevity and not by heightening diversification rate." (Authors) The data set includes Odonata.] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu
- 7005.** Meurgey, F.; Daigle, J.J. (2007): New status for *Orthemis macrostigma* (Rambur, 1842) from the Lesser Antilles (Anisoptera: Libellulidae). *Odonatologica* 36(1): 71-78. (in English). ["*Orthemis macrostigma* (Ramb.) is elevated to full species status and the Selys ♀ type specimen housed in the IRSNB in Brussels, Belgium, is designated as the lectotype. Additional descriptions of the mature ♂, mature ♀, immature ♂ adult, and the larval exuviae are provided. Diagnoses with *O. ferruginea* (Fabr.) and other related *Orthemis* species are included. Notes on behaviour, habitat, and range distribution are provided." (Authors)] Address: Meurgey, F., Mus. d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr
- 7006.** Morgenstern, B. (2007): Great Lakes Odonata Meeting 2005 - A huge success. *Ontario Odonata* 7: 8-9. (in English). [Close to 50 dragonfly enthusiasts attended the Great Lakes Odonata Meeting in July 2005 in Fort Frances, Ontario, Canada. During the meeting, more than 50 regional Odonata were recorded.] Address: Morgenstern, B., 430 Second Street East, Fort Frances, Ontario P9A 1V9, Canada. E-mail: bill@earthmoodsphoto.com
- 7007.** Muise, C.; Langdon, K.R.; Shiflett, R.P.; Trently, D.; Hoff, A.; Super, P.; Mayor, A.; Nichols, B.J. (2007): Preliminary odonate checklist of the Smokies. *South-eastern Naturalist* (Special Issue 1): 207-214. (in English). ["The fauna and flora of Great Smoky Mountains National Park is being systematically studied and documented for the first time as part of the Smokies' All Taxa Biodiversity Inventory (ATBI). With direction from scientific authorities and Park staff, a team of citizen volunteers has undertaken a survey of odonates (dragonflies and damselflies). The survey is focused on adults and includes curated specimens, catch-and-release records, and reliable sight identifications. To date, 93 taxa (63 dragonflies, 30 damselflies) are reported from the Park. However, the habitat-, geographic-, and temporal-survey coverage is far from complete, and records from neighbouring areas suggest the Park may contain more than 130 odonate species. All of the information is being stored in the online ATBI database." (Authors)] Address: Nichols, Becky, Great Smoky Mountains National Park, 1314 Cherokee Orchard Road, Gatlinburg, TN 37738, USA. E-mail: beckynichols@nps.gov.
- 7008.** Muzon, J. (2007): *Comentario bibliografico: Charles W. Heckman. 2006. Encyclopedia of South American Aquatic Insects: Odonata - Anisoptera. Illustrated Keys to Known Families, Genera, and Species in South America. Springer, Dordrecht, The Netherlands. viii+ 725 pp.. Rev. Soc. Entomol. Argent. 66(1-2): 193 - 194. (in Spanish). [book review.]* Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AZ-1900 La Plata, Argentina. E-mail: muzon@ilpla.edu.ar
- 7009.** Nolan, L.; Hogg, I.D.; Sutherland, D.L.; Stevens, M.I.; Schnabel, K.E. (2007): Allozyme and mitochondrial DNA variability within the New Zealand damselfly genera *Xanthocnemis*, *Austrolestes*, and *Ischnura* (Odonata). *New Zealand Journal of Zoology* 34: 371-380. (in English). ["We collected larval damselflies from 17 sites in the North, South and Chatham Islands, and tested the hypotheses that: (1) genetic markers (e.g., allozymes, mtDNA) would successfully discriminate taxa; and (2) the dispersal capabilities of adult damselflies would limit differentiation among locations. Four species from three genera were identified based on available taxonomic keys. Using 11 allozyme loci and the mitochondrial cytochrome c-oxidase subunit I (COI) gene, we confirmed that all taxa were clearly discernible. We found evidence for low to moderate differentiation among locations based on allozyme (mean FST = 0.09)



and sequence (COI) divergence (<0.034). No obvious patterns with respect to geographic location were detected, although slight differences were found between New Zealand's main islands (North Island, South Island) and the Chatham Islands for *A. colenisonis* (sequence divergence 0.030–0.034). We also found limited intraspecific genetic variability based on allozyme data (Hexp < 0.06 in all cases). We conclude that levels of gene flow/dispersal on the main islands may have been sufficient to maintain the observed homogeneous population structure, and that genetic techniques, particularly the COI gene locus, will be a useful aid in future identifications." (Authors)] Address: Hogg, I.D., Centre for Biodiversity & Ecology Research, Dept of Biological Sciences, Univ. of Waikato, Private Bag 3105, Hamilton 3240, New Zealand. E-mail: hogg@waikato.ac.nz

**7010.** Novelo-Gutierrez, R. (2007): *Progomphus marce-lae* spec. nov. from western Mexico. *Odonatologica* 36 (1): 79-84. (in English). ["The new species is described, illustrated and its affinities are pointed out. Holotype ♂: Mexico, Pinolapa, State of Michoacan, alt. 616 m asl, 19°00.524N; 103°01.456W, 7-XI-2005; deposited in IEXA, Xalapa. It appears closely related to the pygmaeus-delicatus group of *Progomphus*, from which it can be distinguished by the shape of the anterior hamuli and epiproct lobes. The female and larva are unknown.] Address: Novelo-Gutierrez, R., Departamento de Entomologia, Instituto de Ecología, A.C. Apartado Postal 63, MX-91070 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**7011.** Ocharan, F.J.; Torralba Burrial, A.; Outomuro, D. (2007): *Brachytron pratense* (Müller, 1764) en la Península Ibérica (Odonata, Aeshnidae). *Boln. S.E.A.* 41: 307-312. (in Spanish, with English summary). ["The distribution of *B. pratense* in the Iberian Peninsula is revised. Its current presence in Asturias (northern Spain) is confirmed with a new population. New data about ecological requirements, pond invertebrate community, phenology and ethology are given. The Iberian populations are considered scarce and fragmented, and therefore the species has been proposed as EN "endangered" in Spain and as CR "critically endangered" in Asturias." (Authors)] Address: Torralba Burrial, A., Depto de Biol. de Organismos y Sistemas, Univ. de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**7012.** Oldham, M.J. (2007): Spatterdock Darner (*Rhionaeschna mutata*) in Ontario. *Ontario Odonata* 7: 10-15. (in English). [R. *mutata* is reported for the first time at Long Point National Wildlife Area, Canada on the north shore of Lake Erie, based on a specimen collected in 2005. Previous Ontario records are discussed and information on the identification, taxonomy, habitat, distribution, and status of the species is provided.] Address: Oldham, M.J., Ontario Natural Heritage Information Centre (NHIC), Biodiversity Section, Fish & Wildlife Branch, Ministry of Natural Resources, 300 Water Str., 2nd Floor, North Tower, P.O. Box 7000, Peterborough, Ontario K9J 8M5, Canada. E-mail: michael.oldham@ontario.ca

**7013.** Olias, M.; Günther, A. (2007): Alpen-Smaragdlibelle (*Somatochlora alpestris*) bodenständig im Hochmoor bei Deutscheinsiedel im Osterzgebirge – Entwicklung der Libellenfauna des Deutscheinsiedler Moores nach Revitalisierungsmaßnahmen. *Mitteilungen des Naturschutzinstitutes Freiberg* 3: 40-45. (in German).

[Sachsen, Germany; blocking of a ditch resulted in the development of *Sphagnum* mats suitable for colonisation by *S. alpestris*. Oviposition occurred an estimated five years after starting the measures.] Address: Günther, A., Naturschutzinstitut Freiberg, Waisenhausstraße 10, D-09599 Freiberg, Germany. E-mail: a.guenther@abo.freiepresse.de

**7014.** Olomukoro, J.O.; Ezemonye, L.I.N. (2007): Assessment of the macro-invertebrate fauna of rivers in southern Nigeria. *African Zoology* 42(1): 1-11. (in English). ["This study evaluated the macro-invertebrate fauna in water bodies of southern Nigeria spanning the rainforest and derived savanna ecozones. The benthic macro-invertebrate fauna of Edo Ecozone comprises 55 taxa, belonging to 13 major groups. The abundance of major taxonomic groups varied considerably among the surveyed aquatic ecosystems. Chironomidae (Diptera) were well represented and dominant in 11 of the 20 water bodies surveyed. Most rare and restricted species were gastropods (Mollusca), one such species, *Mutela cf. dibia*, being endemic to the catchment. The overall abundance was maximal (97) at Okomu River in the lowland forest and minimal (5) at Avielle River in derived savanna, respectively. The human impact on macro-invertebrate biodiversity is documented, including changes in benthic fauna distribution patterns." (Authors) The identification of Odonata was made on the genus level, using Needham & Needham (1982): *A Guide to the Study of Freshwater Biology*. Holden-Day, San Francisco, and therefore exclusively considers North American taxa.] Address: Olomukoro, J.O., Department of Animal and Environmental Biology, University of Benin, P.M.B. 1154, Benin City, Nigeria. E-mail: olomsjo@yahoo.com

**7015.** Peretti, A.; Córdoba-Aguilar, A. (2007): On the value of fine-scaled behavioural observations for studies of sexual coercion. *Ethology Ecology & Evolution* 19: 77-86, 2007: 77-86. (in English). [For the full paper see: <http://ejour-fup.unifi.it/index.php/eee/article/view-File/1121/1066>] Address: Peretti, A., Cátedra de Diversidad Animal I, Facultad de Ciencias Exactas, Físicas y Naturales, Universidad Nacional de Córdoba, Avda. Vélez Sarsfield 299, C.P. 5000, Córdoba, Argentina. E-mail: aperetti@com.uncor.edu

**7016.** Perez-Gutierrez, L.A. (2007): The larvae of *Teinopodagrion caquetanum* De Marmels and *T. vallengatum* De Marmels (Zygoptera: Megapodagrionidae). *Odonatologica* 36(3): 307-313. (in English). ["The last instar larvae are described and illustrated. They are diagnosed against the congeners on the basis of published descriptions. The principal diagnostic features are found in caudal gills, cerci and protuberances of occipital lobes. A key to the known *Teinopodagrion* larvae is provided." (Author)] Address: Perez-Gutierrez, L.A., Lab. de Zoología y Ecología Acuática, Depto de Ciencias Biológicas, Universidad de Los Andes, Carrera 1 N° 18A 10, Bogota, Colombia. E-mail: le-perez@uniandes.edu.co

**7017.** Polhemus, D.A. (2007): Biology Recapitulates Geology: the Distribution of Megalagrion Damselflies on the Ko'olau Volcano of O'ahu, Hawai'i. *Bishop Museum Bulletin in Cultural and Environmental Studies* 3: 233-246. (in English). ["Populations of endemic *Megalagrion* damselflies breeding in upland streams have exhibited a progressive decline in both range and num-

bers on O'ahu since the late 1970s, based on analysis of historical collection data and results of recent surveys. In particular, conservation status surveys conducted from 1991 onward determined that the 4 upland stream-breeding taxa on the island, 3 of which are endemic to O'ahu, have disappeared from many catchments they formerly inhabited, particularly in the Wai'anae Mountains and on the leeward side of the Ko'olau Mountains. The remaining populations on the island are now disproportionately concentrated on windward slopes of the latter range, where they are clustered around exposures of the core dike complex of the Ko'olau volcano. This geological formation traps groundwater in dike-segregated compartments, thereby producing permanent surface flow in the upper reaches of many windward Ko'olau gulches, coupled with naturally interrupted midreaches immediately below that block the upstream migration of invasive species. The discovery of this correlation between geology and damselfly distributions has allowed predictive location of additional colonies by using geological maps, permitting future surveys to be more accurately targeted, and providing an objective basis for the delimitation of habitat critical to the survival of these species." (Author)] Address: Polhemus, D.A., Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources, 1151 Punchbowl St., Honolulu, Hawai'i 96813, USA. E-mail: bugman@bishopmuseum.org.

**7018.** Preston, D.J.; Englund, R.A.; Mcs Hane, M.K.K. (2007): Translocation and monitoring efforts to establish a second population of the rare *Megalagrion xanthomelas* (Selys-Longchamps) on O'ahu, Hawai'i (Zygoptera: Coenagrionidae). *Bishop Museum Bulletin in Cultural and Environmental Studies* 3: 261-276. (in English). ["The last remaining population of *M. xanthomelas* resides in a 100 meter reach of stream located on the grounds of Tripler Army Medical Center, O'ahu. Because actions may be taken that might jeopardize this only known O'ahu population, it has been considered imperative to establish a second population to prevent *M. xanthomelas* from going extinct on O'ahu. An attempt to establish this species at a stream in the Dillingham area of O'ahu was made in 1998, but unfortunately was unsuccessful. Because the Tripler population is so small and restricted in distribution, a second effort at translocation was attempted at a new location. We estimated the population size of *M. xanthomelas* at the Tripler site in 1997 and again in 2003 by mark-recapture and concluded that the Tripler population was stable and could withstand the removal and translocation of a small number of adults and larvae. A stream site located in Makiki Valley was selected for its lack of alien predators such as crayfish, prawns, and mosquito fish, and a number of adults and immatures were translocated to the Makiki site in August 2004. Monitoring of the Tripler and the Makiki sites is ongoing and an additional translocation of *M. xanthomelas* to Makiki is planned. Future conservation plans should also include the assistance of from the general public through avenues such as stocking of backyard ponds with *M. xanthomelas*." (Authors)] Address: Preston, D.J., Hawai'i Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, Hawai'i 96817, USA. E-mail: davidp@bishopmuseum.org

**7019.** Prud'homme, E.; Suarez, D. (2007): Deux nouvelles especes pour le departement de la Charente: *Epi-theca bimaculata* (Charpentier, 1825) et *Macromia splendens* (Pictet, 1843) (Odonata, Anisoptera, Cordu-

liidae, Macromiidae). *Martinia* 23(2): 43-51. (in French, with English summary). [France, Charente department; *E. bimaculata* is new and *M. splendens* was rediscovered.] Address: Prud'homme, E., Rue des Colporteurs, 16230 Nanclars, Franc. E-mail: eric.pmdhomme6@wanadoo.fr

**7020.** Ridei, N.; Khrokalo, L.; Pavlusenko, I. (2007): National Ecological Network of Ukraine and the state of research on odonatafauna in protected territories. *Wiad. entomol.* 26(4): 237-249. (in English). ["An analysis of Odonata check-lists of protected species and territories of national and international significance have been carried out within the framework of a biodiversity data base of Ukrainian National Ecological Network's key areas. Summarised and updated information on 11 protected areas is reported. For five natural reserves, such as "Ielanetskyi steppe", "Kazantyp", "Cheremskyi" and "Karadagskyi" Nature Reserves and one branch of Ukrainian Steppe Reserve the check-lists of dragonflies are presented for the first time." (Authors)] Address: Khrokalo, Lyudmila, P.O. Box 16, Kyiv-118, Ukraine 03118. E-mail: lkhrokalo@mail.ru

**7021.** Robillard, A.L. (2007): Seasonal dynamics of a riparian food web in the Oregon coast range mountains. M.Sc Thesis, Fisheries Science, Oregon State University: 14 + 100 pp. (in English). ["Riparian areas are ecotones where aquatically- and terrestrially-derived insect biomass is exchanged between habitats, presenting consumers with new sources of energy, and resulting in a reciprocal subsidy. The relative contribution of energy exchange and the resulting impacts on vertebrate riparian consumers, such as fish or birds, remains poorly understood. We explored this reciprocal exchange within Honeygrove watershed--an alder dominated riparian system within the Oregon Coast Range. Diet samples were collected from birds and fish along with a suite of insect samples during the summer and fall of 2003 and spring 2004. We detected seasonal differences in the abundance and biomass of terrestrial and aquatic insects available to riparian consumers. Spring provided the most adult aquatic insect biomass, and biomass was similar in summer; the fall emergence was an order of magnitude less than the other seasons. Prey sources differed between salmonids. Salmonid diet varied in biomass consumption by season and prey type. Coho salmon (*Oncorhynchus kitsutch*) on average, consumed more benthic aquatic biomass than adult aquatic insect biomass regardless of season. Despite the availability of externally derived prey, this species depended more on stream-derived resources in summer and fall but not during spring. In all sampling seasons, co-occurring cutthroat trout (*Oncorhynchus clarkii*), consumed more terrestrial invertebrate biomass than aquatic biomass, on average. Only in summer, cutthroat trout ate more adult aquatic than benthic aquatic biomass. In fall, their consumption of adult and benthic insect biomass was equal. During spring, cutthroat trout consumption, on average, consisted of more benthic aquatic biomass than adult aquatic biomass. Bird diet samples obtained from commonly encountered species such as Swainson's thrush, Song Sparrow, and Pacificslope Flycatcher, showed more terrestrial derived than aquatic prey during the summer sampling season. These data provided evidence of a reciprocal subsidy occurring in the Honeygrove watershed. There is potentially a seasonal synchrony between the two habitats such that when prey availability is low in one habitat, it is subsid-

ized by the other's high productivity." (Author) Both, the diet of Pacific-slope Flycatcher and the two fish species contained few Odonata.] Address: not stated

**7022.** Rodríguez, A.; Rodríguez, B.; Rumeu; B.; Nogales, M. (2007): Seasonal diet of the Grey Heron *Ardea cinerea* on an oceanic island (Tenerife, Canary Islands): indirect interaction with wild seed plants. *Acta Ornithol.* 42: 77–87. (in English). ["In 199 pellets analyzed a total of 7460 prey items were counted, 96.2% of which were arthropods. Aeshnidae larvae made up 66.1 % of the total prey items and were the main invertebrate group. Vertebrates constituted 3.8%, with reptiles and mammals being the main prey of this type (1.8% each). Despite the small size of the invertebrates, this group reached > 60% in terms of biomass. All the main prey items varied significantly among seasons. Odonata was the most important group in all seasons, reaching its maximum value in summer. In the case of vertebrates, reptiles were captured mainly in spring, mammals in winter. With regard to indirect interaction with seeds, a total of 901 seeds associated with lizard remains were found in 77 pellets, indicating that they had previously been consumed by these reptiles. External visual damage of seeds was low and only 1.1% was destroyed. No seeds germinated after the four-month germination experiment and practically all of them were unviable. In conclusion, these results indicate that Grey Heron diet on islands varies in comparison with continental zones, including an important number of invertebrates and reptiles. Furthermore, this bird acts as an opportunistic secondary seed disperser, although its ecological effect does not seem to be very significant for the dynamics of the Canary Island ecosystems." (Authors)] Address: Rodríguez, A., Island Ecology and Evolution Research Group, Instituto de Productos Naturales y Agrobiología (IPNA-CSIC), Astrofísico Francisco Sánchez 3, 38206 La Laguna, Tenerife, Canary Islands, Spain. E-mail: airamrguez@ipna.csic.es

**7023.** Rodríguez-Barrios, J.; Ospina-Torres, R.; Gutierrez, J.D.; Ovalle, H. (2007): Density and biomass of drifting aquatic macroinvertebrates in a tropical mountain creek at Bogotá, Colombia. *Caldasia* 29(2): 397-412. (in Portuguese, with English summary). ["The variation of drift density of aquatic macroinvertebrates and biomass contribution of different immature and imago stages were estimate on a stream segment of a first order tropical stream in Eastern hills of Bogotá – Colombia, during high and low rainfall periods. A total of 96 taxa were collected; Simulium was the most abundant with 194 individuals (total abundance). Drift density and biomass contributions, were greater during the dry period. Dipterans (chironomids) and mites showed the mayor drift density; trichopterans (Triplectides) showed the greater biomasses to the drift. Significant differences in diel drift pattern between the day and the night ( $K-S=1.86$ ,  $p=0.002$ ,  $n=185$ ), but not in biomass contribution in drift, were observed." (Authors) Odonata are treated at the order level.] Address: Ospina-Torres, R., Laboratorio de Invertebrados Acuáticos, Universidad Nacional de Colombia, Bogotá, D.C.. Columbia. E-mail: rospinat@unal.edu.co

**7024.** Samways, M.J. (2007): Insect conservation: A synthetic management approach. *Annual Review of Entomology* 52: 465-487. (in English). ["Threats to insect diversity range from habitat loss and invasive alien organisms to environmental contamination and biological

control. Many of the threats are synergistic, with the joint impact of habitat loss and global climate change being highly adversely synergistic. Recent research on insect conservation has elucidated some basic principles for conservation management. There are six basic principles that are interrelated and together provide guidelines for synthetic conservation management of insects. They are maintain reserves (principle 1), maintain as much quality landscape heterogeneity as possible (principle 2), reduce contrast between remnant patches and neighbouring disturbed patches (principle 3), outside reserves, introduce land sparing (principle 4), simulate natural conditions and disturbance (principle 5), and connect similar patches of quality habitat (principle 6). These six principles constitute a coarse-filter, landscape approach. Permeating all six is the principle of maintaining healthy population levels, which require the combined support of the metapopulation trio of large patch (habitat) size, good patch quality, and reduced patch isolation. In addition to these six coarse-filter principles is an overlay of the fine-filter, species approach, in which particular species are given focused attention and management." (Author) The paper includes references to Odonata.] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**7025.** Schiefenhövel, P. (2007): Libellen- und Köcherfliegengemeinschaften im Naturpark Soonwald-Nahe. Diplomarbeit, Lehrstuhl für Tierökologie und Tropenbiologie, Julius-Maximilians Universität Würzburg: 133 pp. (in German, with English summary). ["More and more natural habitats and landscapes are getting disturbed. Animals and plants that populated these habitats disappeared or could switch to secondary habitats. Such secondary biotopes can numerously found in the Soonwald which can be characterized by boggy environment. Species living in forest ponds in the Soonwald are diverse and some of them are seldom. I investigated the diversity and composition of Odonata and Trichoptera communities in 22 of these small water bodies. The impact of several environmental factors (pond volume, water temperature, isolation, vegetation of the water bodies and the shorelines, underground of the water bodies) on the two aquatic insect orders was examined. Habitat selection of five endangered dragonflies (*Leucorrhinia dubia*, *Aeshna juncea*, *Sympetrum danae*, *Lestes dryas*, *L. virens vestalis*) was investigated and I tried to find out what kind of composition of environmental factors were responsible to their distribution. Diversity and composition of dragonflies were strongly influenced by the environmental factors and shade next to six other factors (altitude, vegetation cover of emerged, submersed or reeded plants, abundance of peat-bogs and pond volume) was the most important factor. The dragonfly community was not influenced by factors characterizing the boggy environment of the ponds. However, the occurrence and the reproductive success of three endangered dragonflies was influenced by environmental factors (abundance of peat-bogs, tropical level, water temperature) which usually characterize bog ponds. The diversity and composition of caddisflies were influenced by individual analysed parameters namely by water temperature, sediment depth and pond volume. Reproductive success of caddisflies could not be analysed because emergence traps used in this study could not sample the entire pond area. Finally, advantages and disadvantages of this sampling method



are discussed. Furthermore, recommendations for habitat conservation and establishments of boggy ponds are given." (Author)] Address: not stated

**7026.** Sipkay, C.S.; Hufnagel, L.; Révbesz, A.; Petrányi, G. (2007): Seasonal dynamics of an aquatic macroinvertebrate assembly (Hydrobiological case study of Lake Balaton No. 2). Applied ecology and environmental research 5(2): 63-78. (in English). ["In 2002, 2003 and 2004, we took macroinvertebrate (including some Odonata taxa) samples on a total of 36 occasions at the Badacsony bay of Lake Balaton. Our sampling site was characterised by areas of open water (in 2003 and 2004 full of reed-grass) as well as by areas covered by common reed (*Phragmites australis*) and narrowleaf cattail (*Typha angustifolia*). Samples were taken both from water body and benthic ooze by use of a stiff hand net. We have gained our data from processing 208 individual samples. We took samples frequently from early spring until late autumn for a deeper understanding of the processes of seasonal dynamics. The main seasonal patterns and temporal changes of diversity were described. We constructed a weather-dependent simulation model of the processes of seasonal dynamics in the interest of a possible further utilization of our data in climate change research. We described the total number of individuals, biovolume and diversity of all macroinvertebrate species with a single index and used the temporal trends of this index for simulation modelling. Our discrete deterministic model includes only the impact of temperature, other interactions might only appear concealed. Running the model for different climate change scenarios it became possible to estimate conditions for the 2070-2100 period. The results, however, should be treated very prudently not only because our model is very simple but also because the scenarios are the results of different models." (Authors)] Address: Sipkay, C.S., Dept Mathematics & Informatics, Corvinus University of Budapest H-1118 Budapest, Villányi út 29-33, Hungary. E-mail: cssipkay@yahoo.com

**7027.** Smith-Patten, B.D.; Patten, M.A.; Dreiling, M.J.; Fisher, J. (2007): Phenology and new county records of Odonata of northeastern Oklahoma. Publications of the Oklahoma Biological Survey 2nd Series Vol. 8: 1-13. (in English) ["We summarize status, seasonality, and distribution of 69 species (plus three hypotheticals) of Odonata recorded in Osage, Tulsa, and Washington Counties, Oklahoma. To the 28 species listed in Abbott (2005) for this tricounty area, we add 45 species, including 27 new species for Osage, 54 for Tulsa, and 39 for Washington. These additions bring the county totals to 55, 55, and 40 species, respectively. We also present phenologies for all species that are common or uncommon in this area and for a few that occur rarely but with a distinct seasonality. Provided they continue to be gathered, detailed phenological data may prove helpful for monitoring predicted effects of global climate change." (Authors)] Address: Smith-Patten, Brenda, Sam Noble Oklahoma Museum of Natural History, University of Oklahoma, Norman, Oklahoma 73072, USA. E-mail: argia@ou.edu

**7028.** Stübing, S.; Cloos, T.; Korn, M.; Patzich, R.; Roland, H.-J. (2007): Arbeitskreis Libellen in Hessen: Aktuelle Entwicklungen und Verbreitungsatlas der Libellen Deutschlands. Jahrbuch Naturschutz in Hessen 11: 30-35. (in German). [The paper reports on current activities to map the Odonata in the federal state of Hessen,

Germany, and outlines some interesting records.] Address: Dtübing, S., Im Feldchen 1a, 61209 Echzell, Germany. E-mail: stefan.stuebing@gmx.de

**7029.** Suda, S. (2007): The bringing-in case of the dragonfly from the outside of Japan which accompanies the carriage of the aquatic plants. Nature & Insects 42 (9) (Special issue: Recent trends of Odonatology): 12-15. (in Japanese). [The problems of artificial introduction of water plants from remote regions for population genetics of Odonata are discussed.] Address: Suda, S., Graduate School of Agricultural and Life Sciences, The University of Tokyo, Japan

**7030.** Susa, K.; Watanabe, M. (2007): Egg production in *Sympetrum infuscatum* (Selys) ♀♀ living in a forest-paddy field complex (Anisoptera: Libellulidae). Odonatologica 36(2): 159-170. (in English). ["Although the larval habitats of *S. infuscatum* are paddy fields, all adults leave the paddy fields for forest gaps after emergence, and remain there during their sexually immature stages. In late summer when they have matured, some visit the paddy fields in tandem flight for oviposition. However, many ♀♀ remain perching in the forest gaps, where no mating behaviour is observed. To evaluate the habitat selection of *S. infuscatum* ♀♀ in the forest gaps, fecundity was examined by means of dissection. In the morning, the ♀♀ re♀♀ in the forest gaps loaded fewer mature eggs (ca 100) than did ovipositing ♀♀ in the paddy fields (ca 300). ♀♀ remaining in the forest gaps throughout the day were not willing to visit the paddy fields for oviposition due to the low egg number loaded. This could be because these ♀♀ were developing their eggs, having loaded more sub-mature eggs (ca 60) than ovipositing ♀♀ in the paddy fields (ca 30). As a result, in the evening, ♀♀ that had developed nearly 500 eggs appeared. In an artificial oviposition experiment, the ♀♀ in the paddy fields released their eggs significantly faster (60 eggs/min) than did those in the forest gaps (16 eggs/min), and released almost all of their eggs, while the ♀♀ in the forest gaps retained a considerable number of eggs in their ovaries. Although ♀♀ load ovarioles irrespective of their age, the number of immature eggs per ovariole decreased with age. Consequently, a ♀♀ might have laid more than 2000 eggs in her life span. ♀♀ must visit the paddy fields cyclically several times in a single month and stay in the forest gaps during the other days." (Authors)] Address: Susa, K., Graduate School of Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan

**7031.** Theischinger, G.; Richards, S.J. (2007): *Teinobasis kiautai* spec. nov., a new species from Papua New Guinea (Zygoptera: Coenagrionidae). Odonatologica 36 (1): 85-88. (in English). ["The new species is described, diagnostic characters of the adult ♂ are illustrated and the affinities of the species are discussed. Holotype ♂: Papua New Guinea, Eastern Highlands province, Herowana, 24-XI-2001; deposited at South Australian Mus., Adelaide. *T. kiautai* sp. n. is most similar to *T. scintillans*, but dramatically differs from it in the shape of the ♂ pronotum." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**7032.** Theischinger, G. (2007): The final instar larvae of *Gynacantha rosenbergi* KAUP and *Antipodogomphus proselythus* (MARTIN) (Odonata, Aeshnidae & Gomphidae). Linzer Biologische Beiträge 39(2): 1233-1237. (in

English). ["The Australian dragonflies *Gynacantha rosenbergi* Kaup and *Antipodogomphus proselythus* (Martin) were bred out. Their larvae are described from final instar exuviae and compared with their closest allies. They were previously undescribed." (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**7033.** Torralba Burrial, A.; Ocharan, F.J. (2007): Composicion biogeografica de la fauna de libelulas (Odonata) de la Peninsula Iberica, con especial referencia a la aragonesa. Boln. S.E.A. 41: 179-188. (in Spanish, with English summary). ["The check-list of the Odonata of the Iberian Peninsula is updated, with a total of 76 species. Distribution areas and estimated secondary centres of origin and dispersal are analysed. Species are assigned to biogeographical elements: Holarctic, Euro-siberian, Pontic-Eastern, Holomediterranean, West Mediterranean, Ibero-Maghrebian and Ethiopian; previous classifications are modified. The Iberian dragonfly fauna is composed of Mediterranean (66%, mainly Ibero-Maghrebian), northern (21% Euro-siberian and Holarctic) and some Ethiopian (13%) elements. The Aragonese dragonfly fauna is biogeographically analysed and compared with the fauna of Odonata of other Iberian regions." (Authors)] Address: Torralba Burrial, A., Depto de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniob@hotmail.com

**7034.** Tupinambas, T.H.; Callisto, M.; Santos, G.B. (2007): Benthic macroinvertebrate assemblages structure in two headwater streams, south-eastern Brazil. Revista Brasileira de Zoologia 24(4): 887-897. (in English, with Portuguese summary). ["From December 2003 to September 2004, benthic macroinvertebrates (BM), fishes, water and sediment were collected quarterly at six stations in two streams of the upper São Francisco River basin, south-eastern Brazil. We evaluated the ecological conditions, habitat diversity, water quality, composition and structure of BM communities, as well as the food habits of the local fish fauna. [...] We found 45 BM taxa, and Chironomidae (68%), Oligochaeta (10%) and Elmidae (8.5%) showed the highest abundances. From the stomach contents analysis of 13 fish species, 26 BM taxa were found, including four that were not collected in the sediment samples, being Chironomidae the dominant group (> 60%). Our results show that human activities such as forest clearing, agriculture and cattle rising have altered the habitat diversity in freshwater ecosystems in a process that affects the aquatic biota and thus the food availability to the fish fauna. The results also highlight the importance of the fish stomach contents analysis as a complementary tool in BM inventories." (Authors) Reference is made to "Odonata (Libellulidae, Coenagrionidae, Gomphidae)" without further details.] Address: Tupinambas, T. H., Laboratório de Ecologia de Bentos, Depto de Biologia Geral, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais. Caixa Postal 486, 30161-970 Belo Horizonte, Minas Gerais, Brasil. E-mail: taynanh@yahoo.com.br

**7035.** Ubukata, H.; Kurauchi, Y. (2007): Assessment of lake environment using dragonfly assemblage. A case study at Lake Takkobu, Kushiro Marsh, northern Japan. Japanese Journal of Limnology 68: 131-144. (in Japanese, with English summary). ["A periodical census of

mature dragonflies (Odonata) was conducted at 11 investigation sites along the shore of Lake Takkobu, Kushiro Marsh, Hokkaido in 2004, resulting in a record of 2,572 individuals of 18 species belonging to six families. Dragonfly abundance is analyzed in relation with the following five environmental factors: i.e., width of reed bed, water depth, coverage of aquatic macrophytes, ratios of gravels(=2mm) and silt(=0.075mm). The two-dimensional pattern in the dispositions of investigation sites observed on a detrended correspondence analysis (DCA) diagram of dragonflies broadly coincided with that of an actual pattern on the map, whereas this was not the case for that of a DCA diagram of the environmental factors. As the result of a canonical correspondence analysis (CCA) using both dragonfly and environmental data, the investigation sites were separated into four clusters: i.e., deep sites with rich aquatic macrophytes and wide reed beds; deep sites scarce in macrophytes; shallow sites with poor macrophytes and narrow reed beds; and shallower sites with an abundance of macrophytes. Based on the results of the CCA, most dragonfly species are selected as possible indicators of the environmental conditions of the lake: e.g., *Cercion calamorum* (Ris), *Enallagma circumlatum* Selys and six other species as those preferring sites rich in aquatic macrophytes, *E. circumlatum*, *Epitheca bimaculata sibirica* and five others as those favouring wider reed beds and deeper water; *Sympetrum striolatum imitoides* Bartenef, *Trigomphus melampus* (Sel.) and three others as those preferring sites scarce in macrophytes; *Orthetrum albistylum speciosum* (Uhler) preferring the shallowest water with the fewest macrophytes and reed beds; and *T. melampus* and *Sympetrum croceolum* (Sel.) favouring deeper water. Finally, some other factors that may influence the microdistribution of dragonflies in the lake are discussed." (Authors)] Address: Ubukata, H., Hokkaido Univ. Education at Kushiro, Dept Science Education, Shiroyama 1-15-55, Kushiro, 085, Japan. E-mail: ubukata@kus.hokkyodai.ac.jp

**7036.** Urban, M.C. (2007): Predator size and phenology shape prey survival in temporary ponds. Oecologia 154: 571-580. (in English). ["Theoretical efforts suggest that the relative sizes of predators and their prey can shape community dynamics, the structure of food webs, and the evolution of life histories. However, much of this work has assumed static predator and prey body sizes. The timing of recruitment and the growth patterns of both predator and prey have the potential to modify the strength of predator-prey interactions. In this study, I examined how predator size dynamics in 40 temporary ponds over a 3-year period affected the survival of spotted salamander (*Ambystoma maculatum*) larvae. Across communities, gape-limited predator richness, but not size, was correlated with habitat duration (pond permanence). Within communities, mean gape-limited predator size diminished as the growing season progressed. This size reduction occurred because prey individuals grew into a body size refuge and because the largest of the predators left ponds by mid-season. Elevated gape-limited predation risk across time and space was predicted by the occurrence of two large predatory salamanders: marbled salamander larvae (*Ambystoma opacum*) and red-spotted newt adults (*Notophthalmus viridescens*). The presence of the largest gape-limited predator, *A. opacum*, predicted *A. maculatum* larval survival in the Weld. The distribution of large predatory salamanders among ponds and across time is expected to lead to differing community dynamics and to gener-

ate divergent natural selection on early growth and body size in *A. maculatum*. In general, a dynamic perspective on predator size often will be necessary to understand the ecology and evolution of species interactions. This will be especially true in frequently disturbed or seasonal habitats where phenology and ontogeny interact to determine body size asymmetries. [...] The most abundant predator taxa were the caudates *Notoptthalmus viridescens* adults and *Ambystoma opacum* larvae, the anuran *Rana clamitans*, odonate larvae, including *Sympetrum*, *Aeshna*, *Pachydiplax*, and *Leucorhinia*, the coleopteran *Dytiscus*, the hemipterans *Lethocerus* and *Notonecta*, and the megalopteran *Chauliodes*." (Authors)] Address: Urban, M.C., School of Forestry & Environmental Studies, Yale University, 370 Prospect Street, New Haven, Connecticut 06520 USA. E-mail: urban@nceas.ucsb.edu

**7037.** Vadadi-Fülöp, C.S.; Meszaros, G.; Jablonsky, G.Y.; Hufnagel, L. (2007): Ecology of the Rackeve-Soroksar Danube - a review. *Applied ecology and environmental research* 5(1): 133-163. (in English). ["Present paper is a review on the Rackeve-Soroksar Danube in ecological standpoint. The goal of this study is to collect and evaluate all of available publications (including two with Odonata) - in that conception, concerning this Danube arm. Phytoplankton, zooplankton, macroinvertebrates, vertebrates, macrophytes and also water chemistry, water management, geographical description are presented. The review comprises the main studies beginning with the earliest faunistic publications up to the recent ecological, multidisciplinary investigations. Spatial and temporal patterns likewise water quality are considered as important. Additionally checklist of aquatic invertebrate and vertebrate fauna are given based on data from literature." (Authors)] Address: Vadadi-Fülöp, C.S., Eötvös Loránd University, H-1117 Budapest, Pazmany P. setany 1/c, Hungary. E-mail: vadfulcsab@gmail.com

**7038.** Van Gossum, H.; Beatty, C.D.; Charlat, S.; Waqa, H.; Markwell, T.; Skevington, J.H.; Tuiwawa, (2007): Male rarity and putative sex-role reversal in Fijian damselflies (Odonata). *Journal of Tropical Ecology* 23: 591-598. (in English). ["Behavioural sex-role reversal occurs when ♂♂ and ♀♀ exchange their standard roles in territorial defence or parental care. One circumstance under which sex-role reversal may occur is when ♂♂ are a limiting resource, so that ♀♀ have to compete for access to mates. Here we report on male rarity and male and female behaviour of species within the damselfly genus *Nesobasis*, endemic to Fiji. Earlier reports suggested that, in some members of this genus, ♂♂ were seldom observed and that ♀♀ of these species were consequentially territorial, a phenomenon described as 'sex-role reversal'. Quantitative estimation of the ratio of adult ♂♂ to ♀♀ at 15 localities in 13 *Nesobasis* species (1489 individuals) indicated that ♂♂ were extremely rare in some species, yet common in others. This interspecific variability in male rarity cannot be explained by elevation or habitat. Formal observations of three species with abundant ♂♂ revealed that ♂♂ of these species were highly territorial: they physically challenged intruders while remaining within a confined area. By contrast, in three species where ♂♂ were consistently rare or absent, ♀♀ were not territorial: instead, they moved widely and were primarily engaged in oviposition. While we do not know the underlying reason for the unusual rarity of ♂♂ at oviposition sites in some

species, it is clear that this rarity has not provided sufficient selection pressure to generate genuine sex-role reversal." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**7039.** von Ellenrieder, N.; Garrison, R.W. (2007): Dragonflies and Damselflies (Insecta: Odonata) of the Argentine Yungas: Species composition and identification. *Scientific Reports* n. 7, Publisher Società Zoologica "La Torbiera", Italy: 103 pp. (Bilingual in English and Spanish). ["The Argentine mountain cloud forests, known as Yungas, house a high biodiversity, second only to the Amazon forest in the country. Their Odonata have not yet been documented or extensively studied, and in this contribution a preliminary inventory of their species, as well as keys allowing for identification of adults and all known larvae are provided." (Authors)] Address: Ellenrieder, Natalia von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: odonata@hotmail.com

**7040.** Watanabe, M.; Iwata, S. (2007): Evaluation of line transect method for estimating *Mortonagrion Hirosei* abundance in a dense reed community (Zygoptera: Coenagrionidae). *Odonatologica* 36(3): 275-283. (in English). ["The results of the mark and recapture method for estimating the number of *M. Hirosei* adults were compared to those of census counts using the line transect method carried out in the same habitat, a dense reed community established in brackish water. The mark and recapture method gave a daily estimate of about 1000 and 800 individuals of each sex at the peak population in early July of 2003 and 2004, respectively. These results did not agree with the estimate from the census counts, giving 600 S at that time in the same habitat. Some limitations of the line transect method were discussed for estimates of adults perching in the understory of the dense reed community. However, a relationship was observed with regard to daily population estimates of the line transect method and the mark and recapture method, indicating that the line transect method can be an effective tool for monitoring populations of the endangered damselflies inhabiting such a dense plant community." (Authors)] Address: Watanabe, M., Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan. E-mail: watanabe@kankyo.envr.tsukuba.ac.jp

**7041.** Winkel, S.; Kuprian, M. (2007): Seltener Schnappschuss von der Zweigestreiften Ouelljungfer (*Cordulegaster boltonii*) am Hainbach bei Offenbach. *Jahrbuch Naturschutz in Hessen* 11: 41. (in German). [Hessen, Germany; photographs of oviposition of *C. boltonii*, without detailed record dates.] Address: Winkel, Sibylle, Pommernstr. 7, 63069 Offenbach, Germany. E-mail: si.winkel@t-online.de

**7042.** Winkel, S.; Kuprian, M. (2007): Begleitendes Monitoring der Libellenfauna des FFH- und Naturschutzgebietes „Hölle von Rockenberg“ im Rahmen des Hessischen Wiederansiedlungsprojektes Europäische Sumpfschildkröte. *Jahrbuch Naturschutz in Hessen* 11: 36-40. (in German). [Hessen, Germany; 23 odonate species were recorded between 2004 and 2007] Address: Winkel, Sibylle, Pommernstr. 7, 63069 Offenbach, Germany. E-mail: si.winkel@t-online.de



**7043.** Winkel, S.; Schroth, M.; Bressler, W.; Flöber, E.; Kuprian, M. (2007): Wiederfund der Kleinen Zangenlibelle im Natura 2000-Gebiet 5818-401 „Main bei Mühlheim und NSG Rumpfenheimer & Bürger Kiesgruben“ und Rückkehr der Art an den Untermain. *Insecta* 10: 123-128. (in German). [The paper compiles several new and unpublished records of *O. forcipatus* in Hesse, Germany from the period 1992 to 2006.] Address: Winkel, Sibylle, NABU LAG Naturentwicklung & Biodiversität, Pommernstraße 7, D-63069 Offenbach am Main, Germany. E-Mail: [si.winkel@t-online.de](mailto:si.winkel@t-online.de)

**7044.** Wohlfahrt, B.; Mikolajewski, D.J.; Joop, G.; Vamosi, S.M. (2007): Ontogenetic changes in the association between antipredator responses and growth variables. *Ecological Entomology* 32(5): 567-574. (in English). ["1. An organism's growth parameters are expected to depend on environmental constraints, such as predation risk and food supply. However, antipredator responses, food intake, and thus growth of an animal may be mediated by behavioural traits, which are likely to differ among developmental stages. In this study, it was investigated how the relationship between growth and behavioural antipredator responses changes during ontogeny in the time-constrained dragonfly species *Libellula depressa*, and which factors influenced specific behavioural decisions at different points in ontogeny. 2. The results revealed that behavioural strategies differed between larval developmental stages, depending on associations between larval growth, food supply, and predation risk. Early in ontogeny, faster development was correlated with high larval activity and high food supply. This resulted in high activity levels under high food conditions irrespectively of predator presence, and under low food supply in predator absence only. In the intermediate stage of development, all larvae displayed a high activity level, which was correlated in general with fast development. However, growth later in ontogeny was not only influenced by the activity level, but also by predator presence and food supply, with larvae reared under high food supply and/or in presence of predators attaining a higher final mass. Thus, not only the way in which larval growth parameters and behaviour are related changed during development, but also whether the factors influenced larval growth and behaviour. Once the larvae reached the ultimate stage of development, in which they overwinter, behavioural patterns observed were consistent with model predictions. 3. It is advocated that behavioural plasticity of prey organisms in different developmental stages should be analysed in the context of associated growth variables." (Authors)] Address: Mikolajewski, D.J., Laboratory for Aquatic Ecology, Katholieke Universiteit Leuven, Charles de Bériotstraat 32, B-3000 Leuven, Belgium. E-mail: [d.mikolajewski@tu-bs.de](mailto:d.mikolajewski@tu-bs.de)

**7045.** Xu, Q.-h. (2007): *Periaeschna zhangzhovensis* sp. n. from Fujian, China (Anisoptera: Aeshnidae). *Odonatologica* 36(3):315-318 (in English) ["The new species is described, illustrated and compared with the congeners (holotype ♂, China, Fujian, Huaan co., 3-VIII-2004; deposited at Zhangzhou Education College, China). It is similar to *P. flinti* Asahina, from which it is distinguished by longer inferior appendages, an obtusely tipped dentigerous plate and by different colour patterns of the synthorax and abdomen." (Author)] Address: Xu, Q.-h., Zhangzhou Education College, Zhangzhou 363000, Fujian, China. E-mail: [qihanx@yahoo.com.cn](mailto:qihanx@yahoo.com.cn)

**7046.** Abbott, J.K.; Bensch, S.; Gosden, T.P.; Svensson, E.I. (2008): Patterns of differentiation in a colour polymorphism and in neutral markers reveal rapid genetic changes in natural damselfly populations. *Molecular Ecology* 17(6): 1597-1604. (in English). ["The existence and mode of selection operating on heritable adaptive traits can be inferred by comparing population differentiation in neutral genetic variation between populations (often using  $F_{ST}$  values) with the corresponding estimates for adaptive traits. Such comparisons indicate if selection acts in a diversifying way between populations, in which case differentiation in selected traits is expected to exceed differentiation in neutral markers [ $F_{ST}$  (selected) >  $F_{ST}$  (neutral)], or if negative frequency-dependent selection maintains genetic polymorphisms and pulls populations towards a common stable equilibrium [ $F_{ST}$  (selected) <  $F_{ST}$  (neutral)]. Here, we compared  $F_{ST}$  values for putatively neutral data (obtained using amplified fragment length polymorphism) with estimates of differentiation in morph frequencies in the colour-polymorphic damselfly *Ischnura elegans*. We found that in the first year (2000), population differentiation in morph frequencies was significantly greater than differentiation in neutral loci, while in 2002 (only 2 years and 2 generations later), population differentiation in morph frequencies had decreased to a level significantly lower than differentiation in neutral loci. Genetic drift as an explanation for population differentiation in morph frequencies could thus be rejected in both years. These results indicate that the type and/or strength of selection on morph frequencies in this system can change substantially between years. We suggest that an approach to a common equilibrium morph frequency across all populations, driven by negative frequency-dependent selection, is the cause of these temporal changes. We conclude that inferences about selection obtained by comparing  $F_{ST}$  values from neutral and adaptive genetic variation are most useful when spatial and temporal data are available from several populations and time points and when such information is combined with other ecological sources of data." (Authors)] Address: Abbott, J.K., Department of Biology, Queen's University, Kingston, Ontario, Canada K7L 3N6. E-mail: [abbottj@queensu.ca](mailto:abbottj@queensu.ca)

**7047.** Abbott, J.K.; Svensson, E.I. (2008): Ontogeny of sexual dimorphism and phenotypic integration in heritable morphs. *Evol. Ecol.* 22: 103-121. (in English). ["In this study we investigated the developmental basis of adult phenotypes in a non-model organism, a polymorphic damselfly (*Ischnura elegans*) with three female colour morphs. This polymorphic species presents an ideal opportunity to study intraspecific variation in growth trajectories, morphological variation in size and shape during the course of ontogeny, and to relate these juvenile differences to the phenotypic differences of the discrete adult phenotypes; the two sexes and the three female morphs. We raised larvae of different families in individual enclosures in the laboratory, and traced morphological changes during the course of ontogeny. We used principal components analysis to examine the effects of Sex, Maternal morph, and Own morph on body size and body shape. We also investigated the larval fitness consequences of variation in size and shape by relating these factors to emergence success. ♀♀ grew faster than ♂♂ and were larger as adults, and there was sexual dimorphism in body shape

in both larval and adult stages. There were also significant effects of both maternal morph and own morph on growth rate and body shape in the larval stage. There were significant differences in body shape, but not body size, between the adult female morphs, indicating phenotypic integration between colour, melanin patterning, and body shape. Individuals that emerged successfully grew faster and had different body shape in the larval stage, indicating internal (non-ecological) selection on larval morphology. Overall, morphological differences between individuals at the larval stage carried over to the adult stage. Thus, selection in the larval stage can potentially result in correlated responses in adult phenotypes and vice versa." (Authors)] Address: Abbott, Jessica K., Section for Animal Ecology, Lund University, Ecology Building, 223 62 Lund, Sweden. E-mail: Jessica.Abbott@zooekol.lu.se

**7048.** Adebote, D.A.; Oniye, S.J.; Muhammed, Y.A. (2008): Studies on mosquitoes breeding in rock pools on inselbergs around Zaria, northern Nigeria. *J. Vector. Borne Dis.* 45: 21-28. (in English). ["Background & objectives: Rainwater often collects in depressions on rocks to form pools that are ideal breeding sites of mosquito vectors of diseases. Knowledge on the existence of disease vectors in these remote and relatively inaccessible locations could improve epidemiologic understanding and control capabilities. This study identifies mosquito species, their relative abundance and physicochemical characteristics of breeding microhabitats in rock pools on four inselbergs in northern Nigeria. Methods: Soup ladle dipper was used to obtain representative samples of larval mosquitoes breeding in 141 rock pools on four inselbergs. Physicochemical parameters (depth, electrical conductivity, pH, surface area, temperature and total dissolved solids) of the pools were determined. Larvae were preserved in 70% alcohol and identified microscopically to species using taxonomic keys. Statistical correlation analysis and ANOVA were used to test the associations between physicochemical parameters and mosquito abundance, and for differences amongst inselbergs. Results: Of 2991 larvae, five species of mosquito distributed in three genera (*Anopheles*, *Aedes* and *Culex*) including *Ae. vittatus* (92.88%), *An. ardensis* (0.13%), *An. distinctus* (1.67%), *An. wilsoni* (0.13%) and *Cx. ingrami* (5.18%) bred in the rock pools. Up to five species occurred per pool in various conspecific and heterogeneric combinations. Except for *Ae. vittatus*, the physicochemical parameters of the pools correlate significantly with species abundance. Conclusion: *Ae. vittatus*, a potential vector of yellow fever in Nigeria breeds profusely in rock pools on inselbergs around Zaria. For comprehensive vector implication vector implication and control, rock pools should be amongst the habitats of focus in yellow fever epidemiology." (Authors) The discussion contains references to Odonata as predators of mosquitoes. ] Address: Adebote, D.A, Department of Biological Sciences, Ahmadu Bello University, Zaria, Nigeria

**7049.** Baskinger, G.M.; Ware, J.L.; Kornell, D.D.; May, M.L.; Kjer, K.M. (2008): A phylogeny of *Celithemis* inferred from mitochondrial and nuclear DNA sequence data and morphology (Anisoptera: Libellulidae). *Odonatologica* 37(2): 101-109. (in English). ["The dragonfly genus *Celithemis* consists of 8 species, some of them common and brightly coloured, that are confined largely to eastern North America. Several species have been used in behavioural, ecological, and morphological stu-

dies, but their intrageneric phylogeny is unclear. In this paper is provided a phylogeny based on morphology and on data from mitochondrial and nuclear DNA sequences of multiple individuals of each species. The genus appears to be monophyletic, with one nested species pair (*C. amanda*+*C. martha*) receiving strong bootstrap support by both parsimony or maximum-likelihood criteria as well as high Bayesian posterior probability. A second group (*C. bertha*, *C. elisa*, *C. ornata* and *C. fasciata*) is well-supported in Bayesian analysis but only weakly by parsimony and maximum-likelihood bootstrap values. *C. verna* and *C. eponina* are probably basal to both these groups, but their relationship to each other is unclear. All individuals assigned to a species recognized on morphological grounds were recovered as monophyletic. The problematic taxa, *C. monomalaena* and *C. bertha leonora*, are shown definitively to be synonyms of *C. fasciata* and *C. bertha*, respectively." (Authors)] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu

**7050.** Bedjanic, M. (2008): Notes on the synonymy, distribution and threat status of *Elatoneura oculata* (Kirby, 1894), an endemic damselfly from Sri Lanka (Zygoptera: Protoneuridae). *Odonatologica* 37(2): 145-150. (in English). ["Based on an examination of the material in the Natural History Museum in London, *Elatoneura bigemmata* Lieftinck, 1971 is a junior synonym of *E. oculata* (Kirby, 1894). A map of the currently known distribution of the species is provided. According to the IUCN criteria, due to its very small area of occupancy in SW Sri Lanka and pressure on its habitat, *E. oculata* is to be classified as globally endangered (EN)." (Author)] Address: Bedjanic, M., Kolodvorska 21b, SI-2310 Slovenska Bistrica, Slovenia. E-mail: matjaz.bedjanic@guest.arnes.si

**7051.** Bernard, R.; Kosterin, O.E. (2008): Field notes of two hunters for *Nehalennia speciosa* in boggy Vasyugan Plain, West Siberia. *IDF-Report* 12: 1-34. (in English). ["One important result of our expedition is the picture of the summer aspect of the odonate fauna in these mostly primeval and remote boggy areas. In total, 34 odonate species were recorded, that is quite a few for an area of that size situated at such latitudes in Siberia and having a rather narrow spectrum of habitats predominated by large complexes of *Sphagnum* bogs and fens, and specific rivers bringing peaty waters. Our supposition that the boggy areas of the Vasyugan Plain in the West Siberian Lowland are a huge reservoir of *N. speciosa* was confirmed splendidly. It is worth noticing, however, that, although seemingly omnipresent in pools of *Sphagnum* bogs, it is not so abundant there. Possibly we visited this area near the end of the flight period of *N. speciosa* there, but nevertheless, the pattern of the species occurrence in the plain seems to be based on very numerous and dense but small local populations. Therefore, taking into account the total size of this giant boggy area, the population numbers in the Vasyugan Plain is certainly enormous. However, it is a rather recent picture, since the bogs are 5200 years old at most in some restricted areas, while the peatmoss prevailing stage of their development began just some 1500 years ago. Generally, the complex of peat-moss bog species is flourishing in the studied area. Along with *N. speciosa*, in all such habitats we recorded tyrphobiontic *Aeshna subarctica*, the records of which had hitherto

also been scarce in Siberia. The species is certainly very abundant in the Vasyugan Plain and is well separated spatially from two other co-occurring aeshnids in Sphagnum bogs – *A. juncea* and *A. crenata*. The picture we have drawn of the spatial, temporal and behavioural segregation between these aeshnids confirmed and developed earlier observations from Europe (Bernard 2002, unpublished data). One of the members of the mentioned complex of species, *C. johanssoni*, abundant in primary habitats – small bog water bodies – is completely missing in large oxbows and man-made large ponds. This absence seems to be related to higher nutrient levels and inappropriate or too poor vegetation. One mystery of peat-moss complexes remained undisclosed: this is the breeding places of the generally very abundant *S. arctica*. According to our observations the majority of so numerous individuals ceased their maturation period and disappeared, most probably to their breeding places. However, despite visiting various places in the peat-moss complexes, we failed to observe a single territorial male or ovipositing female. This resembles the situation described by Dijkstra & Koese (2001) from the Belarussian Polesse, where huge numbers of immature *arctica* were observed while at the same time there was no observation of true *arctica* reproduction or its original habitats. It seems that the original, stem habitats of this species may be situated in more central, largely flooded or more sinking parts of large Sphagnum complexes, may be also in large areas of mesotrophic fens overgrown with *Caricetum lasiocarpae*. The study area brought an interestingly high percentage of androchrome ♀♀ of *Calopteryx splendens* and dark-winged *Somatochlora* individuals, especially noteworthy in *S. flavomaculata*. Worth noticing was also the spatially separated occurrence of two subspecies (species?) of *Enallagma cyathigerum*: *cyathigerum* and *risi*. The records of *Gomphus vulgatissimus* and *Shaogomphus postocularis* extended the known range of these species 170–225 km and 185 km north, respectively. The former species, earlier known in Siberia from the only group of localities near Novosibirsk, turned out to be widely distributed and fairly abundant in the area of studies, and the latter was for the first time found west of the Ob'. From the zoogeographical point of view, records of *Leucorrhinia albifrons* and *L. pectoralis* were also very interesting, shifting their known northern range limits significantly to the north. As our studies showed, *Lestes virens*, *Coenagrion puella*, *C. pulchellum*, *Somatochlora flavomaculata* and *Sympetrum sanguineum* also reach or cross their hitherto known northern range limits in the studied area (cf. Belyshev 1973). To conclude, some absences should be stressed, both of the typical northern (boreal-alpine) species, such as *Aeshna caerulea* and *Somatochlora alpestris* (although theoretically they could be recorded, see Belyshev 1973) and some species which are common 200 km to the south, at Novosibirsk, such as *Aeshna mixta* or *Sympetrum pedemontanum* (Kosterin et al. 2001). We quite expected to meet *Aeshna serrata*, which is known even more northerly (Belyshev 1973), but there seemed to be no suitable habitats for it." (Authors)] Address: Bernard, R., Dept General Zool., Adam Mickiewicz Univ., Umultowska 89, PL-61-702 Poznan, Poland; E-mail: rbernard@main.amu.edu.pl

**7052.** Bernard, R.; Ivinskis, P.; Daraz, B. (2008): *Lestes barbarus* (Fabricius), a forgotten species in the fauna of Lithuania (Zygoptera: Lestidae). *Notul. odonatol.* 7(1): 1-2. (in English). ["*L. barbarus* is added to the odonate

fauna of Lithuania based on a forgotten note and 3 new records. The Lithuanian localities are among the northernmost sites in the *L. barbarus* distribution. Their situation is considered in the context of the pulsating nature of the northern border of its range with relation to climatic changes and wandering tendencies of the species. The new localities are briefly described, special attention is given to the site of a breeding population." (Authors)] Address: Bernard, R., Department of General Zoology, Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznan, Poland; E-mail: rbernard@main.amu.edu.pl

**7053.** Buczyński, P. (2008): Extremely northern records of *Sympetrum depressiusculum* (Sel.) in Poland (Anisoptera: Libellulidae). *Notulae odonatologicae* 7(1): 11-12. (in English). [Records from three localities from northern Poland are given: (1) Nature reserve "Bielawa" ad Ostrowo (54°47'32,6"N, 18°14'17,1"E), 11-VIII-2006, (2) Grotowo (54°18'22,3"N, 20°19'13,9"E) 10-VIII-2007, (3) Chmielnik ad Kętrzyn (54°07'12,6"N, 2°12'13,2"E), 11-VIII-2007.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**7054.** Bybee, S.M.; Ogden, T.H.; Branham, M.A.; Whiting, M.F. (2008): Molecules, morphology and fossils: a comprehensive approach to odonate phylogeny and the evolution of the odonate wing. *Cladistics* 24: online first. (in English). ["We undertook a comprehensive morphological and molecular phylogenetic analysis of dragonfly phylogeny, examining both extant and fossil lineages in simultaneous analyses. The legitimacy of higher-level family groups and the phylogenetic relationship between families were tested. Thirteen families were supported as monophyletic (Aeshnidae, Calopterygidae, Chlorocyphidae, Euphaeidae, Gomphidae, Isostictidae, Lestidae, Libellulidae, Petaluridae, Platystictidae, Polythoridae, Pseudostigmatidae and Synthemistidae) and eight as non-monophyletic (Amphipterygidae, Coenagrionidae, Corduliidae, Megapodagrionidae, Protoneuridae and Synlestidae), although Perilestidae and Platycnemididae were recovered as monophyletic under Bayesian analyses. Nine families were represented by one species, thus monophyly was not tested (Epiophlebiidae, Austropetaliidae, Chlorogomphidae, Cordulegastriidae, Macromiidae, Chorismagrionidae, Diphlebiidae, Lestoideidae and Pseudolestidae). Epiprocta and Zygoptera were recovered as monophyletic. *Ditaxinera* is supported as the sister lineage to Odonata, Epiophlebiidae and the lestid-like damselflies are sister to the Epiprocta and Zygoptera, respectively. Austropetaliidae + Aeshnidae is the sister lineage to the remaining Anisoptera. *Tarsophlebia*'s placement as sister to Epiprocta or as sister to Epiprocta + Zygoptera was not resolved. Refinements are made to the current classification. Fossil taxa did not seem to provide signals crucial to recovering a robust phylogeny, but were critical to understanding the evolution of key morphological features associated with flight. Characters associated with wing structure were optimized revealing two wing character complexes: the pterostigma–nodal brace complex and the costal wing base & costal–ScP junction complex. In turn, these two complexes appear to be associated; the pterostigma–nodal brace complex allowing for further modification of the wing characters comprised within the costal wing base & costal–ScP junction complex leading the modern odonate wing." (Authors)] Address: Bybee, S., Graduate Research Assistant: Branham Labor-



atory, Dept Entomology & Nematology, Univ. of Florida. Natural Area Drive, P.O.Box 110620, Gainesville, FL 32611-0620, USA. E-mail: seth.bybee@gmail.com

**7055.** Bybee, S.M. (2008): Description of the female and nymph of *Philogenia mangosisa* from southern Ecuador (Odonata: Megapodagrionidae). *Zootaxa* 1787: 63-68. (in English). ["The previously unknown ♀ and nymph of *Philogenia mangosisa* are described, illustrated, and compared with similar species." (Authors)] Address: Bybee, S., Branham Lab., Univ. Florida, Dept of Entomology & Nematology, Natural Area Drive, PO Box 110620, Gainesville, Florida 32611-0620, USA. E-mail: seth.bybee@gmail.com

**7056.** Carle, F.L.; Kjer, K.M.; May, M.L. (2008): Evolution of Odonata, with special reference to Coenagrionoidea (Zygoptera). *Arthropod Systematics & Phylogeny* 66(1): 37-44. (in English). ["A phylogeny including 26 families of Odonata is presented based on data from large and small subunit nuclear and mitochondrial ribosomal RNAs and part of the nuclear EF-1a. Data were analyzed using Bayesian methods. Extant Zygoptera and Anisoptera are monophyletic. The topology of Anisoptera is ((Austropetalidae, Aeshnidae) (Gomphidae (Petaluridae ((Cordulegastridae (Neopetalidae, Chlorogomphidae)) ((Synthemistidae, Gomphomacromiidae) (Macromiidae (Cordulidae s.s., Libellulidae)))))). Each of the major groups among anisopterans is well supported except the grouping of Neopetalia with Chloropetalia. Lestidae and Synlestidae form a group sister to other Zygoptera, and Coenagrionoidea are also monophyletic, with the caveat that Isostictidae, although well supported as a family, was unstable but not placed among other coenagrionoids. Calopterygoidea are paraphyletic and partly polytomous, except for the recovery of (Calopterygidae, Hetaeriniidae) and also (Chlorocyphidae (Epallagidae (Diphlebiinae, Lestoidinae))). Support for Epallagidae as the sister group of a clade (Diphlebiinae, Lestoideinae) is strong. Within Coenagrionoidea, several novel relationships appear to be well supported. First, the Old World disparoneurine protoneurids are nested within Platycnemididae and well separated from the protoneurine, *Neoneura*. The remaining coenagrionids are divided into two well-supported subdivisions. The first includes Pseudostigmatinae, stat. nov., Protoneurinae, a group of coenagrionids mostly characterized by having an angulate frons, and Argiinae (Argia). The second division includes typical Coenagrionidae." (Authors) Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu

**7057.** Catling, P.M.; Kostiuk, B. (2008): Post conference field trip - Annual Meeting of the Dragonfly Society of the Americas, 2005. *Ontario Odonata* 7: 28-32. (in English). [On 12 July 2005 about 20 people started to 11 localities in the counties Nipissing, Timiskaming, and Cochrane. Result of the trip are 58 odonate species, which are listed in a table.] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**7058.** Catling, P.M. (2008): Why are dragonflies important? *Ontario Odonata* 7: 49-50. (in English). [The note focuses on the ecosystem function of Odonata, their role as bioindicators, their contribution to pest control, and their importance for research.] Address: Catling,

P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**7059.** Catling, P.M.; Jones, C.D.; Pratt, P. (2008): Introduction to the year 2005 Ontario Odonata Summary Records. *Ontario Odonata* 7: 51-208. (in English). ["The 2005 summary of Ontario Odonata includes 8556 records. The database, which contains more information and fields than the appendix table, will be stored at the Natural Heritage Information Centre (NHIC) and will be available to cooperators from the NHIC, (NHIC, Ontario Ministry of Natural Resources, Box 7000, 300 Water Street, Peterborough, Ontario K9L 1C8, email: colin.jones@dmnr.gov.on.ca) and the TEA (www.ontarioinsects.org/)." (Authors)] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**7060.** Catling, P.M.; Hughes, M. (2008): Variation in Canadian *Gomphus fraternus* (Odonata: Gomphidae) in relation to the recognition of subspecies *manitobanus*. *Canadian Entomologist* 140: 327-337. (in English, with French summary). ["Seven characters were evaluated in 146 specimens of *G. fraternus*, including both subspecies, *G. f. fraternus* (Say) and *G. f. manitobanus* Walker, to clarify their circumscription and geographic occurrence in Canada. Specimens corresponding to subspecies *manitobanus* were all from the Assiniboine and Red rivers and formed a discrete group in a principal components analysis, supporting their taxonomic recognition. Their distribution in Canada suggests a separation of subspecies near the boundary of the prairie ecozone in central southern Manitoba. In subspecies *fraternus* the extensor surfaces of the tibiae are largely black, with pale areas often lacking and rarely up to 50% of the segment length. Similarly the dorsal surface of abdominal segment 9 is largely black. If there is a pale area, it is <1 mm long. In subspecies *manitobanus* the extensor surfaces of the tibiae have pale markings on =50% of their lengths and the dorsal surface of abdominal segment 9 has a dorsal yellow spot =1.4 mm long. Widespread dragonflies in western North America are paler in drier climates and the increased pale colouration in the western subspecies *manitobanus* corresponds to this trend. Currently known only from Manitoba, subspecies *manitobanus* may occur in prairie habitats of the Midwestern United States, based on reports of pale individuals in that region." (Authors)] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**7061.** Chakona, A.; Phiri, C.; Magadza, C.H.D.; Brendonck, L. (2008): The influence of habitat structure and flow permanence on macroinvertebrate assemblages in temporary rivers in northwestern Zimbabwe. *Hydrobiologia* 607(1): 199-209. (in English). ["Temporary rivers within the Nyaodza-Gachegache subcatchment in northwestern Zimbabwe were investigated to examine the role of flow permanence and habitat structure on macroinvertebrate community composition. Macroinvertebrate communities of intermittent and ephemeral rivers displayed significant differences in the number of taxa, macroinvertebrate abundance, Shannon & Simpson diversity indices and in size class structure. Intermittent sites were characterised by higher numbers of taxa, diversity and Ephemeroptera and Trichoptera richness compared to ephemeral sites. The fauna of ephemeral sites was dominated by a single taxon (Afrobaetodes) (Eph., Baetidae) whilst larger sized taxa (e.g.

Elassoneuria (Eph., Oligoneuriidae), Dicroptilum (Eph., Baetidae), Aethaloptera (Trichoptera, Hydropsychidae), Pseudagrion (Odonata, Coenagrionidae) and Tholymis (Od., Libellulidae) were exclusively restricted to intermittent sites. Clear differences were observed between sand, gravel, cobble and vegetation habitats. Vegetation and cobbles supported distinct communities, with some taxa exclusively restricted either to vegetation (e.g. Pseudagrion, Leptocerina (Trich., Leptoceridae), Cloeon (Eph., Baetidae), Afronurus (Eph., Heptageniidae) and Povilla (Eph., Polymitarcidae) or cobble (e.g. Aethaloptera & Dicroptilum) habitats. In terms of ensuring optimum diversity within the subcatchment, we consider conservation of critical habitats (cobbles and vegetation) and maintenance of natural flows as the appropriate management actions." Address: Chakona, A., Univ. Lake Kariba Research Station, PO Box 48, Kariba, Zimbabwe. E-mail: achakona@yahoo.com

**7062.** Chelmick, D.C.; Pickess, B.P. (2008): *Trithemis kirbyi* Selys in southern Spain (Anisoptera: Libellulidae). *Notulae odonatologicae* 7(1): 4-5. (in English). [The common African dragonfly, *T. kirbyi*, is recorded from southern Spain on 29 May 2007 near Manilva. As far as the authors can ascertain this is the first time this species has been observed in mainland Europe.] Address: Chelmick, D.C., High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK. E-mail: dgc@davidchelmick.com

**7063.** Collier, K.J.; Lill, A. (2008): Spatial patterns in the composition of shallow-water macroinvertebrate communities of a large New Zealand river. *New Zealand Journal of Marine and Freshwater Research* 42: 129-141. (in English). ["Identifying the environmental factors influencing biotic patterns in large rivers will assist with extrapolating biological monitoring results to broader scale conclusions about river condition. In the present study, we collected macroinvertebrates and physico-chemical data at 47 shallow-water (<1-m deep) sites, including nine sites at major tributary junctions, during summer along the lower Waikato River, North Island, New Zealand. Macroinvertebrate communities were dominated by a few relatively abundant and widespread taxa. Upper site samples were characterised by high relative abundances of Diptera, but the significance of this group declined further downstream where Crustacea became more dominant. Overall, more taxa (36) were found at tributary junctions than at mainstem sites within four hydrogeomorphic zones (22–31 taxa per zone). Significant differences among faunal groups identified in a cluster analysis on relative abundance data were detected for the percentage of wood sampled, and for water conductivity which increased downstream at mainstem sites and was high at some junction sites. Non-metric multidimensional scaling of percentage abundance data revealed differences in community composition among zones, and among some mainstem and tributary junction sites. Geographic position (eastings and northings) was significantly correlated with taxa richness and community evenness (Pielou) at mainstem sites (excluding tributary junctions), reflecting an increase in sample diversity and less equitable taxonomic dominance with distance down river. Overall, these results point to an interplay between habitat patchiness and successional and hydrogeomorphic processes influencing macroinvertebrate community composition in the lower Waikato River. Such multiscale variations need to be accounted for in the design of invertebrate biomoni-

oring programmes if they are to represent the ecological condition of large river environments." (Authors) The list of taxa includes *Austrolestes colenisonis*, *Xanthocnemis zealandica*, and *Anisoptera* sp.. *X. zealandica* builds comparable high abundances in most of the sample localities especially the upper reaches of the river.] Address: Collier, K.J., Environment Waikato, P. O. Box 4010, Hamilton, New Zealand. E-mail: kevin.collier@ew.govt.nz

**7064.** Contreras-Garduno, J.; Cordoba-Aguilar, A.; Peralta-Vazquez, H.; Jimenez-Cortes, J.G.; Luna (2008): Differences in immune ability do not correlate with parasitic burden in two Zygoptera species (Calopterygidae, Coenagrionidae). *Odonatologica* 37(2): 111-118. (in English). ["Differences in phenoloxidase (PO) and hydrolytic enzymes (HE) activity, two key components in insect immune ability, were investigated in *Hetaerina americana* and *Argia tezpi*, to see if they are correlated with patterns of gregarine and mite infection. The prediction was that the species with the more robust immune responses would show a less intense parasitic burden. Fully mature adults of both sexes were used. No clear pattern was found: *H. americana* had higher PO activity while *A. tezpi* had higher HE activity but the latter species had a higher parasitic load for both parasites. Several possible explanations are discussed. However, it seems most likely that either the immune responses measured may be traded-off with other non-immune functions in which both species differ in investment or that both immune components may be traded-off with each other." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**7065.** Cook, J. (2008): *Williamsonia fletcheri* - new to Grenville. *Ontario Odonata* 7: 50. (in English). [Ontario, Canada. Verbatim: On 21-VI-2004 a specimen of *W. fletcheri* was collected beside Kemptville Creek at 44.8608°N, -75.7223°W, in Wolford Tp. The specimen is in my personal collection and was not reported in the 2004 summary.] Address: not stated

**7066.** Costa, J.M.; Ravanello, C.T.; Souza-Franco, G. M. (2008): Description of a new species of *Neocordulia* Selys, 1882 (Odonata: Libellulidae, Corduliinae) from southern Brazil. *Zootaxa* 1704: 64-68. (in English). ["*Neocordulia santacatarinensis* sp. n. is described and illustrated based on a reared ♂ and its exuviae collected at Irani river, Ponte Serrada, Santa Catarina State, Brazil. Holotype is deposited in the Museu Nacional, Rio de Janeiro, Brazil." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@acd.ufrj.br

**7067.** De Block, M.; Slos, S.; Johansson, F.; Stoks, R. (2008): Integrating life history and physiology to understand latitudinal size variation in a damselfly. *Ecography* 31(1): 115-123. (in English). ["Our understanding of latitudinal life history patterns may benefit by jointly considering age and mass at maturity and growth rate. Additional insight may be gained by exploring potential constraints through pushing growth rates to their maximum and scoring physiological cost-related variables. Therefore, we reared animals of a univoltine Spanish

and Belgian population and of a semivoltine Swedish population of the damselfly *Enallagma cyathigerum* (spanning a latitude gradient of ca 2350 km) in a common environment from the eggs until adult emergence and exposed them to a transient starvation period to induce compensatory growth. Besides age and mass at maturity and growth rate we also scored investment in energy storage (i.e. triglycerides) and immune function (i.e. total activity of phenoloxidase). At emergence, body mass was greater in Spain and Sweden and lower in Belgium, suggesting a genetic component for the U-shaped latitudinal pattern that was found also in a previous study based on field-collected adults. The mass difference between univoltine populations can be explained by the shorter development time in the Belgian population, and this despite a higher growth rate, a pattern consistent with undercompensating countergradient variation. In line with the assumed shorter growth seasons, Belgian and Swedish animals showed higher routine growth rates and compensatory growth after transient starvation. Despite a strong link with metabolic rates (as measured by oxygen consumption) populations with higher routine growth rates had no lower fat content and had higher immune function (i.e. immune function decreased from Sweden to Spain), which was unexpected. Rapid compensatory growth did, however, result in a lowered immune function. This may contribute to the absence of perfect compensating countergradient variation in the Belgian population and the lowest routine growth rates in the Spanish population. Our results underscore the importance of integrating key life historical with physiological traits for understanding latitudinal population differentiation." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U. Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**7068.** De Block, M.; Campero, M.; Stoks, R. (2008): Developmental costs of rapid growth in a damselfly. *Ecological Entomology* 33(2): 313-318. (in English). ["1. Developmental costs of rapid growth in terms of increased fluctuating asymmetry are expected to contribute to the widespread occurrence of growth rates below the physiological maximum, but have rarely been demonstrated. Here, these costs are studied for the first time in an invertebrate, *Lestes viridis*, using a rearing experiment where early- and late-hatched larvae of both sexes were reared at decreasing or permanent water levels. 2. Late-hatched animals were more asymmetrical than early-hatched animals except for ♂♂ in the drying treatment. Also, ♀♀ were more asymmetrical than ♂♂ except in early-hatched animals in the drying treatment. 3. The data presented suggest that in ♀♀ but not in ♂♂ treatment groups with higher growth rates have more asymmetrical wings. However, at the individual level no relationship between growth rate and asymmetry was present. 4. Possible reasons why the suggested trade-off between growth and developmental instability was not present at the individual level, and at the group level only in ♀♀, are discussed." (Authors)] Address: De Block, M., Laboratory of Aquatic Ecology, University of Leuven, Ch. Debériotstraat 32, B-3000 Leuven, Belgium. E-mail: marjan.deblock@bio.kuleuven.be

**7069.** De Block, M.; McPeck, M.; Stoks, R. (2008): Stronger compensatory growth in a permanent-pond *Lestes* damselfly relative to temporary-pond *Lestes*. *Oikos* 117(2): 245-254. (in English). ["Compensatory growth where animals compensate for time stress or

transient nutritional or thermal stress by accelerating their growth rate is widespread. We know, however, relatively little about the evolution and ecological correlates of compensatory growth. For this we need studies on congeneric species with known phylogenetic relationships that also focus on the associated largely understudied costs. Here we tested for compensatory growth and associated costs in response to time stress (manipulated by photoperiod) and a transient period of starvation or cooling in larvae of the permanent-pond damselfly *Lestes eurinus*, and compare the results with former studies on temporary-pond *Lestes*. Larvae showed full compensation in body mass at emergence for all combinations of time stress and starvation or cooling. Unexpectedly, compensatory growth to starvation or cooling was not stronger under time stress. Instead, ♂♂ under time stress delayed emergence after these transient stressors. In line with a stronger compensatory growth response to time stress than to the other stressors, physiological costs in terms of a reduced investment in immune response (measured as phenoloxidase activity) and energy storage (measured as fat content) were detected only under time stress. Compared to temporary-pond *Lestes*, *L. eurinus* showed stronger compensatory growth to time stress. We hypothesize that the stronger compensatory (growth) response in permanent-pond *Lestes* co-evolved with their derived slower lifestyle when they invaded permanent ponds." (Authors)] Address: Stoks, R., Lab. Aquat. Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.ku.leuven.ac.be

**7070.** De Marco, P.; Vital, M.V. (2008): Ecology of *Tigriagrion aurantinigrum* Calvert in response to variations in environmental conditions (Zygoptera: Coenagrionidae). *Odonatologica* 37(1): 1-11. (in English). ["The daily activity patterns, behaviour and population dynamics in Zygoptera are thought to be affected by the physical conditions of the environment. How and why the species reacts to those conditions is determined mainly by its bionomic characteristics. Here, an auto-ecological study is performed of *T. aurantinigrum*, in an attempt to clarify its responses to physical conditions. It is suggested that *T. aurantinigrum* could fit, with a few assumptions, in the "female-control" classification of odonate mating system. Some interactions were observed between individuals, but it is assumed that these play a role in sex recognition, rather than in territorial contests. The results indicate that this species is affected by the following physical conditions: the monthly rain fall, which has a positive effect on the abundance (with the possible exception of the heavy rain months); the water flow velocity, which seems to define a limit of its occurrence; and the daily variation in temperature, which seems to induce the species to restrict its activity to the hottest period of the day, as expected from a "thermal conformer". *T. aurantinigrum* appears to be affected by small scale variations of environmental variables, as observed by the differences of its abundance at the 3 different sites of this study. Under conditions of the current "forest-to-pasture" conversion that is common in the Brazilian Atlantic Forest region, the species is expected to increase its abundance and to broaden its geographical range, although water body alterations could limit this process." (Authors)] Address: De Marco, P., Laboratorio Ecologia Teorica e Sintese, Depto de Biologia Geral, Universidade Federal de Goias, BR-74001-970, Goiania, GO, Brazil. E-mail: pdemarco@icb.ufg.br



- 7071.** De Marmels, J. (2008): The larva of *Progomphus dorsopallidus* Byers, 1934, (Odonata: Gomphidae), with a key to larvae of other species of the genus found north of the Orinoco River, Venezuela. *Entomotropica* 20(3) (2005): 235-238. (in Spanish, with English summary). ["The last instar larva of *P. dorsopallidus* is described and illustrated based on six exuviae obtained from reared specimens. A key to the larvae of six of the eight species of the genus recorded so far from north of the Orinoco River is given." (Author) The paper was issued in Jan. 2008 according authors information to the editors of OAS.] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com
- 7072.** De Marmels, J. (2008): *Neocordulia caudacuta* sp. nov. from the Coastal Cordillera, Venezuela (Odonata: Corduliidae). *International Journal of Odonatology* 11(1): 15-20. (in English). ["♂, ♀ and larva of *Neocordulia caudacuta* sp. nov. (holotype: Río Castaño, Aragua State, Venezuela; 21 VI 2007; deposited in MIZA) are described and illustrated. The new species belongs in the subgenus *Mesocordulia*. Male *N. caudacuta* differs from *N. batesi* in details of hamule and penis, and in possessing a sharp, erect dorsomedian spine on abdominal segment 10. Female *N. caudacuta* has strongly outcurved cerci and is comparatively larger than its congeners. The larva of *N. caudacuta* differs from that of *N. batesi* longipollex in having larger occipital tubercles, higher number of premental and palpal setae, and in the presence of lateral spines on abdominal segment 9." (Author)] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com
- 7073.** De Marmels, J. (2008): *Heteragrion archon* spec. nov. from the coastal Cordillera of Venezuela (Zygoptera: Megapodagrionidae). *Odonatologica* 37(2): 151-155. (in English). ["The new species is described and illustrated from a single ♂, which is compared with the holotype male of *H. palmichale* Hartung. The two differ in colour pattern of head and shape of cerci. A map showing distribution of all four species of *Heteragrion* Sel. occurring north of the Orinoco River is provided." (Author)] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com
- 7074.** De Marmels, J. (2008): Three new libelluline dragonflies from southern Venezuela, with new records of other species (Odonata: Libellulidae). *Int. Jour. Odonatology* 11(1): 1-13. (in English). ["*Elasmothemis rufa* sp. nov. (holotype: Venezuela, Amazonas, Río Cataniapo), *Macrothemis taurepan* sp. nov. (holotype: Venezuela, Bolívar, El Pauji), and *Oligoclada garrisoni* sp. nov. (holotype: Venezuela: Amazonas, San Fernando de Atabapo) are described and illustrated. All holotypes are deposited at MIZA. *Macrothemis heteronycha* and *Micrathyria paruensis* are recorded from Venezuela for the first time, and *Micrathyria dunklei* for the second. Some of their features are illustrated. Distribution maps of all these species are also presented." (Author)] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com
- 7075.** Dingemanse, N.J.; Kalkman, V.J. (2008): Changing temperature regimes have advanced the phenology of Odonata in the Netherlands. *Ecological Entomology* 33(3): 394-402. (in English). ["1. Responses of biota to climate change have been well documented for a restricted number of taxa. This study examined shifts in phenology of 37 species of the aquatic insect order Odonata in the Netherlands over the last decade. 2. The present study shows that adults of the Dutch dragonflies and damselflies have advanced their flight dates over recent years due to complex effects of changing temperature regimes on the timing of adult flight dates. 3. Flight dates did not respond to changes in autumn/winter temperatures, advanced with increases in spring temperatures of the focal and previous year, and delayed with increases in summer temperatures of the previous year. Climate change consequently advanced the flight dates of the Odonata because only spring temperatures have increased during the study period. 4. The findings imply that climate change can evoke strong phenological responses in aquatic insects. Moreover, shifts in phenology due to climate change are likely to vary both spatially or temporally, depending on the exact nature of climate change." (Authors)] Address: Dingemanse, N.J., Animal Ecology Group, Centre for Ecological and Evolutionary Studies, University of Groningen, PO Box 14, 9750 AA Haren, The Netherlands. E-mail: n.j.dingemanse@rug.nl
- 7076.** Djikanovic, V.; Jakakovcv-Todorovic, D.; Nikolic, V.; Paunovic, M.; Cacic, P. (2008): Quantitative composition of communities of aquatic macroinvertebrates along the course of the Golijska Moravica river (west-central Serbia). *Arch. Biol. Sci., Belgrade* 60(1): 133-144. (in English). ["As the largest and most significant river of the Moravica region, the Golijska Moravica River arises below the highest peaks of the Golija Mountains. Faunistic-ecological research on aquatic macroinvertebrates was carried out during 2003 and 2004. Macrozoobenthos communities of the Golijska Moravica had not previously been the subject of any hydrobiological studies, and this was the main reason why we conducted their systematic and complex investigation. A list of taxa of aquatic macroinvertebrates is presented and their qualitative composition analyzed. During the period of investigation, a total of 13 groups and 147 taxa were found." (Authors) The list of taxa includes *Gomphus vulgatissimus*.] Address: Djikanovic, V., Siniša Stankovića Institute for Biological Research, 11060 Belgrade, Serbia
- 7077.** Do Manh, C. (2008): *Noguchiphaea mattii* sp. nov. from southern Vietnam (Odonata: Calopterygidae). *International Journal of Odonatology* 11(1): 21-26. (in English). ["*Noguchiphaea mattii* sp. nov. (Hon Ba Nature Reserve, 12°23'N, 109°08'E, Khanh Hoa Province, southern Vietnam, leg. 29 IV 2006, to be deposited in Zoology Collection, Hanoi University of Science) is described from the ♂ sex and compared with *N. yoshikoeae*, a species collected for the first time in Vietnam in Tam Dao, Vinh Phuc Province. Photos of male and female specimens of *N. yoshikoeae* taken in nature are provided." (Author)] Address: Do Manh, C., Hom thu so 16, Buu Dien 10210, 35 Thai Thinh, Hanoi, Vietnam. E-mail: docuong@gmail.com
- 7078.** Doi, H. (2008): Delayed phenological timing of dragonfly emergence in Japan over five decades. *Bio-logical letters* 4(4): 388-391. (in English). ["Recent increa-

ses in air temperature have affected species phenology, resulting in the earlier onset of spring life-cycle events. Trends in the first appearance of adult dragonflies across Japan were analysed using a dataset consisting of observations from 1953 to 2005. Dynamic factor analysis was used to evaluate underlying common trends in a set of 48 time series. The appearance of the first adult dragonfly has significantly shifted to later in the spring in the past five decades. Generalized linear mixing models suggested that this is probably the result of increased air temperatures. Increased summer and autumn temperatures may provide longer bivoltine periods and a faster growth rate; thus, the second generation, which previously hatched in summer, can emerge in the autumn causing the size of the population of dragonflies that emerge in spring to decrease. It is also possible that reduced dragonfly populations along with human development are responsible for a delay in the first observed dragonflies in the spring. However, human population density did not appear to strongly affect the appearance date. This study provides the first evidence of a delay in insect phenological events over recent decades." (Author)] Address: Doi, H., LAFWEDY, Faculty of Agriculture, Ehime University, 3-5-7, Tarumi, Matsuyama, 790-8566 Ehime, Japan

**7079.** Dow, R.A.; Hämäläinen, M. (2008): *Libellago orri* sp. nov. from northern Borneo (Odonata: Chlorocyphidae). *International Journal of Odonatology* 11(1): 27-34. (in English). ["*L. orri* sp. nov. (holotype ♂: Borneo, Sarawak, Bahagian Bintulu, Samarakan, Sg. Gagak, 06 iii 2006, to be deposited in BMNH) from Malaysian Borneo is described from the ♂ sex and compared with *L. hyalina*, which co-occurs at the same sites. ♀♀ of the two species can not be reliably separated at present." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**7080.** Ellenrieder, N. von (2008): Revalidation of *Argentagrion* and redefinition of *Homeoura*, with the description of *H. obrieni* n. sp. (Odonata: Coenagrionidae). *Rev. Soc. Entomol. Argent.* 67(1-2): 81-106. (in English, with Spanish summary). ["*Argentagrion* Fraser, currently considered a synonym of *Homeoura* Kennedy, is revalidated; both genera are rediagnosed and their species illustrated, keyed and mapped. *Ischnura sobrina* Schmidt is transferred to *Homeoura*, and a new species, *H. obrieni* is described, resulting in 5 species being included in *Homeoura* (*H. chelifera*), *H. lindneri*, *H. nepos*, *H. obrieni* sp. n. and *H. sobrina* comb. nov.) and two in *Argentagrion* (*A. ambiguum* and *A. silviae*.)] Address: Ellenrieder, N. von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: natalia.ellenrieder@gmail.com

**7081.** Ellenrieder, N. von; Muzon, J. (2008): An updated checklist of the Odonata from Argentina. *Odonatologica* 37(1): 55-68. (in English). ["An updated checklist of the Odonata species known to occur in Argentina is presented along with distributional information by province. 27 species are removed from previous listings, and 32 new records are added, bringing the total number of species to 271. Of the new records, 14 correspond to new species currently under description. The distribution of the 17 species presently known to be endemic to Argentina is mapped." (Authors)] Address: Ellenrieder, Natalia von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: natalia.ellenrieder@gmail.com

**7082.** Fagundes, C.K.; Behr, E.R.; Kotzian, C.B. (2008): Diet of *Iheringichthys labrosus* (Siluriformes, Pimelodidae) in the Ibicuí River, Southern Brazil. *Iheringia, Sér. Zool., Porto Alegre*, 98(1): 60-65. (in English, with Portuguese summary). ["The diet of the benthic-feeding fish *Iheringichthys labrosus* (Lütken, 1874) was analyzed. Samples were taken bimonthly from December 1999 to January 2002, in three sites of the Ibicuí River, a tributary of Uruguay River basin (Rio Grande do Sul, Brazil). In each sampling point the specimens were collected in lentic and lotic environments. Gillnets and trammel nets were examined every 6 hours (6h, 12h, 18h and 24h). Diet description was based on the frequency of occurrence and the volume of each food item to obtain the Alimentary Index (IAi). The average stomach fullness was adopted to detect variations in the feeding activity according to the season, the circadian rhythm and the environment. Chironomids were the most important food item, followed by molluscs, and feeding activity was highest in summer, during daylight (6h and 12h), and in the lotic environment of the second sampling point." (Authors)] Address: Fagundes, Camila, Programa de Pós-Graduação em Biodiversidade Animal, Universidade Federal de Santa Maria, Campus Universitário, Faixa de Camobi, km 9, 97105-900 Santa Maria, RS, Brazil. E-mail: milakurzmann@yahoo.com.br

**7083.** Fenoglio, S.; Bo, T.; Czekaj, A.; Roeciszewska, E. (2008): Feeding habits, fine structure and microhabitat preference of *Euthyplocia hecuba* (Hagen, 1861) (Ephemeroptera: Euthyplociidae) nymphs from Honduras. *Folia biol. (Kraków)* 56: 43-49. (in English). [Benthic invertebrates found in the stream stretch inhabited by *E. hecuba* nymphs are *Macrothemis* sp., *Miathyria* sp., *Argia* sp., *Palaemnema* sp., and *Haeterina* sp.] Address: Fenoglio, S., Tiziano BO, Univ. of Piemonte Orientale, Dept of Life & Environment Science, Via Bellini 25, 15100 Alessandria, Italy. E-mail: fenoglio@unipmn.it

**7084.** Fincke, O.M.; Hedström, I. (2008): Differences in forest use and colonization by Neotropical tree-hole damselflies (Odonata: Pseudostigmatidae): Implications for forest conversion. *Studies on Neotropical Fauna and Environment* 43(1): 35-45. (in English). ["Differential habitat use in primary and secondary forests was documented for two genera of giant damselflies (Pseudostigmatidae), important predators of tree-hole breeding mosquitoes in tropical forests. In a lowland moist forest of Panama, adults moved between old primary (>400 years old) and contiguous secondary forest (>60 years old) and reproduced seasonally in both types. However, the two *Mecistogaster* species were more common in secondary forest, whereas *Megaloprepus caerulatus* was most common in primary forest. These differences in landscape use were reflected in differential colonization of tree-hole analogs (plastic pots) in primary forest and highly altered secondary growth (<20 years old) in a lowland wet forest in Costa Rica where reproduction of both species was aseasonal. Larvae of *Mecistogaster linearis* were commonly found in pots at both habitat types, whereas *Megaloprepus*, the majority species, rarely colonized pots in altered sites. Our results suggest that *Megaloprepus* is particularly susceptible to forest conversion, and call for increased focus on the dispersal ability of all pseudostigmatids. In tropical moist and wet forests that harbour water-filled tree holes, the presence of the conspicuous *Megaloprepus* and similar species may serve as bio-indicators of a healthy predator guild, the loss of which may adversely

impact human health." (Authors)] Address: Finke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**7085.** Fomekong, A.; Messi, J.; Kekeunou, S.; Tchuen-guem-Fohouo, F.-N.; Tamesse, J.L. (2008): Entomofauna of *Cucumeropsis mannii* Naudin, its impact on plant yield and some aspects of the biology of *Dacus bivittatus* (Diptera: Tephritidae). *African Journal of Agricultural Research* 3(5): 363-370. (in English). [*C. mannii* (Cucurbitaceae) is cultivated in Africa for its important seeds used as food and in the traditional medicine. This work carried out in Yaoundé (Cameroon) focuses on the study of the entomofauna of *C. mannii*, on the impact of insects on plant yield; we studied also some aspects of the biology of *Dacus bivittatus*, main pest of this plant. Insect captured, breeding and identification were conducted from March to August 2001. The results permitted us to note that on *C. mannii* the entomofauna included 36 families. Within this fauna, there were various pests, predators, pollinators and nectarivorous. Among the 36 families recorded, 30 were collected on the leaves, 6 on the stems, 6 on the flowers and 2 on the fruits. [...] (Authors) The taxa list includes Odonata on the family level.] Address: Fomekong, A., Dept of Animal Biology and Physiology, Faculty of Science, University of Yaounde Cameroon

**7086.** Gassmann, D.; Hämäläinen, M. (2008): *Asthenocnemis linnaei*, a new damselfly species from Dumaran island, Philippines (Odonata, Platycnemididae). *Zoologische Mededelingen* 82(5): 35-41. (in English). [*Asthenocnemis linnaei* spec. nov. is described from the Philippine island of Dumaran in the northeastern Palawan subregion. Notes on the taxonomic history of the genus *Asthenocnemis* are provided.] Address: Gassmann, D., Institute of Evolutionary and Ecological Sciences, Leiden University, c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: gassmann@naturalis.nnm.nl

**7087.** Günther, A. (2008): Vergleichende Untersuchungen zum Reproduktionsverhalten südostasiatischer Chlorocyphidae und Calopterygidae (Odonata: Zygoptera). Dissertation an der TU Bergakademie Freiberg, Institut für Biowissenschaften: 228 pp. (in German, with English summary). [*Comparative study of the reproductive behaviour of Southeast-Asian Chlorocyphidae and Calopterygidae* (Odonata: Zygoptera): Many species of Jewels (Chlorocyphidae) and Demoiselles (Calopterygidae) exhibit highly complex and specialized reproductive behaviour, involving territoriality based on limitation of resources. ♂♂ display specialized, species-specific agonistic behaviour, and in most species mating is preceded by ritualized courtship of ♀♀ by ♂♂. In both cases visual communication involving ritualised display of ornamentation is of great importance. Inter- and intra-sexual signals are potentially part of mate recognition systems, which have evolved within communities of syntopic species. This thesis examines the possibilities of using knowledge of reproductive behaviour to differentiate taxa and to help reconstruct their phylogenetic relationships. The study was based on the analysis of behaviour in different parts of Southeast Asia and New Guinea, involving direct observation, partially supported by video footage. Sufficiently replicated and representative behavioural data for quantitative analysis was available for a total of 17 taxa of Jewels of the genera *Aristocypha*, *Disparocypha*, *Heliocypha*, *Libellago*

and *Rhinocypha* and for *Neurobasis kaupi*. For 14 of the 18 taxa no behavioural data had been hitherto published except by the present author. For a further 13 chlorocyphids and 4 *Neurobasis* species supplementary data was available. This account provides information on courtship behaviour and on territorial and oviposition behaviour, circadian activity and habitat requirements. Chlorocyphidae: All taxa studied showed a strong preference for lotic habitats. No reproduction in lakes and ponds or in tidal influenced streams was observed. A conspicuous feature of their habitat preference was the close association with forests, at least gallery forests fringing the streams. Most observations were from streams and rivers in closed forest habitats. The most common oviposition sites contained a wide range of plant substrates such as dead, rotting logs, small pieces of driftwood or petioles of fallen large leaves lying in the water. Mostly oviposition took place at the level of the water surface. An exception was exhibited by the three taxa of the *Libellago rufescens* complex. In these, eggs were laid in logs and robust pieces of driftwood with the female totally submerged. The ♀♀ of *Disparocypha biederermanni* differed from all other Jewels by ovipositing in steep river banks, large logs lying over a stream well above the water and in the mossy bark of trees, some distance from the stream bed. *Heliocypha perforata limbata* and *Libellago semiopaca* provided examples of ♀♀ being able to assess an oviposition site based on the intensity of disturbance experienced during preceding days, with less disturbed sites preferred. ♂♂ of all species tried to defend small territories around oviposition sites and to monopolize this resource. Against rivals, a species-specific, ritualised threat behaviour could be observed. Agonistic behaviour was sometimes found to occupy most of the daily activity schedule. Physical contact was avoided strictly during aggressive interactions. Escalated displays included several ritualised flight patterns, including the motionless presentation of the terminally pigmented forewings (*Libellago*), a frontal presentation of the entire, largely iridescent wing surface by turning forward all wings simultaneously (*Aristocypha*, *Heliocypha*, *Rhinocypha*), the motionless presentation of the hindwings (*Aristocypha*, *Heliocypha*) and an alternating wing beat with intensified frequency (*Aristocypha*, *Disparocypha*, *Heliocypha*). In many cases, such as *Heliocypha perforata limbata*, the threat display obviously served to defend resources, and successful ♂♂ gained more mates. However this simple and obvious explanation, that the threat display of the male serves just to defend resources, was not sufficient to explain the results for three well-studied Sulawesi species of the *Rhinocypha tinctoria*-complex. In contrast to ♂♂ of *Heliocypha perforata limbata* the *Rhinocypha* ♂♂ did not increase their mating success by obtaining and defending a distinct territory. There was at least for two of the three species a negative correlation between the duration of threatening flights on a particular day and the numbers of successful matings for this day. The results support the hypothesis that threatening flights in long-time territorial species serve not only for the territory defence but rather to signal the presence of ♂♂ to arriving ♀♀. In most of the species mating behaviour was characterised by a preliminary courtship display by the male. A significant feature was the display of the legs in a species-specific way. In *Libellago stigmtizans* and *L. semiopaca* all 6 legs were included in the display, and were thrust forward exposing the white-pruinose inner faces of the tibiae. *L. semiopaca* displayed the morphologically unspecialized legs in a unique see-



mingly limp hanging posture. *Aristocypha fenestrata*, *Heliocypha biforata*, *H. fenestrata cornelii*, *H. perforata limbata* and the taxa of the *Rhinocypha tinctoria*-complex presented only the pruinosed middle and posterior legs in the courtship display. In all taxa the ♀♀ were encouraged to oviposit within ♂♂ territory by a postmating courtship display, and the female was, for a time, guarded. Remarkably, no alternative mating tactics without courtship were ever observed in any case in any of these species. The members of the *Libellago rufescens*-complex showed no courtship behaviour. In these taxa ♀♀, after mating, were led in tandem flight to the oviposition site. They avoided harassment by other ♂♂ by submerged oviposition. Similarly there was no courtship behaviour in *Disparocypha biedermanni*. ♂♂ of this taxon guarded small areas around especially attractive oviposition sites at the streams. The ♀♀ appeared at these rendezvous sites for mating but oviposition took place mostly outside these territories. In total four mating systems could be differentiated: "Long territoriality", "Short territoriality", "Male aggregations" and "Weak control". Based on all available information, i.e. the newly acquired and previously published results, the ritualised flight types and the mode of presentation of the legs by ♂♂ were found to be sufficiently stable in an evolutionary sense to reconstruct phylogenetic relationships. With these results a phylogenetic tree based on ethological data could be developed in Odonata for the first time. This is of special significance for the family Chlorocyphidae, as, despite extensive speciation, the different species show little structural morphological differentiation, especially in primary and secondary sexual organs, possibly as a result of species recognition systems strongly mediated by the display of visual ornaments. *Neurobasis kaupi* (Calopterygidae): The reproductive behaviour of *Neurobasis kaupi* was studied for the first time in Central and South Sulawesi. The species was recorded in a wide variety of clear and fast flowing creeks, streams and rivers, mostly in forested areas. The ♂♂ were territorial and defended potential oviposition sites, a limited resource. Territory residents demonstrated their presence by brief synchronized flashings of their iridescent blue hindwings as well as by regular inspection flights. Intruders were first driven off by short chasing flights. Longer lasting conflicts led to three different types of threatening flights, depending on the number of ♂♂ involved and the level of excitation. As in other Calopterygidae, ♂♂ of *N. kaupi* led receptive ♀♀ to potential oviposition sites. In courtship flight the male presented the iridescent upper sides of his stationary, depressed, quivering hindwings, with the hind margins broadly touching the water surface. Oviposition substrates were mostly submerged floating root mats or plants, optimally floating loosely at a depth of 5-15 cm below the water surface. The general patterns of behaviour of *N. kaupi* correspond to the known behaviour of other *Neurobasis* species. However, within this general framework there are clear differences between this species and others, especially *N. chinensis*. These involved distinct differences in pre and post courtship displays and in agnostic displays between ♂♂. The use of ethologic features in systematic-phylogenetic analysis seems promising for *Demoiselles* too. Due to the morphologically less differentiated ornamentation more intense observation seeking behavioural differences is needed, especially if differences in wing beat frequency and phase relationship of the wings in the display flights are to be analysed." (Author)] Address: Günther, A., Naturschutzzentrum Freiberg, Waisenhausstraße 10,

D-09599 Freiberg, Germany. E-mail: a.guenther@abo-freiberg.de

**7088.** Hacet, N.; Aktaç, N. (2008): Two new records of Odonata (Gomphidae) for Turkey, *Gomphus flavipes* (Charpentier, 1825) and *Ophiogomphus cecilia* (Geoffroy in Fourcroy, 1785), with distributional notes on *G. flavipes* and *G. ubadschii* Schmidt, 1953. *Entomological News* 119(1): 81-89. (in English). ["In this paper, we demonstrate the occurrence of *G. flavipes* in Turkey. The single European Turkish record of this taxon was until now confused with the closely related Asiatic species *G. ubadschii*, therefore it could be said that *G. flavipes* is new to Turkey. The distribution of the two species in Turkey is evaluated. Besides, *O. cecilia*, a species which was previously reported from Anatolia based on a misidentification, now for the first time is recorded for Turkey, in the Turkish Thrace." (Authors)] Address: Hacet, N., Trakya University, Faculty of Arts and Sciences, Department of Biology, Tr-22030 Edirne, Turkey. E-mail: nhacet@hotmail.com

**7089.** Hämäläinen, M. (2008): Philogangidae versus Diphlebiidae: nomenclatoric note on a family-group name (Zygoptera). *Not. Odonat.* 7(1): 12. (in English). [Verbatim: D.A.L. Davies & P. Tobin (1984, *The dragonflies of the world, a systematic list of the extant species of Odonata*, Vol. 1: Zygoptera, Anisozygoptera, Soc. Int. Odonatol., Utrecht) introduced the new family, Diphlebiidae, to house a single genus *Diphlebia* Selys, 1896. Presently in some publications, e.g. in G. Bebbly (1996, *Petalura Special-Volume 2*), G. Theischinger & J. Hawking (2006, *The complete field guide to dragonflies of Australia*, Collingwood) and in *World Odonata list* by Schorr et al., available on internet at <http://www.ups.edu/x6140.xml>, two genera *Diphlebia* and *Philoganga* Kirby, 1890 are included in the family called Diphlebiidae. R. Novelo-Gutierrez (1995, *Odonatologica* 24: 73-87) included also *Lestodea* Tillyard, 1913 in this family (but in a separate subfamily *Lestoideinae*). As already pointed out by J. Van Tol (1995, *Odonatologica* 24: 245-248) there exist available family-group names introduced on all three genera *Diphlebia*, *Philoganga* and *Lestoidea*, viz. (in chronological order) *Lestoidinae* [sic!] by Munz (1919, *Mem. am. ent. Soc.* 3: 1-78), *Philoganginae* (by C.H. Kennedy, 1920, *Ohio J. Sci.* 21: 19-29) and *Diphlebiidae* (Davies & Tobin, 1984, see above). Based on the principles of nomenclature, Van Tol concluded as follows "The correct family-group name for a group made of *Diphlebia*, *Philoganga* and *Lestoidea* is thus based on *Lestoidea*, introduced by Munz (1919): *Lestodeidae*. Novelo-Gutierrez also distinguishes two subfamilies, one including *Diphlebia* and *Philoganga*, the other *Lestoidea* only. Their correct names are *Philoganginae* and *Lestoideinae* respectively." Consequently, if the two genera *Diphlebia* and *Philoganga* alone are ranked as a family, its correct name is *Philogangidae* Kennedy, 1920. The present Code (International Commission on Zoological Nomenclature, 1999, *International Code of Zoological Nomenclature*, London) rules in Article 35.5. as follows: "Precedence for names in use at higher taxa. If after 1999 a name in use for a family-group taxon [...] is found to be older than a name in prevailing usage for a taxon at higher rank in the same family-group taxon [...] the older name is not to displace the younger name." However, this more liberal practice cannot be applied in this case, since the mutual priority of the family-group names based on these three genera was documented already in 1995 by van Tol (see

above.)] Address: Hämäläinen M., Dept Applied Zool., P.O. Box 27, FIN- 00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**7090.** Hassall, C.; Thompson, D.J.; Harvey, I.F. (2008): Wings of *Coenagrion puella* vary in shape at the northern range margin (Odonata: Coenagrionidae). *International Journal of Odonatology* 11(1) 2008: 35-41. (in English). ["A previous study has shown that wing size in *C. puella* varied considerably along a latitudinal gradient in the UK. Using landmark data from wing images, patterns of shape variation were also determined along the same transect by geometric morphometric analysis of wing shape. Wing shape was uniform at all sites other than those closest to the range margin, which differed significantly. The potential mechanisms that might have generated such between-population variation are discussed." (Authors)] Address: Hassall, C., Population and Evolutionary Biology Research Group, Biosciences Building, School of Biological Sciences, University of Liverpool, Crown Street, Liverpool L69 7ZB, UK. E-mail: c.hassall@liv.ac.uk

**7091.** Heino, J. (2008): Patterns of functional biodiversity and function–environment relationships in lake littoral macroinvertebrates. *Limnol. Oceanogr.* 53(4): 1446-1455. (in English). ["I examined variability in the abundances of functional groups, functional diversity measures, and functional structure of littoral macroinvertebrate communities in relation to the environmental features of boreal lakes. The most important environmental variables shaping variation in the abundances of functional groups and functional structure were lake surface area, macrophyte cover, total phosphorous, and water hardness. The same environmental variables (i.e., lake surface area, macrophyte cover) accounted for variability in functional richness and functional diversity, while functional evenness was related to different environmental variables (i.e., hardness, colour). Lake surface area and macrophyte cover comprised the most important axes of habitat templates shaping the functional trait structure and biodiversity in boreal lakes: lake area mirrors habitat differences between smaller and larger lakes, and macrophyte cover portrays the effects of habitat structural complexity on functional biodiversity. Functional biodiversity measures were also strongly correlated to species-level measures, and the correlation between similarity in functional and taxonomic structure was strong. Functional and taxonomic measures of macroinvertebrate communities thus provide rather similar information about littoral communities and ecosystem functioning." (Authors) Odonata are mentioned at the genus level only.] Address: Heino, J., Finnish Environment Institute, Research Programme for Biodiversity, P.O. Box 413, FI-90014 University of Oulu, Oulu, Finland

**7092.** Hornung, J.P.; Foote, A.L. (2008): Comparing dietary preferences of Bufflehead ducklings in Western Canada through gut content and stable isotope analysis. *Aquatic Ecology* 42: 61-70. (in English). ["Aquatic invertebrates are essential for duckling growth and development. We present results on the trophic status and dietary analysis of Bufflehead (*Bucephala albeola*) ducklings from the boreal breeding grounds of western Canada. We estimated dietary preference by comparing invertebrates found in Bufflehead diets to those identified in standardized dip net samples at their wetland feeding sites. Stable isotope ratios of Bufflehead

and their prey were used as a second estimator of trophic position. Bufflehead ducklings preferentially foraged for larval Dytiscidae (predaceous diving beetles; 46% of total dietary biomass), Zygoptera larvae (damselflies; 14%) and non-Dytiscidae adult Coleoptera (5%; mainly Haliplidae). Results from stable isotope analyses supported these results; the separation between primary and secondary invertebrate consumers and ducklings was significant for all possible contrasts when considering nitrogen isotope ratios (Tukey HSD;  $P < 0.001$ ). We iteratively explored all possible combinations of  $\delta^{15}N$  and  $\delta^{13}C$  data to generate a proportional range over which each food source may contribute to Bufflehead stable isotope signatures; these results suggested larval Zygoptera and larval Dytiscidae figure prominently in diets when accounting for isotope fractionation. The incorporation of prey availability into the metric of dietary preference, as opposed to the tabulation of ingested items alone, reduces the importance of invertebrate groups such as adult Dytiscidae as highlighted in previous studies." (Authors)] Address: Hornung, J.P., Dept of Renewable Resources, University of Alberta, 751 General Services Building, Edmonton, AB, Canada T6G 2H1. E-mail: jon.hornung@ualberta.ca

**7093.** Jiang, Y.-h.; Li, Z.-h.; Yu, W.-y. (2008): *Macromidia shiehae* sp. n., a new dragonfly from Jiangxi, China (Anisoptera, Corduliidae). *Odonatologica* 37(2): 157-160. (in English). ["The new species is described and illustrated. Holotype ♂: China, Jiangxi: Lushan Mt (Haihui), 31-V-2004; deposited in Nanjing Forestry Univ., Nanjing, China. It is related to *M. ellenae* Wilson and *M. hangzhouensis* Zhou & Wei, but it is differentiated from these by having the postclypeus with yellow on anterior margins, the median lobe of the prothorax with four fine, pale yellow streaks, thorax with 5 yellow stripes, and nodal index of fore- and hindwings lower than in any of the other 4 *Macromidia* species described from China." (Authors)] Address: Jiang, Y.-h., Yuntaixiang Culture Station, Xinpu district, Lianyungang City, Jiangsu-222064, China. E-mail: jiangyh26@yahoo.com.cn

**7094.** Jones, C.D. (2008): Skillet Club tail (*Gomphus ventricosus*) in Ontario. *Ontario Odonata* 7: 49. (in English). [Verbatim: In February 2007, I visited the insect collection at the University of Guelph to examine the two specimens of Skillet Clubtail (*Gomphus ventricosus*), the records of which are contained in the Ontario Odonata Database, housed and maintained at the Natural Heritage Information Centre (NHIC). One was collected at Ignace on July 7, 1978 and the other was collected at Forest on June 18, 1979. Given that this is such a rare species and that clubtails can be challenging to identify, I was interesting in examining the specimens. As it turned out, the specimen from Ignace is actually *G. exilis* (a ♂) and the one from Forest is actually *G. graslinellus* (a ♀). They are both pinned specimens and did not have any species labels on them but were simply in the unit tray labelled *G. ventricosus*. So, it would appear that the only known location we have for this species in Ontario is the historical (1924) record from "Ottawa", presumably from the Ottawa River.] Address: Jones, C.D., Box 182, Lakefield, Ontario, K0L 2H0, Canada. E-mail: colin.jones@mnr.gov.on.ca

**7095.** Joshi, P.C.; Kumar, K.; Arya, M. (2008): Assessment of insect diversity along an altitudinal gradient in Pinderi forests of Western Himalaya, India. *Journal of Asia-Pacific Entomology* 11(1): 5-11. (in English). ["In-

sect diversity, richness and abundance were evaluated at different altitudes in three forest habitats in the Western Himalayas. The habitats studied were all situated between 2100 and 3500 m and included a site with no disturbances, a site with a moderate level of disturbance and a site with a very high level of disturbance. The species composition and diversity of insects varied at all the three study sites, which demonstrates the effect of altitude and disturbances, as well as the effects of other ecological and climatic parameters on insect populations. The site at lowest altitude, which contained a moderate level of disturbance, supported the highest number of species (108), whereas the site at the highest altitude, which contained the maximum level of disturbance, supported the lowest number of species (77). When all of the sites were considered, 122 species of insects belonging to 43 families and 8 orders were recorded. Lepidoptera was the most dominant insect order recorded, with 46 species being observed. This was followed by Hymenoptera (20), Coleoptera (18), Orthoptera (12), Hemiptera (10), Odonata (9), Diptera (5) and Dermeptera (2). The most abundant species were *Vanessa cashmirensis* (Lepidoptera: Nymphalidae), *Pieris canidia indica* (Lepidoptera: Pieridae), *Apis laboriosa* (Hymenoptera: Apidae), *Anomala dimidiata* (Coleoptera: Scarabidae), *Chorthippus* sp. (Orthoptera: Acrididae), *Crocothemis servilia servilia* (Odonata: Libellulidae) and *Syrphus fulvifacies* (Diptera: Syrphidae). The site at the lowest altitude and the sites with the longest rainy seasons had the highest Shannon–Wiener Diversity." (Authors) The following odonate species are also listed: *Palpopleura sexmaculata*, *Sympetrum commixtum*, *Orthetrum sabina*, *O. glaucum*, *O. pruinatum neglectum*, *Anax immaculifrons*, *Cephalaescha orbifrons*, and *Macromia moorei*.] Address: Joshi, P.C., Dept Zool. & Environ. Sci., Gurukul Kangri Univ., Haridwar – 249404, India. E-mail Address: prakash127@yahoo.com

**7096.** Jovice, M.; Andjus, L.; Bedjanic, M.; Santovac, S. (2008): Review of the Odonata fauna of Montenegro. *Opusc. zool. flumin.* 224: 1-27. (in English). ["The 57 hitherto known species are listed along with the locality data and bibliographic references, where applicable. *Coenagrion pulchellum*, *Erythromma najas*, *Anaciaeschna isosceles*, *Anax parthenope*, *Brachytriton pratense*, *Cordulegaster heros*, and *Selysiotthemis nigra* were not previously recorded from Montenegro. The biogeographic composition of the fauna is analyzed. Observations on *Somatochlora metallica* from Mt Durmitor are briefly discussed, and a comprehensive bibliography on the odonate fauna of Montenegro is appended." (Authors)] Address: Jovic, M., Natural History Museum Belgrade, Njegoševa 51, P.O. Box 401, YU-11000 Belgrade, Serbia. E-mail: milos.jovic@nhmbeo.org.yu

**7097.** Kalkman, V.J. (2008): Two new dragonfly species from Yapen and Biak, Papua (Irian Jaya), Indonesia (Odonata). *Zoologische Mededelingen* 82(11): 81-89. (in English). ["During fieldwork on the island of Yapen (Indonesia, Papua (Irian Jaya)), conducted in July 2006, several undescribed species of Odonata were collected. Two of these are described based on material from Yapen and Biak (Papua (Irian Jaya), Indonesia): *Teinobasis sjupp* spec. nov. (type locality: Yapen Island) and *Macromia holthuisi* spec. nov. (type locality: Biak Island)." (Author)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517,

2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**7098.** Kalkman, V.J. (2008): *Argiolestes* in the Bismarck and the Solomon Archipelagos. Notes on Old World Megapodagrionidae 2 (Odonata). *International Journal of Odonatology* 11(1): 43-57. (in English). ["*Argiolestes aurantiacus*, endemic to the Bismarck Archipelago, is redescribed and three new species of *Argiolestes* from the Solomon Archipelago are described: *A. bougainville* sp. nov. (holotype ♂: Papua New Guinea, Bougainville, North Solomons, 02 I 1970), *A. gizo* sp. nov. (holotype ♂: Solomon Islands, Western Province, Gizo Island, alt. 1-100 m, 02 VII 1959) and *A. malaita* sp. nov. (holotype ♂: Solomon Islands, Malaita, Tagatalau, east of Auki, alt. 200 m, 27 IX 1957). The holotypes are deposited in the RMNH." (Author)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**7099.** Kalkman, V.J.; Clausnitzer, V.; Dijkstra, K.D.; Orr, A.G.; Paulson, D.R.; van Tol, J. (2008): Global diversity of dragonflies (Odonata) in freshwater. *Developments in Hydrobiology* 198: 351-363. (in English). ["Larvae of almost all of the 5,680 species of the insect order Odonata (dragonflies and damselflies) are dependent on freshwater habitats. Both larvae and adults are predators. The order is relatively well studied, and the actual number of species may be close to 7,000. Many species have small distributional ranges, and are habitat specialists, including inhabitants of alpine mountain bogs, seepage areas in tropical rain forests, and waterfalls. They are often successfully used as indicators for environmental health and conservation management. The highest diversity is found in flowing waters in rain forests of the tropics, the Oriental and Neotropical regions being the most speciose. This paper discusses diversity, summarises the biogeography of dragonflies in the different biogeographical regions and gives the total number of species and genera per family per biogeographical region. Examples are given of areas of particular diversity, in terms of areas of endemism, presence of ancient lineages or remarkable recent radiations but no well-based review of areas with high endemism of dragonflies is available so far. The conservation status of dragonflies is briefly discussed. Species confined to small remnants of forest in the tropics are most under threat of extinction by human activities." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**7100.** Khan, B.; Colbo, M.H. (2008): The impact of physical disturbance on stream communities: lessons from road culverts. *Hydrobiologia* 600: 229-235. (in English). ["This study examined the impact of physical disturbance from long-established road culverts on stream macroinvertebrate communities. Three streams within a 6 km section of highway on the Avalon Peninsula, Newfoundland, Canada, were sampled. Streams had the entire upstream watershed and at least 100 m downstream of the road with natural boreal forest/barren vegetation and all had, within the sampled reaches, similar physical streambed characteristics. The fauna on stones from riffles was sampled at two upstream and three downstream sites, i.e., from 50 m above to about 100 m below the road in each stream. A total of 33 taxa



were identified among the streams, with differences limited to a few rare taxa. The sample site communities did not significantly differ from each other with respect to the taxa present. Total macroinvertebrate abundance by site, for combined data of all streams, indicated the site at the exit of culvert plunge pool (site 3) had significantly elevated abundances. Analysis of individual taxa showed this was primarily due to very high numbers of *Simulium* species. The other most notable changes were a decrease in numbers of *Hydropsyche* species and *Elmidae* below the road. The abundances of the remaining taxa were more variable among all sites. The study indicated that longstanding point source physical disturbance primarily impacted taxa abundance rather than community present/absent data, which will recolonize the disturbed zone by downstream drift. The differences in abundance are probably the result of the cleaning of substrate by abrasion, movement of substrate and reduction of detritus during each spate." (Author) The study includes "Aeshna sp." Address: Colbo, M.H., Dept Biology, Memorial Univ. Newfoundland, St. John's, NL, Canada A1B 3X9. E-mail: mcolbo@mun.ca

**7101.** Kiyoshi, T. (2008): Differentiation of golden-ringed dragonfly *Anotogaster sieboldii* (Selys, 1854) (Cordulegastridae: Odonata) in the insular East Asia revealed by the mitochondrial gene genealogy with taxonomic implications. *Journal of Zoological Systematics and Evolutionary Research* 46(2): 105-109. (in English, with German summary). ["Molecular phylogeographical analyses of *A. sieboldii* were conducted to reveal the differentiation process of insular populations. The gene genealogy based on 845 bp of the mitochondrial genes (cytochrome oxidase subunit I and subunit II) indicated that *A. sieboldii* includes two deeply separated lineages. These two major lineages seem to have differentiated in Miocene before the formation of the insular East Asia. One lineage includes three inner clades that correspond to the populations of northern area (the Japanese main islands, Korean Peninsula, Yakushima), Amamioshima and Okinawajima. Populations of Central Ryukyu, including Amamioshima and Okinawajima, might have been divided from the northern populations in early Pleistocene. The other major lineage includes populations of the Yaeyama Group, Taiwan and East China. The former two populations were reconstructed as a reciprocal monophyletic group. Populations of Taiwan and Yaeyama Groups would have been separated from the continental ones in Pleistocene. These two highly divergent lineages should be recognized as distinct species. Furthermore, the mitochondrial lineages revealed six genetically distinct and geographically isolated assemblages: (1) northern populations, (2) Amamioshima, (3) Okinawajima, (4) Yaeyama Group, (5) Taiwan and (6) East China." (Author)] Address: Kiyoshi, T., Dept of Zoology, Graduate School of Science, Kyoto University, Kyoto, Japan. E-mail: kiyoshi@zoo.zool.kyoto-u.ac.jp

**7102.** Klass, K.-D. (2008): The female abdomen of ovipositor-bearing Odonata (Insecta: Pterygota). *Arthropod Systematics & Phylogeny* 66(1): 45-142. (in English). ["The exoskeleton and musculature of the middle and posterior abdomen in female *Calopteryx virgo* are described (segments IVff), including parts of the midabdominal nervous system. Based on a sample of 16 species of Odonata with a plesiomorphic morphology of the ovipositor (various Zygoptera, Epiophlebia, and Aeshnidae) the range of variation in the abdominal exoskel-

eton is documented, and a preliminary list and table of 79 characters are assembled. Abdominal muscles in Odonata are surveyed based on data from the literature. Topographic homologies between Odonata and other Insecta are discussed, with a focus on the female genitalic region and the terminal abdomen, and with consideration of previous ontogenetic studies. The results are used for including outgroup scorings into the character list for Odonata. Odonata conform with many Neoptera (e.g., Notoptera, pygidicranid Dermaptera) in the location of the female genital opening between or behind the gonapophyses VIII bases, contrasting with the VIIIth-segmental openings in other Neoptera (e.g., Dictyoptera, Ensifera, 'advanced' Dermaptera), Archaeognatha, and Zygentoma. The gonangulum in most Odonata consists, like in Archaeognatha and some Dermaptera, of two separate sclerites; this contrasts with the one-piece condition of the gonangulum in other Diptera and Epiophlebia. The interpretation of terminal appendages in Odonata as the true cerci is supported by musculature data, and it is shown that previous counter-arguments are invalid. While Epiophlebia is in many characters highly peculiar among Odonata, the abdominal characters provide no resolution for the relationships between Epiophlebia, Zygoptera, and Anisoptera. The monophyly of Zygoptera receives considerable support." (Author) Address: Klass, K.-D., State Natural History Collections Dresden, Museum of Zoology, Königsbrücker Landstraße 159, 01109 Dresden, Germany. E-mail: klaus.klass@snsd.smwk.sachsen.de]

**7103.** König, R.; Suzin, C.R.H.; Restello, R.M.; Hepp, L.U. (2008): Qualidade das águas de riachos da região norte do Rio Grande do Sul (Brasil) através de variáveis físicas, químicas e biológicas. *Pan-American Journal of Aquatic Sciences* 3(1): 84-93. (in Portuguese, with English summary). [Water quality of streams in the north region of Rio Grande do Sul (Brazil) is assessed by the use of physical, chemical and biological variables. - The taxa - including Odonata - are treated on the family level.] Address: Hepp, L.U., Programa de Pós-Graduação em Biodiversidade Animal, Universidade Federal de Santa Maria - RS. Av. Roraima, 1000. Santa Maria - RS. 97105-900. Brasil. E-mail: lhepp@uri.com.br

**7104.** Kone, T.; Kouamélan, E.P.; Yao, S.S.; N'Douba, V.; Ollevier, F. (2008): First results of a study of the feeding habits of *Synodontis comoensis* (Siluriformes: Mochokidae) in a West African river (Comoé River, Comoé National Park, Côte d'Ivoire). *Aquatic Ecology* 42: 35-42. (in English). ["The feeding habits of *S. comoensis* have been studied for the first time. Specimens caught in the Comoé River (Comoé National Park, Côte d'Ivoire) had fed on different types of food including insects (Diptera, Ephemeroptera, Hymenoptera, and Isoptera), molluscs (gastropods and bivalves), oligochaetes, and macrophytes. The food items most frequently found in the stomach contents were chironomid larvae, oligochaetes, vegetable detritus, fruit, and gastropods. Correlation studies based on the index of preponderance of food items revealed noticeable variation in *S. comoensis* diet composition with fish size and season. Preferred food items of young fish were oligochaetes in the rainy season and vegetable detritus in the dry season. Food items preferred by larger fish were fruit and gastropods in the rainy season and chironomid larvae in the dry season." (Authors) *Phyllomacromia* sp. is the only taxon found in the diet of this fish.] Address: Koné, T., Laboratoire d'Hydrobiologie, UFR Biosciences, Uni-

versite´ de Cocody, 22 BP 582 Abidjan, Ivory Coast. E-mail: Ktidiani@yahoo.fr

**7105.** Królak, E.; Korycińska, M. (2008): Taxonomic composition of macroinvertebrates in the Liwiec river and its tributaries (Central and Eastern Poland) on the basis of chosen physical and chemical parameters of water and season. *Polish Journal of Environmental Studies* 17(1): 39-50. (in English). ["The taxonomic composition of macroinvertebrates in the Liwiec River and its tributaries situated in central and eastern Poland was studied during three seasons (spring, summer and autumn). Simultaneously, physical and chemical parameters of water were measured. Water parameters were different in each study period. Macroinvertebrates samples collected in summer and autumn were much more diversified than the samples collected in spring. In the spring samples a greater EPT diversity was observed, while in the samples collected in autumn Odonata, Coleoptera and Heteroptera were more diversified. The values of the BMWP-PL index were slightly higher for the summer and autumn samples than for the spring ones. Correlation between the concentration of oxygen in water and the number of individuals of Plecoptera and Trichoptera larvae was noted. The negative correlation between the values of BOD5, the concentration of nitrate ions and conductivity, and the number of macroinvertebrate families was observed. A negative correlation also was noted between nitrate and phosphate ion concentrations and the number of individual insect larvae." (Authors)] Address: Królak, E., Dept of Ecology & Environmental Protection, University of Podlasie, Prusa 12, 08-110 Siedlce, Poland

**7106.** Krotzer, R.S.; Bried, J.T.; Krotzer, M.J. (2008): The Odonata Of Mississippi. *Bulletin of American Odonatology* 10(4): 65-91. (in English). ["An annotated faunal list of the Odonata occurring in Mississippi is presented, totalling 144 species (100 Anisoptera, 44 Zygoptera). Five species - *Enallagma davisii*, *Gomphus (Hylogomphus) geminatus*, *Epithea (Tetragoneuria) spinosa*, *Neurocordulia alabamensis*, and *Miathyria marcella*, are documented from the state for the first time. The presence in Mississippi of *Celithemis bertha* Williamson, previously reported from the state based on a misidentification, is confirmed. Four species from earlier Mississippi lists are removed, and nine potential additions to the state's fauna are discussed. A brief history of odonatological inventory in Mississippi is given, along with a discussion of the state's physiography and aquatic resources, relationships of its odonate fauna to that of its neighbouring states, and potential conservation measures that could benefit odonates and their habitats." (Authors)] Address: Krotzer, S., 2238 Haysop Church Road, Centreville, AL 35042, USA. E-mail: rskrotze@southernco.com

**7107.** Kukalova-Peck, J. (2008): Phylogeny of higher taxa in insecta: Finding synapomorphies in the extant fauna and separating them from homoplasies. *Evol. Biol.* 35: 4-51. (in English). ["Most currently applied systematic methods use post-groundplan character states to reconstruct phylogenies in modern higher Insecta/Arthropoda taxa. But, this approach is unable to separate synapomorphies from frequently occurring homoplasies. Conflicting, unresolved and unrealistic higher-level phylogenies result. The reasons are analyzed. A contrasting "groundplan" method, long used in Vertebrata and found to be superior in resolving higher-level

phylogenies, is described. This method, as used for insects, uses a highly diversified morphological organ system (such as limb/wing), identifies its homologues in all subphyla and classes, records the full history of its character transformation series in all lineages from the shared Paleozoic ancestor to modern times, pursues the full homologization of its character states in all modern orders, and verifies these data with evidence from other fields of biology. Only such an extremely broad dataset provides the complex information needed to identify and homologize the groundplan character states in modern orders and other higher taxa in the insect /arthropod fauna. After this is accomplished, the gate to recognizing higherlevel synapomorphies is open. Only groundplan-level character states include distinct synapomorphies, since homoplasies are either absent or easily detectable. Examples are given. The interpretations of higher phylogenies and evolutionary processes in Hexapoda, based on the unpredictable and often misleading post-groundplan character states found in extant, Tertiary and Mesozoic fauna, are critically compared with those based on the evolution of organ systems, by using the groundplan method." (Author) The paper includes many references to Odonata.] Address: Kukalova-Peck, Jarmila, Earth Sciences, Carleton University, Ottawa, ON, Canada K1S 5B6. E-mail: jarmilapeck@carleton.ca

**7108.** Lowe, C.D.; Harvey, I.F.; Thompson, D.J.; Watts, P.C. (2008): Strong genetic divergence indicates that congeneric damselflies *Coenagrion puella* and *C. pulchellum* (Odonata: Zygoptera: Coenagrionidae) do not hybridise. *Hydrobiologia* 605: 55-63. (in English). ["Coenagrionid damselflies are in general decline in the British Isles. Numerous factors have been implicated in the loss of these species including recent speculation that hybridisation between congeners may result in species decline. Here we use a panel of 12 microsatellite loci to examine levels of genetic divergence and the likely occurrence of hybridisation in five populations of *Coenagrion puella* and *C. pulchellum* using samples from four sites in south-east England. *C. puella* and *C. pulchellum* were highly genetically divergent, and there was no evidence of hybridisation between any of the populations examined, even where *C. puella* and *C. pulchellum* were sympatric. There was some suggestion that *C. pulchellum* was less genetically diverse than *C. puella*, though this may have been a result of ascertainment bias associated with cross-species application of microsatellite markers. We conclude that there is no evidence that hybridisation between *C. puella/pulchellum* could be responsible for the on-going demographic decline in *C. pulchellum*. Nevertheless, further genetic studies such as this one are likely to provide estimates of diversity, population structure and dispersal capacity that will be invaluable in future conservation management strategies for coenagrionid damselflies." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**7109.** Mahato, M.; Kennedy, J.H. (2008): Field experimental approach to detect urban impact on *Erpetogomphus designatus* Hagen in Selys larvae (Anisoptera: Gomphidae). *Odonatologica* 37(1): 13-28. (in English) "This study attempted to design and conduct an in situ field experiment using *E. designatus* larvae collected from the reference site and then exposed at 4 poten-

tially impacted urban sites; all in the sub-watersheds of the city of Denton, Texas, USA. Before placing them in the urban site enclosures, head width, total width, wing pad length and wet weight were measured. The surviving larvae were retrieved after 6 weeks and all parameters were measured again in order to assess the difference between the reference and urban sites. No survival was observed at 2 urbanized sites in both spring and summer, and at another urbanized site in spring. The differences in survival of the larvae may be influenced by the differences in hydrology and water quality, especially during the summer experimental period. In the spring, a statistically significantly higher growth rate ( $p < 0.05$ ) occurred at one of the urban sites compared to the reference site. The difference in growth rate may have been influenced by less fluctuation and higher minimum water temperature at the urban site. Although the experiment was only partially successful, it did indicate that the local common odonate taxa found at the reference site could be used for field biomonitoring experiments to assess water quality of urban sites. If fully successful, this type of in situ field experiment may indicate actual impacts rather than attempting to apply conclusions based on either laboratory microcosm or mesocosm-based toxicity tests." (Authors)] Address: Mahato, M., URS Corporation, Dallas, TX 75234, USA. E-mail: Mmahato@gmail.com

**7110.** Mandal, S.K.; Ghosh, A.; Bhattacharjee, I.; Chandra, G. (2008): Biocontrol efficiency of odonate nymphs against larvae of the mosquito, *Culex quinquefasciatus* Say, 1823. *Acta Tropica* 106(2): 109-114. (in English). ["An estimation of the predatory efficiency of the nymphs of 5 coexisting odonate species *Aeshna flavifrons*, *Coenagrion kashmirum*, *Ischnura forcipata*, *Rhinocypha ignipennis* and *Sympetrum durum* using the fourth-instar larvae of *Culex quinquefasciatus* as prey, was made under laboratory and semi-field conditions. The daily feeding rate varied among the odonate species, at laboratory conditions. The mean number of IV instars *Cx. quinquefasciatus* larvae killed per day, ranged between 14 and 64 (64 mosquito larvae for *I. forcipata*, 57 for *A. flavifrons*, 45 for *R. ignipennis*, 25 for *S. durum* and 14 for *C. kashmirum*). The prey consumption was linearly related to the number of predators and prey available but inversely related with space. It was also noted that the feeding rates varied significantly between dark and light conditions, in all the odonate species. The presence of nymphs in semi-field conditions significantly lowered the mosquito larval density in dipper samples after 15 days from the introduction, followed by a significant increase of larval mosquito density after 15 days from the withdrawal of the nymphs. The results of the present observations are suggestive of the use of odonate nymphs in temporary pools or larger habitats where they can be a potential biological resource in regulating the larval population of the vector and pest mosquitoes." (Authors)] Address: Mosquito Research Unit, Department of Zoology, The University of Burdwan, Burdwan, Golapbag 713104, West Bengal, India

**7111.** Markwell, K.A.; Fellows, C.S. (2008): Habitat and biodiversity of on-farm water storages: A case study in southeast Queensland, Australia. *Environmental Management* 41: 234-249. (in English). ["On-farm water storages (locally known as farm dams or farm ponds) are an important part of many agricultural landscapes, as they provide a reliable source of water for irrigation and stock. Although these waterbodies are artificially

constructed and morphologically simple, there is increasing interest in their potential role as habitat for native flora and fauna. In this article, we present results from a case study which examined the habitat characteristics (such as water physical and chemical parameters, benthic metabolism, and macrophyte cover) and the macrophyte and macroinvertebrate biodiversity of 8 farm ponds on 4 properties in the Stanley Catchment, Southeast Queensland, Australia. Each landowner was interviewed to allow a comparison of the management of the ponds with measured habitat and biodiversity characteristics, and to understand landowners' motivations in making farm pond management decisions. The physical and chemical water characteristics of the study ponds were comparable to the limited number of Australian farm ponds described in published literature. Littoral zones supported forty-five macroinvertebrate families, with most belonging to the orders Hemiptera, Coleoptera, Odonata, and Diptera. Invertebrate community composition was strongly influenced by littoral zone macrophyte structure, with significant differences between ponds with high macrophyte cover compared to those with bare littoral zones. The importance of littoral zone macrophytes was also suggested by a significant positive relationship between invertebrate taxonomic richness and macrophyte cover." (Authors)] Address: Fellows, Christine, Australian Rivers Institute, Griffith School of Environment, Nathan QLD 4111, Australia. E-mail: c.fellows@griffith.edu.au

**7112.** Martens, A.; Ehmann, H.; Peitzner, G.; Peitzner, P.; Wildermuth, H. (2008): European Odonata as hosts of *Forcipomyia paludis* (Diptera: Ceratopogonidae). *International Journal of Odonatology* 11(1): 59-70. (in English). ["The biting midge *F. (Pterobosca) paludis* is the only ceratopogonid species known to parasitise Odonata imagines in Europe. In this study, based mainly on the analysis of about 200 photographically documented cases, data on host species, parasite load and undisturbed position on the odonate body were analysed. The list of hitherto known hosts is extended significantly to include 55 Odonata species. The records date from mid-May to the beginning of August. Most data originate from southern France, Switzerland, Germany, and Austria, with a few from Sweden and Croatia. Only ♀♀ of *F. paludis* were found on Odonata, attached to both sides of the wings with a preference for their basal half, and mostly facing the wing base. In Calopteryx species the midges were likewise present on the wing tips. In a few cases midges were also found on the odonate's thorax and abdomen." (Authors)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, PF 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**7113.** Matushkina, N.A. (2008): Skeletomuscular development of genital segments in the dragonfly *Anax imperator* (Odonata, Aeshnidae) during metamorphosis and its implications for the evolutionary morphology of the insect ovipositor. *Arthropod Structure & Development* 37(4): 321-332. (in English). ["The skeleton-muscular organisation of abdominal segments 7-9 in female *A. imperator* was examined in the stages of ultimate larva, teneral imago, and mature imago, with special emphasis on the transformation of the muscle arrangement. The absence of certain muscles in the genital segments compared to the 7th pre-genital segment was noted on all studied stages. Reductions of certain muscles in adults compared to those in larvae are re-



ported. Some of ovipositor's muscles appear already in larvae. Attachment sites of larval muscles are retained in freshly emerged ♀♀ concurrently with integument transformations. This situation allows for precise determination of the borders of newly differentiated genital sclerites and, therefore, of the possible origin of certain ovipositor elements in odonates. All changes in the segmental sets of studied abdominal muscles during metamorphosis are tabulated, and displacements of muscles are documented and illustrated. Schematic figures illustrating homologies between the parts of larval and imaginal abdominal sclerites are provided. The origins of the components of the endophytic ovipositor in Odonata as well as their implications for the evolutionary morphology of the insect ovipositor are discussed." (Author)] Address: Matushkina, Natalia A., Dept of Zoology, Biol. Faculty, National Taras Shevchenko University of Kyiv, vul. Volodymirs'ka, 64, Kyiv UA- 01033, Ukraine

**7114.** Matushkina, N.A. (2008): The ovipositor of the relic dragonfly *Epiophlebia superstes*: a morphological re-examination (Odonata: Epiophlebiidae). *International Journal of Odonatology* 11(1): 71-80. (in English). ["The morphology of the endophytic ovipositor in *E. superstes* was studied with light and electron microscopy with special emphasis made on the musculature and micro-sculpture of the exoskeleton. Structural characters are described and illustrated. The musculature of the ovipositor has many similarities with zygopterans. The ovipositor and 10th abdominal segment bear groups of setae and campaniform sensilla, which probably contact the plant surface during egg laying. A group of campaniform sensilla on the base of the stylus may be responsible for the zigzag sequence of egg disposition in *E. superstes*. The phylogenetic significance of the microstructure of the ovipositor in *E. superstes* can be evaluated only after a systematic examination of representatives of other ovipositor-bearing Odonata." (Author)] Address: Matushkina, Natalia A. Department of Zoology, Biological Faculty, Kyiv National University, vul. Volodymirs'ka, 64, Kyiv, 01033, Ukraine. E-mail: odonataly@gmail.com

**7115.** Medina, F.M.; López-Darias, M.; Nogales, M.; García, R. (2008): Food habits of feral cats (*Felis silvestris catus* L.) in insular semiarid environments (Fuerteventura, Canary Islands). *Wildlife Research* 35: 162-169. (in English). ["In this study, we present the first data on diet and impacts of feral cats on a semiarid island (Fuerteventura, Canary Islands). A total of 614 prey was identified in the 209 scats analysed. Introduced mammals, especially rabbits and mice, were the most consumed vertebrate prey and constituted more than 90% of biomass. Barbary ground squirrels, Algerian hedgehogs, and rats were preyed upon less even though they were abundant on the island. Invertebrates, mainly Orthoptera, Coleoptera, Hymenoptera and Odonata, were the second most important prey items (in terms of actual numbers) but they contributed only minimally with respect to biomass (<1.1%). The presence of terrestrial molluscs in the diet was interesting because they are a rare prey in an insular context. Birds and reptiles occurred at a low frequency. A total of 677 seeds was counted, mainly belonging to *Lycium intricatum* (Solanaceae) and two unidentified plant species. Levin's niche breadth was narrow due to the high consumption of mammals. Morisita's index showed a similar trophic overlap in diet with respect to the other xeric habitats of the Canarian archipelago. Considering

that more than 90% of biomass corresponded to introduced mammals, we conclude that feral cats are not having a large direct impact on the native prey species." (Authors) The diet contains *Anax imperator* and indeterminate Odonata remains.] Address: Medina, F.M., Unidad de Medio Ambiente, Cabildo Insular de La Palma, Avenida Los Indianos 20, 2º, 38700 Santa Cruz de La Palma, Canary Islands, Spain. E-mail: felix.medina@cablalpalma.es

**7116.** Meurgey, F. (2008): Description of the adult male and larva of *Brechmorhoga archboldi* (Donnelly) from the French West Indies (Anisoptera: Libellulidae). *Odonatologica* 37(2): 161-166. (in English). ["*Scapanea archboldi* (Donnelly), known only from the holotype ♀ from Dominica, was recently transferred to *Brechmorhoga* (Garrison & von Ellenrieder, 2006, *Can. Ent.* 138: 269-284). Here, its ♂ and larva are described from Guadeloupe and Martinique; some behavioural and habitat notes, and distribution for this species are included. *B. grenadensis* Kirby is considered to be a distinct species and not a subspecies of *B. praecox* (Hagen)." (Author)] Address: Meurgey, F., Mus. d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**7117.** Mikolajewski, D.J.; Stoks, R.; Rolff, J.; Joop, G. (2008): Predators and cannibals modulate sex-specific plasticity in life-history and immune traits. *Functional Ecology* 22(1): 114-120. (in English). ["1. In organisms with complex life cycles, optimality models predict age and size at transition to translate larval condition into adult fitness. Recent studies, however, revealed that only a proportion of fitness is explained by age and size at transition. Moreover, sexes differ in the linkage of larval condition and adult fitness. 2. In this study, we tested the hypothesis that immune traits may be partly decoupled from age and size at habitat transition and therefore contribute to the sex-specific linkage of larval condition and adult fitness. 3. We reared larvae of the damselfly *Coenagrion puella* under the threat of predators and cannibals. We then examined sex-specific patterns in two life-history traits as well as two immune traits and tested for independency of the plastic responses among life-history and immune traits. 4. Results revealed immune traits to be partly decoupled from life-history traits. Moreover, the sexes differed in the plasticity of life-history as well as immune traits. Our results give strong evidence that sex-specific translation of larval condition into adult fitness may be linked to immune traits as well as age and size at transition." (Authors)] Address: Mikolajewski, D.J., Dept of Animal and Plant Sciences, Univ. of Sheffield, Western Bank, Sheffield, S10 2TN, UK. E-mail: d.mikolajewski@tu-bs.de

**7118.** Molineri, C. (2008): Impact of rainbow trout on aquatic invertebrate communities in subtropical mountain streams of northwest Argentina. *Ecologia Austral* 18: 101-117. (in English). ["The present study was conducted to assess the effect of rainbow trout introduction on benthic invertebrate communities, stratified as epibenthos and infauna. Two main questions are explored: 1) do the trout-invaded streams show a different community structure than the streams with autochthonous fish?, and 2) does the presence of trout affect differentially the epibenthos and the infauna? Epibenthic and infaunal samples, drift samples and fish stomach content were sampled four times from three stations to assess the impact of rainbow trout (*Oncorhynchus my-*

kiss) on the invertebrate aquatic fauna. Only one species of native fish was recorded in the studied sites, the siluriform *Trichomycterus corduvense*. Both fish species were found always in allopatry. The trout-invaded site has a different community structure than the other streams with a much lower abundance of large and active epibenthic taxa (e.g., Perlidae, Gripopterygidae, Hydropsychidae, Leptoceridae, Elmidae adults) and an increase in the importance of infaunal organisms (Chironomidae, Oligochaeta). Diversity indices showed alternating and opposite high and low values along time in trout-free and invaded sites." (Author) The analysis includes Aeshnidae.] Address: Molineri, C., INSUECONICET, Facultad de Ciencias Naturales e IML, M. Lillo 205, San Miguel de Tucumán, 4000, Tucumán, Argentina. E-mail: cmolineri@csnat.unt.edu.

**7119.** Mora, A.; Csepes, E.; Toth, M.; Devai, G. (2008): Spatio-temporal variations of macroinvertebrate community in the Tisza river (NE Hungary). *Acta Zoologica Academiae Scientiarum Hungaricae* 54(2) : 181-190. (in English). [The analysis of macrozoobenthos includes *Stylurus flavipes*. Address: Móra, A., Hungarian Academy of Sciences, Balaton Limnological Research Institute, Klebelsberg Kuno 3, H-8237 Tihany, Hungary. E-mail: marnold@tres.blki.hu

**7120.** Mortensen, L.; Richardson, J.M.L. (2008): Effects of chemical cues on foraging in damselfly larvae, *Enallagma antennatum*. *Journal of Insect Behavior* 21(4): 285-295. (in English). ["Animals experiencing a trade-off between predation risk and resource acquisition must accurately predict ambient levels of predation risk to maximize fitness. We measure this trade-off explicitly in larvae of the damselfly *E. antennatum*, comparing consumption rates in the presence of chemical cues from predators and injured prey. Damselflies distinguished among types of chemical cues based on species of prey injured or eaten. Injured coexisting heterospecific and unknown heterospecific chemical cues did not reduce foraging relative to starved predator cues, while cues arising from predators eating a coexisting heterospecific did decrease foraging. This study shows a cost in terms of reduced foraging in response to chemical cues and further defines the ability of prey to respond discerningly to chemical cues." (Authors)] Address: Richardson, J.M.L., Dept Biological Sciences, Brock University, 500 Glenridge Ave., St. Catharines, ON, L2S 3A1, Canada. Email: jr Richardson@brocku.ca

**7121.** Muzon, J. (2008): *Commentario bibliografico: Garrison, R.W., N. von Ellenrieder & J.A. Louton. 2006. Dragonfly Genera of the New World. An illustrated and annotated key to the Anisoptera. The Johns Hopkins University Press, Baltimore, 368 páginas, 1626 figuras y 8 láminas color. Rev. Soc. Entomol. Argent. 65 (3-4) (2006): 18. (in Spanish). [book review.] Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina. E-mail: muzon@ilpla.edu.ar*

**7122.** Neiss, U.G.; Lencioni, F.A.A.; Hamada, N.; Ferreira-Keppler, R.L. (2008): Larval redescription of *Microstigma maculatum* Hagen in Selys, 1860 (Odonata: Pseudostigmatidae) from Manaus, Amazonas, Brazil. *Zootaxa* 1696: 57-62. (in English, with Portuguese summary). ["The last-instar larva of *Microstigma maculatum* Hagen in Selys, 1860 is redescribed and illustrated based on a reared larva collected in a water-filled hole of a fallen tree trunk within an urban forest fragment in

Manaus, Amazonas, Brazil." (Authors)] Address: Lencioni, F.A.A., Rua dos Ferroviários 55, Jardim Mesquita, BR- 12300-000, Jacarei, S.P., Brazil. E-mail: odonata@iconet.com.br

**7123.** Nel, A.; Néraudeau, D.; Perrichot, V.; Gomez, B. (2008): A new dragonfly family in the Upper Cretaceous of France (Insecta: Odonata: Aeshnoptera). *Acta Palaeontologica Polonica* 53(1): 165-168. (in English). ["The new aeshnopteran family *Enigmaaeshnidae* is proposed for *Enigmaaeshna deprei* gen. et sp. nov., the first fossil insect collected as imprint in the Earliest Cenomanian clay of the Puy-Puy quarry at Tonnay-Charente (Charente-Maritime, SW France). The bed bearing *E. deprei* was previously known for its highly diversified fossil plant assemblage. Although this taxon belongs to the much derived clade Aeshnodea, it is characterized by several unique hind wing venation characters, never found in other Aeshnoptera, viz. part of MAb distal of the trigonal planate very long, and presence of five posterior branches of AA directed towards posterior wing margin." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**7124.** Ohba, S.; Miyasaka, H.; Nakasuji, F. (2008): The role of amphibian prey in the diet and growth of giant water bug nymphs in Japanese rice fields. *Population Research* 50(1): 9-16-121-122. (in English). ["Predatory insects that depend upon particular prey animals are commonly regulated by the prey animal's abundance. Nymphs of the giant water bug *Kirkaldyia (=Lethocerus) deyrolli* (Heteroptera: Belostomatidae) are predators regarded as specialists in feeding on tadpoles. We studied the ontogenetic diet shift of aquatic nymphs by quantifying instar abundance and by analyzing captured prey and prey relative abundance during the period of rice irrigation in three localities. We also evaluated the contribution of major prey items (tadpoles, frogs, and Odonata nymphs) on specific growth rates of each nymphal stage in a rearing experiment. First to third-instar nymphs of *K. deyrolli* fed mainly on tadpoles, regardless of differences in prey availability. Nymphs of subsequent fourth and fifth instar stages shifted from tadpoles to other prey animals within each rice field. A rearing experiment demonstrated that giant water bug nymphs provided with tadpoles had greater specific growth rates at all nymphal stages, except for the final stage, than nymphs fed other prey (frogs and Odonata nymphs). The emergence of young *K. deyrolli* nymphs seemed to coincide with the period during which tadpoles became abundant in the rice fields. Consumption of tadpoles seems important to allow the nymph to complete its larval development in an unstable temporary habitat." (Authors)] Address: Ohba, S., Laboratory of Insect Ecology, Graduate School of Environmental Science, Okayama University, Tsushima, Okayama 700-8530, Japan. E-mail: oobah8ag@yahoo.co.jp

**7125.** Patankar, N.V.; Tembhare, D.B. (2008): Immunocytochemical localization of some aminergic and peptidergic neurosubstances in the cephalic neurosecretory system of the dragonfly, *Tramea virginia* (Rambur) (Anisoptera: Libellulidae). *Odonatologica* 37(2): 119-130. (in English). ["An immunocytochemical study showed the presence of 7 neurosubstance-like materials: FMR-Famide, neuropeptide-Y (NPY), substance-P, serotonin, gastrin, chole-cystokinin (CCK) and vasoactive intestinal peptide (VIP) in the median, lateral, ventral and optic

neurosecretory cells groups (MNC, LNC, VNC and ONC, respectively) in the brain and in the corpora cardiaca (CC) of the adult, *T. virginia*. In the MNC cell type A showed NPY- and serotonin- while B and C cell types showed NPY-, serotonin-, substance P- and CCK-like positive immunoreaction. The B cell type in LNC showed FMRFamide-, NPY- and serotonin- and the C cell type showed only NPY and serotonin-like positive immunoreaction. In VNC group, the B cell type showed substance P- and gastrin-, while the C cell type showed substance P- and gastrin- and VIP- like positive immunoreaction. B and C cell types of ONC group showed substance P- and serotonin-like positive immunoreaction. The CC showed only NPY-like positive immunoreactive intrinsic neurosecretory cells. The functional significance of these myotropic and vertebrate gastrointestinal hormone-like substances in the cephalic neurosecretory system of *T. virginia* is discussed." (Authors)] Address: Tembhare, D.B., 44 Vijaya Nagar, South Ambazari Road, Nagpur-440 022, India. E-mail: dr.nitisha@gmail.com

**7126.** Polhemus, D.A.; Michalski, J.; Richards, S.J. (2008): *Pseudagrion fumipennis*, a remarkable new species of damselfly from New Guinea (Odonata: Zygoptera: Coenagrionidae). *Tijdschr. Ent.* 151(1): 51-56. (in English). ["*Pseudagrion fumipennis* sp. n. is described from widely separated localities in the lowlands of New Guinea and immediately adjacent islands. It is the first known coenagrionid from the Papuan region to possess brown-tinted apices on all four wings. The new species appears to be structurally most similar to *P. farinicolle* from New Guinea and *P. ustum* from Sulawesi, but its precise relationships are obscure." (Authors)] Address: Polhemus, D., Dept. Entom., MRC 105, Smith. Inst., Wash., D.C. 20560, USA. Email: bugman@bpbm.org

**7127.** Rach, J.; DeSalle, R.; Sarkar, I.N.; Schierwater, B.B.; Hadrys, H. (2008): Character-based DNA barcoding allows discrimination of genera, species and populations in Odonata. *Proc. R. Soc. (B)* 275: 237-247. (in English). ["DNA barcoding has become a promising means for identifying organisms of all life stages. Currently, phenetic approaches and tree-building methods have been used to define species boundaries and discover 'cryptic species'. However, a universal threshold of genetic distance values to distinguish taxonomic groups cannot be determined. As an alternative, DNA barcoding approaches can be 'character based', whereby species are identified through the presence or absence of discrete nucleotide substitutions (character states) within a DNA sequence. We demonstrate the potential of character-based DNA barcodes by analysing 833 odonate specimens from 103 localities belonging to 64 species. A total of 54 species and 22 genera could be discriminated reliably through unique combinations of character states within only one mitochondrial gene region (NADH dehydrogenase 1). Character-based DNA barcodes were further successfully established at a population level discriminating seven population-specific entities out of a total of 19 populations belonging to three species. Thus, for the first time, DNA barcodes have been found to identify entities below the species level that may constitute separate conservation units or even species units. Our findings suggest that character-based DNA barcoding can be a rapid and reliable means for (i) the assignment of unknown specimens to a taxonomic group, (ii) the exploration of diagnosability of conservation units, and (iii) complement-

ing taxonomic identification systems." (Authors)] Address: Hadrys, Heike, ITZ, Ecology & Evolution, TiHo Hannover, Bünteweg 17d, D-30559, Hannover, Germany. E-mail: heike.hadrys@ecolevol.de

**7128.** Ren, D.; Nel, A.; Prokop, J. (2008): New early griffenfly, *Sinomeganeura huangheensis* from the Late Carboniferous of northern China (Meganisoptera: Meganeuridae). *Insect Syst. Evol.* 38: 223-229 (in English) ["New griffenfly *Sinomeganeura huangheensis* gen. n., sp. n. (Meganeuridae) is described from Upper Carboniferous (Namurian) of the Tupo Formation in northern China (Ningxia Hui Autonomous Region). This taxon exhibits unique structure of the wing venation pattern. It is highly interesting in reference to the Namurian age known for the occurrence of two meganeurids until present (*Namurotypus* Brauckmann & Zessin, 1989 and *Shenzhousia* Zhang & Hong, 2006) as well as the palaeogeographical position of the locality far from all sites in Laurussia. We demonstrate that meganeurids with relatively small wings already co-existed with large species in the Namurian, as for the Stephanian and the Late Permian. Thus, *Sinomeganeura* demonstrates that the meganeurid diversity and wing venation disparity were comparable during the Namurian and the Stephanian, suggesting that this group already had a long history in the Early Carboniferous. Odonatoptera were probably the main, if not unique predators of the flying insects during the Late Paleozoic." (Authors)] Address: Ren Dong, College of Life Sciences, Capital Normal University, Beijing 100037, China. E-mail: rendong@mail.cnu.edu.cn

**7129.** Rice, T.M. (2008): A review of methods for maintaining odonate larvae in the laboratory, with a description of a new technique. *Odonatologica* 37(1): 41-54. (in English). ["Many studies on odonate larvae require the maintenance and rearing of specimens in the laboratory. A wide variety of methods have described the types of containers used and foods provided in raising these larvae. The present discourse is a review of the literature concerning housing and rearing of odonate larvae under laboratory conditions. Furthermore, a new design for short-term maintenance of libellulid larvae is described. Future scientists who desire to use odonate larvae in laboratory settings should benefit from having access to a synopsis of all previous methods in one review." (Author)] Address: Rice, T.M., Dept Biol. Sciences, University of South Alabama, Mobile, AL 36688, United States. E-mail: trice@jaguarl.usouthal.edu

**7130.** Rothfels, C. (2008): The Comet Darner (*Anax longipes*: Aeshnidae): possibly breeding in Canada. *Ontario Odonata* 7: 38-41. (in English). ["We captured and photographed a male *A. longipes* from the Crieff area, in southern Wellington County, during the 2005 Hamilton Odonate Count. It was in suitable breeding habitat for this species, and may have emerged at the site, although searches for reproductive evidence later in the season were unsuccessful. There are three previous Canadian records for *A. longipes* — this is the first Canadian record likely to represent a breeding population. Its presence at Crieff, with a rich assemblage of other odonate species, emphasizes the importance of Ashless aquatic habitats for the maintenance of odonate diversity in Ontario." (Author)] Address: Rothfels, C.J.; crothfels@rbg.ca



- 7131.** Rothfels, C. (2008): Dense darner swarm in Algonquin Provincial Park: observations and questions. *Ontario Odonata* 7: 42. (in English). [1-VIII-2005, dense darner swarm on the Carcajou Creek to Carcajou Bay portage (45.83N, -77.77W), Algonquin Park, Canada including at least *Aeshna canadensis*, *A. tuberculifera*, *A. clepsydra*, and *A. interrupta* preying on ants.] Address: Rothfels, C.J.; [crothfels@rbg.ca](mailto:crothfels@rbg.ca)
- 7132.** Rothfels, C. (2008): Three years of the Hamilton Odonate Count. *Ontario Odonata* 7: 43-48. (in English). ["The first three years of the Hamilton Odonate Count have been full of surprises. The count now boasts a cumulative species tally of 70, a one-day high of 62 species, and has had a significant positive effect on the study of odonates in the Hamilton region. This article provides an overview of the three count years, and a discussion of the role of the Hamilton Odonate Count (and insect counts in general) within the broader study of Odonata." (Author)] Address: Rothfels, C.J.; [crothfels@rbg.ca](mailto:crothfels@rbg.ca)
- 7133.** Rothfels, C. (2008): Odonata of Halton region, Ontario. *Ontario Odonata* 7: 33-37. (in English). [87 od. taxa are checklisted from the Halton, region, Ontario, Canada] Address: Rothfels, C.J.; [crothfels@rbg.ca](mailto:crothfels@rbg.ca)
- 7134.** Ruggiero, A.; Céréghino, R.; Figuerola, J.; Marty, P.; Angélibert, S. (2008): Farm ponds make a contribution to the biodiversity of aquatic insects in a French agricultural landscape. *Comptes Rendus Biologies* 331(4): 298-308. (in English, with French summary). ["Man made ecosystems provide a variety of resources that have strong economic values. We assessed the importance of 37 farm ponds for the biodiversity of Odonata in an agricultural landscape lacking natural wetlands in southwestern France. Farm ponds captured 40% of the regional species pool, including both common and rare species. The species assemblages were not correlated with pond use (e.g., cattle watering, duck farming, etc.) or to landscape variable. Species richness was correlated with pond area, suggesting that community diversity was primarily driven by autoecological processes. Farm ponds thus made a positive contribution to the maintenance of aquatic biodiversity. This added value for biodiversity should be considered when calculating the costs and benefits of constructing water bodies for human activities." (Authors)] Address: Angélibert, S., Laboratoire d'écologie fonctionnelle (EcoLab), UMR 5245, Université Paul-Sabatier, 118, route de Narbonne, 31062 Toulouse cedex 9, France
- 7135.** Sato, M.; Kohmatsu, Y.; Yuma, M.; Tsubaki, Y. (2008): Population genetic differentiation in three sympatric damselfly species in a highly fragmented urban landscape (Zygoptera: Coenagrionidae). *Odonatologica* 37(2): 131-144. (in English). ["The Amplified Fragment Length Polymorphism technique was used to compare the levels of genetic diversity and differentiation among *Paracercion calamorum*, *Ischnura senegalensis* and *I. asiatica* and to compare the genetic structure of populations found in highly fragmented urban habitats to populations in relatively continuous rural habitats. For all 3 species, high genetic diversity was found in both areas. However, population genetic differentiation among urban populations was approximately twice that of rural populations, indicating that movements between habitat patches are more restricted in urban areas, probably due to human disturbances that may function as barriers. Interspecific differences regarding genetic diversity and differentiation are further discussed in terms of habitat specificity." (Authors)] Address: Sato, M., Center for Ecological Research, Kyoto University, 509-3, Hirano 2, Otsu, Shiga, 520-2113, Japan. E-mail: [Mayumi.Sato@ecology.kyoto-u.ac.jp](mailto:Mayumi.Sato@ecology.kyoto-u.ac.jp)
- 7136.** Scanlon, A.T.; Petit, S. (2008): Biomass and biodiversity of nocturnal aerial insects in an Adelaide City park and implications for bats (Microchiroptera). *Urban Ecosyst.* 11: 91-106. (in English). ["Temporal variation of insect communities in urban environments is poorly known and mechanisms driving these changes are unclear, as are the implications for insectivorous predators. We examined the relationships between season and nocturnal aerial insect biomass and biodiversity, and between temperature and insect biomass in the Adelaide zoological gardens from December 2005 to September 2006. We also compared the effectiveness of two insect trap types and used a bat detector to assess bat activity in relation to insect biomass. During the study, 9,939 insects from 13 orders were collected at the Adelaide zoo with a Malaise trap and a light trap. Mass and diversity of insects were highest during warm months, as was bat activity, and bat activity was positively correlated with insect biomass. Winter-active insects consisted predominantly of Diptera and Lepidoptera, which may provide an important winter food resource for insectivorous bats. The Malaise trap attracted fewer insect orders and biomass than did the light trap, and insects congregated within 6 m of artificial lights, so bats that forage at lights may have an advantage in urban areas. A strong need for the inclusion of urban insects to biodiversity inventories exists in the context of bat conservation." (Authors) Odonata were also trapped, but biomass was as low to be further processed.] Address: Petit, Sophie, School of Natural and Built Environments, University of South Australia, Mawson Lakes, South Australia 5095, Australia. E-mail: [sophie.petit@unisa.edu.au](mailto:sophie.petit@unisa.edu.au)
- 7137.** Schmidt, C.; Hachmöller, B.; Kühfuss, M. (2008): *Coenagrion ornatum* Selys, 1850 (Odonata: Zygoptera: Coenagrionidae) im Landschaftsschutzgebiet „Nassau“ bei Meißen / Sachsen. *Faunistische Abhandlungen (Dresden)* 26: 119-135. (in German, with English summary). ["*C. ornatum* has been rediscovered 2004 in Saxony. In the next year started a detailed survey in the period of May to August. The result of this survey was a total amount of 16 distinct habitats along the investigated ditches. The most ditch sections with proof of *C. ornatum* are characterized by a flow speed of 0.1–0.3 m/s, a dark ditch bottom and a high intensity of insolation. Typical species of the emers vegetation are *Nasturtium microphyllum*, *Sparganium erectum* and *Berula erecta*. The vegetation of the ditch banks is mostly influenced by the adjacent arable land. Often dominant species are *Urtica dioica* and *Galium aparine*. The main cause of endangering is seen in the early grow over which is supported by a very high nitrate content of the ditches. That's why is the cut of the nitrate content and a adapted ditch maintenance necessary for the preservation and stabilization of *C. ornatum* in the landscape protection area 'Nassau'." (Authors)] Address: Hachmöller, B., Regierungspräsidium Dresden, Umweltfachbereich, Wasastr. 50, 01445 Dresden, Germany. E-Mail: [Bernard.Hachmoeller@rpdd.sachsen.de](mailto:Bernard.Hachmoeller@rpdd.sachsen.de)

**7138.** Schmidt, E.G. (2008): *Sympetrum depressiusculum* (Selys), a southern continental dragonfly depending on artificial habitats in atlantic northwestern Germany (State of Northrhine-Westphalia) (Anisoptera: Libellulidae). *Notulae odonatologicae* 7(1): 5-10. (in English). ["In the atlantic northwest of central Europe, *S. depress.* is confined to shallow artificial ponds with a particular aquatic vegetation, clear water, rich food supply (zooplankton, zoobenthos) for the larvae, and - due to drying up during winter - with reduced negative impact by fish. Essentially, water temperature has to rise above the average level typical for this region. Carp breeding ponds offer these conditions, favouring *S. depressiusculum* outside of its original area. The artificial carp breeding ponds provide invaluable chances for species conservation in this geographical region, furthering the state's official nature conservation management. Some lead water ponds near the Dutch-Belgian border (in the vicinity of Lommel) seem to provide similar habitat conditions. It is assumed, though still an open question, that *S. depressiusculum* is relying on the same ecological conditions in fish ponds in more continental areas of central Europe (e.g. the Lausitz district near the Oder; the Fränkisches Weihergebiet in the hilly zone of northern Bavaria). This paper should promote the verification of this assumption." (Author)] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**7139.** Solimini, A.G.; Bazzanti, M.; Ruggiero, A.; Carchini, G. (2008): Developing a multimetric index of ecological integrity based on macroinvertebrates of mountain ponds in central Italy. *Hydrobiologia* 597: 109-123. (in English). ["The lack of biological systems for the assessment of ecological quality specific to mountain ponds prevents the effective management of these natural resources. In this article we develop an index based on macroinvertebrates sensitive to the gradient of nutrient enrichment. With this aim, we sampled 31 ponds along a gradient of trophic and with similar geomorphological characteristics and watershed use in protected areas of the central Apennines. A bioassessment protocol was adopted to collect and process benthic samples and key-associated physical, chemical, and biological variables during the summer growth season of 1998. We collected 61 genera of macroinvertebrates belonging to 31 families. We calculated 31 macroinvertebrate metrics based on selected and total taxa richness, richness of some key groups, abundance, functional groups and tolerance to organic pollution. The gradient of trophic was quantified with summer concentrations of chlorophyll *a*. We followed a stepwise procedure to evaluate the effectiveness of a given metric for use in the multimetric index. Those were the pollution tolerance metric ASPT, three metrics based on taxonomic richness (the richness of macroinvertebrate genera, the richness of chironomid taxa, and the percentage of total richness composed by Ephemeroptera, Odonata, and Trichoptera), two metrics based on FFG attributes (richness of collector gatherer taxa and richness of scraper taxa) and the habit based metric richness of burrowers. The 95th percentile of each metric distribution among all ponds was trisected for metric scoring. The final Pond Macroinvertebrate Integrity Index ranged from 7 to 35 and had a good correlation ( $R^2 = 0.71$ ) with the original gradient of environmental degradation." (Authors) Odonata are treated on the genus level.] Address: Solimini, A.G., European Commission, Joint Research Centre, Institute for Environment and

Sustainability, TP 290, 21027 Ispra, Italy. E-mail: [angelo.solimini@jrc.it](mailto:angelo.solimini@jrc.it)

**7140.** Solomon, C.T.; Carpenter, S.R.; COLE, J.J.; Pace, M.L. (2008): Support of benthic invertebrates by detrital resources and current autochthonous primary production: results from a whole-lake  $^{13}C$  addition. *Freshwater Biology* 53(1): 42-54. (in English). ["1. Secondary production of benthic invertebrates in lakes is supported by current autochthonous primary production, and by detritus derived from a combination of terrestrial inputs and old autochthonous production from prior seasons. We quantified the importance of these two resources for the dominant benthic insects in Crampton Lake, a 26 ha, clear-water system. 2. Daily additions of  $NaH^{13}CO_3$  to the lake caused an increase in the stable carbon isotope ratios ( $d^{13}C$ ) of the current primary production of phytoplankton and periphyton. We measured the response of four insect groups (taxon-depth combinations) to this manipulation, quantifying their current autochthony (% reliance on current autochthonous primary production) by fitting dynamic mixing models to time series of insect  $d^{13}C$ . 3. The  $d^{13}C$  of all four groups increased in response to the manipulation, although the magnitude of response differed by taxon and by depth, indicating differences in current autochthony. Odonate larvae (Libellulidae and Corduliidae) collected at 1.5 m depth derived 75% of their C from current autochthonous primary production. Chironomid larvae collected at 1.5, 3.5 and 10 m depths derived, respectively, 43%, 39% and 17% of their C from current autochthonous primary production. 4. Both taxon-specific diet preferences and depth-specific differences in resource availability may contribute to differences in current autochthony. Our results demonstrate significant but incomplete support of insect production by current autochthony, and indicate that allochthonous inputs and old autochthonous detritus support a substantial fraction (25–83%) of insect production." (Authors)] Address: Solomon, C.T., Center for Limnology, University of Wisconsin, Madison, WI 53706, U.S.A. E-mail: [ctsolomon@wisc.edu](mailto:ctsolomon@wisc.edu)

**7141.** Squires, Z.E.; Bailey, P.C.E.; Reina, R.D.; Wong, B.B.M. (2008): Environmental deterioration increases tadpole vulnerability to predation. *Biology letters* 4(4): 392-394. (in English). ["Human-induced environmental change is occurring at an unprecedented rate and scale. Many freshwater habitats, in particular, have been degraded as a result of increased salinity. Little is known about the effects of anthropogenic salinization on freshwater organisms, especially at sublethal concentrations, where subtle behavioural changes can have potentially drastic fitness consequences. Using a species of Australian frog (*Litoria ewingii*), we experimentally examined the effects of salinization on tadpole behaviour and their vulnerability to a predatory dragonfly nymph (*Hemianax papuensis*). We found that tadpoles exposed to an ecologically relevant concentration of salt (15% seawater, SW) were less active than those in our freshwater control (0.4% SW). Tadpoles in elevated salinity also experienced a higher risk of predation, even though the strike rate of the predator did not differ between salt and freshwater treatments. In a separate experiment testing the burst-speed performance of tadpoles, we found that tadpoles in saltwater were slower than those in freshwater. Thus, it would appear that salt compromised the anti-predator response of tadpoles and made them more susceptible to being captured.

Our results demonstrate that environmentally relevant concentrations of aquatic contaminants can, even at sublethal levels, severely undermine the fitness of exposed organisms." (Authors)] Address: Squires, Zoe E., School of Biological Sciences, Monash University, Victoria 3800, Australia

**7142.** Takahara, T.; Kohmatsu, Y.; Yamaoka, R. (2008): Predator-avoidance behavior in anuran tadpoles: a new bioassay for characterization of water-soluble cues. *Hydrobiologia* 607: 123-130. (in English). ["In freshwater systems, little is known about the characteristics of chemical cues derived from predators which induce defensive responses in prey species. To elucidate traits of predator chemical cues, we examined chemical cues originating from water incubated by the nymph of the dragonfly *Anax parthenope julius*, which induces low activity as predator-avoidance behaviour in tadpoles of two anuran species, the Japanese tree frog *Hyla japonica* and the wrinkled frog *Rana (Rugosa) rugosa*. *H. japonica* exhibited a reduction in tail movement time as low activity in response to both untreated incubation water and incubation water that had volatile substances removed by freeze-drying. The response threshold of *R. rugosa* to chemical cues was determined to be one dragonfly nymph in a water volume between 500 and 5,000 ml. We found that chemical cues inducing predator-avoidance behaviour in anuran tadpoles have water-soluble non-volatile characteristics. In this study, we devised both the bioassay to assess the effects of chemical cues and the method to enrich the cues by freeze-drying, which can serve as a tool in the process of identification of unknown chemical cues in freshwater predator-prey interaction." (Authors)] Address: Takahara, T., Venture laboratory, Graduate School of Science and Technology, Kyoto Institute of Technology, Matsugasaki-gosyokaido, Sakyo, Kyoto 606-8585, Japan. E-mail: taka02@kit.ac.jp

**7143.** Takougang, I.; Barbazan, P.; Tchounwou, P.B.; Noumi, E. (2008): The value of the freshwater snail dip scoop sampling method in macroinvertebrates bioassessment of sugar mill wastewater pollution in Mbandjock, Cameroon. *International Journal of Environmental Research and Public Health* 5(1): 68-75. (in English). ["Macroinvertebrates identification and enumeration may be used as a simple and affordable alternative to chemical analysis in water pollution monitoring. However, the ecological responses of various taxa to pollution are poorly known in resources-limited tropical countries. While freshwater macroinvertebrates have been used in the assessment of water quality in Europe and the Americas, investigations in Africa have mainly focused on snail hosts of human parasites. There is a need for sampling methods that can be used to assess both snails and other macroinvertebrates. The present study was designed to evaluate the usefulness of the freshwater snail dip scoop method in the study of macroinvertebrates for the assessment of the SOSUCAM sugar mill effluents pollution. Standard snail dip scoop samples were collected upstream and downstream of the factory effluent inputs, on the Mokona and Mengoala rivers. The analysis of the macroinvertebrate communities revealed the absence of Ephemeroptera and Trichoptera, and the thriving of Syrphidae in the sections of the rivers under high effluent load. The Shannon & Weaver diversity index was lower in these areas. The dip scoop sampling protocol was found to be a useful method for macroinvertebrates collection. Hence, this

method is recommended as a simple, cost-effective and efficient tool for the bio-assessment of freshwater pollution in developing countries with limited research resources." (Authors) Odonata are treated on the family level.] Address: Takougang, I., Dept of Public Health, Faculty of Medicine & Biomedical Sciences, University of Yaounde I, P.O. Box 1364, Cameroon. E-mail: itakougang@yahoo.com

**7144.** Theischinger, G.; Richards, S.J. (2008): *Argiolestes trigonalis* spec. nov., a new species from Papua New Guinea (Zygoptera: Megapodagrionidae). *Odonatologica* 37(2): 167-171. (in English). [The new species is described from lowland rainforest in Gulf Province, Papua New Guinea. Holotype ♂; PNG, Gulf province, Dark-End Lumber, 2-X-1999; deposited at SAMA, Adelaide. Diagnostic characters of the adult ♂ are illustrated and the affinities of the species with *A. pectitus* and *A. lamprostomus* are discussed.] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

**7145.** Touchon, J.C.; Warkentin, K.M. (2008): Fish and dragonfly nymph predators induce opposite shifts in color and morphology of tadpoles. *Oikos* 117(4): 634-640. (in English). ["Many prey species, including amphibian larvae, can adaptively alter colouration and morphology to become more or less conspicuous to predators. Despite abundant research on predator-induced plasticity in tadpoles, the combination of colour and morphological responses to predators remains largely unexplored. We measured predator-induced morphological and colour plasticity in tadpoles. We reared tadpoles of the neotropical treefrog *Dendropsophus ebraccatus* with dragonfly nymph or fish predators, or in a predator-free control. After 10 days, we digitally photographed tadpoles and measured eight morphometric variables and five tail colour variables. Tadpoles reared with nymphs developed the largest and reddest tails, but incurred a developmental cost, being the smallest overall. Cues from fish induced an opposite tail phenotype in tadpoles, causing shallow achromatic tails. Control tadpoles developed intermediate tail phenotypes. This provides the first experimental evidence that tadpoles can shift both colour and morphology in opposite, predator-specific directions in response to a fish and an odonate predator. Despite mean differences, however, there was substantial variation in the degree of phenotype induction across treatments. Tail redness was correlated with tail spot size, but not perfectly, indicating that colour and morphology may be partially decoupled in *D. ebraccatus*. Balancing selection from multiple conflicting predators may result in genetic variation for developmental plasticity." (Authors)] Address: Touchon, J.C., Dept of Biology, Boston Univ., 5 Cummington St., Boston, MA 02215, USA. E-mail: jtouchon@bu.edu

**7146.** Trisnawati, I.; Nakamura, K. (2008): Abundance, diversity and distribution of above-ground arthropods collected by window traps from Satoyama in Kanazawa, Japan: an order level analysis. *Far Eastern Entomologist* 181: 1-23. (in English, with Russian summary). ["Satoyama, the traditional rural landscape of Japan, has been paid much attention because, beside its many important roles, it is a key to biodiversity conservation in Japan. The effects of habitat heterogeneity and restoration activities on the abundance and diversity of above-ground arthropod assemblages were studied using win-



dow traps in a "satoyama area" within Kanazawa University's Campus, Kanazawa, Japan in 2005 and 2006. Monthly samples were taken at upper and ground levels from nine sites, including forested areas and valley areas with paddies under restoration. A total of 93,134 individuals from 24 orders, including 18 Insecta orders, 3 Arachnida, 2 Crustacea and 1 Chilopoda, were collected during the study, and an order level analysis was carried out. At the upper level, Diptera was the dominant order (about 70%), followed by Homoptera and Coleoptera (5-10 %), and at ground level, Diptera (about 40%), Collembola (10%), and ants (8%) were dominant. DCA ordination revealed a clear separation of arthropod order compositions among different habitat types and between upper and ground levels, but the separation was less apparent between years. DCA ordination of 18 orders revealed the variation of spatial distribution of these orders in accordance with habit ("flying" or "non-flying") and habitat preference ("forests" or "cultivated valley" sites)." (Authors) The taxa list also includes Odonata, which are very rarely sampled.] Address: Nakamura, K., Division of Biodiversity, Institute of Nature & Environmental Technology, Kanazawa University, Kakuma, Kanazawa, 920-1192, Japan. E-mail: koji@kenroku.kanazawa-u.ac.jp

**7147.** Tsuchiya, K.; Hayashi, F. (2008): Surgical examination of male genital function of calopterygid damselflies (Odonata). *Behavioral Ecology and Sociobiology*: 1417-1425. (in English). ["Male genitalia show rapid and divergent evolution. It is rarely determined whether variation in male genital morphology influences male reproductive success. Male damselflies possess a unique aedeagus with a re-curved head and spiny lateral processes, and most ♀♀ have two sperm storage organs, a spherical bursa copulatrix and a tubular spermatheca. Previous studies have indicated that the re-curved head may remove bursal sperm, whereas the lateral processes remove spermathecal sperm. However, we need more direct evidence of these functions. We compared sperm number in female sperm storage organs by interrupting copulation to examine sperm removal by the male. In *Calopteryx cornelia*, ♂♂ removed almost all bursal sperm but only partially removed spermathecal sperm. In contrast, ♀♀ of *Mnais pruinosa* store sperm primarily in the bursa, and ♂♂ removed only bursal sperm. To examine the functions of male spiny lateral processes, we compared mating behaviour between control and experimental ♂♂ from which we removed (cut) the lateral processes. In *C. cornelia*, cutting of the lateral processes resulted in a decreased number of abdominal movements during copulation and no removal of spermathecal sperm. The amount of bursal sperm removed during copulation also decreased in experimental ♂♂ compared to the unmanipulated ♂♂. However, in *M. pruinosa*, the experimental removal of male lateral processes did not decrease the abdominal movements and little affected the removal of bursal sperm. Interspecific differences between *C. cornelia* and *M. pruinosa* may be caused by variation in the strategies of female sperm storage." (Authors)] Address: Tsuchiya, K., Department of Biology, Tokyo Metropolitan University, Minamiosawa 1-1, Hachioji Tokyo, 192-0397, Japan. E-mail: tsuchiya-kaori@ed.tmu.ac.jp

**7148.** Vadadi-Fülöp, C.S.; Hufnagel, L.; Sipkay, C.S.; Verasztó, C.S. (2008): Evaluation of climate change scenarios based on aquatic food web modelling. *Applied ecology and environmental research* 6(1): 1-28.

(in English). ["In the years 2004 and 2005 we collected samples of phytoplankton, zooplankton and macroinvertebrates in an artificial small pond in Budapest, Hungary. We set up a simulation model predicting the abundance of the cycloids, *Eudiaptomus zacharias* and *Ischnura pumilio* by considering only temperature as it affects the abundance of population of the previous day. Phytoplankton abundance was simulated by considering not only temperature, but the abundance of the three mentioned groups. This discrete-deterministic model could generate similar patterns like the observed one and testing it on historical data was successful. However, because the model was overpredicting the abundances of *Ischnura pumilio* and *Cyclopoida* at the end of the year, these results were not considered. Running the model with the data series of climate change scenarios, we had an opportunity to predict the individual numbers for the period around 2050. If the model is run with the data series of the two scenarios UKHI and UKLO, which predict drastic global warming, then we can observe a decrease in abundance and shift in the date of the maximum abundance occurring (excluding *Ischnura pumilio*, where the maximum abundance increases and it occurs later), whereas under unchanged climatic conditions (BASE scenario) the change in abundance is negligible. According to the scenarios GFDL 2535, GFDL 5564 and UKTR, a transition could be noticed." (Authors)] Address: Vadadi-Fülöp, C. S., Dept Syst. Zoology and Ecology, Eötvös Loránd University, H-1117 Budapest, Pázmány P. sétány 1/c, Hungary. E-mail: vadfulcsab@gmail.com

**7149.** Vargas, A.; Mittal, R.; Dong, H. (2008): A computational study of the aerodynamic performance of a dragonfly wing section in gliding flight. *Bioinspiration & Biomimetics* 3: 1-13. (in English). ["A comprehensive computational fluid-dynamics-based study of a pleated wing section based on the wing of *Aeshna cyanea* has been performed at ultra-low Reynolds numbers corresponding to the gliding flight of these dragonflies. In addition to the pleated wing, simulations have also been carried out for its smoothed counterpart (called the 'profiled' airfoil) and a flat plate in order to better understand the aerodynamic performance of the pleated wing. The simulations employ a sharp interface Cartesian-grid-based immersed boundary method, and a detailed critical assessment of the computed results was performed giving a high measure of confidence in the fidelity of the current simulations. The simulations demonstrate that the pleated airfoil produces comparable and at times higher lift than the profiled airfoil, with a drag comparable to that of its profiled counterpart. The higher lift and moderate drag associated with the pleated airfoil lead to an aerodynamic performance that is at least equivalent to and sometimes better than the profiled airfoil. The primary cause for the reduction in the overall drag of the pleated airfoil is the negative shear drag produced by the recirculation zones which form within the pleats. The current numerical simulations therefore clearly demonstrate that the pleated wing is an ingenious design of nature, which at times surpasses the aerodynamic performance of a more conventional smooth airfoil as well as that of a flat plate. For this reason, the pleated airfoil is an excellent candidate for a fixed wing micro-aerial vehicle design." (Authors)] Address: Mittal, R., Dept of Mechanical & Aerospace Engineering, The George Washington University, Washington DC 20052, USA. E-mail: mittal@gwu.edu

**7150.** Walther, D.A.; Whiles, M.R. (2008 ): Macroinvertebrate responses to constructed riffles in the Cache River, Illinois, USA. *Environmental Management* 41(4): 516-527. (in English). ["Stream restoration practices are becoming increasingly common, but biological assessments of these improvements are still limited. Rock weirs, a type of constructed riffle, were implemented in the upper Cache River in southern Illinois, USA, in 2001 and 2003–2004 to control channel incision and protect high quality riparian wetlands as part of an extensive watershed-level restoration. Construction of the rock weirs provided an opportunity to examine biological responses to a common in-stream restoration technique. We compared macroinvertebrate assemblages on previously constructed rock weirs and newly constructed weirs to those on snags and scoured clay streambed, the two dominant substrates in the unrestored reaches of the river. We quantitatively sampled macroinvertebrates on these substrates on seven occasions during 2003 and 2004. Ephemeroptera, Plecoptera, and Trichoptera (EPT) biomass and aquatic insect biomass were significantly higher on rock weirs than the streambed for most sample periods. Snags supported intermediate EPT and aquatic insect biomass compared to rock weirs and the streambed. Nonmetric multidimensional scaling (NMDS) ordinations for 2003 and 2004 revealed distinct assemblage groups for rock weirs, snags, and the streambed. Analysis of similarity supported visual interpretation of NMDS plots. All pair-wise substrate comparisons differed significantly, except recently constructed weirs versus older weirs. Results indicate positive responses by macroinvertebrate assemblages to in-stream restoration in the Cache River. Moreover, these responses were not evident with more common measures of total density, biomass, and diversity." (Authors)] Address: D. A. Walther (&) M. R. Whiles Dept of Zoology & Center for Ecology, Southern Illinois University Carbondale, Carbondale, IL 62901-6501, USA. E-mail: denise.walther@yahoo.com

**7151.** Wang, Y.; Wang, Y.; Lu, P.; Zhang, F.; Li, Y. (2008): Diet composition of post-metamorphic bullfrogs (*Rana catesbeiana*) in the Zhoushan archipelago, Zhejiang Province, China. *Frontiers of Biology in China* 3(2): 219-226. (in English). ["Bullfrogs (*Rana catesbeiana*) are listed as one of the 100 worst invasive alien species in the world. They are generalist predators and thus may affect native species through predation. In previous studies, the food contents of bullfrogs were mostly examined at a single site. In the present study, the diet composition of post-metamorphic bullfrogs on eight islands (Daishan, Liheng, Xiushan, Fodu, Taohua, Xiashi, Cezi, and Putuoshan) in the Zhoushan Archipelago, Zhejiang Province of China, were examined by using the stomach flushing method from June 30 to August 11 in 2005. A total of 391 individual frogs were measured, including 113 adults and 278 juveniles. The analysis of the stomach contents shows that, for adult bullfrogs, the most important prey (by diet volume) overall were Decapoda, Coleoptera, Odonata, Mesogastropoda, Raniformes, and Cypriniformes. For juvenile bullfrogs, these were Decapoda, Coleoptera, Cypriniformes, Odonata, Orthoptera, Hymenoptera, Lepidoptera larvae, Mesogastropoda, and Raniformes. Moreover, the prey size and diet volume increased with the body size of both adult and juvenile bullfrogs. The diet composition of primary preys of bullfrogs was significantly different among the islands. The results indicate that bullfrogs exert different predatory influences on native

fauna at different sites and that bullfrogs are generalist predators with extensive ecological impacts on native fauna." (Authors)] Address: Li, Y., Key Lab. of Animal Ecology and Conservation Biology, Institute of Zoology, Chinese Academy of Sciences, Beijing, 100080, China. Email: liym@ioz.ac.cn

**7152.** Ward, L.; Mills, P.J. (2008): Substrate selection in larval *Calopteryx splendens* (Harris) (Zygoptera: Calopterygidae). *Odonatologica* 37(1): 69-77. (in English). ["Under experimental conditions, the relationship between substrate composition, with and without the presence of an emergence support, and larval distribution was investigated. Results revealed that *C. splendens* larvae showed a clear preference for a pebble substrate as opposed to sand or silt, when all 3 substrates were equally available. However, the substrate type decreased in importance as the density of the emergence support increased. Results suggest that the morphological adaptations of *C. splendens* larvae, to cling to a substrate, can be utilised equally in a vegetated habitat and a habitat predominated by pebbles and cobbles. This has implications for the dispersal of *C. splendens* to areas containing, traditionally, less favoured habitat. Range expansion of *C. splendens* on its northern borders, where aquatic habitat characteristics can differ markedly from waterways in lowland southern England, is discussed." (Authors)] Address: Ward, Luise, Askham Bryan College, Askham Bryan, York, YO23 3FR, UK

**7153.** Watanabe, M.; Matsu'ura, S.; Fukaya, M. (2008): Changes in distribution and abundance of the endangered damselfly *Mortonagrion Hirosei* Asahina (Zygoptera: Coenagrionidae) in a reed community artificially established for its conservation. *Journal of Insect Conservation*: (in English). ["Population trends of the brackish water damselfly, *Mortonagrion Hirosei* were studied for 4 years in the reed community artificially established for conservation of this endangered species. Because of difficulty with mark-and-recapture experiments on this small damselfly with weak wings in the large dense reed community, census counts using the line transect method were performed to estimate the population parameters. The reed rhizomes were transplanted in January of 2003. A few adults immigrated to the community in the flying season of this year, but they were restricted near the original habitat. The number of adults throughout the flying season was estimated at 1,000. In 2004, the population included both the immigrants from the original habitat and the emergences from the established habitat, and the total population was estimated at 10,000, and the daily density in peak flight season was 20% that in the original habitat. An estimated 23,000 individuals were found all over the established habitat in 2005. In 2006, the estimated number of adults in the established habitat was 45,600, and the population density increased almost equal to that in the original habitat. Therefore we can conclude that the damselfly had settled in the established habitat.] Address: Watanabe, Mamoru, Graduate School of Life & Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8577, Japan. E-mail: watanabe@kan-kyo.envr.tsukuba.ac.jp

**7154.** Wayland, M.; Headley, J.V.; Peru, K.M.; Crosley, R.; Brownlee, B.G. (2008): Levels of polycyclic aromatic hydrocarbons and dibenzothiophenes in wetland sediments and aquatic insects in the oil sands area of Northeastern Alberta, Canada. *Environ. monit. assess.*

136(1-3): 167-182. (in English). ["An immense volume of tailings and tailings water is accumulating in tailings ponds located on mine leases in the oil sands area of Alberta, Canada. Oil sands mining companies have proposed to use tailings- and tailings water-amended lakes and wetlands as part of their mine remediation plans. Polycyclic aromatic hydrocarbons (PAHs) are substances of concern in oil sands tailings and tailings water. In this study, we determined concentrations of PAHs in sediments, insect larvae and adult insects collected in or adjacent to three groups of wetlands: experimental wetlands to which tailings or tailings water had been purposely added, oil sands wetlands that were located on the mine leases but which had not been experimentally manipulated and reference wetlands located near the mine leases. Alkylated PAHs dominated the PAH profile in all types of samples in the three categories of wetlands. Median and maximum PAH concentrations, especially alkylated PAH concentrations, tended to be higher in sediments and insect larvae in experimental wetlands than in the other types of wetlands. Such was not the case for adult insects, which contained higher than expected levels of PAHs in the three types of ponds. Overlap in PAH concentrations in larvae among pond types suggests that any increase in PAH levels resulting from the addition of tailings and tailings water to wetlands would be modest. Biota-sediment accumulation factors were higher for alkylated PAHs than for their parent counterparts and were lower in experimental wetlands than in oil sands and reference wetlands. Research is needed to examine factors that affect the bioavailability of PAHs in oil sands tailings- or tailings water-amended wetlands." (Authors)] Address: Wayland, M., Environment Canada, Prairie & Northern Wildlife Research Centre, 115 Perimeter Rd., Saskatoon, SK S7N 0X4, Canada. E-mail: mark.wayland@ec.gc.ca

**7155.** Westermann, K. (2008): Sex ratio in a population of *Lestes viridis*: spatial and temporal variability at emergence (Odonata: Lestidae). *International Journal of Odonatology* 11(1): 115-129. (in English). ["In a large population of *L. viridis* inhabiting a complex, extended system of channels in the floodplain of the Upper Rhine River near Weisweil (Baden-Württemberg, Germany) detailed samples of exuviae were collected from several subpopulations. For each sample the sex ratio was determined. For statistical reasons only samples with at least 700 exuviae were considered. These samples sometimes differed highly significant in the sex ratio at emergence. The sex ratio was sitespecific, but differed significantly for different subpopulations with variation in water temperature. Thus, damselfly larvae showed sex-dependent habitat preferences. The frequency of ♂♂ ranged from 49.4% to 57.5%. Statistically significant small-scale differences in sex ratio, which have not previously been described, could not be attributed to different preferences of the sexes with respect to larval habitat and emergence site. No coherent explanation for this phenomenon could be advanced. ♀♀ on average emerged earlier than ♂♂; in one of the samples the median emergence date differed by four days." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhauzen, Germany. E-mail: fosor@t-online.de

**7156.** Williams, P.; Whitfield, M.; Biggs, J. (2008): How can we make new ponds biodiverse? A case study monitored over 7 years. *Hydrobiologia* 597: 137-148. (in English). ["A new pond complex, designed to enhance

aquatic biodiversity, was monitored over a 7-year period. The Pinkhill Meadow site, located in grassland adjacent to the R. Thames, proved unusually rich in terms of its macrophyte, aquatic macroinvertebrate and wetland bird assemblages. In total, the 3.2 ha mosaic of ca. 40 permanent, semi-permanent and seasonal ponds and pools was colonized by approximately 20% of all UK wetland plant and macroinvertebrate species over the 7-year survey period. This included eight invertebrate species that are Nationally Scarce in the UK. The site supported three breeding species of wading bird and was used by an additional 54 species of waders, waterfowl and other wetland birds. The results from four monitoring ponds investigated in more detail showed that these ponds significantly supported more plant and macroinvertebrate species than both minimally impaired UK reference ponds, and other new ponds for which compatible data were available. Comparisons of the physico-chemical, hydrological and land-use characteristics of the Pinkhill pools with those of other new ponds showed that the site was unusual in having a high proportion of wetlands in the near surrounds. It also had significantly lower water conductivity than other ponds and a higher proportion of (non-woodland) semi-natural land in its surroundings. Given that ponds are known to contribute significantly to UK biodiversity at a landscape level, and that several thousand new ponds are created each year in the UK alone, the findings suggest that well designed and located pond complexes could be used to significantly enhance freshwater biodiversity within catchments." (Authors) The supplementary material to this paper contains a list of 13 odonate species observed at Pinkhill.] Address: Williams, P., Pond Conservation: The Water Habitats Trust, Oxford Brookes University, Gypsy Lane, Headington, Oxford OX3 0BP, UK. E-mail: pwilliams@brookes.ac.uk

**7157.** Yang, G.-h.; Mao, B.-y.; Xu, J.-s.; Yang, Z.-z. (2008): A preliminary report on the investigation of dragonflies from Cangshan Nature Reserve of Yunnan. *Journal of Dali University* 7(2): 9-11. (in Chinese, with English summary). [Checklist of Odonata from Cangshan National Nature Reserve of Yunnan, China. 1 species is said to be a new addition to the Chinese list, and 5 species were newly recorded in Yunnan. *Ischnura mildredae*, *I. senegalensis*, *Ceragrion fallax*, *Somatochlora dido*, *Epophthalmia elegans*, *Cephalaeschna magdalena*, *Anisogomphus maacki*, *Mesopodagrion tibetanum*, *Sympetrum darwinianum*, *S. fonscolombii*, *Pantala flavescens*, *Crocothemis servilia*, *Orthetrum japonicum* *internum*, and *O. sabina* are outlined in the discussion, and therefore should contain the new additions.] Address: Yang, G.-h., College of Life Science and Chemistry, Dali University, Dali, Yunnan, 671000, China

**7158.** Yu, X.; Yang, G.H.; Bu, W.-J. (2008): A study of the genus *Pyrrhosoma* from China with description of a new species (Odonata, Coenagrionidae). *Acta Zootaxonomica Sinica* 33(2): 358-362. (in Chinese, with English summary). ["The present paper sums up the research history of *Pyrrhosoma* Charpentier, with emphasis on diagnostic characters of the genus. Besides the red body colour, one important diagnostic character for *Pyrrhosoma* is the presence of distinct hook-like projection between male cerci and paraprocts, called the ventral branch by Kalkman (2006), which extended from the very base of cerci. As Asahina (1973) pointed out, Needham (1930) had confused *Pyrrhosoma tinctipenne* with *Calicnemia* sp. from China, however, his unique



figure about this species (Needham, 1930. p. 191 Fig. 12[5]) was right about *P. tinctipenne*. *Pyrhosoma latiloba* sp. nov. (Holotype ♂, Zhongdian, Yunnan, China, 4 Aug. 2005, YANG Guo-Hui leg., Paratype 1 ♀, ditto.) Type specimens will be deposited in the Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, China. The new species is similar to *P. tinctipenne* from China. The differences between these two species were listed in a table. The new species can be distinguished from two European species by colour pattern and the shape of ligula." (Authors)] Address: Yu, X., Inst. Entomology, College of Life Sciences, Nankai University, Tianjin 300071, China

**7159.** Zampella, R.A.; Bunnell, J.F.; Procopio, N.A.; Bryson, D.E. (2008): Macroinvertebrate assemblages in blackwater streams draining forest land active and abandoned cranberry bogs. *Wetlands* 28(2): 390-400. (in English). ["Cranberry agriculture is a major land use in parts of the New Jersey Pinelands, USA. We compared the composition of genus-level macroinvertebrate assemblages collected from three habitats (muck, vegetated muck, and woody debris) in 12 New Jersey Pinelands blackwater streams draining forest, abandoned-cranberry bogs, and active-cranberry bogs and evaluated whether variations in macroinvertebrate assemblages were related to differences in land uses within the associated drainage basins. All 12 streams were relatively slow moving and acidic, with low conductance values and dissolved oxygen concentrations. Muck was the dominant substrate at most stream sites. Many of the taxa that we encountered are adapted to lentic habitats, slow-moving lotic habitats, or low-oxygen environments. Macroinvertebrate composition differed significantly between the active-cranberry streams and the other two stream types and was associated with a complex environmental gradient represented by variations in dissolved oxygen, temperature, specific conductance, stream width, and woody debris. Overall, the effect of stream type appeared to overshadow that of the three different habitats. Although we cannot conclude that subtle between-site differences in dissolved oxygen were responsible for variations in community composition, many of the genera associated with the forest and abandoned-bog/active-cranberry ends of the community gradient are reported to have contrasting tolerances to low-oxygen levels. The relationship between reduced canopy cover and both lower woody-debris cover and higher stream temperatures, which can influence dissolved-oxygen levels, was most likely related to forest-canopy removal associated with historic and active-cranberry agriculture." (Authors) The study includes records of *Ischnura* sp.] Address: Zampella, R.A., Pinelands Commission, P.O. Box 7, New Lisbon, New Jersey, USA 08064. E-mail: zampella@njpinelands.state.nj.us

**7160.** Zessin, W.; Zolohar, J.; Hitij, T. (2008): A new fossil dragonfly (Insecta, Odonata, Libellulidae) of the Miocene (Lower - Sarmatian) of the Tunjice Hills, Slovenia. *Virgo* 11(1): 86-96. (in English, with German summary). [*Sloveniatrum robici* n. gen. n. sp. "corresponds to the Upper Serravallian of the Mediterranean scale and covers a time span of approximately 1.1 Ma between ~11.6 and ~12.7 Myr before present) in the Sarmatian deposits of the Tunjice Hills, Slovenia is described." (Authors)] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**7161.** Zhang, B.-L.; Pang, H.; Jia, F.-L.; Liang, G.-Q., Ren, D. (2008): Cluster analysis of Zygoptera (Odonata: Zygoptera) fauna in parts of southern China. *Journal of Environmental Entomology* 30(1): 24-32. (in Chinese, with English summary). ["41 genera of Zygoptera located in 8 infra-regions in Guangdong, Hainan, Hongkong, Taiwan and Macao were analyzed by distance coefficient average clustering and nearest neighbour clustering. The result of distance coefficient average clustering shows that Nanling group is the farthest group from the polymer converged stage by stage of the other groups. According to the nearest neighbour clustering, Nanling, Heishiding and Jianfengling converged to a group; Pearl River plain, Hongkong and Taiwan converged to another group; the third group converged by Macau and Neilingding Island is the farthest one. As result, the former shows the latitudinal aggregation and the latter shows the aggregation based on altitude." (Authors)] Address: Zhang, B.-L., College of Life Science, Capital Normal University, Beijing 100037, China

**7162.** Zhou, X.; Zhou, W.-b (2008): A new species of the genus *Megalestes* (Odonata: Chlorolestidae) from China. *Entomotaxonomia* 30(1): 1-3. (in Chinese, with English summary). [*Megalestes palaceus* sp. nov. is described, figured and compared with the similar *M. distans* and *M. hui*. Holotype: ♂, Xiaodanjiang, Leigong Mountain, Guizhou Province, China, 20.IX-2005.] Address: Zhou, W.-b, Zhejiang Museum of Natural History, Hangzhou, Zhejiang 310012, China

**7163.** Rigotti, M.; Costa, J.M. (oJ): Artigo científico: Comunidade de insetos aquáticos imaturos da ordem Odonata associados às caixas de empréstimo ao longo da rodovia que liga o Buraco das Piranhas a Corumbá (trecho Buraco das Piranhas - Curva do Leque, 45 km) no Pantanal da Sub-Região do Miranda - Mato Grosso do Sul. Online publication of the "Portal da Horticultura", Brazil (<http://br.geocities.com/horticultura1/index.htm>), Publication No 9: 1-7. (in Portuguese). [<http://br.geocities.com/horticultura1/Artigo9.pdf>] Address: rigottims@fca.unesp.br.

**7164.** Carvalho, A.L. (2008): On some paintings of Odonata from the late middle ages (14th and 15th centuries). *Odonatologica* 36(3): 243-253. (in English). ["Painted representations of Odonata from the 14th and 15th centuries, found in the masterpieces cited below, are described and commented on: "Belleville Breviary", Paris (J. Pucelle, ca 1323-1326); "Allegory of Good Government", Siena (A. Lorenzetti, ca 1338-1340); "The Two Lovers", Southern Germany (anonymous, ca 1470) and "Hastings Hours", Flandres (anonymous, ca 1480). The symbolic meaning of the Odonata representation in each work seems to be different. The damselfly painted in the "Belleville Breviary", probably based on a male *Calopteryx* specimen, represents the oldest known European representation of Odonata yet." (Author)] Address: Carvalho, A.L., Depto de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro (UFRJ), Caixa Postal 68044, BR-21944-970 Rio de Janeiro, RJ, Brazil. E-mail: alagoc@acd.ufrj.br



**Thanks to all who contributed to this issue of OAS!**

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Silberdistelweg 11, D-72113 Ammerbuch, Germany. Tel. ++49 (0)7073 300770; E-mail: martin@lindeboom.de  
Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105;  
E-mail: K.Reinhardt@sheffield.ac.uk  
Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

---

## 1997

**7165.** Riddiford, N.; Mayol, J. (1997): Els odonats del Parc natural de s'Albufera. Butll. Parc Albufera 3: 63-67. (in Catalan, with English summary) ["This paper summarises the data on Odonata collected study by Earthwatch Europe Project s'Albufera teams since 1989, in spring, summer and autumn. It also includes the few bibliographic data available. Especially noteworthy are the observations of *Sympetrum sanguineum* not previously recorded in the Balearic Islands, and new records of the rare species *Selysiothemis nigra*. Some spectacular concentrations of *Aeshna mixta* occur in autumn. In all, the Park list stands at 17 species (15 from our own observations) of 26 known for the Islands, making s'Albufera a key site for the biodiversity of this group in the Balearics." (Authors)] Address: not stated

**7166.** Samways, M.J.; Stewart, D.A.B. (1997): An aquatic ecotone and its significance in conservation. *Biodiversity and Conservation* 6: 1429-1444. (in English) ["Aquatic invertebrates were sampled throughout an area of transition between a well-established reservoir and a perennial stream in the KwaZulu-Natal Midlands of South Africa. The visibly obvious separation of stream and reservoir was not reflected by the invertebrates. Communities overlapped in species, ranging from fast-flowing stream and moderate-flowing stream, through a transitional ecotone, which ran along the exposed reservoir edge and stream edges, to sheltered edges of reservoir and stream then to open reservoir. These features reflected the degree of water movement (whether from waves or ripples) and type of substratum, rather than visibly lotic or lentic conditions. The main aquatic ecotone between the open reservoir and the main stream was therefore not at the mouth of the stream but along the edges of both systems. The centre of the reservoir and centre of the stream, although physically connected, were quite different in their invertebrates and were separate 'patches' with a sharp boundary. They were faunistically connected through the communities of the edge ecotone. The ecotone acted like a semi-permeable membrane to the drifting stream fauna with movement back again apparently mostly in the air, suggesting a 'patchy metapopulation' model. Both the river continuum and boundary concepts were

applicable to this multi-system. The ecotone did not show any edge effect and accords more with the 'variegation' than 'fragmentation' model. The great difference in patterns of pelagic, littoral and terrestrial communities has important implications for zoning of water bodies for different conservation and recreation activities." (Authors) Odonata are listed or treated at several occasions.] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**7167.** Turner, A.M.; McCarty, J.P. (1997): Resource availability, breeding site selection, and reproductive success of red-winged blackbirds. *Oecologia* 113(1): 140-146. (in English) [oas 23;"Red-winged blackbirds are polygynous and show strong breeding site preferences, but it is unclear which environmental factors regulate their reproductive success and are ultimately responsible for shaping their patterns of habitat selection and their mating system. We evaluated the effect of variation in insect emergence rates on the reproductive success of male and female redwings nesting on replicate ponds. The number of male and female redwings that settled on a pond varied two- to three-fold among ponds, but was not related to insect emergence rates. Insect emergence rates had a positive effect on the number of nestlings successfully fledged by females, the number of nestlings fledged from male territories, and on the mass of nestlings at fledging. *Typha* stem density also varied widely among ponds, and was positively related to male and female settling density and mass of nestlings at fledging, but not to the number of nestlings fledged by females or males. We conclude that alternative breeding sites differ in their ability to support redwing reproduction, and that the availability of emerging odonates is an important environmental factor influencing the reproductive success of both male and female red-winged blackbirds." (Authors)] Address: Turner, A.M., Kellogg Biological Station and Department of Zoology, Michigan State University, Hickory Corners, MI 49060, USA.

## 1998

**7168.** Bacetti, N.; Chelazzi, L.; Colombini, I.; Serra, L. (1998): Preliminary data on the diet of migrating Ruffs *Philomachus pugnax* in northern Italy. *International Wa-*

der Studies 10: 361-364. (in English, with Russian summary) [Odonata larvae contributed sparsely to the diet of Ruffs in northern Italy.] Address: Baccti, Nicola, INFS, Via Ca Fornacetta 9, I-40064 Ozzano Emilia BO, Italy

**7169.** Carvalho, A.L.; Nessimian, J.L. (1998): Odonata do Estado do Rio de Janeiro, Brasil: habitats e hábitos das larvas. Ecol. Insetos Aquát. Rio de Janeiro, 5 (Série Oecologia Brasiliensis): 3-38. (in Portuguese, with English summary) ["Odonata from Rio de Janeiro State, Brazil: habitats and habits of the larvae - Rio de Janeiro State is located in southeastern Brazil, occupying only 0,52% (44,268 Km<sup>2</sup>) of the total area of the country. Species of 77 genera and 12 families are currently known to occur in this State: Calopterygidae (2 gen.); Dicteriadidae (1 gen.); Lestidae (1 gen.); Megapodagrionidae (2 gen.); Perilestidae (1 gen.); Coenagrionidae (14 gen.); Protoneuridae (5 gen.); Pseudosligmatidae (1 gen.); Aeshnidae (10 gen.); Gomphidae (11 gen.); Corduliidae (2 gen.); Libellulidae (27 gen.). Information about habitat preferences and habits of larvae of 133 species of 62 genera were considered in this study, being 19 of them registered for the first time. It was observed that species of 27 genera are lotic dwellers and those of 27 others associated with lentic habitats. Species of 8 genera occur both in lentic and lotic waters. There is no information about larvae of 15 genera yet. In relation to the habits of the larvae it was observed that the majority of Zygoptera from lentic habitats behave as climbers (e.g. *Acanthagrion* spp., *Idioneura ancilla*, *Ischnura* spp., *Leptagrion* spp., *Telebasis* spp.), as the major part of Aeshnidae too (e.g. *Aeshna* spp., *Coryphaeschna* spp., *Gynacantha* spp., *Neuraeschna costalis*, *Remartinia lutetpennis*). Representatives of these two groups become clingers in lotic habitats (e.g. *Argia* spp., *Hetaerina* spp., *Heteragrion* spp., *Limnetron* spp., *Oxyagrion* spp., *Staurophlebia reticulata*). Some Zygoptera has been classified secondarily as swimmers (e.g. *Lestes* spp., *Perilestes fragilis*). Almost all of the species of Gomphidae behave as burrowers. From the other side, the Libellulidae and Corduliidae have been considered as sprawlers in almost their totality." (Author)] Address: Carvalho, A.L., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro (UFRJ), Caixa Postal 68044, BR-21944-970 Rio de Janeiro, RJ, Brazil. E-mail: alagoc@acd.ufrj.br

**7170.** De Marco, P.; Latini, A.O. (1998): Estrutura de guildas e riqueza de espécies em uma comunidade de larvas de anisoptera (Odonata). Oecologia Brasiliensis 5(1): 101-112. (in Portuguese, with English summary) ["Guild structure and species richness in an Anisoptera (Odonata) larval community" - Odonate larvae are important components of the littoral systems in lakes. They are considered food generalises and interact among themselves by a complex of competition and predation of the early upon the late breeders. Here, we determine the guild structure for odonates sampled in Lugon Carioca. Parque Estadual do Rio Doce (PERD), MG, Brasil based on microhabitat use. We only found two species of the macrophyte-dweller guild to seven bottom-dweller species. Using a jackknife procedure, we found that the species richness of the areas with macrophytes were higher than the areas where the macrophytes are absent.] Address: De Marco, P., Laboratório Ecologia Teórica e Síntese, Departamento de Biologia Geral, Universidade Federal de Goiás, BR-74001-970, Goiania, GO, Brazil. E-mail: pdemarco@icb.ufg.br

**7171.** Mitchell, F. (1998): Flying dragons in the backyard. Pond & Garden May/June 1998: 30-35. (in English) [Introduction to water gardening for Odonata.] Address: Mitchell, F.L., Texas Agricultural Experiment Station, Texas Agricultural Extension Service, The Texas A&M University System, Route 2, Box 00, Stephenville, TX 76401, USA. E-mail: f-mitchell@tamu.edu

**7172.** Rask, M.; Nyberg, K.; Markkanen, S.-L.; Ojala, A. (1998): Forestry in catchments: effects on water quality, plankton, zoobenthos and fish in small lakes. Boreal Environmental Research 3: 75-86. (in English) [Odonata in the diet of perch (*Perca fluviatilis*) varied significantly with locality and year.] Address: Rask, M., Finnish Game & Fisheries Research Inst., Evo Fisheries Research and Aquaculture, FIN-16970 Evo, Finland

## 1999

**7173.** Ax, P. (1999): Das System der Metazoa II. Ein Lehrbuch der phylogenetischen Systematik. G. Fischer Verlag. ISBN 3-437-35528-7: 384 pp. (in German) [Odonata pp. 277-280]

**7174.** Vuori, K.-M.; Luotonen, H.; Liljaniemi, P. (1999): Benthic macroinvertebrates and aquatic mosses in pristine streams of the Tolvajärvi region, Russian Karelia. Boreal Env. Res. 4: 187-200. (in English) ["As a preliminary stage in characterizing the biodiversity patterns of pristine stream habitats in Russian Karelia, the macroinvertebrate fauna and bryophyte flora were studied in three river systems of the Tolvajärvi area. The pristine watercourses of this area are among the few representative watercourses to be used as reference sites for the studies dealing with the impact of forestry on lotic biodiversity. The benthic fauna and flora of the area were found to include many species considered as endangered, rare or with a northern distribution in Finland. In Canonical Correspondence Analysis, the most important environmental variables affecting the distribution and abundance of the benthic fauna were the abundance of aquatic mosses, the amount of organic matter and woody debris, the size of the drainage area and the concentrations of nutrients and iron in the water. Filter feeding trichopteran and algae feeding chironomid larvae dominated the stable lake outlet habitats with abundant moss vegetation, while small streams with higher nutrient and iron concentrations and large amount of organic matter were dominated by shredding stonefly species of the genera *Nemoura*, *Nemurella* and *Leuctra*." (Authors) The following Odonata taxa are listed: *Calopteryx virgo*, *Coenagrionidae* indet., *Aeshna grandis*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Cordulegaster boltonii*, *Corduliidae* indet., *Somatochlora metallica*, *Leucorrhinia* sp. indet. and *L. albifrons*] Address: Vuori, K.-M., North Karelia Regional Environment Centre, P.O. Box 69, FIN-80101 Joensuu, Finland

## 2000

**7175.** Kishi, K. (2000): [Tholymis tillarga collected in Fujisawa, Kanagawa prefecture]. Gekkan-Mushi 357: 45-46. (in Japanese) [1 male, 2 females, Fujisawa City, 12/15-IX-1999.] Address: Kishi, K., A-101, Mistral Shonan, 488-1, Ishokawa, Fujisawa. Kanagawa. 252-0815, Japan



**7176.** Martin, R. (2000): Una excursión odonológica al Pirineos de Lérida. Boln. S.E.A. 27: 23-26. (in Spanish, with English summary) [11 species from a total of 20 species regionally known, were recorded in July 1997 at nine lakes and ponds of the Lerida's Pyrenees (El Valle de Aran, La Alta Ribagorza, Paliars Sobirà).] Address: Martin, R., Avda. Marti Pujol, 250,3o 4a. 08911 Badalona (Barcelona), Spain

**7177.** Ponta, U. (2000): Makrozoobenthische Bestandsaufnahme an zwei Kärntner Bächen (Wölfnitz und Wimitz) und deren Analyse. Carinthia II 190/110: 635-640. (in German) [Austria; the paper includes records of *Calopteryx splendens* and *Onychogomphus forcipatus* which are not further specified.] Address: Ponta, Ursula, Kärntner Institut für Seenforschung, Verein für angewandte Gewässerökologie, Fiatschacherstraße 70, 9020 Klagenfurt, Austria.

**7178.** Reichholf, J. (2000): Früheres Vorkommen der beiden Quelljungfer-Arten *Cordulegaster bidentatus* und *Cordulegaster boltonii* an den "Dachlwänden" am unteren Inn. Mitt. zool. Ges. Braunau 7(4): 327-328. (in German) [The author reports local records from 1969 and 1971 referring to both species of *Cordulegaster* in Bavaria, Germany which are regional rare and threatened.] Address: Reichholf, J.H., Zoologische Staatssammlung, Münchhausenstr. 21, D-81247 München, Germany

**7179.** Werren, J.H.; Windsor, D.M. (2000): *Wolbachia* infection frequencies in insects: evidence of a global equilibrium? Proc. R. Soc. Lond. B 267: 1277-1285. (in English) ["*Wolbachia* are a group of cytoplasmically inherited bacteria that cause reproduction alterations in arthropods, including parthenogenesis, reproductive incompatibility, feminization of genetic males and male killing. Previous general surveys of insects in Panama and Britain found *Wolbachia* to be common, occurring in 16-22% of species. Here, using similar polymerase chain reaction methods, we report that 19.3% of a sample of temperate North American insects are infected with *Wolbachia*, a frequency strikingly similar to frequencies found in two other studies in widely separated locales. The results may indicate a widespread equilibrium of *Wolbachia* infection frequencies in insects whose maintenance remains to be explained. Alternatively, *Wolbachia* may be increasing in global insect communities. Within each of the three geographic regions surveyed, Hymenoptera are more frequently infected with A group *Wolbachia* and Lepidoptera more frequently infected with B group *Wolbachia*.] Address: Werren, J.H., Department of Biology, University of Rochester, Rochester, NY 14627, USA

## 2001

**7180.** Huang, D.; Nel, A. (2001): New 'hemeroscopid' larvae from the lower cretaceous of China: Systematic and phylogenetic implications (Anisoptera). Odonatologica 30(3): 341-344. (in English) ["A large number of fossil dragonfly larvae have been collected in Lushangfen Formation (Lower Cretaceous), SW of Beijing, China. All the well-preserved specimens are closely similar to the larvae attributed by L.N. Pritykina (1977, Trans. Soviet-Mongol paleontol. Exped. 4:81-96) to *Hemeroscopus baissicus* Pritykina, 1977, particularly for the labial mask structures." (Authors)] Address: Huang, D.,

Nanjing Institute of Geology and Palaeontology, Academia Sinica, Nanjing, 210008, China. E-mail: huangdiy-ing@sina.com

**7181.** Perron, J.M.; Ruel, Y. (2001): Addition à la faune odonologique du territoire du marais Léon-Provancher, Neuville, Québec. Le naturaliste Canadien 125(1): 37-38. (in French) [*Calopteryx amata*, *C. maculata*, *Enallagma ebrium*, *Aeshna tuberculifera*, *Cordulegaster maculata*, *Cordulia shurtleffi*, *Leucorrhinia frigida*, and *Libellula luctuosa* are added to the regional list amounting the number of species to 50.] Address: not stated

**7182.** Skilsky, I.V.; Klitin, A.N. (2001): Trophic relations of the Little Bittern in the Prut-Dniester interfluvium of Ukraine. Ecologia, Berkut 10(2): 203-206. (in Ukrainian, with English summary) [Contents of 17 stomachs of *Ixobrychus minutus*, collected since 1940s, were analysed. Insects prevailed (56,3 %), and body parts of fishes amounted to 25,0 %. During the spring and early summer the birds feed on invertebrates (water Coleoptera and Ephemeroptera predominate), in the summer-autumn period they prey on vertebrates (small fishes and amphibia). *Aeshna grandis* is the only Odonata recorded as food of the Little Bittern.] Address: Skilsky, I.V., P.O. Box 532, 58001 Chernivtsi, Ukraine

## 2002

**7183.** Fumi Kumagai, A. (2002): Os Ichneumonidae (Hymenoptera) da Estação Ecológica da Universidade Federal de Minas Gerais, Belo Horizonte, com ênfase nas espécies de Pimplinae. Revista Brasileira de Entomologia 46(2): 189-194. (in Portuguese, with English summary) [A few Odonata were caught by accident in malaise traps.] Address: Fumi Kumagai, Alice, Departamento de Zoologia, Universidade Federal de Minas Gerais. Caixa Postal 486, 31.270-901 Belo Horizonte-MG, Brasil. Endereço eletrônico: acfk@icb.ufmg.br

**7184.** Kalnins, M. (2002): Banded Darner, *Sympetrum pedemontanum* (Allioni, 1766) (Odonata: Libellulidae), a new dragonfly in the fauna of Latvia. Latvian Entomologist 39: 44-45. (in English with Latvian summary) [1 adult male, gravel pit near Kangarnieki, Riga district, 15-VII-2001.] Address: Kalnins, M., Ent. Soc. Latvia, 4 Kronvald Blvd, LV-1586 Riga, Latvia

Karube, H. (2002): *Watanabeopelalia* gen. nov., a new genus of the dragonflies (Odonata, Cordulegasteridae, Chlorogomphina). Nabesania, Special Bull. Jap. Soc. Coleopterol. 2002(5): 67-85. (in English) ["The new genus is erected to include *Orogomphus atkinsoni* Sel. (type species), *Chlorogomphus uenoi* Asahina and *Chloropetalia usignata* Chao. The *Chloropetalia* Carle is redefined and downgraded to the rank of a tribe that includes the genus *Chloropetalia* and *Watanabeopelalia* gen. n.; the pertaining species are redescribed and illustrated." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**7185.** Lang, H.; Lang, C.; Raab, R. (2002): Insekt des Jahres 2002: Steckbrief Quelljungfer *Cordulegaster* sp. (Odonata: Cordulegasteridae. Beiträge zur Entomofaunistik 3: 192-193. (in German) [Profile of the insect of the year 2002 in Austria, considering *Cordulegaster bol-*

tonii, C. heros, and Thecagaster bidentata.] Address: Raab, R., Technisches Büro für Biologie, Quadenstraße 13, A-2232 Deutsch-Wagram, Austria. E-mail: rainer.raab@gmx.at

**7186.** Petillon, J.; Dusoulier, F. (2002): Liste commentée d'Invertébrés récoltés dans le bassin rennais en 2000/2001. LOMBRIC A BRAC n°46: 16-25. (in French) [*Ischnura elegans* was recorded in a gravel pit near Lormandière (Chartres-de-Bretagne), France, 05-V-2001.] Address: Petillon, J., 111, Boulevard de l'Europe, 29200 Brest, France. E-mail: j.petillon@voila.fr

## 2003

**7187.** Appleton, C.C.; Curtis, B.A.; Alonso, L.E.; Kipping, J. (2003): Freshwater invertebrates of the Okavango delta, Botswana. In: Alonso, L.E. & Nordin L.-A. (2003): A rapid biological assessment of the aquatic ecosystems of the Okavango Delta, Botswana: High water survey. RAP Bulletin of Biological Assessment 27, Conservation International, Washington DC: 58-68. (in English) ["Selected invertebrate taxa, including Hirudinea, Decapoda, Heteroptera, Ephemeroptera, Odonata, Gastropoda, and Bivalvia, were collected semi-quantitatively in four focal areas of the Okavango Delta. The invertebrate fauna was found to be relatively uniform in all four areas and there was little evidence that it changed as habitat diversity increased from the Panhandle to the seasonal part of the Delta. A largely different fauna was found in ephemeral rainpools isolated from the deltaic habitats in the Moremi and Chief's Island areas. More species would probably have been recorded had the expedition taken place during the summer months, i.e. November to March, when the water would have been warmer and the depth shallower. Several new species and new records for the Delta were found." (Authors)] Address: Kipping, J., BioCart - Ökologische Gutachten & Studien, Albrecht-Dürer-Weg 8, D-04425 Taucha, Germany. E-mail: BioCartKipping@web.de

**7188.** Carneiro Vital, M.V.; De Marco Júnior, P. (2003): Padrão Diário de Atividade de *Tigriagrion aurantinigrum* (Odonata: Coenagrionidae). VI Congresso de Ecologia do Brasil, Fortaleza: 305. (in Portuguese) [Diel activity patterns are outlined. For details see: [http://www.biologia.ufrj.br/labs/labvert/Artigos/VICongEcol\(MVVi eira\).pdf](http://www.biologia.ufrj.br/labs/labvert/Artigos/VICongEcol(MVVi eira).pdf)] Address: Carneiro Vital, M.V., Mestrando em Biologia, Universidade Federal de Goiás, Brasil. E-mail: mvcvital@hotmail.com

**7189.** Ferreras-Romero, M.; Cano-Villegas, F.J.; Salamanca-Ocaña, J.C. (2003): Valoración de la cuenca del río Guadiamar (sur de España), afectada por un vertido minero, en base a su odonofauna. *Limnetica* 22(3-4): 53-62. (in Spanish, with English summary) ["We analysed the Odonata community in the area of the river Guadiamar catchment (southern Spain) affected by a mining spill which occurred in April 1998. Compared to other Andalusian catchments, the number of species found (18) was not particularly low, although a significant proportion (55.5%) belonged to the family Libellulidae. Absence of some species common in Iberian rivers belonging to typically rheophilous families (e.g. Gomphidae and Calopterygidae) was significant. This fact highlights the current bad ecological conditions of this part of the catchment. In addition, zoogeographical analysis showed that a high proportion of elements are

of North-African origin." (Authors)] Address: Ferreras-Romero, M., Departamento de Biología Animal (Zoolo-gia), Facultad de Ciencias, Universidad de Córdoba, Avda. San Alberto Magno s/n, E-14004 Córdoba, Spain. E-mail: ferreras@teleline.es

**7190.** Gilbert, G.; Tyler, G.; Smith, K.W. (2003): Nestling diet and fish preference of Bitterns *Botaurus stellaris* in Britain. *Ardea* 91(1): 35-44. (in English) ["We provide quantitative information on the diet of nestling Bitterns, examine the factors influencing diet composition and determine whether adult females are choosing particular species and size of prey. Sixty regurgitate samples from 44 broods were examined during visits to Bittern nests made at nine sites in England from 1996 to 2001. Compositional analysis was used to assess influence of age, season and year effects on diet. The fish component of the diet was compared with species found to be generally available within each site from electro fishing data. Eel *Anguilla anguilla* and Rudd *Scardinius erythrophthalmus* made up the greatest proportion of biomass of the diet and this proportion did not significantly change with the age of the chicks. [...]" (Authors) Libellulidae contributed only rarely to the diet of the chicks.] Address: Royal Society for the Protection of Birds, The Lodge, Sandy, Bedfordshire, SG19 2DL; E-mail: Gillian.Gilbert@rspb.org.uk

**7191.** Mukhtar, M.; Herrel, N.; Amerasinghe, F.P.; Ensink, J.; van der Hoek, W.; Konradsen, F. (2003): Role of wastewater irrigation in mosquito breeding in south Punjab, Pakistan. *Southeast Asian jour. trop. med. public health* 34(1): 72-80. (in English) ["Mosquito breeding within the wastewater irrigation system around the town of Haroonabad in the southern Punjab, Pakistan, was studied from July to September 2000 as part of a wider study of the costs and benefits of wastewater use in agriculture. The objective of this study was to assess the vector-borne human disease risks associated with mosquito species utilizing wastewater for breeding. Mosquito larvae were collected on a fortnightly basis from components of the wastewater disposal system and irrigated sites. In total, 133 samples were collected, about equally divided between agricultural sites and the wastewater disposal system. [...] The prevalence of established vectors of human diseases such as *An. stephensi* (malaria), *Cx. tritaeniorhynchus* (West Nile fever, Japanese encephalitis) and *Cx. quinquefasciatus* (Bancroftian filariasis, West Nile fever) in the wastewater system indicated that such habitats could contribute to vector-borne disease risks for human communities that are dependent upon wastewater use for their livelihoods. Wastewater disposal and irrigation systems provide a perennial source of water for vector mosquitoes in semiarid countries like Pakistan. Vector mosquitoes exploit these sites if alternative breeding sites with better biological, physical, and chemical conditions are not abundant." (Authors) The paper also contains a few notes on Odonata specified on the genus level.] Address: Mukhtar, M., International Water Management Institute (IWMI), 12 Km Multan Road, Chowk Thokar Niaz Baig, Lahore 53700, Pakistan. E-mail: m.mukhtar@cgiar.org

**7192.** Perez, A.J.; Morales, E.; Oromi, P.; Lopez, H. (2003): Fauna de artrópodos de Montaña Clara (islas Canarias) II: Hexápodos (no coleópteros). *Vieraea* 31: 237-251. (in Spanish, with English summary) [*Anax ephippiger* and *Sympetrum fonscolombii* were recorded

during fieldwork carried out in Montaña Clara between 2000 and 2002.] Address: Pérez, A.J., Depto. de Biología Animal, Universidad de La Laguna, 38206 La Laguna, Tenerife, Spain

**7193.** Prokop, J. (2003): Remarks on palaeoenvironmental changes based on reviewed Tertiary insect associations from the Krušné hory piedmont basins and the Ěeské stědohoří Mts in northwestern Bohemia (Czech Republic). *Acta zoologica cracoviensia*, 46 (suppl. - Fossil Insects): 329-344. (in English) ["Cenozoic insect fauna of northwestern Bohemia is preserved in fluviolacustrine deposits of the Krušné hory piedmont basins and the Ceské stredohorí Mts. The fossil insect assemblages are correlated with palaeobotanical results. The local palaeoenvironmental conditions such as the distance from the shoreline or water depth are interpreted. A reflection of changes in distribution of fossil entomofaunas is compared with relevant world localities of different palaeoenvironments. The sparse fossil insect taphocoenoses fill a gap in record of significant diverse non-marine invertebrate communities and serve for reconstruction of terrestrial palaeoecosystems. The selected fossil sites demonstrate insect taphocoenoses formed under conditions of the palaeoenvironment of a diatomaceous lake with subtropical forests (Kuělin), lowlands of riparian and mesophytic forests (Kundratice - Seifhennersdorf), warm-temperate swamp to riparian forests (Bilina mine) and lake sedimentation near mixed mesophytic forests (Mokøina). The aim is to compare fossil entomofaunas from several periods within Tertiary in northwestern Bohemia and search for analogous palaeoenvironmental conditions in other areas. The results are correlated with the previously proposed palaeobotanical models." (Author) Many references to Odonata are made.] Address: Prokop, J. Department of Palaeontology, Faculty of Science, Charles University, Albertov 6, CZ-128 43 Prague 2, Czech Republic. E-mail: jprokop@natur.cuni.cz

**7194.** Vieira, V.,; Borges, P.A.V.; Karsholt, O.; Wunderlich, J. (2003): La fauna de artrópodos de la isla de Corvo (Azores): lista actualizada de las especies incluyendo nuevos. *Vieraea* 31: 145-156. (in English, with Spanish summary) [Portugal; Anax imperator: Vila do Nova do Corvo: 12.IX.02 - One specimen at Porto da Casa, one observed flying at Pico João de Moura.] Address: Vieira, V., Universidade dos Açores, Departamento de Biologia, CIRN, Rua da Mãe de Deus, PT - 9501-801 Ponta Delgada, Açores, Portugal. E-mail: vvieira@notes.uac.pt

**7195.** Wada, S. (2003): Scientific Report of Nakaikemi Marsh, Tsuruga, Fukui Prefecture. Chapter 8 Insect Fauna of Nakaikemi Marsh and its neighboring areas. (4) The Odonata fauna in Nakaikemi and its current status. Research Report from the National Institute for Environmental Studies, Japan 176: 291-307. (in Japanese) ["In this report, *Sympetrum pedemontanum elatum* (Selys, 1872) is added to the Odonata fauna of Nakaikemi, and the total number of the Odonata species recorded there reached 70 (belonging to 10 families), which attains approximately 35% of the Japanese Odonata fauna (total 197 species). The biodiversity of Odonata in Nakaikemi reflects the diversity of the aquatic environments there, but the abandonment of paddy cultivation and the construction of the road in the wetland in recent years have caused some drastic changes in the aquatic environment, such as the succession of the

wetland, water pollution, the disappearance of several species of aquatic plants, and a marked increase in the number of the American crawfish in almost every canal and wetland in Nakaikemi. These changes have caused fatal damage to the habitats of many Odonata species. The number of larvae of the inhabitants of the canals and wetlands has remarkably decreased, and two vulnerable species, *Aeschnophlebia longistigma* Selys, 1883 and *Aeschnophlebia anisoptera* Selys, 1883, which are typical wetland inhabitants, have not been recorded in Nakaikemi for more than five years." (Author)] Address: Wada, S., National Inst. Environmental Studies, Japan

## 2004

**7196.** Anonymus (2004): Tricks of the trade. *Williamsonia* 8(3): 4-5. (in English) [Tips to improve the equipment of field odonatologists are provided.] Address: not stated

**7197.** Bambaradeniya, C.N.B.; Edirisinghe, J.P.; De Silva, D.N.; Gunatilleke, C.V.S.; Ranawana, K.B.; Wijekoon, S. (2004): Biodiversity associated with an irrigated rice agro-ecosystem in Sri Lanka. *Biodiversity and Conservation* 13: 1715-1753. (in English) ["Irrigated rice fields are temporary wetland agro-ecosystems, managed with a variable degree of intensity. A survey was carried out in Sri Lanka to document the overall biodiversity associated with this unique agro-ecosystem, using a combination of sampling techniques to document different groups of fauna and flora. The total number of biota recorded and identified from the rice field ecosystem during the entire study period consisted of 494 species of invertebrates belonging to 10 phyla and 103 species of vertebrates, while the flora included 89 species of macrophytes, 39 genera of microphytes and 3 species of macrofungi. Of the total species documented, 15 species of invertebrates and one weed species are new records to Sri Lanka. Arthropods were the dominant group of invertebrates (405 species), of which 55 species were rice pest insects, and 200 species were natural enemies of pest insects. The fauna and flora recorded from the rice field were observed to follow a uniform pattern of seasonal colonization and succession during successive rice cultivation cycles. The biodiversity of the irrigated rice agro-ecosystem interests both agroecologists and conservation biologists. Therefore, the integrated efforts of these two groups can result in the formulation of strategies based on biodiversity as an organizing principle in the sustainable management of the rice field agro-ecosystem." (Author) 19 Odonata taxa are listed.] Address: Bambaradeniya, C.N.B., IUCN - The World Conservation Union, Sri Lanka Country Office, No. 53, Horton Place, Colombo 07, Sri Lanka. E-mail: cnb@iucnsl.org

**7198.** Dijkstra, K.-D. (2004): Dragonflies (Odonata) of Mulanje Mountain, Malawi. *Nyala* 22: 3-8. (in English) ["Sixty-five species of Odonata are recorded from Mulanje and its slopes. Only eight species dominate on the high plateau. Among them are two relict species of conservation concern: The endemic *Oreocnemis phoenix* (monotypic genus) and the restricted-range species *Chlorolestes elegans*. The absence of mountain marsh specialists on the plateau is note-worthy. Mulanje's valleys, of which Likabula and Ruo are best known, have a rich dragonfly fauna. The Eastern Arc relict *Nepogom-*



phoides stuhlmanni is common here." (Author)] Address: Dijkstra, K.D., Curator of invertebrates, National Zoological Collection of Suriname, University of Suriname, P.O. Box 9212, Paramaribo, Suriname. E-mail: Dijkstra@naturalis.nnm.nl

**7199.** Giribet, G.; Edgecombe, G.D.; Carpenter, J.M.; d'Haese, C.A.; Wheeler, W.C. (2004): Is Ellipura monophyletic? A combined analysis of basal hexapod relationships with emphasis on the origin of insects. *Organisms, Diversity & Evolution* 4: 319-340. (in English) ["Hexapoda includes 33 commonly recognized orders, most of them insects. Ongoing controversy concerns the grouping of Protura and Collembola as a taxon Ellipura, the monophyly of Diplura, a single or multiple origins of entognathy, and the monophyly or paraphyly of the silverfish (Lepidotrichidae and Zygentoma s.s.) with respect to other dicondylous insects. Here we analyze relationships among basal hexapod orders via a cladistic analysis of sequence data for five molecular markers and 189 morphological characters in a simultaneous analysis framework using myriapod and crustacean outgroups. Using a sensitivity analysis approach and testing for stability, the most congruent parameters resolve Tricholepidion as sister group to the remaining Dicondylia, whereas most suboptimal parameter sets group Tricholepidion with Zygentoma. Stable hypotheses include the monophyly of Diplura, and a sister group relationship between Diplura and Protura, contradicting the Ellipura hypothesis. Hexapod monophyly is contradicted by an alliance between Collembola, Crustacea and Ectognatha (i.e., exclusive of Diplura and Protura) in molecular and combined analyses." (Authors) Many references are made to Odonata; Anax junius and Libellula pulchella are represented in the analyses.] Address: Giribet, G., Dept of Organismic & Evolutionary Biology, Museum of Comparative Zoology, Harvard University, 16 Divinity Avenue, Cambridge, MA 02138, USA. E-mail ggiribet@oeb.harvard.edu

**7200.** Mbabazi, D.; Orach-Meza, F.L.; Makanga, B.; Hecky, R.E.; Baliwa, J.S.; Ogotu-Ohwayo, R.; Verburg, P.; Namulemo, G.; Muhumuza, E.; Luvisa, J. (2004): Trophic structure and energy flow in fish communities of two lakes of the Lake Victoria basin. *Uganda journal of agricultural science* 9: 348-359. (in English) [Odonata are included in the study of fish diet in Lake Victoria, Uganda.] Address: Mbabazi, D., Lake Victoria Environmental Management Project. P.O. Box 5. Entebbe. Uganda

**7201.** McCoy, M.W.; Savitzky, A.H. (2004): Feeding ecology of larval *Ambystoma mabeei* (Urodela: Ambystomatidae). *Southeastern Naturalist* 3(3): 409-416. (in English) ["*A. mabeei* is listed as threatened in Virginia due to its rarity and susceptibility to urbanization and poor forestry practices. The purposes of this study were to determine the composition of the diet of larval *A. mabeei* and to compare larval diet in different geographic regions to gain insights into the ecology of Virginia populations. Ninety-eight percent (N = 75) of all *A. mabeei* larvae dissected contained food items. Virginia samples harbored higher loads of gastric parasites (Nematodes) than individuals from other locations. Furthermore, prey species found in the stomachs of Virginia specimens were different than those of conspecifics from more southern locations. Higher loads of gastric parasites in Virginia animals may be related to their diet, which in turn is related to the forest cover over natural ponds.

Habitat disturbance and parasite prevalence may have major implications both for larval survival and for the long-term persistence of *A. mabeei* populations in this portion of their range." (Author) Odonata contributed to the diet of salamanders as follows: North Carolina: 12.2% and Virginia: 11.1%.] Address: McCoy, M., Dept of Zoology, University of Florida, PO Box 118525, Gainesville, FL 32611-8525, USA. E-mail: mmccoy@zoo.ufl.edu.

**7202.** Murphy, G.W. (2004): Uptake of mercury and relationship to food habits of selected fish species in the Shenandoah river basin, Virginia. Thesis, Master of Science, Fisheries and Wildlife Sciences, Faculty of the Virginia Polytechnic Institute and State University: 221 pp. (in English) [Mercury poses significant challenges to human health and fisheries management. Historical industrial practices in Waynesboro, Virginia left portions of the Shenandoah River basin contaminated with mercury and stringent health advisories for fish consumption. I investigated processes affecting the bioaccumulation of mercury in *Catostomus commersoni*, *Ictalurus punctatus*, *Lepomis auritus*, and *Micropterus dolomieu* by studying food habits, total mercury and methylmercury in common prey items, and bioaccumulation dynamics of methylmercury in the mercury contaminated South River and South Fork of the Shenandoah River and uncontaminated North River. Additionally, I evaluated sexual and seasonal variations of total mercury in *M. dolomieu* in the South Fork of the Shenandoah River. Algae, aquatic insects, crayfish, detritus, and fish accounted for 75-97% of the diet. Total mercury in aquatic invertebrates and forage fish in contaminated rivers ranged from 66.7-398.3 and 198.0-594.9 ng/g wet weight, while total mercury in aquatic invertebrates and forage fish in the reference river were 4.4 and 29.3 ng/g. Model simulations indicated that dietary pathways accounted for 87% of methylmercury uptake by fish in contaminated rivers, but only 57% in the reference river. Total mercury in *M. dolomieu* was 19-20% higher in females than males and 14-21% higher during spring than summer and fall. Results of this study indicate that bioenergetics based bioaccumulation models are valuable tools for evaluating field data, identifying processes critical to contaminant accumulation, and comparing outcomes of alternative management options associated with pollution control, ecosystem management, and/or restoration activities for management guidance prior to costly expenditures." (Author) Odonata are treated on the order level. Predacious aquatic invertebrates (e.g., Odonata) normally exhibited higher concentrations of total mercury than herbivorous and detritivorous invertebrates.] Address: not stated

**7203.** O'Brien, M. (2004): *Aeshna subarctica*, a historical oddity?. *Williamsonia* 8(3): 2-3. (in English) [The author re-examines "records" of *A. subarctica* from Michigan, USA, and states that the species should be eliminated from the state list.] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

**7204.** O'Brien, M. (2004): *Epitheca costalis* in Michigan: update. *Williamsonia* 8(3): 1-2. (in English) [A re-examination of *Epitheca* specimens from Michigan, USA resulted in the addition of *E. cynosura* to the state list.] Address: O'Brien, M., Insect Division, Museum of Zoo-

logy, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

**7205.** O'Brien, M. (2004): An unusual mode of contraception. *Williamsonia* 8(3): 5. (in English) [12VII-2003, Michigan, USA. One male *Gomphus quadricolor* was collected with the terminal abdominal segments of a female still attached to the male's penis.] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

**7206.** Poulton, B.C. (2004): Chapter 4. Aquatic invertebrates of Lisbon Bottom Wetlands. Ecological dynamics of wetlands at Lisbon Bottom, Big Muddy National Fish and Wildlife refuge, Missouri: 83-113. (in English) ["Aquatic macroinvertebrates were sampled both qualitatively and quantitatively from March-July 1999 to characterize the community composition and density in different types of wetlands at Lisbon Bottom based on water source, permanence, available vegetation structure, and timing of flood pulses. Twelve wetlands were sampled 1-2 times per month to document species richness (timed sweep-net sample), and eight wetlands were sampled at least once every two weeks for measuring macroinvertebrate density (0.24-m dia. stovepipe). From this study and previous macroinvertebrate research including adjacent riverine habitats (Lisbon Chute, mainstem Missouri River, etc.). a total of 260 species are known to exist in the Lisbon area, over half of which are unique to the flood-plain wetland complex. Richness of Odonata, Coleoptera, Hemiptera, and Ephemeroptera was high in vegetated areas of most wetlands: however, richness of Diptera was lower than that reported in other studies and the Trichoptera were nearly absent. Temporary wetlands held water throughout the winter months due to the fall 1998 flood, and the invertebrate community was dominated by overwintering species and groups of pioneer taxa that were available for dispersal to other basins after flooding occurred in mid-April. Species richness was lowest in deep scours, and highest in seasonal wetlands. Both species richness and density (#/m<sup>2</sup>) were highest when margin vegetation was inundated, which corresponds with a period of 2-3 weeks after the flood pulse. Richness and density were also highest in seasonal wetlands: scours had lowest species richness throughout the early part of the study, but increased by late spring and summer periods. In all but the deep scours, the ratio of predator / herbivore-detritivores gradually declined during the study period, and the ratio of benthic / pelagic invertebrates peaked during the post-flood period. Both of these indicators appear to correspond with changes in the availability of organic matter due to flooding. Recommendations and goals for managing flood-plain wetlands for maximization of wildlife value will also maximize the availability and productivity of macroinvertebrate food sources for other wildlife species, while increasing biodiversity.] Address: <http://infolink.cr.usgs.gov/Science/Lisbon/4Invertebrates.pdf>

**7207.** Puyshkin, V.B., Yevstafiev, A.I., Gromenko, V.M. & Ruybka, T.S. (>2004?): *Insecta* [sic!], Odonata. Biodiversity of the Crimean Peninsula: 131-135. (in Russian) [Based on 11 of the papers that deal with odonate fauna of the Crimean Peninsula a list is compiled showing the distribution and abundance of the 49 recorded species across 12 steppe and 9 mountain landscape units. The species are then explicitly listed again under

three distribution headings: i) species restricted to a certain distribution zone, ii) species typical for one zone but also found in the other, iii) species with azonal distribution and again under four abundance groups (massive, common, rare, very rare). It is concluded that the dragonfly fauna of the Crimean Peninsula is heterogeneous, that several species should be included in the Red Data Book and that further investigations are necessary. Abstracter's note: Caution might be necessary in adopting even these very general conclusions as the large number of misspellings and taxonomic mistakes and the incomplete literature treatment suggests this survey is not exhaustive.] Address: not stated

**7208.** Reash, R.J. (2004): Dissolved and total copper in a coal ash effluent and receiving stream: Assessment of in situ biological effects. *Environmental Monitoring and Assessment* 96(1-3): 203-220. (in English) ["An in situ chemical and biological study was conducted in the lower Muskingum River (southeast Ohio, U.S.A.) to evaluate potential effects of copper (Cu) discharged from a coal ash effluent. Effluent total Cu, dissolved Cu, TSS and pH measurements were performed monthly during January-December 1995. Benthic macroinvertebrates were sampled at five river locations using artificial substrate samplers, and in situ Cu analyses were conducted. Effluent Cu (total) ranged from 8 to 142 µg L<sup>-1</sup> (mean = 58 µg L<sup>-1</sup>), but dissolved Cu never exceeded 78 µg L<sup>-1</sup> (mean = 20 µg L<sup>-1</sup>). The mean ratio of dissolved Cu to total Cu in these samples was 32%. Total Cu concentrations at the biological sampling sites adjacent to the effluent discharge were higher than levels at ambient sites, but dissolved Cu levels were similar among all sites. The macroinvertebrate community proximal to the coal ash effluent had the highest number of taxa and total number of individuals; a high number of mayfly and caddis fly taxa; and the highest Invertebrate Community Index score. The high water velocity of the discharge (which likely contained particulate organic matter) apparently created a favorable microhabitat that, combined with Cu-complexing constituents in the discharge, superceded potential adverse effects of high Cu levels. This study emphasizes the importance of instream biological data when obtained in conjunction with chemical analyses." (Author) Macroinvertebrate taxa collected in Hester-Dendy samplers at five locations on the Muskingum River, August-September 1995 include *Boyeria vinosa*, *Argia tibialis*, *Coenagrion* sp., *Neurocordulia molesta*, *Celithemis* sp., and *Macromia taeniolata*] Address: Reash, R.J., American Electric Power, Water and Ecological Resource Services, Columbus, Ohio, U.S.A. E-mail: [rjreash@aep.com](mailto:rjreash@aep.com)

**7209.** Relyea, R.R.; Auld, J.R. (2004): Having the guts to compete: how intestinal plasticity explains costs of inducible defences. *Ecology Letters* 7: 869-875. (in English) ["Predators commonly induce phenotypic changes that make prey better at surviving predation at the cost of reduced growth. While we have a good understanding of how trait changes affect predation risk, we lack a mechanistic understanding of why predator induced phenotypes differ in growth. Using two mesocosm experiments, we combined phenotypic plasticity theory with predictions from optimal digestion theory to demonstrate that intra- and interspecific competition induced relatively long guts while predators induced relatively short guts. The longer guts induced by competition appear to be an adaptive response that allows more efficient digestion and more rapid growth whereas the

shorter guts induced by predators appear to result from a tradeoff of building larger tails in predator environments at the cost of smaller bodies. By combining these two bodies of theory, we now have a much better understanding of the mechanisms that cause the phenotypic trade-offs that select for inducible defences." (Authors) The predator used was a late instar *Anax junius* naiad.] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**7210.** Russell, A.J.M.; Storch, I. (2004): Summer food of sympatric red fox and pine marten in the German Alps. *Eur. J. Wildl. Res.* 50: 53-58. (in English) [Based on fecal analyses, summer diet composition and trophic niche breadth for the sympatric red fox *Vulpes vulpes* (n=55 scats) and pine marten *Martes martes* (n=64) in the foothills of the German Alps (Bavaria) were compared. Odonata play a minor role as food for pine marten, obviously only using the "windows of opportunity".] Address: Storch, Ilse, Linderhof Research Station, Technische Universität München, 82488 Ettal, Germany. E-mail: ilse.storch@t-online.de

**7211.** Smith, A.T. (2004): Natural and sexual selection in three species of odonates. Thesis, MSc., Department of Biology, University of Victoria: IX, 114 pp. (in English) ["Evolution is driven mainly by natural and sexual selection, which can be confounded by sex, mating system and environmental influences. Odonates have three important selective episodes during the adult life stage: survival to sexual maturity; survival after sexual maturity and mating success. Using mark-recapture and logistic regression, I examined natural selection in adult males and females of two species of non-territorial damselflies, *Lestes congener* and *L. disjunctus* and one species of territorial dragonfly, *Sympetrum pallipes* in two successive years at Galiano Island, B.C. Females gained more mass over the maturation period than males, but the difference was smaller in territorial *S. pallipes*. Sexual size dimorphism was therefore greater at maturity than emergence but less so in *S. pallipes*. Female survival was lower than male survival over the maturation period and survival over the maturation period was lower than survival after maturity in some groups. Before maturity, small male *L. congener* survived better and male *S. pallipes* with small wing loading values survived less well. No measurable difference was found between female and male survival after maturity in any species and wing loading was a better predictor of survival than body size. I also tested for sexual selection on males of all three species. As predicted, selection on body size was not detectable in both *Lestes* species. In male *S. pallipes*, small males had a mating advantage early in the season but large males had an advantage late in the season. This was attributed to density or weather effects. Large male *S. pallipes* had greater territorial success, but were not more likely to achieve mating success. There were large differences in body size between years in all groups, but the direction of change did not correspond with the direction of selection. The importance of measuring selection over more than one generation and improved observational methods are discussed further.] Address: not stated

**7212.** Suttle, K.B.; Power, M.E.; Levine, J.M.; McNeely, C. (2004): How fine sediment in riverbeds impairs growth and survival of juvenile salmonids. *Ecological Applications* 14(4): 969-974. (in English) ["Although excessi-

ve loading of fine sediments into rivers is well known to degrade salmonid spawning habitat, its effects on rearing juveniles have been unclear. We experimentally manipulated fine bed sediment in a northern California river and examined responses of juvenile salmonids and the food webs (treated on the family level and including Odonata) supporting them. Increasing concentrations of deposited fine sediment decreased growth and survival of juvenile steelhead trout. These declines were associated with a shift in invertebrates toward burrowing taxa unavailable as prey and with increased steelhead activity and injury at higher levels of fine sediment. The linear relationship between deposited fine sediment and juvenile steelhead growth suggests that there is no threshold below which exacerbation of fine-sediment delivery and storage in gravel bedded rivers will be harmless, but also that any reduction could produce immediate benefits for salmonid restoration." (Authors)] Address: Suttle, K.B., Dept of Integrative Biology, University of California, Berkeley, California 94720-3140 USA. E-mail: kbsuttle@socrates.berkeley.edu

**7213.** Talling, J. (2004): The development of freshwater science in Britain and British contributions abroad, 1900 - 2000. *Freshwater forum* 20: 22-80. (in English) [This brief history of British freshwater science of the past century contains only a few references to Odonata, and focusing on the work of Philip Corbet.] Address: Talling, J., Dr J.F. Talling, Freshwater Biological Association, Ambleside, Cumbria LA22 0LP, UK.

**7214.** Thomas, M.; Wagner, D. (2004): Connecticut highlights – 2003. *Ode News* XI(1): 4-6. (in English) [A summary of some of the more noteworthy finds (n = 20) during the 2003 season is provided. The paper includes a road kill record of *Somatochlora williamsoni*.] Address: not stated

**7215.** Torralba Burrial, A.; Ocharan, F.J. (2004): Tandem heterospecifico en el género *Onychogomphus* Sélys, 1854 (Odonata: Gomphidae). *Boln. Asoc. esp. Ent.* 28 (3-4): 181-183. (in Spanish) [31-VII-2003, river Garga, near Gillué (Huesca, NE Spain, 30TYM3298); heterospecific tandem between a male *Onychogomphus forcipatus unguiculatus* and a female *O. uncatatus*.] Address: Ocharan, F.J., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain: E-mail: focharan@oonreo.uniovi.es

**7216.** Tsuyuki, K.; Kobayashi, T.; Sudo, S. (2004): Function of dragonfly wings for the raindrop collision. *Nihon Kikai Gakkai Nenji Taikai Koen Ronbunshu* 6: 163-164. (in Japanese, with English summary) ["This paper presented the results of an experimental investigation of droplet impacting on dragonfly wings. The collision characteristics of dragonfly wings are studied with a digital high speed camera system. The results are presented for different impact velocities and different impact locations on dragonfly wings. The results show the marvelous structure of dragonfly wings for the rain drop collision. It was found that dragonfly wings have the flexible response and the water repellency for the water drop collision. The drop collision phenomena on dragonfly wings are also revealed." (Author)]

**7217.** Vornicu B.; Ion, I. (2004): Nutrition of some species of fish in the middle basis of Moldova river. *Analele Stiintifice ale Universitatii „Al.I.Cuza” Iasi, s. Biologie animala* 50: 223-227. (in English) [Odonata are listed as prey of some fish species.] Address: not stated



## 2005

**7218.** Acuna, V.; Munoz, I.; Giorgi, A.; Omella, M.; Sabater, F.; Sabater, S. (2005): Drought and postdrought recovery cycles in an intermittent Mediterranean stream: structural and functional aspects. *J. N. Am. Benthol. Soc.* 24(4): 919-933. (in English) ["The effects of the intensity of seasonal droughts on stream ecosystems were studied in the Fuirosos, an intermittent forested Mediterranean stream. Macroinvertebrate community structure and stream ecosystem metabolism were measured during seasonal summer droughts in 2001, 2002, and 2003. Ecosystem metabolism was profoundly affected by stream intermittency. Organic matter that accumulated during the dry period enhanced ecosystem respiration during the postdrought recovery. Highest biotic diversity was found at low water levels as the stream dried and contracted. Macroinvertebrate community response to drying was stepped and apparently defined by thresholds of transition from drying to cessation of flow and from the dry phase to restoration of flow. Environmental conditions changed markedly with cessation of flow, causing large changes in community structure during 2001 and 2003 (dry years). Drying caused an increase in macroinvertebrate density that peaked in isolated pools soon after flow ceased, but then decreased rapidly because of the physicochemical changes associated with fragmentation of the watercourse. The macroinvertebrate community at the end of the summer dry phase (when flow resumed) differed from the community that had been present before drying began. Differences in community structure during the summer dry period were not as marked in 2002 (a wet year) as in 2001/2003. The influence of drought on the macroinvertebrate community differed across substrata. Drying led to significant changes in density on cobbles and leaves, but not on sand. Few taxa resisted drying, and resilience to drying was the dominant response to disturbance in the Fuirosos." (Authors) The list of macroinvertebrate taxa from the Fuirosos includes *Calopteryx* sp. and *Onychogomphus* sp.] Address: Acuna, V., Department of Biology, University of New Mexico, Albuquerque, New Mexico 87131, USA. E-mail: vicenc@sevilleta.unm.edu

**7219.** Cano, E.; Jiménez, A. (2005): Evolución de las poblaciones de insectos en una tabla de arroz de las marismas del bajo Guadalquivir. *Limnetica* 24(1-2): 61-66. (in Spanish, with English summary) [Spain; "In the lower Guadalquivir river marshes, rice is grown with a flow-through system, which keeps the water oxygenated and with mild temperatures around 20-25 °C. Traditional farming workings are used in this area. Individuals collected belong to the Order Diptera [...], Order Odonata (Fam. Libellulidae and Fam. Calopterygidae) [...]. Quantitatively the different groups are represented in a very heterogeneous way, however, the most numerous are the dipterans, in particular, the Chironomidae. There are important variations in the insect community of a rice field. These variations can be due to pesticide treatments applied to the rice, and water level oscillations." (Authors)] Address: Cano, E., Dpto. de Fisiología y Zoología. Fac. de Biología. Universidad de Sevilla. Avda. Reina Mercedes, 6. 41012 Sevilla, Spain. E-mail: ecano@us.es

**7220.** Cano Villegas, F.J. (2005): Localizada una nueva zona de cria de *Lestes dryas* Kirby, 1890 (Odonata, Lestidae) en Andalucía. *Boletín de la sociedad entomológica Aragonesa* 36: 262. (in Spanish) [Encantada (alt. 450 m.s.n.m., UTM 30S 03 3827 42 0483), Sierra Morena, Spain; larvae: 31-XII-2003, imagos: 5-IV-2004] Address: Cano Villegas, F.J., Departamento de Ciencias Ambientales, Área de Zoología, Universidad Pablo de Olavide, 41013 (Sevilla). E-mail: fcanovi1@wana-doo.es

**7221.** Fonnesu, A.; Deiana, A.M.; Basset, A. (2005): Effetti della siccità sull'abbondanza e distribuzione dei macroinvertebrati. *Rendiconti Seminario Facoltà Scienze Università Cagliari* 75(1-2): 9-25. (in Italian, with English summary) [The role of disturbance on structuring animal communities is a central subject in the ecological research. In particular in the intermittent systems river, the drought event seems to determine the macroinvertebrate community structure. In such context, we analysed the macrobenthos of a Sardinia (Italy) intermittent stream (Rio Pula, Cagliari). The study was carried out on 16 sites in 3 years (from 2000 to 2002) with seasonal samplings (spring and autumn) of the macroinvertebrate community. The results have shown a temporal stability of community and a spatial change of community structure along the river basin determined by drought frequency. Finally, patterns of spatial change in the guild composition seem to be partly in contrast with the River Continuum concept." (Authors) The list of taxa includes 11 Odonata species.] Address: Fonnesu, A., Dipartimento di Biologia Animale ed Ecologia, Università degli Studi di Cagliari, viale Poetto 1, 09126 Cagliari, Italia. E-mail: alessio.fonnesu@unica.it.

**7222.** Ivinskis, P.; Rimsaite, J. (2005): Baltic seashore as a unique habitat for insects. *Acta Zoologica Lituonica* 15(2): 115-118. (in English, with Lithuanian summary) ["The Baltic seashore is one of important sites of insect biodiversity in Lithuania. Seashore habitats, such as dunes, dry grasslands, sand heaths, are unique and unstable. Research on insect fauna was carried out in seashore habitats of the Curonian Spit and Klaipėda-Ķventoji zone in 1974 - 2004. The whole list embraced more than 2,000 species of insects. 90% of them were common for all Lithuania, but the remaining part of species were dwelling exclusively in seashore habitats or on special plants. New, often southern species firstly establish in Lithuanian seashore habitats and only later spread all over Lithuania." (Authors) The paper also refers to four odonate species protected by the European Fauna-Flora-Habitat Directive: *Aeshna viridis*, *Leucorrhinia albifrons*, and *L. caudalis*, *L. pectoralis*.] Address: Ivinskis, P., Institute of Ecology of Vilnius University, Akademijos 2, LT-08412 Vilnius-21, Lithuania. E-mail: entlab@centras.lt

**7223.** Jahn, P. (2005): Rote Liste und Gesamtartenliste der Libellen (Odonata) von Berlin. In: *Der Landesbeauftragte für Naturschutz und Landschaftspflege / Senatsverwaltung für Stadtentwicklung (Hrsg.): Rote Listen der gefährdeten Pflanzen und Tiere von Berlin. CD-ROM.*: 28 pp. (in German, with English summary) [Up to 2004, 58 species of Odonata are recorded from the area of Berlin, Germany. These species are classified according to their present status and category of threat. Abundance and distribution are characterized for a part of these species and for six additional species, only known from the surroundings of Berlin. Moreover, changes in various biotopes and their implications for the characteristic dragonfly fauna are described. Of some interest is an hitherto unpublished record of *Coenagrion ornatum*

in the Prignitz-region.] Address: Jahn, P., Schillerpromenade 30, 12049 Berlin, Germany

**7224.** Johansson, F.; Stoks, R. (2005): 11 Adaptive plasticity in response to predators in dragonfly larvae and other aquatic insects. In: M.D.E. Fellowes; G.J. Holloway; J. Rolff (Eds.): *Insect evolutionary ecology*; Proceedings of the Royal Entomological Society's 22nd Symposium. ISBN10: 0851998127: 347-370. (in English) ["In this chapter, examples of adaptive plasticity in morphology and life history traits as a way of avoiding predators in dragonfly larvae and other aquatic insects are described. The 4 prerequisites for the evolution of plasticity are discussed. Avenues for further research are suggested."] Address: Johansson, F., Department of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**7225.** Landmann, A.; Lehmann, G.; Mungenast, F.; Sonntag, H. (2005): Die Libellenfauna Tirols - eine Übersicht. *mercuriale* 5: 13-19. (in German) [This is a concise presentation of the book on the dragonflies of Tirol, Austria] Address: Landmann, A., Karl-Kapfere-Str. 3, A-6020 Innsbruck, Austria. E-mail: Armin.Landmann@uibk.ac.at

**7226.** Leconte, N.B.M.; Leconte, L.; Leconte, J. (2005): Constatación de la reproducción de *Somatochlora metallica* (Van der Linden, 1825) (Odonata, Corduliidae) en la Península Ibérica. *Boletín de la sociedad entomológica Aragonesa* 36: 240. (in Spanish) [20-VII-2004, Salardu, Lérida, 42° 37' 54"N, 0° 55' 30"E, Spain. Successful reproduction is recorded of *S. metallica* from the Iberian Peninsula.] Address: Leconte, M., Quartier du Caü, F-64260 Arudy, France

**7227.** Legrand, J.; Fleck, G. (2005): La larve de *Tragomphus tenaculatus* (Fraser, 1926) (Odonata, Anisoptera, Gomphidae). *Revue Française d'Entomologie* 27(2): 73-76. (in French, with English summary) ["The last instar larva of *Tragomphus tenaculatus* (Fraser, 1926) is described and illustrated for the first time. The larva is morphologically close to those of the genera *Ophiogomphus* Selys, 1854 and *Lamelligomphus* Fraser, 1922 and related to the larvae of the European species of the genus *Onychogomphus* Selys, 1854. A generic diagnosis is proposed."] Address: Legrand, J., 10, rue du Chemin de fer, F-94110 Arcueil, France

**7228.** Ocharan, F.J.; Torralba Burrial, A. (2005): Comportamiento de búsqueda de hembras inmaduras como estrategia reproductiva en machos de *Aeshna juncea* (Linnaeus, 1758) (Odonata: Aeshnidae). *Boletín de la SEA* 36: 123-126. (in Spanish, with English summary) ["The behaviour of males searching for immature, teneral females is described from a Pyrenean population of *Aeshna juncea*. Males were seen to hover over aquatic vegetation and to try to grasp emergent females amid vegetation, before the females' maiden flight. This is interpreted as mate-searching behaviour. Usual mating behaviour was observed in nearby ponds when mature females were present. The consequences on male reproductive success and their dispersal and colonization capacity are commented upon. This occurrence is related to previous reports of immature aeshnid females showing signs of having mated." (Author)] Address: Ocharan, F.J., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain: E-mail: focharan@oonreo.uniovi.es

**7229.** Ocharan, F.J.; Torralba Burrial, A. (2005): Larga distancia recorrida en una emergencia fallida en *Aeshna cyanea* (Odonata: Aeshnidae). *Boletín de la SEA* 36: 236. (in Spanish, with English summary) ["A emergent female of *A. cyanea* was found dead at 10 m upslope of lake Ordicuso (2090 m alt., Panticosa, Huesca, north-eastern Spain). This is the largest known distance travelled from the water before emergence by an aeshnid dragonfly." (Authors)] Address: Ocharan, F.J., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain: E-mail: focharan@oonreo.uniovi.es

**7230.** Padilla, D.P.; Nogales, M.; Pérez, A.J. (2005): Seasonal diet of an insular endemic population of Southern Grey Shrike *Lanius meridionalis koenigi* on Tenerife, Canary Islands. *Ornis Fennica* 82: 155-165. (in English) ["The diet and prey selection of *L. meridionalis koenigi* was studied in one of the scarce insular environments where it is present, the xeric coastal area of Tenerife (Canary Islands), Spain. The main aim of this study was to compare the general trophic patterns with respect to continental populations of Northern Grey Shrike (*Lanius excubitor*) and Southern Grey Shrike. The material analysed consisted in 440 pellets collected during the four seasons of the year in the period April 2003–March 2004. A total of 5,112 prey items were identified, 85.4% corresponding to beetles (mainly Curculionidae and Tenebrionidae) and the rest consisted of other arthropods (including few Odonata) and vertebrates. Biomass mainly constituted of vertebrates, especially lizards (64.0%). [...]"] (Authors)] Address: Padilla, D.P., Island Ecology and Evolution Research Group (IPNA-CSIC), La Laguna 38206, Tenerife, Canary Islands, Spain. E-mail: dpadilla@ipna.csic.es

**7231.** Pérez-Bote, J.L.; García Jiménez, J.M.; Ferri Yáñez, F.; Torrejón Sanromán, J.M. (2005): Los odonatos de los parques naturales de Cornalvo y Monfragüe (Extremadura, España). *Boletín Sociedad Entomológica Aragonesa* 36(1): 247-249. (in Spanish, with English summary) [In 2004, a total of 32 Odonata species was recorded in the Natural Parks of Monfragüe and Cornalvo (Extremadura, Spain) (28 in Monfragüe and 22 in Cornalvo).] Address: Área de Zoología, Facultad de Ciencias, Universidad de Extremadura, 06071 Badajoz, Spain. E-mail: jlperez@unex.es

**7232.** Revenga, C.; Campbell, I.; Abell, R.; de Villiers, P.; Bryer, M. (2005): Prospects for monitoring freshwater ecosystems towards the 2010 targets. *Phil. Trans. R. Soc. B* 360: 397-413. (in English) ["Human activities have severely affected the condition of freshwater ecosystems worldwide. Physical alteration, habitat loss, water withdrawal, pollution, overexploitation and the introduction of nonnative species all contribute to the decline in freshwater species. Today, freshwater species are, in general, at higher risk of extinction than those in forests, grasslands and coastal ecosystems. For North America alone, the projected extinction rate for freshwater fauna is five times greater than that for terrestrial fauna—a rate comparable to the species loss in tropical rainforest. Because many of these extinctions go unseen, the level of assessment and knowledge of the status and trends of freshwater species are still very poor, with species going extinct before they are even taxonomically classified. Increasing human population growth and achieving the sustainable development targets set forth in 2002 will place even higher demands

on the already stressed freshwater ecosystems, unless an integrated approach to managing water for people and ecosystems is implemented by a broad constituency. To inform and implement policies that support an integrated approach to water management, as well as to measure progress in halting the rapid decline in freshwater species, basin-level indicators describing the condition and threats to freshwater ecosystems and species are required. This paper discusses the extent and quality of data available on the number and size of populations of freshwater species, as well as the change in the extent and condition of natural freshwater habitats. The paper presents indicators that can be applied at multiple scales, highlighting the usefulness of using remote sensing and geographical information systems technologies to fill some of the existing information gaps. Finally, the paper includes an analysis of major data gaps and information needs with respect to freshwater species to measure progress towards the 2010 biodiversity targets." (Authors) The paper also includes a few notes referring Odonata.] Address: Revenge, C., Global Priorities Group, The Nature Conservancy, 4245 North Fairfax Drive, Arlington, VA 22203, USA

**7233.** Torralba Burrial, A.; Ocharan, F.J. (2005): Primera cita de *Sympetrum vulgatum ibericum* Ocharan, 1985 (Odonata, Libellulidae) para la provincia de Zaragoza. Boletín de la sociedad entomológica Aragonesa 36: 350. (in Spanish) [First records of *Sympetrum vulgatum ibericum* in the province Zaragoza, Spain are mapped.] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**7234.** Torralba Burrial, A.; Ocharan, F.J. (2005): Primera cita de *Ischnura elegans* (Van der Linden, 1820) y *Ceriagrion tenellum* (Villers, 1789) (Odonata, Coenagrionidae) para Teruel (N. E. de España). Boletín de la sociedad entomológica Aragonesa 36: 284. (in Spanish) [Spain; *Ischnura elegans*: Aguilar de Alfambra, río Alfambra, Spain; *Ceriagrion tenellum*: Fuentes de Rubielos, río Rodeche] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**7235.** Trapero Quintana, A.D. (2005): *Gynacantha ereagris* (Gundlach, 1888), un endémico antillano (Odonata). Boletín de la sociedad entomológica Aragonesa 36: 353-354. (in Spanish, with English summary) [*G. ereagris* is a West Indian odonate which had only been recorded from the Bahamas and the western and central regions of Cuba. It is here recorded from the eastern part of the archipelago, and some aspects of the behavior and morphology of the taxon are analysed." (Author)] Address: Trapero Quintana, A., Depto de Biología de la Universidad de Oriente, Patricio s/n, Santiago, Cuba, CP 90500, Cuba. E-mail: atrapero@cnt.uo.edu.-cu

**7236.** van der Winden, J. (2005): Fish and amphibians as calcium source for Black Terns *Chlidonias niger* feeding in acid bogs. *Vogelwelt* 126(3): 235-241. (in English, with German summary) [Malipe bog near Valkenswaard, The Netherlands; Odonata contribute significantly to the food of adult Black terns, and provide app. 50% of the biomass of chick food.] Address: van der Winden, J., Dantelaan 119, 3533 VC Utrecht, The Netherlands. E-mail: jvdwinden@hetnet.nl

**7237.** Verberk, W.; van Kleef, H.; Dijkman, M.; van Hoek, P.; Spierenburg, P.; Esselink, H. (2005): Seasonal changes on two different spatial scales: response of aquatic invertebrates to water body and microhabitat. *Insect Science* 12: 263-280. (in English) ["Knowledge about the spatial and temporal scales of both habitat use and the functional significance of different adaptations is essential for an understanding of the population dynamics of invertebrate assemblages. This fundamental knowledge is not only interesting from an academic point of view, but is sorely lacking and needed in the field of restoration ecology. Many species are threatened due to degradation. Knowing what environmental conditions are needed during the life cycle of these species is important in the design of restoration measures which aim to lift existing bottlenecks for threatened species. To assess the relative importance of water type and microhabitat in structuring the invertebrate assemblage during different seasons, invertebrates were sampled in three water bodies differing in trophic level and acidity. Different parts within a water body (microhabitats) were sampled separately and each water body was sampled in all four seasons. Results show that water body is an important factor structuring the invertebrate assemblage early in the season, whereas microhabitat became more important later in the season. Structural complexity of microhabitats was related to the type of locomotion employed by invertebrates. Seasonal differences could be related to population dynamics (reproduction, mortality). Moreover, fluctuations in resource availability were expected to differ between the water bodies, with highest fluctuations in the eutrophic water body and with fluctuations becoming less predictable later in the season. This was confirmed by the data: species synchronization to pulses in food availability was strongest in the eutrophic water body. Moreover, synchronization was strongest in summer, while in autumn waters were invaded by dispersive species. Based on these results a synthesis is presented on the functioning of the different waters during the different seasons." (Authors) 16 Odonata taxa are treated.] Address: Verberk, W., Bargerveen Foundation, c/o Dept of Environmental Studies, Faculty of Science, Mathematics and Computing Science, Radboud University of Nijmegen, PO Box 9010, 6500 GL Nijmegen, The Netherlands. E-mail: w.verberk@science.ru.nl

## 2006

**7238.** Batista, J.D. (2006): Longitudinal distribution of adult Odonata in Cerrado streams: an ecophysiological hypothesis. Dissertação apresentada à Universidade Federal de Viçosa, como parte das exigências do Programa de Pós-Graduação em Entomologia, para obtenção do título de Magister Scientiae. Viçosa. Minas Gerais. Brasil: VIII, 41 pp. (in Portuguese, with English summary) ["The longitudinal distribution of adult Odonata was examined in streams of different channel width in the Pindaíba River Basin, in the municipalities of Barra do Garças and Nova Xavantina. The general purpose was to evaluate the existence of environmental gradients that affect the longitudinal distribution of Odonata. and to establish testable predictions to this predator group regarding the River Continuum Concept. Two hypotheses were tested: (1) increasing channel width longitudinally along the basin causes an increase of light input, and. assuming restraints and distinct abilities,



there would be a decrease of Zygoptera and increase of Anisoptera species richness. (2) Dragonflies are affected by the gradient generated through river continuum mechanisms, increasing species richness in medium-sized streams. I sampled 19 sites in rivers and streams from 1 to 6 orders, and in each site I sample once in the dry and once in the rainy seasons. Quantitative survey was conducted through scan method in fixed areas, counting visually on Odonata adults along 100 meters of the waterbody, divided into 20 stretches of 5 meters each. Channel width and depth measures were taken at the beginning, middle, and end of each 20-meter region. A total of 549 individuals were collected, distributed in one family, 13 genera and 17 species of Anisoptera, and six families, 15 genera and 30 species of Zygoptera. The abundance and proportion of Zygoptera species decrease while Anisoptera increase with channel width and mean depth of rivers and streams. The channel width was considered the best predictor of Odonata species distribution. The distribution of Odonata species richness, did not corroborate the hypotheses of higher species richness in the middle courses of streams. The results obtained in this study confirm the thermoregulation hypothesis as a determining factor in the distribution of Odonata species in the system." (Author) For details see: <http://www.tede.ufv.br/tesesimplificado/tdearquivos/11/TDE-2006-11-08T092832Z-69/Publico/texto%20completo.pdf>

**7239.** Braune, E. (2006): Spatially explicit models for interacting populations in a changing landscape: A case study on Namibian dragonflies (Odonata). Dissertation, Fakultät für Physik und Geowissenschaften, Technische Universität Carolo-Wilhelmina zu Braunschweig: 134 pp., Anhang. (in English) ["I have developed a model system, which allows the modelling of the responses of the three major ecological groups of dragonflies in arid Namibia under current and future climatic conditions. The habitat models that were introduced in Chapter 2 served to distinguish the three groups regarding their ecological preferences. Especially the use of the habitat web was valuable for the evaluation of the relative habitat preferences. Additionally it allowed estimating the different preferences of the species regarding the landscape layers, which were included in the landscape model (Chapter 4.2). The population dynamic model, which refined the extended Leslie matrix approach for age and size structured populations via the introduction of inter- and intraspecific interactions, showed the importance of the colonisation sequence of the dragonflies at the habitat. The model indicated that local extinctions due to size differences of larval stages are possible between the two species types "migrant" and "resident". The chosen mathematical approach did reproduce the pattern of multivoltinism, which is typical for tropical centred dragonflies, very well (Chapter 3). The construction of the landscape and especially its inherent dynamic was another crucial aspect of this work. The use of satellite images for the derivation of the ecological relevant landscape parameters combined with indispensable expert knowledge about the processes and characteristics of the landscape sectors facilitated to change the model's scale (Chapter 4.2.2). The larger scale led to new insights for the explanation of occurring spatial distribution patterns of the dragonflies. The dynamic change of the landscape showed that in more arid regions the residential species with longer duration of their larval stages were impeded by the smaller number of habitats and a higher level of habitat variability in

terms of continuity (Chapter 4.2.3). The combination of landscape dynamics with the dispersal abilities of the modelled species made the impact of landscape fragmentation in the more arid regions apparent (Chapter 4.3.3). Theoretical scenarios were used to get first results of the model's performance in an explicit spatial context. These scenarios showed the general importance of habitat structures preferred by the residents as a refuge and source habitat, but also as an obstacle for dispersal and consequently the colonisation of habitats in larger distance. The migrant, defined as a habitat generalist, was able to establish at least small subpopulations in the most distant habitats (Chapter 4.3.4). The results of the scenarios based on the real landscape sections in the Swakop River catchment were compared with the survey data from the wetland below the S. von Bach dam. This validation showed that the results of the spatially explicit model reproduced the patterns observed in reality very well (Chapter 4.3.5.2). The coexistence of two residential species in a community seems to be difficult to realise as the results have shown competitive exclusion of the weaker disperser (Chapter 4.3.5.1). Therefore species with equal life-history parameters are supposed to use other mechanisms to coexist in the same habitat. One possible factor, which may promote coexistence despite of the same life-cycle or competitive advantage of one species, may be resource partitioning in the freshwater habitat. Furthermore, the habitat preferences, which were confirmed by the HSM, were also reflected by the spatial patterns produced by the model. Regarding aspects of conservation biology, the model clearly indicated the importance of permanent and well vegetated habitats for the residential species with certain habitat preferences. In the model, these habitats were represented by the outlets of the dams but also permanent springs may provide the required properties and should therefore be regarded as valuable for conservation. The application of climate change scenarios based on IPCC forecasts showed that the mean metapopulation densities in the investigated landscape sections will potentially decrease. Fragmentation of the landscape regarding the presence of freshwater habitats will increase and affect especially the species with poorer dispersal abilities. However, the survival of this species was possible despite of the aggravation of the habitats. Nevertheless, the theoretical scenarios have shown that extreme fragmentation may lead to isolation of a species, which enhances the risk of a complete extinction of a metapopulation (Chapter 4.3.5.3). More empirical data concerning the construction of the landscape and its dynamic are just as desirable as more information on the parameters which drive the local population dynamics. Both would lead to an improved model whose accuracy would increase regarding the predictions of changes in the water balance. Another factor promoting the model's accuracy would be the linkage between the cellular automata to model the far distance dispersal. This would certainly improve the results especially for the migrant species. A refinement of the scale of the cellular automaton on the locality level would also add accuracy. To minimise the proximate extension of calculation time this should only be done in regions with high water densities, where a multitude of single but linked freshwaters exist. The model approach, which was presented in this work, allows making predictions of the spatial patterns of dragonfly communities in the arid regions of Namibia. A change in the lifehistory parameters of the species may allow modelling of other species or communities,

respectively. Furthermore, the implementation of other ecologically relevant properties of the landscape is possible if the information for the construction of the landscape layer exists. Hence, other dragonfly communities can be modelled with little effort. The presented model system can be used as a tool for the assessment of biodiversity of Odonata and may help to identify and emphasise valuable regions for freshwater conservation management." (Author) ] Address: Braune, Eva, Institut für Geoökologie, Technische Universität Braunschweig, Langer Kamp 19c, D-38106 Braunschweig, Germany. E-mail: e.braune@tu-bs.de

**7240.** Brooks, S. (2006): Book review: Askew, R.R.: The Dragonflies of Europe (revised edition). Harley Books, Martins, Great Horkeley, Colchester, Essex C06 4AH (2004). ISBN 0 946589 75 5. J. Br. Dragonfly Society 21(2): 68. (in English) [Review] Address: Brooks, S.J., Entomology, The Natural History Museum, Cromwell Road, London, SW7 5BD, United Kingdom

**7241.** Budha, P.B. (2006): Dragonfly biodiversity: Important management tool for providing safe drinking. Biodiversität und Naturlandschaft im Himalaya - Biodiversity and Natural Heritage of the Himalaya II. - ISBN 10: 3-00-019541-6: (in English) ["Nepal is located in the center of the Himalayas that makes it a transitional zone between the palaerctic and Indo-Malayan biogeographical regions creating a unique and rich biodiversity. In view of species diversity, Nepal occupies the 25th global position however proper estimation of the most diverse insects has yet to be done at national level. Dragonfly biodiversity of Nepal includes about 171 reported dragonfly species from different altitudinal range from 130m to the highest elevation 6300m, however, intensive studies in several unexplored locations of the country can produce many new records to science. Three species of dragonflies; Epiophlebia laidlawi, Caliphæa confusa and Philoganga montana, which are included in priority species of Oriental biodiversity, and IUCN/SCC-Dragonfly Action Plan are found in Nepal but their conservation strategies are not yet developed. A relict dragonfly E. laidlawi is rare and listed as a 'threatened' species in the Red Data List of IUCN. Furthermore, distribution of this indicator species for healthy environment and rivers of the Himalayas, is restricted to Shivapuri National Park, the nearest national park from capital city, the Kathmandu. Shivapuri is the most important watershed area in Nepal, which supplies more than 40 percent drinking water to people of the capital but it is always in pressure due to increasing activities for recreation, hiking and trekking by many foreigners and people of Kathmandu. Pollutants may rise from a wide range of deliberate waste disposal loaded with sediments, nutrients and toxins that are flushed in from the altered watersheds. in situ conservation of E. laidlawi including other dragonflies is an important tool for watershed management and its monitoring but also implies for safe drinking water supply initiatives to Kathmanduities." (Author)] Address: Bahadur Budha, P., Central Department of Zoology, Tribhuvan University, Kathandu, Nepal. E-mail: prembudha@yahoo.com

**7242.** Choong, C.Y. (2006): Dive.Dive.Dive. Oviposition behaviour of Euphaea impar. Malaysian Naturalist 59 (1): 46-48. (in English) [Verbatim: [...] The female lifted herself, and hovered over the stream at a height of 15-20cm. Suddenly, she dived at high speed into the stream against the current at an angle of 45-70 de-

grees. She failed to break the water surface, however, as the running water was too fast. She then retreated to her original perch, [...] but after five minutes, she tried diving again into the same spot. This time she successfully penetrated the water. [...] In the water, she clung to the slime-covered rocks and plant roots at the bottom of the stream, which was 5-10cm deep. Slowly, she crawled forwards and backwards, ovipositing eggs. All the time her head was against the water current so that her body and wings were anti-parallel to the water flow. After she had finished depositing her eggs, she suddenly released her legs, allowing the current to push her out of the water. She then vanished into the forest. The entire underwater process took 30 minutes. Corbet (1983) described submerged oviposition as a slow backing down into the water. Therefore, my observation of flight-dive oviposition has not yet been recorded in odonates [John Truemen, pers. comm.]. Most members of the family Euphaeidae breed in running water (Silsby 2001), so it is not surprising to note that E. impar chooses to oviposit in fast-running forest streams. The flight-dive oviposition behaviour with the absence of any male might explain Silsby's (2001) comment that copulation and oviposition has rarely been witnessed in Euphaeidae. [...] Address: Choong, C.Y., School of Environmental and Natural Resource Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Room: 4107, Banguan Sains Biologi, malaysia. E-mail: cychoong@ukm.my

**7243.** Dijkstra, K.-D (2006): The blue-eyed damselfly: Why "Cercion" should be called Erythromma lindenii. Brachytron 8(2): 20-24. (in Dutch, with English summary) ["Weekers & Dumont (2004) proved through molecular studies what Heidemann & Seidenbusch (1993) already suggested by larval characters: Cercion is a synonym of Erythromma. Compared to European Coenagrion and Enallagma species. Erythromma with the inclusion of E. lindenii differs by: (1) Numerous bristles on the larval stemites. (2) Similarities in DNA. (3) Elongated cerci with bifid tip and large basal tooth; paraprocts reduced to small points. (4) Subcostal cells distal of pterostigma often duplicated, especially in hindwing. (5) Reduced postocular spots. (6) Completely black dorsum of abdominal segment 2. (7) Blue abdominal tail-light' shifted distally to segments 9-10. (8) Eyes brightly coloured without blackish dorsum, contrasting with black dorsum of bead. (9) Reproductive activity on emergent and floating vegetation away from the shore. The blue body and eyes of lindenii possibly represent a reversal to a plesiomorphic character state. This relatively minor difference with other Erythromma species has led to the traditional association of E. lindenii with taxa that are merely superficially similar (like Coenagrion) and the oversight of its true identity." (Author)] Address: Dijkstra, K.D., Curator of invertebrates, National Zoological Collection of Suriname, University of Suriname, P.O. Box 9212, Paramaribo, Suriname. E-mail: Dijkstra@naturalis.nnm.nl

**7244.** Gibson, V. (2006): A study of the copulatory behaviour of three pairs of the Migrant Hawker Aeshna mixta Latreille in the wheel position. J. Br. Dragonfly Society 21(2): 47-54. (in English) [Old Moor, South Yorkshire, UK; three uninterrupted recordings from September 2003 of pairs of A. mixta in the "wheel position" are described in detail.] Address: Gibson, V., 45 St George's Court, Beet Street, Sheffield S3 7GF, UK

- 7245.** Huang, D.-y.; Nel, A.; Shen, Y.; Selden, P.A.; Lin, Q.-b. (2006): Discussions on the age of the Daohugou fauna - evidence from invertebrates. *Progress in natural science* 16(Special Issue): 308-312. (in English) ["Volcanic tuff deposits near Daohugou village, Ningcheng County of Inner Mongolia have yielded many well-preserved fossils. Here we briefly introduce our recent findings of invertebrates from the Daohugou fauna: mainly insects, conchostracans, anostracans, and spiders. The age of the Daohugou fauna is considered to be Middle Jurassic on the basis of an analysis of various invertebrates especially insects and conchostracans, showing strong similarities to the Yanliao fauna of north China and the Karatau fauna of Kazakhstan." (Authors) Odonata are represented by isophlebioid species. A few species of *Aktassia* are also recorded, which are nearly identical to the type species from Karatau.] Address: Huang, D.-y., Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China. E-mail: huangdiy-ing@sina.com
- 7246.** Humala, A.E. (2006): On the insect fauna of "Kivach" Nature Reserve. *Proceedings of Karelian Research Centre of the Russian Academy of Science* 10: 153-159. (in Russian, with English summary) [23 Odonata species are listed.] Address: not stated
- 7247.** Juen, L. (2006): Distribution of Odonata species and beta diversity pattern among streams of Central Amazonia. *Dissertação apresentada à Universidade Federal de Viçosa, como parte das exigências do Programa de Pós-Graduação em Entomologia, para obtenção do título de Magister Scientiae*. Viçosa. Minas Gerais. Brasil: VIII, 64 pp. (in Portuguese, with English summary) ["The Amazon region has the largest drainage basin of the world, which is constituted by a diversity of waterbodies, and almost all of them are resulting from the junction of small streams ("igarapes") that drain the forest. The igarapes present acid, nutrient-poor waters, and their food chains are dependent on allochthonous materials provided by the forest that fall into the igarape, as pollen, flowers, fruits, leaves, branches, insects and spiders. In spite of that, the Terra-Firme system in the Amazon is recognized as the ecosystem of higher species diversity on the planet. This work aimed to describe the distribution and the beta diversity pattern of the species comprising the Odonata communities present in the Adolfo Ducke Forest Reserve river basins. It also objectives to provide information about determining factors of the fauna similarity among sites, in order to select viable units for Odonata conservation. Samples were carried out in 24 igarapes (eleven of 15', eight of 2U and five of 31 order) distributed in four river basins, and in each basin it was conducted samples in six igarapes. The samples constituted on visual counting of adult individuals of Odonata present in 100 meters along each waterbody, divided into 20 stretches of 5 meters. The sampling time constituted of one hour duration on average. The total fauna of Odonata founded in the Ducke Reserve was of 17 species observed and 23 (= 4,77) estimated. The cluster analysis of the abiotic data demonstrated high similarity among the igarapes. The micro-drainage basins were compared in relation to species richness and they were similar statistically, and the same result was also obtained for beta diversity. The low value of beta diversity index demonstrated high fauna similarity among the igarapes. The relationship of beta diversity between the environmental data and the distance among the igarapes was highly non-significant. The low values of beta diversity index may be attributed to the high similarity of the environmental data, which presented small variation in the abiotic data, and also to the distance scale of this study, which may be small enough to not represent a barrier to Odonata dispersion. Another factor that may have contributed to these values is the occurrence of a long period of environmental stability in the Amazon that allowed the species distribution in the environment, even those with low dispersion capacity. The basic environmental variables (channel width and depth) were related to species richness increase. These results are important to species conservation, and indicate the necessity of including intermediate-size streams, with higher variation in depth and channel width, to be used as one selection criteria in the choice of environmental protection areas.] Address: not stated
- 7248.** Kalnins, M. (2006): An investigation of dragonfly (Odonata) ecology at the Titmanu oxbow, Gauja National Park, Latvia. *Acta Biol. Univ. Daugavp.* 6(1-2): 103-108. (in English, with Latvian summary) [In 2005, 29 species of dragonfly were recorded from Titmaiju oxbow, Latvia, namely: *Aeshna cyanea*, *A. grandis*, *A. juncea*, *Brachytron pratense*, *Calopteryx splendens*, *C. virgo*, *Coenagrion hastulatum*, *C. puella*, *C. pulchellum*, *Enallagma cyathigerum*, *Erythromma najas*, *Cordulia aenea*, *Somatochlora arctica*, *S. flavomaculata*, *S. metallica*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Lestes sponsa*, *Sympecma paedisca*, *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis*, *L. rubicunda*, *Libellula quadrimaculata*, *Sympetrum danae*, *S. flaveolum*, *S. sanguineum*, *S. vulgatum*, and *Platycnemis pennipes*. *Aeshna viridis* recorded previously was not confirmed. Special emphasis is given to the phenology of the species.] Address: Kalniņš, M., Department of Zoology and Animal Ecology, Faculty of Biology, University of Latvia, Kronvalda Bulv. 4, Riga LV-1586, Latvia. E-mail: martins.kalnins@dap.gov.lv
- 7249.** Koch, V. (2006): Escargot et libellule. *MalaCo* 2: 33. (in French) [A mollusc (Succineidae) was attached to the abdomen of a just emerged *Crocothemis erythraea* (2-VI-2005, 1 km south of Mouzon, Ardennes, France). *C. erythraea* took flight to a near perch, and after 5 to 8 minutes the mollusc dropped down to the ground.] Address: not stated
- 7250.** Koops, R.-J.; Schut, D.; Groenendijk, D. (2006): Ecological differences between *Leucorrhinia dubia* and *L. rubicunda* in The Netherlands. *Brachytron* 8(2): 3-11. (in Dutch, with English summary) ["The population trend of *L. dubia* is negative, whereas the abundance rate of *L. rubicunda* showed a slight increase during the same period. However, in general both species share the same type of habitat and therefore it was questioned what the reason might be for this difference in abundance rates. The aim of this study was to assess the ecological differences between these two dragonfly species. In total 24 mostly acidic soft water shallow lakes were sampled on *Leucorrhinia* larvae. Two or more transects were placed in different parts of the pools. From each transect different measurements were taken, like pH, conductivity, water depth, detritus layer and vegetation composition. The results suggest that *L. dubia* has a smaller pH-range in comparison to *L. rubicunda*. Both *Leucorrhinia* species prefer heathland above forest in the direct surrounding of a shallow lake. The



vegetation surveys show that both dragonfly species are strongly correlated with the presence of peat moss (*Sphagnum* sp.). The results also indicates that *L. rubicunda* has a wider ecological niche than *L. dubia*. The habitats of both species are acid or slightly acidic, oligo- to mesotrophic moorland pools with *Sphagnum* vegetation; however. *L. rubicunda* range includes a lower pH. Therefore it may be more resistant to acidification." (Authors)] Address: Groenendijk, D., De Vlinderstichting, Postbus 506, NL 6700 AM Wageningen, The Netherlands. E-mail: dick.groenendijk@vlinderstichting.nl

**7251.** Mattei, D.; Cataudella, S.; Mancini, L.; Tancioni, L.; Migliore, L. (2006): Tiber river quality in the stretch of a sewage treatment plant: Effects of river water or disinfectants to *Daphnia* and structure of benthic macroinvertebrates community. *Water Air Soil Pollut.* 177: 441-455. (in English) [oas 23;The evaluation of Tiber River quality, in a stretch including a sewage treatment plant, has been carried out by the contemporary evaluation of water effect on *Daphnia* and benthic macroinvertebrates community structure. To achieve a good status of a river water by the end of 2015, as provided in the Water Framework Directive (WFD) 2000/60/EC, is necessary to know the quality starting point. To this end, several endpoints are expected by the WFD, including *Daphnia* toxicity test and macroinvertebrate community analysis. River water sampling was conducted in the four seasons, from upstream to downstream a sewage treatment plant. I endpoint. At the outfall of the sewage treatment plant, river water showed very high acute toxicity to *Daphnia* only in summer; some toxic effect can be found also upstream in spring. Results at the outfall were consistent with the hypothesis that disinfectants, mainly used in summer to treat discharging waters, are responsible of river water acute toxicity: *Daphnia* tests with each disinfectant (NaClO, PAA, ClO<sub>2</sub>) showed high toxicity. River waters were also utilized in *Daphnia* reproduction tests. Samples at the outfall (excluding the summer one, undoubtedly toxic) caused slight reduction in survival and fecundity. Disinfectants were also checked in reproduction tests. Still at NOEC<sub>24h</sub>, they caused a significant toxicity on both death rate and reproduction. II endpoint. Macroinvertebrate benthic community composition (including *Ischnura*, *Pyrrosoma*, *Platycnemis*, and *Orthetrum*) was evaluated upstream and downstream the sewage treatment plant, on these data Extended Biotic Index (EBI), was determined to get a score as quality class. A reduction of water quality score was found downstream the plant, one season delayed (autumn) respect the acute test on *Daphnia*. Effect of disinfectant discharge, river dilution capability on a short spatial scale and use of different endpoints are discussed in term of river stretch quality.] Address: Migliore, Luciana, Dipartimento di Biologia, Università "Tor Vergata", Via della Ricerca Scientifica I-00133 Roma, Italy. E-mail:luciana.migliore@uniroma2.it

**7252.** Moore, N.W. (2006): Use of the herbicide Glyphosate to control Common Reed (*Phragmites australis*) and its effects on dragonfly populations. *J. Br. Dragonfly Society* 21(2): 37-42. (in English) ["Conclusions: Spraying the encroaching reed bed on my pond in August 2003 succeeded in killing off all the reeds. One pair of Reed Warblers lost their habitat and disappeared. Otherwise there was no evidence of harm to Moorhens, Grass Snakes, Smooth Newts and dragonflies; on the contrary, the increase of suitable habitat allowed

the populations of adult insects to increase. It is just possible that some Smooth Newts and some larvae of *Pyrrosoma nymphula*, which were sprayed in the first year of their development, were adversely affected. In the instance of my pond, spraying was clearly beneficial. To what extent is my experience generally applicable? The toxicity of a herbicide can be affected by concentration levels and formulations; the effects in the field can be affected by weather and the date of spraying. Nevertheless when the choice is between losing most if not all of the dragonflies and relatively small risks attendant on any herbicide application, the risk is obviously worth taking. The experience of others in similar circumstances would be valuable." (Author)] Address: Moore N.W., The Farmhouse, 117 Boxworth End, Swavesey, Cambridge CB4 5RA, United Kingdom

**7253.** Nedbalová, L.; Vrba, J.; Fott, J.; Kohout, L.; Kopáček, J. (2006): Biological recovery of the Bohemian Forest lakes from acidification. *Biologia*, Bratislava, 61/Suppl. 20, Section Zoology: S453-S465. (in English) [Czech Republic; Bavaria, Germany. "A limnological survey of eight small, atmospherically acidified, forested glacial lakes in the Bohemian Forest (Šumava, Böhmerwald) was performed in September 2003. Water chemistry of the tributaries and surface layer of each lake was determined, as well as species composition and biomass of the plankton along the water column, and littoral macrozoobenthos to assess the present status of the lakes. The progress in chemical reversal and biological recovery from acid stress was evaluated by comparing the current status of the lakes with results of a survey four years ago (1999) and former acidification data since the early 1990s. Both the current chemical lake status and the pelagic food web structure reflected the acidity of the tributaries and their aluminium (Al) and phosphorus (P) concentrations. One mesotrophic (Plešné jezero) and three oligotrophic lakes (Ěrné jezero, Ěrtovo jezero, and Rachelsee) are still chronically acidified, while four other oligotrophic lakes (Kleiner Arbersee, Prášílské jezero, Grosser Arbersee, and Laka) have recovered their carbonate buffering system. Total plankton biomass was very low and largely dominated by filamentous bacteria in the acidified oligotrophic lakes, while the mesotrophic lake had a higher biomass and was dominated by phytoplankton, which apparently profited from the higher P input. In contrast, both phytoplankton and crustacean zooplankton accounted for the majority of plankton biomass in the recovering lakes. This study has shown further progress in the reversal of lake water chemistry as well as further evidence of biological recovery compared to the 1999 survey. While no changes occurred in species composition of phytoplankton, a new ciliate species was found in one lake. In several lakes, this survey documented a return of zooplankton (e.g., Cladocera: *Ceriodaphnia quadrangula* and Rotifera: three *Keratella* species) and macrozoobenthos species (e.g., Ephemeroptera and Plecoptera). The beginning of biological recovery has been delayed for ~20 years after chemical reversal of the lakes." (Authors) The list of taxa includes eight Odonata species.] Address: Nedbalová, Linda, Biology Centre AS CR, Institute of Hydrobiology, Na Sádkách 7, CZ-37005 Ěeské Budjovice, Czech Republic

**7254.** Osenimskiy, B.I. (2006): [Short results of inventory of the fauna of the "Jagorlyk" reserve]. In: I.D. Trombitskiy, T.D. Sharapovskaya (Eds). Reserve "Jagorlyk". *Eco-TIRAS*, Tiraspol: 28-36. (in Russian) [Moldova; Ca-

lopteryx splendens, Ischnura elegans, Playcnemis pennipes, Aeshna juncea, and Sympetrum vulgatum are listed.] Address: E-mail: ecotiras@mtc.md; www.ecotiras.org

**7255.** Ramberg, L.; Hancock, P.; Lindholm, M.; Meyer, T.; Ringrose, S.; Sliva, J.; van As, J.; VanderPost, C. (2006): Species diversity of the Okavango Delta, Botswana. *Aquatic Sciences* 68: 310-337. (in English) ["Pinhey recorded a total of 92 species in the Delta. 25 years later Kipping found one species new for the area and one new for science. On the other hand he could only find 70 out of the 92 species found by Pinhey, although his sampling intensity compares well with that of Pinhey both in time and space. Nine of the "missing" species are Zygoptera and seven of them had been recorded from three or more localities in the Delta. Out of the 13 Anisoptera that could not be found again, five had been found in three or more localities. For the species found in only 1–2 localities the problems of sampling rare species arise. However, when there are indications that species which were fairly wide spread up to the mid-seventies are now absent, there are reasons to look for other explanations. There has been a gradual decline in flooding of the Delta since the mid-seventies which could have resulted in a loss of suitable aquatic habitats for the larvae or in a loss of suitable flying prey for hunting adults. Another factor is the aerial spraying against tsetse flies in the Delta which took place during the eighties and then again 2001–02. During the first period fairly potent insecticides such as dieldrin were used but over smaller areas in each year. In the recent spraying, however, the entire Delta south of the Panhandle was sprayed; the northern part in 2001 and the southern part in 2002; totaling to about 17,000 km<sup>2</sup>. Deltamethrin was used which has some good properties such as its short half-life in nature and its specificity for invertebrates. Adult Odonata experienced high mortality during the spraying of deltamethrin and the same results were recorded for larvae of the families living on the sediment surface or on vegetation." (Author).] Address: Ramberg, L., Harry Oppenheimer Okavango Research Centre, University of Botswana, P. Bag 285, Maun, Botswana. E-mail: ramberg@mopipi.ub.bw

**7256.** Schultz, H.; Hess, M.; Graf, W.; Janecek, B.; Reusch, H. (2006): Das Makrozoobenthos der Natura 2000-Gebietes St. Lorenzener Hochmoor (Andertal, Kärnten) unter besonderer Berücksichtigung der Libellenfauna (Insecta: Odonata). *Carinthia II* 196/116/2: 343-358. (in German, with English summary) ["During the years 2003 and 2004 131 taxa of benthic macroinvertebrates (including 9 Odonata species) were collected at the Natura 2000 site St. Lorenzener Hochmoor in Carinthia, Austria. The occurrence of *Coenagrion hastulatum*, *Aeshna juncea*, *Leucorrhinia dubia*, and *Somatoclora alpestris* indicates a typical coenosis of peatbogs. This Odonata community is documented for Carinthia at Andertal only and represents therefore supra-regional importance. The evidence of *Leucorrhinia pectoralis* is top-ranking." (Authors)] Address: Schultz, Heike, Theodor-Kramer-Straße 12/1/14, A-1220 Wien, Austria. E-Mail: heschu@gmx.at

**7257.** Sell, M.; Viebahn, H. (2006): Von Prachtjungfern, Eintagsfliegen und Teichmuscheln. In: Von Eisvögeln, Prachtjungfern und Gänsesägern. Natur an der Ruhr. Herausgeber: das ruhrtal & Regionalverband Ruhrgebiet, Essen. Klartext Verlag, Essen. ISBN 3-89861-560-

X: 69-71. (in German) [General on nature and landscape in the Ruhrgebiet-region, Nordrhein-Westfalen, Germany, with emphasis on Odonata.]

**7258.** Sintupachee, S.; Milne, J.R.; Poonchaisri, S.; Baimai, V.; Kittayapong, P. (2006): Closely related *Wolbachia* strains within the pumpkin arthropod community and the potential for horizontal transmission via the plant. *Microbial Ecology* 51: 294-301. (in English) ["Phylogenetic studies have implicated frequent horizontal transmission of *Wolbachia* among arthropod host lineages. However, the ecological routes for such lateral transfer are poorly known. We surveyed the species of two arthropod communities, one on pumpkin and the other on loofah plants, for *Wolbachia*, constructed *wsp* gene phylogenies of those *Wolbachia* strains found to infect community members, and established ecological links among infected members. Four taxonomically diverse insects in the pumpkin arthropod community contained very closely related *Wolbachia* *wsp* sequences (G1.5% divergence by Kimura-2-parameter distances). These insects, namely, the whitefly *Bemisia tabaci*, the planthopper *Nisia nervosa*, the flea beetle *Phyllotreta* sp., and the fleahopper *Halticus minutus*, were all collected from pumpkin leaves. They were ecologically linked through feeding on the same leaf substrate. Unlike other infected leaf insects, the whitefly population appeared to have a permanent breeding relationship with pumpkin plants, and high and stable, but not fixed, monthly *Wolbachia* infection rates. Our findings suggest potential roles for the plant in *Wolbachia* transmission and for whiteflies in being an infection source for other pumpkin leaf-feeding insects." (Authors) The tests included *Ischnura* sp.] Address: Milne, J.R., Department of Biology, Faculty of Science, Mahidol University, Rama VI Road, Bangkok 10400, Thailand. E-mail: frjm@mahidol.ac.th

**7259.** Skilsky, I.V.; Khlus, L.N.; Meleshchuk, L.I. (2006): Trophic relations of Stonechat of the Prut-Dniester interfluvium of Ukraine and Bukovinian Carpathians. *Ecologia, Berkut* 15(1-2): 132-137. (in Russian, with English summary) [Stomach contents of 24 stonechats (*Saxicola torquata*) collected in Chernivtsi region (West Ukraine) during the second half of the XXth century contained remnants of at least 50 species of invertebrates. Small Coleoptera (50.6 %) and Hymenoptera (21.5 %) dominate. The diet is more diverse during spring and summer. *Coenagrion hastulatum*, *Aeshna cyanea*, and *Gomphus vulgatissimus* are listed as prey of *S. torquata*.] Address: Skilsky, I.V., P.O. Box 532, 58001 Chernivtsi, Ukraine. E-mail: bwasil@chv.ukrpack.net

**7260.** Strayer, D.L. (2006): Challenges for freshwater invertebrate conservation. *J. N. Am. Benthol. Soc.* 25(2): 271-287. (in English) ["Freshwater invertebrate conservation faces 5 important challenges. First, 10,000 species of freshwater invertebrates around the world may already be extinct or imperiled. Second, human pressures on freshwater resources are intense and will increase in the coming decades, putting yet more species at risk. Third, scientific knowledge about freshwater invertebrates, although substantial and useful for many groups, is far less than for the vertebrates for which much of contemporary conservation biology was designed. Even the best-known freshwater invertebrates that have achieved legal protection are perhaps 1% as well studied as the typical vertebrate. Fourth, becau-

se freshwater ecosystems are downhill from and embedded in their watersheds, freshwater conservation usually has to manage entire watersheds rather than small local sites where imperiled species occur. Fifth, society spends only modest amounts of money for freshwater invertebrate conservation. The median expenditure in Fiscal Year 2003 for freshwater invertebrate species on the US Endangered Species List was only US\$24,000, and only a small minority of imperiled species is listed and receives even this modest attention. Considering these serious challenges, I believe that we need to think deliberately about the best approaches for conserving freshwater invertebrate biodiversity. The best solution may be to move away from a species-based approach that is largely derived from a terrestrial model towards broader, regional approaches that try to satisfy legitimate human needs for fresh water while preserving as much biodiversity as possible." (Author) Unionoid mussels are said to have in USA a higher degree of endemism than dragonflies (Anisoptera).] Address: Strayer, D.L., Institute of Ecosystem Studies, P.O. Box AB, Millbrook, New York 12545 USA. E-mail: strayerd@ecostudies.org

**7261.** Tyrrell, M. (2006): Observations on emergence and duration of adult life of the Hairy Dragonfly *Brachytron pratense* (Müller). *J. Br. Dragonfly Society* 21(2): 43-46. (in English) [*B. pratense* expanded its range in Northamptonshire, UK over the last eight years. During the 2005 flight season, regular visits were made to observe emergence behaviour at two breeding sites that support large numbers of *B. pratense*: Ditchford Takes and Meadows Local Nature Reserve (British National Grid Reference SP 934682) and Wilson's Pits (SP 945683). Exuviae were collected, measured and the sex was determined. The emergence patterns for both sexes are presented both as a bar chart and as a cumulative percentage of the total emergence.] Address: Tyrrell, M., 8 Warwick Close, Raunds, Wellingborough, Northamptonshire NN9 6JH, UK

**7262.** Ward-Smith, J. (2006): Population expansion of Small Red Damselfly *Ceriatagrion tenellum* (Villers) in south-east Berkshire. *J. Br. Dragonfly Society* 21(2): 55-67. (in English) ["Since the early 1990s, as a result of a number of conservation measures, there has been a substantial increase in the population and local distribution of *C. tenellum* in the area around Bracknell in south-east Berkshire, UK. Here, details of the sites at which the species has recently been recorded are presented. To provide a context for the changed status of the species, historical records are discussed and the influence of habitat management considered." (Authors)] Address: Ward-Smith, J. 11 The Ridgeway, Bracknell, Berkshire RG12 9QU, UK DS: 26 Moffats Close, Sandhurst, Berkshire GU47 9EN, UK

**7263.** Yasuoka, J.; Levins, R.; Mangione, T.W.; Spielman, A. (2006): Community-based rice ecosystem management for suppressing vector anophelines in Sri Lanka. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 100: 995-1006. (in English) ["Sri Lanka is one of the Asian countries most affected by mosquito-borne diseases, especially malaria. This 18-month study assessed the effectiveness of a new community-based ecosystem management programme to control mosquito vectors in the country's rice ecosystem. Farmers in a malaria-prone village were educated and motivated to engage in source reduction as well as

measures to restore and maximise rice ecosystem functions. Over the course of the programme, the impact of farmers' ecosystem management on local mosquito ecology was also examined. Although little impact was detected on *Culex* and *Aedes* densities, adult *Anopheles* density was significantly suppressed in the south-west monsoon season. Rice farmers who manage their ecosystems can reduce the burden of *Anopheles* mosquitoes, interrupt malaria transmission and prevent the destruction of ecosystems." (Authors) Aquatic insect samples include dragonfly nymphs (Aeshnidae, Gomphidae, Libellulidae).] Address: Yasuoka, J., Dept of Population and International Health, Harvard School of Public Health, Building I, Room 1219, 665 Huntington Avenue, Boston, MA 02115, USA. E-mail: jyasuoka@post.harvard.edu

## 2007

**7264.** Barbarin, J.-P. (2007): Sur la presence de *Leucorrhinia pectoralis* (Charpentier, 1825) dans le Cantal tourbiere du Jolan - Segur-les-Villas. *Arvernis* 39-40: 1-8. (in French) [France, history of records/proofs of the species and the local habitat of *L. pectoralis* are outlined in detail.] Address: Barbarin, J.-P., Société d'Histoire Naturelle Alcide d'Orbigny, 12 place des écoles, F-63160 Billom, France. E-mail: jpbarbarin@shnao.net

**7265.** Brockhaus, T. (2007): Bildet der Jenissei eine pleistozän entstandene Faunengrenze? Eine Diskussion am Beispiel der paläarktischen Libellenfauna (Odonata). *Entomol. rom.* 12(1): 41-59. (in German, with English summary) ["The current distribution of many palaeartic dragonflies can be explained by a hypothetic peri-glacial fauna that existed through the entire ice age. This amends the established hypotheses claiming the sole re-immigration from refugia in post-glacial times. The peri-glacial dragonfly fauna may be the cold-tolerant part of a pre-glacial pliocene fauna. With the new hypothesis the following types of distribution of palaeartic dragonflies can be explained: • species with a trans-palaeartic east to west distribution, e. g. *Lestes sponsa*, *Sympetrum danae* • species with a trans-palaeartic east to west distribution, centring in the boreal zone, e. g. *Aeshna crenata*, *Somatochlora sahlbergi* • western and eastern palaeartic distributions of subspecies and closely related species, e. g. *Leucorrhinia rubicunda* and *L. intermedia* • cold-tolerant species with a disjunctive distribution, e. g. *Coenagrion hylas*, *Somatochlora alpestris* More types of distribution are presented, such as western and eastern palaeartic ranges and ranges which are the results of refugia (*Coenagrion mercuriale*, *Somatochlora meridionale*, *Ischnura aralensis*). During the peak of the Saale glacial period when even western Siberia was covered by an icesheet parts of the peri-glacial fauna were probably subdivided into eastern and western populations. This may have happened near the Jenissei river or further east around the Jenissei, Western and Eastern Sajon mountain ranges. The genetic differentiation of these populations led to their current status as subspecies or species. The ranges of some cold-tolerant species disintegrated after the ice-age leading to boreo-montane and other disjunctions." (Author)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de



**7266.** Cannings, R.A. (2007): Recent range expansion of the Praying Mantis, *Mantis religiosa* Linnaeus (Mantodea: Mantidae), in British Columbia. *J. entomol. soc. British Columbia* 104: 73-80. (in English) [*M. religiosa*, "was introduced into eastern North America in the 1890s and is now a common species throughout much of the eastern United States and southern Ontario and Quebec. It was introduced from Ontario into the southern interior of British Columbia to control grasshoppers in 1937 and 1938. These introductions became established only in the southern Okanagan Valley where populations have persisted from Okanagan Falls south to Osoyoos. Since the late 1990s, the species' range has expanded from the South Okanagan north at least to Kamloops and east to Nelson. In addition, in the core of its traditional British Columbia range, the South Okanagan, this mantid has become more commonly encountered during the past decade. *M. religiosa* has also been collected on Vancouver Island. Specimen, photograph and sight records that document this change in status are listed and discussed and a distribution map is included. Characters used to distinguish *M. religiosa* from the native Ground Mantis, *Litaneutria minor*, and the exotic Chinese Mantis, *Tenodera aridifolia sinensis*, which is available commercially as a bio-control agent, are summarized." (Author) The paper includes a photograph of a preying mantid on *Sympetrum obtrusum*.] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street Victoria, British Columbia V8W 9W2. Canada. E-mail: rcannings@royalbcmuseum.bc.ca

**7267.** Costa, J.M.; Machado, A.B.M. (2007): Two new species of *Neocordulia* Selys, 1882 from southern Brazil (Anisoptera: Corduliidae). *Lundiana* 8(2): 143-146. (in English) ["Two new species of *Neocordulia* Selys, 1882 — *N. fiorentini* sp. n. and *N. gaucha* sp. n. — both from Rio Grande do Sul, Brazil, are described and illustrated. They differ from other species of the genus mainly by the shape of anal appendages, sternal protuberance of abdominal segment 8 and sternum of abdominal segment 9." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@acd.ufrj.br

**7268.** Craves, J.A.; O'Brien, D.S. (2007): *Erythrodiplax umbrata* (Odonata: Libellulidae): new for Michigan. *The Great Lake Entomologist* 40(1/2): 95-97. (in English) [*E. umbrata*, collected in Wayne County, Michigan, USA on 6-X-2007 represents "the first records for this genus and species in the state, as well as the northernmost record for the species. They were found during a period in which many individuals were seen or photographed in Ohio, which prior to 2006, had only two records." (Authors)] Address: Craves, Julie, 2Rouge River Bird Observatory, University of Michigan-Dearborn, Environmental Interpretive Center, Dearborn, MI 48128, USA. E-mail: jcraves@umd.umich.edu

**7269.** Dallas, H.F. (2007): The influence of biotope availability on macroinvertebrate assemblages in South African rivers: implications for aquatic bioassessment. *Freshwater Biology* 52: 370-380. (in English) ["1. Macroinvertebrate biotope preferences and the influence of differences in the availability of biotopes on individual taxa, macroinvertebrate assemblages and a biotic index, the South African Scoring System (SASS), were

investigated in two regions of South Africa. 2. Among biotope differences in individual taxa and macroinvertebrate assemblages resulted in differences in SASS scores, with differences in assemblages being greater among biotopes than between sites. 3. All three metrics studied (SASS score, number of taxa and average score per taxon, ASPT), differed significantly among biotopes, with highest scores consistently recorded in the stones biotope, while lowest SASS scores and fewest taxa were recorded in the sand biotope. 4. SASS score and number of taxa were positively, while ASPT was negatively correlated with number of biotopes sampled. 5. The observed biotope differences highlight the importance of sampling and comparing data from sites separately for each biotope." (Author) Odonata are treated on the family level.] Address: Dallas, Helen, Department of Zoology, University of Cape Town, Private Bag Rondebosch, Cape Town, Western Cape 7700, South Africa. E-mail: hdallas@botzoo.uct.ac.za

**7270.** David, A.; Cicort-Lucaciu, A.-S.; Szabo, A.L.; Ciuca, A.S.; Cserved, K. (2007): Feeding of a *Triturus vulgaris* population from Teuz Valley area, Arad county, Romania. *Biharean Biologist* 1: 57-61. (in Romanian, with English summary) [Odonata were found in the diet of the Common newt.] Address: Cicort-Lucaciu, A.-S., Babes-Bolyai University, Faculty of Biology and Geology, Cluj-Napoca, Romania

**7271.** Dudley, S.; Dudley, C.; Mackay, A. (2007): *Watching British Dragonflies*. Subbuteo Natural History Books. ISBN-13: 9780856611124: 341 pp. (in English) ["Contents: Quick ID Guide: A 14 page section with side by side comparison of each regular British species by family. Species accounts: covers 46 species. All British breeding species receive a 2 page spread (vagrants receive a single pages) with specially commissioned artwork opposite concise species accounts. Site Guide: featuring 94 of Britain's top dragonfly watching sites. All sites get at least a full page (some key sites such as Thurlsey Common in Surrey receive 2 pages) with full access details, species to look for, best time to visit and a site map. Gazetteer: 95 pages of sites to visit in England, Wales, Scotland and Northern Ireland." (Publisher) For a critical review see: [http://www.amazon.co.uk/review/product/0856611123/ref=dptopcmrcra\\_crtxt/278-6594008-2625421?%5Fencoding=UTF8&showViewpoints=1](http://www.amazon.co.uk/review/product/0856611123/ref=dptopcmrcra_crtxt/278-6594008-2625421?%5Fencoding=UTF8&showViewpoints=1)

**7272.** Evenhuis, N.L. (2007): The Godeffroy Museum catalogs in relation to Fiji terrestrial arthropods. Part I: Introduction and review of Myriapoda, Diptera, Odonata, and smaller Hexapod orders. *Bishop Museum Occasional Papers* 91 (Fiji Arthropods VII Edited by Neal L. Evenhuis & Daniel J. Bickel): 17-28. (in English) ["Catalogs of the Godeffroy Museum in Hamburg are reviewed in relation to their listings of Fijian terrestrial arthropods. A table of names of Fijian terrestrial arthropods listed in the catalogs available for study is presented with discussion of the nomenclatural and taxonomic implications. The names of arthropods in the Blattodea, Dermaptera, Diptera, Neuroptera, Myriapoda, Odonata, Phasmida, and Trichoptera are tabulated." (Author)] Address: Evenhuis, N.L., Pacific Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, Hawaii 96817, USA. E-mail: neale@bishopmuseum.org

**7273.** Figueira Van de Koken, A.; Ribeiro Matos, F.A.; Lemes Martins, R. (2007): *Comportamento de Pantala*

flavescens (Odonata, Anisoptera, Libellulidae) e perda do investimento reprodutivo em áreas antropizadas. Boletim do Museu de Biologia Prof. Mello Leitao (Nova Série) 21: 7-18. (in Portuguese, with English summary) ["Behaviour of *P. flavescens* and waste of reproductive investment in urban areas - *P. flavescens* is an exophytic, territorial and migratory dragonfly. Due to its migratory behaviour, this species is commonly recorded in dry areas. However, the presence of *P. flavescens* in parking areas and the occurrence of ovipositions over reflective automobile hood surfaces are not well understood. This work presents data on the behaviour of *P. flavescens* in different areas with and without vehicles to evaluate the reproductive investment of this species in parking areas. There was correlation between the frequency of *P. flavescens* captures and the number of parked vehicles. We also recorded preference for thermoregulation activities over light-colored cars (higher light reflection indexes). Focal observation indicates that common behaviours at parking areas were similar to those registered at flooded areas and very distinct from those observed over pasture, where we registered only foraging behaviour. Eggs collected over car hood were fecundated and viable, indicating some waste of reproductive investments. Results suggest that parking areas could favour the occurrence of *P. flavescens* at urban areas. However the loss in reproductive efforts could be selecting against the animals showing this behaviour." (Authors)] Address: Figueira Van de Koken, Antonia, FAESA – Faculdade de Saúde e Meio Ambiente. Rua Serafim Derenzi 3115 Campus II, São Pedro, CEP 29053-250, Vitória – ES, Brasil. E-mail: antoniafigueira@gmail.com

**7274.** Gligorovic, B.; Pesic, V. (2007): Contribution to knowledge of the dragonflies (Odonata) from Lake Skadar's drainage basin (Montenegro). *Acta entomologica serbica* 12(2): 1-16. (in English) ["An updated list of the Odonata of the Lake Skadar's drainage basin is given, including 45 species and subspecies. Two of them - *Sympecma fusca* and *Ceriagrion tenellum* are new for the fauna of Odonata of Montenegro, while *Brachytron pratense* and *Aeshna isosceles* are recorded for the first time in the Lake Skadar's basin. Findings of *Orthetrum coerulescens* are of the particular interest having in mind distribution of *O. coerulescens* subspecies in this part of Europe." (Authors)] Address: Gligorovic, B., Dept of Biology, Faculty of Sciences, Univ. of Montenegro, Cetinjski put b.b., 81000 Podgorica, Montenegro, E-mail: bogic1@cg.yu

**7275.** Gunzburger, M.S. (2007): Evaluation of seven aquatic sampling methods for amphibians and other aquatic fauna. *Applied herpetology* 4: 47-63. (in English) ["To design effective and efficient research and monitoring programs researchers must have a thorough understanding of the capabilities and limitations of their sampling methods. Few direct comparative studies exist for aquatic sampling methods for amphibians. The objective of this study was to simultaneously employ seven aquatic sampling methods in 10 wetlands to compare amphibian species richness and number of individuals detected with each method. Four sampling methods allowed counts of individuals (metal dipnet, D-frame dipnet, box trap, crayfish trap), whereas the other three methods allowed detection of species (visual encounter, aural, and froglogger). Amphibian species richness was greatest with froglogger, box trap, and aural samples. For anuran species, the sampling methods by

which each life stage was detected was related to relative length of larval and breeding periods and tadpole size. Detection probability of amphibians varied across sampling methods. Box trap sampling resulted in the most precise amphibian count, but the precision of all four count-based methods was low (coefficient of variation > 145 for all methods). The efficacy of the four count sampling methods at sampling fish and aquatic invertebrates was also analyzed because these predatory taxa are known to be important predictors of amphibian habitat distribution. Species richness and counts were similar for fish with the four methods, whereas invertebrate species richness and counts were greatest in box traps." Odonata accounted most significantly to this result. "An effective wetland amphibian monitoring program in the southeastern United States should include multiple sampling methods to obtain the most accurate assessment of species community composition at each site. The combined use of frogloggers, crayfish traps, and dipnets may be the most efficient and effective amphibian monitoring protocol." (Author)] Address: Gunzburger, Margaret, United States Geological Survey, Florida Integrated Science Center, 7920 NW 71st Street, Gainesville, FL 32653-3701, USA. E-mail: mgunzburger@usgs.gov

**7276.** Guo, T. (2007): Design and prototype of a hovering ornithopter based on dragonfly flight. Bachelor of Science, Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge: 31 pp. (in English) ["Hovering is normally achieved using a horizontal wing path to create lift; bees, wasps and helicopters use this technique. Dragonflies hover using a unique method, by flapping along an inclined stroke plane. This seems to create a higher efficiency than is possible for normal hovering. The aim of this project is to build a mechanical model to mimic the aerodynamic properties and hovering motion of dragonflies. Through the design and evaluation of this model, we can evaluate the mechanical feasibility of reproducing the wing path using single motor control and establish whether the difference in stroke plane is advantageous for the dragonfly. By adjusting the initial angle of attack of the ornithopter's wings, we can artificially recreate varying stroke planes. A comparison of the resultant lift generated from different stroke planes showed that greater lift forces were generated with non-zero stroke planes as demonstrated in normal hovering." (Author)] Address: Guo, Theresa, Massachusetts Institute of Technology, Department of Mechanical Engineering, 77 Massachusetts Avenue, Room 3-173, Cambridge, Massachusetts 02139, USA

**7277.** Hutchinson, R.; Menard, B. (2007): First observations on larvae of *Epiaeschna heros* (Odonata: Aeshnidae) in Quebec, Canada. *Ontario Odonata* 7: 1-7. (in English, with French summary) [Discovery of the first larvae of *E. heros* in Quebec prompted nine visits to the habitat between May 29 and November 5, 2005, so that it could be described. The small, dark swamp where the larvae were found was dominated by Black Ash (*Fraxinus nigra*). It is located within 183 m of Lac Beauchamp (45.4923 °N, -75.6235 °W) in Gatineau, Quebec. The swamp was devoid of water for over two months in the middle of the Odonata flight season. Four relatively large larvae of *E. heros* were found and two were reared in an aquarium to adulthood. Furthermore, 20 exuviae were collected, as well as one moult. Fourteen other species of Odonata (exuviae, larvae or adults) were col-

lected in the swamp or in the immediate vicinity." (Authors.) Address: Hutchinson, R., 12, chemin de la Savane, apt. 12, Gatineau (Quebec) J8T 1P7, Canada. E-mail: raymond.hutchinson@sympatico.ca

**7278.** Jabłońska-Barna, I. (2007): Macroinvertebrate benthic communities in the macrophyte-dominated Lake Luknajno (northeastern Poland). *Oceanological and hydrobiological studies* 36 (Suppl. 4): 29-37. (in English) [The study includes samples of *Ischnura elegans* and *Enallagma cyathigerum*.] Address: Jabłońska-Barna, Izabela, Faculty of Environment Sciences and Fisheries, University of Warmia and Mazury, ul. Oczapowskiego 5, 10-957 Olsztyn, Poland. E-mail: ijpb@uwm.edu.pl

**7279.** John, H.; Günther, A.; Reißmann, R.; Tolke, D.; Heilmeier, H. (2007): Bedeutung und Schutz des FFH-Lebensraumtyps „Fließgewässer mit Unterwasservegetation“ im Gebiet der oberen Freiburger Mulde. *Mitteilungen des Naturschutzes Freiberg* 3: 56-83. (in German) [In summer 2003, a heavy high flood impacted the Freiburger Mulde, Sachsen Germany. The recolonisation with submerse vegetation (focus on *Ranunculus peltatus*), fish, and Odonata was studied along the river at 20 sampling sites between summer 2003 and summer 2005. A total of 15 species including *Ophiogomphus cecilia* was recorded.] Address: Günther, A., Naturschutzinstitut Freiberg, Waisenhausstr. 10, 09599 Freiberg, Germany. E-mail: a.guenther@abo.freiepresse.de

**7280.** Kalkman, V.J. (2007): *Archboldargia scissorhandsi* spec. nov. from Papua, Indonesia ((Zygoptera: Coenagrionidae). *Odonatologica* 36(2): 201-206. (in English) ["The new species is described, based on a single male. Holotype male: Indonesia: Papua (formerly Irian Jaya), Pass Valley, Ibem R., 13/20-V-1999; deposited in ZMAN, Amsterdam. A key to the *Archboldargia* males is given and some notes on the distribution of the genus are provided." (Author)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**7281.** Kalnins, M. (2007): Protected aquatic insects of Latvia – *Leucorrhinia pectoralis* (CHARPENTIER, 1825) (Odonata: Libellulidae). *Latvijas entomologs* 44: 26-32. (in English) ["Published data, collections, data collected during the project „Analysis of the Specially Protected Nature Territories in Latvia and Establishing of EMERALD/Natura 2000 Network“ and material collected by Latvian entomologists have all been used in the analysis of the distribution of this species. The distribution of *L. pectoralis* was mapped using a basic grid of 5x5 km squares in the Baltic grid system. In total, *L. pectoralis* is recorded from 98 squares in Latvia. The most known localities are concentrated in central and northern Latvia. The majority of localities of *L. pectoralis* in Latvia have been recorded in the natural eutrophic lakes with Magnopotamion- or Hydrocharition-type vegetation (21 records) and oxbow lakes (44 records). Other *L. pectoralis* habitats are hard oligo-mesotrophic lakes with benthic vegetation of *Chara* spp. (3 localities), natural dystrophic lakes and ponds in active raised bogs or transition mires (15 localities), dystrophic water bodies also (11 localities). Only in a few cases species have been observed in ponds (2 localities) and oligotrophic to

mesotrophic standing waters with *Littorelletea uniflorae* and/or *Isoëto-Nanojuncetea* vegetation (3 localities)." (Author)] Address: Kalnins, M., Nature Protection Board, Eksporta iela 5, LV-1010 Riga, Latvia. E-mail: martins.kalnins@dap.gov.lv

**7282.** Ketelaar, R.; Bouwman, J.H.; Felix, R.P.W.H. (2007): Notes on the habitat of *Sympecma paedisca* in Buryatia, Southeast Siberia, Russia. *Brachytron* 11(1): 91-96. (in Dutch, with English summary) ["In June 2007 the authors visited the federal subject Buryatia of the Russian Federation. On four localities populations of *S. paedisca* were found. In this article a short description and photographs are published. Two localities are more or less comparable to the habitat in The Netherlands, with dense helophyte vegetations of *Phragmites australis*. The two other habitats are different from the European reference: a small sweet water brook floating in a saline lake in the steppe region and helophyte vegetation in the summerbed of a broad river." (Authors)] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: ketelaar@vlinderstichting.nl

**7283.** Ketelaar, R.; Manger, R.; Ruiter, E.J.; Uilhoorn, H.M.G.; de Boer, E.P. (2007): Analysis of the distribution of *Sympecma paedisca* in the Netherlands. *Brachytron* 11(1): 5-20. (in Dutch, with English summary) ["[...] Prior 1970, *S. paedisca* was a rather common damselfly in the northern part of the Netherlands. A negative trend started, leading to the virtually disappearance around 1980. A long period followed with only a few records, and no known populations. In 1997 however, the species was rediscovered in De Weerribben, one of the largest mesotrophic peat moors in the Netherlands. Since then a remarkable recovery followed with a strong increase in number in De Weerribben and also reproduction at a second site, the Kuinderplas. At the end of summer numbers of *S. paedisca* are also increasing on heaths and dry forest edges in the provinces of Drenthe, Friesland and Overijssel, sometimes over eighty kilometres away from the reproduction sites. In spring no sign of reproduction has been seen here so far. It is documented in this article that this remarkable pattern already existed before 1970, when *S. paedisca* was still a rather common species. Reproduction occurs in more or less mesotrophic to eutrophic waters with abundant vegetation. After emergence, a large part of the population departs to drier areas. It is hypothesized in this article that these individuals do not return to their sites of origin, but wander around searching for possible reproduction sites. The fact that no new reproduction sites at these sandy soils have been found (neither have been in the past), suggest that these areas are not suitable and that all these individuals do starve without having reproduced." (Authors)] Address: Ruiter, E., Cornelis Houtmanstraat 10, 8023 EA Zwolle, The Netherlands. E-mail: e.j.ruiter@plajiet.nl

**7284.** Ketelaar, R.; Ruiter, E.J.; Uilhoorn, H.M.G.; Manger, R.; de Boer, E.P. (2007): Habitat choice of *Sympecma paedisca* in the Netherlands. *Brachytron* 11(1): 21-33. (in Dutch, with English summary) ["In the Netherlands, reproduction of *S. paedisca* occurs in marshes with mesotrophic to eutrophic water. The presence of vegetation succession stadia with abundant *Typha angustifolia*, *T. latifolia* and *Phragmites australis* is essential. Eggs are predominantly deposited in floating dead leaves, stems and roots of these plants. Reproduction



sites are mostly sheltered against wind and cold and warm up easily in early spring when oviposition takes place. *S. paedisca* is very scarce at localities that are too open and on sites with encroachment of trees that became too shady. The most important reproduction site in the Netherlands is the peat reserve De Weerribben in the province of Overijssel. After emergence, a part of the population stays within the nature reserve and hibernates in moist forests in tussocks of *Molinia caerulea*. Another part migrates to drier heath lands, sometimes at tens of kilometres distance where they hibernate in either *Molinia caerulea* or *Calluna vulgaris*. After hibernation, the first active individuals of *S. paedisca* were seen on February 27th. Along the edges of the woods and on sheltered sites small insects are caught and eaten, providing energy for the reproduction period from March-May." (Authors) The paper also includes habitat analysis from Baden-Württemberg and Bavaria, Germany, and Poland.] Address: Ruiter, E., Cornelis Houtmanstraat 10, 8023 EA Zwolle, The Netherlands. E-mail: e.j.ruiter@plajiet.nl

**7285.** Kosterin, O.E. (2007): Strekozy (Insecta, Odonata) Akademgorodka [Dragonflies (Insecta, Odonata) of Akademgorodok]. In: Priroda Akademgorodka: 50 let spustya [The Nature of Akademgorodok: 50 years passed], I. F. Zhimulev (ed.), SO RAN Publishing House, Novosibirsk: 74-91. (in Russian) [For details see: <http://pisum.bionet.nsc.ru/kosterin/academicodonata.htm>] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**7286.** Liu, T. (2007): Design of a flapping mechanism for reproducing the motions at the base of a dragonfly wing. Bachelor of Science, Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge: 50 pp. (in English) ["Insect flight is being studied to aid in the development of micro-air vehicles that use the flapping wing model in an attempt to achieve the high levels of maneuverability that insects have. The flight of the dragonfly has been chosen to be modeled because of its exceptional flight capabilities. This thesis addresses the flapping mechanism designed for the root of each wing. The prototype of the mechanism, built at a scale of four times the size of a dragonfly having a wingspan of 150 mm, is able to create motions in the wing of flapping and feathering, and can vary the stroke plane. The coning angle can be set between tests. The design process began with considering two methods of actuation, a four-bar transmission mechanism used in the Micromechanical Flying Insect developed in the UC Berkeley Biomimetic Millisystem Lab, and by pivoting the wing support directly with cables or rigid links. The second design was chosen to be developed further. A functional prototype was built from acrylic and parts made using stereo lithography." (Author)] Address: Liu, Teresa, Massachusetts Institute of Technology, Department of Mechanical Engineering, 77 Massachusetts Avenue, Room 3-173, Cambridge, Massachusetts 02139. USA

**7287.** López-Casas, S.; Jiménez-Segura, L.F. (2007): Reproduction and feeding of *Nicuro Pimelodus blochii* (Valenciennes, 1840) (Pisces: Pimelodidae) in Vachimnero floodplain lake, Magdalena river basis, Colombia. *Actual Biol.* 29(87): 193-201. (in Spanish, with English summary) [In *Pimelodus blochii* stomachs contents of

aquatic and terrestrial animal fragments of at least 16 taxa (including Odonata) were found suggesting that this species has a wide trophic niche and an opportunistic omnivorous feeding behaviour.] Address: López-Casas, Silvia, Laboratorio de Ictiología. Instituto de Biología. Universidad de Antioquia. Medellín (Antioquia), Colombia. E-mail: silvilopezcasas@yahoo.com

**7288.** Maillard, O. (2007): Observaciones sobre el nido, polluelos y cuidado parental de *Bucco macrodactylus* en el norte de Bolivia. *Kempffiana* 2007 3(2): 25-27: 25-27. (in Spanish) [Based on accidental observations, the diet of the Chestnut-capped Puffbird (*Bucco macrodactylus*) also includes nine dragonfly specimens.] Address: Maillard, O., Museo de Historia Natural Noel Kempff Mercado, Universidad Autónoma Gabriel René Moreno. Avenida Irala 565, Casilla postal 2489, Santa Cruz de la Sierra, Bolivia. E-mail: hylopezus@gmail.com

**7289.** Mancu, C.O. (2007): Inventory of the dragonfly collection from Iron Gate Museum, Drobeta Turnu-Severin. *Drobeta, Seria St.Naturii XVII*: 172-183. (in English) [The material deposited in the Iron Gate Museum, Drobeta Turnu-Severin consists of 815 specimens of 43 species. *Coenagrion ornatum* is very important from the Natura 2000 viewpoint and *Lestes macrostigma* is a scarce species in Romania *Chalcolestes parvidens*, *Pyrrhosoma nymphula*, and *Stylurus flavipes* are also note worthy.]

**7290.** Manger, R. (2007): Exterior characteristics of *Sympecma paedisca* in the Netherlands. *Brachytron* 11(1): 63-74. (in Dutch, with English summary) ["In this article a description of the exterior aspects of a hibernating population of *S. paedisca* in the Netherlands is provided. The average body length of the hibernating winter damsel was 37.0 mm. The population studied showed some variation in colour and markings at the thorax. Ten percent of the population showed reduced markings and another thirteen percent showed still bright background colour in the hibernation period from October to April. During the three to four months of hibernation no colour changes appeared. In the reproductive period the individuals became more dull and darker coloured." (Author) The paper also includes remarks and pictures of *Sympecma gobica* from Kazakhstan, and from *S. fusca*.] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rmanger@planet.nl

**7291.** Manger, R.; Dingemanse, N.J. (2007): Survival and biotope selection of *Sympecma paedisca* in a winter habitat in the Netherlands. *Brachytron* 11(1): 52-62. (in Dutch, with English summary) ["This article provides a description of the habitat, behaviour and survival of adults of *S. paedisca* during wintertime. The study was conducted between 2003 and 2006 in the province of Drenthe, the Netherlands. The habitat consisted of heather (*Calluna vulgaris*, *Erica tetralix*) and purple moor-grass (*Molinia caerulea*), surrounded by pine forest (*Pinus*). Capture-recapture techniques were used to study behaviour and survival during wintertime. Hibernating adults were highly philopatric and only moved over small distances within the study area. Recaptures of adults marked elsewhere showed that wintering individuals reached the wintering habitat using stopover-sites. Monthly survival rates (December through March) were high (winter 2004/2005: 75%; 2005/2006: 100%).

Nevertheless, 58% of the hibernating adults did not survive the winter of 2004/2005. The area was used only for hibernation; reproductive behaviour was never observed and reproduction sites were not found. Based on the descriptions of habitat, behaviour and survival during winter, it is suggested that variation in winter survival plays an important role in the population dynamics of this species." (Author)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rmanger@planet.nl

**7292.** Manger, R. (2007): Both *Sympecma paedisca* and *Sympecma fusca* in the same breeding habitat. *Brachytron* 11(1): 83-86. (in Dutch, with English summary) ["In 2007 for the first time reproduction of *S. paedisca* was observed outside the well known reproduction sites in the Netherlands. The distance from this peat hole to the peat bogs in De Weerribben is about 17 kilometers. It was also the first time both *S. paedisca* and *S. fusca* were observed together within the reproduction period for at least five weeks. The observations include both reproduction activity of Siberian winter damsel and Common Winter Damsel. The reproduction site is located along a stream and includes several mesotrophic ponds." (Author)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rmanger@planet.nl

**7293.** Markovic, G.S.; Simic, V.M.; Ostoji, A.M.; Simic, S.B. (2007): Seasonal variation in nutrition of chub (*Leuciscus cephalus* L., Cyprinidae, Osteichthyes) in one reservoir of west Serbia. *Proc. Nat. Sci, Matica Srpska Novi Sad* 112: 107-113. (in English) ["*L. cephalus* is abundantly present fish species in the Balkan freshwaters, which indicates a good adaptation to the environmental conditions existing in the most of reservoirs. The fish species is abundant in the Meduvršje reservoir situated on the Zapadna Morava river (West Serbia, the Danube basin) as the only predator found here. In the period from 1996 to 2002, the intestinal content of 88 individuals of different age was analyzed. The zoophytophage character of diet was found to be largely shared with plant components all the year round. The differences in the trophic spectrum over the various seasons existed between the individuals of different age with high individual variations being found, too." (Authors) Odonata are the most frequent prey of *L. cephalus*. Larvae of *Lestes* sp. *Aeshna* sp. *Anax imperator*, *Gomphus vulgatissimus*, and *Brachytron pratense* are mentioned.] Address: Simic, V., Faculty of Sciences Kragujevac, University of Kragujevac, R. Domanovića 16, 34000 Kragujevac, Serbia. E-mail: goranmsv@tfc.kg.ac.yu

**7294.** McGeoch, M.A. (2007): Insects and bioindication: Theory and progress. *The Royal Entomological Society 2007. Insect Conservation Biology* (eds A.J.A. Stewart, T.R. New and O.T. Lewis): 144-174. (in English) ["The search for broad, repeatable patterns and the development of theory should be the major goal of biological disciplines, where theory is defined as 'empirically based mechanistic explanation of pattern in nature' (Price, 1991; Price et al., 1995). The state of bioindication is now at the point where the framework for developing a theory of bioindication has been well established. The process of theoretical development in bioindication may be considered to include: (i) delineation of objectives and the empirical collection of facts supporting the identity of species responsive, or related, to the EP of inte-

rest; (ii) the generation of hypotheses regarding these responses or relationships; (iii) independent testing of these hypotheses and acceptance or rejection of putative bioindicators; and finally (iv) further development of selected bioindicators to facilitate their use and maximize their suitability for conservation management and policy. The current primary weakness in this framework, at least for insect bioindicators, is the dearth of studies that have established robust bioindicators, and the narrow set of bioindication scenarios and geographic regions addressed by those that have. Insects have contributed substantially to the development of new methods for bioindication, and patterns are beginning to emerge of those insect taxa best suited to bioindication with different objectives, in different environments and geographical regions. However, in spite of an enormous groundswell flagging the importance of bioindication and the potential of insect bioindicators, only a handful of rigorous, fully developed insect bioindication systems have been realized. Perhaps there is a dichotomy between the desired role of indicators and realistic constraints on that role. Alternatively, perhaps the incentive and demand for insect bioindicators have not been sufficiently great. Optimistically, the field has perhaps merely required time to mature, develop methods and establish sufficient direction, and the next decade will see a proliferation of robust insect bioindication systems, as well as their widespread adoption in policy and management." (Author) Odonata contributed app. 5% to the frequency of bioindication publications involving different taxa.] Address: McGeoch, Melodie, Centre for Invasion Biology, Department of Conservation Ecology & Entomology, University of Stellenbosch, Private Bag X1, Matieland 7602, South Africa.

**7295.** Mertens, J.; Beladjal, L.; Janssens, F.; Matthys, P. (2007): Pitfall trapping in flooding habitats: a new technique reveals *Archisotoma pulchella* (Collembola: Isotomidae) as new to the Belgian fauna. *Belg. J. Zool.* 137(2): 177-181. (in English) ["Flooding habitats are unique ecosystems with complex land-water interactions. Research on their terrestrial component is seriously hindered by the lack of an adequate and efficient technique for pitfall trapping. This paper focuses on three consecutive items: (1) the description of a new type of trap, developed for use in temporarily submersed areas; (2) evaluation of its potential usefulness by a literature search of pitfall trapping in diverse environments (1998-2003); (3) its application in the trapping of arthropods inhabiting a salt marsh. The literature search demonstrates a bias towards forests, neglecting flooding biotopes. Beetles and spiders are by far the prominent taxa studied that way. Apart from some Diptera, *Archisotoma pulchella*, a new species of Collembolan for the Belgian fauna, is the only arthropod species trapped by the described sampling technique on the mud flats of the intertidal zone of the Ijzer estuary (Belgium), albeit in very high numbers. Additional sampling provided records from the Schelde estuary, and allows reconstructing some characteristics of its population dynamics." (Authors) Literature search of pitfall trapping resulted in records of trapped Odonata; these are not specified.] Address: Mertens, J., Terrestrial Ecology Unit, Ghent University, Ledeganckstraat 35, B-9000 Ghent, Belgium. E-mail: Johan.Mertens@UGent.be

**7296.** Muranyi, D. (2007): Contribution to the Odonata fauna of Albania. *Folia entomologica hungarica* 68: 41-53. (in English) ["New records of 34 species collected in

Albania during nine collecting trips between 2002 and 2006 are given. Distributional or taxonomical notes are given for 14 species. *Somatochlora meridionalis* and *Sympetrum depressiusculum* are new to the fauna of Albania. The first record of *Somatochlora flavomaculata* for Albania is given based on material from the Natural History Museum, London. The number of known species of Albanian Odonata accounts to 55." (Author)] Address: Muranyi, D., Department of Zoology, Hungarian Natural History Museum, H-1088 Budapest, Baross u. 13, Hungary. E-mail: muranyi@zool.nhmus.hu

**7297.** Muzon, J.; Pessacq, P.; Ramos, L. (2007): Odonata type specimens preserved in the Museo de la Plata, Argentina. *Odonatologica* 36(2): 301-306. (in English) ["Type collection preserved at Museo de La Plata includes 105 specimens of Odonata (6 holotypes, 1 neotype, 6 allotypes and 96 paratypes), representing 13 names belonging to Coenagrionidae (5), Lestidae (1), Megapodagrionidae (1), Aeshnidae (4), Gomphidae (1) and Libellulidae (1). Preservation status and label details of primary types are stated." (Authors)] Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina. E-mail: muzon@ilpla.edu.ar

**7298.** Niehuis, M (2007): Siegmars Ohliger zum 70. Geburtstag. *Fauna und Flora in Rheinland-Pfalz* 11(1): 233-240. (in German) [S. Ohliger is one of the odonological pioneers in Rheinland-Pfalz, who contributed many faunistic data to the distribution of the dragonflies in this federal state of Germany.] Address: Niehuis, M., Im Vorderen Großthal, D-76857 Albersweiler, Germany. E-mail: Niehuis@t-online.de

**7299.** Novelo-Gutiérrez, R. (2007): *Progomphus lambertoi* (Odonata: Anisoptera: Gomphidae) a new species from Mexico. *Proceedings of the Entomological Society of Washington* 109(4): 791-797. (in English, with Spanish summary) ["*Progomphus lambertoi*, n. sp. (holotype from La Chichihua, State of Michoacán, México) (1,127 m asl; 18° 44.812 N; 103° 13.379 W), is described and illustrated. It appears closely related to *P. borealis* McLachlan, from which it can be distinguished by its smaller stature, paler coloration, enlarged and carinated hook of the posterior hamule, and male cerci not basoventrally carinated." (Author)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparato Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx; rodolfo.novelo@inecol.edu.mx

**7300.** Oliveira, L.B.; Conte, C.O.; Favero, S. (2007): Diversidade e abundância de Odonata (Insecta) em uma região do Pantanal do Negro, Mato Grosso do Sul. *Anais do VIII Congresso de Ecologia do Brasil*, 23 a 28 de Setembro de 2007, Caxambu - MG: 1-2. (in Portuguese) [For details see: <http://www.seb-ecologia.org.br/viiiceb/pdf/945.pdf>] Address: Oliveira, L. B., Laboratório de Pesquisa em Entomologia- Universidade para o Desenvolvimento do Estado e da Região do Pantanal - UNIDERPAv. Alexandre Herculano, 1400 - Campo Grande - MS, Brasil

**7301.** Orr, B.; Hämäläinen, M. (2007): The Metalwing Demoiselles (*Neurobasis* and *Matronoides*) of the Eastern Tropics. *Natural History Publications*. ISBN-13: 9789838121231: 115 pp-["The metalwing demoiselles of the eastern tropics include 14 species in two genera

of calopterygid damselflies, distributed from Pakistan and Sri Lanka in the west, to southern China and New Guinea in the east. With their brilliant iridescent hindwings, the males of *Neurobasis* are among the most conspicuous and well-known inhabitants of clear forest streams throughout the region. The renowned odonatologist M.A. Lieftinck was so impressed by their beauty he called them the 'Birds of Paradise' among Odonata. A lifetime goal of Lieftinck, and before him Friedrich Ris, was to produce a full taxonomic revision of the group. Sadly, both died before their aims could be realised. This book provides this revision. Patterns of speciation are discussed in their zoogeographical context and in the light of recent molecular studies of the higher classification of the Calopterygidae. The book also includes a detailed historical account of the study of metalwings, beginning with the description of '*Libellula chinensis*' by Carl von Linné, the father of taxonomy, from a decorative coloured drawing in a book on rare birds, published in 1750. In the past few decades, a good deal of work has focussed on the biology of these insects, including analyses of their complex mating behaviour and of the physical basis for their brilliant colours. This book summarises all published information on all aspects of metalwing biology, and includes also many original observations on their ecology and behaviour, based on the authors' personal experiences." (Publisher)]

**7302.** Papazian, M.; Dumont, H.J.; Mary-Sasal, N.J. (2007): The Odonata of the Pacific ocean islands of Wallis and Futuna, with special reference to speciation in *Ischnura aurora* (Brauer). *Odonatologica* 36(1): 53-62. (in English) ["A collection of adult specimens made during a hydrobiological mission (5-23 X 2004) to the French Pacific Island Territories of Wallis and Futuna is studied. It constitutes the first odonate inventory from this archipelago, and is composed of 10 species (8 Anisoptera, 2 Zygoptera), all of which were known from the Pacific before. Pacific island material of *Ischnura a. aurora* (Brauer, 1865) is compared with specimens from the western part of the range of this species. These represent a good subspecies *I. a. rubilio* Selys, 1876. Furthermore, 2 new synonyms of *I. aurora* are proposed."] Address: Papazian, M., Le Constellation Bat A, 72 Avenue des Caillols, F-13012 Marseille, France

**7303.** Paunovic, M.M.; Jakovcev-Todorovic, D.G.; Simic, V.M.; Stojanovic, B.D.; Cacic, P.D. (2007): Macroinvertebrates along the Serbian section of the Danube River (stream km 1429-925). *Biologia, Bratislava* 62/2: 214-221. (in English) [Results of the investigation of the aquatic macroinvertebrate fauna along a 504 km stretch of the Danube River in Serbia are presented. A total of 74 macroinvertebrate taxa (including: *Gomphus vulgatissimus* and *Pyrrhosoma nymphula*) were observed during a survey in 2001.] Address: Paunovic, Momir, Institute for Biological Research "Sinisa Stankovic", Despota Stefana 142 Blvd, 11000 Belgrade, Serbia. E-mail: mpaunovi@ibiss.bg.ac.yu

**7304.** Prokop, J.; Fikacek, M. (2007): An annotated list of early oligocene insect fauna from Seiffenhensdorf (Saxony, Germany). *Acta musei nationalis Pragae, Series B - Historia Naturalis* 63(2-4): 209-217. (in English) ["The present study provides an annotated list of the Early Oligocene entomofauna from the diatomite of Seiffenhensdorf (Saxony, Germany). This study summarizes published and unpublished material gathered during the past four decades, concerning more than 30



insect specimens housed in two institutional and several private collections. The studied specimens were assigned to 11 families of seven insect orders. Trace fossils of two insect groups, i.e. damselflies egg-sets (Odonata: Zygoptera) and caddisfly larval cases (Trichoptera), were also examined. All taxa were compared to the previously described material from other Oligocene localities in the České středohorí Mts. These results were then correlated with those of paleobotanical research." Address: Fikáček, M., Charles University in Prague, Faculty of Science, Department of Zoology, Viničná 7, CZ-128 44, Praha 2, Czech Republic; email: MFikacek@seznam.cz

**7305.** Ruiter, E.J. (2007): Encounter with a Siberian winter damselfly [*Sympecma paedisca*] after hibernation. *Brachytron* 11(1): 89-90. (in Dutch, with English summary) ["In early spring 2007 a marked *S. paedisca* was seen on a reproduction location. The way of marking showed that this individual was marked in the fall of 2006 on a well known hibernation spot about 7 km away from the reproduction area. This incidental encounter maybe an indication that some individuals manage to return the long way home to the reproduction area after hibernation." (Author)] Address: Ruiter, E., Cornelis Houtmanstraat 10, 8023 EA Zwolle, The Netherlands. E-mail: e.j.ruiter@plajiet.nl

**7306.** Ruiter, E.J.; de Boer, E.P. (2007): Some observations on the behaviour of *Sympecma paedisca*. *Brachytron* 11(1): 75-80. (in Dutch, with English summary) [During a long-term research on *S. paedisca*, a lot of sightings on behaviour were recorded in several notebooks. In this article several kinds of behaviour, such as territorial behaviour, reproduction, hibernation and hunting, are described.] Address: Ruiter, E., Cornelis Houtmanstraat 10, 8023 EA Zwolle, The Netherlands. E-mail: e.j.ruiter@plajiet.nl

**7307.** Ruiter, E.J.; Manger, R. (2007): Hibernation in the Netherlands, not quite easy for *Sympecma paedisca*. *Brachytron* 11(1): 42-49. (in Dutch, with English summary) ["Until 2002 it was unknown where *S. paedisca* hibernated in the Netherlands. With research first winter sightings were established which enabled the researchers to monitor the hibernating damselflies during wintertime. *S. paedisca* hibernates in the drier areas near the reproduction sites, but also on similar areas far from De Weerribben. They hibernate till 60 cm above ground level in free hanging position often on *Calluna vulgaris* and *Molinia caerulea*, but also on *Rubus fruticosus* and young trees like *Betula* and *Quercus robur*. Cryptical hibernation as known from abroad, could not be established." (Authors)] Address: Ruiter, E., Cornelis Houtmanstraat 10, 8023 EA Zwolle, The Netherlands. E-mail: e.j.ruiter@plajiet.nl

**7308.** Ruiter, E.J.; Uilhoorn, H.M.G.; Manger, R.; Keteleer, R.; de Boer, E.P. (2007): Recapture of *Sympecma paedisca* over great distance. *Brachytron* 11(1): 34-41. (in Dutch, with English summary) ["From 2002 till 2004 hundreds *S. paedisca* were marked on behalf of a capture-mark-recapture experiment. Short range recapture showed that several individuals stayed on the same area for weeks. Three individuals were recaptured on places far away from the reproduction site, a unique result. Thanks to these recaptures we can establish that the *S. paedisca* damselfly migrates on purpose to places where they hibernate. The reason for this migration is

not known yet. Probably they search for new reproduction sites. Part of the population hibernates within the boundaries of the reproduction site (De Weerribben), but a significant number migrates to heath lands in the provinces of Friesland, Drenthe and Overijssel where they hibernate. After wintertime they disappear; where they go to still remains uncertain." (Authors)] Address: Ruiter, E., Cornelis Houtmanstraat 10, 8023 EA Zwolle, The Netherlands. E-mail: e.j.ruiter@plajiet.nl

**7309.** Sato, M.; Riddiford, N. (2007): A preliminary study of the Odonata of S'Albufera Natural Park, Mallorca: status, conservation priorities and bio-indicator potential. *Journal of Insect Conservation* 12(5): 539-548. (in English) ["This study obtained baseline information for adult Odonata and assessed their conservation priorities and suitability as biological indicators in S'Albufera Natural Park in Mallorca, Spain. At this site, human activities in and around the wetland have raised concerns about their impact on the ecosystem. Investigations on adult diversity produced records of 14 species (four Zygoptera and 10 Anisoptera) and included the first record of *Erythromma viridulum* for the park. Detrended Correspondence Analysis (DCA) ordination categorised study sites according to their geographical locations in the park and showed clustering of the sites around particular species based on these locations. This pattern might reflect the differences in brackishness in water supplied by different water sources. Canonical Correspondence Analysis (CCA) indicated that some environmental factors were related to particular species. Water flow, vegetation, and depth and size of a water body could discriminate stenotopic species from eurytopic species. Only a few species appeared to be tolerant to the sites with high salinity and low oxygen concentration. The ordination results can be useful for establishing conservation priorities with information of species diversity, abundance, distribution and flight period. Although, with the current limited basic information, the use of Odonata species as biological indicators seems to be difficult, some clear relationships between environmental factors and particular species indicate the great potential of using adult Odonata as biological indicators in the park." (Authors)] Address: Sato, Mayumi, Center for Ecological Research, Kyoto University, Otsu 520-2113, Japan. E-mail: m-sato@ecology.kyoto-u.ac.jp

**7310.** Sharma, G.; Joshi, P.C. (2007): Diversity of Odonata (Insecta) from Dholbaha Dam (Dist. Hoshiarpur) in Punjab Shivalik, India. *Journal of Asia Pacific Entomology* 10(2): 177-180. (in English) ["Study on the species diversity of the order Odonata was carried out during 2002 - 2004 at Dholbaha dam, which has a moist deciduous forest surrounding it in district Hoshiarpur, Punjab, India. A total of 30 species belonging to 7 families of order Odonata were recorded during the study period. The family Libellulidae, represented by 18 species was the most dominant followed by Coenagrionidae (6 species), Aeshnidae (2 species) and Calopterygidae, Chlorocyphidae, Euphaeidae and Gomphidae each having 1 species. In terms of total number of individuals, family Libellulidae constituted maximum with 64.36% followed by Coenagrionidae (28.50%), Chlorocyphidae (1.83%), Gomphidae (1.62%), Euphaeidae (1.56%), Calopterygidae (1.38%) and Aeshnidae (0.75%). *Pantala flavescens* (Fabricius), a migratory species was the most dominant in number of individuals constituting 17.12% of the total. The least dominant species included *Anax immaculifrons* Rambur (0.38%) and *Anax*

parthenope parthenope (Selys) (0.36%). Shannon-Wiener index of species diversity of Odonata was 2.988 and 3.029 during 2002-2003 and 2003-2004, respectively. Seven new species have also been reported from the Dholbaha dam during this study period thus increasing the total species number of odonates so far recorded from this area from 29 to 36." (Authors)] Address: Sharma, G., Division of Entomology, Indian Agricultural Research Institute, Pusa campus, New Delhi-110012, India. E-mail: gauravpandit2@rediffmail.com

**7311.** Svensson, E.I.; Karlsson, K.; Friberg, M.; Eroukhanoff, F. (2007): Gender differences in species recognition and the evolution of asymmetric sexual isolation. *Current Biology* 17: 1943-1947. (in English) ["Closely related sympatric species are expected to evolve strong species discrimination because of the reinforcement of mate preferences. Fitness costs of heterospecific matings are thought to be higher in females than in males, and females are therefore expected to show stronger species discrimination than males. Here, we investigated gender and species differences in sexual isolation in a sympatric species pair of *Calopteryx* damselflies. The genus *Calopteryx* is one of the classic examples of reproductive character displacement in evolutionary biology, with exaggerated interspecific differences in the amount of dark wing coloration when species become sympatric. Experimental manipulation of the extent of dark wing coloration revealed that sexual isolation results from both female and male mate discrimination and that wing melanization functions as a species recognition character. Female choice of conspecific males is entirely based on wing coloration, whereas males in one species also use other species recognition cues in addition to wing color. Stronger species discrimination ability in males is presumably an evolutionary response to an elevated male predation risk caused by conspicuous wing coloration. Gender differences in species discrimination and fitness costs of male courtship can thus shed new light on the evolution of asymmetric sexual isolation and the reinforcement of mate preferences." (Authors)] Address: Svensson, E., Sect. Animal Ecology, Ecology Building, Lund University, SE-223 62 Lund, Sweden. E-mail: erik.svensson@zoekol.lu.se

**7312.** Tol, J. van; Gassmann, D. (2007): Zoogeography of freshwater invertebrates of southeast Asia, with special reference to Odonata. In: Renema, Willem (Ed.): *Biogeography, Time and Place - Distributions, Barriers and Islands. Topics in Geobiology, Vol. 29.* Dordrecht (Springer): 45-91. (in English) [oa 23, Present patterns in the distribution of the regional freshwater invertebrates are the result of complex historical and ecological processes. Many orders of aquatic insects are known in the fossil record from as early as the Early Permian, while the earliest fossils of Odonata date from the Middle Carboniferous. Thus, the breakup of Gondwana, that started in the Late Jurassic, is relevant to our understanding of the present distributional patterns. The geological history of Southeast Asia is extremely complex. The separation of India / Seychelles and Madagascar from Africa at 130 Ma, the subsequent breakup of India / Seychelles and Madagascar at 88 Ma, and the collision of India with Asia at 65-56 (or 43) Ma, significantly changed the western part of the area discussed. The southeastern part of the area changed under the influence of the northward rafting Australian plate from 85 Ma. The southwest directed subduction of the Pacific plate formed several arc-systems at the western margin

of that plate. A very important reorganisation of plate boundaries occurred at 25 Ma, when the New Guinea passive margin collided with an island arc including the eastern Philippine, Halmahera and South Caroline arc-systems, and when the northwestern corner of the Australian plate collided with Southeast Asia in the Sulawesi region. Information on the subaerial history of the respective terranes is still fragmentary. Diversity and distribution of most groups of freshwater invertebrates of Southeast Asia are still underexplored, while phylogenetic reconstructions including taxa of South America or Africa are virtually absent. Various examples from the literature are discussed. A phylogenetic reconstruction and a historical-biogeographic scenario of the Platycnemididae, which special reference to the Calicnemiinae, is presented as one of the first examples of such an analysis of a widespread group. The Calicnemiinae of Southeast Asia are derived from African Platycnemididae. The sister-group of the Southeast Asian taxa is *Leptocnemis cyanops* Selys, a species confined to the Seychelles. The Malesian Calicnemiinae are derived from ancestors on the mainland of Asia, and may have dispersed along the Izu-Bonin arc at the subduction zone of the Pacific plate along the Philippine plate at 40-50 Ma, but alternatively, the Late Cretaceous 'Inner Melanesian Arc' (Mindanao to New Zealand) sensu Polhemus (1995) may have been the route of dispersal. A clade of the genera *Lieftinckia* and *Risocnemis*, confined to the Solomon islands and the Philippines, respectively, represents a more recent westward dispersal of the Calicnemiinae, using the Caroline and Philippine Arcs during the Oligocene. Various other small-scale phylogenetic reconstructions and biogeographical analyses are discussed in Odonata and other freshwater invertebrates. Phylogenetic studies of aquatic and semi-aquatic Heteroptera significantly contribute to our understanding of the areas of endemism and their relationships in Southeast Asia. The areas of endemism in New Guinea are generally congruent with geological entities recognized, e.g. the northern New Guinea terranes, as well as the central New Guinea terranes which are associated with an 'Inner Melanesian Arc'. Special attention is paid to the fauna of Sulawesi. Areas of endemism in Odonata and Heteroptera are generally congruent. Area cladistic reconstructions based on distribution patterns and phylogenetic reconstructions of e.g., *Protosticta* Selys (Odonata, Platystictidae) and genera and species of Chlorocyphidae (Odonata), show a pattern of (Northern arm(Southwest arm(Central ++ Southeast arm))), which is a reflection of the geological history of the island. The biogeographical patterns recognized in freshwater invertebrates of Malesia do not principally differ from those found in strictly terrestrial taxa. The distribution of land and water is responsible for the composition of the biotas during the Cenozoicum. It is not clear whether rafting of biotas on the various island arcs, or congruent patterns in dispersal, are to be considered the underlying principle. The extreme habitat requirements and poor dispersal power of many freshwater organisms, make a dispersal scenario unlikely. However, recent studies show that such habitat specialization may develop rapidly." (Authors)] Address: Gassmann, D., Institute of Evolutionary and Ecological Sciences, Leiden University, c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: gassmann@naturalis.nnm.nl

**7313.** van Sejen, R.; Hofstra, A. (2007): Records of *Sympetma paedisca* in Germany, near Meppen. Bra-

chytron 11(1): 87-88. (in Dutch, with English summary) [On 22-X- 2006 a male and female of *S. paedisca* were found at Hoogmoor Ringe, about 21 km west-southwest of Meppen, Niedersachsen, Germany. These records are in line with the recent expansion in the Netherlands. However, *S.paedisca* is very scarce in northern Germany and the record is therefore extraordinary.] Address: van Seijen, R.; Hofstra, Atmeke, Ee 56, 9201 BJ Drachten, The Netherlands. E-mail: ronaldbonne@hotmail.com

**7314.** Veraghtert, W.; Vogels, B. (2007): De zuidelijke heidelibel (*Sympetrum meridionale*) in Bospolder te Ekeren. Antenne 1(1): 8-9. (in Dutch) [*S. meridionale*, 13-VIII-2006, Bospolder te Ekeren (UTM ES 97 82), Belgium.] Address: Veraghtert, W., Dennenlaan 13, 2500 Lier, Belgium. E-mail: wim.veraghtert@natuurpunt.be

**7315.** Vogt, T.E.; Cashatt, E.D. (2007): Survey site identification for Hine's Emerald Dragonfly (*Somatochlora hineana*) in Illinois: Final report. Submitted to: Illinois Department of Natural Resources, Division of Wildlife Resources, One Natural Resources Way, Springfield, Illinois 62702-1271, USA: 45 pp. (in English) [For the full paper see: [http://www.museum.state.il.us/research/entomology/hines/2007ILHE\\_Dfinalreport.pdf](http://www.museum.state.il.us/research/entomology/hines/2007ILHE_Dfinalreport.pdf)] Address: Cashatt, E.D., Illinois State Museum, 1920 10 1/2 St., Springfield, IL 62703, USA. E-mail: cashatt@museum.state.il.us

**7316.** Yasuoka, J.; Levins, R. (2007): Ecology of vector mosquitoes in Sri Lanka – Suggestions for future mosquito control in rice ecosystems. Southeast Asian J. trop. med. public health 38(4): 646-657. (in English) ["Mosquito-borne diseases are a major public health threat in Asia. To explore effective mosquito control strategies in rice ecosystems from the ecological point of view, we carried out ecological analyses of vector mosquitoes in Sri Lanka. During the 18-month study period, 14 *Anopheles*, 11 *Culex*, 5 *Aedes*, 2 *Mansonia*, and 1 *Armigeres* species were collected, most of which are disease vectors for malaria, filariasis, Japanese encephalitis, or dengue in Sri Lanka and elsewhere in Asia. The density and occurrence of *Anopheles* and *Culex* species were the highest in seepage pools and paddy fields, where the majority of niche overlaps between larval mosquito and aquatic insect species were observed. All 7 aquatic insect species - identified in case of Odonata as Aeshnidae, Gomphidae, Libellulidae -, which are larval mosquito predators, overlapped their niche with both *Anopheles* and *Culex* larvae. This suggests that conserving these aquatic insect species could be effective in controlling mosquito vectors in the study site. Correlations between several climatic factors and mosquito density were also analyzed, and weather conditions, including higher temperature, lower relative humidity, and higher wind velocity, were found to affect mosquito oviposition, propagation, and survival. These findings deepen our understanding of mosquito ecology and will strengthen future mosquito control strategies in rice ecosystems in Asia." (Authors)] Address: Yasuoka, Junko, Department of Population and International Health, Harvard School of Public Health, Boston, MA, USA. E-mail: jyasuoka@post.harvard.edu

**7317.** Zessin, W. (2007): Reproduktionsnachweis der Feuerlibelle (*Crocothemis erythraea*) in Mecklenburg-Vorpommern 2007 am Kraaker Waldsee, Landkreis

Ludwigslust. Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg 10(1): 63-64. (in German) [8.6.2007, Mecklenburg-Vorpommern, Germany; the paper includes a record of the locally rare *Anaciaeschna isocelus*.] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**7318.** Zhang, H.-j.; Yang, Z.-d. (2007): Study of Chinese dragonflies of the family Chlorogomphidae (Odonata). Journal of Shaanxi University of Technology 23(1): 73-76. (in Chinese, with English summary) [14 species and one subspecies of the family Chlorogomphidae in China are keyed.] Address: Zhang, H.-j., Shaanxi Bioresource Key Laboratory, Shaanxi Technology University, Hanzhong 723000, China

**7319.** Zhou, C.F. (2007): The bracing and fusing pattern of longitudinal veins at base in living mayflies (Insecta: Ephemeroptera). Acta Entomologica Sinica 50(1): 51-55. (in English, with Chinese summary) ["The bracing and merging pattern of basal longitudinal veins plays an important role in phylogeny reconstruction within Pterygota. Unfortunately, the basal venation pattern of living mayflies has changed from the ancestral state in most species' but in very rare cases' the origins of some longitudinal vein bases are preserved and visible. The wing base of *Siphuriscus chinensis* has an independent subcostal brace partial stem of the media' visible stem of the cubitus' and indications of the origins of MA and Rs. This kind of wing base plus those of *Ephemera rufomaculata* and *Chromarcys magnifica* show the venation groundplan of modern Ephemeroptera (stem of M parallel to or fused with R basally' MA and Rs fused together for certain distance then separate Cu independent at base). This pattern seems close to that of Neoptera while different from Odonata. In the latter, the M fused with Cu basally. The hypothesized function of subcostal brace in mayflies is to strengthen the connection between distantly separated longitudinal veins because of sclerite plate at radius vein base. This hypothesis also can be used to explain complicated and unique venation of Odonata." (Author)] Address: ZHOU Chang-Fa, Jiangsu Key Laboratory for Bioresource Technology, College of Life Sciences, Nanjing Normal University, Nanjing 210097, China. E-mail: zhouchangfa@njnu.edu.cn

## 2008

**7320.** Almeida, D.; Almodovar, A.; Nicola, G.G.; Elvira, B. (2008): Feeding tactics and body condition of two introduced populations of pumpkinseed *Lepomis gibbosus*: taking advantages of human disturbances?. Ecology of Freshwater Fish 2008: 1-9. (in English) [Odonata played only a minor role in the diet of 166 pumpkinseed from Cabaneros National Park, Spain.] Address: Elvira, B., Department of Zoology and Physical Anthropology, Faculty of Biology, Complutense University of Madrid, E-28040 Madrid, Spain. E-mail: belvira@bio.ucm.es

**7321.** Anholt, B.R. (2008): Chapter 13. Fitness landscapes, mortality schedules, and mating systems. In: Dragonflies: Model Organisms for Ecological and Evolutionary Research, ed. A. Córdoba-Aguilar. Oxford University Press: 167-175. (in English) ["Acquiring the resources for reproduction comes at the risk of death. After emergence, females of most odonate species gain



more mass than males and concomitantly suffer higher mortality rates. Differences in adult mortality rates affect the operational sex ratio. The expected number of future matings for males affects whether males should defend territories or contact guard mates. Where females gain much more mass than males and suffer higher mortality as a result, a male with a mate has a very low expectation of additional matings and should contact guard a mate to maximize reproductive success. When the operational sex ratio is less male-biased, a male with a mate may have additional opportunities to mate and can maximize his reproductive success by territorial behaviour." (Publisher)] Address: Anholt, B.R., Dept Biology, University of Victoria, PO Box 3020, Victoria, BC, V8W 3N5, Canada. E-mail: banholt@uvic.ca

**7322.** Arimoro, F.O.; Iwegbue, C.M.A.; Enemudo, B.O. (2008): Effects of cassava effluent on benthic macroinvertebrate assemblages in a tropical stream in southern Nigeria. *Acta Zoologica Lituanica* 18(2): 147-156. (in English, with Latvian summary) ["Extraction of starch from cassava roots (*Manihot esculenta*, woody shrub of the Euphorbiaceae) requires large amounts of water. After separation of starch and fiber, residual water contains small amounts of starch, proteins and hydrocyanic acid. When this water is released directly into streams and rivers, residual starch can cause rapid growth of bacteria, resulting in oxygen depletion and detrimental effects on aquatic life. Cassava generally contains cyanogens and glycosides that are easily hydrolyzed into hydrogen cyanide. Toxicological effects of cyanide on organisms have been documented by various authors. [...] The study of the effect of cassava effluents on macroinvertebrates along downstream reaches of the Orodo River, the Niger Delta was carried out monthly from January to June 2006. Three study stations were selected along the river course (upstream of the cassava impacted site, the cassava-impacted site, and downstream of the cassava impacted site). The study showed that cassava effluents caused a decrease in dissolved oxygen and pH and an increase in biochemical demand (BOD) and nitrates. Significant differences in these parameters were established among the stations sampled. A post hoc test indicated that station II (the cassava impacted site) was the cause of the observed differences. A total of 55 benthic macroinvertebrate taxa with a mean of 6,116 individuals were collected from the three stations along the river. The analysis showed that the overall density of fauna differed significantly among the stations. Cassava effluents permitted the dominance of oligochaetes and dipterans at station II and this resulted in a decline and total elimination of other benthic macroinvertebrates, which are intolerant of the effects of effluents. These preliminary data suggest that the response of benthic macroinvertebrates is important in the study of impacted aquatic systems and that macroinvertebrates have a great capacity to recover from the cassava effluent impact in terms of taxonomic diversity." (Authors) Odonata were represented by members of four families, and were found in comparable low abundance at stations I and III.] Address: Arimoro, F.O., Dept of Zoology, Delta State University, P. M. B. 1, Abraka, Nigeria. E-mail: fransarimoro@yahoo.com

**7323.** Baker, R.A.; Mill, P.J.; Zawal, A. (2008): Ectoparasitic water mite larvae of the genus *Arrenurus* on the damselfly *Coenagrion puella* (Linnaeus) (Zygoptera: Coenagrionidae). *Odonatologica* 37(3): 193-202. (in English) ["Parasitic larval mites of the genus *Arrenurus*

have been found on *C. puella*. *A. bicuspidator*, *A. cuspidator* and *A. maculator* make up over 80% of the total mites identified. The other species found were *A. bruzei*, *A. claviger* and members of the *A. affinis* complex. Mites are found mainly between the second and third pairs of legs and behind the third pair. *A. bicuspidator* and *A. cuspidator* share these sites with numbers spread roughly equally on both sites. *A. maculator* is found almost exclusively behind the third pair of legs and on the first abdominal segment of the host. Smaller numbers are found on the abdominal segments where *A. claviger* is the dominant species. The larval mites show a preference for female hosts. Size differences between the *Arrenurus* spp. are considered." (Authors)] Address: Zawal, A., Dept Invertebrate Zoology and Limnology, University of Szczecin, Waska 13, PO-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**7324.** Bechly, G.; Wichard, W. (2008): Damselfly and dragonfly nymphs in Eocene Baltic amber (Insecta: Odonata), with aspects of their palaeobiology. *Palaeodiversity* 1: 37-73. (in English, with German summary) ["All seven previously known damselfly larvae in Baltic amber are revised and eight new specimens are described. Some of these can be attributed to the recent family group taxa Calopterygidae: Calopteryginae, Hypolestidae: Hypolestini, Megapodagrionidae: Argiolestinae, Synlestidae, and Lestida (= Lestinoidea sensu Fraser 1957), while others can only be attributed to different unidentified species of the paraphyletic "megapodagrionid" grade of damselflies. A further new specimen is a rather strange odonate larva, which seems to represent the first genuine Anisoptera larva in amber (probably Aeshnidae). Various taphonomic, palaeoecological and palaeobiological aspects of these amber inclusions are discussed. The relative abundance of damselfly larvae with saccoid caudal gills suggests the presence of well-oxygenated and fast flowing habitats." (Authors)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail: bechly@gmx.de

**7325.** Behrstock, R.A. (2008): Dragonflies & Damselflies of the Border Southwest. Rio Nuevo Publishers, Tucson. ISBN 1-933855-14-2: 80 pp. (in English) ["This book is an introduction to 73 (about 1/3) of the 200+ plus Odonata found in the southwest US. It is a photo guide meant to present a sampling of the species to anyone with a casual or beginning interest in this insect family. Each of the species is shown with one small photograph. Just over a dozen of the species have two photos. These photos are good quality, however, the small size of the photos takes away not only some of their luster, but makes it difficult to see some of the features or markings on the subject. Each species is briefly characterized by some basic information on length, phenology, and occurrence in the federal states. A larger paragraph focusses on the habitats and gives advice to identification and differentiation from sibling species not treated in the book."] Address: Behrstock, R.A., 9707 S.Gessner #3506, Houston, TX, 77071-1032, USA. E-mail: rbehrstock@cox.net

**7326.** Benken, T.; Raab, R. (2008): Die Libellenfauna des Seewinkels am Neusiedler See: Häufigkeit, Bestandsentwicklung und Gefährdung (Odonata). *Libellula* 27(3/4): 191-220. (in German, with English summary) ["In the 'Seewinkel' area, east of Lake Neusiedl, Austria, 49 odonate species have been hitherto recorded. Of

special importance is the autochthonous occurrence of *Lestes macrostigma*. The population trends of the various Odonata species have been analysed since 1970, and the species are classified in categories of how endangered they are in terms of a Red List, according to the criteria of the German Federal Agency for Nature Conservation. Recently, the species from the 'Lacken' - characteristic, temporary shallow pools with a high soda concentration - have become especially endangered. On the other hand, the species that chiefly live in secondary habitats like drains, ditches and gravel pits show positive population trends. These species benefit from the improvement of water and habitat quality." (Authors)] Address: Benken, T., Landesmedienzentrum BW, Moltkestraße 64, D-76133 Karlsruhe, Germany. E-mail: theodor@benken-online.net

**7327.** Bernard, R.; Buczyński, P. (2008): Conservation status and habitat selection of *Nehalennia speciosa* (Charpentier, 1840) in Poland. *Odonatrix* 4(2): 43-60. (in Polish, with English summary) [The paper updates the current knowledge on the distribution and habitat of *N. speciosa* in Poland. 65 localities of *N. speciosa* have been discovered in Poland so far, including 31 ones presented in the first synthesis (Bernard 1998). Some corrections and completions to several of these 'old' localities are added. The increase in number of known localities is mostly the result of intensified odonatological exploration during the last ten years. However, a colonization of new sites is also possible on a small scale as Brzeziczno Lake (colonized after 1997) shows.] Address: Bernard, R., Dept of General Zoology, Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznan, Poland; E-mail: rbernard@main.amu.edu.pl

**7328.** Bernotiene, R.; Bartninkaite, I.; Višinskiene, G. (2008): Diffusion of *Bacillus thuringiensis* bacteria and their effect on aquatic invertebrates in the Nemunas River after using VectoBac 12AS preparation. *Ekologija* 54(2): 93-97. (in English) ["Blackfly control with the microbiological preparation VectoBac 12AS was started in Lithuania in 1999. This preparation is based on bacterium *Bacillus thuringiensis* var. *israelensis*. The VectoBac 12AS is applied at a single point from a bank prominence from the year 2000. Investigations were carried out in April-June of 2006 and 2007. The bacteria were found in the Nemunas River 164 km downstream the point of application of the larvicide 3 days after the application. This showed that VectoBac 12AS reached this segment of the river in 3 days. The density of *B. thuringiensis* bacteria decreased downstream from the point of application of the preparation. The highest density of bacteria was found in blackfly larvae, lower densities were found in the ground and on water plants. The effect of VectoBac 12AS on nontarget invertebrates was estimated in study sites from the point of application up to Druskininkai. Using the method of application from one point, this distance of the river was affected by the highest doses of preparation, and its effect on nontarget organisms could be seen in this part of the river. The usage of the preparation had no effect on nontarget invertebrates in the Nemunas River. Significant differences in Chironomid density were detected only in one study site, 6 km downstream the point of application of the larvicide. At a distance of 14 km from the point of application and downstream the river, no differences in the density of Chironomid larvae were detected." (Authors) Three Odonata taxa were identified but are not specified.] Address: Bernotiene, Rasa, Institute of Eco-

logy of Vilnius University, Akademijos 2, LT-08412 Vilnius, Lithuania. E-mail: rasab@ekoai.lt

**7329.** Beynon, T. (2008): Quest for the Bulgarian Emerald. *Dragonfly News* 54: 18-21. (in English) [Extensive report from a trip to Bulgaria in early 2008.] Address: Beynon, T.G.; 34 Church Lane, Checkley, Stoke-on-Trent, Staffordshire ST10 4NJ, United Kingdom

**7330.** Blanke, A.F.R. (2008): Four new Odonata records for the state of Espirito Santo, Brazil: *Heteragrion petiense* Machado, *Lestes forcicula* Rambur, *Orthemis ambinigrata* Calvert and *Erythrodiplax clitella* Borror (Zygoptera: Megapodagrionidae, Lestidae; Anisoptera: Libellulidae). *Notulae odonatologicae* 7(2): 13-15. (in English) ["The 4 species were discovered during a 3-month field trip in 2006. *L. forcicula* and *E. clitella* are represented by a single male adult each, *H. petiense* and *O. ambinigrata* were found several times. The measurements of the specimens and brief descriptions of the habitats are provided." (Author)] Address: Blanke, A.F.R., Section of Lower Arthropods, Alexander Koenig Research Institute and Museum of Zoology, Leibniz Institute for Terrestrial Biodiversity, Adenauerallee 160, D-53113 Bonn, Germany. E-mail: blanke@uni-bonn.de

**7331.** Boudot, J.-P. (2008): *Selysiothemis nigra* (Vander Linden, 1825), nouveau pour le Maroc, et autres observations sur les Odonates du Maghreb nord-occidental (Odonata: Anisoptera: Libellulidae). *Martinia* 24(1): 3-29. (in French, with English summary) ["During a 2007 summer odonatological trip in Morocco, carried out with the intention to gain additional information on some threatened and endemic species in the NW Maghreb, allowed us to record and document *Selysiothemis nigra* (Vander Linden, 1825) for the first time in this country. The latter was present in a significant number at a temporary lake on the border of the Sahara. The occurrence of such a very mobile species on a temporary water body is typical for species well adapted to desert environments, for which a rapid and opportunistic colonization of recent ephemeral water bodies is crucial to reproduce. Dense populations of *Pyrrhosoma nymphula* (Sulzer, 1776), an European species confined in Africa to scarce Moroccan highlands and regarded as a last glacial relict, were found in small habitats within the NE end of the Middle Atlas, about 100 km apart from the previously known localities. Additionally, *Ischnura fontaineae* Morton, 1905 was discovered on a permanent salty river in a subdesertic environment, at the margin of the Sahara, 350 km SW from the previously known locality. This is the single place where this species is known in the western half of Morocco. *Cordulegaster princeps* Morton, 1915, a Moroccan endemic confined to the Middle and High Atlas ranges, remains well established on middle and high elevation rivers and brooks, up to 2600 m a.s.l., and was found to reproduce even in small spring areas with poor seepage water. Some middle and low elevation populations have been found to turn extinct, however, due to excessive water use and stream drying up in agricultural and urban areas. *Calopteryx exul* Selys, 1853, a Maghrebian endemic extending from Morocco to Tunisia in the Atlas ranges, was found only in one locality. Its conservation status is worrying, in Morocco as well as in any other Maghrebian country. Altogether, 34 species were brought on record, among which *Onychogomphus costae* Selys, 1885 is more widely distributed than currently believed. The IUCN category is indicated for every threatened

species." (Author)] Address: Boudot, J.-P., Centre de Pédologie Biologique, 17, rue Notre-Dame de Pauvres, B.P. 5, F-54501 Vandoeuvre-lès-Nancy, France. e-mail: boudot@cpb.cnrs-nancy.fr

**7332.** Bouwman, J.; Ketelaar, R. (2008): New records of *Coenagrion armatum* in Schleswig-Holstein (Odonata: Coenagrionidae). *Libellula* 27(3/4): 185-190. (in English, with German summary) ["In early May 2008 a short survey was carried out to search for *C. armatum* in Schleswig-Holstein, Germany. On 06-V-2008, we found the species at two localities: Möwensee near Süderlügum, and Jardelunder Moor on the German-Danish border. Some details are provided on composition and structure of the vegetation. It is stated that *C. armatum* has always been present in Schleswig-Holstein but has largely been overlooked in the past years." (Authors)] Address: Bouwman, J., Dutch Butterfly Conservation, P.O. Box 506, NL-6700 AM Wageningen, The Netherlands. E-mail: jaap.Bouwman@vlinderstichting.nl

**7333.** Bouwman, J.H.; Kalkman, V.J.; Abbingh, G.; de Boer, E.P.; Geraeds, R.P.G.; Groenendijk, D.; Ketelaar, R.; Manger, R. Termaat, T. (2008): An update of the distribution of dragonflies in The Netherlands. *Brachytron* 11(2): 103-198. (in Dutch, with English summary) ["Dutch dragonflies are winners, the number of observers and the number of records keep increasing and in addition many of the species are also showing an increase. The latter is largely due to the improved water quality and the climate change which is favoring many southern species. As a result the distribution patterns shown in the book 'The Dutch Dragonflies' (NVL, 2002) are already out-dated. The 10 year anniversary of the Dutch Society for Dragonfly research (NVL), the 25 year anniversary of the Dutch Butterfly Conservation and the 33 1/3 anniversary of the European Invertebrate Survey Netherlands was used as an nice excuse to make a new overview of the Dutch dragonfly fauna. This review deals with 67 species. Four species known only from records prior to 1990 are not discussed (*Coenagrion mercuriale*, *Nehalennia speciosa*, *Epithea bimaculata* and *Oxygastra curtisii*). The distribution of the species is presented for two periods: 1990-1997 and 1998-2007. The first period is the same as in the book 'The Dutch Dragonflies' (NVL, 2002). About three times the number of records was available for the second period (308.000) compared to the first (101.000). The increase shown by many species can partly be explained by the increase in records. However many species now occur in areas where they were absent in the first period although these areas were well investigated during that period. This shows that the increase of these species is genuine and not merely a artifact of the increased research activity. Besides maps also a histogram of the flight-period for the period 1998-2007 is given. The histogram is based on unique records (a species, on one day in a square kilometer). The recorded numbers have therefore no influence on the histogram. The text of each species discusses the distribution, habitat and flight-period but the latter two only when new information became available since the publication of the former atlas (NVL, 2002). The Dutch Butterfly Conservation and Dutch Statistics Netherland (CBS) are organizing the Dutch Dragonfly Monitoring Scheme since 1998. In this project dragonflies are counted largely by volunteers using a standardized method. This has made it possible to calculate trends for 33 of the 67 species. For these species also a trend graphic is presented."

(Authors)] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: ketelaar@vlinderstichting.nl

**7334.** British Dragonfly Society (2008): *Dragonfly News* 54 Autumn 2008. *Dragonfly News* 54: 1-38. (in English) [The President's View Pam Taylor; "The BDS appoints the best - and makes them even better!"; From the Conservation Officer; Field Meeting Reports 2008; Field Meetings: Safety Issues and Getting Involved - National Dragonfly Week 2009; Overseas Tours with 'Quest for Nature'; First Dates for Spring 2008; Overseas Tours with 'Greentours' and 'Naturetrek'; Report of the Dragonfly Conservation Group; BDS Members' Day 2008; BDS at the British Birdwatching Fair; An interview with our new Patron Pam Taylor interviews Sir David Attenborough; Dragonflies in Focus Officer; Migrant Update and Other News for Early 2008; Quest for the Bulgarian Emerald; Notes & Observations; Sri Lanka: Dragonflies and Other Wildlife, October 2007; Digital cameras as a naturalist's aid; Photographing Dragonflies in Illinois; Dragonflies in the Media; Wicken Fen, the BDS and Partnerships; Molecular Conservation of Dragonflies: Scarce Chaser Survey, 2008; Peter Miller Schools Pond Fund - Sutton First School; You Can Help; Volunteer enthusiasts needed, Cambridgeshire Change the Editor!; The Great Fen Project; Publications & Reviews: New Naturalist: Dragonflies by Corbet & Brooks, reviewed by Peter Mill; Dragonflies and Damselflies of Hertfordshire reviewed by Peter Allen; Comments On A Recent Book On The Dragonflies ... of Hertfordshire; Tillyard "The Biology of Dragonflies" facsimile reprint; BDS Business; Annual General Meeting; Election of a Trustee and Nominations for Vice-President; Proposed change to By-laws; BDS Local Groups; BDS Memberships - New Officer: Lynn Curry; BDS Shop.] Address: BDS, Secretary Henry Curry, 23 Bowker Way, Whittlesey, Petersborough, PE7 1PY, UK. BDSSecretary@dragonflysoc.org.uk

**7335.** Buczyński, P. (2008): Dragonflies (Odonata) of the Kozłowieckie forests. *Odonatrix* 4(2): 33-42. (in Polish, with English summary) [Lublin region (south-eastern Poland); "The studies were conducted in the years 1999-2006 (mainly 2004-2006) at 35 study sites. 45 dragonfly species were found. The fauna of Kozłowieckie Forests is typical of forest areas under moderate anthropoppression (meliorations, regulations, water pollutions, fish pond management in river valleys). The activity of a human being had double impact on the fauna: either negative or positive. From one hand tyrphobionts have disappeared, the number of some tyrphophiles and rheophiles has decreased or vanished. Lacustrine species and odonatocenoses have appeared as well as the conditions for the development of thermophilous refugial species like *Lestes barbarus*, *Erythromma viridulum*, *Aeshna affinis*, *Anax imperator*, *Orthetrum albistylum*, *Sympetrum depressiusculum*, and *S. fonscolombii*. Kozłowieckie Forests are not the area of great importance for dragonfly protection. They can be treated as the refugium of species diversity for the central part of the Lublin region [...]" (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: paw-bucz@gmail.com

**7336.** Buczyński, P.; Moroz, M.D. (2008): Notes on the occurrence of some Mediterranean dragonflies (Odonata) in Belarus. *Polish journal of entomology* 77: 67-74.



(in English) ["*Sympecma fusca*, *Lestes viridis* and *Orthetrum albistylum* have been recorded for the first time in Belarus, *Erythromma viridulum* and *Orthetrum brunneum* have been found for the second time in this country. These records are analysed and discussed against Middle and East European data on the expansion of Mediterranean dragonfly species." (Authors)] Address: Moroz, M.D., Institute of Zoology, National Academy of Sciences, Akademichnaya 27, 220072 Minsk, Belarus. E-mail: mdmoroz@bk.ru

**7337.** Buczyński, P. (2008): Polish and dedicated to Poland odonatological papers. 6. The year 2007 and additions to the year 2006. *Odonatrix* 4(2): 61-64. (in Polish, with English summary) [The author presents a list of odonatological publications referring to Poland. The list includes 28 books and papers, 2 M. Sc. and 1 B. Sc. theses written in 2007. Six additions to the year 2006 were given, too. The list does not contain the papers published in *Odonatrix*.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**7338.** Caputo, F.P.; Vogt, R.C. (2008): Stomach flushing vs. fecal analysis: The example of *Phrynops rufipes* (Testudines: Chelidae). *Copeia* 2008(2): 301-305. (in English) ["We successfully stomach flushed all 31 adult turtles captured and collected feces from ten of the flushed turtles. Our results show that only an integrated approach using both techniques is able to provide a comprehensive picture of *P. rufipes* diet. Trichoptera larvae were the most eaten item in numeric terms and in frequency of occurrence, but shrimp contributed the greatest volume of invertebrates. [...]"] (Authors) Odonata occurred with a frequency of 29% in the samples.] Address: Caputo, F.P., Via Gabrio Serbelloni 115, 00176 Rome, Italy. E-mail: francescopaolo.caputo@uniroma1.it.

**7339.** Carchini, G.; Die Domenico, M. (2008): The last instar larva of *Gynacantha villosa* Gruenberg and *G. manderica* Gruenberg (Anisoptera: Aeshnidae). *Odonatologica* 37(3): 257-264. (in English) [The larval morphology of the 2 species is described for the first time from specimens collected in Uganda, East Africa, and a comparison between the species is given.] Address: Carchini, G., Dipartimento di Biologia, Università "Tor Vergata", Viale della Ricerca Scientifica, I-00133 Roma, Italy. E-mail: archini@utovrm.it

**7340.** Carvalho, A.L.; Sagado, L.G.V.; Fleck, G. (2008): Description of the larva of *Lauromacromia pinguaba* Carvalho, Salgado & Werneck-de-Carvalho 2004, with a key to the genera of Corduliidae larvae occurring in South America (Odonata: Anisoptera). *Zootaxa* 1848: 57-65. (in English) ["The ultimate stadium larva of *Lauromacromia pinguaba* Carvalho, Salgado & Werneck-de-Carvalho is described and illustrated based on reared specimens from Pinguaba, Ubatuba, São Paulo state, Brazil, some of which belong to the type-series. All material is deposited in the Instituto de Biologia, Universidade Federal do Rio de Janeiro (UFRJ), Rio de Janeiro. General notes on larval biology and the breeding habitat are provided. A generic key for South American Corduliidae larvae is appended." (Authors)] Address: Carvalho, A., Caixa Postal 68044, BR 21944-970, Cidade Universitária, Rio de Janeiro, RJ, Brazil. E-mail: alagoc@acd.ufrj.br

**7341.** Carvalho Braga, A.L.; dos Santos Pompeu, P.; Flósculo Carvalho, R.; Lopes Ferreira, R. (2008): Diet and morphometric relationships of the *Synbranchus marmoratus* (Bloch, 1975) (Pisces, Synbranchiformes) during the pre-estivation period in an oxbow lake in São Francisco Basin, Minas Gerais, Brazil. *Revista Brasileira de Zoociências* 10(2): 133-138. (in Portuguese, with English summary) [Insecta including Odonata contribute very few to the diet of *S. marmoratus*.] Address: Carvalho Braga, A.L., Programa de Pós Graduação em Ecologia Aplicada, Universidade Federal de Lavras, Lavras - MG. Cep 37200000, Brazil. E-mail: bragaalc@hotmail.com

**7342.** Castellanos, P.M.; Serrato, C. (2008): Diversidad de macroinvertebrados acuáticos en un nacimiento de río en el Páramo de Santurbán, Norte de Santander. *Rev. Acad. Colomb. Cienc.* 32(122): 79-86. (in Spanish, with English summary) [From September 2005 to February 2006, a study to determine the diversity of aquatic macroinvertebrates in a headwater stream in the Moorland of Santurbán, Norte de Santander Colombia was carried out. The macroinvertebrate community consisted of 63 taxa, including "Aeshna sp.".] Address: Castellanos, P.M., Universidad Industrial de Santander. Bucaramanga Colombia. E-mail: pablouis@gmail.com

**7343.** Céréghino, R.; Ruggiero, A.; Marty, P.; Angélibert, S. (2008): Biodiversity and distribution patterns of freshwater invertebrates in farm ponds of a south-western French agricultural landscape. *Hydrobiologia* 597: 43-51. (in English) ["We assessed the importance for biodiversity of man-made farm ponds in an agricultural landscape in SW France lacking natural wetlands. The ponds were originally created to provide a variety of societal services (irrigation, visual amenity, water for cattle, etc.). We also assessed the environmental factors influencing invertebrate assemblages in these ponds. Only 18 invertebrate taxa out of 114 taxa occurring in the study area were common to ponds and rivers indicating that the contribution of farm ponds to freshwater biodiversity was potentially high. A Self-Organizing Map (SOM, neural network) was used to classify 36 farm ponds in terms of the 52 invertebrate families and genera they supported, and to specify the influence of environmental variables related to land-use and to pond characteristics on the assemblage patterns. The SOM trained with taxa occurrences showed five clusters of ponds, most taxa occurring only in 1-2 clusters of ponds. Abandoned ponds tended to support higher numbers of taxa, probably because they were allowed to undergo a natural succession. Nevertheless, abandoned ponds were also amongst the largest, so that it remained difficult to separate the effects of pond size and abandonment, although both factors were likely to interact to favour higher taxon richness. The invertebrate communities in the ponds appeared to be influenced mainly by widely acting environmental factors (e.g. area, regionalization of assemblages) with little evidence that pond use (e.g. cattle watering, amenity) generally influenced assemblage composition. Our results support the idea that agricultural landscapes containing man-made ponds make a significant contribution to freshwater biodiversity indicating that protection of farm ponds from threats such as in-filling and pollution can make a positive contribution to the maintenance of aquatic biodiversity. This added value for biodiversity should be considered when calculating the economic costs and benefits of constructing water bodies for hu-

man activities." (Authors) Odonata are treated but without details.] Address: Céréghino, R., EcoLab, UMR 5245, Université Paul Sabatier, 118 route de Narbonne, 31062 Toulouse cedex 9, France. E-mail: cereghin@cict.fr

**7344.** Chakona, A.; Phiri, C.; Magadza, C.H.D.; Brendonck, L. (2008): The influence of habitat structure and flow permanence on macroinvertebrate assemblages in temporary rivers in northwestern Zimbabwe. *Hydrobiologia* 607(1): 199-209. (in English) ["Temporary rivers within the Nyaodza-Gachegache subcatchment in northwestern Zimbabwe were investigated to examine the role of flow permanence and habitat structure on macroinvertebrate community composition. Macroinvertebrate communities of intermittent and ephemeral rivers displayed significant differences in the number of taxa, macroinvertebrate abundance, Shannon and Simpson diversity indices and in size class structure. Intermittent sites were characterised by higher numbers of taxa, diversity and Ephemeroptera and Trichoptera richness compared to ephemeral sites. The fauna of ephemeral sites was dominated by a single taxon (*Afrobaetodes*) (Eph., Baetidae) whilst larger sized taxa (e.g. *Elassoneuria* (Eph., Oligoneuriidae), *Dicentropilum* (Eph., Baetidae), Aethaloptera (Tri., Hydropsychidae), *Pseudagrion* (Odonata, Coenagrionidae) and *Tholymis* (Odonata, Libellulidae) were exclusively restricted to intermittent sites. Clear differences were observed between sand, gravel, cobble and vegetation habitats. Vegetation and cobbles supported distinct communities, with some taxa exclusively restricted either to vegetation (e.g. *Pseudagrion*, *Leptocerina* (Tri., Leptoceridae), *Cloeon* (Eph., Baetidae), *Afronurus* (Eph., Heptageniidae) and *Povilla* (Eph., Polymitarciidae) or cobble (e.g. Aethaloptera and *Dicentropilum*) habitats. In terms of ensuring optimum diversity within the subcatchment, we consider conservation of critical habitats (cobbles and vegetation) and maintenance of natural flows as the appropriate management actions." (Authors)] Address: Chakona, A., University Lake Kariba Research Station, PO Box 48, Kariba, Zimbabwe. Email: achakona@yahoo.com

**7345.** Cham, S. (2008): Underwater tandem formation in Common Blue Damsel *Enallagma cyathigerum* and the need for contact guarding. *J. Br. Dragonfly Society* 24(1): 24-31. (in English) ["Observations on a large population of *E. cyathigerum* show competition for females between males to be very high at high population densities. This results in a number of aggressive tactics used by males to try to win over females by displacing the tandem male." (Author)] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com

**7346.** Cocksedge, B.; Parr, A. (2008): Atypical Black Scarce Chaser *Libellula fulva* in Hampshire. *Atropos* 35: 63. (in English) [Verbatim: On the afternoon of 11 June 2008 Brian Cocksedge visited Blashford Lakes Nature Reserve, near Ringwood in Hampshire, UK. The weather was warm with little wind. Along the small track between the car park and the Wildlife Trust centre an unusual black dragonfly was seen. Normally the only all-black species in the UK is the (male) Black Darter *Sympetrum danae*, but this dragonfly was clearly not that species. The general body shape and heavy black mark at the base of the hindwing, coupled with a dark streak near the base of the forewing, indicated that the dra-

gonfly was instead a Scarce Chaser *Libellula fulva*. This species is occasionally reported from Blashford Lakes, and old females are known to become rather dull and dark in colouration. Typically in such females there is, however, still some indication of the row of triangles along the mid-line of the abdomen that is normally a distinctive identification feature. The Blashford dragonfly was, however, very dark all over, with a featureless abdomen. Close examination of photos taken revealed that despite the brown eyes, darkened wing-tips and other aspects of the general appearance, the individual was a male. The end of the abdomen was thus more tapered than in females, and the anal appendages were not the expected short, widely-spaced, female cerci but instead stouter, more centrally-placed male claspers. The dragonfly thus seems to be a male Scarce Chaser which had developed beyond its initial immature colouration, but which somehow lacked the normal blue abdominal pruinescence and blue tint to the eyes seen in mature males. Some rubbing off of the waxy pruinescence, so revealing a black background colour to the abdomen, frequently occurs in males after mating—apparently caused by the grip of the female—but the total lack of blue (even on the eyes) in the present individual seems exceptional. Advanced abrasion of the pruinescence as a factor of age seems unlikely given the relatively early date. Perhaps something like a mutation, or possibly weather conditions, interfered with the normal development of the blue pruinescence. (Authors)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**7347.** Conniff, K.L.; van der Poorten, N.E. (2008): First description of female *Elatoneura caesia* (Selys, 1860) and amended description of male *E. caesia* and male and female *E. centralis* (Selys, 1860) from Sri Lanka, with notes on behaviour, habitat, and distribution and field identification characters. *Odonatologica* 37(4): 361-366. (in English) ["The female of *E. caesia* is described and figured for the first time. In earlier publications, *E. caesia* and *E. centralis* were confused with each other (cf. F.C. FRASER, 1933, The fauna of British India including Ceylon and Burma: Odonata, vol. 1, pp. 238-241, Taylor & Francis, London). Amended descriptions of the male of *E. caesia* and of both sexes of *E. centralis* are provided. Key phenotypic differences between the 2 species are illustrated, and additional notes are given on behaviour, habitat and distribution." (Authors)] Address: Conniff, K.L., 11WMI, RO. Box 2075, Colombo-1, Sri Lanka. E-mail: karoconniff@gmail.com

**7348.** Contreras-Garduño, J.; Buzattob, B.A.; Serrano-Menesesa, M.A.; Nájera-Cordero, K.; Córdoba-Aguilera, A. (2008): The size of the red wing spot of the American rubyspot as a heightened condition-dependent ornament. *Behavioral Ecology* 19: 724-732. (in English) ["We investigated an ornamental trait known to reflect male fighting ability and tested whether it shows heightened condition dependence compared with nonornamental traits in the American rubyspot (*Hetaerina americana*). Adult males bear red wing spots, the size of which is sexually selected: large-spotted and fatter males are more successful in territorial competition and obtain more matings than are nonterritorial males. First, to see whether spot area may signal fighting ability at a particular age (to discriminate animals that are unlikely to compete), we investigated the age at which males engaged more in fighting and compared their fat reser-

ves and muscle mass at 3 ages (young, middle aged, and old) and territorial status. Middle-aged males showed the highest fat and muscle values, engaged more in fighting, and were predominantly territorial. Second, we looked for traits not shaped by sexual selection: we compared red chroma and brightness of spot and thorax, spot area, muscle mass, and fat reserves in winner and loser males after a territorial contest. The only difference was that winners had larger spot areas and higher fat reserves. Finally, an immune challenge-based experiment was performed during the development of spot area and its color properties (chroma and brightness). Compared with a control (unchallenged) group, the results revealed that area decreased, brightness increased, and there was no change in red chroma, muscle mass, and fat reserves in challenged animals. Thus, spot area is a stress-sensitive, energy-reflecting trait that is likely to be used for communication during territorial competition in these damselflies" (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: [acordoba@uaeh.reduaeh.mx](mailto:acordoba@uaeh.reduaeh.mx)

**7349.** Corbet, P.S.; May, M.L. (2008): Fliers and perchers among Odonata: dichotomy or multidimensional continuum? A provisional reappraisal. *International Journal of Odonatology* 11(2): 155-171. (in English) ["We revisit the hypothesis, first advanced in 1962, that, with regard to their means of thermoregulation and overt behaviour, two types of Odonata can be recognised: fliers, when active (during reproductive activity, primarily, or foraging) remain on the wing, whereas perchers, when similarly engaged, spend most of the time on a perch from which they make short flights. First, in light of the available data, we restrict the hypothesis to apply primarily to activity at the rendezvous. Next, we review evidence, including direct measurements of body temperature coupled with activity budgets, to test the proposition that the hypothetical classification constitutes a dichotomy rather than a continuum. We conclude: (1) that there is merit in retaining the dichotomous classification into fliers and perchers, together with the thermoregulatory capabilities assigned to each category; (2) that the distinction between fliers and perchers is sufficiently discrete to be a useful predictor of the suite of thermoregulatory strategies and energy demands characteristic of representatives of each category; and (3) that, within each category a continuum exists such that the capacity to heat the body by irradiation (i.e. ectothermally) or by metabolic heat production (endothermy) increases with body size. Some departures from expectation based on the percher/flier dichotomy reflect the increased flight activity that occurs at the rendezvous under conditions of heightened conspecific or interspecific interference. Other apparent anomalies are identified as topics for potentially fruitful research." (Authors)] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: [may@aesop.rutgers.edu](mailto:may@aesop.rutgers.edu)

**7350.** Corbet, P.S. (2008): Foreword. In: Wildermuth, H.: *Die Falkenlibellen*. ISBN: 3-89432-896-7. 496 pp. *Die Neue Brehm-Bücherei* 653: 5. (in English) [The late P.S. Corbet gives a brief introduction into Hansruedi Wildermuth' outstanding book on the European Corduliidae: "I commend this book to its fortunate readership. It

sets a new, high standard for monographs in odonate biology".]

**7351.** Corbet, P.S. (2008): WDA Archivist's Report No.1. The origin and development of WDA: the first ten years, 1997-2007. *Agrion* 12(1): 30-36. (in English) [This is an extensive, well balanced report on the first ten years of the Worldwide Dragonfly Association.]

**7352.** Corbi, J.J.; Jancso, M.A.; Trivinho-Strixino, S.; dos Santos, A. (2008): Environmental evaluation of metals in sediments and dragonflies due to Sugar Cane cultivation in Neotropical streams. *Water, Air, & Soil Pollution* 195: 325-333. (in English) ["The use of fertilizers, containing different metals ions such as lead(II), chromium(III), cadmium(II), copper(II) and zinc(II), in the soil, for sugar cane cultivation, may cause impacts on the hydric resources of the adjacent areas. The scope of this study was to evaluate the impacts of sugar cane cultivation based on metal concentrations in sediments and dragonflies (Odonata). The bioavailability of such metals was determined in ten Neotropical streams. Six streams were located on areas with sugar cane cultivation, without riparian vegetation (classified as impacted area) and four streams were located on forested areas (reference sites). The results showed that there are high concentrations of metals in the sediments and dragonflies in streams located on impacted areas. The contamination by metals of aquatic insects of terrestrial adult life cycle, as Odonata organisms, represents a dangerous link for the transference of metals to upper trophic levels, as fishes, reptiles, birds and mammals." (Authors)] Address: Corbi, J., Departamento de Hidrobiologia, Universidade Federal de São Carlos, CP 676, 13560-970 São Carlos, SP, Brazil. Email: [julianocorbi@yahoo.com.br](mailto:julianocorbi@yahoo.com.br)

**7353.** Cordero-Rivera, A.; Stoks, R. (2008): Chapter 2. Mark-recapture studies and demography. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research*, ed. A. Córdoba-Aguilar. Oxford University Press: 7-21. (in English) ["Population ecologists track wild animals over their lifetimes using mark-recapture methods. Odonates are easily marked and remain near water bodies, allowing for high recapture rates. In recent years, the focus in mark-recapture models has switched from population size estimates to survival and recapture rate estimation, and from testing hypotheses to model selection and inference. This chapter presents a review of the literature on mark-recapture studies, with a suggestion of areas where more research is needed. These include the effect of marking on survival and recapture rates, differences in survival between sexes and female colour morphs, the relative importance of processes in the larval and the adult stage in driving population dynamics, and the contribution of local and regional processes in shaping metapopulation dynamics." (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: [acordero@uvigo.es](mailto:acordero@uvigo.es)

**7354.** Cordoba-Aguilar, A (2008): Chapter 1: Introduction. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research*, ed. A. Córdoba-Aguilar. Oxford University Press: 1-5. (in English) ["Despite their relative small number, compared with other insects, dragonflies and damselflies have been extensively used as study subjects in ecological and evolutionary research.



The few books on these organisms, however, have been more interested in the animals per se than in the scientific questions where they have been used as study subjects. This is the essence of this book: to show how these animals have been used to answer questions and have thus helped to construct ecological and evolutionary theory." (Author)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: [acordoba@uaeh.reduaeh.mx](mailto:acordoba@uaeh.reduaeh.mx)

**7355.** Cordoba-Aguilar, A.; Cordero-Rivera, A. (2008): Chapter 15. Cryptic female choice and sexual conflict. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research*, ed. A. Córdoba-Aguilar. Oxford University Press: 189-203. (in English) ["Females may choose their male mates. However, both sexes may engage in a kind of dispute not to be coerced into mating (for females) and to be chosen (for males). These two hypotheses (called female choice and sexual conflict, respectively) are currently in vogue in studies of sexual reproduction. This chapter highlights some instances where both can be tested in odonates. These instances are: during copula invitation by males, for the duration of copulation, and during the male post-copulatory displays preceding and during oviposition. There are four other aspects that may be investigated to see the prevalence of each hypothesis: the differences of genitalic diversity across populations, the genitalic complexity at the multiple species level, the female benefits when mating with 'attractive' males, and the costs to evade superfluous matings." (Publisher)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: [acordero@uvigo.es](mailto:acordero@uvigo.es)

**7356.** Córdoba-Aguilar, A. (Ed.) (2008): *Dragonflies and Damselflies - Model Organisms for Ecological and Evolutionary Research*. ISBN-13: 978-0-19-923069-3: 256 pp. (in English) ["Dragonflies and Damselflies documents the latest advances in odonate biology and relates these to a broader ecological and evolutionary research agenda. Despite being one of the smallest insect orders, dragonflies offer a number of advantages for both laboratory and field studies. In fact, they have been crucial to the advancement of our understanding of insect ecology and evolution. This book provides a critical summary of the major advances in these fields. Contributions from many of the leading researchers in dragonfly biology offer new perspectives and paradigms as well as additional, unpublished, data. The editor has carefully assembled a mix of theoretical and applied chapters (including those addressing conservation and monitoring) and achieves a balance of emerging and established research topics, providing suggestions for future study in each case.

**7357.** This accessible text is not about dragonflies per se but an essential source of knowledge that describes how different sets of evolutionary and ecological principles/ideas have been tested on a particular taxon. It will therefore be suitable for graduate students and researchers in entomology, evolutionary biology, population and behavioural ecology, and conservation biology. It will of course be of particular interest and use to those working on insects and an indispensable reference text for odonate biologists." (Publisher)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biológicas, Uni-

versidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: [acordoba@uaeh.reduaeh.mx](mailto:acordoba@uaeh.reduaeh.mx)

**7358.** Correia, A.M.; Anastacio, P.M. (2008): Shifts in aquatic macroinvertebrate biodiversity associated with the presence and size of an alien crayfish. *Ecological Research* 23: 729-734. (in English) ["To investigate the effects of *Procambarus clarkii* on macroinvertebrate diversity, we conducted a mesocosm experiment simulating small pools in rice field pads after the rice season. We hypothesized that crayfish predation would negatively impact macroinvertebrate diversity, and the magnitude of this impact should vary with the size of *P. clarkii*. We conducted a short-term mesocosm experiment to determine macroinvertebrate diversity in the presence of three size classes and in the absence of crayfish, as well as the diet composition of crayfish from the three size classes. At the end of the experiments, the diet of crayfish was composed of the most available taxa (Culicidae, Chironomus, Tanytarsini and Orthocladinae). These results also show evidence that, in confined areas, crayfish are important predators of major rice pests such as rice Chironominae larvae. Macroinvertebrate diversity was negatively affected by crayfish presence, but the effect was inversely proportional to crayfish size. The highest diversity index was obtained in the absence of *P. clarkii*, and juvenile crayfish significantly reduced macroinvertebrate diversity. Thus, the impact of *P. clarkii* on aquatic macroinvertebrates is size dependent and may be relevant in small pools formed in rice field pads from early autumn to late winter. Overall, our findings suggest that the negative effects of *P. clarkii* on macroinvertebrate diversity may be particularly strong in local natural assemblages confined to puddles of water or small ponds in wetland areas." (Authors) "Aeshna" plays a minor role as food of crayfishs] Address: Correia, A.M., Department of Zoology and Anthropology, National Natural History Museum (MNHN), Center for Environmental Biology (CBA), University of Lisbon, Rua da Escola Politécnica 58, 1269-102 Lisbon, Portugal. E-mail: [amcorreia@fc.ul.pt](mailto:amcorreia@fc.ul.pt)

**7359.** Costa, J.M.; Ravello, C.T.; Souza-Franco, G.M. (2008): The larva of *Argia croceipennis* Selys (Zygoptera: Coenagrionidae). *Odonatologica* 37(3): 265-271. (in English) ["The larva is described and illustrated for the first time, based on a specimen from southern Brazil. The features separating *A. croceipennis* from *A. insipida*, *A. pulla* and *A. sordida* are outlined." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: [jcosta@acd.ufrj.br](mailto:jcosta@acd.ufrj.br)

**7360.** Costa, J.M.; Machado, A.B.M. (2008): Two new species of Corduliidae Selys, 1882 from southern Brazil (Anisoptera: Corduliidae). *Lundiana* 8: 143-146. (in English) ["Two new species of *Neocordulia* Selys, 1882 — *N. fiorentini* sp. n. and *N. gaucha* sp. n. — both from Rio Grande do Sul, Brazil, are described and illustrated. They differ from other species of the genus mainly by the shape of anal appendages, sternal protuberance of abdominal segment 8 and sternum of abdominal segment 9." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: [jcosta@acd.ufrj.br](mailto:jcosta@acd.ufrj.br)

**7361.** Cremona, F.; Planas, D.; Lucotte, M. (2008): Assessing the importance of macroinvertebrate trophic dead ends in the lower transfer of methylmercury in littoral food webs. *Can. J. Fish. Aquat. Sci.* 65(9): 2043-2052. (in English, with French summary) ["Total mercury and methylmercury concentrations ([THg], [MeHg]) were measured in littoral macroinvertebrates from Lake St. Pierre, Quebec, Canada. Functional groups (detritivore, grazer, edible predator, inedible predator) explained the greatest fraction of [MeHg] variation compared with time (year, month), and space (station and shore). Greatest [THg] and [MeHg] were found in inedible predators mostly from families of heteropterans and coleopterans. Detritivores and grazers exhibited the lowest Hg concentrations, while edible predators were intermediate. Inedible predators also had the highest percentage of MeHg ([MeHg]/[THg]), with some taxa close to 100%. Such high percentages are seldom observed in freshwater organisms other than piscivorous fish. MeHg burden (concentrations × biomass) in inedible predators accounted for 10% of the MeHg pool for the whole invertebrate community. These large quantities of MeHg are sequestered in aquatic "trophic dead ends" and could partly explain the low [MeHg] measured in fish, compared with [MeHg] of macroinvertebrates from Lake St. Pierre and other freshwater ecosystems with large littoral zones. We recommend taking into account the inedible organisms in Hg cycling models to avoid a possible overestimation of the MeHg pool available to fish." (Authors) The paper contains some references to Odonata.]

**7362.** Crumrine, P.W.; Switzer, P.V.; Crowley, P.H. (2008): Chapter 3. Structure and dynamics of odonate communities: accessing habitat, responding to risk, and enabling reproduction. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research*, ed. A. Córdoba-Aguilar. Oxford University Press: 21-39. (in English) ["This chapter highlights the key abiotic and community-level interactions that influence odonate community structure. Three important life-history based issues central to odonate communities are developed: habitat access, response to risk during the larval stage, and emergence and reproduction. Each issue is addressed by considering relevant ecological theory and identifying and reviewing empirical studies with odonates that address hypotheses raised by theoretical studies. Although numerous short-term studies at relatively small spatial scales have been conducted with odonate larvae, very little is known about the relative impacts of competition, cannibalism, predation, intraguild predation and size structure on odonate population dynamics, and community structure in natural systems. Long-term studies at multiple life history stages and levels of organization are required to generate a more complete understanding of odonate communities, and ecological communities in general." (Publisher)] Address: Crumrine, P., Dept Nat. Sciences, Longwood Univ., Farmville, VA 23909, USA. E-mail: crumrinepw@longwood.edu

**7363.** Daguet, C.A.; French, G.C.; Taylor, P. (eds) (2008): *The Odonata Red Data List for Great Britain. Species Status Assessment No 11.* Joint Nature Conservation Committee, Peterborough.: 34 pp. (in English) [For the full paper see: <http://www.jncc.gov.uk/pdf/pub08speciesstatus11.pdf>] Address: Taylor, Pam, Decoy Farm, Decoy Rd, Potter Heigham, Norfolk, NR29 5LX, UK. E-mail: ptaylor@acle.norfolk.sch.uk

**7364.** Davies, G.B.P. (2008): Book review. 'Dragonflies and damselflies of South Africa.' Michael J. Samways Sofia/Moscow: Pensoft Publ., 2008. 297 pp. Softcover. ISBN 978-954-642-330-6. Price: 39 Euro. Pensoft Online Bookshop: <http://www.pensoft.net/>. African Invertebrates 49(2): [Verbatim: As attractive, generally large, diurnal, predatory insects, the Odonata have long attracted research interest from entomologists. In our region, a firm foundation for odonatology was laid by Elliot Pinhey, Boris Balinsky and others. This research mantle has been carried forward by Michael Samways and his students, who have devoted the last two decades to their study, firstly in KwaZulu-Natal, and more recently in the Western Cape. 'Dragonflies and damselflies of South Africa' (hereafter 'DDSA') is the culmination of much of Samways's investigation into our dragonfly fauna, and it is unequivocally a significant milestone for South African (and African) odonatology. As the Odonata are aquatic insects, it is instructive to remember that South Africa is largely an arid country, with vast areas of western South Africa falling below the 600 mm isohyet. Consequently, our dragonfly fauna is small (ca 158 species) relative to tropical Africa, but it does have the advantage of mixing dazzling tropical forms like *Anax tristis* with endemic, localized temperate taxa like the *Ecchlorestes* species. 'DDSA' is a most attractive volume and, although running to nearly 300 pages, the book is nevertheless compact and lightweight. I am not sure whether the author and the publishers intended this as a field-guide or a more formal handbook. The Preface (p. 5) does mention the words field guide, but I get the impression from its large mass of text and data that 'DDSA' is, in fact, a hybrid between the two. This 'schizophrenic' nature is perhaps the book's weakest aspect. As I will discuss below, there are some features that detract from the book's effectiveness as a classic field-guide, while others mar its handbook status. The book begins with concise chapters on dragonfly biology and ecology. These notes highlight many interesting facets of South African dragonfly biology, e.g. that certain taxa (such as *Sympetrum fonscolombii*) are migratory, or that Western Cape Odonata divide into two phenological categories, 'spring species' and 'autumn species'. Regrettably, Samways is unable to expand on such interesting topics, and, perhaps even worse, none of the statements in these opening chapters is referenced, making it difficult to trace the primary source of a particular conclusion or result. There are also tips on conservation (a field that Samways has been especially active in), photographing, collecting and even rearing dragonfly larvae and building a 'dragonfly pond' for one's garden. I was interested to learn that pinning specimens with spread wings has fallen out of favour with odonatologists, who now prefer to accession material by placing specimens in plastic envelopes. There are two keys in the book: one to major groupings and a longer key to species. The latter is liberally illustrated with drawings of genitalia, wings, etc. I have not had an opportunity to test the keys, but they appear comprehensive and well-written. The species accounts include notes on identification, a description of the entire insect (face, eyes, prothorax, synthorax etc.), distribution (with map, but provincial boundaries are not indicated), habitat, behaviour and comparison with similar species. Usefully, there are also two bar graphs for each account, one showing phenology (flight period) and the other a 'dragonfly biotic index', which shows sensitivity to pollution, habitat disturbance etc. Most accounts have two colour photographs, generally of male and female, although

occasionally only one sex is illustrated. All 416 photographs of dragonflies and damselflies are of a high standard, but some appear to have been reproduced too darkly. Samways deserves much credit for successfully photographing all the South African Odonata taxa. Given the often wary nature of dragonflies, this is a most praiseworthy achievement. Sketches of genitalia and wing photos also appear, these duplicating the images from the species key. It is evident, therefore, that a large amount of information is incorporated into each species account. This is welcome on one level for comprehensiveness, but for field-guide purposes it is a daunting torrent of data to wade through. This abundance of text and data gives Samways's book a rather cramped and 'busy' feel; a definite negative feature. Possibly as a result of the cramped nature of the individual species accounts, on pp. 204-213 a section entitled 'Additional photographs' appears. It is wonderful to have these additional photos, but something of an oddity to have them divorced from the respective accounts. Why not just insert the relevant photos after each account as an extra page for the particular species? Inevitably, Samways's book invites comparison with the two-volume field guides privately published by Warwick and Michèle Tarboton (Tarboton & Tarboton 2002, 2005). Those two excellent books broke new ground in being the first field guides to South African Odonata. 'DDSA' has an obvious edge in that the dragonflies and damselflies are all in one volume. 'DDSA' is brim-full of information, as mentioned, and scores points over the Tarboton guides, which were marked by their concision. Samways's colour photos of live or freshly killed individuals also means that the true colours of the insects comes across clearly in his book. The Tarbotons in some cases had to use old museum specimens. A striking example of this is *Lestiniogomphus angustus*: Samways's photograph (p. 125) shows this stunning dragonfly with its vibrant yellow and black coloration and reddish abdominal apex to great advantage, whereas the same insect in Tarboton is a dried-out, dull, brown husk. On the other hand, the text-heavy feel of 'DDSA' contrasts negatively with the neat, uncluttered layout of the Tarboton guides, which also gave maximum space to the dragonflies themselves rather than to the text. 'DDSA' is finished off with a check-list providing Latin and vernacular names of Odonata and references to relevant pages. The check-list is followed by a glossary of mostly morphological terms, an extensive bibliography that lists 118 publications on taxonomy, ecology and conservation of Afrotropical dragonflies and damselflies, and by a five-page general index. Like butterflies, all South African Odonata now have English common names, but problematically many differ between Samways and the Tarbotons. There is no correct answer to what is a subjective decision on which name to use, but the differences between the books may cause frustration amongst users. To sum up, 'Dragonflies and Damselflies of South Africa' is an admirable volume which is a credit to author and publisher. 'DDSA' is highly recommended to established entomologists and novices, as well as to ecologists, conservation specialists, naturalists, etc. South African scientific community is immeasurably strengthened by having this book available, and the order now begins to rival the butterflies for sumptuous and accessible coverage. References Tarboton, W. & Tarboton, M. 2002. A fieldguide to the dragonflies of South Africa. Modimolle, South Africa: privately published. -2005. A fieldguide to the damselflies of South Africa. Modimolle, South Africa: privately published.]

**7365.** De Block, M.; Stoks, R. (2008): Short-term larval food stress and associated compensatory growth reduce adult immune function in a damselfly. *Ecological Entomology* 33(6): 796-801. (in English) [" 1. In animals with a complex life cycle, larval stressors may carry over to the adult stage. Carry-over effects not mediated through age and size at metamorphosis have rarely been studied. The present study focuses on the poorly documented immune costs of short-term food stress both in the larval stage and after metamorphosis in the adult stage. 2. The present study quantified immune function [number of haemocytes, activity of prophenoloxidase (proPO) and phenoloxidase (PO)] in an experiment where larvae of the damselfly *Lestes viridis* were exposed to a transient starvation period. 3. Directly after starvation, immune variables were reduced in starved larvae. Levels of proPO and PO remained low after starvation, even after metamorphosis. In contrast, haemocyte numbers were fully compensated by the end of the larval stage, yet were lower in previously starved animals after metamorphosis. This can be explained as a cost of the observed compensatory growth after starvation. Focusing only on potential costs of larval stressors within the larval stage may therefore be misleading. 4. The here-identified immunological cost in the adult stage of larval short-term food stress and associated compensatory growth strongly indicates that physiological costs may explain hidden carry-over effects bridging metamorphosis. This adds to the increasing awareness that the larval and adult stages in animals with a complex life cycle should be jointly studied, as trade-offs may span metamorphosis." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**7366.** De Block, M.; McPeck, M.A.; Stoks, R. (2008): Life-history evolution when *Lestes* damselflies invaded vernal ponds. *Evolution* 62: 485-493. (in English) ["We know little about the macroevolution of life-history traits along environmental gradients, especially with regard to the directionality compared to the ancestral states and the associated costs to other functions. Here we examine how age and size at maturity evolved when *Lestes* damselflies shifted from their ancestral temporary pond habitat (i.e., ponds that may dry once every decade or so) to extremely ephemeral vernal ponds (ponds that routinely dry completely each year). Larvae of three species were reared from eggs until emergence under different levels of photoperiod and transient starvation stress. Compared to the two temporary-pond *Lestes*, the phylogenetically derived vernal-pond *Lestes dryas* developed more rapidly across photoperiod treatments until the final instar, and only expressed plasticity in development time in the final instar under photoperiod levels that simulated a later hatching date. The documented change in development rate can be considered adaptive and underlies the success of the derived species in vernal ponds. Results suggest associated costs of faster development are lower mass at maturity and lower immune function after transient starvation stress. These costs may not only have impeded further evolution of the routine development rate to what is physiologically maximal, but also maintained some degree of plasticity to time constraints when the habitat shift occurred." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be



**7367.** De Marmels, J. (2008): Buchbesprechung: Ellenrieder & Garrisson. *Entomologische Zeitschrift* 118(1): 22. (in German) [Review of the book referred as OAS 6676] Address: De Marmels, J., Inst. Zool. Agrícola, Fac. Agronomía, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com

**7368.** Deng, X.; Hu, Z. (2008): Wing-wing interactions in dragonfly flight. *The Neuromorphic Engineer* 10.2417/1200811.1269: 1-3. (in English) [A pair of robotic wings have been used to investigate why dragonflies use different phase angles for different flight modes.] Address: Xinyan Deng and Zheng Hu; Mechanical Engineering, University of Delaware, Newark, DE, USA

**7369.** Dorn, N.J. (2008): Colonization and reproduction of large macroinvertebrates are enhanced by drought-related fish reductions. *Hydrobiologia* 605: 209-218. (in English) ["Aquatic predators and habitat permanence can jointly affect benthic invertebrate biomass and community composition. In 2006 I sampled fish and invertebrates in ten ponds embedded in a seasonal wetland before and after a natural drought. Drought reduced fish biomass and density leaving some ponds in a fishless condition when rains returned in July. In July, large aquatic insects and crayfish colonized and reproduced in the ponds, but did not colonize all of the ponds equally. Using measurements of fish abundance and other environmental parameters of the ponds, I conducted linear regression analyses to explore potential drivers of variable invertebrate biomass in July. Fish biomass had a negative effect on invertebrate biomass and it explained more of the variation in total invertebrate biomass and total non-shrimp biomass than fish abundance (number of fish caught). Dissolved oxygen and pond depth were both correlated with fish biomass, but were poorer predictors of invertebrate biomass. Ponds with few or no fish had 209 greater total biomass and 2009 more non-shrimp biomass than ponds with high fish biomass. Shrimp dominated the invertebrate composition, and were only found in the two deepest ponds with the highest fish biomass; predatory insects and crayfish dominated the other eight ponds. When taxa were analyzed separately, fish biomass explained a large portion of the variation for predatory insects (Coleoptera, Hemiptera, and Odonata) and crayfish (*Procambarus allenii*), but dissolved oxygen was the best predictor of larval stratiomyid (order Diptera) biomass. These results are generally consistent with studies demonstrating negative effects of fish on large predatory invertebrates, but also suggest that more severe local droughts can seasonally enhance insect and crayfish populations by generating fishless or nearly fishless conditions." (Author)] Address: N. J. Dorn, N.J.; Department of Biological Sciences, Florida Atlantic University, Davie, FL 33314, USA. E-mail: ndorn1@fau.edu

**7370.** Dümpelmann, C.; Kern, D. (2008): Die Besiedlung der hessischen Lahn durch *Onychogomphus f. forcipatus* (Odonata: Gomphidae). *Libellula* 27(3/4): 147-161. (in German, with English summary) ["From 1999 onwards, the colonisation of the River Lahn in Hesse, Germany, by *O. forcipatus* has been documented by 82 records of adults, larvae and exuviae at 39 different localities. We show that *O. forcipatus* is currently a well established part of the limnofauna of the River Lahn in Hesse, at the northern limit of its range, where it had not been recorded yet. The occurrence of the species is

strongly connected to natural or restored sections of the river. The colonisation possibly originated from the upper parts of the River Eder where a big population has been known for many years. In addition, an overview on all known records of *O. forcipatus* from Hesse is given." (Authors)] Address: Dümpelmann, C., Zeppelinstr. 33, D-35039 Marburg/Lahn, Germany. E-mail: duempelc@staff.uni-marburg.de

**7371.** Dyatlova, E.S.; Kalkman, V.J. (2008): Massive migration of *Aeshna mixta* and *Sympetrum meridionale* in the Ukrainian Danube delta (Odonata-Anisoptera: Aeschnidae, Libellulidae). *Entomologische berichten* 68(5): 188-190. (in English, with Dutch summary) [18-VIII-2006, Taranov kut, about 16 km NE of Vylkove in the Ukrainian part of the Danube delta (45°29.523' N, 029°45.307'E); the number of specimens was estimated along 20 m of beach and by extrapolating this number to the 1 km explored. The authors estimated that there were at least 40,000 specimens of *A. mixta* and 30,000-50,000 specimens of *S. meridionale* present. *A. mixta* males (69%) outnumbered females (31%); in *S. meridionale* the sex ratio was 56% males and 44% females, but the ratio differed if catching flying or resting specimens. None of the specimens had freshly emerged, but no visible damage on the wings could be seen either, so probably the specimens were a few days to one or two weeks old.] Address: Dyatlova, Elena, Department of Zoology, Faculty of Biology, Odessa National University, Dvoryanskaya 2, UKR-65026 Odessa, Ukraine. E-mail: lena.dyatlova@gmail.com

**7372.** Dyatlova, E.S.; Kalkman, V.J. (2008): The Odonata of southwestern Ukraine, with emphasis on the species of the EU Habitats Directive. *Libellula* 27(3/4): 275-290. (in English, with German summary) ["From 2006 to 2008 a database with records of Odonata from southwestern Ukraine - the provinces of Odessa, Mykolaiv and Kherson - was built. This database holds records from literature, collections and fieldwork and contains over 1500 records. Distribution maps of all species have been made available on the Internet. In total 48 of the 74 Ukrainian species were recorded from this area. The area has a relatively low diversity of aquatic habitats and a large percentage of freshwater habitats consist of large lakes or large rivers characterised by high flood events in winter and spring. These habitats generally have a low diversity of Odonata, although densities can be very high. Species in the Habitats Directive occurring in the area are *Coenagrion ornatum*, *Gomphus flavipes* and *Sympecma paedisca*. Based on their occurrence and the presence of species of the Ukrainian Red List and species rare in southwestern Ukraine, six 'Important Dragonfly Areas' were selected: Reservoirs in a lower part of Khadzhibejski Liman, the basins of Southern Bug and Ingul rivers, the Lower Dniestr with tributaries and lakes and Dniestrovski Liman, the Kinburn Peninsula, the Dniepr delta, and the Lower Danube with the pre-Danube region. Large areas of southwestern Ukraine are poorly studied, and more field-work will undoubtedly result in the recognition of more areas with a high importance for Odonata." (Authors)] Address: Dyatlova, Elena, Odessa National I. I. Mechnikov University, Biological Faculty, Department of Zoology, Shampanski pereulok, 2, UA-Odessa, 65058, Ukraine. E-mail: lena.dyatlova@gmail.com

**7373.** Ellenrieder, N. von (2008): *Phoenicagrion* gen. nov. for *Leptagrion flammeum*, with description of a new

species, *P. paulsoni*, from Peru (Odonata: Coenagrionidae). *International Journal of Odonatology* 11(1): 81-93. (in English, with Spanish summary) ["The placement of *Leptagrion flammeum* in *Aeolagrion* is confirmed to be incorrect; comparison with all other described genera of New World Coenagrionidae shows that this species does not belong in any of them. A new genus, *Phoenicagrion* (type species *L. flammeum*), is here described to include *L. flammeum* and a new species, *P. paulsoni* (holotype male: Peru, Loreto department, Río Napo 50 km above Río Amazonas, 3°12'S, 72°57'W, 22 iii 2004, in UMMZ). A generic characterization, diagnoses, illustrations and distribution maps are provided." (Author) Address: Ellenrieder, Natalia von, Mus. Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: natalia.ellenrieder@gmail.com

**7374.** Ellenrieder, N. von; Garrison, R.W. (2008): The genus *Oligoclada* in Argentina, with description of *O. rubribasalis* sp. nov. (Odonata: Libellulidae). *International Journal of Odonatology* 11(2): 249-260, pl. IV. (in English, with Spanish summary) ["A new species (holotype male in MLP: Argentina, Formosa province, Parque Nacional Río Pilcomayo, Laguna Blanca, marshes next to pond, 25°10'29"S, 58°07'44"W, 74 m a.s.l., 16/17 ii 2008, leg. NvE, RWG) is described, diagnosed and illustrated, and a key, diagnostic illustrations, and distribution maps are provided for the three species of the genus occurring in Argentina. The combination of well defined orange-red dorsal spots on S2-3 in mature specimens, well developed supplementary tooth in pre-tarsal claws, shape of occipital triangle of female, and of vesica spermalis, genital lobe, posterior hamule, and cercus of male diagnose the new species." (Authors)] Address: Ellenrieder, Natalia von, Mus. Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: natalia.ellenrieder@gmail.com

**7375.** Ellenrieder, N. von; Garrison, R.W. (2008): *Drepanoneura* gen. nov. for *Epipleoneura letitia* and *Protoneura peruviana*, with descriptions of eight new *Protoneuridae* from South America (Odonata: Protoneuridae). *Zootaxa* 1842: 1-34. (in English, with Spanish summary) ["A new genus, *Drepanoneura* (type species *Drepanoneura loutoni* sp. nov.), is described to include *Epipleoneura letitia* Donnelly, *Protoneura peruviana* Fraser, and six new congeneric species from South America: *D. donnellyi*, *D. flinti*, *D. janirae*, *D. loutoni*, *D. muzoni*, and *D. tennesse*. *Drepanoneura* is similar to *Epipleoneura* and *Epipotoneura* in venational characters, but differs from them in morphology of male cercus, genital ligula, female pronotum, and epiproct. A new species of *Epipleoneura* from Venezuela, *E. demarmelsi*, and a new species of *Epipotoneura* from Brazil, *E. machadoi*, are described, and diagnostic illustrations for the poorly known *Epipotoneura nehalennia* Williamson are also presented. A generic characterization, diagnoses, and keys for species of *Drepanoneura* are provided, as well as diagnostic illustrations and distribution maps for all involved species." (Authors)] Address: Ellenrieder, Natalia von, Mus. Ciencias Naturales, Univ. Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: natalia.ellenrieder@gmail.com

**7376.** Ellenrieder, N. von; Garrison, R.W. (2008): *Oreiallagma* gen. nov. with a redefinition of *Cyanallagma* Kennedy 1920 and *Mesamphiagrion* Kennedy 1920, and the description of *M. dunklei* sp. nov. and *M. ecuatoriale* sp. nov. from Ecuador (Odonata: Coenagrionidae).

*Zootaxa* 1805: 1-51. (in English, with Spanish summary) ["In this paper we re-evaluate *Cyanallagma* Kennedy 1920, which currently includes 15 species, and we address another five species that share diagnostic characters with some of them but are currently placed within *Leptagrion* Selys 1876, *Mesamphiagrion* Kennedy 1920, and *Telagrion* Selys 1876. A new genus, *Oreiallagma*, is described to include 5 species originally placed in *Acanthagrion* Selys 1876, *Cyanallagma*, and *Telagrion*. These species are *O. thelakterion* (De Marmels 1997) (type species), *O. acutum* (Ris 1918), *O. oreas* (Ris 1918), *O. prothoracicum* (Kimmins 1945), and *O. quadricolor* (Ris 1918). The last stadium larva of *O. quadricolor* is described. The remaining species currently included in *Cyanallagma* are allocated to two separate genera: *Cyanallagma sensu stricto* and *Mesamphiagrion*. *Cyanallagma sensu stricto* comprises southern South American species including the type species, *Cyanallagma interruptum* (Selys 1876). *Mesamphiagrion* Kennedy 1920 includes a cluster of species from northwestern South America that are considered congeneric with the type species *Mesamphiagrion occultum* (Ris 1918). Two new species from Ecuador, *M. dunklei* and *M. ecuatoriale*, are described and *Argia hebdomatica* Navás 1934 is found to be a junior synonym of *M. ovigerum* (Calvert 1909). Synonymic lists, diagnoses, illustrations, keys, and distribution maps for the three genera are provided." (Authors) (Authors)] Address: Ellenrieder, Natalia von, Mus. de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: natalia.ellenrieder@gmail.com

**7377.** Faraone, F.P.; Lillo, F.; Giacalone, G.; Lo Valvo, M. (2008): The large invasive population of *Xenopus laevis* in Sicily, Italy. *Amphibia-Reptilia* 29: 405-412. (in English) ["The worldwide spread of invasive species is considered to be one of the main causes of global amphibian declines and the loss of bio diversity in general. The African Clawed Frog, *Xenopus laevis*, shows a strong ability to establish populations and invade various geographic regions. In 2004 *X. laevis* was found in Sicily for the first time. The Sicilian population is probably the largest in Europe with a range of about 225 km<sup>2</sup> in an area characterized by numerous agricultural ponds. This high density of ponds has potentially facilitated the dispersal of *X. laevis*. The frogs can move far from rivers or watercourses by utilizing the ponds as suitable "islands". The analysis of their diet shows that the aquatic larvae of nektonic insects comprise the major portion in terms of mass while small planktonic crustaceans are the most numerous component. There is a significant difference between the diet of adults and juveniles." (Authors) Odonata contribute significantly to the diet of *X. laevis*.] Address: Lo Valvo, M., Dipartimento di Biologia Animale "G. Reverberi", Università degli Studi di Palermo, Via Archirafi 18, I-90123 Palermo, Italy. E-mail: mlovalvo@unipa.it

**7378.** Ferland-Raymond, B.; Murray, D.L. (2008): Predator diet and prey adaptive responses: Can tadpoles distinguish between predators feeding on congeneric vs. conspecific prey? *Can. J. Zool.* 86(12): 1329-1336. (in English, with French summary) ["Predator diet can play an important role in facilitating detection of predation risk among prospective prey, and such detection should have adaptive significance in reducing mortality in environments where not all predators confer similar risk. In the laboratory, we tested behavioural and morphological responses of tadpoles from two congeneric

frog species (bullfrog (*Rana catesbeiana* Shaw, 1802) and mink frog (*Rana septentrionalis* Baird, 1854)) to cues from an odonate predator (genus *Aeshna* Fabricius, 1775). In a separate experiment we found that both frog species had similar baseline vulnerability to *Aeshna* predation, implying that species' responses to predators feeding on conspecific vs. congeneric prey also would be similar. Both species reduced their activity in the presence of predators feeding on tadpoles of either species vs. those fed invertebrates (*Libellulidae*) or not subjected to predators (controls). Bullfrog tadpoles grew bigger than controls when exposed to predators fed mink frog tadpoles only, whereas mink frogs failed to show a comparable response. Neither species exhibited changes in shape that were attributable to predator diet. Our results suggest that closely related frog species do not distinguish between predators feeding on conspecific vs. congeneric prey, implying that selection favours generalized antipredator responses when prey species are subject to similar predation risk." (Authors)] Address. not accessible.

**7379.** Fleck, G.; Brenk, M.; Misof, B. (2008): Larval and molecular characters help to solve phylogenetic puzzles in the highly diverse dragonfly family *Libellulidae* (Insecta: Odonata: Anisoptera): The *Tetrathemistinae* are a polyphyletic group. *Organisms Diversity and Evolution* 8(1): 1-16. (in English) ["The systematics of the dragonfly family *Libellulidae* remains an unsolved puzzle. The classification into subfamilies relies primarily on wing venational characters, as is the case for most systematic hypotheses on dragonflies. In this study, we show that the discovery of unknown libellulid larvae can change tremendously our views on phylogenetic relationships. The larvae of the genera *Micromacromia* Karsch, 1889 and *Allorhizucha* Karsch, 1889 are described and illustrated. They are briefly compared with the larva of *Neodythemis* Karsch, 1889. The larvae of *A. klingi* Karsch, 1889 and *N. africana* Fraser, 1954 are extremely similar. The larva of *M. camerunica* Karsch, 1889 displays well developed dorsal hooks on abdominal segments 4-8, which distinguishes it from other closely allied genera. *Micromacromia*, *Allorhizucha* and *Neodythemis* are traditionally placed within the *Tetrathemistinae*, but their larvae strongly resemble those in the subfamily *Libellulinae*. Larval morphological studies and a molecular analysis based on mitochondrial SSU, LSU and tRNA valine imply that *Micromacromia*, *Allorhizucha* and *Neodythemis* have to be placed in the subfamily *Libellulinae*. Consequently, the subfamily *Tetrathemistinae* becomes a polyphyletic group. Our analysis suggests that imaginal characters, and in particular wing venation, are much more often prone to homoplasious evolution than previously anticipated. Taxonomic or systematic works predominantly based on wing venation might be in need of substantial revision, at least within this dragonfly family, presumably even in the whole suborder Anisoptera, based on independent character sets like larval and molecular data." (Authors)] Address: Misof, B., Department of Entomology, Zoologisches Forschungsmuseum A. Koenig, Adenauerallee 160, D-53113 Bonn, Germany E-mail: b.misof.zfmk@uni-bonn.de

**7380.** Fleck, G.; Ullrich, B.; Brenk, M.; Wallnisch, C.; Orland, M.; Bleidissel, S.; Misof, B. (2008): A phylogeny of anisopterous dragonflies (Insecta, Odonata) using mtRNA genes and mixed nucleotide/doublet models. *Journal of Zoological Systematics and Evolutionary Re-*

*search* 46(4): 310-322. (in English) ["The application of mixed nucleotide/doublet substitution models has recently received attention in RNA-based phylogenetics. Within a Bayesian approach, it was shown that mixed models outperformed analyses relying on simple nucleotide models. We analysed a mt RNA data set of dragonflies representing all major lineages of Anisoptera plus outgroups, using a mixed model in a Bayesian and parsimony (MP) approach. We used a published mt 16S rRNA secondary consensus structure model and inferred consensus models for the mt 12S rRNA and tRNA valine. Secondary structure information was used to set data partitions for paired and unpaired sites on which doublet or nucleotide models were applied, respectively. Several different doublet models are currently available of which we chose the most appropriate one by a Bayes factor test. The MP reconstructions relied on recoded data for paired sites in order to account for character covariance and an application of the ratchet strategy to find most parsimonious trees. Bayesian and parsimony reconstructions are partly differently resolved, indicating sensitivity of the reconstructions to model specification. Our analyses depict a tree in which the damselfly family *Lestidae* is sister group to a monophyletic clade *Epiophlebia* + Anisoptera, contradicting recent morphological and molecular work. In Bayesian analyses, we found a deep split between *Libelluloidea* and a clade 'Aeshnoidea' within Anisoptera largely congruent with Tillyard's early ideas of anisopteran evolution, which had been based on evidently plesiomorphic character states. However, parsimony analysis did not support a clade 'Aeshnoidea', but instead, placed *Gomphidae* as sister taxon to *Libelluloidea*. Monophyly of *Libelluloidea* is only modestly supported, and many interfamily relationships within *Libelluloidea* do not receive substantial support in Bayesian and parsimony analyses. We checked whether high Bayesian node support was inflated owing to either: (i) wrong secondary consensus structures; (ii) under-sampling of the MCMC process, thereby missing other local maxima; or (iii) unrealistic prior assumptions on topologies or branch lengths. We found that different consensus structure models exert strong influence on the reconstruction, which demonstrates the importance of taxon-specific realistic secondary structure models in RNA phylogenetics." (Authors)] Address: Misof, B., Department of Entomology, Zoologisches Forschungsmuseum A. Koenig, Adenauerallee 160, 53113 Bonn, Germany. E-mail: b.-misof.zfmk@uni-bonn.de

**7381.** Fleck, G.; Nel, A.; Bechly, G.; Delclòs, X.; Jarzembowski, E.A.; Coram, R.A. (2008): New Lower Cretaceous 'libelluloid' dragonflies (Insecta: Odonata: Cavilabiata) with notes about estimated divergence dates for this group. *Palaeodiversity* 1: 19-36. (in English, with German summary) ["Several new fossil Lower Cretaceous Cavilabiata ('*Libelluloidea*') are studied. In the *Araripelibellulidae*, the male of *Araripelibellula martinnetoi* Nel & Paicheler, 1994, *Araripelibellula britannica* n. sp. from the UK and *Rencordulia sinica* n. gen., n. sp. from PR China are described. A further specimen of *Cretaneophya strevensi* Jarzembowski & Nel, 1996 is adding new information on its wing venation. In the *Chlorogomphida*, *Mesochlorogomphus crabbi* n. gen., n. sp. from the UK and *Hispanochlorogomphus rossi* n. gen., n. sp. from Spain are also described and placed in the new family *Mesochlorogomphidae*. The estimated divergence dates for the libelluloid dragonflies based on molecular data are disputed on the basis of the fossil



record. The Cavilabiata ('Libelluloidea') probably appeared during the Early to Middle Jurassic and greatly diversified during the Early Cretaceous." (Authors)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**7382.** Flenner, I.; Sahlen, G. (2008): Dragonfly community re-organisation in boreal forest lakes: rapid species turnover driven by climate change?. *Insect Conservation and Diversity* 1: 169-179. (in English) ["1. Climate change affects many ecosystems on earth. If not dying out or migrating, the species affected have to survive the altered conditions, including changes in community structure. It is, however, usually difficult to distinguish changes caused by a changing climate from other factors. 2. Forestry is considered to be the major disturbance factor in Swedish forests. Here, we use forest lake data sets from 1996 and 2006 which include species abundance data for dragonfly larvae, water plant structure, forest age and forestry measures during a period of 25 years: from 1980 to 2005. Hence, we were able to discriminate between forestry effects and changes in species composition driven by recent climate change. 3. We explored effects on regional species composition, species abundance and ecosystem functions, such as changes in niche use, utilising dragonflies (Odonata) as model organisms. 4. Our results show that dragonflies react rapidly to climate change, showing strong responses over such a short time span as 10 years. We observed changes in both species composition and abundance; former rare species have become more frequent and now occur in lakes of a wider quality range, while former widespread species have become more selective in their choice of waters. The new communities harbour about the same number of species as before, but seen from a regional perspective, diversity is reduced. 5. We predict that the altered species composition and abundance might raise new demands in conservation planning as well as altering the ecological functions of the aquatic systems." (Authors)] Address: Flenner, Ida, Ecology and Environmental Sciences, Halmstad University, PO Box 823, SE-30118 Halmstad, Sweden. E-mail: ida.flenner@hh.se

**7383.** Forbes, M.R.; Robb, T. (2008): Chapter 14: Testing hypotheses about parasite-mediated selection using odonate hosts. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research* edited by Alex Córdoba-Aguilar. Oxford University Press.: 175-189. (in English) ["Parasites are thought to select for host traits, such as elaborate ornaments and intricate immune systems. Dragonflies have proven useful hosts for studying parasite-mediated selection. This chapter summarizes whether parasites exert fitness costs on their dragonfly hosts and affect signals and the mating success of males. It also reviews determinants of resistance against ectoparasitic mites, which is present in many dragonfly species and introduces recent work suggesting that host gender and age influence immunological responses to bacterial and artificial challenges. The chapter highlights that the likelihood of demonstrating parasite-mediated selection might depend on whether or not the species being considered is a generalist parasite. New ideas on elucidating how dragonfly prey species should deal with threats from multiple enemies, such as predators and parasites, are considered." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive,

Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**7384.** French, G.; Smallshire, D. (2008): Criteria for determining key Odonata sites in Great Britain. *J. Br. Dragonfly Soc.* 24(2): 54-61. (in English) ["This article describes the development of criteria for the determination of key Odonata sites in Britain. By emphasising the importance of proof of breeding and estimation of population size, the criteria build upon the approach taken within the national Odonata recording scheme's Key Sites Project, promoting the continuation of recording breeding and abundance evidence and complementing the conservation agencies' criteria for the determination of SSSI designation (NCC, 1989)." (Authors)] Address: French, G., JNCC, Monkstone House, City Road, Peterborough, PE1 1JY, UK

**7385.** Gaino, E., Piersantia, S.; Rebor, M. (2008): Egg envelope synthesis and chorion modification after oviposition in the dragonfly *Libellula depressa* (Odonata, Libellulidae). *Tissue and Cell* 40(5): 317-324. (in English) ["*Libellula depressa* (Odonata, Libellulidae) is an exophytic dragonfly ovipositing eggs in clutches on the surface of floating plants and algae. The present work investigates, at ultrastructural level, the gradual differentiation of the egg envelopes and the chorionic changes after egg deposition in water. The ovary of the mature female of *L. depressa* is composed of numerous strings of panoistic ovarioles, where the eggshell formation takes place gradually throughout the activity of the follicle cells. The present data show that the egg envelopes are constituted of a very thick electron-dense vitelline envelope, a thin endochorion and an extremely thick exochorion composed of a fibrillar matrix resting on a thin electron-dense layer. After deposition in water, *L. depressa* eggs, initially white and almost transparent, gradually become brown spots in a semitransparent jelly coat, rich of incorporated debris. The jelly coat enveloping the eggs of *L. depressa* derives exclusively from the exochorion, constituted of a fibrillar matrix, which swells at contact with water. The jelly-like coat performs an adhesive function and presumably a protective role during egg segmentation and ensuing larval hatching." (Authors)] Address: Rebor, Manuela, Dipartimento di Biologia Cellulare e Ambientale, Università di Perugia, 06123 Perugia, Italy. E-mail: rebor@unipg.it

**7386.** Gama, G.; Francis, F. (2008): Etude de la biodiversité entomologique d'un milieu humide aménagé: le site du Wachnet, le long du Geer à Waremme (Province de Liège, Belgique). *Faunistic Entomology – Entomologie faunistique* 61(1-2): 33-42. (in French, with English summary) [Wachnet in Waremme, Wallonia, Belgium; between June and August 2007, 13 Odonata taxa are reported, mostly common species.] Address: Francis, F., Unité d'Entomologie fonctionnelle et Evolutive (Prof. E. Haubruge), Faculté Universitaire des Sciences Agronomiques de Gembloux, Belgium. E-mail: entomologie@fsagx.ac.be

**7387.** Garré, A.; Muzón, J.; Ardohain, D.M. (2008): Description of the final instar larvae of *Erythrodiplax atroterminata* Ris and *E. corallina* (Brauer) (Odonata: Libellulidae). *Zootaxa* 1896: 45-50. (in English) ["The final stage larva of *Erythrodiplax atroterminata* and *E. corallina* are described and illustrated based on reared specimens from Argentina. A comparative analysis of all known larvae of *Erythrodiplax* from Argentina is provided.

ded" (Authors)] Address: Garré, Analia, Instituto de Limnología "Dr. Raúl A. Ringuelet" (CCT-CONICET- La Plata) C.C. 712, 1900 La Plata, Argentina. E-mail: analiagarre@hotmail.com

**7388.** Garrison, R.W.; Ellenrieder, N. von (2008): *Dolonagrion* nov. gen. for *Telagrion fulvellum* from South America (Odonata: Coenagrionidae). *International Journal of Odonatology* 11(2): 173-183. (in English, with Spanish summary) ["Based on examination of the syntype female of *Telagrion fulvellum* which we designate as lectotype, and its comparison with additional male and female specimens from Peru, this species is assigned to a new genus, *Dolonagrion*, and both sexes are redescribed, diagnosed, and illustrated." (Authors) Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**7389.** Gassmann, D.; Richards, S.J. (2008): Description of *Idiocnemis patriciae* spec. nov. from Papua New Guinea (Odonata: Platycnemididae), with new distributional records of other *Idiocnemis* species. *Zool. Med. Leiden* 82(47): 581-593. (in English) ["*Idiocnemis patriciae* sp. n. is described from lowland rainforests of the Dark-End Lumber and Lakekamu regions in Gulf Province, Papua New Guinea. Biogeographically, the new species is near-endemic to the Papuan Gulf Coastal Lowlands area of endemism. Notes on the habitat of the new species and on a female specimen from the Lakekamu Basin tentatively assigned to it, are included. The distributions of *I. australis* Gassmann, *I. chloropleura* Lieftinck and *I. kimminsi* Lieftinck are updated. *I. chloropleura* is recorded from Yapen island for the first time. A revised key to the males of the *Idiocnemis inornata* species-group is provided." (Authors)] Address: Gassmann, D., Institute of Evolutionary and Ecological Sciences, Leiden University, c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: gassmann@naturalis.nm.nl

**7390.** Giacomini, H.C.; De Marco, P. (2008): Larval ecomorphology of 13 Libellulidae (Anisoptera, Odonata) of the Middle Rio Doce Valley, Minas Gerais, Brazil. *Braz. J. Biol.* 68(1): 211-219. (in English, with Portuguese summary) ["In the lakes of the Middle Rio Doce, Minas Gerais (MG), two groups of larval Libellulidae are distinguished by preferences of habitat use: one uses mainly aquatic macrophytes and the other uses the bottom substrate. The goal of this work was to verify if there is a morphological distinction between the two groups of species. Thirteen body measures were taken from the larvae and analyzed. No difference was found between the two groups of species regarding the body size, but shape differences were observed for two morphological variables. The species that use mainly macrophytes tend to have larger relative measures of the labium and smaller measures of the abdomen width. Advantages in resource obtainment and in vulnerability to predation are probably the explanations for the morphological divergence among these larval groups." (Authors) The paper considers the following taxa: *Erythrodiplax* sp., *Idiataphe amazonica*, *Miathyria simplex*, *Micrathyria* sp. 1 and M. sp. 2, *Tauriphila australis*, *Traemea binotata*, *Erythemis peruviana*, *Brachymesia furcata*, *Diastatops obscura*, *Orthemis discolor*, *Perithemis mooma*, and *Dythemis multipunctata*.] Address: Giacomini, H.C., Departamento de Ecologia, Campus de Rio

Claro, Universidade Estadual Paulista "Júlio de Mesquita Filho", Av. 24-A, 1515, CEP 13506-900, Rio Claro, SP, Brazil. E-mail: hgjacomini@gmail.com

**7391.** Gligorovic, B.; Pešic, V.; & Zekovic, A. (2008): Contribution to the knowledge of the dragonflies (Odonata) of the river Zeta (Montenegro). *Natura Montenegrina* 6: 73-89. (in English) ["An updated list of the dragonflies (Odonata) of the River Zeta ( Montenegro ) is given, including 27 species. Three of them: *Aeshna affinis*, *Lestes barbarus*, and *Gomphus vulgaticismus* are new for fauna of Montenegro." (Authors)] Address: Gligorovic, B., Department of Biology, Faculty of Sciences, University of Montenegro, Cetinjski put b.b., 81000 Podgorica, Montenegro, E-mail: bogic1@cg.yu

**7392.** Gligorovic, B.; Pesic, V.; Zekovic, A. (2008): A contribution to the knowledge of dragonflies (Odonata) from the area of Gornji Crnci - Piperi (Montenegro). *Acta entomologica serbica*. 13(1/2): 1-7. (in English, with Serbian summary) [In this work, an updated list is provided of 14 species of Odonata of the area Gornji Crnci-Piperi (Montenegro), an area of soft karst. Among the species is *Cordulegaster picta*, the first record for Montenegro.] Address: Gligorovic, B., Department of Biology, Faculty of Sciences, University of Montenegro, Cetinjski put b.b., 81000 Podgorica, Montenegro, E-mail: bogic1@cg.yu

**7393.** Goertzen, D. (2008): Industriebrachen im Ruhrgebiet - Lebensraum für Libellen? (Odonata). *Libellula* 27(3/4): 163-184. (in German, with English summary) ["Wastelands generated by industry offer secondary habitats for many plant and animal species. The capacity of wastelands of the coal and steel industry in the Ruhr as a habitat for Odonata was studied at twelve wasteland sites, among them mining waste heaps, factory premises and storage areas. At all study sites altogether 36 species of Odonata were recorded, of which 20 were red list species and 29 indigenous at least at one site. Compared to artificially structured sites, at habitats with semi-natural structures significantly more threatened species were recorded. Due to high diversity in typology, water level and vegetation, water bodies on mining waste heaps and on storage areas can be considered as habitats of high value, also for endangered species. In contrast, factory premises with different kinds of basins were colonised chiefly by ubiquitous species."] Address: Goertzen, Diana, Dornröschenweg 27, D-44339 Dortmund, Germany. E-mail: diana.goertzen@rub.de

**7394.** Gomiero, L.M.; Manzatto, A.G.; Braga, F.M.S. (2008): The role of riverine forests for food supply for the omnivorous fish *Brycon opalinus* Cuvier, 1819 (Characidae) in the Serra do Mar, Southeast Brazil. *Braz. J. Biol.* 68(2): 321-328. (in English) [The diet of the fish *Brycon opalinus* (Characidae) was studied along three rivers (Paraibuna, Ipiranga and Grande) in the basin of the Paraibuna, southeast Brazil. Odonata contribute to the diet.] Address: Gomiero, L.M., Depto de Zoologia, Instituto de Biociências, Universidade Estadual Paulista – UNESP, Av. 24-A 1515, CEP 13506-900, CP 199, Rio Claro, SP, Brasil. E-mail: leanmg@rc.unesp.br

**7395.** Gonzalez-Soriano, E. (2008): Odonata from some west-coast Mexican islands. *Notulae odonologicae* 7(2): 15-18. (in English) ["Occasional collections in 14 islands brought about 130 specimens belonging to 16 species. As expected, the most wide ranging spe-

cies belong to strong fliers of the suborder Anisoptera. *Pantala hymenaea* and *P. flavescens* were the most widespread species, occurring at 8 and 6 islands, respectively. *P. flavescens* was the only species recorded from Isla Clarion, the farthest Mexican island." (Author)] Address: Gonzalez-Soriano, E., Depto Zoologia, Inst. Biol., Universidad Autonoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**7396.** Gonzalez-Soriano, E.; Noguera, F.A.; Zaragoza-Caballero, S.; Morales-Barrera, M.A.; Ayala-Barajas, R.; Rodriguez-Palafox, A.; Ramirez-Garcia, E. (2008): Odonata diversity in a tropical dry forest of Mexico, 1. Sierra de Huautla, Morelos. *Odonatologica* 37(4): 305-315. (in English) ["A study of the fauna of Odonata of a tropical deciduous forest is presented. Collections were made monthly during a 1-yr period (Nov. 1995-Oct. 1996) during 5 days each month. A total of 2595 adult specimens were collected, belonging to 57 species, 33 genera and 8 families. Estimated richness value using the non-parametric estimator ICE was 76.28." (Author)] Address: Gonzalez-Soriano, E., Depto Zoologia, Inst. Biol., Universidad Autonoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**7397.** Gossum, H. van; Sherratt, T.N.; Cordero-Rivera, A. (2008): Chapter 17. The evolution of sex-limited colour polymorphism. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research*, ed. A. Córdoba-Aguilar. Oxford University Press: 219-231. (in English) ["Species that exhibit genetic colour polymorphism are ideal for studying the micro-evolutionary forces that maintain genetic variation in nature. One very intriguing polymorphism is the coexistence of several discrete morphs within only one sex, with one morph often resembling the opposite sex in colour and sometimes behaviour. In males, this resemblance often allows access to receptive females, while in females the polymorphism appears related to avoiding excessive male sexual harassment. One might wonder why natural selection does not simply give rise to a single best male and female type for each species. The phenomenon of sex-limited polymorphisms provides an important opportunity to test contemporary ideas relating to sexual selection and sexual conflict, and the diversity of polymorphisms that have arisen in odonates clearly offers one of the best natural systems for among species and population comparative research." (Publisher)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvogossum@ruca.ua.ac.be

**7398.** Günther, A. (2008): *Pracht- und Juwelenlibellen Südostasiens (Calopterygidae und Chlorocyphidae)*. Eigenverlag. André Günther, Freiberg: 80 pp. (in German) [This is a wonderful coffee table book with plenty of stunning photographs from jewelwing Odonata from the Philippines, Indonesia, Bali, New Guinea, Malaysia, Thailand, and China, and covering the following species: *Archineura incarnata* (Karsch 1891), *Neurobasis chinensis* (Linnaeus 1758), *Neurobasis kaupi* Brauer 1867, *Rhinocypha fenestrella* (Rambur 1842), *Disparocypha biedermani* Ris 1916, *Rhinocypha biforata* Selys 1859, *Rhinocypha perforata* (Percheron 1835), *Libellago asclepiades* Ris 1916, *Libellago aurantiaca* (Selys 1859), *Libellago rufescens* (Selys 1873), *Libellago lineata* (Burmeister 1839), *Libellago semiopaca* (Selys

1873), *Libellago stigmatizans* (Selys, 1869), *Libellago xanthocyana* (Selys 1869), *Rhinocypha chaoi* Wilson, 2004, *Rhinocypha humeralis* Selys 1873, *Rhinocypha monochroa* Selys 1873, *Rhinocypha pelops* Laidlaw 1936, *Rhinocypha phantasma* Lieftinck 1935, *Rhinocypha tinctoria* (Rambur 1842), *Neurobasis luzoniensis* Selys 1879.] Address: Günther, A., Naturschutzinstitut Freiberg, Waisenhausstraße 10, D-09599 Freiberg, Germany. E-mail: a.guenther@abo.freiepresse.de

**7399.** Hämäläinen, M. (2008): *Calopteryx splendens* (Harris, 1780) — a note on the publication date of the description of the Banded Demoiselle. *J. Br. Dragonfly Society* 24(1): 19-23. (in English) ["The correct citation of the scientific name of the Banded Demoiselle is *Calopteryx splendens* (Harris, 1780). The description was published in the first edition of Moses Harris' *An exposition of English Insects*, which was issued in three or four parts in 1776—1780. In odonatological literature the date 1782, which refers to the publication of the second edition of the book, has been traditionally, but incorrectly, used for this species. The first available synonymic name of *C. splendens* is *Libellula ludovicea* Kourcroy, 1785.] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**7400.** Hao, S.-l.; et al. (not transliterated) (2008): Preliminary report on Odonata in Baxianshan Natural Reserve in Tianjin. *Journal of Anhui Agri. Sci.* 36(23): 10000-10001. (in Chinese, with English summary) [14 Odonata species are listed.] Address: HAO Shu-lian, Tianjin Natural History Museum, Tianjin 300074, China

**7401.** Harabis, F.; Dolny, A. (2008): Red list of dragonflies (Odonata) of the Czech part of Silesia [2008]. *Cas. Slez. Muz. Opava (A)*, 57: 31-36. (in English, with Czech summary) [27 species of the regional 65 dragonfly species are red listed.] Address: Harabiš, F., Department of Ecology and environment, Faculty of Environmental sciences, Czech university of life sciences Prague, Kamýcká 129, CZ-165 21 Prague 6, Czech Republic.

**7402.** Hardersen, S. (2008): Dragonfly (Odonata) communities at three lotic sites with different hydrological characteristics. *Italian Journal of Zoology* 75(3): 271-283. (in English) ["At the nature reserve "Bosco della Fontana" (Lombardy, Italy) the communities of larval and adult dragonflies were studied at three sites in small streams. The larval communities were investigated by collecting exuviae. Site 1, a stream section which falls dry in March–April due to human intervention, had a community of larval dragonflies where species typical of running water were almost absent. Here *Ischnura elegans* was the dominant species, accounting for more than 64% of the total number of exuviae. Additionally, other species typical for stagnant water were present. However, reproductively active adults of rheophilous species were dominant when flowing water was abundant at this site in summer. In contrast, at the two other sites, where flowing water is present throughout the entire year, rheophilous species were dominant in the larval community and in the adult communities. It is concluded that streams with a highly modified hydrology may represent "ecological traps" for specialized species and that dragonfly surveys solely based on the observation of adults can be misleading." (Author)] Address: Hardersen, S., Centro Nazionale per lo Studio e



la Conservazione della Biodiversità Forestale, Corpo Forestale dello Stato, Strada Mantova, 29, I-46045 Marmirolo (MN), Italy. E-mail: s.hardersen@libero.it

**7403.** Hassall, C.; Thompson, D.J.; Harvey, I.F. (2008): Latitudinal variation in morphology in two sympatric damselfly species with contrasting range dynamics (Odonata: Coenagrionidae). *Eur. J. Entomol.* 105: 939-944. (in English) ["Geographic range expansion is one of the best documented macroecological consequences of climate change. A concomitant change in morphology has been demonstrated in some species. The relationship between latitudinal variation in morphology (e.g. Bergmann's rule) and the morphological consequences of microevolutionary pressures at expanding range margins have received little attention in the literature. Here we compare morphology of males of two Palearctic damselfly species, *Coenagrion puella* and *Pyrrosoma nymphula*. *C. puella* has recently expanded its range from the north of England into Scotland. *P. nymphula* does not exhibit a range margin in the United Kingdom and has established populations in northern Scotland. We demonstrate evidence for spatially correlated variation in body size across the sampling sites between the two species but a deviation in patterns of dispersal-related morphology. *P. nymphula* exhibited very weak relationships between dispersal-related morphology (wing loading and thorax : abdomen mass ratio) and latitude. However, the more southerly distributed *C. puella* exhibited strong relationships between mass investment in dispersal-related morphology and latitude. These trends appear to indicate compensatory growth patterns in cooler environments like those demonstrated for other species. The limits of this compensation for conditions that are close to the limits of a species' tolerance may contribute to the determination of the range margin. Greater variation in morphology towards the range margin has been observed in previous studies in Odonata. As such, the location of the sampling sites relative to the range margin of each species (closer in *C. puella* than *P. nymphula*) is highlighted as a potential contributing factor to the variation observed.] Address: Hassall, C., Biosciences Building, Crown Str., University of Liverpool, L69 7ZB Liverpool, UK. E-mail: c.hassall@liv.ac.uk

**7404.** Hassall, C.; Thompson, D.J. (2008): The effects of environmental warming on Odonata: a review. *Int. Journal of Odonatology* 11(2): 131-153. (in English) ["Climate change brings with it unprecedented rates of increase in environmental temperature, which will have major consequences for the earth's flora and fauna. The Odonata represent a taxon that has many strong links to this abiotic factor due to its tropical evolutionary history and adaptations to temperate climates. Temperature is known to affect odonate physiology such as developmental rate, phenology and seasonal regulation as well as immune function and the production of pigment for thermoregulation. A range of behaviours are likely to be affected which will, in turn, influence other parts of the aquatic ecosystem, primarily through trophic interactions. Temperature may influence changes in geographical distributions, through a shifting of species' fundamental niches, changes in the distribution of suitable habitat and variation in the dispersal ability of species. Finally, such a rapid change in the environment results in a strong selective pressure towards adaptation to cope and the inevitable loss of some populations and, potentially, species. Where data are lacking

for odonates, studies on other invertebrate groups will be considered. Finally, directions for research are suggested, particularly laboratory studies that investigate underlying causes of climate-driven macroecological patterns." (Authors)] Address: Thompson, D. J., Population Biology Research Group, School of Biol. Sciences (Nicholson Building), Univ. of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**7405.** Hein, A.T.; Kunz, B. (2008): Kleinlibellen erbeuten Spinnentiere (Odonata: Coenagrionidae; Arachnida). *Libellula* 27(3/4): 253-257. (in German, with English summary) ["Damselflies as predators of arachnids (Odonata: Coenagrionidae; Arachnida) — In 2007 and 2008 three observations were documented photographically, during which zygopterans actively preyed on arachnids: *Pyrrosoma nymphula* on an orb weaver *Mangora acalypha* (Araneae: Araneidae), *Ischnura elegans* on a small undetermined spider and *Coenagrion puella* on a har-vestman (Opiliones: Phalangidae). The damselflies gleaned their prey from vegetation or directly from the spider's web. Except for the Neotropical family of the Pseudostigmatidae, this interaction hitherto has only rarely been described." (Authors)] Address: Hein, A.T., Ackerstraße 109, D-13355 Berlin, Germany. E-mail: andreas.hein1961@arcor.de

**7406.** Hercut, R.; Purtan, S.; Balog, B. (2008): Contributions to the study of the macrozoobenthic invertebrate communities from two habitats in Dobrudja (Romania). *Bihorean Biologist* 2: 21-26. (in Romanian, with English summary) [*Ischnura elegans*, *Coenagrion hastulatum*, *C. puella*, *Crocothemis erythraea*, and *Orthetrum coerulescens* are listed as species found in two permanent ponds from Dobrudja, one situated at Sarighiol de Deal in Tulcea County and the other at Dobromir de Deal in Constanta County.] Address: Hercut, Ramona, anul IV Biologie-Chimie, Univ. Oradea, Facultatea de Stiinte, Romania

**7407.** Hercut, R.; Cupsa, D.; Purtan, S.; Balog, B. (2008): Studies upon the structure of the macrozoobenthic invertebrate communities in three habitats from Arginesti surroundings (Mehedinti County, Romania). *Bihorean Biologist* 2: 14-20. (in Romanian, with English summary) [9 taxa were recorded in three ponds including one odonate species identified as *Anaciaeschna isosceles*.] Address: Cupsa, D., Univ. Oradea, Facultatea de Stiinte, Catedra de Biologie, str. Universitatii nr. 1, 410087, Oradea, Romania. E-mail: dcupsa@uoradea.ro

**7408.** Hoess, R. (2008): Kampf an der Wasserlinie: *Anax imperator*-Larve attackiert Weibchen von *Aeshna juncea* bei der Eiablage (Odonata: Aeshnidae). *Libellula* 27(3/4): 263-266. (in German, with English summary) ["At a pond in Berne, Switzerland, a female *A. juncea* was attacked by a male F-0 larva of *Anax imperator*. The female was obviously caught while ovipositing in front of the larva. Several escaping attempts of the female were futile. The larva consumed parts of segment 8 of its victim before letting it go abruptly." (Author)] Address: Hoess, R., Normannenstr. 35, 3018 Bern, Switzerland. E-mail: ReneHoess@1st.ch

**7409.** Hoffmann, J.; Schorr, M. (2008): Nachruf: Prof. Dr. Philip Steven Corbet, geb. 21. Mai 1929 in Kuala Lumpur, Malaysia, gest. 13. Februar 2008 in Truro, Cornwall, Großbritannien. *IDF-Report* 14: 1-46. (in German) [Obituary P.S. Corbet 21-05-1929 - 13-II-2008.]

Address: Hoffmann, J., Haldesdorfer Str. 21, 22179 Hamburg, Germany. E-mail: hoffmann.joa@t-online.de

**7410.** Holusa, O. (2008): Raupen des Fichtennestwicklers *Epinotia tedella* (Lepidoptera: Tortricidae) als Beute von *Aeshna cyanea* (Odonata: Aeshnidae). *Libellula* 27(3/4): 259-262. (in German, with English summary) ["On 30-VIII-2002, on the Massiv of Kaznicov near Hukvaldy in the eastern part of the Czech Republic (district of Frydek-Mfstek, 49°38'N, 18°14'E), a hunting male of *A. cyanea* was observed. In this forest, which chiefly consisted of *Fagus sylvatica* mixed with younger *Picea abies*, the dragonfly hovered approximately 5 cm from a caterpillar of *Epinotia tedella* hanging on a long thread from the lower branches of *P. abies*, at a height of approximately 1.2 m above ground. The dragonfly approached the caterpillar, seized it with its legs, tore it off the thread and devoured it while flying. This foraging behaviour was observed three times altogether. It is classified as midair foraging, and is suggested to be more widespread in the species." (Author)] Address: Holusa, O., Bruzovská 420, CZ-738 01 Frydek-Mistek, Czech Republic. E-mail: holusao@email.cz

**7411.** Hope, P. (2008): The Vagrant Emperor *Anax ephippiger* (Burmeister, 1839): proof of breeding in Turkey. *J. Br. Dragonfly Society* 24(1): 32-36. (in English) [Mugla province, 50m from the Mediterranean Sea at Cahs (near Fethiye), Turkey; 17-XI-2004, *A. ephippiger* settled at the base of a stem of *Typha angustifolia*. The following year exuviae collected from the location were identified to be *A. ephippiger*. This is the first proof of breeding for this species in Turkey.] Address: Hope, P., English Bridge Court, Wyle Cop, Shrewsbury, Shropshire SY1 1XH, UK

**7412.** Hope, P. (2008): Balkan Emerald *Somatochlora meridionalis* (Neilson, 1935) — A remarkable extension of the distribution range in Turkey. *J. Br. Dragonfly Society* 24(1): 14-18. (in English) ["Whilst working on a United Nations (Development Project) biodiversity study at Gokova in southwest Turkey in 2003 (Hope, 2004), I caught a metallic green dragonfly at a stream in the Cetibeli Forest. Although initially assumed to be a Brilliant Emerald *Somatochlora metallica*, the specimen was sent to Dr R. R. Askew for positive identification. He informed me that it was in fact a Balkan Emerald *Somatochlora meridionalis* and, according to him, not recorded in Asian Turkey. Later correspondence with odonatologists from the Natural History Museum (European Invertebrate Survey, Nederland) in Leiden, The Netherlands, confirmed that it was scarce to fairly common in Thrace (European Turkey) and had been recorded in the adjacent Asian Turkey just over the Bosphorus. My discovery put it some 900km to the south of any previous records, a remarkable extension of its distribution range." (Author)] Address: Hope, P., 2 English Bridge Court, Wyle Cop, Shrewsbury, Shropshire SY1 1XH, UK

**7413.** Hunger, H.; Schiel, F.-J. (2008): Erstnachweis von *Gomphus flavipes* am deutsch-schweizerischen Hochrhein (Odonata: Gomphidae). *Libellula* 27(3/4): 221-228. (in German, with English summary) ["At 29-VI, 23-VII, 27-VIII and 09-VIII-2008, four exuviae of *Stylurus flavipes* were found on the High Rhine east of Basle, three on the German bank and one on the Swiss bank. This is the first confirmed record of *S. flavipes* in Switzerland, although a previous occurrence of the species in the Canton of Vaud is regarded as likely. The fin-

dings are described and briefly discussed." (Authors)] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), August-Ganther-Straße 16, D-79117 Freiburg, Germany. E-mail: holger.hunger@inula.de

**7414.** Ishizawa, N. (2008): Factors in the selection of oviposition mode in *Sympetrum infuscatum* (Selys) (Anisoptera: Libellulidae). *Odonatologica* 37(4): 317-328. (in English) ["The study was conducted at rice paddies in the cool temperate area of central Japan. The oviposition time period was limited to between ca 10:00 a.m. and 14:00 p.m. with a peak around noon. At an ambient temperature ( $T_a$ ) below 30°C most pairs oviposited in tandem (TO) but at a  $T_a$  above 30°C in mid-summer most pairs separated shortly after the start of TO. The females continued to oviposit while being escorted by their partners. The regression coefficient of male body temperature ( $T_b$ ) in ovipositing pairs was characteristically greater than that of the female, and it is suggested that the male is more dependent on  $T_a$  than is the female. Although the duration of oviposition was a little longer in pairs that separated after the start of oviposition, this difference was not significant. The reason why *S. infuscatum* starts oviposition in such a hot season of summer seems to be due to the morphological feature of its slender abdomen, which decreases abdominal light absorption at low  $T_a$  in the autumn." (Author)] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozavva City, Saitama Pref., Japan. E-mail: isizawa7@rivo.mediatti.net

**7415.** Jacobsen, D.; Marin, R. (2008): Bolivian Altiplano streams with low richness of macroinvertebrates and large diel fluctuations in temperature and dissolved oxygen. *Aquatic Ecology* 42: 643-656. (in English) ["We sampled benthic macroinvertebrates and recorded oxygen and temperature regime during 2-day periods in 12 stream sites at an altitude of 3,800–4,000 m a.s.l. on the Bolivian Altiplano, during low flow conditions at the end of the dry season. Eight of the sites were relatively unpolluted, while the remaining four sites were affected by domestic/industrial sewage. Compared to other Andean streams, the fauna was poor with a total of 28 and a mean of 11 taxa (mostly families) in the unpolluted sites. The entire EPT group was represented by just five families. Of these, only Baetidae and Hydroptilidae were common. At all sites, the dominant taxa were found among just four taxa (Elmidae, Chironomidae, Oligocheata and Hyallellidae). Mean water temperature was 12.9 C°, while mean diel amplitude was 13.4 C° and the maximum range 17.4 C°. Ten richness and biotic indices were used to analyse for effects of temperature and oxygen on the fauna. Most measures of fauna richness were negatively correlated with mean and max temperature (even excluding the four polluted sites), while biotic indices were mostly uncorrelated with temperature. Thus, the large fluctuations in temperature seemed to exclude taxa, thereby reducing overall diversity of Altiplano streams. Oxygen saturation also varied considerably, with a mean diel range of 48% and a maximum range of 93%. Richness measures were uncorrelated with oxygen %, while all biotic indices were positively correlated with either mean or min oxygen %. Most measures of faunal composition showed a marked shift at levels of 10–30% min oxygen saturation. Earlier studies of high Andean streams in Ecuador have shown a major shift in faunal composition at 50–60% oxygen saturation. The fauna in the Altiplano streams may be

adapted to the large fluctuations in oxygen saturation, and therefore more robust towards low oxygen saturations. The implications for biotic assessment of Altiplano streams are discussed." (Authors) A few Aeshnidae were collected.] Address: Jacobsen, D., Freshwater Biological Laboratory, Institute of Biology, University of Copenhagen, Helsingørsgade 51, Hillerød 3400, Denmark. E-mail: Djacobsen@bi.ku.dk

**7416.** Jara, F.G. (2008): Tadpole–odonate larvae interactions: influence of body size and diel rhythm. *Aquatic Ecology* 42(3): 503-509. (in English) ["Several studies have shown that prey and predator body size may affect the outcome of predator–prey interactions. However, few studies have taken in account the changes on predator–prey interactions over 24 h. In a tropical freshwater system I evaluated how predator and prey size, and their diel rhythm in activity influenced the interaction between *Physalaemus pustulosus* tadpoles and dragonfly larvae. Tadpoles of different size classes were exposed to two size classes of the dragonfly larvae *Rhionaeschna spec.* Feeding trials were conducted during day and night. Tadpole activity showed a diel rhythm and affected size-selective predation of the smallest dragonfly larvae, but not of the larger ones. Predator and prey size had a significant effect on the prey survivorship and prey size had a significant effect on the preference of the predator. The interaction between both factors was significant, indicating that they did not operate independently. I conclude that the predator–prey interactions between odonate larvae and anuran tadpoles were mainly affected by the size of the prey and the predator, and less by the diel activity pattern of the prey." (Author)] Address: Jara, F.G., Laboratorio de Fotobiología, Centro Regional Bariloche, Universidad Nacional del Comahue, Quintral 1250, San Carlos de Bariloche, Rio Negro 8400, Argentina. E-mail: fjara@crub.uncoma.edu.ar

**7417.** Jiang, Y.-H.; Zhang, H.-M. (2008): Descriptions of the full-grown *Cephalaeschna patrorum* Needham and *Planaeschna shanxiensis* Zhu & Zhang larvae from China (Anisoptera: Aeshnidae). *Odonatologica* 37(3): 273-277. (in English) ["The male and female ultimate instar larvae of the 2 species from the Beijing area are described and illustrated. Differential characters with other species from Taiwan, Hong Kong, China and Japan are summed up." (Authors)] Address: JIANG, Y.-h., Yuntai-xiang Culture Station, Xinpu District, Lianyungang City, Jiangsu-222064, China. E-mail: jiangyh26@yahoo.com.cn

**7418.** Johansson, F.; Mikolajewski, D.J. (2008): Chapter 10. Evolution of morphological defences. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research*, ed. A. Córdoba-Aguilar. Oxford University Press: 127-139. (in English) ["Understanding the ecology and evolution of morphological defences in animals and plants may help us to understand and protect biodiversity. Several species of dragonfly larvae express lateral and dorsal abdominal spines. In some species these spines seem to be fixed, and in others they are induced by the presence of predatory fish. Larger spines are adaptations to reduce predation risk by fish, but incur a cost because large spines are associated with a higher predation risk by invertebrate predators. The difference in vulnerability to different predators has the potential to affect temporal and spatial variation in the morphology of dragonfly larvae, and may ultimately re-

sult in speciation. Future focus on the joint evolution of correlated defensive traits such as morphology and behaviour and their plasticity might be fruitful for a better understanding of the development of animal diversity." (Authors)] Address: Johansson, F., Dept of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**7419.** Jovic, M. (2008): Report on Adriatic Montenegro 2007 project - Odonata. IDF-Report 15: 1-25. (in English) [In 2007, field work was carried out in the wetlands of the Adriatic shore in Montenegro and in the vicinity of the Lake of Skadar. 36 Odonata species were recorded from 39 localities. The records are documented and briefly discussed. The species list includes *Gomphus schneiderii*, *Lindenia tetraphylla*, and *Selysiothemis nigra*.] Address: Miloš, J., M., Natural History Museum in Belgrade, Njegoševa 51, 11000 Belgrade, Serbia. E-mail: milos.jovic@nhmbeo.org.yu

**7420.** Jovic, M.; Santovac, S.; Andjz, L. (2008): *Leucorrhinia caudalis* (Charpentier, 1840) - a new or an ex dragonfly species in Serbian fauna? *Bulletin of the Natural History Museum Belgrade* 1: 161-171. (in English, with Serbian summary) ["The discovery of 11 specimens (4males, 7females) of *L. caudalis* in the entomological collection of the National Museum in Zrenjanin is presented. This material from the early 1970's represents the first reliable data about the occurrence of this species in Serbian territory and should, therefore, be considered a new species of Serbian fauna. Contemporary literature data about this endangered species in the region are discussed. Attempts to find a present population in the locality cited on the specimen's labels remained unsuccessful. Both the original list of the species collected together with the specimens *L. caudalis* and the list of those collected in the same locality thirty-five years later are given and commented upon. Remarks about habitat destruction and the possibilities of survival of this species in N Serbia are also presented." (Authors)] Address: Jovic, M., Natural History Museum Belgrade, Njegoševa 51, P.O. Box 401, YU-11000 Belgrade, Serbia. E-mail: milos.jovic@nhmbeo.org.yu

**7421.** Jung, S.W.; Hguyen, V.V.; Nguyen, Q.H.; Bae, Y.J. (2008): Aquatic insect faunas and communities of a mountain stream in Sapa Highland, northern Vietnam. *Limnology* 9(3): 219-229. (in English) ["Aquatic insect communities were investigated from the Muonghoa Stream in the Sapa Highland (highest peak 3,143 m), a subtropical mountain stream in northern Vietnam. Field investigations for quantitative (Surber net 50 cm 9 50 cm, mesh size 0.2 mm, riffle and pool/run) and qualitative (hand net, mesh size 1 mm) sampling were conducted at nine sites along the watercourse between 27 November and 2 December 2005. As a result, a total of 216 species (the majority of them undescribed) belonging to 139 genera, 61 families, and nine orders were recognized: 53 Ephemeroptera species (24.5%), nine Odonata species (4.2%), 15 Plecoptera species (6.9%), seven Hemiptera species (3.2%), 35 Coleoptera species (16.2%), one Megaloptera species (0.5%), 29 Diptera species (13.4%), 66 Trichoptera species (30.6%), and one Lepidoptera species (0.5%). Trichoptera, Ephemeroptera, and Coleoptera represented the major aquatic insect groups with regard to taxonomic and individual richness, whereas Hemiptera and Odonata were relatively less diverse and abundant than in studies of



other tropical Southeast Asian streams. The dominance, richness, and diversity indices (H0) fell within the following ranges [mean  $\pm$  standard deviation (SD)]: 0.18–0.76 (0.42  $\pm$  0.19), 4.13–9.19 (7.06  $\pm$  1.45), and 1.61–3.22 (2.67  $\pm$  0.55), respectively. Riffle habitats generally yielded numbers of aquatic insect species and individuals approximately twice that sampled in pool/run habitats. Shredders were relatively larger in proportion within the headwater reach, whereas scrapers and collector-gatherers were more abundant in the middle and lower stream reaches. This functional feeding group composition is characteristic of temperate streams in East Asia. The results of detrended correspondence analysis and Bray–Curtis cluster analysis indicated that aquatic insect compositions at the sampling sites were very reflective of the reach characteristics, which evidence gradual changes with altitude and stream order along the stream watercourse. This is the first comprehensive investigation of aquatic insects in highland Southeast Asian regions." (Authors) Odonata are treated on the genus level.] Address: Y. J. Bae (&) Lab of Animal Systematics and Ecology, Division of Life Sciences and Biotechnology, Korea University, 1 Anam-dong, Seongbuk-gu, Seoul 136-701, South Korea e-mail: yjbae@korea.ac.kr

**7422.** Kadoya, T.; Suda, S.; Nishihiro, J.; Washitani, I. (2008): Procedure for predicting the trajectory of species recovery based on the nested species pool information: Dragonflies in a wetland restoration site as a case study. *Restoration Ecology* 16(3): 397-406. (in English) ["Restoration of seminatural habitats in the rural agricultural landscape has become an urgent matter in environmental conservation. We propose here a procedure for predicting the trajectory of species recovery and for specifying the priority of habitat types for restoration of a rural agricultural landscape. We then apply it as a case study to the recovery of dragonfly species in the Azame restoration project that began in 2003 in northern Kyushu, Japan. We examined the nestedness of the regional distribution of dragonflies using a national database on wildlife distribution and listed the recorded species in order of their prevalence in the region. We also conducted a census of adult dragonflies currently found at the restoration site to assess species richness. By comparing these data, we identified species potentially capable of inhabiting the restoration site and, based on their habitat requirements, suggest what type of habitat (e.g., bogs and marshes, ponds, and bodies of slow-moving water) should be restored preferentially. We observed significant nestedness in the presence–absence matrix for dragonfly species and thus predict that species recovery at the restoration site will follow the regional order of prevalence of the species. The required habitat types did not differ significantly between the currently observed species and the potential species, which indicates that all these habitat types should be restored in the project." (Authors)] Address: Kadoya, T., Department of Ecosystem Studies, Graduate School of Agricultural and Life Sciences, The University of Tokyo, 1-1-1 Yayoi, Bunkyo-ku, Tokyo 113-8657, Japan. E-mail kadoya@e-mail.jp

**7423.** Kalkman, V. (2008): Records of dragonflies from Borneo, Star Mountains, Papua, Indonesia (Odonata). *Entomologische berichten* 68(2) : 45-52. (in English, with Dutch summary) ["In Borneo, a village on the lower northern slopes of the Star Mountains, New Guinea, almost a week fieldwork was conducted by four affiliates

of the Entomology Department of the Cenderawasih University, Abepura, Indonesia, in collaboration with two Dutch entomologists. This article presents an impression of the work and focuses on observations on dragonflies. A total of 37 species from 13 families were recorded. Information on the distribution, habitat and ecology of dragonflies in New Guinea is scarce and despite the small number of field days much new information was gathered. Comparing the results with other studies from Papua New Guinea generates the prediction that at least 70 species are present in the area." (Author)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**7424.** Kalkman, V.J. (2008): Taxonomy, behaviour, and habitat of *Mesopodagrion* and *Sinocnemis*. Notes on Old World Megapodagrionidae 3 (Odonata). *International Journal of Odonatology* 11(2): 185-193; pls I, II. (in English) ["Published records of *Mesopodagrion* are reviewed and the distributions of *M. tibetanum* and *M. yachowensis* are given. *Sinocnemis henanese* is considered a junior synonym of *S. yangbingi*. Based on morphological and behavioural characters *Sinocnemis* is removed from *Platycnemididae* and placed in *Megapodagrionidae*. Species of *Sinocnemis* show a general resemblance to species of *Mesopodagrion* but it is not clear if the two genera are closely related. Adults of both *Mesopodagrion* and *Sinocnemis* rest with open wings, and show a preference for perching on horizontal surfaces, keeping their thorax and abdomen close to the surface of their perch. This behaviour may have a thermoregulatory function." (Author)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**7425.** Kalnins, M. (2008): Protected aquatic insects of Latvia – *Leucorrhinia albifrons* (BURMEISTER, 1839) and *L. caudalis* (CHARPENTIER, 1840) (Odonata: Libellulidae). *Latvijas Entomologs* 45: 5-13. (in English) ["Published data, collections, data collected during the project „Analysis of the Specially Protected Nature Territories in Latvia and Establishing of EMERALD/Natura 2000 Network” and material collected by Latvian entomologists have all been used in the analysis of the distribution of this species. The distribution of *L. albifrons* and *L. caudalis* were mapped using a basic grid of 5x5 km squares in the Baltic grid system. In total, *L. albifrons* is recorded from 96 squares and *L. caudalis* - from 80 squares in Latvia. The most known localities are concentrated in central and northern Latvia. The majority of localities of *L. albifrons* in Latvia has been recorded in natural eutrophic the Lakes with Magnopotamion or Hydrocharition – type vegetation and in natural dystrophic the Lakes and ponds, in active raised bogs or transition mires. Other *L. albifrons* habitats are polytrophic the Lakes and polytrophic oxbow the Lakes with Magnopotamion or Hydrocharition type vegetation, hard oligo-mesotrophic the Lakes with benthic vegetation of *Chara* spp. The majority of localities of *L. caudalis* in Latvia has been recorded in natural eutrophic the Lakes with Magnopotamion or Hydrocharition – type vegetation, polytrophic the Lakes and polytrophic oxbow the Lakes with Magnopotamion or Hydrocharition type vegetation. Other *L. albifrons* habitats are hard oligo-mesotrophic the Lakes with benthic vegetation of *Chara*

spp., natural dystrophic the Lakes and ponds, in active raised bogs or transition mires." (Author)] Address: Kalnins, M., Nature Protection Board, Eksporta iela 5, LV-1010 Riga, Latvia. E-mail: martins.kalnins@dap.gov.lv

**7426.** Keil, P.; Simova, I.; Hawkins, B.A. (2008): Water-energy and the geographical species richness pattern of European and North African dragonflies (Odonata). *Insect Conservation and Diversity* 1(3): 142-150. (in English) ["1. Environmental correlates of broad-scale patterns of Odonata species richness were studied in Europe and part of northern Africa using 220 × 220-km gridded data. Relationships with 11 environmental variables were tested using multiple regression. 2. Two models were constructed: (i) for the entire data set covering both Europe and northern Africa, and (ii) only for Europe. 3. Across both regions, actual evapotranspiration had the strongest relationship with richness, followed by weaker associations of potential evapotranspiration (a concave polynomial) and summer vegetation index (a positive linear relationship). Within Europe the strongest predictor was a concave polynomial of potential evapotranspiration, followed by vascular plant species richness (a positive relationship) and annual precipitation (a concave polynomial). 4. A test of metabolic theory identified strong non-linearity in the temperature-richness relationship, and geographically weighted regression indicated consistency with the theory in a very limited part of Europe. 5. The results are most consistent with the hypothesis that broad-scale species richness patterns are primarily determined by water-energy balance, similar to many fully terrestrial insect groups." (Authors)] Address: Keil, P., Dept of Ecology, Faculty of Science, Charles University, Vinicna 7, Prague 2, Czech Republic. E-mail: pkeil@seznam.cz

**7427.** Kiatanova, D.; Slavevska Stamenkovic, V.; Kostov, V.; Marinov, M. (2008): Contribution to the knowledge of dragonfly fauna of the Bregalnitsa river, Macedonia (Insecta: Odonata). *Natura Montenegrina* 7(2): 169-180. ["Six Odonata species have been established as possibly breeding in Bregalnitsa River during a hydrobiological research conducted from the source region to the lower part of the watercourse. Dragonfly larvae are found in seven out of thirteen sampling points. Other six species have been discovered during faunistic research performed in the adjacent area and added to the overall dragonfly check-list for the region. All together are discussed according to their autochthony, habitat specialisation and zoogeographical affiliation." (Authors) Of special interest are records of *Coenagrion ornatum* and *Stylurus flavipes*.] Address: Kiatanova, Despina, Macedonian Ecological Society, Blvd. Kuzman Josifovski Pitu 28/3-7; 1000 Skopje, Macedonia. E-mail: kitanova@mes.org.mk

**7428.** Koenig, W.D. (2008): Chapter 12. Lifetime reproductive success and sexual selection theory. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research*, ed. A. Córdoba-Aguilar. Oxford University Press: 153-167. (in English) ["This chapter summarizes studies of lifetime reproductive success (LRS) conducted on odonates. Such studies have focused on many characters, but have typically concluded that survivorship — the main component of natural selection, is more important than mating efficiency — a primary component of sexual selection, in determining LRS. They have also frequently found that environmental fac-

tors are important and that selection and the opportunity for selection vary considerably depending on density, sex ratio, and community composition. LRS studies have been most successful when focused on specific traits and when complemented by experimental manipulations. Progress in understanding the current actions of natural and sexual selection is thus most likely to involve long-term LRS work combined with experimental or comparative approaches. Particularly desirable are studies that incorporate the larval stage in fitness calculations, perform parentage analyses to determine realized fitness, and consider the role of non-breeding behaviours such as foraging efficiency." (Publisher)] Address: Koenig, W.D., Hastings Reservation, University of California Berkeley, 38601 E. Carmel Valley Road, Carmel Valley, CA 93924, USA. E-mail: koenigwd@berkeley.edu

**7429.** Kosterin, O.E.; Vikhrev, N.E. (2008): Odonatological field notes of two January trips to SE Thailand, in 2005 and 2006. *Malangpo* 22: 222-236. (in English) ["A report about Odonata met during two trips to SE Thailand (Chon Buri, Rayong and Chanthaburi Provinces) in January 2005 and January 2006 is given in a form of field notes of the former author, along with his impressions of a Siberian first time occurred in tropics. Few data of the second author's visit in November 2006 and December 2007 are added. The shortened version of the text concerning the trip in 2005 has been already published in *WDA's Agrion* 10(1): 5-7. Observations of 2005 and 2006 are compared. *Aciagrion borneense*, *A. pallidum*, *Onychargia atrociana*, *Pseudothemis jorina*, *Anax guttatus*, *Epopthalmia* were for the first time recorded in Chon Buri Province; *Aristocypha fenestrella*, *Heliocypha biforata*, *Prodasineura autumnalis*, *Coelliccia yamasakii* Asahina, 1984, *Brachythemis contaminata*, *Brachydiplax farinosa*, *Trithemis aurora*, *Neurothemis intermedia atalanta* in Rayong Province, and *Ceriagrion praetermissum* and *Hydrobasileus croceus* in Chanthaburi Province, but all these records except for *A. borneense* and *A. guttatus* for Chon Buri Province has been already published in the mentioned publication of the first author. For these species, a list of the collected or observed specimens is provided." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**7430.** Kosterin, O.E. (2008): Observations on the crepuscular flight in *Aeshna viridis* Eversman in Omsk province, West Siberia (Anisoptera: Aeshnidae). *Notulae odonotologicae* 7(2): 18-20. (in English) ["Observations of the crepuscular trophic flight of *A. viridis* (20:10-20:50 to 21:20-21:40) for the period of August 4-15, 1978 in northern Omsk province. West Siberia are presented. Upon the day of appearance, the moths *Loxostege sticticalis* L. were the main prey." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**7431.** Królak, E.; Korycińska, M. (2008): Taxonomic composition of macroinvertebrates in the Liwiec River and its tributaries (Central and eastern Poland) on the basis of chosen physical and chemical parameters of water and season. *Polish Journal of Environmental Studies* 17(1): 39-50. (in English) [The composition of ma-

croinvertebrates - measured on the family level - was studied during spring, summer and autumn. "Simultaneously, physical and chemical parameters of water were measured. Water parameters were different in each study period. Macroinvertebrates samples collected in summer and autumn were much more diversified than the samples collected in spring. In the spring samples a greater EPT diversity was observed, while in the samples collected in autumn Odonata, Coleoptera and Heteroptera were more diversified. The values of the BMWP-PL index were slightly higher for the summer and autumn samples than for the spring ones. ... The results of the studies show that samples used for the biotic assessment of the quality of waters of moderately polluted lowland rivers typical of central and eastern Poland should be collected in autumn, not in spring." (Authors)] Address: Królak, E., Dept Ecol. & Environmental Protection, University of Podlasie, Prusa 12, 08-110 Siedlce, Poland. E-mail: kruell@o2.pl

**7432.** Krotzer, R.S.; Bried, J.T.; Krotzer, M.J. (2008): The Odonata of Mississippi. *Bulletin of American Odonatology* 10(4): 65-91. (in English) ["An annotated faunal list of the Odonata occurring in Mississippi is presented, totaling 144 species (100 Anisoptera, 44 Zygoptera). Five species - *Enallagma davisii*, *Gomphus (Hylgomphus) geminatus*, *Epitheca (Tetragoneuria) spinosa*, *Neurocordulia alabamensis*, and *Miathyria marcella* - are documented from the state for the first time. The presence in Mississippi of *Celithemis bertha* Williamson, previously reported from the state based on a misidentification, is confirmed. Four species from earlier Mississippi lists are removed, and nine potential additions to the state's fauna are discussed. A brief history of odonatological inventory in Mississippi is given, along with a discussion of the state's physiography and aquatic resources, relationships of its odonate fauna to that of its neighboring states, and potential conservation measures that could benefit odonates and their habitats." (Authors)] Address: Krotzer, S., 2238 Haysop Church Road, Centreville, AL 35042, USA. E-mail: rs-krotze@southernco.com

**7433.** Kuńka, A.; Hebda, G.; Łęgowski, D.; Świerad, R. (2008): Faunistical data on selected species of dragonflies (Insecta: Odonata) in the Opole Province (Southwest Poland). *Opole Scientific Society Nature Journal* 41: 101-105. (in English) [Records of 28 Odonata species, rare, endangered, threatened with extinction or protected by law from the Opole province, Poland are presented.] Address: Kuńka, A., Fieldorfa 14/308, 45-273 Opole, Poland. E-mail: akunka@o2.pl

**7434.** Kunz, B. (2008): Anfänge der Libellenkunde in Württemberg (Odonata). *Libellula* 27(3/4): 229-252. (in German, with English summary) [Germany; "Literature investigations and a check of the collection of the 'Staatliches Museum für Naturkunde Stuttgart' (SMNS) revealed a number of early Odonata records from Württemberg that had been hitherto unknown or neglected. As the oldest faunistic work from this region, the 1802 publication of «Verzeichniss der Halbkaefer, Netzflügler, Wespen, ungeflügelten Insekten, Wanzen und Fliegen, welche um den Ursprung der Donau und des Neckars, dann um den untern Theil des Bodensees vorkommen» by the naturalist Friedrich Roth von Schreckenstein, was identified. Considering several other newly evaluated historic publications, such as the, 'Oberamtsbeschreibungen' or the 'Jahreshefte des Ver-

eins für vaterländische Naturkunde in Württemberg' (1844-1900), the first steps of odonatology in the 19th century in Württemberg are documented. Apart from describing the start of Odonata species listing from Württemberg, hitherto neglected data concerning species that today are regarded as rare or extinct - *Leucorhinia albifrons* and *L. caudalis* - are presented." (Author)] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: libellen@berndkunz.de

**7435.** Lencioni, F.A.A. (2008): *Angelagrion* gen. nov. with description of *A. nathaliae* sp. nov. and *A. fredericoi* sp. nov. from Brazil (Odonata: Coenagrionidae). *Zootaxa* 1968: 23-32. (in English, with Spanish summary) ["A new genus of Coenagrionidae is described from Brazil, *Angelagrion* (type species *Angelagrion fredericoi* sp. nov.) including two new species, *A. fredericoi* sp. nov. and *A. nathaliae* sp. nov.. The new genus is characterized by an enormous and modified internal fold of genital ligula, abdominal segments S8-10 dark brown or black contrasting with mostly bluish abdomen, sternum of S8 in males with a circular bluish-white spot, and short CuA." (Author) ] Address: Lencioni, F.A.A., Rua Anibal, 216 – Jardim Coleginho – Jacareí – São Paulo – Brazil - CEP (ZIP) 12310-780. E-mail: odonata@zygoptera.bio.br

**7436.** Lieckweg, T. (2008): Die Libellenfauna der Ostfriesischen Inseln (Odonata). Dokumentation des aktuellen Artenbestandes anhand von Literaturdaten. *Schriftenreihe Nationalpark Niedersächsisches Wattenmeer* 11: 141-144. (in German, with English summary) ["The East Frisian dune islands off the German coast of the North Sea with their 350 limnic and 200 brackish ponds harbour 39 species of dragonfly, 26 of which are currently considered indigenous to the islands. This amounts to about 33 % of all dragonfly species known from Germany and to 43 % known from Lower Saxony. Nine of the dragonfly species native to the islands are listed as threatened in Germany or Lower Saxony. Breeding waters favoured by dragonflies are freshwater ponds in grey dune sites and in wet dune slacks, but slightly brackish waters of less than 5 ‰ salinity are tolerated by 15 species. Having almost invariably been created by human activity, today most of the islands' water bodies are threatened with being filled up by sedimentation and by excessive scrub encroachment, which severely impairs their functioning abilities as habitats for dragonflies." (Author)] Address: Lieckweg, T., Carl-von-Ossietzky-Universität, Fakultät V, Institut für Biologie und Umweltwissenschaften, D-26111 Oldenburg, Germany. E-mail: tammo.lieckweg@gmx.de

**7437.** Lingenfelder, U. (2008): Die Gabel-Azurjungfer – *Coenagrion scitulum* (Rambur, 1842) – erobert die Pfalz (Odonata: Coenagrionidae). *Fauna und Flora in Rheinland-Pfalz* 11(2): 377-408. (in German, with English summary) [In Rhineland-Palatinate, Germany, *C. scitulum* "was recorded for the first time in 2006 in the north of the federal state. Now, the species has been found also in the Palatinate, the southern part of the federal state, at eleven localities in the western part of the region between Kaiserslautern and Homburg/Saar. Reproduction evidence was provided by the observation of newly emerged or immature specimens at five of these waters. The localities are predominantly flat and relatively warm and include seven rain storage basins, three waters in old sand pits and one pond. One additional observation of the species in the eastern part of



the Palatinate was reported recently from the area around Ludwigshafen by J. Ott. In this article, the observations of *C. scitulum* in the Palatinate are described. A short survey of the distribution of the species in adjoining regions is also given here. In conclusion, dispersal/distribution, habitats, and status in the Palatinate are discussed." (Author)] Address: Lingenfelder, U., Seebergstr. 1, 67716 Heltersberg. Germany. E-mail: U.Lingenfelder@VR-web.de

**7438.** Lingenfelder, U. (2008): Pfalz-Eroberung von 2 Seiten. Boten des Klimawandels: Libellenart Gabel-Azurjungfer ist „neu“ in der Pfalz. Die Rheinpfalz. Markt-platz Regional. Nr. 264 vom 12.11.2008: (in German) [Brief but sound report on the current (2008) discoveries of *Coenagrion scitulum* in Rheinland-Pfalz, Germany.] Address: Lingenfelder, U., Seebergstr. 1, 67716 Heltersberg. Germany. E-mail: U.Lingenfelder@VR-web.de

**7439.** Lok, A.F.S.L. (2008): The biology and distribution in Singapore of *Lestes praemorsus decipiens* Kirby, 1893. *Nature in Singapore* 1: 27-30. (in English) [The paper includes some general information on distribution, habitat, and wing morphology of the taxa.] Address: Lok, A., Dept Biol. Sciences, National University Singapore, 14 Science Drive 4, Singapore 117543, Republic of Singapore. E-mail: dbsloks@nus.edu.sg

**7440.** Lok, A.F.S.L. (2008): The biology and distribution in Singapore of *Prodasineura humeralis* Selys, 1860. *Nature in Singapore* 1: 51-53. (in English) [V-2008, 2 km from Chestnut Track area, Upper Seletar Reservoir, Singapore. The paper includes some general information on distribution, habitat, and wing morphology of the species.] Address: Lok, A., Dept Biol. Sciences, National University Singapore, 14 Science Drive 4, Singapore 117543, Republic of Singapore. E-mail: dbsloks@nus.edu.sg

**7441.** Lotzing, K. (2008): Liste der seit 1980 nachgewiesenen Libellen (Insecta: Odonata) im Bereich der Bode und ihrer Nebenarme innerhalb des ehemaligen Landkreises Aschersleben-Staßfurt (Sachsen-Anhalt) mit Einschätzung ihres Vorkommens und ihrer aktuellen Bestandssituation. *Entomol. Mitt. Sachsen-Anhalt* 16(2): 66-80. (in German, with English summary) [Between 1980 and 2007, the dragonfly-fauna of the River Bode and its tributaries within the administrative boundaries of the former administrative district Aschersleben - Staßfurt, now part of "Salzlandkreis", Sachsen-Anhalt, Germany was investigated. A total of 29 species was recorded including the regional interesting species *Calopteryx splendens*, *Lestes barbarus*, *L. dryas*, *L. virens*, *Coenagrion pulchellum*, *Ophiogomphus cecilia*, *Brachytron pratense*, *Anaciaeschna isoceles*, *Crocothemis erythraea*, *Sympetrum pedemontanum*, and *S. striolatum*.] Address: Lotzing, K., Am Hollschen Bruch 4c, 39435 Unseburg, Germany

**7442.** Lytle, D.A.; Olden, J.D.; McMullen (2008): Drought-escape behaviors of aquatic insects may be adaptations to highly variable flow regimes characteristic of desert rivers. *The Southwestern Naturalist* 53(3): 399-402. (in English, with Spanish summary) ["We document how two species of desert aquatic insects use positive rheotaxis to escape drought in desert rivers. We observed ca. 3,600 adults of the long-toed water beetle *Postelichus immsi* (Coleoptera: Dryopidae) crawling upstream concurrent with upstream recession of

surface water in the Santa Maria River, La Paz and Mohave counties, Arizona. At the same time, we observed larvae of the gray sanddragon *Progomphus borealis* (Odonata: Gomphidae) burrowing and swimming upstream in large densities (690 larvae/m<sup>2</sup>). Both taxa moved with sufficient speed to arrive at perennial reaches of the river before being overtaken by drought." (Authors)] Address: Department of Zoology, Oregon State University, Corvallis, OR 97331 (DAL, LEM) School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA 98195, USA. E-mail: lytle@science.oregonstate.edu

**7443.** Ma, J.; Liang, B.; Zhang, S.; Metzner, W. (2008): Dietary composition and echolocation call design of three sympatric insectivorous bat species from China. *Ecol. Res.* 23: 113-119. (in English) ["By examining an extensive data set covering a period of 2 years, the present study identifies the dietary composition of three sympatric insectivorous bat species in rural areas of Beijing municipality. Each species clearly has different preferences for particular food items. Greater horseshoe bats, *Rhinolophus ferrumequinum*, preferred to catch nocturnal, actively flying insects, mostly moths (Lepidoptera), and to a lesser percentage flies (Diptera), beetles (Coleoptera), and flying ants and termites (Hymenoptera). Other nocturnal insects which do not exhibit any perceptible wing movements, such as true bugs (Homoptera), or strictly diurnal insects that hardly ever fly in the dark, such as grasshoppers (Orthoptera) and dragon- and damselflies (Odonata), were never found in droppings of horseshoe bats. Large mouse-eared bats, *Myotis chinensis*, preferentially glean relatively large terrestrial prey of the order Coleoptera (mostly carabid beetles) and Orthoptera, whereas greater tube-nosed bats, *Murina leucogaster*, consume predominantly smaller, diurnal Coleoptera (mostly soldier beetles, Cantharidae, and ladybugs, Coccinellidae). Our findings also indicate previously not described, significant spectro-temporal differences in the echolocation signals of *M. chinensis* and *M. leucogaster*. The results suggest that in our study area the dramatic differences in the dietary composition of these three bat species are mainly based upon differences in their foraging behaviors, including differences in their echolocation signal structure. The dietary data provide important background information for conservation efforts, such as habitat protection." (Authors)] Address: Metzner, W., Dept of Physiological Science, University of California, 621 Charles E. Young Dr. S., Box 951606, Los Angeles, CA 90095-1606, USA. E-mail: metzner@ucla.edu

**7444.** Macagno, A.L.M.; Boano, G.; Palestrini, C.; Stasi, M.; Rolando, A. (2008): Movement and demographics of *Libellula fulva* (Odonata, Libellulidae). *Environ. Entomol.* 37(5): 1145-1153. (in English) ["Many capture-recapture studies on adult dragonflies have found male-biased sex ratios. However, few have estimated survivorship of males and females separately from data on frequency of recaptures in the field. Even when daily survival and capture probabilities are estimated separately, controversies can arise on whether sex biases in local survival are to be attributed to mortality or permanent emigration from the study site. The knowledge of male and female movements, assessed on an appropriate scale (i.e., within and outside the breeding site), can help address this issue. In this paper, we performed a 4-yr capture-recapture study of two *L. fulva* populations in northwest Italy. Cormack-Jolly-Seber models

were used to get unbiased estimates of demographic parameters (daily survival and capture probabilities, sex ratio, mean life span, and population size). Movement parameters were measured directly by georeferencing encounters. Moderate differences in survival, with males surviving better than females, were found in one population and not in the other, suggesting that these differences are not an inherent characteristic of the species. In the population with lower female survival, females were not more vagile than males, thus indicating their lower survival was caused by actual mortality rather than to emigration. In the population with no survival differences between males and females, marked males outnumbered females, but estimated sex ratios were 1:1 or female biased. Therefore, raw field data were misleading because they led to underestimates of the more elusive sex and overestimates of the more detectable one (males). Survival and movement differences detected in the two populations are discussed in the framework of local environmental and demographic factors." (Authors)] Address: Macagno, Anna, Dipartimento di Biologia Animale e dell'Uomo, Università degli Studi di Torino, Via Accademia Albertina 13, 10123 Torino, Italy. E-mail: anna.macagno@unito.it

**7445.** Malkov, N.P. (ed.) (2008): Krasnaya Kniga Respubliki Altai. Zhivotnye [Red Data Book of Altai Republic. Animals]. Gorno-Altaysk: 47-58. (in Russian) [O. E. Kosterin: *Sympetrum croceolum* Selys, 1883 (p. 47-50); *Anax parthenope* Selys, 1839 (p. 50-52); *Ischnura pumilio* Charpentier, 1825 (p. 52); *Nehalennia speciosa* Charpentier, 1840 (p. 53-56); A.Y. Haritonov, O.E. Kosterin: *Macromia amphigena fraenata* Martin, 1906 (p. 56-58). For more details see: <http://pisum.bionet.nsc.ru/kosterin/redbookaltai.htm>] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**7446.** Marden, J.H. (2008): Chapter 19: Dragonfly flight performance: a model system for biomechanics, physiological genetics, and animal competitive behavior. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research*, ed. A. Córdoba-Aguilar. Oxford University Press: 249-261. (in English) ["Adult dragonflies are heavily dependent on their flight muscles and flight ability for nearly all of their adult activities. This chapter reviews research that presents dragonflies as model organisms for examining mechanisms that underlie variation in flight performance within and between species, molecular mechanisms by which muscle performance is adjusted within individuals, and how these physiological traits affect territorial and mating success. Results of these studies in dragonflies have provided fundamental new knowledge that informs the theoretical bases of a number of fields: biomechanics of animal locomotion, physiological genetics, and game theory approaches to animal contests. New insights that cross the boundaries of these disparate fields demonstrate the payoff for performing integrative research." (Author)] Address: Marden, J.H., Dept Biol., Pennsylvania St. University, 208 Mueller Laboratory, University Park, PA 16802, USA. E-mail: jhm10@psu.edu

**7447.** Martens, A.; Wildermuth, H. (2008): The biting midge *Forcipomyia paludis* as a parasite on dragonfly wings: a species not recorded from Britain for more than 70 years (Diptera: Ceratopogonidae). *J. Br. Dragonfly Society* 24(2) : 88-90. (in English) [*F. paludis*

"has only been recorded from British odonates in the first half of the last century. All known records are from the type locality, Wicken Fen, Cambridgeshire, the last in June 1936. It is suggested that a useful approach for gathering further information is to check odonate photographs. Special attention should be drawn to oval brownish spots on odonate wings." (Authors)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**7448.** Martens, A.; Suhling, F.; Weihrauch, F. (2008): In memoriam Philip S. Corbet (21. Mai 1929 - 13. Februar 2008). *Libellula* 27(3/4): 291-295. (in German, with English summary) ["Corbet was beyond doubt one of the most important odonatologists of the 20th and early 21st century. A brief obituary acknowledges his life's work, especially from the perspective of the Society of German-speaking Odonatologists (GdO). The strong ties between Philip Corbet and the GdO with its journal 'Libellula' are emphasized." (Authors)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**7449.** May, M.L.; Matthews, J.H. (2008): Chapter 6. Migration in Odonata: a case study of *Anax junius*. In: Alex Córdoba-Aguilar (Editor): *Dragonflies and damselflies: Model organisms for ecological and evolutionary research*. Oxford Scholarship Online Monographs: 63-79. (in English) ["Migration by Odonata may illuminate patterns and evolution of insect migration in general. As aquatic/aerial carnivores dragonflies differ from most migratory insects, and because they are large and diurnal, observational techniques are available that are impossible in most other insects. Geographic analysis of genetic structure and stable and radiogenic isotope composition and use of newly developed radio-tracking techniques has been applied to migration in the North American dragonfly, *Anax junius*. Southbound migrants move up to 2,800 km. Developmental phenology suggests early ('resident') and late ('migrant') cohorts at most sites, but these groups appear genetically identical, and the species is essentially panmictic in eastern North America. Apparently environmental cues and physiological responses to photoperiod and temperature engender migratory behaviour. Successful radio-tracking of individual *A. junius* has revealed alternating periods of migration and energy replenishment, and responses to wind and temperature similar to avian migration." (Authors)] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu

**7450.** McCauley, S.J.; Davis, C.J.; Relyea, R.A.; Yurewicz, K.L.; Skelly, D.K.; Werner, E.E. (2008): Metacommunity patterns in larval odonates. *Oecologia* 158: 329-342. (in English) ["The growth of metacommunity ecology as a subdiscipline has increased interest in how processes at different spatial scales structure communities. However, there is still a significant knowledge gap with respect to relating the action of niche- and dispersal-assembly mechanisms to observed species distributions across gradients. Surveys of the larval dragonfly community (Odonata: Anisoptera) in 57 lakes and ponds in southeast Michigan were used to evaluate hypotheses about the processes regulating community structure in this system. We considered the roles of both niche- and

dispersal-assembly processes in determining patterns of species richness and composition across a habitat gradient involving changes in the extent of habitat permeance, canopy cover, area, and top predator type. We compared observed richness patterns and species distributions in this system to patterns predicted by four general community models: species sorting related to adaptive trade-offs, a developmental constraints hypothesis, dispersal assembly, and a neutral community assemblage. Our results supported neither the developmental constraints nor the neutral-assemblage models. Observed patterns of richness and species distributions were consistent with patterns expected when adaptive tradeoffs and dispersal-assembly mechanisms affect community structure. Adaptive trade-offs appeared to be important in limiting the distributions of species which segregate across the habitat gradient. However, dispersal was important in shaping the distributions of species that utilize habitats with a broad range of hydroperiods and alternative top predator types. Our results also suggest that the relative importance of these mechanisms may change across this habitat gradient and that a metacommunity perspective which incorporates both niche- and dispersal-assembly processes is necessary to understand how communities are organized." (Authors)] Address: McCauley, S.J., Dept of Ecology & Evolutionary Biology, Univ. of Michigan, Ann Arbor, MI 48109-1048, USA. Email: mccaule@umich.edu

**7451.** McKay, T.; Herman, T. (2008): Thermoregulation in three species of damselflies, with notes on temporal distribution and microhabitat use (Zygoptera: Lestidae). *Odonatologica* 37(1): 29-39. (in English) ["Thermoregulation in *Lestes d. disjunctus*, *L. rectangularis*, and *L. dryas* was investigated at the Old Mill Pond, Pictou Landing, Nova Scotia, Canada between 30 July and 3 Sept. 1994. *L. dryas* was more dependent on ambient temperature than *L. disjunctus* and *L. rectangularis*. *L. disjunctus* and *L. dryas* had different temporal distributions and they varied in their microhabitat use. *L. disjunctus* was the first species to begin activity during the day (0900 to 1200 h), while *L. dryas* was only active during the afternoon (1200 to 1600 h). *L. disjunctus* perched in full sun in open areas with low grassy vegetation. *L. dryas* was found in shady regions where shrubs were dominant. It had slightly lower thoracic and abdominal temperatures than the other 2 species." (Authors)] Address: McKay, T., Dept of Biological Science, Arkansas State University, P.O. Box 599, State University, AR 72467, USA. E-mail: tmckay@astate.edu

**7452.** McNulty, S. (2008): Rare dragonfly found on HWF. *The Spruce Moose, Adirondack Ecological Center*, Fall 2008: 10. (in English) [In June 2006, a male *Gomphus quadricolor* was captured near the Military Pond/Rianu Meadow area of southern Huntington Wildlife Forest (HWF), New York, USA.] Address: McNulty, Stacy, Adirondack Ecological Center, 6312 State Route 28N, Newcomb, NY 12852, USA. E-mail: aechwf@esf.edu

**7453.** McPeck, M.A. (2008): Chapter 5. Ecological factors limiting the distributions and abundances of Odonata. In: Alex Cordoba-Aguilar (Editor): *Dragonflies and damselflies: Model organisms for ecological and evolutionary research*. Oxford Scholarship Online Monographs: 51-63. (in English) ["This chapter reviews the ecological processes that define and limit the distributions and abundances of many odonate species across eco-

logical environments. Distributions of species among standing bodies of water seem to be limited mainly by the distributions of their predators in the larval stage (e.g., larger dragonflies and fish). Although species also show restricted distributions among flowing water habitats, much less is known about the ecological processes that constrain their distributions. Many different types of species interactions (e.g., resource abundances, competitors, predators, parasites) contribute to the limitation of local abundances. Directions for potential future research are suggested." (Publisher)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**7454.** McPeck, M.A.; Shen, L.; Torrey, J.Z.; Farid, H. (2008): The tempo and mode of 3-dimensional morphological evolution in male reproductive structures. *American Naturalist* 171(5): E158-E178. (in English) ["Various evolutionary forces may shape the evolution of traits that influence the mating decisions of males and females. Phenotypic traits that males and females use to judge the species identity of potential mates should evolve in a punctuated fashion, changing significantly at the time of speciation but changing little between speciation events. In contrast, traits experiencing sexual selection or sexually antagonistic interactions are generally expected to change continuously over time, because of the directional selection pressures imposed on one sex by the actions of the other. To test these hypotheses, we used spherical harmonic representations of the shapes of male mating structures in reconstructions of the evolutionary tempo of these structures across the history of the *Enallagma* damselfly clade. Our analyses show that the evolution of these structures is completely consistent with a punctuated model of evolutionary change, and a constant evolutionary rate throughout the clade's history. In addition, no interpopulation variation in shape was detected across the range of one species. These results indicate that male mating structures in this genus are used primarily for identifying the species of potential mates and experience little or no selection from intraspecific sexual selection or sexual antagonism. The implications of these results for speciation are discussed." (Authors)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**7455.** McPeck, M.A. (2008): The ecological dynamics of clade diversification and community assembly. *American Naturalist* 172: E270-E284. (in English) ["Clades diversify in an ecological context, but most macroevolutionary models do not directly encapsulate ecological mechanisms that influence speciation and extinction. A data set of 245 chordate, arthropod, mollusk, and magnoliophyte phylogenies had a majority of clades that showed rapid lineage accumulation early with a slowing more recently, whereas a small but significant minority showed accelerated lineage accumulation in their recent histories. Previous analyses have demonstrated that macroevolutionary birth-death models can replicate the pattern of slowing lineage accumulation only by a strong decrease in speciation rate with increasing species richness and extinction rate held extremely low or absent. In contrast, the metacommunity model presented here could generate the full range of patterns seen in the real phylogenies by simply manipulating the degree of ecological differentiation of new species at the



time of speciation. Specifically, the metacommunity model predicts that clades showing decelerating lineage accumulation rates are those that have diversified by ecological modes of speciation, whereas clades showing accelerating lineage accumulation rates are those that have diversified primarily by modes of speciation that generate little or no ecological diversification. A number of testable predictions that integrate data from molecular systematics, community ecology, and biogeography are also discussed." (Author) Many references to *Enallagma* sp. are made.] Address: McPeck, M., Department Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**7456.** Meurgey, F. (2008): Description of the larva of *Protoneura ailsa* Donnelly (Zygoptera: Protoneuridae). *Odonatologica* 37(3): 279-282. (in English) ["The last instar larva is described and illustrated for the first time based on specimens from Martinique in the Lesser Antilles. Additional notes on its ecology and larval habitat are included." (Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**7457.** Micevski, N.; Micevski, B.; Bedjanic, M. (2008): *Aeshna cyanea* and *A. juncea*, new for the fauna of Macedonia (Odonata: Aeshnidae). *Libellula* 27(3/4): 267-274. (in English, with German summary) ["At the elevated wetland Begovo Pole near the village of Gornojabolciste (Mt. Jakupica, central Macedonia, 1980 m a.s.l.), two adult males of *A. juncea* and an emerging male of *A. cyanea* were recorded on 13-VII-2008. Additionally, a dozen males of *A. cyanea* were recorded at lake Lokuv near the village of Trebiste (Mt. Desat, W Macedonia, 1560 m a.s.l.) on 07-VIII-2008. The occurrence of both species in the Balkans and south-eastern Europe is outlined and a short zoogeographical discussion is provided." (Authors)] Address: Micevski, Nikola, Bulevar ASNOM 58 - 2/4, MZ-Skopje 1000, Macedonia. E-mail: brankom@ukim.edu.mk

**7458.** Mill, P. (2008): Publications & Reviews: New Naturalist: Dragonflies by Philip Corbet & Stephen Brooks. The New Naturalist Library. 454 pp. Published by Collins, London, 2008. *Dragonfly news* 54: 32. (in English) [Extensive review.]

**7459.** Moore, N.W. (2008): The Norfolk Hawker *Aeshna isosceles* and Water Soldier *Stratiotes albidus*: a study of their relationship at Castle Marsh, Suffolk and elsewhere in the Broads 1991-2004. *J. Br. Dragonfly Society* 24(2) : 71-87. (in English) ["The relationship between *S. aloides* and *A. isosceles* was studied at the Suffolk Wildlife Trust Nature Reserve at Castle Marsh, 1991 to 2004. During that period *S. aloides* was affected by saline pollution of the northern part of the reserve and by changes in management. It decreased slightly and then increased considerably. The numbers of territorial male *A. isosceles* remained fairly similar throughout the period. *A. isosceles* was mainly, but not only, found on dykes with thick monocultures of *S. aloides*. The presence of territorial males on dykes with little or no *S. aloides* was possibly due to their being driven out of the better habitats by more successful individuals. The situation at Castle Marsh was found to be typical of most of the Broadland area. However, *A. isosceles* occurred in the upper Waveney valley and on the Hundred River where

the water courses had no *S. aloides* but which did have thick growths of other aquatic plants, notably Common Bladderwort *Utricularia vulgaris* and Frogbit *Hydrocharis morsus-ranae*. *A. isosceles* occurred at densities broadly similar to those in 5. *aloides* dykes, its preferred habitat. Interspecific aggression between *A. isosceles* and the males of six other species was studied. It mainly occurred with *A. grandis* and with *L. quadrimaculata*; although it occurred frequently it had no discernible effect on the distribution of the species concerned. Both *S. aloides* and *A. isosceles* are under the threat of extinction from rising sea levels caused by climate change. The natural recolonisation of the Fens, where both species are now extinct, is shown to be unlikely. Therefore an experimental study at Wicken Fen NNR — the most suitable fenland site - has been initiated. *S. aloides* has been reintroduced. If the reintroduction is successful, and if it is necessary, *A. isosceles* will also be reintroduced." (Author)] Address: Moore N.W., The Farmhouse, 117 Boxworth End, Swavesey, Cambridge CB4 5RA, UK

**7460.** Müller, O. (2008): Larval habitats and life history of the Crete Island endemic *Boyeria cretensis* (Odonata: Aeshnidae). *International Journal of Odonatology* 11(2): 195-207. (in English) ["*Boyeria cretensis* belongs to the most threatened European dragonfly species. It is restricted to some isolated permanent streams on the island of Crete. The streams have a pronounced gallery vegetation and are situated in a narrow belt of altitude between 50 and 400 m. We understand very little about the biology of this species so information is required to develop effective conservation measures. The life cycle and spatial distribution of the larvae were studied at a small perennial stream in the central part of Crete during three consecutive years. The larvae showed a preference for calcareous sinter mineral substrate associated with organic material such as roots, leaves and wood. This microhabitat selection is supposed to be mainly an antidrift strategy, since *B. cretensis* lives in habitats with a dynamic hydrology during the rainy period in winter. On the other hand, it may also be a strategy to avoid predation from fish and crabs. The last seven larval stadia were determined by wing sheath length and head width. Based on data of head width frequency distributions, a univoltine or semivoltine life cycle is discussed." (Author)] Address: Müller, O., Birkenweg 6d, D-13206 Libbenichen, Germany. E-mail: olemueller@bioscience-art.de

**7461.** Müller, R.; Haybach, A.; Schönfelder, J. (2008): Erstnachweis von *Baetis nexis* Navás, 1918 (Ephemeroptera: Baetidae) für Brandenburg. *Lauterbornia* 62: 59-64. (in German, with English summary) [*Gomphus vulgatissimus* and *Orthetrum coerulescens* are reported from two localities in Brandenburg, Germany.] Address: Müller, R., Planungsbüro Hydrobiologie, Augustastr. 2, 12203 Berlin, Germany. E-Mail: hydrobiologie@t-online.de

**7462.** Muzón, J.; von Ellenrieder, N.; Pessacq, P.; Lozano, F.; Garré, A.; Lambruschini, J.; Ramos, L.; Weigel Muñoz, M.S. (2008): Odonata from Iberá Wetlands (Corrientes, Argentina): preliminary inventory and biodiversity. *Rev. Soc. Entomol. Argent.* 67(1-2): 59-67. (in English, with Spanish summary) ["A preliminary inventory of the Odonata from Iberá Wetlands and their area of influence (Corrientes, Argentina) is presented. Different kinds of environments were surveyed in seven lo-

calities. Seventy five species grouped in 33 genera and seven families were registered, from which three genera and 10 species are new records for the country. The localities belonging to the Iberá Wetland system show low endemism and a high faunistic relationship with the Paraná basin." (Authors)] Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina. E-mail: muzon@ilpla.edu.ar

**7463.** Nagy, B.H.; Szalassy, N.; Devai, G. (2008): Site fidelity, satellite tactics and mating success in *Libellula fulva* (Müller) (Anisoptera: Libellulidae). *Odonatologica* 37(3): 203-211. (in English) ["The site fidelity and satellite behaviour in relation to mating success were investigated in *L. fulva* males during 2 reproductive seasons (2002-2003) in eastern Hungary. There was no difference in mating success in males that were faithful to 1, 2 or 3 independent territories. Those that were site-faithful had a higher mating success than non site-faithful males. Site-faithful males showed satellite behaviour more frequently than non site-faithful ones. Males used both of the 2 tactics and this switching ability was independent of male body size. The better mate-rewarding tactic appears to show site fidelity and satellite behaviour alternatively." (Authors)] Address: Nagy, B.H., Department of Hydrobiology, University of Debrecen, Egyetem ter 1, HU-4032 Debrecen, Hungary. E-mail: nagy.beata@gmail.com

**7464.** Nel, A.; Garrouste, R.; Roques, P. (2008): A new griffenfly genus from the Late Carboniferous of northern France (Odonoptera: Meganeuridae). *Insect Systematics & Evolution* 39: 231-239. (in English) ["*Gallotopus oudardi*, new genus and species of Meganeuridae is described from the Late Carboniferous of Northern France. Potential phylogenetic implications of two wing venation structures present in meganeurids are discussed on the basis of this new fossil. The most basal antenodal brace Ax0 could be a potential synapomorphy of the Meganeuridae with the Odonatoclauda. The 'subnodus' could have been a structure related to larval tracheation in meganeurids, exapted as a part of the complex nodal structure in modern Odonata, related to the flight. Lastly the shortly petiolated wing of *Gallotopus* is analogous to similar wing shapes of several Mesozoic, Cenozoic, and modern nodalatan lineages." (Authors)] Address: Roques, P., allée des Myosotis, F-93330 Neuilly sur Marne, France. E-mail: patrick.roques93@wanadoo.fr

**7465.** Nel, A.; Huang, D.-y.; Lin, Q.-b. (2008): A new genus of isophlebioid damselfly-like dragonflies with "calopterygid"-like wing shape from the Middle Jurassic of China (Odonata: Isophlebioidea: Campteropterygidae). *Eur. J. Entomol.* 105(4): 783-787. (in English) ["*Zygotarawia reni*, a new campteropterygid genus and species is described from the Middle Jurassic of China. This fossil has a wing shape unique for this clade, i.e. a fore- and hind wing of the same width and very shortly petiolated, and hind wing cubito-anal area nearly as narrow as that of the forewing. This wing shape is convergently similar to that of recent Zygoptera: Calopterygidae, as well as to several other Cenozoic zygopteran clades, suggesting similar styles of flight and habits, i.e. predation on small insects and flight along trees of river banks.] Address: Nel, A., CNRS UMR 5202, CP 50, Entomologie, Muséum National d'Histoire Naturelle, 45 Rue Buffon, F-75005, Paris, France; e-mails: anel@mnhn.fr;

**7466.** Niven, J.E.; Graham, C.M.; Burrows, M. (2008): Diversity and evolution of the insect ventral nerve cord. *Annual Review of Entomology* 53: 253-271. (in English) ["Is the remarkable diversity in the behaviour of insects reflected in the organization of their nervous systems? The ventral nerve cords (VNCs) have been described from over 300 insect species covering all the major orders. Interpreting these data in the context of phylogenetic relationships reveals remarkable diversity. The presumed ancestral VNC structure is rarely observed; instead the VNCs of most insects show extensive modification and substantial convergence. Modifications include shifts in neuromere positions, their fusion to form composite ganglia, and, potentially, their separation to revert to individual ganglia. These changes appear to be facilitated by the developmental and functional modularity of the VNC, a neuromere for each body segment. The differences in VNC structure emphasize trade-offs between behavioural requirements and the costs incurred while maintaining the nervous system and signaling between its various parts. The diversity in structure also shows that nervous systems may undergo dramatic morphological changes during evolution." (Authors) The analysis includes *Petalura gigantea*, *Lesites tenuatus*, and *Anax junius*.] Address: Niven, J.E., Department of Zoology, University of Cambridge, Cambridge CB2 3EJ, UK. E-mail: nivenj@si.edu; jen22@cam.ac.uk

**7467.** Norma-Rashid, V.; Cheoug, L.F.; Lua, H.K.; Murphy, D.H. (2008): The Dragonflies (Odonata) of Singapore: Current status, records and collections of the Raffles Museum of Biodiversity Research. *Raffles Museum of Biodiversity Research, Department of Biological Sciences, 6 Science Drive 2. #03-01, Faculty of Science, National University of Singapore, Singapore 117546, Republic of Singapore: 1-20.* (in English) ["To date, few publications have been solely devoted to the Singapore odonate fauna. This publication attempts to fill this gap and encourage in-depth studies into this remarkable fauna. To date, including 11 new records presented here, 117 species of odonates are known from Singapore. An annotated checklist of the Odonata specimens held in the Raffles Museum of Biodiversity Research. National University of Singapore, is presented. Historical records from museum collections are also discussed." (Authors)] Address: Norma-Rashid, Y. Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia. E-mail: norma@zoology.um.edu.my

**7468.** Noronha, C.R.S.; Barbosa, J.F.; Quadros, A.M. (2008): Método de controle de Odonatas na piscicultura. *PUBVET, Londrina, V. 2, N. 45, Art#443: 6 pp.* (in Portuguese, with English summary) [The paper refers methods to eliminate dragonfly larvae from fish ponds in Brazil.] Address: Noronha, C.R.S., Professor do Centro Federal de Educação Tecnológica de Bambuí – CEFET-BAMBUÍ, Rodovia Bambuí/Medeiros, km 37, Zona Rural. CEP: 39.800.000. CAIXA POSTAL 05, Bambuí – Minas Gerais. Brasil

**7469.** Novelo-Gutierrez, N. (2008): Description of the last instar of *Argia barretti* Calvert (Zygoptera: Coenagrionidae). *Odonatologica* 37(4): 367-373. (in English) ["The larva of *A. barretti* is described for the first time and compared with those of *A. harknessi* from Mexico and *A. joergenseni* from Argentina. Based upon larval characters these 3 species appear closely related,

mainly by features such as: similar colour pattern of antennae, femora and caudal lamellae; mandibular formula; size of ligula; one palpal seta; shape of male and female gonapophyses, and the presence of claviform setae on abdominal sternite 8 and gonapophyses." (Authors)] Address: Novelo-Gutiérrez, R., Depto de Entom., Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**7470.** Novelo-Gutiérrez, R. (2008): Description of the larva of *Paraphlebia zoe* Selys in Hagen, 1861 (Odonata: Megapodagrionidae). *Zootaxa* 1876: 29-34. (in English, with Spanish summary) ["The larva of *P. zoe* is described, this being the first for the genus *Paraphlebia*. It is compared to all other known neotropical megapodagrionid larvae from which it can be distinguished by following combination of characters: antenna shorter than length of head; second antennomere the longest; prementum slightly wider than long; male gonapophyses absent; gills strongly inflated with a thick caudal filament. The larva inhabits seepages." (Author)] Address: Novelo-Gutiérrez, R., Instituto de Ecología, A.C. Depto Entomología, Apartado Postal 63, 91070 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**7471.** Oertli, B. (2008): Chapter 7. The use of dragonflies in the assessment and monitoring of aquatic habitats. In: Alex Cordoba-Aguilar (Editor): *Dragonflies and damselflies: Model organisms for ecological and evolutionary research*. Oxford Scholarship Online Monographs: 79-97. (in English) ["Odonata constitute a valuable tool for various types of bioassessment and biomonitoring of aquatic habitats, such as the measure of biodiversity, the appraisal of waterbody health or integrity (including water quality and ecosystem function), the monitoring of management or restoration practices, and the detection and prediction of biological impacts of climate warming. Furthermore, they have already provided excellent data sets for hypothesis testing in ecology or evolution. An efficient sampling method for Odonata should account for the three live stages, i.e., larvae, exuviae, and adults. However, as this approach may be too expensive, most existing methods only focus on one stage. In applied issues, the adult stage is surveyed at a low cost, and is therefore useful for rapid assessments; it can serve for preliminary screening, for example when identifying local hotspots of diversity or, on the contrary, to mark degraded sites." (Publisher)] Address: Oertli, B., Dept of Nature Management, Univ. of Applied Sciences of Western Switzerland - EIL, 1254 Jussy, Geneva, Switzerland. E-mail: beat.oertli@hesge.ch

**7472.** Oertli, B.; Indermuehle, N.; Angélibert, S.; Hinden, H.; Stoll, A. (2008): Macroinvertebrate assemblages in 25 high alpine ponds of the Swiss National Park (Cirque of Macun) and relation to environmental variables. *Hydrobiologia* 597: 29-41. (in English) ["High-altitude freshwater ecosystems and their biocoenosis are ideal sentinel systems to detect global change. In particular, pond communities are likely to be highly responsive to climate warming. For this reason, the Swiss National Park has included ponds as part of a long-term monitoring programme of the high-alpine Macun cirque. This cirque covers 3.6 km<sup>2</sup>, has a mean altitude of 2,660 m a.s.l., and includes a hydrographic system composed of a stream network and more than 35 temporary and permanent ponds. The first two steps in the

programme were to (i) make an inventory of the macroinvertebrates of the waterbodies in the Macun cirque, and (ii) relate the assemblages to local or regional environmental variables. Sampling was conducted in 25 ponds between 2002 and 2004. The number of taxa characterising the region (Macun cirque) was low, represented by 47 lentic taxa. None of them was endemic to the Alps, although several species were cold stenothermal. Average pond richness was low (11.3 taxa). Assemblages were dominated by Chironomidae (Diptera), and Coleoptera and Oligochaeta were also relatively well represented. Other groups, which are frequent in lowland ponds, had particularly poor species richness (Trichoptera, Heteroptera) or were absent (Gastropoda, Odonata, Ephemeroptera). Macroinvertebrate assemblages (composition, richness) were only weakly influenced by local environmental variables. The main structuring processes were those operating at regional level and, namely, the connectivity between ponds, i.e. the presence of a physical connection (tributary) and/or small geographical distance between ponds. The results suggest that during the long-term monitoring of the Macun ponds (started in 2005), two kinds of change will affect macroinvertebrate assemblages. The first change is related to the natural dynamics, with high local-scale turnover, involving the metapopulations characterising the Macun cirque. The second change is related to global warming, leading to higher local and regional richness through an increase in the number of colonisation events resulting from the upward shift of geographical ranges of species. At the same time the cold stenothermal species from Macun will be subject to extinction." (Authors)] Address: Oertli, B., Dept of Nature Management, University of Applied Sciences of Western Switzerland - EIL, 1254 Jussy, Geneva, Switzerland. E-mail: beat.oertli@hesge.ch

**7473.** Okajima, R. (2008): The controlling factors limiting maximum body size of insects. *Lethaia* 41(4): 423-430. (in English) ["The purpose of this study is to consider the controlling factors limiting maximum body size of insects. For this analysis, we set up and quantitatively verify the following working hypothesis: insect body sizes can be explained only by the historical changes in the oxygen supply. The present study focuses on the body size of the Protodonata and Odonata. The amount of oxygen needed and that of oxygen entering the insect body was calculated using allometric equations. The theoretical maximum sizes at each geologic time were estimated from palaeo-atmospheric oxygen partial pressure and compared with the maximum size of known fossilized insects. The historical change in fossilized insect sizes was much larger than that in theoretical sizes. Additionally, from the Jurassic, despite an increase in the partial pressure of oxygen, which would theoretically increase maximum size, the maximum size of fossilized insects became smaller. These findings are inconsistent with the expectations of the working hypothesis. Oxygen supply is likely to partially limit the maximum size of insects with additional factors." (Author)] Address: Okajima, Ryoko, Department of Ecology and Evolutionary Biology, Graduate School of Life Sciences, Tohoku University, Aoba-yama, Sendai 980-8578, Japan. E-mail: okajima@mail.tains.tohoku.ac.jp

**7474.** Ott, J. (2008): Die Kleine Pechlibelle – *Ischnura pumilio* (Charpentier, 1925) (Odonata: Coenagrionidae) in der Pfalz: ein Profiteur von Regenrückhaltebecken, Naturschutzgewässern und der Klimaänderung. Main-



zer naturwiss. Archiv 46: 233-261. (in German, with English summary) [*I. pumilio* "was not very common in Rhineland-Palatinate (Germany) during the last decades; in particular it was rare in the central part of the biosphere reserve "Palatinate Forest". Outside the Palatinate Forest *I. pumilio* was found more often, e.g. in the Rhine Valley (e.g. Rhinehesse, Bienwald), or along the Haardtrand at lower altitudes. Here it is mainly present in young and shallow waters, mostly in ponds created for nature conservation measurements (protection of amphibians). Another habitat it typically inhabits are water retention ponds near roads. Both types are maintained (road authorities, nature conservation organisations) and kept in early successional stages. In 2007 the species was found in several waters in the Palatinate Forest for the first time, also with indigenous populations. The species was profiting of lower water tables – a consequence of climatic changes in the area. To arrive at these waters the species must have crossed at least several kilometres of dense forest which is a remarkable fact. The possible ways of the colonisation are discussed in relation to its larval development and voltinism. The larvae of this species, being obviously a generalist, can live in a wide range of abiotic conditions: some of these waters had a pH of only 3.3 and the conductivity varied between 13 and 9109 µS/cm. Larvae were found to survive a period of about 3 weeks in a dried out pond. Finally, aspects of nature conservation and the classification of *I. pumilio* in Red Lists are discussed." (Author)] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**7475.** Ott, J. (2008): Wandler zwischen den Welten. Rote Liste der Libellen entsteht in Worms. Worms 2009. Heimatjahrbuch für die Stadt Worms 4: 224-226. (in German) [General account on dragonflies in a popular local yearbook with special emphasis on the German Red list on Odonata and a meeting of the German Red list experts in Oktober 2007 in the rooms of the "Rheingütestation" situated in Worms, Rheinland-Pfalz, Germany.] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**7476.** Parr, A.; Smallshire, D. (2008): Identification of the UK species of emerald damselflies *Lestes* spp.. *Atropos* 34: 3-9. (in English) [Morphological identification characters of imagos and larvae of *Lestes barbarus*, *L. dryas*, *L. sponsa*, and *Chalcolestes viridis* are depicted and discussed.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**7477.** Parr, A. (2008): Dragonfly news for spring and early summer 2008. *Atropos* 35: 54-55. (in English) [Verbatim: The first half of 2008 saw many insect groups well down in numbers, no doubt reflecting in part the poor summer the year before. While dragonflies were perhaps less affected than many groups, the early 2008 season still turned out to be relatively uneventful, though fortunately with a few highlights. A period of warm weather in the first half of May, associated with a lengthy spell of easterlies, probably came too early in the season to be highly productive. As the weather turned later in the month, some spectacular counts of *Libellula quadrimaculata* at Dungeness in Kent (where there were morning roosts of 650 on 17 May and 700 on 22 May) were thought to result from mass emergences. The very end of May through to 1 July saw a scattering of reports of *Sympetrum fonscolombii* from

south coast sites (Cornwall, Devon, Hampshire, Sussex and Kent), as well as singletons at the traditional sites of Spurn, East Yorkshire, and Middleton, Lancashire. There was also one record from Co. Wexford, Ireland. These various sightings probably relate largely, though perhaps not entirely, to local breeding since many individuals were immatures, and an exuvia was found at Rye Harbour in Sussex on 30 June. Given the very low numbers seen at most sites the fate of many of these breeding colonies remains unclear, though it is possible that some additional individuals went unrecorded given the largely indifferent weather. In addition to Red-veined Darter there was also one record of *S. flaveolum* during the spring—from Carvey Wick, Essex, on 25 June. Probably the major highlight of May /June was the continuing good fortunes of *Libellula fulva*. Numbers at many established sites, including some areas only recently colonised, were high. Large numbers were, for example, seen at sites along the Great Ouse between St Ives, Cambridgeshire, and Roxton, Bedfordshire, on 18 May, with 'hundreds' together near Brampton, Cambridgeshire. After an apparent absence of a decade or more, good numbers were also seen in the Sandwich Bay area of Kent. More dramatically still there were several reports from entirely new areas, including the Isle of Wight, the Somerset Levels, and even sites in the Attingham area of Shropshire. These latter sightings represent the most north-westerly in Britain. It is hoped to provide a more detailed analysis of the on-going range expansion of Scarce Chaser in a future issue. July was rather quiet, despite a hot spell and generally southeasterly winds during the last third of the month. A total of three records of *Anax parthenope* seemed unexpectedly low given recent trends, but one (a male on 24 July) was at least from the probable breeding site of Maxey Gravel Pits, Cambridgeshire, where oviposition was seen in 2007. The other records came from Sandwich, Kent (12 July), and near Havenstreet, Isle of Wight (28 July). No reports have as yet been received from likely breeding sites besides Maxey but the implications of this are still unclear, not least because there is some potential flexibility in the length of the lifecycle in Britain. The month ended with small numbers of Red-veined Darter at Keyhaven, Hampshire, on 30 July." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**7478.** Parr, A.J. (2008): Migrant and dispersive dragonflies in Britain during 2007. *J. Br. Dragonfly Society* 24(2) : 62-70. (in English) ["The 2007 dragonfly season was one of contrast. April 2007 was the warmest April on record, but although resident species started flying unusually early, little of note was reported on the migrant front. Mid-summer was often wet to very wet, with temperatures somewhat lower than in many recent summers. Some short spells of hot settled weather were however observed, and these were often associated with migratory influxes and/or enhanced internal dispersal. Although there was no repetition of the dramatic migrations of 2006, the year was thus far from uneventful. *Sympetrum fonscolombii* once again occurred in good numbers, and *Anax parthenope* also maintained a strong presence. Several unusual 'one-off' sightings were similarly made — notably a Norfolk Hawker *Aeshna isosceles* reported from Hampshire and a female *Lestes viridis* reported from Suffolk. This latter record is only the third report of the species from Britain in the last hundred years." (Author)] Address: Parr, A.J., 10

Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**7479.** Paunovic, M.M.; Slavica, S.; Borkovic, S.Z.; Pavlovic, Z.S.; Saicic, Z.S.; Cakic, P.D. (2008): Results of the 2006 Sava project - Aquatic macroinvertebrates. Arch. Biol. Sci., Belgrade 60(2): 265-271. (in English, with Serbian summary) [The paper presents results of the 2006 Sava survey. The investigation was carried out at four locations along 188 km of the Serbian stretch of the Sava River. Sixty-two taxa were identified including *Gomphus vulgatissimus* and *Platycnemis pennipes*. Molluscs and oligochaetes were the most diverse groups of macroinvertebrates. The results support the hypothesis that the Sava River is an important bio-invasion trajectory, a part of the Southern Invasive Corridor of Europe. Five alien macroinvertebrate taxa were identified, some of which (*Corbicula fluminea*, *Branchyura sowerbyi*, and *Anodonta woodiana*) were found to be important components of the macroinvertebrate community.] Address: Paunovic, M.M., Siniša Stankovića Institute for Biological Research, University of Belgrade, 11060 Belgrade, Serbia

**7480.** Peretti, D.; Andrian, I.F. (2008): Feeding and morphological analysis of the digestive tract of four species of fish (*Astyanax altiparanae*, *Parauchenipterus galeatus*, *Serrasalmus marginatus* and *Hoplias aff. malabaricus*) from the upper Paraná River floodplain, Brazil. Braz. J. Biol. 68(3): 671-679. (in English, with Spanish summary) [Odonata contributed to the diet of the insectivorous fish *Parauchenipterus galeatus*.] Address: Peretti, D.D, Depto de Ciências Biológicas, Programa de Pós-Graduação em Ecologia de Ambientes Aquáticos Continentais, Universidade Estadual de Maringá – UEM, Av. Colombo, 5790, Campus Universitário, Bloco G90, CEP 87020-900, Maringá, Paraná, Brazil. E-mail: perettidani@gmail.com

**7481.** Pessacq, P. (2008): Phylogeny of Neotropical Protoneuridae (Odonata: Zygoptera) and a preliminary study of their relationship with related families. Systematic Entomology 33: 511-528. (in English) ["A cladistic analysis of Neotropical Protoneuridae was performed on a data matrix of 48 morphological characters and 43 terminal taxa. Representatives of Paleotropical Protoneuridae, Platycnemididae and Isostictidae were included to test their relationships with Neotropical Protoneuridae. Coenagrionidae was chosen as the outgroup, but alternative analyses with Platycnemididae as the outgroup were also performed. Protoneuridae appears as a polyphyletic clade, with its Paleotropical component being more closely related to Platycnemididae and Isostictidae. Neotropical Protoneuridae appear as a monophyletic clade; included genera considered monophyletic or valid monotypic taxa are *Epipleoneura* Williamson, 1915; *Idioneura* Selys, 1860; *Junix* Rácenis, 1968; *Neoneura* Selys, 1860; *Peristicta* Hagen in Selys, 1860; *Roppaneura* Santos, 1966; and *Lamproneura* De Marmels, 2003. A key to the Neotropical Protoneuridae genera is included." (Author)] Address: Pessacq, P., CONICET, Laboratorio de Investigaciones en Ecología y Sistemática Anima, Universidad Nacional de la Patagonia San Juan Bosco, Esquel, Chubut, Argentina. E-mail: pablopessacq@yahoo.com.ar

**7482.** Petrulevicius, J.F.; Wappler, T.; Wedmann, S.; Rust, J.S.; Nel, A. (2008): New megapodagrionid damselflies (Odonata: Zygoptera) from the Paleogene of

Europe. Journal of Paleontology 82(6): 1173-1181. (in English) ["Three fossil taxa of megapodagrionid damselflies are described and figured from the Paleogene localities in Europe on the basis of isolated wings. *Eckfeldia superstes* (Wappler, 2003) gen. nov. is described from the laminated mudstones of middle Eocene age from Eckfeld Maar, Germany. *Furagrion jutlandicus* (Henriksen, 1922) gen. nov. is recorded from the laminated claystones of lowermost Eocene age from the Ølst and Fur-Formation, Denmark, and an undetermined megapodagrionid damselfly is recognized from middle Eocene strata. Taphonomy and color preservation in the fossils are briefly considered. Characters used for phylogenetic analyses in extant and fossil Megapodagrionidae are discussed. The biogeographic and paleoecological implications of the new European fossils are briefly discussed." (Authors)] Address: Petrulevicius, J.F., Departamento Científico Paleozoología Invertebrados, Museo de La Plata, Paseo del Bosque, s/n. 1900 La Plata, and CONICET, Argentina. E-mail: levicius@museo.fcnym.unlp.edu.ar

**7483.** Pott, C.; Labandeira, C.C.; Krings, M.; Kerp, H. (2008): Fossil insect eggs and ovipositional damage on bennettitalean leaf cuticles from the Carnian (Upper Triassic) of Austria. Jour. Paleontol. 82(4): 778-789. (in English) ["Two types of evidence for insect ovipositional activity (i.e., actual egg chorions and ovipositional damage) occur on Nilssoniopteris (bennettitalean foliage) leaf cuticles from the Carnian of Austria and provide a rare direct insight into insect egg morphology and oviposition in the Late Triassic. The egg chorions have exclusively been found on *N. haidingeri* leaves, where they are attached to the outer surface of the abaxial cuticle; one specimen suggests that the eggs were arranged in circles. It is impossible at present to determine the affinities of the eggs; possible producers may be beetles, dragonflies, sawflies, or other allied basal Hymenoptera. Ovipositional damage occurs on *N. angustiarum* leaves in the form of lenticular egg impressions surrounded by a narrow, elevated margin. The impressions are visible on the ad- and abaxial cuticle, and coincide when both cuticles are superimposed, which indicates that the eggs producing these impressions were injected into the interior of the leaf. Producers of eggs that may have caused these damages are perhaps dragonflies or damselflies. The restricted occurrence of the two types of ovipositional activity suggests that some kind of host specificity existed, perhaps related to specific preferences in larval diet." (Authors)] Address: Pott, C., Forschungsstelle für Paläobotanik am Geologisch-Paläontologischen Institut, Westfälische Wilhelms-Universität Münster, Hindenburgplatz 57, D-48143 Münster, Germany. E-mail: christian.pott@uni-muenster.de

**7484.** Prentice, S. (2008): Dragonfly conservation from the BDS. Dragonflies in focus: A new national dragonfly atlas. Atropos 34: 65-66. (in English) [A new project for the Atlas of Odonata distribution in Britain, Ireland, and the Channel Islands is introduced. Work should be done between 2008 and 2012.] Address: Prentice, S., c/o Natural England (West Midlands), Attingham Park, Shrewsbury, SY4 4TW. E-mail: stephan.prentice@naturalengland.org.uk

**7485.** Principe, R.E. (2008): Taxonomic and size structures of aquatic macroinvertebrate assemblages in different habitats of tropical streams, Costa Rica. Zoological Studies 47(5): 525-534. (in English) ["Taxonomic

and size structures of macroinvertebrate assemblages associated with different habitats of tropical streams of Costa Rica were analyzed. Surber samples were taken in riffle and run habitats in 2 streams. Invertebrates were identified and measured, and the biomass was estimated. The taxonomic richness and total abundance were higher in riffle habitats. Correspondence analysis showed a clear separation between riffle and run samples. The IndVal method identified the characteristic assemblages in each habitat type. Tricladida, Hydrachnidia, Leptophlebiidae, Hydropsychidae, Simulium sp., Corynoneurini, Orthoclaudiinae, and Empididae showed significant indicator values for riffle habitats; whereas Bivalvia, Tanyptodinae, and Chironomini were the characteristic taxa from runs. The length-frequency distribution of riffles differed from that in runs in both streams as measured by Kolmogorov-Smirnov tests. The largest organisms were found in run habitats, with macroinvertebrates belonging to the 1st size class being the most abundant in riffles. Although larger organisms were found in runs, differences in total biomass between habitats were not observed due to the high number of small invertebrates collected in riffles. The size spectrum for the entire benthic community showed that the total biomass was relatively equitably distributed among the size classes, although a peak was suggested for medium size classes. When the size spectrum was separately analyzed in each habitat, a peak was also suggested in riffles. Differences in the physical attributes of riffles and runs were clearly reflected in the taxonomic composition of the size spectra. Patterns observed in taxonomic and size structures may indicate different ecological functioning at the habitat level in the tropical streams studied." (Author)] Address: Principe, Romina E., La Selva Biological Station, Organization for Tropical Studies, Puerto Viejo de Sarapiquí, Heredia, 41001, Costa Rica. E-mail: rprincipe@exa.unrc.edu.ar

**7486.** Pritchard, G. (2008): The life history of a temperate zone dragonfly living at the edge of its range with comments on the colonization of high latitudes by Neotropical genera of Zygoptera (Odonata). *International Journal of Odonatology* 11(2): 209-223. (in English) ["Of the many Zygopteran genera that occur in the Neotropics, only five (Hetaerina, Archilestes, Lestes, Argia, and Ischnura) are represented north of 40°N in North America, and only three of these (Hetaerina, Archilestes, and Argia) probably had a tropical origin. In the two genera of Lestidae (Archilestes and Lestes) the life history of temperate-zone populations is usually regulated by an egg diapause, whereas in the two genera of Coenagrionidae (Argia and Ischnura) larval diapause synchronizes life histories with seasonal temperature changes. This paper presents data on the life history of a northern population of a species in the first genus, Hetaerina americana living in a geothermally influenced stream near to the northern edge of the species' range in western North America. Larval growth is affected by temperature and differs between warmer and cooler years, but generally larvae appear to grow very rapidly during summer and even grow over winter. Two peaks of larval recruitment each year and a decrease in final stadium size over the summer may be evidence for bivoltinism, and the absence of final stadium larvae in October, November, and December indicates a short-day regulatory diapause in F-1 larvae. A long-day diapause which prevents autumnal metamorphosis of larvae appears not to be present. It is not known whether the tactics that allow New World species of Zygoptera to survi-

ve at mid- to high-temperate latitudes are also present in their tropical congeneric relatives, but it does appear that diapause expression has been associated with speciation in the temperate zone." (Author)] Address: Pritchard, G., Department of Biological Sciences, University of Calgary, Calgary, Alberta, Canada T3A 1K9. E-mail: gpritch@ucalgary.ca

**7487.** Radwell, A.J.; Brown, A.V. (2008): Benthic meiofauna assemblage structure of headwater streams: density and distribution of taxa relative to substrate size. *Aquatic Ecology* 42: 405-414. (in English) ["Permanent meiofauna taxa and portions of the population of other invertebrates that are temporarily in the meiofauna size class are often precluded from stream studies and assessments. This study was designed to determine the identity, density, and distribution of major meiofauna taxa relative to substrate size in a set of similar headwater streams. Using a coring technique, meiofauna (80 mm–1 mm) and substrate samples were collected from 11 Ozark headwater streams in the Boston Mountain ecoregion of Arkansas, USA. Mean meiofauna density among streams was  $1739 \pm 436$  organisms per l. Permanent meiofauna taxa (Copepoda, Cladocera, Ostracoda, Rotifera, Nematoda, Hydrachnida, and Tardigrada) comprised 22.5% of the organisms collected with a mean density of  $394 \pm 233$  organisms per l; temporary meiofauna taxa (Oligochaeta, Turbellaria, Hydroidea, Chironomidae, Ephemeroptera, and other insects - including Odonata) comprised the remainder with a density of  $1346 \pm 308$  organisms per l. [...] The potential value of inclusion of meiofauna in stream environmental assessments is discussed." (Authors)] Address: Radwell, Andrea, Department of Biological Sciences, University of Arkansas, Sci-Eng Room 601, Fayetteville, AR 72701, USA. E-mail: aradwell@uark.edu

**7488.** Raihani, G.; Serrano-Meneses, M.A.; Córdoba-Aguilar, A. (2008): Male mating tactics in the American rubyspot damselfly: territoriality, nonterritoriality and switching behaviour. *Animal Behaviour* 75(6): 1851-1860. (in English) ["Odonates exhibit a wide range of territorial and nonterritorial mating tactics and are ideal for investigating alternative reproductive behaviours. We studied male mating tactics in the American rubyspot damselfly, Hetaerina americana, a species that exhibits red wing spots that have been suggested to have evolved as a consequence of male–male contests. In this species mating success is enhanced by the ability of males to defend territories along streams and rivers, which depends on the amount of thoracic fat reserves available. Previous studies on this species have distinguished between territorial and nonterritorial males, in which the former obtain significantly more matings than the latter. In our study, however, we found a third reproductive tactic: switching. Switcher males exhibit both territorial and nonterritorial tactics and a mating success similar to that of territorial and nonterritorial males, although this result may be confounded by the small sample size used for this analysis. We suggest that the different mating tactics may be condition determined: territorial males contained the highest fat reserves, nonterritorial males had the least fat content and switchers had intermediate fat loads. We also show that there were no age differences between males using these tactics. Our results suggest that territorial behaviour is extremely plastic in this species. Finally, we discuss the implications of our study and directions for future work on territorial and nonterritorial reproductive tactics in odona-



tes." (Authors)] Address: Córdoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**7489.** Reborá, M.; Piersantia, S.; Gaino, E. (2008): The antennal sensilla of the adult of *Libellula depressa* (Odonata: Libellulidae). *Arthropod Structure & Development* 37(6): 504-510. (in English) ["An ultrastructural investigation (SEM, TEM) on the antennal flagellum of the adult of the dragonfly *Libellula depressa* (Odonata: Libellulidae) revealed sensilla located in pits on the lateral-ventral side of the antenna. These sensilla are represented by sensilla coeloconica and by deeply sunken sensilla. The sensilla coeloconica are innervated by three unbranched dendrites, which enter the peg and show a dendrite sheath ending at the base of the peg. The peg has no socket and its cuticle is irregular with wide pore-like structures at the base of which actual pores are visible. The structure of these coeloconic sensilla is in agreement with that reported for single-walled insect chemoreceptors. The deeply sunken sensilla are represented by two kinds of sensilla styloconica, named type-1 and type-2, located at the bottom of deep cavities appearing as simple openings on the antennal surface. These sensilla are no-pore sensilla with inflexible socket and unbranched dendrites and, notwithstanding their structural differences, share common features typical of thermo/hygroreceptors. The presence of chemoreceptors in adult dragonflies sheds light on evolutionary trends in insect perception; the previously unknown occurrence of thermo/hygroreceptors in dragonflies is very important in view of the reported ability of Odonata to thermoregulate heliothermally." (Authors)] Address: Reborá, Manuela, Dipartimento di Biologia Cellulare e Ambientale, Università di Perugia, 06123 Perugia, Italy. E-mail: reborá@unipg.it

**7490.** Reece, B.A.; McIntyre, N.E. (2008): Dragonfly (Odonata: Anisoptera) holdings of the Museum of Texas Tech University. *Occasional Papers, Museum of Texas Tech University* 279: 1-13. (in English) ["Specimens of dragonflies held in the Museum of Texas Tech University were reviewed. Prior to our work, this collection had only been partially sorted and not cataloged. Most specimens are from the state of Texas, with fewer individuals having been collected from other states and countries. The holdings for Texas include some undersampled areas. A total of 54 new county records were uncovered for the state of Texas." (Authors) The collection also includes same species from the Philippines, and undetermined specimens.] Address: Reece, B.A., Museum of Texas Tech. University, Lubbock, TX 79409-3191, USA

**7491.** Reinhardt, K. (2008): *Besprechungen: Gilbert, P.: A source book for biographical literature on Entomologists.* - Leiden: Backhuys Publishers, 200, VII, 694 p. - ISBN 978-90-5782-186-8. *Beiträge zur Entomologie* 58(1): 179, 190. (in English) [Book review, containing critical remarks on abundant incorrect information and spelling of odonatologists.] Address: Reinhardt, K., Dept Animal & Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: K.Reinhardt@sheffield.ac.uk

**7492.** Reinhardt, K. (2008): Zur Libellenfauna nordost-deutscher Flüsse (Odonata). *Entomologische Nachrichten und Berichte* 52(2): 109-114. (in German, with Eng-

lish summary) ["On the dragonfly fauna of rivers in northeastern Germany. Three rivers in northeastern Germany (Tollense, Peene, Uecker) were investigated during a seven-day kajak trip. Twelve species were found at 5 to 7 of the seven river-days and so considered typical for this area. These include the significant records of *Anax imperator*, *A. parthenope*, *Aeshna isosceles*, *Gomphus vulgatissimus* and *Libellula fulva* for which previous records are rare in northeastern Germany. Noteworthy are also the records of *Crocothemis erythraea*, a possible new arrival to that area and the near-absence of the usually abundant species *L. quadrimaculata*. Other observations include a detailed protocol of the copulatory behaviour of *A. isosceles*, the emergence of *Calopteryx splendens* of 6 m away from the banks as well as the finding of eggs, presumably from snails, attached to an exuvia of *G. vulgatissimus*. It is also concluded that kajaking might be an important means to study the dragonfly of rivers because some species may be detected that are hard to observe from the river banks." (Author)] Address: Reinhardt, K., Dept Animal & Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: K.Reinhardt@sheffield.ac.uk

**7493.** Remsburg, A.J.; Olson, A.C.; Samways, M.J. (2008): Shade alone reduces adult dragonfly (Odonata: Libellulidae) abundance. *Journal of Insect Behavior* 21(6): 460-468. (in English) ["We demonstrate that physical habitat conditions influence adult dragonfly (Odonata: Anisoptera) riparian site selection. In naturally treeless riparian areas of South Africa, invasive trees create shade and reduce native vegetation. We hypothesized that most breeding odonates select riparian areas (1) without shade, and (2) with high density and variety of understory perch structures. In two experiments at reservoir shorelines, we varied shade and perch structures. Dragonfly abundances (predominantly *Trithemis* species) were lower at sites with high (75%) or moderate (55%) shade cover than at sites with no shade, and lower at bare sand sites than sites containing stick perches. Perch density and variety (variety of heights and diameters) did not affect dragonfly abundance. These results indicate that shade alone directly reduces dragonfly habitat selection, isolating one aspect of habitat change that can alter insect behaviours." (Authors)] Address: Remsburg, Alysa, Dept of Zoology, University of Wisconsin, 430 Lincoln Dr., Madison, WI 53706, USA. E-mail: aremsburg@unity.edu

**7494.** Ren, D., Nel, A. & Prokop, J. (2008): New early griffenfly, *Sinomeganeura huangheensis* from the Late Carboniferous of northern China (Meganisoptera: Meganeuridae). *Insect Systematics & Evolution* 39: 223-229. (in English) ["New griffenfly *Sinomeganeura huangheensis* gen. n., sp. n. (Meganeuridae) is described from Upper Carboniferous (Namurian) of the Tupo Formation in northern China (Ningxia Hui Autonomous Region). This taxon exhibits unique structure of the wing venation pattern. It is highly interesting in reference to the Namurian age known for the occurrence of two meganeurids until present (*Namurotypus Brauckmann & Zessin, 1989* and *Shenzhousia Zhang & Hong, 2006*) as well as the palaeogeographical position of the locality far from all sites in Laurussia. We demonstrate that meganeurids with relatively small wings already co-existed with large species in the Namurian, as for the Stephanian and the Late Permian. Thus, *Sinomeganeura* demonstrates that the meganeurid diversity and wing venation disparity were comparable during the Na-

murian and the Stephanian, suggesting that this group already had a long history in the Early Carboniferous. Odonoptera were probably the main, if not unique predators of the flying insects during the Late Paleozoic." (Authors)] Address: Ren, D., College of Life Sciences, Capital Normal University, 105 Xisanhuanbeilu, Haidian District, Beijing 100037, P. R. China. E-mail: rendong@mail.cnu.edu.cn

**7495.** Resende, D.C.; De Marco, P. (2008): Residence and territorial characteristics of Libellulidae species in a neotropical assemblage (Anisoptera). *Odonatologica* 37(3): 213-220. (in English) ["During territorial behaviour, aggressive attacks among heterospecific odonate males are common and may cause a separation of niches, based on the preferred sites for territorial defence. Here, territorial behaviour and the characteristics of territories in males of *Erythrodiplax media*, *Micrathyrta catenata* and *M. hesperis* are described and their territorial fidelity, capturing and marking of males are discussed. In all species studied, there was a clear distinction among the microhabitats defended as territories. In both *Micrathyrta* species, males seem to defend territories with defined resources. In *E. media*, the defended resources are less evident. Its males are highly aggressive and show high territorial fidelity but, apparently, they lose the territory if they stay away from water for at least one day.] Address: De Marco, P., Laboratório Ecologia Teórica e Síntese, Depto de Biologia Geral, Universidade Federal de Goiás, BR-74001-970, Goiania, GO, Brazil. E-mail: pdemarco@icb.ufg.br

**7496.** Reynolds, A.; Gladwin, T.; Shepperson, C. (2008): Dragonflies and Damselflies of Hertfordshire. ISBN 978-0-9521685-6-0. 142 pp. (in English) [Sections on all 19 breeding species including: description and colour photo, distribution maps covering all 458 tetrads in Herts, flight charts specific to Herts both based on 14,600 records between 2000 and 2006.] Address: Hertfordshire Natural History Society, HNHS, 24 Mandeville Rise, Welwyn Garden City, AL8 7JU, UK. E-mail: herts.naturalhistorysociety@ntlworld.com

**7497.** Rudolf, V.H.W.; Armstrong, J. (2008): Emergent impacts of cannibalism and size refuges in prey on intraguild predation systems. *Oecologia* 157 : 675-686. (in English) ["Many organisms undergo ontogenetic niche shifts due to considerable changes in size during their development. These ontogenetic shifts can alter the trophic position of individuals, the type and strength of ecological interactions across species, and allow for cannibalism within species. In this study we ask if and how the interaction of a size refuge and cannibalism in the prey alters the dynamics of intraguild predation (IGP) systems. By manipulating the composition of large cannibalistic (*Aeshna umbrosa*) and predatory (*Anax junius*) dragonfly larvae in mesocosms we show that the interaction of cannibals and predators was non-linear and increased the survival of prey. The structure of the final resource community shared by prey and predator differed between small and large dragonfly treatments but not within size classes across species. In general, the small prey stage showed similar shifts in microhabitat use and refuge use when exposed to either conspecific cannibals or predators, while large cannibals showed no clear anti-predator response. However, further behavioral experiments revealed that specific behavioral components, such as distances between individuals or number of movements, differed when individuals

were exposed to either cannibals or predators. This indicates that individuals discriminated between conspecific or heterospecific predators. Furthermore, in similar experiments large cannibals and predators showed different behaviors when exposed to conspecifics rather than to each other. These changes in behavior are consistent with the observed increase in prey survival. In general, the results indicate that cannibalism and ontogenetic niche shifts can result in behavior-mediated indirect interactions that reduce the impact of the predator on the mortality of its prey and alter the interactions of IGP systems. However, they also indicate that size is not the sole determinant and that we also need to account for the species identity when predicting the dynamics of communities." (Authors)] Address: Rudolf, V., Mountain Lake Biological Station, Pembroke, VA, USA. E-mail: volker.rudolf@rice.edu

**7498.** Rudolf, V.H.W. (2008): The impact of cannibalism in the prey on predator-prey system. *Ecology* 89: 3116-3127. (in English) ["Cannibalism is ubiquitous in natural communities and has the potential to alter the functional relationship of predator-prey interactions. Although cannibalistic species are frequently subject to predation, the consequences of cannibalism in the prey for predator-prey interactions are poorly understood. Using a dragonfly larvae system, I provide the first experimental evidence that cannibalism in the prey creates behaviour- and density-mediated indirect effects that result in nonlinear predator-prey interactions. As a consequence, cannibalism in the prey altered the functional relationship of the predator and its prey and reduced the impact of the predator on prey mortality by 47%. By parameterizing a mechanistic predation model, I show that the nonlethal interaction between cannibals and predators reduced cannibalism rates, which explained almost two times more of the observed mortality reduction than the consumption of cannibals. However, only a model that accounted for both behavioural interactions and the consumption of cannibals could predict 100% of the observed mortality. Using the mechanistic model, I discuss the long-term effects of cannibalism on community dynamics and how they can differ from effects of simple density-dependent mortality. In general, these results demonstrate the importance of accounting for the trophic structure in cannibalistic populations and the resulting nonlinear interactions to predict predator-prey dynamics." (Author)] Address: Rudolf, V., Dept of Ecology and Evolutionary Biology, Rice University, Houston, Texas 77005 USA. E-mail: volker.rudolf@rice.edu

**7499.** Rust, J.; Petrulevicius, J.F.; Nel, A. (2008): The first damselflies from the lowermost eocene of Denmark, with a description of a new subfamily (Odonata, Zygoptera, Dysagrionidae). *Palaeontology* 51(3): 709-713. (in English) ["*Eodysgrion mikkelseni* gen. et sp. nov., type species of the new subfamily Eodysgrioninae, and the dysagrionine *Primorilestes madseni* sp. nov., the first thaumatoneurid damselflies from the lowermost Eocene of Denmark, are described. They confirm the presence of this American family in the Palaeogene of Western Europe." (Authors)] Address: Rust, J., Inst. of Palaeontology, University of Bonn, Nussallee 8, 53115 Bonn, Germany. E-mail: jrust@uni-bonn.de

**7500.** Sahlén, G.; Haase, S.; Suhling, F. (2008): Morphology of dragonfly larvae along a habitat gradient: interactions with feeding behaviour and growth (Odonata: Libellulidae). *International Journal of Odonatology* 11

(2): 225-240. (in English) ["It has been shown that life history, behavioural as well as morphological traits vary with the habitats occupied by odonate larvae. Here we ask the following questions: (1) Are the morphological traits, which are associated with perception and foraging, related to the larval habitat? (2) Do these traits influence foraging success and growth rate? We analysed the morphology of species pairs belonging to the genera *Crocothemis*, *Orthetrum* and *Trithemis*; one species in each pair occurring in perennial spring-fed streams, the other able to develop in temporary waters. A PCA reveals four principal components of morphological characters which may be expressed as PC1: prey handling, PC2: visual perception, and PC3 and PC4: density of long and short setae on the feet. The variances of PC1, PC2 and PC3 were affected by phylogeny. PC1, PC2 and PC4 differed between habitats. Species of perennial springs had larger values for visual perception. These waters are clear and larger eyes should be beneficial. But, a high PC2 value was associated with low growth rate and did not affect foraging success. We therefore conclude that investment in better sight made by perennial water species may reflect the need of avoiding predators. Development in temporary waters mainly requires rapid growth and species may not be capable to invest also in visual perception. PC1 was negatively correlated with foraging behaviour and PC3 was positively so. This indicates the importance of prey capture mode to foraging success, which may, however, not translate into a higher growth rate." (Authors)] Address: Sahlén, G., Syst. Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, S-752 36 Uppsala, Sweden. E-mail: goran.sahlen@set.hh.se

**7501.** Salvini-Plawen, L.; Svojtka, M. (2008): Fische, Petrefakten und Gedichte: Rudolph Kner (1810 - 1869). *Denisia* 24. 132 pp. (in German, with English summary) [The exhaustive biography of the Austrian R. Kner, first appointed professor in zoology in Austria, also presents pictures of his collection of fossils including *Mesuropetalia koehleri* (Hagen, 1848) from Solnhofen, Bavaria, Germany.] Address: Svojtka, M., Universität Wien, Institut für Paläontologie, Althansstr. 14, 1090 Wien, Austria. E-mail: a9701546@unet.univie.ac.at

**7502.** Samways, M.J.; Grant, P.B.C. (2008): Elephant impact on dragonflies. *Journal of Insect Conservation* 12(5): 493-498. (in English) ["African elephants and other indigenous megaherbivores have a major impact on local vegetation structure, including aquatic communities, as their big feet and large mass pound the fringes of water bodies. This disturbance is likely to have a profound influence on the structure and composition of insect assemblages in these habitats. We investigated which dragonfly (Odonata) species were tolerant of trampling by elephants and other game. Assemblage composition differed according to extremely high, very high or high disturbance levels. Dragonfly abundance was greatest where impact was high, and decreasing when disturbance became very high or extremely high. Several odonate species are well-adapted to fairly high levels of disturbance, although too much is impoverishing. Medium and low impact sites were geographically separated, and this, combined with much lower disturbance levels, had a considerable influence on promoting regional dragonfly diversity. Several regional specialist species only occurred in the geographically separated, low-impact sites. The full complement of dragonflies is present only when there is a combination of va-

rious disturbance levels combined with spatial variation. Elephant impact is similar to that of humans, with too much of either or both, leading to a species-poor, habitat-generalist dragonfly assemblage." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**7503.** Samways, M.J. (2008): Chapter 8. Dragonflies as focal organisms in contemporary conservation biology. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research*, ed. A. Córdoba-Aguilar. Oxford University Press: 97-109. (in English) ["Freshwater ecosystems worldwide are highly threatened. As a consequence, many dragonfly species are also threatened. The threats to them are many and varied, including invasive alien plants and habitat loss. Global climate change is also beginning to affect them, with some species changing their geographical ranges. Worldwide assessments are being made of dragonfly conservation status. They are one of the highest profile invertebrates in conservation awareness, planning, and action. One reason for this is that they are highly valued, being iconic, aesthetic, and sensitive bioindicators of landscape change. They are both important subjects in their own right as well as important role players in overall biodiversity conservation." (Publisher)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**7504.** Schiel, F.-J.; Rademacher, M. (2008): Artenvielfalt und Sukzession in einer Kiesgrube südlich Karlsruhe. *Ergebnisse des Biotopmonitoring zum Naturschutzgebiet „Kiesgrube am Hardtwald Durmersheim“*. *Naturschutz und Landschaftsplanung* 40(3): 87-94. (in German, with English summary) [The study presents the results of a six year monitoring programme, carried out between 1993/94 and 2005 in a gravel pit in the Upper Rhine Valley south of Karlsruhe (Germany, Federal State of Baden-Württemberg). The gravel pit shows a very high biodiversity of plants and animals, also including 34 dragonfly species. A few species of shallow, temporary water bodies are listed. "From 2000 onwards extensive management measures have been carried out to preserve the characteristic habitats and the species diversity of the gravel pit, focussing on the conservation of the pioneer habitats 'dune vegetation' and 'open temporary water zones' and on the control of neophytes." (Authors)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenenweg 9, 77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INU-LA.de

**7505.** Schultz, T.D.; Anderson, C.N.; Symes, L.B. (2008): The conspicuousness of colour cues in male pond damselflies depends on ambient light and visual system. *Animal Behaviour* 76(4): 1357-1364. (in English) ["The colours of male coenagrionid damselflies have been interpreted by some as intraspecific signals that reduce intrasexual harassment by advertising the unprofitability of pursuing conspecific males as potential mates. As visual cues, male colours should be conspicuous to other males under the specific light environments where males search for females. We tested this prediction by using spectroradiometry and two models of damselfly colour vision to determine the chromatic and achromatic contrast of males from six species of *Enallagma* damselflies with pond backgrounds under



the ambient light conditions when each species was most active. The males of five species were active at the time when their colour was most conspicuous against aquatic vegetation. Three blue species were most active and attained their highest levels of contrast during midday, while species that became active in late afternoon or evening reflected longer wavelengths and increased in brightness contrast under low sun angles. A sixth species, *Enallagma pictum*, departed from this pattern. We propose that colour may serve as a signal of both sexual and species identity among males." (Authors) *E. aspersum*, *E. basidens*, *E. geminatum*, *E. signatum*, *E. vesperum*] Address: Schultz, T.D., Department of Biology, Denison University, Granville, Ohio, USA. E-mail: schultz@denison.edu

**7506.** Seidenbusch, R. (2008): Three-winged Southern Hawker, *Aeshna cyanea* (Müller, 1767). *J. Br. Dragonfly Society* 24(2) : 51-53. (in English) ["In June 2007 about two dozen Southern Hawkers *Aeshna cyanea* emerged from my small garden pond. One of the emerged specimens was missing its left forewing and, although the other three were fully formed, it was unable to fly. It is suggested that the damage to the larval wing sheath occurred at a late stage in larval development thereby allowing too little time for sufficient regeneration to take place." (Author)] Address: Seidenbusch, R., Klenze Str. 5, D-92237 Sulzbach-Rosenberg, Germany. E-mail: seidenbusch@freenet.de

**7507.** Serrano-Meneses, M.A.; Córdoba-Aguilar, A.; Székely, T. (2008): Chapter 18. Sexual size dimorphism: patterns and processes. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research*, ed. A. Córdoba-Aguilar. Oxford University Press: 231-249. (in English) ["Odonates provide excellent model organisms for testing functional explanations of sexual size dimorphism (SSD) because of their wide variety of habitats, morphology, development, feeding behaviour, and mating strategies. This chapter discusses three major functional hypotheses of SSD and uses data on 133 odonate species to describe their patterns of SSD. It shows that SSD centres around monomorphism in dragonflies, whereas SSD is mostly male-biased in damselflies. Interestingly, phylogenetic comparative analyses suggest that damselflies — but not dragonflies — exhibit allometry consistent with Rensch's rule. Sexual selection acts mainly on males, whereas fecundity selection appears to influence female body size. Further tests, however, are essential, in particular of fecundity selection and the differential niche-utilization." (Publisher)] Address: Serrano-Meneses, M.A., Department of Biology and Biochemistry, University of Bath, Claverton Down, Bath BA2 7AY, UK. E-mail: mserrano@miranda.ecologia.unam.mx

**7508.** Serrano-Meneses, M.A.; Sanchez-Rojas, G.; Córdoba-Aguilar, A. (2008): Sexual selection as the possible underlying force in calopterygid wing pigmentation: comparative evidence with *Hetaerina* and *Calopteryx* (Zygoptera: Calopterygidae). *Odonatologica* 37(3): 221-233. (in English) ["Five hypotheses for the evolution of conspicuous male wing pigmentation have been proposed: sexual selection, differential niche utilization, predator warning, social badge and ecological character displacement. Here, the sexual selection and ecological character displacement hypotheses are compared. First, the coefficients of variation (CVs) of pigmentation were compared against the CVs of a selec-

ted set of other animals' traits that are known to be maintained by either natural or sexual selection. *Hetaerina americana*, *H. vulnerata*, *Calopteryx aequitabilis*, *C. haemorrhoidalis* and *C. xanthostoma* were used in order to compare CVs. Second, it was predicted that pigmentation should not differ in species whose populations are in sympatry (compared to allopatry) if sexual selection is driving the evolution of pigmentation (compared, for example, to an ecological character displacement hypothesis in which pigmentation between spp. should differ). Here, the pigmentation of sympatric and allopatric populations of *H. americana* and *H. vulnerata* were compared. The study produced 2 main results. First, the CVs of pigmentation were not different from the CVs of sexually selected traits in other animals; nevertheless, they were different from those of naturally selected traits. Second, the pigmentation of the 2 species in sympatry did not differ significantly. The same was true for allopatric populations. Taken together, these results suggest that sexual selection is the main mechanism of maintenance of pigmentation in these animals. Other alternative hypotheses for the evolution of pigmentation (differences in habitat use in both sexes, warning to predators by males and ecological character displacement) are discussed in the light of these results." (Authors)] Address: Serrano-Meneses, M.A., Dept Biology and Biochemistry, University of Bath, Claverton Down, Bath BA2 7AY, UK. E-mail: mserrano@miranda.ecologia.unam.mx

**7509.** Sharma, A.; Sharma, R.C.; Anthwal, A. (2008): Surveying of aquatic insect diversity of Chandrabhaga river, Garhwal Himalayas. *Environmentalist* 28(4): 395-404. (in English) ["Aquatic insect diversity in the Chandrabhaga, an important headwater stream of Garhwal Himalayas, was surveyed for a period of twelve months (October 1999 to September 2000). All the important physico-chemical environmental variables (temperature, water velocity, hydromedian depth, transparency, turbidity, total dissolved solids, pH, alkalinity, dissolved oxygen, free CO<sub>2</sub>, nitrates, phosphates, sodium and potassium) of the aquatic ecosystem were measured monthly for one year. Aquatic insects were sampled from three sites (S1, S2 & S3) of the headwater stream Chandrabhaga. Aquatic insects of Chandrabhaga were represented by the members of the orders of Ephemeroptera, Trichoptera, Coleoptera, Diptera, Plecoptera and Odonata. The maximum density of aquatic insects was recorded in the month of March (4,165 ind. m<sup>-2</sup>) and minimum in the month of August (680 ind. m<sup>-2</sup>). The annual contribution of Trichoptera (38%) and Ephemeroptera (32%) was observed to be maximum, while Odonata contributed minimum (2%) to the total aquatic insect density. The present study on the relationship between physico-chemical environmental variables and the density of aquatic insects revealed that the velocity of water, hydromedian depth, turbidity and dissolved oxygen in addition to composition and texture of the bottom substrates have significant impact on benthic aquatic insects' density and their diversity. The ecological relevance of the measured hydrological attributes was investigated by composing their degree of correlation with insects density and diversity. The diversity index (Shannon-Weiner) of aquatic insects dwelling in the Chandrabhaga river ranged from 2.54 to 3.86. Some of the natural and anthropogenic environmental factors contributing towards the degradation of the watershed of the Chandrabhaga have been identified, and ameliorative measures for the conservation of the aquatic in-

sect diversity have been suggested." (Authors)] Address: Sharma, A., Dept of Environmental Sciences, H.N.B Garhwal University, P.O. Box 67, Srinagar, Garhwal, 246174, Uttarakhand, India. Email: drrameshcs-harma@yahoo.com

**7510.** Shcherbakov, D.E. (2008): On Permian and Triassic insect faunas in relation to biogeography and the Permian–Triassic crisis. *Paleontological Journal* 42(1): 15-31. (in English) [„The taxonomic diversity dynamics of pterygote insects in the Permian and Triassic at the family/age level are considered. Different metrics of taxonomic diversity are compared. Biogeographic and taphonomic aspects of changes in the composition of insect faunas in the Permian and about the P–T transition are discussed. Some changes in the Permian insect faunas are of a biogeographic nature and do not indicate global changes in diversity. Insects with aquatic immatures (including Odonata) were rather common in the Permian and Early Triassic, but these immatures are well represented in only few localities." (Author) Address: Shcherbakov, D.E., Paleontological Inst., Russian Academy of Sciences, Profsoyuznaya ul. 123, Moscow, 117997 Russia. E-mail: dshh@narod.ru

**7511.** Simaika, J.P.; Samways, M.J. (2008): Chapter 9. Valuing dragonflies as service providers. In: Alex Cordoba-Aguilar (Editor): *Dragonflies and damselflies: Model organisms for ecological and evolutionary research*. Oxford Scholarship Online Monographs: 109-125. (in English) [„Valuing the services provided by ecosystems and their components is emerging as a new, practical tool for conservation of biodiversity. One such framework for quantifying those components of biodiversity and their attributes, which are important for the diversity of ecosystem services, is the Service Providing Unit (SPU). This framework provides a conceptual link between ecosystem services and the role of populations of different species in providing these services. Dragonflies provide several ecosystem services to humanity at the population level. Their role as SPUs encompasses most of the 28 ecosystem services, directly or indirectly, as recognized by the Millennium Ecosystem Assessment, in the categories of provisioning, cultural, supporting, and regulating services. Service provision by dragonflies can be quantified, for example, in pest control and riparian restoration. As the SPU concept, as a value metric, has considerable currency with dragonflies, there is merit in investigating its application to other invertebrate taxa and ecosystems." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**7512.** Skalskaya, I.A.; Bakanov, A.I.; Flerov, B.A. (2008): Study on zooperiphyton and zoobenthos of a small river. ISSN 1995-0829, *Inland Water Biology*, 2008, Vol. 1, No. 1, pp. 84–92. © Pleiades Publishing, Ltd., 2008. Original Russian Text © I.A. Skalskaya, A.I. Bakanov, B.A. Flerov, 2008, published in *Biologiya Vnutrennikh Vod*, No. 1, 2008, pp. 89–98: (in English) [„The special traits of zooperiphyton and zoobenthos structures in a small river were studied. Under conditions of maximal proximity of niches, these groups of invertebrates retain taxonomic and ecological heterogeneity. Differences in zooperiphyton and zoobenthos taxonomic structures are most pronounced in terms of presence of dipterans, oligochetes, and molluscs. In the periphyton, the dominant groups are chironomid (ortho-cladines, chi-

ronomines, and tanitarsines) larvae, oligochetes of Naididae and molluscs of Limnaeidae. In the benthos chironomid (chironomines and tanirodines), oligochetes of Tubificidae, and molluscs of Pisidiidae are dominant. On average, the bottom invertebrates are considerably larger than fouling organisms. At similar abundance values, the biomass of benthos is by an order of magnitude higher compared to zooperiphyton. Ranging of average biomasses of zooperiphyton and zoobenthos revealed that the leader common for both communities is the large and mobile predatory leech, *Erpobdella octoculata*. The anthropogenic impact and zoogenic (beavers) impact upon the river biota are comparable to each other." (Authors) Aeshna cyanea] Address: Skalskaya, I.A., Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences, Borok, Nekouzskii raion, Yaroslavskaia oblast, 152742 Russia. E-mail: skalskaya@ibiw.yaroslavl.ru

**7513.** Skvortsov, V.E.; Matyokhin, A.V. (2008): *Cordulegaster boltonii* (Donovan) found at the polar circle in Karelia, NW Russia (Anisoptera: Cordulegastridae). *Notulae odonatologicae* 7(2): 22-24. (in English) [„2 new *C. boltonii* localities, located near the Peninga estuary (63°40'50"N, 31°13'50"E) and at the Chornaya Guba bay on the White Sea coast (66°31'03"N, 32°55'35"E), are brought on record. The latter site is situated 4.5 km S of the Polar Circle, therefore, technically, the species is (as yet) not to be included on the Arctic fauna list. This is the northernmost locality known for the family in Eurasia. All the previously published *C. boltonii* records from Russia are discussed.] Address: Skvortsov, V.E., Dept of Biological Evolution, Faculty of Biology, Moscow State University, RUS-119992 Moscow, GSP-1, Russia. E-mail: west-urnus@yandex.ru

**7514.** Skvortsov, V.E. (2008): Some Odonata records from the transpolar area in north-eastern European Russia. *Notulae odonatologicae* 7(2): 20-22. (in English) [„9 species collected from 4 localities in the Nenetskiy Autonomous District (NAD, Russia), 66°38'N - 69°50'N probably represent the northernmost Odonata records in eastern Europe and the first reliable data on the odonate fauna of NAD and of the transpolar European Russia. *Aeshna grandis* and *Leucorrhinia rubicunda* are new additions to the Russian transpolar fauna. A most unusual dragonfly occurrence on an arctic isle (Dodgii Island in the Barents Sea), where *Aeshna caerulea* and *A. juncea* were discovered, is discussed in some detail." (Author) The additional species are *Coenagrion hastulatum*, *Aeshna subarctica elisabethae*, *Somatochlora arctica*, *S. metallica*, and *Sympetrum flaveolum*.] Address: Skvortsov, V.E., Dept of Biological Evolution, Faculty of Biology, Moscow State University, RUS-119992 Moscow, GSP-1, Russia. E-mail: west-urnus@yandex.ru

**7515.** Smallshire, D. (2008): Sri Lanka: Dragonflies and other wildlife, October 2007. *Dragonfly News* 54: 24-25. (in English) [Report from a trip to Sri Lanka.] Address: Smallshire, D., 8, Twindle Beer, Chudleigh, Newton Abbot, Devon, TQ13 0JP, UK. E-mail: davesmall@supanet.com

**7516.** Starmore, A. (2008): Submerged oviposition behaviour in the Large Red Damselfly *Pyrrosoma nymphula* (Sulzer) on the Isle of Lewis. *J. Br. Dragonfly Society* 24(2) : 45-50. (in English) [P. nymphula "was observed and photographed in oviposition at two locations

on the Isle of Lewis in the summer of 2007. The usual method was for the male, with the female in tandem, to land on a stem of the Bogbean *Menyanthes trifoliata* and then, with both grasping the stem, the female to start laying eggs in the stem, progressing downwards until her abdomen was about half submerged, while always holding her wings clear of the surface. On one occasion a female grasped a leaf with the abdomen three quarters submerged and the wing tips immersed. On 1 July the female of a pair became completely submerged. In all cases the male remained in the sentinel position while contact guarding the female." (Author)] Address: Starmore, Alice, Hedmark, 42 Gress, Isle of Lewis HS2 ONB, UK

**7517.** Stevens, L.E.; Bailowitz, R.A. (2008): Odonata of Ash Meadows National Wildlife Refuge, Southern Nevada, USA. *Journal of the Arizona-Nevada Academy of Science* 40(2): 128-135. (in English) ["The Odonata of Ash Meadows National Wildlife Refuge (AMNWR) in southern Nevada were studied bimonthly in 2004 and 2005, revealing 32 species, a moderately high level of diversity for this relatively small, semi-isolated southern Nevada valley. *Enallagma civile* was the most regularly encountered species, followed by *Rhionaeschna multicolor*, *Argia sedula*, and *Pachydiplax longipennis*. Fourteen species were detected at three or fewer sites. The assemblage was co-dominated by taxa with ranges centered in North America and western North America, and 25% of the fauna were Mexican-neotropical. We report *Macrodiplax balteata* as new to Nevada's Odonata list, and six other new Nye County records. Odonata larval density/m<sup>2</sup> and overall species richness (but not Shannon-Weiner diversity) were highest in the largest AMNWR wetlands, regardless of whether they were natural or anthropogenic, and were greater in two restored springs. Several of the most regularly detected larval Anisoptera (i.e., *Erpetogomphus compositus* and *Erythemis collocata*) were benthic ooze dwellers that have a flattened body morphology, which may allow them to avoid predation by non-native *Procambarus clarki* crayfish. Geomorphic restoration of springs may increase Odonata production, while augmentation of habitat area may increase species richness." (Authors)] Address: Stevens, L.E., Museum of Northern Arizona, 3101 N. Ft. Valley Rd, Flagstaff, AZ 86001, USA

**7518.** Stoks, R.; Johansson, F.; De Block, M. (2008): Chapter 4. Life-history plasticity under time stress in damselfly larvae. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research*, ed. A. Córdoba-Aguilar. Oxford University Press: 39-51. (in English) ["Animals often face time stress because they have to reach a certain stage before a certain time horizon (e.g., the onset of winter or pond drying). Damselflies react to time stress with a shortening of their development time, and often show compensatory growth to avoid a smaller size at metamorphosis. Behaviour (increased foraging) and digestive physiology (increased growth efficiency) underlie this life history plasticity. Both ecological and physiological costs of this accelerated life history have been shown: time-stressed larvae are less responsive to predators and hence suffer higher mortality by predation, and show larger mass loss during starvation and reduced investment in immune function and in energy storage. These costs may explain why time-stressed larvae suffer a reduced lifetime mating success in the adult stage." (Publisher)] Address: Stoks, R., Laboratorium voor Aquatische Ecolo-

gie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**7519.** Strand, K.A.; Chipps, S.R.; Kahara, S.N.; Higgins, K.F.; Vaa, S. (2008): Patterns of prey use by Lesser scaup *Aythya affinis* (Aves) and diet overlap with fishes during spring migration. *Hydrobiologia* 598: 389-398. (in English) [Odonata, like additional insects, occurred infrequently within diet of Lesser scaup *Aythya affinis*, and contributed little to consumed mass.] Address: Chipps, S.R., U.S. Geological Survey, South Dakota Cooperative Fish and Wildlife Research Unit, Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, South Dakota 57007, USA. E-mail: Steven.Chipps@sdstate.edu

**7520.** Suhonen, J.; Rantala, M.J.; Honkavaara, J. (2008): Chapter 16. Territoriality in odonates. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research*, ed. A. Córdoba-Aguilar. Oxford University Press: 203-219. (in English) ["This chapter discusses causes and consequences of territorial behaviour in odonates. In territorial species, males may use two mating tactics or strategies that may be environmentally or genetically determined: territoriality and non-territoriality. The tactic a male exhibits in each particular case is determined by the cost-benefit ratio of territorial and non-territorial behaviours. The main benefit of territoriality is increased access to females, and the costs may accumulate due to e.g., predation, injuries, and/or energy loss due to territorial contests. Moreover, density of both males and females as well as sex-ratio at breeding sites both contribute to the costs and benefits of each tactic. Interspecific aggression by heterospecific males may also influence the profitability of these tactics." (Publisher)] Address: Rantala, M.J., Dept of Biology, University of Turku, FIN-20024 Turku, Finland. E-mail: markus.rantala@utu.fi

**7521.** Szallassy, N. (2008): Preliminary data on the Odonata fauna of the backwaters of River Tur. *Bihorean Biologist, Supplement (Flora si fauna rezervatiei "Râul Tur")*: 51-54. (in Romanian, with English summary) [18 species were found including "*Crocothemis servillia*."] Address: Szallassy, Noémi, Fac. de Biologie si Geologie, Universitatea Babeş-Bolyai, Romania

**7522.** Takahara, T.; Kohmatsu, Y.; Yamaoka, R. (2008): Predator-avoidance behavior in anuran tadpoles: a new bioassay for characterization of water-soluble cues. *Hydrobiologia* 607(1): 123-130. (in English) ["In freshwater systems, little is known about the characteristics of chemical cues derived from predators which induce defensive responses in prey species. To elucidate traits of predator chemical cues, we examined chemical cues originating from water incubated by the nymph of the dragonfly *Anax parthenope julius*, which induces low activity as predator-avoidance behaviour in tadpoles of two anuran species, the Japanese tree frog *Hyla japonica* and the winkled frog *Rana (Rugosa) rugosa*. *H. japonica* exhibited a reduction in tail movement time as low activity in response to both untreated incubation water and incubation water that had volatile substances removed by freeze-drying. The response threshold of *R. rugosa* to chemical cues was determined to be one dragonfly nymph in a water volume between 500 and 5,000 ml. We found that chemical cues inducing predator-avoidance behaviour in anuran tadpoles have water-soluble non-volatile characteristics. In this



study, we devised both the bioassay to assess the effects of chemical cues and the method to enrich the cues by freeze-drying, which can serve as a tool in the process of identification of unknown chemical cues in freshwater predator-prey interaction." (Authors)] Address: Takahara, T., Chemical Ecology laboratory, Graduate School of Science and Technology, Kyoto Institute of Technology, Matsugasaki-gosyokaido, Sakyo Kyoto, 606-8585, Japan. Email: taka02@kit.ac.jp

**7523.** Tang, H.B. (2008): A new record of *Heliaeschna uninervulata* Martin (Odonata: Gynacanthini: Aeshninae) in Singapore. *Nature in Singapore* 1: 1-3. (in English) [12-IV-2008, Central Catchment Nature Reserve, Singapore] Address: Tang, H.B., Blk442, Ming Ave, '18-423, Singapore 570442. E-mail: tanghungbun@yahoo.com

**7524.** Taylor, P. (2008): Comments on The Odonata Red List for Great Britain. *J. Br. Dragonfly Society* 24(1): 37-44. (in English) ["The background to the recent Odonata Red List (Daguet et al., 2008) is presented. Four British species are evaluated as 'Endangered', two as 'Vulnerable' and six as 'Near Threatened'. Of the remainder, 27 are of 'Least Concern', two recently established species have not been evaluated and there is insufficient data available for one. Red List status is not applicable for the 11 species that are occasional migrants. This list is compared with the previous one (Shirt, 1987)."] (Author) For the Red list see: <http://www.jncc.gov.uk/pdf/pub08speciesstatus11.pdf> Address: Taylor, Pam, Decoy Farm, Decoy Rd, Potter Heigham, Norfolk, NR29 5LX, UK. E-mail: ptaylor@acle.norfolk.sch.uk

**7525.** Tennessen, K.J. (2008): Gynandromorphs in the genera *Ophiogomphus* Selys, 1854 and *Ischnura* Charpentier, 1840 (Odonata: Gomphidae, Coenagrionidae). *Insecta mundi* 37: 1-3. (in English) ["A gynandromorph of *O. smithi* from Wisconsin and a gynandromorph of *I. hastata* from Alabama are described. The specimens appear to be bilateral in that they display mostly left/right separation of male and female characters.] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**7526.** Theischinger, G. (2008): *Austroaeschna ingrid* sp. nov. from Victoria, Australia (Odonata: Telephlebiidae). *International Journal of Odonatology* 11(2): 241-247, pl. III. (in English) ["*Austroaeschna ingrid*, a new telephlebiid from the Grampians in Victoria, Australia, is described (holotype: McKenzie Falls, 21-23 January 2008, to be deposited in Museum of Victoria, Melbourne). This species is most similar to *A. christine*, *A. multipunctata* and *A. obscura* but may be distinguished by the length and slenderness of the male anal appendages, particularly the long and narrow appendix inferior, by the pointed female occiput and by the small yellow pattern elements on the front of the synthorax. The larva of *A. ingrid* stands out by the very slender elements of the anal pyramid."] (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**7527.** Torreias, S.R. da S.; Neiss, U.G.; Hamada, N.; Ferreira-Keppler, R.L.; Lencioni, F.A.A. (2008): Description of the larva of *Bromeliagrion rehni* (Odonata: Coenagrionidae) with bionomic notes concerning its phytotelmic habitat in central Amazonas, Brazil. *Rev.*

*Bras. Zool.* 25(3): 479-486. (in English, with Portuguese summary) ["The last-stage larva of *Bromeliagrion rehni* Garrison in De Marmels & Garrison, 2005 is described and illustrated and bionomics and habitat information on this species are provided. The study was conducted in the Reserva Florestal Adolpho Ducke, located near Manaus, state of Amazonas, Brazil. Twelve samplings were done between April, 2003 and April, 2005: six in the rainy season and six in the dry season. In each sampling month, 12 bromeliads (*Guzmania brasiliensis* Ule, 1907, Bromeliaceae) were collected, six of which were terrestrial and six epiphytic, yielding 144 samples. A total of 75 specimens of *B. rehni* were collected. The relationship between larval *B. rehni* abundance and the measured environmental parameters (volume (ml), pH, season and stratum) was significant (ANCOVA,  $F = 5.296$ , d.f. = 130,  $p < 0.001$ ). Larvae were most abundant in the rainy season ( $p < 0.01$ ) and water volume was positively related to the abundance of *B. rehni*. Larvae of *B. rehni* can be distinguished from those of *B. fernandezianum* (the only species in the genus with described larvae) by the number of setae in the prementum and by the color of the apical region of the femur. The association of this species with phytotelmata of *G. brasiliensis* is reported here for the first time."] (Authors)] Address: Torreias, Sharlene R. da S., Divisão de Curso de Entomologia, Coordenação de Pesquisas em Entomologia, Instituto Nacional de Pesquisas da Amazônia. Caixa Postal 478, 69011-970 Manaus, Amazonas, Brasil. E-mail: robertatorreias@hotmail.com

**7528.** Trockur, B.; Didion, A. (2008): In: Rote Liste gefährdeter Pflanzen und Tiere des Saarlandes: XV Rote Liste und Faunenliste der Libellen (Odonata) des Saarlandes (3. Fassung). Ministerium für Umwelt und DE-LATTINIA (Hrsg.); Atlantenreihe Band 4: 485-498. (in German, with French and English summaries) ["In correlation with new methodic proposals regarding the compilation of red lists in Germany and the actualization of the data bank for the extension of the species-and biotope-protection-programme for the Saarland, the knowledge on the dragonfly fauna of the Saarland at the end of 2004 was analyzed and, based on this knowledge, the actual draft of the red list was outlined. The improved knowledge of the last years leads to a decrease of so-called "D-species" (data deficient) in the present red list. Although several species could be released from the red list, leading to an absolute red list-number of only 17 species, the conditions have not really improved. Thus the increase of extremely rare species (category R) from earlier one to now five species has to be noticed and nine percent of the species are ranked into the new category V (near threatened). In comparison to 1997, species released from the red list and of which the red list category was improved respectively, are noted in a blue list. For the species actually remaining in the red list, their threat-reasons are discussed."] (Authors)] Address: Trockur, B., Brückenstr. 25, 66636 Tholey-Hasborn, Germany. E-mail: Bernd-Trockur@gmx.de

**7529.** Tynkkynen, K.; Grapputo, A.; Kotiaho, J.S.; Rantala, M.J.; Väänänen, S.; Suhonen, J. (2008): Hybridization in *Calopteryx damselflies*: the role of males. *Animal behaviour* 75: 1431-1439. (in English) ["Females are often considered responsible for hybridization between two species because usually they are the choosier sex and their cooperation is needed for successful copulation. However, males can also be responsible for hybridization.

zation, for example in species in which males are able to force copulation. We studied the pattern of hybridization in two congeneric damselfly species, *Calopteryx splendens* and *Calopteryx virgo*, and provide evidence that F1 hybrids between the two damselfly species occur in the wild. According to mitochondrial DNA analysis, hybridization is reciprocal: five of seven hybrids were sired by *C. splendens* and two by *C. virgo* males. We conducted an experiment that revealed that males of both species have surprisingly poor premating reproductive isolation in that they accept heterospecific females, but *C. splendens* males were less discriminating against con- and heterospecific females than were *C. virgo* males. Moreover, our data on the number of hybrids sired by either species in the wild are congruent with the results of the discrimination experiment, supporting the conclusion that males may be responsible for the hybridization. Our results suggest that the males' role in hybridization studies should no longer be neglected." (Authors)] Address: Tynkkynen, Katja, Dept of Biological and Environmental Science, University of Jyväskylä, P.O. Box 35, FIN-40014 Jyväskylä, Finland. E-mail: katynkky@bytl.jyu.fi

**7530.** Tynkkynen, K.; Kotiaho, J.S.; Svensson, E. (2008): Chapter 11. Interspecific interactions and premating reproductive isolation. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research*, ed. A. Córdoba-Aguilar. Oxford University Press: 139-153. (in English) ["Two species can interact in several ways: there may occur interspecific competition or aggression, the two species may hybridize or they may interact indirectly through different predator-prey interactions. One consequence of these interactions is the evolution of premating reproductive isolation between the two species. For example, there may be divergent selection on male secondary sexual characters, which results in enhancement of premating reproductive isolation of two closely related species. This chapter focuses on two questions: firstly, how do interspecific hybridization, aggression and predation, affect premating reproductive isolation? Secondly, is reproductive isolation a direct target of selection or does it evolve as a correlated response to selection on other traits? This chapter uses *Calopteryx* damselflies as model organisms in this discussion, which have been under intensive study concerning these topics." (Publisher)] Address: Tynkkynen, Katja, Dept of Biological and Environmental Science, University of Jyväskylä, P.O. Box 35, FIN-40014 Jyväskylä, Finland. E-mail: katynkky@bytl.jyu.fi

**7531.** Uhl, A. (2008): Ergebnisse einer Nachsuche nach den Libellenarten Südliche Binsenjungfer (*Lestes barbarus*), Gefleckte Heidelibelle (*Sympetrum flaveolum*) und Südliche Heidelibelle (*Sympetrum meridionale*). *Naturschutz südl. Oberrhein, Beiheft 2* (2008): 33-38. (in German) [Baden-Württemberg, Germany. Records from 2004 and 2005 of *L. barbarus*, *S. flaveolum*, and *S. meridionale* are documented in detail.] Address: Uhl, A., Ritterstr. 26, D-77746 Schutterwald, Germany

**7532.** Usherwood, J.R.; Lehmann, F.-O. (2008): Phasing of dragonfly wings can improve aerodynamic efficiency by removing swirl. *J. R. Soc. Interface* 5: 1303-1307. (in English) ["Dragonflies are dramatic, successful aerial predators, notable for their flight agility and endurance. Further, they are highly capable of low-speed, hovering and even backwards flight. While insects have repeatedly modified or reduced one pair of wings, or

mechanically coupled their fore and hind wings, dragonflies and damselflies have maintained their distinctive, independently controllable, four-winged form for over 300 Myr. Despite efforts at understanding the implications of flapping flight with two pairs of wings, previous studies have generally painted a rather disappointing picture: interaction between fore and hind wings reduces the lift compared with two pairs of wings operating in isolation. Here, we demonstrate with a mechanical model dragonfly that, despite presenting no advantage in terms of lift, flying with two pairs of wings can be highly effective at improving aerodynamic efficiency. This is achieved by recovering energy from the wake wasted as swirl in a manner analogous to coaxial contra-rotating helicopter rotors. With the appropriate fore-hind wing phasing, aerodynamic power requirements can be reduced up to 22 per cent compared with a single pair of wings, indicating one advantage of four-winged flying that may apply to both dragonflies and, in the future, biomimetic micro air vehicles." (Authors)] Address: Lehmann, F.-O., BioFuture Research Group, University of Ulm, Albert-Einstein-Allee 11, 89081 Ulm, Germany. E-mail: fritz.lehmann@uni-ulm.de

**7533.** Van Gossum, H.; Robb, T.; Forbes, M.R.; Rasmussen, L. (2008): Female-limited polymorphism in a widespread damselfly: morph frequencies, male density, and phenotypic similarity of andromorphs to males. *Can. J. Zool.* 86(10): 1131-1138. (in English, with French summary) ["In several animal species, one male type coexists with two to several female types, a polymorphism often explained in the context of sexual selection. Where it occurs, one female morph typically resembles the conspecific male phenotype, but the degree of resemblance varies across species. Here, we question whether the degree of phenotypic similarity between male-like females and males varies within species. Phenotypic resemblance is hypothesized to depend on the potential for frequency- and density-dependent selection on male and (or) female phenotypes. We studied six populations of *Nehalennia irene* that differed widely in estimates of morph frequency and male density. Male-like females resemble males more than another female type resembles males, across populations, when comparisons are based on abdominal patterns. Abdomen phenotype does matter in male-female interactions of damselflies. Furthermore, male-like females were more similar to males at low and high density sites compared with sites with intermediate densities, contrary to the hypothesis that the potential for male harassment influences the degree of phenotypic similarity. Additionally, male-like females of most populations converged on the abdominal phenotype of males of one population rather than on that of syntopic males; a problem that has not received any attention." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, Univ. of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**7534.** van Gossum, H.; Beatty, C.D.; Tokota'a, M.; Sherratt, T.N. (2008): The Fijian Nesobasis: a further examination of species diversity and abundance (*Zygoptera: Coenagrionidae*). *Odonatologica* 37(3): 235-245. (in English) ["Recently, an overview of the diversity, abundance, distribution and morphological characteristics of species of the genus *Nesobasis*, endemic to Fiji, was presented for species occurring on the 2 largest islands of the archipelago: Viti Levu and Vanua Levu. Here, this

knowledge is extended by providing more extensive diversity and abundance data for the island of Vanua Levu, as well as for 4 smaller islands in Fiji: Taveuni, Koro, Ovalau and Kadavu. Previous research indicated that the *Nesobasis* species inhabiting Viti Levu and Vanua Levu are unique, with these islands having no species in common. The new data confirm this proposal and also show that smaller islands in proximity to these 2 larger islands usually contain a subset of the large island's *Nesobasis* fauna. The island of Koro, however, is unusual in that, while its *Nesobasis* species are predominantly those found on Vanua Levu, it also harbours *N. rufostigma*, a species occurring on Viti Levu. Further, *N. recava* is endemic to Kadavu and is not found on Viti Levu, the nearest large island. Species richness is higher on large than small islands while mean species abundances were consistently higher on large islands compared to small islands. The pattern of distribution and speciation in this genus is quite complex, and is the subject of ongoing research." (Authors)] Address: Gossium, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossium@ruca.ua.ac.be

**7535.** van Kleef, H.; van der Velde, G.; Leuven, R.S.E.W.; Esselink, H. (2008): Pumpkinseed sunfish (*Lepomis gibbosus*) invasions facilitated by introductions and nature management strongly reduce macroinvertebrate abundance in isolated water bodies. *Biol. Invasions* 10: 1481-1490. (in English) ["*L. gibbosus*, originates from Eastern North America and was introduced to the Netherlands in 1902 as an aquarium and garden pond fish. At present the pumpkinseed is widely spread throughout the Netherlands and occurs in a variety of aquatic habitats. It is especially abundant in moorland pools, fishing ponds and urban waters. Strong population development of the pumpkinseed appears to be facilitated by nature management practices in existing ponds (the removal of accumulated organic matter and macrophytes) and by creating new ponds. These measures enhance suitable breeding habitats that are free of competitors and predators. Isolated waters harbouring pumpkinseed were more often situated close to human habitation and infrastructure than could be expected based on the distribution of randomly selected isolated waters, identifying introductions as an important dispersal mechanism. In order to minimize the chances of introductions, planning of nature management practices should be done at distances over 250 m from human habitation and 100 m from infrastructure. Macroinvertebrate (including Odonata) abundance in pools populated by pumpkinseed was eighty three percent lower than in pools without pumpkinseed, probably due to opportunistic feeding and high pumpkinseed abundances. Currently there is little experience with pumpkinseed control. However, options to be explored include: decreasing depth of colonized waters by filling them with soil allowing them to occasionally dry up, introducing native competitors and predators and the use of biodegradable piscicides. In addition, limitation of the sale of pumpkinseed is required as well as public education on the consequences of introducing exotic species." (Authors)] Address: van der Velde, G., National Museum of Natural History, Naturalis, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: g.vandervelde@science.ru.nl

**7536.** van Tol, J. (2008): Notes on some species of the genus *Protosticta* from Vietnam (Odonata, Platystictidae). *Zool. Med. Leiden* 82(21): 217-234. (in English)

["Based on a study of various recent collections of *Protosticta* Selys from Vietnam, the dragonfly species *P. grandis* Asahina and *P. khaosoidaoensis* Asahina (sensu stricto) are reported from Vietnam for the first time. New records are provided for *P. satoi* Asahina (new status), and the affinities of *P. satoi* and *P. beaumonti* Wilson are discussed. The status of a very dark form of *Protosticta satoi* found in Tam Dao (northern Vietnam) is also discussed. Two species from Chu Yang Sin National Park (southern Vietnam, Dak Lak province) are described as new to science, viz. *P. caroli* spec. nov. and *P. linnaei* spec. nov." (Author)] Address: Tol, J. van, National Museum of Natural History, P.O. Box 9517, NL-2300 RA Leiden, The Netherlands

**7537.** Vasilenko, D.V. (2008): Insect ovipositions on aquatic plant leaves *Quereuxia* from the Upper Cretaceous of the Amur region. *Paleontological Journal* 42(5): 514-521. (in English) ["New form taxa of insect ovipositions on aquatic plant leaves *Quereuxia* from the Campanian locality of Udurchukan (Amur Region) are described. Endophytic ovipositions *Paleoovoidus flabelatus* sp. nov. and *P. arcuatus* sp. nov. do not differ in shape from ovipositions of recent damselflies. Exophytic ovipositions *Palaexovoidus ovoideus* gen. et sp. nov., *P. catenulatus* sp. nov., *P. multus* sp. nov., and *P. amplus* sp. nov. belong to insects that develop in the water, probably dragonflies of the suborder Anisoptera. A new family *Palaexovoididae* fam. nov. is erected." (Author) The original Russian text was published in *Paleontologicheskii Zhurnal*, 2008, No. 5, pp. 60–66.] Address: Vasilenko, D.V., Paleontological Institute, Russian Academy of Sciences, Profsoyuznaya ul. 123, Moscow, 117997, Russia. Email: lab@palaeoentomolog.ru

**7538.** Vercauteren, T.; Wouters, K. (2008): *Proasellus coxalis* sensu auctorum (Crustacea, Isopoda) in de bovenloop van de Raambeek te Heist-op-den-Berg: eerste vaststelling van deze zoetwaterpissebed in België. *Antenne* 2(4): 12-16. (in Dutch, with English and French summaries) [The freshwater isopod *Proasellus coxalis* sensu auct. has been discovered in a lowland brook, the Raambeek, at Heistopden-Berg in N.E.-Belgium in 2005. The species name *P. coxalis* sensu auct. is preferred since there is no decisive conclusion on the definition of the species (*P. coxalis* or *P. banyulensis*) and the different subspecies. The locality is situated in the upper reach of the lowland brook. At the site the brook has been transformed into a ditch. De water is very slow to stagnant, brownish, circumneutral (pH 7-7,5) and poor in oxygen ( $\pm 2,5$  mg O<sub>2</sub>/l). The bottom is covered with a thick layer of litter and silt. The water vegetation is, apart from floating conglomerates of filamentous algae, restricted to a few *Iris pseudacorus* and *Juncus effusus*. Other macro-invertebrates, besides *Asellus aquaticus* and *P. coxalis*, are: Gastropoda as *Physella acuta*, *Galba truncatula*, *Radix balthica* and Anisoptera vortex; larvae of *Cloeon dipterum* (Ephemeroptera), *Ischnura elegans* and *Aeshna mixta* (Odonata); Coleoptera as *Hydroporus palustris*, *Aclilius canaliculatus* and *A. sulcatus*, *Rhantus suturalis*; Heteroptera as *Nepa cinerea*, *Notonecta viridis* and *Sigara striata* and Diptera as *Chaoborus pallidus*, *Chironomus luridus* and *Psectrotanypus varius*.] Address: Vercauteren, T., Provinciaal Instituut voor Hygiëne, Kronenburgstraat 45, 2000 Antwerpen, Belgium. E-mail: thierry.vercauteren@pih.provant.be



- 7539.** Wan, Y.I.; Cong, Q.; Wang, X.-j.; Yan, Z. (2008): The wettability and mechanism of geometric non-smooth structure of dragonfly wing surface. *Journal of Bionic Engineering* 5 (Supplement 1): 40-45. (in English) ["Scanning electron microscope and optical contact angle measuring instruments were used to investigate the microstructure and wettability of geometric non-smooth structure of dragonfly wing surface. Results show that the geometric non-smooth structure of dragonfly wing surface is one part of epicuticle, some organic solvents can effectively dissolve the main ingredient of non-smooth structure. The hydrophobicity of dragonfly wing surface is induced by the co-coupling of the non-smooth structure and the waxy layer covering." (Authors)] Address: Cong, Q., Key Laboratory of Terrain-Machine Bionics Engineering (Ministry of Education, China), Jilin University, Changchun 130022, P. R. China. E-mail: congqian@jlu.edu.cn
- 7540.** Ware, J.L.; Ho, S.Y.; Kjer, K. (2008): Divergence dates of libelluloid dragonflies (Odonata: Anisoptera) estimated from rRNA using paired-site substitution models. *Molecular Phylogenetics and Evolution* 47: 426-432. (in English) ["Conclusions: The results of our analyses here, coupled with the general desirability of utilizing evolutionary models that are biologically realistic, suggest that it is very important to take stem pairing into account during analyses of rRNA data sets. The impact of using paired-sites substitution models on divergence time estimates is not easily predictable, particularly when explicit models of among-lineage rate heterogeneity are used in conjunction with partitioned analyses of complex data. Paired-sites models apparently do not lead to uniformly lower dating estimates, although it is necessary to investigate a wider range of data sets before further inferences can be made. Accordingly, it is prudent to assess the effects of model selection on resulting date estimates, as well as on the consequent ecological and biogeographic interpretations." (Authors)] Address: Ware, Jessica, Department of Entomology, Rutgers The State University of New Jersey, New Brunswick, NJ, USA
- 7541.** Waterkeyn, A.; Grillas, P.; Vanschoenwinkel, B.; Brendonck, L. (2008): Invertebrate community patterns in Mediterranean temporary wetlands along hydroperiod and salinity gradients. *Freshwater Biology* 53: 1808-1822. (in English) ["1. Temporary aquatic habitats often are inhabited by a unique fauna and flora and contribute significantly to regional diversity. Temporary wetlands around the world are disappearing rapidly. The individual and interacting impacts of factors influencing community structure and dynamics in temporary wetlands are not always well known. 2. Camargue wetlands are mainly characterized by variable salinity and hydroperiod. The individual and combined impacts of these local factors, together with regional variables, on invertebrate communities remain unknown. We therefore characterized and sampled invertebrates in 30 temporary wetlands along salinity and hydroperiod gradients in the Camargue (Southern France) 3, 5 and 7 months after inundation. 3. Over the three sampling occasions, a total of 17 cladoceran species and 49 macroinvertebrate taxa were identified. Hydroperiod and salinity were the most important variables explaining variation in taxonomic composition and can be considered key factors shaping the invertebrate communities in Camargue wetlands. The impact on taxon richness was significantly positive for hydroperiod but significantly negative for salinity. Regional factors had no significant effect on the structure of the studied invertebrate communities, suggesting that dispersal was not limiting and that species sorting was the most important structuring process. 4. The results of this study suggest that the combined and interacting effects of salinization and hydrological modification of Mediterranean temporary wetlands (due to water management, climate change, etc.) can result in reduced diversity in large numbers of Mediterranean wetlands and induce a considerable decline in regional diversity of aquatic invertebrates." (Authors) Odonata were identified to genus level.] Address: Waterkeyn, Aline, Laboratory of Aquatic Ecology and Evolutionary Biology, Katholieke Universiteit Leuven, Ch. Deberiotstraat 32, B-3000 Leuven, Belgium. E-mail: aline.waterkeyn@bio.kuleuven.be
- 7542.** Weitzel, M. (2008): Untersuchungen zur Libellenfauna des NSG „Mattheiser Wald" in Trier. *Dendrocoptes* 35: 75-79. (in German) [34 Odonata species were recorded between 2001 and 2007 near Trier, Rheinland-Pfalz, Germany.] Address: Weitzel, M., Graf-Reginard-Straße 43, 54294 Trier, Germany
- 7543.** Wellmann, H. (2008): Die fliegenden Diamanten. *tv14* 16: 18-21. (in German) [Popular account on dragonflies published in a German television guide.] Address: not stated
- 7544.** White, D. (2008): The territorial behaviour of the Keeled Skimmer *Orthetrum coerulescens* (Fabricius) at Holt Lowes, Norfolk. *J. Br. Dragonfly Society* 24(1): 1-13. (in English) ["A population of the dragonfly *Orthetrum coerulescens* (Fabricius) was observed at four wetland zones at Holt Lowes, Norfolk between 26 May and 1 8 September 2003. Territories occurred in discrete areas throughout the wetland zones of the site. The territories of 40 marked males were described and measured. Males averaged  $59.6 \pm 14.4$  flights per hour and the mean number of matings was  $1.1 \pm 1.1$  per hour with the males which held larger territories achieving more matings. It is suggested that this may be due to the arrangement and density of territories rather than size per se. The mean territory size was  $5.75 \pm 10.16\text{m}^2$  with, on average, almost 50 per cent of the territory over water. The mean height of the vegetation within each territory was 356mm (range 50 - 600mm). Males spent on average  $5.9 \pm 2.0$  min h<sup>-1</sup> in flight, or about 10 per cent of their time. Habitat quality is discussed in relation to competition and territory fidelity. A case is argued for the site north of the Northern Mire being the area of highest habitat quality; it was occupied first, it was tiarest to the approaching females and there was some evidence that competition was highest in this zone. It was also where the males showed the greatest territory fidelity. The relationship between territory holders and wandering males is discussed." (Author)] Address: White, D., Centre for Ecology, Evolution & Conservation, School of Biological Sciences, University of East Anglia, Norwich, NR4 7TJ, UK
- 7545.** Wik, A.; Lycken, J.; Dave, G. (2008): Sediment quality assessment of road runoff detention systems in Sweden and the potential contribution of tire wear. *Water Air Soil Pollut.* 194: 301-314. (in English) ["Sediments from 18 different road runoff detention systems, located on the Swedish West Coast, were assessed for their ecological hazard potential. Thirteen of the sites were detention ponds, three were manholes within the

same sedimentation construction, and two were detention basins handling wash water from road tunnels. Sediments from all sites were analysed for a range of physico-chemical parameters and contaminants, and screened for acute toxicity using *Hyalella azteca* (sediment), *Daphnia magna* (elutriate), and *Ceriodaphnia dubia* (elutriate) as the test organisms, and for chronic toxicity using *C. dubia* as the test organism. The benthic fauna (including "Odonata") of the thirteen detention ponds was also studied. Sediment quality guidelines probable effect levels were exceeded for one or several contaminants at half of the sites, and one third revealed toxicity in some of the bioassays. Most of the detention ponds were dominated by tolerant taxa indicating low biological quality. Relationships between contaminant concentrations, toxicity in bioassays, and benthic fauna were, however, found to be weak. Extractable organic Zn, which was used as a tire wear marker, correlated with Zn, Cu, presumably from brake linings, and W, a common component of tire studs. The highest concentration, which was found in the manholes (14 mg kg<sup>-1</sup> ds), corresponds to a tire wear concentration of 11 g kg<sup>-1</sup> ds. The results of the present study have shown that traffic related contaminants accumulate in the studied runoff treatment systems, and, therefore, the maintenance of them is crucial in order to prevent contamination of surrounding waters.] Address: Wik, Anna, Department of Plant- and Environmental Sciences, University of Gothenburg, Box 461, 405 30 Gothenburg, Sweden. E-mail: [anna.wik@dpes.gu.se](mailto:anna.wik@dpes.gu.se)

**7546.** Wildermuth, H. (2008): Habitat requirements of *Orthetrum coerulescens* and management of a secondary habitat in a highly man-modified landscape (Odonata: Libellulidae). *International Journal of Odonatology* 11(2): 261-276. (in English) ["Due to the destruction of its primary habitats, the West Palaearctic libellulid *Orthetrum coerulescens* has suffered much decline in central Europe. However, at the regional scale it has survived in a variety of secondary habitat, such as draining ditches. In order to find adequate measures for its conservation and promotion, habitat use and habitat recognition of *O. coerulescens* were investigated by description and experimentation at fenland ditches in a small nature reserve in the Swiss Plateau. This breeding habitat, which harbours a viable population, had been restored and maintained for 25 years. The most densely populated sites comprised small ditches between 40-70 cm wide, with rather sparse vegetation of narrow-leaved plants and that had parts of the water surface uncovered; the peaty, mud ground was partly overgrown with submerged pads of stonewort (*Chara* spp.). Water was mainly supplied by seepage springs with a mixture of local slow flow that were hardly recognizable and shallow sites, which were used for oviposition. In hot summer spells the water temperature could exceed 30°C. Some freezing occurred in winter, but the mud was permanently ice-free. The development of the breeding population, which comprised more than 200 individuals in 2006, was followed over two subsequent years. My data indicate that conservation and promotion of *O. coerulescens* populations in small ditches can be achieved by relatively simple habitat maintenance, such as a rotational strategy of clearing ditches, using of small weirs to prevent or protract desiccation and annual cutting of the surrounding litter meadows." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: [hansruedi@wildermuth.ch](mailto:hansruedi@wildermuth.ch)

**7547.** Wildermuth, H. (2008): Konstanz und Dynamik der Libellenfauna in der Drumlinlandschaft Zürcher Oberland. Rückblick auf 35 Jahre Monitoring. *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich* 153(3/4): 57-66. (in German, with English summary) ["In the «Drumlin Landscape Zurich Oberland» (47°19'N, 08°48'E), a nature reserve consisting of fragmented and disturbed bogs, fens and woodland with a variety of small water bodies, 51 dragonfly (Odonata) species had been recorded during ca. 1000 monitoring days from 1973 to 2007. Regular reproduction was found in 27 species, all the others reproduced sporadically or occurred as vagrants. *Nehalennia speciosa* became extinct, and three species have colonized the reserve permanently since 2005. Quantitative exuviae collections of the Anisoptera on six focus peat ponds during 24 years revealed strong spatial differences and temporal fluctuations of the annual population size of all species. These dynamics were considered in the mode of peat pond management that was especially aimed at *Leucorhinia pectoralis*. In the course of the monitoring period fruitful interactions between research and water management arose, resulting in successful conservation and promotion of the local dragonfly fauna. The indigenous populations can only be preserved and promoted by creating new water bodies and by sophisticated management of the extant waters. The results of this long-term study underline the importance of the moorland reserve as a biodiversity hotspot in a highly man-modified landscape." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: [hansruedi@wildermuth.ch](mailto:hansruedi@wildermuth.ch)

**7548.** Willkommen, J. (2008): The morphology of the pterothorax of Ephemeroptera, Odonata and Plecoptera (Insecta) and the homology of wing base sclerites and flight muscles. *Stuttgarter Beiträge zur Naturkunde A, Neue Serie* 1: 203-300. (in English, with German summary) ["The ability to fly was the decisive factor for the evolutionary success of the most diverse group of insects, the Pterygota. Nevertheless, the ground plan of the functionally important wing base has not been sufficiently clarified. The aim of this study is to homologise the wing base sclerites of Ephemeroptera, usually regarded as sister group of the remaining Pterygota, with that of other basal pterygote lineages and to reconstruct the ground plan of the wing base of Pterygota. The pterothoracic musculature of representatives of the three basal lineages of Pterygota (Ephemeroptera, Odonata and Neoptera) is also described and discussed. Contrary to previous hypotheses, it is shown that most elements of the neopteran wing base are also present in Ephemeroptera and Odonata. The wing base in the ground plan of Pterygota is presumably composed of three axillary sclerites. The proximal median plate is probably also present in the ground plan of Pterygota. The first axillary is provided with two muscles. The third axillary is equipped with a short muscle that originates from the epimeron. This muscle is interpreted as another ground plan character of Pterygota. In Plecoptera a second muscle inserts at the third axillary sclerite. It originates from the episternum and is most likely an autapomorphic character of Neoptera. The results imply that the wing base of the Plecoptera is close to the pterygote ground plan. It is assumed that the wing base of Ephemeroptera and Odonata is secondarily stiffened. The so-called basalare and its associated muscles in Ephemeroptera and Odonata are probably not homologous to the basalare and respective muscles in Neoptera.

The enlarged subalare and associated muscles, the large dorsal longitudinal muscle, the small metathorax and shortened hind wings in Ephemeroptera suggest that mayflies have a derived flight apparatus in many respects. The Odonata on the other hand show different specialisations, namely a synthorax, large direct flight musculature, and a fusion of second and third axillary with the proximal median plate. Though the wing base in both taxa is secondarily stiffened, the specialisations of Ephemeroptera and Odonata may have evolved independently from each other." (Author)] Address: Willkommen, Jana, Staatl. Museum für Naturkunde, Abt. Entomologie, Rosenstein 1, 70191 Stuttgart, Germany. E-mail: willkommen.smns@naturkundemuseum-bw.de

**7549.** Wilson, A.L.; Watts, R.J.; Stevens, M.M. (2008): Effects of different management regimes on aquatic macroinvertebrate diversity in Australian rice fields. *Ecological Research* 23(3): 565-572. (in English) ["The maintenance of invertebrate diversity within agricultural environments can enhance a number of agronomically important processes, such as nutrient cycling and biological pest control. However, few Australian studies have been undertaken which specifically address the effects of commercial management regimes on rice field biodiversity. In this study, we compared aquatic macroinvertebrate communities within Australian rice fields cultivated under three commercial management regimes: conventional-aerial (agrochemicals applied, aerially sown), conventional-drill (agrochemicals applied, directly drill-sown) and organic-drill (agrochemical-free, directly drill-sown). These comparisons were undertaken using a combination of community assessment approaches, including morphospecies richness, abundance, diversity and community composition. In general, greater biodiversity existed within macroinvertebrate communities that developed under organic management regimes than under conventional regimes (i.e., higher morphospecies richness and Shannon diversity). Although there were significant differences in several parameters across management regimes early in the rice-growing season, as the growing season progressed the invertebrate communities that developed in the different management regimes became more similar. Only community composition analyses showed significant differences late in the growing season, with functional differences across aquatic faunal assemblages suggested by increased predator abundance in communities sampled from the organic management regime. In order to improve biodiversity within these aquatic environments, management techniques need to be examined individually and the most disruptive processes identified. Alternative management procedures can then be developed that minimise biodiversity loss whilst still delivering required agronomic outcomes." (Authors) List of morphospecies includes Odonata.] Address: Wilson, A.L., Inst. Land, Water & Society, School of Environmental Sciences, Charles Sturt University, Locked Bag 588, Wagga Wagga, NSW 2678, Australia. E-mail: awilson@csu.edu.au

**7550.** Wilson, K.D.P.; Xu, Z. (2008): Aeshnidae of Guangdong and Hong Kong (China), with descriptions of three new *Planaeschna* species (Anisoptera). *Odonatologica* 37(4): 329-360. (in English) ["Taxonomic information is provided on the Chinese aeshnid fauna from Guangdong and Hong Kong, based on surveys completed from 1998 to 2005. *Planaeschna haui* sp. n. (holotype: male, Shimentai, Guangdong), *P. nanlingensis* sp. n. (holotype: male, Nanling, Guangdong) and *P. skiaperipola* sp. n. (holotype: male, Shimentai, Guangdong) are described. *Periaeschna rotunda* Wilson is synonymised with *Cephalaeschna klotsi* Asahina. *Petaliaeschna gerrhon* Wilson is combined with the genus *Periaeschna* Martin and the first female described. *Boyeria karube* Yokoi is newly recorded from China. Keys are provided for the determination of Oriental Brachytronini genera and identification of Chinese species of male *Cephalaeschna* Selys, *Periaeschna* Martin and *Petaliaeschna* Fraser. A total of 25 aeshnids are recorded from Guangdong, including 3 new species, and 3 new provincial records. 12 aeshnids are recorded from Hong Kong, including *Planaeschna skiaperipola* sp. n. (paratype: female, Wu Kau Tang, Hong Kong)." (Authors)] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: wilsonkd@ntlworld.com

**7551.** Wilżak, T.; Żurawlew, P. (2008): Przyroda. Powiatu Pleszewskiego. Pleszew: 82-84. (in Polish) [In a book referring to the fauna of the county Pleszew, Poland, 28 odonate species are listed. A few locality data concerning rarer species are added. 13 species are depicted.] Address: not stated

**7552.** Wootton, R.J.; Newman, D.J.S. (2008): Chapter 20. Evolution, diversification, and mechanics of dragonfly wings. In: *Dragonflies: Model Organisms for Ecological and Evolutionary Research*, ed. A. Córdoba-Aguilar. Oxford University Press: 261-290. (in English) ["This chapter shows how the patterns of evolution and diversification of odonatoids, and by implication those of other flight-active taxa can be illuminated by studying their flight mechanics. The relationships between flight capabilities and wing and body design are discussed; and the functional significance of familiar wing characters and character states are investigated and compared in a range of extant and extinct odonates, using simple physical models. Convergence in wing shape and in some other characters is shown to be widespread, reflecting similarities in flight behaviour and performance in different taxa throughout the long history of the Superorder. Anagenesis — evolutionary 'improvement' — is also widely recognizable. Three important areas for future research are identified: detailed comparative investigations of flight performance; comparative morphometric analysis of functionally interpretable wing and body characters; and detailed Finite Element modelling of selected wing characters, rather than superficial analyses of complete wings." (Publisher)] Address: Wootton, R.J., School of Biol. Sciences, Univ. of Exeter, Hatherly Laboratories, Prince of Wales Road, Exeter EX4 4PS, UK. E-mail: r.j.wootton@exeter.ac.uk

**7553.** Xu, Q.-H. (2008): Notes on the Chinese *Sarasaeschna*, with description of a new species from Fujian (Odonata, Aeshnidae). *Acta Zootaxonomica Sinica* 33 (3): 480-483. (in English, with Chinese summary) [Six species of the genus *Sarasaeschna* Karube & Yeh occurring in China are treated. *Sarasaeschna zhuae* sp. nov. is described and illustrated from a single male. A key to the Chinese species of the genus is provided.] Address: Xu, Qi-Han, Zhangzhou City University, Fujian 363000, China

**7554.** Xu, Qi-han; Liu Chang-ming (2008): Classification and new records of Fujian Corduliidae (Insecta: Odonata). *Journal of Fujian College of Forestry* 28(3): 237-239. (in Chinese, with English summary) [The paper treats 9 corduliid species in Fujian. *Macromia septima* is



recorded in China for the first time; *M. unca* and *M. flavocolorata* are newly to Fujian. *Macromidia hangzhouensis* Zhou et Wei is synonymised with *Macromidia kelloggi* Asahina.] Address: Xu Qi-han, Zhangzhou City University, Zhangzhou, Fujian 363000, China

**7555.** Yakubovich, V.S. (2008): To the fauna of dragonflies (Insecta, Odonata) of the lower Amur region. A.I. Kurentsov's Annual Memorial Meetings 19: 96-102. (in Russian, with English summary) [The list of Odonata from the lower Amur valley amounts to 53 species.] Address: Institute of Water and Ecological Problems FEB RAS, Khabarovsk

**7556.** Yu, X.; Bu, W. (2008): A study of the genus *Calicnemia* Stand in China, with the description of two new species (Zygoptera: Platycnemididae). *Odonatologica* 37(3): 247-255. (in English) ["*C. gulinensis* sp. n. (holotype male: Gulin, Sichuan, China, 2-VII-2001), *C. porcata* sp. n. (holotype male: Mt Emei, Sichuan, China, 4-VH-1957), are described and a brief synopsis of the Chinese spp. of the genus *Calicnemia* Strand, 1928 is presented." (Authors)] Address: Bu, W., Inst. of Entomology, College of Life Sciences, Nankai University, Tianjin, 300071 China. E-mail: wenjunbu@nankai.edu.cn

**7557.** Zhang, H.-j.; Yang, Z.d. (2008): *Calicnemia zhuae* spec. nov. from Shaanxi, China (Zygoptera: Platycnemididae). *Odonatologica* 37(4): 375-379. (in English) ["Both sexes of the new sp. are described and illustrated. Holotype male and allotype female: China, Shaanxi prov., Langao co., Mt Dubashan, alt. 1200 m, 28-VII-2006; both deposited with the Shaanxi Bioresource Key Laboratory, Hanzhong, China. The pattern of the head and synthorax are similar to *C. miles* (Laidl.), from which the new species differs in pattern of the top of the abdomen and in the structure of anal appendages and penile organ." (Authors)] Address: Zhang, H.-j., Shaanxi Bioresource Key Laboratory, Shaanxi University of Technology, Hanzhong-723000, Shaanxi, China. E-mail: hjzhang663@sohu.com

**7558.** Zoller, J. (2008): Das Naturschutzgebiet Altenrhein im Schweizerischen Rheindelta. *Schr. Ver. Gesch. Bodensee* Bd. 126: 231-248. (in German) [Switzerland; the paper includes a note on *Sympetrum depressiusculum*] Address: Zoller, J., AG Bodenseeufer e. V., Promenadenstrasse 53, CH-9400 Rorschach, Switzerland. E-mail: j.zoller@bluewin.ch

## 2009

**7559.** Brodin, T. (2009): Behavioral syndrome over the boundaries of life—carryovers from larvae to adult damselfly. *Behavioral Ecology* 20(1): 30-37. (in English) ["Activity is an important behavioral trait that mediates a trade-off between obtaining food for growth and avoiding predation. Active individuals usually experience a higher encounter rate with food items and suffer higher predation pressure than less active individuals. I investigated how activity of the damselfly *Lestes* congener is affected by larval state and predator presence and if larval behavioral type (BT) can be used to predict larval boldness, foraging success, and adult BT. Activity level of individual larvae was studied without predator at 2 different physiological states (hungry and fed) and in 2 predator treatments: familiar predator cues and unfamiliar predator cues. Larvae did not adjust their activity

depending on state or when subjected to unfamiliar predator cues, but a general reduction in activity was seen in the familiar predator treatment. Hence, active individuals remained active compared with their conspecifics, independent of state or predator treatment. Active individuals were also bolder and more efficient foragers than their less active conspecifics. Furthermore, both adult activity and boldness were correlated with larval BT. The results illustrate that BT of a larvae is carried over many different situations keeping active larvae active even in maladaptive situations, demonstrating how a behavioral syndrome may constrain behavioral plasticity. Furthermore, results showed that behavioral syndromes can carry over from larvae through metamorphosis and dictate the BT of the adult." (Author)] Address: Brodin, T., Dept Ecol. and Environ. Science, Umeå Univ. S-90187 Umeå, Sweden. E-mail: tomas.brodin@emg.umu.se

**7560.** Brooks, S.J. (2009): Aren't dragonflies great study organisms? *Trends in Ecology and Evolution* 24(1): 6-7. (in English) [Book review of: *Dragonflies & Damselflies: Model Organisms for Ecological and Evolutionary Research* edited by Alex Córdoba-Aguilar, Oxford University Press, 2008, US \$130 (288 pages) ISBN 978-0-199-23069-3] Address: Brooks, S.J., Entomology, The Natural History Museum, Cromwell Road, London, SW7 5BD, United Kingdom

**7561.** Chang, X.; Zhai, B.; Wang, B.; Sun, C. (2009): Effects of the mixture of avermectin and imidacloprid on mortality and developmental stability of *Coperana annulata* (Odonata: Zygoptera) larvae. *Biological Journal of the Linnean Society* 96(1): 44-50. (in English) ["The present study explored the effects of mixture of avermectin and imidacloprid on the level of fluctuating asymmetry (FA) and mortality of *Coperana annulata* larvae. The results showed that the mortality of larval damselflies treated with different concentrations of insecticide did not differ significantly. However, we found that the levels of FA of two traits were significantly different with different treatments but the others did not show any differences. Explicitly, FA of two traits increased with increasing pesticide concentration. There was a significantly negative relationship between first femur length and the absolute difference between its right and left sides. There was no relationship with respect to the absolute difference between the right and left sides of all traits and their body size. FA was not associated with mortality. Our results emphasized that insecticide had potential effects on bilaterally symmetrical traits of damselfly larvae, although they were no longer treated with insecticide during the last rearing." (Authors)] Address: not accessible.

**7562.** Fraker, M.E. (2009): The effect of prior experience on a prey's current perceived risk. *Oecologia* 158(4): 765-774. (in English) ["The prior experience of prey may influence how they assess the level of predation risk associated with an information source. Here, I present the results from a set of experiments that demonstrate how the prior experience of green frog (*Rana clamitans*) tadpoles can influence their risk assessment during exposure to the chemical cue of predatory larval dragonflies (*Anax* spp.) consuming conspecific tadpoles. At the short-term scale, green frog tadpoles perceived a higher level of risk when consecutive cue exposures overlapped, but only when the total chemical cue concentration was weak. Weaker chemical cue concen-

trations may be less reliable than stronger cue concentrations, and overlapping cue exposures may increase the degree of certainty that tadpoles have in their perceived risk. When consecutive cue exposures did not overlap, tadpoles assessed the risk associated with each cue exposure independently. Predator-conditioned tadpoles responded longer during exposure to the *Anax* chemical cue than nonconditioned tadpoles, which suggests that a tadpole's long-term experience eventually does influence its risk assessment. In general, the results suggest that a prey's prior experience may influence its current perceived risk by influencing either the degree of certainty in or the level of its perceived risk. Understanding how the prior experience of prey influences their current risk assessment requires that the rate of decay of the value of prior experience should be identified at two timescales as an indicator of the current level of predation risk." (Author)] Address: Fraker, M.E., Dept of Ecology and Evolutionary Biology, University of Michigan, 830 North University, Ann Arbor, MI 48109-1048, USA. E-mail: mfraker@umich.edu

**7563.** Ghahari, H.; Tabari, M.; Sakenin, H.; Ostovan, H.; Imani, S. (2009): Odonata (Insecta) from Northern Iran, with comments on their presence in rice fields. *Munis Entomology & Zoology* 4(1): 148-154. (in English) [During 2003 and 2006, in rice fields and additional sites located in northern Iran (Mazandaran Province) 30 Odonata species were collected. ] Address: Ghahari, H., Department of Entomology; College of Agriculture, Islamic Azad University, Science and Research Branch, P.O.Box 14515/775; Poonak; HesarakTehran; Iran. E-mail: hghahhari@yahoo.com

**7564.** Hassall, C.; Thompson, D.J.; Harvey, I.F. (2009): The impact of climate-induced distributional changes on the validity of biological water quality metrics. *Environmental Monitoring and Assessment*: (in English) ["We present data on the distributional changes within an order of macroinvertebrates used in biological water quality monitoring. The British Odonata (dragonflies and damselflies) have been shown to be expanding their range northwards and this could potentially affect the use of water quality metrics. The results show that the families of Odonata that are used in monitoring are shifting their ranges poleward and that species richness is increasing through time at most UK latitudes. These past distributional shifts have had negligible effects on water quality indicators. However, variation in Odonata species richness (particularly in species-poor regions) has a significant effect on water quality metrics. We conclude with a brief review of current and predicted responses of aquatic macroinvertebrates to environmental warming and maintain that caution is warranted in the use of such dynamic biological indicators." (Authors)] Address: Hassall, C., School of Biol. Sciences, Biosciences Building, Univ. of Liverpool, Crown Str., Liverpool, L69 7ZB, UK. E-mail: c.hassall@liv.ac.uk

**7565.** Kaliszewicz, A.; Uchmański, J. (2009): Damage released prey alarm substances or predator odours? Risk assessment by an aquatic oligochaete. *Hydrobiologia* 618(1): 57-64. (in English) ["Although the abilities of prey to detect and respond to chemical substances associated with a predator have been widely reported, the factors promoting the evolution of responses to prey alarm cues vs. predator odours are still vague. In this article, we combined field research with laboratory experiments to explore which chemical substance asso-

ciated with predator activity (predator odour, conspecific or heterospecific alarm substances) induces defence responses in the aquatic oligochaete *Stylaria lacustris*, which is vulnerable to common littoral predators. The field results indicated that predators injure the oligochaetes and a great proportion, up to 45% of individuals in the population, were found to be damaged. The results of the laboratory experiments revealed that chemical odours from damselfly larvae feeding on *S. lacustris* did not induce the defence response in the oligochaetes. On the contrary, oligochaetes detected and responded to alarm substances from damaged conspecifics alone and substances from damaged cladoceran *Daphnia magna*. We discussed conditions favouring the responses to damage released prey alarm cues instead of predator odours in *Stylaria lacustris*. Our data suggest that the selection of responses to alarm cues from damaged prey vs. predator odours may be dependent on three factors: (1) non-species-specific predation, (2) divergence of food niche of the different stages of the predator and (3) complex food web with multiple predators." (Authors)] Address: Kaliszewicz, Anita, Centre for Ecol. Research, Polish Academy of Sciences, 05-092 Lomianki, Poland. E-mail: a.kaliszewicz@cbe-pan.pl

**7566.** Leunda, P.M.; Oscoz, J.; Miranda, R.; Arino, A.H. (2009): Longitudinal and seasonal variation of the benthic macroinvertebrate community and biotic indices in an undisturbed Pyrenean river. *Ecological Indicators* 9: 52-63. (in English) ["The present work aims to analyze the spatio-temporal variability in benthic macroinvertebrate assemblages and biotic indices in an undisturbed and unpolluted Pyrenean river. Samples were collected seasonally over 2 year-cycles (2001–2002) at fifteen sampling sites along the Erro River (Ebro River Basin, Spain) during a exhaustive biomonitoring program following the IBMWP–IASPT scoring system protocol routinely applied in Iberia. Despite absolute values of the biotic indices showed high spatio-temporal variation, the IBMWP–IASPT scoring system proved useful because water quality classes were consistent throughout seasons and years as well as along-river. The original macroinvertebrate families' presence/absence data matrix was reduced in a number of ways to conduct different statistical procedures in order to detect and separate the underlying near-natural spatial and temporal gradients of the assemblage composition in the Erro River. Along-river, spatial variation of the macroinvertebrate community composition was well assessed by similarity analysis, which clearly detected physical features on the river (drought-affected reach, gorge, towns and flow gauging weirs). Categorical principal component analysis (CATPCA) synthesized and jointly ordered macroinvertebrate samples in a spatio-temporal gradient in the factorial map defined by the first two principal components providing a parsimonious way to assess the assemblages' variation. These two variation gradients throughout the macroinvertebrate families' occurrence data were subsequently confirmed separately by several correspondence analyses and revealed additional information, as the representative families for each sampling site group and season could be identified. Furthermore, these spatio-temporal gradients were discussed and put in relation with changes in the aquatic habitat (water temperature, conductivity, total dissolved solids, water velocity, channel width, canopy cover, etc.). The near-natural functioning of the Erro River promoted us to emphasize that conservation efforts should aim to maintain the free-flowing as a permanent source

of variability." (Authors) Odonata are treated on the family level.] Address: Leunda, P.M.; Dept Zool. & Ecol., Univ. of Navarra, PO Box 177, E-31080, Pamplona/Iruña, Navarra, Spain. E-mail: pedro.leunda@gavrn.com

**7567.** Lorion, C.M.; Kennedy, B.P. (2009): Relationships between deforestation, riparian forest buffers and benthic macroinvertebrates in neotropical headwater streams. *Freshwater Biology* 54(1): 165-180. (in English) ["1. Few studies have evaluated the effectiveness of riparian buffers in the tropics, despite their potential to reduce the impacts of deforestation on stream communities. We examined macroinvertebrate assemblages and stream habitat characteristics in small lowland streams in southeastern Costa Rica to assess the impacts of deforestation on benthic communities and the influence of riparian forest buffers on these effects. Three different stream reach types were compared in the study: (i) forested reference reaches, (ii) stream reaches adjacent to pasture with a riparian forest buffer at least 15 m in width on both banks and (iii) stream reaches adjacent to pasture without a riparian forest buffer. 2. Comparisons between forest and pasture reaches suggest that deforestation, even at a very local scale, can alter the taxonomic composition of benthic macroinvertebrate assemblages, reduce macroinvertebrate diversity and eliminate the most sensitive taxa. The presence of a riparian forest buffer appeared to significantly reduce the effects of deforestation on benthic communities, as macroinvertebrate diversity and assemblage structure in forest buffer reaches were generally very similar to those in forested reference reaches. One forest buffer reach was clearly an exception to this pattern, despite the presence of a wide riparian buffer. 3. The taxonomic structure of macroinvertebrate assemblages differed between pool and riffle habitats, but contrasts among the three reach types in our study were consistent across the two habitats. Differences among reach types also persisted across three sampling periods during our 15-month study. 4. Among the environmental variables we measured, only stream water temperature varied significantly among reach types, but trends in periphyton abundance and stream sedimentation may have contributed to observed differences in macroinvertebrate assemblage structure. 5. Forest cover was high in all of our study catchments, and more research is needed to determine whether riparian forest buffers will sustain similar functions in more extensively deforested landscapes. Nevertheless, our results provide support for Costa Rican regulations protecting riparian forests and suggest that proper riparian management could significantly reduce the impacts of deforestation on benthic communities in tropical streams." (Authors) Ephemeroptera and Diptera were much less important in terms of total insect biomass, while Odonata and Coleoptera were more prominent, particularly in riffle habitats in the forest reaches.] Address: Lorion, C., Oregon Department of Fish and Wildlife, Corvallis Research Lab, 28655 Hwy 34, Corvallis, OR 97333, USA. E-mail: chrislorion@vandals.uidaho.edu

**7568.** Luttbeg, B.; Hammond, J.I.; Sih, A. (2009): Dragonfly larvae and tadpole frog space use games in varied light conditions. *Behavioral Ecology* 20(1): 13-21. (in English) ["Predators and prey often engage in a game where predators attempt to be in areas with higher prey densities and prey attempt to be in areas with lower predator densities. A few models have predicted the resulting distributions of predators and prey, but litt-

le empirical data exist to test these predictions and to examine how abiotic and biotic factors shape the distributions. Thus, we observed how *Anax* dragonfly nymphs and Pacific tree frog tadpoles (*Pseudacris regilla*) either together or separately distributed themselves in an arena with a high- and a low-prey resource patch. Trials were conducted in high- and low-light conditions to manipulate predation risk and to view the effects of this abiotic factor. Counter to the model predictions, we found that predators were not more abundant in high-resource (HR) patches, and they thus did not force prey toward being uniformly distributed. Using a model selection approach to assess what factors affected predator and prey patch-switching movement, we found that prey more often left patches that had more predators present, but predators surprisingly more often left patches with more prey present. Light levels did not affect predation risk; however, in the dark with the associated reduction in visual information predators preferred HR patches. This caused a lower coincidence of prey and predators in patches. Predators also switched patches less often when they occupied the same patch as the other predator. This suggests that predator distributions, and indirectly prey distributions, are affected by the risk of intraguild predation." (Authors)] Address: Luttbeg, B., Dept of Zoology, 430 Life Sciences West, Oklahoma State University, Stillwater, OK 74078, USA. E-mail: luttbeg@okstate.edu.

**7569.** Samways, M.J. (2009): Book review: Rosser W. Garrison, Natalia von Ellenrieder and Jerry A. Louton, *Dragonfly Genera of the New World: An Illustrated and Annotated Key to the Anisoptera* The John Hopkins University Press, Baltimore MS, USA, 2006, Hardback, US\$99.00, ISBN: 0-8018-8446-2, 368 pp.. *Journal of Insect Conservation* 13(1): 137-138. (in English) [Book review related to OAS 5914] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**7570.** Sharma, R.C.; Rawat, J.S. (2009): Monitoring of aquatic macroinvertebrates as bioindicator for assessing the health of wetlands: A case study in the Central Himalayas, India. *Ecological Indicators* 9: 118-128. (in English) ["The present contribution encompasses the first case study on the aquatic macroinvertebrates as bioindicators for assessing the health of Asan wetland (area 3.2 km<sup>2</sup>), located in the foothills of Central Himalayas, India. Monthly sampling from all the sampling sites in five replicates was made for a period of 12 months (July 2002–June 2003) at 9:00–11:00 h. A total of 32 species of macroinvertebrates were found with the Ephemeroptera and Gastropoda being the most abundant component of invertebrates communities. The Shannon–Wiener diversity index calculated for macroinvertebrates ranged from 3.50 to 4.61. Seasonal fluctuations in the density of macroinvertebrates revealed maximum density (451–503 ind m<sup>2</sup>) during winter and minimum (126–143 indm<sup>2</sup>) during monsoon season. The density of macroinvertebrates was influenced by the anthropogenic disturbances and water level fluctuations causing disturbance in the littoral zone of the wetland. The statistical relationships between turbidity, transparency, dissolved oxygen and water temperature and macroinvertebrates of Asan wetland were also computed for assessing the impact of anthropogenic disturbances on macroinvertebrates." (Authors) The monthly density of larvae/m<sup>2</sup> for the following species is documented: *Enal-*



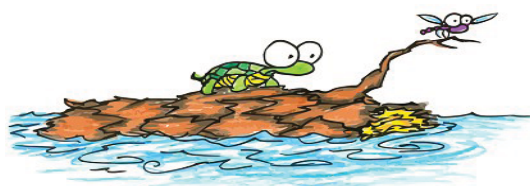
lagma parvum, Onychogomphus duaricus, Crocothemis s. servilia, and Ceriagrion cerinorubellum.] Address: Ramesh, C., Dept of Environmental Sciences, H.N.B. Garhwal University, Post Box 67, Srinagar-Garhwal 246174, Uttarakhand, India. E-mail address: drramesh-csharma@yahoo.com

**7571.** Tollett, V.D.; Benvenuti, E.L.; Deer, L.A.; Rice, T.M. (2009): Differential toxicity to Cd, Pb, and Cu in dragonfly larvae (Insecta: Odonata). Archives of Environmental Contamination and Toxicology 56(1): 77-84. (in English) ["Odonate larvae are important organisms in aquatic ecosystems but have been rarely studied in laboratory toxicity tests. Only a few previous studies have been conducted on odonates and their responses to heavy metals. We exposed two species of libellulid larvae (Pachydiplax longipennis, Erythemis simplicicollis) to equimolar concentrations of cadmium, lead, or copper in 7-day survival tests. Larvae were tolerant of high concentrations of cadmium and lead, as no significant decrease in survival was observed at exposures as high as 0.893 and 2.232 mM, respectively. In contrast, larvae were more sensitive to copper exposure, demonstrating significantly decreased survival to exposures as low as 2.360 µM. In whole animal samples, larvae accumulated very high concentrations (>1000 µg/g dry weight) of all three metals in an exposure-related manner. Much of this accumulation could probably be attributed to adsorption or accumulation of metal within the exoskeleton, because odonate larvae are known to sequester metals into this material. Our results were generally consistent with previous observations indicating that odonates are tolerant to metal exposures, even in comparison with other aquatic invertebrates. However, there are few studies that have used odonates in toxicity tests and compared these organisms to other aquatic life. Based on their abundance and their simple requirements in the laboratory, we believe that odonate larvae can be useful toxicological model organisms." (Authors)] Address: Rice, T.M., Department of Biological Sciences, University of South Alabama, Mobile, AL 36688, USA. Email: trice@jaguar1.usouthal.edu

**7572.** Whiteman, N.K.; Sites, R.W. (2009): Aquatic insects as umbrella species for ecosystem protection in Death Valley National Park. J. Insect Conserv. 12(5): 499-509. (in English) ["Under the United States Endangered Species Act (ESA), critical habitat for listed species is also protected. Many aquatic insects protected under the ESA are habitat-restricted, mainly to springs. Some of these species do not co-occur with ostensibly more charismatic vertebrates, and have the potential to act as umbrella species for aquatic ecosystems. We suggest that the flightless creeping water bug Ambrysus funebris La Rivers (Insecta: Heteroptera: Naucoridae) has the potential to be such a species. Endemic to a spring system in Death Valley National Park, it co-occurs with eight other endemic aquatic invertebrate species, but with no vertebrates. Therefore, its protection would facilitate protection of this desert oasis. [...]."] (Authors) Aquatic or semiaquatic insect species currently protected or proposed as candidates for protection under the US Endangered Species Act are compiled in a list; this includes seven Odonata species.] Address: Whiteman, N.K., Department of Organismic and Evolutionary Biology, Museum of Comparative Zoology, Harvard University, 26 Oxford Street, Cambridge, MA 02138, USA. E-mail: nwhiteman@oeb.harvard.edu

**7573.** Yamanaka, T.; Tanaka, K.; Hamasaki, K.; Nakatani, Y.; Iwasaki, N.; Sprague, D.S.; Bjørnstad, O.N. (2009): Evaluating the relative importance of patch quality and connectivity in a damselfly metapopulation from a one-season survey. Oikos 118(1): 67-76. (in English) ["The area-and-isolation paradigm, which has been the primary focus of metapopulation research, may not hold in some animal metapopulations if within-patch preference is more important than patch area or connectivity. Recently, regression analyses have been used to evaluate the effect of patch connectivity and various patch qualities including area. However, their relative importance is not easy to determine, because patch qualities and connectivity are often spatially autocorrelated. In this paper, we try to evaluate the relative importance of within-patch quality, patch connectivity and spatial autocorrelation using variation partitioning methods from community ecology. We constructed three regression models: within-patch quality, PCNM (principal coordinates of neighbor matrices) and patch connectivity based on a one-season survey of a damselfly Copera annulata metapopulation. The contribution of within-patch quality was larger than that of connectivity. There was no prominent effect of patch area. We conclude that the area-and-isolation paradigm is not applicable to this C. annulata metapopulation. The spatial autocorrelation extracted by PCNM had the largest contribution; it contained almost all of the variation of connectivity and overlapped with variation explained by within-patch quality. Connectivity corresponded most closely to medium-scale spatial structure captured by PCNM (ca 640 m). The mean effective dispersal scale was estimated to be 53 m. Within-patch quality, debris accumulation and vegetation cover in the pond corresponded with the medium and small (ca 201m) spatial scales from PCNM, though we could not clearly explain the cause of this correspondence. We believe that our method will contribute to quick and effective evaluation of spatial and non-spatial aspects of metapopulation." (Authors)] Address: Yamanaka, Takehiko, Biodiversity Division, National Inst. for Agro-Environmental Sciences, 3-1-3 Kannondai, Tsukuba, JP-305-8604 Ibaraki, Japan. E-mail: apple@affrc.go.jp

**Thanks to all who contributed to this issue of OAS!!!**



<http://bluebison.net/sketchbook/2008/0308/turtle-and-dragonfly.png>

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Silberdistelweg 11, D-72113 Ammerbuch, Germany. Tel. ++49 (0)7073 300770; E-mail: martin@lindeboom.de  
Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105;  
E-mail: K.Reinhardt@sheffield.ac.uk  
Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

---

## 1997

**7574.** He, J.-r.; Jiang B.-h.; Chen, T.-s. (1997): The aquatic insects of Rainbow Lake. *Conservation Quarterly*, summer quarterly, June, 1997, 18: 37-41. (in Chinese) [Rainbow Lake is an alpine Lake in Taiwan. The paper provides brief information on *Aeshna petalura* and *Polycanthagyna erythromelas*. (Abstract by Haomiao Zhang)]

**7575.** Liebherr, J.K.; Polhemus, D.A. (1997): R.C.L. Perkins: 100 years of Hawaiian entomology. *Pacif. Sci.* 51(4): 343-355, 1 pl. (in English) ["R. C. L. Perkins comprehensively surveyed the insect fauna of the Hawaiian Islands one century ago, initially as the collector for the Fauna Hawaiiensis survey project and subsequently as an entomologist with the Hawaiian Sugar Planters' Association. The Hawai'i he observed was in a period of rapid transformation. Thus, he has the unique distinction of being the first and last person to record the habits of many native Hawaiian species. The islands on which he collected were already heavily impacted by exotic herbivores-including goats, cattle, sheep, and pigs-yet he was able to sample remnant pockets of native vegetation that are now lost in a jungle of exotic introductions. His broad understanding of insect natural history allowed him to document ably the habits of insect groups that we are only beginning to understand 100 yr later. Moreover, his collections and extensive taxonomic contributions afford us a firm foundation for future taxonomic and evolutionary studies of the uniquely rich and highly endemic Hawaiian insect biota." (Authors) The Odonata of Hawaii were revised of Perkins (1899) and (1910)] Address: Polhemus, D., Dept. Entomology, MRC 105, Smithsonian Institution, Washington, D.C. 20560, USA. Email: bugman@bpbm.org

**7576.** Valenti, M.A.; Ferrell, G.T.; Berryman, A.A. (1997): Insects and related arthropods associated with greenleaf manzanita in montane chaparral communities of northeastern California. *Gen. Tech. Rep. PSW-GTR-167*. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Dept. Agriculture: 26 pp. (in English) ["Specimens representing 19 orders and 169 arthropod families (mostly insects) were collected from greenleaf manzanita brushfields in northeastern California and identified to species whenever possible. More

than 500 taxa below the family level were inventoried, and each listing includes relative frequency of encounter, life stages collected, and dominant role in the greenleaf manzanita community. Specific host relationships are included for some predators and parasitoids. Herbivores, predators, and parasitoids comprised the majority (80 percent) of identified insects and related taxa." (Authors) The list of Odonata includes the following taxa: *Aeshna palmata*, *Anax junius*, *Cordulegaster dorsalis*, *Libellula* sp., *Pantala hymenea*, *Tarnetrum corruptum*, *Lestidae* species undet., and *Coenagrionidae* species undet.] Address: <http://www.fs.fed.us/psw/publications/documents/pswgtr167/pswgtr167.pdf>

**7577.** Yeh, W.-c. (1997): The Lindeninae dragonflies of Taiwan. *Conservation Quarterly*, summer quarterly, June, 1997, 18: 32-36. (in Chinese) [Four species in three geni of Lindeninae are known from Taiwan, including *Ictinogomphus pertinax*, *Sinictinogomphus clavatus*, *Gomphidia confluens*, and *Gomphidia kruegeri fukienensis*. They can be distinguished by their large size, venation and structure of caudal appendages. The structural features, distribution, habitat, behaviour and flight period of each species are described. A key to the larvae is also provided. (Translation of the original Chinese summary thanks to Haomiao Zhang)] Address: Yeh, Wen-Chi, Division of Forest Protection, Taiwan Forestry Research Institute, 53 Nanhai Road, Taipei 100, Taiwan. E-mail: wcyeh@tfri.gov.tw

## 1998

**7578.** Bennett, B.L. (1998): Land use influences on benthic invertebrate assemblages in southern Appalachian agricultural streams. MSc Thesis, Dept Biology, Faculty of the Virginia Polytechnic Institute and State University Blacksburg: VIII, 98 pp. (in English) ["I investigated the role of land use in structuring benthic invertebrate assemblages in agricultural streams in the French Broad River drainage in western North Carolina. I sampled six agricultural streams (3 with cleared headwaters and 3 with forested headwaters) at three points along a gradient (headwaters, a midpoint, and a downstream site). At each site, I measured a variety of physico-chemical parameters, including temperature, chlorophyll a, discharge, nutrients, and suspended solids.

Invertebrates were sampled at all sites in October 1996 and April 1997. Riparian vegetation was assessed for each site at multiple spatial scales using GIS data from the 1950s, 1970s, and 1990s. Forested agricultural (FA) streams had more riparian vegetation than cleared agricultural (CA) streams in both the 1950s and the 1970s. Cleared agricultural streams had less organic matter, more primary production, higher nitrates, and warmer temperatures than FA streams. Total and EPT taxa richness was greater in FA streams. Pollution-sensitive Plecoptera were relatively more abundant in FA streams, while tolerant Diptera were more abundant in CA streams. High diversity and Plecoptera abundance was related to high habitat quality, more riparian vegetation, low nitrates, and low summer temperatures. Higher invertebrate diversity was related to the land use 25-50 years as well as the current land use (forested, moderate agriculture, or heavy cattle impact). These results indicate a long-term legacy of agricultural influences on stream invertebrate assemblages." *Boyeria grafiana*, *B. vinosa*, *Gomphus lividia*, *Lanthus parvulus*, and *Ophiogomphus mainensis* are listed.] Address: Bennett, Barbara Loraine, Dept Biology, Virginia Polytechnic Institute and State University Blacksburg, VA 24061-0406, USA

#### 1999

**7579.** Riaz, H.; Riaz, M. (1999): The naiads of *Acisoma panorpoides panorpoides* and *Brachythemis contaminata* [Libellulidae: Odonata]. *Int. J. Agriculture & Biology* 1(3): 147-148. (in English) [Description of the two taxa and documentation of localities the specimens were sampled.] Address: Riaz H., Pest Warning and Quality Control of Pesticides, Pakpattan, Pakistan. E-mail: riazhussain37@hotmail.com

**7580.** Riaz, H.; Riaz, M. (1999): Description of last instar naiads of *Rhyothemis variegata variegata* Linnaeus and *Pantala flavescens* (Fabricius) (Anisoptera: Odonata). *Int. Jour. Agriculture & Biology* 1(3): 145-146. (in English) [The larvae of *R. variegata* and *P. flavescens* collected from various localities of the Sindh Province, Pakistan are described and illustrated.] Address: Riaz, H., Pest Warning and Quality Control of Pesticides, Pakpattan, Pakistan. E-mail: riazhussain37@hotmail.com

**7581.** Wust, E.; Alge, R. (1999): Libellen und wirbellose Wassertiere des Naturschutzgebietes Gsieg-Obere Mahder, Lustenau (Vorarlberg). *Vorarlberg. Naturschau* 6: 111-120. (in German) [A commented list of 35 odonate species from a Nature Reserve near Lustenau, Vorarlberg, E Austria. The list includes *Sympecma paeidisca*, a species protected by the European law.] Address: Wust, E., Elserweg 3a, A-6714 Niiziders, Austria

#### 2000

**7582.** Chae, J.-S.; Pusterla, N.; Johnson, E.; Derock, E.; Lawler, S.P.; Madigan, J.E. (2000): Infection of aquatic insects with nematode metacercariae carrying *Ehrlichia risticii*, the cause of Potomac Horse Fever. *J. Med. Entomol.* 37(4): 619-625. (in English) ["We provide evidence of *Ehrlichia risticii* Holland, the agent of Potomac horse fever, in trematode stages found in

aquatic insects collected from a pasture stream in northern California, using nested polymerase chain reaction (PCR) amplification and sequence analyses of the 16S rRNA, 51 kDa major antigen and groEL heat shock protein genes. *E. risticii* was detected in metacercariae found in the immatures and adults of the following insects: Trichoptera, Ephemeroptera, Odonata (Zygoptera and Anisoptera), and Plecoptera. The prevalence of *E. risticii* was 31.9% (n 5 454 individuals) in aquatic insects (13 of 17 species were positive). Prevalence within orders was as follows: 43.5% (n 5 207) in caddisflies, 15.2% (n592) in mayflies, 13.9% (n5115) in damselflies, 10.0% (n510) in dragonflies, and 80.0% (n 5 30) in stoneflies. This study demonstrates a broad intermediate host range for trematodes that act as vector for *E. risticii*. Insects are likely to play an important role in the epidemiology of this disease." (Authors)] Address: Chae, J.-S., College of Veterinary Medicine, Chonbuk National University, Chonju, Chonbuk 561-756, Korea

**7583.** Triapitsyn, S.V.; Beardsley, J.W. (2000): A review of the Hawaiian species of *Anagrus* (Hymenoptera: Mymaridae). *Proc. Hawaiian Entomol. Soc.* 34: 23-48. (in English) ["A brief historical account of the use of *Anagrus* Haliday (Hymenoptera: Mymaridae) in biological control in the Hawaiian Islands is given. Twelve species of *Anagrus*, ten of them named, are keyed and descriptive notes are provided. [...] Two of the named *Anagrus* species, *A. insularis* Dozier and *A. oahuensis* n. sp., are not known outside the Hawaiian Islands. The former species has been reared from eggs of Odonata and the host is an endemic Megalagrion species (Coenagrionidae). This species of *Anagrus* may be endemic to the Hawaiian Islands although it is morphologically close to the European species *Anagrus brocheri* Schulz. Possibly a complex of *Anagrus* species is associated with the eggs of Megalagrion, but additional research is needed to demonstrate this." (Authors)] Address: Triapitsyn, S.V., Department of Entomology, University of California, Riverside, California 92521, USA

#### 2001

**7584.** Alvarez, M.; Pardo, I.; Moya, G.; Ramon, G.; Martinez-Taberner, A. (2001): Invertebrate communities in Temporary streams of the island of Majorca: a comparison of catchments with different land use. *Limnetica* 20(2): 255-266. (in English, with Spanish summary) ["This study compares the invertebrate communities in two catchments in the Mediterranean island of Majorca, Spain. The Soller catchment is highly urbanised, with areas of intensive agriculture. The catchment of stream Sant Jordi is covered in a large part by a mature forest of Mediterranean Quercus. Upper and middle reaches of the latter were chosen as reference sites of well-preserved environmental conditions. Diptera was the richest taxon in both catchments, followed by Coleoptera and Trichoptera in the Sant Jordi catchment, and by Mollusca in Soller. Overall, invertebrate species richness was similar in the two catchments. Species composition and representation differed and Crustacea were proportionally more abundant in the Sant Jordi catchment sites than in Solier. In the latter catchment, Diptera (mainly Chironomidae) and Oligochaeta were more abundant than in the Sant Jordi catchment. Main factors influencing community structure in both catchments were identified, i.e. allochthonous organic inputs



from riparian vegetation and land use effects on this, local wastewater discharge, length of the dry period, saltwater intrusion and watertable lowering due to increasing groundwater extraction at downstream sites." (Authors) Odonata are also treated on the family level.] Address: Moya, G., Departament de Biologia Ambiental, Universitat de les Illes Balears, 0707 1 Palma de Mallorca, Spain

**7585.** Boix, D.; Sala, J.; Moreno-Amich, R. (2001): The faunal composition of Espolla pond (NE Iberian Peninsula): the neglected biodiversity of temporary waters. *Wetlands* 21(4): 577-592. (in English) ["The faunal composition, richness, and their determinant factors were analyzed in a Mediterranean temporary pond located in NE Spain. The aquatic community was sampled weekly over 7 periods of flooding during 4 years (1996–1999). Composition of the pond community was found to be influenced by duration of the hydroperiod and, secondarily, by seasonality. Insects and crustaceans were the most well-represented types of fauna. The small numbers of species captured over all hydroperiods spend the dry periods in situ or have an important dispersal capacity. Comparison of the faunal composition of several temporary ponds of temperate latitudes confirms the great diversity of faunal groups found in temporary aquatic environments, and this richness is comparable to that found in permanent water bodies. The richness of these temporary ponds is related to flooded surface and to hydroperiod duration. The peculiarity of the fauna of temporary waters, together the deteriorating condition of those habitats, make it necessary for more active policies of preservation to be pursued." (Authors) In tab. 2 larval records of *Chalcolestes viridis* and *Anax imperator* are listed.] Address: Boix, D., Institute of Aquatic Ecology and Dept. of Environmental Sciences, University of Girona, Campus de Montilivi, Faculty of Sciences, 17071—Girona, Catalunya, Spain

**7586.** Malikova, E.I.; Ivanov, P.Yu. (2001): Fauna strekoz (Insecta, Odonata) Primorskogo kraja. - [Dragonfly (Odonata) fauna of the Primorye region]. *Chteniya V.L. Levanidov bienn. mem. Meetings 1*: 131-143. (in Russian) [Far East, Russia; the Odonata fauna of the region is critically reviewed and a checklist (with 80 species) is provided. The regional occurrence of *Enallagma cyathigerum*, *Aeshna viridis*, *Trigomphus anormolobatus*, and *Neurothemis fluctuans* requires confirmation.] Address: Malikova, E.I., Studencheskaya 25/1-5, RUS-675027 Blagoveshchensk, Amur Region. Russia

**7587.** Nguyen, V.V.; Hoang, D.H.; Cao, T.K.T.; Nguyen, X.Q.; Bae, Y.J. (2001): Altitudinal distribution of aquatic insects from Tarn Dao National Park in northern Vietnam. In: Bae, Y.J., [Ed.], 2001. *The 21st century and aquatic entomology in East Asia*. [Proc. 1st Symp. Aquat. Entomologists E Asia], Korean Soc. Aquat. Ent., Seoul, viii+146 pp.: 123-133. (in English) [Odonata on pp. 126 and 130; 26 taxa are listed on the genus level.] Address: Nguyen, V.V., Department of Biology. Seoul Women's University. Seoul 139-774, Korea

## 2002

**7588.** Abbott, J.; Beckemeyer, R.J.; Donnelly, T.W.; Gonzalez-Soriano, E.; Harp, G.L. (2002): Odonata collected in Nicaragua. *Notul. Odonatol.* 5: 125-128. (in English) [During 29 July through 3 Aug. 2001, 71 spe-

cies were collected and 4 additional species were positively identified, from 12 localities in Jinotega and Matagalpa Departments. 25 species are new records for Nicaragua, raising the total number of species for this country to 124." (Authors)]

**7589.** Antipova, L.F.; Baikova, T. V. (2002): Invertebrates of the Pskov District. Pskov State University Press: (in Russian) [A list of invertebrates from the Pskov Oblast is provided. For the Odonata this includes general remarks on the biology (mostly restricted to the family or genus level) and the list of 46 species of Odonata. *Aeshna viridis* and *Anax imperator* are very rare. Photographs of some species are presented.] Address: not stated

**7590.** Bracken, B.; Lewis, C. (2002): Black saddlebags (*Tramea lacerata*): First records for Ottawa-Carleton and Prescott-Russell counties and possible range expansion. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 16-18. (in English) [*T. lacerata* was recorded in September 2001 approximately 180 km northeast of the main southwestern Ontario range of *T. lacerata*. This expansion might be attributed to the unusually warm weather in 2001. Records prior to 2001 are mapped.] Address: Bracken, B., 711-1435 Morisset Ave., Ottawa, ON, K1Z 8H4, Canada. E-Mail: brackensworld@hotmail.com, weewa@primus.ca

**7591.** Bree, D. (2002): Notes on the Odonata of Prince Edward County, Ontario - 2001. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 14-15. (in English) ["Three new county records are reported for Prince Edward County bringing the county list to 73 species. Additions reported are *Aeshna clepsydra*, *Cordulia shurtleffi*, and *Perithemis tenera*. The latter represents a significant northeastern range extension. In addition county late and early flight dates are reported, as are records of the uncommonly encountered *Aeshna canadensis*, *A. umbrosa*, *A. verticalis*, and *Baisiaeschna janata*. Included is an update on the Sandbanks Pannes wetland and the disappearance of *Ischnura hastata* from that habitat. The annual autumn build-up of darners (*Aeshnidae*) was again noted and may be associated with many of the uncommon *Aeshna* species that appear in the county at that time." (Author)] Address: Bree, D., Box 123, Bloomfield, ON, K0K 1G0, Canada; E-Mail: dbree@post.kosone.com

**7592.** Bree, D. (2002): Summary of the Odonata of Petroglyphs Provincial Park in 2001. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): *Ontario Odonata*, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 5-10. (in English) ["An annotated list is presented including 60 species of Odonata found in 2001 at Petroglyphs Provincial Park located on the extreme southern edge of the Canadian Shield at 44° 37'N, 78° 03'W. *Progomphus obscurus* is reported for the third time in Canada. A number of uncommon species are also reported including; *Macromia illinoiensis*, *Cordulegaster maculata*, *Gomphaeschna furcillata*, *G. lividus*, *Somatochlora williamsoni*, *Stylogomphus albistylus*, and *Stylurus scudderi*. *Gomphus adelphus* and *Somatochlora kennedyi* are added to the Peterborough County list bringing the total to 101 and late and early flight dates for the county are noted. Recommendations are made to provide special conservation status to Jack's Creek

and the calcareous-rich waters of McGinnis lake and a nearby pond." (Author)] Address: Bree, D., Box 123, Bloomfield, ON, K0K 1G0, Canada; E-Mail: dbree@post.kosone.com

**7593.** Catling, P.M.; Brownell, V.R. (2002): Additions to the Odonata of Lanark County, Ontario.. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 4-5. (in English) ["Notes are provided on seven species which are additions to the reported fauna of Lanark County, Ontario. Included are *Enallagma vernale*, *Gomphaeschna furcillata*, *Gomphus quadricolor*, *Ophiogomphus rupinsulensis*, *Williamsonia fletcheri*, *Nannothemis bella*, and *Pantala flavescens* bringing the county list to 87 species." (Authors)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, ON, K0A 2P0, Canada; E-Mail: brownell@achilles.net

**7594.** Catling, P.M. (2002): A new identification problem in field surveys: *Tamea lacerata* and *Epitheca princeps*. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 58-61. (in English) [Field identification characters are outlined to discriminate *Tamea lacerata* and *Epitheca princeps*.] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, ON, K0A 2P0, Canada; E-Mail: brownell@achilles.net

**7595.** Catling, P.M.; Brownell, V.R. (2002): Observations of Odonata in Ontario made in 1996, 1997 and 1998. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 63-190. (in English) ["The observations in the following table totaling 1937, were recorded prior to the concept of a major Odonata survey in Ontario. Many were collected during a study of the ecology of gravel pit ponds. Others were collected during floristic surveys. In general the emphasis was on Zygoptera in connection with ecological studies. Very few records of larvae are included. The lack of data on numbers and sexes, and the way in which the data was collected places some limitations on its use in the analysis of trends. It is useful in contributing to an understanding of geographic occurrence, flight periods and in connection with regional studies. Many of the observations are supported by voucher specimens in the collection of the observers and/or in the Ontario Survey collection at CNC (Agriculture and Agri-Food Canada, Ottawa). As with the summary data produced in volumes 1-3 of Ontario Odonata, these observations are part of a limited access database maintained by the Toronto Entomologists Association and the Natural Heritage Information Center (NHIC) in Peterborough. Among the noteworthy species listed in the following summary is *Hetaerina titia* originally discovered in Ontario by P. Pratt and Jo Barton in 1985 (see Great Lakes Entomologist 31 (3-4): 205-208. 1998). The male of *H. titia* is longer, more slender and darker than the male of *H. americana* and has conspicuous dark colouration at the wing tips especially the hindwing." (Authors)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, ON, K0A 2P0, Canada; E-Mail: brownell@achilles.net

**7596.** Catling, P.M.; Brownell, V.R. (2002): Notes on the Odonata of Murphys Point Provincial Park, Lanark County, Ontario.. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomolo-

gist's Association, Toronto, Ontario: 20-23. (in English) ["Forty-six species of Odonata are reported for Murphys Point Provincial Park in Lanark County, on the Frontenac Axis of the Canadian Shield, approx. 50 km NNE of Kingston, Ontario. Less common Ontario species present included *Enallagma geminatum*, *E. vesperum*, *Lestes forcipatus*, *L. vigilax*, and *Celithemis eponina*. *Pachydiplax longipennis*, and *Celithemis eponina* reach their northern limit in the general region of the park, and provide an example of the pattern of disjunction from the Carolinian zone of extreme southwestern Ontario into the Frontenac Axis." (Authors)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, ON, K0A 2P0, Canada; E-Mail: brownell@achilles.net

**7597.** Catling, P.M. (2002): An evaluation of some characters separating male *Lestes disjunctus* and *Lestes forcipatus* in Ontario. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 51-58. (in English) ["Using scatter diagrams and analysis of variance, five characters were evaluated in ninety-three males of *L. forcipatus* and *L. disjunctus* throughout Ontario. The analysis included the morphological characters: (1) relative length of abdominal segments 2 and 3; (2) shape of the penis vesicle; (3) relative size of distal tooth of superior appendage; (4) length of the anterior lamina; and (5) proximity of basal swelling to basal tooth of the superior appendage. Also included were the colour pattern characters: (1) extent of dark colour on side of thorax above metapleural suture; and (2) colour of ventral surface of abdominal segment 10. The length of the anterior lamina discriminated groups well but is a difficult field character. Size of distal tooth on superior appendage along with coloration are recommended to distinguish the two species since both are highly correlated with length of anterior lamina and are also easy to use." (Author)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, ON, K0A 2P0, Canada; E-Mail: brownell@achilles.net

**7598.** Catling, P.M.; Brownell, V.R. (2002): A preliminary assessment of changes in status of Ontario dragonflies since Walker's published survey in 1941. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 36-48. (in English) ["To elucidate changes in status of Ontario Odonata, the number of records for each of 164 species in Walker's published survey was compared with the number of records for the same species in the year 1999 and year 2000 seasonal summaries. Based on criteria established for reasonable evidence, 29 species have declined and 14 have increased. The result of a greater number of declining species suggests that the threat to dragonfly biodiversity has increased. Species for which there was particularly good evidence of decline, based on meeting 2 of the 3 numeric sub-criteria, included *Somatochlora minor*, *Epiaeschna heros*, *Aeshna verticalis*, and *Somatochlora kennedyi*. Species for which there was particularly good evidence for increase (based on meeting 2 of the 3 numeric sub-criteria) included *Tamea lacerata*, *Argia apicalis*, *Erythemis simplicicollis*, *Celithemis elisa* and *Enallagma civile*. Significantly more than expected of the declining species are currently considered to be at risk and thus rarity criteria that provide a basis for assigning risk are supported. Although based largely on rarity, S-ranks are often indicative of decline. Significantly more than expected of the declining species were associated

with good water quality while significantly more of the increasing species are associated with poor water quality. Thus deteriorating water quality over the past 50 years is implicated as a factor in status change. Species for which there was significant evidence of increase were more often than expected associated with ponds and lakes, than with rivers and streams. A significantly larger than expected proportion of the increasing species had a southern Carolinian or Carolinian Subunit distribution pattern, and a significantly smaller than expected proportion of the decreasing species had such a pattern. This provides further evidence for an increase in "southern" species associated with climate warming. An increase in the numbers of most migratory and/or wandering species is correlated with the recent northward extension of this group, also likely attributable to climatic warming." (Authors)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, ON, K0A 2P0, Canada; E-Mail: brownell@achilles.net

**7599.** Catling, P.M. (2002): Checklist of Ontario Odonata. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 33-35. (in English) ["Following is an update to the checklist of Ontario Odonata (including 166 species, one with 2 subspecies) (Catling and Brownell 2000: Damselflies and Dragonflies of Ontario: Resource Guide and Annotated List. ProResources, 2326 Scrivens Drive, Metcalfe, Ontario, Canada. 200 pp.). That list included additions made after 1975 to the list that could be generated from publications of Dr. E.M. Walker (Walker 1953, 1958, Walker and Corbet 1975). These additions included: *Dromogomphus spoliatus*, *Gomphaeschna furcillata*, *Enallagma anna*, *E. basidens*, *E. triviatum westfalli*, *Hetaerina titia*, *Macromia taeniolata*, *Ophiogomphus mainensis*, *Progomphus obscurus*, *Stylurus amnicola*, and *Stylurus laurae*. The changes made in this edition of the checklist include the dropping of *Sympetrum janeae* which appears too indistinct to warrant recognition (e.g. Donnelly 2001, pp. 9-10), the dropping of *Sympetrum occidentale* following the suggestion of Dr. N. Donnelly upon whose authority and collections it was originally included (see also Donnelly 2001, p. 10), the listing of *Lestes australis* as a species (Donnelly 2001) and the addition of *Ischnura kellicotti*, discovered in 2001." (Author)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, ON, K0A 2P0, Canada; E-Mail: brownell@achilles.net

**7600.** Catling, P.M.; Brownell, V.R. (2002): Ebony Jewelwing (*Calopteryx maculata*) in northwestern Ontario. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 18-19. (in English) ["*C. maculata* is reported from two locations in Kenora district of northwestern Ontario, representing a range extension of 600 km to the northwest within the province, and another example a disjunction north of Lake Superior which is characteristic of 17 of the 166 species (167 taxa) of Odonata occurring in Ontario." (Authors)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, ON, K0A 2P0, Canada; E-Mail: brownell@achilles.net

**7601.** Catling, P.M.; Brownell, V.R. (2002): Rapids Clubtail (*Gomphus quadricolor*) in eastern Ontario. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 1-4. (in English) ["*G. quadricolor* is reported from two locations on the Mississippi River in eastern

Ontario. This represents a 320 km northeastern disjunction from the nearest locations in southwestern Ontario, and is 340 km north of the nearest location in New York State. These sites represent the fourth and fifth localities for Ontario. This globally vulnerable species has not been seen since 1939 at two of the five Ontario sites. Only males were observed and only in the very restricted areas of rapids along a relatively slow moving river. All of the known provincial records are summarized in an accompanying table." (Authors)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, ON, K0A 2P0, Canada; E-Mail: brownell@achilles.net

**7602.** Heideman, N.J.L. (2002): A comparison of the breeding and nonbreeding season diets of *Agama aculeata* and *Agama planiceps* (Reptilia: Agamidae) in Windhoek, Namibia. *Journal of Herpetology* 36(3): 515-520. (in English) [Odonata contributed to the diet of these reptiles, but according an Index of relative importance (IRI) of prey items in the diet of both species during the breeding and nonbreeding seasons, Odonata are assessed as quite irrelevant as diet.] Address: Heideman, N.J.L., School of Life Sciences, University of the North (Qwa-Qwa campus), Private Bag X13, Phuthadithjaba 9866, South Africa. E-mail: heideman@uniqwa.ac.za

**7603.** Jones, C.D. (2002): Additional records of the River Bluet (*Enallagma anna*) in Ontario. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 49-50. (in English) ["Three new sites for *E. anna* from Ontario are described, including new county records for Hamilton, Wentworth, and Wellington counties. Habitats include a small, cool, mucky-bottomed stream, a seepage creek passing through a fen, and a rapid river bordering a seepage fen. The fact that it has now been recorded at two sites on the Credit River that have received relatively good coverage in the past suggests that it is a recent immigrant to Ontario." (Authors)] Address: Jones, C.D., Natural Heritage Information Centre, Ontario Ministry of Natural Res, 300 Water Street, P.O. Box 7000, Peterborough, ON, K9J 8M5, Canada. E-Mail: colin.jones@mnr.gov.on.ca

**7604.** Jones, C.D.; Bree, D.; Difruscia, R. (2002): Further additions to the Odonata list of Peterborough County, Ontario. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 10-12. (in English) [Three new county records are reported for Peterborough County, Ontario from the 2001 field season. They are: *Gomphus adelphus*, *Somatochlora kennedyi*, and *Trautmanella lacerata*. In addition, *Macromia illinoensis*, formerly overlooked in earlier published lists, is "officially" added to the county list. The total species list for the county now stands at 101 species, among the highest counties for Odonata diversity in Ontario. Two of these species are considered provincially rare." (Authors)] Address: Jones, C.D., Natural Heritage Information Centre, Ontario Ministry of Natural Res, 300 Water Street, P.O. Box 7000, Peterborough, ON, K9J 8M5, Canada. E-Mail: colin.jones@mnr.gov.on.ca

**7605.** Jones, C.D.; Burke, P.S. (2002): Mass multiple species aggregation of dragonflies at Morris Island, Ottawa River. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 31-32. (in English) ["A



multiple species aggregation of several hundred Odonata is reported from Morris Island, Ottawa River, Ontario, Canada. The aggregation appeared to be an overnight roosting site, from which the individuals had not yet dispersed. The aggregation was comprised of one species in the Libellulidae (*Libellula quadrimaculata*) and seven species in the Corduliidae (*Cordulia shurtleffi*, *Dorocordulia libera*, *Epitheca cynosura*, *E. spinigera*, *Helocordulia uhleri*, *Somatochlora forcipata*, and *S. kennedyi*). It is suspected that individuals involved in the aggregation had emerged from ponds and wetlands on Morris Island (or elsewhere nearby) and that the edge of the Ottawa River provided a particularly good foraging site due to a concentration of prey and the topography of the land. The record of *Helocordulia uhleri* is notable in that it may represent the first record of this species from the Ottawa River." (Authors)] Address: Jones, C.D., Natural Heritage Information Centre, Ontario Ministry of Natural Res, 300 Water Street, P.O. Box 7000, Peterborough, ON, K9J 8M5, Canada. E-Mail: colin.jones@mnr.gov.on.ca

**7606.** Kauppinen, J. (2002): Relative importance of different coloration, smell and shape in the predation of wasps: field experiments on hunting dragonflies (Odonata: *Aeshna grandis*). Master of Science thesis, Dept Biological and Environmental Science Ecology and Environmental Management, University of Jyväskylä: 18 pp. (in English) ["Aposematism is a phenomenon, where poisonous or acrid prey signal their unprofitability to potential predators with conspicuous colouration or some other feature. The mechanisms of aposematism have – excluding a small number of exceptions – been studied from the vertebrate predators' (especially birds) point of view. In contrast, the possible impact of invertebrate predators to the evolution of aposematism has gained only little interest. Dragonflies are a numerous group of invertebrate predators that feed mainly on flying insects and exercise prey selection by vision. Although it has been reported that colours do work as cues in the mating systems of dragonflies no studies have been carried out tackling the question whether dragonflies use their colour vision when exercising prey selection. In the present field experiments I investigated whether hunting *Aeshna grandis* avoid attacking on wasps (Hymenoptera: *Vespula norvegica*), that are a highly unprofitable group of prey for most predators. Further, I was interested in finding out which features of the wasp – colouration, smell and shape – affect the attack rates of hunting dragonflies. To tackle these questions I carried out four field experiments. In the wasp avoidance experiment I offered four different types of living prey (black flies, black-and-yellow flies, black wasps and black-and-yellow wasps) to the hunting dragonflies. I stunned the prey items with carbon dioxide and manipulated all of them either with black or yellow paint. According to the results, the dragonflies avoided the wasps over the flies. Within the flies the black-and-yellow coloured individuals were significantly avoided over the black ones suggesting that aposematic colouration on harmless fly provided a selective advantage against invertebrate predators. Interestingly, there was no significant difference in the reactions towards the black and the black-and-yellow wasps indicating that some other feature in wasps might work as well as an aposematic signal. In the next three experiments I studied the relative importance of the possible aposematic signals: coloration, shape and smell in wasps. First, I tested whether hunting dragonflies react differ-

ently on solid black, black-and-yellow striped and solid yellow artificial prey items. In accordance with the wasp experiment dragonflies clearly avoided the black-and-yellow artificial prey items over the solid black or solid yellow ones. In the second experiment I used two artificial prey types (prey item soaked in mashed wasps and prey item soaked in mashed flies) to test if the smell of the prey alone causes different reactions against the prey. The results suggest that smell of the prey did not have any influence on the dragonfly hunting reactions. In the third experiment I offered artificial wasp shaped and a fly shaped prey item to free flying dragonflies. According to the results there was a slight but not significant difference suggesting that dragonflies were more reluctant in attacking the wasp shaped items than the fly shaped ones. My results suggest that most likely the typical black-and-yellow striping combined with shape makes wasps highly intimidating to dragonflies. Since black-and-yellow striping alone significantly decreased attack rate, even profitable prey species (Batesian mimics) are able to exploit the dragonflies' avoidance to certain colours and colour patterns. It is a task for future work to investigate whether these avoidances are learned or whether they have a genetical basis." (Author)] Address: Kauppinen, J., Vehntie 23, FIN-04400 Järvenpää, Finland

**7607.** Laking, B.J.; Holt, M.; Falls, J.B. (2002): An annotated checklist of the Odonata of Manitoulin District, Ontario. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 23-31. (in English) [An annotated checklist of the Odonata of Manitoulin District, Ontario is provided with records for 67 species (22 Zygoptera, and 45 Anisoptera). Forty new species have been discovered since 1991. The dragonfly fauna indicates a tension zone with some southern species at or near to their northern limits including *Calopteryx maculata*, *Ischnura posita*, *Nasiaeschna pentacantha* and *Libellula pulchella*, and some northern species at or near their southern limits such as *Aeshna sitchensis* and *Ophiogomphus colubrinus*. The high level of biological significance of the Misery Bay area is further supported by a relatively high odonate diversity including 6 species in various threat categories." (Authors)] Address: Laking, Brend., 9 Glenwood Drive, Huntsville, ON, P1H 1B8, Canada; E-Mail: huntsvilledragonlady@hotmail.com

**7608.** Pratt, P.D. (2002): *Ischnura kellicotti* (Lilypad Forktail) new to Canada. In: Catling, P.M., C.D. Jones & P. Pratt (Eds): Ontario Odonata, vol. 3. Toronto Entomologist's Association, Toronto, Ontario: 12-13. (in English) [Canada, Ontario; *I. kellicotti* was discovered at Lake Pond, Point Pelee National Park (41°58'N 82°31'W) on 13-VII-2001, and was found to be relatively common in the extensive open beds of *Nuphar* and *Nymphaea* water lilies.] Address: Pratt, P.D., Ojibway Nature Centre, 5200 Matchette Road, Windsor, ON, N9C 4E8, Canada. E-Mail: ppratt@city.windsor.on.ca

**7609.** Rosalino, L.M.; Santos-Reis, M. (2002): Feeding habits of the common genet *Genetta genetta* (Carnivora: Viverridae) in a semi-natural landscape of central Portugal. *Mammalia* 65: 195-205. (in English, with French summary) [The feeding habits of *G. genetta* (Linnaeus, 1758) were studied in Sintra-Cascais Natural Park, a semi-natural landscape where the mountain contrasts with the surrounding plains. The analysis of

588 scats resulted in the identification of 1926 items among seven main food categories (mammals, birds, reptiles, arthropods, gastropods, fruits and carrion garbage), and also included one adult and odonate larva.] Address: Rosalino, L.M., Centra de Biologia Ambiental, Faculdade de Ciencias, Universidade de Lisbon, Ed. C2, 3ºPiso, Campo Grande, 1749-016 LISBOA Portugal

**7610.** Taber, B. (2002): Spring dragonfly (Odonata) and butterfly (Lepidoptera) fallout at the Chesapeake Bay Bridge-tunnel. *Banisteria* 19: 26-27. (in English) [Virginia, Maryland, USA. Report from a "frontal boundary and radar visible migration" of dragonflies along the East Coast of USA in end of may and beginning June 3 June 2000. Nine odonate taxa were observed involved in the grounding to escape an approaching thunderstorm.] Address: Taber, B., Coastal Virginia Wildlife Observatory, P.O. Box 912, Eastville, Virginia 23347, USA

### 2003

**7611.** Cano Villegas, F.J. (2003): Aportación al conocimiento de la fauna de odonatos (Insecta: Odonata) en una cuenca fluvial costera: río Fuengirola (Málaga, Sur de España). *Boletín de la Sociedad Andaluza de Entomología* 7: 7-15. (in Spanish, with English summary) [Spain; faunistic data about twenty species of Odonata observed in a Mediterranean coastal basin are shown. Zoogeographical analysis shows a high presence of African elements in this basin including *Orthetrum trinacria*, *O. chrysostigma*, *Brachythemis leucosticta*, *Trithemis annulata*, and *Zygonyx torrida*.] Address: Cano Villegas, F.J., Área de Zoología. Departamento de Ciencias Ambientales, Universidad Pablo de Olavide, Ctra. de Utrera Km 1. 41013 Sevilla, Spain. E-mail: fjcarnovil@wanadoo.es

**7612.** Riaz, H.; Khawaja Basharat, A. (2003): Damselfly naiads (Odonata: Zygoptera) of Sindh-Pakistan. *International journal of agriculture & biology* 5(1): 53-56. (in English) [Larvae belonging to the geni of *Lestes*, *Pseudagrion*, *Ceriagrion* and *Ischnura* are figured.] Address: Riaz, H., Pest Warning and Quality Control of Pesticides, Pakpattan, Pakistan. E-mail: riazhussain37@hotmail.com

**7613.** Wang, L.-p. (2003): Breeding habitat selection and breeding biology of Blue-tailed Bee-eaters (*Merops philippinus*) on Kinmen Island. Department of Forestry, National Taiwan University, Taipei. Adviser: Yuan Hsiao-Wei: 52 pp. (in Chinese, with English summary) ["I studied habitat selection and breeding biology of blue-tailed bee-eaters (*Merops philippinus*) on Kinmen Island from 2000 to 2002. Blue-tailed bee-eaters were found to only build nest holes on Kinmen layer and sandy soils, which both had lower clay content. On the 822 Blue-tailed bee-eater individuals observed, 84% of them built nest holes on natural cliffs and 16% used artificial habitats, and 92% built nest holes into one-side open colony and only 8% built radical colony. Scan observations revealed the major diet of Blue-tailed bee-eaters were insects that were mostly Odonata (49%), Homoptera (17%), Diptera (13%) and Lepidoptera (12%). I compared the water quality of nearest water bodies of six nest colonies, no significant difference in dissolved oxygen, BOD, pH value and some nutrients nutrients (PO<sub>4</sub>-3, NO<sub>3</sub>-, N, Cl-, SO<sub>4</sub>-2, NH<sub>4</sub>+, HCO<sub>3</sub>-, CO<sub>3</sub>-, Ca, Mg, Na, K). was found between retained and abandoned

nest colonies. Nevertheless, the nearest water bodies of abandoned nest colonies had lower electro-conductivity, which positively correlated with abundance and species richness of dragonflies, the main diet of Blue-tailed bee-eaters. I found that Blue-tailed bee-eaters preferred to build nest holes on cliffs with lower vegetation. We suggested lower vegetation structure might increase their ability to detect nest predators and thus decrease the chance of nest predation. Blue-tailed bee-eaters were mainly colonial breeding and monogamy in Kinmen during the study period. In the breeding season of 2001, 83% of the chicks hatched within a period of nine days, suggesting Blue-tailed bee-eaters might be synchrony breeding. We also found 16 nests had more than two adults jointly feeding chicks, which suggests Blue-tailed bee-eaters might adapt cooperative breeding." (Author)] Address: not transliterated

**7614.** Wust, E. (2003): Die Libellen des Frastanzer Riedes (Insecta: Odonata) (Vorarlberg, Österreich). In: Stadler, G. & Staub, R. (Red): *Naturmonographie Frastanzer Ried*. Vorarlberger Naturschau - forschen und entdecken, 13. Dornbirn: 195-210. (in German, with English summary) [Austria; 18 Odonata species are autochthonous, 10 are allochthonous species. Compared with studies from 1994, a decrease of species was registered between 2000 - 2002, probably as a consequence of water pollution and sedimentation from highwater floods of the river Ill in 1999.] Address: Wust, E., Elserweg 3a, A-6714 Nüziders, Austria. E-mail: oflice@wust.at

**7615.** Zhu, C.-j.; Muraoka, J.; Mizuno, H. (2003): Visual simulation of dragonflies based on aerodynamics. *The Journal of the Society for Art and Science* 2(4): 146-155. (in Japanese, with English summary) ["A dragonfly is a familiar insect by which the sense of season can be shown. The expression of a dragonfly by CG can be expected as an element improving the sense of season in landscape simulation, virtual reality, etc. This paper proposes the flight model of a dragonfly based on aerodynamics. In this model, a dragonfly can be made to fly in real time considering the force caused by the flapping of the wings, performing flight characteristics including steep rise, sudden stop, hover and rapid turn. Furthermore, the flight route of a dragonfly can be easily established depending on the control-points placed in the space." (Authors)] Address: Mizuno, H., hmizuno@tohtech.ac.jp

### 2004

**7616.** Brown, T.G.; Winchell, P.; Postans, N. (2004): Benthic community of Shuswap Lake's foreshore. *Can. Manusc. Rep. Fish. Aquat. Sci.* 2693: iv + 33 pp. (in English, with French summary) ["Substrate trays and a benthic pump were employed to collect samples of the benthic community from the foreshore of Shuswap Lake, British Columbia, Canada. The majority of samples were collected in June and July (1999-2001) from depths of less than two meters. The most numerous benthic invertebrates were: Cladocera, Chironomidae (larvae), Ostracods, Oligochaeta, Calanoida and Nematoda. [...]. The list of samples includes three Odonata taxa: *Aeshna umbrata*, *Enallagma* sp., and *Enallagma cyathigerum*.] Address: Brown, T.G., Fisheries and Oceans Canada Science Branch, Pacific Region, Pa-

cific Biological Station, Nanaimo, BC V9T 6N7, Canada. E-mail: browntg@pac.dfo-mpo.gc.ca

**7617.** Cano Villegas, F.J. (2004): Los odonatos del monumento natural de los Sotos de la Albolafia, río Guadalquivir (Córdoba, Andalucía). Boletín de la Sociedad Andaluza de Entomología 11: 7-13. (in Spanish, with English summary) [7 Odonata species were recorded from August of 2002 until August of 2004. *Onychogomphus costae* was found breeding in the area.] Address: Cano Villegas, F.J., Área de Zoología. Departamento de Ciencias Ambientales, Universidad Pablo de Olavide, Ctra. de Utrera Km 1. 41013 Sevilla, Spain. E-mail: fjcanovil@wanadoo.es

**7618.** Goncalves, J.F.; Santos, A.M.; Esteves, F.A. (2004): The influence of the chemical composition of *Typha domingensis* and *Nymphaea ampla* detritus on invertebrate colonization during decomposition in a Brazilian coastal lagoon. *Hydrobiologia* 527: 125-137. (in English) [The aims of this study were to investigate the structure and composition of the invertebrate community during the detritus decomposition (colonization features) of the two most abundant aquatic macrophytes *T. domingensis* and *N. ampla* in Jurubatiba Lagoon and verify if the chemical composition of the substratum has any influence on invertebrate colonization and which are the functional groups possibly affected by these compounds. The substratum *T. domingensis* had higher percentages of cell wall fraction ( $F = 108.33$ ;  $p < 0.0001$ ) and organic matter ( $F = 225.77$ ;  $p < 0.0001$ ), while nitrogen ( $F = 408.61$ ;  $p < 0.0001$ ) and phosphorus ( $F = 224.59$ ;  $p < 0.0001$ ) contents were higher in *N. ampla*. These differences in the chemical composition of the substrata influenced the decomposition rate, and the detritus of *N. ampla* (4.37% DW day<sup>-1</sup>) decomposed approximately 26 times faster than the *T. domingensis* (0.17% DW day<sup>-1</sup>) detritus. The main groups of invertebrates that colonized both substrate were Chironomidae, with more than 50% of the total, followed by Oligochaeta, Nematoda, Copepoda and Cladocera. The results showed that the slow breakdown rate of *T. domingensis* detritus provided a higher probability for colonization and that the main driving force structuring the invertebrates' community was degradative ecological succession (DES).] (Authors) *T. domingensis* was colonized by odonate larvae after 9 days (Libellulidae, Aeshnidae) with a strong increase of abundance/biomass after app. 60-90 days. *N. ampla* was colonized earlier by larvae of Libellulidae and Gomphidae (in high abundances after 9 resp. 16 days).] Address: Gonçalves Jr., J.F., Dept of General Biology, Benthic Ecology Laboratory, Federal University of Minas Gerais, ICB, 486, CEP: 30161-970 Belo Horizonte, MG, Brazil. E-mail: jfjunior@mono.icb.ufmg.br

**7619.** Komposch, B.; Brunner, H.; Holzinger, W.E. (2004): Wiederfund der Zwerglibelle (*Nehalennia speciosa*) und weitere bemerkenswerte Libellen-Nachweise aus Kärntner Mooren (Insecta: Odonata). *Carinthia II* 194/114: 495-502. (in German, with English summary) [2002; investigations of Odonata in 20 peat bogs in Carinthia, Austria provided records of 16 endangered species, including the first record of *Nehalennia speciosa* for 70 years.] Address: Brunner, Helwig, ÖKO-TEAM, Bergmannsgasse 22, 8010 Graz, Austria. E-mail: office@oekoteam.at

**7620.** Kuki, N.; Okubo, K. (2004): The relationship between dragonfly communities and environmental conditions in paddy field area on Kamiina district, Nagano prefecture. Abstracts of the Annual Meeting of the Ecological Society of Japan 51: 365. (in English) ["The purpose of this study was to know relationship between dragonflies in paddy area and environmental condition. We selected five various condition study areas (two non-consolidated paddy areas in hilly and mountainous areas, one consolidated paddy area in hilly and mountainous area, one non-consolidated paddy area in urbanized area, one consolidated paddy area in urbanized area.) in the Kamiina district, Nagano Prefecture. The number and behaviour of dragonflies were recorded by route census method. The survey of land utilization was carried out on these areas. The number of all of the species was twenty-three. The number of species and individuals were higher in 3 hilly and mountainous areas than in 2 urban areas. Five study areas were classified into 3 hilly and mountainous area region and 2 urban areas by TWINSpan. Dragonfly communities were classified to seven types. Each type corresponded different environment conditions of waterside, forest and others. It was confirmed that the environmental selection and behaviour of mature dragonflies corresponded to the each species character. The environmental selection of mature dragonflies were different between hilly and mountainous area and urban area. It was clear that dragonfly communities were affected by consolidation and urbanization."] (Authors) Address: Okubo, K., Department of Forest Science, Faculty of Agriculture, Shinshu University, Japan.

**7621.** Riaz, H.; Khawaja, B.A. (2004): Damselfly naiads (Odonata: Zygoptera) of Sindh-Pakistan. *International Journal of Agriculture & Biology* 5(1): 53-56. (in English) [The genera *Lestes*, *Pseudagrion*, *Ceragrion* and *Ischnura* taxa are considered.] Address: Khawaja, B.A., Department of Zoology, University of Azad Jammu & Kashmir, Muzaffarabad

## 2005

**7622.** Béthoux, O.; Papier, F.; Nel, A. (2005): The Triassic radiation of the entomofauna. *Comptes Rendus Palevol* 4(6-7): 609-621. (in English, with French summary) ["Assessing the insect evolution around the Permian/Triassic boundary faces various pitfalls. The taxonomic and phylogenetic frames are not consensually established, and diverse evidences suggest that the record is incomplete. Nevertheless, extensive studies in progress on the super-ordinal clades Archaeorthoptera and Odonoptera reveal common trends. Several important lineages get extinct, and groups underrepresented or absent in Late Permian became major components of the entomofauna in Middle Triassic. In addition, the radiation of the Diptera and the diversification of the Coleoptera in the Triassic also support the hypothesis of an important renewal of the entomofauna at the Permian/Triassic boundary."] (Authors) Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**7623.** Bezmaternykh, D.M. (2005): Composition, structure and quantitative characteristic of zoobenthos of the Lake Chany in 2001. *Sibirskii ekologiceskii shurnal* 2: 249-254. (in Russian) [3 Odonata species were recorded (out of a total of 70 benthic invertebrate spe-



cies). Odonata represented ca. 3% of species richness in 2001 but about 10% between 1973-1982. Coenagrion hastulatum was particularly abundant.] Address: Bezmaternykh, D.M., Institute for aquatic and ecological problems, Sibir Branch of the Russian Academy of Sciences, 656038 Barnaul, ul. Molodjeshnaja 1, Russia

**7624.** Harman, W.N.; Hingula, L.P.; Macnamara, C.E. (2005): Does long-term macrophyte management in lakes affect biotic richness and diversity?. *J. Aquat. Plant Manage.* 43: 57-64. (in English) ["We hypothesize that the richness and diversity of the biota in Lake Moraine (42°50'47"N, 75°31'39"W) in New York have been negatively impacted by 60 years of macrophyte and algae management to control Eurasian watermilfoil (*Myriophyllum spicatum* L.) and associated noxious plants. To test this hypothesis we compare water quality characteristics, richness and selected indicators of plant diversity, zooplankton, benthic macroinvertebrates and fish in Lake Moraine with those in nearby Hatch Lake (42°50'06"N, 75°40'67"W). The latter is of similar size and would be expected to have similar biota, but has not been subjected to management. Measurements of temperature, pH, oxygen, conductivity, Secchi transparency, calcium, total phosphorus and nitrites + nitrates are comparable. Taxa richness and the diversity indices applied to the aquatic macrophytes are similar in both lakes. The greatest disparity is the lack of Eurasian watermilfoil and Canadian waterweed (*Elodea canadensis* Michx.) in the main basin of Lake Moraine. The elimination of the former was the intent of a 2001 application of fluridone (1-methyl-3-phenyl-5-(3-(trifluoromethyl) phenyl)-4(1H)-pyridinone[C<sub>19</sub>H<sub>14</sub>F<sub>3</sub>NO]) and the loss of the latter was a related consequence. Zooplankton richness is similar in both lakes. The diversity of benthic macroinvertebrates is similar; however, richness at the genus level is quite different. There is a paucity of species collected in Lake Moraine that are intolerant to winter lowering of water levels. Fish species richness in both lakes is similar, but there are differences in specific taxa and percent abundance directly related to stocking and the balance between forage fish populations and piscivorous fish populations in the two lakes. That phenomenon also appears responsible for some of the variation in the zooplankton communities in both lakes. Overall, taxonomic richness and diversity in Lake Moraine and Hatch Lake are remarkably similar. Annual winter drawdown of water levels is implicated as having greater effect on the biota than long-term herbicide utilization. The hypothesis is rejected." (Authors) Odonata accounted to app. 20% of genus-diversity, but to less than 1% of biomass.] Address: Harman, W.N., SUNY College at Oneonta, Biological Field Station (BFS), 5838 ST HWY 80, Cooperstown, NY 13326.

**7625.** Hua, Y.; Li, H. (2005): Food web and fluid in pitchers of *Nepenthes mirabilis* in Zhuhai, China. *Acta Bot. Gallica* 152(2): 165-175. (in English, with French summary) [*N. mirabilis* "attracts ants and flying insects with floral and extrafloral nectaries, color of pitcher and flower, and possibly flower odor. Its slippery rim and collar trap preys, but some wasps can hold legs on the outside of the rim. Its preys include arthropods in four classes (with nine orders in insect class), plus very few snails and lizards. Fresh fluid sinks, kills, and digests preys (including lizards) quickly, but allows frogs to live in; while old fluid allows mosquitoes to hatch in it. Fluid reaches its maximum amount at pitcher opening. Then, the pH decreases gradually from 6 to 1.9, as the color

changes slowly from colorless to yellow, and finally both pH and color reverse as pitchers dying. Proteinase nepenthesins could be resulted in these special conditions through long evolutionary adaptation." (Authors) The prey includes Coenagrionidae; regrettably it is not outlined if this records are by accident or occur regularly.] Address: Li, H., Biology Department, Frostburg State University, MD 21532, USA. E-mail: hli@frostburg.edu

**7626.** Johnson, K.E.; Eidielis, L. (2005): Tadpole body zones differ with regard to strike frequencies and kill rates by dragonfly naiads. *Copeia* 2005(4): 909-913. (in English) ["We assessed *Anax junius* dragonfly naiad strike frequencies and kill probabilities against *Rana sylvatica* (Wood Frog) tadpoles. Strikes fell into five categories according to their placement on the tadpole body: anterior head/body, posterior head/body, head/body-tail intersection, anterior tail, and posterior tail. The kill probability was calculated for each category as the number of kills divided by the number of contacts made in that category. These probabilities varied; a higher probability was found for both the anterior and posterior head/body, and values declined for successively posterior categories. Neither the kill probability nor the size of the body zone influenced the number of strikes to that zone. Surprisingly, the dragonfly naiads struck most frequently at the relatively narrow region of the head/body-tail intersection, suggesting that dragonfly naiads may aim at a specific target." (Authors)] Address: Eidielis, Laura, Univ. michigan, Dept Ecology & Evolutionary Biology, Kraus Natural Science Cuilding, Ann Arbor, Michigan 48109-1048, USA. E-mail: leidieli@umich.edu.

**7627.** Ketelaar, R.; Groenendijk, D.; Joop, P. (2005): Soortbeschermingsplan Hoogveenglanslibel - Species Protection Plan *Somatochlora arctica* 2006-2010. Directie Kennis, Ministerie van Landbouw, Natuur en Voedselkwaliteit, Rapport DK nr. 2005/033: 56 pp. (in Dutch, with English summary) ["*Somatochlora arctica* is a characteristic species of bogs and wet heaths. In the Netherlands, it declined during the last century, and at the moment, only four populations are left. These are situated in the eastern and southern parts of the country (figure 2). The Moorland Emerald can be characterised by its ability to survive in extreme environments. The female deposits her eggs in small, very shallow pools with an overgrowth of *Sphagnum* moss, and therefore hardly any visible water. The larvae are well able to survive prolonged drought and freezing. However, competition with larvae of other dragonfly species is a limiting factor. Adults display a leisurely flight in open woods, tree tops and at woodland edges, where they feed on small insects, and also copulate. As the adults only visit the aquatic breeding sites briefly, it is difficult to establish the species' presence. Aims: During the time allotted to this Species Protection Plan, the aims are: • to know more about the ecology of the Moorland Emerald and the measures required for its conservation, and to convey this knowledge to those concerned with nature conservation in the field; • to integrate this new knowledge into hydrological parts of peat restoration projects and into scientific visions on the functioning of peat ecosystems. Bottlenecks: The future of the Moorland Emerald in the Netherlands is precarious. Important causes are: • desiccation of peatland habitat due to agricultural and forestry practices, excessive usage of ground water, and reduction of

slightly buffered water supply from seepage. • eutrophication of its habitats by nitrogen from agriculture and traffic. Shifts in plant communities may occur, in particular, *Betula pubescens* and *Molinia caerulea* dominance on peat bogs and wet heaths. • habitat loss and fragmentation, reducing population size and isolating populations. • lack of knowledge concerning the ecology of the Moorland Emerald and the hydrology of wet heaths and peat bogs. This lack of knowledge exists also at the level of practical management, illustrating the difficulty of assessing the probability and possibility of raised bog restoration in the Netherlands. • climate change may also affect this species negatively, but measures taken to minimise any of its effects are beyond the scope of this Species Protection Plan. Measures: To ensure that there are sustainable populations of the Moorland Emerald in the Netherlands, the following measures need to be taken: • counter desiccation on both small and large scales by preventing surface drainage and designating buffer zones. For at least two locations, agreements have to be made with nature conservation bodies in neighbouring countries. • reduce eutrophication by taking local measures; these measures should also be supported by national policy. • enlarge and improve present and potential habitats during the term of this Species Protection Plan. • set up research on the ecology of the Moorland Emerald, with particular attention to its breeding sites. At the same time, set up monitoring of all known populations in order to evaluate the effect of local measures. All appropriate measures for the Moorland Emerald in the Netherlands are summed up in an Action Plan. The main purpose of this Species Protection Plan is to increase the current knowledge and subsequently, to apply the new knowledge at the level of practical management, so that effective measures can be taken. The implementation of these measures is the responsibility of the Ministry of Agriculture, Nature and Food Quality, the provinces of Gelderland, Noord-Brabant, Limburg and Overijssel, together with the different owners of nature reserves where the Moorland Emerald occurs. Furthermore, local water boards should also play a crucial role when hydrology plays an important part in a peat restoration project. As these measures take the whole ecosystem into account, they fit into the framework of the so-called "Survival Plan for Forest and Nature". In the case of at least two populations, the co-operation of German or Belgium local authorities needs to be sought." (Authors)] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: ketelaar@vlinderstichting.nl

**7628.** Kobayashi, H.; Toda, H. (2005): Life history of a water mite (*Piona carnea*) in Lake Shirakomaïke. 11-15. (in Japanese, with English summary) ["Life history of *P. carnea* was studied in a mountain humic lake (Lake Shirakomaïke) in Nagano prefecture, Japan from May in 1999 to February in 2000. *P. carnea* appeared in plankton assemblage from late May to late October. Females having eggs were observed between late May and late July. They attached their eggs on aquatic plants in the west coast of the lake from late June to late July. In the coastal area, the first larval stage (larvae) appeared from early July to early August, and parasitized the 2nd and 3rd-year larvae of Odonata. The second larval stage (nymphs) was observed in a plankton assemblage from early July to mid September. In mid September the second pupae were observed on aquatic plants in the west coast. New recruitments of adults

appeared in late September. *P. carnea* disappeared from plankton assemblage until the end of October, and accumulated in the lake bottom from November to probably April. A dense population was found on 18 November (267 individuals nr2) and on 7 February (281 individuals nr2) in the bottom at the lake center. *P. carnea* completes its life history each year in Lake Shirakomaïke." (Authors)] Address: Toda, H., Dept of Environmental sciences Faculty of Science, Shinshu University

**7629.** Mello, M.J. (2005): Inventory of macrolepidoptera and other insects in the Boston Harbor Islands National Park area. *Northeastern Naturalist* 12 (Special Issue 3): 99-144. (in English) [Maine, USA; 10 Odonata species are reported from fourteen islands within the Boston Harbor Islands national park area. Although sampling was limited, the paucity of odonates may be related to the lack of fresh water within the park; however, feeding swarms of the larger, migratory odonates were expected over the fields of Worlds End. The taxa are documented in Appendix IV.] Address: Mello, M.J., Lloyd Center for Environmental Studies, 430 Potomska Road, Dartmouth, MA 02748, USA E-mail: research@thelloydcenter.org.

**7630.** Nicoara, A.; Nicoara, M.; Bianchini, F. (2005): Diet composition during breeding period in populations of *Bufo viridis*, *Pelobates fuscus* and *Rana esculenta* complex from Ciric river's basin (Iasi, Romania). *Analele Sinfice ale Universitatii "Al.I. Cuza" Iasi, s. Biologie animala*, LI: 179-187. (in English) [In March-June 2004, 1263 prey specimens were identified in the 143 anuran individuals collected of three anuran species. In *B. viridis* 95.25% of the preys were insects, 2% arachnids. In *P. fuscus*, insects represented 74.19% and arachnids 16.12%, while in *R. esculenta* complex, 82.52% were insects and 10.22% crustaceans. Odonata (one specimen) exclusively were represented in the diet of *P. fuscus*.] Address: not stated

**7631.** Nogami, K.; Takeyama, H. (2005): A study on relation between the appearance of butterflies and dragonflies, and the temperature environment of a big tree. *Papers on Environmental Information Science*, No.19 (The 19th Conference on Environmental Information Science): 19-24. (in Japanese, with English summary) [Verbatim: "In this research, it aimed at clarifying relation between the appearance of butterflies and dragonflies, and the temperature environment of a big tree. A result is shown in the following; 1) Even if it was one big tree, when meeting conditions with various temperature environments, it was able to observe that a big tree was important as a habitat of a butterflies and dragonflies. 2) The big tree is functioning as a stepping stone for a butterfly or a dragonfly. 3) A big tree, water, wood, a vegetable garden, etc. are designed in one, and the appearance of a butterfly and a dragonfly increases by making temperature environment various." (Authors)] Address: Takeyama, H., The Museum of Nature and Human Activities, Hyogo, Japan

**7632.** Pennuto, C.M.; Lane, O.P.; Evers, D.C.; Taylor, R.T.; Loukmas, J. (2005): Mercury in the Northern Crayfish, *Orconectes virilis* (Hagen), in New England, USA. *Ecotoxicology* 14: 149-162. (in English) ["Biologists and policy makers continue to seek environmental correlates of mercury bioavailability in aquatic ecosystems. In this study, we assessed the effects of drainage basin, habitat type, size class, and sex on mercury con-

centrations in *O. virilis*. Drainage basin, habitat type, and size class had significant effects on mercury concentration in crayfish tail muscle even though animals from roughly half the sites examined had mean mercury values at or below expected background levels. The low observed mercury values in crayfish tail muscle indicate a low consumptive risk. Contrary to expectations, crayfish from brooks had higher mercury concentrations than animals from other habitat types, possibly as a result of point source contamination or varying diet compositions among habitats. We suggest that crayfish represent a good indicator of mercury bioavailability in aquatic ecosystems and provide a synthesis for lower food webs. Our understanding of mercury dynamics in lower food webs has been hindered by an under appreciation of the complexity in foraging habits of macroinvertebrates. Further studies focusing on benthos with well-understood life histories and foraging behaviour are essential to improve our understanding of mercury transfer and bioavailability through aquatic systems." (Authors) Patterns in total mercury concentration of benthic macroinvertebrates in lake and river habitats are compared between orders, and including Odonata.] Address: Pennuto, C.M., Dept of Biology & Center for Great Lakes Research, Buffalo State College, Buffalo, NY, USA, 14222. E-mail: pennutcm@buffalostate.edu

**7633.** Smith, M.J.; Drew, M.M.; Peebles, M.; Summers, K. (2005): Predator cues during the egg stage affect larval development in the Gray Treefrog, *Hyla versicolor* (Anura: Hylidae). *Copeia* 2005(1): 169-173. (in English) ["The presence of predators can induce changes in the morphology and behaviour of the potential prey. In this study, we examined the effects of different predator induced changes in water chemistry experienced during the egg stage on larval development in the Gray Treefrog. The potential predators of amphibian eggs and tadpoles used in this study included larval odonates (Aeshnidae), crawfish, and leeches. Tadpoles from eggs exposed to leech-induced changes in water chemistry were consistently smaller throughout their larval development than the tadpoles in the control and other potential predator treatments. Size at metamorphosis did not differ significantly among treatments, but the tadpoles in the leech treatment were significantly older at metamorphosis than tadpoles in the other treatments. These results highlight some of the potential fitness consequences for larval *H. versicolor* that received predator cues during the egg stage." (Authors) Nested analysis of variance showed a significant effect of predator treatment on age at metamorphosis. Tadpoles exposed to the leech treatments were significantly older at metamorphosis than the tadpoles in the control ( $P < 0.05$ ), crawfish ( $P < 0.05$ ), and odonate ( $P < 0.08$ ) treatments. All other treatments did not differ significantly from each other in age at metamorphosis.] Address: not stated

**7634.** Stoks, R.; Nystrom, J.L.; May, M.L.; McPeck, M.A. (2005): Parallel evolution in ecological and reproductive traits to produce cryptic damselfly species across the Holarctic. *Evolution* 59(9): 1976-1988. (in English) ["The damselfly genus *Enallagma* originated in the Nearctic, and two Nearctic lineages recently underwent radiations partly associated with multiple independent habitat shifts from lakes dominated by fish predators into lakes dominated by dragonfly predators. A previous molecular study of four Palearctic morphospecies and all representative Nearctic species identified

the presence of two cryptic species sets, with each set having Palearctic and Nearctic representatives. However, the cryptic species within each set are not sibling species. Here, we present quantitative data on ecologically important larval morphologies and behaviours involved in predator avoidance and on adult male morphological structures involved in mate recognition to quantify the phenotypic relationships among these cryptic species sets. For the adult stage, our data indicate strong parallel evolution of the structures involved in specific mate recognition - the male cerci. For the larval stage, morphometric analyses show that the Palearctic species evolved a nearly identical morphology to the sibling-clade members in the Nearctic that live in waters where dragonflies are the top predators. This implicates the importance of dragonfly predation in the history of the Palearctic clade. Behavioural analyses suggest population differentiation in response to the actual predator environment in the Palearctic clade, consistent with the species differentiation seen in the Nearctic. Our results suggest parallel evolution of adult traits that influence specific mate choice and larval traits that influence ecological performance underlie the striking similarity of *Enallagma* species across continents. This concurrent parallel evolution in both stages of a complex life cycle, especially when both stages do not share the same selective environment, may be a very unusual mechanism generating cryptic species." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U. Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**7635.** Stolen, E.D. (2005): Great Egrets gleaning dragonflies. *Florida Field Naturalist* 33(1): 15-16. (in English) ["Although mainly piscivorous, the Great Egret (*Ardea alba*) takes a variety of food items including dragonflies (McCrimmon et al. 2001, Hancock and Kushlan 1984, Palmer 1962). Clark (1980) described gleaning of dragonflies from low salt marsh vegetation by Tricolored Herons (*Egretta tricolor*) near a nesting colony. Gleaning of insects is noted as a foraging behaviour of Great Egrets in Kushlan (1978), but I could find no published description of gleaning behaviour for the Great Egret. On the morning of 24 March 2003, I was measuring foraging rates of wading birds feeding in impounded salt marsh habitat along the Black Point Wildlife Drive on Merritt Island National Wildlife Refuge near Titusville, Florida. Between 10:30 and 12:00 I observed four Great Egrets gleaning dragonflies which were perched on the ends of stems of sand cord grass (*Spartina bakeri*) and salt grass (*Distichlis spicata*). From my observation point 35 m away, the length of each dragonfly's body appeared to be less than one-quarter of the length of a Great Egret bill, which is typically in the range of 11 cm (Palmer 1962). Two of the Great Egrets that gleaned dragonflies were foraging in a loose mixed species foraging aggregation (individuals separated by 15-50 m) including four Great Egrets, and one Tricolored Heron. The other two Great Egrets observed eating dragonflies were foraging solitarily (greater than 100 m to the nearest other wading bird). During the time the birds were observed gleaning dragonflies, the birds were moving slowly through the vegetation with the neck extended in an upright posture and body angled away from the ground. The dragonflies were captured with rapid strikes of the head and neck and were swallowed immediately. One of the birds captured six fish and one dragonfly during the three minutes I observed its foraging behaviour; two others captured only dragon-



flies during the three minutes (one and three dragonflies captured). The last individual observed gleaning dragonflies was not observed long enough to quantify its foraging behavior. Thus, dragonfly gleaning behaviour appeared to be a foraging strategy rather than incidental or opportunistic captures during foraging for other prey. The weather was typical of early spring in Florida, with clear skies and air temperature around 22°C with a light wind around 11 km/h. On numerous occasions while conducting monthly aerial surveys of wading bird foraging habitat use during the past six years, I have noticed small groups of Great Egrets foraging in non-flooded *Spartina bakeri* salt marsh during the winter dry season. These groups typically consist of 2-10 individuals separated by 10-100 body lengths. Individuals appear to be standing upright and are stationary or moving slowly within the tall (1-2 m) grass. Accounts of Great Egrets taking various small mammals (Palmer 1962) led me to assume that the birds were foraging for terrestrial vertebrates, but clearly they may have been foraging for insects." (Authors)] Address: Stolen, E.D., Dynamac Corp., Mail Code: DYN-2, Kennedy Space Center, FL 32899, USA

**7636.** Sudo, S.; Tsuyuki, K.; Kobayashi, T. (2005): Experimental study on the collision of a droplet with a dragonfly wing. *Journal of the Japanese Society for Experimental Mechanics* 5(3): 272-279. (in Japanese, with English summary) ["The collision dynamics of a water droplet on a wing surface of live dragonfly were studied using a high-speed video camera system. The high-speed video camera system is composed of two video cameras, two video cassette recorders, motion grabber, two video monitors, and a personal computer. This experimental study focused mainly on the function of the dragonfly wings for the droplet collision. The dynamic response of dragonfly wing was studied for two impact velocities of water droplet. It was found that live dragonfly wings have excellent shock absorption and deformability for the rain droplet collision." (Authors)] Address: Sudo, S., Faculty of Systems Science and Technology, Akita Prefectural University, Ebinokuchi 84-4, Yurihonjo 015-0055, Japan

**7637.** Tennessen, K.J. (2005): The larvae of *Enallagma davisii* Westfall and *E. recurvatum* Davis (Odonata: Coenagrionidae). *J. New York Entomol. Soc.* 113(3-4): 205-211. (in English) ["Larvae of *E. davisii* and *E. recurvatum* have round gill tips similar to *E. minusculum* but final stadia are significantly larger (total length 11.4-13.8 mm for *davisii* and *recurvatum* combined vs. 9.5-9.7 mm for *minusculum*) and the lateral carinae of abdominal segments 2-7 have distinct stout setae. The prementum of *E. davisii* (length 1.85-2.30 mm, width 1.56-1.80 mm; n=10) is slightly larger than that of *E. recurvatum* (length 1.75-1.85 mm, width 1.48-1.53 mm; n=5). The cerci of *E. davisii* in lateral view are wider than long in males and about as wide as long in females; in *E. recurvatum* the cerci are longer than wide in both sexes." (Author)] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**7638.** Van de Meutter, F. (2005): Local and regional processes in macroinvertebrate communities in shallow lakes. Proefschrift voorgedragen tot het behalen van de graad van Doctor in de Wetenschappen. Katholieke Universiteit Leuven. Faculteit Wetenschappen. Departement Biologie. Laboratorium voor Aquatische Ecologie:

205 pp. (in English, with Dutch summary) ["This thesis consists of three major parts. A first part deals with the interaction of the local factors turbidity and predation with lake macroinvertebrates and macroinvertebrate community structure in lakes. In the second part we investigate to what extent the presence of littoral invertebrate predators may interfere with horizontal migration behaviour of *Daphnia*. Finally, in the third part we focus on the effects of the regional process dispersal and the interaction between dispersal and the drainages of the lakes, on structuring lake macroinvertebrate (meta)communities." (Author) Odonata are studied in many cases, especially in Chapter 2 (Water turbidity affects predator-prey interactions in a fish-damselfly system), Chapter 3 (Behavioural linkage of pelagic prey and littoral predators: microhabitat selection by *Daphnia* induced by damselfly larvae), and Chapter 4 (Spatial avoidance of littoral and pelagic invertebrate predators by *Daphnia*). *Summaries: Chapter I: The effect of turbidity state and microhabitat on macroinvertebrate assemblages: a pilot study of six shallow lakes.* Shallow lakes can occur in two alternative stable states, a clear-water state and a turbid state. This is associated with separate assemblages of fish, zooplankton and plants. Little is known about whether macroinvertebrate assemblages differ across both stable states. This study investigated this in a connected set of three turbid and three clear-water shallow lakes. To overcome confounding effects of differences in spatial structure of macrophytes in turbid and clear-water lakes, we sampled three microhabitats that occurred in both alternative stable states: open water, sago pondweed (*Potamogeton pectinatus*) and reed (*Phragmites australis*). Univariate analyses indicated no differences in the number of organisms, taxon richness or diversity between turbid and clear-water lakes. Multivariate analysis, however, indicated a trend towards differences in the macroinvertebrate community structure of both stable states. Two taxa explained a significant amount of the variation between both lake types, both of which preferred the clear-water lakes. The number of organisms and the taxon richness were higher in reed than in the other microhabitats, but diversity and evenness did not differ among the microhabitats. Multivariate analyses separated all three microhabitats. Four taxa, mainly detritus feeders and collector-gatherers, explained most of the variation in the data and preferred the reed microhabitat. The effects of turbidity state (11.8 % explained variance) and microhabitat (24 % explained variance) on the macroinvertebrate assemblages were largely independent from each other (2 % shared variance). Although macroinvertebrates are not implemented in the initial theory of stable states, our results indicate different assemblages across both stable states. *Chapter II: Water turbidity affects predator-prey interactions in a fish-damselfly system.* Community structure may differ dramatically between clear-water and turbid lakes. These differences have been attributed to differences in the cascading effect of fish on prey populations, due to the reduced efficiency of fish predation in the presence of macrophytes. However, recent theoretical ideas suggest that water turbidity may shape predator-prey interactions, and it is predicted that prey will relax its antipredation behaviour in turbid water (H1). As a result, the nature of predator-prey interactions is expected to shift from both direct and indirect in clear water to dominantly direct in turbid water (H2). We tested these ideas in a fish-damselfly predator-prey system. In a first behavioural experiment, we looked at antipredation behaviour of damselfly lar-

vae isolated from habitats that differ in turbidity, in the presence of fish in clear and turbid water. As predicted in H1, the larvae were more active in turbid than in clear water. In a complementary enclosure experiment, we reared larvae in a clear-water pond and a turbid pond, respectively, and manipulated the origin of the larvae (clear-water, turbid pond), fish presence (absent, present), and vegetation density (sparse, abundant). In both ponds, fish had a direct negative effect on survival of the larvae, which was mitigated in the presence of vegetation. In the fish treatment, the change in average body mass tended to be higher in the turbid than the clear pond, suggesting indirect effects of fish were mitigated in the turbid pond. This was supported by a negative effect of fish on effective growth rate of larvae in the clear pond, but not in the turbid pond. These results are compatible with the idea that predator-prey relationships are mainly governed by direct effects in turbid water, and by direct and indirect effects in clear water.

**Chapter III: Behavioural linkage of pelagic prey and littoral predators: microhabitat selection by Daphnia induced by damselfly larvae.** Only recently ecologists started treating the previously separately considered benthic, littoral and pelagic zones of lake ecosystems as closely connected compartments. Here we study a link between organisms belonging to a different compartment - namely the pelagic and the littoral - through behaviour in a series of laboratory experiments. Waterfleas of the genus *Daphnia* are inhabitants of the pelagic zone and suffer a high predation pressure from syntopic vertebrate predators (mainly fish). Presumably to escape this predation, they sometimes migrate in the day to the littoral to seek refuge within macrophytes and return to the pelagic at night. Zygopterans from the genus *Ischnura* do commonly co-occur in ponds with *Daphnia* and are known as opportunistic predators of *Daphnia*. In two initial experiments in microcosms in the lab we showed that *Ischnura* larvae are littoral predators strongly associated with macrophytes. Although we found that predation rates of individual *Ischnura* larvae on *Daphnia* are approximately 1.5 fold lower in macrophytes compared to open water, total predation from *Ischnura* on *Daphnia* per unit area is tenfold higher within macrophytes than in open water, making the open water a safer place for *Daphnia* with regard to *Ischnura* predation. In a third microcosm experiment we monitored horizontal distribution of *Daphnia* in the absence, presence and odour only of *Ischnura* larvae. After 2 hours, on average 10 % less *Daphnia* remained within the vegetation when *Ischnura* larvae or only their odour were present compared to when *Ischnura* or *Ischnura* odour were absent. We interpret this as a behavioural anti-predation response of *Daphnia* to the presence of *Ischnura* larvae that seems primarily chemically mediated. The observed horizontal migration of the pelagic prey driven by the littoral predator may couple both lake compartments and may interact with the predator-prey relationships within the pelagic.

**Chapter IV: Spatial avoidance of littoral and pelagic invertebrate predators by Daphnia.** Studies on spatial avoidance behaviour of predators by prey often ignored the fact that prey typically face multiple predators which themselves interact and show a spatial pattern in abundance and predation rates. In a series of laboratory experiments we investigated predation risk and horizontal migration of the cladoceran *Daphnia magna* between open water and vegetation in response to two important invertebrate predators with a contrasting spatial distribution: pelagic *Chaoborus* and vegetation-as-

sociated *Ischnura*. As expected, predation risk by *Chaoborus* was higher in open water due to higher numbers and higher predation rates of *Chaoborus*, while for *Ischnura*, predation risk was highest in the vegetation due to higher densities but despite lower predation rates of *Ischnura*. In accordance with this, *Daphnia* moved into the vegetation in the single presence of the pelagic *Chaoborus*. In the single presence of *Ischnura*, however, *Daphnia* showed no response. We hypothesize this may be the result of a constitutive behaviour of *Daphnia* to avoid pelagic fish, which impedes a response to the open water. In the combined predator treatment, *Daphnia* migrated to the open water zone. The increased risk of predation in the vegetation, due to a facilitating effect of *Chaoborus* on *Ischnura* predation rates is believed to have caused this migration of the *Daphnia*. This response of *Daphnia* declined through time and *Daphnia* moved toward the vegetation. A decline in the activity of the *Ischnura* larvae through time may have switched the risk balance in favour of the vegetation environment.

**Chapter V: Lake-to-lake dispersal of lentic macroinvertebrates through lake outlets.** Little is known on dispersal of lentic macroinvertebrates. We quantified dispersal of lentic macroinvertebrates through lake connections in a highly connected lake system, and investigated the role of connection properties and timing (day, night) on dispersal rate. Furthermore, by comparing dispersing macroinvertebrate assemblages with the macroinvertebrate assemblages of source lakes, we tested whether dispersal was neutral or a taxon-specific process. Many taxa dispersed through the lake connections, probably mainly by passive transport. Taxon richness of the dispersing macroinvertebrate assemblage was proportional to taxon richness in the source lakes. The number of individuals that dispersed, however, was not related to source lake densities, possibly because of the highly patchy distribution of lentic macroinvertebrates within lakes and the relatively short sampling time. Baetidae, Chironomidae and Physidae exhibited higher dispersal rates, corrected for source pond densities, than a selection of seven other macroinvertebrate families, indicating that the extent of dispersal may be taxon-specific. None of the physical properties of the connections affected dispersal. The number of dispersing macroinvertebrates was higher during the night than during daytime. Of seven frequently dispersing families, Chaoboridae and Chironomidae showed higher dispersal during the night, probably resulting from diel vertical migration behaviour. Dispersal rates of actively and passively over-land dispersers through lake connections did not differ. Since over-land dispersal probably is more frequent in active dispersers compared to passive dispersers, dispersal through lake-outlets in connected lake systems may generate different spatial patterns compared to over-land dispersal with regard to the composition of communities and the genetic structure of populations.

**Chapter VI: Rapid response of macroinvertebrates to drainage management of shallow lakes.** Shallow lakes throughout the world are subject to drainages, either as part of fish farming practices to harvest the fish, or as part of lake restoration projects. Lake drainages of fish lakes are known to improve macrophyte and zooplankton diversity, but the effect on the macroinvertebrate community is poorly known. In this study, we investigated temporal trends in the macroinvertebrate community following lake drainage in six shallow connected lakes. We evaluated drainage effects for all macroinvertebrates at the family level and for Coleoptera, Hemi-

ptera and Odonata at the genus or species level. After the drainages, diversity increased for all macroinvertebrates at the family level, Hemiptera and Odonata. Taxon richness increased for Coleoptera, Hemiptera and Odonata. Recolonization of the lakes by the former inhabitants occurred within the first year after the drainages and was supplemented with a set of species that previously were rare or did not occur in the lakes. Changes in the environmental conditions of the lakes were small and transient, except for the decline in fish. The fact that species that occurred in the lakes before the drainages rapidly recolonized the lakes is attributed to the high connectivity in our study system. The occurrence of supplementary species probably was linked to the decline in fish predation, suggesting fish was a dominant factor in shaping the communities. In summary, lake drainage has a positive effect on the diversity and richness of macroinvertebrates in shallow connected lakes. This positive effect seems largely due to a combination of a decline in fish predation following lake drainage and the high rate of recolonization amongst others via connections to nondrained lakes. Lake drainage therefore probably is the most cost-effective lake restoration tool in shallow connected lakes. Other restoration tools may be more favourable in isolated lakes where recolonization may be constrained.

*Chapter VII: Metacomunity structure of lentic macroinvertebrates: contrasting active and passive dispersers.* Macroinvertebrates inhabiting ponds and lakes can be categorized as active or passive dispersers. Because dispersal over land is assumed to be very limited in passive dispersers, connections between lakes may provide important additional dispersal corridors between lakes. Active dispersers can easily fly from lake to lake over land, and the additional contribution of dispersal via lake connections to dispersal may be negligible. As a result, metacomunities of active and passive macroinvertebrate dispersers may be differentially affected by lake connectivity and hence show different spatial structures. We investigated this hypothesis in a system of 34 connected lakes. In agreement with our expectations, we found that communities of passively dispersing macroinvertebrates were regionally structured according to a spatial model that incorporated the connections among the lakes, while active dispersers were not. Active dispersers, and surprisingly also passive dispersers, were also strongly structured conform the spatial model of Euclidian distances among the lakes, possibly suggesting that over-land dispersal as well was an important dispersal mechanism. These results confirm the importance of connectivity among habitats for metacomunity structure and dynamics, but also indicate that the net effect of connectivity on metacomunity structure depends on the prevailing mode of dispersal of the organisms.

*Chapter VIII: Habitat selection drives macroinvertebrate community turnover along the hydroperiod gradient.* Community turnover along the hydroperiod gradient is generally assumed to result from local selective mechanisms, abiotic limitation and species sorting, while the possibility of habitat selection behaviour is largely ignored. In this study, the colonizing assembly of macroinvertebrates in small, fishless habitats deviated strongly from that observed in a surrounding large set of fish lakes. By studying distance-similarity relationships, we could show that fish lakes did not act as sources for the colonization of the fishless habitats. We argue that neither abiotic limitation, nor species sorting due to invertebrate predators in the fishless habitats or due to fish in the fish lakes were able to

explain the observed patterns. Our results indicate that strong habitat selection may substantially contribute to community turnover along environmental gradients observed in nature, thereby offsetting a direct role for abiotic limitation and species sorting.] Address: Van de Meutter, F., Laboratorium voor Aquatische Ecologie, K.U. Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: frank.vandemeutter@bio.kuleuven.ac.be

**7639.** Vega, F.J.; García-Criado, F.; Miguélez, D.; Valladares, L.F. (2005): Diversidad de odonatos en los humedales rehabilitados del Parque Natural de Salburua (Álava). *Estudios del Museo de Ciencias Naturales de Álava* 20: 107-114. (in Spanish, with English summary) ["Adult Odonata were sampled from May to September 2003 in Salburua Natural Park (Álava, Basque Country, Spain) with the aim of characterising the diversity of this group in the area. The specimens were actively captured from 7 sampling stations using hand nets. 27 species (16 Zygoptera and 11 Anisoptera) were recorded. One of them, *Sympetrum meridionale*, is cited for the first time from the province of Álava and its presence in the Basque Country is confirmed. The richness value can be considered high when compared with studies conducted in other areas. This fact, together with the presence of some threatened species, specially *Coenagrion mercuriale* (National Catalogue of Threatened Species and Annex II of the Habitat Directive) and *Coenagrion scitulum* (designated as vulnerable in Europe by some authors), allow us to consider Salburua as an area of special interest for odonate conservation in the Basque Country." (Authors)] Address: Vega, F.J., Depto de Biología Animal, Facultad de Ciencias Biológicas y Ambientales, Universidad de León. 24071 León, Spain. E-mail: dbafvm@unileon.es

**7640.** Venturelli, P.; Tonn, W.M. (2005): Invertebrate communities of littoral macroinvertebrates in small boreal lakes. *J. N. Am. Benthol. Soc.* 24(4): 904-918. (in English) [Canada, Alberta; "Recent comparative studies suggest that macroinvertebrates in small Boreal Plains lakes respond to large fluctuations in fish densities caused by winterkill and subsequent recovery even when such fluctuations involve the normally piscivorous northern pike (*Esox lucius*). We introduced pike into a boreal lake made fishless by a past winterkill to isolate experimentally the effects of pike on littoral macroinvertebrates. We compared postmanipulation macroinvertebrate data from the experimental lake (EXP) to premanipulation data from the same lake, to parallel data from 2 unmanipulated reference lakes (R1 and R2) containing pike, and to data from mesocosms within EXP. Pike in all 3 lakes preyed heavily upon macroinvertebrates; diets consisted predominantly of the amphipod *Gammarus lacustris* in R1 and R2 and erpobdellid leeches in EXP. Principal components analysis (PCA) of macroinvertebrate communities distinguished between systems with and without fish and detected a shift in the macroinvertebrate community of EXP and predator-exposed control mesocosms away from large conspicuous taxa (e.g., odonates, coleopterans, and leeches) toward less-conspicuous taxa such as dipterans and trichopterans following manipulation. Responses of individual taxa were generally in agreement with PCA; erpobdellid leeches and odonates showed consistent negative responses to pike. Our study provides experimental evidence at the whole-lake scale that northern pike can affect littoral macroinvertebrates in small boreal lakes, and demon-



strates the sensitivity that littoral food webs in these systems can have to changes in the density of fish." (Authors)] Address: Venturelli, P., Dept Biological Sciences, University of Alberta, Edmonton, Alberta, Canada T6G 2E9

**7641.** Wu, Z.-j.; Li, Y.-m.; Wang, Y.-p.; Adams, M.J. (2005): Diet of introduced bullfrogs (*Rana catesbeiana*): Predation on and diet overlap with native frogs on Daishan Island, China. *Journal of Herpetology* 39(4) : 668-674. (in English) [The authors examined the diet of introduced *Rana catesbeiana* and three native frog species (*R. limnocharis*, *R. nigromaculata*, and *Bufo bufo gargarizans*) co-occurring at a group of ponds on Daishan Island, east of China, to gain insight into the nature of potential interactions between Bullfrogs and native frog species. The three most important diet items for juveniles bullfrogs were *Cambaridae* (33.60%), *Bassomatophore* (12.57%), and *Odonata* (11.35%). The diet of female bullfrogs and *Bufo bufo gargarizans* didn't include *Odonata*."] Address: Wu, Z.-j., Institute of Zoology, Chinese Academy of Sciences, 25 Beisihuanxi Road, Haidian, Beijing 100080, China

## 2006

**7642.** Aowphol, A.; Thirakhupt, K.; Nabhitabhata, J.; Voris, H.K. (2006): Foraging ecology of the Tokay gecko, *Gekko gekko* in a residential area in Thailand. *Amphibia-Reptilia* 27: 491-503. (in English) ["The foraging behaviour of *G. gekko* was observed at the visitor complex of the Khao Khiao Open Zoo at the Khao Khiao-Khao Chomphu Wildlife Sanctuary in Chon Buri Province, Thailand. Foraging parameters of *G. gekko* (foraging period, time spent moving, foraging attempts, foraging success, prey size consumed, and foraging distance) did not vary significantly between males, females, and juveniles. Individuals foraged between 18:01 and 09:00 hrs. Peak emergence time was between 18:01 and 20:00 hrs. Peak retreat time was between 04:01 and 07:00 hrs. Major food items included insects of the orders *Lepidoptera*, *Orthoptera*, and *Coleoptera*. Prey sizes of males, females, and juveniles were not significantly different, indicating no prey size selection. This may have been due to low insect availability in the habitat. *G. gekko* tended to be a sit-and-wait forager spending most of the time waiting for active prey. However, it sometimes foraged more actively when insect abundance was relatively high. Foraging behavior of males tended to be more variable than females and juveniles. In addition, variation in foraging parameters among individuals was noted. Foraging strategies of *G. gekko* observed in this study are interpreted in the context of optimal foraging theory." (Authors) *Odonata* are preyed, but seem to play a minor role as food source compared with other insect orders.] Address: Thirakhupt, K., Dept Biology, Faculty of Science, Chulalongkorn University, Pathumwan, Bangkok, 10330 Thailand. E-mail: Kumthorn@sc.chula.ac.th

**7643.** Aygen, D.; Emslie, S.D. (2006): Royal Tern (*Sterna maxima*) Chick Diet at Fisherman Island National Wildlife Refuge, Virginia. *Waterbirds* 29(3): 395-400. (in English) [In 2003, chick diet of Royal Tern included one undetermined dragonfly.] Address: Emslie, S.D., University of North Carolina, Department of Biology and Marine Biology, 601 S. College Road, Wilmington, NC 28403, USA. E-mail: emslies@uncw.edu

**7644.** Bartninkaite, I.; Bernotiene, R.; Pakalniškis, S.; Žygiutienė, M. (2006): Control of bloodsucking black fly (*Simuliidae*) populations in Lithuania. *Ekologija* 4: 70-75. (in English) ["The outbreak of bloodsucking black flies began in the 70s of the 20th century in the south-eastern part of Lithuania. By 1990, the biting activity of bloodsucking black flies increased and had become a serious problem. The bloodsucking insects caused losses of cattle and domestic birds and tormented holiday-makers in the Druskininkai health-resort. Biological larvicide based on *Bacillus thuringiensis* var. *israelensis* was used for bloodsucking black fly control in 1999–2005. The larvicide was introduced into the Nemunas River stream in one point directly from the river bank. A sufficient efficacy was achieved in a 164 km long segment of the river every year." (Authors) No effects on *Odonata* are observed.] Address: Bernotiene, Rasa, Institute of Ecology of Vilnius University, Akademijos 2, LT-08421 Vilnius, Lithuania. E-mail: rasab@ekoi.lt

**7645.** Bedjanic, M. (2006): Current status of taxonomy, research and conservation of dragonfly fauna (*Insecta: Odonata*) of Sri Lanka. *Bambaradeniya, C.N. B. (Ed): Fauna of Sri Lanka. Status of Taxonomy, Research and Conservation. IUCN: 20-34.* (in English) ["Altogether 116 described odonate species are known from Sri Lanka. The level of endemism is high - 53 taxa or 45.7 % are confined to the island. The families *Chlorocyphidae*, *Euphaeidae*, *Protoneuridae*, *Platystictidae*, *Gomphidae* and *Corduliidae* consist of almost exclusively endemic taxa. Additionally, four new endemic species are currently being described, bringing the actual number of dragonfly taxa to a total of 120 and the number of endemic representatives to a total of 57 taxa or 47.5 %. The odonate fauna of Sri Lanka is still insufficiently known. The knowledge on distribution, biology and taxonomy of adults and especially larval forms is very poor. Destruction of primary and secondary rainforests, destruction of forest corridors along streams, pollution and other pressures on streams and rivers in the southwestern and central parts of Sri Lanka are the major threats to the exceptionally rich endemic dragonfly fauna. More than 80% of the species confined to Sri Lanka are classified as endangered. Altogether 20 highly threatened endemic dragonfly species from Sri Lanka are currently proposed for inclusion on the new IUCN Global Red List of Threatened Animals. The paper elaborates on future research priorities with recommendations for the conservation of odonate fauna in Sri Lanka." (Author)] Address: Bedjanic, M., Kolodvorska 21b, SI-2310 Slovenska Bistrica, Slovenia. E-mail: matjazbedjanic@yahoo.com

**7646.** Casas, J.J.; Gessner, M.O.; Langton, P.H.; Calle, D.; Descals, E.; Salinas, M.J. (2006): Diversity of patterns and processes in rivers of eastern Andalusia. *Limnetica* 25(1-2): 155-170. (in English, with Spanish summary) ["We document the outstanding diversity of fluvial ecosystems in eastern Andalusia, mostly attributable to the high environmental heterogeneity of the region. [...] Fluvial communities respond to this spatial heterogeneity with marked qualitative and quantitative changes among rivers and along the upstream-downstream continuum, generally exhibiting a great decrease in taxonomic and functional diversity as human impacts increase towards the lower reaches. Discharge fluctuations add heterogeneity on the temporal scale and are an additional essential determinant of biological diversity. Climatic, geological and hydrological charac-

teristics profoundly affect the structure of the riparian vegetation, which in turn strongly conditions the community structure of benthic macroinvertebrates and organic matter turnover in fluvial ecosystems." (Authors) Macroinvertebrates including Odonata are treated on the order level.] Address: Casas, J., Departamento de Biología Vegetal y Ecología, Universidad de Almería, 04120-Almería, Spain. E-mail: jjcasas@ual.es

**7647.** De Marmels, J. (2006): Una pequeña colección de libélulas (Odonata) de Colombia. *Entomotropa* 21(1): 69-71. (in Spanish, with English summary) [A list of 31 species from the Quindío Department is presented.] Address: De Marmels, J., Inst. Zool. Agrícola, Fac. Agronomía, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com

**7648.** Govindarajulu, P.; Price, S.; Anholt, B.R. (2006): Introduced Bullfrogs (*Rana catesbeiana*) in western Canada: Has their ecology diverged? *Journal of Herpetology* 40(2): 249-260. (in English) ["Organisms can diverge in life history when introduced outside their native range due to release from predators, competitors, and parasites, and also due to genetic drift and local adaptation. We studied the ecology of *R. catesbeiana* in its introduced range in British Columbia (BC). To assess differences between introduced and native populations, we compared the population ecology of BC bullfrogs to published life-history parameters from the bullfrog's extensive native range in eastern North America. [...] Terrestrial insects were the primary prey item of bullfrogs < 150 g, whereas frogs were the primary prey item of larger bullfrogs. The life-history parameter values estimated for BC bullfrogs were within the range observed for bullfrogs in their native habitats. Due to milder weather conditions in southwestern BC, the seasonal pattern and growth rate of bullfrogs were similar to lower latitude populations in Kentucky and Missouri. We found no evidence to support the hypothesis that when released from native predators and parasites bullfrogs build up to unusually high population densities or attain significantly larger sizes in their introduced range." (Authors) Passing references to Odonata are made.] Address: Govindarajulu, P., Department of Biology, University of Victoria, Victoria, British Columbia, V8W 3N5, Canada. E-mail: purnimap@uvic.ca

**7649.** Graca, M. (2006): Allochthonous organic matter as a food resource for aquatic invertebrates in forested streams. The importance of forests for dragonflies in different continents. In: Rivera, AC (ED). 2006. *Forests and Dragonflies*. 4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005. Pensoft Series Faunistica 61: 37-47. (in English) ["This paper summarises the role of organic matter in the ecology of forested low order streams. Forests are among (lie most productive systems on Earth. More than 90% of forest primary production will end in detrital pathways, in soil and water. The amount of energy in the form of plain litter entering forested low order streams is several times higher than the energy synthesized by aquatic producers: therefore leaves produced in the riparian zones are a main energy source and decomposition is an important ecological process in those systems. Decomposition is mainly a biological process initiated by aquatic fungi and shredding invertebrates. Those organisms promote the transformation of leaves into fine particles used by bacteria, collectors and filter-feeding invertebrates. There-

fore, much of the energy allocated into secondary production in streams has an allochthonous origin. Nutrients liberated as a result of decomposition are used further downstream, in lakes or estuaries by primary producers. The rate at which leaf litter is decomposed is controlled by intrinsic leaf properties (nutrient content, plant chemical and physical defences) as well as environmental factors (e.g. nutrients in water). Disturbances of riparian zones and eutrophication can affect decomposition and, for this reason, changes in decomposition rates could be used as a functional parameter to assess stream health. Given that the standing stock of leaf litter has a positive effect on leaf consumers, allowing high biomass and diversity, it is likely to also affect top invertebrate predators including odonates: however, the literature on this subject is still scarce." (Author)] Address: Graça, M.A., IMAR, Depto de Zoologia, Univ. Coimbra. 3004-517 Coimbra. Portugal. E-mail: mgracailci.uc.pt

**7650.** Harzsch, S. (2006): Neurophylogeny: Architecture of the nervous system and a fresh view on arthropod phylogeny. *Integrative and Comparative Biology Advance Access* published February 28, 2006. doi: 10.1093/icb/iccj011: 1-33. (in English) ["The phylogenetic relationships within the Arthropoda have been controversial for more than a century. Today, comparative studies on the structure and development of the nervous system contribute important arguments to this discussion, so that the term "neurophylogeny" was coined for this discipline. The large number of recent studies on the nervous system in various nonmodel arthropods indicates that we are far advanced in the process of analyzing the cellular architecture of the arthropod nervous system in a depth that will ultimately provide characters at a level of resolution equal or even superior to that of characters traditionally used in morphological phylogenetic studies. This article sets out to summarize the current state of the discussion on arthropod phylogeny (including Odonata) and briefly evaluates the morphological characters that have been used as arguments in favour of the traditional Tracheata hypothesis. Then, a thorough overview is given of characters derived from structure and development of the arthropod brain and the ventral nerve cord from the cellular level to the level of larger neuropil systems. These characters support the new Tetraconata hypothesis suggested by Dohle and provide evidence for a clade that unites malacostracan and remipede crustaceans with the Hexapoda." (Author)] Address: Harzsch, S., Universität Ulm, Abt. Neurobiologie & Sektion Biosystematische Dokumentation, Albert-Einstein-Str. 11, D-89081 Ulm, Germany. E-mail: steffen.harzsch@uni-ulm.de

**7651.** Hoess, R. (2006): Catalogue of type material in the Odonata collection of the Natural History Museum Basel. *Entomologica Basiliensia et Collectionis Frey* 28: 1-31. (in English) ["A list of all types, apart from topotypes, present in the Odonata collection of the Natural History Museum, Basel is provided, whether they are indicated in the literature or not. The respective original descriptions are also listed. The type status, method of conservation, state of preservation, and the content of labels is given for each of the 111 specimens, belonging to 57 taxa, as well as additional information e.g. on other types of the respective taxon. The collection holds types of about 1% of the extant species of Odonata, thus being one of the more important Odonata collections worldwide; 37 taxa are represented by their primary types, and seven genera by type material of the

respective type species. Most specimens have been collected on expeditions made by non-specialist odonatologists." (Author)] Address: Hoess, R., Normannenstr. 35, 3018 Bern, Switzerland. E-mail: ReneHoess@1st.ch

**7652.** Honcu, M. (2006): Dragonflies (Odonata) of Kokorínsko Protected Landscape Area. Bohemia centralis 27: 231-239. (in Czech, with English summary) [In the past 15 years, a total of 33 Odonata species was registered in the Kokorínsko Protected Landscape Area (Central and Northern Bohemia, Czech Republic), representing 46,5 % of all dragonflies living in the Czech Republic. "Common species prevail, owing to the low altitude the sub-mountain and mountain species were not found. Very surprising is the occurrence of Ophiogomphus cecilia, Leucorrhinia pectoralis and two mediterranean species Crocothemis erythraea and Aeshna isosceles. Noteworthy is the occurrence of Lestes dryas, Brachytron pratense, Gomphus vulgatissimus, Somatochlora flavomaculata, Sympetrum danae, and S. flaveolum. The population of G. vulgatissimus found in the Pšovka brook is one of the most abundant in Northern Bohemia." (Author)] Address: Honcu, M., Vlastivídné muzeum a galerie Ěeská Lípa, Nám. Osvození 297, CZ - 470 01 Česká Lípa, Czech Republic. E-mail: honcu@muzeum.clnet.cz

**7653.** Ihssen, G. (2006): Bemerkenswerte Wiederfunde zweier Fließwasser-Libellenarten im Osten Hamburgs. Bombus 70/71: 291-292. (in German) [Germany, Hamburg; Stylurus flavipes: 24.6.2006, river Elbe near Lange Grove (Neuengamme); Cordulegaster boltonii: 9.7.2006, brook Bille.] Address: Ihssen, G., Timm-Kröger-Weg 6, 22335 Hamburg, Germany

**7654.** Kennedy, J.H. (2006): Book review: Dragonflies and damselflies of Texas and the southcentral United States. J. C. Abbott. ISBN 0-691-11364-5. Princeton University Press. J. N. Am. Benthol. Soc. 25(2): 531-532. (in English) ["In summary, this book does an outstanding job of fulfilling its goal of providing a comprehensive reference for adult dragonflies found in the southcentral US. It is a beautiful and well-produced field guide." (Author)] Address: Kennedy, J.H., Dept of Biology, University of North Texas, Denton, Texas, USA

**7655.** Kosterin, O.E.; Korsun, O.V. (2006): A collection of odonata from the Argun' (Hailar) River basin in Transbaikalia, east Siberia, Russia. Notulae Odonatologicae 6(8): 81-85. (in English) [B.F. BELYSHEV (1973, Strekozy (Odonata) Sibiri, Vol. 1, pts 1 & 2, Nauka, v Novosibirsk) noted 25 species for PriArgun'ye, that is the western catchment basin of the Argun' (Hailar) River within Chita province of Russia, E Transbaikalia. Additional material, especially that collected by the first author in 1997, increased the list to 32 species. The absence of any records of Calopteryx and Orthetrum from Transbaikalia is discussed. Coenagrion bifurcatum Zhu & Ou-yan, 2000 is synonymized with C. johanssoni (Wallengren, 1894).] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**7656.** Krebs, A. (2006): Räuber der Lüfte. Natürlich 7-2006: 40-45. (in German) [General account on Odonata in a Swiss journal directed to people interested in nature.] Address: not stated

**7657.** Martens, A. (2006): Buchbesprechungen: Schorr, M. & M. Lindeboom (eds) 2004: Dragonfly Research 2. Lauterbornia 56: 40. (in German) [Review of Version 2 of the odonatological literature database. In the meantime Version 6 of this data and pdf repository was published with more than 26500 titles and more than 4000 pdf.] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**7658.** Mauffray, B. (2006): Additional records of Georgia (United States) Odonata from the B.E. Montgomery archives. Notulae Odonatologicae 6(8): 86-87. (in English) ["In 2006, the B.E. Montgomery archives, housed at the International Odonata Research Institute, Gainesville, Florida, USA, was sorted. A number of county records omitted from Mauffray & Beaton (2005, Bull. Am. Odonatol. 9[2]: 21-66) are listed here with a few notes on "doubtful" and "expected" species." (Author)] Address: Mauffray, B., 4525 N.W. 53rd Lane., Gainesville, FL 32653, USA. E-mail: iori@afn.org

**7659.** McPeck, M.A.; Gavrillets, S (2006): The evolution of female mating preferences: Differentiation from species with promiscuous males can promote speciation. Evolution 60(10): 1967-1980. (in English) ["Females of many species are frequently courted by promiscuous males of their own and other closely related species. Such mating interactions may impose strong selection on female mating preferences to favor trait values in conspecific males that allow females to discriminate them from their heterospecific rivals. We explore the consequences of such selection in models of the evolution of female mating preferences when females must interact with heterospecific males from which they are completely postreproductively isolated. Specifically, we allow the values of both the most preferred male trait and the tolerance of females for males that deviate from this most preferred trait to evolve. Also, we consider situations in which females base their mating decisions on multiple male traits and must interact with males of multiple species. Females will rapidly differentiate in preference when they sometimes mistake heterospecific males for suitable mates, and the differentiation of female preference will select for conspecific male traits to differentiate as well. In most circumstances, this differentiation continues indefinitely, but slows substantially once females are differentiated enough to make mistakes rare. Populations of females with broader preference functions (i.e., broader tolerance for males with trait values that deviate from females' most preferred values) will evolve further to differentiate if the shape of the function cannot evolve. Also, the magnitude of separation that evolves is larger and achieved faster when conspecific males have lower relative abundance. The direction of differentiation is also very sensitive to initial conditions if females base their mate choices on multiple male traits. We discuss how these selection pressures on female mate choice may lead to speciation by generating differentiation among populations of a progenitor species that experiences different assemblages of heterospecifics. Opportunities for differentiation increase as the number of traits involved in mate choice increase and as the number of species involved increases. We suggest that this mode of speciation may have been particularly prevalent in response to the cycles of climatic change throughout the Quaternary that forced the assembly



and disassembly of entire communities on a continent-wide basis." (Authors) References to damselflies (*Enallagma*) are made.] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**7660.** Meurgey, F. (2006): A possible economic impact of libellulid larvae on production of freshwater shrimps in Guadeloupe, French West Indies (Anisoptera: Libellulidae). *Notulae Odonatologicae* 6(7): 79-80. (in English) ["It seems, the odonate presence in shrimp farming ponds has a negative effect on shrimp production. As recorded at Pointe Noire, an approx. 20% decrease of post-larvae production was noticed for several years, mainly due to *Pantala flavescens* predation on shrimps. There are two rearing basins at this site, the largest of these has a surface of ca 100 m<sup>2</sup>. During two days, 2302 exuviae were collected there and numerous final instar larvae were observed." (Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**7661.** Michael, J.L.; Batzer, D.P.; Fischer, J.B.; Gibbs, H.L. (2006): Fate of the herbicide sulfometuron methyl (Oust) and effects on invertebrates in drainages of an intensively managed plantation. *Can. J. Forest. Res.* 36: 2497-2504. (in English, with French summary) ["The off-site movement and impacts on water quality and aquatic ecosystems of sulfometuron methyl applied as the herbicide Oust to catchments in short-rotation plantations in the coastal plain of South Carolina were studied. Sulfometuron methyl was applied at the rate of 0.053 kg active ingredients ha<sup>-1</sup> to 5.4- and 5.9-ha catchments (C5 and C6, respectively). Off-site movement of sulfometuron methyl in drainage ditches was observed between application on 14 March 2001 and 14 June 2001 for the first five flow-producing rain events on C5 and the first four events on C6. The maximum observed concentrations (24 µg L<sup>-1</sup> on C5 and 23 µg L<sup>-1</sup> on C6) occurred during the first storm. Subsequent maximum concentrations for flow-producing storms were 10.0, 5.0, 0.5, and 0.1 µg L<sup>-1</sup> on C5 and 15.1, 6.7 and 0.5 µg L<sup>-1</sup> on C6. Pulsed inputs of sulfometuron methyl to stormflow were ephemeral and the maximum concentration for each storm event lasted 15 min or less. The faunal communities observed in these drainage ditches were dominated by a diversity of invertebrates typical of wetland habitats, such as midges, mosquitoes, water beetles, physid snails, and water fleas. Negative effects of sulfometuron methyl treatment on these communities in treated watersheds were not observed." (Authors) Tab. 2 lists a few Odonata on the genus level.] Address: Michael, J.L., Forestry Sciences Laboratory, Southern Research Station, USDA Forest Service, 520 DeVall Drive. Auburn. AL 36849. USA. E-mail: michajl@auburn.edu

**7662.** Mola, L.M.; Papeschi, A.G. (2006): Holokinetic chromosomes at a glance. *Journal of Basic & Applied Genetics* 17(1): 17-33. (in English) ["Current knowledge on holokinetic chromosomes is reviewed in this work. Their distribution in the different kingdoms is compiled and updated. The main criteria for their recognition are provided and discussed, from basic morphology and behaviour (ascertained by light microscopy) to a more precise characterization by means of immunofluorescence techniques and ultrastructural studies. The two modes of meiosis (pre- and post-reductional) recounted

in holokinetic systems are described as well as other topics related to the meiotic process. The principal mechanisms of karyotype evolution (fusion1 simplicity, fragmentation/agmatoploidy, translocation, poliploidy) and their occurrence and frequency in the different taxa are summarized. Finally, the different hypotheses about the origin of holokinetic chromosomes are described." (Authors) Odonata are referred as an example within the group of arthropods for which holokinetic chromosomes are typically.] Address: Mola, Liliana Maria, Laboratorio de Citogenética y Evolución, Dpto. Ecología, Genética y Evolución, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires. Int. Giiiraldes 2620, Ciudad Universitaria, Pabellon II, 4º Piso. (C1428EHA) Ciudad Autónoma de Buenos Aires, Argentina. E-mail: limola@ege.fcen.uba.ar

**7663.** Naraoka, H. (2006): Landing of *Epiophlebia superstes* (Sel.) larvae on snow-covered slopes (Epiophlebiota: Epiophlebiidae). *Notulae Odonatologicae* 6(8): 92-93. (in English) [Nurukawa, Aomori prefecture, Japan; "larvae were seen crawling up on steep snow walls during 3-27 April with a peak in the second half of April. With the approach of the spring season in April, the snow-covered stream opens up here and there, and the larvae crawled up through the openings and moved slowly on the snow during 09:00-14:30 h. ... The walking larvae entered the cavities around the tree roots or the crevices in the snow that was still covering the steep banks, and found shelter under the dead leaves. Probably they remain under the leaves until emergence. The latter commences at this locality in mid May, meaning the larvae may be able to survive on land during almost a month." (Author)] Address: Naraoka, H., 36-71 Fukunoda, Kitatsugaru, Aomori 0383661, Japan

**7664.** Nelson, C.R. (2006): Brook review: Introducing the Dragonflies of British Columbia and the Yukon. 2002. Robert A. Cannings. Royal British Columbia Museum, Victoria, British Columbia, Canada. \$12.95, paperback, 96 pages. ISBN 0-7726-4637-6. *Western North American Naturalist* 66(1): 136. (in English) [Book review, see also OAS 2901.] Address: Nelson, C.R., Department of Integrative Biology, Brigham Young University, Provo, Utah 84602, USA

**7665.** Nijboer, R.; Verdonschot, P.; Piechocki, A.; Tomczyk, G.; Klukowska, M. (2006): Characterisation of pristine Polish river systems and their use as reference conditions for Dutch river systems. *Alterra-rapport* 1367, ISSN 1566-7197: 221 pp. (in English) ["A central feature of the European Water Framework Directive are the reference conditions. The ecological quality status is determined by calculating the distance between the present situation and the reference conditions. To describe reference conditions the natural variation of biota in pristine water bodies should be measured. Because pristine water bodies are not present in the Netherlands anymore, water bodies (springs, streams, rivers and oxbow lakes) in central Poland were investigated. Macrophytes and macroinvertebrates were sampled and environmental variables were measured. The water bodies appeared to have a high biodiversity and a good ecological quality. They contain a high number of rare macroinvertebrate species. There are only few species that can not occur in the Netherlands, but their abundances were low. The Polish water bodies are suitable to describe reference conditions for similar Dutch water types. The data resulting from this project can be used

to update the descriptions of reference conditions in the 'Handboek Natuurdoeltypen' or to develop the descriptions for the Water Framework Directive types." (Authors) Odonata are part of the water body indicator system. The list of taxa also includes *Aeshna viridis*, *Stylurus flavipes*, and *Ophiogomphus cecilia*] Address: Alterra, P.O. Box 47; 6700 AA Wageningen; The Netherlands. E-mail: info.alterra@wur.nl

**7666.** Orlova, M.I.; Telesh, I.V.; Berezina, N.A.; Antsulevich, A.E.; Maximov, A.A.; Litvinchuk, L.F. (2006): Effects of nonindigenous species on diversity and community functioning in the eastern Gulf of Finland (Baltic Sea). *Helgol. Mar. Res.* 60: 98-105. (in English) ["An increase of xenodiversity in plankton and benthos in the eastern Gulf of Finland was observed from 1998 to 2004. Nonindigenous species account for 4.8% of all species found and up to 96% of total biomass. Invasive benthic omnivores, the alien amphipods *Gmelinoides fasciatus* and *Pontogammarus robustoides* and the predaceous fish *Perccottus glenii* with their versatile diets strongly affect the community structure. Invasive sessile seston-feeders that directly (through grazing and water clearance) and indirectly (through recycling of nutrients) interact with other ecosystem components, are mainly represented by the zebra mussel *Dreissena polymorpha*, which affect the structure of benthic and planktonic communities as well as benthicpelagic coupling. The invasive predatory cladocerans *Cercopagis pengoi* and *Evadne anonyx* and larvae of *D. polymorpha* are only temporary components in the zooplankton, which is limiting their overall effect. Alien benthic bioturbators, the polychaetes *Marenzelleria neglecta* and the oligochaete *Tubificoides pseudogaster* account for a high proportion of total abundance and biomass but their effects on native species need further research." (Authors) The content of stomachs of *Perccottus glenii* included Odonata.] Address: Orlova, Marina, Laboratory of Freshwater and Experimental Hydrobiology, Zoological Institute of the Russian Academy for Sciences, Universitetskaya Emb., 1., 199034 St. Petersburg, Russia. E-mail: marinaorlova@rambler.ru

**7667.** Orr, A.G. (2006): Odonata in Bornean tropical rain forest formations: Diversity, endemism and applications for conservation management. In: Cordero Rivera A (Ed.) *Forest and Dragonflies. Fourth WDA International Symposium of Odonatology*, Pontevedra (Spain), July 2005. Sofia-Moscow: Pensoft: 51-78. (in English) ["The island of Borneo was originally almost completely covered by closed canopy tropical rainforest. Owing to an aseasonal, hot, perhumid climate and high rainfall, forests were well supplied with streams and standing water. Consequently the rich, largely endemic odonate fauna must have evolved in association with these forests, and non-forest species, common today in disturbed land, must formerly have been rare opportunists in forest gaps or localised lacustrine species, it is estimated that at least 70 % of the fauna is presently confined to forest habitats and probably depends on forest for its survival. This study relates odonate distribution to a mosaic of complex tropical rain forest formations in Brunei. The tiny sultanate of Brunei still enjoys about 80% forest cover, representative of all the seven major formations found on the island and a great many of the 30+ sub-formations, and results from a nation-wide survey of odonates from most habitats are considered to be broadly applicable to the entire island of Borneo and many other parts of equatorial

south-east Asia. Greatest odonate diversity, both a and b, and greatest endemism, is found in the primary lowland mixed dipterocarp forests, especially those growing in highly dissected landscapes such as occur at the KBFSC. at the edges of the central uplands. High diversity and endemism is also found in swamp forest, especially freshwater swamp, with certain endangered peat swamp formations also important. The highly vulnerable kerangas forest harbours fewer species, none uniquely, and the mangrove fauna is still more depauperate, with only a single wide-ranging specialist restricted to this habitat. Secondary dipterocarp forest is certainly less rich in odonates than primary forest, but lack of sites for parallel comparisons makes it difficult at present to state how serious this effect is. These results emphasise the importance of conserving a wide range of primary forest formations to achieve satisfactory odonate conservation, a strategy congruent with the conservation of charismatic land-based vertebrates and forest peoples." (Author)] Address: Orr, B., 26 Currimundi Rd, Caloundra, Q4551, Australia

**7668.** Park, H.-h.; Lee, J.-h. (2006): Arthropod trophic relationships in a temperate rice ecosystem: A stable isotope analysis with  $^{13}\text{C}$  and  $^{15}\text{N}$ . *Environ. Entomol.* 35(3): 684-693. (in English) [Korea; "Arthropod trophic relationships in temperate rice fields during the growing season were explored in 2000 and 2001 by measuring signatures of naturally occurring carbon and nitrogen stable isotopes.  $^{13}\text{C}$  and  $^{15}\text{N}$  values for rice plants, soil, and arthropods varied slightly between both years, and the values were rather distinctive according to functional groups. Isotopic changes in rice plants affected values for herbivorous insects. Seasonal changes in  $^{13}\text{C}$  and  $^{15}\text{N}$  values for predators indicated that prey composition of their diets changed seasonally. Early in the season, there were two distinct clusters: (1) rice plants-herbivorous insects-parasitoids cluster and (2) filter-feeders/detrivores and predators cluster. The correlations in each case suggest interactions. During mid-season, the rice plants-herbivorous insects-parasitoids interaction was maintained, and herbivorous insects such as planthoppers were linked to predators. Also, detritivores such as Entomobryidae spp. seemed to be linked. During the late season, close interactions occurred at all trophic levels. Our study provided isotopic evidence that filter feeders/detrivores such as Chironomidae and Entomobryidae play a valuable role in maintaining the predator complex in the rice ecosystems during the rice-growing season. Also, fundamental data of stable carbon and nitrogen isotopes acquired in this study would be of value for use in advanced community studies for rice fields." (Authors) Table 1 includes Aeshnidae and Lestidae, and the means of carbon and nitrogen stable isotope ratios of sampled specimens.] Address: Park, H.-h., Entomology Program, School of Agricultural Biotechnology, College of Agriculture and Life Sciences, Seoul National University, San 56-1, Shillim-dong, Gwanak-gu, Seoul 151-921, Republic of Korea

**7669.** Prunier, F. (2006): Sex ratio y Biometría en tres poblaciones de libélulas de Sierra Morena: *Anax imperator*, *Boyeria irene*, *Cordulegaster boltoni immaculifrons* (Insecta: Odonata). *Boletín de la Sociedad Andaluza de Entomología* 13(2005): 67-71. (in Spanish, with English summary) [Total length and sex ratio were measured in three Andalusian (Spain) populations.] Address: E-mail: florent.prunier@netcourrier.com

**7670.** Reinhardt, K. (2006): A note on emergence and oviposition of *Paragomphus nyasicus* Kimmins at Lake Malawi, Malawi (Anisoptera: Gomphidae). *Notulae Odonatologicae* 6(8): 88-90. (in English) ["In the night of 22 to 23 Sept. 2001, emergence of the species was observed at Chembe village, Lake Malawi. About one individual per 1 metre beach emerged on a strip of 50 m length, all exuviae were very close to the waterline. Most individuals emerged after midnight, 6 to 9 h after sunset which is later than previously reported for tropical gomphids. This emergence delay may either be typical for *P. nyasicus* or be caused by human activity at the beach which lasted until well after dusk. The sex ratio was equal. Females oviposited by abdomen dipping onto the sand that has just been touched by the tiny lake waves. The dipping frequency appeared to be correlated to the frequency by which these little wavelets would roll onto the sand. Males patrolled or perched on the sand very close to the waterline but did not appear to show territorial activity." (Author)] Address: Reinhardt, K., Dept Animal & Plant Sciences, Univ. Sheffield, Sheffield S10 2TN, UK. E-mail: K.Reinhardt@sheffield.ac.uk

**7671.** Tailly, M.; Zampieri, D (2006): *Crocothemis servilia* added to the Armenian fauna and new records of *Lindenia tetraphylla* and *Selysiothemis nigra* from Azerbaijan (Anisoptera: Gomphidae, Libellulidae). *Notulae Odonatologicae* 6(8): 93-94. (in English) [*Crocothemis servilia*: 18-VI-2004, vicinity of Meghri in southern Armenia, close to the border of Iran (38°53.443'N, 46°15.926'E; 516 m asl). *Lindenia tetraphylla*, 1 ♀, 23-VI-1958, Mingeçaur (40°46'12"N, 47°2' 56"E). *Selysiothemis nigra*, 1 ♂, 1 ♀, both from Mingeçaur, dated 29-VI-1958 and 23-VI-1958, respectively.] Address: Tailly, M., Hoonakkerdreef 35, B-8791 Waregem, Belgium. E-mail: marc.tailly@pandora.be

**7672.** Tol, J. van (2006): The status of seven nomina nova introduced by H. Steinmann (1997). *Notulae Odonatologicae* 6(8): 94-95. (in English) ["[...] As will be explained below, it has appeared that all new names are unnecessary replacement names. It is considered worthwhile to publish the arguments, since such catalogues may have long-lasting impact on the use of scientific names. The names are in alphabetical order of species-group names. A general remark can also be made. Steinmann argues for all names to be replaced that they are junior secondary homonyms; they are actually junior primary homonyms.

\**cancer* Steinmann, 1997b: 172, *Onychogomphus*. — Replacement name for *Gomphus* (*Onychogomphus*) *ruptus* Selys, 1858 (nee Selys, 1857). STEINMANN (1997b) includes two nominal taxa in his catalogue, viz. *Nihonogomphus ruptus* Selys, 1857, and *Onychogomphus ruptus* Selys, 1858. For the latter he proposes *O. cancer* as a replacement. However, both nominal taxa refer to the same taxonomic species. The references of Steinmann to Selys (1857, *Monogr. Gomph.*: 393), and to Selys (1858, *Mem. Soc. r. Set, Liege* 11: 653) pertain to the same publication (E. de SELYS, 1858, *Monographic des Gomphines*, Muquardt, Bruxelles).

\**johnsoni* Steinmann, 1997b: 12, *Aeshna* — Replacement name for *Aeshna gigas* Bartenev, 1909 (nee Rambur, 1842). *Aeshna gigas* Bartenev is considered a junior synonym of *Aeshna crenata* Hagen, 1856 (B.F BELYSHEV, 1973: 405, *The dragon/lies of Siberia*, Vol. 1, part 2, Nauka, Novosibirsk), so a replacement name was unnecessary.

\**kiautai* Steinmann, 1997a: 201, *Argia*. — Replacement name for *Argia apicalis* Matsumura, 1913 (nee Say, 1839). The status of *Argia apicalis* Matsumura was ascertained by ASAHINA (1951: 15, *Kontyu* 19: 15-22), when he introduced the name *Rhipidolestes okinawana* sp. n. [recte: *okinawanus*] for this species.

\**schmidtii* Steinmann, 1997a: 259, *Enallagma*. — Replacement name for *Enallagma risi* Pinhey, 1962 (nee Schmidt, 1961). The homonymy of *Enallagma risi* Pinhey was already recognised by PINHEY (1966: 9, *Arnoldia* 2(33): 1-24), who introduced *Enallagma angolicum* nom. nov. for this species. Presently assigned to *Pinheyagrion*.

\**secundus* Steinmann, 1997b: 112, *Gomphurus*. — Replacement name for *Gomphus septima* Westfall, 1956 (nee Needham, 1930). Both nominal taxa *Septimus* Needham, 1930 and *septima* Westfall, 1956 were indeed described in *Gomphus* (contra e.g. BRIDGES, 1991: VII. 190, *Catalogue of the family-group, genus-group and species-group names of the Odonata of the World*, Privately published, Urbana). These names should, however, not be considered homonyms. *Septimus* is an adjective, but *septima* appears to be a noun in apposition. 'This species is named for Dr Septima Smith ...' (WESTFALL, 1956: 253, *Quart. J. Fla. Acad. Sci.* 19: 251-258). Both names cannot be considered 'variant spellings' of the same name. Since a difference of one letter is sufficient to prevent homonymy (*Int. Comm. Zool. Nomenclature*, 1999, *International Code of Zoological Nomenclature*, London: Article 57.6), *Gomphurus secundus* Steinmann is an unnecessary replacement name.

\**vilma* Steinmann, 1997b: 52-53, *Gynacantha*. — Replacement name for *Aeschna viridis* Rambur, 1842 (nee Eversmann, 1836). This name has not been used as a valid name for a taxonomic taxon since RAMBUR (1842, *Histoire naturelle des Insectes. Neuropteres*. Roret, Paris). The status is thus uncertain, and should be considered a nomen oblitum. Based on the same type, the name *Gynacantha vilma* has to be considered a nomen oblitum as well." (Author)] Address: Tol, J. van, National Museum of Natural History, P.O. Box 9517, NL-2300 RA Leiden, The Netherlands

**7673.** Tolasch, T. (2006): Wiederrund von *Gomphus flavipes* (Charpentier, 1825) in Hamburg nach über 70 Jahren. *Bombus* 70/71: 292. (in German) [Germany; *Stylurus flavipes*, 1.8.2003, Elbe, S Altengamme.] Address: Tolasch, T., Universität Hohenheim, Inst. Zoologie, Fg Tierkunde 220c, Garbenstr. 30, D-70593 Stuttgart, Germany. E-mail: tolasch@uni-hohenheim.de

**7674.** Utzeri, C.; Belfiore, C.; Peels, F. (2006): Some new records of *Lindenia tetraphylla* (Vander Linden) in Italy (Anisoptera: Gomphidae). *Notulae Odonatologicae* 6(8): 90-92. (in English) ["A new site for *L. tetraphylla* from Sardinia and 4 from Tuscany are put on record. Some of these apparently harbour reproductive populations. *Selysiothemis nigra* is for the first time recorded from Tuscany." (Authors)] Address: Utzeri, C., Dipartimento di Biologia Animale e dell'Uomo, Università di Roma "La Sapienza". Viale dell'Università 32, 1-00185 Roma, Italy. E-mail: carlo.utzeri@uniroma1.it

**7675.** Vega, F.J.; García-Barrera, P.; del Carmen Perrilliat, M.; Coutiño, M.A.; Mariño-Pérez, R. (2006): El Espinal, a new plattenkalk facies locality from the Lower Cretaceous Sierra Madre Formation, Chiapas, south-eastern Mexico. *Revista Mexicana de Ciencias Geológicas*



gicas 23(3): 323-333. (in English, with Spanish summary) [A new plattenkalk facies locality with plants, invertebrates and vertebrates in laminar dolomitic limestones from the Albian of the lower part of the Sierra Madre Formation in central Chiapas is reported. The finding also include a zygopteran larvae, which is described and figured. Abstracters note: The figured specimen belongs to an anisopteran genus.] Address: Vega, F.J., Instituto de Geología, Universidad Nacional Autónoma de México, Ciudad Universitaria, Delegación Coyoacán, 04510 México D.F., Mexico. E-mail: vegver@servidor.unam.mx

**7676.** Ward, P.; Labandeira, C.; Laurin, M.; Berner, R.A. (2006): Confirmation of Romer's Gap as a low oxygen interval constraining the timing of initial arthropod and vertebrate terrestrialization. *Proceedings of the National Academy of Sciences of the USA* 103(45): 16818-16822. (in English) ["The first terrestrialization of species that evolved from previously aquatic taxa was a seminal event in evolutionary history. For vertebrates, one of the most important terrestrialized groups, this event was interrupted by a time interval known as Romer's Gap, for which, until recently, few fossils were known. Here, we argue that geochronologic range data of terrestrial arthropods show a pattern similar to that of vertebrates. Thus, Romer's Gap is real, occupied an interval from 360 million years before present (MYBP) to 345 MYBP, and occurred when environmental conditions were unfavorable for air-breathing, terrestrial animals. These model results suggest that atmospheric oxygen levels were the major driver of successful terrestrialization, and a low-oxygen interval accounts for Romer's Gap. Results also show that terrestrialization among members of arthropod and vertebrate clades occurred in two distinct phases. The first phase was a 65-million-year (My) interval from 425 to 360 MYBP, representing an earlier, prolonged event of complete arthropod terrestrialization of smaller-sized forms (425-385 MYBP) and a subsequent, modest, and briefer event of incipient terrestrialization of larger-sized, aquatic vertebrates (385-360 MYBP). The second phase began at 345 MYBP, characterized by numerous new terrestrial species emerging in both major clades. The first and second terrestrialization phases bracket Romer's Gap, which represents a depauperate spectrum of major arthropod and vertebrate taxa before a major Late Paleozoic colonization of terrestrial habitats." (Authors) Fig. 1 includes Odonata.] Address: Berner, R.A., Department of Geology and Geophysics, Yale University, New Haven, CT 06520-8109, USA. E-mail: robert.berner@yale.edu.

**7677.** Yermokhin M.V.; Yevdokimov N.A. (2006): Rare and disappearing species of freshwater invertebrates in the Red Book of Saratov region. *Povolshskii ekologiceskii shurnal* 2006, Special issue C: 41-46. (in Russian) [The Red Data Book status of some rare and disappearing species in the Saratov region is listed. Seven species are mentioned, *Calopteryx splendens*, *C. virgo*, *Anax imperator*, *Aeshna grandis*, *A. cyanea*, *A. juncea*, *Sympetrum pedemontanum*. Whilst the conservation status of some species is mentioned as having changed compared to the 1996 Red Data Book, the empirical basis of this comparison is not given.] Address: Yermokhin M.V., Saratov State University N.G. Tschernyshevskii, 410012 Saratov, Astrachanskaja 83, Russia

**7678.** Banaduc, D. (2007): Sibiu National History Museum hydrobiological collections. *Brukenthal. Acta Musei* 3: 185-186. (in English) [The Odonata collection - the oldest specimen dates back to 1849 - includes a total of 1608 specimens, collected in Europe, Africa, Asia, and North and South America. Material sampled in Europe and especially in Romania is prevalent. The most important material originates from Hans Plattner, Transylvanian Society for Natural Sciences of Sibiu, Worell and Hannenheim.] Address: Banaduc, D., Muzeul de Istorie Naturala Sibiu, Str. CetaNii, nr. 1, Sibiu, RO - 550160, Romania. E-mail: doru.banaduc@brukenthal-museum.ro

**7679.** Bernotiene, R., Višinskiene, G. (2007): The diversity of benthic invertebrates in three rivers in Lithuania. *Acta Biol. Univ. Daugavp.* 7(2): 87-96. (in English) [6 odonate taxa were recorded. These are not specified with the exception of *Ophiogomphus cecilia*] Address: Bernotiene, R., Institute of Ecology of Vilnius University, Akademijos 2, LT-08412 Vilnius, Lithuania. E-mail: rasab@ekoi.lt

**7680.** Bogacka-Kapusta, E.; Kapusta, A. (2007): The diet of Roach, *Rutilus rutilus* (L.) and Bleak, *Alburnus alburnus* (L.) larvae and fry in the shallow littoral zone of a heated lake. *Archives of Polish Fisheries* 15: 401-413. (in English, with Polish summary) [Odonata biomass contributed significantly to the diet of roach and bleak inhabiting Lake Goslawskic, Poland. The dietary composition of fish changes over time. Species richness (invertebrate taxa including Odonata) in the diets of roach and bleak larvae and fry was high. The variety of the dietary composition of early developmental stages of roach and bleak was strictly correlated to body length.] Address: Bogacka-Kapusta, Elzbieta, Dept of Ichthyology, The Stanisław Sakowicz Inland Fisheries Institute in Olsztyn, ul. Oczapowskiego 10, 10-719 Olsztyn, Poland. E-mail: ela@infish.com.pl

**7681.** Bogacka-Kapusta, E.; Kapusta, A.; Duda, A.; Szczepkowski, M.; Kolman, R. (2007): Evaluation of the suitability of samples collected in vivo for investigations of juvenile sturgeon stomachs. *Archives of Polish Fisheries* 15: 165-170. (in English, with Polish summary) [32 stomachs of sturgeon (*Acipenser* different species, taxa, hybrids) were analysed for diet contents; Odonata were represented in 25% of the stomachs.] Address: Bogacka-Kapusta, Elzbieta, Dept of Ichthyology, The Stanisław Sakowicz Inland Fisheries Institute in Olsztyn, ul. Oczapowskiego 10, 10-719 Olsztyn, Poland. E-mail: ela@infish.com.pl

**7682.** Briiliute, A.; Budrys, E. (2007): New record of damselfly *Lestes barbarus* in the south of Lithuania (Odonata: Lestidae). *New and Rare for Lithuania Insect Species. Records and Descriptions* 19: 10-12. (in English, with Lithuanian summary) [Two specimens are documented and discussed in some detail. This records rise the number of Lithuanian Odonata to a total of 62 species. "One of these species, *Sympetrum eroticum* (Selys, 1883), collected by A. Stanionyte in 1988 (Stanionyte, 1989), most probably has been accidentally introduced to Lithuania from the Amur river basin together with grass carp fry. Obviously, it did not establish, as it was never found here later. Therefore, *S. eroticum* must be removed from the check-list of Odonata of the Lithuanian fauna. Currently, the latter should include 61

species.]" Address: Budrys, E., Department of Zoology of Vilnius University, M.K.Ciurlionio g. 21/27, LT-03101 Vilnius, Lithuania. E-mail: ebudrys@ekoi.lt

**7683.** Buidin, C.; Rochepaulte, Y. (2007): Inventaire des odonates de Minganie. *Le Naturaliste Canadien* 131(2): 10-16. (in French) [Golf du Saint-Laurent, Quebec, Canada; 39 odonate species were recorded at 13 localities. The records of the following species are treated with more detail: *Nehalennia irene*, *Anax junius*, *Cordulegaster maculata*, *Somatochlora franklini*, *S. kennedyi*, *S. septentrionalis*, *S. walshii*, *Pantala flavescens*, and *P. hymenaea*.] Address: E-mail: balbu1@globetrotter.net

**7684.** Cecala, K.K.; Price, S.J.; Dorcas, M.E. (2007): Diet of larval Red Salamanders (*Pseudotriton ruber*) examined using a nonlethal technique. *Journal of Herpetology* 41(4): 741-745. (in English) [North Carolina, USA; "Because larval stream salamanders are more abundant within streams than adults, feed and forage throughout the year, and may spend multiple years in streams before transformation, larvae may play a more important role than adults in trophic interactions within streams. We conducted a study using larval *P. ruber* to determine (1) the prey composition of larval salamanders, (2) whether feeding rates are affected by stream water temperature, (3) whether larval size affects the diversity of prey items, and (4) whether nonlethal stomach flushing is an effective technique for examining the diet of larval salamanders. We found that larvae consumed a wide diversity of prey items including individuals of the families Chironomidae (36.52% of prey items) and Sphaeriidae (15.17%) as well as terrestrial prey (7.87%) and other salamanders (2.25%). We also found that feeding rates were negatively correlated with stream water temperature, and larger larvae consumed a wider diversity of prey items than smaller individuals. Our results also suggest that nonlethal stomach flushing did not affect survivorship. These findings suggest that larval Red Salamanders are generalist predators that can play important trophic roles in stream ecosystems." (Authors) Odonata contributed 0.56% to the prey items; 1.47% of the salamanders had preyed on Odonata.] Address: Cecala, Kristen, Department of Biology, Davidson College, Davidson, North Carolina 28035-7118, USA

**7685.** Clopton, R.E.; Cook, T.J.; Cook, J.L. (2007): Revision of *Geneiorhynchus* Schneider, 1875 (Apicomplexa: Eugregarinida: Actinocephalidae: Acanthosporinae) with recognition of four new species of *Geneiorhynchus* and description of *Geneiorhynchus manifestus* n. sp. Parasitizing naiads of the Green Darner, *Anax junius* (Odonata: Aeshnidae) in the Texas Big Thicket. *Comp. Parasitol.* 74(2): 273-285. (in English) ["*Geneiorhynchus manifestus* n. sp. (Apicomplexa: Eugregarinida) is described from the naiads of *Anax junius* collected from the Big Sandy Creek Unit of the Big Thicket National Preserve, Polk County, Texas, USA. The genus *Geneiorhynchus* is revised and its constituent species reviewed. Descriptions are provided for 2 previously named species, *Geneiorhynchus monnieri* from naiads of *Libellula depressa* collected from Bayreuth, Germany and Roscoff, France and *Geneiorhynchus aeshnae* from naiads of *Aeshna constricta* and *Aeshna* sp. collected from Pennsylvania, USA., and Cheboygan County, Michigan, USA.; and 3 previously reported taxa recognized as new species: *Geneiorhynchus desportesi*

n. sp. from naiads of *A. cyanea* collected from Montpellier, France, *Geneiorhynchus baudoini* n. sp. from naiads of *A. grandis* collected from Vincennes and Besse-et-Saint-Anastaise, France, and *Geneiorhynchus shtei* n. sp. from naiads of *A. cyanea* and *Aeshna* sp. collected from Lakes Pert and Svyat, Karelian Republic, Russian Federation and both Hersbruck and Bamberg, Germany." (Authors)] Address: Clopton, R.E., Dept Natural Science, Peru State College, Peru, Nebraska, U.S.A. 68421. E-mail: rclopton@oakmail.peru.edu

**7686.** Danks, H.V. (2007): The elements of seasonal adaptations in insects. *Canadian entomologist* 139: 1-44. (in English, with French summary) ["The many components of seasonal adaptations in insects are reviewed, especially from the viewpoint of aspects that must be studied in order to understand the structure and purposes of the adaptations. Component responses include dispersal, habitat selection, habitat modification, resistance to cold, dryness, and food limitation, trade-offs, diapause, modifications of developmental rate, sensitivity to environmental signals, life-cycle patterns including multiple alternatives in one species, and types of variation in phenology and development. Spatial, temporal, and resource elements of the environment are also reviewed, as are environmental signals, supporting the conclusion that further understanding of all of these seasonal responses requires detailed simultaneous study of the natural environments that drive the patterns of response." (Author) Some references to Odonata are made.] Address: Danks, H.V., Biological Survey of Canada (Terrestrial Arthropods), Canadian Museum of Nature, P.O. Box 3443, Station D, Ottawa, Ontario, Canada K1P 6P4. E-mail: hdanks@mus-nature.ca

**7687.** de Drago, I.; Marchese, M.; Montalto, L. (2007): 10. Benthic Invertebrates. In: M.H. Iriondo, J.C. Paggi, and M.J. Parma (Eds.): *The Middle Paraná River: Limnology of a subtropical wetland*. Springer-Verlag. Berlin Heidelberg: 251-275. (in English) [This review includes a few remarks on Odonata (*Aphylla* sp.).] Address: de Drago, Ines, Instituto Nacional de Limnología, INALI (CONICET-UNL). José Maciá 1933, 3016 Santo Tomé, Argentina. E-mail: inesezurra@arnet.com.ar

**7688.** Dechruksa, W.; Krailas, D.; Ukong, S.; Inkapatanakul, W.; Koonchornboon, T. (2007): Trematode infections of the freshwater snail family Thiaridae in the Khek river, Thailand. *Southeast Asian J. trop. med. public health* 38(6): 1016-1028. (in English) ["The freshwater snail family Thiaridae was studied at five different locations: water sources for the Khek River, Thailand. Snail samples were collected by hand using counts per unit of time sampling method between December 2004 and October 2005. The physico-chemical quality of the water changed with the seasons and affected the sampling areas during both the dry season and the flood season. A total of 9,568 snail samples comprised of 14 species were found. These were 284 *Tarebia granifera*, 24 *Melanoides tuberculata*, 86 *Thiara scabra*, 3,295 *Paracrostoma pseudosulcospira pseudosulcospira*, 736 *P. paludiformis paludiformis*, 3,266 *P. paludiformis ubiosa*, 117 *P. morrisoni*, 304 *Brotia* (*Brotia*) *binodosa binodosa*, 1,250 *B. (Brotia) microsculpta*, 146 *B. (Senckenbergia) wykoffi*, 1 *B. (Brotia) pagodula*, 5 *B. (Brotia) binodosa spiralis*, 5 *B. (Brotia) insolita* and 49 *B. (Brotia) manningi*. The cercariae were investigated

using shedding and crushing methods where they were categorized into two types and five species. The first type, Parapleurolophocercous cercariae, were comprised of Haplorchis pumilio Looss, 1899 and Centrocestus formosanus Nishigori, 1924. The second type, Xiphidiocercariae were comprised of Acanthatrium hitaense Koga, 1953, Loxogenoides bicolor Kaw, 1945 and Haematoloechus similis Looss, 1899. The cercarial infection rates in the above 5 species were 0.1% (5 : 9,568), 0.2% (15:9,568), 0.3% (24:9,568), 0.4% (37 : 9,568) and 0.1% (5: 9,568), respectively. 5 species of snails were susceptible to trematode infections. They were T. granifera, M. tuberculata, T. scabra, P. paludiformis paludiformis and B. (Senckenbergia) wykoffi; infections were found in 26.1% (74:284), 33.3 % (8:24) , 1.2% (1:86), 0.3% (2:736) and 0.7% (1:146), respectively." (Author) A passing reference to Odonata is made.] Address: Krailas, Duangduen, Dept of Biology, Faculty of Science, Silpakorn University, Nakhon Pathom 73000, Thailand. E-mail: kduang@su.ac.th

**7689.** Driessen, M. (2007): Review: The Complete Field Guide to Dragonflies of Australia by Günther Theischinger and John Hawking, CSIRO Publishing, 2006, paperback, 366 pages. The Tasmanian Naturalist 129: 84-85. (in English) [Review, with a little focus on Tasmanian Odonata.] Address: Driessen, M., Kingston Beach, Tasmania 7050, Australia. Email: michael.driessen@dpiw.tas.gov.au

**7690.** Evenhuis, N.L. (2007): Field Notes of E.H. Bryan, Jr. on the Whitney South Seas Expedition (February – November 1924). Compiled by Neal L. Evenhuis. Bishop Museum Technical Report 37: 334 pp. (in English) [This report documents the journals written by Bishop Museum curator Edwin Horace Bryan, Jr. (1898–1985) as he participated on one of the Whitney South Seas Expedition trips to the South Pacific. These notes span most of the year 1924 (February through November). He traveled from Honolulu to Samoa including the northern Cooks and Fiji. Many brief but general notes on dragonflies are made, and in a few cases the folk names of Odonata are noted (Savaii Island: Odonata - semu. Dragonflies - mataga).] Address: Evenhuis, N.L., Pacific Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, Hawai'i 96817, USA. E-mail: neale@bishopmuseum.org

**7691.** Ferletic, U. (2007): Small red damselfly *Ceragrion tenellum* (Insecta: Odonata) in Slovenia. Graduation Thesis (University studies), Biotechnical faculty, Department of biology, University of Ljubljana: XI, 88 pp. (in Slovenian, with English summary) [*C. tenellum* is rare and endangered in Slovenia. "It is found only in Iskra and the Vipava valley. From May to October 2004 I checked 17 localities for presence of the species, number of individuals and habitat characteristics. On four localities present plant species were determined and on two localities population size was estimated. *C. tenellum* was found on 10 localities, only 4 of which support numerous and stable populations, while on others few specimens were occasionally observed. Two populations sizes were estimated with 209±109 and 51±20 specimens respectively in July and 179±78 and 43±17 specimens in August. Four plant species were found on all four localities. To preserve *C. tenellum* in Slovenia the four localities with the strongest populations should be kept in the present state, whereas for the other localities long term monitoring would be needed." (Author)]

Address: Ferletic, Urška, University of Ljubljana, Biotechnical faculty, Veena pot 111, Department of biology, SI-1000 Ljubljana, Slovenia

**7692.** Giraudo, A.R.; Arzamendia, V.; López, S.M. (2007): 14 Reptiles. In: M.H. Iriondo, J.C. Paggi, and M.J. Parma (Eds.): The Middle Paraná River: Limnology of a Subtropical Wetland: 341-362. (in English) [Argentina; Odonata larvae belong to the diet of water turtles.] Address: Giraudo, A.R., Instituto Nacional de Limnología, CONICET-UNL, José Maciá 1933 (3016) Santo Tomé, Santa Fe, Argentina. E-mail: alejandrogiraudo@hotmail.com

**7693.** Griffis-Kyle, K.L.; Ritchie, M.E. (2007): Amphibian survival, growth and development in response to mineral nitrogen exposure and predator cues in the field: an experimental approach. *Oecologia* 152: 633-642. (in English) ["Mineral nitrogen (N) has been suggested as a potential factor causing declines in amphibian populations, especially in agricultural landscapes; however, there is a question as to whether it remains in the water column long enough to be toxic. We explored the hypothesis that mineral N can cause both lethal and sublethal toxic effects in amphibian embryos and larvae in a manipulative field experiment. We sampled 12 ponds, fertilizing half with ammonium nitrate fertilizer early in the spring, and measured hatching, survival, development, growth, and the incidence of deformities in native populations of wood frog (*Rana sylvatica*) and eastern tiger salamander (*Ambystoma tigrinum tigrinum*) embryos and larvae held in situ enclosures. We found that higher ammonium concentrations negatively affect *R. sylvatica* more strongly than *A. tigrinum*. *R. sylvatica* tended to have lower survival as embryos and young tadpoles, slowed embryonic development, and an increased proportion of hatchlings with deformities at experimentally elevated ammonium. *A. tigrinum* did not experience significantly reduced survival, but their larval development was slowed in response to elevated ammonium and the abundance of large invertebrate predators. Variable species susceptibility, such as that shown by *R. sylvatica* and *A. tigrinum*, could have large indirect effects on aquatic community structure through modification of competitive or predator-prey relationships. Ammonium and nitrate + nitrite concentrations were not correlated with other measures that might have affected amphibians, such as pH, pond area, depth, or vegetation. Our results highlight the potential importance of elevated ammonium on the growth, development and survival of amphibians, especially those that breed in surface waters receiving anthropogenic N inputs." (Authors) Odonata are treated on the order level.] Address: Griffis-Kyle, K.L., Department of Fishery and Wildlife Sciences, New Mexico State University, MSC 4901, P.O. Box 30003, Las Cruces New Mexico 88003, USA. E-mail: kerrygk@nmsu.edu

**7694.** Hämmerle, E. (2007): Ergänzungen zur Libellenfauna des Naturschutzgebietes Gsieg – Obere Mähder (Lustenau, Vorarlberg, Österreich). *Vorarlberger Naturschau* 20: 313-318. (in German, with English summary) [Compared with Wust & Alpe (1999), 7 new species for the Odonata fauna Gsieg – Obere Mähder, Austria now increased to 42 species. The new additions are *Calopteryx virgo*, *Coenagrion mercuriale*, *Gomphus pulchellus*, *Brachytron pratense*, *Somatochlora arctica*, *Crocothemis erythraea*, and *Libellula fulva*.] Address:



Hämmerle, E., St. Antoniusstraße 18, A-6890 Lustenau, Austria

**7695.** Hicham, K.; Lotfi, A. (2007): The dynamics of macroinvertebrate assemblages in response to environmental change in four basins of the Etueffont landfill Leachate (Belfort, France). *Water Air Soil Pollution* 185: 63-77. (in English) ["We investigated the relationships between the composition and structure of macroinvertebrate communities and some environmental variables over a year in four basins of the Etueffont landfill leachate (Belfort, France) using co-inertia analysis. Culicidae larvae were the dominant macroinvertebrate group in the studied basins, contributing to 87% of the total zoobenthos density, followed by Corixidae (8.8%), Chironomids (2.5%) and other larvae (each <1%). The lowest density of chironomid larvae was recorded in the first basin which is used as a discharge system for the leachate produced by the landfill. In basin 4, however, the Baetidae, Orthocladiinae (*Orthocladius* spp., *Chaetocladius* spp. and *Isocladius* spp.) and Tanyptodinae (*Psectrotanyptus* spp.) developed favoured by low levels in ammonia, COD, BOD, EC, metals and high oxygen concentrations. The co-inertia analysis illustrated both temporal and spatial variabilities in the basins and revealed a strong relationship between environmental conditions and benthic macroinvertebrates assemblages. This ordination technique showed that the chironomid community structure might be used successfully to differentiate between sites with different levels and types of pollution." (Authors) Gomphidae and Zygoptera are rarely represented.] Address: Lotfi, A., Laboratoire de Biologie Environnementale, INRA 3184, Université de Franche-Comté, 1, Place Leclerc, 25030 Besançon Cedex, France. E-mail: lotfi.aleya@univ-fcomte.fr

**7696.** Höser, N.; Klaus, D. (2007): Egon Jungmann zum 70. Geburtstag. *Entomologische Nachrichten und Berichte* 51(3-4): 245-246. (in German) [E. Jungmann contributed several papers to the Odonata fauna of the Federal State Thuringia, Germany.] Address: not stated

**7697.** Huang, H.; Sun, M. (2007): Dragonfly forewing-hindwing interaction at various flight speeds and wing phasing. *AIAA Jour.* 45(2): 508-511. (in English) ["Dragonflies are accomplished fliers. Scientists have always been fascinated by their flight. Experimental and computational studies on a single airfoil in dragonfly hovering mode were conducted by Freymuth [1] and Wang [2], respectively. They showed that large vertical force was produced during each downstroke. In each downstroke, a vortex pair was created; the large vertical force was explained by the downward two-dimensional jet induced by the vortex pair [2]. Recently, due to the advances in computational and experimental techniques and facilities, researchers are beginning to study dragonfly aerodynamics and forewing-hindwing interactions using three-dimensional model wings [3-5]. Sun and Lan [3] studied the aerodynamics and the forewing-hindwing interaction of a dragonfly in hover flight, using the method of computational fluid dynamics (CFD). Maybury and, Lehmann [4] and Yamamoto and Isogai [5] conducted experimental studies on the forewing-hindwing interaction at hovering conditions. Wang and Sun [6] extended the computational study of Sun and Lan [3] to the case of forward flight. In most of these studies, only hovering flight was considered. Only Wang and Sun [6] investigated the effects of forward flight speed, but the investigation was limited to a few phase

differences ( $\gamma(d) = 0, 60, 90,$  and  $180$  deg;  $\gamma(d)$  denotes the difference in phase angle between the forewing and the hindwing stroke cycles, positive when the hindwing leads the forewing and negative when the forewing leads the hindwing). Because the distance of a wing from the wake of another wing depends on the flight speed and the relative motion of the fore- and hindwings, it is expected that the forewing-hindwing interaction is strongly influenced by the flight speed and the relative phase difference. Therefore, it is desirable to study the forewing-hindwing interaction by systematically varying the flight speed and the phase angle. Moreover, in the above studies [3-6], attention was mainly paid on whether or not the aerodynamic forces were changed by the forewing-hindwing interaction, while how the interaction occurred was not well understood. It is of interest to make further investigation on the flow field of the wing wake to reveal how the forewing-hindwing interaction occurs. In the present study, we address the above questions by numerical simulation of the flows of model dragonfly wings. The phasing and the flight speed are systematically varied. Advance ratio (the nondimensional flight speed) ranges from 0 to 0.6. At each advance ratio, eight phase differences,  $-180, -135, -90, -45, 0, 45, 90,$  and  $135$  deg, are considered." (Authors)] Address: Huang, H., Beijing Univ. of Aeronautics & Astronautics, 100083 Beijing, China

**7698.** Kalnins, M. (2007): Brown Orthetrum Orthetrum brunneum (Fonscolombe, 1837) - a new dragonfly species in Latvia. *Acta Biol. Univ. Daugavp.* 7(2): 109-111. (in English) [teneral male specimen, 12-VII-2005 in the Klanu Nature reserve, Latvia] Address: Kalniņš, M., Department of Zoology and Animal Ecology, Faculty of Biology, University of Latvia, Kronvalda bulv. 4, Riga, LV-1586, Latvia. E-mail: martins.kalnins@dap.gov.lv

**7699.** Karjalainen, S. (2007): Sudenkorentojen (Odonata) uudet maakuntahavainnot 2002–2007 [New provincial records of Finnish dragonflies (Odonata) in 2002–2007]. *Sahlbergia* 13: 13-25. (in Finnish, with English summary) ["This paper presents 48 new provincial records of Finnish dragonflies made in 2002–2007. In this period two species new to the Finnish fauna have been found, viz. *Aeshna mixta* and *Sympetma paedisca*. By 2007, both of them are already distributed in a large area adjacent to the southern coast. Also *Coenagrion puella*, *Sympetrum sanguineum*, and *Leucorrhinia pectoralis* have become more common and are currently distributed in a wider area than before. The large number of new provincial records result from greatly increased interest in dragonflies in Finland and widened distribution pattern of some species. An updated version of a distribution table of Finnish dragonflies by biogeographical provinces is presented." (Author) ] Address: Karjalainen, S., Neidonpuistontie 6 D 8, FI-02400 Kirkkonummi, Finland. Email: sk@korento.net

**7700.** Kawase, N.; Natuhara, Y. (2007): Suitable habitats and the habitat network of a threatened aeshnid dragonfly, *Aeschnophlebia longistigma* Selys (Odonata: Aeshnidae) in suburban areas of Sakai City, Osaka Prefecture, Japan. *Jpn. J. Environ. Entomol. Zool.* 18(3): 123-131. (in Japanese, with English summary) ["Suitable habitats (ponds or marshes that are well covered by tall aquatic plants) of the threatened *A. longistigma* were identified by observing aerial photographs of suburban area of Sakai City. Field surveys were then

carried out to find adult dragonflies in those identified habitats. Although 19 suitable habitats were found in the area investigated, adult dragonflies were found only in 10 of the 19 habitats. Additionally, only 3 of 10 habitats were regarded as suitable breeding habitats or sources by determining the existence of larval exuviae or teneral adults. In the 3 habitats, a tall-growing aquatic plant *Phragmites australis* was seen to dominate. As a result of analyzing the distances of the 10 habitats, adults dragonflies found in the 7-sink habitats were traveling  $2,260 \pm 841$  m from the nearest 3-source habitats." (Authors)] Address: Kawase, N., Osaka Prefecture University, Graduate School of Life and Environmental Sciences, 1-1 Gakuen-cho, Sakai, Osaka 599-8531, Japan

**7701.** Kratzer, E.B.; Batzer, D.P. (2007): Spatial and temporal variation in aquatic macroinvertebrates in the Okefenokee swamp, Georgia, USA. *Wetlands* 27(1): 127-140. (in English) ["Aquatic macroinvertebrates of the Okefenokee Swamp have been largely overlooked despite their ecological importance and value as water quality indicators. In a two-year study we analyzed taxon richness and abundances of individual macroinvertebrate taxa in the Okefenokee Swamp to assess temporal variation among seasons and spatial variation among five plant community habitats (marsh prairies, cypress forest, scrub-shrub thickets, deepwater lakes, and boat trails) and across six areas of the Okefenokee. Chironomid and ceratopogonid midges and water mites numerically dominated the macroinvertebrate community, and chironomids, dytiscid beetles, and libellulid dragonflies had the greatest generic richness. Multivariate analysis of macroinvertebrate community structure did not show clear patterns among seasons, habitats, or areas. Furthermore, few individual taxa had either spatial or temporal variation in abundance. Wetland macroinvertebrate communities were relatively homogenous across the Okefenokee Swamp possibly because conditions important to these organisms did not vary dramatically among habitats or seasons. Alternatively, most resident taxa might be ecological generalists able to exploit a broad range of conditions." (Authors)] Address: Kratzer, Erika, Dept of Entomology University of Georgia, Athens, Georgia, USA 30602. E-mail: ekratzer@vt.edu

**7702.** Mahan, R.D.; Johnson, J.R. (2007): Diet of the Gray Treefrog (*Hyla versicolor*) in relation to foraging site location. *Journal of Herpetology* 41(1): 16-23. (in English) [Missouri, USA; using a stomach-flushing technique, stomach contents of *H. versicolor* also resulted in one prey item identified as a mandible of a "Coenagrionidae". "Despite growing concern over habitat destruction, little is known regarding the activities of pond-breeding amphibians in the terrestrial environment. Yet, because most pond-breeding amphibian species spend the majority of their time in terrestrial habitats, it is important to understand what role terrestrial habitat plays in their life history. We examined the stomach contents of the Gray Treefrog (*Hyla versicolor*) in central Missouri using a stomach-flushing technique. Treefrogs were stomach-flushed; stomach contents were dried and weighed; and prey items were counted and identified for frogs caught in both artificial arboreal refugia and at breeding ponds. The majority of prey consisted of ants (41.2%) and beetles (29.6%). Both males and females caught in artificial refugia contained greater stomach content mass than those caught at breeding

ponds. There was a positive correlation between mass of stomach contents and distance from breeding ponds, with the average number of beetles per stomach increasing with distance from ponds. There was also greater stomach content mass in frogs found in artificial refugia on white oaks than red oaks or sugar maples, but there was no relationship between tree diameter and stomach content mass. These results demonstrate the importance of protecting terrestrial habitat to maintain foraging areas for treefrogs." (Authors)] Address: Mahan, Rachel, Division of Biological Sciences, University of Missouri, Columbia, Missouri 65201, USA. E-mail: MahanRD@gmail.com

**7703.** Miller, J. (2007): Mantis religiosa frisst Anax parthenope. mercuriale 7: 43. (in German) [Photo of *M. religiosa* preying on *A. parthenope*; 19-09-2004, Salin de Giraud, Camargue, France.] Address: Miller, J., Leharstraße 6c, 86179 Augsburg, Germany

**7704.** Ramsey, J.B.; White, D.S.; Jin, H.-S. (2007): Spatial distribution of benthic macroinvertebrates in a sidearm embayment of Kentucky Lake. *Journal of the Kentucky Academy of Science* 68(1): 50-58. (in English) ["The macrobenthos of Ledbetter Embayment, Kentucky Lake, were sampled monthly (January 2005 through July 2006) to determine community structure with focus on the physical and chemical factors influencing spatial distribution and density. We collected 38 species, including 27 insects, four molluscs, two crustaceans, and three annelids. Species composition was similar to that observed in other midwestern reservoirs except that some taxa, typically rare in other systems, were very abundant. Mean density was 1158 m<sup>2</sup> and density increased with water depth. Macroinvertebrate distribution was patchy. Profundal collector-gatherers were associated with depositional zones created by flow patterns within the embayment driven by the main stem current. Most littoral species showed associations with allochthonous input or substrate heterogeneity provided by incoming streams. The physical structure of Kentucky Lake embayments and commensurate patterns of organic matter deposition, depth, and substrate composition appear to be the primary factors structuring the macrobenthos." (Authors) Four odonate taxa are listed on the genus level.] Address: Ramsey, J., Hancock Biological Station and Center for Reservoir Research, 561 Emma Drive, Murray, Kentucky 42071

**7705.** Richards, L.A.; Windsor, D.M. (2007): Seasonal variation of arthropod abundance in gaps and the understorey of a lowland moist forest in Panama. *Journal of Tropical Ecology* 23: 169-176. (in English) ["Treefalls gaps contribute to the habitat heterogeneity of tropical forest floors. Previous studies have shown that these gaps play an important role in plant and bird communities, however less is known about their role in arthropod communities. Using eight Malaise traps we investigated the difference in arthropod abundance of 19 taxonomic groups between gaps and understorey for 21wk during the rainy season and 8wk in the dry season on Barro Colorado Island, Panama. More (33.8%) arthropods were collected in gaps during the rainy season and 32.2% more in the understorey during the dry season. To assess the possible factors contributing to these differences we measured light, plant densities and young leaf densities, as indicators of abiotic factors and food resources for insect herbivores. Arthropod abundance was negatively correlated with light in the dry season.

Thus, abiotic stress may explain the pattern of abundance in the dry season. While there was no correlation with light in the rainy season, predator abundance was positively correlated with herbivore abundance. The plant and young leaf density data suggest that there is significantly higher food availability for herbivores in gaps. Thus, less stressful abiotic conditions and more food resources may contribute to more herbivores followed by more predators in gaps during the rainy season." (Authors) Odonata capture rate in gaps was higher than in understory both in rainy and dry season.] Address: Richards, Lora, Dept of Biology, Univ. of Utah, 257 S. 1400 E., Salt Lake City UT 84112, USA. E-mail: lrichards@bio.mq.edu.au

**7706.** Rodrigues Fernandes, F.; Dominici Cruz, L.; Ferreira Rodrigues, A.A. (2007): Diet of the Gray-Breasted Martin (Hirundinidae: *Progne chalybea*) in a wintering area in Maranhão, Brazil. *Revista Brasileira de Ornitologia* 15(3): 445-447. (in English, with Portuguese summary) [*P. chalybea* is a Neotropical migrant that reproduces in southern Brazil and migrates to northern South America during the non-breeding period in April to September, where it occupies urban areas. This study presents some preliminary data on diet of the population of *P. chalybea* that winters in Presidente Dutra. A total of 27 stomachs were analyzed, 17 from May, and 10 from August. The analyses of stomach contents resulted in the identification of 4,599 individual preys, belonging to nine insect Orders. Hymenoptera was the most abundant, being found in all stomachs, and contributing to 69.9% of all prey items. Odonata contribute with 0,1 % of prey items found in 2 of the 27 stomachs.] Address: Ferreira Rodrigues, A.A., Universidade Federal do Maranhão, Departamento de Biologia, Av. dos Portugueses, s/n, Campus Universitario do Bacanga, CEP 65080.040, Sao Luis, MA, Brasil. E-mail: agosto@ufma.br

**7707.** Sage, W. (2007): ZGB-Exkursion in Kroatien vom 30. 04. - 06. 05. 2005. *Artenliste der festgestellten Reptilien, Amphibien, Schmetterlinge, Insekten und Spinnentiere. Mitt. Zool. Ges. Braunau* 9(3): 215-220. (in German) [Croatia; records of *Crocothemis erythraea* from the Island of Pag (environment of Vela Blata) and *Orthetrum albystylum* from lake Vrana are listed.] Address: Sage, W., Seibersdorfer Str. 88 a, D-84375 Kirchdorf/Inn, Germany.

**7708.** Schotthoefer, A.M.; Labak, M.; Beasley, V.R.; (2007): *Ribeiroia ondatrae* cercariae are consumed by aquatic invertebrate predators. *J. Parasitol.* 93(5): 1240-1243. (in English) ["Trematodes amplify asexually in their snail intermediate hosts, resulting in the potential release of hundreds to thousands of free-living cercariae per day for the life of the snail. The high number of cercariae released into the environment undoubtedly increases the probability of transmission. Although many individual cercariae successfully infect another host in their life cycle, most fail. Factors that prevent successful transmission of cercariae are poorly understood. Microcrustaceans and fish have been observed to eat cercariae of some species, although the possibility that predation represents a significant source of mortality for cercariae has been largely unexplored. We tested the cercariophagic activity of several freshwater invertebrates on *Ribeiroia ondatrae*, a trematode that causes limb deformities in amphibians. Individuals of potential predators were placed into wells of multiwell

plates with 10–15 cercariae, and numbers of cercariae remaining over time were recorded and compared with numbers in control wells that contained no predators. Of the species tested, *Hydra* sp., damselfly (Odonata, Coenagrionidae) larvae, dragonfly (Odonata, Libellulidae), larvae, and copepods (Cyclopoida) consumed cercariae. In some cases, 80–90% of the cercariae offered to damselfly and dragonfly larvae were consumed within 10 min. In most cases, predators continued to consume cercariae at the same average rates when offered cercariae together with individuals of an alternate prey item. *Hydra* sp. ate fewer cercariae in these trials. Our findings suggest the need for field and laboratory studies to further explore the effects of predators on transmission of *R. ondatrae* to amphibian larvae. In addition, the results suggest that conservation of the biodiversity and numbers of aquatic predators may limit adverse impacts of trematode infections in vertebrate hosts." (Authors)] Address: Schotthoefer, Anna, The Metropolitan State College of Denver, Dept of Biology, Campus Box 53, P.O. Box 173362, Denver, Colorado 80217. E-mail: schottho@gmail.com

**7709.** Takegawa, Y.; Fukuda, H.; Totsuka, K.; Kimoto, H.; Taketo, A. (2007): Phylogenetic relationship among several Japanese Odonate species inferred from mitochondrial DNA sequences. *Memoirs Fukui Institute of Technology* 37: 235-242. (in English) ["Using mitochondrial DNA sequences, phylogenetic relationships were studied on several odonate species occurring in Honshu, Japan. A calopterygid damselfly, *Mnais pruinosa* was roughly classified into two groups: *subspecies nawai* and others which were subdivided into *subspecies pruinosa* and *costalis*. On the other hand, the nucleotide sequences of COI region in *Somatochlora viridiaenea* were identical between *subspecies viridiaenea* and *atrovirens*. The sequence of *Sympetrum frequens* differed from that of *S. depressiusculum* in a single nucleotide, but this change was synonymous, and thought to be within individual variation or polymorphism." (Authors)] Address: Kimoto, H., Department of Bioscience, Fukui Prefectural University, Japan

**7710.** Tol, J. van (2007): The Odonata of Sulawesi and adjacent islands, part 6. Revision of the genus *Drepanosticta* Laidlaw (Zygoptera: Platystictidae). *Odonatologica* 36(2): 171-189. (in English) ["The genus *Drepanosticta* Laidlaw is revised for Sulawesi and adjacent islands. *D. ephippiata* Lieftinck is redescribed, and *D. bicolor* sp. n. (Buton Island), *D. hamulifera* sp. n. (Kabana Island), *D. penicillata* sp. n. (central Sulawesi) and *D. watuwilensis* sp. n. (SE Sulawesi) are described as new to science. A key to the males is provided. Based on the structure of posterior margin of the pronotum, *D. ephippiata* presumably represents a monophyletic clade with the *D. lymetta* and *D. megametta* species-groups, including species from the mainland of New Guinea. This group is distributed from Mindanao (Philippines) eastward to the northern Moluccas, northern New Guinea and the Solomon Islands. The newly described species are morphologically quite diverse; they are presumably most closely related to species occurring SE of Sulawesi." (Author)] Address: Tol, J. van, National Museum of Natural History, P.O. Box 9517, NL-2300 RA Leiden, The Netherlands

**7711.** Tsuyuki, K.; Sudo, S.; Igarashi, S. (2007): Flow characteristics around a dragonfly wing obtained using liquid particles and numerical simulation. *Journal of the*



Japanese Society for Experimental Mechanics 7(3): 240-246. (in Japanese, with English summary) ["This paper describes the application of liquid particles to the measurement of the airflow around the forewing of the dragonfly, *Sympetrum frequens*. The particles with the diameter of approximately 10 µm were obtained by heating a mixture of glycols and distilled water. They were scattered as tracer particles in a wind tunnel. A PIV system was used to analyze the airflow around the dragonfly forewing with  $Re = 1.1 \times 10^3$ . On the other hand, a three-dimensional dragonfly forewing model was constructed for a numerical simulation. This simulation was used to obtain the velocity distributions around the model as well as the aerodynamic characteristics such as lift and drag coefficients. The experimental velocity results were in a good agreement with those of the simulation. Therefore, it was confirmed that the use of liquid particles comprising glycols was suitable for the analysis of low Reynolds number flows by the PIV system." (Authors)] Address: Sudo, S., Faculty of Systems Science and Technology, Akita Prefectural University, Ebinokuchi 84-4, Yurihonjo 015-0055, Japan

**7712.** Ueuma, Y.; Sagawa, T. (2007): A preliminary report of Odonata and such liek [sic] faunas of Hangando moor in Mt. Hakusan. Annual Report of The of Hakusan Nature Conservation Center 34: 31-33. (in Japanese, with English translation of the title) [Highland bogs are not known until now from the Hakusan Mountains. However, it is said that such a bog was located upper reach of the Myodani river at Hakuho, Hakusan city, Ishikawa prefecture (Matsumura et. al, 1980), and the precise location was not clear. This time we conducted a preliminary investigation of the bog on July 19, 2007. The bog was located at a height of ca. 1400 m a. s. l., and as the area was called Hangando for a long time, we named the bog Hangando moor. The vegetation of the area is Japanese beech, Japanese oak trees, cedars and bamboo grass and low bushes. The moor was divided by a small stream on the east and the west, in the former with three bog pools and the latter, one bog, wider and deeper than the east bogs, and small pools. The moor was covered with bog moss, and surrounded by grassy field of dew grass and lilies. We could not find such a proof of a high moor there as Matsumura et. al. indicated. Table 1 shows our findings from the two areas. At the west area rather a lot of *Leucorrhinia dubia*, the first specimen from Ishikawa prefecture; formerly only photos of the species were recorded, were sighted (Photo 3). Others are *Cordulia aenea amurensis*, the first specimen from the Hakusan Mountains in Ishikawa prefecture, *Coenagrion lanceolatum*, seemingly exuvia of *Aeshna juncea* and *Sympetrum frequens*. In the water salamanders and water beetles were found and 5 species of birds were seen. At the east, *L. dubia* (>10) and *Ceriagrion melanurum* were sighted. It is noticeable that such a lot of *L. dubia* were found from the Hakusan Mountains, and also the location of *L. dubia* and *C. a. amurensis* there seems to be the western limit in Japan. (Naoya Ishizawa)] Address: Ueuma, Yasuo, Hakusan Nature Conservation Center, Japan

**7713.** Wiesenborn, W.D.; Heydon, S.L. (2007): Diets of breeding Southwestern willow flycatchers in different habitats. *The Wilson Journal of Ornithology* 119(4): 547-557. (in English) ["We identified arthropods in fecal samples from 56 Southwestern Willow Flycatchers (*Empidonax traillii extimus*) at three localities in Nevada

and Arizona, USA with different plant communities during the 2004 breeding season. We concurrently collected arthropods in flight with Malaise traps and on different plant species by sweep net. These potential prey were identified to Order and counted. Fecal samples contained 57 taxa of spiders and insects including 32 families in 8 Orders. Flycatchers consumed similar diversities (numbers of taxa), but different taxonomic compositions (abundances in Orders) of arthropods among localities." (Authors) Odonata were more abundant in fecal samples at Topock Marsh than at Pahrana-gat Lake or Virgin River. They comprised 20% of arthropods in fecal samples at Topock Marsh and included Anisoptera and Zygoptera.] Address: Wiesenborn, W. D., U.S. Bureau of Reclamation, Lower Colorado Regional Office, P. O. Box 61470, Boulder City, NV 89006, USA. E-mail: wwiesenborn@lc.usbr.gov

**7714.** Zessin, W.; Ludwig, R. (2007): Intraspezifische Aggression unter Libellen (Odonata) auf Zerstörung der Flügel gerichtet. *Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 10(1): 67-68. (in German) [Two specimens of *Aeshna mixta* accidentally fixed by a spider clues tried to free in vain from their trap. With increasing failure they directed their aggression against the opposite specimen biting into the wings.] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

## 2008

**7715.** Aistleitner, E.; Barkemeyer, W.; Lehmann, G.; Martens, A. (2008): A checklist of the Odonata of the Cape Verde Islands. *Mitt. internat. entomol. Ver. Frankfurt a.M.* 33(1/2): 45-57. (in English) ["To date, 14 species of Odonata have been recorded from the archipelago. The checklist is based on previously published records, unpublished details from the historical collection of Leonardo FEA and collections made on 8 trips from 1998 to 2007. The dragonfly fauna comprises species typical for arid conditions, being widespread in Africa and known from several other African islands." (Authors)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**7716.** Almeida Andrade, H.T. de; Santiago, A.S.; Fernandes Medeiros, J. (2008): Estrutura da comunidade de invertebrados bentônicos com enfoque nos insetos aquáticos do Rio Piranhas-Assu, Rio Grande do Norte, nordeste do Brasil. *EntomoBrasilis* 1(3): 51-56 ( ): 51-56. (in Portuguese, with English summary) ["The aim of this work was to verify the benthonic invertebrates, and to identify the functional trophic groups that exist in the Piranhas-Assu, in Alto do Rodrigues municipality, Rio Grande do Norte State. The samples were carried taken on May (rain season), July and September (dry season) from 2002, in different sites in the river. The measurements of water speed, wide, temperature and river deep where made. It was collected 3525 individuals of Insecta and other classes (Malacostraca, Gastropoda, Bivalvia, Arachnida, Ostracoda and Copepoda). Insecta showed a higher abundance in September (dry season). The river discharge showed significant correlation with Insecta classe abundance, and the superficial water speed had correlation with other classes. The insects showed a highest abundance of predators, followed by collectors, in the other classes, the scappers

were the most abundant." (Authors) Odonata are treated on the family level.] Address: Fernandes Medeiros, J., Coordenação de Pesquisas em Ciências da Saúde, Instituto Nacional de Pesquisas da Amazônia, e-mail: imedeiro@inpa.gov.br

**7717.** Azar, D.; Nel, A. (2008): First Baltic amber megapodagrionid damselfly (Odonata: Zygoptera). *Ann. soc. entomol. Fr. (n.s.)* 44(4): 451-457. (in English, with French summary) ["*Electropodagrion szwedoi* n. gen., n. sp., first Baltic amber megapodagrionid damselfly, is described. The European and North American fossils document a very high diversity and a much wider distribution of this group of damselflies during the Cenozoic than today. A checklist of described fossil species of damselflies of the family Megapodagrionidae is given." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**7718.** Balzan, M.V. (2008): The distribution of *Orthetrum trinacria* Selys, 1841 and *Trithemis annulata* Palisot de Beauvois, 1807 in the Maltese Islands (Odonata: Libellulidae). *Bulletin of the Entomological Society of Malta* 1: 91-96. (in English) ["Two recently recorded dragonfly species, *Orthetrum trinacria* and *Trithemis annulata*, were observed over several bodies of water in Gozo. The distribution of these species is documented. Moreover, it is suggested that the introduction of these species could have been favoured by changes in the climate, in the light of similar observations made throughout Southern Europe." (Author)] Address: Balzan, M.V., International Environment Institute, Univ. of Malta, 3rd Floor, Chemistry Building, Room 311, Msida, Malta. E-mail: balzanmv@gmail.com

**7719.** Bellstedt, R.; Kaiser, J. (2008): Zur Limnofauna der Kiesgruben Herrenhof/Georgenthal im Landkreis Gotha Thüringen unter besonderer Berücksichtigung der Libellen (Insecta, Odonata). *Abh. Ber. Mus. Nat. Gotha* 25: 57-62. (in German) [35 odonate species - including the protected by law species *Leucorrhinia albifrons* - were sampled in the gravel pits of Herrenhof/Georgenthal, Landkreis Gotha, Thüringen, Germany.] Address: Bellstedt, R., Brühl 2, D-99867 Gotha, Germany

**7720.** Böke, R. (2008): Die Libellen (Odonata) im Landkreis Holzminden (Niedersachsen). *Braunschweiger Naturkundliche Schriften* 8(1): 151-171. (in German, with English summary) [Germany; "In the district of Holzminden, situated in the south of Lower Saxony, 49 of the 81 dragonfly species occurring in Germany have been found. 38 species are indigenous in at least one of the 161 investigated locations. 27 species are listed with threat category 1 to 3 in the Red Data List of Germany (20), Lower Saxony (22), or Northrhine-Westphalia - "Weserbergland" region (17). Specific valuable biotopes are located in the Soiling mountains with their upland moors, in the Weser valley, and in the mountainous regions with natural brooks and their headwaters. While the trend of the population of many species is negative, supported by the climatic changes the southern species *Erythromma lindenii* and *E. viridulum* are expanding also in the district of Holzminden." (Author)] Address: Böke, R., Viktoria-Luise-Weg 12, 37603 Holzminden, Germany

**7721.** Boros, E.; Forro, L.; Gere, G.; Kiss, O.; Vörös, L.; Amdrikovics, S. (2008): The role of aquatic birds in

the regulation of trophic relationships of continental soda pans in Hungary. *Acta Zoologica Academiae Scientiarum Hungaricae* 54 (Suppl. 1): 189-206. (in English) ["The aim of this study was to estimate the population sizes, food resources, food selection and trophic regulation of aquatic birds in these soda pans. We classified the estimated density of birds into 3 simple nutrient cycling guilds: net-importer, exporter-importer and the net-exporter. The most important aquatic bird guild was the net-importer guild (51–70%), and the second was the exporter-importer guild (41–27%), while the relative densities of the net-exporter guild was the lowest (8–3%) in the investigated 2 pans. The captive foraging experiment demonstrated that the filter-feeder wildfowl (*Anas* species) could successfully remove the microcrustacean plankton and invertebrate nekton from the water. The biomass of planktonic crustaceans was significantly more by an order of magnitude than the biomass of the other invertebrates (benthos [including Odonata], nekton). The relatively simple trophic relationships demonstrate the bottom up function of some keystone herbivore aquatic bird species, while the top down control is determined by several wildfowl and wader species. The external nutrient load of the aquatic birds causes hypertrophic level of inorganic nutrient resources for the algae, while the planktonic primary production varied only between oligotrophy and mesotrophy because of the extreme physical conditions of these waters. The observed net heterotrophy and several trophic relationships seem to be regulated by aquatic birds." (Authors)] Address: Boros, E., Naturglob Ltd., H-1196 Budapest, Kossuth L. u. 76, Hungary. E-mail: drborose@gmail.com

**7722.** Bots, J.; de Bruyn, L.; van Damme, R.; van Gossum, H. (2008): Effects of phenotypic variation onto body temperature and flight activity in a polymorphic insect. *Physiological Entomology* 33: 138-144. (in English) ["According to biophysical principles, colour and size are important phenotypic factors that may influence body temperature and activity in ectothermic insects. In taxa showing female-limited polymorphism, males and female morphs differ in body colour, size and activity pattern. However, no previous study has evaluated whether such phenotypic and behavioural variation relates to differences between males and female morphs in thermal properties. In the present study, the relationships between body colour, size, activity and body temperature are examined under laboratory and field conditions, for the polymorphic damselfly *Enallagma cyathigerum*. Contrary to expectation, males and female colour morphs of this species do not differ in thermal properties (i.e. heating characteristics or field body temperatures). When questioning phenotype and activity, temperature does not appear to be relevant for understanding the maintenance of female-limited polymorphism." (Authors)] Address: Bots, Jessica, Evolutionary Ecology Group, Department of Biology, University of Antwerp, Groenenborgerlaan 171, B-2020, Antwerp, Belgium. E-mail: jessica.bots@ua.ac.be

**7723.** Brown, J.W.; Bahr, S.M. (2008): The insect (Insecta) fauna of Plummers Island, Maryland: Brief collecting history and status of the inventory. *Bulletin of the Biological Society of Washington* 15: 54-64. (in English) ["Plummers Island, a small site situated along the northern shore of the Potomac River in Montgomery County, Maryland, has been the research home of the Washington Biologists' Field Club for more than 100 years. Field

work conducted by club members from 1901 to about 1925 resulted in the accumulation of thousands of insect specimens of all orders from the Island, most of which are deposited in the collections of the National Museum of Natural History, Smithsonian Institution. Little collecting was conducted from ca. 1930–1950. In the 1960s sampling by Karl Krombein focused on bees and wasps and that by Terry Erwin on carabid beetles. Since 1998 the Lepidoptera fauna, leaf beetles (Chrysomelidae), and darkling beetles (Tenebrionidae) all have been the subject of investigations. In 2005 and 2006 Malaise traps were deployed to sample other orders (e.g., Trichoptera, Diptera, Hymenoptera). While the four major insect orders (i.e., Coleoptera, Diptera, Lepidoptera, and Hymenoptera) are represented by large numbers of historical specimens, only Lepidoptera have been surveyed thoroughly in recent times; notable exceptions include specific families: carabid beetles, leaf beetles, darkling beetles, sawflies, and bees and wasps. Based on an examination of the insect collection of the National Museum of Natural History and a review of relevant literature, we document 3012 insect species in 253 families, encompassing 18 insect orders: Collembola, Odonata, Dermaptera, Blattodea, Phasmatodea, Orthoptera, Psocoptera, Thysanoptera, Hemiptera, Neuroptera, Megaloptera, Coleoptera, Mecoptera, Trichoptera, Lepidoptera, Diptera, Siphonaptera, and Hymenoptera.] Address: Brown, J.W., Systematic Entomology Laboratory, P.S.I., Agricultural Research Service, U.S. Department of Agriculture, National Museum of Natural History, Smithsonian Institution, P.O. Box 37012, Washington, D.C. 20013-7012, USA. E-mail: john.brown@ars.usda.gov;

**7724.** Caillouët, K.A.; Carlson, J.C.; Wesson, D.; Jordan, F. (2008): Colonization of abandoned swimming pools by larval mosquitoes and their predators following Hurricane Katrina. *J. Vector Ecol.* 33(1): 166-172. (in English) ["Thousands of flooded swimming pools were abandoned in New Orleans following Hurricane Katrina and provided a natural experiment to examine colonization of a novel aquatic habitat by mosquito larvae and their aquatic predators. We conducted a randomized survey of flooded swimming pools in two neighborhoods in January 2006 and found that 64% contained mosquito larvae, 92% contained predatory invertebrates, and 47% contained fishes. We collected 12,379 immature mosquitoes representing five species, primarily *Culiseta inornata*, and secondarily, the arboviral vector *Culex quinquefasciatus*. Dragonfly nymphs in the families Aeshnidae and Libellulidae were the most common predatory invertebrates collected among a total of 32 non-mosquito invertebrate species. Eleven species of fishes were collected, with *Gambusia affinis* accounting for 76% of the catch. Diversity of fishes in swimming pools was positively correlated with proximity to a levee breach and the fish assemblage found in swimming pools was similar to that found along shorelines of Lake Pontchartrain and drainage canals that flooded the study area. Mosquito larvae were rare or absent from pools containing fishes; however, path analysis indicated that the presence of top predators or abundant competitors may somewhat mitigate the effect of *Gambusia affinis* on mosquito presence." (Authors)] Address: Caillouët, K.A., Dept of Tropical Medicine, Tulane Univ., New Orleans, LA 70112, USA.

**7725.** Chen, J.-S.; Chen, J.Y.; Chou, Y.F. (2008): On the natural frequencies and mode shapes of dragonfly

wings. *Journal of Sound and Vibration* 313: 643-654. (in English) ["A base-excitation modal testing technique is adopted to measure the natural frequencies and mode shapes of dragonfly wings severed from thoraxes. The severed wings are glued onto the base of a shaker, which is capable of inducing translational motion in the lateral direction of the wing plane. Photonic probes are used to measure the displacement history of the shaker base and the painted spots of the wing simultaneously. A spectrum analyzer is employed to calculate the frequency response functions, from which the natural frequencies and the associated mode shapes of the wing structure can be extracted. Our experimental results show that the fundamental natural frequency of dragonfly wings is in the order of 170 Hz when it is clamped at the wing base. The average flapping frequency 27 Hz of dragonflies is about 16% of the fundamental natural frequency. At this frequency ratio, the inertial force of the wing is negligible compared to the elastic force. In other words, the wing deformation during flapping flight is solely due to the balance between the external aerodynamic force and the elastic force of the wing structure. The wing structures are generally lightly damped, with damping ratio in the order less than 5%." (Authors) Study species are *Orthetrum pruinosum* and *O.sabina*.] Address: Chen, J.-S., Department of Mechanical Engineering, National Taiwan University, Taipei 10617, Taiwan. E-mail: jschen@ntu.edu.tw

**7726.** Craig, C.N.; (2008): Nestedness in Playa odonates as a function of area and surrounding land use. *Wetlands* 28(4): 995-1003. (in English) ["As degradation of wetlands continues to occur as a result of human activities, it is important to identify aquatic and amphibious species' extinction risks and the relative hospitalities of sites to support intact biotic communities; one such technique involves comparing the nestedness of assemblages as an assay of predictability and stability. We measured the degree of nestedness of odonate communities in the playa wetland complex of the Texas panhandle (data from 23 species in 73 playas in the summers of 2003–05) under current conditions as well as four simulations of future socioeconomic and climate change. Compared to randomized (null model) assemblages, significant nestedness was found for the system as a whole as well as for each year separately and for playas within each of the two dominant regional forms of land cover (cropland and grassland). Cropland and grassland playas were further split into three size categories, based on natural size breaks. Although departures from nestedness (idiosyncrasy) were unrelated to playa size or surrounding land use, larger playas surrounded by cropland displayed lower nestedness than did smaller ones whereas grassland playas showed the opposite pattern. This relationship between playa area and surrounding land-use type showed that there is lower stability in odonate community composition in even large playas if those playas are surrounded by agriculture. Departures from nestedness mainly consisted of unexpected species presences rather than absences, with idiosyncratic species being larger in total body length and including two range extensions. Under simulations of playa losses, community patterns were similar to contemporary data, suggesting that the ephemeral and dynamic nature of playas may already expose the odonate community to selective pressures possible under future land conversion." (Authors)] Address: Craig, Crystal, Dept Biol. Scien., Texas Tech Univ. Lubbock, Texas, USA 79409. E-mail: nancy.mcintyre@ttu.edu



**7727.** Czirok, A.; Horvai, V.; Sarfi, N. (2008): Faunistic data from the littoral zone of the Hungarian reach of river Drava. *Acta Biol. Debr. Oecol. Hung* 18: 27-36. (in Hungarian, with English summary) ["Between 2005 and 2007 we took macroinvertebrate samples at 4 sites on river Drava, and we identified 110 taxa. The Hungarian-Croatian reach of river Drava can be divided into two sections according to hydromorphological features. We examined, whether our samples had reflected this phenomenon. We also investigated how the results were affected by the local habitat features, the low number of sampling sites and sample number." (Authors) 10 Odonata taxa are listed including *Stylurus flavipes* and *Ophiogomphus cecilia*.] Address: Czirok, A., South Transdanubian Regional Environmental Nature Conservation and Water Management Inspectorate, Laboratory, Pécs H-7621, Papnövelde u. 13., Hungary

**7728.** Dapkus, D.; Tamutis, V. (2008): Protected species of insects in conservation areas of central Lithuania recorded in 2007. New and rare for Lithuania insect species 20: 58-63. (in English, with Lithuanian summary) [Lithuania; records of *Ophiogomphus cecilia* are documented.] Address: Dapkus, D., Department of Zoology, Vilnius Pedagogical University, Studentu 39, LT-08106 Vilnius, Lithuania. E-mail: daldap@vpu.lt

**7729.** Davis, C.A.; Bidwell, J.R. (2008): Response of aquatic invertebrates to vegetation management and agriculture. *Wetlands* 28(3): 793-805. (in English) ["Wetland managers rely on a variety of vegetation management techniques to set back plant succession, enhance seed production, create hemi-marsh conditions, and reduce the coverage of invasive plants in wetlands. We evaluated the effects of vegetation management techniques (prescribed burning, cattle grazing, mowing, and disking) on aquatic invertebrate communities in seasonal wetlands in the Rainwater Basin Region of Nebraska, USA. Because many of these wetlands are embedded in an agricultural landscape, we also evaluated the effects of agriculture on aquatic invertebrates. We conducted the study in 24 wetlands during spring 2004 and 2005. In general, aquatic invertebrate richness and diversity were similar among wetlands subjected to different management regimes. However, richness and diversity were highest in grazed wetlands and lowest in disked wetlands. Regardless of the management regime, total benthic and nektonic invertebrate biomasses were higher in managed wetlands than unmanaged wetlands. In 2004, naidid oligochaete biomass was highest in farmed wetlands. Cattle grazing, mowing, and prescribed burning seemed to have the greatest influence on individual taxa; 12, eight, and seven of the taxa (out of 32) had higher biomasses in grazed, mowed, and burned wetlands, respectively. Within mowed wetlands, the biomasses of some taxa (*Gyraulus*, *Lymnaea*, and *Physa*) were lower in managed areas than unmanaged areas, emphasizing the need to leave some areas unmanipulated to provide cover. Because of high spatial and temporal variability in wetlands and aquatic invertebrate communities, the response of aquatic invertebrates to vegetation management techniques was not consistent and no management regime offered a particular advantage in enhancing aquatic invertebrate communities. However, managers should be aware that some type of physical manipulation of aquatic vegetation in wetlands is still warranted on a regular basis to reduce nuisance vegetation, enhance seed production, and create optimal

habitat conditions for migratory waterfowl and other wetland-dependent birds. [...] Each of the Odonata taxa differed among treatments. *Enallagma* biomass was highest in grazed wetlands, while *Lestes* biomass was highest in farmed wetlands. *Libellula* biomass was higher in grazed and reference wetlands than in mowed and farmed wetlands." (Authors)] Address: Davis, C.A., Natural Resource Ecology and Management Department, 008C Agricultural Hall, Oklahoma State University, Stillwater, Oklahoma, USA 74078. E-mail: craig.a.davis@okstate.edu

**7730.** Davis, R.S.; Peterson, R.K.D. (2008): Effects of single and multiple applications of mosquito insecticides on nontarget arthropods. *Journal of the American Mosquito Control Association* 24(2): 270-280. (in English) ["Mosquito management plans have been implemented in the United States and globally to manage mosquito vectors of West Nile virus and many other diseases. However, there is public concern about ecological risks from using insecticides to manage mosquitoes. Two studies were conducted during the late summers of 2004 through 2006 at Benton Lake National Wildlife Refuge near Great Falls, MT. The first experiment was conducted in 2004 and 2005 to assess acute impacts of mosquito adulticides (permethrin and d-phenothrin) and larvicides (*Bacillus thuringiensis israelensis* and methoprene) on nontarget aquatic and terrestrial arthropods after a single application. The second experiment was conducted in 2005 and 2006 to assess longer-term impacts of permethrin on nontarget terrestrial arthropods after multiple repeated applications. For aquatic samples, in the first study, no overall treatment effects were observed despite a potentially deleterious effect on amphipods on sample date 1 in 2004. During the same study, 1 of 54 responses had a significant overall treatment effect for sticky-card samples. Many of the responses for stickycard samples suggested significant time effects and time 3 treatment effects. Three response variables were associated with fewer individuals present in the insecticide-treated plots in a multivariate analysis. For the multiple-spray study conducted in 2005 and 2006, 6 of the response variables collected via sticky cards exhibited significant overall treatment effects, but none was associated with fewer individuals in the insecticide-treated plots. None of the responses collected using sweep-net sampling suggested overall treatment effects. Time and time 3 treatment effects were prevalent in 2005, but no discernable pattern was evident. In general, nearly all of the responses evaluated for either study indicated few, if any, deleterious effects from insecticide application. [...] Interactions between treatment and time were significant for Odonata. Samples had relatively lower counts of odonates for the larvicide-treated plots on the first sampling date followed by a slight increase on date 2. Each of the adulticide-treated plots and the control plots started with relatively more odonates on date 1, followed by a decrease on date 2. Power to detect multivariate overall treatment effects was generally low for stickycard samples during 2004 (0.05–0.717), with some exceptions within certain dates, including Araneae, Coleoptera, and the large size class in the eastern plots, as well as Bombyliidae, Ceratopogonidae, Chironomidae, Hymenoptera, Odonata, and predators in the western plots (.0.85)." (Authors)] Address: Davis, R.S., Department of Land Resources and Environmental Sciences, 334 Leon Johnson Hall, Montana State University, Bozeman, MT 59717-3120, USA

- 7731.** De Marco Júnior, P. (2008): Libellulidae (Insecta: Odonata) from Itapiracó Reserve, Maranhão, Brazil: New Records and Species Distribution Information. *Acta Amazonica* 38(4): 819-822. (in English) ["In this work, I apply a simple protocol to species occurrence inventory of Odonata in a region of Maranhão state, Brazil which has very few distributional records. Some relations between species occurrence and environmental characteristics are discussed, mainly in relation to the high occurrence of *Erythemis*. Eighteen new records are presented discussing the role of this approach to generate useful information for conservation purposes." (Author)] Address: De Marco, P., Laboratório Ecologia Teórica e Síntese, Depto de Biologia Geral, Universidade Federal de Goiás, BR-74001-970, Goiânia, GO, Brazil. E-mail: pdemarco@icb.ufg.br
- 7732.** Degabriele, G. (2008): An annotated catalogue of the Odonata collection of Guido Lanfranco at the National Museum of Natural History in Malta. *Bulletin of the Entomological Society of Malta* 1: 85-89. (in English) ["An annotated list (n = 10 properly labelled species, and one exuvium) of the Odonata collection of Guido Lanfranco, is provided. The specimens were captured between 1952 and 1971, and may be the oldest surviving specimens caught and still available in local collections from Malta. Almost all locally occurring species are represented, with some specimens collected in sites and habitats that have since been destroyed by urban development. A portion of the specimens bear no data labels and do not contribute to the knowledge of the distribution of the species. During the cataloguing process, specimens in poor condition were restored." (Author)] Address: Degabriele, G., Centifolja, Triq it-Tank, Siggiewi, SGW 3412, Malta. E-mail: gergo@euroweb.net.mt
- 7733.** Duan, X.-d.; Wang, Z.-y. (2008): Experimental study on the effect of habitat isolation on river ecology. In: *Advances in Water Resources and Hydraulic Engineering – Proceedings of 16th IAHR-PAD Congress and 3rd Symposium of IAHR-ISHS (Vol.VI: Hydropower Hydraulics)*. Eds.: Changkuan Zhang & Hongwu Tang. ISBN: 978-7-302-18662-5: 86-91. (in English) ["The field investigations and an experiment were conducted in the Juma river in the suburbs of Beijing (China) to study the effect of habitat fragmentation on river ecology, using benthic macro-invertebrates as indicator species. Three experimental plots were isolated from a relatively undisturbed stream habitat with sheet iron. The benthic assemblages and water parameters were measured by sampling periodically. The results indicate that the abundance, taxa richness and bio-diversity of invertebrates significantly decrease in the experimental plots owing to the habitat isolation. The smaller the experimental habitat plot, the more significantly these biotic indices decrease. The contents of the dissolved oxygen in the studied plots present the inconsistent variations. The comparison of the benthic communities shows that the relative abundances of Ephemeroptera and Diptera reduces significantly in the isolated plots, and that of the Odonata and Lamellibranchia increase significantly. It is also found that the benthic communities need some time to stabilize after isolation, and then present apparent variation over time. There is a relatively high degree of taxa turnover between isolated plots and the non-isolated reach, which can be attributed to the flight and dispersal of many aquatic insects in their adult stage. However, the benthic communities
- in isolated plots are not nested subsets in the natural non-isolated stream. This paper also gives some suggestions of the river restoration and the preservation of river ecological integrity based on the study and the present status of the rivers in China." (Authors)] Address: not stated
- 7734.** Fidelis, L.; Nessiman, J.L.; Hamada, N. (2008): Spatial distribution of aquatic insects communities in small streams in Central Amazonia. *Acta Amazonica* 38(1): 127-134. (in Portuguese, with English summary) ["Small streams, at the Biological Dynamics of Fragmented Forest Project – INPA ca. 80 Km north from the city of Manaus (Amazonas, Brazil), were studied concerning the composition of the aquatic insects communities in different substrates. In each one of the 20 stretches, four samples of the principal biotopes were collected: leaf litter in riffle areas, leaf litter deposited on the bottom of the stream, sand and roots/vegetation on marginal banks. The aim of this study were to evaluate the aquatic insect fauna and relate it with specific substrates inside the igarapé. Leaf litter in riffle presented high richness number (106) while sand showed the lowest value (55). Higher similarity values occurred between leaf litter deposited on the bottom and marginal roots/vegetation. Lower values occurred between leaf litter in riffle and sand substrates. Some collected taxa were considered indicators of one type of substrate, but there were some taxa that showed no preference. The indicator taxa occurred in riffle litter were found in deposited leaf litter in Southeast streams of Brazil. This indicates the current velocity may be responsible for the community established. The size of the stream is related to the order and flow regime. In this study bigger streams (presenting higher values of flow and order) showed more distinct communities in each substrate than the smaller ones." (Authors) The samples include "Progomphus".] Address: Fidelis, Luana, INPA / DCEN, Caixa Postal 478, CEP: 69070-970, Manaus – AM. E-mail: luafidelis@uol.com.br
- 7735.** Fliedner, H.; Martens, A. (2008): The meaning of the scientific names of Seychelles dragonflies (Odonata). *Phelsuma* 16: 49-57. (in English) ["The meaning of the scientific names of all Odonata species known from the Seychelles is explained in detail. The basis of many scientific names is ancient Greek or Latin describing characters of the insects or names of important researchers. Understanding the meaning of these names should offer an additional approach for being familiar with these insect species. Additionally, it is a good approach to understand research history of tropical insects - in which the Seychelles play an important role just from the beginning." (Authors)] Address: Fliedner, H., Louis-Seegelken Str., D-28717 Bremen, Germany. E-mail: H.Fliedner@t-online.de
- 7736.** Gliwa, B.; Seškauskaitė, D. (2008): Rare species of Lepidoptera and Odonata recorded from the environments of Lake Praviršulis (Central Lithuania) in 2007–2008. New and rare for Lithuania insect species 20: 64-68. (in English, with Lithuanian summary) [*Ischnura pumilio*, *Leucorrhinia pectoralis*, *Ophiogomphus cecilia*] Address: Gliwa, B., University of Latvia, Chair of Baltic Linguistics, Visvalžu 4a, LV-1050 Riga, Latvia. E-mail: berndgliwa@yahoo.de
- 7737.** Gniatkowski, J. (2008): Wazki (Odonata) w okolicach Częstochowa. Część II. *Biuletyn Częstochow-*

skiego Kola Entomologicznego 7: 8-9. (in Polish, with English summary) [In the surroundings of Czeszochowa, Poland, 23 odonate species - including *Aeshna subarctica* and *Leucorrhinia dubia* - were recorded between 2005 and 2007.] Address: Gniatkowski, J., ul Oskara Lange 7/97, PL-42-207 Czeszochowa, Poland

**7738.** Gros, P. (2008): Erste Nachweise von *Somatochlora arctica* (Zetterstedt 1840) und *Lestes barbarus* (Fabricius 1798) aus dem Ibmer Moos (Innviertel, Oberösterreich) sowie aktuelle Libellenfunde aus diesem Europaschutzgebiet (Insecta: Odonata). Beiträge zur Naturkunde Oberösterreichs 18: 115-121. (in German, with English summary) ["*S. arctica* and *L. barbarus* are reported from the Upper Austrian bog of Ibm for the first time. In Upper Austria, these two dragonfly species are currently only known from very few sites. Details of these discoveries are given, typical features of the concerned species are described. Beyond that, all dragonfly species recently found in this area by the author are listed." (Author)] Address: Gros, P., Haus der Natur, Museumsplatz 5, A-5020 Salzburg, Austria. E-Mail: patrick.gros@hausdernatur.at

**7739.** Günther, A. (2008): Erste Nachweise der Kleinen Zangenlibelle (*Onychogomphus f. forcipatus*) an der Freiburger Mulde. Mitteilungen des Naturschutzinstitutes Freiberg 4: 72-76. (in German) [In June 2008, *O. forcipatus* was recorded along the river Freiburger Mulde between Gleisberg and Roßwein (Landkreis Mittelsachsen, Sachsen, Germany). This record is the first after 60 years.] Address: Günther, A., Naturschutzinstitut Freiberg, Waisenhausstraße 10, D-09599 Freiberg, Germany. E-mail: a.guenther@abo.freiepresse.de

**7740.** Hauenstein, W. (2008): Buchbesprechungen: Die Falkenlibellen Europas, Hansruedi Wildermuth, Die Neue Brehm-Bücherei Bd. 653, 1. Auflage von 2008, Westarp Wissenschaften, Hohenwarsleben. 512 S., 173 SW-Abb., 39 Farb-Abb., ISBN: 3-89432-896-7, € 59,95 / sFr 102,60. Entomo Helvetica 1: 84. (in German) [Book review] Address: not stated

**7741.** Heidemann, H. (2008): Nouvelles parutions: Die Falkenlibellen Europas (Corduliidae) par Hansruedi Wildermuth, 2008. La lettre des sociétaires. Société française d'Odonatologie 48: 8-9. (in French) [Book presentation.] Address: Heidemann, H., Au in den Buchen, 76646 Bruchsal, Germany

**7742.** Höttinger, H. (2008): Nachweise der Braunen Mosaikjungfer *Aeshna grandis* (Linnaeus, 1758) und der Balkan-Smaragdlibelle *Somatochlora meridionalis* (NIELSEN, 1935) aus dem Burgenland, östliches Österreich (Insecta: Odonata). Beiträge zur Entomofaunistik 9: 181-186. (in German) [Records of *A. grandis* (and the rare *Sympetrum meridionalis* from the same locality) (28-VII-2008) and *Som. meridionalis* (29-VII-2008) from Burgenland, E Austria are documented in detail.] Address: Höttinger, H., Institut für Zoologie, Dept für Integrative Biologie & Biodiversitätsforschung, Universität für Bodenkultur, Gregor Mendel Straße 33, A-1180 Wien, Austria. E-Mail: helmuthoettinger@boku.ac.at

**7743.** Janský, V.; David, S. (2008): Occurrence of the dragonfly *Cordulegaster heros* ssp. *heros* (Odonata: Cordulegastridae) in Slovakia. Acta Rer. Natur. Mus. Nat. Slov. Vol. LIV: 61-68. (in Slovakian, with English summary) [In 2003, *C. heros* was published new for Slovakia. It was known from 7 localities (4 loc. from

Malé Karpaty Mts. and 3 loc. from Borská nížina lowlands). Recent records arised the number of localities to 27 (23 loc. – Malé Karpaty Mts. and 4 loc. – Borská nížina lowland). The records are documented in detail, and mapped. The Slovakian oldest record is a larva from 1956 (Igt. Jedlička, Malé Karpaty Mts.). *C. heros* is listed in the appendix of the European Fauna-Flora-Habitat-Directive, and of special concern for the protection of European biodiversity.] Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. E-mail: stanislav.david@savba.sk

**7744.** Jensen, K.; Das, I. (2008): Dietary observations on the Asian Softshell Turtle (*Amyda cartilaginea*) from Sarawak, Malaysian Borneo. Chelonian Conservation and Biology 7(1): 136-141. (in English) ["We examined the diet of *A. cartilaginea* from 2 localities in Sarawak: Loagan Bunut National Park and Balai Ringin. The most commonly found items in stomach contents, when using percentage frequency of occurrence, were plant material (77%) and unknown vertebrate parts (55%). Fecal analysis indicated similar results: plant material (100%), unknown vertebrate parts (84%), fish (69%), and unknown arthropods (62%). Results indicate that *A. cartilaginea* is an opportunistic omnivore." (Authors) The diet of one female *A. cartilaginea* included one "Odonata".] Address: Jensen, Karen, Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak, 94300, Kota Samarahan, Sarawak, Malaysia. E-mail: kitti.jensen@yahoo.com; idas@ibec.unimas.my

**7745.** Kamisawa, Y.; Isigai, I. (2008): Optimum flapping wing motions of dragonfly. Trans. Japan Soc. Aero. S Sci. 51: 114-123. (in English) ["We studied the optimum flapping wing motions of a dragonfly (*Anax parthenope julius*) from hovering to cruising flight at various speeds, using a 3D Navier-Stokes code coupled with an optimization algorithm. The minimum necessary power curve and optimum flapping wing motions for the various flight velocities were determined using the optimization algorithm. The minimum power curve shows the typical U-shape. The optimum flapping wing motions were evaluated by comparison with experimental data. Examining the flow patterns showed that the large-scale flow separation around the wings is suppressed at these optimum conditions, except for very low flight speeds including hovering." (Authors)] Address: Isigai, I., Micro Flying Robot Laboratory, Nippon Bunri University

**7746.** Kazanci, N. (2008): Contribution to the knowledge of Odonata Fauna of Turkey: Central Anatolia. Review of Hydrobiology 2: 119-128. (in English, Turkish summary) ["1. This paper provides data on 41 Odonata species from Central Anatolia and Bolu province between 1977 and 1980. Adults were collected surroundings of lakes, dams, wetlands and running waters. 2. Some observations of larval habitats of species were also given. Pollution and habitat destruction are the main reasons of the elimination of the Odonata species in freshwater ecosystems." (Author)] Address: Kazanci, Nilgün., Hacettepe University Science Faculty Biology Department Hydrobiology Section, Beytepe, Ankara, Turkey. E-mail: nilgunkazanci@gmail.com

**7747.** Kazanci, N.; Girgin, S. (2008): Ephemeroptera, Odonata, Plecoptera (Insecta) Fauna of Ankara Stream (Turkey). Review of Hydrobiology 1: 37-44. (in English,



Turkish summary) [14 odonate taxa are reported; some identifications need confirmation (e.g. *Aeshna juncea*, *Coenagrion mercuriale*.)] Address: Kazanci, Nilgün, Hacettepe University Science Faculty Biology Department Hydrobiology Section, Beytepe, Ankara, Turkey. E-mail: nilgunkazanci@gmail.com

**7748.** Kim, S. B.; Jeon, H.S.; Oh, H.S.; Jung, Y.H.; Kim, W.T. (2008): Phylogenetic relationships of the Anisoptera (Insecta, Odonata) of Jeju Island, Korea, based on partial mitochondrial 16S ribosomal RNA sequences. *Korean J. Genetics* 30: 53-61. (in English) ["The phylogenetic relationship of the suborder Anisoptera distributed on Jeju Island, Korea, was analyzed by comparing partial mitochondrial 16S ribosomal RNA (rRNA) gene sequences. The length of the partial mitochondrial 16S rRNA genes for the 27 species of the Anisoptera studied ranged from 405 to 421 base pairs (bp). No intra-genus length-variations were identified in the genera *Anax* and *Orthetrum*, while the genes of *Somatochlora* and *Sympetrum* displayed lengths of 411 to 412 and 406 to 411 bp, respectively. The GC content of the partial mitochondrial 16S rRNA gene ranged from 26.76% to 30.83%. A parsimony analysis of the unambiguously aligned mitochondrial 16S rRNA gene sequences from 28 species, including outgroup species, produced eight equally most parsimonious trees. The strict consensus tree had three large independent groups: group I (family Aeshnidae), group II (family Libellulidae), and group III (family Corduliidae). Interestingly, the eight species of the genus *Sympetrum* were clearly distinguishable from the other species. The strict consensus tree, based on the mitochondrial 16S rRNA gene sequences, contained monophyletic groups. These results concurred with previous studies published by several researchers that were based on morphological characteristics." (Authors) *Anax parthenope*; *Anax nigrofasciatus*; *Anax guttatus*; *Gynacantha japonica*; *Polycaanthagyna melanictera*; *Aeschnoplebia anisoptera*; *Somatochlora graeseri*; *Somatochlora clavata*; *Epophthalmia elegans*; *Macromia amphigena*; *Lyriothemis pachygastra*; *Orthetrum albistylum*; *Orthetrum melania*; *Crocothemis servilia*; *Deiella phaon*; *Sympetrum striolatum*; *Sympetrum darwinianum*; *Sympetrum eroticum*; *Sympetrum uniforme*; *Sympetrum kunkeli*; *Sympetrum infuscatum*; *Sympetrum risi*; *Sympetrum speciosum*; *Pseudothemis zonata*; *Rhyothemis fuliginosa*; *Pantala flavessens*; *Tramea virginia*] Address: Oh, Hong-Shik, Dept of Science Education, Cheju National University, Jeju 690-756, Korea. E-mail: sci-edu@cheju.ac.kr

**7749.** Kosco, J.; Manko, P.; Miklisova, D.; Kosuthova, L. (2008): Feeding ecology of invasive *Percocottus glenii* (Perciformes, Odontobutidae) in Slovakia. *Czech J. Anim. Sci.* 53(11): 479-486. (in English) [Stomach contents of 331 specimens of *P. glenii* were dominated by chironomids, ephemeropterans and crustaceans. Odonata larvae were represented in two sampling periods (April, August), but accounted to less than 2% of food items.] Address: Kosco, J., Faculty of Human and Natural Sciences, University of Presov, Presov, Slovak Republic

**7750.** Kovacs, T.; Godunko, R.J.; Juhasz, P.; Kiss, B.; Müller, Z. (2008): Quantitative records of larvae of Ephemeroptera, Odonata and Plecoptera from the Zakarpats'ka Region, Ukraine (2004, 2006). *Folia historica naturalia musei matraensis* 32: 135-147. (in English)

[*Gomphus vulgatissimus*, *Onychogomphus forcipatus*, and *Platycnemis pennipes* are listed.] Address: Kovacs, T., Mátra Museum., Kossuth Lajos u. 40, HU-3200 Gyöngyös, Hungary. E-mail: koati@matavnet.hu

**7751.** Kulesza, A.E.; Holomuzki, J.R.; Klarer, D.M. (2008): Benthic community structure in stands of *Typha angustifolia* and herbicide-treated and untreated *Phragmites australis*. *Wetlands* 28(1): 40-56. (in English) ["We compared benthic community structure among stands of *T. angustifolia* (narrow-leaf cattail) and herbicide-treated (Glypro) and untreated *P. australis* (common reed) over two summers in a Lake Erie coastal wetland (i.e., drowned river mouth). Both macrophytes are invasives, but only *Phragmites* is currently controlled by herbicides because of its reputed "undesirable" effects on wetland community structure and function. Macroinvertebrate diversity was similar among stand types and relatively high (Shannon-Weaver indices 2.6-4.2), probably because of high system primary productivity and a mix of lentic and riverine species. Proportions of macroinvertebrate functional feeding groups were also similar, but Jaccard's similarity indices were relatively low (29%-57%), suggesting macroinvertebrate compositional differences among stand types. Coleopterans particularly affected species presence/absence patterns, but their presence was associated with low water level rather than hydrophyte type per se. Moreover, total macroinvertebrate densities were greater in both *Phragmites* treatments than in *Typha*; a pattern generated mostly by gastropods ( $\geq 95\%$  *Gyraulus deflectus* and *Physella gyrina*) and chironomids. Microalgal food supply likely plays a part in explaining these density differences, given diatom-dominated epiphyton was denser on submerged shoots of *Phragmites* than on *Typha*. Common diatom assemblages were similar among stand types, but species richness was significantly greater on untreated-*Phragmites* than on herbicide-treated, early senescent *Phragmites* and untreated-*Typha*. However, advanced senescence from herbicide application (~3 months) did not apparently affect macroscale habitat suitability and structure above and below the waterline, given counts of ovipositing odonates (mostly *Ischnura* and *Enallagma*) and captures of juvenile fishes ( $>90\%$  *Lepomis* spp.) were similar among stand types. Overall, our results suggest that benthic community structure is comparable between similarly-aged stands (~4 yrs old) of invading reed and cattail and is not directly or indirectly affected by Glypro application." (Authors) Of the 813 Odonata individuals observed, a total of 86 were observed to oviposit; 93% of these were zygopterans, and 7% were anisopterans. The main genera of zygopterans observed were *Ischnura* and *Enallagma*, whereas the main genus of anisopterans observed was *Anax*. Counts of ovipositing odonates did not significantly differ among stand types or among sample dates.] Address: Holomuzki, J., Dept of Evolution, Ecology, and Organismal Biology, The Ohio State University, 1680 University Drive, Mansfield, Ohio, USA 44906. E-mail: holomuzki.3@osu.edu

**7752.** Machida, K.; Oikawa, T.; Shimanuki, J. (2008): Structure analyses of the wings of *Anotogaster sieboldii* and *Hybris subjacens*. *Journal of the Japanese Society for Experimental Mechanics* 8(2): 142-146. (in Japanese, with English summary) ["In general, it is known that structures of living things are optimized. The wings of a dragonfly are very thin and light. Although it is having the structure of bearing the load produced in the

case of an advanced flight such as "Flapping flight", "Glide", and "Hovering". The wings of a dragonfly are made by veins and membranes. In addition, the wings of a dragonfly have some characteristic structures, such as "Nodus". Thus, the wings of a dragonfly have many complicated structures. The costal vein configuration of the wings of a dragonfly is different from them of other insects. So, we paid attention to the costal vein configuration of the wings of a dragonfly. Therefore, in this study, we researched about the effect of the costal vein. As a result, it was showed that the configuration of costal vein made the deformation of bending and torsion small. In addition, it was showed that the configuration of costal vein closely related to nodus. In this study, several 3-D models of the dragonfly's wing were created and analyzed by the 3-D finite element method (FEM)." (Authors)] Address: not transliterated.

**7753.** Makarieva, A.M.; Gorshkova, V.G.; Lib, B.-I.; Chown, S.L.; Reich, P.B.; Gavrillov, V.M. (2008): Mean mass-specific metabolic rates are strikingly similar across life's major domains: Evidence for life's metabolic optimum. *Proceedings of the National Academy of Sciences* 105(44): 16994-16999. (in English) ["A fundamental but unanswered biological question asks how much energy, on average, Earth's different life forms spend per unit mass per unit time to remain alive. Here, using the largest database to date, for 3,006 species that includes most of the range of biological diversity on the planet—from bacteria to elephants, and algae to sapling trees—we show that metabolism displays a striking degree of homeostasis across all of life. We demonstrate that, despite the enormous biochemical, physiological, and ecological differences between the surveyed species that vary over 1020-fold in body mass, mean metabolic rates of major taxonomic groups displayed at physiological rest converge on a narrow range from 0.3 to 9 W kg<sup>-1</sup>. This 30-fold variation among life's disparate forms represents a remarkably small range compared with the 4,000- to 65,000-fold difference between the mean metabolic rates of the smallest and largest organisms that would be observed if life as a whole conformed to universal quarterpower or third-power allometric scaling laws. The observed broad convergence on a narrow range of basal metabolic rates suggests that organismal designs that fit in this physiological window have been favoured by natural selection across all of life's major kingdoms, and that this range might therefore be considered as optimal for living matter as a whole." (Authors) Odonata included into this study are: *Anax junius*, *Brachymesia gravida*, *Erythemis simplicicollis*, *Erythrodiplax berenice*, and *E. connata*.] Address: Makarieva, Anastassia, Theoretical Physics Division, Petersburg Nuclear Physics Institute, Gatchina, St. Petersburg 188300, Russia

**7754.** Martens, A.; Schiess, H.; Kunz, B.; Wildermuth, H. (2008): *Onychogomphus uncatus* in Deutschland: die historischen Funde am Hochrhein (Odonata: Gomphidae). *Libellula* 27(1/2): 53-61. (in German, with English summary) ["According to diary notes by Friedrich Ris, the Canadian odonatologist Edmund M. Walker collected several specimens of *O. uncatus* on 16-viii-1928 on the German side of the High Rhine near Altenburg. This should be considered the first record in Germany. Based on Ris' diary further published accounts, of which precise records have been lacking, can now be clearly interpreted. A survey of all hitherto known records between 1883 and 1991 from Switzer-

land and Germany is given." (Authors)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**7755.** Monnerat, C. (2008): Première observation de l'Aesche isocèle *Aeshna isocèles* (O.F. Müller, 1776) (Odonata: Aeshnidae) en Ajoie (canton du Jura: Suisse). *Entomo Helvetica* 1: 135-137. (in French, with English and German summaries) [A single adult male *A. isocèles* - quite obviously vagrant - was seen the 15 of June 2006 at Porrentruy.] Address: Monnerat, C., Centre suisse de cartographie de la faune (CSCF), Maximilien de Meuron 6, 2000 Neuchâtel, Switzerland. E-mail: christian.monnerat@unine.ch

**7756.** Montesinos, A.; Santoul, F.; Green A.J. (2008): The diet of the night heron and purple heron in the Guadalquivir Marshes. *Ardeola* 55(2): 161-167. (in English, with Spanish summary) [Spain; in Purple heron (*Ardea purpurea*), Odonata nymphs were present in 13.5 % of samples. The Night heron (*Nycticorax nycticorax*) did not feed on Odonata.] Address: Green, A., Department of Wetland Ecology. Estación Biológica de Doñana-CSIC, Avda. Américo Vespucio s/n, 41092 Sevilla, Spain. E-mail: ajgreen@ebd.csic.es

**7757.** Pelabon, C.; Hansen, T.F. (2008): On the adaptive accuracy of directional asymmetry in insect wing size. *Evolution* 62(11): 2855-2867. (in English) ["Subtle left-right biases are often observed in organisms with an overall bilateral symmetry. The evolutionary significance of these directional asymmetries remains uncertain, however, and scenarios of both developmental constraints and adaptation have been suggested. Reviewing the literature on asymmetry in insect wings (including a paper on *Calopteryx maculata*), we analyze patterns of directional asymmetry in wing size to evaluate the possible adaptive significance of this character. We found that directional asymmetry in wing size is widespread among insects, with left- and right-biased asymmetries commonly observed. The direction of the asymmetry does not appear to be evolutionarily conserved above the species level. Overall, we argue that the very small magnitude of directional asymmetry, 0.7% of the wing size on average, associated with an extremely imprecise expression, precludes directional asymmetry from playing any major adaptive role." (Authors)] Address: Pelabon, C., Dept of Biology, Centre for Conservation Biology, Norwegian University of Science and Technology, Trondheim, Norway. E-mail: christophe.pelabon@bio.ntnu.no

**7758.** Phillips, I.D.; Parker, D.; McMaster, G. (2008): Aquatic invertebrate fauna of a northern prairie stream: range extensions and water quality characteristics. *Western North American Naturalist* 68(2): 173-185. (in English) [28 Odonata taxa, in most cases on the species level, are listed from Pipestone Creek watershed in southeastern Saskatchewan, Canada.] Address: Phillips, I.D., Stewardship Division, Saskatchewan Watershed Authority, #330-350 3rd Av. North, Saskatoon, SK, Canada S7K 2H6. E-mail: iain.phillips@swa.ca

**7759.** Pisica, E.I.; Popescu-Mirceni, R. (2008): Data on some dragonflies (Insecta: Odonata) from western Turkey (Results of the "Taurus"-2005 and "Focida"-2006 expeditions). *Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa"* 51: 335-344. (in English, with French summary) ["The paper presents a list of

258 Odonata specimens collected during the expeditions carried out in Western Turkey between 2005-2006 by the "Grigore Antipa" National Museum of Natural History. In all, 27 Odonata species were identified, grouped in nine families. The paper also presents some distributional data for these 27 species"] Address: Pîsica, Elena, Muzeul Naþional de Istorie Naturală "Grigore Antipa", Sos. Kiseleff nr. 1, 011341 Bucuresti 2, Romania. E-mail: elenap@antipa.ro

**7760.** Popova, O.N.; Haritonov, A.Yu. (2008): Inter-annual changes in the fauna of dragonflies and damselflies (Insecta, Odonata) in the Southern Urals. *Russian Journal of Ecology* 39(6): 405-413. (in English) ["Data on the abundance and occurrence of 64 odonate species in the Southern Urals are considered. A comparative analysis of the odonate fauna in the early 20th century, in the 1960s and 1970s, and in the early 21st century is performed. On this basis, it is concluded that its structure has been markedly changing with time, with the magnitude of these changes being comparable to that of regional faunistic differences. The causes of these changes are discussed. The apparent enrichment of the odonate fauna is attributed primarily to the appearance of new anthropogenic habitats." (Authors) Original Russian Text © O.N. Popova, A.Yu. Kharitonov, 2008, published in *Ekologiya*, 2008, No. 6, pp. 427-435] Address: Institute of Animal Systematics and Ecology, Siberian Branch, Russian Academy of Sciences, ul. Frunze 11, Novosibirsk, 630091, Russia. E-mail: pc@eco.nsc.ru

**7761.** Pryke, J.S.; Samways, M.J. (2008): Conservation of invertebrate biodiversity on a mountain in a global biodiversity hotspot, Cape Floral Region. *Biodivers. Conserv.* 17: 3027-3043. (in English) ["Mountains present particular challenges for biodiversity conservation. Table Mountain is a significant mountain in a global biodiversity hotspot, the Cape Floristic Region. It has outstanding angiosperm diversity and endemism. Yet, aerial and foliage invertebrates in the area have been poorly studied, despite their importance as pollinators and predators. These plant and invertebrate assemblages are under great pressure from human disturbance. Aerial and foliage invertebrates were sampled with a range of techniques. Sites were chosen to make comparisons between vegetation structure and type, elevation and aspect. In total, 216 species from 63 families and 14 orders were recorded. Vegetation structure (fynbos or forest) and elevation were the most important environmental variables for both aerial and foliage invertebrates. Peak time for aerial invertebrate abundance was spring and summer in the fynbos and spring in the forests, while the foliage invertebrates showed very little seasonal variation. There was no correlation between the diversity of aerial and foliage invertebrates. When these results were compared with others on epigaeic invertebrates, it became clear that epigaeic and aerial invertebrates are not correlated, while epigaeic and foliage invertebrates were only partially correlated, but not sufficiently so to consider one as a reliable estimator of the other. The management pointer from this study is that sites at all elevations are vital for the conservation of biodiversity on Table Mountain. Both the aerial and epigaeic/foliage invertebrate assemblages will need to be monitored separately to maintain the mountain's conservation status." (Authors) The paper includes references to Odonata.] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch,

Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**7762.** Qiao, H.-l.; Luo, Y.-q.; Tian, C.-m.; Sun, J.-h.; Feng, X.-f. (2008): Diversity of insect communities with different development phases in natural *Populus euphratica* forests in Xinjiang. *Forestry Studies in China* 10(1): 56-59. (in English) ["An investigation method with sample plots was used to study insect communities in four different growth phases of *P. euphratica* forests, which are juvenile, middle aged, over-mature and degraded forests, in Tarim, Xinjiang in July, 2005 and April, 2006. In our studies, 5,116 insect specimens, belonging to 12 orders, 61 families and 141 species, were collected. Lepidoptera and Coleoptera were the dominant orders. In middle-aged forests, species, individual numbers and diversity indices of insect communities were higher than those in other woodlands. The species richness and diversity indices were lowest in degraded forests because of extremely scarce vegetation." (Authors) Three libellulid species with 11 specimens are listed without taxonomic details.] Address: Qiao, H.-l., Key Laboratory for Silviculture and Conservation of Ministry of Education, Beijing Forestry Univ., Beijing 100083, P. R. China. E-mail: youqingluo@26.com

**7763.** Rivera-Usme, J.J.; Camacho-Pinzón, D.L.; Botero-Botero, A. (2008): Estructura numérica de la entomofauna acuática en ocho quebradas del departamento del Quindío-Colombia. *Acta biol. Colomb.* 13(2): 133-146. (in Spanish, with English summary) [A study of the aquatic insect fauna of 8 streams in the department of Quindío, Colombia in La Tebaida and Calarcá was carried out. During August to December of 2004, 1917 individuals were collected including 216 odonate specimens. These are listed at the genus level.] Address: Botero-Botero, A., Fundación Neotrópica-Colombia, Armenia - Quindío, Carrera 7 No. 12-55 La Tebaida Quindío, Colombia. E-mail: albotero33@yahoo.com

**7764.** Rocha, V.; Aguiar, L.M.; Silva-Pereira, J.E.; Moro-Rios, R.F.; Passos, F.C. (2008): Feeding habits of the crab-eating fox, *Cerdocyon thous* (Carnivora: Canidae), in a mosaic area with native and exotic vegetation in Southern Brazil. *Revista Brasileira de Zoologia* 25(4): 594-600. (in English, with Portuguese summary) ["*C. thous* (Linnaeus, 1766) is the most widespread neotropical canid, most commonly inhabiting forested areas. This animal is a generalist omnivore that is able to use environments disturbed by human activities. The aim of this study was to describe its diet through the stomach content analysis of 30 samples obtained from specimens that were run over in a mosaic composed by *Araucaria* Pine Forest, Semidecidual Seasonal Forest, natural grasslands, and exotic vegetation. The items were quantified by frequency of occurrence (F.O.) and percentage of occurrence (P.O.). A total of 64 food items were found among 171 occurrences. According to F.O. method, plant items corresponded to 93.3% of the occurrences, followed by animal items (86.7%) and human rejects (16.6%)....] (Authors) In one occasion wings of a *Coenagrionidae* were found as stomach content.] Address: Rocha, V., Bioecologia e Manejo Integrado de Pragas e Doenças Florestais, Pesquisa Florestal, Klabin S.A. Avenida Araucária, 84279-000 Lagoa, Paraná, Brasil. E-mail: vlamir@klabinxom.br

**7765.** Sadeghi, S. (2008): Aspects of infraspecific phylogeography of *Calopteryx splendens*. PhD thesis.



Dept Biology, Univ. Ghent. ISBN 978-90-8756-015-7: IV, 166 pp. (in English, with Iranian summary) [*Calopteryx splendens* Harris (1780) (Odonata: Calopterygidae) is a widespread damselfly, found in most of Europe, large parts of Siberia and much of west and central Asia. There is great variation among males in wing coloration. Traditionally subspecific taxa have been distinguished by the size and position of the pigmented wing spot, and by (mating) behavior. About a dozen of subspecies have been recognized. *Calopteryx splendens splendens*; *C. s. xanthostoma*; *C. s. caprai*; *C. s. balcanica* in Europe and various other names, such as *C. s. intermedia*, *C. s. orientalis*, *C. s. taurica*, *C. s. tschaldirica*, *C. s. waterstoni*, *C. s. amasina*, and so on, refer to putative subspecies, all of which are more or less geographically confined, but often with overlapping ranges and strong variation in wing spot size. For more than a century wing and wing spot characters have been used as criteria for *Calopteryx* species and subspecies identification. Most results suggest that wing pigmentation is a reliable signal of male quality and plays a role in mate recognition by females. Size and density of wing pigmentation is also correlated with immunological condition and animal resistance against disease. In spite of these indications, the question arises whether variation in wing spot is really a taxonomically valid discriminator. We used two morphological (traditional and geometric morphometries) and one molecular (AFLP) method to quantify and analyze morphological and molecular data. Comparing the results of these methods helped us to show some unclear and ambiguous relations between these populations and lighted some aspects of phylogeography of the (sub)species. In morphological study, the question was how well populations (subspecies) are recognizable based on wing and wing spot sizes and wing shape (irrespective of wing spot). In both morphological methods, left fore wing of the male specimens were evaluated because generally only males bear wing spot. For traditional morphometry, 10 different wing characters were measured using a semi-automatic image analysis program. Geometric morphometric study was implemented based on collected superimposed data from 19 digitized landmarks following the procrustes method. We used AFLP as molecular method because of its low start-up time and cost effective generation of data from a large number of distributed loci in the whole genome. In this part, the first aim was to investigate patterns of *C. splendens* population structure and the spatial distribution of genetic diversity, and the second aim was to determine whether there is a consistent spatial distribution pattern of *C. splendens* based on genetic and morphological diversity of wings, in other words whether the genetic differences are compatible with morphological differences of wings. Our results in traditional and geometric morphometries (regardless of wing spot) confirmed differentiation of *C. s. waterstoni* from other populations. Likewise, a relationship between two populations from north-east border of Turkey (*C. s. tschaldirica*) and Ireland, both with a small wing spot, was supported. Populations of *C. s. orientalis* from north of Iran and south of Turkmenistan (16 and Tm254 respectively) also showed close relations, which differentiate them from other groups in both morphometric techniques. The relationship between *C. s. xanthostoma* and *C. s. amasina* (from Turkey) was more remarkable than European populations in both morphometric methods. However, the results of these two morphometric methods were not consistent in many cases, while geometric morphometric analysis showed

wing shape differences between entire populations; traditional morphometry did not revealed such differences based on linear measurements of wing characters between most of populations. In general, geometric morphometric of Eurasian populations showed that two almost separate European and Asian groups of *C. splendens* are recognizable except some relations of *C. s. waterstoni* (from Turkey) to Eastern European populations, and *C. s. xanthostoma* (from Spain) to Asian populations. These conclusions were partly confirmed by AFLP results, but were not consistent with results of traditional morphometry which is mainly affected by linear size and area of wing and wing spot. Hence, use of wing spot patterns must be studied critically before those are used up as systematic characters at any taxonomic level. The AFLP results of our samples showed low levels of gene flow between populations except one case in the central Asia between Russian and Kazakhstani populations which is partly due to lack of effective obstacles and presence of Irtysh river. Many populations showed double or more geographical origin, a circumstance that can reflect rapid diversification and introgression. The reasons of this situation and likely relations between three main subspecies, *C. s. waterstoni*, *C. s. intermedia* and *C. s. xanthostoma* have been discussed. The deepest split in the phylogeography of *C. splendens* populations was found within the unglaciated areas in the east border of Turkey and Azerbaijan. We discuss the isolation of *C. s. waterstoni*. We interpret the unexpected relation between Azerbaijani and French populations as an intrusion of *intermedia*-genes in both. The conclusion drawn from comparison of the data in all three analyses is that the results of shape analysis between populations was more akin to molecular data and more reliable than linear measurements of wing characteristics, although some populations showed the same result in both methods. These observations suggest that wing spot similarity necessarily cannot capture the full genetic grouping of populations and therefore, is not an infallible character in *Calopteryx splendens* subspecies." (Author)]

**7766.** Schmidt, E. (2008): Libellen als Indikatoren für einen Klimawandel - Mediterrane Libellen neu im NABU-Laubfrosch-Schutzgebiet Brink bei Coesfeld. *Naturzeit im Münsterland* 9(1): 14. (in German) [Records of *Crocothemis erythraea*, *Sympetrum fonscolombii*, and *S. meridionale* near Coesfeld, Nordrhein-Westfalen, Germany are briefly reported and commented.] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**7767.** Slos, S.; Stoks, R. (2008): Predation risk induces stress proteins and reduces antioxidant defense. *Funct. Ecol.* 22(4): 637-642. (in English) ["1. Despite its wide ecological relevance, we know little about the physiological mechanisms underlying the growth vs. mortality by predation trade-off. Here, we test for two costly, potential physiological correlates of the fight-or-flight response that may contribute to the growth reduction under predation risk: induction of stress proteins (Hsp60 and Hsp70) and of antioxidant enzymes (superoxide dismutase, SOD and catalase, CAT), in larvae of the damselfly *Enallagma cyathigerum*. 2. Under predation risk, there was a growth reduction and an increase in oxygen consumption, indicative of the fight-or-flight response. Predation risk did not affect Hsp60 levels but induced an increase in energetically costly Hsp70 levels. 3. Under predation risk, levels of SOD remained

constant and those of CAT decreased. Together with the increase in respiration, this should inevitably result in oxidative stress. 4. Our results suggest that induction of stress proteins may contribute to the partly physiologically mediated growth reduction under predation risk and that oxidative stress is a novel cost of predation risk that may have important long-term negative fitness consequences for the prey. The latter adds to the recent insight that costs of stressors and life-history trade-offs may not always directly operate through increased energy consumption and differential allocation, but, may also work through the increased production of reactive oxygen species." (Authors)] Address: Slos, Stefanie, Laboratory Aquatic Ecology and Evolutionary Biology, Univ. of Leuven, Ch. Debériotstraat 32, B-3000 Leuven, Belgium. E-mail: stefanie.slos@bio.kuleuven.be

**7768.** Srivastava, D.S.; Trzcinski, M.K.; Richardson, B.A.; Gilbert, B. (2008): Why are predators more sensitive to habitat size than their prey? Insights from bromeliad insect food webs. *American Naturalist* 172(6): 761-771. (in English) ["Ecologists have hypothesized that the exponent of species-area power functions ( $z$  value) should increase with trophic level. The main explanation for this pattern has been that specialist predators require prior colonization of a patch by their prey, resulting in a compounding of the effects of area up trophic levels. We propose two novel explanations, neither of which assumes trophic coupling between species. First, sampling effects can result in different  $z$  values if the abundances of species differ (in mean or evenness) between trophic levels. Second, when body size increases between trophic levels, effects of body size on  $z$  values may appear as differences between trophic levels. We test these alternative explanations using invertebrate food webs in 280 bromeliads from three countries. The  $z$  value of predators was higher than that of prey. Much of the difference in  $z$  values could be explained by sampling effects but not by body size effects. When damselflies occurred in the species pool, predator  $z$  values were even higher than predicted, as damselflies avoid small, drought-prone bromeliads. In one habitat, dwarf forests, detrital biomass became decoupled from bromeliad size, which also caused large trophic differences in  $z$  values. We argue that there are often simpler explanations than trophic coupling to explain differences in  $z$  values between trophic levels." A(uthors)] Address: Srivastava, Diane, Dept of Zoology, University of British Columbia, 6270 University Boulevard, Vancouver, British Columbia V6T 1Z4, Canada. E-mail: srivast@zoology.ubc.ca

**7769.** Stamper, C.E.; Downie, J.R.; Stevens, D.J.; Monaghan, P. (2008): The effects of perceived predation risk on pre- and post-metamorphic phenotypes in the common frog. *Journal of Zoology* 277(3): 205-213. (in English) ["Where organisms undergo radical changes in habitat during ontogeny, dramatic phenotypic reshaping may be required. However, physiological and functional interrelationships may constrain the extent to which an individual's phenotype can be equally well adapted to their habitat throughout the life cycle. The phenotypic response of tadpoles to the presence of a predator has been reported for several species of anuran but the potential post-metamorphic consequences have rarely been considered. We reared common frog *Rana temporaria* tadpoles in the presence or absence of a larval odonate predator, *Aeshna juncea*, and examined the consequences of the result-

ing phenotypic adjustment in the aquatic larval stage of the life cycle for the terrestrial juvenile phenotype. In early development tadpoles developed deeper tail fins and muscles in response to the predator and, in experimental trials, swam further than those reared in the absence of a predator. While the difference in swimming ability remained significant throughout the larval period, by the onset of metamorphosis we could no longer detect any differences in the morphological parameters measured. The corresponding post-metamorphic phenotypes also did not initially differ in terms of morphology. At 12 weeks post-metamorphosis, however, frogs that developed from predator-exposed tadpoles swam more slowly and less far than those that developed from tadpoles reared in the absence of predators, the opposite trend to that observed in the larval stage of the life cycle, and had narrower femurs. These results suggest that there may be long-term costs for subsequent life-history stages of tailoring the larval phenotype to prevailing environmental conditions." (Authors)] Address: Stamper, Clare, Dept of Environmental and Evolutionary Biology, Institute of Biomedical and Life Sciences, Univ. of Glasgow, Glasgow, UK. Email: c.e.stamper@exeter.ac.uk

**7770.** Sudo, S.; Tsuyuki, K.; Honda, T. (2008): Swimming mechanics of dragonfly nymph and the application to robotics. *Journal International Journal of Applied Electromagnetics and Mechanics* 27(3): 163-175. (in English) ["This paper concerned with the development of swimming micro mechanism based on the study of swimming functions and mechanisms of the minute organisms. At the beginning, this paper describes the swimming analysis of a dragonfly nymph using the high speed video camera system. It was found that dragonfly nymphs can swim skillfully by reciprocating motions consisting of a power stroke and a recovery stroke. Based on the swimming analysis of the dragonfly nymph, the micro swimming robot with the wireless energy supply system was produced. Driving elements of the micro swimming robot are composed of NdFeB permanent magnet, polystyrene body, and a polyethyleneterephthalate film fin. Frequency characteristics of the micro swimming robot propelled by the alternating magnetic field and small permanent magnet were examined experimentally." (Authors)] Address: Sudo, S., Faculty of Systems Science & Technology, Akita Prefectural Univ., Ebinokuchi 84-4, Yurihonjo 015-0055, Japan

**7771.** Švitra, G.; Gliwa, B. (2008): New records of *Nehalennia speciosa* (Charpentier, 1840) (Odonata, Coenagrionidae) in Lithuania in 2006–2008. New and rare for Lithuania insect species 20: 10-13. (in English, with Lithuanian summary) [Between 2006 and 2008, seven new populations of *N. speciosa* were detected totalling all known localities in Lithuania of this rare species to thirteen. The new additions are briefly documented.] Address: Švitra G., Lithuanian Entomological Society, Akademijos 2, LT-08412 Vilnius, Lithuania. E-mail: gjedsvis@gmail.com

**7772.** Sy, T. (2008): Ein neuer Fundort der Scharlachlibelle *Ceragrion tenellum* (de Villiers, 1789) in Sachsen-Anhalt (Odonata, Coenagrionidae). *Entomologische Nachrichten und Berichte* 52(1): 61-64. (in German) [A second record in the German Federal State Sachsen-Anhalt from 17-VII-2007 (Jävenitzer Moor near Gardelegen) is documented and discussed in detail. The species probably has colonised the new hab-

itat less than 20 years ago. The nearest population exists in a distance of 20 km.] Address: Sy, T., RANA - Büro für Ökologie und Naturschutz, Frank Meyer, Mühlweg 39, D-06114 Halle(Saale), Germany. E-mail: thoralf.sy@rana-halle.de

**7773.** Tafangenyasha, C.; Dube, L.T. (2008): An investigation of the impacts of agricultural runoff on the water quality and aquatic organisms in a Lowveld sand river system in southeast Zimbabwe. *Water Resour. Manage.* 22: 119-130. (in English) ["In this research we examined the hypothesis that agricultural pollution is a key determinant of variability in nutrients concentrations and benthic fauna in a semi-arid tropical lowveld region of southeast Zimbabwe. Water quality was monitored in the river water column and river bottom sediments at a time when dissolved oxygen concentration was thought to be very low during the winter period in the rivers passing through low input agricultural sections and intensive commercial agricultural sections. The surveys used established chemical methods and biological methods. Benthic fauna assemblages were used to complement chemical cases of nutrient loading at localities chosen for sampling. Unpolluted control sites were not significantly different (t test,  $p < 0.05$ ) from polluted sites in levels in mean values of dissolved oxygen, conductivity, total dissolved solids and mean density (no.m<sup>2</sup>) of benthic invertebrates in May. Significant differences (t test,  $p < 0.05$ ) were not found in mean values of calcium, magnesium, potassium, total nitrogen, nitrate nitrogen, ammonia nitrogen and total phosphorus in river bottom sediments in May and August. These data certainly do not support the notion that the Runde River is severely polluted by the upstream agricultural activities and the hypothesis that agricultural runoff is a key determinant of water quality is rejected. As the data suggests the Runde River may be receiving moderate nutrient pollution. The positive effects of moderate eutrophication on fish catch and the trade-off in pollution implied here needs to be addressed by appropriate agricultural and environmental policies that relate to water pollution and land use." (Authors) Four Odonata taxa are listed at the genus level.] Address: Tafangenyasha, C., Department of Environmental Science and Health, National University of Science and Technology, P. Bag AC 939, Bulawayo, Zimbabwe. E-mail: ctafangenyasha@nust.ac.zw

**7774.** Tchiboza, S.; Aberlenc, H.-P.; Ryckewaert, P.; Le Gall, P. (2008): Première évaluation de la biodiversité des Odonates, des Cétoines et des Rhopalocères de la forêt marécageuse de Lokoli (Sud Bénin). *Bulletin de la Société entomologique de France* 113(4): 497-509. (in French, with English summary) [2006; 24 Odonata species are listed, with 13 new species for Benin, including *Oxythemis phoenicosceles*, a rare species, and *Ceriagrion citrinum*, an endangered species on the IUCN red list.] Address: Tchiboza, S., Centre de Recherche pour la Gestion de la Biodiversité et du Terroir (Cerget), 04 B.P. 0385 Cotonou, Bénin. E-mail: tchisev@yahoo.fr

**7775.** Triapitsyn, S.V.; Querino, R.B.; Feitosa, M.C. B. (2008): A new species of *Anagrus* (Hymenoptera: Mymaridae) from Amazonas, Brazil. *Neotropical Entomology* 37(6): 681-684. (in English, with Portuguese summary) [The new fairyfly species from the Neotropics, *Anagrus* (*Anagrus*) *amazonensis* sp. n., is described and illustrated. *Anagrus* Haliday is a large genus of

Mymaridae (Hymenoptera), which now includes eight species recorded from Brazil. This new species attacks eggs of damselflies.] Address: Triapitsyn, S.V., Entomology Research Museum, Dept. of Entomology, Univ. California, Riverside, California 92521, USA. E-mail: serguei.triapitsyn@ucr.edu

**7776.** Vanappelghem, C.; Lambret, P.; Prioul, B. (2008): Symposium international sur le suivi des odonates d'Europe. La lettre des sociétés. *Société française d'Odonatologie* 48: 6-7. (in French) [This is an extensive report on the international symposium on monitoring European Odonata held in Wageningen, the Netherlands on 13/14 June 2008.] Address: Vanappelghem, C., 14, rue Brûle Maison, F-59000 Lille, France. E-mail: cedvana@free.fr

**7777.** Vilaseca, C.J.; Baptiste, L.G.; López-Ávila, A. (2008): Incidence of the margins on the natural biological control of *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae) in rice crops. *Revista Corpoica – Ciencia y Tecnología Agropecuaria* 9(2): 45-54. (in Spanish, with English summary) ["Multiple researches have shown the environmental, economic and productive benefits that can be generated when including natural vegetation in the margins of the crops. This happens thanks to the presence of natural habitats, which are the ones that promote biotic factors such as natural enemies and abiotic ones as temperature, humidity or rain that can affect negatively the pests. The objective of this research was to evaluate and compare the effect of other natural systems present at the same landscape such as crop of oil palm and gallery forests over the natural biological control of *Spodoptera frugiperda* in growing areas of rice. For this purpose, an area of study was selected at the Colombian plain foothills (Villanueva, Casanare), a place that is characterized for having big extensions of rice, surrounded by oil palms plantations and gallery forests. The abundance of *S. frugiperda* in the stages of larva and imago was evaluated, as well as the parasitism of eggs and larvae and the diversity of natural enemies and other arthropods. It was found that plantations of oil palm, as the gallery forests promote the natural biological control of *S. frugiperda* by increasing the diversity of the natural enemies and reduction of the pest population in the borders of the crop. The importance of parasitoids as *Apanteles marginiventris* and predators of the order Odonata in the control of *S. frugiperda* was identified. It is highlighted the importance to associate perennial crops as oil palm with transitory crops as rice in the planning of agroecosystems on the region and promote the conservation of gallery forest, as long as they can become key factors in the natural biological control of pests. Nevertheless, aspects as the low quality of the habitat and frequently use of chemical pesticides affected the results." (Authors)] Address: Vilaseca, C.J., Ecólogo. Pontificia Universidad Javeriana, Bogotá. Colombia. E-mail: javiervila4@hotmail.com

**7778.** Wei, L.; Han, N.; Zjang, L.; Helgen, K.M.; Parsons, S.; Zhou, S.; Zhang, S. (2008): Wing morphology, echolocation calls, diet and emergence time of black-bearded tomb bats (*Taphozous melanopogon*, Emballonuridae) from southwest China. *Acta Chiropterologica* 10(1): 51-59. (in English) [*T. melanopogon* was studied from May to October 2006 in Guangxi Province, southwest China. A total of 344 fecals was collected; Odonata contributed with 1.05% to abundance. The diet of



this species consists mostly of Lepidoptera and Hemiptera.] Address: Zhang, S., School of Life Science, East China Normal University, 3663 Zhongshan Beilu, Putuo, Shanghai 200062, China. E-mail: syzhang@bio.ecnu.edu.cn

**7779.** Weidel, B.; Carpenter, S.; Cole, J.; Hodgson, J.; Kitchell, J.; Pace, M.; Solomon, C. (2008): Carbon sources supporting fish growth in a north temperate lake. *Aquatic Sciences* 70: 347-260. (in English) [Bluegill growth was primarily the result of feeding on Trichoptera, Odonata, Diptera, terrestrial invertebrates (predominantly Coleoptera) and Cladocera. These same diet items made up the majority of age 0 yellow perch growth, whereas age 1 perch diets consisted mainly of Odonata (> 60%). Adult Odonata was the predominant terrestrial item contributing to largemouth bass growth, but diets also included Coleoptera, small mammals, and arachnids.] Address: Weidel, B., Center for Limnology, University of Wisconsin, Madison, Wisconsin 53706, USA. E-mail: weidel@wisc.edu

**7780.** Wildermuth, H. (2008): Die Falkenlibellen. Libellen Europas Bd. 5 in "Die Neue Brehm-Bücherei 653". ISBN: 3-89432-896-7: 496 pp. (in German) [The late Philip Corbet writes in his foreword to this outstanding book on odonate biology exemplified using the European Corduliidae: "The prospect of a book devoted to the family Corduliidae, or Emeralds, will instantly appeal to any odonatologist. Members of this family are strikingly elegant, and they possess a romantic, almost magical, quality, being furtive in their habits and frequenting wild, beautiful and remote habitats. The elusive habit of corduliids means that relatively little information has been placed on record about their biology." The information presented in this monograph comprises a comprehensive synopsis of observations published by other workers, integrated and greatly enlarged by own researches of H. Wildermuth, in the field and laboratory. "The content of this book upholds the best tradition of the science of natural history: meticulous field observations are extended by behavioural experiments and microscopic dissections conducted in the laboratory. The book's scope embraces all aspects of the family that any reader might wish to learn about: systematics; nomenclature; evolution; the life cycle, including the morphology and natural history of all developmental stages; adult life, including maturation, foraging, and reproductive behaviour; neurophysiology, with special emphasis on the visual system of Corduliidae; and habitat selection and threat and conservation of the dragonfly family." Monographs of the eleven European species comprise information on the discovery and name of each species, taxonomic information, descriptions of imago and larva, emergence, flight period, habitat, habits, accompanying species, threats and conservation measures, needs of research, and distribution differed according to the European countries. The book also includes an extensive bibliography, and an excellent(!) register. Corbet: "A definitive monograph of a family of Odonata is always to be welcomed and admired. It represents an immense commitment of time, effort and expertise. In the hands of a first-class, all-round biologist such as Hansruedi Wildermuth it constitutes an immensely valuable contribution to a field of science: it saves the aspiring investigator from devoting time to a laborious literature search, which should be an obligation but nowadays is sadly often dispensed with; and it points up possible avenues for fruitful research. In gratitude and

admiration, I commend this fine book to all odonatologists. I am confident that odonatology as a science will benefit if investigators are encouraged to adopt Hansruedi Wildermuth's rigorous methodology, especially in the field, so that, by the exercise of appropriate rigour, observations can be standardised and made comparable between habitats. I commend this book to its fortunate readership. It sets a new, high standard for monographs in odonate biology (Philip S. Corbet in his foreword). There is only to add that the book is completely written in German language. As Dr. B. Kiauta wrote in his review of the book, the author is well known for the excellence of his research and lucidity of his writings. The latter will facilitate everyone not common with the German language to read this book overcoming difficulties with the language. I am sure: This book is worth to refresh your German. (Martin Schorr) For additional details see the publisher's home page: <http://www.westarp.de/pages/hauptsei.php?/texts/webasn.php?Kennung=540c61fc2d769292c3d7c8862d3db06a&titlnr=3-89432-324-8&wseite=1> Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**7781.** Wilson, H.W. (2008): The behavior of the Seaside Dragonlet, *Erythrodiplax berenice* (Odonata: Libellulidae), in a Maine Salt Marsh. *Northeastern Naturalist* 15(3): 465-468. (in English) [E. berenice was studied over two summers at Weskeag Marsh, South Thomaston, Maine, USA. "These dragonflies are lethargic, spending over 99% of their time perched on the culm of a salt marsh plant. No evidence of territorial behaviour was found. Females oviposit while in tandem in algal mats on the surface of salt-water pannes. They perch preferentially into the wind, presumably to aid in providing lift on take-off." (Author)] Address: Dept of Biology, Colby College, 5739 Mayflower Hill, Waterville, ME, 04901, USA. E-mail: whwilson@colby.edu.

**7782.** Yoshimura, M. (2008): Longitudinal patterns of benthic invertebrates along a stream in the temperate forest in Japan: in relation to humans and tributaries. *Insect Conservation and Diversity* 1: 95-107. (in English) [" 1. The relationship between benthic invertebrate assemblage composition and surrounding land use has been examined in various ways, but most studies are undertaken at a coarse scale, or they compare obviously different landscapes. In Japan, these obvious differences in landscape are rare, and humans reside even in remote montane areas. 2. In order to clarify the influence of human residence on benthic invertebrate assemblages, seasonal and site differences among benthic samples collected from a 15-km stretch of Kuroson Stream and their relation with riparian land use were examined. 3. The number of individuals and genera differed significantly both spatially and temporally. Multivariate assemblage structure also differed significantly across space and time along the stream. 4. Increase of residential areas affected the in-stream benthic invertebrate assemblage. Site differences along the stream and the effect of human residence were not masked by the potentially homogenizing influence of tributary streams. 5. The composition of surrounding vegetation was the most important factor influencing benthic community structure. The presence or absence of human residential areas and seasonal change were also important variables. 6. Benthic invertebrates may be carried and migrate to main streams from tributaries; however, this phenomenon was not observed. As-

semblages of benthic invertebrates that inhabit a particular site do not change and are considered to vary seasonally across a certain range." (Author). The following taxa are listed: *Epiophlebia* spp., *Lanthus* spp., and *Calopteryx* spp.] Address: Yoshimura, M., Forest Biodiversity Group, Kansai Research Center, Forestry and Forest Products Research Institute, Nagaikyutaro 68, Momoyama, Fushimi, Kyoto 612-0855, Japan. E-mail: yoshi887@ffpri.affrc.go.jp

**7783.** Zawal, A.; Dyatlova, E.S. (2008): Parasitizing on damselflies (Odonata: Coenagrionidae) by water mite (Acari: Hydrachnidia) larvae from Odessa province (southwestern Ukraine). *Natura Montenegrina* 7(3): 453-462. (in English, with Serbian summary) [*Ischnura elegans*, *I. pumilio*, *Coenagrion pulchellum*, and *Erythromma najas* "from the Odessa province were found with six parasitic water mite species (*Hydryphantes octoporus*, *Arrenurus cuspidator*, *A. maculatur*, *A. tricuspikator*, *A. sp.1*, *A. sp.2*). The greatest numbers of the larvae were recorded on *I. elegans* and *C. pulchellum*. Larvae of *H. octoporus* were mainly attached to the lateral side of odonata's body while larvae of *Arrenurus* genus were only attached to the ventral side of odonata's body. The preferred parts were mesosternum and metasternum. Larvae two of the parasitic species never been described therefore they are sign as *Arrenurus sp.1* and *A. sp.2*. The larvae of *Hydryphantoidae* were recordered first time on odonata's body." (Authors)] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Wąska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**7784.** Zessin, W. (2008): Einige Aspekte zur Biologie paläozoischer Libellen (Odonoptera). *Entomologica generalis* 31(3): 261-278. ["Some aspects concerning the biology of Palaeozoic dragonflies (Odonoptera): In the more than 320 million years old evolution the monophyletic group Odonoptera (dragonflies) developed a number of unique morphological adaptations. One of them is the very complex mating behaviour ('tandem position' and 'wheel position') which is the strongest argument for a monophyletic status of the recent dragonflies. A first theory concerning the development of this strange behaviour as well as the evolution of such unique structures was published by Zessin [1995]; it was modified subsequently by Bechly, Brauckmann, Zessin & Gröning [2001] and Zessin et al [2001]. Based upon two fossil specimens of *Namurotypus sippeli* Brauckmann & Zessin 1989 and *Erasipteroides valentini* (Brauckmann 1985) of Namurian B age from Hagen-Vorhalle, Germany, with preserved wings as well as even the male and female genitalia, the evolution of the 'mating wheel' and of the mode of oviposition of recent dragonflies with its peculiar copulation apparatus is discussed; both specimens are therefore of outstanding scientific value for the reconstruction of the development of these body structures. The enlargement of the wing-span of certain Late Palaeozoic Odonoptera [as for example the specimens mentioned above from the Namurian B of Hagen-Vorhalle; *Erasipterella piesbergensis* Brauckmann 1983, and *Piesbergtypus hielscheri* Zessin 2006 of Westphalian D age of the Piesberg near Osnabrück, Germany, and other Permocarboneous species from Central Europe and North America] is discussed in connection with the supposed increasing oxygen concentration in the air during the Late Carboniferous and Early Permian; largest known insect at all is

the Early Permian *Meganeuropsis permiana* Carpenter 1939 with a wing-span of 72 cm. The flying ability of the giant Odonoptera is discussed, too, by focussing on *Stephanotypus schneideri* Zessin 1983. Gliding flight is assumed to be predominant, interrupted by phases of wing flapping. Improvements of the flight ability by nodus- and pterostigma-like structures within the wings were already developed during the Late Carboniferous. Certain characters of the head (size of mandibles and eyes) and spiniferous legs (with three terminal claws) recommend a predatory mode of life similar to the ones of recent Odonoptera. The well-preserved large orthopteroid-like ovipositor of *Erasipteroides valentini* (Brauckmann 1985) suggests an endophytic or an endosubstratic oviposition in soils at the bottom of ponds. The giant dragonflies (Meganisoptera) were not able to adapt their mode of life to the rapidly decreasing oxygen concentration in the air at the end of the Permian period and became completely extinct. Other, smaller Permocarboneous Odonoptera with petiolate wing-base - for example such Protozygoptera as *Bechlya ericrobinsoni* Jarzembowski & Nel 2002, *Oboraneura kukalovae* Zessin 2008, the species of the Kennedyidae Tillyard 1925 and *Saxonagrion minutus* Nel et al 2000 (firstly grouped by NEL et al 2000 with the Zygoptera Selys 1854, then, NEL et al 2008, with the Panodonata) - survived the Permian/ Triassic crisis and gave origin to the rich diversity of the Mesozoic and to the recent species. The so-called, 'secondary copulation' must have already evolved during Permocarboneous or Lower Triassic, because each of the recent suborders of the Odonata [Anisoptera, Anisozygoptera, and Zygoptera] share it; therefore their common stem species (presumably of Permian or Triassic age) must already have had 'secondary copulation' (with the female taking off the sperm from a special structure at the 2nd and 3rd abdominal segment while forming a 'mating wheel' with the male). The larval instars of the giant Odonoptera are poorly known; a single wing of a nymph is described from the Stephanian of Wettin (Sachsen-Anhalt, Germany) as *Schlechtendaliola nympha* Handlirsch 1919." (Author)] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**7785.** Zhang, B.; Ren, D.; Pang, H. (2008): New Isophlebioid Dragonflies from the Middle Jurassic of Inner Mongolia, China (Insecta: Odonata: Isophlebioptera: Campteroptelebiidae). *Acta geologica Sinica* (English Edition) 82(6): 1104-1114. (in English) ["Three new species of fossil dragonflies assigned to *Sinokaratawia* Nel, Huang & Lin in family Campteroptelebiidae, i.e. *S. daohugouica* sp. nov., *S. magica* sp. nov. and *S. gloriosa* sp. nov., and new materials of male *S. prokopi* Nel, Huang & Lin, 2007 are described from the Middle Jurassic of Daohugou, Inner Mongolia, China. An emended diagnosis of genus *Sinokaratawia* was proposed." (Authors)] Address: Ren Dong, College of Life Sciences, Capital Normal University, Beijing 100037, China. E-mail: rendong@mail.cnu.edu.cn

**7786.** Zhang, D.; Yang G.; Zheng, Z. (2008): Comparison of cytochrome b gene sequences and phylogenetic analysis of partial Libellulidae (Odonata: Anisoptera). *Journal of Ningxia University* (Natural Science Edition) 29(2): 161-165. (in Chinese, with English summary) ["Based on 576 bp sequences of Cytb gene by MEGA 2.0 biosoftware, the nucleotide composition and the phylogenetic relationship among 8 libellulid species (*Libellula depressa*, *Pantala flavescens*, *Trithemis fest-*

iva, *T. aurora*, *Diplacodes trivialis*, *Neurothemis fulvia*, *Palpoleura sex-maculata*, *Pseudothemis zonata*) were dealt with. The results show that the average contents of T, C, A and G are 37.0%, 18.3%, 31.3% and 13.4%. The contents of A+T (68.3 %) is obviously higher than that of G+C (31.7 %), and come up to 81.0 % at the third position of cordon. The replacement of nucleotides mostly occurs at the third position. Employing *Mnais auripennis* and *Neurobasis chinensis* as outgroups, the phylogenetic trees shows that the relationship between *Pseudothemis* and *Trithemis* are more closed than that of other genera. *Neurothemis* and *Palpoleura* are the sister group of *Diplacodes*, *Libellula* and *Pantala*." (Authors)] Address: Zhang Dazh, School of Life Science, Ningxia University, Yinchuan 750021, China

**7787.** Zhang, D.; Dai, J. (2008): Odonata species diversity of Yinchuan. *Journal of Ningxia University (Natural Science Edition)* 29(4) : 343-347. (in Chinese, with English summary) [The Odonata diversity (n = 24) in Yinchuan region, China was surveyed from May to September in 2006. Five plots were choosed. Species diversity was analyzed by Margalef's richness indexes (dMa), Shannon-Wiener's diversity index (H'), Simpson index (D), Pielon evenness index (I) and Jaccard similarity coefficients. 827 samples were collected. *Sympetrum frequens* is the most abundant species. *S. frequens*, *Orthetrum albistylum*, *Pantala flavescens*, *Crocothemis servilia*, *Ischmura elegans* and *Coenagrion dyeri* are dominant species. The dMa score in five plots from high to low is: Junqu Farm, Shuidonggou, Hequan Lake, West Lake and Bao Lake. The highest H' was Shuidonggou plot, and Bao Lake plot was lowest. The authors conclude that the environmental heterogeneity and the diversity of Odonata are significantly positive correlated.] Address: Zhang, D., School of Life Science, Ningxia University, Yinchuan 750021, China

**7788.** Anikin, V.V.; Streshnev, A.V.; Boyarkin, A.G. (2008 (>2004)): [Productivity, composition and bioindication of the macrozoobenthos of the Surskoje reservoir]. *Actual Problems of Geography and Ecology* 2(4): o.P.. (in Russian) [*Platycnemis pennipes* and *Coenagrion hastulatum* are mentioned from two and one out of 10 sampling sites, respectively. Odonata larvae occurred in densities of 10 to 26 ind/m<sup>2</sup>, or 0.05 to 0.28 g/m<sup>2</sup>.] Address: E-mail: vvanikin@mail.ru

## 2009

**7789.** Abbott, J.K.; Gosden, T.P. (2009): Correlated morphological and colour differences among females of the damselfly *Ischnura elegans*. *Ecological Entomology* 34(3): 378-386. (in English) ["1. The female-limited colour polymorphic damselfly *Ischnura elegans* has proven to be an interesting study organism both as an example of female sexual polymorphism, and in the context of the evolution of colour polymorphism, as a model of speciation processes. 2. Previous research suggests the existence of correlations between colour morph and other phenotypic traits, and the different female morphs in *I. elegans* may be pursuing alternative phenotypically integrated strategies. However, previous research on morphological differences in southern Swedish individuals of this species was only carried out on laboratory-raised offspring from a single population, leaving open the question of how widespread such differences are. 3. The present study therefore analysed multi-generation-

al data from 12 populations, investigating morphological differences between the female morphs in the field, differences in the pattern of phenotypic integration between morphs, and quantified selection on morphological traits. 4. It was found that consistent morphological differences indeed existed between the morphs across populations, confirming that the previously observed differences were not simply a laboratory artefact. It was also found, somewhat surprisingly, that despite the existence of sexual dimorphism in body size and shape, patterns of phenotypic integration differed most between the morphs and not between the sexes. Finally, linear selection gradients showed that female morphology affected fecundity differently between the morphs. 5. We discuss the relevance of these results to the male mimicry hypothesis and to the existence of potential ecological differences between the morphs." (Authors)] Address: Abbott, Jessica, Department of Animal Ecology, Ecology Building, Lund University, SE-223 63 Lund, Sweden. E-mail: abbottj@queensu.ca

**7790.** Anderson, R.C. (2009): Do dragonflies migrate across the western Indian Ocean? *Journal of Tropical Ecology* 25(4): 347-358. (in English) ["In the tropical Indian Ocean, the Maldives Islands lack surface freshwater, so are unsuitable for dragonfly reproduction. Nevertheless, millions of dragonflies (Insecta, Odonata; mostly globe skimmer, *Pantala flavescens*) appear suddenly every year starting in October. Arrival dates in the Maldives and India demonstrate that the dragonflies travel from southern India, a distance of some 500–1000 km. Dates of arrival and occurrence coincide with the southward passage of the Inter-tropical Convergence Zone (ITCZ). Circumstantial evidence suggests that the dragonflies fly with north-easterly tail winds, within and behind the ITCZ, at altitudes over 1000 m. It is proposed that this massive movement of dragonflies is part of an annual migration across the western Indian Ocean from India to East Africa. Arrival dates in the Seychelles support this hypothesis. Dragonflies also appear (in smaller numbers) in the Maldives in May, with the onset of the southwest monsoon, suggesting a possible return migration from Africa. These proposed migrations of dragonflies, regularly crossing 3500 km or more of open ocean, were previously unknown. It is known that these dragonflies exploit ephemeral rain pools for reproduction; the monsoons and ITCZ bring not only alternating, seasonal rains to India and Africa, but also appropriate winds for dragonflies to follow those rains. Several bird species migrate from India across the western Indian Ocean to wintering grounds in Africa. They do so at the same time as the dragonflies, presumably taking advantage of the same seasonal tail winds. Many of these birds also eat dragonflies; the possible significance of this was not previously appreciated." (Author)] Address: Anderson, C., Manta Marine Pvt Ltd, P.O. Box 2074, Malé, Republic of Maldives. E-mail: anderson@dhivehinet.net.mv

**7791.** Anonymus (2009): Abstracts of Talks to be Presented at the Sullivan, Missouri DSA Annual Meeting. *Argia* 21(2): 1-3. (in English) [Brief abstracts of the following lectures are presented: \*National Review of State Wildlife Action Plans for Odonata SGCN—Jason Bried and Celeste Mazzacano. \*Some Chalcidoid Parasites of *Aeshna tuberculifera* Walker (Black-tipped Darner)—Burton Cebulski. \*Status and Distribution of *Orthemis schmidtii* Buchholz and the Odonata of Grenada—Jerrold J. Daigle, Erik Pilgrim, and François Me-



urges. \*Live Culturing of Dragonflies from Larvae to Adults—Richard Groover. \*Population genetics of Hine's Emerald Dragonfly (*Somatochlora hineana*) in Missouri—Meredith J. Mahoney and E.D. Cashatt. \*Lessons Learned from the First Eight Years of Conducting Hine's Emerald Dragonfly Surveys in Missouri—P.M. McKenzie, T. Vogt, J.C. Walker, J.H. Smentowski, R. Gillespie, R. Day, E.D. Cashatt and M.J. Mahoney. \*West Indian Odonata—Constraints and Opportunities—Dennis Paulson. \*A proposal: Incorporating Odonates into Stream Bioassessments Using DNA Barcodes—Erik Pilgrim. \**Somatochlora* Phylogeny—T.E. Vogt, Meredith Mahoney, Everett Cashatt, and James Purdue] Address: Editor: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**7792.** Baldaccini, G.N.; Leone, L.M.; Taddei, C. (2009): The running waters macroinvertebrates community: sampling techniques. *J. Environ. Monit.* 11: 756-760. (in English) ["The community of running water macroinvertebrates has proved to be one of key subjects for fluvial ecology and bioindication studies, thanks both to the different trophic roles within the range of taxa and to the ease with which they may be collected and identified. However, the complex nature of this community creates problems concerning the complete identification of the full range of taxa, even when restricting the taxonomic classification to families and genera. Even so, the need to use the community for the implementation of indexes of Ecological Status of freshwaters and for the detection of reference conditions, necessarily means a deeper knowledge of this structure. Hence, a standard methodology of the capture effort is required to identify not only the ecological quality but also a reference community for each selected fluvial typology and for each section examined. Starting from the processing of data collected during intercalibration exercises of the IBE method, the authors analyse the results underlining the share given by the size of the sample collected (catchment effort), and by the distribution models of different taxa within the community, in order to give a contribution to the evaluation of the reliability level of standard samples. The results confirm the models already described in previous publications and lead us to accept the presence of marginal degrees of uncertainty in standard samples." (Authors) "*Onychogomphus*" is listed.] Address: not stated

**7793.** Bao, L.; Yu, Y.L. (2009): Preliminary modeling of the fluid-structure interaction on a deformable insect wing in flapping. *New Trends in Fluid Mechanics Research. Proceedings of the Fifth International Conference on Fluid Mechanics (Shanghai, 2007)*. ISBN 978-3-540-75994-2 (Print) 978-3-540-75995-9 (Online): 638-???. (in English) ["Insect wings are considered as highly functional and largely optimized mechanical constructions. They can deform passively in flapping, corresponding to external aerodynamic loading, wing's structure and material properties, which is a complicated Fluid-Structure Interaction course. In this paper, a viscoelastic constitutive relation model of the dragonfly wing was established firstly, and then the FSI problem—the periodical deformation in wing flapping was primarily explored." (Authors)] Address: Bao, L., The Laboratory for Biomechanics of Animal Locomotion, Graduate University of Chinese Academy of Sciences, Beijing, 100049, China. E-mail: lbao@gucas.ac.cn

**7794.** Barquyn, J.; Death, R.G. (2009): Physical and chemical differences in karst springs of Cantabria, northern Spain: do invertebrate communities correspond? *Aquatic Ecology* 43(2): 445-455. (in English) ["Benthic macroinvertebrate communities (including *Onychogomphus* sp. and *Aeshna* sp.) were studied and environmental variables were measured in six rheocrene springs in Cantabria, northern Spain. Principal component analysis revealed two different spring types according to their physical and chemical characteristics. Springs from group A (GA) had higher temperature and conductivity, while springs in group B (GB) had higher values of pH, altitude, mean water velocity, percentage of boulders and coarse particulate organic matter. Total number of invertebrate taxa and individuals were not different between GA and GB springs. However, Shannon diversity index was significantly higher for GB springs. Analysis of similarities (ANOSIM) and non-metric multidimensional scaling (NMDS) analysis indicated that invertebrate assemblages from GA and GB springs were different. [...]" (Authors)] Address: Death, R.G., Institute of Natural Resources, Ecology, Massey University, Private Bag 11222, Palmerston North, New Zealand. E-mail: R.G.Death@massey.ac.nz

**7795.** Behrstock, R.A. (2009): An updated list of the Odonata of Coahuila, Mexico, including forty-one new state records and the first Mexican occurrence of *Libellula composita* (Hagen). *Bulletin of American Odonatology* 11(1): 1-7. (in English, with Spanish summary) ["Records are presented for Odonata located at various sites in the state of Coahuila, Mexico during May 2006 and June 2007. Based upon collected specimens, photos and sightings, 41 species (17 Zygoptera and 24 Anisoptera) are reported as new for the state. Also included is the first Mexican record of *L. composita*." (Author)] Address: Behrstock, R.A., 10359 S. Thicket Pl., Hereford, AZ 85615, USA. E-mail: rbehrstock@cox.net

**7796.** Belevich, O.E. (2009): A key to Palaearctic dragonflies of the genus *Aeshna* Fabricius, 1775 (Odonata, Aeschnidae). *Entomological Review* 89(2): 185-188. (in English) ["Keys to 10 Palaearctic species of the dragonfly genus *Aeshna* are given. For adults of the two morphologically similar species *Ae. juncea* (Linnaeus, 1758) and *Ae. subarctica* Walker, 1908, new distinguishing characters are given. These are the shape of the genital plate and position of the anal appendages relative to the horizontal plane of the female body, and the shape of the processes of the anterior hooks of the male genitalia. Additionally, keys to the larvae based on characters of larvae reared in the laboratory are given. These keys allow species-level identification for early and middle larval instars." (Author) Original Russian Text © O.E. Belevich, 2009, published in *Entomologicheskoe Obozrenie*, 2009, Vol. 88, No. 1, pp. 111-115.] Address: Belevich, O.E., Institute of Animal Systematics and Ecology, Siberian Branch, Russian Academy of Sciences, Novosibirsk, Russia

**7797.** Bogunski, G. (2009): Ergebnisse entomofaunistischer Untersuchungen im "Hochmoorrest am Filzteich" - einem entomofaunistisch bedeutsamen Gebiet Sachsens" - mit angrenzenden Bereichen im Hartmannsdorfer Forst. *Mitt. Sächs. Entomol.* 85: 13-28. (in German) [Saxonia, Germany; 22 species are recorded from the locality including *Coenagrion hastulatum*, *Lesites virens*, and *Leucorrhinia dubia*.] Address: Bogunski, G., Gartenstr. 10, 08141 Reinsdorf, Germany

**7798.** Borisov, S.N. (2009): Distribution patterns of dragonflies (Odonata) in Central Asia. *Entomological Review* 89(1): 26-33. (in English) ["The dragonfly fauna of Central Asia reveals distinct vertical differentiation. Three groups of species can be distinguished: mountain (24 species), plain (18), and plain-mountain (34) ones. The ranges observed can be classified into 7 principal types: plain, mountain, continuous boreo-montane, disjunctive Central Asian boreo-montane, disjunctive Tien Shan boreo-montane, Central Asian, and Pamir-Alay plain-mountain. The leading factors determining the distribution of dragonflies are the temperature and the presence of streams suitable for preimaginal development; the former factor determines the potential ranges, and the latter, the actual ones. The present-day composition, structure, and vertical distribution of the dragonfly fauna formed during the historical time, after the development of artificial irrigation canals which provided new habitats for dragonflies. Original Russian Text © S.N. Borisov, 2009, published in *Zoologicheskii Zhurnal*, 2009, Vol. 88, No. 1, pp. 11–17." (Author)] Address: Borisov, S.N., Institute of Animal Systematics and Ecology, Russian Academy of Sciences, Novosibirsk, 610091, Russia. Email: borisov-s-n@yandex.ru

**7799.** Bots, J.; van Dongen, S.; Adriaens, T.; Dumont, H.J.; Stoks, R.; van Gossum, H. (2009): Female morphs of a colour polymorphic damselfly differ in developmental instability and fecundity. *Animal Biology* 59: 41-54. (in English) ["Sex-limited colour polymorphism occurs in several animal taxa and is usually explained in the context of sexual selection. Specifically, for polymorphism restricted to the female sex, multiple phenotypes may have evolved in response to male harassment. Such male harassment is generally considered to entail differential costs to female morphs, which may ultimately result in fitness differences. However, contrary to this prediction, most previous studies do not support that female morph (andromorphs and heteromorphs) differ in measures of quality and (or) fitness components. In this study, we evaluate quality and fitness differences between mated female morphs of the damselfly *Enallagma cyathigerum*. We suggest that many earlier studies may have failed to observe morph differences in quality or fitness because selection by male harassment was weak. Here, we selected a study population for which our expectation was that levels of per female capita male harassment were high. Nevertheless, also in this population mated female morphs did not differ in body size or condition (body mass/body length). However, mated female morphs did differ in levels of developmental instability: heteromorphs consistently showed a higher level of fluctuating asymmetry than andromorphs. Also, mated female morphs differed in fecundity: andromorphs had a lower clutch size than heteromorphs. In addition, larger females contained more eggs, but the slope of this relationship was steeper in heteromorphs. In conclusion, mated female morphs of the damselfly *E. cyathigerum* at our study site clearly differed in one quality estimate (developmental instability) and in our measure of fitness (fecundity)." (Authors)] Address: Bots, Jessica, Evolutionary Ecology Group, University of Antwerp, Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: jessica.bots@ua.ac.be

**7800.** Bots, J.; Breuker, C.J.; van Kerkhove, A.; van Dongen, S.; De Bruyn, L.; van Gossum, H. (2009): Variation in flight morphology in a female polymorphic dam-

selfly: intraspecific, intrasexual, and seasonal differences. *Can. J. Zool.* 87(1): 86-94. (in English, with French summary) ["In aerial animals, flight morphology needs to be designed to allow daily behavioural activities. Within species differences in behaviour can therefore be expected to relate to differences in flight morphology, not only between males and females but also between same-sex members when they use different behavioural strategies. In female polymorphic damselflies, one female morph is considered a male mimic that resembles the male's body colour and behaviour (andromorph), whereas the other is dissimilar (gynomorph). Here, we questioned whether males, andromorphs, and gynomorphs of the damselfly *Enallagma cyathigerum* differ in flight morphology, with andromorphs being more similar to males than gynomorphs. In addition, we evaluated whether differences in flight morphology are consistent or whether some morphs are more plastic in response to seasonal environmental fluctuations. Most morphometrics showed similar seasonal plasticity for males and both female morphs, which could only partly be explained from allometry. Consistent with high manoeuvrability in flight, males had broader wings and lower wing loading than females. Variation between female morphs was less pronounced, with no consistent differences in length, aspect ratio, total surface, and wing loading. However, we detected morph-specific differences in shape and width, with andromorphs having broader wings than gynomorphs similarly to males." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**7801.** Boudot, J.P.; Kalkman, V.J.; Azpilicueta Amorin, M.; Cordero Rivera, A.; Degabriele, G.; Domanget, J.-L.; Ferreira, S.; Garrigós, B.; Jovic, M.; Kotarac, M.; Lopau, W.; Marinov, M.; Mihokovic, N.; Riserivato, E.; Samraoui, B.; Schneider, W. (2009): Atlas of the Odonata of the Mediterranean and North Africa. *Libellula Suppl.* 9: 256 pp. (in English, with German summary) ["This atlas gives the distribution of Odonata in Africa north of the 18th northern parallel, the Levant, Anatolia and the whole of Mediterranean Europe. Some nearby areas like Portugal, The Canary Islands, Madeira, Serbia, Macedonia, Bulgaria and parts of the Arabian Peninsula, Iraq and Iran are included as well. Records, shown via a 50 km x 50 km UTM MCRS grid, are categorized according to their date - prior to 1980 and from 1980 onwards. 179 species are presently recognized in this area." (Authors)] Address: Boudot, J.-P., LIMOS, UMR CNRS 7137, Universités de Nancy, Faculté des Sciences, B.P. 239, F-54506 - Vandoeuvre-lès-Nancy Cedex, France. E-mail: jean-pierre.boudot@limos.uhp-nancy.fr

**7802.** Bredenhand, E.; Samways, M.J. (2009): Impact of a dam on benthic macroinvertebrates in a small river in a biodiversity hotspot: Cape Floristic Region, South Africa. *Journal of Insect Conservation* 13(2): 297-307. (in English) [Suitable reservoirs and monitoring methods are needed to manage scarce water supplies in dry countries. We assessed here the impact on aquatic macroinvertebrates of the only dam on the Eerste River, which runs through the heart of a biodiversity hotspot, the Cape Floristic Region, South Africa. The dam and associated activities, were the only forms of disturbance in this otherwise pristine area. We sampled over 20,000 macroinvertebrate individuals and illus-

trated some categorical effects of the impoundment and its effects on macroinvertebrate assemblages. Macroinvertebrate species diversity below the dam was only half of that in the pristine catchment area above the dam. Furthermore, Ephemeroptera, Plecoptera and Trichoptera diversity and abundance dropped to almost zero as a result of the impoundment. In contrast, the abundance of the Diptera family Chironomidae increased substantially below the dam. These changes in macroinvertebrate diversity mirrored those recorded in biologically less diverse areas, but are of major concern in this biodiversity hotspot with its rich endemic fauna. We conclude that such an impoundment, while important for human welfare, results in a high price being paid in terms of loss of local biodiversity." (Authors) All specimens - including Odonata - were identified to family level according to South African Scoring System version 5 protocol.] Address: Samways, M.J., Dept Ent. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**7803.** Breuker, C.J. (2009): Book review: Alex Córdoba-Aguilar (ed): Dragonflies and damselflies. Model organisms for ecological and evolutionary research. Oxford University Press, Oxford, UK, 2008, Hardback, Sterling £65.00, ISBN 978-0-19-923069-3, 288 pages. *Journal of Insect Conservation* 13(3): 363-365. (in English) [Book review.] Address: Breuker, C.J., Evolutionary Developmental Biology Research Group, Sinclair Building, School of Life Sciences, Oxford Brookes University, Gypsy Lane, Headington, Oxford, OX3 0BP, UK. E-mail: cbreuker@brookes.ac.uk

**7804.** Bried, J.T. (2009): Location and seasonal differences in adult dragonfly size and mass in northern Mississippi, USA (Odonata: Libellulidae). *Int. J. Odonatology* 12(1): 123-130. (in English) ["Size and mass are often uniformly related within individuals and populations, but the relationship may vary in time or space. I asked whether isolated adult dragonfly populations within the same environmental context (climate, physiography, ecoregion) differ in both size and mature mass, and whether earlier emerging dragonflies are both larger and heavier on average. Differences were apparent among locally separated populations (ca 130-160 km apart), with the most northerly populations containing larger and heavier adults on average. Site-level environmental variation probably exerted a larger influence than broad-based ecogeographic rules (e.g., Bergmann's rule) at this fine scale. On average, earlier emerging dragonflies tended to outsize and/or outweigh later emerging dragonflies, a commonly observed pattern in adult odonates and other insect taxa. Size and mass did not produce the same results in every case, suggesting the size-mass relationship within dragonfly species can vary among spatially or seasonally isolated adult populations." (Author)] Address: Bried, J.T., The Nature Conservancy, 195 New Karner Road, Albany, New York 12205, USA. E-mail: jbried@tnc.org

**7805.** Cannings, R.A. (2009): Book reviews: Samways, M.J. 2008. Dragonflies and Damselflies of South Africa. Pensoft, Sofia, 297 pp. ISBN 978-954-642-330-6, hardback, 145x210 mm. Euros 39.00. From <http://www.Pensoft.net>. *Florida Entomologist* 92(2): 404-405. (in English) [Book review.] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street, Victoria, BC, Canada V8W 9W2. E-mail: RCannings@royalbcmuseum.bc.ca

**7806.** Cicort-Lucaciu, A.-S.; Dimancea, N.; Blaga-Lungulescu, R.M.; Hodisan, O.; Benkö, A. (2009): Diet composition of a *Triturus dobrogicus* (Amphibia) population from Arad County, western Romania. *Bihorean Biologist* 3(1): 77-82. (in English) ["Odonata larvae" play a minor role as diet in a *Triturus dobrogicus* population from Cermeiului Plain.] Address: Cicort-Lucaciu, A.-S., University of Oradea, Faculty of Sciences, Department of Biology, 1 Universitatii str., 410087 - Oradea, Romania. E-mail: cicort.alfred@yahoo.com

**7807.** Clausnitzer, V.; Kalkman, V.J.; Ram, M.; Colleen, B.; Baillie, J.E.M.; Bedjanic, M.; Darwall, W.R.T.; Dijkstra, K.-D.; Dow, R.; Hawking, J.; Karube, H.; Malikova, E.; Paulson, D.; Schütte, K.; Suhling, F.; Villanueva, R.J.; von Ellenrieder, N.; Keith Wilson, K. (2009): Odonata enter the biodiversity crisis debate: The first global assessment of an insect group. *Biological Conservation* 142(8): 1864-1869. (in English) ["The status and trends of global biodiversity are often measured with a bias towards datasets limited to terrestrial vertebrates. The first global assessment of an insect order (Odonata) provides new context to the ongoing discussion of current biodiversity loss. A randomly selected sample of 1500 (26.4%) of the 5680 described dragonflies and damselflies was assessed using IUCN's Red List criteria. Distribution maps for each species were created and species were assigned to habitat types. These data were analysed in respect to threat level for regions and habitat types. We have found that one in 10 species of Odonata is threatened with extinction. This threat level is among the lowest of groups that have been assessed to date, suggesting that previous estimates of extinction risk for insects might be misleading. However, Odonata only comprise a small invertebrate order, with above-average dispersal ability and relatively wide distribution ranges. For conservation science and policy to be truly representative of global biodiversity a representative cross-section of invertebrates needs to be included." (Authors)] Address: Clausnitzer, Viola, Graefestr. 17, D-06110 Halle/Saale, Germany. E-mail: violacl@t-online.de

**7808.** Contreras-Garduno, J.; Canales-Lazcano, J.; Jiménez-Cortés, J.G.; Juárez-Valdez, N.; Lanz-Mendoza, H.; Córdoba-Aguilar, A. (2009): Spatial and temporal population differences in male density and condition in the American rubyspot, *Hetaerina americana* (Insecta: Calopterygidae). *Ecological Research* 24(1): 21-29. (in English) ["Increased resource availability should favour higher animal density. It may also affect sex ratio, the male condition, and mating competition over access to females, although the direction of these variables is not straightforward to predict. Using a non-experimental approach, we carried out preliminary research using the territorial *H. americana* by comparing two spatially separated populations and the same population in two different seasons (each comparison with varying population densities). We first compared the sex ratio by counting males (using two categories, territorial and non-territorial) and females; relative foraging time (as an indicator of how much feeding resources each site provides); wing spot size (a sexual ornament), body size and immune melanization response (these two variables were used to assess male condition); and fighting time and contest number (to assess competition). For the seasonal comparison we used a third population in which we only compared male spot size and two indicators of condition and immune response, phen-



oloxidase (PO) and nitric oxide (NO) activity. The high-density population had higher values of non-territorial males (but similar sex ratio), relative foraging time, contest time and number, wing spot (but similar body size) and melanization response than the low-density population. According to season, at high density, males had higher values of wing spots, PO, and NO. Our results suggest that in a population where animals have more dietary resources, males reach a better condition despite the competition being more intense." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biológicas, Univ. Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**7809.** Córdoba-Aguilar, A.; Serrano-Meneses, M.A.; Cordero-Rivera, A. (2009): Copulation duration in non-territorial Odonate species lasts longer than in territorial species. *Annals of the Entomological Society of America* 102(4): 694-701. (in English) ["We tested whether long copulation duration is more likely to have evolved in nonterritorial odonate species than in territorial species, given that nonterritorial males do not incur the costs of territory defense. A phylogenetic comparative method that controls for the phylogenetic nonindependence of species was used to compare copulation duration among 46 species of the two main odonate suborders (Anisoptera and Zygoptera). Copulation duration of nonterritorial anisopteran species was longer than for territorial dragonflies; however, this relationship was not found for Zygoptera. Long copulations in Anisoptera may be related to a male's ability to manipulate a female's stored sperm. It is suggested that constraints that prevent a territorial male from lengthening copulation do not seem to operate in Zygoptera. Other selective processes (i.e., cryptic female choice and/or sexual conflict) may also be important determinants of copulation duration in the Zygoptera. To our knowledge, this is the first exploration of the relation copulation duration and mating systems in insects." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**7810.** Costa, J.M.; Oldrini, B.B.; Anjos-Santos, D. (2009): Eight new Leptagrion larvae from Brazil (Zygoptera: Coenagrionidae). *Odonatologica* 38(2): 93-111. (in English) ["The ultimate instar larvae of *L. andromache*, *L. bocainense*, *L. capixabae*, *L. dardanoi*, *L. elongatum*, *L. macrumum*, *L. perlongum*, and *L. vriesianum* are described and illustrated from the states of Rio de Janeiro, Espírito Santo, Minas Gerais, Pernambuco, and Santa Catarina. All specimens are deposited in Museu Nacional, Rio de Janeiro, Brazil. A comparative tab. of the structural characters is included." (Authors)] Address: Costa, J.M., Depto de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20940-40 Rio de Janeiro, RJ, Brazil. jcosta@globocom

**7811.** Couteyen, S., (2009): Biogéographie et spéciation des Odonates de l'île de la Réunion. *Ann. soc. entomol. Fr.* (n.s.) 45(1): 83-91. (in French, with English summary) ["The odonatological fauna of la Réunion is fundamentally of Mauritian origin for the geological history of the Mascarenes and the different routes taken by cyclones in the south-west of the Indian Ocean. The study of the Odonata distribution according to various

aquatic ecosystems of the island shows that: 1. Indigenous species with wide repartition are mainly found in open ecosystems of low and moderate altitude (from 0 to 800 meters). These ecosystems include as many as 13 species and have the highest Odonata density. 2. The Odonata fauna of la Réunion can be distinguished from those of the other islands of the Madagascan Region by the presence of two species originated from the continent which are confined above an altitude of 1000 meters. 3. For most of them, endemic species live in forested ecosystems. Those ecosystems do not hold more than five species of the odonatological fauna of the island. Finally, it seems that the speciation of Odonata in la Réunion doesn't take place in the diversified ecosystems with widely distributed species, but in a set of marginal ecosystems with low Odonata diversity." (Author)] Address: Couteyen, S., Association réunionnaise d'Ecologie, 188 chemin nid joli, F-97430 le Tampon, île de la Réunion, France. E-mail: scouteyen@ecologie.re

**7812.** Damm, S.; Hadrys, H. (2009): *Trithemis morrisoni* sp. nov. and *T. palustris* sp. nov. from the Okavango and Upper Zambezi Floodplains previously hidden under *T. stictica* (Odonata: Libellulidae). *International Journal of Odonatology* 12(1): 131-145, pls III-IV. (in English) ["During the course of a population genetic study of *Trithemis stictica* that included sites in Namibia, Kenya, Tanzania, Ethiopia, Botswana and Zambia, two undescribed libellulid species were discovered in the Okavango and Upper Zambezi Floodplains. These were both previously identified as *T. stictica*. We describe the two species, *T. morrisoni* sp. nov. (holotype ♂: Namibia, Nature Reserve Popa Falls, Okavango River at the rapids, 18°07'S, 21°40'E; IV 2007, leg. K.-D.B. Dijkstra; dep. in the National Museum of Namibia, Windhoek) and *T. palustris* sp. nov. (holotype ♂: Botswana, Okavango Delta, Moremi Game Reserve, 19°15'S, 23°20'E; II 2007, leg J. Kipping; dep. in the Nat. Mus. of Namibia, Windhoek) and compare them with *T. stictica*." (Authors)] Address: Damm, Sandra, ITZ, Ecology & Evolution, TiHo Hannover, Bünteweg 17d, 30559 Hannover, Germany. E-mail: sandra.giere @ecolevol.de

**7813.** Deeds, J.; Bogar, D.; Koval, R.; McWilliams, J.; Schiffer, C. (2009): Six new Odonata state records in Pennsylvania. *Argia* 21(2): 5-6. (in English) [Records of *Enallagma anna*, *Ischnura kellicotti*, *Ophiogomphus incurvatus*, *Macromia taeniolata*, *Libellula deplanata*, and *Celithemis fasciata* are documented.]

**7814.** Dibble, C.J.; Kauffman, J. E.; Zuzik, E.M.; Smith, G.R.; Rettig, J.E. (2009): Effects of potential predator and competitor cues and sibship on wood frog (*Rana sylvatica*) embryos. *Amphibia-Reptilia* 30(2): 294-298. (in English) ["Chemical cues emitted from predators or competitors are often important for animals living in aquatic ecosystems as they allow potential prey to assess predation risk and make appropriate risk-sensitive responses. In our experiment, we examined if *R. sylvatica* embryos exposed to potential predator and competitor cues would alter their time to hatching, size at hatching, or survivorship. Eggs from four different sibships were subjected to a variety of cues including dragonfly larvae (potential tadpole predator), mosquito fish (*Gambusia affinis*; a non-native potential egg and tadpole predator), and overwintered tadpoles of *Rana* sp. (potential competitors). We found no significant effects of any of the cues. However, we did find sig-

nificant variation in mean time to hatching and mean hatchling size among sibships. Our results suggest that wood frog embryos may have limited ability to respond to some cues at the embryonic stage, at least for the concentrations and conditions used in this experiment. Our results do indicate genetic or parental effects can affect embryonic wood frog development rate and hatchling size." (Authors)] Address: Smith, G.R., Dept Biology, Denison University, Granville, OH 43023, USA. Email: smithg@denison.edu

**7815.** Donnelly, T.W. (2009): Book Review: Dragonflies and Damselflies of the West. By Dennis Paulson, Princeton University Press, 2009. 535 pages, color, soft cover \$29.95. ISBN 978-0-691-12281-6. *Argia* 21(2): 14-15. (in English) [Book review.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**7816.** Dow, R.A.; Reels, G.T. (2009): Expedition to Mount Dulit, Sarawak, August-September 2008 - Odonata. IDF-Report 19: 1-16. (in English) [This is a report on a short expedition to Mount Dulit, Sarawak, conducted by Rory Dow and Graham Reels in late August, and early September, 2008. The objective of the expedition was to survey Odonata on the mountain, with particular attention to reconfirming the presence of a number of species (*Rhinoneura caerulea*, *Bornargiolestes nigra*, *Drepanosticta dulitensis*, *D. forficula*, & *D. dentifera* and *Orthetrum borneense*) originally described from Mt. Dulit by Kimmins (1936), from material collected by members of an Oxford University Expedition to Sarawak in 1932 (Harrison 1933). The mountain was not re-visited by odonatologists until 2006. A total of 49 species is listed. Some of the target species could not be traced due to insurmountable problems to reach the plateau of the Dulit mountains.] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**7817.** Dumont, H.J. (2009): Aquatic insects of the Nile basin, with emphasis on the Odonata. *Monographiae Biologicae* 89: 631-646. (in English) ["Much work has been done on the Diptera of the Nile, because many species are vectors of disease of man and cattle. Some biogeographic work has been done on the Heteroptera, but the group that is known best is that of the Odonata. With c. 250 species out of an estimated 900 for Africa, the Nile is not particularly rich. Unlike the Congo basin, it lacks a high degree of endemism. Relatively most endemic species are found on the faunistically depauperate Ethiopian plateau, followed by the East African lake zone. Quite a few wide-ranging Afrotropical species have used the Nile valley as a pathway to reach the Mediterranean shores, while in Lower Egypt some Palaearctic species of Irano-Turanian extraction occur. There has been exchange, across Sinai with the Levant, and perhaps across the Bab-el-Mandeb passage with Arabia. Some of these exchanges have been recent, others are older, and (sub) speciation has occurred since. Old endemics of Arabia and The Levant (at genus level) may not have had anything to do with the Nile. Their ancestors may have used the Red Sea valley as a pathway for dispersal before the opening of Bab-el-Mandeb. Not only the Afrotropical fauna of the Levant is a pluvial relict of Pleistocene age; also in West Sudan, relicts of an African forest fauna are found in a mountainous Sahel environment (Jebel Marra). Oriental elements in the Nile fauna are extre-

mely rare." (Author)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@ugent.be

**7818.** Ellenrieder, N.v. (2009): Odonata of the Argentine Yungas cloud forest: distribution patterns and conservation status. *Odonatologica* 38(1): 39-53. (in English) ["Odonata of streams, small rivers and ponds were sampled in the Yungas cloud forest of NW Argentina, and presence / absence information of species from samples and from examination of collections was recorded in a spatial-relational data base. Alpha, beta, and gamma diversity and total species richness expected for the area were estimated. Similarity in composition of odonate communities from lotic and lentic environments were analyzed according to latitudinal and altitudinal gradients, using multivariate cluster analysis. Assemblages from NW Argentina were compared to those from equivalent sites in SE Peru. Odonata species diversity was found to follow both a latitudinal (decreasing from N to S) as an altitudinal gradient (decreasing from low to high elevations). Based on IUCN (2001) criteria, the conservation status of the odonate species endemic to the Yungas cloud forest was assessed at a global scale; 6 species were assessed as of Least Concern and 2 as Near Threatened." (Author)] Address: Ellenrieder, Natalia von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: natalia.ellenrieder@gmail.com

**7819.** Escoto-Moreno, J.A.; González-Soriano, E.; Escoto-Rocha, J. (2009): Odonata from Aguascalientes state, Mexico. *Odonatologica* 38(2): 151-158. (in English) ["A list is presented of 58 species, including their distribution by municipalities; 50 of these are new records for the state. Information on general distribution of selected species is also provided. In accordance with the non-parametric estimation Chao2, the number of observed species represents ca 87.8% of the total number of species estimated for the state of Aguascalientes." (Authors)] Address: Escoto-Moreno, J.A., Depto de Biología, Universidad Autónoma de Aguascalientes, Avenida Universidad 940, MX-20100 Aguascalientes, Mexico. E-mail: jerjaem2002@yahoo.es

**7820.** Ferenti, S.; Dimancea, N.; David, A.; Tântar, A.; Daraban, D. (2009): Data on the feeding of a *Rana ridibunda* population from Sarighiol de Deal, Tulcea County, Romania. *Bihorean Biologist* 3(1): 45-50. (in English) [The diet of 86 specimens of *R. ridibunda* is mainly represented by the Coleoptera, Diptera and Homoptera (Cicada). The majority of prey have a terrestrial origin. The presence of different size preys indicates opportunistic feeding. Odonata contribute between 3.5 - 6% to the diet. ] Address: Ferenti, Sara, University of Oradea, Faculty of Science, Dept of Biology, 1 Universitatii str., 410087, Oradea, Romania. E-mail: ferentisara@yahoo.com

**7821.** Fincke, O.M.; Santiago, D.; Hickner, S.; Biebek, R. (2009): Susceptibility of larval dragonflies to zebra mussel colonization and its effect on larval movement and survivorship. *Hydrobiologia* 624: 71-79. (in English) ["Colonization by the zebra mussel, *Dreissena polymorpha*, was quantified for five dragonfly species that differed in size and larval habits in a Michigan lake. Both larger size and a non-burrowing habit independently increased susceptibility to colonization. In 2005, over 50% of the final instars of the sprawlers *Didymops*

transversa and Hagenius brevistylus were colonized, as well as younger instars. Rarely colonized were Progomphus obscurus and Dromogomphus spinosus, whose larvae burrow under sand, and the sprawler Epithea princeps, whose final instars were lightly covered with sand. Hagenius larvae that had been preyed upon carried more mussels than those dying of other causes. More generally, mussel attachment decreased the probability that sprawlers left the water to emerge, the distance that some species traveled before emerging, and the ability of an overturned sprawler to right itself. On average, final instars of Didymops and Hagenius remaining in the water carried three times as many mussels as individuals known to emerge. Compared to uncolonized individuals, Epithea and Progomphus with mussels emerged closer to the water line. Among colonized Didymops, the distance traveled on land before emerging decreased with increasing mussel load. Of the colonized Didymops that could right themselves, righting time increased with mussel load. Because the two common species of sprawlers were disproportionately colonized, and mussel attachment decreased their chances of emerging, our results suggest that *D. polymorpha* has the potential to affect the community structure of this guild of aquatic and terrestrial predators." (Authors)] Address: Finke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**7822.** Fleck, G.; Waller, A.; Serafin, J.; Nel, A. (2009): The oldest Calopterygidae in the Eocene Baltic amber (Odonata: Zygoptera). *Zootaxa* 1985: 52-56. (in English) ["A larva of the damselfly family Calopterygidae is described from Eocene Baltic amber. It is the oldest record of this family partially filling the gap between previous records from the Oligocene and the Mesozoic inferred from molecular analyses for this family." (Authors)] Address: Serafin, J., 3Ul. Balladyny 5A, 05-502 Piaseczno, Poland. E-mail: dorotaz@orange.pl

**7823.** Fontanarrosa, M.; Collantes, M.B.; Bachmann, A.O. (2009): Seasonal patterns of the insect community structure in urban rain pools of temperate Argentina. *Journal of Insect Science* 9:10: 18 pp. (in English) ["Temporary aquatic environments are widespread in the world, and although there are considerable regional differences in their type and method of formation they have many physical, chemical and biological properties in common. With the aim to increase knowledge of urban temporary pool fauna, the objectives of this work were to assess the seasonal patterns of species composition, richness, and diversity of the aquatic insect community inhabiting rain pools in urban temperate Argentina, and to identify the environmental variables associated to these patterns. Four temporary pools of an urban green space in Buenos Aires City were studied throughout a 1-year period. Eleven flood cycles with very varied hydroperiods and dry periods, mainly associated with rainfall, were identified. Insect species richness in these temporary urban pools, 86 taxa were documented, was found to be within the range reported for wild temporary water bodies of other regions of the world. The present results provide evidence for the existence of a clear link between habitat and community variability. Hydroperiod and seasonality were the main environmental factors involved in structuring the insect communities of the studied water bodies. Urban pools in green spaces have the potential to act to its dwellers like corridors through the urban matrix. Taking into ac-

count these characteristics and their accessibility, urban temporary pools can be considered as promising habitats for the study of ecological processes involving the insect community." (Authors) Odonata are treated on the order resp. in app. 1 family level] Address: Soledad Fontanarrosa, M., Departamento de Ecología, Genética y Evolución, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, CONICET, Argentina. E-mail: fontanarrosa@ege.fcen.uba.ar

**7824.** Garrison, R.W.; von Ellenrieder, N. (2009): Re-definition of *Mesoleptobasis* Sjöstedt 1918 with the inclusion of *Metaleptobasis cyanolineata* (Wasscher 1998) comb. nov. and description of a new species, *Mesoleptobasis elongata* (Odonata: Coenagrionidae). *Zootaxa* 2145: 47-68. (in English, with Spanish summary) ["*Metaleptobasis cyanolineata* is transferred to *Mesoleptobasis* and a new species, *Mesoleptobasis elongata*, is described. The genus is diagnosed by the combination of rounded frons, highly modified pronotum with long processes at least in males, pterothoracic color pattern lacking dark mid-dorsal stripe, pretarsus with supplementary tooth vestigial or absent, vein descending from quadrangle forming an unbroken line to wing margin, and genital ligula with a small inner fold and with spine-like projections on lateral margins distal to flexure. Its species are illustrated, mapped, and keyed." (Authors)] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**7825.** Garrison, R.W. (2009): Book Review: Common Dragonflies of California. A Beginner's Pocket Guide (2nd Edition). By Kathy Biggs, Azalea Creek Publishing, 2009, 128 pages (ISBN 978-0-9677934-6-7) 220 full-color photos. Still \$9.95. Available from <http://www.sonic.net/dragonfly/>. *Argia* 21(2): 15. (in English) [Book review.] Address: Garrison, R.W., Plant Pest Diagnostics, California Dept of Food & Agriculture, 3294 Meadowview Rd, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**7826.** Gligorovic, B.; Pesic, V.; Zekovic, A. (2009): A contribution to the knowledge of the dragonflies (Odonata) of mountainous area Lukavica (Montenegro). *Natura Montenegrina* 8(1) (2008): 31-39. (in English, with Serbian summary) [12 species including *Coenagrion hastulatum*, *Aeshna juncea*, and *Cordulia aenea* are reported from the region. The record of *Aeshna cyanea* on Manito jezero Lake (1764 m a.s.l.) represents the highest altitude of finding of this species in Montenegro.] Address: Gligorovic, B., Dept of Biology, Faculty of Sciences, University of Montenegro, Cetinjski put b.b., 81000 Podgorica, Montenegro. E-mail: bogic1@cg.yu

**7827.** Gonzalez-Soriano, E.; von Ellenrieder, N. (2009): What is *Amphipteryx agrioides* Selys 1853 (Odonata: Amphipterygidae)? *Zootaxa* 2074: 61-64. (in English) [The paper determines the correct identity of *A. agrioides*, provides diagnostic illustrations of the same, and discusses the location of its type locality] Address: Gonzalez-Soriano, E., Depto Zoologia, Inst. Biol., Universidad Autonoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**7828.** Gosden, T.P.; Svensson, E.I. (2009): Density-dependent male mating harassment, female resistance,



and male mimicry. *Am. Nat.* 173: 709-721. (in English) ["Genetic variation in female resistance and tolerance to male mating harassment can affect the outcome of sexually antagonistic mating interactions. We investigated female mating rates and male mating harassment in natural populations of *Ischnura elegans*. This damselfly species has a heritable sex-limited polymorphism in females, where one of the morphs is a male mimic (androchrome females). The three female morphs differ in mating rates, and these differences are stable across populations and years. However, the degree of premating resistance toward male mating attempts varied across generations and populations. Male mating harassment of the female morphs changed in a density-dependent fashion, suggesting that male mate preferences are plastic and vary with the different morph densities. We quantified morph differences in male mating harassment and female fecundity, using path analysis and structural equation modeling. We found variation between the morphs in the fitness consequences of mating, with the fecundity of one of the nonmimetic morphs declining with increasing male mating harassment. However, androchrome females had lower overall fecundity, presumably reflecting a cost of male mimicry. Density-dependent male mating harassment on the morphs and fecundity costs of male mimicry are thus likely to contribute to the maintenance of this female polymorphism." (Authors)] Address: Svensson, E.I., Department of Animal Ecology, Ecology Building, Lund University, S-223 62 Lund, Sweden. E-mail: erik.svensson@zooekol.lu.se.

**7829.** Gossum, H. van; Bots, J.; Snijkers, T.; Meyer, J.; Wassenbergh, S. van; De Coen, W.; De Bruyn, L. (2009): Behaviour of damselfly larvae (*Enallagma cyathigerum*) (Insecta, Odonata) after long-term exposure to PFOS. *Environmental Pollution* 157(4): 1332-1336. (in English) ["Perfluorooctane sulfonic acid (PFOS) is a persistent and ubiquitous environmental contaminant that has been detected in organisms worldwide. Here, we evaluate whether long-term (1 and 4 months) exposure to PFOS contamination affects the behavioural performance of freshwater larvae of the damselfly *E. cyathigerum*. Our results show reduced behavioural performance with increasing PFOS concentration. In 1 month exposed larvae, no observed effect concentrations (NOECs) were 100 µg/L for general activity. In 4 months exposed larvae, NOECs were 10 µg/L, for each behavioural trait, except swimming acceleration of male larvae where the NOEC was 100 µg/L. When faced with PFOS concentrations above the NOEC, *E. cyathigerum* larvae were less active, less capable to escape a simulated predator attack and less efficient in foraging. Together, our results show that damselfly larvae suffer reduced survival-related behavioural performance." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**7830.** Gysels, J.; Puls, H. (2009): Beekschaatsenrijder en bosbeekjuffer in de provincie Antwerpen (1995-2008). *Antenne* 3(1): 12-15. (in Flemish) [Records (province Antwerpen, Belgium) of *Calopteryx virgo* from 1995-2008 are discussed and mapped.] Address: Gysels, J. Poelenwerkgroep Natuurpunt, Belgium. E-mail: jos.gysels@natuurpunt.be

**7831.** Hämäläinen, M.; Reels, G.T.; Zhang, H. (2009): Description of *Aristocypha aino* sp. nov. from Hainan, with notes on the related species (Zygoptera: Chlorocyphidae). *Tombo* 51: 16-22. (in English, with Japanese summary) ["A new chlorocyphid damselfly species, *Aristocypha aino* sp. nov. (holotype ♂ from Jianfengling National Nature Reserve, Hainan Island, China) is described and illustrated for both sexes. Its systematic relationship with other taxa in the genus is discussed. *Rhinocypha bifenestrata* Fraser, 1922 is ranked as a synonym of *Aristocypha cuneata* (Selys, 1853), not as a synonym of *A. quadrimaculata* (Selys, 1853). *Rhinocypha chaoi* Wilson, 2004 is transferred to the genus *Aristocypha*." (Authors)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**7832.** Hamasaki, K.; Yamanaka, T.; Tanaka, K.; Nakatani, Y.; Iwasaki, N.; Sprague, D.S. (2009): Relative importance of within-habitat environment, land use and spatial autocorrelations for determining odonate assemblages in rural reservoir ponds in Japan. *Ecological Research* 24(3): 597-605. (in English) ["To clarify the major factors affecting odonate assemblages in rural reservoir ponds among within-habitat environments, land use around ponds and spatial autocorrelation, we surveyed odonate adults in 70 study ponds in Ibaraki Prefecture, Japan, during three sampling periods in 2005. Redundancy analyses (RDA) for these three factor groups were executed to determine their strength in explaining the odonate species composition. Their relative contributions were also evaluated by the method of variation partitioning. A total of 41 odonate species were recorded in the study ponds, and 24 of them, excluding rare species, were used for our analysis. Summed effects including all three factor groups explained approximately 39% of the variation in odonate species composition. We found that spatial autocorrelation was the most important, though the within-habitat environment and land use had comparable effects. We conclude that spatial autocorrelation should be considered in this type of analysis, though we could not clearly explain what caused such a spatial structure. Pond area and debris that had accumulated at the bottom of ponds were selected as the within-habitat environment, and the forests and paddy fields around ponds were selected for land use after the procedure of forward stepwise selection. These results suggest that the recent decrease of forests around the ponds has had a negative effect on the odonate assemblages." (Authors)] Address: Hamasaki, K., Biodiversity Division, National Institute for Agro-Environmental Sciences, 3-1-3 Kannondai, Tsukuba Ibaraki, 305-8604, Japan. E-mail: kenjih@affrc.go.jp

**7833.** Hammers, M.; Sánchez-Guillén, R.A.; Gossum, H. van (2009): Differences in mating propensity between immature female color morphs in the damselfly *Ischnura elegans* (Insecta: Odonata). *Journal of Insect Behaviour* 22: 324-337. (in English) ["Female-limited color polymorphisms occur in a variety of animal taxa where excessive male sexual harassment may explain the coexistence of multiple female color morphs. In the color polymorphic damselfly *Ischnura elegans*, mature and immature female color morphs coexist at the mating site where males are in search for suitable mating partners. Here, we study male preference and female mating propensity for the two immature female morphs.

As would be expected, compared to mature morphs, both immature female morphs mate much less. Within immature females, one morph consistently mates more frequently compared to the other morph, a pattern that is similar for the ontogenetically corresponding mature female morphs. Preference experiments with the two differently colored immature female morphs, however, did not indicate male mate preference for either morph. Low mating frequencies of immature females at natural sites in combination with relatively high attractiveness of immature models in terms of male preference indicate that female behavior influences female mating success." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvgossum@ruca.ua.ac.be

**7834.** Huang, D.-y.; Baudoin, A.; Nel, A. (2009): A new aeschniid genus from the Early Cretaceous of China (Odonata: Anisoptera). *Cretaceous Research* 30: 805-809. (in English) ["The new genus and species of aeschniid dragonfly *Linaeschnidium sinensis* is described from the Early Cretaceous of China. Its close relationships with the two Western European genera *Angloaeschmidium*, and *Lleidoaeschmidium* confirms the great affinities between the aeschniid faunas of the two areas despite of the presence of continental seas between them during this period." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**7835.** Huang, D.-y.; Nel, A. (2009): The first Chinese Tarsophlebiidae from the Lower Cretaceous Yixian Formation, with morphological and phylogenetic implications (Odonoptera: Panodonata). *Cretaceous Research* 30(2): 429-433. (in English) ["The Early Cretaceous *Turanophlebia sinica* sp. nov. is the first Chinese representative of the enigmatic family Tarsophlebiidae. The exquisite preservation of the type specimen allows to precise several important morphological structures of phylogenetic importance, i.e. three-segmented tarsi, with basal tarsomere very long; and absence of subapical tooth on tarsal claw. If the first character not longer supports a basal position for Tarsophlebiidae, the second confirms it. The presence of a fore leg tibial comb of the Hemiphlebiidae is apomorphic for this last group." (Authors)] Address: Huang, D.-y., Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China. E-mail: huangdiy-ing@sina.com

**7836.** Huang, D.-y.; Nel, A. (2009): The first Chinese Tarsophlebiidae from the Lower Cretaceous Yixian Formation, with morphological and phylogenetic implications (Odonoptera: Panodonata). *Cretaceous Research* 30(2): 429-433. (in English) ["The Early Cretaceous *Turanophlebia sinica* sp. nov. is the first Chinese representative of the enigmatic family Tarsophlebiidae. The exquisite preservation of the type specimen allows to precise several important morphological structures of phylogenetic importance, i.e. three-segmented tarsi, with basal tarsomere very long; and absence of subapical tooth on tarsal claw. If the first character not longer supports a basal position for Tarsophlebiidae, the second confirms it. The presence of a fore leg tibial comb supports the hypothesis that the reduced tibial comb of the Hemiphlebiidae is apomorphic for this last group." (Authors)] Address: Huang, D.-y., State Key

Lab. of Palaeobiology & Stratigraphy, Nanjing Inst. of Geology & Palaeontology, Chinese Acad. Sci., Nanjing 210008, PR China. E-mail: huangdiy-ing@sina.com

**7837.** Ishizawa, N. (2009): Akatombo, "Red Dragonflies". *Argia* 21(2): 13-14. (in English) [The note presents an English translation of the famous Japanese song, and reports on the current situation (2005) of aka tomo - *Sympetrum frequens*, now seems to be lost around the birthplace of the poet, Miki, Rofu.] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozawa City, Saitama Pref., Japan. E-mail: sieba4318@rivo.mediatte.net

**7838.** Johansson, F.; Soderquist, M.; Bokma, F. (2009): Insect wing shape evolution: independent effects of migratory and mate guarding flight on dragonfly wings. *Biological journal of the Linnean society* 97(2): 362-372. (in English) ["Although, in some insect taxa, wing shape is remarkably invariant, the wings of Anisopteran dragonflies show considerable variation among genera. Because wing shape largely determines the high energetic costs of flight, it may be expected that interspecific differences are partly due to selection. In the present study, we examined the roles of long-distance migration and high-maneuvrability mate guarding in shaping dragonfly wings, using a phylogeny-based comparative method, and geometric morphometrics to quantify wing shape. The results obtained show that migration affects the shape of both front and hind wings, and suggest that mate guarding behaviour may also have an effect, especially on the front wing. These effects on front wing shape are at least partly independent. Our findings are interesting when compared with the geographically widespread and ecologically diverse dipterans *Acalyptatae* (including the genus *Drosophila*). The wings in that group are similar in function and structure, but show strikingly low levels of interspecific variation." (Authors)] Address: Johansson, F., Dept of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**7839.** Johnson, J. (2009): Presumed *Enallagma anna* Williamson × *carunculatum* Morse hybrids from Oregon and California. *Bulletin of American Odonatology* 11(1): 8-10. (in English, with Spanish summary) ["Two presumed male *E. anna* × *carunculatum* hybrids, one from Crook County, Oregon, the other from Inyo County, California, are described and their abdominal terminalia are figured. Figures of *E. anna* and *carunculatum* are provided for comparison." (Author)] Address: Johnson, J., 3003 Unander Avenue, Vancouver, WA 98660, USA. E-mail: jtjohnson@comcast.net

**7840.** Johnson, J. (2009): *Ophiocordyceps odonatae* —An odonate-specific fungal pathogen. *Argia* 21(2): 4-5. (in English) [The paper briefly reports on the fungus *O. odonatae*. Dr. Joey Spatafora (E-mail: spatafoj@science.oregonstate.edu) from the Oregon State Arthropod Collection (OSAC) holds a specimen from Japan with this fungus noting that such a fungus is not known from the neotropis. Conscientized for fungi in Odonata specimens, a *Gynacantha nervosa* from the Dominican Republic was traced which was infected by a fungal pathogen. The latter will be processed in near future.]

**7841.** Jones, B.R.; Bogdanowicz, S.M.; Jordan, S. (2009): Isolation and characterization of 16 polymorphic microsatellite loci in the endemic Hawaiian damselfly

Megalagrion xanthomelas (Odonata: Coenagrionidae). Molecular Ecology Resources 9(1): 165-167. (in English) ["Microsatellite loci have been isolated from two species of endemic Hawaiian damselflies, Megalagrion xanthomelas and M. eudytum, that are of conservation concern. Sixteen polymorphic loci were characterized in 32 M. xanthomelas from one population on Molokai and one on Hawaii Island. The total number of alleles per locus ranged from two to 16 and observed population heterozygosity ranged from 0.0 to 0.963. Eleven of these loci amplified successfully in M. eudytum as well. These loci will be used to further conservation efforts and infer genetic consequences of Pleistocene glaciations." (Authors)] Address: Jones, B., Dept of Biology, Bucknell University, Lewisburg, PA 17837, USA. E-mail: BRJones04@gmail.com

**7842.** Jorcin, A.; Nogueira, M.G.; Belmont, R. (2009): Spatial and temporal distribution of the zoobenthos community during the filling up period of Porto Primavera Reservoir (Paraná River, Brazil). Braz. J. Biol. 69(1): 19-29. (in English, with Portuguese summary) ["This study is part of the limnological monitoring undertaken by the Energy Company of the State of São Paulo (CESP) during the filling up process of the Porto Primavera Reservoir (Hydroelectric Power Plant Engenheiro Sérgio Motta). This reservoir, located in the high Paraná River between the States of São Paulo and Mato Grosso do Sul, is the fourth largest in the country. The first filling up phase started in December 1998 and the second phase in March 2001. Samples for benthic community and sediment characteristics analysis were quarterly collected between August of 1999 and November 2001 and also in August of 2002 (11 sampling campaigns). Samplings were carried out at 13 stations distributed in the reservoir, and at one point located downstream of the dam. 128 invertebrate taxa were identified [(including "Gomphidae" and "Aphylla") ...] Noticeable variations in the fauna density were observed, considering both different periods and locations. The maximum density of organisms (mean value of 7812 ind.m<sup>2</sup>) was recorded in the center of the reservoir, and the minimum (mean value 9 ind.m<sup>2</sup>) in the more lacustrine area near the dam. The greatest species richness per sample (24 taxa) was observed in the reservoir upstream (fluvial zone). The maximum diversity (Shannon-Wiener Index) per station/period, 3.82 and 3.86 bits.ind<sup>-1</sup>, were calculated in the transitional river/reservoir zone during the beginning (August 1999) and in the reservoir central zones in the end (August 2002) of the filling up period, respectively. There was no clear relation between the distribution of the different faunistic groups and the sediment granulometric characteristics. However, the decrease or even total absence of organisms was observed at stations with high organic matter concentration (>40%) in a low degradation state (coarse detritus). This fact may be related to the lack of sediment deposits, which would cause difficulties to the fixation of the benthic fauna. Additionally, in those conditions more reduced chemical conditions are expected in function of the intense decomposition process of the flooded vegetation." (Authors)] Address: Jorcin, A., Depto de Zoologia, Instituto de Biociências, Universidade Estadual Paulista – UNESP, Distrito de Rubião Júnior, CEP 18600-000, Botucatu, SP, Brazil. E-mail: ajorcin@ibb.unesp.br

**7843.** Jovic, M.; Malidzana, S. (2009): List of dragonflies in the collection of the national History Museum of

Montenegro (Insecta: Odonata). Acta entomologica serbica 14(1): 121-124. (in English) [The Odonata collection of the Natural History Museum of Montenegro totals to 86 specimens representing 28 species. In most cases they were collected during the 2006 and 2007 summer seasons. The list contains about half of all known dragonfly species in Montenegro, including Coenagrion scitulum, which is here recorded for the first time from Montenegro. This species has a wide Mediterranean distribution but is most common in the western part of its range; it is considered a Least Concerned species on the Red List of Mediterranean Odonata (BOUDOT et al., 2009).] Address: Jovic, M., Natural History Museum Belgrade, Njegoševa 51, P.O. Box 401, YU-11000 Belgrade, Serbia. E-mail: milos.jovic@nhmbeo.rs

**7844.** Jovic, M. (2009): Report on Macedonia 2008 project - Odonata. IDF-Report 21: 1-23. (in English) [Macedonia; in the period from 29 May till 12 June 2008, 34 Odonata species were collected and observed at 38 localities. The list of species e.g. includes Coenagrion ornatum, C. scitulum, C. pulchellum, Ophiogomphus cecilia, and Cordulegaster heros.] Address: Jovic, M., Natural History Museum, Njegoševa 51, P.O. Box 401, 11000 Belgrade, Serbia. email: milos.jovic@nhmbeo.rs

**7845.** Khrokalo, L.; Prokopov, G. (2009): Review of the Odonata of Crimea (Ukraine). IDF-Report 20: 1-32. (in English) ["A list of 60 Odonata species and their distribution across 109 localities on the Crimean Peninsula is provided. The study is based on a literature review and a field survey between 1999 and 2008. Erythromma lindenii and Epiteca bimaculata are here recorded for the first time from Crimea. Diagnostic morphological characters of Calopteryx splendens taurica and Orthetrum coerulescens anceps are briefly described. Descriptions of typical Crimean habitats of dragonflies are also presented. The necessity of the protection of Crimean freshwater habitats is discussed." (Authors)] Address: Khrokalo, Lyudmilla, Environmental biotechnology and bioenergy Dept, National Technical University of Ukraine "KPI", Kyiv, Ukraine, lkhrokalo@mail.ru

**7846.** Kim, S.-B.; Oh, H.-S.; Kim, W.-T.; Tadauchi, O. (2009): Phenetic analysis of the Anisoptera (Insecta: Odonata) in Jeju Island, Korea, based on morphological characters. J. Fac. Agr., Kyushu Univ. 54(1): 123-132. (in English) ["This study was conducted from April 2002 to September 2007 to investigate the relationships of 27 species of Anisoptera which were collected in wetlands of Jeju Island, using a phenetic analysis of external morphological characters. The generated phenogram revealed the presence of two superfamilies within Anisoptera, Aeshnoidea and Libelluloidea. Moreover, the three groups, Aeshnidae, Libellulidae and Corduliidae, were clearly branched. As a result, the phenogram was similar to that of the ordinary systematic classification. The Aeshnidae was divided into Anax and Gynacantha, and Polycanthagyna and Aeschnophlebia. Three species of Anax (e.g., guttatus, parthenope and nigrofasciatus) presented to have very similar external morphological characteristics. Particularly, A. guttatus has confused its name, e.g., someone treated it as a synonym with A. parthenope due to the presence of very similar morphological characters. However, major differences were observed in the upper edge of the frons and the anterior femur in these species. Therefore, we obtained



a conclusion that is more valid to classify *A. guttatus* as an independent species rather than as a synonym. The Libellulidae consisted of three subgroups. When the relationship of the genus *Sympetrum* were considered, the key characteristics were determined to be the patterns of the first lateral suture, the second lateral suture and the humeral suture. The Corduliidae was divided into Macromiinae and Cordulinae. Particularly, *Somatochlora graeseri* and *S. clavata* were confirmed to be unregistered species in Jeju Island." (Authors) *Anax parthenope*; *A. nigrofasciatus*; *A. guttatus*; *Gynacantha japonica*; *Polycanthagyna melanictera*; *Aeschnophlebia anisoptera*; *Somatochlora graeseri*; *Somatochlora clavata*; *Epophthalmia elegans*; *Macromia amphigena*; *Lyriothemis pachygastra*; *Orthetrum albistylum*; *O. melania*; *Crocothemis servilia*; *Deilelia phaon*; *Sympetrum striolatum*; *S. darwinianum*; *S. eroticum*; *S. uniforme*; *S. kunkeli*; *S. infuscatum*; *S. risi*; *S. speciosum*; *Pseudothemis zonata*; *Rhyothemis fuliginosa*; *Pantala flavescens*; *Tramea virginia*] Address: Oh, Hong-Shik, Dept of Science Education, Cheju National University, Jeju 690-756, Korea. E-mail: sciedu@cheju.ac.kr

**7847.** Koch, K.; Quast, M.; Sahlén, G. (2009): Morphological differences in the ovary of Libellulidae (Odonata). *International Journal of Odonatology* 12(1): 147-156. (in English) ["All female Odonata have been assumed to produce oocytes continuously during their mature life span. However, a recent study of ovariole orientation and development led to the suggestion that Libellulidae are divided into two groups of species, one with continuous, the other with stepwise oocyte production. To find more evidence of this division, we compared the size variation and growth within the vitellarium of the ovary, studying oocytes, and follicle cells. We found that morphological characters discriminate between the two ovary types in eight of the 10 investigated species. In both types we found an increase in all measurements from the anterior to the posterior end of the vitellarium. The increase in oocyte width and follicle cell length was significantly higher in species with a continuous oocyte production. We also noted that follicle cells may have more than one nucleus and that their number can vary during vitellogenesis. Our study confirmed the hypotheses that two different ovary types exist in Libellulidae. The two species not fitting into this grouping could be an artefact of small sample size due to intraspecific phenotypic plasticity, or else there might be more than two ovary groups, or even a continuum. We could not offer an explanation as to how the process of stepwise oocyte production differs from continuous based production on morphological characters." (Authors)] Address: Koch, Kamilla, Department of Ecology, Johannes-Gutenberg University of Mainz, Becherweg 13, 55128 Germany. E-mail: kochka@uni-mainz.de

**7848.** Küry, D. (2009): *Krebsschere* (Stratiotes aloides) in Naturschutzweihern der Schweiz. *Bauhinia* 21: 49-56. (in German, with English summary) ["*S. aloides* is an aquatic macrophyte which colonizes shallow water zones of meso- to eutrophic lakes, lowland rivers and ditches. It is distributed in northern and eastern parts of Central Europe as well as in southern Scandinavia. In the past it has been introduced in other regions of Europe like France and Switzerland. Since several years *S. aloides* has been planted out in newly created ponds where it had rapidly overgrown most of the water surface. By introducing this neophyte conservationists intend to foster the pond fauna. However, the

consequences for the pond ecosystem are disadvantageous. Allelopathic effects inhibit the growth of other hydrophytes and planktic algae. In consequence, faunistic diversity decreases and over-growing increases. The management of ponds should aim at creating habitats similar to the stagnant waters which existed more than 150 years ago, when the floodplains were still natural landscapes." (Author) Special emphasis is given to *Aeshna viridis*, and the disadvantageous effects of *S. aloides* in Swiss waterbodies for dragonflies and additional macrozoobenthic species.] Address: Küry, D., Life Science AG, Greifengasse 7, 4058 Basel, Switzerland. E-mail: daniel.kuery@lifescience.ch

**7849.** Lehmann, F.-O. (2009): Wing-wake interaction reduces power consumption in insect tandem wings. *Experiments in Fluids* 46(5): 765-775. (in English) ["Insects are capable of a remarkable diversity of flight techniques. Dragonflies, in particular, are notable for their powerful aerial manoeuvres and endurance during prey catching or territory flights. While most insects such as flies, bees and wasps either reduced their hind wings or mechanically coupled fore and hind wings, dragonflies have maintained two independent-controlled pairs of wings throughout their evolution. An extraordinary feature of dragonfly wing kinematics is wing phasing, the shift in flapping phase between the fore and hind wing periods. Wing phasing has previously been associated with an increase in thrust production, readiness for manoeuvrability and hunting performance. Recent studies have shown that wing phasing in tandem wings produces a twofold modulation in hind wing lift, but slightly reduces the maximum combined lift of fore and hind wings, compared to two wings flapping in isolation. Despite this disadvantage, however, wing phasing is effective in improving aerodynamic efficiency during flight by the removal of kinetic energy from the wake. Computational analyses demonstrate that this increase in flight efficiency may save up to 22% aerodynamic power expenditure compared to insects flapping only two wings. In terms of engineering, energetic benefits in four-wing flapping are of substantial interest in the field of biomimetic aircraft design, because the performance of man-made air vehicles is often limited by high-power expenditure rather than by lift production. This manuscript provides a summary on power expenditures and aerodynamic efficiency in flapping tandem wings by investigating wing phasing in a dynamically scaled robotic model of a hovering dragonfly." (Author)] Address: F.-O. Lehmann, F.-O., BioFuture Research Group, University of Ulm, Albert-Einstein-Allee 11, 89081 Ulm, Germany. E-mail: fritz.lehmann@uni-ulm.de

**7850.** Lencioni, F.A.A. (2009): The genus *Idioneura* (Selys) with description of *I. celioi* spec. nov. (Zygoptera: Protoneuridae). *Odonatologica* 38(1): 1-5. (in English) ["The new species is described from 1 ♂ and ♀♀. Holotype ♂ and allotype ♀: Brazil: São Paulo State, Fazenda Santana do Rio Abaixo (24°14'55"S – 46°00'27"W), alt. 569 m, 30-XI-2002, collected in tandem; deposited in author's collection. It is compared with the original description of *I. ancilla* Selys, 1860 (the type species of the genus) and with specimens identified as that species. Diagnostic illustrations and notes on *Idioneura* distribution and biology are provided." (Author)] Address: Lencioni, F.A.A., Rua Aníbal, 216 – Jardim Coleginho – Jacareí – São Paulo – Brazil - CEP (ZIP) 12310-780. E-mail: odonata@zygoptera.bio.br

**7851.** Leuthold, W. (2009): Libellen (Odonata) im Neeracherried (Kanton Zürich). Das Artenspektrum und seine Veränderungen in 20 Jahren. Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich 154(1/2): 21-29. (in German, with English summary) [The Odonata of the Neeracherried, a 100 ha marsh in the Canton of Zürich, Switzerland, a total of 42 species was recorded (25 Anisoptera; 17 Zygoptera) – nine species more than were found in a similar study some 20 years ago. "Two then fairly widespread species have apparently disappeared (*Sympetrum flaveolum* and *Lestes dryas*). The differences in species composition are probably due to several factors such as long-term habitat changes, measures of habitat management, changes in distribution of individual species and some differences in the methods of study. – A fairly sizeable population of the critically endangered *Lestes virens* (still) exists in the Neeracherried." (Author)] Address: Leuthold, W., Kinkelstr. 61, CH-8006 Zürich, Switzerland. E-mail: wleuthold@bluewin.ch

**7852.** Levine, T.D.; Lang, B.K.; Berg, D.J. (2009): Parasitism of mussel gills by dragonfly nymphs. The American Midland Naturalist 162(1): 1-6. (in English) ["Predators of unionoid mussels are generally identified as fishes or aquatic mammals. During a mark and recapture study of the critically endangered mussel *Popeinaia popeii*, we discovered a nymph of the dragonfly *Gomphus militaris* eating the gills of a gravid mussel; larvae and gill material were found in the nymph's gut. Many (15.2%) of the other mussels captured during a quantitative survey exhibited damage consistent with that inflicted by this dragonfly. Few non-gravid mussels were damaged and gravid mussels exhibited substantially more damage in gills used for brooding larvae than in gills not typically used for brooding. This previously unreported parasitic relationship may reflect a unique cost associated with reproduction and should be considered in the development of conservation strategies for *P. popeii*. Our observations underscore the need for basic ecological data when monitoring endangered species." (Authors)]

**7853.** Li, Z.-x.; Shen, W.; Tong, G.-s.; Tian, J.-m.; Yu-Quoc, L. (2009): On the vein-stiffening membrane structure of a dragonfly hind wing. Journal of Zhejiang University Science A 10(1): 72-81. (in English) ["Aiming at exploring the excellent structural performance of the vein-stiffening membrane structure of dragonfly hind wings, we analyzed two planar computational models and three 3D computational models with cambered corrugation based on the finite element method. It is shown that the vein size in different zones is proportional to the magnitude of the vein internal force when the wing structure is subjected to uniform out-of-plane transverse loading. The membrane contributes little to the flexural stiffness of the planar wing models, while exerting an immense impact upon the stiffness of the 3D wing models with cambered corrugation. If a lumped mass of 10% of the wing is fixed on the leading edge close to the wing tip, the wing fundamental frequency decreases by 10.7%~13.2%; if a lumped mass is connected to the wing via multiple springs, the wing fundamental frequency decreases by 16.0%~18.0%. Such decrease in fundamental frequency explains the special function of the wing pterostigma in alleviating the wing quivering effect. These particular features of dragonfly wings can be mimicked in the design of new-style reticulately stiffening thin-walled roof systems and flapping

wings in novel intelligent aerial vehicles." (Authors)] Address: Li, Z.-x., 1Institute of Structural Engineering, Zhejiang University, Hangzhou 310058, China. E-mail: lizx19993@zju.edu.cn

**7854.** Locklin, J.L.; Vodopich, D.S. (2009): Bidirectional gender biases of gregarine parasitism in two co-existing dragonflies (Anisoptera: Libellulidae). Odonatologica 38(2): 133-140. (in English) ["Parasitism affects all taxa and influences individual and population success. Parasitism of adult dragonflies is widespread and frequently includes gregarine (Apicomplexa) life stages in the gut of the host. This research investigates variation in gregarine parasite prevalence and load in male versus female adults of *Erythemis simplicicollis* and *Brachymesia gravida* associated with 2 central Texas reservoirs in close proximity. Parasite prevalence was biased toward male *E. simplicicollis* and toward female *B. gravida*. Results suggest that gender bias in parasite prevalence is influenced by gender behaviour and environment more so than by immuno-response differences between genders." (Authors)] Address: Locklin, J.L., Dept of Biology, Baylor University, One Bear Place 76798, Waco, TX 97388, USA. E-mail: jasonlocklin@baylor.edu

**7855.** Machado, A.B.M. (2009): Denticulobasis and Tuberculobasis, new genera close to Leptobasis, with description of ten new species (Odonata: Coenagrionidae). Zootaxa 2108: 1-36 (2009): 1-36. (in English) ["Two new genera, Denticulobasis and Tuberculobasis, are described. Denticulobasis contains three species: *D. dunklei* sp. nov. from Loreto, Peru, and *D. garrisoni* sp.nov. and *D. ariken* sp. nov. from Rondônia, Brazil. Tuberculobasis includes 12 species, all from South America, seven of which are new, viz.: *T. arara* sp. nov. from Rondônia, Brazil, *T. geijskesi* sp. nov. from Suriname, *T. guarani* sp. nov. from São Paulo, Brazil, *T. karitiana* sp. nov. from Rondônia, Brazil, *T. macuxi* sp. nov. from Roraima, Brazil, *T. tirio* sp. nov. from Pará, Brazil, and *T. williamsoni* sp. nov. from Colombia and Venezuela. Five species are herein transferred from Leptobasis Selys, 1877 to Tuberculobasis: *L. cardinalis* (Fraser, 1946), *L. costalimai* Santos, 1957, *L. inversa* Selys, 1876, *L. mammilaris* Calvert, 1909, and *L. yanomami* De Marmels, 1992. The new genera are close to Leptobasis; differences between them are analyzed and their diagnostic characters are described. In addition, diagnostic characters of females of three species of Tuberculobasis, most likely new, are illustrated but they are not named. A key for males and females of Tuberculobasis is provided, and an attempt to understand their life cycle is made." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Caixa Postal 486, BR 31270-901, Belo Horizonte, Minas Gerais, Brasil. E-mail: angelo@icb.ufmg.br

**7856.** Manger, R.; Dingemanse, N.J. (2009): Adult survival of *Sympecma paedisca* (Brauer) during hibernation (Zygoptera: Lestidae). Odonatologica 38(1): 55-59. (in English) ["The survival of hibernating adults was assessed in its winter habitat in the Netherlands to gain insight in the potential importance of this life-history phase for the population dynamics of this endangered species Compared to other Odonata, monthly survival rates (Dec. 2004 - March 2005) were high (mean  $\pm$  SE = 0.75  $\pm$  0.08), but overall winter survival was low (0.42). Potential causes of mortality during hibernation

are discussed. The results imply that effective protection of this species in the Netherlands may benefit from protection of both its breeding and wintering habitat.] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen, The Netherlands. E-mail: rmanger@planet.nl

**7857.** Marinov, M. (2009): Spatial modelling of dragonfly habitats in New Zealand (Odonata: Insecta). Dissertation. Master of Applied Sciences, Lincoln Univ., Christchurch, New Zealand: VI, 50 pp., 15 app. (in English) ["While New Zealand is poor in Odonata species the seventeen species thus far established have great natural importance (Moore 1989). Ten of them are endemic to the islands representing the country. Those include four genera known to occur only in this part of the world (Rowe 1987). This poses a great responsibility on New Zealand to protect this natural treasure. Damselflies and dragonflies are considered well protected within the national parks, but the loss of habitats could severely impact them in the future. This suggests that a habitat assessment should be prepared for the whole country that will serve as base-line data set for monitoring the development of the natural environment for the Odonata species in New Zealand. Fourteen species have been selected for this analysis. Their biological features and ecological requirements were considered in preparing a working habitat assessment methodology. Habitat models were developed using ArcGIS 9.2 software. Multistep spatial analysis was carried out to reclassify the layers containing the important information on the land topology representing crucial elements in the Odonata species habitats. The final outputs are individual species maps where the New Zealand territory is marked with four different colour classes corresponding to the ranks of importance that each area is considered to have for individual species. The models are named probabilistic in that they reveal the areas where the ecological demands of the species are approached at a maximum level. However, they should not be used as distribution maps. Probabilistic models are contrasted against deterministic models used in other Odonata habitat models. The strengths and weaknesses are discussed and some important conclusions and recommendations are described and suggested." (Author)] Address: Marinov, M., 5/160 Rossall Str., Merivale, Christchurch, New Zealand. E-mail: mgmarinov@mail.bg

**7858.** McMeeking, RM; Ma, LF; Arzt, E. (2009): Mechanism maps for frictional attachment between fibrillar surfaces. *Journal of applied mechanics - Transactions of the ASME* 76(3)(Art. No. 031007): 8 pp. (in English) ["The mechanics of frictional attachment between surfaces with pillars, inspired by the head fixation system of dragonflies, is analyzed. The system consists of two surfaces of interdigitating pillars held together through friction, as by the densely packed bristles of two brushes when pressed together. The adhesive strength of the system is promoted by high elastic modulus, high friction coefficient, large aspect ratio, and dense packing of the fibers. However, the design is limited by the compressive buckling, the compressive indentation or cracking of the contacting pillars, yielding in shear or similar mechanisms that limit the achievable friction stress, and tensile failure of the pillars upon pull-out. Maps, which summarize the strength of the adhesive system and the failure limits and illustrate the trade-off among the design parameters, are presented. Case studies for steel, nylon, and ceramic pillars show that

useful strength can be achieved in such attachments; when buckling during assembly and contact failure can be avoided, adhesive performance as high as 30% of the tensile strength of the pillar material may be possible." (Authors)] Address: Arzt, E., Leibniz Institute for New Materials (INM), Campus D2 2, 66123 Saarbrücken, Germany

**7859.** McPeck, M.A.; Shen, L.; Farid, H. (2009): The correlated evolution of three-dimensional reproductive structures between male and female damselflies. *Evolution* 63(1): 73-83. (in English) ["For many taxa, species are defined by the morphologies of reproductive structures. In many odonates, these structures are the cerci of males (used to hold females during mating) and the thoracic plates of females where the male cerci contact the females' bodies. A previous study showed that the shapes of cerci of *Enallagma* males (Zygoptera: Coenagrionidae) are best explained by an evolutionary model of punctuated change at the time of speciation, with a homogeneous rate of change across the entire phylogeny of the genus. In the present study, we examine the evolution of shape change in the corresponding female plates. We found that, like male cerci, the shapes of *Enallagma* female thoracic plates could best be explained by an evolutionary model of punctuated change at the time of speciation, with a homogeneous rate of change across the clade. Moreover, the evolutionary contrasts quantifying the rates of change in male cerci and female thoracic plates were positively related across the history of the clade, demonstrating that these male and female structures evolve in a correlated fashion. This pattern of evolution suggests that these structures are primary signals of species identity during mating." (Authors)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**7860.** Muzón, J.; Weigel Munoz, S.; Campos, R. (2009): Description of the bromeliad-dwelling final instar larva of *Leptagrion andromache* Hagen in Selys (Zygoptera: Coenagrionidae). *Zootaxa* 2089: 65-68. (in English) [Specimens examined: 3 males 2 females, reared final instar larvae; Argentina, Misiones province, Parque Nacional Iguazu, 25°39'S, 54°18'W, October to November 2005, leg., R. Campos and M. Mogi. All specimens deposited in the collection of the Departamento Entomología, Museo de La Plata.] Address: Muzón, J., Instituto de Limnología "Dr. R. A. Ringuelet" (CONICET - CCT La Plata), C.C. 712, 1900, La Plata, Argentina. E-mail: muzon@ilpla.edu.ar

**7861.** Møller, A.P.; Mousseau, T.A. (2009): Reduced abundance of insects and spiders linked to radiation at Chernobyl 20 years after the accident. *Biology letters* 5(3): 356-359. (in English) ["Effects of low-level radiation on abundance of animals are poorly known. We conducted standardized point counts and line transects of bumble-bees, butterflies, grasshoppers, dragonflies and spider webs at forest sites around Chernobyl differing in background radiation by over four orders of magnitude. Abundance of invertebrates decreased with increasing radiation, even after controlling for factors such as soil type, habitat and height of vegetation. These effects were stronger when comparing plots differing in radiation within rather than among sites, implying that the ecological effects of radiation from Chernobyl on animals are greater than previously assumed. [...] The total number of dragonflies was 105 during



point counts, with abundance decreasing significantly with radiation, time of day and habitat." (Authors)] Address: Møller, A.P., Department of Biological Sciences, University of South Carolina, Columbia, SC 29208, USA. E-mail: anders.moller@u-psud.fr

**7862.** Nagel, L.; Robb, T.; Forbes, M.R. (2009): Parasite-mediated selection amidst marked inter-annual variation in mite parasitism and damselfly life history traits. *Ecoscience* 16(2): 265-270. (in English) ["Parasite-mediated selection in host populations is thought to vary in magnitude temporally. We monitored variation in life history traits that are known or suspected to influence fitness in a population of damselflies parasitized by larval water mites. Mite prevalence and intensity varied considerably over 5 y and was often higher in females. Prevalence and intensity were highest in the years when the damselfly emergence periods were early and of short duration, which also corresponded to damselflies emerging at larger sizes. Mites appeared to exert negative effects on apparent survival in some years only, and only for females, suggesting that parasite-mediated selection on damselflies is variable and dependent on other factors such as emergence times, weather, and sex and body size of hosts." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**7863.** Nanao, J.; Kubo, H.; Bockel, A. (2009): Wohin fliegst du, kleine Libelle? Sauerländer-Verlag. ISBN 978-3-7941-9142-0: 24 pp. (in German) [This children book was first published 2002 in Japan under the title 'Niramekko' by Kaisei-sha Publishing Co. Wording is from Jun Nanao and photographs from Hidekazu Kubo. The German translation of the Japanese original was realised by Antje Bockel. This book is a brief introduction into biodiversity portraying many arthropods "seen" with the eyes of a Zygoptera.] Address: www.sauerlaender.de

**7864.** Nel, A. (2009): A new Odonata family from the Jurassic of Central Asia (Odonata: Epiproctophora). *Journal of Natural History* 43(1-2): 57-64. (in English) ["The new damsel-dragonfly family Paragonophlebiidae is described based on a new genus and two new species from the Middle-Late Jurassic of Central Asia." (Author)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**7865.** Ninomiya, T.; Yoshizawa, K. (2009): A revised interpretation of the wing base structure in Odonata. *Systematic Entomology* 34(2): 334-345. (in English) ["Homology of the wing base structure in the Odonata is highly controversial, and many different interpretations of homology have been proposed. In extreme cases, two independent origins of insect wings have been suggested, based on comparative morphology between the odonate and other pterygote wing bases. Difficulties in establishing homology of the wing base structures between Odonata and other Pterygota result mainly from their extreme differences in morphology and function. In the present paper, we establish homology of the wing base structures between Neoptera, Ephemeroptera and Odonata using highly conservative and unambiguously identifiable characters (the basal wing hinge and subcostal veins) as principal landmarks. Homology of the

odonate wing base structure with those of Ephemeroptera and Neoptera can be identified reliably. Based on this interpretation, the ancestral condition of the insect wing base structure is discussed." (Authors)] Address: Yoshizawa, K., Systematic Entomology, Graduate School of Agriculture, Hokkaido University, Sapporo 060-8589, Japan. E-mail: psocid@res.agr.hokudai.ac.jp

**7866.** Novelo-Gutiérrez, R.; Gómez-Anaya, J.A. (2009): A comparative study of Odonata (Insecta) assemblages along an altitudinal gradient in the Sierra de Coalcomán Mountains, Michoacán, Mexico. *Biodivers. Conserv.* 18: 679-698. (in English) ["Odonate diversity in the Coalcomán Mountain Range (CMR), Michoacán State, Mexico, was surveyed, and samplings were made during 2 years in eight streams along an altitudinal gradient. Presence-absence data were analyzed using non-parametric and parametric methods. Beta and gamma diversities were estimated using Whittaker's and Lande's formulae, respectively. A total of 2,526 adults and 489 larvae were captured, yielding 116 species (c diversity), 44 genera and 9 families. 5 new species were discovered. The genus *Argia* was the most important contributor to Zygoptera diversity and total richness (c diversity), yielding 40.4 and 14.7%, respectively. The non-parametric estimator Chao2 provided the closest theoretical estimate of species richness, and Clench's model fit the data well (R<sup>2</sup> ranged from 99.44 to 99.99) to explain a high proportion of the variance (98.8). We conclude that beta diversity is important at the landscape scale, supporting the hypothesis that Mexico is a beta diverse country. Our results triple the number of known species of Odonata for Michoacán. Given the considerable richness of odonates at local and landscape scales, our results support the proposal of the Coalcomán Mountain Range as a priority area for conservation and related research." (Authors)] Address: Novelo-Gutiérrez, R., Depto de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: novelor@ecologia.edu.mx

**7867.** Oberholster, P.J.; Botha, A.-M.; Ashton, P.J. (2009): The influence of a toxic cyanobacterial bloom and water hydrology on algal populations and macroinvertebrate abundance in the upper littoral zone of Lake Krugersdrift, South Africa. *Ecotoxicology* 18(1): 34-46. (in English) ["The biological interactions and the physical and chemical properties of the littoral zone of Lake Krugersdrift were studied for a 4-month period when a dense, toxic cyanobacterial bloom dominated by *Microcystis aeruginosa* was present in the main lake basin. The presence of a toxic strain of *M. aeruginosa* was confirmed through the use of ELISA and molecular markers that detect the presence of the *mcyB* and *mcyD* genes of the *mcy* gene cluster that synthesizes microcystin. An increase in *Microcystis* toxicity at sites dominated by the cyanobacterial scum was accompanied by an increase in total abundance of the macroinvertebrate families Hirudinae, Chironomidae, and Tubificidae. Sites located away from the cyanobacterial scum had a lower abundance but a higher diversity of macroinvertebrates (including Coenagrionidae). The water quality under the *Microcystis* scum was characterized by low pH values, low concentrations of dissolved oxygen, and lower total alkalinity values. The periphytic alga *Ulothrix zonata* was absent in areas dominated by the cyanobacterial scum, possibly as a result of overshadowing by the scum or direct toxic al-

lelopathic effects on growth and photosynthesis. The diatom *Diatoma vulgare* dominated the benthic algal flora beneath the cyanobacterial scum." (Authors)] Address: Oberholster, P.J., CSIR Natural Resources and the Environment, PO Box 395, Pretoria ZA0001, South Africa. E-mail: anna.oberholster@up.ac.za

**7868.** Obolewski, K.; Głinska-Lewczuk, K.; Kobus, S. (2009): An attempt at evaluation the influence of water quality on the qualitative and quantitative structure of epiphytic fauna dwelling on *Stratiotes aloides* L., a case study on an oxbow lake of the Lyna river. *J. Elementol.* 14(1): 119-134. (in English, with Polish summary) ["The paper contains the results of a study on the dependence of the qualitative and quantitative structure of the phytophilous macrofauna dwelling on *S. aloides* (water soldier) on the quality of waters in a lentic oxbow lake of the Lyna River. The observations were carried out during the vegetative season (April – June) 2006 at high and moderate water levels. During the study, a total of 18 taxa of invertebrates dwelling on the above plant species were identified, with the exact number of taxa varying in time: 11 taxa were noticed in April and May, and in June their number went up to 13. The examination of hydrochemical parameters of the oxbow lake waters revealed that the density of macrofauna was lower at higher values of proper conductivity and macronutrients, ammonia nitrogen and COD, increasing at high levels of sulphates. High concentrations of ammonia nitrogen and non-organic components coincided with decreased biomass of epiphytic animals on water soldier. Additionally, it has been observed that elevated concentrations of potassium ions have a negative influence on the biomass of most epiphytic animals (except *Erbobdella* sp.)." (Authors) The biomass of Odonata is considered in tables and graphs.] Address: Obolewski, K., Chair of Land Reclamation and Management, University of Warmia and Mazury, pl. Łódzki 2, Olsztyn-Kortowo 10-719, Poland. E-mail: obolewsk@apsl.edu.pl

**7869.** Parkes, K.A.; Amos, W.; Moore, N.W.; Hoffman, J.I.; Moore, J. (2009): Population structure and speciation in the dragonfly *Sympetrum striolatum* / *nigrescens* (Odonata: Libellulidae): An analysis using AFLP markers. *Eur. J. Entomol.* 106(2): 179-184. (in English) ["There has been a long-standing debate as to whether *Sympetrum striolatum* (Charpentier, 1840) and the darker northern form, *S. nigrescens* (Lucas, 1912) should be recognised as separate species of dragonfly. Here we address this question using genetic analysis based on AFLP markers and samples collected from sites across the species' United Kingdom range. The program STRUCTURE finds no support for specific status. Instead, it reveals strong patterns of divergence between populations sampled from Scottish islands and those on the mainland, suggesting that salt water is a major barrier to gene flow. Thus, the dark form is quite likely to reflect a beneficial polymorphism that allows individuals to take advantage of short periods of warmer weather. Our AFLP markers appear to be very rapidly evolving, showing little or no overlap between congeneric species, and hence are ideally suited to answering questions relating to the levels of gene flow among populations within species." (Authors)] Address: Parkes, K.A., Dept of Zoology, Univ. Cambridge, Downing Str., Cambridge, CB2 3EJ, UK. E-mail: jih24@cam.ac.uk

**7870.** Paulson, D. (2009): *Dragonflies and Damselflies of the West*. Princeton University Press: 536 pp. (in

English) [This book is the first fully illustrated field guide to all 348 species of Odonata in western North America. Every species is generously illustrated with 863 full-colour photographs and a distribution map, and structural features are illustrated where they aid in-hand identification. Detailed species accounts include information on size, distribution, flight season, similar species, habitat, and natural history. Dennis Paulson's introduction provides an essential primer on the biology, natural history, and conservation of Odonata along with helpful tips on how to observe and photograph them.] Address: <http://press.princeton.edu/titles/8871.html>

**7871.** Paulson, D. (2009): Larval Tiger Beetles eat dragonflies. *Argia* 21(2): 13. (in English) [On 9-V-2009 at Red Slough Wildlife Management Area, McCurtain County, Oklahoma, USA, two mature male *Erythemis simplicicollis* were found that had been captured by larval tiger beetles (*Cicindela* sp.).] Address: Paulson, D. R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**7872.** Pinto, A.P.; Carvalho, A.L. (2009): On a small collection of dragonflies from Barcarena Municipality, Pará State, Brazil, with the rediscovery of *Acanthallagma luteum* Williamson & Williamson. *Bulletin of American Odonatology* 11(1): 11-16. (in English, with Spanish summary) ["A small series of 42 specimens of Odonata from the Barcarena municipality, northern Brazil, is brought on record. 18 species belonging to the families Calopterygidae, Coenagrionidae, and Libellulidae were identified. The rare species *Acanthallagma luteum* Williamson & Williamson is reported for the first time after its description and represents the first record of the genus from Pará state. In addition we provide taxonomic remarks on the Libellulidae *Erythrodiplax fusca* (Rambur), *Gynothemis pumila* (Karsch), *Orthemis ferruginea* (Fabricius) and *Zenithoptera lanei* Santos." (Authors) A distribution map of the 3 species of genus *Acanthallagma* and photographs of *A. luteum* are also presented.] Address: Carvalho, A.L., Laboratório de Biologia e Sistemática de Odonata, Depto de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão 20940-040, Rio de Janeiro, RJ, Brazil. E-mail: alagoc@acd.ufrj.br

**7873.** Poornima, V.; Mathai, M.T.; Inbaraj, R.M. (2009): Analysis of ecdysterone in *Bradinopyga geminata* (Rambur) larvae by reverse phase - high performance liquid chromatography, RP-HPLC (Anisoptera: Libellulidae). *Odonatologica* 38(1): 61-65. (in English) ["Ecdysterone or 20-hydroxyecdysone (20E) is a polyhydroxylated ecdysone that plays a major role in insect growth and metamorphosis. The 20E level was analyzed in 2 larval instars of the dragonfly using RP-HPLC. The presence of 20E was demonstrated for the first time in dragonflies, with the higher levels occurring in the older larval instar (larger larvae), while in the younger instar (smaller larvae) low or negligible levels were recorded. This has implications for extending the use of odonate larvae as biocontrol agents in aquatic ecosystems." (Author)] Address: Poornima, V., Dept Zoology, Madras Christian College (Autonomous), Tambaram, Chennai-600059, India. E-mail: inbarajmoses2004@yahoo.com

**7874.** Rae, S. (2009): *Dragonflies*. *Bandicoot times*. Newsletter of the Hobart Bushcare Groups 33 (Winter 2009): 6, 8. (in English) [Brief general account on Tas-

manian Odonata.] Address: <http://www.hobart-city.tas.gov.au/hccwr/assets/main/lib60033/bandicoot%20times%20-%20winter%202009.pdf>

**7875.** Reece, B.A.; McIntyre, N.E. (2009): Community assemblage patterns of odonates inhabiting a wetland complex influenced by anthropogenic disturbance. *Insect Conservation and Diversity* 2(2): 73-80. (in English) ["1. Many wetland complexes around the world are highly influenced by human activity (chiefly land conversion for agriculture). Measuring the impact of such activity hinges not only upon using appropriate wetland indicator taxa but also upon metrics that are sensitive enough to capture subtle effects. 2. Over a 5-year period, we quantified the distribution and community structure of odonates occupying a wetland complex in Texas. When using traditional community metrics, there were no significant differences in diversity or evenness in the odonate assemblages in wetlands surrounded by the two dominant regional forms of land use (tilled cropland and grassland). Similarity analyses likewise failed to detect any significant differences in odonate community composition with land use. 3. Discriminant function analysis, however, revealed that species co-occurrences could be distinguished on the basis of surrounding land use, which indicates that odonate assemblages in these wetlands are structured in a manner that typical community metrics fail to adequately describe. 4. Differences between the approaches are discussed, particularly with regard to the use of presence-absence data." (Authors)] Address: McIntyre, Nancy, Department of Biological Science, Texas Tech University, Lubbock, TX 79409-3131, USA. E-mail: [nancy.mcintyre@ttu.edu](mailto:nancy.mcintyre@ttu.edu)

**7876.** Reece, B.A.; McIntyre, N.E. (2009): Odonata of Playas in the southern high plains, Texas. *The Southwestern Naturalist* 54(1): 96-99. (in English, with Spanish summary) ["Playas represent the only natural source of above-ground freshwater in the southern High Plains of North America; there are >20,000 such wetlands in the Panhandle of Texas (area of the highest concentration of playas). Many organisms use these small, ephemeral ponds during some stage of their life histories; [...] of this otherwise semi-arid region require these aquatic habitats for larval development. Relatively few distributional records have been established for Odonata in this region, so we conducted a baseline survey to assess distributional patterns of odonates in playas. 5 seasons of observation and collection yielded important presence-absence data, resulting in 110 county records for the 16 counties in the study area." (Authors)] Address: Reece, B.A., Dept of Biological Sciences, Texas Tech University, Lubbock, TX 79409-3131, USA. E-mail: [b.reece@ttu.edu](mailto:b.reece@ttu.edu)

**7877.** Reinhardt, K. (2009): Book Review: Die Falkenlibellen Europas. Corduliidae. Wildermuth, H. 2008. Neue Brehm-Bücherei, Westarp Wissenschaften Hohenwarsleben. ISBN 3 89432 896 7. *Antenna* 33(2):110. (in English) [Extensive book review.] Address: Reinhardt, K., Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: [K.Reinhardt@sheffield.ac.uk](mailto:K.Reinhardt@sheffield.ac.uk)

**7878.** Remsburg, A.J.; Turner, M.G. (2009): Aquatic and terrestrial drivers of dragonfly (Odonata) assemblages within and among north-temperate lakes. *J. N. Am. Benthol. Soc.*, 2009, 28(1):44-56. (in English) ["The physical structure of vegetation influences di-

versity, interactions, movement, and thermoregulation of animals. Vegetation structure might be a good indicator of habitat requirements of generalist predators, such as Odonata, and thereby affect species diversity. Odonates use aquatic and terrestrial habitats during larval and adult life stages, respectively, but the relative importance of vegetation in these habitats is poorly understood. We compared how aquatic and riparian habitat variables affected odonate larvae from 41 sites (each 30 m in shoreline length) on 17 lakes in northern Wisconsin. We used principal components analyses to reduce multiple habitat variables to 2 lakelevel axes (lake size and development, lake wetlands and predators), 2 site-level littoral axes (littoral macrophytes, littoral muckiness), and 2 site-level riparian axes (riparian structural complexity, riparian tall wetland plants). Most (61.6%) of the variance in larval species richness occurred at the site level. Density of the most abundant family, Gomphidae, was positively related to riparian tall wetland plants, whereas species richness was positively correlated with abundance of littoral macrophytes (on the basis of multiple linear regression with an information theoretic approach). Surveys in 18 paired littoral microsites in 9 lakes indicated that larvae from the clasper and sprawler behavioral guilds were most abundant in microsites with submerged macrophytes. However, predation risk, assessed by tethering larvae in patches of submerged macrophytes, did not differ between habitats with and without macrophytes. We tested whether shoreline plants affected recruitment from the adult stage by comparing adult odonate behaviors in response to 2 riparian vegetation treatments. Adult damselfly abundance was higher where we placed potted wetland plants than at manicured lawns without tall vegetation. Our results indicate that odonate larvae might be influenced by vegetation structure in both aquatic and riparian habitats and demonstrate how animals with complex life histories link aquatic and terrestrial communities." (Authors)] Address: Remsburg, Alysia, Biodiversity Center, Unity College, Unity, Maine 04988 USA. E-mail: [aremsburg@unity.edu](mailto:aremsburg@unity.edu)

**7879.** Rojas-R., N.C.; Sánchez, M. (2009): New records of *Acanthagrion* (Odonata: Coenagrionidae) from Colombia. *Bulletin of American Odonatology* 11(1): 17-19. (in English, with Spanish summary) ["7 species of *Acanthagrion*, *A. abunae*, *A. adustum*, *A. inexpectum*, *A. minutum*, *A. vidua*, *A. peruvianum*, and *A. viridescens*, are newly reported from Colombia and characters that differ from the original descriptions are mentioned, thus expanding their known variability." (Authors)] Address: Sánchez, Melissa, Museo de Historia Natural, Universidad de los Andes, Bogotá, Colombia. A. A. 4976 Bogotá, Colombia. E-mail: [mel-sanc@uniandes.edu.co](mailto:mel-sanc@uniandes.edu.co)

**7880.** Rose, J.S. (2009): Dragonfly Days 2009. *Argia* 21(2): 3-4. (in English) [60 Odonata species were recorded along the Dragonfly Days at 23-25-V-2009 held in Texas, USA and spotting several regional localities for Odonata. The activities resulted e.g. in a first sighting of *Leptobasis vacillans* for USA.] Address: E-mail: [opihi@rgv.rr.com](mailto:opihi@rgv.rr.com)

**7881.** Sarzetti, L.C.; Labandeira, C.C.; Muzón, J.; Wilf, P.; Cúneo, N.R.; Johnson, K.R.; Genise, J.F. (2009): Odonatan endophytic oviposition from the Eocene of Patagonia: The ichnogenus *Paleoovoidus* and implications for behavioral stasis. *Journal of Paleonto-*



logy 83(3): 431-447. (in English) ["We document evidence of endophytic oviposition on fossil compression / impression leaves from the early Eocene Laguna del Hunco and middle Eocene Río Pichileufú floras of Patagonia, Argentina. Based on distinctive morphologies and damage patterns of elongate, ovoid, lens-, or teardrop-shaped scars in the leaves, we assign this insect damage to the ichnogenus *Paleoovoidus*, consisting of an existing ichnospecies, *P. rectus*, and two new ichnospecies, *P. arcuatum* and *P. bifurcatus*. In *P. rectus*, the scars are characteristically arranged in linear rows along the midvein; in *P. bifurcatus*, scars are distributed in double rows along the midvein and parallel to secondary veins; and in *P. arcuatum*, scars are deployed in rectilinear and arcuate rows. In some cases, the narrow, angulate end of individual scars bear a darkened region encompassing a circular hole or similar feature indicating ovipositor tissue penetration. A comparison to the structure and surface pattern of modern ovipositional damage on dicotyledonous leaves suggests considerable similarity to certain zygopteran Odonata. Specifically, members of the Lestidae probably produced *P. rectus* and *P. bifurcatus*, whereas species of Coenagrionidae were responsible for *P. arcuatum*. Both Patagonian localities represent an elevated diversity of potential fern, gymnosperm, and especially angiosperm hosts, the targets of all observed oviposition. However, we did not detect targeting of particular plant families. Our results indicate behavioral stasis for the three ovipositional patterns for at least 50 million years. Nevertheless, synonymy of these oviposition patterns with mid-Mesozoic ichnospecies indicates older origins for these distinctive modes of oviposition." (Authors)] Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina. E-mail: muzon@iilpla.edu.ar

**7882.** Schouten, M.A.; Verweij, A.; Barendregt, A.; Kleukers, R.M.J.C.; Kalkman, V.J.; de Ruiter, P.C. (2009): Determinants of species richness patterns in the Netherlands across multiple taxonomic groups. *Biodiversity and Conservation* 18: 203-217. (in English) ["We examined the species richness patterns of five different species groups (mosses, reptiles and amphibians, grasshoppers and crickets, dragonflies, and hoverflies) in the Netherlands (41,500 km<sup>2</sup>) using sampling units of 5 × 5 km. We compared the spatial patterns of species richness of the five groups using Spearman's rank correlation and used a stepwise multiple regression generalized linear modelling (GLM) approach to assess their relation with a set of 36 environmental variables, selected because they can be related to the several hypotheses on biodiversity patterns. Species richness patterns of the five groups were to a certain extent congruent. Our data suggest that environmental heterogeneity (in particular habitat heterogeneity) is one of the major determinants of variation in species richness within these five groups. We found that for taxonomic groups comprising a low number of species, our regression model explained more of the variability in species richness than for taxonomic groups with a large number of species." (Authors)] Address: Schouten, M.A., Department of Environmental Sciences, Copernicus Institute for Sustainable Development and Innovation, Utrecht University, P.O. Box 80115, 3508 TC Utrecht, The Netherlands. E-mail: m.a.schouten@uu.nl

**7883.** Schultz, T.D. (2009): Diversity and habitats of a prairie assemblage of Odonata at Lostwood National

Wildlife Refuge, North Dakota. *Journal of the Kansas Entomological Society* 82: 91-102. (in English) ["An inventory of the Odonata at the Lostwood National Wildlife Refuge (LNWR) was conducted during the summer of 2003. Adult censuses and larval sampling at 32 wetland sites produced 10 dragonfly and 14 damselfly species that were resident in the refuge. In 2006, two additional species were added. The odonate fauna of LNWR consisted primarily of widespread, common species that are adapted to fishless lentic communities and tolerant of alkaline and impermanent water regimes. *Enallagma annexum*, *E. boreale*, *Lestes disjunctus*, *L. congener*, *Sympetrum costiferum*, and *S. internum* were the most abundant odonates at the refuge. The odonate communities of semipermanent, oligosaline ponds were the most diverse and included species of *Aeshna*, *Anax*, *Libellula*, *Leucorrhinia*, *Sympetrum*, *Lestes*, *Coenagrion*, *Enallagma*, *Ischnura*, and *Nehalennia*. Large polysaline lakes were inhabited only by *Ischnura damula* and four species of *Enallagma*. Seasonal ponds that remained flooded until mid-July produced large numbers of *S. internum*, *L. disjunctus*, and *L. unguiculatus*. Spring-fed bogs and fens supported several species that were rare at the refuge including *Sympetrum danae*, *S. semicinctum*, and *Amphiagrion abbreviatum*. Long-term monitoring of odonate diversity and abundance may be useful in tracking the effects of climate change in the prairie pothole region but must take into account yearly fluctuations due to variation in winter and summer precipitation." (Author)] Address: Schultz, T.D., Department of Biology, Denison University, Granville, OH, USA 43023 Schultz@denison.edu

**7884.** Simaika, J.P. (2009): Diversity of Nature's Valley damselfly and dragons: Groot river. *Nature's news* (Newsletter of the Nature's Valley Trust) 25: 4-6. (in English) [The paper gives a brief introduction to the 14 species recorded at the Groot River so far. Nearly half are endemic to South Africa, and of these, four are restricted to the southern Cape.] Address: www.naturesvalleytrust.co.za

**7885.** Simaika, J.P.; Samways, M.J. (2009): Reserve selection using Red Listed taxa in three global biodiversity hotspots: Dragonflies in South Africa. *Biological Conservation* 142(3): 638-651. (in English) ["The Red List can be used as a gauging tool by conservationists to assess which species require focused conservation attention. Mapping the relative distributions of species, and identification of centers of richness, endemism and threat are a first step towards site-oriented conservation action. We use here a specially developed biodiversity index, based on three weighted sub-components assigned to each species: geographical distribution, Red List status, and sensitivity to habitat change. We test this approach using what is called here the Dragonfly Biotic Index (DBI) to prioritize sites for conservation action, with special emphasis on species occurrence in three global hotspots in southern Africa. Using a selected set of the 23 top prioritized sites, we compare the DBI's performance to that of a rarity-complementarity algorithm. As with several other taxa, local endemism levels are highest in the Cape Floristic Region (CFR), while richness is highest in the north east, particularly in the stream systems of the Maputaland-Pondoland-Albany (MPA) hotspot. Red Listed Odonata species are also concentrated in the CFR, while richness is highest in the MPA hotspot. Site prioritization using the DBI reveals that CFR sites protect Red Listed taxa rather well,

despite the fact that catchments are only partially protected. The DBI demonstrates high levels of redundancy in representing Red Listed species, in other words, the same species are represented in several catchments. The value in the DBI thus lies in maximizing redundancy (i.e. representation) of globally Red Listed species. The rarity-complementarity algorithm represents all species, but without greater emphasis on the rare and threatened (i.e. Red Listed) species. We conclude that the DBI is of great value in selecting biodiversity hotspots, while the algorithm is useful for selecting complementarity hotspots. We identify protection gaps and thus recommend continued searches in centers of endemism and existing reserves, as well as gap areas. These searches will hone Red List assessments and identify priority sites, as well as monitor already-identified sites for changes in quality of habitat." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**7886.** Simaika, J.P.; Samways, M.J. (2009): An easy-to-use index of ecological integrity for prioritizing freshwater sites and for assessing habitat quality. *Biodiversity and Conservation* 18(5): 1171-1185. (in English) ["Prioritizing and assessing the condition of sites for conservation action requires robust and ergonomic methodological tools. We focus here on prioritizing freshwater sites using two promising biodiversity indices, the Dragonfly Biotic Index (DBI) and Average Taxonomic Distinctness (AvTD). The AvTD had no significant association with either species richness or endemism. In contrast, the DBI was highly significantly associated with species richness and endemism, although the strengths of the associations were weak. These associations are related to how the sub-indices in the DBI are weighted, and how species are distributed geographically. Additionally, the DBI was found to be very useful for site selection based on its ability to measure ecological integrity, combined with level of threat, at multiple spatial scales. The AvTD was found to be useful principally for regional use. As the DBI is a low-cost, easy-to-use method, it has the additional use as a method for assessing habitat quality and recovery in restoration programs. The DBI operates at the species level, and is therefore highly sensitive to habitat condition and has great potential for environmental assessment and monitoring freshwater biodiversity and quality. Practical, worked examples of river restoration are given here. In view of the ease and versatility by which the DBI can be employed, we recommend its testing and possible integration into freshwater management and conservation schemes elsewhere in the world." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**7887.** Slos, S.; Meester, L.D.; Stoks, R. (2009): Behavioural activity levels and expression of stress proteins under predation risk in two damselfly species. *Ecological Entomology* 34(3): 297-303. (in English) ["1. It has become apparent that predators may strongly decrease prey fitness without direct contact with the prey, as they induce the development of defence systems that limit the availability of energy for growth and reproduction. Recent studies suggest that stress proteins may help prey organisms deal with this stress. The pattern is not general, however, and little is known about species differences in physiological traits in coping with

predator stress, and covariation of physiological with other antipredator traits. 2. To explore these issues, we quantified levels of constitutive and fish-induced stress proteins (Hsp60 and Hsp70) and anti-predator behaviours in larvae of two damselfly species that differ in lifestyle. Both stress proteins were fixed at higher levels in *Erythronma najas*, which has a slow lifestyle, than in *Lestes sponsa*, which has a fast lifestyle. Similarly, anti-predator behaviours were fixed at safer levels in *E. najas* than in *L. sponsa*. 3. These results suggest that stress proteins may be part of anti-predator syndromes of damselfly larvae, and there may be trait co-specialisation between stress proteins and behavioural anti-predator traits. Studies formally testing these hypotheses in more species may prove rewarding in advancing our understanding of the functional integration of physiological anti-predator traits in relation to the prey's lifestyle." (Authors)] Address: Slos, Stefanie, Lab. of Aquatic Ecology & Evolutionary Biology, Katholieke Universiteit Leuven, Ch. Debériotstraat 32, B-3000 Leuven, Belgium. E-mail: stefanie.slos@bio.kuleuven.be

**7888.** Slos, S.; De Block, M.; Stoks, R. (2009): Autotomy reduces immune function and antioxidant defence. *Biology letters* 5(1): 90-92. (in English) ["Costs of autotomy, an antipredator defence, are typically explained by impaired mobility; yet physiologically mediated costs may also play a role. Given the resemblance to wounding, a decreased immune function and an associated reduction in antioxidant defence is expected after autotomy. In line with this, after lamellae autotomy, larvae of *Lestes viridis* showed lower levels of innate immunity (i.e. phenoloxidase, PO) and antioxidant defence (superoxide dismutase, SOD). Levels of catalase (CAT) remained, however, unaffected. In line with its cytotoxicity, PO covaried positively with CAT, yet negatively with SOD. We identified a novel cost of autotomy in terms of a reduced innate immunity, which may provide an alternative explanation for the often observed costs of autotomy and which may generate indirect interactions between predators and parasites.] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**7889.** Stetzuhn, H. (2009): Kleines Granatauge (*Erythronma viridulum*) am Rodder Maar, Ldkrs Ahrweiler. *Pflanzen und Tiere in Rheinland-Pfalz (Berichtsjahr 2008)* 19: 160. (in German) [Germany, Rheinland-Pfalz, 14-VIII-2008] Address: not stated

**7890.** Stevens, L.E.; Bailowitz, R.A. (2009): Odonata Biogeography in the Grand Canyon Ecoregion, Southwestern USA. *Annals of the Entomological Society of America* 102(2): 261-274. (in English) ["The Odonata fauna of the Grand Canyon ecoregion (GCE) on the southern Colorado Plateau includes 89 species (35 genera, seven families), including 49 Anisoptera species (25 genera, four families) and 40 Zygoptera species (10 genera, three families), and with 58 Odonata species in Grand Canyon (GC; 24 genera, seven families). Three biogeographic hypotheses account for this relatively high regional species richness: faunal affinity (origin), elevation effects on range, and landform impacts across spatial scale. The GCE Odonata assemblage is the result of mixing of taxa from adjacent Neotropical and Nearctic regions. Allochthonous taxa include 34.8% tropical (Mexican, Caribbean, Neotropical, or Pantropical) and 21.3% boreal (Nearctic or Holarctic)

species. Autochthonous species (43.8%) are range-centered in North American, neither clearly Nearctic nor Neotropical, with a strong Pacific Coast influence. Area-adjusted species richness is negatively linearly related to elevation. Tropical species have lower elevation ranges than do boreal species, whereas the elevation ranges of both allochthonous groups overlap those of autochthonous species. Odonata generally overcome landform-based range constraints at coarse spatial scales, but barrier/filter and corridor effects predominate over refuge and null biogeographic effects in GC. Anisoptera and Zygoptera biogeographic patterns are similar, except that 9-fold more Zygoptera species exist in refugia in GC compared with Anisoptera. Although no GCE Odonata previously have been considered rare or at risk, 15 (16.9%) species are restricted to three or fewer localities, four (4.5%) of species have been detected at only a single locality, and four high-elevation Nearctic species may be at risk of extirpation though climate change impacts on their habitats." (Authors)] Address: Stevens, L.E., Museum of Northern Arizona, 3101 N. Ft. Valley Rd, Flagstaff, AZ 86001, USA. E-mail: farvana@aol.com

**7891.** Stevenson, D.J.; Beaton, G.; Elliott, M.J. (2009): Distribution, status and ecology of *Cordulegaster sayi* Selys in Georgia, USA (Odonata: Cordulegasteridae). *Bulletin of American Odonatology* 11(1): 20-25. (in English) ["*C. sayi* is one of the most poorly known dragonfly species of the southeastern United States. Over a 13-year period (1996–2008), we documented *C. sayi* from 17 sites in 11 counties in southern Georgia, including nymph collections. At 11 (65%) sites, nymph habitat consisted of mucky seepages at the base of the slopes of xeric sandhills; at the remaining six sites, the habitat consisted of seepages on the slopes of steep hardwood bluffs above major streams (or within ravines associated with these bluffs). Salamanders of the genus *Pseudotriton* (*P. ruber* and *P. montanus*) are characteristic associates of *C. sayi* nymph habitats. Because nymph habitats are perennial seepages located downslope of Longleaf Pine (*Pinus palustris*)–Turkey Oak (*Quercus laevis*) sandhills, and because adults typically forage in these habitats, we consider *C. sayi* a Longleaf Pine ecosystem endemic." (Authors)] Address: Stevenson, D.J., Project Orianna, Ltd., Indigo Snake Initiative, 414 Club Drive, Hinesville, Georgia, USA 31313. E-mail: dstevenson@projectorianna.org

**7892.** Strobbe, F.; McPeck, M.A.; de Block, M.; De Meester, L.; Stoks, R. (2009): Survival selection on escape performance and its underlying phenotypic traits: a case of many-to-one mapping. *Journal of evolutionary biology* 22(6): 1172-1182. (in English) ["Selection often operates not directly on phenotypic traits but on performance which is important as several traits may contribute to a single performance measure (many-to-one mapping). Although largely ignored in the context of selection, this asks for studies that link all relevant phenotypes with performance and fitness. In an enclosure experiment, we studied links between phenotypic traits, swimming performance and survival in two *Enallagma* damselflies. Predatory dragonflies imposed survival selection for increased swimming propensity and speed only in *E. annexum*; probably *E. aspersum* was buffered by the former species' presence. Accordingly, more circular caudal lamellae, structures involved in generating thrust while swimming, were selected for only in *E. an-*

*nexum*. Other phenotypic traits that contributed to swimming speed were apparently not under selection, probably because of many-to-one mapping (functional redundancy). Our results indicate that not only the phenotypic distributions of syntopic prey organisms but also many-to-one mapping should be considered when documenting phenotype–performance–fitness relationships." (Authors)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**7893.** Svensson, E.I.; Abbott, J.K.; Gosden, T.P.; Coreau, A. (2009): Female polymorphisms, sexual conflict and limits to speciation processes in animals. *Evolutionary Ecology* 23(1): 93-108. (in English) ["Heritable and visually detectable polymorphisms, such as trophic polymorphisms, ecotypes, or colour morphs, have become classical model systems among ecological geneticists and evolutionary biologists. The relatively simple genetic basis of many polymorphisms (one or a few loci) makes such species well-suited to study evolutionary processes in natural settings. More recently, polymorphic systems have become popular when studying the early stages of the speciation process and mechanisms facilitating or constraining the evolution of reproductive isolation. Although colour polymorphisms have been studied extensively in the past, we argue that they have been underutilized as model systems of constraints on speciation processes. Colouration traits may function as signalling characters in sexual selection contexts, and the maintenance of colour polymorphisms is often due to frequency-dependent selection. One important issue is why there are so few described cases of female polymorphisms. Here we present a synthetic overview of female sexual polymorphisms, drawing from our previous work on female colour polymorphisms in lizards and damselflies. We argue that female sexual polymorphisms have probably been overlooked in the past, since workers have mainly focused on male-male competition over mates and have not realized the ecological sources of genetic variation in female fitness. Recent experimental evolution studies on fruit flies (*Drosophila melanogaster*) have demonstrated significant heritable variation among female genotypes in the fitness costs of resistance or tolerance to male mating harassment. In addition, female-female competition over resources could also generate genetic variation in female fitness and promote the maintenance of female sexual polymorphisms." (Authors)] Address: Svensson, E.I., Section for Animal Ecology, Ecology Building, Lund University, Lund 223 62, Sweden. E-mail: erik.svensson@zoekol.lu.se

**7894.** Svidersky, V.L.; Plotnikova, S.I.; Gorelkin, V.S. (2009): Structural-functional peculiarities of the wing apparatus of insects that do not have and do have the maneuvering flight. *Journal of Evolutionary Biochemistry and Physiology* 44(6): 643-656. (in English) ["The work considers character of behaviour in flight and discusses peculiarities of structural-functional organization of the wing apparatus of two representatives of insects — the migratory Asian locust *Locusta migratoria* (a low-maneuvering insect) and the dragonfly-darner *Aeshna* sp. (an insect able to perform complex maneuvers in air). The main principles underlying the insect wing apparatus activity are considered and the mechanisms allowing the dragonflies to perform complex maneuvers in the flight are analyzed in detail." (Authors) Original Russian Text published in *Zhurnal Evolyutsionnoi Biokhimii*



i Fiziologii, 2008, Vol. 44, No. 6, pp. 545–555.] Address: Svidersky, V.L., Sechenov Institute of Evolutionary Physiology and Biochemistry, Russian Academy of Sciences, St. Petersburg, Russia. E-mail: office@iephb.ru

**7895.** Tajima, Y.; Watanabe, M. (2009): Changes in the number of spermatozoa in the female sperm storage organs of *Ischnura asiatica* (Brauer) during copulation (Zygoptera: Coenagrionidae). *Odonatologica* 38(2): 141-149. (in English) ["Spermatozoan dynamics in the female sperm storage organs of *I. asiatica* were examined with interrupted copulation experiments in the field. The copulation process was divided into 3 stages (I, II and III) according to the movements of the male abdomen. Females interrupted just after the termination of stage I of copulation contained a much lower number of spermatozoa, both in the bursa copulatrix and in the spermatheca, than solitary females captured before being attached by males. At the tip of the male's secondary genitalia, there was a pair of horns which might be used to remove sperm from the bursa copulatrix and the spermatheca during copulation. The latter was joined to the base of the former by a spermathecal duct. Since each horn of the male genitalia was significantly shorter than the spermathecal duct, the spermatheca might be inaccessible to males. The actual position of the horns in the female sperm storage organs during stage I of copulation was observed by freezing copulating pairs using quick-freeze aerosol sprays. The horns were in the bursa copulatrix, but no horns had entered the spermatheca. Additional mechanisms of sperm removal from the spermatheca are proposed." (Author)] Address: Graduate School of Life & Environmental Sciences, Univ. of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan. E-mail: watanabe@kankyo.envr.tsukuba.ac.jp

**7896.** Tol, J. van (2009): Phylogeny and biogeography of the C (Odonata). Ph.D. thesis, University of Leiden: X + 294 pp.[Chapter: 1. J. van Tol, B.T. Reijnen & H.A. Thomassen. Phylogeny and biogeography of the Platystictidae (Odonata); \*Chapters 2-8 were previously published with the same text and illustrations. \*Chapter 2. – Chapter 2 in: W. Renema (editor) [2007]. Biogeography, time and place: Distributions, barriers and islands. p. 45-91. Springer, Dordrecht. \*Chapter 3. – Zoologische Mededelingen 82 (21) [2008]: 217-234. \*Chapter 4. – *Odonatologica* 32 [2003]: 39-45. \*Chapter 5. – Zoologische Mededelingen 79-2 [2005]: 195-282. \*Chapter 6. – Tijdschrift voor Entomologie 143 [2000]: 221-266. \*Chapter 7. – *Odonatologica* 36 [2007]: 171-189. \*Chapter 8. – Deutsche Entomologische Zeitschrift 54 [2007]: 3-26. \*For the complete version see: <https://openaccess.leidenuniv.nl/handle/1887/13522>;

**7897.** Trapero Quintana, A.; Alonso Tabet, M.; Reyes Tur, B.; Alonso Jiménez, Y.; López, M. (2009): Notes on the Odonata of Refugio de Fauna Monte Cabaniguán, Las Tunas, Cuba. *Bulletin of American Odonatology* 11(1): 26-28. (in English) ["The Odonata fauna at Refugio de Fauna Monte Cabaniguán (Las Tunas Province) in eastern Cuba is brought on record. A total of 19 species in four families (Lestidae, Coenagrionidae, Aeshnidae, Libellulidae) were collected; 15 were libellulids." (Authors)] Address: Trapero Quintana, A., Depto de Biología, Universidad de Oriente, Patricio Lumumba s/n, C.P. 90500, Santiago de Cuba, Cuba. E-mail: atrapero@cnt.uo.edu.cu

**7898.** Trapero Quintana, A.D.; & Cuellar Araújo, N. (2009): Description of the last instar larva of *Cannaphila insularis funerea* (Carpenter, 1897) (Anisoptera: Libellulidae), with notes on the habitat of the species. *Zootaxa* 2034: 61-64. (in English) [The description is based on two male exuviae collected in the outlet of the Chalons basin (20°04'13"N, 75°48'47"W, 108 m), 4-VIII-2007, and the Los Gomez stream (20°02'52"N, 75°49'18"W, 90 m), 30-V-2008, col. Trapero. Both locations are in northern Santiago de Cuba.] Address: Trapero Quintana, A.D., Departamento de Biología, Universidad de Oriente. Ave. Patricio Lumumba. Santiago de Cuba 90500. Cuba. E-mail: trapero76@gmail.com

**7899.** Trapero-Quintana, A.; Cabrera Anaya, A.; Torres Cambas, Y.; Rodríguez Montelíer, L. (2009): Reproductive behavior of *Enallagma coecum* (Hagen) in Cuba (Zygoptera: Coenagrionidae). *Odonatologica* 38 (1): 7-13. (in English) ["The reproductive behaviour is described from 2 populations on the outskirts of Santiago de Cuba, between June 2005 and May 2006. Males started arriving at the water body in the morning nearly 2 h before females. Sperm translocation was brief (less than 30 s), and the duration of copulation averaged about 18 min. During oviposition the female was guarded in tandem by the male, except when she submerged under water, when non-contact guarding was observed. The mean duration of oviposition was about 10 min. Abiotic factors that interfered with the reproduction were wind, absence of sun, and rain; and the biotic interactions included conspecific males, spiders of the genus *Dolomedes*, *Gambusia punctata* fishes and the lizard *Anolis sagrei*.] Address: Trapero Quintana, A., Departamento de Biología de la Universidad de Oriente, Patricio s/n, Santiago, Cuba, CP 90500, Cuba. E-mail: atrapero@cnt.uo.edu.cu

**7900.** van der Poorten, N. (2009): *Lyriothemis defonsekai* spec. nov. from Sri Lanka, with a review of the known species of the genus (Anisoptera: Libellulidae). *Odonatologica* 38(1): 15-27. (in English) ["Both sexes of the new species and its early instar larva are described and illustrated. Holotype ♂: Ratnapura district, near Kudawe, alt. 500 m, 3-VII-2007; to be deposited at the Colombo National Museum. The habitat characteristics and species behaviour are briefly outlined. The new species is compared to all known congeners. It closely resembles *Lyriothemis acigastra* and *L. elegantissima*." (Author)] Address: van der Poorten, Nancy, 17 Monkton Avenue, Toronto, Ontario, M8Z 4M9, Canada; E-mail: nmgvdp@netscape.net

**7901.** van Huyssteen, P.; Samways, M.J. (2009): Overwintering dragonflies in an African savanna (Anisoptera: Gomphidae, Libellulidae). *Odonatologica* 38(2): 167-172. (in English) ["To better understand overwintering capability of dragonflies in the African savanna, observed individuals were placed into predetermined age categories at sites along the Mogalakwena river, Limpopo province, South Africa, during mid-winter. Age categories were determined by degree of wing wear each individual had sustained. The Dragonfly Biotic Index (DBI) was used to categorize species into rare, widespread generalists versus rare, narrow-range specialists. All the recorded species were common, widespread generalists, occupying microhabitats created by the winter dry season decrease in water level and flow rate, and able to survive seasonal habitat changes. Seven of the 8 species were libellulids, and 1 gomphid.

Their ability to thermoregulate by selecting appropriate perch sites, in addition to their high habitat tolerance, plays an important role allowing them to survive as adults throughout winter. It is confirmed that the libellulids observed here were highly habitat tolerant, common and widespread species whose success comes about at least partly from their ability to overwinter and be ready to take advantage of the first rains." (Authors) The species involved in this study are: *Ictinogomphus ferox*, *Orthetrum chrysostigma*, *Crocothemis erythraea*, *C. sanguinolenta*, *Trithemis annulata*, *T. arteriosa*, *T. furva*, and *T. kirbyi*.] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**7902.** Velasquez, N.; Bautista, K.; Guevara, M.; Ramirez, D.; Realpe, E.; Perez-Gutierrez, L.A. (2009): Larval development and growth ratio in *Ischnura cruzi* De Marmels, with description of last larval instar (Zygoptera: Coenagrionidae). *Odonatologica* 38(1): 29-38. (in English) ["Under stable laboratory conditions larval stages were measured and morphologically compared in order to establish growth ratio and total number of instars through their postembryonic development. Head width, total length, metafemur length, forewing pad length, and length and width of prementum were measured to determine variation between instars, and growth ratio was calculated. By Dyar's Law, 12 larval instars were estimated. Fundamental morphological differences were found in order to distinguish the stages and at the same time to have a record of the morphological development through the stages. Finally, the last larval instar is described and illustrated." (Authors)] Address: Perez-Gutierrez, L.A., Departamento de Biología, Universidad del Atlántico, Km. 7, Antigua Vía, Puerto Colombia, Barranquilla, Colombia; 1 la.perez60@egresados.uniandes.edu.co

**7903.** Villanueva, R.J.T. (2009): Dragonflies of Babuyan and Batanes group of islands, Philippines (Insecta: Odonata). *IDF-Report* 17: 1-16. (in English) ["Odonata were recorded and voucher specimens collected between April 23 and May 14 2008. In the islands of Sabtang and Itbayat >90% of the known freshwater system was explored while for Batan and Calayan approximately 60 and 40 percent respectively. In total 33 species belonging to 21 genera and 7 families were found. In addition to this three unidentified species were seen. All these species are new to the islands and one species is new to the Philippines. Furthermore, four of the recorded species (*Amphicnemis* in Calayan, *Drepanosticta* 1 & 2 in Calayan and Batan, *Teinobasis* in Calayan and Batan) are probably new to science. For a further four species the material shows differences with the specimens from the mainland. Some of these might also represent species new to science. Nearly 55 percent of the recorded species are Anisoptera. On the island of Calayan I found 29 species, most of which are forest specialists. Among these species are three probably new species, *Amphicnemis*, *Drepanosticta* and *Teinobasis*. Some of the species, *Diplacina*, *Neurobasis* and *Teinobasis* requires further comparison with known species. Only one species (*Rhyothemis regia*) noted on the island was not captured. On Sabtang, I found 12 species including a new record for the Philippines (*Tramea virginia*). On Batan, 9 species were found including two possibly new species of Zygoptera. Only one species noted in the island was not collected. The island of

Itbayat has nine species including possible one new species. Two species were noted only by sighting and could not be confirmed for proper identification." (Author)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., Davao City, 8000 Philippines. E-mail: reaganjoseph@lycos.com

**7904.** Vukusic, P.; Stavenga, D.G. (2009): Physical methods for investigating structural colours in biological systems. *J. R. Soc. Interface* 6, Suppl 2: S133-S148. (in English) ["Many biological systems are known to use structural colour effects to generate aspects of their appearance and visibility. The study of these phenomena has informed an eclectic group of fields ranging, for example, from evolutionary processes in behavioural biology to micro-optical devices in technologically engineered systems. However, biological photonic systems are invariably structurally and often compositionally more elaborate than most synthetically fabricated photonic systems. For this reason, an appropriate gamut of physical methods and investigative techniques must be applied correctly so that the systems' photonic behaviour may be appropriately understood. Here, we survey a broad range of the most commonly implemented, successfully used and recently innovated physical methods. We discuss the costs and benefits of various spectrometric methods and instruments, namely scatterometers, microspectrophotometers, fibre-optic-connected photodiode array spectrometers and integrating spheres. We then discuss the role of the materials' refractive index and several of the more commonly used theoretical approaches. Finally, we describe the recent developments in the research field of photonic crystals and the implications for the further study of structural coloration in animals." (Author) *Neurobasis chinensis* exhibits bright and highly saturated iridescent green hind wings as a result of the melanin-backed multilayer in its wing membrane.] Address: Vukusic, P., School of Physics, University of Exeter, Exeter EX4 4QL, UK. E-mail: p.vukusic@ex.ac.uk

**7905.** Wilson, S.R.; Ricciardi, A. (2009): Epiphytic macroinvertebrate communities on Eurasian watermilfoil (*Myriophyllum spicatum*) and native milfoils *Myriophyllum sibiricum* and *Myriophyllum alterniflorum* in eastern North America. *Canadian Journal of Fisheries and Aquatic Sciences* 66(1): 18-30. (in English, with French summary) ["Aquatic macrophytes play an important role in the survival and proliferation of invertebrates in freshwater ecosystems. Epiphytic invertebrate communities may be altered through the replacement of native macrophytes by exotic macrophytes, even when the macrophytes are close relatives and have similar morphology. We sampled an invasive exotic macrophyte, *M. spicatum*, and native milfoils *M. sibiricum* and *M. alterniflorum* in four bodies of water in southern Quebec and upstate New York during the summer of 2005. Within each waterbody, we compared the abundance, diversity, and community composition of epiphytic macroinvertebrates (including Odonata on different taxonomical levels) on exotic and native *Myriophyllum*. In general, both *M. sibiricum* and *M. alterniflorum* had higher invertebrate diversity and higher invertebrate biomass and supported more gastropods than the exotic *M. spicatum*. In late summer, invertebrate density tended to be higher on *M. sibiricum* than on *M. spicatum*, but lower on *M. alterniflorum* than on *M. spicatum*. Our results demonstrate that *M. spicatum* supports macroinvertebrate communities that may dif-

fer from those on structurally similar native macrophytes, although these differences vary across sites and sampling dates. Thus, the replacement of native milfoils by *M. spicatum* may have indirect effects on aquatic food webs." (Authors)] Address: Ricciardi, A., Redpath Museum. McGill University. 859 Sherbrooke Street West. Montreal. QC H3A 2K6. Canada. E-mail: tony.ricciardi@mcgill.ca

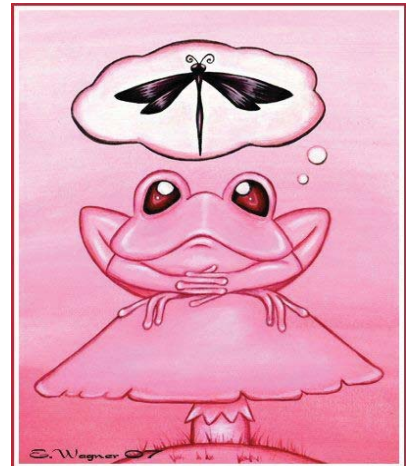
**7906.** Wissinger, S.A.; Greig, H.; McIntosh, A. (2009): Absence of species replacements between permanent and temporary lentic communities in New Zealand. *J. N. Am. Benthol. Soc.* 28(1): 12-23. (in English) ["The species composition of lentic communities often shifts along hydroperiod gradients, in part because temporary-habitat specialists replace closely related permanent-habitat specialists. These replacements reflect tradeoffs between traits that facilitate coexistence with permanent-habitat predators and those that prevent desiccation. The evidence for species replacements and the underlying tradeoffs is considerable in North America, but few studies have explored this pattern in other regions. We compared benthic communities in permanent and temporary habitats on the South Island of New Zealand. Ordination across 58 sites showed that community composition was distinctly different between the 2 types of habitats. Assemblages in permanent habitats had .23 the number of species as those in temporary habitats. We found little evidence for temporary-habitat specialists; i.e., species in temporary communities were a nested subset of those in permanent communities. Quantitative sampling at 12 intensively studied sites revealed that chironomids, water bugs, beetles, and crustaceans accounted for 90% of the biomass in temporary, but only 14% of the biomass in permanent habitats, which were dominated by molluscs, annelids, caddisflies, and odonates. Damselflies, dragonflies, caddisflies, and several other large-bodied taxa common in permanent habitats were absent from most temporary habitats. We propose 2 explanations for the absence of species replacements in these groups in the New Zealand habitats that we studied. First, drying is unpredictable within and between years, perhaps precluding the evolution of temporary-habitat specialization. Second, fish predation on benthic invertebrates, a driver for phylogenetic diversification in North America, appears to be comparatively weak in New Zealand. Comparative studies across a range of climates and faunas will be needed to identify the ecological and phylogenetic contexts that favour evolution of generalists vs specialists along permanence gradients." (Authors)] Address: Wissinger, S.A., Biology Department, Allegheny College, Meadville, Pennsylvania 16335 USA. E-mail addresses: swissing@allegheny.edu

**7907.** Zhang, H.-m.; Tong, X.-l. (2009): *Trigomphus hainanensis* spec. nov., a new dragonfly species from Hainan, China (Anisoptera: Gomphidae). *Odonatologica* 38(1): 67-71. (in English) ["Both sexes of the new species are described and illustrated. Holotype ♂, paratype ♀: China, Wushishan, Hainan, 30-III-2008; deposited in the Collection of Aquatic Insects and Soil Animals, Department of Entomology, South China Agricultural University Guangzhou. *T. hainanensis* sp. n. is closely related to *T. citimus* (Needham), from which it can be distinguished by the labrum, colour of ♂ superior appendices and by a pointed black occipital horn in female." (Authors)] Address: Tong, X.-l., Department of Entomology, College of Natural Resources and En-

vironment, South China Agricultural University, Guangzhou 510642, China. E-mail: xtong@scau.edu.cn

"I'm thinking dragonflies"

[http://www.eb-sqart.com/Artist/s/cmd\\_6023\\_profile.htm](http://www.eb-sqart.com/Artist/s/cmd_6023_profile.htm)



**7908.** Zhang, H.-m.; Tong, X.-l. (2009): First description of the larva and adult male *Paragomphus wuzhishanensis* Liu (Anisoptera: Gomphidae). *Odonatologica* 38(2): 173-178. (in English) ["The descriptions and illustrations are based on specimens reared in the laboratory from larvae collected from the type locality of Hainan, China. A comparison is also provided between adult males *P. capricornis* (from Guangdong), and *P. wuzhishanensis* and *P. pardalinus* (both from Hainan)."] Address: Zhang, H.-m., Dept of Entomology, College of Natural Resources and Environment, South China Agricultural University, Guangzhou-510642, China. E-mail: xtong@scau.edu.cn

**Thanks to all who contributed to this issue of OAS!!!**



[http://www.toonpool.com/user/1391/files/tongue\\_tied\\_372365.jpg](http://www.toonpool.com/user/1391/files/tongue_tied_372365.jpg)



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Silberdistelweg 11, D-72113 Ammerbuch, Germany. Tel. ++49 (0)7073 300770; E-mail: martin@lindeboom.de  
Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105;  
E-mail: K.Reinhardt@sheffield.ac.uk  
Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

---

## 1997

**7909.** De Knijf, G.; Anselin, A.; Demolder, H. (1997): The odonatofauna of the Damvallei (east-Flanders, Belgium); past glory or still worthwhile? *Biol. Jaarh. Dodonaea* 64, 1996 (1997): 75-91. (in English) ["The Damvallei, rich in aquatic habitats, hosted an impressive number (39) of interesting dragonfly (Odonata) species before the construction of a highway junction in 1967. A dragonfly survey was undertaken in the area between 1992-1995 to compare present-day with former species richness. A number of species linked to mesotrophic ponds and marshes, oligotrophic waterbodies and oxygen-rich slow running rivers and brooks have disappeared from the area. Although several species have been lost since 1970, the presence of healthy populations of several interesting species, in particular *Coenagrion pulchellum* and *Erythromma najas* and of a high species richness (26), indicates that the area is still valuable for dragonflies. However it urgently needs a proper dragonfly-friendly management." (Author)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**7910.** Jacobsen, D.; Schultz, K.; Encalada, A. (1997): Structure and diversity of stream invertebrate assemblages: the influence of temperature with altitude and latitude. *Freshwater Biology* 38: 247-261. (in English) ["1. Structure and diversity of the macroinvertebrate fauna were studied in relation to altitude and latitude among three groups of streams from Ecuador (lowland: 100-600 m, Central Valley: 2600-3100 m, Paramo: 3500-4000 m), and one group from the temperate lowland region of Denmark. The streams in the four regions were comparable with regard to physical characteristics such as size, current and substratum. 2. In terms of faunal composition the Ecuadorian highland streams bore more resemblance to the Danish lowland streams than the Ecuadorian lowland streams. The greater similarity between the Ecuadorian highland and the Danish streams, however, was due to the large number of insect families in the Ecuadorian lowlands, many of which were not found in the other regions. Of ten physico-chemical parameters measured, maximum stream temperature explained by far the most variability in faunal composition. 3. The number of insect orders

and families increased linearly with maximum stream temperature and therefore decreased with altitude and latitude. A compilation of literature data on insect richness and maximum water temperature from streams around the world confirmed this pattern, yielding a common linear relation for both temperate and tropical streams. This pattern may arise due to a direct temperature effect on speciation but is probably also related to geological history and the influence of climatic changes on stream ecosystems. We estimate that small, tropical, lowland streams have, on average, a two- to fourfold higher species richness than temperate lowland streams. [...] The number of insect orders decreased with altitude. In the lowland streams nine orders were found. Odonata comprised 8%, Hemiptera 7%, Megaloptera 0.8% and Lepidoptera 0.5% of the lowland fauna, but, except for a few Odonata in the Central Valley, these four orders were absent in the Central Valley and the Paramo streams." (Authors)] Address: Jacobsen, D., Freshwater Biological Laboratory, Univ. of Copenhagen, 51 Helsingorsgade, DK 3400 Hillerod, Denmark

**7911.** Lebenhagen, A. (1997): Die Entomofauna und Malakofauna des LSG "Wanzeberg". *Virgo, Mitt.bl. ent. Ver. Mecklenburg* 1: 7-8. (in German) [Mecklenburg-Vorpommern, Germany; a total of 27 Odonata species is reported from the locality, but only *Anax imperator* is specified.] Address: Lebenhagen, A., Schäferstraße 4, D -19053 Schwerin

**7912.** Lopez, D.; Lugo, E.; Valle, S.; Espinoza, P.; Lopez, M.M.; Delgado, M.; Rivera, P.; Garcia Avila, I. (1997): Insectos acuáticos como biorreguladores de larvas de mosquitos en Nicaragua [Aquatic insects as bio-regulators of mosquito larvae in Nicaragua]. *Revista Nicaraguense de Entomología* 39: 27-30. (in Spanish, with English summary) ["This study presents some predators of mosquito larvae collected during a survey in Nicaragua. High populations of predators correspond to low populations of mosquito larvae. Predators were: *Pantala flavescens*, *Orthemis ferruginea*, *Leptemis vesiculosa*, *Erythrodiplax umbrata*, *Tamea calverti*, *Anax amazilli*; *Ischnura ramburi*, *Enallagma novaehispaniae*, *Ceratura capreola* (Odonata); *Belostoma annulipes*, *B. minor*, *Ranata fabricii*, *Buenoa platycnemis* (Heteroptera), *Tropisternus lateralis*, *T. proximus*, *Hy-*

drophilus sp., *Thermonectes circumscripta* (Coleoptera)." (Authors)] Address: not stated

**7913.** Nel, A.; Martinez-Declòs, F.; Papier, F.; Oudard, J. (1997): New Tertiary fossil Odonata from France (Sieblosiidae, Lestidae, Coenagrionidae, Megapodagrionidae, Libellulidae). *Deut. entomol. Zeitschrift* 44(2): 231-258. (in English, with German summary) ["*Thanetophilosina menatensis* gen. n., sp. n. (Zygoptera: Megapodagrionidae) is described from the Palaeocene of France. Two new species of *Stenolestes* (Zygoptera: Sieblosiidae) and a new specimen of *Stenolestes fischeri* Nel, 1986 are described from the Oligocene of France. Three unnamed new Coenagrionidae, a lestid, *Lesstes brisaci* sp. n., and a libellulid, *Caussanelia papaziani* gen. n., sp. n. are described from the Upper Oligocene of south-east France. An unnamed new species of Coenagrionidae is described from the Upper Miocene of central France. These new taxa increase our knowledge of the palaeodiversity of odonatan faunas in the Tertiary of western Europe." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**7914.** Plaistow, S.J. (1997): Variation in non-territorial behaviour in male *Calopteryx splendens xanthostoma* (Charpentier) (Zygoptera: Calopterygidae). *Odonatologica* 26(2): 171-181. (in English) ["Male calopterygid damselflies commonly demonstrate 2 alternative mate-securing tactics, occurring as either territorial or non-territorial individuals. Previous studies have assumed that non-territorial males constitute one category. This study describes variation in non-territorial behaviour which is dependent upon whether or not the non-territorial male had been displaced from a territory. Consequently, non-territorial males are classified as pre-territorial or post-territorial. Pre-territorial males are agonistic towards conspecific territorial males and fight to obtain territories. Post-territorial males rarely fight; instead they wait for territories to become vacant." (Author)] Address: Plaistow, S.J., School Biol. Sciences, University of Liverpool, Liverpool P.O. Box 147, Liverpool, L69 3BX, UK

**7915.** Salamun, A.; Bedjanic, M. (1997): Dragonflies (Odonata) from Slovenia and Croatia in the Collection "Finzi" of the Natural History Museum Trieste. *Exuviae* 4(1): 4-10. (in Slovenian, with English summary) ["A list of 27 dragonfly species from the collection of odonatologist and myrmecologist Bruno Finzi is given. *Sympetrum depressiusculum* (Sel.) is new for the territory of Istria, north-western Croatia." (Authors)] Address: Bedjanic, M., Kolodvorska 21b, SI-2310 Slovenska Bistrica, Slovenia. E-mail: [matjazbedjanic@yahoo.com](mailto:matjazbedjanic@yahoo.com)

**7916.** Schutte, G.; Reich, M.; Plachter, H. (1997): Mobility of the rheobiont damselfly *Calopteryx splendens* (Harris) in fragmented habitats (Zygoptera: Calopterygidae). *Odonatologica* 26(3): 317-327. ["*C. splendens* is common along slow-flowing streams and rivers in central Europe. This species is well-suited for studies on the population structure and mobility of semi-aquatic rheobiont organisms. In this study the authors investigated a local population over a 2 km stretch of river in central Germany, by habitat analysis and mark-recapture-experiments. Emergent aquatic vegetation only influences density if the coverage is lower than 10%. Adult damselflies mainly use vegetation along the banks. Unused, moderately eutrophicated stands of herbaceous vegetation without trees and shrubs are preferred. In-

solation in the morning is the primary factor for the selection of the males' territories and thus determines the pattern of density. The investigated population turns out to be much bigger than expected. 2649 individuals have been marked individually (1543 male, 1106 female). 47% of the males and 29% of the females have been recaptured at least once. Most individuals migrated less than 300 m, which is roughly the home range size, but 23 individuals covered more than 1000 m. Three bridges spanned the investigated stretch of river. None of them caused a complete fragmentation of the habitat, but in the case of a wide but low bridge, more than 70% of the approaching damselflies turned back. However, 13% of all recaptured individuals successfully crossed at least one bridge." (Authors)] Address: Plachter, H., University of Marburg, Fac.Biologie, Nature Conservation Division, D-35037 Marburg, Germany. E-mail: [h-plachter@staff.uni-marburg.de](mailto:h-plachter@staff.uni-marburg.de)

**7917.** Tol, J. van (1997): The genus *Pocordulia* Martin in western Malesia (Odonata, Corduliidae). *Tijdschrift voor Entomologie* 140: 133-146. (in English) ["The species of the genus *Procordulia* occurring in Malaysia, the Philippines and Indonesia, excl. New Guinea, are discussed and a key to the species is provided. *P. papandayanensis* is described from Java, and *P. lompobatang* and *P. rantemario* from SW Sulawesi. These new species all belong to the *P. sambawana* group of species." (Author)] Address: Tol, J. van, National Museum of Natural History, P.O. Box 9517, NL-2300 RA Leiden, The Netherlands

## 1998

**7918.** Lockwood, M. (1998): Primer inventari dels odonats del delta del Llobregat. *Spartina. Butlletí naturalista del delta del Llobregat* 3 (Anys 1997-98): 111-118. (in Catalan, with English summary) ["First inventory of the dragonflies of the Llobregat Delta, NE Spain: Based on observations of dragonflies in the Llobregat Delta, NE Spain, during 1995-1997, a database of information on the distribution and ecology of the area's dragonflies has been assembled. Seventeen species were recorded during this period, three of which (*Hemianax ephippiger*, *Aeshna isosceles*, *A. affinis*) are very scarce in the Iberian Peninsular. The species richness of certain artificial habitats (recently created pools in El Prat Golf Club and Remolar-Filippines marsh) is remarked upon and illustrates the ease with which more quality habitat could be created for dragonflies in the Llobregat Delta." (Author)] Address: Lockwood, M., La Devesa, 3, 1", E-17850 Besalu, Spain. E-mail: [mike@walkingcatalonia.net](mailto:mike@walkingcatalonia.net)

**7919.** Muzón, J.; Ellenrieder, N. von (1998): Estado de conservación de los Odonata en la Argentina.. *Pro-Biota, FCNyM, UNLP, Serie Folletos T04*: 1-3. ISSN 1666-731X.: 6 pp. (in Spanish) [Leaflet with introducing information on conservation matters of the Odonata of Argentina] Address: Ellenrieder, Natalia von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: [natalia.ellenrieder@gmail.com](mailto:natalia.ellenrieder@gmail.com)

**7920.** Spikkeland, I. (1998): Dyreliv i dammer i Askim. *Natur i Østfold* 17(1-2): 13-22. (in Norwegian) [Norway; eleven Odonata taxa are listed, of which *Aeshna cyanea* and *Libellula depressa* are of special regional

interest.] Address: Spikkeland, I., Buer, 1870 Ørje, Norway. E-mail: isp@riff.hiof.no

**7921.** Springer, M. (1998): Genera of aquatic insects from Costa Rica, deposited at the Museo de Zoología, Universidad de Costa Rica. *Rev. Biol. Trop.* 46. Suppl. 6: 137-141. (in English) ["A first checklist of the genera of aquatic insects from Costa Rica is presented. The material has been collected since 1990 throughout the entire country and is deposited at the Museo de Zoología, Universidad de Costa Rica. The collection includes only the aquatic stages from each order and contains a total of 278 genera from 92 families in 11 orders." (Author) Odonata larval stages are represented by 54 genera.] Address: Springer, Monika, Escuela de Biología, Universidad de Costa Rica, 2060 San Jose, Costa Rica. E-mail: mspringe@t:ariari.ucr.ac.cr

## 1999

**7922.** Bae, Y. J.; Yum, J. W.; Cha, J.Y.; Yoon, I. B. (1999): Morphology, habitat, and distributional records of *Nannophya pygmaea* Rambur (Libellulidae, Odonata). *Korean J. Ent.* 29(4): 287-290. (in English) [Male and female adults and the larva of *N. pygmaea* are described from the southwestern part of the Korean peninsula. In addition, information on habitat, ecology, distribution, and conservation status are provided.] Address: Yum, Jin-Whoa, E-mail: lestes93@me.go.kr

**7923.** Hecker, K.R. (1999): Testing for sex biases and morph biases in parasitism of zygopterans (Odonata) by gregarines (Eugregarinidae). M.Sc. thesis, Carleton Univ. Ottawa, Ontario: 72 pp. (in English) ["I studied gregarine parasites of *Enallagma boreale* to elucidate causes and consequences of sex biases in parasitism of adult hosts. I found some evidence that adult females had higher prevalence and intensity of infection than males. Both sexes showed a positive correlation between number of gregarines and longevity under conditions of food stress. This may be because food ingested with the infective cysts is more beneficial than the parasites are harmful. I also studied *Nehalennia irene* damselflies and their gregarine parasites, predicting that female morphs would differ in measures of parasitism, therefore balancing the advantages accrued to one morph at high population densities. I found that female morphs did not differ in measures of parasitism. There was no significant difference in prevalence between the sexes across five separate ponds. although females had more gregarines than males. I found no correlation between the number of gregarines and longevity of hosts.] Address: <http://www.collectionscanada.gc.ca/obj/s4/f2/dsk2/ftp01/MQ48490.pdf>

**7924.** Ivanov, V.D.; Krivokhatsky, V.A. (1999): Insects and spiders of the Leningrad region. *Transactions of the St. Petersburg naturalists society Ser. 6, Vol. 2:* 339-396. (in Russian, with English summary) [15 odonate species are listed. The authors consider only rare or endangered taxa (= redlisted species from Lithuania, Finland, Germany or Norway, and from Karelia). The species list bases on literature data from the 1880s (!).] Address: not stated

**7925.** Pleguezuelos, J.M.; Poveda, J.C.; Monterrubio, R.; Ontiveros, D. (1999): Feeding habits of the common chameleon, *Chamaeleo chamaeleon* (L.,

1758) in the southeastern Iberian Peninsula. *Israel Journal of Zoology* 45(2): 267-276. (in English) ["We present the feeding habits of *C. chamaeleon* at Taramay, a small coastal valley in the southeastern Iberian Peninsula. Fecal pellets collected from sexed and measured specimens trapped in the field were used for diet analysis. 34 fecal samples provided a total of 777 identified prey items. All prey were arthropods and the numerically dominant groups were Diptera, Hymenoptera, Orthoptera, and Heteroptera. We failed to find sexual differences in diet preference, but there was a seasonal shift in the prey consumed. Orthoptera, the largest prey type, was consumed less in spring than summer or autumn. Examination of grasshopper phenology in coastal habitats of the southeastern Iberian Peninsula, and of the change in chameleon habitat utilization and mobility during the mating period, verified that the common chameleon appears to consume grasshoppers in approximate proportion to their abundance. Prey consumed were smaller than in previous studies. We believe the earlier findings may have been biased due to the diet consisting of captive specimens. Most of the prey consumed in the present study were flying insects, perhaps reflecting the arboreal habits of this climbing species; and most prey were also mobile, as has been predicted for sit-and-wait foragers such as the common chameleon." (Authors) Lestidae are very rarely represented in the diet of the chameleon.] Address: Pleguezuelos, J.M., Dept of Animal Biology and Ecology, University of Granada, 18071 Granada, Spain

## 2000

**7926.** Collier, K.J.; Smith, B.J.; Quinn, J.M.; Scarsbrook, M.R.; Halliday, N.J.; Croker, G.F.; Parkyn, S.M. (2000): Biodiversity of stream invertebrate fauna in a Waikato hill-country catchment in relation to land use. *New Zealand Entomologist* 23: 9-22. (in English) [Mangaotama nr Hamilton, New Zealand; "between 1992 and 1999, stream invertebrates were collected from 24 sites surrounded by a mixture of native forest and pasture. *Antipodochlora braueri*, *Austrolestes colenisonis*, and *Xanthocnemis* sp. were collected from pasture and mixed pasture, while no Odonata were recorded from native and mixed native forest." (Author)] Address: Collier, K.J., Natn. Inst. Water & Atmospheric Res., P.O. Box 11-115, Hamilton, New Zealand. E-mail: k.collier@niwa.cri.nz

**7927.** Karube, H. (2000): Additional records of the genus *Petaliaeschna* of northern Vietnam with description of a new species. *Tombo* 42: 23-25. (in English) [*Petaliaeschna tomokunii* sp. nov.; holotype. male, Mt Piaoac, Cao Hang Province, Northern Vietnam. 17-V-1998, leg. M. Tomokuni. The holotype is deposited in the collection of the National Science Museum, Tokyo. The new species looks related to *P. flavipes* Karube recorded from same locality, but is easily distinguished by the longer pterostigma and the shape of the superior appendage (pointed apex). This latter character reflects a relationship to *P. fletcheri* from India.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**7928.** Last, L.L.; Whitman, R.L. (2000): Aquatic macroinvertebrates of the Grand Calumet river. *Proceedings of the Indiana Academy of Science* 108 / 109



(1999/2000): 45-81. (in English) ["The Grand Calumet River is potential habitat for a rich community of aquatic macroinvertebrates. Historical surveys of these organisms have been limited to post-industrialization of the Calumet Region; but because river habitats and conditions prior to industrialization have been described, past macroinvertebrate community composition can be inferred. In the past 20 years, several surveys have been conducted in the Grand Calumet that have focused on a limited area, but when these studies are amassed the information available covers much of the river. In this paper, the aquatic macroinvertebrate communities in the river are described, and options for restoration are discussed. Many of the macroinvertebrates present are indicators of high levels of pollution, but a few pollution-sensitive species have been found. There is evidence, however, that the sediment quality has improved since the 1960's, likely due to pollution controls that have been put into place. Restoration opportunities should consider the macroinvertebrate community and the potential to improve sediment habitat without damaging the community structure." (Authors) Odonata are treated at the genus level.] Address: Last, L.L., U.S. Geological Survey, Biological Resources Division, Lake Michigan Ecological Research Station, 1100 North Mineral Springs Road, Porter, Indiana 46304 USA

**7929.** Strayer, D.L.; Smith, L.C. (2000): Macroinvertebrates of a rocky shore in the freshwater tidal Hudson River. *Estuaries* 23(3): 359-366. (in English) ["We studied the macroinvertebrate fauna of a rocky shore in the freshwater tidal Hudson River during 1992-1994, the early years of the zebra mussel (*Dreissena polymorpha*) invasion. The macroinvertebrate community was numerically dominated by chironomids, nematodes, oligochaetes, gastropods, zebra mussels, and planarian flatworms. The community was a mixture of species typical of stony warm water rivers and lake shore, freshwater generalists and semiterrestrial species. Overall macroinvertebrate densities were moderate to low (2,800-14,600 m<sup>2</sup>). Density was a strong function of season and elevation with consistently low densities in the early spring and in the intertidal zone. This pattern suggests that physical harshness (alternating submergence and desiccation; ice and low temperatures) limits the distribution of invertebrates at this site. [...] A weak correlation between the densities of zebra mussels and those of other macroinvertebrates nonetheless suggests that the zebra mussel invasion may have affected community structure." (Authors) Mean density of Odonata: 2 specimens / m<sup>2</sup>.] Address: Strayer, D.L., Inst. Ecosystem Studies, Box AB, Millbrook, New York 12545, USA

## 2001

**7930.** Czeżuga, B.; Godlewska, A. (2001): Aquatic insects as vectors of aquatic zoosporic fungi parasitic on fishes. *Acta Ichthyologica & Piscatoria* 31(2): 87-104. (in English, with Polish summary) [32 species of aquatic insects in 6 water bodies of various trophic state in Poland were surveyed for aquatic zoosporic fungi. 46 different species of aquatic zoosporic fungi parasitic on fishes were recorded on *Erythromma najas* (n = 26 fungi), *Anax imperator* (n = 12) and *Aeshna grandis* (n = 32).] Address: Czeżuga, B., Dept Gen. Biol., Medical Univ., Białystok, Kilińskiego 1, 15-230 Białystok, Poland

**7931.** Edokpayi, C.A.; Osimen, E.C. (2001): Hydrobiological studies on Ibiekuma River at Ekpoma, southern

Nigeria, after impoundment: the faunal characteristics. *African Journal of Science and Technology (AJST) Science and Engineering Series* 2(1): 72-81. (in English) ["A study of a 3 Km stretch of a perennial rainforest stream in southern Nigeria describes the macrobenthic faunal characteristics of pools (dam site stations) and runs. A total of 84 invertebrate taxa made up of 2,535 individuals were recorded. The overall faunal abundance was not significantly different at the study stretch. The abundance of the major taxonomic groups was however significantly different (P < 0.05) at the study stations. Hemiptera and Diptera were the most abundant invertebrate groups recorded. The high number of benthic invertebrates observed is a reflection of the physical and chemical stability of the study stream." (Authors) The study includes records of "Petaluridae" at several stations.] Address: Edokpayi, C.A., Department of Zoology, Marine Biology and Fisheries, University of Lagos, Akoka, Lagos, Nigeria

**7932.** Harp, G.L.; Trial, L. (2001): Distribution and Status of *Ophiogomphus westfalli* (Odonata Gomphidae) in Missouri and Arkansas. *Journal of the Arkansas Academy of Science* 55: 43-50. (in English) ["*O. westfalli* is endemic to the Interior Highlands (Ozark Plateaus and Ouachita Mountains), in Missouri, Arkansas and southeastern Kansas. First described in 1985, its life history is still little known. Prior to 1997, this species was known from only six sites in Missouri and 10 in Arkansas. From late May through late July in both 1999 and 2000 we surveyed 49 sites, three of them twice each, on Missouri Ozark streams in order to further clarify the distribution and relative abundance of this dragonfly. Adults, nymphs and/or exuviae were found at 23 sites. Literature and museum searches bring to 72 locations in Missouri and 10 in Arkansas where this species has been found. Small to moderate-sized populations, restricted to the Interior Highlands, are known from at least 82 locations. Therefore, it is recommended that its global and Missouri rankings be changed from G2 and S2 to G3 and S3, respectively. Distribution and abundance of this species needs further study in Arkansas." (Authors)] Address: Harp, G.L., Department of Biological Sciences, Arkansas State University, State University, AR72467, Fish & Wildlife Res. Center, Missouri Dept. of Conservation, 1110 South College Ave., Columbia, MO 65201, USA

**7933.** Illinois Department of Natural Resources (2001): Vermilion River (Illinois River Basin) Area Assessment. Volume 3. Living resources. Authority of the State of Illinois: X, 166 pp. (in English) [The checklist of Odonata is compiled in table 18. The full version of the study is available at: <http://www.ideals.uiuc.edu/bitstream/handle/2142/13890/vermillionirb3.pdf?sequence=4>] Address: Illinois Department of Natural Resources, Office of Scientific Research and Analysis, Natural History Survey Division, 607 East Peabody Drive, Champaign, Illinois 61820, USA

**7934.** Vercauteren, T.; Martin, P.; Goddeeris, B.; (2001): *Vejdovskyaella comata* (Vejdovski, 1883) (Oligochaeta: Naididae) in een vijver van het Raadsherenpark te Vosselaar: eerste melding van deze gelede worm in België. *Antwerpse Koepel voor Natuurstudie - Jarboek* 2001: 83-88. (in Dutch, with English and French summaries) [The study also includes record odonate larvae of *Lestes sponsa*, *L. viridis*, *Cordulia aenea*, *Sympetrum* spp., and *Anax imperator*.] Address: Vercauteren, T.,

## 2002

**7935.** Bambaradeniya, C.N.B.; Ekanayake, S.P.; Kekulandala, L.D.C.B.; Samarawickrama, V.A.P.; Ratnayake, N.D.; Fernando, R.H.S.S. (2002): An assessment of the status of biodiversity in the Muthurajawela Wetland Sanctuary. Occ. Pap. IUCN, Sri Lanka 3. ISBN: 955-8177-17-2: IV, 48 pp. (in English) [Odonata consist "of 22 species (in 4 families), representing approximately 19 % of the total odonate species in Sri Lanka (App. 10). Among them, only one is endemic, while 2 are nationally threatened. Among the odonate species, 36% were common. *Rhyothemis variegata* and *Agriocnemis pygmaea* were abundant. Interestingly, the former was more common in degraded/disturbed habitats. The survey clearly highlighted that odonates could be used as indicators of habitat quality in wetland ecosystems." (Authors)] Address: IUCN - Sri Lanka, No. 53, Horton Place, Colombo 7, Sri Lanka.

**7936.** Garcés, H.A. (2002): Fauna acuática asociada al Río San Félix, provincia de Chiriquí, República de Panamá. *Tecnociencia* 4(2): 73-86. (in Spanish) [Panama; Odonata are treated at the order level.] Address: Garcés, H., Universidad de Panamá, Facultad de Ciencias Naturales, Exactas y Tecnología. Centro de Ciencias del Mar y Limnología (CCML). Departamento de Biología Marina y Limnología, Panama. E-mail: hgarcés@ancon.up.ac.pa

**7937.** Jueg, U.; Grosser, C. (2002): Erste Fachtagung "Europäische Hirudinea" in Karnin (Landkreis Parchim, Mecklenburg-Vorpommern) vom 30.08. bis 02.09.2001. *Lauterbornia* 44: 37-44. (in German, with English summary) ["10 participants concerned with leeches or interested in at least attended the first workshop on European Hirudinea. They came from Poland, Germany and Slovenia. After exchange of experience by papers and statements a study trip to waters near Schwerin, Germany yielded remarkable faunistic results." (Authors) The list of taxa also includes *Cordulia aenea*.] Address: Jueg, U., Schweriner Allee 16, D-19288 Ludwigslust, Germany. E-mail: uweueg(@t-online.de

**7938.** Kadoorie Farm and Botanic Garden (2002): Report of Rapid Biodiversity Assessments at Tongtieling Forest Area and Xinglong Tropical Botanic Garden, Southeast Hainan, China, 22-23 May 1999, ii.. South China Forest Biodiversity Survey Report Series (Online Simplified Version): No. 22. KFBG, Hong Kong SAR: II + 18 pp-["17 species were recorded at Tongtieling, and ten at Xinglong Tropical Botanic Garden. The most frequently encountered species at Tongtieling was *Drepanosticta zhoui*, which was first recorded from Shangxi on the same survey trip. *Burmargiolestes xinglongensis* is a species new to science. It has been described from a single specimen by Wilson K.D.P. & Reels (2001), and named after the locality. The record of *Pseudoagrion australasiae* is the first from China. The records of *Macromia berlandi*, *M. katae*, *M. moorei malayana* and *M. rapida* are the first from Hainan. [...] Some species at Tongtieling are of particular conservation significance: – *Burmargiolestes xinglongensis* is known only from

Tongtieling; – *Euphaea ornata*, *Pseudolestes mirabilis*, *Coeliccia scutellum hainanense*, *Drepanosticta zhoui* are known only from Hainan; – *M. katae* and *Zygonyx iris insignis* are known only from Hainan and Hong Kong; – *M. calliope* is known only from Hainan and Vietnam; – *M. rapida* is known only from Hainan, Hong Kong and Guangdong; – *Paragomphus pardalinus* is known only from Hainan, Guangxi and Guangdong; – *M. berlandi* is known only from Hainan, Guangxi, Hong Kong and Vietnam. At Xinglong Botanic Garden the species present were more associated with lentic habitats such as ponds." (Authors; K.D.P. Wilson)] Address: Kadoorie Farm and Botanic Garden Corporation, Lam Kam Road, Tai Po, N.T., Hong Kong SAR

**7939.** Kadoorie Farm and Botanic Garden (2002): Report of Rapid Biodiversity Assessments at Fusui Rare Animal Nature Reserve, Southwest Guangxi, China, 1998 and 2001. South China Forest Biodiversity Survey Report Series (Online Simplified Version): No. 12. KFBG, Hong Kong SAR: II + 12pp. (in English) ["24 dragonfly species were recorded (Table 5: Dragonfly species at Fusui, 28 May 1998). Most are typical of lentic habitats. Notable finds included *Indocypha* sp. and *Dysphaea* sp., which have yet to be identified: *Indocypha* sp. (pending identification), *Libellago lineata lineata*, *Ceragrion auranticum*, *Pseudagrion pruinosum*, *P. spencei*, *P. rubriceps*, *Dysphaea* sp. (pending identification), *Copera marginipes*, *Prodasineura autumnalis*, *Anax guttatus*, *Epophthalmia elegans*, *Ictinogomphus pertinax*, *Sinictinogomphus clavatus*, *Brachydiplax farinosa*, *Orthetrum pruinosum*, *O. sabina sabina*, *Acisoma p. panorpoides*, *Brachythemis contaminata*, *Crocothemis servilia*, *Neurothemis fulvia*, *Trithemis aurora*, *Pantala flavescens*, *Tholymis tillarga*, *Zygonyx iris insignis*." (Authors; K.D.P. Wilson)] Address: Kadoorie Farm and Botanic Garden Corporation, Lam Kam Road, Tai Po, N.T., Hong Kong SAR

**7940.** Kadoorie Farm and Botanic Garden (2002): Report of Rapid Biodiversity Assessments at Nonggang National Nature Reserve, Southwest Guangxi, China, 19 to 27 May 1998. South China Forest Biodiversity Survey Report Series (Online Simplified Version): No. 10. KFBG, Hong Kong SAR: II + 34pp. (in English) ["Sixty-two species of dragonfly were recorded over the course of the study period, of which 40 were found in the Nonggang section, 33 at Longhu and 19 at Longshan [...]. Most of these are new records for the reserve. A new species of *Coeliccia* (Zygoptera: Platycnemididae) was discovered. *Orolestes selysi* is a new record for mainland China, but is also known from Hainan, Taiwan, India, Laos and Vietnam. *Dysphea basitincta* is a new record for mainland China. It is also known from Hainan and was described from Vietnam. *Euphaea superba* is a new record for China. It too was described from Vietnam. [...] Despite the lack of surface streams in the porous limestone hills of Nonggang and Longhu sections, the dragonfly fauna was very rich, and included a number of rare species. Several species were good forest indicators, including *Dysphaea* sp., *Polycanthagyna erythromelas*, and many gomphid species. At Longshan the odonates encountered were, with the exception of *Libellago lineata*, *Pseudagrion rubriceps*, *Coeliccia* sp., *Stylurus* sp. B and *Tetrathemis platyptera*, largely typical of lentic habitats." (Authors; K.D.P. Wilson)] Address: Kadoorie Farm and Botanic Garden Corporation, Lam Kam Road, Tai Po, N.T., Hong Kong SAR

**7941.** Kadoorie Farm and Botanic Garden (2002): Report of a Rapid Biodiversity Assessment at Xidamingshan Headwater Forest Nature Reserve, Southwest Guangxi, China, 15-17 October 1998. South China Forest Biodiversity Survey Report Series (Online Simplified Version) 20. KFBG, Hong Kong SAR: II + 16 pp. (in English) ["A total of 15 dragonfly species were recorded in the Xidamingshan area over the period 15-17 October. All but one of these were recorded at Lizhi on the first day. The odonate fauna was generally typical of mixed habitats, and no restricted or forest-specialist species were recorded." (Authors; K.D.P. Wilson)] Address: Kadoorie Farm and Botanic Garden Corporation, Lam Kam Road, Tai Po, N.T., Hong Kong SAR

**7942.** MacRury, N.K.; Graeb, B.D.S.; Johnson, B.M.; Clements, W.H. (2002): Comparison of dietary mercury exposure in two sympatric top predator fishes, largemouth bass and northern pike: a bioenergetics modeling approach. *Journal of Aquatic Ecosystem Stress and Recovery* 9: 137-147. (in English) ["Physical and ecological factors, including lake temperature, fish physiology, and diet, influence methylmercury (MeHg) exposure in fish. We employed bioenergetics modeling to compare dietary MeHg exposure in sympatric top predators, largemouth bass (*Micropterus salmoides*) and northern pike (*Esox lucius*). We compared simulations using field data to hypothetical simulations with (1)  $\pm$  25% change in mean daily lake temperature for juvenile and adult bass and pike; (2)  $\pm$  25% change in long-term growth rate of pike; (3) adult bass diet shift from generalist predator to strict piscivore. Bass and pike MeHg exposures were similar in baseline simulations and reflected patterns in field tissue concentrations. This occurred despite the fact that bass consumed highly contaminated benthic invertebrates (including Odonata), while pike exclusively consumed less contaminated fish prey. Higher temperatures increased adult bass and pike MeHg exposures by 35% and 27%, respectively. Shifting adult bass diets to 100% fish resulted in a 54% decrease in exposure, while increasing pike growth rates resulted in a 24% decrease. Bioenergetics modeling proved useful in understanding the influence of temperature, prey-base, and predator growth on differences in Hg exposure across fish species." (Authors)] Address: MacRury, Nicole, Dept of Fishery and Wildlife Biology, Colorado State University, Fort Collins, CO 80523, USA. E-mail: nicolem@cnr.colostate.edu

**7943.** Ruchin, A.B.; Ryzhov, M.K. (2002): On the diet of the Marsh Frog (*Rana ridibunda*) in the Sura and Moksha watershed, Mordovia. *Advances in Amphibian Research in the Former Soviet Union* 7: 197-205. (in English, with Russian summary) [Russia; based on material collected in 2001 – 2002, the diet of *R. ridibunda* included 200 different taxa. Odonata contribute with 1,4% of prey items to the diet of *R. ridibunda* including the following taxa: Calopterygidae im., *Calopteryx virgo* L. im., *Lestes dryas* im., *Aeshna* sp. l., *Gomphus* sp. l., *Libellula* sp. l., and *Anax* sp. larvae.] Address: Ruchin, A.B., Department of Biology, Mordovian State University, Bolshevitskaya Ul., Saransk 430000 Russia

**7944.** Stich, M.; Stich, F.; Holzinger, W.E.; Wieser, C. (2002): Zwei bemerkenswerte Libellenfunde in den Karawanken (Insecta: Odonata). *Carinthia* II 192/112: 511-516. (in German, with English summary) [*Austria*; *Somatochlora arctica* was recorded for the first time from Carinthia in the area of Bodental on 22.6.2000, S.

*meridionalis* was photographed at the Singerberg near Ferlach on 27.6.2000, a second record for the country.] Address: Stich, Margit & Friedrich, Griesgasse 62, A-9170 Ferlach, Austria

**7945.** Suda, S. (2002): Dragonflies of the Institute for Nature Study, Tokyo. *Miscellaneous reports of the National Park for Nature Study* 34: 107-130. (in Japanese, with English summary) [Between July 1998 to November 2000, and in July 2001, 28 odonate species were recorded in the Institute for Nature Study, Tokyo. The species are listed and briefly discussed. *Anaciaeschna martini* is a new addition to the list of 49 species recorded at this locality between 1949-2001.] Address: Suda, S., Graduate School of Agricultural and Life Sciences, The University of Tokyo, Japan

**7946.** Yokoi, N. (2002): Description of new *Boyeria* species from central Laos (Anisoptera: Aeshnidae). *Tombo* 45(1/4): 12-14. (in English) ["A new *Boyeria* species (captured at last instar larvae and reared in room until emergence) is described from central Laos and compared with *B. sinensis* from China and *B. madachlani* from Japan. The new sp. *Boyeria karubei* differed from the Japanese species in colour of head and antealar carina, and differed from the Chinese species in a pair of distinct yellow stripes in front of pterothorax, and subbasal ventral tubercle and sharply pointed apex in superior appendages. The genus *Boyeria* is recorded for the first time from South-East Asia." (Author)] Address: Yokoi, N., 2-37-11 Kaisei, Koriyama. Fukushima, 963-8851 Japan

**7947.** Yutaka, Y.; Bunzaemon, S.; Norio, S. (2002): Adult eclosion of *Sympetrum* (red dragonfly) and paddy rice cultivation method in paddy field. *Tohoku Nogyo Kenkyu Seika Joho* 16: 57-58. (in Japanese) ["Influence of difference in cultivation methods of paddy rice on the aquatic organisms was investigated. Cultivation sectors by non chemical fertilizers, reduced pesticides, combination of these two, organic cultivation, and traditional practice (medium dry and full-time flooding) were set up, and number of adult-eclosion individuals of *Sympetrum* was counted at the respective sector. The number was found remarkably high in the full-time flooding sector compared with that in the medium dry sector. The number did not show much difference between sectors with and without chemical fertilizers. The adult eclosion number was found higher both in organic cultivation sector and reduced pesticide sector than that for the traditional practice sector." (Authors)] Address: unknown

## 2003

**7948.** Arimoro, F.O. (2003): Guides to the Freshwater Invertebrates of Southern Africa. Volume 7: Insecta I. Ephemeroptera, Odonata and Plecoptera. I.J. de Moor, J.A. Day and F.C. de Moor (editors). Water Research Commission, Pretoria, South Africa. WRC Report No. TT 207/03. ISBN 978-1-77005-017-4: 288 pp. (in English) [not available for abstracting.] Address: Obtainable from the Water Research Commission, Private Bag X03, Gezina, Pretoria 0031, South Africa, or orders @wrc.org.za

**7949.** Boano, G.; Rolando, A. (2003): Aggressive interactions and demographic parameters in *Libellula*



fulva (Odonata, Libellulidae). Italian Journal of Zoology 70(2): 159-166. (in English) ["Male aggressive interactions and demographic parameters (sex ratio, survival, abundance and life span) of *L. fulva* were studied for four years at a marsh in northwestern Italy by monitoring marked individuals. Perching males attacked every dragonfly passing near the perch. However, the mean homospecific attack distance was significantly longer than the heterospecific one and this suggests that males were able to discriminate among species, at least partially. In some instances, aggressive males succeeded in catching and copulating with females. Release-recapture analyses indicate that the sex ratio was very biased towards males, even though male and female capture probabilities were equal. Females had a slightly greater mortality rate than males, but this difference in adult survival is not sufficient to explain why adult females were rather rare at our study site. Life span estimates are in keeping with field observations, indicating that most males stayed alive for less than 10 days. All these results suggest a connection between interactions and demographic parameters. Male aggressive behaviour can in fact be viewed as an adaptation to a sexual environment here the time for reproduction is very short and the probability of meeting a partner is very low. Aggressions may in fact enhance males' probabilities to catch (and copulate with) females which are flying through the site. Weather conditions influenced males' behaviour, attack distance being significantly and positively related with light intensity. Vice-versa, weather conditions did not influence survival, maybe because of mild temperatures and scanty rain. The aggressive behaviour of *L. fulva* males might be classed as territoriality. However, the classical "defence of resource approach" seems to be scarcely appropriate here, since no resource located inside the hypothetical territory was defended, at least at the perch site." (Authors)] Address: Boano, G., Museo Civico di Storia Naturale, Via San Francesco di Sales 188, I-10022 Carmagnola, Torino, Italy. E-mail: gboano@tiscali.it

**7950.** Cano, F.J. (2003): Una rara libélula amenaza da peligra al excluirse de Natura 2000 una cuenca malagueña. Quercus 212: 53. (in Spanish) [Brief report on a record of a population of *Oxygastra curtisii* along the river Alaminos at the confluent with the river Fuen-girola in the southern part of the province of Málaga, Spain.] Address: Cano Villegas, F.J., C/Montemayor, 4 1º-2; 14003-Córdoba, Spain. E-mail: fjcanovi2@hotmail.com

**7951.** Catling, P.M. (2003): Dragonflies (Odonata) of the Northwest Territories, Status ranking and preliminary atlas. University of Ottawa: 49 pp. (in English) ["Thirty-five species of Odonata are given status ranks in the Northwest Territories based on number of occurrences and distributional area within the territory. Nine species are ranked as S2, may be at risk, including *Aeshna subarctica*, *Lestes congener*, *Nehalennia irene*, *Ophiogomphus colubrinus*, *Somatochlora albicincta*, *S. forcipata*, *S. franklini*, *S. sahlbergii* and *S. septentrionalis*. Many of these are widespread and on the edge of their range in the Northwest Territories. The most restricted species overall in North America is the Palearctic - East Beringian *S. sahlbergii*. *O. colubrinus* appears rare and local in the western part of its range. Nineteen species are ranked as S3, sensitive and 7 are ranked as S4, secure. The ranking is based on a database of 1040 records each defined as unique combination of

date, location and collector. Rejected taxa and possible additions are outlined. Regions requiring further survey are noted. Information on collecting and inventory is provided. Distribution maps for the species in the Northwest Territories are included." (Author)] Address: <http://www.enr.gov.nt.ca/live/documents/documentManagerUpload/AtlasDragonflies.pdf>

**7952.** Corbet, P.S. (2003): Leiden, June 2002. Agrion 7(1): 3-4. (in English) [Report on a regional meeting of the Worldwide Dragonfly Association in June 2002 in the Netherlands]

**7953.** Crampton, W.G.R.; Lovejoy, N.R.; Albert, J.S. (2003): *Gymnotus ucumara*: a new species of Neotropical electric fish from the Peruvian Amazon (Ostariophysi: Gymnotidae), with notes on ecology and electric organ discharges. Zootaxa 277: 1-18. (in English) [*Gymnotus ucumara* n.sp. is described from floodplain habitats in the Rio Ucayali Basin, Peru. Stomach content analysis shows that Odonata play a significant role (app. one third of food items) of this fish.] Address: Crampton, W.G.R., Florida Museum of Natural History, University of Florida, Gainesville, FL, 32611-7800, USA. E-mail: willc@flmnh.ufl.edu

**7954.** Filho, D.Z.; Cunha Ribeiro, A.; Cunha Ribeiro, G.; Aguiar Fracasso, M.P.; Monetti Pavani, M.; Müller Patrao Oliveira, O.; Adriano de Oliveira, S.; Marques, A.C. (2003): Faunistic survey of sandstone caves from Altinópolis region, Sao Paulo state Brazil. Papéis Avulsos de Zoologia: 93-99. (in English, with Portuguese summary) ["The fauna of eight sandstone caves of the region of Altinópolis, (Serra Geral Arenitic Speleological province, São Paulo State, Southeastern Brazil) was surveyed. Our results improve the previous faunistic knowledge of the region, recording 15 new occurrences for Brazilian caves and 26 for Brazilian sandstone caves. The fauna is characterized by a large number of detritivores/omnivores such as crickets and cockroaches, and several predators like spiders and heteropterans in bat guano." (Authors) One specimen of a Libellulidae was found in the Duas Bocas cave.] Address: Marques, A.C., Depto de Zoologia, Instituto de Biociências, Univ. de São Paulo, Caixa Postal 11461, 05422-970, São Paulo, Brasil. E-mail: marques@ib.usp.br.

**7955.** Hämäläinen, M. (2003): *Platycnemis phasmovolans* sp. nov., an extraordinary damselfly from Laos with notes on its East Asian congeners (Odonata: Platycnemididae). Tombo 46: 1-7. (in English) [*Platycnemis phasmovolans* sp. n. from Lak Sao area in central Laos is described and illustrated in both sexes. The new species is characterized by possessing the most highly expanded tibiae so far known in Odonata. Its habitat is briefly described. The other species found from the same stream include *Philoganga vetusta* Ris, 1912 and *Zygonyx takasago* Asahina, 1966, both of which are recorded from Laos for the first time. The forgotten Japanese taxon *Platycnemis bilineata* Barteneff, 1910 from Matsuyama, Shikoku, is synonymized with *Copera annulata* (Selys, 1863). Preliminary taxonomic notes on other East Asian taxa described as *Platycnemis* species are provided.] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**7956.** Hansen, H. (2003): Food habits of the North American River Otter (*Lontra canadensis*). Graduate Program, Department of Zoology and Physiology, Uni-

iversity of Wyoming: 7 pp. (in English) ["Aquatic invertebrates have been found to comprise a significant portion of the river otters' diet. Reid et al. (1994) found that otters ate more aquatic invertebrates in the summer as the insect populations increased and certain life stages became vulnerable. Most aquatic invertebrates consumed are dragonfly and stonefly nymphs and adult beetles) (Berg 1999, Reid et al. 1994)." (Author)] <http://www.amigosbravos.org/docs/projects/riverotter/030700-foodhabits.pdf>

**7957.** Karube, H. (2003): Description of a new species of the genus *Cephalaeschna* (Anisoptera: Aeshnidae) from northern Vietnam. *Tombo* 46: 9-12. (in English) [The genus *Cephalaeschna* is recorded from northern Vietnam for the first time. *Cephalaeschna aritai* n.sp. - related to *C. needhami* Asahina, 1981 from Jiangxi, SE China - is described. Distribution. Sapa, N Vietnam. Type-specimens. Holotype: male; Sapa (alt. 1500-2000 m), Lao Cai Province, northern Vietnam, 2002, native collector leg. Paratypes, 2 females, same date as holotype. The holotype is deposited in the collection of the Kanagawa Prefectural Museum of Natural History, Japan.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: [paruki@nh-kanagawa-museum.jp](mailto:paruki@nh-kanagawa-museum.jp)

**7958.** Mkize, N. (2003): A contribution to cabbage pest management by subsistence and small-scale farmers in the Eastern Cape, South Africa. Submitted in fulfilment of the requirements for the Degree of Master of Science in Entomology, Rhodes University: X, 108 pp. (in English) ["The interaction between farmers, agricultural scientists and extension workers is sometimes overlooked in agricultural entomology. In an attempt to respond to this reality this study examines some foundation of this interaction in relation to the pest management practices of subsistence and small-scale farmers and also highlights the problems that might arise in the implementation of IPM. Problems involving pests occurrence; language barriers; beliefs, knowledge and perception about insects, and visual literacy are examined. The thesis has a two-fold focus, firstly the study of pests on cabbages of subsistence farmers in Grahamstown and secondly a broader focus on other aspects such as cultural entomology, perception of insects and visual literacy specifically in relation to Xhosa speaking people in the Eastern Cape." (Author) Names of Odonata (general, Zygoptera, Anisoptera) in isiXhosa language are listed in tables 2 and 3.] Address: <http://eprints.ru.ac.za/752/1/Mkize-MSc.pdf>

**7959.** Nekaris, K.A.I. ; Rasmussen, D.T. (2003): Diet and feeding behaviour of Mysore Slender Lorises. *International Journal of Primatology* 24(1): 33-46. (in English) ["We studied the feeding ecology of the Mysore slender loris (*Loris lydekkerianus lydekkerianus*) for 10.5 month in a dry scrub forest at Ayyalur Interface Forestry Division, Tamil Nadu, South India. We recorded and analyzed 1240 feeding incidents, which indicate that the lorises were almost exclusively faunivorous, with 96% of all feeding events representing animal prey. Of prey items that could be identified (n = 605), 62.9% were ants and termites. Lorises fed on 9 orders and 17 families of insects, including Odonata, plus spiders, molluscs, and small vertebrates. Lorises infrequently fed on gums and a legume pod. They usually grabbed prey with one hand, while other appendages firmly held the substrate. Many of the identifiable prey

items belong to insect taxa likely to contain toxic chemicals. Consumption of insects inferred to be toxic was accompanied by an elaborate behavioural repertoire of sneezing, slobbering and urine-washing. A high proportion of insects eaten by slender lorises (71%) occurred in patches or aggregations. The utilization of aggregated social insects may have implications for understanding the unusually high degree of gregarious behaviour exhibited by the lorises." (Authors)] Address: Nekaris, K.A.I., Dept of Anthropology, Washington University, One Brookings Drive, St. Louis, Missouri, 63110, USA. E-mail: [titania@nocturnalprimate.org](mailto:titania@nocturnalprimate.org)

**7960.** Park, Y.-I.; Bradshaw, J. (2003): Insect origami: Into the fold. Using the art of paper folding to stimulate an interest in insect diversity and morphology. *American entomologist*, Winter 2003: 210-214. (in English) [The paper presents stunning works of insect origami, including the example of an Aeshnidae.] Address: not stated

**7961.** Prysawitt, K.-P. (2003): Die Zwerglibelle (*Nehalennia speciosa*) im NSG Helstorfer Moor (Region Hannover). *Mitt. AG Zool. Heimatt. Nds.* 9: 25. (in German) [Niedersachsen, Germany; 15-VI-2003, app. 20 specimens of *N. speciosa* were recorded in the high bog of Helstorf.] Address: Prysawitt, K.-P., Lessingstr. 2, 31535 Neustadt a. Rbge, Germany. E-mail: [K-P.Prysawitt@freenet.de](mailto:K-P.Prysawitt@freenet.de)

**7962.** Sanford, M.R.; Keiper, J.B.; Walton, W.E. (2003): The impact of wetland vegetation drying time on abundance of mosquitoes and other invertebrates. *Journal of the American Mosquito Control Association* 19(4): 361-366. (in English) ["Vegetation management for constructed treatment wetlands often involves knocking down emergent vegetation with heavy equipment and inundating the dead vegetation after a period of drying. Such practices create favourable conditions for larval mosquitoes. We studied the relationship between length of the drying period for an emergent macrophyte, *Typha* sp., and the abundance of aquatic invertebrates in replicated 0.18-m<sup>3</sup> wading pools. The mosquito, *Culex tarsalis*, was significantly more abundant in pools containing vegetation aged for 2 wk before inundation compared to pools containing vegetation aged 5 wk, freshly cut vegetation, or without vegetation. Potential larval mosquito food resources (particles between 2 and 61 µm in equivalent spherical diameter) in the 2-wk aging treatment did not differ significantly from the other treatments during the 5-wk experiment. The abundance of other larval culicids, nonculicine Diptera, and potential mosquito predators (i.e., Dytiscidae and Aeshnidae) did not differ significantly among the vegetation aging treatments."] Address: Sanford, Michelle, Department of Entomology, University of California, Riverside, Riverside, CA 92521, USA

**7963.** Schlüpmann, M. (2003): Beitrag zur Flora und Fauna des Erfttales bei Grevenbroich. Teil II: Fauna. *Decheniana* 156: 261-286. (in German, with English summary) [Nordrhein-Westfalen, Germany; 6 odonate taxa are reported. *Calopteryx splendens* is accessed as regionally threatened.] Address: Schlüpmann, M., Hierseier Weg 18, D-58119 Hagen, German. E-mail: [martin-schluempmann@t-online.de](mailto:martin-schluempmann@t-online.de)

**7964.** Teixeira, D.M.; Nacinovic, J.B. (2003): Itens alimentares do colhereiro, *Ajaia ajaja* (Linnaeus, 1758) no Brasil central (Ciconiiformes, Threskiornithidae). *Arqui-*

vos do Museu Nacional, Rio de Janeiro 61(1): 49-54. (in Portuguese, with English summary) [The food of roseate spoonbill, *Ajaia ajaia* in Central Brazil was analyzed dissecting 20 stomachs of adult specimens obtained near the Fontoura Indian Post, Bananal island, State of Tocantins. 14 different food items among fishes (99% of total volume) and aquatic insects (0.4% of total volume). Four of the stomachs also contained larvae of Odonata.] Address: Nacinovic, J.B., Museu Nacional / UFRJ, Depto de Vertebrados. Quinta da Boa Vista, São Cristóvão, 20940-040, Rio de Janeiro, RJ, Brasil

**7965.** Thipaksorn, A. (2003): Diversity, distribution and Wolbachia infection of rice field odonate insects in Thailand. M.Sc. diss., Fac. Graduate Stud., Mahidol Univ., Bangkok. ISBN974-04-3551-3: xiii+115 pp. ["Odonate insects are important predators of rice pests that play a valuable role in the rice ecosystem. Twenty-nine odonate species, 15 zygoptera and 14 anisoptera, were collected from rice fields in 36 provinces around Thailand from 1998 to 2000. Within all rice odonate species, three zygoptera species, *Agriocnemis pygmaea*, *Agriocnemis f. femina* and *Ischnura senegalensis*, had the highest numbers of individuals. Within the anisoptera, the species with the highest number of individuals was *Diplacodes trivialis*. The distributions of 15 coenagrionid and 11 libellulid odonate species were extended with many new provincial records. The distribution and phylogenetic relationships of the reproduction-modifying bacteria called Wolbachia in odonate insects were also studied. Using a PCR-based method and wsp gene primers, four odonate species, *Agriocnemis f. femina*, *Pseudagrion pruinatum* (Zygoptera), *Brachythemis contaminata* and *Neurothemis t. tullia* (Anisoptera) were found to be infected with Wolbachia and the percentage of Wolbachia infection among species of the Order Odonata was 13.79 %. All procedures used for phylogenetic reconstruction (maximum parsimony, maximum likelihood and neighbor-joining methods) place all odonate Wolbachia strains in the Con and Pip subgroups within the B group of Wolbachia strains. The wsp gene sequences of *Agriocnemis f. femina* and *Brachythemis contaminata* were in the Pip subgroup, but Wolbachia sequences from *Neurothemis t. tullia* and *Pseudagrion pruinatum* were grouped together into the Con subgroup of B group Wolbachia strains. The low Wolbachia infection frequencies and identical wsp gene sequences in odonate species that are not closely related suggest that Wolbachia might have recently invaded rice field odonate populations through some means of horizontal transmission. Identical wsp gene sequences were found from all three positive populations of *A. f. femina* collected from different regions of Thailand. This finding supports the hypothesis that Wolbachia-infected damselflies spread into uninfected populations. Further study should be done to investigate the rates at which Wolbachia-infected damselflies could spread into uninfected populations." (Author) "The subjects treated in this well-styled and beautifully produced dissertation were earlier summarized in 3 journal papers, viz. the diversity and distribution in *Malangpo* 18(2001): 171-174, and *Notulae odonatologicae* 6(2003): 20-24; and the Wolbachia infection in *Curr. Microbiol.* 47(2003): 314-318. As to the Thai ricefield Odonata, all species are here described and keyed, their distribution is listed per province (along with the quantitative data), and a map is provided. The distribution and phylogenetic relationships of the reproduction-modifying Wolbachia in *Agriocnemis f. femina*, *Pseud-*

*agrion pruinatum*, *Brachythemis contaminata* & *Neurothemis t. tullia* form the main and most important part of this work. All procedures used for phylogenetic reconstruction (maximum parsimony, maximum likelihood, and neighbour-joining methods) place the odonate Wolbachia strains (wsp gene sequences) in the Pip (*A. femina*, *B. contaminata*) and Con (*P. pruinatum*, *N. tullia*) subgroups within the B group of Wolbachia strains. The low infection frequencies and the identical wsp gene sequences in not closely related spp. suggest that Wolbachia might have recently invaded rice field odonate populations through some means of horizontal transmission." Address: Thipaksorn, A., Biol. Sect., Mahidol Wittayanusom Sch., Salaya, Phutthamonthon, Nakhon Pathom-73170, Thailand

**7966.** Whiteman, H.H.; Sheen, J.P.; Johnson, E.B.; Vandeuken, A.; Cargille, R.; Sacco, T.W. (2003): Heterospecific prey and trophic polyphenism in larval Tiger salamanders. *Copeia*, 2003(1): 56-67. (in English) ["Polyphenisms (environmentally cued polymorphisms) are ubiquitous, yet the specific proximate mechanisms producing alternative morphs are generally not well known. We tested hypotheses for the role of large heterospecific prey in the cannibalistic polyphenism within larval tiger salamanders, *Ambystoma tigrinum nebulosum*, to determine whether heterospecific prey directly or indirectly influence the production of cannibal morphs. Field surveys suggested, and laboratory experiments confirmed, that macroinvertebrate prey induce cannibals via an increase in body size variation within larval salamander populations. Dietary data and laboratory foraging experiments revealed that cannibals preferred conspecifics even when their capture success was greater on macroinvertebrates. Typical morphs, in contrast, consumed only macroinvertebrate and other prey and never successfully cannibalized conspecifics. Our results support the indirect hypothesis that cannibals are induced via increased body size variation within a population of larvae, as a result of differential consumption of large heterospecific prey, and do not rely on consumption of heterospecific prey once they are cannibals. The cannibalistic polyphenism is one example of phenotypic plasticity in which the functional significance and the proximate mechanisms producing the two morphs are becoming clearer, allowing further study of the molecular and physiological basis of the alternative phenotypes." (Authors) Odonata included into this study were larvae of *Coenagrion resolutum* and *Enallagma cyathigerum*.] Address: Whiteman, H.H., Dept Bio. Sci., Murray State University, Murray, Kentucky 42071, USA

## 2004

**7967.** Achmed, S.; Kashif, M.; Nisar, S. (2004): Efficacy of Monomethypo 5G and Chlorpyrifos 40EC against insect pests and their effect on natural enemies in rice eco-system. *Pak. Entomol.* 26(1): 87-94. (in English) ["An experiment for the efficacy of monomethypo 5G @ 7 kg arce-1 against rice leaf folder (*Cnaphalocrocis medinalis*, G.M), rice stem borers (*Tryporyza* spp.) and chlorpyrifos 40 EC @ 1000 ml acre-1 and effect on natural enemies (dragonflies, damselflies and green lacewings) was laid out in Randomized Complete Block Design (RCBD). Three treatments, i.e., monomethypo 5G, chlorpyrifos 40EC and a control were replicated thrice. Results showed that % leaf folder infestation level, pop-



ulation density of naiads and adults of Odonata and adults of green lace wings on Basmati super was not significantly different from that of Basmati-385 ( $P=0.20$ ) for one tail and  $P<0.41$  for two tail t-test. The effect of insecticides was more evident in chlorpyrifos 40EC than in monomehyppo 5G treated plots at 24, 46,72 hr, one week after the application compared to the check plots. It was also found that ~50% reduction in population of natural enemies of naiads and adults of Odonata flies and green lace wings was observed." (Authors)] Address: Nisar, S., College of Agriculture, University of Agriculture, DG Khan, Pakistan

**7968.** Bracken, B.; Lewis, C. (2004): First records and emergence of Variegated Meadowhawk (*Sympetrum corruptum*) in Prescott-Russell County. Ontario Odonata 4: 1-3. (in English) ["On 17-VIII-1997, at a sewage lagoon east of Ottawa, Canada near the town of Embrun (45.2584·N, 75.3313· W), we collected one teneral female *S. corruptum*, and observed a second teneral. This is the second record of the species for the Ottawa valley and the first record for eastern Ontario away from the Great Lakes. The new eastern Ontario record is an extension of 202 km northeast from the nearest known Ontario collection from Sandbanks Provincial Park (Prince Edward County) on Lake Ontario. The observation of these tenerals, incapable of flight, is also of interest in indicating emergence at the site." (Authors)] Address: Lewis, Christina Lewis, 22-246 Harcourt Ave. Ottawa, ON K2B 5C3, Canada. E-mail: ha-genius@primus.ca

**7969.** Bree, D. (2004): Additional records of Arrowhead Spiketail (*Cordulegaster obliqua*) in Ontario. Ontario Odonata 4: 6-8. (in English) ["*C. obliqua* is reported from two locations in eastcentral Ontario, Canada which are first county records for Peterborough and Frontenac. The nine previous records from Ontario are outlined. Information on the small stream habitats at the two new locations and on ovipositing behaviour is provided. Possible reasons for the rarity of this species in Ontario are discussed." (Author)] Address: Bree, D., Box 123, Bloomfield, Ontario KOK 1G0, Canada

**7970.** Cating, P.M. (2004): The Austral Spreadwing, *Lestes australis*, in Ontario. Ontario Odonata 4: 18-22. (in English) ["Documentation for the occurrence of *L. australis* in Ontario, Canada is discussed. No fully reliable Ontario records are known. The literature reports are problematic because they are based on females which cannot be identified with certainty. Other reports lack supporting evidence or the voucher lacks some characteristic features. More study of this species in Ontario is needed. Identification is discussed." (Author)] Address: Cating, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**7971.** Cating, P.M. (2004): Rapid recovery of Odonata populations at a completely dried up pond. Ontario Odonata 4: 15-17. (in English) ["In 2001, a shallow gravel pit pond completely dried up to a dusty sun-baked expanse and remained completely dry for three months. Water returned in 2002 and 14 species of adult Odonata, and over 100 individuals as well as 3 species of nymphs were observed. The uncommon *Enallagma aspersum* was present and *Lestes forcipatus* and *L. unguiculatus* were ovipositing at the pond. Periodically dry ponds are an important habitat for Odonata. To a degree their periodic drying out can be viewed as a ne-

cessary and natural process." (Author)] Address: Cating, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**7972.** Cating, P.M. (2004): Ontario Odonata records through the years. Ontario Odonata 4: 23-27. (in English) ["Records from the Ontario Odonata Database and those published in Ontario Odonata as part of the annual Ontario Odonata summary are mapped. For mapping purposes, the records were divided into the "Walker Period" with 6,000 records up to and including 1975, the 1976-1998 pre-annual summary period with 10,000 records, and then each year of the annual summary (1999-2001) including a total of almost 16,000 records. A map also features all the 32,000 Ontario records combined. These maps illustrate the tremendous amount of survey work (both historical and contemporary) that has occurred in Ontario, as well as identifying those areas that could most benefit from more detailed surveys in the future. They also demonstrate the effectiveness of a well-coordinated effort to compile and maintain records in a central repository." (Author)] Address: Cating, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**7973.** Cating, P.M. (2004): *Anax junius* overwintering in eastern Ontario. Ontario Odonata 4: 9-10. (in English) ["Populations of *A. junius* in southern Canada are both resident and migrant. The resident population is said to overwinter as half grown larvae and emerge in late June. A resident population has not been reported north of Toronto and was not expected in eastern Ontario based on a 1965 study at approximately the same latitude at Montreal which found no evidence of overwintering. In April 2002 overwintering larvae of *Anax junius* were found at three locations in the Ottawa and St. Lawrence valley regions of Ontario, far beyond the Carolinian region which was the previously known limit of resident populations." (Author)] Address: Cating, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**7974.** Cating, P.M. (2004): A preliminary study of dragonflies at eastern Ontario sewage lagoons in relation to water quality. Ontario Odonata 4: 28-32. (in English) ["To better understand the Odonata species composition at sewage ponds and its relationship to water quality, numbers of individuals of each species were recorded from 15 sewage ponds and the same data was collected for nymphs from 10 sewage ponds. The ponds studied were distributed throughout eastern Ontario. The numbers and presence of species was related to clarity which was shown to be related to water quality and chemical parameters. Seventeen species of adults and thirteen species of larvae were recorded. The predominant species were *Ischnura verticalis* and *Enallagma civile* and these were also characteristic of the poorest water quality. Species of *Lestes* and *E. ebrium* occurred only in the pools with relatively clean water. More species occurred in clean ponds." (Author)] Address: Cating, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**7975.** Cating, P.M. (2004): Another record of Zebra Mussel attached to an exuvium of *Epitheca princeps*, and inferences of effect. Ontario Odonata 4: 5. (in English) ["An exuvium of *E. princeps* with an attached Zebra Mussel was found 30 cm above the water level along the wall of a marina at Presqu'île Bay (44.0188 N,

77.7276 W, Northumberland Co.), Canada." Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**7976.** Che Salmah, M.R.; Wahizatul Afzan, A. (2004): Distribution of Odonata (Insecta) in various ecosystems in northern Peninsular Malaysia. *Wetland Science* 2(3): 184-191. (in English) ["Odonata larvae and adults were collected from fourteen sites of various habitats including rivers, rice fields, mountain streams, freshwater and peat swamps, oil palm, sugarcane and rubber plantations and lake. Out of 51 species recorded, Libellulidae made up the most dominant of 10 families followed by Gomphidae and Coenagrionidae. Other families were less common. Riverine and stream ecosystems were the most diverse, both with six families and 19 and 13 species respectively. In the rice fields, Libellulidae and Coenagrionidae were represented by 17 and seven species respectively. The poorest fauna of Odonata was recorded from a lake system. A few of libellulids were found to be pollution tolerant and widespread in distribution. Many odonate species were restricted to preferred habitats or water parameter gradients that could be used as bioindicators of respective habitats or parameters." (Authors)] Address: Mrs. Wahizatul Afzan Bt. Azmi, Fac. Science & Technol., Kustem, Mengabang Telipot, 21030 Kuala Terengganu, Terengganu, Malaysia. E-mail: wahizatul@kustem.edu.my

**7977.** Clausnitzer, V. (2004): Ecology and biogeography of the dendrolimnetic *Coryphagrion grandis* (Odonata). In: Breckle, S.-W., Schweizer, B. & Fangmeier, A. (eds) "Results of worldwide ecological studies". Heimbach, Stuttgart: 243-256. (in English) ["A study on the ecology of *C. grandis* was undertaken in coastal forests of East Africa. The results are compared with other dragonfly species, known to breed in phytotelmata as well. These ecological and additional morphological and genetic results of this study show, that the monotypic *C. grandis*, which was placed for conveniences within the Megapodagriidae, belongs to the otherwise South and Central American Pseudostigmatidae. Although the separation from the neotropical Pseudostigmatidae occurred at least 100 million years ago, the morphology and biology *C. grandis* is still very similar to the former. These findings support biogeographical considerations about historical forest distribution in Africa, stability of East African coastal forests and the species loss due to extinctions in West and Central Africa. Since the future of *C. grandis* depends on the survival of the last coastal and lower Eastern Arc forests in East Africa, a short conservation chapter is added in the end." (Author)] Address: Clausnitzer, Viola, Friedländer Weg 53, 37085 Göttingen, Germany. E-mail: violacl@t-online.de

**7978.** Cook, J. (2004): Notable records of Emeralds (*Somatochlora* spp.) from Leeds-Grenville, eastern Ontario. *Odonata* 4: 4. (in English) [*S. forcipata* and *S. walshii*, both previously known from Mer Bleue bog, are reported for the second time in eastern Ontario. *S. williamsoni* also occurred at the location near a slow moving stream 2 km SW of Bishops Mills in a general region of extensive marshes and swamps. The distinction between females of *S. williamsoni* and *S. tenebrosa* is discussed.] Address: Cook, Joyce, R.R. 3 North Augusta Ont. K0G 1R0, Canada. E-mail: joyce-cook@carleton.ca

**7979.** Costa, S.M. (2004): Distribution and species richness of Odonate at Brookhaven National Laboratory. Prepared in partial fulfillment of the requirements of the Office of Science, DOE Science Undergraduate Laboratory Internships (SULI) Program under the direction of Dr. Timothy M. Green in the Environmental and Waste Management Services Division at Brookhaven National Laboratory: 17 pp. (in English) ["Odonate research was conducted at Brookhaven National Laboratory during the summer of 2004. The purpose for the research was to continue the Odonata research that began in the summer of 2003, which consisted of identifying and cataloging the specimens found at the Laboratory. Identification was to species level when ever possible. In addition the 2004 goal was to survey the bodies of water at the Lab primarily for adult odonates, to observe species richness, and catalog and preserve the specimens collected in support of the New York Odonate Atlas. To date a total of forty-six species have been identified at Brookhaven National Laboratory between the two summers of research. Twenty-five adults and twelve larvae were identified during the summer of 2003 and fifteen different adults species were found and identified during the summer of 2004. Future research may continue at the ponds in order to expand cataloging of Odonates; to possibly look at a link between species richness and pH of ponds; and to continue the larger on going biotic inventory of the Lab." (Author)] Address: Costa, Susan, SULI Program Community, College of Rhode Island, Brookhaven National Laboratory, Upton, New York

**7980.** González Soriano, E.; Delgado Hernández, O.; Harp, G.L. (2004): Libélulas de la Estación de Biología Chamela (Insecta: Odonata). In: Alfonso N. García Aldrete & Ricardo Ayala Barajas (Editores): *Artrópodos De Chamela*. Universidad Nacional Autónoma. ISBN: 9703216072: 37-61. (in Spanish) [For more details see: <http://books.google.com/books?hl=en&lr=&id=B4SGsUEYcM8C&oi=fnd&pg=PA37&dq=%22Lib%C3%A9lulas+de+la+Estaci%C3%B3n+de+Biolog%C3%ADa+Chamela%22&ots=gFqkTtN0zQ&sig=fCALX54o17ZQjWl0VRPKwLUQE>] Address: Gonzalez-Soriano, E., Depto Zoología, Inst. Biol., Universidad Autónoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**7981.** Kadoorie Farm and Botanic Garden (2004): Report of a Rapid Biodiversity Assessment at Luokeng Nature Reserve, North Guangdong, China, September 2002. South China Forest Biodiversity Survey Report Series (Online Simplified Version) 40. KFBG, Hong Kong SAR: II + 19 pp. (in English) ["23 species were recorded in Luokeng during the three-day survey. The most frequently encountered species was *Pantala flavescens*. The record of *Indocypha katharina* is new to Guangdong. This is a very restricted species and is previously known from only three sites, two in Guangxi and another in Sichuan (Wilson & Reels, 2003)." (Authors; K.D.P. Wilson)] Address: Kadoorie Farm & Botanic Garden Corporation, Lam Kam Road, Tai Po, N.T., Hong Kong SAR

**7982.** Kadoorie Farm and Botanic Garden (2004): Report of a Rapid Biodiversity Assessment at Heishiding Nature Reserve, West Guangdong, China, July 2002. South China Forest Biodiversity Survey Report Series (Online Simplified Version): No. 39. KFBG, Hong Kong SAR: II + 19 pp. (in English) ["37 species were re-

corded during the five-day survey. *Rhinocypha* sp. (*Aristocypha chaoi* sp.n.) is a species new to science and is being described. *Vestalis miao* and *Bayadera bidentata* are apparently new records for Guangdong province. The former has also been recorded from Guangxi and Hainan while the latter is known from Guangxi, Hubei and Zhejiang (Wilson & Reels, 2003)." (Authors; K.D.P. Wilson)] Address: Kadoorie Farm and Botanic Garden Corporation, Lam Kam Road, Tai Po, N.T., Hong Kong SAR

**7983.** Lekka, E.; Kagalou, I.; Lazaridou-Dimitriadou, M.; Albanis, T.; Dakos, V.; Lambropoulou, D.; Sakkas, V. (2004): Assessment of the Water and Habitat Quality of a Mediterranean River (Kalamas, Epirus, Hellas), in accordance with the EU Water Framework Directive. *Acta hydrochim. hydrobiol.* 32(3): 175-188. (in English, with German summary) ["In the present study, the water quality of Kalamas river (NW Greece) was evaluated using physicochemical and hydromorphological parameters and benthic macroinvertebrates. Statistical analyses (Cluster and FUZZY analyses) were performed and two biotic scores (BMWP' and HS) were used in order to classify the sites according to water quality. Kalamas river appeared to have excellent to moderate water quality at all sampling sites except one (close to the delta area) which was "fairly or significantly polluted". During the low flow season water quality appeared poorer than during the high flow season. The Greece ecological parameters (hydromorphological, chemical, and biological) used for this integrated approach are the ones proposed by the New Water Directive 2000/60 EC for an efficient surveying monitoring of running waters." (Authors) Taxa - including Odonata - are treated on the order level.] Address: Lazaridou-Dimitriadou, Maria, Department of Zoology, School of Biology, Faculty of Sciences, Aristotle University of Thessaloniki, 54006, Thessaloniki, Greece. E-mail: mlazarid@bio.auth.gr

**7984.** Płaska, W. (2004): The influence of predators on the forming of species diversity of zooplankton of some water ecosystems of the Łężna-Włodawa lake-land. *Teka Kom. Ochr. Kszt. Srod. Przyr.*, 2004,1: 180-183. (in Polish, with English summary) ["The studies were conducted within two lakes and two subsided ponds situated in the Leczna-Włodawa Lake District. In the studied water bodies, 73 zooplanktonic taxa were found to occur; the highest number of taxa - 44 - occurred in Lake Usciwierz, the lowest one - 24 - in the depression reservoir Szczecin. The highest values of frequency (35-40%) were found in Lake Usciwierz and the depression reservoir Nadrybie, the lowest one - from 10% to 19% - occurred in Lake Piastfczno and the depression reservoir Szczecin. The obtained results showed that within water bodies with escalating pressure of predators the species diversity of zooplankton was also high." (Authors) Odonata contributed highly to the biomass of predators.] Address: Płaska, W., Katedra Hydrobiologii i Ichtiologii Akademii Rolniczej, ul. Akademicka 13, 20-950 Lublin, Poland

**7985.** Pratt, P.D.; Paiero, S.M. (2004): *Archilestes grandis* (Rambur) (Odonata: Lestidae), new to Canada. *Ontario Odonata* 4: 11-12. (in English) ["One adult male *A. grandis* was collected while perched on foliage in the Ojibway Prairie Provincial Nature Reserve (42° 15' 43", 82° 04' 12") on August 26, 2002." (Authors)] Address: Pratt, P.D., 7100 Matchette Rd, La Salle, ON, Canada, N9C 2S3. E-mail: prairie@netcore.ca

**7986.** Armstrong, K.N.; Storey, A.W.; Davies, P.M. (2005): Effects of catchment clearing and sedimentation on macroinvertebrate communities of cobble habitat in freshwater streams of southwestern Australia. *Journal of the Royal Society of Western Australia* 88: 1-11. (in English) ["The removal of riparian vegetation from along first order streams of the northern jarrah forest reduced ecological health, as assessed by an examination of cobble communities. Macroinvertebrate diversity was significantly lower in cleared compared to uncleared reaches. There was also an associated decrease in the biomass and a change in the composition of epilithon communities, from those dominated by the angiosperm *Potamogeton ?crispus* to thin slimes dominated by diatoms. Extensive growths of filamentous algae were not observed on cobbles in cleared reaches. Species of Odonata (*Argiolestes minimus*), Ephemeroptera, Trichoptera and Chironomidae were the most notable absences from cobbles in cleared reaches. Grazer abundance also was reduced. Few species in cobble habitats appeared to benefit from catchment clearing although there was a significant increase in the abundance of the undescribed chironomid *Orthocladiinae* V61, which may be a useful indicator species. We also tested the effect of short term elevations in suspended sediment through experimental addition of sediment in an attempt to separate the effects of sediment from others related to catchment clearing. There was no significant difference in macroinvertebrate diversity between control and sediment-added cobbles, and both had higher diversity than cobbles in cleared reaches. We concluded that the changes in the epilithic cover in cleared reaches caused indirectly the changes in the macroinvertebrate community, either through a change in the composition of food sources or loss of refugia. Sedimentation in cobble environments might have greater impact in the longer term than noted in this study, and also might have impact on other stream mesohabitats." (Authors)] Address: Armstrong, K.N., School Animal Biology (M092), Univ. Western Australia, Crawley, WA 6009, Australia

**7987.** Boelter, R.A. (2005): Predation of native anurans by bullfrogs (*Rana catesbeiana*: Ranidae) in the South of Brazil. *Dissertação de Mestrado, Mestrado em Biodiversidade Animal, Universidade Federal de Santa Maria, RS, Brasil*: 36 pp. (in Portuguese and English) ["Bullfrogs have been introduced in many continents causing impact on native species. We have studied the influence of bullfrogs on the native anuran fauna through the diet analysis of 291 specimens, collected between May 2002 and June 2003, in an area in the South of Brazil. In order to check the feeding importance of the food items, the Pinkas index was used, classifying them by their relative importance (IRI). To analyze ontogenetic changes in the diet, we compared the variation among weight classes. The most important item found in the bullfrog diet was the anuran (IRI = 2157.71) from the Leptodactylidae, Hyliidae, Microhylidae and Ranidae families, totalizing nine preyed species. Anurans were found in all weight classes. These results show a potentially strong predation pressure on the native anuran fauna. A control program for this invasive species in natural environments in the South of Brazil is suggested to be undertaken urgently." (Authors) Odonata are represented as app. 10% of food items in bullfrog stomachs.] Address: Boelter, R.A., Curso de Mestrado em Biodiversidade Animal, Universidade Federal



de Santa Maria, Faixa de Camobi, Km 9, Bairro Camobi, Santa Maria, Rio Grande do Sul Brasil, Cep.: 97105-900. E-mail: rubinhoboelter@brturbo.com.br

**7988.** Brito-Junior, L. de; Pegado Abílio, F.J.; Watanabe, T. (2005): Aquatic insects of São José dos Cordeiros dam (Paraiban semiarid) with emphasis in Chironomidae. *Entomol. Vect.* 12(2): 149-157. (in Portuguese, with English summary) [Brasil; Chironomidae and additional aquatic insects of São José dos Cordeiros dam, in São José dos Cordeiros-PB (07°23'S 36°49'W) were bimonthly collected between July 1998 and July 1999. The insect fauna was sampled randomly with a hand net. Dominant taxa were Aedokritus (Chironomidae) and Gomphidae.] Address: Pegado Abílio, F.J., Depto de Metodologia da Educação, Centro de Educação e Depto de Sistemática e Ecologia, Centro de Ciências Exatas e da Natureza, Universidade Federal da Paraíba, Rua Maria Rosa Padilha 84, Edifício Aeroville, Ap. 210, Bairro Bessa, CEP: 58037-260 João Pessoa, Paraíba. E-mail: chicopegado@hotmail.com

**7989.** Carvalho, A.L.; Wernck-de-Carvalho, P.C. (2005): Descrição da larva de *Orthemis cultriformis* Calvert, 1899 (Insecta, Odonata, Libellulidae). *Arquivos do Museu Nacional, Rio de Janeiro* 63(2): 267-273. (in Portuguese, with English summary) ["The ultimate instar larva of *O. cultriformis* is described and figured based on reared specimens from Magé, RJ, Brazil. This larva is compared in a table with those other six known of the genus, using features of the external morphology. A preliminary key to the known larvae of the genus is appended." (Authors)] Address: Carvalho, A.L., Museu Nacional / UFRJ, Depto de Entomologia, Quinta da Boa Vista, São Cristóvão, 20940-040, Rio de Janeiro, RJ, Brasil.

**7990.** Catling, P.M.; Cannings, R.A.; Brunelle, P.M. (2005): An annotated checklist of the Odonata of Canada. <http://www.bcarchives.bc.ca/ContentFiles/Files/Collections%20and%20Research/Natural%20History/Entomolog y/CanadaOdonatalistPDFNov05.pdf>: 33 pp. (in English) ["This list of the 208 species of Canadian Odonata is current as of December 2004. It uses the scientific nomenclature and English names of the North American list [...]. Most French names come from Pilon and Lagacé (1998), which includes only those species known in the province of Québec as of the date of that publication. We encourage the development of appropriate French names for the whole Canadian fauna. Following the List of Species is a table of species occurrence by province and territory with rankings indicating national and provincial conservation status. Also included are recent additions to the Canadian fauna, taxonomic notes and an extensive list of references that provides the basis for decisions on occurrence and status." (Authors)] Address: Brunelle, P.-M., 2460 John Street, Halifax, Nova Scotia, B3K 4K7, Canada. E-mail: as849@chebucto.ns.ca

**7991.** Denk, T.; Seehofer, H.; Berg, H.M.; Braun, M.; Hochebner, T.; Jäch, M.A. (2005): Biotoperhebung Garnisonsübungsplatz (GÜPI) Völtendorf bei St. Pölten, NÖ. *Vegetationskundliche und faunistische Kartierung 2000-2001. Wiss. Mitt. Niederösterreich. Landesmuseum* 17: 183-264. (in Berg, H.-M., *Naturhistorisches Museum, 1. Zoologische Abteilung, Burgring 7, A-1010 Wien, Austria.* E-mail: hans-martin.berg@nhm-wien.ac.at) [20 out of the 69 odonate species known in Nieder-

österreich (Austria) were recorded. Most species were those characteristic of ephemeral water bodies, created by military use of the landscape. *Lestes barbarus* and *Ischnura pumilio* build up large populations.]

**7992.** Dohogne, R. (2005): Observation originale de la Cordulie à corps fin, *Oxygastra curtisii* (Dale, 1834) (Odonata, Cordulidae) en Limousin et dans l'Indre. *Epops* 65: 53-55. (in French) [Brief report on the record of *O. curtisii* in June 2004 at lake Pontauzier, near Châtre-Langlin, France.] Address: <http://www.epol.asso.fr/@Publications/@EPOPS/Epops65.pdf>

**7993.** Englund, R.A. (2005): Threats to native aquatic insect biodiversity in Hawai'i and the Pacific and challenges in their conservation. Dissertation, University of Hawai'i: IX, 202 pp. (in English) [Although the decline in numbers and diversity and threat to native insects in the Hawaiian Islands is widely recognized by field scientists there has been little progress in either documenting the real decline of native species, or in demonstrating specific causes of the overall decline of these species. Additionally, few conservation actions to either restore populations or mitigate actual threats to native arthropods have been mentioned in the literature. The following chapters examine several assessments of relevant aquatic systems and the native aquatic insects dwelling within, where there has either been a perceived or real decline of these native Hawaiian aquatic arthropods because of threats from invasive or introduced species. The large adaptive radiation of the endemic native damselflies (Coenagrionidae: Megalagrion) in Hawai'i has received considerable attention and study since at least the 1880s. Endemic Megalagrion are in many ways reflective of a great loss because they are largely now found in remote upper headwater areas of streams, yet they also represent the hope of preserving highly diverse freshwater ecosystems found throughout the Hawaiian archipelago. The first two chapters of this dissertation examine the impacts of two differing taxa of introduced fish on Hawaiian Megalagrion, Pocciliidae (livebearers or mosquitofish family) and Salmonidae (trout). The effects of each fish species on native aquatic insects depended mainly on the invasive status of each group; for example. Chapter 1 (Englund 1999) examines the impacts of introduced poeciliids on native damselflies. Damselflies were completely eliminated on the island of O'ahu wherever species in the highly invasive mosquitofish family were found, and only remnant populations were found in high elevations lacking introduced fish. Chapter 2 (Englund and Polhemus 2001) examines the impacts of the non-invasive rainbow trout (*Oncorhynchus clarki*) on Megalagrion damselflies. Damselflies and all other native aquatic insects were not found to be harmed by trout in the uppermost elevations of Kaua'i streams where trout reproduce naturally, and even had more robust populations than in some nearby non-trout containing streams. The lack of impacts on native damselflies by a large, generalist predator such as rainbow trout pointed out a seeming paradox. Whereas the small but ubiquitous mosquitofish appears to have completely devastated native aquatic fauna wherever it has been introduced outside of its natural range, trout, because of their restricted range and smaller population sizes have had minimal, if any impacts on native invertebrates in Hawai'i. Because introduced fish species have caused either the extinction or severe range contractions of Megalagrion damselflies in Hawai'i, long-term monitoring of the remnant

populations has become necessary to preserve these remaining populations. Chapter 3 (Englund 2001) provides a case study in both the monitoring and preservation of a remnant O'ahu damselfly population now found in only 95 m of Ashless stream at the Tripler Army Medical Center. Chapter 3 also provides several harrowing examples of how this species was nearly eliminated in the past 10 years through accidents and mismanagement. Not only are the endemic *Megalagrion* now missing from all lowland areas of O'ahu (with the exception of the Tripler population), lowland aquatic insect diversity throughout O'ahu is at a remnant status, and biodiversity surveys for native aquatic insects in the Pearl Harbor watersheds in Chapter 4 (Englund 2002) indicated a near absence of native aquatic insects in these freshwater habitats. Lower Pearl Harbor watersheds were documented to have lost many native aquatic insect taxa such as all native Heteroptera, damselflies, Coleoptera, and many Diptera species, while introduced insect species were abundant. A variety of conservation measures have been suggested to either restore or maintain the current levels of freshwater biodiversity in Hawai'i. In Chapter 5 (Englund and Filbert 1999), the case of significantly increasing and restoring stream flow in a formerly diverted stream was examined to determine whether this factor alone would lead to a restoration of native aquatic species. It was found that merely increasing stream flow by itself was not enough to rid the stream of any alien aquatic species, in fact, several new nonindigenous aquatic species became established after stream flows were increased. The results of Chapter 5 confirm that an integrated, balanced and possibly drastic approach will be required to maintain and preserve Hawai'i's native aquatic insect fauna. A wide-variety of conservation measures in the Hawaiian archipelago will be needed to maintain current biodiversity levels, and also hopefully restore native freshwater biodiversity in selected areas. To put the Hawai'i problem into perspective, a brief review of the impacts of invasive species on native insects in other tropical areas is provided in Chapter 6. This review chapter also provides a synthesis of the problem facing Hawaiian freshwater insects and other terrestrial arthropods in Hawai'i and elsewhere due to invasive species, and how the Hawaiian case study of invasive species impacts has many parallels to other vulnerable biotas. Finally, drawing on a mixed record of past mistakes and successes in Hawai'i and elsewhere, some potential practical conservation measures intended to preserve and restore endemic island aquatic insects are provided in Chapter 6." (Author)] Address: Englund, R.A., J. Linsley Gressitt Center for Entomological Research, Bishop Museum, 1525 Bernice Street, Honolulu, HI, 96817, USA. E-mail: englund@bishopmuseum.org

**7994.** García Ruiz, A. (2005): Importancia de las lagunas temporales para la conservación de la biodiversidad de artrópodos edáficos en zonas agrícolas de Castilla-La Mancha. *Limnetica* 24(1-2): 83-90. (in Spanish, with English summary) ["The aim of this work is the comparative study of the soil arthropod communities in two transient lagoons from Castilla-La Mancha, by the use of pit-fall type traps. In the study areas sites with different environmental characteristics were identified. Analysis of frequency, abundance and richness and multivariate analyses were performed to detect preferences for particular habitats among the groups found." (Authors) Arthropods including Odonata are treated on

the order level.] Address: García Ruiz, A., Depto de Didácticas Específicas. Facultad de Formación de Profesorado y de educación. Univ. Autónoma Madrid. 28049 Madrid, Spain. E-mail: andres.garcia.ruiz@uam.es

**7995.** Gerecke, R.; Stoch, F.; Meisch, C.; Schrankel, I. (2005): Die Fauna der Quellen und des hyporheischen Interstitials in Luxemburg Unter besonderer Berücksichtigung der Milben (Acari), Muschelkrebse (Ostracoda) und Ruderfusskrebse (Copepoda). *Ferrantia* 41: 134 pp. (in German, with English and French summaries) [*Aeshna cyanea* (n = 1) and *Cordulegaster bidentata* (n = 3) were reported from a few sampling sites.] Address: Meisch, C., Musée natl. d'histoire naturelle Luxembourg, 25, rue Munster, L-2160 Luxembourg, Luxembourg. E-mail: claude.meisch@education.lu

**7996.** Hurtado, S.; Garcia-Trejo, F.; Gutierrez-Yurrita, P.J. (2005): Importancia ecológica de los macroinvertebrados bentónicos de la subcuenca del Río San Juan, Querétaro, México. *Folia Entomot. Mex.*, 44(3): 271-286. (in Spanish, with English summary) [Three sections of river Río San Juan with different impacts / degradation by man were surveyed: "before the dam (1) and just after the dam (2), these areas have moderate and high impact levels, respectively; the third place was located close to the lower section of the San Juan river, Boyecito spring (3), and has no negative impact, apparently. Alpha- and beta-diversity-indices were assessed for each locality and for the entire basin, respectively." 19 orders were collected from the first site: Diptera was the dominant order (51.8%). 16 orders were collected from the second site; Amphipoda and Diptera were the dominant groups (35.2 and 25%, respectively). 19 orders were collected from the third site: Diptera was the dominant order (41.4%). "The less deteriorated site was Boyecito, being this site the only one that can keep constant its diversity levels during a hydrological cycle. Whereas, Tecozautla river showed in its great variations of diversity levels during the hydrological cycle the effects of regulating its water due to the dam. Action plans to conserve the ecological integrity of the basin are proposed." The study includes Odonata, as all taxa on the order level.] Address: Gutierrez-Yurrita, P.J., Laboratorio de Ecofisiología, Facultad de Ciencias Naturales, Universidad Autónoma de Querétaro, Campus Junquilla, Carretera estatal a Juriquilla s/n. Querétaro 76230, Qro., México. E-mail: yurrita@uaq.mx

**7997.** Pegado Abílio, F.J.; Fonseca-Gessner, A.A.; Watanabe, T. Leite, R.L. (2005): *Chironomus* gr. *decorus* (Diptera: Chironomidae) and others [sic] aquatic insects in a temporary dam from Paraíba semi-arid, Brazil. *Entomol. Vect.* 12(2): 233-242. (in Portuguese, with English summary) [The taxa list includes Odonata at the family level.] Address: Pegado Abílio, F.J., Depto de Metodologia da Educação, Centro de Educação e Depto de Sistemática e Ecologia, Centro de Ciências Exatas e da Natureza, Universidade Federal da Paraíba, Rua Maria Rosa Padilha 84, Edifício Aeroville, Ap. 210, Bairro Bessa, CEP: 58037-260 João Pessoa, Paraíba. E-mail: chicopegado@hotmail.com

**7998.** Stevens, L.E.; Bailowitz, R.A. (2005): Distribution of *Brechmorhoga* clubskimmers (Odonata: Libellulidae) in the Grand Canyon region. *Western North American Naturalist* 65(2): 170-174. (in English) ["We examined the distribution of *B. mendax* and *B. pertinax* in northern Arizona and southern Nevada. *Brechmorhoga*

mendax occurs widely throughout the Southwest and in Arizona up to the Mogollon Rim, and up the Colorado River from the west to at least River Mile 132 (downstream from Lees Ferry, Arizona) at elevations of 110–1460 m. In Grand Canyon it occurs along small to large tributaries and on the mainstream at elevations below 650 m. The only previously reported locality for *B. pertinax* in the United States is in southeastern Arizona, where it was presumed to be accidental. We report *B. pertinax* along 5 small, perennial tributaries emanating from Redwall Formation aquifer springs on the south side of central Grand Canyon. Those springs habitats may be threatened by regional groundwater depletion. *B. pertinax* appears to be somewhat more stenotolerant in its habitat requirements than *B. mendax*, a finding in keeping with these differences in range. The presence of isolated populations of *B. pertinax* in Grand Canyon is an example of a Neotropical influence on the fauna and indicates biogeographic corridor and refuge functions of this large, deep canyon." (Authors)] Address: Stevens, L.E., Museum of Northern Arizona, 3101 N. Ft. Valley Rd, Flagstaff, AZ 86001, USA. E-mail: farvana@aol.com

**7999.** Toth, S. (2005): Monitoring dragonflies on the section of the Dráva between Ortilos and Vízvár (Insecta: Odonata). *Natura Somogyiensis* 7: 35-48. (in English) ["The power plant planned on the Croatian section of the Drava can result in unfavourable changes in the fauna of wetlands by the river and may - among others - affect the dragonflies developing there, too. This necessitates the long-term monitoring of the local dragonfly fauna. Already the experiences of the first few years of monitoring referred to the fact that the shallower wetlands of the area are particularly vulnerable. In the course of the examination, it turned out that the dragonfly fauna of the area is rich- 14 of the 48 species detected so far are protected by law. Outstanding among these are the 5 taxons listed in the Bern Convention (*Aeshna viridis*, *Gomphus flavipes*, *Ophiogomphus cecilia*, *Leucorrhinia caudalis*, *L. pectoralis*). The composition of the local fauna - similarly to the national situation - is dominated by Pontic-Mediterranean, Siberian and West-Siberian faunal elements. However, the proportions alter to some extent from group to group. The author gives a detailed analysis of the composition of the fauna of the individual sampling sites and offers a separate depiction of the quantitative composition of the fauna according to the suborder." (Author)] Address: Toth, S., Széchenyi u. 2, H-8420 Zirc, Hungaria. E-mail: flycatcher@freemail.hu

## 2006

**8000.** Bentley, C. (2006): Reports from Coastal Stations - 2006: Rye Harbour Nature Reserve, East Sussex. *Atropos* 30: 63-64. (in English) [UK; *Anax parthenope*, *Erythromma viridulum*, *Lestes dryas*] Address: not stated

**8001.** Bowman, N. (2006): Reports from Coastal Stations - 2006: Eccles-on-Sea, Norfolk. *Atropos* 30: 77-78. (in English) [UK; *Erythromma viridulum*, *Anax parthenope*, *Calopteryx splendens*] Address: not stated

**8002.** Buchwald, R. (2006): Libellen – Kleinode unserer Gewässer. NVN/BSH 3/06 (Naturschutzverband Niedersachsen/Biologische Schutzgemeinschaft Hunte

Weser-Ems): 4 pp. (in German) [General on Odonata.] Address: Buchwald, R., Universität Oldenburg, Institut für Biologie und Umweltwissenschaften (IBU), 26111 Oldenburg, Germany. E-mail: rainer.buchwald@uni-oldenburg.de

**8003.** Cano Villegas, F.J.; Gomez, B. (2006): Confirmación de la presencia de *Aeshna affinis* Van der Linden, 1820 (Odonata, Aeshnidae) en Andalucía. *Boletín de la S.E.A.* 39: 150. (in Spanish) [29-VI-2006, a male of the rare Andalusian *A. affinis* was caught at Encantada (alt. 450 m a.s.l., UTM 30S 033827 420483), Sierra Morena cordobesa, Spain.] Address: Cano Villegas, F.J., C/Montemayor, 4 1º-2; 14003-Córdoba, Spain. E-mail: fjcanovi2@hotmail.com

**8004.** Clancy, S. (2006): Reports from Coastal Stations - 2006: Dungeness area, Kent. *Atropos* 30: 64-67. (in English) [UK; *Anax parthenope*, *Sympetrum fonscolombii*, *Erythromma viridulum*, *Calopteryx splendens*] Address: not stated

**8005.** Cordoba-Aguilar, A.; Contreras-Garduno, J. (2006): Differences in immune ability in forest habitats of varying quality: dragonflies as study models. In: Rivera, AC (ED). 2006. *Forests and Dragonflies*. 4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005. *Pensoft Series Faunistica* 61: 268-278. (in English) ["In this chapter we review the potential use of dragonflies for testing current ideas of differences in immune ability related to habitat quality. It is known that immune ability in insects can be affected by a number of biotic and abiotic factors. We briefly review these factors in dragonflies. Given the fact that the same species of dragonfly may live in forests of varying quality (e.g. food abundance), this can lead to immune ability differences among dragonfly populations. We examine the literature regarding this, in particular studies of varying parasite burden and immune ability to advance the hypothesis that forest quality can be assessed using immune ability. One particular trait that may be used for this is male wing pigmentation. Current knowledge suggests that this trait is sexually selected (the more pigmentation, the more successful the male is in leaving more offspring), sensitive to environmental stress (such as food supply) and an indicator of immune ability. These conditions make pigmentation ideal to see the response of dragonflies to forest quality and environmental stress." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**8006.** Darke, J. (2006): Reports from Coastal Stations - 2006: Skomer Island NNR, Pembrokeshire. *Atropos* 30: 83-84. (in English) [UK; *Sympetrum danae*, *Orthetrum cancellatum*, *Cordulegaster boltonii*, *Aeshna mixta*, *Anax imperator*] Address: not stated

**8007.** Davidson, P.J.A. (compiler) (2006): The biodiversity of the Tonle Sap Biosphere Reserve. 2005 status review. Technical report for the UNDP/GEF funded Tonle Sap Conservation Project. Wildlife Conservation Society, Phnom Penh: 76 pp. (in English) [The Tonle Sap Great Lake is the largest permanent freshwater lake in Southeast Asia. It is situated in the centre of the low-lying Cambodian plain, which has an average elevation of 10-30 m asl. The paper compiles available data on biodiversity of the locality. Eight dragonfly spe-



cies were identified during a visit to Prek Toal on 7 February 2003 (P.K. Batchelor in litt. to Sam Veasna Centre for Wildlife Conservation, 2003): *Pseudagrion rubriceps*, *Brachythemis contaminata*; *Crocothemis servilia*, *Orthetrum sabina*, *Rhyothemis phyllis*, *R. variegata*; *Tholymis tillarga*, and *Trithemis pallidinervis*.] Address: not stated

**8008.** Deans, M. (2006): Reports from Coastal Stations - 2006: Bawdsey Peninsula, Suffolk. *Atropos* 30: 73-75. (in English) [*Erythromma viridulum*, *Sympetrum striolatum* (at light)] Address: not stated

**8009.** Djernaes, M.; Damgaard, J. (2006): Exon-Intron structure, paralogy and sequenced regions of elongation factor-1 alpha in Hexapoda. *Arthropod Systematics & Phylogeny* 64(1): 45-52. (in English) ["Elongation factor-1 alpha (EF-1a) is already widely used and shows even more promise for phylogenetic studies of Hexapoda. However, paralogous copies and the presence of nitrons pose problems. We survey exon-intron structure, presence of paralogous copies and the number and extent of sequenced regions in all hexapod orders. We assess the phylogenetic utility of the exon-intron structure of EF-1a, which is unexpectedly dynamic with widespread losses and several independent instances of intron gain. Paralogous copies of EF-1a are present in Hemiptera, Thysanoptera, Neuropterida, Coleoptera, Hymenoptera and Diptera. With the presented information about exon-intron structure and paralogous copies, researchers will be able to realise the full phylogenetic potential of EF-1a, including exon-intron structure as this can provide additional characters and help to define clades and paralogous copies. We recommend a suitable focus region of 500 bp for future studies of EF-1a in Hexapoda." (Authors) The study includes Odonata.] Address: Damgaard, J., Biological Institute and Zoological Museum, University of Copenhagen, Denmark. E-mail: JDamgaard@bi.ku.dk

**8010.** Eason, P.K.; Switzer, P.V. (2006): International Journal of Comparative Psychology 19: 268-281. (in English) ["Spatial learning is evident in dragonflies on a variety of spatial scales. Mature dragonflies must be able to locate a variety of features in the habitat that are critical to survival and reproduction, including sites for breeding, foraging, roosting, and thermoregulating. In many species, these sites do not coincide in space. Because individuals may repeatedly use particular sites for different activities, they must learn both the locations of these sites and routes among them. Further evidence of spatial memory in dragonflies is provided by their site specificity on a finer scale. Breeding males, for example, often are faithful not only to a particular area, but to a specific territory site within that area. Males appear to become faithful to a territory site through localization, a process during which they explore the site and develop a spatial map of the location of the territory and its resources. Males also respond to their interactions with other individuals, adjusting both their choice of territories and their space use within their territories to reflect those interactions. In eastern amberwing dragonflies (*Perithemis tenera*), males are not faithful to territories on which they have lost a fight with another male; in contrast, males are more likely to be faithful to territories on which they successfully mated than to territories on which they obtained no matings. Similarly, while on territories, male amberwings adjust their position in response to negative and positive interactions. They

move away from the side of the territory from which neighbors most frequently intruded, and they move toward locations from which they pursued a female. Territorial amberwings thus modify their space use at both the territory and within-territory spatial scale in response to their social environment. Their responses are consistent with the hypothesis that they learn from their positive and negative experiences and adjust their future space use accordingly. Further study of spatial learning in dragonflies would greatly enhance studies of dragonflies' behaviour and ecology, and help us understand learning in general." (Authors)] Address: Eason, P.K., Dept of Biology, University of Louisville, Kentucky 40292, U.S.A. E-mail: perri.eason@louisville.edu

**8011.** Gapud, V.P. (2006): Damselflies (Odonata: Zygoptera) of Greater Luzon, Philippines with description of two new species. *Philippine entomologist* 19(2): 1-42. (in English) ["39 species of damselflies are recorded for Greater Luzon. Of these, 21 are endemic to Luzon and 11 are endemic to the Philippines. Two new species, *Drepanosticta makilingia* and *Amphicnemis isabelae*, are described and illustrated. Thirty of the 39 species are similarly illustrated. The Philippine Odonata are represented by 309 species (Hämäläinen & Müller 1997) with an overall endemism of 65.7%. Of these, the Zygoptera include 186 species with very high endemism (85.5%). Majority of endemic damselflies such as *Risicnemis*, *Drepanosticta*, *Argiolestes*, *Rhinagrion*, *Amphicnemis*, and *Teinobasis* are forest dwellers. Many species remain undescribed and are waiting to be discovered. In 2001, *Argiolestes baltazarrae* Gapud and Recueno-Adorada, was described from a lowland forest beside an inundative river in Digsinan, San Mariano, Isabela, within the Northern Sierra Madre Natural Park. It is not known how many new species will turn out in this biodiversity corridor." (Author)] Address: Gapud, V.P., Univ. Philippines, Coll. Agr., Pest. Biol. and Biodivers. Div., Los Banos 4031, Philippines

**8012.** Hadrys, H.; Clausnitzer, V.; Groeneveld, L.F. (2006): The present role and future promise of conservation genetics for forest Odonates. In: Rivera, AC (ED). 2006. Forests and Dragonflies. 4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005. *Pensoft Series Faunistica* 61: 279-299. (in English) ["Although the history of conservation genetics as a discipline dates back more than two centuries, odonates have only recently entered the scene. This is highly unfortunate since – especially in tropical forests – odonates may serve as prime examples for the application and potential of conservation genetic research. Faced with the same conservation problems as the forests themselves, they epitomize the difficulties of maintaining biodiversity in tropical forests. To date, no data exist on population structures, dynamics, viabilities or histories of afro-tropical forest odonates. Below, a case study is introduced that demonstrates the application of population genetic research to three African damselfly species of the genus *Pseudagrion*. The three species selected represent a habitat gradient ranging from open habitats in Namibia to isolated mountain forests in Kenya and Tanzania. The results of mitochondrial (ND1) sequence analyses revealed strong inter- and intraspecific differences in the population structures of all three species, reflecting their habitat adaptations and demographic distribution. Mean genetic diversity and genetic isolation patterns increased with habitat specificities and restricted distributional range of the species. The two species

with a wider distributional range, *Pseudagrion massaicum*, and *P. kersteni* displayed similar low genetic diversities in Namibia but showed considerable differences in population sub-structures between Namibian and East African populations. The third species, *P. bicocculans*, an endemic of high-elevated mountain forests in Kenya and Tanzania, shows a multifold higher genetic diversity and complete genetic isolation between populations. The comparison with divergence values of true species suggests, that speciation in this species is well advanced. Given that the strong divergence patterns are neither correlated with geographic distance nor with the differences in morphological traits, the results provide a good example on how genetic data can provide information about conservation units and cryptic speciation processes. Future challenges in conservation genetic research for tropical forest species should focus on establishing as many genetic species profiles of current conditions as possible. Those data sets are valuable snapshots of the current conditions and may serve as calibration points for future conservation work." (Authors)] Address: Hadrys, Heike, ITZ, Ecology & Evolution, TiHo, D-30559 Hannover, Germany

**8013.** Harvey, R.; Higgott, J. (2006): Reports from Coastal Stations - 2006: Minsmere RSPB Nature Reserve, Suffolk. *Atropos* 30: 75-76. (in English) [UK; *Anax parthenope*, *Anaciaeschna isosceles*, *Erythromma viridulum*] Address: not stated

**8014.** Hunter, I. (2006): Reports from Coastal Stations - 2006: Elms Farm, Icklesham, East Sussex. *Atropos* 30: 62-63. (in English) [UK; *Erythromma viridulum*] Address: not stated

**8015.** Jarman, N.; Morris, T. (2006): Reports from Coastal Stations - 2006: Kingsdown Beach and St Margaret's at Cliffe, Kent. *Atropos* 30: 67-69. (in English) [UK; *Erythromma viridulum*] Address: not stated

**8016.** Joniak, T.; Domek, P. (2006): Influence of humification on biodiversity of lake benthic macroinvertebrates. *Acta Agrophysica* 7(2): 363-368. (in English, with Polish summary) ["The work presents the taxonomic composition and abundance of macrozoobenthos in 3 humic lakes, each undergoing different stages in the process of humification. The potential influence of habitat conditions was defined, modified under the influence of the humic substances, on biodiversity and the number of benthic invertebrates. Fish were also researched in an attempt to define the possibility of their influence on the benthic fauna." (Authors) The taxa list includes six Odonata.] Address: Joniak, T., Dept of Water Protection. Adam Mickiewicz University, ul. Drzymały 24, 60-613 Poznań, Poland. E-mail: tjoniak@wp.pl

**8017.** Kim, D.G.; Yum, J.W.; Yoon, T.J.; Bae, Y.J. (2006): Effect of temperature on hatching rate of *Nannophya pygmaea* eggs (Odonata: Libellulidae). *Korean J. Appl. Entomol.* 45(3): 381-383. (in English) ["The hatching rate of the eggs of *N. pygmaea*, an endangered dragonfly species in Korea, was experimented in different temperature conditions (10, 15, 20, 25, and 30 °C) in laboratory. *N. pygmaea* eggs were collected from female adults inhabited a small wetland in Mungyong-si, Kyeongsangbuk-do, Korea, in July 2006. The hatching rate was evaluated from the number of hatched nymphs for the period of 100 days. As a result, the hatching rates were 83, 89, and 76% at 20, 25, and 30 deg C, respectively; however, eggs were not hatched at

10 °C and 15 °C during the experiment period. The derived thermal threshold for egg hatching was 14.3 °C, which is relatively higher than the values of other temperate dragonflies." (Authors)] Address: Bae, Y.J., Seoul Women's University, Seoul, Republic of Korea. E-mail: yjbae@swu.ac.kr

**8018.** Kishimoto, N.; Natori, M.C.; Higuchi, K.; Ukegawa, K. (2006): New deployable membrane structure models inspired by morphological changes in nature. American Institute of Aeronautics and Astronautics, 47th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Newport, Rhode Island, 2006/05/01 - 2006/05/04 : 10 pp. (in English) ["Some characteristics of morphological changes in nature are discussed and morphological changes in space structure systems are investigated. Essentially space structure systems change their forms and functions, since they must be initially stowed due to spatial constraints of transportation systems, and deployed in their designed orbits. Recently various concepts of membrane structures are proposed for future large space systems, since they can be compactly stowed, and can easily realize space structures with large area. In their developments, it is a major important issue to ensure the reliability of their deployment processes. From the viewpoint of deployment processes, various morphological changes of some plants, insects (including *Anax parthenope* and *Davidius nanus*), and animals are investigated. The efficient characteristics in their morphological changes such as high redundancy, sequential deployment, utilization of gravity forces, and so on are introduced. A new concept of deployable membrane structure models derived especially from the observation of insects' metamorphosis including eclosion of butterflies, dragonflies, cicadas, and so on is proposed. Numerical results of its deployment behaviour are also shown." (Authors)] Address: Kishimoto, N., Institute of Space and Astronautical Science / Japan Aerospace Exploration Agency 3-1-1 Yoshinodai, Sagamihara, Kanagawa 229-8501, Japan

**8019.** Knill-Jones, S. (2006): Reports from Coastal Stations - 2006: Isle of Wight. *Atropos* 30: 58-60. (in English) [UK; *Sympetrum fonscolombii*, *Erythromma najas*] Address: not stated

**8020.** Li, C.W.; Cook, S.B.; Li, P.; Hollingsworth, J. W. (2006): Influence of water quality on macroinvertebrate population and diversity. *Journal of Environmental Hydrology* 14(Paper 11): 13 pp. (in English) ["Water samples from rural and urban watersheds around Cookeville, TN, USA were collected and analyzed. GIS was used to delineate watersheds, and land use and land cover data were computed to obtain urban areas in each watershed. Water samples were collected from three sites, all 3rd ordered streams. [...]. Habitat assessment and land use data were compared to measurements of water quality. Computation from percent dominance and percent clingers showed that watersheds exert their own characteristics. Percent urban area has negative impact on the diversity of macroinvertebrate community and dominance. Habitat assessment also supports such findings." (Authors) Gomphidae, Gomphus are listed from Blackburn Fork.] Address: Li, P., Department of Earth Sciences, Tennessee Technological University, Cookeville, TN 38505, USA. E-mail: pli@tntech.edu

- 8021.** Luque Pino, P.; Serra Sorribes, A. (2006): *Macromia splendens* i *Gomphus graslinii*, dues noves espècies d'odonats per a Catalunya. *Butll. Inst. Cat. Hist. Nat.* 74: 113-116. (in Spanish) [Spain; *M. splendens*: Locality: near Vidre, river Algars, community of Arnes, 31TBF6826, 555 m asl, 15-VI-2007, 23-VI-2007 i 07-VII-2007. *G. graslinii*: Localities: rivers Algars and Estrets, communities Vidre, Arnes, Horta de Sant Joan, end of June and early July 2007.] Address: Luque Pino, P., Museu Comarcal del Montsià, Gran Capità, 34. E-43870 Amposta, Spain. E-mail: [odonats@yahoo.es](mailto:odonats@yahoo.es)
- 8022.** McMurray, P.D.; Newhouse, S.A. (2006): An annotated list of the aquatic insects collected in 2004 in the Wabash River watershed, Indiana. *Proceedings of the Indiana Academy of Science* 115(2): 110-120. (in English) [USA; In 2004, 47 streams and rivers within the Wabash River watershed were sampled. More than 5500 aquatic insect specimens, representing 229 taxa were collected. "Diptera (73 taxa) was the most diverse insect order followed by Coleoptera (43 taxa), Odonata (31 taxa), Ephemeroptera (25 taxa), Trichoptera (23 taxa), Hemiptera (20 taxa), Plecoptera (7 taxa), Megaloptera (5 taxa), and Lepidoptera (2 taxa). We collected 50–70% of the families, 21-45% of the genera, and 9–17% of the species of Ephemeroptera, Odonata, Plecoptera, and Trichoptera currently reported from Indiana. The upper Wabash sub-watershed had the greatest number of insect taxa (148) while the lower Wabash sub-watershed had the fewest taxa (119)." (Authors) *Calopteryx maculata* was found at more than 50% of the sites.] Address: McMurray, Jr, P.D., Indiana Dept Environmental Management, Biol. Studies Section, 100 North Senate Av., Indianapolis, Indiana 46204 USA
- 8023.** Mesquita, D.O.; Colli, G.R.; Costa, G.C.; Franca, F.G.R.; Garda, A.A.; Peres Jr., A.K. (2006): At the water's edge: Ecology of semiaquatic teiids in Brazilian Amazon. *Journal of Herpetology* 40(2): 221-229. (in English) [Activity patterns, diet, reproduction, sexual dimorphism, and thermal ecology of the semiaquatic teiids *Crocodylus amazonicus* and *Dracaena guianensis*, from two localities in the Brazilian Amazon are described. In one case, the stomach content of 57 *C. amazonicus* surveyed, included an Odonata.] Address: Garda, A., Sam Noble Oklahoma Museum of Natural History, 2401 Chautauqua, Norman, Oklahoma 73072-7029, USA; E-mail: [garda@ou.edu](mailto:garda@ou.edu)
- 8024.** Moore, C. (2006): Reports from Coastal Stations - 2006: Dunwich Heath National Trust, Suffolk. *Atropos* 30: 76-77. (in English) [UK; *Erythromma viridulum*, *Anaciaeschna isosceles*, *Sympetrum flaveolum*] Address: not stated
- 8025.** Morgan da Costa, F.L.; Oliveira, A.; Callisto, M. (2006): Inventory of benthic macroinvertebrates diversity in the Peti Environmental Station Reservoir of Minas Gerais, Brazil. *Neotropical Biology and Conservation* 1(1): 17-23. (in Portuguese, with English summary) ["The aim of this study was to inventory the diversity of benthic macroinvertebrates of the reservoir of the Peti Environmental Station in Minas Gerais State through the evaluation of these communities in space and temporal scales during the rainy and dry periods from June - 2002 up to June - 2004. The Peti reservoir has almost 50 years and is used for hydropower generation. The benthic macroinvertebrates are an important tool for the evaluation of water quality and environment monitoring through inventories of diversity and data on community structure. A total of 16 taxa was found and the most abundant groups were Chaoboridae (47,51%), the Chironomidae genera *Coelotanytus* (15,1%) and *Chironomus* (2,77%), *Bivalvia* (19,11%) and *Oligochaeta* (9,54%). There were no significant variations ( $R = 0,1927$ ;  $p > 0,05$ ) for the biotic data among the sampling stations during the studied periods. The evaluation of the distribution and structure of the benthic community showed that the quality of the reservoir's water is preserved, because there was no predominance of bad quality indicator organisms. This situation is due to the constant oxygenation of the hypolimnion which is probably related with the reservoir operation." (Authors) "Gomphidae" are listed.] Address: Universidade Federal de Minas Gerais, Instituto de Ciências Biológicas, Depto de Biologia Geral, Laboratório de Ecologia de Bentos. CP. 486, CEP. 30.161-960, Belo Horizonte, MG, Brasil. E-mail: [callisto@icb.ufmg.br](mailto:callisto@icb.ufmg.br)
- 8026.** Odin, N. (2006): Reports from Coastal Stations - 2006: Landguard Bird Observatory, Suffolk. *Atropos* 30: 71-72. (in English) [UK; No daytime migration was observed; nocturnal immigration of *Enallagma cyathigerum*, *Aeshna mixta*, *Sympetrum sanguineum* and *S. striolatum* is documented, especially for *S. striolatum* with a total of 42 records at a 400w light trap.] Address: not stated
- 8027.** Packard, P. (2006): Dragonflies and Damselflies. Small Wonder. Beautiful and Beneficial. *Downstream* 15: 1, 5-7. (in English) [Massachusetts, USA; general on Odonata] Address: Packard, Paula; <http://archives.lib.state.ma.us/bitstream/handle/2452/41013/ocm48880163-15.pdf?sequence=1>
- 8028.** Parr, A.J. (2006): Migrant dragonflies in 2006 including recent decisions and comments by the Odonata Record Committee. *Atropos* 30: 26-35. (in English) [UK; the following species are involved: *Calopteryx splendens*, *C. virgo*, *Lestes dryas*, *L. barbarus*, *Erythromma viridulum*, *Enallagma cyathigerum* (caught at light), *Aeshna affinis*, *A. juncea*, *A. mixta*, *Anax imperator*, *A. parthenope*, *Libellula depressa*, *Orthetrum cancellatum*, *Crocothemis erythraea* (Guernsey, Jersey), *Sympetrum striolatum*, *S. fonscolombii*, *S. flaveolum*, *S. sanguineum*, *S. danae*] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: [Adrian.parr@bbsrc.ac.uk](mailto:Adrian.parr@bbsrc.ac.uk)
- 8029.** Parr, A.J. (2006): Identification workshop: Forms of Lesser Emperor *Anax parthenope* Selys. *Atropos* 28: 17-18. (in English) ["Given reasonably good views of a typical male Lesser Emperor it is easy enough to make a positive identification. The St Mary's Lesser Emperor, however, highlights some of the more subtle identification issues—for instance, not all individuals showing significant amounts of blue are necessarily males, and the 'dull abdomen with a bright blue base' is not always a distinctive feature of the species. The combination of olive-brown thorax and greenish eyes are useful points to look for in 'unusual' individuals, helping to distinguish the species from Emperor (which has a green thorax), Vagrant Emperor *Hemianax ephippiger* (which has brown eyes) and Green Darner *Anax junius* (which has both a dark green thorax and brownish eyes)." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: [Adrian.parr@bbsrc.ac.uk](mailto:Adrian.parr@bbsrc.ac.uk)



**8030.** Parr, A.J. (2006): The changing trends of Britain's Odonata. *Atropos* 28: 27-31. (in English) ["Given the increasing numbers of dragonfly enthusiasts in recent years, it is not surprising that new species to Britain have been discovered, and that ranges have become better documented. Considering the small size of the British dragonfly fauna—approximately 47 resident or regular migrant species recorded prior to 1995—the seven new species recorded since then is, however, impressive, and suggestive of more than just increased observer awareness. The colonisation of Small Red-eyed Damselfly, in particular, is an event of significance—even past historic colonists such as Migrant Hawker seem to have taken some while to become widely established. Range changes now being observed for some of our more traditional residents are also substantial, and cannot simply be artefacts of improved coverage. Distribution maps for some species are out of date almost as soon as they are published, and Britain's dragonfly fauna seems to be in a state of flux. Given the nature of the trends being observed in Britain and the near Continent, and the fact that many other taxa, including birds and Lepidoptera, are behaving similarly, it would seem that change is being driven by some broad-scale controlling variable, such as climate. Indeed, in retrospect, modern changes seem to have begun somewhere in the 1980s, at roughly the same time as the British and Northern Hemisphere mean annual temperatures started to rise sharply above their 1961-1990 average (Hadley Centre 2006; University of East Anglia 2006). Many of the events of the last decade or so thus seem likely to be linked to climate change and global warming, whatever the precise underlying reasons behind this phenomenon. It will be of considerable interest to continue monitoring changes to the British dragonfly fauna in the years to come." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**8031.** Paulson, D. (2006): The importance of forests to neotropical dragonflies. In: Rivera, AC (ED). 2006. *Forests and Dragonflies*. 4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005. Pensoft Series Faunistica 61: 79-101. (in English) ["Dragonflies are quintessential forest animals, and forests are essential to them. The majority of odonate species are associated with forests, especially in the neotropical region. Forests are important, in furnishing a variety of larval habitats and favourable conditions for adults. Adult odonates can use both sunshine and shade available in forests, but forests also offer constraints to odonate activity. Forest odonates are poorer dispersers than those of open country, this factor contributing to the very high biodiversity of the tropics." (Author)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**8032.** Phillips, J. (2006): Reports from Coastal Stations - 2006: Hayling Island, Hampshire. *Atropos* 30: 60-61. (in English) [UK; *Sympetrum fonscolombii*] Address: not stated

**8033.** Samways, M. (2006): Threat levels to odonate assemblages from invasive alien tree canopies. In: Rivera, AC (ED). 2006. *Forests and Dragonflies*. 4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005. Pensoft Series Faunistica 61: 209-224. (in English) ["Dragonflies are well-known to be sensitive to light

conditions, with the various species having a range of light conditions that they prefer. When these conditions are changed, such as by human removal of the tree canopy, the odonate assemblage changes accordingly, with forest species being replaced by species preferring sunlit habitats. Most of the South African species, including the national and local endemics, are mostly species that inhabit sunlit habitats, especially those fringed with indigenous grasses and bushes. During the 20th century, many of the South African riparian corridors became invaded and radically transformed by alien trees, especially *Acacia* spp. As these trees are a threat to hydrological processes, a massive national 'Working for Water Programme' was started to clear riparian zones of these alien trees. These trees were also posing a major threat to local biodiversity, especially endemic odonates. Some odonate species were even on the verge of extinction as a result of shading of their habitats by the alien trees as well as from various synergistic impacts such as over-abstraction of water and damage to the banks by domestic livestock. The recovery of some of these odonate species as a direct result of alien tree removal has been absolutely remarkable, and is a strong message in support of genuinely effective and positive conservation action involving removal of alien trees." (Author)] Address: Samways, M. J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**8034.** Scott, D.A. (2006): Reports from Coastal Stations - 2006: Dursey Island, Co. Cork. *Atropos* 30: 85-86. (in English) [Ireland; *Sympetrum striolatum*; *Aeshna juncea*] Address: not stated

**8035.** Scott, M.A.; Scott, W.J.; Scott, T.R. (2006): Reports from Coastal Stations - 2006: Longstone Heritage Centre, St Mary's, Isles of Scilly. *Atropos* 30: 49. (in English) [UK; *Ischnura elegans*, *Sympetrum striolatum*, *Aeshna mixta*] Address: not stated

**8036.** Solly, F. (2006): Reports from Coastal Stations - 2006: Isle of Thanet, Kent. *Atropos* 30: 69-71. (in English) [UK; *Sympetrum flaveolum*, *S. fonscolombii*, *S. danae*, *S. sanguineum*, *A. mixta*] Address: not stated

**8037.** Spence, B. (2006): Reports from Coastal Stations - 2006: Spurn Point, East Yorkshire. *Atropos* 30: 79-81. (in English) [UK; *Sympetrum fonscolombii*, *S. flaveolum*] Address: not stated

**8038.** Strieder, M.N.; Ronchi, L.H.; Stenert, C.; Scherer, T.; Neiss, U.G. (2006): Biological measures and water quality indices in a micro-watershed polluted with urban and tannery sewage in south Brazil. *Acta Biologica Leopoldensia* 28(1): 17-24. (in Portuguese, with English summary) ["The article is based on a comparative study between biological measures based on the benthic macroinvertebrate communities and the Water Quality Index (WQI) determined by physical-chemical parameters. The data were collected in the downstream region of the Sinos river basin, in the State of Rio Grande do Sul, at six sites located in the longitudinal gradient of the Peão creek and in the Sinos river. The macroinvertebrate sampling followed the methodology proposed by the Environmental Protection Agency (EPA) of the United States of America and the water analyses were conducted according to standard methods established by the American Public Health Association (APHA). The macroinvertebrate communities were

evaluated by the Shannon-Wiener diversity index, the Hilsenhoffs Family-level Biotic Index and the Biological Monitoring Working Party (BMWP) Score System. These biotic indices presented a strong correlation with the WQI. Whereas the Shannon-Wiener diversity index and the BMWP biotic score system indicated a positive correlation with the WQI values ( $r = 0.680$  and  $r = 0.567$  respectively), the Hilsenhoff Biotic Index presented a negative correlation ( $r = -0.667$ ). Thus, the benthic macroinvertebrates are important indicators of the water quality and can provide relevant information for the water quality management program in the Sinós river basin." (Authors) Odonata are treated on the family level.] Address: Strieder, M.N., Programa de Pós-Graduação em Biologia – Universidade do Vale do Rio dos Sinós - UNISINOS, Caixa Postal 275, 93001-970, São Leopoldo, RS, Brasil. E-mail: strieder@unisinos.br

**8039.** Sulem; S.Y.; Brummett, R.E. (2006): Relative importance of various predators in *Clarias gariepinus* fry mortality in Cameroon. *NAGA, WorldFish Center Quarterly* 29(3/4): 74-77. (in English) [The authors study interspecific competition between fishes and dragonflies. "To estimate the relative importance of the most common predators of *C. gariepinus* fry, increasing levels of protection were afforded to exclude amphibians, aquatic arthropods and birds. At a stocking density of 10 larvae/m<sup>2</sup> in nursing ponds, fencing off amphibians resulted in a 28 per cent decrease in mortality. Holding fry in hapas to protect them from both amphibians and aquatic arthropods decreased mortality by an insignificant 5.7 per cent. Installation of bird-netting over the hapas reduced mortality by 21.7 per cent. The remaining 4.9 per cent of total mortality, which could not be explained, was attributed to opportunistic cannibalism, disease and/or handling stress. Increasing stocking density to 40/m<sup>2</sup> and, thus, reducing the food available per fry increased mortality by 28.3 per cent." (Authors) Aquatic arthropods were most notably dragonfly larvae that entered the pond after filling through direct oviposition from the airborne female. But: "The selection of such hapas as a defense against aquatic insects was based on the observation that these predators are common in open ponds at the PARC, but have never been found in hapas. Presumably, any insect eggs laid directly into a hapa are vulnerable to predation by the larval catfish." The breeding hapa is a box-like enclosure (2 m x 1.5 m x 1.0 m) stitched out of square-meshed mosquito netting cloth and tied on to bamboo poles fixed in ponds or tanks so that about 0.3 m is above the water level while its bottom is 0.3 m above the pond bottom. For more details see e.g.: <http://aquacomm.fcla.edu/1728/1/Better-Practice5opt.pdf>] Address: Sulem, S.Y., IITA-Cameroon (Attn: R.E. Brummett), c/o L.W. Lambourn & Co. Ltd., Carolyn House, 26 Dingwall Road, Croydon, Surrey CR9 3EE, United Kingdom

**8040.** Tam, T.-w.; Lee, V.L.F. (2006): 17th International Symposium of Odonatology at Hong Kong Wetland Park. *Hong Kong Biodiversity* 12: 16. (in English) ["The symposium provided a valuable platform for odonate experts to share their experience and research findings. Keynote speakers talked about the uses and values of dragonflies for monitoring freshwater ecosystem health, dragonfly biodiversity in South East Asia and dragonfly conservation in Africa. Other participants presented papers on dragonfly biology, morphology, ecology, conservation, taxonomy, reproduction and habitat enhancement. The symposium included a field trip to Sha Lo

Tung for participants to appreciate the 'winged jewels' and the Hong Kong countryside. There was also a five-day tour to Nankanshan mountain ranges, in mainland China, after the symposium. Nearly half of the participants joined the tour. They found it to be a great opportunity to examine this unexplored insect group, making a few new records (e.g. *Aciagrion tillyardi* and *Philosina* sp.) for the area. [...]" (Authors)] Address: not stated

**8041.** Taylor, P. (2006): Movement behaviours of a forest odonate in two heterogeneous landscapes. In: Rivera, AC (ED). 2006. *Forests and Dragonflies*. 4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005. *Pensoft Series Faunistica* 61: 225-238. (in English) ["The results from an empirical survey of *C. maculata* along streams in both a largely forested landscape and a more open, agricultural landscape are compared so simple measures of landscape structure, and the output from a behavioural simulation model based on a set of simple rules that govern how *C. maculata* accesses resources in the two landscapes. In the more open landscape, only proximity of the forest to the stream explains the empirical pattern of distribution, but in the more forested landscape, only simulated use of streams does. Further, populations are aggregated at broader spatial scales in the more open landscape. Collectively, the results suggest that *C. maculata* move more extensively when compared to the more closed, forested landscape, which has implications for landscape scale population structure." (Author)] Address: Taylor, P.D., Atlantic Cooperative Wildlife Ecology Research Network, Department of Biology, Acadia University, Wolfville, NS. B4P 2N5

**8042.** Troake, P. (2006): Reports from Coastal Stations - 2006: Gibraltar Point, Lincolnshire. *Atropos* 30: 78-79. (in English) [UK; *Erythromma viridulum*, *Sympetrum fonscolombii*, *S. flaveolum*] Address: not stated

**8043.** Tunmore, M. (2006): Reports from Coastal Stations - 2006: Lizard Peninsula, Cornwall. *Atropos* 30: 51-53. (in English) [UK; *Sympetrum fonscolombii* (attracted at light), *Ceragrion tenellum*] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: atropos@atroposed.-freereserve.co.uk

**8044.** Wagstaff, W. (2006): An unusual Migrant Hawker *Aeshna mixta*. *Atropos* 28: 84. (in English) [UK; "... around St Agnes, Isles of Scilly, on 16 VIII 2005 I noticed a hawker dragonfly zipping about over Bracken *Pteridium aquilinum* near the sandbar across to the Isle of Gugh. It was not easy to get views until it perched about 60ft from us, at which point I was able to set my telescope up. I soon realised that although it was probably a *A. mixta*, a species I had seen many times on Scilly, it showed far more orange on the abdomen compared to any I had seen before. [...] Having subsequently looked up *A. mixta* in the available literature I could find no reference to any hawker showing the orange that was so obvious in the field." Adrian Parr comments on the "abnormal" colour as follows: "As can be seen from the shape of the markings on abdominal segments S2/S3, this individual is actually a female *A. mixta*, despite the blue abdominal spots (the yellow markings in *A. mixta* are known to become bluish in some individuals, an effect in part probably related to ageing but likely to involve other factors). Females of many species of hawker show a more brownish ground colour to that of the

males with which most people are more familiar, and in *A. mixta* this is quite orangey. This individual nicely illustrates some of the subtle variation that it is difficult to convey in field guides, where there is space for only one or two illustrations."] Address: Wagstaff, W., 42 Sally Port, St Mary's, Isles of Scilly, TR210JE, UK

**8045.** Walia, G.K.; Sandhu, R.; Goyal, S. (2006): Cytogenetical analysis of *Nepogomphus modestus* from Palampur area of Himachal Pradesh, India (Gomphidae : Anisoptera). *Chromosome Science* 9: 99-100. (in English) [Primary spermatocyte chromosome analysis of *N. modestus* "showed haploid number  $n(\text{male}) = 12$  consisting of 11 bivalents and a univalent. In the complement,  $m$  chromosomes were lacking. The univalent, the largest element in the complement, is X chromosome. The result indicates that diploid chromosome number of *Nepogomphus modestus* is  $2n(\text{male}) = 23 = 22A+X$ . *N. modestus* is the first species described cytologically among three species known to genus *Nepogomphus*." (Authors)] Address: Walia, G.K., Dept of Zoology, Punjab University, Patiala-147 002 (Punjab), India

**8046.** Wallace, K.M. (2006): The feeding ecology of yearling, juvenile and sub-adult Nile crocodiles, *Crocodylus niloticus*, in the Okavango Delta, Botswana. Thesis presented in partial fulfilment of the requirements for the degree of Master of Science, Department of Conservation Ecology and Entomology, Faculty of Agricultural Sciences, University of Stellenbosch: 123 pp. (in English) [Young crocodilians primarily predate on insects (Coleoptera, Orthoptera and Odonata) and arachnids. These decrease in importance as the crocodilian increases in size. Larvae of *Orthetrum* sp., *Trithemis* sp., and *Phyllomacromia* sp. were identified as stomach items in young crocodiles.] Address: <http://etd.sun.ac.za/bitstream/10019/1300/1/Wallace,%20KM.pdf>

**8047.** Watanabe, M. (2006): Mate location and competition for mates in relation to sunflecks of forest floors. In: Rivera, AC (ED). 2006. Forests and Dragonflies. 4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005. *Pensoft Series Faunistica* 61: 259-268. (in English) ["Although most forest odonate species have a maiden flight away from water and sexually immature adults stay in the forests foraging for food, mature males of some species (e.g. *Platycnemis echigoana*, *Letes sponsa* and hyaline-winged males of *Mnais pruinosa costalis*) tend to remain in forests. To locate females in the forests, males mainly perch in sunflecks (a sunlit site in the forest floor) and adopt a sit-and-wait tactic. Some of them try to occupy perching sites. Territorial behaviour of males of *P. echigoana* is described at sunflecks in climax deciduous forests, Males showed patrolling flight along the periphery of the sunfleck. and hovering flight above it. suggesting that such flight was a display associated with the occupation of the sunfleck. Flight behaviour of the damselfly, *L. sponsa*, in The forest floor also showed male-male interference and the existence of a lek-like mating system is discussed. Some solitary males interfered in copulation in the forest floor, while others were also observed on the shoreline of the pond throughout the day. but they did not harass pairs ovipositing in tandem. Although hyaline-winged males of *M. pruinosa costalis* adopt, sneak tactics, a male that failed in occupying a perching site to intercept females entering the territory is called an 'opportunist', which moves around forest floor with sunflecks to search females. The longest copula dura-

tion was observed in the opportunists, suggesting that the entire sperm displacement must be occurred. These observations point to functional relationships with habitat selection and thermoregulation. Perching behaviour under direct, sunlight at sunflecks was shown to result in considerable variation in thermoregulatory properties. The relationships of thermoregulation to mate location strategy are different among species. A male that has been able to perch in direct sunlight will gain an advantage over an individual that lies not. and this advantage may manifest, itself in fights with other males. Forest structures with sunflecks are discussed from the viewpoint of habitat selection acting on female choice. These relationships are also relevant to other behaviours, particularly oviposition behaviour by water. Adults that showed mating behaviour in the forests oviposit in tandem by water. The importance of sunflecks in the forest floor is discussed in relation to the life history strategies of the damselfly species inhabiting forests." (Author)] Address: Watanabe, M., Dept of Biology, Faculty of Education, Mie University, Tsu, Mie 514-8507, Japan. E-mail: [watanabe@edu.mie-u.ac.jp](mailto:watanabe@edu.mie-u.ac.jp)

**8048.** Wightman, S. (2006): Dragonfly Conservation from the BDS: Cornmill Meadows Dragonfly Sanctuary. *Atropos* 30: 42-43. (in English) [UK, Essex; a new established Dragonfly Discovery Trail is introduced.] Address: not stated

**8049.** Wilson, K.D.P. (2006): New *Planaeschna* record from Hong Kong (Odonata: Aeshnidae). *Porcupine* 34: 5-6. (in English) [Verbatim: During late October 2005 I undertook a crepuscular survey of dragonflies at Wu Kau Tang. In the 10-20 minute feeding frenzy which takes place just before dusk, I captured a total of seven aeshnid specimens using a net. Six of the seven specimens were identified as *Gynacantha japonica* Barteneff and the remaining specimen belongs to the genus *Planaeschna* McLachlan. It may represent an undescribed species. No previous species of *Planaeschna* has been recorded from Hong Kong. The genus *Planaeschna* is mainly confined to Indo-China with outliers occurring in South China, Thailand, Burma, India (Assam) and Japan. Seven species of *Planaeschna* have been described from China, which are *P. celia* Wilson & Reels, 2001 (Hainan), *P. gressitti* Karube, 2002 (Guangdong), *P. maolanensis* Zhou & Bao, 2002 (Guizhou), *P. risi* Asahina, 1964 (Japan & Taiwan), *P. shanxiensis* Zhu & Zhang (Shanxi), *P. suichangensis* Zhou & Wei, 1980 (Guangdong, Guangxi & Zhejiang), *P. taiwana* Asahina, 1951 (Taiwan). In addition, a further five species of *Planaeschna* have been described from Vietnam. A total of 17 species have been described to date with nine of these named in the last 10 years. The Hong Kong female *Planaeschna* does not belong to *suichangensis*, which is the most widespread and abundant *Planaeschna* species recorded from Guangdong. Currently the female *gressitti* is unknown but the abdomen does not have yellow spots, adjacent to the transverse carina, which are linked to basal, ventral yellow spots to form a yellow median from S3-8. This ringed pattern is possessed by male *gressitti* (Karube, 2002) and in all other *Planaeschna* species the feature is exhibited by both males and females. The Hong Kong female does not have this feature so is most unlikely to belong to *gressitti*. Two new species of *Planaeschna* from central and north Guangdong await description but the Hong Kong female does not belong to either of these new species. It is closest to *risi* but further specimens are



nevertheless required, especially a male, before a clear placement of the Hong Kong *Planaeschna* can be made. *Planaeschna risi* was recorded from Guangxi by Wilson (2005) but evaluation of further material from Guangxi and Guangdong indicates this material does not in fact belong to *risi*, which is endemic to Taiwan and the Ryukyu islands. The Hong Kong female *Planaeschna* was collected over abandoned marshy agricultural land at San Uk Ha, Wu Kau Tang on the evening of 30 October 2005. *Planaeschna* larvae dwell in flowing streams usually in montane, forested areas. Most species are known from altitudes exceeding 500 m. Only one species, described from North Vietnam, *Planaeschna cucphuongensis* Karube, is known from lowland forest (Karube, 1999). The new *Planaeschna* species is likely to breed in montane forested tributary streams in the country park surrounding Wu Kau Tang but its larvae may utilize the tributaries or main stream flowing through the Wu Kau Tang basin i.e. the area covered by the Wu Kau Tang Outline Zoning Plan.] Address: Wilson, K.D.P., Dragonfly Ecological Services, 18, Chatsworth Road, Brighton, BN1 5DB, UK. E-mail: kdpwilson@gmail.com

## 2007

- 8050.** Abbott, J.C. (2007): Update on OdonataCentral. *Argia* 18(4): 7-8. (in English) [Problems with the data map server, activities to solve the problems, and improve the services of OdonataCentral are outlined.] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu
- 8051.** Abilhoa, V. (2007): Aspectos da história natural de *Astyanax scabripinnis* Jenyns (Teleostei, Characidae) em um riacho de floresta com araucária no sul do Brasil. *Revista Brasileira de Zoologia* 24(4): 997-1005. (in Spanish, with English summary) [Population structure, feeding habits and reproduction of *A. scabripinnis* are described, basing on the analysis of fish collected monthly from October 1998 to September 1999 in a Araucaria-forest stream of the upper Iguaçu River basin. Odonata larvae (without further specification) belong to the diet of this fish species.] Address: Abilhoa, V., Grupo de Pesquisas em Ictiofauna, Museu de História Natural Capão da Imbuia, Prefeitura de Curitiba. Rua Professor Benedito Conceição 407, 82810-080 Curitiba, Paraná. E-mail: vabilhoa@uol.com.br
- 8052.** Anselin, A. (2007): From goldfish to *Aeshna cyanea*. *Libellenvereniging Vlaanderen - nieuwsbrief* 1 (3): 2-3. (in Dutch, with English summary) ["Garden ponds may not be prime habitat for dragonflies, but if having the opportunity to develop in a rather "natural way" they may offer the observer some surprises. In a formerly concrete basin in the observers garden after about 15 years in total 32 *A. cyanea* emerged this year. Two of the freshly emerged dragonflies stayed on their support for more than 30 hours, probably due to bad weather. An adult one landed on a sunlit wall and stayed there for about 36 hours, sitting on the same spot." (Author)] Address: Anselin, Anny, Emiel Poetoustr. 13, 9030 Mariakerke, Belgium. E-mail: anny.anselin@inbo.be
- 8053.** Arbour, D. (2007): *Tholymis citrina* (Evening Skimmer) found in Oklahoma. *Argia* 18(4): 29. (in English) [Red Slough Wildlife Management Area, McCurtain County, Oklahoma, USA, 20-VIII-2006; first state record for Oklahoma, and seventh for USA] Address: Arbour, D., De Queen, Arkansas, USA. E-mail: arbour@windstream.net
- 8054.** Beaton, G.; Dobbs, M. (2007): 2006 summary of Odonate research in Georgia. *Argia* 18(4): 26-28. (in English) [Records of the 25 species/taxa with fewer than ten county records in Georgia, USA are documented.] Address: Beaton, G., 320 Willow Glen Drive, Marietta, GA 30068, USA. E-mail: giffbeaton@mindspring.com
- 8055.** Behrstock, R.A.; Rose, J.S.; Abbott, J.C. (2007): First Texas record and second U.S. occurrence of the Pale-green Darner, *Triacanthagyna septima* (Selys in Sagra, 1857) (Odonata: Aeshnidae). *Argia* 18(4): 28-29. (in English) [Anzalduas County Park, Hidalgo County, Texas, USA, 22-X-2006] Address: Behrstock, R.A., 9707 S.Gessner #3506, Houston, TX, 77071-1032, USA. E-mail: rbehrstock@cox.net
- 8056.** Behrstock, R.A.; Danforth, D.; Upson, S. (2007): List of the Odonata of Chihuahua State, Mexico, including new State records and the first Mexican record of *Argia alberta*, Kennedy, 1918. *Bulletin of American Odonatology* 10(2-3): 52-63. (in English, with Spanish summary) ["Twenty-one sites were visited in northwestern Chihuahua from 17 June to 30 September 2005. Based upon these visits, we present 35 records of Odonata (15 Zygoptera and 20 Anisoptera) that have not been reported or confirmed for Chihuahua. The total number of species known from the state is increased to 80. Just over one-half of the new records exhibit broad distributions, living from sea level to moderate altitudes. The remainder inhabit higher elevations. *Argia alberta* Kennedy, 1918, is reported for the first time from Mexico." (Authors)] Address: Behrstock, R.A., 10359 S. Thicket Pl., Hereford, AZ 85615, USA. E-mail: rbehrstock@cox.net
- 8057.** Beinlich, B.; Lohr, M. (2007): Zur Tierwelt des NSG „Grundlose-Taubenborn“ bei Höxter. *Beiträge zur Naturkunde zwischen Egge und Weser* 19: 41-59. (in German) [Nordrhein-Westfalen, Germany; 36 odonate species (31 autochthonous) are listed and briefly discussed with focus on the colonisation of new water bodies. Two years after creation, 23 odonate species could be recorded. Such a high diversity is discussed as result of dispersal of specimens from the nearby source populations established in the gravel pits of the alluvium of River Weser.] Address: Lohr, M., FH Lippe und Höxter, Fachgebiet Tierökologie und Landschaftsökologie, An der Wilhelmshöhe 44, D-37671 Höxter, Germany. E-mail: mlrohr@fh-luh.de
- 8058.** Bernardo, C. (2007): Seleção intra-sexual na libélula *Homeoura nepos* (Zygoptera: Coenagrionidae): conflito sexual e sistema de acasalamento. *Dissertação apresentada ao Departamento de Ecologia da Universidade de Brasília, como requisito parcial à obtenção do grau de Mestre em Ecologia, Instituto de Ciências Biológicas Departamento de Ecologia*: 60 pp. (in Portuguese, with English summary) ["Sexual dimorphism, agonistic interactions and the type of association between males and their sexual partners are characteristics subjected to selective pressures that determine the type of mating system of a species. In Odonata. Two types of mating systems occur: resource defense

polygyny and polygyny through scramble competition. In the latter type, there is no consensus concerning the role of sexual dimorphism, the influence of individual size in agonistic interactions and the type of selective pressures that influence the occurrence of tandem (post copulation guarding). In this study I used *Homeoura nepos* as the model species to analyze: 1) type of sexual dimorphism; 2) effect of environmental temperature, body size and local density of males, male distance to the shore, and residency upon agonistic interactions; 3) influence of male and female density at the oviposition site, and the effects of environmental temperature and wind upon tandem duration and upon oviposition events that occur during tandem; and 4) the effect of male body size on tandem duration. In the species analyzed, females had longer wings than males, male density at the sites where interactions occurred influenced agonistic encounters and resident males won more fights, supporting the hypothesis of asymmetric contest. Tandem duration was longer when other females were abundant in the immediate area and there was also a positive tendency between tandem duration and temperature, which suggests that environmental temperature can contribute to male permanence in tandem. Oviposition events were more abundant in sites with higher male density. The wind had no effect on the behaviours evaluated. It is assumed that *H. nepos* presents scramble competition polygyny. Nevertheless, some predictions of this hypothesis concerning post copulatory association were not met, indicating the necessity of more studies on the behaviour of tropical damselflies." (Author)] Address: Carolina Tavares da Silva Bernardo, no further details available

**8059.** Blue, D.V. (2007): First record of *Erythrodiplax basifusca* (Plateau Dragonlet) for California. *Argia* 18 (4): 30. (in English) [Imperial County, California, USA, 21-X-2006] Address: Blue, D.V., 3783 Ruelle San Raphael, San Diego, CA 92130, USA. E-mail: dblue@san.rr.com

**8060.** Cano Villegas, F.J. (2007): Odonatos del río Borosa (Jaén, sur de España) (Odonata). *Boln. S.E.A.* 41: 468-470. (in Spanish, with English summary) [13 Odonata species of the Borosa river (Jaen, southern Spain, Sierra de Cazorla. Segura y Las Villas Natural Park) are reported. Most of them are said to be rare or threatened in Spain.] Address: Cano Villegas, F.J., C/Montemayor, 4 1º-2; 14003-Córdoba, Spain. E-mail: fcanovi2@hotmail.com

**8061.** Claret, C.; Lienhardt, G.; Cartier, V.; Franquet, E.; Miralles, G. (2007): Composition et distribution des assemblages d'invertébrés dans la zone hyporhéique d'une plaine alluviale de la Moyenne-Durance. *Ecologia mediterranea* 33: 5-13. (in French, with English summary) ["Alluvial flood plains are among the most heterogeneous and dynamic ecosystems in the world. This heterogeneity is linked to the mosaic of terrestrial and aquatic habitats in surface waters, as well as to the functional relationships between surface and subsurface waters via the hyporheic zone (i.e. the ecotone between benthic and groundwater compartments). In natural systems, discharge and flow variability influence the connectivity among habitats and ecological conditions within habitats that contribute to the richness of flood plains. However, the natural dynamics of many rivers and streams have been impacted by regulation and low residual discharge that change the composition

and structure of invertebrate assemblages. In the Durance River, a regulated river in the south-east of France, the benthic fauna of the main channel has been widely studied, but the hyporheic zone has never been considered. In this study, we present some first data on the composition and the distribution of invertebrate assemblages from the hyporheic zone of an alluvial flood plain located in the middle stretch of the Durance. This study provides some biological information on a poorly known compartment of this sub-Mediterranean system." (Authors) Odonata are treated at the family level.] Address: Claret, Cécile, Institut méditerranéen d'écologie et de paléocéologie (IMEP, UMR-CNRS 6116), Univ. Paul-Cézanne Aix-Marseille 3 (case 441), 13397 Marseille cedex 20, France. E-mail: cecile.claret@univ-cezanne.fr

**8062.** Cortel, N., Gailledrat, M., Jourde, P., Précigout, L., Prud'Homme, E., (2007): Liste Rouge des Libellules menacées du Poitou-Charentes. Statut de conservation des Odonates et priorités d'actions. Juin 2007. Poitou-Charentes Nature, Fontaine-le-Comte. ISBN 2-9515017-8-1: 48 pp. (in French) [Poitou-Charentes, France; Between 2000 and 2005, more than 50000 data points of Odonata were recorded. Based on that, 27 species of the 70 regionally known species had to be included into the regional Red list of Odonata. According to the IUCN criteria, the situation details as follows: Regionally Extinct: 2; Critically Endangered: 6; Endangered: 6; Vulnerable: 7; Near Threatened 6. For details see: <http://www.poitou-charentes-nature.asso.fr/IMG/pdf/listerougedeslibellulesenpc.pdf>] Address: Poitou-Charentes Nature, 14 rue Jean Moulin – 86240 Fontaine-le-Comte, France. E-mail: pc.nature@laposte.net

**8063.** Daigle, J.J.; McPeck, M.A. (2007): DNA Status of *Enallagma coecum* Hagen (Purple Bluet) and *E. cardenium* Hagen. *Argia* 18(4): 13. (in English) ["I sequenced 702 base pairs of the cytochrome oxidase mitochondrial gene. Three individuals of *E. cardenium* differed from three *E. caecum* individuals at 32 sites - a genetic difference of 4.6%. Based on the accepted molecular clock estimate for this gene, this genetic difference suggests that these two species are derived from a common ancestor that lived approximately 2 million years ago. When placed in the overall molecular phylogeny for the *Enallagma*, these species group with *E. novaehispaniae*, but they appear to have been separated from *E. novaehispaniae* for 6-0 million years." (Authors)] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@netally.com

**8064.** De Block, M.; Stoks, R. (2007): Flight-related body morphology shapes mating success in a damselfly. *Animal behaviour* 74: 1093-1098. (in English) ["A small-male mating advantage has been only rarely encountered in territorial species and may be an artefact of selection on covarying traits linked to flight-related body morphology. Here, we explicitly tested its occurrence in the territorial damselfly, *Lestes viridis*, while taking into account two key traits shaping flight performance: relative thorax mass and wing asymmetry. Morphological correlates of mating success were determined by comparing sets of mated and unmated males in a natural population at two different collection dates. We showed consistent morphometric differences between mated and unmated males across both sampling dates, suggesting consistent sexual selection on these traits. Mated males were smaller, had a higher relative

thorax mass (proxy for flight-muscle ratio), and showed lower levels of fluctuating asymmetry in the hindwings compared with unmated males. Moreover, these patterns remained when taking their potential covariation into account, suggesting they were directly selected for. As such, we provided the first multivariate proof for a small-male mating advantage in a territorial species taking into account two other key traits related to flight-related body morphology. Given the assumed mechanistic base (low energy consumption and high flight manoeuvrability), we hypothesize that a small-male mating advantage may not be that rare in flying territorial species." (Authors)] Address: De Block, Marjan, Laboratory of Aquatic Ecology, Department of Biology, University of Leuven, Debe'riotstraat 32, B-3000 Leuven, Belgium. E-mail: marjan.deblock@bio.kuleuven.be)

**8065.** De Knief, G. (2007): Report of the European Odonata camp in Romania. Libellenvereniging Vlaanderen - nieuwsbrief 1(3): 12-13. ["The dragonfly fauna of Romania is one of the least known in Europe. To better understand its fauna, a European fieldwork meeting was organised in July 2007 with almost 30 odonatologists from 9 different European countries. In total 42 species were observed and an area of approximately 120 by 150 km was investigated. Along the streams in the mountains we found *Cordulegaster heros* and *C. bidentata* widely distributed. The fieldwork shows that it is likely that *C. boltonii* is absent in this region and is replaced by *C. heros*. Research on mountain lakes and peatbogs (1500-2000m asl) resulted in the discovery of *Somatochlora arctica* and several populations of *S. alpestris*. Both species were hitherto unknown or very doubtfully cited for Romania. Other remarkable faunistic findings were one of the first records of *Erythromma lindenii* and the first evidenced record of *Lestes viridis* for Romania." (Author)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**8066.** De Knijf, G. (2007): Excursion of the 12th of August to the nature reserve Hageven in Neerpelt. Libellenvereniging Vlaanderen —nieuwsbrief 1(3): 8-9. (in Dutch, with English summary) ["A total of 23 species were observed during the fieldtrip. The most interesting were the high numbers of *Lestes virens* (>120) and the rediscovery of *Somatochlora flavomaculata* at several fens. The main reason for this fieldtrip was to assess the status of the once rather common *Sympetrum depressiusculum* in the reserve. We only could find 3 and 4 individuals at two different localities in the reserve. This low number is very alarming since the species disappeared at most sites the last 5 years in Flanders." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**8067.** De Marmels, J. (2007): *Tepuibasis* gen. nov. from the Pantepui region of Venezuela, with descriptions of four new species and with biogeographic, phylogenetic and taxonomic considerations on the *Teinobasinae* (Zygoptera: Coenagrionidae). *Odonatologica* 36(2): 117-146. (in English) [The new genus *Tepuibasis* includes 7 species, all endemic to Pantepui; - 4 are new to science, viz.: *T. garciana* sp. n. from the Serranía de Maigualida, *T. nigra* sp. n. from Cerro Yutajé and Cerro Yaví, *T. rubicunda* sp. n. from Cerro Guanay, and *T. thea* sp. n., also from Cerro Guanay. *T. chimantai* (De Marmels, 1988), comb. n., *T. fulvum* (Needham, 1933),

comb. n. and *T. neblinae* (De Marmels, 1989) comb. n. are transferred to *Tepuibasis* from *Aeolagrion* Williamson, 1917. The new genus falls within *Teinobasinae* Tillyard, 1917 (= *Amphicneminae* Fraser, 1957 syn. n. = *Nehalenniinae* De Marmels, 1984 syn. n), and herein within *Teinobasini*, because of the presence of an articulated ventrobasal spur on the male cercus. Other noticeable features of *Tepuibasis* are a bifid apical penis segment, and a spiny, auricle-like process directed proximad, at the base of each of the lobes forming bifid tip. *Tepuibasis* evolved out of ancestral *teinobasine* stock with considerable morphogenetic potential reflected by the large number of recent genera present in cratonic S. America, which is equaled only by insular SE Asia. Taxogeny of *Tepuibasis* was triggered by the uplift of the Guyana shield, and the vicariant species are the result of secondary isolation through fracturing and partial erosion of these highlands." (Author)] Address: De Marmels, J., Inst. Zool. Agrícola, Fac. Agronomía, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com

**8068.** Duffey, A. (2007): Genetic structuring among naturally isolated dune lake populations; a microcosm of evolutionary processes on oceanic islands. Thesis submitted for the degree of Doctor of Philosophy, Queensland University of Technology, Faculty of Science, School of Natural Resource Sciences: XIII, 121 pp. (in English) ["Oceanic islands have been used as model systems for studies of evolution and speciation as the range of island sizes coupled with their known geological chronosequence make them ideal systems for the study of spatial and temporal variations in species diversity and distributions. These processes also occur on continental islands and mainland habitats but features of oceanic islands, notably their clearly delimited boundaries, natural isolation and simple geological composition make them more amenable to study. The perched dune lakes of Fraser Island, Australia share many of the properties of oceanic islands. The naturally isolated formation of the perched lakes, clearly delimited boundaries of the freshwater habitat and phase difference compared to the surrounding, terrestrial environment have significant implications for the biota these lakes support. Inhabitants of the perched dune lakes consist of the aquatic and semi-aquatic descendants of colonisers that were able to traverse a land barrier and survive in the oligotrophic acidic waters over subsequent generations. Barriers to ongoing gene flow among lake populations, are however likely to be different for species with different life history characteristics. I therefore sought to assess the effects of three different life history characteristics on post-colonisation inter-population gene flow. A representative species was selected to represent one of each of the following life history characteristics: • Aquatic species confined to lake for entire life cycle - freshwater shrimp *Caridina* indistincta, • Semi-aquatic species capable of terrestrial dispersal - freshwater turtle *Emydura krefftii*, • Semi-aquatic species capable of aerial dispersal - odonate *Orthetrum boumiera*. 137-250 individuals were sampled per species across six lakes separated by 1-6km. Regions of the mitochondrial genome were targeted and molecular screening methods developed and employed to assess the relative levels of post-colonisation gene flow among lake populations. Parsimony analysis of the 25 unique haplotypes identified in the species with no apparent inter-lake dispersal mechanism, the freshwater



shrimp *Caridina indistincta*, demonstrated that there was no sharing of derived haplotypes among lake populations. Star shaped genealogies were identified in four lake populations indicative of a population expansion and mismatch distribution analysis confirmed a recent population expansion estimated to have occurred no more than 200,000 years ago. This demonstrates that each of the perched dune lakes was colonised by *C. indistincta* soon after their inception but that no ongoing gene flow among lake populations has occurred. The population genetic structure of the species assessed which is capable of terrestrial dispersal suggests that although this species of freshwater turtle, *Emydura krefftii*, is capable of overland dispersal, gene flow among lake populations is limited. Even at the small spatial scale examined in this study, *E. krefftii* populations displayed a pattern of isolation by distance ( $r=0.854$ ,  $p<0.03$ ). Nested clade analysis also suggested a pattern of restricted gene flow with some long distance dispersal in recent times with long distance dispersal and a possible range expansion occurring historically. The species examined in this study that displayed the most extensive gene flow among lake populations was the dragonfly *Orthetrum boumiera* (population pairwise  $i>st$  all  $<0.1$ ). No relationship was found between genetic and geographic distance ( $r=-0.0852$ ,  $p>0.05$ ) and nested clade analysis could not identify a geographical association among haplotypes indicative of panmixia. While larval life stages of this species are fully aquatic, the winged adult stages of this species appear to be connecting seemingly isolated lake populations, at least at the spatial scale examined here. The results of this study have demonstrated that these perched dune lakes provide 'island like' models for recent biogeographic processes. The pattern of colonisation and subsequent diversification identified in these populations takes the form of in-situ 'genetic radiations' with those populations that are isolated forming monophyletic clades endemic to a single lake. The genetic diversity and endemism identified in this study has occurred over much smaller temporal ( $<500,000$  years) and spatial ( $<6.5$ km) scales than in studies of oceanic island fauna. However, the mode of formation of the perched dune lakes and the implications that their natural isolation and abiotic genesis have for the evolution of colonisers of these unique habitats has resulted in them being analogous to true oceanic islands." (Author) Address: Duffy, Angela, further details not stated

**8069.** Duran, M.; Kara, Y.; Akyildiz, G.K.; Özdemir, A. (2007): Antimony and heavy metals accumulation in some macroinvertebrates in the Yesilirmak River (N Turkey) near the Sb-mining area. *Bull. Environ. Contam. Toxicol.* 78: 395-399. (in English) [Mobility and the biological role of Antimony (Sb), its behaviour and transfer into food chain, are not well known. Total Sb concentrations in natural waters have been reported to be in the range of 0.01–1.1 mg/L (US EPA 1996). Acutely toxic concentrations of Sb are in the range of 22–36 mg/L fish (Lin and Hwang 1998), and 9–20 mg/L for daphnids (Anderson 2000), although the toxicity database is small. All these concentrations are above the typical range of concentrations in mine effluents. Therefore, Sb is unlikely to contribute appreciably to effluent acute toxicity. A decline in biodiversity of macroinvertebrate communities has generally related to metal pollution but Sb is not often studied in contrast to Zn, Cu and Cd. "This work presents total Sb, Cd, Pb, Zn and Cu accumulation in water, sediments, some macro-

invertebrate from active antimony mining area. We were interested in comparing heavy metal levels between mine impacted and non impacted sites. Also, this study addresses the impact of Sb-mining on biological components of macroinvertebrate of this part of Yesilirmak River." (Authors) *Leucorrhinia dubia* was identified in the effluent of the mine - certainly wrongly so as *L. dubia* does not inhabit running waters but mires and bogs. Accumulation of heavy metals is presented. The density of the odonate taxa is higher in the effluent of the mine compared with the unimpacted stretch of the water. Antimony and lead concentrations are higher in specimens from the effluent.] Address: Duran, M., Fac. of Science and Arts, Dept of Biology, University of Pamukkale, Denizli 20070, Turkey. E-mail: mduran@pau.edu.tr

**8070.** Dyatlova, E.S. (2007): First record of *Cordulia aenea* (Odonata, Corduliidae) in Dnieper Delta. *Vestnik zoologii* 41(1): 326. (in English) [One male of the regionally rare *C. aenea* was collected in Dnieper Delta: 46°29'04.27"N 32°25'37.98"E, Golaya Pristan' vicinity, left bank of Konka river, 17.05.2007 (M.O. Son).] Address: Dyatlova, Elena Sergeevna, Inst. Zoology, Faculty of Biology, I.I. Mechnikov University of Odessa, Odessa, Ukraine. E-mail: lena.dyatlova@gmail.com

**8071.** Ferris, G.; Rudolph, V.H.W. (2007): Responses of larval dragonflies to conspecific and heterospecific predator cues. *Ecological Entomology* 32: 283-288. (in English) ["1. In cannibalistic populations, smaller individuals are subject to predation by larger conspecifics, and small individuals commonly alter their behaviour in response to cannibals. Little is known, however, about the underlying cues that trigger such responses and how the behavioural responses to conspecific cannibals differ from heterospecific predators. 2. This study tests which cues are used for the detection of conspecific predators in the larva of the dragonfly *Plathemis lydia* and how the behavioural response to cannibals differed from the response to heterospecific predators. 3. Individuals were exposed to chemical cues, visual cues, and a combination of both cues from conspecifics as well as no predator and heterospecific predator controls during which their activity and feeding rates were observed. 4. Individuals increased their activity, spatial movement and feeding behaviour in response to either visual or chemical cues from conspecific predators, which was opposite to responses displayed with cues from heterospecific predators. Interestingly, the responses to visual and chemical cues from conspecifics combined were weaker than to either cue in isolation and similar to the no cue control. 5. The results clearly indicate that individuals are able to use chemical and visual cues to detect even very subtle differences in phenotype of conspecific predators. 6. The opposite response in behaviour when exposed to conspecific cannibals vs. heterospecific predators suggests that the presence of cannibals will increase the mortality risk of small individuals due to heterospecific predation. This risk-enhancement is likely to have important consequences for the dynamics of predator – prey interactions.] Address: Volker H. W. Rudolf, Dept of Biology, University of Virginia, 243, Gilmer Hall, Charlottesville, VA 22904, USA. E-mail: vrudolf@virginia.edu

**8072.** Gorb, S. (2007): An impressive time piece. *Argia* 18(4): 35. (in English) [Report of a visit to an exhibition of the miniatures made by Nikolay Syadrysty <<http://www.microart.kiev.ua>> in Kiev, Ukraine. "I was mostly

impressed by the clock, which almost perfectly casts a *Sympetrum* dragonfly with the complete working mechanism built into the eye." (Author)] Address: Gorb, S. E-mail: s.gorb@mf.mpg.de

**8073.** Grosser, N. (2007): Insekten der Wildflusslandschaft des Tagliamento (Friaul/Italien) - Ergebnisse eines studentischen internationalen Workshops 2006. *Entomologica Romanica* 12: 195-201. (in German, with English summary) [Italy; in August 2006, a student ecological survey of the Tagliamento river landscape was made. A total of 10 odonate species is listed. *Gomphus simillimus* would be a new record for Italy, and therefore urgently needs confirmation.] Address: Grosser, N., FH Erfurt, Landschaftsarchitektur, Leipziger Straße 77, 99085 Erfurt, Germany. E-Mail: grosser@fh-erfurt.de

**8074.** Hatfield, I. (2007): The dragonflies and damselflies of the Llano Estacado: In search of new species records on the Panhandle South Plains. *Argia* 18(4): 30-32. (in English) [Texas, USA, 2006; records of 14 species are documented.] Address: E-mail: jhatfield@teamumc.com

**8075.** Jeziorski, P. (2007): Collection of dragonflies (Odonata) in the Museum of National History in Olomouc and in the Regional Muzeum Valašsko in Valašské Meziříčí. *Cas. Slez. Muz. Opava (A)* 56: 145-148. (in English, with Czech summary) ["A list of dragonflies deposited in collections of the Museum of National History in Olomouc and in the Regional Muzeum Valašsko in Valašské Meziříčí is given. In total, the material from both museums contains 143 specimens of 28 species which were collected predominantly in Moravia; only a few specimens come from Slovakia." (Author)] Address: Jeziorski, P., Na Belidle 1, CZ - 735 64 Havírov-Suchá, Czech Republic

**8076.** Kadoya, T.; Washitani, I. (2007): An adaptive management scheme for wetland restoration incorporating participatory monitoring into scientific predictions using dragonflies as an indicator taxon. *Global Environmental Research* 11(2): 179-185. (in English) ["Here we propose an adaptive management scheme for wetland restoration using data collected by citizens to make scientific predictions. We assessed the potential advantages of such a scheme using a wetland restoration project conducted in a small floodplain area along the Matsu-ura River in Kyushu, Japan. For the case study, we compiled data provided by amateur naturalists on distribution patterns of dragonflies on the eco-regional scale, as well as ecological characteristics such as behaviour and habitat preferences. Based on this information, we predicted a species recovery trajectory at the wetland restoration site. By monitoring species recovery to test our prediction, we demonstrated that colonization by dragonfly species at the restored site could be predicted using species prevalence on the regional scale based on the nestedness rule. The data collected by the amateur naturalists were critical in making this prediction, which highlights the importance of citizen participation in the proposed scheme."] Address: Kadoya, T., Dept Ecosyst. Studies, Inst. Agr. and Life Sci., Bunkyo Ku, Univ. Tokyo, 1-1-1 Yayoi, Tokyo, 1138657, Japan. E-mail: aa47143@mail.ecc.u-tokyo.ac.jp

**8077.** Kim, K.g.; Jamg, S.K.; Park, D.W.; Hong, M.Y.; Oh, H.-H.; Kim, K.Y.; Hwang, J.S.; Han, Y.S.; Kim, I.K. (2007): Mitochondrial DNA sequence variation of the Tiny Dragonfly *Nannophya pygmaea* (Odonata; Libellul-

idae). *Int. J. Indust. Entomol.* 15(1): 47-58. (in English) ["*N. pygmaea* is one the smallest dragonflies in the world and listed as a second-degree endangered wild animal and plant in Korea. For the long-term conservation of such endangered species, an investigation on nation-wide genetic magnitude and nature of genetic diversity is required as a part of conservation strategy. We, thus, sequenced a portion of mitochondrial COI gene, corresponding to "DNA Barcode" region (658 bp) from 68 *N. pygmaea* individuals collected over six habitats in Korea. The sequence data were used to investigate genetic diversity within populations and species, geographic variation within species, phylogeographic relationship among populations, and phylogenetic relationship among haplotypes. Phylogenetic analysis and uncorrected pairwise distance estimate showed overall low genetic diversity within species. Regionally, populations in southern localities such as Gangjin and Gokseong in Jeollanamdo Province showed somewhat higher genetic diversity estimates than those of remaining regions in Korean peninsula. Although geographic populations of *N. pygmaea* were subdivided into 2 groups, distance- or region-based geographic partition was not observed." (Authors)] Address: Kim, K.-G.; E-mail: kimkg@me.go.kr

**8078.** Kouassi, N.; Peng, J.-x.; Li, Y.; Cavallaro, C.; Veyrunes, J.-C. (2007): Pathogenicity of *Diatraea saccharalis* densovirus to host insects and characterization of its viral genome. *Virologica Sinica* 22(1): 53-60. (in English) [This study on the sugar cane moth borer *Diatraea saccharalis* (Lepidoptera: Crambidae) includes a passing reference to Odonata, also known to be infected by densoviruses.] Address: Li, Y., College of Life Sciences, Huazhong Normal University, 430079 Wuhan, P.R. China. E-mail: liyi@mail.ccnu.edu.cn

**8079.** Martin, K. (2007): Chipmunks as predators of emerging Odonata. *Argia* 18(4): 12. (in English) ["During the summer of 2006, I observed four cases of *Gomphus vastus* predation by Eastern Chipmunk (*Tamias striatus*). All of the predation occurred on a sandy exposed beach located within the Turner's Pool area of the Connecticut River. The beach in this area is a wide (100 ft) sandy section, that lacks emergent vegetation and has only a few protruding logs. The beach area abuts a steeply forested slope, which provides ample cover for chipmunks. Predation was observed on 24 June 2006 between 8:00 and 8:40 AM, 3.7-3.9 m from the water's edge. As I sat at the edge of the study area, I observed several *G. vastus* nymphs emerging from the water, as they proceeded to crawl across the beach toward the bank, two chipmunks emerged from a small hole on the bank. The chipmunks ran down the hill and across to a large fallen log that partially extended over one side of the beach. As the first *G. vastus* neared the tip of the log, one of the chipmunks jumped down, pounced on the nymph, and carrying it in its teeth, ran up the bank and sat on a large rock. Another nymph neared the log, which the second chipmunk also grabbed and ate. While I was noting this behaviour, two more chipmunks emerged from opposite sides of the study area, and ran out onto the same log. Within a maximum period of five minutes, each of these chipmunks had also grabbed an emerging nymph. I did not observe any aggressive interactions between the four chipmunks. The chipmunks did not venture out onto the exposed section of the beach, but instead stayed near the fallen log, and the exposed roots that lined the

bank. Chipmunk predation of dragonfly nymphs may be a rare event, as during the 24 days (192 hours) of field-work conducted this season, these were the only such events that were observed." (Author)] Address: Martin, Kirsten, Environmental Studies, Antioch University New England, Keene, NH, USA. E-mail: Kirsten.Martin@antiochne.edu

**8080.** Mills, C. (2007): *Aphylla williamsoni* (Two-striped Forceptail) new for Arkansas. *Argia* 18(4): 34. (in English) [Okay Landing area of Millwood Lake in Howard County, Arkansas, USA 2-IX-2006] Address: Mills, C., Ogden AR 71853, USA. E-mail: cmills@arkansas.net

**8081.** Neiss, U.G. (2007): Estrutura da comunidade de microinvertebrados aquáticos associados a *Mauritia flexuosa* Linnaeus (Arecaceae). fitotelmata. na Amazônia Central, Brasil. Dissertação (mestrado)- INPA / UFAM. Manaus: X, 79 pp. (in Portuguese, with English summary) ["Adult *M. flexuosa* palms, known locally as buriti, have large individual axillae that can store substantial volumes of water (phytotelmata). The objectives of the present study were to compare the aquatic macroinvertebrate fauna associated with the axillae of palms occurring in groups and as isolated trees in order to verify the relationship between abiotic factors (volume of water, pH, electrical conductivity, dissolved oxygen and height above the ground) and the macroinvertebrates, in addition to inferring a trophic web for these organisms. A total of 60 axillae were sampled in May and June 2006. distributed over 17 rural and semi-urban locations in Manaus and President Figueiredo counties, Amazonas state, Brazil. A total of 31,135 individuals distributed over 19 macroinvertebrate taxa were collected. The families Chironomidae and Ceratopogonidae were the most abundant (32.2% and 29.6% respectively), followed by Oligochaeta (17.5%), Acarina (9.6%) and Culicidae [*Culex* (*Microculex*) *stonei* Lane & Whitman, 1943 (3.4%), *Culex* (*Mcx.*) *pleuristriatus* Lutz, 1903 (2%), *Culex* (*Mcx.*) *sp.1* (1.8%), *Culex* (*Culex*) *mollis* Dyar & Knab. 1906 (0.6%), *Wyeomyia* *sp.* (16 individuals) and *Toxorhynchites* (*Haemorrhoidalis*) *haemorrhoidalis* (Fabricius, 1794) (1 individual)]. For each axilla. the following averages ( $\pm$ SD) were calculated: individuals per axilla: 519 ( $\pm$ 348); volume of water: 1075 mL ( $\pm$ 972); temperature: 27.3 °C ( $\pm$ 1.4); pH: 5.6 ( $\pm$ 0.7); electrical conductivity: 25.2  $\mu$ S/cm ( $\pm$ 18.4) and dissolved oxygen: 7.3 mg/L ( $\pm$ 1.3). The most frequent taxa were *Culicoides* spp. and *Endotribelos* sp., both with 100% occurrence, followed by *Oligochaeta* (93.3%), *Acarina* (85%) and *Culex* (*Mcx.*) *stonei* (75%). The final multiple regression model relating macroinvertebrate abundance to the abiotic variables explained 25.3% of the variance ( $F_{4,55}=4.66$ ;  $p=0.0026$ ), volume being the only variable that was related to abundance ( $p=0.007$ ). Multiple regression for species richness was not significant ( $F_{4,55}=2.31$ ;  $p=0.069$ ). The numbers of Culicidae and Odonata individuals showed significant positive relationships with water volume ( $p=0.0009$  and  $p=0.045$ , respectively). The distribution of macroinvertebrates not differed between grouped and isolated palm trees (ANOSIM.  $R=0.037$ ;  $p=0.029$ ), the abundance of Odonata being influenced by the grouping of the trees ( $t$ -test,  $p=0.048$ ). The presence of Odonata larvae (top predators in the ecosystem) appears not to influence the abundance of Culicidae larvae in the axillae of *M. flexuosa* ( $t$ -test,  $p=0.382$ ). Analysis of the stomach content of Odonata representatives found in the buriti (Coe-

nagrionidae sp. and *Erythrodiplax* sp.) revealed Chironomidae, Ceratopogonidae and Culicidae as the most frequent prey. Diptera was the most frequent and abundant group, confirming the importance of this insect in communities associated with phytotelmatas. In comparison with other phytotelmata studies, the trophic web found in the *M. flexuosa* axillae is relatively complex, involving 20 taxa: the top predator of this web is represented by *Coenagrionidae* sp. and *Erythrodiplax* sp." (Author)] Address: not stated

**8082.** Novelo-Gutiérrez, R. (2007): El estudio de los odonatos (Insecta: Odonata) en México. Enfoques y perspectivas. In: Novelo-G., R. & R. Alonso-Eguialis (Eds.), 2007. Simposio Internacional Entomología Acuática Mexicana: Estado Actual de Conocimiento y Aplicación, Instituto Mexicano de Tecnología del Agua, Sociedad Mexicana de Entomología, Jiutepec, Mor., 105 pp: 9-23. (in Spanish, with English summary) ["The main approaches in which the odonates have been used as a subject of study in a worldwide scale are analysed, making emphasis on the Mexican panorama. While at worldwide scale odonates are studied under several approaches, in Mexico only three main lines of study have traditionally been developed: taxonomical, faunistical and ethological. In this country, taxonomical studies appear as the most consistent and diverse, while the ethological ones show other scale of analysis in the last years. Most of the odonate fauna studies come from students' thesis that are rarely published." (Author)] Address: Novelo-Gutiérrez, R., Depto Entom., Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**8083.** Ortega, H.; Rengifo, B.; Samanez, I.; Palma, C. (2007): Diversidad y el estado de conservación de cuerpos de agua Amazónicos en el nororiente del Perú. *Rev. peru. biol.* número especial 13(3): 189-193. (in Spanish, with English summary) ["The present paper describes the diversity and state of conservation, determined by a rapid biological inventory, carried out since October 24 to 30 of 2005, at the Amazonian waterbodies from Northeast of Peru, between 680 and 133 m of altitude, among Tarapoto (San Martín) and Yurimaguas (Loreto). Data and samples were collected in 26 stations. Plankton samples were collected with standard net (40 microns), benthos with Surber net and fishes with small mesh seines. Descriptions of each habitat included coordinates (UTM), and limnological characteristics (pH, temperature, conductivity, oxygen). The richness of species of fishes was of 95, dominated by Characiformes and Siluriformes. Richness of species in phytoplankton was of 74, in zooplankton, 22 species and in benthos of 20 species. The conservation state was determined using the Index of Biological Integrity (IBI) for fishes, and EPT index (Ephemeroptera, Plecoptera, and Trichoptera) for the aquatic environments. The results indicate that in the better zones conserved were found in the around of Yurimaguas." (Authors) Odonata are treated on the genus level.] Address: Ortega, H., Museo de Historia Natural, Facultad de Ciencias Biológicas, Universidad Nacional Mayor de San Marcos, Apartado 14-0434, Lima 14, Perú. E-mail: hortega@terra.com.pe

**8084.** Paulson, D. (2007): A suggested species code for odonates. *Argia* 18(4): 26. (in English) [The author reports on a species name system comprising of three



letters of the genus name and three or four of the species name. Such a system can be helpful taking quick field notes.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**8085.** Paulson, D. (2007): New Checklist Committee for DSA, Argia 18(4): 6-7. (in English) [The Common Names Committee of the Dragonfly Society of the Americas began its existence in 1996, and was charged with the responsibility for overseeing the common (English) names of the Odonata of Canada and the US after the publication in 1996 of an approved list of common names. The paper lists the names affected by the committee since the publication of the original list. The old committee has now been disbanded, to be replaced by a DSA Checklist Committee that will not only continue deliberations on common names but will also attempt to maintain an official checklist of North American Odonata, incorporating published taxonomic proposals.] Address: Paulson, D.R., Slater Mus., Univ. Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**8086.** Peeters, L.; Anselin, A.; Taily, M. (2007): Den Diel at Mol threatened? Libellenvereniging Vlaanderen - nieuwsbrief 1(3): 10-11. (in Dutch, with English summary) ["The richest site for dragonflies in the whole of Belgium and even the Benelux is the nature reserve Den Diel in Mol (Flanders). There are plans for building economically important shiplocks precisely in the reserve itself, but it remains uncertain if this could ever be the case as the site is protected by several nature protection measures. Nevertheless our Flemish Dragonfly Association will be vigilant for any further initiatives." (Authors)] Address: Taily, M., Hoonakkerdreef 35, 8791 Waregem, Belgium. E-mail: marc.taily@pandora.be

**8087.** Pessacq, P. (2007): Peristicta aeneoviridis Calvert, 1909 and P. forceps Hagen in Selys, 1860: re-descriptions and a new synonymy (Zygoptera: Protoneuridae). Odonatologica 36(2): 207-218. (in English) ["Peristicta misionera Jurzitza, 1981 is considered a junior synonym of P. aeneoviridis Calvert, 1909. The holotype of P. aeneoviridis and male P. forceps are re-described, and P. forceps female and larva are described for the first time." (Author)] Address: Pessacq, P., Laboratorio de Investigacion en Sistemática y Ecología animal (LIESA), Sarmiento 849, AR-9200 Esquel, Chubut, Argentina. E-mail: pablopessacq@yahoo.com.ar

**8088.** Prokopov, G.; Khrokalo, L. (2007): Sravnitelnyy analiz vidovykh kompleksov strekoz fisiko-geograficheskikh oblastey Kryma (Comparative analysis of Odonata species complexes from Crimean physical-geographical regions). Zapovedniki Kryma (Reservation of Crimea). Proceedings of IV international conference, 2th November 2007, Simferopol': 152-164. (in Russian) [A brief history of odonatological investigation in Crimea, Ukraine, and an analyse of the distribution of the 57 species - so far known to the region - among steppe and mountain geographical provinces (7 districts) are presented. Comparing of species abundance was provided due to Chekanovsky-Sørensen Index and cluster analysis. Need of conservation measures for rare species and their habitats are also discussed. (Lyudmila Khrokalo)] Address: Khrokalo, Lyudmila, P.O. Box 16, Kyiv-118, Ukraine 03118. E-mail: lkhrokalo@mail.ru

**8089.** Prys Witt, K.-P.; Riedel, J. (2007): Grüne Mosaikjungfer (Aeshna viridis) im Netz der Wespenspinne

(Argiope bruennichi). Naturkundliche Beiträge Soltau-Falingbostel 13/14: 52-54. (in German) [Grindau, Niedersachsen, Germany; 29-VII-2006, A. viridis was caught in the net of A. bruennichi. A record of A. affinis also is documented.] Address: Prys Witt, K.-P., Lessingstr. 2, 31535 Neustadt a. Rbge, Germany. E-mail: K.P.Prys Witt@freenet.de

**8090.** Randel, C.J.; Aguirre, R.; Peterson, M.J.; Sly, N.J. (2007): Invertebrate abundance at Rio Grande Wild Turkey brood locations. Journal of Wildlife Management 71(7): 2417-2420. (in English) ["Abundance of Rio Grande wild turkeys (Meleagris gallopavo intermedia) has declined in the southeastern Edwards Plateau (EP) of Texas, USA, whereas abundance has remained stable in the northwestern EP. Invertebrates are a critical protein source for poult <6 weeks posthatch. We collected invertebrates at brood and paired locations in both the stable and declining regions. Our objective was to determine if differences in invertebrate abundance existed in regions typified by declining versus stable Rio Grande wild turkey abundance. We found no difference in invertebrate abundance between brood or paired locations within regions, but invertebrate abundance, whether measured as dry mass or frequency, was greater in the stable region. Decreased invertebrate abundance may have contributed to the decline in wild turkey abundance in the southeastern EP." (Authors) The study includes Odonata (at the order level) data of biomass and frequency of occurrence.] Address: Randel, C.J., Sapphos Environmental, Inc., Pasadena, CA 91105, USA. E-mail: crandel@sapphosenvironmental.com

**8091.** Rensburg, A.J. (2007): Aquatic and terrestrial vegetation influence lacustrine dragonfly (order Odonata) assemblages at multiple life stages. Ph.D., The University of Wisconsin - Madison, 127 pp. (in English) ["Understanding how animals respond to habitat structure is a fundamental objective in ecology, but is particularly challenging when the animals require distinct habitats for different life stages. Although the majority of animals have spatially segregated life stages, research on habitat associations has generally been restricted to only one of the life stages. The relative importance of aquatic and terrestrial habitat structure is not well known for the order Odonata. In northern Wisconsin (USA) lakes, housing development contributes to heterogeneity in riparian and littoral vegetation structure. I surveyed odonate larval assemblages at 41 sites across 17 lakes. Based on mixed-effects multiple regressions, model selection identified site-level littoral macrophyte abundance as a key driver of larval odonate species richness, and riparian wetland plant abundance as the best predictor for odonate density. Subsequent field experiments on larval predation and adult site selection helped explain these patterns. Additional surveys of the most abundant family (Gomphidae) at 22 lake sites indicated that local larval densities depend most on recruitment, which I estimated from adult densities during the previous year. Densities of emergent Gomphidae skins (exuviae) were most related to densities of the later-instar (second-year) larvae, further suggesting that larval survivorship and movement are less variable spatially than recruitment from the previous life stage. Field experiments conducted at two South African lakes demonstrated how riparian tree structures alter adult odonate abundances. Riparian shade reduced the abundance of odonates at these potential breeding sites. Perch structures, added to separate experimental plots,

supported locally higher adult abundances, but dragonflies were not sensitive to perch structure density or diversity. Thus shade is the critical habitat component that should be addressed for odonate conservation in South Africa. Collectively, this research describes the role of habitat structure during multiple life stages. Field experiments demonstrate that generalist predators are sensitive to vegetation structure. The results suggest that riparian habitat selection by animals with complex life cycles can influence aquatic communities." (Author)] Address: Remsburg, Alysa, Dept Zoology, Univ. Wisconsin, 430 Lincoln Dr., Madison, WI 53706, USA. E-mail: aremsburg@unity.edu

**8092.** Rouag, R.; Djilalib, H.; Gueraiiche, H.; Luiselli, L. (2007): Resource partitioning patterns between two sympatric lizard species from Algeria. *Journal of Arid Environments* 69: 158-168. (in English) [Parc National d'El Kala, north-eastern Algeria; in the stomach of *Acanthodactylus erythrurus* one specimen of Odonata was found.] Address: Luiselli, L., F.I.Z.V. (Ecology) & Centre of Environmental Studies Demetra s.r.l., via Olona 7, I-00198 Roma, Italia. E-mail: lucamlu@tin.it

**8093.** Ruchin, A.B.; Loginova, N.G.; Kurmaeva, D.K. (2007): [Insects fauna of two forestries of "Smolny" National park (Mordovia Republic)]. *Fauna and ecology of insects. - Vol. 1. - Rostov-on-Don. - CBBP publishing: 24-33.* (in Russian) [Insects of two forestries in "Smolny" National Park (Republic of Mordovia) were studied. "Smolny" National Park (36.5 thousand ha) is situated in the NE part of Mordovia, Russia in landscapes of mixed forests of water-ice and the ancient alluvial plains on the left bank of Alatyr river. The river is remarkable for its young ravines. The bank is sloped and terraced. The floodplain has lakes, dry ducts and vast marshland. In 2004-2006, insects were studied on the territory of Mordovia. Among dragonflies, *Lestes dryas*, *Enallagma cyathigerum*, *Platycnemis pennipes*, *Coenagrion puella*, *C. pulchellum*, *Cordulia aenea*, *Sympetrum flaveolum*, *Aeshna viridis*, and *A. isosceles* were recorded. (Elena Dyatlova)] Address: Ruchin, A.B., Department of Biology, Mordovian State University, Bolshevitskaya Ul., Saransk 430000 Russia

**8094.** Rüppell, G.; Hilfert, D. (2007): NABU Winter-vortrag in Bad Gandersheim: Die Liebe der Libellen. „Kurzzeitfotos und Zeitlupen zeigen nie Gesehenes“. *Kurzeitung Bad Gandersheim* 1/07: 20. (in German) [A few generals on dragonflies are attended by information on the most recent film and book productions on Odonata done by the authors.] Address: Hilfert-Rüppell D., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: d.hilfert@tu-bs.de

**8095.** Sánchez-Fernández, D.; Abellán, P.; Camarero, F.; Esteban, I.; Gutiérrez-Cánovas, C.; Ribera, I.; Velasco, J.; Millán, A. (2007): Los macroinvertebrados acuáticos de las salinas de Anana (Álava, España): Biodiversidad, vulnerabilidad y especies indicadoras. *Boletín Sociedad Entomológica Aragonesa* 40(1): 233-245. (in Spanish, with English summary) ["The purpose of this study was to complete and update the available information on the diversity of aquatic macroinvertebrates in the Añana salt-pans. We also wanted to identify both the most threatened species and those with the highest value as indicators. Finally, we have tried to determine the conservation status and the main sources of environmental impact affecting the area. We found a

total of 84 taxa, 61 identified to the species level. The species with the highest value as natural indicators in Añana's saline environment are *Nebrioporus baeticus*, for lotic environments, and *Ochthebius notabilis*, for wells and salt-pans. Also, these two species were the most threatened in the study area. The area's main environmental problem is the progressive deterioration of the salt-pans caused by neglect and by organic contamination processes, eutrophication and loss of salinity in the lower part of the stream." (Author) Odonata are treated at the family level.] Address: Millán, A., Depto de Ecología e Hidrología. Facultad de Biología. Universidad de Murcia. 30100. Espinardo. Murcia. Spain. E-mail: acmillan@um.es

**8096.** Santos, S.A.P.; Cabanas, J.E.; Pereira, J.A. (2007): Abundance and diversity of soil arthropods in olive grove ecosystem (Portugal): Effect of pitfall trap type. *European Journal of Soil Biology* 43: 77-83. (in English) [Curiously enough, Odonata were represented in pitfall-traps; reasons for that are not outlined. Eventually they have been prey of wasps or ants, which in case of ants where caught regularly in pitfall-traps.] Address: Santos, Sónia, CIMO/Escola Superior Agrária, Instituto Politécnico de Bragança, Apt. 1172, 5301-855 Bragança, Portugal. E-mail: saps@ipb.pt

**8097.** Sathe, T.V.; Shinde, K.P. (2007): On a new species of the genus *Crocothemis* Brauer from western Ghats, Maharashtra. *Flora and Fauna (Jhansi)* 13(2): 367-370. (in English) [India; Odonata "are potential bio-control agents. Taxonomical studies were made on a new species, *Crocothemis rageshri* sp. n. The male is 32.3 mm long excluding anal appendages; head 3.2 mm long, thorax 9.5 mm long, fore wing 27.00 mm long, hind wing 26.5 mm long, abdomen 19.5 mm long, red; superior anal appendages 1.46 mm long, reddish.] No additional information are available, and this seems to be one more of the obscure "new species" "described" by the authors. (Martin Schorr)

**8098.** Schütte, K.; Razafindraibe, P. (2007): Chapter 4.3: Checklist of Dragonflies of the Littoral Forests near Tolagnaro (Fort-Dauphin). In: Ganzhorn, J.U., S.M. Goodman & M. Vincelette (Eds.): *Biodiversity, Ecology and Conservation of Littoral Ecosystems in Southeastern Madagascar, Tolagnaro*. SIMAB Series 11. ISBN 978-1-893912-00-7: 163-165. (in English, with French summary) [A total of 52 Odonata species is checklisted from the littoral forests of Petriky, Mandena, and Sainte Luce in southeastern Madagascar.] Address: Smithsonian Institution, Nat. Zool. Park, Center for Conservation Education & Sustainability. Monitoring & Assessment of Biodiversity Program, 1100 Jefferson Drive, SW, Suite 3123, Washington, DC 20560-0705, USA

**8099.** Sibley, F.C. (2007): Second record of *Anax ephippiger* (Vagrant Emperor) from the West Indies. *Argia* 18(4): 17. (in English) [Guan Island, British Virgin Islands, 20-X-2006] Address: Sibley, F.C., The Conservation Agency, 6 Swinburne St. Jamestown, RI 02835, USA. E-mail: fcsibley@empacc.net

**8100.** Statzner, B.; Bonada, N.; Dolédec, S. (2007): Conservation of taxonomic and biological trait diversity of European stream macroinvertebrate communities: a case for a collective public database. *Biodivers. Conserv.* 16: 3609-3632. (in English) ["The use of databases for the conservation of biodiversity is increasing. During the last decade, such a database has been cre-

ated for European stream macroinvertebrates. Today, it includes 527 sites that are the least human-impacted representatives of many stream types across many European regions. It includes data on the abundance of 312 invertebrate genera, several environmental site characteristics, collection methods, bibliographic data sources, and 11 biological traits of the genera (e.g. size, life cycle, food and feeding habits, described in 61 categories). The database will be useful in addressing many topics that are potentially relevant to biodiversity conservation. To illustrate this potential, we provide examples of how the data could be exploited. First, we describe the frequency of some taxonomic and biological characteristics (e.g. richness and diversity of genera and traits) of the macroinvertebrate communities and assess how these characteristics are related (e.g. how trait richness increases with genus richness). Second, we describe the frequency of some characteristics of the genera and traits (e.g. occurrence frequency, abundance, dispersion index) and again assess how these characteristics are related (e.g. how occurrence increases with abundance). Finally, we suggest how the database could be developed into a collective, publicly accessible database that covers stream types and regions of Europe more comprehensively." (Authors) Table 3 includes Brachytron, Diplacodes, and Enallagma.] Address: Statzner, B., CNRS-Ecologie des Hydrosystèmes Fluviaux, Université Claude Bernard Lyon 1, 69622 Villeurbanne Cedex, France. E-mail: statzner@biomserv.univ-lyon1.fr

**8101.** Subramanian, K.A.; Sivaramkrishnan, K.G. (2007): Aquatic Insects of India - A Field Guide. Ashoka Trust for Ecology and Environment (ATREE), Bangalore, India: 62 pp. (in English) [Larval Odonata are keyed at the family level on pages 26-29.] Address: Subramanian, K.A., Zoological Survey of India, Western Regional Station, Pune-411 044 Maharashtra, India. E-mail:subbuka.zsi@gmail.com

**8102.** Tailly, M.; Van der Schoot, P.; Wallays, H. (2007): Excursion of 1st of July 2007 to the Mol area. Libellenvereniging Vlaanderen - nieuwsbrief 1(3): 5-6. (in Dutch, with English summary) ["Although the weather was not optimal during the whole week and the day itself proved to be suboptimal from the meteorological point of view, 29 species were observed in this area which is the area with the most species in the whole of Belgium. The top of the day was a male of Anax parthenope at Den Diel." (Authors)] Address: Tailly, M., Hoonakkerdreef 35, 8791 Waregem marc.tailly@pandora.be

**8103.** Tennessen, K.J.; Hopper, A.E. (2007): New distribution records of Gomphus consanguis (Odonata: Gomphidae) in Tennessee. Journal of the Tennessee Academy of Science 82(1-2): 40-41. (in English) ["Gomphus consanguis was found in two counties in eastern Tennessee (McMinn and Meigs) in 2004-2005. The streams in which the species was found are impacted by farm operations, and population numbers appear to be low. The species is still considered rare." (Authors)] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**8104.** Torralba Burrial, A.; Ocharan, F.J. (2007): Dragonflies caught by plants (Odonata: Libellulidae). Entomologia generalis 30(4): 301-305. (in English, with German summary) ["Observations of a male of Crocothemis erythraea (Brullé 1832) which was caught by the

plant *Silene inaperia* (Caryophyllales: Caryophyllaceae) are reported. This plant presents sticky secretions on the stem, with seemingly defensive functions against herbivory. The dragonfly was caught when sticking the four wings to the stems of several plants. Other cases of capture of dragonflies by non insectivorous plants are reviewed." (Authors)] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**8105.** Upson, S.; Danforth, D.; Gonzalez-Soriano, E.; Behrstock, R.A.; Bailowitz, R.A. (2007): A preliminary checklist of the Odonata of Sonora, Mexico. Bulletin of American Odonatology 10(2-3): 23-51. (in English, with Spanish summary) ["Little detailed information is available on the Odonata of Sonora, which is located in northwestern Mexico. A recent paper (Paulson & Gonzalez-Soriano, 2006) listed 46 species for the state. We have documented 122 species based on seven years of field work, including two undescribed species (an *Argia* and an *Erpetogomphus*). Species accounts include locality data, flight period and distribution map by municipio (= county). An overview of Sonora's regional biocommunities is provided, including maps of major watersheds and municipio boundaries." (Authors)] Address: Behrstock, R.A., 10359 S. Thicket Pl., Hereford, AZ 85615, USA. E-mail: rbehrstock@cox.net

**8106.** Van der Schoot, P. (2007): Excursion of 28th of July 2007 to "Het Vinne" in Zoutleeuw. Libellenvereniging Vlaanderen - nieuwsbrief 1(3): 7-8. (in Dutch, with English summary) ["Again the weather was not good for an odonatological excursion in this recently restored lake. During recent years quite a number of interesting species has been found. But on this day the main observations were Little bittern and Black woodpecker." (Author)] Address: not stated

**8107.** Vinogradova, E.B. (2007): 5. Diapause in aquatic insects, with emphasis on mosquitoes. Monographiae Biologicae 84: 83-113. (in English) ["In Odonata both egg and larval diapauses occur in different instars (Corbet, 1980). Embryonic diapause occurs in certain temperate species, notably *Aeshna*, *Sympetrum*, and *Lestes*. For instance, *Lestes* congener oviposits in dry stems, the eggs undergo a bit of embryogenesis in autumn and then enter diapause in winter, at which time they are resistant to both low temperature and desiccation. Hatching of larvae is observed only after wetting and exposure to temperatures of 5°C and higher (Sawchin & Gillott, 1974). Such a response may be augmented in some other species of *Lestes* by sensitivity to photoperiod. Larval diapause is the most common diapausing stage for dragonflies in the temperate zone. Larval growth rate is controlled by the interaction of responses to temperature and photoperiod such that morphological development within and between certain instars is arrested or accelerated at different times of year (Corbet, 1980). A relatively simple example of the mechanism of environmental regulation is provided by *L. eurinus* from North Carolina, USA, where the populations overwinter in three larval instars preceding the final one (Lutz, 1968). Over a wide temperature range larvae of these instars develop more rapidly under summer than under winter photoperiods. Such a response magnifies the seasonal change in growth rate due to temperature. More complex responses to temperature and photoperiod exist among certain other species from



North Carolina, South Ontario, Sweden, and England. Their common feature is that one or more late instars became unresponsive to a long photoperiod stimulus in late summer or early autumn and thus enter diapause. The larvae of some dragonflies may also diapause in a dried (anhydrobiotic) state (Van Damme & Dumont, 1999). In Brazil, one larva of *Pantala flavescens* survived drought at least a few months and after flooding successfully completed metamorphosis. It is argued that early larval tolerance to drought may be common in *Pantala* contributing its success in semiarid environments; possible other species in which a similar phenomenon occurs are also listed by Van Damme and Dumont (1999). In *Enallagma hageni* it has been shown experimentally (Ingram 1975) that termination of diapause can be caused by exposure to a low temperature, regardless of photoperiod, or to short photoperiod at a permissive temperature. A critical element in the seasonal regulation of many dragonflies at higher latitudes is the annual reversal of response to photoperiod among one or more late instars at, or sometimes before, the autumnal equinox. This reversal can induce the population to molt synchronously at that time and can also establish a latent sensitivity to spring photoperiod (Lutz 1974). In European *Leucorrhinia dubia*, which spends its last winter mainly in the final instar, analogous differential responses to photoperiod operate within the final instar and thus enhance the responses to photoperiod and the degree to which each of several developmental phases is synchronized within the larval population (Norling 1976). Such responses prevent autumnal emergence and reduce temporal variation among overwintering larvae that are due to emerge the next summer." (Author)] Address: Vinogradova, Elena, University of Experimental Entomology and Biocontrol, Zoological Institute of the Russian Academy of Science, University emb., 1, 199034, St. Petersburg, Russian Federation. E-mail: vino@md12306.spb.edu

**8108.** Winterbourn, M.J.; Harding, J.S.; McIntosh, A.R. (2007): Response of the benthic fauna of an urban stream during six years of restoration. *New Zealand Natural Sciences* 32: 1-12. (in English) ["Okeover Stream flows through the University of Canterbury campus and has been subject to restoration since 1998. While initially spring-fed, its main source of flow is now aquifer water, which has been used for cooling university buildings. Water quality is generally good, but the low-gradient streambed includes substantial amounts of fine inorganic sediment and organic matter including deciduous tree leaves. Restoration activities include riparian plantings, channel shaping, substratum manipulations and additions, the construction of sediment traps and macrophyte management. Thirty aquatic invertebrate taxa (13-19 per year) have been recorded in annual surveys since 2000. *Paracalliope fluviatilis* (Amphipoda), Copepoda and Oligochaeta were most abundant in all years, whereas Mollusca and Trichoptera always made up <4% and <2% of individuals, respectively. Furthermore, cased caddisflies were found only in the two (of four) downstream reaches, whereas Copepoda were predominantly in the upper two reaches where flow was generally slower. Low annual MCI (69-84) and SQMCI (3.5-4.8) values indicated the fauna comprised mainly species that are tolerant of poor water quality or degraded habitat conditions. Our data indicate that the invertebrate fauna has yet to respond positively to the changes in physical habitat and riparian conditions made along Okeover Stream. The introduction of pulses of

poor quality water during heavy rainfalls, high levels of siltation, heavy metals in bed sediments, large accumulations of slowly decomposing leaves and an inadequate source of potential colonists may all contribute to the weak response of the invertebrate fauna to restoration activities." (Authors) *Xanthocnemis zealandica* is rare.] Address: Winterbourn, M.J., School of Biological Sciences, University of Canterbury, Private Bag 4800, Christchurch, New Zealand. E-mail: michael.winterbourn@canterbury.ac.nz

**8109.** Worthen, W.B.; Jones, C.M. (2007): Odonata survey of Union County, South Carolina. *Argia* 18(4): 32-33. (in English) [USA; from IV, 2004 through IX, 2006. Most of the sites were within the Enoree Ranger District of Sumter National Forest. We found 41 species of odonates, 34 representing new county records. We focused our attention on the watersheds of the Tyger River and Fairforest Creek, just north of Whitmire and south of Union." (Authors)] Address: Worthen, W.B., Dept of Biology, Furman Univ., Greenville, SC29613 USA. E-mail: worthen@furman.edu

**8110.** Yum, J. W.; Bae, Y. J. (2007): Description of the larva of *Copera tokyoensis* Asahina (Insecta: Odonata: Platynemididae) from Korea. *Korean J. Syst. Zool.* 23(1): 87-89. (in English) ["The larval stage of *C. tokyoensis* is described for the first time from Korea. The larva can be distinguished from other known larvae of *Copera* by the absence of lateral setae on the abdominal segments and by the labial palpal lobe, which bears three setae. Line-drawings of key characters and discussion on Korean *Copera* are provided." (Author)] Address: Yum, Jin-Whoa, E-mail: lestes93@me.go.kr

**8111.** Zhang, W. (2007): Computer inference of network of ecological interactions from sampling data. *Environ. Monit. Assess.* 124: 253-261. (in English) ["Both direct and indirect ecological interactions may occur in an ecosystem with large numbers of taxa. Traditional food web technique is a popular tool to measure the quality and health of the environment. Much of works must be done before constructing a food web for an ecosystem especially with many taxa. This food web is generally specific for some ecological interactions and fixed for a set of given species. It is therefore not an effective method for dynamic and prompt assessment of environment. Ecological interactions and their interactive intensity may be detected by sampling biological taxa in the field and by detecting various between-taxa distances or similarities. Network may clearly exhibit the complex interactions among biological taxa. Statistic tests on various distance or similarity measures and computer designs are required to infer the network. We develop an algorithm and software to infer the network of direct or indirect ecological interactions in ecosystem. It is a prompt and effective tool in monitoring and assessment of the environment. A redundant network may be inferred and drawn by computer based on the statistic tests on sampling data or the pathway information given in HTML file. Dominant taxa may be found in the network. In total of 16 distance and similarity measures, including Euclidean distance, Manhattan distance, Pearson correlation, partial correlation, point correlation, linkage coefficients, Jaccard coefficient etc., are provided to detect taxa pairs with significant parametric or nonparametric similarities, based on randomization tests and ordinary statistic tests. Criteria to use distance and similarity measures are discussed." (Author) The

interaction network also includes Odonata.] Address: Zhang, W., Research Institute of Entomology and State Key Laboratory of Biocontrol, School of Life Sciences, Zhongshan Univ., Guangzhou 510275, P.R. China. E-mail: LS71@zsu.edu.cn; zhangwenjun@scientist.com

## 2008

**8112.** Anonymus (2008): In Memoriam Dr. John Haarstad. University of Minnesota, Department of Entomology, Newsletter 2008: 24. (in English) [John Haarstad was the long time resident naturalist at the University of Minnesota Cedar Creek Ecosystem Science Reserve (CCESR) in East Bethel, MN, USA. November 17, 2008 he passed away at the age of 62. After graduating from Carleton College in Northfield, MN, he served in the Peace Corps in northern Nigeria teaching science. He later earned his M.S. degree in 1980 (Thesis Title: Temporal organization in dragonfly communities). An obituary was published in the Minneapolis Star Tribune on 11/20/2008.] Address: not stated

**8113.** Bambaradeniya, C.N.B.; Edirisinghe, J.P. (2008): Composition, structure and dynamics of arthropod communities in a rice agro-ecosystem. *Cey. J. Sci. (Bio. Sci.)* 37(1): 23-48. (in English) ["The study on terrestrial arthropod communities in rice agro-ecosystems was conducted in Bathalagoda, Sri Lanka. A total of 342 arthropod species was documented comprising 282 species of insects in 90 families and 17 orders and 60 species of arachnids in 14 families. Eight taxa new to Sri Lanka are reported. Majority of the insects documented were hymenopterans, dominated by bees and ants. Based on feeding habits, majority of the arthropods recorded were predators (149 species), dominated by spiders. However, in the rice field proper, abundance of phytophagous rice pests was higher than that of predators. Density fluctuations of predators and parasitoids were positively correlated. Species richness and diversity of terrestrial arthropods increased gradually with crop age, but declined following application of pesticides. Species diversity ( $H'$ ) of terrestrial arthropods during vegetative, reproductive and grain ripening stages and the fallow period were significantly different. Diversity of terrestrial arthropods in the field proper positively correlated with crop age and height of the rice plant, and in field bunds with the weed cover. Findings indicate that a stable relationship could be maintained between rice insect pests and their arthropod natural enemies through minimal biocide applications and manipulation of weed cover in the rice agroecosystem." (Authors) 19 odonate taxa, in most cases at the species level, are listed.] Address: Bambaradeniya, C.N.B., IUCN – The World Conservation Union, Asia Regional Office, Sri Lanka. E-mail: cnb@iucnsl.org

**8114.** Bedjanic, M.; Micevski, N.; Micevski, B. (2008): On the dragonfly collection in the natural history museum in Struga, Macedonia (Insecta: Odonata). *Biol. Macedonica* 61: 97-105. (in English) ["The collection of the Natural History Museum "Dr. Nikola Nežlobinski" in Struga contains 23 dragonfly species, collected in the first half and in the middle of 20th century in the vicinity of city Struga on the shores of Ohrid Lake. *Somatochlora flavomaculata* is new for the fauna of Macedonia. Its occurrence in the Balkans and south-eastern Europe is outlined and a short zoogeographical discussion is provided. A list of 37 dragonfly species hereto recorded

at Ohrid Lake and its surroundings is compiled." (Authors)] Address: Bedjanic, M., Kolodvorska 21b, SI-2310 Slovenska Bistrica, Slovenia. E-mail: matjazbedjanic@yahoo.com

**8115.** Bobeldyk, A.M.; Lamberti, G.A. (2008): A decade after invasion: Evaluating the continuing effects of Rusty Crayfish on a Michigan river. *J. Great Lakes Res.* 34: 265-275. (in English) ["In 2004, we revisited a Michigan stream invaded by rusty crayfish (*Orconectes rusticus*) to determine if this species continued to expand its downstream range and negatively impact the stream food web. Compared to a 1992 study, we predicted that rusty crayfish would increase in density and downstream distribution from a small lake, resulting in further reduction of in-stream resources such as organic matter, benthic invertebrates, and periphyton. To determine current crayfish distributions and impacts, we conducted a longitudinal survey of crayfish abundance, ran a 28-d leaf breakdown experiment, and sampled benthic substrates. Leaf packs of sugar maple (*Acer saccharum*) leaves were placed at three sites with differing crayfish densities (high, intermediate, and none). Breakdown rates were compared across the three sites and for two treatments (closed leaf bags excluding crayfish and open bags allowing crayfish access). Benthic invertebrates were sampled from leaf bags and invertebrates and periphyton were sampled from cobbles. In contrast to 1992, we found that the maximum downstream distance of rusty crayfish declined from 4 km to less than 3 km downstream from the lake. Leaves in open bags decayed significantly faster ( $k = 0.143$ ) than did leaves in closed bags at all sites ( $k = 0.079$ ) ( $p = 0.0005$ ). The site lacking crayfish had significantly higher densities of invertebrates compared to both high and intermediate crayfish density sites ( $p = 0.005$ ). Although we found that rusty crayfish reduced standing stocks of leaves and invertebrates, we did not detect measurable changes in periphyton biomass. Therefore, rusty crayfish have not dispersed further downstream since 1992, but where present, these omnivores significantly reduce resource availability via the consumption of leaf material and benthic invertebrates." (Authors)] Address: Bobeldyk, Angela, Department of Biological Sciences, University of Notre Dame, Notre Dame, Indiana 46556-0369, USA. E-mail: bobeldyk.1@nd.edu

**8116.** Boulton, A.J.; Boyero, L. Covich, A.P.; Dobson, M.; Lake, S.; Pearson, R. (2008): Are tropical streams ecologically different from temperate streams? In: Dudgeon, D. (Ed): *Tropical Stream Ecology*. San Diego: Academic Press. ISBN: 978-0-12-088449-0: 257-284. (in English) ["If tropical streams differ ecologically from temperate ones, we must be cautious in our extrapolation of ecosystem models developed in temperate-zone streams. Similarly, approaches and techniques used routinely in management of temperate streams may not be applicable in the tropics. Despite considerable variability in geological history, flow regime and geomorphology, streams in the tropics typically receive higher insolation and more intense rainfall, with warmer water and often relatively predictable floods. For many groups of aquatic taxa, tropical streams also harbour higher biodiversity than their temperate equivalents. Nonetheless, there is little published evidence for consistent differences in food-web structure, productivity, organic-matter processing and nutrient dynamics, or responses to disturbance which would indicate that the term 'tropical' has special significance

when applied to stream ecology. Instead, ecological processes in tropical streams appear to be driven by the same variables that are important in temperate ones. For example, biotic responses to drought and flooding are similar to those in temperate streams while in-stream productivity is limited by the same factors: nutrients, shading, disturbance, and trophic structure. Shredders are reputed to be rare in many tropical streams but this also is the case in many southern temperate streams, implying that models of leaf breakdown developed in the north-temperate zone may not have the universal applicability often assumed. Biome comparisons among temperate and tropical streams are confounded by the immense inherent variability of streams within both these zones, and the wide range of climatic and hydrological conditions – even in the tropics. Valid extrapolation of models and management strategies may be less a matter of tropical versus temperate streams but, instead, of ensuring comparability at appropriate scales and fuller understanding of ecological mechanisms, plus recognition of the magnitude and complexity of spatial and temporal variation in stream ecosystems at all latitudes." (Author) Many references to Odonata are made.] Address: not stated

**8117.** Bowman, N. (2008): Reports from coastal stations - 2007: Eccles-on-sea, Norfolk. *Atropos* 33: 69-70. (in English) [UK; *Calopteryx splendens*, *Brachytron pratense*, *Erythromma viridulum*, *Sympetrum fonscolombii*] Address: not stated

**8118.** Brame, W. (2008): Willow Emerald damselfly *Lestes viridis* Vander Linden in Suffolk. *Atropos* 33: 3. (in English) [17-VIII-2007; third or fourth UK record of *L. viridis* from Trimley, Suffolk.] Address: Brame, W., 27 Maidstone Rd, Felixstowe, IO11 9EE, UK

**8119.** Brooks, D.R.; Hoberg, E.P. (2008): Darwin's necessary misfit and the sloshing bucket: The evolutionary biology of emerging infectious diseases. *Evo. Edu. Outreach* 1: 2-9. (in English) ["Evolutionary studies suggest that the potential for rapid emergence of novel host-parasite associations is a "built-in feature" of the complex phenomenon that is Darwinian evolution. The current Emerging Infectious Disease (EID) crisis is thus a new manifestation of an old and repeating phenomenon. There is evidence that previous episodes of global climate change and ecological perturbation, broadly defined, throughout earth history have been associated with environmental disruptions that produce episodic bursts of new host-parasite associations, each of which would have been called an EID at the time of its first appearance. This perspective implies that there are many evolutionary accidents waiting to happen, requiring only the catalyst of climate change, species introductions, and the intrusion of humans into areas they have never inhabited before. [...] The trematode *Haematoloechus floedae* transmission dynamics, although specialized, are conservative across the genus, in each case involving a freshwater pulmonate snail, a dragonfly nymph, and a relatively large aquatic frog. Although most lung flukes are known from only a single snail species in natural infections, a number are capable of infecting a broader range of snails from the superfamily Lymnaeidae in the laboratory. The larvae, called cercariae, that emerge from the snail infect the second intermediate host, which, for all species studied to date is an anisopteran odonate (dragonflies). Members of the Lymnaeidae and the Anisoptera are widespread through-

out North American and Mesoamerica. Evolutionary conservatism in the physiology and ecology would allow the parasite to expand into novel territory; all that would be required is a species of lymnaeoid pond snail and a species of anisopteran dragonfly. Leopard frogs appear to be the ancestral frog hosts for *Haematoloechus* species. Within that historical context, however, *H. floedae* itself appears to have originated through a switch to bullfrogs, so the original host for *H. floedae* is bullfrogs. *Rana taylori* and *R. cf. forreri*, the hosts for *H. floedae* in Costa Rica, are leopard frogs. Parasite species can thus retain ancestral host utilization capabilities, even when they are not being used, which allows "new" associations to be formed through 'retrocolonization'." (Authors)] Address: Brooks, D.R., Dept of Ecology & Evolutionary Biology, University of Toronto, Toronto, ON M5S 3G5, Canada. E-mail: dbrooks@zoo.utoronto.ca

**8120.** Buden, D.W. (2008): First records of Odonata from the Republic of Nauru. *Micronesica* 40(1/2): 227-232. (in English) [Five odonate species are recorded from Nauru for the first time, and constitute the first records of Odonata from this island republic identified to species. None is endemic; all are widespread in the Indo-Australian region and the islands of the west central Pacific Ocean. *Diplacodes bipunctata* is the most common species throughout the island, but *Ischnura aurora* appears locally abundant, possibly seasonally. Breeding is confirmed for all species.] Address: Buden, D.W., Division of Natural Sciences and Mathematics, College of Micronesia-FSM, P.O. Box 159, Kolonia, Pohnpei, Federated States of Micronesia 96941. E-mail: donbuden@comfsm.fm

**8121.** Campero, M.; De Block, M.; Ollevier, F.; Stoks, R. (2008): Metamorphosis offsets the link between larval stress, adult asymmetry and individual quality. *Functional Ecology* 22: 271-277. (in English) ["1. It is poorly understood which traits translate larval stressors into adult fitness in animals where larval and adult stages are separated by metamorphosis. Although fluctuating asymmetry (FA) is often assumed to do so, especially in insects the relationship between larval stress, adult FA and individual quality is often absent. One suggested hypothesis for this is the higher mortality of low quality (hence more asymmetric) animals during metamorphosis (i.e. developmental selection hypothesis). 2. Here we test this hypothesis and also propose and test an alternative hypothesis where metamorphosis is stressful but not lethal and increases FA of all animals up to a certain level (i.e. stressful metamorphosis hypothesis). 3. We manipulated larval stress (food stress and pesticide stress) and measured FA before and after metamorphosis in *Coenagrion puella*. Additionally, we assessed the relationship between FA and individual quality variables measured at metamorphosis (age, mass and two immune variables: phenoloxidase (PO) and haemocyte number). 4. Before metamorphosis, FA reflected the combination of food and pesticide stress and was negatively related with mass and both immune variables after metamorphosis. These patterns were, however, offset after metamorphosis. Low mortality, not linked to FA during metamorphosis, indicates that developmental selection cannot explain this. Instead, the strong increase in FA up to equal levels across treatments during metamorphosis supports the stressful metamorphosis hypothesis. 5. Taken together, the developmental stage in which FA is measured may critically determine the reliability of FA as an indicator of



stress and of individual quality in insects." (Authors)] Address: Campero, Melina, Unidad de Limnología y Recursos Acuáticos, Univ. Mayor de San Simón, Cochabamba, Bolivia. E-mail: melina.campero@gmail.com

**8122.** Cano Villegas, F.J. (2008): Interesantes observaciones de artrópodos en Sierra Nevada (Granada, Andalucía). Boletín de la SAE 15 (ISSN: 1573-1666): 99-102. (in Spanish) [Pyrrhosoma nymphula and Ischnura graellsii were observed in the Sierra Nevada, Spain at 2220 a.s.l. (Parque del Mirlo resp. Estranque (Pradollano, Granada), 10-08-2004 resp. 09-08-2007 (UTM: 30S VG 647 055).] Address: Cano Villegas, F.J., C/Montemayor, 4 1º-2; 14003-Córdoba, Spain. E-mail: fcanovi2@hotmail.com

**8123.** Chaput-Bardy, A.; Lemaire, C.; Picard, D.; Secondi, J. (2008): In-stream and overland dispersal across a river network influences gene flow in a freshwater insect, *Calopteryx splendens*. Molecular Ecology 17(5): 3496-3505. (in English) ["Gene flow in riverine species is constrained by the dendritic (branching) structure of the river network. Spatial genetic structure (SGS) of freshwater insects is particularly influenced by catchment characteristics and land use in the surroundings of the river. Gene flow also depends on the life cycle of organisms. Aquatic larvae mainly drift downstream whereas flying adults can disperse actively overland and along watercourses. In-stream movements can generate isolation by distance (IBD) at a local scale and differentiation between subcatchments. However, these patterns can be disrupted by overland dispersal. We studied SGS across the Loire River in *C. splendens* which is able to disperse along and between watercourses. Our sampling design allowed us to test for overland dispersal effects on genetic differentiation between watercourses. Amplified fragment length polymorphism markers revealed high genetic differentiation at the catchment scale but the genetic structure did not reflect the geographical structure of sampling sites. We observed IBD patterns when considering the distance following the watercourse but also the Euclidean distance, i.e. the shortest distance, between pairs of sites. Altogether, our results support the hypothesis of overland dispersal between watercourses. From a conservation perspective, attention should be paid to the actual pathways of gene flow across complex landscapes such as river networks." (Authors)] Address: Chaput-Bardy, Audrey, Laboratoire Paysages et Biodiversité, UFR Sciences, 2 Bd Lavoisier, 49045 Angers cedex 01, France. E-mail: audrey.chaput-bardy@univ-angers.fr or chaputbardyaudrey@hotmail.com

**8124.** Chen, S. (2008): Erstfund von *Ceragrion tenellum* (de Villers, 1789) (Späte Adonislíbel) und *Erythromma lindenii* (Selys, 1840) (Pokal-Azurjungfer) im NSG "Heiliges Meer". Natur und Heimat 68(1): 26-28. (in German) [Nordrhein-Westfalen, Germany; *C. tenellum*: 20./25-VIII-2007; *E. lindenii*: 15./26-VIII-2007] Address: Chen, S., Hustr. 76, 44263 Dortmund, Germany. E-mail: simon.chen@lycos.de

**8125.** Choong, C.; Orr, B.; Dow, R. (2008): Checklist of dragonflies of UKM Campus, including Bangi Forest Reserve, Bangi, Selangor, Malaysia. Echo 2008: 4-5. (in English) ["In total, 74 species from 13 families were recorded. This compares with 235 species from 15 families recorded from Peninsular Malaysia and Singapore (Orr, 2005, Dow, Choong and Orr, 2007, Choong 2006,

Choong and Orr, unpublished records). To find more than 30 percent of a major region's rich fauna concentrated on a single university campus is we believe, some kind of record, and surely provides a magnificent opportunity for using these lovely insects for teaching and research." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**8126.** Clancy, S.P. (2008): Reports from coastal stations - 2007: Dungeness area, Kent. Atropos 33: 57-59. (in English) [UK; records of *Anax parthenope*, *Sympetrum fonscolombii*, and *Erythromma viridulum* are documented.] Address: not stated

**8127.** De Gennaro, D.; Rebagliati, P.J.; Mola, L.M. (2008): Fluorescent banding and meiotic behaviour in *Erythrodiplax nigricans* (Libellulidae) and *Coryphaeschna perrensi* (Aeschnidae) (Anisoptera, Odonata). Caryologia 61(1): 60-67. (in English) ["The species of Odonata are cytogenetically characterised by possessing holokinetic chromosomes, a post-reductional meiosis, an XX/XO (female/male) sex chromosome mechanism, m-chromosomes, and only one chiasma per bivalent. Chromosome studies were performed on males of *E. nigricans* and *C. perrensi* from Argentina. *E. nigricans* has  $n=12+XO$  and lacks m-chromosomes, while *C. perrensi* has  $2n=27$ ,  $n=13+XO$ , m-chromosomes and a large autosomal pair associated with the nucleolus. The meiotic behaviour of both species follows the general pattern of the order: the X chromosome is positively heteropycnotic during early prophase I; bivalents regularly show only one chiasma; all chromosomes migrate synchronously and almost parallel to the equatorial plane at anaphase I; at metaphase II the X chromosome is present in all the cells as a consequence of the post-reductional division, lies outside the metaphasic plate, and migrates asynchronously with the autosomes at anaphase II. In *C. perrensi*, the largest bivalent exhibits two chiasmata in a large proportion of cells, which is a very rare feature among dragonflies. Heterochromatin characterisation with DAPI-CMA banding reveals that *C. perrensi* does not show fluorescent banding, except for a CMA bright band at one telomeric region of the largest bivalent, associated with the NOR region; in *E. nigricans*, autosomes have small AT-rich telomeric blocks, except for the smallest pair, which exhibits conspicuous bands in both telomeric regions, one being GC-rich and the other AT-rich. Taking into account that the m-chromosomes have been found in other *E. nigricans* populations, their absence in the studied population may be due to the presence of such heterochromatic blocks." (Authors)] Address: Mola, Liliana Maria, Laboratorio de Citogenética y Evolución, Departamento de Ecología Genética y Evolución, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires. Intendente Güiraldes y Costanera Norte, 1428 Ciudad Universitaria. Ciudad Autónoma de Buenos Aires, Argentina. E-mail: limola@ege.fcen.uba.ar

**8128.** De Knijf, G. (2008): The season 2006 for dragonflies (Odonata) in Flanders: a review. Libellenvereniging Vlaanderen - nieuwsbrief 2(1): 9-13. (in Dutch, with English summary) ["Here we present the first results of the observations of dragonflies we received for the year 2006 for Flanders. A total of more than 6000 observations, the highest number ever, from 58 species were received. These were collected by 73 collaborators. All geographical regions and 40% of the total num-

ber of atlas squares (5x5 km UTM) were investigated. Three species, *Ischnura elegans*, *Anax imperator* and *Orthetrum cancellatum* were seen in more than 50% of the investigated squares. Remarkable was the still going on increase of *Calopteryx splendens* which was observed in 30% of the squares. Southern species as *Erythromma viridulum* and *Crocothemis erythraea* are getting quite common and are among the 20 most reported species in Flanders. Other southern species as *Lestes barbarus*, *Sympetrum fonscolombii*, both mentioned in more than 10% of the squares, and *Aeshna affinis*, *Anax parthenope* and *Orthetrum brunneum* were observed at several localities. The decline of some Red List species seems still to be going on. The number of localities for some of them, e.g. *Coenagrion lunulatum*, *Gomphus vulgatissimus*, *Sympetrum depressiusculum* and *Leucorrhinia rubicunda* has fallen to less than three. They can be considered as becoming extinct in Flanders in the near future if their decline continues." (Author)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**8129.** Deans, M. (2008): Reports from coastal stations - 2007: Bawdsey Peninsula, Suffolk. *Atropos* 33: 65-66. (in English) [UK, *erythromma viridulum*; *Sympetrum striolatum* was caught at light on 8 and 13 August, 2007] Address: not stated

**8130.** Dow, R.; Reels, G. (2008): List of species recorded at Gunung Mulu National Park, Sarawak, Malaysian Borneo in 2005-2006. *Echo* 2008: 2-3. (in English) ["Gunung Mulu National Park, with an area of 544 km<sup>2</sup>, is the largest national park in Sarawak. It is located in northeast Sarawak close to the border with Brunei. Gunung Mulu, a sandstone massif, dominates the park. The park covers an altitudinal range from close to sea level up to 2376m at the summit of Gunung Mulu. A number of smaller limestone mountains run along the western face of Gunung Mulu. With the exception of mangrove forest, all of the main vegetation types found in Sarawak are represented within the park: mixed dipterocarp forest (MDF), montane forest, limestone forest, alluvial forest (including freshwater swamp forest), kerangas (tropical heath) forest and peat swamp forest. Collecting was carried out from 16th April to 24th April 2005 and from 4th February to 20th February 2006. At present, some 106 species are known from the park, of which at least four represent probable new species." (Authors)] Address: Dow, R.A., 6 Bramley Av., Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**8131.** Durst, S.L.; Theimer, T.D.; Paxton, E.H.; Sogge, M.K. (2008): Age, habitat, and yearly variation in the diet of a generalist insectivore, the Southwestern Willow Flycatcher. *The Condor* 110(3): 514-525. (in English, with Spanish summary) ["Characterizing avian diet is complex, especially for generalist insectivores, as food resources can vary over space and time, and individuals of different sexes and ages may consume different food. We examined diet of a generalist insectivore, the Southwestern Willow Flycatcher (*Empidonax traillii* extimus), at Roosevelt Lake in central Arizona from 2000 to 2004, determined from 344 fecal samples. We found that five prey categories accounted for 70% of the proportional abundance in flycatcher diet: Hymenoptera, Diptera, Cicadellidac, Coleoptera and Formicidae, although the relative amounts of these and other taxa differed significantly among years. We detected no

differences in diet between sexes of adults, but adults and nestlings differed, with higher proportions of Hymenoptera in adult samples and more Diptera in nestling samples. Using a subset of samples, we compared flycatcher diet in habitat patches dominated by native cottonwood (*Populus fremontii*) and willow (*Salix gooddingii*), exotic salt cedar (*Tamarix ramosissima*), or a mix of these tree species. We found that prey groups varied significantly among habitats in only one year, 2002, with Araneae, Lepidoptera and Odonata significant indicators of native habitat, Cicadellidae and Hymenoptera significant indicators of exotic habitats, and Homoptera a significant indicator of mixed habitat. In 2002, a severe drought resulted in reduced prey base and near total reproductive failure, but we detected no major shift in the composition of adult diet during that year, suggesting that for generalists like the Southwestern Willow Flycatcher, overall insect abundance may be a more important driver of productivity than abundance of specific prey taxa." (Authors)] Address: Durst, S.L., Department of Biological Sciences, P.O. Box 5614, Northern Arizona University, Flagstaff, AZ 86011, USA. E-mail: scottdurst@fws.gov

**8132.** Dyatlova, E. (2008): [Study of amphibiotic insects at Zoological field station of Odessa National I.I. Mechnikov University in Low Dniestr // Significance and prospects of stationary research on conservation of biodiversity]. Proceedings of International Scientific Conference devoted to the 50th anniversary of high-mountain "Pozhizhevskia" Biological Station. - Lviv-Pozhizhevskia, 23-27 September 2008.- Lviv 2008: 129. (in Russian) [Dragonflies are currently well-studied in the Low Dniestr River (SW Ukraine) - 33 species have been recorded since the beginning of this century but have almost never been studied here before. Among the species protected at the European level *Gomphus flavipes* occurs. *Anax imperator* and *Erythromma lindenii* are nationally protected in Ukraine. In field and laboratory conditions the fecundity of two *Ischnura elegans* morphs have been studied here. Also mite infestation, morphometric analysis and density of each morph in population were studied. Dragonflies in Low Dniester were divided in 6 groups according their flight periods. Trichoptera and Ephemeroptera also have been studied at the Low Dniestr. These insects were attracted to light. (Elena Dyatlova)] Address: Dyatlova, Elena, Institute of Zoology, Faculty of Biology, I.I. Mechnikov University of Odessa, Odessa, Ukraine. E-mail: lena.dyatlova@gmail.com

**8133.** Ebejer, M.J.; Degabriele, G.; Sciberras, A. (2008): An annotated checklist of Odonata of the Maltese Islands, with evidence for a recent influx of species. *Libellula* 27(1/2): 133-145. (in English, with German summary) ["Mainly within the last ten years, the number of species of Odonata known from the Maltese Islands has increased from nine resident and two migrant species to 13 residents and two migrants. The former migrant species now regularly breed in the islands. The literature on the Odonata of Malta is reviewed, and an overview of the flight season data is given. Records of all species are given for the first time and some reasons for the recent increase in the number of species are discussed." (Authors)] Address: Ebejer, M.J., Entomology Section, Department of Biodiversity and Systematic Biology, Amgueddfa Cymru National Museum Wales, Cathays Park, Cardiff CF10 3NP, UK. E-mail: martin.ebejer@btinternet.com

**8134.** Ewuim, C.S. (2008): Odonata fauna of contrasting semi-aquatic and terrestrial ecosystems in Awka, Nigeria. *Animal Research International* 5(1): 783-786. (in English) ["The sweep net was used to study the Odonata fauna of the Permanent Site of Nnamdi Azikiwe University, Awka for a twelve-month period. The Odonata species collected from the marshy plot included *Orthetrum chrysostigma*, *Ceriatrigon glabrum*, *Platycnemis subaequistyla* Fraser and *Nesciothemis nigeriensis* while *Hemistigma coronata* and *Palpopleura lucia* were obtained from the fallow plot. Only two species - *Palpopleura lucia* and *Hemistigma albipuncta* were collected from the cultivated plot. A statistical analysis of the collections of these insect species using Analysis of variance (ANOVA) failed to show any significant differences at F-ratio of 0.458 and p-value of 0.6339, even though higher numbers of species were obtained at the wetland. Similarly the sweep net catches failed to show any significant difference using the Fisher's Least Significance Difference(F-LSD) test at 5% probability level. The higher catches of the odonates at the marshy plot was traced to the nature of the habitat. The role of these sub aquatic species as indicators of ecosystem quality was highlighted." (Author)] Address: Ewuim, C.S., Department of Zoology, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria. E-mail: cewuim@yahoo.com

**8135.** Fernandez, L.; Springer, M. (2008): El efecto del beneficiado del café sobre los insectos acuáticos en tres ríos del Valle Central (Alajuela) de Costa Rica. *Rev. Biol. Trop.* 56 (Suppl. 4): 237-256. (in Spanish, with English summary) ["The effect of coffee processing on aquatic insects in three rivers from the Central Valley (Alajuela) of Costa Rica: In Costa Rica one of the greatest sources of organic pollution in the rivers has been the residual material generated from the processing of coffee beans. In this study, the usefulness of aquatic insects as bioindicators is examined in order to measure the effect of spills of coffee processing plants into two rivers of the Central Valley. The study was conducted at three different coffee processing plants at the three most important moments of the harvest, at the beginning, the peak and at the end. On each of the three dates, biological samples were taken 50m up- and 50m down-stream from the point where the coffee processing plants discharge their liquid wastes. The following physical and chemical factors were also measured: DBO, DQO, pH, temperature, fats and oils, sedimentable solids, dissolved oxygen and the discharge of the river. Systematic samples of aquatic insects were taken in order to obtain relative abundance, taxa richness, diversity (Shannon-Wiener), similarity (Bray-Curtis) and biological index B.M.W.P.' (Biological Monitoring Working Party) adapted for Costa Rica. Physical-chemical results showed a decrease in the amount of dissolved oxygen and in the discharge of the rivers. In addition, in some cases very high values of DBO and DQO were reached as the season advanced; nevertheless, the majority of the measurements taken were within the limits established by the laws of Costa Rica. Populations of insects increased down stream as the season advanced, due mainly to an increase in the density of *Chironomus* larvae (Diptera) which became the dominant group. At the same time other pollution sensitive taxa diminished or disappeared. This was reflected by decreasing taxonomic richness and a low diversity index. Similarity between samples taken up and down stream was less than half (0,41), and comparing the

three main harvest moments, the highest point was very similar to the end of the harvest (0,81) and both were very different from the beginning of the harvest (0,26). According to the modified biological index BMWP, water quality diminished to category "strongly contaminated" at the highest point of the harvest. The results indicate that there is an important effect on the populations of aquatic insects caused by the period of harvest, which is not necessarily detected by the standard analysis required by law. Therefore we recommend that the fauna of aquatic macroinvertebrates should be included as a mandatory procedure in water quality testing, the capacity of the treatment plants should be evaluated, and the standard limits established by present laws in Costa Rica, should be critically analyzed." (Authors) Odonata (*Hetaerina*, *Argia*, *Brechmorhoga*, *Perithemis*, *Palaemnema*) are treated on the genus level. ] Address: Fernández, L., Escuela de Biología, Universidad de Costa Rica, 2060 San Pedro, San José, Costa Rica. E-mail: leofq@hotmail.com; springer@biologia.ucr.ac.cr

**8136.** Glitz, D. (2008): Erstnachweis von *Coenagrion scitulum* in Rheinland-Pfalz (Odonata: Coenagrionidae). *Libellula* 27(1/2): 33-37. (in German, with English summary) ["*C. scitulum* was recorded during July 2006 for the first time in Rhineland-Palatinate, Germany including breeding records. Successful reproduction was also evidenced at the same site, which is situated in the southern 'Rhenish Bay', during the summer of 2007. The breeding records pertained to newly emerged males, together with copulation wheels and oviposition. The closest known record of *C. scitulum* was taken near Zülpich in North Rhine-Westphalia at a distance of 40 km from the new site." (Author)] Address: Glitz, D., Vischeler Str. 50, 53505 Kaienborn, Germany. E-mail: Glitz-Kalenborn@t-online.de

**8137.** Günther, A. (2008): Erste Nachweise der Feuerlibelle (*Crocothemis erythraea*) im Regierungsbezirk Chemnitz. *Mitteilungen des Naturschutzesinstitutes Freiberg* 4: 68-71. (in German) [Documentation and discussion of records of *C. erythraea* from VII-2008 in the counties (Landkreise) Freiberg and Zwickau, Sachsen, Germany.] Address: Günther, A., Naturschutzinstitut Freiberg, Waisenhausstraße 10, D-09599 Freiberg, Germany. E-mail: a.guenther@abo.freiepresse.de

**8138.** Harvey, R.; Higgott, J. (2008): Reports from coastal stations - 2007: Minsmere RSPB Nature Reserve, Suffolk. *Atropos* 33: 67. (in English) [UK; *Symptetrum fonscolombii*, *Anaciaeschna isosceles*, *Erythromma viridulum*] Address: not stated

**8139.** Heckman, C.W. (2008): *Encyclopedia of South American Aquatic Insects: Odonata -Zygoptera*. Springer-Verlag. ISBN: 9781402081750: VIII, 692 pp. (in English) ["Zygoptera completes the two volume work on the order Odonata in the *Encyclopedia of South American Aquatic Insects*. A brief review of the biology of the group includes illustrations of the main morphological features as well as explanations of alternative systems for naming the wing veins and other characteristics commonly used to distinguish the species. This will show the user of the identification keys in the volume the alternative names for the anatomical structures most frequently encountered in the literature. The sections on the morphology of the adults and larvae are followed by brief discussions of ecological and zoogeographical factors influencing the distribution of the



dragonflies and instructions on the various methods used to observe, collect, preserve, and examine specimens. Most of the book is devoted to keys that facilitate identification of both adults and those larvae which have already been described. For the first time, all of the available information needed to identify the adults of all recognized species inhabiting South America has been compiled from a large number of individual taxonomic works written in six languages during the past two centuries. Separate keys are provided to identify all larvae that have been positively identified and described prior to early 2007. In addition to the descriptions of the morphological features used to distinguish the species, the keys provide the known ranges listed by country and by states within Brazil, as well as the synonyms most likely to be encountered in the literature. The publications cited with the species names and in the keys can be found compiled in an extensive bibliography, informing the user where more extensive species descriptions and additional information about each species can be located. Although taxonomic revisions are deliberately avoided, suggestions for additional research and the opinions of experts concerning imminent taxonomic changes are provided where appropriate. To provide the user of the keys with maximum assistance in making reliable identifications, the book is richly illustrated with pen and ink drawings of thousands of individual morphological structures arranged in 767 figures. It is certain that many significant changes will occur in the systematics of South American damselflies in the future, and this book is meant to provide the impetus needed to accelerate the work of nomenclature and revision. Meanwhile, it will provide a comprehensive overview of the South American Zygoptera that has hitherto remained almost unobtainable to most South American scientists because of the great difficulties in obtaining the numerous publications from numerous countries in which the original descriptions of species and taxonomic revisions have appeared. It also provides student entomologists with a basic text for learning what they need to know to work effectively with the Zygoptera of South America and adjacent regions." (Publisher)]

**8140.** Heidecke, F.; Lindemann, K. (2008): Erster Nachweis der Schabrackenlibelle für Sachsen-Anhalt in der Goitzsche. *Naturschutz im Land Sachsen-Anhalt* 45(2): 60. (in German) [Anax ephippiger, 14-VI-2007, Goitzsche near Bitterfeld (Sachsen-Anhalt, Germany)] Address: Heidecke, F., Sieverstorstr. 57, 39016 Magdeburg, Germany. E-mail: Libellenforscher@web.de

**8141.** Herrera, L.G.; Reynoso, V.H.; Curiel, D.; Ramírez, N.; Rodríguez, M.; Mirón, L.; Sánchez, R.; Aguilar, S.; Carmona, F.; Urbina, J.; González, A. (2008): La riqueza faunística en un ambiente perturbado: el caso del Parque Ecológico Jaguarundi. In: Yolanda Nava & Irma Rosas (coord.): *El Parque Ecológico Jaguarundi Conservación de la selva tropical veracruzana en una zona industrializada*. ISBN: 978-968-7623-28-4: 79-100. (in Spanish) [Mexico; the following Odonata taxa are listed: *Argia pulla*, *Argia* sp., *Ischnura ramburii*, *Ischnura* sp., *Leptobasis vacillans*, *Dythemis sterilis*, *Erhythomis plebeja*, *Erythrodiplax fusca*, *Erythrodiplax* sp., *Micrathyria* sp., and *Perithemis moonia*.] Address: www.puma.unam.mx

**8142.** Herzon, I.; Helenius, J. (2008): Agricultural drainage ditches, their biological importance and func-

tioning. *Biological conservation* 141: 1171-1183. (in English) ["We reviewed studies on the biological state of agricultural drainage ditches in the temperate and boreal zones of the Northern Hemisphere. We looked at the relative importance of ditches for farmland biota as compared to that of other habitats, and assessed the degree to which biological communities of ditches contribute to the provisioning of ecosystem services. We evaluated impacts pertaining to replacement of open drains by subsurface drainage, removal of main ditches, rehabilitation of old drainage systems, and maintenance of ditches. Most ditches support species also common elsewhere. Whenever comprehensive surveys were conducted, ditches were shown to provide valuable wet vegetated noncropped habitats to both aquatic and terrestrial taxa, supply food resources lacking in otherwise dry and intensively managed cropland, and perform connectivity functions within a wider landscape. Regionally ditches were shown to harbour rare species or species not found presently in other farmland habitats. Some functions of drainage ditches, such as regulating water flow and nutrient retention, are likely to depend on the composition and structure of biological communities of ditches, though the issue remains poorly explored. The biggest threat to the quality of ditch networks as ecosystems is presented by a severe runoff from the fields, management in disregard of a habitat value of ditches, and removal of ditches." (Authors) The paper includes a passing note on the importance and ecological function of ditches in USA, but ignores completely e.g. the German publications on the highly significant ecological importance of ditches as habitat for the European protected by law species *Coenagrion mercuriale* and *C. ornatum*.] Address: Herzon, Irina, Dept of Applied Biology, University of Helsinki, Latokartanonkaari 5-7, 00014, Finland

**8143.** Hill, P. (2008): Review: Watching British Dragonflies by Steve Dudley, Caroline Dudley & Andrew Mackay. *Subbuteo Natural History Books*, 2007. 341 pp.. *Atropos* 33: 29-30. (in English) [critical review] Address: not stated

**8144.** Holmes, P. (2008): East Keswick's dragonflies and damselflies. *East Keswick Wildlife Trust Newsletter* 31: 1-2. (in English) [UK; a general on Odonata with a few local resp. locality information, and advice for regional places good to see Odonata.] Address: E-mail: paul@ox-close.co.uk

**8145.** Holusa, O. (2008): *Trithemis kirbyi* auf Sardinien: Erstnachweis für Europa (Odonata: Libellulidae). *Libellula* 27(1/2): 111-115. (in German, with English and Italian summaries) ["In June 2003 *T. kirbyi* was recorded for the first time in the territory of Europe, on the Italian island of Sardinia. One male was collected at the Oridda rivulet, in the surroundings of the Villacidro village, in the southwestern part of the island." (Author)] Address: Holusa, O., Muzeum Beskyd, prirodovedné oddeleni, Zámecké náměstí 1264, CZ-738 01 Frydek-Mistek. E-mail: holusao@post.cz

**8146.** Hunter, I. (2008): Reports from coastal stations - 2007: Elms Farm. Ickesham, East Sussex. *Atropos* 33: 57. (in English) [UK; *Erythromma viridulum*: 17-VI - 3-IX-2008, max. of 150 specimens at 3-VIII-2007. *Symphetrum fonscolombii*: 3-VI-2007] Address: not stated

**8147.** Jones, C.D.; Kingsley, A.; Burke, P.; Holder, M. (2008): *Field Guide to The Dragonflies and Damselflies*

flies of Algonquin Provincial Park and the Surrounding Area. The Friends of Algonquin Park. Algonquin Park Field Guide Series 1: 263 pp. (in English) ["A comprehensive field guide to all 135 species of dragonflies and damselflies found in Algonquin Provincial Park and surrounding area, extending across southcentral Ontario and into southwestern Quebec. Detailed, full-colour illustrations of all species, including males, females and variants. Additional close-up illustrations of features important in species identification. Key field marks are highlighted through the use of arrows and accompanying text. Information on identification, similar species, habitat, behaviour, flight period, status and range for each species. Includes an introduction, complete with illustrations and photographs, to anatomy and life cycle, as well as the fundamentals of observation, identification and capture. A site guide to some of the key areas within Algonquin Park to find and observe these fascinating insects." (Publisher)] Address: <http://store.algonquinpark.on.ca/cgi/algonquinpark/00517.html?id=BL9A-JDPX&mvp=211>

**8148.** Kasangaki, A.; Chapman, L.J.; Balirwa, J. (2008): Land use and the ecology of benthic macroinvertebrate assemblages of high-altitude rainforest streams in Uganda. *Freshwater Biology* 53(4): 681-697. (in English) ["1. In sub-Saharan Africa, tropical forests are increasingly threatened by accelerating rates of forest conversion and degradation. In East Africa, the larger tracts of intact rainforest lie largely in protected areas surrounded by converted landscape. Thus, there is critical need to understand the functional links between large-scale land use and changes in river conditions, and the implications of park boundaries on catchment integrity. 2. The objective of this study was to use the mosaic of heavily converted land and pristine forest created by the protection of the high-altitude rainforest in Bwindi Impenetrable National Park, Uganda to explore effects of deforestation on aquatic systems and the value of forest in buffering effects of adjacent land conversion. A set of 16 sites was selected over four drainages to include four categories of deforestation: agricultural land, deforested upstream (of the park boundary), forest edge (park boundary) and forest. We predicted that forest buffer (downstream or on the edge) would moderate effects of deforestation. To address this prediction, we quantified relationships between disturbance level and both physicochemical characters and traits of the macroinvertebrate assemblages during six sampling periods (February 2003 and June 2004). 3. Results of both principal components analysis and cluster analyses indicated differences in limnological variables among deforestation categories. PC1 described a gradient from deforested sites with poor water quality to pristine forested sites with relatively good water quality. Agricultural sites and deforested upstream sites generally had the highest turbidity, total dissolved solids (TDS), and conductivity values and low transparency values. Forest sites and boundary site groups generally exhibited low turbidity, TDS, and conductivity values and high water transparency values. Sites also clustered according to deforestation categories; forest and forested edge sites formed a cluster independent of both agricultural land and deforested-upstream. 4. Water transparency, water temperature, and pH were the most important factors predicting benthic macroinvertebrate assemblages. Sensitive invertebrate families of Trichoptera, Ephemeroptera, Plecoptera, and Odonata dominated forested sites with high water transparency,

low water temperature, and low pH while the tolerant families of Ephemeroptera, Diptera, Hemiptera, and Coleoptera were abundant in agriculturally impacted sites with low water transparency, high water temperature, and high pH. 5. This study provides support for the importance of riparian buffers in moderating effects of deforestation. Forest and forested edge sites were more similar in both limnological and macroinvertebrate assemblage structure than sites within or downstream from agricultural lands. If the protected area cannot encompass the catchment, the use of rivers as park boundaries may help to maintain the biological integrity of the rivers by buffering one side of the watercourse." (Authors)] Address: Kasangaki, A., Institute of Tropical Forest Conservation, Mbarara University of Science & Technology, PO Box 44, Kabale, Uganda. E-mail: [kasangaki@itfc.org](mailto:kasangaki@itfc.org)

**8149.** Knott, C. (2008): Further observation of facing oviposition in Emperor Anax imperator. *Atropos* 33: 37-38. (in English) [Oviposition behaviour of two female *A. imperator* is described.] Address: Knott, C., Old Hall Farm House, Penhill rd, Great Ellingham, Attleborough, Norfolk, NR17 1 LR, UK

**8150.** Kotenko, A.G.; Plushtch, I.G.; Ermolenko, V. M.; Pavlusenko, I.N. (2008): Protected insects in Kiev. *Sci. Bull. Uzhgorod Univ. (Ser. Biol.)*, 24: 175-177. (in Russian, with Ukrainian and English summaries) [57 species of protected insects (those enlisted in Red Book of Ukraine, Bern Convention List, European Red List and IUCN List) are indicated for Kiev basing on the investigations of the author as well as on bibliographical sources. The list includes Lepidoptera, Hymenoptera, Orthoptera, Odonata, Coleoptera, Diptera. Ten species belong to the Odonata.] Address: Pavlusenko, I.N., Schmalhausen Institut of Zoology, Vul.B. Khmelnyts'kogo, 15, Kiev, 01601, Ukraine. E-mail: [pavlusenko@inbox.ru](mailto:pavlusenko@inbox.ru)

**8151.** Kucuk, S. (2008): The effect of organic pollution on benthic macroinvertebrate fauna in the Kirmer creek in the Sakarya basin. *ADÜ Ziraat Fakültesi Dergisi* 5(1): 5-12. (in English) [Turkey; Libellulidae contributed - in seasonal dependence - significantly to the biomass of the macroinvertebrate fauna.] Address: Kucuk, S., Adnan Menderes Üniversitesi Ziraat Fakültesi Su Ürünleri Bölümü, 09100, Aydın, Turkey. E-mail: [skucuk@adu.edu.tr](mailto:skucuk@adu.edu.tr)

**8152.** Lambeets, K.; Pellegrons, B. (2008): Estimating damselfly populations at the Hannecartbos (Koksijde). *Libellenvereniging Vlaanderen - nieuwsbrief* 2(1): 2-8. (in Dutch, with English summary) ["During a five day field survey in June 2007, population size and dispersal distance of *Coenagrion puella* and *Ischnura elegans* were estimated based on capture-mark-recapture (CMR) data. Beside it, all odonata species observed were listed. The study was performed in the Hannecartbos (Koksijde, Belgium), which is part of the Flemish nature reserve Ter Yde. In order to restore calcareous dune grasslands on a peaty, seepage-fed underground, the woodland was partly cleared in 2004. In general, 671 individuals spread over 13 species were observed. During the CMR study, a total of 631 individuals of *C. puella* (352) and *I. elegans* (279) were caught from which respectively 66 and 4 individuals were recaptured (total: 70). Population size was calculated by the Petersen estimate for closed populations and the Jolly-Seber

estimate for open populations. Both estimates were comparable for *C. puella*, but for *I. elegans* they differed remarkably due to low recapture numbers for this species. Dispersal distances were found to be quite similar for both species, with a maximum of 149.5m for *C. puella* and 104.5m for *I. elegans*. Furthermore, the Hannecartbos seems to provide suitable habitat conditions for rare species as *C. pulchellum* and *Libellula quadrimaculata*. This study indicates the high potential of both damselfly species for recolonizing suitable patches and their ability to build up persistent populations quite fast. Plausible factors confounding population size estimates as weather conditions and the lateral demarcation of the sample plots, however, may obfuscate the results. Also, maximum dispersal distances of both species may be larger since the survey was carried out along the banks of a small rivulet and did not account for other water bodies nearby. A standardized and more comprehensive experimental set-up would certainly increase the value of CMR-studies." (Authors)] Address: Lambrechts, K.; Onderzoeksgroep Terrestrische Ecologie (TEREC), Dep. Biologie, Universiteit Gent, KL Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Kevin.lambrechts@UGent.be

**8153.** Lambrechts, J. (2008): Quick colonisation by dragonflies of a pond on the ecoduct Kikbeek (Maasmechelen, Limburg). Libellenvereniging Vlaanderen - nieuwsbrief 2(2): 2-6. (in Dutch, with English summary) ["This ecoduct was built in 2006 to facilitate movements between some large areas north and south of the highway. During monitoring activities for other organisms also dragonflies were recorded. The minimum width of the ecoduct is 40 m and length 70 m. Substrate is "grind", hard pressed. A pond was dugged and rain water stagnates easily, creating temporary water. No less than 21 species of Odonata were recorded in the first year, 12 of which reproducing (pioneer species as *Lesetis barbarus*, *Ischnura pumilio* and *Sympetrum fonscolombii* in important numbers)."] (Author)] Address: Lambrechts, J., Zuurbemde 9, 3380 Glabbeek, Belgium. E-mail: jr.lambrechts@arcadisbelgium.be

**8154.** Lin, Y.c. (2008): A survey of aquatic insects and biotic index in constructed wetlands. M.S. thesis, Department Graduate of Environmental Engineering and Science: 167pp. (in Chinese, with English summary) ["This study analysis the parameters of water quality and collected the aquatic insects in the Chna constructed wetland system, Gang-Wei constructed wetland system, Ke-Liao constructed wetland system, Er-Hang constructed wetland system, An-Shun constructed wetland system and Niao-Song wetland park since March 2006 to May 2008. We related aquatic insects sampling to water quality parameters in various constructed wetland system and investigated to establish the biotic index to assess constructed wetland water quality. The aquatic insects were collected regularly, and the monitoring parameters of water quality were recorded at the same time. In this research, we analyse the monitoring parameters of water quality including temperature, pH, conductivity, DO, BOD5, NH4-N and SS, and to calculate the river pollution index of a constructed wetland system. We counted the number and identified the species of the collected aquatic insects. We utilize the numbers and the species of the collected aquatic insects to calculate the biotic index, including the number of individual, Family-level biotic index, Richness index, Shannon-Weaver diversity index, Simpson's-

s diversity index and Evenness index. We wish to establish an ideal formula for the biotic index to assess the constructed wetland water quality. The results showed that the water quality and aquatic insects of the six constructed wetlands systems were significant difference. We compared the four water quality parameters that to calculate the river pollution index of the four regular sampling system, we found that the Gang-Wei system had high DO and low NH4-N value, Chna system had better BOD5 and SS value. The Gang-Wei system had the best environment quality overall. Chna system's aquatic insects recorded six orders, 15 family and 15 species, the number of individual per sampling area was 5044 / m<sup>2</sup>. Gang-Wei system's aquatic insects recorded seven orders, 18 family and 19 species, the number of individual per sampling area was 14,998 / m<sup>2</sup>. Ke-Liao system's aquatic insects recorded six orders, 8 family and 8 species, the number of individual per sampling area was 477 / m<sup>2</sup>. An-Shun system's aquatic insects recorded five orders, 9 family and 9 species, the number of individual per sampling area was 544 / m<sup>2</sup>. Niao-Song system's aquatic insects recorded five orders, 5 family and 5 species, the number of individual per sampling area was 111 / m<sup>2</sup>. The correlation testing of the water quality parameters and the biotic index are significant difference, depending on the various characteristics of the constructed wetland system. The river pollution index (RPI) was used to evaluate the river water pollution levels. The river pollution index (RPI) of Gang-Wei system, Chna system, Ke-Liao system and Er-Hang system were progressive increase. The Family-level biotic index was to evaluate the water quality, the Gang-Wei system is better than the Chna system, and the Ke-Liao system is the worse. The higher Shannon-Weaver diversity index value represented the more species diversity and abundance. The Shannon-Weaver diversity index value of Gang-Wei system, Chna system, and Ke-Liao system were reduce progressively. Applied these methods to evaluate water quality had the same results. We were able to refer the current use of the biotic index to assess stream water quality methods, and to establish the biotic index to assess constructed wetland water quality. The potential biotic indexes were Family-level biotic index and Shannon-Weaver diversity index. These methods could assist chemical analysis to assess the whole water quality. The multiple gradually regression analysis was to establish an ideal formula for water quality parameters to estimate the Gleason index, Evenness index and Simpson's diversity index. The results were the same as the utility of river pollution index. It could reduce water quality parameters analysis project, and assess the overall water environment. Analyze the river pollution index (RPI) and the individuals of various orders correlation to establish the biological indicators. The result was that the Odonata, Hemiptera, Coleoptera and Ephemera were the candidate of the biological indicators in the constructed wetland system. It needed more large sample size and more detail aquatic insect classification to establish the more representative biological indicators. The constructed wetland was the breeding site of *Culex* and *Anopheles*. It has the potential to increase the local adult mosquito populations. These mosquitoes could be the vectors of pathogen or to disturb the neighbour of constructed wetland. It should improve the management of constructed wetland to reduce the public health problem." (Author)] Address: Lin, Yi-cheh, Email Address tracy0614@xuite.net



- 8155.** Malkmus, R.; Ruf, T. (2008): Herbstaktive Libellen in Südportugal (Odonata). *Libellula* 27(1/2): 123-132. (in German, with English summary) ["During an excursion in November 2007 through the southern Portuguese provinces Algarve and Baixo Alentejo, Odonata were recorded at 43 investigated sites. Six species - *Lestes viridis*, *Aeshna mixta*, *Crocothemis erythraea*, *Orthetrum chrysostigma*, *Sympetrum fonscolombii*, and *S. striolatum* - were observed in reproductive activity. Autumn activity of Odonata is discussed in the context of the few hitherto published records. Remarkable observations of *Trithemis annulata* and *O. chrysostigma* within the first ten days of November, and a large number of migrating specimens of *S. tons-colombii* along the southwestern coast, are noted. *A. mixta* and *S. striolatum* so far had been recorded only from few places in southern Portugal. As a result of our observations both species must be considered as the most common ones in this region. The occurrence of *A. cyanea* in the hilly hinterland of the Algarve coast is noteworthy." (Authors)] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany
- 8156.** Martens, A. (2008): Die Rolle Baden-Württembergs bei der Vervollständigung der deutschen Libellenartenliste Records on the territory of the federal state of Baden-Württemberg for the refinement of the German Odonata checklist. *mercuriale* 8: 1-3. (in German, with English summary) ["After 1871, about 20 species were added to the German checklist of Odonata. In this process, records from southwestern Germany play an important role. In the Baden part of Baden-Württemberg, in chronological order, *Somatochlora arctica*, *Sympetma paedisca*, *Coenagrion scitulum*, *Anax ephippiger*, *Onychogomphus uncatatus*, and *Gomphus simillimus* were recorded at first for the territory of Germany." (Author)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Bismarckstraße 10, 76133 Karlsruhe, Germany. E-mail: martens@ph-karlsruhe.de
- 8157.** Martynov, A.V.; Martynov, V.V. (2008): Dragonflies of the National Natural Park "Guculshina". *Liriodnichy Almanac*: 100-106. (in Russian) [On the basis of published and own records, 33 species are listed and discussed for the Guculshina-National Park in Ukraine.] Address: E-mail: martynovav@ukr.net
- 8158.** Martinov, A.V.; Martinov, V.V. (2008): Biology of *Lestes macrostigma* (Odonata: Lestidae) in south-eastern Ukraine. *Kharkov Entomological Society Gazette* 2007 (2008) XV(1-2): 185-192. (in Russian, with English summary) ["*L. macrostigma* is well adapted to development in ephemeral water basins of variable salinity. The stages of species life cycle, in particular, follow the seasonal changes in its immediate environment. We studied the life cycle of *L. macrostigma* in southeastern Ukraine in relation to changes of environment salinity, noting the distinction between the first and last instar larvae, and describe the oviposition and development of larvae in natural and laboratory conditions." (Authors)] Address: Martynov A. V., Martynov V. V. Department of Zoology, Biological Faculty, Donetsk National University, ul. Shchorsa 46, Donetsk, 83050, Ukraine. E-mail: martynov@dongu.donetsk.ua
- 8159.** Mathuriau, C.; Thomas, A.G.B.; Chauvet, E. (2008): Seasonal dynamics of benthic detritus and associated macroinvertebrate communities in a neotropical stream. *Fundamental and Applied Limnology / Archiv für Hydrobiologie* 171(4): 323-333. (in English) ["The dynamics of benthic detritus and the structure, composition and functional feeding groups of associated macroinvertebrate communities were followed at biweekly intervals over one year in a 4th-order Andean stream located in a forested hill in SW Colombia. The density of macroinvertebrates and the number of taxa showed a similar bimodal annual pattern with highest values occurring from January to mid-March and from July to mid-October. The accumulated benthic detritus and the invertebrate abundance and community structure were apparently controlled by stream discharge. This was confirmed by a cluster analysis of invertebrate assemblages over the year where three groups of sampling dates emerged. The first group occurred during high discharges, the second one under intermediate hydrological conditions and the third coincided with low rainfall and low discharges. Numerically, collectors dominated, whereas shredders represented less than 5.3 % of the invertebrates. Unexpectedly, benthic detritus and collector densities were negatively correlated; however, no relation between benthic detritus and the abundance of shredders was found, which may suggest that benthic detritus consisting mainly of plant remains was not a limiting resource in this neotropical stream. Macroinvertebrates appear to have a minor role in the decomposition of plant matter which is consistent with previous observations from the same and other tropical streams. As a consequence, macroinvertebrate dynamics in this stream were more influenced by hydrological variations than by input of plant detritus." (Authors) 'Hetaerina' and 'Brechmorhoga' are listed.] Address: Mathuriau, Catherine, Centro de Investigaciones en Ecosistemas, Universidad Nacional Autónoma de México (UNAM), antigua carr. a Pátzcuaro # 8701, 58190 Morelia, Michoacán, México. E-mail: mathuriau@oikos.unam.mx
- 8160.** Maue, T.; Springer, M. (2008): Effect of methodology and sampling time on the taxa richness of aquatic macroinvertebrates and subsequent changes in the water quality index from three tropical rivers, Costa Rica. *Rev. Biol. Trop.* 56 (Suppl. 4): 257-271. (in English) ["Three rivers, one in Alajuela province and two in Puntarenas province in Costa Rica, were tested with two methods and different collecting times, in the rainy and dry season. The first method involved collecting of organic and inorganic material for a fixed time period (3, 5, 8, 10 min) with a strainer. This material was transferred to a plastic bowl containing 70% alcohol and aquatic macroinvertebrates were sorted out in the laboratory. With the second method the specimens were collected in the field directly out of the strainer for a total collecting time of 120 minutes and preserved immediately with 70% alcohol. In order to obtain species accumulation curves for this method, subsamples were taken every 15 minutes. The data analysis showed that the abundance and taxa richness was higher with the second method, and a higher number of genera could be found with increasing collecting time, but not necessarily a higher number of individuals. A difference in the number of individuals between rainy and dry season was observed. Species accumulation curves for samples taken with both methods showed that new genera and families were still being found after the maximum time of collection, no matter which season or river. Categories of water quality obtained from the BMWP-CR index varied greatly among sampling times and methods used. The second method always achieved a higher water quality than the longest sampling time (10 min)

in the first method. However, it still didn't reach the level obtained for all families found in both methods combined. Although the first method is the one officially used in most sampling protocols for biomonitoring in temperate zones, these results suggest that more extensive testing of adequate sampling time and methodology is still necessary for tropical rivers." (Authors) Taxa including Odonata are treated at the genus level.] Address: Maue, T., Hydrobiologie, Universität Essen-Duisburg, Essen, Germany. E-mail: tmaue@web.de

**8161.** Monnerat, C. (2008): Neufund einer Population von *Nehalennia speciosa* in der Westschweiz (Odonata: Coenagrionidae). *Libellula* 27(1/2): 39-51. (in German, with French and English summaries) ["A population of *N. speciosa* was discovered on 19-VI-2007, in a permanently flooded fen zone of the southern shore of Lake Neuchâtel. This is the westernmost locality of its distribution area currently known. The species has not been found in Switzerland since it was last recorded in 1990 in the Canton of Zurich, therefore having been considered extinct in this country. The discovery demonstrates that surprising findings are still possible in Central Europe, even for rather well known taxa like the Odonata. On a national scale the new record stimulates fresh efforts for the conservation of one of the most endangered species in Switzerland. With respect to the preservation of *N. speciosa* it is considered important to establish a monitoring scheme and to stipulate an optimal manner and frequency of habitat maintenance." (Author)] Address: Monnerat, C., Centre Suisse de cartographie de la faune (CSCF), Maximilien-de-Meuron 6, CH-2000 Neuchâtel, Switzerland. E-mail: christian.monnerat@unine.ch

**8162.** Montoya Moreno, Y. (2008): Caracterización de la biodiversidad acuática y de la calidad de las aguas de La Quebrada Los Andes, el Carmen de Viboral, Antioquia. *Revista Institucional Universidad Tecnológica del Chocó: Investigación, Biodiversidad y Desarrollo* 27(1): 85-123. (in Spanish, with English summary) ["The watershed of Los Andes stream it's very important for El Carmen de Viboral municipality because is one on the main water sources for the aqueduct municipal, for these reason was realized twelve bimonthly surveys between Jan. 2004 and Dec. 2005 in one station upstream of the intake of the aqueduct. Physics, chemistry and biologists variables don't show statistic variability although were observed fluctuation in community indexes, in special in number of taxa evenness. We found 95 taxa belonging to 52 families and five phyla. Values of BMWPCol index oscillated between 77 and 294, with a 159 average value indicate that the waters of the stream are very clean." (Author) Taxa including Odonata are treated at the genus level.] Address: Montoya Moreno, Y., Grupo de investigación GAIA, Facultad de Ingeniería, Universidad de Antioquia, Medellín, Colombia. E-mail: yimmymontoya3@hotmail.com

**8163.** Moore, C. (2008): Reports from coastal stations - 2007: Dunwich Health National Trust, Suffolk. *Atropos* 33: 68-69. (in English) [UK; *Anaciaeschna isoceles*] Address: not stated

**8164.** Muscatello, J.R.; Belknap, A.M.; Janz, D.M. (2008): Accumulation of selenium in aquatic systems downstream of a uranium mining operation in northern Saskatchewan, Canada. *Environmental Pollution* 156:

387-393. (in English) ["The objective of this study was to investigate the accumulation of selenium in lakes downstream of a uranium mine operation in northern Saskatchewan, Canada. Selenium concentrations in sediment and biota were elevated in exposure areas even though water concentrations were low (<5 µg/L). [...] Detritivore and predator invertebrates (including 'Odonata') showed significant increases in selenium concentrations ( $p < 0.05$ ) compared to filterer invertebrates, plankton and periphyton at both medium and high exposure sites. The overall pattern of selenium accumulation (from smallest to largest) was as follows: periphyton < plankton and filterer invertebrates < detritivore and predator invertebrates < small bodied fish (shiners) and predatory fish (juvenile pike). Selenium concentrations in the evaluated exposure areas were higher in fish, detritivore and predator invertebrates than filterer invertebrates, indicating the importance of sediments and detrital processes in selenium bioaccumulation. Filterer invertebrates feed on the particles suspended in the water column (e.g., plankton), but in contrast, other invertebrates rely on food sources closely related to detrital processes, suggesting a stronger association with sediments. [...] Biomagnification of selenium resulted in an approximately 1.5-6 fold increase in the selenium content between plankton, invertebrates and forage fish. However, no biomagnification was observed between forage fish and predatory fish. Selenium content in organisms from exposure areas exceeded the proposed 3-11 µg/g (dry weight) dietary toxicity threshold for fish, suggesting that the selenium released into these aquatic systems has the potential to bioaccumulate and reach levels that could impair fish reproduction." (Authors)] Address: Janz, D.M., Toxicology Centre, Univ. Saskatchewan, 44 Campus Drive, Saskatoon, SK Canada S7N 5B3. E-mail: david.janz@usask.ca

**8165.** Muschiol, D.; Traunspurger, W. (2008): Life at the extreme: meiofauna from three unexplored lakes in the caldera of the Cerro Azul volcano, Galápagos Islands, Ecuador. *Aquatic Ecology* 43(2): 235-248. (in English) ["On Isla Isabela, Galápagos Archipelago, 3 so far unexplored lakes were investigated in the caldera of Cerro Azul, one of the most active volcanoes in the world. The lakes face recurrent desiccation and eruption events and showed distinct differences in their water chemistry. Thirty cores from the upper 15 cm of sediment indicate distinct differences in the composition of meiobenthic communities between the lakes. In total, 27 different aquatic metazoan species could be distinguished. Numerically, rotifers dominated in two of the lakes, with mean densities up to 4.56 9 106 individuals m<sup>-2</sup> while the third lake was dominated by a gastrotrich of the genus *Chaetonotus* (0.67 9 106 individuals m<sup>-2</sup>). The largest lake harboured up to 14.4 9 106 nematodes m<sup>-2</sup>, which is the highest nematode density thus far reported for a freshwater habitat. The lakes yielded few nematode species ( $S = 7$ ,  $N = 887$ ) and calculation of the Shannon-Wiener index ( $H_0$ ) indicated an exceptionally low nematode diversity. The nematode community of one lake was clearly dominated by an undescribed suction-feeding *Mesodorylaimus* (59.6%), the community of the other lake by the epistrate feeder *Achromadora pseudomicoletzkyi* (89.3%), whereas the third lake surprisingly contained no nematodes. The benthic nematode biomasses for the two nematode-containing lakes differed by a factor 50. The food webs of the three lakes are presumed to have an exceptional simple structure." (Authors) The tax list includes "Aeshnidae" and

"Libellulidae".] Address: Muschiol, D., Animal Ecology, Univ. Bielefeld, Morgenbreede 45, 33615 Bielefeld, Germany. E-mail: daniel.muschiol@uni-bielefeld.de

**8166.** New, T.R. (2008): Günther Theischinger and John Hawking, The Complete Field. Guide to Dragonflies of Australia. CSIRO Publishing, Collingwood, 2006, Paperback, Au\$49.95, ISBN 0-643-09073-8, 376 pp. J. Insect Conserv. 12(2): 189-190. (in English) [Review.] Address: New, T.R., Dept Zool., La Trobe Univ., Victoria, 3086, Australia. E-mail: T.New@latrobe.edu.au

**8167.** Ngai, J.T.; Kirby, K.R.; Gilbert, B.; Starzomski, B.M.; Pelletier, A.J.D.; Conner, J.C.R. (2008): The impact of land-use change on larval insect communities: Testing the role of habitat elements in conservation. *Ecoscience* 15(2): 160-168. (in English, with French summary) [Costa Rica; "Conservationists have proposed that maintaining key elements of the original land-cover type in modified landscapes may mitigate the detrimental effects of land-cover change on residual species. We tested this hypothesis for aquatic insect communities in tank-forming bromeliads in forested and non-forested habitats in Costa Rica. Bromeliad tanks hold much of the standing water in this region and therefore provide an important resource for insects with aquatic larval stages. We quantified the relative importance of land-use type and the bromeliad-specific "local" environment on the insect community, and also the effect of land-use type on this local environment. Insect species responded to both land-use type and the local environment, with these variables explaining a total of 36% of species densities. The local environment independently explained 19% of insect densities, while land-use type explained 17%, mainly through its modification of the local environment. Local environmental conditions were strongly correlated to land-use type ( $r^2 = 0.64$ ), with non-forest habitat having a higher average temperature, a greater variation in temperature, and a lower density of bromeliads. Our results indicate that the land-use type in which bromeliads occur influences the relative densities of insects by altering the local environment of bromeliads. Therefore, maintaining bromeliads under land-use conversion will not necessarily maintain the bromeliad insect community of the original forested habitat." (Authors) *Mecistogaster ornata* was found more frequently in larger bromeliads in warmer, roadside areas.] Address: Ngai, Jacqueline, Biodiversity Research Centre, Dept Zool., Univ. of British Columbia, 6270 University Boulevard, Vancouver, British Columbia V6T 1Z4, Canada E-mail: ngai@zoology.ubc.ca

**8168.** Noikong, W.; Palarak, C. (2008): Diversity and nutritional values of edible aquatic insects in Ban Thi and Mueang Lamphun District, Lamphun Province. 32nd Congress on Science and Technology of Thailand (STT.32), 10 - 12 October 2006 at Queen Sirikit National Convention Center, Bangkok, Thailand "Science and Technology for Sufficiency Economy": 2 pp. (in English) ["During November 2004 to November 2005, samples of edible aquatic insects were collected from 6 sampling sites and 6 local markets. In addition, physical and chemical parameters of water quality were also determined. The result showed that total edible aquatic insects were 3 orders 10 families and 20 genera. Family Notonectidae represented as highest number of individual. According to the diversity index, Ban Jam, was found as the highest diversity (2.98) while Ban San Rim Ping, showed highest species richness (3.14). For nutritional

values analysis, family Hydrophilidae in order Coleoptera showed highest protein content, family Belostomatidae in order Hemiptera showed highest crude fat level whereas, highest level of carbohydrate, fiber and ash were belonged to family Gomphidae in order Odonata. The physical and chemical parameters analysis revealed that there were no significant different among sampling sites and water quality assessment resulting as mesotrophic – eutrophic status." (Authors)] Address: Noikong, W., Dept Applied Biology, Fac. of Science, Rajabhat Piboonsongkram University, Pitsanulok, Thailand

**8169.** Noordijk, J.; de With, N. (2008): Les Odonates de la vallée du Liort avec quelques notes sur la gestion conservatoire (département de l'Aveyron). *Martinia* 24(4): 143-150. (in French, with English summary) ["The results of a survey of the Odonata of the catchment basin of the the Liort river (Aveyron, France) are presented. The basin provides three habitat types: the Liort river, its tributaries and artificial ponds. All together, twenty-nine species could be recorded. The presence of many characteristic species in small sunny brooks tributaries on the plateaus is important, and includes *Coenagrion mercuriale* which appears on the Habitat Directive of the European Union. In the fast flowing stream, the Liort, all specialized species that would be expected were really present, indicating healthy ecological conditions. Some recommendations for the conservation of the observed dragonflies are given for the three kinds of habitat." (Authors)] Address: Noordijk, J., Ass. les Amis du Moulin de Liort, F-12440, La Salvétat-Peyralès, France. E-mail: jinzenoordijk@hotmail.com

**8170.** Ober, S.V. (2008): First record of *Pantala flavescens* for the western Balkans (Odonata: Libellulidae). *Libellula* 27(1/2): 117-121. (in German, with English summary) ["In the course of the reorganisation of the Odonata collection of the 'Staatliches Museum für Naturkunde Stuttgart', a male of *Pantala flavescens*, collected in Herceg-Novi in June 1972, was discovered. It marks the first record for Montenegro as well as for the western Balkans. The record on the Adriatic coast is analysed in comparison with the remaining odonate data from Montenegro and possible flight paths to the country are discussed." (Author)] Address: Ober, S.V., Staatliches Museum für Naturkunde Stuttgart, Rosenstein 1, 70191 Stuttgart, Germany. E-mail: ober.smns@naturkundemuseum-bw.de

**8171.** Odin, N. (2008): Reports from coastal stations - 2007: Landguard Bird Observatory, Suffolk. *Atropos* 33: 64. (in English) [UK; records of *Brachytron pratense*, *Sympetrum fonscolombii*, and *Erythromma viridulum* are documented.] Address: not stated

**8172.** Öz, B.; Kazanci, N. (2008): A research on determination of habitat quality of running waters of western Black Sea region using by benthic macroinvertebrates. *BALWOIS 2008 – Ohrid, Republic of Macedonia – 27*: 16 pp. (in English) [The benthic macroinvertebrate fauna was studied in running waters near Düzce, Bolu, Karabük, Kastamonu and Sinop, Turkey. Odonata were recorded at 6 of the 15 sampling sites, and refer to *Epallage fatime*, *Calopteryx splendens*, *Aeshna affinis*, and *Onychogomphus forcipatus*.] Address: Öz, B., Hacettepe University, Department of Biology, 06532, Beytepe, Ankara, Turkey. E-mail: basakozz@gmail.com

**8173.** Osadowski, Z.; Obolewski, K.; Strzelczak, A. (2008): Influence of anthropogenic factors on microhab-



itats inhabited by riverine hydrobionts – assessment with MRT method. *Ecological Questions* 10: 41-50. (in English) ["This study concerns the influence of urban area on vegetation and invertebrates inhabiting the Ślupia River (northern Poland). Altogether, 10 plant communities and 37 macrozoobenthos taxa were determined during four seasonal samplings (October 2005, January, April and August 2006). In order to reveal how the city of Ślupsk affects the vegetation and fauna, MRT (multivariate regression tree) models were created. On their basis the most important factors were determined from the following set of variables: season, water temperature, salinity, distance, water depth, bottom type, location in the river bed and degree of river bed transformations. Performed analyses showed that vegetation in the urban area was primarily influenced by distance (correlated with anthropogenic pressure), while for invertebrates season and temperature were the most important factors." (Authors)] Address: Osadowski, Z., Dept of Botany and Genetics, Institute of Biology & Environmental Protection, Pomeranian University in Ślupsk, Arciszewskiego 22B, 76 – 200 Ślupsk, Poland. E-mail: osadowsk@sl.onet.pl

**8174.** Parr, A.J. (2008): Migrant dragonflies in 2007. Including recent decisions and comments by the Odonata Records Committee. *Atropos* 33: 17-21. (in English) [Records of the following species are discussed: *Calopteryx splendens*, *Lestes dryas*, *L. viridis*, *Erythromma viridulum*, *Aeshna juncea*, *A. mixta*, *Anaciaeschna isoceles*, *Anax imperator*, *A. parthenope*, *Libellula depressa*, *Crocothemis erythraea*, *Sympetrum striolatum*, *S. vulgatum*, *S. fonscolombii*, *S. flaveolum*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**8175.** Paz, A.; Moreno, P.; Rocha, L.; Callisto, M. (2008): Effectiveness of protected areas for the conservation of water quality and freshwater biodiversity in reference sub-basins in Das Velhas River. *Neotropical Biology and Conservation* 3(3): 149-158. (in Portuguese, with English summary) ["The creation of protected areas is one of the most important methods for the preservation of the biodiversity. It does not necessarily mean that the creation of these areas will guarantee the proper conservation of all biodiversity. It is necessary to evaluate the site, the protection capacity and the ecological status of this environment and if the management is effective. The proper conservation and management of rivers and the maintenance of their ecological integrity are essential to preserve the biodiversity and the health of freshwater ecosystems in Brazil. In this study, we assessed the effectiveness of six protected areas in maintaining the quality of freshwater habitats and in preserving the benthic assemblages in Das Velhas river watershed. Both abiotic and biotic analysis showed that the protected areas are effective in preserving the sampling stretches of Das Velhas watershed, due to the use control and the land occupation in the surrounding areas. The results suggest that, although the protected areas do not have the conservation of freshwater biodiversity as their priority, its effective management guaranteed the preservation of benthic communities in those rivers." (Authors) Odonata are treated at the family level.] Address: Paz, Aline, ICB, Depto. Biologia Geral, Lab. Ecologia de Bentos, UFMG, Caixa Postal 486, 31270-901, Belo Horizonte, MG, Brazil. E-mail: alineza@p@yahoo.com.br

**8176.** Pelli, A.; Rejane de Paula, D.; Martins Arruda, A.A.; de Magalhães Lopes, J.; Ramos, S.M.; Sampaio Rezende, A.P. (2008): Acute and chronic toxicity of diflubenzuron to jáú Zungaro zungaro (Humboldt, 1821) (Pisces, Pimelodidae). *Revista Brasileira de zootecnias* 10(1): 51-54. (in Portuguese, with English summary) [Acute and chronic toxicity of diflubenzuron for *Z. zungaru*, aiming to use this product in the control of the predation of juveniles by Odonata, is studied. The studies indicate that this insecticide is an efficient regulator of growth of insects impacting ecdesis.] Address: Pelli, A, Universidade Federal do Triângulo Mineiro. Depf de Ciências Biológicas, Rua Frei Paulino 30, CEP 38025180, Uberaba, MC, Brasil. E-mail: apelli.oikos@dcb.uftm.edu.br

**8177.** Percsy, C.; Percsy, N. (2008): La réserve naturelle de Gentissart (Villers-la-Ville, Brabant Wallon): Colonisation d'une ancienne sablière par les odonates et autres insectes. *Les Naturalistes belges* 89(2-3): 34-56. (in French, with English summary) ["A continued survey of the Odonata has been made at the old sand quarry of Gentissart from 1997 until 2007. In total, 27 species have been observed, from which four are included in the Wallonian Red List (*Lestes virens*, *Sympetma fusca*, *Ischnura pumilio*, *Sympetrum flaveolum*) and two are « nearly threatened » (*Erythromma najas*, *Sympetrum vulgatum*) ; four others are rare recent colonisers in Wallonia (*Lestes barbarus*, *Anax parthenope*, *Crocothemis erythraea*, *Sympetrum fonscolombii*). Concerning *Lestes virens*, a single female has been observed in 2003: it constitutes the first mention of this species in Wallonia since the middle of the 20th Century. The odonatological interest of this site (26ha) is explained by the abundance and diversity of pools. Their varied characteristics give the opportunity to reveal the habitat preferences of the Odonata species." (Authors)] Address: Percsy, C., Chemin du Bon Air, 12, 1380 Ohain, Belgium

**8178.** Pessacq, P. (2008): Book Review: Dragonfly Genera of the New World: an illustrated and annotated key to the Anisoptera. Rosser WG, N Von Ellenrieder & JA Louton. The Johns Hopkins University Press, Baltimore, Maryland, USA, 2006. 384 pp., ISBN-10: 0801884462, USD 99.00 (hardcover). *Revista Chilena de Historia Natural* 81: 151-152. (in English) [Extensive book review: "In conclusion, this book becomes the fundamental study for every biologist and advanced naturalist who deals with or is interested in Neotropical dragonflies." (Author)] Address: Pessacq, P., CONICET - Facultad de Ciencias Naturales, (LIESA), Universidad Nacional de la Patagonia San Juan Bosco, Sarmiento 849, 9200, Esquel, Chubut, Argentina. E-mail: pablo-pessacq@yahoo.com.ar

**8179.** Reinhardt, K. (2008): Der Beitrag von Eduard May (1905-1956) zur Libellenkunde (Odonata). *Libellula* 27(1/2): 89-110. (in German, with English summary) ["E. May worked on Fritz Ris's Odonata collection at the Senckenberg Museum in Frankfurt/Main between 1929 and 1931. This work led to most of his odonatological papers. Most of his original papers appear to be largely based on Friedrich Ris's unpublished manuscripts and notes and vary considerably in quality and novelty. E. May also published several reviews, most notably the Odonata part in the 'Fauna arctica' and the 'Tierwelt Deutschlands'. In the latter he covered the literature in depth, in particular ecological and behavioural observa-

tions for individual species, rather than the Odonata as a whole. As such he is among the founders of the 'Integrating Strand' sensu Corbet (1991) of German speaking odonatology although much of this work is based on earlier observations mainly by Wesenberg-Lund (1913) and Tillyard (1917). It remains unknown how E. May, who had published little on the Odonata, happened to become the contributor to such a prestigious reference series. Other odonatological works of E. May include a faunistic paper on Odonata collected in China, a paper on the classification of the Coenagrionidae and some field observations. None of these contributions are particularly original. His last paper on the Odonata was published in 1935. However, Odonata may have remained part of May's interest. As first evidenced here, in 1948 he stated that two publications on the Calopterygidae were in press and in preparation, both of which, however, never appeared in print." (Author)] Address: Reinhardt, K., Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: K.Reinhardt@sheffield.ac.uk

**8180.** Robison, H.; McAllister, C.; Carlton, C.; Tucker, G. (2008): The Arkansas endemic biota: An update with additions and deletions. *Journal of the Arkansas Academy of Science* 62: 84-96. (in English) ["It has been over a decade since the publication of Robison & Allen (1995) that provided the definitive list of endemic flora and fauna of Arkansas. The present study brings up-to-date the endemic biota of the state. Since 1995, several new species have been described and new discoveries have been made, adding species to the state biota. Other species are deleted and new distributional information on other state endemics is presented. Specifically, 3 new plant species are added to the state list while 4 plant species are deleted. Sixteen new animal species/subspecies are added to the state list while numerous species are deleted. These changes bring to 110 (10 species of plants and 100 species/subspecies of animals) the total number of Arkansas state endemic plants and animals presently known, which represents a decrease by 7 species from the 117 species reported in 1995." Cordulegaster talaria Tennessee 2004 is an addition to the state list of endemics. "This new dragonfly was described from a first-order tributary of the Caddo River at Caddo Gap in Montgomery County. It was also reported from a site in Garland County and is considered endemic to the Ouachita Mountains of western Arkansas. Habitat of this new odonate is densely-shaded small seeps." (Authors)] Address: Robison, H., Department of Biological Sciences, Southern Arkansas University, Magnolia, AR 71754-9354, USA. E-mail: hwrobison@suddenlink.net

**8181.** Samways, M. (2008): The Dragonflies and Damselflies of South Africa. Pensoft Publishers (Sofia-Moscow). ISBN 9789546423306. 297 pp (in English) [This book enables their identification, using several approaches, from simple flick-through to the use of comprehensive identification keys. Each species is also given a Dragonfly Biotic Index, covering a spectrum from the most common, widespread and tolerant species through to the most threatened, rare and sensitive ones.] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**8182.** Schuran, E. (2008): The impact of Deltamethrin on larval development of dragonflies (Odonata) of

the Okavango delta, Botswana. Diploma Thesis, Anhalt University (FH), Bernburg, Department 1, „Nature Conservation & Landscape Planning“ in cooperation with the Harry Oppenheimer Okavango Research Centre (HOORC), University of Botswana, Maun, Botswana: 39 pp. (in English, with German summary) ["Tsetse flies have long been a threat to the health of humans and their livestock in tropical and subtropical Africa. In the early 1940s, the first attempts to control or eradicate *Glossina morsitans centralis* were implemented in order to fight concealed pupae in the ground. Methods used were bush clearance, game destruction and ground spraying. The mid 1970s saw the dominance of aerial spraying with dieldrin and DDT above all other techniques. After a ten year break of aerial applications in the 1990s and a new outbreak of trypanosomiasis in 1999, deltamethrin, which is considered far less dangerous to the environment, was used in 2001/02 to fight the new outbreak. Tsetse fly control monitoring conducted between 2002 and 2005 did not detect any tsetse in the sprayed areas. However, it does appear that deltamethrin applications were responsible for a significant decrease in terrestrial and aquatic invertebrate abundance and shifted species composition within different habitats in the Okavango Delta. For a closer investigation of the affects caused by deltamethrin, fourteen artificial ponds were constructed at the ground of the Harry Oppenheimer Okavango Research Centre (HOORC) in May 2007. Half of these were treated with spraying campaigns of equivalent dose of deltamethrin after natural colonisation by freshwater invertebrates. The observation of subsequent effects focused primarily on Dragonflies (Odonata). During the research period was observed, that the abundance of invertebrate fauna decreased drastically in treated ponds. The emergence of Odonata stopped within these ponds almost entirely whereas Odonates in control ponds constantly flourished successful reproduction. This experiment was simultaneously conducted for Odonata larvae and *Bufo poweri* tadpoles under laboratory conditions. Applied was a concentration (30 µl) equivalent to the dose used in former spraying operations. Additionally the experiment was repeated with just half of the concentration. In both cases the results resembled and supported those obtained under field conditions. Odonata larvae died within 3 hours at a concentration of 15 µl and 30 µl; hence measurements of probably occurring delays in larval growth could not be measured. In accordance to results from the laboratory experiment the lethal dose is estimated below 15 µl. In accordance to the obtained results the significant increase in mortality of Odonata larvae and other fresh water invertebrates can not be denied. Hence, all further campaigns of aerial spraying should be handled carefully and with utmost concern. The impact of deltamethrin needs to be analyzed in a more controlled setting in order to achieve more concrete and generalizable results to avoid further endangerments of already threatened species and a loss in biodiversity." (Author)] Address: not stated

**8183.** Schweighofer, W. (2008): Syntopes Vorkommen von *Cordulegaster boltonii* und *C. heros* an einem Bach im westlichen Niederösterreich (Odonata: Cordulegasteridae). *Libellula* 27(1/2): 1-32. (in German, with English summary) ["For the first time, co-occurrence of larval *C. boltonii* and *C. heros* was detected at three small streams in western Lower Austria. At one of these streams some aspects of this co-occurrence were investigated during 2006 and 2007. As no conspicuous

differences in larval microhabitat use could be found between the two species, an intensive mark-release-recapture study was conducted on male adults. This study revealed slight differences in patrolling activity patterns between the two species, both seasonally and daily. This was interpreted as a tendency to mutually avoid peaks in patrolling activity. At the stream studied, patrolling males of *C. boltonii* were much more frequent than those of *C. heros*. Furthermore, data on minimal lifespan and site fidelity of patrolling males was recorded. A few long-lived males visited the stream 35 days after having been marked. Some males displayed a tendency to frequent a certain stream section, but no males remained solely in one location. Only single individuals of a third Cordulegaster species, *C. bidentata*, were found at the study site." (Author)] Address: Schweighofer, W., Ötscherblick 10, A-3661 Artstetten, Austria. E-mail: wolfgang.schweighofer@schule.at

**8184.** Sciberras, A. (2008): A contribution to the knowledge of Odonata in the Maltese Islands. The Central Mediterranean Naturalist 4: 275-288. (in English) [*Calopteryx virgo meridionalis*, *Ischnura genei*, *Anax ephippiger*, *A. imperator*, *A. parthenope*, *Aeshna mixta*, *Crocothemis erythraea*, *Orthetrum brunneum*, *O. cancellatum*, *O. coerulescens anceps*, and *Trithemis arteriosa* are discussed in detail with special emphasis on the diet of the odonate species and predation of Odonata by birds, reptils, fishs, and amphibians. ] Address: Sciberras, A., 131, "Arnest", Arcade Str., Paola, Malta. E-mail: bioislets@gmail.com

**8185.** Sciberras, A.; Sammut, M. (2008): On the occurrence of *Calopteryx virgo meridionalis* (Selys, 1873) (Odonata: Calopterygidae) in the Maltese Islands. The Central Mediterranean Naturalist 4: 334-337. (in English) [The first Maltese record of a calopterygid (*Calopteryx virgo meridionalis*) at a rock pool near Marsacala is documented in detail.] Address: Sciberras, A., 131, "Arnest", Arcade Str., Paola, Malta. E-mail: bioislets@gmail.com

**8186.** Seggewiße, E. (2008): Paarungsrüttümer bei Libellen. *mercuriale* 8: 51-52. (in German) [Baden-Württemberg, Germany; heterospecific copulations are documented: male *Calopteryx virgo* - female *Pyrrhosoma nymphula*, male *Ischnura elegans* - female *Calopteryx splendens*, male *Ischnura elegans* - female *Sympecma fusca*, male *Libellula fulva* - female *L. quadrimaculata*.] Address: Seggewiße, Edelgard, Rottenburger St. 18, 72411 Bodelshausen, Germany. E-mail: Seggewisse@t-online.de

**8187.** Serrano-Meneses, M.A.; Córdoba-Aguilar, A.; Azpilicueta-Amorín, M.; González-Soriano, E.; Székely, T. (2008): Sexual selection, sexual size dimorphism and Rensch's rule in Odonata. *Journal of Evolutionary Biology* 21: 1259-1273. (in English) ["Odonata exhibit a range of sexual size dimorphism (SSD) that includes species with male-biased (males > females) or female-biased SSD (males < females) and species exhibiting nonterritorial or territorial mating strategies. Here, we use phylogenetic comparative analyses to investigate the influence of sexual selection on SSD in both suborders: Anisoptera and Zygoptera. First, we show that damselflies have male-biased SSD, and exhibit an allometric relationship between body size and SSD, that is consistent with Rensch's rule. Second, SSD of dragonflies is not different from unit, and this suborder does

not exhibit Rensch's rule. Third, we test the influence of sexual selection on SSD using proxy variables of territorial mating strategy and male agility. Using generalized least squares to account for phylogenetic relationships between species, we show that male-biased SSD increases with territoriality in damselflies, but not in dragonflies. Finally, we show that nonagile territorial odonates exhibit male-biased SSD, whereas male agility is not related to SSD in nonterritorial odonates. These results suggest that sexual selection acting on male sizes influences SSD in Odonata. Taken together, our results, along with avian studies (bustards and shorebirds), suggest that male agility influences SSD, although this influence is modulated by territorial mating strategy and thus the likely advantage of being large. Other evolutionary processes, such as fecundity selection and viability selection, however, need further investigation." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**8188.** Shebl, M.A.; Kamel, S.M.; Abu Hashesh, T.A.; Osman, M.A. (2008): The most common insect species in alfalfa field in Egypt. *Academic Journal of Entomology* 1(2): 27-31. (in English) ["Alfalfa (*Medicago sativa* L.) is a superb forage, but it can be shelter by a complex of insect pests, natural enemies and pollinators. Alfalfa insect populations can vary greatly from field to field. Therefore, it is essential to check each alfalfa field frequently for the presence of insects. The survey of the insect fauna of alfalfa was carried out in different areas of Egypt like Ismailia, Suez, Swia Oasis and The New Valley. A high number of insects were collected from alfalfa fields. Different samples were collected during the season 2003, the insect faunal composition could be categorized to the following groups; pests, natural enemies and pollinators." (Authors) *Ischnura senegalensis* and *Crocothemis erythraea* are listed as common predators of pest insects.] Address: Mohamed A. Shebl, Department of Plant Protection, Faculty of Agriculture, Suez Canal University, Ismailia, Egypt

**8189.** Simaika, J.P. (2008): Conservation biogeography of South African dragonflies (Odonata). M.s. Thesis, Stellenbosch University, Department of Conservation Ecology and Entomology, Faculty of AgriSciences: XI + 71 pp. (in English) ["The great pressures on freshwaters require their conservationists and managers to develop methods to rapidly and accurately assess their condition. Dragonflies are excellent indicators of habitat integrity and are effective organisms for this purpose. However, assessment must be done at the correct spatial scale. My aim here is to optimize the spatial resolution at which species are mapped, using three different concepts and methods in freshwater invertebrate distribution mapping, with special emphasis on IUCN Red Listing. The first is the extent of occurrence (EOO) concept, using the minimum convex polygon, and the second, the area of occupancy (AOO) concept, using IUCN and quaternary catchments. The third approach uses a river layer to compare the suitability of grids as opposed to catchments in mapping. In this study I found that area estimation based on minimum convex polygons should not be encouraged for aquatic organisms. This study also suggests that the IUCN concept of area of occupancy (AOO) should be redefined simply as occurrence, referring to known point-locality presences



only and, if future data allow to known absences. The IUCN extent of occurrence (EOO), for aquatic species, should be defined as 'the sum of the smallest hydrological units identified of presently known, inferred or projected occurrences of a taxon, excluding cases of vagrancy, that are used to estimate the threat to a taxon'. A single hydrological unit is also the conservation or management unit. Currently, that unit is the quaternary catchment. Dragonflies have excellent potential as indicators of habitat integrity. For this purpose, my aim was to develop the Dragonfly Biotic Index (DBI) for South Africa and compare the DBI to another index, the Average Taxonomic Distinctness Index (AvTD), which was believed to have potential in assessments. The DBI and AvTD are correlated, which suggests that they could be used on a complementary basis to prioritize sites. The DBI is a low-cost, easy-to-use method and is already used for measuring habitat recovery. It has great potential for environmental assessment and monitoring freshwater biodiversity, especially as a complement to freshwater quality assessments that use macroinvertebrate scores. I thus recommend its integration into freshwater management and conservation schemes." (Author)] Address: Simaika, J.P., Centre for Invasion Biology, Dept of Conservation Ecology and Entomology, Stellenbosch University, P Bag X1, Matieland 7602, South Africa. E-mail: simaika@sun.ac.za

**8190.** Smilkov, S.; Slavevska-Stamenkovic, V.; Prelic, D.; Paunovic, M. (2008): Distribution of benthic macroinvertebrates in Mantovo Reservoir (South-East part of the R. Macedonia). BALWOIS 2008 – Ohrid, Republic of Macedonia – 27: 1-12. (in English) [Composition and community structure of the macroinvertebrates from Mantovo Reservoir (South-East part of the R. Macedonia) in relation to lake depth was analysed. Bottom samples, carried out between May 2003 and April 2004, were collected at four different depths across the reservoir. *Calopteryx splendens* and *Ischnura elegans* are found in very small abundances.] Address: Slavevska-Stamenkovic, V., Sv Cyril & Methodius University, Faculty of Natural Science and Mathematics, Institute of Biology, P.O. Box 162, 1000 Skopje, Republic of Macedonia. E-mail: vstamen@yahoo.com

**8191.** Solly, F.; Milton, P.; Sawyer, D.; Hodge, T.; Hunt, B. (2008): Reports from coastal stations - 2007: Isle of Thanet. *Atropos* 33: 62-63. (in English) [UK; *Sympetrum fonscolombii*] Address: not stated

**8192.** Spence, B. (2008): Reports from coastal stations - 2007: Spurn Point, East Yorkshire. *Atropos* 33: 70-71. (in English) [UK; *Calopteryx splendens*, *Erythromma viridulum*, *Sympetrum fonscolombii*] Address: not stated

**8193.** Springer, M. (2008): Aquatic insect diversity of Costa Rica: state of knowledge. *Rev. Biol. Trop.* 56 (Suppl. 4): 273-295. (in English) ["Costa Rica hosts an extraordinarily high biodiversity and is among the best studied neotropical countries. Insects represent the most diverse group of organisms, not only in terrestrial but also in aquatic, especially freshwater, habitats. Among the most diverse aquatic insect orders are the Trichoptera, Diptera and Coleoptera; although Ephemeroptera can locally also be very abundant and diverse. In Costa Rica, the taxonomically best known orders of aquatic insects are Trichoptera, Odonata, and Plecoptera and within the Dipterans, groups of medical im-

portance have received special attention. The interest in aquatic insects has been constantly growing in Costa Rica over the past 10 years, but scientific publications are widely dispersed and often difficult to locate. Due to the importance of aquatic organisms in environmental impact studies and biomonitoring of freshwater habitats, there is an urgent need for comprehensive studies and publications that are locally available. In this sense, the present paper tries to give an overview on the state of knowledge and the literature published to date on the aquatic insects of Costa Rica, taking in account taxonomic, biological and ecological studies. [...] The country's Odonata fauna is very well known, especially the adults, but also, to some extent, the immatures. For the 268 species of Odonata existing in Costa Rica, a great amount of taxonomic works have been published (...), and the Costa Rican dragonfly fauna is considered to be the best known of all Latin-American countries (Ramírez et al. 2000). Despite this, only half of the species have their nymphal stages described and next to nothing is known about their behaviour, natural history, ecology and distribution (Ramírez 1996-1997, Ramírez et al. 2000.)] Address: Springer, Monika, Escuela de Biología, Universidad de Costa Rica, 2060 San Pedro de Montes de Oca, San José, Costa Rica. E-mail: springer@biologia.ucr.ac.cr

**8194.** Stöhr, M. (2008): Erste Treuhandstiftung dank des Testaments von Hartmut Spaeter. Individualist, Globetrotter, Naturfreund. Umweltstiftung Greenpeace. Jahresrundbrief 2008. (in German) [Polythore spaeteri Burmeister & Börsöny, 2003 was named after Hartmut Spaeter, Munich, Germany (1922 - 2007). The published note refers to this species and provides two figures with portraits of H. Spaeter.] Address: <http://www.umweltstiftung-greenpeace.de/fileadmin/umweltstiftung/userupload/Jahresrundbrief2008.pdf>

**8195.** Stoks, R. (2008): Philip Corbet – een leven vol libellen. Libellenvereniging Vlaanderen - nieuwsbrief 2(1): 19. (in Dutch) [Obituary] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robbystoks@bio.kuleuven.ac.be

**8196.** Strobl, P.; Heinze, B. (2008): Insekten der Altmark und des Elbhavellandes. 3. Teil: Odonata - Libellen, Heteroptera - Wanzen, Trichoptera - Köcherfliegen. *Entomologische Mitteilungen Sachsen-Anhalt Sonderh.* 2008: 3-46. (in German) [Sachsen-Anhalt, Germany, 55 odonate species are listed, and 23 species are briefly discussed.] Address: Strobl, P., Schulstr. 34, 39576 Stendal, Germany. E-mail: strobl-angepe@web.de

**8197.** Surugiu, V.; Cristea, A.E. (2008): Spatial and temporal analysis of aquatic invertebrate fauna from the Ozana river. *Analele Stiintifice ale Universitatii „Al. I. Cuza” Iasi, s. Biologie animala LIV:* 169-176. (in English, with Romanian summary) [Spatial and temporal distribution of benthic macroinvertebrates from the Ozana River was studied seasonally at 4 stations between autumn 2003 and summer 2004. As a result of the examination of 877 individuals collected 34 taxa were identified. The most diverse group were Ephemeroptera (8 taxa), Diptera (7 taxa), Gastropoda (5 taxa), and Plecoptera (4 taxa), whereas in terms of number of individuals dominant were Ephemeroptera (534 individuals), Trichoptera (121 individuals), and Diptera (93 individuals). The most abundant species was *Ecdyonurus* dis-

par (211 individuals), followed by *Paraleptophlebia submarginata* (125 individuals), and *Hydropsyche pellucidula* (120 individuals). Species assemblages of the macrobenthos and variations in ecological indices at stations with respect to seasons were determined and discussed." (Authors) Gomphus flavipes] Address: "Al. I. Cuza" University Iasi, Faculty of Biology, Bd. Carol I 20A, 700505 Iasi, Romania. E-mail: vsurugiu@uaic.ro

**8198.** Tailly, M.; De Knijf, G. (2008): Dutch names for European dragonflies (including Northern Africa and Western Turkey). *Libellenvereniging Vlaanderen - nieuwsbrief* 2(1): 22-25. (in Dutch, with English summary) ["Vernacular names gain in importance for popular insect groups. Since some time there was a readily accepted list for Western European species in Dutch, but with the future publication of a Dutch translation of the Dijkstra & Lewington Field Guide an extended list with Dutch names for all European species was made by a group of Dutch and Flemish people and is presented here." (Authors)] Address: Tailly, M., Hoonakkerdreef 35, 8791 Waregem, Belgium. E-mail: marc.tailly@pandora.be

**8199.** Takahashi, Y.; Watanabe, M. (2008): Male mate preference depending on mating experience in the damselfly, *Ischnura senegalensis* (Rambur) (Odonata: Coenagrionidae). *Japanese Journal of Entomology* N.S. 11(1): 13-17. (in Japanese, with English summary) ["Females of coenagrionid damselflies exhibit colour dimorphism, andromorph and gynomorph. Males seem to switch reversibly their mate choice to the morphs by prior experience of encounters with females. To clarify the effect of mating experience on male mate preference, binary choice experiments between the two female morphs in *Ischnura senegalensis* were conducted in the laboratory. Unexperienced males that had been reared separately from females after emergence showed fair selectivity, indicating that the innate male mate preference was not biased. Binary choice experiments for males that had been put into a small cage with a single female in the morning were also conducted both in the afternoon and in the following morning. In the former, males that mated with the female during the morning significantly preferred the same female morph, while males that did not mate due to the female rejection showed fair selectivity. In the latter, males that mated with female during the morning of previous day showed fair selectivity. These results indicate that the male mate preference changes depending on the prior mating experience, and the biased male preference disappears by the following morning." (Authors)] Address: Watanabe, M., Department of Biology, Faculty of Education, Mie University, Tsu, Mie 514-8507, Japan. E-mail: watanabe@edu.mie-u.ac.jp

**8200.** Tam, T.-w.; Kwan, B.S.P.; Wu, K.K.Y.; Wong, B.S.F.; Tang, S.S.H.; Fung, C.H.L.; Wong, W.S.Y.; Wong, J.K.; Fongt, S.W.L.; Lei, A.H.C. (2008): Current status of dragonflies (Odonata) and their representation in protected areas of Hong Kong. *Hong Kong Biodiversity* 16: 1-7. (in English, with Chinese summary) ["All the extant 112 species (after excluding the three historical records that were made over 40 – 110 years ago) were well represented in the protected areas and are considered to be well protected. In addition, the dragonfly species of conservation interest and the dragonfly representative sites were also well protected by the protected areas system or appropriate conservation meas-

ures in Hong Kong. Nevertheless, monitoring of the dragonfly representative sites and up-keeping of the existing management measures of the protected area system will be continued so as to safeguard the habitats and local populations of the dragonflies of conservation interest in Hong Kong.] Address: not stated

**8201.** Ternois, V. (2008): L'Aeschna paisible *Boyeria irene* (Donscolombe, 1838): Première mention pour de Département de la Haute-Marne (Odonata, Anisoptera, Aeshnidae). *Bull. Société de sciences naturelles et d'archéologie de la Haute-Marne* 7: 11-13. (in French) [*Boyeria irene* was observed for the first time in the Département Haute-Marne, France at 4-VIII-2007. This is a considerable range extension to the north (east).] Address: Ternois, V., RCPiE du Pays de Soulaïnes, Domaine de Saint-Victor, 10200 Soulaïnes-Dhuys, France

**8202.** Torralba Burrial, A. (2008): Comportamiento de cerrar las alas al estar posado en *Lestes dryas* Kirby, 1890 (Odonata: Lestidae). *Boletín de la S.E.A.* 42(1): 455-456. (in Spanish, with English summary) [*L. dryas* perching with closed wings, instead of keeping them open, as is the usual practice in *Lestes* spp., are reported. Other congeneric cases are commented.] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonio@hotm.com

**8203.** Viallanueva, R. (2008): Some notes on the dragonflies of Dinagat, northeast Mindanao, Philippines. *Echo* 2008: 2. (in English) [Verbatim: When arriving on Dinagat Island I travelled through the interior from Dinagat town to Albor-Libjo. The entire area from Dinagat to Albor was completely deforested and I saw only some areas with secondary growth, particularly in the mountain areas of Basilisa. Dragonfly habitats seen along the road included small ponds, wet rice field areas and creeks. Some small rivulets and trickles were present along some roadside cliffs. *Pantala flavescens* was often seen at roadsides and in open areas, *Macrodiplax cora* was also seen hovering at some ponds and pools along the road. While staying in the Albor District Hospital for 3 days I managed to explore few places in its vicinity. The area seems to be bare of forest specialist and only *Prodasineura integra* was noted near a small stream. Several opportunistic species like *Diplacodes trivialis*, *Neurothemis terminata* and *Orthetrum sabina* were the only Anisoptera encountered. I arrived in Loreto and stayed in Loreto District Hospital where I work as medical officer. I explored the surrounding waterways and managed to collect some specimens of *Teinobasis* sp. (nov?) in the nearby Nipa swamp were *Raphismia bispina* was also present. Aside from several widespread oriental species I managed to collect a *Gynacantha* sp female entering the hospital. During a short trip to a river near the entrance road to Chromico mining firm I saw *Euphaea amphicyana* and *Drepanosticta mylitta* and *Risicnemis appendiculata* were found at a shaded rivulet near the river. A trip to Paragua Forest reserve yielded two new records for the island: *Rhinagrion philippina* and *Teinobasis cf. filamentum*. *Risicnemis prauesta* is the commonest species found in the area and was even found at some distance from the waterways. In total I visited seven sites thus far mostly within Loreto and a total of 29 species were recorded.] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., Davao City, 8000 Philippines. E-mail: reaganjoseph@lycos.com

**8204.** Wang, X.-s.; Li, Y.; Shi, Y.-f. (2008): Effects of sandwich microstructures on mechanical behaviours of dragonfly wing vein. *Composites Science and Technology* 68: 186-192. (in English) ["Dragonfly wings, which consist mainly of the veins and membranes, are highly specialized flight organs adapted to cope with the individual flight behaviour of each dragonfly. Therefore, it is important and necessary from a bionic view to investigate how the microstructures affect their mechanical behaviours of elements. In this study, it is focused on effects of microstructure on mechanical characteristics of dragonfly wing vein. These results indicate that the microstructure of vein is a complex sandwich structure, which consists of chitin shell and protein/muscle with some fibrils. This sandwich structure can be subjected to the rather greater bending loading and torsional deformation based on the von Mises stress and flexural deformation analysis of finite element analysis (FEA). It assists us to understand and design the new high strength-to-weight ratio of composite materials or structure." (Authors)] Address: Wang, X.-s., Dept Engineering Mech., Tsinghua Univ., 100084 Beijing, PR China

**8205.** Westermann, K. (2008): Auswirkungen von Hochwassern auf die Emergenzraten von Libellen an Fließgewässern des Oberrheinischen Tieflandes (Odonata). *Libellula* 27(1/2): 63-88. (in German, with English summary) ["Exuviae were collected systematically during several years at four running water sites in the southern Upper Rhine lowland plains. Different impacts of floods on the emergence of Odonata were documented: At two channels, over which the main flood discharge occurred, the emergence rates of all frequent species decreased to insignificant levels. In contrast, emergence rates drastically increased at a side channel, which featured little current during floods. At one stream, the emergence rates of some species recovered at the earliest after two years. In a mesotrophic channel considerable amounts of nutrients were accumulated during a flood, causing the macrophyte populations to almost entirely die off, so that Odonata larvae evidently migrated away in large numbers. Emergence was at most an exception during floods. A long-lasting flood delayed the emergence in the same year for several weeks. The specific flood characteristics of a running water site are crucial factors for both species composition and the abundance of Odonata. As reported from other organisms, the results confirmed that a 'catastrophic drift' may occur during floods, possibly leading to a substantial reduction of population sizes. The larvae of Odonata can survive in refugia like side channels, and recolonize watercourses with flood-depleted subpopulations from there. The canalization of most watercourses in Central Europe has destroyed many of these refugia or has reduced their effectiveness. Hence, securing and reconstructing refugia has become a key challenge for water management authorities when running waters are revitalized and measures for flood protection are taken. The conservation or recreation of a species-rich and abundant fauna in river-scapes cannot succeed otherwise." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**8206.** Wilson, K.D.P.; Reels, G.T.; Xu, Z. (2008): Revised Checklist of Hainan Odonata, China. *Echo* 2008: 6-14. (in English) ["A revised checklist of the odonates of Hainan is provided. In total 146 species are listed, which includes 16 unpublished species records. Six of

these species are recorded from Chinese territory for the first time. The Hainan fauna is briefly compared with the odonate fauna from Taiwan." (Authors) B&W figures of the following species are provided: *Stylurus erectornis*, *Rhinocypha* (*Heliocypha*) *huai*, *Rhinocypha drussilla*.] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: wilsonkd@ntlworld.com

**8207.** Yu, W.-y.; coauthors not transliterated (2008): Analysis on the flora [sic] of Libellulidae insects of Odonata in Lushan Area, Jiangxi province and its diversity study. (in Chinese, with English summary) *Journal of Anhui Agri. Sci.* 36(7): 2854-2856, 2866 [24 species of Libellulidae are reported from the Lushan area, including 12 species new for the Jiangxi province.] Address: Yu, W.-y., Dept of Life Science, Nanjing Xiaozhuang University, Nanjing, Jiangsu 210017, China

**8208.** Yu, W.-y.; Li, Z.-h.; Song, D.-j.; Huang, C.; Yang, X.; Yuan, X.-j.; Zhou, J. (2008): Study on the fauna and diversity of Odonata insects in Zijin Mountain of Nanjing. *Journal of Nanjing Forestry University* (Natural Sciences Edition) 32(4): 139-142. (in Chinese, with English summary) [Between 2005 and 2007, 30 species of Odonata were collected in the Zijin Mountain of Nanjing, China, including 8 species new for the Jiangsu province.] Address: Yu Wei-yan, Dept of Life Science, Nanjing Xiaozhuang University, Nanjing 211171, China

**8209.** Yu, W.-y.; Li, Z.-h.; Song, D.-j.; Huang, C.; Wang, H.-q.; Lu, J.; Wang, H.; Qian, Y.-p. (2008): Research on fauna and diversity of Odonata in different seasons in Laoshan Area, Nanjing. *Sichuan Journal of Zoology* 127(13): 322-326. (in Chinese, with English summary) [Between 2005 to 2007, 30 odonate species were found in the Laoshan area of Nanjing City, China, 7 of them for the first time in the Jiangsu Province. The species belonged to different zoogeographical groups.] Address: Yu Wei-yan, Dept of Life Science, Nanjing Xiaozhuang University, Nanjing 211171, China

**8210.** Yu, X. (2008): Ovipositing of *Ischnura aurora*. *Echo* 2008: 2. (in English) [Verbatim: In the summer of 2006, I went to Yunnan, China for fieldwork. In a valley in Tengchong County I noticed a female *Ischnura aurora* ovipositing in the centre of a little pool on a stem of a kind of horsetail (*Equisetum* sp.). She moved slowly down along the stem into the water and stayed below the water for about two minutes. Suddenly, just like a missile launched from a submarine, she was ejected out of the water without leaving a ripple on the face of the pool and without any interruption she flew around and ceased at another stem nearby. All this happened in a split second and I am sure she came out off the water directly, so without crawling upward along the stem, as the position where she came out of the water was at a little distance from the stem of the plant. About one minute later, she tested the new stem with her ovipositor and went down into the water again. Four minutes later she used the same trick and came out of the water and flew away. I have observed the submerged oviposition behaviour of *Ischnura asiatica*, *Paracercion v-nigrum*, *Euphaea ochracea*, and some other species, but they never showed such an impressive style like this female *Ischnura aurora*.] Address: Xin Yu [yuxin@mail.nankai.edu.cn]

**Thanks to all who contributed to this issue!!**



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Silberdistelweg 11, D-72113 Ammerbuch, Germany. Tel. ++49 (0)7073 300770; E-mail: martin@lindeboom.de  
Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105;  
E-mail: K.Reinhardt@sheffield.ac.uk  
Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

---

## 2009

**8211.** Abilhoa, V.; Bornatowski, H.; Otto, G. (2009): Temporal and ontogenetic variations in feeding habits of *Hollandichthys multifasciatus* (Teleostei: Characidae) in coastal Atlantic rainforest streams, southern Brazil. *Neotropical Ichthyology* 7(3): 415-420. (in English, with Portuguese summary) [Stomach content of *H. multifasciatus* includes odonate larvae but is not further specified.] Address: Otto, G., Universidade Federal do Paraná (UFPR), Depto de Zoologia, CP 2936, 69083-000 Curitiba, PR, Brazil. E-mail: ottogis@gmail.com

**8212.** Adeyemi, S.O.; Adikwu, I.A.; Akombu, P.M.; Iyela, J.T. (2009): Survey of zooplanktons and macroinvertebrates of Gbedikere Lake, Bassa, Kogi State, Nigeria. *International Journal of Lakes and Rivers* 2(1): 37-44. (in English) [Between July and Sept., 2008, macroinvertebrates were represented by Coleoptera (2.44%), Diptera (48.85%), Ephemeroptera (2.59%), Hemiptera (9.59%), Odonata (29.07%), Trichoptera (0.91%), Plecoptera (0.30%), Arachnida (2.13%), Annelida (2.89%) and Nematoda (1.22%).] Address: Adeyemi, S.O., Dept of Biological Sciences, Benue State University, Makurdi, Nigeria. E-mail: sadeyemi2003@yahoo.com

**8213.** Akira, M. (2009): Growth of several fish and dragonfly species in the drainage system of a consolidated paddy field. *Japanese Journal of Conservation Ecology* 14(1): 3-11. (in Japanese, with English summary) ["This study examined the growth of aquatic animals in the canal system constituting the main, lateral, and farm drains in a consolidated paddy field, with emphasis on canal structure and year-round water flow in the canals. A field survey at six sites, which involved three different canal levels, was carried out in Chikusei, Ibaraki Prefecture, Japan (36°21'N, 139°59'E). Sampling was conducted at monthly intervals from April 2001 to March 2002. Of the freshwater fish, young-of-the-year (YOY) *Zacco platypus* appeared in September, while YOY *Misgurnus anguillicaudatus* appeared in May. Last instars of *Calopteryx atrata* were collected only in June, suggesting emergence about this time, while those of *Orthetrum albistylum speciosum* were collected in May and July, suggesting a longer duration of emergence. Since populations of the four species decreased during the non-irrigation season when the wa-

ter level was low, I propose that a marsh be developed as a wintering site in the lower reaches of the canal system in consolidated paddy fields." (Author)] Address: not available

**8214.** Al-Houty, W. (2009): Insect biodiversity in Kuwait. *International Journal of Biodiversity and Conservation* 1(8): 251-257. (in English) ["Natural causes, together with the deliberate destruction of the environment with the objective of forcing political, military and means of civilization have resulted in great deterioration of the environment. The insect fauna of Kuwait has suffered from such destructions, resulting in some becoming extinct, while others are threatened with extinction from Kuwait desert, however, others still flourishing. This contribution records the status of the entomofauna in Kuwait prior to the Gulf War (from 1980 - 1990), and after the Gulf War (from 1992 - 2008), including the effects of new modern dwellings and severe draught. During the first period 474 species of insects were recorded from Kuwait (356 genera, 109 families, 19 orders) but the numbers of species increased to 492 (273 genera, 116 families, 19 orders) during the second period. The differences are caused by disappearance and re-appearance. This study will discuss the reasons for increase, disappearance and reappearance of insects in the desert ecosystem of Kuwait." (Author) 11 odonate taxa - without specification - and each prior and after the war are listed.] Address: Al-Houty, W., Department of Biological Sciences, Faculty of Science, University of Kuwait. E-mail: wamia@kuc01.kuniv.edu

**8215.** Aliberti Lubertazzi, M.A.; Ginsberg, H.S. (2009): Persistence of dragonfly exuviae on vegetation and rock substrates. *Northeastern Naturalist* 16(1): 141-147. (in English) ["Surveys of dragonfly exuviae have been used to assess rare species' habitats, lake water quality status, and wetland restoration programs. Knowledge of the persistence of exuviae on various substrates is necessary to accurately interpret exuvial surveys. In 2006, we recorded exuvial persistence at defined areas in a variety of small freshwater wetlands in Rhode Island. Exuviae were field-identified, labeled with small daubs of nail polish, and observed every three weeks from June through September. Overall, exuvial persistence displayed exponential decline, disappearing rapidly during the first few weeks, and more slowly

thereafter. The initial rate of decline was similar for most species, but differed in some taxa. There was no significant difference in exuvial retention on emergent vegetation vs. rock substrate." (Authors)] Address: Lubertazzi, Maria, Dept of Plant Sciences/ Entomology, University of Rhode Island, Woodward Hall, Kingston, RI 02881, USA. E-mail: mariaaa@mail.uri.edu

**8216.** Altamiranda Saavedra, M. (2009): Actualización de registros del orden Odonata del Museo Entomológico Francisco Luis Gallego. Boletín del Museo Entomológico Francisco Luis Gallego 1(3): 6-18. (in Spanish) [Since 1945, 1,180 Odonata specimens were deposited in the collection of the Museo Entomológico Francisco Luis Gallego. In a table, taxonomic information, identifier, and locality data of this collection are compiled. All specimens are from Colombian localities.] Address: Altamiranda Saavedra, M., Biólogo, Estudiante de Maestría Ciencias – Entomología, Universidad Nacional de Colombia sede Medellín, Grupo de Investigación en Ecología y Sistemática de Insectos (GIESI). Museo Entomológico Francisco Luis Gallego MEFLG Apartado Aéreo 3840. Medellín, Colombia

**8217.** Alvarez, G.; Nicieza, A.G. (2009): Differential success of prey escaping predators: Tadpole vulnerability or predator selection? *Copeia* 2009(3): 453-457. (in English) ["Species inhabiting habitats with different predators are expected to show divergent phenotypes for antipredator traits. Here, we used a predator-prey system of dragonfly larvae and tadpoles to determine if vulnerability to a common predator differs in species with contrasting antipredator strategies. We examined the vulnerability of tadpoles of *Rana temporaria* and *Bufo bufo* to predation by *Aeshna* larvae when the two species co-occur in the same arena. Our results demonstrated that tadpoles of *Bufo* were more vulnerable than tadpoles of *Rana* despite the observation that dragonfly larvae did not show initial preferences for either prey species. Differences in susceptibility to predation seem to be associated with their low performance in evasive responses. Most important, our data suggest that despite chemical protection that effectively prevented the consumption of *B. bufo* by *Aeshna* larvae, injured tadpoles that otherwise had survived are at a high risk of being cannibalized. This loss of survival advantage of a chemical defense is an indirect result of two antipredator responses: the effectiveness of the chemical defense itself and the immobility of refused tadpoles." (Authors)] Address: Álvarez, G, Depto de Biología de Organismos y Sistemas, Unidad de Ecología, Univ. de Oviedo, E-33006 Oviedo, Spain. E-mail: dalvarez@innova.uniovi.es.

**8218.** Andrew, R.J. (2009): Fine structure of the egg chorion in two anisopteran dragonflies from central India (Libellulidae). *Odonatologica* 38(4): 359-363. (in English) ["The fine structure of the egg chorion in *Brachydiplax sibirica* and *Orthetrum s. sabina*, is described using the scanning electron microscope. The unwetted eggs of *B. sibirica* are bluish-green and spindle-shaped while those of *O. s. sabina* are oval and light brown in colour. The egg chorion is distinctly divided into an outer exochorion and an inner tough endochorion. The exochorion expands into a thick, sticky, jelly-like structure in water during oviposition, whereas the endochorion remains unchanged. The endochorion is thin and smooth in *O. s. sabina*, but in *B. sibirica* the undersurface of the endochorion is pitted and rough. The apical

micropylar apparatus is composed of a sperm storage chamber (atrium) and a median projecting stalk, which possesses a pair of sub-terminal orifices. The atrium in *B. sibirica* is dome shaped with a tiny stalk whereas in *O. s. sabina* the micropylar apparatus is triangular with a longer stalk and a pair of almost apically placed orifices. Significant variations occur in the shape and size of the micropylar apparatus. The functional interrelationship of the micro morphological modifications in the chorionic structures is discussed." (Author)] Address: Andrew, R.J., Post-Graduate Department of Zoology, Hislop College, Nagpur 440 001, India. E-mail: rajuan-drew@yahoo.com

**8219.** Anonymous (2009): Of damsels and dragons. *The Nature of Scotland* 4 (Summer 2009): 17-19. (in English) [General account on Scottish Odonata.] Address: <http://www.snh.org.uk/pdfs/SNHMagazine/Contents-Summer-2009/Damselsdragons.pdf>

**8220.** Ardila-Garcia, A.M.; Gregory, T.R. (2009): An exploration of genome size diversity in dragonflies and damselflies (Insecta: Odonata). *Journal of Zoology* 278: 163-173. (in English) ["Like most insect orders, the Odonata remain poorly studied from the perspective of genome size. They exhibit several characteristics that make them desirable targets for analysis in this area, for example a large range in body size, differences in developmental rate, and distinct modes of flight – all of which are related to genome size in at least some animal taxa. The present study provides new genome size estimates and morphometric data for 100 species of odonates, covering about 1/5 of described North American diversity. Significant relationships are reported between genome size and body size (positive in dragonflies, negative in damselflies), and there is also indication that developmental rate and flight are related to genome size in these insects. Genome size is also positively correlated with chromosome number across the order. These findings contribute to an improved understanding of genome size evolution in insects, and raise several interesting questions for future research." (Authors)] Address: Gregory, T.R., Department of Integrative Biology, University of Guelph, Guelph, Ontario N1G 2W1 Canada. Email: rgregory@uoguelph.ca

**8221.** Argyroudi, A.; Chatzinikolaou, Y.; Poirazidis, K.; Lazaridou, M. (2009): Do intermittent and ephemeral Mediterranean rivers belong to the same river type?. *Aquatic ecology* 43(2): 465-476. (in English) ["The benthic macroinvertebrate communities and ecological quality of eleven temporary rivers (seven intermittent and four ephemeral) in Dadia National Park, north-eastern Greece, were examined with respect to the degree of flow temporality. Sampling took place during the high flow season at both ephemeral and intermittent sites and during the low flow season only at the intermittent ones, which receded to pools. Despite the remarkable seasonal variation in both the hydrology and ecology of the intermittent rivers, the various metrics and indices as well as the multivariate analyses confirmed the clear distinction between the two river types (ephemeral and intermittent). Existing European quality indices do not sufficiently differentiate between ephemeral and intermittent river types, and thus cannot reliably discriminate the degree of natural variability from human induced stressors in temporary rivers." (Authors) Cluster A was composed of the low flow intermittent sites and characterized mostly by the Diptera family of Chironomidae

and the Odonata Platycnemydidae (40.62% and 21.99% contribution, respectively.)] Address: Argyroudi, A., School of Biology, Department of Zoology, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece. E-mail: anna.argyrou@gmail.com

**8222.** Asokan, S.; Samsoor Ali, A.M.; Manikannan, R. (2009): Diet of three insectivorous birds in Nagapattinam District, Tamil Nadu, India – a preliminary study. *Journal of Threatened Taxa* 1(6): 327-330. (in English) ["The dietary composition of the White-breasted Kingfisher *Halcyon smyrnensis*, the Small Bee-eater *Merops orientalis* and the Black Drongo *Dicrurus macrocercus* was studied between 2005 and 2006 in Nagapattinam District, Tamil Nadu, India by analyzing regurgitated pellets. The analysis revealed that the White-breasted Kingfisher preys mainly on arthropods (83.40%) and less on vertebrates; seven orders of insects were identified, with Coleoptera, Hemiptera, Hymenoptera and Orthoptera predominant. The small bee-eater diet is composed of Coleoptera (22.3%), Hymenoptera (20.8%), Hemiptera (14.1%), Orthoptera (12.6%), Odonata (10.7%), Lepidoptera (10.4%) and Diptera (8.6%). Beetles were also found to be the most frequent prey (23.7%) in the diet of black drongos, followed by Hemiptera (21.6%), Orthoptera (19.3%), Hymenoptera (14.4%), Lepidoptera (7.5%), Diptera (6.8%) and Odonata (6.0%)."] (Authors)] Address: Asokan, S., Ph.D. Research Scholar, Department of Zoology & Division of Wildlife Biology, A.V.C. College (Autonomous), Mannampandal, Mayiladuthurai, Tamil Nadu 609305, India. E-mail: beeeasokan@yahoo.co.in

**8223.** Ayten, Y.; Özgökçe, M.S. (2009): Odonata species, their distribution and habitats in Van province. *Yyü. Tar. Býl. Derg. (Yyü J. Agr. Sci.):* 1-9. (in Turkish, with English summary) [The Odonata of Van Province, Turkey were investigated in 2003 and 2004. A total of 11 species including new provincial records (*Calopteryx splendens intermedia*, *Lestes barbarus*, *Aeshna affinis*, *Anax imperator* *Orthetrum anceps*, *Sympetrum meridionale*) were recorded. ] Address: Özgökçe, M.S., Yüzüncü Yıl Üniversitesi, Ziraat Fakültesi, Bitki Koruma Bölümü, VAN, Turkey. e-mail: msozgekce@yyu.edu.tr

**8224.** Ballengée, B.; Sessions, S.K. (2009): Explanation for missing limbs in deformed amphibians. *Journal of Experimental Zoology Part B: Molecular and Developmental Evolution* 312(7): 770-779. (in English) ["We present evidence that the most commonly found deformities in wild-caught amphibians, those featuring missing limbs and missing limb segments, may be the result of selective predation. Here we report that predatory dragonfly nymphs can severely injure and even fully amputate developing hind limbs of anuran tadpoles. Developmental responses of the injured/amputated tadpole limbs range from complete regeneration to no regeneration, with intermediate conditions represented by various idiosyncratic limb deformities, depending mainly on the developmental stage of the tadpole at the time of injury/amputation. These findings were reinforced by experimental amputations of anuran tadpole hind limbs that resulted in similar deformities. Our studies suggest that selective predation by dragonfly nymphs and other aquatic predators may play a significant role in the most common kinds of limb deformities found in natural populations of amphibians." (Authors)] Address: Sessions, S.K., Department of Biology, Hartwick College, Oneonta, New York, USA. E-mail: sessions@hartwick.edu

**8225.** Beckemeyer, R.J. (2009): First record of the dragonfly *Miathyria marcella* (Selys) for Kansas (Odonata: Anisoptera: Libellulidae). *Transactions of the Kansas Academy of Science* 112: 130-132. (in English) [USA, Sedgwick County, Kansas, Wichita State University Ninescah Field Station, 26-IX-2008, single specimen of a mature male *M. marcella*. "This occurrence is approximately 200 miles beyond the previously recorded range, a distance that does not seem likely to be due to an individual wandering about while feeding. Dragonflies are often displaced long distances by weather systems. Such a system was in place from 8 to 15 September, 2008, in the form of Hurricane Ike." (Author)] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**8226.** Beckemeyer, R.J. (2009): Kinematics of a territorial defense maneuver by the dragonfly *Pachydiplax longipennis* (Odonata: Anisoptera: Libellulidae). *Transactions of the Kansas Academy of Science* 112(3/4): 169-180. (in English) ["A high speed (1000 frame/s) video segment, 0.367 seconds long, showing a territorial male *P. longipennis* dragonfly responding in the field to a challenge from a conspecific male, reveals that the defender used a high rate yaw-turn to position itself to drive off the challenger. In-phase flapping of the fore and hind wings was used during the yaw turn and in the following pursuit of the challenger. During the right yawing turn, the dragonfly flapped its right wings to a more negative stroke amplitude than its left wings on the first two downstrokes (1st downstroke: -65° right wing, -45° left wing; 2nd downstroke: -90° right wing, -50° left wing). Upstroke amplitudes were the same for both wings throughout the yaw turn. The 135° yaw turn was executed, in three wing beats (0.085 s) and in about 6/10ths of a body length of horizontal travel, at an average yaw rate of 1590%, and a peak turn rate of 3000%. This rapid yawing rotation was accompanied by a significant deceleration in flight path speed, which dropped from 30 to 7 body lengths per second (1.1 m/s to 0.3 m/s) as the dragonfly yawed through 90° in the first half of the yaw turn. The wingbeat frequency dropped from 41.7 Hz at the beginning of the yaw turn to 33.3 Hz at the end. The horizontal and vertical flight velocity components both reached zero near the completion of the yaw turn, during the upstroke portion of the third wing beat. Within 1/10th of a second after completing the yaw turn, the defender had reached speeds of 8 body lengths per second (0.3 m/s) upward and 14 body lengths per second (0.55 m/s) horizontally, and was accelerating along its flight path at approximately 150 body lengths per second<sup>2</sup> (5.5 m/s<sup>2</sup>) in its pursuit of the challenger." (Author)] Address: Beckemeyer, R.J., Research Associate, Division of Entomology, Natural History Museum, 1501 Crestline Drive — Suite 140, University of Kansas, Lawrence, Kansas 66049-2811, USA. E-mail: roybeckemeyer@ku.edu

**8227.** Bedjanic, M. (2009): *Drepanosticta starmuehlneri* St. Quentin, 1972 from Sri Lanka, a synonym of *D. lankanensis* (Fraser, 1931) (Zygoptera: Platystictidae). *Notulae odonatologicae* 7(4): 38-39. (in English) ["The badly damaged holotype of *D. starmuehlneri* in the Vienna Natural History Museum is compared with Fraser's original description and illustrations and with the type-checked specimens of *D. lankanensis*, and it is concluded the former is a junior synonym of the latter." (Author)] Address: Bedjanic, M., Kolodvorska 21b, SI-2310



Slovenska Bistrica, Slovenia. E-mail: matjazbedjanic@yahoo.com

**8228.** Berezina, N.A.; Zhakova, L.V.; Zaporozhets, N.V.; Panov, V.E. (2009): Key role of the amphipod *Gmelinoides fasciatus* in reed beds of Lake Ladoga. *Boreal Env. Res.* 14: 404-414. (in English) [Russia, "The Baikalian *G. fasciatus*, a successful invader in Eurasia, colonized the coastal zone of Lake Ladoga (northeastern Europe) in late 1990s. In the summers of 2000 and 2005 the density and biomass of benthic communities (including Odonata) associated with macrophyte beds (*Phragmites australis*) and role of the invader in fish diet were studied." (Authors)] Address: Berezina, N.A., Zoological Institute of Russian Academy of Sciences, St-Petersburg 199034, Russia. E-mail: nber@zin.ru

**8229.** Bergmann, T.; Hadrys, H.; Breves, G.; Schierwater, B. (2009): Character-based DNA barcoding: a superior tool for species classification. *Berliner und Münchener Tierärztliche Wochenschrift* 122(11/12): 446-450. (in English, with German summary) ["In zoonosis research only correct assigned host-agent-vector associations can lead to success. If most biological species on Earth, from agent to host and from prokaryotes to vertebrates, are still undetected, the development of a reliable and universal diversity detection tool becomes a *conditio sine qua non*. In this context, in breathtaking speed, modern molecular-genetic techniques have become acknowledged tools for the classification of life forms at all taxonomic levels. While previous DNA-barcoding techniques were criticised for several reasons (Moritz and Cicero, 2004; Rubinoff et al. (2006a, b; Rubinoff, 2006; Rubinoff and Haines, 2006) a new approach, the so called CAOS-barcoding (Character Attribute Organisation System), avoids most of the weak points. Traditional DNA-barcoding approaches are based on distances, i.e. they use genetic distances and tree construction algorithms for the classification of species or lineages. The definition of limit values is enforced and prohibits a discrete or clear assignment. In comparison, the new character-based barcoding (CAOS-barcoding; DeSalle et al. 2005; DeSalle, 2006; Rach et al. 2008) works with discrete single characters and character combinations which permits a clear, unambiguous classification. In Hannover (Germany) we are optimising this system and developing a semiautomatic high-throughput procedure for hosts, agents and vectors being studied within the Zoonosis Centre of The „Stiftung Tierärztliche Hochschule Hannover“. Our primary research is concentrated on insects, the most successful and species-rich animal group on Earth (every fourth animal is a bug). One subgroup, the winged insects (Pterygota), represents the outstanding majority of all zoonosis relevant animal vectors." (Authors) The method is exemplified using *Crocothemis erythraea*, *Orthetrum chrysostigma* and *Anax imperator*.] Address: Bergmann, T., Institut für Tierökologie und Zellbiologie, Stiftung Tierärztliche Hochschule Hannover, Bünteweg 17d, 30559 Hannover, Germany. E-mail: tjard.bergmann@ecolevol.de

**8230.** Bhattarai, G.P.; Horner, J.D. (2009): The importance of pitcher size in prey capture in the carnivorous plant, *Sarracenia alata* Wood (Sarraceniaceae). *The American Midland Naturalist* 161(2): 264-272. (in English) ["Prey capture in pitcher plants has been found to be significantly dependent on pitcher size, but the ac-

tual importance of size is not clearly understood. We studied insect capture by the carnivorous plant *Sarracenia alata* and compared the rate of insect capture per unit capture area of plants with that of nonbiological models and traps. The total mass of insects captured was significantly positively related to capture area for both biological and nonbiological systems. However, the rate of insect capture was significantly greater for plants than for models and traps, which suggests a role of attractants in insect capture in pitcher plants. Odor from decaying insects was found to have a significant effect on insect capture on experimental attraction cups. Further study should focus on the nature of other attractants including nectar, UV reflectance and volatiles to determine their role in insect capture by pitcher plants. [...] Even though dragonflies are commonly observed perching on pitcher hoods, we have never observed one captured in hundreds of pitchers examined." (Authors)] Address: Horner, J.D., Department of Biology, Box 298930, Texas Christian University, Fort Worth, Texas 76129, USA. E-mail: J.Horner@tcu.edu

**8231.** Bjurström, L. (2009): Impacts of the non-native crayfish (*Pacifastacus leniusculus*) on littoral benthic invertebrate communities in Lake Päijänne. Master of Science Thesis, Department of Biological and Environmental Science, International Aquatic Masters Programme, University of Jyväskylä: 28 pp. + attachments. (in English, with Finnish summary) ["The introduced crayfish *P. leniusculus* is now a permanent resident in many of the large lakes in Finland, but the effects of this large omnivore on lake ecosystems are largely unknown. In general, it is thought that when crayfish abundance increases, species composition of benthic invertebrates may change towards species less vulnerable to predation by crayfish and the snail abundance is expected to decrease. However, indirect impacts of crayfish on benthic communities can also be expected. The impacts of *P. leniusculus* on littoral benthic invertebrate communities in large Lake Päijänne were therefore studied by comparing the benthic invertebrate assemblages of stony shores in lake areas with well established crayfish populations to those in areas without crayfish. The invertebrate community composition differed between the areas, and there was a clear reduction in species richness and abundance and of snail abundance in particular in the presence of signal crayfish. The crayfish sites were dominated by Chironomidae and Oligochaeta and small number of other invertebrate groups (including Odonata, Coenagrionidae, Corduliidae). The non-crayfish sites were dominated evenly by Chironomidae and Oligochaeta, Elmidae, Amphipods, Gastropoda and Trichoptera. [...] The invertebrate density was on average 44 % lower at areas with crayfish than without crayfish. [...] Significant negative relationships at the family level included [...] Coenagrionidae." (Author)] Address: Bjurström, Lotta; not stated

**8232.** Bonino, M.F.; Lescano, J.N.; Haro, J.G.; Leynaud, G.C. (2009): Diet of *Hydromedusa tectifera* (Tentaculata-Chelidae) in a mountain stream of Córdoba province, Argentina. *Amphibia-Reptilia* 30(4): 545-554. (in English) ["The diet of *H. tectifera* occurring in two mountain streams in the province of Córdoba is described through a comparative analysis of 154 individuals. Turtles were manually captured between August 2005 and August 2006 from streams at the localities of Tanti and Flor Serrana. Before being released, turtles were stomach-flushed, and sex and carapace length

were recorded. The stomach contents were observed under stereomicroscope; prey items were identified and classified according to size and volume. The importance of the different items was quantified using the Index of Relative Importance (IRI). Similarity in the diet between sexes and among size classes and seasons of an annual cycle was evaluated using the simplified Morisita index. Trophic breadth was estimated with the Shannon diversity index. Detrended Correspondence Analysis (DCA) was used to evaluate differences in the diet between categories (sex, size classes). Forty-seven food items belonging to the following taxa were identified: leeches, annelids, gastropods, arachnids, insects, and fishes. According to the IRI value, the most important items in the diet of *H. tectifera* were larvae of Trichoptera (IRI = 33.5), fishes (IRI = 30), and naiads of Odonata (IRI = 25.2). The relative importance of the items varied with size of turtles but not with sex. Size of prey consumed increased with increasing turtle size. A greater trophic breadth was observed in smaller individuals." (Authors)] Address: Leynaud, G.C., Centro de Zoología Aplicada. Facultad de Ciencias Exactas, Físicas y Naturales (Universidad Nacional de Córdoba), Rondeau 798, Casilla de Correo 122, Córdoba (5000), Argentina. Email: gleynaud@efn.uncor.edu

**8233.** Bowers, J. (2009): The Dragonflies of Lesbos. Promoline SA for the Friends of Green Lesbos, Mytilene, Lesbos. ISBN 978-960-930703-1: 92 pp. (in English) [The book starts with a brief discussion of dragonfly biology and ecology. Dragonfly habitats are listed with typical species. 42 species found on the island are briefly described and illustrated with a photograph. Neuroptera that may be confused with dragonflies are also illustrated. There is a gazeteer of the main dragonfly sites. The book finishes with a discussion of problems of dragonfly conservation. For more details on the Odonata of Lesbos, Greece, see: Lopau, W. (1995): Die Libellenfauna der Insel Lesbos. Libellen, Lurche, Kriechtiere. Naturkundliche Reiseberichte, Gnarnenburg 3. 81 pp] Address: Bowers, J., 6 Ashwood Terrace, Leeds, West Yorkshire, L56 2EH, UK

**8234.** Brauner, O. (2009): Erstnachweis von *Ceragrion tenellum* in Brandenburg (Odonata: Coenagrionidae). *Libellula* 28(1/2): 25-29. (in German, with English summary) ["In 2008 *C. tenellum* was recorded for the first time in Brandenburg, northeastern Germany. The circumstances of the record - a single male only - and the water body are briefly described. The species, which has chiefly an Atlantic and western Mediterranean distribution, benefited from the milder winters during recent years and was observed increasingly at the eastern fringe of its area. The distances to the closest known localities in Saxony-Anhalt and Mecklenburg-West Pomerania were 50 to 85 km. Hence, other hitherto undiscovered occurrences can be expected." (Author)] Address: Brauner, O., R.-Breitscheidstr. 62, D-16225 Eberswalde, Germany. E-mail: oliver.brauner@gmail.com

**8235.** Brauner, O.; Reichling, A.; Möller, J. (2009): Die Libellenfauna im östlichen Teil des Naturparks Barnim sowie in der nördlich angrenzenden Umgebung von Eberswalde. *Märkische entomologische Nachrichten* 11 (1): 69-90, 4 pl.. (in German, with English summary) [In the period from 1999 to 2008, 175 sites were examined. In total, 59 of the 68 dragonfly species known for Brandenburg, Germany were discovered. Of these, 54

species were proved on the territory of the Nature Reserve Barnim, 46 in the city of Eberswalde and 54 in the southern part of the Biosphere Reserve Schorfheide-Chorin. 25 odonate species are discussed in detail.] Address: Brauner, O., R.-Breitscheidstr. 62, 16225 Eberswalde, Germany. E-mail: oliver.brauner@gmail.com

**8236.** Brockhaus, T. (2009): Erste kommentierte Checkliste der Libellen des Himalayagebirges (Insecta: Odonata). In: Hartmann, M. & J. Weipert: Biodiversität und Naturlandschaft im Himalaya III. - Verein der Freunde und Förderer des Naturkundemuseums Erfurt e.V., Erfurt: 87-106, Tafel III. (in German, with English summary) [239 species are included into the checklist of the Himalaya's Odonata. A brief discussion is given about typical mountain species, possible endemic species and the zoogeographical composition of the Himalayan odonate fauna.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**8237.** Brockhaus, T.; Rychla, A. (2009): Vorläufige kommentierte Checkliste der Libellen des Muskauer Faltenbogens (Insecta: Odonata). *Berichte der Naturforschenden Gesellschaft der Oberlausitz* 17: 77-82. (in German, with English summary) ["The "Muskauer Faltenbogen" is a potential UNESCO area named "Geopark". In this region many water bodies with natural and anthropogenic origin are found. A preliminary checklist of 49 dragonfly species with comments to remarkable discoveries is given. Further research is needed to demonstrate the biodiversity of this area exemplified by the dragonflies." (Authors)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**8238.** Brockhaus, T.; Hartmann, A. (2009): New records of *Epiophlebia laidlawi* Tillyard, 1921 in Bhutan with notes on its biology, ecology, distribution, zoogeography and threat status (Anisozygoptera: Epiophlebiidae). *Odonatologica* 38(3): 203-215. (in English) ["*E. laidlawi* larvae were found for the first time in Bhutan, collected in 5 streams in W and central parts of the country, at altitudes 2350-2885 m a.s.l. The habitats and larval development stages are described, and a brief overview is presented on the biology, ecology and known distribution in Bhutan, India and Nepal. The species inhabits fast running mountain streams in Himalayan broadleaf and subtropical pine forests at an altitude of 1300-2885 m a.s.l. The palaeobiogeographical history of the fossil Epiophlebiidae and Stenophlebiidae and of the 2 extant Epiophlebia species is discussed. *E. laidlawi* is a relict species, living in headwaters of pristine mountain forests. It is endangered because human influences, such as deforestation, provision of water power, erosion and other factors. The best protection would be ensured by the conservation of specific habitats in vast protected areas. This has at least partly been put into action in Nepal." (Authors)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**8239.** Brooks, A.C.; Gaskell, P.N.; Maltby, L.L. (2009): Sublethal effects and predator-prey interactions: Implications for ecological risk assessment. *Environmental toxicology and chemistry* 28(11): 2449-2457. (in English) ["Ecological risk assessments tend to focus on contaminant effects on single species in isolation. However, additional effects from interactions between spe-

cies (e.g. predator-prey interactions) may also occur in natural systems. This study investigated the consequences of sublethal contaminant effects in prey on predator-prey interactions, particularly the interaction between prey behavioural changes and predation by predators with different hunting strategies. Ambush (*Ischnura elegans*) and active (*Notonecta glauca* (Heteroptera)) predator species were used in conjunction with three prey species (*Asellus aquaticus* (Crustacea, Isopoda), *Cloëon dipterum* (Ephemeroptera), and *Chironomus riparius* (Diptera)). Immobilised prey demonstrated the importance of prey behaviour for determining predation rates for both single and multiple prey species. *C. riparius* was less responsive following exposure to cadmium, becoming more vulnerable to attack by the active but not the ambush predator. There was also some evidence for reduced general activity in *C. dipterum* following cadmium exposure. Sublethal exposure of prey did not affect the prey choice of active predators, possibly due to prey behavioural changes being insufficient to influence their relative availabilities. However, cadmium exposure of prey did alter their susceptibility to ambush predators. There was a reduction in the proportion of *C. dipterum* and an increased proportion of *A. aquaticus* in the diet of ambush predators, possibly due to reduced activity in *C. dipterum* affecting their relative encounter rates with predators. Sublethal exposures can therefore result in reduced prey survival that would not be predicted by single species toxicity tests." (Authors)] Address: Maltby, L.L., Dept Animal & Plant Sciences, Univ. of Sheffield, Western Bank, Sheffield S10 2TN, UK. E-mail: l.maltby@sheffield.ac.uk

**8240.** Brotóns Padilla, M.; Ocharan, F.J.; Outomuro, D.; Torralba Burrial, A. (2009): "Anaciaeschna isoceles" (Müller, 1767) en el ámbito ibero-balear (Odonata: Aeshni). Boletín de la Sociedad Entomológica Aragonesa 44: 365-374. (in Spanish, with English summary) ["Six Iberian-balearic localities and biological data on *A. isoceles* are presented, including the first records for Álava, Albacete and Toledo provinces, and the second one for Ciudad Real. A bibliographic review of the scarce Iberian-Balearic data has been done. The distribution pattern is fairly concordant with bioclimatic factors, being *A. isoceles* a thermal, low-altitude species at the study area. Phenology data indicate a continuous flight season from late March to early August, peaking in early summer, with late records in mid-October. European and North African data on species' phenology and biology are compared with the Iberian ones. The conservation status for the study area is revised using IUCN regional criteria, assigning a Data Deficient (DD) category. Finally, several priority actions to clarify its biology and conservation status are suggested." (Authors)] Address: Torralba Burrial, A., Depto de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**8241.** Buczyński, P. (2009): Babki, palatiki i dzieweczki, czyli o wazkach – ozdobie przyrody Warmii i Mazur. Natura 3(14): 6-11. (in Polish) [General account on Odonata in a Polish journal dedicated to nature observation and conservation.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8242.** Buczyński, P.; Jędryczak, P. (2009): On the occurrence of *Orthetrum brunneum* (FONSCOLOMBE,

1837) (Odonata: Libellulidae) in the Polish part of the South Baltic Sea Coast Region. Wiad. entomol. 28(3): 141-147. (in Polish, with English summary) [*O. brunneum* was recorded in northern Poland (54°29'.54°48' N, 18°15'.18°33' E). This is a range extension over 1.5 degree of latitude towards the north compared with localities of species known so far. The distribution of *O. brunneum* in northern parts of Central Europe is also analyzed.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8243.** Byun, D.-y.; Hong, J.; Saputra; Koa, J.H.; Young, J.L.; Park, H.C.; Byun, B.-K.; Lukes, J.R. (2009): Wetting characteristics of insect wing surfaces. Journal of Bionic Engineering 6(1): 63-70. (in English) ["Biological tiny structures have been observed on many kinds of surfaces such as lotus leaves, which have an effect on the colouration of *Morpho* butterflies and enhance the hydrophobicity of natural surfaces. We investigated the micro-scale and nano-scale structures on the wing surfaces of insects and found that the hierarchical multiple roughness structures help in enhancing the hydrophobicity. After examining 10 orders and 24 species of flying Pterygotan insects, we found that micro-scale and nano-scale structures typically exist on both the upper and lower wing surfaces of flying insects. The tiny structures such as denticle or setae on the insect wings enhance the hydrophobicity, thereby enabling the wings to be cleaned more easily. And the hydrophobic insect wings undergo a transition from Cassie to Wenzel states at pitch/size ratio of about 20. In order to examine the wetting characteristics on a rough surface, a biomimetic surface with micro-scale pillars is fabricated on a silicon wafer, which exhibits the same behaviours as the insect wing, with the Cassie-Wenzel transition occurring consistently around a pitch/width value of 20.2." (Authors) *Pantala flavescens* and *Orthetrum albistylum speciosum* have been studied.] Address: Byun, D., Department of Aerospace Information Engineering, Artificial Muscle Research Center, Konkuk University, Seoul 143-701, Republic of Korea. E-mail: dybyun@konkuk.ac.kr

**8244.** Cano Villegas, F.J. (2009): Desarrollo larvario de "*Onychogomphus costae*" Sélys, 1885 en el sur de la Península Ibérica y aclaración sobre su confusión con "*Ophiogomphus cecilia*" (Fourcroy, 1785) (Odonata: Gomphidae). Boletín de la Sociedad Entomológica Aragonesa 44: 327-332. (in Spanish, with English summary) ["A preliminary study of the larval development and phenology of *O. costae* in Andalusia is presented. In the studied area, this species exhibits a semivoltine life cycle. Previous records of *O. cecilia* from the studied area are considered to be misidentifications of *O. costae* larvae. These mistakes may be due to faults in the taxonomic keys. Finally, a new taxonomic key is proposed which makes it possible to separate *O. cecilia* larvae from those of *O. costae* as well as from the rest of the Iberian species of the same genus. This key is valid even for larval instars lower than the last one." (Author)] Address: Cano Villegas, F.J., C/Montemayor, 4 1°-2; 14003-Córdoba, Spain. E-mail: fcanovi2@hotmail.com

**8245.** Cano Villegas, F.J.; Conesa García, M.A. (2009): Expansión de *Trithemis kirbyi* Sélys, 1891 (Odonata: Libellulidae) en la provincia de Málaga (sur de la Península Ibérica). Boletín de la Sociedad Ento-



mológica Aragonesa 44: 569-572. (in Spanish, with English summary) ["Eight new Iberian localities are recorded for the Afro-tropical anisopteran *T. kirbyi*, with an update of its current distribution in Málaga province (Spain). Its reproduction in Europe is confirmed for the first time, and biometric information is given on the collected specimens." (Authors)] Address: Cano Villegas, F.J., C/Montemayor, 4 1º-2; 14003-Córdoba, Spain. E-mail: fjcanovi2@hotmail.com

**8246.** Cano-Villegas, F.J.; Conesa-Garcia, M.A. (2009): Confirmation of the presence of *Lestes macrostigma* (Eversmann, 1836) (Odonata: Lestidae) in the "Laguna de Fuente de Piedra" Natural Reserve (Málaga, South Spain). *Boln. Asoc. esp. Ent.* 33(1-2): 91-99. (in English, with Spanish summary) ["We introduce new data about 14 species of dragonflies in the Nature Reserve "Laguna de Fuente de Piedra". We especially highlight the persistence of *L. macrostigma* in that area, after fourteen years with no trace of them in Andalusia. Populations of this species are clearly regressive along its European distribution." (Authors)] Address: Cano Villegas, F.J., C/Montemayor, 4 1º-2; 14003-Córdoba, Spain. E-mail: fjcanovi2@hotmail.com

**8247.** Carroll, T.M. (2009): Resource pulses and spatial subsidies in Ozark Karst Springs: Effects on community structure and food webs. Ph.D. Dissertation. University of Kansas: 162 pp. (in English) [Steury and Danforth Springs (37°21" N, 93°21" W; 37°24" N, 93°15") east of Springfield in the James River basin, Missouri, USA. "Spatial and temporal patterns of invertebrate community composition, biomass, functional diversity, foodweb dynamics, and foodweb complexity were examined in three Ozarks springs. Also examined was the effect of an experimental manipulation of algal production (function of light limitation) on foodweb pathways and complexity. Food source-consumer interactions were determined using carbon and nitrogen stable isotope and stoichiometric analyses. Biocomplexity and functional diversity increased temporally and spatially along the spring source-springbrook gradient likely due to variability in the composition and availability of food sources. Foodweb analyses indicated that the trophic base of the foodweb was autochthonous, shifting temporally towards a greater reliance on allochthonous resources. Spatial and temporal shifts in food availability and utilization were associated with corresponding increases in foodweb complexity. Isotope ratios, based on manipulation of algal production, indicated a shift toward more allochthonous-based pathways and increases in omnivory and foodweb complexity in manipulated (shaded) sections of the spring." (Author) The publication includes many notes on *Argia sedula*, represented in Danforth and Steury (coniferous and deciduous canopies, respectively). Young larvae of *A. sedula* feed on protozoans that colonize fine allochthonous detrital matter, and were prominent in springbrooks with heavy riparian growth of coniferous and deciduous trees.] Address: Carroll, Teresa Mae, <http://kuscholarworks.ku.edu/dspace/handle/1808/5571>

**8248.** Carron, G. (2009): *Coenagrion mercuriale* (Charpentier, 1840) et *Leucorrhinia albifrons* (Burmeister, 1839) (Odonata) dans la région genevoise. *Entomo Helvetica* 2: 71-81. (in French, with English and German summaries) ["A restricted but quite large population of *C. mercuriale* was rediscovered in 2006, after 46 years of absence, in a small river located in the can-

tons of Geneva and Vaud, Switzerland. No other population of this species is known in the Geneva basin. A confirmed reproduction site of a small population of *L. albifrons* was found in 2006 in Cartigny. This is also the single population of this species in the Geneva region, and the third one in Switzerland." (Author)] Address: Bureau Gilles Carron, Bioindication Gestion Monitoring, case postale 90, 2002 Neuchâtel, Switzerland. E-mail: carron.bureau@vtx.ch

**8249.** Carron, G. (2009): Les coléoptères aquatiques des marais du lac de Pfäffikon (canton de Zürich), avec première mention pour la Suisse de *Hydroporus scalexianus* Stephens, 1828 et recommandations pour la conservation. *Entomo Helvetica* 2: 239-253. (in French, with English and German summaries) [61 species of water beetles have been recorded in two transitional mires adjacent to Lake Pfäffikon. The paper includes a passing reference on Odonata] Address: Bureau Gilles Carron, Bioindication Gestion Monitoring, case postale 90, 2002 Neuchâtel, Switzerland. E-mail: carron.bureau@vtx.ch

**8250.** Carron, G. (2009): Une illustration de la ponte de *Cordulegaster boltonii* (Donovan, 1807) (Odonata, Cordulegasteridae. *Entomo Helvetica* 2: 200. (in French) [Photograph of an oviposition of *C. boltonii*, 13-VII-2005, Veyron, near Montricher VD, Switzerland.] Address: Bureau Gilles Carron, Bioindication Gestion Monitoring, case postale 90, 2002 Neuchâtel, Switzerland. E-mail: carron.bureau@vtx.ch

**8251.** Chakona, A.; Phiri, C.; Chinamaringa, T.; Muller, N. (2009): Changes in biota along a dry-land river in northwestern Zimbabwe: declines and improvements in river health related to land use. *Aquatic Ecology* 43(4): 1095-1106. (in English) ["Macroinvertebrates (including Odonata) were sampled from 15 sites along a dry-land river in northwestern Zimbabwe to assess biotic responses to land use changes along the course of the river. The headwater sites were protected by a riparian corridor of native forest, but this was replaced by intensive subsistence agriculture in the mid-reaches while the lower reaches were located within a protected wildlife area with diverse and wide riparian forests. Canonical correspondence analysis indicated that intensive agricultural activities within the mid-reaches caused severe degradation of the stream physical habitat through increased fine sediment deposition. This coincided with a significant decline in macroinvertebrate richness, diversity, and abundance at the agriculturally impacted mid-reach sites. The presence of wide riparian zones at the lower river sites resulted in significant improvements in stream physical habitat quality, and this was paralleled by significant recovery or reappearance of taxa that had disappeared from the mid-reaches. We suggest that restoration of the riparian vegetation within the mid-reaches of the Nyadza River would lead to improved physical habitat and biotic health of this dry-land river." (Authors)] Address: Chakona, A., University of Zimbabwe Lake Kariba Research Station, PO Box 48, Kariba, Zimbabwe. E-mail: achakona@yahoo.com

**8252.** Chaplin, G.I.; Valentine, J.F. (2009): Macroinvertebrate production in the submerged aquatic vegetation of the Mobile-Tensaw Delta: Effects of an exotic species at the base of an estuarine food web. *Estuaries and Coasts* 32(2): 319-332. (in English) ["This study, conducted in 1997, reports the first estimates of the im-

pacts of the proliferation of an exotic submerged aquatic vegetation (SAV) species (*Myriophyllum spicatum*) on macroinvertebrate production via comparisons with two co-occurring native SAV species (*Heteranthera dubia* and *Vallisneria spiralis*) in the tide-influenced Mobile-Tensaw Delta (located in the north-central Gulf of Mexico, 30°40' N, 87°55' W). Production of macroinvertebrates was greatest on *M. spicatum* and *H. dubia* and least on *V. spiralis*. The key determinant of these differences was a greater abundance of amphipods (*Gammarus mucronatus*) found on the leaves of *M. spicatum* and *H. dubia*. Macroinvertebrate production on *M. spicatum* was three times greater (>1 kg m<sup>-2</sup> year<sup>-1</sup>) than on either of the native SAV species. No-choice palatability tests showed that these differences could not be attributed to differences in invertebrate grazing on these plants. Instead, it is probable that the high production within the structurally complex *M. spicatum* and *H. dubia* was the result of reduced predator foraging efficiency. If true, then the presence of this exotic species probably renders this elevated production inaccessible to most high-order predators." (Authors) Odonata are treated at the suborder level.] Address: Valentine, J.F., Department of Marine Science, University of South Alabama, Mobile, AL 36688, USA. Email: jvalentine@disl.org

**8253.** Chase, J.M.; Suhlman, R.S. (2009): Wetland isolation facilitates larval mosquito density through the reduction of predators. *Ecological Entomology* 34: 741-747. (in English) ["1. Wetlands harbour high biodiversity and offer important ecosystem services, but they are also a habitat for mosquito larvae (Diptera: Culicidae), which are important disease vectors. 2. Isolation among remnant, or newly created wetlands and ponds, and their consequent density in the landscape, is a key factor that can influence a variety of food web processes, including effects on mosquitoes which are important prey to many predators. 3. We assess the impact of habitat isolation on the density of pond-breeding mosquitoes (several *Anopheles* and *Culex* species) both directly and indirectly through the food web. 4. Results from structural equation modelling of survey data shows that larval mosquitoes are denser in ponds that are more isolated from one another, and that this result was primarily driven indirectly by a reduction of larval mosquito predators (e.g. predaceous insects and amphibians). Furthermore, results from a long-term mesocosm experiment factorially manipulating isolation and predator reduction show that the effect of isolation on mosquito density was eliminated when predators were experimentally reduced. 5. It is concluded that metacommunity processes, both directly and indirectly mediated through predators, can play an important role in the local abundance of wetland breeding mosquitoes and possibly the diseases they spread." (Authors) Mosquito predators are primarily insects in the orders Hemiptera, Odonata, and Coleoptera, as well as salamanders and newts. Their biomass was converted to dry-weight biomass using species-specific conversions.] Address: Chase, J.M., Dept of Biology and Tyson Research Center, Washington University in St. Louis, Saint Louis, MO 63130, USA. E-mail: jchase@wustl.edu

**8254.** Chase, J.M.; Biro, E.G.; Ryberg, W.A.; Smith, K.G. (2009): Predators temper the relative importance of stochastic processes in the assembly of prey metacommunities. *Ecology Letters* 12(11): 1210-1218. (in English) [St Louis, Missouri, USA. "Communities as-

semble through a combination of stochastic processes, which can make environmentally similar communities divergent (high  $\beta$ -diversity), and deterministic processes, which can make environmentally similar communities convergent (low  $\beta$ -diversity). Top predators can influence both stochasticity (e.g. colonization and extinction events) and determinism (e.g. size of the realized species pool), in community assembly, and thus their net effect is unknown. We investigated how predatory fish influenced the scaling of prey diversity in ponds at local and regional spatial scales. While fish reduced both local and regional richness, their effects were markedly more intense at the regional scale. Underlying this result was that the presence of fish made localities within metacommunities more similar in their community composition (lower  $\beta$ -diversity), suggesting that fish enhance the deterministic, relative to the stochastic, components of community assembly. Thus, the presence of predators can alter fundamental mechanisms of community assembly and the scaling of diversity within metacommunities." (Authors) The following taxa are listed in the supporting material to the paper: *Aeshna canadensis*, *Epiaeschna heros*, *Tetragoneuria synosura*, *Erythemis simplicicollis*, *Libellula cyanea*, *L. incesta*, *L. pulchella*, *Pachydiplax longipennis*, *Pantala hymenaea*, *Perithemis tenera*, *Plathemis lydia*, *Sympetrum rubicundum*, *S. corruptum*, *Tramea lacerata*, *Archilestes grandis*, *Lestes disjunctus*, *Ischnura* sp., *Enallagma* sp. 1, *Enallagma* sp. 2, and *Argia* sp.] Address: Chase, J.M., Department of Biology and Tyson Research Center, Washington University in St. Louis, 1 Brookings Drive, St Louis, MO 63130, USA. E-mail: jchase@wustl.edu

**8255.** Chelmick, D. (2009): Species Review 2: The Orange-spotted Emerald Dragonfly *Oxygastra curtisii* (Dale 1834). *J. Br. Dragonfly Society* 25(2): 76-93. (in English) ["This review deals with *O. curtisii*, [...] which is locally common in the Iberian peninsula and France south of the 48° parallel. It is endemic to the western Palearctic. In northern Europe it is very local and was last recorded in the UK in 1963. It is the only southern endemic riparian dragonfly to have occurred in the UK and probably became extinct here by a combination of habitat degradation and the extreme winter of 1962/63." (Author) The paper discusses the chances to rediscover the species in UK] Address: Chelmick, D.G., 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK. E-mail: dgc@david.chelmick.com

**8256.** Chelmick, D.G.; Moore, N.W. (2009): The Scarce Emerald Damselfly *Lestes dryas* Kirby in East Sussex 1940 to 2007: an account of species extinction through changing agricultural practice. *J. Br. Dragonfly Society* 25(1): 27-40. (in English) ["*L. dryas* is a very local damselfly which, in England, is found only in a few localities in the extreme east, mainly in coastal areas. In the 1940's NWM discovered this species in East Sussex and carried out a detailed survey. DGC has visited the historical NWM sites and recorded the fauna now present. This paper covers a period of 67 years and compares the historical and modern habitat and faunal information. The paper first outlines the life history and distribution of *L. dryas* and, from these perspectives, considers how changes in agricultural practice have led to the extinction of *L. dryas* in East Sussex." (Authors)] Address: Chelmick, D.G., 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK. E-mail: dgc@david.chelmick.com

- 8257.** Chen, T.-H.; Lue, K.-Y. (2009): Changes in the population structure and diet of the Chinese Stripe-Necked Turtle (*Mauremys sinensis*) inhabiting a disturbed river in northern Taiwan. *Zoological Studies* 48(1): 95-105. (in English) ["*Mauremys (Ocadia) sinensis* was investigated in the Keelung River, northern Taiwan, following severe habitat disturbances. "During a 2-yr levee construction and channel dredging project, the physical characteristics and riparian vegetation of the river were dramatically altered. Compared with results obtained prior to the disturbance, sex ratios were significantly skewed toward males, and the proportion of larger females significantly decreased both during and after project construction. Moreover, fewer small-sized juveniles were found following the construction disturbance. The diet of *M. sinensis* also changed, with plant materials assuming greater importance than they had prior to the disturbance. Furthermore, the mean volume of food ingested decreased both during and after the project. This tendency was more pronounced in females than males. Dietary overlap indices between the sexes during (0.591) and after (0.922) the project suggest that intraspecific food competition increased throughout the duration of the study." (Authors) Odonata contribute less than 0.1% to diet of the turtle.] Address: Chen, Tien-Hsi, Department of Life Science, National Taiwan Normal University, Taipei 116, Taiwan. E-mail:cuora.flavo@msa.hinet.net
- 8258.** Chin, K.S.; Taylor, P.D. (2009): Interactive effects of distance and matrix on the movements of a peatland dragonfly. *Ecography* 32(5): 715-722. (in English) ["We conducted a mark-release-recapture survey of *Leucorrhinia hudsonica* in each of two years (2002; 2003) in a harvested forest landscape in western Newfoundland, Canada. The odds of an individual male moving between peatlands was influenced by both the distance between peatlands and the type of intervening habitat (the matrix). Specifically, at meso scales (>700 m) there was a positive effect of the amount of cut matrix between peatlands on the odds of moving, but at fine scales (<700 m) there was the opposite effect; proportionally fewer individuals moved between peatlands. The odds of moving out of a peatland decreased as the surface area of water in the peatland increased. Multi-state mark-recapture models showed that the daily probability of a male moving between any two peatlands was 1.9% in 2002 and 6.9% in 2003 (n=1527 and 1280 marked individuals). The results suggest that additional empirical studies that directly measure patterns of movement with respect to landscape structure at multiple spatial scales in other taxa and situations are needed in order to uncover other possible non-linear changes in behaviour." (Authors)] Address: Chin, Krista, Dept of Biology, Acadia Univ., 24 Univ. Ave., Wolfville, NS B4P 2R6, Canada. E-mail: 057448c@acadiau.ca
- 8259.** Clancy, S.P. (2009): Reports from Costal Stations - 2008: Dungeness area, Kent. *Atropos* 36: 47. (in English) [UK; *Anax parthenope*, *Sympetrum fonscolombii*, *Erythromma viridulum*] Address: not stated
- 8260.** Colding, J.; Lundberg, J.; Lundberg, S.; Andersson, E. (2009): Golf courses and wetland fauna. *Ecological Applications* 19(6): 1481-1491. (in English) ["Golf courses are often considered to be chemical-intensive ecosystems with negative impacts on fauna. Here we provide evidence that golf courses can contribute to the support and conservation of wetland fauna, i.e., amphibians and macroinvertebrates. Comparisons of amphibian occurrence, diversity of macroinvertebrates, and occurrence of species of conservation concern were made between permanent freshwater ponds surveyed on golf courses around Sweden's capital city, Stockholm, and off-course ponds in natureprotected areas and residential parklands. A total of 71 macroinvertebrate species were recorded in the field study, with no significant difference between golf course ponds and offcourse ponds at the species, genus, or family levels. A within-group similarities test showed that golf course ponds have a more homogenous species composition than ponds in natureprotected areas and ponds in residential parkland. Within the macroinvertebrate group, a total of 11 species of odonates were identified, with no difference detected between the categories of ponds, nor any spatial autocorrelation. [...] Among macroinvertebrates of conservation status, *Leucorrhinia pectoralis* was only detected in golf course ponds, and *Tricholeiochiton fagesi* (Trichoptera) was only found in one off-course pond. GIS results revealed that golf courses provide over a quarter of all available permanent, freshwater ponds in central greater Stockholm. We assert that golf courses have the potential to contribute to wetland fauna support, particularly in urban settings where they may significantly contribute to wetland creation. We propose a greater involvement of ecologists in the design of golf courses to further bolster this potential." (Authors)] Address: Colding, J., The Beijer Institute of Ecological Economics, Royal Swedish Academy of Sciences, Box 50005, 104 05 Stockholm, Sweden. E-mail: Johanc@beijer.kva.se
- 8261.** Collier, K.J.; Hamer, M.; Chadderton, W.L. (2009): A new substrate for sampling deep river macroinvertebrates. *New Zealand Natural Sciences* 34: 49-61. (in English) ["We compared macroinvertebrate communities colonising multiplate samplers constructed from perspex or tempered hardboard (wood) with an alternative artificial substrate constructed from folded coconut fibre matting (coir) enclosed in nylon netting. Substrates were incubated for 62 days over January to March 2007 at six sites over 240 km along the Waikato River. The three substrates supported similar numbers of invertebrate taxa (27 - 29 taxa), but coir samples contained 71% of total invertebrate numbers from all substrates combined, compared with <17% for each type of multiplate sampler. Coir faunas were heavily dominated by the hydrobiid snail *Potamopyrgus* (84 % of numbers), and this taxon along with the amphipod *Paracalliope* comprised 58 - 66 % of invertebrates on both types of multiplate samplers. Analysis of a Bray-Curtis matrix suggested statistically significant differences in percent community composition between coir samplers and each type of multiplate sampler over the late summer study period. Densities per cm<sup>3</sup> of Oligochaeta, Mollusca, and "other worms" (Platyhelminthes, Rhabdocoela, Nemertea and Hirudinea combined) were significantly higher in coir samples than one or both of the multiplate samplers. Results suggest coir samplers may provide a useful supplement to multiplate samplers for deep river invertebrate studies by collecting a different range of taxa, including those favouring cover and characteristic of depositional environments." (Authors) One specimen of *Hemicordulia* sp. was found in coir; *Xanthocnemis* sp. was represented in all substrates without significant differences.] Address: Collier, K.J., Environment Waikato, PO Box 4010, Hamilton, New Zealand. E-mail: kevin.collier@ew.govt.nz



**8262.** Coram, R.A.; Nel, A. (2009): A new petalurid dragonfly from the Lower Cretaceous of southern England (Odonata: Petalurida: ?Cretapetaluridae). *Palaeodiversity* 2: 205-208. (in English, with German summary) ["The new petalurid genus and species *Anglopetalura magnifica* n. gen., n. sp. is described from the Lower Cretaceous of southern England, and tentatively attributed to the Mesozoic family Cretapetaluridae, already known by two genera from the Lower Cretaceous Crato Formation of Brazil." (Authors).] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**8263.** Cordoba-Aguilar, A. (2009): A female evolutionary response when survival is at risk: male harassment mediates early reallocation of resources to increase egg number and size. *Behavioral Ecology and Sociobiology* 63(5): 751-763. (in English) ["One unexplored area in sexual conflict studies is the female physiological costs and possible resource reallocation that accompany evolutionary costs due to male harassment. Using females of the damselfly *Hetaerina americana*, I first investigated whether male harassment affected female mating rate and survival and explored whether such effects induced a resource allocation from immunity (in the form of phenoloxidase activity) and muscular fat reserves to egg number and size. Using two seasons that differed in male harassment, it was found that the higher the male harassment, the fewer are the female matings and the lower is the female survival. These results were corroborated using an experimental approach in which a situation of high male harassment was induced. It was also found that when the first mating takes place and at high male harassment, females had more reduced phenoloxidase activity and fat reserves and tended to lay most of the eggs they produce in their lifetime and these were considerably large. However, at low male harassment, egg number and size were more equally produced across matings. Females under high male harassment seemed to suffer the survival costs but may show a plastic evolutionary response of reallocating resources to egg traits to maximize fitness." (Author)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**8264.** Córdoba-Aguilar, A.; Raihani, G.; Serrano-Meneses, M.A.; Contreras-Garduño, J. (2009): The lek mating system of *Hetaerina* damselflies (Insecta: Calopterygidae). *Behaviour* 146(2): 189-207. (in English) ["We investigated whether territorial males of *Hetaerina* damselflies show lekking behaviour using experimental techniques and observations: (i) we altered potential vegetation substrates to determine whether this affected the number of female visitations and matings; (ii) by removing territorial males and allowing other males to occupy the territory, we determined whether females changed their visitation and mating number; (iii) we observed whether vegetation substrates were present and used, and whether lighting conditions affected male territorial behaviour; (iv) we documented female pre- and post-copulatory behaviour to examine whether female choice occurred; and (v) we investigated whether male traits were linked to mating success. Our results revealed that (1) vegetation substrates were rarely found in territories and even when vegetation was present, it did not affect female visitation and mating number; (2)

males constantly moved to more illuminated places and females had little opportunity to exert choice due to harassment from males; (3) females oviposited outside territories; and (4) males with larger wing pigmentation and body size obtained a larger mating number because they were more likely to acquire a territory and/or displace other males while in tandem. This is the first documented evidence that odonate males display a lek mating system." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**8265.** Cordoba-Aguilar, A.; Serrano-Meneses, A.; Cordero-Rivera, A. (2009): Copulation duration in nonterritorial Odonate species lasts longer than in territorial species. *Ann. Entomol. Soc. Am.* 102(4): 694-701. (in English) ["We tested whether long copulation duration is more likely to have evolved in nonterritorial odonate species than in territorial species, given that nonterritorial males do not incur the costs of territory defense. A phylogenetic comparative method that controls for the phylogenetic nonindependence of species was used to compare copulation duration among 46 species of the two main odonate suborders (Anisoptera and Zygoptera). Copulation duration of nonterritorial anisopteran species was longer than for territorial dragonflies; however, this relationship was not found for Zygoptera. Long copulations in Anisoptera may be related to a male's ability to manipulate a female's stored sperm. It is suggested that constraints that prevent a territorial male from lengthening copulation do not seem to operate in Zygoptera. Other selective processes (i.e., cryptic female choice and/or sexual conflict) may also be important determinants of copulation duration in the Zygoptera. To our knowledge, this is the first exploration of the relation copulation duration and mating systems in insects.] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biologicas, Universidad Autonoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**8266.** Cordoba-Aguilar, A. (2009): Seasonal variation in genital and body size, sperm displacement ability, female mating rate, and male harassment in two calopterygid damselflies (Odonata: Calopterygidae). *Biological Journal of the Linnean Society* 96(4): 815-829. (in English) ["Sperm competition is a pervasive force. One adaptation is the male ability to displace the rivals' sperm that females have stored from previous copulations. In the damselfly, *Calopteryx haemorrhoidalis* asturica, males with wider aedeagi displace more spermathecal sperm. The present study documents that the same mechanism operates in another damselfly, *Hetaerina americana*. However, this genital width in both species decreases along the season, but late-emerging females have more sperm displaced than early-emerging females. Because territorial males mated more and were larger in body and genital size than nonterritorial males, late-season females mated with considerably larger males with respect to female size and this produced higher sperm displacement. Assuming female benefits from storing sperm but that such benefit does not prevail if males displace sperm, it is predicted that, along the season, females will mate less and male harassment (in terms of male mating attempts and oviposition duration) will increase. These predictions were cor-

roborated. In *H. americana*, it was also tested whether spermathecal sperm became less viable along the season. The results obtained did not corroborate this. This is the first evidence indicating that season affects sperm displacement ability and female mating frequency due to changes in male body and genital size." (Author)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**8267.** Córdova, S.; Gaete, H.; Aránguiz, F.; Figueroa, R. (2009): Evaluación de la calidad de las aguas del estero Limache (Chile central), mediante bioindicadores y bioensayos. *Lat. Am. J. Aquat. Res.* 37(2): 199-209. (in Spanish, with English summary) ["The water quality in the Limache stream was evaluated at five sampling stations during the period of low water flow. At each station, aquatic macroinvertebrates were collected and the following parameters were measured in situ: pH, conductivity, dissolved oxygen, and total dissolved solids. The biological oxygen demand, total phosphorus, and total nitrogen were determined in the laboratory. Water toxicity was determined through toxicity bioassays with the microalga *Pseudokirchneriella subcapitata*. Thirty-three macroinvertebrate families were found and the dominant taxa were Dugessidae, Oligochaeta and Chironomidae. A significant correlation was found among the Family Biotic Index ChFBI, conductivity, and total dissolved solids ( $r = 0.92$ ;  $p < 0.05$ ). Species diversity was lowest, as was the growth rate of *P. subcapitata*, at the stations with the greatest anthropogenic activity and in the discharge zone of a domestic wastewater treatment plant." (Authors) The taxa list includes indetermined specimens of Gomphidae and Coenagrionidae.] Address: Gaete, H., Departamento de Biología y Ciencias Ambientales, Facultad de Ciencias, Universidad de Valparaíso, Av. Gran Bretaña 1111, Playa Ancha, Valparaíso, Chile. E-mail: hernan.gaete@uv.cl

**8268.** Cortezzi, S.S.; Bispo, P.; Paciencia, G.; Leite, R.C. (2009): Influência da ação antrópica sobre a fauna de macroinvertebrados aquáticos em riachos de uma região de cerrado do sudoeste do Estado de São Paulo. *Iheringia, Sér. Zool.* 99(1): 36-43. (in Portuguese, with English summary) [Macroinvertebrate colonisation of standardized pebble packages at nine stations in the headwaters of the Ribeirão Água do Cervo (the main water supplier of the city of Assis, Brazil). After twenty-five days of exposure, the packages were removed from the stream. The macroinvertebrates associated to each of the pebble packages were identified. Biodiversity was lowest at the most impacted station. No significant trade-off between the physicochemical factors and the fauna were detected. It is concluded that anthropogenic impacts can be identified by the fauna. Taxa including Odonata are treated using the morphospecies concept.] Address: Cortezzi, Sara, Laboratório de Biologia Aquática, Departamento de Ciências Biológicas, Faculdade de Ciências e Letras de Assis, Universidade Estadual, Paulista. Av. Dom Antônio, 2100, Parque Universitário, 19806-900 Assis, SP, Brasil. E-mail: saracortezzi@yahoo.com.br

**8269.** Costa, J.M.; Santos, T.C. (2009): Description of the larva of *Orthemis schmidti* (Odonata, Libellulidae). *Iheringia, Sér. Zool.* 99(2): 129-131. (in English, with Portuguese summary) ["The larva of *O. schmidti* is described and illustrated for the first time based on one

specimen from the northeastern region Brazil. Diagnostic characters which separate this larva from known larvae of other congeners are mentioned, and some notes on the habitat of the species are presented." (Authors)] Address: Costa, J.M., Depto de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@globocom

**8270.** Crick, K. (2009): Variations in key features of the final instar larvae and exuviae of the Azure Damsel-fly *Coenagrion puella* (Linnaeus). *J. Br. Dragonfly Society* 25(1): 16-26. (in English) ["A number of key features used for species identification of zygopteran final instar larvae and exuviae, published in the United Kingdom can be shown to have levels of variability exceeding the published limits. This paper seeks to record those variations as they apply to *Coenagrion puella*, based on the population contained within the Blackwater Valley catchment area located on the Hampshire/Berkshire border; outlining in detail specific variations found through close examination of 387 individuals. The features addressed include the species-specific characteristics of the caudal lamellae, the prementum and the post ocular region of the head; also some that are not found in current published keys, such as the setae on the labial palps and the lateral carinae on the second abdominal segment. The need to address a combination of key factors and to be aware of the areas of morphology where significant variations occur within species cannot be over emphasised." (Author) In fig. 5, the prementum of *C. puella* and *Ceriagrion tenellum* are transposed.] Address: Crick, K., 29 Village Way, Yateley, Hants, GU46 7SE, UK

**8271.** Czachorowski, S.; Czachorowski, P. (2009): New localities of *Nehalennia speciosa* (Charpentier, 1840) in the vicinity of Dobre Miasto (north-eastern Poland). *Odonatrix* 5(2): 45-47. (in Polish, with English summary) ["*N. speciosa* is one of the most endangered dragonfly species in Europe. In July 2008, two new localities were recorded. Adults were observed in shore vegetation of two water bodies near Dobre Miasto (north of Olsztyn, Masurian Lakeland), in the area planned to be included in the Natura 2000 network. Together with *N. speciosa* occurred: *Leucorrhinia albifrons*, *Aeshna grandis*, *Cordulia aenea*, *Erythromma najas*, *Coenagrion puella*, *Ischnura elegans*, *Lestes virens*, *Enallagma cyathigerum*." (Authors)] Address: Czachorowski, S., Katedra Ekologii i Ochrony Środowiska, Uniwersytet Warmińsko-Mazurski w Olsztynie, Pl. Łódzki 3, 10-727 Olsztyn, Poland. E-mail: stanislaw.czachorowski@uwm.edu.pl

**8272.** Daraż, B. (2009): Dragonflies (Odonata) of the Przemysl Foothills and adjacent areas along the San River. *Wiad. entomol.* 28(1): 5-32. (in Polish, with English summary) ["Studies were carried out at 36 localities in Pogórze Przemyskie (the Przemysl Foothills) and adjacent areas along the San River (SE Poland) in the years 2004-2007. 54 species of dragonflies (74% of the Polish dragonfly fauna) were recorded, among them: a) *Nehalennia speciosa* in a highly isolated population, currently situated at the southern border of the species distribution, b) *Crocothemis erythraea* at 5 localities, autochthonous at least at two of them, abundant at one site, and with a probable second generation, c) *Cordulegaster bidentata*, widespread at many localities, d) *Leucorrhinia albifrons* and *L. caudalis* at the southern

border of their distribution, the latter species being extremely rare at these latitudes, e) *L. pectoralis*, rare in southern Poland, f) several thermophilous species as e.g. *Aeshna affinis*, *Orthetrum brunneum*, *O. albistylum*, *Sympetrum meridionale*. The species composition of the odonate fauna and the occurrence of some species are commented on and discussed with reference to the geographical position of the area and the habitat spectrum. Conservation aspects are presented and assessed and some conservation measures are proposed." (Author)] Address: Daraz, B., ul. Kościelna 41, 35-505 Rzeszów; Poland. E-mail: bdaraz@poczta.onet.pl

**8273.** Dargent, T.; Bao, X.-q.; Grondel, S.; Le Brun, G.; Paquet, J.B.; Soyer, C.; Cattan, E. (2009): Micromachining of an SU-8 flapping-wing flying micro-electro-mechanical system. *J. Micromech. Microeng.* 19, 085028 (doi:10.1088/0960-1317/19/8/085028): 10 pp. (in English) ["This paper presents a feasibility step in the development of an ultra-small biomimetic flying machine. Advanced engineering technologies available for applications such as the micro-electro-mechanical system (MEMS) technologies are used. To achieve this goal, a flapping-wing flying MEMS concept and design inspired from insects is first described. Actuators and an actuation way for the control over the wing kinematics are proposed. The initial concepts are subsequently analyzed and presented using multi-body and finite element models. An overview of SU-8 photoresist structures and their functions in the future micro-robot insect is then presented. Consequently, micromachining enables the implementation of a flying MEMS. It is also demonstrated that the structure can be made at insect sizes and actuated at low power inputs. Moreover, the flapping frequency obtained is within the flapping frequency range of wings of many common insects of millimetric dimensions. Such prototypes are of interest as tools to artificially recreate and study insect flight with characteristics, similar to those of insects, that are able to produce lift and hover. Finally, if a micro-battery, wireless receivers, microcontrollers, sensors and actuators can all be fitted onto chips only a few millimeters square, with a mass in the order of milligrams, then we believe that an insect-size flying MEMS can be realized. All these requirements can now be achieved due to advanced engineering methods." (Authors) The publication includes references to Odonata.] Address: Cattan, E., Université Lille Nord de France, F-59000 Lille, France. E-mail: eric.cattan@univ-valenciennes.fr

**8274.** Darvizeh, M.; Darvizeh, A.; Rajabi, H.; Rezaei, A. (2009): Free vibration analysis of dragonfly wings using finite element method. *The International Journal of Multiphysics* 3(1): 101-110. (in English) ["In the present work, investigations on the microstructure and mechanical properties of the dragonfly wing are carried out and numerical modeling based on Finite Element Method (FEM) is developed to predict flight characteristics of dragonfly wings. Vibrational behaviour of wings type structures is immensely important in analysis, design and manufacturing of similar engineering structures. For this purpose natural frequencies and mode shapes are calculated. In addition, the kind of deformation in each mode shape evaluated and the ratio between numerical natural frequency and experimental natural frequency presented as damping ratio. The results obtained from present method are in good agreement with same experimental methods."] Address: Guilan University, Iran

**8275.** de Oliveira, D.E.; de Marco Júnior, P. (2009): Is there a trade-off between the melanin allocated to the immune system and to camouflage on larvae of the dragonfly *Micrathyrina catenata* Calvert, 1909 (Odonata: Libellulidae)? *Neotropical Biology and Conservation* 4 (3): 133-136. (in English, with Portuguese summary) ["In insects, the immune system responds to the presence of antigens involving them in melanin. However, the melanin is also allocated into the exoskeleton's pigmentation, used to camouflage. We aimed to test the existence of a trade-off between the allocation of melanin to the immune system and to camouflage on the larvae of *M. catenata*. We conducted the study in the "Reserva do km 41" (41 km' Reserve), 80 km distant from Manaus, Amazonas, Brazil. We implanted a nylon line into the abdomen of 30 larvae and observed if had or not deposition of melanin in the line. We counted the number of individuals who responded to implant depositing melanin and, later, we took photos of the larvae's heads and calculate gray intensity. We used a t-test for independent samples. 76% of larvae responded to treatment depositing melanin on the implants. There were no significant differences in the intensity of gray between the larvae that responded to the implants and those who did not responded. There is no trade-off to allocation of melanin for camouflage and for the immune system. This should happen because the immune system is not limited by the acquisition of resources or the camouflage's demand for melanin is not enough to influence the immune system." (Authors)] Address: de Oliveira, D.E., Programa de Pós-Graduação em Biologia Animal, Instituto de Ciências Biológicas, Sala AT 159, Campus Universitário Darcy Ribeiro, Universidade de Brasília, 70910-900, Asa Norte, Brasília, DF, Brazil. E-mail: daniloelo@gmail.com

**8276.** Deans, M. (2009): Reports from Costal Stations - 2008: Bawdsey Peninsula, Suffolk. *Atropos* 36: 53-54. (in English) [UK; *Erythromma viridulum*, *Sympetrum striolatum* (at a light trap)] Address: not stated

**8277.** Delevati Colpo, K.; Brasil, M.T.; Vielmo Camargo, B. (2009): Macroinvertebrados bentônicos como indicadores do impacto ambiental promovido pelos efluentes de áreas orizícolas e pelos de origem urbana/industrial. *Ciência Rural* 39(7): 2087-2092. (in Portuguese, with English summary) [Cachoeirinha, Rio Grande do Sul, Brazil; Benthic macroinvertebrates as indicators of environmental impact promoted by rice crop flood and by urban/industrial effluents. Table 1 includes data on the abundance of "Anisoptera".] Address: Delevati Colpo, Karine, Depto de Ciências Biol., Univ. Regional Integrada do Alto Uruguai e das Missões (URI), Campus de Santiago. Av. Batista Bonoto Sobrinho, 97700-000, Santiago, RS, Brasil. E-mail: kacolpo@gmail.com

**8278.** Demarez, L. (2009): Eerste waarneming van eiafzetting bij Zuidelijke keizerlibel (*Anax parthenope*) in Vlaanderen, Het Vinne 30 juli 2008 [First observation of ovipositing *Anax parthenope* in Flanders]. *Nieuwsbrief Libellenvereniging Vlaanderen* 3(2): 2-3. (in Dutch, with English summary) ["Although in Flanders, Belgium *A. parthenope* has been observed quite a few times during the last years, and populations being suspected, real reproduction had not yet been proven. The author describes an observation of a pair ovipositing in tandem at the nature reserve Het Vinne in Zoutleeuw." (Author)] Address: Demarez, L., Ooststraat 2, 8890 Moorslede, Belgium. E-mail: leendemarez@telenet.be



- 8279.** Dibble, E.D.; Thomaz, S.M. (2009): Use of fractal dimension to assess habitat complexity and its influence on dominant invertebrates inhabiting tropical and temperate macrophytes. *Journal of Freshwater Ecology* 24(1): 93-102. (in English) ["We evaluated the feasibility of using fractal geometry to measure the structural complexity innate to 11 species of temperate and tropical macrophytes. The efficacy of fractal dimension (D) as a surrogate of plant complexity was tested by using D values to predict the density of two dominant invertebrate taxa (Annelida and Odonata). Plants and invertebrates were collected from lagoons in the upper Parana River, Brazil, and from a lake in central Minnesota, USA. Fractal dimensions varied from 1.16 (SD=0.03) in *Potamogeton illinoensis* to 1.68 in *Najas conferta* (SD=0.07) and *Myriophyllum spicatum* (SD=0.02). Spatial scale did not affect D values, since the results obtained for pictures taken at 25 cm<sup>2</sup>, 100 cm<sup>2</sup> and 600 cm<sup>2</sup> did not differ for five tropical species. Using the results of D recorded at 100 cm<sup>2</sup>, a positive and significant relationship between plant complexity and Annelida and Odonata densities was observed. The biological significance of the positive correlations between D and invertebrate densities and the feasibility in calculating D make this method a potential candidate for measuring plant complexities at small scales." (Authors)] Address: Dibble, E.D., Rm# 217, Thompson Hall, Department of Wildlife and Fisheries, Box 9690, Mississippi State, MS 39762-9690, USA. E-mail: edibble@cfr.msstate.edu
- 8280.** Diomande, D.; Bony, K.Y.; Oi Edia, E.; Konan, K.F.; Gourène, G. (2009): Diversité des Macroinvertébrés Benthiques de la Rivière Agnébi (Côte d'Ivoire; Afrique de l'Ouest). *European Journal of Scientific Research* 35(3): 368-377. (in French, with English summary) [The middle stream range of the Agnébi, Ivory Coast (Pont Autoroute) was sampled monthly over 10 months, and covering the 4 local rainy seasons. Ten samples with an Ekman grab resulted in the record of 50 taxa (Oligochetes: 2, molluscs: 14, and insects: 34 taxa). The following odonate taxa are listed: *Pseudagrion salisburyensis*, *Ictinogomphus*, *Lestinogomphus angustus*, *Paragomphus*, *Phyllogomphus aethiops*, and *Phyllomacromia*.] Address: Diomandé, D. Laboratoire d'Environnement et Biologie Aquatique UFR Sciences et Gestion de l'Environnement, Université d'Abobo-Adjamé 02 BP 801 Abidjan 02, Ivory Coast. E-mail: diomdram@yahoo.fr
- 8281.** Dominak, P.; Michalczuk, W. (2009): Two species of biting midges (Diptera: Ceratopogonidae) new to the Polish fauna. *Dipteron* 25: 8-13. (in Polish, with English summary) ["*Forcipomyia paludis* (Macfie, 1936) and *Monohelea estonica* Remm, 1965 are recorded from Poland for the first time. As a result the number of biting midges species in the Polish fauna increased to 215. Females are briefly diagnosed and illustrated, geographical distribution analysed and Odonata hosts of parasitic *F. paludis* reviewed." (Author)] Address: Dominak, Patrycja, Katedra Zoologii Bezkręgowców Uniwersytetu Gdańskiego, Al. Marszałka Piłsudskiego 46, 81-378 Gdynia, Poland. E-mail: heliocopris@gmail.com
- 8282.** Donoso, D.A.; Salazar, F.; Maza, F.; Cárdenas, R.E.; Dangles, O. (2009): Diversity and distribution of type specimens deposited in the Invertebrate section of the Museum of Zoology QCAZ, Quito, Ecuador. *Ann. soc. entomol. Fr. (n.s.)* 45(4): 437-454. (in English, with French summary) ["The Invertebrate section of the Museum of Zoology QCAZ at the Pontifical Catholic University of Ecuador in Quito maintains nearly two million curated specimens, and comprises Ecuador's largest collection of native taxa. We review 1902 type specimens from 6 subspecies and 320 species in 121 genera and 42 families, currently kept in the Museum. The list includes 116 holotypes, 10 allotypes, 1774 paratypes and 2 neoparatypes. The collection of type specimens is particularly strong in the Coleoptera (family Carabidae and Staphylinidae) and Hymenoptera. [...]. An analysis of the geographic distribution of type localities showed that collection sites are clustered geographically with most of them found towards the northern region of Ecuador, in Pichincha, Cotopaxi and Napo provinces. Sites are mainly located in highly accessible areas near highways and towns. Localities with a high number of type species include the cloud forest reserve Bosque Integral Otonga and Parque Nacional Yasuní in the Amazon rainforest near PUCE's Yasuní Scientific Station. Type localities are not well represented in the Ecuadorian National System of Protected Areas. Future fieldwork should include localities in the southern region of Ecuador but also target less accessible areas not located near highways or towns. We discuss the value of the collection as a source of information for conservation and biodiversity policies in Ecuador." (Authors)] Address: Odonata are represented in the collection by the following type material: *Lestes jerrelli* Tennessen 1997. Paratype; *Oxyagrion tennesseni* Mauffray 1999. Paratype.; *Aeshna* (*Marmaraeschna*) *brevicercia* Muzón & Von Ellenrieder 2001. Holotype, paratype (= *Rhionaeschna brevicercia* (Muzón & von Ellenrieder, 2001)).] Address: Salazar, Fernanda, Museo de Zoología, Escuela de Ciencias Biológicas, Pontificia Universidad Católica del Ecuador, Av. 12 de Octubre 1076 y Roca, Apdo. 17-01-2184, Quito, Ecuador. E-mail: mafersalazar@yahoo.es
- 8283.** Ebrahimi, A.; Madjdzadeh, S.M.; Mohammadian, H. (2009): Dragonflies (Odonata) from South-Eastern Iran. *Caspian Journal of Environmental Sciences* 7 (2): 107-112. (in English) [27 species of Odonata (528 specimens from more than 30 sites, 2006-2008) were collected in south-eastern Iran, Kerman province, in contrast to 11 species that were recorded previously from this region. 528 specimens were collected from more than 30 sites in Kerman province during 2006-2008. *Anax imperator* was first recorded for the central plateau of Iran. This species had been recorded only from northern part of Iran (Caspian Sea fringe).] Address: Ebrahimi, A., Dept. of Biology, Faculty of Sciences, Shahid Bahonar University, Kerman, Iran. E-mail: aebrahimi60@yahoo.com
- 8284.** Edokpayi, C.A.; Uwadiae, R.E.; Oluwarotimi, O.T. (2009): The physicochemistry and phytomacrobenthic communities associated with *Pistia stratiotes* (L.) (Water Lettuce) in a non tidal creek within the University of Lagos, South-West, Nigeria. *Journal Sci. Res. Dev.* 11(2008 / 2009): 62-76. (in English) [Samples were collected monthly for six months (March-August, 2003). A total of 5,593 individuals (32 taxa) was dominated by Dipterans (53.21%) and Plecopterans (23.85%). Odonata (*Libellulidae*, "*Coenagrionidae*", "*Agriidae*") are represented by 5 specimens only.] Address: Edokpayi, C.A., Dept of Marine Sciences, University of Lagos, Nigeria
- 8285.** El-Kazafy, A.T.; Yousry, A.B. (2009): The value of honey bees (*Apis mellifera*, L.) as pollinators of summer seed watermelon (*Citrullus lanatus* colothyn-

thoides L.) in Egypt. *Acta Biologica Szegediensis* 53(1): 33-37. (in English) [*Hemianax ephippiger* and *Ischnura senegalensis* are listed in Tab. 2 as pollinators on summer seed watermelon plants at Dessouk region, Kafr El-Sheikh Governorate during 2006 season.] Address: Economic Entomology Department, Faculty of Agriculture, Kafrelsheikh University, Kafr El-Sheikh, Egypt

**8286.** Ellenrieder, N. von; Molineri, C.; Emmerich, D. (2009): Odonata de Uruguay: lista de especies y nuevos registros. *Rev. Soc. Entomol. Argent.* 68(1-2): 227-230. (in Spanish, with English summary) ["A list of 70 species known to occur in Uruguay is given. 14 species are new country records: *Mnesarete pruinosa*, *Acanthagrion lancea*, *A. peruvianum*, *Argia serva*, and *Oxyagrion chapadense*, *Neoneura ethela*, *Progomphus costalis*, *Elasmothemis constricta*, *Erythrodiplax basalis*, *Erythrodiplax media*, *Micrathyria hypodidyma*, *Micrathyria ringueleti*, *Orthemis ambinigrata*, and *Perithemis icteropectera*." (Authors)] Address: Ellenrieder, Natalia von, California State Collection of Arthropods, CDFA, 3294 Meadowview Road, Sacramento, CA 95832. Email: natalia.ellenrieder@gmail.com

**8287.** Ellenrieder, N. von; Garrison, R.W. (2009): Odonata. In: Domínguez, E. & H. R. Fernández (eds.). *Macroinvertebrados bentónicos sudamericanos. Publicación Especial N° X, Fundación Miguel Lillo, Tucumán, Argentina.* [ISBN 978-950-668-015-2]: 95-143. (in Spanish) [The larvae of South American taxa are keyed to the family level, the imagines to the genus level. Many illustrations demonstrate morphological characters on the species level. The chapter also includes morphological essentials and notes on observing and collecting Odonata.] Address: Ellenrieder, Natalia von, California State Collection of Arthropods, CDFA, 3294 Meadowview Road, Sacramento, CA 95832. Email: natalia.ellenrieder@gmail.com

**8288.** Endersby, I. (2009): Nomenclatural amendments to the current catalogue of Australian Odonata. *Australian Entomologist* 36(3): 99-101. (in English) ["Notes on the type depositories for seven species of libellulid dragonflies described by J.J. Kaup or F. Brauer from southeast Asia and recorded from Australia are provided, together with a note on the validity of the generic name *Tamea* Hagen." (Author) The paper bases on Schneider (2004), and considers *Gynacantha rosenbergi*, *Brachydiplax denticauda*, *B. duivenbodei*, *Raphisimia bispina*, *Neurothemis stigmatizans*, *Tamea loewii*, and *Macrodiplox cora*.] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@mira.net

**8289.** Eroukhmanoff, F.; Outomuro, D.; Ocharan, F.J.; Svensson, E.I. (2009): Patterns of phenotypic divergence in wing covariance structure of calopterygid damselflies. *Evolutionary Biology* 36(2): 214-224. (in English) ["Comparing species differences in covariance patterns of traits subject to divergent selection pressures can increase our understanding to the mechanisms of phenotypic divergence. Different species of calopterygid damselflies have diverged in the melanized wing patch of males. This trait serves multiple ecological functions and has behavioural consequences in terms of sexual selection, interspecific interactions, reproductive isolation. We compared the phenotypic variance-covariance matrices (P) of wing traits among nine populations of four European species of calopterygid

damselflies. We found modest divergence in covariance structure among populations of the same species, but strong divergence between species. Interestingly, the orientation of the first eigenvector of P (P max) differed more between closely related species than between distantly related species, although this pattern was absent when overall covariance structures were compared. We also found that distantly related species but geographically closer had converged towards a similar covariance structure. Finally, divergence in covariance structure was correlated with divergence in wing patch length, but not with other wing traits. This last finding suggests that divergent selection on wing patch length might have affected the stability of P. These results indicate that P might not only reflect ancestral developmental pathways but might also be influenced by current ecology." (Authors) *Calopteryx splendens*, *C. xanthostoma*, *C. virgo meridionalis*, and *C. v. virgo*] Address: Eroukhmanoff, Fabrice, Section for Animal Ecology, Ecology Building, Lund University, 223 62 Lund, Sweden. E-mail: fabrice.eroukhmanoff@zoekol.lu.se

**8290.** Ferro, M.L.; Sites, R.W.; Vitheepadit, A. (2009): Contributions to the faunistics of Odonata in Thailand. *Insecta Mundi* 0104: 1-24. (in English) ["Distribution and habitat information are provided for 1578 adult specimens of Odonata representing 127 species in 70 genera and 16 families that were collected from 143 locations throughout Thailand. Of the species collected, 25 (20%) were represented by a single specimen, and 40 (31%) were collected from a single location. Collections were made at 49 lentic and 85 lotic sites, and an average of 6.9 and 6.6 species were collected at each site in each habitat, respectively." (Authors)] Address: Ferro, M.L., Louisiana State Arthropod Museum, Department of Entomology, LSU Agricultural Center, Baton Rouge, Louisiana, 70803, USA. E-mail: spongymesophyll@gmail.com

**8291.** Fillinger, U.; Sombroek, H.; Majambere, S.; van Loon, E.; Takken, W.; Lindsay, S.W. (2009): Identifying the most productive breeding sites for malaria mosquitoes in The Gambia. *Malaria Journal* 2009, 8:62: 14 pp. (in English) ["Background: Ideally larval control activities should be targeted at sites that generate the most adult vectors, thereby reducing operational costs. Despite the plethora of potential mosquito breeding sites found in the floodplains of the Gambia River, about 150 km from its mouth, during the rainy season, only a small proportion are colonized by anophelines on any day. This study aimed to determine the characteristics of larval habitats most frequently and most densely populated by anopheline larvae and to estimate the numbers of adults produced in different habitats. Methods: A case-control design was used to identify characteristics of sites with or without mosquitoes. Sites were surveyed for their physical water properties and invertebrate fauna. The characteristics of 83 sites with anopheline larvae (cases) and 75 sites without (controls) were collected between June and November 2005. Weekly adult productivity was estimated with emergence traps in water-bodies commonly containing larvae. Results: The presence of anopheline larvae was associated with high invertebrate diversity (Odds Ratio, OR 11.69, 95% CI 5.61-24.34,  $p < 0.001$ ), the presence of emergent vegetation (OR 2.83, 95% CI 1.35-5.95,  $p = 0.006$ ), and algae (at borderline significance; OR 1.87, 95% CI 0.96-3.618,  $p = 0.065$ ). The density of larvae was reduced in sites that were larger than 100 m in

perimeter (OR 0.151; 95% CI 0.060–0.381,  $p < 0.001$ ), where water was tidal (OR 0.232; 95% CI 0.101–0.533,  $p = 0.001$ ), vegetation shaded over 25% of the habitat (OR 0.352; 95% CI 0.136–0.911,  $p = 0.031$ ) and water conductivity was above 2,000  $\mu\text{S}/\text{cm}$  (OR 0.458; 95% CI 0.220–0.990,  $p = 0.048$ ). Pools produced the highest numbers of *Anopheles gambiae* adults compared with rice fields, floodwater areas close to the edge of the floodplain or close to the river, and stream fringes. Pools were characterized by high water temperature and turbidity, low conductivity, increased presence of algae, and absence of tidal water. Conclusion: There are few breeding sites that produce a high number of adult vectors in the middle reaches of the river in The Gambia, whereas those with low productivity are larger in area and can be found throughout the rainy season. Even though risk factors could be identified for the presence and density of larvae and productivity of habitats, the results indicate that anti-larval interventions in this area of The Gambia cannot be targeted in space or time during the rainy season." (Authors) Odonata are treated at the order level.] Address: Fillinger, Ulrike, Disease Control & Vector Biology Unit, London School of Hygiene & Tropical Medicine, Keppel Street, London, WC1E 7HT, UK. E-mail: Ulrike.fillinger@lshtm.ac.uk;

**8292.** Fischer, C. (2009): *Enallagma cyathigerum* und *Ischnura elegans* als Kleptoparasiten in Spinnennetzen (Odonata: Coenagrionidae). *Libellula* 28(3/4): 183-186. (in German, with English summary) [Two observations near Starnberg, Bavaria, Germany, are portrayed, when one female *E. cyathigerum* and one male *I. elegans* successfully purloined prey items from spiders' webs.] Address: Fischer, Christine, Ammerseestr. 32, D-82061 Neuried, Germany

**8293.** Fleck, G.; Hamada, N.; Carvalho, A.L. (2009): A remarkable new genus and species of dragonfly (Odonata: Anisoptera: Libellulidae) from Brazil and notes on its bionomics and phylogenetic affinities. *Ann. soc. entomol. Fr. (n.s.)* 45(3): 275-284. (in English, with French summary) ["*Orionothemis felixorioni* n. gen., n. sp. from Bahia state, Brazil, is described and illustrated from larvae, reared adults and an immature adult male taken in association with its possible larval shuck. This taxon exhibits remarkable features among the Odonata, such as enormous dorsal and lateral spines perpendicular to the body axis, totally fused last abdominal segments in the larva, strongly differentiated and sexually dimorphic posterior legs, and the incompletely chitinized eighth abdominal tergite of the adult. *Orionothemis* is closely related to *Elasmothemis* (Neotropical) and *Onychothemis* (South-East Asia). The larvae were collected in the abundant immersed vegetation in a clear and cool stream in the Brazilian 'planalto' (central plateau) in an area that is endangered by deforestation and irrigation." (Authors)] Address: Hamada, N., Instituto Nacional de Pesquisas da Amazônia (INPA), Coordenação de Pesquisas em Entomologia (CPEN), Avenida André Araújo, n. 2936, CP 47, BR 69011-970, Manaus, AM, Brazil. E-mail: nhamada@inpa.gov.br

**8294.** Flenner, I.; Olne, K.; Suhling, F.; Sahlén, G. (2009): Predator-induced spine length and exocuticle thickness in *Leucorrhinia dubia* (Insecta: Odonata): a simple physiological trade-off? *Ecological Entomology* 34: 735-740. (in English) ["1. Morphological defence structures evolve against predators but are costly to the individual, and are induced only when required. A well-

studied example is the development of longer abdominal spines in dragonfly larvae in the presence of fish. Numerous attempts to discover trade-offs between spine size and behaviour, development time or body size have, however, produced little evidence. 2. We considered a physiological trade-off. Spines consist of cuticle and using material to build longer structures may result in less material remaining elsewhere. We therefore measured exocuticle thickness at nine locations on *Leucorrhinia dubia* larvae from habitats with and without fish. 3. Our results show a significant effect of the interaction between fish presence and spine length on head and fore leg exocuticle thickness. Relative thickness increased with relative length of lateral spine 9 in the absence of fish, whereas no such relationship existed with fish. Hence, synthesis and secretion of cuticle material occur as a trade-off when larvae react to fish presence. 4. We assume the mechanism to be a selective synthesis of material with different responses in different parts of the larval body. These findings offer a new angle to the fish/spine trade off debate.] Address: Sahlén, G., Halmstad University, P.O. Box 823, 30118 Halmstad, Sweden. E-mail: goran.sahlen@hh.se

**8295.** Fliedner, H. (2009): Two remarkable observations from Puerto Rico. *Argia* 21(1): 8-9. (in English) [Lucia Beach east of Yabucoa, eastern coast of Puerto Rico, 4-XII-2008]: *Crocothemis servilia*, which is a new addition to the regional fauna, and *Erythrodiplax umbrata*. This male is "noteworthy because of the irregularity of its wing pattern. On the left forewing the dark band is missing totally, on the right one there is only an irregular dark mark near the anterior margin, and the dark bands on the hindwings are much lighter at the rear. This asymmetrical lack of pigment may be due to an anomaly in development." (Author)] Address: Fliedner, H., Louis-Seegelken Str., D-28717 Bremen, Germany. E-mail: H.Fliedner@t-online.de

**8296.** Florencio, M.; Serrano, L.; Gomez-Rodriguez, C.; Millan, A.; Dyaz-Paniagua, C. (2009): Inter- and intra-annual variations of macroinvertebrate assemblages are related to the hydroperiod in Mediterranean temporary ponds. *Hydrobiologia* 634: 167-183. (in English) ["Macroinvertebrate assemblages of 22 temporary ponds with different hydroperiod were sampled monthly during a dry year (2005–2006) and a wet year (2006–2007). Coleopteran and Heteropteran adults were most abundant at the end of the hydroperiod, while Coleopteran larvae, mainly Dytiscidae, were mostly recorded in spring. Macroinvertebrate assemblages differed between study years. The shorter hydroperiod of ponds in the dry year constrained the length of the aquatic period for macroinvertebrates, and three distinct wet phases of community composition could be distinguished: filling phase, aquatic phase and drying phase. In the wet year, with a longer pond hydroperiod, five phases could be identified, with the aquatic phase differentiated into winter, early spring and late spring phases. Dispersers such as *Anisops sardeus*, *Berosus guttalis* or *Anacaena lutescens* were typical during the filling phase and *Corixa affinis* or *Enochrus fuscipennis* during the drying phase. The ponds with intermediate hydroperiod showed a similar composition (mainly dispersers) at the beginning and end of their wet period; this is not being seen in early drying or long hydroperiod ponds. A general pattern was detected, with similar variation between both years, which may be associated with the life histories of the macroinvertebrate taxa re-



corded." (Authors) 16 odonate species are listed. Odonata and Heteroptera included the highest number of species and individuals during both years." (Authors)] Address: Florencio, Margarita, Donana Biological Station-CSIC, P.O. Box 1056, 41080 Seville, Spain. E-mail: margarita@ebd.csic.es

**8297.** Fraker, M.E. (2009): Predation risk assessment by green frog (*Rana clamitans*) tadpoles through chemical cues produced by multiple prey. *Behav. Ecol. Sociobiol.* 63: 1397-1402. (in English) ["Many prey assess predation risk through predator chemical cues. Numerous studies have shown that (1) prey sometimes respond to chemical cues produced by heterospecifics and (2) that many species are capable of associative learning. This study extends this research by focusing on predation risk assessment and antipredator behaviour in environments containing chemical cues produced by multiple prey species. The results show that *R. clamitans* tadpoles (1) assess risk from the chemical cue produced during predation by a heterospecific (gray tree frog, *Hyla versicolor*, tadpoles) and (2) can exhibit similarly strong behavioral responses to a mix of conspecific and heterospecific cues compared to conspecific cue alone, depending on their conditioning environment. I then discuss how the prey choice of the predators and the relative abundances of the prey species should influence the informational value of heterospecific cues." (Authors) The tadpole-odonate larvae interaction was tested using *Anax junius*.] Address: Fraker, M.E., Department of Ecology and Evolutionary Biology, University of Michigan, 830 North University, Ann Arbor, MI 48109-1048, USA. E-mail: mfraker@umich.edu

**8298.** Funk, A.; Reckendorfer, W.; Kucera-Hirzinger, V.; Raab, R.; Schiemer, F. (2009): Aquatic diversity in a former floodplain: Remediation in an urban context. *Ecological Engineering* 35(10): 1476-1484. (in English) ["The Lobau, a former floodplain area of the Danube River situated within the city limits of Vienna (Austria), was strongly affected by the river regulation in 1875. The reduced hydrological connectivity led to an increasing loss of aquatic habitats. A water enhancement scheme with a maximum water input of 0.5 m<sup>3</sup> s<sup>-1</sup> was initiated in 2001. The present study assesses the effect of this scheme on biodiversity using three target species groups – aquatic molluscs, dragonflies and fish – following a common Before-After Control-Impact design (BACI). Dragonflies and molluscs were positively affected, reflecting the habitat alterations in the system. For fish, no significant impact was observed. The aim of the scheme has been achieved: increased habitat diversity and improved habitat conditions for the system's initial community and further rheophilic / rheotolerant species. Water enhancement schemes can be effective remediation measures and deserve further attention in the management of urban wetlands." (Authors)] Address: Raab, R., Tech. Büro für Biol., Quadenstr. 13, A-2232 Deutsch-Wagram, Austria. E-mail: rainer.raab@gmx.at

**8299.** Gaenzle Schilling, E.; Loftin, C.S.; Hury, A.D. (2009): Macroinvertebrates as indicators of fish absence in naturally fishless lakes. *Freshwater Biology* 54 (1): 181-202. (in English) ["1. Little is known about native communities in naturally fishless lakes in eastern North America, a region where fish stocking has led to a decline in these habitats. 2. Our study objectives were to: (i) characterise and compare macroinvertebrate

communities in fishless lakes found in two biophysical regions of Maine (U.S.A.): kettle lakes in the eastern lowlands and foothills and headwater lakes in the central and western mountains; (ii) identify unique attributes of fishless lake macroinvertebrate communities compared to lakes with fish and (iii) develop a method to efficiently identify fishless lakes when thorough fish surveys are not possible. 3. We quantified macroinvertebrate community structure in the two physiographic fishless lake types (n = 8 kettle lakes; n = 8 headwater lakes) with submerged light traps and sweep nets. We also compared fishless lake macroinvertebrate communities to those in fish-containing lakes (n = 18) of similar size, location and maximum depth. We used nonmetric multidimensional scaling to assess differences in community structure and t-tests for taxon-specific comparisons between lakes. 4. Few differences in macroinvertebrate communities between the two physiographic fishless lake types were apparent. Fishless and fish-containing lakes had numerous differences in macroinvertebrate community structure, abundance, taxonomic composition and species richness. Fish presence or absence was a stronger determinant of community structure in our study than differences in physical conditions relating to lake origin and physiography. 5. Communities in fishless lakes were more speciose and abundant than in fish-containing lakes, especially taxa that are large, active and free-swimming. Families differing in abundance and taxonomic composition included Notosectidae, Corixidae, Gyrinidae, Dytiscidae, Aeshnidae, Libellulidae and Chaoboridae. 6. We identified six taxa unique to fishless lakes that are robust indicators of fish absence: *Graphoderus liberus*, *Hesperocorixa* spp., *Dineutus* spp., *Chaoborus americanus*, *Notonecta insulata* and *Callicorixa* spp. These taxa are collected most effectively with submerged light traps. 7. Naturally fishless lakes warrant conservation, because they provide habitat for a unique suite of organisms that thrive in the absence of fish predation." (Authors)] Address: Gaenzle Schilling, Emily, Department of Wildlife Ecology, University of Maine, 5755 Nutting Hall, Orono, ME 04469-5755, USA. E-mail: emily.schilling@umit.maine.edu

**8300.** Garrison, R.W. (2009): A synopsis of the genus *Telebasis* (Odonata: Coenagrionidae). *International Journal of Odonatology* 12(1): 1-121, 2 pls. (in English) ["In this synopsis all 50 species of the primarily neotropical genus *Telebasis* are keyed, diagnosed, and illustrated. *Helveciagrion* is considered a junior subjective synonym of *Telebasis*, *T. coccinata* a junior subjective synonym of *T. coccinea*, and *T. limoncocha* a junior subjective synonym of *T. griffinii*. Six new species from South America are described: *T. carvalhoi* (holotype male: Brazil, Pará State, Floresta Nacional de Carajás, Parauapebas, S11D-C, 6°02'59"S, 49°53'24"W, ix 2005, leg. N. Ferreira Jr., in UFRJ); *T. corbeti* (holotype male: Peru: Madre De Dios Department, Tambopata-Candamo Reserved Zone, Camp 3, Collpa, Río Tambopata west bank, 13°08'31"S, 69°36'46"W, 17 ix 1992, leg. M. Butt, in BNHM); *T. farcimentum* (holotype male: Colombia: Valle del Cauca Department, Cali, 3°26'14"N, 76°31'21"W, 01 viii 1972, leg. N.B. Stiles, in FSCA); *T. leptocyclus* (holotype male: Brazil: Rondônia State, Abuna, 9°42'S, 65°23'W, 112 m, 09 iii 1922, leg. J.H. Williamson, J.W. Strohm, in UMMZ); *T. levis* (holotype male: Guatemala, El Petén Department, Uaxactun, 03 v 1931, leg. A. Murie, in UMMZ); and *T. williamsoni* (holotype male: Colombia: Magdalena Department, El Banco, 9°02'50"N, 73°58'41"W, 46 m, 25 i 1917, leg. J.H.

Williamson, E.B. Williamson, in UMMZ)." (Author)] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**8301.** Gonzalez-Soriano, E.; Noguera, F.A.; Zaragoza-Caballero, S.; Ramirez-Garcia, E. (2009): Odonata de un bosque tropical caducifolio: sierra de San Javier, Sonora, Mexico. *Revista Mexicana de Biodiversidad* 80: 341-348. (in Spanish, with English summary) ["A faunistic survey of the Odonata from San Javier. Sonora, was undertaken during 7 months between November 2003 and October 2004. A total of 1012 specimens were collected belonging to 7 families. 27 genera, and 52 species. The family Libellulidae was the most diverse with 23 species, followed by Coenagrionidae (16), Gomphidae (5) and Aeshnidae (4). The least diverse families were Lestidae (2). Calopterygidae (1) and Coenagrionidae (1). The genus *Argia* was the dominant one with 10 species followed by *Enallagma* with 4. This diversity of this small area is outstanding, with 42.6% of all the species recorded for the state of Sonora." (Authors)] Address: Gonzalez-Soriano, E., Depto de Zool., Inst. de Biología, Univ. Nacional Autónoma de México. Avenida Universidad 3000, Ciudad Universitaria, 04510 México, D. F., México. E-mail: esoriano@ibiologia.unam.mx

**8302.** Gorb, S.N.; Tynkkyne, K.; Kotiaho, J.S. (2009): Crystalline wax coverage of the imaginal cuticle in *Calopteryx splendens* (Odonata: Calopterygidae). *International Journal of Odonatology* 12(2): 205-221. (in English) ["In this study we use high resolution SEM to describe the diversity of wax crystals and their distribution on different morphological structures in male individuals of *C. splendens*. The entire cuticle surface of this damselfly, with the exception of ommatidia and ocelli, is covered with crystalline wax in dimensions from submicron to micron range. It is shown that shape – rod-like, plate like, filamentous, etc. –, size, and density of crystals vary on different surfaces and in individuals of different ages. Additionally, we demonstrate different types of damage to the crystalline wax layer: scratches, compressions, wear, and contamination. The primary function of the wax crystalline coverage in odonates is, presumably, reduction of surface wettability by water (superhydrophobicity). However, other functions are also discussed, especially in such specialized body areas as postero-ventral parts of male abdomen, the so called 'lantern'." (Authors)] Address: Gorb, S.N., Department of Functional Morphology and Biomechanics, Zoological Institute, Christian Albrecht University of Kiel, Am Botanischen Garten 1-9, 24118 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**8303.** Hacet, N.; Aktaç, N. (2009): Contribution to the knowledge of Odonata fauna of Southern Marmara Region of Turkey. *Türk. entomol. derg.* 33(3): 171-178. (in English, with Turkish summary) [Records of 17 species and subspecies, collected in 1996, 2002 and 2003 from the Çanakkale and Yalova provinces situated in the Southern Marmara Region of Turkey are listed. *Libellula fulva* is a first record for the region. Species new for the Çanakkale and Yalova provinces are discussed.] Address: Hacet, Nurten, Trakya University, Faculty of Arts and Sciences, Department of Biology, 22030, Edirne, Turkey. E-mail: nhacet@hotmail.com

**8304.** Hacet, N. (2009): Odonata of the western Black Sea region of Turkey, with taxonomic notes and species list of the region. *Odonatologica* 38(4): 293-306. (in English) ["40 species and subspecies from 58 localities were recorded during 2003 and 2005-2007. *Sympetma fusca*, *Erythromma lindenii*, *Somatochlora meridionalis*, *Orthetrum albistylum* and *Sympetrum pedemontanum* are new for the region. *S. meridionalis* records are the easternmost within its range. Geographical distribution of some other species is discussed, and notes on the morphology and taxonomic status of the regional *Calopteryx splendens*, *C. virgo*, *Ischnura elegans* and *Cordulegaster insignis* are provided. The distributions of *Coenagrion pulchellum*, *C. scitulum*, *Pyrrhosoma n. nymphula*, *Aeshna cyanea*, *Cordulia aenea* and *Sympetrum depressiusculum* in Turkey are still largely unknown. Based on all available records, a list of the 51 species and subspecies currently known from the Western Black Sea Region is presented." (Author)] Address: Hacet, Nurten, Department of Biology, Faculty of Arts and Sciences, Trakya University, TR-22030 Edirne, Turkey. E-mail: nhacet@hotmail.com

**8305.** Hannelly, E.C. (2009): The effects of introduced trout on native macroinvertebrates from lakes in the Trinity Alps Wilderness in northern California. Thesis, Faculty of Humboldt State University, Masters of Arts In Biology: IX, 61 pp. (in English) ["I examined differences in native macroinvertebrates among four lake management categories (fish stocked, temporary stocking suspension, fish removal lakes, and historically fishless lakes) and among three habitats (rock, organic/silt substrate, and emergent vegetation) from 16 different lake basins in a four-year study (2003-2006) in the Trinity Alps Wilderness in northeastern California. This study showed that introduced insectivorous fish reduce the diversity of native aquatic insects. Chironomid midges were more abundant and in greater proportion in fish lakes than in fishless lakes. Additionally, more taxa were sampled each subsequent year following fish removals and more taxa were sampled from Hidden Lake, a stocking suspension lake that did not maintain a fish population, than in the other three stocking suspension lakes that did sustain viable fish populations. The reduction in insect diversity due to fish was further exemplified in Hidden Lake alone, where more taxa were recorded each subsequent year of the study. *Libellula* was most common in fish stocked lakes. The life history and morphology of *Libellula* seems to give them an advantage over other invertebrate predators in fish lakes. Fish create top down effects that are illustrated by the apparent ability of *Libellula* to regulate other insect abundances and proportions. This study also demonstrated how large-bodied insects are more commonly found in complex habitats, which may be attributable to increased habitat availability and resources, to the invertebrates seeking refugia from insectivorous fish, or to a combination of both." (Author)] Address: not stated

**8306.** Harvey, R.; Higgott, J. (2009): Reports from Coastal Stations - 2008: Minsmere RSPB Nature Reserve, Suffolk. *Atropos* 36: 54-55. (in English) [UK; *Sympetrum flaveolum*; *Anaciaeschna isosceles*, *Erythromma najas*, *E. viridulum*] Address: not stated

**8307.** Hassall, C.; Thompson, D.J. (2009): Variation in wing spot size and asymmetry of the Banded Demoiselle *Calopteryx splendens* (Harris, 1780). *J. Br. Dragonfly Society* 25(1): 7-15. (in English) ["Wing pigment-

ation of calopterygid damselflies has received considerable attention due to its role as an honest signal of male quality. We describe a quantitative analysis of this trait in two populations of *C. splendens* in England. One population, sampled close to the northern limit of its range in Northumberland, exhibited substantially smaller wing spots than a population sampled in Hampshire. Wing asymmetry (in terms of length and area) did not vary between the two populations, nor did it co-vary with the size of the wing spots. We propose that the decline in wing spot size is the result of variation in climate between the two sites. Such variation in immunocompetence could contribute to the determination of range margins in this species." (Authors)] Address: Thompson, D. J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**8308.** Hassall, C.; Thompson, D.J.; Harvey, I.F. (2009): Variation in morphology between core and marginal populations of three British damselflies. *Aquatic Insects* 31(3): 187-197. (in English) ["As selective pressures are altered by the changing climate, species have been shown to shift their distributions. Here we investigate morphological variation in dispersal-related traits between core and marginal populations in three species of Odonata, a taxon that is known to be expanding polewards. We sampled individuals of (i) *Calopteryx splendens*, a species with a rapidly expanding range, (ii) *Erythromma najas*, a species with a slowly expanding range, and (iii) *Pyrrhosoma nymphula*, a species that does not exhibit a range margin in the UK (as a control). Only *C. splendens* exhibited consistent trends within two dispersal-related traits (wing:abdomen length ratio and aspect ratio). This result suggests that proximity to range margin alone does not account for variations in damselfly morphology, but that the rate of range expansion may also be important in determining variation." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biol. Sciences (Nicholson Building), Univ. of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**8309.** Heidemann, H. (2009): Die Entdeckung von *Coenagrion hylas* in Österreich. *IDF-Report* 18: 5-8. (in German) [Harald Heidemann reports the story of the discovery of the rare and disjunct distributed *C. hylas* in central Europe. The sketch includes brief anecdotes with Gerhard Jurzitza and M.A. Lieftinck.] Address: Heidemann, H., Au in den Buchen 66, 76646 Bruchsal, Germany, German

**8310.** Hentz, J.-L.; Bernier, C. (2009): *Macromia splendens*, une libellule remarquable dans le département du Gard. *Synthèse des connaissances. Gard Nature*: 16 pp. (in French) [The paper critically reviews the representation of *M. splendens* in the French network of Natura2000 sites. On the basis of 242 records of *M. splendens* along several rivers in the Gard region the current distribution of the species in southern France is documented.] Address: Gard Nature, Mas du Boschet Neuf, 30300 Beaucaire, France. E-mail: gard.nature@laposte.net

**8311.** Herath, H.M.M.; Edirisinghe, J.P. (2009): Spatial interactions of odonates frequenting "Lanka Pokuna" at the Royal Botanic Gardens, Peradeniya. *Proceedings of the Peradeniya University Research Ses-*

sions, Sri Lanka 14: 275-277. (in English) [A total of 27 Odonata species was recorded at the pond. "Monthly variation in species composition and species presence of Odonata during the study period is shown in Figure 1. The highest species composition was recorded during January-March 2009 and the lowest in December. Only 2 species were present throughout the study period while majority (25 species) was confined to certain months of the year. Presence of different species at the pond varied depending on the time of the day (Figure 1). Majority were active between 10.00-12.00 noon. Two species were present throughout the daytime and others for 2-3 hrs of the day." (Authors)] Address: Herath, H., Dept of Zoology, Faculty of Science, University of Peradeniya, Peradeniya 20400, Sri Lanka

**8312.** Hoffmann, J. (2009): Summary catalogue of the Odonata of Peru - Kommentiertes Faksimile des Manuskripts von J. COWLEY, Cambridge, 20.05.1933 und aktuelle Liste der Odonaten Perus mit Fundortangaben sowie Historie zu Sammlern und Odonatologen in Peru. *International Dragonfly Fund Report* 16: 1-115. (in German, with English and Spanish summaries) ["In the entomological library of the Natural History Museum of Lima, Peru, a badly damaged manuscript, entitled 'Summary Catalogue of the Odonata of Peru' was discovered at the beginning of the 1990s. This manuscript had been kept there since 1933. Its author was stated as 'J. Cowley'. Whether indeed Cowley is the sole author of the whole text, cannot be asserted with certainty. However there are numerous indications that the manuscript was written in Cambridge, England. It seems certain that the list itself was written by Cowley, since many examples were given from his collection and the way the locations were cited. Presumably the manuscript was written together with the German veterinarian Paul Martin and his wife Margarita who lived in Lima. Martin was a very enthusiastic amateur lepidopterologist who had set up a network of butterfly collectors in Peru. Insects other than Lepidoptera were passed on by Martin to specialists, dragonflies apparently mainly to Cowley, who named a species in honour of Martin. The manuscript is of great value, since it is the first known and most complete list of Odonata with localities based on the state of knowledge of those days. Up to this time these records were scattered across few and also incomplete lists as part of taxonomic works or collection catalogues. On the basis of the state of knowledge and rules of nomenclature of his days (1933) Cowley named a total of 174 dragonfly species (synonymised 168 species) from 71 localities. Eleven years later Schmidt (1942) published a list of 173 Peruvian odonates, while 21 years later a catalogue with 165 species (synonymised 158 species) was published by Soukop in 1954. A comprehensive list of 252 species (synonymised to 243) was published by Racenis (1959) 26 years after Cowleys unpublished list. Since then there have been only a few complete lists. Currently and here presented, there are 481 species known from 238 localities, of which 87 were new species first described on the basis of type material from Peru. Up to the end of the 1960s material from commercial collectors and the trade with insects was the basis for most catalogues, with dragonflies being only a by-catch of butterfly collecting expeditions. Publications of lists from scientific expeditions on the other hand, were a rare event. The history of Odonatology in Peru is, therefore, largely connected to the history of research and collecting expeditions into the Amazon region for the greater



part of the 20th century. Up to the era of Cowley, expeditions into the collection regions of Peru took place mainly out of the east of the continent by way of the Amazon and its tributaries. The first of such odonatological evidences are by the famous Amazon researcher Henry Walter Bates, who also collected a large number of dragonflies between the years 1848 and 1859. With an increasing interest in the flora and fauna in their own country and with the founding of natural history institutions at the beginning of the 20th century in Lima, more and more expeditions were organised from Lima. Until the middle of the last century the majority of researchers and collectors active in Peru were still mainly Europeans. With the beginnings of the 70s of the last century, pure collecting expeditions became progressively less common. Odonata, collected during the last 20 years in Peru, mainly stem from research projects with a defined goal. A map of the locations until 2007 shows that more than 70% of the country is still unexplored as far as odonates are concerned. Thus the list of the 481 species more than likely does not reflect the actual inventory of dragonfly species and distribution of Peru. The register lists all the species which have definitely been recorded for the country and takes into account their present validity and comprehensible taxonomic relationships." (Author)] Address: Hoffmann, J., alauda, Wendenstr. 435, D-20537 Hamburg, Germany. E-Mail: hoffmann@alauda.de

**8313.** Holusa, O. (2009): New records of *Cordulegaster bidentata* and *Somatochlora alpestris* in the Ukrainian Carpathians (Odonata: Cordulegasteridae, Corduliidae). *Libellula* 28(3/4): 191-201. (in English, with German summary) ["During 2005 and 2006, a detailed research of freshwater habitats in the catchment of the Chrepeľiv River and in a part of the catchment of the Bistricja Nadvirnjanska River in the Nadvirna district in the Ivano-Frankivsk Oblast, Ukraine, was carried out. *C. bidentata* was found at four localities. Its occurrence in the Ukrainian Carpathians is discussed, and all hitherto published records of *S. alpestris* and *C. bidentata* from the territory of the Ukraine are summarised. In August 2004 and 2006, male adults of *S. alpestris* were recorded at two sites on the massif of Mt. Pip Ivan Maramorosky in the Zakarpattia Oblast, Ukraine. One recording site was in the vicinity of Mt. Berlebashka, and the other on the foot of Mt. Obniz. The occurrence of permanent populations is discussed." (Author)] Address: Holusa, O., Dept Forest Protection & Game Management, Faculty Forestry & Wood Technology, Mendel University of Agriculture & Forestry Brno, Zemedelská 3, CZ-613 00 Brno, Czech Republic. E-mail: holusao@email.cz

**8314.** Honkavaara, J.; Rantala, M.J.; Suhonen, J. (2009): Mating status, immune defence, and multi-parasite burden in the damselfly *Coenagrion armatum*. *Entomologia Experimentalis et Applicata* 132(2): 165-171. (in English) ["Immunity and reproductive effort are both physiologically costly and often a trade-off between these functions has been shown. In studies with damselflies, parasite load has been associated with fitness costs, such as reductions in mating success, male condition, and survival. Although each individual may be simultaneously infected by various parasite species, most studies have concentrated on the effects of a single parasite taxon. We examined natural ecto- and endoparasite infection levels in male *C. armatum* in relation to their mating status, fat reserves, and ability to further mount an immune response, measured as en-

capsulation of an experimentally introduced foreign object. Encapsulation response was lower for mated (paired) males than for single males and declined with increasing water mite abundance. Mated males had fewer water mites than single males. Male weight or fat reserves did not explain variation in encapsulation response. The number of gregarine gut parasites was not related to the level of encapsulation response and did not differ between mated and single males. However, there was a negative correlation between mite abundance and gregarine load. Our data suggest that current mite infection may compromise a male's resistance against further infections by pathogens and parasites, and there may be a trade-off between reproductive effort and encapsulation response in male *C. armatum*." (Authors)] Address: Honkavaara, J., Department of Biology, Section of Ecology, University of Turku, 20014 Turku, Finland. E-mail: johhon@utu.fi

**8315.** Hope, P. (2009): Species Review 1: The Small Red Damselfly *Ceriagrion tenellum* (de Villers) and its close relative, the Turkish Red Damselfly *Ceriagrion georgifreyi* (Schmidt). *J. Br. Dragonfly Soc.* 25(1): 41-56. (in English) ["This review deals *C. tenellum*, a widespread species in Europe, with Britain and Ireland at the northern end of its range. It also looks at its close relative, *C. georgifreyi*, only discovered in 1953 and confined to a narrow fringe along the Mediterranean from Israel to southwest Turkey and three Greek islands." (Authors)] Address: Hope, P., English Bridge Court, Wyle Cop, Shrewsbury, Shropshire, SY1 1XH, UK

**8316.** Horváth, G.; Kriska, G.; Malik, P.; Robertson, B. (2009): Polarized light pollution: a new kind of ecological photopollution. *Front. Ecol. Environ.* 7(6): 317-325. (in English) ["The alteration of natural cycles of light and dark by artificial light sources has deleterious impacts on animals and ecosystems. Many animals can also exploit a unique characteristic of light – its direction of polarization – as a source of information. We introduce the term "polarized light pollution" (PLP) to focus attention on the ecological consequences of light that has been polarized through interaction with human-made objects. Unnatural polarized light sources can trigger maladaptive behaviors in polarization-sensitive taxa and alter ecological interactions. PLP is an increasingly common byproduct of human technology, and mitigating its effects through selective use of building materials is a realistic solution. Our understanding of how most species use polarization vision is limited, but the capacity of PLP to drastically increase mortality and reproductive failure in animal populations suggests that PLP should become a focus for conservation biologists and resource managers alike." (Authors) References to Odonata are made at several occasions.] Address: Horvath, G., Biooptics Laboratory, Department of Biological Physics, Loránd Eötvös University, 1117 Budapest, Pázmány Péter sétány 1, Hungary. E-mail: gh@arago.elte.hu

**8317.** Hunter, I. (2009): Reports from Costal Stations - 2008: Elms Farm, Icklesham, East Sussex. *Atropos* 36: 46. (in English) [UK; *Erythromma viridulum*] Address: not stated

**8318.** Hunter, M. (2009): My best day. *Atropos* 37: 44-45. (in English) [The author describes his most memorable day involving Odonata. 5-VIII-2000, Hamsterley Forest, Durham, UK, records of *Aeshna juncea*, *A. grandis*, *A. mixta*, *A. cyanea*, *Anax partenope*, *A. imper-*

ator, and *Cordulegaster boltonii* are reported.] Address: Hunter, M., 9 Colpitts Lane, West Park, Darlington, DL2 2FG, UK

**8319.** Idris, A.B.; Ismail, S.; Haron, Y.; Suhana, Y. (2009): Insects of Tasik Chini with special emphasis on ichneumonid wasps. *Sains Malaysiana* 38(6): 813-816. (in English) [Tasik Chini, trails to Sg. Gumum and Kampung Melai, Malaysia: a total of 502 insect individuals comprising of seven orders (Hymenoptera, Diptera, Coleoptera, Orthoptera, Blattaria, Odonata and Microcoryphia) and 47 families were collected. Aeshnidae contribute with 12, and Libellulidae with 73 specimens (*Rhythemis phyllis phyllis*, *Nuerothemis fluctuans*, *Orthetrum testateum testateum*, *Orthetrum* sp. 1, *Brachydiplax* sp. 1, *Diplacodes trivialis*, *Cratilla* sp. 1, *Orthetrum sabina* and *Acisoma panorpoides*). In May-Juni 2004, *N. fluctuans* was the dominant species. All taxa are new records for the area as there has been no study conducted previously.] Address: Idris, A.B., Center for Insect Systematics Faculty of Science and Technology Universiti Kebangsaan Malaysia 43600 UKM Bangi, Selangor D.E. Malaysia. E-mail: idrisgh@ukm.my

**8320.** Ingram, S. (2009): Dragonflies: Marvels of the meadows. *SierraScapes*. The Newsletter of the Eastern Sierra Land Trust. Spring 2009: 2. (in English) [General on Odonata.] Address: www.easternsierralandtrust.org

**8321.** Iserbyt, A.; Bots, J.; Ting, J.J.; Jvostov, F.P.; Forbes, M.R.; Sherratt, T.N.; Van Gossum, H (2009): Multi-annual variation in female morph frequencies of the polymorphic damselfly, *Nehalennia irene*, at continental and regional scales. *Animal Biology* 59(3): 313-326. (in English) ["Female-limited polymorphism occurs in different animal taxa but is particularly abundant among species of damselflies, most likely as a consequence of selection to avoid excessive male harassment. Recent work *N. irene* indicated that within year spatial variation in female morph frequencies was limited in nearby populations (i.e. intra-regional scale), but large at a continental scale. As anticipated, some of the observed variation in morph frequency was correlated with variation in the estimated degree of male harassment towards female morphs, measured by male density and operational sex ratio. Here, we extended earlier work by quantifying variation in morph frequency over two to three years, allowing us to elucidate how morph frequencies vary temporally at both intra-regional and continental scales (data for 8 populations over three years and for 33 populations over two years, respectively). Annual variation in morph frequencies was relatively high at the intra-regional scale, but was never large enough to obscure the underlying spatial pattern at the continental scale. At both geographic scales, male density and operational sex ratio were highly variable between years. The estimated degree of male harassment correlated with variation in morph frequency within some regions, but not all. Together, the observed natural variation in female morph frequencies may be partly explained by variation in male harassment, but it appears that a complete understanding will require considering the role of other environmental factors." (Authors)] Address: Iserbyt, A., Evolutionary Ecology Group, University of Antwerp, Groenenborgerlaan 171, B-2020 Antwerp, Belgium

**8322.** IUCN (2009): Odonata Facts. The IUCN Red List of Threatened Species™ 2009 update: 2 pp. (in

English) [*Chlorocypha centripunctata*] – VU known from very few areas in southeast Nigeria and southwest Cameroon, Africa, and *Arabicnemis caerulea* – VU known from Yemen, northeast Oman and the north of the United Arab Emirates are added to the list of threatened Odonata.] Address: Clausnitzer, Viola, Friedländer Weg 53, 37085 Göttingen, Germany. E-mail: violacl@t-online.de

**8323.** Iwata, S.; Watanabe, M. (2009): Spatial distribution and species composition of larval Odonata in the artificial reed community established as a habitat for *Mortonagrion hirosei* Asahina (Zygoptera: Coenagrionidae). *Odonatologica* 38(4): 307-319. (in English) ["Yearly changes in the odonate larval community were surveyed for 4 year after setting up an artificial reed community adjacent to the original habitat of *M. hirosei*, an endangered brackish water species. Only *M. hirosei* larvae were found in the original habitat during the survey period. In the first year of the established habitat, *Ischnura senegalensis* was the dominant species in the larval community. Although the abundance of *M. hirosei* larvae increased year by year, becoming the most abundant species after the second year, the species composition of the larval community of the established habitat was different between the West and East because of environmental factors, such as saline concentration and reed shoot density. *M. hirosei* larvae had expanded their distribution to the entire area of the established habitat in 2005, while the distribution of *I. senegalensis* had been restricted to several patchy areas in accordance with a decrease in their population. There was a negative relationship between the number of *M. hirosei* and *I. senegalensis* larvae. The prey-predator relationship and competitive relationship between the 2 species should have affected the population dynamics and distribution of *M. hirosei*. The odonate larval community and habitat environment that is optimal for *M. hirosei* conservation are discussed from the viewpoint of both biotic and abiotic factors.] Address: Iwata, S., Graduate School of Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan. E-mail: shukoaiwa@hotmail.com

**8324.** Jana, S.; Pahari, P.R.; Dutta, T.K.; Bhattacharya, T. (2009): Diversity and community structure of aquatic insects in a pond in Midnapore town, West Bengal, India. *Journal of Environmental Biology* 30(2): 283-287. (in English) [In total, 20 species of aquatic insects have been recorded from a weed infested pond. Odonata were the most abundant group constituting of 54% of the total aquatic insects. *Urothemis signata* was a eudominant species. *U. signata*, *Agriocnemis pygmaea* and *Enallagma parvum* have been recorded from Paschim Medinipore district for the first time.] Address: Bhattacharya, T., Department of Zoology, Vidyasagar University, Midnapore - 721 102, India. E-mail: prof.t.bhattacharya@gmail.com

**8325.** Johnson, A. (2009): Dragonflies and Damselflies in Your Pocket: A Guide to the Odonates of the Upper Midwest. *Bur Oak Guides*. University of Iowa Press. ISBN-10: 1587297868: laminated fold-out guide. (in English) [This laminated fold-out guide introduces us to some 50 odonates of the Upper Midwest, USA. Ann Johnson includes common and scientific names, sizes, general flight seasons, and the best habitats in which to find each species. Any more in Odonata experienced user will ask, what such a field guide is good for? May

be that a first insight into the different families of Odonata will be possible. This "guide" is sold for 10 US \$. You can waste your money, or you can buy one of the good US-field guides that work. (Martin Schorr) Address: <http://www.uipress.uiowa.edu/books/2009-spring/johnson-dragons.htm>

**8326.** Jovic, M.; Mihajlova, B. (2009): Catalogue of the Odonata collection in the Macedonian museum for natural history. *Acta entomologica serbica* 14(2): 133-146. (in English, with Serbian summary) ["The Odonata collection in the Macedonian Museum of Natural History is the most comprehensive collection of this insect order in Macedonia. It is comprised of 1344 specimens, belonging to 46 species. The oldest specimens were collected in 1938, while the freshest material was collected in 2009. This period of time, about 70 years long, presents respectable continuity in collecting Odonata. Unfortunately, explorations didn't equally cover the given period of time and the area from which the entomological material originated. This catalogue includes data on *Lestes parvidens*, which is a new species for Macedonian fauna. New data on the distribution of *Aeshna juncea* and *Gomphus schneiderii* in Macedonia are briefly commented on." (Authors) The collections also includes a few records from Bosnia and Herzegovina, Serbia, Greece and Turkey.] Address: Jovic, M., Natural History Museum Belgrade, Njegoševa 51, P.O. Box 401, YU-11000 Belgrade, Serbia. E-mail: [milos.jovic@nhmbeo.rs](mailto:milos.jovic@nhmbeo.rs)

**8327.** Jovic, M.; Andjus, L.; Santovac, S. (2009): New data on some rare and poorly known Odonata species in Serbia. *Bulletin of the Natural History Museum* 2: 95-108. (in English, with Serbian summary) ["In spite of the relatively long tradition of studies on Odonata fauna in Serbia, its territory remains a "blank space" on distribution maps of many European Odonata species. The real distribution of almost all species is poorly known, so this paper presents new data on the least known species (*Lestes viridis*, *Erythromma lindenii*, *Brachytron pratense*, *Anax parthenope*, *A. ephippiger*, *Cordulegaster heros*, *Somatochlora flavomaculata*, *S. metallica*, *Epitheca bimaculata* and *Sympetrum vulgatum*), including overview based on modern tendencies in taxonomy. Also included is a comment on the needs and present state of conservation of certain species as natural rarities and assets of Serbia." (Authors)] Address: Jovic, M., Natural History Museum Belgrade, Njegoševa 51, P.O. Box 401, YU-11000 Belgrade, Serbia. E-mail: [milos.jovic@nhmbeo.rs](mailto:milos.jovic@nhmbeo.rs)

**8328.** Junichi, T.; Motoharu, F.; Yoshitaka, T. (2009): Genetic diversity of the dragonfly *Libellula angelina* in the Okegayanuma area of Japan. *Japanese Journal of Conservation Ecology* 14(1): 73-79. (in Japanese, with English summary) ["The genetic diversity and differentiation among 60 individuals of the threatened dragonfly species *Libellula angelina* from three populations in the Okegayanuma area of Japan was determined using random amplified polymorphic DNA (RAPD) analysis. Twenty polymorphic loci were detected by 19 of the 80 RAPD primers examined, and 12 DNA types were determined (only four types were population specific). The diversity among and within the populations was lower; the mean gene diversity and gene differentiation values were 0.317 and 0.007, respectively. No significant between-population genetic differences were detected in the analysis of molecular variance (AMOVA). Of the ge-

netic divergence, 98.7% was attributable to population divergence and 1.3% to individual differences within a population. Cluster analysis indicated that most individuals from the three populations belonged to the same cluster. Our results provide data that could be used to elucidate genetic diversity in *L. angelina* populations, using RAPD analysis." (Authors)] Address: not available

**8329.** Kadoya, T.; Suda, S.; Washitani, I. (2009): Dragonfly crisis in Japan: A likely consequence of recent agricultural habitat degradation. *Biological Conservation* 142(9): 1899-1905. (in English) ["Many Japanese dragonfly species depend on habitat complexes maintained in rice paddy systems. We postulated that recent alterations to habitat complexes in paddy systems have had adverse effects on dragonfly populations, especially those 'once common species' that have come to depend primarily on paddy systems following losses of natural floodplain habitats. A high proportion of Japanese lentic dragonfly species depends on paddy fields or agricultural ponds that have been extensively degraded, while lotic species can often use both paddies and natural river systems. Thus we also postulated that lentic species are more susceptible to changes in agricultural habitats and are subject to higher extinction risks than lotic species. We aimed to extend previous work on estimating dragonfly extinction risk by developing mechanistic insights into the processes involved. Postulates were tested by analyzing relationships between (1) previous quantitative extinction risk assessments for dragonfly species and (2) species' ecological characteristics (i.e., distribution range and habitat type [lentic or lotic]). Lentic species were disproportionately represented among those with elevated extinction risk. Species with large distribution ranges were also subject to higher extinction risks than those with narrower ranges, reflecting a driving force acting at a national scale (i.e., intensive degradation of paddy systems)." (Authors)] Address: Kadoya, T., Dept Ecosystem Studies, Institute of Agriculture & Life Sci., Univ. Tokyo, 1-1-1 Yayoi, Bunkyo-ku, Tokyo 113-8657, Japan. E-mail: [kadoya@e-mail.jp](mailto:kadoya@e-mail.jp)

**8330.** Kaize, J.; Kalkman, V.J. (2009): Records of dragonflies from kabupaten Merauke, Papua, Indonesia collected in 2007 and 2008 (Odonata). *Suara Serangga Papua* 4(2): 40-45. (in English, with Indonesian summary) ["Odonata were collected in the period 9 July to 4 August 2007 and 4 to 16 June 2008 in the surroundings of Merauke, Papua province, Indonesia. In total 37 species were recorded during the fieldwork bringing the number of species known for the area to 42. It is estimated, that this is about half of the species present in the area. Of the 42 species recorded from the Merauke area 38 belong to the families of Coenagrionidae and Libellulidae. None of the genera endemic to New Guinea were recorded during the fieldwork and only one (*Hemicordulia silvarum* Ris, 1913) of the recorded species is endemic to New Guinea. The results seem to suggest that —compared to the central mountain range or the area in the north of New Guinea— the southern parts of New Guinea have an impoverished fauna. Further fieldwork in the area should be held in different seasons and should try to sample along running waters." (Authors)] Address: Kaize, J., 1d/a Kelompok Entomologi Papua, Kotakpos 1078, Jayapura 99010, Indonesia. Email: [jexluz@yahoo.com](mailto:jexluz@yahoo.com)

**8331.** Kalkman, V.J.; van Mastrigt, H.; Richards, S.J. (2009): First records of dragonflies (Odonata) from the



Foja Mountains, Papua Province, Indonesia. *Suara Serangga Papua* 4(1): 14-19. (in English, with Indonesian summary) ["A small collection of dragonflies obtained during two RAP biodiversity surveys to the Foja Mountains, organised by Conservation International with help of LIPI, Bogor, in 2005 and 2008 are brought on record. Twelve species were found at two sites below 100 m near Kwerba, a small village adjacent to the Mamberamo River. Thirteen species were recorded at 'Moss Camp' at 1650 m in the Foja Mountains. Of these *Hemicordulia ericetorum* was previously only known from the central mountain range while *Oreoeschna dictatrix* was only known from Lake Paniai and the Cyclops Mountains. It is likely that more genera and species now known only from the central mountain range occur in the Foja Mountains and probably also the Van Rees Mountains. However one species, *Argiolestes* spec. nov. is probably endemic to the Foja Mountains. Although this collection includes only a small fraction of the diversity likely to be present in the mountains it is nonetheless of interest as it represents the first records of dragonflies from the area." (Author)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**8332.** Kalnins, M. (2009): Lesser Emperor *Anax parthenope* (SELYS, 1839) (Odonata: Aeshnidae) – a new dragonfly species in Latvia. *Latvijas Entomologs* 47: 16-20. (in English) ["In 2008 and 2009, *A. parthenope* has been found at five localities in Latvia. The dragonfly is a new species for Latvian fauna. 59 dragonfly species of nine families have been recorded in Latvia so far, inter alia two or three temporary immigrants and one species with unclear status." (Author)] Address: Kalnins, M., Nature Protection Agency, Bazn cas iela 7, LV-2150, Sigulda, Latvia. E-mail: martins.kalnins@daba.gov.lv

**8333.** Karjalainen, S (2009): Sudenkorentojen aikaisimmat ja myöhäisimmät aikuishavainnot Suomessa [The earliest and latest observations of dragonflies in Finland]. *Crenata* 2: 39-43. (in Finnish) [Tabulated abstract of the phenological basic data of all Finnish species available from literature or data bank resource is presented. (Asmus Schröter)] Address: not stated

**8334.** Kishida, O.; Trusseli, G.C.; Nishimura, K. (2009): Top-down effects on antagonistic inducible defense and offense. *Ecology* 90(5): 1217-1226. (in English) ["Antagonistic phenotypic plasticity may strongly influence trait evolution in tightly interacting predator-prey pairs as well as the role that trait plasticity plays in community dynamics. Most work on trait plasticity has focused on single predator-prey pairs, but prey must often contend with multiple predators in natural environments. Hence, a better understanding of the evolutionary and ecological significance of phenotypic plasticity requires experiments that examine how multiple predators shape prey trait plasticity. Here, using a simple food chain consisting of a top predator (dragonfly larvae, *Aeshna nigroflava*), an intermediate predator (salamander larvae, *Hynobius retardatus*), and frog (*Rana pirica*) tadpoles as prey, we show that the presence of dragonfly risk cues substantially modifies the intensity of antagonistic morphological plasticity in both amphibians. In the absence of dragonflies, tadpoles produced bulgier bodies in response to salamanders, and salamanders responded to this defense by enlarging their gape size. However, in the presence of dragonfly risk cues, the ex-

pression of both antagonistic traits was significantly reduced because tadpoles and salamanders produced phenotypes that are more effective against dragonfly predators. Thus, the reduced antagonism likely emerged, in part, because the benefits of antagonistic trait expression were outweighed by the potential cost of increased vulnerability to dragonfly predation. In addition, our results suggest that when all three species were present, salamander activity levels, which influence the amount of signals required to induce antagonistic traits, were more strongly affected by dragonfly risk cues than were tadpole activity levels. This species-specific difference in activity levels was likely responsible for the reduced tadpole mortality caused by salamanders in the presence vs. absence of dragonfly risk cues. Hence, dragonflies had a positive trait-mediated indirect effect on tadpoles by modifying both the morphological and behavioral traits of salamanders." (Authors)] Address: Kishida, O., Center for Ecological Research, Kyoto University, Otsu, Shiga 520-2113 Japan. E-mail: bulgytadpoles@hotmail.com

**8335.** Knijf, G. de (2009): Waarneming van de Zadelibel (*Anax ephippiger*) in centrum Brussel (België) [Recent observation of *Anax ephippiger* in the city centre of Brussels (Belgium)]. *Nieuwsbrief Libellenvereniging Vlaanderen* 3(2): 4-6. (in Dutch, with English summary) ["At lunchtime of the 9th of May an adult male of *A. ephippiger* was seen flying 1 meter above the buildings of INBO (15 meter above ground level) in Brussels. It came straight from the south and continued flying northwards at the same altitude. This illustrates the inconspicuous movements and migration of *A. ephippiger* and the difficulties to detect the species outside its reproduction sites. A short overview of all observations from Belgium (4 published and 1 unpublished) are given. We further discuss the probability when to detect this species in Belgium and its possible origins." (Author)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**8336.** Knill-Jones, S. (2009): Reports from Costal Stations - 2008: Isle of Wight. *Atropos* 36: 43-44. (in English) [UK; *Anax parthenope*, *Libellula fulva*, *Cordulia aenea*, *Erythromma najas*, *Brachytron pratense*, *Sympetrum danae*] Address: not stated

**8337.** Kobingi, N.; Raburu, P.O.; Masese, F.O.; Gichuki, J. (2009): Assessment of pollution impacts on the ecological integrity of the Kisian and Kisat rivers in Lake Victoria drainage basin, Kenya. *African Journal of Environmental Science and Technology* 3(4): 097-107. (in English) ["Macro-invertebrate assemblages were used as bioindicators to assess the ecological integrity of Rivers Kisat (influenced by urban development) and Kisian (influenced by agriculture) using community attributes and the Index of Biotic Integrity. Six stations, three per river, were selected to correspond to different impact types and intensities along the rivers. Physico-chemical parameters and nutrients were determined for each station on a monthly basis from November 2007 to April 2008. Two-way analysis of variance was used to compare water quality and nutrient parameters, and macro invertebrate community attributes between the two rivers, with the river and station as the main factors. Significant differences were accepted at 95% confidence level. There were inconsistencies in the variation of physico-chemical parameters along the two rivers.

However, River Kisat recorded higher values for all physico-chemical parameters considered, except pH and DO. Different indices and metrics representing the structural and functional organization of macro invertebrates were computed and evaluated for responsiveness to physico-chemical parameters and nutrient levels. Macro invertebrate diversity, richness and evenness values failed to delineate stations according to the different levels of degradation they were experiencing. However, the differences were captured by the index of biotic integrity, which separated stations into different classes of quality. River Kisat stations in urban areas scored lowest index values, less than 15 out of 25, while two river Kisat stations scored the highest value, more than 19. The index provided evidence of response to changes in ecosystem integrity exhibited by resident macro invertebrate assemblages to pollution arising from both point and nonpoint sources." (Authors) Aeshna sp. and Gomphus sp. are well represented in Kisat River, and only Aeshna sp. is very rare in Kisat River. As regrettably of often, taxonomic work was processed by using identification keys of non-African handbooks.] Address: Kobingi, Nyakeya, Kenya Marine & Fisheries Research Institute (KMFRI), P. O. Box 1881 Kisumu, Kenya. E-mail: kobnyakeya@yahoo.com.

**8338.** Koch, B.; Wildermuth, H.; Walter, T. (2009): Einfluss der Habitategenschaften auf das Verbreitungsmuster von *Coenagrion mercuriale* an einem renaturierten Fließgewässer im Schweizer Mittelland (Odonata: Coenagrionidae). *Libellula* 28(3/4): 139-158. (in German, with English summary) ["Only few and isolated populations of the Southern Damselfly exist in Switzerland and the species is considered as critically endangered. The recent discovery of a hitherto unknown population of *C. mercuriale* on a revitalized stream in the Canton of Zurich caused a study to be made on the size and the distribution pattern of the population along a heterogeneously structured 2.15 km-stretch. In summer 2007, the abundance of *C. mercuriale* was recorded at 215 sections and data on physical parameters were collected. The results of statistical analyses showed that the distribution pattern of *C. mercuriale* was significantly affected by the width of the watercourse, depth of the water, cover of the water vegetation, cover and width of the riparian vegetation and cover by trees higher than three metres. The composition of the riparian vegetation that could be classified into six different groups using a cluster analysis also exhibited an effect on the distribution. *Coenagrion mercuriale* preferred sites with relatively wide and deep water, luxuriant aquatic vegetation, wide intermittent but jaggy riparian vegetation and little cover by trees shading the water surface. Riparian vegetation that was mainly composed of *Carex* spp., *Lythrum salicaria* or *Phalaris arundinacea* was most densely colonized by *C. mercuriale*. In contrast, sections overgrown predominantly by *Filipendula ulmaria* and *Epilobium hirsutum* were generally avoided. Additionally, data on the local dragonfly fauna were collected and 14 streams in the neighbourhood of the study site were examined for their suitability for colonization by *C. mercuriale*. In total 21 Odonata species were recorded. Maintenance of the habitat by patchy clearance of dense riparian vegetation, aiming at the promotion of the local population, was conducted in the frame of a conservation programme in late 2007 and early 2008. Censuses carried out during the flying season 2008 showed that the measures adopted had a positive effect on *C. mercuriale*.] Address: Koch, Bärbel,

Via Grütli 21, CH-6855 Stabio, Switzerland. E-mail: baerbel.koch@hotmail.com

**8339.** Kolozsvári, I.; Illar, L. (2009): A Tisza tiszaujlaki szakaszán élő szitakötőfajok faunisztikai felmérése. *Acta Beregsasiensis* 8(1): 231-240. (in Hungarian, with Russian summary) [Study along a stretch of the Tisza-river in Hungaria with focus on *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Stylurus flavipes*, *Platycnemis pennipes*, and *Calopteryx splendens*.] Address: Kolozsvári, I., II. Rákóczi Ferenc Kárpátaljai Magyar Főiskola, 4. éves biológia-földrajz szakos hallgató, Hungaria

**8340.** Koskimäki, J.; Rantala, M.J.; Suhonen, J. (2009): Wandering males are smaller than territorial males in the damselfly *Calopteryx virgo* (L.) (Zygoptera: Calopterygidae). *Odonatologica* 38(2): 159-165. (in English) ["In territorial Odonata, adult males may use 2 mating tactics that may be genetically or environmentally determined: territoriality and non-territoriality. The non-territorial tactic has been sometimes found to include 2 additional males: sneaking and wandering. The non-territorial males, however, often have lower reproductive success than territorial males. Studies on various *Calopteryx* species have repeatedly shown that territorial and non-territorial behaviours are conditional mating tactics and that body size does not predict male resource-holding potential and territorial behaviour. Instead, the resource holding potential seems to depend on the amount of male fat resources. Here, both territorial and wandering *C. virgo* males were collected from a creek in central Finland. It was found that territorial males were larger and heavier than wandering males. The data show that the size of the individual may predict the reproductive tactic of some odonate males to a greater degree than previously thought." (Authors)] Address: Suhonen, J., Sect. Ecology, Dept Biol., Univ. Turku, FIN-20014 Turku, Finland. E-mail: juksuh@utu.fi

**8341.** Koskinen, J. (2009): Kuutyönkorento ja aapaikiitokorento Suomessa 2008 [*Coenagrion lunulatum* and *Somatochlora alpestris* in Finland 2008]. *Crenata* 2: 2-4. (in Finnish) [In 2008 the national monitoring project laid special emphasis on two target species due to the fact that their distribution pattern and ecology in Finland is not well understood. (Asmus Schröter)] Address: not stated

**8342.** Koskinen, J.; Mäkinen, J. (2009): Korentokatsaus 2008 [Dragonfly review for 2008]. *Crenata* 2: 8-31. (in Finnish) [The article gives a detailed overview and analysis of the observation data of the national monitoring project and points out the number of records and the phenology of every species in 2008. The commonest dragonfly and damselfly were *Aeshna grandis* and *Coenagrion hastulatum*, whereas *Somatochlora sahlbergi*, *Aeshna viridis* and *Nehalennia speciosa* were seen only once each. Moreover *Aeshna affinis* was observed in Finland for the first time. (Asmus Schröter)] Address: not stated

**8343.** Kosterin, O.E.; Sivtseva, L.V. (2009): Odonata of Yakutia (Russia) with description of *Calopteryx splendens njuja* ssp. nov. (Zygoptera: Calopterygidae). *Odonatologica* 38(2): 113-132. (in English) ["A short overview of the history of odonatological exploration of Yakutia and an annotated checklist of 35 species currently known from its territory are provided with reference to all earlier records and lists of hitherto unpublished spe-

cimens. *Calopteryx splendens*, *Aeshna grandis* and *Ophiogomphus obscurus* were not previously known from Yakutia. *C. splendens njuja* ssp. n. is described and illustrated. Holotype male: Russia, Sakha Republic, Yakutia: Lena Ulus, the Nyuya river at the mouth of the Chayanda; 14-VII-2006; deposited in Institute of Animal Systematics and Ecology, Novosibirsk. It is characterised by a drastic reduction of wing pigmentation in males." (authors)] Address: Kosterin, O.E., Institute Cytology & Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**8344.** Kosterin, O.E.; Lyubchanskii, I.I. (2009): Odonata collection from the Bureinskii State Nature Reserve, Khabarovskii Krai, Russia. *Notulae odonatologicae* 7(3): 25-27. (in English) ["11 species, all boreal, were collected in 2004-2005 in the Reserve, which is situated within the larch taiga zone of the Russian Far East, ca 52°N and 500-2175 m a.s.l. Interesting is the presence of *Somatochlora sahlbergi*, but the southernmost locality of this species is on the Sokhondo Mt in Transbaikalia." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**8345.** Krilowicz, C. (2009): Congregating Odes. *Argia* 21(1): 8. (in English) [oas 25: Cape May, New Jersey, USA. "I then stopped and decided to look more closely for *S. ambiguum*. To my surprise I was surrounded by them. Earlier, I had unsuccessfully been searching in all the local ponds and surrounding fields for this species. My count for this area was 60 males and 8 females with four of those in a wheel. I am not 100% sure why all these bugs were here. The dominant activity was basking and mating. I did not make any observation of feeding behavior. I could only conclude that there was something unique about this site that attracted so many individuals. The date was 14 October 2008 and it happened to be a new late date for New Jersey. On 22 October 2008 I decided to look for *Aeshna umbrosa* in Atlantic County where it had not been recorded. I picked Makepeace Wildlife Management Area in Mayes Landing. While slowly driving down a deserted blacktop drive surrounded by overgrown pines a small bug hit my windshield. I stopped the car and jumped out. It was a *Lestes* congener and I was able to photograph and collect it. I decided to walk this section of road. By the time I finished my tally, I counted 50 male and 10 female *L.* congener and one *S. ambiguum* (late dates are fleeting). I never expected to see this spreadwing here, for it is an Atlantic County record and I had no idea where there was any standing water nearby. Only 100 yards away is a very large vernal pool which was completely dry. Again I did not observe any feeding behaviour and none were in a wheel. I wonder why they all decided to congregate here? May be just another location to pick a mate." (Author)] Address: Krilowicz, C., Haddonfield, NJ, USA. E-mail: chippop@verizon.net

**8346.** Kriska, G.; Bernath, B.; Farkas, R.; Horvath, G. (2009): Degrees of polarization of reflected light eliciting polarotaxis in dragonflies (Odonata), mayflies (Ephemeroptera) and tabanid flies (Tabanidae). *Journal of Insect Physiology* 55: 1167-1173. (in English) ["With few exceptions insects whose larvae develop in freshwater possess positive polarotaxis, i.e., are attracted to sources of horizontally polarized light, because they detect

water by means of the horizontal polarization of light reflected from the water surface. These insects can be deceived by artificial surfaces (e.g. oil lakes, asphalt roads, black plastic sheets, dark-coloured cars, black gravestones, dark glass surfaces, solar panels) reflecting highly and horizontally polarized light. Apart from the surface characteristics, the extent of such a 'polarized light pollution' depends on the illumination conditions, direction of view, and the threshold  $p^*$  of polarization sensitivity of a given aquatic insect species.  $p^*$  means the minimum degree of linear polarization  $p$  of reflected light that can elicit positive polarotaxis from a given insect species. Earlier there were no quantitative data on  $p^*$  in aquatic insects. The aim of this work is to provide such data. Using imaging polarimetry in the red, green and blue parts of the spectrum, in multiple-choice field experiments we measured the threshold  $p^*$  of ventral polarization sensitivity in mayflies, dragonflies and tabanid flies, the positive polarotaxis of which has been shown earlier. In the blue (450 nm) spectral range, for example, we obtained the following thresholds: dragonflies: *Enallagma cyathigerum* ( $0\% < p^* 17\%$ ), *Ischnura elegans* ( $17\% p^* 24\%$ ). Mayflies: *Baetis rhodani* ( $32\% p^* 55\%$ ), *Ephemera danica*, *Epeorus silvicola*, *Rhithrogena semicolourata* ( $55\% p^* 92\%$ ). Tabanids: *Tabanus bovinus*, *T. tergestinus* ( $32\% p^* 55\%$ ), *T. maculicornis* ( $55\% p^* 92\%$ )." (Authors)] Address: Horvath, G., Bio-optics Laboratory, Dept of Biological Physics, Loránd Eötvös University, 1117 Budapest, Pázmány Péter sétány 1, Hungary. E-mail: gh@arago.elte.hu

**8347.** Kukulova-Peck, J. (2009): Carboniferous protodonatoid dragonfly nymphs and the synapomorphies of Odonoptera and Ephemeroptera (Insecta: Palaeoptera). *Palaeodiversity* 2: 169-198. (in English, with German summary) ["Three extremely rare fossil protodonatoid dragonfly nymphs are described from the middle Pennsylvanian (Moscowian) of Mazon Creek, Illinois: *Dragonympha srokai* n. gen., n. sp. (Meganisoptera), a large, nearly complete young nymph with an extended labial mask and uplifted wing pads; *Alanymphe richardsoni* n. gen., n. sp. (Meganisoptera), a nymphal forewing with two articular plates attached to it; and *Carbonympha herdinai* n. gen., n. sp. (Eomeganisoptera), a detached nymphal forewing. Plesiomorphic states in *Dragonympha* n. gen. indicate homologies unresolved in modern Odonata. The segmented head bears 3rd tergum ventrally invaginated. The extended labial mask still shows limb segments. The prothorax bears a pair of winglets. The short wing pads are fully articulated, twisted, uplifted and streamlined with body. The mesothoracic anepisternum is placed between acrotergite and prescutum. The abdominal leglets form long, segmented, serial gill filaments. In the ontogenesis of modern dragonflies, the wing and articulation disc occurs just above subcoxal pleuron and far from tergum. Wing sclerites are arranged in eight rows protecting eight blood pathways running towards eight wing veins. The sistergroup of Odonoptera has not yet been convincingly resolved with computer cladistic approaches. Reasons are examined and discussed. More accurate, evolution-based character evaluations are shown with examples. The role of a correct model of the pan-arthropod limb and the origin of insect wings is discussed. Groundplan characters in dragonflies and mayflies are compared in their Paleozoic and modern states, their obscurity is clarified and complex synapomorphies are proposed. Palaeoptera is confirmed as a monophyletic group and the following sistergroup relationships are



suggested: Pterygota = Palaeoptera + Neoptera; Palaeoptera = Palaeodictyopteroidea + Hydropalaeoptera; Hydropalaeoptera = Odonatoptera + Ephemeroptera." (Author)] Address: Kukulova-Peck, Jarmila, Department of Earth Science, Carleton University, Ottawa K1S 5B6, Ontario, Canada. E-mail: jarmilapeck@carleton.ca

**8348.** Kunz, B. (2009): Fehlbildungen der Flügel bei *Libellula depressa* (Odonata: Libellulidae). *Libellula* 28 (3/4): 175-182. (in German, with English summary) ["A general female *L. depressa* with one heavily malformed wing, and another individual with completely missing wings were found in June 2008 at two ponds that had been constructed in September 2006. During 2008 *L. depressa* emerged from these ponds in great numbers. The malformations may have been caused by injuries of the wing structures in the larval stage, inflicted by crowded fellow larvae in the newly established ponds with low prey density." (Author)] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: libellen@berndkunz.de

**8349.** Lak, M.; Fleck, G.; Azar, D.; Engel, M.S.; Kadumi, H.F.; Neraudeau, D.; Tafforeau, P.; Nel, A. (2009): Phase contrast X-ray synchrotron microtomography and the oldest damselflies in amber (Odonata: Zygoptera: Hemiphlebiidae). *Biol. Jour. Linnean Soc.* 156(4): 913-923. (in English) ["*Electrohemiphlebia barucheli* gen. et sp. nov. and *Jordanhemiphlebia electronica* gen. et sp. nov., two new genera and species are described, based on exceptional inclusions of hemiphlebiid damselflies in Cretaceous amber from France and Jordan. The type specimen of *E. barucheli* was studied using phase contrast X-ray synchrotron microtomography, giving exceptional images and detailed information. Its comparison with the recent *Hemiphlebia mirabilis* confirms the attribution of several Cretaceous damselflies to the Hemiphlebiidae, showing that this particular group was widespread in the Early Cretaceous and probably originated in the Late Jurassic or earlier. The ecological niches today occupied by the small coenagrionoid damselflies were occupied during the Triassic and Jurassic by Protozygoptera, hemiphlebiids during the Early Cretaceous, and modern taxa in the Cenozoic." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**8350.** Larison, B. (2009): Impacts of environmental heterogeneity on alternative mating tactics in the threadtail damselfly. *Behavioral Ecology and Sociobiology* 63(4): 531-536. (in English) ["Environmental heterogeneity, including variation in the physical environment, may be key to understanding the evolution and maintenance of alternative mating tactics, but its influence is rarely examined. Males of the threadtail damselfly *Protoneura amatoria* reversibly use two alternative mating tactics (perching vs. hovering) and have previously been found to modulate their use of these tactics in response to variation in both light conditions and the density of ovipositing females. Here, I show that mating success payoffs of the two tactics are differentially influenced by these factors. The payoff of the perching tactic was greater than that of the hovering tactic under low light conditions and at low densities of ovipositing females. The payoff of the hovering tactic was greater under high light conditions and higher densities of ovipositing females. The differential success of the two mating tactics in response to light conditions is dis-

cussed in light of flight dynamics, vision, and predation." (Author)] Address: Larison, Brenda Dept Ecology & Evolutionary Biology, Univ. of California, Los Angeles, 621 Charles E. Young Drive So., Los Angeles, CA 90095, USA. E-mail: blarison@ucla.edu

**8351.** Larkin, P.V. (2009): Photospot: Emperor Anax imperator. *Atropos* 37: 64. (in English) [16-VI-2009, Brockholes Quarry, Lancashire, UK] Address: not stated

**8352.** Lasley, G.W.; Abbott, J.C. (2009): Two New Damselflies for Texas. *Argia* 21(3): 17-18 (in English) [Mature male *Leptobasis vacillans*, Santa Ana National Wildlife Refuge in Hidalgo Co., Texas, 9-VI-2009. Male *Nehalennia gracilis*, Beaver Ponds in Angelina National Forest, Jasper Co., Texas, 15-VI-2009] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabott@mail.utexas.edu

**8353.** Lau, D.C.P.; Leung, K.M.Y.; Dudgeon, D. (2009): What does stable isotope analysis reveal about trophic relationships and the relative importance of allochthonous and autochthonous resources in tropical streams? A synthetic study from Hong Kong. *Freshwater Biology* 54: 127-141. (in English) ["1. Analysis of the stable isotope signatures of carbon (C) and nitrogen (N) of foods and consumers has led to some preliminary understanding of the relative importance of allochthonous and autochthonous resources in tropical streams. However, robust generalizations about the dynamics of food webs in these habitats, and their response to shading gradients or season, are still lacking. In addition, the feasibility of employing a baseline  $\delta^{15}\text{N}$  value for estimating trophic positions (TPs) of consumers in small tropical streams has yet to be explored. 2. We analysed data on stable isotope signatures of food sources and aquatic consumers obtained from 14 studies carried out in small streams in monsoonal Hong Kong (22°30'N, 114°10'E) between 1996 and 2006. Emphasis was placed on determining the relative importance of leaf litter and autochthonous foods in supporting consumer biomass, and the extent to which trophic base and TP vary among streams and seasons. 3. Although allochthonous leaf litter was generally  $^{13}\text{C}$ - and  $^{15}\text{N}$ -depleted relative to autochthonous foods, there were marked isotopic shifts of food sources and consumers in response to season (dry versus wet) and stream shading. Consumer taxa were generally more  $^{13}\text{C}$ - and  $^{15}\text{N}$ -enriched in the unshaded streams, but seasonal effects were more variable. Despite these changes, there was consistent evidence that stream food webs were based on periphytic algae and/or cyanobacteria with leaf litter serving as a minor food. 4. Heptageniidae (Ephemeroptera), Tipulidae (Diptera), Elmidae (Coleoptera) and shrimps (Atyidae) were used as a baseline for calculating the TPs of other consumer taxa. The maximum TPs in shaded streams remained fairly constant between seasons (dry = 3.93; wet = 3.97), while those in unshaded streams were higher and showed seasonal fluctuations (dry = 5.13; wet = 4.39). 5. Although variations in consumer isotope signatures in response to season and shading gradients did not confound our interpretation of the stream food base, changes in consumer  $\delta^{15}\text{N}$  did affect the calculation of consumer TPs. Misleading estimates of consumer TPs are likely if samples are collected from a narrow range of streams and/or during one season. Overestimation of

the TPs of specialist herbivores (e.g. fish grazers) is also possible when autochthonous resources are substantially more <sup>15</sup>N-enriched than allochthonous foods." (Authors) The study includes *Euphaea decorata*.] Address: Dudgeon, D., Division of Ecology & Biodiversity, School of Biological Sciences, The University of Hong Kong, Pokfulam Road, Hong Kong, China. E-mail: ddudgeon@hkucc.hku.hk

**8354.** Le Viol, I.; Mocq, J.; Julliard, R.; Kerbiriou, C. (2009): The contribution of motorway stormwater retention ponds to the biodiversity of aquatic macroinvertebrates. *Biological Conservation* 142(12): 3163-3171. (in English) ["Biodiversity conservation does predominantly focus on protected natural areas, but has to consider also the usually Human-dominated matrix in which these natural areas are embedded. Here we study highway stormwater retention ponds, which may act as refuges for native flora and fauna and contribute to the maintenance of biodiversity in Human-dominated landscapes. However, the biodiversity supported by such artificial ponds has received little attention so far. Using standardised methods, we addressed the potential role of highway stormwater ponds as refuges by comparing aquatic macroinvertebrate communities (Coleoptera, Heteroptera, Odonata and Gastropoda) in highway stormwater ponds with ponds in the wider landscape. As expected from their pollutant retention function, highway ponds differed in abiotic conditions from surrounding ponds. However, they supported aquatic macroinvertebrate communities at least as rich and diverse at the family level as surrounding ponds and exhibited similar variability in family community composition and structure. The main difference we observed was a higher abundance of small and/or short-lived invertebrates in the highway ponds. These similar community compositions and structures suggest that highway ponds contribute to the biodiversity of the pond network at a regional scale. Thus, road practitioners should consider highway ponds not only for their hydrological and pollutant retaining purposes but also as a possibility to increase the role of highway verges as a refuge and, consequently, landscape connectivity. The management of these water bodies should recognise their potential for biodiversity especially in Human-dominated landscapes."(Authors)] Address: Le Viol, Isabelle, Muséum national d'Histoire naturelle, Conservation des espèces, restauration et suivi des populations, CERSP – UMR 7204 MNHN-CNRS-UPMC, 55 rue Buffon, 75005 Paris, France

**8355.** Lee, E.M.; Hong, M.Y.; Kim, M.I.; Kim, M.J.; Park, H.C.; Kim, K.Y.; Lee, I.H.; Bae, C.H.; Jin, B.R.; Kim, I. (2009): The complete mitogenome sequences of the palaeopteran insects *Ephemera orientalis* (Ephemeroptera: Ephemeridae) and *Davidius lunatus* (Odonata: Gomphidae). *Genome* 52(9): 810-817. (in English) ["Currently, the palaeopteran lineages (insect orders Ephemeroptera and Odonata) that have a problematic relationship with neopteran lineages are poorly represented by mitogenome sequences. In this study, we have determined the complete mitogenome of the oriental mayfly, *Ephemera orientalis*, and the dragonfly *Davidius lunatus*. The 16 463 bp mitogenome of *E. orientalis* and the 15 912 bp mitogenome of *D. lunatus* have many of the features typically detected in insect mitogenomes. Although the initiation codon for the *D. lunatus* COI gene is the typical ATA, *E. orientalis* is unusual in that no typical start codon was detected in the start region of

the COI gene. The A+T-rich regions of both mitogenomes have some unusual features. The *E. orientalis* A+T-rich region harbors two identical 55 bp sequences separated by 158 bp, and the *D. lunatus* A+T-rich region harbors a tandem repeat comprising two identical 261 bp copies and one partial copy of the repeat. Additionally, the A+T-rich regions of both mitogenomes harbour the stem-and-loop structures flanked by the conserved sequences "TA(A)TA" at the 5' end and "G(A)nT" at the 3' end, which have been suggested to be the signals involved in minor strand replication initiation. Furthermore, the *D. lunatus* A+T-rich region contains two tRNA-like structures with proper anticodon and cloverleaf structures." (Authors)] Address: Hong, M.Y., Dept of Life Science, Hoseo University, Asan-city, Chungchungnam-do 336-795, Republic of Korea

**8356.** Lehmann, F.-O. (2009): 17. The limits of turning control in flying insects. In: Dario Floreano, Jean-Christophe Zufferey, Mandyam V. Srinivasan & Charlie Ellington (Eds.): *Flying Insects and Robots*. Springer Berlin Heidelberg. ISBN 978-3-540-89392-9 (Print): 231-246. (in English) ["This chapter provides insights into the turning flight of insects, considering this specific behaviour from experimental and numerical perspectives. The presented analyses emphasize the need for a comparative approach to flight control that links an insect's maneuverability with the physical properties of its body, the properties and response delays of the sensory organs, and the precision with which the muscular system controls the movements of the wings. In particular, the chapter focuses on the trade-off between lift production and the requirement to produce lateral forces during turning flight. Such information will be useful not only for a better understanding of the evolution and mechanics of insect flight but also for engineers who aim to improve the performance of the future generation of biomimetic micro-air vehicles." (Authors) References to Odonata are made.] Address: Lehmann, F.-O., Institute of Neurobiology, University of Ulm, Albert-Einstein-Allee 11, 89081 Ulm, Germany. E-mail: fritz.lehmann@uni-ulm.de

**8357.** Lemelin, R.H. (2009): Goodwill Hunting? Dragon hunters, dragonflies & leisure. *Current Issues in Tourism* 12(5&6): 553-571. (in English) ["In Asia, insects have a long history of being a part of recreation and tourism activities, with some species such as rhinoceros beetles and dragonflies being raised as pets. While the role of insects in recreation and tourism (i.e. dragonfly gatherings, educational outings) is somewhat more modest in North America, Europe, and Australia, some of these activities are increasing in popularity. The availability of field guides, associations, and websites is helping to facilitate the growth of these leisure activities, and more specifically the viewing of Odonata. Participant observations and interviews were used to provide an empirical understanding of how one particular insect order - Odonata attracts participants to recreation and tourism activities, fosters interests, and creates controversies (e.g. collecting). A theoretical framework provided by naturework, an interpretivistic approach developed by Fine [(2003). *Morel tales: The culture of mushrooming*. University of Illinois Press.] is used to understand the philosophies involved in dragonflying. The conclusion highlights how new forms of recreation and tourism activities can promote greater awareness of insects." (Author)] Address: Lemelin, H., Lakehead University, School of Outdoor Recreation, Parks and Tour-

ism, 955 Oliver Rd., Thunder Bay, Ontario, P7B 5E1, Canada. E-mail: harvey.lemelin@lakeheadu.ca

**8358.** Li, J.; Luo, Y.-q.; Huang, T.-y.; Shi, J.; Chen, Y.-j.; Heliövaara, K. (2009): Diversity and dominant species of arthropods in different forests of Aershan, Inner Mongolia. *Forestry Studies in China* 11(1): 1-8. (in English) [Four Odonata species without any taxonomic details are listed in a table.] Address: Luo, Y.-q., Key Laboratory for Silviculture and Conservation of Ministry of Education, Beijing Forestry University, Beijing 100083, P.R. China. E-mail: youqingluo@126.com

**8359.** Liao, L.M. (2009): Recent collecting efforts of Philippine flora and fauna based on a critical assessment of the published literature (2002-2005): Some accommodations for policy re-evaluation and reforms. *Philippine Journal of Systematic Biology* 3: 68-96. (in English) [The bibliography includes papers from Dirk Gassmann, Matti Hämäläinen and Jan van Tol on Odonata.] Address: Liao, L.M., Graduate School of Biosphere Science, Hiroshima University, 1-4-4 Kagamiyama, Higashi-Hiroshima, 739-8528 Japan

**8360.** Linke, T.J. (2009): Flussjungfern am Niederrhein. Verbreitung und Habitatbindung. Diplomarbeit. Institut für Landschaftsökologie, Westfälische Wilhelms-Universität Münster: III, 44 pp, Anhänge. (in German, with English summary) ["Distribution and population density of clubtails at the lower Rhine over, are poorly investigated: only a few exuviae and adults of *Gomphus flavipes*, *G. vulgatissimus*, *Onychogomphus forcipatus* and *Ophiogomphus cecilia* were observed during the last decade. This study aims at investigating the local distribution and at identifying those environmental factors that determine habitat selection. Research was carried out at 30 study sites of 200 x 10 m size, between May 1st and August 31st 2008. Each site was sampled 10 times for exuviae. Additionally, structural parameters were ascertained. Exuviae of all four gomphids were found; however, numbers differed widely. Compared to other streams total abundances of all species were low. Most common species in the area were *G. flavipes* and *G. vulgatissimus* (4-5 exuviae/200 m waterside). At most sites, *G. flavipes* and *G. vulgatissimus* co-occurred. At five sites, exuviae of *O. forcipatus* occurred together with these two species. Exuviae abundances of *G. flavipes* showed positive correlation with the amount of fine sand fractions. A positive effect of sand and total riparian vegetation cover on the abundances of *G. vulgatissimus* was indicated. In sandy substrates *O. forcipatus* and *O. cecilia* are possibly replaced by *G. flavipes* and *G. vulgatissimus* due to hunting strategy and activity patterns. It is assumed, that low abundances of exuviae are caused by inappropriate and fragmented habitat structures, noticeable by the lack of fine substrate fractions. Additionally, hydromorphology, adjacent land use and shipping traffic may have a negative influence on the species." (Author)] Address: Linke, J., Schillerstr. 71, 48155 Münster, Germany

**8361.** Linke, T.J. (2009): Exuvienfunde zweier Gomphiden im Brackwasserbereich des Nestos (Odonata: Gomphidae). *Libellula* 28(3/4): 203-208. (in German, with English summary) ["On 30-V-2009 several exuviae of *Gomphus vulgatissimus* and *Onychogomphus f. forcipatus* were found on the beach of the estuary mouth of River Nestos. The possible origin of the exuviae is

briefly discussed.] Address: Linke, T.J., Gertrudenstr. 29A, D-38120 Braunschweig, Germany. E-mail: jonas.linke@web.de

**8362.** Linke, T.J.; Fartmann, T. (2009): Flussjungfern am Niederrhein: Verbreitung und Habitatbindung (Odonata: Gomphidae). *Libellula* 28(3/4): 159-173. (in German, with English summary) ["This study aims to investigate the local distribution and to identify environmental factors that determine habitat selection of all species of Gomphidae on the Lower Rhine. Altogether exuviae of 4 gomphid species were recorded, however, their numbers differed widely. Compared to other large rivers, the total abundances of all species were low. Most abundant were *Gomphus flavipes* and *G. vulgatissimus*, with 4-5 exuviae on 200 m bank sections. Exuviae abundances of *G. flavipes* were positively correlated with the amount of fine sand, those of *G. vulgatissimus* with sand and total riparian vegetation cover. Both *G. flavipes* and *G. vulgatissimus* can be described as specialists for certain digging substrates and as opportunists in their emergence behaviour. We assume that low abundances of exuviae are caused by inappropriate and fragmented habitat structures, noticeably by the lack of fine substrate fractions. Additionally, hydro-morphology, drift, adjacent land use and shipping traffic may have a negative influence on gomphids." (Authors)] Address: Linke, T.J., Gertrudenstr. 29A, D-38120 Braunschweig, Germany. E-mail: jonas.linke@web.de

**8363.** Lorenzo-Carballa, M.O.; Cordero-Rivera, A. (2009): Thelytokous parthenogenesis in the damselfly *Ischnura hastata* (Odonata, Coenagrionidae): genetic mechanisms and lack of bacterial infection. *Heredity* 103: 377-384. (in English) ["Thelytokous parthenogenesis, the production of female-only offspring from unfertilized eggs, has been described in all the insect orders, but is a rare phenomenon in the Odonata. The only-known case of parthenogenesis in this group is the North American damselfly species *Ischnura hastata*, which has parthenogenetic populations in the Azores Islands. Here, we present for the first time the results of laboratory rearing, which showed parthenogenetic reproduction in the Azorean I. *hastata* populations. In an attempt to understand how parthenogenesis could have evolved in this species, we first determined the genetic mode of parthenogenesis by analysing the genotype of parthenogenetic females and their offspring at three polymorphic microsatellite loci. In addition, we used polymerase chain reaction amplification to test whether parthenogenesis in I. *hastata* could be bacterially induced. Our data indicate that thelytoky is achieved through an (at least functionally) apomictic mechanism and that parthenogenesis is not caused by endosymbionts. Finally, we discuss possible routes to parthenogenetic reproduction, as well as the evolutionary implications of this type of parthenogenesis." (Authors)] Address: Lorenzo-Carballa, M.O., Departamento de Ecología e Biología Animal, Grupo de Ecología Evolutiva e da Conservación, Universidade de Vigo, EUET Forestal, Campus Universitario, Pontevedra, España 36005, Spain. E-mail: olalla.lorenzo@uvigo.es

**8364.** Lorenzo-Carballa, M.O.; Beatty, C.D.; Utzeri, C.; Vieira, V.; Cordero-Rivera, A. (2009): Parthenogenetic *Ischnura hastata* revisited: present status and notes on population ecology and behaviour (Odonata: Coenagrionidae). *International Journal of Odonatology* 12(2): 395-411, pl. VIII. (in English) ["Populations of *Ischnura*



hastata found in the Azores archipelago represent the only known example of parthenogenesis in the order Odonata. In this paper, we present results from field-work done on the islands of São Miguel, Pico, Santa Maria, and Graciosa, aimed at characterizing population ecology and habitat preferences of this species. Sampling of several ponds in the islands of São Miguel and Pico showed that *I. hastata* occurred in oligotrophic ponds, but was absent from all eutrophic ponds sampled, many of which have been impacted by cattle grazing and water extraction by humans. This suggests that parthenogenetic populations are highly sensitive to eutrophication, which may be different from suggested habitat preferences of sexual populations for this species. Mark-recapture studies showed *I. hastata* to occur in high densities in the studied populations. Although life expectancy of mature females was estimated at less than one week, their high fecundity and fertility could potentially explain the large number of individuals observed in some of the studied sites. Submerged oviposition seems to be a common behaviour, probably evolved as an adaptation to unfavourable climatic conditions and to avoid egg desiccation caused by water depletion. In summary, this work represents a first attempt to study the ecology and population biology of parthenogenetic populations of *I. hastata*, and may help us to understand the unique conditions under which these populations could have evolved and how to best insure their conservation." (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**8365.** Lowe, C.D.; Harvey, I.F.; Watts, P.C.; Thompson, D.J. (2009): Reproductive timing and patterns of development the damselfly *Coenagrion puella* in the field. *Ecology* 90: 2202-2212. (in English) ["By a combination of detailed behavioural observations and molecular genetic approaches we have assessed development time, timing of first maturity, and the extent of genetic structure through the flying season in a wild population of *C. puella* in England. This work provides the first estimate of development time (egg to mature adult) in the field based on individual damselflies. Development time was significantly longer for females than males. In contrast to reported laboratory studies, there was no difference in development times between different female colour morphs. Development time ranged between 347 and 396 days and was negatively correlated with egg-laying date. As a result eggs laid early in one season reach adult maturity relatively late in the next; concurrently individuals developing from eggs laid late mature relatively early. We speculate that this pattern of development is a direct physiological response to seasonal environmental variation and results in reproductive synchrony within a population. Size, specifically hind wing length, declined with development time in males, but not in females. In one of the two years of the study there was evidence for weak clustering of related individuals during the reproductive season. This appeared to be the result of developmental synchronization within families: variance in timing of maturation was smaller in full-sib families than in half-sib families or randomly assigned unrelated groups." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**8366.** Lozano, F.; Muzon, J.; Torres, S. (2009): Description of the final instar larva of *Homeoura lindneri* (Ris, 1928) and redescription of the larva of *H. chelifera* (Selys, 1876) (Odonata: Coenagrionidae). *Zootaxa* 2231: 47-54. (in English, with Spanish summary) ["The final instar larvae of *H. lindneri* and *H. chelifera* are described and illustrated based on reared specimens from Argentina. A generic diagnosis is provided, as well as a key to the larvae of the most common genera of Coenagrionidae present in Argentina." (Authors)] Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina. E-mail: muzon@ilpla.edu.ar

**8367.** Luostarinen, T. (2009): Sorjahukankorento (*Libellula fulva*) Itä-Suomessa [*Libellula fulva* in eastern Finland]. *Crenata* 2: 5-7. (in Finnish) [*L. fulva* is very rare and localised in Finland, most populations live near-by Kitee (Northern Karelia). A typical biotope of *L. fulva* is shown and described and the role of calcareous water as a possible limiting factor for this species is shortly discussed. (Asmus Schröter)] Address: not stated

**8368.** Machado, A.B.M. (2009): Studies on Neotropical Protoneuridae. 21. The status of *Amazona Machado, 2004* (Odonata: Protoneuridae). *Lundiana* 9(1) (2008): 53-56. (in English) ["The genus *Amazona* Machado, 2004, regarded by Lencioni (2005) as a junior synonym of *Forcepsioneura* Lencioni, 1999, is revalidated based on morphological and zoogeographic evidence." (Author)] Address: Machado, A. B.M., Depto de Zool., Instituto de Ciên. Biol., Universidade Federal de Minas Gerais, C.P. 486, 31270-901, Belo Horizonte, Minas Gerais, Brasil. E-mail: angelo@icb.ufmg.br.

**8369.** Mäkinen, J. (2009): Havainnot hyötykäyttöön [The use and report of dragonfly observation data]. *Crenata* 2: 34-35. (in Finnish) [The scheme of the Finnish national data bank for dragonfly records is presented. (Asmus Schröter)] Address: no stated

**8370.** Mäkinen, J. (2009): Pääkirjoitus [Preface]. *Crenata* 2: 1. (in Finnish) [Introducing words to volume 2 of 'Crenata', the journal of the Finnish Odonatological Society.] Address: Finnish Dragonfly Society/ Suomen sudenkorentoseura ry. www.sudenkorento.fi. makisenjussi@gmail.com

**8371.** Magnusson, A.K.; Williams, D.D. (2009): Top-down control by insect predators in an intermittent pond – a field experiment. *Ann. Limnol. - Int. J. Lim.* 45: 131-143. (in English, with French summary) ["The role of predation in the regulation of freshwater communities is predicted to decrease along a habitat-duration gradient, from permanent to episodic waters. We tested the role of invertebrate predation in shaping the community structure in a fishless temperate intermittent pond with a three month long hydroperiod by comparing the community structure in two large field enclosures (4.2 m<sup>2</sup>) with added predators to two enclosures without added predators. The added predators reflected the density and composition of top predators in the pond and comprised weekly additions of dytiscid larvae (for three weeks) followed by weekly additions of odonate nymphs (for five weeks). Compared with the enclosure controls, the predator addition enclosures had fewer dipterans and crustaceans, higher concentrations of benthic ciliates and other protozoans, higher chlorophyll a and bacterial counts, and lower abundance of rotifers. Many treatment effects were temporally variable and this ap-

peared to be linked to predator identity, predator size, and prey availability. Compared with the surrounding pondwater, the enclosed areas had lower abundance of molluscs, ostracods and cladocerans but higher abundance of cyclopoids and higher concentrations of phytoplankton and ciliates. Despite high productivity and seasonally variable predator and prey assemblages, which likely buffered against strong top-down control, we conclude that the top-predators regulate the dipterans and zooplankton in this intermittent pond and that the effects propagated down through the food web to lower trophic levels." (Authors)] Address: Magnusson, Katarina, Dept Biol. Sc., Univ. Toronto at Scarborough, 1265 Military Trail, Scarborough, Ontario M1C 1A4, Canada. E-mail: a.katarina.magnusson@gmail.com

**8372.** Maguregi Arenaza, J. (2009): Presencia de *Brachytron pratense* (Müller, 1764) en la Comunidad Autónoma Vasca, norte de la Península Ibérica (Odonata: Aeshnidae). *Heteropterus Revista de Entomología* 9(1): 53-55. (in Spanish, with Euskarian and English summaries) [Field observations of *B. pratense* in Forua, Bizkaia, are reported. It is the first record of this species (rare and localised in the Iberian Peninsula) from the Basque Autonomous Community.] Address: Maguregi Arenaza, J., B° Altamira 64. 3o izda.: 48350 Busturia (Bizkaia), Spain. E-mail: fotosmagu@gmail.com

**8373.** Markovic, G.; Karan-Znidarsic, T.; Simonovic, P. (2009): Bryozoan species *Hyalinella punctata* Hancock in the gut content of chub *Leuciscus cephalus* L.. *Pol. J. Ecol.* 57(1): 201-205. (in English) [In spring, Odonata make up to 10%, in summer 9%, and in autumn 6% of food items in the gut content of *L. cephalus* in the Zapadna Morava river (West Serbia, Danube River basin).] Address: Markovic, G., Faculty of Agronomy, Cacak, University of Kragujevac, Cara Dušana 34, 32000 Cacak, Serbia. E-mail: goranmsv@tfc.kg.ac.yu

**8374.** Marrocco, J. (2009): Biomimetic design of a flexible wing. *ACCEESS Proceedings 0908*: 5 pp. (in English) ["The practical application of relatively small, and light weight micro air vehicles (MAV), is of great interest to the engineering community. Innovative and interesting approaches are being utilized to address the many constraints that arise from attempting to design a flapping MAV. The goal of this research is to investigate the structural and mechanical properties of the dragonfly, that give it its unique flight capabilities, and mimic the design in a finite element model to simulate the wings structural dynamics for analyses." (Author)] Address: Computational Science Research Center, 5500 Campanile Drive, San Diego, CA 92182-1245, USA

**8375.** Martens, A. (2009): Die Libellenfauna von Samos (Odonata). *Libellula* 28(3/4): 209-220. (in German, with English summary) ["From 28-VII to 09-VIII-1999, 24 species were recorded from a total of 24 localities. *Selysiotthemis nigra* is new for the fauna of Samos, which now includes 32 species of Odonata. An overview of the Odonata fauna is given. Emphasis is placed on the fauna of permanent lotic waters, which are threatened by intensive use of water for irrigation purposes and touristic development." (Author)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Bismarckstr. 10, D-76133 Karlsruhe, Germany. E-mail: martens@ph-karlsruhe.de

**8376.** Martens, A.; Griese, J. (2009): Verschleppung von *Agrionemys pygmaea* mit exotischen Wasserpflan-

zen nach Deutschland (Odonata: Coenagrionidae). *Libellula* 28(3/4): 187-189. (in German, with English summary) ["Two very small zygopteran larvae were taken from an aquarium with exotic plants in a pet shop in Karlsruhe, Germany. After emergence, one individual was clearly identified as a male *A. pygmaea* (Rambur). The species is distributed from India to Japan and Australia, where it is common at waters with rich vegetation. Currently, tropical plants for aquaristics in Europe are mainly imported from Singapore, Indonesia and Thailand, and it is suggested that the damselflies originated in one of those countries." (Authors)] Address: Griese, J., Bahnhofstr. 34, D-76461 Muggensturm, Germany. E-mail: lilly.Griese@t-online.de

**8377.** Martinez, N.; Küttel, M.; Weber, D. (2009): Deutliche Zunahme wildlebender Tierarten in der Schweiz seit 1900. Aussterbe- und Einwanderungsereignisse über 107 Jahre. *Naturschutz und Landschaftsplanung* 41(12): 375-381. (in German, with English summary) ["The number of species recorded on Red Lists in Central European countries is high and includes several species that already have disappeared. This suggests that the total species number is declining in these countries. However, besides disappearing species there are species immigrating into new areas, either due to human help or due to natural area expansion, as well as formerly extinct species that are re-migrating. Regional extinction of some species therefore does not necessarily lead to a decrease in total species number. The study analysed the influence of extinction and of immigration on total species number in Switzerland for the last 107 years and for several taxonomic groups (mammals without bats, breeding birds, reptiles, amphibians, fish, cyclostomes, butterflies, grasshoppers and dragonflies). During this period total species number clearly increased (+19 species). This increase is mainly due to species that immigrated autonomously from other European countries. Most of them are wetland inhabitants." (Authors) As new to the Odonata fauna are listed *Erythromma lindenii* (1910), *Crocothemis erythraea* (1990), and *Orthetrum albistylum* (1990). Lost Odonata are *Coenagrion lunulatum* (2000), *C. ornatum* (1960), and *Onychogomphus uncutus* (1990).] Address: Martinez, N., Hintermann & Weber AG, Austr. 2a, CH-4153 Reinach, Switzerland. E-Mail martinez@hintermannweber.ch

**8378.** Matsumoto, K. (2009): Odonate fauna of Tama Forest Science Garden. *Bulletin of Forest Entomology, Forestry and Forest Research Institute (FFPRI)* 8(1): 109-114. (in Japanese, with English summary) [33 odonate species were collected in the Tama Forest Science Garden of Forestry and Forest Products Research Institute, Hachioji City, Tokyo Metropolis, Japan. Species occurring in Hachioji City but unrecorded from the study locality were mostly those preferring un-shaded ponds or marshy habitats, and those preferring middle reaches or limited to upper reaches of running waters. Twelve red data listed species for South Tama Region of Tokyo Metropolis are represented in this study: three B-ranked species (*Onychogomphus viridicostus*, *Boyeria maclachlani* and *Aeschna juncea juncea*), and eight C-ranked species (*Asiagomphus melaenops*, *Lanthus fujiacus*, *Sieboldius albardae*, *Gynacantha japonica*, *Polycanthygyna melanictera*, *Somatochlora uchidai*, *Sympetrum parvulum*, and *Sympetrum infuscatum*).] Address: Matsumoto, K., Division of Forest Entomology, Forestry & Forest products Research Institute, Matsun-

osato 1, Tsukuba, Ibaraki 305-8687 Japan. E-mail: kazuma@ffpri.affrc.go.jp

**8379.** McMullen, L.E.; Campbell, E.Y.; Lytle, D.A. (2009): Burrowing behaviour of *Progomphus borealis* (McLachlan) larvae (Anisoptera: Gomphidae). *Notulae odonatologicae* 7(4): 39-41. (in English) ["Burrowing behaviour was studied in the Big Sandy River (Mojave co., Arizona, USA). Observations of (1) burrowing speed and (2) trail length of different instars are discussed. *P. borealis* is shown to have the fastest burrowing speed of all larval Odonata. on record." (Authors)] Address: McMullen, L.E., Department of Zoology, Oregon State University, Corvallis, OR 97331, USA

**8380.** Metsälä, P.; Parkko, P. (2009): Summit sahlbergi [Sahlbergi summit]. *Crenata* 2: 32-33. (in Finnish) [The authors report about a typical trip to northern Finnish-Lapland with *Somatochlora sahlbergi* as the target species. Plenty of dragonflies were observed during the four days trip but not the elusive *S. sahlbergi*. (Asmus Schröter)] Address: not stated

**8381.** Meurgey, F. (2009): Description of the larva of *Macrothemis meurgeyi* Daigle from the Lesser Antilles (Anisoptera: Libellulidae). *Odonatologica* 38(4): 365-368. (in English) ["The last instar larva is described and illustrated for the first time, and compared with the known congeneric larvae from the Caribbean. Its peculiarities are: size reduction of dorsal hooks, the presence of a dorsal hook on segment 2, and the absence of dorsal hooks on segments 6-9. *M. meurgeyi* has a triangular ligula with 10 premental setae and 6 palpal setae. Notes on the ecology of this lotic species are provided." (Author)] Address: Meurgey, F., Muséum d'Histoire Naturelle, 12 rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**8382.** Meurgey, F. (2009): Redescription of *Argia concinna* (Rambur), with a description of *Argia telesfordi* spec. nov. from Grenada, West Indies (Zygoptera: Coenagrionidae). *Zootaxa* 2272: 54-62. (in English) ["*Argia telesfordi* sp. nov. a new species close to *Argia concinna*, is described from Grenada. Both species are illustrated and diagnosed. They can be distinguished by morphology of male tori, cerci and paraproct and female mesostigmal laminae. Their distribution is allopatric, with *Argia telesfordi* distributed on Grenada and *Argia concinna* known only from Guadeloupe and Dominica." (Author)] Address: Meurgey, F., Muséum d'Histoire Naturelle, 12, rue Voltaire, 44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**8383.** Meurgey, F. (2009): The Odonata of Grenada (Lesser Antilles). Survey report May 1 – 14 2009. L'Herminier Natural History Society. Odonata report # 1: 33 pp, app.. (in English) ["This report is based on the examination of 200 specimens, collected by two individuals. Although 23 specimen localities are included in this report, and although these localities occur in the totality of the six parishes of Grenada, the areal coverage of the island is uneven. The principal collecting localities have been in the north part of the island, and especially on St Andrews and St Marks parishes, along the east coast, in the central uplands of the island and in the most of waterfalls. There are very few collections from the south part of the island, and almost none from the south-west coast of the island. The most important locality, on the northeast coast of Grenada is the large swamp at Meadow Beach, at Conference Bay, where a

variety of habitats have been collected rather thoroughly. The most of the species are far more common here than elsewhere, and *Lestes tenuatus* and *Erythrodiplax fervida* has been recorded on Grenada only from this locality. Several waterfalls in the central upland region were collected repeatedly. These streams and small rivers are characteristically rocky, more or less swift, and have very limited emergent vegetation. They have limited odonata fauna, consisting mainly of *Argia concinna*, *Dythemis sterilis* and *Brechmorhoga praecox grenadensis*. From a biogeographical point of view, the dragonfly fauna of Grenada is clearly a mix between the Caribbean and the South American fauna, with three species originated from South America not shared with other islands, and one (*Argia concinna*) which is a Caribbean endemic. This first survey needs to be completed by further researches on the ecology and on the biology of species. The dragonfly fauna of Grenada could increase to 20-22 species." (Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**8384.** Michalczyk, M.; Buczyński, P.; Daraż, B. (2009): First data from the monitoring of population condition of Ornate Bluet *Coenagrion ornatum* (Selys, 1850) in the valley of Sieniocha river (Sniatycze, south-eastern Poland) *Wiaczeslaw. Odonatrix* 5(2): 33-44. (in Polish, with English summary) ["*Coenagrion ornatum* is a critically endangered dragonfly species in Poland known nowadays from only one site (three others given after 1990 extinguished). The authors discuss first data (2007–2008) coming from regular observations of the last known population discovered in 2007 r. in Sniatycze near Zamosc (50°38'–50°39'N, 23°32'E, UTM square: FB71). *C. ornatum* inhabits one of drainage ditches in the area of a spring fen of calcareous character (Fig. 1). *Molinietum caeruleae* and *Caricetum appropinquatae* are dominating in vegetation, in some places *Cladietum marisci* and *Schoenetum ferruginei*, associated with shallowly situated calcareous substratum, are also preserved. The described fen is systematically burnt-out together with surrounding meadows. The ditch with *C. ornatum* has no direct connection with springs. Its water is warmer, slightly impoverished in oxygen and more fertile than spring waters (Tab. 1). During the warmer winter in 2007 ice layer did not cover the whole water surface –it was present only in sides. In the cooler winter in 2008 layer reached the thickness of 5 cm and covered the whole water surface, however, the ditch were not frozen to the bottom. The ditch is shallow (a few cm), narrow (the width of water surface up to 1m, however, in many places only to 20–30 cm), the bottom is covered with muddy substrata. Current is slow, water transparent. The bottom is grown by *Berula erecta*: in varied density –from a single plant to compact clusters. In large part of the watercourse the expansion of *Phragmites communis* and *Carex appropinquata* is visible, banks are grown by single scrubby willows in some places. In the front part of the ditch water is covered by moss mats. Regular observations were conducted in the year 2007, from the moment of discovery of the site and through the whole year 2008. *C. ornatum* was noted during 11 controls (Tab. 2). Maximum number of individuals was 195, they inhabited the stretch of ditch with length of ca. 170 m –with *Berula erecta* the least choked by *Phragmites communis* and *Carex appropinquata*. The period of imaginal flight lasted from the last decade of May till the last decade of July (individuals



observed on 3 June were very numerous and partially mature therefore their emergence must have taken place several days earlier). It is a relevant supplement to the previous data from Poland. This corresponds with the data from Czech Republic and is similar to data from other countries of Central and Eastern Europe. The features of habitat correspond with these in literature. The fact that the species is resistant to ice layer seems to be important (however, water must be flowing just above the bottom). Two colour forms were distinguished within females: blue and green, within males – only blue one. Juvenile individuals of blue form were violet, green one – beige-brown. The base of eyes corresponded with colour forms. Three forms of abdominal pattern of males and two of females were described (Fig. 2). One of the forms of males (spot in form of goblet without a stem on the second segment) has been described for the first time. The following species coexisted with *C. ornatum* in the ditch (\* autochthonic ones or probably autochthonic): *Lestes barbarus*, \**L. sponsa*, *Ischnura elegans*, *I. pumilio*, \**Enallagma cyathigerum*, \**Coenagrion puella*, \**C. pulchellum*, \**Somatochlora flavomaculata*, *Libellula quadrimaculata*, *L. fulva*, \**Orthetrum coerulescens*, *O. cancellatum*, *Sympetrum danae*, \**S. sanguineum*, *S. vulgatum*. In neighbouring habitats (other ditches, peat excavations) there were also: *Calopteryx virgo*, \**Sympecma paedisca*, *Pyrrhosoma nymphula*, \**Aeshna juncea*, *Leucorrhinia albifrons*. The threat to the ornate bluet in Sniatycze is mainly the expansion of vegetation (reed and sedges). Moreover, water surface is covered with litter. In 2008, by the efforts of Nature Association of Zamosc, first protection activities were taken like mowing reeds in some places and removing reed and sedge litter from current to the banks of the watercourse. The aim of these activities is to redouble the length of the ditch with optimal conditions for the species. These actions will be continued and their results monitored. *C. ornatum* is the species proposed by Poland to the appendix II of Habitats Directive. On this account, as well as due to its legal protection and Red List status, this species should be encompassed by national program of inventarisation, monitoring and protection. In the meantime there are no funds for this purpose – at the same time money is available for researches of species important but not endangered in Poland to Nature 2000, like *Ophiogomphus cecilia* and *Leucorrhinia pectoralis*. The authors criticise this situation." (Authors)] Address: Michalczuk, M., Zamojskie Towarzystwo Przyrodnicze, ul. Szymonowica 19/6, 22-400 Zamość, Poland. E-mail: wiack@wp.pl

**8385.** Miszta, A.; Cuber, P. (2009): New localities of dragonflies (Odonata) endangered in Poland recorded in the years 2006–2008 in Silesian Province outside of protected areas. *Odonatrix* 5(2): 48-54. (in Polish, with English summary) ["In the area of districts: Chelm Śląski, Tarnowskie Góry, Ogrodzieniec and the city of Czechochowa, five new sites were found in 2006–2008, which occurred to be the breeding and development sites of endangered dragonfly species in Poland, such as: *Nehalennia speciosa*, *Somatochlora arctica*, *Cordulegaster boltonii*, *Aeshna subarctica elisabethae* and *A. juncea*. One of those sites, a sinkhole pond in Bledów near Chelm Śląski, is quite interesting for *N. speciosa*, *A. subarctica* and *A. juncea* were recorded all together. Another interesting site is in Pniowiec, where *S. arctica* and *C. boltonii* were found, which completed previous observations of the other dragonfly species in this site: *Brachytron pratense*. Because of their natural aspects

both sites are going to be included in the conservation system of Nature 2000 areas." (Authors)] Address: Miszta, Alicja, Centrum Dziedzictwa Przyrody Górnego Śląska, ul. Św. Huberta 35, 40-543 Katowice, Poland. E-mail: a.miszta@cdpigs.katowice.pl

**8386.** Mitra, T.R.; Babu, R. (2009): Previously unrecorded Odonata from salt ranges and Sind in Pakistan. *Notul. odonatol.* 7(4): 37-44. (in English) [238 specimens in the National Zoological Collection at Zoological Survey of India: 28 species are new records for Salt Ranges and 11 species for Sind. (Authors)] Address: Babu, R., Zoological Survey of India, M-Block, New Alipore, Kolkata/Calcutta - 700 053, India. E-mail: rb-abu2000@rediffmail.com

**8387.** Montana, C.G.; Winemiller, K.O. (2009): Comparative feeding ecology and habitats use of *Crenicichla* species (Perciformes: Cichlidae) in a Venezuelan floodplain river. *Neotropical Ichthyology* 7(2): 267-274. (in English, with Spanish summary) ["Feeding behaviour and habitat use of two species of pike cichlids *Crenicichla lugubris* and *C. aff. wallacii* were studied in the río Cinaruco, a floodplain river in the Venezuelan llanos. We examined 309 individuals of *C. lugubris* and 270 individuals of *C. aff. wallacii* from both the main channel and lagoons throughout the falling-water phase of the annual hydrological cycle. [...] Analysis of stomach contents showed that larger specimens (> 100 mm SL) *C. lugubris* fed mostly on small fishes (e.g. characids, cichlids), but juveniles (< 100 mm SL) consumed mostly aquatic insects, fish scales, and shrimps. *Crenicichla aff. wallacii* fed on aquatic insects and other invertebrates associated with leaf litter substrates." (Authors) "Odonata" contributed up to app. 10% of the diet depending on the age class of the fish.] Address: Montaña, Carmen, Section of Ecology, Evolution and Systematic Biology, Dept Wildlife & Fisheries Sciences. Texas A&M University, College Station, TX 77843-2258, USA. E-mail: car1607@tamu.edu

**8388.** Moreira-Hara, S.S.; Zuanon, J.A.S.; Amadio, S.A. (2009): Feeding of *Pellona flavipinnis* (Clupeiformes, Pristigasteridae) in a Central Amazonian floodplain. *Iheringia, Sér. Zool.* 99(2): 153-157. (in English, with Portuguese summary) ["The feeding habits of *P. flavipinnis* at Catalão, a floodplain area on the Brazilian Central Amazon was studied. Data was obtained during three hydrological cycles, between September 1999 and September 2003. Diet composition, daily and seasonal variation in the feeding activity and the relationship between predator's size and its prey were analyzed. Almost 80% of the food consumed has autochthonous origin and diet was composed basically by insects and fish. Juvenile fish predominated in the stomach contents of all size classes but there was no significant relationship between predator's size and its prey. *P. flavipinnis* may be considered a carnivorous species which feeds mainly on juvenile (young-of-the-year) specimens of other fish. More intense feeding activity occurred at night and in the high water period." (Authors) "Odonata" accounted significantly to the diet of the fish species.] Address: Moreira-Hara, Sandra, Escola Superior Batista do Amazonas, Rua Leonor Telles, 278, Conj. Abílio Nery, Adrianópolis, Manaus, AM, Brazil. E-mail: sandrasocorromoreira@yahoo.com.br

**8389.** Moreno, P.; Franca, J.S.; Ferreira, W.R.; Paz, A.D.; Monteiro, I.M.; Callisto, M. (2009): Use of the

BEAST model for biomonitoring water quality in a neotropical basin. *Hydrobiologia* 630: 231-242. (in English) ["The use of predictive models in Neotropical basins is relatively new, and applying these models in large basins is hindered by the lack of ecological, geographical, and social-environmental knowledge. Despite these difficulties, we used data from the das Velhas River basin to apply the BEAST (Benthic Assessment of SedimenT) methodology to evaluate and classify the level of environmental degradation. Our two main objectives were to modify and implement the BEAST methodology for use in biomonitoring programs of Brazilian basins, and to test the hypothesis that a gradient of environmental degradation determines a gradient in the structure and composition of benthic macroinvertebrate assemblages. We evaluated 37 sites: 8 in the main river, 15 in the main tributaries with different impact levels, and 14 in tributaries with minimally disturbed conditions (MDC). The BEAST model allowed us to classify 16 test sites: two as natural, four as altered, three as highly altered, and seven as degraded. Our results indicated degradation of the das Velhas River basin near its urban areas. The BEAST model indicated that the pollution gradient found among the sites generated a gradient of the macroinvertebrate assemblages, corroborating the hypothesis." (Authors) Odonata are treated at the family level.] Address: Callisto, M., Laboratório de Ecologia de Bentos, Departamento de Biologia Geral, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Av. Antônio Carlos 6627, Belo Horizonte, Minas Gerais, Brazil. E-mail: callistom@ufmg.br

**8390.** Msyani, E.K.; Lazaro, J.; Castor, O.N.; Cham-begga, O.A. (2009): Seasonal inventory and status of flying insects, in Kihansi Gorge, Tanzania. *African Journal of Ecology* 47(3): 267-275. (in English) ["Sampling of flying insects in Kihansi Gorge was conducted in six micro-habitats namely Lower, Upper, Main, Mid-Gorge and Mhalala Spray Wetlands and adjacent forest. The four traps used were, malaise, pitfall, light and artificial substrate sampler, besides sweep netting and beating. In the wet season, 65,549 flying insects (65.13%) were recorded when compared to 35,633 flying insects (34.87%) in dry season. At its peak, 29,783 flying insects (29.15%) were recorded at the start of wet season (December 2004). The abundance value was significant ( $\chi^2= 1794.98$ , d.f.= 5,  $P \leq 0.001$ ). The favourable weather condition at the beginning of the wet season might have triggered emergence of high numbers of winged insects like ants, to facilitate migration through dispersal and reproduction, and some aquatic insects (Plecoptera, Odonata and Trichoptera) moulted and entered into terrestrial life to raise terrestrial abundance. No association was recorded between abundance of flying insects and amphibians (Kihansi Spray Toad; *Nectophrynoides asperginis*), for Mid-Gorge and Main Spray Wetlands ( $r = -0.71$ ,  $n = 4$ ,  $P = 0.147$  and  $r = -0.69$ ,  $n = 5$ ,  $P = 0.201$ ) respectively." (Authors)] Address: Msyani, E.K., Coll. of African Wildlife Management, Mweka, PO Box 3031, Moshi, Tanzania; E-mail: emsyani@yahoo.com

**8391.** Müller, J. (2009): Bibliographie zur Libellen-Fauna (Odonata) Sachsens-Anhalts. Erstes Verzeichnis der Schriften zur Libellen-Fauna Sachsens-Anhalts. Abhandlungen und Berichte des Museums Heineanum 8: 55-83. (in German, with English summary) [An annotated bibliography of odonatological literature from Saxony-Anhalt, Germany is presented, comprising 275 literature-references and 178 unpublished expert research

reports.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**8392.** Müller, J.; Steglich, R. (2009): Zum Vorkommen der Scharlachlibelle *Ceragrion tenellum* in Sachsen-Anhalt. *halophila*, Mitt.-Bl. FG Faun. u. Ökol. Staßfurt 53: 14. (in German) [Sachsen-Anhalt, Germany; compilation of records of this regionally very rare species.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**8393.** Müller, J. (2009): Beitrag zur Geschichte der Libellenkunde (Odonatologie) in Sachsen-Anhalt. Abhandlungen und Berichte des Museums Heineanum 8: 35-53. (in German, with English summary) [The paper presents a concise history of odonatological research in Sachsen-Anhalt, Germany, documents regional museum collections of Odonata, and compiles biographic data of 65 odonatologists / persons involved in odonatological research in Sachsen-Anhalt.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**8394.** Muzon, J. (2009): Estado actual del conocimiento del orden Odonata en la Patagonia. *Rev. Soc. Entomol. Argent.* 68(1-2): 163-167. (in Spanish, with English summary) [Patagonian (Argentina) Odonata are represented by 36 species belonging to nine families and 18 genera. "The endemism level is high being approximately 60% of the species and 40% of genera endemic. The specific richness in Patagonia decreases from West to East and from North to South, being Nahuel Buta (Chile) and Andes mountains between 38° and 41° S on the forest area, and the Somuncurá plateau (Argentina) on the steppe the richest areas. An update of its records and an analysis of the main distribution patterns are provided in this paper." (Author)] Address: Muzón, J., Instituto de Limnología "Dr. Raúl A. Ringuelet", C.C. 712, 1900 La Plata, Argentina. E-mail: muzon@ilpla.edu.ar

**8395.** Nel, A.; Huang, D.-y. (2009): First Chinese *Cymatophlebiidae* from the Middle Jurassic of Inner Mongolia (Odonata: Anisoptera: Aeshnoptera). *Palaeodiversity* 2: 199-204. (in English, with German summary) ["*Sinacymatophlebia mongolica* n. gen., n. sp., the oldest and first Chinese record of the Mesozoic aeshnopteran dragonfly family *Cymatophlebiidae*, is described from the Middle Jurassic Jiulongshan Formation of Inner Mongolia." (Authors).] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**8396.** Nel, A.; Bechly, G. (2009): The third petalurid dragonfly from the lower cretaceous of Brazil (Odonata: Cretapetaluridae). *Annales zoologici (Warszawa)* 59(3): 281-285. (in English) ["*Cratopetalura petruleviciusi* gen. et sp. nov. is the third genus and species of the Mesozoic petalurid family Cretapetaluridae from the Lower Cretaceous of Brazil. With the recent discovery of another representative of this family in the Lower Cretaceous of England, it demonstrates the great diversity of this group during this period." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**8397.** Nel, A.; Bechly, G.; Declos, X.; Huanag, D.-y. (2009): New and poorly known Mesozoic damsel-dragonflies (Odonata: Isophlebioidea: Campterothlebiidae,

Isophlebiidae). *Palaeodiversity* 2: 209-232. (in English, with German summary) ["The diagnoses of the families Campterothlebiidae and Isophlebiidae are emended. *Campterothlebia elegans* BODE, 1905, type of the Campterothlebiidae, and *Sinitia sophiae* PRITYKINA, 2006 are redescribed. The latter is transferred from the Isophlebiidae into the Campterothlebiidae *sp. nov.* Two new campterothlebiids are described: *Pritykinia rasnitsyni* n. gen., n. sp. (Lowermost Cretaceous of Russia) and *Qibinlina sinica* n. gen., n. sp. (Middle Jurassic of China). Three new isophlebiids are described: *Walleria magnifica* n. gen., n. sp. (Upper Jurassic of Kazakhstan), *Parawalleria mongolica* n. gen., n. sp. and *Parawalleria incompleta* n. sp. (Upper Jurassic of Mongolia)."] (Authors.) Address: Nel, A., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimr1.mnhn.fr](mailto:anel@cimr1.mnhn.fr)

**8398.** Niederbichler, C. (2009): Hartmut Spaeter: Weltreisender, Naturschützer, Förderer des LBV. Großherzige Unterstützung der LBV-Stiftung „Bayerisches Naturerbe“: LBV Vogelschutz 1/2009: 11. (in German) [Hartmut Spaeter, Munich, Germany (1922 - 2007). The published note refers to *Polythore spaeteri* Burmeister & Börsöny, 2003, and provides a figure with a portrait of H. Spaeter.] Address: <http://www.lbv.de/fileadmin/lbvde/service/HeftVogelschutz/Heft109www.pdf>

**8399.** Niehuis, M. (2009): Nur scheinbar die Altbekannte. Boten des Klimawandels: Die Südliche Mosaikjungfer findet man in Flachgewässern im Oberrheingraben. Rheinpfalz - Marktplatz aktuell vom 29.07.09 Ausgabe Kandel und Ausgabe Edenkoben; eine Woche vorher in Bad Bergzabern und Gernersheim: (in German) [Rheinland-Pfalz, Germany; popular account in a regional significant newspaper on Odonata with special emphasis on *Aeshna affinis* resp. species favoured by climate change.] Address: Niehuis, M., Im Vorderen Großthal, D-76857 Albersweiler, Germany. E-mail: [Niehuis@t-online.de](mailto:Niehuis@t-online.de)

**8400.** Novelo-Gutiérrez, R. (2009): Description of the larva of *Acanthagrion quadratum* Selys, with a key to the known larvae of the genus (Zygoptera: Coenagrionidae). *Odonatologica* 38(4): 321-328. (in English) ["The larva is described, illustrated, and compared with other described congeneric larvae. *A. quadratum* is distinguished from all others by possessing 3 premental setae, 4 setae on labial palp, and caudal lamellae 8-10 times longer than their widest part. A key to the 9 known congeneric larvae is provided."] (Author)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: [rodolfo.novelo@inecol.edu.mx](mailto:rodolfo.novelo@inecol.edu.mx)

**8401.** Ober, S.V.; Staniczek, A.H. (2009): A new genus and species of coenagrionid damselflies (Insecta, Odonata, Zygoptera, Coenagrionidae) from Vanuatu. *Zoosystema* 31(3): 485-497. (in English, with French summary) ["A new genus, *Vanuatubasis* n. gen., is described and illustrated based on specimens from the islands of Aneityum, Espiritu Santo, and Malekula, Vanuatu. Males of the new genus differ from males of the similar *Nesobasis* Selys, 1891 in having short and broad superior anal appendages and long, forcipate inferior anal appendages. The already described species, *Nesobasis malekulana* Kimmins, 1936 and *N. bidens* Kimmins, 1958, are transferred to the new genus. Both

species, only known from males, are redescribed. Additionally, a new species, *Vanuatubasis santoensis* n. gen., n. sp., is described from Espiritu Santo. Males of *V. santoensis* n. gen., n. sp. differ from males of the closely related *V. malekulana* n. comb. by their larger size, a more raised hind ridge of the pronotum, the less prominent medio-posterior protuberance of the mesostigmal laminae, and the paisley-shaped superior anal appendages. A key to the males of *Vanuatubasis* n. gen. is provided."] (Authors)] Address: Ober, S.V., Staatliches Museum für Naturkunde Stuttgart, Abteilung Entomologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail: [ober.smns@naturkundemuseum-bw.de](mailto:ober.smns@naturkundemuseum-bw.de)

**8402.** Odin, N. (2009): Reports from Coastal Stations - 2008: Landguard Bird Observatory, Suffolk. *Atropos* 36: 52-53. (in English) [UK; *Lestes sponsa*, *Erythromma viridulum*; *Libellula depressa*, *L. quadrimaculata*] Address: not stated

**8403.** Palacino-Rodríguez, F. (2009): Dragonflies (Odonata: Anisoptera) of the collection of the Instituto de Ciencias Naturales, Universidad Nacional de Colombia. *Boletín del Museo de Entomología de la Universidad del Valle* 10(1): 37-41. (in English, with Spanish summary) [This collection of Anisoptera holds 2900 specimens which have been collected since 1940 across 27 departments of the country. "More than a half of the specimens are Anisoptera (53%) and these are represented by three families Aeshnidae, Gomphidae, and Libellulidae, 38 genera and 91 species. These numbers constitute 80% of the genera and species of the suborder reported from Colombia. The more abundant genera are *Erythrodiplax* (37%), *Uracis* (15%), and *Erythemis* (8%). The presence of *Uracis siemensii* Kirby, 1897, *U. infumata* (Rambur, 1842), and *Zenithoptera viola* Ris, 1910, in Colombia, is confirmed."] (Authors)] Address: Palacino-Rodríguez, F., Instituto de Ciencias Naturales, Universidad Nacional de Colombia, A. A. 7495, Bogotá - Colombia. E-mail: [fpalacino@unal.edu.co](mailto:fpalacino@unal.edu.co)

**8404.** Parr, A.J. (2009): Winter damselfly *Sympetma fusca* Vander Linden in West Glamorgan. *Atropos* 37: 28-31. (in English) [14-XII-2008, Tonna, UK.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: [Adrian.parr@bbsrc.ac.uk](mailto:Adrian.parr@bbsrc.ac.uk)

**8405.** Parr, A.J. (2009): Migrant Dragonflies in 2008 including recent decisions and comments by the Odonata Records Committee. *Atropos* 36: 28-32. (in English) [UK; the following species are considered in the report: *Sympetma fusca*, *Aeshna grandis*, *A. mixta*, *Anax* sp. (*Anax junius* cf.), *A. imperator*, *A. parthenope*, *Libellula fulva*, *Sympetrum danae*, *S. striolatum*, *S. flaveolum*] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: [Adrian.parr@bbsrc.ac.uk](mailto:Adrian.parr@bbsrc.ac.uk)

**8406.** Parr, A.J. (2009): Migrant and dispersive dragonflies in Britain during 2008. *J. Br. Dragonfly Society* 25(2): 94-99. (in English) ["The year 2008 was rather a quiet one for dragonfly migration in Britain, probably no surprise given the frequently unfavourable summer and autumn weather. A low level of immigration did however take place, especially during warmer spells in late July and early August. One or two species also appeared to show enhanced dispersal within Britain, whilst other interesting sightings probably related to the consequences of previous migration/dispersion events. The highlight of 2008 must be the discovery to-



wards the end of the year of a female Winter Damselfly *Sympecma fusca*, apparently attempting to hibernate inside a house in south Wales. This represents the first record of the species for Britain, though its appearance had been anticipated." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**8407.** Parr, M.J. (2009): Professor Philip S. Corbet, 21 May 1929 - 13 February 2008. *J. Br. Dragonfly Society* 25(1): 1-6. (in English) [Obituary.] Address: Parr, M. J., Hele Barton, 9c St James's St., South Pethcrton, Somerset, TA13 5BS, UK. E-mail: mima37@tiscali.co.uk

**8408.** Paulson, D.R. (2009): A new species of *Leptobasis* from Costa Rica (Odonata: Coenagrionidae). *Zootaxa* 2239: 62-68. (in English) ["*Leptobasis guanacaste* is described from seasonal wetlands in dry forest in Guanacaste, Costa Rica. It is unique among the five species of the genus in thoracic colour pattern and the structure of the male terminal appendages and female mesostigmal laminae and appears to be closest to *L. candelaria* through similarities in genital ligula, male metafemur, and female ovipositor." (Author)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**8409.** Paulson, D.R. (2009): Scarlet Skimmer (*Crocothemis servilia*) in Jamaica. *Argia* 21(1): 9. (in English) [Iverclaud Hotel in Black River, St. Elizabeth Parish, July 2008.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**8410.** Peixoto, P.E.C.; De Marco Jr., P. (2009): No size or density effect on alternative mate-locating tactics in the tropical damselfly *Hetaerina rosea* males (Odonata: Calopterygidae). *Rev. Biol. Trop.* 57(1-2): 361-370. (in English, with Spanish summary) ["Males of *H. rosea* may defend mating sites along river margins (resident males) or, alternatively, wander among different areas presumably searching for mates (nonterritorial males). Although the occurrence of territorial and non-territorial males of *H. rosea* is very common in Brazil, studies examining which factors may be responsible for the adoption of alternative mate-locating tactics in this species are inexistent. We investigated the relationship between the adoption of these alternative mate-locating tactics by males of *H. rosea* and two possible causes: body weight and male abundance. We carried the study in three areas: sites 1, 2 and 3. Samples were monthly undertaken in sites 1 and 2 between September/2001 and August/2002 and in site 3 between May/1999 and January/2001. Using the scan method with fixed areas and mark-resighting techniques, we did not find any relationship between the proportion of nonterritorial males and male abundance per month on sites 2 ( $n=6$ ) and 3 ( $n=7$ ), indicating that the adoption of alternative mate-locating tactics is not affected by competition for territories. In the same way, nonterritorial and resident males showed similar body and thoracic weight measures ( $n=30$  and  $n=27$  for sites 2 and 3 respectively). Maybe the nonterritorial tactic is adopted by individuals searching for better territories or males that were evicted from their defended sites. The absence of relationship between weight and male territorial status is in accordance with other *Hetaerina* species. However, other traits not investigated here such as parasitic load, fat content and age may influence the adoption of different mate-ac-

quisition tactics in *H. rosea* males. ] Address: Peixoto, P.E.C., Departamento de Zoologia, IB, UNICAMP, C.P.6109, CEP 13083-970, Campinas, São Paulo, Brasil. E-mail: popscardoso@yahoo.com.br

**8411.** Penney, D. (2009): Field guide to wildlife of The Gambia: an introduction to common flowers & animals. Siri Scientific Press, Manchester, U.K.. ISBN 978 0 9558636 1 5: 120 pp. (in English) [14 of the 554 colour photographs show Odonata: Ceriagrion, Azuragrion, Palpopleura, Pantala, Diplacodes, Crocothemis, Orthetrum, Brachythemis, and Bradinopyga.]

**8412.** Petrulevicius, J.F.; Nel, A. (2009): First Cordulephyidae dragonfly in America: A new genus and species from the Paleogene of Argentina (Insecta: Odonata). *Comptes Rendus Palevol.* 8(4): 385-388. (in English, with French summary) ["*Palaeophya argentina* gen. et sp. n. is the first American representative of the Cordulephyidae. The fossil belongs to Neophyinae and is closely related to the unique genus *Neophya* present in the Early Oligocene of England and extant in Africa. This fossil record supports the evidence of a Cretaceous age and a wide ancient distribution in Palaeogene warm regions for the Neophyinae, which acquire the status of relict in recent intertropical Africa." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimr-s1.mnhn.fr

**8413.** Porst, G.; Irvine, K. (2009): Implications of the spatial variability of macroinvertebrate communities for monitoring of ephemeral lakes. An example from turloughs. *Hydrobiologia* 636(1): 421-438. (in English) ["Turloughs, ephemeral water bodies associated with karstified limestone, are an important habitat found in the West of Ireland. They are a priority habitat under the European Habitats Directive (92/43/EEC) and are groundwater-dependent habitats under the European Water Framework Directive (2000/60/EC; WFD). Sampling to meet the objectives of either Directive requires discrimination of inherent natural variation from anthropogenically induced disturbances and accounting for both spatial and seasonal patterns of biotic distribution. This study reports within. (submerged grassland) and between-habitat (submerged and emergent grassland) variability of macroinvertebrate (including *Lestes dryas*) communities in six turloughs. Two different habitat types were sampled from two turloughs in April 2007, and further assessment of spatial pattern in commonly found submerged grassland habitat was determined from four additional turloughs in spring 2008. While cluster analysis and non-metric multidimensional scaling identified differences in macroinvertebrate community structures between habitats in one out of two turloughs, congruence of invertebrate communities was, nevertheless, greater within than among turloughs. Within-habitat variability of macroinvertebrate communities across sampling locations of submerged grassland habitat was sufficiently low so that samples collected at any location of a turlough can provide a reliable metric of the macroinvertebrate community of a turlough as a whole. A standardized submerged grassland sampling approach for routine turlough sampling is recommended as a pressure response method to fulfil the requirements of the WFD. For a comprehensive conservation assessment, however, as demanded under the EC Habitats Directive, we suggest a multi-habitat sampling approach to obtain a thorough assessment of turlough

macroinvertebrate biodiversity." (Author)] Address: Porst, Gwendolin, Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB), Müggelseedamm 301, 12587 Berlin, Germany. E-mail: porst@igb-berlin.de

**8414.** Precigout, L.; Prud'Homme, E.; Jourde, P. (Coord.) (2009): *Libellules du Poitou-Charentes*. Poitou-Charentes Nature. ISBN: 978-2-918831-00-6: 256 pp. (in French) ["The fruit of 18 years of sampling and of the accumulated experience of more than 200 naturalists, this work treats the 73 species of dragonflies currently known in the Poitou-Charentes. Precise descriptions of the distribution, abundance, life cycle and conservation status of each species are presented. This detailed information is accompanied by graphs, distribution maps and by numerous photographs. More than a simple field guide, this is a book to read at home. It will please naturalists, fishermen and those who enjoy simply observing the natural world around them. It is a collective and associative work where each chapter reflects the different personalities of the contributors. To know, to respect, and to protect dragonflies - such are the principles which have led us to publish this work today. May it contribute to a better understanding and long term protection of these marvellous creatures which form an important part of our natural heritage." (Editors)] Address: <http://www.poitou-charentes-nature.asso.fr/Livre-Libellules-extraits.html>

**8415.** Proess, R. (2009): Plan national pour la protection de la nature (PNPN). Plans d'actions espèces: Plan d'action Agrion de mercure *Coenagrion mercuriale*. <http://www.environnement.public.lu/conservation/dossiers/Plansdactions/PAECoenagrionmercuriale.pdf>: 4 pp. (in French) [Fundamentals for conservation of the single locality of *C. mercuriale* (Wollefsbach, sw of Useldange) in Luxembourg are outlined.] Address: Proess, R., ECOTOP, 6, rue Gustave Kahnt, L-1851 Luxembourg, Luxembourg. E-mail: [ecotop@pt.lu](mailto:ecotop@pt.lu)

**8416.** Pryke, J.S.; Samways, M.J. (2009): Conservation of the insect assemblages of the Cape Peninsula biodiversity hotspot. *Journal of Insect Conservation* 13(6): 627-641. (in English) ["The Cape Peninsula is an area of outstanding biological importance, not only for its high levels of floristic diversity and endemism, but also for its number of localised endemic invertebrates. Little is known of the spatial distribution of invertebrates across the Peninsula, or how best to conserve them. Sampling by visual searches assisted by aerial and aquatic hand-nets was undertaken throughout the Peninsula. The most important areas for insect diversity on the Peninsula, and associated environmental variables, were determined. The 'Peninsula effect' was also investigated. Nine Red Listed species and five new species for the Peninsula were recorded. This high number of Red Listed species (for those few groups that have been assessed) emphasises the biological importance of the Cape Peninsula. Table Mountain had the most Red Listed species, while Cape Point had many species not found in the other areas. Noordhoek Wetland is very important for aquatic Coleoptera. Small hills on the Peninsula are important for overall insect diversity. Elevation, slope, aspect, distance to water and vegetation structure were the most important environmental variables in determining the insect assemblages. The Peninsula effect appears to have no influence on these particular insect assemblages of the Cape Peninsula. The high number of new Peninsula records for well-known

taxonomic groups indicates that still little is known of the insect assemblages across the Peninsula. Nevertheless, areas of conservation priority identified in this study are Table Mountain (for Red Listed species), Noordhoek (for aquatic Coleoptera) and Cape Point and the small hills across the Peninsula (for their unique invertebrate assemblages). Conservation of a variety of elevations, including steep and flat areas, all aspects of mountains, as well as both the wet and dry areas, overall will contribute to the conservation of the insects." (Authors) The paper includes references to Odonata. For more details also see: <http://etd.sun.ac.za/bitstream/10019/1452/2/Pryke,JS.pdf>] Address: Pryke, J. S., Dept Conservation Ecology and Entomology, Centre for Agricultural Biodiversity, Faculty of AgriSciences, University of Stellenbosch, Private Bag X1, Matieland, 7602, South Africa. E-mail: [Jpryke@sun.ac.za](mailto:Jpryke@sun.ac.za)

**8417.** Purse, B.V.; Thompson, D.J. (2009): Emergence site selection in the endangered Southern Damselfly *Coenagrion mercuriale* in its UK stronghold, with observations on the Small Red Damselfly *Ceragrion tenellum*. *J. Br. Dragonfly Society* 25(2): 68-75. (in English) ["Emergence site selection was compared between *C. mercuriale* and *C. tenellum* in one of the UK strongholds for the former species. The mean height of exuviae above water level was  $3.64 \pm 0.36$  cm ( $n = 74$ ) for *C. mercuriale* and  $2.35 \pm 0.18$  cm ( $n = 68$ ) for *C. tenellum*. For both species there was a significant difference between observed and expected (based solely on relative abundance) plant species used as emergence perches. *Eleocharis palustris* and *Juncus articulatus* were used more, and *Hypericum elodes* less, often than expected. The national vegetation community in 13 cages was M29 i.e. *Hypericum elodes*-*Potamogeton polygonifolius* (Bog Pondweed) mire. Two other cages contained Si9a and Si9b which is *Eleocharis palustris* swamp. Broadly, suitable emergence habitat consisted of semi-submerged communities of *H. elodes* (mean % cover  $50 \pm 4.4\%$ ), *P. polygonifolius* (mean % cover  $5.8 \pm 1.9\%$ ), *E. palustris* (mean % cover  $19.2 \pm 2.6\%$ ) and *J. articulatus* (mean % cover  $3.2 \pm 1.1\%$ )] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: [d.j.thompson@liv.ac.uk](mailto:d.j.thompson@liv.ac.uk)

**8418.** Querino, R.B.; Hamada, N. (2009): An aquatic microhymenopterous egg-parasitoid of *Argia insipida* Hagen in Selys (Odonata: Coenagrionidae) and biological observations in the Central Amazon, Brazil. *Neotropical Entomology* 38(3): 346-351. (in English, with Portuguese summary) ["The tritrophic interaction *A. insipida*, the Trichogrammatidae egg parasitoid *Pseudoligosita longifrangata* (Viggiani) and the host plant *Tonina fluviatilis* (Eriocaulacea), which is a substrate for egg deposition of *A. insipida*, was investigated. The study locality was a stream with rapids where macrophytes such as *T. fluviatilis* grow. Information on aquatic egg parasitoids is scarce. This is the first record of egg parasitism of *A. insipida* by *P. longifrangata* in Brazil, and the first record of occurrence of *P. longifrangata* in the country. Parasitized and unparasitized eggs of *A. insipida* were observed only on leaves 0-5 cm below the water surface. The maximum number of pairsof *A. insipida* laying eggs in the study area was observed between 13:00h and 14:00h. Leaves of *T. fluviatilis* become yellowish and dry out when large numbers of eggs of *A. insipida* are laid on them." (Authors)] Ad-

dress: Querino, R.B., Embrapa Roraima, BR 174, km 8, Distrito Industrial, 69301-970, Boa Vista, RR; ranys@cpafrr.embrapa.br

**8419.** Rainier Audubon Society (2009): Monday, November 16, at 7:00 PM. Rainier Audubon Presents Dr. Dennis Paulson Dragonflies and Damselflies of Washington. The Heron Herald November 2009: 1. (in English) [Introduction to a lecture of Dennis Paulson on the Odonata of Washington, USA.] Address: Rainier Audubon Society, PO Box 778. Auburn WA 98071. (253) 796-2203, USA

**8420.** Ramos-Elorduy, J.; Pino Moreno, J.M.; Martínez Camacho, V.H. (2009): Edible aquatic Coleoptera of the world with an emphasis on Mexico. Journal of Ethnobiology and Ethnomedicine 2009, 5:11 doi:10.1186/1746-4269-5-11: 13 pp. (in English) [Passing references on Odonata. Anthropoentomophagy is an ancient culinary practice wherein terrestrial and aquatic insects are eaten by humans. Of these species of insects, terrestrial insects are far more commonly used in anthropoentomophagy than aquatic insects. In this study we found that there are 22 genera and 78 species of edible aquatic beetles in the world. [...] Address: Ramos-Elorduy, Julieta, Instituto de Biología, UNAM, Apdo. Postal 70-153, 04510, México. E-mail: relorduy@ibunam2.ibiologia.unam.mx

**8421.** Reborá, M.; Piersanti, S.; Gaino, E. (2009): A comparative investigation of the antennal sensilla in adult Anisoptera. Odonatologica 38(4): 329-340. (in English) ["A fine structural overview of the flagellar sensilla of *Onychogomphus forcipatus*, *Aeshna cyanea*, *Somatochlora metallica*, and *Cordulegaster boltonii* revealed the presence of pits containing sensilla typically located on the latero-ventral side of the first flagellar segments in all four species. These sensilla are represented by coeloconic single-walled olfactory sensilla and deeply sunken sensilla styloconica (type-1 and type-2) sharing common features typical of thermo-hygroreceptors. Sensilla styloconica are located inside deep convoluted cavities. It is suggested that olfactory and thermo-hygroreceptive sensilla are the main sensilla on the antennae of all anisopteran families. The attribution of the coeloconic sensilla of dragonflies to single-walled olfactory sensilla (confirmed by the finding of pore tubules in *O. forcipatus*), together with their common occurrence in the suborder Anisoptera, are relevant for phylogenetic studies." (Authors)] Address: Reborá, Manuela, Dipto di Biologia Cellulare e Ambientale, Università di Perugia, Via Elce di Sotto, I-06123 Perugia, Italy

**8422.** Reinboud, W. (2009): View and reviews: Field Guide to the Larvae and Exuviae of British Dragonflies, Volume 1. Atropos 36: 63. (in English) [Review of: Cham, S. (2007): Field Guide to the Larvae and Exuviae of British Dragonflies. Volume 1: Dragonflies (Anisoptera). British Dragonfly Society. ISBN-13: 9780955647109. 80 pp] Address: Reinboud, Weia

**8423.** Reinhardt, K. (2009): Ein Nachweis des Plattbauches von 1797 – der erste Libellennachweis in Bayern? IDF-Report 18: 3-4. (in German) [In a publication by Johann Heinrich Jördens (1764–1813) [Jördens, J. H. 1798. Geschichte der kleinen Fichtenraupe, oder der Larve von der Phalaena Monacha Linn. Nebst einem Beytrag zur Berichtigung der Ausrottungsmittel dieser Waldverheererin und einer mit Farben erleuchteten Kupfertafel. 46 S. Hof, Verlag von Grau.] Libellula de-

pressa is documented. The author discusses the probability that this is the first published record of this species in Bavaria, Germany.] Address: Reinhardt, K., Dept Animal & Plant Sciences, Univ. Sheffield, Sheffield S10 2TN, UK. E-mail: K.Reinhardt@sheffield.ac.uk

**8424.** Reinhardt, R. (2009): Bericht über die 17. Tagung der Sächsischen Entomologen der EFG e.V.. Entomologische Nachrichten und Berichte 53(3-4): 187-188. (in German) [Sachsen, Germany, Jens Kipping made a lecture reporting on his activities on African Odonata.] Address: Reinhardt, R., Burgstädter Str. 80a, 09648 Mittweida, Germany

**8425.** Renker, C.; Henrich, B. (2009): Die Entomologischen Sammlungen des Naturhistorischen Museums Mainz / Landessammlung für Naturkunde Rheinland-Pfalz. Mainzer naturwiss. Archiv 47: 395-447. (in German, with English summary) [The paper summarizes the development of the entomological collections at the Mainz Museum of Natural History / State Collection of Natural History of Rhineland-Palatinate, Germany. After the nearly complete destruction of the museum and its collections during the air raid on Mainz on February 27th, 1945, the rebuilding of the entomological collections started in the 1960's. The different phases of the rebuilding are described, introducing the volunteers, and important persons who worked for a long time in the entomological collections of the museum. In a second section the nowadays available collections and their collectors are presented. The most comprehensive inventory exists for the butterflies (Lepidoptera), true bugs (Heteroptera), wasps and bees (Hymenoptera), and beetles (Coleoptera). Concerning flies (Diptera) the museum has the largest individual collection based on the hoverflies (Syrphidae) from Franz Malec. Other insect orders are represented by small or very small collections or are lacking completely. Odonata are represented in five boxes, in most cases in poor labelling condition. Taxa are represented by records from Germany, Austria, Denmark, Norway, 10 specimens from Peru, and 44 specimens from Ruanda.] Address: Renker, C., Naturhistorisches Museum Mainz / Landessammlung für Naturkunde Rheinland-Pfalz, Reichklarastr. 10, 55116 Mainz, Germany. E-mail: dr.carsten.renker@stadt.mainz.de

**8426.** Repenning, M.; de P. Basso, H.C.; Rossoni, J.R.; Krügel, M.M.; Fontana, C.S. (2009): Análise comparativa da dieta de quatro espécies de cucos (Aves: Cuculidae), no sul do Brasil. Zoologia 26(3): 443-453. (in Portuguese, with English summary) [The diet from 4 species of cuckoos (Aves: Cuculidae) in South Brazil was studied by analyzing stomachs contents of 50 specimens: *Guira guira* (Gmelin, 1788) (n = 21), *Coccyzus melacoryphus* (Vieillot, 1817) (n = 8), *Crotophaga ani* (Linnaeus, 1758) (n = 11), and *Piaya cayana* (Linnaeus, 1766) (n = 10). One item of Odonata was found in a *Guira guira* stomach.] Address: Fontana, Carla, Setor de Ornitologia, Museu de Ciências e Tecnologia, Pontifícia Universidade Católica do Rio Grande do Sul. Avenida Ipiranga 6681, 90619-900 Porto Alegre, Rio Grande do Sul, Brasil. E-mail: carla@pucrs.br

**8427.** Riservato, E.; Boudot, J.-P.; Ferreira, S.; Jovice, M.; Kalkman, V.J.; Schneider, W.; Samraoui, B.; Cuttelod, A. (compilers) (2009): The status and distribution of dragonflies of the Mediterranean basin. Gland, Switzerland and Malaga, Spain: IUCN. ISBN: 978-2-



8317-1161-4: vii + 33 pp. (in English) [Executive Summary: Aim: This report contains a review of the conservation status of 165 Mediterranean species of dragonflies occurring in the Mediterranean basin, according to the IUCN regional Red Listing criteria. It identifies species that are threatened with extinction at regional level so that appropriate conservation action can be taken to improve their status. Scope: The geographical scope of this report is the Mediterranean region in terms of freshwater hydrosystems, defined by identifying all catchments of rivers flowing into the Mediterranean Sea as well as in the adjacent Atlantic waters of Spain, Portugal and Morocco. Status assessment: The status of all species was assessed using the IUCN Red List Criteria (IUCN 2001), which are the world's most widely accepted system for measuring extinction risk. All assessments followed the Guidelines for Application of IUCN Red List Criteria at Regional Levels (IUCN 2003). The assessments were peer-reviewed by other experts during a workshop and through correspondence with relevant experts. Results: Almost a fifth (19%) of the dragonfly species occurring in the Mediterranean region are threatened and a further 16% are Near Threatened. Four species (2%), *Agriocnemis exilis*, *Ceriatrigon glabrum*, *Rhyothemis semihyalina* and *Phyllomacromia africana* are listed as Regionally Extinct. Threatened dragonflies are found all over the Mediterranean region. However, some areas have a particular high concentration of threatened species: the most notable are the southern Balkans, northeastern Algeria and the Levant with the adjacent southern parts of Turkey. Fourteen percent of the species in the Mediterranean Basin are endemic, (9 of these are threatened and 5 Near threatened). This highlights the responsibility that the Mediterranean countries have to protect the global populations of these species. The highest number of endemics are found in the Maghreb and in the Levant whereas the smaller numbers are found in the southern Balkans, Crete and the Western Mediterranean. Dragonfly diversity is greatest in the northern parts of the region as both Mediterranean and more boreal species can be found in the same area. Italy has the highest number of species due to its particular shape allowing the presence of North African species in the south and alpine species in the north. Other species rich areas are found in France, the Balkans region, Greece, Tunisia and Turkey. Habitat destruction, degradation, pollution and mismanagement of water bodies are significant threats to dragonflies in the Mediterranean Basin. In recent years it has become clear that Climate Change will turn out to be one of the most important threats to dragonflies in the Mediterranean. Increased water demand together with a lower level of precipitation will result in the desiccation of brooks, a habitat on which many of the endemics are dependent. Conclusions: Threatened dragonflies in the Mediterranean Basin require urgent action to improve their status: While some species are already receiving some conservation attention thanks to international laws (e.g. the European Habitat Directive), others are not. The priorities identified in this study include addressing the threats, such as the destruction and degradation of freshwater habitats, and the need to improve monitoring, surveys and studies in some important areas of the Mediterranean Basin. Regional action is urgently needed: This report shows where the highest diversity, the highest level of endemism, and the highest portion of threatened dragonflies are found within the Mediterranean region. Based on this, five areas of high conser-

vation concern were selected (Maghreb, The Levant, Crete, Southern Balkans and Western Mediterranean). These areas are discussed separately, and for each one, conservation actions are prioritized. A sustained investment in the conservation and monitoring of species sites and landscapes is needed for all Mediterranean countries: To ensure that Mediterranean species are secure in the long term, this needs to be combined with the political will to integrate biodiversity conservation into all policy sectors.] Address: IUCN Centre for Mediterranean Cooperation, C/ Marie Curie 22, 29590 Campanillas, Malaga, Spain

**8428.** Riservato, E. (2009): Atlante delle libellule della Provincia di Novara. Provincia di Novara: 180 pp. (in Italian) [51 odonate species occurring in the Italian province Novara are monographically introduced giving information on morphology, ecology, phenology, status of conservation, and regional distribution.] Address: agricoltura@provincia.novara.it

**8429.** Robinette, P.R. (2009): A macroinvertebrate study of the Shenango River Westinghouse Superfund Site, Sharon, PA. M.s. thesis, Environmental Studies Program, Youngstown State University: VII, 41 pp. (in English) [Odonata are treated on the genus, a few at the family level.] Address: not stated

**8430.** Romo-Beltrán, A.; Macías-Ordóñez, R.; Córdoba-Aguilar, A. (2009): Male dimorphism, territoriality and mating success in the tropical damselfly, *Paraphlebia zoe Selys* (Odonata: Megapodagrionidae). *Evolutionary Ecology* 23(5): 699-709. (in English) ["The tropical damselfly *Paraphlebia zoe* has two male morphs: a black-winged (BW) male which is associated with territorial defense of oviposition sites; and a hyaline-winged (HW) male similar in appearance to females, and, compared to the black morph, less frequently found defending territories. In a wild population of this species, we first assessed the relationship between phenotypic traits [male morph, size and territorial status (being territorial or non-territorial)], their role on mating success, and the degree to which a particular territory may contribute to male mating success. Second, to relate a physiological basis of being territorial we compared both morphs in terms of muscular fat reserves and thoracic muscle, two key traits related to territory defense ability. Males of both morphs defended territories although the BW males were more commonly found doing this. BW males were larger than HW males and size predicted being territorial but only within HW males (territorial males were larger) but not in BW males. Male mating success was related to territorial status (territorial males achieved a higher mating success), but not to morph or size. Furthermore, territory identity also explained mating success with some territories producing more matings than others. The BW morph stored more fat reserves which may explain why this morph was more likely to secure and defend a place than the HW morph. However, the HW morph showed higher relative muscle mass which we have interpreted as a flexible strategy to enable males to defend a territory. These results are distant to what has been found in another male dimorphic damselfly, *Mnais pruinosa*, where the advantage of the non-territorial morph relies on its longevity to compensate in mating benefits compared to the territorial morph." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza

Juarez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**8431.** Sadeghi, S.; Adriaens, D.; Dumont, H.J. (2009): Geometric morphometric analysis of wing shape variation in ten European populations of *Calopteryx splendens* (Harris, 1782) (Zygoptera: Calopterygidae). *Odonatologica* 38(4): 341-357. (in English) ["The wings of 10 *C. splendens* populations were examined by landmark-based geometric morphometric analysis. Subspecific taxa in this group are currently based on wing spot size in males. Here, the variation in wing shape and size is evaluated, to test whether shape is different at a population level, and whether this has implications at a taxonomic level. It was found that Geometric Morphometrics successfully discriminates populations; overall wing shape significantly differed between populations but the results were only partly compatible with taxonomic studies based on wing spot size. Irrespective of wing spot, all populations showed differentiation in wing shape even though not in wing size; 4 groups were recognized based on wing shape: (1) Turkish1 population; (2) Spanish, Finnish, Russian and Turkish populations; (3) Italian, German and French populations; (4) Greek and Albanian populations. Ordination of the populations based on consensus data and cluster analysis phenogram confirmed such a pattern. The Spanish population (*C. xanthostoma*), did not show a strong identity, while the Turkish1 (*C. s. waterstoni*) was quite isolated. The Italian population (*C. s. caprai*) showed more relation to the French (*C. s. fairvei*) and German populations than to Albanian and Greek populations." (Authors)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@ugent.be

**8432.** Samways, M. (2009): Book Review: Rosser W. Garrison, Natalia von Ellenrieder and Jerry A. Louton, *Dragonfly Genera of the New World: An Illustrated and Annotated Key to the Anisoptera*. The John Hopkins University Press, Baltimore MS, USA, 2006, Hardback, US\$99.00, ISBN: 0-8018-8446-2, 368 pp. *Journal of Insect Conservation* 13: 137-138 (in English) [Review]. Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**8433.** Sánchez-Montoya, M.M.; Suárez, M.L.; Vidal-Abarca, M.R. (2009): Seasonal and interannual variability of macroinvertebrate reference communities and its influence on bioassessment in different Mediterranean stream types. *Fundamental and Applied Limnology / Archiv für Hydrobiologie*, Volume 174(4): 353-367. (in English) ["We investigated the seasonal changes in macroinvertebrate reference communities in four Mediterranean stream types (temporary, evaporite calcareous at medium altitude, siliceous headwaters at high altitude, and calcareous headwaters at medium and high altitudes) and the interannual changes in the two headwaters stream types in Spain. Eighty-eight seasonal reference sites distributed into 23 basins were sampled on three occasions (spring, summer and autumn of 2003), and 18 interannual reference sites distributed in 6 basins were sampled in the autumn of 2003, 2004 and 2005 to examine this temporal variability. Interannual reference sites were a subset of seasonal reference sites. The analysis of similarity (ANOSIM) performed on Bray-Curtis similarity distances, using presence-absence data, showed no seasonal or inter-

annual changes in the macroinvertebrate communities. The influence of seasonal and interannual variability was also tested in all the stream types using 18 macroinvertebrate metrics classified as richness, index, multi-metric index, tolerance/intolerance and diversity. ANOVAs showed no seasonal differences in any of the studied metrics for temporary and evaporite calcareous at medium altitude and most of the metrics in the two headwaters stream types. This suggests the suitability of using a single season approach for the biomonitoring purposes of these metrics. Conversely, the seasonal differences detected in the metrics related with EPT (Ephemeroptera, Plecoptera and Trichoptera) and OCH (Odonata, Coleoptera and Heteroptera) taxa in calcareous headwaters indicate possible differences in the relative presence of macrohabitats (riffles and pools) as a result of flow variation. No interannual changes were detected in any of the metrics except EPT/OCH in siliceous headwaters. However, the large variability in the annual rainfall in this study area suggests that this three-year study period may be too short to assess the effect of climatic variations on the ecological status assessment. In general, the lower temporal variability (measured as seasonal and interannual coefficients of variation) of the taxon richness metric (S) and the two studied indices (IBMWP and IASPT), compared with the other metrics, make them a priori robust indicators to assess ecological status in Mediterranean streams." (Authors)] Address: María del Mar Sánchez Montoya, Dept of Ecology and Hydrology, University of Murcia, E-30100, Murcia, Spain. E-mail: marsanch@um.es

**8434.** Sasamoto, A.; Kawashima, I. (2009): Description of the last instar larva of *Hylaeothemis clementia* Ris from Laos (Anisoptera: Libellulidae). *Odonatologica* 38(4): 369-374. (in English) ["The larva is described and illustrated for the first time, based on the last instar exuviae. It is compared with the known Tetrathemistinae larvae and appears similar to the African *Neodythemis* rather than to the Asian members of the subfamily." (Author)] Address: Sasamoto, A., 190-4 Yakuoji, Tawaramoto-chô, Shiki-gun, Nara, 636-0341, Japan. E-mail: aksmt@sea.plala.or.jp

**8435.** Schmutterer, H. (2009): *Tropische Insekten - Meisterwerke der Evolution. Einblick in die Formenvielfalt und faszinierende Biologie tropischer Kerbtiere*. Neue Brehm Bücherei 671: 269 pp. (in German) [Chapter 2.1 Ordnung Libellen (Odonata) (Abb. 1-4), pages 12-17 are directed to the dragonflies]

**8436.** Schneider, B.; Wildermuth, H. (2009): Libellen als Individuen – zum Beispiel *Aeshna cyanea* (Odonata: Aeshnidae). *Entomo Helvetica* 2: 185-199. (in German, with English and French summaries) ["All ascertainable males and females of *A. cyanea* that were present in the course of about two months in autumn 2008 at four small adjacent ponds near Winterthur (Switzerland) were documented by digital photography. The insects were examined for morphological features by which the individuals could be recognized. Distinct differences were found in the marking-pattern of head, thorax and abdomen as well in the fine wing veins. Altogether 66 males and nine females could be identified with certainty. They were present at the study site on one to eleven different days over a maximum period of 43 days. The advantages and disadvantages of photodocumentation of the individuality with respect to morphology and behaviour are discussed." (Authors)] Address: Schneider,

B., Wolfbühlstrasse 34a, CH-8408 Winterthur, Switzerland. E-mail: beatsch@bluemail.ch

**8437.** Schröter, A.; Karjalainen, S. (2009): Hohtoukkokorento (*Aeshna affinis*) tavattiin Suomessa ensi kerran [First record of the Blue-eyed Hawker/Migrant Hawker *Aeshna affinis* in Finland]. *Crenata* 2: 36-38. (in Finnish) [The article describes the circumstances of the discovery of the first record of *A. affinis* in Finland (2nd August 2008; Vuosaari, Helsinki) and gives a short synopsis of the species status and recent records in adjacent countries and the northern half of Europe. The origin and possible migration route of the Finnish specimen is shortly discussed. (Asmus Schröter)] Address: not stated

**8438.** Schultz, T.D.; Fincke, O.M. (2009): Structural colours create a flashing cue for sexual recognition and male quality in a neotropical damselfly. *Functional Ecology* 173: 724-732. (in English) ["Structural colouration is common among animals that produce sexual displays involving motion or ultraviolet reflection. Different sources of colour may provide multicomponent signals that indicate the location, sex, and fitness of a potential mate or rival. We investigated the proximate basis and ultimate function of the wing colouration of the territorial damselfly *Megaloprepus caerulatus*, which produces a dynamic, high contrast display during flight. The wings of both sexes have blue and white bands, but the location of the white patches are sex specific. Wax filaments produce diffuse, white areas through broadband scattering of wavelengths between 300 and 700 nm. Blue bands reflect wavelengths between 300 and 500 nm (max = 398 nm) and shift in hue with viewing angle, the result of thin layer interference produced by layers of cuticle and pigment within the wing membrane. Both wing bands strongly reflect UV wavelengths. Both the iridescent UV-blue and white wing patches provide high contrast against the vegetation in forest light gaps where mating occurs. Moreover, the iridescent signal oscillates during flight. Angle-dependent UV-blue iridescence is periodically extinguished during each wing beat cycle, in contrast to the white areas, which remain bright. Males distinguish potential mates from rivals by the presence of a female's white wing tip. Blackening the white wing bands of males and adding white wing tips to resemble a female elicits a sexual rather than aggressive response from males. Conversely, blackening the white wing tips of females reduces sexual responses. The proportional area of the white wing bands of males is indicative of wing symmetry, correlated with body size, and in turn, territory residency suggesting that it may serve as a signal of male condition during intra- and intersexual interactions. We propose that the flashing iridescent UV-blue wing bands provide a beacon to potential mates across forest light gaps, whereas the white patches serve in mate recognition and may indicate male quality or territorial status. Our study identifies a unique combination of interference and broadband reflectors that provide a dynamic multicomponent signal." A(authors)] Address: Fincke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**8439.** Scott, M.A.; Scott, W.J.; Scott, T.R. (2009): Reports from Costal Stations - 2008: Longstone Heritage Centre, St Mary's, Isles of Scilly. *Atropos* 36: 35-36. (in English) [UK; *Ischnura elegans*, *Aeshna mixta*] Address: not stated

**8440.** Segura, N.A.; Usaquén, W.; Sánchez, M.C.; Chuaire, L.; Bello, F. (2009): Succession pattern of cadaverous entomofauna in a semi-rural area of Bogotá, Colombia. *Forensic Science International* 187: 66-72. (in English) ["The main objective of this work was to examine the succession of insects colonizing three pig (*Sus scrofa*) cadavers in a semi-rural area of Bogotá. The 12 kg pigs were shot and put into metallic mesh cages to allow access by insects. Arthropods were then sampled at different intervals depending on the corresponding stage of decomposition. In total 5981 arthropods were collected during decomposition, 3382 adults and 2599 immature stages, belonging to 10 orders and 27 families. *Sarconesia magellanica* and *Comptosomyia verena* (Diptera: Calliphoridae) were the first species to colonize the corpses. Egg masses and 1st stage Calliphoridae larvae were associated with the fresh stage of decomposition, 1st and 2nd stage larvae of Calliphoridae and Sarcophagidae during chromatic and emphysematous stages, immature *Chrysomya albiceps* (Diptera: Calliphoridae), *Ophyra* sp. (Diptera: Muscidae) and *Oxellytrum discicolle* (Coleoptera: Silphidae) during the colliquative stage and mainly Coleoptera during the skeletization phase (plus some adult Diptera). The data obtained in the present investigation could be used for the estimation of postmortem interval (PMI) in real cases when the conditions to which a cadaver has been exposed are similar to those recorded during this work." (Authors) During the chromatic and emphysematous stages (days 4–10) of decomposition, Odonata were represented by 0.08% of the total fauna.] Address: Bello, F., Laboratorio de Entomología Médica y Forense, Facultad de Ciencias Naturales y Matemáticas, Universidad del Rosario, Calle 63D No. 24-31, Bogotá D.C., Colombia. E-mail: fbello@urosario.edu.co

**8441.** Shang, J.K.; Combes, S.A.; Finio, B.M.; Wood, R.J. (2009): Artificial insect wings of diverse morphology for flapping-wing micro air vehicles. *Bioinspiration & Biomimetics* 4: 6 pp. (in English) ["The development of flapping-wing micro air vehicles (MAVs) demands a systematic exploration of the available design space to identify ways in which the unsteady mechanisms governing flapping-wing flight can best be utilized for producing optimal thrust or maneuverability. Mimicking the wing kinematics of biological flight requires examining the potential effects of wing morphology on flight performance, as wings may be specially adapted for flapping flight. For example, insect wings passively deform during flight, leading to instantaneous and potentially unpredictable changes in aerodynamic behaviour. Previous studies have postulated various explanations for insect wing complexity, but there lacks a systematic approach for experimentally examining the functional significance of components of wing morphology, and for determining whether or not natural design principles can or should be used for MAVs. In this work, a novel fabrication process to create centimeter-scale wings of great complexity is introduced; via this process, a wing can be fabricated with a large range of desired mechanical and geometric characteristics. We demonstrate the versatility of the process through the creation of planar, insect-like wings with biomimetic venation patterns that approximate the mechanical properties of their natural counterparts under static loads. This process will provide a platform for studies investigating the effects of wing morphology on flight dynamics, which may lead to the design of highly maneuverable and efficient MAVs and insight into the functional morphology of natural



wings." (Authors) The paper includes references to dragonfly wings.] Address: Wood, R.J., School of Engineering & Applied Sciences, Harvard Univ., Cambridge, MA 02138, USA. E-mail: rjwood@seas.harvard.edu

**8442.** Sharma, R.C.; Arambam, R.; Sharma, R. (2009): Surveying macroinvertebrate diversity in the Tons river, Doon Valley, India. *Environmentalist* 29: 241-254. (in English) ["A survey of macro-invertebrates and their monthly variations occupying the Tons river in Doon Valley was conducted from August 2003 – July 2004. Macroinvertebrate collections and water samples were taken from three sampling stations every month during the period of study. All the hydrological attributes were measured monthly for 1 year. The present study showed that the water velocity, hydromedian depth, turbidity and dissolved oxygen and nature and size of the bottom substrates do play a major role in determining the macroinvertebrate diversity of Tons river. The ecological relevance of the measured hydrological attributes was investigated by comparing their degree of correlation with invertebrate density and diversity. The Shannon–Wiener index (H0) of macroinvertebrates was found to be highest (3.60) during spring season (February and March) and lowest (2.59) during monsoon season (July and August). The high values of diversity index of macro-invertebrates at all the three sampling sites indicate diverse macroinvertebrate communities in the Tons river in Doon Valley, India." (Authors) The following taxa are listed in table 2: Agrion, Ceriagrion cerinorubellum, Ischnura, and Ophiogomphus.] Address: Sharma, R.C., Department of Environmental Sciences, H.N.B. Garhwal University, Post Box 67, Srinagar-Garhwal, Uttarakhand 246174, India. E-mail: drrameshchsharma@yahoo.com

**8443.** Sherwin, G. (2009): Submergence of both sexes during oviposition in the Large Red Damselfly *Pyrhosoma nymphula* (Sulzer) in Norfolk. *J. Br. Dragonfly Society* 25(2): 62-67. (in English) ["A pair of *P. nymphula* was observed and filmed whilst ovipositing in Norfolk in the summer of 2008. During previous observations, pairs were usually seen on floating *Ceratophyllum demersum* with attached males in the sentinel position contact guarding their respective mates. Females oviposited into the Hornwort with only a part of their abdomens submerged. Similar behaviour was also observed by pairs perched on other plants, including *Menyanthes trifoliata*. On 11 May a pair was observed when the female submerged completely for just over a minute. On 23 May a pair was seen with the female already completely submerged and the male followed. At the same time a second pair was also observed nearby with both sexes submerged. To the best of my knowledge this is the first report of complete male submergence in this species." (Authors)] Address: Sherwin, G., The Beeches, Sporle Road, Little Dunham, King's Lynn, Norfolk, PE32 2DG, UK

**8444.** Slos, S.; De Meester, L.; Stoks, R. (2009): Food level and sex shape predator-induced physiological stress: immune defence and antioxidant defence. *Oecologia* 161: 461-467. (in English) ["Despite the potential impact on prey fitness and predator–prey interactions, most studies of predation risk ignore physiological responses and their dependence upon food level and sex. Therefore, we reared male and female larvae of the damselfly *Lestes viridis* under predator stress (dragonfly larvae) at high and low food levels, and sub-

sequently scored for important variables of insect immune defence (i.e. phenoloxidase) and antioxidant defence [i.e. superoxide dismutase, and catalase (CAT)]. Under predation risk, larvae did not decrease growth rate or immune defence, and only slightly reduced food intake in the high food treatment, probably because of time stress, i.e. little time available to complete the larval development. However, larvae facing predator stress did show an upregulation of antioxidant enzymes. This upregulation was dependent upon food level for CAT and both food level and sex for SOD, consistent with energetic constraints and sex differences in the link between longevity and adult fitness. Our results illustrate that predator stress can influence life history, behavioural and physiological responses differentially and in a context-dependent way. This implies that non-consumptive physiological effects of predators on their prey show independent yet similar complexities in behavioural and life history response variables. In general, our results advocate that mechanistic studies on predator–prey interactions may benefit from including physiological variables." (Authors)] Address: Slos, Stefanie, Lab. of Aquatic Ecology and Evolutionary Biology, Univ. of Leuven, Ch. Debériotstraat 32, B-3000 Leuven, Belgium. E-mail: stefanie.slos@bio.kuleuven.be

**8445.** Solly, F.; Milton, P.; Sawyer, D.; Woods, C.; Hodge, T. (2009): Reports from Costal Stations - 2008: Isle of Thanet, Kent. *Atropos* 36: 50-51. (in English) [UK; *Sympetrum fonscolombii*] Address: not stated

**8446.** Song, H.; Bucheli, S.R. (2009): Comparison of phylogenetic signal between male genitalia and non-genital characters in insect systematics. *Cladistics* 25: 1-13. (in English) ["It is generally accepted that male genitalia evolve more rapidly and divergently relative to non-genital traits due to sexual selection, but there is little quantitative comparison of the pattern of evolution between these character sets. Moreover, despite the fact that genitalia are still among the most widely used characters in insect systematics, there is an idea that the rate of evolution is too rapid for genital characters to be useful in forming clades. Based on standard measures of fit used in cladistic analyses, we compare levels of homoplasy and synapomorphy between genital and non-genital characters of published data sets and demonstrate that phylogenetic signal between these two character sets is statistically similar. This pattern is found consistently across different insect orders (- the genus *Enallagma* represents the Odonata -) at different taxonomic hierarchical levels. We argue that the fact that male genitalia are under sexual selection and thus diverge rapidly does not necessarily equate with the lack of phylogenetic signal, because characters that evolve by descent with modification make appropriate characters for a phylogenetic analysis, regardless of the rate of evolution. We conclude that male genitalia are a composite character consisting of different components diverging separately, which make them ideal characters for phylogenetic analyses, providing information for resolving varying levels of hierarchy." (Authors)] Address: Song, H., Dept Biology, Brigham Young University, Provo, UT 84602, USA. E-mail address: hojunsong@byu.edu

**8447.** Spaccesi, F.; Rodrigues Capitulo, A. (2009): Benthic invertebrate assemblage in Samborombón River (Argentina, S. America), a brackish plain river. *Aquatic Ecology* 43(4): 1011-1022. (in English) ["The

spatial and temporal differences in the structure and composition of benthic invertebrates were studied at three sites of the Samborombón River, which is an important tributary of the Río de la Plata Estuary (Argentina), having a low slope and brackish drainage. Biological samples were taken during each season. Physico-chemical variables were measured to determine their association in the benthic fauna distribution. Site 1, in the headstream, was characterized by freshwater Pampean organisms; site 2 showed the highest density, taxa diversity, and richness; brackish species, e.g., *Laonereis culveri*, were found here. Site 3, close to the Samborombón Bay, was characterized by an unstable taxonomic composition that is strongly influenced by the estuary. The lowest density and taxonomic diversity of organisms were registered and distinguished by estuarine species. The multivariate method (redundancy analysis) showed the benthic groups having an important spatial variability, superimposed on the temporal variability, associated with the salinity gradient of the river." (Authors) *Erythrodiplax nigricans* and *Oxyagrion hemmeli* were sampled at site 1 resp. site 2.] Address: Spaccesi, F., Laboratorio de Bentos, Instituto de Limnología Dr. Raúl A Ringuet (ILPLA) UNLP-CONICET, Av. Calchaquí, km 23,5 CC 712, CP 1900 La Plata, Buenos Aires, Argentina. E-mail: spaccesi@ilpla.edu.ar

**8448.** Spence, B. (2009): Reports from Coastal Stations - 2008: Spurn Point, East Yorkshire. *Atropos* 36: 57-58. (in English) [UK; *Calopteryx splendens*, *Erythromma viridulum*] Address: not stated

**8449.** Stavenga, D.G. (2009): 15. Surface colours of insects: Wings and eyes. In: Gorb, S.N. (Ed): *Functional surfaces in biology. Little structures with big effects. Volume 1.* Verlag Springer Netherlands. ISBN 978-1-4020-6696-2 (Print): 285-306. (in English) [On pages 288-289 Odonata are treated: "14.3 Damselfly Wing colours: The wings of damselflies are thin chitinous structures with mechanically strong veins, bordering membranous cells. Damselfly wings are usually rather colourless, although often adorned with some black spots. A few species have colourful wings, however A notable example is the damselfly *Neurobasis chinensis*, where the membranous structure in the cells of the hindwings feature beautiful multilayers, causing blue-green iridescent wings (Vukusic et al.. 2004). Remarkably, the mature males of another Asian damselfly, *Calopteryx japonica*, also display iridescent wings, but here the multilayers are exclusively in the wing veins. They provide the wings with a blue-green sheen (Fig. 14.3). Measurements of the reflectance of immature and mature males and females show that the reflectance is generally rather low (Fig. 14.4a-d), but the mature male wings have a noticeable reflectance peak in the blue (Fig. 14.4d). The wing transmittance varies strongly with age and sex. The transmittance spectra of the wings of immature and mature females indicate that the wings contain some melanin pigment (Fig. 14.4e, 0, so that the wings have a rather inconspicuous, brownish colouration. The wing transmittance of the immature males is much lower than that of the females (Fig. 14.4g), due to a higher concentration of melanin, and this concentration increases sharply with age (Fig. 14.4h). The deposition of melanin in the wing cells and the vein multilayers causes a dark background upon which the iridescence of the mature males, although not very intense, still clearly stands out. Behavioral observations show that the resulting striking blue colour of the mature

males plays an important role in the sexual recognition and discrimination of immature and mature animals (Hariyuma et al.. 2005)." (Author)] Address: Stavenga, Doekele, Department of Neurobiophysics, University of Groningen, Nijenborgh 4, 9747 AG Groningen, The Netherlands. Email: d.g.stavenga@rug.n

**8450.** Strand, L.; Billqvist, M.; Karlsson, T. (2009): Projekt trollslandor i Skane 2009 - 2014. Inventeringsmanual. Entomologiska sällskapet i Lund, Naturskyddsföreningen i Skåne och Studieförbundet: 37 pp. (in Swedish) [Well organized manual to survey the Odonata in the Skane-region, Sweden. For details see: <http://www.trollslandor.se/trollslandemanual.pdf>] Address: Strand, Linda

**8451.** Subramanian, K.A. (2009): *Dragonflies of India: A Field Guide.* Published by Vigyan Prasar, Noida. ISBN: 978-81-7480-192-0: XII + 168 pp. (in English) [Photographic field guide with more than 200 photographs to 111 Indian Odonata species, with English common names introduced to Indian dragonflies and damselflies for the first time. Implemented are field keys for the identification of larvae and adults, and information on key characteristics and ecology of each species.] Address: <http://www.vigyanprasar.gov.in>; Subramanian, K.A., Zoological Survey of India, Western Regional Station, Pune-411 044 Maharashtra, India. E-mail:subbuka.zsi@gmail.com

**8452.** Subramanian, K.A. (2009): A checklist of Odonata (Insecta) of India (version December 2009). Zoological Survey of India. <http://zsi.gov.in/zoological-survey-of-india/zsi-data/checklist/OdonataIndica151209.pdf>: 36 pp. (in English) [463 species are included into the checklist of the Indian Odonata. Thirteen of these are critically commented. Information on species described after 1995 (n=5), new species reports to India after 1995 (n=4), species synonymised after 1995 (n=16), species removed (n=7) and 18 taxa declared as nomen nudem according the provisions of ICZN Articles-13 & 16, as well as acknowledgements and references are added.] Address: Subramanian, K.A., Zoological Survey of India, Western Regional Station, Pune-411 044 Maharashtra, India. E-mail:subbuka.zsi@gmail.com

**8453.** Subramanian, K.A. (2009): A checklist of Odonata (Insecta) of India (version July 2009). Zoological Survey of India, Western Regional Station. <http://zsi.gov.in/zoological-survey-of-india/zsi-data/checklist/OdonataIndica110709.pdf>: III, 34 pp. (in English) [Globally app. 5,740 species of Odonata are known. Of these 470 species in 139 genera and 19 families exist in India. The taxa are listed and discussed. The type materials of following species (18 species) published by Sathe & Shinde (2006a,b, 2008a,b) are not deposited in any recognized national or international repositories. Moreover, the species descriptions do not provide illustrations or photographs of genitalia, anal appendages, wing venation etc. for a critical comparative study. Since the species descriptions does not adhere to the provisions of ICZN Articles-13 & 16 (Edition-4, 2000), the species may be considered nomen nudum until the types and illustrations are made available for scientific scrutiny: 1. *Agriocnemis kolhapurensis*; 2. *Anax mahaxmi*; 3. *Bradinopyga satarens*; 4. *Crocothemis rage-shri*; 5. *Gynacantha sathei*; 6. *Indothemis indica*; 7. *Indothemis koyinei*; 8. *Mesogomphus humani*; 9. *Mesogomphus indica*; 10. *Onychothemis patani*; 11. *Pantala*

shalakhi; 12. *Pantala shivajiensis*; 13. *Potamarcha humani*; 14. *Potamarcha koynii*; 15. *Rhyothemis rangiri*; 16. *Rhyothemis yashawanti*; 17. *Trithemis hivei*; 18. *Trithemis maharashtri*.] Address: Subramanian, K.A., Zool. Survey India, Western Regional Station, Pune-411 044 Maharashtra, India. E-mail:subbuka.zsi@gmail.com

**8454.** Suhling, F.; Martens, A.; Leipelt, K.-G.; Schütte, K.; Hoppe-Dominik B. (2009): Libellen Braunschweigs – Verbreitungsmuster und Bestandstrends der Libellenfauna einer Großstadt (Odonata). *Braunschweiger Naturkundliche Schriften* 8(2): 449-476. (in German, with English summary) ["In the period from 1980 to 2009, 51 odonate species were recorded in the area of Braunschweig, Lower Saxony, Germany. With a data base of 4405 records from 180 localities and a relatively continuous field work in that period, distribution patterns as well as long-term trends in the occurrence of species were analysed. For several species distinct trends of decline or increase could be detected and related to local habitat variation and general population trends. 30 of the recorded species were categorised as more or less frequent, 13 as rare and eight species were only recorded as single specimens. *Sympetrum pedemontanum*, *Coenagrion pulchellum*, *Ischnura pumilio* and especially *Sympetrum danae* showed a decline, whereas *Sympecma fusca*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Orthetrum brunneum* and *O. coerulescens* became more frequent during that period. The diversity of the dragonfly fauna of Braunschweig can be explained by the presence of pond systems in the urban periphery and by the presence of two rivers and their floodplain remnants: both habitat types were improved by restauration and conservation measures, i.e. construction of small ponds and sympathetic river management, respectively." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, 38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**8455.** Suutari, E.; Salmela, J.; Paasivirta, L.; Rantala, M.J.; Tynkkynen, K.; Luojumäki, M.; Suhonen, J. (2009): Macroarthropod species richness and conservation priorities in *Stratiotes aloides* (L.) lakes. *Journal of Insect Conservation* 13(4): 413-419. (in English) ["Species with narrow ranges and specialised traits are most at risk, and the extinction wave is further enhanced by coextinctions. We studied the conservation value and indicator potential of *Stratiotes aloides*, an aquatic macrophyte that has declined considerably in Europe. Our purpose was to determine whether *S. aloides* could be used as an indicator of a valuable habitat in terms of macroarthropod diversity and species richness. The potential occurrence of an internationally endangered *Stratiotes*-habitat specialist, the dragonfly *Aeshna viridis*, can increase the conservation value of plant colonies. *S. aloides* beds harboured diverse macroarthropod fauna often containing species of conservation concern, including *A. viridis*. *Stratiotes* is a potential indicator of a valuable habitat, and its indicator value is enhanced by the easy identification of the species. However, its use as an indicator of a defined macroarthropod community is limited because no particular community type is connected to it. We suggest that protecting *Stratiotes* simultaneously conserves valuable arthropod fauna, including *A. viridis*." (Authors)] Address: Suutari, Erna, Department of Biological and Environmental Science, University of Jyväskylä, P.O. Box 35, FI-40014 Jyväskylä, Finland. Email: ermasuut@jyu.fi

**8456.** Swillen, I.; De Block, M.; Stokks, R. (2009): Morphological and physiological sexual selection targets in a territorial damselfly. *Ecological Entomology* 34(6): 677-683. (in English) ["1. Several morphological and physiological traits may shape fitness through the same performance measure. In such cases, differentiating between a scenario of many-to-one mapping, where phenotypic traits independently shape fitness leading to functional redundancy, and a scenario where traits strongly covary among each other and fitness, is needed. 2. A multivariate approach was used, including morphological and physiological traits related to flight ability, a crucial performance measure in flying insects, to identify independent correlates of short-term mating success (mated versus unmated males) in the territorial damselfly *Lestes viridis*. 3. Males with higher flight muscle mass, higher relative thorax mass, and more symmetrical hindwings, all traits presumably linked to manoeuvrability, were more likely to be mated. Unexpectedly, although relative thorax mass is often used as a proxy for flight muscle mass, both traits were selected for independently. Mated males had a higher thorax fat content than unmated males, possibly because of enhanced flight endurance. 4. The finding of several independent targets of sexual selection linked to flight ability is consistent with a scenario of many-to-one mapping between phenotype and performance. Identifying such a scenario is important, because it may clarify situations where animals may show suboptimal values for some phenotypic traits shaping a performance measure, while still having high performance and fitness. We argue in the discussion that the functional approach of sexual selection provides a potent tool for examining unresolved issues in both sexual selection theory, as well as life-history theory." (Authors)] Address: Swillen, Ine, Laboratory of Aquatic Ecology and Evolutionary Biology, University of Leuven, Deberiotstraat 32, B-3000 Leuven, Belgium. E-mail: Ine.swillen@bio.kuleuven.be

**8457.** Takahashi, Y.; Watanabe, M. (2009): Diurnal changes and frequency dependence in male mating preference for female morphs in the damselfly *Ischnura senegalensis* (Rambur) (Odonata: Coenagrionidae). *Entomological Science* 12(3): 219-226. (in English) ["*I. senegalensis* females exhibit colour dimorphism, consisting of an andromorph and a gynomorph, which might be maintained under a frequency-dependent process of mating harassment by mate-searching males. Males change their mating preference for female morph depending on prior copulation experience. Binary choice experiments between two female morphs were carried out in four local populations in the early morning (07.00–09.00 hours) and the afternoon (12.00–14.00 hours), times which mark the onset and the end of diurnal mating activity, respectively. According to the line census along the water's edge, the proportion of andromorphs in the female population varied from 21 to 67% throughout the survey period for four local populations. Males showed non-biased preference for female morphs in the early morning in each local population, while they chose the common morph in the afternoon. Male mating preference for female morphs was positively correlated to the proportion of female morphs in the population. If the selective mating attacks on the common female morphs inhibit their foraging and/or oviposition behaviour, frequency-dependent male mating attacks might provide a selective force for maintaining the female colour dimorphism in *I. senegalensis*." (Authors)] Address: Watanabe, M., Graduate School of Life



& Environmental Sciences, Univ. of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan. Email: watanabe@kankyo.envr.tsukuba.ac.jp

**8458.** Takehara, S.; Uchida, S.; Kimura, K. (2009): Impact assessment of deposit removal on the physical habitat for aquatic insects in the middle reach of the Yahagi River, central Honshu, Japan. *Aichi Kogyo Daigaku Kenkyu Houkoku B* [Annual Report of Aichi Institute of Technology B.] 44(21): 155-162. (Japanese, with English summary) ["We assessed the impact of deposit removal from the middle reach of the Yahagi River, central Honshu, Japan, on the physical habitat availability for five species of aquatic insects (*Macromia daimoji*, *Gomphus postocularis*, *Onychogomphus viridicostus*; *Oyamia seminigra*, *Neoperla* sp. (Plecoptera: Perlidae), by employing the IFIM / PHABSIM. The weighted usable area (WUA) of the species that live in the cobble substrates with interstitial spaces, *O. viridicostus*, *O. seminigra*, and *Neoperla*, were expected to become wider in the estimated riverbed after the deposit removal than in the present riverbed. On the other hand, the WUA of the species that live on the mud and sand substrates in a backwater pool along the channel margin, *M. daimoji* and *G. postocularis*, were expected to become smaller in the estimated riverbed after the deposit removal than in the present riverbed, if the gravel bar around the backwater pool would be removed. But, it was difficult to accurately assess the physical habitat in the places like the backwater pool after the deposit removal. Therefore, the practice of deposit removal work should follow the process of adaptive management in order to determine the best management strategy." (Authors)] Address: not transliterated into English

**8459.** Taylor, P.; Smallshire, D.; Parr, A. (2009): Revised list of Odonata recorded in the United Kingdom. *J. Br. Dragonfly Soc.* 25(1): 57-61. (in English) ["The Trustees of the BDS recently decided that the species list used in all BDS publications should follow the same systematic order. Additionally it was felt that a system of categories for UK species is needed. The Odonata lists presented follow the taxonomic sequence of Davies & Tobin (1984, 1985) and employ similar groupings to the example set by the British Ornithologists' Union Records Committee for its bird list, although it has not been sensible to use exactly the same categories." (Authors)] Address: Taylor, Pam, Decoy Farm, Decoy Rd, Potter Heigham, Norfolk NR29 5LX, UK

**8460.** Tennessen, K.J. (2009): Description of the final instar nymph of *Homeoura nepos* (Selys, 1876) (Odonata: Coenagrionidae). *Zootaxa* 2286: 65-68. (in English) ["The description of the nymph of *H. nepos* by Calvert (1948) was based on a single, immature specimen from São Paulo, Brazil which lacked gills. The nymphs of *H. chelifera* and *H. lindneri* were described by Lozano et al. (2009), who considered Calvert's description of the nymph of *H. nepos* doubtful. The following description and illustrations of the nymph of *H. nepos* are based on reared specimens from Bolivia. The nymphs of the three species now definitely known are compared; the nymphs of *H. sobrina* and *H. obrieni* remain unknown." (Author)] Address: Tennessen, K.J., 125 N Oxford St., Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**8461.** Teuscher, M.; Brändle, M.; Traxel, V.; Brandl, R. (2009): Allometry between leg and body length of in-

sects: lack of support for the size-grain hypothesis. *Ecological Entomology* 34(6): 718-724. (in English) ["The size-grain hypothesis (Kaspari & Weiser, 1999) states that (1) as organisms decrease in size, they perceive their environment as being more rugose; (2) long legs allow organisms to step over obstacles but hinder them from entering small gaps; and (3) as the size of an organism decreases, the benefits of long legs begin to be outweighed by the costs of construction. Natural selection should therefore favour proportionally longer legs in larger organisms, thereby leading to a positive allometry between leg and body length (scaling exponent  $b > 1$ ). Here we compare the scaling exponent of leg-to-body length relationships among insects that walk, walk and fly, and predominantly fly. We measured the lengths of the hind tibia, hind femur, and body length of each species. The taxa varied considerably in the scaling exponent  $b$ . In seven out of ten groups (Formicidae, Isoptera, Carabidae, Pentatomidae, Apidae, Lepidoptera, Odonata adult),  $b$  was significantly greater than one. However, there was no gradual decrease in  $b$  from walking to walking/flying to flying insects. The results of the present study provide no support for the size-grain hypothesis. We propose that leg length is not only affected by the rugosity of the environment, but also by (1) functional adaptations, (2) phylogeny, (3) lifestyle, (4) the type of insect development (hemimetabolism or holometabolism), and (5) constraints of gas exchange." (Authors)] Address: Teuscher, Miriam, Animal Ecology, Department of Ecology, Faculty of Biology, Philipps-Universität Marburg, Karl-von-Frisch Str. 8, 35032 Marburg, Germany. E-mail: miriam.teuscher@gmx.de

**8462.** Thiery, G.; Milenkovski, S.; Lindgren, P.E.; Sahlén, G.; Berglund, O.; Weisner, S.E.B. (2009): Wetland creation in agricultural landscapes: Biodiversity benefits on local and regional scales. *Biological Conservation* 142: 964-973. (in English) ["Wetland creation aiming at a simultaneous increase in nutrient retention and species diversity in agricultural landscapes has recently become applied as a catchment-scale compensation measure for past wetland losses. Here, we evaluate if, and to what extent, dual-purpose wetlands benefit local and regional diversity of agricultural landscapes. We analysed composition and  $a$ ,  $b$ , and  $c$  diversity of aquatic macroinvertebrate assemblages among dual-purpose wetlands in an agricultural region in southwest Sweden in relation to local (water quality, wetland morphology, succession stage, proximity to other aquatic habitats) and landscape parameters (regional connectivity, wetland density). Diversity of mature agricultural ponds was used as a standard to evaluate the value of dual-purpose wetlands. Dual-purpose wetlands sustained  $a$ ,  $b$ , and  $c$  diversity similar to that of natural lentic water bodies in agricultural landscapes in the region and elsewhere. Over 80% of the overall species richness was attributed to  $b$  diversity, and each created wetland contributed to overall species accumulation. Ecosystem parameters explained 19% of the compositional variation among assemblages, but were only marginally related to diversity. Wetland density promoted  $a$  and  $c$  diversity, while spatial heterogeneity ( $b$ ) remained equally high, independent of wetland density. Our results indicate that catchment-scale wetland creation for simultaneous retention and diversity purposes benefits the biodiversity of agricultural landscapes, particularly if the density of aquatic habitats is increased by at least 30%." (Authors) Odonata belong to the most diverse insect orders in man-made water bodies.] Address: Sah-

lén, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, S-752 36 Uppsala, Sweden. E-mail: goran.sahlen@set.hh.se

**8463.** Ting, J.T.; Bots, J.; Pérez Jvostov, F.; van Gossum, H.; Sherratt, T.N. (2009): Effects of extreme variation in female morph frequencies on the mating behaviour of male damselflies. *Behavioral Ecology and Sociobiology* 64(2): 225-236. (in English) ["Female-limited polymorphism is often attributed to selection to avoid excessive male mating attempts. It is encountered in various taxonomic groups, but is particularly common in damselflies, where one female morph (andromorph) typically resembles the conspecific male in colour pattern, while the other(s) (gynomorph(s)) do not. Two sets of theories have been proposed to explain the phenomenon in damselflies, which can be classified as the learned mate recognition (LMR) and male mimicry (MM) hypotheses. To test predictions of these hypotheses, we evaluated the rate of male sexual response towards female morphs and conspecific males in *Nehalennia irene*. The LMR hypothesis predicts that males should respond sexually to andromorphs at greater rates in populations containing a higher relative frequency of andromorphs. The MM hypothesis predicts that males respond more often sexually to both andromorphs and males as the ratio of andromorphs to males increases. While LMR predicts that the rate of mating attempts towards gynomorphs should vary, the MM predicts that it should be relatively fixed. On experimentally presenting live specimens to focal males in five different populations with extreme variation in female morph frequencies, we observed that as the andromorph frequency and ratio of andromorphs to males increased, the proportion of male mating attempts increased on both andromorphs and males, whereas it decreased on gynomorphs. While the simplest form of the MM hypothesis is rejected, the results support specific predictions of both hypotheses and suggest that future studies should not treat these hypotheses as mutually exclusive." (Authors)] Address: Sherratt, T.N., Department of Biology, Carleton University, 1125 Colonel By Drive, Ottawa ON, K1S 5B6, Canada. E-mail: sherratt@ccs.carleton.ca

**8464.** Toivanen, T.; Rantala, M.J.; Suhonen, J. (2009): Influence of alternative mating tactics on predation risk in the damselfly *Calopteryx virgo*. *Can. Jour. Zool.* 87: 684-688. (in English, with French summary) ["Alternative mating tactics are a widespread feature in insects. A typical form of alternative mating behaviour is being a sneaker in the vicinity of a territorial male. Such nonterritorial males have lower mating success, but they may benefit from lower energetic costs and decreased predation risk. In this study, we examined whether nonterritorial male damselflies *C. virgo* are subject to lower predation risk than territorial males. To distinguish predation from other sources of mortality, we used models. The experiment consisted of dried male damselflies settled into the typical perching positions of territorial and nonterritorial males. Also the spatiotemporal patterns of predation risk were studied. The survival of nonterritorial male models was consistently higher than that of territorial male models, which can be attributed to different predation risk. Survival of the models was lower in the presence of avian predators and in large populations. Survival rates were affected by habitat type but did not change during the season. We conclude that nonterritorial male damselflies are less vulnerable to predation and that there may be a

trade-off which could potentially make the fitness of sneakers equal to that of territorial males." (Author)] Address: Suhonen, J., Secti. Ecology, Dept Biology, Univ. Turku, 20014 Turku, Finland. E-mail: juksuh@utu.fi

**8465.** Torralba Burrial, A.; Mezquita, I. (2009): De Monstruos y Prodigios (23): un caso de teratología abdominal en *Ischnura pumilio* (Charpentier, 1825) (Odonata: Coenagrionidae). *Boletín de la Sociedad Entomológica Aragonesa* 44: 349-350. (in Spanish, with English summary) [A teratology in last abdominal segments of a male specimen of *I. pumilio* is reported ] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

**8466.** Torralba Burrial, A.; Mezquita, I. (2009): Fallos en reconocimiento de pareja en libélulas: cinco tandems intrasexuales inter e intraespecíficos (Odonata: Lestidae, Coenagrionidae y Gomphidae). *Boletín de la Sociedad Entomológica Aragonesa* 44: 522-524. (in Spanish, with English summary) ["Partner recognition failure in dragonflies: five intrasexual inter and intraspecific tandems (Odonata: Lestidae, Coenagrionidae and Gomphidae) 5 intrasexual tandems in dragonflies are reported. Two are intraspecific tandems (*Ischnura pumilio* and *Lestes sponsa*) and three are interspecific tandems (*L. sponsa* with *Lestes barbarus*, *L. sponsa* with *Chalcolestes viridis* and *Onychogomphus uncutus* with *Onychogomphus forcipatus*)." (Authors)] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

**8467.** Torralba-Burrial, A. (2009): Libélulas de montaña: cuatro especies amenazadas en la Península Ibérica. *El Ecologista* 62: 40-41. (in Spanish, with English summary) [*Aeshna juncea*, *Cordulegaster bidentata*, *Sympetrum flaveolum*, and *Leucorrhinia pectoralis* are threatened in the Iberian Peninsula, due to distribution fragmentation, loss of its habitats and climatic change.] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

**8468.** Torralba-Burrial, A.; Ocharan, F.J. (2009): Two gynandromorphs of *Sympetrum striolatum* (Charpentier, 1840) (Odonata: Libellulidae). *Entomological Science* 12(2): 182-187. (in English) [Spain; 2 gynandromorphs of *S. striolatum*, with different features, are described here, with special emphasis on the genitalic structures.] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

**8469.** Trautner, J. (2009): Artenschutz und Umweltaftung bei Pflege- und Unterhaltungsmaßnahmen an Fließgewässern. Ein Streiflicht zur Berücksichtigung der relevanten Rechtsnormen in der Praxis. *Naturschutz und Landschaftsplanung* 41(3): 78-82. (in German, with English summary) ["Species Protection and Environmental Liability in Watercourse Maintenance – Consideration of relevant legal norms'. Measures in the context of watercourse maintenance may seriously impair protected species. Some examples are given, including strictly protected species of the European Habitats Directive (92/43/EEC). It is necessary to pay attention to the regulations of the German Federal Nature Conservation Act (BNatSchG) on species protection as well as

to those of the Environmental Damage Act (USchadG) on environmental liability. Currently this seems to be insufficiently known or is not taken seriously enough. Concerning measures planned in the framework of watercourse maintenance firstly at least a rough estimation of their effects is necessary. If highly endangered species could be affected a more detailed assessment should be done. Both the estimation and the assessment aim to clarify (a) which particularly sensitive and protected species are affected, (b) which possibilities for prevention or reduction of negative impacts respectively a careful management are given, (c) if nevertheless legal prohibitions are touched, (d) if a legal exemption is necessary and even possible under the specific circumstances (reasons for the planned measures, lack of satisfactory alternative solutions, conservation status of the populations), (e) if and which additional measures could be necessary in this context." (Author) Coenagrion mercuriale serves as an example to outline legal considerations to maintain watercourses.] Address: Trautner, J., Arbeitsgruppe für Tierökologie und Planung, Johann-Strauß-Straße 22, D-70794 Filderstadt, Germany. E-Mail info@tieroekologie.de

**8470.** Tun-Lin, W.; Lenhart, A.; Nam, V.S.; Rebolgar-Tellez, E.; Morrison, A.C.; Barbazan, P.; Cote, M.; Midega, J.; Sanchez, F.; Manrique-Saide, P.; Kroeger, A.; Nathan, M.B.; Meheus, F.; Petzold, M. (2009): Reducing costs and operational constraints of dengue vector control by targeting productive breeding places: a multi-country non-inferiority cluster randomized trial. *Tropical Medicine and International Health* 14(9): 1143-1153. (in English) ["Objectives: To test the non-inferiority hypothesis that a vector control approach targeting only the most productive water container types gives the same or greater reduction of the vector population as a non-targeted approach in different ecological settings and to analyse whether the targeted intervention is less costly. Methods: Cluster randomized trial in eight study sites (Venezuela, Mexico, Peru, Kenya, Thailand, Myanmar, Vietnam, Philippines), with each study area divided into 18-20 clusters (sectors or neighbourhoods) of approximately 50-100 households each. Using a baseline pupal-demographic survey, the most productive container types were identified which produced  $\geq 55\%$  of all *Ae. aegypti* pupae. Clusters were then paired based on similar pupae per person indices. One cluster from each pair was randomly allocated to receive the targeted vector control intervention; the other received the 'blanket' (nontargeted) intervention attempting to reach all water holding containers. Results: The pupal-demographic baseline survey showed a large variation of productive container types across all study sites. In four sites the vector control interventions in both study arms were insecticidal and in the other four sites, non-insecticidal (environmental management and/or biological control methods). Both approaches were associated with a reduction of outcome indicators in the targeted and non-targeted intervention arm of the six study sites where the follow up study was conducted (PPI, Pupae per Person Index and BI, Breteau Index). Targeted interventions were as effective as non-targeted ones in terms of PPI. The direct costs per house reached were lower in targeted intervention clusters than in non-targeted intervention clusters with only one exception, where the targeted intervention was delivered through staff-intensive social mobilization. Conclusions: Targeting only the most productive water container types (roughly half of all water holding container types)

as effective in lowering entomological indices as targeting all water holding containers at lower implementation costs. Further research is required to establish the most efficacious method or combination of methods for targeted dengue vector interventions." (Authors) In Myanmar, the study included dragonflies to reduce *Ae. aegypti*, and is in combination with sweeps and fishes as predators of *Aedes* the most effective method to reduce *Ae. aegypti* as well as community participation in controlling and maintaining water containers.] Address: Tun-Lin, W., Dept Medical Research, Yangon, Myanmar

**8471.** Tunmore, M. (2009): Reports from Costal Stations - 2008: Lizard Peninsula. *Atropos* 36: 36-38. (in English) [*Sympetrum fonscolombii*, *Ceragrion tenellum*] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: atropos@atroposed.freeseerve.co.uk

**8472.** Tynkkynen, K.; Raatikainen, K.J.; Häkklä, M.; Haukilehto, E.; Kotiaho, J.S. (2009): Alternative reproductive tactics and the propensity of hybridization. *J. evol. biol.* 22: 2512-2518. (in English) ["One explanation for hybridization between species is the fitness benefits it occasionally confers to the hybridizing individuals. This explanation is possible in species that have evolved alternative male reproductive tactics: individuals with inferior tactics might be more prone to hybridization provided it increases their reproductive success and fitness. Here we experimentally tested whether the propensity of hybridization in the wild depends on male reproductive tactic in *Calopteryx splendens* damselflies. Counter to our expectation, it was males adopting the superior reproductive tactic (territoriality) that had greatest propensity to hybridize than males adopting the inferior tactics (sneakers and floaters). Moreover, among the territorial males, the most ornamented males had greatest propensity to hybridize whereas the pattern was reversed in the sneaker males. Our results suggest that there is fluctuating selection on male mate discrimination against heterospecific females depending on both ornament size and the male's reproductive tactic." (Authors)] Address: Tynkkynen, Katja, Centre of Excellence in Evolutionary Research, Department of Biological and Environmental Sciences, PO Box 35, University of Jyväskylä, FI-40014 Jyväskylä, Finland. E-mail: katja.m.m.tynkkynen@jyu.fi

**8473.** Tyrrell, M.; Emary, C.; Piper, M. (2009): The Beautiful Demoiselle *Calopteryx virgo* (Linnaeus) in Northamptonshire: eastwards expansion & habitats. *J. Br. Dragonfly Soc.* 25(2): 100-106. (in English) ["Northamptonshire is at the eastern limit of the range of *C. virgo* in the Midlands of England, making this population of regional importance. *C. virgo* is included as a Key County species according to key sites criteria (French & Smallshire, 2008). Historically, *C. virgo* in Northamptonshire has been limited to two river systems, the Rivers Tove and Cherwell, with its range showing few signs of expanding. However, since 2003, it has undergone a significant range expansion and is now recorded on six river systems, adding the Great Ouse near Brackley, the Leam, the Avon and the Nene to the list. While increased recording in the County over this time period will have undoubtedly contributed new records, this is mainly infilling, and a genuine expansion has been noted into new previously well recorded areas. This paper discusses this expansion using a series of dated distribution maps, and reviews the river habitats of all



river systems with possible expansion corridors discussed." (Authors)] Address: Tyrrell, M., 8 Warwick Close, Raunds, Northamptonshire, NN9 6JH, UK

**8474.** Uzenbaev, S.D.; Lyabzina, S.N. (2009): An experimental study of the effects of spider venom on animals. *Entomological Review* 89(4): 479-486. (in English) ["The effects of venom of spiders from the families Pisauridae, Argyronetidae, and Araneidae on different animals (worms, molluscs, arthropods, fishes, and mammals) were studied. The animals of different classes varied in their sensitivity to spider venom. The animals that can be a potential prey were the most sensitive. The venom of spider females was more efficient than that of males. The spiders were found to be able to kill five victims in sequence; the most effective action of venom was on the first two ones. The venom regenerates in 1.5–2 hours." (Authors) In case of the two odonata taxa studied, the results are as follows: Sensitivity of *Lestes sponsa* larvae to venom of terrestrial *Araneus bituberculatus* (7.4 h before death); *A. diadematus* (1.5 h before death); Sensitivity of *Lestes sponsa* larvae to venom of aquatic *Argyroneta aquatica* (12.4 h  $\pm$  2.3 before death); *Dolomedes fimbriatus* (14.3 h  $\pm$  4.2 before death); Sensitivity of *Aeshna juncea* larvae to venom of aquatic *Argyroneta aquatica* (17.7 h  $\pm$  5.6 before death); *Dolomedes fimbriatus* (44.8 h  $\pm$  4.2 before death)] Address: Uzenbaev, S.D., Petrozavodsk State University, Petrozavodsk, 185910 Russia. E-mail: uzenbaev@petrsu.ru

**8475.** Van Passel, B. (2009): Dragonflies in the northern part of the Waasland (province of East-Flanders) in 2008. *Libellenvereniging Vlaanderen —nieuwsbrief* 3(1): 8-10. (in Dutch, with English summary) [Belgium; *Ceriaton tenellum*, *Coenagrion pulchellum*, *Leucorhinia dubia*, and *Aeshna isocetes* were found by surveying a region with relatively few historical data.] Address: Van Passel, Brigitte, (Libellenwerkgroep Natuurpunt Waasland-Noord), Bormte 24, 9190 Stekene, Belgium. E-mail: brigitte.van.passel1@telenet.be

**8476.** Veber, T.; Kotta, J.; Lauringson, V.; Kotta, I. (2009): Influence of the local abiotic environment, weather and regional nutrient loading on macrobenthic invertebrate feeding groups in a shallow brackish water ecosystem. *Oceanology* 51(4): 541-559. (in English) ["This study evaluated the extent to which depth, sediment type, exposure to waves and coastal slope inclination modulate the relationships between regional nutrient loading, weather patterns and the species composition and dominance structure of macrobenthic invertebrate feeding groups in a brackish water ecosystem of the Baltic Sea. Irrespective of feeding function, the species composition and dominance structure of benthic invertebrate communities were determined by local abiotic variables such as exposure, depth and sediment type. Regional weather variables (average southerly winds, salinity, water temperature, ice conditions) either separately or interactively contributed to the variability of benthic invertebrates. Nutrient loading had significant effects on benthic invertebrates only in interactions with local abiotic or regional weather variables. Herbivores, deposit feeders and suspension feeders exhibited a stronger response to the studied environmental variables than carnivores. All this suggests that (1) the dynamic coastal habitats studied in this work are not very sensitive to shifts in nutrient loading and (2) local abiotic conditions and weather patterns largely define the ob-

served biotic patterns. We believe that the benthic invertebrate time series will only be a better reflection of the nutrient loading signal if more years covering extreme events are included." (Authors) Odonata are referred on the order level.] Address: Kotta, J., Estonian Marine Institute, University of Tartu, Mäealuse 10a, EE-12618 Tallinn, Estonia. E-mail: jonne.kotta@sea.ee

**8477.** Vercruyssen, W.; Feys, S.; Provoost, S. (2009): Two years of dragonflies in the PINK-project, an inventory of ponds at the Belgian coast. *Libellenvereniging Vlaanderen —nieuwsbrief* 3(1): 2-7. (in Dutch, with English summary) ["Very few historic dragonfly data exist from the coastal region. Till 2006, 27 species had been reported. In this three-year project some 150 waterbodies, some created recently as drinking reservoirs for nature-helping grazers, will be monitored. Till now 32 species have been found during these visits (two from the past haven't been found back yet), meaning 7 new species for the coast, some relatively rare for the western provinces of Belgium. One of the most extraordinary facts is the now almost omnipresence of *Coenagrion scitulum*, where the less good weather of 2008 seems to have had no impact on its populations." (Authors)] Address: Vercruyssen, W., INBO, Kliniekstraat 25, 1070 Brussel, Belgium. E-mail: edward.vercruyssen@inbo.be

**8478.** Versigghel, J. (2009): Ontdekking van een populatie Tangpantserjuffer (*Lestes dryas*) op de grens tussen West- en Oost-Vlaanderen [Discovery of a population of *Lestes dryas* on the border of West- and East-Flanders]. *Nieuwsbrief Libellenvereniging Vlaanderen* 3(2): 7-10. (in Dutch, with English summary) ["In the summer of 2009 a population of this rare damselfly was discovered in Wingene (on the border the provinces of East- and West-Flanders. The spot is situated in woodland, but parts have been cleared and ponds digged as part of a Life project. The area - as the nearby "Gulke Putten" nature reserve - holds quite a number of typical species from the Campine region. As the species is very rare, except in parts of the eastern half of Flanders (Antwerp and Limburg Campine), it seems that she is capable of colonising rather far away regions given a suitable habitat." (Author)] Address: Versigghel, J., Gouvernementstraat 34, 9880 Aaler, Belgium. E-mail: jan.versigghel@skynet.be

**8479.** Victorian Department of Sustainability and Environment (2009): Advisory list of threatened invertebrate fauna in Victoria - 2009. Department of Sustainability and Environment, East Melbourne, Victoria. ISBN 978-1-74242-058-5: 12 pp. (in English) [Australia; the red list of includes the following odonate species: *Calia grion billinghami*, *Hemiphysalia mirabilis* (endangered), *Austroaeschna flavomaculata* (vulnerable), *Austrolestes aridus*, *Austropetalia tonyana*, *Coenagrion lyelli* (near threatened), and *Dendroaeschna conspersa* (data deficient).] Address: Dept of Sustainability & Environment, 8 Nicholson Street, East Melbourne 3002, Australia

**8480.** Villanueva, R.J.T. (2009): Odonata of Dinagat Island, the Philippines: updated species list and notes on conservation of species and habitats. *Notulae odonatologicae* 7(3): 27-35. (in English) ["69 species were recorded from the island in 2007-2008, raising the number of the known species up to 83, but 12 species from the 1997 list of M. Hämäläinen & R.A. Müller (*Odonatologica* 26: 249-315) were not recorded during the present survey. 7 species and 3 sites are considered im-

portant from conservation viewpoint." (Author)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., Davao City, 8000 Philippines. E-mail: reaganjoseph@lycos.com

**8481.** Vintchevski, D.; Yasievitch, A. (2009): Comparison of a diet of the Montagu's Harrier *Circus pygargus* L. during breeding season in two distinct plots in the western Belarus. *Studia i Materialy Centrum Edukacji Przyrodniczo-Lesnej R. 11. Zeszyt 3 (22):* 110-117. (in English, with Polish summary) [Hrodna and Smarhon' districts, Belarus; the diet of *Circus pygargus* included *Sympetrum* sp.] Address: Vintchevski, D., Hrodna regional branch of APB-BirdLife Belarus. E-mail: Harrier@tut.by

**8482.** von Ellenrieder, N. (2009): Five new species of *Orthemis* from South America (Odonata: Libellulidae). *International Journal of Odonatology* 12(2): 347-381, pl. VII. (in English, with Spanish summary) ["Five new species of the levis-group of *Orthemis*, *O. cinnamomea* (holotype male in USNM: Peru, Madre de Dios Department, Explorer's Inn on Rio Tambopata, 12°50'S, 69°17'W, 300 m, 23 vii 2002, leg. D. Paulson & N. Smith), *O. coracina* (holotype male in USNM: Ecuador, Sucumbios Province, Limoncocha, 00°24'S, 76°36'W, 300 m, 23 vii 1977, leg. D. Paulson), *O. harpago* (holotype male in USNM: Peru, Madre de Dios Department, Explorer's Inn on Rio Tambopata, 12°30'S, 69°12'W, 300 m, 17 vi 1977, leg. D. Paulson), *O. philipi* (holotype male in MLP: Argentina, Salta Province, pond at route 15 between route 5 and Las Varas, 23°21'S, 64°08'W, 392 m, 23 v 2008, leg. N. von Ellenrieder), and *O. tambopatae* (holotype male in USNM: Peru, Madre de Dios Department, Explorer's Inn on Rio Tambopata, 12°30'S, 69°12'W, 300 m, 16 vi 1977, leg. D. Paulson), are described, illustrated, and diagnosed. A key for all species of the levis-group of *Orthemis* is provided." (Author)] Address: Ellenrieder, Natalia von, Museo de Ciencias Naturales, Universidad Nacional de Salta, Mendoza 2, Salta 4400, Argentina. E-mail: natalia.ellenrieder@gmail.com

**8483.** von Reumont, B.M.; Meusemann, K.; Szucsich, N.U.; Dell'Ampio, E.; Gowri-Shankar, V.; Bartel, D.; Simon, S.; Letsch, H.O.; Stocsits, R.R.; Luan, Y.-x.; Wägele, J.W.; Pass, G.; Hadrys, H.; Misof, B. (2009): Can comprehensive background knowledge be incorporated into substitution models to improve phylogenetic analyses? A case study on major arthropod relationships. *BMC Evolutionary Biology* 2009, 9:119: 19 pp. (in English) ["Background: Whenever different data sets arrive at conflicting phylogenetic hypotheses, only testable causal explanations of sources of errors in at least one of the data sets allow us to critically choose among the conflicting hypotheses of relationships. The large (28S) and small (18S) subunit rRNAs are among the most popular markers for studies of deep phylogenies. However, some nodes supported by this data are suspected of being artifacts caused by peculiarities of the evolution of these molecules. Arthropod phylogeny is an especially controversial subject dotted with conflicting hypotheses which are dependent on data set and method of reconstruction. We assume that phylogenetic analyses based on these genes can be improved further i) by enlarging the taxon sample and ii) employing more realistic models of sequence evolution incorporating nonstationary substitution processes and iii) considering covariation and pairing of sites in rRNA-genes.

Results: We analyzed a large set of arthropod sequences, applied new tools for quality control of data prior to tree reconstruction, and increased the biological realism of substitution models. Although the split-decomposition network indicated a high noise content in the data set, our measures were able to both improve the analyses and give causal explanations for some incongruities mentioned from analyses of rRNA sequences. However, misleading effects did not completely disappear." (Authors)] Address: Björn M von Reumont, Molecular Lab, Zoologisches Forschungsmuseum A. Koenig, Bonn, Germany. E-mail: bmvr@arcor.de

**8484.** Waldhauser, M. (2009): First record of *Erythromma lindenii* (Sélys, 1840) (Odonata, Coenagrionidae) in the Czech Republic. *Bulletin Lampetra* VI: 26-29. (in Czech, with English summary) [In July 2009, *E. lindenii* was recorded for the first time in Czech Republic (northern Bohemia, Liberec region, at a pond called Horní Kunratický rybník near the village of Kunratice u Cvikova). It is a mesotrophic pond of 0,07 km<sup>2</sup> at 350 m a.s.l. with submerged vegetation dominated by *Myriophyllum spicatum* and a narrow zone of littoral vegetation. It is located approx. 65 km SE from the nearest known locality - Knappensee - in Saxony, Germany.] Address: Waldhauser, M., Petrovice 136, 47125 Jablonné v Podještědí, Czech Republic. E-mail: martin.waldhauser@nature.cz

**8485.** Walker, I. (2009): Emergence of aquatic insects and spider abundance in the Balbina Reservoir (Presidente Figueiredo, Amazonas, Brazil) during the phase of declining eutrophication. *Acta Limnol. Bras.* 21(2): 199-207. (in English, with Portuguese summary) ["Aim: Between April 1991 and December 1994 the patterns of insect emergence were assessed by a total of 422 emergence traps that were set for 24 hours periods on the water surface of the riparian zones of two islands in the Balbina Lake; Methods: These collections were accompanied by observations of spider densities along the shrubby forest margins of the islands. Furthermore, to characterize the lake ecosystem, casual observations on Odonata and spider abundance within the inundated forest with dead, emergent trees were recorded, and some of the species were identified; Results: Insect emergence did not decline during the 4 years of collection, and the Chironomidae and Chaoboridae were dominant throughout, adding up to 70-90% of the catches. There is some indication of seasonal cycles, and the specific pattern of Ephemeroptera emergence is demonstrated in more detail; Conclusions: It appears that production of aquatic insects in the Balbina Reservoir, while still in its eutrophic phase, is lower than along the Tarumã- Mirim, an undisturbed Central Amazonian forest stream of nutrient-poor, acid water. [...] A total of 37 counts made during these excursions resulted in a mean estimate of 40-55 adult Odonata/ha of inundated dead forest, and there was no consistent trend of change of abundance during the seven- year period of observation. On a single occasion no Odonata were seen (20 July/94, 8:30 hours, Ilha das Aranhãs), and it may be that this is due to the relatively early hour of the day, because the highest number recorded from this area was 306/ha, between 14:00-16:00 hours (28 November/95). This interpretation is favored by the observation that on May 2nd 1993, 37% of emergent tree tops were occupied by Odonata at 9:00 in the morning, as against 68% at midday on the same day in the same place (near the Ilha das Aranhãs). Excessive densities

were recorded in July/97 when approaching the Serra do Chocador: 5-15 individuals per 100 m<sup>2</sup>, which amounts to 500-1500/ha. Extension of the 100 m<sup>2</sup> values to hectares, however, may not be realistic, because naiads may accumulate locally for emergence; for example, on March/94, 41 Odonata-exuviae were counted within 1 m<sup>2</sup> of aquatic macrophytes that floated between the dead trees near the Serra do Chocador. Although adult Odonata were not specified when motoring to the research sites, the abundance of *Brachymesia herbida* in the emergent dead forest of the reservoir between the dam and the research islands was noted during the whole period of the project." (Author) In tab. 4 the following taxa are listed: *B. herbida*, *Erythemis hematogaster*, *Erythemis vesiculosa*, *Orthemis ferruginea* (?), *Perithemis lais*, *Ischnura fluviatilis*, and *Protoneura* sp.] Address: Walker, I., Coordenação de Pesquisa em Ecologia – CPEC, Instituto Nacional de Pesquisa da Amazônia – INPA, Av. André Araújo, 2936, Aleixo, CP 478, CEP 69011-970, Manaus, AM, Brazil. E-mail: iwalker@inpa.gov.br

**8486.** Walker, I. (2009): Omnivory and resource - sharing in nutrient - deficient Rio Negro waters: Stabilization of biodiversity? *Acta Amazonica* 39(3): 617-626. (in English, with Portuguese summary) [*Ischnura* spec. and *Aeschnosoma* spec. "are essentially insectivores, [...] any other prey type is sporadic. The only exception is oligochaete capture by *Aeschnosoma*. The Anisoptera occupy niches within the litter layers, and thus, have access to the small oligochaetes that colonize the surface of litter leaves, while the Zygoptera usually occupy surfaces near the open water, where oligochaetes are less frequent. The prevalent prey of both Odonata species are Ephemeroptera and Chironomidae, presumably because these are the most frequent and ubiquitous insect larvae in these benthic habitats (Walker 1994, 1998). Algae ingestion is questionable, because small algae may accidentally enter the ventricle in the course of prey capture. Rather surprising are fish vertebrae within an Odonata ventricle, yet, the smallest fish species of the litter habitat is a tiny gobby *Microphylipnus*, with a standard length of 1,2cm. This fish, therefore, is within the range of the normal prey of larger anisopteran larvae, furthermore, there are the larvae and juveniles of other small litter-colonizing fish species, which may serve as prey. On the whole it appears that both Odonata species, [...] accept any animal prey within the range of their perception and size that allows for successful capture and ingestion. Thus, even if algae- feeding is excluded, they are omnivores in the sense that they feed on various trophic levels, considering that larger insect larvae (Ephemeroptera, Trichoptera) feed on algae, microcrustacea and chironomids (Walker 1987)." (Author)] Address: Walker, Ilse, Instituto Nacional de Pesquisas da Amazônia (INPA), Coordenação de Pesquisas em Ecologia (CPEC), Caixa Postal 478, 69011-970, Manaus (AM), Brazil. E-mail: iwalker@inpa.gov.br

**8487.** Ware, J.L.; Simaika, J.P.; Samways, M.J. (2009): Biogeography and divergence time estimation of the relict Cape dragonfly genus *Syncordulia*: global significance and implications for conservation. *Zootaxa* 2216: 22-36. (in English) ["*Syncordulia* (Libelluloidea) inhabits mostly cool mountainous streams in the Cape Floristic Region of South Africa. It is found at low densities in geographically restricted areas. *Syncordulia* is endemic to South Africa and, until recently, only two spe-

cies were known, *S. venator* and *S. gracilis*, both considered Vulnerable by the World Conservation Union (IUCN). Two new species, *S. serendipator* and *S. legator*, were described from previously unrecognized museum specimens and new field collections. Here we corroborate the validity of these two new species using multiple genes and propose intergeneric relationships within *Syncordulia*. Molecular data from two independent gene fragments (nuclear 28S and ribosomal and cytochrome oxidase subunit I mitochondrial data) were sequenced and/or downloaded from GenBank for 7 libelluloid families, including 12 *Syncordulia* specimens (2 *Syncordulia gracilis*, 4 *S. serendipator*, 2 *S. legator* and 4 *S. venator*). The lower libelluloid group GSI (sensu Ware et al. 2007), a diverse group of non-corduliine taxa, is strongly supported as monophyletic. *Syncordulia* is well supported by both methods of phylogenetic analyses as a monophyletic group deeply nested within the GSI clade. A DIVA biogeographical analysis suggests that the ancestor to the genus *Syncordulia* may have arisen consequent to the break-up of Gondwana (>120 Mya). Divergence time estimates suggest that *Syncordulia* diverged well after the breakup of Gondwana, approximately 60 million years ago (Mya), which coincides with the divergence of several Cape fynbos taxa, between 86 – 60 Mya. DIVA analyses suggest that the present distributions of *Syncordulia* may be the result of dispersal events. We relate these phylogenetic data to the historical biogeography of the genus and to the importance of conservation action." (Authors)] Address: Ware, Jessica Dept Ent., Rutgers Univ., New Brunswick, NJ, USA. E-mail: jware@amnh.org

**8488.** Watts, P.C. (2009): Characteristics of microsatellite loci in Odonata. *International Journal of Odonatology* 12(2): 275-286. (in English) ["Microsatellite loci have become the genetic markers of choice for population-level molecular ecological studies. However, microsatellite loci had been isolated for comparatively few species of odonate until the past five years. This review summarises the main characteristics – expected heterozygosity and microsatellite length – of 116 microsatellite loci that have been isolated from the genomes of 11 odonate species and discusses potential problems associated with using microsatellite loci to study odonate biology. It is clear that odonates are characterised by relatively short microsatellites, typically less than 10 core motifs, that demonstrate a high level of heterozygote deficits. Some reasons why some odonate species have particularly low levels of gene diversity are discussed also." (Author)] Address: Watts, P.C., School of Biol. Sc., Biosciences Building, Univ. Liverpool, Crown Str., L69 7ZB, Liverpool, UK. E-mail: phill@liv.ac.uk

**8489.** Weiss, K. (2009): Libellen-Beobachtungen im Queich-Gebiet/TK 6715-Lingenfeld und Basaltsteinbruch/TK 6312-Rockenhausen. *Pflanzen und Tiere in Rheinland-Pfalz (Berichtsjahr 2008)* 19: 159. (in German) [Germany, Rheinland-Pfalz; a list of 17 species includes *Coenagrion mercuriale* and *Ophiogomphus cecilia*, species protected by law.] Address: not stated

**8490.** Wichard, W.; Gröhn, C.; Sereuszus, F. (2009): *Aquatic Insects in Baltic Amber - Wasserinsekten im Baltischen Bernstein*. Verlag Kessel. ISBN: 978-3-941300-10-1: 336 pp. (in Bilingual text (English/German)) ["At first sight the embedment of aquatic insects in Baltic amber seems to be contradictive, as the insects live in water and amber originated from resin of



extinct trees that grew in a Fennoscandian montane forest approximately 40–50 million years ago. About 25% of all animals found in amber are aquatic insects. The larvae of these amphibious forms lived in water whereas adults were frequently terrestrial and capable of flying. The Tertiary “amber forest” apparently contained a great amount of lentic waters, flood plains and flowing waters. The resin was washed out of dead wood and streams and rivers transported it to the sea where it became fossilized into amber. Without water, the genesis of amber would be impossible. The high number of aquatic insects in amber is connected with the process of its fossilization. As if in a complex “paleontological jigsaw puzzle” amber inclusions are combined together so that the whole mosaic of the nature of 40–50 million years ago can be reconstructed.” (Authors) Odonata are treated on pages 19-29.] Address: www.verlagkessel.de.

**8491.** Wildermuth, H.; Küry, D. (2009): Libellen schützen, Libellen fördern. Leitfaden für die Naturschutzpraxis. Beiträge zum Naturschutz in der Schweiz 31: 88 pp. (in German; French) [This is a manual on protection and conservation of Odonata including the management of their habitats in Switzerland.] Address: Schweizerische Arbeitsgemeinschaft Libellenschutz, SAGLS, Life Sciences AG, Greifengasse 7, CH-4058 Basel, Switzerland

**8492.** Willigalla, C.; Fartmann, T. (2009): Die Libellenfauna der Regenrückhaltebecken der Stadt Mainz (Odonata). *Libellula* 28(3/4): 117-137. (in German, with English summary) [“Between 2006 and 2008, 32 species of Odonata were recorded at twelve rain-storage ponds (RSP) in Mainz. This is 84 % of the total Odonata fauna of the city area of Mainz, which comprises 38 species in total. Twenty-two of the observed species were classified as indigenous. On average, we found between six and nine species per RSP. Therefore, beside park ponds, RSP serve as a second important habitat for dragonflies and damselflies in urban areas. The diversity of Odonata depended on pond size and the position of the ponds in different city zones. In the suburbs more species were found than in the city centre. In damselflies the abundance was negatively correlated with the density of buildings in the surroundings (up to 200 m around the ponds). Where building cover exceeded 40 %, damselfly abundances were very low. The spatial distance between the RSP was the main driver of similarity among Odonata assemblages of the RSP. Due to the warm urban climate in cities RSP generally favour Mediterranean species. However, the macroclimate had a stronger impact on community composition in cities. The Odonata fauna of the RSP of Mainz was very similar to those of the cities of Münster and Osnabrück. The main reason for this seems to be that the majority of species occurring in RSP are widespread and common species that are typical of eutrophic ponds. We assume that in Germany about 35 Odonata species are able to colonize RSP in cities. *Enallagma cyathigerum*, *Erythromma viridulum*, *Aeshna affinis*, *A. mixta*, *Libellula depressa* and *Orthetrum cancellatum* act as regional character species.] Address: Willigalla, C., Am Großen Sand 22, D-55124 Mainz, Germany. E-mail: christoph@willigalla.de

**8493.** Wingate, D.B.; Madeiros, J.L.; Kushlan, J.A. (2009): Green Heron colonizes Bermuda. *Waterbirds* 32(1): 162-168. (in English) [“The only non-fish prey

item observed to be taken by Green Herons (*Butorides virescens*) during the study period was a *Tamea abdominalis*, captured by a recently-fledged bird.” (Author)] Address: Kushlan, J.A., P.O. Box 2008, Key Biscayne, FL 33149, USA. E-mail: jkushlan@earthlink.net

**8494.** Winkler, C.; Neumann, H.; Drews, A. (2009): Verbreitung und Ökologie von *Coenagrion armatum* am südwestlichen Arealrand in Schleswig-Holstein (Odonata: Coenagrionidae). *Libellula* 28(1/2): 1-24. (in German, with English summary) [“Distribution and ecology of *C. armatum* on the southwestern fringe of its area in Schleswig-Holstein, Germany — The last systematical surveys of *C. armatum* in Schleswig-Holstein (SH) had been conducted during the 1960s and 1970s. The last population was detected in 1982. In order to record the present distribution of *C. armatum* in SH a countrywide survey was carried out between 24-IV and 5-VI-2008. Based on former records, 137 standing waters in 37 sites were investigated. Imagines of *C. armatum* were found at 18 waters, which were situated in 12 sites. All these sites were located in the northern part of SH. More than ten imagines were detected at eight waters, whereas more than 100 imagines were recorded from a shallow lake and a peat digging hole. Tandems were found at 13 waters and ovipositions at four of these localities. Only one pair was seen in wheel position. *C. armatum* populated mesotrophic waterbodies from 0.01 to 4.7 ha with shallow water zones. Most waters were regarded as perennial. All known occurrences were restricted to moor- and heathland. The soft rush *Juncus effusus* occurred, at least partially, as riparian vegetation on all colonised waters. Stocks of soft rush offered perches and were used by *C. armatum* for hiding and mating. Broken stems of soft rush on the water surface were even used for oviposition. The flying period of *C. armatum* extended at least from 6-V to 30-V-2008.” (Authors)] Address: Winkler, C., Bahnhofstr. 25, 24582 Bordesholm, Germany. E-mail: chr.winkler@email.de

**8495.** Winkler, C.; Neumann, H. (2009): Neu für Schleswig-Holstein: Die Feuerlibelle (*Crocothemis erythraea* (Brullé, 1832)). *Bombus* 3(76-78): 312. (in German) [Germany; 19.VI.2007, Stadthagen (Kreis Rendsburg-Eckemförde; 10°04'46.77"E, 54°25'13.50"N). 15.VII.2007, N Muggenburg, NSG Salemer Moor (Kreis Hztg. Lauenburg; 10°49'03"E, 53°40'54"N).] Address: not stated

**8496.** Wolff, L.L.; Abilhoa, V.; Sant'Anna Rios, F.; Donatti, L. (2009): Spatial, seasonal and ontogenetic variation in the diet of *Astyanax aff. fasciatus* (Ostariophysi: Characidae) in an Atlantic Forest river, Southern Brazil. *Neotropical Ichthyology* 7(2): 257-266. (in English, with Spanish summary) [Odonata are of minor importance as food for *A. aff. fasciatus*.] Address: Wolff, L.L., Departamento de Biologia Celular, Universidade Federal do Paraná. Caixa Postal 19031, 81531-990 Curitiba, PR, Brazil. E-mail: lucianobiol@yahoo.com.br;

**8497.** Wu, Z.-r.; Han, L.-x.; Kuang, Z.-f. (2009): Breeding behaviors of Blue Tailed Bee-eater of Nujiang valley. *Zoological Research* 30(4): 429-432. (Chinese, with English summary) [China; observations from 26th March to 17th July, 2007 showed that the most common food items male *Merops philippinus* fed to females are Odonata and Hymenoptera, accounting for 83.56% (Odonata: 63%) of all food items.] Address: Han, L.-x., Faculty of Conservation Biology, Southwest Forestry

University, Kunming, 650224, China. E-mail: lianxian.han@gmail.com

**8498.** Wu, Y.-t.; Wang, C.-h.; Zhang, X.-d.; Zhao, B.; Jiang, L.-F.; Chen, J.-k.; Li, B. (2009): Effects of salt-marsh invasion by *Spartina alterniflora* on arthropod community structure and diets. *Biol. Invasions* 11: 635-649. (in English) ["Invasive plants strongly affect physical and biotic environments of native ecosystems. Insects and other arthropods as one of the major components of many ecosystems are very sensitive to subtle changes in abiotic and biotic environments. We examined the effects of exotic *Spartina alterniflora* invasion on community structure and diets of arthropods in a saltmarsh previously dominated by native *Phragmites australis* in Yangtze River estuary through net sweeping and plant harvesting methods and stable isotope analysis. [...]."] (Authors) According to the authors, the plants *Phragmites* and *Spartina* contribute 100% to diets of the *Caeneagriidae* (Odonata).!!!] Address: Li, B., Coastal Ecosystems Research Station of Yangtze River Estuary, Ministry of Education Key Lab. Biodiv. Science & Ecological Engineering, Institute of Biodiversity Science, Fudan Univ., Shanghai 200433, China. E-mail: bool@fudan.edu.cn

**8499.** Yu, X.; Bu, W. (2009): A revision of *Mesopodagrion* McLachlan, 1896 (Odonata: Zygoptera: Megapodagrionidae). *Zootaxa* 2202: 59-68 (in English) ["A synopsis of *Mesopodagrion* including diagnostic illustrations, distribution maps, and keys to all taxa incorporates the following taxonomic changes: *Mesopodagrion yachowensis* Chao, 1953 is resurrected from synonymy, *Mesopodagrion tibetanum* McLachlan, 1896 comprises two subspecies, one new *M. tibetanum australe* and a unique character for the genus, the bifurcate process on distal dorsum of S10 of the male."] (Authors)] Address: Bu, W., Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, 300071 China. E-mail: wenjunbu@nankai.edu.cn

**8500.** Xu, Q.-h.; Chen, Z.; Qiu, Z.-p. (2009): A new species of the genus *Planaeschna* McLachlan from Fujian, China (Odonata, Aeshnidae). *Acta zootaxonomica Sinica* 34(3): 439-442. (in English, with Chinese summary) [*Planaeschna liui* sp. nov. is described and illustrated from a single male. The holotype is deposited at Institute of Biological Control Research, Fujian Agriculture and Forestry University, Wuyi Mountain (27°33'-54'N, 117°27'-51'E), 16 July 2008.] Address: Xu, Q.h., Zhangzhou City University, Zhangzhou, Fujian 363000, China

**8501.** Yu, X.; Bu, W. (2009): Description of two new damselflies, *Protosticta zhengi* and *Sinosticta sylvatica*, from China (Odonata: Zygoptera: Platystictidae). *Zootaxa* 2245: 54-58. (in English) ["2 new species of Platystictidae (*Sinosticta sylvatica*, holotype male: China, Hainan, Diaoluoshan Nature Reserve, 620m, 29-V-2007; and *Protosticta zhengi*, holotype male; China, Yunnan, Xishuangbanna, Menghun, 750m, 30-V-1958; both deposited in Inst. Ent., Nankai Univ., Tianjin, China) are described, and a key is provided for the identification of all described species of *Sinosticta* Wilson."] (Authors)] Address: Yu, X., Coll. Environmental Science & Engineering, Nankai Univ., Tianjin, 300071, China. E-mail: nkyuxin@yahoo.cn

**8502.** Zampaulo, R.; Ferreira, R.L. (2009): Diversidade de invertebrados terrestres cavernícolas em nove

cavidades naturais no município de Aurora do Tocantins (TO). *ANAIS do XXX Congresso Brasileiro de Espeleologia, Montes Claros MG, 09-12 de julho de 2009 - Sociedade Brasileira de Espeleologia: 267-274.* (in Portuguese, with English summary) ["Odonata" are listed without any further details as recorded in the caves of Aurora, Brazil.] Address: Zampaulo, R., Univ. Federal de Lavras, Depto de Biologia, Setor de Ecologia, Campus Universitário, Caixa Postal 3037, 37200-000, Minas Gerais, Brasil. E-mail: rzampaulo@yahoo.com.br

**8503.** Zessin, W.; Günther, A. (2009): Bericht über das 18. Internationale Symposium der Odonatologie, 5. bis 13. November 2008 in Nagpur, Indien. *Virgo - MittBl. ent. Ver. Mecklenburg* 12(1): 57-71. (in German) [Report on the 18th International Symposium of Odonatology in India, with the list of presentations, a checklist of Odonata of the Nagpur area (Tamil Nadu), documents of reports in local newspapers, and the list of records made during the Symposium at 8 localities. Many photographs are included in the paper.] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**8504.** Zessin, W. (2009): Erstnachweis der Zierlichen Moosjungfer (*Leucorrhinia caudalis*) in West-Mecklenburg 2008 am Kraaker Waldsee, Landkreis Ludwigslust. *Virgo - MittBl. ent. Ver. Mecklenburg* 12(1): 76-78. (in German) [*C. caudalis* was recorded on 24-V-2008 in the western part of the federal state Mecklenburg-Vorpommern, Germany. There, a total of 22 Odonata species is co-occurring.] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**8505.** Zhao, Y.; Tong J.; Sun J.; Chen D.; Zhang, J. (2009): Property tests of nanoindentation on membranous wings of dragonflies. *Journal of Agricultural Mechanization Research* 11: 26-29. (in Chinese, with English summary) ["The nano-mechanical behaviour of dragonfly membranous wings was investigated with a nano-indenter. The holding time and the loading rate were selected 20s and 53µN/s by the method of test optimization. In nano-indentation experiment, 6 indentation measurements were done in an area of 0.075mm × 0.01mm and then took the mean value as the nano-mechanical parameter of this position. It was shown that the maximums of the reduced modulus and the hardness of the living dragonfly *Anax parthenope julius* Brauer and *Pantala flavescens* Fabricius are about at position of 0.7L of their wings, where L is the total length of their wings. The maximums of the reduced modulus and the hardness of the dragonfly *Sympetrum striolatum* are at position of 0.5L of its wing, where L is the total length of the wing. The reduced modulus and the hardness of *A. parthenope julius* are maximum on the corresponding parts among the three dragonflies, related to the large somatotype."] (Authors)] Address: Zhao, Y., The College of Mechanical and Power Engineering, Henan Polytechnic University, Jiaozuo 454000, China

**8506.** Zherikhin, V.V.; Sukacheva, I.D.; Rasnitsyn, A.P. (2009): Arthropods in contemporary and some fossil resins. *Paleontological Journal* 43(9): 987-1005. (in English) ["More than 4800 arthropod inclusions were isolated and identified from resin of various contemporary conifer trees in various parts of northern Eurasia. Their composition is compared with that in representat-

ive collections of Baltic and Rovno ambers (Upper Eocene) and with that in Dominican amber (Lower Miocene). The original composition of inclusions of Dominican amber is reconstructed for the first time using a procedure intended to reduce the effect of human bias. Taphonomical characteristics of resins and their effects on the composition of inclusions are studied. The actual paleontological approach reveals a trend towards a decrease in the relative abundance of arboreal springtails and nematoceran dipterans and an increase in that of the true bugs, beetles, lepidopterans, and hymenopterans (especially ants) between the Eocene and the present. Relative abundances of spiders and mites show no clear trend. The available data on other arthropods are still insufficient for elucidating evolutionary trends. Surprisingly, a small contemporary sample from Taimyr (N. Siberia) was inexplicably more similar to the Eocene amber than to other contemporary resins. No other significant differences in composition of inclusions, compared across different conifer genera or geographic areas, have been revealed. A more detailed comparison between contemporary and fossil hymenopteran and beetle inclusions reveals correlations with both age (= evolutionary change) and geography. The absolute dominance of ants, particularly Formicinae and Myrmicinae, and, among solitary hymenopterans, Ichneumonidae, Braconidae, and Pteromalidae, and a corresponding decline in the abundance of Scelionidae and Dolichoderinae in contemporary resins compared to amber reflect evolutionary changes. In contrast, the overwhelming abundance of Formicinae and consistent occurrence of sawflies in contemporary resins of northern Eurasia appear to be explained by geography. The Eocene assemblages of beetle inclusions are characterized by a wider and more variable set of dominant families, in sharp contrast to contemporary resins, which are uniformly dominated by Curculionidae, Chrysomelidae, and Staphylinidae. Additional analyses are needed to explain this difference." (Authors)] Address: V. V. Zherikhin, V.V., Borissiak Paleontological Institute, Russian Academy of Sciences, Profsoyuznaya ul. 123, Moscow, 117997, Russia. E-mail: lab@palaeontolog.ru

## 2010

**8507.** Allen, K.A.; Thompson, D.J. (2010): Movement characteristics of the Scarce Blue-tailed Damselfly, *Ischnura pumilio*. *Insect Conservation and Diversity* 3(1): 5-14. (in English) ["1. *I. pumilio*, is threatened in the UK and exists in small, transient colonies. Consequently, little is known about its dispersal characteristics. This study investigates movement in two contrasting habitats with the aim of informing conservation management on a landscape scale. 2. Mark-release-recapture studies were performed at an established colony in the New Forest and a smaller population in the Red River valley in southern England. A total of 2304 individuals was marked. 3. *I. pumilio* was found to be exceptionally sedentary. Mean gross lifetime movement was 56 m and 43% of individuals moved <50 m in their lifetime. Movements over 150 m were very rare. Maximum lifetime movement was 1165 m. As such, *I. pumilio* is the most sedentary odonate studied in the UK to date. 4. Movement was inversely density dependent, which has important conservation implications if individuals attempt to emigrate from small populations be-

cause of low density. The presence of parasitic mites (*Hydryphantes* sp.) significantly increased movement distance. 5. *I. pumilio* had a low dispersal probability compared to other damselflies. As the smallest British odonate, this is in keeping with the relationship between size and dispersal found across taxa. 6. *I. pumilio* has been regarded as a 'wandering opportunist' due to its tendency to appear in locations far from known sites. However, this study suggests that long range movement rarely occurs from prime habitat that is maintained in an early successional stage. This has implications for the conservation of the species in the UK." (Author)] Address: Allen, Katherine, School Biol. Sc., University of Liverpool, Liverpool, UK. E-mail: kaallen@liv.ac.uk

**8508.** Anderson, C.N.; Grether, G.F. (2010): Inter-specific aggression and character displacement of competitor recognition in *Hetaerina* damselflies. *Proc. R. Soc. B* 277: 549-555. (in English) ["In zones of sympatry between closely related species, species recognition errors in a competitive context can cause character displacement in agonistic signals and competitor recognition functions, just as species recognition errors in a mating context can cause character displacement in mating signals and mate recognition. These two processes are difficult to distinguish because the same traits can serve as both agonistic and mating signals. One solution is to test for sympatric shifts in recognition functions. We studied competitor recognition in *Hetaerina* damselflies by challenging territory holders with live tethered conspecific and heterospecific intruders. Heterospecific intruders elicited less aggression than conspecific intruders in species pairs with dissimilar wing colouration (*H. occisa*/*H. titia*, *H. americana*/*H. titia*) but not in species pairs with similar wing colouration (*H. occisa*/*H. cruentata*, *H. americana*/*H. cruentata*). Natural variation in the area of black wing pigmentation on *H. titia* intruders correlated negatively with heterospecific aggression. To directly examine the role of wing colouration, we blackened the wings of *H. occisa* or *H. americana* intruders and measured responses of conspecific territory holders. This treatment reduced territorial aggression at multiple sites where *H. titia* is present, but not at allopatric sites. These results provide strong evidence for agonistic character displacement." (Authors) The experiments reported here were carried out in June–August 2006, May–July 2007 and April–May 2008 at 10 sites in Texas, USA and Mexico.] Address: Grether, G.F., Dept Ecology & Evolutionary Biol., Univ. California, 621 Charles E Young Drive South, Los Angeles, CA, 90095. USA. E-mail: ggrether@oeb.ucla.edu

**8509.** Azpilicueta Amorin, M.; Vila, M.; Cordero Rivera, A. (2010): Population genetic structure of two threatened dragonfly species (Odonata: Anisoptera) as revealed by RAPD analysis. In: Jan Christian Habel and Thorsten Assmann (Eds.): *Relict species. Phylogeography and conservation biology*. Springer Berlin Heidelberg. ISBN 978-3-540-92161-5 (Print): 295-308. (in English) ["*Macromia splendens* and *Oxygastra curtisii* were included in the European Habitats directive as taxa of special concern. Nevertheless, there is almost no genetic information about them. We assessed the genetic diversity and population structuring among several Northwest Iberian locations where these species occur. For this, we examined the genetic pattern revealed by RAPD markers in 4 locations of *M. splendens* and five locations of *O. curtisii*. The former showed strong population structuring, whereas gene flow bet-



ween different river systems may be the reason for the lower structuring inferred for *O. curtisii*. Based on these results, we support the need of special management for *M. splendens* in Northwest Iberia." (Authors)] Address: Azpilicueta Amorin, Mónica, Department of Ecology and Animal Biology, University of Vigo, EUET Forestal, Campus Universitario, E-36006 Pontevedra, Spain. E-mail: mazpilicueta@sek.es

**8510.** Bogut, I.; Cerba, D.; Vidakovic, J.; Gvozdic, V. (2010): Interactions of weed-bed invertebrates and *Ceratophyllum demersum* stands in a floodplain lake. *Biologia* 65(1): 113-121. (in English) ["This investigation reports on weed-bed invertebrate abundance associated with the submersed macrophyte *Ceratophyllum demersum* L. in Lake Sakadaš within Kopacki rit Nature Park (Croatia). Twenty five taxonomic groups, with the dominance of chironomids (79%), were recorded at three stations during the investigation from July 14 to September 8, 2004. Nematodes and large predatory larvae of Zygoptera with 6% were second in dominance, followed by oligochaetes with 5%. Weed-bed invertebrates on *C. demersum* were more abundant than on *Myriophyllum spicatum* L. due to different morphology of the host plants. Environmental parameters within *C. demersum* stands were found in the same range at all stations, but they changed during the season. They indicated eutrophy with the tendency to hypertrophy which is reflected by the composition of the weed-bed invertebrate community." (Authors)] Address: Bogut, Irela, Fac.Education, J. J. Strossmayer Univ., Lorenza Jägera 9, Osijek, Croatia. E-mail: dcerba@gmail.com

**8511.** Bots, J.; de Bruyn, L.; Snijders, T.; van den Branden, B.; van Gossun, H. (2010): Exposure to perfluorooctane sulfonic acid (PFOS) adversely affects the life-cycle of the damselfly *Enallagma cyathigerum*. *Environmental Pollution* 158(3): 901-905. (in English) ["We evaluated whether life-time exposure to PFOS affects egg development, hatching, larval development, survival, metamorphosis and body mass of *Enallagma cyathigerum* (Insecta: Odonata). Eggs and larvae were exposed to five concentrations ranging from 0 to 10 000 µg/L. Our results show reduced egg hatching success, slower larval development, greater larval mortality, and decreased metamorphosis success with increasing PFOS concentration. PFOS had no effect on egg developmental time and hatching or on mass of adults. Eggs were the least sensitive stage (NOEC = 10 000 µg/L). Larval NOEC values were 1000 times smaller (10 µg/L). Successful metamorphosis was the most sensitive response trait studied (NOEC < 10 µg/L). The NOEC value suggests that *E. cyathigerum* is amongst the most sensitive freshwater organisms tested. NOEC for metamorphosis is less than 10-times greater than the ordinary reported environmental concentrations in freshwater, but is more than 200-times smaller than the greatest concentrations measured after accidental releases. Long-term laboratory exposure to perfluorooctane sulfonic acid reduces survival and interferes with metamorphosis of *Enallagma cyathigerum* (Insecta: Odonata)." (Authors)] Address: Bots, Jessica, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: Jessica.bots@ua.ac.be

**8512.** Buden, D.W. (2010): *Pantala flavescens* (Insecta: Odonata) rides west winds into Ngulu Atoll, Micronesia: Evidence of seasonality and wind-assisted

dispersal. *Pacific Science* 64(1): 141-143. (in English) ["Observations of *P. flavescens* on Ngulu Island during early August 2008 constitute the first report of Odonata on Ngulu Atoll, Yap State, Federated States of Micronesia; no other odonate is documented on the atoll, but descriptions by local residents of a larger, rarely encountered, blue dragonfly may pertain to *Anax guttatus*. The sudden appearance of *P. flavescens* on Ngulu after its apparent absence during the previous two and a half weeks of this study, together with the absence of exuviae at potential breeding sites and remarks by local residents alluding to its appearance each year around August and September, suggests that it occurs regularly in migration and that there is no permanent resident population. Its appearance often coincides with winds from a westerly direction." (Author)] Address: Buden, D.W., Division of Natural Sciences and Mathematics, College of Micronesia-FSM, P.O. Box 159, Kolonia, Pohnpei, Federated States of Micronesia 96941. E-mail: donbuden@comfsm.fm

**8513.** Buffagni, A.; Erba, S.; Armanini, D.G. (2010): The lentic-lotic character of Mediterranean rivers and its importance to aquatic invertebrate communities. *Aquatic Sciences* 72(1): 45-60. (in English) ["Hydromorphological features are crucial in structuring habitats for freshwater organisms. The quantification of these variables is often performed through accurate measuring or detailed estimation, but their assessment is not always feasible for river management purposes. Economic and time constraints often lead to difficulty in creating simple summaries of collected data for practical use. The Lentic-lotic River Descriptor (LRD) was developed to identify the character of a river site in terms of local hydraulic conditions. Information about the presence of flow types, channel substrates, in-stream vegetation, organic debris and artificial features is included in its calculation. The main aim of this paper is to investigate whether the lentic-lotic character of a river site, as summarized with the LRD descriptor, is relevant to aquatic invertebrate communities in nearly natural river sites. Invertebrate data were collected with multi-habitat, proportional sampling and hydromorphological information was gained by applying the CARAVAGGIO method (river habitat survey technique) in the field. The dataset was generated from High or Good ecological status river sites located in Mediterranean areas of Italy. Correspondence Analysis was performed to relate the invertebrate community structure to a set of catchment-scale, reach-scale and chemical environmental variables. The results of the multivariate analysis indicate that LRD provides a persuasive explanation of the most important axis of variation in benthic data. This paper also presents the optimal LRD range for a set of invertebrate taxa, accompanied by a short discussion of their potential use in conservation issues." (Authors) Odonata are treated at the genus level (*Calopteryx*, *Orthetrum*.)] Address: Buffagni, A., CNR, IRSA, Water Research Institute, Via del Mulino, 19, 20047 Brugherio (MB), Italy. E-mail: buffagni@irsa.cnr.it

**8514.** Davis, J.M.; Rosemond, A.D.; Eggert, S.L.; Cross, W.F.; Wallace, J.B. (2010): Long-term nutrient enrichment decouples predator and prey production. *PNAS* 107(1): 121-126. (in English) ["Increased nutrient mobilization by human activities represents one of the greatest threats to global ecosystems, but its effects on ecosystem productivity can differ depending on food web structure. When this structure facilitates efficient

energy transfers to higher trophic levels, evidence from previous large-scale enrichments suggests that nutrients can stimulate the production of multiple trophic levels. Here we report results from a 5-year continuous nutrient enrichment of a forested stream that increased primary consumer production, but not predator production. Because of strong positive correlations between predator and prey production (evidence of highly efficient trophic transfers) under reference conditions, we originally predicted that nutrient enrichment would stimulate energy flow to higher trophic levels. However, enrichment decoupled this strong positive correlation and produced a nonlinear relationship between predator and prey production. By increasing the dominance of large-bodied predator-resistant prey, nutrient enrichment truncated energy flow to predators and reduced food web efficiency. This unexpected decline in food web efficiency indicates that nutrient enrichment, a ubiquitous threat to aquatic ecosystems, may have unforeseen and unpredictable effects on ecosystem structure and productivity." (Author) The paper includes data on *Cordulegaster* and *Lanthus*.] Address: Davis, J.M., Odum School of Ecology, University of Georgia, Athens, GA 30602, USA. E-mail: jmdavis@isu.edu.

**8515.** Dumont, H.J.; Vierstraete, A.; Vanfleteren, J.R. (2010): A molecular phylogeny of the Odonata (Insecta). *Systematic Entomology* 35: 6-18. (in English) ["We estimated the phylogeny of the order Odonata, based on sequences of the nuclear ribosomal genes 5.8 S, 18S, and ITS1 and 2. An 18S-only analysis resolved deep relationships well: the order Odonata, as well as suborders Zygoptera and Epiprocta (Anisoptera + Epiophlebia), emerged as monophyletic. Some other deep clades resolved well, but support for more recently diverged clades was generally weak. A second, simultaneous, analysis of the 5.8S and 18S genes with the intergenic spacers ITS1 and 2 resolved some recent branches better, but appeared less reliable for deep clades with, for example, suborder Anisoptera emerging as paraphyletic and Epiophlebia superstes recovered as an Anisopteran, embedded within aeshnoid-like anisopterans and sister to the cordulegastrids. Most existing family levels in the Anisoptera were confirmed as monophyletic clades in both analyses. However, within the corduliids that form a major monophyletic clade with the Libellulidae, several subclades were recovered, of which at least Macromiidae and Oxygastridae are accepted at the family level. In the Zygoptera, the situation is complex. The lestid-like family groups (here called Lestomorpha) emerged as sister taxon to all other zygopterans, with Hemiphlebia sister to all other lestomorphs. Platystictidae formed a second monophylum, subordinated to lestomorphs. At the next level, some traditional clades were confirmed, but the tropical families Megapodagrionidae and Amphipterygidae were recovered as strongly polyphyletic, and tended to nest within the clade Caloptera, rendering it polyphyletic. Platycnemididae were also non-monophyletic, with several representatives of uncertain placement. Coenagrionids were diphyetic. True Platycnemididae and non-American Protoneurids are closely related, but their relationship to the other zygopterans remains obscure and needs more study. New World protoneurids appeared relatively unrelated to old world + Australian protoneurids. Several recent taxonomic changes at the genus level, based on morphology, were confirmed, but other morphology-based taxonomies have misclassified taxa considered currently as Megapodagrionidae, Pla-

tycnemididae and Amphipterygidae and have underestimated the number of family-level clades." (Authors)] Address: Dumont, H.J., Department of Biology, Ghent University, Ledeganckstraat, 35, B-9000 Ghent, Belgium. E-mail: Henri.Dumont@ugent.be

**8516.** Eberhard, W.G. (2010): Evolution of genitalia: theories, evidence, and new directions. *Genetica* 138: 5-18. (in English) ["Many hypotheses have been proposed to explain why male intromittent genitalia consistently tend to diverge more rapidly than other body traits of the same individuals in a wide range of animal taxa. Currently the two most popular involve sexual selection: sexually antagonistic coevolution (SAC) and cryptic female choice (CFC). A review of the most extensive attempts to discriminate between these two hypotheses indicates that SAC is not likely to have played a major role in explaining this pattern of genital evolution. Promising lines for future, more direct tests of CFC include experimental modification of male genital form and female sensory abilities, analysis of possible male-female dialogues during copulation, and direct observations of genital behaviour." (Author) References on Odonata are made.] Address: Eberhard, W.G., Smithsonian Tropical Research Institute, and Escuela de Biología, Universidad de Costa Rica, Ciudad Universitaria, San Pedro, Costa Rica. E-mail: william.eberhard@gmail.com

**8517.** Flenner, I.; Richter, O.; Suhling, F. (2010): Rising temperature and latitudinal development in dragonfly populations. *Freshwater biology* 55: 397-410. (in English) ["1. For modelling the future ecological responses to climate change, data on individual species and on variation within and between populations from different latitudes are required. 2. We examined life cycle regulation and growth responses to temperature in Mediterranean and temperate populations of a widespread European odonate, *Orthetrum cancellatum*. In an experiment, offspring from individual females from different parts of the range were kept separately to elucidate differences between families. 3. The experiment was run outdoors at 52°N at a natural photoperiod for almost a year. We used four temperature regimes, ambient (i.e. following local air temperature) and ambient temperature increased by 2, 4 and 6°C, to mimic future temperature rise. A mathematical model was used to categorise the type of seasonal regulation and estimate parameters of the temperature response curve. 4. Growth rate varied significantly with temperature sum, survival and geographic origin, as well as with family. Offspring of all females from the temperate part of the range had a life cycle with a 12 h day-length threshold necessary to induce diapause (i.e. diapause was induced once day length fell below 12 h). By contrast, Mediterranean families had a 10 h threshold or had an unregulated life cycle allowing winter growth. The temperature response did not significantly differ between populations, but varied between families with a greater variation in the optimum temperature for growth in the Mediterranean population. 5. The variation in seasonal regulation leads to a diversity in voltinism patterns within species, ranging from bivoltine to semivoltine along a latitudinal gradient. Given that the type of seasonal regulation is genetically fixed, rising temperatures will not allow faster than univoltine development in temperate populations. We discuss the consequences of our results in the light of rising temperature in central Europe." (Authors)] Address: Flenner, Ida, Ecology & Environmental

**8518.** González-Tokman, D.-M.; Córdoba-Aguilar, A. (2010): Survival after experimental manipulation in the territorial damselfly *Hetaerina titia* (Odonata: Calopterygidae): more ornamented males are not more pathogen resistant. *Journal of Ethology* 28(1): 29-33. (in English) ["It has been hypothesized that sexual ornaments communicate pathogen resistance ability. We experimentally explored the relationship between the expression of a male ornamental trait (wing pigmentation) of *H. titia* and survival after a bacterial challenge. We infected males with *Serratia marcescens* (a Gram-negative bacteria typical of insects) and compared survival against a group infected with dead bacteria and a noninfected group. Wing pigmentation was entered as a predictor of survival in this comparison. Our study indicated that wing pigmentation was not a good predictor of immune ability against bacteria. This result contradicts previous findings in the same and other calopterygid species in which wing pigmentation intensity inversely correlated with gregarine infection levels. It also contradicts the general idea that ornaments are honest indicators of pathogen defense." (Authors)] Address: González-Tokman, D.-M., Depto de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510 Mexico D.F., Mexico. E-mail: danielgt@miranda.ecologia.unam.mx

**8519.** Heiser, M.; Schmitt, T. (2010): Do different dispersal capacities influence the biogeography of the western Palearctic dragonflies (Odonata)? *Biological Journal of the Linnean Society* 99(1): 177-195. (in English) ["The biogeography of the western Palearctic has been intensively studied for more than a century. Recent advances in genetics have allowed the testing of old theories based on distribution patterns, although these analyses are obviously restricted to a reduced number of specific genetic data sets. On the other hand, an increased knowledge on the distributions of species and advances in computer capacities have allowed more detailed biogeographical analyses based on species presence/absence. In the present study, we selected the Odonata as the study group. For all 162 species native to the western Palearctic, we compiled their respective presence or absence in 97 predefined biogeographical regions. Using cluster analyses and principal component analyses, both based on Jaccard similarity coefficients, we analysed the differentiation among these regions and species. In subsequent analyses, the data set was reduced to the Zygoptera, Anisoptera, and the western Palearctic endemics. All analyses consistently showed different faunal regions and faunal elements. In particular, the (1) western and (2) eastern Mediterranean; (3) Central and (4) Northern Europe; and (5) the British Isles were invariably found in all cases. Although the two major Mediterranean regions were characterized by several endemic faunal elements, Northern Europe and the British Isles lacked such elements, but were characterized by faunal compositions strongly deviating from the rest of the western Palearctic region. Moderate differences between Zygoptera and Anisoptera existed, with the latter more clearly redrawing the Mediterranean refuge areas, whereas the former reflected to a greater extent the postglacial expansion patterns from these regions. In general, our findings underline the old biogeographical

theories, but refine especially our understanding of the Atlanto- and Ponto-Mediterranean region. Central Europe, comprising the area with the highest species numbers of our whole study region, unravels as a crossroad of postglacial immigrations, but might also represent a region of in situ glacial survival." (Authors)] Address: Schmitt, T., Biogeographie, Fachbereich VI, Am Wissenschaftspark 25-27, Universität Trier, 54296 Trier, Germany. E-mail: thsh@uni-trier.de

**8520.** Kefford, B.J.; Zaluzniak, L.; Dunlop, J.E.; Nugge-goda, D.; Choy, S.C. (2010): How are macroinvertebrates of slow flowing lotic systems directly affected by suspended and deposited sediments? *Environmental Pollution* 158(2): 543-550. (in English) ["The effects of suspended and deposited sediments on the macroinvertebrates are well documented in upland streams but not in slower flowing lowland rivers. Using species found in lowland lotic environments, we experimentally evaluate mechanisms for sediments to affect macroinvertebrates, and in one experiment whether salinity alters the effect of suspended sediments. Suspended kaolin clay reduced feeding of *Ischnura heterosticta* at high turbidity (1000–1500 NTU) but had no effects on feeding of *Hemianax papuensis* and *Micronecta australiensis* (Hemiptera: Corixidae). In freshwater (0.1  $\mu$ S/cm), survival of *Ischnura aurora* was poor in clear water, but improved with suspended kaolin. Growth and feeding of *I. aurora* were unaffected by suspended sediments and salinity. Burial (1–5 mm) of eggs with kaolin or sand reduced hatching in *Physa acuta* (Gastropoda: Physidae), *Gyraulus tasmanica* (Gastropoda: Planorbidae) and *Chironomus cloacalis* (Diptera: Chironomidae). Settling sediments may pose greater risk to lowland lotic invertebrates than suspended sediments." (Authors)] Address: Kefford, B.J., Dept of Biotechnology & Environmental Biology, RMIT University, PO Box 71, Bundoora, 3083, Victoria, Australia. E-mail: ben.kefford@rmit.edu.au

**8521.** Koperski, P. (2010): Diversity of macrobenthos in lowland streams: ecological determinants and taxonomic specificity. *J. Limnol.* 69(1): 1-14. (in English) ["The present study contains the results of an investigation of the relationships between the environmental variables and the taxonomic diversity of common and important groups of benthic macrofauna: Chironomidae, Ephemeroptera, Odonata, Hirudinea and Gastropoda, collected from various types of bottom substrate in seven lowland streams of north-eastern Poland. Four metrics were used to express the diversity of the studied taxa in each sample as the examples of its four different aspects: species richness, rarity, Shannon-Weaver's diversity index and Pielou evenness index. The values of total species richness and Shannon-Weaver index were rarified by functional extrapolation with Michaelis-Menten asymptotic function chosen as a richness estimator. There are high differences in taxonomic diversity of benthic animals between the studied streams. The results of estimation of total species richness and total species diversity are mainly affected by the diversity of the taxon richest in species – larval Chironomidae and, to a lesser extent, Hirudinea. The total taxonomic diversity significantly correlates with the status of riparian vegetation and with the isolation of the sampling site, while the relationship with other environmental parameters, i.e. pollution and seasonality, is not significant. The diversity of Gastropoda and Hirudinea is significantly affected by pollution (positively), water depth and season-



ality; whereas the diversity of Ephemeroptera and Chironomidae by the state of riparian vegetation, and that of Odonata by stream width and isolation of the site. The study presents and discusses reduced diversity of certain higher taxa as a result of a reduction in pollution loading to a stream with simultaneous unchanged values of the total diversity." (Authors)] Address: Koperski, P., Dept Hydrobiol., Univ.Warsaw, Banacha 2, 02-097 Warszawa, Poland. E-mail: p.t.koperski@uw.edu.pl

**8522.** Marques Couceiro, S.R.; Hamada, N.; Forsberg, B.R.; Padovesi-Fonseca, C. (2010): Effects of anthropogenic silt on aquatic macroinvertebrates and abiotic variables in streams in the Brazilian Amazon. *Journal of Soils and Sediments* 10(1): 89-103. (in English) ["Purpose: While environmental risks associated with petroleum extraction such as oil spills or leaks are relatively well known, little attention has been given to the impacts of silt. The increase in petroleum exploitation in Amazonia has resulted in sediment input to aquatic systems, with impacts on their biodiversity. Here we use a combination of field measurements and statistical analyses to evaluate the impacts of anthropogenic silt derived from the construction of roads, borrow pits, and wells during the terrestrial development of gas and oil, on macroinvertebrate communities in streams of the Urucu Petroleum Province in the Central Brazilian Amazon. Material and methods: Ten impacted and nine non-impacted streams were sampled in January, April, and November of 2007. Macroinvertebrates were sampled along a 100-m continuous reach in each stream at 10-m intervals using a dip net. Abiotic variables including, a siltation index (SI), suspended inorganic sediment (SIS), sediment colour index (SCI), suspended organic sediment (SOS), pH, electrical conductivity, dissolved oxygen, temperature, water velocity, channel width, and depth, were measured at three equidistant points in each stream (~30-m intervals). Results and discussion: SI did not differ between impacted and undisturbed streams. SIS was higher and SCI lower (more reddish) in impacted than in non-impacted streams. SCI had a positive and SIS a negative effect on both macroinvertebrate richness and density. SIS and SCI also influenced macrophyte taxonomic composition. In impacted streams, taxonomic richness and density were 1.5 times lower than in non-impacted streams. No taxon was significantly associated with impacted streams. SIS was positively correlated with SOS and electrical conductivity while SCI was negatively correlated with SOS, electrical conductivity, and pH. The lack of difference in SI between impacted and non-impacted streams suggests that anthropogenic sediment does not accumulate on stream beds. The reddish colour of SIS in impacted streams reflects terrestrial erosion and indicates the rapid flow of suspended sediments through these reaches, impacting macroinvertebrate richness, density, and species composition. Conclusions: Anthropogenic suspended silt has had a significant negative impact on aquatic macroinvertebrate diversity and density in streams in the Urucu Petroleum Province. Soil conservation measures are needed to reduce silt inputs and restore these streams to their natural condition. Additional studies are also needed to investigate the dynamics of sediments in the impacted streams." (Authors) Odonata are treated at the genus level.] Address: Marques Couceiro, Sheyla Regina, Instituto Nacional de Pesquisas da Amazônia/Coordenação de Pesquisas em Entomologia, Av. André Araújo, 2936, Aleixo, CP 478 CEP 69060-001 Manaus,

Amazonas, Brazil. E-mail: sheylacouceiro@yahoo.com.br

**8523.** Muscatello, J.R.; Janz, D.M. (2010): Selenium accumulation in aquatic biota downstream of a uranium mining and milling operation. *Science of the total environment* 407(4): 1318-1325. (in English) ["Uranium mining and milling operations have the potential to release trace elements such as arsenic, molybdenum, nickel, selenium and uranium and ions (e.g., sulfate, ammonium) into the receiving aquatic ecosystem. The major implication of elevated environmental selenium is its propensity to accumulate in the aquatic food chain, potentially impairing fish reproduction. The objective of this study was to investigate the accumulation of selenium in the major compartments of aquatic ecosystems (lakes) upstream and downstream of a uranium mine in northern Saskatchewan, Canada. Selenium concentrations in aquatic biota were elevated in the exposure lake although water and sediment concentrations were low (0.43 µg/L and 0.54 µg/g dry weight, respectively). Biomagnification of selenium resulted in approximately 1.5 to 6 fold increase in the selenium concentration between plankton, invertebrates and fish. However, no biomagnification was observed between forage and predatory fish. Although some aquatic biota (e.g., forage fish) exceeded the lower limit of the proposed 3 to 11 µg/g (dry weight) dietary toxicity threshold for fish, no adverse effects of selenium could be identified in this aquatic system. Continued environmental monitoring is recommended to avoid potential selenium impacts. [...] Selenium concentrations in Diptera, Trichoptera and Odonata were significantly ( $p < 0.05$ ) greater in the exposure site than the reference site. In addition, there were significant ( $p < 0.05$ ) increases in the concentrations of Co and Mn in Gastropoda, Odonata and Hirudinea between sites. The concentration of As was greater for Odonata collected from exposure site compared to the reference site ( $p < 0.05$ ). In contrast, other concentrations of trace elements in Diptera (Ba, copper [Cu], Mn, Ni and zinc [Zn]), Trichoptera (Ba and V), Gastropoda (Cr, Fe and V) and Odonata (Cd, Cu and Sr) collected from the exposure site were significantly less ( $p < 0.05$ ) than the reference site." (Authors)] Address: Janz, D.M., Toxicology Centre, University of Saskatchewan, 44 Campus Drive, Saskatoon, SK Canada S7N 5B3. E-mail: david.janz@usask.ca

**8524.** Omoigberale, M.O.; Ogbeibu, A.E. (2010): Environmental impacts of oil exploration and production on the macrobenthic invertebrate fauna of Osse River, southern Nigeria. *Research Journal of Environmental Sciences* 4(2): 101-114. (in English) [The impact of Dubri Oil Company operations on the macrobenthic invertebrate fauna of Osse River, Edo State (Nigeria) was investigated between July 2000 and June 2002 at five sites. A total of fifty-seven taxa was identified; Odonata accounted to 6.56% of the taxa. The Odonata listed are a mixture of North-American and European taxa.] Address: Omoigberale, M.O., Department of Animal and Environmental Biology, University of Benin, P.M.B. 1154, Benin City, Nigeria

**8525.** Paralikidis, N.; Papageorgiou, N.; Tsiompanoudis, A.; Konstantinou, L.; Christakis, T. (2010): Foods of hunter-killed Black Francolins (*Francolinus francolinus*) in Cyprus. *European Journal of Wildlife Research* 56(1): 89-93 (in English) [Odonata contributed accidentally as diet of the Black Francolin on the island of

Cyprus during November and December of 2004 and 2005.] Address: Paralikiadis, N., Dept Forestry & Natural Environment, Laboratory of Wildlife and Fisheries, Aristotle University of Thessaloniki, 541 24 Thessaloniki, Greece. E-mail: atsiompa@for.auth.gr

**8526.** Reinhardt, K. (2010): Natural selection and genital variation: a role for the environment, parasites and sperm ageing? *Genetica* 138: 119-127. (in English) ["Male genitalia are more variable between species (and populations) than other organs, and are more morphologically complex in polygamous compared to monogamous species. Therefore, sexual selection has been put forward as the major explanation of genital variation and complexity, in particular cryptic female choice for male copulatory courtship. As cryptic female choice is based on differences between males it is somewhat paradoxical that there is such low within-species variation in male genitalia that they are a prime morphological identification character for animal species. Processes other than sexual selection may also lead to genitalia variation but they have recently become neglected. Here I focus on pleiotropy and natural selection and provide examples how they link genitalia morphology with genital environments. Pleiotropy appears to be important because most studies that specifically tested for pleiotropic effects on genital morphology found them. Natural selection likely favours certain genital morphology over others in various environments, as well as by reducing re-infection with sexually transmitted diseases or reducing the likelihood of fertilisation with aged sperm. Both pleiotropy and natural selection differ locally and between species so may contribute to local variation in genitalia and sometimes variation between monogamous and polygamous species. Furthermore, the multitude of genital environments will lead to a multitude of genital functions via natural selection and pleiotropy, and may also contribute to explaining the complexity of genitalia." (Authors) References to Odonata are made.] Address: Reinhardt, K., Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: K.Reinhardt@sheffield.ac.uk

**8527.** Starzomski, B.M.; Suen, D.; Srivastava, D.S. (2010): Predation and facilitation determine chironomid emergence in a bromeliad-insect food web. *Ecological Entomology* 35: 53-60. (in English) ["1. Ecological theory has focused on negative interactions, such as competition and predation, to explain species' effects on one another. This study demonstrates the importance of considering both positive and negative interactions in explaining how species influence abundances at the local scale. 2. Two experiments were conducted using the aquatic insect food web in Costa Rican bromeliad phytotelmata. Manipulations contrasted the strength of predation between trophic levels versus facilitation within a trophic level on the emergence of detritivore chironomids. 3. Predation had a strong negative effect on chironomids, reducing emergences by 81% overall. Most predation was as a result of the top predator, *Mecistogaster modesta*; the intermediate predator, a tany-podine chironomid, had little effect. In the absence of predators, shredder and scraper detritivores (tipulid and scirtid larvae) increased the emergence rate of chironomid larvae by 86%. The mechanism of facilitation was likely the processing, by tipulids and scirtids, of intact detritus into fine particles that the detritivore chironomids consume or use to build protective cases. 4. This study is among the first demonstrations of a pro-

cessing chain in a multispecies context, and in bromeliad-insect food webs. Our finding that top-down effects are of similar magnitude to facilitative effects suggests that the relative importance of processing chains in nature will depend on food web context." (Authors)] Address: Starzomski, B.M., School of Environmental Studies, Univ. Victoria, Victoria, British Columbia V8P 5C2, Canada. E-mail: starzom@uvic.ca

**8528.** Takahashi, Y.; Watanabe, M. (2010): Female reproductive success is affected by selective male harassment in the damselfly *Ischnura senegalensis*. *Animal Behaviour* 79: 211-216. (in English) ["In animals without any courtship behaviour, persistent mating attempts by males are frequently observed. Male harassment affects female reproductive success in the laboratory, but few studies have evaluated the costs of male harassment in the wild. In *I. senegalensis*, females exhibit colour dimorphism (andromorph and gynomorph), and the morph frequency varies between local populations. In two populations where gynomorphs were common, we found that males harassed more gynomorphs than andromorphs throughout their daily foraging and oviposition activity period. Gynomorphs excreted less faeces than andromorphs, indicating that preferential harassment of gynomorphs decreased their food intake. Gynomorphs also produced fewer eggs than andromorphs. As a result, gynomorphs laid 35% fewer eggs per day than andromorphs, suggesting that male harassment decreased their reproductive success." (Authors) Address: Watanabe, M., Conservation Biology Laboratory, Graduate School of Life & Environmental Sciences, Univ. Tsukuba, 1-1-1 Tennodai, Tsukuba, Ibaraki, Japan. E-mail address: watanabe@kankyo.envr.tsukuba.ac.jp

**8529.** Vernoux, J.; Huang, D.-y.; Jarzembowski, E. A.; Nel, A. (2010): The Proterogomphidae: a worldwide Mesozoic family of gomphid dragonflies (Odonata: Anisoptera: Gomphidae). *Cretaceous Research* 31(1): 94-100. (in English) ["The first Chinese and English representatives of the Mesozoic gomphid family Proterogomphidae are described, respectively *Lingomphus magnificus* gen. et sp. nov., and *Cordulagomphus europaeus* sp. nov. A phylogenetic analysis of the most 'basal' gomphid lineages is proposed, showing the monophyly of the Proterogomphidae and the position of *Lingomphus* as sister group of all other representatives of this family. *C. europaeus* is the first Eurasiatic representative of the subfamily Cordulagomphinae that was previously restricted to the Lower Cretaceous of Crato Formation (South America). The Proterogomphidae has a known distribution very similar to those of several other Lower Cretaceous insect groups, viz. Asia, Europe, and South America, showing that the distribution of the climates and land masses at that time was not a 'serious' impediment for the displacements of these organisms." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**Thanks to all who contributed to this issue of OAS. A special thank to Asmus Schröter for translation of Finnish and Haomiao Zhang of Chinese paper summaries. Pawel Buczyński provided us with publications from eastern central Europe. Also special thanks to Werner Piper, Rainer Rudolph and Andreas Martens for continuous shipping of new papers.**

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Silberdistelweg 11, D-72113 Ammerbuch, Germany. Tel. ++49 (0)7073 300770; E-mail: martin@lindeboom.de  
Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105;  
E-mail: K.Reinhardt@sheffield.ac.uk  
Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

1997

**8530.** Both, C. (1997): Career-decisions of Calopteryx-species. *Brachytron* 1(1): 11-15. (in Dutch, with English summary) ["Males of *Calopteryx splendens* and *C. virgo* sometimes engage in long, escalated fights. This paper addresses the question why these damselflies spend so much time and energy in those fights. By individually marking males from both species we showed that about three quarters of the marked individuals was restricted to a particular site. These males were frequently involved in short disputes with bordering males, suggesting that the males defended territories. Males not restricted to a particular site hardly got engaged in these border disputes, suggesting that these males were non-territorial. Only one escalated fight was observed in which a marked territorial male was displaced by a non-territorial individual after more than 30 minutes continuous fighting. Territorial males attracted females by a flight display, sometimes including a part in which males entered the stream and floated some distance downstream. Non-territorial males chased females in a pursuit flight. The territorial strategy is far more rewarding in *Calopteryx* damselflies, resulting in 1000 times more eggs fertilized per day than males without territories (Plaiستow & Siva-Jothy, 1996). The escalated fights seem to be a way of getting the preferred mating option." (Author)] Address: Both, C., Droevendaalsesteeg 57, 6708 PB Wageningen. The Netherlands. E-mail: Both@cto.nioo.knaw.nl

**8531.** Habraken, J.M.; Crombaghs, B.H. (1997): Discovery of a larva of *Gomphus flavipes* along the Waal. *Brachytron* 1(1): 3-5. (in Dutch, with English summary) ["On the 5th of June 1996 a living larva of *G. flavipes* was found in the residue of the cooling-water filters of the EPON power station at Nijmegen. This was the first record of the species in The Netherlands since 1902. Pollution and canalization of rivers have caused its extinction in most of western Europe. It was recently re-discovered along some German rivers. The cooling-water is extracted from a canal connecting the rivers Waal (Rhine) and Maas (Meuse) which originate in Germany and France respectively. It seems probable that larval drift, due to high-water in recent winters, explains this remarkable discovery. The Rhine is the most

likely source, there being a number of barriers in the canal from the other side. The importance of the regeneration of riverine habitats for the possible return of populations of *G. flavipes* to The Netherlands is stressed." (Authors)] Address: Habraken, J.M. p/a Limes Divergens, Postbus 31070, 6503 CB Nijmegen, The Netherlands

**8532.** Hermans, J.T.; Gubbels, R.E. (1997): The Scarlet Dragonfly (*Crocothemis erythraea*) Brullé in Limburg. *Brachytron* 1(1): 22-26. (in Dutch, with English summary) ["In Europe the *C. erythraea* has a predominantly mediterranean distribution. During the last decade it has expanded in a northerly direction. In 1993 it reappeared in The Netherlands, after an absence of 17 years, in the south-western province of Zeeland. From 1995 onwards it has also been recorded regularly in the south-eastern province of Limburg. Until now it is known from five localities in the latter province. Two sites in Limburg (De Doort and Weustenrade) are discussed in more detail. Both areas possess enough potential for a possibly viable population of *C. erythraea* in the future." (Authors)] Address: Hermans, J.T.; Hertestraat 21, NL-6067 ER Linne, The Netherlands

**8533.** Pritchard, G.; Kortello, A. (1997): Roosting, perching, and habitat selection in *Argia vivida* Hagen and *Amphiagrion abbreviatum* (Selys) (Odonata: Coenagrionidae), two damselflies inhabiting geothermal springs. *Canadian Entomologist* 129(4): 733-743. (in English, with French summary) ["Although *A. abbreviatum* and *A. vivida* often occur at the same geothermally heated springs in western Canada and the United States, they differ markedly in their abundance at any particular site. There is no relationship between crude data on water temperature, conductivity, or aquatic vegetation and the relative abundance of the two species, but there is a striking correlation with presence or absence of trees. The absence of *A. abbreviatum* from heavily treed areas is associated with the paucity of suitable daytime perching sites, and there may be competitive pressure exerted by *A. vivida* for the perching sites that are available. *A. vivida* does not live at open sites because it requires trees for night-time roosts. *A. vivida* roosted higher than *A. abbreviatum* in cages and held the body at a greater angle from the cage wall. The roosting posture of *A. vivida* is probably related to interception of solar radiation in the morning, and the body positions of



both species possibly provide defence against predation." (Authors)] Address: Pritchard, G., Div. Ecol. Dept Biol. Sci., Univ. Calgary, Calgary, AB, T2N 1N4, Canada. E-mail: gpritcha@ucalgary.ca

**8534.** Strausfeld, N.J.; Hansen, L.; Li, Y.; Gomez, R.S.; Ito, K. (1998): Evolution, discovery, and interpretations of arthropod mushroom bodies. *Learning & Memory* 5: 11-37. (in English) ["Mushroom bodies are prominent neuropils found in annelids and in all arthropod groups except crustaceans. First explicitly identified in 1850, the mushroom bodies differ in size and complexity between taxa, as well as between different castes of a single species of social insect. These differences led some early biologists to suggest that the mushroom bodies endow an arthropod with intelligence or the ability to execute voluntary actions, as opposed to innate behaviors. Recent physiological studies and mutant analyses have led to divergent interpretations. One interpretation is that the mushroom bodies conditionally relay to higher protocerebral centers information about sensory stimuli and the context in which they occur. Another interpretation is that they play a central role in learning and memory. Anatomical studies suggest that arthropod mushroom bodies are predominately associated with olfactory pathways except in phylogenetically basal insects. The prominent olfactory input to the mushroom body calyces in more recent insect orders is an acquired character. An overview of the history of research on the mushroom bodies, as well as comparative and evolutionary considerations, provides a conceptual framework for discussing the roles of these neuropils. [...] Thysanura, Ephemeroptera, and Odonata are probably all primarily anosmic (lacking a sense of smell) with respect to airborne odors. [...] A crucial feature is that these apterygotes, as well as palaeopteran insects, all lack the glomerular antennal lobes typical of Neoptera whose ancestors first appeared in the Late Carboniferous. Another important feature of the mushroom bodies of primitive anosmic insects is that they lack calyces. However, their neuropils derive from thousands (in odonates, hundreds of thousands) of globuli cells that provide cell body fibers forming a thin pedunculus, which, anteriorly, gives rise to elaborately subdivided and swollen lobes. [...] Judging from their modern representatives, the mushroom body lobes of these earliest insects thus seem to serve mainly mechano- and optosensory integration rather than olfaction." As example of anosmic insects (Odonata), *Argia* sp. is used. "In some species, the calyx is divided into inner, middle, and outer components vertical, medial, frontal, and recurrent lobes (in some species, lobe subdivisions represent inner, middle, and outer calyces)." (Authors)] Address: Strausfeld, N.J., Arizona Research Laboratories Division of Neurobiology, University of Arizona, Tucson, Arizona 85721 USA

**8535.** Hermans, J.T. (1999): The dragonfly fauna of the Meinweg area 1992 - 1999. *Natuurhistorisch maandblad* 88: 308-310. (in Dutch, with English summary) ["The Meinweg nature reserve includes various types of water body. Stagnant waters include heathland pools, raised bog pools, cattle ponds and artificial ponds; running water is present in the form of brooks. The odonatological value of the Meinweg is determined by these various aquatic biotopes. Between 1980 and 1992, the author found forty species of dragonfly; ten of these species are very common, such as *Coenagrion puella*, *Libellula quadrimaculata*, *Anax imperator*, *Sym-*

*pterus danae*, *Lestes sponsa*, *L. virens*, *Aeshna cyanea*, *Ischnura elegans*, *Pyrrhosoma nymphula* and *Enallagma cyathigerum*. Between 1992 and 1999, 36 dragonfly species were observed. The status of the common species did not change over this period. Some species showed a decline, such as *Coenagrion lunulatum*, *Ceriagrion tenellum*, *Leucorrhinia dubia* and *L. rubicunda*. Preservation of the unique dragonfly fauna of the Meinweg area can only be achieved by means of special management measures against dehydration, in combination with rigorous biotope protection." (Author)] Address: Hermans, J.T.; Hertestraat 21, NL-6067 ER Linne, The Netherlands

**8536.** Kiauta, B.; Kiauta, M. (1999): A note on dragonfly response during the 98,3% solar eclipse of 11 August 1999 in the Netherlands (Odonata). *Opusc. zool. flumin.* 172: 1-6. (in English) ["An analysis of odonate behaviour at a locality near Utrecht, combined with the available evidence from India and France, seems to indicate it is the rapid reduction of light intensity during a solar eclipse rather than a relatively minor drop in the ambient temperature that triggers the behavioural response. The latter is similar to the behaviour preceding oncoming heavy weather." (Authors)] Address: Kiauta, B., P.O. Box 256, NL-3720 AG Bilthoven, The Netherlands. E-mail: mb.kiauta@12move.nl

**8537.** Wirth, T.; Le Guellec, R.; Veuille, M. (1999): Directional substitution and evolution of nucleotide content in the Cytochrome Oxidase II gene in earwigs (Dermapteran Insects). *Mol. Biol. Evol.* 16(12): 1645-1653. (in English) ["The cytochrome oxidase subunit II (COII) gene was sequenced for six dermapteran species. The nucleotide composition of this gene is biased in most animals. While the CG content of other insect orders is low (mean, 27.6%; range, 19.5%–33.1%), species from the *Forficula* genus showed unusually high values (mean, 42.4%; range, 37.3%–44.1%), mostly due to high CG frequencies at third codon positions: the mean CG content at these positions was around 45% (range, 43.9%–46.9%) for *Forficula*, compared with only 13.3% for other insects. This effect was so strong that in one species, *Forficula lesnei*, there was no significant difference between the frequencies of the four bases. During evolution, this loss of bias has involved a significant increase in the synonymous substitution rate and an increase of transitions over transversions compared with other insects. A strong directionality of substitutions has favored T->C and A->G changes. This phenomenon was also observed between two conspecific populations of *Forficula auricularia*. A species from a closely related genus, *Anechura bipunctata*, was intermediate between *Forficula* and other insects for these parameters, while two remotely related dermapteran species, *Labidura riparia* and *Euborellia moesta*, were similar to other insects. These results suggest that the evolution of *Forficula* DNA content has been both rapid and recent." (Authors) *Symptetrus striolatus* was used as outgroup representative in phylogenetic analysis.] Address: Wirth, T., Laboratoire d'Ecologie and Ecole Pratique des Hautes Etudes, Paris 6 University, Paris, France

## 2000

**8538.** Batzer, D.P.; Pusateri, C.R.; Vetter, R. (2000): Impacts of fish predation on marsh invertebrates: direct and indirect effects. *Wetlands* 20(2): 307-312. (in Eng-

lish) ["We excluded predatory fish from a marsh weed-bed to evaluate experimentally their impact on invertebrate prey. Gut analyses of wetland fish, including pumpkinseed sunfish (*Lepomis gibbosus*), brown bullhead (*Ictalurus nebulosus*), black crappie (*Pomoxis nigromaculatus*), and common carp (*Cyprinus carpio*), revealed that large numbers of midge larvae (Diptera: Chironomidae) were consumed. However, our exclusion of these predatory fish from study habitats did not result in midge population increases. On the contrary, fewer epiphytic midges occurred where predatory fish had been excluded ( $P = 0.0043$ ). Populations of midge competitors (especially Planorbidae and Physidae) and invertebrate midge predators (especially Corixidae and Glossiphoniidae) were suppressed directly by fish, and midges that co-existed with fish apparently benefitted indirectly from those interactions. For epiphytic midge larvae, the negative direct influence of fish predation was strong, but positive indirect effects apparently were even more powerful. [...] When all of the potential invertebrate predators of non-tanypod midges were pooled (odonates, hemipterans, leeches, tanypod midges), more occurred in habitats where fish were excluded, but in this case, no interaction existed between predator taxa and fish treatment" (Authors)] Address: Batzer, D.P., Department of Entomology, University of Georgia, Athens, Georgia, USA 30602.

**8539.** Birge, W.J.; Price, D.J.; Shaw, J.R.; Spromberg, J.A.; Wigginton, A.J.; Hogstrand, C. (2000): Metal body burden and biological sensors as ecological indicators. *Environmental Toxicology and Chemistry* 19(4): 1199-1212. (in English) [Big Bayou Creek, Kentucky, USA; "Metal body burden (BB) was analyzed in three groups of organisms evaluated as sentinel monitors of metal exposure. The study site was a lotic system of moderate gradient that received effluent outfalls from an uranium enrichment plant. Metal BBs (e.g., Ag, Cd, Cr, Cu) increased in the order Cheumatopsyche spp. (caddisfly), *Campostoma anomalum* (central stoneroller minnow), and *Stenonema* spp. (mayfly). This was consistent with their classifications as metal-tolerant, moderately tolerant, and sensitive taxa, respectively. The Ag, Cd, and Cu BBs in stoneroller minnows from upstream, effluent-receiving, and downstream stations correlated strongly with macroinvertebrate bioassessment (BA) scores, numbers of taxa, and the Ephemeroptera, Plecoptera, Trichoptera indices. Proportional differences in metal BBs in the minnow were used to derive metal multipliers that were applied to total recoverable metal concentrations to calculate bioavailable metal. The bioavailable metal fractions correlated with BA scores and numbers of taxa. When five metals (i.e., Ag, Cd, Cu, Cr, Pb) were included in an additive model, results also correlated with BA scores ( $r = -0.93$ ) and numbers of taxa ( $r = -0.86$ ). Metal BB in minnows was a strong indicator of ecological impact and provided a means of determining bioavailable metals. Also, we describe the development of the metal biosensor, which incorporates a reconstructed fish gill epithelium, the primary target of metal exposure. This *in vitro* biosensor should directly quantify bioreactive metals that cross the epithelium and react with a genetically engineered intracellular detector. This biosensor complements biotic ligand models based on surface binding of metals to gill epithelia." (Authors) Density of Odonata in appendix 1 is documented at the family level.] Address: Birge, W.J., School of Biological Sciences, University of Kentucky,

101 TH Morgan Building, Lexington, Kentucky 40506-0225, USA. E-mail: bio110@pop.uky.edu

**8540.** De Moor, F.C.; Barber-James, H.M.; Harrison, A.D.; Lugo-Ortiz, C.R. (2000): The macroinvertebrates of the Cunene River from the Ruacana Falls to the river mouth and assessment of the conservation status of the river. *Afr. J. aquat. Sci.* 25: 105-122. (in English) [The paper includes a checklist of 13 odonate taxa (mostly at genus level) from selected sites along the Cunene river, Namibia.] Address: De Moor, F.C., Dept Freshwater Invertebrates, Albany Museum, Grahamstown - 6139, South Africa

**8541.** Termaat, T. (2000): Survey of new riverine habitat of *Gomphus flavipes* in The Netherlands in 1999. *Brachytron* 4(1): 13-17. (in Dutch, with English summary) ["After the rediscovery of *G. flavipes* in The Netherlands in 1996, the species was recorded in 1998 in eight 1x1 km-squares along the river Waal near Nijmegen in the eastern part of The Netherlands. Extensive research in 1999 displayed the species presence at many new locations of *G. flavipes* along the rivers Waal, Nedernjn, Nieuwe Merwede and Beneden Merwede. One wandering male was found near Goirte outside the species normal riverine habitat, at short distance of the Belgian border. An overview is presented of all new locations, many reaching well westwards. In addition, all locations where the species appeared to be absent despite searching are presented also. Possible reasons for absence of *G. flavipes* along the river Lek are discussed, just as the possibilities for the species presence along other river systems." (Author)] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands

## 2001

**8542.** Euliss, N.H.; Mushet, D.M.; Johnson, D.H. (2001): Use of macroinvertebrates to identify cultivated wetlands in the prairie pothole region. *Wetlands* 21(2): 223-231. (in English) ["We evaluated the use of macroinvertebrates (in most cases at order or family level, and including Odonata larvae) as a potential tool to identify dry and intensively farmed temporary and seasonal wetlands in the Prairie Pothole Region. The techniques we designed and evaluated used the dried remains of invertebrates or their egg banks in soils as indicators of wetlands. For both the dried remains of invertebrates and their egg banks, we weighted each taxon according to its affinity for wetlands or uplands. Our study clearly demonstrated that shells, exoskeletons, head capsules, eggs, and other remains of macroinvertebrates can be used to identify wetlands, even when they are dry, intensively farmed, and difficult to identify as wetlands using standard criteria (i.e., hydrology, hydrophytic vegetation, and hydric soils). Although both dried remains and egg banks identified wetlands, the combination was more useful, especially for identifying drained or filled wetlands. We also evaluated the use of coarse taxonomic groupings to stimulate use of the technique by nonspecialists and obtained satisfactory results in most situations." (Authors)] Address: Euliss, N.H., U.S. Geological Survey, Northern Prairie Wildlife Research Center. 8711 37 Street SE Jamestown, North Dakota, USA 58401

**8543.** Han, F.-y.; Xi, Y.-y. (2001): *Ischnura elegans* as an indicator of pollution of cadmium on water system.

Agro-environmental protection 20(4): 229-230. (in Chinese, with English summary) [*I. elegans* was found to accumulate cadmium. Content of cadmium in *I. elegans* males corresponded well with cadmium content in the water body of the locality the damselfly was sampled.] Address: Xi, Y.-y., Department of Environment Protection Science, Shanxi University, Taiyuan 030006 China

**8544.** Vliegenthart, A.; Termaat, T. (2001): De Mercurwaterjuffer (*Coenagrion mercuriale*) in Nederland? *Brachytron* 5(1/2): 3-7. (in Dutch, with English summary) ["Recently, several species of damselfly that were considered to be extinct in The Netherlands were re-discovered. We describe the habitat and ecological requirements of *C. mercuriale* in order to provide an accurate search image for this species. The habitat is usually situated in agricultural landscape, in places mostly ignored by many observers. Our description of the ecological requirements may enable observers to search more specific for *C. mercuriale* in The Netherlands. The influx of other southern species and the recent discovery of a new population in Belgium give hope for success." (Authors)] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands

**8545.** Yagi, T.; Kitagawa, K. (2001): A survey of the dragonflies in the Klias and Binsulok Forest Reserves, Sabah, Malaysia. *Nature and Human Activities* 6: 31-39. (in English) ["In the Klias-Binsulok Scientific Expedition and Inventory 1999 jointly organized by Universiti Malaysia Sabah and the Sabah Wildlife Department, a total of 28 Odonata species [...] were recorded. Twenty-two species were recorded from the Klias Forest Reserve and its surroundings, while 21 species were from the Binsulok Forest Reserve. Two types of dragonfly fauna were recognized in the Klias region as a result of the classification of collecting sites by the distribution pattern of the dragonflies. One is a type that developed in the forest area, the other is a type that developed on open land. In the Binsulok Forest Reserve, these two types of fauna were found coexisting." (Authors)] Address: Yagi, T., Division of Natural History, Museum of Nature and Human Activities, Hyogo, Yayoigaoka 6, Sanda, Hyogo, 669-1546 Japan

**8546.** Zwick, P. (2001): Book review: CORBET, P.S. (1999): *Dragonflies: Behaviour and Ecology of Odonata*. *Aquatic Insects* 23(1): 83. (in English) [review] Address: Zwick, P., Limnologische Fluß-Station des Max-Planck-Instituts für Limnologie, PF 260, D-36105 Schlitz. e-mail: pzwick@mpil-schlitz.mpg.de

## 2002

**8547.** Aswari, P. (2002): Keragaman serangga air ditaman Nasional Gunung Halimun. Edisi Khusus "Biodiversitas Taman Nasional Gunung Halimun" *Berita Biologi* 5(6) (2001): 755-764. (in Indonesian, with English summary) [Java, Indonesia; between 1995 and 2002, 26 Odonata taxa were recorded along the Cikaniki, Cibeurang and Citarik streams and some of their branches, in the villages of Malasari, Cisarua and Cihameurang.] Address: Aswari, P., Bidang Zoologi, Pusat Penelitian Biologi-LIPI

**8548.** De Haro, J.J. (2002): Guida de campo de la entomologia en Internet, 3: Odonata. *Boln Soc. ent. aragon.* 30: 205-207. (in Spanish) [36 websites with

odonatological content are listed..] Address: De Haro, J.J., jjdeharo@terra.es

**8549.** Dudley, R. (2002): Mechanisms and implications of animal flight maneuverability. *Integr. Comp. Biol.* 42: 135-140. (in English) ["Accelerations and directional changes of flying animals derive from interactions between aerodynamic force production and the inertial resistance of the body to translation and rotation. Anatomical and allometric features of body design thus mediate the rapidity of aerial maneuvers. Both translational and rotational responsiveness of the body to applied force decrease with increased total mass. For flying vertebrates, contributions of the relatively heavy wings to whole-body rotational inertia are substantial, whereas the relatively light wings of many insect taxa suggest that rotational inertia is dominated by the contributions of body segments. In some circumstances, inertial features of wing design may be as significant as are their aerodynamic properties in influencing the rapidity of body rotations. Stability in flight requires force and moment balances that are usually attained via bilateral symmetry in wingbeat kinematics, whereas body roll and yaw derive from bilaterally asymmetric movements of both axial and appendicular structures. In many flying vertebrates, use of the tail facilitates the generation of aerodynamic torques and substantially enhances quickness of body rotation. Geometrical constraints on wingbeat kinematics may limit total force production and thus accelerational capacity in certain behavioural circumstances. Unitary limits to animal flight performance and maneuverability are unlikely, however, given varied and context-specific interactions among anatomical, biomechanical, and energetic features of design." (Author) The paper includes references to Odonata.] Address: Dudley, R., Section of Integrative Biology, University of Texas, Austin, Texas 78712, USA. E-mail: rpdudley@utxvms.cc.utexas.edu

**8550.** Eda, S. (2002): A hybrid male supposed between *Sympetrum e. eroticum* and *S. baccha mutatum*. *Tombo* 45(1/4): 20. (in Japanese, with English summary) [On September 26, 2002, an interspecific hybrid was captured at Ebinoko-ike pond in Shiojiri City, Nagano Prefecture, Japan.] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**8551.** Eda, S. (2002): A correction and some considerations of the records concerning numerous occurrence of *Anax guttatus* (Burmeister) in Japan, 1999. *Tombo* 45(1/4): 1-6. (in Japanese, with English summary) [In autumn of 1998, unusually great numbers of *A. guttatus* migrated to the Japanese mainlands: Kyushu, Shikoku and south-east Honshu. Records of 38 Japanese prefectures totalling to 743 males and 64 females, 4 males and 4 female larvae, and each one male and female exuvia.] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**8552.** Gallardo Mayenco, A. (2002): Macroinvertebrados acuáticos de la red hidrográfica del campo de Gibraltar: una revisión. *Almoraima* 27: 351-364. (in Spanish) [Seven Odonata species are listed from four localities in the Gibraltar region in southern Spain. *Ischnura elegans* and *Crocothemis erythraea* from Algeciras, *Ischnura graellsii* from Junto al Camping Río Jara, Tarifa, *Ceriagrion tenellum* from Canuto Juan de Sevilla, and *Onychogomphus uncatius*, *Cordulegaster*



boltonii, and *Oxygastra curtisii* from Canuto Garganta del Prior.] Address: not stated

**8553.** Sherwood, G.D.; Kovacs, J.; Hontela, A.; Rasmussen, J.B. (2002): Simplified food webs lead to energetic bottlenecks in polluted lakes. *Can. J. Fish. Aquat. Sci.* 59: 1-5. (in English, with French summary) [Quebec, Canada; "Very little is known about the consequence of human activities on the flow of energy through natural ecosystems. Here, we present a trophic-based approach to describing energy relationships in pollutant-disturbed lakes, emphasizing the importance of prey diversity in maintaining energy transfer to growing fish. Both diet and community analysis indicated that the food web leading to yellow perch (*Perca flavescens*) in metal-polluted lakes was extremely simplified compared with reference lakes. Through the application of an in situ marker for fish activity costs (muscle lactate dehydrogenase activity) and through bioenergetic modelling, we show how this has severe consequences on the efficiency of energy transfer to perch from their prey; premature energetic bottlenecks (zero conversion efficiency) occur when successively larger prey types are not available to growing perch. These observations provide a much needed ecological and physiological framework for assessing how energy transfer can be affected in polluted systems. Our approach need not be limited therein but should be applicable to any aquatic system where food web structure is variable and (or) disrupted." (Authors) The analysis includes Odonata, but without further details.] Address: Sherwood, G.D., Department of Biology, McGill University, 1205 Dr. Penfield, Montreal, QC H3A 1B1, Canada. E-mail: grahamsherwood@hotmail.com).

**8554.** Taketo, A. (2002): Transition of odonate fauna in the artificial ponds in Yuhidera, Kanazawa: situation in the 9th year. *Tombo* 45(1/4): 33-35. (in Japanese, with English summary) ["The Odonate fauna in artificial ponds at Yuhidera sanctuary on the 9th year is reported. Two rare species, *Polycanthagyna melanictera* and *Aeschnophlebia anisoptera* emerged and are new records in 2001. A teneral male of *Sympetrum pedemontanum elatum* was caught, for the first time in this area. Except for such species as *Libellula quadrimaculata asahinai*, *Anax parthenope julius* and *Pseudothemis zonata*, yield of dragonflies as revealed by exuviae collection decreased markedly. Nine zygopteran species appeared in this area and, larval density of Zygoptera was considerably higher than that of Anisoptera. Unexpectedly, *Micropterus salmoides*, a kind of voracious foreign sunfish, had been illicitly released into one of the pond. In November, the pond was drained to remove the sunfish thoroughly. Examination of digestive tract of the fish demonstrated remains of *P. zonata* larvae." (Author)] Address: Taketo, A., 1-19, Ishibiki 1-chome, Kanazawa City, 920, Japan

**8555.** Van der Weide, M. (2002): 'De Nederlandse Libellen', about the results and the future. *Brachytron* 6(2): 56-59. (in Dutch, with English summary) ["This article provides an anthology of the recently published book 'De Nederlandse Libellen'. It ends with targets for further field research. The main aim of the book is the presentation of the distribution of the seventy species recorded in The Netherlands. The distribution is given in three periods (before 1950, 1950-1989 and 1990-1997). Striking changes in distribution are for example visible in *Erythromma viridulum*, *Sympecma fusca*, *Gomphus flavipes* and *G. vulgatissimus*. The balance in the drag-

onfly fauna in the last 100 year is as follows: five species have disappeared. 20 have decreased. 23 are more or less stable and 17 have increased. Species of fens, brooks and rivers show the highest decreases. Morphology, life history and behaviour of dragonflies in relation to their environment is also described in the book. However, with the publication of this atlas, knowledge of dragonflies in The Netherlands is not complete. For the future the challenges are monitoring of the dragonfly populations, further distribution surveys and research on behaviour, ecology and the effects of nature management." (Author)] Address: van der Weide, M., van Oldenbarneveltstraat 46, 6 512 AZ Nijmegen, The Netherlands. E-mail: mvdweide@knoware.nl

**8556.** Arefina, T.I.; Ivanov, P.Yu.; Kocharina, S.L.; Lafer, S.S.; Makarchenko, M.A.; Teslenko, V.A.; Tinova, T.M.; Khamenkova, E.V. (2003): Aquatic insects from Taui basin (Magadan territory). *Vladimir Ya. Levandov's Biennial Memorial Meetings 2003(2)*: 45-60. (in Russian, with English summary) [Five Odonata taxa are listed..] Address: Khamenkova, E.V., Magadan Research Institute of Fisheries and Oceanography, 36/10 Portovaya Street, Magadan, 685000, Russia

**8557.** Brothers, D.J.; Rasnitsyn, A.P. (2003): Diversity of Hymenoptera and other insects in the Late Cretaceous (Turonian) deposits at Orapa, Botswana: a preliminary review. *African Entomology* 11(2): 221-226. (in English) ["The kimberlitic eruption that formed the crater at Orapa occurred about 91 Mya, and its fossiliferous sediments were deposited shortly thereafter. The pieces of rock from Orapa which contain insect fossils, approximately 2000 currently housed in the Bernard Price Institute of Palaeontology at the University of the Witwatersrand and about 220 in the National Museum of Botswana in Gaborone, were screened for Hymenoptera, and all arthropods on the 68 pieces so selected were identified to the lowest level possible. After adjusting for the prior selection of Hymenoptera, the ordinal composition of the arthropods was calculated. The major components, based on number of specimens, are: Coleoptera (29 %), Homoptera (18 %), Blattodea (17 %), Diptera (13 %), Thysanoptera (7 %), and Hymenoptera and Orthoptera (6 % each)." (Authors) 1 specimen of the 641 studied insects belonged to the Odonata.] Address: Brothers, D.J., School of Botany and Zoology, University of Natal Pietermaritzburg, Private Bag X01, Scottsville, 3209 South Africa

**8558.** Harp, G.L.; Harp, P.A. (2003): Dragonflies (Odonata) of the Ouachita National Forest. *Journal of the Arkansas Academy of Science* 57: 68-75. (in English) [USA; "The Ouachita National Forest (ONF) was established in 1907 and encompasses 1.8 million acres (728,450 ha) in Arkansas and Oklahoma, almost entirely within the Ouachita Mountains Natural Division. The adult dragonfly species richness, seasonal and spatial distribution, and relative abundance were surveyed during 2002. Fifty four collections were made at 43 sites during 10-19 May (20 collections), 10-22 July (19 collections) and 9-17 September (15 collections). Literature records were searched, as well as records from pertinent museums and individuals. Eighty-three species are reported here for the ONF, 77 of which were collected during 2002. *Nehalennia integricollis* is newly reported for Arkansas, as are several species for the six Arkansas and two Oklahoma counties that encompass the ONF. The species richness results from a diversity of aquatic habitats, particularly within the

Caddo Ranger District. Plastic species (e.g. *Plathemis lydia*) typically are widely distributed and have long flight seasons. More specialized species (e.g. *Ophiogomphus westfalli*) often are quite restricted in both distribution and flight season. Maintenance of good water quality in all aquatic habitat types will ensure species richness for dragonflies and the invertebrates upon which they feed." (Authors) Address: Harp, G., Dept of Biological Sciences, Arkansas State Univ., State University, AR 72467, USA. E-mail: glharp@astate.edu

**8559.** Kawashima, I. (2003): Redescription of the larva of the aeshnid dragonfly, *Sarasaeschna kunigamiensis* (Ishida, 1972) (Aeshnidae) from Okinawa-jima Is., Ryukyu Isls. Tombo 46: 13-16. (in English, with Japanese summary) [The external morphology of the last instar larva of *S. kunigamiensis* from Okinawa-jima Is., Ryukyu Isls., is redescribed and illustrated in detail. Many external characters of this species are closely allied to those of *S. pryeri* from the mainland of Japan, not to *S. niisato* from northern Vietnam.] Address: Kawashima, I., 1-50-9 Nagasawa, Yokosuka, Kanagawa, 239-0842 Japan

**8560.** Prokonov, G.A. (2003): Presnovodnaya fauna basseyna r. Chernov. [Freshwater fauna of the Chernaya river basin]. Vopr. Razvitiya Kryma 15: 151-174. (in Russian) [*Calopteryx taurica*, *Gomphus vulgatisimus* and *Onychogomphus forcipatus* are recorded from the Chernaya River, Crimea, the Ukraine.] Address: not stated

**8561.** Sasamoto, A. (2003): Description of a new *Rhinagrion* species from Laos (Megapodagrionidae: Zygoptera). Tombo 46: 17-19. (in English) [*Rhinagrion yokoi* sp. n., is described from Sekong, SE Laos. It is related to *R. mima* (Karsch, 1891), but easily distinguished from the latter by body maculations and the structures of anal appendages and penile organ.] Address: Sasamoto, A., 190-4 Yakuoji Tawaramoto-cho, Shiki-gun, Nara, 636-0341 Japan

**8562.** Taketo, A. (2003): Transition of Odonate fauna in the artificial ponds in Yuhidera. Kanazawa: Situation in the 10 th year. Tombo 46: 20-21. (in Japanese, with English title) ["The Odonate fauna in artificial ponds at Yuhidera sanctuary, Kanazawa City on the 10 th year is reported. The occurrence of 13 anisopteran species was confirmed by quantitative exuviae collection. Although *Anax n. nigrofasciatus* and *Anaciaeschna martini* showed a considerable increase as compared with last year, seven dragonfly species disappeared, including common species, such as *Sympetrum eroticum*, *S. frequens* and *S. infuscatum*. Besides drought and accumulated mud, increasing crayfish numbers may be responsible for deterioration of the Odonate fauna." (Author) ] Address: Taketo, A., 1-19, Ishibiki 1-chome, Kanazawa City, 920, Japan

**8563.** Taketo, A. (2003): Recent information on the Odonate fauna of Tshikawa Prefecture. Tombo 46: 21-22. (in Japanese, with English title) ["Recent habitat situation of several rare odonate species (incl. *Asiagomphus pryeri* and *Gynacantha japonica*) in Ishikawa Prefecture, Hokuriku District, in 2002, were reported. Adults of *Mnais pruinosa nawai* Yamamoto were taken from Noto-jima Is., a solitary island in Nanao Bay. Exuviae of two stream dwellers, *Anisogomphus maacki* and *Sieboldius albardae* were found in a typically lentic habitat. Lake Shibayama-gata in Kaga City." (Author)]

Address: Taketo, A., 1-19, Ishibiki 1-chome, Kanazawa City, 920, Japan

**8564.** Taylor, M.J. (2003): The Naturalist on Chios. The Prefecture of Chios: 26 pp. (in English) [Odonata are treated on pages 15-17. The author gives a general account on dragonflies and lists a few prospective localities for dragonfly observation.] Address: E-mail: mike.taylor@tiscali.co.uk

**8565.** Verstrael, T.J.; Bouwman, J.; Kleukers, R.; Turin, H.; Verhagen, R.; de Vries, H. (2003): Prioritaire insecten en andere ongewervelden in Noord-Brabant. Rapport VS2003.022, De Vlinderstichting, Wageningen: 36 pp. (in Dutch) [Noord-Brabant, The Netherlands; the following Odonata are assessed as species action plans should be prepared: *Calopteryx virgo*, *Lestes virens*, *Sympecma fusca*, *Coenagrion hastulatum*, *Aeshna isoceles*, *Brachytron pratense*, *Gomphus vulgatisimus*, *G. flavipes*, *Cordulegaster boltonii*, *Somatochlora flavomaculata*, *S. arctica*, *Leucorrhinia dubia*, *L. pectoralis*, *Libellula fulva*, *Orthetrum coerulescens*, *Sympetrum depressiusculum*, *S. pedemontanum*] Address: Bouwman, J.H., Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: jaap.bouwman@vlinderstichting.nl

**8566.** Zhou, Z.-h.; Barrett, P.M.; Hilton, J. (2003): An exceptionally preserved Lower Cretaceous ecosystem. Nature 421: 807-814. (in English) ["Fieldwork in the Early Cretaceous Jehol Group, northeastern China has revealed a plethora of extraordinarily well-preserved fossils that are shaping some of the most contentious debates in palaeontology and evolutionary biology. These discoveries include feathered theropod dinosaurs and early birds, which provide additional, indisputable support for the dinosaurian ancestry of birds, and much new evidence on the evolution of feathers and flight. Specimens of putative basal angiosperms and primitive mammals are clarifying details of the early radiations of these major clades. Detailed soft-tissue preservation of the organisms from the Jehol Biota is providing palaeobiological insights that would not normally be accessible from the fossil record." (Authors) Records include Odonata.] Address: Zhou, Z., Institute of Vertebrate Paleontology & Paleoanthropology, Chinese Academy of Sciences, PO Box 643, Beijing 100044, China

## 2004

**8567.** Ferreras-Romero, M.; Cano-Villegas, F.J. (2004): Odonatos de cursos fluviales del parque natural Los Alcornocales (sur de España). Boln. Asoc. esp. Ent. 28(3-4): 49-64. (in Spanish, with English summary) ["Odonata of running waters of Los Alcornocales Natural Park (southern Spain). Faunistic data on 29 species of Odonata collected in brooks and streams of Los Alcornocales Natural Park are given. The more frequent species found were *Boyeria irene*, *Onychogomphus uncatatus* and *Cordulegaster boltonii*. Three species listed as vulnerable by the IUCN and included in the Spanish National Catalogue of Threatened Species (*Gomphus graslinii*, *Oxygastra curtisii* and *Macromia splendens*) maintain populations within this protected area. A biogeographical analysis of the breeding species in flowing waters within this park indicates the low percentage (20%) of Ethiopian elements, and the high presence (69.2%) of endemic sensu lato species geo-

graphically restricted to western Europe and the occidental part of the Mediterranean basin." (Authors)] Address: Ferreras-Romero, M., Depto de Ciencias Ambientales (Zoología). Univ. Pablo de Olavide. Ctra de Utrera km 1. 41013 Sevilla, Spain. E-mail: ferreras@teleline.es

**8568.** Huang, K.-y.; Lin, Y.-s.; Severinghaus, L.L. (2004): The diet of Besra Sparrowhawk (*Accipiter virgatus*) in Yangmingshan area, northern Taiwan. *Taiwania* 49(3): 149-158. (in English) ["We monitored 25 *A. virgatus* nests from 1993 to 2002, to document the prey composition of this species during the breeding season. Results showed that birds were the major prey both in frequency and in biomass. *A. virgatus* preyed more on species active in canopy, mid-layer, and shrubs than on the ground. There were seasonal shifts in prey composition and diet diversity indices. We suggest that *A. virgatus* captured prey opportunistically, capitalizing on seasonally emerging prey species that are abundant and energetically rewarding to catch." (Authors) Six specimens of *Anotogaster sieboldius* are among the prey items, accounting to 0.7% of prey frequency and 0.1% of biomass.] Address: Severinghaus, Lucia Liu., Research Center of Biodiversity and Institute of Zoology, Academia Sinica, Taipei 115, Taiwan. Email: zobowl@gate.sinica.edu.tw

**8569.** Kotarac, M.; Salmun, A.; Govedic, M. (2004): NATURA 2000 vrste v naravnih in antropogenih vodnih habitatih – Primer kaejih pastirjev. Mišičev vodarski dan 2004, Maribor, 10. december. Zbornik referatov, (Mišičev vodarski dan). Maribor: Vodnogospodarski biro, 2004: 91-97. (in Slovenian) [Slovenia, distribution maps of the appendix II/IV - species of the European Fauna-Flora-Habitat-Directive; *Coenagrion ornatum*, *Ophiogomphus cecilia*, *Cordulegaster heros*] Address: Kotarac, M., Centre for Cartography of Fauna & Flora, Antoliceva 1, SI-2204 Miklavz na Dravskem polju, Slovenia. E-mail: mladen.kotarac@ckff.si

## 2005

**8570.** Bedell, P.; Bryan, A. (2005): *Orthemis ferruginea* observed in Virginia. *Argia* 17(3): 27. (in English) [19-VI-005 in Henrico County, Virginia, USA] Address: not stated

**8571.** Bernard, R. (2005): Swiss precision: WILDERMUTH, H., Y. GONSETH & A. MAIBACH (Hrsg.), 2005. *Odonata – Die Libellen der Schweiz*. *Fauna Helvetica* 12, CSCF/SEG, Neuchâtel, 440 pp. *Odonatrix* 1(2): 36-37. (in Polish, with English summary) ["Dragonflies of Switzerland" appears as an excellent monograph presenting the occurrence of dragonflies in various aspects of the Swiss space and time. The author comments on the contents and form of the book stressing its 'smooth' dignified appearance, richness of data, plasticity and informativeness of figures and maps, great precision and some economy of species texts." (Author)] Address: Bernard, R., Department of General Zoology, Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznań, Poland; E-mail: bernard@amu.edu.pl

**8572.** Bernard, R. (2005): Buffer protection zones for *Nehalennia speciosa* – a vision, law and problems. *Odonatrix* 1(2): 21-24. (in Polish, with English summary) ["Buffer protection zones in the range up to 100 m around localities with *N. speciosa*, proposed by the

author, were legally implemented in Poland in 2004 by the Ministry of Environment, with the aim to prevent deforestation, changes in hydrological conditions and any other impact on the species habitat. So far, conservation measures of this type have been used in Poland mainly for birds. The vital role of forests as buffer zones for *N. speciosa* is evident. To a large extent they influence hydrochemical conditions and through them the composition and texture of vegetation, extremely important for the species. They also contribute to the stabilization of the hydrological conditions and serve as windshields. In the article, the necessity of implementation of the protection zones is substantiated considering a deep regress of this very endangered species. The legal status quo is described, some of its imperfections are explained, and a list of bans is enclosed. The expected problems related to designation of individual localities and outlining the range of their protection zones are considered in the context of continuous disputes with forest administration bodies." (Author)] Address: Bernard, R., Department of General Zoology, Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznań, Poland; E-mail: bernard@amu.edu.pl

**8573.** Brown, G. (2005): *Celithemis verna* in New York. *Argia* 17(3): 21-22. (in English) [Several specimens were recorded at Long Island in summer 2005. "It is, to my knowledge, the first record of this southern species for New York, and the first record north of New Jersey."] Address: not stated

**8574.** Buczyński, P.; Tończyk, G. (2005): New regulation pertaining to the list of the animal species being under protection. *Odonatrix* 1(1): 3-5. (in Polish, with English summary) ["The new regulation about species protection of animals encompasses 15 dragonfly species: *Sympecma paedisca*, *Coenagrion armatum*, *C. ornatum*, *Nehalennia speciosa*, *Gomphus flavipes*, *Ophiogomphus cecilia*, *Aeshna caerulea*, *A. subarctica*, *A. viridis*, *Cordulegaster boltonii*, *Somatochlora alpestris*, *S. arctica*, *Leucorrhinia albifrons*, *L. caudalis* and *L. pectoralis*. Additionally, for *N. speciosa* 100 m yearlong protection zone was introduced, covering its breeding and regularly inhabiting areas. In the paper the history of constructing the list of dragonflies under protection was also presented. They were provided for the first time in the regulation from 1995 in which only 7 species were involved. The next regulation (2001) encompassed 11 species, and the newest (2004) – 15 ones. It seems that after almost 10 years of efforts and mistakes, the composition of protected dragonflies has been competently fixed. It covers: non-threatened species or little threatened ones (their protection is associated with the ratification of the Bern Convention by Poland in 1995 as well as the acceptance of the EU-Habitat Directive in 2004) and really endangered (of the highest threat categories on the Red List of Threatened Animals in Poland). The authors analyse the practical dimension of species protection. Its up-to-date very restrictive legal construction derives from vertebrate and vascular plant protection. It can hinder the conducting of scientific research and cause conflicts with forest services." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8575.** Buczyński, P. (2005): Why *Odonatrix*? *Odonatrix* 1(1): 1. (in Polish, with English summary) [*Odonatrix* is the bulletin of the Odonatological Section of the Pol-



ish Entomological Society (PTE). It is launched twice a year, in January and July, and presents information on recent events of the section as well as Polish and world-wide odonatology, announcements and discussions of scientific conferences, comments on odonological literature, short reviews and popular scientific texts as well as faunistic notes. The bulletin is also available as a PDF-file in the Internet. It is written in Polish, with English abstracts.] Address: Buczyński, P., Dept Zool., Maria Curie-Skłodowska Univ., Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8576.** Buczyński, P. (2005): Polish and dedicated to Poland odonological papers published in the 1st half of the year 2005 and additions to the year 2004. *Odonatrix* 1(2): 38-40. (in Polish, with English summary) [Update of the Polish odonological bibliography.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8577.** Buczyński, P. (2005): List of Polish odonatologists and dragonfly fans. *Odonatrix* 1(1): 7-8. (in Polish, with English summary) [27 people are listed. Their postal and e-mail addresses are given.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8578.** Buczyński, P. (2005): The 2nd National Symposium of Odonatology, Urszulin, May 21-23, 2004. *Odonatrix* 1(1): 8-10. (in Polish, with English summary) [15 odonatologists from Poland, the Ukraine and Czech Republic participated the symposium, that was held in the Poleski National Park, Poland within the framework of the conference "Studies on dragonflies, beetles and caddisflies within protected areas". 12 reports and 14 posters were presented. These covered methods of odonological studies, situation of dragonflies in Poland and neighbouring countries as well as dragonfly protection, composition and status of the faunas of particular areas (mainly protected ones) and some problems connected with taxonomy and biology of dragonflies.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8579.** Buczyński, P. (2005): Polish and dedicated to Poland odonological papers published in the year 2004. *Odonatrix* 1(1): 14-17. (in Polish) [46 papers are considered.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8580.** Buczyński, P.; Tończyk, G. (2005): Keys useful in identifying Polish dragonflies. Part 1. Imagines. *Odonatrix* 1(2): 33-36. (in Polish, with English summary) [Poland; "It was 2005 when the first national key to imagines was published, and the only key to larvae and exuviae still remains in the manuscript form. Thus the authors present the main, recently published and available keys, useful in studying national adult dragonflies. These are in most cases the keys included in monographs of European dragonflies as well as in the compilations of the faunas of neighbouring countries (Germany, the Ukraine, Czech Republic). Newly published atlas of the dragonflies of Switzerland was highly evaluated." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19,

PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8581.** Buczyński, P. (2005): Minutes of the meeting of the Odonatological Section of the PES in Urszulin. *Odonatrix* 1(1): 10-12. (in Polish, with English summary) ["The meeting was held on May 22, 2004, with 16 people participating in. New governing authorities were chosen and the forms of the activities of the Section were discussed, e.g. „The atlas of distribution of dragonflies (Odonata) in Poland” project as well as other desirable trends in dragonfly research in Poland." (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8582.** Butler, R.G.; deMaynadier, P.G.; Tomlinson, M.; Robbins, H.; Long, P.; Marenberg, A. (2005): Northeast range extension and observations of atypical "sash" of *Enallagma laterale* (New England Bluet) in Maine. *Argia* 17(3): 23-25. (in English) [*Enallagma laterale* (New England Bluet) is a globally rare damselfly species (G3 or vulnerable) that has been documented in eastern Pennsylvania, northern New Jersey, southeastern New York, Connecticut, Rhode Island, Massachusetts, southeastern New Hampshire, and in southwestern and coastal Maine, the northern extreme of its range. Previously the northern-most known location for this species was Tilton Pond in Fayette, Maine (Kennebec City: N 44.4563°, W 70.0722°), and the eastern-most site was Pitcher Pond in Lincolnville, Maine (Waldo City: N44.3361°, W 69.0498°). In Downeast, Maine on 16 June 2004, a new breeding location for *E. laterale* was discovered at Otter Pond in T24 MD BPP, ME (Washington City: N44.8244°, W 67.9324°). Approximately 105 km from the nearest known site to the southwest, this population currently represents the extreme northeastern known limit to the distribution of *E. laterale* in North America. The habitat is described, and the morphology of the terminal abdominal segments is discussed.] Address: deMaynadier, P.G., Endangered Species Group, Maine, Maine Department of Inland Fisheries and Wildlife, 650 State Street, Bangor, Maine 04401, USA. E-mail: phillip.demaynadier@maine.gov

**8583.** Catling, P.M.; Kostiuk, B. (2005): Post-conference field trip — DSA 2005. *Argia* 17(3): 11-12. (in English) [Ontario, Canada; 12-14-VII-2005; 58 species from several localities (manly rivers and bogs) could be added to the Ontario Odonata Database maintained by the Natural Heritage Information Centre.] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**8584.** Catling, P.M.; Kostiuk, B.; Lewis, C.; Bracken, B. (2005): Observations on local field trips collecting in the Arnprior area; Annual meeting of the Dragonfly Society of the Americas. *Argia* 17(3): 9-11. (in English) [10-11-VII-2005; 68 species at five localities in the Arnprior, Ontario, Canada area.] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**8585.** Cios, S. (2005): Trout preying on adult dragonflies. *Odonatrix* 1(1): 5-7. (in Polish, with English summary) ["In the stomach of a brown trout caught on 22.06.2001 in Lake Valkeisjarvi near Oulu (Finland) the author found 14 males of *Cordulia aenea* and 2 males of *Enallagma cyathigerum*. The fish fed close to the water surface, without jumping out of the water. The large number of adults in the diet and the fact that they

were solely males, results from falling on the water surface of victims of combats between territorial males. The author discusses also literature data on the proportion of sexes in adult Odonata and on the role of imagines as food of fish." (Author)] Address: Cios, S., ul. Stryjeńskich 6/4, 02-791 Warszawa, Poland. E-mail: tanislaw.cios@msz.gov.pl

**8586.** Cios, S. (2005): Further accounts of fish preying on adult Odonata. *Odonatrix* 1(2): 24-25. (in Polish, with English summary) ["... In the first case the angler observed big chub (*Leuciscus cephalus*) jumping out of the water (River Gwda in Poland) trying to catch male adults of *Calopteryx* perching on vegetation overhanging the water. He didn't see any successful attacks, but in the stomachs of caught fish he found some of these damselflies. The second account also concerns male adults of *Calopteryx*. In River Dosse near Berlin another angler has seen brown trout jump out of the water, in an effort to catch the males. This angler has also once found an adult of *Anax imperator* in the stomach of a brown trout caught in the River Nuthe near Berlin. The last account is taken from an angler's article published in Internet. The angler has seen brown trout in the River Lozoya (Castilia in Spain) jump out of the water, trying to catch damselflies (probably females of *Calopteryx haemorrhoidalis*) perching on vegetation overhanging the water." (Author)] Address: Cios, S., ul. Stryjeńskich 6/4, 02-791 Warszawa, Poland. E-mail: stanislaw.cios@msz.gov.pl

**8587.** De Brito, L.; Abillo, F.J.P.; Watanabe, T. (2005): Insetos aquáticos do acude São José dos Cordeiros (semi-árido Paraibano) com ênfase em Chironomidae. *Entomologia y Vectores* 12(2): 149-157. (in Portuguese, with English summary) [Brazil; the decrease in the Gomphidae abundance was correlated with the increase of organic matter in the sediment.] Address: De Brito, L., Depto Metodol. Educação. Univ. Fed. Paraíba, Rua Maria Rosa Padilha 84, Edif. Aeroville, Ap. 210, Bairro Bessa, 58037-260 João Pessoa, PB, Brazil

**8588.** Donnelly, N. (2005): Oceanic islands in the news - or - parthenogenesis means never having to remember Valentine's Day. *Argia* 17(3): 31-32. (in English) [The author refers to the work of Adolf Cordero from Vigo University in Spain on the partenogenetic population of *Ischnura hastata* on the Azores, and discusses impacts of natural catastrophes like hurricanes or volcanic eruptions on island faunas and the possibilities resp. biological strategies to recover from such tragedies. The author also discusses the qualities of a good coloniser such as *I. hastata* (laying eggs in wide range of tiny fresh water habitats, low pressure from predators).] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**8589.** Dragonfly Society of the Americas (2005): *Argia* Vol. 17, No. 3, 1 October 2005. *Argia* 17(3): (in English) [In This Issue: 1-2; Nancy Adams (1958 – 2005), by Oliver Flint: 2-3; In Grateful Appreciation, by Carl Cook: 3; Welcome to Kentucky in June 2006, by Carl Cook & Ellis Lauder milk: 3-4; 2006 Southeastern DSA Meeting, by George L. Harp: 4; Northeast DSA Meeting, 2006: 4; Springtime in Tallahassee, Florida, 2006, by Jerrell J. Daigle: 4; Yahoo Yazzoo!, by Steve & Mary Jane Krotzer: 5; Bigger is better at Northeast DSA Meeting, by Bryan Pfeiffer: 5-7; North to Arnprior — The DSA 2005 Annual Meeting, by Roy Beckemeyer: 7-9; 2004 – 2005 DSA

Financial Report, by Jerrell Daigle:13; DSA Business Meeting Minutes, 2005, by Sid Dunkle: 13-14; Report of first field foray of the newly formed Dragonfly Society of Missouri, 10 – 12 June 2005, by Paul M. McKenzie: 14; The fourth Hine's Emerald dragonfly workshop, St. Ignace, Michigan, or show me your hiney!, by Mark O'Brien:15-17; Aeshna Sierra Ware Huff (26 March 2005), by Mike May: 38.] Address: DSA c/o Abbott, J.C., Patterson Labs 219, School of Bio. Sci., Univ. Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**8590.** Geiger, W.; Alcorlo, P.; Baltanas, A.; Montes, C. (2005): Impact of an introduced Crustacean on the trophic webs of Mediterranean wetlands. *Biological Invasions* 7: 49-73. (in English) ["Based on a review and our own data, we present an overview of the ecological impacts on the trophic web of Mediterranean wetlands by an introduced Decapod Crustacean, the red swamp crayfish (*Procambarus clarkii*). *P. clarkii* lacks efficient dispersal mechanisms but is very well adapted to the ecological conditions of Mediterranean wetlands (fluctuating hydroperiods with regular intervals of drought). As an opportunistic, omnivorous species, which adapts its ecology and life history characteristics, such as timing and size at reproduction to changing environmental conditions, it became readily established in most of the Mediterranean wetland environments. High reproductive output, short development time and a flexible feeding strategy are responsible for its success as an invader. Like most crayfish, it occupies a keystone position in the trophic web of the invaded system and interacts strongly with various trophic levels. It efficiently grazes on macrophytes and is one of the main factors, besides the impact of flamingos, cattle and introduced fish, of the change of many water bodies from a macrophyte dominated, clear water equilibrium to a phytoplankton driven turbid water balance. Juveniles feed on protein rich animal food with the corresponding impact on the macroinvertebrate community in competition with other crayfish or fish species. At the same time, it serves as a prey for mammals, birds and fish. Due to its predatory and grazing activity, it efficiently canalises energy pathways reducing food web complexity and structure. Feeding also on detritus it opens, especially in marshlands, the detritic food chain to higher trophic levels which results in an increase of crayfish predators. As a vector of diseases, it has a severe impact on the preservation and reintroduction of native crayfish. *P. clarkii* accumulates heavy metals and other pollutants in its organs and body tissues and transmits them to higher trophic levels. Due to the long history of its presence, the complex interactions it established within the invaded ecosystems and the socio-economic benefits it provides to humans, prevention and control seem the most promising management measures to reduce the negative impact of this crayfish species." (Authors) Odonata rarely were represented in crayfish traps.] Address: Geiger, W., Departamento de Ecología, Universidad Autónoma de Madrid, 28049 Madrid, Spain. E-mail: walter.geiger@uam.es

**8591.** Hutchings, G.E.; Halstead, D.A. (2005): Southern boreal forest observations for *Somatochlora williamsoni*: is its range extending northward? *Argia* 17(3): 41. (in English) [12-VII-2005, *S. williamsoni* adults were encountered in large numbers west of Stanley Mission in the Churchill River region of north central Saskatchewan, Canada.] Address: Hutchings, G.E., 971 Arun-

del Dr., Victoria, B.C., Canada, V9A-2C4. E-mail: seatrek@islandnet.com

**8592.** Kawartha Highlands Signature Site (2005): Kawartha Highlands Signature Site. Management Plan. Background Information. ISBN 0-7794-9039-8 (Print): 104 pp. (in English) [74 species of Odonata are known to have been recorded from Kawartha Highlands or from within 3 km of the boundary, representing 45 per cent and 77 per cent of the species known to occur in Ontario and Peterborough County respectively (Catling & Brownell, 2000; Jones, 1999b). The Kawartha Highlands Odonata checklist has been compiled from 746 dragonfly and damselfly records. Of the records, 486 were field observations made during 2000 fieldwork. The remaining 260 records were obtained from the Atlas of Ontario Odonata database (OOD, 2001). No species details are given.] Address: Kawartha Highlands Signature Site Park, P.O. Box 500, 106 Monck Street, Bancroft, ON K0L 1C0, Canada

**8593.** Larsen, R. (2005): Navajo word for dragonfly. *Argia* 17(3): 41. (in English) ["Robert Larsen recently circulated a list of Odonata from the Navajo Nation homeland. In this he reveals that on the Navajo homeland ("Dine'Tah"), odonates are called "Tani-l'ai".] Address: not stated

**8594.** Lee, Y.-F.; Mccracken, G.F. (2005): Dietary variation of Brazilian Free-tailed bats links to migratory populations of pest insects. *Journal of Mammalogy* 86(1): 67-76. (in English) ["We examined food habits of Brazilian free-tailed bats (*Tadarida brasiliensis*) at 3 colonies in central Texas over 3 summers. Fecal samples collected from 1,550 bats contained remains of 12 orders and 35 families of insects, documenting the most diverse diet ever reported in insect-eating bats. Daily and seasonal patterns of insect consumption were similar at the 3 sites and closely correlated to patterns of emergence, migration, and availability of adult populations of corn earworms *Helicoverpa zea* and fall armyworms *Spodoptera frugiperda*, both species of noctuid moths and major crop pests. The percentage of feces volume comprised by moth remains increased from 14.8%  $\pm$  2.1 SE (range: 6.3–43.7%) to 43.0%  $\pm$  7.1 (range: 1.7–73.5%) in samples collected at midnight versus dawn on days when large influxes of migratory moths arrived in Texas in early morning, following their massive emergence from northern Mexico. Daily patterns diminished later in the season, after moth populations became established in local crops and were available in large numbers throughout night. Moth consumption decreased in both evening and dawn feeding periods when crops senesced and moth populations declined. These and other data suggest that crop pests comprise a substantial portion of the bats' diet and that bats provide valuable natural pest control services." (Authors) Odonata represented 0.2% to the diet items of *T. brasiliensis*.] Address: Lee, Y.-F., Dept Life Sciences & Inst. Biodiversity, National Cheng Kung Univ., Tainan 701, Taiwan

**8595.** Matthews, J.H. (2005): Long-distance migration and emergence patterns in *Anax junius*: review of work to date. *Argia* 17(3): 29-30. (in English) [The author refers current knowledge on the bimodal emergence pattern in *A. junius* (residents/overwintering population in late spring/summer, while migrants emergence in later summer/autumn), records of (rare) overwintering larvae at the northern range limit of the species distribu-

tion (in Canada), and migration events of the species. He outlines his own attempts to get additional information on the migration system of *A. junius* (running dissertation).] Address: Matthews, J.H., USGS/Oregon State University, 541/738-0386, USA. E-mail: johoma@gmail.com

**8596.** McKenzie, P.M.; Vogt, T.E. (2005): Observations of Hine's Emerald Dragonfly (*Somatochlora hineana*) in Missouri between 1999 and 2004. *Argia* 17(3): 17-21. (in English) [The paper gives detailed information on ecology, biology and distribution of the species in Missouri, USA, and introduces into the methodology to prove the different stages of the species. Between 2001 and 2004 approximately 93 sites were examined in 23 counties throughout the state, and resulting in 19 new records of the species in Missouri. The vast majority of sites searched were within the Ozark Highlands Ecoregion, which has the largest concentration of fens in the state.] Address: Vogt, T.E., 207 West Summer Street, Hillsboro, IL 62049, USA

**8597.** Mielewczyk, S. (2005): Origins of the words *ważka*, *Libellula*, *Odonata*. *Odonatrix* 1(2): 25. (in Polish, with English summary) ["The first vernacular name of Odonata in Poland was *panna* (demoiselle, miss), which has been quickly replaced by the word *ważka* (a very small libra)."] (Author)]

**8598.** Nakamura, S.; Matsuda, S. (2005): The Insects in the riversides of Takatsu River, Shimane Prefecture, a result of survey in 2000. *Bull. Hoshizaki Green Found.* 8: 99-172. (in Japanese, with English summary) [Japan; 51 Odonata species are listed with location and day of capture dates.] Address: Nakamura, S., Nishihon-machi, 1-7-7, Shobara, Hiroshima Pref. 727-0013, Japan

**8599.** O'Brien, M. (2005): *Hagenius brevistylus* larva with attached Zebra mussels, Photo by P. Myer. *Argia* 17(3): 32-33. (in English) [Author and editor of *Argia* contribute some cases of mussel epizoon on *Hagenius brevistylus*, *Dromogomphus spinosus* and *Epithea princeps*. Detrimental effects of mussel load on mobility, hunting success and emergence of larvae are discussed.] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

**8600.** Paulson, D. (2005): Northern Bluet separated from its Eurasian relative and assigned a new species name. *Argia* 17(3): 28-29. (in English) [Turgeon et al (2005): Simultaneous quaternary radiations of three damselfly clades across the Holarctic. *American Naturalist* 165: E78 – E107 show, that new world populations previously considered as *Enallagma cyathigerum* must be recognized as a separate species, which receives the name *Enallagma annexum* (Hagen 1861). The common name remains Northern Bluet.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**8601.** Paulson, D. (2005): *Anax concolor*, a new species for the United States. *Argia* 17(3): 26-27. (in English) [5-VI-2005, Santa Ana National Wildlife Refuge, Hidalgo County, Texas, USA.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**8602.** Paulson, D. (2005): Common names for two species new to the United States. *Argia* 17(3): 38. (in English) [*Leptobasis melinogaster* González 2002 -



Cream-tipped Swampdamselfly; *Anax concolor* Brauer 1865 - Blue-spotted Comet Darner] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**8603.** Rehn, A.; Furth, D. (2005): Rediscovery of a lost dragonfly collection and the holotype of *Tanypteryx hageni* (Selys) - or - *Tanypteryx* meets sasquatch: The Perry Turner story. *Argia* 17(3): 34-37. (in English) ["The fate of Perry Edward Turner, Jr. remains a mystery." Turner was a somewhat obscure American odonatologist with special interest in Petaluridae. Many institutions and private persons borrowed specimens (or additional information) to Turner, material which never was returned. By chance, Turner's rebate was discovered. The fascinating story of inspecting the rebate and to get access to it, is told in some extend. In the end, much of the material that Turner had borrowed was recovered and returned to the appropriate institutions.] Address: Rehn, A., 2817 G Street, #1, Sacramento, CA 95816, USA

**8604.** SaintOurs, F. (2005): Monponsett disaster. *Argia* 17(3): 33-34. (in English) [The use of the herbicide Sonar in a suburban water body with unnaturally high nutrient loads (Monponsett Pond in southeastern Massachusetts, USA, a popular recreational pond for fishermen, motor boaters, and jet skiers), caused the complete domination of one of the most common lentic species (*Pachydiplax longipennis*) in USA in the lotic system of the outlet stream of the west pond. Calopteryx, Didymops, and Cordulegaster had disappeared.] Address: SaintOurs, F., Dept of Biology, Univ. of Massachusetts Boston, USA. E-mail: fred.saintours@umb.edu

**8605.** Steele, M.; Daigle, J.J. (2005): New Stewart County, Tennessee records. *Argia* 17(3): 28. (in English) [2003 and 2005, 34 species were recorded at the pond and creek on the "Triple J Ranch", Stewart County, Tennessee, USA. "The presence of *Dythemis velox*, a species common in dry Texas country, is interesting in that it may be expanding its range towards the Northeast."] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**8606.** Tończyk, G. (2005): Database of Polish odonatalogical literature. *Odonatrix* 1(2): 29-30. (in Polish, with English summary) ["The announcement for odonatologists writing about the dragonflies of Poland. Works on the base of Polish and referring to Poland literature have begun. The base will be available in electronic form. Every paper will be provided with short note on the subject and a study area. The list of papers will be constructed in two versions: chronological and alphabetical one. Detailed information on the taken initiative can be received from Grzegorz Tończyk (tonczyk@biol.uni.lodz.pl)."] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk@biol.uni.lodz.pl

**8607.** Tończyk, G. (2005): Odonatological Section of the Polish Entomological Society. *Odonatrix* 1(1): 1-3. (in Polish, with English summary) ["Short history of the origin of the Odonatological Section of Polish Entomological Society. The Section started its activity on April 18, 1998. The make-up of previous governing body (chairman: S. Mielewicz, secretary: P. Buczyński) and current one (chairman: P. Buczyński, secretary: G. Tończyk). Information about taken up projects by the

Section: „The atlas of distribution of dragonflies (Odonata) in Poland”, WWW-page, electronic data base of Polish odonatalogical literature, editing of the bulletin *Odonatrix*." (Author)] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk@biol.uni.lodz.pl

**8608.** Tończyk, G. (2005): The atlas of distribution of dragonflies (Odonata) in Poland – we have just started to collect data! *Odonatrix* 1(1): 12-13. (in Polish, with English summary) [The action of data collecting for "The atlas of distribution of dragonflies (Odonata) in Poland" has started. This project of collective authorship (R. Bernard, P. Buczyński, G. Tończyk, A. Łabędzki, S. Mielewicz and J. Wendzonka) is going to be a summary of the knowledge on the distribution of the dragonflies recorded in Poland. The presentation of collected data is planned till the end of 2008. The initiative has been directed to people involved in entomology as well as to amateurs.] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i hydrobiologii, Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk@biol.uni.lodz.pl

**8609.** Tończyk, G. (2005): The observations of the foraging of Hawkers (*Aeshna* spp.) in the urban conditions. *Odonatrix* 1(2): 26-27. (in Polish, with English summary) ["During the research on odonofauna of Łódź city conducted in the years 2002-2004 the foraging of Hawkers (*A. cyanea*, *A. mixta* and *A. grandis*) in the area of urban compact development was observed very often. In late summer and early autumn periods Hawkers forage regularly along walls with southern exposition, strongly heating up during the day. Numerous insects, taking advantage on specific microclimatic conditions, gather willingly by such walls." (Author)] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk@biol.uni.lodz.pl

**8610.** Vogt, T.E.; McKenzie, P.M. (2005): New Zygoptera state records for Missouri: *Telebasis byersi* and *Telebasis salva*. *Argia* 17(3): 22-23. (in English) [Telebasis byersi, 1-IX-2004, in a baldcypress (*Taxodium distichum*) swamp at Big Oak Tree State Park, Mississippi County, Missouri, USA. *Telebasis salva*, 11-VIII-1963, Jasper County, Missouri, USA, no further data were available.] Address: Vogt, T.E., 207 West Summer Street, Hillsboro, IL 62049, USA

**8611.** Worthen, W.B. (2005): Odonata survey of Paris Mountain State Park and Jones Gap State Park, Greenville County, South Carolina. *Argia* 17(3): 27-28. (in English) [USA; Paris Mountain State Park: 22 species; Jones Gap State Park: 17 species.] Address: Worthen, W.B., Dept Biology, Furman Univ., Greenville, SC 29613, USA. E-mail: worthen@furman.edu

## 2006

**8612.** Albertoni, E.F.; Palma-Silva, C. (2006): Macroinvertebrates associated with floating macrophytes in urban channels (Balneário Cassino, Rio Grande, RS, Brazil). *Neotropical Biology and Conservation* 11(2): 90-100. (in Portuguese, with English summary) ["The Bal-

neario Cassino is located at south coastal plain of Rio Grande do Sul State. It has channels to pluvial running in all of its extension, with dense stands of floating macrophytes. The aim of this study was to characterize macroinvertebrates associated with these macrophytes, which were sampled in five sampling points (P1 *Pistia stratiotes*; P2 *Spirodela intermedia*; P3 *Eichhornia crassipes*; P4 *Salvinia minima* and P5 *Eichhornia crassipes*), monthly, with a net (500  $\mu$ m mesh size) in triplicates, between March 2000 and February 2001. The macrophytes were washed on 500  $\mu$ m mesh size sieve, the retained material preserved in 80 % alcohol and then separated at stereomicroscope. The plants were dried (60°C) to obtain the dry weight. At each point dissolved oxygen, temperature, pH and electric conductivity, and nutrient (P and N) concentrations were measured. The associated community was assessed with taxa abundance and occurrence, and calculated the Shannon-Wiener diversity index and homogeneity (Jf, Pielou). The Dice-Sorensen similarity among plants was estimated. *Eichhornia crassipes* (P5) had the highest relative density (116,723.61 org. 100g DW<sup>-1</sup>) and the higher taxa number (46). In all plant species Chironomidae (Diptera), Oligochaeta and Copepoda predominated in abundance and density. The associated community showed high similarity among macrophyte species, with significant difference in Hf ( $p < 0.05$ ), varying between 2.51 (*E. crassipes* P3 in spring) and 0.98 (*S. minima* P4 in summer). Low concentration of dissolved oxygen (between 1.4 and 7.6 mg.L<sup>-1</sup>) and high nutrient concentration (total-P between 0.01 and 4.81 mg.L<sup>-1</sup>, and total-N between 0.35 and 14.94 mg.L<sup>-1</sup>) suggesting an eutrophication process in these channels, mainly during summer months, when increased population and domestic sewage contribution to this systems. This process is reflected by macroinvertebrate community, by the predominant groups, and indicates the deterioration of water quality of these channels." (Authors) Odonata are treated at the family level.] Address: Albertoni, E.F.; Laboratório de Ecologia e Limnologia, Depto de Ciências Morfobiológicas, Fundação Universidade Federal do Rio Grande (FURG), Avenida Itália, km 8, Caixa Postal 474, Rio Grande, RS, 96.201-900, Brasil. E-mail: dmbefa@furg.br

**8613.** Bailowitz, R.; Stevens, L. (2006): *Argia hinei* in Utah. *Argia* 17(4): 21. (in English) ["*A. hinei* is one of these tropically-rooted species, extending into the United States only in Arizona, southern California, southern Nevada, southern New Mexico, and western Texas." Now, the species was recorded at Bowns Canyon, a tributary to Lake Powell in Utah, USA, on 21-VII-2004.] Address: Stevens, L.E., Museum of Northern Arizona, 3101 N. Ft. Valley Rd, Flagstaff, AZ 86001, USA. E-mail: farvana@aol.com

**8614.** Bailowitz, R. (2006): Marl Pennant (*Macrodiplosis balteata*) in Nevada. *Argia* 17(4): 22. (in English) [8-VII-2005, group of ponds in extreme northwestern Arizona, Mohave County, USA.]

**8615.** Beckemeyer, R. (2006): Talking about dragonflies — Spreading the word. *Argia* 17(4): 24-25. (in English) [The author gives some didactical advise on how to do talks about Odonata.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**8616.** Bernard, R.; Buczyński, P.; Tończyk, G. (2006): Dr Stefan Mielewicz (4 II 1933 – 12 VIII 2005). *Odo-*

*natrix* 2(1): 2-8. (in Polish, with English summary) [Obituary: "A biography and a profile of Dr S. Mielewicz, an excellent Polish hydroentomologist, are presented with special attention paid to his odonatalogical achievements. A complete list of his 76 publications (57 original) to a various extent related to Odonata or odonatology is enclosed." (Authors)] Address: Bernard, R., Dept of General Zoology, Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznań, Poland; E-mail: bernard@amu.edu.pl

**8617.** Bernard, R. (2006): 4th WDA International Symposium of Odonatology, Pontevedra (Spain), 26-30 July 2005 – a report. *Odonatrix* 2(1): 21-22. (in Polish, with English summary) [The author's report focuses on most interesting events, papers and posters from a personal view.] Address: Bernard, R., Dept of General Zoology, Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznań, Poland; E-mail: bernard@amu.edu.pl

**8618.** Blust, M. (2006): What a day! *Argia* 17(4): 4-5. (in English) [21-VI-2005, Vermont, USA; *Enallagma laterale*, *Nasiaeschna pentacantha*, *Epiaeschna heros* and *Rhionaeschna mutata*, new state records. Later this summer *Gomphus abbreviatus* and *Stylurus amnicola* also could be added to the Vermont list of Odonata.] Address: Blust, M., The University of the State of New York, The State Education Department, Albany, NY 12230, USA

**8619.** Braccia, A.; Voshell, J.R. (2006): Benthic macroinvertebrate fauna in small streams used by cattle in the Blue Ridge Mountains, Virginia. *Northeastern Naturalist* 13(2): 269-286. (in English) ["Cattle production is a common land use, and the adverse effects of cattle grazing on stream habitat and macroinvertebrates has been well documented. The purpose of our study was to provide a list of taxa that can be expected to occur in small streams impacted by cattle in the southern Blue Ridge Mountains and to demonstrate how taxon-specific natural history information can be used to gain insight about benthic habitat condition. We identified 97 benthic macroinvertebrate taxa (including *Cordulegaster*, *Gomphus*, *Lanthus*, and *Stylogomphus albistylus*) from five cattle-impacted streams that differed in cattle grazing intensity. Our findings suggest that some macroinvertebrate taxa can sustain low levels of cattle grazing and that sedimentation is a major stressor to the macroinvertebrate fauna." (Authors)] Address: Braccia, Amy, Department of Entomology. Blacksburg, Virginia, USA; E-Mail rvoshell@vt.edu

**8620.** Bridgehouse, D.W. (2006): Significant range extension for *Somatochlora brevicincta* (Quebec Emerald) in Nova Scotia. *Argia* 17(4): 19-20. (in English) [2-IX-2005, at a small roadside pond at West Porters Lake, Halifax County, Nova Scotia, Canada. This record represents a further range increase to ca. 1,550 km from the type locale, and is the most southern locale for the species at ca. 44.73°N.] Address: Bridgehouse, Derek. E-mail: d.bridgehouse@ns.sympatico.ca

**8621.** Buczyński, P. (2006): 25. annual meeting of the Society of German-Speaking Odonatologists (GdO), Essen (Germany), March 17-19, 2006. *Odonatrix* 2(2): 44-46. (in Polish, with English summary) [Report on the GdO-meeting with particular attention paid to some speeches concerning ecology and protection of dragonflies.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

- 8622.** Buczyński, P. (2006): Corbet's monograph: a "bible" for odonatologists. *Odonatrix* 2(1): 25-26. (in Polish, with English summary) [Book review: "The monograph by Corbet (1999, 2004) is estimated as the most important and very useful world-wide elaboration of the biology and ecology of dragonflies." (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 8623.** Buczyński, P. (2006): Polish and dedicated to Poland odonatological papers published in the 2nd half of the year 2005 and additions to the 1st half of this year and for the year 2004. *Odonatrix* 2(1): 27-29. (in Polish, with English summary) [Update of the Polish odonatological bibliography.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 8624.** Buczyński, P.; Tonczyk, G. (2006): Keys useful in identifying Polish dragonflies. Part 2. Larvae and exuviae. *Odonatrix* 2(1): 22-25. (in Polish, with English summary) ["The most important literature useful in determining of larvae and exuviae of Polish dragonflies are reviewed and evaluated. The authors describe the newest publications first of all, but some older keys are mentioned that are important due to historical or didactical reasons." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 8625.** Buczyński, P. (2006): Worth to know, worth to have: the monograph of European Calopterygidae. *Odonatrix* 2(1): 26-27. (in Polish, with English summary) [Book review: "The book analysed is appreciated as a highly valuable synthesis of data about European demoiselles. Especially worth of attention is a very extensive and competent part concerning the behavioural and evolutionary biology. Some remarks on the whole series "Die Libellen Europas" "(The dragonflies of Europe") are given." (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 8626.** Buczyński, P. (2006): Polish and dedicated to Poland odonatological papers published in the 1st half of the year 2006 and additions to the year 2005. *Odonatrix* 2(2): 47. (in Polish, with English summary) [Update of the Polish odonatological bibliography.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 8627.** Cannings, R.A.; Catling, P.M.; Brunelle, P.M. (2006): An annotated checklist of the Odonata of Canada update — November 2005. *Argia* 17(4): 26-28. (in English) [New records and status changes for *Somatochlora williamsoni* in Saskatchewan, and six new records of *Arigomphus villosipes* in Ontario are referred. „North American populations of the Northern Bluet, previously *Enallagma cyathigerum* (Charpentier), are now to be called *Enallagma annexum* (Hagen) as outlined by Turgeon et al., and by Paulson (see below). The name *cyathigerum* is correctly applied to old world populations. *Leucorrhinia proxima* has the pale areas red and is truly the Red-waisted Whiteface in much of the west, but is pale yellow on the waist and elsewhere in much of the east (e.g. Donnelly 2004b). This interesting pattern of variation deserves more study." A list of new and important publications is also added to the paper.] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street Victoria, British Columbia V8W 9W2. Canada. E-mail: rcannings@royalbcmuseum.bc.ca
- 8628.** Cannings, R.A.; Catling, P.M.; Brunelle, P.M. (2006): New subspecific status for *Macromia rickeri* Walker. *Argia* 17(4): 23. (in English) ["Recently, *M. rickeri* Walker (1937, see also Walker & Corbet 1975) has been treated as a synonym of *M. magnifica* (e.g. Needham et al. 2000, Cannings 2002); Dunkle (2000) called it the "northern form" of the species. We believe it is best treated as a subspecies. Although identical structurally to *M. m. magnifica*, subspecies *M. m. rickeri* is a dark-coloured form endemic to southern British Columbia, Canada." (Authors)] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street Victoria, British Columbia V8W 9W2. Canada. E-mail: rcannings@royalbcmuseum.bc.ca
- 8629.** Cano Villegas, J.J.; Muñoz Vallés, S. (2006): Nueva cita de "*Coenagrion mercuriale*" (Charpentier, 1840) en el Parque Natural Sierra Norte (Sevilla, España) (INSECTA: ODONATA). *Boletín de la Sociedad Andaluza de Entomología* 14: 13-19. (in Spanish, with English summary) [11-VI-2006, *Coenagrion mercuriale* was found in the Sierra Norte Natural Park (Seville, Spain). At the same date, *Calopteryx xanthostoma* was firstly recorded in the province of Seville.] Address: Cano Villegas, F.J., Departamento de Sistemas Físicos, Químicos y Naturales, Area de Zoología, Universidad Pablo de Olavide, 41013 Sevilla, Spain. E-mail: ficanovil@wanadoo.es
- 8630.** Casey, R.E.; Simon, J.A.; Atueyi, S.; Snodgrass, J.W.; Karouna-Renier N.; Sparling, D.W. (2006): Temporal trends of trace metals in sediment and invertebrates from stormwater management ponds. *Water Air Soil Pollution* 178: 69-77. (in English) ["Stormwater ponds are an increasingly common feature in urban landscapes. Because these ponds retain runoff and particulate-bound contaminants from impervious surfaces, organisms inhabiting stormwater ponds may be exposed to elevated metal levels in sediments. This study evaluated temporal changes in sediment and macroinvertebrate Cu, Pb and Zn over an eleven-year period with specific attention to land use in pond watersheds. Sediment and invertebrate metal levels were quantified using atomic absorption spectrophotometry (1993 samples) or inductively coupled plasma mass spectrometry (2003–2004 samples). Sediment trace element levels did not significantly change from 1993 to 2003-2004 with the exception of Zn in ponds receiving runoff from highways, which increased from a mean of 32 mg kg<sup>-1</sup> in 1993 to 344 mg kg<sup>-1</sup> in 2003–2004. Sediment Pb and Cu generally remained below published threshold effects concentrations (TEC) except for two instances of elevated Cu in 2003–2004. Zn remained below the TEC in 1993 but exceeded the TEC in six ponds in 2003–2004. Trace metal body burdens varied among invertebrate groups, and to a lesser extent among land uses, but in both cases this variation was a function of year. In general, trace element body burdens were more similar among invertebrate groups or land use or both during 2003–2004 when compared to levels in 1993. Our results suggest sediment and invertebrate trace metal levels are at steady state in these stormwater management ponds and that risk to organisms in-



habiting these ponds does not vary as a function of pond age. [...] In general, Cu, Pb and Zn levels were lowest among odonates, composite samples and molluscs, respectively." (Authors) Address: Casey, R.E., Department of Chemistry, Towson University, 8000 York Rd., Towson, MD 21252-0001, USA. E-mail: racasey@towson.edu

**8631.** Craves, J. (2006): Odonata in central Panama. *Argia* 17(4): 15-16. (in English) [Report from a ten-day field trip in August 2005 to Panama.] Address: not stated

**8632.** Dragonfly Society of the Americas (2006): *Argia* Vol. 17, No. 4. *Argia* 17(4): (in English) [In This Issue: 1-2; A Message from the President, by Steve Krotzer: 2-3; Calendar of Events: 3; DSA Kentucky Bound in 2006! by Carl Cook and Ellis Lauder milk, 3-4; Northeast Regional Meeting of the DSA, Twin Mountain, New Hampshire, 22 – 25 June 2006, by Pam Hunt: 4; Catling, P.M. 2006 Zebra mussels on dragonfly larvae — from Ontario *Argia* 17(4) 25 (reprinted from Ontario Odonata vol. 6. 2005); DSA National Meeting Sites Committee, by Daigle, J.J.: 26; Meeting of Ohio Odonata Society: 28; Errata for an annotated checklist of the Odonata of Canada: 28; Tidbits from the IORI, by Bill Mauffray: 29; Proposed Revisions to the Bylaws of the Dragonfly Society of the Americas: 29-31.] Address: DSA c/o Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**8633.** Ehmann, H. (2006): Libellenfunde im Bundesland Salzburg 2000-2005 (Insecta: Odonata). Mitteilungen aus dem Haus der Natur XVII: 91-117. (in German, with English summary) [During 2000-2005, a total of 54 odonate species was recorded in the province of Salzburg, Austria. Collection data are presented in detail.] Address: Ehmann, H., Hirschenhöhrstr. 25, A-5450 Werfen, Austria

**8634.** Gordon, S.; Kerst, C. (2006): 2005 Aeshna Blitz — the best ever. *Argia* 17(4): 10-12. (in English) [Oregon, USA; brief report on collecting Odonata in ? 2005. A total of 42 species (some are outlined) were recorded. A female *Aeshna constricta* (new Klamath Co. record) is the second record for this species in Oregon since 1929.] Address: Kerst, C. E-mail: caryk@comcast.net

**8635.** Grimes, B. (2006): Robber fly predation on dragonfly. *Argia* 17(4): 26. (in English) [Henry County, Virginia, USA, City of Martinsville Reservoir on 15-VII-2005; *Perithemis tenera* was preyed by a robber fly (species unknown).] Address: not stated

**8636.** Gros, P. (2006): Ausbreitung der westlichen Keiljungfer *Gomphus pulchellus* Selys, 1840 in Zentral-europa: erster Nachweis dieser Art im Bundesland Salzburg, Österreich (Odonata: Gomphidae). Mitteilungen aus dem Haus der Natur 17: 118-121. (in German, with English summary) [*G. pulchellus* is newly reported for the fauna of the county of Salzburg, Austria. Details of this discovery are given, typical features of this dragonfly are described.] Address: Gros, P., Haus der Natur, Museumsplatz 5, 5020 Salzburg, Austria. E-mail: patrick.gros@hausdernatur.at

**8637.** Harp, G.; Robinson, (2006): Aquatic macroinvertebrates of the Strawberry River system in north-central Arkansas. *Journal of the Arkansas Academy of*

*Science* 60: 46-61. (in English) [USA; "The Strawberry River has been designated an Extraordinary Resource Water, an Ecologically Sensitive Water Body, and a Natural and Scenic Waterway. As such, it is particularly important that the biodiversity of this river system be documented thoroughly. The purpose of this research was to develop a comprehensive list of the aquatic macroinvertebrates of the Strawberry River and its major tributaries. The information was developed from a thorough literature review and by examining specimens housed in various collections of the Arkansas State University Museum of Zoology and collections of the authors. The latter included 9 collections at 4 sites along the mainstream and 17 collections from 8 tributaries. To date, 313 species of aquatic macroinvertebrates are known to occur in the Strawberry River system." (Authors) Odonata contribute with 50 taxa, in most cases identified to the species level, in some cases at the genus level. The taxa are listed locality wise.] Address: Harp, G., Department of Biological Sciences, Arkansas State University, State University, AR 72467, USA. E-mail: glharp@astate.edu

**8638.** Harp, G.L. (2006): The Shirey Bay Rainey Brake WMA BioBlitz. *Argia* 17(4): 12. (in English) [Shirey Bay Rainey Brake (SB/RB) Wildlife Management Area. Arkansas, USA, 9 – 10-V-2005. A total of 24 Odonata species was recorded. Less common species of the survey, at least in Arkansas, were *Lestes vigilax*, *Ischnura kellicotti*, and *Celithemis verna*.] Address: Harp, G.L. E-mail: glharp@astate.edu

**8639.** Harp, G.L. (2006): Dragonfly records from the Hiawatha National Forest, Michigan. *Argia* 17(4): 24. (in English) [USA; between 18–19-VII-2005, seven sites within this Forest were visited and 26 species recorded.] Address: Harp, G.L. E-mail: glharp@astate.edu

**8640.** Hummel, S. (2006): Mistaken identity. *Argia* 17(4): 19. (in English) [20-IX-2005, Ida Grove, Iowa, USA; attempt of mating between a male *Aeshna constricta* and a female *Anax junius*.] Address: Hummel, S., P.O. Box 121, Lake View, IA, 51450, USA. E-mail: mshummel@netins.net

**8641.** Hung, K.-y.; Lin, Y.-s.; Severinghaus, L.L. (2006): Comparison of three common methods for studying the diet of nestlings in two *Accipiter* species. *Zoological Studies* 45(2): 234-243. (in English) ["Food provisioning to 4 *Accipiter virgatus* nests and 2 *A. trivirgatus* nests was monitored during 1998 and 2000 in Yangmingshan National Park, Taipei, Taiwan. We made direct observations of prey deliveries and collected prey remains and pellets throughout the breeding seasons in order to compare the effectiveness and efficiency of the different diet analysis methods for these 2 raptor species. The method of using prey remains worked best for *A. virgatus* for all measurements, producing 45.23% of all prey items found, 45.23% of all prey items identified to prey taxa, and 38.87% of all prey items identified to species. The observation method worked best for *A. trivirgatus*, providing 41.05% of all prey items and 18.95% of prey items identified to species, but the proportion of prey items identified to prey taxa was highest using the pellet method (37.37%). Time efficiency was consistently the highest for the prey remains method in *A. virgatus*. In contrast, for *A. trivirgatus*, the pellet method was most efficient for assessing the number of prey items delivered and the number identified to prey taxa, but the prey remains method worked best for

identifying prey to species. Combining the prey remains and pellet methods increased the prey taxa identified to 81.63% for *A. virgatus* and 58.95% for *A. trivirgatus*. Although the value of direct observation has been stressed by many researchers, its effectiveness varied between these 2 species studied in Taiwan." (Authors) *A. virgatus* preyed upon *Anotogaster sieboldii*.] Address: Severinghaus, Lucia Lin, Research Center for Biodiversity, Academia Sinica, Taipei, Taiwan 11528, R.O.C. E-mail: zobbowl@gate.sinica.edu.tw

**8642.** Hutchings, G.E.; Halstead, D.A. (2006): Southern boreal forest observations of *Somatochlora williamsoni*: is their range extending northward? *Argia* 17(4): 20-21. (in English) [In July 2005, *S. williamsoni* adults were encountered in large numbers west of Stanley Mission at several locations in the Churchill River region of north central Saskatchewan, Canada.] Address: Halstead, D.A., University of Victoria, Victoria, B.C., Canada. E-mail: odonatas@uvic.ca

**8643.** Kunz, B.; Hunger, H. (2006): Phänologiedaten 2006 einiger Libellen aus Mitteleuropa. *mercuriale* 6: 42-46. (in German) [Phenology data and / or observations referring to voltinism are presented from localities in Germany and Switzerland.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: libellen@berndkunz.de

**8644.** Lagunov, A.V. (2006): Insect species from the Red Book of Russian Federation in the fauna of the Chelyabinsk district. An annotated list. Proceedings of the Chelyabinsk Scientific Center 4 (34): 96-100. (in Russian) [The list includes *Aeshna viridis*, *Leucorrhinia albifrons*, *L. caudalis*, and *Ophiogomphus cecilia*.] Address: Lagunov, A.V., Ilmensky state reserve, Ural branch of Russian Academy of Science, Miass, Russia. E-mail: lagunov@ilmeny.ac.ru

**8645.** Mielewczyk, S. (2006): Życiorys: Stefan Mielewczyk. *Odonatrix* 2(1): 1-2. (in Polish, with English summary) [Curriculum vitae; short autobiography of Dr. Stefan Mielewczyk (1933-2005)]

**8646.** Novak, P. (2006): New York dragonfly and damselfly survey: An update. *Argia* 17(4): 17-19. (in English) [Brief report on activities to prepare an Odonata survey and keep it running in New York, USA. A list of interesting records from 2005 field trips is added.] Address: Novak, P., New York Natural Heritage Program, NYSDEC, 625 Broadway, 5th Floor, Albany, NY 12233-4757, USA. E-mail: pgnovak@gw.dec.state.ny.us

**8647.** Odonatological Section of the Polish Entomological Society (2006): Statute of the Odonatological Section of the Polish Entomological Society. *Odonatrix* 2(1): 29-30. (in Polish, with English summary) [Published print version of the official document.] Address: c/o Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8648.** Odonatological Section of the Polish Entomological Society (2006): Report on activities of the Odonatological Section of the Polish Entomological Society in 2005. *Odonatrix* 2(2): 50-52. (in Polish, with English summary) ["Annual report is presented that has been submitted to the Governing Board of the Polish Entomological Society. A discussion and constructive criticism of activities of the section are welcome." (Author)] Ad-

dress: c/o Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8649.** O'Brien, M. (2006): *Archilestes grandis* in Michigan. *Argia* 17(4): 22. (in English) [Wayne County, Michigan, USA; without further data.] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfbrien@umich.edu

**8650.** Paulson, D. (2006): Dragonfly graveyards. *Argia* 17(4): 17. (in English) [The author describes a few observations on dead or dying *Enallagma* and *Somatochlora*-specimens. „Are these old individuals that don't have the strength to fly up ... Do dragonflies go to the water to die, or do they merely attempt to get a drink and get stuck?"] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**8651.** Paulson, D. (2006): *Gynacantha mexicana* at communal roost in south Texas. *Argia* 17(4): 5-6. (in English) [Santa Ana, Texas, USA; 9 – 12-XI-2005; „I was quite surprised, when I followed one flushed individual deeper into the low branches of a shrub thicket, to find it at a communal roost with a total of eight individuals, four males and four females, in a space of about a cubic meter and about a meter above the ground. Six were hanging under branches, and two were perched vertically on a good-sized tree trunk. Several individuals were almost touching other individuals. I saw one additional individual, so at least nine were present near one side of the pond.“] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**8652.** Pfeiffer, B.M. (2006): The dragonflies and damselflies of teal Farm, Huntington, Vermont, 2005. Prepared for Foundation for a Sustainable Future: 15 pp. (in English) [Survey work was concentrated at the two ponds sites, where Teal Farm's odonate diversity is greatest. No natural ponds occur on the land. This investigation revealed a total of 11 Zygoptera species and 26 Anisoptera species. These represent 26 % of the Vermont's known Zygoptera fauna and 27% of its Anisoptera fauna. Notable species are associated with watercourses: *Lanthus parvulus* and *Ophiogomphus carolus*.] Address: Pfeiffer, B., 113 Bartlett Rd, Plainfield VT, 05667, USA. E-mail: Bryan@VermontBirdTours.com

**8653.** Schlüpmann, M. (2006): Die Fauna einer bedrohten Kulturlandschaft in Hagen. *Dortmunder Beiträge zur Landeskunde. Naturwissenschaftliche Mitteilungen* 40: 59-96. (in German, with English summary) [Nordrhein-Westfalen, Germany; 13 odonate taxa are reported from two running waters and two artificial ponds. *Erythromma viridulum* is an addition to the regional fauna.] Address: Schlüpmann, M., Hierseier Weg 18, D-58119 Hagen, German. E-mail: martin-schlupe-mann@t-online.de

**8654.** Schneider, B. (2006): Herbstmosaikjungfer *Aeshna mixta* in den Klauen einer Wasserkäfer-Larve. *mercuriale* 6: 40. (in German) [Switzerland; on 15-VIII-2006, an ovipositioning female of *A. mixta* was attacked by a water beetle, probably *Cybister* sp.] Address: Schneider, B., Wolfbühlstr. 34a, CH-8408 Winterthur, Switzerland

- 8655.** Schneider, T. (2006): Die Libellenfauna an der Schmalen Sinn vor und nach Einbürgerung des Bibers (*Castor fiber albicus*). Beiträge zur Naturkunde in Ost-Hessen 43: 61-74. (in German, with English summary) ["The odonata fauna of the trout region brook „Schmale Sinn" in the secondary chain of mountains in the south-east of Hessen (Central Germany) is poorly investigated. The introduction of the beaver at the end of the 80th in the last century resulted in changes in the environment with the creation of beaver ponds in this region. The analysis of the Odonata fauna in this region over a long period prior and after the introduction of the beaver revealed an increase of species from 19 before to 26 after the establishing of a stable beaver population. Not all of the changes of the Odonata fauna in this period were due to the creation of ponds by the beavers. The disappearance of one specie (*Orthetrum coerulescens*) was already established several years before the beaver was introduced. From 8 species new in the region, 2 (*Gomphus pulchellus*, *Aeshna mixta*) appeared at the same time at the beaver pond and at several other biotopes of the region. The introduction of the beaver in the trout region brook „Schmale Sinn" had no negative effects on the autochthonous Odonata fauna, in contrary the spectrum and abundance of species increased." (Author)] Address: Schneider, T., Arnold-Knoblach-Ring 76, 14109 Berlin/Wannsee, Germany. E-mail: karin.thomas.schneider@gmx.de
- 8656.** Sibley, F. (2006): Nebraska summer. *Argia* 17(4): 8-10. (in English) [Nebraska is one of most less studied Federal states in USA with respect to Odonata (850 county records for all of Nebraska.). In July 2005, "we hit 44 counties in the month adding over 600 county records to the Nebraska database. *Argia nahuana* (5 counties), *Nasiaeschna pentacantha* (2 counties), and *Stylurus plagiatus* were new for the state list."] Address: Sibley, F.C., The Conservation Agency, 6 Swinburne St., Jamestown, RI 02835, USA
- 8657.** Sibley, F.; Daigle, J.J. (2006): Return to Red October or Wilma chases Fred and Barney from paradise! *Argia* 17(4): 6-8. (in English) [Middle Torch Key, Florida, USA; records of *Nehalennia minuta*, *Lestes spumarius* and *Brachymesia herbida* are reported and discussed. *Remartinia secreta* is a new addition to the Odonata fauna of USA. A total of 23 species was recorded in October 2005. The problem of *Orthemis ferruginea* vs. *O. schmidti* is discussed.] Address: Sibley, F.C., The Conservation Agency, 6 Swinburne St., Jamestown, RI 02835, USA
- 8658.** Stephan, U. (2006): Nachweis von *Gomphus flavipes* (Asiatische Keiljungfer) am Rheinkanal bei Vogelgrun/Breisach. *mercuriale* 6: 9-11. (in German, with French summary) [A total of 62 *Stylurus flavipes exuviae* were collected in 2005 and 2006 along a flat sandy riverside of the Grand Canal d'Alsace near Vogelsheim, France, Departement Haut-Rhin.] Address: Stephan, Ulrike, Im Westengarten 12, 79241 Ihringen, Germany
- 8659.** Strickland, G.; Strickland, J. (2006): First record of *Gomphus australis* for Louisiana. *Argia* 17(4): 22. (in English) [Lake in St. Tammany Parish, Louisiana, USA, 15-IV-2005.] Address: Strickland, J., 1354 Brookhollow Drive, Baton Rouge, LA 70810, USA
- 8660.** Tennesen, K. (2006): Ecuador expedition V. *Argia* 17(4): 13-15. (in English) [Report on a field trip to Ecuador held between 11-22-IX-2005. The elusive *Archaepodagrion bicorne* was traced on 21 Sept. along Rio Anzu north of Mera. Drough resistance potential of *Uracis fastigiata* larvae is discussed.] Address: Tennesen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennesen@centurytel.net
- 8661.** Tończyk, G. (2006): Dragonflies (Odonata) of the City of Łódź - data from Ernst Koeppen's collection. *Odonatrix* 2(2): 39. (in Polish, with English summary) [Data from a small collection of dragonflies caught in Łódź by Ernst Koeppen in 1941 and 1942 are documented. Four Odonata species (*Lestes sponsa*, *Sympetrum danae*, *S. vulgatum*, *Ophiogomphus cecilia*) were found. These species are also present within the administrative borders of Łódź nowadays.] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk@biol.uni.lodz.pl
- 8662.** Tończyk, G. (2006): Odonatological notes from the vicinities of the Wigry Lake. *Odonatrix* 2(2): 40-42. (in Polish, with English summary) [Two week field trip in August 2005 to 10 localities situated in the Wigry National Park, Poland led to the record 26 species of Odonata. Most interesting species from a regional view are: *Anax parthenope*, *Erythromma viridulum* and *Sympetrum pedemontanum*.] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk@biol.uni.lodz.pl
- 8663.** Tończyk, G. (2006): Dragonflies (Odonata) recorded at the Puck Bay. *Odonatrix* 2(2): 42-44. (in Polish, with English summary) [Poland; 26-27-V-1998; 11 species were recorded of which *Coenagrion puella*, *Ischnura elegans*, *Erythromma najas*, *Enallagma cyathigerum* and *Orthetrum cancellatum* breed in salty waters of the Puck Bay.] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk@biol.uni.lodz.pl
- 8664.** Wasscher, M.T. (2006): Van NLO tot NVL, 35 jaar georganiseerde libellenstudie in Nederland. *Brachytron* 9(1/2): 21-32. ["Before 1970 some people in The Netherlands were studying dragonflies, but there was no higher organisation with newsletters and/or meetings. Since the start of the NLO on 7 March 1970, three periods of 'official' dragonfly activity can be recognised. These periods were separated by intervals of lesser activity, where no meetings were organised and few, if any, official newsletters were published. In those intervening periods, there were always youth federation members studying dragonflies, and those dragonfly lovers would then start the next period of official dragonfly study in The Netherlands. The first period commenced with the formation of the NLO during 1970, under the leadership of Bastiaan Kiauta. This period ended with the foundation of the international SIO in 1974. The second period lasted from 1979 to 1992 and was started by Marian Verdonk, with Marcel Wasscher gradually taking over her tasks. The final period, which is still on-going, started in 1994, though already in 1992 youth federation members of the NJN had started a 'Dragonfly Project' which would result in increased interest in dragonflies in The Netherlands. In 1997 both the NLO and the Dragonfly Project merged into a new



dragonfly organisation, the NVL. In 2002 the Dutch Atlas was published, a milestone in dragonfly study in The Netherlands. Over the last decade, dragonflies have become an important group for nature study and nature management. This is illustrated by an official Red List, two field guides in Dutch, 22 regional and provincial study groups and over 400 members of the NVL, some of whom are also professional dragonfly workers." (Author)] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: marcel.hilair@12move.nl

**8665.** Wybraniec, K. (2006): Preliminary results of studies on the dragonflies of the Skierbieszów community. *Odonatrix* 2(1): 18-19. (in Polish, with English summary) ["24 dragonfly species were recorded in the Skierbieszów community (the Lublin Upland, CE Poland) in the years 2004 and 2005. The most interesting are: *Sympecma paedisca*, *Aeshna affinis*, *A. juncea*, *Libellula fulva*, *Sympetrum pedemontanum*." (Author)] Address: Wybraniec, Katarzyna, Lipina Nowa, 41, 22-420 Skierbieszów, Poland

## 2007

**8666.** Agudelo-Zamora, H.D.; Lopez-Macias, J.N.; Sanchez-Paz, C.L. (2007): Hábitos alimentarios de la arawana (*Osteoglossum bicirrhosum* Vandelli, 1829) (Pisces: Osteoglossidae) en el alto río Putumayo, área del Parque Nacional Natural La Paya, Putumayo, Colombia. *Acta Biol. Par., Curitiba* 36(1-2): 91-101. (in Spanish, with English summary) ["To analyze food habits of *O. bicirrhosum* in lagoons of the Paya National Park, we made 12 collections from August, 2002 to July, 2003 which included all river phases of the Caucaya River. 247 individuals were captured, from 220 - 820 mm SL and 98 to 5150 gr of weight 91% of the stomachs analysed for contents contained food. We used IRI to determine the arawana's preference for fish, insects and snails, but birds and reptiles are also eaten. This species is an opportunistic omnivore that mainly consumes fish. No difference in diet was noted between sexes ( $p > .05$ ). The active consumption of snails from November - December was related with the need protein storage for the reproductive period, which requires a period of starvation because this species incubates the young orally." (Authors) Odonata were among the prey, but are not specified further.] Address: Agudelo-Zamora, H.D., Facultad de Administración de Recursos Costeros y Marinos, Universidad Santiago de Cali, Santiago de Cali, Colombia. E-mail: obicirrhosum@yahoo.es

**8667.** Belevich, O.E.; Yurchenko, Yu. A. (2007): Dynamics of daily activity and feeding of *Aeshna mixta* Latreille, 1805 (Odonata, Aeshnidae) in the south of west Siberia. *Evraziatskii Entomologicheskii Zhurnal* [Eurasian entomological journal] 6(1): 25-28. (in Russian, with English summary) ["Maximum of flight and trophic activity of *Aeshna mixta* Latreille, 1805 in August in the southern part of West Siberia occur at dusk. Food remains undigested in the gut of dragonflies until the following day. Low night temperatures dictate slow food assimilation, which is probably significant for the accumulation of energy for morning activity and for surviving of poor weather conditions." (Authors)] Address: Belevich, O.E., Institute for Animal Systematics and Ecology, Russian Academy of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk 630091, Russia

**8668.** Besprozvannykh, V.V. (2007): Life cycle of the trematode *Halipegus japonicus* (Halipegidae) in Primorskiy Krai (Russia). *Vestnik Zoologii* 41(1): 23-28, 95. (in Russian with English and Ukrainian summaries) [*H. japonicus* Yamaguti, 1936 involves the fresh water snails *Helicorbis suffunensis* and *Polypylis semiglobosa* as first intermediate hosts, ostracode crustaceans as second and larvae of the dragonflies *Cordulia* and *Aeshna* as third intermediate host. A possibility of involvement of the fish species *Percottus glehni* and *Pseudobagrus fulvidraco* into the life cycle of the trematode is shown; the parasite is localized in the fish esophagus on its early stages.] Address: Besprozvannykh, V.V., Biologo-pochvennyi institut DVO RAN, prosp. 100-let Vladivostoky, 159, Vladivostok, 690022, Russia

**8669.** Boyce, W.M.; Lawler, S.P.; Schultz, J.M.; McCauley, S.J.; Kimsey, L.S.; Niemela, M.K.; Nielsen, C.F.; Reisen, W.K. (2007): Nontarget effects of the mosquito adulticide pyrethrin applied aerially during a West Nile virus outbreak in an urban California environment. *J. Am. Mosq. Control. Assoc.* 23: 335-339. (in English) ["In August 2006, a pyrethrin insecticide synergized with piperonyl butoxide (EverGreen Crop Protection EC 60-6, McLaughlin Gormley King Company, Golden Valley, MN) was sprayed in ultralow volumes over the city of Davis, CA, by the Sacramento-Yolo Mosquito and Vector Control District to control mosquitoes transmitting West Nile virus. Concurrently, we evaluated the impact of the insecticide on nontarget arthropods by 1) comparing mortality of treatment and control groups of sentinel arthropods, and 2) measuring the diversity and abundance of dead arthropods found on treatment and control tarps placed on the ground. We found no effect of spraying on nontarget sentinel species including dragonflies (*Sympetrum corruptum*), spiders (*Argiope aurantia*), butterflies (*Colias eurytheme*), and honeybees (*Apis mellifera*). In contrast, significantly higher diversity and numbers of nontarget arthropods were found on ground tarps placed in sprayed versus unsprayed areas. All of the dead nontarget species were small-bodied arthropods as opposed to the large-bodied sentinels that were not affected. The mortality of sentinel mosquitoes placed at the same sites as the nontarget sentinels and ground tarps ranged from 0% to 100%. Dead mosquitoes were not found on the ground tarps. We conclude that aerial spraying with pyrethrins had no impact on the large-bodied arthropods placed in the spray zone, but did have a measurable impact on a wide range of small-bodied organisms." (Authors)] Address: Boyce, W.M., Wildlife Health Center, University of California, One Shields Avenue, Davis, CA 95616, USA

**8670.** Buczyński, P. (2007): Dragonflies (Odonata) of the valley of the River Bug between Gołębie and Włodawa. *Nowy Pam. Fizjogr., Warszawa* 5(1-2): 3-26. (in Polish, with English summary) [The article presents faunistic and ecological data on the Odonata of the middle part of the River Bug valley (Poland) gathered during long-term studies in the years 1993-2005 (mainly 2000-2003), in the vicinity of 24 localities, and resulting in records of 52 dragonfly species (71% of the Polish dragonfly fauna).] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8671.** Kefford, B.J.; Salter, J.; Clay, C.; Dunlop, J.E.; Nugegoda, D. (2007): Freshwater invertebrates' response to gradients of salinity and turbidity: using pref-

erence as a rapid sub-lethal test. *Australasian journal of ecotoxicology* 13: 131-142. (in English) ["This study investigates the use of a sub-lethal rapid toxicity testing method that allows animals to move within a concentration gradient in an attempt to measure a sub-lethal response of preference to inhabit a particular contaminant concentration. We describe a testing apparatus and trial its use in assessing the preferences of selected riverine invertebrates (collected from Victoria, Australia) for two common river contaminants, salinity and turbidity [simulated by suspended fine sediment (standardised clay, kaolin)]. For salinity preference experiments, the testing apparatus was found to be unsuitable for use with small macroinvertebrates due to the need to use vigorous aeration to mix the test solution in order to prevent horizontal stratification. However, aerated salinity preference tests were successful using the freshwater shrimp *Paratya australiensis* (Decapoda: Atyidae), and indicated their preference for salinity <17.6-18.8  $\mu$ S/cm. This observed preference for low salinity was unchanged by acclimation to salinity of 0.1, 10 or 20  $\mu$ S/cm prior to testing. A dispersion of suspended particulates was used for turbidity preference experiments, and so vigorous aeration was unnecessary. When used in this way the test apparatus was found to be suitable for testing all stream macroinvertebrates tested (nine species including *Ischnura aurora* and *I. heterosticta*) and one microinvertebrate. One test species, *Micronecta annae* (Hemiptera: Corixidae), was observed to prefer relatively high turbidity (>200 NTU) but only when collected from one of two locations. Another species, *Austrochilonia subtenuis* (Amphipoda: Hyalellidae), showed weak evidence for a preference for lower turbidity (<200 NTU). It is unknown whether the lack of turbidity preference shown for the other seven species is because turbidity is not directly harmful or whether they are not able to detect and/or avoid certain turbidity levels. When preference experiments find that most species show no preference to a specific contaminant, then another approach will be needed to establish their sensitivity." (Authors) *Ischnura aurora* appeared unsuitable for preference testing in the device. Their movement was restricted by air bubbles and the lack of suitable substrate for them to attach. *Ischnura heterosticta* was observed across the spectrum of turbidity levels examined.] Address: Kefford, B., Biotechnology & Environmental Biology, School of Applied Sciences, RMIT University, PO Box 71, Bundoora, Victoria 3083, Australia. E-mail: ben.kefford@rmit.edu.au

**8672.** Silva F.J.; Callisto, M. (2007): Benthic macroinvertebrates collection: a tool for the knowledge of freshwater biodiversity. *Neotropical Biology and Conservation* 2(1): 3-10. (in Portuguese, with English summary) ["Zoological collections can be considered important registries of freshwater biodiversity for academical and research activities. The objective of this study was to organize a database of the diversity of benthic indicators of water quality collected in many freshwater ecosystems. The Benthic Macroinvertebrates Reference Collection of the Laboratory Ecology of Benthos, Institute of Biological Sciences, Federal University of Minas Gerais was created in 1997. This collection comprises 16,500 registers from different lotic and lentic ecosystems in Brazil and other countries. The taxa (with one or more organisms) are preserved in tubes, glasses, and wardrobes. In the tomb notebooks are registered: the taxonomical identification, origin, collection method, number of individuals, sample number and field obser-

ations. Besides the maintenance of the Reference Collection, a database is being constructed with the benthic biodiversity information. Up to this moment, the database has almost 71,000 registers preserved in 6,000 tubes and in 174 glasses. The incorporation of new organisms to the Collection is of c. 7,100.00 (+ 7,471.67) organisms per year. The aquatic insects are the main abundant and taxonomic diverse in the Collection. Diptera, Ephemeroptera, and Trichoptera were the most numerical important groups, with respectively 37.9%, 16.7%, and 14.5%. Among the Dipterans, Chironomidae comprises 59 genera. This Reference Collection represents an important tool for knowledge of benthic biodiversity in lotic and lentic ecosystems, allowing later taxonomical identification, and the development of population dynamics and community structure studies, due to the increase deposit of knew material. Moreover, it is of paramount importance to guarantee future taxonomical, biogeographical, phylogenetical and ecological studies, using this material." (Authors) Odonata are treated at the family level.] Address: Callisto, M., Univ. Federal de Minas Gerais, Instituto de Ciências Biológicas, Departamento de Biologia Geral, Laboratório de Ecologia de Bentos. CP. 486, CEP. 30.970-201, Belo Horizonte, MG, Brasil. E-mail: callisto@icb.ufmg.br

**8673.** Verdonschot, R.C.M.; Groenendijk, D.; Bouwman, J.H. (2007): Dragonflies on shallow soft-water lakes in Noord-Brabant; a first attempt for a synecological analysis of the Dutch national dragonfly database. *Brachytron* 10(2): 185-193. (in Dutch, with English summary) ["Shallow soft-water lakes are one of the most Odonata rich habitats in the Netherlands. Different types of shallow soft-water lake ecosystems are distinguished to test whether the Odonata species composition of those waters reflect this classification. A comparison was made of observations of adults at 13 shallow soft-water lakes. In the province of Noord-Brabant, which is situated on sandy soils in the southern part of the Netherlands, information about the species composition was gathered using the database of Odonata observations of the Netherlands, considering the period 1990-2003, the months may-august. TWINSPAN was used to analyse the species composition data. Because observations from the database are used, there is a lot of uncertainty regarding investigated area, search time, number of individuals. Therefore, only present/absent data were used. Despite this drastic transformation, the analysis shows that the species composition of shallow soft-water lakes fed by rain water differs from lakes which are fed by both rain water and buffered ground water. The lakes fed by buffered ground water were characterised by *Aeshna grandis*, *A. mixta*, *A. cyanea*, *Erythromma najas*, *Brachytron pratensis* and *Cordulia aenea*. The lakes fed by rainwater were characterised by *Lestes dryas* and *Libellula depressa*." (Authors)] Address: Bouwman, J., De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: jaap.bouwman@vlinderstichting.nl

**8674.** Waldhauser, M.; Waldhauserova, I. (2007): Interesting findings of dragonflies (Odonata) in the Liberec Region. *Sborník Severočeského Muzea, Přírodní Vědy*, 25: 39-48. (in Czech, with English summary) [Records of the following species from the Liberec Region, Czech Republic are presented: *Aeshna affinis*, *A. caerulea*, *Brachytron pratense*, *Sympetrum depressicolum*, *S. fonscolombii*, *S. meridionale*, *S. pedemontanum*, *Somatochlora alpestris*, *S. arctica*, *Cordulegaster*

bidentata, *Ophiogomphus cecilia*, *Gomphus vulgatis-simus*, *Leucorrhinia albifrons*, and *L. pectoralis*.] Address: Waldhauser, M., Petrovice 136, 471 25 Jablonné v Podještědí, Czech Republic.

**8675.** Wang, Y.-n.; Leong, R.; Tian, P.-t.; Chan, M.-h.; Liu, S.W.; Chang, C.-s. (2007): Using biological investigation to evaluate the landslide rebuilt at experimental forest of NTU. *Journal of Experimental Forest of the National Taiwan University* 21(4): 307-319. (in Chinese, with English summary) [We collected 143 landslide rebuilt cases that were restored between 2001 and 2002 at Experimental Forest of National Taiwan University to evaluate the restoring effectiveness by using biological investigation. Important vegetation index (IVI), birds diversity index (BDI), and aquatic insect community parameters index (AICPI) were applied for biological investigation. Our data showed that major vegetation in landslide rebuilt are *Miscanthus floridulus*, *Arundo formosana*, *Trema orientalis*. The performance of silviculture of *Acacia confusa* and *Alnus formosana* silvicultures were better than *Zelkova serrata*. BDI at BeSer creek watershed was better than Chenyolan creek. However, BDI was not different with different technics and construction situation, while BDI could be differed with the size of landslide area. We collected 26 families and 32 taxa aquatic insects, mainly in Ephemeroptera and Trichoptera. Aquatic insect diversity was 1.94 – 2.03, and evenness was 0.63 – 0.69. Water quality assessed by aquatic insects biotic index was at good scale for most landslide rebuilt cases, except site 1 at fine scale." (Authors) *Euphaea formosa* was recorded at two sites.] Address: E-mail: cannon@exfo.ntu.edu.tw

## 2008

**8676.** Bachmann, R. (2008): Ökopreis des WWF Schwyz für die Libellen. *Schwyz Panda. Mitteilungen des WWF Schwyz* 20(2): 4-5. (in German) [The well known German odonatologists, Heinrich and Traude Flieder were awarded with the Swiss Ökopreis for their engagement in dragonfly conservation.] Address: not stated

**8677.** Englund, R.A. (2008): Invasive species threats to native aquatic insect biodiversity and conservation measures in Hawai'i and French Polynesia. *Journal of Insect Conservation* 12(3-4): 415-428. (in English) ["Impacts of invasive species, and of attempts to control them, on the aquatic invertebrate fauna of Hawaii and French Polynesia are reviewed and discussed, as a foundation for determining conservation need. Aquatic insects are poorly documented in the region, with many species undescribed, so that practical conservation must be pursued with highly incomplete basic taxonomic knowledge. The establishment of at least one dedicated reserve for aquatic invertebrates is recommended for each high island in an archipelago, as an aid to safeguarding local endemic species, and other recommendations include increased monitoring for new alien species (particularly of fish), planning for removal of alien species from selected water bodies where alien species are less likely to recolonize, effective protection of key sites with high biodiversity value, and securing sites for future restoration and translocation or rare and endangered species." (Author) Many references to Odonata are made.] Address: Englund, R.A., J. Linsley Gressit Center for Entomological Research, Bishop

Museum, 1525 Bernice Street, Honolulu, HI, 96817, USA. E-mail: englund@bishopmuseum.org

**8678.** Graf, R. (2008): Jahresbericht Wauwiler Ebene 2007/2008: Abschlussbericht der ersten Umsetzungsperiode des Vernetzungsprojekts. *Schweiz. Vogelwarte, Sempach*: 41 pp. (in German) [The man-made ponds, constructed since 1995 in the Wauwiler Plain (canton Luzern, Switzerland), were soon colonised by *Ischnura pumilio*. 42 odonate species were recorded between 1999 and 2007 at the Mauensee.] Address: Graf, R., Schweizerische Vogelwarte, 6204 Sempach, Switzerland

**8679.** Harp, G.; Harp, P.; McCord, S. (2008): Aquatic macroinvertebrates collected from thirty-two Missouri Ozark streams. *Journal of the Arkansas Academy of Science* 62: 61-74. (in English) ["A previously reported study of the distribution and status of an endemic dragonfly in Missouri, USA emphasized data collected by aerial netting and examination of specimens housed in the Wilbur Enns Museum of Entomology. Dip net samples were also taken, however, to find naiads of the target species at sites where adults might not have been found and to determine whether there were associated species. Forty-one collections were made in 32 Ozark streams between mid-May and early June 1999-2000." (Authors) Odonata represent 64 of the 372 taxa identified, in most cases identified at the species level, in some cases at the genus level. The taxa are listed locality wise.] Address: Harp, G., Department of Biological Sciences, Arkansas State University, State University, AR 72467, USA. E-mail: glharp@astate.edu

**8680.** Kaynas, B.Y.; Gürkan, B. (2008): Species richness and abundance of insects during post-fire succession of a *Pinus brutia* forest in Mediterranean region. *Polish Journal of Ecology* 56(1): 165-172. (in English) ["In the Marmaris National Park (located on the Mediterranean coast of SW Turkey) mostly covered with *Pinus brutia* forests, four sites were selected to study the post-fire successional trends in vegetation and insect communities. The sites represented: 1, 5, and 21 years after fire as well as control site (more than 45 years after fire). On the study plots (0.5 ha) the insects were collected with the sweep net swung along three transects each of 100 m length, in monthly intervals between August 2000 and September 2001. The number of plant species decreased from 41 to 32 along succession, as well as the number of stage-specific species but the mean height of vegetation increased with successional stage. The abundance and species richness of herbivorous insects decreased along succession as well as two main herbivore groups – xylophagous and sap-feeders. However, no major changes were found between the sites in terms of abundance or species richness of predators. This decrease in herbivorous forms may be a result of changes in the plant architecture and vegetation structure between post-fire successional stages." (Authors) Odonata are treated at the order level.] Address: Kaynas, B.Y., Hacettepe University, Faculty of Science, Biology Department 06800 Beytepe-Ankara, Turkey. E-mail: bkaynas@hacettepe.edu.tr

**8681.** Ketelaar, R.; Bouwman, J. (2008): A reconstruction of the dragonfly and butterfly fauna of the Koningsven (Odonata, Lepidoptera). *Nederlandse faunistische mededelingen* 29: 5-20. (in Dutch, with English summary) ["The Koningsven ('Kings peat') is a former peat moor in the eastern part of the Netherlands. It



was almost completely reclaimed in the first half of the twentieth century, leaving only a tiny bit of 7 hectare of wetland. The area has a reputation as former habitat of rare and threatened plant species. Old publications show its enormous natural value. Recently, plans have been developed to renaturalise the area and restore the Koningsven. For a better understanding of the natural history of the area, a reconstruction of the former fauna of dragonflies and butterflies was based on records in literature and faunistic databases. It is shown that the Koningsven was a very important biodiversity hot spot for dragonflies and, to a lesser degree, butterflies. Dragonflies like *Nehalennia speciosa*, *Coenagrion hastulatum*, *Leucorrhinia caudalis* and *L. pectoralis* are nowadays rare, threatened or even extinct in the Netherlands and northwestern Europe. [...] At present it is likely that nowhere in northwestern Europe a similar habitat and species composition can be found. The planned renaturalisation will hopefully contribute to at least a partial recovery of this extraordinary fauna." (Authors)] Address: R. Ketelaar, R., Vereniging Natuurmonumenten, Postbus 9911, 1243 zr 's-Graveland, The Netherlands. E-mail: r.ketelaar@natuurmonumenten.nl

**8682.** Lim, Y.-S.; Lee, S.-L.; Kwon, K.-W.; Bin, J.-H.; Park, H.-K. (2008): Study on benthic macroinvertebrates community at Daecheon stream. The Annual Report of Busan Metropolitan City Institute of Health & Environment 18(1): 126-136. (in Korean, with English summary) [Daecheon stream, Busan, South-Korea; from Jan. – Nov. 2008, physicochemical parameters and benthic macroinvertebrate communities were correlated at three sites - upperstream (Gonghae village), mid-stream (Aegi-So), downstream (Gycongnam apartment). Benthic macroinvertebrates were composed by 71 species including one odonate species, *Davidus lunatus*.] Address: E-mail:im3632528@korea.kr

**8683.** Martynov, A.V.; Martynov, V.V. (2008): Dragonflies (Insecta, Odonata) of the "Kamennye Mogily" reserve. Prirodovedniy Al'manah (Biologichni nauki) 10: 67-82. (in Russian., with English & Ukrainian summaries) [28 odonate species of the Reserve, situated on the Karatysh river (Donetsk region, the Ukraine) are outlined with emphasize to phenology. ] Address: Martynov, A.V., Dept Ecol., Fac. Biol., Donetsk Natn. Univ., Shchorsa 46, 83050 Donetsk, Ukraine

**8684.** McCauley, S.J.; Davis, C.J.; Werner, E.E. (2008): Predator induction of spine length in larval *Leucorrhinia intacta* (Odonata). Evolutionary Ecology Research 10: 435-447. (in English) ["Questions: Do larvae of a dragonfly with a broad habitat distribution have longer abdominal spines when they co-exist with fish, and are these differences the result of phenotypic plasticity? Hypothesis: Phenotypic plasticity will result in larvae having longer spines when they are exposed to cues from predatory fish. Organism: Larvae of *L. intacta* (Research site: Natural ponds and cattle tanks on the E.S. George Reserve in southeast Michigan. Methods: We compared the morphology of larvae collected from two natural ponds before and after a drought resulted in the extirpation of fish from one pond. We also compared spine morphology of larvae reared in an experiment where they were either exposed to caged fish or empty cages. Finally, we use a phylogeny for this genus to begin reconstructing the evolutionary history of plasticity and spine morphology within *Leucorrhinia*. Results: Larvae collected from ponds with fish present had longer spines than larvae collected from ponds without

fish. In the experiment, exposure to fish resulted in longer spines for some but not all of the spines measured. These results indicate that at least some of the variation in spine length is the result of plasticity. *L. intacta* is not a sister species to a European *Leucorrhinia* in which similar plasticity has been found. Mapping plasticity on to the phylogeny of this genus indicates that either plasticity is ancestral to the two major clades of this genus or that it has arisen independently twice." (Authors)] Address: McCauley, S.J., Center for Population Biology, University of California Davis, 2320 Storer Hall, One Shields Avenue, Davis, CA 95616, USA. E-mail: sjmccauley@ucdavis.edu

**8685.** Miyaguchi, H.; Katsuura, M.; Yamamoto, R.; Hirabayashi, T.; Ban, S.; Toda, T.; Yamamoto, H. (2008): Aquatic invertebrate fauna in Tohorogawa mire, eastern Hokkaido. Japanese Journal of Limnology 69: 143-153. (in Japanese, with English summary) [Japan; "To clarify the characteristics of the aquatic invertebrate fauna in Tohorogawa mire, we collected aquatic invertebrates from peat soils, peat-excavation pools and the Tohorogawa River, in May 2005 and June 2006. As a result, 83 taxa of aquatic invertebrates were found in the study site. Northern species included [...] *Libellula quadrimaculata asahinai*, [...], while southern species were [...] *Orthetrum albistylum speciosum* [...]. The proportion [sic: only three taxa are documented!] of northern species of Odonata and Coleoptera in Tohorogawa mire was similar to that found in other mires in eastern Hokkaido. This indicates that Tohorogawa mire allows the inhabitation of northern species at the same level as the other mires in eastern Hokkaido. The northern species were distributed in peat-excavation pools where the water temperature is comparatively low, while the southern species were found in peat soil where the water temperature is relatively high. Therefore, it is concluded that the significant spatial difference in water temperature is a major factor allowing the coexistence of northern and southern aquatic invertebrates in Tohorogawa mire." (Authors)] Address: Miyaguchi, H., 1-236 Department of Environmental Engineering for Symbiosis. Faculty of Engineering. Soka University. 1-236 Tangi-cho. Hachioji. Tokyo 192-S577. Japan

**8686.** Mrosovsky, N.; Godfrey, M.H. (2008): The path from grey literature to Red Lists. Endang. Species Res. 6: 185-191. (in English) ["This paper concerns the process by which Red List designations are decided and supported; it does not concern whether the past or present Red List categorizations are correct. We argue that, contrary to statements extolling the scientific and authoritative nature of the Red List, the reality for some species falls far short of these ideals. The prominent role played by the grey literature is an important factor in these problems. We use the case of the hawksbill turtle *Eretmochelys imbricata* as an example of the problems with relying on unavailable grey literature, but similar problems apply to various taxa classified in the Red List." (Author) The case of *Pseudagrion newtoni* is briefly outlined: Occurrence of grey literature (including personal communications) in selected Red List (RL) assessments (retrieved from the IUCN Red List website (www.redlist.org)) show, that 8 of the 9 citations are based on published information.] Address: Mrosovsky, N., Department of Ecology and Evolutionary Biology, University of Toronto, 25 Harbord Street, M5S 3G5 Toronto, Ontario, Canada. E-mail: mgodfrey@seaturtle.org

- 8687.** Nuckowska, K.; Agapow, L.; Nadobnik, J. (2008): Preliminary evaluation of the quality of water in the Mierzęcka Struga River by a biological method. In: R. Goldyn, P. Klimaszuk, N. Kuczyńska-Kippen & R. Piotrowicz (eds): *The Functioning and Protection of Water Ecosystems*. Department of Water Protection, Faculty of Biology, Adam Mickiewicz University, Poznań: 11-16. (in English) [The Mierzęcka Struga River, Poland is the longest right tributary of the lower Drawa River. On the basis of the research conducted between 2000 and 2004, it has been found that the river is characterised by taxa typical for unimpacted or slightly polluted water. The taxa-list includes *Calopteryx splendens*.] Address: Nuckowska, Kinga, 66-400 Gorzów Wlkp., ul. Owocowa 28a
- 8688.** Obeten Offem, B.; Akegbejo-Samsons; Y.; Tunde Omoniyi, I. (2008): Diet, size and reproductive biology of the silver catfish, *Chrysichthys nigrodigitatus* (Siluriformes: Bagridae) in the Cross River, Nigeria. *Rev. Biol. Trop.* 56 (4): 1785-1799. (in English) [*C. nigrodigitatus* is a highly valued food-fish included among the dominant commercial catches exploited in major rivers of Africa. To provide useful biological data for management, samples were collected monthly between January (2005) and December (2007) in three zones: I: Upper Cross River (grassland), II: Middle Cross River (mixed forest and grassland), and III: Lower Cross River (rainforest)] along 200 km length of the Cross River, Nigeria. Data from 1 248 specimens were processed. Frequency of occurrence of Odonata in the stomach of *C. nigrodigitatus* was between 1.4 and 8.7%.] Address: Obeten Offem, B., Department of Fisheries, Faculty of Agriculture and Forestry, Obubra Campus, Cross River State, Nigeria. E-mail: benbeff06@yahoo.com
- 8689.** Ott, J. (2008): Der "Libellenatlas Rheinland-Pfalz" - es geht weiter ... GNOR-Info 107: 36. (in German) [Brief report on the current status on work to prepare a manual of the Odonata in Rheinland-Pfalz, Germany] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de
- 8690.** Srygley, R.B.; Dudley, R. (2008): Optimal strategies for insects migrating in the flight boundary layer: mechanisms and consequences. *Integrative and Comparative Biology* 48(1): 119-133. (in English) ["Directed aerial displacement requires that a volant organism's airspeed exceeds ambient wind speed. For biologically relevant altitudes, wind speed increases exponentially with increased height above the ground. Thus, dispersal of most insects is influenced by atmospheric conditions. However, insects that fly close to the Earth's surface displace within the flight boundary layer where insect airspeeds are relatively high. Over the past 17 years, we have studied boundary-layer insects by following individuals as they migrate across the Caribbean Sea and the Panama Canal. Although most migrants evade either drought or cold, nymphalid and pierid butterflies migrate across Panama near the onset of the rainy season. Dragonflies of the genus *Pantala* migrate in October concurrently with frontal weather systems. Migrating the furthest and thereby being the most difficult to study, the diurnal moth *Urania fulgens* migrates between Central and South America. Migratory butterflies and dragonflies are capable of directed movement towards a preferred compass direction in variable winds, whereas the moths drift with winds over water. Butterflies orient using both global and local cues. Consistent with optimal migration theory, butterflies and dragonflies adjust their flight speeds in ways that maximize migratory distance travelled per unit fuel, whereas the moths do not. Moreover, only butterflies adjust their flight speed in relation to endogenous fat reserves. It is likely that these insects use optic flow to gauge their speed and drift, and thus must migrate where sufficient detail in the Earth's surface is visible to them. The abilities of butterflies and dragonflies to adjust their airspeed over water indicate sophisticated control and guidance systems pertaining to migration."] (Authors)] Address: Srygley, R.B., USDA-Agricultural Research Service, 1500 N. Central Avenue, Sidney, MT 59270, USA. E-mail: robert.srygley@ars.usda.gov
- 8691.** Stewart, T.W.; Downing, J.A. (2008): Macroinvertebrate communities and environmental conditions in recently constructed wetlands. *Wetlands* 28(1): 141-150. (in English) [Iowa, USA; "We quantified macroinvertebrate community characteristics in nine temporary or permanent wetlands, and related these to environmental conditions. Macroinvertebrates inhabiting the water column and shallow sediment (42-cm depth) were sampled 20 months after wetland construction in June 2005. A total of 29 taxa were collected, and macroinvertebrate communities varied among wetlands. Total macroinvertebrate biomass (mean 6 SE 5 16.44 6 4.72 g AFDW/m<sup>3</sup>) and densities (mean 6 SE 5 372,096 6 124,972 individuals/m<sup>3</sup>) were positively related to coarse particulate organic matter abundance (living and nonliving plant matter; CPOM) and negatively related to turbidity. Density of ecologically sensitive EOT (Ephemeroptera, Odonata, Trichoptera) taxa was also positively related to CPOM and negatively related to turbidity. Total taxa richness was negatively related to turbidity, and percent of total macroinvertebrate density consisting of EOT (% EOT) was positively related to CPOM. These relationships were greatly influenced by 10 dominant taxa (nematodes, physid snails, mites, small squaregill mayflies, narrowwinged damselflies, biting midges, non-biting midges, ostracods, cladocerans, and cyclopoid copepods) that were positively associated with CPOM and negatively related to turbidity. Two wetlands inhabited by common carp (*Cyprinus carpio*) appeared to be in the poorest condition. These wetlands had the lowest macroinvertebrate biomass and densities and highest turbidity. Additionally, although net uptake of total nitrogen (TN) occurred in these high-turbidity wetlands, NH<sub>3</sub> concentrations were two-fold higher in outflow than inflow. Net uptake of total phosphorus (TP) occurred only in wetlands with low turbidity, high CPOM abundance, and high macroinvertebrate abundance and diversity. To enhance macroinvertebrate abundance and diversity and ecological functions (e.g., nutrient removal) in newly constructed wetlands, management efforts should be directed toward increasing plant abundance and reducing turbidity.] Address: Stewart, T.W., Dept of Natural Resource Ecology & Management, Iowa State Univ. Ames, Iowa, USA 50011. E-mail: twstewar@iastate.edu
- 8692.** Szálassy, N. (2008): Date preliminare privind fauna de odonate (Insecta: Odonata) de pe Bratele Moarte ale Râului Tur. In: Sike, T., Márk-Nagy, J. (eds.) *Flora i Fauna Rezerva iei Naturale „Râul Tur” / The Flora and Fauna of the Tur River Natural Reserve*. *Bihorean Biologist* 2 (Suppl. 1): 51-54. (in Romanian, with English summary) ["Preliminary data on the Odonata fauna of the backwaters of River Tur. The paper presents faunistic results based on collection and obser-

vations of adults in odonatological studies carried out in the backwaters of River Tur. By this study 18 species (8 Zygoptera, 10 Anisoptera) were found to occur in the area, out of which 11 are very frequent, 4 from the less frequent and 3 from the rare class of country-wide occurrence frequency. The main threats to survival of these species are pollution, dredging, drying-out of the habitats." (Author)] Address: Szállassy, Noémi, Babeş-Bolyai University, Fac. of Psych. & Sci. of Educ., Dept. of Math. & Sci. Teaching Education, Sindicatelor Str. 7, 400029 Cluj-Napoca, Romania. E-mail: szallassy@gmail.com

**8693.** Tafangenyasha, C.; Dube, L.T. (2008): Evaluation of the usefulness of the South African scoring systems in savanna rivers. *Tropical and Subtropical Agroecosystems* 8: 135-144. (in English, with Spanish summary) ["The usefulness of the South African Scoring Systems (SASS) in a savanna river was studied for an array of lowveld streams. The streams were also characterised using standard chemical methods from August 2004 to May 2005 to complement biological monitoring methods. Nutrients such as total nitrogen, nitrate nitrogen and total phosphates did not show differences ( $p>0.05$ ) between the wet and dry seasons. The SASS and ASPT scores were different ( $p<0.05$ ) between dry and wet season at test sites but not between the dry and wet season at control sites. Site, media and site x media interaction had a significant effect on SASS scores and only site showed significant difference in ASPT scores. Multiple comparison tests using paired t-tests with Bonferoni adjustment showed site effect ( $p<0.05$ ) on total nitrogen, ammoniacal nitrogen, ASPT scores and SASS scores. Media effect showed difference ( $p<0.05$ ) on total nitrogen, nitrate nitrogen and SASS scores. The effect of season was significant ( $p<0.05$ ) on total nitrogen and total phosphate. In this study, nutrient data show that water quality is dynamic and the nutrients change with season because of real changes in nutrient concentrations. The results indicate that SASS indices provide a better measure of water quality since they integrate seasonal influences on changes in water bodies than chemical data that reflect conditions at the time the water samples were taken. The study of seasonal effects on nutrients and water quality has the potential to develop our conceptual understanding of the impact of discharges on the fluvial ecology for an environment that is naturally challenging for organisms, given the temporal variation in river flow, temperature and suspended solids." (Authors) Odonata are treated at the genus level.] Address: Tafangenyasha, C., Dept of Environmental Science and Health, National University of Science and Technology, P. Bag AC 939, Bulawayo, Zimbabwe. E-mail: ctafangenyasha@nust.ac.zw

**8694.** Zhang, J.; Zhou, C.; Gai, Y.; Song, D.; Zhou, K. (2008): The complete mitochondrial genome of *Parafro-nurus youi* (Insecta: Ephemeroptera) and phylogenetic position of the Ephemeroptera. *Gene* 424: 18-24. (in English) ["The first complete mitochondrial genome of a mayfly, *P. youi*, was sequenced using a long PCR-based approach. The genome is a circular molecule of 15,481 bp in length, and encodes the set of 38 genes. Among them, 37 genes are found in other conservative insect mitochondrial genomes, and the 38th unique gene is *trnM*-like (*trnM2*). The duplication-random loss model can be used to explain one of the translocations at least. The A+T content of the control region is 57%,

the lowest proportion detected so far in Hexapoda. Based on the nucleotide dataset and the corresponding amino acid dataset of 12 protein-coding genes, Bayesian inference and maximum likelihood analyses yielded stable support for the relationship of the three basal clades of winged insects as Ephemeroptera+(Odonata+Neoptera)." (Authors)] Address: Zhou, K., Jiangsu Key Laboratory for Biodiversity and Biotechnology, College of Life Sciences, Nanjing Normal University, Nanjing 210046, China. E-mail: kyzhou@126.com

**8695.** Zhang, J.; Wu, W.; Huang, R.-i. (2008): Investigation on beneficial insects in Xinjiang(III) - Predatory insects and insects for joy. *Xinjiang Agricultural Science* 45(1): 98-101. (in Chinese, with English summary) ["Insects for joy are those of beautiful-colourful or of fancy shape such as butterflies, dragonflies, crickets, katydids, grasshoppers, 'tumblebugs', leaf beetles, mantis, stick insects etc." (Authors) The following Odonata - all originating from north western China - are listed: *Calopteryx splendens*, *Onychogomphus forcipatus*, *Aeshna juncea*, *A. mixta*, *Somatochlora arctica*, *Libellula depressa*, *L. quadrimaculata*, *Orthetrum albistylum*, *Symptetrum pedemontanum*, and *Leucorrhinia rubicunda*. The occurrence of some of these taxa in China is questionable, and the really spectacular taxa from subtropical China are lacking in total.] Address: Zhang, J.-i., College of Science and Technology, Xinjiang University, Urumqi, C830046 China

## 2009

**8696.** Anderson, A.L.; Brown, W.D. (2009): Plasticity of hatching in Green Frogs (*Rana clamitans*) to both egg and tadpole predators. *Herpetologica* 65(2): 207-213. (in English) ["We examined whether embryos of *R. clamitans* would adaptively alter hatching times in the presence of both egg predators (the crayfish *Procambarus nigrocinctus*) and tadpole predators (the dragon nymph *Anax junius*). Under laboratory conditions, we exposed eggs with developing embryos to four experimental treatments that varied in the type of caged predator: egg predator only, tadpole predator only, both predators together, or no predator. As predicted, the presence of an egg predator caused a significant reduction in time to hatching. However, contrary to our prediction, eggs also hatched sooner in the presence of a tadpole predator. Moreover, there was no significant interaction between the effects of the two predators and thus no evidence that *R. clamitans* embryos can distinguish between predator types. We also found significantly lower hatching success in the presence of an egg predator, despite the fact that the predator did not have direct contact with the eggs. These results suggest adaptive early and delayed hatching do not co-occur in this species with this particular predator regime." (Authors)] Address: William D. Brown, W.D., Department of Biology, State University of New York at Fredonia, Fredonia, New York 14063, USA. E-mail: William.Brown@fredonia.edu

**8697.** Bailowitz, R.; Danforth, D. (2009): Another interesting saddlebags from Arizona. *Argia* 21(4): 13. (in English) [A young male *Tramea binotata* photographed on 25-IX-2009, in Roper Lake State Park, is a new species addition to the state Odonata list of Arizona, USA. ] Address: Danforth, D., P.O. Box 232, Bisbee, Az., 85603, USA. E-mail: Dougofbis@yahoo.com



- 8698.** Bailowitz, R.; Danforth, D.; Deviche, P. (2009): West Mexico updated. *Argia* 21(4): 15-18. (in English) [On a five day trip (1-5-X-2009), 62 species of Odonata for the coastal region between Mazatlán in southern Sinaloa and San Blas in central Nayarit, Mexico could be recorded. *Leptobasis guanacaste*, a recently described species (Paulson, 2009) was heretofore known only from two locations in Costa Rica and represents a new record for Sinaloa and for Mexico as well as a significant northward range extension for the species. *Leptobasis melinogaster*, *Erythemis haematogastra*, and *Micrathyrina dissocians* are further rare Mexican and regionally interesting species.] Address: Danforth, D., P.O. Box 232, Bisbee, Az., 85603, USA. E-mail: Dougofbis@yahoo.com
- 8699.** Behr, H. (2009): Notizen zur Libellenfauna des Siebendorfer Moores bei Schwerin (Mecklenburg-Vorpommern). *Virgo*, Mitteilungsblatt des Entomologischen Vereins Mecklenburg 12(1): 44-46. (in German) [Germany; A total of 32 Odonata species were recorded between 2005 and 2008 near Schwerin. These data are compared with a survey from the early 1990th. The increase of species number is explained by a higher frequency of survey dates in 2005-2008. Special emphasize is given to *Crocothemis erythraea*.] Address: Behr, H., Herrengartenweg 57, 19061 Schwerin, Germany. E-mail: hauke-behr@web.de
- 8700.** Bogunski, G. (2009): Aktuelle Checkliste der Tagfalter, Widderchen, Libellen und Heuschrecken aus den Kalksteinbrüchen im Wildenfesler Zwischengebirge (EBG Nr. 35 sowie FFH Nr. 276). *Mitteilungen Sächsischer Entomologen* 88: 4-6. (in German) [Sachsen, Germany; between 2005 and 2008, eight limestone gravel pits were surveyed for their fauna of Lepidoptera, Orthoptera and Odonata. A total of 19 Odonata species is listed including - in most cases - more widespread species. Dominant species are *Aeshna grandis*, *A. mixta*, *Anax imperator*, *Sympetrum sanguineum* and *S. vulgatum*. *S. pedemontanum* is rare and only locally represented.] Address: Bogunski, G., Gartenstr. 10, 08141 Reinsdorf, Germany
- 8701.** Braby, M. (2009): Dragonflies: reporting back on the talk by Brian Thistleton at the April meeting. *Nature Territory* 2009 (May): 9-10. (in English) [General, with emphasis on Australia and with a list of some Northern Territory odonate species.] Address: Braby, M., c/o P.O. Box 39565, Winnellie, NT 0821, Australia
- 8702.** Buczyński, P. (2009): Demoiselles, emerald damselflies and azure bluets, or on dragonflies, ornaments of nature of Warmia and Mazury. *Natura*, Olaztyn 2(14): 6-11. (in Polish, with English summary) [Poland; the objective of this general is to trigger the interest in odonatological research with amateur entomologists. Following a brief introduction into Odonata morphology, biology, ecology and biotopes, and with reference to Polish fauna, the odonate fauna of Warmia and Mazury is outlined. The emphasis is given to the various types of habitats, consequences of the climate change and to the anthropogenic impacts.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 8703.** Buczyński, P. (2009): Polish and dedicated to Poland odonatological papers. 7. The year 2008 and the supplement for the year 2007. *Odonatrix* 5(1): 22-24. (in Polish, with English summary) [Update of the Polish odonatological bibliography.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 8704.** Caesar, R.M.; Wenzel, J.W. (2009): A phylogenetic test of classical species groups in *Argia* (Odonata: Coenagrionidae). *Entomologica Americana* 115(2): 97-108. (in English) ["We present the first cladistic analysis of *Argia* species, focusing on those occurring in North America north of Mexico. Our analysis is based on mitochondrial 16S rDNA and morphological characters of both sexes of adults and immatures. We reexamine classical work on *Argia* taxonomy and phylogeny. Our results agree considerably with previous hypotheses based morphology in an absence of phylogenetic analysis, and thus our work represents and independent test of these previous hypotheses. *Argia* is recovered as monophyletic. The clade composed of *A. funcki* plus *A. lugens* is basal among the species studied here. The species *A. fumipennis*, including the three subspecies, appears to be a paraphyletic assemblage, and thus may warrant being considered separate species as originally described. The feasibility of producing a thorough phylogenetic analysis of the entire genus using multiple sources of data is discussed." (Authors)] Address: Caesar, R.M., Dept of Entomology, Ohio State Univ., Columbus, OH, USA. E-mail: caesar.6@osu.edu
- 8705.** Catling, P.M.; Lucas, Z.; Freedman, B.; Brunelle, P. (2009): New records of Odonata from Sable Island, Nova Scotia. *Argia* 21(4): 11-12. (in English) [*Schnura hastata*, *Tramea carolina* and *T. lacerata* were new to the Maritime Provinces of Canada and/or to Sable Island. These records are documented and discussed in detail.] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca
- 8706.** Cebulski, B.C. (2009): *Hetaerina titia* (Smoky Rubyspot) no longer rare in southern Michigan. *Argia* 21(4): 21-22. (in English) [Several new records of *H. titia* in southeast Michigan, USA are communicated.] Address: Cebulski, B.C. E-mail: bcebul@tc3net.com
- 8707.** Cebulski, B.C. (2009): Collecting odonates under the ice. *Argia* 21(3): 8-9. (in English) [Odonata larvae were collected with a dredge that could be pulled over the ground.] Address: Cebulski, B.C. E-mail: bcebul@tc3net.com
- 8708.** Chadwick, W. (2009): A visit to central Florida. *Argia* 21(3): 7. (in English) [11 Odonata species at six localities in Florida, USA are dealt with.] Address: Chadwick, W., Bronxville, New York, USA. E-mail: mrcnaturally@optonline.net
- 8709.** Daigle, J.J. (2009): 2009 Florida Panhandle Soirée. *Argia* 21(3): 9-10. (in English) [In the framework of the 2010 Southeast Regional meeting of odonatologists, several localities in northern Florida, USA were visited in 2009 to scout out areas and logistics for the meeting. Records (range extensions) of *Brachymesia furcata*, *Lestes forficula*, and *Nehalennia pallidula* are discussed as result of global warming.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com
- 8710.** Daigle, J.J. (2009): *Tramea* treasure island. *Argia* 21(4): 20-21. (in English) [Report on a short field trip to Key West, Florida, USA in October 2009.] Ad-

dress: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**8711.** Dijkstra, K.D.B.; Matushkina, N. (2009): Kindred spirits: "Brachythemis leucosticta", Africa's most familiar dragonfly, consists of two species (Odonata: Libellulidae). *International Journal of Odonatology* 12(2): 237-256. (in English) ["Brachythemis leucosticta was found to include two morphotypes, which we consider to represent separate species. Males are separable by the ventral structure of S8 and often differ in the colour of the venation and genital lobe. Females are as yet not reliably distinguishable. Examination of 1,154 males demonstrated that both species are widespread: the true *B. leucosticta* occupies most of tropical Africa and Madagascar, while *B. impartita* (comb. nov.; corrected spelling - neotype P: Ngaoundaba Ranch, Cameroon; in RMNH) ranges north and south of the Sahara, and extends into Eurasia. The two overlap from The Gambia to Ethiopia and south at least to Lake Victoria. The presence of wing bands was scored for all examined males and 970 females. Banded females are frequent in sub-Saharan populations of *B. impartita*, but virtually absent in *B. leucosticta* and northern *B. impartita*. *B. impartita* males become banded shortly after emergence, but *B. leucosticta* becomes so more gradually. Larval morphology and ecology require further study, but some ecological and seasonal segregation may occur in areas of overlap. Of two larval forms described from Uganda, the 'mud form' may pertain to *B. leucosticta*, and the 'sand form' to *B. impartita*." (Authors)] Address: Dijkstra, K.D., Curator of invertebrates, National Zoological Collection of Suriname, University of Suriname, P.O. Box 9212, Paramaribo, Suriname. E-mail: Dijkstra@naturalis.nnm.nl

**8712.** DiLeo, C.; Deng, X. (2009): Design of and experiments on a dragonfly-inspired robot. *Advanced Robotics* 23(7-8): 1003-1021. (in English) ["This paper describes the design of dragonfly-inspired robots. Dragonflies demonstrate unique and superior flight performance compared with most other insect species. They are equipped with two pairs of independently controlled wings. The high level of dexterity in wing motion of the dragonfly allows it to hover, fly fast forward, make turns rapidly, fly sideways and even glide. A dragonfly-inspired robot that could effectively mimic those kinematics would potentially exhibit superior flight performance compared with existing designs of insect robots. In this paper, we introduce two generations of robotic dragonfly prototypes developed to implement simplified dragonfly kinematics. Preliminary experiments on kinematics and aerodynamic force measurements of the prototypes are also presented." (Authors)] Address: Deng, X., Dept of Mechanical Engineering, Univ. Delaware, Newark, DE, USA. E-mail: deng@udel.edu

**8713.** Donnelly, N.; Donnelly, A. (2009): Malawi in february — sure beats New York. *Argia* 21(2): 7-9. (in English) [Extensive report on a field trip to Malawi in Februar 2009.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**8714.** Donnelly, N.; Donnelly, A. (2009): Peru in November — Not to every odonatist's taste. *Argia* 21(2): 9-10. (in English) [Report from a high Andean field trip in Peru (November 2008) with poor odonatological results. 40 specimens in 13 taxa (one *Gomphomacromia* new to science) were recorded.] Address: Donnelly, T., 2091

Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**8715.** Dragonfly Society of the Americas (2009): *Argia* Vol. 21, No. 2. *Argia* 21(2): (in English) [In This Issue: 1; Calendar of Events: 1; Results of the Dragonfly Society of the Americas 2009 Election, from Steve Valley: 6; Free Odonata Boxes Available: 10; From Princeton—Special 20% Discount: 14; Is a 2,000 foot dragonfly coming to a town near you?: 15. Papers from *Argia* 21(2) omitted in this section are abstracted in this issue of OAS.] Address: DSA c/o Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**8716.** Dragonfly Society of the Americas (2009): *Argia* Vol. 21, No. 3. (in English) [In This Issue: 1; Calendar of Events: 1; 2010 DSA Annual Meeting in Maine: A Preview, by Bryan Pfeiffer: 1-2; 2009 Annual DSA Meeting in Sullivan, Missouri: An overwhelming success, by Paul M. McKenzie: 2-3; 2009 Northeast DSA Regional Meeting Report, by Bryan Pfeiffer: 4-5; Galax Gallopers!, by Jerrell Daigle: 10-11; Duncan Cuyler 2009 Update, by Jerrell Daigle: 11.] Address: DSA c/o Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**8717.** Dragonfly Society of the Americas (2009): *Argia* Vol. 21, No. 4. (in English) [In This Issue: 1; Calendar of Events: 1; Fourth Annual Minnesota Dragonfly Gathering at Shalom Hill Farm near Jeffers, Minnesota, by Scott King: 2; The Tenth Annual Oregon Aeshna Blitz: October in August, by Steve Gordon: 3; GLOM 2009 Visits Indiana Dunes National Lakeshore, by Bob DuBois and Burton C. Cebulski: 4; Snow Dragonfly!: 5; Minutes of the 2009 Annual Meeting of the Dragonfly Society of the Americas, by Jerrell J. Daigle: 5; 2009 Treasurer's Report, by Jerrell J. Daigle: 6.] Address: DSA c/o Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**8718.** Dyatlova, E.S. (2009): Dragonflies (Insecta, Odonata) of the southwestern Ukraine: biodiversity, ecology and conservation. Thesis for a degree of Candidate of Biological Sciences (Ph. D. (Biology)) by speciality 03.00.16 – ecology. Odessa National - Mechnikov University, MES of Ukraine. – Odesa. Autoreferat: 22 pp. (in Ukrainian, with English summary) ["The recent odonate fauna is described. In the study area (Odesa, Mykolaiv and Kherson provinces) 48 species of dragonflies were recorded, belonging to 21 genera and 8 families. Two species and one subspecies (*Sympetrum pedemontanum*, *Coenagrion scitulum* and *Orthetrum coerulescens anceps*) were recorded for the first time in southwestern Ukraine. The fauna of Zmeiny Island in the Black Sea and National Park "Nizhnednestrovsky" in the lower Dniestr river were almost unstudied before our investigations. Two Zygoptera species (*Ischnura elegans* and *Coenagrion pulchellum*) were chosen as model objects for population studies. Age and sex structures of populations and the ratio of female morphs were investigated. Morphometry analysis, fecundity and parasite infestation were studied in two *I. elegans* "infuscans" and "andromorph" female morphs. Based on criteria we have developed, six important dragonfly areas (IDA) were identified. Three IDA are of particular importance: the Danube delta, Dniestr and Dniepr rivers." (Author)] Address: Dyatlova, Elena

Sergeyevna, Institute of Zoology, Faculty of Biology, I.I. Mechnikov University of Odessa, Odessa, Ukraine. E-mail: lena.dyatlova@gmail.com

**8719.** Ellenrieder, N. von (2009): Type specimens of Insecta housed at the Museo de Ciencias Naturales de Salta, Argentina. *Rev. Soc. Entomol. Argent.* 68(3-4): 253-262. (in English, with Spanish summary) [A short description of the entomological collection of the Natural History Museum of Salta, Argentina, is provided, with a listing of the type specimens held here (34 holotypes, 6 syntypes, 9 allotypes, and 55 paratypes). The collection includes two paratypes of *Oligoclada rubribasalis* von Ellenrieder & Garrison 2008.] Address: Ellenrieder, Natalia von, California State Collection of Arthropods, CDFA, 3294 Meadowview Road, Sacramento, CA 95832. Email: natalia.ellenrieder@gmail.com

**8720.** Ferreras-Romero, M.; Márquez-Rodríguez, J.; Ruiz-García, A. (2009): Implications of anthropogenic disturbance factors on the Odonata assemblage in a Mediterranean fluvial system: River Guadiamar, southern Iberian Peninsula. *International Journal of Odonatology* 12(2): 413-428. (in English) ["During a period of nine years, from 2000 to 2008, two consecutive studies - one focusing on observations of adult Odonata, the other on collection of larvae - were carried out in the basin of the Guadiamar River in the southwestern Iberian Peninsula. In addition to monitoring Odonata, several environmental variables were assessed, including an index based on macroinvertebrate communities (IBMWP). In April 1998, this river system suffered from an accidental release of a large mass of toxic mining waste, which exterminated macroinvertebrates in the middle and lower parts and floodplain. Several years later, dragonfly communities in these areas were similar to those of unaffected upper reaches. Communities of sites less affected by general human impact were dominated by semivoltine anisopterans. In contrast, headwaters and river reaches where riparian forest had been destroyed many years ago and seasonality of river discharge was boosted by landscape management harboured chiefly uni- or bivoltine species, regardless whether a site had been affected by mining waste or not. Species assemblage was especially poor in lower river reaches that experienced permanent, diffuse urban and agricultural pollution. A few parti-voltine species were recorded, but only in habitats with a high IBMWP index. It seems that over the long term, Odonata respond more to land use and catchment management than other groups included in the IBMWP index." (Authors)] Address: Ferreras-Romero, M., Departamento de Biología Animal (Zoología), Facultad de Ciencias, Universidad de Córdoba, Avda. San Alberto Magno s/n, E-14004 Córdoba, Spain. E-mail: ferreras@teleline.es

**8721.** Fraker, M.E. (2009): Perceptual limits to predation risk assessment in green frog (*Rana clamitans*) tadpoles. *Behaviour* 146(8): 1025-1036. (in English) ["Many prey assess predation risk through information sources that decline in reliability over time (i.e., the information sources indicate a wider range of potential predation risk levels over time until they provide no information about the current predation risk). However, prey may lack the perceptual ability to accurately assess the reliability of ageing information sources. Here, evidence is provided that suggests that *R. clamitans* tadpoles are unable to assess the age of the chemical cue of predatory larval *Anax junius* upon exposure to

cue up to 48 h old (but can at 72 h). As a result, tadpoles may overestimate the level of risk when they encounter aged *Anax* chemical cue, resulting in a disproportionately strong behavioural response. In general, the results suggest that the predation risk assessment of prey depends not only on the objective characteristics of the information source, but also on the perceptual limitations of the prey. Prey may lack the context to accurately assess information sources and may consequently misestimate the actual level of predation risk." (Author)] Address: Fraker, M.E., Dept of Ecology and Evolutionary Biology, University of Michigan, Ann Arbor, MI 48109-1048, USA. Email: mfraker@umich.edu

**8722.** Frankovic, M.; Bogdanovic, T. (2009): *Vretenca. Prirucnik za inventarizaciju i pracenje stanja.* Zagreb. ISBN 978-953-7169-71-8: 48 pp. (in Croatian) [Manual for the inventarisation of the Croatian Odonata.] Address: not stated

**8723.** Goncalves Neves dos Santos, A.F.; Racca-Filho, F.; Neves dos Santos, L. (2009): El pez Trachelopterus striatulus (Siluriformes: Auchenipteridae) como herramienta de muestreo de la entomofauna en un embalse tropical. *Revista de Biología Tropical* 57(4): 1081-1091. (in Spanish, with English summary) [The diet of the insectivorous fish *T. striatulus* was examined through dietary analyses of 383 individuals caught between April 1999 and March 2000 in Lajes Reservoir, a 30 km<sup>2</sup> oligotrophic impoundment in Southeast Brazil. The diet consisted to 92.1% of insects (10 orders and 9 families). Hymenoptera (57.90%), Odonata (39.76%), Trichoptera (27.41%), Ephemeroptera (26.25%) and Coleoptera (28.96%) were the most frequent taxa.] Address: Racca-Filho, F., Depto de Biologia, Univ. Federal Rural do Rio de Janeiro, Antiga BR 465, Km 47, Seropédica, RJ - Brasil. E-mail: fraccafo@ufrj.br

**8724.** Gregoire, S.; Gregoire, J. (2009): Shift in *Celithemis elisa* (Calico Pennant) emergence strategy. *Argia* 21(4): 10. (in English) [Daily counts of emergence of *C. elisa* are documented for 2005-2009.] Address: Gregoire, J., Kestrel Haven Avian Migration Observatory, Burdett, NY 14818, USA. E-mail: khmo@empacc.net

**8725.** Guezennec, P.; Guezennec, C. (2009): First record of *Tauriphila australis* Hagen (Garnet Glider) for Guadeloupe (FWI). *Argia* 21(4): 14. (in English) [28-IX-2009, a single male specimen of *Tauriphila australis* was observed at "Mare Castex", near Petit-Canal on Grande-Terre of Guadeloupe.] Address: Guezennec, P., Société d'Histoire Naturelle L'Herminier, Muséum d'Histoire Naturelle, 12 rue Voltaire, 44000 Nantes, France. E-mail: pierre.guezennec@shnlh.org

**8726.** Hatfield, J.K. (2009): *Sympetrum pallipes* (Striped Meadowhawk): A new Texas state record. *Argia* 21(4): 11. (in English) [Llano Estacado Audubon Society Trail of Buffalo Springs Lake, Texas, 2-IX-2009] Address: Hatfield, J.K. E-mail: dragonflywatcher1029@yahoo.com

**8727.** Hatfield, J.K. (2009): The Dot-winged Baskettail (*Epitheca petechialis*) of the Texas Llano Estacado. *Argia* 21(3): 6-7. (in English) [Llano Estacado Audubon Trail of Buffalo Springs Lake in southeast Lubbock County, Texas, USA, spring 2005] Address: Hatfield, J.K. E-mail: dragonflywatcher1029@yahoo.com

**8728.** Hilfert-Rüppell, D.; Rüppell, G. (2009): Males do not catch up with females in pursuing flight in Calo-



pteryx splendens (Odonata: Calopterygidae). International Journal of Odonatology 12(2): 195-203. (in English) ["In high densities males of Calopteryx splendens showed alternative reproductive behaviour at the river Oker in northern Germany. One of several tactics was to pursue females. Pursuing flight was filmed in summer 2006 in slow motion. Frame by frame analysis showed that males fly in irregular flight patterns: they showed different lengths of wing beat phases in comparison to females which fly more steadily. Females had significantly lower wing beat frequencies than males. The flight patterns of males depended on their position to other pursuing males and to the pursued female. The possible causes of these flight differences are discussed." (Authors)] Address: Hilfert-Rüppell, Dagmar, Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: d.hilfert@tu-bs.de

**8729.** Höpstein, G.; Bellstedt, R. (2009): Die Besiedlung eines neu angelegten Kleingewässers durch Amphibien (Amphibia) und aquatische Insekten (Insecta: Odonata, Coleoptera) bei Bad Blankenburg (Landkreis Saalfeld-Rudolstadt / Thüringen). Thüringer faunistische Abhandlungen 14: 31-42. (in German, with English summary) [Thüringen, Germany; 16 Odonata species are recorded between 2004 and 2008. With the exception of the strongly dispersive but rare species *Ischnura pumilio* and *Lestes barbarus*, the Odonata recorded are more widespread species.] Address: Höpstein, G., Flecken 17, 07422 Bad Blankenburg, Germany

**8730.** Holdt, E. von (2009): Entomologische Besonderheiten des Jahres 2009. HVV-info 1/2021 (Hannoverscher Vogelschutzverein): 3-6. (in German) [*Leucorrhinia caudalis*, 30-VI-2009, Hannover, Niedersachsen, Germany] Address: von Holdt, E., Offensteinstr. 13, 30451 Hannover, Germany. E-mail: ecvocho@t-online.de

**8731.** Holdt, E. von (2009): Bemerkenswerte Libellen im Raum Hannover 2007 und 2008. HVV-info 1/2009 (Hannoverscher Vogelschutzverein): 29-30. (in German) [Germany, Niedersachsen; records of the following Odonata species are dealt with: *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis*, *Anax parthenope*, *Orthetrum brunneum*, *O. coerulescens*, *Sympetrum pedemontanum*, *S. fonscolombii*, *Erythromma lindenii*, *Anaciaeschna isoceles*.] Address: von Holdt, E., Offensteinstr. 13, 30451 Hannover, Germany. E-mail: ecvocho@t-online.de

**8732.** Hong, S.J. (2009): Surface ultrastructure of *Plagiorchis muris* growth and developmental stages in rats, the final host. Parasitol. Res. 105(4): 1077-1083. (in English) ["In the excysted metacercaria, the whole fluke surface was covered with peg-shaped tegumental spines. Ciliated sensory papillae (type I) were concentrated around the oral sucker, and non-ciliated sensory papillae (type II) were aligned on the lip of oral and ventral suckers. Several type II papillae were aligned laterally with linear symmetry between the oral and ventral suckers. In juvenile flukes, cytoplasmic processes were band-shaped on the anterior half of the body surface and velvety on the posterior half. In adult flukes, cytoplasmic processes were differentiated into velvety processes, and densities of tegumental spines were reduced on the posterior half of the body. Flukes grew to be elongated and leaf-like as adults and retained a surface ultrastructure that was similar to that of juveniles in terms of the distribution of tegumental spines and sen-

sory papillae. From the above results, the authors suppose that the marked differentiation of cytoplasmic processes and the reduced density of tegumental spines observed on the posterior half of the body surface are closely related to the development of reproductive organs therein. [...] *Sympetrum eroticum* were caught in the rice paddies of Yongho-myon, Koseong-gun, Gyeongsangnam-do, Korea during June and July 1994. They were crushed with a mortar and pestle and digested within artificial gastric juice at 37°C for 1 h. After washing with phosphate-buffered physiological saline (PBS), *P. muris* metacercariae were collected from particulates under a dissecting microscope." (Author)] Address: Hong, S.J., Department of Medical Environmental Biology, Chung-Ang University College of Medicine, Tongjak-gu, Seoul 156-756, South Korea. E-mail: hongsj@cau.ac.kr

**8733.** Iserbyt, A.; van Gossum, H. (2009): Unexpected absence of behavioural differences between female damselfly colour morphs. Animal Behaviour 78(6): 1463-1469. (in English) ["Males are often selected for higher mating rates than females. As a consequence of this sexual conflict, unreceptive females may suffer fitness costs from excessive male sexual harassment. In a variety of vertebrate and invertebrate species, multiple female morphs coexist in natural populations which have been observed to differ in body colour, in behaviour and also in the amount of male harassment received. However, the degree of harassment on a female morph may depend on the frequency and density of males and female morphs in the population. We quantified harassment rate and subsequent refusal behaviour of males and female morphs of the polymorphic damselfly *Nehalennia irene*. Unexpectedly and contrary to previous work, female morphs received similar amounts of male harassment and showed mostly the same behaviour. We discuss why differences in morph behaviours may be lacking and how this compares to contemporary explanations for the maintenance and evolution of female-limited polymorphisms." (Authors)] Address: Iserbyt, A., Evolutionary Ecology Group, University of Antwerp, Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: arne.iserbyt@ua.ac.be

**8734.** Iwasaki, H.; Suda, D.; Watanabe, M. (2009): Foraging activity of *Sympetrum infuscatum* (Selys) adults living in Satoyama Forest gaps (Odonata: Libellulidae). Jpn. J. Appl. Entomol. Zool. 53: 165-171. (in Japanese, with English summary) ["Adult *S. infuscatum* live in the forest gaps throughout their life except when visiting rice paddy fields for oviposition. They prey on small flying insects in the forest gaps, using sit-and-wait tactics. They perch on the tips of branches or grass all day and take off when a small flying insect comes into sight. In the present study, the foraging behaviour of *S. infuscatum* in the forest gaps was observed. The perching height was high in the morning and evening and low around noon. The diurnal change in the perching height corresponded to the abundance of flying small insects. The mean daily frequency of foraging flights was 251 for females and 182 for males, and the mean actual number of insects captured was 109 and 89, respectively. A total of 2,935,300 small flying insects were preyed on by *S. infuscatum* adults during one day in the Satoyama forest gaps." (Authors)] Address: Iwasaki, H., Graduate School of Life and Environmental Sciences, University of Tsukuba; Tennodai, Tsukuba, Ibaraki 305-8572, Japan

- 8735.** Johanson, J. (2009): Two new odonates for Oregon in two days. *Argia* 21(3): 22-23. (in English) [USA; male *Lestes forcipatus* at a pond about 14 miles north of Enterprise, Wallowa County, Oregon, 3-VIII-2009. Female *Aeshna tuberculifera* at a borrow pit near Fry Meadow, Union County, Oregon, 3-VIII-2009.] Address: Johnson, J., Vancouver, Washington, USA. E-mail: jjjohnson@comcast.net
- 8736.** Johnson, J. (2009): Mysterious behavior: Tail-dipping female *Octogomphus specularis* (Grappletail). *Argia* 21(4): 7-8. (in English) [Females perched on the sides of rocks and lodged with just the tip of the abdomen in the water.]
- 8737.** Karlsson, T. (2009): Arsprapport 2008 för project Trollsländor i Östergötland. Ent. For. Östergötland: 7 pp. (in Swedish) [A report on the 2008 survey of the Odonata of Östergötland, Sweden, with information on records of the observed species as *Aeshna serrata*, *Lestes virens*, *Nehalennia speciosa*, *Coenagrion armatum* and *C. lunulatum*.] Address: Karlsson, T., Länsstyrelsen Östergötland, Miljövärdsheten, 58186 Linköping, Sweden
- 8738.** Keppner, E. (2009): Occurrence of *Libellula pulchella* (Twelve-spotted Skimmer) in Bay County, Florida. *Argia* 21(3): 12. (in English) [*L. pulchella* appeared to be a rare migrant in Florida, USA; imagines of *L. pulchella* were recorded on 30-XI-2007, and larvae of the species were collected in winter 2007 and 2008.] Address: Keppner, E. E-mail: ekeppner@bellsouth.net
- 8739.** Kerst, C. (2009): A deformity in a female *Aeshna sitchensis* (Zigzag Darner) from Washington. *Argia* 21(4): 9. (in English) [Bunchgrass Meadows in north-eastern Washington, USA; „The abdomen of the female was upside down with the ovipositor on top. The female appeared to be mature so apparently was able to feed and function with this deformity. The abdomen may have twisted during emergence, but it appeared more likely that segments three and four of the abdomen were malformed.“ (Author)] Address: Kerst, C. E-mail: caryk@comcast.net
- 8740.** Kerst, C. (2009): Color change in male *Argia nahuana* (Aztec Dancer) in tandem pairs. *Argia* 21(4): 8-9. (in English) [Twentymile Creek, Oregon, USA; In most tandems of *A. nahuana*, the blue colours of the male head and thorax were a dull purple colour rather than the normal bright blue. The author collected a couple of tandem pairs of *A. nahuana* with dark males and placed them in envelopes where the males changed back to the normal bright blue colour. Additional examples of darkening of males in tandem pairs in *Argia* sp. are outlined, and advice to the physiological colour change at low temperatures is given.] Address: Kerst, C. E-mail: caryk@comcast.net
- 8741.** Khrokalo, L.A.; Verves, Yu.H. (2009): Dragonflies (Odonata) and certain two-winged insects (Diptera: Calliphoridae; Sarcophagidae) of the Shatsk Lake district. *Nauk. Visn. Bolls'kogonac. Univ. L Ukrainki* 2009(2) [Research news of the Volyn National University of Lesya Ukrainka 2 (Fauna) (2): 114-118. (in Ukrainian, with Russian and English summaries) [31 out of 49 regionally known Odonata species were recorded between 2005–2008 in the Shatsk Lake District and in the Volyn Oblast, Ukraine. *Sympecma fusca*, *Anaciaeschna isosceles*, *Ophiogomphus cecilia*, and *Calopteryx splendens ancilla* are new for the fauna of Volyn, while *S. fusca* and *Sympetrum striolatum* are new for the Shatsk lakes area.] Address: Khrokalo, Lyudmila, P.O. Box 16, Kyiv-118, Ukraine 03118. E-mail: khrokalo@mail.ru
- 8742.** Kitt, M.; Röller, O.; Seitz, U. (2009): Viele neue Erkenntnisse über Tiere und Pflanzen des Bienwaldes. *POLLICHA-Kurier* 25(4): 5-6. (in German) [In the framework of the the "Day of biodiversity", held on 12./13-VI-2009 in the Bienwald-region, southern Rheinland-Pfalz, Germany, several regionally rare Odonata were recorded including *Coenagrion mercuriale*, *C. scitulum*, *Gomphus vulgatissimus*, and *Cordulegaster boltonii*.] Address: Kitt, M., Raiffeisenstr. 39, D-76872 Minfeld, Germany, E-mail: MKitt@tonline.de
- 8743.** Krilowicz, C.; Lubchansky, J. (2009): New county records for New Jersey. *Argia* 21(4): 22. (in English) [ "After spending several years in the field chasing Odonata, we have accumulated a number of county records.“ 48 species are listed along with data on first record in each of the counties visited by the authors.] Address: Krilowicz, C., Haddonfield, NJ, USA. E-mail: chippop@verizon.net
- 8744.** Khrokalo, L.A.; Savcuk, V.V. (2009): New records of rare dragonflies (Insecta, Odonata) in Ukraine. *Vestnic zoologii* 43(4): 378. (in Russian) [Records of *Erythromma lindenii*, *Coenagrion scitulum*, and *Selysiothemis nigra* are documented.] Address: Khrokalo, Lyudmila, P.O. Box 16, Kyiv-118, Ukraine 03118. E-mail: khrokalo@mail.ru
- 8745.** Krotzer, S. (2009): A new species record for Alabama. *Argia* 21(4): 13-14. (in English) [*Lestes forcipula*, a species expanding its range to the east of USA was observed on 24-IX-2009 in the Conecuh National Forest, Covington County, Alabama, USA (31°05.40' N, 086°33.38' W).] Address: Krotzer, S., 2238 Haysop Church Road, Centreville, AL 35042, USA. E-mail: rskrotze@southernco.com
- 8746.** Martynov, A.V.; Martinov, V.V. (2009): New interesting finds of dragonflies (Odonata) in Ukraine. *Vest. Zool.* 43(2): 150. (in Russian, with English title) [New records are presented for *Chalcolestes parvidens*, *Coenagrion scitulum*, *Anax ephippiger*, *Somatochlora arctica*, *S. metallica*, *Sympetrum fonscolombii*, and *S. striolatum*.] Address: Martynov, A.V., Dept Zool., Fac. Biol., Donetsk Natn. Univ. Shchorsa 46, UKR-83050 Donetsk, Ukraine
- 8747.** Matushkina, N.A.; Guga, E.K.; Buy, D.D.; Limarenko, D.A. (2009): Dragonflies (Insecta, Odonata) of the Udai River part of the Sula River ecological corridor (Central Ukraine: A preliminary checklist). *Nature Reserves in Ukraine* 15(1): 70-71. (in English) [14 species including *Sympecma paedisca* are listed.] Address: Matushkina, Natalia A., Department of Zoology, Biological Faculty, National Taras Shevchenko University of Kyiv, vul. Volodymirs'ka, 64, Kyiv UA-01033, Ukraine. E-mail: odonatally@gmail.com
- 8748.** McCaul, A.; McCaul, E. (2009): Dragonhunter (*Hagenius brevistylus*) mating trio. *Argia* 21(4): 10. (in English) [Triple connection of *H. brevistylus* with two males leading a female, as seen near Huntsville, Alabama, USA, 15-VIII-2009.] Address: McCaul, A. E-mail: asm@stormshooter.com
- 8749.** Meurgey, F.; Daigle, J.J. (2009): Collecting trip to Grenada (Lesser Antilles): an updated checklist of

species. *Argia* 21(3): 13-17. (in English) [To further increase knowledge on the biogeography of the Lesser Antillean dragonflies, a survey of Grenada was carried out from 1-14-V-2009. Localities are briefly described and interesting species are dealt with. *Brechmorhoga grenadensis* is considered a synonym of *B. praecox*.] Address: Daigle, J.J., Little River Lane, Tallahassee, FL 32311 USA. E-mail: jdaigle@nettally.com

**8750.** Millan Jimenez, C., (2009): Insectos acuáticos del humedal Timbique en el corregimiento del Bolo-Palmira (Valle del Cauca, Colombia). *Boletín del Museo de Entomología de la Universidad del Valle* 10(1): 30-36. (in Spanish, with English summary) ["Sampling of aquatic insects associated with the Timbique wetland (Palmira, Valle del Cauca) was performed between May of 2008 and January 2009. Insects were collected using Surber and kick nets D in five strategic points chosen in the wetland. In general, the absence of the Diptera Culicidae and Chironomidae in the latter year was evident. This result appears to be caused by the partial removal of water lettuce (*Pistia* sp.) in the wetland, which served as substrate for the larvae of mosquitoes *Coquillettidia* sp. and *Mansonia* sp. found in 2008. Additionally, the presence of larvae and adults in courtship flights of Odonata suggests reproductive activity in the area." (Authors) Odonata are treated at the family level.] Address: Millán Jiménez, Carolina, Departamento de Biología, Universidad del Valle, Calle 13 # 100 - 00 Sede Meléndez. Cali - Colombia. A.A 25360, Cali, Colombia. E-mail: lepidoptera.azul@gmail.com

**8751.** Ohba, S. (2009): Feeding habits of the diving beetle larvae, *Cybister brevis* Aubé (Coleoptera: Dytiscidae) in Japanese wetlands. *Appl. Entomol. Zool.* 44 (3): 447-453. (in English) ["A number of descriptive reports suggest that *Cybister* larvae feed on tadpoles, fish, and aquatic insects; however, no quantitative study on their feeding habits has been reported. In order to elucidate the feeding ecology of *C. brevis* larvae, field observations and laboratory experiments were carried out. In the field, all *C. brevis* larvae fed on invertebrates, such as insects and isopoda, but did not eat vertebrates, such as fish and anuran larvae. A rearing experiment demonstrated that all *C. brevis* larvae provided with tadpoles died. Larvae provided with Odonata nymphs - [Small damselfly nymphs (Platycnemididae: *Copera* spp. and Lestidae: *Lestes* spp., <15 mm), medium damselfly nymphs (same species, 15-20 mm), and large dragonfly nymphs (Libellulidae: *Orthetrum albistylum speciosum*, *Sympetrum frequens*, *S. infuscatum*; Aeshnidae: *Planaeschna milnei*, and *Anax parthenope parthenope*, 20-30 mm) were provided as food to 1st, 2nd, and 3rd instars, respectively.] - had a longer total body length than larvae reared with a mixture of tadpoles and Odonata nymphs. In addition, larvae of *C. brevis* could search for and eat motionless Odonata nymphs, but all larvae died from starvation when they were supplied with motionless tadpoles. These results suggested that *C. brevis* larvae mainly preyed upon invertebrate animals and did not eat vertebrate animals, such as tadpoles and fish." (Author) ] Address: Ohba, Shin-ya, Dept of Vector Ecology & Environment, Inst. of Tropical Medicine, Nagasaki Univ., Sakamoto, Nagasaki 852-8523, Japan. E-mail: oobug@hotmail.com

**8752.** Orr, A.G. (2009): Reproductive behaviour of *Libellago semiopaca* on a Bornean rainforest stream (Odonata: Chlorocyphidae). *International Journal of Odonatology* 12(2): 157-180. (in English) ["The repro-

ductive behaviour of *L. semiopaca* was studied on a swift-flowing shallow forest stream in Brunei. Females oviposited just below the water-line, commonly in groups, only on large, firm-textured, semi-submerged logs, usually guarded by males. Both sexes were very sedentary. Suitable sites, with good illumination and deep deposits of fine gravel and leaf mulch in dead water immediately behind the log were scarce. When stream levels were high, no oviposition sites were available. When possible, females generally oviposited every day, arriving between 10:00 and 15:00 h, and usually remaining on site for at least two hours. Males arrived earlier, between 09:00 and 13:00 h, and established small territories along the log. Females apparently began reproductive activity only when all oocytes were mature, and the egg load diminished daily as eggs were laid. Most matings occurred before 12:00 h with early-arriving females. Females mated every 2-3 days, probably to replenish sperm supplies. Male density was at its highest after 11:00 h and males shared territories, spending much of their time flying in low intensity confronting contests. Removal of males from a site, just as it was becoming available by falling water levels, resulted in little use of the site by females. Pinning decoy dead females at a good oviposition site failed to attract females if males had been removed. It is suggested that the prolonged male agonistic display attracts females to the site, and possibly commits them to future matings with the territory holders." (Authors)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**8753.** Paulson, D. (2009): *Lestes forficula* (Rainpool Spreadwing) in Florida. *Argia* 21(3): 18-19. (in English) [11 July 2009, at a series of flatwoods ponds on Eglin Air Force Base, Okaloosa County, Florida, USA (30° 29.05' N, 086°43.09' W). ] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**8754.** Paulson, D. (2009): Additional comments about Odonata of Baja California Sur. *Argia* 21(2): 12-13. (in English) [The regional status of *Archilestes grandis*, *Ischnura hastata*, *Aeshna walkeri*, *Tramea lacerata* (all: first records for BCS) and *Libellula croceipennis* (correction of the first record in BCS) is updated. *Enallagma annexum* and *Ischnura denticollis* should be deleted as regional records.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**8755.** Phillips, I.D.; Vinebrooke, R.D.; Turner, M.A. (2009): Experimental reintroduction of the crayfish species *Orconectes virilis* into formerly acidified Lake 302S (Experimental Lakes Area, Canada). *Canadian Journal of Fisheries and Aquatic Sciences* 66(11): 1892-1902. (in English, with French summary) ["Reintroduction of functionally important species is considered a key strategy for restoring damaged ecosystems. However, the sudden reappearance of an extirpated species may have adverse ecological impacts, degrading ecosystem services. Therefore, we experimentally reintroduced *O. virilis* [...] to determine its effect on the littoral food web following a 17-year absence. In June 2004, a single-factor experimental design consisting of two treatment levels (crayfish-less control versus 1.8 introduced crayfish-m<sup>-2</sup>) was replicated five times for a total of 10 littoral cages (4m<sup>2</sup>). *O. virilis* significantly ( $P < 0.05$ ) suppres-



sed the total biomass of other benthic invertebrates by 70% primarily because of declines in larval damselflies and midges. In addition, crayfish reduced periphytic biomass by 90% ( $P < 0.001$ ). Stable isotopic analyses of the mesocosm food webs further indicated that *O. virilis* likely functioned as an omnivore, exerting direct and possibly indirect effects on other invertebrates and periphyton. Our findings highlight how the reintroduction of *O. virilis* must be balanced with adequate fish predation to prevent this species from becoming an invader and negatively affecting the productive capacity of boreal lakes. [...] Crayfish treatments had contrasting species-specific effects on odonates. *O. virilis* enclosures contained significantly less biomass of the most abundant odonate, *Aeshna* sp. However, crayfish significantly increased the population density of this anisopteran (RM-ANOVA,  $F = 4.37$ ,  $P = 0.04$ ). In contrast, crayfish significantly increased total zygopteran biomass, consisting primarily of *Enallagma* sp.. [...] *O. virilis* strongly suppressed the total abundance of the *Aeshna* sp. by negatively affecting larger individuals belonging to this genus. However, densities of *Aeshna* sp. were significantly elevated in the enclosures relative to the crayfishless controls because of the increase in small individuals. Similarly, the smaller zygopteran genus *Enallagma* sp. was also more abundant in the presence of crayfish. Therefore, we suggest that size-selective predation by crayfish on larger odonates, or possibly their active avoidance of this large predator, released smaller odonates from competition and cannibalism." (Authors)] Address: Vinebrooke, R., Dept of Biological Sciences, University of Alberta, Edmonton, Alberta T6G 2E9, Canada. E-mail: rolf@ualberta.ca

**8756.** Purse, B.V.; Thompson, D.J. (2009): Oviposition site selection by *Coenagrion mercuriale* (Odonata: Coenagrionidae). *International Journal of Odonatology* 12(2): 257-273. (in English) ["The aim of the study was to determine oviposition site selection in the endangered damselfly *Coenagrion mercuriale* in its UK stronghold and to determine hatching success of eggs. This was achieved by watching the behaviour of marked pairs from the onset of copulation to the end of oviposition and recording the number and duration of oviposition attempts and the plants oviposited in during the pairing. Pairs were either freely observed along a stream or placed in pre-placed cages within the stream. Stems into which oviposition had been observed were collected after four weeks and the fate of deposited eggs was determined. Pairs typically oviposited in several stems during multiple oviposition bouts, but usually in just one plant species. Mean total duration of oviposition behaviour was 671 s but ranged from 244 to 1,471 s. Mean number of eggs laid was 91 and ranged from 23 to 337. The female submerged completely in 15% of ovipositions. Mean egg deposition rate was 14 eggs per min but there was considerable variation. There was a significant positive relationship between total duration of oviposition in a stem and number of eggs laid in that stem. None of the habitat variables measured was a good predictor of duration of oviposition or number of eggs laid. Mean mortality of eggs was 14% at the time of collection and there was asynchronous development. *Hypericum elodes* was used significantly more than expected from its frequency in the environment and *Eleocharis palustris*, *Molinia caerulea* and *Myrica gale* significantly less." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liver-

pool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**8757.** Rasteiro Ordiale, P.; Costa Cavalcante, A. (2009): Influência da urbanização na comunidade de insetos aquáticos no Ribeirão das Antas. *Anuário da Produção de Iniciação Científica Discente XII*(14): 97-113. (in Portuguese) [Brazil; taxa including "Gomphidae" are treated at the family level.] Address: Rasteiro Ordiale, Patrícia, Alameda Maria Tereza, 2000 Valinhos, SP - CEP 13278-181, Brazil. E-mail: rc.ipade@unianhanguera.edu.br

**8758.** Reid, L. (2009): Dragonflies and butterflies: reporting back on the April field trip. *Nature Territory* 2009 (May): 11. (in English) [14 odonate species are recorded from McMinns Lagoon, Northern Territory, Australia.] Address: Reid, L., c/o P.O. Box 39565, Winnellie, NT 0821, Australia

**8759.** Reid, M. (2009): *Cannaphila insularis* (Gray-waisted Skimmer), a new genus/species for New Mexico. *Argia* 21(4): 14-15. (in English) [5-VIII-2009, Rattlesnake Springs, part of Carlsbad Caverns National Park, New Mexico.] Address: Reid, M., 11500 Huebner Road #1605, San Antonio, TX 78230, USA. E-mail: upupa@airmail.net

**8760.** Reid, M. (2009): *Libellula gaigei* (Red-mantled Skimmer), a new species for the United States. *Argia* 21(3): 20-21. (in English) [11-VIII-2009, Santa Ana National Wildlife Refuge, Hidalgo county, southernmost Texas.] Address: Reid, M., 11500 Huebner Road #1605, San Antonio, TX 78230, USA. E-mail: upupajynx@yahoo.com

**8761.** Saavedra, M.A. (2009): Dragonfly (Insecta: Odonata) diversity in two use of soils in a tropical dry forest. *Rev. Fac. Nal. Agr. Medellín* 62(2): 5071-5079. (in Spanish, with English summary) ["Dragonfly diversity was estimated in the Agricultural Center Cotove (Santafe de Antioquia-Colombia). Active capture using an entomological net was used. Each transect was located perpendicular to the water body, for a length of approximately 200 m and a lateral extension of 8 m. Twenty Odonata species were registered. Libellulidae showed the biggest abundance and richness, with 65 specimens that represent 53.7% of the total abundance, and 12 species that represent 60% of the registered community. The alpha-diversity was high in the forest in reference at crop; however, the low abundances register highlight the need for greater sampling effort in cultivating, for a better estimate of gamma-diversity; the beta-diversity was of 12 species and the complementary index was of 0.6, it indicates that the Odonata's fauna is characteristic and distinctive for each use of soil." (Author)] Address: Estudiante de Maestría en Ciencias-Entomología. Universidad Nacional de Colombia, Sede Medellín. Facultad de Ciencias. A.A. 3840, Medellín, Colombia. E-mail: marianoaltamirandas@hotmail.com

**8762.** Saha, N.; Aditya, G.; Saha, G.K. (2009): Habitat complexity reduces prey vulnerability: An experimental analysis using aquatic insect predators and immature dipteran prey. *Journal of Asia-Pacific Entomology* 12(4): 233-239. (in English) ["The effects of alternative prey and structural complexity of habitat on the selection of mosquito larvae by aquatic insect predators were evaluated in the laboratory. The water bugs *Anisops bouvieri*, *Diplonychus* (= *Sphaerodema*) *rusticus*, and *D.*

annulatus, and the odonate nymphs, *Ceriagrion coromandelianum* and *Brachydiplax chalybea chalybea*, selected mosquito larvae based on their abundance relative to chironomid larvae and on the levels of habitat complexity. The effect of one prey species on the other was asymmetrical, as indicated through prey selectivity values. Compared to open habitat, the presence of macrophytes reduced the vulnerability of mosquito larvae while the effect was reverse in the presence of sediments. When both sediment and macrophytes were present in habitats, all the predators except *D. annulatus* consumed more mosquito larvae than chironomid larvae. The clearance rate, an indicator of predatory efficiency, varied among the predator species and habitat types. The results suggest that the outcome of the interactions between insect predators and mosquito immatures was context-dependent and that it was mediated by the presence of alternative trophic species and the habitat complexity." (Authors)] Address: Saha, N., Department of Zoology, University of Calcutta, 35, Ballygunge Circular Road, Kolkata 700019, India. E-mail: nabaneetasaha@gmail.com

**8763.** Sartor, V.; Holdefer Woldan, D.R.; Mello Garcia, F.R. (2009): Survey and ecological aspects of entomological fauna in municipality of União da Vitória state of Paraná. *Biodiversidade Pampeana Uruguiana* 7(1): 35-43. (in Portuguese, with English summary) [Brasil; a total of 19 Odonata specimens were caught in malaise traps.] Address: Sartor, V., Depto. de Engenharia Florestal da Univ. do Contestado – UNC, Campus Canoinhas. Campus Universitário Mar cílio Dias, Canoinhas SC. Brasil. E-mail: vitorsartor@yahoo.com.br

**8764.** Schiel, F.-J. (2009): Exuvie der Zierlichen Moosjungfer (*Leucorrhinia caudalis*) mit Dreikantmuschel (*Dreissena polymorpha*) (*Bivalvia*: *Dreissenidae*) als Aufsitzer. *mercuriale* 9: 21-22. (in German, with English summary) ["On 09-VI-2008, an exuvia of *Leucorrhinia caudalis* with a zebra mussel (*Dreissena polymorpha*) attached to the ventral side of its metathorax was found in a gravel pit near Karlsruhe, SW-Germany. The mussel had a length of 6 mm." (Author)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**8765.** Schmidt, E. (2009): Langzeit-Beobachtungen zur Libellenfauna am Garten-Kleinteich im Münsterland /Westfalen. *Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 12(1): 37-43. (in German) [Germany, Nordrhein-Westfalen; starting in 1995/96, a total of 17 odonate species was observed as dispersers or - in rare cases - as breeders in a small garden-pond, resp. a 80 l water bucket. Habitat conditions are assessed as sub-optimal to Odonata. Species- and ecological composition of the fauna and the periods of emergence and flight are analyzed and discussed. Devouring of a freshly emerged *Pyrrhosoma nymphula* by *Ischnura elegans* lasted app. 45 min.] Address: Schmidt, E.G., Coesfelder Str. 230, 48249 Dülmen, Germany

**8766.** Schoeppner, N.M.; Relyea, R.A. (2009): Phenotypic plasticity in response to fine-grained environmental variation in predation. *Functional Ecology* 23: 587-594. (in English) [1. In nature, organisms experience environmental variability at coarse-grained (inter-generational) and fine-grained (intra-generational) scales and a common response to environmental variation is phenotypic plasticity. The emphasis of most empirical

work on plasticity has been on examining coarse-grained variation with the goal of understanding the costs and benefits of plastic responses in response to a particular environment. 2. In this study, we investigated the effects of fine-grained variation in predation on the inducible defences of larval wood frogs (*Rana sylvatica*) by widely altering the density and feeding schedule of caged predators (*Dytiscus* spp.) while holding average predation constant. 3. We found that predator cues induced change in tadpole behaviour, morphology, and mass. Surprisingly, however, temporal variation in predation did not cause the tadpoles to alter their activity (compared to a constant predation treatment) or mass. Temporal variation in predation did alter tadpole tail depth, but only when experiencing our most extreme variation treatment in which the predators were fed once every 8 days. Under these conditions, the predator-induced tadpole tail was less extreme compared to environments containing constant predation. 4. While a number of previous studies have examined behavioural responses of prey to temporal variation in predation risk without holding average predation constant, this appears to be the first test of temporal variation per se. As in previous studies of organism responses to temporal variation in resources, our results suggest that fine-grained environmental variability can affect the expression of phenotypically plastic traits, but our tadpoles appear to be generally unresponsive to this finegrained variation for many of their traits." (Authors)] Address: Schoeppner, Nancy, School of Biology, Georgia Institute of Technology, 310 Ferst Drive, Atlanta, Georgia 30332; E-mail: nschoeppne3@mail.gatech.edu.

**8767.** Schoeppner, N.M.; Relyea, R.A. (2009): When should prey respond to consumed heterospecifics? Testing hypotheses of perceived risk. *Copeia* 2009(1): 190-194. (in English) ["In aquatic systems, a long-standing question is why chemical cues from some diets consumed by a predator induce strong anti-predator responses in prey while other diets induce weak or no responses. We performed an experiment to determine if strong prey responses to particular predator diets are due to prey being closely related to the predator's diet (i.e., phylogenetic relatedness) or due to prey coexisting with the predator's diet and thereby sharing a risk of predation. We compared the behaviour of Gray Treefrog tadpoles (*Hyla versicolor*) to cues from a dragonfly nymph (*Anax junius*) that consumed either conspecific Gray Treefrogs, one of six diets that commonly coexist with Gray Treefrogs (spanning a wide range of phylogenetic relatedness), or one diet that is closely related to Gray Treefrogs but has an allopatric range that has not overlapped for at least 20,000 yrs. We found that tadpoles could discriminate among the diets and that the magnitude of behavioural response supported the hypothesis of diet phylogenetic relatedness and refuted the hypothesis of diet coexistence." (Authors)] Address: Schoeppner, Nancy, School of Biology, Georgia Institute of Technology, 310 Ferst Drive, Atlanta, Georgia 30332; E-mail: nschoeppne3@mail.gatech.edu.

**8768.** Shibuya, A.; Araujo, M.L.G.; Zuanon, J.A.S. (2009): Analysis of stomach contents of freshwater stingrays (*Elasmobranchii*, *Potamotrygonidae*) from the middle Negro River, Amazonas, Brazil. *Pan-American Journal of Aquatic Sciences* 4(4): 466-475. (in English, with Portuguese summary) ["Potamotrygonid stingrays are restricted to Neotropical rivers and information on their diet remains scarce. Thus, the prey composition of

four freshwater stingray species from the middle Negro River was studied using stomach contents analysis: *Potamotrygon motoro* (n=40), *Potamotrygon orbignyi* (n=27), *Potamotrygon* sp. "cururu" (n=26), and *Paratrygon aiereba* (n=34)." (Authors) Odonata - identified up to the family level - were used as diet by all fish taxa. Stomach contents of *P. orbignyi* were composed principally by insects (96.4%), with predominance of gomphid dragonfly larvae.] Address: Shibuya, Akemi, Programa de Pós-Graduação em Biologia de Água Doce e Pesca Interior, BADPI, Instituto Nacional de Pesquisas da Amazônia, INPA, Avenida André Araújo, 2936, Aleixo, 69083-000, Manaus, AM, Brazil. E-mail: akemishibuya@yahoo.com.br

**8769.** Smith, G.R.; Boyd, A.; Dayer, C.B.; Ogle, M.E.; Terlecky, A.J. (2009): Responses of grey treefrog and American toad tadpoles to the presence of cues from multiple predators. *The Herpetological Journal* 19(2): 79-83. (in English) ["Prey may often need to confront and integrate cues from multiple predators simultaneously. We examined the effects of the cues of two potential predators, mosquitofish and odonates, individually and in combination, on the behaviour of two species of anuran tadpoles, grey treefrog (*Hyla versicolor*) and American toad (*Bufo americanus*). Mosquitofish cues alone reduced the activity of tadpoles of *H. versicolor*, but had no effect on activity of the tadpoles of *B. americanus*. Odonate cues had no independent effects on the behaviour of *B. americanus* or *H. versicolor*. The behaviour of neither species was affected differently by the simultaneous exposure to mosquitofish and odonate cues compared to the independent effects of each predator cue. Habitat use was not affected by any cues or combination of cues in either species. Our results suggest that grey treefrog tadpoles and American toad tadpoles do not respond to the combination of cues from multiple predators any differently than would be expected from their exposure to each cue independently. Our results also demonstrate that the behavioural response of tadpoles to predator cues can be variable among species of prey, as well as among species of predator." (Authors)] Address: not available

**8770.** Sodhi, N.S.; Wilcove, D.S.; Subaraj, R.; Yong, D.-I.; Lee, T.-m.; Bernard, H.; Lim, S.L.H. (2009): Insect extinctions on a small denuded Bornean island. *Biodiversity and Conservation* 19(2): 485-490. (in English) ["We report odonate and butterfly extinctions on Pulau Mengalum (Sabah) between 1928 and 2007. Pulau Mengalum has lost all of its closed-canopy forest; 55.5% of the odonates and 40% of the butterflies present in 1928 have likely been extirpated. Fourteen and five species of odonates and butterflies found by us were new records for the island, respectively. It is unclear if newly recorded species were missed by previous surveyors in 1928 or if they have colonized the island after that time. While our study indicates that deforestation is a serious threat to tropical insects, it remains unclear if deforested areas provide opportunities for new colonists. [...] Mengalum has likely lost five (55.5%) of nine odonates since 1928 (*Archibasis melanocyana*, *Camacinia gigantea*, *Gynacantha dohrni*, *Lestes praemorsa*, and *Raphismia bispina*). Our last survey in October did not add any species to the previously recorded odonates suggesting that our sampling was adequate. [...] We recorded 14 new odonates in 2007 (*Archibasis viola*, *Agriocnemis femina*, *A. pygmaea*, *Brachydiplax chalybea*, *Diplacodes trivialis*, *Isch-*

*nura senegalensis*, *Lathrecista asiatica*, *Macrodiplax cora*, *Mortagrion falcatum*, *Orthetrum sabina*, *Pantala flavescens*, *Pseudagrion microcephalum*, *Rhyothemis phyllis*, and *Tramea transmarina*). One of these new records (*A. viola*) is a forest species." (Authors)] Address: Sodhi, N.S., Dept of Biological Sciences, National Univ. of Singapore, 14 Science Drive 4, Singapore, 117543, Republic of Singapore. Email: nsodhi@oeb.harvard.edu

**8771.** Stefanović, K.S.; Nikolić, V.P.; Tubić, B.P.; Tomović, J.M.; Atanacković, A.D.; Simić, V.M.; Paunović, M.M. (2009): Aquatic macroinvertebrates of the Jablanica river, Serbia. *Arch. Biol. Sci., Belgrade* 61(4): 787-794. (in English, with Serbian summary) [*Gomphus vulgatissimus* was the only dragonfly sampled during 2005 and 2006 at four sampling sites along the Jablanica River, a right-hand tributary of the Kolubara River.] Address: Stefanovic, Katarina, Siniša Stankovic Institute for Biological Research, 11060 Belgrade, Serbia

**8772.** Steiner, U.K.; Van Buskirk, J. (2009): Predator-induced changes in metabolism cannot explain the growth/predation risk tradeoff. *PLoS ONE* 4(7): e6160., doi:10.1371/journal.pone.0006160: 4 pp. (in English) ["Defence against predators is usually accompanied by declining rates of growth or development. The classical growth/predation risk tradeoff assumes reduced activity as the cause of these declines. However, in many cases these costs cannot be explained by reduced foraging effort or enhanced allocation to defensive structures under predation risk. Here, we tested for a physiological origin of defence costs by measuring oxygen consumption in tadpoles (*Rana temporaria*) exposed to predation risk (final instar dragonfly larva (*Aeshna cyanea*) over short and long periods of time. The short term reaction was an increase in oxygen consumption, consistent with the "fight-or-flight" response observed in many organisms. The long term reaction showed the opposite pattern: tadpoles reduced oxygen consumption after three weeks exposure to predators, which would act to reduce the growth cost of predator defence. The results point to an instantaneous and reversible stress response to predation risk. This suggests that the tradeoff between avoiding predators and growing rapidly is not caused by changes in metabolic rate, and must be sought in other behavioural or physiological processes." (Authors)] Address: Steiner, U.K., Department of Biology, Stanford University, Stanford, California, USA. E-mail: usteiner@stanford.edu

**8773.** Suhling, F.; Martens, A.; Marais, E. (2009): How to enter a desert - patterns of Odonata colonisation of arid Namibia (Odonata). *International Journal of Odonatology* 12(2): 287-308.. (in English) ["With a total of 75 species the odonate diversity in the Namibian desert is surprisingly high. Based on their distribution characteristics, invasion patterns, and breeding success, there are six well-defined categories of Odonata: widespread species - (1) permanently living in the desert, and desert biased, (2) permanently living in the desert, but not desert-biased; (3) entering the desert seasonally; (4) entering from neighbouring tropical or temperate regions, whose populations may breed in the desert sometimes or locally. Category (5) consists of species with highly localised breeding populations in the desert, which are widely isolated from potential source populations. The last category (6) consists of species restricted to allochthonous perennial rivers. We discuss these patterns from a geographical and a temporal perspective. On the one hand, there have been



different spatial directions from where species have entered deserts. On the other hand, Odonate distribution patterns in the deserts have a palaeoclimatic as well as a present time perspective, the latter with seasonal and annual fluctuations and a strong influx from neighbouring biomes. The discovery of a desert-bias in several species suggests that odonates could be well adapted to desert conditions or, in other words, some species of odonates may be promoted by arid conditions." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**8774.** Svitra, G. (2009): Data on eight protected species of dragonflies (Odonata) recorded in Lithuania in 2003–2009. New and rare for Lithuania insect species 21: 5-11. (in English, with Lithuanian summary) [Records of *Sympecma paedisca*, *Aeshna viridis*, *Anax parthenope*, *Ophiogomphus cecilia*, *Cordulegaster boltonii*, *Leucorrhinia albifrons*, *L. caudalis*, and *L. pectoralis* are compiled.] Address: Švitra G., Lithuanian Entomological Society, Akademijos 2, LT-08412 Vilnius, Lithuania. E-mail: giedsvis@gmail.com

**8775.** Szállassy, N.; Szabó, Z.D.; Nagy, B.H. (2009): Survival of dragonfly *Libellula fulva* males according to their mating status: a four year study. *Entomologica romanica* 14: 13-18. (in English, with Romanian summary) ["During four seasons (2000-2003), a closed *L. fulva* population was studied along a creek in Eastern Hungary. The movement of marked and solitary males was observed with binoculars and it was recorded along a 350 meter natural section of the Kutas-channel. Our aim was to analyse the recapture and survival rate of two male groups of *L. fulva* by using mark-recapture models. The model-selection showed that the recapture rate of mated males was higher than of solitary ones. Survival rate of mating males was also higher in every year than the survival of the solitary individuals. This result suggest, that even if it is costly for males to occupy and defend a territory, finding, guarding and mating a female, the successful males have still a higher survival rate." (Authors)] Address: Szállassy, Noémi, Babes Bolyai University, Fac. of Psych. & Sci. of Educ., Dept. of Math. & Sci. Teaching Education, Sindicatelor Str. 7, 400029 Cluj-Napoca, Romania. E-mail: szallassy@gmail.com

**8776.** Takahara, T.; Yamaoka, R. (2009): Temporal and spatial effects of predator chemical and visual cues on the behavioral responses of *Rana japonica* tadpoles. *Current Herpetology* 28(1): 19-25. (in English) ["A laboratory experiment was conducted to evaluate temporal and spatial effects of predator chemicals and visual stimuli on the behavioural responses of the *Rana japonica* tadpoles. Nymphs of *Anax parthenope julius* were used as the predator model. Tadpoles exhibited defensive responses by reducing tail movement time associated with their activity when exposed to chemicals from the nymphs. These responses tended to be quicker and stronger as distance from the nymphs decreased. Tadpoles exposed to visual stimuli from the nymphs also exhibited similar but weaker behavioural responses. Our results suggest that in a short distance encounter defensive responses of the *R. japonica* tadpole are induced more quickly by chemical cues of the predator than by its visual cues. For the tadpole, detecting the dragonfly nymph by chemical cues may function as a trigger for effective predator-avoidance strategy in tadpole-dragonfly nymph interactions." (Authors)] Address:

Yamaoka, R., Chemical Ecology Laboratory, Graduate School of Science and Technology, Kyoto Institute of Technology, Japan

**8777.** Tennessen, K. (2009): *Aeolagrion philipi* sp. nov. from Bolivia and a review of the genus *Aeolagrion* (Odonata: Coenagrionidae). *International Journal of Odonatology* 12(2): 309-322. (in English, with Spanish summary) ["*Aeolagrion philipi* sp. nov. is described and illustrated (holotype cf. Bolivia, Santa Cruz department, Nuflo de Chavez province, pooled tributary of Rio San Julian, 5 km SE of San Ramon, 14 xi 1998, leg. KJT, in FSCA). The new species is closely related to *A. inca* but is distinct in shape of hind margin of prothorax, genital ligula morphology, shape of male cerci, and colour pattern of female S8 (dark brown). The female of *A. axine* is described and a key to the species of the genus is provided." (Author)] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennesen@centurytel.net

**8778.** Theischinger, G.; Endersby, I. (2009): Identification Guide to the Australian Odonata. ISBN 978 1 74232 475 3: IV, 283 pp. (in English) [The identification guide includes 325 species in 110 recognised genera, and "provides keys to the identification of the adults of all Australian species and to the larvae as far as known and diagnosable. In order to facilitate identifications, and to increase confidence, particularly in the identification of some larvae, detailed distribution maps of all species are included. Finally, profiles are given for species of serious conservation concern." (Publisher)] Address: Published by: Department of Environment, Climate Change and Water NSW, 59–61 Goulburn Street Sydney, PO Box A290 Sydney South 1232, Australia. E-mail: info@environment.nsw.gov.au; website: www.environment.nsw.gov.au

**8779.** Walker, J.C.; McKenzie, P.M.; Smentowski, J.H. (2009): *Nehalennia gracilis* (Sphagnum Sprite) found in Missouri: No longer a historical record. *Argia* 21(4): 19-20. (in English) [The rediscovery of *N. gracilis* in Missouri, USA (several records in summer 2009) represents another, more southern, disjunct population of this species.] Address: Walker, Jane, Washington University Tyson Research Center, P.O. Box 258, Eureka, MO 63025, USA. E-mail: walker@biology.wustl.edu

**8780.** Wang, F.; Huang, Y.; Wang, X.-I. (2009): The first record of the genus *Hylaeothemis* with a species from China (Odonata, Libellulidae). *Acta zootaxonomica sinica* 34(2): 391-394. (in Chinese, with English summary) [*Hylaeothemis clementia* Ris, 1909 is reported for the first time from Xishuangbanna, Wangtianshu, Yunnan, China ( 21°39'N, 101°30'E); the specimens were caught on 3-V-2007, and are deposited in the Insect Collections of China Agricultural University, Beijing, China.] Address: Wang, Fang, Department of Entomology, College of Agronomy and Biotechnology, China Agricultural University, Beijing 100193, China. E-mail: wangxl @cau.edu.cn

**8781.** Ware, J.; Louton, J. (2009): A larva worth a thousand words: Imaging preserved dragonfly nymphs using a digital camera. *Argia* 21(2): 10-12. (in English) [As digital photographing substitute line drawings more and more in morphological studies, the authors provide extensive advises how to prepare (cleaning) exuviae for digital processing and how to process the photographing. This is a very thorough paper which enables the user to get very good results in using digital cameras to

photograph exuviae.] Address: Ware, Jessica, Division of Invertebrate Zoology, American Museum of Natural History, 79th and Central Park West, New York, NY, 10024, USA. E-mail: jware@amnh.org

**8782.** Wildermuth, H. (2009): Season and temperature dependent location of mating territories in *Somatochlora flavomaculata* in a heterogeneous environment (Odonata: Corduliidae). *International Journal of Odonatology* 12(2): 181-193. (in English) ["In a heterogeneous environment, males of *S. flavomaculata* regularly occupy site-fixed locations away from water, adjacent to vertical landscape elements, and to a lesser extent, also at water, i.e. at oviposition sites. Territories both over land and over water are typically patrolled by continuous site-fixed flights. These places serve as rendezvous sites where copulation is initiated. The results of a sevenyear study in a heterogeneous mire habitat of Central Europe with scattered oviposition sites demonstrated that the rendezvous sites changed over the flight season in both location and quality. At the beginning of the reproduction period territories were established almost exclusively over land. Subsequently, there was a significant shift from sites over land to sites over water, and towards the end of the flight season virtually all territories were situated over water. Areas with overgrown puddles were also attractive for establishing territories, even at the beginning of the flight season. When the puddles desiccated during hot and dry spells in the first half of the reproduction period, these sites were no longer used as rendezvous sites. However, no shift towards territories over water was observed in this situation. Small-scale transfer of territories was also related to ambient temperatures. Below 28°C all males patrolled in full sunshine, but when temperatures rose they shifted their patrol sites gradually to the shade, presumably for thermoregulatory reasons. It appears that the mate search strategy of *S. flavomaculata* is characterised by extensive phenotypic plasticity with respect to time and space." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**8783.** Willkommen, J. (2009): The tergal and pleural wing base sclerites – homologous within the basal branches of Pterygota? *Aquatic Insects* 31(Supplement 1): 443-457. (in English) ["The Ephemeroptera are usually regarded as the sister group of the remaining Pterygota. Their wing base sclerites and pterothoracic musculature are compared with that of other basal pterygote lineages. It is shown that most elements of the neopteran wing base are also present in Ephemeroptera and Odonata. The wing base in the ground plan of Pterygota is presumably composed of three axillaries and a proximal median plate. The first axillary is provided with two muscles. The third axillary is equipped with one short muscle in the ground plan of Pterygota. A second muscle, which inserts at the third axillary and originates from the episternum, is most likely an autapomorphic character of Neoptera. The results imply that the wing base of Plecoptera is close to the pterygote ground plan. It is assumed that the wing bases of Ephemeroptera and Odonata are secondarily stiffened. The so-called basalare and its associated muscles in Ephemeroptera and Odonata are probably not homologous to the basalare and respective muscles in Neoptera. Though the wing bases of both Ephemeroptera and Odonata show similar modifications their specialisations may have evolved independently from each

other." (Author)] Address: Willkommen, Jana, Staatliches Museum für Naturkunde, Abt. Entomologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail: willkommen.smns@naturkundemuseum-bw.de

**8784.** Worthen, W.B. (2009): A second Odonata survey at Congaree National Park, Richland Co., South Carolina. *Argia* 21(3): 19. (in English) [13 sampling days 2002 and 39 sampling days in 2008–09 totalled at 70 species for the Congaree National Park, approximately 25 km southeast of Columbia, South Carolina, USA. The new state record is *Gomphus* (*Hylogomphus*) *apomyius*.]. A single teneral female was captured on 30-III-2009 at Wise Lake (33.8150°N, 080.828°W).] Address: Worthen, W.B., Dept of Biology, Furman Univ., Greenville, SC29613 USA. E-mail: worthen@furman.edu

**8785.** Zhang, J.; Lu, X.-y. (2009): Aerodynamic performance due to forewing and hindwing interaction in gliding dragonfly flight. *Physical Review E* 80, 017302: 017302-1-017302-4. (in English) ["Aerodynamic performance due to forewing and hindwing interaction in gliding dragonfly flight has been studied using a multiblock lattice Boltzmann method. We find that the interactions between forewing and hindwing effectively enhance the total lift force and reduce the drag force on the wings compared to two independent wings. The interaction mechanism may be associated with the triangular camber effect by modulating the relative arrangement of the forewing and hindwing. The results obtained in this Brief Report provide physical insight into the understanding of aerodynamic behaviors for gliding dragonfly flight." (Authors)] Address: Lu, X.-y., Department of Modern Mechanics, University of Science and Technology of China, Anhui, Hefei 230026, China. E-mail: xlu@ustc.edu.cn

## 2010

**8786.** Abbott, J.K.; Svensson, E.I. (2010): Morph-specific variation in intersexual genetic correlations in an intra-specific mimicry system. *Evolutionary Ecology Research* 12: 105-118. (in English) ["Background: Positive intersexual genetic correlations are typically viewed as constraining the evolution of sexual dimorphism, when traits are subject to sexually antagonistic selection. Our study species, *Ischnura elegans*, has a female-limited colour polymorphism with three female colour morphs (males are monomorphic), one of which is considered to be a male mimic. Questions: Are there morph-specific differences in the magnitude of intersexual genetic correlations in *I. elegans*? Specifically, do male-mimic (Androchrome) females have higher intersexual genetic correlations for morphological traits than non-mimic (Infuscans) females? Methods: We collected copulating pairs in the field and raised offspring from these pairs in the laboratory. We measured five morphological traits in both parent and offspring generations and investigated their heritabilities and genetic correlations. Results: We found a negative overall relationship between the degree of sexual dimorphism for a trait and its intersexual genetic correlation. But the magnitude and direction of intersexual genetic correlations depended on the female morph. As expected, male mimic (Androchrome) females had higher intersexual genetic correlations. In addition, the genetic correlations between the morphs were in all cases significantly lower than unity. Male mimic (Androchrome) females had higher mother–son covariances

than the non-mimic (*Infuscans*) morph, and this difference is the proximate explanation for the difference in intersexual genetic correlations between the morphs." (Authors)] Address: Abbott, Jessica, Department of Animal Ecology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, SE-752 36 Uppsala, Sweden. E-mail: jessica.abbott@ebc.uu.se

**8787.** Aletsee, M. (2010): Classification of dystrophic ponds by means of the TWINSPAN algorithm for an ecological characterisation of the Odonata habitats in the Hohe Venn / Hautes Fagnes (Germany/Belgium). *Brachytron* 12(1/2): 50-59. (in English, with Dutch and German summaries) ["the Hohe Venn contains a large number of mired *palsa*. Regarding the Odonata, there are two types of reproduction habitats, the ones with a central, open water body (shallow pool, *Kolk*) and the ones with at most times a shallow, temporary water body (shallow, *Schlenke*). Huge parts of the fens in this area were destroyed by afforestation and intensive draining (Kamp, 1962). At the beginning of the 1990s, some *palsa* were restored by filling up the drains with clay (Paulissen, 1997). This paper compares a descriptive morphologic-genetic classification of the habitats of Odonata with a classification using the TWINSPAN algorithm. We discuss in particular the potential of recolonisation of the restored *palsa*. Some characteristic and very rare species like *Aeshna subarctica* and *Somatochlora arctica* could not be found in the recently developed habitats, while others such as *Coenagrion hastulatum* and more euryoecious species, i.e. those that tolerate very different environmental conditions, have successfully established themselves." (Author)] Address: Aletsee, M., Obersteinstr. 38, 52223 Stolberg, Germany. E-mail: aletsee@rwth-aachen.de

**8788.** Arscott, D.B.; Larned, S.; Scarsbrook, M.R.; Lambert, P. (2010): Aquatic invertebrate community structure along an intermittence gradient: Selwyn River, New Zealand. *Journal of the North American Benthological Society* 29(2): 530-545. (in English) ["Changes in community structure and life-history traits of benthic invertebrates were examined along a longitudinal intermittence gradient in an alluvial river. The gradient was characterized with modeled and measured hydrologic, chemical, and physical environmental variables. The invertebrates were collected in the Selwyn River, southeastern New Zealand, at multiple sites in each of 4 river sections with distinct hydrological conditions (perennial-losing, ephemeral, intermittent, perennial-gaining). Values of hydrological metrics for each site were generated with an empirical model developed for the Selwyn River. The metrics included 4 that characterized intermittent flow (flow permanence, flow duration, drying frequency, distance to nearest perennial site). Most invertebrate richness and density metrics were significantly higher in the perennial-losing and perennial-gaining sections than in the ephemeral and intermittent sections. A principle components analysis (PCA) separated invertebrate samples from the 4 sections along 2 primary factors. Nine of 13 hydrological metrics, including the 4 intermittence metrics, were correlated with the PCA site scores. Linear regressions indicated that most taxon-richness metrics and some density metrics were related to flow permanence, flow duration, or both. Based on the regression analysis, we predicted that 1.9 taxa/m<sup>2</sup> are added with each 10% increase in flow permanence, and 0.5 taxa/m<sup>2</sup> are added with each 10-d increase in flow duration. Results from a nested-

ness analysis indicated that communities at ephemeral and intermittent sites were nested subsets of the communities at perennial sites, and the nesting order of sites was related to both flow permanence and flow duration. Assemblages of taxa with particular life-history traits (life span, fecundity, maximum size, and voltinism) varied linearly with flow permanence and flow duration. The variation in invertebrate communities along the Selwyn River was primarily the result of progressive removal of desiccationsensitive taxa with increasing intermittence, not to selection for desiccation-resistant specialists. Quantitative intermittence–ecology relationships are needed to predict the consequences of future changes in flow intermittence, but such relationships are rare. The univariate relationships reported in our study contribute to a small but growing array of intermittence–ecology relationships." (Author) In data analysis, Odonata are treated as "other insects".] Address: David B. Arscott, D.B., Stroud Water Research Center, 970 Spencer Rd, Avondale, Pennsylvania 19311 USA. E-mail: darscott@stroudcenter.org

**8789.** Beaton, G.; Dobbs, M. (2010): 2008–2009 summary of odonate research in Georgia. *Argia* 22(1): 15-17. (in English) [This article summarizes the additional work done in Georgia, USA during 2008 and 2009. Georgia has 159 counties and since the end of 2007 there have been 176 new records for a total of 4439. The best finds were a huge new population of *Ophiogomphus edmundo*, new state records for *Gomphus viridifrons* and *Brachymesia furcata*. These additions raise the state list to 180 taxa comprising 177 species. Of these, 53 species (55 taxa) are Zygoptera and 124 species (125 taxa) are Anisoptera. 20 interesting taxa are discussed in detail.] Address: Dobbs, Marion, 9 Bridlewood Lane, Rome, GA, 30165, USA. E-mail: spreadwing@mac.com

**8790.** Bernhardt, G.E.; Kutschenbach-Brohl, L.; Washburn, B.E.; Chipman, R.B.; Francoeur, L.A. (2010): Temporal variation in terrestrial invertebrate consumption by Laughing Gulls in New York. *American Midland Naturalist* 163: 442-454. (in English) [Terrestrial insects consumed by laughing gulls and collected at the John F. Kennedy International Airport, USA, New York during 2003 and 2004 included one specimen of *Libellulidae*.] Address: Washburn, B.E., USDA Wildlife Services, National Wildlife Research Center, 6100 Columbus Avenue, Sandusky, Ohio 44870. E-mail: brian.e.washburn@aphis.usda.gov

**8791.** Borisov, S.N. (2010): Study of dragonfly (Odonata) migrations in the western Tien Shan mountains using ornithological traps. *Entomological review* 89(9): 1025-1029. (in English) ["Migrations of dragonflies in Chokpak Pass of the Western Tien Shan (42.530°N, 70.605°E) were studied using large bird traps of the Rybachy type, which proved to be very efficient for recording these insects. The obligatory southward autumn migrations were proved for *Sympetrum fonscolombii* and *Anax parthenope*, and supposed for *Hemianax ephippiger*, which is a rare species in this region. The autumn movement from the mountains to plains was recorded for the species characterized by seasonal vertical migrations: *Sympetrum arenicolor*, *S. striolatum pallidum*, and *Aeshna mixta*. The cold air fronts increase the intensity of flights." (Author) Original Russian Text © S.N. Borisov, 2009, published in *Zoologicheskii Zhurnal*, 2009, Vol. 88, No. 10, pp. 1184–1188] Address: Borisov, S.N., Institute of Animal Systematics &



Ecology, Siberian Branch, Russ. Acad. of Sci., Novosibirsk, 630091 Russia. E-mail: borisov-s-n@yandex.ru

**8792.** Bouwman, J.; Conze, K.-J.; Göcking, C.; Ketelaar, R. (2010): The first cross-border dragonfly symposium. *Brachytron* 10(1/2): 4-5. (in English) [Introduction into the Dutch-German cross-border symposium on regional the Odonata fauna.] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: ketelaar@vlinderstichting.nl

**8793.** Bouwman, J.H.; Conze, K.-J.; Ketelaar, R. (2010): The organisation of dragonfly research in The Netherlands and North Rhine-Westphalia. *Brachytron* 12(1/2): 6-9. (in English) [The authors give introductions into the origins of dragonfly study in The Netherlands and - with less extent - in Nordrhein-Westfalen, Germany, the development and increase of odonatological activities in the past decades and current activities ("dragonfly projects").] Address: Bouwman, J.H., Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: jaap.bouwman@vlinderstichting.nl

**8794.** Bowerman, J.; Johnson, P.T.J.; Bowerman, T. (2010): Sublethal predators and their injured prey: linking aquatic predators and severe limb abnormalities in amphibians. *Ecology* 91(1): 242-251. (in English) ["While many predators completely consume their prey, others feed only on blood or tissue without killing the prey, sometimes causing ecologically significant levels of injury. We investigated the importance of sublethal predator attacks in driving an emerging issue of conservation importance: missing-limb deformities in amphibians. We combined long-term field data and manipulative experiments to evaluate the role of sublethal predation in causing abnormalities in two regions of central Oregon, USA. Since 1988, western toads (*Bufo boreas*) in Lake Aspen have exhibited abnormalities dominated by partially missing limbs and digits at annual frequencies from <1% to 35%. On Broken Top volcano, we found comparable types and frequencies of abnormalities in Cascades frogs (*Rana cascadae*). Field sampling and observational data implicated two aquatic predators in these abnormality phenomena: introduced sticklebacks (*Gasterosteus aculeatus*) at Lake Aspen and cordulid dragonfly larvae (*Somatochlora albicincta*) at Broken Top. In experiments, these predators produced limb abnormalities identical to those observed in the respective regions. At Lake Aspen, in situ predator exclosures effectively eliminated abnormalities in toads, while comparisons among years with low and high stickleback abundance and between wetlands with and without sticklebacks reinforced the link between fish and amphibian abnormalities. Neither trematode parasite infection nor pesticide contamination could explain observed abnormalities. Our results suggest that predators are an important explanation for missing-limb abnormalities and highlight the ecological significance of sublethal predation in nature." (Authors)] Address: Johnson, P., Ecology and Evolutionary Biology, University of Colorado, Ramaley N122, Campus Box 334, Boulder, Colorado 80309 USA. E-mail: pieter.johnson@colorado.edu

**8795.** Bried, J. (2010): Dragonfly survey effort project: C'mon on join the fun! *Argia* 22(1): 5. (in English) [The author introduces a project to acquire data on how frequently to survey and how long each survey should last to get a representative spectrum of Odonata species at

a chosen site.] Address: Bried, J., Mississippi State University, Dept Biol. Sciences, Rm 130 Harned, PO Box GY, Mississippi State, MS 39762, USA. E-mail: jbried@TNC.ORG

**8796.** Bried, J.T.; Mazzacano, C.A. (2010): National review of state wildlife action plans for Odonata species of greatest conservation need. *Insect Conservation and Diversity* 3(2): 61-71. (in English) ["1. The overarching goal of United States wildlife action plans is to prevent wildlife from becoming endangered or declining to levels where recovery becomes unlikely. Effective plan implementation depends on establishing Species of Greatest Conservation Need (SGCN), defined as wildlife species with small or declining populations or other characteristics that make them vulnerable. 2. Although nearly two-thirds of distinct Odonata species known from the U.S. (441 species as of 2005) were appointed as SGCN, over half the states neglected to assign dragonfly SGCN, damselfly SGCN, or both. Western and southern states listed proportionately fewer odonate SGCN than states of the Great Lakes, Mid-Atlantic, and New England regions, apparently reflecting geographic patterns of legal authority, available information, and involvement by Odonata specialists. 3. Greater consultation of Odonata specialists is encouraged in any revision of state wildlife action plans, along with increased: (i) use of existing conservation lists, (ii) inferences from field guides and major faunal synopses, (iii) recognition of patterns of endemism, and (iv) application of empirical species distribution modelling. 4. Legal and management restrictions aside, insects and other invertebrates are often neglected in mainstream conservation efforts because they are perceived as understudied. It is erroneous to assume 'not enough information' exists for well-studied microfauna such as Odonata and doing so further undermines the conservation of less conspicuous and charismatic taxa." (Authors)] Address: Bried, J.T., Albany Pine Bush Preserve Commission, Albany, NY 12205-4605, USA. E-mail: jbried@albanypinebush.org

**8797.** Cannings, R. (2010): Rex Kenner (1950–2010). *Argia* 22(1): 7-10. (in English) [Obituary: Rex Kenner born on 14 November 1950, deceased on 23 January 2009] Address: Cannings, R., Curator of Entomology, Royal British Columbia Museum, 675 Belleville Street, Victoria, BC V8W 9W2, Canada. E-mail: rcannings@royalbcmuseum.bc.ca

**8798.** Chadwick, W. (2010): Yonkers odonates. *Argia* 22(1): 18. (in English) [Yonkers is the fourth most populous city in New York State, USA. In 2009 the Yonkers sites where the author searched for odonates were Lenoir Nature Preserve, Tibbetts Brook Park, and the Bronx River. 28 species could be recorded.] Address: Chadwick, W. E-mail: mrcnaturally@optonline.net

**8799.** Chaput-Bardy, A.; Gregoire, A.; Baguette, M.; Pagano, A.; Secondi, J. (2010): Condition and phenotype-dependent dispersal in a damselfly, *Calopteryx splendens*. *PLoS ONE* 5(5): e10694. doi: 10.1371/journal.pone.0010694: 7 pp. (in English) ["Individual dispersal decisions may be affected by the internal state of the individual and the external information of its current environment. Here we estimated the influence of dispersal on survival and investigated if individual phenotype (sex and wing length) and environmental condition (conspecific density and sex-ratio) affected dispersal decisions in *C. splendens*. As suspected from the litera-

ture, we showed that the proportion of dispersing individuals was higher in females than in males. We also found negative-density dependent dispersal in both sexes and influence of sex-ratio on dispersal. Individuals moved less when sex-ratio was male biased. These results are consistent with a lek mating system where males aggregate in a place and hold mating territories. Contrary to our expectations, neither dispersal nor survival was affected by wing length. Nevertheless, mean adult survival was about 8% lower in dispersing individuals than in residents. This might reflect a mortality cost due to dispersal." (Authors)] Address: Chaput-Bardy, Audrey, 1 Laboratoire d'Etudes Environnementales des Systèmes Anthropisés, Univ. d'Angers, Angers, France. E-mail: chaputbardyaudrey@hotmail.com

**8800.** Chase, J.M.; Burgett, A.A.; Biro, E.G. (2010): Habitat isolation moderates the strength of top-down control in experimental pond food webs. *Ecology* 91(3): 637-643. (in English) ["Habitat isolation is well known to alter patterns of species' abundance, richness, and the ratios of predators : prey. Less clear, however, is how isolation alters interactions within food webs. Here, we present the results from an experiment performed in artificial ponds (mesocosms) manipulating habitat isolation crossed with a predator reduction treatment to disentangle how isolation mediates the top-down effect of predators. The strength of the trophic cascade, from predators, through herbivores, to producers, was considerably stronger in connected than in isolated habitats. We further found that the overall richness of both predator and herbivore species declined strongly with isolation. Experimental predator reductions suggest that the mechanism underlying the herbivore response was likely mediated by a keystone predator effect; when predators were reduced, herbivore richness was lower, and there was no discernable effect of isolation on herbivore richness. Finally, we found that the composition of predators in more isolated habitats consisted of species that were smaller and likely less effective predators than species that persisted in less isolated habitats. In all, our experiment showed that habitat isolation can alter the structure of communities by a combination of direct effects of the species in question, as well as effects mediated through their interactions in the food web." (Authors) The study includes Odonata.] Address: Chase, J.M., Department of Biology and Tyson Research Center, Washington University in Saint Louis, Saint Louis, Missouri 63130 USA

**8801.** Chaudhry, M.T.; Aslam, M. (2010): New record of genus *Macromia* Rambur 1842 (Odonata: Anisoptera) from Azad Jammu and Kashmir, Pakistan. *Asia Life Sciences* 19(2): 229-233. (in English) [So far, *M. cingulata*, has been the only member of the genus reported from Pakistan. Now, specimens of *M. moorei* were collected from Dhirkot, Azad Jammu and Kashmir.] Address: Aslam, M., Department of Entomology, Pir Mehr Ali Shah (PMAS) Arid Agriculture University, Rawalpindi, Pakistan.

**8802.** Cobbaert, D.; Bayley, S.E.; Greter, J.-L. (2010): Effects of a top invertebrate predator (*Dytiscus alaskanus*; Coleoptera: Dytiscidae) on fishless pond ecosystems. *Hydrobiologia* 644(1): 103-114. (in English) ["We investigated the predatory effects of *D. alaskanus*, a large predaceous diving beetle, on the biomass, species composition and diversity of fishless pond communities. The effects were tested using presence and absence treatments of *D. alaskanus* in 24 mesocosms

distributed among six ponds. We sampled phytoplankton, zooplankton and macroinvertebrates every two weeks for a six week period. Periphyton was sampled from the mesocosm walls on the final day. Total macroinvertebrate biomass decreased in the presence of dytiscids while species richness was not affected. Macroinvertebrate predators, snails and *Gammarus lacustris* decreased in the dytiscid treatments. Laboratory feeding experiments confirmed feeding preferences consistent with the mesocosm results. Periphyton biomass was six times greater in the dytiscid enclosures, concomitant with the decreased grazing by gastropods and other invertebrate primary consumers indicating a benthic trophic cascade. Top-down effects of dytiscids on other predatory invertebrates led to increased total zooplankton biomass, largely due to increased abundances of large and small cladocerans. Zooplankton species richness increased in the dytiscid enclosures. Inconsistent with trophic cascade theory, phytoplankton did not respond to top-down effects of *D. alaskanus* within the study period. Overall, the results show *D. alaskanus* predation caused trophic effects via two distinct food chains, a dytiscid–snail–periphyton trophic cascade, and a dytiscid–predatory macroinvertebrates–zooplankton partial trophic cascade." (Authors) *D. alaskanus* preferred prey was large mobile predaceous macroinvertebrates including Corixidae, Zygoptera and Chaoborus.] Address: Cobbaert, Danielle, Department of Biological Sciences, University of Alberta, Edmonton, AB, T6G 2E9, Canada. E-mail: cobbaert@ualberta.ca

**8803.** Collins, A.R. (2010): The Globe Skimmer *Pantala flavescens* (Fabr.): the greatest migrant? *Atropos* 39: 14-17. (in English) [The paper reviews the recent publication of Anderson (2009) (see OAS 7790) and records of the species in Great Britain, and reports feeding aggregations of *P. flavescens* north of Davao City, Mindanao, Philippines.] Address: Collins, A.R., 228 Kathleen Road, Sholing, Southampton, Hampshire, SO19 8GY, UK; E-mail: arc@soton.ac.uk

**8804.** Combes, S.A.; Crall, J.D.; Mukherjee, S. (2010): Dynamics of animal movement in an ecological context: dragonfly wing damage reduces flight performance and predation success. *Biology letters* 6(3): 426-429. (in English) ["Much of our understanding of the control and dynamics of animal movement derives from controlled laboratory experiments. While many aspects of animal movement can be probed only in these settings, a more complete understanding of animal locomotion may be gained by linking experiments on relatively simple motions in the laboratory to studies of more complex behaviours in natural settings. To demonstrate the utility of this approach, we examined the effects of wing damage on dragonfly flight performance in both a laboratory drop–escape response and the more natural context of aerial predation. The laboratory experiment shows that hindwing area loss reduces vertical acceleration and average flight velocity, and the predation experiment demonstrates that this type of wing damage results in a significant decline in capture success. Taken together, these results suggest that wing damage may take a serious toll on wild dragonflies, potentially reducing both reproductive success and survival." (Authors)] Address: Combes, S.A., Dept of Organismic & Evolutionary Biology, Concord Field Station, Harvard University, 100 Old Causeway Road, Bedford, MA 01730, USA. E-mail: scombes@oeb.harvard.edu

**8805.** Conze, K.-J.; Bouwman, J.H. (2010): Working with the Habitats Directive: two countries, two approaches. *Brachytron* 12(1/2): 60-67. (in English, with Dutch and German summaries) ["The Habitats Directive is getting more and more important in Europe. The Netherlands and North Rhine-Westphalia implement the Habitat-directive in their own way in local laws. One of the most important parts of the Habitats Directive is the designation of Special Protected Areas. They have to be designated for all species mentioned in Annex II of the Habitats Directive. Both in distribution and in designating Special Protection Areas (SPA) there's quite a difference between both countries." (Authors) The policy is exemplified using the cases of *Coenagrion mercuriale*, *Leucorrhinia pectoralis*, and *Ophiogomphus cecilia*.] Address: Conze, K.J., Listerstr. 13, D-45147 Essen, Germany. E-Mail: [kjc@loekplan.de](mailto:kjc@loekplan.de)

**8806.** Corbi, J.J.; Froehlich, C.G.; Trivinho Strixino, S.; dos Santos, A. (2010): Bioaccumulation of metals in aquatic insects of streams located in areas with sugar cane cultivation. *Química Nova* 33(3): 644-648. (in English) ["Streams located in areas of sugar cane cultivation receive elevated concentrations of metal ions from soils of adjacent areas. The accumulation of metals in the sediments results in environmental problems and leads to bioaccumulation of metal ions by the aquatic organisms. In the present study, bioaccumulation of the metals ions Al, Cd, Cr, Cu, Fe, Mg, Mn and Zn in aquatic insects in streams impacted by the sugar cane was evaluated. The results pointed out that the insects were contaminated by the sediment and that the collector organisms as Chironomus species accumulated higher concentration of metals than the predator organisms." (Authors). The following odonate taxa are involved in the study: *Dasythemis* sp., *Erythemis* sp., *Erythrodiplax* sp., *Miathyria* sp., *Dythemis* sp., *Micrathyria* sp. and *Tamea* sp. Odonata accumulate taxa- and locality-specific: (1) Água Sumida stream: *Dasythemis* sp. accumulate more Al, Cr, Cu, Fe, Mg, Mn, Zn than *Erythemis* sp. (2) São João stream: larvae of *Erythrodiplax* sp. accumulate high amounts of Al, Cr, Cu, Fe and Zn, while *Dasythemis* sp. accumulate high amounts of Mg and Mn. (3) Água Preta stream: Larvae of *Tamea* sp. accumulate more Al, Cu, Mg and Zn than the other species. Chromium and manganese were mostly accumulate by *Micrathyria* sp.] Address: Corbi, J.J., Departamento de Biologia, Faculdade de Filosofia Ciências e Letras de Ribeirão Preto, Universidade de São Paulo, Av. Bandeirantes, 3900, 14040-901 Ribeirão Preto – SP, Brasi. E-mail: [julianocorbi@yahoo.com.br](mailto:julianocorbi@yahoo.com.br)

**8807.** Crosby, T.K. (2010): Honoured by taxon name — Robin John Tillyard. *Zootaxa* 2414: 67-68. (in English) [Correspondance with a very concise biography of R.J. Tillyard.] Address: Crosby, T.K., Landcare Research, Private Bag 92170, Auckland 1142, New Zealand. E-mail: [crosbyt@landcareresearch.co.nz](mailto:crosbyt@landcareresearch.co.nz)

**8808.** Crumrine, P.W. (2010): Size-structured cannibalism between top predators promotes the survival of intermediate predators in an intraguild predation system. *J. N. Am. Benthol. Soc.* 29(2): 636-646. (in English) ["Individuals in most natural populations of predators vary in size, and size differences among individuals often result in cannibalism. Cannibalism is an extremely common phenomenon in the animal kingdom, particularly among generalist predators that engage in intraguild predation (IGP). However, few studies have specifically addressed the effects of cannibalism on IGP.

The aim of my study was to investigate how trophic and behavioural interactions between 2 size classes of an intraguild (IG) predator influenced the survival and behaviour of IG prey and a shared prey resource. I tested for these effects with larval odonates by exposing a shared prey resource (*Ischnura verticalis*) to the presence or absence of IG prey (*Pachydiplax longipennis*) and 2 size classes of IG predators (small or large *Anax junius*) in a 2 3 2 3 2 factorial design. Mortality rates of the shared resource in all single-predator treatments were significantly greater than in nonpredator controls, and risk reduction was observed when the shared resource was exposed to combinations of predators. The significant negative effect of large *A. junius* on *P. longipennis* survival and activity level was greater than that of small *A. junius*. Cannibalism occurred between large and small *A. junius* in size-structured IG predator treatments, and the effects of the size classes were not additive for the survival of IG prey. Cannibalism was not solely responsible for risk reduction in IG prey, and reduced activity level of small *A. junius* in the presence of larger conspecifics probably had a positive influence on *P. longipennis* survival. My results demonstrate that cannibalism among IG predators can influence the survival of IG prey and might contribute to coexistence among predators in systems with strong IGP." (Author)] Address: Crumrine, P.W., Department of Biological Sciences and Program in Environmental Studies, Rowan University, Glassboro, New Jersey 08028 USA. E-mail: [crumrine@rowan.edu](mailto:crumrine@rowan.edu)

**8809.** Curry, C.M.; Kennedy, J.H. (2010): Factors affecting interaction rates in *Plathemis lydia* (Drury) (Anisoptera: Libellulidae). *Odonatologica* 39(1): 29-38. (in English) ["Interspecific interaction rates and space use were observed for *P. lydia* at 3 ponds in north-central Texas from June to August 2007. Aggressive interactions of marked individuals were tallied for each interacting species by which individual was the aggressor or target and which species won or lost. The space used was also mapped. These data were also collected for one individual each of the libellulids *Pachydiplax longipennis* and *Tamea lacerata* and compared to *P. lydia*. Interaction rates were different depending on the category of interacting Odonata (perching or flying), supporting the hypothesis that the thermoregulatory categories of perching and flying aid in habitat partitioning among species" (Authors)] Address: Curry, Claire, Dept of Zoology, University of Oklahoma, 730 Van Vleet Oval, Room 314, Norman, Oklahoma 73019, USA. E-mail: [Claire.M.Curry-1@ou.edu](mailto:Claire.M.Curry-1@ou.edu)

**8810.** Damm, S.; Dijkstra, K.D.; Hadrys, H. (2010): Red drifters and dark residents: The phylogeny and ecology of a Plio-Pleistocene dragonfly radiation reflects Africa's changing environment (Odonata, Libellulidae, Trithemis). *Molecular Phylogenetics and Evolution* 54: 870-882. (in English) ["In the last few million years, tropical Africa has experienced pronounced climatic shifts with progressive aridification. Such changes must have had a great impact on freshwater biota, such as Odonata. With about forty species, *Trithemis* dominates dragonfly communities across Africa, from rain-pools to streams, deserts to rainforests, and lowlands to highlands. Red-bodied species tend to favour exposed, standing and often temporary waters, have strong dispersal capacities, and some of the largest geographic ranges in the genus. Those in cooler habitats, like forest streams, are generally dark-bodied and more seden-



tary. We combined molecular analyses of ND1, 16S, and ITS (ITS1, 5.8S, and ITS2) with morphological, ecological, and geographical data for 81% of known *Trithemis* species, including three Asian and two Madagascan endemics. Using molecular clock analyses, the genus's origin was estimated 6–9 Mya, with multiple lineages arising suddenly around 4 Mya. Open stagnant habitats were inferred to be ancestral and the rise of *Trithemis* may have coincided with savannah-expansion in the late Miocene. The adaptation of red species to more ephemeral conditions leads to large ranges and limited radiation within those lineages. By contrast, 3 clades of dark species radiated in the Plio-Pleistocene, each within distinct ecological confines: (1) lowland streams, (2) highland streams, and (3) swampy habitats on alternating sides of the Congo-Zambezi watershed divide; together giving rise to the majority of species diversity in the genus. During *Trithemis* evolution, multiple shifts from open to more forested habitats and from standing to running waters occurred. Allopatry by habitat fragmentation may be the dominant force in speciation, but possibly genetic divergence across habitat gradients was also involved. The study demonstrates the importance of combining ecological and phylogenetic data to understand the origin of biological diversity under great environmental change." (Authors)] Address: Dijkstra, K.D., Curator of invertebrates, National Zoological Collection of Suriname, University of Suriname, P.O. Box 9212, Paramaribo, Suriname. E-mail: [Dijkstra@naturalis.nnm.nl](mailto:Dijkstra@naturalis.nnm.nl)

**8811.** De Paiva Silva, D.; De Marco, P.; Resende, C.D. (2010): Adult odonate abundance and community assemblage measures as indicators of stream ecological integrity: A case study. *Ecological Indicators* 10(3): 744-752. (in English) ["Water resources demand constant conservation actions due to several problems (e.g. riparian vegetation cut-off, construction of dams, acidification, sewage and pesticide spills) that degrade the aquatic systems worldwide and affect its physico-chemical parameters and habitat characteristics. Odonata is a potential group of organisms that could indicate these habitat alterations once they have aquatic and terrestrial life forms. In this study, we tested the use of adult odonate individual species and community assemblage measures to evaluate the effect of riparian vegetation cut-off and sewage discharges. The study was performed at Turvo Sujo River, in Viçosa, Southern Brazil. We selected twelve sites, six of them were upstream and six were downstream the city. Species abundance and species richness estimates of adult odonates were performed on sunny days during summer and winter. We analyzed the goodness-of-fit of the species abundances to geometric and lognormal series. We also measured the Habitat Physical Integrity Score (HPIS), pasture and forest proportions and physico-chemical water parameters at each site. Only few species were abundant in up- and downstream regions. Abundance of *Argia modesta* was higher at the upstream ( $t = 3.188$ ;  $df = 17$ ;  $p = 0.005$ ) than at the downstream region and this species is a potential habitat bioindicator organisms. Species richness was statistically different only in the wet season and species-abundance relations at the two regions fitted well to both geometric and lognormal series. The lack of riparian vegetation indicates a loss of habitat integrity and heterogeneity at Turvo Sujo River basin, which was mainly dominated by lake-dwelling odonate species. Low species richness differences are caused by spe-

cies pool biases toward those ones capable to survive at degraded ecosystems, suggesting that the effects of water parameters are much less important than a landscape dominated by pastures and practically without forests. We suggest the use of species-abundance models (like geometric and lognormal series) to determine the degree of impacts over a given community once they are simple models and can show intrinsic processes structuring communities." (Authors)] Address: De Marco, P., Lab. Ecologia Teórica e Sintese, Depto de Biologia Geral, Univ. Federal de Goiás, BR-74001-970, Goiania, GO, Brazil. E-mail: [pdemarco@icb.ufg.br](mailto:pdemarco@icb.ufg.br)

**8812.** Dillon, M. (2010): Odonates of Wright Patman Lake in northeast Texas. *Argia* 22(1): 13-14. (in English) [USA; 57 species from the locality are checklisted.] Address: Dillon, M., 4414 Jeff Davis St., Marshall, Texas 75672, USA. E-mail: [mdillon444@charter.net](mailto:mdillon444@charter.net)

**8813.** Dow, R.A. (2010): Two new Platystictidae (Odonata: Zygoptera) from Sarawak, Malaysian Borneo. *Zootaxa* 2412: 63-68. (in English) ["Two new members of the Platystictidae are described from Sarawak: *Drepanosticta sbong*, holotype male: Malaysia, Sarawak, Kapit division, Sungai Spong, 11-II-2008; and *Protosticta tubau*, holotype male: Malaysia, Sarawak, Bintulu division, Planted Forest Zone, Tubau area, block E2K, 16-VIII-2009; both to be deposited in the RMNH Leiden, The Netherlands." (Author)] Address: Dow, R.A., National Museum of Natural History Naturalis, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: [rory.dow230@yahoo.co.uk](mailto:rory.dow230@yahoo.co.uk)

**8814.** Dow, R.A.; Choong, C.Y.; Ng, Y.F. (2010): *Elatoneura mauros* sp. nov. (Odonata: Zygoptera: Protoneuridae) from Sarawak, Malaysian Borneo. *Zootaxa* 2502: 65-68. (in English) [Holotype: male, Malaysia, Sarawak, Lanjak Entimau Wildlife Sanctuary, Sungai Begua, 18.VI.2008. A key to the six *Elatoneura* species known from Borneo and Sundaland is provided.] Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: [cychoong@ukm.my](mailto:cychoong@ukm.my)

**8815.** Dragonfly Society of the Americas (2010): *Argia* 22(1). *Argia* 22(1): 1-19. (in English) [These are the papers from issue 22(1) with technical background: In This Issue: 1; Thank You!: 1; Calendar of Events: 1; 2010 DSA Annual Meeting in Orono, Maine, by Bryan Pfeiffer: 2; 2010 Southeast Regional Meeting, by Jerrell J. Daigle: 3; Great Lakes Odonata Meeting, by Bob Glotzhober: 3; Rob Cannings Receives National Award from Canadian Museum Network: 4; New Listserve—Colorado Odes: 7; Duncan Cuyler Collection now in IORI/FSCA, by Bill Mauffray: 10-11; Nick and Ailsa Donnelly Fellowship for 2010: 17; A Call for Papers for BAO: 19.] Address: DSA c/o Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: [jcabbott@mail.utexas.edu](mailto:jcabbott@mail.utexas.edu)

**8816.** Dube, T.; Makaka, C.; Sibanda, Z. (2010): An assessment of the effect of industrial and sewage effluent on aquatic invertebrates: A case study of a southern urban stream, Zimbabwe. *Journal of Sustainable Development* 3(2): 210-214. (in English) ["The impact of industrial effluent discharged in Mazai stream was assessed through physical-chemical parameters and also by bio-monitoring of benthic macro-invertebrates. Samples were collected at three sites, one before the effluent discharge point into the stream (site 3) and two sites which were located downstream after the dis-

charge points (sites 1 and 2). High levels of chemical pollutants were recorded at sites 1 and 2 (ZINWA red category) whereas site 3 (reference site) consisted of relatively clean water (ZINWA blue category). This was confirmed by the biological evaluation process. The SASS4 scores at sites 1 and 2 indicated a deterioration of water quality while site 3 there was good water quality with high species diversity. Detrended correspondence analysis (DCA) showed that pollution sensitive taxa such as Hemiptera, Trichoptera, Coleoptera and Odonata were dominant at site 3 whilst the other sites were dominated by pollution tolerant species such as Chironomids. Continuous discharge of effluent could lead to extreme degradation of Mazai stream hence loss of biodiversity of macro-invertebrates." (Authors)] Address: Dube, T., Dept Biological Sciences, Midlands State Univ., P. Bag 9055, Gweru, Zimbabwe. E-mail: tdube@msu.ac.zw

**8817.** DuBois, B. (2010): *Cordulegaster maculata* (Twin-spotted Spiketail) nymphs in a natural drainage lake in Wisconsin. *Argia* 22(1): 6-7. (in English) [5 June 2009, Upper St. Croix Lake, Douglas County, Wisconsin, USA; „To my knowledge, *C. maculata* appears to be an obligate forested-stream species. Although some lotic odonates are also found along windswept shorelines of large lakes, I have not found any published reference to *C. maculata* inhabiting lakes. I suspect that the nymphs I collected originated from Park Creek and that oviposition did not occur in the lake proper, but obviously this is just a guess." (Author)] Address: Bob DuBois, Department of Natural Resources, Superior, WI, USA. E-mail: robert.dubois@wisconsin.gov

**8818.** Duxbury, C.; Holland, J.; Pluchino, M. (2010): Experimental evaluation of the impacts of the invasive catfish *Hoplosternum littorale* (Hancock, 1828) on aquatic macroinvertebrates. *Aquatic Invasions* 5(1): 97-102. (in English) [*H. littorale* is a callichthyid catfish native to South America. It was first recorded in Florida in 1995. It has now dispersed throughout much of Florida. It is thought that this fish has had little or no impacts to native fish. However, it is unknown if the introduction of this fish can cause other ecological impacts, such as alteration of aquatic invertebrates assemblages. We conducted a cage experiment to evaluate the effects of the hoplo catfish on macroinvertebrates. Results showed that macroinvertebrate abundance and taxa on artificial substrates (MAS) were reduced by 31 and 50% in the fish treatments, respectively. The entire macroinvertebrate assemblage structure was significantly different between fish and no-fish treatments. This difference was driven primarily by reductions in amphipods, and chironomids. Macroinvertebrates were also identified from fish stomachs and these were compared to assemblages on the MAS. We found a smaller subset of taxa in the stomachs, as compared to the MAS. These results suggest that this fish could alter the macroinvertebrate assemblage structure. This could have implications for environmental monitoring programs that use macroinvertebrates to assess water quality." (Authors) Relative abundance of Odonata found on the artificial substrates in fish and no-fish treatments (n=10, each) did not differ significantly. No Odonata were found in the stomach contents of caged fish.] Address: Duxbury, C., Walt Disney Imagineering, Research & Development, 1365 Ave. of The Stars, Lake Buena Vista, Florida, USA. E-mail: craig.v.duxbury@disney.com

**8819.** Dyatlova, E.S. (2010): Dragonflies of Moldova: state of knowledge and personal observations. International Dragonfly Fund - Report 25: 1-43. (in English) ["During summer field work in 2005 and 2009 data on the distribution of dragonflies were obtained on the territory of Moldova. In August 2005, 9 species were recorded for the middle part of the Dniester River (surroundings of Sakharna). Between 28 June and 4 July 2009 dragonflies were studied in almost all parts of the country - 25 species were observed. Four species (*Lesites macrostigma*, *Coenagrion ornatum*, *Coenagrion scitulum*, *Orthetrum brunneum*) were recorded for the first time in Moldova. For many species the knowledge of their Moldovan distribution was improved. The habitats of every species were described, illustrated and preliminary maps of species distribution were prepared. Literature data were also analysed and a check list of Moldovan dragonflies was created containing 37 species. The presence of several species (including *Nehalennia speciosa*) in Moldova needs confirmation." (Author)] Address: Dyatlova, Elena, Low Dniester National Nature Park, Frantzuzskij boulevard 89, Ukraine, Odessa 65009. E-mail address: lena.dyatlova@gmail.com

**8820.** Ellenrieder, N. von (2010): Odonata biodiversity of the Argentine Chaco biome. *International Journal of Odonatology* 13(1): 1-25. (in English, with Spanish summary) ["Odonates of small temporary pools, marshes, large permanent ponds, oxbow lakes, dams, and perennial rivers were sampled in the semiarid Chaco biome of NW Argentina between September 2007 and December 2008. Information from 35 localities yielded 60 species; presence/absence information of species was recorded in a spatial-relational database. Alpha, beta, and gamma diversity and total species richness expected for the area were estimated, and structure of Chaco odonate assemblages was preliminarily analyzed using nonmetric multidimensional scaling (NMS) ordination. Species composition was found to be related to both habitat type and longitudinal sector. Some species that might be indicative of habitat type were identified. — In order to analyze the distribution and biogeography of the odonates of the Chaco biome in Argentina, collections and literature were also examined, adding 58 localities (93 total) and 28 species (88 total). Odonate diversity of the Chaco was compared with that of neighboring Yungas and Paranense biomes by means of percent complementarity and cluster analysis, which showed Chaco odonate composition to be slightly more similar to that of the Yungas than to the Paranense biome, and W and E Chaco sectors to be more similar between them than with either of the two neighboring biomes. Most odonate species found in the Chaco are vagile and more widely distributed in the Neotropical region, with only four potential endemics." (Authors)] Address: Ellenrieder, Natalia von, California State Collection of Arthropods, Cdfa, 3294 Meadowview Road, Sacramento, CA 95832. Email: natalia.ellenrieder@gmail.com

**8821.** Fenoglio, S.; Bo, T.; Cammarata, M.; Malacarne, G.; Del Frate, G. (2010): Contribution of macro- and micro-consumers to the decomposition of fish carcasses in low-order streams: an experimental study. *Hydrobiologia* 637: 219-228. (in English) ["Vertebrate carrions, in particular fish, can provide a significant source of organic matter to lotic systems. Most studies related to animal matter degradation have been

undertaken in Western North America, where entire lotic networks depend on large masses of anadromous salmonids, but less is known of other aquatic environments. In this study, the decomposition process of trout was analyzed in a Northern Italian stream, investigating the different importance of macro (invertebrates)—and micro (fungi)—consumers. Trout carcasses exhibited an exponential mass loss over time and attracted a rich community of microbic and invertebrate colonists. Final values for fish decay were significantly affected by the presence of macroconsumers; nevertheless, the role of macroinvertebrates seems to be not as predominant as in other ecological systems. Our study indicates that in lotic environments, which lack specialized necrophagous or sarcophagous invertebrate taxa equivalent to those found in terrestrial environments (such as maggots or carrion beetles), micro-consumers play a main role in fish carcasses decomposition." (Authors) *Calopteryx splendens* was absent in the river bed; its relative abundance from macroinvertebrates on fish carcasses counts 0,5%.] Address: Fenoglio, S., Dept of Environmental & Life Sciences, University of Piemonte Orientale, Via Teresa Michel, 11, 15121 Alessandria, Italy. E-mail: fenoglio@unipmn.it

**8822.** Fulan, J.A.; Almeida, S.C. (2010): Effect of the spatial heterogeneity on the predation of *Scinax fuscovarius* and *Physalaemus cuvieri* tadpoles by Odonata larvae. *Acta Scientiarum. Biological Sciences*, Maringá 32(2): 121-124. (in English, with Portuguese summary) ["The objective of this work was to analyze the effect of predation by Odonata naiads (*Micrathyrina* sp.) on two amphibian species with distinct habits – benthic and mid-water – and to verify whether the presence and architecture of macrophytes can mediate this interaction. All tadpoles and Odonata larvae were captured in a temporary pond. Sixteen tanks were used for three different treatments: *Pistia*, *Salvinia* and no macrophytes. Ten tadpoles of each species and two Odonata larvae were placed in each tank. The survival of tadpoles according to treatments was assessed through analysis of repeated measures. We concluded that the survival of *P. cuvieri* and *S. fuscovarius* tadpoles was not affected by the presence and architecture of the macrophytes (*Pistia* and *Salvinia*) or by their behaviour." (Authors)] Address: Fulan, J.A., Univ. Federal do Amazonas, Instituto de Educação, Agricultura e Ambiente, Rua 29 de Agosto, 786, 69800-000, Humaitá, Amazonas, Brazil. E-mail: joaofulan@ig.com.br

**8823.** Göcking, C.; Hübner, T.; Röhr, K. (2010): Status and conservation of *Coenagrion mercuriale* in North Rhine-Westphalia. *Brachytron* 12(1/2): 11-17. (in German, with Dutch and English summaries) ["*C. mercuriale* occurs in North Rhine-Westphalia (NRW) in small, sunny, alkaline meadow brooks and ditches poor in detritus, with submerged and emergent vegetation. A herb-rich vegetation is present on the banks. To our present knowledge, there are about twelve populations in NRW; two are discussed here in detail. In order to protect the species, conservation measures concerning the management of the water bodies are suggested." (Authors)] Address: Göcking, C., NABU-Naturschutzstation Münsterland, Haus Heidborn, Westfalenstr. 490, 48165 Münster, Germany. E-mail: C.Goecking@NABU-Station.de

**8824.** Gregoire, S.; Gregoire, J. (2010): *Lestes* survival at high temperature and low water. *Argia* 22(1): 5-6. (in English) [New York, USA; report on emergence of

*Lestes* species (*L. rectangularis*, *L. unguiculatus*, *L. congener*) in dependence of water table and water temperature. Water temperature arised to app. 33°C; no larval mortality could be observed.] Address: Gregoire, J., 5373 Fitzgerald Rd., Burdett, NY 14818, USA. E-mail: khmo@empacc.net

**8825.** Groenendijk, D.; Bouwman, J.H. (2010): Occurrence and conservation of *Somatochlora arctica* in the Netherlands. *Brachytron* 12(1/2): 18-24. (in English, with Dutch and German summaries) ["*S. arctica* is one of the least known and rarest dragonflies of northwest Europe. As one of the most characteristic species of raised bog, its decline is paralleled by the diminishing quantity and quality of this habitat type. Since the publication of the Species Protection Plan in 2005, seven populations are known to be present in the Netherlands. Locating the breeding grounds and understanding the adult's behaviour were given priority. Small pools, about a metre deep and largely covered with *Sphagnum* moss, were frequented by both males and females. Females were seen ovipositing, and larvae in various stages and empty skins were found. These pools have been targeted for measures on the short term; depending on the local situation, managers are given advice either on how to protect them or how to dig new ones. On the long term, the existence of such pools needs to be included into plans for the restoration of the bog, ensuring suitable breeding grounds for this rare and beautiful species. Moreover, as most populations are located in border areas, cross-border protection is urgently needed." (Authors)] Address: Groenendijk, D., De Vlinderstichting, Postbus 506, NL 6700 AM Wageningen, The Netherlands. E-mail: dick.groenendijk@vlinderstichting.nl

**8826.** Hacet, N. (2010): Notes on flight periods and distributions of some dragonflies in Turkey. *Munis Entomology & Zoology* 5(1): 158-162. (in English) [Phenological data of 11 species collected in 1996, 1997, 2001, 2002 and 2005-2009 are presented. *Anax ephippiger* is the earliest dragonfly recorded (in February) in Turkey so far. In addition, new localities are reported for *Coenagrion scitulum*, *Aeshna mixta*, *A. ephippiger*, *Stylurus flavipes*, *Gomphus vulgatissimus*, and *Somatochlora meridionalis*.] Address: Hacet, Nurten, Trakya University, Faculty of Arts and Sciences, Department of Biology, TR-22030 Edirne, Turkey. E-mail: nhacet@hotmail.com

**8827.** Hepp, L.U.; Milesi, S.V.; Biasi, C.; Restello, R.M. (2010): Effects of agricultural and urban impacts on macroinvertebrates assemblages in streams (Rio Grande do Sul, Brazil). *Zoologia* 27(1): 106-113. (in English) ["This study evaluates the effects of agricultural and urban activities on the structure and composition of benthic communities of streams in the state of Rio Grande do Sul, Brazil. Benthic macroinvertebrates were collected in streams influenced by urbanization and agriculture and in streams with no anthropogenic disturbances (reference streams). Organism density was superior in urban streams when compared with streams in the other two areas. The taxonomic richness and Shannon diversity index were higher in reference streams. The benthic fauna composition was significantly different among land uses. The classification and ordination analyses corroborated the results of variance analyses demonstrating the formation of clusters corresponding to streams with similar land use. Seasonality was also found to influence the benthic community,



though in a lesser degree than land use." (Authors) Odonata are treated at the family level; abundance of Odonata was low.] Address: Laboratório de Biomonitoramento, Departamento de Ciências Biológicas, Universidade Regional Integrada do Alto Uruguai e das Missões. Avenida Sete de Setembro 1621, Caixa Postal 743, 99700-000 Erechim, Rio Grande do Sul, Brasil. E-mail: lhepp@uri.com.br

**8828.** Huang, D.-y.; Nel, A. (2010): *Protoliupanshanian wangi*, a new genus and species from the Chinese Early Cretaceous (Odonata: Aeshnoptera: Liupanshaniidae). *Zootaxa* 2387: 57-62. (in English) ["*Protoliupanshanian wangi*, new genus and species, is described from the Lower Cretaceous Yixian Formation of western Liaoning, China. It is probably the sister genus of the clade that comprises all other liupanshaniid genera, based on current knowledge of the wing venation of *Paramesuropetala*." (Authors)] Address: Nel, A., Lab. Ent. Mus. Nat. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrns1.mnhn.fr

**8829.** Huang, D.-y.; Nel, A. (2010): *Sinahemeroscopus magnificus*, new genus and species of 'libelluloid' dragonfly from the Chinese Mesozoic (Odonata, Anisoptera: Nannogomphidae?). *Zootaxa* 2388: 44-48. (in English) ["*Sinahemeroscopus magnificus* gen. and sp. nov. is described from the Early Cretaceous of China. We tentatively attribute it to the Nannogomphidae. This family was currently known from the Late Jurassic of Germany." (Authors)] Address: Huang, D.-y., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, P.R. China. E-mail: huangdiyong@sina.com

**8830.** Jara, F.G.; Perotti, M.G. (2010): Risk of predation and behavioural response in three anuran species: influence of tadpole size and predator type. *Hydrobiologia* 644: 313-324. (in English) ["Many species alter their activity, microhabitat use, morphology and life history in response to predators. Predation risk is related to predator size and palatability of prey among others factors. We analyzed the predation risk of three species of tadpoles that occur in norwestern Patagonia, Argentina: *Pleurodema thaul*, *Pleurodema bufoninum* and *Rhinella spinulosa*. We sampled aquatic insect predators in 18 ponds to determine predator-tadpole assemblage in the study area. In laboratory conditions, we analysed the predation rate imposed by each predator on each tadpole species at different tadpole sizes. Finally, we tested whether tadpoles alter their activity in the presence of chemical and visual cues from predators. Small *P. thaul* and *P. bufoninum* tadpoles were the most vulnerable prey species, while small *R. spinulosa* tadpoles were only consumed by water bugs. Dragonflies and water bugs were the most dangerous tadpole predators. Small *P. thaul* tadpoles reduced their activity when they were exposed to all predators, while large tadpoles only reduced the activity in the presence of large predators (dragonfly larvae and water bugs). Small *P. bufoninum* tadpoles reduced the activity when they were exposed to beetle larvae and dragonfly larvae, while large tadpoles only reduced activity when they were exposed to larger predators (water bugs and dragonfly larvae). *R. spinulosa* tadpoles were the less sensitive to presence of predators, only larger tadpoles responded significantly to dragonfly larvae by reducing their activity. We conclude that behavioural responses of these anuran species were predator-specific and related to the risk

imposed by each predator." (Authors)] Address: Jara, F.G., Laboratorio de Fotobiología-INIBIOMA (CONICET), Centro Regional Universitario Bariloche, Universidad Nacional del Comahue, Quintral 1250, 8400 San Carlos de Bariloche, Rio Negro, Argentina. E-mail: fjara@crub.uncoma.edu.ar

**8831.** Karube, H.; Moriya, H.; Hayashi, F. (2010): Distribution of calopterygid damselflies of the genus *Mnais* in Kanagawa prefecture and its adjacent areas, central Japan. *Bull. Kanagawa prefect. Mus. (Nat. Sci.)* 39: 25-34. (in Japanese, with English summary) ["Two closely related species of *Mnais* damselflies. *M. pruinosa* and *M. costalis* are known in Kanagawa Prefecture. The previous studies of DNA sequences of the ITS1 region suggested that another group of *Mnais* is also distributed there. In this study, we sequenced 223-bp of ITS1 of 543 *Mnais* damselflies collected across Kanagawa Prefecture and its adjacent Shizuoka, Yamanashi, Tokyo, and Saitama Prefectures. Morphological measurements were also made for 404 male adult specimens. Obtained sequences consisted of three types, each corresponding to *M. pruinosa*, *M. costalis*, and another one. The last group was distributed in the central part of the studied region, being surrounded by either species, and had intermediate morphologies between the two species. Thus, this group seems to be a hybrid swarm derived from isolation of the past hybrid individuals of the two species. We discuss the possible geographic events in the past that affected the distribution patterns of them." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**8832.** Kawashima, I.; Tsuji, I. (2010): Records of *Aeschnophlebia anisoptera* Selys and *Gynacantha japonica* Barteneff (Odonata: Anisoptera: Aeshnidae) from the Southern Part of the Miura Peninsula, Kanagawa Prefecture. *Natural History Report of Kanagawa* 31: 37-40. (in Japanese, with English title) [Japan; *Aeschnophlebia anisoptera*: 10-VII-2009; *Gynacantha japonica*: 19-VII-2009] Address: Kawashima, I., 1-50-9 Nagasawa, Yokosuka, Kanagawa, 239-0842 Japan

**8833.** Ketelaar, R. (2010): Recovery and further protection of rheophilic Odonata in the Netherlands and North Rhine-Westphalia. *Brachytron* 12(1/2): 38-49. (in English, with Dutch and German summaries) ["This article describes and discusses the current distribution of lotic dragonflies in The Netherlands and North Rhine-Westphalia, Germany. Combined distribution maps of seven species are published: *Calopteryx splendens*, *C. virgo*, *Cordulegaster bidentata*, *C. boltonii*, *Ophiogomphus cecilia*, *Gomphus flavipes* and *G. vulgatissimus*. It is concluded that most dragonflies of running waters are recovering since 1990. Although the trend is undoubtedly positive, some species are still very rare and threatened, especially *Coenagrion mercuriale*, *C. ornatum* and *Cordulegaster bidentata*. The European Habitat Directive will provide new activities for the protection of these species. However, more promising seems to be the Water Framework Directive. To make further recovery of these species possible cooperation of odonatologists is necessary, the exchange of distribution data is a first step." (Author)] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: ketelaar@vlinderstichting.nl

- 8834.** Kim, D.G.; Yum, J.W.; Yoon, T.J.; Bae, Y.J. (2010): Life history of an endangered dragonfly, *Nannophya pygmaea* Rambur, in Korea (Anisoptera: Libellulidae). *Odonatologica* 39(1): 39-46. (in English) ["Aspects of the *N. pygmaea* life history, an endangered species in Korea, were studied at an abandoned paddy field in Mungyeong, Gyeongsangbuk-do, Korea. The larvae were sampled quantitatively at monthly intervals (every 2 weeks during the emergence period) from June 2006 to July 2007 and the adults were counted via a line-transect method. Based on the analyses of larval body length distribution, degree days (DD), and emergence time, the species is considered univoltine with an emergence period from mid-May to early August. The estimated sum of the thermal amount, effective to larval development during the study period, was 2468 DD. The relationship between the larval head width and wingsheath width, which is coincident with the temperature fluctuation pattern, shows that the population harbors at least 4 size groups (cohorts) in a generation." (Authors)] Address: Bae, Y.J., College of Life Sciences and Biotechnology, Korea University, Seoul 136-701, Korea. E-mail: yjbae@korea.ac.kr
- 8835.** King, S. (2010): The dragonflies and damselflies of the Cannon River watershed. *Watershed Watcher* 19(2-4): 5. (in English) [Announcement for starting odonatological activities in the Cannon River Watershed, Minnesota, USA.] Address: Cannon River Watershed Partnership, 8997 Eaves Ave, Northfield, MN 55057, USA
- 8836.** Kohler, N.S. (2010): First records of *Sympetrum vicinum* (Autumn Meadowhawk) in Montana. *Argia* 22(1): 12-13. (in English) [Montana, USA. The first sightings of *S. vicinum* came on 15-IX-2009 while surveying a man-made pond complex west of Drummond in Granite County, Montana. Additional records result from three western Montana counties.] Address: Kohler, N.S. E-mail: nskohler@bresnan.net
- 8837.** Kortello, A.D.; Ham, S.J. (2010): Movement and habitat selection by *Argia vivida* (Hagen) (Odonata, Coenagrionidae) in fuel-modified forest. *Journal of Insect Conservation* 14(2): 133-140. (in English) ["Fuel management for wildfire protection is becoming increasingly common in the wildland-urban interface and may have conservation implications for species with restricted distributions and limited dispersal abilities. To evaluate the impact of forest fuel management on the damselfly *A. vivida* at the northern margin of its range, we examined terrestrial movements and habitat associations using Capture-Mark-Recapture and point count techniques. We found that habitats away from the springs were particularly important for *A. vivida* females. Most damselflies travelled at least 50 m between capture and recapture and patches of cleared forest up to this size did not pose a barrier to movement. Although *A. vivida* typically roosts in trees at night, cleared fuel treatment areas were preferred over unmodified or thinned forest as daytime basking and foraging sites. Preferred sites were also characterized by heterogeneous canopy closure, i.e., a clearing adjacent to unmodified forest with a closed canopy. We speculate that this behaviour derives from the species' thermoregulation requirements; the use of sunspots for thermal basking during the day and the use of forest cover at night to slow the radiant loss of heat. Our findings demonstrate the scale of movements that define available habitat and the importance of both daytime and night time habitat requirements in considering terrestrial foraging and movement corridors. Consequently, conservation efforts for this species in fuel management areas should focus on maintaining unmodified stands of dense trees in association with cleared patches of appropriate dimension, rather than a uniformly thinned forest." (Authors)] Address: Kortello, Andrea, Banff National Park, Fire and Vegetation Management Program, Box 900, Banff, AB, T1L 1K2, Canada. E-mail: kortello@yahoo.com
- 8838.** Kraus, J.M. (2010): Diet shift of lentic dragonfly larvae in response to reduced terrestrial prey subsidies. *Journal of the North American Benthological Society* 29(2): 602-613. (in English) ["Inputs of terrestrial plant detritus and nutrients play an important role in aquatic food webs, but the importance of terrestrial prey inputs in determining aquatic predator distribution and abundance has been appreciated only recently. I examined the numerical, biomass, and diet responses of a common predator, dragonfly larvae, to experimental reduction of terrestrial arthropod input into ponds. I distributed paired enclosures ( $n = 7$ ), one with a screen between the land and water (reduced subsidy) and one without a screen (ambient subsidy), near the shoreline of 2 small fishless ponds and sampled each month during the growing season in the southern Appalachian Mountains, Virginia (USA). Screens between water and land reduced the number of terrestrial arthropods that fell into screened enclosures relative to the number that fell into unscreened enclosures and open reference plots by 36%. The  $\delta^{13}C$  isotopic signatures of dragonfly larvae shifted towards those of aquatic prey in reduced-subsidy enclosures, a result suggesting that dragonflies consumed fewer terrestrial prey when fewer were available (ambient subsidy: 30%, reduced subsidy: 19% of diet). Overall abundance and biomass of dragonfly larvae did not change in response to reduced terrestrial arthropod inputs, despite the fact that enclosures permitted immigration/emigration. These results suggest that terrestrial arthropods can provide resources to aquatic predators in lentic systems, but that their effects on abundance and distribution might be subtle and confounded by in situ factors." (Author) The most common dragonflies emerging from the ponds during the experiment were *Libellula lydia*, *L. pulchella*, *Somatochlora elongata*, *Cordulia shurtleffi*, *Aeshna umbrosa*, and *Sympetrum rubicundulum*.] Address: Kraus, Johanna, Trani Center for Life Sciences, Dept of Biology, Virginia Commonwealth Univ., 1000 West Cary Street, Richmond, Virginia 23284-2012 USA. E-mail: jmkraus@vcu.edu
- 8839.** Kutera, M.; Woźniak, A. (2010): New locality of common goldenring *Cordulegaster boltonii* (Donovan, 1807) near Starachowice on the Kielce Upland. *Chrońmy Przyr. Ojcz.* 66(2): 121-124. (in Polish, with English summary) [On 11-VII-2007, a male *C. boltonii* was recorded near Lubienia (UTM EB15), Poland. "The nearest known locality is situated in the Suchedniowsko-Oblęgorski Landscape Park, where the species was recorded in 1981. After the year 2005 found in the vicinity of Suchedniowsko-Oblęgorski Landscape Park and in the Świętokrzyskie (Holy Cross) Mountains. The extent of *C. boltonii* in Poland includes northwestern, midwestern and southern part of the country, and only one locality known from the North-East. The species seemed to be nearly extinct in the Upper Silesia region, however, it has recently been rediscovered in this area. The species is protected by law in Poland and in the

national Red List 2002 it was qualified for the category VU – (vulnerable). However, new data have shown the more favourable conservation status of the species than it had previously been assessed. Therefore, *C. boltonii* has been deleted from the Polish Red List." (Authors)] Address: Kutera, M., Rudka 30, 27–415 Kunów. Poland. E-mail: marcin.kutera@poczta.onet.pl

**8840.** Lavilla, I.; Rodrigueza-Linares, G.; Garrido, J.; Bendicho, C. (2010): A biogeochemical approach to understanding the accumulation patterns of trace elements in three species of dragonfly larvae: evaluation as biomonitors. *J. Environ. Monit.* 12: 724-730. (in English) ["The accumulation patterns of different trace elements (As, Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn) were studied in three species of dragonfly larvae (*Cordulegaster boltoni*, *Boyeria irene* and *Onychogomphus uncatatus*). Additionally these species were assessed as potential biomonitors in a lotic ecosystem (Louro River, Spain). Element concentrations were determined by inductively coupled plasma optical emission spectrometry (ICP-OES) in both dragonfly larvae and river sediments. The surface of the larvae was observed and analyzed with scanning electron microscopy (SEM). A desorption test was used to establish the percentage of element adsorbed into the exoskeleton. Field biomonitoring studies were made considering the first part of the river as a control area in relation to the second part, which was severely polluted by industrial and domestic activities. Upon application of principal component analysis (PCA), two different element groups were found in relation to element bioaccumulation. Cu, Cd and Zn were mainly associated with the inner part of the larvae. As, Cr, Fe, Mn, Ni and Zn were found on the outer body parts, related with deposition of oxyhydroxides in the hydrocycle. SEM revealed a layer of inorganic particles, similar in composition to fine bed sediments. Significant relations between the element content of this group and that of sediments at the sampling site were found. Differences in bioaccumulation for each of the three species, except for As, were observed. Dragonfly larvae revealed their ability to reflect environmental concentrations of As in freshwater media." (Authors)] Address: Lavilla, Isela, Departamento de Química Analítica y Alimentaria, Facultad de Química, Universidad de Vigo, As Lagoas—Marcosende s/n, 36310 Vigo, Spain. E-mail: isela@uvigo.es

**8841.** Lehmann, F.-O. (2010): Wing-wake interaction reduces power consumption in insect tandem wings. In: G.K. Taylor, M.S. Triantafyllou & C. Tropea (eds.): *Animal Locomotion*. Springer Verlag. Berlin Heidelberg. ISBN 978-3-642-11632-2: 203-213. (in English) ["Insects are capable of a remarkable diversity of flight techniques. Dragonflies, in particular, are notable for their powerful aerial manoeuvres and endurance during prey catching or territory flights. While most insects such as flies, bees and wasps either reduced their hind wings or mechanically coupled fore and hind wings, dragonflies have maintained two independent-controlled pairs of wings throughout their evolution. An extraordinary feature of dragonfly wing kinematics is wing phasing, the shift in flapping phase between the fore and hind wing periods. Wing phasing has previously been associated with an increase in thrust production, readiness for manoeuvrability and hunting performance. Recent studies have shown that wing phasing in tandem wings produces a twofold modulation in hind wing lift, but slightly reduces the maximum combined lift of

fore and hind wings, compared to two wings flapping in isolation. Despite this disadvantage, however, wing phasing is effective in improving aerodynamic efficiency during flight by the removal of kinetic energy from the wake. Computational analyses demonstrate that this increase in flight efficiency may save up to 22% aerodynamic power expenditure compared to insects flapping only two wings. In terms of engineering, energetic benefits in four-wing flapping are of substantial interest in the field of biomimetic aircraft design, because the performance of man-made air vehicles is often limited by high-power expenditure rather than by lift production. This manuscript provides a summary on power expenditures and aerodynamic efficiency in flapping tandem wings by investigating wing phasing in a dynamically scaled robotic model of a hovering dragonfly." (Author)] Address: Lehmann, O.-F., BioFuture Research Group, University of Ulm, Albert-Einstein-Allee 11, 89081 Ulm, Germany. E-mail: fritz.lehmann@uni-ulm.de

**8842.** Lencioni, F.A.A. (2010): *Telebasis luizae* spec. nov. from Brazil (Zygoptera: Coenagrionidae). *Odonatologica* 39(1): 71-74. (in English) ["The new species is described and illustrated based on a single specimen from the state of Bahia. Holotype male: Brazil, Bahia, São Desidério, 17-I-2004; deposited in author's collection. It can be separated from all other known congeners by the long and strongly sclerotized carina on the dorso-posterior margin of abdominal segment 10, which is much larger than the almost vestigial carina in *T. dominicana*, *T. filiola* and *T. willinki*." (Author)] Address: Lencioni, F.A.A., Rua Aníbal, 216 - Jardim Coleginho, BR-12310-780, Jacareí, SP, Brazil. E-mail: odonata@zygoptera.bio.br

**8843.** Lin, Q.-b.; Petrulevicius, J.F.; Huang, D.-y.; Nel, A.; Engel, M.S. (2010): First fossil Calopterygoidea from southeastern Asia (Odonata: Zygoptera): A new genus and species from the Paleogene of China. *Geobis* 43(3): 349-353. (in English, with French summary) ["*Sinocalopteryx shangyongensis* nov. gen., nov. sp., the first fossil calopterygoid from eastern Asia, is described from the earliest Eocene of Southwest China. Although the new genus has the principle synapomorphies of Calopterygoidea, it possesses a unique structure (possible reversal) in the pattern of vein RP1/2." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**8844.** Lin, Q.-b.; Nel, A.; Huang, D.-y. (2010): *Sinak-tassia tangi*, a new Chinese Mesozoic genus and species of Aktassiidae (Odonata: Petaluroidea). *Zootaxa* 2359: 61-64. (in English) ["Here we describe a new well-preserved fossil of Petaluroidea attributable to a new genus and species of the family Aktassiidae from the Early Cretaceous Yixian Formation, Western Liaoning, China. This fossil is the most recent representative of the Aktassiinae. The genus *Aktassia* is known from the Jurassic of Mongolia, Chinese Inner Mongolia (Nel et al., 1998; Huang et al., 2006), and Kazakhstan (Pritykina, 1968)." (Authors)] Address: Huang, D.-y., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, P.R. China. E-mail: huangdiyong@sina.com

**8845.** Locklin, J.L.; Vodopich, D.S. (2010): Patterns of gregarine parasitism in dragonflies: host, habitat, and seasonality. *Parasitology Research* 107(1): 75-87. (in



English) ["Gregarines are ubiquitous protozoan parasites that infect arthropods worldwide. More than 1,600 gregarine species have been described, but only a small percentage of invertebrates have been surveyed for these apicomplexan parasites. Adult dragonfly populations were surveyed for gregarines at two reservoirs in Texas, USA for 2 years. Gregarine prevalence and intensity were compared intraspecifically between host genders and reservoirs, among wing loads, and through time. Of the 29 dragonfly species collected, 41% hosted gregarines. Nine of these dragonfly species were previously undocumented as hosts. Among the commonly collected hosts, prevalence ranged from 18 to 52%. Parasites were aggregated among hosts and had a median intensity of five parasites per host. Gregarines were found only in hosts exceeding a minimum wing load, indicating that gregarines are likely not transferred from the naiad to adult during emergence. Prevalence and intensity increased during both years, suggesting that gregarine oocyst viability parallels increasing host population densities and may be short-lived. Prevalence and intensity also differed between dragonfly populations at two reservoirs. Regression analyses revealed that host species, host gender, month, and year were significant explanatory variables related to gregarine prevalence and intensity. Abundant information on odonate distributions, diversity, and mating activities makes dragonfly-gregarine systems excellent avenues for ecological, evolutionary, and parasitological research. Our results emphasize the importance of considering season, hosts, and habitat when studying gregarine-dragonfly ecology." (Authors)] Address: Locklin, J.L., Department of Biology, Baylor University, One Bear Place 97388, Waco, TX 76798, USA. Email: jasonlocklin@baylor.edu

**8846.** Lumbra, L. (2010): Wildlife, Plants and Natural Communities News. Natural Heritage Harmonies Winter 2010: 4-6. (in English) [Vermont, USA; Statewide surveys have been completed to identify Odonata that live in peatland habitats and large rivers. Information from this project has greatly increased our knowledge of both common and rare members of the odonate family. Twenty-seven species of greatest conservation need (SGCN) were targeted in these habitats, of which 20 were observed. Three additional SGCN were encountered during the course of field work. One new species for the state, *Enallagma durum* was also observed. Efforts included at least 54 sites on 23 rivers and 28 peatland sites. Overall, the project has resulted in the discovery of new sites for many of Vermont's Odonata SGCN. This project has allowed us, for the first time, to assign status ranks to all of Vermont's Odonata, which number over 140 species.] Address: Vermont Fish & Wildlife Department, 103 South Main Street, 10 South Waterbury, VT 05671-0501, USA

**8847.** Mantel, S.K.; Muller, N.W.J.; Hughes, D.A. (2010): Ecological impacts of small dams on South African rivers Part 2: Biotic response – abundance and composition of macroinvertebrate communities. *Water SA* 36(3): 361-370. (in English) ["This paper investigates the cumulative impacts of small dams on invertebrate communities in 2 regions of South Africa – the Western Cape and Mpumalanga. Previous research found reduced discharge, increased total dissolved salts, and a decrease in average score per taxon (ASPT; collected using SASS4 methods) at sites with high density of small dams in their catchment. These

changes in ASPT are investigated using the invertebrate abundance data available in the River Health Programme. Multivariate analyses found differences in invertebrate communities in rivers with high densities of small dams in their catchment in foothill-gravel streams (in both Western Cape and Mpumalanga) and in foothill-cobble streams (in Western Cape only). Opportunistic taxa that are tolerant of pollution, and capable of exploiting various habitats, and those that prefer slower currents increased in numbers, while other taxa that are sensitive to pollution and disturbance declined in numbers. Some regional differences were noted possibly reflecting climatic differences between the regions. Since the results of this study are correlative, it highlights the need for a systematic (by sites and seasons) and detailed (at species level) collection of data to verify the results of cumulative effects of small dams. This can further the development of a framework for small-dam construction and management that will limit their impact on river catchments. ... the average abundance for the taxa contributing to 90% of the dissimilarity in the invertebrate communities between sites with low and high small-dam density for the 3 group comparisons where ANOSIM found significant differences. In general, the abundance of taxa with low SASS4 scores (signifying species that are less sensitive to pollution and disturbance, and primarily belonging to Turbellaria, Mollusca and Heteroptera) increased, and those with high SASS4 score (i.e. more sensitive species, mostly Odonata, Trichoptera and some Ephemeroptera) declined." (Authors) Odonata are treated at the family level.] Address: Mantel, S.K., Unilever Centre for Environmental Water Quality – Institute for Water Research (UCEWQ-IWR), Rhodes University, PO Box 94, Grahamstown, South Africa. E-mail: s.mantel@ru.ac.za

Martin, K.H. (2010): The transition zone: Impact of riverbanks on emergent dragonfly nymphs. Implications for riverbank restoration and management. Ph.D. thesis, Antioch University, Antioch New England: Environmental Studies: IV, 104 pp. (in English) ["The use of riprap in the restoration and stabilization of riverine landscapes is an issue of concern for many ecologists. While current methods of bank stabilization, especially those involving the placement of rocks (riprap) along the waterline, are effective in controlling erosion their presence changes habitat components (slope, substrate composition, near-shore river velocity) at the river-land interface. The additional impacts of river current, water temperature, soil composition, slope, and water level fluctuation, may further imperil emerging nymphs. The purpose of this research is to document the effects of riprap, location (upriver or downriver of hydroelectric intake/outtake facilities), water level fluctuation, river velocity, air temperature, water temperature, substrate temperature, and soil composition on the distance traveled to eclosure site by *G. vastus* and *S. spiniceps*, and the density of *S. spiniceps*, *G. vastus*, *N. yamaskanensis*, *D. spinosus*, *O. rupinsulensis*, *M. illinoensis*, and *E. priniceps*. Knowledge of the conservation status of these species is fairly limited, although *S. spiniceps* (threatened), *G. vastus* (species of special concern), and *N. yamaskanensis* (species of special concern) are all currently listed on the Massachusetts Endangered Species list. Species density was determined through exuviae collection, and emergence distance was recorded from the edge of the waterline to the site of attached exuviae. Results of the study indicate that nymphal response to the observed abiotic

features varies both with location and species. The presence of riprap had no significant effect on densities of *S. spiniceps*, *G. vastus*, *N. yamaskanensis*, *D. spinosus*, *O. rupinsulensis*, *M. illinoiensis*, and *E. priniceps*, but did significantly reduce the distance traveled from the waterline by both *G. vastus* and *S. spiniceps*." (Author)] Address: Martin, Kirsten, 132 Root Road, Somers, CT 06071

**8848.** McCauley, S. (2010): Body size and social dominance influence breeding dispersal in male *Pachydiplax longipennis* (Odonata). *Ecological Entomology* 35 (3): 377-385. (in English) ["1. Dispersal behaviour can be affected by an individual's phenotype, by the environmental or social context they experience, and by interactions between these factors. Differential dispersal propensities between individuals may also be an important modifier of functional connectivity between populations. To assess how a key trait, body size, affected both social interactions and dispersal behaviour, this study examined the relationship between body size, antagonistic interactions, and breeding dispersal in male *P. longipennis* across a seasonal decline in adult body size. 2. During a seasonal peak in male body size in this study, dispersers were smaller than non-dispersers. Later in the season, the body size of dispersers and non-dispersers did not differ. 3. Focal observations found that body size was related to competitive dominance, large males engaged in aggressive chases more often and smaller males were more frequently pursued. 4. These results indicate that when large males were present, small males were more likely to disperse suggesting that dispersal is a tactic adopted by social subordinates in this context. If breeding dispersal is typically undertaken by subordinate males, functional connectivity between populations may be less than estimated from absolute dispersal rates." (Author)] Address: McCauley, S., Department of Ecology and Evolutionary Biology, University of Toronto, 25 Willcocks St., Toronto, ON M5S 3B2, Canada. E-mail: shannon.mccauley@utoronto.ca

**8849.** McCauley, S.J.; Brodin, T.; Hammond, J. (2010): Foraging rates of larval dragonfly colonists are positively related to habitat isolation: Results from a landscape-level experiment. *American Naturalist* 175 (3): E66-E73. (in English) ["There is increasing evidence of intraspecific variation in dispersal behaviour. Individual differences in dispersal behaviour may be correlated with other traits that determine the impact individuals have on patches they colonize. We established habitat patches—artificial pools—across a landscape, and these pools were naturally colonized by dragonfly larvae. Larvae were collected from pools at different levels of isolation and held under common lab conditions for 5 months. We then compared larval foraging rates. Foraging rate was positively related to habitat isolation, and colonists from the most isolated artificial pools had significantly higher foraging rates than individuals from the least isolated pools. Our results indicate that spatial patterns in colonist behaviour can develop across a landscape independent of species-level dispersal limitation. This finding suggests that studies of community structure across space should include an assessment of the distribution of phenotypes as well as species-level dispersal limitation patterns." (Authors)] Address: McCauley, S.J., Center for Population Biology, Department of Entomology, University of California, Davis, California 95616, USA.

**8850.** Milesi, S.V.; Biasi, C.; Restello, R.M.; Hepp, L.U. (2010): Distribution of benthic macroinvertebrates in Subtropical streams (Rio Grande do Sul, Brazil). *Acta Limnol. Bras.* 21(4) (2009): 419-429. (in English, with Portuguese summary) [The aim of the study was to evaluate the spatial and seasonal distribution of the benthic macroinvertebrates community in nine streams in the north region of Rio Grande do Sul State. "Streams with riparian vegetation and lower contents of dissolved nutrients showed higher richness of intolerant organisms to pollution. The results suggest that the distribution of benthic macroinvertebrates in the studied region was mainly related to anthropic activities developed in the catchment." (Authors) Odonata are treated at the family level.] Address: Milesi, S.V., Laboratorio de Biomonitoramento, Departamento de Ciencias Biológicas, Universidade Regional Integrada do Alto Uruguai e das Missoes, Campus de Erechim, Av. Sete de Setembro, 1621, CEP 99700-000, Erechim, RS, Brazil. E-mail: silviamilesi@yahoo.com.br

**8851.** Molecular Ecology Resources Primer Development Consortium; Cordero-Rivera, A.; & 40 co-authors (2010): Permanent Genetic Resources Note: Permanent Genetic Resources added to Molecular Ecology Resources Database 1 December 2009–31 January 2010. *Molecular Ecology Resources* 10(3): 576-579. (in English) [The article documents the addition of 220 microsatellite marker loci to the Molecular Ecology Resources Database, including *Ischnura elegans*. The loci were cross-tested on *I. graellsii*, *I. ramburii*, and *I. pumilio*.] Address: Center for the Conservation of Biological Resources, Black Hills State University, 1200 University St Unit 9053, Spearfish, SD 57799, USA. E-mail: editorial.office@molecol.com.

**8852.** Moreno, J.L.; Angeler, D.G.; De las Heras, J. (2010): Seasonal dynamics of macroinvertebrate communities in a semiarid saline spring stream with contrasting environmental conditions. *Aquatic Ecology* 44: 177-193. (in English) ["Semiarid saline streams are rare aquatic ecosystem types. Their constituent biota is expected to have adapted evolutionarily to strong hydrological variability and salinity stress; however, their ecology is not well known. In this study, we quantify the seasonal changes in the structure of the macroinvertebrate community in the Reventón Rambla (southeastern Spain), a permanent saline spring stream which is included in a drainage system consisting of ephemeral dry channels (so-called "ramblas"). Seasonal patterns of community structure were studied in two reaches with contrasting environmental regimes using univariate and multivariate statistics. The upstream site showed more stable environmental conditions than the downstream site, and both sites also differed with regard to species richness, and structural and functional group attributes. On a seasonal basis, community dissimilarity was high during periods when both sites were isolated during summer droughts but dissimilarity decreased when both sites were connected through surface flow. Furthermore, the communities tended to show cyclical trajectories in multivariate ordination space. Rather than being related to salinity stress, these patterns seemed to track the hydrological disturbance regime of this rambla system. Spates tended to disrupt communities, while signs of recovery were evident during low-flow periods. Results suggest that salinity fluctuation does not pose a severe abiotic constraint to these adapted macroinvertebrate communities. Their

suits of functional properties provide them with the necessary traits to recover quickly from natural disturbance. While human-caused salinization of streams severely impacts communities eventually reducing their recovery potential, our results suggest that communities in natural saline streams may show similar responses to hydrological disturbance as communities from non-saline streams. [...] The biomass of Diptera and Odonata was significantly higher in the upstream reach, and Ephemeroptera and Heteroptera in the downstream reach. The biomass of Mollusca, Hydrachnidia, Diptera, Odonata, Ephemeroptera, Coleoptera and Heteroptera showed a marked increase in the spring-summer period. The highest value of average dissimilarity between upstream and downstream sites was recorded in summer (78.17%), when communities were more independent as a result of isolation of both reaches. When both sites were connected by high flows (e.g. autumn), the structure of upstream and downstream communities was more similar, showing a lower dissimilarity value. The main dissimilarities between upstream and downstream sites in community structure, measured as biomass differences, were shown by Mollusca [...] and Odonata (*Orthetrum brunneum* at upstream)." (Authors)] Address: J. L. Moreno, J.L., Regional Centre of Water Research (CREA), University of Castilla-La Mancha, Crtra. de Las Penas, km 3, Albacete 02071, Spain. E-mail: joseluis.moreno@uclm.es

**8853.** Muzon, J.; Weigel Munoz, S.; Campos, R.E. (2010): The larva of *Mecistogaster amalia* (Odonata: Pseudostigmatidae). *International Journal of Odonatology* 13(1): 137-144. (in English) ["The final larval stadium of *M. amalia* is described and illustrated for the first time based on one female collected in a tree hole in Misiones province, Argentina, and compared with all known larvae of related genera. Larval morphology of Pseudostigmatidae is briefly discussed." (Authors)] Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina. E-mail: muzon@ilpla.edu.ar

**8854.** Nagel, L.; Robb, T.; Forbes, M.R. (2010): Inter-annual variation in prevalence and intensity of mite parasitism relates to appearance and expression of damselfly resistance. *BMC Ecology* 2010, 10:5: (in English) ["Background: Insects can resist parasites using the costly process of melanotic encapsulation. This form of physiological resistance has been studied under laboratory conditions, but the abiotic and biotic factors affecting resistance in natural insect populations are not well understood. Mite parasitism of damselflies was studied in a temperate damselfly population over seven seasons to determine if melanotic encapsulation of mite feeding tubes was related to degree of parasitism, host sex, host size, emergence timing, duration of the emergence period, and average daily air temperature. Results: Although parasite prevalence in newly emerged damselflies was >77% each year, hosts did not resist mites in the early years of study. Resistance began the year that there was a dramatic increase in the number of mites on newly emerged damselflies. Resistance continued to be correlated with mite prevalence and intensity throughout the seven-year study. However, the percentage of hosts resisting only ranged from 0-13% among years and resistance was not sex-biased and was not correlated with host size. Resistance also was not correlated with air temperature or with timing or duration of damselfly emergence. Conclusions: Resis-

tance in host damselflies was weakly and variably expressed over the study period. Factors such as temperature, which have been identified in laboratory studies as contributing to resistance by similar hosts, can be irrelevant in natural populations. This lack of temperature effect may be due to the narrow range in temperatures observed at host emergence among years. Degree of mite parasitism predicted both the appearance and continued expression of resistance among parasitized damselflies." (Authors)] Address: Nagel, Laura, Department of Biology, Carleton University, Ottawa, Canada. E-mail: lnagel@connect.carleton.ca

**8855.** Neseemann, H.; Shah, R.D.T.; Shah, D.N.; Sharma, S. (2010): First records of *Rhincoda natatrix* and *Rhincoda rugosa* (Blattodea: Blaberidae) from Nepal and India (Maharashtra) with notes on habitat quality. *Journal of threatened taxa* 2(1): 648-652. (in English) [Two species of cockroaches (*R. natatrix* and *R. rugosa*) were collected from aquatic habitats of undisturbed natural forest streams in Nepal and India (Maharashtra). Nymphs and adults are depicted and field observations of microhabitat and behaviour described. Taxa lists of accompanying macroinvertebrate fauna are given (in most cases at the family level; *Epiophlebia laidlawi* was recorded at two sites), and water quality class is calculated using three biotic scoring systems. *R. natatrix* is a true aquatic species with amphibious lifestyle in the eulittoral of springs (Crenon) and streams (Rhithron) of excellent and good water quality classes I and II. *R. rugosa* is a predominantly terrestrial species that also colonizes the banks of water bodies and appears in between aquatic fauna. These species cannot be classified using the traditional habitat system." (Authors)] Address: Neseemann, H., Aquatic Ecology Center, Kathmandu University, Dhulikhel, Nepal. E-mail: hneseemann2000@yahoo.co.in

**8856.** Novelo-Gutierrez, R.; Tennesen, K.J. (2010): Description of the larva of *Aeshna persephone* Donnelly, 1961 (Odonata: Aeshnidae). *Zootaxa* 2484: 61-67. (in English, with Spanish summary) ["The last instar larva of *A. persephone* is described and compared to the other *Aeshna* species inhabiting Mexico and the southwestern U.S. A key is provided to separate *A. persephone* from the six other sympatric species of *Aeshna*. Larvae inhabit roots of riparian herbaceous vegetation in open streams with boulders." (Authors)] Address: Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Apartado Postal 63, 91070 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**8857.** Ohiokhioya, T.; Imoobe, T.; Ohiozebau, E. (2010): Pollution status of a tropical forest river using aquatic insects as indicators. *African Journal of Ecology* 48(1): 232-238. (in English, with French summary) ["Aquatic insects inhabiting Okhuo River, in a tropical forest near Benin City, Southern Nigerian, were studied between January and December 2006 to determine the taxa composition, diversity, EPT index, relative proportions of the various groups and hence the pollution level of the waterbody. Three stations were selected and sampled monthly using the kick sampling technique. A total of 3235 individual aquatic insects belonging to 24 taxa distributed among 23 genera in six orders were collected. The insect orders occurred in the following order of dominance: Ephemeroptera > Odonata > Coleoptera > Diptera > Plecoptera > Tricoptera. Based on the diverse composition of the community dominated by organisms intolerant of organic enrichment, and the



high diversity and EPT index, water quality in Okhuo River is not significantly degraded. Community composition varies seasonally, with a trend toward a declining proportion during the rainy season and increasing proportions during the dry season. Aquatic insect composition in Okhuo River compares favourably with those in similar, relatively undisturbed forest streams and rivers in Nigeria, but the diversity and proportional distribution of taxa vary considerably between streams." (Authors)] Address: Imoobe, T., Department of Animal and Environmental Biology, University of Benin, Benin City, P.M.B. 1154, Nigeria. E-mail: timoobe@yahoo.co.uk

**8858.** Olthoff, M. (2010): The dragonflies of the peat bogs and heathlands in Western Münsterland (Westphalia, Germany). *Brachytron* 12(1/2): 32-37. (in English, with Dutch and German summaries) ["The dragonflies of the peat bogs and heathlands in Western Münsterland, most of them situated nearby the Dutch-German borderline, were investigated between 1999 and 2005. Altogether 42 species of dragonflies were recognized, among them stenotopic moorland dragonflies (e.g. *Aeshna subarctica*, *Somatochlora arctica*). The peat bogs and heathlands are of a great importance for the protection of dragonflies in an otherwise well-fertilized landscape of the Western Münsterland." (Author)] Address: Olthoff, M., Biologische Station Zwillbrock e.V., Zwillbrock 10, 48691 Vreden, Germany

**8859.** Paiero, S.M.; Marshall, S.A. (2010): Chapter 9. Insects of Ojibway Prairie, a southern Ontario tallgrass prairie. In: Paiero, S. M., S. A. Marshall, P. D. Pratt, and M. Buck. 2010. Insects of Ojibway Prairie, a Southern Ontario Tallgrass Prairie. In *Arthropods of Canadian Grasslands (Volume 1): Ecology and Interactions in Grassland Habitats*. Edited by J. D. Shorthouse and K. D. Floate. Biological Survey of Canada. © 2010 Biological Survey of Canada. ISBN 978-0-9689321-4-8. doi:10.3752/9780968932148xh9: 199-225. (in English., with French summary) [The Ojibway prairie is the single locality in Canada, *Archilestes grandis* is occurring.] Address: Paiero, S.M., Department of Environmental Biology, University of Guelph Guelph, Ontario, Canada

**8860.** Parag, R.; Manoj, B.; Omkar, D. (2010): Additions to the Odonata (Insecta) of Goa. *Journal of Threatened Taxa* 2(4): 805-814. (in English) ["The study reports the results from surveys for Odonates in the State of Goa over 19 months during 2007-2008. A total of 66 species of Odonates were documented with 34 new species records from the State. The present study has resulted in an increase of 47.30% in the number of species reported from Goa to 74 from the existing 39. Family Libellulidae dominated the odonate community with 32 species followed by Coenagrionidae with 14 species. *Orthetrum sabina* was the most abundant species while seven species were documented only once during the survey period. More survey effort are needed to completely document the odonate species diversity of the state." (Authors)] Address: Rangnekar, P, Bldg 4, S-3, Technopark, Chogm Road, Alto-Porvorim, Goa 403001, Tamil Nadu, India. E-mail: paragrangnekar@yahoo.com

**8861.** Paula-Lima, J.E. de; Rödder, D.; Sole, M. (2010): Diet of two sympatric Phyllomedusa (Anura: Hylidae) species from a cacao plantation in southern Bahia, Brazil. *North-Western Journal of Zoology* 6(1): 13-24. (in English) [Contrary to Teixeira, R. L. & D. Vrcibradic (2007): *Phyllomedusa rohdei*. Diet. *Herpeto-*

*logical Review* 38: 69-70' no Odonata were detected as prey items in the diet of the *Phyllomedusa rohdei* and *P. burmeisteri*.] Address: Sole, M., Departamento de Ciências Biológicas, Universidade Estadual de Santa Cruz, Rodovia Ilhéus Itabuna, km 16, CEP 45650-000, Ilhéus, Bahia, Brazil. E-mail: mksole@uesc.br

**8862.** Paulson, D. (2010): Damsels in distress — or Maui phooey. *Argia* 22(1): 11-12. (in English) [Maui, Hawaii, this winter (9–15 December 2009); visiting known as prospective localities for *Megalagrion* species, no *Megalagrion* specimens could be traced. „We saw crayfish and *Gambusia* (both introduced) at a number of the stream crossings, and my understanding was that both of them, as well as other fish species introduced in the lower reaches of many of the streams, could have adverse effects on *Megalagrion* populations. I wonder if they have increased and/or spread farther since Jerrell was there in 1993.“] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**8863.** Pinto, A.P.; Carvalho, A.L. (2010): A new species of *Lauromacromia* (Odonata: Corduliidae) from Southeastern Brazil, with a cladistic analysis of the genus and comments on Neotropical dragonfly biogeography. *Zootaxa* 2425: 45-68. (in English) ["*Lauromacromia melanica* sp. nov. from Conceição da Barra municipality, Espírito Santo State, Brazil, is described and illustrated based on two males (both in MNRJ nº 135). The new species is similar to *L. pinguaba* differing from it mainly by the absence of pale spots on S3–6 and by the ellipsoid shape of metepisternal pale stripe. A key for males of all species of the genus is provided. A cladistic analysis encompassing 43 external morphological male characters carried out in two distinct procedures, the first with all characters unordered and the second with two or three state characters ordered. The unordered analysis generated only one most-parsimonious tree (66 steps of length, CI = 0.69, RI = 0.62). The hypothesis of monophyly of *Lauromacromia* is supported and includes three groups, one formed by the Atlantic Forest species (*L. melanica* sp. nov. + *L. pinguaba*), and another by the Cerrado species (*L. flaviae* + (*L. bedei* + *L. luismoojeni*)), and *L. dubitalis*, positioned in polytomy with these two groups. The ordered analysis also generated only one most-parsimonious tree (68 steps of length, CI = 0.70, RI = 0.67), which maintained the monophyly of *Lauromacromia* but *L. dubitalis* positioned basally as sister-group to the Atlantic Forest + Cerrado species groups. The geographic distribution of *Lauromacromia* is updated with a new record of *L. luismoojeni* based on one adult male (Brazil: Mato Grosso do Sul State) and probable first Brazilian records for *L. dubitalis* (Amazonas and Pará States) based on two larvae. A vicariance hypothesis is proposed to explain spatial evolution of *Lauromacromia*, and based on current biogeographical classifications we consider *Gomphomacromia* and *Rialla* apart from Neotropical biota. Some aspects of biology and ecology of *Lauromacromia* are also discussed." (Authors)] Address: Pinto, A.P., Programa de Pós-graduação em Ciências Biológicas (Zoologia) IB - USP, Museu de Zoologia, Universidade de São Paulo, Av. Nazaré 481, Ipiranga 04263-000, São Paulo, SP, Brazil. E-mail: odonata\_angelo@hotmail.com

**8864.** Popova, O.N.; Smirnova, Yu.A. (2010): Community of aquatic insects in forest-steppe lakes of Baraba (South of West Siberia). *Contemporary Prob-*

lems of Ecology 3(1): 50-54. (in English) ["The studies were performed from 2004 to 2006 (mid-May-late October) on drainage Lake Fadikha, a typical water body with reed beds in the Barabinsk region of the Baraba forest-steppe zone in the south of West Siberia." At the lake and adjacent areas, 41 species of dragonflies (imagoes) were identified. Samples taken from the lake contained larvae of 18 Odonata species. A checklist of the species is omitted in the paper. Some results are discussed as follows: In the sublittoral, 14 species (8 Anisoptera and 6 Zygoptera) and in the reed border, also 14 species (9 Anisoptera and 5 Zygoptera) were found. In the sublittoral, *Lestes sponsa*, *Aeshna serrata*, *Leucorrhinia dubia*, and *Sympetrum danae* were absent. "The absence of *Lestes sponsa* in the sublittoral zone is not surprising since this species prefers shallow, saline, and heavily silted or overgrown water bodies. The absence of the other three species may be occasional [...]. In reeds (*Phragmites australis* reed beds), *Enallagma cyathigerum*, *Erythromma najas*, *Anax parthenope*, and *Somatochlora flavomaculata* are absent. [...] Ten species, characterized by wide environmental valence, appeared to be common for the sublittoral and reeds: *Sympecma paedisca*, *Coenagrion armatum*, *C. lunulatum*, and *C. pulchellum*, and *Leucorrhinia pectoralis*, *L. rubicunda*, *Libellula quadrimaculata*, *Sympetrum flaveolum*, *S. sanguineum*, and *S. vulgatum*. A comparison of the number of dragonfly larvae in the studied biotopes showed that Odonata are 3.3 times more abundant in reeds than in the sublittoral, and of them Anisoptera were 1.7 times and Zygoptera 3.6 times more abundant in reeds than in the sublittoral. The ratio of the numbers of Anisoptera and Zygoptera is 1 : 6.4 in the sublittoral and 1 : 13.5 in reeds. Most likely, these ratios are not quite realistic. This large difference between Anisoptera and Zygoptera in the number of larvae is likely due to the specific distribution of representatives of each of the suborders in the water environment. Anisoptera larvae, unlike Zygoptera larvae, appear to show aggregated distribution more often than random; therefore they are rare and less abundant in samples. Generally, the number of Anisoptera larvae in a water body should not be much smaller than that of Zygoptera larvae because counts of imagoes provide evidence for approximately equal proportions of these suborders in nature." (Authors) Original Russian Text © O.N. Popova, Yu.A. Smirnova, 2010, published in *Sibirskii Ekologicheskii Zhurnal*, 2010, Vol. 17, No. 1, pp. 69-74] Address: Popova, Olga, Institute of Systematics and Ecology of Animals, Siberian Branch of the Russian Academy of Sciences, ul. Frunze 11, Novosibirsk, 630091, Russia. Email: pc@eco.nsc.ru

**8865.** Poschmann, M.; Schindler, T.; Uhl, D. (2010): Fossil-Lagerstätte Enspel – a short review of current knowledge, the fossil association, and a bibliography. *Palaeobiodiversity and Palaeoenvironments* 90: 3-20. (in English) ["Almost two decades ago, the Generaldirektion Kulturelles Erbe Rheinland-Pfalz initiated annual field campaigns in order to investigate geological and palaeobiological aspects of the Fossil-Lagerstätte Enspel, an upper Oligocene crater lake. Since then, the fossil-bearing 'oilshale' became more and more exposed due to the removal of the overlying basalt, which is still being commercially exploited. This contribution briefly summarizes the current knowledge that accumulated mainly within the last 20 years, gives a taxonomic listing of the fossil association, and includes a bibliography." (Authors) The following odonate taxa were iden-

tified from the Enspel Lagerstätte: *Lestomorpha?*, oviposition of "coenagrionid-type", *Oligaeschna jungi* Piton and Theobald, 1939, and *Aeshninae* indet.] Address: Poschmann, M., Generaldirektion Kulturelles Erbe RLP, Direktion Landesarchäologie, Referat Erdgeschichte, Große Langgasse 29, 55116 Mainz, Germany. E-mail: markus.poschmann@gdke.rlp.de

**8866.** Pryke, J.S.; Samways, M.J. (2010): Significant variables for the conservation of mountain invertebrates. *J. Insect Conserv.* 14: 247-256. (in English) [Conserving biodiversity on mountains holds particular challenges, with topographic species beta diversity being high. In turn, conserving mountain biodiversity in the heart of a biodiversity hotspot, with intense urbanization on its lower slopes, poses further challenges. We investigate here an iconic mountain at the southern tip of Africa, which is under multiple human pressures, while receiving much conservation attention. We sought here some general principles to guide conservation management of this and other similar mountains. Our focal organisms were surface-active invertebrates, as they are abundant, diverse, and environmentally sensitive at point localities. We show that vegetation structure and elevation were the most important environmental variables determining this diversity. Type of fynbos vegetation, proximity of forest to a river, aspect, and abundance of the alien Argentine ant *Linepithema humile*, had no significant influence. Suburban woodland species richness and abundance had a non-significant difference to that of natural forest. Fynbos had high species beta diversity of invertebrates, suggesting that large areas of this dominant vegetation type should be conserved. However, many specialist and highly local endemic species were in forest, highlighting the irreplaceability of forest habitats. Such a mountain, with its complex topography, requires total protection, as there is no room for loss of any part of the mountain. We emphasize that, while the upper slope and summit are well protected, the lower slopes are in need of urgent attention, a situation which mirrors that in Europe." (Authors) Reference is made to *Orthetrum rubens* which has not been recorded on the Cape Peninsula since the holotype was collected in 1927.] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**8867.** Ramamurthy, V.V.; Akhtar, M.S.; Patankar, N.V.; Menon, P.; Kumar, R.; Singh, S.K.; Ayri, S.; Parveen, S.; Mittal, V. (2010): Efficiency of different light sources in light traps in monitoring insect diversity. *Munis Entomology & Zoology* 5(1): 109-114. (in English) [Field observations were undertaken at weekly interval (standard week), in 2007-08 at the Indian Agricultural Research Institute, New Delhi, India for studying the effect of three light sources in light traps (viz., mercury, black and ultra violet) on insect catch and relationship with weather parameters. More than 70% of Odonata were caught at mercury, and app. 30% at black light sources. None was attracted by ultra violet light sources. The absolute numbers of Odonata are not stated.] Address: Ramamurthy, V.V., Division of Entomology, Indian Agricultural Research Institute, New Delhi-110012, India

**8868.** Reels, G. (2010): Report on field surveys of dragonflies in Hainan, China, and preparation of a field guide to the Odonata of the island. *International Dragonfly Fund - Report* 24: 1-60. (in English) [Four Kadoorie Farm & Botanic Garden (KFBG, Hong Kong)

field surveys were joined in order to gather information for a field guide on Hainan Odonata focused primarily on nature reserves, with some sampling of unprotected upland and lowland habitats. The locations visited were dictated by KFBG, in close collaboration with local officials, and comprised sites in southern, central and eastern parts of the island. The results of the study are detailed and species list are presented locality-wise. A checklist of 160 Odonata of Hainan is presented, but additional material from other region of the Island and current studies not yet finished are known. The total number of Hainan Odonata taxa should be 170, and it is to expect that this number will be exceeded by intensifying research activities. The paper contains personally written reports and little stories, and is furnished with wonderful pictures of Odonata species and landscape impressions.] Address: Reels, G., H-3-30 Fairview Park, Yuen Long, Hong Kong. E-mail address: greels@gmail.com

**8869.** Resende, D.C. (2010): Residence advantage in heterospecific territorial disputes of Erythrodiplax braueri species (Odonata, Libellulidae). *Revista Brasileira de Entomologia* 54(1): 110-114. (in English, with Portuguese summary) [Área de Proteção Ambiental (APA) São José, Minas Gerais, Brazil; "Territories are the outcome of interactions determining where and how long individuals settle. To odonate species, aggressive disputes are not so common since the outcome can be predetermined by advantages such as residency, age, and body size. However, it is possible to predict that at heterospecific disputes, larger body-sized or more aggressive species have some profits overcoming these individual advantages, generating patterns of species hierarchy. Here, I studied the aggressiveness of five Erythrodiplax species (E. famula, E. fusca, E. latimaculata, E. media, E. pallida) during territorial disputes and verified if larger body-sized species are more aggressive than smaller ones or if the residence advantage prevails on the heterospecific disputes. Larger species were not more aggressive than smaller ones and winners of intra- and interspecific territorial disputes were defined mainly by the residence. So, the residence advantage between heterospecific opponents appears to prevail over any other asymmetry among these species. This pattern may occur because, despite the territorial behaviour in dragonfly males, heterospecific disputes may not increment male reproductive success because it may not increase their access to females." (Author)] Address: Resende, D.C., Laboratório de Bioinformática e Evolução, Departamento de Biologia Geral, Universidade Federal de Viçosa, 36570-000, Viçosa-MG, Brasil. E-mail: dcresende@ig.com.br

**8870.** Sadeghi, S.; Kyndt, T.; Dumont, H.J. (2010): Genetic diversity, population structure and taxonomy of *Calopteryx splendens* (Odonata: Calopterygidae): An AFLP analysis. *Eur. J. Entomol.* 107(2): 137-146. ["*Calopteryx splendens* is a widely distributed palaeartic damselfly with a remarkably uniform morphology. Variation in the size and shape of the pigmented spot on the wing is the main diagnostic character used to discriminate subspecies across its huge geographic range. Here, AFLP analysis was used to assess the genetic structure and diversity of nine populations representing 3 putative subspecies and evaluate the pigment spot as a taxonomic marker. Genetic diversity was high, with the number of polymorphic loci per population ranging from 141 to 280 out of a total of 333 variable sites

(42.3–84.1%) and Nei's gene diversity from 0.160 to 0.283 (overall 0.299). Overall population genetic differentiation ( $F_{ST} = 0.2766$ ) suggests limited gene flow and adaptation to local environments. Restricted gene flow and genetic differentiation among populations are supported by significant  $F_{ST}$  estimates. High levels of gene flow ( $N_m > 1$ ) were only recorded among three Asian populations (Russia – Kazakhstan – Turkey). The patterns of genotypic diversity suggest that a given wing spot size and shape may arise from the hybridization of a limited number, possibly not more than four, ancestral gene pools in different ways and at different times. Clearly, the sample analyzed was not sufficient to capture all of the complex history of *C. splendens*, but sufficient to indicate the taxa *ancilla*, *waterstoni*, and *orientalis* possibly represent three of the four ancestral gene pools, and originated in western Asia. The origin of the fourth, *xanthostoma*, is the western Mediterranean." (Authors)] Address: Dumont, H.J., Department of Biology, Gent University, Ledeganckstraat 35, B-9000 Gent, Belgium; e-mail: henri.dumont@ugent.be

**8871.** Samejima, Y.; Tsubaki, Y. (2010): Body temperature and body size affect flight performance in a damselfly. *Behav. Ecol. Sociobiol.* 64: 685-692. (in English) ["Flight performance is undoubtedly an important factor for behavioural success in flying insects. Though it is well-known that the flight performance is influenced by body temperature and body size, the relative importance of these factors is not well-understood. We performed laboratory experiments using the male-polymorphic damselfly *Mnais costalis* with larger territorial males and smaller nonterritorial males in a population. We analyzed the effects of body temperature and body size, measured as the thoracic temperature and left hind-wing length, respectively, on two indices of flight performance: maximum lifting force and size-corrected lifting force. The latter is an index of acceleration that is related to aerial agility. The results showed that higher body temperature produced both larger maximum lifting force and larger size-corrected lifting force. In contrast, while larger size produced a larger maximum lifting force, it produced a lower size-corrected lifting force. The results of field measurements showed that territorial males had variable thoracic temperatures depending on the insolation in their territories. In contrast, nonterritorial males had less variable and generally higher thoracic temperatures than territorial males as they are mostly found in sunny spots. Until now, the influence of body temperature on behavioural performance has remained unclear although considerable studies have suggested such influence. We showed, here, for the first time, combined effects of body size and body temperature on flight performance. We also showed that body temperature was influenced by the mating strategies of a damselfly. These findings provide new insights into the cost and benefits of territorial behaviour in ectothermic animals." (Authors)] Address: Samejima, Y., Center for Ecological Research, Kyoto University, 2-509-3 Hirano, Otsu, Shiga, Japan. E-mail: samejima@ecology.kyoto-u.ac.jp

**8872.** Sanchez-Herrera, M.; Realpe, E. (2010): Population structure of *Polythore procera* at a Colombian stream (Odonata: Polythoridae). *International Journal of Odonatology* 13(1): 27-37. (in English, with Spanish summary) ["We studied a population of *Polythore procera* along a stream in the Colombian eastern Andean foothills. Mark and recapture samples were made dur-



ing January to April 2006, covering both dry and wet seasons. We determined population size, daily survival probability, and longevity during the entire period and compared them with precipitation data. Age and sex proportions along two different sectors of the stream were also analyzed, and notes about their ecology and habitat were taken. Our data suggest this species has a high daily survival probability in comparison with those of other odonates. Males are highly territorial, and exhibit low dispersal capacity. We also conclude that population dynamics of *P. procerus* can be affected by an extrinsic factor such as seasonality." (Authors) Address: Sánchez-Herrera, Melissa, Laboratorio de Zoología y Ecología Acuática, Departamento de Ciencias Biológicas, Universidad de Los Andes, Carrera 1 N° 18A 10, Bogotá, Colombia. E-mail: mel-sanc@uniandes.edu.co

**8873.** Śniegula, S.; Johansson, F. (2010): Photoperiod affects compensating developmental rate across latitudes in the damselfly *Lestes sponsa*. *Ecological Entomology* 35(2): 149-157. (in English) ["1. Although there is a great deal of theoretical and empirical data about the life history responses of time constraints in organisms, little is known about the latitude-compensating mechanism that enables northern populations' developmental rates to compensate for latitude. To investigate the importance of photoperiod on development, offspring of the obligatory univoltine damselfly *Lestes sponsa* from two populations at different latitudes (53°N and 63°N) were raised in a common laboratory environment at both northern and southern photoperiods that corresponded to the sites of collection. 2. Egg development time was shorter under northern photoperiod regimes for both populations. However, the northern latitude population showed a higher phenotypic plasticity response to photoperiod compared with the southern latitude population, suggesting a genetic difference in egg development time in response to photoperiod. 3. Larvae from both latitudes expressed shorter larval development time and faster growth rates under northern photoperiod regimes. There was no difference in phenotypic plastic response between northern and southern latitude populations with regard to development time. 4. Data on field collected adults showed that adult sizes decreased with an increase in latitude. This adult size difference was a genetically fixed trait, as the same size difference between populations was also found when larvae were reared in the laboratory. 5. The results suggest phenotypic plasticity responses in life history traits to photoperiod, but also genetic differences between north and south latitude populations in response to photoperiod, which indicates the presence of a latitudinal compensating mechanism that is triggered by a photoperiod." (Authors)] Address: Śniegula, S., Dept of Ecosystem Conservation, Institute of Nature Conservation, Polish Academy of Sciences, Kraków, Poland. E-mail: szymon.sniegula@gmail.com

**8874.** Sujay, Y.H.; Sattagi, H.N.; Patil, R.K. (2010): Invasive alien insects and their impact on agroecosystem. *Karnataka J. Agric. Sci.* 23(1): 26-34. (in English) [*Heteropsylla cubana* (Psyllidae: Homoptera), native of Central America was introduced into India during the 19th century. It sucks the sap from young shoots, leaves and inflorescences which results in complete deformation of young shoots, plants susceptible *Leucaena* species and varieties. In severe cases, the plants could not recover. In Karnataka, *Leucaena* is

being cultivated in an area of 10,000 ha its planned extension by the Karnataka Plantation Corporation by 4000 ha was abandoned for the fear of loosing the plantation due to the psyllid attack. *Pantala flavescens* fed on the outbreak populations of the psyllid but is sated not to exercise the required control.] Address: Sujay, Y.H., Department of Agricultural Entomology, University of Agricultural Sciences, Dharwad- 580 005, Karnataka, India. E-mail: sujayhurali@yahoo.co.in

**8875.** Sun, J.Y.; Pan, C.X.; Tong, J.; Zhang, J. (2010): Coupled model analysis of the structure and nano-mechanical properties of dragonfly wings. *IET Nanobiotechnol.* 4(1): 10-18. (in English) ["To establish the quantitative model of the dragonfly wing the reconfiguration and nanoindentation technique were used. The mechanical properties of wings were measured by nanoindenter. Generally, the costa undertake is mainly pressure, and its mechanical properties should be the largest. However, in the nanoindentation test, the largest value of the reduced modulus ( $E_r$ ) and hardness ( $H$ ) mainly appear in the radius, except the value at 0.7L (L is the wing length). The  $E_r$  and  $H$  of the forewing were larger than that of the hindwing, except the value at 0.7L. The reversing engineering (3-D scanner) and AutoCAD were cooperated to reconfigure the dragonfly wing. Then the material parameters and skeleton transforms to a finite element analysis. The quantitative models were discussed in static range." (Authors)] Address: Sun, J.Y., Key Laboratory of Bionic Engineering, Ministry of Education and Jilin University, College of Biological and Agricultural Engineering, Changchun, People's Republic of China

**8876.** Theischinger, G. (2010): Der GSI-Clade (Odonata, Libelluloidea) in Australien – Systematik im Fluss. *Entomologica Austriaca* 17: 49-66. (in German, with English summary) ["GSI (=Gomphomacromia-Synthemis-Idionyx"), a taxon recently (WARE et al. 2007) established for a monophyletic group (clade) of higher Libelluloidea, is discussed. Details are presented on the history of discovery and systematic integration of the Australian members of the group. Information is also given on morphological characters of adults and larvae, distribution, biology, behaviour, conservation, collecting and preparation, and pressing research priorities are pointed out." (Author) Address: Theischinger G., NSW Department of Environment and Climate Change, 480 Weeroona Rd, Lidcombe, NSW, Australia 2141. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**8877.** Tom, K.R.; Newman, M.C.; Schmerfeld, J. (2010): Modeling mercury biomagnification (South River, Virginia, USA) to inform river management decision making. *Environmental Toxicology and Chemistry* 29(4): 1013-1020. (in English) ["Mercury trophic transfer in the South River (VA, USA) was modeled to guide river remediation decision making. Sixteen different biota types were collected at six sites within 23 river miles. Mercury biomagnification was modeled using a general biomagnification model based on 15N and distance from the historic mercury release. Methylmercury trophic transfer was clearer than that for total Hg and, therefore, was used to build the predictive model ( $r^2$  prediction = 0.76). The methylmercury biomagnification factors were similar among sites, but model intercept did increase with distance down river. Minimum Akaike's Information Criterion Estimation (MAICE) justified the incorporation of distance in the model. A model with a very similar biomagnification factor to the South

River (95% confidence intervals [CI] = 0.38-0.52) was produced for a second contaminated Virginia river, the North Fork Holston River (95% CI = 0.41-0.55). Percent of total Hg that was methylmercury increased monotonically with trophic position. Trophic models based on  $^{15}\text{N}$  were adequate for predicting changes in mercury concentrations in edible fish under different remediation scenarios." (Authors) Test organisms include "Gomphidae" and "Zygoptera".] Address: Newman, M., College of William and Mary - VIMS, Gloucester Point, Virginia 23062, USA. E-mail: [newman@vims.edu](mailto:newman@vims.edu)

**8878.** Verma, A.K.; Saksena, D.N. (2010): Impact of pollution on sewage collecting River Kalpi (Morar) Gwalior (M.P.) with special reference to water quality and macrozoobenthic fauna. *Asian j. exp. biol. sci.* 1(1): 155-161. (in English) [India; Five odonate taxa are listed. The highly polluted stretches of the river are uninhabited by Odonata with the exception of *Brachythemis contaminata*. That species doesn't occur at stretches without or with less pollution.] Address: Verma, A.K., Limnology Research Unit, Aquatic Biology Laboratory, SOS in Zoology, Jiwaji University, Gwalior-474011 (M.P.), India. E-mail: [akwater79@yahoo.com](mailto:akwater79@yahoo.com)

**8879.** Villanueva, R.J.T. (2010): Dragonflies of Polillo Island, Philippines. *International Dragonfly Fund - Report 23*: 1-24. (in English) [Polillo is a small group of islands east of central Luzon made up of four main islands and several islets. Odonata were recorded and voucher specimens collected between April 16 and April 27 2009. Sixty-two species of 14 families and 41 genera were found. An additional two unidentified Aeshnidae were seen. Two of the 17 previously recorded species were not found. An observed *Anax* could not be determined and it was uncertain whether it was the previously recorded *A. guttatus* or represented an additional island record. The *Gynacantha* material could not be compared at the moment with the previously recorded species. Forty-seven of the recorded species are new to the island and one species is new to the Philippines. Furthermore, five of the recorded species (*Sulcosticta*, *Amphicnemis*, *Teinobasis*, *Heliogomphus*) are new or possible new to science. An additional four of the recorded species (*Drepanosticta*, *Amphicnemis*, *Teinobasis*, *Rhinocypha*) shows variation from known species or need more material for better comparison and some of them may even represent an additional species new to science. The first male of *Idionyx salva* was found. *Drepanosticta* sp. n. without naming is described. *Teinobasis martinschorri* nov. sp. is described after three males (holotype male: Tamulaya, Polillo, Polillo Island. April 25, 2009. RJTV leg., to be deposited in RMNH; paratype: 2 males in the authors collection). A female of *Gomphidia kirschii* is described in detail.] Address: Villanueva, R.J.T., 1 D3C Gahol Apartment, Lopez Jaena St., Davao City, 8000 Philippines. E-mail: [rjtvillanueva@gmail.com](mailto:rjtvillanueva@gmail.com)

**8880.** Vries, H.H. de (2010): Species Protection Plan for *Aeshna viridis*. *Brachytron* 12(1/2): 25-31. (in English, with Dutch and German summaries) ["*A. viridis* was the first dragonfly in the Netherlands to have its own national species protection plan. This was published in 2001 by the Ministry of Agriculture, Nature and Fisheries, aiming to initiate several conservation activities. As *A. viridis* is strongly associated with *Stratiotes aloides*, this plant plays an important role in the strategies adopted for protection and communication. The protection plan led to a number of projects in several

provinces, including the compilation of distribution maps, communication about good management and starting nature restoration. Backed up with European legislation, the need for protection of this species has come to the attention of a much wider audience. Therefore, it can be expected that this plan will continue to have an effect long after the projects it gave rise to have ended." (Author)] Address: de Vries, H., De Vlinderstichting, Postbus 506, NL 6700 AM Wageningen, The Netherlands. E-mail: [henk.devries@vlinderstichting.nl](mailto:henk.devries@vlinderstichting.nl)

**8881.** Walid Fathy, M.; El Sayed, H. S. (2010): A checklist of some recorded insects in Misurata, Libya. *Journal of King Saud University (Science)* 22(2): 61-65. (in English) [Three Odonata species: *Anax ephippiger*, *Ischnura sengalensis*, *Brachythemis leucosticta* are listed.] Address: Walid Fathy, M., Faculty of Education, Ain Shams University, Roxy, Cairo, Egypt. E-mail: [walidfathy72@yahoo.com](mailto:walidfathy72@yahoo.com) (M. Walid Fathy)

**8882.** Wedmann, S.; Poschmann, M.; Hörschemeyer, T. (2010): Fossil insects from the Late Oligocene Enspel Lagerstätte and their palaeobiogeographic and palaeoclimatic significance. *Palaeobio. Palaeoenv.* 90: 49-58. (in English) ["Fossil insects can provide unique insights into evolutionary history, and their study has become increasingly important in recent decades. In this paper, we give an overview of the insect taphocoenosis from the upper Oligocene Enspel Lagerstätte (Rheinland-Pfalz, Germany) and discuss taphonomic similarities with other localities. Among the fossil insects identified, terrestrial groups are highly dominant, with march flies (Bibionidae) and weevils (Curculionidae) being the most common groups; aquatic insects are rare. We provide a detailed survey of the represented taxa, including new records of a predaceous diving beetle (Dytiscidae), a soldier beetle (Cantharidae) and mayfly larvae (Ephemeroptera). Updated information on the ants (Formicidae) and reticulated beetles (Cupediidae) is reported. The palaeoclimatic and palaeobiogeographic inferences that can be drawn from the represented groups are discussed. Studies on the insects from Enspel indicate a warm temperate climate. Several records document that the distribution of many insect groups in the Oligocene was distinctly wider than it is today. [...] While only one adult damselfly (Odonata: Zygoptera) has been found in Enspel, several dragonflies (Odonata: Anisoptera) have been recorded, comprising both larvae and remains of the adults (Wedmann 2000) (Fig. 6). Most fossils belong to the darners (Aeshnidae), but the morphological diversity seen among the larvae (Fig. 6a-c) suggests the presence of further, hitherto undetermined dragonfly families. Several fossils of adult specimens belong to the species *Oligaeschna jungi* Piton and Theobald, 1939 (Fig. 6d), previously recorded from the upper Oligocene locality Puy-de-Mur (Auvergne, France) (Piton and Theobald 1939). A leaf with characteristic marks of damselfly eggsets has also been found (Poschmann and Wedmann 2005)." (Authors)] Address: Wedmann, Sonja, Forschungsstation Grube Messel, Forschungsinstitut Senckenberg, Markstraße 35, 64409 Messel, Germany. E-mail: [Sonja.Wedmann@senckenberg.de](mailto:Sonja.Wedmann@senckenberg.de)

**8883.** Wesner, J.S. (2010): Aquatic predation alters a terrestrial prey subsidy. *Ecology* 91(5): 1435-1444. (in English) ["Organisms with complex life histories (CLH) often cross habitat or ecosystem boundaries as they develop from larvae to adults, coupling energy flow bet-

ween ecosystems as both prey (bottom-up) and consumers (top-down). Predation effects on one stage of this life cycle can therefore cascade across ecosystems, magnifying the impact of local predation. The majority of predation studies have assessed effects only on a local level, within the habitat of the predator. I used large outdoor stream mesocosms to test the hypothesis that predation in an aquatic habitat alters the magnitude and trophic structure of a prey assemblage in a terrestrial habitat. I also tested how a consumer in the terrestrial habitat (web-weaving spiders) responded to these changes in prey export. Two fish species were the predators (red shiner, *Cyprinella lutrensis* and orangethroat darter, *Etheostoma spectabile*) in an experiment with three treatments: both fish species monocultures plus a fishless control. Fish predation reduced aquatic insect emergence biomass by 50% compared to the fishless control and altered the trophic structure of the emergent community, reducing emerging insect predator biomass by 50%, but had no effect on other insect trophic groups. Spiders captured only insects that were unaffected by fish predation (mostly chironomids) and therefore did not respond numerically to overall changes in insect abundance or biomass. Patterns of insect emergence were largely driven by a strong negative relationship between fish and a predatory dragonfly (*Pantala flavescens*). The results of this experiment show that predation in one habitat can have strong effects on the biomass and trophic structure of subsidies entering adjacent habitats, resulting in contrasting predictions for the role of these subsidies in recipient food webs. In the absence of fish, aquatic habitats produced terrestrial insect communities with higher biomass (bottom-up potential) and a higher proportion of predators (top-down potential) than when fish were present." (Author)] Address: Wesner, J.S., Biological Station and Department of Zoology, University of Oklahoma, Norman, Oklahoma 73019 USA

**8884.** Wildermuth, H. (2010): Die Wasserschlauch-Arten im oberen Glatttal, Kanton Zürich, mit besonderer Berücksichtigung von *Utricularia stygia* Thor. *Bauhinia* 22: 61-82. (in German, with English summary) ["Occurrence and distribution of Central European bladderworts (*Utricularia* spp.) have been studied in the upper Glatt Valley (Canton of Zürich, Switzerland), with special reference to *U. stygia*. [...] Recent decline of *Utricularia* spp. in the Swiss Plateau and its causes are outlined and recommendations for suitable habitat management are given to secure long-term survival of the rare *Utricularia* species in Switzerland. Special attention is paid to cooccurrence of *Utricularia stygia*, *U. intermedia*, *U. minor* and the damselfly *Nehalennia speciosa*, all exhibiting similar habitat requirements." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**8885.** Wilkens, H. (2010): Vielfalt auf der Kanareninsel Lanzarote: Vögel auf Lava. *Der Falke* 57(1): 16-22. (in German) [Canary Islands, Spain; the paper includes brief note on predation of *Ischnura saharensis* by *Falco eleonorae*.] Address: not stated

**8886.** Wittwer, T.; Sahlen, G.; Suhling, F. (2010): Does one community shape the other? Dragonflies and fish in Swedish lakes. *Insect Conservation and Diversity* 3(2): 124-133. (in English) ["1. Freshwater communities are often structured by predation. In permanent lentic freshwater habitats dragonfly larvae are major predators which, in return, suffer predation by fish. Antipreda-

tor traits vary between the dragonfly species, and the dragonfly communities are therefore shaped by the presence of fish. But fish communities vary, and as different fish species affect dragonflies in different ways, the species composition of the fish community may affect the composition of the dragonfly community. 2. We sampled dragonfly larvae in 24 lakes with a known fish stock in south-western Sweden, and explored the impact of fish as well as vegetation structure on dragonfly communities by means of multivariate analyses. 3. We found that the presence of four fish species affected the community structure of dragonflies. The impact strength depended mainly on the abundance of *Perca fluviatilis*, with which most dragonfly species were negatively correlated. Many dragonfly species were also positively correlated with the occurrence of at least one fish species, which may reflect similar habitat requirements or imply indirect positive effects of these fish species. 4. Of the 24 recorded dragonfly species, four did not occur in lakes dominated by *P. fluviatilis*, whereas only one species was lacking in lakes dominated by *Rutilus rutilus*. The dragonfly species diversity was higher in *R. rutilus* lakes than in *P. fluviatilis* lakes. 5. Our results suggest that the fish species composition is a major determinant of the dragonfly community, which in turn will influence the lower trophic levels." (Authors)] Address: Wittwer, T., Department of Earth and Ecosystem Sciences, Lund University, Sölvegatan 12, SE-223 62 Lund, Sweden. E-mail: torben.wittwer@nateko.lu.se

**8887.** Zhang, H. (2010): The Superfamily Calopterygoidea in South China: taxonomy and distribution. Progress Report for 2009 surveys. International Dragonfly Fund - Report 26: 1-36. (in English) [Three families in the superfamily Calopterygoidea occur in China, viz. the Calopterygidae, Chlorocyphidae and Euphaeidae. They include numerous species that are distributed widely across South China, mainly in streams and upland running waters at moderate altitudes. To date, our knowledge of Chinese species has remained inadequate: the taxonomy of some genera is unresolved and no attempt has been made to map the distribution of the various species and genera. This project is therefore aimed at providing taxonomic (including on larval morphology), biological, and distributional information on the superfamily in South China. In 2009, two series of surveys were conducted to Southwest China-Guizhou and Yunnan Provinces. 1. Odonata recorded from Xiangzhigou, Guizhou Province: A total of 51 species were found in Xiangzhigou area, belonging to 11 families. Many of the species recorded here are rather rare in South China, such as *Anaciaeschna martini*, *Cephalaeschna needhami*, *Cephalaeschna obversa*, *Planaeschna maolanensis*, *Polycanthagyna melanictera*, *Chlorogomphus papilio*, *Watanabeopetalia usignata*. 2. Odonata from Yunnan: A total of 82 species in 12 families were recorded from Xiangshuangbanna, Yunnan Province. Four species are new to the fauna of China, and 9 species have not been identified." (Author)] Address: Zhang, H., Department of Entomology, College of Natural Resources and Environment, South China Agricultural University, Guangzhou 510642, China. E-mail: zhanghaomiao6988@gmail.com

**Thanks to all who contributed to this issue of OAS. A special thank to Pawel Buczyński who provided us with publications from eastern central Europe.**



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Martin Lindeboom, Silberdistelweg 11, D-72113 Ammerbuch, Germany. Tel. ++49 (0)7073 300770; E-mail: martin@lindeboom.de  
Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105;  
E-mail: K.Reinhardt@sheffield.ac.uk  
Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

---

## 1997

**8888.** Ihssen, G. (1997): Florida vom 15.03. bis 05.04.1994. Ein naturkundliches Reisetagebuch mit ausführlicher Behandlung der Libellenfunde (Odonata). Naturkundliche Reiseberichte 6: 1-53. (in German) [Detailed report on a trip to Florida, USA between 15-III. and 5-IV-1994] Address: Ihssen, G., Timm-Kröger-Weg 6, 22335 Hamburg, Germany

## 2000

**8889.** Miyashita, M. (2000): Studies on the method for assessment of the habitat of the damselfly *Mortonagrion Hirosei*. Proceedings of the Japan Society of Civil Engineers 657: 65-73. (in Japanese, with English summary) [M. Hirosei was studied at the Tone Kamorae Chashi bridge on the Tonegawa river, Japan. Water level fluctuation and salinity were measured as ecological variables. The larvae were recorded only from a pond on a "sunken place" on the riverside (landward pothole?), covered with dead reed leaves.] Address: not stated

**8890.** Miyashita, M. (2000): Studies on the conditions of location and restoration of the habitat of the damselfly *Mortonagrion Hirosei*. Proceedings of Annual Meeting of Environmental Systems Research 28: 475-483. (in Japanese, with English summary) [M. Hirosei, was designated as an endangered species by the Japanese Environment Agency in 1991, due to the vulnerability to the habitats against effects of land reclamation and river improvement. It prefers as habitat reed vegetation, and is distributed from the Kitakamigawa River in Miyagi Prefecture to the Tsushima Islands in Nagasaki Prefecture, Japan. Habitats of the species are located from the estuary up to a distance of 40 km from the mouth of a river. Four types are occupied; riverside, movable dam, brackish lake and tidewater control pond. The author considers fluctuation of salinity and water level as most important environmental variables in population ecology of the species.] Address: not stated.

## 2001

**8891.** Rose, J. (2001): Dragonflies for birders. The bulletin of the Chapel Hill Bird Club 30(3): 4-6. (in Eng-

lish) [General on Anisoptera in North Carolina, USA.] Address: not stated

**8892.** Vinebrooke, R.D.; Turner, M.A.; Kidd, K.A.; Hann, B.J.; Schindler, D.W. (2001): Truncated foodweb effects of omnivorous minnows in a recovering acidified lake. *J. N. Am. Benthol. Soc.* 20(4): 629-642. (in English) ["Cyprinids (*Margariscus margarita*, *Phoxinus* spp., *Pimephales promelas*) have resumed reproduction in a boreal headwater lake (Lake 302S, Experimental Lakes Area, northwestern Ontario) that is recovering from experimental acidification. Concomitant changes to the littoral food web suggested that these omnivorous minnows suppressed the development of green algal mats, termed metaphyton. We tested this hypothesis by conducting an experiment using minnow enclosures, minnow exclosures, and open control plots in the shallow littoral zone of Lake 302S. Minnows significantly suppressed zooplankton biomass, and altered community composition by disproportionately reducing large daphnids and chydorids. Epiphytic chironomids were also significantly less abundant in the presence of minnows. Minnows had a significant time-dependent, negative effect on benthic invertebrate biomass and community composition because chironomids and anisopterans were suppressed during the second half of the 6-wk experiment. However, minnows did not reduce the abundance of the dominant primary producer, namely metaphyton. Stable isotope analyses revealed that minnows did not suppress metaphyton because these algae were not the primary C source for the food web. Instead, our findings suggest that the littoral food web depended mainly on sedimentary C, which resulted in the foodweb effect of minnows being truncated at the level of invertebrates. Therefore, metaphyton appears to be regulated primarily by abiotic factors (e.g., availability of dissolved inorganic C) and not herbivory in recovering acidified lake." (Authors)] Address: Vinebrooke, R., Department of Biological Sciences, University of Alberta, Edmonton, Alberta T6G 2E9, Canada. E-mail: rolf@ualberta.ca

**8893.** Voisin, J.-F. (2001): The entomology collections of the Museum national d'Histoire naturelle, Paris (France). *Norw. J. Ent.* 48(1): 31-34. (in English) ["The Museum was founded in 1793. The staff of the Ent. Lab. includes 42 persons (25 research scientists, 17 technicians & administrative employees). It is organised according to the major taxonomic units, but in 1996, another division was superimposed onto taxonomically

based organisation, viz. "Origin and structure of insect biodiversity" and "Systematics, biodiversity and insect evolution". The section, "Odonata & small orders" harbours a collection of 160,000 specimens. The total insect collection of the Laboratory consists of ca. 45,5 million specimens, covering ca 400,000 insect species. The best represented regions are W Europe, the Mediterranean, Madagascar, W Africa, New Caledonia and French Guyana." (Author)] Address: Voisin, J.-F., Lab. Zool., Mus. natn. Hist, nat., 45 rue Buffon, F-75005 Paris, France

## 2002

**8894.** Futahashi, R.; Futahashi, H. (2002): The first record of the migrant *Sympetrum vulgatum* imitans from Japan. *Tombo* 45(1/4): 29-30. (in Japanese, with English summary) [Four males, one caught at 4-X-2002 and three at 6-X-2002, Takaoka City, Toyama Prefecture, Japan] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**8895.** Futahashi, R.; Futahashi, H., Arab, Y. (2002): Recent findings concerning Odonata in the Hokuriku district, part 2. *Tombo* 45(1/4): 31-32. (in Japanese, with English summary) ["*Paracercion melanotum* is here recorded for the first time from Ishikawa Prefecture. Some zoogeographical comments are given for the noteworthy species, *Lestes japonicus*. Eight males and one female of the migrant species, *Sympetrum fonscolombii* were collected from Toyama and Ishikawa Prefectures. One male, an interspecific hybrid between *Anax n. nigrofasciatus* and *A. parthenope julius* is newly recorded from Ishikawa Prefecture, Japan." (Author)] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**8896.** Labandeira, C.C. (2002): Paleobiology of predators, parasitoids, and parasites: Death and accommodation in the fossil record of continental invertebrates. In: Kowalewski, M., and P.H. Kelley, (eds.), 2002. *The Fossil Record of Predation*. Paleontological Society Papers 8: 211-249. (in English) ["Carnivory is the consumption of one animal by another animal; among invertebrates in terrestrial and freshwater ecosystems this type of feeding can take three forms: predation, parasitoidism, and parasitism. Differences among these three functional modes involve (i) whether the duration of feeding on the prey item is quick or there is an accommodation, coevolutionary or otherwise, between the carnivore and the host prey; (ii) whether the prey or host is killed; (iii) whether single or multiple prey or host items are consumed during the carnivore's lifespan, and (iv) the relative sizes of the carnivore and its prey or host. Uniformitarian and nonuniformitarian evidence directly relating to the history of carnivory can be found in exceptionally preserved deposits from the mid-Paleozoic to the Recent, but such evidence is relatively rare because carnivores are the least represented trophic group in ecosystems. Six types of paleobiological data provide evidence for carnivory: taxonomic affiliation, fossil structural and functional attributes, organismic damage, gut contents, coprolites, and indications of mechanisms for predator avoidance. Only 12 invertebrate phyla have become carnivorous in the continental realm. Six are lophotrochozoans (*Acanthocephala*, *Rotifera*, *Platyhelminthes*, *Nemertinea*, *Mollusca*, and *Annelida*) and six are ecdysozoans (Ne-

matoda, *Nematomorpha*, *Tardigrada*, *Onychophora*, *Pentastoma*, and *Arthropoda*). Most of these groups have poor continental fossil records, but the two most diverse - nematodes and arthropods - have comparatively good representation. The record of arthropods documents (i) the presence of predators among primary producers, herbivores, and decomposers in early terrestrial ecosystems; (ii) the addition later in the fossil record of the more accommodationist strategies of parasitoids and parasites interacting with animal hosts; (iii) the occurrence of simpler food-web structures in terrestrial ecosystems prior to parasitoid and parasite diversification; and (iv) a role for mass extinction in the degradation of food-web structure that ultimately affected carnivory. Future research should explore how different modes of carnivory have brought about changes in ecosystem structure through time. Despite numerous caveats and uncertainties, trace fossils left by predators on skeletons of their prey remain one of the most promising research directions in paleoecology and evolutionary paleobiology." (Author) The paper includes many references to Odonata.] Address: Labandeira, C., Department of Paleobiology, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560-0121 and Department of Entomology, University of Maryland, College Park, Maryland 20742 USA. E-mail: labandec@si.edu

## 2003

**8897.** Appleton, C.C.; Curtis, B.A.; Kipping, J. (2003): Appendix 2. Macro-invertebrate collections by geo-reference point. In: Alonso, L.E. & Nordin L.-A. (2003): A rapid biological assessment of the aquatic ecosystems of the Okavango Delta, Botswana: High water survey. *RAP Bulletin of Biological Assessment* 27, Conservation International, Washington DC: 123-129. (in English) [52 points have been researched; some of them with records of Odonata.] Address: Kipping, J., BioCart - Ökologische Gutachten & Studien, Albrecht-Dürer-Weg 8, D-04425 Taucha, Germany. E-mail: BioCartKipping@web.de

**8898.** De Vries, H. (2003): Libel met een eigen website: de groene glazenmaker. - *Aeshna viridis*, a dragonfly with its own website. *Vlinders* 18(3): 12-13. (in Dutch, with English summary) [General remarks on the current situation of *A. viridis* in the Netherlands, with emphasis on the management of its habitats and on the related Stratiotes aloides research. For detail see [www.groeneglazenmaker.nl](http://www.groeneglazenmaker.nl)] Address: henk.devries@vlinderstichting.nl

**8899.** Stoffels, R.J.; Karbe, S.; Paterson, R.A. (2003): Length-mass models for some common New Zealand littoral-benthic macroinvertebrates, with a note on within-taxon variability in parameter values among published models. *New Zealand Journal of Marine and Freshwater Research* 37: 449-460. (in English) [Regression models are developed and presented to predict dry mass (mg) from two linear dimensions (mm) for 17 benthic macroinvertebrate taxa (including *Xanthocnemis zealandica*; *Procordulia grayi*) common to littoral zones of New Zealand lakes. We also provide regression models to predict body length from head capsule width for the major insect taxa. Dry mass was best explained as a power function of all linear dimensions:  $M = aL^b$ . Parameters are presented in the log<sub>10</sub>-transformed linear form of this power function. Body

length was a simple linear function of head capsule width for all insect taxa, hence parameters for these models are presented as untransformed values." (Authors)] Address: Stoffels, R.J., Department of Zoology, University of Otago, P.O. Box 56, Dunedin, New Zealand. E-mail: rick.stoffels@toroa.otago.ac.nz

## 2004

**8900.** Abbott, J.C. (2004): A summer for the record books in Texas. *Argia* 16(3): 16-17. (in English) [New state records: *Argia oenea*, *Enallagma antennatum*, *Aeshna persephone*, and *Erythemis attala*. *Leptobasis melinogaster*, *Phyllocycla breviphylla* and *Erythemis mithroides* are also new records for Texas and USA.] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**8901.** Biggs, K. (2004): Simply superb! A new California state record — 2004. and a bit of California Odonata history. *Argia* 16(3): 21-22. (in English) [*Pseudoleon superbus*, 9-V-2004, San Diego County, California, USA.] Address: Biggs, Kathy, 308 Bloomfield Road, Sebastopol CA, 95472, USA. E-mail: bigsnest@sonic.net

**8902.** Bocanegra, O.R.; Czaplak, D. (2004): *Phyllocycla breviphylla* collected in the United States. *Argia* 16(3): 18. (in English) [29-V-2004, Anacua Wildlife Management Area, Cameron County, Texas, USA.] Address: Bocanegra, O.R., U.S. Fish and Wildlife Service, 711 Stadium Drive, Arlington, Texas 76011, USA

**8903.** Catling, P.M.; Oldham, M.J.; Jones, C.D.; Oldham, R.; Dombroskie, J.J.; Kostiuik, B. (2004): Broad-tailed Shadowdragon, *Neurocordulia michaeli* Brunelle, new to Ontario. *Argia* 16(3): 13-16. (in English) [First record: Petawawa River, near Petawawa, Renfrew County, Ontario (45.8908° N, 77.3072° W), Canada, in June 2003 (exuviae), 3-VI-2004 (imagos). Additional localities resp. records are also dealt with.] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**8904.** Catling, P.M.; Kostiuik, B. (2004): Another addition to the Odonata of the Northwest Territories. *Argia* 16(3): 21. (in English) [Canada, *Enallagma hageni*, Great Slave Lake northwest of Enterprise (61.08596° N, 118.29758° W), 25-VII-2004.] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**8905.** Catling, P.M.; Kostiuik, B. (2004): Dragonflies recorded in 2004 from the Saskatchewan portion of the Cypress Hills Interprovincial Park. *Argia* 16(3): 20-21. (in English) [Cypress Hills, southern Saskatchewan-Alberta, Canada, 16 Odonata species are listed.] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**8906.** Catling, P.M.; Kostiuik, B. (2004): Three additions to the Odonata of Saskatchewan, and some notable records. *Argia* 16(3): 18-20. (in English) [Surveys made in July 2004 resulted in new additions to the Saskatchewan, Canada Odonata list. *Argia fumipennis violacea*, *Enallagma antennatum*, and *Ischnura perparva* are additions to the Odonate fauna of Saskatchewan. *Stylurus notatus* and *Enallagma anna* are additions to/corrections of the status ranking in Canada, but reported previously in 2004. *I. verticalis* has not been

reported from Saskatchewan in the scientific literature, but is on the ranking list.] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**8907.** Coelho, J.R. (2004): Insects in Rock and Roll cover art. *American Entomologist* 50(3): 142-151 (in English) ["Sixteen taxonomic orders of insects graced album covers or liner notes. Of these, the order appearing most frequently was Lepidoptera (36%), followed by Hymenoptera (17%), Coleoptera (11%), Diptera (9%), and Odonata (8%)." App. 30 covers with dragonfly illustrations are known to the author; this is far away from a realistic count, because many covers more are known to the abstracter ... "Dragonflies provided for some striking covers, such as Deyss' The Dragonfly from the Sun, Dragonfly's self-titled release, and Galadriel's Chasing the Dragonfly." (Author)] Address: Coelho, J., Biology Program, Quincy University, 1800 College Ave., Quincy, IL 62301, USA

**8908.** Dragonfly Society of the Americas (2004): *Argia* 16(3). *Argia* 16(3): (in English) [In This Issue: 1; DSA 2005 at Arnprior, Ontario, 8 – 12 July 2005, by Paul Catling, Colin Jones, & Brenda Kostiuik: 2-5; 2005 Southeastern DSA Meeting, by Steve Krotzer: 5; DSA 2005 Northeast Meeting June 9 – June 12 State College, PA, by Hal White: 5; Eglin AFB Odonata Survey in March, 2005, by Jerrell J. Daigle & Theresa Thom: 6; 2005 GLOM Meeting In Southwestern Ontario, by Bill Morgenstern: 6; Final call for Georgia data, by Bill Mauffray: 26; Dragonfly study — The Baltimore Sun's Version, by Sandy Alexander: 27; Agency to designate habitat for dragonfly, by John Fleisher: 28; Florida State Collection of Arthropods (FSCA) Collection Expansion, by Bill Mauffray: 31; Book notice: Damselflies of Alberta, by John Acorn, by Dennis Paulson: 31; Paper notice: Cues for territory choice in two tropical dragonflies [*Perithemis mooma* Kirby and *Orthemis discolor*; Neotropical Entomology 33(4):397 – 401(2004)], by Paulo de Marco jr. & Daniela C. Resende: 32; First announcement of the International Symposium on the Odonata fauna of the Balkans and current problems of its conservation: 32; TRAMEA: Using dragonfly discussion groups to help determine distribution and flight data, by Kathy Biggs: 33; Odonata list available for the birder's diary program, by Kreg D. Ellzey: 34. Papers from *Argia* 16(3) omitted in this section are abstracted in this issue of OAS.] Address: Dragonfly Society of the Americas c/o Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**8909.** Ellzey, K.D. (2004): *Enallagma doubledayi* population in Kisatchie National Forest, Natchitoches Parish, Louisiana. *Argia* 16(3): 24-25. (in English) [5-VI-2004, Kisatchie Ranger District, Kisatchie National Forest, Natchitoches Parish, Louisiana, USA (31° 27.59'N, 93°11.96'W).] Address: Ellzey, K.D., 3416 Gum Springs Loop, Hornbeck, LA 71439, USA.

**8910.** Fernández-Martínez, M.A. (2004): First record of *Triacanthagyna septima* for the Dominican Republic. *Argia* 16(3): 27. (in English) [25-II-2004, Punta Cana, Dominican Republic (18°35'N 68°19'W).] Address: Fernández-Martínez, M.A., Tercio de Afora n 9, 36201 VIGO, Spain. E-mail: miguelvacaloura@hotmail.com

**8911.** Johnson, J. (2004): *Aeshna* Blitz '04 not a bust. *Argia* 16(3): 6-7. (in English) [20 – 22-VIII-2004, Gold Lake Bog, Lane County, Oregon, USA. Findings in-



cluding three new county records are briefly documented.]

**8912.** Johnson, J. (2004): A new damselfly for Utah. *Argia* 16(3): 25-26. (in English) [*Argia hinei*., 5-X-2004, Virgin River at La Verkin, Washington County, Utah, USA]

**8913.** Mauffray, B. (2004): *Epithea semiaquea* (Selys) added to the Louisiana list. *Argia* 16(3): 25. (in English) [Two records from the early 1990s are added to the Louisiana, USA list.] Address: Mauffray, B., 4525 N.W. 53rd Lane., Gainesville, FL 32653, USA. E-mail: iori@afn.org

**8914.** Michalski, J. (2004): Return to New Guinea. *Argia* 16(3): 8-10. (in English) [The author introduces into PNG country, people, and – at the genus level – *Odonata* with its app. 600 species.]

**8915.** Mikat, M.; Cip, D. (2004): New records of dragonfly *Coenagrion ornatum* (Selys, 1850) (Odonata, Coenagrionidae) in the Czech Republic. *Acta Mus. Reginaehradecensis* (A) 30: 43-44. (in Czech, with English summary) [*C. ornatum* was not seen in Czech Republic since many decades. Here, two males are reported from Hradec Kralove, 23-VII-2001 and 27-VII-2003, respectively. The habitats are described, and the history of *C. ornatum* in the Czech Republic is outlined.] Address: Mikat, M., Muz. vychodnich Cech, Eliscino nabr. 465, CZ-500 01 Hradec Kralove, Czech Republic

**8916.** Oldham, M.J.; Brodribb, K.E. (2004): Notes on the Smoky Rubyspot (*Hetaerina titia*) in southern Ontario. *Ontario Odonata* 4: 38-40. (in English) [Canada; "Thames River between Tate's Bridge, 9.2 km south-east of Glencoe (Post Office), and Big Bend Conservation Area, 4.3 km southeast of Wardsville (main intersection) ... In total on 15 September we recorded 108 *H. titia* at 32 different locations along a 23 km stretch of the Thames River. We estimate that this represents less than 50% of the number actually observed. Second in abundance were *H. americana* with 19 individuals being recorded at 9 sites. The only other odonate species encountered were *Boyeria vinosa* (6 individuals at 5 sites) and *Calopteryx maculata* (1 individual at 1 site). ... On 16-IX-2002 we surveyed several sites on the Sydenham River between Alvinston and Dawn Mills. Sites were accessed by land from bridges and other access points. *H. titia* was observed at only a single location, near Shetland." (Authors)] Address: Oldham, M.J., Natural Heritage Information Centre, Ontario Ministry of Natural Resources, P.O. Box 7000, 300 Water St., Peterborough, Ontario, K9J 8M5. E-mail: michael.oldham@rnrr.gov.on.ca

**8917.** Orr, R.L. (2004): Notes on the 2004 impact of the 17-Year Periodical Cicada on Potomac River dragonflies. *Argia* 16(3): 11-12. (in English) ["Every 17 years during May and June, three species of Magicicada emerge together in phenomenal numbers. These large heavy 25 – 50 mm red-eyed Homoptera dominate the landscape for about a month. Their numbers are truly impressive with up to 1.5 million per acre; but densities of a few tens, to hundreds, of thousands per acre are more the norm. Predators (mainly birds, mammals, reptiles etc.) become so focused on the cicadas that they tend to ignore other types of prey items. During mass emergences of *Gomphus vastus*, mortality rates in 2002 and 2003 at some sites along the Potomac climbed in excess of 50% (the wings of the emerging

specimens were scatted along the shore line). During May and June of 2004 (with mass emergence of cicadas), two very obvious differences were noted when compared to the same period in 2002 and 2003 (without mass emergence of cicadas). First, dragonfly wings were noticeably absent in 2004. It was obvious that few predators wanted to eat dragonflies when they had a belly full of cicadas! „The emerging dragonflies were having a banner year, with negligible predation thanks to the cicadas. Second, the number of dead adult dragonflies found in June 2004 was far in excess of the numbers found in previous years. The reason for this is not that more dragonflies were dying but that they were not being eaten by scavengers. Again, why eat a dying or dead dragonfly when there are lots of dead and dying cicadas to eat?“ „Did the dragonflies feed on the adult cicadas? It may be surprising, but I would say, generally not. It was likely a size thing. I observed *Hagenius brevistylus*, *Epiaeschna heros*, and *Anax junius* successfully take them out of the air and onto the ground but it always ended in the buzzing cicada getting away.“] Address: Orr, R.L., 5215 Durham Road East, Columbia, MD 21044-4444, USA. E-mail: richard.l.orr@usad.gov

**8918.** Paulson, D. (2004): New common names for some North American Odonata. *Argia* 16(3): 29. (in English) [North American Odonata species for which common names are to be changed: *Lestes disjunctus*, Northern Spreadwing; *Lestes australis*, Southern Spreadwing; *Argia fumipennis violacea*, Violet Dancer; *Argia fumipennis fumipennis*, Smoky-winged Dancer; *Argia fumipennis atra*, Black Dancer; *Chrysobasis lucifer*, Lucifer Damsel; *Macromia illinoensis*, Swift River Cruiser; *Macromia illinoensis illinoensis*, Illinois River Cruiser; *Macromia illinoensis georgina*, Georgia River Cruiser. New north American Odonata species for which common names are designated: *Ophiogomphus* sp. nov., Sioux Snaketail; *Stylogomphus albistylus*, Eastern Least Clubtail (modified); *Stylogomphus sigma-stylus*, Interior Least Clubtail; *Cordulegaster* sp nov, Ouachita Spiketail; *Erythemis simplicicollis* + *Erythemis collocata*, Common Pondhawk; *Leucorrhinia proxima*, Belted Whiteface; *Orthemis discolor*, Carmine Skimmer; *Orthemis "Antillean"*, Antillean Skimmer; *Sympetrum vicinum*, Autumn Meadowhawk.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**8919.** Pfeiffer, B. (2004): The view from Vermont. *Argia* 16(3): 22-24. (in English) [Second record of *Aeshna subarctica* in Vermont (27-IX-2004). The author uses this record to outline additional Odonata records recently reported from Vermont, USA.] Address: Pfeiffer, B., 113 Bartlett Rd, Plainfield VT, 05667, USA. E-mail: Bryan@VermontBirdTours.com

**8920.** Prather, I.; Prather, B. (2004): First Colorado record of *Erpetogomphus compositus* Hagen in Selys, 2004. *Argia* 16(3): 26. (in English) [8-VII-2004, Delores River, Mesa County, Colorado, USA.] Address: Prather, I.; Prather, B., 13810 Weld County Road 1, Longmont CO 80504, USA

## 2005

**8921.** Beckemeyer, R. (2005): Afrikaan Anisoptera and Zulu Zygoptera: A trip to South Africa. *Argia* 17(1): 17-18. (in English) [Report on a trip to South Africa ma-

de in February 2005 and highlighting Odonata.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**8922.** Behrstock, R.A. (2005): New state records of Odonata for eastern Mexico. *Argia* 17(1): 13-15. (in English) [Records of the following species are documented: *Lestes forficula*, *Mecistogaster ornata*, *Protoneura aurantiaca*, *Argia oculata*, *A. pulla*, *A. ulmea*, *A. westfalli*, *Neocythromma cultellatum*, *Anax amazili*, *Erpetogomphus elaps*, *Phyllogomphoides suasus*, *Brechmorhoga vivax*, *Dythemis maya*, *Erythemis peruviana*, *Libellula herculea*, *Macrothemis inequinguis*, *Orthemis discolor*, *Perithemis mooma*, *Tramea lacerata*.] Address: Behrstock, R.A., 10359 S. Thicket Pl., Hereford, AZ 85615, USA. E-mail: rbehrstock@cox.net

**8923.** Bernard, R. (2005): Dragonflies in a guidebook for the conservation of habitats and species of Natura 2000 in Poland – a story of a fight. *Odonatrix* 1(2): 30-33. (in Polish, with English summary) ["The course of the author's struggle for the shape and consistence of papers on three dragonfly species, *Coenagrion ornatum*, *Ophiogomphus cecilia* and *Leucorrhinia pectoralis*, is described. Insufficient finances, the necessity to follow top-down orders, not considering authors' suggestions, unwise decisions of editors, carelessness of editorial staff making corrections in the texts have made these papers less communicative and poorer in information. However, despite these disadvantages, the papers have remained the valuable synthetic source of data on these species in Poland with reference to their ecology, situation, threats and conservation." (Author)] Address: Bernard, R., Department of General Zoology, Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznań, Poland; E-mail: bernard@amu.edu.pl

**8924.** Bree, D. (2005): Predation of *Ladona julia* by Crab-Spider (Thomisidae). *Argia* 17(1): 8. (in English) [At Petroglyphs Provincial Park, near Peterborough, Ontario, Canada on 26 May 2004 a young adult *L. julia* was caught by a species of Crab Spider, possibly *Xysticus elegans*. The dragonfly was about 5× longer than the spider, and probably massed over 7× greater.] Address: not stated.

**8925.** Bried, J.; Krotzer, S. (2005): New species records for Mississippi: An expected dragonfly and an unexpected damselfly. *Argia* 17(1): 6-7. (in English) [*Arigomphus lentulus*: 17-V-2004, northern Oktibbeha Co., east-central Mississippi (N 33° 31.008', W 88° 52.167');; *Lestes forficula* 17-IX-2004 (N 33.5328°, W 88.8649°), the second record was taken 24-IX-2004 from a beaver wetland complex (N 33° 13.814', W 89° 03.726') in the Tombigbee National Forest, Winston Co., east-central Mississippi, USA.] Address: Bried, J., Mississippi State University, Dept Biol. Sciences, Rm 130 Harned, PO Box GY, Mississippi State, MS 39762, USA. E-mail: jbried@TNC.ORG

**8926.** Bried, J.T. (2005): Species of adult Odonata from three natural areas in Mississippi. *Argia* 17(1): 10. (in English) [Altogether, 75 species were caught or seen among the natural areas in 2003 – 04: Noxubee National Wildlife Refuge in Noxubee, Winston, and Oktibbeha Counties; Strawberry Plains Audubon Center in Marshall Co.; and Tombigbee National Forest in Winston and Choctaw Counties.] Address: Bried, J., Mississippi State University, Dept Biol. Sciences, Rm 130 Harned, PO Box GY, Mississippi State, MS 39762, USA. E-mail: jbried@TNC.ORG

**8927.** Buczynski, P. (2005): Dragonflies in the Net. Part 1. Poland. *Odonatrix* 1(2): 40-42. (in Polish, with English summary) [28 Polish websites with odonatalogical content are introduced.] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8928.** Buczyński, P. (2005): The 24th Annual Meeting of the Society of German Speaking Odonatologists, Freising (Germany), March 18-20, 2005. – Conference report. *Odonatrix* 1(2): 28-29. (in Polish, with English summary) [This is an extensive report on the meeting of GdO in 2005, with reference to some lectures held in the framework of the meeting.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8929.** Daigle, J.J. (2005): A super Bowl Weekend or The Hunt for Red October: Part II. *Argia* 17(1): 10. (in English) [Feb. 2005, Big Pine Key, Florida, USA. Report on a few catches of *Orthemis* sp., *Tramea* sp. and potential species to trace later in the season.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**8930.** de Maynadier, P.; Hudson, J. (2005): First national records for Canada Whiteface (*Leucorrhinia patricia*) in the USA. *Argia* 17(1): 5-6. (in English) [18-VI-2003, *L. patricia* was collected for the first time in the USA in Maine (Somerset Co.), and the second record was realised on 23-VI-2003 in Alaska (Southeast Fairbanks Borough). Habitats and co-occurring Odonata species are documented.]

**8931.** Donnelly, N. (2005): Is there life after acetone? A "cool" method for preserving odonates. *Argia* 17(1): 18. (in English) [In cases acetone to proceed specimens is not available in field trips, the author proposes the following treatment: „I have found what seems to be an easier, and more satisfactory method. First, I thoroughly dry the specimen. My method is truly "cool": instead of heat I use a desiccant. My desiccant of choice is 4-angstrom synthetic zeolite, which generally goes under the commercial name "molecular sieve". It is non-toxic, and is also handy for drying your wallet when it falls in the river. It lowers the partial pressure of water to a lower value even than silica gel, which is itself far superior to cobalt-doped calcium sulfate ("Drierite"). The desiccant can be reused essentially infinitely by cooking it in the oven at about 300 degrees F. When you return from the trip with your crispy specimens, then a good soak in acetone will degrease them.".] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**8932.** Dragonfly Society of the Americas (2005): *Argia* 17(1). *Argia* 17(1): (in English) [In This Issue: 1; Rainy River Valley Field Naturalists to Host Dragonfly Symposium, by Bill Morgenstern: 2-3; DSA Annual Meeting in Ontario: Information on Post-conference trip, Paul M. Catling: 3; Calendar of Events for 2005: 3; Dragonfly Days, 20 – 22 May 2005, by Joshua Stuart Rose: 15; What every boy and girl needs to know about GPS, and how to locate your position, by Nick Donnelly: 19-22; Dragonfly pond selected for the Garden Conservancy's Open Days program, by Kathy Biggs: 22-23; Damselfly Creeps into National Geographic, by Kathy Biggs: 23; Hine's Emerald Dragonfly Workshop, by Tim Cashatt: 23-24; WDA Symposium in Vigo, Spain, July 2005, by

Adolfo Cordero: 24; Proposed Photo Archive for DSA, by Steve Valley: 25; Minutes of the Annual Meeting of the Dragonfly Society of the Americas, by Ailsa Donnelly: 25-26; BAO Notice: An Annotated Checklist of the Odonata of Canada, by P. Catling, R. Cannings, and P. M. Brunelle: 26; A Reminder from the Publisher: 26; TRAMEA: OdonataCentral: A New North American Web Site, by John C. Abbott: 26-27; Williamsonia On-Line, by Mark O'Brien: 28; Label Data Standards, by Mark O'Brien: 28; ESA Debuts New Web Site: 28. Papers from *Argia* 17(1) omitted in this section are abstracted in this issue of OAS.] Address: Dragonfly Society of the Americas c/o Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**8933.** Hogsden, K.L.; Vinebrooke, R.D. (2005): Environmental predictors of benthic consumers and autotrophic communities along a recovery gradient. *Can. J. Fish. Aquat. Sci.* 62: 2226-2239. (in English, with French summary) ["Ecological theory predicts that biological factors replace abiotic regulation of community structure during recovery from ecosystem stress. We examined relationships between benthic autotroph (epilithic periphyton) and consumer communities, and environmental variables, along a gradient of six recovering acidified lakes to identify the best explanatory variables of community structure. Dissolved organic carbon, pH, and total dissolved phosphorus were important predictors of autotrophic biomass, while total dissolved phosphorus was the only significant factor explaining variation in consumer biomass. Abiotic factors (e.g., dissolved organic carbon, pH) were also significant predictors of autotrophic and consumer community composition. Autotrophic biomass was significantly greater in recovering lakes owing to an increased abundance of attached filamentous green algae. However, consumer biomass did not differ significantly between severely stressed and recovering lakes because of a compensatory shift from numerous small tolerant omnivores to fewer large-bodied sensitive grazers. Lack of a significant relationship between autotrophic and consumer biomass along with stable isotopic evidence of few primary consumers suggested that grazing pressure was weak, especially in the stressed lakes. The persistent importance of abiotic factors to autotrophic and consumer communities suggested that ecosystem recovery remained incomplete in these lakes." (Authors) Odonata are treated at the family level.] Address: Hogsden, Kristy, Freshwater Biodiversity, Laboratory, Dept of Biological Sciences, University of Alberta, Edmonton, AB T6G 2E9, Canada. E-mail: khogsden@gmail.com).

**8934.** Hunt, P. (2005): Additional notes on the Odonata of the Cayman Islands. *Argia* 17(1): 16. (in English) [Twelve species of Odonata were recorded between 8 – 12 April 2004, two of these were not previously recorded from the Cayman Islands: *Coryphaeschna adnexa* and *Micrathyria aequalis*.] Address: Hunt, Pamela, Audubon Society of New Hampshire, 3 Silk Farm Road, Concord, NH 03301, USA. E-mail: phunt@nhaudubon.org

**8935.** Johnson, P.G. (2005): Odonata survey of Pinnacles National Monument, California. *Argia* 17(1): 4. (in English) [38 Odonata species were recorded between 2001 and 2003. No details are dealt with. Records of *Lestes stultus* and *Erpetogomphus compositus* represent considerable range extensions, and *Anax walsinghami* is distributed very disjunctly in California.

Predation of *Cordulegaster dorsalis* by red-legged frogs is outlined. Noteworthy is the observation of reptile predation on Odonata: „I watched a Western fence lizard flinging itself into the air repeatedly at coenagrionids, like a dog leaping after a Frisbee.“] Address: not stated

**8936.** Landmann, A. (2005): Rote Listen und Föderalismus im deutschsprachigen Raum: Entwicklung, Bestand, fachliche und praktische Probleme. *Naturschutz und Biologische Vielfalt* 18: 167-185. (in German, with English summary) ["More than 2000 Red Lists (RL) have been published in German-speaking countries during the last thirty years. Many of these RL only refer to political subunits (federal countries, provinces, districts, cities) and often to only small areas. After giving a general review of numbers and history of such regional-level RL (RRL) in Switzerland, Austria, Germany, Liechtenstein and the South Tyrol (Alto Adige, Italy), the paper mainly deals with specific scientific problems of RRL which tend to increase with decreasing reference areas (eg. problems connected with metapopulation biology, biogeography) and with tendencies reducing the practicability of RRL for nature conservation activities (e. g. inflation with insufficiently known invertebrate taxa or with biological units below species level). For several scientific and practical reasons, I think that in many cases the IUCN-guidelines for RL at regional-levels are not adequately applicable for RRL at small scales. As such RRL are mostly dedicated to serve as instruments for regional nature conservation, different and more region-specific criteria and threat descriptors might be more useful than for national and international RL. Moreover, I doubt, that the comparability between RRL is improved by just simply adopting standardised criteria and categories." (Authors) The analysis includes Red Lists referring to Odonata.] Address: Landmann, A., Institut für Zoologie der Universität Innsbruck, Technikerstr. 25, A-6020 Innsbruck, Austria. E-mail: Armin.Landmann@uibk.ac.at

**8937.** Laswell, J. (2005): Curtis "Curt" Williams. *Argia* 17(1): 2. (in English) [Obituary: 5-IX-1917 – 19-II-2005] Address: not stated

**8938.** Łabędzki, A. (2005): The symposium of the Odonatological Section in the year 2005. *Odonatrix* 1(1): 13-14. (in Polish, with English summary) [Announcement; the symposium/workshop will be held on June 26-30 2005 in Laski near Kępno (SW Poland). In the framework of the meeting it is planned to collect insects in the area of Wzgórza Trzebnicko-Ostrzeszowskie, one of the poorest known faunistic regions of Poland.] Address: Łabędzki, A., Akademia Rolnicza, Katedra Entomologii Leśnej, ul. Wojska Polskiego 71c, PL-60-625 Poznań, Poland. E-mail: andrzejlab@poczta.onet.pl

**8939.** Markowich, J.; Mayer, S. (2005): Birth of a dragon. *Argia* 17(1): 12-13. (in English) [General remarks on identifying an emerging *Argomphus furcifer*.]

**8940.** Roble, S.M. (2005): Observations on an aggregation of *Gomphaeschna furcillata* in southeastern Virginia. *Argia* 17(1): 8-9. (in English) [16-IV-2003; First Landing State Park, City of Virginia Beach, Virginia, USA. During the period from 1100 – 1130 hrs, we observed hundreds of adults of *G. furcillata*, yet not a single mating pair or aggressive interaction was detected.] Address: not stated.



**8941.** Tennessen, K. (2005): Elegy for the Azure Bluet. *Argia* 17(3): 38. (in English) [poem] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**8942.** Wild Bird Society of Taipei (2005): Dragonflies of Taiwan: 120 species. ISBN 9579875162: 128 pp. (in Chinese with Latin and English names) [Photographic guide of adult dragonflies occurring in Taiwan with more than 360 colour photos.] Address: www.Booksfrom-Taiwan.com

**8943.** Xu, Q.-h. (2005): A new species of the genus *Aciagrion* Selys from Fujian, China (Odonata: Coenagrionidae). *Entomological Journal of East China* 14(4): 301-302. (in Chinese, with English summary) [*Aciagrion huaanensis* sp. nov. is described. The new species is similar to *A. olympicum*, but different from the latter by "(1) the blue markings on head limited only to frons, postocular spots and the stripe linking the latter, (2) two small brown spots at the median area of postclypeus, (3) the scape, pedicel and flagellum of antenna with different colour respectively, (4) dorsal base of segment 3—7 narrowly ringed with pale blue, and (5) dorsal markings of segments 8—9 on basal 4/5 and basal half respectively, not as *A. olympicum* which has bifurcate markings on segments 8 and elongate triangle-shaped markings on segment 9." Measurements (mm): female: Abd. + app. 28 mm, hindwing 20 mm. Holotype: female: Huaan County, Fujian Province, China (24°49'N 117°45'E), 2005-09-22, coll. XU Qi-han; the type specimen is deposited in Zhangzhou Education College, Fujian, China.] Address: XU Qi-han, Zhangzhou Education College, Zhangzhou, Fujian 363000, China

## 2006

**8944.** Abellan, P.; Sanchez-Fernandez, D.; Millan, A.; Botella, F.; Sanchez-Zapata, J.A.; Gimenez, A. (2006): Irrigation pools as macroinvertebrate habitat in a semi-arid agricultural landscape (SE Spain). *Journal of Arid Environments* 67: 255-269. (in English) ["The intensification of agriculture has resulted in the loss of many aquatic ecosystems in southern Europe. Despite this, the construction of irrigation pools and reservoirs to retain the water necessary for intensive cultivation may also provide new habitats for macroinvertebrates. The biotic and abiotic attributes of 40 such reservoirs in south-eastern Spain were studied to determine the presence of macroinvertebrates, and to discover if there is such a thing as an optimal design of an artificial pond for maximizing macroinvertebrate richness. A total of 72 macroinvertebrate taxa belonging to 38 families were recorded from the pools examined. Pools constructed with low-density polyethylene covered with sand and stones contained a significantly greater species richness, abundance and diversity of macroinvertebrates than those constructed with high-density plastic materials. The treatment with algicide, and the presence of emergent and submerged vegetation, accounted for most of the deviance when modelling species richness by means of logistic regression." (Authors) The following Odonata taxa are listed: *Coenagrion*, *Ischnura*, *Libellula*, *Orthetrum*, *Crocothemis erythraea*, *Diplacodes lefebvrei*, *Sympetrum*, and *Anax*.] Address: (P. Abellán, P., Departamento de Ecología e Hidrología,

Universidad de Murcia, Campus de Espinardo, 30100 Murcia, Spain. E-mail: pabellan@um.es

**8945.** Balik, S.; Ustaoglu, M.R.; Sari, H.M.; Mis, D.Ö.; Aygen, C.; Tasdemir, A.; Yildiz, S.; Topkara, E.T.; Sömek, H.; Özbek, M.; İlhan, A. (2006): A preliminary study on the biological diversity of Bozalan Lake (Memen-Izmir). *Journal of Fisheries & Aquatic Sciences* 23(3-4): 291-294. (in Turkish, with English summary) [*Libellula* sp., *Leucorrhinia* sp., *Anax* sp., *Coenagrion* sp. are listed.] Address: Ustaoglu, M.R., Ege Üniversitesi, Su Ürünleri Fakültesi Su Ürünleri Temel Bilimler Bölümü, 35100, Bornova, Izmir, Turkey. E mail: m.rusen.ustaoglu@ege.edu.tr

**8946.** Buczyński, P. (2006): Distribution atlas of the dragonflies in the Thuringia. ZIMMERMANN, W., PETZOLD, F., FRITZLAR, F. 2005. Verbreitungsatlas der Libellen (Odonata) im Freistaat Thüringen. *Naturschutzreport* 22, Jena. *Odonatrix* 2(2): 47-48. (in Polish, with English summary) [Review of a German regional fauna on Odonata.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8947.** Buczyński, P.; Daraż, B. (2006): Interesting records of *Leucorrhinia caudalis* in secondary habitats. *Odonatrix* 2(1): 9-12. (in Polish, with English summary) ["Breeding populations of *L. caudalis* were found in the years 2000-2005 in a sand pit in Zarzeka (CE Poland) and in fish ponds in Pawłokoma (SE Poland). The localities are interesting complements to the knowledge about the distribution of the species at the southern border of its compact range. The importance of fish ponds and surface rock excavations as secondary habitats is stressed. The water bodies are especially essential in areas that are poor of optimal habitats (well preserved glacial lakes and oxbow lakes) or where the habitats are destroyed. Some clues on the conservation activities (interference in succession of water body, limitation of an intensive fish culture, restrictions on fishing) are given." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**8948.** Buczyński, P.; Tończyk, G.; Daraż, B.; Dyatlova, E.; Michalczyk, W.; Miszta, A.; Szymański, J.; Szpala, B.; Tondys, J. (2006): Dragonflies collected during the 3rd National Symposium of Odonatology of the Polish Entomological Society (Zwierzyniec, September 15-17, 2006). *Odonatrix* 2(suppl. 1): 1-12. (in Polish, with English summary) ["15 localities in SE Poland were visited within the frame-work of a field workshop that was conducted during the 3rd National Symposium of Odonatology of the Polish Entomological Society. These localities represented the following habitats: streams, rivers, fish ponds, sand pits, fens, and transitional peat bogs. 40 dragonfly species were recorded, of which the following ones were the most interesting for faunistical, zoogeographical and sociological reasons: *Sympecma paedisca*, *Ophiogomphus cecilia*, *Aeshna juncea*, *A. subarctica elisabethae*, *A. viridis*, *Somatochlora arctica*, *Sympetrum depressiusculum*, *S. meridionale*, *S. striolatum*, *Leucorrhinia pectoralis*. Peat bogs were regarded as the most important habitats that hold strong populations of many endangered species. The numerous occurrence of Mediterranean species was also discussed." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

- 8949.** Buczyński, P. (2006): Notes on the occurrence of *Aeshna affinis* Vander L. in the Lublin region. *Odonatrix* 2(2): 33-36. (in Polish, with English summary) ["Fifteen new localities of *Aeshna affinis* are given from the Lublin district (SE Poland). Data about the occurrence of the species in this region is compiled and discussed. *A. affinis* has been recorded more frequently, especially in the last years. Clear abatement towards the north and strong preferences for river valleys (81% of localities) as well as warm and shallow waters (95%) were observed. The occurrence of this species mainly in river valleys can be associated with the using them as migration tracks. The main track is probably the River Bug valley (>50% of localities)."] (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 8950.** Cios, S. (2006): References to Odonata in Polish literature from the 18th and 19th centuries. *Odonatrix* 2(1): 12-17. (in Polish, with English summary) ["Presented are the oldest currently known references to Odonata in Polish literature (well known entomological papers from the second part of the 19th century are omitted). The first one is in KLUK (1780), who mentioned the species after Linnaeus. KLUK (1780), CZEMPIŃSKI (1789), JAROCKI (1807) and MORAWSKI (1880) reported massive flights of these insects in May. Of particular interest is the terminology. It seems that there was no single common name of these insects. Three old local ones are known – babka, lalka and strzałka. KLUK (1780) and many later authors used the name panna, a translation of demoiselle and Wasserjungfern. CZEMPIŃSKI (1789) was the first author to record the name wazka, currently referring to Odonata. He could have introduced it as an equivalent of libella. However, in Polish there was a verb ważyć, which referred to flying birds and insects. The relatively small number of references to Odonata may be due to poor knowledge of these insects in the past. The common people often confused them with locusts and probably even with butterflies."] (Author)] Address: Cios, S., ul. Stryjeńskich 6/4, 02-791 Warszawa, Poland. E-mail: stanislaw.cios@msz.gov.pl
- 8951.** Dolný, A. (2006): Ecological characteristics of dragonflies (Odonata) signficated within the European territory - Czech Republic. *Vážky 2005: sborník referátu VIII. celostátního semináře odonatologu ve Žďárských vrších: seminár usporádaly ve dnech 23.-26.6.2005* Správa CHKO Žďárské vrchy, ZO CSOP Vlašim a Vlastivedné muzeum a galerie v České Líze / editor sborníku Lubomír Hanel. -- Vyd. 1. -- Vlašim: ZO CSOP Vlašim, 2006. ISBN 80-86327-52-3: 97-122. (in Czech, with English summary) [Czech Republic; Odonata protected by European law (FFH-Directive, app. II & IV) and occurring in the member state of the European Community are introduced in great detail (areal and regional distribution, habitat, phenology): *Sympetma paedisca*, *Coenagrion ornatum*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Leucorrhinia caudalis*, *L. albifrons*, and *L. pectoralis*.] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic
- 8952.** Dolný, A.; Petrikova, M. (2006): New findings of dragonflies (Odonata: *Epithea bimaculata* and *Libellula fulva*) in Moravia and Silesia (Czech Republic). *Vážky 2005: sborník referátu VIII. celostátního semináře odonatologu ve Žďárských vrších: seminár usporádaly ve dnech 23.-26.6.2005* Správa CHKO Žďárské vrchy, ZO CSOP Vlašim a Vlastivedné muzeum a galerie v České Líze / editor sborníku Lubomír Hanel. -- Vyd. 1. -- Vyd. 1. -- Vlašim: ZO CSOP Vlašim, 2006. ISBN 80-86327-52-3: 179-181. (in Czech, with English summary) [Regional records from May/June 2005 for *E. bimaculata* (n=1) and *L. fulva* (n=5) are added to the known distribution of these species in the Czech Republic.] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic
- 8953.** Dolný, A. (2006): Long-termed monitoring of dragonflies (Odonata) within the protected territory system of European interest NATURA 2000: methodical proposals for the Czech Republic. *Vážky 2005: sborník referátu VIII. celostátního semináře odonatologu ve Žďárských vrších: seminár usporádaly ve dnech 23.-26.6.2005* Správa CHKO Žďárské vrchy, ZO CSOP Vlašim a Vlastivedné muzeum a galerie v České Líze / editor sborníku Lubomír Hanel. -- Vyd. 1. -- Vyd. 1. -- Vlašim: ZO CSOP Vlašim, 2006. ISBN 80-86327-52-3: 123-153. (in Czech, with English summary) [The author introduces a monitoring scheme for the Odonata protected by European law (FFH-Directive, app. II & IV) and occurring in Czech Republic, to fulfil the demands of article 17 of the directive: *Sympetma paedisca*, *Coenagrion ornatum*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Leucorrhinia caudalis*, *L. albifrons*, and *L. pectoralis*.] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic
- 8954.** Eda, S. (2006): *Lestes temporalis* Selys laid an egg unusually into a leaf of cattail grass. *Tombo* 48: 34. (in Japanese) [Documentation of oviposition by a photograph.] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com
- 8955.** Eda, S. (2006): Old records of *Libellula angelina* in Nagano Prefecture. *Tombo* 48: 29. (in Japanese) [Japan] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com
- 8956.** Eda, S. (2006): The first collector of *Epiophlebia superstes* larva may be Takeo Ito. *Tombo* 48: 24. (in Japanese) [Japan] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com
- 8957.** Eda, S. (2006): Two caces of triple-connection in the Odonata. *Tombo* 48: 32. (in Japanese) [Japan; "The female of *Lestes temporalis* is laying eggs into a branch of a willow tree. Type A." "While two males of *Sympetrum frequens* are trying to fly, the female is grasping the grass. Type A."] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com
- 8958.** Ellwanger, G.; Burbach, K.; Mauersberger, R.; Ott, J.; Schiel, F.-J.; Suhling, F. (2006): 11 Libellen (Odonata). *Berichte des Landesamtes für Umweltschutz Sachsen-Anhalt Halle, Sonderheft* 2(2006): 121-139. (in German) [Schemes to access the local populations of Odonata species protected by the European law.] Address: Ellwanger, G., c/o Bundesamt für Naturschutz, Konstantinstr. 110, 53179 Bonn, Germany. E-mail: EllwangerG@bfn.de

- 8959.** Fukunaga, K.; Tomita, M.; Murata, M.; Matsu-mura, K.; Shirai, M. (2006): Analysis of mitochondrial DNA in the exuviae of *Libellula angelina* Selys (Libellulidae). Tombo 48: 21-22. (in Japanese, with English summary) ["DNA analyses were made from the exuviae of *L. angelina* and *L. quadrimaculata asahinai*. The partial fragments of the mitochondrial 16S rRNA gene were amplified by using a polymerase chain reactions PCR method. Amplified genetic sequences extracted from two *L. angelina* individuals were 100% identical, but differed from that of *L. quadrimaculata asahinai*. These results indicate that the use of exuviae is efficient for analyzing DNA sequences in odonate species." (Authors)] Address: not stated in English
- 8960.** Futahashi, R.; Futahashi, H. (2006): The Odonate fauna of the Noto Peninsula, Hokuriku District, Honshu (2). Tombo 48: 18-20. (in Japanese, with English summary) [Noto Peninsula (Ishikawa Pref., Hokuriku District, Central Honshu, Japan); recent collections of *Paracercion melanotum*, *Sympetma paedisca*, and *Sympetrum maculatum* are documented. Two migratory species, *Sympetrum fonscolombii* and *Tramea virginia*, and a supposed hybrid between *Anax nigrofasciatus nigrofasciatus* and *Anax parthenope julius* are newly recorded from this peninsula.] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan
- 8961.** Hesoun, P.; Tichy, V. (2006): A contribution to the knowledge about dragonflies (Odonata) of South - East Asia. Vážky 2005: sborník referátu VIII. celostátního semináře odonatologu ve Žďárských vrších: seminár usporádaly ve dnech 23.-26.6.2005 Správa CHKO Žďárské vrchy, ZO CSOP Vlašim a Vlastivedné muzeum a galerie v České Lípe / editor sborníku Lubomír Hanel. -- Vyd. 1. -- Vlašim : ZO CSOP Vlašim, 2006. ISBN 80-86327-52-3: 90-96. (in Czech, with English summary) [Records of 63 taxa from several trips to Thailand, Birma, Nepal, and Malaysia between 1996 and 2005. 13 taxa remain currently unidentified.] Address: Hesoun, P., Bednárecek 58, CZ-37842 Nová Včelnice, Czech Republic. E-mail: hesoun@jh.cz
- 8962.** Hesoun, P.; Holuša O. (2006): The results of faunistic research of the dragonflies (Odonata) in central and east parts of district of Jindřichuv Hradec town (Southern Bohemia). Vážky 2005: sborník referátu VIII. celostátního semináře odonatologu ve Žďárských vrších : seminár usporádaly ve dnech 23.-26.6.2005 Správa CHKO Žďárské vrchy, ZO CSOP Vlašim a Vlastivedné muzeum a galerie v České Lípe / editor sborníku Lubomír Hanel. -- Vyd. 1. -- Vlašim: ZO CSOP Vlašim, 2006. ISBN 80-86327-52-3: 64-78. (in Czech, with English summary) [Czech Republic; records of 51 Odonata species are documented.] Address: Hesoun, P., Bednárecek 58, CZ-37842 Nová Včelnice, Czech Republic. E-mail: hesoun@jh.cz
- 8963.** Hogsden, K.L.; Vinebrooke, R.D. (2006): Benthic grazing and functional compensation in stressed and recovered lakes. Can. J. Fish. Aquat. Sci. 63: 1999-2010. (in English, with French summary) ["During ecosystem recovery, grazing pressure is expected to increase as larger herbivores become reestablished. Alternatively, grazing pressure may remain unchanged during recovery as large consumers replace and functionally compensate for more abundant populations of smaller, tolerant herbivores. We tested these hypotheses by conducting a 90-day experiment in which three size categories of benthic consumers were excluded from producers in three chemically stressed and three recovered lakes. Our findings showed that consumers did not significantly affect producer biomass in either type of lake. However, exposure to larger and more abundant grazers did induce a physiognomic shift towards less edible producers in the recovered lakes. In comparison, recovered lakes contained significantly greater producer biomass and diversity. Comparison of the observed subtle effects of consumers and pronounced negative impact of ecosystem stress on benthic producers suggest that they can compensate for natural disturbances (e.g., grazing), but not for the other multiple stressors associated with anthropogenic acidification of the Killarney lakes." (Authors) Odonata are treated at the family level.] Address: Hogsden, Kristy, Freshwater Biodiversity, Laboratory, Department of Biological Sciences, University of Alberta, Edmonton, AB T6G 2E9, Canada. E-mail: khogsden@gmail.com)
- 8964.** Ishikawa, H.; Yano, M. (2006): A record of *Neurothemis fluctuans* (Fabricius, 1793) from Tokyo. Tombo 48: 36. (in Japanese) [Japan] Address: not stated
- 8965.** Kawashima, I.; Karube, H. (2006): External morphology of the last instar larva of probable *Petaliaeschna flavipes* Karube (Anisoptera, Aeshnidae, Brachytroninae) from Laos, Indochina. Tombo 48: 7-11. (in English, with Japanese summary) ["The external morphology of the last instar larva of what is presumed to be *Petaliaeschna flavipes* Karube, 1999, from Laos is reported and illustrated based on an exuvia. The characters are compared with those of the genera *Cephalaeschna* Selys, 1883 (Fraser, 1943; Asahina, 1961) and *Periaeschna* Martin, 1909 (Matsuki & Lien, 1984)." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp
- 8966.** Kawashima, I.; Sasamoto, A. (2006): Description of the last instar larva of *Periaeschna laidlawi* (Forster) (Anisoptera, Aeshnidae) from Malaysia, southwestern Asia. Tombo 48: 12-17. (in English, with Japanese summary) ["The external morphology of the last instar larva of *P. laidlawi* is described and illustrated for the first time, and is compared with the larvae of *P. magdalena* Martin from Taiwan (Matsuki & Lien, 1984) and *Cephalaeschna* spp. from Assam (Fraser, 1943; Asahina, 1961)." (Author)] Address: Sasamoto, A., 190-4 Yakuoji, Tawaramoto-chô, Shiki-gun, Nara, 636-0341, Japan. E-mail: akssmt@sea.plala.or.jp
- 8967.** Kita, H. (2006): A female of *Sympetrum speciosum speciosum* that copulated after refusing in tandem position. Tombo 48: 27-28. (in Japanese, with English summary) ["A female *Sympetrum* s. *speciosum* repeatedly showed a refusal behaviour (i.e., not complying with taking a copula position by bending abdomen forward) while in tandem with a male, although she did finally copulated with the male. The female is not fully mature and this may be the cause of this unusual behaviour. (Author)] Address: Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan
- 8968.** Kita, H. (2006): A heterospecific "Type AB" triple-connection between a male of *Sympetrum infuscatum* (Selys, 1883) and a copulating pair of *S. maculatum* Oguma, 1915. Tombo 48: 25-26. (in Japanese, with English summary) ["A case of heterospecific triple-connection (Type AB) by a male of *Sympetrum infuscatum*



and a pair of *S. maculatum* in copula was observed in Ojiya City, Niigata Prefecture. The male *S. infuscatum* showed, while in the triple connection, swing movements that resembled typical tandem oviposition behaviour in the air above grassland suitable for oviposition for this species. From this behaviour, and similar examples cited, it was guessed that a male *Sympetrum* might show oviposition movements in tandem without experiencing copulation with the connected partner(s) if it was in tandem with a heterospecific individual or in triple connection." (Author)] Address: Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan

**8969.** Kita, H. (2006): A male of *Indolestes boninensis* (Odonata, Lestidae) connected with a dead female. Tombo 48: 28-29. (in Japanese, with English summary) ["A male *I. boninensis*, in tandem with a dead female which had lost her abdomen posterior to the 5th segment, was observed in Ototo-jima Island of the Ogasawara Islands, Japan. This male showed some movement that seemed to prompt the female to oviposition. (Author)] Address: Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan

**8970.** Kunz, B. (2006): Beitrag zur unterschiedlichen Färbung der Exuvien von *Aeshna cyanea. mercuriale* 6: 38-40. (in German) [Colour variation of exuviae of *A. cyanea* is documented and discussed.] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: libellen@berndkunz.de

**8971.** Lockwood, M.T. (2006): Una primera aproximació a la riquesa específica dels odonats al Parc Natural de la Zona Volcànica de la Garrotxa. Butlletí de la Institució Catalana d'Història Natural 73 (2005): 71-83. (in Spanish, with English summary) ["A total of 35 species of odonata (dragonflies and damselflies) were recorded from the Natural Park of the Volcanic Zone of La Garrotxa (NE Iberian Peninsula; PNZVG) in 2002 and 2003, of which 27 were observed at Els Estanys de Can Jordà. Three factors were considered in explaining this species-richness. First, the PNZVG is located at a confluence of biogeographical regions, a fact which ensures that there is great variety in the habitat type in the natural park and therefore in the Odonata that fly there. Secondly, the habitat surrounding the wetlands in the natural park is very varied and satisfies the ecological needs of a great variety of species. Lastly, the wetlands themselves in the PNZVG are very varied, and have good water quality. At the end we comment that only by understanding the reasons for such great species-richness can habitat be managed for Odonata in the PNZVG and elsewhere." (Author)] Address: Lockwood, M., La Devesa, 2, 1r. 17850 Besalú, Spain

**8972.** Mikát, M. (2006): The atypical tandems of dragonflies (Odonata: Lestidae) observed in the protected locality Na Plachte (Hradec Králové, Eastern Bohemia). Vážky 2005: sborník referátu VIII. celostátního semináře odonatologu ve Žďárských vrších: seminář uspořádaly ve dnech 23.-26.6.2005 Správa CHKO Žďárské vrchy, ZO CSOP Vlašim a Vlastivedné muzeum a galerie v České Lípě / editor sborníku Lubomír Hanel. -- Vyd. 1. -- Vlašim: ZO CSOP Vlašim, 2006. ISBN 80-86327-52-3: 182-189. (in Czech, with English summary) [The following interspecific tandems were noticed during 2004-2005: male *Lestes barbarus* + female *Lestes dryas*; male *Lestes sponsa* + female *Lestes virens*; male *Lestes viridis* + female *Lestes dryas*; male *L.*

*sponsa* + female *Erythromma najas*. Male-male tandems: *Lestes viridis*; *Sympetma fusca*; male *Lestes sponsa* + male *Lestes dryas*; male *Lestes dryas* male *Lestes sponsa*; male *Lestes sponsa* + male *Lestes barbarus*. A tandem was formed by a male of *Lestes sponsa* and a dead immature male of *Lestes viridis*. Triple connection: male *Lestes sponsa* with a tandem *Lestes viridis*.] Address: Mikát, M., Pekařova 670, CZ-500 09 Hradec Králové, Czech Republic. E-mail: marmulak.hk@tiscali.cz

**8973.** Miszta, A. (2006): We search him; we search her – reflections on the beginning of the fifth year of dragonfly monitoring the Upper Silesia. Odonatrix 2(2): 52-53. (in Polish, with English summary) ["The author presents a brief history of her interest in Odonata paying special attention to studies on Silesian nature reserves and to searching of the most threatened species out of nature reserves. The necessity of a coherent dragonfly monitoring system in Poland is stressed too." (Author)] Address: Miszta, Alicja, Centrum Dziedzictwa Przyrody Górnego Śląska, ul. Świętego Huberta 35, 40-543 Katowice, Poland. E-mail: amiszta@cdpgs.katowice.pl

**8974.** Nakada, A. (2006): An observation of heterogeneric copulation between *Deielia phaon* (Selys, 1883) male and *Orthetrum albistylum speciosum* (Uhler, 1853) female. Tombo 48: 23-24. (in Japanese) [Japan] Address: not stated in English

**8975.** Naraoka, H. (2006): Four continental *Sympetrum* dragonflies (Libellulidae) collected in Aomori Prefecture, northern Honshu, Japan, in 2005. Tombo 48: 33-34. (in Japanese, with English summary) ["*Sympetrum depressiusculum*, *S. cordulegaster*, *S. vulgatum imitans* and *S. f.flaveolum* were collected from Aomori Prefecture in autumn of 2005. The former three species are well-known migrants from Continental Eurasia. *S. f. flaveolum* is new to Honshu, and is considered to have migrated from Eurasia continent or Hokkaido. A female, instead of males, of *S. vulgatum imitans* was recorded for the first from Japan." (Authors) ] Address: Naraoka, H., 36-71 Fukunoda, Kitatsugaru, Aomori 0383661, Japan

**8976.** Rowe, R.J. (2006): Patterns and processes in freshwater systems: the social dimension. New Zealand Natural Sciences 31: 59-71. (in English) ["Social interactions within species present an under-appreciated complicating factor in freshwater ecology. Such processes can markedly alter distribution patterns. Odonata are an important group of animals in freshwater systems and have the capacity, under some circumstances, to exclude other organisms (invertebrate and vertebrate) from otherwise suitable habitats. Within the Odonata stylised agonistic behaviours are widespread in larvae of Zygoptera and have important consequences for both the ecology of the species concerned and for the impact of zygopteran larvae within ecosystems. In this paper the diversity of agonistic displays within the Zygoptera is reviewed. On phylogenetic grounds, supported by fossil dates, zygopteran display systems are very ancient (~ 150-200 My). Given the obvious costs in energy, increased exposure to predators, and the real risk of damage during interactions, agonistic behaviours must have considerable adaptive significance. Investigations of the processes involved in social interactions, and how they generate the patterns that are more generally recorded, will probably require

a return to large aquarium studies, or to in situ examination of microhabitats using underwater observatories." (Author)] Address: Rowe, R.J., School of Marine and Tropical Biology, James Cook University, Townsville 4811, Australia. E-mail: richard.rowe@jcu.edu.au

**8977.** Sahlén, G. (2006): Specialists vs. generalists among dragonflies - the importance of forest environments in the formation of diverse species pools. In: Rivera, A.C. (Ed). 2006. Forests and Dragonflies. 4th WDA Symposium of Odonatology, Pontevedra, Spain, July 2005. Pensoft Series Faunistica 61: 153-179. (in English) ["In Scandinavia more Odonate species occur in forested environments than in agricultural areas. Some authors attribute the high number of forest species to extensive river and wetland networks. But because there are also fewer species in some agricultural areas with numerous wetlands, there must be another explanation-It is known that forestry practices affect species composition. Remove the trees, the environment changes and some species disappear. The time elapsed after logging affects species survival. While undisturbed forest habitats support the greatest number of species, partivoltine species decrease during the first 5-10 years after disturbance, partivoltine species are not affected - in fact the univoltine species present here are also part of the species pool of agricultural areas; they are true generalists. A discriminant analysis comparing the species composition of lakes in different seral stages during forest regrowth gave more than 90% separation between the stages. Moreover, an even better separation was achieved when the investigation was combined with an analysis of (semi)aquatic plant communities along the shoreline, or when dragonfly density was taken into account. Plants and odonates are interconnected; the insects respond to the habitat's form and structure rather than to water chemistry (e.g. acidity or nutrient levels) or other ecological parameters. Forestry thus affects the very structures needed for survival. What kind of structures are we dealing with? A classification of species according to habitat preferences in a comparison between agricultural and forested areas showed that, in treeless habitats there were fewer specialists as well as generalists in constructed wetlands compared to older ponds and lakes. The latter habitats however, had fewer species than were present in the adjacent forested lakes. An investigation of constructed wetlands under 10 years of ago showed that, those close to forest habitats (even small clumps of trees) had, on average, more than twice as many breeding species than those in more open areas. Trees are obviously important to Odonata species, at least during some stage of their life. All species would probably survive in the waters of open areas, yet certain species do not survive unless a forest habitat occurs at a moderate distance from their breeding waters. Larval as well as adult habitat is relevant: egg-laying substrates must be included. Forests thus seem to possess what agricultural areas do not the maintenance of a high diversity of Odonata within a landscape depends on several seral stages and many different wetlands, surrounded by a diverse matrix of plants, including trees. All this adds up to one general rule: forests harbour specialists, while open landscapes are the playgrounds of generalists." (Authors)] Address: Sahlén, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, S-752 36 Uppsala, Sweden. E-mail: goran.sahlen@set.hh.se

**8978.** Salcher, M. (2006): Erstnachweis mit Reproduktionsnachweis der Südlichen Binsenjungfer (*Lestes barbarus*) für den Nordschwarzwald. *mercuriale* 6: 21-22. (in German) [In August 2005 a 25m<sup>2</sup> shallow pond was dug out within a meadow near Obermusbach, Landkreis Freudenstadt (MTB 7416-SO, R 3461404, H 5373940, 695 m asl, Germany). It was dry until mid September 2005. On 29-VI-2006, 50 freshly emerged *L. barbarus* were recorded immediately near the pond.] Address: Salcher, M., Ferdinand-Weiß-Str. 92, 79106 Freiburg, Germany

**8979.** Schiel, F.J. (2006): Tagesaktivität der Gemeinen Becherjungfer (*Enallagma cyathigerum*) am Fortpflanzungsgewässer. *mercuriale* 6: 22-25. (in German) [Diel activity patterns of *Enallagma cyathigerum* and air temperature were studied on 01-VIII-1995 on a gravel pit near Neuried-Altenheim (MTB 7512, 48° 30' N, 7° 45' E, 144 m asl.), Baden-Württemberg, Germany.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**8980.** Schneider, B. (2006): Kommensalen bei *Anax imperator*. *mercuriale* 6: 37. (in German) [29-VI-2005 near Winterthur, Switzerland, a male *Anax imperator* was observed catching a bee (*Apis mellifera*). Starting to devour its prey, a few seconds later some small Diptera occupied the caput of the *Anax* and tried to get something from the dragonfly's prey. The Diptera stayed as long on the head of the *Anax* as long as it fed on its prey (5 min.), and then disappeared as secretly as they had arrived. The Diptera could not be identified, but looks similar to *Desmometopa*.] Address: Schneider, B., Wolfbühlstrasse 34a, CH-8408 Winterthur, Switzerland. E-mail: b.schneider@libellen.li

**8981.** Śniegula, S. (2006): The adventure with *Soma-tochlora sahlbergi* Trybom, 1889. *Odonatrix* 2(2): 36-39. (in Polish, with English summary) ["At the beginning of July 2004, I reached a decision to challenge myself and bike 4,5 thousand km one way in order to search for the population of *S. sahlbergi*. This happened in gorgeous regions of north-western Canada. The adventure started in Calgary (51°N) and ended in Inuvik (68° N). The search for treeline emerald started from the 28th day of my trip, from a place where a paved road transfers to a gravel road called Dempster Highway. The gravel highway stretches from 64°N to Inuvik. It runs through subarctic tundra and is underlain by permafrost. The investigation took place on meso- and oligotrophic ponds, peat bogs and along creeks. The weather conditions and the date were adequate to see flying *S. sahlbergi*, but investigations usually ended by observations of another Odonata, mostly from families *Aeshna* and *Enallagma*. On August 2nd, while checking a small (8 x 4m) and approximately 1,3m deep peat bog located on the North slope of the Ogilvie Mountains range, a single male of *S. sahlbergi* was noticed. In addition to Sphagnum moss and lichens, the pond was surrounded also by single sedges and in a farther distance by low spruce trees and shrubby birch. The male was patrolling open water, sometimes crisscrossing the pond over the water surface. The observations lasted 15 minutes, until tree-line emerald left the pond and flew to the evergreen forest. *S. sahlbergi* is a far north dragonfly. It requires deep, cold water that is surrounded by moss but not necessary Sphagnum. Because of the severe climate, the right habitats are hard to check by scientists. Currently, it is hard to say

how big is the whole population and in what degree this species is endangered. It should be noticed that treeline emerald would be probably a good indicator for environmental changes caused by global warming and in North Norway additionally, by acid rains." (Author)] Address: Śniegula, S., Rakowo 32, 78-445 Lubowo, Poland. E-mail: ssniegula81@interia.pl

**8982.** Śniegula, S.; Johansson, F. (2006): Trollsländor i Grössjöns naturreservat, Umeå. *Natur i Norr*, Umeå 25 (2): 105-106. (in Swedish) [Sweden, in 2006 the following species have been recorded in that nature reserve: *Lestes sponsa*, *Enallagma cyathigerum*, *Coenagrion hastulatum*, *C. johanssoni*, *Erythromma najas*, *Aeshna caerulea*, *A. juncea*, *A. subarctica*, *A. grandis*, *Cordulia aenea*, *Somatochlora metallica*, *S. arctica*, *S. flavomaculata*, *Libellula quadrimaculata*, *Sympetrum danae*, *Leucorrhinia dubia*, and *L. rubicunda*.] Address: Śniegula, S., Instytut Ochrony Przyrody PAN, al. Mickiewicza 33, 31-120 Kraków, Poland. E-mail: sniegula@iop.krakow.pl

**8983.** Steverding, M. (2006): Die Moore im Kreis Borken. *Naturerbe von landesweiter Bedeutung. Naturzeit im Münsterland* 3(6): 9-10. (in German) [General on bogs and bog fauna in Landkreis Borken, Nordrhein-Westfalen, Germany. *Aeshna subarctica*, *A. juncea*, *Somatochlora arctica*, *Leucorrhinia rubicunda*, *L. dubia*, *Ceriagrion tenellum*, *Coenagrion lunulatum* and *C. hastulatum* are stressed as noteworthy members of the Odonata fauna of bogs.] Address: not stated

**8984.** Sugano, T.; Umeda, T. (2006): The first record of *Neurothemis fluctuans* (Fabricius, 1793) from Kanagawa Prefecture. *Tombo* 48: 35. (in Japanese) [Japan; 26-VIII-2005] Address: not stated in English

**8985.** Tończyk, G. (2006): "Switezianka" – a forbidden newsletter. *Odonatrix* 2(2): 46-47. (in Polish, with English summary) [Brief "story of the trial of origins of bulletin called „Switezianka”. The bulletin was about to be published in the middle of the 1980s. It was the initiative of Dr. Stefan Mielewczyk. However, the bulletin „Switezianka” was never published due to the objection of communistic authorities of the then Poland." (Author)] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk.grzegorz@gmail.com

**8986.** Tończyk, G. (2006): 3rd National Symposium of Odonatology of the Polish Entomological Society (Zwierzyniec, September 15-17, 2006). *Odonatrix* 2 (suppl. 1): 13-16. (in Polish, with English summary) [Announcement: "Third national meeting of odonatologists took place in Zwierzyniec in Roztocze. Three-day long conference was of a field workshop type thus the training in larval identification, exuviae and imaginal dragonflies as well as presentation of the methods of field works were possible to conduct. Nine persons were involved in the symposium. The studies conducted during the meeting resulted in finding 40 dragon-fly species at 15 study sites – detailed data was published in the current supplement of the 2nd annual edition of „Odonatrix”." (Author)] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk.grzegorz@gmail.com

**8987.** Tończyk, G.; Buczyński, P. (2006): Dragonflies recorded in Białowieża during the Meeting of Polish Platform for Biodiversity (23-25.04. 2004) and 45th meeting of the Polish Entomological Society (17-19.08. 2004). *Odonatrix* 2(1): 20-21. (in Polish, with English summary) ["The authors present a list of 17 Odonata species that were recorded in the Białowieża Primeval Forest during two scientific meetings in the year 2004. The most interesting species are *Sympetma fusca* and *Erythromma viridulum*, Mediterranean species that are relatively rare in the NE Poland." (Authors)] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk.grzegorz@gmail.com

**8988.** Watanabe, K. (2006): *Sympetrum fonscolombi* emerged out in winter at Ishigaki Is. *Tombo* 48: 17. (in Japanese, with English summary) ["Last instar larvae of *S. fonscolombii* were collected from a swimming pool at Ishigaki, Japan on Jan. 14, 2006. From them a male and a pair emerged on Jan. 18 and on Feb. 11 respectively." (Author)] Address: not stated in English

**8989.** Yamamoto, T.; Nobuaki, N. (2006): A few atypical oviposition behavior in *Epitheca marginata* (Selys) (Anisoptera: Corduliidae). *Tombo* 48: 30-32. (in Japanese, with English summary) ["Three cases of atypical oviposition behaviour of *E. marginata* were observed in Kyoto Prefecture. 1) A female did oviposition without perching after copulation. During oviposition she repeatedly released egg masses by striking the water surface with the tip of abdomen, while the partner male flew around her. 2) A female repeated perching and flying oviposition about eight times. The oviposition was carried out by striking the water surface with the tip of abdomen. While perching, the female made an egg mass. The egg masses after oviposition did not take an usual form of "eggs-string" or "eggs-strand", but took a form of several small fragments of egg-masses. 3) When a female arriving at a pond immediately began flying oviposition without perching, like that of *Sympetrum* species." (Authors)] Address: not stated in English

## 2007

**8990.** Aguilard, D. (2007): CalOdes/DSA Blitz II—The desert experience (A new state record). *Argia* 18(4): 4-6. (in English) [Riverside & Imperial Counties, California, USA; 8-X-2006, *Tramea calverti*] Address: not stated

**8991.** Belenkova, N.I.; Djurtubaev, M.M.; Djurtubaev, Yu.M. (2007): The Danube lakes dragonfly larvae (Odonata). *Odessa National University Herald* 12(5): 159-166. (in Russian, with Ukrainian and English summary) [In the paper matters of taxonomy, distribution, diversity and biomass of the Danube lakes Odonata larvae are treated. 16 species have been found; most frequent are *Ischnura elegans*, *Sympetma fusca*, *Anax imperator*, and *Libellula quadrimaculata*. Maximum larvae numbers and biomass in most of the lakes is found in summer. Remarkable species are *Sympetma paedisca*, *Coenagrion scitulum*, and *Leucorrhinia caudalis*.] Address: Belenkova, N.I., Odessa National I. I. Mechnikov University, Department of Hydrobiology and General Ecology Dvoryanskaya 2, Odessa, 65058, Ukraine



- 8992.** Bernard, R.; Kosterin, O. (2007): Odonatological impressions from the Vasyugan Plain, Western Siberia. *Odonatrix* 3(2): 50-58. (in Polish, with English summary) ["Between 12 and 23 July 2006, dragonflies of selected localities in the Vasyugan Plain, West Siberia, were studied during an expedition by Rafal Bernard and Oleg Kosterin. The article presents personal impressions of the first author from this expedition, partly based on the odonatological results. Our investigations were focused on the largest in the world complex of Sphagnum bogs and fens and on rivers flowing between them. Additionally, small anthropogenic water bodies were also visited. In total, 34 odonate species were recorded. An important result of our expedition is the picture of the summer aspect of the odonate fauna in these mostly primeval and remote boggy areas, with the flourishing complex of peat-moss bog species and an interesting species composition of the fauna of rivers. *Nehalennia speciosa* (the main aim of our expedition) and *Aeshna subarctica*, both species poorly known and considered to be rare in Siberia, appeared to be omnipresent in pools of Sphagnum peat bogs. The latter species and two other aeshnids occurring there, *A. crenata* and *A. juncea* were well-segregated in aspects of space, weather and behaviour. It is also noteworthy that one member of the mentioned complex of species, *Coenagrion johanssoni*, abundant in primary habitats - small bog water bodies, is completely missing in large oxbows and man-made larger ponds. This absence seems to be related to their higher trophic and inappropriate or too poor vegetation. One mystery of peat-moss complexes remained undisclosed: the breeding places of generally very abundant foraging *Somatochlora arctica*. In rivers, the records of western *Gomphus vulgatissimus* and eastern *Shaogomphus postocularis* broadened significantly their known ranges to the north. What is more, the former species, earlier almost unknown in Siberia, turned out to be widely distributed and fairly abundant in the studied area, and the latter one was for the first time found west of the Ob' River. From zoogeographical point of view records of *Lestes virens*, *Coenagrion puella*, *Coenagrion pulchellum*, *Leucorrhinia albifrons*, *Leucorrhinia pectoralis* and *Sympetrum sanguineum* were also interesting as they were situated at the hitherto known northern range limits of these species or to the north of them. The expedition did not bring taxonomic surprises but an interesting high percentage of androchrome females of *Calopteryx splendens* and dark-winged *Somatochlora* individuals, especially noteworthy in *Somatochlora flavomaculata*, were recorded." (Authors)] Address: Bernard, R., Dept of General Zoology, Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznań, Poland; E-mail: bernard@amu.edu.pl
- 8993.** Bried, J.T.; Hunt, P.; Worthen, W.B. (2007): How often and how long? Studying temporal survey design for adult odonates. *Argia* 18(4): 8-11. (in English) ["This study is not about trying to find an optimum survey design, as decisions regarding sampling frequency and survey length will depend on the project objectives, the level of accuracy required, and the human resources available. Instead, our mission is to offer a set of guidelines and options built upon rigorous data that will facilitate prudent decisions about temporal survey design in any projects using adult odonates." (Authors)] Address: Worthen, W.B., Dept Biol., Furman University, Greenville, SC29613 USA. E-mail: worthen@furman.edu
- 8994.** Buczyński, P. (2007): Polish and dedicated to Poland odonatological papers. 5. The second half of the year 2006. *Odonatrix* 3(2): 62-64. (in Polish, with English summary) [The author presents a list of Polish and dedicated to Poland odonatological papers that were published in the second half of the year 2006. In the reported time period, 24 papers appeared, and 2 Ph.D. theses and 1 expertise were written. Some additions to the year 2005 were given too. The list does not contain the papers published in *Odonatrix* - they are listed in a separate index at the end of an ever volume.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 8995.** Buczyński, P. (2007): Odonatological conferences in the year 2007. *Odonatrix* 3(1): 29. (in Polish, with English summary) [Announcements and brief information on the coming conferences of GdO in Dresden, Germany, and WDA in Namibia.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 8996.** Buczyński, P. (2007): New records of *Erythromma viridulum* (Charpentier, 1840) on the edge of its distribution area in the northern Poland. *Odonatrix* 3(1): 15-18. (in Polish, with English summary) ["The author gives four localities of *E. viridulum* situated in the northern Poland at Polish-Russian borderline, outside the up-to-date-known area of its occurrence. *E. viridulum* has been in the stage of expansion towards the north in last two decades, likewise in other countries of western and central Europe. The changes of climate and eutrophication of surface waters are crucial factors of this state. It is clear that next records of this species outside its range are expected. The neighbourhood of the localities given in the paper to Kaliningrad District (NW part of Lake Głębockie - only 2.2 km) points out that this species might occur in its area." (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 8997.** Buczyński, P. (2007): Dragonflies in the Net. Part 2. Germany. *Odonatrix* 3(1): 30-32. (in Polish, with English summary) [17 web based links are presented.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 8998.** Cios, S (2007): Odonata as food of fish. *Odonatrix* 3(1): 1-8. (in Polish, with English summary) ["Presented is data on the occurrence of Odonata in fish stomachs in certain waters in Poland, Finland, Italy and France. In general Odonata are a rare item in fish stomachs (they constitute less than 1% of the organisms eaten). In Poland the main Odonata eaten by salmonids are *Calopteryx*, *P. pennipes* and gomphids, almost exclusively in highland and lowland running waters. In the material from Finland there is a striking lack of *Zygoptera*. The material from Italy, though small, indicates a similar role of lotic and lentic species. In general high water favours consumption of Odonata larvae by salmonids in running waters, by increasing their availability to fish (higher catastrophic drift). In the case of perch it seems that the consumption increases during low water level. In the material adults played a negligible role." (Author)] Address: Cios, S., ul. Stry-

jeńskich 6/4, 02-791 Warszawa, Poland. E-mail: tani-slav.cios@msz.gov.pl

**8999.** Cotrel, N.; Rouillier, P.; Boissinot, A. (2007): Atlas commenté des Odonates des Deux-Sèvres. Nature entre Deux-Sèvres 1: 56-76. (in French) [Deux-Sèvres is a Department in the region Poitou-Charentes situated in the west of France. A total of 59 species is briefly introduced and records of the species are mapped.] Address: Deux-Sèvres Nature Environnement, 7 rue Crèmeau, 79000 NIORT, France. E-mail: contact@dsne.org

**9000.** Curtean-Babduc, A. (2007): Contributions to the study of Cibin river Odonata larvae communities. Brukenthal. Acta Musei 3: 117-124. (in English, with Romanian summary) [Romania; between 1997 - 2001, and in 2005 nine sampling stations (S1 - S9) - localized along Cibin River, starting at 16 km downstream the springs to the confluence with the Olt River - were sampled for their Odonata fauna. Eight species: *Calopteryx virgo* (S3, S4, S5, S6), *C. splendens* (S1), *Lestes dryas* (S1), *Gomphus vulgatissimus* (S2, S3, S9), *Ophiogomphus cecilia* (S2, S3), *Cordulegaster boltonii* (S1, S2), *Cordulegaster bidentata* (S2, S3), and *Leucorrhinia pectoralis* (S6, S7, S9) were recorded.] Address: Curtean-Babduc, Angela, „Lucian Blaga” University, Faculty of Sciences, Ecology and Environmental Protection Department, Oituz Street, no. 31, Sibiu, Sibiu County, Ro - 550337, Romania. E-mail: angela.banaduc@ulbsibiu.ro

**9001.** Dapkus, D. (2007): Protected species of insects in conservation areas of central Lithuania recorded in 2007. New and rare for Lithuania insect species 19: 5-9. (in English, with Lithuanian summary) [Lithuania; records of *Leucorrhinia pectoralis* and *Ophiogomphus cecilia* are documented.] Address: Dapkus, D., Dept of Zoology, Vilnius Pedagogical University, Studentu 39, LT-08106 Vilnius, Lithuania. E-mail: daldap@vpu.lt

**9002.** Donnelly, N. (2007): More on the Caribbean Islands: Odonates taken during Mike Ivie's beetle survey of Montserrat. Argia 18(4): 13-14. (in English) [Lesser Antilles: *Triacanthagyna trifida*, *Orthemis macrostigma*, *Protoneura romanae*, *Macrothemis meurgeyi*, *Dythemis* sp.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**9003.** Dyatlova, E.S. (2007): Phenology of dragonflies (Insecta: Odonata) in south-western Ukraine. Odessa National University Herald 12(5): 167-176. (in English) [Dragonflies, South-Western Ukraine, phenology, Odonata] [“38 species of dragonflies from the south-western Ukrainian fauna have been distributed into six groups according to their flying periods: 53% belong to the summer group, 18% - to the summer-autumnal group, 5% - to spring-summer-autumnal group, 8% - to spring-summer group; 3% - to overwintering species on the adult stage. Data on phenology for two subspecies (*Calopteryx splendens ancilla* and *Orthetrum coerulescens anceps*) and one species (*Erythromma lindenii*) are published for the first time in Ukraine. In comparison to the literature data obtained from other parts of Ukraine, the phenological range has increased for ten species. The largest number of species flying simultaneously was observed in the second half of June.” (Author)] Address: Dyatlova, Elena Sergejevna, Institute of Zoology, Faculty of Biology, I.I. Mechnikov University of

Odessa, Odessa, Ukraine. E-mail: lena.dyatlova@gmail.com

**9004.** Feldwieser, G. (2007): Aus meinem Kuriositäten Kabinett. mercuriale 7: 42-43. (in German) [Among some curious pictures are an interspecific copulation between male *Chalcolestes viridis* and male *Enallagma cyathigerum*, and pictures of predation of damselflies by hornet and an Orthoptera.] Address: Feldwieser, G., Gönninger Straße 27, 72793 Pfullingen, Germany

**9005.** Göcking, C.; Menke, N.; Kiel, E.-F.; Hübner, T. (2007): Die Helm-Azurjungfer (*Coenagrion mercuriale*, CHARPENTIER 1840). Vorkommen, Schutz und Management einer FFH-Art in NRW. Natur in NRW 2/07: 18-23. (in German) [The distribution of *C. mercuriale* in Nordrhein-Westfalen, Germany was mapped, and habitats are described and assessed according to the assessing scheme of Ellwanger et al (2007). At present only 12 localities are known with in most cases medium sized population (100-500 ind.).] Address: Göcking, C., NABU-Naturschutzstation Münsterland e.V., Zumsandstr. 15, 48145 Münster, Germany. E-Mail: C.Goeking@NABU-Station.de

**9006.** Hunger, H. (2007): Nachruf auf Adolf und Stefan Heitz. mercuriale 7: 44-47. (in German) [Obituary for two well known German odonatologists.] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), August-Ganther-Straße 16, D-79117 Freiburg, Germany. E-mail: holger.hunger@inula.de

**9007.** Kelly, J.M. (2007): Ecotoxicological assessment of juvenile northern pike inhabiting lakes downstream of a uranium mill. M.Sc. thesis, Toxicology Graduate Program, University of Saskatchewan, Saskatoon: XIV, 129 pp. (in English) [Key Lake uranium mill in northern Saskatchewan, Canada; “dragonfly larvae” were present in the stomachs of pike from all three lakes.] Address: Kelly, Jocelyn Marie, Toxicology Centre, University of Saskatchewan, 44 Campus Drive, Saskatoon, Saskatchewan S7N 5B3, Canada

**9008.** Kronenbitter, J. (2007): Ungewöhnliches Eiablageverhalten beim Kleinen Granatauge (*Erythromma viridulum*). mercuriale 7: 39-41. (in German) [Würzburg, Bavaria, Germany (9°55'54”O, 49°45'55”N); submerged oviposition of a tandem] Address: Kronenbitter, Jenja, Schwabenstr. 21, D-76646 Bruchsal, Germany

**9009.** May, M. (2007): Phylogeny of Odonata: Part 1, Phylogenetic inference. Argia 18(4): 19-25. (in English) [Brilliant introduction into general and Odonata phylogeny.] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu

**9010.** Meurgey, F.; Weber, G. (2007): The Odonata of Dominica, British West Indies — 2006 collecting trip. Argia 18(4): 14-16. (in English) [A survey of 23 localities, resulted in 21 Odonata species, and bringing the checklist of Dominica to 25 species.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**9011.** Michalczyk, W. (2007): Ornate damselfly *Coenagrion ornatum* (Sélys, 1850) found in the Wołyńska Upland (south-eastern Poland). Odonatrix 3(2): 40-42. (in Polish, with English summary) [“The paper is a preliminary report about the population of *C. ornatum* re-

corded 20 km east-south-east of Zamość (50°39'N, 23°32' E, the Wołyńska Upland, south-eastern Poland). Numerous imagines of *C. ornatum* were observed on 15 May, 2007 in the valley of the River Sieniocha at the outlet canal of the spring peat bog of carbonate character. *Enallagma cyathigerum*, *Somatochlora flavomaculata* and *Libellula fulva* were co-occurring species. *C. ornatum* has been observed for the first time since 1992 and it has been the first record in south-eastern Poland since over 60 years. In the near future more detailed analyses of the recorded population as well as the habitat and its monitoring are planned." (Author)] Address: Michalczyk, M., Zamojskie Towarzystwo Przyrodnicze, ul. Szymonowica 19/6, 22-400 Zamość, Poland. E-mail: wiack@wp.pl

**9012.** Miszta, A.; Dolný, A. (2007): Localities of protected and rare dragonfly species in the Silesian woiwodship found out of water and peat bog nature reserves in the years 2003-2005. *Odonatrix* 3(1): 9-14. (in Polish, with English summary) [A survey of dragonflies at 13 localities in the Silesian woiwodship but situated outside the area of nature reserves was made. 15 dragonfly species belonging to protected or rare animal species occurred. Only one of the sites seems to be safe from human activities or natural succession. The remaining ones need continuous monitoring, some of them should be actively protected." (Authors)] Address: Miszta, Alicja, Centrum Dziedzictwa Przyrody Górnego Śląska, ul. Św. Huberta 35, 40-543 Katowice, Poland. E-mail: a.miszta@cdpgs.katowice.pl

**9013.** Miszta, A.; Boroń, M.; Cuber, P.; Dolný, A. (2007): The occurrence of *Aeshna affinis* Vander Linden, 1820 and *Crocothemis erythraea* (BRULLÉ, 1832) in sinkhole ponds in the Silesian voivodeship in 2006 (Odonata: Aeshnidae, Libellulidae). *Odonatrix* 3(2): 42-46. (in Polish, with English summary) [A study "of dragonflies on man-made reservoirs of the Silesian Region took place, in 2006 there were recorded numerous males and less numerous females of *A. affinis*. Single individuals have been reported in 1939 in Gwozdziany and in 1966 in Ustron. Since its last record *A. affinis* has been noted again in 2005 in an old river bed of the River Odra River in Lasaki. It has been recorded on seven new sites in the next year. Most of those new sites were small sinkhole ponds created by coal-mining. What is more *A. affinis* was recorded on a few natural sites too. While on natural sites there were 2 - 4 specimens recorded, on anthropogenic water bodies there were usually about 20 individuals. Creating tandems indicated making attempts to inhabit anthropogenic water bodies by this species. There was another quite rare and stenothermic species - *C. erythraea* recorded on two sites together with *A. affinis*. This species has been observed since 2002 in Oder River Valley, near the southern border of Silesian Region with Czech Republic. Nevertheless it was recorded for the first time in sinkhole ponds in 2006." (Authors)] Address: Miszta, Alicja, Centrum Dziedzictwa Przyrody Górnego Śląska, ul. Św. Huberta 35, 40-543 Katowice, Poland. E-mail: a.miszta@cdpgs.katowice.pl

**9014.** Paulson, D. (2007): Hawaii — another view. *Argia* 18(4): 11-12. (in English) [Kauai, Hawai'i, USA, 15-15. Oct. 2006: *Anax strenuus*, *Megalagrion vagabundum*, *M. oresitrophum*, *M. eudytum*, *Pantala flavescens*, and some introduced Odonata: *Ischnura ramburii*, *I. posita*, *Orthemis ferruginea*, *Crocothemis servilla*, *Anax junius*] Address: Paulson, D.R., Slater Museum,

Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**9015.** Prioul, B. (2007): Analyse d'ouvrage: Juwelenschwingen, Geheimnisvolle Libellen (Gossamer Wings, Mysterious Dragonflies) par Dagmar Hilfert-Rüppell & Georg Rüppell, 2007. Splendens-Verlag, Allemagne. Relié, couverture rigide en couleurs. 22 x 28 cm, 168 pages, 264 photographies en couleurs. ISBN : 978-3-00-020389-3. Prix: 34,95. Site Internet: <http://www.splendens-verlag.de/>. *Martinia* 23(3): 111-112. (in French) [review] Address: not stated

**9016.** Robin, J.; Albinet, S.; Fusari, M. (2007): Atlas préliminaire des Odonates de Tarn-et-Garonne. *Bulletin de la Société des sciences naturelles de Tarn-et-Garonne* 31(2006-2007): 1-21. (in French) [Département Tarn-et-Garonne, France; 48 Odonata species are mapped and briefly discussed.] Address: Robin, J., 6 rue du Stade 24, 82370 Corbarieu, France, E-mail: robin-jerome@voila.fr

**9017.** Sächsische Landesstiftung Natur und Umwelt; Staatliches Museum für Tierkunde Dresden (Hrsg.); Brockhaus, T.; Nuß, M.; Voigt, N. (Red.) (2007): Abstracts, 26. Jahrestagung Gesellschaft deutschsprachiger Odonatologen (GdO e.V.), 09.-11. März 2007 · Dresden. 49 pp: (in German) [Laptop-Präsentation: ROLAND TÜRK: Tierdatenbanken. Poster: EVA BULANKOVA, ALES DOLNÝ & DAN BÁRTA: River Habitat Survey – eine Methode zur Charakterisierung der Biotopansprüche der rheophilen Libellen; W. ZESSIN: Überblick über die paläozoischen Libellen; H. SCHNABEL: Die Libellen des Biosphärenreservates Oberlausitzer Heide- und Teichgebiet; D. BÁRTA & A. DOLNÝ: *Aeshna juncea* in pictures – some methods of displaying the dragonflies; A. DOLNÝ & L. HANEL: Současné znalosti o vážkách České republiky a možnosti jejich ochrany (Present knowledge about dragonflies of the Czech Republic and ways and means of their protection). Vorträge: H. VOIGT: Die Libellenfauna der Stadt Dresden; J. PHOENIX & P. BENDA: Die Libellenfauna der Sächsisch-Böhmischen Schweiz; H.-J. CLAUSNITZER: Die Veränderung der Libellenfauna im Landkreis Celle 1984–2006; E. G. SCHMIDT: Die Veränderungen der Odonatenfauna der nordfriesischen Insel Amrum in den letzten Jahrzehnten und ihre Ursachen; R. BERNARD & T. SCHMITT: Ecological and genetical potential of *Nehalennia speciosa* and its implication for conservation; K. BURBACH: Voruntersuchungen zu einem Artenhilfsprogramm Libellen in Bayern; K.-J. CONZE: Quelljungfern (*Cordulegaster* sp.) in Nordrhein-Westfalen; H. DONATH: Libellen als Indikatoren zur Evaluierung von Gässerschutzprojekten im Naturpark Niederlausitzer Landrücken; J. OTT, M. SCHORR, B. TROCKUR & U. LINGENFELDER: Artenschutzprojekt Gekielte Smaragdlibelle (*Oxygastra curtisii*); B. HACHMÖLLER & C. SCHMIDT: Pflegekonzept für Gräben im LSG Nassau bei Meißen unter besonderer Berücksichtigung der Vogel-Azurjungfer (*Coenagrion ornatum*); S. HEITZ: Regionale Mindeststandards zur Gewässerunterhaltung von Wiesenbächen am Oberrhein; G. DE KNIJF & A. ANSELIN: Some interesting results of the Belgian dragonfly atlas; P. BUCZYŃSKI, R. BERNARD & G. TONCZYK: Atlas der Verbreitung der Libellen in Polen; M. MARINOV: Current gaps in our knowledge and the need of research on Bulgarian Odonata; MARTENS: Libellen als Neozoen; T. BROCKHAUS: Das Projekt der Libellenfauna Deutschlands; T. KOHBACH & D. AUGUSTIN:



MultiBase Version CS, kartengestützte Arterfassung deutschlandweit am Beispiel der Libellen; V. KALKMAN: Mapping European dragonflies; K. KOCH, M. KARLSSON & G. SAHLÉN: Wie können Ovarienstrukturen die zwei Eigelege-Typen von Libelluliden erklären?; A. GÜNTHER & D. BARTÁ: *Archineura incarnata* – erste Impressionen aus dem Verhalten der unbekanntesten Riesen; F. WEIHRAUCH: Fakt oder Phantasma – ist *Ophiogomphus cecilia* auf der Iberischen Halbinsel indigen?; D. GOERTZEN: Die Industriebrachen des Ruhrgebiets – wertvolle Lebensräume für Libellen?; W. ZESSIN: Zur Biologie paläozoischer Libellen; H. WILDERMUTH: Ökologische Fallen in der Zivilisationslandschaft – Neues zum Polarisationssehen der Libellen; K. WESTERMANN: Anhaltende Eiablage vieler *Lestes viridis* in Stängel der Großen Brennnessel (*Urtica dioica*) – falsche Substratwahl infolge der Geburtsortstreue; KUNZ: Eiablage von *Sympetma fusca* in vertikales grünes Substrat; O. MÜLLER: Beitrag zur Ökologie der Larven von *Boyeria cretensis*; F. SUHLING, E. BRAUNE & O. RICHTER: Wie wirken sich Klimaveränderungen auf Lebenszyklen von Libellen aus? Erste Ergebnisse am Beispiel von *Gomphus vulgatissimus*; J. OTT: Die Veränderung der Libellengemeinschaften der Wöoge im Biosphärenreservat Pfälzerwald infolge der Klimaveränderung und Konsequenzen für das Netz NATURA 2000; J. HOFFMANN: Klimawandel und Libellen – Eindrücke zu Untersuchungen in den Anden] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**9018.** San Roman, L.S.; Bastero Monserrat, J.J.; De La Campa Martinez, H. (2007): El Homenaje a Linneo de 1907 en Zaragoza: un siglo más tarde. *Naturaleza Aragonesa* 18: 4-13. (in Spanish) [The paper includes references to Longinos Navás (1858-1937), famous Spanish neuropterologist and experienced worker in Odonata.] Address: San Román, L.S., già de Granada. Campus Universitario de La Cartuja, s/n. Aptdo. de Correos 2002. E-18080 Granada. España. E-mail: Lsequeiros@probesi.org

**9019.** Schielke, E.; Costantini, C.; Carchini, G.; Sagnon, F.; Powell, J.; Caccone, A. (2007): Short report: Development of a molecular assay to detect predation on *Anopheles gambiae* complex larval stages. *Am. J. Trop. Med. Hyg.* 77(3): 464-466. (in English) ["We developed a molecular assay to detect predation on *Anopheles gambiae* sensu lato (s.l.) mosquitoes. This intergenic spacer ribosomal DNA polymerase chain reaction assay and restriction enzyme analysis uses *An. gambiae*-specific primers to detect mosquito DNA in the DNA extracts from whole invertebrate predators, which enables identification of species (*An. gambiae* s.s. versus *An. arabiensis*) and molecular forms (M versus S in *An. gambiae* s.s.). We show that *An. gambiae* s.l. DNA can be detected after ingestion by members of the families Lestidae after four hours, Libellulidae after six hours, and Notonectidae (order Hemiptera) after 24 hours. This method is an improvement over previously published methods because of ease of execution and increased time of detection after ingestion." (Authors)] Address: Powell, P., Dept Ecol. Evol. Biol., Yale Univ., PO Box 208106, New Haven, CT 06520-8106, USA. E-mail: jeffrey.powell@yale.edu

**9020.** Sibley, F.C.; Daigle, J.J. (2007): Florida Keys—September/October 2006 or where's Wilma? *Argia* 18(4): 17-19. (in English) [Hurricane affected ponds and species composition of habitats. The results of a pre-

hurricane (Oct. 2005) and the post-hurricane (Oct. 2006) samples are documented and discussed.] Address: Sibley, F.C., The Conservation Agency, 6 Swinburne St. Jamestown, RI 02835, USA. E-mail: fcsibley@empacc.net

**9021.** Śniegula, S. (2007): The Odonata of the Täfteån (Västerbotten, Province, Sweden). *Odonatrix* 3(2): 47-49. (in Polish, with English summary) ["This article contains data on Odonata species recorded on July 16th, 2006 in two localities at the Täfteån River. *Calopteryx virgo* and *Cordulegaster boltonii* represent typical lotic species and were recorded in locality 1. *Pyrrhosoma nymphula* was previously recorded in 5 localities in the Västerbotten Province. It seems that these are the most northern localities of the species, whose larvae prefer slow flowing and productive rivers. The author recorded *P. nymphula* in locality 2. Two widespread in Sweden *Aeshna* species are usually found in meso- and dystrophic lakes. Both were recorded exclusively in locality 2. *Somatochlora metallica* was a dominant dragonfly in two studied localities. In the Västerbotten Province larvae of this species are found in variety of aquatic habitats." (Author)] Address: Śniegula, S., Rakowo 32, 78-445 Lubowo, Poland. E-mail: ssniegula81@interia.pl

**9022.** Tończyk, G. (2007): Moreover than dragonfly impressions from field studies at northern Mazowsze. *Odonatrix* 3(1): 19-21. (in Polish, with English summary) ["Report on nature impressions from the expedition to the northern Mazowsze in the frames of "Atlas of the distribution of the dragonflies (Odonata) of Poland" project. The studies covered 124 study sites and resulted in recording 55 dragonfly species. However, the studied area was strongly transformed - especially this referred to small water courses. Melioration and pollution were probably the main reasons why *Calopteryx virgo* was found as a very rare species. *Erythromma viridulum*, *Lestes barbarus*, *Aeshna juncea*, *A. subarctica elisabethae*, *A. viridis*, *Orthetrum albistylum* and *O. brunneum* were the most interesting species recorded during studies." (Author)] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk.grzegorz@gmail.com

**9023.** Tończyk, G. (2007): 4th National Symposium of Odonatology of the Polish Entomological Society, Brda, May 18-20, 2007. *Odonatrix* 3(2): 59-61. (in Polish, with English summary) ["4th All-Polish Odonatological Symposium took place in Brda by the River Brda in Tucholskie Forests. There were 18 participants involved. During three days of the conference the problems connected with standardisation of the methods used in odonatological studies as well as larval and exuvial identification were discussed. The main task of the meeting was the practical introduction to the analysis of dragonfly faunistic composition of some study sites which were visited during a daylong field excursion." (Author)] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk.grzegorz@gmail.com

**9024.** Tończyk, G. (2007): Horizontal and vertical parameters of *Ophiogomphus cecilia* (Fourcroy, 1785) (Odonata: Gomphidae) emergence in small lowland river.

Odonatrix 3(1): 23-25. (in Polish, with English summary) ["Short note on horizontal and vertical parameters of the position of *Ophiogomphus cecilia* exuviae in the bank zone of small lowland river. The measurements of 111 exuviae positions were made. The average height on which exuviae were found was 77 cm (min. 11 cm, max. 172 cm, most often from 60 to 120 cm), the average distance from the bank line was 43 cm (min. 0 cm, max. 210 cm, most often from 0 to 50 cm).] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk.grzegorz@gmail.com

**9025.** Tończyk, G. (2007): Interesting development sites of *Aeshna cyanea* (O.F. Müller, 1764). *Odonatrix* 3(1): 22-23. (in Polish, with English summary) ["*A. cyanea* is one of the most eurytopic dragonfly species using all types of waters for its development. The observations of this species inhabiting pools made during the mud bath of boars (*Sus scrofa*) are given. This phenomenon was observed in 2006 in Mazowsze and the east Sudety Mts." (Author)] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk.grzegorz@gmail.com

**9026.** Wendzonka, J. (2007): Second record of *Crocothemis erythraea* (Brullé, 1832) in Western Poland with remarks on its distribution and ecology (Odonata: Libellulidae). *Odonatrix* 3(2): 33-39. (in Polish, with English summary) [*C. erythraea* was observed in a pond near the village Gostyń Stary, 51° 54' N, 16° 57' E, by Gostyn, 65 km S of Poznań, Poland.] Address: Wendzonka, J., ul. Graniczna 17, 63-800 Gostyń, Poland. E-mail: wendzonka@wp.pl

**9027.** Zięba, P.; Buczyński, P. (2007): Green Hawker *Aeshna viridis* caught in light traps. *Odonatrix* 3(1): 26-28. (in Polish, with English summary) ["Adults of *A. viridis* were collected in light traps in the valley of the river Narewka in Białowieża village, NE Poland (2006-07-22, 1 female at mercurial lamp and 2006-07-23, 3 females and 1 male at arc-lamp). All specimens were caught on ca 21.40. The collected individuals were sitting frontally to the lamp so that their body axes were forwardly directed to the source of light. The authors discuss the known cases of light-trapped dragonflies, especially in the zone of temperate climate and in Europe. This phenomenon can be the result of spontaneous activity of dragonflies or their arousal to activity by strong light. Up-to-date observations have shown that there are two possible explanations: in particular cases the first or the second mechanism was involved. For the observations from Białowieża more possible is the second one: *A. viridis* was multiply found in the valley of the Narewka River, also at the sites where light traps were provided. It seems that many cases of dragonflies attracted to the light source are overlooked for odonatologists do not use the method and other entomologists who set light traps are not interested in dragonflies or underestimate such observations. So for gathering more data on the subject the cooperation of odonatologists and specialists of other insect groups is needed." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**9028.** Bernard, R.; Daraż, B. (2008): State and habitat of a peripheral and isolated population of *Nehalennia speciosa* (Charpentier, 1840) in southeastern Poland (Odonata: Coenagrionidae). *Odonatrix* 4(1): 12-19. (in Polish, with English summary) ["The peripheral population of *N. speciosa*, discovered in 2004 in the nature reserve "Broduszurki", SE Poland (49°49' N, 22°21' E; UTM EA91), is the southernmost remaining population of the species in E Europe and E part of Central Europe. The Broduszurki population represents the same Evolutionary Significant Unit (ESU) as other Polish populations of the species and could be included into the same Management Unit (MU). However, a slightly greater genetic distance and genetic differentiation against all other studied populations, combined with the current state of strong isolation (the nearest species locality 90 km distant), might justify treating this population as a separate MU. This population, occupying ca 0.06 ha, is medium-sized (max > 400 imagines per control and min 1500 in the flight period) and dynamic, recently increasing and colonizing new patches of the habitat, but also tightly attached to selected small areas. The local high density was mirrored in a high mortality in spiders' webs (e.g. 36 individuals/14 webs or 35/15). The habitat of *N. speciosa* is secondary: several-dozen-year old peat excavation pools in different stages of succession, surrounded by low peaty pine forest. *N. speciosa* occurred in two subpopulations (pools) and four habitat patches. It was related mostly to the rich in water habitat with *Carex rostrata*, *Sphagnum* sp., *Warnstorfia fluitans*, and admixtures of *Juncus effusus* and *Molinia caerulea*, resembling the "rostrata" habitats known from several other localities in E Poland and Europe. However, the species occurrence in one patch based mostly on *Molinia caerulea* is exceptional, known only from Lower Saxony, where one locality even highly resembles the Broduszurki one. The habitat in this patch is spatially separated between the larval one (*Warnstorfia fluitans* "soup" in water) and that one for imagines - land tussocks of *M. caerulea* explored by the species up to 5 m from the water. Dry leaves of *Molinia*, hanging into water and used for the emergence were a passage between these two microhabitats. However, the use of such an untypical habitat is possible only due to a specific combination of conditions, such as the occurrence of *M. caerulea* under the canopy of trees protecting from excessive insolation and stronger winds. As *N. speciosa* was not observed in other seemingly similar places nearby for no apparent reason, it seems that some of these conditions have remained unrecognised." (Authors)] Address: Bernard, R., Dept General Zool., Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznań, Poland; E-mail: bernard@amu.edu.pl

**9029.** Buczyński, P. (2008): Impressions from the 26th Annual Congress of the German Speaking Odonatologists in Dresden (March 9-11, 2007). *Odonatrix* 4(1): 28-29. (in Polish, with English summary) ["Brief relation on the international odonatological congress that took place in Dresden. The main streams of debates are presented. The most valuable speeches are pointed, especially from the field of dragonfly conservation, biology and zoogeography." (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

- 9030.** Buczyński, P. (2008): First record of *Coenagrion armatum* (Charpentier, 1840) in the Lithuanian Lake District (Odonata: Coenagrionidae). *Odonatrix* 4(1): 25-27. (in Polish, with English summary) ["*C. armatum* is a critically endangered species in Poland which has been vanishing in the western part of the country. Its refuge is eastern borderland, however, no contemporary existing populations have been found from the northern part of this area so far. The author gives the description of the first site of *C. armatum* known from Polish part of the Lithuanian Lake District: Lake Gulberek NE from Wizajny (54°23'44" N, 22°55'26" E, 220 m. a.s.l., UTM: FF22)."] (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 9031.** Buczyński, P. (2008): 47th Congress of the Polish Entomological Society, Bieszczady Mts., June 26-29, 2008. *Odonatrix* 4(1): 27. (in Polish, with English summary) [Announcement: "In June 2008 the 47th Congress of the Polish Entomological Society will be held in the Bieszczady Mts. (SE Poland). Meetings of thematic sections are planned during this congress. Therefore we are forced to cancel the 5th All-Polish Symposium of Odonatology that was planned in the year 2008. All persons interested in dragonflies are invited to participate in the congress of the Polish Entomological Society. Information about the congress are available on the webpage of the PES: [www.pte.au.poznan.pl](http://www.pte.au.poznan.pl) (section "Aktualności")."] (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 9032.** Buczyński, P. (2008): Preliminary studies on dragonflies (Odonata) of carbonate fens near Chelm. *Odonatrix* 4(1): 21-35. (in Polish, with English summary) ["In 2007 in the vicinity of Chelm (Central-Eastern Poland), researches on dragonflies of carbonate fens and habitats associated with them or formed in the area (canals, small water bodies, ponds) were conducted. 34 dragonfly species were found, of which 32 with confirmed or probable development. The most frequent species are: *Lestes virens*, *Coenagrion puella*, *C. pulchellum*, *Somatochlora flavomaculata*, *Libellula quadrimaculata* and *Sympetrum danae*. Carbonate fens as well as dystrophic waters connected with them were characterized by a specific dragonfly fauna - with no or very scarce some tyrphophilous (e.g. *Aeshna juncea*, *Leucorrhinia pectoralis*) and strong dominance of others (e.g. *Lestes virens*, *Somatochlora flavomaculata*). Peat bog drying out caused the disorder of this arrangement: the extinction of tyrphophilous, the increase in number of eurytopes and incidence of thermophilous species like *Lestes barbarus*."] (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 9033.** Dillon, M. (2008): Dragonflies and damselflies of Wright Patman Lake. *Dragonflies and Damselflies (Odonata) of Texas* 3: 5. (in English) [31 Odonata species are listed from Wright Patman Lake, extreme northeast Texas, USA.] Address: Dillon, M., Marshall, Texas, USA. E-mail: mdillon@charter.net
- 9034.** El Haissofi, M.; Lmohdi, O.; Bennas, N.; Mellado, A.; Millan, A. (2008): Les Odonates du bassin versant Laou (Rif occidental, Maroc). *Bayed A. & Ater M. (éditeurs). Du bassin versant vers la mer: Analyse multidisciplinaire pour une gestion durable. Travaux de l'Institut Scientifique, Rabat, série générale* 5: 47-59. (in French, with English summary) ["Prospecting of 17 localities of the catchment area of Oued Laou allowed us to identify 22 species of Odonata, among which, *Coenagrion scitulum*, *Pyrrhosoma nymphula nymphula*, and *Onychogomphus costae* are new quotations for this catchment area. Data collected during this study and the literature analysis made it possible to draw up the inventory of 32 species of Odonata known until now for this area. Detailed data on the regional distribution, a description of the habitat of each species captured and a chorological analysis of the odonatological settlement of the area are presented."] (Authors)] Address: El Haissofi, M., Université Abdelmalek Essaâdi, Faculté des Sciences, Laboratoire de Diversité et Conservation des Systèmes Biologiques, B.P. 1221, 93000 Tétouan, Maroc. E-mail: sympetrum111@hotmail.com
- 9035.** Gallucci, T. (2008): The Odonata of Kerr county and the Guadalupe river system of Texas. *Dragonflies and Damselflies (Odonata) of Texas* 3: 6-11. (in English) [USA.; brief history in regional Odonata study, brief description of ecological situation, and checklist of the county Odonata.] Address: Gallucci, T., Gulf Coast Laboratory for Wildlife Research and Milk River Milm; P.O. Box 6, Camp Verde, Texas 78010-5006, USA. E-mail: milkrivermusic@hotmail.com
- 9036.** Gallucci, T. (2008): The Odonata of Real County and the Frio-Nueces River System of Texas. *Dragonflies and Damselflies (Odonata) of Texas* 3: 12-19. (in English) [USA.; brief history in regional Odonata study, brief description of ecological situation, and checklist of the county Odonata.] Address: Gallucci, T., Gulf Coast Laboratory for Wildlife Research and Milk River Milm; P.O. Box 6, Camp Verde, Texas 78010-5006, USA. E-mail: milkrivermusic@hotmail.com
- 9037.** Gamboa, M.; Reyes, R.; Arrivillaga, J. (2008): Macroinvertebrados bentónicos como bioindicadores de salud ambiental. *Boletín de malariología y salud ambiental XLVIII(2)*: 109-120. (in Spanish, with English summary) [Benthic macroinvertebrates as bioindicators of environmental health: The fluvial system has been under strong human pressure, due to a lack of urban planning, which has triggered a potentially dangerous potable water problem for human consumption and irrigation. These changes in the quality of the fluvial systems have promoted important microclimatic changes, within the niche of special aquatic fauna, macroinvertebrates, that have a susceptible population dynamics to habitat disturbances. For sustainable development it is necessary to consider aquatic atmosphere conservation and to propose an adequate management plan, which includes bioindicators as a potential tool, to evaluate the perturbation grade and monitor the fluvial system within the water conservation plan. A bioindicador is defined as a set of species, with specific requirements in relation to physical or chemical variables, so that the significant changes of these variables indicates for the species that the system is perturbed and the species are close to tolerance limits. The assemblages of macroinvertebrates are the best bioindicators of contaminated water, because they are very abundant, are present in all the fresh water ecosystems, easy to collect and monitoring is low cost. The taxa to consider for environmental quality are: Ephemeroptera, Trichoptera, Plecoptera, Diptera, Odonata and Coleoptera. In this work we suggest the use of these aquatic macroin-



vertebrates as biological bioindicators, and their utility as biotic indices to estimate the tolerance of benthos to the polluting agents (BMWP, IBMW, BMWQ, IBF, EPT, the percentage of scrapers and the abundance of Chironomidae) as well as the functional response of these organisms to the polluting agents. Increasing studies of biomarkers leads to a better understanding of how fresh water is affected by a pollutant.] Address: Gamboa, Maribet, Depto de Estudios Ambientales, Laboratorio de Genética de Poblaciones, Ecología Molecular de Insectos, Departamento de Biología de Organismos, Universidad Simón Bolívar, Caracas 89000, Venezuela. E-mail: maribetg@gmail.com

**9038.** Gierach, K.-D. (2008): Die Wiesenweihe in der nordwestlichen Niederlausitz: 2003 bis 2007. Biologische Studien, Luckau 37: 70-84. (in German) [Brandenburg, Germany; four dragonfly specimens were found as prey items of Montagu's Harrier (*Circus pygargus*).] Address: Gierach, K.-D., Straße der Einheit 48, 15926 Luckau, OT Beesdau

**9039.** Goertzen, D. (2008): Die Libellenfauna von Industriebrachen des Ruhrgebiets (NRW). Entomologie heute 20: 77-91. (in German, with English summary) [Germany; "In the highly industrialized Ruhr region the Odonata fauna at 11 industrial wasteland sites in 2006 resulted in 36 species; 29 of them reproduced in the water bodies present there. Temporary pools and small ponds as well as artificial basins were colonized from many species. From the 20 Red List species, 12 are indigenous at one or more sites, *Ischnura elegans*, *Sympetrum striolatum*, *Anax imperator*, *Aeshna mixta* and *Coenagrion puella* with a steadiness of at least 80 % are the most frequent species. Compared to the Ruhr region and NRW the rare *Lestes barbarus* and *Ischnura pumilio* are more frequent on industrial wasteland." (Author)] Address: Goertzen, Diana, Dornröschenweg 27, D-44339 Dortmund, Germany. E-mail: diana.goertzen@rub.de

**9040.** Heidemann, H. (2008): Analyse d'ouvrage: Die Falkenlibellen Europas par Hansruedi Wildermuth, Série Die Neue Brehm-Bücherei, vol. 653. 2008. Westarp-Wissenschaften, Hohenwarsleben. Couverture rigide en couleurs. Format: 14,5 x 21 cm. 496 pages. 16 planches avec 39 photographies en couleurs, 140 figures (4 photos au microscope électronique à balayage, 11 cartes de distribution, 4 autres cartes géographiques, 27 schémas géométriques, 97 dessins), 33 tableaux. ISBN 978 3 89432 896 2. Prix: 60 €. Commande à adresser à: Westarp-Wissenschaften, Kirchstr. 5, D-39326 Hohenwarsleben. *Martinia* 24(4): 153-156. (in French) [book review] Address: Heidemann, H., Au in den Buchen 66, 76646 Bruchsal, Germany

**9041.** Hilfert-Rüppell, D.; Rüppell, G. (2008): Alternative Taktiken im Fortpflanzungsverhalten von *Calopteryx splendens* in einem geographischen Vergleich (Odonata: Calopterygidae). *Entomologie heute* 20: 93-103. (in German, with English summary) ["Males of the widespread European *C. splendens* exhibited in high densities different alternative reproductive tactics between which they were able to change. Precedent copulations influenced the choice of the tactic and the outcome of fights. The causes are discussed. In a northern population of *C. splendens* frequency, intensity and success of the alternative reproductive tactics were higher than in a southern population. *C. haemorrhoidalis* that is restricted to the western Mediterranean

region, never showed alternative tactics during the investigation period, neither at the roosting site nor in enclosure experiments. These geographical variations of the behaviour within a species and in comparison to a southern species are discussed in a climatic context." (Authors)] Address: Hilfert-Rüppell, Dagmar, Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: d.hilfert@tu-bs.de

**9042.** Kasthala, G.; Hepelwa, A.; Hamiss, H.; Kwayu, E.; Emerton, L.; Springate-Baginski, O.; Allen, D.; Darwall, W. (2008): An integrated assessment of the biodiversity, livelihood and economic value of wetlands in Mtanza-Msona Village, Tanzania. Tanzania Country Office, International Union for Conservation of Nature, Dar es Salaam: VI, 143 pp. (in English) ["Odonata specimens were collected from 10 locations (9 lakes, 2 locations on the Mbaligani River following rain, and 1 site adjacent to the northern terrace of the Rufiji River). 100 specimens were collected, photographed and preserved. No field keys currently exist for East African odonates, and an export permit, required to send the specimens to an expert for identification, was not obtained. However, photographs of the specimens were submitted to an expert (V. Clausnitzer) for identification, and 14 specimens were identified (3 to Genus level, 11 to Species). All identified specimens are of Least Concern according to the IUCN Red List, and, except for *A. tristis* (a new record for the Rufiji), are common species associated with wetlands in the region." (Author) The following taxa are listed in table 25: *Anax tristis*, *Azuragrion nigradorsum*, *Ceriagrion* spp., *Ceriagrion glabrum*, *Ischnura senegalensis*, *Lestes uncifer*, *Acisoma panorpoides*, *Brachythemis leucosticta*, *Crocothemis* spp., *Orthetrum* spp., *Palpopleura lucia*, *Rhyothemis semihyalina*, *Trithemis annulata*, *T. arteriosa*.] Address: Tanzania Country Office IUCN, 63/1 Galu Street, Ada Estate, Kinondoni, PO Box 13513, Dar es Salaam, Tanzania

**9043.** Lambert, J.-L. (2008): Redécouverte de la leucorrhine à large queue (*Leucorrhinia caudalis*) dans le bassin du Drugeon. *l'Azuré* 7: 6. (in French) [9 juin 2006, commune de Frasne, Franche-Comté, France] Address: Lambert, J.-L., Office national de l'eau et des milieux aquatiques (Onema), Service Départemental de la Marne, France. E-mail: jean-luc.lambert18@wanadoo.fr

**9044.** Leipelt, K.G.; Schiel, F.J. (2008): Neufunde des Zweiflecks (*Epithea bimaculata*) am nördlichen Oberrhein und im angrenzenden Kraichgau (Baden). *mercuriale* 8: 27-35. (in German) [Records of *E. bimaculata* at 14 water bodies situated in Baden-Württemberg, Germany are documented in detail.] Address: Leipelt, K.G., Kriegsstraße 184, 76133 Karlsruhe, Germany. E-mail: klausguidoleipelt@gmx.de

**9045.** Martin, P. (2008): Wassermilben (Hydrachnidia, Acari) und Insekten. Ein Überblick über eine selten betrachtete Beziehung. *Entomologie heute* 20: 45-75. (in German, with English summary) [Parasite-host associations between insects and water mites are introduced with many details. Odonata are referred to at several occasions.] Address: Martin, P., Christian-Albrechts-Universität zu Kiel, Zoologisches Institut, Abt. Ökologie der Tiere, Olshausenstr. 40, 24098 Kiel, Germany. E-mail: pmartin@zoologie.uni-kiel.de

**9046.** Roland, H.-J. (2008): Zum Vorkommen der Helm-Azurjungfer *Coenagrion mercuriale* im Wetterau-

kreis 2007. Libellen in Hessen 1: 56-58. (in German) [Six habitats of *C. mercuriale* studied in 2007 in Landkreis Wetterau, Hessen, Germany are briefly documented.] Address: Roland, H.-J., Im Mühlahl 35, 61203 Reichelsheim, Germany. E-mail: Hjuergenroland@aol.com

**9047.** Rychła, A. (2008): New records of Keeled Skimmer *Orthetrum coerulescens* (Fabricius, 1798) from western Poland (Odonata: Libellulidae). *Odonatrix* 4(1): 19-20. ["*O. coerulescens* is a rare dragonfly in Poland and the data of its distribution is still insufficient (DD category in the Red List of Poland). In 2007, adults of this species were observed at two sites in the Lubuskie district (western Poland). In a meadow at a small ditch near Wicina (UTM: WT03) two females were recorded. At Lake Głębokie near Proszów (VT83) a single male was observed." (Author)] Address: Rychła, Anna, ul. Osiedlowa 12, Ploty, PO-66-016 Czerwiensk, Poland. E-Mail: rychlan@op.pl

**9048.** Shcherbakov, D.E. (2008): Madygen, Triassic Lagerstätte number one, before and after Sharov. *Alavesia* 2: 113-124. (in English) ["The insect fauna of the world's richest Triassic fossil locality, Madygen (Ladinian–Carnian of Kyrgyzstan) is reviewed; other groups of animals and plants recorded from the locality are also listed. The research history, fossil preservation and paleoenvironment of the Madygen Formation are briefly discussed. The site was discovered in 1933, and the better part of fossils was collected from the outcrop richest in insects, Dzhayloucho, during five expeditions headed by Alexander Sharov, who discovered there and described two peculiar gliding reptiles that made Madygen worldwide known. The entomofauna includes 20 orders (including the earliest Hymenoptera and early Diptera) and nearly 100 families. The insect assemblage is numerically dominated by Coleoptera, Blattodea, and Auchenorrhyncha. In Dzhayloucho, subdominants are Mecoptera, Orthoptera, and Protorthoptera. The largest insects belong to Titanoptera, the order established by Sharov and the most diverse in Madygen. Amphibiotic insects are rare and represented almost exclusively by adults. In some outcrops phyllopod *Kazacharthra* are common. The paleoenvironment may be reconstructed as an intermontane river valley in seasonally arid climate, with mineralized oxbow lakes and ephemeral ponds on the floodplain. ... Turning to the entirely amphibiotic orders, we find the Odonata the most abundant (about 100 specimens, all adults), and nearly as diverse in Madygen (10 families with 30 species) as in the Jurassic of Karatau or Solnhofen. This rich fauna is dominated by stalk-winged forms analogous to modern damselflies, and appears more archaic than those of Ipswich or Molteno (Pritykina 1981). Most groups are Triassic endemics: Triadophlebiidae (1/3), Paurophlebiidae (5/11), Zygophlebiidae (4/4), Mitophlebiidae (1/1), Xamenophlebiidae (1/1), Batkeniidae (1/1). Other families either are Permian relicts as the Triadotypidae s.l. (1/1) and Kennedyidae (1/2), or survived into the Jurassic as the Protomyrmeleontidae (2/4) and Triasolestidae (2/2)." (Author)] Address: Shcherbakov, D.E., Paleontological Institute, Russian Academy of Sciences, Profsoyuznaya 123, Moscow 117647, Russia. E-mail: dshh@narod.ru

**9049.** Steinmann, P. (2008): Makrozoobenthos und aquatische Neozoen im Greifensee und Pfäffikersee 2008. Untersuchung im Auftrag der Baudirektion des Kantons Zürich, AWEL Amt für Abfall, Wasser, Energie

und Luft: 28 pp. (in German) [Two lakes in the Kanton Zürich, Switzerland were surveyed in 2006 and 2007 for their macrozoobenthos with special reference to neozoon. 6 Odonata species including *Erythromma najas*, *Onychogomphus uncatatus* and *Gomphus pulchellus* were recorded. Thanks to the author of the study, the voucher species could be restudied by H. Wildermuth. *O. uncatatus* has to be replaced by *O. forcipatus* and *E. najas* by *Enallagma cyathigerum*. To download the study see: <http://www.gewaesserqualitaet.zh.ch/inter-net/bd/awel/gq/de/doku/dokuseen.SubContainerList.SubContainer1.ContentContainerList.0047.Download-File.pdf?CFCcK=1273943659299>

**9050.** Tończyk, G.; Stankiewicz, M. (2008): Dragonflies (Odonata) of the Łódź Hills Landscape Park. *Odonatrix* 4(1): 1-11. (in Polish, with English summary) ["In the studies encompassing the years 1994-2006 (mainly 2004 and 2005) in the area of the Łódź Hills Landscape Park, 40 dragonfly species were recorded. Fauna of this area consists of eurytopic forms, rare and endangered species on the national and regional scale are not numerous. The most valuable species of the park area are: *Lestes barbarus*, *Ischnura pumilio*, *Coenagrion lunulatum*, *Erythromma viridulum*, *Aeshna affinis*, *Anax parthenope* and *Libellula fulva*. The studies covered 4 types of habitats: running waters, fish ponds, small temporary water bodies, water bodies on peat bogs. The most valuable habitats were small pools inhabited by the strong populations of *Lestes barbarus* and *Leucorrhinia pectoralis* as well as fish ponds in which some rare typical of middle Poland species were found." (Author)] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk.grzegorz@gmail.com

**9051.** Tończyk, G. (2008): Klaas-Douwe B. Dijkstra (ed.). Illustrated by Richard Lewington. 2006. Field Guide to the Dragonflies of Britain and Europe. British Wildlife Publishing, Gillingham, 320 pp., ISBN 0-953-1399-4-8 (paperback), ISBN 0-953-1399-5-6 (hardback), price: Engl. Pound 21,9. *Odonatrix* 4(1): 30-32. (in Polish, with English summary) [Extensive book review.] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk.grzegorz@gmail.com

**9052.** Torralba Burrial, A.; Ocharan, F.J. (2008): Odonata de la red fluvial de la provincia de Teruel (España). *Boletín de la S.E.A.* 42(1): 325-335. (in Spanish, with English summary) ["Data of 33 Odonata species present in Teruel's fluvial network are given. *Chalcolestes viridis*, *Lestes sponsa* and *Sympetrum sinaiticum* are recorded for the first time from the province, and a further five species are recorded of which there were no records since the beginning of the 20th century (*Aeshna mixta*, *A. cyanea*, *Gomphus simillimus*, *Onychogomphus uncatatus* and *S. striolatum*). *Calopteryx haemorrhoidalis*, *Platycnemis latipes*, *C. xanthostoma*, *Boyeria irene*, *Coenagrion mercuriale*, *Cordulegaster boltonii* and *C. caerulescens* are the most common dragonflies in this fluvial network. Records of the last one and *C. mercuriale* are particularly interesting." (Authors)] Address: Torralba Burrial, A., Depto de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**9053.** Torralba Burrial, A.; Ocharan, F.J. (2008): Odonata del Somontano de Barbastro (Huesca, España). Boletín de la S.E.A. 42(1): 267-270. (in Spanish, with English summary) ["Faunistic data of 27 Odonata species from Somontano de Barbastro are reported. These data include records of scarcely recorded dragonflies like *Onychogomphus costae* and *Sympetrum meridionale*, which complete their development in the area." (Author)] Address: Torralba Burrial, A., Depto de Biol. de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**9054.** Vieira, V. (2008): First record of *Sympetrum fonscolombii* (Selys, 1840) (Odonata: Libellulidae) for the Sal Island, Cape Verde. Boletín de la S.E.A. 42(1): 376. (in English) [*S. fonscolombii* is recorded for first time from Sal island of the Cape Verde archipelago. *Crocothemis erythraea* is recorded too.] Address: Vieira, V., Universidade dos Açores, Depto de Biol., CIRN, Rua da Mãe de Deus, PT - 9501-801 Ponta Delgada, Açores, Portugal. E-mail: vvieira@notes.uac.pt

**9055.** Zimmermann, P. (2008): Prädation zwischen Heupferd (*Tettigonia viridissima*) und Feuerlibelle (*Crocothemis erythraea*). *mercuriale* 8: 49-50. (in German) [29-06-2008, near Karlsruhe, Baden-Württemberg, Germany; documentation of the predation of *C. erythraea* by the orthopteroïd *T. viridissima*.] Address: Zimmermann, P., Regierungspräsidium Karlsruhe, Referat Naturschutz und Landschaftspflege, 76247 Karlsruhe, Germany. E-mail: peter.zimmermann@rpk.bwl.de

## 2009

**9056.** Abbott, J.C. (2009): Odonata (Dragonflies and Damselflies). In: Gene E. Likens (Ed.): *Encyclopedia of Inland Waters*. Elsevier Ltd. ISBN: 978-0-12-370626-3: 394-404. (in English) ["Odonata [...] inspire a wide range of emotions ranging from fear to admiration. They are a beneficial group of insects whose primary prey items, as both larvae and adults, include biting flies such as mosquitoes (Culicidae), black flies (Simuliidae), and horse and deer flies (Tabanidae). They also represent important components in the food webs of freshwater systems. Odonata are paleopterous, exopterygote insects whose closest relatives are the Ephemeroptera. The larvae are longer-lived than the adults and have evolved numerous adaptations to the freshwater aquatic environment resulting in pronounced differences in form across taxonomic groups. The adults occupy a conspicuous presence in the air, especially around ponds. The group is largely found in warmer areas, with over 75% of its species occurring in tropical regions. Some species, such as *Anax junius*, are known to migrate and are capable of travelling from Canada to Veracruz, Mexico, though our understanding of exactly what triggers these events, when they occur, and which members in the population are migrating, still remains a mystery." (Author) The article gives information on: Paleontology, Systematics, Characterization and Morphology, Biology, Life Cycle and Metamorphosis, Egg stage, Larval stage, Larval Habitats, Emergence, Dispersal and Maturation, Recognition and Courtship, Mating, Mate Guarding Behaviour, Thermoregulation, Conservation, Further Reading, Glossary.] Address: Abbott, J.C., University of Texas at Austin, Austin, TX, USA

**9057.** Abbott, J.C. (Ed.) (2009): *Dragonflies and Damselflies (Odonata) of Texas*. Vol. 3. ISBN 978-0-6151-9494-3: 315 pp. (in English) [The book is a reference to the 224 species of odonates distributed in Texas, USA. Included in Volume 3 are updated and detailed species distribution and seasonality accounts arranged so that users can search by scientific name, county name, or flight season. A variety of articles are also included on the natural history, collection and preservation, and diversity of Texas odonates. Articles. Odonata of the Lower Rio Grande Valley: 2007 Summary, J.S. Rose; Dragonflies and Damselflies of Wright Patman Lake, M. Dillon; The Odonata of Kerr County and the Guadalupe River System of Texas, T. Gallucci; The Odonata of Real County and the Frio-Nueces River System of Texas, T. Gallucci; Statistical Summary of Odonata in Texas; Abundance & Distribution of Texas Odonata, J.C. Abbott; Diversity of Texas Odonata by County; Checklist of Dragonflies & Damselflies of Texas, J.C. Abbott; Seasonality of Odonata in Texas, J.C. Abbott; Dragonflies & Damselflies of Texas Listed by County; Distribution Maps of Texas Odonata; Appendix: Collection Guidelines for the Odonata Survey of Texas, J.C. Abbott; The Dragonfly Society of the Americas Guidelines for Collecting; Specific Collecting & Preservation Instructions, J.C. Abbott; Guidelines for Field Notes & Data Recording, J.C. Abbott; Odonata Field Guides, Resources, Societies, & Suppliers; Glossary of Terms Relating to Odonata, J.C. Abbott; Index to Maps] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**9058.** Anonymus; Bernard, R. (2009): 6th Polish Symposium of Odonatology of the Polish Entomological Society "Polish odonatology in the past, present time and future", Poznan and environs, October 23-25, 2009. First announcement. *Odonatrix* 5(1): 16-17. (in Polish, with English summary) [Announcement: "6th Polish Odonatological Symposium will be focused on the first book on the dragonflies of Poland, "Atlas of the distribution of dragonflies in Poland". The Atlas is scheduled to be published in September 2009. This is an opportunity to sum up past and present achievements of Polish odonatology and the conservation status of the Polish odonate fauna. Workshops, informal discussions and presentations, and a field trip are also planned. If you are interested in the participation, please, contact Dr. Rafal Bernard (Adam Mickiewicz University in Poznań, Department of General Zoology, Umultowska 89, PO-61-614 Poznań, e-mail: rbernard@amu.edu.pl) (Author)] Address: Bernard, R., Dept of General Zoology, Adam Mickiewicz Univ., Umultowska 89, PL-61-702 Poznań, Poland; E-mail: bernard@amu.edu.pl

**9059.** Ballesteros, T.M.; Torres-Mejia, M.; Ramírez-Pinilla, M.P. (2009): How does diet influence the reproductive seasonality of tropical freshwater fish? A case study of a characin in a tropical mountain river. *Neotropical Ichthyology* 7(4): 693-700. (in English, with Portuguese summary) ["Seasonal breeding of tropical freshwater fish may be synchronized with periods of high food consumption. We explored this hypothesis by studying the relationship between diet and reproductive activity of *Creagrutus guanes* (Teleostei, Characidae). Our results showed that *C. guanes* had a generalist and omnivorous diet dominated by aquatic insects (mainly Diptera larvae) and seeds. *Creagrutus guanes* did not show intersexual or ontogenetic variation in diet. Peaks



of feeding activity during rainy months were not synchronized with breeding in dry months. Our results do not support the hypothesis that the reproductive season has to be synchronized with high food consumption. We discussed the hypothesis fat reserves may be an important factor for the desynchronization of peaks of feeding and reproduction as explanation of seasonal breeding of this species." (Authors) The 'Index of Relative Importance' for Odonata as diet is very low.] Address: Ballesteros, Tania M., Laboratorio de Biología Reproductiva de Vertebrados, Universidad Industrial de Santander, A.A. 678, Bucaramanga, Colombia. E-mail: marceballesteros10@gmail.com

**9060.** Benazzouz, B.; Mouna, M.; Amezian, M.; Bensusan, K.; Perez, C.; Cortes, J. (2009): Assessment and conservation of the dragonflies and damselflies (Insecta: Odonata) at the marshes of Smir. Bulletin de l'Institut Scientifique, Rabat, section Sciences de la Vie 31(2): 79-84. (in English, with French summary) ["Wetlands are characterized by their high biodiversity. However, these habitats are very vulnerable and are often altered by human activity, which often includes drainage. Many wetlands have disappeared and this trend will continue until ecological awareness increases. The Smir marshes are presently targeted by the tourism industry. Knowledge of the Odonata of the marshes is important because these insects are useful indicators of habitat quality. Therefore, an inventory of Odonata living in the Smir marshes was carried out over thirteen months, demonstrating the importance of this area in terms of biodiversity. The status of the species collected is examined in order to promote the protection of the marshes and their living organisms. The biogeography of these insects is also considered so as to assess their origin." (Authors) With the exception of *Sympecma fusca*, *Anaciaeschna isosceles*, and *Aeshna mixta*, the odonate species recorded are widely distributed in northern Africa. The following species are listed: *Ischnura graellsii*, *Sympecma fusca*, *A. mixta*, *A. isosceles*, *Anax ephippiger*, *A. imperator*, *A. parthenope*, *Crocothemis erythraea*, *Diplacodes lefebvrei*, *Orthetrum chrysostigma*, *O. cancellatum*, *O. trinacria*, *Sympetrum striolatum*, *S. fonscolombii*, *S. meridionale*] Address: Benazzouz, B., Université Ibn Tofail, Faculté des Sciences, Laboratoire Génétique & Physiologie Neuroendocrinienne, B.P.133, 14000-Kénitra, Maroc. E-mail: bbenazzouz@yahoo.fr

**9061.** Bhattarai, S.; Chaudhary, R.P.; Taylor, R.S.L. (2009): Ethno-medicinal plants used by the people of Nawalparasi District, Central Nepal. Our Nature 7: 82-99. (in English) ["Despite new advances in modern medicine, the cultural use of plant in traditional medicine continues from ancient time to this day all over the world. The present research seeks to explore ethnomedicinal plants used by the local people of Nawalparasi district for primary healthcare. Local healers were interviewed regarding the detail uses of plants. When convenient a jungle or forest walk was also conducted, accompanying local healers for plant collection and detailed information gathering. A rich and unique diversity of 94 ethnomedicinal plant species belonging to 49 families under 86 genera were documented. In Nawalparasi, the expense of modern medical treatment combined with the poor economic status of indigenous people and a strong belief in the traditional medicine and traditional medical practitioners are the main reasons for the persistence of the traditional healing sys-

tem. In addition, we have also documented a lack of continuation and flow of indigenous knowledge from the elders to the younger generation. Youth tend to be attracted by the wave of modernization and do not appreciate the importance of conservation of traditional knowledge. The use of plants in Nawalparasi is an old tradition and the exploration of such unique cultures should be completed thoroughly so that the oral traditions are not lost forever. Immediate conservation and management approaches of valuable medicinal plants with the involvement of local indigenous people of Nawalparasi district will encourage the sustainable conservation of both biological and cultural diversity. ... 69. *Plumeria rubra* L. (Apocynaceae), V 2586. 'Galaini' (N). (b) About 100 g stem bark is mixed with 100 g of jaggery and approximately 100 g of dead dragonflies and cooked. This is then taken twice a day to try to prevent rabies infection after someone is bitten by a mad dog. It is taken until the patient recovers, which the healers stated does happen." (Authors)] Address: Bhattarai, S., Central Department of Botany, Tribhuvan University, Kirtipur, Kathmandu, Nepal

**9062.** Boroń, M.; Mirosławski, J. (2009): Using insects (damselflies: *Azur damselfly* - *Coenagrion puella*) as biomarkers of environmental pollution. Fresenius environmental bulletin 18(7a): 1219-1225 [Czech Republik, Poland; "The phenomenon of bioaccumulation in damselflies was used to assess the metal pollution in the natural environment and indirectly but consequently, to estimate the risks for humans. *C. puella* was collected in polluted regions of Silesia and the control site – Wigry National Park. Flame atomic absorption spectrophotometer was used to estimate the concentration of chosen heavy metals: Cd, Cr, Cu, Fe, Mn, Ni, Pb, and Zn. The analysis indicated a general correlation between metal concentration in damselflies and in chosen elements of environment. It has been stated that azure damselflies can be used as biomarkers of environmental pollution for iron, lead and zinc, also manganese and nickel to an average degree. However, there is an insignificant correlation in case of cadmium and copper. Chromium was not present in the samples." (Authors)] Address: Boroń, Marta, School of Labour Safety Management in Katowice, Department of Environmental Engineering and Hygiene of Work, Bankowa Street 8, 40-007 Katowice, Poland. E-mail: marta.boron@wp.pl

**9063.** Bowman, N. (2009): Reports from Costal Stations - 2008: Eccles-on-Sea, Norfolk. *Atropos* 36: 56. (in English) [UK; *Erythromma viridulum*, *Sympetrum sanguineum*] Address: not stated

**9064.** Brockhaus, T.; Meng, S.; Müller, O. (2009): Fossile Libellenlarven aus den interglazialen Seesedimenten von Neumark-Nord (Odonata: Coenagrionidae, Libellulidae). *Libellula* 28(1/2): 49-58. (in German, with English summary) ["Two fossil Odonata larvae from the Upper Pleistocene fossil deposit 'Neumark-Nord', Saxony-Anhalt, Germany, are described. They comprise one larva of *Erythromma najas* and a libellulid larva. Owing to a lack of diagnostic characteristics, it is not possible to assign the latter clearly to a species. As a result of the most recent investigations, this fossil deposit has been classified as Eemian Interglacial." (Author)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**9065.** Buczyński, P.; Karasek, T.; Kowalak, E.; Kowalak, J.; Oder, T. (2009): Contribution to the knowledge of dragonflies (Odonata) of the Roztocze Upland. *Odonatrix* 5(1): 1-6. (in Polish, with English summary) ["The paper presents the results of studies conducted in Roztocze Upland (SE Poland) during the camp of Student Scientific Circle of Biologists of Maria Curie-Skłodowska University in July 2008. At 27 study sites, of which 13 were situated in the Roztoczanski National Park, 37 dragonfly species were found (51% of the national fauna). The most interesting were: *Sympecma paedisca*, *Nehalennia speciosa*, *Gomphus vulgatissimus* and *Ophiogomphus cecilia*. 9 species have been recorded for the first time from the Roztoczanski National Park, which elongated the list of well-known species to the number of 47. The study site of *Nehalennia speciosa* (Borowina near Józefów, *Caricetum lasiocarpae* on the edges of the water body between dunes) has been known for over 10 years. New data confirms the subsistence of the population and even the decrease in numbers: at least >1.000 specimens, juvenile imagines and development behaviour were observed. At the same time, the disappearance of the other population of *N. speciosa* was found - on a transitional peat-bog near the village Hamernia (last data from 2002). Perhaps the same refers to the population of *Somatochlora arctica* on a transitional peat-bog near the village Tarnowola (last data from 2003). Other examples of vanishing of peat-bog species on Roztocze due to drying out of habitats are also given. Perhaps we are witnessing the start of regress of this ecologic group which has not been endangered up till now. Data about Gomphidae has been analyzed by their rarity in the discussed region which is surprising for Roztocze is rich in rivers with suitable habitat structure and satisfactory water quality. The authors give two possible explanations responsible for these conditions: forest basin of the rivers (which results in shading and low pH among others) as well as strong fish stocking of Roztocze rivers by trout by Polish Angling Association." (authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**9066.** Buczyński, P.; Bernard, R.; Pietrzak, L. (2009): Dragonflies (Odonata) of selected dystrophic water bodies in the vicinity of Złocieniec (north-western Poland). *Chrońmy Przyrodę Ojczyzna* 65(5): 353-364. (in Polish, with English summary) ["Studies of the odonate fauna (mostly larvae and exuviae, additionally imagines) were carried out between 1999 and 2001 at 3 localities in the environs of Złocieniec ("Czarnówek" No. 1, "Gronowo" No. 2, "Krosino" No. 3). All the water bodies represent acidic habitats typical of the Pomeranian Lake Districts (NW Poland): an oligohumic, very poor in nutrients, and extremely clearwater pool surrounded by a broad Sphagnum bog (No. 3); a mesohumic lake and small pools situated in a Sphagnum bog channel (No. 1a – pools, 1b – lake); a polyhumic, kettle lake with brownish water, bounded only with a few-metre-wide Sphagnum zone (No. 2). 27 species were recorded, i.e. 37% of the odonate fauna of Poland. Most of them were autochthonous, several – probably autochthonous, and one certainly allochthonous species. Number of species was the poorest in small, less diversified pools "hanging" in Sphagnum mats, and (among greater water bodies) in oligohumic, crystal lake No. 3. Species composition was mostly typical of the habitats, predominated by tyrphobiontic (*Leucorrhinia dubia*, *Aeshna sub-*

*arctica elisabethae*) and tyrphophilic (e.g. *L. rubicunda*, *L. albifrons*, *Lestes virens*, *Coenagrion hastulatum*, *Nehalennia speciosa*) species. This was confirmed by high values of the Biocenosis Naturality Index (especially in its quantitative aspect). In this context, the occurrence of *Erythromma viridulum* (with reproductive behaviour) was rather surprising. It suggests its misidentification of the microhabitat – an occupied specific patch of floating Sphagnum at locality No. 1 was physiologically very similar to favourable *Ceratophyllum demersum*. The autochthonous large population of *Lestes viridis* at locality No. 1 and a regular occurrence of *Coenagrion lunulatum* were also noteworthy. However, the large population of *N. speciosa* (critical species in Europe, EN in the Polish Red list, NT in the Global Red list) in *Carex limosa* belt at locality No. 2 was certainly the most valuable element, qualifying this site for legal protection with the use of a buffer protection zone." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**9067.** Buczyński, P. (2009): Red list of dragonflies (Odonata) of the Lublin Region (Eastern Poland). Second edition: 2009. *Odonatrix* 5(1): 25-29. (in Polish, with English summary) ["The author presents the new red list of dragonflies of the Lublin Region, 10 years after publishing the previous edition (Buczyński 1999). The list includes 10 species: 4 species of high risk categories (VU-CR) and 6 of low risk categories (LC, NT). The most endangered are: *Coenagrion ornatum* (CR), *Cordulegaster boltonii* (CR), *Coenagrion armatum* (EN) and *Nehalennia speciosa* (EN). The scale of threats of dragonflies of the Lublin Region is smaller than in the whole Poland (Bernard et al. 2002) or in the Łódź Region (central Poland) (Tończyk, Szymański 2006). Seriously endangered are the faunas of small running waters and Sphagnum peat bogs. For the protection of dragonflies in Poland, particularly important are populations of *Coenagrion armatum* (9 in total) as well as one of 3-4 populations of *C. ornatum* known nowadays in the country which is large and stable." (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**9068.** Canobbio, S.; Mezzanotte, V.; Sanfilippo, U.; Benvenuto, F. (2009): Effect of multiple stressors on water quality and macroinvertebrate assemblages in an effluent-dominated stream. *Water Air Soil Pollution* 198: 359-371. (in English) ["Lura stream flows in the populated and industrialized conurbation North of Milan, Italy. The area suffers a sprawling urbanization which is leading to major alterations in water quality, hydrology and morphology of streams. These water bodies are known as effluent-dominated streams, because most of the baseflow is given by Wastewater Treatment Plant (WWTP) discharges. In this paper, a 5 year long assessment of Lura stream is presented and the collected data is discussed to understand overall ecological quality. Multivariate analysis carried out on macroinvertebrate assemblages and environmental variables suggests that invertebrate communities suffer severe alteration both upstream and downstream WWTP discharges. Results indicate that the high polluting loads coming from WWTP discharges affect seriously the stream water quality, but the most important cause of impairment are pulse perturbations related to the modified hydrology, causing droughts and flash floods, and to the spills

of untreated sewage from overflows during rain events." (Authors) *Onychogomphus* sp., *Crocothemis* sp. and *Orthetrum* sp. are listed from the Lura stream.] Address: Canobbio, S., Dipartimento di Scienze dell'Ambiente e del Territorio, Università degli Studi di Milano-Bicocca, Piazza della Scienza 1, 20126 Milan, Italy. E-mail: sergio.canobbio@unimib.it

**9069.** Carvalho, A.L.; Pinto, A.P.; Ferreira-Jr., N. (2009): *Castoraeschna corbeti* sp. nov. from Floresta Nacional de Carajás, Pará state, Brazil (Odonata: Aeshnidae). *International Journal of Odonatology* 12(2): 337-346. (in English) ["*Castoraeschna corbeti* sp. nov. is described and diagnosed based on four males (holotype: Brazil, Para State, Floresta Nacional de Carajas [6°06'13.9"S, 50°08'13.1"W, ca 600 m a.s.l.], 28 ix 2007 to be deposited in Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro). This species is similar to *C. longfieldae* and *C. coronata* but can be distinguished mainly by the absence of medio-dorsal spots on S8; postero-dorsal spots on S8-9 very narrow; cerci external margin almost straight in lateral view, without a distinct angulation between stem and base of lamina; cerci apex blunt. The probable ultimate stadium larva is described based on two individuals, male and female, collected at the type locality. Adults were observed flying along margins of a small shaded second-order stream where the larvae were taken. The surrounding forest is under impact of iron ore extraction and will probably disappear in the next years." (Author)] Address: Carvalho, A.L., Depto de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro (UFRJ), Caixa Postal 68044, BR-21944-970 Rio de Janeiro, RJ, Brazil. E-mail: alagoc@acd.ufrj.br

**9070.** Casatti, L.; Veronezi Júnior, J.L.; de Paula Ferreira, C. (2009): Diet of the armored catfish *Aspidoras fuscoguttatus* (Ostariophysi, Callichthyidae) in streams with different limnological and structural features. *Biota Neotropica* 9(1): 113-121. (in Portuguese, with English summary) [Odonata: Percent composition by number (CP: 1,6), frequency of occurrence (FO: 4,9), and dominance (D: 0) of the feeding items registered in the stomach contents of *Aspidoras fuscoguttatus* (246 specimens) from 18 streams in the São Paulo State northwestern region, upper Rio Paraná system, São Paulo State, Brazil.] Address: Casatti, Lilian, Laboratório de Ictiologia, Depto de Zoologia e Botânica, IBILCE, Universidade Estadual Paulista – UNESP, Rua Cristóvão Colombo, 2265, Jardim Nazareth, CEP 15054-000, São José do Rio Preto, SP, Brasil. E-mail: Lilian Casatti, e-mail: lcasatti@ibilce.unesp.br

**9071.** Chasle, J.-P. (2009): Inventaire des Odonates du Baugeois de 2002 à 2005 (département du Maine-et-Loire). *Martinia* 25(1): 29-39. (in French, with English summary) [An inventory of Odonata carried out from May to September between 2002 and 2005, resulted in 38 species. These are checklisted, classified to habitat types, and briefly discussed.] Address: Chasle, J.-P., Association pour la promotion, l'étude et la protection des écosystèmes aquatiques (APEPEA) de la Bretagne et des Pays de la Loire, 9 rue du Gué de l'Arche, F-49150 Fougère, France

**9072.** Chovet, M.; Pratz, J.-L.; Lett, J.-M. (2009): Un Odonate nouveau pour le département du Cher et la région Centre: *Cordulegaster bidentata* Selys, 1843 (Anisoptera: Cordulegasteridae). *Martinia* 25(4): 165-171. (in French, with English summary) [30-V-2007,

north of Cher department, in Fort land which is a hill territory separated from Massif Central mountains.] Address: Chovet, M., 97 B, rue Vieille Levée F-45100 Orléans, France

**9073.** Costa, J.M.; Santos, T.C.; de Souza, L.O.I. (2009): *Cyanallagma corbeti* sp. nov. from Brazil (Odonata: Coenagrionidae). *International Journal of Odonatology* 12(2): 232-329. (in English) ["The new species *Cyanallagma corbeti* (holotype male: Brazil, Rio Grande do Sul State, Rio do Pinto river, km 93 of road RS-453 between Sao Francisco de Paula and Rio Tainha, 29°30'70"S, 50°51'70"W, 900 m, 09 xi 1967, leg. N.D. Santos); deposited in the Museu Nacional (UFRJ), Rio de Janeiro, Brazil is described, illustrated, and compared with the other species of the genus. A justification for the placement of this new species in *Cyanallagma* is presented, and males of known species of the genus are keyed." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@acd.ufrj.br

**9074.** Couroy, Y.; Duquet, M. (2009): Quatre nouvelles espèces d'Odonates pour la faune de Guyane française. *Martinia* 25(4): 140-144. (in French, with English summary) [*Aphylla producta*, *Aeschnosoma elegans*, and *Orthemis anthracina* - collected from French Guyana during a field study in December 2007, near Sinnamary and Roura - are new to the fauna of this French overseas department. *Perilestes* sp. indet., with well characterized anal appendages, is probably new to science. This species is closely related to *P. attenuatus* Bates in Selys, 1886.] Address: Couroy, Y., 271 rue de l'Armée de l'Est, 70110 Villersexel, France

**9075.** Daraž, B. (2009): New data on dragonflies (Odonata) of northeasternmost Bulgaria. *Odonatrix* 5(2): 55-64. (in Polish, with English summary) ["During the summer trip to north-eastern coasts of Bulgaria, the fauna of dragonflies was studied at 12 study sites between the 2nd and 12th of July 2008. The studies covered the area between the Romanian border and the River Kamchia, mostly within the villages of Shabla, Kavarna, Balchik and Dobrich. In the northern part, temporary running waters prevail. Thus, studies were concentrated in a narrow zone along the coasts of the Black Sea where permanent waters occur, both running and standing. In the southern part of the studied area the network of permanent flowing waters is more dense and present in the depth of the land. 24 dragonfly species, have been recorded in the studied area, which comprises 35% of 68 species known in Bulgaria. The most interesting were the records of: *Cordulegaster insignis*, *Cordulegaster picta* and *Lestes macrostigma*, moreover, *Caliaeschna microstigma* is also worth mentioning. *C. insignis* has been known from 13 published localities and a few unpublished records found recently. Its occurrence is practically restricted to the eastern part of the country and a few sites situated along the Danube River. Two new study sites partly covered a gap in the north-eastern part of the country. This suggests a wider and more continuous occurrence of the species range in eastern Bulgaria. The range of *C. picta* in Bulgaria encompasses a narrow belt along the coast of the Black Sea. Four new study sites found by the author have a bit extended this belt in its northern part, in the basin of the River Batova. These study sites are presently the northernmost known localities in the



whole range of the species. *C. picta* has been found in general in small fast-flowing streams with a stony bottom, totally or to a large degree shaded by trees. Numerous patrolling males have been observed (often in a high density), as well as females ovipositing in shallow sandy areas along the stream banks. Larvae were found among stones while exuviae - among roots and dry vegetation near banks. Four study sites of *L. macrostigma* have been recorded so far from Bulgaria. The 5th site, given in this paper, was known previously from 2006, however, it was not published. This study site has a similar coastal situation to three study sites adjacent to the Burgas Gulf. However, it is located much more to the north. Very numerous local population, estimated to over 10000 of specimens, results from optimal habitat conditions: the low depth and high temperature of brackish water, and the abundant occurrence of *Bolboschoenus maritimus* and *Scirpus* sp. swamps. *C. microstigma* was recorded in Bulgaria in the southern, central and eastern part of the country. In the east, it was known from the coasts of the Black Sea to Kavarna. The author's studies provided 6 sites of this species, one of them was situated 25 km to the north-east of Kavarna. The last record is presently northernmost locality of *C. microstigma* in the eastern Balkans. Two recorded species - *L. macrostigma* and *C. ornatum* belong to critical species in Europe. Four species were proposed to the Bulgarian Red List of dragonflies: *C. insignis* (CR), *L. macrostigma* (CR), *C. microstigma* (VU), *C. picta* (VU). New records combined with the literature data seem to show that the species mentioned above are not threatened in Bulgaria to such degree." (Author)] Address: Daraż, B., ul. Kościelna 41, 35-505 Rzeszów; Poland. E-mail: bdaraz@poczta.onet.pl

**9076.** Delasalle, J.-F. (2009): Contribution à la connaissance d'un Zygoptère récemment décrit de Guyane française: *Neoneura angelensis* Juillerat, 2007 (Odonata: Zygoptera: Protoneuridae). *Martinia* 25(4): 149-152. (in French, with English summary) [The paper presents new observations of *N. angelensis* in French Guyana with a description of the biotope and the observation of the reproduction of that Protoneuridae.] Address: Delasalle, J.-F., Domaine de Chantraigne 30 rue Jules Lardière BP 70225 F-80800 Corbie, France. E-mail: jf.delasalle@aliceadsl.fr

**9077.** Dolata, P.T.; Stawicki, A.; Żuk, T. (2009): New records of the Scarlet Dragonfly *Crocotthemis erythraea* (Brullé, 1832) in the South Wielkopolska region (SW Poland) and some remarks about its detecting and the participation of amateurs in odonatology. *Odonatrix* 5 (1): 13-16. (in Polish, with English summary) ["Two new localities (within 35 km) of the Scarlet Dragonfly were recorded on the clay pits in the South Wielkopolska region: 1) Odolanów (Ostrów Wielkopolski district, 51°35' N, 17°39' E, UTM: XT81): one male on 28th May 2007; 2) Kotlin (Jarocin district, 51°54' N, 17°40' E, UTM: XT85): one male on 23rd June 2007. Those records were made 4-48 km from localities detected by Zurawlew (2009) in Pleszew district (Fig. 1) and support his opinion about high importance of clay pits for this species. Both records came from Kartoteka Przyrodnicza Południowej Wielkopolski (Nature Database of the South Wielkopolska), the "citizen science" scheme, led by local group of the Polish Society for the Protection of Birds. The wider co-operation of the odonatologists with such groups and schemes is proposed in the article." (Authors)] Address: Żuk, T., Południowoweil-

kopolska Grupa OTOP, ul. Wrocławska 60 A/7, 63-4000 Ostrów Wielkopolski, Poland. E-mail: tomasz.zuk@post.pl

**9078.** Dommange, J.L.; Guilmet, M. (2009): Odonates nouveaux pour le département de l'Aveyron. *Martinia* 25(3): 102. (in French) [France; *Sympetrum meridionale*, VII-2009, le Rougier de Camarès (commune de Montlaur) & lac du causse de Villeneuve (commune de Martiel); *Somatochlora arctica*, V-2009, commune de Laguiole, Aubrac. La découverte d'exuvies et d'individus émergents (24 et 30 mai 2009); *Calopteryx haemorrhoidalis*, 2005 and 2006, Dourdou de Camarès (commune de Montlaur) & 2008, Lot (communes de Balaguier-d'Olt).] Address: Guilmet, Martine, 51, cité Cardaillac, F-12000 Rodez, France

**9079.** Doucet, G. (2009): Suivi de l'émergence d'*Oxygastra curtisii* (Dale, 1834) et de *Gomphus graslinii* Rambur, 1842 sur un étang du centre de la Dordogne (Odonata: Anisoptera: Corduliidae, Gomphidae). *Martinia* 25(4): 157-164. (in French, with English summary) ["Following the discovery of *O. curtisii* and *G. graslinii* exuviae in a pond located in the center of Dordogne department, France during early June 2008, the author decided to study the emergence of both species in order to increase the knowledge of their phenology and abundance in this particular breeding biotope. Exuviae collection highlighted not only that both species had great population size but also that several other species which are encountered in this pond are rather relevant of running waters."] Address: Doucet, G., 74 me de la Colonie, F-75 013 Paris, France. E-mail: guillaume.doucet@yahoo.fr

**9080.** Dufour, C. (2009): Nouvelle preuve de reproduction d'*Onychogomphus* f. *forcipatus* (Linnaeus, 1758) dans le Lac de Neuchâtel, Suisse (Odonata, Gomphidae). *Ento Helvetica* 2: 23-31. (in French, with English and German summaries) [*O. forcipatus* reproduces again in the Lake of Neuchâtel, Switzerland "along a highly artificial bank, after many decades without any observations of either larvae or exuvia. This return is probably linked to the great improvement of the quality of the water which is the result of efforts developed over more than 40 years. A particularly rapid imaginal moult is described and illustrated." (Author)] Address: Dufour, C., Muséum d'histoire naturelle, rue des Terreaux 14, CTI-2000 Neuchâtel, Switzerland. E-mail: Christophe.Dufour@unine.ch

**9081.** Duprez, B. (2009): Étude des exuvies d'*Aeshna cyanea* (Millier, 1764) dans une mare de ferme en Limousin (Corrèze) (Odonata, Anisoptera, Aeshnidae). *Martinia* 25(3): 129-130. (in French, with English summary) ["Based on three sampling sessions of *A. cyanea* exuviae, the author presents the corresponding chronology, sex-ratio and measurements." (Author)] Address: Duprez, B., 43 avenue Alexandre de Serbie, F-51100 Reims, France

**9082.** Eid, E.; Katbeh-Bader, A.; Al-Otoom, M.; Othmaii, Y. (2009): Contribution to the Entomofauna of Dibeen Forest Reserve in Jordan. Centre for Entomological Studies Ankara - *Cesa News* 49: 19-41. (in English) ["A baseline insect survey of the Dibeen Forest Reserve was conducted from 26th of March till the 5th of May, 2006. Pitfall traps, light traps and butterfly nets were used for collecting. The collected specimens were preserved in the University of Jordan Insect Museum and Dibeen Forest Reserve. A total of 122 insect spe-

cies in 11 orders and 42 families were identified. Nine of these species were recorded for the first time from Jordan. Available biological and or ecological data, distribution and relevant remarks about each species are given. Rare, common, pest species, and species that can be used in ecological studies are discussed." (Authors) Only two Odonata species - *Orthetrum chrysostigma*, *Trithemis arteriosa* - were recorded.] Address: Katbeh-Bader, A. Department of Plant Protection, Faculty of Agriculture, University of Jordan, Amman 11942, Jordan. Email: Ahmadk@ju.edu.jo

**9083.** Faucheux, M.J. (2009): Sensilles antennaires de l'imago de *Brachythemis leucosticta* (Burmeister, 1839) (Odonata, Anisoptera, Libellulidae). *Martinia* 25 (1): 40-48. (in French, with English summary) ["The sensory complement of the adult antenna of *B. leucosticta* is studied using scanning electron microscopy. The scape and the pedicel bear aporous sensilla chaetica: those located at the following joints (head-scape, scape-pedicel, pedicel-flagellum) are proprioceptors which monitor the movements of these segments in relation to each other; the other sensilla chaetica are tactile mechanoreceptors. The sensillum campaniformium of the pedicel controls the movements of flagellum. The two first flagellomères possess two types of multiporous sensilla coeloconica whose hygroreceptive function is assumed, and a third type of sensillum coeloconicum with unknown function." (Author)] Address: Faucheux, M.J., Lab. d'Endocrinologie des Insectes Sociaux, Fac. Sciences et Techniques, 2 rue de la Houssinière, B.P. 92208, F-44322 Nantes Cedex

**9084.** Faucheux, M.J.; Meurgey, F. (2009): Les sensilles antennaires d'une larve fousseuse, *Ophiogomphus cecilia* (Geoffroy in Fourcroy, 1785) (Odonata, Anisoptera, Gomphidae). *Martinia* 25(2): 85-92. (in French, with English summary) ["The flattened antenna of the burrower larva of *Ophiogomphus cecilia* bears five types or subtypes of mechanoreceptive sensilla: club-shaped sensilla, thorny sensilla chaetica, sensilla filiformia of subtypes short, long, thorny. The variety of the sensilla filiformia suggests that the reception of the vibrations is carried out subtly. The dorsal surface of antenna is covered with club-shaped sensilla whose presence is related to the burrowing behaviour of the larva; they are probably current receptors that also detect the presence and position of prey. They are described for the first time on the larval antennae of Odonata. Thorny sensilla chaetica are tactile. The proprioceptors which monitor the relative position of antennal segments in other species are not here observed." (Authors)] Address: Faucheux, M.J., Laboratoire d'Endocrinologie des Insectes Sociaux, Faculté des Sciences et Techniques, 2 rue de la Houssinière, B.P. 92208, F-44322 Nantes Cedex 3, France

**9085.** Feldwieser, G. (2009): Blutsauger auf den Flügeln der Braunen Mosaikjungfer (*Aeshna grandis*) - erster Fund der Gnitz Forcipomyia paludis (Diptera: Ceratopogonidae) auf Libellen in Baden-Württemberg, mercuriale 9: 31-32. (in German) [Bad Wurzburg, Baden-Württemberg, Germany; photographic evidence of a ceratopogonid *Forcipomyia paludis* sucking on the wings of *A. grandis*.] Address: Feldwieser, G., Gönningerstr. 27, D-72793 Pfullingen, Germany

**9086.** Feldwieser, G. (2009): Neun Exuvien der Großen Königslibelle (*Anax imperator*) auf einem Halm. *mercuriale* 9: 40. (in German) [Aggregation of nine exu-

viae at the tip of *Typha latifolia*.] Address: Feldwieser, G., Gönningerstr. 27, D-72793 Pfullingen, Germany

**9087.** Feldwieser, G. (2009): Blaugrüne Mosaikjungfer (*Aeshna cyanea*) fällt ins Wasser und einem Gelbrandkäfer (Coleoptera: Dytiscidae) zum Opfer. *mercuriale* 9: 39. (in German) [Reutlingen, Baden-Württemberg, Germany; photographic documentation of an *A. cyanea* male accidentally fallen into water and caught by water tension. *Dysticus marginatus* preyed upon the dragonfly immediately, starting to devour it at the caput.] Address: Feldwieser, G., Gönningerstr. 27, D-72793 Pfullingen, Germany

**9088.** Franz, N.M.; Vanegas, S.Z.Y. (2009): The university of Puerto Rico at Mayagüez insect collection – then and now. *Entomological news* 120(4): 457-464. (in English) ["The origin, historical trajectory, and present status of the insect collection of the University of Puerto Rico at Mayagüez (collection coden: UPRM) are reviewed. The collection initiated in the mid 1920s and has grown relatively continuously thanks to efforts by several outstanding entomologists working at UPRM. As of 2007, the collection includes more than 130,000 objects (individual specimens, slides, or vials) pertaining to 25 hexapod orders (Odonata: 840 specimens). The numbers of collection objects per order are listed. The geographic emphasis is on Puerto Rico and surrounding islands. The auchenorrhynchos Hemiptera, Collembola, and Coleoptera are particularly well represented. The collection is in a process of reorganization and is available for specimen loans and related collaborative activities." (Authors)] Address: Franz, N.M., Dept Biol., P. O. Box 9012, Univ. of Puerto Rico, Mayagüez, Puerto Rico 00681 USA. E-mail: franz@uprm.edu

**9089.** Gaenzle Schilling, E.; Loftin, C.S.; Huryn, A.D. (2009): Effects of introduced fish on macroinvertebrate communities in historically fishless headwater and kettle lakes. *Biological Conservation* 142(12): 3030-3038. (in English) ["Widespread fish introductions have led to a worldwide decline in the number of fishless lakes and their associated communities. Studies assessing effects of fish stocking on native communities in historically fishless lakes have been limited to high-elevation headwater lakes stocked with non-native trout. Little is known about the effect of fish stocking in historically fishless and hydrologically isolated lowland kettle lakes. We compared the effects of introduced fish on macroinvertebrate communities in kettle lakes stocked with centrarchids, salmonids, and cyprinids, and headwater lakes stocked with brook trout (*Salvelinus fontinalis*) in Maine, USA. Fish had significant effects on macroinvertebrate community structure in both lake types, with reduced species richness and abundances of taxa characteristic of fishless lakes. The effects of introduced fish were more pronounced in headwater lakes despite a less diverse fish assemblage than in kettle lakes. We attribute this to abundant submerged vegetation providing refuge from fish predation and reduced stocking frequency in kettle lakes. We assessed effects of stocking duration on macroinvertebrates in a subset of headwater lakes with known dates of trout introduction. Species richness and abundance of most taxa declined within 3 years following trout introduction; however, richness and abundance were least in lakes with long stocking histories (40 years). Macroinvertebrates previously identified as fishless bioindicators were absent from all stocked lakes, indicating that trout rapidly eliminate these sensitive taxa. Conservation of this his-

torically undervalued ecosystem requires protecting remaining fishless lakes and recovering those that have been stocked. [...] The odonates *Aeshna eremita* and *Leucorrhinia* spp. were more abundant in fishless than stocked headwater lakes. No odonates differed in abundance or percent occurrence between stocked and fishless kettle lakes." (Authors) ] Address: Gaenzle Schilling, Emily, Department of Wildlife Ecology, University of Maine, 5755 Nutting Hall, Orono, ME 04469-5755, USA. E-mail: emily.schilling@umit.maine.edu

**9090.** Gilard, B.; Vrignaud, S. (2009): Redécouverte de *Coenagrion ornatum* (Selys in Selys et Hagen, 1850) dans le département de l'Allier (Région Auvergne), 20 ans après une première donnée (Odonata, Zygoptera, Coenagrionidae). *Martinia* 25(3): 95-101. (in French, with English summary) ["*C. ornatum* has been rediscovered in Allier department (Auvergne Region, France) during 2005 and 2006 investigations, twenty years after its first observation in the area. Among important populations of *C. mercuriale*, those of *C. ornatum* were found in pastures. They were very localized and sensitive to overgrazing." (Authors)] Address: Gilard, B., 3, lotissement de la Croix des Frères, rue du Mont Mouchet, F-43100 Brioude, France

**9091.** Grand, D.; Billaud, F. (2009): Les Odonates du marais temporaire de Morlin (Communes de Montagny et de Taluyers) (Département du Rhône). *Martinia* 25(1): 15-24. (in French, with English summary) ["*Lestes dryas* has been recently discovered in Morlin temporary pond and is thus the 62nd species of Rhône department, France. A low deep ditch borders the 3 ha pond which is mainly composed by a submerged meadow with shrubs and trees. This meadow dries out from early summer to autumn, sometimes winter, except for a pool measuring only a few squared meters; such a milieu is rare in the department. Thirty three Odonata species can be encountered. Among them a significant part is represented by typical temporary pools species such as *Lestes barbarus*, *L. virens*, *Aeshna affinis*, *Sympetrum meridionale* and *S. sanguineum* but also by *Chalcolestes viridis* and *Sympetma fusca* that can stand the drying of the pool during summer but are rather permanent pool species. Considering those seven species, lots of adults emerge from the water and *L. barbarus* and *S. sanguineum* do so especially early (respectively on the 8th and 15th of May). Other conspicuous dragonflies fly around the pool: *Ischnura pumilio*, *Coenagrion scitulum*, *Anax parthenope*, *Sympetrum fonscolombii*; *Leucorrhinia pectoralis* do so occasionally. Finally, the author underlines that Morlin temporary pool is threatened by a highway project." (Author)] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France. E-mail: danielgrand@yahoo.fr

**9092.** Grosser, N.; Hahn, K. (2009): *Brachytron pratense* (Müller, 1764) - Kleine Mosaikjungfer im Werratal bei Sallmannshausen (Thüringen) im Jahre 2008 (Odonata: Aeshnidae). *Mitteilungen des Thüringer Entomologenverbandes* 16(1): 16-17. (in German) [Thuringia, Germany; documentation of a record in early summer 2008 without further data details of the regionally rare *B. pratense*.] Address: Grosser, N., Fakultät LGF, Fachrichtung Landschaftsarchitektur Fachhochschule Erfurt University of Applied Sciences Leipziger Strasse 77 99085 Erfurt, Germany

**9093.** Guerbaa, K. (2009): Restauration de milieux favorables à *Coenagrion mercuriale* (Charpentier, 1840) sur la Réserve Naturelle Nationale de la Tourbière des Dauges (Saint-Léger-la-Montagne, Haute-Vienne). *Martinia* 25(3): 131-32. (in French, with English summary) ["The author presents a management approach of *C. mercuriale* based on a traditional agricultural technique. It consists in creating or restoring drains using a tractor equipped with a channel digger. The advantages of this technique are highlighted." (Author)] Address: Guerbaa, K., CREN Limousin, Sauvagnac, F-87340 Saint-Léger-la-Montagne, France

**9094.** Hennequin, E.; Lolive, N. (2009): Synthèse des connaissances des Odonates du Pays de Tulle (Département de la Corrèze). *Martinia* 25(1): 25-27. (in French, with English summary) [France; data were gathered by field investigations and literature, resulting in 50 Odonata species of which 17 are in the Limousin Red List. Only a few are briefly discussed, but the complete checklist is omitted.] Address: Hennequin, E., Société Limousine d'Odonatologie, 11 rue Jauvion, F-87000 Limoges assoslo@wanadoo.fr

**9095.** Hennequin, E. (2009): Découverte d'une nouvelle population de *Leucorrhinia dubia* (Vander Linden, 1825) dans le département de la Corrèze (Limousin) (Odonata, Anisoptera, Libellulidae). *Martinia* 25(3): 116. (in French) [France; 28-V-2008] Address: Hennequin, E., Conservatoire Régional des Espaces Naturels du Limousin, 6 ruelle du Theil, F-87510 Saint-Gence, France

**9096.** Hennige, K. (2009): Odonate Sightings April 1 to August 31 2009. *The Blue Bill* 56(3): 105-107. (in English) [76 species are listed according their first sighting in 2009. The report includes records in the Kingston Checklist area and Charleston Lake & Menzel Provincial Parks, Ontario, Canada. Cool weather delayed the appearance of many species by one to two weeks, and numbers for some common species were lower than in past years. A new species was added to the Checklist when 3 *Somatochlora walshi* were seen along Roblin Road, 3km east of the Menzel Gate. This species was also seen in at least three more locations just outside the Kingston Checklist area and at least 15 were seen at Menzel. *Somatochlora kennedyi* and *S. willamsoni* also were found at Menzel Centennial Provincial Park. Even more surprising was the discovery of 1 male and several female of the very rare and scattered distributed *Williamsonia fletcheri*, also at Menzel Centennial. Other highlights include the second record of *Sympetrum costiferum*, third and fourth records of *Epiaeschna heros*, also on Charleston Lake, 3km from the 2007 location, a new population of *Enallagma antennatum* along Millhaven Creek, and 3 records of the rare *Gomphaeschna furcillata*.] Address: Hennige, K. E-mail: khennige@sympatico.ca

**9097.** Hope, P. (2009): New records of *Leucorrhinia pectoralis* in Turkey (Odonata: Libellulidae). *Libellula* 28(1/2): 93-96. (in English, with German summary) ["In June 2008, a male *L. pectoralis* was observed perched on a waterside plant beside a canal, in an area known as Koca Calis, situated on the Mediterranean coast near Fethiye, Mugla province, Turkey. In the same month, another male *L. pectoralis* was photographed at Koycegiz, 80 km to the west of Fethiye. These two sightings extend the previously known range of *L. pectoralis* 200 km further south to the Mediterranean



coast." (Author)] Address: Hope, P., 2 English Bridge Court, Wyle Cop, Shrewsbury, Shropshire, SY1 1XH, United Kingdom. E-mail: paulhope99@googlemail.com

**9098.** Ingley, S.J. (2009): Life on the fly: Ecology and evolution of the helicopter damselflies (Odonata: Pseudostigmatidae). University of Florida, Dept of Wildlife Ecology & Conservation, CALS Honors Program: 32 pp. (in English) [Helicopter damselflies form a relatively small, yet dynamic group of endangered odonates (including the largest extant odonate, *Megaloprepus caeruleus*, with a wingspan of ~190 mm). This highly specialized group is found in primary-growth rainforest (Central and South America; one East African species) where they oviposit exclusively in phytotelmata and are specialist foragers on orb weaver spiders which are plucked from their web. Pseudostigmatids exhibit unique wing structure within Zygoptera, and within Pseudostigmatidae both broad and narrow wing forms exist. Oviposition, spider feeding, and wing form evolution are examined for the first time within an evolutionary context using modern phylogenetic methods of tree reconstruction and character optimization. Phylogenetic analyses (Bayesian and Parsimony) were performed on a data set composed of 60 morphological characters and ~3.4kb of sequence data (Mitochondrial loci: 12S, 16S, COII; Nuclear loci: 28S, H3). Findings include monophyletic Pseudostigmatidae, *Coryphagrion grandis* (East African species) as the sister group to all Neotropical genera, and *Pericnemis* as sister to Pseudostigmatidae. The genera *Mecistogaster* and *Pseudostigma* are monophyletic while *Microstigma* forms a monophyletic group with *Megaloprepus*. Oviposition in phytotelmata likely evolved multiple times within Zygoptera, and spider feeding evolved from a single origin. There are two separate origins of narrow wings within Pseudostigmatidae. These findings provide new insight into Pseudostigmatid evolution that can be used to generate awareness of the threatened status of Helicopter damselflies.] Address: Ingley, S.J. E-mail: sjingley@gmail.com

**9099.** Juillerat, L., Monnerat, C. (2009): Odonata in southern Morocco, with first records of *Orthetrum ransonnetii* and *Sympetrum sinaiticum* (Odonata: Libellulidae). *Libellula* 28(1/2): 97-115. (in English, with French and German summaries) ["On several field trips between 2001 and 2008 to southern Morocco, 26 odonate species were recorded in 24 localities. *O. ransonnetii* and *S. sinaiticum* were recorded for the first time in April 2003 and April 2007 respectively. Both are new for the Moroccan fauna, increasing the number of odonate species for this country to 61." (Authors)]

**9100.** Kovacs, T.; Ambrus, A.; Olajos, P.; Szilagyi, G. (2009): Records of Ephemeroptera and Odonata from the Biebrza National Park, Poland. *Folia historico naturalia musei Matraensis* 33: 87-96. (in English) [This paper provides data on 20 Ephemeroptera and 42 Odonata species from the Biebrza National Park, Poland, including many species protected by European law.] Address: Kovács, T., Mátra Museum, H-3200 Gyöngyös, Kossuth Lajos u. 40, Hungary. E-mail: koati@t-online.hu

**9101.** Krieger, M. (2009): Frühe Heidelibelle *Sympetrum fonscolombii* (Selys 1843) in Rotenburg/Fulda um das Jahr 1880. *Libellen in Hessen* 2: 62. (in German) [A male of *S. fonscolombii* was traced in the collection of the Natural History Museum Kassel, caught by Heinrich

Eisenach prior 1886 in Rotenburg/Fulda, Hessen, Germany. This seems to be one of the oldest records known from Germany.] Address: Krieger, M., Fuldablick 20, 36199 Rotenburg a.d. Fulda, Germany

**9102.** Krieg-Jacquier, R.; Deliry, C. (2009): Observations récentes de *Leucorrhinia albifrons* (Burmeister, 1839) dans le département de l'Ain (Odonata, Anisoptera, Libellulidae). *Martinia* 25(3): 119-127. (in French, with English summary) ["At the beginning of summer 2006, a new site of *L. albifrons* has been discovered in Bugey (Jura mountain, Ain department, France). Because of the big size of the population, its nearness to other populations and the discovery of another big population in the northern part of Isère department in 2007, the species seems likely to disperse in montane regions." (Authors)] Address: Deliry, C., Villa D, 2 rue de la Forge, F-38200 Villette de Vienne, France

**9103.** Lambert, J.-L. (2009): A propos du statut de *Leucorrhinia caudalis* (Charpentier, 1840) et *Leucorrhinia albifrons* (Burmeister, 1839) dans le bassin du Drugeon (département du Doubs) (Odonata, Anisoptera, Libellulidae). *Martinia* 25(1): 3-13. (in French, with English summary) ["*L. caudalis* and *L. albifrons* have been recently rediscovered in the hydrographical basin of Drugeon river (Doubs department, France) by roughly 840 meters asl. The author demonstrates their autochthony and reminds that *L. pectoralis* and *L. dubia* are also native from this area. He wonders about historical data regarding the status of *L. caudalis* at this altitude. Several species mainly encountered in the plain have been recently observed in this middle high mountain area, especially in Remoray's lake natural reserve. Hence their strongly suspected nativity could be established." (Author)] Address: Lambert, J.-L., Office National de l'Eau et des Milieux Aquatiques, Service Départemental de la Marne, F-51520 La Veuve, France. E-mail: sd51@onema.fr

**9104.** Lambret, P.; Cohez, D.; Janczak, A. (2009): *Lestes macrostigma* (Eversmann, 1836) en Camargue et en Crau (Département des Bouches-du-Rhône) (Odonata, Zygoptera, Lestidae). *Martinia* 25(2): 51-65. (in French, with English summary) [France; "*L. macrostigma* is a patchily spread species. It is not legally protected, either in Europe or in France, despite its conservation status. This paper reviews the previous and recent investigations (i.e. before and from 1998 onwards) in Camargue and in Crau. Its abundance can experience great variations from to year and the species can even eclipse from a site during some time. Nonetheless those eclipses are not irreversible. Our data show that its biology and ecology are still poorly known. Numerous human activities threaten the preferred habitats of the species and therefore increase its weakness. Hence, it seems necessary (i) to lead further investigations in the area and (ii) to monitor and to study already known populations and (iii) to protect this endangered species at the European scale." (Authors)] Address: Lambret, P., Marais du Vigueirat, 13104 Mas Thibert, France. E-mail: philambret@hotmail.com

**9105.** Lambret, P.; Boudot, J.-P. (2009): *Nesciothemis farinosa* (Förster, 1898) et *Orthetrum ransonnetii* (Brauer, 1865) nouveaux pour l'Arabie Saoudite et autres observations d'Odonates sur les reliefs côtiers de la Mer Rouge. *Martinia* 25(4): 153-155. (in French, with English summary) [*Nesciothemis farinosa* and *Orthetrum ransonnetii* have been recently identified from pho-

tographs taken in Saudi Arabia in 2002; both are new to the country. Additional records include *Ceragrion glabrum*, *Pseudagrion hamoni*, *Anax ephippiger*, *Paragomphus sinaiticus*, *Orthetrum chrysostigma*, *Pantala flavescens*, *Trithemis arteriosa*, and *T. kirbyi*.] Address: Lambret, P., Marais du Vigueirat, F-13104 Mas Thibert, France. E-mail: philambret@hotmail.com

**9106.** Lolive, N. (2009): *Cordulegaster bidentata* Selys, 1843 dans le département du Cantal: état des connaissances (Odonata, Anisoptera, Cordulegastriidae). *Martinia* 25(2): 73-78. (in French, with English summary) [*C. bidentata* seemed to be a quite rare species in the Cantal department, France prior 2005. To improve knowledge on the distribution of that species the Odonatological Society of Limousin region developed a method to detect larvae of *C. bidentata*. Conducting this method lead to a significant increase of new localities for the species. Thus, the new data gathered thereby show that this species is well represented in the department.] Address: Lolive, N., 35 avenue de la République, F-1 5000 Aurillac, France

**9107.** Machado, A.B.M. (2009): *Tukanobasis* gen. nov. with the descriptions of *T. corbeti* sp. nov. from the Amazonian region of Brazil (Odonata: Coenagrionidae). *International Journal of Odonatology* 12(2): 331-336. (in English) ["A new coenagrionid genus, *Tukanobasis*, is described for *T. corbeti* sp. nov. found in a flooded forest in the Amazonian region of Brazil (holotype: Brazil, Amazonas State, Taraqua [3°27'15"S, 62°51'05"W, 35 m], viii 1964, in ABMM). The new genus is characterized by the presence of an apical brown spot on Hw of mature males, a ventral thoracic tubercle, long paraprocts, two large pleural yellow stripes, and a short CuA. Its affinities are uncertain." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil. E-mail: angelo@icb.ufmg.br

**9108.** Martens, A.; Schiel, F.J. (2009): *Pseudagrion microcephalum* mit exotischen Wasserpflanzen nach Deutschland verschleppt (Odonata: Coenagrionidae). *mercuriale* 9: 27-29. (in German, with English summary) [[*Pseudagrion microcephalum* introduced accidentally to Germany with exotic water plants (Odonata: Coenagrionidae)]: Zygopteran larvae were taken from an aquarium containing Java Moss, *Taxiphyllum barbieri*, bought in a pet shop in Ulm, Germany. After emergence, several imagoes were clearly identified as *P. microcephalum*. The species is distributed from India and Sri Lanka to Japan and Australia, where it is common at waters with abundant vegetation. This is the second record of the species for Europe. In Europe, tropical plants for aquariums are presently mainly imported from Singapore, Indonesia and Thailand, and it is suggested that the damselflies originated from one of these countries." (Authors)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**9109.** Martens, A. (2009): Die Quagga-Muschel *Dreissena rostriformis bugensis* (Bivalvia: Dreissenidae) erobert den Main, Rhein und Neckar: Hinweise zu einem potenziellen Aufsitzer von Libellenlarven. *mercuriale* 9: 23-26. (in German, with English summary) ["[The quagga mussel *Dreissena rostriformis bugensis* (Bivalvia: Dreissenidae) invading the Main, Rhine and Neckar

Rivers: Clues for a potential epizoon on odonate larvae.] *D. rostriformis bugensis* is rapidly spreading in navigable inland waters of Central Europe. Whether this invasive species is epizoic on odonate larvae as the zebra mussel *Dreissena polymorpha* is unknown. Information on identification, ecology and biogeography is given." (Author)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**9110.** Mauersberger, R. (2009): Nimmt *Leucorrhinia caudalis* im Nordosten Deutschlands rezent zu? (Odonata: Libellulidae). *Libellula* 28(1/2): 69-84. (in German, with English summary) ["Evidence is given that *L. caudalis* became more numerous and widespread in the lake region of northern Brandenburg and Mecklenburg-Vorpommern, Germany, during the last ten years. In the years 1992 to 1996 0.4 % of all dragonfly records referred to *L. caudalis*, whereas 1.4 % of records referred to this species in the period from 2004 to 2008. Between 2001 and 2008, the constancy of *L. caudalis* at the monitoring sites of 16 lakes increased from 19 to 53 %. During the same period, the average annual abundance at all monitoring sites rose from 0.3 to 4.7 exuviae per 10 m shoreline. Altogether 48 sites in Brandenburg and 14 in Mecklenburg-Vorpommern were recorded where *L. caudalis* was newly detected from 2004 to 2008. Global warming is assumed as a probable cause for this increase." (Author)] Address: Mauersberger, R., Prenzlauer Allee 66, 17268 Templin, Germany. E-mail: rue.mau@web.de

**9111.** McLachlan-Troup, T.A.; Dickman, C.R.; Grant, T.R. (2009): Diet and dietary selectivity of the platypus in relation to season, sex and macroinvertebrate assemblages. *Journal of Zoology* 280(3): 237-246. (in English) ["The diet of the platypus *Ornithorhynchus anatinus* was studied by examination of material collected from the cheek pouches of animals captured while foraging in streams in Kangaroo Valley, NSW, Australia. Platypuses consumed benthic invertebrates from 55 families in 16 orders, with virtually no prey being derived from the terrestrial environment. We also sampled invertebrates in pool, riffle and stream edge habitats to identify where prey were obtained. Invertebrates in the diet were most similar to those collected along stream edges and in pools compared with the faster-flowing riffles, suggesting that platypuses focused their foraging activities largely in these deeper water habitats. Although there was no seasonality in the assemblage structure of macroinvertebrates, the diet of platypuses varied between seasons, notably between winter and summer, suggesting that some dietary selectivity is seasonal. Dietary differences between the sexes were not detected. Overall, our results suggest that some dietary selection occurs in the platypus with respect to both foraging habitat and season. Seasonal selectivity may reflect different metabolic demands on platypuses at different times of the year. In contrast, habitat selectivity may reflect difficulty of prey access and risk of prey escape in fast-flowing riffles, higher energy costs and risk of predation associated with exploiting this habitat, and prey avoidance responses that are more rapid in the shallow riffles than in the deeper water pools and stream edges. These alternatives await evaluation by future research." (Authors)] Macroinvertebrate taxa found most frequently in cheek pouch samples from platypuses (n=50 samples)

included Gomphidae with 34 %.] Address: McLachlan-Troup, Tanya, Inst. Wildlife Res., School of Biological Sciences, A08, University of Sydney, Sydney, NSW 2006, Australia. E-mail: mclachlan.troup@gmail.com

**9112.** Menke, N.; Olthoff, M. (2009): Individuenreiche Vorkommen der Großen Moosjungfer (*Leucorrhinia pectoralis*) in Westfalen im Jahr 2008 - Masseneinflug oder übersehene Vorkommen. *Natur und Heimat* 69(3): 69-72. (in German) [06-06-2008; more than 20 specimens were found in NSG Heiliges Meer; 20-06-2008, 18 specimens in NSG Gagelbruch Borkenberge, both situated in the Federal State Nordrhein-Westfalen, Germany.] Address: Menke, N., Stephanweg 15, 48155 Münster, Germany. E-mail: Menkems@aol.com

**9113.** Michel, M.J.; Adams, M.M. (2009): Differential effects of structural complexity on predator foraging behavior. *Behavioral Ecology* 20(2): 313-317. (in English) ["The choice of predator foraging mode has important consequences for ecological communities. Foraging mode designations are often made on the basis of predator activity, yet activity can be affected by various environmental stimuli independent of changes in foraging mode. Structural complexity can reduce predator activity by either interfering with predator vision and mobility or as part of a foraging mode shift. We examined the effects of simulated aquatic vegetation on multiple behaviours of 2 aquatic insect predators to distinguish between these 2 possible outcomes. Larvae of the diving water beetle (*Dytiscus* spp.) shifted from an active predator in treatments without structure to a sit-and-pursue (SAP) predator in treatments containing structure, as indicated by a decrease in activity and prey encounter rates and an increase in probability of capture. This trade-off between encounter rates and probability of capture resulted in an equal number of prey captures among the treatments. Dragonfly nymphs (*Anax junius*) remained SAP predators in both treatments, although interference from the simulated vegetation significantly reduced activity. Structure also slightly decreased the number of aeshnid prey captures. Physiological attributes of the predators, such as mode of respiration and method of prey detection, seemed to influence foraging behaviour. This study emphasizes the benefits of measuring multiple predator behaviours when classifying predators to particular foraging modes." (Authors)] Address: Michel, M.J., Department of Biological Sciences, University of Notre Dame, Notre Dame, IN 46556, USA. E-mail: mmichel1@nd.edu.

**9114.** Moore, C. (2009): Reports from Costal Stations - 2008: Dunwich Heath National Trust, Suffolk. *Atropos* 36: 55. (in English) [UK, *Anaciaeschna isosceles*, *Sympetrum striolatum* was caught at a light trap] Address: not stated

**9115.** Mühle, L.; Rohe, L.; Flenner, I.; Suhling, F. (2009): Atmungsverhalten von *Orthetrum cancellatum*-Larven: Einfluss der aktuellen Temperatur und der Aufzuchtbedingungen (Odonata: Libellulidae). *Libellula* 28 (1/2): 59-68. (in German, with English summary) ["The intensity of respiration of larval Anisoptera can be determined by observing the frequency of abdominal movements. We used this to study the influence of the current temperature on the larval respiration of *O. cancellatum*. We assumed that (1) the breathing rate of the larvae increases with rising temperature and that (2) the response to the current temperature depends on the rearing conditions. The larvae were kept for nine

months under four different rearing conditions. The egg clutches originated from two countries in different climate zones, from southern France in the Mediterranean area and from northern Germany in the temperate zone. Our experiment revealed that the ventilation rate increased with increasing temperature. This was more pronounced with higher rearing temperatures than the larvae experienced. We interpreted this as a habituation effect. The size of the larvae influenced the ventilation rate as well. On the other hand, the genetic and geographic origin of the larvae had no significant effect." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**9116.** Ohba, S. (2009): Ontogenetic dietary shift in the larvae of *Cybister japonicus* (Coleoptera: Dytiscidae) in Japanese rice fields. *Environmental Entomology* 38(3): 856-860. (in English) ["No quantitative study on the feeding habits of *C. japonicus* larvae has been reported. In this study, field observations and rearing experiments were carried out to show the feeding ecology of *C. japonicus* larvae. Unlike previous commentaries, the first- and second-instar larvae of *C. japonicus* preyed on insects, mainly Odonata nymphs (*Orthetrum* spp. and *Sympetrum* spp.) and *Notonecta triguttata*, irrespective of prey availability, but did not eat vertebrates such as tadpoles and fish in the field. On the contrary, the third-instar larvae fed on both insects and vertebrates. Rearing experiments showed that the number of Odonata nymphs consumed was significantly more than the number of tadpoles consumed by the first and second instars but third-instar larvae ate both the Odonata nymphs and tadpoles in the tadpole-Odonata nymph mixture experiment. The total body lengths of *C. japonicus* new adults in the Odonata nymph and tadpole-Odonata nymph mixture treatments were statistically equal. These results suggested that the first- and second-instar larvae of *C. japonicus* prey mainly on insects and do not eat vertebrate animals (insectivore), whereas the third-instar larvae fed on both insects and vertebrates (generalist)." (Author)] Address: Ohba, S., Dept of Vector Ecology & Environment, Institute of Tropical Medicine, Nagasaki University, Sakamoto, Nagasaki 852-8523, Japan. E-mail: oobug@hotmail.com

**9117.** Olthoff, M.; Schmidt, E. (2009): Die Libellen (Insecta, Odonata) des Truppenübungsplatzes Haltern-Borkenberge (Kreis Coesfeld und Recklinghausen). *Abhandlungen aus dem Westfälischen Museum für Naturkunde* 71(3): 223-262. (in German, with English summary) ["Between 2004 and 2008, the dragonfly fauna of the Haltern-Borkenberge Training Area, a hilly sand area with little bogs (approx. 1.800 ha) southwest of the city of Münster in the Westphalian Bight, was recorded. Water-filled ruts and two oligotrophic ponds were investigated in the intensively used opened parts of the training area, while two small bogs (Habichtsmoor, Heimingshofmoor) were examined in the woody south of Borkenberge. Two bogs in the north of the training area (Gagelbruch, Suskenbrocksmoor) were examined very intensively, while the little stream Sandbach was only investigated at random. Altogether, 44 species of dragonflies were recorded. Three more species were documented between 1990 and 2002, which sums up to 47 in total, i.e. almost two thirds of the North Rhine-Westphalian species (64% of 73 species). The water-filled ruts that developed from the military training represent important biotopes for pioneer species (*Ischnura pu-*



milio, *Platetrum depressum*). The oligotrophic ponds in the open area accommodate remarkable populations of *Lestes virens* and *Leucorrhinia rubicunda*. The woody bogs in the south of the training area (Habichtsmoor, Heimingshofmoor) are relatively poor in species (21 species), though very important for specific acid water dragonflies (e.g. *Ceriagrion tenellum*, *Somatochlora arctica*, *Leucorrhinia dubia*, *L. rubicunda*). The two bogs in the northern part of the training area are species-rich (30 species in Suskenbrocksmoor, 41 species in Gagelbruch). The low density of acid water dragonflies and the breakdown of species since 2002 (*S. arctica* in both bogs, in addition *Brachytron pratense*, *Coenagrion lunulatum*, *C. hastulatum* in Gagelbruch) can be regarded as an indication of unfavourable water conditions. The stream Sandbach at the northern borderline of the training area is habitat for running-water dragonflies (*Calopteryx splendens*, *C. virgo*, *Gomphus vulgatissimus*). After 1990, a large population of *Orthetrum coerulescens* was discovered in a nutrient-poor ditch in Gagelbruch. Its core population is supposedly located in an outflow of a flooded quarry which was set up in the 1980s. The flooded quarry and the outflow have got mediterranean thermic conditions caused by ground water. All species found in Borkenberge are categorized in ecological groups and discussed in detail." (Authors)] Address: Olthoff, M., Naturförderstation im Kreis Coesfeld, Borkener Str. 13, 48653 Coesfeld, Germany. E-Mail: matthias.olthoff@naturfoerderstation.de

**9118.** Oosterhout, M.P. van; van der Velde, G.; Gaigher, I.G. (2009): High altitude mountain streams as a possible refuge habitat for the catfish *Amphilius uranoscopus*. *Environ. Biol. Fish.* 84: 109-120. (in English) ["*Amphilius uranoscopus* is [...] restricted to rivers and streams in east, southern and central Africa. It is likely to be displaced due to both competition and predation by exotic trout and other introduced fish. In high altitude mountain streams it can be the only species occurring, which means that this habitat may act as a refuge for this species. [...] The abiotic environment, population structure, behaviour and feeding biology of *Amphilius uranoscopus* were studied in a small, high-altitude perennial tributary of the Limpopo River in the Soutpansberg mountain range, Limpopo Province, South Africa, during 2005–2006. Here *A. uranoscopus* showed nocturnal behaviour. It used dark hollow crevices in rapids as shelters during the daytime. The rapids are characterized by a high flow rate, high dissolved oxygen content and coarse riverbed substrate consisting mainly of boulders without fallen leaves. In contrast to the adults, juveniles found shelter among the fallen leaves in pools. At night, *A. uranoscopus* moved out of the rapids into the open water of the pools. The main food of *A. uranoscopus* consisted of macroinvertebrates, mainly Trichoptera larvae." (Authors) The diet also includes a few Odonata ('Zygoptera', 'Anisoptera', 'Gomphidae')] Address: Gaigher, I.G., Lajuma Environmental Research Centre, P.O. Box 522, Makhado 0920, South Africa. E-mail: leopard@lajuma.com

**9119.** Ott, J. (2009): Veränderungen der Libellenfauna in Deutschland und Europa Klimawandels und Konsequenzen für den Naturschutz. *BfN-Skripten* 246: 41-42. (in German) [Brief introduction into current developments and processes in climatic induced changes of the European Odonata fauna.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**9120.** Petzold, F. (2009): Fund eines von Wassermilben parasitierten Männchens von *Anax parthenope* (Hydrachnidia; Odonata: Aeshnidae). *Libellula* 28(1/2): 85-88. (in German, with English summary) [A male *A. parthenope* parasitized by water mites "was found on 17-vi-2008 at a water-filled peat pit in northeastern Brandenburg, Germany. Approximately 830 water mite larvae were counted. The indeterminable mite larvae clung predominantly to the ventral side of the abdominal segments 5 to 7 and to the underpart of the thorax. This finding is the first documented evidence of parasitization of *A. parthenope* by water mites." (Author)] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. E-mail: petzold.falk@googlemail.com

**9121.** Petzold, F. (2009): Bericht über die Aktivitäten des Arbeitskreises Libellen Thüringens. *Mitteilungen des Thüringer Entomologenverbandes* 16(1): 29-34. (in German) [Thüringen; detailed report with species list of two excursions, and a seminar on species identification held at the university of Erfurt, Germany.] Address: Petzold, F., Pappelallee 73, D-10437 Berlin, Germany. E-mail: falkpetzold@web.de

**9122.** Phoenix, J. (2009): Herbstschlupf von *Ophiogomphus cecilia* (Odonata: Gomphidae) an der unteren Elbe in der tschechischen Republik. *Lampetra* 6: 30-32. (in German, with English and Czech summaries) [12-IX-2008, river Elbe at Velké Brezno, Czech Republic; unusual autumnal emergence of *O. cecilia*] Address: Phoenix, J., Goethestr. 22, 01824 Königstein, Germany. E-mail: juergen.phoenix@t-online.de

**9123.** Raczyńska, M.; Chojnacki, J.C. (2009): The structure of macrozoobenthic communities in the Tywa River, a right-bank tributary of the Oder River (north-west Poland). *Oceanological and hydrobiological studies* 38(3): 32-42. (in English) [Odonata are treated at the order level.] Address: Raczyńska, Małgorzata, West Pomeranian University of Technology, Faculty of Food Sciences and Fishery, Department of Marine Ecology and Environmental Protection, ul. K. Królewicza 4/H, 71-550 Szczecin, Poland. E-mail: malgorzata.raczynska@zut.edu.pl

**9124.** Radwell, A.J.; Camp, N.B. (2009): Comparing chemiluminescent and LED light for trapping water mites and aquatic insects. *Southeastern Naturalist* 8(4): 733-738. (in English) ["This research compared the effectiveness of red, yellow, green, and blue chemiluminescent candles and white light from an LED source in capturing water mites and aquatic insects in a macrophyte bed of a small reservoir. We sought to compare the abundance of organisms captured and to determine whether specific taxa showed a preference for certain colours. A total of 2974 organisms in 19 taxa were collected including 7 water mite genera and 12 other invertebrate taxa. The abundance of Hydrachnida (water mites) in the traps was greater than all other taxa combined. The dominant insect taxa collected were Ephemeroptera and Odonata. No statistically significant inter-taxon preferences for colour were found, but overall there was a greater attraction to yellow, green, or white light than to red and blue light. Since white light from the reusable LED source performed as well as yellow or green disposable chemiluminescent candles that are typically used in aquatic traps, submersible LED flashlights could be considered a suitable alternative" (Authors)] Address: Radwell, Andrea, 34 Sunrise Place, Cabot, AR 72023, USA. E-mail: aradwell@uark.edu.

- 9125.** Renker, C.; Beck, H.; Feuck, W.; Fritsch, R.; Grimm, F.; Haybach, A.; Henss, E.; Idelberger, S.; Keller, P.; Ludewig, H.-H.; Malec, F.; Marx, M.; Oesau, A.; Rodeland, J.; Simon, H.; Simon, L.; Trautmann, S.; Weitmann, G.; Weitzel, M.; Willigalla, C. (2009): Eine Momentaufnahme aus der Flora und Fauna des Eich-Gimbsheimer Altrheins - Ergebnisse des 11. GEO-Tags der Artenvielfalt am 13. Juni 2009. Fauna und Flora in Rheinland-Pfalz 11(3): 879-940. (in German, with English summary) [Rheinland-Pfalz, Germany; 18 Odonata species were recorded, including the regionally rare *Coenagrion pulchellum*] Address: Willigalla, C., Am Großen Sand 22, D-55124 Mainz, Germany. E-mail: christoph@willigalla.de
- 9126.** Robertson, A. (2009): The Great Canadian BioBlitz 2009. The Blue Bill - Quarterly Journal of the Kingston Field Naturalists 56(3): 82-101. (in English) [Camden East, Ontario, Canada, 12-13-VI-2009; 21 Odonata are reported.] Address: Robertson, Anne. E-mail: n8ture.anne@sympatico.ca
- 9127.** Rochelet, B.; Maillard, W. (2009): Redécouverte à Anax parthenope (Selys, 1839) en Sarthe et état des connaissances sur la présence de l'espèce en Pays de la Loire (Odonata, Anisoptera, Aeshnidae). Martinia 25(2): 79-84. (in French, with English summary) [France; "A. parthenope has been rediscovered in 2008 in Sarthe department after a gap of observation longer than 60 years. The species was observed in three different sites that were separated by several kilometres and clues of reproduction were detected in one of them. A focus is made on its regional status." (Authors)] Address: Rochelet, B., 19, rue des Allards F-79210 Usseau, France
- 9128.** Roland, H.-J. (2009): Erstnachweis von *Coenagrion scitulum* (Rambur, 1842) (Gabel-Azurjungfer) in Hessen. Libellen in Hessen 2: 59-61. (in German) [Echzell-Gettenau, Hessen, Germany, 29-VI-2008] Address: Roland, H.-J., Im Mühlahl 35, 61203 Reichelsheim, Germany. E-mail: Hjuergenroland@aol.com
- 9129.** Rychła, A. (2009): New localities of some protected and rare dragonfly species from western Poland with remarks to the hydrological state of the habitats. Odonatrix 5(1): 7-12. (in Polish, with English summary) ["New records of six protected or/and rare dragonfly species (*Leucorrhinia caudalis*, *L. albifrons*, *Cordulegaster boltonii*, *Erythromma lindenii*, *Aeshna juncea* and *A. affinis*) from western Poland have been described. The characterisation of habitats includes short remarks to the hydrological situation with regard to changing climate followed by fluctuations of water levels. The possible consequences for the habitat quality and for the dragonfly species are discussed." (Author)] Address: Rychła, Anna, ul. Osiedlowa 12, Ploty, PO-66-016 Czerwieńsk, Poland. E-Mail: rychlan@op.pl
- 9130.** Samraoui, B. (2009): Seasonal ecology of Algerian Lestidae (Odonata). International Journal of Odonatology 12(2): 383-394. (in English) ["When comparing the phenology of species within the family Lestidae in Numidia, northeastern Algeria, we found that: (1) four of five species - *Lestes barbarus*, *L. numidicus*, *L. viridis*, and *Sympetma fusca* - feature a prolonged pre-reproductive period approaching five (*Lestes* spp.) or eight months (*S. fusca*); (2) adults of *L. numidicus*, and probably of *S. fusca*, move to upland refuge sites in summer, whereas those of *L. barbarus* and *L. viridis aestivate* in alder carrs in lowlands close to reproductive sites; and (3) adults of all five species exhibit distinct spatial and/or temporal segregation." (Authors)] Address: Samraoui, B., Lab. de Recherche des Zones Humides, Université d'Annaba, 4 rue Hassi-Beida, Annaba, Algeria. E-mail: bsamraoui@hotmail.com
- 9131.** Schlotmann, F. (2009): Populationsdynamik der Gemeinen Keiljungfer (*Gomphus vulgatissimus*) und der Kleinen Zangenlibelle (*Onychogomphus forcipatus*) im Gewässersystem der Nahe (Rheinland-Pfalz) (Anisoptera: Gomphidae). Fauna und Flora in Rheinland-Pfalz 11(3): 981-998. (in German, with English summary) ["In the second half of the 20th century the gomphids represented the most severely endangered group of dragonfly species in central Europe. Their populations have generally recovered since the decade of the 1980ies. The paper documents this development for the Nahe river system in Rheinland-Palatinate (Western Germany) focusing on *G. vulgatissimus* and *O. forcipatus* which are regionally the most important species of this group. *G. vulgatissimus* had only been recorded three times before 1985; since then it has spread widely through the river system in a time period of less than two decades. The same development is reported for *O. forcipatus* starting in 1979 with the first record since 1915. The rapid increase of both populations goes hand in hand with the installation of many efficient sewage plants which improved the water quality of the rivers and streams. Measures to improve the morphological situation of the water bodies started later when the recovery of the gomphid populations had already become evident." (Author)] Address: Schlotmann, F., Weserstr. 11, 55296 Harxheim, Germany. E-mail: frank.schlotmann@gmx.de
- 9132.** SGL (2009): Vereinsnachrichten. 40: 50. (in German) [Schutzgemeinschaft Libellen in Baden-Württemberg, Germany; minutes, announcements, membership list] Address: SGL c/o Schiel, F.-J., Inst. Naturschutz & Landschaftsanalyse, Turenenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de
- 9133.** Shaalan, E.-A.-S.; Canyon, D.V. (2009): Aquatic insect predators and mosquito control. Tropical Biomedicine 26(3): 223-261. (in English) ["The use of insect predators in mosquito control has been exploited in a limited fashion and there is much room for further investigation and implementation. Insects that are recognized as having predatorial capacity with regard to mosquito prey have been identified in the Orders Odonata, Coleoptera, Diptera (primarily aquatic predators), and Hemiptera (primarily surface predators). Although their capacity is affected by certain biological and physical factors, they could play a major role in mosquito control. Furthermore, better understanding for the mosquitoes-predators relationship(s) could probably lead to satisfactory reduction of mosquito-borne diseases by utilizing either these predators in control programs, for instance biological and/or integrated control, or their kairomones as mosquitoes'ovipositing repellents. This review covers the predation of different insect species on mosquito larvae, predator-prey-habitat relationships, cohabitation developmental issues, survival and abundance, oviposition avoidance, predatorial capacity and integrated vector control." (Authors)] Address: Canyon, D.V., School of Public Health and Tropical Medicine, James Cook University, Townsville Qld 4811, Australia. E-mail: deon.canyon@jcu.edu.au

**9134.** Śniegula, S. (2009): Dragonflies (Odonata) of eutrophic waterbodies of Borne Sulinowo commune (West and South Pomeranian Lakeland District). *Wiad. entomol.* 28(2): 73-82. (in Polish, with English summary) ["The investigated habitats included two eutrophic lakes with some features of mesotrophy (high water transparency; significant part of sandy and rocky bottoms) located in the northwestern part of Borne Sulinowo commune and numerous small shallow eutrophic water bodies (ZMZE) situated in the southern part of the commune (former Soviet Union military area). A total of 37 dragonfly species were recorded, most of them were eurytopic organisms which were widely distributed in Europe and not endangered in Poland. However, there were several species collected during this study that were sensitive to anthropogenic changes in aquatic ecosystems. Those dragonflies indicated a high natural value of the investigated habitats. Furthermore, some of these species (*Sympecma paedisca*, *Aeshna viridis*, *Leucorrhinia albifrons*, *L. caudalis* and *L. pectoralis*) are protected in Poland and three species (*A. viridis*, *L. albifrons* and *L. caudalis*) are placed on the Polish Red list." (Author)] Address: Śniegula, S., Instytut Ochrony Przyrody PAN, al. Mickiewicza 33, 31-120 Kraków, Poland. E-mail: [sniegula@iop.krakow.pl](mailto:sniegula@iop.krakow.pl)

**9135.** Śniegula, S.; Gołąb, M.J. (2009): The dragonflies (Odonata) of peat bog water bodies in the vicinity of Borne Sulinowo (West and South Pomeranian Lakeland District). *Wiad. entomol.* 28(1): 33-41. (in Polish, with English summary) [Poland; "Five localities in the vicinity of the town of Borne Sulinowo, northwestern Poland, were studied in two seasons: 2005 and 2006. The investigated habitats included small dystrophic (sublocality 1a, localities 2 and 3) and eutrophic (sublocality 1b, 4 and 5) forest lakes surrounded by Sphagnum mats. Thirty-six species of dragonflies were recorded at all the localities. Among them there were two species (*Aeshna subarctica* and *Leucorrhinia dubia*) that represented dragonflies restricted to bogs (tyrphobionts), and three species (*A. juncea*, *Somatochlora flavomaculata* and *Sympetrum danae*) that were characteristic of bogs but not confined to them (tyrphophiles). The composition of dragonfly species at locality 1 (fish-free sublocality 1a and fishstocked sublocality 1b) showed that introducing fish into peat-bogs may have drastic effects on dragonflies sensitive to habitat changes. Locality 5 had a very interesting species composition that included the Mediterranean dragonflies *Anax imperator*, *A. parthernope*, and a coexisting numerous population of northern species *L. albifrons*. It must be stressed that four reported dragonflies: *Sympecma paedisca*, *A. subarctica*, *L. albifrons* and *L. pectoralis* are protected by law in Poland and three species are placed on the Polish Red list: *A. juncea*, *A. subarctica* and *L. albifrons*. The data enclosed in this paper confirm that the environs of Borne Sulinowo comprise a large number of valuable aquatic habitats that are important in sustaining the populations of stenotopic dragonflies." (Author)] Address: Śniegula, S., Instytut Ochrony Przyrody PAN, al. Mickiewicza 33, 31-120 Kraków, Poland. E-mail: [sniegula@iop.krakow.pl](mailto:sniegula@iop.krakow.pl)

**9136.** Sonnenburg, F.; Böhm, K.; Haßel, C. (2009): Libellenfauna der Ohligser Heide. *Jber. Naturwiss. Ver. Wuppertal* 61: 101-124. (in German, with English summary) ["The dragonfly fauna of Ohligser Heide (Germany, North Rhine-Westphalia, Solingen) is well known because of field studies conducted by the Biolo-

gische Station Mittlere Wupper and further odonatologists, and based on data analysis of published papers. This enables us to record changes in the dragonfly fauna since 1984 and before. Over the whole period 40 species were recorded in total, 27 of them with established populations and four of them colonizing at least periodically in the study area. The number of established species has been increasing continuously, which is a result of successful re-creation of wetland habitats. Many of the dragonfly species found are regionally rare. Nine species show a more or less high affinity for bog or heath habitats. The study area is of major importance for dragonfly protection not only locally but also on wider scale." (Authors)] Address: Sonnenburg, F., Biologische Station Mittlere Wupper, Vogelsang 2, 42653 Solingen, Germany. E-mail: [FSonnenburg@t-online.de](mailto:FSonnenburg@t-online.de)

**9137.** St John, M.A. (2009): The benthic invertebrate community of lakes previously impaired by mining-related acidification near Wawa, Ontario. M.S. Thesis, Graduate Department of Zoology, University of Toronto: VII, 75pp. (in English) ["Iron mining began in Wawa, Ontario in the late 1800s and ceased in 1998. The sintering process of iron pyrite produced sulfur dioxide which led to the acidification of nearby lakes. Benthic macroinvertebrate samples were collected from lakes along a gradient of historical impairment in Wawa to examine the extent to which the benthos of the lakes would separate along the historical impairment gradient. The results show that the lakes are not separated along a gradient of impairment, and acid-intolerant taxa were collected in previously acidified lakes. There was no ameliorative intervention to combat the historical acidification and the observed recovery of water chemistry and benthos is entirely due to natural ecosystem processes. The two sampling methods (littoral kick sampling using a D-net and Hester-Dendy substrates) used to sample the benthos in these lakes can lead to substantial differences in the taxa collected." (Author) Odonata are treated at the genus level.] Address: St John, Margaretha Ann, Graduate Department of Zoology, University of Toronto, Canada

**9138.** Stephan, U.; Schiel, F.-J. (2009): Nachruf auf Karl Müller. *mercuriale* 9: 41. (in German) [Obituary Karl Müller (1927-2009); with bibliography.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: [Franz-Josef.Schiel@INULA.de](mailto:Franz-Josef.Schiel@INULA.de)

**9139.** Szkokan-Emilson, E.J.; Wesolek, B.E.; Gunn, J.M.; Sarrazin-Delay, C.; Bedore, J.; Chan, F.; Garreau, D.; O'Grady, A.; Robinson, C. (2009): Recovery of benthic invertebrate communities from acidification in Killarney Park lakes. *Environmental Monitoring and Assessment* 166(1-4): 293-302. (in English) ["Using a reference-condition comparison, recovery of benthic invertebrate communities from acidification was assessed in three lakes in Killarney Wilderness Park approximately 40–60 km from the massive metal smelters in Sudbury, Canada. Test site analyses (TSAs) were used to compare the park lakes to 20 reference lakes near Dorset Ontario, 200 km to the east. An extension of a previous survey (1997–2001) of two sensitive mayfly species (*Stenonema femoratum* and *S. interpunctatum*) was conducted in one of the lakes. TSA results indicate that the three Killarney lakes remain significantly different from reference condition due primarily to higher abundances of a few acid-tolerant families and the presence of some less abundant sensitive families. Colo-



nization rates differ greatly between the two mayfly species presumably because of competition for available habitat. Overall, this study suggests that early colonizers will gain an advantage to out-compete subsequent arrivals, and these competitive interactions will delay the return of communities to reference condition. ... George Lake was found to be the most different from reference, and this is largely because of the presence of Gammaridae, Cordulegastridae, and Glossosomatidae." (Authors)] Address: Szkokan-Emilson, E.J., Co-operative Freshwater Ecology Unit, Biology Dept, Laurentian University, Sudbury, ON, P3E 2C6, Canada. E-mail: exszkokanemilson@laurentian.ca

**9140.** Tellez, D.; Dommanget, J.-L. (2009): *Lindenia tetraphylla* (Vander Linden, 1825) en Corse du sud (Odonata, Anisoptera, Gomphidae). *Martinia* 25(3): 117-118. (in French, with English summary) [14-VI-2009, Corsica, France, in a littoral lagoon in the southern part of the island.] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**9141.** Tillmanns, O. (2009): *Aeshna mixta* als Beute der Larve von *Cicindela campestris* (Odonata: Aeshnidae; Coleoptera: Cicindelidae). *Libellula* 28(1/2): 89-91. (in German, with English summary) [19-VIII-2001, Burgwald near Marburg, Hessen, Germany, NSG „Franzosenwiesen/Rotes Wasser“; a larva of *C. campestris* was observed while feeding on a female *A. mixta*. Obviously such a large dragonfly species hitherto had not been recorded as prey of *Cicindela* larvae in Middle Europe.] Address: Tillmanns, O., Orkener Str. 17, D-41515 Grevenbroich, Germany. E-mail: mail@natur-gutachten.de

**9142.** Tończyk, G. (2009): Review. Cham S. 2007. Field Guide to the larvae and exuviae of British Dragonflies. Volume 1: Dragonflies (Anisoptera). The British Dragonfly Society. Gem Publishing Company, Brightwell, Wallingford, 76 ss. ISBN-978-0-9556471-0-9. *Odonatrix* 5(1): 30-32. (in Polish, with English summary) ["Field Guide to the larvae and exuviae of British Dragonflies. Volume 1: Dragonflies (Anisoptera)"] is an interestingly prepared key to the identification of final stage larvae and exuviae of dragonflies. The review contains the de-briefing of contents with emphasizing the value of good photographs presenting exuviae of 25 dragonfly species. The study was evaluated as a moderately successful work of local importance." (Author)] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk.grzegorz@gmail.com

**9143.** van Buskirk, J. (2009): Natural variation in morphology of larval amphibians: Phenotypic plasticity in nature? *Ecological Monographs* 79(4): 681-705. (in English) ["Phenotypic plasticity has been studied intensively in experimental settings but infrequently in nature, and therefore the relevance of experimental findings is poorly known. This is especially true for morphological plasticity in amphibian larvae induced by predators and competitors. This paper describes a seven-year survey of head and tail shape in eight species of anuran and newt larvae in northern Switzerland, involving 6824 individual larvae and 59 ponds. I tested relationships between geometric measures of size and shape and five habitat gradients: pond permanence, cover by forest canopy and aquatic vegetation, and the densities of predators and competitors. Responses to competitors and predators were often similar to those reported in

experiments. High competitor density was associated with small size and a large head in newt larvae, a long or deep head/body in anuran larvae, and a short or shallow tail in newts and some tadpoles. High predator density was correlated with a deep tail fin and tail muscle in many species. In anurans, the change in shape between low- and high-predator ponds in nature closely paralleled the plastic response to nonlethal predators in mesocosm experiments. The survey revealed many previously undescribed relationships between morphology and the other habitat features. Several species had relatively large tails in ponds that were shaded or thickly vegetated. Associations between year-to-year changes in shape and habitat within ponds implicated phenotypic plasticity rather than genetic population divergence, at least in anurans. These results inspire confidence in the relevance of experiments and highlight many new patterns that will merit further study. [...] Common predators were aeshnid dragonfly larvae (*Aeshna cyanea* and *Anax imperator*), larval dytiscid beetles (especially *Dytiscus marginalis* and *Hydaticus* spp.), four species of adult *Triturus* newts, adult backswimmers (Hemiptera: *Notonecta glauca*), and larval libellid and corduliid dragonflies." (Author) ] Address: van Buskirk, J., Institute of Zoology, University of Zürich, CH-8057 Zürich, Switzerland. E-mail: jvb@zool.uzh.ch

**9144.** van der Poorten, N. (2009): *Libellago corbeti* sp. nov. from Sri Lanka (Odonata: Chlorocyphidae). *International Journal of Odonatology* 12(2): 223-230. (in English) ["*Libellago corbeti* sp. nov. (holotype male; Sri Lanka, Ratnapura District, near Kudawe, 6.26°N, 80.25°E, 03 vii 2007, to be deposited in the Sri Lanka National Museum, Colombo) is described and figured. Its phenotype does not resemble that of any other *Libellago* species. Habitat characteristics and species behaviour are briefly outlined. Keys to males and females of *Libellago* species in Sri Lanka are provided." (Author)] Address: van der Poorten, Nancy, 17 Monkton Avenue, Toronto, Ontario, M8Z 4M9, Canada; E-mail: nmgvdp@netscape.net

**9145.** Vanappelghem, C. (2009): Les odonates de la région Nord - Pas de Calais - Historique de la connaissance et diversité. *L'heron* 40(4)(2007): 149-154. (in French, with English summary) [Basing his study on the published reports recording the distribution of Odonata, the author analyzes the evolution of the species diversity in the "region Nord - Pas-de-Calais", France up to 2005. The situation of some species of this region (*Sympetrum depressiusculum*, *Onychogomphus forcipatus*, *Crocothemis erythraea*, *S. meridionale*, *Lestes barbarus*) is discussed particularly through new information from the collections of the "musee d'Histoire naturelle de Lille".] Address: Vanappelghem, C., 14, rue Brûle Maison, F-59000 Lille, France. E-mail: cedvana@free.fr

**9146.** Villanueva, R.J.; van der Ploeg, J.; van Weerd, M. (2009): Some Odonata from the Northern Sierra Madre Natural Park, Isabela, Luzon, Philippines. *Agrion* 13(2): 72-74. (in English) ["From 12 to 24 September 2008, we organized a biodiversity survey to sitio Dipagsangan, barangay Didian in the municipality of Palanan. We camped in lowland dipterocarp forest at Dipinantahikan (campsite 1), and in mid-elevation forest at Pinakdatatin ti Bulayo (campsite 2). The short field survey revealed 35 species, and represents the first Odonata survey in the eastern side of NSMNP. New records are predominantly zygopteran, which, with one

exception, are all endemic. This shows the remarkable Odonata assemblage in this largest remaining Philippine forest block. The present list is the result of a short fieldwork period (with field days further shortened by a tropical depression hitting the area during the survey). Additional species are to be expected when more fieldwork is conducted during good weather conditions. More field work is also necessary to provide distributional data for the undescribed species." (Author)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**9147.** Villanueva, R.J.T. (2009): Two new species of Risiocnemis from northern Sierra Madre Luzon, Philippines (Odonata: Platynemididae). *International Journal of Odonatology* 12(2): 231-236. (in English) ["Risiocnemis corbeti sp. nov. and R. hamalaineni sp. nov. (for both species: holotype male, Dipmantahikan area [16°53'39"N, 122°20'47"E], Dipagsangaan, Palanan, Isabela, Luzon, Philippines, 12-20 ix 2008, in RMNH) are described, illustrated, and diagnosed." (Author)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., Davao City, 8000 Philippines. E-mail: reaganjoseph@lycos.com

**9148.** Wildermuth, H. (2009): Förderung der Libellenfauna kleiner Moorgräben durch einfache Naturschutzmaßnahmen (Odonata). *Libellula* 28(1/2): 31-48. (in German, with English summary) ["In a nature reserve near Zürich, Switzerland, the overgrown drains with an overall length of 370 m were revitalized in 1.5 ha of recently cleared fenland. In order to promote the odonate fauna and other aquatic organisms, several controllable weirs had been installed successively, thus preventing or protracting desiccation of the drains during hot periods with low or no precipitation. Habitat maintenance by a rotational strategy of clearing the ditches should allow the dragonflies to colonize the water bodies permanently. Extensive monitoring during three years revealed positive results throughout. In total 22 species were recorded, nine of them with regular reproduction. *Orthetrum coerulescens*, *Pyrrhosoma nymphula* and *Coenagrion puella* turned out to be the most abundant species and were found at all sections. *Cordulegaster boltonii* preferred the rare, short stretches with visible running water, and *Somatochlora flavomaculata* colonised sites with stagnant water, submerged vegetation and peat mud. Due to the retention of the water by weirs, the drains never dried up completely, which allowed the larvae to survive during longer lasting hot and dry periods. After clearing of largely overgrown sections in autumn, no emergence of dragonflies was noted in the subsequent season at these sites as the larvae had obviously been eliminated with the excavated material. However, the cleared sections were immediately colonised by reproductively active adults, e.g. by *O. coerulescens*; by the following spring larvae in different stadia were found there, together with other species. The results substantiate the hypothesis that the dragonfly fauna of the small fen ditches was considerably promoted by simple measures of habitat restoration and maintenance." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**9149.** Wright, I.A.; Burgin, S. (2009): Comparison of sewage and coal-mine wastes on stream macroinvertebrates within an otherwise clean upland catchment, southeastern Australia. *Water Air Soil Pollution* 204:

227-241. (in English) ["Macroinvertebrates have been widely used in freshwater ecosystems as surrogates to assess the impacts of waste discharges and water pollution. However, often interpretations have been made on the impact of one pollutant in the presence of others that may provide an unidentified additive effective or otherwise confound the results. There have been few opportunities to study the impact of pollutants without such potentially confounding effects. We studied macroinvertebrates using a replicated kick sampling technique and identified to the family level to assess and compare the effects of zinc-rich coal-mine waste and organic pollution from treated sewage on an otherwise clean upland stream network within a world heritage area. We used multivariate analysis of macroinvertebrate assemblages from polluted and clean sites to measure and compare the effect of each waste impact to community structure. We also calculated three widely used biotic indices (Ephemeroptera, Plecoptera and Trichoptera (EPT) family richness, family richness, and abundance) and found that the EPT index was the only one to respond to both pollution types. Macroinvertebrate abundance was an important attribute of the study, with each source of pollution having a contrasting effect on total abundance. It also helped us to measure the relative response of families to each pollutant. There was an initial significant modification of macroinvertebrate assemblages below the outflow of each of the pollutants, followed by different degrees of recovery downstream." (Authors) Taxa including Odonata: Aeshnidae and Gomphidae are treated at the family level.] Address: Wright, I.A., College of Health and Science, Univ. of Western Sydney, Locked Bag 1797, South Penrith Distribution Centre, 1797 Sydney, NSW, Australia. E-mail: i.wright@uws.edu.au

**9150.** Xiao, T.; Ang, H. (2009): Numerical study of unusual phase relationships and aerodynamic interaction between forewing and hindwing of dragonfly Model. *Acta Aeronautica et Astronautica Sinica* 30(7): 1165-1175. (in Chinese, with English summary) ["Dragonflies have the ability to control the aerodynamic forces for flight by modulating the phase relationship between their forewings and hindwings. In this article, unsteady flows of a dragonfly model in hovering (advance ratio  $J = 0$ ) and in forward flight with medium-speed ( $J = 0.3$ ) are simulated by solving unsteady Navier-Stokes (N2S) equations on dynamic overset unstructured grids. At each advance ratio, 13 phases from  $0^\circ$  to  $360^\circ$  with intervals of  $30^\circ$  each are considered. The variation of aerodynamic force and power with phase as well as the aerodynamic perturbation between the forewing and hindwing are studied. It is found that the period average vertical force and power varies in a "U" shape as a function of the phase. The vertical force generated by the model is enough to balance the weight, and the data for aerodynamic power also agree with the statistical data of real dragonflies. In the wide phase region of  $90^\circ$  to  $270^\circ$ , aerodynamic interaction between the wings is relatively strong and stable. The vertical force and power is relatively small and stay roughly constant. All these results may be useful for explaining the unusual phase relationships between the wings of dragonflies." (Authors)] Address: Xiao, T., College of Aerospace Engineering, Nanjing Univ. of Aeronautics & Astronautics, Nanjing 210016, China. E-mail: xt.hang@nuaa.edu.cn

**9151.** Xu, Y.; Wu, B. (2009): A primary study on dragonflies from Huangshan region. *Journal of Huangshan*

University 11(3): 59-61. (in Chinese, with English summary) [Between 2000 and 2006, 61 Odonata species were collected in the Huangshan region of Anhui Province, China, 54 for the first time in Anhui Province.] Address: Xu Yajun, Wu Bian (Institute of Biodiversity, Huangshan University, Huangshan 245041, China

**9152.** Xu, Y.j.; Zeng, L.; Lu, Y.-y.; Liang, G.-w. (2009): Food content of refuse piles of the red imported fire ant, *Solenopsis invicta* Buren (Hymenoptera: Formicidae). *Acta Ecologica Sinica* 29(11): 5791-5798. (in Chinese, with English summary) ["Refuse piles of *S. invicta*, were collected from four typical habitats in South China: litchi orchard, nursery, wasteland and roadside, and analyzed to learn seasonal food content fluctuation of this ant. The result showed that the refuse piles had a wide variety of solid particles including 41 species of insect fragments and seeds from 8 orders in total. Coleopterans were the dominant components in all of the habitats accounting 69.05%, 41.17%, 51.8% and 66.67% in litchi orchard, nursery, wasteland and roadside respectively. Homoptera was the least common prey which was only found in the wasteland composing 1.20%. The Hymenoptera, Hemiptera, seeds, Orthoptera, Lepidoptera, Isoptera and Odonata preys comprised 14.92, 11.96, 11.66, 2.08, 0.60, 0.60 and 0.60%, respectively. Adult fragments were the main parts in refuse piles with few insect larval or pupal fragments found. The numbers of prey species discovered in refuse piles were similar among habitats, but the composition of the species and their quantity were different. It showed obvious seasonal fluctuations of the forage items with two foraging active periods occurring from April to May and from September to October." (Authors) Odonata result from the roadside habitat; it will be possible that the ants collected odonate road kills.] Address: Laboratory of Insect Ecology and Red Imported Fire Ant Research Centre, South China Agricultural University, Guangzhou 510642, China. E-mail: zengling@scau.edu.cn

**9153.** Yu, W.-y.; Li, Z.-h.; Song, D.-j.; Lu, J.; Qian, Y.-p.; Lou, T.-t.; Gao, L. (2009): A study on fauna and diversity of Odonata in Huaiyu Mountain, Jiangxi Province. *Acta agriculturae universitatis Jiangxiensis* (Natural Sciences edition) 31(3): 562-584. (in Chinese, with English summary) [Between 2005 and 2008, 57 Odonata species were recorded including 16 new records for Jiangxi Province, China.] Address: Dept of Life Science, Nanjing Xiaozhuang University, Nanjing 211171, China. E-mail: ywy138519@126.com

**9154.** Zhang, H.-j. (2009): Odonata resources in Shaanxi province. *Journal of Anhui Agri. Sci.* 37(24): 11565-11567. (in Chinese, with English summary) [China; 117 Odonata species are listed.] Address: Zhang, H.-j., Bioresources Key Laboratory of Shaanxi Province, Shaanxi University of Technology, Hanzhong, Shaanxi 723000, China

**9155.** Zhao, H.-x.; Zhong, Z. (2009): Research advance in mechanics of dragonfly wings. *Chinese quarterly of mechanics* 30(3): 389-404. (in Chinese, with English summary) ["The study shows that Odonata are supremely versatile, maneuverable fliers in nature because of the special constructions of their wings. The pterostigma and nodus can balance the fore- and hind-wings and eliminate the wings tremor. Four types of wing model are generally used: the conceptual model, physical model, simple analytical model and numerical analysis

model. The first three models are simplified ones, though the numerical model can modify as three dimensional numerical simulation, but ignore the materials composition of the wings. The flight mechanism of dragonfly and the mechanical characteristics of its wings were described, and pointed out that the influence of the unsteady flow must be taken into account when analyzing the flight mechanism of dragonfly. The measuring method of elastic modulus, hardness and bending stiffness of the wings were introduced. It shows that the spanwise EI scales with the cube of span length, whereas the chordwise EI scales with the square of chord length. A prospect of mechanism of dragonfly and its wings was proposed." (Authors)] Address: Zhao, H.-x., School of Aerospace Engineering and Applied Mechanics, Tongji Univ. Shanghai 200092, China

**9156.** Żurawlew, P. (2009): Occurrence and records of breeding behaviour of Scarlet Dragonfly *Crocothemis erythraea* (Brullé, 1832) (Odonata: Libellulidae) in the Pleszew Powiat (south-eastern Great Poland). *Odonatrix* 5(1): 18-21. (in Polish, with English summary) [In 2007 and 2008, "over 60 study sites were controlled against the occurrence of Odonata. 45 species were recorded within (61,6% of the dragonfly fauna in Poland). *C. erythraea* was recorded at four study sites (all of them were clay excavations): 1) Kwileń (51°59'N, 17°51'E, UTM: XT96), in 2007 - 4 observations 1 male, and in 2008 it was noted during 9 controls: the highest numbers 10 VI - ca. 15 males, 3 VII and 31 VII - each ca. 10 males, additionally, 10 VI a pair in copula was observed, and next, 1 female laying eggs in *Batrachium* sp.; 2) Kowalew (51°53'N, 17°43'E, UTM: XT85), 1 male observed 11 VI 2008; 3) Nowa Wies (51°52'N, 17°46'E, UTM: XT95), 1 male recorded on 18 VI 2008; 4) Lenartowice (51°55'N, 17°48'E, UTM: XT95), 2 males patrolling and territorial noted on 25 VI 2008. In Poland the stable populations of the Scarlet Dragonfly have been found so far in the valley of the Upper Vistula River and in Przemysl Upland. Clay excavations are the environments that play very important role in the existence of many dragonfly species. This refers not only to the Pleszew Powiat but also to the whole south-eastern Great Poland (Wielkopolska)." (Author)] Address: Żurawlew, P., Kwileń 67A, 63-313 Chocz, Poland. E-mail: grusleo@wp.pl

## 2010

**9157.** Andrew, R.J. (2010): Mortality during emergence of *Pantala flavescens* Fabricius in central India (Anisoptera: Libellulidae). *Odonatologica* 39(1): 57-62. (in English) ["Mortality during emergence was studied at an open drain in the city of Nagpur (central India). The total mortality rate (MR) was 10.92% (n = 686). Failure to moult (incomplete emergence state, MR = 4.8%) and failure to expand abdomen and harden wings for flight (complete emergence state, MR = 6.12%) were the two major reasons of mortality. The emerging dragonflies failed to moult and were found dead in the following conditions: cuticle of the thorax split and head and thorax of the pharate partly out of the exuviae (MR = 2.04%), head, thorax and wings out but the entire abdomen trapped in the exuviae (MR = 2.76%). After complete moulting some pharates were found floating, dead or completely exhausted in the water body. Some of the dead pharates had a curved telescopic abdomen



and crumpled (MR = 0.44%), or stretched wings (MR = 2.33%), while others exhibited a straight, expanded abdomen and stretched overlapping (MR = 1.75%) or stretched spread wings (MR = 1.60%). Death due to overcrowding and predation was negligible. Statistical analysis revealed that mortality is independent of stage of emergence ( $P = 0.25$ ). (Author)] Address: Andrew, R.J., Dept of Zoology, Hislop College, Civil lines, Nagpur-440 001, India. E-mail: rajuanrew@yahoo.com

**9158.** Andrew, R.J.; Patankar, N. (2010): The process of moulting during female emergence of the dragonfly *Pantala flavescens* (Fabricius) (Anisoptera: Libellulidae). *Odonatologica* 39(2): 141-148. (in English) ["The chain of events occurring during emergence in *P. flavescens* is described in detail. The moulting process is divided into 3 stages. The larva climbs out of the water a few hours after sunset. If disturbed while climbing, it exhibits thanatosis i.e. death feigning and crab-like side-ways crawling. It stops at a suitable vertical emergent support. Manipulation from vertical to horizontal of this support stops commencement of ecdysis. 1 Stage I starts from the moment the larva finds a suitable site for moulting. Soon, it starts shuddering, quivering and shaking its body in a synchronized pattern. The imago inside the exuviae exerts pressure on the thoracic tergites until the cuticle splits. This stage varies from 8 to 20 min and occupies 16% of the moulting period. 1 During stage II, the head and thorax of the imago emerge out of the split thoracic cuticle. The imago exhibits an antero-posterior humping movement and the body hangs out downwards with folded legs. The half suspended, upturned imago starts 'breathing' heavily. Unfolding of the legs and movements of the packed wings takes place in a characteristic manner. The imago turns upwards, grips the head of the exuviae and jerks out the remaining terminal portion of the abdomen from the exuviae. This stage takes 18 to 35 min and occupies 31% of the moulting time. Pigmentation of the head region is completed during this stage. 1 In stage III, the imago is released from the exuviae, it starts hardening its cuticle and extending the wings. The imago moves a few inches above the exuviae. The abdomen is pale green and curved upwards. The wings expand but are opaque. Simultaneously, pigmentation of the body starts around the thoracic region and the terminal tip of the abdomen. Within 10-14 min the whole body of the imago develops a species-specific teneral pattern of colouration. Meanwhile, the expanding wings unfold and separate out and the teneral adult is ready for flight. This stage takes 40-55 min and occupies 53% of the total moulting period. Observations on incomplete metamorphosis indicate that gravitational force is responsible for uniform wing expansion." (Authors)] Address: Andrew, R.J., Dept of Zoology, Hislop College, Civil lines, Nagpur-440 001, India. E-mail: rajuanrew@yahoo.com

**9159.** Baker, R.A. (2010): Robert John Tillyard (1881-1937) F.R.S. - an account of his life and legacy with special reference to odonatology. *J. Br. Dragonfly Society* 26(1): 1-9. (in English) ["R. J. Tillyard had a short but remarkable life into which he packed so much scientific work. Trained as a mathematician at Cambridge, he soon left England for Australia to teach at the grammar school in Sydney before embarking on a career in scientific research and then scientific administration in Australia and New Zealand. However his first love was in natural history and in particular dragon-

flies. He published about 180 scientific papers; also five books, his best known being "The Biology of Dragonflies". He was elected a Fellow of the Royal Society in 1925." (Author)] Address: Baker, R.A., Faculty of Biological Sciences, University of Leeds, Leeds LS2 9JT, UK

**9160.** Bernard, R.; Schmitt, T. (2010): Genetic poverty of an extremely specialized wetland species, *Nehalennia speciosa*: implications for conservation (Odonata: Coenagrionidae). *Bulletin of Entomological Research* 100(4): 405-413. (in English) ["Oligo- and mesotrophic wetlands, such as bogs, fens and swamps, have become more and more restricted in Europe, and wetland species related to them have increasingly been threatened. Due to increasing habitat fragmentation, the exchange of individuals of these species among sites and, as a consequence, gene flow has been reduced or even eliminated. Therefore, we analysed the genetic structure of 11 populations of an endangered stenotopic damselfly, *Nehalennia speciosa* (Odonata: Coenagrionidae), in Poland and Lithuania by means of allozyme electrophoresis of 14 gene loci. The overall genetic diversity of all populations was low (A: 1.32; H: 2.6%; Ptot: 29.2%), and no significant differences were observed among the different groupings of populations (degree of fragmentation, habitat type and size, population size). The genetic differentiation among populations was also low (FST: 2.0%) and no regional groups were detected. A low degree of isolation by distance was observed for genetic distances. Taking into account these results, the conservation effort for this species should be focused on large local populations and not necessarily on metapopulation structures. Furthermore, *N. speciosa* could be (re-)introduced in extinct patches and seemingly suitable localities. Genetically, such relocations should be feasible due to the generally high genetic homogeneity of populations." (Authors)] Address: Bernard, R., Dept of General Zoology, Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznań, Poland; E-mail: rbernard@main.amu.edu.pl

**9161.** Bernard, R.; Daraž, B. (2010): Relict occurrence of East Palaearctic dragonflies in northern European Russia, with first records of *Coenagrion glaciale* in Europe (Odonata: Coenagrionidae). *International Journal of Odonatology* 13(1): 39-62, pl. 1. (in English) ["The East Palaearctic *C. glaciale* and *C. hylas* are characterized by a current disjunct distribution. New data from northern European Russia significantly modify the earlier known pattern of their distribution. The first European records of *C. glaciale* and a new record of *C. hylas* west of the Urals are reported from the environs of Pinega village (Arkhangelsk oblast, Pinega region). Distribution ranges of these two species are analysed in light of their palaeogeography. These postglacial relicts in Europe are representatives of a cold-stenothermal fauna that probably colonized the continent during the late Pleistocene and early Holocene in the period of the maximum spread of birch and pine. During the Atlantic period they withdrew far to the East remaining probably only as isolates in the Urals and in Europe. However, the new records suggest that the European remains of the early Holocene distribution may be more numerous and extensive than previously believed and are concentrated especially in the almost unexplored northeast. The survival of *C. glaciale* and *C. hylas* in the presumptive isolate of their distribution range in the Pinega region is probably a consequence of a specific combination of severe climate and habitat and microclimatic

conditions, largely influenced by karst. The habitat conditions at 'Pinega' localities are analysed in the context of the species' requirements. Additionally, biogeographically important findings of the North and Central Asian *Aeshna serrata* are recorded. This species was previously assumed to occur in Europe only as an isolate around the Baltic Sea, but the new records suggest that it has a much more extensive but fragmented distribution in the European north and northeast." (Authors)] Address: Bernard, R., Dept General Zool., Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznań, Poland; E-mail: rbernard@main.amu.edu.pl

**9162.** Bernard, R.; Kosterin, O.E. (2010): Biogeographical and ecological description of the odonata of eastern Vasyugan Plain, west Siberia, Russia. *Odonatologica* 39(1): 1-28. (in English) ["Results of the studies of odonate fauna, carried out in July 2006 in the odonatologically almost unexplored Vasyugan Plain, are presented. The studies concentrated in the northern and northeastern parts of the largest bog in the world, the Vasyugan Bog, and its surroundings. Large primeval complexes of Sphagnum bogs and fens and other accompanying habitats, man-made as well, were studied. 25 localities are briefly described and the occurrence of 35 recorded spp. is commented. Due to almost total absence of typically East Palaearctic species (only *Shaogomphus postocularis* found), the aspect of the Odonata fauna in the studied area is similar to a certain degree to that known from central and eastern Europe, but with some differences in the species composition, abundance of many species and their habitat preferences. In *Coenagrion puella*, *C. pulchellum*, *Enallagma risi*, *Nehalennia speciosa*, *Gomphus vulgatissimus*, *Shaogomphus postocularis*, *Somatochlora flavomaculata*, *Leucorrhinia albifrons*, and *L. pectoralis*, the northern limit of their distribution appears further N than it was previously known. This suggests that the actual northern range limit of some of these species in W Siberia does not descend as sharply to the S as it was expected. The first known site of *S. postocularis* W of the Ob' river and on a perfect plain is also worth noticing. Among the most remarkable discoveries was the regular, area-wide occurrence of several previously poorly known in Siberia species, such as *N. speciosa*, *Aeshna subarctica*, *G. vulgatissimus* and *S. flavomaculata*. Taxonomically interesting is the coexistence, in the studied area but not at the same localities, of two taxa considered as subspecies or separate species, *E. c. cyathigerum* and *E. (c.?) risi*. The fact of clear spatial separation and at most a minimum degree of intergrading (if any) of these 2 taxa suggests their full species status which would agree with morphological and recent molecular data. The regular and not rare presence of 2 androchrome *Calopteryx splendens* / forms and females with the wings coloured to the tips, as well as the occurrence of brownish wing 'smoking' of many / *S. flavomaculata* and *S. arctica* are peculiar features of the Vasyugan Odonata aspect. The male segregation in the 'triangle' of peat bog aeshnids, *Aeshna crenata*, *A. juncea* and *A. subarctica*, is described and discussed. Between *A. juncea* and *A. subarctica* it was very advanced, partially spatial and partially weather/temporal, between *A. crenata* and *A. subarctica* almost complete, spatial, and between *A. crenata* and *A. juncea* advanced, weather/temporal. These observations confirm the dominant position of *A. crenata* over the water table, and also suggest the lack of *crenata*-dominance off the water table. The reliability of adult diagnostic features, more

and less commonly used to distinguish between *A. subarctica* and *A. juncea*, is discussed." (Authors)] Address: Kosterin, O.E., Institute of Cytology & Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**9163.** Brodman, R.; Newman, W.D.; Laurie, K.; Osterfeld, S.; Lenzo, N. (2010): Interaction of an aquatic herbicide and predatory salamander density on wetland communities. *Journal of Herpetology* 44(1): 69-82 (in English) ["Pesticides can be important conservation tool, but they could have unintended impacts on amphibians. The commercial glyphosate-based herbicide Accord is approved for use in wetlands and ponds because it is designed to be safer to aquatic wildlife than other herbicide formulations (e.g., Roundup or Atrazine); however, field experiments are needed to determine whether there are direct, indirect, or sublethal effects on amphibians or effects on wetland community structure. We conducted a replicated field experiment in constructed ponds to test for both the effects of Accord and predator (Tiger Salamanders, *Ambystoma tigrinum*) density on amphibians and aquatic invertebrates. Herbicide treatment had significant density-dependent effects on Tiger Salamander growth, development, and survival. The survival of anurans and aquatic invertebrates was also affected by herbicide treatment and predator density. At certain Tiger Salamander densities, the community structure was altered such that some species became more common with herbicide treatment, whereas others became less common. Behaviour assays of salamander larvae suggest that herbicide treatment alters predator-prey relationships in the experimental pond communities. These results suggest that competition and predation may mediate indirect effects of this herbicide on the aquatic fauna. We conclude that exposure to Accord poses less of a risk to the ecology of amphibians than do other formulations of glyphosate-based herbicides. ... The abundance of benthic worms (*Turbellaria* and *Oligochaeta*) and pelagic insects (*Anisoptera*, *Zygoptera*, *Corixidae*, *Notonectidae*, *Belostomatidae*, *Gyrinidae*, *Dytiscidae*, *Chaoboridae*) were not significantly affected by herbicide treatment. ... Tiger Salamander larvae from herbicide treated ponds ate significantly fewer chironomid midges and *Bufo* tadpoles but significantly more damselflies than larvae from control ponds." (Authors)] Address: Brodman, R., Biology Department, Saint Joseph's College, Rensselaer, Indiana 47978 USA. E-mail: bobb@saintjoe.edu

**9164.** Bwong, B.A.; Measey, G.J. (2010): Diet composition of *Xenopus borealis* in Taita Hills: effects of habitat and predator size. *African Journal of Ecology* 48(2): 299-303. (in English, with French summary) [Kenya; "Frogs in the genus *Xenopus* are ubiquitous in sub-Saharan Africa, yet very little is recorded on their ecology. They are commonly found in anthropogenically disturbed habitats, but how do these compare to conspecifics from natural habitats? The diet of *Xenopus borealis* from three different sites in Taita Hills, Kenya was established based on a sample of 77 (54 females and 23 males) specimens from two disturbed and one pristine sites. *Xenopus borealis* from all the sites was found to be a dietary generalist, feeding predominantly on invertebrates. A total of twelve invertebrate orders both terrestrial and aquatic were recorded in addition to amphibian eggs, tadpoles and fish. Frogs from the

pristine forest were smaller and had ingested more terrestrial prey items than frogs in the disturbed open habitat ponds. The stomach content (both by mass and quantity) was independent of body size. The results suggest that *X. borealis* is an opportunistic generalist predator which may be constrained by food availability in its natural habitat. However, disturbed habitats provide abundant food items which are enough to significantly increase the mean size of the population." (Authors) Odonata were recorded from all three habitats sampled.] Address: Bwong, B.A., Herpetology Section, National Museums of Kenya, PO Box 40658-00100, Nairobi, Kenya: E-mail: bebwong@yahoo.com

**9165.** Catarino, M.F.; Zuanon, J. (2010): Feeding ecology of the leaf fish *Monocirrhus polyacanthus* (Perciformes: Polycentridae) in a terra firme stream in the Brazilian Amazon. *Neotropical Ichthyology* 8(1): 183-186. (in English, with Portuguese summary) ["*M. polyacanthus* is a remarkable leaf-mimicking fish that inhabits streams, lake and river margins along the Amazon basin. Despite its obvious predatory habits and being frequently present in the international aquarium trade, little is known about its diet under natural conditions. We examined 35 specimens of leaf fish (28.5-82.0 mm SL), of which 19 had food in the stomach. Thirty-three preys were found in the stomach contents, 19 of which were measured (2.0-33.0 mm total length). Up to five preys were found in the stomach contents of a single leaf fish specimen. The diet of the leaf fish was constituted by fish (63.15% FO, n = 12) and invertebrates (36.3% FO, n = 4); fish and invertebrate preys occurred together in three stomachs (15.8% FO). Of the 33 prey found in the stomachs, 21 were fish and 12 invertebrates. Among the consumed preyfishes, Characiformes and Perciformes represented 76.1% and 14.2% respectively. Characidae was the most commonly recorded prey family, followed by Lebiasinidae. Invertebrates were represented by shrimps (Decapoda) and insects (Coleoptera, Hymenoptera, Ephemeroptera and Odonata). There was a positive relation between the size of the leaf fish specimens and of its consumed preys. The combination of leaf fish's visually effective body camouflage and the reduced activity of the characids at crepuscular hours probably allow the capture of such fast moving preys. The coiled position of the fishes found in the stomach of *M. polyacanthus* possibly allowed the accommodation of more than one prey simultaneously, which seems to be important for predators that consume proportionally large preys that are captured only occasionally." (Authors)] Address: Catarino, M.F., Universidade Federal do Amazonas, Laboratório de Ecologia Pesqueira, Mini Campus, Setor Sul, Bloco Z, Manaus, AM, Brazil. E-mail: michel-catarino@yahoo.com.br

**9166.** Chadwick, W. (2010): Costa Rica in April. *Argia* 22(2): 7-8. (in English) [14-20-IV-2010, Villa Lapas and Carara National Park, Puntarenas Province, Costa Rica. 16 taxa are listed including one *Argia* to be described as new to science.] Address: Chadwick, W., Yonkers, New York, USA. E-mail: mrcnaturally@optonline.net

**9167.** Cham, S. (2010): Variations in the key features of exuviae of the Variable Damselfly *Coenagrion pulchellum* (Vander Linden) and the use of a score matrix to determine identification. *J. Br. Dragonfly Society* 26(1): 10-28. (in English) ["The identification of exuviae of the *C. pulchellum* can be determined in the majority

of cases by examination of the caudal lamellae and the setae on the prementum. These can however, be highly variable and some specimens are similar to *C. puella* and pose difficulties for separation. A combination of characters when used in a score matrix will aid identification of borderline specimens." (Author)] Address: Cham, S., 24 Bedford Avenue. Silsoe, Bedfordshire, MK45 4ER, UK

**9168.** Choong, C.Y.; Orr, A.G. (2010): The larva of *Podolestes orientalis* from West Malaysia, with notes on its habitat and biology (Odonata: Megapodagrionidae). *International Journal of Odonatology* 13(1): 109-117, pl. IV. (in English) ["The larva of the south-east Asian *P. orientalis*, is described and figured. Specimens were collected from shallow forest pools lined with large dead leaves in secondary lowland forest. Final and earlier stadium larvae were found concentrated around the edges of pools in very shallow water. Larvae sometimes perched in exposed situations, just below the water surface, with abdomen upturned and caudal lamellae splayed outward to expose the broad respiratory surfaces. This represents the first account of the immature stages for this south-east Asian genus. The caudal lamellae are very broad and flattened, inserted horizontally, suggesting a close relationship between the genus *Podolestes* and Australian region megapodagrionids." (Authors)] Address: Choong, Chee Yen, Centre for Insect Systematics, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.my

**9169.** Collins, S.; Reece, B; McIntyre, N. (2010): Lestes on the playas of the southern high plains of Texas. *Argia* 22(2): 4-7. (in English) [Specimens were collected from 37 wet playas in 10 counties in Texas, USA from July 2003 to September 2009. A map shows the distribution of playas in the Texas panhandle and the localities of *Lestes alacer* and *L. australis*.] Address: McIntyre, Nancy, Department of Biological Sciences, Texas Tech University, Mailstop 3131, Lubbock, TX 79409-3131, USA. E-mail: nancy.mcintyre@ttu.edu

**9170.** Costa, J.M.; Carriça, C.; Santos, T.C.; Mascarenhas, B.J.A. (2010): Description of the final instar of *Macrothemis heteronycha* (Calvert) (Anisoptera: Libellulidae). *Zootaxa* 2506: 65-68. (in English) ["Material: Deposited in the Museu Nacional da Universidade Federal do Rio de Janeiro; Brazil, Rio de Janeiro, 22°14'31" S and 43°42'5" W, 6.III.2004 (alt: 249 m) B. Mascarenhas leg. Ultimate larval instar male emerged 23.III.2004." A key to the known *Macrothemis* larvae (n = 10) is provided.] Address: Costa, Janira, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, 20940-040, Rio de Janeiro, RJ, Brazil. E-mail: jmcosta@globocom

**9171.** Covaciu-Marcov, S.D.; Cicirt-Lucaciu, A.; Mitrea, I.; Sas, I.; Caus, A.V.; Cupsa, D. (2010): Feeding of three syntopic newt species (*Triturus cristatus*, *Mesotriton alpestris* and *Lissotriton vulgaris*) from Western Romania. *North-Western Journal of Zoology* 6(1): 95-108. (in English) ["The feeding of three newt species from western Romania is different in the aquatic period regarding both the composition and the time needed. Thus, *Mesotriton alpestris* spends shorter time in the water compared to *Triturus cristatus* and *Lissotriton vulgaris*, having the weakest feeding habit in this environment. This is probably a consequence of its relationship with mountainous and harsher climate areas that



shortens its aquatic environment period, which also affects the species in a lower altitude habitat. The difference in the food of the three species results from their different sizes and hunting territories. *L. vulgaris* mainly hunts near puddle banks, in areas with lower and warmer water and the other two species hunt near the bottom, in the deeper areas. The crested newts have the longest aquatic period and the highest affiliation for hunting in this habitat. This species consumes larger sized preys while the common newts consume numerous reduced sized preys, having an intensive feeding and high food diversity. Meanwhile, differences between the food ingested by male and female individuals are not significant in any newt species." (Authors) Odonata don't play an important role as food of nets.] Address: Covaciu-Marcov, S.D., University of Oradea, Faculty of Sciences, Department of Biology, 1 Universitatii str., Oradea - 410387, Romania. E-mail: scovaciu@uoradea.ro

**9172.** Daigle, J.J.; Abad, R. (2010): *Ophiogomphus australis* sightings in Florida. *Argia* 22(2): 11. (in English) [Notes on some recent records of *O. australis* in Florida, USA detailed at the county level.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**9173.** De Knijf, G.; Termaat, T. (2010): *Sympetum meridionale* in Belgium and The Netherlands. Identification, distribution and status in North-western Europe. *Brachytron* 13(1/2): 4-18. (in Dutch, with English summary) ["Since 2000 sightings of *S. meridionale* have become frequent in Belgium and The Netherlands. First records came from Belgium, soon followed by observations in The Netherlands. *S. meridionale* is difficult to identify among other *Sympetum* species. notable *S. striolatum* and *S. vulgatum* with which it often co-occurs. *S. meridionale* shows a lot of variation in coloration depending on age and sex. In general it can be distinguished by the paucity of black markings. Fully coloured imagines can be recognised by their rather pale coloration. It is advisable that several characters are checked for correct identification. In the 19th century, the species was only observed once in The Netherlands (Friesland). More records are available from Belgium, mostly from Selys, but its former status remains unclear. It is plausible that the species could reproduce then, but only sporadically and not over a longer time period. Records from the 20th century are very scarce. There is one observation in 1906 in a large peat bog area at 700 m altitude in Belgium and one in The Netherlands in 1994. Since 2000, 26 records are available from 15 localities in Belgium, nearly all from the northern part. *S. meridionale* could reproduce successfully at least on three localities: in 2000 in Harchies (Henegouwen), in 2003 in Kallo (port of Antwerp) and in 2006 and 2007 in Ekeren (north of Antwerp). Only two records are available from the Netherlands for the period 2000-2005. Since 2006 the species has been observed at no less than 35 localities. At one locality (Vooroes Duin, Zuid-Holland) it was able to reproduce from 2006 to 2008. This recent increase in records has also been noted in several other regions or countries in North-western Europe. For the French regions Picardie and Nord-Pas-de-Calais, no records from before 2000 are available. Since then, several records are known. *S. meridionale* could reproduce en masse at water reservoirs in the region Champagne-Ardenne. No populations are present in the Lorraine region, but the species

has been noted at several localities, especially in the valley of the Moselle. The only record for Luxembourg is from 1993 and also originated from this river valley. The last records in the UK already date back from 1948, when the species was noted on the Channel Islands. This might reflect a lack of experience of English odonatologists with the species. In Germany, the species has always been limited to Baden-Württemberg and Bavaria. In more northern regions like North Rhine-Westphalia, the species was first observed in 2000. It has been observed since 2006 in most of the German federal states and reproduction has been recorded at several localities. We suppose that the recent increase of records of *S. meridionale* in Belgium and The Netherlands is primarily due to climate change. As so, it follows the recent increase of several other southern species, like *Crocothemis erythraea*, in Northern Europe. Specimens of *S. meridionale* have been observed in Belgium and The Netherlands at a broad spectrum of habitats, ranging from heathlands to forest edges, peat bogs, dune waters and garden ponds. All localities where reproduction could be observed can be characterised by the presence of relatively small, shallow and very thermophilic water bodies, which partly dry out in summer. Well developed emergent vegetation is present at the shore. Imagines of *S. meridionale* can be observed in Belgium and The Netherlands from mid June to early September. The species has only one generation per year in Belgium and the Netherlands." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**9174.** Donnelly, N. (2010): R. Duncan Cuyler, 1929-2010. *Argia* 22(2): 2-4. (in English) [Obituary († 3-V-2010), with personal reminiscences of Carl Cook, Sid Dunkle and Nick Donnelly.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**9175.** Dragonfly Society of the Americas (2010): *Argia* 22(2). *Argia* 22(2): (in English) [In This Issue: 1; Tell Your Friends!: 1; Calendar of Events: 1; 2010 SE DSA Meeting in Panama City, by Jerrell J. Daigle: 1; Coming Soon: Damselfly Genera of the New World: An Illustrated and Annotated Key to the Zygoptera: 14; From the Huffington Post: 15; A call for papers for BAO: 15. Papers from *Argia* 22(2) omitted in this section are abstracted in this issue of OAS.] Address: Dragonfly Society of the Americas c/o Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**9176.** Dudgeon, D.; Cheung, F.K.W.; Mantel, S.K. (2010): Foodweb structure in small streams: do we need different models for the tropics?. *J. N. Am. Benthol. Soc.* 29(2): 395-412. (in English) ["Prevailing notions of foodweb structure and trophic relations in fresh waters are based on research undertaken in a limited range of latitudes or habitat types. This limitation had led to the general view that stream food webs are detritus-based with short food chains and simple interactions that often are dominated by a few key species. We used gut-content analyses and stable-isotope signatures to characterize feeding relationships and foodweb attributes of benthic communities in riffles in 2 forest streams in Hong Kong. We compared them with existing data on foodweb structure from pools in 1 of the streams and data from the literature. The 2 approaches to dietary analyses yielded complementary results,

providing confidence that trophic relations and foodweb structure were adequately characterized. Food webs in both streams were remarkably similar regardless of habitat (riffle vs pool). Consumers in both streams depended primarily on autochthonous resources, as has been reported from some other tropical streams, and food chains were short although connectance was higher than has been recorded previously for stream food webs. Very few omnivores were found, and omnivory was even rarer than is typical of temperate streams, although it is common in other tropical streams and rivers. No evidence was found for dominance by a few common macroconsumer species, as observed elsewhere in the tropics. The apparently high levels of autochthony in tropical running waters imply that models of ecosystem functioning for northern temperate streams are inadequate for describing tropical systems. However, marked differences in the degree of omnivory and dominance of tropical stream food webs by macroconsumers is evidence that characterization of trophic interactions and stream ecosystem functioning cannot be captured by a simple tropical vs temperate dichotomy. Successful management of these systems will depend upon development of conceptual models that reflect the diversity of food webs within and between regions." (Authors) A single odonate, *Euphaea decorata* (Euphaeidae), was well represented in significant numbers in samples from both streams (Appendix 1).] Address: Dudgeon, D., School Biological Sciences, Division of Ecology & Biodiversity, University of Hong Kong, Hong Kong. E-mail: ddudgeon@hkucc.hku.hk

**9177.** Felix, Z.I.; Wang, Y.; Schweitzer, C.J. (2010): Effects of experimental canopy manipulation on amphibian egg deposition. *Journal of Wildlife Management* 74(3): 496-503. (in English) ["Although effects of forest management on amphibians are relatively well studied, few studies have examined how these practices affect egg deposition by adults, which can impact population recruitment. We quantified the effects of 4 canopy tree-retention treatments on amphibian oviposition patterns in clusters of 60-L aquatic mesocosms located in each treatment. We also related aquatic and terrestrial biophysical parameters in treatment plots to oviposition patterns. Cope's gray treefrogs (*Hyla chrysoscelis*) deposited more egg masses in clear-cut and 25–50% tree-retention treatments than in controls. In contrast, mountain chorus frogs (*Pseudacris brachyphona*) deposited more egg masses in unharvested control and 75% retention treatments than in clear-cut or 25–50% retention treatments. Spotted salamanders (*Ambystoma maculatum*) only deposited eggs in 75% retention treatments and controls. The number of egg masses deposited by mountain chorus frogs was positively related to canopy cover and negatively related to water temperature, pH, and dissolved oxygen, whereas we noted the opposite relationships for Cope's gray treefrogs. We did not detect a relationship between the number of egg masses deposited by any species and the distance of mesocosms to either the nearest mature closed-canopy forest or to the nearest natural amphibian breeding pool. The impacts of the silvicultural treatments we studied were species-specific and depended on the amount of trees removed. In areas where protection of spotted salamander and mountain chorus frog breeding habitat is a priority, we recommend harvests retain at least 75% of the canopy. Our results also suggest that retention of 25–50% of canopy trees surrounding amphibian breeding pools has little conservation benefit.

[...] We observed larval dragonflies at least once in 17% of 25–50% and 75% retention treatment arrays, and in 33% of clear-cut arrays. Other studies have reported increased prevalence of dragonflies in open- versus closed-canopy pools (McCauley 2005, Hocking and Semlitsch 2008). Increased abundance of larval dragonflies in clear-cuts compared to mature forest habitats had little effect on survival of gray treefrog tadpoles in Missouri (Hocking and Semlitsch 2008). It is unlikely that higher prevalence of dragonfly larvae in open-canopy treatments affected mountain chorus frog and spotted salamander oviposition because these amphibian species breed prior to dragonflies and we dewatered all pools between years." (Authors)] Address: Felix, Z.I., Center for Forestry, Ecology, and Wildlife, Alabama A&M University, Normal, AL 35762, USA. E-mail: zif@reinhardt.edu

**9178.** Ferland-Raymond, B.; March, R.E.; Metcalfe, C.D.; Murray, D.L. (2010): Prey detection of aquatic predators: Assessing the identity of chemical cues eliciting prey behavioral plasticity. *Biochemical Systematics and Ecology* 38(2): 169-177. (in English) ["Chemical cues transmitted through the environment are thought to underlie many prey responses to predation risk, but despite the known ecological and evolutionary significance of such cues, their basic composition are poorly understood. Using anuran tadpoles (prey) and dragonfly larvae (predators), we identified chemical cues associated with predation risk via solid phase extraction and mass spectrometry of the extracts. We found that dragonfly larvae predators consistently produced a negative ion,  $m/z$  501.3, when they fed on bullfrog (*Rana catesbeiana*) and mink frog (*Rana septentrionalis*) tadpoles, but this ion was absent when dragonflies were fasted or fed invertebrate prey. When tadpole behavioral responses to dragonfly chemical cues were examined, tadpoles reduced their activity, particularly in response to dragonflies feeding on tadpoles. Furthermore, a negative correlation was noted between the level of tadpole activity and the concentration of the  $m/z$  501.3 compound in dragonfly feeding trials, indicating that this ion was possibly responsible for tadpole anti-predator behaviour." (Authors)] Address: Ferland-Raymond, B., Department of Biology, Trent University, Peterborough, Ontario, Canada. E-mail: bastien.ferland-raymond@usherbrooke.ca

**9179.** Ferreira, S. (2010): 1st European Congress on Odonatology. Programme and abstracts, 2-5 July 2010, Vairão-Vila do Conde, Portugal: 77 pp. (in English) [Dijkstra, K.-D.: The biogeography of European dragonflies, with an emphasis on Afrotropical species in the Palaearctic; Froufe, E.; Ferreira, S.; Boudot, J.-P.: Phylogeny of Cordulegaster in West Palearctic; Kosterin, O.: Siberian taxonomical problems concerning European odonate species; Kalkman, V.: An atlas of the European dragonflies: will it ever happen?; Sillero, N.; Tarroso, P.: How to record and store species locations? The use of Geographical Information Systems, GPS and Free/Open Source software; Kulijer, D.: Odonata in Bosnia and Herzegovina; Martens, A.: An overview of exotic dragonflies found in Europe; Nielsen, E.R.: Danish Odonata Atlas and newly arrived species; Mihokovic, N.; Matejci, M.: Towards the atlas of Croatian dragonflies; Dyatlova, E.S.; Kormyzenko, V.L.: Dragonflies of Moldova: state of knowledge and personal observations (2005, 2009); Jovic, M.; Marinov, M.; Gligorovic, B.; Hacet, N.; Kitanova, D.; Kulijer, D.: A

Project Named BOB . Balkan OdoBase; Conze, K.-J.: Dragonflies in Germany - the atlas-project of the GdO (society of german-speaking odonatologists); Weihrauch, F.; Malkmus, R.: Distribution and ecology of *Sympetrum nigrifemur* in the Macaronesian Islands (Odonata: Libellulidae); Vilenica M.; Micetic, V.; Frankovic, M., Kucinic, M.: Dragonfly composition (Insecta, Odonata) in wetland area of Turopolje region, Croatia; Kitanova, D.; Jovic, M.: Review of Macedonian Odonata; Mancini, C.-O.: An overview on dragonfly (Insecta: Odonata) fauna from Romania; Muranyi, D.: The Odonata fauna of Albania; Riservato, E.; Hardersen, S.: Odonatology in Italy: state of the art; Luque, P.; Soler, E.; Lockwood, M.: The Atlas of Dragonflies and Damselflies of Catalonia; Karjalainen, S.: New records of *Somatochlora sahlbergi* from Finland; Sacha, D.: Notes to conservation of dragonflies in Northern Slovakia; Termaat, T.; Groenendijk, D.; van Strien, A.: A European Dragonfly Monitoring Scheme: how to get started?; Kalmar, A.F.; Devai, G.; Jakab, T.: Preliminary study to monitoring the dragonfly fauna (Odonata) in the ET 56 UTM grid square (South-Nyirseg, Hungary); Soler, E.; Mendez, M.: The dragonflies of temporary pools in Menorca; Lambret, P.H.: Identifying keys to the conservation of *Lestes macrostigma* (Eversmann, 1836): to a European monitoring?; Torralba-Burrial, A.; Ocharan, F.J.; Outomuro, D.; Azpilicueta Amorin, M.; Cordero Rivera, A.: VOPHI: an index to assess threatened dragonfly populations and habitats; Salamun, A.: Research of Balkan goldenring (*Cordulegaster heros*) in Slovenia; Ott, J.: Climatic changes and alien invasive species - a deadly cocktail for dragonflies; Sahlen, G.; Suhling, I.: Communities in forest lakes show ecological shifts: indirect effects of climate change; Suhling, F.; Suhling, I.; Richter, O.: Rising temperatures, altered life cycles and their consequences for dragonflies in Europe; Conze, K.-J.; Menke, N.; Olthoff, M.: Nature conservation response to climate change - some ideas from Northrhine-Westphalia, Germany; De Knijf, G.; Flenker, U.; Vanappelghem, C.; Mancini, C.O.; Kalkman, V.J.: The impact of climate change on two boreo-alpine dragonfly species, *Somatochlora alpestris* and *S. arctica*, at the edge of their range; Ott, J.; Sanchez-Guillen, R.A.; Cordero-Rivera, A.: Microevolution through climatic changes? The example of the expansion of *Crocothemis erythraea* in Europe; Parr, A.: Migrant Dragonflies in the UK: Distributions are flexible, especially in times of climate change; Kalkman, V.: European Red List; Nelson, B.: Dragonflies on the western fringe: red list and important dragonfly areas of Ireland; Günther, A.: Construction of a new stream (even) for dragonflies; Groenendijk, D.; Termaat, T.: Protection of Red List species in the Netherlands: ecological research, monitoring and conservation; Watts, P.C.; Thompson, D.J.: Developmental plasticity as a cohesive evolutionary force between alternate-year odonate cohorts; Gordon, L.K.; Watts, P.C.; Thompson, D.J.: Range-wide genetic diversity of the rare odonate *Coenagrion mercuriale*: influence of latitude and isolation; Cordero Rivera, A.; Luque Pino, P.; Azpilicueta Amorin, M.; Blanco Garrido, F.; Cano Villegas, F.J.; da Silva, G.; Gavira Romero, O.; Herrera Grao, A.F.; Nieto, A.; Perez Gordillo, J.; Torralba Burrial, A.; Ocharan Larrondo, F.J.: *Macromia splendens* in the Iberian peninsula: status and priorities for future research; Boudot, J.-P.: Outside European borders: the Odonata from Palearctic Africa; Schneider, W.: The Odonata of the Levant (Eastern Mediterranean): Taxonomy, biogeography, and conservation; Martens, A.: Ecology of the Odonata at the western-

most spot of Africa, the island of Santo Antao, Cape Verde; Riservato, E.; Bouwman, J.; Ketelaar, R.: About dragonflies and dragons blood! Odonata on the island of Socotra (Yemen); Reimer, R.W.: Recent advances in UAE and Oman; Lorenzo-Carballea, M.O.; Hadrys, H.; Cordero-Rivera, A.; Andres, J.A.: Geographic parthenogenesis in the damselfly *Ischnura hastata*: A role for metapopulation structure?; Stoks, R.: Latitude patterns in life history, physiology and behaviour; Cordero Rivera, A.; Lorenzo Carballea, O.: Reproductive behaviour of *Calopteryx haemorrhoidalis*: a species with a surprising phenotypic variation; Ewoud van der Ploeg, E.; Brochard, C.: Photographic Guide to the Exuviae of European Dragonflies; Holuša, O.: Notes to the ecological demands of *Cordulegaster heros* (Cordulegasteridae) in its northern part of area in Slovakia; Leipelt, K.G.: *Cordulegaster insignis* and *C. picta* on Aegean Islands: longitudinal distribution patterns and the mechanism behind them; Dumont, H.: Towards an understanding of *Calopteryx splendens*; Outomuro, D.; Rodriguez-Martinez, S.; Ocharan, F.J.: Fluctuating asymmetry in wings of *Calopteryx damselflies* at species, population and latitudinal levels; Hardersen, S.: The influence of season on wing morphology of *Calopteryx splendens* (Harris, 1782); Sanchez-Guillen, R.A.; Wellenreuther, M.; Cordero-Rivera A.; Svensson, E.; Hansson, B.: Genetic diversity and introgression between *Ischnura elegans* and *I. graellsii* (Odonata: Coenagrionidae); Gyulavari, H.A.; Felföldi, T.; Benken, T.; Szabo, L.J.; Miskolczi, M.; Cserhati, C.S.; Horvai, V.; Marialigeti, K.; Devai, G.Y.: Preliminary morphometric and molecular investigations on adult specimens of two *Lestes* (Chalcolestes) taxa; Sacha, D.: Project "Popularizacia odonatologie na Slovenskuh", its outputs and inspiration for the participants of the Congress.] Address: Ferreira, Sónia, Centro de Investigação em Biodiversidade e Recursos Genéticos (CIBIO), Campus Agrário de Vairão, Rua Padre Armando Quintas, 4485-661 Vairão, Portugal. E-mail: europeandragonflies@googlemail.com

**9180.** Fraker, M.E.; Hu, F.; Cuddapah, V.; McCollum, A.; Relyea, R.A. (2010): Characterization of an alarm pheromone secreted by amphibian tadpoles that induces behavioral inhibition and suppression of the neuroendocrine stress axis. *Hormones and Behavior* 55(4): 520-529. (in English) ["Many species assess predation risk through chemical cues, but the tissue source, chemical nature, and mechanisms of production or action of these cues are often unknown. Amphibian tadpoles show rapid and sustained behavioral inhibition when exposed to chemical cues of predation. Here we show that an alarm pheromone is produced by rapid tadpole skin cells, is released into the medium via an active secretory process upon predator attack (*Anax junius*), and signals predator presence to conspecifics. The pheromone is composed of two components with distinct biophysical properties that must be combined to elicit the behavioural response. In addition to the behavioural response, exposure to the alarm pheromone caused rapid and strong suppression of the hypothalamo-pituitary-adrenal (HPA) axis, as evidenced by a time and dose-dependent decrease in whole body corticosterone content. Reversing the decline in endogenous corticosterone caused by exposure to the alarm pheromone through addition of corticosterone to the aquarium water (50 nM) partially blocked the anti-predator behaviour, suggesting that the suppression of the HPA axis promotes the expression and maintainan-



ce of a behaviorally quiescent state. To our knowledge this is the first evidence for aquatic vertebrate prey actively secreting an alarm pheromone in response to predator attack. We also provide a neuroendocrine mechanism by which the behavioural inhibition caused by exposure to the alarm pheromone is maintained until the threat subsides." (Authors)] Address: Denver, R.J., Department of Ecology and Evolutionary Biology, The University of Michigan, Ann Arbor, MI 48109-1048, USA. E-mail address: rdenver@umich.edu

**9181.** Giannatos, G.; Karypidou, A.; Legakis, A.; Polymeni, R. (2010): Golden jackal (*Canis aureus* L.) diet in Southern Greece. *Mammalian Biology - Zeitschrift für Säugetierkunde* 75(3): 227-232. (in English) ["The diet of jackals was studied in the Mediterranean lowlands of Fokida and Samos island, Greece, by analyzing 127 scats collected between January 2002 and May 2003. Across all seasons frequencies of food items show that the most common items were mammals (frequency 42.7%, biomass 69.8%) and birds (12.0%, biomass 27.7%). Although the frequencies of plant material (27.3%) and insects (18.0%) were quite high, their biomass contribution was low (1.7%, 0.8% respectively). Most of the biomass consumed composed of mammals of domestic livestock origin (55.9%) which were presumably scavenged. This reveals the importance of this food item to the opportunistic jackals in wildlife-poor ecosystems like the anthropogenic Mediterranean lowlands. The occurrence of small mammals in the scats was very low while very few traces of grass and human refuse (such as leftovers of meals, plastic, pieces of paper etc.) were found in the diet of jackals. Furthermore, the findings support the opportunistic nature of a species capable to exploit any easily available food source." (Authors) 3 items from a total of 45 insects represent Odonata.] Address: Giannatos, G., Section of Zoology – Marine Biology, Department of Biology, University of Athens, Panepistimioupolis GR-15784, Athens, Greece. E-mail: giannatos@biol.uoa.gr

**9182.** Gonzalez-Soriano, E. (2010): A synopsis of the genus *Amphipteryx* Selys 1853 (Odonata: Amphipterygidae). *Zootaxa* 2531: 15-28. (in English, with Spanish summary) ["The Mesoamerican damselfly genus *Amphipteryx* includes one already described and three more undescribed species: *Amphipteryx agrioides*, Selys 1853, *A. chiapensis* (Mexico, Chiapas, 5 mi E Rayón), *A. meridionalis* (Honduras, 10 mi SW Siguatepeque) and *A. nataliae* (Verapaz, Guatemala). Here I include keys and diagnostic illustrations of all species." (Author)] Address: González-Soriano, E., Instituto de Biología, UNAM, Departamento de Zoología Apartado Postal 70-153, C.P. 04510, Mexico D.F. E-mail: esoriano@ibiologia.unam.mx

**9183.** Grunwell, M.J. (2010): Dragonflies and Damselflies in the State of Qatar. *Journal of the Qatar Natural History March 2010 Issue No. 3: 2-13.* (in English) ["A brief generalist overview of Odonata is given below followed by a summary of eleven known species (*Ischnura evansi*, *I. fountaineae*, *Anax parthenope*, *A. ephippiger*, *Orthetrum sabina*, *Sympetrum fonscolombii*, *Crocothemis erythraea*, *C. sevilla*, *Trithemis annulata*, *Diplacodes lefebvrei*, *Selysiothemis nigra*) in the State of Qatar. The main body is an illustrated and annotated checklist of the Odonata of Qatar followed by speculation about further additions to the list, ending with a proposal for future recording procedures of Odonata in Qatar." (Author)] Address: Grunwell, M.J., Al Khor Inter-

national School – British stream, Secondary Staffroom, PO Box 22166, Doha, Qatar. E-mail: mjgrunwell@gmail.com

**9184.** Hacet, N. (2010): An anomalous connection in the genus *Aeshna* Fabricius, 1775 (Odonata: Aeshnidae) with an additional record of *Aeshna cyanea* (Müller, 1764) from Turkish Thrace. *Acta entomologica serbica* 15(1): 1-6. (in English, with Serbian summary) ["A heterospecific tandem between a male *Aeshna affinis* and a female *A. cyanea* is reported from Igneada (Longo Forest) in Kirklareli province in the Turkish Thrace Region. The locality, where the tandem was observed, is the second recording locality for *A. cyanea* from the region." (Author)] Address: Hacet, Nurten, Trakya University, Faculty of Arts and Sciences, Department of Biology, TR-22030 Edirne, Turkey. E-mail: nhacet@hotmail.com

**9185.** Hassall, C.; Lowe, C.D.; Harvey, I.F.; Watts, P.C.; Thompson, D.J. (2010): Phenology determines seasonal variation in ectoparasite loads in a natural insect population. *Ecological Entomology* 35(4): 514-522. (in English) ["1. The extent to which individuals are parasitised is a function of exposure to parasites and the immune response, which in ectotherms may be associated with temperature. 2. We test the hypothesis that seasonal variation in ectoparasite burden is driven by temperature using an extensive mark-release-recapture study of adult *Coenagrion puella* as a model system. Mite counts were taken both at capture and on a subset of subsequent recaptures over two entire, consecutive breeding seasons. 3. Emergence date was the most significant factor in determining individual differences in mite burden, and mean counts for individuals emerging on the same days showed strong unimodal relationships with time of season. Subsequent recounting of mites on a subset of individuals showed that patterns of loss of mites were similar between seasons. 4. While temperature did not significantly affect mite burdens within seasons and ectoparasite prevalence was very similar across the two seasons, intensity of infection and rate of mite gain in unparasitised individuals were significantly higher in the cooler season. 5. We demonstrate that, while temperature may modulate the invertebrate immune response, this modulation does not manifest in variations in mite burdens in natural populations." (Authors)] Address: Hassall, C., Dept of Biology, Carleton University, Ottawa, ON, Canada K1S 5B6. E-mail: chassall@connect.carleton.ca

**9186.** Holuša, O.; Holuša, J. (2010): "Accompanying" behaviour of *Brachythemis leucosticta* (Burmeister in Europe (Anisoptera: Libellulidae). *Odonatologica* 39(1): 63-70. (in English) ["At a location in southern Spain (nr Vejer de la Frontera, Rio Barbate valley, Andalusia), observations were made on a local population of ca 40 *B. leucosticta* individuals, a species known for its inclination to accompany large mammals (the test subject was a human). The goal of the tests was to ascertain how far they are willing to accompany a large mammal, whether the size of the group has an influence on the distance for accompanying the subject and whether the accompaniment differs between sexes. Accompanying a person was recorded in 53 cases, involving 41 male and 83 female dragonflies. They generally flew at a height of 10-50 cm above the ground in front of the moving person, distributed in a semicircle with a radius of 1-2 m (the maximum observed group size was 11 dragonflies). Group size did not influence

the flight range of the last individual or the detachment of the first individual from the group, as the dragonflies broke away at random. The average distance of accompaniment by females (38.4 m) was further than that by males (23.9 m). The maximum path of accompaniment was 89 m for males and 111 m for females. After detaching from the person, the dragonflies returned to the shade. Only rarely did females settle on open pasture, and then just for a brief period. In 3 cases (i.e. 1.6%), hunting of prey stirred up from the pasture by the person was observed." (Authors) According Dijkstra & Matushkina (2009): Kindred spirits: "Brachythemis leucosticta", Africa's most familiar dragonfly, consists of two species (Odonata: Libellulidae). International Journal of Odonatology 12(2): 237-256 the behaviour described should correspond to *B. impartita*.] Address: Holuša, J., Department of Forest Protection and Game Management, Faculty of Forestry and Wood Sciences, Czech University of Life Sciences, Kamýcká 1176, CZ-16521 Prague 6-Suchbát, Czech Republic. E-mail: HolušaJ@seznam.cz

**9187.** Hossie, T.J.; Murray, D.L. (2010): You can't run but you can hide: refuge use in frog tadpoles elicits density-dependent predation by dragonfly larvae. *Oecologia* 163(2): 395-404. (in English) ["The potential role of prey refuges in stabilizing predator-prey interactions is of longstanding interest to ecologists, but mechanisms underlying a sigmoidal predator functional response remain to be fully elucidated. Authors have disagreed on whether the stabilizing effect of prey refuges is driven by prey- versus predator-centric mechanisms, but to date few studies have married predator and prey behavioural observations to distinguish between these possibilities. We used a dragonfly [*Anax junius*] nymph-tadpole system to study the effect of a structural refuge (leaf litter) on the predator's functional response, and paired this with behavioural observations of both predator and prey. Our study confirmed that hyperbolic (type II) functional responses were characteristic of foraging predators when structural cover was low or absent, whereas the functional response was sigmoidal (type III) when prey were provided with sufficient refuge. Prey activity and refuge use were density independent across cover treatments, thereby eliminating a prey-centric mechanism as being the genesis for density-dependent predation. In contrast, the predator's pursuit length, capture success, and handling time were altered by the amount of structure implying that observed shifts in density-dependent predation likely were related to predator hunting efficiency. Our study advances current theory by revealing that despite fixed-proportion refuge use by prey, presence of a prey refuge can induce density-dependent predation through its effect on predator hunting strategy. Ultimately, responses of predator foraging decisions in response to changes in prey availability and search efficiency may be more important in producing density-dependent predation than the form of prey refuge use." (Authors)] Address: Hossie, T.J., Environmental & Life Sciences Graduate Program and Department of Biology, Trent University, 1600 West Bank Dr., Peterborough, ON, K9J 7B8, Canada. E-mail: thomashossie@trentu.ca

**9188.** Hudson, J. (2010): Dragonfly investigations in central Alaska, 2009. *Argia* 22(2): 8-9. (in English) [Records from Bettles, Fairbanks and Galena, Alaska, USA taken in 2008 and 2009, are documented. The state list of Odonata now encompasses 32 species. *Somatochlora*

*ra minor* is a new state record for Alaska. For some species significant range extensions over several 100 km resp. knowledge on distribution could be recorded.] Address: Hudson, J., Juneau, Alaska, USA. E-mail: jhudson@gci.net

**9189.** Jenkins, D.K. (2010): Folding wing behaviour in the Golden-ringed Dragonfly *Cordulegaster boltonii*. *J. Br. Dragonfly Society* 26(1): 32-33. (in English) ["An unusual observation is reported of a specimen of *C. boltonii* raising its wings over its back while at rest during a period of light rain." (Author)] Address: Jenkins, Derek, 7 Lakewood Road, Ashurst, Southampton, Hants SO40 7DH, UK

**9190.** Johansson, F.; Sniegula, S.; Brodin, T. (2010): Emergence patterns and latitudinal adaptations in development time of Odonata in north Sweden and Poland. *Odonatologica* 39(2): 97-106. (in English) ["Using exuviae, data are presented on emergence dates of dragonflies from northern Sweden and northwestern Poland. The 17 species sampled in Sweden showed considerable overlap in emergence periods. In Sweden, *Leucorrhinia rubicunda* was the first species to emerge (May 31) and *Sympetrum danae* the last (July 19). A comparison of first dates of emergence of species in Sweden and Poland showed a difference between 9 and 30 days, with all Polish species emerging first. Compared to spring species, summer species and obligate univoltine summer species showed less difference in first date of emergence between Swedish and Polish populations. In a laboratory experiment *Leucorrhinia dubia* was reared from both regions from the egg to final instar larva under northern Swedish and northwestern Polish photoperiods. Swedish larvae developed faster under a northern Swedish photoperiod compared to a northwestern Polish photoperiod. However, no such difference in development was found for northwestern Polish larvae. This suggests that there are genetic differences between both populations in response to photoperiod. The results are discussed in the context of compensation of larval development of northern populations in relation to photoperiod." (Authors)] Address: Johansson, F., Dept of Ecology & Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**9191.** Jovic, M.; Gligorovic, B.; Stankovic, M. (2010): Review of faunistical data on Odonata in Bosnia & Herzegovina. *Acta entomologica serbica* 15(1): 7-27. (in English, with Serbian summary) ["This paper deals with faunistical data and taxonomic notes on Odonata in Bosnia and Herzegovina. A database containing all available published, previously unpublished, and new data was made in order to create a review of the current knowledge of the country's Odonata fauna and point out the priorities in future investigations. 57 Odonata species are listed as resident species in Bosnia and Herzegovina. Of that number, exact data on the occurrence of 6 species (*Lestes parvidens*, *L. macrostigma*, *Erythromma viridulum*, *Aeshna grandis*, *Lindenia tetraphylla* and *Somatochlora flavomaculata*) are presented and discussed here for the first time." (Authors)] Address: Jovic, M., Natural History Museum Belgrade, Njegoševa 51, P.O. Box 401, YU-11000 Belgrade, Serbia. E-mail: milos.jovic@nhmbeo.rs

**9192.** Kalkman, V.J.; Wilson, K.D.P. (2010): *Calilestes* and *Lestomima*, junior synonyms of *Rhipidolestes* (Odonata: Megapodagrionidae). *International Journal of*

Odonatology 13(1): 97-102. (in English) ["*Calilestes pallidistigma* and *Lestomima flavostigma*, both sole representatives of their respective genera, are shown to belong to the genus *Rhipidolestes*. *Rhipidolestes flavostigma* comb. nov. is determined to be a junior synonym of *R. truncatidens*. *R. pallidistigma* comb. nov. is deemed to be a valid species." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey – Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**9193.** Kalkman, V.J.; Richards, S.J.; Polhemus, D.A. (2010): Three new species of *Argiolestes*, with a key to the males of *Argiolestes* s. str. (Odonata: Megapodagrionidae). *International Journal of Odonatology* 13(1): 75-88, pls II, IIIa. (in English) ["In this article the genus *Argiolestes* s.str. is defined and three new species belonging to this group are described: *A. foja* sp. nov. (holotype: Foja Mountains, Indonesia, dep. in MBBJ); *A. muller* sp. nov. (holotype: Baia River, Papua New Guinea, dep. in SAMA); *A. roon* sp. nov. (holotype: Roon Island, Indonesia, dep. in BPBM). New records for *A. alfurus* are given, a key to males is presented and a map of the distribution of the species is shown. Both sexes of *A. muller* and the male of *A. roon* are depicted in life. The group is distributed from New Guinea over the Moluccas to Sulawesi. As far as is known all species are confined to forest brooks." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey – Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**9194.** Kalkman, V.J.; Boudot, J.-P.; Bernard, R.; Conze, K.J.; De Knijf, G.; Dyatlova, E.; Ferreira, S.; Jovic, M.; Ott, J.; Riservato, E.; Sahlén, G. (2010): European Red List of Dragonflies. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-14153-9: vii + 28pp. (in English) ["Aim: The European Red List is a review of the conservation status of ca. 6,000 European species (dragonflies, butterflies, freshwater fishes, reptiles, amphibians, mammals and selected groups of beetles, molluscs, and vascular plants) according to the IUCN regional Red Listing guidelines. It identifies species that are threatened by extinction at the regional level – so that appropriate conservation action can be taken to improve their status. This Red List publication summarises the results concerning the European dragonflies. Scope: All dragonfly species native to Europe are included, except those confined to northern Caucasus. The geographic scope is continent-wide, extending from Iceland in the west to the Urals in the east, and from Franz Josef Land in the north to the Mediterranean and the Canary Islands in the south. The Caucasian region is not included. Red List assessments were made at two regional levels: for geographical Europe, and for the 27 current Member States of the European Union. Status assessment: The status of all species was assessed using the IUCN Red List Criteria (IUCN 2001). This is the world's most widely accepted system for measuring extinction risk. All assessments followed the Guidelines for Application of IUCN Red List Criteria at Regional Levels (IUCN 2003). Preliminary regional assessments were made by Jean-Pierre Boudot and Vincent Kalkman. These assessments were then evaluated by Rafal Bernard, Klaus-Jürgen Conze, Geert De Knijf, Elena Dyatlova, Sónia Ferreira, Miloš Jovic, Jürgen Ott, Elisa Riservato and Göran Sahlén during a

workshop held in Faro, Portugal and through correspondence with relevant experts. The assessments are available on the European Red List website and internet platform: <http://ec.europa.eu/environment/nature/conservation/species/redlist> and <http://www.iucnredlist.org/europe>. Dragonflies in Europe: Dragonflies are colourful, relatively large, and well-known insects. Their larvae live in freshwater habitats such as lakes, bogs, seepages, rivers and springs. Dragonflies occur almost everywhere in Europe, but the highest species diversity is found in the southern half, with the highest numbers in parts of southern France, the footland of the Alps and parts of the Balkan Peninsula. Europe holds 138 species, only three of which are not found in the 27 member states of the EU. Five species were regarded as Not Applicable, as they have no stable populations in Europe. Two species (*Cordulegaster helladica* and *Onychogomphus forcipatus*) have three subspecies each, the taxonomy and distribution of which are sufficiently well-known to make them eligible for an assessment. Thus, a total of 137 species and subspecies were assessed. Eighteen of the European species are endemic to Europe (i.e. they are not found anywhere else in the world). Fourteen are endemic to the EU27. Sixteen of the 18 endemics are either confined to islands, to the Balkan Peninsula or (at least mainly) to the Iberian Peninsula and France. Results: Approximately one out of seven (15%) European dragonflies are threatened in Europe, with a similar proportion being threatened at the EU level. An additional 11% are considered Near Threatened. By comparison, 23% of the amphibians, 19% of the reptiles, 15% of the mammals, 13% of the birds, 11% of the saproxylic beetles and 9% of the butterflies in Europe are threatened (Temple & Cox 2009, Cox & Temple 2009, Temple & Terry 2007, BirdLife International 2004, Nieto & Alexander 2010, Van Swaay et al. 2010). No other groups have so far been comprehensively assessed at the European level. About a quarter (24%) of the European dragonflies have declining populations, ten percent are increasing and roughly half of the species are stable. For the remaining 12%, the available information is too limited to define any population trends. Most of the threatened species are confined to parts of southern Europe. Currently, the main threat to European dragonflies is desiccation of their habitats due to the increasingly hot and dry summers combined with intensified water extraction for drinking and irrigation. Other important threats to species living in running waters are water pollution and the construction of dams and reservoirs. Conclusion and recommendations: This report shows where the highest levels of diversity and endemism, and the greatest proportion of threatened dragonflies are found within the European region. Using these parameters, three key areas for dragonfly conservation in Europe have become evident: the southern Balkan Peninsula, Crete and the Iberian Peninsula. Certain measures are urgent: \*A freshwater action plan is needed for Crete. \*Species action plans should be made for the most threatened species on the southern Balkan Peninsula, especially for *Pyrrhosoma elisabethae*, *Cordulegaster helladica* ssp. and *Somatochlora borisi*, as these taxa are endemic to Europe. \*Large scale and multi-taxa conservation plans for river systems are needed in order to establish a balance between agriculture, development and nature conservation, especially on the Iberian Peninsula, in southern France, Greece and parts of Italy. \*Better management practices for fish ponds and rice fields would also have



valuable conservation effects without increasing the long term costs. \*Development of a sustainable network of local experts and volunteers is needed to facilitate the conservation and monitoring of dragonfly species and habitats.] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**9195.** Kalkman, V.J.; Choong, C.Y.; Orr, A.G.; Schütte, K. (2010): Remarks on the taxonomy of Megapodagrionidae with emphasis on the larval gills (Odonata). *International Journal of Odonatology* 13(1): 119-135. (in English) ["A list of genera presently included in Megapodagrionidae and Pseudolestidae is provided, together with information on species for which the larva has been described. Based on the shape of the gills, the genera for which the larva is known can be arranged into four groups: (1) species with inflated sack-like gills with a terminal filament; (2) species with flat vertical gills; (3) species in which the outer gills in life form a tube folded around the median gill; (4) species with flat horizontal gills. The possible monophyly of these groups is discussed. It is noted that horizontal gills are not found in any other family of Zygoptera. Within the Megapodagrionidae the genera with horizontal gills are, with the exception of Dimeragrion, the only ones lacking setae on the shaft of the genital ligula. On the basis of these two characters it is suggested that this group is monophyletic." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**9196.** Karlsson, M.; Sahlén, G.; Koch, K. (2010): Continuous and stepwise oocyte production in Libellulidae (Anisoptera). *Odonatologica* 39(2): 107-119. (in English) ["Compared to other insect groups, libellulids have a rather high mean number of ovarioles. In addition, the mean ovariole diameter differs greatly between and within species. In general, 2 different types of ovariole arrangement exist: (1) all developing oocytes mature and equal in size; in some species without, and in others with, surrounding connective tissue and (2) oocytes displaying gradual maturation, with only the outermost ovarioles mature. These differences have ecological consequences: the first arrangement occurs in species that have stepwise egg production. These species will lay one or more clutches, after which an interclutch interval of ovariole regrowth follows. Species with the second arrangement have continuous egg production and are able to lay at least some eggs all the time, reducing the length of interclutch intervals. However, no direct connection between mate-guarding strategies and ovariole arrangements can be seen. Nevertheless, it is believed that the process of ovariole maturation differs between these groups. It is concluded that ovary morphology in libellulids may exhibit evolutionary fixed traits, although the whole picture still remains complex. The ovariole arrangement may have a crucial impact on the reproductive ecology of the species." (Authors)] Address: Sahlén, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, S-752 36 Uppsala, Sweden. E-mail: goran.sahlen@set.hh.se

**9197.** Kishida, O.; Trussell, G.C.; Mougi, A.; Nishimura, K. (2010): Evolutionary ecology of inducible morphological plasticity in predator-prey interaction: toward the practical links with population ecology. *Population*

*Ecology* 52(1): 37-46. (in English) ["The outcome of species interactions is often strongly influenced by variation in the functional traits of the individuals participating. A rather large body of work demonstrates that inducible morphological plasticity in predators and prey can both influence and be influenced by species interaction strength, with important consequences for individual fitness. Much of the past research in this area has focused on the ecological and evolutionary significance of trait plasticity by studying single predator-prey pairs and testing the performance of individuals having induced and noninduced phenotypes. This research has thus been critical in improving our understanding of the adaptive value of trait plasticity and its widespread occurrence across species and community types. More recently, researchers have expanded this foundation by examining how the complexity of organismal design and community-level properties can shape plasticity in functional traits. In addition, researchers have begun to merge evolutionary and ecological perspectives by linking trait plasticity to community dynamics, with particular attention on trait-mediated indirect interactions. Here, we review recent studies on inducible morphological plasticity in predators and their prey with an emphasis on internal and external constraints and how the nature of predator-prey interactions influences the expression of inducible phenotypes. In particular, we focus on multiple-trait plasticity, flexibility and modification of inducible plasticity, and reciprocal plasticity between predator and prey. Based on our arguments on these issues, we propose future research directions that should better integrate evolutionary and population studies and thus improve our understanding of the role of phenotypic plasticity in predator-prey population and community dynamics." (Authors) Reference to a study using *Aeshna nigroflava* as predator is made.] Address: Kishida, O., Center for Ecological Research, Kyoto Univ., Otsu Shiga, 520-2113, Japan. E-mail: bulgytadpoles@hotmail.com

**9198.** Kouam, M.K.; Ditoa, M.Y.; Da Costa, S.K.; Edia, E.O.; Ouattara, A.; Gourne, G. (2010): Aquatic macroinvertebrate assemblages associated with root masses of water hyacinths, *Eichhornia crassipes* (Mart.) Solms-Laubach, 1883 (Commelinales: Pontederiaceae) in Taabo Lake, Ivory Coast. *Journal of Natural History* 44 (5&6): 257-278. (in English) ["We examined aquatic macroinvertebrates associated with *Eichhornia crassipes* roots at five sampling sites in Taabo Lake. An average density of 1644 individuals (ind.)/m<sup>2</sup> was recorded. In total, 68 macroinvertebrate taxa belonging to 34 families and 14 orders were identified. Among these, Insecta was predominant (77.94%). The highest densities were recorded at Taabo cit during both rainy and dry seasons. Taxon diversity differences were not observed among all stations according to a Kruskal-Wallis test. High densities of predators were recorded. Next most prevalent in the trophic structure were detritivores. Indicator taxa analysis, using the Indval method, showed that stations upstream of the lake were characterized by eight taxa, while 11 appeared as indicators of the station near the dyke. Predators and herbivores dominated within those indicators. Sites near bays were distinguished by 18 indicator taxa with a predominance of predators and detritivores. Conductivity, NH<sub>4</sub><sup>+</sup>, temperature, PO<sub>4</sub><sup>3-</sup>, turbidity and dissolved oxygen were parameters that strongly influenced the macroinvertebrate community. ... Five orders (Coleoptera, Diptera, Heteroptera, Odonata and Ephemer-

optera) dominated within Insecta, which represented qualitatively 77.94% of macroinvertebrate assemblages. Table 4 shows the diversity of these macroinvertebrates at the five stations." (Authors)] Address: Kouam, M.K., Lab. d'Environnement et de Biologie Aquatique, UFR-SGE, Univ. d'AboboAdjam, Ivory Coast

**9199.** Kownacki, A. (2010): Benthic macroinvertebrates from waters of the Tatra National Park – present state, threats, protection. Benthic fauna of Polish national parks. ISBN 978-83-62298-09-9: 54-60. (in Polish, with English summary) ["738 species of benthic macroinvertebrates were found so far in the Tatra National Park waters. Many of them living above the timber line are not found in Poland except the Tatra Mts. Among them only 2 species and probably additional 2 taxa are recognized as endemic. Tatra waters are generally not altered by the human activity. The effect on benthic macroinvertebrate are observed only below the inflow of sewage from shelter house. Other factors such as introduction of fish into high mountain lakes, acid rains and climatic changes little effect on fauna. Nevertheless *Branchinecta paludosa polonica* disappeared in the Polish part of Tatra." (Author) The paper includes remarks on *Cordulegaster boltonii*, *Somatochlora alpestris*, and *S. arctica*.] Address: Kownacki, A., Institute of Nature Conservation PAS, al. Mickiewicza 33, 31-120 Kraków, Poland. E-mail: kownacki@iop.krakow.pl

**9200.** Lacerda, C.H.F.; Hayashi, C.; Soares, C.M.; GFernandes, C.E.B. (2010): Influence of aquatic plants on the predation of *Piaractus mesopotamicus* larvae by *Pantala flavescens*. *Acta Scientiarum. Biological Sciences*, Maringá, 32(2): 147-151. (in English, with Portuguese summary) ["The experiment aimed to study the influence of the aquatic plants *E. najas*, *P. stratiotes* and *S. auriculata* on the predation of *P. mesopotamicus* larvae by *P. flavescens*. One hundred and twenty larvae of *P. mesopotamicus* and 24 larvae of *P. flavescens* were placed in 24 aquariums with capacity of 12 L, with one Odonate per aquarium. Treatments were different regarding the species of aquatic plants *E. najas*, *S. auriculata* and *P. stratiotes*, with one control treatment without aquatic plants. One aquarium (12 L) containing one Odonate and 30 *P. mesopotamicus* larvae was considered one experimental unit. After 18 hours, the Odonates were removed from the aquariums and fish larvae left (alive) were counted in each experimental unit. The survival rate of *P. mesopotamicus* larvae in the treatment without aquatic plants (control) was significantly lower than in the treatment with *E. najas*. However, the survival rates in the aquariums with floating aquatic plants did not differ from the control. The morphological characteristics of *E. najas* promoted higher structural complexity in the environment, offering more protection to the fish larvae, and increasing their survival. We concluded that the presence of the submerged aquatic plant *E. najas* promoted the reduction of predation of *P. mesopotamicus* larvae by *Pantala flavescens*." (Authors)] Address: Lacerda, C., Laboratory of Ecology & Management of Estuarine & Coastal Ecosystems, Depto de Oceanografia, Univ. Federal de Pernambuco, Cidade Universitária, Av. Arquitetura, s/n, 50740-550, Recife, Pernambuco, Brazil. E-mail: lacerdachf@hotmail.com

**9201.** Machado, A.B.M. (2010): *Philogenia marina-silva* spec. nov. from the state of Acre Brazil (Zygoptera: Megapodagrionidae). *Odonatologica* 39(2): 149-152. (in English) ["The new species is described and il-

lustrated from a single specimen, representing the second unquestionable *Philogenia* record from Brazil. Holotype male; Brazil, state of Acre, Mancio Lima, 11/15-VII-1996; deposited in author's collection. It is close to *P. schmidti*." (Author)] Address: Machado, A.B.M., Depto Zoologia, Instituto de Ciências Biológicas, Univ. Federal de Minas Gerais, Avenida Antonio Carlos, 6627, Caixa Postal 486, BR 31270-901, Belo Horizonte, Minas Gerais, Brasil; 1 angelo@icb.ufmg.br

**9202.** Machado, A.B.M. (2010): Seven new species of *Telebasis* from Brazil (Odonata: Coenagrionidae). *Zootaxa* 2384: 53-64. (in English) ["Seven new species of *Telebasis* from Brazil are described, illustrated, and diagnosed: *T. celiovallei*, *T. divaricata* (Pará State); *T. lenkoi* (Mato Grosso State); *T. myrianae* (Bahia State); *T. pallida* (Mato Grosso State); *T. pareci* (Mato Grosso State); and *T. pataxo* (Bahia State)." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil. E-mail: angelo@icb.ufmg.br

**9203.** Machado, A.B.M. (2010): Four new species of *Phoenicagrion* von Ellenrieder, 2008 from Brazil (Odonata, Coenagrionidae). *Zootaxa* 2517: 44-52. ["Four new species of *Phoenicagrion* von Ellenrieder, 2008, *P. flavescens*, *P. ibseni*, *P. karaja*, and *P. megalobos* are described and illustrated. A key is provided for the six species of the genus." (Author)] Address: Machado, A.B.M., Depto de Zoologia, Univ. Federal de Minas Gerais, Caixa Postal 486, 31270-901, Belo Horizonte, Minas Gerais, Brazil. E-mail: angelo@icb.ufmg.br

**9204.** Marinov, M. (2010): Further knowledge of the colonisation of the South Island, New Zealand by *Hemicordulia australiae* (Odonata: Corduliidae). *The Weta* 39: 17-28. (in English) ["Information on *Hemicordulia australiae* from New Zealand is summarised with emphasis on its colonisation over South Island. The first records on possibly breeding individuals from Canterbury plains are also presented." (Author)] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: mgmarinov@yahoo.com

**9205.** Mendoza, G. de; Catalan, J. (2010): Lake macroinvertebrates and the altitudinal environmental gradient in the Pyrenees. *Hydrobiologia* 648: 51-72. (in English) ["The distribution of different macroinvertebrate (including 'Aeshna' and 'Enallagma') groups inhabiting the littoral zone of 82 mountain lakes in the Pyrenees was investigated in relation to the altitudinal environmental gradient. For each lake, altitude, longitude and latitude, together with 28 environmental variables, relating to chemical and physical characteristics and to lake general productivity, were considered. Using Principal Component Analysis (PCA) we showed that the altitudinal environmental gradient (i.e. altitude and altituderelated variables) represented the largest gradient of environmental variability. We found that incidence was related to altitude in about 50% of macroinvertebrate groups, most relationships being inverse, and also that the number of macroinvertebrate groups found per lake was better described by a second-order polynomial function than by simple linear regression. However, this relationship was linear for a subset of high-altitude lakes above 2,500 m a.s.l., suggesting an ecological threshold around this altitude. Redundancy Analyses (RDAs) showed the importance of environmental factors varying with altitude for the distribution of macroin-

vertebrate groups. Organic matter, salmonid presence, fine substrate dominance, macrophyte coverage, temperature and altitude by itself were, in this order, the most relevant factors. Partial RDAs showed that different combinations of these variables contributed to the explanation of the distribution of each group. However, the variable that uniquely explained most variability differed from group to group. We conclude that the altitudinal gradient is a multi-faceted ecological factor, which impinges on each group by means of some specific environmental variable(s) that are particularly relevant for the life history of that group." (Authors)] Address: de Mendoza, G., Limnology Group (CSIC-UB), Centre d'Estudis Avançats de Blanes (CEAB-CSIC), c/Acc. Cala St. Francesc, 14, 17300 Blanes (Girona), Spain. E-mail: mendoza@ceab.csic.es

**9206.** Meurgey, F. (2010): Description of the larva of *Protoneura romanae* Meurgey from the West Indies (Zygoptera: Protoneuridae). *Odonatologica* 39(2): 153-157. (in English) ["The larva from Guadeloupe is described, illustrated for the first time, and compared to the other described larvae. Additional notes on ecology are also given." (Author)] Address: Meurgey, F., Muséum d'Histoire Naturelle, 12 rue Voltaire, F-44000 Nantes, France. E-mail: francois.meurgey@mairie-nantes.fr

**9207.** Michalski, J.; Opiel, S. (2010): Two new species of *Argiolestes* from Papua New Guinea (Odonata: Megapodagrionidae). *International Journal of Odonatology* 13(1): 63-74. (in English) ["Two new species of the New Guinean megapodagrionid genus *Argiolestes* are described: *A. tuberculiferus* (holotype male: Papua New Guinea, Simbu Province, 6°43'S, 145°05'E; 900 m, 14 xii 2003) and *A. verrucatus* (holotype male: Papua New Guinea, Sandaun Province, 4°48'S, 141°39'E; 1,700-2,100 m, 08 ix 2004). We further provide additional descriptions and ecological data of new specimens of *A. fornicatus*. We briefly discuss the status of several other nominal taxa in *Argiolestes* based on observations of some recent collections." (Authors)] Address: Michalski, J., 223 Mount Kemble Avenue, Morristown New Jersey 07960, USA. E-mail: jmichalski@east-hanoverschools.org

**9208.** Mill, P.J. (2010): The Large Red Damselfly *Pyrrhosoma nymphula* (Sulzer) with notes on its close relative the Greek Red Damselfly *Pyrrhosoma elisabethae* Schmidt. *J. Br. Dragonfly Society* 26(1): 34-56. (in English) ["Only four species belonging to the coenagrionid genus *Pyrrhosoma* are known to date, two in Europe and two in China. Our knowledge of *P. nymphula* is described in detail along with brief notes on the little known *P. elisabethae*. Some areas where further study would be useful are given in the conclusions." (Author)] The paper stresses *P. nymphula* due to lack of knowledge in *P. elisabethae*. Descriptions of eggs, larvae, adults, habitat, and detailed information on life cycle, emergence, reproduction, dispersal, and parasites are provided.] Address: Mill, P.J., School of Biological Sciences, University of Leeds, Leeds, LS2 9JT, UK. E-mail: gpmill@supanet.com

**9209.** Moore N.W. (2010): Remembering encounters with dragonflies from the 1930s to the launching of the BDS in 1983. *J. Br. Dragonfly Society* 26(1): 29-31. (in English) ["The history of research on dragonflies has been extensively reviewed by Corbet & Brooks (2008). The aim of this paper is to describe the problems experienced by an odonatologist during the 45-year pe-

riod before the formation of the BDS in 1983." (Author)] The author presents a brief personal history of development of odonatology in UK, Europe, and worldwide.] Address: Moore N.W., The Farmhouse, 117 Boxworth End, Swavesey, Cambridge CB4 5RA, UK

**9210.** Nel, A.; Petrulevicius, J.F. (2010): Afrotropical and Nearctic genera of Odonata in the French Oligocene: biogeographic and paleoclimatic implications (Insecta: Calopterygidae, Aeshnidae). *Ann. Soc. Entomol. (N.S.)* 46(1-2): 228-236. (in English, with French summary) ["New species of the genera *Sapho* and *Epiaeschna* are recorded in the Oligocene of Aix-en-Provence, Bouches-du-Rhône, France. *Sapho legrandi* n. sp. is the third fossil representative of this recent African genus and *Epiaeschna pseudoheros* n. sp. is the fifth fossil species of this recent North American genus. The fossil species *Triaeschna gossi* from the Eocene of England, *Epacantha magnifica* from the Late Oligocene of Kazakhstan, and *Mediaeschna matutina* from the Oligocene of China, are considered species of *Epiaeschna* and the three fossil genera *Triaeschna* Campion 1916, *Mediaeschna* Zhang 1989, and *Epacantha* Martynov 1929 are synonymized with *Epiaeschna*. The closely related genera *Umma* and *Sapho* inhabit warm humid forests of Western Africa. Their presence in two Oligocene deposits of France supports the hypothesis of a warm humid palaeoenvironment for Armissan (Aude, France), and Aix-en-Provence." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**9211.** Peters, G. (2010): Abnahme der Großlibelle *Aeshna subarctica* auf den Rheinsberger Hochmooren und mögliche Ursachen. *Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin (N.F.)* 47: 119-125. (in German, with English summary) ["The populations of *A. subarctica* at 4 Sphagnum circled bog lakes in the north of Brandenburg (east of Rheinsberg; Germany) have been monitored since 1966 (a 5th lake north of Rheinsberg was added in 1988). This survey yielded data on population sizes and their fluctuations. For comparison, similar data were collected on the accompanying species *A. cyanea*, *A. grandis*, *A. juncea* and *A. mixta*. During the 1990s, the populations of *A. subarctica* declined drastically such that over the last years only single specimens could be observed. The proposed reasons for this decline are repeated long-lasting periods of summer heat („climate warming“), which severely affect the younger larvae of *A. subarctica*. No decline was observed in populations of the accompanying species, whose larvae are not specialized on living in peat bog pools." (Author)] Address: Peters, G., Dürerstr. 17, 16341 Panketale, Germany. E-mail: guenther.peters@freenet.de

**9212.** Petrulevicius, J.F.; Nel, A.; Voisin, J.-F. (2010): A new genus and species of damer dragonfly (Aeshnidae: Odonata) from the lower Eocene of Laguna del Hunco, Patagonia, Argentina. *Ann. Soc. Entomol. (N.S.)* 46 (1-2): 271-275. (in English, with French summary) ["A new genus of Aeshnidae, *Huncoeschna* n. gen., based on *Huncoeschna corrugata* n. gen., n. sp., is erected from Laguna del Hunco (Ypresian) in Patagonia Argentina. The specimen presents a special kind of preservation with the middle part of the wing wrinkled. The presence of only two fossil specimens of Aeshnidae in South America is surely due to the lack of paleontologists and collections of fossil insects in the subcontinent." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist.



Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**9213.** Pinto, A.P. (2010): A Sertanejo's trip: Occurrence of *Orthemis sulphurata* Hagen in northeastern Brazil? *Argia* 22(2): 12-14. (in English) [Ceará state, the northeast region, Brazil, debate of specimens recorded end 2009, beginning 2010. It is concluded that „*O. sulphurata* is a coastal species in Brazil, while *O. schmidti* is more abundant in the inland.“] Address: Pinto, A.P., Museu de Zoologia, Universidade de São Paulo, SP, Brazil. E-mail: odonataangelo@hotmail.com

**9214.** Prokop, J.; Nel, A. (2010): New griffenfly, *Bohemiatupus elegans* from the Late Carboniferous of western Bohemia in the Czech Republic (Odonoptera: Meganisoptera: Meganeuridae). *Ann. Soc. Entomol. (N.S.)* 46(1-2): 183-188. (in English, with French summary) ["A new griffenfly, *Bohemiatupus elegans* n. gen., n. sp. (Meganeuridae) is described from the Upper Carboniferous (Bolsvian) deposits of the Ovcín near Radnice in western Bohemia (Czech Republic). The new taxon based on fore- and hindwing venation is compared with the other meganeurid genera. It is the first record of a large griffenfly from the continental basins of the Bohemian Massif supplementing the other giant insects such as *Bojophlebia prokopi* Kukalová-Peck 1985 or *Carbotriplura kukalovae* Kluge 1996 from the same strata." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**9215.** Rada, B.; Puljas, S. (2010): Do Karst rivers "deserve" their own biotic index? A ten years study on macrozoobenthos in Croatia. *International Journal of Speleology* 39(2): 137-147. (in English) ["In this study we present the results of a ten year survey of the aquatic macroinvertebrate fauna along four karst rivers: Jadro, Žrnovnica, Grab and Ruda, all of them situated in the Middle Dalmatia region of Croatia, in an attempt to construct the Iliric Biotic Index, which will be more applicable for the water quality analysis than the most frequently applied biotic index in Croatia, the Italian Modification of Extended Biotic Index. The rivers geologically belong to the Dinaric karst, unique geological phenomena in Europe. Benthic macroinvertebrates were collected along each river at 15 sites by standard methods of sampling along with several physicochemical parameters, including: temperature, dissolved oxygen, carbon dioxide, alkalinity, hardness and pH. Univariate and multivariate techniques revealed differences in the macroinvertebrate community structure as well as in physicochemical parameters between the Karst rivers and continental rivers. Based on those differences, the Iliric Biotic Index was proposed as the standard of karst river water quality in Croatia in accordance with the EU Water Framework Directive. Differences between the Iliric Biotic Index and the most commonly used biotic indices in the European Community and the USA (The Biological Monitoring Working Party (B.M.W.P.) scores, i.e. Extended Biotic Index, Indice Biotique, Family Biotic Index) suggest that karst rivers need a new biotic index." (Authors) In a table records of the benthic fauna of the karst rivers made during the period of investigation (1994-2004) are compiled. The list includes - without further details - *Anax imperator*, *Cordulegaster boltonii*, and *Calopteryx virgo*.] Address: Rada, B., University of Split, Faculty of Science, Department of Biology, Teslina 12/III, 21000 Split, Croatia. E-mail: radja@pmfst.hr

**9216.** Realpe, E. (2010): Two new Andean species of the genus *Ischnura* Charpentier from Colombia, with a key to the regional species (Zygoptera: Coenagrionidae). *Odonatologica* 39(2): 121-131. (in English) ["*Ischnura chingaza* sp. n. (holotype male: Cundinamarca Dept, Parque Nacional Natural Chingaza, Quebrada La Playa, alt. 3164 m a.s.l., 10-V-2005) and *Ischnura cyane* sp. n. (holotype male: Cundinamarca Dept, Francisco de Sales, Vereda San Miguel, alt. 1984 m a.s.l., 1-XII-2004) are described and illustrated. The types are deposited at Mus. Hist. Nat., Univ. Andes, Bogotá. A key to the regional species is appended." (Author)] Address: Realpe, E., Lab. de Zoología y Ecología Acuática, Depto de Ciencias Biológicas, Universidad de Los Andes, Carrera 1 N° 18A 10 Bloque J, Bogotá, Colombia. E-mail: erealpe@uniandes.edu.co

**9217.** Reels, R. (2010): The curious case of the cannibal coenagrionid. *Agrion* 14(2): 27. (in English) [25 July 2008, small stream at Luk Keng, N.T., Hong Kong; a male *Ceriagrion auranticum* consumed a female.] Address: Reels, G., H-3-30 Fairview Park, Yuen Long, Hong Kong. E-mail address: gtreels@gmail.com

**9218.** Regier, J.C.; Shultz, J.W.; Zwick, A.; Hussey, A.; Ball, B.; Wetzer, R.; Martin, J.W.; Cunningham, C.W. (2010): Arthropod relationships revealed by phylogenomic analysis of nuclear protein-coding sequences. *Nature* 463 (7284): 1079-1083. (in English) ["The remarkable antiquity, diversity and ecological significance of arthropods have inspired numerous attempts to resolve their deep phylogenetic history, but the results of two decades of intensive molecular phylogenetics have been mixed. The discovery that terrestrial insects (Hexapoda) are more closely related to aquatic Crustacea than to the terrestrial centipedes and millipedes (Myriapoda) was an early, if exceptional, success. More typically, analyses based on limited samples of taxa and genes have generated results that are inconsistent, weakly supported and highly sensitive to analytical conditions. Here we present strongly supported results from likelihood, Bayesian and parsimony analyses of over 41 kilobases of aligned DNA sequence from 62 single-copy nuclear protein-coding genes from 75 arthropod species. These species represent every major arthropod lineage, plus five species of tardigrades and onychophorans as outgroups. Our results strongly support Pancrustacea (Hexapoda plus Crustacea) but also strongly favour the traditional morphology-based Mandibulata (Myriapoda plus Pancrustacea) over the molecule-based Paradoxopoda (Myriapoda plus Chelicerata). In addition to Hexapoda, Pancrustacea includes three major extant lineages of 'crustaceans', each spanning a significant range of morphological disparity. These are Oligostraca (ostracods, mystacocarids, branchiurans and pentastomids), Vericrustacea (malacostracans, thecostracans, copepods and branchiopods) and Xenocarida (cephalocarids and remipedes). Finally, within Pancrustacea we identify Xenocarida as the long-sought sister group to the Hexapoda, a result confirming that 'crustaceans' are not monophyletic. These results provide a statistically well-supported phylogenetic framework for the largest animal phylum and represent a step towards ending the often-heated, century-long debate on arthropod relationships." (Authors) The analysis includes "*Ischnura*" and "*Libellula*".] Address: Wetzer, Regina, Natural History Museum of Los Angeles County, Los Angeles, California 90007, USA.

- 9219.** Roland, H.-J.; Roland, U. (2010): New records of Odonata on a birding trip to Cambodia 12th-26th February 2010. *Agrion* 14(2): 30-33. (in English) ["On a guided birding trip to various places in Cambodia, over 500 pictures of Odonata were taken. 24 Anisoptera and 8 Zygoptera species could be identified. Among these only one was without photo evidence, *Pseudothemis jorina*. One *Neurothemis* species had to be left unidentified. The following species have not been recorded for Cambodia before: *Aethriamanta aethra*, *A. brevipennis*, *A. gracilis*, *Brachydiplax farinosa* and *Rhyothemis triangularis*. This fact can be partially explained by the low number of observers of Odonata in Cambodia. Most of the species are rather common in neighbouring countries." (Authors)] Address: Roland, H.-J., Im Mühlahl 35, 61203 Reichelsheim, Germany. E-mail: Hjuergenroland@aol.com
- 9220.** Samways, M.J.; Sharratt, N.J. (2010): Recovery of endemic dragonflies after removal of invasive alien trees. *Conservation Biology* 24(1): 267-277. (in English) ["Because dragonflies are very sensitive to alien trees, we assessed their response to large-scale restoration of riparian corridors. We compared three types of disturbance regime—alien invaded, cleared of alien vegetation, and natural vegetation (control)—and recorded data on 22 environmental variables. The most significant variables in determining dragonfly assemblages were percentage of bank cover and tree canopy cover, which indicates the importance of vegetation architecture for these dragonflies. This finding suggests that it is important to restore appropriate marginal vegetation and sunlight conditions. Recovery of dragonfly assemblages after the clearing of alien trees was substantial. Species richness and abundance at restored sites matched those at control sites. Dragonfly assemblage patterns reflected vegetation succession. Thus, initially eurytopic, widespread species were the main beneficiaries of the removal of alien trees, and stenotopic, endemic species appeared after indigenous vegetation recovered over time. Important indicator species were the two national endemics (*Allocnemis leucosticta* and *Pseudagrion furcigerum*), which, along with vegetation type, can be used to monitor return of overall integrity of riparian ecology and to make management decisions. Endemic species as a whole responded positively to restoration, which suggests that indigenous vegetation recovery has major benefits for irreplaceable and widespread generalist species." (Authors)] Address: Samways, M.J., Dept of Conservation Ecology and Entomology and Centre for Invasion Biology, University of Stellenbosch, Private Bag X1, Matieland, 7602, South Africa. E-mail samways@sun.ac.za
- 9221.** Saperstein, L. (2010): People swarm to 2nd Annual Dragonfly Day in Fairbanks, Alaska. *Argia* 22(2): 10-11. (in English) ["About 450 people flocked to the Creamer's Field refuge in Fairbanks, Alaska on 20 June 2009 to celebrate the second annual Dragonfly Day, a 50% increase over the previous year's attendance." (Author)] Address: Saperstein, Lisa, Yakima, WA, USA. E-mail: lsaperst@gmail.com
- 9222.** Schütte, K. (2010): The larva of *Nesolestes* sp. from Madagascar (Odonata: Megapodagrionidae). *International Journal of Odonatology* 13(1): 103-108. (in English) ["The larva of the genus *Nesolestes* is described and figured for the first time. Specimens were found in small brooklets in littoral swamp forest in south-eastern Madagascar. The larva is compared with the two other Madagascan genera of Megapodagrionidae, *Protolestes* and *Tatocnemis*, and diagnostic characters are given. The caudal lamellae are held in a horizontal plane. Similar types of caudal lamellae are found in some megapodagrionids of the south-east Asian and Australian region. It can be easily distinguished from the genera *Protolestes* and *Tatocnemis* by the shape of the caudal lamellae." (Author)] Address: Schütte, K., Entomologie, Biozentrum Grindel und Zoologisches Museum Hamburg, 20146 Hamburg, Germany. E-mail: Kai.Schuette@uni-hamburg.de
- 9223.** Skvortsov, V.E.; Kuvaev, A.V. (2010): *Ischnura fountaineae* Morton, *Lindenia tetraphylla* (Vander Linden) and *Selysiothemis nigra* (Vander Linden) new for European Russia (Zygoptera: Coenagrionidae; Anisoptera: Gomphidae, Libellulidae). *Notul. odonatol.* 7(5): 49-51. (in English) ["25 Odonata species recorded during 2005-2007 from Kalmykia Republic (lower reaches of the Volga river), are listed. *I. fountaineae*, *L. tetraphylla* and *S. nigra* were not previously recorded from European Russia; the former 2 species are also new for Eastern Europe, and the *I. fountaineae* specimen is the first reliable specimen collected in the Russian territory." (Authors)] Address: Skvortsov, V.E., Dept Biol. Evolution, Fac. of Biology, Moscow State Univ., Moscow-119992. GSP-1, Russia. E-mail: west-urnus@yandex.ru
- 9224.** Sutherland, T.; Young, J.H.; Weisman, S.; Hayashi, C.Y.; Merritt, D.J. (2010): Insect silk: One name, many materials. *Annual Review of Entomology* 55: 171-188. (in English) ["Silks play a crucial role in the survival and reproduction of many insects. Labial glands, Malpighian tubules, and a variety of dermal glands have evolved to produce these silks. The glands synthesize silk proteins, which become semicrystalline when formed into fibers. Although each silk contains one dominant crystalline structure, the range of molecular structures that can form silk fibers is greater than any other structural protein group. On the basis of silk gland type, silk protein molecular structure, and the phylogenetic relationship of silk-producing species, we grouped insect silks into 23 distinct categories, each likely to represent an independent evolutionary event. Despite having diverse functions and fundamentally different protein structures, these silks typically have high levels of protein crystallinity and similar amino acid compositions. The substantial crystalline content confers extraordinary mechanical properties and stability to silk and appears to be required for production of fine protein fibers." (Authors) The authors refer to Gomphidae (papers of Trueman 1990, Gambles 1956, Gambles & Gardner 1960): "Anchoring eggs? Bundles of fibers attached to eggs that uncoil upon exposure to water."] Address: Sutherland, Tara, CSIRO Entomology, Canberra, ACT 2601, Australia. E-mail: Tara.Sutherland@CSIRO.au
- 9225.** Takahashi, Y.; Watanabe, M. (2010): Diurnal changes in male mate preference to female dimorphism in *Ischnura senegalensis* (Rambur) (Zygoptera: Coenagrionidae). *Odonatologica* 39(2): 159-162. (in English) ["*I. senegalensis* females exhibit colour dimorphism as andromorphs and gynomorphs, to which males seem to switch their mate preference according to prior copulation experience. In the field where andromorphs were dominant, the binary choice experiments were conducted both in the early morning, which marks the onset of daily copulation activity, and in the afternoon, which marks the end of the copulation activity. During

the former period, males showed fair selectivity, while they preferred the andromorphs in the afternoon, suggesting that male mate preference to each female morph switched in relation to copulation experience; i.e. the mating attempts of males were biased to the dominant female morph. Mating attempts in the afternoon were considered to inhibit female oviposition behaviour, resulting in a decrease of her reproductive success. Therefore, biased male mate choice toward the dominant morph in the afternoon might be a selective force to maintain the female colour dimorphism." (Authors)] Address: Takahashi, Y., Graduate School of Life & Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki, 305-8572 Japan. E-mail: yuyuyuyu@ies.life.tsukuba.ac.jp

**9226.** Takahashi, Y.; Watanabe, M. (2010): Mating experience affecting male discrimination between sexes and female morphs in *Ischnura senegalensis* (Rambur) (Zygoptera: Coenagrionidae). *Odonatologica* 39(1): 47-56. (in English) ["*Ischnura senegalensis* females exhibit colour dimorphism, appearing as andromorphs and gynomorphs. Binary choice experiments between sexes and morphs were conducted in the laboratory. Virgin males reared separately from females showed no preference between sexes or between morphs, suggesting that virgin males were unable to recognize potential mates and had no innate mating preference for a particular female morph. After enclosure with a single female in a small cage, males that had experienced copulation significantly preferred the same female morph with which they had copulated, while males that failed to copulate with the female showed no preference. The males that had experienced copulation significantly preferred females over males. Therefore, ability of males to discriminate between sexes and morphs was confirmed by their copulation experience." (Authors)] Address: Watanabe, M., Grad. School of Life & Environmental Sc., Univ. of Tsukuba, Tsukuba, Ibaraki, 305-8572, Japan. E-mail: watanabe@kankyo.envr.tsukuba.ac.jp

**9227.** Takahashi, Y.; Watanabe, M. (2010): Morph-specific fecundity and egg size in the female-dimorphic damselfly *Ischnura senegalensis*. *Zoological Science* 27: 325-329. (in English) ["Females of coenagrionid damselflies exhibit colour dimorphism, consisting of an andromorph and a gynomorph. This study compared reproductive traits between the female morphs in both fieldcaptured and laboratory-reared females of the female-dimorphic *I. senegalensis*. No difference was found in the onset of egg development between the morphs. The andromorphs developed significantly smaller mature eggs and had significantly more immature eggs than the gynomorphs. These results suggest that the andromorphs are r-strategists (high fecundity with small eggs), whereas the gynomorphs are K-strategists (low fecundity with large eggs). Fecundity and egg size might determine the quantity and quality of the offspring, respectively, indicating that morph-specific reproductive traits would contribute to the overall fitness of each female morph, and consequently be key factors affecting morph frequency in a population." (Authors)] Address: Watanabe, M., Conservation Biology Lab., Graduate School of Life & Environmental Sciences, University of Tsukuba, 1-1-1, Tennodai, Tsukuba, Ibaraki 305-8572, Japan. E-mail: watanabe@kankyo.envr.tsukuba.ac.jp

**9228.** Taylor, A.N. (2010): Impacts of cadmium contamination and fish presence on wetland invertebrate communities: An application of population measures and multi-metric tests. *Ecological Indicators* 10(6): 1206-1212. (in English) ["Wetlands are extensively used in heavy metal bioremediation, and it is important to know how biota are impacted by such toxins. I examined invertebrate communities in six experimental wetland ponds in Ithaca, NY, USA to assess the effects of residual cadmium. Three ponds had been treated with cadmium in 1983, and still had average levels of 3.6 mg/kg in the sediment in 2001. Also, two of the cadmium ponds and one non-cadmium pond had predatory fish populations. I quantified the variable effects on invertebrate communities using non-parametric statistics, CCA (canonical correspondence analysis), and three published multi-metric tests ([Burton et al., 1999], [Apfelbeck, 2001] and [Helgen and Gernes, 2001]). Cadmium effects could not be seen in ponds with fish because invertebrate abundance in these ponds was low. In ponds without fish, cadmium appeared to have significant influence on invertebrate abundance, but not on diversity. None of the multi-metric tests detected a cadmium impact. This study suggests that trophic interactions between fish and invertebrates should be considered in wetland index development and implementation." (Author) Odonata are treated at the genus level. No effects of cadmium on Odonata seem to exist.] Address: Office of Surface Mining, 1645 S. 101 East Avenue, Suite 145, Tulsa, OK 74128, USA. E-mail: ataylor@osmre.gov

**9229.** Tennessen, K.J.; Johnson, J.T. (2010): *Archaeopodagrion armatum* sp. nov. from Ecuador (Odonata: Megapodagrionidae). *International Journal of Odonatology* 13(1): 89-95, pl. IIIb. (in English) ["*Archaeopodagrion armatum* sp. nov. is described and illustrated (holotype male: Ecuador, Zamora Chinchipe Prov., forest S of Zamora (4°07'18"S, 78°58'22"W), 02 iv 2008, leg. KJT; in FSCA). The new species is distinct from *A. bicorne* and *A. bilobatum* by the pair of highly recurved processes on the hind margin of the prothorax of both sexes, and a hair pencil and preapical spike-shaped process on the dorsal surface of the male paraprocts." (Authors)] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**9230.** Tennessen, K.J. (2010): The madicolous nymph of *Heteropodagrion sanguinipes* Selys (Odonata: Megapodagrionidae). *Zootaxa* 2531: 29-38. (in English, with Spanish summary) ["Nymphs of the genus *Heteropodagrion* are described and illustrated for the first time based on supposed specimens of *H. sanguinipes* taken in vertical sheet flow adjacent to small montane streams in western Ecuador. The nymph of *Heteropodagrion* resembles *Paraphlebia* and *Sciotropis*, but is unique among Megapodagrionidae in possessing a slightly curved row of very small transverse ridges on each side of the prementum." (Author)] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**9231.** Tsubaki, Y. (2010): 2011 International Congress. *Agrion* 14(2): 26. (in English) [Announcement of the International Odonatological Congress to be held in Kanagawa Prefectural Museum of Natural History in Odawara City, Kanazawa, Japan in July 2011.] Address: Tsubaki, Y., Center for Ecological Research, Kyoto Uni-



versity, Hirano 2-509-3, Otsu, 520-2113, Japan. E-mail: ytsubaki@ecology.kyoto-u.ac.jp

**9232.** Villanueva, R.J.T. (2010): Adult Odonata community in Dinagat Island, The Philippines: impact of chromium ore mining on density and species composition. *Odonatologica* 39(2): 133-140. (in English) ["Mining modifies the surrounding environment and causes habitat deterioration along river systems receiving mine tailings. Here it is assessed whether chromium ore mining affects the Odonata abundance and diversity. Line transect surveys were conducted during 4 months at the Henry river (along a pristine section and a previously mined section), and at the Lecing river, which is currently receiving tailings from chromium ore mines. The density of adult Odonata was 10 times higher in the pristine than in the mined river. Species richness was reduced in both the currently and in the previously mined sections (5 species) as compared to that of the pristine river (12 species), showing a detrimental effect of chromium mining on dragonfly diversity and abundance." (Author)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**9233.** Xu, Q.-h. (2010): The larvae of *Macromia flavocolorata* and *M. septima* from Fujian, China (Odonata: Macromiidae). *International Journal of Odonatology* 13(1): 145-152. (in English) ["The final stadium larvae of *M. flavocolorata* and *M. septima* are described and illustrated for the first time. They are diagnosed against the congeners on the basis of published descriptions." (Author)] Address: Xu, Q.-h., Zhangzhou City University, Zhangzhou, Fujian 363000, P.R. China. E-mail: qihanx@yahoo.com.cn

**9234.** Yates, A.G.; Bailey, R.C. (2010): Covarying patterns of macroinvertebrate and fish assemblages along natural and human activity gradients: implications for bioassessment. *Hydrobiologia* 637(1): 87-100. (in English) ["Bioassessment is based upon the premise that biological assemblages have predictable relationships with the surrounding natural and human environments. As the nature of these relationships can vary from region to region, it is important that environment-biota relationships be established prior to the initiation of any bioassessment program. In this study, multivariate analysis was used to establish how fish and benthic macroinvertebrate (BMI) assemblages in southwestern Ontario streams vary across natural and human activity gradients. The use of canonical correspondence analysis allowed us to determine that changes in community composition of both fish and BMI are strongly correlated with variation in the extent of human activity. The primary source of variation in community composition across activity gradients appeared to reflect a shift from intolerant to tolerant taxa as the extent of human activity increased. Habitat and feeding traits, for BMI and fish respectively, accounted for a secondary source of variation primarily attributable to differences in the extent of human activity at the reach scale. However, variation in human activity, especially at the basin scale, covaried with the dominant natural gradient of surface geology, making interpretation of the results difficult. Implications for bioassessment studies are discussed." (Authors) Odonata are treated at the family level.] Address: Yates, A.G., Department of Biology, The University of Western Ontario, 1151 Richmond St. N., London, ON, N6A 5B7, Canada. E-mail: adam.yates@ec.gc.ca

**9235.** Zhang, Z.-s.; Lü, X.-g.; Wang, Q.-c.; Zheng, D.-m.; Zhang, Xi-y.; Zheng, N. (2010): Mercury contents and distribution characteristics in Cicadae. *Environmental Science* 31(2): 509. (in Chinese, with English summary) ["Total mercury contents of cicadae bodies, wings and exuviae were studied in Huludao City to discuss mercury distribution characteristics in cicadae and to reveal the environmental mercury accumulation effects in the long life-cycle insects through comparing cicadae with other insect species. The average mercury contents of cicadae bodies were 2.64 mg·kg<sup>-1</sup> and much higher than those in the contrast sites (1.00 mg·kg<sup>-1</sup> on average) in Huludao City. Mercury contents were found in the order of cicadae bodies > wings (0.98 mg·kg<sup>-1</sup> on average) > exuviae (0.50 mg·kg<sup>-1</sup> on average). Sex differences of mercury contents and body weights of cicadae were significantly great. The females had larger body weights (1.11 g on average) and lower mercury contents (1.34 mg·kg<sup>-1</sup> on average) than the males (body weight: 0.54 g on average; mercury contents: 3.38 mg·kg<sup>-1</sup> on average), respectively. Mercury contents of cicadae's bodies varied greatly with sample sites, mercury contents of wings changed little. No significant correlation was found between mercury contents of soil and cicadae bodies. Mercury contents of cicadae were lower than those of dragonflies, higher than those of other insects with shorter life-cycle periods and it reflected the accumulation effects of environmental mercury in the long life-cycle insects such as cicadae." (Author)] Address: Wang, Q.-c., Key Lab. of Wetland Ecology & Environment, Inst. Northeast Geography & Agroecology, Chinese Acad. of Sci., Changchun 130012, China. E-mail: wangqichao@neigae.ac.cn

**9236.** Zimmermann, M.; Vischer-Leopold, M.; Ellwanger, G.; Ssymank, A.; Schröder, E. (2010): The EU Habitats Directive and the German Natura 2000 network of protected areas as tool for implementing the conservation of relict species. In: Habel, J.C. & T. Assmann (Hrsg.): *Relict Species: Phylogeography and Conservation Biology*. Verlag Springer Berlin Heidelberg. ISBN 978-3-540-92161-5: 323-340. (in English) ["This study analyses whether the Natura 2000 network of Sites of Community Importance (SCIs) is able to protect relict species in the taxonomic groups of higher plants, molluscs, dragonflies and damselflies as well as butterflies (only Rhopalocera) in Germany. Altogether, a total of 157 species from all groups are identified as relict species in Germany. 14 of these are included in Annexes II, IV or V of the Habitats Directive. Most glacial relicts are well covered by an indirect protection regime of the European Union (EU) Habitats Directive as they occur in 46 of Annex I habitat types, and their occurrences are to a large extent covered by Natura 2000 sites (SCIs). For a few relict species and certain relict plant communities a gap remains in the EU protection regime, which can be filled by a national protection regime, for example, in nature reserves. The best way to protect local relict species is to include them in special management plans for their conservation." (Authors)] Address: Zimmermann, M., Inst. Forest Botany & Forest Zoology, TU Dresden, Tharandt, Germany. E-mail: marcozimmermann53129@googlemail.com

**Thanks to all who contributed to this issue of OAS. A special thank to Pawel Buczyński who provided us with publications from eastern central Europe.**

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105;  
E-mail: K.Reinhardt@sheffield.ac.uk  
Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

## 1997

**9237.** Bernard, R.; Samoląg, J. (1997): Analysis of the emergence of *Aeshna affinis* Vander Linden, 1823 in the vicinity of Poznan, western Poland (Odonata: Aeshnidae). *Opusc. zool. flum.* 153: 1-12. (in English) ["The studies were conducted during June-July 1996. The habitat is described and the data are presented on population strength, sex ratio, changes in daily emergence rate, differences between the sexes, time of emergence, height of climbing and on mortality. The emergence in this species is highly synchronized (ECM = 7); this is probably related to the mechanism of a lower temperature threshold in larval development. The status of the species in this part of Europe in relation to climatic conditions, and temporal segregation with the coexisting *A. mixta* are discussed."] (Authors)] Address: Bernard, R., Department of General Zoology, Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznań, Poland; E-mail: bernard@amu.edu.pl

**9238.** Gerlach, J.; Matyot, P.; Saaristo, M. (1997): Silhouette species list. *Phelsuma* 5, Suppl. A: 42 pp. (in English) [11 taxa are listed together with their published sources resp. first description data.]

## 1998

**9239.** Bernier, C. (1998): ODONATA 44-85: L'atlas contemporain (suite). *Lettre de l'Atlas entomologique régional (Nantes)* 10: 144-146. (in French) [The paper gives a brief interim report - covering the period between 1990 and 1997 - on 55 odonate species found in the frame work of a grid mapping (10x10km) project on the regional distribution of Odonata in France.] Address: Bernier, C., 8, allée des Tilleuls, 44230 Saint-Sébastien-sur-Lorie, France

## 2000

**9240.** Besprozvannykh, V.V. (2000): A life cycle of the trematode *Pneumonocercis nanchangensis* major (Plagiorchiidae) parasitizing in lungs of frogs in the Primorye region. *Parazitologiya* 34(1): 63-65. (in Russian, with English summary) ["The life cycle of the trematode *P. nanchangensis* major includes three hosts: primary intermedial host (molluscs *Helicorbis sijfunensis*, *Polypylis semiglobosa*), secondary intermedial host (larvae of dragonfly genus *Lestes*), and final host (frogs *Rana ni-*

*gromaculata*, *R. semiplicata*). Descriptions and measurements of cercariae and metacercariae are proposed."] (Author)] Address: Besprozvannykh, V.V., Institute of Biology & Soil Sciences, Far East Branch of the Russian Academy of Sciences, prospect 100-letija, 159, Vladivostok, 690022, Russia. E-mail: besproz@ibss.dvo.ru

**9241.** Besprozvannykh, V.V. (2000): Biology of trematodes *Nenimandijea kashmirensis* and *Pleurogenoides medians* (Pleurogenidae) - The parasites of frogs in the Primorye territory. *Parazitologiya* 34(4): 349-354. (in Russian, with English summary) ["The experimental study of life cycles of the trematodes *Nenimandijea kashmirensis* Kaw, 1950 and *Pleurogenoides medians* Olsson, 1876 was carried out. It was found out, that their life cycles include: the first intermedial host - the mollusc *Boreoelona contortrix ussuriensis*, the second intermedial host - dragonfly larvae of the genus *Cordulia*, and the final host - the frogs *Rana nigromaculata* and *R. semiplicata*. Based on obtained data it is suggested, that *Pleurogenoides japonicus* (Yamaguti) should not be considered as a separate species."] (Author)] Address: Besprozvannykh, V.V., Institute of Biology & Soil Sciences, Far East Branch of the Russian Academy of Sciences, prospect 100-letija, 159, Vladivostok, 690022, Russia. E-mail: besproz@ibss.dvo.ru

**9242.** Besprozvannykh, V.V. (2000): Life cycle of the trematode *Glyphthelmiss rugocaudata* (Plagiorchiidae) in the Primorye region. *Parazitologiya* 34(2): 153-155. (in Russian, with English summary) ["It is found out, that the life cycle of the trematode *G. rugocaudata* (Yoshida, 1916) in the Primorye region includes two intermedial hosts (molluscs *Lymnaea pacifampla* and larvae of the genera *Cordulia* and *Lestes*) and a final host, frog species *Rana nigromaculata* and *R. semiplicata*."] (Author)] Address: Besprozvannykh, V.V., Institute of Biology & Soil Sciences, Far East Branch of the Russian Academy of Sciences, prospect 100-letija, 159, Vladivostok, 690022, Russia. E-mail: besproz@ibss.dvo.ru

**9243.** Nagano, M.; Ooki, H.; Mizutani, Y.; Shimano, S.; Aoki, J. (2000): List of insects collected in the campus of Yokohama National University. *Bulletin, Institute of Environmental Science and Technology, Yokohama National University* 26: 123-134. (in Japanese, with English title and nomenclature) [Japan; six odonate species are listed.] Address: Nagano, M., Dept of Soil Zoology, Institute of Environmental Science & Technology, Yokohama National University, Yokohama, 240-8501 Japan

**9244.** Alonso, L.E.; Slonso, A.; Schulenberg T.S.; Dallmeier, F. (Eds.) (2001): Biological and social assessments of the Cordillera de Vilcabamba, Peru. Rapid Assessment Program. Smithsonian Institution / Monitoring and Assessment of Biodiversity Program 12: 296 pp. (in English) [The report includes a few information on Odonata: Acosta, R., M. Hidalgo, E. Castro. N. Salcedo & D. Reyes: Biodiversity assessment of the aquatic systems at the southern Vilcabamba region, Peru (pp. 140-146); same authors: Number of aquatic invertebrate species per family found in quantitative and qualitative sampling at Lactahuaman and Wayrapata, southern Cordillera de Vilcabamba, Peru (pp. 271-275).] Address: Alonso, L.E., Conserv. International Cent. Appl. Biodiv. Sci., Dept Conserv. Biol., 1919 M Street NW, Suite 600, Washington. DC 20036, USA

**9245.** Chambers, D.B.; Messinger, T. (2001): Benthic invertebrate communities and their responses to selected environmental factors in the Kanawha River Basin, West Virginia, Virginia, and North Carolina. U.S. Department of the Interior, U.S. Geological Survey, Water-Resources Investigations Report 01-4021, National Water-Quality Assessment Program, Charleston, West Virginia 2001: VII, 52 pp. (in English) ["The effects of selected environmental factors on the composition and structure of benthic invertebrate communities in the Kanawha River Basin of West Virginia, Virginia and North Carolina were investigated in 1997 and 1998. Environmental factors investigated include physiography, land-use pattern, streamwater chemistry, streambed-sediment chemistry, and habitat characteristics. Land-use patterns investigated include coal mining, agriculture, and low intensity rural-residential patterns, at four main stem and seven tributary sites throughout the basin. Of the 37 sites sampled, basin size and physiography most strongly affected benthic invertebrate-community structure. Land-use practices also affected invertebrate community structure in these basins. The basins that differed most from the minimally affected reference condition were those basins in which coal mining was the dominant nonforest land use, as determined by comparing invertebrate-community metric values among sites. Basins in which agriculture was important were more similar to the reference condition. The effect of coal mining upon benthic invertebrate communities was further studied at 29 sites and the relations among invertebrate communities and the selected environmental factors of land use, streamwater chemistry, streambed-sediment chemistry, and habitat characteristics analyzed. Division of coal-mining synoptic-survey sites based on invertebrate-community composition resulted in two groups—one with more than an average production of 9,000 tons of coal per square mile per year since 1980, and one with lesser or no recent coal production. The group with significant recent coal production showed higher levels of community impairment than the group with little or no recent coal production. Median particle size of streambed sediment, and specific conductance and sulfate concentration of streamwater were most strongly correlated with effects on invertebrate communities. These characteristics were related to mining intensity, as measured by thousands of tons of coal produced per square mile of drainage area." (Authors) The study includes data on *Ophiogomphus* sp., *Boyeria grafiana*, *Macromia taeniolata* (low tolerance against pollution), and *Argia* sp.

(high tolerance against pollution).] Address: Chambers, D.B., U.S. Geological Survey, Branch of Information Services, Box 25286, Denver, CO 80225-0286, USA

**9246.** Restani, M.; Rau, L.R.; Flath, D.L. (2001): Nesting ecology of Burrowing Owls occupying Black-tailed Prairie dog towns in southeastern Montana. *J. Raptor Res.* 35(4): 296-303. (in English) [Nest-site selection, productivity, and food habits of 13 breeding pairs of Burrowing Owls (*Athene cucularia*) breeding on prairie dog (*Cynomys ludovicianus*) towns in southeastern Montana, USA were studied. Owls fed on invertebrates (mainly grasshoppers and beetles), mammals (mice and voles), birds (blackbirds and buntings), and amphibians (frogs). In one case an unidentified Odonata was found as prey.] Address: Department of Biology, Rocky Mountain College, Billings, MT 59102 USA. E-mail: restanim@rocky.edu

**9247.** Samways, M.J. (2001): Seychelles fineliner damselfly not extinct after all. *Phelsuma* 9: 55. (in English) [*Teinobasis alluaudi* (Martin, 1896) was recorded from Mahe in 1894 and 1909 and on Silhouette in 1908. It was feared extinct, not having been observed since 1909. On 27-VI-1997 it was rediscovered on southwestern Mahe, by a small stream in Terminalia forest, at sea level. New records (1998-2001) from Silhouette are also communicated.] Address: Samways M.J., Invertebrate Conservation Research Centre, Dept Zool. & Entomol., University of Natal, P/Bag X01, Scottsville 3209, Pietermaritzburg, South Africa. E-mail: samways@un.ac.za

## 2002

**9248.** Eigenheer, K. (2002): Die Libellen an der Aare zwischen Büren a.A. und Rothrist (Schweiz). Eigenverlag: 47 pp. (in German) [www.konrad.eigenheer.ch; 27 Odonata species along the river Aare, Switzerland are mapped according their reproduction status (exuviae / imagines), and phenology of species is documented.] Address: Eigenheer, K., Hofmatt 11, CH-4582 Brügglen, Switzerland. E-mail: konrad@eigenheer.ch

**9249.** Guilloton, J.-A. (2002): ODONATA 44-85: L'atlas contemporain (suite). *Lettre de l'Atlas entomologique régional (Nantes)* 15: 12-14. (in French) [The paper gives a brief progress report - covering the period between 1997 and 2001 - on 59 odonate species found in the frame work of a grid mapping (10x10km) project on the regional distribution of Odonata in France.] Address: Guilloton, J.-A., La Close des Saules, 44810 Héric, France

**9250.** Perron, J.M.; Ruel, Y. (2002): Saison de vol des Odonates du Territoire du marais Léon-Provancher, Neuville, division de recensement de Portneuf (Québec). *Le Naturaliste Canadien* 126(2): 13-17. (in French) [Canada; Phenological data of the regional fauna are presented and compared with data compiled in Pilon, J.-G. & D. Lagacé (1998): Les Odonates du Québec. Entomofaune du Québec (EQ) inc, Chicoutimi (Québec), 367 pp.] Address: Perron, J.-M., 963, rue Grandjean, app. 506, Sainte-Foy, Quebec G1X 4P9, Canada. E-mail: collections@coll.ulaval.ca

**9251.** Schlüter, M.; Welt, M. (2002): The dragonfly: a more effective genetic biomarker of pollution. Poster 78-04. presented at the 12th Annual Meeting of the Society of Environmental Toxicology and Chemistry Europe,



Vienna (Austria), 12-16 May 2002: (in English) ["Currently, there are limited insect biomarkers with field applications, even though insects play key roles in most terrestrial and freshwater ecosystems. Most pollutants and toxicants occur at the highest concentrations in the soil or aquatic sediment due to solubility and settling; however most current biomarker species spend little or no time in these areas. The development of a biomarker species that resides a significant portion of its life span in the sediment may be a more sensitive indicator of environmental health and stability. Dragonflies are an excellent example of an insect species whose larvae spends one or more years in the aquatic sediment. The main goal of the following study is to investigate the potential of the dragonfly as a new biomarker species of pollution. Dragonflies show a high level of genetic diversity as measured by allozymes (protein phenotypes) and by DNA fingerprinting. Allozyme allele frequencies were examined to determine if these characteristics were related to environmental quality. Population genetic structure (allele frequencies) of several populations of a common dragonfly species, *Erythemis simplicicollis*, were compared and contrasted. Populations were sampled from "polluted" sites (e.g. heavy metals, petroleum) and "clean" sites. Differences in allele frequencies were detected in the populations. These differences may be related to the toxicants present in the environment. DNA fingerprinting (RAPD markers) was able to identify individuals as well as separate populations. Allozyme data show that selection for specific phenotypes are related to environmental pollution. This was illustrated by comparisons of allozyme phenograms to genomic population phenograms. These differences suggest that the phenotypic (allozyme) data from dragonflies may serve as an effective biomarker of environmental health." (Authors)] Address: Schlüter, M., Dept Biol., Xavier Univ., 1 Drexel Dr., New Orleans, LA 70125-1098. USA

**9252.** Watanabe, M.; Mimura, Y.; Higashi, T. (2002): Ecological studies on habitat establishment for threatened brackish water damselfly, *Mortonagrion hirosei*: microclimate of the habitat. Annual Report of the interdiscipl. Res. Inst. environ. Sci. 21: 47-58. (in Japanese, with English summary) ["The spatial distribution for perching sites of the endangered brackish water damselfly, *Mortonagrion hirosei*, was restricted about 20cm above the water surface in a small reed community of an estuary in the warm-temperate zone of Japan. The flight season was from late May to early August. The peak estimated daily number of the damselfly adults was about 1000, that is 2 adults per square meter in the habitat. There was a dense reed community, 440 shoot per square meter, that is, the distance between shoots is 5cm. Relative light intensity at the 20cm above the water surface in the reed community was about 10%. Although there was no difference between ambient and inside temperature of reed community, the wind velocity inside the reed community was apparently lower than that outside the community. Therefore, the micro-environment of the damselfly habitat was comparable to that of forest floor. The closed habitat made by a lot of shoot of the reed may inhibit the other odonate species to enter inside of the reed community. Consequently, the floor of the reed community was considered to be a suitable micro-habitat of the brackish water damselfly." (Author)] Address: Watanabe, M., Conservation Biology Laboratory, Graduate School of Life and Environmental Sciences, University of Tsukuba, 1-1-1, Tennodai, Tsu-

kuba, Ibaraki 305-8572, Japan. E-mail: watanabe@kankyo.envr.tsukuba.ac.jp

**9253.** Zuellig, R.E.; Kondratieff, B.C.; Rhodes, H.A. (2002): Benthos recovery after an episodic sediment release into a Colorado rocky mountain river. *Western North American Naturalist* 62(1): 69-72. (in English) [During late September 1996, approximately 7000 m<sup>3</sup> of clay- to gravel-sized sediment was flushed from Halligan Reservoir, Larimer County, Colorado, into the North Fork Cache la Poudre River during dam inspections. Approximately 9.6 km of this river was partially or completely affected by this episodic sediment release. Pools up to 3.2 km downstream from the dam lost 50% of their volume. Hess samples taken from October 1996 to September 1997, 100 m downstream from the dam (site 1) and 3.2 km downstream (site 2), revealed effects of sediment on recovery patterns of benthic communities. A 2-way ANOVA was used to determine significant interactions using site and date as main factors. Pairwise differences were then compared using least squares means to determine significant dates within and between sites. Ten days after the sediment release, both density and taxa richness at site 1 (55 organisms per m<sup>2</sup>, 5 taxa) were significantly lower ( $P < 0.05$ ) than site 2 (1156 organisms per m<sup>2</sup>, 25 taxa). These differences remained until June when species richness and densities increased. Plecoptera and Trichoptera colonized from June to September after being eliminated at site 1 and reduced at site 2. No permanently flowing tributaries exist within the study area; therefore, passive downstream drift from such inputs apparently did not influence recovery. Increased densities of taxa such as Baetidae, Hydroptilidae, Hydropsychidae, Chironomidae, Simuliidae, and Oligochaeta occurred plausibly by rapid reproduction. Based on pre-event data, community function completely changed at site 2 from a scraper community to one dominated by collector-gatherers." (Authors) Odonata are represented in very small numbers by "Zygoptera" and *Ophiogomphus severus*.] Address: Zuellig, R.E., Colorado State University, Dept of Bioagricultural Sciences and Pest Management, Fort Collins, CO 80523

## 2003

**9254.** Blanco-Garrido, F.; Sánchez-Polaina, F.J.; Prenda, J. (2003): Summer diet of the Iberian chub (*Squalius pyrenaicus*) in a Mediterranean stream in Sierra Morena (Yeguas stream, Córdoba, Spain). *Limnetica* 22 (3-4): 99-106. (in English, with Spanish summary) [The diet of *S. pyrenaicus* was studied in the upper Yeguas river. The chub showed a wide trophic range, and a pronounced generalist character. The main trophic categories were chironomid larvae and filamentous algae. Taxa - including Odonata - are treated at the order level.] Address: Prenda, J., Depto de Biología Ambiental y Salud Pública, Univ. de Huelva. Campus universitario de El Carmen, Avda. de la Fuerzas Armadas s/n, 21007 Huelva, Spain. E-mail: jprenda@uhu.es

**9255.** Brammer, C.A.; MacDonald, J.F. (2003): Benthic insect fauna of a clean water stream on Utah's Colorado Plateau, USA. *Western North American Naturalist* 63(1): 21-34. (in English) ["Extensive collecting using a variety of methods was conducted in 1994 and 1995 in association with Pleasant Creek in south central Utah, USA, in an effort to inventory the aquatic insects. Collecting efforts yielded 133 insect taxa from

12 sample sites in 8 study areas from near the headwaters of Pleasant Creek and downstream to where it flows out of Capitol Reef National Park. Applying Protocol III methodology of Plafkin et al. (1989), we determined species assemblages of benthic insects and calculated selected ecological indices based on monthly collections from March through August 1994. Richness, equitability index, and mean diversity index values at all sample sites approached, or were greater than, the generally accepted values for clean-water streams in the mountains of the western United States." (Authors) The taxa list includes *Hetaerina americana*, *Argia vivida*, and *Ophiogomphus severus*.] Address: Brammer, C.A., Department of Biology, Utah State University, Logan, UT 84322.

**9256.** Chochel, M. (2003): Příspěvek k rozšíření klínatky obecné *Gomphus vulgatissimus* (Linnaeus, 1785) v CHKO Labské pískovce a její bionomii (Odonata, Gomphidae) - Beitrag zur Verbreitung Gemeine Keiljungfer - *Gomphus vulgatissimus* (Linnaeus, 1785) im Landschaftsschutzgebiet Labské pískovce und seine Bionomie (Odonata, Gomphidae). Sborník Oblastního muzea v Mostě, řada přírodovědná 25: 37-38. (in Czech, with German summary) [07-V-2003, three larvae and one exuvia of *Gomphus vulgatissimus* were found along River Elbe near Diéin/Tetschen, Czech Republic. This record raises the regionally known Odonata to 44 species.] Address: Chochel, M., Malá Veleč 23, 407 22 Benešov nad Ploučnicí, Czech Republic. E-mail: chochel@schkocr.cz

**9257.** Henriksson, B. (2003): Citrongul kärtrrollslända *Leucorrhinia pectoralis* i Blekinge. LUCANUS 2003 8:2. SydOstEntomologerna. www.fsoe.se: 4 pp. (in Swedish) [In June and beginning of July 2001, 26 sample sites near Blekinge, southern Sweden were studied for the Odonata fauna with special emphasis to *Leucorrhinia pectoralis*. This species was recorded at 10 localities. A total of twelve odonate species is documented locality-wise in a table.] Address: Henriksson, B., Sandåsvägen 12, 370 30 Rödeby, Sweden

**9258.** Zeppelini Filho, D.; Cunha Ribeiro, A.; Cunha Ribeiro, G.; Aguiar Fracasso, M.P.; Monetti Pavani, M.; Müller Patrao Oliveira, O.; De Oliveira, S.A.; Marques, A. (2003): Faunistic survey of sandstone caves from Altinópolis region, Sao Paulo state, Brazil. Papéis Avulsos de Zoologia 43(5): 93-99. (in English, with Portuguese summary) ["*Libellulidae*" are listed from Duas Bocas cave, High Parana River Basin Domain, northern Sao Paulo state.] Address: Marques, A., Depto Zool., Inst. Bio-cien., Univ. Sao Paulo, C.P. 11401, BR-05422-97' Sao Paulo, Brazil. E-mail: marques@ib.usp.br

## 2004

**9259.** Andreew, A.; Derschanskij, B. (2004): Fauna strekoz (Insecta, Odonata) Moldov'i: Perwye itogi. Analele Stiintifice ale USM, Seria "Stiinte chimico-biologice" 2004: 170-173. (in Russian, with Romanian and English summaries) ["Not less than 54 Odonata species may inhabit Moldova; 42 species were noted in Moldova's boundaries during (in the last 100 years, currently the presence of 37 species was confirmed. The most numerous species is *Ischnura elegans* the number of which seemingly exceeds the joint number of three nearest species; evidently the species becomes the dominant and superdominant in the most eutrophic

waters. *Sympetrum sanguineum* takes the second place on number, then *Platycnemis pennipes*, *Erythronma viridulum*, *Calopteryx splendens*, *Sympetrum meridionale* and *Orthetrum albistylum* succeed. There were 33 species in the Ramsar site - the planned Nistrul de Jos (Lower Dniester) National Park and in comparison with the published data shows an important concentration of a specific diversity." (Authors)] Address: not stated in English

**9260.** Borisov, S.N. (2004): Night hatching of dragonflies in southern part of West Siberia. Eurasian entomological journal 3(3): 216. (in Russian, with English summary) [In a locality in the south of West Siberia, night emergence of *Lestes macrostigma*, *Sympetrum flaveolum*, *S. vulgatum* L., *Aeshna mixta*, *A. affinis* is recorded.] Address: Borisov, S.N., Inst. of Systematic & Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia

**9261.** Borisov, S.N.; Haritonov, A.Yu. (2004): Dragonflies (Odonata) in high mountains of the East Pamirs. Eurasian entomological journal 3(2): 97-100. (in Russian, with English summary) [Tajikistan; "Presence of six dragonfly species in high mountains of the East Pamirs (3360 5000 m a.s.l.) was established. *Sympetrum fonscolombii* and *Pantala flavescens* fly here only during seasonal migrations. The first of these species is rare. For the second species the directed passages in a Southern direction are marked in August. *Orthetrum brunneum*, *S. haritonovi* and *Ischnura pumilio* inhabit only the bogs formed by hot springs. Their life cycle is outlined." (Author) Most of the records result from studies in the early 1980th, and include also a record of *Enallagma cyathigerum*.] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**9262.** Bree, D. (2004): Significant Odonate observations from Petroglyphs Provincial Park and Area in 2002. Ontario Odonata 4: 33-37. (in English) ["Updates to the checklist of the Odonata found at Petroglyphs Provincial Park during field studies in 2002 are presented. Documented are eleven new species for the park's list bringing the total to 71. Included are two uncommonly encountered species, *Cordulegaster obliqua* and *Enallagma aspersum*, which are also new for Peterborough County, and two provincially rare species, *Lestes eurinus* and *Williamsonia fletcheri*. Two of the other new species for the park, *Erythemis simplicicollis* and *Celithemis eponina* suggest the possibility of a northern range expansion of southern species. Additional documentation of breeding evidence for species in and near the park is presented, including the provincially rare *Progomphus obscurus* and the uncommon *Neurocordulia yamaskanensis*. New late and early flight dates for Peterborough County are also included." (Author)] Address: Bree, D., Box 123, Bloomfield, Ontario K0K 1G0, Canada. E-mail: dbree@post.kosone.com

**9263.** Catling, P.M.; Jones, C.D.; Pratt, P. (2004): Ontario Odonata projects; News and comments; Recent literature; Index to species in the year 2002 summary table. Ontario Odonata 4: 194-216. (in English) [10 even running studies are compiled; NEWS AND COMMENTS: 1. *Williamsonia lintneri* has been found in a number of localities in Michigan and likely occurs in Ontario. Articles about its occurrence in Michigan may be found in *Williamsonia*, an excellent publication of the

Michigan Odonate Survey (<http://insects.umrnz.lsa.urnich.edu/michodo/mos.htm> 1, [michodo@urnich.edu](mailto:michodo@urnich.edu). 2. Could Citrine Forktails (*Ischnura hastata*) be expanding north, or have they just been overlooked? There are a number of recent records in the Great Lakes region. See Craves, J. and D. O'Brien. 2003. Update on two 2002 State Records. *Williamsonia* 7(3,4): 6-7. 3. Mike May and Phil Corbet have outlined a question about the northern occurrences of *Anax junius* and their note is worth reading: May, M. and P. Corbet. 2003. Gathering useful information about the seasonal ecology of *Anax junius*. *Argia* (the news journal of the dragonfly society of America) 15(2): 15-16. See also an article about overwintering *Anax junius* in this volume. 4. Although the resource guide may not be reprinted, it is anticipated that the first volume of a three volume guide to the Dragonflies of Ontario by P. M. Catling will be available late in 2004. The first advertisements will likely appear in "Ontario Insects." 5. Mystery species: The following species (historically known from Ontario) have not been recorded during the detailed survey of Odonata in Ontario over the past four years: *Aeshna mutata*, *A. subarctica*, *Anax longipes*, *Celithemis fasciata*, *Coenagrion angulatum*, *Gomphus ventricosus*, *Leucorrhinia borealis*, *Somatochlora ensigera*, *S. hudsonica*, *Stylurus plagiatu*s, *Sympetrum ambiguu*m. 6. Status of Canadian Dragonflies. The National General Status Working Group, which is composed of biologists from each of the Canadian provinces and territories and three federal agencies whose mandate includes wildlife, met in Ottawa on November 22, 2003 to finalize assessments of the general status of 209 dragonfly species in Canada. Ensuring human actions don't drive species extinct in Canada means knowing the status of species across the length and breadth of the nation - which species are secure for now, which to keep an eye on, and which need to be formally assessed and perhaps protected. The most recent effort on dragonflies provides an overview of their status in Canada. It brings the results of Provincial, Territorial, and Federal monitoring efforts onto a single platform for the first time. This effort was conducted under the auspices of the National Accord for the Protection of Species at Risk. The results and interpretation of these assessments will be available on the Wild Species Web site <http://www.wildspecies.ca> as part of Wild Species 2005, the second of the General Status of Species in Canada reports. For more information, contact [wild.species@ec.gc.ca](mailto:wild.species@ec.gc.ca) (From Lisa Twolan and Jim Duncan, January 23, 2004)." (Authors)] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: [catinggp@agr.gc.ca](mailto:catinggp@agr.gc.ca)

**9264.** Catling, P.M. (2004): Monitoring dragonflies using exuviae from under bridges. *Ontario Odonata* 4: 13-14. (in English) ["On the walls beneath bridges exuviae are often more or less protected from wind and rain, and they are often secured by spider webs. For these reasons they remain longer than elsewhere. The walls of bridges, being rather extensive upright structures, provide an opportunity to monitor dragonflies on a continuing basis." (Authors)] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: [catinggp@agr.gc.ca](mailto:catinggp@agr.gc.ca)

**9265.** Catling, P.M.; Jones, C.D.; Pratt, P. (2004): Introduction to the year 2002 Ontario Odonata summary. List of contributors; Observations of Odonata in Ontario during 2001; Corrections to previous volumes. *Ontario Odonata* 4: 41-194. (in English) [The 2002

summary of Ontario Odonata involved 43 contributors and includes 6698 records.] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: [catinggp@agr.gc.ca](mailto:catinggp@agr.gc.ca)

**9266.** Costa, J.M.; Souza, L.O.I.; Oldrini, B.B. (2004): Chave para as famílias e gêneros das larvas de Odonata citadas para o Brasil: Comentários e Registros Bibliográficos. *Publicações avulsas do Museu Nacional, Rio de Janeiro* 99: 1-43. (in Portuguese, with English summary) [An illustrated key to identify the Brazilian Odonata larvae at family and genus levels is provided. Brief information on habitat, and a bibliography with additional information on most of the taxa are also presented.] Address: Costa, J.M., Depto de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: [jcosta@acd.ufrj.br](mailto:jcosta@acd.ufrj.br)

**9267.** Dolný, A.; Veselý, M.; Bárta, D. (2004): On Dragonflies of Central America. *Živa journal* 1/2004: 30-32. (in Czech, with English summary) [General remarks on south American Odonata: "Some 500 known species of Odonata occur in continental Central America. The authors present the odonate richness and the diversity of the insects as well as some remarkable and unusual members of the order. For example, the largest representatives of the suborder Zygoptera living on the Earth hunt for Comb-Footed Spiders, sometimes also called Cobweb Weavers from the family Theridiidae. There are also some dragonflies displaying activities at dusk." (Authors)] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic

**9268.** Feher, Z.; Eröss, Z.; Kotschan, J.; Muranyi, D. (2004): Collecting sites of the zoological expeditions of the Hungarian Natural History Museum to Albania (1992-2003). *Folia historico naturalia musei Matraensis* 28: 67-82. (in English) ["Researchers and collaborators of the Hungarian Natural History Museum participated in nine zoological expeditions to Albania between 1992 and 2003. Mollusca, Oligochaeta, Tardigrada, Araneae, Opiliones, Acari, Decapoda, Amphipoda, Isopoda, Chilopoda, Diplopoda, Ephemeroptera, Odonata, Plecoptera, Blattodea, Dermaptera, Orthoptera, Heteroptera, Homoptera, Psocoptera, Neuroptera, Coleoptera, Diptera, Trichoptera, Lepidoptera, Hymenoptera, Pisces, Amphibia, Reptilia, Aves and Mammalia specimens were collected or observed at 277 localities. Apart of this material is not worked up yet, and some of the results are still unpublished. The aim of publishing the list of the collecting sites was (i) to ease the uniform usage of the locality names, (ii) to make it easy to identify the localities on common maps and (iii) to help other researchers to find and visit the same sites." (Authors) For details see: Muranyi, D. (2007): Contribution to the Odonata fauna of Albania. *Folia entomologica hungarica* 68: 41-53.] Address: Feher, Z., Dept Zoology of the Hungarian, Natural History Museum, H-1088 Budapest, Baross u. 13, Hungaria. E-mail: [feher@nhmus.hu](mailto:feher@nhmus.hu)

**9269.** Forrest, P.J (2004): Southern Emerald Damselfly *Lestes barbarus* in Kent. *Atropos* 21: 81. (in English) [21-VIII- 2004, Sandwich Bay, Kent, UK.] Address: Forrest, P.J., Flat 3, No. 8 Chandos Square, Broadstairs, Kent, CT10 1QN, UK

**9270.** Jobin, L.-J.; Perron, J.-M. (2004): Odonatofaune du parc écologique du mont Shefford, division de recensement de Shefford, Québec. *Le Naturaliste Cana-*



dien 128(1): 27-30. (in French) [6 sites within the boundaries of the ecological park of Shefford mountain, Québec, Canada were surveyed in 2000 and 2001. 42 Odonata species could be recorded; these are listed in a table together with phenological data.] Address: Perron, J.-M., 963, rue Grandjean, app. 506, Sainte-Foy, Quebec G1X 4P9, Canada. E-mail: collections@coll.ulaval.ca

**9271.** Starzyk, J.R. (2004): Contribution of entomologists of Lviv to the development of nature conservation in eastern Galicia. Scientific Bulletin of the Ukrainian State Forestry University 14(8) ISSN: 1994-7836: 38-46. (in English, with Ukrainian summary) ["Entomological research before World War I, and during the period between First and Second World Wars was conducted in Lviv in three scientific centres: Dzieduszycki Natural Museum, Department of Forest Protection & Entomology of Forest Technological University of Lviv, and Department of Zoology of Jan Kazimierz University. In 1920 the Entomological Section was erected within Nicholas Copernicus Natural Society, transformed into the Polish Entomological Association in 1923. A high activity of entomologists conducting investigations in eastern Galicia resulted in over 360 publications, mainly of faunistic character. They formed the basis for evaluation of natural areas which should be put includes such names as Marian Lomnicki, Jaroslaw Lomnicki, Aleksander Kozikowski, Jan Romaniszyn, Jan Kinel, Adam Krasucki, Jan Noskiewicz, and Roman Kuntze. [...] Józef Dziędzielewicz (1844-1918) was a long term co-worker of the Physiographic Committee of the Polish Academy of Sciences in Krakow. He conducted faunistic investigations in surroundings of Lviv, Podolia, the Gorgany Mts, Czarnohora, the Tatra Mts, and Silesia, collecting insects of the orders: Ephemeroptera, Odonata, Plecoptera, Copeognatha, Megaloptera, Raphidioptera, Plannipennia, Trichoptera, and Mecoptera. A part of his collection he handed down to the Museum of the Physiographic Committee in Krakow, and a part to the Dzieduszycki Museum. The results of his studies were published in the "Reports of the Physiographic Committee of the Polish Academy of Sciences". A specially valuable is his monograph of dragonflies of Galicia (1902), and the work entitled "Neuropterous insects of the Polish territory" (1919-1920) published by the Dzieduszycki Museum." (Author)] Address: Starzyk, J.R., Department of Forest Entomology, Agricultural University of Kraków, 31-425 Kraków, Al. 29 Listopada 46, Poland

## 2005

**9272.** Ameilia, Z.S.; Che Salmah, M.R.; Abu Hassan, A. (2005): The diversity of Odonata in relation to ecosystem and land use in northern peninsular Malaysia. Jurnal Ilmiah Pertanian KULTURA 40(2): 106-112. (in English) ["Odonata larvae were sampled from 16 tributaries of Kerian River in Kerian River Basin (KRB) using a long handle D-pond net from September 1998 until May, 1999 covering wet and dry seasons. Platynemididae (Suborder Zygoptera) and Libellulidae (Suborder Anisoptera) were the most dominant families. The distribution of odonate genera was significantly different in wet season ( $F=4.70$ ) and dry season ( $F=3.99$ ) at  $p=0.05$  in all streams but no difference in distribution was detected between both seasons. Scores of biological indices ( $H'$ ,  $D$ ,  $E$ ,  $R1$ ,  $R2$ ) and indicator species based on selected chemical properties were listed, which showed the dragonfly fauna was slightly poor.

There were strong correlation between generic diversity to dissolved oxygen and nitrate in wet season, likewise temperature and conductivity in dry season." (Authors)] Address: Ameilia, Z.S., Lecturer Dept. Pest and Disease, Faculty of Agriculture USU, Medan 20155, Malaysia

**9273.** Beckemeyer, R. (2005): Afrikan Anisoptera and Zulu Zygoptera: A Trip to South Africa. Idalia Society of Mid-American Lepidopterists 16(2): 3-5. (in English) [oas 29 Report from a field trip made in February 2005.] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**9274.** Behle, L.; Lisges, E.; Irle, A. (2005): Erstnachweise der Südlichen Binsenjungfer *Lestes barbarus* (Fabricius, 1798) und des Kleinen Granatauges *Erythromma viridulum* (Charpentier, 1840) sowie weitere bemerkenswerte Libellenbeobachtungen im Kreis Siegen-Wittgenstein. Beiträge zur Tier- und Pflanzenwelt des Kreises Siegen-Wittgenstein 8: 29-34. (in German) [Nordrhein-Westfalen, Germany. Records of the following Odonata species are communicated: *Sympetrum pedemontanum*, *Lestes barbarus*, *Erythromma viridulum*, *E. najas*, *Orthetrum brunneum*.] Address: Behle, L., Albaumer Str. 5, 57399 Kirchhundem, Germany

**9275.** Borisov, S.N. (2005): Ecology of *Selysiothemis nigra* (Vander Linden, 1825) (Odonata, Libellulidae) under desert conditions. Eurasian entomological journal 4(2): 95-100. (in Russian, with English summary) ["The ecology of *S. nigra* is investigated in one of the hottest region of Central Asia, Tigrovaya Balka State Reserve in Tajikistan where it reaches its greatest abundance on semi-flowing artificial reservoirs. Development of the species is bivoltine, individuals of the second generation being smaller in size. Emergence of the first generation imagines starts when the daily average aerial temperature reaches 22-23° C. Emergence takes place at night. During the pre-reproductive period, dispersal from reservoirs is well expressed. In the desert zone, *S. nigra* is the most heliophilic, thermophilic and xerophilic species among all dragonflies. Peaks of daily activity coincide with the highest values of temperature and lowest values of air humidity under direct sun irradiation.] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Bran, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**9276.** Borisov, S.N. (2005): Distribution and habitat characteristics of *Ophiogomphus reductus* Calvert, 1898 (Odonata, Gomphidae). Eurasian entomological journal 4(4): 273-278. (in Russian, with English summary) [Records of *O. reductus*, a species endemic to Central and Middle Asian mountains, from Turkmenistan and Tajikistan are detailed, and all available data are mapped. "In mountainous areas, the larvae develop in rivers strongly influenced by silt and snow waters. The main factor influencing the spread of this species in the plains is anthropogenic, since the larvae inhabit channels of irrigation systems; hence their establishment there over time is related to the development of irrigation work." (Author)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Bran, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**9277.** Kryukova, N.A.; Yurlova, N.I.; Glupov, V.V. (2005): The effect of trematodes on the cellular immunity of the dragonfly *Aeschna grandis* (Odonata) larvae.

Parazitologiya 39(4): 306-317. (in Russian, with English summary) [The last larval stage of *A. grandis* is highly infested trematodes of the families Plagiorchiidae and Prosthogonimidae. "About 30 % of the trematode cysts were melanized. It is established, that the parasitising of the trematodes do not affect the process of incapsulation of extrinsic bodies, but it suppresses partly the formation of oxygen free radicals and phenoloxidase activity in the haemocytes of dragonfly larvae." (Authors)] Address: Kriukova, N.A., Siberian Division, Russian Academy of Sciences, Inst. of Animal Systematics and Ecology, ul. Frunze 11, Novosibirsk, 630091, Russia

**9278.** Mancu, C.O. (2005): Preliminary study on the dragonfly (Insecta: Odonata) fauna from the Vanatori Neamt Natural Park. In: Deju R. & S. Catanoiu (Eds): Studies and research in Vanatori Neamt Natural Park. 1: 28-35. (in English, with Romanian summary) [At present, 11 Odonata species have been recorded until now. The relative small number of species found results from an inappropriate period of the year in which the samples have been collected.] Address: Mancu, C.O., Acad. Remus Radulet 13, bl. 119, ap. 7, Timisoara 300281, Timis County, Romania. E-mail: cosminovidiu@yahoo.com

**9279.** Moiseenko, T.I. (2005): Effects of acidification on aquatic ecosystems. Russian Journal of Ecology 36(2): 110-119. (in English) ["Effects of acidification on aquatic ecosystems are analyzed on the basis of an analytical synopsis of relevant data. Major active agents influencing aquatic organisms and main trends in the reorganization of microbial, phyto- and zooplanktonic, benthic, and fish communities in an acidified environment are described. A generalized concept of changes in ecosystems caused by acid precipitation and accompanying factors is formulated. These changes include the reduction of biodiversity of all structural elements due to the disappearance of species sensitive to acidification, modification of trophic structure, and decrease of fish stock." (Author) The study includes references to a few studies with information on acidification impacts on Odonata, but provides no original data. Translated from *Ekologiya*, No. 2, 2005, pp. 110-119] Address: Moiseenko, T.I., Institute of Water Problems, Russian Academy of Sciences, ul. Gubkina 3, Moscow, 119991 Russia

**9280.** Olthoff, M. (2005): Die Gemeine Keiljungfer (*Gomphus vulgatissimus*) an der Berkel, Westmünsterland. Jahrbuch des Kreises Borken 2006: 53-56. (in German) [Nordrhein-Westfalen, Germany; In 2001, a survey of *G. vulgatissimus* was made along the Berkel, a sandy river in den German/Dutch border region. The river bears a strong population of the species.] Address: Olthoff, M., Naturförderstation im Kreis Coesfeld, Borkener Straße 13, 48653 Coesfeld, Germany. E-Mail: matthias.olthoff@naturfoerderstation.de

**9281.** Paoletti M.G.; Dufour, D.L. (2005): Edible invertebrates among Amazonian indians: A critical review of disappearing knowledge. Paoletti M.G. (ed.) 2005. Ecological Implications of Minilivestock. Potential of Insects, Rodents, Frogs and Snails Science Publishers, Enfield N.H., USA 648 pp: 293-342. (in English) ["For the indigenous populations of Amazonia, invertebrates constitute an important component of the diet. Information on entomophagy for 39 ethnic groups (and three other post-Columbian settlers) or about 21.4% of the 182 groups known in the Amazon Basin is presented here,

but utilization of this non-conventional food resource is surely much more widespread. A database is given of all the information available for each ethnic group regarding the species included in the diet, scientific and the ethno name if known, stage of life cycle consumed, manner of preparation and, when known, host plant. This database lists 209 scientifically identified species (including seven Odonata taxa identified at the species resp. genus level). Information on an additional 426 species and ethno names, with an insecure link to Linnean taxonomy suggest that local knowledge is very extensive. The database represents not only an easy-to-consult resource, but also a support for further research. Caterpillars, termites, leafcutter ants, bees, wasps, and Coleoptera seem to be the more collected items, together with a few aquatic ones. The most intensively collected are those dependent on forest leaves and litter, representing in general the higher biomass, so much work needs to be done for other groups, including caterpillars, aquatic insects, grasshoppers, snails, and spiders. Knowledge of the relations between indigenous populations and ecosystems is indeed the base for the preservation of natural and cultural biodiversity. We are at the beginning of a survey that has to be expanded." (Authors)] Address: Paoletti M.G., Dept of Biology, Padova University, Via U. Bassi 58/b, Padova, Italy. E-mail: paoletti@civ.bio.unipd.it

**9282.** Perron, J.-M.; Jobin, L.-J.; Mochon, A. (2005): Odonatofaune du parc national de la Yamaska, division de recensement de Shefford, Québec. *Le Naturaliste Canadien* 129(2): 17-25. (in French) [This National Park is situated app. 90 km southeast of Quebec, Canada. A total of 67 Odonata species was recorded in 2002. The species are differed for six sampling sites in a table, and species diversity is compared with addition studies made in regions south of Quebec.] Address: Perron, J.-M., 963, rue Grandjean, app. 506, Sainte-Foy, Quebec G1X 4P9, Canada. E-mail: collections@coll.ulaval.ca

**9283.** Saleh, M.A.; Basuony, M.I. (2005): The Zoril, *Ictonyx striatus erythrae* De Winton, 1898 in Egypt. *Egyptian Journal of Biology* 7: 103-107. (in English) ["The Zoril *Ictonyx striatus* is one of the rarest mammals of Egypt, known from only two specimens collected more than 50 years ago. The collection of two new specimens and the observation of others in the Gabal Elba area provide new data on this little-known animal in Egypt. [...] The analysis of the stomach contents of our Egyptian specimens revealed that insects form the main item in the food of this mammal. Insects belonging to three different orders were detected. Coleoptera were represented by several species of ground-dwelling beetles, which occurred with the highest frequency in the stomach contents (84%). Odonata and Hymenoptera (ants) occurred at frequencies of 8 % and 6% respectively. Contrary to these findings, Dorst (1970) and Osborn & Helmy (1980) suggest that the food of *Ictonyx striatus* consists of rodents, reptiles and bird eggs." (Authors)] Address: Basuony, M.I., Dept Zoology, Faculty of Science, Al-Azhar Univ., Nasr City, Cairo, Egypt

**9284.** Ternois, V.; Fradin, E.; Gautier, C. (2005): Atlas préliminaire des Odonates du Parc naturel régional de la Forêt d'Orient. *Courrier scientifique du Parc naturel régional de la Forêt d'Orient* 28: 90 pp. (in French) [Champagne-Ardenne, France; between 1998 and 2005, 51 Odonata species were recorded. These are monographically introduced, and the records of each species are mapped in detail.] Address: Parc naturel

2006

**9285.** Borisov, S.N. (2006): Distribution and ecology of *Sympetrum arenicolor* Jödicke, 1994 (Odonata, Libellulidae) in Middle Asia. *Eurasian entomological journal* 5 (4): 278-284. (in Russian, with English summary) ["Distribution data on *S. arenicolor* in Middle Asia are given. It is shown that this species mainly inhabits artificial ponds in lowlands. Its development is monovoltine. Seasonal migrations into mountains and back to lowlands are characteristic during the pre-reproductive period. Emergence in spring and in the beginning of summer, and reproductive period in autumn and the beginning of winter are described. This species is the most kreophilous amongst all dragon flies in desert zone of the Middle Asia. It probably evolved in mountainous conditions, but its increase in numbers in lowlands during historic time is dependent on the development of irrigation systems." (Author)] Address: Borisov, S.N., Russian Acad. Sci., Inst. Animal. Systemat. & Ecol., Novosibirsk 610091, Russia. E-mail: mu4@eco.nsc.ru

**9286.** Borisov, S.N. (2006): A new record of *Lindenia tetraphylla* (Van der Linden, 1825) (Odonata, Gomphidae) in Balkhash Region, South East Kazakhstan. *Eurasian entomological journal* 5(2): 122. (in Russian, with English summary) [*L. tetraphylla* is documented from two northern-easternmost localities of South-East Kazakhstan, 45° 03' N, 74° 37' E and 45° 22' N, 74° 08' E.] Address: Borisov, S.N., Institute of Systematic & Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia

**9287.** Boukhemza, M.; Boukhemza-Zemmouri, N.; Voisin, J.-F.; Baziz, B. (2006): Écologie trophique de la Cigogne blanche (*Ciconia ciconia*) et du Héron garde-boeufs (*Bubulcus ibis*) en Kabylie (Algérie). *ecologia mediterranea* 32: 15-28. (in French, with English summary) [Odonata are a potential regionally available prey, but it is not clear from the publication if they are preyed upon by the two bird species.] Address: Boukhemza, M., Laboratoire d'ornithologie et d'écologie des vertébrés, Département des sciences agronomiques, Université Mouloud Mammeri de Tizi Ouzou, BP 17 RP, Tizi Ouzou, DZ-15000, Algeria. E-mail: boukhemza@hotmail.com

**9288.** Couteyen, S. (2006): Étude de l'exploitation des sites de reproduction par les Anisoptères à l'île de la Réunion (Odonata). *Bulletin de la Société entomologique de France* 111(1): 65-71. (in French, with English summary) [France, Réunion; habitat selection of reproduction sites and interspecific competition avoiding mechanisms are discussed. The paper considers all Odonata taxa known to occur along the island: *Anax imperator mauritanus*, *Diplacodes lefebvrei*, *Gynacantha bispina*, *Hemicordulia asiatica*, *Orthetrum* spp. (*O. brachiale* et *O. stemmale*), *Pantala flavescens*, *Sympetrum fonscolombii*, *Tholymis tillarga*, *Tramea limbata*, *Trithemis annulata haemetina*, and *Zygonyx torrida torrida*.] Address: Couteyen, S., Assoc. Reunionnaise Ecol., 188 Chemin Nid Joli, F-97430 Le Tampon, Reunion. E-mail: couteyensf@wanadoo.fr

**9289.** Feulner, G. (2006): Kuwait Natural History. *Gazelle, Dubai* 21(6): 4-5. (in English) ["Last but not least,

my Kuwait visit ("May 2006") gave me, quite unexpectedly, my first encounter with the Arabian lobetail (*Lindenia tetraphylla*), Arabia's largest perching dragonfly. Also present were many of the smaller, hovering desert darter (*Selysiotthemis nigra*). Both of these species were probably migrating into the area in response to the recent rains, as they have long been recognised to do." (Author)] Address: Feulner, G., c/o Dubai Natural History Group, PO Box 9234, Dubai, United Arab Emirates

**9290.** Feulner, G. (2006): Diverse Dragonflies. *Gazelle, Dubai* 21(5): 6-7. (in English) [Oman; "In March I visited a minor wadi in the Mahdhah area where, at the mountain front, a small settlement exists and a series of bedrock pools have been "improved" for human and agricultural use. Just above this area, at a 10m long natural pond that had not existed when I visited the site two years before, I found 12 species of dragonflies – an impressive number given that only about 24 species have been identified from the UAE and neighbouring northern Oman. My mid-morning visit gave me an opportunity to watch how all of these "similar but different" organisms divided up the available pond habitat among them." (Author) The following species are briefly discussed: *Ischnura evansi*, *Arabicnemis caerulea*, *Arabineura khalidi*, *Trithemis arteriosa*, *T. kirbyi*, *T. annulata*, *Paragomphus sinaiticus*, *Crocothemis erythraea*, *Diplacodes lefebvrei*, *Orthetrum sabina*, *O. chrysostigma*, *Anax imperator*] Address: Feulner, G., c/o Dubai Natural History Group, PO Box 9234, Dubai, UAE

**9291.** Feulner, G. (2006): Dragonfly migration. *Gazelle, Dubai* 21(3): 4. (in English) ["*Hemianax ephippiger* was once again on its characteristic January migration in January 2006. Or rather, since this phenomenon is not known with certainty to be a directional one, perhaps it should be called a peregrination. In any case, large numbers were observed at mid-month among low hills in the Wadi Shawkah area. In previous years, in January swarms could be found intermittently over much of the mountain areas, including even the very tip of the Musandam Peninsula. Gary Feulner would be interested to know if others have noticed this year's 'migration.' The Vagrant Emperor is a relatively large dragonfly and generally patrols at a height of more than a meter above the ground, seldom perching. Both males and females appear basically olive green in flight, although the male may show accents of blue. [If high-swarmling dragonflies seem slightly reddish, you are probably seeing the Globe Skimmer (*Pantala flavescens*), a strong migrant which often appears after localized showers.] Address: Feulner, G., Dubai Nat. Hist. Gr., P.O. Box 9234, Dubai, UAE

**9292.** Jensen, P.D. (2006): Ecological impact of selenium and mercury on two insect food chains. PhD Dissertation, University of California, Riverside, CA, USA. 139 pp. (in English) [The author evaluated the effects of Se and/or methyl-mercury (MeHg) on consumption rates of *Sympetrum corruptum* when fed *Culex quinquefasciatus* (Diptera: Culicidae). He found that *S. corruptum* in Se treatment solutions consumed significantly more mosquito larvae per day than controls; however, predators eating prey contaminated with Se + MeHg consumed significantly fewer prey per day. Predators' consuming more in Se-treated water with non-treated prey was attributed to the mosquito larvae experiencing a reduction in avoidance behaviour. Predators' consuming less in the Se + MeHg treatments was attributed to treatments making the prey unpalatable or suppressing



the predator's appetite.] Address: Jensen, P.D., Department of Entomology, University of California, Riverside, 92521 California, USA

**9293.** Kirchen, T. (2006): Mittagssmahl der etwas unüblichen Art. *mercuriale* 6: 41. (in German) [A female *Ischnura elegans* devoured a freshly emerged female *Coenagrion puella*.] Address: Kirchen, T., Wolsfelder Str. 35, 54886 Holsthum, Germany

**9294.** Kriukov, N.A.; Sokolova, I.; Glupov, V.V. (2006): Microsporidiosis of the dragonfly *Aeshna viridis* larvae (Odonata: Aeshnidae) caused by *Systemostrema alba* Larsson, 1988 (Microsporidia: Thelohaniidae). *Parazitologiya* 40(1): 66-73. (in Russian, with English summary) ["A microsporidian species producing octospores in sporophorous vesicles is found in *Aeshna viridis* larvae from intermittent streams situated in the vicinity of Novosibirsk City. Size of the spores measured on fresh smears was 6.9 +/- 0.09 microm x 4.1 +/- 0.08 microm (6.0-7.6 x 3.5-4.9). Each spore have single elongated nucleus and an anisofilar polar filament composed of 10-11 anterior and 10-11 posterior coils. The infection was restricted to adipose tissue. According to spore morphology the Siberian isolate can be attributed to the species *Systemostrema alba* described from *Aeshna grandis* in Sweden (Larsson, 1988). This is the first description of *Microsporidia* infecting Odonata from Siberia." (Authors) The microsporidia constitute a phylum of spore-forming unicellular parasites. They were once thought to be protists but are now known to be fungi.] Address: Glupov, V.V., Laboratory of insect pathology, Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Frunze street 11, Novosibirsk 630091 Russia

**9295.** Li, X.; Zhou, W.; Yang, Y.; P, X.-f. (2006): Sexual dimorphism and feeding habits of *Rana pleuraden*. *Journal of southwest forestry college* 26(1): 47-51. (in Chinese, with English summary) [China (no additional locality information provided in English language), 563 specimens of *Rana pleuraden* (female: 235, male: 223) were analysed for feeding habits. Odonata were only represented by one prey item from 1 118 items devoured by females.] Address: Li, X., Faculty of Conservation Biology, Southwest Forestry College, Kunming Yunnan 650224, China

**9296.** Lu, J.-f.; Che, J.-z. (2006): Review on the utilization history, current status and development trend of edible insect resources. *Shipin Kexue* 27(12): 830-837. (in Chinese, with English summary) ["Edible insects as alternate source of food provide significant nutritional, economic and ecological benefits for rural communities. In this review, we summarize research progresses of edible insect resources, including that the utilization history, species and distributions of edible insects in the whole globe, and the attitude of the eastern and western world on this issue. Based on the current status, some reasonable advices on exploitation and utilization of edible insects as human food were suggested." (Authors) Table 1 includes "Odonata".] Address: Lu, J.-f., School of Biotechnology and Food Engineering, Hefei University of Technology, Hefei 230009, China

**9297.** Schiel, F.J.; Hunger, H. (2006): Zufallsfunde von *Sympyga fusca* in mutmaßlichen Überwinterungshabitaten fernab geeigneter Entwicklungsgewässer. *Mercuriale* 6: 26-27. (in German) [Baden-Württemberg, Germany; forest clearings as hibernation habitats of *S. fusca* are documented. Post emergence mobility of the

specimens from the nearest known breeding habitat may reach up to 16 km as the crow flies.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**9298.** Schmidt, E. (2006): Das NSG Fürstenkuhle im Gescher-Hochmoor. Ein gefährdeter Hochmoorrest aus Sicht der Libellenfauna. *Naturzeit* 3(6): 12-13. (in German) [The author introduce into the development / degradation over the past app. 70 years of the high bog Fürstenkuhle between Coesfeld and Velen, Nordrhein-westfalen-Germany, with special emphasis on the Odonata fauna.] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**9299.** Semwal, N.; Akolkar, P. (2006): Water quality assessment of sacred Himalayan rivers of Uttaranchal. *Current Science* 91(4): 486-496. (in English) ["Mass bathing in sacred water bodies is an age-old ritual in India. Organized outdoor bathing is an important in situ utilization of water bodies, which demands water quality requirements for drinking as well as bathing purposes. Apart from this, the Himalayan rivers have a great potential for hydroelectric power generation due to altitudinal variations. The present study deals with water quality assessment of rivers in Uttaranchal, in view of their religious importance and ecological sustainability. Based on bio-monitoring assessment, biological water quality criteria have been evolved for rivers of Uttaranchal, indicating various beneficial uses of water quality and their respective levels of characteristics. Out of 60 stretches of 19 rivers, 41 stretches indicated clean water quality of Class 'A', five stretches were slightly polluted (class 'B'), six were moderately polluted (class 'C'), one stretch was highly polluted (class 'D') and there were altogether seven severely polluted (class 'E') stretches. The physico-chemical water quality in most of the rivers of Uttaranchal remained unchanged except of total dissolved solids, which ranged from 90.23 to 121.33 mg/l, total suspended solids varying from 126.5 to 236.5 mg/l and total alkalinity of 37.0 to 96.0 mg/l. Religious places have contributed significant levels of sulphates to water quality (1.66 to 20.0 mg/l). Traces of iron, zinc and copper metals in water and sediments have been observed in clean water quality stretches. Agricultural practices on the river bank may have considerable impact on contribution of pesticide residues such as total Endosulfan, Dieldrin and DDT. Open defecation is the most common activity on river banks, which has significant contribution towards the aesthetic water quality of rivers." (Authors) Odonata are treated at the family level.] Address: Semwal, N., Central Pollution Control Board (Ministry of Environment & Forests, Govt of India), Parivesh Bhawan, East Arjun Nagar, Delhi 110 032, India. E-mail: nripsemwal@yahoo.co.in

**9300.** Société Limousine d'Odonatologie (2006): Elaboration d'une Liste Rouge des odonates menacés du Limousin. *Epops - La revue des naturalistes du Limousin* 70(4): 8-10. (in French) [33 odonate species are redlisted in the Limousin region, France (Départements Corrèze, Creuse, Haute-Vienne).] Address: Société Limousine d'Odonatologie, 11, rue Jauvion, F-87000 Limoges, France

**9301.** Archaux, F. (2007): *Sympetrum fonscolombii* (Selys, 1840), nouvelle espèce pour le département du Loiret et découverte d'une nouvelle population de *Coenagrion mercuriale* (Charpentier, 1840). *Martinia* 23(3): 109-111. (in French, with English summary) [Département Loiret, France; "the observation of at least one male of *Sympetrum fonscolombii* on the Grand rue pond on 4th June 2006 constitutes the first record of this species for the Loiret department (Centre region). Furthermore, a new population of *C. mercuriale* was discovered in May 2005 on a small, temporary stream over chalky substrate. This population is the fourth known in the department and the only one in the East." (Author)] Address: Archaux, F., Cemagref, Domaine des Barres, 45290 Nogent-sur-Vernisson, France

**9302.** Bernard, D. (2007): Découverte d'une nouvelle population d'*Epithea bimaculata* (Charpentier, 1825) dans l'Ain (Odonata, Anisoptera, Corduliidae). *Martinia* 23(1): 30. (in French) [26-V-2006, Thézillieu (01), France.] Address: Bernard, D., 15 rue Puits Gaillot, F-69001 Lyon, France. E-mail: damlbernard@yahoo.fr

**9303.** Borisov, S.N.; Haritonov, Yu.A. (2007): The dragonflies (Odonata) of Middle Asia. Part 1. Caloptera, Zygoptera. *Eurasian entomological journal* 6(4): 343-360. (in Russian, with English summary) ["A review of the Odonata fauna of Middle Asia (Turkmenistan, Uzbekistan, Tajikistan, Kyrgyzstan, southern part of Kazakhstan) is presented from which 85 species of dragonflies have been recorded, including 51 for Turkmenistan, 56 for Uzbekistan, 56 for Tajikistan, 58 for Kyrgyzstan and 66 for the southern part of Kazakhstan. Taxonomic problems, distribution characteristics and ecology of Caloptera and Zygoptera are given in this first part of the review. Distribution maps for all (n = 36) zygopteran species in Middle Asia are provided." (Authors) Table 1. List of dragonfly species and their distribution in Middle Asia: Turkmenistan, Uzbekistan, Tajikistan, Kyrgyzstan, southern part of Kazakhstan] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**9304.** Cordoba-Aguilar, A.; Leshner-Trevino, A.C.; Anderson, C.N. (2007): Sexual selection in *Hetaerina titia* males: a possible key species to understand the evolution of pigmentation in calopterygid damselflies (Odonata: Zygoptera). *Behaviour* 144(8): 931-952. (in English) ["*H. titia* males bear wing pigmentation patterns similar to *Hetaerina* and *Calopteryx* (a derived sister genus of *Hetaerina*) species: black (typical of *Calopteryx*) and red (typical of *Hetaerina*). Sexual selection has operated on red (via male-male competition) and black (via male-male competition and female choice) in *Hetaerina* and *Calopteryx*, respectively. We investigated sexual behaviour and pigmentation in *H. titia* to understand their evolution in both genera using *H. titia* as a possible evolutionary transitional stage. Similar to *Calopteryx*, the black pigmentation correlated with five male quality aspects: defending a territory, survival, immune ability, parasite resistance and fat reserves. We hypothesize that black pigmentation, but not red, may be used to signal energetic condition when males compete for a territory. The red pigmentation, despite indicating male quality in *Hetaerina* species, did not correlate with quality but showed a positive relation with parasite

burden. These results suggest that the red lost its function which was gained by the black pigmentation, possibly via intrasexual competition, in the absence of female choice (as *H. titia* does not show male pre-copulatory courtship as in *Calopteryx*, during which females choose males based on black pigmentation). It is unknown why the red pigmentation was retained." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biológicas, Univ. Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**9305.** Dommangeat, J.-L. (2007): La faune odonologique du département des Yvelines: état des connaissances (Région Ile-de-France). *Martinia* 23(3): 95-108. (in French, with English summary) [France; "This first assessment of Yvelines department Odonata counts 51 species, i.e. 56% of mainland France fauna. Half of these species are critically endangered (1 species), endangered (3 species) or vulnerable (22 species). Two tables summarize the status, habitats and populations of the species present in the area." (Author)] Address: Dommangeat, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**9306.** Dommangeat, J.-L. (2007): La rue René Martin au Blanc (Département de l'Indre). *Martinia* 23(1): 34. (in French) [A street in Blanc (Département Indre), France was named after René Martin (1846-1925).] Address: Dommangeat, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**9307.** Dommangeat, J.-L. (2007): Analyse d'ouvrage: Les libellules de Belgique. Répartition, tendances et habitats par P. Goffart, G. De Knijf, A. Anselin et M. Tailly, 2006, Publication du Groupe de Travail Libellules Gomphus et du Centre de Recherche de la Nature, des Forêts et du Bois. Ministère de la Région wallonne. Série Faune-Flore-Habitats, n°1. Gembloux. Relié couverture souple en couleurs. 24 x 17 cm, 398 pages. Très nombreuses cartes, graphiques, tableaux, photographies et autres illustrations en couleurs. ISBN: 2-87401-204-1 - Distributeur: Librairie Aves-Natagora, Maison liégeoise de l'Environnement, Rue Fusch 3, B-4000 Liège. librairie@aves.be. Prix : 24,90 €. *Martinia* 23(2): 71-72. (in French) [book review] Address: Dommangeat, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**9308.** Dyatlova, E.; Kalkman, V. (2007): Important Dragonfly Areas in Southwest Ukraine. Dutch Ministry of Agriculture, Nature and Food Quality (BBI-MATRA / 2006/002): 32 pp. (in English) ["In this report information gathered during the project 'Guardians of the watershed: Identifying Important Dragonfly Areas in Southwest Ukraine' is presented. The project was conducted from July 2006 to December 2007. [...]. The project resulted in an overview of the dragonfly fauna and a list of Important Dragonflies Areas of SW Ukraine. This information is important when establishing new nature reserves and for the management of existing reserves. In order to do so a database was created containing Ukrainian records and additional fieldwork have been conducted. Based on four criteria six areas were selected as Important Dragonfly Areas: 1) Reservoirs in a lower part of Khadzhibejski Liman; 2) Basin of South Bug and Ingul rivers; 3) Lower Dniestr with tributaries and lakes and Dniestrovski Liman; 4) Kinburn Peninsular; 5) Dniepr Delta; 6) Lower Danube and Predanube Region. The project resulted in the start of

an informal organised Odonata-community in Ukraine, which will maintain and further expand the database with distributional records." (Authors) The regional distribution of the following species is mapped: *Aeshna cyanea*, *Anax imperator*, *Calopteryx splendens ancilla*, *Coenagrion scitulum*, *C. ornatum*, *Cordulia aenea*, *Erythromma lindenii*, *Gomphus vulgatissimus*, *Stylurus flavipes*, *Lestes macrostigma*, *Selysiothemis nigra*, *Sympetrum danae*, *S. depressiusculum*, and *S. pedemontanum*.] Address: Dyatlova, Elena, Inst. of Zool., Faculty of Biology, I.I. Mechnikov Univ. of Odessa, Odessa, Ukraine. E-mail: lena.dyatlova@gmail.com

**9309.** Dyatlova, E.S. (2007): Polymorphism of coenagrionid damselflies in the southwestern Ukraine. Questions of aquatic entomology of Russia and adjacent lands: Materials of the Third All-Russia Symposium on Amphibiotic and Aquatic Insects. Voronezh State University. ISBN 978-5-9273-1169-9: 107-113. (in Russian, with English summary) ["Population characteristics of *Coenagrion pulchellum* and *Ischnura elegans* were studied in southwestern Ukraine for the first time. During all the flight period juvenile specimens were continually recorded in two populations of *I. elegans*. The following population characteristics have been studied: age structure of populations and ratio of gynomorphic and andromorphic females. It was shown that in southwestern Ukraine andromorphic females of *C. pulchellum* constituted 25% of the females. In two populations of *I. elegans* andromorphic females constituted 52% and 66%." (Author)] Address: Dyatlova, Elena, Inst. of Zool., Faculty of Biology, I.I. Mechnikov Univ. of Odessa, Odessa, Ukraine. E-mail: lena.dyatlova@gmail.com

**9310.** Feulner, G. (2007): Dragonflies at the Beach. *Gazelle, Dubai* 22(2): 5. (in English) ["When I first came to the UAE, I was surprised to find the occasional dragonfly deep within sand desert regions such as Liwa. Later I learned that two kinds, both relatively large, can often be found in the deserts of the UAE, although sadly from the point of view of study they are "hawkers" that tend to remain in flight continuously and seldom settle. One is the globe skimmer, *Pantala flavescens*, a pantropical dragonfly that is a strong migrant and often one of the first to show up in a "dry" area (desert, wadi or mountain) after rain. In January a lone female specimen patrolled very close to us as we sat in the shade of the car near midday among large dunes in the Umm Az-Zamool area. This is a medium size dragonfly that is often identifiable by the slightly "dipped" posture of its abdomen in flight. Females are a yellowish green; males may be more orange or reddish, with a bright yellow face. The other is the larger Vagrant Emperor, *Hemianax ephippiger*, also yellowish green, but with hints of blue in the male, which seems often to migrate in January and February. Most of the Emperor dragonflies in the collection at EAD (formerly ERWDA) in Abu Dhabi are of this species. In confirmation of prior experience, I have recently seen this species in the Huqf area of Oman (patrolling outside a roadside restaurant) and in Umm Az-Zamool (patrolling the landscaped surroundings of a guardhouse). I was able to confirm the identification of the Umm Az-Zamool species because one flew into the lantern in the archeologists' field camp there. It was swatted and dispatched by one of the workmen, but preserved for science and brought back to civilisation by former DNHG member John Martin, a member of the archeological team. Like the Globe Skimmer, the Vagrant Emperor is a strong migrant and

can be found throughout the UAE, not just in deserts. In mid-February, travelling home by taxi from a delightful tour of Bur Dubai's Temple Alley, I saw two individuals patrolling different patches of roadside landscaping within urban Dubai." (Author)] Address: Feulner, G., c/o Dubai Natural History Group, PO Box 9234, Dubai, UAE

**9311.** Feulner, G. (2007): Dragonflies at the Beach. *Gazelle, Dubai* 22(10): 6-7. (in English) [United Arab Emirates; "In early September of this year, on a visit to Hulaylah Island north of Rams, RAK, ... I encountered *P. flavescens* almost everywhere on the barrier island, despite the decidedly overgrazed and partly 'developed' landscape. We saw them swarming high in the air near large mesquite trees; around goat and camel pens; patrolling a partially fenced area that excluded camels (but not goats) and therefore had retained a low ground cover of the bristly *Heliotropium kotschy*; over more or less barren, overgrazed sand near a shallow lagoon with flamingoes (where the dragonflies seemed to seek out our vehicles as an intruder into their familiar surroundings; and even along the length of the 1 km jetty at the mouth of the inlet.) We found them active from 7 am until we ourselves departed at nearly noon." (Author)] Address: Feulner, G., c/o Dubai Natural History Group, PO Box 9234, Dubai, UAE

**9312.** Grand, D. (2007): *Coenagrion ornatum* (Selys in Selys et Hagen, 1850) dans le département du Rhône (Odonata, Zygoptera, Coenagrionidae). *Martinia* 23(2): 66. (in French) [The author documents three records of *C. ornatum* in the Rhône Department, France from May/June 2007.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France. E-mail: danielgrand@yahoo.fr

**9313.** Grand, D. (2007): Apparition précoce des libellules au printemps 2007 en région lyonnaise. *Martinia* 23(3): 88. (in French) [Phenological data on spring flight season in the Lyon region, France are presented.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France. E-mail: danielgrand@yahoo.fr

**9314.** Greenway, M.; Polson, C. (2007): Protecting aquatic ecosystem health: are water quality objectives realistic? Case studies from Queensland, Australia. *NOVATECH 2007*: 1747-1754. (in English, with French summary) ["Many regulatory authorities set water quality objectives or thresholds based on nutrient concentrations to safeguard aquatic ecosystem health. But do these criteria adequately assess the biological and ecological status? Our research has been focussing on the performance of constructed wetlands for water quality improvement and ecosystem health. In this paper we present data on macroinvertebrate species richness from two wastewater treatment wetlands and two stormwater treatment wetlands. Despite nutrient concentrations exceeding water quality objectives all four wetlands supported a diverse assemblage of macroinvertebrates, including sensitive taxa. From our study we concluded that water quality objectives may be too stringent and that aquatic plants are more important for macroinvertebrate richness. Thus, constructed wetlands are effective for both water quality improvement and aquatic biodiversity." (Authors) Taxa, including Odonata, are treated at the order level.] Address: Greenway, Margaret, School of Engineering, Griffith



Univ., Brisbane, Queensland 4111, Australia. E-mail: m.greenway@griffith.edu.au

**9315.** Guerbaa, K. (2007): Les Odonates de la Collection Charles Alluaud (Musée de la Sénatorie, Guéret, Creuse). *Martinia* 23(1): 31-33. (in French, with English summary) [The «Musée de la Sénatorie» in Guéret has an important insects collection, built up by Charles Alluaud (1861-1949). Two boxes with Odonata harbour 23 species in most cases from the Département Creuse, France, and including few records from the Vienne and Loire Atlantique (Île Dumet) Departments.] Address: Guerbaa, K., Société Limousine d'Odonatologie, 11, rue Jauvion, F-87000 Limoges, France

**9316.** Hennequin, E. (2007): État des connaissances sur *Coenagrion mercuriale* (Charpentier, 1840) en Limousin (Odonata, Zygoptera, Coenagrionidae). *Martinia* 23(3): 89-93. (in French, with English summary) [The development of the knowledge about the distribution of *C. mercuriale* in Limousin, France is presented, "together with ecological information from data gathered between 1994 and 2005. The species distribution appears to be growing. This can be explained by more extensive searches for this species. Breeding sites are nevertheless not numerous and the unfavourable regional status of this species is justified." (Author)] Address: Hennequin, E., Société Limousine d'Odonatologie, 11 rue Jauvion F-87000 Limoges, France

**9317.** Levasseur, M. (2007): Une remise de pluie pour *Pantala flavescens* (Fabricius, 1798) (Odonata, Anisoptera, Libellulidae). *Martinia* 23(1): 8. (in French) [Mutsamudu (capital Anjouan), Comores, 30-XI-2006. 150-200 specimens of *P. flavescens* were found in the vegetation near a shed during long lasting and heavy rain. The temperature reached 27°C, and during periods of less rain, small groups of the species started to flight erratically.] Address: Levasseur, M., 11 rue du Pont Colbert, F-78000 Versailles, France. E-mail: levasseur@magic.fr

**9318.** Levasseur, M. (2007): Observation et collection d'Odonates au Malawi (Afrique australe). *Martinia* 23(1): 13-22. (in French, with English summary) ["During a 22 months period in Malawi from november 1988 to august 1990, [...] a total of 53 species has been collected or identified, representing 35 % of the country's known fauna (152 species). Four colour plates of pictures taken by the author and representing imagines of 24 taxa are given." (Author)] Address: Levasseur, M., 11 rue du Pont Colbert, F-78000 Versailles, France. E-mail: levasseur@magic.fr

**9319.** Li, G.; Liang, B.; Wang, Y.; Zhao, Y.; Helgen, K.M.; Lin, L.; Jones, G.; Zhang, S. (2007): Echolocation calls, diet, and phylogenetic relationships of *Stoliczka's trident bat*, *Aselliscus stoliczkanus* (Hipposideridae). *Jour. Mammalogy* 88(3): 736-744. (in English) [China; "The diet of *A. stoliczkanus* is mainly composed of lepidopterans, beetles, and hemipterans. Lepidopterans were the most abundant food items in the samples (79% of the diet in volume), followed by coleopterans (15%), hemipterans (7%), and odonates (<1%)." (Authors)] Address: Zhang, S., School of Life Science, East China Normal University, Shanghai, 200062, China. E-mail: syzhang@bio.ecnu.edu.cn

**9320.** Lolive, N.; Hennequin, E. (2007): Découverte d'un site de première importance pour le genre *Somatochlora* en Limousin (Odonata, Anisoptera, Cordulii-

dae). *Martinia* 23(1): 12. (in French) [Swamps of Vénachat (Compreignac, 87), France; 24-VI-2006; exuviae of *Somatochlora flavomaculata* and *S. arctica* were found.] Address: Lolive, N., Société Limousine d'Odonatologie, 11, rue Jauvion, F-87000 Limoges, France

**9321.** Louve, N.; Guerbaa, K. (2007): La connaissance de *Cordulegaster bidentata* Selys, 1843 en Limousin affinée par une méthode de recherche des larves très efficace (Odonata, Anisoptera, Cordulegasteridae). *Martinia* 23(1): 3-8. (in French, with English summary) [Prior 2002, only 18 records of *C. bidentata* were available in Limousin (Corrèze and Haute-Vienne departments), France. In order to improve the knowledge about this species, an efficient method for searching larvae operating with a landing net was proposed. Within three years, this method led to the discovery of the species at ten additional sites.] Address: Guerbaa, K., Société Limousine d'Odonatologie, 11, rue Jauvion, F-87000 Limoges, France

**9322.** Manger, R. (2007): An unusual hibernator - *Sympecma paedisca*. *Vlinders* 1/2007: 4-6. (in Dutch, with English summary) ["In the Netherlands, there are two damselflies that hibernate as adult, *S. fusca* and *S. paedisca*. Both species are on the Red List; *S. paedisca* is critically endangered. Recent research on heathland in Drenthe into the hibernation and survival of *S. paedisca* has brought new facts to light. Being nondescript brown in colour, it is well camouflaged in its winter biotope. The adults can be found deep in grass tussocks in cold weather, but may fly when it is sunny. During hibernation, they stay put. Only half of the winter population survives. They do not reproduce here, despite water in the vicinity. In spring, they suddenly disappear. Wing marking at the reproduction sites showed that adults are able to fly large distances of up to 20 km. Eggs are laid in mid-April on dead vegetation, especially *Typha latifolia* and *Phragmites australis*, in lowland marshes. Perhaps these damselflies show migratory behaviour, spending eight or nine months on land and then flying in search of suitable waters to reproduce." (Authors)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rmanger@planet.nl

**9323.** Matushkina, N.A. (2007): The morpho-functional adaptations in Lestidae (Odonata, Zygoptera) to the oviposition into plant substrates of different stiffness. Questions of aquatic entomology of Russia and adjacent lands: Materials of the Third All-Russia Symposium on Amphibiotic and Aquatic Insects. Voronezh State University. ISBN 978-5-9273-1169-9: 177-183. (in Russian, with English summary) ["Several morpho-functional peculiarities of ovipositors in five lestids species, *Sympecma paedisca*, *Lestes virens*, *L. sponsa*, *L. barbarus*, and *Chalcolestes parvidens*, are listed, in part on the basis of this author's earlier studies. Some of the found modalities of the ovipositor's skeletal musculature and the insect's oviposition behaviour were considered as possible adaptations to oviposition into plants of different stiffness. The problems and methodology of such complex research, as well as the phylogenetic significance of some obtained results, are briefly discussed." (Author)] Address: Matushkina, Natalia A., Department of Zoology, Biological Faculty, National Taras Shevchenko University of Kyiv, vul. Volodymirs'ka, 64, Kyiv UA-01033, Ukraine. E-mail: odonataly@gmail.com

- 9324.** Meurgey, F. (2007): Observations récentes de *Sympetrum danae* (Sulzer, 1776) dans les Pyrénées-Orientales (Odonata, Anisoptera, Libellulidae). *Martinia* 23(1): 23-29. (in French, with English summary) ["*S. danae* is a rather common species in France, notably in mountainous areas. However, data are missing for the Pyrénées-Orientales department, where the most recent observation was made in 1997. The author presents observations made in this department in 1997, 1999 and 2003." (Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr
- 9325.** Meurgey, F.; Weber, G. (2007): Observation récente d'*Ischnura capreolus* (Hagen, 1861) en Guadeloupe (Antilles françaises) (Odonata, Zygoptera, Coenagrionidae). *Martinia* 23(1): 35-37. (in French, with English summary) ["*I. capreolus* is a rare species in Guadeloupe, ever not seen since 1983. Many still invalidated data throwed the doubt about the real presence of this species in the archipelago. During our 2006 mission, a small population was observed on Grande-Terre (Les Abymes)." (Authors)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr
- 9326.** Meurgey, F. (2007): Liste actualisée des Odonates des Antilles françaises (Guadeloupe et dépendances, Martinique). *Martinia* 23(3): 75-88. (in French, with English summary) ["Studies of the Odonata fauna of the French West Indies began in 2000. They allowed to update the check-list of extant species in this area, and to accumulate biogeographical, ecological and biological data. Comments are given about the distribution and relative abundance of the 37 species composing this fauna." (Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr
- 9327.** Prioul, B. (2007): Analyse d'ouvrage: Les libellules de France, Belgique et Luxembourg par Daniel Grand et Jean-Pierre Boudot, 2006, Biotope, Mèze, (Collection Parthénope). Relié couverture rigide en couleurs. 24,5 x 17 cm, 480 pages en couleur. ISBN-10: 2914817053 ISBN-13: 978-2914817059 - Adresse de l'éditeur: Biotope 22, Boulevard Maréchal Foch, BP 58, F-34140 Mèze. Prix : 43 €. *Martinia* 23(1): 39-40. (in French) [book review] Address: not stated
- 9328.** Riexinger, W.-D. (2007): Die Libellenfauna im Stadtkreis Heilbronn. *mercuriale* 7: 1-3. (in German) [Baden-Württemberg, Germany; 31 Odonata species are listed. Some water bodies of importance as habitat of rare or specialized Odonata are briefly introduced.] Address: Riexinger, W.-D., Stadt Heilbronn, Planungs- & Baurechtsamt (Untere Naturschutzbehörde), Cäcilienstr. 56, D-74072 Heilbronn, Germany
- 9329.** Rückriem, C. (2007): Die Eiablage der Mond-Azurjungfer. Beobachtung eines Luftjägers auf Tauchgang. *Jahrbuch des Kreises Borken* 2007: 89-92. (in German) [Nordrhein-Westfalen, Germany, nature reserve Amtsfenn und Hündfelder Moor, between Ahaus und Gronau, 22-V-2006; a submerged oviposition of *Coenagrion lunulatum* is documented.] Address: not stated
- 9330.** Ryazanova, G.I. (2007): Reproduction tactics in the males of *Lestes sponsa* (Hansemann) (Odonata, Zygoptera): individual reproduction success or success of the population. Questions of aquatic entomology of Russia and adjacent lands: Materials of the Third All-Russia Symposium on Amphibiotic and Aquatic Insects. Voronezh State University. ISBN 978-5-9273-1169-9: 287-292. (in Russian, with English summary) ["Reproductive behaviour of individually marked males of *L. sponsa* at the water was observed. The males displayed territoriality. We suggested that one of the main functions of male *L. sponsa* territoriality in this case was even distribution of the males on all mating places at the water. The conservatism of individual reproductive tactics of the males was demonstrated. It may be supposed that this male tactics does not promote individual reproductive success, but promotes the reproductive success of all the population." (Author)] Address: Ryazanova, G.I., Biological Faculty, Moscow Lomonosov State University, Moscow, 119992, Russia
- 9331.** Salm, P. (2007): Heuschrecken und Libellen am Wulfesknapf. *ABU info* 30/31 (2006/07): 18-23. (in German) [Nordrhein-Westfalen, Germany; between 2003 and 2006, a total of 22 odonate species was recorded in that legally protected area. Most of the water bodies are of temporary character. Hence, the Odonata fauna is represented by many species known to be quite dispersive and good colonisers.] Address: Salm, Petra, c/o Landschaftsökologisches Planungsbüro Stelzig, Aldegrevewall 1, D-59594 Soest, Germany
- 9332.** Schäfer, R.B.; Caquet, T.; Siimes, K.; Mueller, R.; Lagadic, L.; Liess, M. (2007): Effects of pesticides on community structure and ecosystem functions in agricultural streams of three biogeographical regions in Europe. *Science of the Total Environment* 382: 272-285. (in English) ["There is a paucity of large-scale field investigations on the effects of organic toxicants on stream macroinvertebrate community structure and ecosystem functions. We investigated a total of 29 streams in two study areas of France and Finland for pesticide exposure, invertebrates and leaf-litter breakdown. To link pesticide exposure and community composition we applied the trait-based Species At Risk (SPEAR) indicator system. In the French region, pesticide stress was associated with a decrease in the relative abundance and number of sensitive species in the communities. The presence of undisturbed upstream reaches partly compensated the effects of pesticide contamination. Functional effects of pesticides were identified by a 2.5-fold reduction of the leaf-litter breakdown rate that was closely correlated with the structural changes in the contaminated streams. No effects of pesticides were observed in Finnish streams since contamination with pesticides was very low. In a follow-up analysis, the SPEAR approach successfully discriminated between reference and contaminated sites across different biogeographical regions, also including results of a previous field study in North Germany. Furthermore, change of the community structure was detectable at a concentration range as low as 1/100 to 1/1000 the acute 48 h-LC50 of *Daphnia magna*. Our findings demonstrate that pesticides may influence the structure and function of lotic ecosystems and that the SPEAR approach can be used as a powerful tool in biomonitoring over large spatial scales." (Authors) Supplementary data include Odonata on different taxonomic levels.] Address: Schäfer, R.B., UFZ - Helmholtz Centre for Environmental Research, Dept. System

Ecotoxicology, Permoser Straße 15, 04318 Leipzig, Germany. E-mail: Ralf.Schaefer@ufz.de

**9333.** Semenova, V.A.; Golub, V.B. (2007): Results of evaluating the condition of the benthic layer of the Voronezhskoye Reservoir on the basis of the stability of development index of the test-object, the damselfly *Ischnura elegans* (Odonata, Coenagrionidae). Questions of aquatic entomology of Russia and adjacent lands: Materials of the Third All-Russia Symposium on Amphibiotic and Aquatic Insects. Voronezh State University. ISBN 978-5-9273-1169-9: 296-302. (in Russian, with English summary) [Fluctuating asymmetry of wing venation of *Ischnura elegans* from three sample points at the Voronezhskoye Reservoir and one sample point at the Usman River, Russia with different anthropogenic impacts was studied. "The highest index of the fluctuating asymmetry level was observed at the lower reaches of the reservoir and at the Usman River near railway station Borovoye; the lowest level of this index was observed at the higher reaches of the reservoir." (Author)] Address: Semenova, V.A., Voronezh State University, Voronezh, Russia

**9334.** Sharma, G.; Sundararaj, R.; Karibasvaraja, L.R. (2007): Species diversity of Odonata in the selected provenances of sandal in southern India. *Zoos' Print J.* 22(7): 2765-2767. (in English) [21 Odonata species are reported from sandal ecosystems of 6 localities in Karnataka, Tamil Nadu and Kerala, India (Bengaluru, Thangli and Mandagadde in Karnataka, Javadis and Chitteri in Tamil Nadu and Marayoor in Kerala).] Address: Sharma, G., Wood Biodegradation Div., Inst. Wood Sci. & Technol., 18th Cross Malleswaram, Bangalore, Karnataka-560003, India

**9335.** Shestani, L.; Morisi, A.; Battagazzore, M. (2007): Comunità macrobentoniche di riferimento nei fontanili del cuneese. *Studi Trent. Sci. Nat., Acta Biol.* 83: 123-128. (in English) ["Macrobenthic reference communities in the flood-plane springs of the Cuneo province - On the basis of the macrobenthic fauna the flood-plane springs of the Cuneo plain may be ascribed to different reference types. The chemical-physical features, the relative composition of invertebrate community and the presence/absence of indicator taxa, grouped the flood-plane springs reflecting a division in geographic areas. The belonging to different types appeared well stated considering the taxa present in the 50% of the surveys, even more when the limit was fixed at 90%. In some cases, flood-plane springs with similar physico-chemical features belonged to different groups on the basis of the composition of the macrobenthic community (e.g. springs of Morozzo). This work points out the meaning of these biotopes as "stock" of biodiversity, also emphasizes their importance as matter of studies devoted to provide a more detailed ecological classification, exclusively based, in case of chemical/physical uniformity, on their faunal features." (Authors) "Calopteryx" and "Cordulegaster" were present in "Reference communities" (taxa present in 50% of samplings.)] Address: Morisi, A., Dipartimento di Scienze Ambientali, Università degli Studi del Piemonte Orientale "Amedeo Avogadro", Via Bellini 25, 15100 Alessandria, Italia. E-mail: a.morisi@arpa.piemonte.it

**9336.** Silina, A.Ye. (2007): Substance and energy outflow from marsh ecosystem by insect emerging: the succession aspect. Questions of aquatic entomology of Russia and adjacent lands: Materials of the Third All-

Russia Symposium on Amphibiotic and Aquatic Insects. Voronezh State University. ISBN 978-5-9273-1169-9: 303-320. (in Russian, with English summary) ["Insects emerging as adults from the hydrocensus of a mesotrophic marsh in the Usman pine-forest (Voronezh province, Russia) were studied from early May to late September, 1990. Insects were collected using floating emergence traps (S=1m<sup>2</sup>). For the determination of the concentrations of Cd and Pb in adult insects we used a Graphite Furnance Atomic Absorption Spectrometer with deuterium background correction, Cu and Zn with Flame Atomic Absorption Spectrometer, C and N with CHN-analyser. Total number, biomass, the role of different taxa, dominants composition and zoogeographical character of communities are discussed in correlation with the succession stage of the biocenosis. Levels of bio-, energy-mass and chemical elements outflowing out from water to terrestrial biotopes and the loss of secondary production with insects emerging are estimated." (Authors) The study includes data referring to *Lestes virens*, *L. sponsa*, *Coenagrion hastulatum*, and *Sympetrum flaveolum*.] Address: Silina, A.Ye., Voronezh State University, Voronezh, Russia

**9337.** Skvortsov, V.E.; Kuvaev, A.V. (2007): *Lindenia tetraphylla* (Vander Linden, 1825) and *Selysiothemis nigra* (Vander Linden, 1825) (Insecta, Odonata), new records for European Russia. *Eurasian entomological journal* 6(4): 448-449. (in Russian, with English summary) ["*L. tetraphylla* and *S. nigra* are recorded for the first time from European Russia. Material was collected in June 2007 from the Kalmyk Republic (Yashkul'sky and Chernozemelsky districts), mostly in the territory of the Chernye Zemli Nature Reserve. Both species proved to be common and occurred together in many localities, sometimes in great number. The problem of their autochthony in Kalmyk Republic is discussed." (Authors)] Address: Skvortsov, V.E., M.V. Lomonosov Moscow State University, Faculty of Biology, GSP-1, Leninskiye Gory, Moscow 119992 Russia. E-mail: westurnus@yandex.ru; Kuvaev, A.V., A.N. Severtzov Institute of Ecology and Evolution, Russian Academy of Sciences, Leninskiy prospect 33, Moscow 119071 Russia. E-mail: kuvaevav@mail.ru

**9338.** Ternois, V.; Epe, M. (2007): Première mention de *Boyeria irene* (Fonscolombe, 1838) dans le Parc naturel régional de la Forêt d'Orient et en région Champagne-Ardenne (Odonata, Anisoptera, Aeshnidae). *Martinia* 23(2): 53-57. (in French, with English summary) [*B. irene* was observed 1-IX- 2006 in Orient forest Natural Park (Aube department, France). This is the first record of this species for Champagne-Ardenne region.] Address: Epe, M., De Vlier 18, NL-6581 WE Maiden, The Netherlands. E-mail: martineniris@hotmail.com

**9339.** Vanappelghem, C. (2007): Les collections d'Odonates des Muséums et Universités du Nord-Pas-de-Calais. Inventaire et révision I. *Faculté Libre des Sciences et Technologies et Station Marine de Wimereux. Martinia* 23(2): 59-66. (in French, with English summary) [France; the author presents an inventory and a revision of the Odonata collections of the Faculté Libre des Sciences et technologies (92 specimens for 18 species) and Station Marine de Wimereux (7 specimens for 7 species). Recording details are documented, and a few species are briefly discussed.] Address: Vanappelghem, C., 14, rue Brûle Maison, F-59000 Lille, France. E-mail: cedvana@free.fr



- 9340.** Andrade, H.T.A.; Santiago, A.S.; Medeiros, J.F. (2008): Estrutura da comunidade de invertebrados bentônicos com enfoque nos insetos aquática do Rio Piranhas-Assu, Rio Grande do Norte, nordeste do Brasil. *EntomoBrasilis* 1(3): 51-56. (in Portuguese, with English summary) [The benthic invertebrate community with focus on the insects of the Piranhas-Assu River, State of Rio Grande do Norte, Northeast, Brazil was studied in May (rain season), July and September (dry season) 2002. Odonata are treated at the family level.] Address: de Almeida Andrade, Herbet Tadeu, Departamento de Microbiologia e Parasitologia, Centro de Biociências, Universidade Federal do Rio Grande do Norte, Brazil. E-mail: herbet@ufrnet.br.
- 9341.** Bogdanović, T.; Merdić, E.; Mikuska, J. (2008): Data to the dragonfly fauna of lower Neretva river. *Entomologia Croatica* 12(2): 51-65. (in English, with Croatian summary) [Between 2003 to 2005, a total of 48 odonate species was recorded at six localities along the lower stretches of Neretva River, Croatia. 12 species are additions to the regional list of Odonata: *Calopteryx virgo*, *Ceragrion tenellum*, *Aeshna cyanea*, *Brachytron pratense*, *Onychogomphus forcipatus*, *Cordulia aenea*, *Somatochlora flavomaculata*, *Somatochlora meridionalis*, *Orthetrum albistylum*, *Orthetrum coerulescens*, *Sympetrum flaveolum* and *Sympetrum fonscolombii*.] Address: Bogdanović, T., Department of Biology, University of J. J. Strossmayer, Osijek, Trg Ljudevita Gaja 5, HR-31000 Osijek, Croatia. E-mail: tbogdano@ffos.hr
- 9342.** Borisov, S. (2008): The larva of *Anormogomphus kiritshenkoi* Bartenef, 1913 (Odonata, Gomphida). *Eurasian entomological journal* 7(4): 307-310. (in Russian, with English summary) [Turkmenistan, the last instar larva of the rare *A. kiritshenkoi* is described. The larva differs from the other larvae of the Gomphidae by the shape of mask, with a strongly convex and emarginate distally medial paddle. The larval stage of *A. kiritshenkoi* lasts probably four years.] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru
- 9343.** Borisov, S.N. (2008): Dragonflies (Odonata) in ornithological traps from Western Tien-Shan. *Eurasian entomological journal* 7(1): 1-10. (in Russian, with English summary) [Kazakhstan; "seven migratory dragonfly species are found in ornithological traps settled in Western Tien-Shan (N 42.530°, E 70.605°): *Sympecma gobica*, *S. fusca*, *S. paedisca*, *Aeshna mixta*, *Anax parthenope*, *Sympetrum arenicolor*, and *S. fonscolombii*." (Author)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru
- 9344.** Borisov, S.N.; Haritonov, A.Yu. (2008): The Dragonflies (Odonata) of Middle Asia. Part 2 (Anisoptera). *Eurasian entomological journal* 7(3): 97-123. (in Russian, with English summary) ["A review of the Odonata fauna of Middle Asia (Turkmenistan, Uzbekistan, Tajikistan, Kyrgyzstan, southern part of Kazakhstan) is presented. In the second part of the paper the problems of taxonomy, distribution and ecology of Anisoptera are discussed. Distribution maps for all dragonfly species in Middle Asia are provided." (Authors)] Address: Haritonov, A.Yu., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia.
- 9345.** Boudot, J.-P. (2008): Un *Crocothemis* en bien mauvaise posture. *Martinia* 24(4): 151. (in French) [WWF Kerkiní Wetland, Greece, 29-VII-2008; a juvenile Squacco Heron (*Ardeola ralloides*) is preying on *Crocothemis erythraea*] Address: Boudot, J.-P., LIMOS, UMR CNRS 7137, Universités de Nancy, Faculté des Sciences, B.P. 239, F-54506 - Vandoeuvre-lès-Nancy Cedex, France. E-mail: jean-pierre.boudot@limos.uhp-nancy.fr
- 9346.** Breton, F. (2008): Phénomènes migratoires chez *Sympetrum fonscolombii* (Selys, 1840) dans les Alpes du Sud (Odonata, Anisoptera, Libellulidae). *Martinia* 24(4): 113-128. (in French, with Italian and English summary) [The paper compiles older observations on migration of *S. fonscolombii* across the European Alps (and the Pyrenees). More systematic observations were made between 2003 and 2007 along the southwestern Alps situated along the border between Italy and France, analysing 38 records of - in most cases - southwards directed late summer-autumn migrations. "These irregular migrations, which could concern several millions of individuals, seem to be initiated by massive emergences in the Italian region of Piémont, starting at the end of July. The most observed direction is toward north-west and south, sometimes toward west and south-west. The environmental conditions which release these migrations are debated." (Authors)] Address: Breton, F., Parc national du Mercantour, Franc. E-mail: francois.breton@espaces-naturels.fr
- 9347.** Collen, B., Ram, M., Dewhurst, N., Clausnitzer, V., Kalkman, V., Cumberlidge, N. and Baillie, J.E.M. (2008): Broadening the coverage of biodiversity assessments. In: J.-C. Vié, C. Hilton-Taylor and S.N. Stuart (eds). *The 2008 Review of The IUCN Red List of Threatened Species*. IUCN Gland, Switzerland. 9 pp. (in English) [Verbatim: "Box 4: Threats to dragonflies and damselflies: a. Restricted range - damselflies: The Pemba Featherleg *Platycnemis pembipes*, a fragile black and white damselfly was first discovered in 2001 on the island of Pemba off the Tanzanian coast. Remarkably its nearest relatives occur on Madagascar, separated by 1,000 km of ocean. Although the species might have reached Pemba aided by strong monsoon winds, recent studies suggest it may be the survivor of an ancient African fauna that is now largely confined to Madagascar. The species only inhabits the single stream flowing through Pemba's last remnant of forest and is listed as Critically Endangered. The Pemba Featherleg shares this fate with two other East African damselflies of unknown origin. *Amanipodagrion gilliesi* (Critically Endangered) survives on a single stream in Tanzania's Usambara Mountains. It shares no similarities with any other known species. Equally unique is *Oreocnemis phoenix* (Critically Endangered), named for its bright red males. Streams on the high plateau of Mount Mulanje in Malawi, known aptly as 'the island in the sky' and a mere 24 km across, are its only known habitat. The plateau is made up of bauxite deposits: mining these would significantly impact the habitat. b. Climate change impact on the Ancient Greenling *Hemiphlebia mirabilis*: The Australian endemic damselfly *Hemiphlebia mirabilis* (Endangered), the Ancient Greenling, is notable for its apparent archaic characters, its male mating displays and its biogeography. Originally thought to have been a Victorian endemic, the species was subsequently found in northeastern Tasmania and then on Flinders Island.

This suggests that the species would have occupied the Bassian Ridge when it was exposed during glacial times and this may have been a dispersal route at some time. The species is cryptic within its reed habitat except when the males in particular display by waving their expanded, white anal appendages. The species breeds in open, sedge marshes with a low water level and seems to be capable of recolonizing habitats when they have become dry, probably surviving in the egg stage. In recent times, however, dry spells are longer and more frequent due to climate change and they pose a severe threat to this already rare species. The Ancient Greenling is not the only Australian dragonfly to be affected by climate change and it seems likely that dry spells will become a major driver for decline in the near future." (Authors)] Address: Clausnitzer, Viola, Heinzelstr. 3, 02826 Görlitz, Germany. E-mail: violacl@t-online.de

**9348.** COSEWIC/COSEPAC; Harris, A.; Foster, R. (2008): COSEWIC. 2008. COSEWIC assessment and status report on the Rapids Clubtail *Gomphus quadricolor* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa ([www.sararegistry.gc.ca/status/statuse.cfm](http://www.sararegistry.gc.ca/status/statuse.cfm)). ISBN 978-0-662-48813-2: vi + 35 pp. (in English) ["Species information: *Gomphus* (*Gomphus*) *quadricolor* Walsh 1863, Rapids Clubtail, is a member of the family Gomphidae, the clubtail dragonflies. It is a small dragonfly, with a wingspan of 25-27 mm and a contrasting pattern of brownish-black and yellowish-green stripes on the thorax. The abdomen is slender, but in males is expanded slightly at the tip. Distribution: The range of *Gomphus quadricolor* includes Ontario and 25 states in the northeastern and northcentral U.S. The global maximum extent of occurrence encompasses about 1.7 million km<sup>2</sup>. In Canada, it was historically known from four sites in southern and eastern Ontario, but is extant at only two sites. Its extent of occurrence in Canada is about 1570 km<sup>2</sup> and its area of occupancy is approximately 26 km<sup>2</sup>. Habitat: Larvae live in muddy pools in clear, cool streams. Adult males perch on rocks in rapids. Adult females inhabit forests on the riverbanks, moving to the rapids when ready to mate. Biology: Adult *Gomphus quadricolor* fly between early June and early July in Ontario and live about three to four weeks. Mating takes place over the river and females deposit eggs on the water surface over rapids. Eggs or recently hatched larvae are carried downstream to pools. Larvae spend most of their time buried just below the surface of the sediment in the bottom of the pool, breathing through the tip of the abdomen raised above the sediments. The duration of the larval stage of *Gomphus quadricolor* is unknown, but is probably two or more years. Before the final moult, larvae crawl onto vegetation on the edge of the stream. Newly emerged adults disperse inland to avoid predation until the exoskeleton hardens and they are able to fly swiftly." (Authors)] Address: COSEWIC Secretariat, c/o Canadian Wildlife Service, Environment Canada, Ottawa, ON, K1A 0H3. E-mail: COSEWIC/COSEPAC@ec.gc.ca; <http://www.cosewic.gc.ca>

**9349.** Couteyan, S.; Papapzin, M. (2008): Contribution à la connaissance des Odonates de l'île de La Réunion 9. Description de la larve d'*Hemicordulia atrovirens* Dijkstra, 2007 (Odonata, Corduliidae). *L'entomologiste* 64(4): 225-227. (in French) [On the basis of numerous exuviae, the last larval instar of the Reunion Island endemic *H. atrovirens* is described.] Address: Cou-

teyan, S., 188 chemin Nid Joli, F-97430 Le Tampon, La Réunion, France. E-mail: [couteyensf@vanadoo.fr](mailto:couteyensf@vanadoo.fr)

**9350.** Cremona, F.; Planas, D.; Lucotte, M. (2008): Biomass and composition of macroinvertebrate communities associated with different types of macrophyte architectures and habitats in a large fluvial lake. *Fundamental and Applied Limnology - Archiv für Hydrobiologie* 171/2: 119-130. (in English) ["The influence of macrophyte habitat and architecture on macroinvertebrate biomass, abundance, and richness was investigated in Lake St. Pierre, a large fluvial lake of the St. Lawrence River (Quebec, Canada). A lake-wide estimate of macroinvertebrate biomass associated with different macrophyte habitats was also calculated in order to assess the quantitative effects of vegetation changes on macroinvertebrate communities. For two years during the ice-free period, phytophilous macroinvertebrates were sampled in macrophyte beds comprising more than ten species of plants and three habitats (emergent, floating-leaved, submerged), and in three submerged macrophyte architectures based on plant morphology (simple, intermediate, and complex). Invertebrate sub-samples were classified into four functional groups (detritivore, grazer, crawling predator - including not further specified Odonata -, diving predator). Biomass and density of invertebrates were expressed per unit of plant dry weight. The main findings are that macroinvertebrate biomass, abundance and richness were significantly greater in submerged than in emergent and floating-leaved habitats. However, macrophytes with a complex architecture did not host significantly greater macroinvertebrate biomass than plants with a simpler architecture. This could be related to substrate preferences of herbivores (mostly Gastropoda) toward the tape grass *Vallisneria americana*. Differences in macroinvertebrate abundance and biomass were found between the two years associated with variations in the river water level. During the year with average water level, total macroinvertebrate biomass was 16 % greater than in the year with a lower water level. We conclude that a reduction in the water level of Lake St. Pierre, predicted to occur with climate change, could lead to a decrease in benthos biomass which constitutes a crucial food source for fish." (Authors)] Address: Cremona, F., Centre GÉOTOP-UQAM-McGill, Université du Québec à Montréal, P.O. Box 8888 Succ. Centreville, Montreal, Quebec, Canada H3C 3P8. E-mail: [cremona.fabien@courrier.uqam.ca](mailto:cremona.fabien@courrier.uqam.ca)

**9351.** Cuttelod, A.; García, N.; Abdul Malak, D.; Temple, H.; Katariya, V. (2008): The Mediterranean: a biodiversity hotspot under threat. In: J.-C. Vié, C. Hilton-Taylor and S.N. Stuart (eds). *The 2008 review of The IUCN Red List of Threatened Species*. IUCN Gland, Switzerland. 13 pp. (in English) [In figure 8 Odonata species richness in the Mediterranean basin and species richness of regionally threatened dragonflies in the Mediterranean basin are mapped.] Address: IUCN, Rue Mauverney 28, CH-1196 Gland, Switzerland. [www.iucn.org](http://www.iucn.org)

**9352.** Diehl, D.A. (2008): Libellenarten in der Sammlung Wilhelm Michel. *Libellen in Hessen* 1: 59. (in German) [A small, undated collection of Odonata made between 1930 and 1960 near Babenhausen, Hessen, Germany includes four species. *Orthetrum coerulescens* and *Sympetrum fonscolombii* are of regional interest.] Address: Diehl, D.A., Naturkunde-Institut Langstadt, Breuberger Weg 4, 64832 Langstadt, Germany. E-mail: [biologodd@aol.com](mailto:biologodd@aol.com)

- 9353.** Doucet, G.; Mora, F.; Bettinelli, L. (2008): Contribution à la biologie et à l'écologie de *Leucorrhinia pectoralis* (Charpentier, 1825) en Haute-Saône (Odonata, Anisoptera, Libellulidae). *Martinia* 24(4): 137-142. (in French, with English summary) [France; Habitat parameters are given based on the authors', and in most cases, literature data.] Address: Doucet, G., 7 rue Esquirol, F-87000 Limoges, France. E-mail: guillaume.doucet@yahoo.fr
- 9354.** Duprez, B. (2008): Ponte répétitive à *Orthetrum cancellatum* (L., 1758) sur une racine de *Typha* sp. Interrogation sur une stratégie de reproduction (Odonata, Anisoptera, Libellulidae). *Martinia* 24(4): 136. (in French) [The author reports on a repetitive oviposition of a female at the same microhabitat. Benayes, Corrèze Département, France, summer 2006.] Address: Duprez, B., 43 avenue Alexandre de Serbie, F-51100 Reims, France
- 9355.** Duquef, M. (2008): Préparation des Odonates récoltés dans les pays tropicaux. *Martinia* 24(3): 106-108. (in French, with English summary) ["Basing on its French Guiana experience to preserve collected local specimens of Odonata, the author details a methodology taking the tropical climate constraints into account.] Address: Duquef, M., 25 rue Paul Baroux, Blangy-Tronville, F-80440 Boves, France
- 9356.** Eagles-Smith, C.A.; Suchanek, T.H.; Colwell, A.E.; Anderson, N.L.; Moyle, P.B. (2008): Changes in fish diets and food web mercury bioaccumulation induced by an invasive planktivorous fish. *Ecological Applications*, 18(8) Suppl., 2008: A213-A226. (in English) ["The invasion, boom, collapse, and reestablishment of a population of the planktivorous threadfin shad in Clear Lake, California, USA, were documented over a 20-yr period, as were the effects of changing shad populations on diet and mercury (Hg) bioaccumulation in nearshore fishes. Threadfin shad competitively displaced other planktivorous fish in the lake, such as inland silversides, young-of-year (YOY) largemouth bass, and YOY bluegill, by reducing zooplankton abundance. As a result, all three species shifted from a diet that was dominated by zooplankton to one that was almost entirely zoobenthos. Stable carbon isotopes corroborated this pattern with each species becoming enriched in  $\delta^{13}C$ , which is elevated in benthic vs. pelagic organisms. Concomitant with these changes, Hg concentrations increased by ~50% in all three species. In contrast, obligate benthivores such as prickly sculpin showed no relationship between diet or  $\delta^{13}C$  and the presence of threadfin shad, suggesting that effects of the shad were not strongly linked to the benthic fish community. There were also no changes in Hg concentrations of prickly sculpin. The temporary extirpation of threadfin shad from the lake resulted in zooplankton densities, foraging patterns, isotope ratios, and Hg concentrations in pelagic fishes returning to pre-shad values. These results indicate that even transient perturbations of the structure of freshwater food webs can result in significant alterations in the bioaccumulation of Hg and that food webs in lakes can be highly resilient." (Author) Odonata are treated at the order level.] Address: Eagles-Smith, C.A., U.S. Geol. Survey, Western Ecol. Res. Center, Davis Field Station, One Shields Av., Davis, California 95616 USA. E-mail: ceagles-smith@usgs.gov
- 9357.** Feulner, G. (2008): Emperor Dragonflies Swarming. *Gazelle*, Dubai 23(2): 6. (in English) [UAE; The typical January migration (or at least swarming) of *Anax ephippiger* "was in evidence throughout the area once again this year. They could be seen from the relatively idyllic setting of Wadi Khadra (over pools adjacent to the plantations) in the Mahdhah area of Oman, to the urban setting of downtown Dubai (the entrance road between Emirates Towers and the DIFC). They were also observed on a DNHG field trip deep within the mountains near Masafi in earliest February. *Anax imperator* The so-called "emperor" dragonflies are the largest local dragonflies. The UAE has three species but the vagrant emperor is the only one which flies in groups and the only one which is routinely seen far from water. The other two are territorial. The distinctive electric-blue males of the blue emperor (*Anax imperator*) patrol territories at fresh water bodies and will not tolerate intrusion by other males."] Address: Feulner, G., c/o Dubai Natural History Group, PO Box 9234, Dubai, United Arab Emirates
- 9358.** Feulner, G. (2008): Dragonfly Detectives. *Gazelle*, Dubai 23(11): 4-5. (in English) [UAE; the story, to properly identification of *Orthetrum ransonneti* in UAE and northern Oman is told in some extend.] Address: Feulner, G., c/o Dubai Natural History Group, PO Box 9234, Dubai, United Arab Emirates
- 9359.** Fraker, M.E. (2008): The dynamics of predation risk assessment: responses of anuran larvae to chemical cues of predators. *Journal of Animal Ecology* 77: 638-645. (in English) ["1. While the antipredator behaviour of prey has been well studied, little is known about the rules governing the predation risk assessment of prey. In this study, I measured the activity levels of predator-naïve green frog (*Rana clamitans*) tadpoles during and after exposures to the chemical cue of predatory larval dragonflies (*Anax longipes* and *A. junius*). I then used the lengths of the time lags from the end of the cue exposures until the tadpoles returned to a control level of activity as an index of the perceived risk of the tadpoles. 2. While tadpoles always responded upon exposure to the *Anax* chemical cue by strongly reducing their activity level, their perceived risk increased asymptotically over time during the initial period of the cue exposure. Tadpoles of all size classes perceived increasing risk in proportion to chemical cue concentration, but the length of time that tadpoles responded during cue exposure and the length of their post-exposure time lags decreased with increasing body mass. 3. The results suggest that the perceived risk of green frog tadpoles varies over time and does not correspond directly to their behavioural response (i.e. activity level). However, their perceived risk does appear to vary in accordance with the predation risk associated with the *Anax* chemical cue and the reliability of the information from the cue, and therefore may be predictable." (Author)] Address: Fraker, M.E., Dept of Ecology & Evolutionary Biology, University of Michigan, 830 North University, Ann Arbor, MI 48169-1048, USA
- 9360.** Grand, D. (2008): Quelques données commentées sur la période de vol de *Sympecma fusca* (Vander Linden, 1820) dans les environs de Lyon (Odonata, Zygoptera, Lestidae). *Martinia* 24(4): 129-135. (in French, with English summary) [Records of *S. fusca* in the Lyon-region, France are compiled in detail.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France. E-mail: danielgrand@yahoo.fr



- 9361.** Groll, E.K. (2008): Besprechungen: Hilfert-Rüppell, D. & Rüppell, G.: Juwelenschwingen - Geheimnisvolle Libellen ; Gossamer Wings - Mysterious Dragonflies. - Cremlingen: Splendens-Verlag, 2007. - 168 S., zahlr. Farbabb. - ISBN 978-3-00-020389-3. Beiträge zur Entomologie 58(1): 96. (in German) [book review] Address: Groll, E.K., c/o DEI, Eberswalder Str. 90, 15374 Müncheberg, Germany. E-mail: egroll@senckenberg.de
- 9362.** Holzenthal, R. (2008): Nature's Design Identified. University of Minnesota, Department of Entomology, Newsletter 2008: 1-2-7. ["From October 9 through November 7, the Paul Whitney Larson Gallery in the St. Paul Student center was infested by insects. Well, actually it was infested by insect illustrations and pinned specimens from the Insect Museum. The Department of Entomology sponsored an exhibition entitled Nature's Design Identified: An Exhibition of Insect Illustrations With an estimated one million different species, insects are the most diverse group of organisms on Earth. In order to identify such a vast array of species, taxonomists rely on the exquisitely accurate illustrations of the insect's complex anatomy. It is this meticulous design that determines each individual species' identity. Based on the Entomology course "Scientific Illustration of Insects (ENT 5051)," the exhibition displayed examples of scientific illustration ranging from delicately hand-drawn pen and ink drawings from of the early twentieth century to digital artwork design by today's University of Minnesota students. Both 'traditional' and digital illustrations were displayed. Traditional techniques used include pen and ink, coquille board, watercolour, and mixed use of acrylic paint and coloured pencils; digital illustrations were created in Adobe Illustrator using the pen tool to create weighted line illustrations as well as the gradient mesh tool to create more complex illustrations in black and white and colour. Adobe Photoshop was used to render highly realistic colour digital paintings using primarily the digital brush and varying its hardness, opacity and colour were displayed. The illustrations were displayed alongside pinned specimens of the actual insects portrayed. Contributions to the University of Minnesota Insect Collection began in 1879 with specimens of insects and spiders from the North Shore of Lake Superior. During the last 130 years, the Collection's holdings have grown from a regional collection of 3,000 specimens to a major national and international resource of almost 3,700,000 specimens. In the most recent survey, the Collection ranked as the 8th largest university-affiliated insect collection in North America. Enhancing the Collection's status as an outstanding research facility are 7 resident taxonomists, computerized inventory management and specimen databases, a large departmental library, and a molecular taxonomy laboratory. Research projects associated with the Collection have broad taxonomic and geographic scope. Faculty and graduate student research focuses on both aquatic and terrestrial insect groups and includes taxonomic, phylogenetic, and applied questions. The Collection is the mainstay of graduate training in systematic entomology at the University of Minnesota. Artists included in the exhibition were: Courtney Amundson, Roger Blahnik, Louise Bush, Lourdes Chamorro, Kevin Denny, Lydia M. Hart, Ralph Holzenthal, Sharolyn Kawakami, Kris Kuda, Haude Levesque, Stephanie Lyon, Julie Martinez, Rufus H. Pettit, Manuel Ramirez Desiree Robertson." (Authors) The cover of the newsletter includes colour drawings of R. Holzenthal from *Ophiogomphus rupinsulensis* and *Lestes* sp.] Address: Ralph W. Holzenthal, E-mail: holze001@umn.edu
- 9363.** Hunt, P. (2008): The New Hampshire Dragonfly Survey manual for volunteers: 2008. New Hampshire Audubon, Concord: 23pp. (in English) [Instruction manual for the recorders (with the related forms) and a checklist of species currently known to occur in NH, USA.] Address: Hunt, Pamela, Audubon Soc. New Hampshire, 3 Silk Farm Rd, Concord, NH 03301, USA
- 9364.** Johansson, F.; Crowley, P. (2008): Cannibalism and population regulation in dragonfly larvae systems. In: Lancaster, J.; Briers, R.A. (Eds.): Aquatic Insects: Challenges to Populations: Proceedings of the Royal Entomological Society's 24th Symposium. Cabi Publishing. 332 pp: 36-54. (in English) ["Cannibalism has strong impacts on population structure and population dynamics. Dragonfly larvae are important predators in aquatic systems and cannibalism is common in these larvae. Dragonflies are therefore an important model system that can be used for a thorough understanding of the dynamic interactions that shape community structure in aquatic systems. In this review we bring up the costs and benefits of cannibalism in general terms. We then briefly discuss important mechanism that affects the intensity and degree of cannibalism in dragonfly larvae: intraspecific density, alternative prey, habitat structure, size structure and time constraints. Thereafter we review general theoretical models that consider the population dynamics of cannibalism. We also provide some empirical evidence for the model predictions by using dragonfly larvae as examples. Finally, we suggest some avenues for further research on cannibalism." (Authors)] Address: Johansson, F., Dept Ecol. & Environmental Sc., Animal Ecol. Group, Umea Univ., 90187 Umeå, Sweden. E-mail: frank.johansson@eg.umu.se
- 9365.** Jorcin, A.; Nogueira, M.G. (2008): Benthic macroinvertebrates in the Paranapanema reservoir cascade (southeast Brazil). Braz. J. Biol. 68(4, Supl.): 1013-1024. (in English, with Portuguese summary) [Composition, diversity and abundance of benthic macroinvertebrates from sediments of eight reservoirs of the Paranapanema River (southeast Brazil), as well as from the main tributaries (Taquari, Pardo and Tibagi) and the mouth zone into the Parana River were analyzed. Nineteen points distributed along 700 km were sampled quarterly (8 campaigns) during a two-year period (2000 and 2001). The zoobenthos was characterized by a high species richness, (app. 100 taxa; including Odonata: Gomphidae: Aphylla and Progomphus), with the predominance of Diptera (Chironomidae; app. 50 taxa).] Address: Jorcin, A., Depto de Zoologia, Instituto de Biociências, Universidade Estadual Paulista – UNESP, Distrito de Rubião Júnior, CEP 18600-000, Botucatu, SP, Brazil. E-mail: ajorcin@ibb.unesp.br
- 9366.** Khan M.S. (2008): Biology and distribution of geckos of the genus *Indogekko* Khan, 2003 (Sauria: Gekkonidae). Russian Journal of Herpetology 15(2): 87-92. (in English) [Notes on morphology, ecology and distribution of geckos of genus *Indogekko* Khan, 2003 are provided, with comments on their distribution in upper Indus Valley and circum Hindukush Region (northwestern Pakistan, southwestern Afghanistan, northeastern Iran and southern Turkmenistan. Stomach content of the three studies *Indogekko* species (*I. fortunroi*, *I. indusoani*, *I. rohtasfortai*) contained Odonata (Zygoptera)] Address: Khan, M.S., D-206 west. Lands-

downe Towers Apartments, 776 Providence Road, Aldan, PA 19018, USA. E-mail: Typhlops99@hotmail.com

**9367.** Krassilov, V.; Shuklina, S. (2008): Arthropod trace diversity on fossil leaves from the mid-Cretaceous of Negev, Israel. *Alavesia* 2: 239-245. (in English) [A set of egg insertions on an *Acaciaephyllum*-type leaf (*Phyllostigmas*) is illustrated from the Albion of Makhtesh Ramon. The set shows a zigzag pattern characteristic of Odonata and assigned to the "coenagrionid type" (Hellmund & Hellmund 1996).] Address: Krassilov, V., Inst. Evol., Univ. Haifa. Mount Carmel, Haifa-31905, Israel

**9368.** Lambert, J.-L.; Lumet, J.-C. (2008): Une journée consacrée aux Odonates pour les agents de la Délégation interrégionale de Metz de l'Office National de l'Eau et des Milieux Aquatiques. *Martinia* 24(3): 101-105. (in French, with English summary) [The excursion of the National agency of water and aquatic environments (ONEMA) lead to three habitats in the Lorraine/Alsace-region in northeastern France. The study of two bog waters and the Schwarzbach near Windsheim resulted in 23 Odonata species. Highlight of the excursion was the record of *Ophiogomphus cecilia* along the Schwarzbach.] Address: Lambert, J.-L., ONE-MA, Service départemental de la Marne, F-51520 Veuve, France. E-mail: jean-luc.lambertl8@wanadoo.fr

**9369.** Maes, D.; Anselin, A.; Decler, K.; De Knijf, G.; Fichet, V. (2008): Insect diversity and climate change in Belgium. The worst is yet to come. *Natuur.focus* 7(3): 107-111. (in Dutch, with English summary) ["Being ectothermal, insects are predicted to suffer more severely from climate change than warm-blooded animals. We forecast possible changes in diversity and composition of butterflies, grasshoppers and dragonflies in Belgium under increasingly severe climate change scenarios for the year 2100. Butterfly and grasshopper diversity were predicted to decrease significantly in all scenarios and species-rich locations were predicted to move towards higher altitudes. Dragonfly diversity was predicted to decrease significantly in all scenarios, but dragonfly-rich locations were predicted to move upwards only in the less severe scenarios. The largest turnover rates were predicted to occur at higher altitudes for butterflies and grasshoppers, but at intermediate altitudes for dragonflies. We discuss possible conservation and policy measures to mitigate the putative strong impact of climate change on insect diversity in Belgium." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.de-knijf@inbo.be

**9370.** Martynov, A.V. (2008): [Dragonflies (Insecta: Odonata) of the left-bank side steppe of the Ukraine]. In: A.V. Prisny, [Ed.]. *Shivye objekty v usloviyah antropogennogo pressa*, Belgorod. Gos. Univ., Belgorod, ISBN 978-5-98242-107-4: 124-125. (in Russian) [59 odonate species are reported without detailed checklist.] Address: Martynov, A.V., Dept Ecol., Fac. Biol., Donetsk Natn. Univ., Shchorsa 46, 83050 Donetsk, Ukraine. E-Mail: martynov\_av@ukr.net

**9371.** Mendiondo, E.M. (2008): Challenging issues of urban biodiversity related to ecohydrology. *Braz. J. Biol.* 68(4, Suppl.): 983-1002. (in English) [Tijuco Preto Creek, Sao Carlos, Brazil; "This paper aims to outline challenging issues of urban biodiversity in order to address yardsticks related to ecohydrology, and with a complementary approach to eutrophication impacts.

The vision of environmental services, urbanization's consequences and management aspects of water governance are also depicted. Factors of river restoration, environmental tradeoffs and socio-cultural constraints are envisaged through concept questions towards emerging aspects that figure out methodological guides, strategic challenges for stakeholders and inter-disciplinary opportunities. Examples from case studies on restoration and management, from experiences and lessons learned, are enclosed, with brief discussions and literature citation." (Author) The toxicity evidences tolerance value of 'Zygoptera', 'Libellulidae', and 'Aeshnidae' is listed in table 7.] Address: Mendiondo, E.M., Escola de Engenharia de São Carlos – EESC, Universidade de São Paulo – USP, Av. Trabalhador Sancar-lense, 400, CEP 13566-590, São Carlos, SP, Brazil. E-mail: emm@sc.usp.br

**9372.** Meyer, C.K.; Whiles, M.R. (2008): Macroinvertebrate communities in restored and natural Platte River slough wetlands. *J. N. Am. Benthol. Soc.* 27(3): 626-639. (in English) ["Wetlands in the central Platte River basin provide numerous ecosystem services but have been diminished and degraded by agricultural practices and development. Wetland restoration is increasingly common in this region, but the success of restorations is virtually unknown. We sampled macroinvertebrates during spring 2003 and 2004 in restored (5–16 y old) and natural slough wetlands to assess restoration success. Simple measures (e.g., total abundance, biomass, diversity) were all similar in restored and natural wetlands. Communities were similar in natural and restored wetlands, but we observed some taxonomic differences. For example, abundances of *Helisoma* and *Pisidium* and abundance and biomass of amphipods were higher in natural than in restored wetlands, and leeches were collected only in natural wetlands. These results suggest that dispersal ability is a biotic filter limiting recovery and that these noninsects are good candidates for assessing recovery. Functional structure on the basis of abundance was similar between natural and restored wetlands, but some differences in biomass-based estimates were evident. For example, relative biomass of collector-filterers was higher in natural than in restored wetlands in 2003. Multivariate analyses indicated that factors such as hydroperiod might be more important than restoration status in shaping wetland macroinvertebrate communities. Furthermore, drought conditions constrained our sampling efforts and influenced temporal patterns, thereby underscoring the need for multiyear studies, especially under extreme environmental conditions. Our results indicate that wetland macroinvertebrate communities in this region are resilient and recover rapidly after restoration, but that ongoing restoration and management efforts should focus on hydrology, which might limit recovery in restorations and is a critical factor shaping wetland macroinvertebrate communities." (Authors) Taxa, including Odonata, are treated at the order level.] Address: Meyer, C.K., Dept of Zoology & Center for Ecology, Southern Illinois Univ. Carbondale, Carbondale, Illinois 62901-6501 USA

**9373.** Millen, A. (2008): Summer Science. *Gazelle, Dubai* 23(10): 3-4. (in English) [United Arab Emirates; "Dragonflies apparently treat the smaller pond on the Sheikh Zayed Road side as a typical man-made pond. I found the four species I would most have expected: the purple-blushed darter (*Trithemis annulata*), the carmine

darther (*Crocothemis erythraea*), the oasis skimmer (*Orthetrum sabina*) and the blue-banded damselfly (*Ischnura* sp. - we have to be more cautious in identifying them, now that a second species has been recognised locally)." This note is illustrated with a photograph entitled "Oasis skimmer (*Orthetrum sabina*), From The Emirates: A Natural History, eds. Peter Hellyer & Simon Aspinall." In fact, the picture shows *Ceriagrion glabrum* (see Millen & Feuler, 2008)] Address: Millen, Anne, E-mail: pvana@emirates.net.ae

**9374.** Millen, A.; Feulner, G. (2008): Erratum: Oasis Skimmer Dragonfly. *Gazelle*, Dubai 23(11): 6-7. (in English) ["The "dragonfly" depicted on page 4 of the previous *Gazelle* (October 2008) is NOT the Oasis Skimmer *Orthetrum sabina*. It is not even a dragonfly but a damselfly, *Ceriagrion glabrum*, which has been called, in the vernacular, the "Olive Eyes Damselfly"." (Authors)] Address: Feulner, G., c/o Dubai Natural History Group, PO Box 9234, Dubai, United Arab Emirates

**9375.** Mugnai, R.; Oliveira, R.B.; do Lago Carvalho, A.; Baptista, D.F. (2008): Adaptation of the Índice Biotico Esteso (IBE) for water quality assessment in rivers of Serra do Mar, Rio de Janeiro State, Brazil. *Tropical Zoology* 21: 57-74. (in English) ["This paper presents the index Índice Biotico Estendido-Instituto Oswaldo Cruz (IBE-IOC) adapted from the Índice Biotico Esteso (IBE) for the Serra do Mar region, Rio de Janeiro State, Brazil. This index was adjusted to 1st to 4th order streams using data from previous studies from 1999 through 2002. The surveys were carried out at 36 sampling sites, most with records from three different times of the year, for a total of 98 sampling events. The adaptation of the index was carried out in three stages: (1) adequacy of the taxonomic list of the SU definition table; (2) vertical modification of the calculation table, considering the taxa richness data; (3) horizontal modification of the calculation table, considering the tolerance of taxa to stress-related factors. In this article, there is also a table with the relative tolerances of the taxa present in the study area. Preliminary tests indicate good sensitivity of the IBE-IOC for the detection of different types of environmental impact, associated with the organic pollution, deforestation and industrial activities." (Authors) Odonata are treated at the genus level.] Address: Mugnai, R., Laboratório de Avaliação e Promoção da Saúde Ambiental, Fundação Oswaldo Cruz, Av. Brasil 4365, Manguinhos, 21045-900 Rio de Janeiro, RJ, Brazil. E-mail: mugnai@ioc.fiocruz.br

**9376.** Nishu, S. (2008): A late record of *Pseudothemis zonata*. *Sympetrum Hyogo* 11: 32-33. (in Japanese, with English summary) [Japan; "P. zonata has been recorded during early May to mid October in literatures. In Sakurabori Pond in Akashi Park, two males of this species were recorded on October 21, 2008. The record continued to subsequent days until November 2 when a single male was recorded. This marks the latest record of the imago life of this "summer species". It will be interesting to determine whether this male belongs to the second generation from the egg laid by an early ovipositing female." (Author)] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net

**9377.** Polhemus, D.A.; Englund, R.A.; Polhemus, J.T. (2008): Aquatic Insects of the Solomon Islands. In: Polhemus, D.A.; Englund, R.A.; Allen, G.R.; Boseto, D.;

Polhemus, J.T. (2008): Freshwater biotas of the Solomon Islands. Analysis of richness, endemism and threats. Contribution 2008-13 to the Pacific Biological Survey (ISSN 1085-455X). 133 pp: 41-89. (in English) [Between 11-XI-2004 and 4-VIII-2005, 70 localities were visited and collected for Odonata. The localities are briefly characterized, and the species recorded are listed, and in some cases discussed. Fig. 37-52 are devoted to Odonata. "Based on these surveys, plus examination of museum collections and scientific literature, the aquatic insect biota of the Solomon Islands displays the following levels of richness and endemism for the groups surveyed: [...] 2.) In the Odonata, 63 described species are now known, representing 37 genera in 9 families. Of these, 4 genera and 28 species are endemic, representing a 11% rate of endemism at the generic level and a 44% rate of endemism at the species level. At least one undescribed species of endemic Zygoptera was collected during the present survey." (Authors) Address: Polhemus, D., Dept. of Entomology, MRC 105, Smithsonian Institution, Washington, D.C. 20560, USA. Email: bugman@bpbm.org

**9378.** Rochelet, B. (2008): Première preuve de reproduction de *Gomphus graslinii* Rambur, 1842 en Deux-Sèvres et observations odonatologiques en bord de Sèvre niortaise (Odonata, Anisoptera, Gomphidae). *Martinia* 24(3): 93-100. (in French, with English summary) [Reproduction of *G. graslinii* was proved at 18-VI-2007, Sèvre River, Surimeau, Deux-Sèvres department (W France). The status of the species in W central France is discussed, and the Odonata fauna of the stretch of the river investigated is listed.] Address: Rochelet, B., 19, rue des Allards F-79210 Usseau, France

**9379.** Sahuquillo, M.; Miracle, M.R.; Rieradevall, M.; Kornijów, R. (2008): Macroinvertebrate assemblages on reed beds, with special attention to Chironomidae (Diptera), in Mediterranean shallow lakes. *Limnetica* 27(2): 239-250. (in English, with Spanish summary) ["Macroinvertebrate assemblages on reed beds, with special attention to Chironomidae (Diptera), in Mediterranean shallow lakes Macroinvertebrates associated to reed beds (*Phragmites australis*) in six shallow natural water bodies along the 220 km of coast of the Comunidad Valenciana (Spain) were studied. These sites were selected to reflect different trophic states, but also, and due to the natural variability of mediterranean wetlands, they greatly differ in salinity and hydroperiod. To unify the sampling, reed bed was chosen to provide data from a habitat common to all wetlands, including the most eutrophic ones where submerged macrophytes have disappeared due to water turbidity. Individual submerged stems of *Phragmites australis* were sampled along with the surrounding water. The animal density found refers to the available stem surface area for colonization. Forty-one taxa were recorded in total, finding Chironomidae to be the most important group, quantitatively and qualitatively. In freshwater sites it was observed an increase in macroinvertebrate's density at higher trophic states. Nevertheless each studied region had a different fauna. The PCA analysis with macroinvertebrate groups distinguished three types of environment: freshwaters (characterized by swimming insect larvae, collectors and predators, oligochaetes and Orthocladiinae), saline waters (characterized by crustaceans and Chironominae) and the spring pool, which shares both taxa. Chironomids were paid special attention for being the most abundant. A DCA analysis based



on the relative abundance of Chironomids reveals salinity as the main characteristic responsible for its distribution, but trophic state and hydrological regime were also shown to be important factors." (Authors) The study includes *Ischnura elegans* and *Sympetrum fonscolombii*.] Address: Sahuquillo, Maria, Dept. de Microbiologia i Ecologia. Universitat de València. 46100 Burjassot (Valencia) Spain. E-mail: maria.sahuquillo@uv.es

**9380.** Sciberras, A. (2008): Nota fuq in Nomenklatura tal- Mazzarelli Li ghawn idokumentati fil Gzejjer Maltin. *L-Imnara* 9(1): 42-44. (in Maltese) [For the hitherto known Odonata species of Malta, vernacular names are given.] Address: Sciberras, A., 131, "Arnest", Arcade Str., Paola, Malta. E-mail: bioislets@gmail.com

**9381.** Stanley, S.; Pehek, E. (2008): Biodiversity of a unique habitat in an urban setting. Abstracts Northeast Natural History Conference X., N.Y. State Mus. Circ. 71. ISBN: 1-55557-246-4: 79. (in English) ["Despite New York City's mountains of concrete and dense population, its natural areas provide an important refuge for many species of wildlife. Most of the city's undeveloped land is in the borough of Staten Island, much of it in private ownership. As these green spaces quickly disappear, parkland becomes essential to the continued survival of local wildlife species. The 110-acre Ocean Breeze Park is a unique natural area in northern Staten Island supporting an incredible diversity of flora and fauna. Originally an estuarine salt marsh, the site was filled in, over time developing into a complex of seasonal freshwater wetlands within open, sandy uplands. An unusual habitat type in the metropolitan area, Ocean Breeze Park has the highest odonata species count in the city for any one year in recent times, including three New York State rare species, *Ischnura ramburii*, *I. hastata*, and *Libellula needhami*. [...] As recent survey work took place only in 2007, further exploration of the park will likely yield more interesting finds of both invertebrate and vertebrate species." (Authors)] Address: Stanley, Susan, New York City Dept of Parks & Recreation, Natural Resources Group, New York, NY, USA

**9382.** Stübing, S.; Gelpke, C. (2008): Mehrjähriges Vorkommen der Torf-Mosaikjungfer *Aeshna juncea* in einem Gartenteich. *Libellen in Hessen* 1: 60-61. (in German) [Exuviae of *A. juncea* were found in a garden pond (10 x 5 m) located at Niedenstein-Metze, Hessen, Germany from 2002 to 2007.] Address: Stübing, S., Im Feldchen 1a, D-61209 Echzell, Germany. E-mail: stefan.stuebing@gmx.de

**9383.** Stübing, S.; Roland, H.-J.; Cloos, T.; Korn, M.; Patzich, R. (2008): Einleitung - Libellen in Hessen. *Libellen in Hessen* 1: 4-5. (in German) [Introduction into tasks and schedule of the working group to study the Odonata of Hessen, Germany] Address: Stübing, S., Im Feldchen 1a, D-61209 Echzell, Germany. E-mail: stefan.stuebing@gmx.de

**9384.** Termaat, T.; Groenendijk, D.; Bouwman, J. (2008): Monitoring dragonflies Europe: report on a successful symposium. *Vlinders* 4/2008: 6-7. (in Dutch) ["The International Symposium on Monitoring Dragonflies in Europe took place in Wageningen on 13th and 14th June 2008. The symposium was one of many activities organised this year by Dutch Butterfly Conservation to mark their 25th anniversary. We wanted to bring people together, to exchange experiences and discuss the possibilities of a European monitoring project. We had invited people from as many countries

as possible whom we knew were already involved in monitoring, or those hoping to be so in the future; 35 people came from eleven countries! On the first day, we heard lectures about how dragonfly work was organized in the various countries, whether monitoring was carried out, and if so, how? At the end of the day, there was a discussion on the easiest and most practical way of combining current initiatives to create a European monitoring network. The excursion to the wetland De Weerribben the next day gave the participants the chance to see typical lowland bog species. It was suggested that a congress be held every two years, with a wider choice of subjects. Portugal in 2010?" (Authors)] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands

**9385.** Ternois, V.; Lambert, J.-L.; Fradin, E. (2008): *Oxygastra curtisii* (Dale, 1834) en Champagne-Ardenne: premiers résultats du programme d'études 2007-2009 (Odonata, Anisoptera, Corduliidae). *Martinia* 24 (3): 75-87. (in French, with English summary) [A survey devoted to *O. curtisii* was initiated in 2007 in the Champagne-Ardenne region (NE France) to examine the status of this species. First results of the study are used to update the regional distribution map of the species. The importance of gravel pits as habitat of the species is stressed.] Address: Ternois, V., CP1E du Pays de Soullaines, Domaine de Saint-Victor, F-10200 Soullaines-Dhuys, France. E-mail: cpie.vincent.ternois@wanadoo.fr

**9386.** Tessier, M.; Sfreddo, G. (2008): Premier bilan d'inventaires d'Odonates dans le nord du département de l'Ariège. *Martinia* 24(3): 89-92. (in French, with English summary) ["This paper presents the first results of Odonata surveys in the northern part of the Ariège department, France between the Ariège and Hers Vif rivers. During these surveys, a large population of *Coenagrion mercuriale* was recorded in the "Ariège plain" and few individuals of *Oxygastra curtisii* were seen on the Hers Vif river." (Authors)] Address: Tessier, M., 62 chemin del prat, 31320, Auzeville-Tolosane, France. E-mail: marc.tessier3@free.fr

**9387.** Todd, J.H.; Ramankutty, P.; Barraclough, E.I.; Malone, L.A. (2008): A screening method for prioritizing non-target invertebrates for improved biosafety testing of transgenic crops. *Environ. Biosafety Res.* 7: 35-56. (in English) ["We have developed a screening method that can be used during the problem formulation phase of risk assessment to identify and prioritize non-target invertebrates for risk analysis with any transgenic plant. In previously published protocols for this task, five criteria predominated. These criteria have been combined by our method in a simple model which assesses: (1) the possible level of risk presented by the plant to each invertebrate species (through measurements of potential hazard and exposure, the two principal criteria); (2) the hypothetical environmental impact of this risk (determined by the currently known status of the species' population in the ecosystem and its potential resilience to environmental perturbations); (3) the estimated economic, social and cultural value of each species; and (4) the assessed ability to conduct tests with the species. The screening method uses information on each of these criteria entered into a specially designed database that was developed using Microsoft Access 2003. The database holds biological and ecological information for each non-target species, as well as information about the transgenic plant that is the subject of the risk

assessment procedure. Each piece of information is then ranked on the basis of the value of the information to each criterion being measured. This ranking system is flexible, allowing the method to be easily adapted for use in any agro-ecosystem and with any plant modification. A model is then used to produce a Priority Ranking of Non-Target Invertebrates (PRONTI) score for each species, which in turn allows the species to be prioritized for risk assessment. As an example, the method was used to prioritize non-target invertebrates for risk assessment of a hypothetical introduction of *Bacillus thuringiensis* (Bt) Cry1Ac-expressing *Pinus radiata* trees into New Zealand." (Author) *Antipodochlora braueri* was selected as one of 80 test species.] Address: Todd, Jacqui, The Horticulture and Food Research Institute of New Zealand Limited, Mt Albert, Private Bag 92169, Auckland Mail Centre, Auckland 1142, New Zealand. E-mail: jtodd@hortresearch.co.nz

**9388.** Torralba Burrial, A.; Alonso Naveiro, M. (2008): Primera cita de la libélula amenazada *Coenagrion scitulum* (Odonata: Coenagrionidae) en la provincia de Teruel (España). *Boletín de la Asociación Española de Entomología* 32(3-4): 375-377. (in Spanish) [30-VI-2008, first record of the threatened *C.scitulum* in Teruel province (Spain, Costanilla en Fonfría; 30TXL611392).] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniob@hotmail.com

**9389.** Vanappelghem, C. (2008): In memoriam Philip S. Corbet. *Martinia* 24(4): 111-112. (in French) [Obituary, including a brief account on the major stations of scientific and publication activities.] Address: Vanappelghem, C., 14, rue Brûle Maison, F-59000 Lille, France. E-mail: cedvana@free.fr

**9390.** Verdu, J.R.; Galante, E. (2008): Atlas de los Invertebrados Amenazados de España (Especies En Peligro Crítico y En Peligro). Dirección General para la Biodiversidad, Ministerio de Medio Ambiente, Madrid. ISBN: 978-84-8014-753-8: 340 pp. (in Spanish) [Odonata are treated on pages 198-234, and refer to *Brachytron pratense*, *Macromia splendens*, *Oxygastra curtisii*, *Gomphus graslinii*, *Lindenia tetraphylla*, *Leucorrhinia pectoralis*. All species are treated in a monographic way including information on habitat and distribution, protection status and a bibliography. The maps are the most informative ever published on these species in Spain. Authors of the Odonata chapters are: Mónica Azplicueta Amorín, Francisco J. Ocharan, Antonio Torralba Burrial, Rocío Ocharan Ibarra, David Outomuro Priede & Adolfo Cordero Rivera.] Address: <http://www.mma.es/portal/secciones/biodiversidad/inventarios/inb/atlasinvertebrados/pdf/AtlasinvertebradosamenazadosEspania.pdf>

**9391.** Zia, A.; Naeem, M., Ather Rafi, M.; Ali Hassan, S. (2008): A List of damselflies (Zygoptera: Odonata) recorded from Azad Jammu and Kashmir, Pakistan. *Pakistan Journal of Scientific and Industrial Research* 51(6): 329-332. (in English) [An intensive odonatological survey of the valley of Kashmir during the summer season of three consecutive years (2005-2007) yielded 31 Zygoptera.] Address: Zia, A., National Insect Museum, NARC-Islamabad, Pakistan

**9392.** Altamiranda Saavedra, M. (2009): Diversidad de libélulas (Insecta-Odonata) para dos usos de Suelo, en un bosque seco tropical. *Rev. Fac. Nal. Agr. Medellín* 62(2): 5071-5079. (in Spanish, with English summary) ["Dragonfly diversity was estimated in the Agricultural Center Cotove (Santafé de Antioquia-Colombia). Active capture using an entomological net was used. Each transect was located perpendicular to the water body, for a length of approximately 200 m and a lateral extension of 8 m. Twenty Odonata species were registered, from 5 families and 15 genus. Libellulidae showed the biggest abundance and richness, with 65 specimens that represent 53.7% of the total abundance, and 12 species that represent 60% of the registered community. The alpha diversity was high in the forest in reference at crop; however, the low abundances register highlight the need for greater sampling effort in cultivating, for a better estimate of gamma diversity; the beta diversity was of 12 species and the complementary index was of 0.6, it indicates that the Odonata's fauna is characteristic and distinctive for each use of soil." (Author)] Address: Altamiranda Saavedra, M., Universidad Nacional de Colombia, Sede Medellín. Facultad de Ciencias. A.A. 3840, Medellín, Colombia. E-mail: marianoaltamirandas@hotmail.com

**9393.** Asokan, S.; Samsoor Ali, A.M.; Manikannan, R. (2009): Preliminary investigations on diet and breeding biology of the Indian Roller *Coracias benghalensis* in a portion of Cauvery Delta, Tamil Nadu, India. *World Journal of Zoology* 4(4): 263-269. (in English) [The diet composition of the Indian Roller - studied between 2005 and 2006 and based on the regurgitated pellets (n=712) - mainly includes Coleoptera (26.6%), followed by Orthoptera (19.5%), Hemiptera (16.7%), Hymenoptera (14.2%), Diptera (9.1%), Odonata (6.7%) and Lepidoptera (6.5%).] Address: Samsoor Ali, A.M., Department of Zoology, Saraswathi Narayanan College, Perungudi, Madurai - 625 022, Tamil Nadu, India

**9394.** Azuma, T. (2009): Difference in the mating strategy between *Aeshna nigroflava* and *A. juncea*. *Sympetrum Hyogo* 11: 18-19. (in Japanese, with English summary) ["The difference in the mating strategy between *A. nigroflava* and *A. juncea* is discussed through some cases of observation. A male *A. nigroflava* will not catch the ovipositing female in his territory but keep on flying in pursuit of the ovipositing female, and will catch the female when forced to come out of the pond. A male *A. juncea* caught the female soon after finding the ovipositing female. During a series of observation the author found a case that a female *A. juncea* tried to escape and got into a hole in a leaf accidentally, by which means succeeded in escaping from the male." (Author)] Address: not stated

**9395.** Bamann, T.; Betz, O. (2009): Die Libellen des NSG Schaichtal (Schönbuch) - Ergebnisse einer ökologisch orientierten Diplomarbeit. *mercuriale* 9: 1-10. (in German) [NSG Schaichtal, Baden-Württemberg, Germany; in 2008, a total of 28 Odonata species was recorded. Habitat parameter or faunistically interesting records of the following species are briefly discussed: *Calopteryx virgo*, *Lestes virens*, *Sympetma fusca*, *Cordulegaster bidentata*, *Gomphus pulchellus*, *Onychogomphus forcipatus*, *Crocothemis erythraea*, *Leucorrhinia dubia*, and *Sympetrum flaveolum*.] Address: Bamann,

T., Amselweg 9, 71144 Steinenbronn, Germany. E-mail: t.bamann@web.de

**9396.** Baumgärtner, D. (2009): Großer Blaupfeil (*Orthemtrum cancellatum*) Larve läuft Langstrecke auf Landgang. *mercuriale* 9: 37-38. (in German) [Baden-Württemberg, Germany; The distance between the emergence site and nearest shore line of a gravel pit was 34 m.] Address: Baumgärtner, D., Regierungspräsidium Karlsruhe, Karl-Friedrich-Str. 17, 76133 Karlsruhe, Germany

**9397.** Brydegaard, M.; Guan, Z.; Wellenreuther, M.; Svanberg, S. (2009): Insect monitoring with fluorescence lidar techniques: feasibility study. *Applied Optics* 48(30): 5668-5677. (in English) ["We investigate the possibilities of light detection and ranging (lidar) techniques to study migration of *Calopteryx splendens* and *C. virgo*. Laboratory and testing-range measurements at a distance of 60 m were performed using dried, mounted damselfly specimens. Laboratory measurements, including color photography in polarized light and spectroscopy of reflectance and induced fluorescence, reveal that damselflies exhibit reflectance and fluorescence properties that are closely tied to the generation of structural color. Lidar studies on *C. splendens* of both genders show that gender can be remotely determined, especially for specimens that were marked with Coumarin 102 and Rhodamine 6G dyes. The results obtained in this study will be useful for future field experiments, and provide guidelines for studying damselflies in their natural habitat using lidar to survey the air above the river surface. The findings will be applicable for many other insect species and should, therefore, bring new insights into migration and movement patterns of insects in general." (Authors)] Address: Brydegaard, M, Atomic Physics Division, Lund University, P.O. Box 118, SE-221 00 Lund, Sweden. E-mail: mikkel.brydegaard@fysik.lth.se

**9398.** Byers, C.J.; Eason, P.K. (2009): Conspecifics and their posture influence site choice and oviposition in the damselfly *Argia moesta*. *Ethology* 115(8): 721-730. (in English) ["Finding a suitable oviposition site can be costly because of energy and time requirements, and ovipositioning can be dangerous because of the risk of predation and harassment by males. *A. moesta* oviposits, contact-guarded by her mate, on vegetation in streams. Oviposition aggregations are commonly observed in this species, despite their territorial nature during other behaviours. We conducted experiments in the field to test the hypothesis that aggregations are the result of conspecific attraction. In the first experiment, two oviposition sites (sycamore leaves) were provided, one with models of ovipositing pairs, and one without. In the second experiment, one leaf again had ovipositing models, while the other had models of uncoupled males and females in a resting posture. In both experiments, damselfly pairs preferred the site with ovipositing models. In general, they visited the ovipositing models first more often than expected by chance, stayed longer there, were more likely to oviposit there, and laid a greater total number of eggs there. These results support the hypothesis that conspecific attraction is responsible for ovipositing aggregations in *A. moesta* and that posture is an important cue for attraction. Using conspecific cues could be a beneficial strategy to save in search costs while taking advantage of the presence of ovipositing conspecifics to dilute the effects of harassment and predation." (Authors)] Address:

Eason, Perri, Dept of Biology, University of Louisville, LF 139, Louisville, KY 40292, USA. E-mail: perri.eason@louisville.edu

**9399.** Čadková, Z. (2009): Aquatic ecosystems of the Radovesice dumping site. In: Harabiš Filip & Suvorov Petr (Eds.): *Environmental Sciences 2009. Proceedings of the 2nd conference, 12-13 March 2009.* Department of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences in Prague, Kamýcká 129, 165 21 Prague 6 – Suchbát. ISBN 978-80-213-1919-6: 5-8. (in English) [The study presents results of a biological monitoring of the aquatic ecosystems of the Radovesice dumping site (northwest Bohemia, near the city of Bílina, Czech Republic). A total of 39 zoobenthic taxa includes includes Odonata (without any additional detail).] Address: Čadková, Zuzka, Czech University of Life Sciences Prague, Faculty of Agrobiological Sciences, Department of Zoology and Fisheries, Kamýcká 957, 165 21 Prague 6 – Suchbát, Czech Republic. E-mail: cadkova@af.czu.cz

**9400.** Chovanec, A.; Schindler, M.; Pall, P.; Hostettler, K. (2009): Bewertung des österreichischen Bodenseeuferes auf der Grundlage libellenkundlicher Untersuchungen. *Schriftenreihe Lebensraum Vorarlberg* 59: III, 43 pp. (in German, with English summary) ["The ecological status of the littoral areas of Lake Constance in Austria was assessed by a dragonfly survey. A key element of the approach, which is oriented towards the Water Framework Directive (WFD), is the Odonata Habitat Index. The assessment is based on the comparison between the status quo and a reference condition derived from current and historical data on dragonflies and macrophytes. A total of 28 species were recorded at 15 investigation sites, 25 species were classified as autochthonous. The ecological status of the lake shore section was ranked as class II ("good ecological status") in the 5-tiered WFD classification scheme." (Authors)] Address: Chovanec, A., Krottenbachgasse 68, A-2345 Brunn am Gebirge, Austria.

**9401.** Ciemiński, J.; Zdanowski, B. (2009): Changes in the zoobenthos structure in a system of heated lakes in central Poland. *Arch. Pol. Fish.* 17: 221-238. ["The aim of the study was to identify changes in the quality and quantity structure of the zoobenthos assemblages inhabiting the lakes, channels, and basins that comprise the cooling system of a power plant in central Poland. By comparing the invertebrate fauna occurring on the freshwater clam *Sinanodonta woodiana* (Lea) and the macrophyte *Vallisneria spiralis* (L.), the significance of exotic species in the development of invertebrate macrofauna species was demonstrated. The zoobenthos inhabiting the channels was poorer quantitatively and qualitatively than was the lake zoobenthos. Factors that determined this included thermal and oxygen conditions and water flow. Elements that enriched the development of the zoobenthos and the zooperiphyton included populations of alien zebra mussel *Dreissena polymorpha* Pallas and *S. woodiana*, and assemblages of *Myriophyllum spicatum* L. and *Ceratophyllum demersum* L. In comparison to thirty years ago, the quality of the bottom fauna in the system has decreased." (Authors)] The study includes records of *Platycnemis pennipes*, *Coenagrion pulchellum*, *Calopteryx virgo*, and *Calopteryx* sp.] Address: Zdanowski, B., Department of Hydrobiology, The Stanislaw Sakowicz Inland Fisheries Institute in Olsztyn, ul. Oczapowskiego 10, 10-718 Olsztyn, Poland. E-mail: bzdanowski@infish.com.pl



- 9402.** Clopton, R.E. (2009): Phylogenetic relationships, evolution, and systematic revision of the septate gregarines (Apicomplexa: Eugregarinorida: Septatorina). *Comparative parasitology* 76(2): 167-190. (in English) ["A phylogenetic hypothesis was constructed with the use of ssu rDNA sequence data from 27 eugregarine species parasitizing a variety of arthropod hosts and habitats. The data were used to address higher-level character transitions, identify clades, recognize supraspecific taxonomic groups, assess the existing gregarine classification, and assess the effects of host metabolic pattern and habitat transitions on the radiation of the septatorinid gregarines. [...] Trophozoites, gamonts, and gametocysts of *Geneiorhynchus manifestus* were collected as part of the original type series collection from naiads of *Anax junius* collected from Beaver Slide Pond, Big Sandy Creek Unit, Big Thicket National Preserve, Polk County, Texas, USA (30°38'49"N; 96°17'64"W) in February 2006. [...] Trophozoites, gamonts, and gametocysts of *Prismatospora evansi* were collected from naiads of *Anax junius* collected from Collins Pond, Big Sandy Creek Unit, Big Thicket National Preserve, Polk County, Texas, USA. (30°47'78"N; 94°12'81"W) in February 2006. [...] Trophozoites, gamonts, and gametocysts of *Hoplorhynchus acanthatholius* were collected from adults of *Enallagma civile* collected from Optimist Lake, Auburn, Nemaha County, Nebraska, USA (40°23'94"N; 95°50'24"W) during July–August 2007. [...] Hemimetabolic insect life cycles are found only in truly aquatic insect orders. In the analysis presented herein, hemimetabolic hosts are exploited only by the Actinocephalidae. Patterns of host-stadium specificity are more complex in this group. Host-stadium specificity is observed in species of *Prismatospora* and *Geneiorhynchus*, which infect dragonfly naiads (Anisoptera) but not in species of *Hoplorhynchus*, which infect damselfly naiads and adults (Zygoptera). As a general trend, anisopterans are strong fliers with comparatively large home ranges, and zygopterans are weak fliers with small home ranges. Adult anisopterans are rarely infected, probably because they are exploiting a different, perhaps nonaquatic, resource base than are their naiads. Although physiologically hemimetabolic, from a gregarine's point of view anisopteran hosts are holometabolic ecological actors, whereas zygopteran hosts are hemimetabolic ecological actors." (Author)] Address: Clopton, R.E., Dept Natural Science, Peru State College, Peru, Nebraska 68421, USA. E-mail: rclipton@oakmail.peru.edu
- 9403.** Covey, S. (2009): Wiltshire dragonfly report 2008. Wiltshire County Recorder's Annual Report 2008-2009: 9-11. (in English) [14 odonate species - recorded in 2008 from Wiltshire (UK) - are briefly commented on.] Address: not stated
- 9404.** Csordás, L.; Ferincz, Á.; Lókkös, A.; Rozner, G. (2009): New data on the distribution of Large Golden Ringed Dragonfly (*Cordulegaster heros* Theischinger, 1979) (Odonata) in Zselic hills. *Natura Somogyiensis* 15: 53-56. (in English) [The first regional record of *C. heros* dates back to 2005. Intensive investigations of *C. heros* were conducted in 2008 and 2009. These records are documented and mapped.] Address: Csordás, Lilla, Western Hungary University, Institution of Forest Protection and Forest Cultivation, H-9400 Sopron, Bajcsy-Zsilinszky Endre u. 4., Hungary. E-mail: lillaszitatokotok@gmail.com
- 9405.** Darvizeh, M.; Darvizeh, A.; Rajabi, H.; Rezaei, A. (2009): Free vibration analysis of dragonfly wings using finite element method. *Int. J. Multiphysics* 3(1): 101-110. (in English) ["In the present work, investigations on the microstructure and mechanical properties of the dragonfly wing are carried out and numerical modelling based on Finite Element Method (FEM) is developed to predict Flight characteristics of dragonfly wings. Vibrational behaviour of wings type structures is immensely important in analysis, design and manufacturing of similar engineering structures. For this purpose natural frequencies and mode shapes are calculated. In addition, the kind of deformation in each mode shape evaluated and the ratio between numerical natural frequency and experimental natural frequency presented as damping ratio. The results obtain from present method are in good agreement with same experimental methods." (Authors)] Address: Rajabi, H., Department of Mechanical Engineering, Guilan University, P.O. Box 3756, Rasht, Iran. E-mail: harajabi@hotmail.com
- 9406.** David, A.; Ferenți S.; Hodișan; O., Horia, B.-V.; Gale, O. (2009): The food analysis of a *Triturus cristatus* population near Ignești locality, Arad County, Romania. *Herpetologica Romanica* 3: 47-52. (in English) [The stomach content of 113 individuals of *T. cristatus* was studied during the reproductive period in March and April. Crustacean-Cladocera and Trichoptera larvae represent the most important prey taxa categories. Odonata are of minor importance in the diet of *T. cristatus*.] Address: David, Anamaria, University of Oradea, Faculty of Sciences, Department of Biology, Universității str., No. 1, 410087- Oradea, Romania. E-mail: anadavid07@yahoo.com
- 9407.** Delasalle, J.-F. (2009): Contribution à la connaissance d'*Acanthallagma luteum* Williamson & Williamson, 1924 en Amérique du Sud (Odonata: Zygoptera: Coenagrionidae). *Martinia* 25(4): 145-148. (in French, with English summary) [French Guyana, 21-II-2004 (2 males, 2 females) and 19-VIII-2005 (1 male) near Saül. Known South American records of the species are mapped.] Address: Delasalle, J.-F., Domaine de Chantraigne 30 rue Jules Lardière BP 70225 F-80800 Corbie, France. E-mail: jf.delasalle@aliceadsl.fr
- 9408.** Dierickx, H. (2009): Negen jaar libellen in het Kollintenbos te Zemst (2000-2008). *Brakona jaarboek* 2008: 88-99. (in Dutch) [Kollintenbos near Zemst, Belgium; a nine year monitoring of the Odonata fauna resulted in 25 species. These are listed in a table according their first occurrence in the habitat. *Sympetrum vulgatum* was lost, while in most cases species favoured by climate change are new additions to the local fauna.] Address: Dierickx, H., L. Luybaertstraat 244/1, 1850 Grimbergen, Belgium. E-mail: herman.dierickx@telenet.be
- 9409.** Dolson, R.; McCann, K.; Rooney, N.; Ridgway, M. (2009): Lake morphometry predicts the degree of habitat coupling by a mobile predator. *Oikos* 118: 1230-1238. (in English) ["Habitat coupling is an ecosystem process whereby semi-discontinuous habitats are connected through the movement of energy and nutrients by chemical, physical or biological processes. One oft-cited example is that of littoral pelagic coupling in lakes. Theory has argued that such habitat coupling may be critical to food web dynamics, yet there have been few empirical studies that have quantified ecological factors that affect the degree of habitat coupling in ecosystems.

Specifically, the degree to which habitat coupling occurs across important physical gradients has largely been ignored. To address this, we investigate the degree of littoral habitat coupling (i.e. the degree to which a top predator lake trout, *Salvelinus namaycush*, derives energy from the littoral zone) along a gradient of lake shape, where lake shape modifies the relative quantity of coupled epilimnetic benthic and pelagic habitats within each lake. Herein we demonstrate that littoral habitat coupling is intensified in simple circular lakes compared to their reticulate counterparts in seven Canadian Shield lakes. Although the more reticulate lakes had larger areas of epilimnetic benthic habitat, littoral food sources comprised 11% compared to 24% of lake trout diet in reticulate and circular lakes, respectively. This heightened interaction in circular lakes also appears to translate into increased omnivory in more circular lakes compared to reticulate lakes such that lake trout of circular lakes have a significantly lower trophic position than lake trout of reticulate lakes ( $F_{1,5} = 6.71$ ,  $p = 0.05$ ). These results suggest that it is the accessibility of littoral production via thermal refugia, and not the amount of littoral production, that determines the degree to which lake trout couple littoral and pelagic habitats in lakes. [...] Due to low snail abundance in some lakes, littoral grazing [sic] benthic invertebrate specimens (Odonata and Ephemeroptera,  $n = 6-8$  per lake) were incorporated into the littoral carbon baseline signature." ((Authors) ] Address: Dolson, Rebecca, Dept of Integrative Biology, Univ. of Guelph, Guelph, ON, N1G 2W1, Canada. E-mail: rebecca.dolson@gmail.com

**9410.** Dominiak, P.; Michalczyk, W. (2009): Two species of biting midges (Diptera: Ceratopogonidae) new to the Polish fauna. *Dipteron* 25: 8-13. (in Polish, with English summary) ([http://pte.au.poznan.pl/dipteron/biuletyn/vol25/Dipteron\\_vol\\_25.pdf](http://pte.au.poznan.pl/dipteron/biuletyn/vol25/Dipteron_vol_25.pdf)) ["*Forcipomyia paludis* (Macfie, 1936) and *Monohalea estonica* Remm, 1965 are recorded from Poland for the first time. As a result the number of biting midges species in the Polish fauna increased to 215. Females are briefly diagnosed and illustrated, geographical distribution analysed and Odonata hosts of parasitic *Forcipomyia paludis* reviewed." (Authors)] Address: Dominiak, Patrycja, Katedra Zoologii Bezkręgowców Uniwersytetu Gdańskiego, Al. Marszałka Piłsudskiego 46, 81-378 Gdynia, e-mail: heliocopris@gmail.com

**9411.** Dommanget, J.-L. (2009): In Memoriam René Préchac - 1919-2009. Un artiste au service de l'entomologie. *Martinia* 25(1): 14, 24. (in French) [R. Préchac realised the plates in d'Aquilar, J.; Dommanget, J.-L.; Prechac, R. (1985): *Guide des Libelles d'Europe de d'Afrique du Nord*. Delachaux & Niestlé. Neuchâtel. Paris. 341 pp.] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**9412.** Donath, H. (2009): Zur Entwicklung des Schlupfbeginns von Libellen in der nordwestlichen Niederlausitz (1977 - 2009). *Biologische Studien, Luckau* 38: 59-64. (in German) [Phenological data of 20 Odonata species obtained between 1977 and 2009 are presented. The data referring to start of emergence in the respective year are detailed for *Libellula quadrimaculata*, *Cordulia aenea*, *Pyrrhosoma nymphula*, *Ischnura pumilio*, *Erythromma najas*, and *Coenagrion puella*. In recent years emergence has started one week earlier than in the 1980ies.] Address: Donath, H., Caule Nr. 1, 15926 Luckau, OT Zieckau, Germany

**9413.** Evangelista, M. (2009): Italian faunistic records 483 - *Coenagrion scitulum* (Rambur, 1842) (Odonata Coenagrionidae). *Boll. Soc. entomol. ital.* 141(2): 113. (in Italian) [Piemonte: Poirino (Torino), Favari, Sito Natura "Cascina Bellezza", 248 m a.s.l., Italy; 15-VI-2008. M. Evangelista leg., 3 males, 1 female.] Address: Evangelista, M., c/o Museo civico di Storia naturale, Parco Cascina Vigna, c. p. 89, 1-10022 Carmagnola TO, Italy

**9414.** Feulner, G. (2009): Date Palm Evolution. *Gazelle, Dubai* 22(10): 5-6. (in English) [UAE; a photograph of *Crocothemis sanguinolenta* without data is published.] Address: Feulner, G., c/o Dubai Natural History Group, PO Box 9234, Dubai, United Arab Emirates

**9415.** Feulner, G. (2009): 'Female *Trithemis annula* on an aloe in a very dry garden on Al Wasl Road, at least half a kilometre from Safa Park'. *Gazelle, Dubai* 22(9): 1. (in English) [In June 2009, a female *Trithemis annula* was photographed on an aloe in a very dry garden on Al Wasl Road, at least half a kilometre from Safa Park, United Arab Emirates.] Address: Feulner, G., Dubai Natural History Group, PO Box 9234, Dubai, UAE

**9416.** Frank, J.H.; Lounibos, L.P. (2009): Insects and allies associated with bromeliads: a review. *Terrestrial arthropod reviews* 1(2): 125-153. (in English) ["Larvae of Odonata are aquatic and predatory. They have well-developed legs and thereby can climb out of the water from one leaf axil and into the water in another. At least 12 species have been reported from bromeliad phytotelmata in Neotropical countries, and some of them appear to be specialists to this habitat. These specialists are all species of damselflies, especially of the genera *Leptagrion* and *Bromeliagrion* (Coenagrionidae), but also of *Mecistogaster* (Pseudostigmatidae) (Corbet, 1983; Melnychuk & Srivastava, 2002; Srivastava et al., 2005; Marmels & Garrison, 2005). Their prey includes mosquito larvae (Lounibos et al., 1987a) and immature crabs where these exist (Diesel, 1992). Predation by *M. modesta* on detritivores increases nitrogen cycling by preventing its export from the bromeliad axils by emerging adults of the detritivores, allowing uptake by the plant (Ngai & Srivastava, 2006)." (Authors)] Address: Frank, J.H., Florida Medical Entomology Laboratory, 2009th St. SE, Vero Beach, Florida 32962, USA. E-mail: jhfrank@ufl.edu

**9417.** Gallardo, B.; Gascon, S.; Garcia, M.; Comin, F.A. (2009): Testing the response of macroinvertebrate functional structure and biodiversity to flooding and confinement. *J. Limnol.* 68(2): 315-326. (in English) ["The aim of the present study was to investigate the relative importance of flooding- and confinement-related environmental features in explaining macroinvertebrate trait structure and diversity in a pool of wetlands located in a Mediterranean river floodplain. To test hypothesized trait-environment relationships, we employed a recently implemented statistical procedure, the fourth-corner method. We found that flooding-related variables, mainly pH and turbidity, were related to traits that confer an ability of the organism to resist flooding (e.g., small body-shape, protection of eggs) or recuperate faster after flooding (e.g., short life-span, asexual reproduction). In contrast, confinement-related variables, mainly temperature and organic matter, enhanced traits that allow organisms to interact and compete with other organisms (e.g., large size, sexual reproduction) and to efficiently use habitat and resources (e.g., diverse locomotion and feeding strategies). These results are in

agreement with predictions made under the River Habitat Templet for lotic ecosystems, and demonstrate the ability of the fourth-corner method to test hypothesis that posit trait-environment relationships. Trait diversity was slightly higher in flooded than in confined sites, whereas trait richness was not significantly different. This suggests that although trait structure may change in response to the main environmental factors, as evidenced by the fourth-corner method, the number of life-history strategies needed to persist in the face of such constraints remains more or less constant; only their relative dominance differs." (Authors) Odonata (Coenagrion) were more abundant in confined habitats.] Address: Gallardo, Belinda, Pyrenean Institute of Ecology (CSIC), Avda. Montañana 1005, 50192 Zaragoza, Spain. E-mail: belinda@ipe.csic.es

**9418.** Groenendijk, D.; Plate, C. (2009): Positive population trends for odonates. *Vlinders* 3/2009: 22-24. (in Dutch, with English summary) ["The Dutch Monitoring Scheme shows that, in general, the year 2008 can be regarded as a good year for odonates. Monitoring routes have been set out in various habitats, along streams, ponds and pools, and across peat bogs. The population trends in the coastal dunes seem to differ from those calculated for inland water bodies, being quite negative for common species. Inland, the improved water quality results in higher numbers of odonates. In addition, some rare species benefit from the improved water quality of their habitats. The monitoring results confirm that dragonflies are useful indicators of the habitat quality of Dutch wetlands." (Authors)] Address: Groenendijk, D., De Vlinderstichting, Postbus 506, NL 6700 AM Wageningen, The Netherlands. E-mail: dick.groenendijk@vlinderstichting.nl

**9419.** Hennequin, E. (2009): Les Odonates d'un site remarquable du Limousin: la tourbière-étang de Chabannes (Tarnac-Saint-Merd-les-Oussines, Corrèze). *Martinia* 25(2): 67-72. (in French, with English summary) [Between 1994 and 2007, 34 Odonata species were recorded at the peat bog-pond of Chabannes, located in the western part of Limousin Mountain, France. The list includes 8 regionally red-listed species (*Aeshna juncea*, *Coenagrion hastulatum*, *Leucorrhinia dubia*, *Somatochlora arctica*, *S. flavomaculata*, *Symptetrum danae*, *S. flaveolum*, *S. vulgatum*).] Address: Hennequin, E., Conservatoire Régional des Espaces Naturels du Limousin, 6 ruelle du Theil, F-87510 Saint-Gence, France

**9420.** Holz, B. (2009): Fotografische Dokumentation der Prädation von Großlibellenlarven durch den Eisvogel (*Alcedo atthis*) (Coraciiformes: Alcedinidae). *Mercuriale* 9: 35-36. (in German) [A kingfisher with a Libellulidae-larva was photographed north of Freiburg, Baden-Württemberg, Germany. Along with a few published data, references from photographs published in the www are briefly discussed.] Address: Holz, B., Franzosenstr. 1, 79341 Kenzingen, Germany. E-mail: holz.bernd@web.de

**9421.** Inoue, K. (2009): On the names of dragonflies: Part 1. Scientific names of Japanese odonate taxa. *Sympetrum Hyogo* 11: 2-17. (in Japanese, with English summary) ["The meaning and the origin of the scientific names of all Japanese odonate species, subspecies and forms is explained in detail." (Author)] Address: Inoue, K., 5-9 Fuminosato 4-chome, Abeno-ku, Osaka 545, Japan. E-mail: ks-inoue@mx2.nisq.net

**9422.** Jeon, D-Y.; Cha, Y.-U.; Kim, M.-H.; Lee, S.-L.; Kim, C.-I.; Kwon, K.-W.; Yoo, P.-J. (2009): Assessments of ecosystem health in middle reaches of Suyoung River. The Annual Report of Busan Metropolitan City Institute of Health & Environment 19(1): 94-113. (in Korean, with English summary) [Busan, South-Korea; the assessment of stream condition based on the index of Korea Saprobic Index (KSI) indicated a "good ~ fair" status. Odonata are treated at the order level.] Address: Jeon, D-Y., Busan Metropolitan City Institute of Health & Environment, Busan, South-Korea. E-mail: jeon1st@korea.kr

**9423.** Kalyoncu, H.; Gülboy, H. (2009): Benthic macroinvertebrates from Darýören and Isparta streams (Isparta/Turkey) – Biotic indices and multivariate analysis. *Journal of Applied Biological Sciences* 3(1): 79-86. (in English) ["During 2003 -2004, seventy-two samples were collected from 6 sampling points on Isparta stream basin (Isparta/Turkey). Macrozoobenthic organisms and physico-chemical parameters were investigated to assess the impact of the pollution on macrozoobenthos assemblages. Ecological methodologies (species richness, diversity and family biotic indices and multivariate analysis) were employed to assess the impact of the pollution on macrozoobenthic assemblages. During the study, totally 27293 specimens were collected from six sampling points. These belonged to 83 taxa distributed into 6 taxonomic groups as follows: Plathelminthes, Mollusca, Annelida, Crustacea, Insecta, and Arachnida. Biological oxygen demand, NH4-N, NO3-N, NO2-N SO4, conductivity, total hardness and turbidity parameters were measured higher in the 3rd and 6th sampling points, while dissolved oxygen amount was the lowest in these. pH was variable. In this study, the number of species is the highest at station 1, which is also reflected by Margalef and Shannon-Weaver indices. As the amount of pollution is higher at stations 3 and 6, the number of species is fewer in these stations compared to the others. Sampling points 1, 2, 4 and 5 were of good water quality levels. Changes in water quality levels were better reflected by species richness, diversity indices and principal component analysis than pollution indices in Isparta stream." (Authors) Odonata taxa are treated at the genus level with the exception of *Epallage fatime*.] Address: Kalyoncu, H., S. Demirel University Faculty of Arts and Sciences Department of Biology 32260 Isparta, Turkey. E-mail: kalyoncu@fef.sdu.edu.tr

**9424.** Kato, Y.; Takemon, Y.; Hori, M. (2009): Invertebrate assemblages in relation to habitat types on a floating mat in Mizorogaike Pond, Kyoto, Japan. *Limnology* 10(3): 167-176. (in English) ["Abiotic environmental variables and invertebrate assemblages were compared among four habitat types (bare hollow, sphagnum-rich hollow, pool, and mat edge) on a floating mat in Mizorogaike Pond, Kyoto. We found differences in abiotic environments between two hollows and two inundated habitats (pool and mat edge); pH was significantly lower in hollow habitats than in inundated habitats, and water depths were significantly shallower in sphagnum-rich hollows than in inundated sites. The composition of invertebrate assemblages in the hollow was distinct from that in the inundated habitats. The abundances of some dominant invertebrate taxa or functional feeding groups on the floating mat differed between the hollows and inundated habitats, and were correlated with water temperature, pH and depth. These results indicate that



habitat heterogeneity created by the coexistence of hollows and inundated habitats contributes to species diversity on the floating mat in Mizorogaike Pond. A comparison of the pH values in different wetlands revealed that both bog- and fen-specific components coexist within this system. In order to adequately manage and conserve peatland ecosystems, it is necessary to consider the importance and vulnerability of both hollows and inundated habitats in peatlands." (Authors) *Ceriagrion melanurum* was significantly more abundant at mat edges than in pools and the two types of hollows. The following taxa have been recorded in the nymphal stage: *Ceriagrion nipponicum*, *Aciagrion migratum*, *Lestes sponsa*, *Sympetrum speciosum speciosum*, *S. eroticum eroticum*, *S. pedemontanum elatum*, *Nannophya pygmaea*, *Crocothemis servilia*, *Libellulidae*] Address: Kato, Y., Laboratory of Animal Ecology, Dept. of Zoology, Graduate School of Science, Kyoto Univ., Kitashirakawa-oiwake, Sakyo, Kyoto 606-8502, Japan. E-mail: yoshikazukato@terra.zool.kyoto-u.ac.jp

**9425.** Keller, D.; Brodbeck, S.; Holderegger, R. (2009): Characterization of microsatellite loci in *Leucorhinia caudalis*, a rare dragonfly endangered throughout Europe. *Conservation Genetics Resources* 1(1): 179-181. (in English) ["*L. caudalis* is a rare dragonfly, threatened throughout Europe. It only survived in a single population in Switzerland in the 1980s. However, it recently spread and colonized new ponds. In order to be able to study contemporary migration in this species, eight new microsatellite markers were developed and tested on 24 individuals from six Swiss ponds. We detected three to eleven alleles per polymorphic locus and found observed and expected heterozygosities of 0.250 to 0.875 and 0.215 to 0.840, respectively." (Authors)] Address: Keller, Daniela, WSL Swiss Federal Research Institute, Zürcherstr. 111, 8903 Birmensdorf, Switzerland

**9426.** Khrokalo, L.A.; Savchuk, V.V.; Dyatlova, E.S. (2009): New records of rare dragonflies (Insecta, Odonata) in Ukraine. *Vestnik Zoologii* 43(4): 378. (in Russian, with English title) [Records of *Erythromma lindenii*, *Coenagrion scitulum* and *Selysiotthemis nigra* are documented..] Address: Khrokalo, Lyudmila, P.O. Box 16, Kyiv-118, Ukraine 03118. E-mail: lkrokalo@mail.ru

**9427.** Kim, W.-K.; Kob, J.H.; Park, H.C.; Byun, D. (2009): Effects of corrugation of the dragonfly wing on gliding performance. *Journal of Theoretical Biology* 260 (4): 523-530. (in English) ["We investigate the aerodynamic performance of the dragonfly wing, which has cross-sectional corrugation, via a static 2-dimensional unsteady simulation. Computational conditions are  $Re = 150, 1400, \text{ and } 10,000$  with angles of attack ranging from  $0^\circ$  to  $40^\circ$ . From the computational results, lift coefficients are increased by the wing corrugation at all Reynolds number. However, the corrugation has little influence on the drag coefficients. The flows such as vortex in the valley of corrugation and near the edge of the corrugation are locally different from those of an elliptic wing. However, such local flows have little influence on the time averaged wing performance. From the numerical experiment presented in this study, it is determined that suction side corrugations of the wing have very little influence on increase of the lift coefficient at a positive angle of attack." (Authors)] Address: Byun, D., Department of Intelligent Advanced Technology Fusion, Konkuk University, Gwangjin-gu, Seoul 143-701, Republic of Korea. E-mail: dybyun@konkuk.ac.kr

**9428.** Lambrechts, J.; Guelinckx, R.; Collaerts, P.; Van der Wijden, B.; Jacobs, M. (2009): De kracht van natuurherstel in Het Vinne Resultaten van 4 jaar intensieve faunamonitoring. *Brakona jaarboek* 2008: 6-35. (in Dutch) ["Het Vinne" near Zoutleeuw, Belgium; 38 Odonata species were recorded between 2005 and 2008. The abundance of the species is documented in a table. Colonisation, succession and fluctuation of the odonate fauna are briefly described.] Address: Lambrechts, J., Zuurbemde 9, 3380 Glabbeek, Belgium. E-mail: j.lambrechts@arcadisbelgium.be

**9429.** Lambret, P.; Boudot, J.-P. (2009): Sortie d'hibernation précoce de *Sympetma fusca* (Vander Linden, 1820) en région lyonnaise (Odonata: Zygoptera: Lestidae). *Martinia* 25(4): 156. (in French) [Despite a very hard winter in the Lyon-region, France, the first specimens of *S. fusca* were recorded at the end of February 2009.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France. E-mail: danielgrand@yahoo.fr

**9430.** Levy, D.-E.; Seifert, A. (2009): Simplified dragonfly airfoil aerodynamics at Reynolds numbers below 8000. *Phys. Fluids* 21: 17 pp. (in English) ["Effective aerodynamics at Reynolds numbers lower than 10000 is of great technological interest and a fundamental scientific challenge. The current study covers a Reynolds number range of 2000–8000. At these Reynolds numbers, natural insect flight could provide inspiration for technology development. Insect wings are commonly characterized by corrugated airfoils. In particular, the airfoil of the dragonfly, which is able to glide, can be used for two-dimensional aerodynamic study of fixed rigid wings. In this study, a simplified dragonfly airfoil is numerically analyzed in a steady free-stream flow. The aerodynamic performance (such as mean and fluctuating lift and drag), are first compared to a "traditional" low Reynolds number airfoil: the Eppler-E61. The numerical results demonstrate superior performances of the corrugated airfoil. A series of low-speed wind and water tunnel experiments were performed on the corrugated airfoil, to validate the numerical results. The findings indicate quantitative agreement with the mean wake velocity profiles and shedding frequencies while validating the two dimensionality of the flow. A flow physics numerical study was performed in order to understand the underlying mechanism of corrugated airfoils at these Reynolds numbers. Airfoil shapes based on the flow field characteristics of the corrugated airfoil were built and analyzed. Their performances were compared to those of the corrugated airfoil, stressing the advantages of the latter. It was found that the flow which separates from the corrugations and forms spanwise vortices intermittently reattaches to the aft-upper arc region of the airfoil. This mechanism is responsible for the relatively low intensity of the vortices in the airfoil wake, reducing the drag and increasing the flight performances of this kind of corrugated airfoil as compared to traditional low Reynolds number airfoils such as the Eppler E-61." (Authors)] Address: Seifert, A., School of Mechanical Engineering, Faculty of Engineering, Tel-Aviv University, Tel Aviv 69978, Israel

**9431.** Lok, A.F.S.L.; Orr, A.G. (2009): The biology of *Euphaea impar* Selys (Odonata: Euphaeidae) in Singapore. *Nature in Singapore* 2: 135-140. (in English) [According to specimens deposited in the Zoological Reference Collection (ZRC), Raffles Museum of Biodiversity Research, National University of Singapore, *Euphaea*

impar was first recorded in Singapore in 1992 at Nee Soon Swamp Forest. The typical habitat of *E. impar* in Singapore is usually near relatively pristine, clear, shallow-flowing streams in primary or secondary forest, with a sandy or slightly muddy substrate with accumulations of detritus and leaf litter, and sometimes with large rocks. The stream banks are usually well-vegetated, providing suitable perches from which the males guard their territory. The vividly-coloured males are somewhat more frequently encountered because they are usually seen along streams, whereas the duller females are usually encountered in the shady undergrowth. Typically, there are three main types of habitats of *E. impar* in Singapore: firstly sandy, clear-water streams with dense marginal vegetation, secondly, a muddy braided stream system at the lower reaches of the Sime Road Forest where the canopy consists predominantly of pulai paya (*Alstoma spathula*) and has a relatively open undergrowth, thirdly, small forest streams with muddy bottoms (especially in the Nee Soon Swamp Forest). *E. impar* is very sensitive to movement, making approaching it for photographing difficult, with the subject flying higher and higher when disturbed. Flash photography also can be very difficult with this species and requires careful and prolonged stalking until the subject becomes accustomed to the flash and ceases to fly away with each discharge.] Address: Lok, A., Dept Biol. Sciences, National University Singapore, 14 Science Drive 4, Singapore 117543, Republic of Singapore. E-mail: dbsloks@nus.edu.sg

**9432.** Lopez, J.A.; Scarabotti, P.A.; Medrano, M.C.; Ghirardi, R. (2009): Is the red spotted green frog *Hypsiboas punctatus* (Anura: Hylidae) selecting its prey? The importance of prey availability. *Revista de Biología Tropical* 57(3): 847-857. (in English) ["Notwithstanding, the lack of food resources data in many studies of amphibians feeding has led to partial understanding of frog feeding strategies. In this study we evaluate the trophic selectivity of a *Hypsiboas punctatus* population from a Middle Paraná River floodplain pond in Argentina, and discuss the importance of prey availability data when interpreting results from diet analysis. We analyzed the gut contents of 47 *H. punctatus* adults and compared frog's diet with the environmental food resources. Prey availability was estimated by systematically seep-netting the microhabitat where anurans were localized foraging. We identified 33 taxonomic categories from gastrointestinal contents. Numerically, the most important prey categories were dipterans, followed by hemipterans, homopterans and coleopterans. The diet similarity between males and females was high and no statistical differences in diet composition were found. The most abundant food resources in the environment were dipterans, coleopterans, homopterans and collembolans. In order to assess whether frogs were selecting their preys, we calculated Pianka's niche overlap index and Jacobs' electivity index comparing gut contents to prey availability data. Trophic niche overlap was medium but significantly higher than expected by chance. The electivity index indicated that *H. punctatus* foraged dipterans slightly above their environmental abundance. Among the secondary preys, hemipterans were foraged selectively, homopterans were consumed in the same proportion to their occurrence in the environment, coleopterans were foraged quite under their availability and collembolans were practically ignored by frogs. Without food resources data, *H. punctatus* could be classified as a specialist feeder, but dipterans

also were quite abundant in the environment. Our results show that *H. punctatus* fit better as a generalist feeder, foraging on their main food item and some secondary preys in similar proportion to their environmental availability; even though other secondary preys are being selectively preferred or ignored by frogs. Our data illustrate the importance of including the resource availability data on diet studies to improve the understanding of amphibian feeding ecology." (Authors) Compared with the food availability, Odonata (Coenagrionidae) are used quite rarely.] Address: Scarabotti, P.A., Instituto Nacional de Limnología (CONICET - UNL), Ciudad Universitaria "Paraje El Pozo", (3000) Santa Fe, provincia de Santa Fe, Argentina. E-mail: pascarabotti@yahoo.com.ar

**9433.** Lotzing, K. (2009): Kurzübersicht der seit 1980 nachgewiesenen Libellen (Insecta: Odonata) im Bereich der Bode und ihrer Nebenarme innerhalb des ehemaligen Landkreises Aschersleben-Staßfurt (Sachsen-Anhalt). *halophila*, Mitteilungsblatt der Fachgruppe Faunistik und Ökologie Staßfurt 53: 15-18. (in German) [5 wetland localities in the former district of Aschersleben-Stassfurt (Sachsen-Anhalt, Germany) are described in detail and their recorded odonate fauna (29 species) is listed.] Address: Lotzing, K., Am Hollschen Bruch 4c, D.39435 Unseburg, Germany

**9434.** Machet, P. (2009): Les espèces du genre *Perilestes* Hagen in Selys, 1862 en Guyane française (Odonata: Zygoptera: Perilestidae). *Martinia* 25(4): 135-140. (in French, with English summary) ["In French Guyana, the genus *Perilestes* Hagen in Selys, 1862 is represented by three species belonging to the attenuates / gracillimus group. This one was set off on the character of Cu2 in the hind wing by Kennedy (1941). The three species are commented on and briefly characterized. Two taxa are probably confused under the species *P. attenuatus* Bates in Selys, 1886. The female type of this latter should be studied and redefined. The third species is very close to *P. gracillimus* Kennedy, 1941." (Author)] Address: Machet, P., L'Étre Delangle, F-61140 La Chapelle-d'Andaine, France

**9435.** Mayer, J. (2009): Ein bodenständiges Vorkommen der Helm-Azurjungfer (*Coenagrion mercuriale*) im baden-württembergischen Donauraum. *mercuriale* 9: 11-14. (in German) [Westernach brook system, MTB 7626, Baden-Württemberg, Germany; occurrence of *C. mercuriale* was mapped in 2009 along the Westernach. Habitat was analyzed and assessed according habitat suitability for *C. mercuriale*. The brook is settled by a small, isolated population of this rare damselfly species.] Address: Mayer, J., Arbeitsgruppe für Tierökologie und Planung, Johann-Strauß-Str. 22, 70794 Filderstadt, Germany. E-mail: info@tieroekologie.de

**9436.** McMurray Jr, P.D.; Schuster, G.A. (2009): The dragonflies and damselflies (Insecta: Odonata) of the upper Rockcastle River system, Kentucky, U.S.A. *Journal of the Kentucky Academy of Science* 70(2): 122-126. (in English) ["A survey of the adult Odonata fauna of streams in the upper Rockcastle River system, Kentucky, was conducted during 2002–2003. Twenty-seven species were collected, resulting in 31 new county records for Jackson, Laurel, and Rockcastle counties and the extension of the Kentucky flight season for six species. The 27 species collected during this study represent 18% of the odonate species currently known from Kentucky." (Authors)] Address: McMurray Jr, P.D.,

Biology Dept, Indiana State Univ., 600 Chestnut Street, Science Building Room 281, Terre Haute, Indiana 47809, USA. E-mail: paul.mcmurray79@gmail.com

**9437.** Morioka, Y. (2009): A male *Macromia daimoji*. *Sympetrum Hyogo* 11: 1. (in Japanese, with English summary) [A male *M. daimoji* is the cover photo of this issue of *Sympetrum Hyogo*, and was taken by Yasuyuki, Morioka on July 12, 2008.] Address: not stated

**9438.** Müller, J.; Steglich, R. (2009): Beringungsarbeit erbringt entomologisch wertvolle FFH-Libellen-Nachweise in Nahrungsresten. *Berichte der Vogelwarte Hiddensee* 19: 69-70. (in German) [A subadult female *Stylurus flavipes* found on 30-VII-2009 as prey of *Meros apiaster* is the first record for the near situated Natura 2000-Site "Bode und Selke im Harzvorland", Sachsen-Anhalt, Germany.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**9439.** Müller, J. (2009): Großes Granatauge *Erythromma najas* (Odonata, Coenagrionidae) wehrt Angriff des Wasserläufers *Gerris najas* (Heteroptera, Gerromorpha, Gerridae) erfolgreich ab. *Ent. Nachr. Ber.* 53(3-4): 167-168. (in German, with English summary) [The attack of a water strider, *G. najas*, on the male of a submerged ovipositing *E. najas*-tandem is documented and briefly discussed. The male slung the water strider away the moment the predator jumped and landed on the head of the damselfly. This observation is photographically documented in a sequence of three pictures.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**9440.** Nishu, S. (2009): Report of the survey trips of The Hyogo Society of Odonatology in 2009. Part 1 focused to *Mortonagrion Hirosei* and *Macromia daimoji*. *Sympetrum Hyogo* 11: 34-37. (in Japanese, with English summary) [Japan; "results of the survey trips of the Hyogo Society of Odonatology carried out on June 20 and 21, 2009 are reported. *Mortonagrion Hirosei* was recorded in good numbers, though the date of the survey was somewhat too early and the imagoes were rather immature and no copulation was observed. This species was recorded only in Momoike Pond. One male *Macromia daimoji* was recorded along Izushi River where the Typhoon No.23 brought a severe flood in 2004. *Onychogomphus viridicostus* was seen in good numbers, thus it is considered that odonate species of running waters are regaining their good habitats." (Author)] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net

**9441.** Nishu, S. (2009): Exuviae of *Pseudothemis zonata* placed on the trees distant from the pond shore. *Sympetrum Hyogo* 11: 28-31. (in Japanese, with English summary) [Japan; "Fifteen exuviae of *P. zonata* were found on the tree trunks some distance far from the shore of Gonoike Pond in Akashi Park on June 20, 2008. Measurements of the distance between the shore and the exuviae were made. The results revealed that the larvae travelled the distance of 2.89m to 5.88m with the average of 4.99m through the wall of the pond, horizontal part and the tree trunk of 2.36m high above the water surface. The angles of posture were mostly over 90°, and it seems that this species likes to emerge in overhang posture. The shore of this pond is not high enough for the emergence, and the adjacent land is almost flat, thus they walked in search of overhang wall

until at last climbed to such high." (Author)] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net

**9442.** Nishu, S.; Yoshihiko, Y (2009): The survey results of *Macromia daimoji* along Izushi River in 1997. *Sympetrum Hyogo* 11: 22-26. (in Japanese, with English summary) [Japan; "*M. daimoji* had been recorded along Izushi River during 1993-2004, but the flood caused by Typhoon No.23 swept the population of this species away in October 2004. It was revealed through the survey carried out in 2009 that a small population of this species is established. The survey results carried out by Yamazaki in 1997 on all odonate species are added, which will give a suitable measure for evaluating the recovery after the typhoon."] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net

**9443.** Nishu, S. (2009): Report of the survey trips of The Hyogo Society of Odonatology in 2009. Part 2 Odonate fauna of Aonogahara. *Sympetrum Hyogo* 11: 38-44. (in Japanese, with English summary) [Japan; "This is the report of the survey trips for the odonate fauna of Aonogahara carried out on September 27, October 11 and 25, 2009 by the members of the Hyogo Society of Odonatology. 36 species were recorded including 2 male *Sympetrum maculatum* and many *Sympetrum uniforme*, though *Lestes japonicus* was not found." (Author)] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net

**9444.** Oda, Y. (2009): An additional photograph of *Sympetrum fonscolombii* in Shishigaik pond. *Sympetrum Hyogo* 11: 27. (in Japanese, with English summary) ["The author succeeded in taking photograph of a male *S. fonscolombii* at Shishigaik Pond on September 17, 2009. This is the second record of this migrant species in Kobe City, Japan after that of November 10, 2004 by the same author." (Author) ] Address: not stated

**9445.** Papazian, M. (2009): Compte-rendu d'étude faunistique réalisée sur la Cèze (Gard): les Odonates. *L'Entomologiste* 65(4): 171-173. (in French) [The presence of the legally protected Odonata species *Macromia splendens*, *Oxygastra curtisii* and *Gomphus grasilinii*, in the French Gard Department along the Cèze River is confirmed. Results of the mapping mandatory made it necessary to enlarge the respective Natura 2000 site.] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France. E-mail: mpapazian@ecologie.re

**9446.** Prunier, F. (2009): Nueva cita de "*Oxygastra curtisii*" (Dale, 1834) (Odonata: Corduliidae) en la Provincia de Sevilla. *Boletín de la Sociedad Andaluza de Entomología* 16: 45-47. (in Spanish) [A larva of *O. curtisii* was recorded at 16-III-2008 in the Rivera River near Ciudad de Jaén (TH80), Sierra Morena, Spain.] Address: E-mail: florent.prunier@netcourrier.com

**9447.** Quadros, G.; Gurav, G.; Bhagat, K.; Chorghé, A.; Dhamorikar, A.; Khot, K.; Nagarkar, M. (2009): Report of the study of the biodiversity of Indian Institute of Technology Bombay Campus. *WWF-India MSO for IIT Bombay*: 158 pp. (in English) [In the campus, 36 odonate taxa were recorded, of which 30 species are iden-



tified and presented on pages 93-97.] Address: World Wide Fund for Nature -India, Maharashtra State Office, 204 National Insurance Building, Dr. D.N. Road. Fort Mumbai 400 001, India

**9448.** Robin, J.; Fusari, M (2009): Deux nouvelles espèces pour l'atlas préliminaire des Odonates de Tarn-et-Garonne. Bulletin de la Société des sciences naturelles de Tarn-et-Garonne 33: 23-26. (in French) [*Soma-tochlora metallica*: 5-VIII-2009, le vallon du Lemboulas; *Macromia splendens*: 2006, Aveyron River near Bruniquel. These records increase the regional list of Odonata to 50 species. The possible/to expect presence of *Anax parthenope* and *Trithemis annulata* is outlined.] Address: Robin, J., 6 rue du Stade, 82370 Corbarieu, France. E-mail: robin-jerome@voila.fr

**9449.** Rosa, B.F.J.V.; Martins, R.T.; de Oliveira, V.C.; Alves, R. (2009): Phoretic association between larvae of *Rheotanytarsus* (Diptera: Chironomidae) and genera of Odonata in a first-order stream in an area of Atlantic Forest in southeastern Brazil. *Zoologia* 26(4): 787-791. (in English) ["In this note, the occurrence of phoresy between larvae of *Rheotanytarsus* sp. (Diptera: Chironomidae) and larvae of *Heteragrion* sp. (Odonata: Megapodagrionidae) and of unidentified genera of Calopterygidae (Odonata) collected in a first-order stream in an area of Atlantic Forest in southeastern Brazil is reported. During the dry season of 2007 and the rainy season of 2008, with the aid of a Surber sampler, 15 samples of each of the following mesohabitats were collected: litter from riffle areas, litter from pool areas and sediment in pool areas. Eighty-five Odonata larvae were obtained, 10 (11.76%) with cases of phoresy by *Rheotanytarsus* sp.. These chironomids were associated with only one specimen of Megapodagrionidae, whereas the other larvae were recorded in association with Calopterygidae. Most of the Odonata with cases of phoresy by *Rheotanytarsus* sp. were recorded in the dry season. In the present study, the absence of the phoretic association with other potential hosts for *Rheotanytarsus* sp. found in the samples indicates a possible preference of these larvae for Odonata, which accounted for only 2.42% of the collected macroinvertebrates in litter and sediment." (Authors)] Address: Rosa, Beatriz, Laboratório de Invertebrados Bentônicos, Programa de Pós-graduação em Ciências Biológicas em Comportamento Animal e Biologia, Departamento de Zoologia, Instituto de Ciências Biológicas, Universidade Federal de Juiz de Fora. 36036-330 Juiz de Fora, Minas Gerais, Brasil. E-mail: beatrizjabour@yahoo.com.br

**9450.** Sängner, H. (2009): Das Naturschutzlehrojekt Rückersdorf (Landkreis Greiz). Teil 1: Bilanz der Entwicklung seit der EXPO 2000. Landschaftspflege und Naturschutz in Thüringen 46(1): 27-41. (in German) [Germany, Thüringen; of a total of 27 species observed between 1998 and 2007, only the four regionally red listed Odonata species are listed: *Calopteryx splendens*, *C. virgo*, *Coenagrion hastulatum*, *Aeshna grandis*.] Address: Sängner, H., Berggasse 6, 08451 Crimmitschau, Germany. E-mail: bios-bfu@arcor.de

**9451.** Schmid, F. (2009): Erstnachweis der Grünen Flussjungfer (*Ophiogomphus cecilia*) an der baden-württembergischen Donau. *mercuriale* 9: 33-34. (in German) [Danube, NSG Braunsel near Rechenstein, Alb-Donau-Kreis, Baden-Württemberg, Germany, 20-VII-2009] Address: Schmid, F, Graben 23, 7225 Münsingen, Germany. E-mail: fcschmid@t-online.de

**9452.** Schmidt Dalzochio, M. (2009): Descrição da larva de último estágio de *Nephepeltia berlai* Santos, 1950 (Odonata, Libellulidae). *EntomoBrasilis* 2(3): 70-72. (in Portuguese, with English summary) ["The larvae of the last instar of *N. berlai* is described and illustrated based on material collected in Cascavel Municipality, Paraná State, Brazil. The generic concept based in the immatures is redefined." (Author)] Address: Schmidt Dalzochio, Marina, Pesquisadora autônoma. Rua Terezina, 2305 - Bairro Tropical, CEP 85807-140 - Cascavel-PR-Brasil. E-mail: mahsdalzochio@gmail.com

**9453.** Schmidt Dalzochio, M.; Rodrigues, M.E. (2009): Descrição da larva de último estágio de *Oxyagrion sulmatogrossense* Costa, Souza & Santos (Odonata, Coenagrionidae). *EntomoBrasilis* 2(3): 73-75. (in Portuguese, with English summary) [Larvae and imago of *O. sulmatogrossense* are described and illustrated based on material collected in Cascavel Municipality, Paraná State, Brazil.] Address: Schmidt Dalzochio, Marina, Pesquisadora autônoma. Rua Terezina, 2305 - Bairro Tropical, CEP 85807-140 - Cascavel-PR-Brasil. E-mail: mahsdalzochio@gmail.com

**9454.** Schmidt Dalzochio, M. (2009): Descrição da larva de último estágio de *Micrathyria pseudeximia* Westfall (Odonata, Libellulidae). *EntomoBrasilis* 2(2): 54-57. (in Portuguese, with English summary) ["The larva of ultimate stadium of *M. pseudeximia* is described and illustrated based on material collected in Cascavel Municipality, Paraná State, Brazil. The generic concept based in the larvae is amplified." (Author)] Address: Schmidt Dalzochio, Marina, Pesquisadora autônoma. Rua Terezina, 2305 - Bairro Tropical, CEP 85807-140 - Cascavel-PR-Brasil. E-mail: mahsdalzochio@gmail.com

**9455.** Silva Dias, A.S.; Molozzi, J.; Pinheiro, A. (2009): Distribuição e ocorrência de macroinvertebrados bentônicos em rios nas áreas com cultura orizícola no vale do Itajaí-SC. *Holos Environment* 9(1): 45-64. (in Portuguese, with English summary) ["Rice is one of the main cereals grown in Brazil. The handling of the rice culture may impact in the river downstream of the farming. The main goal of this research was to evaluate the distribution and occurrence of benthic macroinvertebrates in rivers with rice plantations. This research was developed in the cities of Gaspar and Agrolândia, in Itajaí River Basin, Santa Catarina, Brazil. [...] 21.831 organisms were collected at the six sites. 73% were Diptera with predominance of Chironomidae family with 14.956 individuals. Site 4 had the lowest diversity and the highest dominance. In rivers under influence of the rice culture it is observed predominance of taxons resistant to pollution. Taxons more sensitive to pollution were hardly found at the six sites, demonstrating the inappropriate conditions for their development." (Authors) Odonata are treated at the family level.] Address: Silva Dias, Aline, .Bióloga, Universidade Regional de Blumenau - FURB. Rua Antônio da Veiga, 140. Bairro Victor Konder. CEP 89012-900 - Blumenau - SC. E-mail: aline.sil@terra.com.br

**9456.** Smiroldo, G.; Balestrieri, A.; Remonti, L.; Prigioni, C. (2009): Seasonal and habitat-related variation of otter *Lutra lutra* diet in a Mediterranean river catchment (Italy). *Folia Zool.* 58(1): 87-97. (in English) ["To investigate time- and spatial related variations in the composition of otter *Lutra lutra* diet, a total of 838 faecal samples was collected in the upper catchment of the Agri

River (Basilicata region, southern Italy), and analysed. Data were split up according to the four seasons and between the main river and three of its tributaries. Fish and amphibians formed the bulk of otter diet, their consumption being inversely correlated. Trophic niche breadth was positively correlated with the frequency of occurrence of fish, whilst it was negatively correlated to that of amphibians and the altitude of the sampling stations. The frequency of consumption of fish did not vary through the year, whilst amphibians were mainly eaten during their hibernation and breeding period. Otter diet along the four main rivers differed significantly, the species being mainly piscivorous on the main river, whilst relying on alternative food resources on its tributaries, where habitat features or human interference reduced fish abundance. Fish availability seems to represent the main factor determining the composition and diversity of otter diet." (Authors) Odonata have a minor importance as food of the otter.] Address: Prigioni, C., Dipartimento di Biologia Animale, Università di Pavia, Piazza Botta 9, 27100 Pavia, Italy. E-mail: prigioni@unipv.it

**9457.** Storck, F. (2009): Les Odonates de la réserve naturelle du Plan de Tuéda: bilan des connaissances (Les Allues, Savoie). *Martinia* 25(3): 103-115. (in French, with English summary) [14 Odonata species are known in the nature Reserve Plan de Tuéda (Les Allues, Savoie department, France).] Address: Storck, F., Parc national de la Vanoise, route de Mussillon, F-73550 Meribel-les-Allues, France

**9458.** Toth, S. (2009): Dragonfly fauna (Odonata) based on the Biodiversity Days at Gyűrűfü. *Natura Somogyiensis* 13: 77-80. (in Hungarian, with English summary) [In 2006-2007, a total of 24 Odonata species "were recorded from the sampling area that was about 1 km<sup>2</sup> with two brooks and drying up marsh. The most important species is *Cordulegaster heros*, a strictly protected and Natura 2000 species. *Coenagrion ornatum* and *Orthetrum brunneum*, protected species were also found. *Pyrrhosoma nymphula interposita* Varga, 1968 is important from faunistic and zoogeographical point of view." (Author)] Address: Tóth, S., H-8420 Zirc, Széchenyi, u. 2., Hungary. E-mail: flycatcher@vnet.hu

**9459.** Ueda, Y.; Nishu, S.; Futahashi, R. (2009): A male hybrid between *Sympetrum e. eroticum* male and *S. baccha matutinum* female caught at Aonogahara. *Sympetrum Hyogo* 11: 20-21. (in Japanese, with English summary) ["A male hybrid between *Sympetrum eroticum* and *Sympetrum baccha matutinum* was recorded at Aonogahara in Ono City, Hyogo Prefecture, Honshu, Japan, which has intermediate characteristics between both species. The results of nuclear and mitochondrial DNA analyses suggest that this specimen was derived from interspecific mating between male *S. eroticum* and female *S. baccha matutinum*." (Authors)] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**9460.** van Wijngaarden, R.P.A.; Barber, I.; Brock, T.C.M. (2009): Effects of the pyrethroid insecticide gamma-cyhalothrin on aquatic invertebrates in laboratory and outdoor microcosm tests. *Ecotoxicology* 18(2): 211-224. (in English) ["The sensitivity of a range of freshwater lentic invertebrates to gamma-cyhalothrin (GCH), a single enantiomer of the synthetic pyrethroid lambda-cyhalothrin, was assessed in single species

laboratory tests and an outdoor multi-species ecosystem test. The most sensitive species in the laboratory single species tests with GCH was *Chaoborus obscuripes* (96 h EC50: 3.8 ng/l). The species sensitivity distribution curve, based on the laboratory 96 h EC50 acute toxicity data for eight species, gave a median HC5 value for GCH of 2.12 ng/l. The NOECcommunity derived from the multi-species ecosystem test was 5 ng/l, and the insects *Chaoborus* sp. and *Caenis* sp. were identified as the most sensitive species. The results indicate that the median HC5, based on eight species selected to include those known to be sensitive to pyrethroids, provided a good estimation of the NOECcommunity for GCH. Furthermore, the results for GCH indicated that the endpoints typically used in higher-tier risk assessments for pesticides in Europe (HC5 and NOECcommunity) were consistent with expectations when compared to the equivalent endpoints for the racemate LCH." (Author) Zygotera tested were a mixture of at least four species (*Coenagrion puella/pulchellum*, *Enallagma cyathigerum*, *Ischnura* sp., *Coenagrion* sp.)] Address: van Wijngaarden, R.P.A., Dept for Water and Climate, Alterra, PO Box 47, 6700 AA Wageningen, The Netherlands. E-mail: rene.vanwijngaarden@wur.nl

**9461.** Walguarnery, J.W.; Schröder, R.; Butler, M.A. (2009): Visual target detection in damselflies. U.S. Army Research Office, P.O. Box 12211, Research Triangle Park, NC 27709-2211: IV, 19 pp. (in English) ["Insect predators accomplish difficult visual tasks with tiny visual systems, and may provide important information for machine vision and remote sensing applications in variable light environments. We studied the visual system of *Megalagrion xanthomelas*, which possesses 1.5mm diameter eyes with 360 field of view, lives in dark habitats, and detects small objects against complex backgrounds. We accomplished four objectives: 1) Mapped regional variation in light sensitivity and spatial resolving power across the thousands of individual sensory units. Compound eyes (multiple, non-focusing lenses) may inspire microsensor array design. 2) Developed methods to quantify light heterogeneity viewed by the sensor array in nature along four principle viewing directions. These spectroradiometric measurements provide critical data on limits to target detection imposed by ambient brightness and colour contrast. 3) Established colour as an essential sensory channel for target discrimination in insect vision, especially when light levels are too dim to detect achromatic contrast. 4) Discovered that damselflies extend the performance range of their eyes through behavioural means, pointing their high-resolution frontal regions toward backgrounds against which visual targets will appear most conspicuous. This behaviour may provide insight for the design and deployment of artificial sensory systems for target detection in low light." (Authors)] Address: Butler, Marguerite A., University of Hawaii, Department of Zoology, 2538 McCarthy Mall, Honolulu, HI, 96822 USA. E-mail: mbutler@hawaii.edu

**9462.** White, H.B.; Calhoun, J.V. (2009): Miss Mattie Wadsworth (1862–1943): Early woman author in Entomological News. *Transactions of the American Entomological Society* 135(3 & 4): 413-429. (in English) ["Miss Mattie Wadsworth, an amateur entomologist from rural Maine, stands out as one of the early women authors in Entomological News. Wadsworth's correspondence with Philip P. Calvert, prominent and longtime member of the American Entomological Society, shows Calvert's

important role in cultivating her entomological interests. *Celithemis martha* was named in honor of Wadsworth by E.B. Williamson." (Authors)] Address: White, III, H.B., Department of Chemistry and Biochemistry, University of Delaware, Newark, Delaware 19716

**9463.** Wyn, B.; Kidd, K.A.; Burgess, N.M.; Curry, R.A. (2009): Mercury biomagnification in the food webs of acidic lakes in Kejimikujik National Park and National Historic Site, Nova Scotia. *Canadian Journal of Fisheries and Aquatic Sciences* 66(9): 1532-1545. (in English, with French summary) ["Mercury (Hg) concentrations in fish from acidic lakes (pH < 6.0) are typically elevated above those from near-neutral systems. It is unknown whether high biomagnification rates through the supporting food web can explain elevated Hg concentrations in top predators from low pH lakes. To investigate this, we collected yellow perch (*Perca flavescens*), brown bullhead (*Ameiurus nebulosus*), banded killifish (*Fundulus diaphanus*), golden shiner (*Notemigonus crysoleucas*), and littoral and pelagic invertebrates from four acidic lakes in Kejimikujik National Park and Historic Site (KNPNHS), Nova Scotia, Canada, and analyzed them for total Hg and methyl Hg (MeHg), and  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  to determine sources of energy and trophic position, respectively. Mercury biomagnification rates (slopes of  $\log\text{Hg}$  versus  $\delta^{15}\text{N}$ ) varied significantly among the four lakes but did not explain the among-lake differences in perch Hg; these slopes were also within the range published for near-neutral systems. Rather, Hg concentrations in yellow perch (i.e., predatory fish) in KNPNS were higher in lakes with higher MeHg in lower-trophic-level organisms and suggest that processes influencing Hg uptake at the base of the food web are more important than rates of food web biomagnification for understanding the variation in concentrations of this contaminant among top predators." ..... "The  $\delta^{15}\text{N}$  data indicated distinct trophic levels in these four lakes of KNPNS. Limnephilids and heptagenids typically had the lowest mean  $\delta^{15}\text{N}$  (e.g. 1.45  $\pm$  0.43 and 2.26  $\pm$  0.78, respectively, in North Cranberry), illustrating that that these invertebrates were primary consumers (Table 3-2, Figures 3-2  $\pm$  3-5). The dragonfly nymph, *Aeshna umbrosa*, had the highest  $\delta^{15}\text{N}$  of the invertebrates (e.g. 4.32  $\pm$  0.12 in North Cranberry; Figures 3-2  $\pm$  3-5), which was between 2 and 3. higher than that of the limnephilids and heptagenids, suggesting that this invertebrate preys upon other invertebrates. All fish in these lakes had  $\delta^{15}\text{N}$  values that were 3 - 6. higher than the littoral invertebrates, suggesting that most fishes were insectivorous or omnivorous, relying either partially or completely on near-shore invertebrates. In particular, this degree of enrichment suggests that fish were likely feeding on the most  $\delta^{15}\text{N}$  enriched littoral macroinvertebrates (e.g. *Aeshna umbrosa*). Fish in each lake had similar  $\delta^{15}\text{N}$  (Table 3-4; Figures 3-2  $\pm$  3-5). The large yellow perch were typically more enriched than the smaller individuals, but the mean  $\delta^{15}\text{N}$  of yellow perch was not related to the diversity or type of fishes present. The invertebrates and fishes in North Cranberry Lake had the highest  $\delta^{15}\text{N}$ , while those in Pebbleloggitch had the lowest  $\delta^{15}\text{N}$ ; the differences among lakes were reduced when the data were adjusted for baseline  $\delta^{15}\text{N}$ ."] Address: Wyn, Brianna, Biology & Canadian Rivers Inst., Univ. New Brunswick

**9464.** Yu, W.y.; Li, Z.-h.; Song, D.j.; Li, Z.-x.; Lu, J.; Qian, Y.-p. (2009): Study on community diversity at spring and autumn of Odonata in DaZhang mountain, Jiangxi Province. *Journal of Nanchang University (Natural Science)* 33(5): 505-510. (in Chinese, with English summary) [Between 2005 and 2008, 57 Odonata species were collected in the DaZhang mountain of Jiangxi, China. 16 species have not observed previously in the Jiangxi Province. An analysis of zoogeographical range of the species shows that Oriental species outnumber Palearctic species.] Address: Yu, W.-y., Department of Life Science, Nanjing Xiaozhuang University, Nanjing 211171, China

**9465.** Zimmermann, W.; Arenhövel, C. (2009): Die Südliche Heidelibelle, *Sympetrum meridionale* (Selys, 1841), aktuell neu in Thüringen. *Landschaftspflege und Naturschutz in Thüringen* 46(1): 42-45. (in German) [Germany, Thüringen, Weimar, Legefelder Seeteich, 10-VII-2008] Address: Zimmermann, W., Thomas-Müntzer-Str. 5, 99423 Weimar, Germany. E-mail: wolfgang.zimmermann.we@kabelmail.de

## 2010

**9466.** Armatys, P.; Loch, J.; Ruciński, M. (2010): Nature of forest clearings in Gorce Mts. Goczański Park Narodowy, Poręba Wielka. ISBN – 978-83-924596-7-5: 64 pp. (in Polish) ([www.gorzanski-park.pl/UserFiles/Przyroda%20gorcza%20C5%84skich%20polan\\_internet.pdf](http://www.gorzanski-park.pl/UserFiles/Przyroda%20gorcza%20C5%84skich%20polan_internet.pdf)) [The booklet introduces into fauna and flora of forest clearings in the Goczański Park in southern Poland. *Cordulegaster spec.* is figured, and a brief reference on hobbies (*Falco subbuteo*) preying on dragonflies is made.] Address: Goczański Park Narodowy, Poręba Wielka 590, 34-735 Niedźwiedz, Poland. E-mail: gpn@gorcepn.pl

**9467.** Aroviita, J.; Mykrä, H.; Hämäläinen, H. (2010): River bioassessment and the preservation of threatened species: Towards acceptable biological quality criteria. *Ecological Indicators* 10: 789-795. (in English) ["A central objective of environmental management is to maintain biodiversity, including populations of threatened species. Freshwater ecosystems are increasingly assessed by their biotic properties, but whether the resulting classifications of biotic condition are sufficient to protect species with conservation status has received very little consideration. We used data from 225 reference and impacted river sites from Finland to examine whether the occurrence and abundance of threatened macroinvertebrate species (TS) are associated with a commonly used estimate of biological condition (Observed-to-Expected number of predicted taxa of macroinvertebrates or O/E-ratio of taxonomic completeness, based on a predictive model). We suggest that a minimal acceptable condition below which restoration is needed, equivalent to, e.g. 'good' ecological status described by the European Union Water Framework Directive, should also ensure the occurrence of TS populations. We therefore followed conventional procedures for condition assessment, and examined two classifications by using the 10th or 25th percentiles of a reference O/E-distribution as alternative upper boundaries for the acceptable condition. The number and abundance of TS, and occurrence of individual TS showed positive relationships with the O/E. However, particularly if the 10th percentile threshold was used, there were only few occurrences and low abundance of TS in the



suggested 'good' condition. The results imply that conventional criteria for satisfactory condition may not be sufficient for preservation of threatened river macroinvertebrates. However, our approach could bring an objective, meaningful, and societally acceptable means for setting site quality criteria in freshwater assessment." (Authors) *Ophiogomphus cecilia* occurred at 5% of the 96 sites with minimum alteration by human activities and therefore adjudged to be in reference or best-available condition, and at 3% of impacted sites (n = 134).] Address: Aroviita, J., University of Jyväskylä, Department of Biological and Environmental Science, P.O. Box 35, FIN-40014 University of Jyväskylä, Finland. E-mail: jukka.aroviita@ymparisto.fi

**9468.** Arulprakash, R.; Gunathilagaraj, K. (2010): Abundance and diversity of Odonata in temporary water bodies of Coimbatore and Salem districts in Tamil Nadu. *Journal of Threatened Taxa* 2(8): 1099-1102. (in English) [India; "Conclusion: The survey of 13 temporary water bodies revealed the occurrence of 21 species of Odonata. Libellulidae dominated in all the temporary water bodies except Nagarajapuram Tank (Coimbatore) which was dominated by Zygoptera. The presence of shade cover and aquatic vegetation favoured zygopteran population more than Anisoptera. *P. flavescens* was the most dominant Odonata and *Diplacodes trivialis*, *Orthetrum sabina* and *P. flavescens* were present in all temporary water bodies sampled. Maximum Odonata diversity was observed in Kamalapuram tanks one and two." (Authors)] Address: Arulprakash, R., Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu 641003, India. E-mail: avrarulprakash@gmail.com

**9469.** Belevich, O.E.; Yurchenko, Yu.A. (2010): Variability of *Aeshna juncea* Linnaeus, 1758 and taxonomic status of *Ae. undulata* Bartenev, 1930 (Odonata, Aeshnidae). *Eurasian entomological journal* 9(1): 13-18. (in Russian, with English summary) ["Analysis of diagnostic characters (colouration of labrum and thorax, structure of anal appendages and penis) used in the description of *Aeshna undulata* showed that each is more or less inherent to *A. juncea*. It was shown that the size and location of penis structure elements of *A. juncea* strongly depended upon digestion time in alkali. The posterior plate (pp) and hamular folds shape, which according to A. N. Bertnev distinguish *A. undulata* and *A. juncea*, are variable. It was established that the structure of the medial plate (ip) remains unchanged, but the shape of the male *A. juncea* varies considerably and cannot serve as a reliable diagnostic feature. The shape of the appendages of the hamular process (hp) of the genitalia of *Ae. undulata* is identical to that of *A. juncea*. We are of the opinion that A. N. Bertnev erroneously described a young male *A. juncea* as a new species, and therefore propose the synonymy *A. juncea* = *A. undulata*, syn. n." (Authors)] Address: Belevich, Olga, Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia. E-mail: belong@ngs.ru

**9470.** Berti, J.; Gonzalez, J.; Navarro-Bueno, E.; Zoppi, E.; Gordon, E.; Delgado, L. (2010): Larval seasonality of the mosquito *Anopheles aquasalis* (Diptera: Culicidae) and other insects associated to its habitat in Sucre, Venezuela. *Revista de biología tropical* 58(2): 777-787. (in Spanish, with English summary) ["*Anopheles aquasalis* Curry is considered the main vector of human malaria in Northern Venezuela. A longitudinal study was

carried out in the coastal areas of the Paria Peninsula, Sucre state. The larval habitats of *A. aquasalis* were classified as: 1--Brackish mangrove, and 2--Freshwater herbaceous swamp. Field surveys of mosquito larvae and aquatic insects (including Coenagrionidae, Aeshnidae and Libellulidae) were carried out in the same breeding sites over a one-year period, between January and December 1999. At each site, 30 samples of *Anopheles* larvae and aquatic insects were taken monthly. Simultaneously with mosquito larvae sampling, five selected variables of water were measured: conductivity, salinity, dissolved oxygen, temperature and pH. Seasonal and temporal variations of *A. aquasalis* larvae and aquatic insects were determined in the two larval habitats. For the entire study period, the abundance of larvae was higher in the mangrove. Correspondence analysis showed a strong relation between some chemical factors of water and larval abundance. The abundance of *A. aquasalis* larvae in both seasons, was positively correlated with water salinity, pH and conductivity, and negatively and with dissolved oxygen in the dry season. The presence of larvae was positively correlated with the presence of *Avicenia germinans*. In the mangrove there was a positive association between larvae abundance and Scirtidae family abundance and a negative correlation between larvae abundance and monthly precipitation (Spearman), as well as a significant negative correlation between Gerridae abundance and monthly precipitation. In the herbaceous swamp, there were not significant associations between *A. aquasalis* larvae abundance and abundance of others aquatic insects associated to habitat." (Authors)] Address: Berti, J., Inst. Altos Estudios 'dr A. Gabaldon', Lab. Ent. Malaria, Calle Dr A. Gabaldon, Las Delicias, Maracay, Venezuela

**9471.** Biggs, K.; Oriti, B. (2010): Second Striped Sadlebags (*Tramea calverti*) site found in California! *Argia* 22(3): 19-20. (in English) [22-VIII-2010; Owens River in the Owens Valley, east of the Sierra Nevada in California, Upper and Lower Twin Lakes (36.8804° N, 118.1672° W), USA. This record of *T. calverti* is believed to be the most northern record for the species in the western USA.] Address: Biggs, Kathy, 308 Bloomfield Road, Sebastopol CA, 95472, USA. E-mail: biggsnest@sonic.net

**9472.** Bolek, M.G.; Tracy, H.R.; Janovy, J. (2010): The role of damselflies (Odonata: Zygoptera) as paratenic hosts in the transmission of *Halipegus eccentricus* (Digenea: Hemiuridae) to anurans. *J. Parasitol.* 96(4): 724-735. (in English) [During July–August 2007 and 2008, 19 larvae and 122 adult *Lestes unguiculatus*, 140 adult *Ischnura verticalis*, and 55 teneral and adult *Enallagma civile*, were collected from Nevens Pond and examined for *Halipegus* sp. metacercariae. "*Halipegus eccentricus* is a common hemiurid trematode in the eustachian tubes of North America frogs. However, the life cycle of this species has never been completely elucidated. Studies on *H. eccentricus* suggest that it has a 3-host life cycle. Here, we show through fieldwork and host specificity experimental infections that the life cycle of *Halipegus eccentricus* utilizes 4 hosts. Metamorphosed anurans become infected with *H. eccentricus* by feeding on infected damselflies; worms reside in the stomach of anurans, migrate to the eustachian tubes within 32–39 days post-exposure (DPE), and release eggs 50–60 DPE. Cystophorous cercariae develop in *Physa gyrina* snails within 32–35 DPE, infect

ostracod (*Cypridopsis* sp.) second intermediate hosts, and develop to metacercariae. Fifteen- to 19-day-old metacercariae from ostracods are infective to both damselfly larvae and metamorphosed anurans. Field surveys of damselflies and tadpoles, along with laboratory exposure of damselfly larvae, metamorphosed anurans, and tadpoles with infected ostracods, indicated that only metamorphosed anurans and damselflies become infected with *H. eccentricus*, whereas field-collected tadpoles and laboratory-exposed tadpoles were never infected with *H. eccentricus*. Because little morphological change occurred in the metacercaria stage of *H. eccentricus* between the ostracod second intermediate host and damselfly host, and metamorphosed anurans became infected with *H. eccentricus* metacercariae recovered from both host groups, we suggest that odonates serve as paratenic hosts in this life cycle. Additionally, our field work and experimental infections provide data on the use of odonates as the route of infection by another North American *Halipegus* sp. that matures in the stomach of frogs. Our data indicate that when the life cycles are known, the use of odonates as the route of infection to anurans is common in the life cycles of *Halipegus* spp., and all species exhibit remarkable infection site fidelity in their amphibian hosts." (Authors)] Address: Bolek, M.G., Department of Zoology, Oklahoma State University, Stillwater, Oklahoma 74078, USA. E-mail: bolekm@okstate.edu

**9473.** Borisov, S.N. (2010): Autumnal migrations of dragonflies in the Chokpak Pass of West Tien-Shan, observed and actual flight measurements. *Eurasian entomological journal* 9(1): 7-18. (in Russian, with English summary) [Kazakhstan; obligate migrations of *Anax ephippiger*, *A. parthenope*, and *Sympetrum fonscolombii*, were studied using ornithological traps established in Chokpak pass (N 42.530, E 70.605) in Western Tien-Shan. The correlation between flight and cold air fronts is described, and the inequality of dragonfly migration intensity in different years was defined by ornithological trap data. These findings can explain the actual change in number of migrating dragonflies in different years, and the characteristics of dragonflies falling into traps according to winds from different directions. Noticeable above-ground flights were registered only with south-west headwinds. However, numbers observed or trapped may provide only an approximate measure of dragonfly autumnal movements since a large proportion occur at higher altitudes.] Address: Borisov, S.N., Institute of Systematics & Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**9474.** Bots, J.; van Dongen, S.; de Bruyn, L.; van Houtte, N.; van Gossum, H. (2010): Clutch size and reproductive success in a female polymorphic insect. *Evolutionary Ecology* 24(5): 1239-1253. (in English) ["Differences in reproductive success (RS) between different groups of individuals are of interest to researchers studying natural and sexual selection. Since it is often not feasible to quantify RS in the wild, researchers make use of proxies instead. One such proxy is clutch size. However, research on species providing parental care (mainly birds and mammals) has learned that a large clutch size does not guarantee a large number of offspring. In contrast, much less is known on the link between clutch size and RS for species lacking parental care, such as many reptiles and insects. Here, we ask whether clutch size provides a satisfactory estimate of

RS for a polymorphic insect. Our study species is *Enallagma cyathigerum* showing two distinct female morphs for which RS (estimated by clutch size) has been studied to evaluate the evolutionary role of sexual conflict. However, in this system not only among family variation in offspring viability, but also differences between female morphs, may affect how clutch size relates to offspring number and quality. To evaluate the use of clutch size as estimate of RS, we examined how clutch size correlated with subsequent success measures of developing offspring by rearing damselfly from eggs to adults under two laboratory food treatments. In both treatments, we detected that clutch size correlated well with offspring number early in larval life, but that this relation is reduced by among family variation in survival in later developmental stages. Clutch size was moderately correlated with the number of offspring that successfully metamorphosed to winged adults. Patterns did not differ between female morphs and the nature of the correlation could not be explained from offspring quantity-quality trade-offs." (Authors)] Address: Gossum, H. van, Evolutionary Biology Group, University of Antwerp (RUCA), Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: hvvgossum@ruca.ua.ac.be

**9475.** Brake, I.; von Tschirnhaus, M. (2010): *Stomosis arachnophila* sp. n., a new kleptoparasitic species of freeloader flies (Diptera, Milichiidae). *ZooKeys* 50: 91-96. (in English) ["Adults of some species in several milichiid genera feed by sucking on prey of spiders or predatory insects such as Reduviidae, Asilidae, Mantidae, or Odonata. Mostly they are attracted to predators feeding on stink bugs (Pentatomidae), squash bugs (Coreidae) or in the case of *Desmometopa* flies, on honey bees (Apidae)."] Address: Brake, Irina, Department of Entomology, Natural History Museum, Cromwell Road, London SW7 5BD, United Kingdom. E-mail: Irina.Brake@nhm.ac.uk

**9476.** Braune, E.; Martens, A.; Richter, O.; Söndgerath, D.; Suhling, F. (2010): A spatially explicit model for interacting populations of dragonflies in arid Namibia. In: Schmiedel, U. & Jürgens, N. [Eds.]: *Biodiversity in southern Africa. Volume 2: Patterns and processes at regional scale.* Klaus Hess Publishers, Göttingen & Windhoek: 289-294. (in English) ["In order to understand the spatial and seasonal distribution of dragonflies in western Namibia we developed a model framework based on habitat suitability models, a local population dynamic model of interacting species and a dynamic landscape model combined with a spatially explicit model. Local population dynamics as well as the spatial patterns of the aggregated model showed good accordance with field data. Therefore, the model approach may be useful for the identification and understanding of dragonfly spatial patterns as well as for predicting future spatial patterns, which are influenced by changes in the water balance due to climate change.] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**9477.** Buss, D.F.; Vitorino, A.S. (2010): Rapid Bioassessment Protocols using benthic macroinvertebrates in Brazil: evaluation of taxonomic sufficiency. *J. N. Am. Benthol. Soc.* 29(2): 562-571. (in English) ["Rapid Bioassessment Protocols (RBPs) have been widely used to assess the ecological health of aquatic ecosystems. Specific aims of RBPs for wadeable streams are to indicate the ecological condition of a stream using low-

cost protocols to allow long-term and widespread routine monitoring. Our study was part of an ongoing effort to test and standardize a protocol using benthic macroinvertebrates as indicators of the water quality of Wadeable streams in southeast Brazil. One of the most controversial issues during RBP development is deciding the taxonomic resolution that should be used. We evaluated how well genus-, family-, and order-level taxonomic resolution detected a gradient of impairment. All 3 taxonomic resolutions statistically discriminated reference, intermediately impaired, and impaired sites based on assemblage structure, water-quality classification, and biotic index responses. Analysis at the genus level was more effective than analysis at other levels of taxonomic resolution for discriminating sites that varied in degradation conditions, especially when considering biotic index responses, but the lack of comprehensive taxonomic keys and information about the ecology of those genera hinder their widespread use in bioassessments. On the other hand, analyses at the order level had lower discriminating power to separate reference sites from intermediately impaired sites when considering biotic index responses. Analyses at the family level gave results similar to results at the genus level, and we support its use in a RBP program for this region, at least until better keys and autoecological knowledge are available." (Author) Odonata - without further specification - are said to be considered at the genus level.] Address: Vitorino, A.S., Laboratório de Avaliação e Promoção da Saúde Ambiental, Instituto Oswaldo Cruz, Fundação Oswaldo Cruz – FIOCRUZ, Av. Brasil, 4.365, Manguinhos, Rio de Janeiro, RJ, Brazil, CEP 21045-900. E-mail: as.vitorino@bol.com.br

**9478.** Capellan, E.; Nicieza, A.G. (2010): Constrained plasticity in switching across life stages: pre- and post-switch predators elicit early hatching. *Evolutionary Ecology* 24(1): 49-57. (in English) ["The timing of many life history events shows phenotypic plasticity in response to the risk of predation. Theory predicts that increased risk of mortality in an early stage should select for switching earlier, while a higher risk after the transition should select for switching later. Here we examined the effects of stage-specific predation risk on the timing of hatching of *Rana temporaria*. Embryos were exposed to chemical cues from either an egg predator (*Haemaphysalis sanguisuga*) or a tadpole predator (*Aeshna cyanea*) to evaluate three specific hypotheses: (1) a fixed intermediate response, (2) a 'fixed predator' response (i.e., either anticipation or delay), and (3) a specific predator response (both anticipation and delay). *Rana temporaria* embryos did not discern between pre- and post-hatching specific predators, and they hatched prematurely regardless predator type. These results suggest that *R. temporaria* embryos respond to predation risk in a fixed way by hatching early, and that they use cues stemming from injured conspecifics, which provides a simple, conservative mechanism of risk assessment. In conclusion, our data are not anticipated by the theoretical consideration that organisms should spend less time in more dangerous environments, but they confirm an invariable adjustment of hatching time in response to an inscrutable predation risk (response to a fixed-predator) in connection with a consistent mechanism mediating the perception of predation risk." (Authors)] Address: Nicieza, A., Ecology Unit, Dept of Biology of Organisms and Systems, University of Oviedo, 33071 Oviedo, Spain. E-mail: nicieza@innova.uniovi.es

**9479.** Chalmers, V. (2010): Light trap session and reptile moonwalk. *Gazelle*, Dubai 25(5): 4-5. (in English) [Prior may 2010 (not data are available to the abstracter), a mercury vapour light trap was installed at the Al Ain Zoo roundabout, UAE. "Dragonflies were also seen at the light trap and Bob Reimer identified them as a female *Anax ephippiger* and two female *Anax parthenope* dragonflies."] Address: Chalmers, Valerie; not stated

**9480.** Chara-Serna, A.M.; Chara, J.D.; Zuniga, M.; Pedraza, G.X.; Giraldo, L.P. (2010): Clasificación trófica de insectos acuáticos en ocho quebradas protegidas de la ecorregión cafetera colombiana. *Universitas Scientiarum* 15(1): 27-36. (in Spanish, with English summary) ["Trophic classification of aquatic insects in eight sheltered streams of the Colombian coffee ecoregion. Objective. To determine the trophic structure of the aquatic insect assembly associated to eight streams in the Colombian coffee-growing ecoregion. Materials and methods. Aquatic insects were collected in eight forested streams located in La Vieja river basin. The taxa collected were assigned to dietary groups according to a regional classification based on the gut content analysis of aquatic insects associated to forested streams of the Otún river basin. Results. 2019 individuals belonging to 73 taxa were collected and 60 were classified into dietary groups. The most abundant group was collectors (55%), followed by shredders (31%) and predators (10%). Scrapers represented only 0.05% of the sample and the remaining 3,95% could not be classified due to lack of information. Conclusions. The dominance of collectors and shredders reveals the importance of coarse particulate organic matter (leaf litter) as a food resource for the insect fauna. Similarities between the trophic structure of this community and other communities studied in similar streams, suggest the possibility of a common pattern for Andean streams. This study evidenced the lack of knowledge on trophic ecology of tropical aquatic insects; 50% of the taxa collected did not have this kind of information for the tropics and 20% had no information neither for the tropics nor temperate zones." (Authors) Odonata are treated at the genus level.] Address: Chará-Serna, Ana M., Centro para la Investigación en Sistemas Sostenibles de Producción Agropecuaria - CIPAV, Carrera 25 No. 6-62 Cali, Colombia. E-mail: ana@cipav.org.co

**9481.** Chemes, S.B.; Giraudo, A.R.; Gil, G. (2010): Dieta de *Lontra longicaudis* (Carnivora, Mustelidae) en El Rey National Park (Salta, Argentina) y su comparación con otras poblaciones de la cuenca del Paraná. *Mastozoología Neotropical* 17(1): 19-29. (in Spanish, with English summary) [The diet of *Lontra longicaudis* (Carnivora, Mustelidae) in El Rey National Park (Salta, Argentina) was studied and compared with others populations from the Paraná basin. 130 feces from 37 latrines were collected. 623 prey items analyzed included two Anisoptera (= 0.32%) and three Zygoptera (= 0.48%).] Address: Chemes, Silvina, Facultad de Humanidades y Ciencias, Universidad Nacional del Litoral, Ciudad Universitaria, Paraje El Pozo, S3000ZAA Santa Fe, Argentina. E-mail: schemes@fhuc.unl.edu.ar

**9482.** Chertoprud, M.V. (2010): Biogeographic zonation of the Eurasian fresh waters based on the macrobenthic faunas. *Zhurnal Obshchei Biologii* 71(2): 144-162. (in Russian, with English summary) ["Spatial differentiation of the Eurasian freshwater faunas is analyzed based on the original and published data on the aquatic



insects, crustaceans, and mollusks (about 8800 species in total). The Hacker-Dice similarity index is employed as a principal criterion of differentiation. The schemes of biogeographic zonation are constructed for [...] Odonata, Ephemeroptera, Plecoptera, Hemiptera, Coleoptera, Trichoptera, Malacostraca, Gastropoda, and Bivalvia. Discussed are principal discordances in distribution of three different ecological-systematic groups of the macrobenthos, namely, limnophylic insects, rheophylic insects, and crustaceans with mollusks. A generalized zonation system of the Eurasian fresh waters is elaborated, which is fundamentally divided into Palaearctic and Oriental Regions. The former is further divided into five subregions: Euro-Ob, Near East, Central Asia, Eastern Siberia, and Japan. The latter is divided into three subregions: Indo-Himalaya, China, and Malay. Preliminary classification of the provinces is also provided. Disagreements between the biogeographic systems of different authors are discussed." (Author)] Address: Chertoprud, M.V., Moscow Lomonosov State University, Faculty of Biology, 119992 Moscow, Leninskie Gory, Russia. E-mail: lymnaea@yandex.ru

**9483.** Clopton, R.E.; Cook, T.J.; Cielocha, J.J. (2010): *Nubenocephalus nickoli* n. sp. and *Nubenocephalus xunantunichensis* n. sp. (Apicomplexa: Eugregarinida: Actinocephalidae) parasitizing damselflies (Odonata: Zygoptera) in Belize, Central America. *Comparative Parasitology* 77(2): 125-136. (in English) ["Two new species of *Nubenocephalus* are described from adult damselflies sampled in Cayo District, Belize, Central America. *N. nickoli* n. sp. is described from *Hetaerina americana*, and *H. titia*, and *N. xunantunichensis* n. sp. is described from *Argia chelata*. New, complete morphological data sets are reported for populations of *N. nebraskensis* and *N. secundus*, and a complete, synoptic reevaluation of diagnostic morphological characters used to discriminate species within *Nubenocephalus* is presented for all known species of the genus in the New World. *N. nebraskensis* is reported from *Argia apicalis* for the first time." (Authors)] Address: Cielocha, J.J., Department of Ecology and Evolutionary Biology and the Biodiversity Institute, University of Kansas, Lawrence, Kansas 66045, USA. E-mail: jjhays@ku.edu

**9484.** Corser, J.D. (2010): Status and ecology of a rare gomphid dragonfly at the northern extent of its range. *Northeastern Naturalist* 17/2: 341-345. (in English) ["New records of the rare *Stylurus plagiatus*, are described from the Hudson River estuary in eastern New York State, USA. Breeding occurred primarily in tidal mudflats; however, in other parts of its range, this species is known to use a broader array of habitat types. As a southerly species at its northern range margin, populations of *S. plagiatus* in eastern New York are likely to be temperature-limited, although other factors, such as shoreline habitat integrity and dispersal behaviour, may also play a role in defining its range limits." (Author)] Address: New York Natural Heritage Program, 625 Broadway, 5th Floor, Albany, NY 12233, USA. E-mail: jdcorser@gw.dec.state.ny.us.

**9485.** Couceiro, M.S.; Fonseca Ferreira, N.M.; Tenreiro Machado, J.A. (2010): Modeling and Control of a Dragonfly-Like Robot. *Journal of Control Science and Engineering* Volume 2010, Article ID 643045: 10 pp. (in English) ["Dragonflies demonstrate unique and superior flight performances than most of the other insect species and birds. They are equipped with two pairs of independently controlled wings granting an unmatched

able flying performance and robustness. In this paper, the dynamics of a dragonfly-inspired robot is studied. The system performance is analyzed in terms of time response and robustness. The development of computational simulation based on the dynamics of the robotic dragonfly allows the test of different control algorithms. We study different movements, the dynamics, and the level of dexterity in wing motion of the dragonfly. The results are positive for the construction of flying platforms that effectively mimic the kinematics and dynamics of dragonflies and potentially exhibit superior flight performance than existing flying platforms." (Authors)] Address: Fonseca Ferreira, N.M., Department of Electrotechnical Engineering, Institute of Engineering of Coimbra, Rua Pedro Nunes, Quinta da Nora, 3030-199 Coimbra, Portugal. E-mail: nunomig@isec.pt

**9486.** De Knijf, G.; Demolder, H. (2010): Odonata records from Alentejo and Algarve, southern Portugal. *Libellula* 29(1/2): 61-90. (in English, with German summary) ["During two field trips in summer 2008 and spring 2009 to the Alentejo and Algarve in southern Portugal, we altogether recorded 42 species of Odonata at 112 localities. All localities were classified in one of the following five categories: streams, rivers, ponds and pools, reservoir lakes, and brackish waters. Seventeen species are categorised as rheophilous and twelve as having a clear preference for standing waters. Remarkable records of *Lestes dryas*, *Onychogomphus forcipatus*, *O. uncatatus*, *Paragomphus genei*, *Orthetrum chrysostigma*, *O. coerulescens*, *O. nitidiverve*, *O. trinacria*, *Diplacodes lefebvrei*, *Brachythemis impartita* and *Zygonyx torridus* are presented in detail and discussed, and a regional distribution map is provided for most of them. With 35 species, the Odonata fauna of southern Portuguese streams and rivers is rich and diverse. This diversity can be explained by the high naturalness of many fluvial systems, resulting in a high degree of variation in velocity and substrate, and by the regionally warm climate. Nearly all endemic and threatened species are restricted in the region to running waters. This demonstrates very well the great importance of streams and rivers for dragonflies and the international responsibility of Portugal to protect and conserve these habitats. Despite their rarity in southern Portugal, ponds and pools harbour relict populations of several northern species like *Lestes dryas* and *Libellula quadrimaculata* at the limits of their distribution. However, today these ponds are endangered by intensification of agriculture and the loss of traditional land use practices and should also be protected." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**9487.** Deubelius, K.; Jödicke, R. (2010): *Leucorrhinia caudalis* in Nordwestdeutschland (Odonata: Libellulidae). *Libellula* 29(1/2): 1-12. (in German, with English summary) ["In 2009, *L. caudalis* was recorded from four lakes in Lower Saxony north and east of Bremen, Germany, for the first time. Reproduction in one of the lakes was proved by several exuviae. An analysis of all records from Lower Saxony showed that only the flood plain of the river Elbe in the Wendland area may be part of the permanent range of the species. All other records from the 20th century indicate short-term populations, some of which having been only inadequately documented. Since the turn of the millennium, the species was recorded from six localities in Lower Saxony, which may be interpreted in terms of a turnaround in the hi-

therto observed decline of the species. Hence, similar news from other parts of Germany and adjacent countries is supported." (Authors)] Address: Deubelius, K., Am Kapellenberg 7, D-28759 Bremen, Germany. E-mail: KadeeHB@t-online.de

**9488.** Dijkstra, K.D.; Boudot, J.-P. (2010): First update of the Atlas of the Odonata of the Mediterranean and North Africa: *Orthetrum machadoi* new to the Palaearctic and *Agriocnemis sania* new to the Egyptian Nile Valley. *Libellula* 29(1/2): 107-125. (in English, with German summary) ["Twenty-four species of Odonata were found in the Egyptian Nile Valley and Western Desert in May 2009, which represents 71 % of the fauna confirmed for African Egypt. *Agriocnemis sania* Nielsen, 1959 was recorded in the lower valley and delta of the Nile. This suggests that a doubtful old record of a damaged *Agriocnemis exilis* Selys, 1872 from Port Said referred to *A. sania*, and that *A. exilis* should be removed from the checklist of Egyptian, North African and Mediterranean Odonata. *Agriocnemis sania* is new to African Egypt and should be downgraded from «Regionally Extinct» to «Endangered» on the IUCN North African Red List. *Orthetrum machadoi* Longfield, 1955 was discovered in the Siwa Oasis and is new for Egypt and the Palaearctic at large. The site is over 2600 km from the nearest known locality in Ethiopia, and, like the sympatric and sometimes syntopic *Acisoma panoroides* Rambur, 1842, can be considered as a tropical relict from (a) pluvial period(s), more than 6,000 years ago, when the Sahara was considerably wetter. The overall proportion of observed Afrotropical species was 71 %, whereas the Palaearctic element was only 25 %." (Authors)] Address: Dijkstra, K.D., Curator of invertebrates, National Zoological Collection of Suriname, University of Suriname, P.O. Box 9212, Paramaribo, Suriname. E-mail: Dijkstra@naturalis.nnm.nl

**9489.** Dong, H.; Koehler, C.; Liang, Z.-x.; Wan, H.; Gaston, Z. (2010): An integrated analysis of a dragonfly in free flight. 28th AIAA Applied Aerodynamics Conference, 28 June - 1 July 2010, Chicago, Illinois. American Institute of Aeronautics and Astronautics Paper 2010-4390: (in English) ["There were few literatures on the discussion of the wing flexion and associated aerodynamic performance of dragonfly wings in dragonfly free flights, which are potential candidates for developing bio-inspired micro aerial vehicles (MAVs) that can match the hovering and maneuvering performance of winged insects. To this end, we experimentally measure the wing flexion of a free flying dragonfly during take-off using high-speed photogrammetry and three-dimensional surface reconstructions. From the collected data, analysis of body motion Euler angles, SVD analysis of wing kinematics, wing surface deformation and topologies, and direct numerical simulations will provide insights into the selection of flapping wing and kinematics for quad-winged MAV designs and applications." (Authors)] Address: Dong, H., Department of Mechanical & Materials Engineering, Wright State University, Dayton, OH 45435, USA. E-mail: haibo.dong@wright.edu.

**9490.** Dubai Natural History Group (2010): Our next speaker. *Gazelle*, Dubai 25(5): 2. (in English) [This is an introduction in a scheduled lecture on 6-VI-2010, to be given by: "Keith Wilson is Director Marine Programme, Emirates Marine Environmental Group. He has 32 years experience in the water and aquaculture industries, management of fisheries and marine protected areas, environmental impact assessment, development

project management, and management of marine and coastal resources in the UK, Asia and the Middle East. Keith has written many scientific papers and several books on conservation, marine fishes and dragonflies. He is an accomplished photographer both above and below water with numerous wildlife photographs used commercially in books, journals and newspapers. Keith has a BSc (Hons) in Physiology and Biochemistry and an MSc in Applied Hydrobiology, together with a host of postgraduate qualifications and memberships. He includes amongst his achievements being a founder member of the Hong Kong Institute of Environmental Impact Assessment, a member of the Royal Entomological Society, UK, and is a recognized international expert on the Odonata (dragonflies) of China."] Address: Dubai Natural History Group, PO Box 9234, Dubai, UAE

**9491.** Eigenheer, K. (2010): Massenschlupf von *Gomphus vulgatissimus* an einem neu gestalteten Flachufer der Aare (Odonata: Gomphidae). *Libellula* 29(1/2): 13-20. (in German, with English summary) ["Between 12 June and 12 July 2009, on a shallow 350 m-stretch of the river Aare near Selzach, Canton of Solothurn, Switzerland, 6644 exuviae of *G. vulgatissimus* were collected. The river bank had been raised during the years 2006 and 2007. Averaging 19 exuviae per meter of river bank, this is the highest density ever recorded in this species." (Author)] Address: Eigenheer, K., Hofmatt 11, CH-4582 Brügglen/SO, Switzerland. E-mail: konrad@eigenheer.ch

**9492.** Eltjon, H.; Anila, P.; Dritan, T.; Kastriot, M. (2010): The impact of environmental conditions on the biodiversity of aquatic insects, Odonata, from aquatic ecosystems of Karavasta and Spillea, in Albania. *Water Observation and Information System for Balkan Countries - BALWOIS 2010 - Ohrid, Republic of Macedonia - 25, 29 May 2010: 6 pp.* (in English) [Between 2007-2008, Odonata of the Karavasta lagoon (Divjaka), the Spillea Area and the delta of Shkumbini River (Kavaja) were studied. A total of 26 Odonata species could be recorded. The Albanian vernacular names of all the taxa are also provided.] Address: Halimi Eltjon, University of Tirana; Faculty of Natural Science; Department of Biology, Tirana, Albania

**9493.** Englund, R.A.; Polhemus, D.A. (2010): A review of the damselfly fauna of the Austral Islands, French Polynesia, with descriptions of two new species (Odonata: Zygoptera: Coenagrionidae). *Tijdschrift voor Entomologie* 153(1): 25-40. (in English) ["The Zygoptera biota of the Austral Islands in French Polynesia is reviewed, and two new endemic species are described: *Ischnura rurutana* endemic to the island of Rurutu, and *Ischnura jeanyvesmeyeri* endemic to the island of Rai-vavae. Additional notes on coloration and ecological preferences are also given for *Ischnura thelmae* Lief-tinck, 1966, endemic to Rapa, and the occurrence of the widespread species *Ischnura aurora* Brauer, 1865 on all the high islands in the Australs is briefly noted. Colour photographs of adult males are provided for all three endemic Austral Island species, as well as figures of the male wing venation, pterothoracic colour patterns, and male secondary genitalia, and the female dorsal pterothorax and lateral terminal abdomen. Scanning electron micrographs of the male abdominal appendages in various views are provided for all three endemic Austral Island Zygoptera species. Photographs are also provided for the breeding habitat and immature stage of *I. rurutana*." (Authors)] Address: Englund, R.A.,

J. Linsley Gressitt Center for Entomological Research, Bishop Museum, 1525 Bernice Street, Honolulu, Hawaii 96817, USA. E-mail: englund@bishopmuseum.org

**9494.** Eremia, E.E. (2010): New records of dragonfly species (Insecta, Odonata) for Southern Urals. Eurasian entomological journal 9(1): 19-21. (in Russian, with English summary) [Russia; "48 dragonfly species were collected in the southern Urals and Trans-Ural regions, Republic of Bashkortostan, Chelyabinskaya, Kurganskaya and Orenburgskaya Oblast, during the field season of 2009. Four species were found there for the first time. *Coenagrion glaciale*, considered earlier as endemic of East Siberia, was caught on Slyudorudnik water pond in the vicinity of Kyshtym City in Chelyabinskaya Oblast (eastern slope of Ural mountain, Asia), and *Aeshna caerulea*, *A. subarctica* and *Somatochlora arctica*, previously known as representatives of the northern faunal complex, were captured on Tygyn swamp of Beloretsky District (western slope of ural mountain) (alt. 980 m asl) in the Republic of Bashkortostan." (Author)] Address: Eremina, E.E., Post Box 2775, Chelyabinsk 454014 Russia. E-mail: karmiska@mail.ru

**9495.** Fischer, E.; Munin, R.L.; Longo, J.M.; Fischer, W.; de Souza, P.R. (2010): Predation on bats by Great Kiskadees. Journal of Field Ornithology 81(1): 17-20. (in English, with Spanish summary) [Great Kiskadees (*Pitangus sulphuratus*) "are known to occasionally prey on small vertebrates, but, to our knowledge, bats have never been reported as a prey item. We observed a breeding pair of Great Kiskadees preying on bats (*Myotis* spp.) at the field station Base de Estudos do Pantanal in the southern Pantanal, Brazil. [...] We found that bats, insects, and fruits were the most common food items fed to nestlings by adult kiskadees." (Authors) Odonata represented 2 items from a total of 123 food items fed to nestlings by adult Great Kiskadees at two nests in the Pantanal, 1997–1998.] Address: Fischer, E., Depto de Biologia, Universidade Federal de Mato Grosso do Sul, 79070-900 Campo Grande, Mato Grosso do Sul, Brasil. E-mail: eafischer@uol.com.br

**9496.** Gabriels, W.; Lock, K.; De Pauw, N.; Goethals, P.L.M. (2010): Multimetric Macroinvertebrate Index Flanders (MMIF) for biological assessment of rivers and lakes in Flanders (Belgium). Limnologica 40: 199-207. (in English) ["The European Water Framework Directive requires that member states assess all their surface waters based on a number of biological elements, including macroinvertebrates. Since 1989, the Flemish Environment Agency has been using the Belgian Biotic Index for assessing river water quality based on macroinvertebrates. Throughout the years, the Belgian Biotic Index has proven to be a reliable and robust method providing a good indication of general degradation of river water and habitat quality. Since the Belgian Biotic Index does not meet all the requirements of the Water Framework Directive, a new index, the Multimetric Macroinvertebrate Index Flanders (MMIF) for evaluating rivers and lakes was developed and tested. This index was developed in order to provide a general assessment of ecological deterioration caused by any kind of stressor, such as water pollution and habitat quality degradation. The MMIF is based on macroinvertebrate samples that are taken using the same sampling and identification procedure as the Belgian Biotic Index. The index calculation is a type-specific multimetric system based on five equally weighted metrics, which are taxa richness, number of Ephemeroptera,

Plecoptera and Trichoptera taxa, number of other sensitive taxa, the Shannon–Wiener diversity index and the mean tolerance score. The final index value is expressed as an Ecological Quality Ratio ranging from zero for very bad ecological quality to one for very good ecological quality. The MMIF correlates positively with dissolved oxygen and negatively with Kjeldahl nitrogen, total nitrogen, ammonium, nitrite, total phosphorous, orthophosphate and biochemical and chemical oxygen demand. This new index is now being used by the Flemish Environment Agency as a standard method to report about the status of macroinvertebrates in rivers and lakes in Flanders within the context of the European Water Framework Directive." (Authors) Taxa taken into account for calculating the Multimetric Macroinvertebrate Index Flanders, with their respective tolerance scores (TS), ranging from 10 for very pollution sensitive to 1 for very pollution tolerant taxa. With reference to Odonata the sensitive index is as follows: *Aeshna* 6, *Brachytron* 7, *Calopteryx* 8, *Cercion* 7, *Ceriagrion* 7, *Coenagrion* 6, *Cordulegaster* 9, *Cordulia* 7, *Crocothemis* 7, *Enallagma* 7, *Epithea* 7, *Erythromma* s.s. 7, *Gomphus* 7, *Ischnura* 6, *Lestes* 7, *Leucorrhinia* 7, *Libellula* 7, *Nehalennia* 7, *Onychogomphus* 7, *Ophiogomphus* 7, *Orthetrum* 7, *Oxygastra* 7, *Platycnemis* 7, *Pyrrosoma* 7, *Somatochlora* 7, *Sympecma* 7, *Sympetrum* 7.] Address: Gabriels, W., Flemish Environment Agency (VMM), A. Van de Maelestraat 96, B-9320 Erembodegem, Belgium. E-mail address: w.gabriels@vmm.be

**9497.** Garrison, R.; Ellenrieder, N. von (2010): Redefinition of *Leptobasis* Selys with the synonymy of *Chrysobasis* Rácenis and description of *L. mauffrayi* sp. nov. from Peru (Odonata: Coenagrionidae). Zootaxa 2438: 1-36. (in English, with Spanish summary) ["*Chrysobasis* is synonymized with *Leptobasis*. The latter is diagnosed by the combination of rounded frons, CuP reaching hind margin of wing, CuA relatively short, and supplementary pretarsal claw reduced to vestigial, and by the presence on the distal segment of the genital ligula of a pair of chitinized, flap-like, movable processes directed posteriorly. A new species from Peru, *L. mauffrayi*, is described, and illustrations, maps, and keys for all *Leptobasis* species are provided." (Authors)] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**9498.** Giudicelli, J.; Olivari, G. (2010): Les cours d'eau méditerranéens à régime de soutien karstique Spécificités écologiques et hydrobiologiques. *ecologia mediterranea* 36(1): 25-44. (in French, with English summary) [*Platycnemis* spec. and *Onychogomphus uncatus* are reported from one station along the riversystem Les Sorgues, Vaucluse, France.] Address: Giudicelli, J., 945, avenue du 21 Août 1945. F-13400 Aubagne, France. E-mail: jb.giudicelli@wanadoo.fr

**9499.** Godlevska, L.; Fesenko, H. (eds) (2010): Fauna of Ukraine: conservation categories. Reference book. 2nd edition. Kyiv. ISBN 978-966-7830-13-5: 80 pp. (in Ukrainian, with English summary) (<http://www.lucanus.org.ua/articles/redlist-ukr-animals-2010.pdf>) ["The book includes lists of all species of Ukrainian fauna which have conservation status according to national and international red lists as well as to conventions and agreements ratified by Ukraine. A short review of documents determining conservation status for species and definition for all the conservation categories are given.



Ways for practical implementations of the conservation documents are considered. For officers of protected territories, nature protection organizations, students and lecturers of biological speciality, all biologists." (Authors). 30 Odonata species including their vernacular Ukrainian names are listed.] Address: Godlevska, Lena, Schmalhausen Institute of Zoology of NAS of Ukraine, 15 Khmelnytskogo Str., Kyiv, Ukraine, 01601. E-mail: lgodlevska@gmail.com

**9500.** Groenendijk, D. (2010): Mysterious and beautiful, the Northern Emerald. *Vlinders* 3/2010: 18-21. (in Dutch, with English summary) ["*Somatochlora arctica* is one of the least known and rarest dragonflies of north-west Europe; in the Netherlands it is listed as a threatened species. One of the most characteristic species of living raised bog, its decline has been paralleled by the loss and degradation of such wetland habitat. We set up a Species Protection Plan which came into action in 2005. Seven Dutch populations are now known. Priority was given to locating the breeding grounds and understanding the adult's behaviour. Both males and females were seen frequenting small pools of about a metre deep. The surface was almost completely covered with rather dried out looking *Sphagnum* moss, often with other bog plants growing in it. We saw females ovipositing, and found larvae in various stages and their empty skins (exuviae). These pools have been targeted for conservation measures. On the short term, managers are given on-site advice either on how to protect them or how to dig new ones, depending on the local situation. On the long term, it is important that hydrological plans for the restoration of the bog include such pools, thus ensuring suitable breeding grounds for this rare and beautiful species." (Author)] Address: Groenendijk, D., De Vlinderstichting, Postbus 506, NL 6700 AM Wageningen, The Netherlands. E-mail: dick.groenendijk@vlinderstichting.nl

**9501.** Grome, N.M. (2010): Neural basis of visually evoked head and wing movements in dragonflies. *FASEB Journal* 24: 988.16. (in English) ["Dragonflies make their living by foraging on flying insects. We are using two approaches to study their prey capture behavior. (1) Using close-up, high speed video, we are recording the head movements of dragonflies (*Sympetrum vicinum*) to the movement of small moving images that simulate prey items. Our study shows that dragonflies use two distinct types of head/eye movements, tracking and saccades. The former are smooth movements that stabilize the moving prey image. The latter are jerky movements that may be involved in distance estimation. (2) Using intracellular penetration and recording, we are studying a group of neurons that are thought to guide prey capture. By controlling their activity with current pulses we are studying the wing steering movements that they elicit. Injection of a fluorescent dye, Lucifer Yellow, into these neurons allows us to study their dendritic structure within the dragonfly's brain." (Author)] Address: Grome, Natalie Marie, Biology, Union College, Schenectady, NY, USA

**9502.** Hamamoto, M.; Ohta, Y.; Hara, K.; Hisada, T. (2010): Basic design strategy for stiffness distribution on a dragonfly-mimicking wing for a flapping micro aerial vehicle. *Advanced Robotics* 24(5-6): 861-877. (in English) ["A basic configuration of a flexible wing is derived from that of a real dragonfly. To realize the development of a flapping micro aerial vehicle, it is essential to study real insects' flight. In particular, the

sophisticated structure of the wing contains many helpful hints for the solution of the efficiency. However, to solve the fluid-structure interaction problem between wing deformation and the surrounding airflow has been quite difficult, and the study of the ultimately light wing has been inhibited. We analyzed this problem using a novel numerical simulation — finite element analysis based on the arbitrary Lagrangian-Eulerian method, which can treat the interactive behaviour accurately. A comparison of wing deformations and surrounding airflows for 13 wing models, actuated in the same way as is hovering by a real dragonfly and having one-third to 23 times the Young's modulus of a real dragonfly wing, indicated that the real wing positioned on the lower border of the zone where the flight efficiency was sustained. It was also observed that the wingtip area, the attitude of which plays a dominant role in determining the efficiency, was mainly supported by the structural stiffness of a shallow groove that crosses the wing diagonally." (Authors)] Address: Hamamoto, M., Advanced Technology Research Lab., Corporate Research & Develop. Group, Sharp Corp., 2613-1 Ichinomoto-cho, Tenri-city, Nara 632-8567, Japan. E-mail: hamamoto.masaki@sharp.co.jp

**9503.** Hill, B.T.; Roland, H.-J. (2010): Die Mond-Azurjungfer *Coenagrion lunulatum* (Charpentier 1840) in Hessen. *Libellen in Hessen* 3: 55-57. (in German) [Old records of *C. lunulatum* in Hessen, Germany, from 1963/64 (Rau 1966), thought to be questionable, could be verified. Voucher specimens were found in the entomological collection of the Künanzhaus.] Address: Hill, B.T., Egenolfstr. 22, 60316 Frankfurt, Germany. E-mail: hillbt@yahoo.de

**9504.** Hughes, M. (2010): Effects of Zebra Mussel colonization on dragonfly larvae burying behavior. Thesis submitted to the faculty of Wesleyan University in partial fulfillment of the requirements for the Degree of Bachelor of Arts with Departmental Honors in Biology Middletown, Connecticut April: 55 pp. (in English) ["Invasive species have caused massive ecological and economic damage throughout the world. In North America, zebra mussels (*Dreissena polymorpha*) native to Eastern Europe invaded aquatic ecosystems in the 1980s, altering ecological communities and harming human infrastructure. Zebra mussels have been found attached to dragonfly larvae, decreasing the likelihood of successful emergence as adults. This study assesses the negative impacts zebra mussel colonization has on dragonfly larvae by testing the effects of colonization on dragonfly burying behavior. *Macromia illinoensis* larvae and zebra mussels were collected and tested at Douglas Lake, Michigan in July and August 2009. Weather and water temperature affected uncolonized burial time, but not uncolonized burial depth. Uncolonized burial time, head width, and body area were predictors of which individual dragonflies got colonized. Once individuals were colonized, their burial depth was impaired, which could lead to early mortality. Because dragonflies link aquatic and terrestrial ecosystems, increased early mortality of dragonflies could cause cascading effects across ecosystems." (Author)] Address: not stated

**9505.** Hunt, P.A.; Blust, M.; Morrison, F. (2010): Lotic Odonata of the Connecticut River in New Hampshire and Vermont. *Northeastern Naturalist* 17(2): 175-188. (in English) ["Several riverine species in the insect order Odonata are recognized as being of conservation con-

cern in the Northeast. Along the Connecticut River, most data on these species have come from the southern portion of the river that passes through Connecticut and Massachusetts, while the northern portion has been poorly sampled until recently. In this paper, we summarize recent surveys along the Vermont—New Hampshire stretch of the river and place these in the context of known distributional data for the river as a whole. Our focus is on species typical of large rivers, with a particular focus on members of the family Gomphidae. Also included is information on the first Vermont or New Hampshire records of three species — *Enallagma antennatum*, *E. durum*, and *Stylurus amnicola* — and the first upper river records for several other species." (Authors)] Address: Hunt, Pamela, Audubon Society of New Hampshire, 3 Silk Farm Road, Concord, NH 03301, USA. E-mail: phunt@nhaudubon.org

**9506.** Ippolito, A.; Sala, S.; Faber, J.H.; Vighi, M. (2010): Ecological vulnerability analysis: A river basin case study. *Science of the Total Environment* 408: 3880-3890. (in English) [Italy, "Assessing and quantifying ecosystem vulnerability is a key issue in site-specific ecotoxicological risk assessment. In this paper, the concept of vulnerability, particularly referred to aquatic ecosystems is defined. Sensitivity to stressors, susceptibility for exposure and recovery capability are described as component of vulnerability of biological communities. The potential for habitat changes must also be considered in ecosystem vulnerability assessment. A procedure based on the application of an ecosystem vulnerability index is proposed. The method allows the assessment of vulnerability of riverine ecosystems to multiple stressors. The procedure is applied to two river systems in northern Italy: River Serio, subject to strong human pressure, and River Trebbia, in semi-natural conditions, as reference system. Macrozoobenthos is chosen as the indicator community. The actual quality of River Serio was evaluated as the result of the multiple stressor pressure on the reference system. Values and limitations of the approach are discussed." (Authors) Taxa, including Odonata, are treated at the order level.] Address: Vighi, M., Department of Environmental Sciences, University of Milano Bicocca, Piazza della Scienza, 1, 20126 Milano, Italy. E-mail address: marco.vighi@unimib.it (M. Vighi).

**9507.** Juhant, M.A. (2010): Austral spring migration counts of raptors in Punta Rasa, Argentina. *Ornitologia Neotropical* 21: 263-270. (in English, with Spanish summary) ["Punta Rasa, eastern Buenos Aires province, Argentina; "That day, there were 5000 to 10,000 hawks moving westward through the Tanques Watchsite area, together with swarms of thousands of dragonflies. Another episode was recorded at the same moment 5 km south from Tanques Watchsite, where a flock of approximately 5000 hawks was feeding on dragonflies in a 300 x 300 m area." (Author)] Address: Juhant, M.A., Universidad Nacional de La Plata. Republica de Chile 3006, San Justo 1754, Buenos Aires, Argentina. E-mail: matiasjuhant@yahoo.com.ar

**9508.** Kalniņš, M. (2010): Dragonfly (Odonata) conservation in Latvia. XXVIII Nordic - Baltic Congress of Entomology. Abstract book: 49. (in English) [Verbatim: "Until now, there are altogether 59 species of nine dragonfly families known in Latvia including one irregularly immigrated species – *Sympetrum fonscolombii* and one species with unclear status – *Aeshna caerulea*. Although dragonflies represent a faunistically well investi-

gated group of insects in Latvia, the data of threatened and protected species regional distribution is still insufficient as compared with other dragonflies species. There is also few ecological data available on dragonflies of Latvia. Published data, the collections of different institutions, the data collected during the project „Analysis of the Specially Protected Nature Territories in Latvia and Establishing of EMERALD/Natura 2000 Network” in 2001-2002 and material collected by Latvian entomologists up to 2009 have been used in the analysis of the distribution and habitat preference. Data on dragonflies were collected by using a hydrobiological net or entomological net, or by direct observations. The material was collected from 1998 to 2009. Both historical and recent data, totally 10885 records of all dragonfly species, were included in a Microsoft Office Access database hold by the author. There are altogether 16 species are protected by national and European legislation or included in Red Data book of Latvia. They are: *Lestes virens*, *Ischnura pumilio*, *Pyrrhosoma nymphula*, *Nehalennia speciosa*, *Aeshna mixta*, *A. isosceles*, *A. viridis*, *Anax imperator*, *Gomphus flavipes*, *Ophiogomphus cecilia*, *Cordulegaster boltonii*, *Epitheca bimaculata*, *Libellula fulva*, *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis*. Specially protected natural areas of Latvia are geographical territories, that are under special state-level protection, in order to safeguard and maintain biodiversity of nature – rare and typical ecosystems, habitats for rare species, landscapes, that are peculiar, beautiful and characteristic for Latvia, geological and geomorphological formations, as well as territories, significant for recreational and educational purposes. The protected areas are classified according following categories: strict nature reserves, nature parks, nature reserves, national parks, biosphere reserves, natural monuments, areas of protected landscapes. Altogether in Latvia there are 684 (excluding nature monuments – veteran trees) specially protected natural areas certified by law or regulations of the Cabinet of Ministers. The half of these protected areas has been established as Natura 2000 – protection areas of European level also." (Author)] Address: Kalniņš, M., Nature Conservation Agency, Baznīcas iela 7, Sigulda, Siguldas novads, LV-2150, Latvia. E-mail: martins.kalnins@daba.gov.lv

**9509.** Kalogianni, E.; Giakoumi, S.; Andriopoulou, A.; Chatzinikolaou, Y. (2010): Feeding ecology of the critically endangered *Valencia letourneuxi* (Valenciidae). *Aquatic Ecology* 44: 289-299. (in English) [Greece; Food resource utilization by *V. letourneuxi*, a critically endangered freshwater fish, was studied in its most abundant known Greek population of Chiliadou stream. "The diet of this population appears to be dominated by microcrustaceans, dipteran larvae, Acari, and Mollusca. Its feeding is highly dependent on seasonal prey availability and diversity, with niche overlap being low only between winter and the rest of the seasons, indicating that only during winter its diet differs significantly in relation to the other seasons. There are no significant sex- and sizerelated dietary shifts. This *V. letourneuxi* population is characterized by a generalist feeding strategy and appears to consist mostly of individuals with broad niches. Its generalist feeding pattern and dietary flexibility permits it to fully exploit this very diverse and rich habitat and may account for the high local abundance of this population." (Authors) 0,5% of prey items contributed to Odonata.] Address: Kalogianni, E., Institute of Inland Waters, Hellenic Centre for

Marine Research, 46.7 km Athinon—Souniou Av., P.O. Box 712, 190 13 Anavissos, Greece. E-mail: ekalog@ath.hcmr.gr

**9510.** Karube, H. (2010): 20. Endemic insects in the Ogasawara Islands: Negative impacts of alien species and a potential mitigation strategy. In: Kazuto Kawakami and Isamu Okochi (2010) (eds.): Restoring the Oceanic Island Ecosystem. Impact and Management of Invasive Alien Species in the Bonin Islands. ISBN 978-4-431-53858-5 (Print). Springer Japan: 133-137. (in English) ["The impact of invasive alien species on endemic insects in the Ogasawara Islands and current efforts to mitigate this impact are described. Endemic insects have probably been impacted most by the green anole (*Anolis carolinensis carolinensis*) as a result of its direct predation pressure, although alien trees such as bishopwood (*Bischofia javanica*) and ironwood (*Casuarina equisetifolia*) have also had substantial indirect impacts. Factors causing the decline of species that typify individual habitats — endemic odonates, the Ogasawara tiger beetle (*Cicindela bonina* Nakane et Kurosawa, 1959), and the Ogasawara lycaenid butterfly (*Celastrina ogasawaraensis* Pryer, 1883) — have been revealed, and possible conservation efforts have been developed based on these results. Habitat restoration is now underway. Specific examples of these efforts are presented here." (Author)] Address: Karube, H., Kanagawa Prefectural Museum of Natural History, 499 Iryuda, Odawara Kanagawa, 250-0031, Japan. E-mail: paruki@nh.kanagawa-museum.jp

**9511.** Kazanci, N.; Dögel, M. (2010): Determination of influence of heavy metals on structure of benthic macroinvertebrate assemblages in low order Mediterranean streams by using canonical correspondence analysis. *Review of Hydrobiology* 3(1): 13-26. (in English, with Turkish summary) [Köyceğiz-Dalyan Nature Reserve, Turkey; Seventy-five species of benthic macroinvertebrates were identified. Relationships between benthic macroinvertebrate assemblages and the metal Zn, Cd, Ni, Cu, Fe, Mn and electrical conductivity, pH, Ca, dissolved oxygen and nitrate were explored by using canonical correspondence analysis. The study includes records of the following Odonata taxa: *Calopteryx splendens*, *Platycnemis pennipes*, *Coenagrion* sp., *Aeshna* sp., *Gomphus flavipes*, *Onychogomphus forcipatus*, and *Ophiogomphus cecilia*. *O. forcipatus*, *O. cecilia* were related to Cd, Ni, dissolved oxygen and pH but negatively with nitrate nitrogen and Ca (Figure 1). These taxa tended to tolerate high concentrations of Cd and Ni and preferred alkaline, organically unpolluted habitat with low Ca concentration. *C. splendens* and *G. flavipes* were positively related to nitrate and Ca and were negatively correlated with Cd, pH, Ni and dissolved oxygen.] Address: Kazanci, Nilgün, Hacettepe Univ. Science Faculty Biology Dept Hydrobiology Section, Beytepe, Ankara, Turkey. E-mail: nilgunkazanci@gmail.com

**9512.** Kazanci, N. (2010): Contribution to the knowledge of Odonata (Insecta) fauna of Turkey: Eastern and Southeastern Anatolia. *Review of Hydrobiology* 3(1): 1-11. (in English, with Turkish summary) [Turkey, Hakkari and Siirt Provinces. Between 1981 and 1984, 18 Odonata species were recorded. *Ischnura senegalensis* is a new record for Turkey. The list also includes the rare *Sympetrum haritonovi*.] Address: Kazanci, Nilgün, Hacettepe University Science Faculty Biology Dept

Hydrobiology Section, Beytepe, Ankara, Turkey. E-mail: nilgunkazanci@gmail.com

**9513.** Keller, D.; Brodbeck, S.; Flöss, I.; Vonwil, G.; Holderegger, R. (2010): Ecological and genetic measurements of dispersal in a threatened dragonfly. *Biological Conservation* 143: 2658-2663. (in English) ["*Leucorrhinia caudalis* is a rare dragonfly, threatened throughout its European distribution. The species was formerly widespread in the Swiss lowlands, but only a single population remained in the 1980s. However, a spread has recently been observed, with additional ponds being colonised, sometimes at considerable distance. Despite this evidence of recent long-distance dispersal, it is unknown whether *L. caudalis* regularly moves among ponds or whether this is a rather rare event. A combination of an ecological mark-resight and a population genetic study was applied to investigate contemporary dispersal and the genetic footprint of the recent population history of *L. caudalis* in Switzerland. DNA for genetic microsatellite analysis was extracted from exuviae. The mark-resight study and the genetic analysis gave congruent results. They showed that *L. caudalis* is mostly a sedentary species, with only a few contemporary dispersal events over distances up to 5 km being observed. The genetic analysis was in agreement with the recent population history of the Swiss populations. The oldest and largest population showed large genetic diversity and acted as source population for the recent spread of *L. caudalis* in Switzerland. Recurrent gene flow among this source population and close populations caused substantial local genetic variation in the latter, as well as low population differentiation. The two recently founded distant populations (30 km distance) were genetically less diverse and highly differentiated. These distant populations and another recently colonised population also expressed signatures of genetic bottlenecks." (Authors)] Address: Keller, Daniela, WSL Swiss Federal Research Institute, Zürcherstr. 111, CH-8903 Birmensdorf, Switzerland. E-mail: mailto:daniela.keller@wsl.ch

**9514.** Korte, T. (2010): Current and substrate preferences of benthic invertebrates in the rivers of the Hindu Kush-Himalayan region as indicators of hydromorphological degradation. *Hydrobiologia* 651(1): 77-91. (in English) ["The study introduces an approach to obtaining information about the preferences of benthic invertebrates for substrate and current velocity in a region with little prior knowledge of benthic invertebrates. These preferences are then used for river assessment. Substrate-specific sampling of 271 reference sites was conducted in lower mountainous and lowland areas of the Hindu Kush-Himalaya region. Statistical analysis revealed significant preferences for substrate type and current velocity for 50 taxa of Ephemeroptera, Plecoptera, Trichoptera, Coleoptera, Diptera, Odonata, Mollusca, and Oligochaeta. A 20-point system was developed to assign scores for substrate and current preferences. Scores from seven taxa of Ephemeroptera and Trichoptera revealed low ecological potential in response to habitat alteration. These data were used to develop four preference metrics. The Lithal metric is composed of 34 taxa with significant preferences for stony substrates (fine gravel to bedrock size). The Lithophile metric contains 21 taxa with strong statistical links to stony substrates, which were also found on other substrates. The Lithobiont metric consists of 13 taxa exclusively found on stones. The Lotic metric consists of 11



taxa with significant preferences for moderate-to-fast current velocities. Multi-habitat sampling was conducted at 181 sites reflecting a hydromorphological gradient. The Mann-Whitney U test and box-and-whisker plots were applied to test the relationship of the new metrics to hydromorphological stress. Of the four new metrics, the Lithal, Lithophile, and Lotic were able to detect impacts of hydromorphological degradation." (Authors)] Address: Korte, T., Dept Applied Zoology/Hydrobiology, Institute of Biology, University of Duisburg-Essen, Universitätsstr. 5, 45141 Essen, Germany. E-mail: thomas.korte@uni-due.de

**9515.** Kosterin, O.E.; Gorbunov, P.G. (2010): Notes on the Odonata of Kazakhstan, including the first record of *Ischnura evansi* Morton (Zygoptera: Coenagrionidae). *Notulae odonatologicae* 7(5): 45-48. (in English) ["*Ischnura evansi* and *I. fountaineae* are reported from brackish springs in the Ustyurt Nature Reserve, W. Kazakhstan. This is the northernmost record and the first Kazakhstan record of the former species. The Kazakhstan record of *Aeshna cyanea*, by K. REINHARDT & J. SAMIETZ (2003, *Entomologische Nachrichten und Berichte* 47: 71-76), is most probably erroneous. Some corrective notes on the recent review of the Odonata of Kazakhstan by I.A. CHAPLINA et al. (2007, *Odonatologica* 36: 339-364) are provided." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**9516.** Landwer, B.H.P.; Sites, R.W. (2010): The larval Odonata of ponds in the Prairie region of Missouri. *Transactions of the American entomological society* 136(1-2): 1-105. (in English) ["Despite a proliferation of regional faunistic treatments throughout North America in recent years, knowledge of the Odonata fauna of Missouri has lagged behind that of other midwestern states. Samples of larval Odonata were collected from 105 ponds in the Prairie Region of Missouri over three sampling periods: Fall 1998, Spring 1999, and Summer 1999. Some ponds were sampled during more than one sampling period, resulting in a total of 117 unique pond and sampling period combinations. Sites were selected from Missouri Department of Conservation owned lands and the University of Missouri owned Baskett Wildlife Area. Within each pond, sampling was conducted separately in each distinct vegetational mesohabitat. Supplemental rearing of difficult or uncommon taxa was carried out in the laboratory. More than 30,000 specimens, representing 51 species, 22 genera, and 6 families of larval Odonata were collected from ponds in the Prairie Region of Missouri. Overall, the ponds of the Prairie Region supported a generalized Odonata community, with a relatively small number of species being found in a large number of ponds. Presented here is a faunistic inventory of the larval Odonata of ponds in the Prairie Region of Missouri, with mesohabitat associations and a taxonomic key to suborders, families, genera, and species known or expected to occur there." (Authors) *Archilestes*, *Lestes*, *Amphiagrion*, *Argia*, *Enallagma*, *Ischnura*, *Nehalennia*, *Aeshna*, *Anax*, *Boyeria*, *Basiaeschna*, *Epiaeschna*, *Nasiaeschna*, *Rhionaeschna*, *Arigomphus*, *Dromogomphus*, *Gomphus*, *Epithecica*, *Epicordulia*, *Tetragoneuria*, *Celithemis*, *Dythemis*, *Erythemis*, *Ladona*, *Leucorrhinia*, *Libellula*, *Pachydiplax*, *Pantala*, *Perithemis*, *Plathemis*, *Sympetrum*, *Tramea*] Address: Enns Entomology Museum, Division of Plant

Sciences, University of Missouri, Columbia, Missouri 65211, USA.

**9517.** Lima, D.O.; Behr, E.R. (2010): Feeding ecology of *Pachyurus bonariensis* Steindachner, 1879 (Sciaenidae: Perciformes) in the Ibicuí River, Southern Brazil: ontogenetic, seasonal and spatial variations. *Braz. J. Biol.* 70(3): 503-509. (in English, with Portuguese summary) [The diet of *P. bonariensis*, a freshwater sciaenid, was analyzed (stomachs of 324 fish specimens). Fish were collected bimonthly from December 1999 to January 2002 at three locations along the Ibicuí River in the Rio Grande do Sul State, Brazil. The main items were Ephemeroptera, Diptera (larvae), Trichoptera and Odonata.] Address: Lima, Daniela, Universidade Federal da Fronteira Sul – UFFS, Campus de Cerro Largo, Rua João Sebastião, 16, CP 63, CEP 97900-000, Cerro Largo, RS, Brazil. E-mail: daniela.ol.lima@gmail.com

**9518.** Lopau, W. (2010): Verbreitungsatlas der Libellen in Griechenland (Odonata). *Libellula Supplement* 10: 5-153. (in German, with English summary) ["Based on a set of approximately 14,750 records, distribution maps are presented for all and flight period histograms for most of the 78 species that have been reported from Greece. Remarks on distribution and phenology of each species are given and, in special cases, information on taxonomy and ecology is added. Particular emphasis is given on distribution data from islands." (Author)]

**9519.** Lopau, W. (2010): Bisher unveröffentlichte Libellenbeobachtungen aus Griechenland IV (Odonata). *Libellula Suppl.* 10: 155-260. (in German, with English summary) ["Hitherto unpublished Odonata records from Greece IV - Almost 3,380 Odonata records provided by 27 workers are listed. The data, comprising 64 of the 78 species known from Greece today, was recorded between 02-ix-1990 and 25-ix-2008." (Author)]

**9520.** Lopez, L.D.; Peterson, M.S.; Lang, E.T.; Charbonnet, A.M. (2010): Linking habitat and life history for conservation of the rare saltmarsh topminnow *Fundulus jenkinsi*: morphometrics, reproduction, and trophic ecology. *Endangered Species Research* 12: 141-155. (in English) [The diet (including Odonata) of the fish species *F. jenkinsi* is analyzed at the order level.] Address: Peterson, M.S., Dept of Coastal Sciences, The University of Southern Mississippi, Ocean Springs, Mississippi 39564, USA. E-mail: mark.peterson@usm.edu

**9521.** Loskutova, O.A.; Zelentsov, N.I.; Scherbina, G. Kh. (2010): Amphibiotic insects of mountain lakes and small watercourses in the Urals. *Inland Water Biology* 3(1): 11-20. (in English) [Russia; Several specimens of *Leucorrhinia dubia* were found on the snow near the lakes in the Bal ban yu River basin (65°16' N, 59°56' E). This is a range extension of that species which had not previously been found north of the Ukhta Rive according to Sedykh, K.F., *Zhivotnyi mir Komi ASSR. Bespozvochnye* (Animal World of Komi ASSR: Invertebrates), Syktyvkar: Komi Knizh. Izd., 1974.] Address: Loskutova, O.A., Institute of Biology, Komi Scientific Center, Urals Branch, Russian Academy of Sciences, ul. Kommunisticheskaya 28, Syktyvkar, 167982 Russia. E-mail: loskutova@ib.komisc.ru

**9522.** Macip-Ríos, R.; Sustaita-Rodríguez, V.H.; Barrios-Quiroz, G.; Casas-Andreu, G. (2010): Alimentary habits of the Mexican Mud Turtle (*Kinosternon integrum*) in Tonatico, Estado de México. *Chelonian Conservation and Biology* 9(1): 90-97. (in English) ["We

analyzed the diet of the previously unstudied Mexican mud turtle during 2003 and 2004. Analysis was conducted separately by sex and age (immature vs. adults) and seasons (rainy vs. dry). Gastric contents and fecal samples were used in combination for more complete results. Based on 57 samples (32 stomach flushes and 25 from feces), *K. integrum* is a generalist–opportunist in alimentary habits, feeding on 27 categories of food. Plant material, Coleoptera, Odonata, Diptera, and mixed animal matter were the most important components. Overall dietary diversity was similar between adults and juveniles and between the two sexes, but juveniles differed between seasons. In similarity analysis we found a shift in diet between seasons. Females shifted from being primarily carnivorous during the rainy season to being primarily herbivorous during the dry season, while males were carnivorous during both seasons. The data suggest that this turtle feeds opportunistically on available prey items rather than on a few preferred food items." (Authors)] Address: Macip-Ríos, R., Departamento de Zoología, Instituto de Biología, Universidad Nacional Autónoma de México, Circuito exterior S/N, Ciudad Universitaria, Coyoacán, Distrito Federal, CP 04510 México [rmr@ibiologia.unam.mx](mailto:rmr@ibiologia.unam.mx)

**9523.** Maes, D.; Titeux, N.; Hortal, J.; Anselin, A.; Declerck, K.; De Knijf, G.; Fichet, V.; Luoto, M. (2010): Predicted insect diversity declines under climate change in an already impoverished region. *J. Insect Conservation* 14: 485-498. (in English) ["Being ectotherms, insects are predicted to suffer more severely from climate change than warm-blooded animals. We forecast possible changes in diversity and composition of butterflies, grasshoppers and dragonflies in Belgium under increasingly severe climate change scenarios for the year 2100. Two species distribution modelling techniques (Generalised Linear Models and Generalised Additive Models), were combined via a conservative version of the ensemble forecasting strategy to predict present-day and future species distributions, considering the species as potentially present only if both modelling techniques made such a prediction. All models applied were fair to good, according to the AUC (area under the curve of the receiver operating characteristic plot), sensitivity and specificity model performance measures based on model evaluation data. Butterfly and grasshopper diversity were predicted to decrease significantly in all scenarios and species-rich locations were predicted to move towards higher altitudes. Dragonfly diversity was predicted to decrease significantly in all scenarios, but dragonfly-rich locations were predicted to move upwards only in the less severe scenarios. The largest turnover rates were predicted to occur at higher altitudes for butterflies and grasshoppers, but at intermediate altitudes for dragonflies. Our results highlight the challenge of building conservation strategies under climate change, because the changes in the sites important for different groups will not overlap, increasing the area needed for protection. We advocate that possible conservation and policy measures to mitigate the potentially strong impacts of climate change on insect diversity in Belgium should be much more pro-active and flexible than is the case presently." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: [geert.deknijf@inbo.be](mailto:geert.deknijf@inbo.be)

**9524.** Malkmus, R.; Weihrauch, F. (2010): Verbreitung und Phänologie von *Sympetrum nigrifemur* auf den Ma-

karonesischen Inseln (Odonata: Libellulidae). *Libellula* 29(1/2): 91-106. (in English, with German summary) ["12 new records of *S. nigrifemur*, taken during October 2008 in Madeira, are presented. These are included in a compilation of all available record of this species, published and unpublished, from the Macaronesian Islands. Altogether 220 dated records have been investigated that originate from three Macaronesian archipelagoes - Madeira, Ilhas Selvagens and Canary Islands - and are distributed on nine islands: Madeira (86 records), La Gomera (73), Tenerife (37), Gran Canaria (10), La Palma (7), Selvagem Grande (3), Ilhas Desertas (3; Deserta Grande, 2, & Ilheu Chao, 1) and Lanzarote (1). Autochthony of *S. nigrifemur* can be assumed in Madeira, La Palma, Tenerife, La Gomera and Gran Canaria. Seen vertically, records were taken from sea level to 1,600 m, and breeding sites were recorded from sea level up to 1,300 m. Adult *S. nigrifemur* are on the wing throughout the year. Larval records were taken in February, April, August and October. Emergence was recorded in April and May as well as in August, September and October. Oviposition was seen in the winter months from November until March and in July, and old individuals were explicitly noted only from early March to late April. In our eyes the most likely phenological scenario is a bivoltine development with a rapid larval summer generation." (Authors)] Address: Malkmus, R., Schulstr. 4, D-97859 Wiesthal, Germany

**9525.** Marr, B. (2010): Odonata of the Robert Thorson Brown Nature Sanctuary. *Argia* 22(3): 19. (in English) [Houghton County, Michigan, USA; 18 Odonata species were recorded in 2009-2010 in this fen.] Address: Marr, B. E-mail: [rmarr@mtu.edu](mailto:rmarr@mtu.edu)

**9526.** Martens, A.; Richter, O.; Suhling, F. (2010): The relevance of perennial springs for regional biodiversity and conservation. In: Schmiedel, U. & Jürgens, N. [Eds.]: *Biodiversity in southern Africa. Volume 2: Patterns and processes at regional scale.* Klaus Hess Publishers, Göttingen & Windhoek: 70-74. (in English) ["Natural perennial surface water in the interior parts of Namibia only occurs at widely separated springs around mountains. These waters host a very diverse and unique Odonata assemblage, which is threatened due to the habitat restriction of several species, as well as by recent habitat loss and degradation. Species occurring permanently at these waters, including *Crocothemis sanguinolenta*, *Orthetrum julia*, and *Trithemis stictica* differ significantly in seasonality, dispersal and life cycle characteristics from species colonising temporary waters. Their larvae grow slowly and they are present in these habitats as larvae throughout the year. This presence is the key factor why invaders with rapid development, which are dominant elsewhere, do not outcompete these species in these unique habitats. There is significant potential for stream dragonfly species to act as indicators for threatened freshwater wetlands in arid Namibia and they may also serve as an indication of the sustainable use of water resources, including the evaluation of measures to rehabilitate environments." (Authors)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: [andreas.martens@ph-karlsruhe.de](mailto:andreas.martens@ph-karlsruhe.de)

**9527.** Matsushita, M. (2010): Torahiko Terada (1878–1935): Father of the science of complex systems. *Evolutionary and Institutional Economics Review* 6(2): 337-340. (in English) ["I do not remember when I first heard the name of Torahiko Terada. But I still have a strong

impression of being a middle school student and reading his essay entitled "Tombo" ("Dragonflies") in my Japanese language textbook. Starting from the behaviour of a dragonfly resting on a hat, he observed many dragonflies staying on electric power lines and performed a statistical analysis about their orientation." (Author)] Address: Matsushita, M., Dept of Physics, Chuo University, Kasuga, Bunkyo-ku, Tokyo 112-8551, Japan. E-mail: matusita@phys.chuo-u.ac.jp

**9528.** Mayumi, Y.; Isamu, O. (2010): A decrease in endemic odonates in the Ogasawara Islands, Japan. In: Kawakami, K. and I. Okochi (eds): Restoring the Oceanic Island Ecosystem. Impact and Management of Invasive Alien Species in the Bonin Islands: 139-144. (in English) ["There are many endemic species in the Japanese Ogasawara Islands. However, many of these endemic species are likely to disappear as a result of reduction of habitat and the introduction of exotic species. Odonates are included within this category of species at risk. If the decrease in endemic odonates is due to a decrease in aquatic habitat, we have only to provide artificial ponds to conserve these species. In this study, we provided artificial ponds as a habitat for odonates in Chichi-jima and Ani-jima, Ogasawara Islands. We then examined the possibility of protection and enhancement of odonate populations. Endemic odonates were found in the natural ponds of Ani-jima and Ototo-jima. In Ani-jima, they could be collected both in the artificial and natural ponds. The artificial pond could provide habitat for endemic odonates. However, in Chichi-jima, few odonates could be collected both in the artificial and natural ponds. Here, invasive species, such as *Gambusia affinis* and *Anolis carolinensis*, are found, which considered to prey upon odonate larvae and adults. Extermination of invasive species may be necessary to conserve the endemic odonates in Chichi-jima. Reprinted from Yoshimura M, Okochi I (2005) Bulletin of FFPRI 4:45-51, with permission of FFPRI." (Authors)] Address: Mayumi, Y., Kansai Research Center, Forestry and Forest Products Research Institute (FFPRI), 68 Nagaikyutaro, Momoyama, Fushimi Kyoto, 612-0855, Japan. E-mail: yoshi887@ffpri.affrc.go.jp

**9529.** Meurgey, F. (2010): 2010 collecting trip to St. Vincent (Lesser Antilles). *Argia* 22(3): 10-12. (in English) [35 locations were sampled and 7 Odonata species were recorded as follows: *Argia telesfordi*, *Ischnura ramburii*, *Anax amazili*, *Dythemis multipunctata*, *Erythrodiplax fusca*, *Erythrodiplax umbrata*, *Orthemis sulphurata*, and *Pantala favescens*.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**9530.** Meusemann, K.; von Reumont, B.M.; Simon, S.; Roeding, F.; Strauss, S.; Kück, P.; Ebersberger, I.; Walz, M.; Pass, G.; Breuers, S.; Achter, V.; von Haeseler, A.; Burmester, T.; Hadrys, H.; Wägele, W.; Misof, B. (2010): A phylogenomic approach to resolve the arthropod tree of life. *Molecular Biology and Evolution* 27 (11): 2451-2464 (in English) ["Arthropods were the first animals to conquer land and air. They encompass more than three quarters of all described living species. This extraordinary evolutionary success is based on an astoundingly wide array of highly adaptive body organizations. A lack of robustly resolved phylogenetic relationships, however, currently impedes the reliable reconstruction of the underlying evolutionary processes. Here, we show that phylogenomic data can substantial-

ly advance our understanding of arthropod evolution and resolve several conflicts among existing hypotheses. We assembled a data set of 233 taxa (including Odonata) and 775 genes from which an optimally informative data set of 117 taxa and 129 genes was finally selected using new heuristics and compared to the unreduced data set. We included novel EST data for eleven species and all published phylogenomic data augmented by recently published EST data on taxonomically important arthropod taxa. This thorough sampling reduces the chance of obtaining spurious results due to stochastic effects of undersampling taxa and genes. Orthology prediction of genes, alignment masking tools, and selection of most informative genes due to a balanced taxa-gene ratio using new heuristics were established. Our optimized data set robustly resolves major arthropod relationships. We received strong support for a sister group relationship of onychophorans and euarthropods, and strong support for a close association of tardigrades and cycloneuralia. Within pancrustaceans, our analyses yielded paraphyletic crustaceans and monophyletic hexapods, and robustly resolved monophyletic endopterygote insects. However, our analyses also showed for few deep splits that were recently thought to be resolved, for example the position of myriapods, a remarkable sensitivity to methods of analyses." (Authors)] Address: Misof, B., Biozentrum Grindel & Zoologisches Museum, Martin-Luther-King Platz 3, 20146 Hamburg, Germany. E-mail: bernhard.misof@uni-hamburg.de

**9531.** Munguia-Steyer, R.; Cordoba-Aguilar, A.; Romo-Beltran, A. (2010): Do individuals in better condition survive for longer? Field survival estimates according to male alternative reproductive tactics and sex. *Journal of Evolutionary Biology* 23(1): 175-184. (in English) ["There is a gap in terms of the supposed survival differences recorded in the field according to individual condition. This is partly due to our inability to assess survival in the wild. Here we applied modern statistical techniques to field-gathered data in two damselfly species whose males practice alternative reproductive tactics (ARTs) and whose indicators of condition in both sexes are known. In *Paraphlebia zoe*, there are two ART: a larger black-winged (BW) male which defends mating territories and a smaller hyaline-winged (HW) male that usually acts as a satellite. In this species, condition in both morphs is correlated with body size. In *Calopteryx haemorrhoidalis*, males follow tactics according to their condition with males in better condition practicing a territorial ART. In addition, in this species, condition correlates positively with wing pigmentation in both sexes. Our prediction for both species was that males practicing the territorial tactic will survive less longer than males using a nonterritorial tactic, and larger or more pigmented animals will survive for longer. In *P. zoe*, BW males survived less than females but did not differ from HW males, and not necessarily larger individuals survived for longer. In fact, size affected survival but only when group identity was analysed, showing a positive relationship in females and a slightly negative relationship in both male morphs. For *C. haemorrhoidalis*, survival was larger for more pigmented males and females, but size was not a good survival predictor. Our results partially confirm assumptions based on the maintenance of ARTs. Our results also indicate that female pigmentation, correlates with a fitness component – survival – as proposed by recent sexual selection ideas applied to females." (Authors)] Address: Córdoba-



Aguilar, A., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Coyoacán, Mexico. E-mail: acordoba@ecologia.unam.mx

**9532.** Murphy, J.T.; Hu, H. (2010): An experimental study of a bio-inspired corrugated airfoil for micro air vehicle applications. *Experiments in Fluids* 49(2): 531-546 (in English) ["An experimental study was conducted to investigate the aerodynamic characteristics of a bioinspired corrugated airfoil compared with a smooth-surfaced airfoil and a flat plate at the chord Reynolds number of  $Re_C = 58,000-125,000$  to explore the potential applications of such bio-inspired corrugated airfoils for micro air vehicle designs. In addition to measuring the aerodynamic lift and drag forces acting on the tested airfoils, a digital particle image velocimetry system was used to conduct detailed flowfield measurements to quantify the transient behavior of vortex and turbulent flow structures around the airfoils. The measurement result revealed clearly that the corrugated airfoil has better performance over the smooth-surfaced airfoil and the flat plate in providing higher lift and preventing large-scale flow separation and airfoil stall at low Reynolds numbers ( $Re_C < 100,000$ ). While aerodynamic performance of the smooth-surfaced airfoil and the flat plate would vary considerably with the changing of the chord Reynolds numbers, the aerodynamic performance of the corrugated airfoil was found to be almost insensitive to the Reynolds numbers. The detailed flow field measurements were correlated with the aerodynamic force measurement data to elucidate underlying physics to improve our understanding about how and why the corrugation feature found in dragonfly wings holds aerodynamic advantages for low Reynolds number flight applications." (Authors) The paper includes references to Odonata] Address: Hu, H., Dept of Aerospace Engineering, Iowa State University, Ames, IA 50011, USA. E-mail: huhui@iastate.edu

**9533.** Neiss, U.G.; Hamada, N. (2010): The larva of *Perilestes attenuatus* Selys, 1886 (Odonata: Perilestidae) from Amazonas, Brazil. *Zootaxa* 2614: 53-58. (in English, with Portuguese summary) ["The larva of *P. attenuatus* is described and illustrated based on exuviae of reared larvae and last-instar larvae collected in Manaus, Amazonas state, Brazil. The larva of *P. attenuatus* can be distinguished from that of *P. fragilis*, the only other species of which the larva has been described, by the presence of a pair of tubercles on the ligula and by the arrangement of the spines and hooks on the abdominal segments." (Authors)] Address: Neiss, U.G., Inst. Nacional de Pesquisas da Amazônia/INPA, Coordenação de Pesquisas em Entomologia/CPEN, Caixa Postal 478, CEP 69011-970, Manaus, AM, Brazil. E-mail: ulisses.neiss@gmail.com

**9534.** Nel, A.; Huang, D.-y. (2010): A new Mesozoic Chinese genus of aeshnopteran dragonflies (Odonata: Anisoptera: Progobiaeshnidae). *Comptes Rendus Palevol.* 9(4): 141-145. (in English, with French summary) ["*Mongoliaeschna sinica* gen. et sp. n., third record of the Mesozoic aeshnopteran family Progobiaeshnidae is described from the Lower Cretaceous of Yixian Formation in Liutiagou (Ningcheng County, Inner Mongolia, China)." (Authors)] Address: Huang, D.-y., State Key Laboratory of Palaeobiology & Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, P.R. China. E-mail: mail: huangdiyong@sina.com

**9535.** Norma-Rashid, Y. (2010): Dragonflies (Odonata) of Bachok Coast, Kelantan and promoting common names. *Malaysian Journal of Science* 29 (Special Issue): 73-79. (in English, with Malaysian summary) ["A brief study of odonates in the coastal area of Bachok, Kelantan found 16 species, belonging to two families Coenagrionidae (made up 25 % of the population) and Libellulidae (75 %). The common names used here are accepted internationally for cosmopolitan species, while others are coined to reflect local descriptions. *Crocothemis servilia* was most predominant followed by *Agrionemis femina* while the rest of the species occurred in moderate numbers. Population numbers were biased towards males rather than females which was reflective of male tendency to exploit water as a reproductive strategy in acquiring mates." (Author)] Address: Norma-Rashid, Y., Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur. E-mail: ynorma@um.edu.my

**9536.** Novelo-Gutiérrez, R. (2010): The larva of *Apanisagrion lais* (Brauer in Selys) (Zygoptera: Coenagrionidae). *Odonatologica* 39(3): 259-264. (in English) ["The larva is described and illustrated, based on material from Mexico. It is characterized by having 5+2 or 5+3 premental setae, 7 palpal setae, abdomen granular, caudal lamellae apically widened, female gonapophyses exceeding sternite 10, and male cerci sharply pointed." (Author)] Address: Novelo-Gutiérrez, R., Instituto de Ecología, A.C., Apartado Postal 63, MX-91070 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**9537.** O'Brien, M. (2010): *Arigomphus submedianus* (Odonata: Gomphidae) to be removed from the Michigan list of Odonata. *Argia* 22(3): 16-17. (in English) ["It was based solely on Hagen's 1885 paper on nymphal forms of Odonata. That record (under "*Gomphus pallidus*") is from a nymph in alcohol supposedly collected in Detroit, Michigan, 6 June 1879, by H.G. Hubbard. Hagen states that the various nymphal specimens he listed represent "four different moults." Given the status of knowledge of Gomphid nymphs at the time, and subsequent work on the group, I would say that common sense dictates that the Hagen "record" which has been propagated throughout the literature (and in the Byers [1927] and Kormondy [1958] Michigan lists), and has been a questionable record by the Michigan Odonata Survey (1997), be stricken from the Michigan list. With all the collecting that has taken place over the last 100 years, and not a single *Arigomphus submedianus* caught in Michigan, it's plain to me that the record is an error. To believe that a casual collector caught this in the Detroit area, far from any typical habitat and based on a larval specimen when the taxonomy of the larvae was imprecise at best, flies in the face of scientific scrutiny. Hagen may have been the father of North American Odonatology, but like any scientist, he was not perfect. It's time to be rid of this mistake that keeps getting propagated in the literature."] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

**9538.** Ott, J.; Samways, M.J. (2010): Effects of climatic changes on Odonata: Are the impacts likely to be the same in the northern and southern hemispheres? In: Josef Settele, Lyubomir Penev, Teodor Georgiev, Ralf Grabau, Vesna Grobelnik, Volker Hammen, Stefan Klotz, Mladen Kotarac & Ingolf Kuehn (Eds): Atlas of

Biodiversity Risk. Pensoft Publishers, Sofia + Moscow. ISBN 978-954-642-446-4: 84-85. (in English) ["In both the northern and southern hemispheres, the species most at risk are those of sensitive habitats – such as moorland and montane species, as well as species requiring stable environmental conditions (e.g., water level). Species with small populations and a patchy distribution or isolated populations within these groups are even more threatened." (Authors)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**9539.** Outomuro, D.; Torralba-Burrial, A.; Ocharan, F.J. (2010): Distribution of the Iberian Calopteryx damselflies and its relation with bioclimatic belts: Evolutionary and biogeographic implications. *Journal of Insect Science* 10(61): 16 pp. (in English) ["Using bioclimatic belts as habitat and distribution predictors, the present study examines the implications of the potential distributions of the three Iberian Calopteryx-taxa, with the aim of investigating the possible consequences in specific interactions among the species from a sexual selection perspective and of discussing biogeographical patterns. To obtain the known distributions, the literature on this genus was reviewed, relating the resulting distributions to bioclimatic belts. Specific patterns related to bioclimatic belts were clearly observed in the Mediterranean region. The potential distribution maps and relative frequencies might involve latitudinal differences in relative abundances, *C. virgo meridionalis* being the most abundant species in the Eurosiberian region, *C. xanthostoma* in the northern half of the Mediterranean region and *C. haemorrhoidalis* in the rest of this region. These differences might explain some previously described latitudinal differences in secondary sexual traits in the three species. Changes in relative abundances may modulate interactions among these species in terms of sexual selection and may produce sexual character displacement in this genus. *C. v. meridionalis* distribution and ecological requirements explain its paleobiogeography as a species which took refuge in Iberia during the Würm glaciation. Finally, possible consequences in species distributions and interactions are discussed within a global climate change context." (Authors)] Address: Outomuro, D., Depto de Biología de Organismos y Sistemas, Univ. de Oviedo, Oviedo, E-33071, Spain. E-mail: aoutomuro.david@gmail.com

**9540.** Padgett, D.J.; Carboni, J.J.; Schepis, D.J. (2010): The dietary composition of *Chrysemys picta picta* (Eastern Painted Turtles) with special reference to the seeds of aquatic macrophytes. *Northeastern Naturalist* 17(2): 305-312. (in English) ["Animals facilitate macrophyte seed dispersal in various ways despite specializations of macrophytes for water dispersal. Previous diet analyses of freshwater aquatic turtles revealed that several North American turtle species consume a variety and abundance of seeds among other plant material and animal prey. We quantified the dietary habits of *C. picta picta* in a Massachusetts lake to examine if these animals included hydrophyte seeds in their diet and evaluate their capacity as passive seed-dispersal agents. Fifty-four turtles were trapped and housed to collect feces. Examination of feces revealed a diverse diet with comparatively high frequencies of animal, plant, and algal matter. 857 seeds of at least nine plant species were egested (among 87% of turtles), with all but five (99%) seeds visibly intact. Seeds of *Nuphar* (473) and *Decodon* (305) were most abun-

dant in the feces. Life-history characteristics of both *C. p. picta* and *Nuphar* suggest an effective endozoochorous seed dispersal association. [...] The most frequent animal prey were dipteran larvae (mostly ceratopogonid midges) and odonate larvae (mostly libellulid dragonflies), egested by 83% and 60% of the turtles, respectively." (Authors)] Address: Padgett, D.J., Dept of Biological Sciences, Bridgewater State College, Bridgewater, MA 02325, USA. E-Mail: dpadgett@bridgew.edu.

**9541.** Paillat, R. (2010): Les libellules (Odonata) de l'étang de la Benette, à Senonches. *La Garzette d'Eure-et-Loir Nature* 94: 9-12. (in French) [Département Eure-et-Loir, France; in 2009, 21 odonate species were recorded. Four of these species are listed due to regional faunistic importance: *Lestes sponsa*, *Aeshna grandis*, *Cordulegaster boltonii*, and *Boyeria irene*.] Address: not stated.

**9542.** Palacino, F.R.; Millan, C.A. (2010): First records of possible migratory dragonflies in Colombia. *Argia* 22 (3): 9-10. (in English) ["We recently observed more than 3 km of the center of Yopal (Casanare) covered by "clouds" of dragonflies travelling in a west-east direction, between 6:30 and 9:00 in the morning. The event occurred on a cloudy day with a temperature of 24°C. Within the swarm, tandem pairs of *Erythrodiplax umbrata* were collected, a species with great dispersion capacity, but for which migratory behaviour has not yet been recorded here. Aggregations of thousands of individuals of *E. umbrata* have been seen travelling in Texas (USA) and Veracruz (Mexico) but its flight path has not been determined (Paulson, pers. comm.). Several visual records include the movements of swarms of *Miathyria marcella* and *Pantala flavescens* in bogs and other habitats along the Atlantic coast (pers. obs.)."] Address: Palacino F.R., Universidad Nacional de Colombia, A.A. 7495, Bogotá-Colombia. E-mail: fpalacino@unal.edu.co

**9543.** Paulson, D. (2010): Book Review: *Dragonflies & Damselflies: Model Organisms for Ecological and Evolutionary Research*. Edited by A. Córdoba-Aguilar. Oxford: Oxford University Press (2010). Pp. xii, 290. Price \$59.95. paperback. *Animal Behaviour* 80: 345-346. (in English) [book review] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**9544.** Petrin, Z.; Schilling, E.G.; Loftin, C.S.; Johanson, F. (2010): Predators shape distribution and promote diversification of morphological defenses in *Leucorrhinia*, Odonata. *Evolutionary Ecology* 24(5): 1003-1016. (in English) ["Predators strongly influence species assemblages and shape morphological defenses of prey. Interestingly, adaptations that constitute effective defenses against one type of predator may render the prey susceptible to other types of predators. Hence, prey may evolve different strategies to escape predation, which may facilitate adaptive radiation of prey organisms. Larvae of different species in the dragonfly genus *Leucorrhinia* have various morphological defenses. We studied the distribution of these larvae in relation to the presence of predatory fish. In addition, we examined the variation in morphological defenses within species with respect to the occurrence of fish. We found that well-defended species, those with more and longer spines, were more closely associated with habitats inhabited by predatory fish and that species with weakly developed morphological defenses were

more abundant in habitats without fish. The species predominantly connected to lakes with or without fish, respectively, were not restricted to a single clade in the phylogeny of the genus. Our data is suggestive of phenotypic plasticity in morphological defense in three of the studied species since these species showed longer spines in lakes with fish. We suggest that adaptive phenotypic plasticity may have broadened the range of habitats accessible to *Leucorrhinia*. It may have facilitated colonization of new habitats with different types of predators, and ultimately, speciation through adaptive radiation." (Authors)] Address: Johansson, F., Dept of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**9545.** Piersanti, S.; Rebor, M.; Gaino, E. (2010): A scanning electron microscope study of the antennal sensilla in adult Zygoptera. *Odonatologica* 39(3): 235-241 (in English) ["Scanning electron microscope studies of the antennal flagella of *Coenagrion puella* and *Ischnura elegans* (Coenagrionidae), *Platycnemis pennipes* (Platycnemididae), *Lestes barbarus*, *L. viridis* (Lestidae), *Calopteryx virgo* and *C. haemorrhoidalis* (Calopterygidae) reveal the presence of pits containing sensilla on the latero-ventral side of the antenna. All these pits are the opening of deep cavities bearing the same sensilla previously described on Anisoptera antennae. These sensilla are represented by: (i) coeloconic porous sensilla, visible on the antennal surface, whose structure is in agreement with that reported for single walled olfactory receptors, and by (ii) two types of sensilla styloconica (type-1 and type-2), located at the bottom of the cavities and sharing common features typical of thermo-hygroreceptors. The present data allow us to extend previous considerations on the sensory role of the dragonfly antennae to the whole order Odonata, suggesting that olfaction, together with the ability to perceive temperature and humidity, are the main sensory functions of the antennae of these insects." (Authors)] Address: Rebor, Manuela, Dipartimento di Biologia Cellulare e Ambientale, Università di Perugia, 06123 Perugia, Italy. E-mail: rebor@unipg.it

**9546.** Polacik, M.; Reichard, M. (2010): Diet overlap among three sympatric African annual killifish species *Nothobranchius* spp. from Mozambique. *J. Fish Biol.* 77 (3): 754-768. (in English) ["The diet patterns of three *Nothobranchius* species (*N. furzeri*, *N. orthonotus* and *N. rachovii*), small, short-lived annual killifish from temporary pools in African savannah were investigated. Four sites with contrasting fish density and water surface area were sampled in 2008 and 2009 in southern Mozambique. Stomach content analysis showed that all the species examined were generalists, with diets largely based on aquatic invertebrates. The same invertebrate prey categories were consumed by all three species, but their relative proportions varied across species. The largest species, *N. orthonotus*, showed the most distinct diet and consumed vertebrates (juvenile lungfish *Protopterus annectens* and larval Amphibia) and a relatively high proportion of Odonata, Coleoptera and Ephemeroptera larvae. The diet of the other two species (*N. furzeri* and *N. rachovii*) showed a stronger overlap, did not include vertebrates, but was rich in small crustaceans (Cladocera, Copepoda, Ostracoda and Conchostraca). Mosquito (Diptera) larvae formed only a negligible part of the diet of all the three species." (Authors)] Address: Polacik, M., Institute of Vertebrate

Biology, Academy of Sciences of the Czech Republic, Kvetná 8, 603 65 Brno, Czech Republic. E-mail: polacik@ivb.cz

**9547.** Raebel, E.M.; Merckx, T.; Riordan, P.; Macdonald, D.W.; Thompson, D.J. (2010): The dragonfly delusion: why it is essential to sample exuviae to avoid biased surveys. *Journal of Insect Conservation* 14(5): 523-533. ["Odonate populations and species numbers are declining globally. Successful conservation requires sound assessments of both odonate distributions and habitat requirements. Odonates have aquatic (larval) and terrestrial (adult) stages, but most surveys that are used to inform conservation managers are undertaken of the adult stage. This study investigates whether this bias towards adult records in odonate recording is misinterpreting the environmental quality of sites. The habitat focus is farmland ponds, a key feature of agricultural landscapes. We tested whether or not, adult, larval and exuvial surveys lead to similar conclusions on species richness and hence on pond quality. Results showed that pond surveys based upon larvae and exuviae are equally suitable for the reliable assessment of presence/absence of odonates, but that adult surveys are not interchangeable with surveys of larvae/exuviae. Larvae were also found at ponds with no emerging individuals due to changes in habitat quality, therefore presence of exuviae remains the only proof of life-cycle completion at a site. Ovipositing females were recorded at all ponds where exuviae were totally absent hence adult surveys over-estimate pond quality and low-quality ponds are functioning as ecological traps. Highly mobile and generalist species were recorded at more locations than other species. Adult surveys also bias recording towards genera, species and populations with non-territorial mate-location strategies. Odonate biodiversity monitoring would benefit from applying the best survey method (exuviae) to avoid wasting valuable financial resources while providing unbiased data, necessary to achieve conservation objectives." (Authors)] Address: Raebel, Eva M., Wildlife Conservation Research Unit, The Recanati-Kaplan Centre, Department of Zoology, University of Oxford, Tubney House, Abingdon Road, Tubney, Abingdon, OX13 5QL, UK. E-mail: eva.raebel@zoo.ox.ac.uk

**9548.** Rantala, M.J.; Honkavaara, J.; Suhonen, J. (2010): Immune system activation interacts with territory-holding potential and increases predation of the damselfly *Calopteryx splendens* by birds. *Oecologia* 163: 825-832. (in English) ["Activation of the immune system in insects has been shown to be costly in the laboratory setting, but experimental studies in the field are lacking. The costs of immunity in the wild may be different to those in the laboratory because animals in the wild are simultaneously subjected to a suite of selective agents. We have measured the costs of immune system activation in a wild population of the territorial damselfly *Calopteryx splendens*. Immune-challenged males were found to be less likely to be territorial and had lower overall survival rates than control or sham-manipulated males. Because territorial males have a higher mating success than nonterritorial males, this result suggests that immune-challenged males are also likely to suffer reduced mating success. However, the activation of the immune system as such did not increase predation risk; this occurred due to a combination of the former with a reduced territory-holding potential. As such, immune-challenged males not holding a



territory were most susceptible to predation by birds. The size of the wing spots, a known sexually selected male trait, predicted territorial behaviour in control and sham-manipulated males, but not in immune-challenged males. Our data show that immune system activation can have several costs acting in unison and that ubiquitous ecological interactions, such as predation, may affect trade-offs between immunity and other life history traits."(Authors)] Address: Rantala, M.J., Dept of Biology, University of Turku, FIN-20024 Turku, Finland. E-mail: markus.rantala@utu.fi

**9549.** Reithäusler, M.; Martens, A. (2010): Der Anteil gebänderter Larven von *Anax imperator* in einem Gartenteich im November (Odonata: Aeshnidae). *Libellula* 29(1/2): 21-28. (in German, with English summary) ["In November 2009, from a garden pond in Karlsruhe, Germany, 203 larvae of *A. imperator* were sampled. Their size varied from very small stadia (head width 2.1 mm) to those in the ultimate larval stadium before emergence (maximum head width 9.7 mm). Apart from larvae with sharp transversely white bands and those with a greenish ochreous mottled body, we defined two intermediate forms: (1) banded larvae with less contrast in their colouration, the dark areas not uniformly dark, and (2) larvae with only one broad transversal stripe on the basis of the abdomen. Up to 3.3 mm head width all larvae were banded, from 5.3 mm head width onwards all larvae were not banded. Within the transition zone the proportion of banded larvae was decreasing." (Authors)] Address: Reithäusler, M., Leipziger Str. 3, D-76646 Bruchsal, Germany. E-mail: michael.reithaeusler@gmx.net

**9550.** Richardson, J.S.; Zhang, Y.; Marczak, L.B. (2010): Resource subsidies across the land-freshwater interface and responses in recipient communities. *River Research and Applications* 26: 55-66. (in English) ["Fluxes of resource subsidies, such as terrestrial leaf litter to streams and adult aquatic insects to riparian predators, are examples of important links between adjacent ecosystems. The importance of these cross-ecosystem resource flows from donor systems to recipient consumers is increasingly recognized. Streams, especially small streams with their high edge ratio with the terrestrial system, provide excellent models for the study of subsidies and a large portion of this literature has been produced by aquatic scientists. Field experiments manipulating flows between small streams and their riparian areas (e.g. leaf litter, terrestrial invertebrates, and adult aquatic insects to riparian areas) have indicated that consumers in streams and riparian areas are highly dependent upon such subsidies and the value of the subsidies are further modified by patterns of retention and pathways of use. Experiments typically indicate rapid growth or demographic responses by consumers, indicating these populations are resource limited or at levels of incipient population limitation, and can capitalize on short-term resource pulses. More press manipulations are still necessary to determine the dynamical consequences of subsidies for recipient communities. The nature of the subsidy (e.g. species of litter or invertebrates) and its timing are also important details that need further study. Finally, there are opportunities to consider the evolution of life cycle timing (modelling), interception strategies by recipient populations and short-term and long-term responses of communities. [...] Linkages at the community level: Knight et al. (2005) demonstrated that the presence of predacious

fish in aquatic systems could lead to a trophic cascade in adjacent riparian ecosystems by suppressing the numbers of adult dragonflies. The numbers of dragonfly larvae can be suppressed directly through fish predation or indirectly through behavioural modifications resulting in fewer dragonfly adults. Such fish predation on dragonfly larvae indirectly facilitates terrestrial vegetation reproduction, because insect pollinators were released from the predation pressure of dragonfly adults. Hence, the numbers of pollinators were higher in riparian zones of fish-bearing ponds, where plants received more pollinator visits than plants near fish-free ponds (Knight et al., 2005). Similarly, Ngai and Srivastava (2006) demonstrated that aquatic communities in epiphytic bromeliads containing damselflies had lower rates of emergence of adults of detritivorous insects (chironomids, tipulids, scirtids). As a consequence of a difference in communities the type and rates of subsidies to the terrestrial environment constrained by the presence or absence of predators in the aquatic system. These examples indicate that strong biotic interactions between species can reverberate across ecosystem boundaries through consumer flows." (Authors)] Address: Richardson, J.S., Dept of Forest Sciences, University of British Columbia, Vancouver, V6T 1Z4 Canada. E-mail: john.richardson@ubc.ca

**9551.** Riservato, E.; Grieco, C.; Pella, F.; Sindaco, R.; Pupin, F.; Saeed Suleiman, A.; Fasola, M. (2010): A contribution to the knowledge of the odonatofauna of the Socotra Archipelago (Yemen) (Insecta: Odonata). *Zoology in the Middle East* 50: 101-106. (in English) ["The odonatofauna of the Socotra Archipelago is reviewed on the basis of recently collected material and a literature survey. The occurrence of 17 out of the 18 known species from the main island was confirmed between 2007 and 2010, and information on their distribution patterns was obtained. New information on the species occurring on Abd El-Kuri and Samha islands is presented." (Author)] Address: Riservato, Elisa, Dipartimento di Biologia Animale, Università di Pavia, Piazza Botta 9, 27100 Pavia, Italy. E-mail: elisa.riservato@unipv.it

**9552.** Rodriguez-S., L.C. (2010): Dieta de *Anolis homolechis* (COPE, 1864) en el Jardín Botánico Nacional de Cuba. *Revista Colombiana de Ciencia Animal* 2(1): 147-152. (in Spanish) [The diet of 21 male and 19 female *Anolis homolechis* (Cope, 1864) (Reptilia) caught at 27-VI-1991 in the Jardín Botánico Nacional, La Habana, Cuba (23°00'01" N, 82°02'36" E) was studied. One each of 138 male and 267 female prey items belonged to "Odonata".] Address: Rodriguez-S., Lourdes, Instituto de Ecología y Sistemática. C. de Varona Km 3.5, Boyeros CP 10800, AP 8029, La Habana, Cuba. E-mail: zoologia.ies@ama.cu

**9553.** Santos, T.C.; Costa, J.M.; Carrico, C. (2010): A new species of *Neocordulia* Selys, 1882 (Odonata: Corduliidae) from Minas Gerais State, Brazil. *Biota Neotropica* 10(2): 89-91. (in English, with Portuguese summary) [*Neocordulia machadoi* sp. n. is described and illustrated based on a reared male, collected at Cachoeira da Eubiose stream, São Tomé das Letras, Minas Gerais State, Brazil. The holotype is deposited in the Museu Nacional, UFRJ, Rio de Janeiro, Brazil.] Address: Costa, Janira, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, 20940-040, Rio de Janeiro, RJ, Brazil. E-mail: jmcosta@globo.com

- 9554.** Schmidt, E.G. (2010): Adolf Portmann (1897-1982), ein Basler Zoologe von Weltrang: «Mit Libellen fing es an» (Odonata). *Libellula* 29(1/2): 127-141. ["A biographic outline and remarks on the work of the famous Swiss zoologist Adolf Portmann is given, with special reference to his dissertation (1921) on the Odonata of the surroundings of Basel, Switzerland. It comprised the starting point of "biological systematics" in the Odonata, which were later established generally, based on behaviour, by Konrad Lorenz. A popular book on social behaviour (1953) was introduced by a chapter on dragonflies, proving his lifelong love for these insects. He initiated the thesis of the Dutch Dirk C. Geijskes on the limnology of a mountain rivulet near Basel (1935), including a key stone factor analysis on the habitat preference of *Cordulegaster bidentata* and *C. boltonii*. Hence, Portmann is important for the history of odonatology in Central Europe during the first half of the 20th century." (Author)] Address: Schmidt, E.G., Coesfelder Straße 230, D-48249 Dülmen, Germany
- 9555.** Schneider, T.; Müller, O. (2010): Neue Funde von *Boyeria irene*, *Cordulegaster bidentata sicilica* und *C. trinacriae* in Kalabrien (Odonata: Aeshnidae, Cordulegasteridae). *Libellula* 29(1/2): 47-54. (in German, with English and Italian summaries) ["New sites for these species are presented from Calabria, Italy. Apart from one older single record, the findings of *B. irene* are the first from the Calabrian catchment area of the Ionian Sea. In addition, this is the closest known population to its sibling species *Boyeria cretensis*, a Cretan endemic. Furthermore, we report a new locality of *C. bidentata sicilica* in southern Calabria in the Aspromonte mountains." (Authors)] Address: Schneider, T., Arnold-Knoblauch-Ring 76, D-14109 Berin/Wannsee, Germany. E-mail: karin.thomas.schneider@gmx.de
- 9556.** Schouten, M.A.; Barendregt, A.; Verweij, P.A.; Kalkman, V.J.; Kleukers, V.; Lenders, H.J.R.; Siebel, H.N. (2010): Defining hotspots of characteristic species for multiple taxonomic groups in the Netherlands. *Biodivers. Conserv.* 19: 2517-2536. (in English) ["Biogeographical zonation based on single taxa poses major limitations on planning for nature conservation. This paper identifies biogeographical patterns of multiple taxa in the Netherlands, where no endemics are present at species level, on the basis of characteristic species. We used occurrence data on five species groups in order to identify spatially coherent, ecologically important regions. TWINSPAN was used to cluster grid squares according to similarity in species composition for each taxonomic group. Species that are characteristic of each of the clusters were identified using a preference index, and corresponding clusters among the taxonomic groups were identified with Kappa statistics. Regions containing characteristic species for several taxonomic groups were defined as 'hotspots'. Stepwise discriminant analysis was then used to characterize these hotspots according to differences in environmental conditions. The analysis yielded five regions that are clearly distinct in terms of species composition for individual taxonomic groups. Each region is characterized by a set of unique species that occur in the zonation of at least two of the taxonomic groups. Stepwise discriminant analysis revealed significant environmental differences among these regions. The concept of hotspots as operationalized in this study can make nature conservation planning more efficient. In combination, the hotspots defined here comprise the majority of the species occurring in the Netherlands for the studied groups. Therefore, this regionalization should be taken into account when prioritizing nature conservation efforts." (Authors) The study includes of hoverflies, herpetofauna, grasshoppers and crickets, dragonflies, and mosses.] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl
- 9557.** Schröter, A. (2010): The Odonata of Kyrgyzstan I. Critical national check list, annotated list of records and collected data of the summer half-years 2008 and 2009. *International Dragonfly Fund - Report 28*: 1-72. (in English) ["Based on the results of fieldwork and collecting in 2008 and 2009 and the evaluation of literature an updated national checklist of the Odonata of Kyrgyzstan is presented. The list comprises a total of 63 species, whereas 55 species were encountered in the field by the author, including five new for the country: *Aeshna serrata*, *Onychogomphus lefebvrei*, *Orthetrum sabina*, *Crocothemis servilia*, *Selysiothemis nigra*. 826 specimens of 49 species have been collected (dep. in coll. A. Schröter). All 55 species recorded in 2008 and 2009 are listed and annotated. Moreover, the unclear or controversial taxonomical status of several species is briefly debated. Interesting ecological observations include the emergence of *Libellula quadrimaculata* from running water and cleptoparasitism by *Ischnura forcipata* in spider webs." (Author)] Address: Schröter, A., Harustie 7F 79, 00980 Helsinki, Finland. Email: asmus-tim@gmx.de
- 9558.** Sciberras, A.; Sciberras, J.; Kunz, B. (2010): *Orthetrum nitidinerve* new to the Maltese Islands (Odonata: Libellulidae). *Libellula* 29(1/2): 55-60. (in English, with German summary) ["In July 2008 *O. nitidinerve* was observed and collected on the Maltese Islands. Records were taken in several localities. *O. nitidinerve* is new to the fauna of the Maltese Islands, which now includes 16 species of Odonata." (Authors)] Address: Sciberras, A., 1131 Arnest', Arcade Street, Paola, Malta. E-mail: bioislets@gmail.com
- 9559.** Shafroth, P.B.; Wilcox, A.C.; Hickey, L.J.T.; Andersen, D.C.; Beauchamp, V.B.; Hautzinger, A.; McMullen, L.E.; Warner, A. (2010): Ecosystem effects of environmental flows: modelling and experimental floods in a dryland river. *Freshwater Biology* 55: 68-85. (in English) ["1. Successful environmental flow prescriptions require an accurate understanding of the linkages among flow events, geomorphic processes and biotic responses. We describe models and results from experimental flow releases associated with an environmental flow program on the Bill Williams River (BWR), Arizona, in arid to semiarid western USA. 2. Two general approaches for improving knowledge and predictions of ecological responses to environmental flows are: (1) coupling physical system models to ecological responses and (2) clarifying empirical relationships between flow and ecological responses through implementation and monitoring of experimental flow releases. 3. We modelled the BWR physical system using: (1) a reservoir operations model to simulate reservoir releases and reservoir water levels and estimate flow through the river system under a range of scenarios, (2) one- and two-dimensional river hydraulics models to estimate stage-discharge relationships at the whole-river and local scales, respectively, and (3) a groundwater model to estimate surface- and groundwater interac-

tions in a large, alluvial valley on the BWR where surface flow is frequently absent. 4. An example of a coupled, hydrology-ecology model is the Ecosystems Function Model, which we used to link a one-dimensional hydraulic model with riparian tree seedling establishment requirements to produce spatially explicit predictions of seedling recruitment locations in a Geographic Information System. We also quantified the effects of small experimental floods on the differential mortality of native and exotic riparian trees, on beaver dam integrity and distribution, and on the dynamics of differentially flow-adapted benthic macroinvertebrate groups. 5. Results of model applications and experimental flow releases are contributing to adaptive flow management on the BWR and to the development of regional environmental flow standards. General themes that emerged from our work include the importance of response thresholds, which are commonly driven by geomorphic thresholds or mediated by geomorphic processes, and the importance of spatial and temporal variation in the effects of flows on ecosystems, which can result from factors such as longitudinal complexity and ecohydrological feedbacks. [...] While both Gomphidae and Ephemeroptera experienced flood-induced mortality, both groups rebounded in numbers after 2 weeks. We attribute the rapid return of gomphids to their ability to move back to the active stream channel, even when they were displaced into high flow channels that dried out postflood." (Authors)] Address: Shafroth, P.B., U.S. Geological Survey, Fort Collins Science Center, 2150 Centre Avenue, Building C, Fort Collins, CO 80526, USA. E-mail: shafrothp@usgs.gov

**9560.** Sherratt, T.N.; Laird, R.A.; Hassall, C.; Lowe, C.D.; Harvey, I.F.; Watts, P.C.; Cordero-Rivera, A.; Thompson, D.J. (2010): Empirical evidence of senescence in adult damselflies (Odonata: Zygoptera). *Journal of Animal Ecology* 79(5): 1034-1044. (in English) ["1. Age-dependent increases in mortality have been documented in a variety of species of insect under laboratory conditions. However, while strong statistical evidence has been presented for senescence in vertebrate populations in the wild, we know little about the rate and shape of senescence in wild populations of insects. 2. Odonates provide excellent candidate species for evaluating demographic senescence as they are large enough to be marked individually and they are easily re-sighted without recapture. The prevailing opinion – based entirely on qualitative examination of the declines in log numbers alive with time since marking – is that odonates exhibit age-independent daily survivorship. 3. Here, we examine mark-recapture data on *Coenagrion puella* over two consecutive seasons. For the first time, we evaluate and compare the fit of quantitative models that not only account for weather-dependent daily variation in daily re-sighting rates, but also age-dependent variation in daily survivorship. 4. Models with age-dependent declines in daily survivorship provide a more parsimonious explanation for the data than similar models without these age-dependent effects. In general, models in which mortality increases in an exponential (Gompertz) fashion explain the mark-recapture sequences more efficiently than a range of alternative models, including those in which mortality increases as a power function (Weibull) or reaches a plateau (logistic). These results are indicative of a general senescent decline in physiological functioning, which is particularly marked after 15 days as a mature adult. 5. Weather (temperature, sun and precipitation)

and initial mite load influenced the probability of daily re-sighting. Weather and mite load also influenced daily survivorship, but their effects differed between seasons. 6. Overall, fitting models with age as an explicit covariate demonstrates that odonates do indeed senesce. This contradicts previously held assumptions that Odonata do not exhibit age-dependent survivorship in the wild." (Authors)] Address: Sherratt, T.N., Dept of Biology, Carleton Univ., 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: sherratt@ccs.carleton.ca

**9561.** Siepielski, A.M.; Hung, L.L.; Bein, E.E.B.; McPeck, M.A. (2010): Experimental evidence for neutral community dynamics governing an insect assemblage. *Ecology* 91(3): 847-857. (in English) ["The high levels of species diversity observed within many biological communities are captivating, yet the mechanisms that may maintain such diversity remain elusive. Many of the phenotypic differences observed among species cause interspecific trade-offs that ultimately act to maintain diversity through niche-based coexistence. In contrast, neutral community theory argues that phenotypic differences among species do not contribute to maintaining species diversity because species are ecologically equivalent. Here we provide experimental and observational field evidence that two phylogenetically very distant *Enallagma* species appear to be ecologically equivalent to one another. Experimental abundance manipulations showed that each species gains no demographic advantage at low relative abundance, whereas manipulations of total *Enallagma* abundance resulted in large increases in per capita mortality and large decreases in growth for both species. Moreover, demographic rates and relative abundances of multiple *Enallagma* species were uncorrelated with major environmental gradients in an observational study of 20 natural lakes. These are the expected patterns if species are ecologically equivalent. However, these results do not imply that all damselflies in these lakes are ecologically identical. Previous experimental results have demonstrated the operation of strong coexistence mechanisms maintaining *Enallagma* and its sister-genus *Ischnura* in these littoral food webs. Combined with a simple theoretical model we present, these results taken together show how both neutral and niche dynamics can jointly structure communities." (Author)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**9562.** Simaika, J.P.; Samways, M.J. (2010): Large-scale estimators of threatened freshwater catchment species relative to practical conservation management. *Biological Conservation* 143(2): 311-320 (in English) ["Freshwater ecosystems are among the most threatened in the world. In light of the threats to freshwater biodiversity, it is essential to map the distribution and status of species to ascertain their threat status for prioritizing conservation action. However, while there is agreement that the conservation of freshwater ecosystems depends on whole-catchment management, there are still a wide variety of large-scale mapping methods in use, the advantages and disadvantages of which have not been fully explored. This study shows that area estimation based on minimum convex polygons should not be encouraged for aquatic species. The IUCN definition of area of occupancy (AOO) is a useful term, albeit highly scale-dependent, for assessment of the total approximate area over which a species occurs.



However, for aquatic fauna, and perhaps many other organisms, assessment of occurrence should be based on the more accurate point-locality presences only. The IUCN extent of occurrence (EOO), for freshwater catchment species, should be redefined as 'the sum of the smallest hydrological units identified, of presently known, inferred or projected occurrences of a taxon, excluding cases of vagrancy, that are used to estimate the threat to a taxon'. A single hydrological unit is also the conservation or management unit. Here we suggest that this unit is the quaternary catchment. This new mapping approach is more appropriate and practical for use in both management planning and conservation action. We suggest that conservation managers and decision makers facilitate co-operation in freshwater mapping efforts by working at the same spatial scale, i.e. the same hydrological unit." (Authors) The paper includes many references to Odonata.] Address: Samways, M.J., Dept Entomol. & Nematol, Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**9563.** Small, G.E.; Pringle, C.M. (2010): Deviation from strict homeostasis across multiple trophic levels in an invertebrate consumer assemblage exposed to high chronic phosphorus enrichment in a Neotropical stream. *Oecologia* 162(3): 581-590. (in English) ["A central tenet of ecological stoichiometry is that consumer elemental composition is relatively independent of food resource nutrient content. Although the P content of some invertebrate consumer taxa can increase as a consequence of P-enriched food resources, little is known about how ecosystem nutrient loading can affect the elemental composition of entire consumer assemblages. Here we examine the potential for P enrichment across invertebrate consumer assemblages in response to chronic high P loading. We measured elemental ratios in invertebrate consumers and basal food resources in a series of streams in lowland Costa Rica that range widely in P levels (2-135 µg l<sup>-1</sup> soluble reactive P). Streams with high P levels receive natural long-term (over millennia) inputs of solute-rich groundwater while low-P streams do not receive these solute-rich groundwater inputs. P content of leaf litter and epilithon increased fourfold across the natural P gradient, exceeding basal resource P content values reported in the literature from other nutrient-rich streams. Invertebrate consumers from the high-P study stream were elevated twofold in P content across multiple taxonomic and functional feeding groups, including predators. Our results strongly support the hypothesis that elevated P content in consumers feeding on P-enriched food resources is a consequence of deviation from strict homeostasis. In contrast to prior studies, we found that between-stream variation in P content of a given taxon greatly exceeded within-stream variation among different taxa, suggesting that environment may be as important as phylogeny in controlling consumer stoichiometry. Relaxing the assumption of strict homeostasis presents challenges and opportunities for advancing our understanding of how nutrient limitation affects consumer growth. Moreover, our findings may provide a window into the future of how chronic anthropogenic nutrient loading can alter stoichiometric relationships in food webs." (Authors) Taxa including Odonata are treated at the order or family-level.] Address: Small, G.E., Odum School of Ecology, University of Georgia, Athens, GA 30602, USA. E-mail: csmall@uga.edu

**9564.** Souza, L.O.; Costa, J.M.; Santos, T.C. (2010): Revalidation of *Acanthagrion cuyabae* (Odonata, Coenagrionidae) and description of the female, with a key to the Brazilian species of the *viridescens* group. *Iheringia, Sér. Zool.* 100(1): 79-83. (in English, with Portuguese summary) ["*Acanthagrion cuyabae* Calvert, 1909 was described based on a male from State of Mato Grosso, Brazil. The female of this species was described based on morphological characters of four individuals collected in copula from State of Mato Grosso do Sul, and three other specimens of same locality. *A. cuyabae* is here revalidated based on morphological characters of the female. Illustrated keys to the groups of *Acanthagrion* Selys, 1876 and species of the *viridescens* group occurring in Brazil are provided." (Authors)] Address: de Souza, L.O., Depto de Biologia/CCBS, Universidade Federal de Mato Grosso do Sul, Cidade Universitária s/n, 79070-900 Campo Grande, MS, Brazil. E-mail: irineudesouza@gmail.com

**9565.** Stannard, H.J.; Caton, W., Old, J.M. (2010): The diet of red-tailed phascogales in a trial translocation at Alice Springs Desert Park, Northern Territory, Australia. *Journal of Zoology* 280(4): 326-331. (in English) ["In this study, a dietary analysis was conducted to determine the preferred diet of the translocated phascogales in the park environment. Scats were collected during July–October, 2006 and January–March, 2007 from nesting sites within the park. [...] Scat analysis methods identified that red-tailed phascogales were primarily insectivorous with 92.6% of all scats containing arthropods. They are also opportunistic predators within the park, consuming birds (51.6%), small mammals (33.3%) and on occasion reptiles, and plant material (27.4%). Seasonal comparison of data through SIMPER analyses showed there was significant variation (P=0.009) between spring and summer, due to a large portion of birds present in the diet in spring." (Authors) The diet of the Red-tailed phascogales *Phascogales calura* (Mammalia) also includedes a *Zygoptera*.] Address: Old, Julie, Native & Pest Animal Unit, School of Natural Sciences, Univ. of Western Sydney, Hawkesbury Building M15, Locked Bag 1797, Penrith South DC 1797, NSW, Australia. E-mail: j.old@uws.edu.au

**9566.** Števo, B.; Bulánková, E. (2010): Macrozoobenthos of the middle part of the Vydrice stream – comparison after 50 and 25 years. *Folia faunistica Slovaca* 15(3): 19-24. (in Slovakian, with English summary) [Records of *Cordulegaster heros* from two localities along the the middle part of stream Vydrice in the Malé Karpaty Mts. (48°12'59,6"N 17°05'20,0" E; 48°12'57,5"N 17°05'27,6"E) are reported.] Address: Bulánková, Eva, Inst. of Ecology, Faculty of Natural Sciences, Comenius Univ., Mlynská dolina B-II, SK-84215 Bratislava., Slovakia. E-mail: Bulankova@fns.uniba.sk

**9567.** Stübing, S.; Roland, H.-J. (2010): Hinweise zum Auftreten der Südlichen Heidelibelle *Sympetrum meridionale* (Selys 1841) in Hessen und zu ihrer Bestimmung. *Libellen in Hessen* 3: 58-60. (in German) [Current records of *S. meridionale* in Hessen, Germany are compiled. Some critical remarks on identification of the species are made.] Address: Stübing, S., Im Feldchen 1a, D-61209 Echzell, Germany. E-mail: stefan.stuebing@gmx.de

**9568.** Suhling, F.; Samways, M.J.; Simaika, J.P.; Richter, O.; Marais, E.; Martens, A.; Kipping, J. (2010): Dragonfly diversity from the Cape to the Kavango. In:

Schmiedel, U. & Jürgens, N. [Eds.]: Biodiversity in southern Africa. Volume 2: Patterns and processes at regional scale. Klaus Hess Publishers, Göttingen & Windhoek: 64-69. (in English) ["Dragonflies are amongst the most well-studied and most recognised insects and there is an ongoing worldwide initiative in which the diversity and conservation status of all species are being assessed. In Africa, where about 900 species of Odonata occur, the southern part of the continent is currently the best surveyed for Odonata. In this chapter we analyse and depict biodiversity distribution patterns in the BIOTA transect area, from the Cape in the south to the Okavango River in the north, using Odonata databases for Botswana, Namibia and South Africa. We counted species numbers in each WWF Terrestrial Ecoregion and freshwater basin. Species numbers were highest in the Zambebian ecoregions followed by the Cape ecoregions, whereas the drier ecoregions had fewer species, except for a few outstanding localities. The proportions of range-restricted species were highest in the Cape and Zambebian ecoregions accounting for at least one third of the species, whereas all other ecoregions were almost exclusively populated by widespread species." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**9569.** Suhonen, J.; Hilli-Lukkarinen, M.; Korkeamäki, E.; Kuitunen, M.; Kullas, J.; Penttinen, J.; Salmela, J. (2010): Local extinction of dragonfly and damselfly populations in low- and high-quality habitat patches. *Conservation Biology* 24(4): 1148-1153. (in English, with Spanish summary) ["Understanding the risk of extinction of a single population is an important problem in both theoretical and applied ecology. Local extinction risk depends on several factors, including population size, demographic or environmental stochasticity, natural catastrophe, or the loss of genetic diversity. The probability of local extinction may also be higher in low-quality sink habitats than in high-quality source habitats. We tested this hypothesis by comparing local extinction rates of 15 species of Odonata between 1930-1975 and 1995-2003 in central Finland. Local extinction rates were higher in low-quality than in high-quality habitats. Nevertheless, for the three most common species there were no differences in extinction rates between low- and high-quality habitats. Our results suggest that a good understanding of habitat quality is crucial for the conservation of species in heterogeneous landscapes." (Authors)] Address: Suhonen, J., Department of Biological and Environmental Science, P.O. Box 35, FI-40014, University of Jyväskylä, Finland

**9570.** Suhonen, J.; Honkavaara, J.; Rantala, M.J. (2010): Activation of the immune system promotes insect dispersal in the wild. *Oecologia* 162(3): 541-547. (in English) ["Dispersal has important ecological and evolutionary consequences but is a poorly understood behaviour. We experimentally tested whether activation of the immune system affects dispersal in male damselflies, *Calopteryx virgo*, from three natural populations. We show that males that contained an experimentally inserted artificial pathogen, a nylon monofilament implant, had higher dispersal rates and flew further than control males, but not further than sham manipulated males. Our data suggest that dispersal may reduce the risk of further infections if immune system activation indicates high parasite infection risk in the present habitat. We, thus, suggest that parasites may play an impor-

tant role in the evolution of host dispersal." (Authors)] Address: Suhonen, J., Section of Ecology, Department of Biology, University of Turku, 20014 Turku, Finland. E-mail: juksuh@utu.fi

**9571.** Togashi, H.; Suzuki, T.; Urabe, J. (2010): Spatial variations in chironomid larvae and dragonfly predation in pools on a Japanese high mountain moor. *Verh. Int. Ver. Limnologie* 30(9): 1357-1362. (in English) ["Our study clearly showed a negative impact of dragon-flies, *Aeshna juncea* and *A. nigroflava*, on the abundance of chironomid larvae, due largely to the impact on *Alotanypus*, which dominated the chironomid communities in the Shibakusa-Daira pools. The abundance of this genus when dragonfly nymphs were added was significantly lower than that in their absence. The effect index of post-manipulation was negatively correlated with dragonfly biomass. Thus, regardless of the pool, an increase in *Aeshna* abundance consistently reduced *Alotanypus* abundance. However, in the 3 other genera - *Tanytarsus*, *Procladius*, and *Chironomus* - no significant difference was detected between the effect indices of pre- and post-manipulation. This implies either that *Aeshna* do not prey heavily on these genera or that net effects of this predatory dragonfly on these genera differ among the pools. These possibilities imply that the abundance of *Aeshna* can be a factor differentiating the community structure of chironomid larvae among pools at the Shibakusa-Daira." (Authors)] Address: Togashi, H., Division of Ecology and Evolutionary Biology, School of Life Sciences, Tohoku University, Aoba, Aramaki, Aoba-ku, Sendai 980-8578, Japan. E-mail: hiroyuki-togashi@mail.tains.tohoku.ac.jp

**9572.** Touchon, J.C.; Warkentin, K.M. (2010): Short- and long-term effects of the abiotic egg environment on viability, development and vulnerability to predators of a Neotropical anuran. *Functional Ecology* 24(3): 566-575. (in English) ["1. Environmental variation during development is common and often has long-lasting effects on phenotypes and survival. In organisms with complex life cycles, such effects may carry over from one life stage into the subsequent stages, affecting reproductive success and survival in both direct and indirect manners. Much research has focused on the transition from the larval to adult stages, but fewer studies have addressed how egg-stage variation may affect the larval stage, development to metamorphosis, and adult fitness. 2. We assessed the short- and long-term consequences of abiotic environmental variation during egg development of the Neotropical treefrog *Dendropsophus ebraccatus*. Typically, *D. ebraccatus* eggs are oviposited terrestrially on leaves above water and hydrated by rainfall. However, at our field site in Panama ~25% of terrestrial eggs become desiccated during development and ~19% become submerged underwater. In addition, in unshaded ponds *D. ebraccatus* lays eggs directly in water. We assessed immediate and carryover effects of egg development under hydrated, desiccated and submerged conditions. We measured morphology and vulnerability to predators at hatching and at three time points during the larval period. We also measured morphology at metamorphosis. 3. Submerged eggs hatched less developed and later and had higher baseline mortality after hatching than either hydrated or desiccated terrestrial eggs. By 10 days after hatching, the morphology of tadpoles from the three egg environments was indistinguishable. Nonetheless, the egg environment affected predation, with tadpoles from

submerged eggs being least vulnerable; later in development egg environment ceased to affect vulnerability. Tadpoles from all egg environments grew to a size refuge from dragonfly nymphs, whereas vulnerability to water bugs remained constant throughout development. At metamorphosis, froglets from submerged eggs were the largest and those from hydrated eggs were the smallest. 4. With anticipated climate change in the Neotropics, rainstorms are predicted to become more sporadic but larger when they do occur, potentially increasing the chances of both egg desiccation and flooding. The incidence of different egg environments may therefore change, potentially affecting amphibian phenotypes, interactions with predators, and survival across multiple life stages." (Author)] Address: Touchon, J.C., Department of Biology, Boston University, Boston, Massachusetts, USA. E-mail: jtouchon@bu.edu

**9573.** Tsubaki, Y.; Samejima, Y.; Siva-Jothy, M.T. (2010): Damselfly females prefer hot males: higher courtship success in males in sunspots. *Behavioral Ecology and Sociobiology* 64(10): 1547-1554. (in English) ["Males of some territorial calopterygid damselflies show an elaborate courtship display that involves high-frequency wing-beats directed toward an incoming female. Although it has been suggested that female mate preference is based on some characteristics of male's courtship display, it is unclear whether the courtship display varies between males or is influenced by environmental conditions. We combined two recent technologies, thermographic imaging and high-speed digital videography, to show that the wing-beat frequency during courtship (i.e., courtship intensity) in a damselfly, *Mnais costalis*, is correlated with thorax temperature. Our data indicated that (1) male thorax temperature was associated with solar exposure in his territory, (2) environmentally derived thermal gain enhanced courtship intensity, (3) hotter males were more likely to copulate than others, and (4) female thorax temperature during oviposition within a territory was associated with solar exposure. Males with territories that have longer exposure to sun spots are expected to attain higher thorax temperatures for longer and so are able to successfully court more females. We suggest that females benefit from mating with hot males because they will be on a warmer territory while ovipositing. Hot males might also have greater mate guarding ability, and/or eggs may develop faster in warmer territories." (Authors)] Address: Tsubaki, Y., Center for Ecological Research, Kyoto University, Hirano 2-509-3, Otsu 520-2113, Japan. E-mail: ytsubaki@jecology.kyoto-u.ac.jp

**9574.** Tsuchiya, K.; Hayashi, F. (2010): Factors affecting sperm quality before and after mating of calopterygid damselflies. *PLoS ONE* 5(3): e9904. doi: 10.1371/7 pp. (in English) ["Damselflies have a more complex sperm transfer system than other internally ejaculating insects. Males translocate sperm from the internal reproductive organs to the specific sperm vesicles, a small cavity on the body surface, and then transfer them into the female. To examine how the additional steps of sperm transfer contribute to decreases in sperm quality, we assessed sperm viability (the proportion of live sperm) at each stage of mating and after different storage times in male and female reproductive organs in two damselfly species, *Mnais pruinosa* and *Calopteryx cornelia*. Viability of stored sperm in females was lower than that of male stores even just after copulation. Male sperm vesicles were not equipped to main-

tain sperm quality for longer periods than the internal reproductive organs. However, the sperm vesicles were only used for short-term storage; therefore, this process appeared unlikely to reduce sperm viability when transferred to the female. Males remove rival sperm prior to transfer of their own ejaculate using a peculiar-shaped aedeagus, but sperm removal by males is not always complete. Thus, dilution occurs between newly received sperm and aged sperm already stored in the female, causing lower viability of sperm inside the female than that of sperm transferred by males. If females do not remate, sperm viability gradually decreases with the duration of storage. Frequent mating of females may therefore contribute to the maintenance of high sperm quality." (Authors)] Address: Hayashi, F., Department of Biology, Tokyo Metropolitan University, Tokyo, Japan. E-mail: fhayashi@tmu.ac.jp

**9575.** van Strien, A.J.; Termaat, T.; Groenendijk, D.; Mensing, V.; Kery, M. (2010): Site-occupancy models may offer new opportunities for dragonfly monitoring based on daily species lists. *Basic and Applied Ecology* 11(6): 495-503 (in English) ["Monitoring biodiversity is necessary but difficult to achieve in practice, in part because standardized field work is often demanding for volunteer field workers. Collecting opportunistic data on presence and absence of species is much less demanding, but such data may suffer from a number of biases, such as variation in observation effort over time. Here we explore whether site-occupancy models may be helpful to reduce such biases in opportunistic data, especially those caused by temporal variation of observation effort and by incomplete reporting of sightings. Site-occupancy models represent a generalisation of classical metapopulation models to account for imperfect detection; they estimate the probability of sites to be occupied (and of the rates of change, colonisation and extinction rates) while taking into account imperfect detection of a species. The models require so-called presence-absence data from replicated visits for a number of sites (e.g., 20-50). We tested whether these models provide reliable trend estimates if collectors of opportunistic data do not report all species detected. We applied the models to three opportunistic datasets of dragonfly species (1999-2007) in the Netherlands: (1) one-species records, (2) short daily species lists and (3) comprehensive daily species lists. Trend estimates based on a fourth dataset from a standardized monitoring scheme were used as a yardstick to judge the results. The analyses showed that occupancy trends based on comprehensive daily species lists in combination with site-occupancy models were generally similar to those based on the monitoring scheme. But trends based on one-species records and short daily lists were too imprecise to be very useful. In addition, site-occupancy models lead to more realistic occupancy estimates than those obtained from conventional logistic regression analysis. We conclude that comprehensive daily species lists can be useful surrogates for monitoring schemes to assess distributional trends." (Authors) Address: van Strien, A.J., Statistics Netherlands, P.O. Box 24500, 2490 HA The Hague, The Netherlands. E-mail: asin@cbs.nl

**9576.** Varnosfaderany, M.N.; Ebrahimi, E.; Mirghafary, N.; Safyanian, A. (2010): Biological assessment of the Zayandeh Rud River, Iran, using benthic macroinvertebrates. *Limnologica* 40: 226-232. (in English) ["Benthic macroinvertebrate communities from the



middle of Zayandeh Rud River were analyzed monthly during 1 year at 8 stations, in order to assess changes in their diversity and richness in relation to water quality. Two major groups of sites based on similarity between macroinvertebrate communities were identified by cluster analysis. The performances of the original and revised BMWP score systems were assessed by comparing the community structure indices of benthic macroinvertebrates along with physico-chemical parameters of the water. The biotic indices (BMWP, ASPT, revised BMWP and ASPT) showed better correlation with water quality parameters than that of the richness and diversity indices. The revised ASPT had the highest correlation with water quality parameters. It seems that the application of the revised BMWP score system could be useful for assessment of the water quality in Zayandeh Rud River." (Authors) Odonata are treated at the family level.] Varnosfaderany, M.N., Dept of Natural Resources, Isfahan Univ. of Technology, Isfahan 84156-83111, Iran. E-mail address: mnemati@na.iut.ac.ir (M.N. Varnosfaderany).

**9577.** Velte, F. (2010): Teichfrosch erbeutet Blaugrüne Mosaikjungfer *Aeshna cyanea* (Müller 1764). Libellen in Hessen 3: 61. (in German) [19-IX-1995, Oberursel, Hessen, Germany; Two males of *A. cyanea* involved in territorial contest, dropped at the surface of a pond. One of two *Rana esculenta* (No. 1) successfully preyed on one of the specimens, while the second male *A. cyanea* could escape *R. esculenta* (No. 2).] Address: Velte, F., In den Lindengärten 3, 61352 Bad Homburg, Germany. Marlin1904@aol.com

**9578.** Villanueva, R.J.T. (2010): Odonata fauna of Polillo Island - revisited. International Dragonfly Fund - Report 27: 1-16. (in English) [Philippines; "Odonata were recorded and voucher specimens collected between March 25 and April 4 2010. The present survey revealed 73 species from 15 families and 44 genera. An additional nine species were added from the previous list. This includes two species new to science and one that is possible also new to science. Additional specimens were obtained from species of particular importance (2 individual of the new *Drepanosticta* and 2 individual of *Hemicordulia*, both noted during 2009 survey). Several species collected in 2009 were not found during the recent survey." (Author)] Address: Villanueva, R., D3C Gahol Apartment, Lopez Jaena St., Davao City, 8000 Philippines. Email: rjtvillanueva@gmail.com

**9579.** von Blanckenhagen, B. (2010): Zwei Stillgewässer als Fortpflanzungshabitat der Gemeinen Keiljungfer *Gomphus vulgatissimus* (Linnaeus 1758) in Hessen. Libellen in Hessen 3: 62. (in German) [Germany; Exuviae of the rheophilous *G. vulgatissimus* were found in gravel pits.] Address: von Blanckenhagen, B., Kaffweg 8, 35039 Marburg, Germany. E-mail: benno.v.blanckenhagen@web.de

**9580.** Waldhauser, M.; Mikát, M. (2010): New records of *Coenagrion ornatum* in the Czech Republic (Odonata: Coenagrionidae). Libellula 29(1/2): 29-46. (in English, with German and Czech summaries) ["The distribution of *C. ornatum* in the Czech Republic is far more extensive than considered up to 2009. Before 2009 only one recent population from the Piletický brook watershed and five historical records from Bohemia and Moravia were known. In 2009 twenty-five new localities with *C. ornatum* were discovered. These localities are distributed in northern, central and eastern Bohemia.

The new *C. ornatum* localities are situated mostly in open farmland or mining areas at altitudes below 280 m a.s.l. *C. ornatum* prefers sunny parts of brooks and amelioration ditches with lush littoral vegetation (e.g. *Sparganium erectum*, *Veronica beccabunga*, *Potamogeton* spp., *Berula erecta*). However, it also occurs along degraded and regulated sections of the streams where the vegetation is dominated by *Phalaris arundinacea* and *Urtica dioica*." (Authors)] Address: Waldhauser, M., Administration of Lužické hory Protected Landscape Area, Školní 12, 471 25 Jablonné v Podještědí, CZ-471 25, Czech Republic. E-mail: martin.waldhauser@nature.cz

**9581.** Waldhauser, M.; Mikát, M. (2010): The Ornate Bluet – A surprise from a coal mine dump. *Ochrana přírody* 2010(2): 15-17. (in Czech, with English summary) ["The distribution of *Coenagrion ornatum* in the Czech Republic is far more extensive than it was considered before 2009. At that time the only single recent population from the Piletický potok Brook Basin and five historical records from Bohemia and Moravia had been known. In 2009 25 new sites inhabited by the Ornate Bluet were discovered. They are located in northern, central and eastern Bohemia and are situated mostly in open farmlands or mining areas at altitudes below 280 m a.s.l. *Coenagrion ornatum* prefers sunny parts of brooks and channels with rich littoral vegetation (e.g., *Sparganium erectum*, *Veronica beccabunga*, *Potamogeton* spp.). However, it also occurs at degraded and regulated stream stretches where the vegetation is dominated by *Phalaris arundinacea* and *Urtica dioica*." (Authors)] Address: Mikát, M., Charles University in Prague, Faculty of Science, Department of Zoology, Viničná 7, Praha 2, CZ-128 43, Czech Republic. E-mail: michael.mikat@gmail.com

**9582.** Watts, P.C.; Keat, S.; Thompson, D.J. (2010): Patterns of spatial genetic structure and diversity at the onset of a rapid range expansion: colonisation of the UK by the small red-eyed damselfly *Erythromma viridulum*. *Biological Invasions* 12(11): 3887-3903. (in English) ["Species' geographic ranges may vary in size in response to a change in environmental conditions. The specific genetic consequences of range expansions are context dependent, largely depending upon the rate of colonisation as well as the origins and numbers of founders, and the time since colonisation. Like other "charismatic" taxa, such as birds and lepidopterans, the distributions of odonates are well-known through substantial monitoring programmes co-ordinated by various societies. The small red-eyed damselfly *E. viridulum* has undergone a substantial, northward range expansion in Europe in the last 30 years and has recently colonised two distinct areas in the UK. We quantify the immediate genetic consequences of this rapid colonisation by genotyping more than 1,400 *E. viridulum* from 39 sites across the northwest margin of this species' geographic range. Levels of genetic diversity and spatial structure are impacted by this species recent range expansion and non-equilibrium conditions that drive weak genetic divergence, even at regional spatial scales. Populations of *E. viridulum* become less diverse towards the edge of this species' distribution, presumably as a consequence of colonisation through a series of founder events. Specifically, there is a significant reduction in genetic diversity in the smallest, most recent focus of colonisation in the UK; however, there are generally low levels of genetic diversity across this *E.*

viridulum's northern range margin. While most populations are generally poorly differentiated, *E. viridulum* nonetheless consists of two distinct lineages that broadly differentiate between eastern and western Europe. Genetic divergence between the two UK colonisation foci are indicative of distinct immigration events from separate sources; however a general lack of spatial structure prevents us from pinpointing the specific origins of these migrant damselflies." (Authors) Address: Watts, P.C., School of Biological Sciences, The Biosciences Building, Crown Street, University of Liverpool, Liverpool, L69 7ZB, UK. E-mail: p.c.watts@liv.ac.uk

**9583.** Wellenreuther, M.; Vercken, E.; Svensson, E.I. (2010): A role for ecology in male mate discrimination of immigrant females in *Calopteryx damselflies*?. *Biological Journal of the Linnean Society* 100(3): 506-518. (in English) ["Sexual selection against immigrants is a mechanism that can regulate premating isolation between populations but, so far, few field studies have examined whether males can discriminate between immigrant and resident females. Males of the damselfly *C. splendens* show mate preferences and are able to force pre-copulatory tandems. We related male mate responses to the ecological characteristics of female origin, geographic distances between populations, and morphological traits of females to identify factors influencing male mate discrimination. Significant heterogeneity between populations in male mate responses towards females was found. In some populations, males discriminated strongly against immigrant females, whereas the pattern was reversed or nonsignificant in other populations. Immigrant females were particularly attractive to males when they came from populations with similar predation pressures and densities of conspecifics. By contrast, immigrant females from populations with strongly dissimilar predation pressures and conspecific densities were not attractive to males. Differences in the abiotic environment appeared to affect mating success to a lesser degree. This suggests that male mate discrimination is context-dependent and influenced by ecological differences between populations, a key prediction of ecological speciation theory. The results obtained in the present study suggest that gene-flow is facilitated between ecologically similar populations." (Authors)] Address: Wellenreuther, Maren, Section for Animal Ecology, Ecology Building, Lund University, Sölvegatan 37, SE-223 62 Lund, Sweden. E-mail: maren.wellenreuther@zoekol.lu.se

**9584.** Wildermuth, H. (2010): Waldlichtungen als terrestrische Habitate von Libellen (Odonata). *Entomo Helvetica* 3: 7-24. (in German, with English and French summaries) ["Forest clearings as terrestrial habitats of dragonflies (Odonata). – Odonates are generally considered aquatic insects living in or near water. However, during the imaginal period they spend much time in terrestrial habitats often far aside from the breeding sites. In a systematic study at eight forest clearings with extensively utilized moist meadows in the Swiss Plateau it has been shown that 80 % of the local odonate fauna used these terrestrial habitats for maturation, foraging, thermoregulation and exceptionally also as rendezvous. *Platycnemis pennipes* and *Libellula fulva* evidently had to cover distances of 0.7–2.2 km and to fly over forests and cross wide roads in order to reach the clearings and to return to the breeding site. The importance of the clearings for various species was different and thus discussed in detail." (Author)] Address: Wildermuth, H.,

Haltbergstrasse 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**9585.** Worthen, W.B. (2010): Flying Dragons: A colorful field experiment in resource partitioning. *The American Biology Teacher* September 72(7): 432-436. (in English) ["Several common dragonfly species perch at different heights. Using dowels as perches and simple chi-square tests, this pattern of resource partitioning can be described quickly and easily. Additional experiments can examine the effect of interspecific competition on perch selection, and the relationships between perching height, body size, and wing aerodynamics." (Author)] Address: Worthen, W.B., Dept of Biology, Furman Univ., Greenville, SC29613 USA. E-mail: worthen@furman.edu

**9586.** Yamada, Y.; Sasaki, H.; Harauchi, Y. (2010): Composition of road-killed insects on coastal roads around Lake Shikotsu in Hokkaido, Japan. *J. Rakuno Gakuen Univ.* 34(2): 177-184. (in English, with Japanese summary) ["Road-killed insects were collected 12 times along two environmentally different coastal roads of Lake Shikotsu, Hokkaido, Japan, from mid-June to mid-September in 2007. Route 276 is located 50-100 m distant from the lakeshore and separated from the water by woodland, whereas Route 453 is situated alongside the lakeshore; thus, flora along the two roadsides differ. In total, 2590.1 insects per kilometre were found along Route 276, whereas 2414.2 insects per kilometre were found on Route 453. When classified by order, the composition of the collected insects differed between the two roads: Lepidoptera (32.79%) was the dominant order on Route 276 followed by Coleoptera (25.29%) and Diptera (18.52%), whereas on Route 453, Coleoptera (25.47%) was the dominant order, followed by Diptera (21.33%) and Odonata (17.02%). The species composition of dragonflies and butterflies also differed between the roads. Our results suggest that differences in the composition of insects killed along roads are due to differences in roadside environments.] Address: Yamada, Y., Lab. of Entomol., Graduate school of Rakuno Gakuen Univ., Ebetsu, Hokkaido 069-8501, Japan

**9587.** Yoon, J.; Jong, M.N.; Heungtae, K.; Yeon, J.B.; Jae, G.K. (2010): *Nannophya pygmaea* (Odonata: Libellulidae), an endangered dragonfly in Korea, prefers abandoned paddy fields in the early seral [sic] stage. *Environ. Entomol.* 39(2): 278-285. (in English) ["To characterize habitats of *N. pygmaea*, which is endangered in Korea, we analyzed characteristics of surface water and soil, landscape properties, and vegetation types in 22 habitats in eight areas of Korea where nymphs of *N. pygmaea* have been found since 2005. We divided the habitats into two groups: DS (dwelling site) habitats, where *N. pygmaea* was observed at the time of the study, and PDS (past dwelling site) habitats, where *N. pygmaea* recently lived but is no longer found. The habitats were mostly located in former paddy fields on mountain slopes that have been abandoned for 3-7 yr. The main water sources for these habitats were ground water and surface runoff, and the water level was stable at 3-7 cm in depth. The habitats ranged from 300 to 1000 m<sup>2</sup> and were dominated by *Juncus effusus*, which formed tussock mounds. According to the hydrosere model of succession, *N. pygmaea* appeared mostly in the early stages of plant succession (the period 3-7 yr after the initiation of succession in former paddy fields) and *N. pygmaea* preferred habitats displaying the water and soil characteristics that are typical of the

early stages of succession in abandoned paddy fields. These results indicate that the primary habitats of *N. pygmaea* in Korea are recently abandoned paddy fields that are in an oligotrophic state. As succession proceeds in these habitats, *N. pygmaea* disappears. A habitat management program should be launched to conserve the habitats and populations of *N. pygmaea*." (Authors)] Address: Jae, G.K., Department of Biology Education, Seoul National University, Seoul 151-748, Korea. E-mail: jaegkim@snu.ac.kr.

**9588.** Zambrano, L.; Valiente, E.; Vander Zanden, M.J. (2010): Stable isotope variation of a highly heterogeneous shallow freshwater system. *Hydrobiologia* 646: 327-336. (in English) ["Food web structure is well known to vary widely among ecosystems. Recent research indicates that there can be a high degree of spatial heterogeneity within ecosystems as well. Xochimilco is a small heterogeneous freshwater system that has been transformed into a network of canals, small lakes, and wetlands. Located within Mexico City, this ecosystem has been intensively managed and highly impacted for more than 50 years. This system receives urban and agricultural runoff, with resulting impacts on water quality. The aquatic community is dominated by exotics such as carp (*Cyprinus carpio*) and tilapia (*Oreochromis niloticus*), though the system still supports endemic species such as the aquatic salamander, axolotl (*Ambystoma mexicanum*), and crayfish (*Cambarellus montezumae*), which are both endangered. In this study, we used carbon and nitrogen stable isotopes for the whole food web and gut content analysis from the exotic fishes to describe food web structure in different canals within Xochimilco. There were significant isotopic differences among canals. These differences may result from isotopic baseline differences as well as differences in actual food web structure: both are related to local spatial variation in water quality driven by nutrient inputs and exotic fishes. Within ecosystem variability is likely to be seen in other perturbed shallow systems as well, and should be explicitly considered in future food web studies." (Authors) There were no significant differences among years in carbon or nitrogen for Odonata. Most taxa did not show seasonal differences in  $\delta^{15}N$ , except for axolotl, which were higher in the rainy season, and Odonata, which were higher in the dry season.] Address: Zambrano, L., Depto de Zoología, Instituto de Biología, Universidad Nacional Autónoma de México, Ciudad Universitaria, México DF 04200, México. E-mail: zambrano@ibiologia.unam.mx

**9589.** Zessin, W. (2010): Der renaturierte Kraaker Mühlenbach – ein Refugium für seltene Pflanzen und Tiere. *Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 13(1): 17-19. (in English) [27 Odonata species were found in 2008 to have colonized the revitalised Kraaker Mühlenbach, Mecklenburg-Vorpommern, Germany. Without the exception of *Sympetrum pedemontanum* no Odonata species are specified. For details see: Zessin, W.; Ludwig, R. (2010): Die Libellen auf dem Gebiet der Gemeinde Rastow-Kraak, Landkreis Ludwigslust, Mecklenburg. *Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 13(1): 32-37.] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**9590.** Zessin, W.; Ludwig, R. (2010): Die Libellen auf dem Gebiet der Gemeinde Rastow-Kraak, Landkreis Ludwigslust, Mecklenburg. *Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 13(1): 32-37. (in

German) [A total of 28 species reported including the rare resp. redlisted *Leucorrhinia caudalis*, *Erythromma viridulum*, *Aeshna isocetes*, *Anax imperator Calopteryx virgo* (RL 3), *Calopteryx splendens*, *Lestes viridis*, *Sympetma fusca*, and *Sympetrum pedemontanum*.] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**9591.** Zhang, Y.-y.; Xuan, W.-j.; Zhao, J.-l.; Zhu, C.-d.; Jiang, G.-f. (2010): The complete mitochondrial genome of the cockroach *Eupolyphaga sinensis* (Blattaria: Polyphagidae) and the phylogenetic relationships within the Dictyoptera. *Molecular Biology Reports* 37(7): 3509-3516. (in English) ["We present the complete mitochondrial DNA sequence of *Eupolyphaga sinensis*. This closed circular molecule is 15553 bp long and consists of 37 genes that encode for 13 inner membrane proteins, 2 ribosomal RNAs and 22 transfer RNAs. The genome shares the gene order and orientation with previously known Blattaria mitochondrial genomes. All tRNAs could be folded into the typical cloverleaf secondary structure, but the tRNA<sup>Ser</sup> (AGN) appears to be missing the DHU arm. The A + T-rich region is 857 bp long and longer than other cockroaches. Based on the concatenated amino acid sequences of all protein coding genes of *E. sinensis* in conjunction with those 23 other arthropod sequences, we reconstruct the phylogenetic tree. Phylogenetic analyses shows that Blataria (including Isoptera) and the Mantodea are sister groups. Furthermore the relationship of the three basal clades of winged insects are different from the three previous hypotheses ((Ephemeroptera + Odonata) + Neoptera, Ephemeroptera + (Odonata + Neoptera), Odonata + (Ephemeroptera + Neoptera)). The Ephemeroptera (*Parafronurus youi*) clusters with the Plecoptera (*Pteronarcys princes*)."] (Authors)] Address: Jiang, G.-f., Jiangsu Key Laboratory for Biodiversity & Biotechnology, College of Life Sciences, Nanjing Normal University, Nanjing, 210046, China. Email: cnjg1208@163.com

**9592.** Zhao, H.-x.; Yin, Y.-j.; Zhong, Z. (2010): Micro- and nanostructures and morphologies on the wing veins of dragonflies. *Chinese Science Bulletin* 55(19): 1993-1995. (in English) ["The surfaces of the veins of dragonflies (*Pantala flavescens* and *Crocothemis servilia*) wings are observed through SEM, and interesting micro- and nanostructures and morphologies are discovered. On the surfaces of the veins, not only ripple wave morphologies are distributed, but also spikes are grown. Besides, on the surfaces of the spikes, straight stripe wave morphologies are grown along the generatrix. These marvellous micro- and nanostructures and morphologies may enable us to better understand the remarkable flying abilities of dragonflies." (Authors)] Address: Zhong, Z., School of Aerospace Engineering and Applied Mechanics, Tongji University, Shanghai 200092, China. E-mail: zhongk@tongji.edu.cn

**Thanks to all who contributed to this issue of OAS. A special thank to Pawel Buczyński who provided us with many publications from eastern central Europe.**





# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105; E-mail: K.Reinhardt@sheffield.ac.uk

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: mg\_marinov@yahoo.com

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

## 1997

**9593.** Bernard, R. (1997): An extremely late record of *Sympetrum fonscolombi* (Sel.) in Poland (Anisoptera: Libellulidae). *Notulae odonatologicae* 4(10): 159-160. (in English) [Record of a male caught on 29-X-1996, near Poznań, Poland] Address: Bernard, R., Dept of General Zoology, Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznań, Poland; E-mail: Bernard@amu.edu.pl

**9594.** Burkart, W. (1997): Neue Reproduktionsnachweise der Frühen Heidelibelle (*Sympetrum fonscolombi* SELYS 1840) (Odonata: Libellulidae) in Niedersachsen. *Beiträge zur Naturkunde Niedersachsens* 50: 48. (in German) [Teneral of *S. fonscolombi* were recorded in Rotenburg, Niedersachsen, Germany on 8-IX-1996] Address: Burkart, W., Am Emel 7, 27412 Wilstedt, Germany. E-mail: weguburkart@gmx.de

**9595.** Dijkstra, K.-D. (1997): New records of *Libellula fulva* (Müll.) for Portugal (Anisoptera: Libellulidae). *Notulae odonatologicae* 4(10): 160. (in English) [Two records of the regional very rare *L. fulva* are documented and briefly discussed.] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: dijkstra@nrm.nl

**9596.** Gatter, W. (1997): *Birds of Liberia*. Aula-Verlag, Wiesbaden. ISBN 3-89104-615-4: 320 pp. (in English) [The book includes a colour picture of the Little Bee-eater *Merops pusillus* with an anisopteran prey.] Address: AULA-Verlag, Industriepark 3, 56291 Wiebelsheim, Germany

**9597.** Habdijia, I.; Radanovic, I.; Primc-Habdijia, B. (1997): Longitudinal distribution of predatory benthic macroinvertebrates in a karstic river. *Archiv für Hydrobiologie* 139(4): 527-546. (in English) ["The longitudinal distribution of predatory macroinvertebrates and their diversity were investigated on boulder, cobble and gravel substrates along the River Kupa, a karstic river in the NW Dinarid area (Croatia). Depending on substrate type and river section, the predator biomass constituted 6.9 % to 20.2 % of the total macro-invertebrate biomass. In the headwater streams more than 80 % of predator biomass was represented by rhyacophilid, perlid and perlodid larvae. In the upper river section *Hirudinea* species, rhyacophilids and the dipteran larva,

*Atherix ibis*, constituted approximately equal percentages of total predators. In the lower river section *Hirudinea* species, Odonata larvae, tanipod and ceratopogonid larvae were the most dominant predators. Along the river gradient the increase of predator biomass corresponded with the increase of scraper, collector-gatherer and filterer biomass. The Shannon index of diversity showed that the diversity of predators increased from the source area to the downstream reaches. A significant and positive association was found between diversity of predators and diversity of collector-gatherers. This positive relationship between predators and collector-gatherers may be interpreted as the diversity response of predators to the diversity of prey." (Authors) The species list includes *Platycnemis* sp., *Corduliidae*, 'non det.', *Gomphus vulgatissimus*, and *Onychogomphus* sp.] Address: Habdijia, I., Department of Zoology, Faculty of Science, University of Zagreb, Rooseveltov trg 6, 10000 Zagreb, Croatia

**9598.** Holuša, O. (1997): The occurrence of dragonfly *Aeshna subarctica* Walker, 1908 (Odonata: Aeshnidae) in the Hrubý Jeseník Mts. (Czech Republic). *Čas. Slez. Muz. Opava (A)*. 46: 287-288. (in Czech, with English summary) [5 males, 1 female and 2 exuviae of *A. subarctica* were collected by the author on 8-IX-1997 at the peaty lake Malé mechové jezírko on the moorland of Rejvíz (745 in a.s.l., Hrubý Jeseník Mrs., north-western Silesia in Czech Republic). Oviposition took place in the growth of *Eriophorum* sp. in the margin of the lake. *A. subarctica* frequently was observed to hunt for tandems of *Sympetrum* species.] Address: Holuša, O., Muzeum Beskyd, Přírodovědné oddělení, Zámecké náměstí 1264, CZ-738 01 Frýdek-Místek

**9599.** Holuša, O. (1997): Scarce chaser (*Libellula fulva*), a rare species in the Czech Republic and Slovak Republic. *Ochrana Přírody* 52(8): 240-241. (in Czech, with English summary) [*L. fulva* was found on a pond near the village Brzotin, Slovakia. The regional records of this species are documented. The list of Odonata from the same locality includes further 9 Odonata species e.g. *Erythromma viridulum*, *Anax parthenope*, and *Crocothemis erythraea*.] Address: Holuša, O., Muzeum Beskyd, Přírodovědné oddělení, Zámecké náměstí 1264, CZ-738 01 Frýdek-Místek

**9600.** Parr, A. (1997): The 1996 Red-veined Darter *Sympetrum fonscolombi* (Selys) influx into Britain. *Atropos* 2: 44-46. (in English) [The influx is given in de-

tails presenting phenological diagram of observation dates and a map with localities of observation.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK

**9601.** Raab, R.; Chwala, E. (1997): Rote Liste ausgewählter Tiergruppen Niederösterreichs - Libellen (Insecta: Odonata), 1. Fass. 1995. Hrsg.: Amt der Niederösterreichischen Landesregierung, Abteilung Naturschutz, Wien. ISBN 3-901542-07-8: 91 pp. (in German) [Red list of the endangered Odonata of the federal state 'Niederösterreich' (NÖ), Austria. The publication also includes notes on dragonflies as bioindicators, the history of dragonfly research in NÖ, altitudinal distribution of Odonata in NÖ, a checklist of the species, data on the regional distribution, habitats, risk assessment, action plan, regional papers on Odonata, and in most cases colour pictures and distribution maps of the species.] Address: Amt der NÖ Landesregierung, Abteilung Naturschutz, Landhausplatz 1; Haus 16, A-3109 St. Pölten, Austria

**9602.** Zimmermann, P. (1997): Die Naturschutzgebiete im Landkreis Calw (Nordschwarzwald) - Beitrag zur Herpeto-, Heuschrecken- und Libellenfauna. Veröffentlichungen für Naturschutz und Landschaftspflege in Baden-Württemberg 71/72: 327-377. (in German) [27 Odonata species are represented in the 25 studied nature conservation areas within the boundaries of Landkreis Calw, Baden-Württemberg, Germany.] Address: Zimmermann, P., Regierungspräsidium Karlsruhe, Referat Naturschutz und Landschaftspflege, 76247 Karlsruhe, Germany. E-mail: peter.zimmermann@rpk.bwl.de

**9603.** Zimmermann, W. (1997): Die Arktische Smaragdlibelle (*Somatochlora arctica*) erstmalig in Thüringen nachgewiesen. Landschaftspflege und Naturschutz in Thüringen 34(1): 24-25. (in German) [First record of *S. arctica* in Thüringen, Germany, 11-VI-1997, NSG Saukopfmoor.] Address: Zimmermann, W., Thomas-Müntzer-Str. 5, D-99423 Weimar, Germany

## 1998

**9604.** Brinkmann, R. (1998): Berücksichtigung faunistisch-tierökologischer Belange in der Landschaftsplanung. Informationsdienst Naturschutz Niedersachsen 4/98: 58-127. (in German) [The potential of Odonata for landscape planning purposes is commented on pages 102-103.] Address: Niedersächsisches Landesamt für Ökologie, Abt. Naturschutz, Postfach 101062, D-31110 Hildesheim, Germany. E-mail: poststelle@hi.nloe.land.ni.dbp.de

**9605.** Dahmen, D.; Dahmen, E.-G.; Gellert, G. (1998): Einfluß extremer Schwermetallbelastungen auf die Zusammensetzung der Makrobenthoszönose eines Mittelgebirgsbaches in einem ehemaligen Erzabbaugebiet des Raumes Overath (Bergisches Land). Decheniana 151: 173-182. (in German, with English summary) ["The effects on benthic invertebrates of the extremely with heavy metals contaminated creek Grünewaldbach (Nordrhein-Westfalen, Germany), impacted by wastes from past mining activities, were studied in 1995. As reference served a low impacted creek (Hellenthalbach), situated at a distance of 1.3 km. Both creeks are tributaries of the river Sülz. The organisms were exposed to high levels of Cd (up to 0.13 mg/L), Zn (up to

133 mg/L) and Ni (up to 2.18 mg/l) and lower concentrations of Pb and Cu. This led to a high elevated whole-body heavy metals bioaccumulation. The grazing species showed the highest and the carnivorous species the lowest concentrations. Severely influenced by heavy metals was the composition of the benthic community in the Grünewaldbach. Triclad, gammarids, mayflies, dragonflies and water beetles were absent. The most widespread organism was the caddisfly *Plectrocnemia conspersa*." (Authors) Larvae of *Cordulegaster boltonii* occurred in the low impacted creek Hellenthalbach; the mean (n=20) of heavy metals in dried bodymass in mg/kg is as follows: Cd: 5.6 (s=3.7), Pb: 28.1 (s=11), Cr: 1.9 (s=0.2), Cu: 43.3 (s=9.9), Ni: 4.9 (s=1.9), Zn: 193 (s=16).] Address: Dahmen, D., Burbacherstr. 263, 53129 Bonn, Germany

**9606.** Dudley, R. (1998): Atmospheric oxygen, giant Paleozoic insects and the evolution of aerial locomotor performance. *The Journal of Experimental Biology* 201: 1043-1050. (in English) ["Uniformitarian approaches to the evolution of terrestrial locomotor physiology and animal flight performance have generally presupposed the constancy of atmospheric composition. Recent geophysical data as well as theoretical models suggest that, to the contrary, both oxygen and carbon dioxide concentrations have changed dramatically during defining periods of metazoan evolution. Hyperoxia in the late Paleozoic atmosphere may have physiologically enhanced the initial evolution of tetrapod locomotor energetics; a concurrently hyperdense atmosphere would have augmented aerodynamic force production in early flying insects (including Protodonata). Multiple historical origins of vertebrate flight also correlate temporally with geological periods of increased oxygen concentration and atmospheric density. Arthropod as well as amphibian gigantism appear to have been facilitated by a hyperoxic Carboniferous atmosphere and were subsequently eliminated by a late Permian transition to hypoxia. For extant organisms, the transient, chronic and ontogenetic effects of exposure to hyperoxic gas mixtures are poorly understood relative to contemporary understanding of the physiology of oxygen deprivation. Experimentally, the biomechanical and physiological effects of hyperoxia on animal flight performance can be decoupled through the use of gas mixtures that vary in density and oxygen concentration. Such manipulations permit both paleophysiological simulation of ancestral locomotor performance and an analysis of maximal flight capacity in extant forms." (Author)] Address: Dudley, R., Dept of Zoology, University of Texas, Austin, TX 78712, USA. E-mail: rdudley@utxvms.cc.utexas.edu

**9607.** Finck, P. (1998): Der Einfluß von Probenahmezeitpunkt und -häufigkeit auf die Erfassung der Makroinvertebraten in Mittelgebirgsbächen. *Lauterbornia* 34: 245-254. (in German, with English summary) [The influence of sample timing and frequency on the recording of the macroinvertebrates in mountain brooks was studied by recording macroinvertebrates at two sites in the Eifel mountains in Northrhine-Westfalia, Germany. Additionally the dominance structures of the biocoenosis indicating different habitat requirements were analysed. Recommendations are given for a minimum standard to guarantee the relevance and validity of the results for physical planning: not less than 4 samples obligatory in March, May, June, and September. *Calopteryx virgo* and *C. splendens* are recorded for the studied brooks Ahbach and Klausenbach.] Address: Finck,

P., Bundesamt für Naturschutz, Abt. Biotopschutz und Landschaftsökologie, Konstantinstr. 110, 53179 Bonn, Germany

**9608.** Jödicke, R. (1998): Extraordinary flight dates of *Ceriatrigona tenellum* (De Vill.) in NW Germany (Zygoptera: Coenagrionidae). *Notulae odonatologicae* 5(2): 20-21. (in English) [The paper compiles data on phenology of the species, in most cases from the Federal State Niedersachsen, Germany.] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: reinhard.joedicke@ewetel.net

**9609.** Kossenko, S.M.; Fry, C.H. (1998): Competition and coexistence of the European bee-eater *Merops apiaster* and the Blue-cheeked bee-eater *Merops persicus* in Asia. *Ibis* 140(1): 3-13. (in English) ["Studies were conducted over a 10-year period on the supposedly similar European Bee-eater *Merops apiaster* and Blue-cheeked Bee-eater *M. persicus* breeding in mixed and separate colonies in four Asiatic countries (Turkmenistan, Uzbekistan, Tajikistan). In spring, *M. persicus* arrived a few days later and laid up to 2 weeks later than *M. apiaster*. Spatial distributions of the two species were positively associated. They were sympatric and syntopic: more than half of the local breeding ranges overlapped, and many birds bred within sight and sound of the congener. Intraspecific conflict was frequent, but in mixed colonies interspecific conflict was rare. Most *M. apiaster* nest burrows were dug into cliffs and most *M. persicus* ones into level ground, but dense mixed colonies occurred only in cliffs. Burrow architecture differed specifically. Diets were qualitatively similar at insect family level but different at the species level, partly because of local variation in availability and partly because of distinct preferences of *M. apiaster* for small beetles, ants and termites and of *M. persicus* for large dragonflies and cicadas. *Merops persicus* was less specialized than *M. apiaster* and had an airborne insect prey spectrum nearly twice as broad. Diets were more alike where the two birds foraged together than where they foraged separately. There was a high incidence of egg and nestling loss by predation and starvation. We speculate that each species may prove to breed more successfully in mixed than in monospecific colonies. We propose that the two bee-eaters do not compete for nest sites but may compete for food and coexist unaggressively by trading off food competition against improved breeding success in mixed colonies." (Authors)] Address: Fry, C.H., University of Aberdeen, Department of Zoology, Tillydrone Avenue, Aberdeen AB9 2TN, UK

**9610.** Niedringhaus, R.; Zander, B. (1998): Die Kleingewässer der Ostfriesischen Inseln. Zustandsanalyse und ökologische Bewertung anhand der Flora/Vegetation und der Wirbellosenfauna. Schriftenreihe Nationalpark Niedersächsisches Wattenmeer 3: 270 pp. (in German) [This is a detailed and extensively documented study of the Mollusca, Odonata, Coleoptera and Heteroptera of the pools in the Lower-saxony watten sea Islands. Odonata (37 species) are dealt with in chapter 6.12 and on several other places in the book.] Address: Bezirksregierung Weser-Ems, Nationalparkverwaltung, Virchowstr. 1, 26382 Wilhelmshaven, Germany

#### 1999

**9611.** Kuhn, J. (1999): Zwischen Hochwasser und Austrocknung – die Gefleckte Heidelibelle. *Magazin*

Lebensräume 3: 29. (in German) [Baden-Württemberg, Germany; brief note on factors determining population dynamic of *Sympetrum flaveolum*. The species is a habitat specialist of fluctuating water levels in the littoral of lakes and ponds.] Address: Kuhn, J., Marktstr. 26, 89143 Blaubeuren, Germany

#### 2000

**9612.** Dudley, R. (2000): The biomechanics of insect flight: form, function, evolution. Princeton Univ. Press, Princeton, N.J. ISBN-13: 978-0691044309: 476 pp. (in English) ["Here, Robert Dudley presents the first comprehensive explanation of how insects fly. The author relates the biomechanics of flight to insect ecology and evolution in a major new work of synthesis. The book begins with an overview of insect flight biomechanics. Dudley explains insect morphology, wing motions, aerodynamics, flight energetics, and flight metabolism within a modern phylogenetic setting. Drawing on biomechanical principles, he describes and evaluates flight behaviour and the limits to flight performance. The author then takes the next step by developing evolutionary explanations of insect flight. He analyzes the origins of flight in insects, the roles of natural and sexual selection in determining how insects fly, and the relationship between flight and insect size, pollination, predation, dispersal, and migration. Dudley ranges widely--from basic aerodynamics to muscle physiology and swarming behaviour--but his focus is the explanation of functional design from evolutionary and ecological perspectives." (Publisher) This is a comprehensive and definitive summary of the state of the art in the biomechanics of insect flight - including Odonata - through the late 1990's.] Address: Dudley, R., Dept of Zoology, Univ. of Texas, Austin, TX 78712, USA. E-mail: rdudley@utxvms.cc.utexas.edu

**9613.** Kotenko, T.I. (2000): The European pond turtle (*Emys orbicularis*) in the Steppe Zone of the Ukraine. *Stapfia* 69: 87-106. (in English) ["*E. orbicularis* is widely distributed in the Steppe Zone of the Ukraine and most abundant in the deltas of big rivers. Data are presented on distribution, habitats, abundance, seasonal and daily activity, migrations, reproduction, diet, enemies and parasites, collected between 1974 and 1999. ... The diet included many species of invertebrates and a few vertebrates. Gastropoda, Dytiscidae (Coleoptera), Hemiptera and larvae of Diptera and Odonata were the dominant components." (Author)] Address: Kotenko, Tatiana, Schmalhausen Institute of Zoology, National Academy of Science, Khmel'nitsky Str. 15, 252030 Kiev, Ukraine. E-mail: Kotenko@iz.freenet.kiev.ua

**9614.** Kourie, J.I.; Shorthouse, A.A. (2000): Properties of cytotoxic peptide-formed ion channels. *Am. J. Physiol. Cell. Physiol.* 278: C1063-C1087. (in English) ["Cytotoxic peptides are relatively small cationic molecules such as those found 1) in venoms, e.g., melittin in bee, scorpion toxins in scorpion, pilosulin 1 in jumper ant, and lycotoxin I and II in wolf spider; 2) in skin secretions (e.g., magainin I and II from *Xenopus laevis*, dermaseptin from frog, antimicrobials from carp) and cells of the immune system (e.g., insect, scorpion, and mammalian defensins and cryptidins); 3) as autocytoxicity peptides, e.g., amylin cytotoxic to pancreatic b-cells, prion peptide fragment 106–126 [PrP-(106–126)], and amyloid b-protein (AbP) cytotoxic to neurons; and 4) as designed synthetic peptides based on the sequences and



properties of naturally occurring cytotoxic peptides. The small cytotoxic peptides are composed of  $\beta$ -sheets, e.g., mammalian defensins, AbP, amylin, and PrP-(106–126), whereas the larger cytotoxic peptides have several domains composed of both  $\alpha$ -helices and  $\beta$ -sheets stabilized by cysteine bonds, e.g., scorpion toxins, scorpion, and insect defensins. Electrophysiological and molecular biology techniques indicate that these structures modify cell membranes via 1) interaction with intrinsic ion transport proteins and/or 2) formation of ion channels. These two nonexclusive mechanisms of action lead to changes in second messenger systems that further augment the abnormal electrical activity and distortion of the signal transduction causing cell death. .... Alignment of the sequence of the scorpion defensin with the sequences of insect defensins (20). The defensins were characterized from species belonging to three insect orders: Diptera (a), Coleoptera (b), and Odonata (c). The scorpion defensin is closely related to the *Aeschna* defensin (c). Dashes indicate gaps to optimize the alignment. Identical amino acids are boxed. Boxes in bold represent the identical residues between *Aeschna* and scorpion residues." (Authors)] Address: Kourie, J.I., Membrane Transport Group, Department of Chemistry, The Faculties, The Australian National University, Canberra City, Australian Capital Territory, 0200 Australia

**9615.** Nachtigall, W.; Kesel, A.B. (2000): Biologisch komponentierte Materialien und Systeme Schwerpunkt Biomimetische Materialien. *magazin forschung* 1/2000, Saarbrücken: 49-56. (in German) [The membrane of the wing of *Orthetrum cancellatum* is used to demonstrate the mechanical characterisation of biological materials, serving as a basis for the biomimetical development of new (industrial) materials.] Address: Kesel, Antonia, Department of Zoology, Technical Biology and Bionics, University of Saarland, 66041 Saarbrücken, Germany. E-mail: a.kesel@rz.uni-sb.de

**9616.** Palot, M.J.; Soniya, V.P. (2000): Odonata of Keoladeo National Park, Bharathpur, Rajasthan, India. *Zoos' Print Journal* 15(8): 317-320. (in English) [Sixteen odonate species are briefly documented from the Keoladeo National Park which is situated in the Indo-Gangetic flood plains in the Bharathpur District of Rajasthan, India.] Address: Soniya, Y.P., Zool. Survey of India, Freshwater Biological Station, 1-1-300/B Ashok Nagar, Hyderabad, Andhra Pradesh 500020, India

**9617.** Sankey, J. (2000): Key to adult damselflies of the Ottawa District. *Trail & Landscape* 34(1): 17-27. (in English) ["This article includes diagrams of damselfly body and wing anatomy and many detailed drawings of the features that allow one to distinguish among local species. Adapted from larger keys, especially The Odonata of Canada, and with illustrations prepared for Manuel d'identification des libellules du Québec." (Author)] Address: not stated

## 2001

**9618.** Bechly, G. (ed.) (2001): Die faszinierende Evolution der Insekten. *Stuttgarter Beiträge zur Naturkunde - Serie C (Wissen für alle)* 49: 94 pp. (in German) [The Book includes several well written brief introductions to different aspects of insect evolution and contains many references to Odonata.] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosen-

stein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**9619.** Berezina, N.A. (2001): Influence of ambient pH on freshwater invertebrates under experimental conditions. *Russian Journal of Ecology* 32(5): 343-351. (in English) ["In experimental mesocosms differing in water pH, the communities of macroinvertebrates demonstrated marked differences in their species composition and the quantitative ratios between the main groups of members (oligochaetes, chironomids, mollusks, etc.). The highest species diversity was recorded at pH 4.09–8.65. It proved to decrease at pH below 4 and above 9. In experiments on determining tolerance to water pH, seven groups of invertebrates differing in their adaptive potential were distinguished among 40 species found en masse in the freshwater zoobenthos and zooperiphyton of the Upper Volga basin." (Author) *Epitheca bimaculata* and *Libellula depressa* were used in laboratory experiments. In these species, pH-tolerance ranges from 4.5–9.0. Translated from *Ekologiya*, No. 5, 2001, pp. 372–381.] Address: Berezina, N.A., Papanin Institute of the Biology of Inland Waters, Russian Academy of Sciences, Borok, Nekouzskii raion, Yaroslavl oblast, 152742 Russia

**9620.** Keiler, J.-A.; Kovac, D. (2001): Travertininsekten. *Natur und Museum, Frankfurt* 131(6): 195-197. (in German) ["Includes a brief description of a Thuringian travertine rock, with an odonate larva incrustation (age 130.000-110.000 B.C.)."] Address: Keiler, J.-A., c/o Senckenberg. Naturf. Gesellschaft, Senckenberganlage 25, D-60325 Frankfurt/Main, Germany

**9621.** Kordges, T. (2001): Kalksteinbrüche in Wuppertal-Dornap: Eingriffsflächen mit Refugialfunktionen für gefährdete Tier- und Pflanzenarten. *Umweltschutz in Wuppertal*: 33-52. (in German) [The paper includes some general information on the dragonfly fauna of quarries and their habitat requirements.] Address: Kordges, T., Oekoplan, Hushmannshoferstr. 10, 45143 Essen, Germany. E-mail: thomas.kordges@oekopla-essen.de

## 2002

**9622.** Kadoorie Farm and Botanic Garden (2002): Report of Rapid Biodiversity Assessment at Heweishan Forest Farm, Southwest Guangdong, 4 to 5 May 1998. *South China Forest Biodiversity Survey Report Series (Online Simplified Version)* 6. KFBG, Hong Kong SAR: II + 15 pp. (in English) ["Sixteen species of dragonfly were encountered over the two-day period. The most frequently encountered was the ubiquitous *Pantala flavescens*. Unfortunately, apart from a species of Gomphinae awaiting identification, the most interesting dragonflies observed were two species of *Macromia* which could not be collected or identified in the field. The remaining thirteen species are all also known from Hong Kong, where (with the exception of the rare *Paragomphus capricornis*) they are all abundant to fairly common (K.D.P. Wilson, 1997). *P. capricornis* has not previously been recorded from Chinese territory outside of Hong Kong (K.D.P. Wilson, 1997), and is therefore a new provincial record." (K. D.P. Wilson)] Address: Kadoorie Farm and Botanic Garden Corporation, Lam Kam Road, Tai Po, N.T., Hong Kong SAR

**9623.** Kunkel, A.; Werner, W. (2002): Vergessen Sie Archaeopteryx! *aviso* 1/2002: 16-22. (in German) [The

papers reports on fraudulent falsification of fossils including an example of a dragonfly mounted on plates from the Lower Cretaceous of the Brazilian Santana-formation.] Address: not stated

**9624.** Malkmus, R. (2002): Die Libellen des Spessarts. Nachrichten des Naturwissenschaftlichen Museums der Stadt Aschaffenburg 106: 3-55. (in German, with English summary) ["Between 1990 and 1996 the dragonflies of the mountain range Spessart in Central Germany - an area of 3922 qkm, within the borderlines of the river Main, Sinn and Kinzig - were mapped. 47 species could be pointed out, 38 of them in established reproductive populations. Significant is the appearance of *Gomphus vulgatissimus*, *Cordulegaster bidentata*, *Somatochlora arctica*, and *Crocothemis erythraea*; rare *guesta* - some of them presumably reproducing - are the species *Aeshna affinis*, *Anaciaeschna isocoles*, *Brachytron pratense*, *Libellula fulva*, *Orthetrum brunneum*, *Sympetrum pedemontanum*, and *Leucorrhinia pectoralis*." (Author)] Address: Malkmus, R., Schulstr. 4, 98759 Wiesthal, Germany

**9625.** Rizali, A.; Buczori, D.; Triwidodo, H. (2002): Insect diversity at the forest margin-rice field interface: Indicator for a healthy ecosystem. Hayati 9(2): 41-48. (in English) ["This research was conducted in Gunung Halimun National Park, West Java. The influence of forest habitat toward insect diversity in rice field was shown. Samplings of insect species were done using pitfall trap, farmcop, malaise trap, and light trap. Altogether, there were 14 352 individual insects collected, which consist of 16 orders, 110 families, and 435 species. Based on analysis of their functional role, the insect complexes consist of 37.2% herbivores, 21.4% predators, 12.2% parasitoids, 6.2% detritivores, and 23.0% transient species. Our data further suggested that Chironomidae are dominating species on the rice field. Some of the transient species could potentially be used as indicator for healthy ecosystem. These are the Ephemeroptera, Trichoptera, Carabidae and Formicidae in rice field. Ephemeroptera and Trichoptera are bioindicators for water habitat whereas Carabidae and Formicidae for soil habitat." (Authors) Odonata are only represented by "Coenagrionidae".] Address: Rizali, A., Yayasan Peduli Konservasi Alam, Jalan Sirnasari II No. 12A, Sindangbarang, Bogor 16117, Indonesia. E-mail: kpkai@indo.net.id

### 2003

**9626.** Kadoorie Farm and Botanic Garden (2003): Report of a Rapid Biodiversity Assessment at Guan-yinshan Nature Reserve, Central Guangdong, China, August 2000. South China Forest Biodiversity Survey Report Series (Online Simplified Version) 30. KFBG, Hong Kong SAR: II + 19 pp. (in English) [29 species were recorded during the three-day survey. One of these (*Vestalis* sp.) remains unidentified. The presence of four calopterygids and two *Macromia* species indicates that streams in the study area were of high water quality. (G.T. Reels, K.D.P. Wilson)] Address: Kadoorie Farm and Botanic Garden Corporation, Lam Kam Road, Tai Po, N.T., Hong Kong SAR

**9627.** Mühle, R.-U. (2003): Tierleben: ein zoologischer Überblick zur Unteren Havelniederung. Brandenburgische Umwelt Berichte 13: 82-97. (in German) [Brandenburg, Germany. 17 Odonata species are briefly cha-

racterised with reference to ecology and habitats.] Address: Mühle, R.-U., Ökologische Station Gülpe, Universität Potsdam, 15715 Gülpe, Germany. E-mail: muehle@rz.uni-potsdam.de

**9628.** Strnadova, M.; Borstelmann, G. (2003): "Fliegende Edelsteine". Die Libellenwelt der Schlatts im Landkreis Diepholz. Stiftung Naturschutz Diepholz: 22 pp. (in German) [The paper focuses on the app. 40 Odonata species in the Landkreis Diepholz. Niedersachsen, Germany-region, and gives a brief introduction in biology, ecology and aesthetics of Odonata.] Address: <http://www.stiftung-naturschutz-diepholz.de/img/download/libelle.pdf>

### 2004

**9629.** Biologische Station Westliches Ruhrgebiet (2004): Grundlagenarbeiten (Kartierungen, Bestandsaufnahmen) und Konzeptentwicklung. Jahresberichte der Biologischen Station Westliches Ruhrgebiet 2003: 17-48. (in German) [Nordrhein-Westfalen, Germany; Legally protected sites were studied for their fauna and flora. Twenty eight Odonata species are included in the study. Regionally interesting species are briefly presented.] Address: Biologische Station Westliches Ruhrgebiet, Ripshorster Str. 306, 46117 Oberhausen, Germany. E-mail: info@bswr.de

**9630.** Fenoglio, S.; Bo, T.; Gallina, G.; Cucco, M. (2004): Vertical distribution in the water column of drifting stream macroinvertebrates. Journal of freshwater ecology 19(3): 485-492. (in English) ["We examined the macroinvertebrate composition and drift density in a Mediterranean lotic system, the Erro River (northwestern Italy). Drift density and composition were sampled for one year at three levels of the water column; temperature and flow velocity were also measured. We found that drift density was generally highest near the bottom. We also noticed that various taxa tended to drift at preferential levels of the water column, with 41.4 % of taxa mainly at the bottom level and 31.0% mainly at the top. Drift density decreased with increasing water temperature. Both taxa richness and macroinvertebrate abundance in the drift were positively associated with natural riverbed richness and abundance." (Authors) The list of taxa includes *Onychogomphus* sp.] Address: Fenoglio, S., University of Eastern Piedmont, Di.S.A.V., Via Cavour 84, 15100 Alessandria, Italy. E-mail: tenoglio@unipmn.it

**9631.** Windte, J.; Pfingsten, K.C. (2004): On 2D motion parameters for flapping wing propulsion. First European micro air vehicle conference and flight competition. Braunschweig, Germany, July 13 & 14, 2004: (in English) ["The paper discusses how to obtain favourable 2D motion parameters for a flapping wing propulsion system. To find parameter sets with a high propulsion efficiency, two different approaches are considered: A biomimic approach is undertaken, where the motion parameters of a dragonfly are derived from slow motion Im material of a dragonfly in search flight condition with a flight speed of  $U_1 = 1m/s$  and a Reynoldsnumber based on chord length of  $Re = 800$ . These are used to perform a Navier-Stokes-simulation of two moving airfoils representing the flow conditions at a position of  $2=3$  of the wingspan. Then, a generic approach is undertaken, in which simple motion forms are analysed systematically to achieve a basic understanding of the

generation of thrust. For this investigation the flight conditions of a dragonfly in fast forward flight at  $U_1 = 10\text{m/s}$  are studied. Both approaches result in a set of motion parameters which yield a good efficiency. They demonstrate two different ways to obtain essential knowledge for a potential propulsion system for micro air vehicles." (Authors)] Address: Windte, J., Institute of Fluid Mechanics, Technical University Braunschweig, Germany. E-mail: J.Windte@tu-bs.de

## 2005

**9632.** Albrecht, C.; Dworschak, U.; Esser, T.; Klein, H.; Weglau, J. (2005): Tiere und Pflanzen in der Rekultivierung. 40 Jahre Freilandforschung im Rheinischen Braunkohlerevier. Kapitel 4.1.10 Libellen (Odonata). Acta Biologica Benrodis Supplementband 10: 176-183. (in German) [A total of 42 odonate species was recorded in the brown coal mining region west of Köln, Nordrhein-Westfalen, Germany. Most of the data result from expertises from the late 1990th and early 2000th.] Address: Albrecht, C., Forschungsstelle Rekultivierung, Hackhausen 86, 41363 Jüchen. dr.albrecht@kbff.de

**9633.** Aletsee, M. (2005): Schutz und Renaturierung der "Palsen" als Grundlage für den Erhalt der Moorvegetation und gefährdeter Libellenarten im deutsch-belgischen Hohen Venn. Telma 35: 93-109. (in German, with English summary) ["The Hohe Venn contains a large number of so called palsen (mired relicts of paisa). Different types of oligotrophic and acidic mires have developed in the palsen. These mires often show a characteristic, radial ecological gradient. Simplified this gradient starts with a Sphagnum fallax-fazies, continues with an ombrotrophic stage of vegetation and ends in a central fen. Not influenced by humans these palsen are unique relict of a natural landscape with a large number of endangered species. They are very important especially as reproduction habitat for Odonata. On account of intensive drainage up to the middle of the 20th century a lot of palsen were influenced and some were destroyed. This paper points out the potential of renaturation of drained palsen by investigating the vegetation and by classifying the Odonata habitats by means of TWINSPAN-algorithm. In conclusion you can still find a reduced flora in restored palsen, but also an expansion of the typical, remained vegetation (Sphagnum fallax, Eriophorum angustifolium, Vaccinium oxycoccus). The marginal zone shows in both, flora and Odonata fauna, in one part more euryoecious species (Juncus effusus, Glyceria fluitans, Aeshna cyanea) and in the other part typical species of acid-dystrophic water (Carex echinata, C. canescens, Sphagnum fallax, Aeshna juncea, Leucorrhinia dubia, Coenagrion hastulatum, Sympetrum danae). On the other hand you can find highly specialized Odonata species like Aeshna subarctica and Somatochlora arctica as well as elements of the vegetation like Andromeda polifolia and Rhynchospora alba only in not by human influenced palsen." (Author)] Address: Aletsee, M., Obersteinstr. 38, 52223 Stolberg, Germany. E-mail: aletsee@rwth-aachen.de

**9634.** Biologische Station Westliches Ruhrgebiet (2005): Grundlagenarbeiten (Kartierungen, Bestandsaufnahmen) und Konzeptentwicklung. Jahresberichte der Biologischen Station Westliches Ruhrgebiet 2004: 17-82. (in German) [Nordrhein-Westfalen, Germany; Legally protected sites were studied for their fauna and flora. Thirty three Odonata species are included in the

study. Regionally interesting species are briefly presented.] Address: Biologische Station Westliches Ruhrgebiet, Ripshorster Str. 306, 46117 Oberhausen, Germany. E-mail: info@bswr.de

**9635.** Darwall, W.; Smith, K.; Lowe, T.; Vié, J.-C. (2005): The status and distribution of freshwater biodiversity in eastern Africa. IUCN SSC Freshwater Biodiversity Assessment Programme. IUCN, Gland, Switzerland and Cambridge, UK. Occasional Paper of the IUCN Species Survival Commission No. 31: viii + 36 pp. (in English) ["Biodiversity within inland water ecosystems in Eastern Africa is both highly diverse and of great regional importance to livelihoods and economies. However, development activities are not always compatible with the conservation of this diversity and it is poorly represented in the development planning process. One of the main reasons for inadequate representation of biodiversity is cited as a lack of readily available information on the status and distribution of inland water taxa. In a response to this need for information, the IUCN/SSC Freshwater Biodiversity Assessment Programme conducted a regional assessment of over 1,600 taxa of freshwater fishes, molluscs, odonates and crabs from Burundi, Kenya, Malawi, Rwanda, Tanzania and Uganda. In the process of the study, which is based on the collation and analysis of existing information, regional experts from five of these countries were trained in biodiversity assessment methods and, where appropriate, in field assessment and taxonomy. Distribution ranges have been mapped for the majority of species so providing an important tool for application to the conservation and development planning process. The full dataset is to be made freely available through the internet and through distribution on CD-ROM. Levels of regional endemism are notably high with 82% of fish and 74% of molluscs restricted to the region. Species diversity is also high and the major centres of diversity are the African Great Lakes of Malawi/Nyassa/Niassa, Tanganyika and Victoria, and in the Eastern Arc Mountain Range (for Odonata). Major threats are identified as loss and degradation of habitat, in particular from sedimentation due to deforestation and eutrophication, and the introduction of alien species. The centres of threatened species are the African Great Lakes and a number of East Coast river drainages. A major concern for the future is the potential impact of water resource developments such as for improved water supply, irrigation and provision of hydroelectric power. A gaps analysis found that inland waters are poorly protected within the existing Protected Areas network which is largely focused on terrestrial ecosystems. Forest Reserves were, however, observed to provide effective protection of watersheds at the headwaters of some river systems; it is recommended that their legal status be raised to provide a greater incentive for their effective management and for increasing the potential for attracting funds. Finally, it is most important that the data from this study are made available to the relevant decision makers and stakeholders in a format that can be easily understood and readily integrated within the decision making process. With this in mind a second major project has been initiated to extend the work to the rest of Africa and to develop a series of "Best Practice Guidelines" for the integration of biodiversity information within the development process." (Authors)] Address: IUCN Publications Services Unit, 219c Huntingdon Road, Cambridge CB3 0DL, UK. E-mail: books@iucn.org



- 9636.** Durdin, C. (2005): Recent wildlife highlights on Fenland nature reserves. Fenland Newsletter 3: 3. (in English) ["Small red-eyed damselfly *Erythromma viridulum* was recorded for the first time at the Ouse Washes in 2004. Seven males and a breeding pair were using the important ditch habitats on the reserve. This species is a recent colonist in Britain (first records 1999) and its spread from the continent is being linked to climate change." (Author)] Address: E-mail: chris.durdin@rspb.org.uk
- 9637.** Gillett, M.; Gillet, C. (2005): Insects & other arthropodes. In: Peter Hellyer and Simon Aspinall (Eds): The Emirates. A natural history. Trident Press Limited. The Environment Agency, Abu Dhabi, Dolphin Energy Limited. ISBN: 1-900724-74-X: 169-196. (in English) [Verbatim: "Although the early stages of dragonflies are totally dependent on fresh water, adult specimens can be found in a variety of habitats, including offshore islands and inland sand dunes. Indeed, for a desert country, the UAE has a remarkable and beautiful dragonfly fauna, reviewed most recently by Giles (1998), with some additions by Feulner (1999). Five species of damselflies (suborder Zygoptera) and 17 of dragonflies (suborder Anisoptera) are known from the Emirates with a further small number of species recognised from neighbouring areas of Oman and, therefore, also likely to be found in the UAE. After the Lepidoptera, the Odonata, including both damselflies and dragonflies proper, is probably the next most colourful insect group in the Emirates. Damselflies migrate at night, but during daytime they are usually not found far from water, as in the wadis of the Hajar Mountains. Particularly colourful damselflies include the endemic powder-blue damselfly *Arabicnemis caerulea* and the bright orange-red *Ceragrion glabrum*. Blues and red also predominate in the colours of the dragonflies. A striking example is the large and iridescent blue male of the emperor dragonfly *Anax imperator*, common wherever there is water for it to patrol. Equally large, the female is more dully coloured. The males of several species have red-dish-marked wings and bodies, such as the purple-blushed, gully and orange darter dragonflies (*Trithemis annulata*, *T. arteriosa* and *T. kirbyi*, respectively). The young stages of all species of Odonata are spent in fresh water. Eggs may be simply dispersed at random over water or the female may insert single eggs into slits cut into the stems of aquatic plants. After hatching, the nymphs may spend several years growing and developing in the water, before climbing out and giving rise to the mature winged insect in a final spectacular moult. Both young and adults are carnivorous. The adults of dragonflies are very fast and manoeuvrable predators that attack even large insects on the wing. After the adults hatch out, they often migrate vast distances to find feeding areas and new bodies of water for reproduction to begin anew."] Address: Gillett, M., Dept Biochemistry, FMHS, UAE University, P.O. Box 17666, AL Ain, U.A.E. E-mail: M.gillet@uaeu.ac.ae
- 9638.** Gröning, E.; Brauckmann, C. (2005): Neue Rekonstruktions-Zeichnungen von ausgewählten paläozoischen Gliederfüßern (Fluginsekten, Spinnentiere und Arthropodea). Virgo - Mitteilungsblatt des entomologischen Vereins Mecklenburg-Vorpommern 8: 21-25. (in German) [Five species are presented including *Namurotypus sippeli* Brauckmann & Zessin, 1989.] Address: Gröning, Elke, Institut für Geologie und Paläontologie, Technische Universität Clausthal, Leibnizstr. 10, D-38678 Clausthal-Zellerfeld, Germany. E-mail: groening@geologie.tu-clausthal.de
- 9639.** Lange, L. (2005): Ausgewählte Libellenfunde im Kreis Parchim aus den Jahren 2001-2003. Virgo - Mitteilungsblatt des entomologischen Vereins Mecklenburg-Vorpommern 8: 2-3. (in German) [30 Odonata species from various localities in the district Parchim (Mecklenburg-Vorpommern, Germany) are briefly documented.] Address: Lange, L., Deichreihe 21, 25599 Wewelsfleth, Germany
- 9640.** Liess, M.; von der Ohe, P.C. (2005): Analyzing effects of pesticides on invertebrate communities in streams. Environmental Toxicology & Chemistry 24(4): 954-965. (in English) ["The aim of this investigation was to find patterns in aquatic invertebrate community composition that are related to the effects of pesticides. Investigations were carried out in 20 central European streams. To reduce the site-specific variation of community descriptors due to environmental factors other than pesticides, species were classified and grouped according to their vulnerability to pesticides. They were classified as species at risk (SPEAR) and species not at risk (SPenotAR). Ecological traits used to define these groups were sensitivity to toxicants, generation time, migration ability, and presence of aquatic stages during time of maximum pesticide application. Results showed that measured pesticide concentrations of 1 : 10 of the acute 48-h median lethal concentration (LC50) of *Daphnia magna* led to a short- and long-term reduction of abundance and number of SPEAR and a corresponding increase in SPenotAR. Concentrations of 1 : 100 of the acute 48-h LC50 of *D. magna* correlated with a long-term change of community composition. However, number and abundance of SPEAR in disturbed stream sections are increased greatly when undisturbed stream sections are present in upstream reaches. This positive influence compensated for the negative effect of high concentrations of pesticides through recolonization. The results emphasize the importance of considering ecological traits and recolonization processes on the landscape level for ecotoxicological risk assessment." (Authors) Nine Odonata families and *Platycnemis pennipes*, *Aeshna cyanea* and *Cordulegaster boltonii* are classified as invertebrate at risk of being affected by pesticides.] Address: Liess, M., UFZ—Centre for Environmental Research, Permoserstr. 15, D-04318 Leipzig, Germany. E-mail: matthias.liess@ufz.de
- 9641.** Minniti, M. (2005): Biotopi di Odonata Anisoptera nel Lazio e nella Toscana. Atti Mus. Stor. nat. Maremma 21: 3-13. (in Italian, with English summary) [Records of Anisoptera from seven localities in Lazio (n = 10) and four in Toscana (n = 13 taxa) are outlined. Most interesting is a record of *Lindenia tetraphylla* from Lago dell'Accesa, Toscana.] Address: Minniti, M., Via del Giordano 19, 00144 Roma, Italy
- 9642.** Packauskas, R.J. (2005): Hudsonian Emerald Dragonfly (*Somatochlora hudsonica*): A technical conservation assessment. Prepared for the USDA Forest Service, Rocky Mountain Region, Species Conservation Project: 38 pp. (in English) ["*S. hudsonica* appears to be an uncommon species, both from the standpoint of its encounters with human beings as well as the number of specimens found in collections. Very little historical information or primary literature exists for this dragonfly, and it has never been studied in depth. Although the species is reported to be widely distributed across

Canada (Dunkle 2000), the only records of its occurrence in the continental United States place it at seven locales in Colorado, possibly three in Wyoming, and one in Montana. Most records are over 30 years old, and little or no documented collecting has been done at these sites since the originals. The paucity of records for this species, which may be due to a lack of collecting in areas where the species may occur, makes it suspect as a species of special concern. At this time, however, there is limited scientific evidence that either alleviates or warrants concern for its viability. The Hudsonian emerald dragonfly is considered a sensitive species in the Rocky Mountain Region of the USDA Forest Service. Primary Threats: As with other dragonflies, the main threat to the viability of this species would be the degradation of its aquatic habitat. Trees are an important component of areas surrounding the aquatic habitats of the Hudsonian emerald dragonfly since they provide areas for prey foraging by adults as well as shade that maintains lower water temperatures. Trees may also serve as mating areas. The loss of trees can occur through timber harvest, fuel reduction, or wildfires. Grazing by livestock may decrease perching or emergence vegetation for this species as well as degrade the aquatic habitat by increasing sedimentation. Sedimentation may also occur as a result of road construction or clear cutting. Tree harvest, grazing, and road construction can also help to produce nutrient runoff, increasing nutrient loads to the aquatic habitat, thus producing eutrophication. Use of pesticides, like piscicides and herbicides, can also serve to decrease population densities of the Hudsonian emerald dragonfly as well as populations of prey species when these chemicals enter the aquatic environment. Primary Conservation Elements, Management Implications and Considerations: Since this species is known from only a few limited areas, those areas and nearby aquatic habitats should be protected from management practices that would adversely affect them until more information on this species is forthcoming. Since the largest proportion (possibly 80 percent or more) of this species' life cycle is spent as larvae in the water, these aquatic stages are the most important to preserve in order to produce reproducing populations. Land management practices done in or around the areas currently inhabited by this species must be done thoughtfully to have as little impact on the aquatic habitats as possible. Adaptive land management methodologies, such as adjusting livestock grazing regimes in riparian or wetland areas, creating alternative livestock watering sources, and leaving timber harvest and fuel reduction buffers around known aquatic habitats for this species may be warranted. The main conservation focus should be to keep the known aquatic habitats (given in this paper) in mind when proposing management of any kind in these areas." (Author) The full paper is available at: <http://www.fs.fed.us/r2/projects/scp/assessments/hudsonianemeralddragonfly.pdf> Address: Packauskas, R.J., Dept. Biol. Sc., Fort Hays State Univ., 600 Park Str., Hays, Kansas 67601, USA

**9643.** Schachtner, J.; Schmidt, M.; Homberg, U. (2005): Organization and evolutionary trends of primary olfactory brain centers in Tetraconata (Crustacea + Hexapoda). *Arthropod Structure & Development* 34: 257-299. (in English) ["The olfactory lobes of crustaceans and the antennal lobes of insects are the primary olfactory brain centers in Tetraconata. Recent publications considered the apparent lack of olfactory centers in se-

veral crustacean and insect taxa and structural differences in the organization of olfactory and antennal lobes as evidence for an independent origin of both brain areas. In depth comparison of species within and across tetraconate taxa, however, rather demonstrates that many characters of the organization of tetraconate olfactory centers are shared even among distantly related clades, but have been modified in various taxon-specific ways. From the available data and from comparison with the situation in chilopods, a closely related mandibulate outgroup, we conclude that an olfactory lobe organized into spheroidal glomeruli is a plesiomorphic character of the tetraconate brain. Shared features between decapod crustaceans and neopteran insects are cholinergic uniglomerular afferent neurons, a single large serotonin-immunoreactive neuron, multiglomerular GABAergic local interneurons, and projection neurons of similar morphology. Taxonspecific apomorphies include loss of olfactory sensilla and olfactory lobes in palaeopteran insects, certain branchiopod, maxillopod, and isopod crustaceans, profound changes in glomerular architecture in decapod crustaceans, and decomposition of glomerular boundaries in orthopteroid insects. In holometabolous insects, olfactory afferent projections from mouthpart sensilla are integrated into the antennal lobe and an increased tendency of contralateral connections is observed in lepidopterans and dipterans. Sexual dimorphism of antennal lobes, prominent in several neopteran insects, has most likely occurred convergently, and is not observed in malacostracan crustaceans." (Authors) In Fig. 5, the agglomerular area in the brain receiving sensory input from the antennae of *Hemicordulia tau* is shown; this area is innervated by AST-A-ir fibers originating partly from cell bodies in a medial cell group.] Address: Homberg, U., FB Biologie, Tierphysiologie, Universität Marburg, D-35032 Marburg, Germany. E-mail: [homberg@staff.uni-marburg.de](mailto:homberg@staff.uni-marburg.de)

**9644.** Schiess, H. (2005): *Schmetterlinge und Libellen in der Schwantenuau*. Franz Kälin AG. Einsiedeln. ISBN 3-9523062-0-7: 135 pp. (in German) [Einsiedeln, Kanton Schwyz, Switzerland; 20 Odonata species are illustrated and briefly introduced.] Address: Druckerei Franz Kälin AG, Kornhausstr. 22, CH-8840 Einsiedeln, Switzerland

**9645.** Terzani, F.; Marconi, A.; Carletti, B. (2005): *Odonati raccolti dal 1971 al 1986 e depositati nel Museo Zoologico dell'Università di Firenze (Odonata)*. *Atti Mus. Stor. Nat. Maremma* 21: 39-48. (in Italian, with English summary) [A collection of 109 odonate specimens from Somaliland has been studied. It resulted in a list of 29 species. New additions for Somaliland are *Hemistigma albipuncta*, *Orthetrum guineense*, and *Trithemis pluvialis*. An updated list of the dragonflies of Somaliland is provided.] Address: Terzani, F., Museo Zoologico "La Specola" dell'Università di Firenze, Via Romana, 17, I-50125 Firenze, Italy. E-mail: [tterza@tin.it](mailto:tterza@tin.it)

**9646.** Zessin, W. (2005): *Bilder aus der Geschichte des Schweriner Zoos* (15). *Ursus, Schwerin* 11(1): 81-84. (in German) [The paper includes photographs of participants of the 16th International Symposium of Odonatology, held on 28-VII-2004 in Schwerin, Germany.] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: [zessin@zoo-schwerin.de](mailto:zessin@zoo-schwerin.de)

**9647.** Aletsee, M. (2006): Libellen - rasante Flieger über den Gewässern. In: Heiko Schumacher, Frauke Severit (Red.): Tiere und Pflanzen im Nationalpark Eifel. Ein Begleiter durch Wald, Wasser und Wildnis. Verlagsgruppe Bachem. ISBN: 3761620055: 319 pp. (in German) [General view on the Odonata fauna (n=20 species) of the Nationalpark Eifel, situated in Nordrhein-Westfalen, Germany.] Address: Aletsee, M., Obersteinstr. 38, 52223 Stolberg, Germany. E-mail: aletsee@rwth-aachen.de

**9648.** Benstead, P. (2006): Casual observations of Odonata recorded in Cambodia in 2005 and 2006. *Malangpo* 21: 218-220. (in English) ["The Odonate fauna of Cambodia is poorly known, the list for the country presented in Tsuda (2000) is incomplete and many widespread Indochinese species are missing. This short note hopes to fill some of these gaps. The author recently made two three-day visits to Cambodia and spent some time identifying Odonata. The trips took place in March 2005 and March 2006 and cumulatively 27 species of Odonata were recorded. Visual observations were in most cases backed up by photographic records. No specimens were taken." (Author)] Address: Benstead, P., The Old Stables, Church Street, Reepham, Norwich. NR10 4JW, UK. E-mail: phil.benst01@tesco.net

**9649.** Biologische Station Westliches Ruhrgebiet (2006): Grundlagenarbeiten (Kartierungen, Bestandsaufnahmen) und Konzeptentwicklung. Jahresberichte der Biologischen Station Westliches Ruhrgebiet 2005: 19-85. (in German) [Nordrhein-Westfalen, Germany; Legally protected sites were studied for their fauna and flora. Twenty four Odonata species are included in the study. Regionally interesting species are briefly presented.] Address: Biologische Station Westliches Ruhrgebiet, Ripshorster Str. 306, 46117 Oberhausen, Germany. E-mail: info@bswr.de

**9650.** Buchwald, R.; Manzi, A.; Hunger, H. (2006): Habitatwahl von *Lestes dryas* und *Sympetrum flaveolum* in mittelitalienischen Karst-Hochebenen. In: Buchwald, R. (Hrsg.) (2006): Habitatwahl, Fortpflanzungsverhalten und Schutz mitteleuropäischer Libellen (Odonata). Ergebnisse der 23. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen (GdO), 19.-21.3. 2004, Oldenburg. ISBN: 3-89995-278-2. 128 pp: 15-26. (in English, with German and Italian summaries) ["In numerous, both permanent and ephemeral (summer-dry) standing waters of karst plateaus of Central Italy, we studied the effect of various factors regarding their structure, hydrology, and vegetation on abundance, frequency, and reproduction of the odonate species *L. dryas* and *S. flaveolum*. Both species occur in a wide variety of waters and habitat types - however, with significant differences in frequency and abundance. The imagoes prefer waters with shallow shores which are covered by (brownish- or yellowish-) green vegetation dominated by the growth forms "rushes" (or similar) and "sedges". The vegetation height exceeds (30-) 35 cm (*L. dryas*) respectively 20 cm (*S. flaveolum*) along the edges and (30-) 35 cm (*L. dryas*) respectively (25-) 30 cm (*S. flaveolum*) in the central depressions. Compared to vegetation aspect and -colour and vegetation height in the central depressions, other parameters (e.g., area size, water level at the time of oviposition, density and cover of the vegetation, soil colour) play a subdominant

or no role at all for the colonisation by the studied species. These results are congruent with those from other regions of Europe to the greatest possible extent. From our findings, we derive a habitat selection hypothesis for the two species. This hypothesis should be tested by carrying out experiments designed to study the importance of each parameter individually." (Authors)] Address: Buchwald, R., Universität Oldenburg, Institut für Biologie und Umweltwissenschaften (IBU), 26111 Oldenburg, Germany. E-mail: rainer.buchwald@uni-oldenburg.de

**9651.** Ewers, M.; Buchwald, R. (2006): *Orthetrum coerulescens* zwischen Weser und Ems - Bestandssituation, Ökologie und Schutzmöglichkeiten. In: Buchwald, R. (Hrsg.) (2006): Habitatwahl, Fortpflanzungsverhalten und Schutz mitteleuropäischer Libellen (Odonata). Ergebnisse der 23. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen (GdO), 19.-21.3. 2004, Oldenburg. ISBN: 3-89995-278-2. 128 pp: 84-91. (in German, with English summary) ["Actually only two populations of *O. coerulescens* are known in the Region Weser-Ems (western Lower Saxony, Germany). In the Börstel Forest (Lkr. Osnabrück) the species reproduces in a ditch, a spring brook and some ponds in a heath bog with *Erica tetralix*] the breeding habitats are characterized by flowing, summer-warm, acid water with low content of bases. In the Meerkanal (Lkr. Oldenburg), an outflow of a natural lake, a big population was detected in 1997 and intensively studied in 1999 and 2002. In a section of 900 meters up to 118 territorial males were counted showing a maximum abundance between 13.00 and 14.30 o'clock. The maximum density of males was observed in sections with little or no shade, medium velocity of flow, rich floating vegetation (e.g. *Potamogeton alpinus*), and adjacent extensive meadows/pastures or heaths. Despite the different structure of their water bodies and their vegetation, the two habitats have some characteristics in common, above all high water temperatures in winter and summer, open and flowing water courses, a small or medium cover of helophytes and hydrophytes and an extensive use of the surrounding landscape. In order to improve the situation of *O. coerulescens* in the study region it is proposed to keep open the breeding waters and to (re)create appropriate flowing waters near the two actual populations." (Authors)] Address: Buchwald, R., Universität Oldenburg, Institut für Biologie und Umweltwissenschaften (IBU), 26111 Oldenburg, Germany. E-mail: rainer.buchwald@uni-oldenburg.de

**9652.** Gärtner, E.; Karsch, U.; Prysitt, K.-P.; Scherzer, H. (2006): Libellenfauna im NSG Helstorfer Moor (Hannoversche Moorgeest) - Lebensraum der Zwerglibelle (*Nehalennia speciosa*). In: Buchwald, R. (Hrsg.) (2006): Habitatwahl, Fortpflanzungsverhalten und Schutz mitteleuropäischer Libellen (Odonata). Ergebnisse der 23. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen (GdO), 19.-21.3. 2004, Oldenburg. ISBN: 3-89995-278-2. 128 pp: 106-113. (in German, with English summary) ["The Helstorfer Moor, a small bog north of Hannover (Lower Saxony, Germany), has been exploited by peat cutting over some centuries. In a two-year-inventarisation 35 dragonfly species (Odonata) were found, among these many rare typical species of peat bogs (sensu Eb. SCHMIDT). After one single male had been discovered by Prysitt, in 2003 a large population of the Graceful Dragonfly (*Nehalennia speciosa*) was found in the Helstorfer Moor,



situated in a distance of about 20 km from another population near Hannover. The imagoes of this species predominantly occur in the northern part of the bog, where the peat waters are hydrologically influenced by flowing water and/or adjacent springs. In the small larval ponds the Small Water-Hose (*Utricularia minor*) is the characteristic plant species. The peat water is strongly or weakly acid, the conductivity is below 100  $\mu$ S. The imagoes of *Nehalennia* were found in sections dominated by the Whistle Grass (*Molinia caerulea*), in part mixed with sparse stands of trees (*Pinus silvestris*, *Betula pubescens*). The habitat is part of a Nature Reserve of 410 hectares, well protected against external detrimental influences." (Authors)] Address: Gärtner, E., Drosselgasse 14, 31139 Hildesheim, Germany

**9653.** Geißler-Strobel, S.; Trautner, J.; Jooß, R.; Hermann, G.; Kaule, G. (2006): Informationssystem Zielartenkonzept Baden-Württemberg. Ein Planungswerkzeug zur Berücksichtigung tierökologischer Belange kommunalen Praxis. Naturschutz und Landschaftsplanung 38(12): 361-369. (in German, with English summary) ["Information System Target Species Concept in Baden-Württemberg- Tool to consider faunistic concerns in local planning practice This System is a web-based planning tool for designing zoological conservation and development concepts for target species. Intended to start in December 2006, it will be available within the web-space of the governmental 'Authority of Environment. Measurements and Nature Conservation' ([www.lubw.baden-wuerttemberg.de](http://www.lubw.baden-wuerttemberg.de)). Target groups for the tool are local and regional authorities and their departments for planning, environmental protection and forestry as well as zoologists commissioned to produce expert reports. The planning tool has been developed to improve consideration of the essential aims of the Target Species Concept in municipal landscape planning. The tool assesses expert knowledge on the distribution and ecology of about 330 selected animal target species, applying the approach of assigning special conservation responsibilities for target species to local communities. The planning methodology derived from this knowledge supports the first steps of a planning process towards species and habitat oriented measures but it does not replace zoological investigations. In combination with the planning tool a two step approach to design community-based conservation concepts for target species has been developed and already tested to some extent. The first step allows to evaluate planning priorities and the relevance of many types of measures for the local area without extensive field work. This preliminary evaluation is based on the tool output, an overview inspection by qualified zoologists, and the analysis of existing faunistic data. The results of the first step can be used as a rough framework for action, particularly for the development of local landscape plans and of qualified "eco-accounts". The second step aims to specify the preliminary results more precisely e.g. concerning selected parts of a local community. This step generally requires additional field data. Partial results can be integrated as separate modules." (Authors) The paper refers to *Coenagrion mercuriale* and *Orthetrum coerulescens*.] Address: Geißler-Strobl, Sabine, Jahnstr. 15, 72070 Tübingen, Germany. E-Mail [geissler-strobel@t-online.de](mailto:geissler-strobel@t-online.de)

**9654.** Hall, L.W.; Killen, W.D.; Anderson, R.D. (2006): Characterization of benthic communities and physical habitat in the Stanislaus, Tuolumne, and Merced Rivers,

California. Environmental Monitoring and Assessment 115: 223-264. (in English) ["The primary goal of this study was to characterize physical habitat and benthic communities (macroinvertebrates, including Odonata) in the Stanislaus, Tuolumne and Merced Rivers in California's San Joaquin Valley in 2003. These rivers have been listed as impaired water bodies (303 (d) list) by the State of California due to the presence of organophosphate (OP) insecticides chlorpyrifos and diazinon, Group A pesticides (i.e., organochlorine pesticides), mercury, or unknown toxicity. Based on 10 instream and riparian physical habitat metrics, total physical habitat scores in the Stanislaus River ranged from 124 to 188 (maximum possible total score is 200). The highest total habitat score was reported at the upstream site. Tuolumne River physical habitat scores ranged from 86 to 167. Various Tuolumne River physical habitat metrics, including total habitat score, increased from downstream to upstream in this river. Merced River physical habitat scores ranged from 121 to 170 with a significant increase in various physical habitat metrics, including total habitat score, reported from downstream to upstream. Channel flow (an instream metric) and bank stability (a riparian metric) were the most important physical habitat metrics influencing the various benthic metrics for all three rivers. Abundance measures of benthic macroinvertebrates (5,100 to 5,400 individuals) were similar among the three rivers in the San Joaquin watershed. Benthic communities in all three rivers were generally dominated by: (1) Baetidae species (mayflies) which are a component of EPT taxa generally considered sensitive to environmental degradation; (2) Chironomidae (midges) which can be either tolerant or sensitive to environmental stressors depending on the species; (3) Ephemerellidae (mayflies) which are considered sensitive to pollution stress; and (4) Naididae (aquatic worms) which are generally considered tolerant to environmental stressors. The presence of 117 taxa in the Stanislaus River, 114 taxa in the Tuolumne River and 96 taxa in the Merced River implies that the benthic communities in these streams are fairly diverse but without a clear definition of benthic community expectations it is unknown if these water bodies are actually impaired." (Authors)] Address: Hall, L.W., Agricultural Experiment Station, Wye Research and Education Center, University of Maryland, Queenstown, MD, USA

**9655.** Joger, U. (2006): In Memoriam Peter Lenk (26 March 1964 – 23 November 2005). Salamandra 42(4): 193-196. (in English) [Obituary for a regionally known German resp. Bavarian odonatologist.] Address: Joger, U., Staatliches Naturhistorisches Museum, Pockelsstr. 10, 38106 Braunschweig, Germany, E-Mail: [ulrich.joger@snhm.niedersachsen.de](mailto:ulrich.joger@snhm.niedersachsen.de).

**9656.** Khaleghizadeh, A.; Sehhatibet, M.E. (2006): Contribution of the knowledge of the diet of Iranian birds. Ekologia 15: 145-150. (in English, with Russian summary) [The diet of the Black Frankolin (*Francolinus francolinus*) also includes Odonata.] Address: Khaleghizadeh, A., Ornithology Laboratory, Agricultural Zoology Research Department, Iranian Research Institute for Plant Protection, PO Box 1454, Tehran 19395, Iran. E-mail: [akhaleghi@adeh@yahoo.com](mailto:akhaleghi@adeh@yahoo.com)

**9657.** LeRoy Poff, N.; Olden, J.D.; Vieira, N.K.M.; Finn, D.S.; Simmons, M.P.; Kondratieff, B.C. (2006): Functional trait niches of North American lotic insects: traits-based ecological applications in light of phylogenetic relationships. J. N. Am. Benthol. Soc. 25(4): 730-

755. (in English) ["The use of species traits to characterize the functional composition of benthic invertebrate communities has become well established in the ecological literature. This approach holds much potential for predicting changes of both species and species assemblages along environmental gradients in terms of traits that are sensitive to local environmental conditions. Further, in the burgeoning field of biomonitoring, a functional approach provides a predictive basis for understanding community-level responses along gradients of environmental alteration caused by humans. Despite much progress in recent years, the full potential of the functional traits-based approach is currently limited by several factors, both conceptual and methodological. Most notably, we lack adequate understanding of how individual traits are intercorrelated and how this lack of independence among traits reflects phylogenetic (evolutionary) constraint. A better understanding is needed if we are to make the transition from a largely univariate approach that considers single-trait responses along single environmental gradients to a multivariate one that more realistically accounts for the responses of many traits across multiple environmental gradients characteristic of most human-dominated landscapes. Our primary objective in this paper is to explore the issue of inter-trait correlations for lotic insects and to identify opportunities and challenges for advancing the theory and application of traits-based approaches in stream community ecology. We created a new database on species-trait composition of North American lotic insects. Using published accounts and expert opinion, we collected information on 20 species traits (in 59 trait states) that fell into 4 broad categories: life-history, morphological, mobility, and ecological. First, we demonstrate the importance of considering how the linkage of specific trait states within a taxon is critical to developing a more-robust traits-based community ecology. Second, we examine the statistical correlations among traits and trait states for the 311 taxa to identify trait syndromes and specify which traits provide unique (uncorrelated) information that can be used to guide trait selection in ecological studies. Third, we examine the evolutionary associations among traits by mapping trait states onto a phylogenetic tree derived from morphological and molecular analyses and classifications from the literature. We examine the evolutionary lability of individual traits by assessing the extent to which they are unconstrained by phylogenetic relationships across the taxa. By focusing on the lability of traits within lotic genera of Ephemeroptera, Plecoptera, and Trichoptera, taxa often used as water quality indicators, we show how a traits-based approach can allow a priori expectations of the differential response of these taxa to specific environmental gradients. We conclude with some ideas about how specific trait linkages, statistical correlations among traits, and evolutionary lability of traits can be used in combination with a mechanistic understanding of trait response along environmental gradients to select robust traits useful for a more predictive community ecology. We indicate how these new insights can direct the research in statistical modeling that is necessary to achieve the full potential of models that can predict how multiple traits will respond along multiple environmental gradients." (Authors) Odonata taxa are treated at the genus level.] Address: LeRoy Poff, N., Department of Biology and Graduate Degree Program in Ecology, Colorado State University, Fort Collins, Colorado 80523 USA. E-mail: poff@lamar.colostate.edu

**9658.** Luck, J. (2006): Dragonflies and damselflies – Sussex 2006. *Adastra* 2006: 19-20. (in English) [Records of the locals *Erythromma viridulum*, *Lestes dryas* and the immigrants *Anax parthenope*, *Aeshna affinis*, and *Sympetrum fonscolombii* are briefly reported. In regard to the Sussex Rare Species Inventory, *Platycnemis pennipes*, *Brachytron pratense*, and *Sympetrum sanguineum* were removed for the encouraging reason that they had become more common. The report includes a brief report on current research on the distribution of *Libellula fulva*, and the announcement of a lecture held by Dave Chelmick.] Address: Luck, J., 4 Mill View, Ringmer, East Sussex BN8 5EP, UK. Email: johnluck@gotadsl.co.uk

**9659.** Malkmus, R. (2006): Zur Verbreitung von Amphibien, Reptilien und Libellen in den Ostalpen (4. Nachtrag). *Nachrichten des naturwissenschaftlichen Museum der Stadt Aschaffenburg* 108: 55-67. (in German, with English summary) [Odonate records (including *Aeshna caerulea*, *Somatochlora alpestris*, *S. arctica*) from Überschalljoch, Karwendel, Hirzkarsee, Dachstein, and Schladminger Tauern, Austria are briefly documented.] Address: Malkmus, R., Schulstr. 4, 98759 Wiesthal, Germany

**9660.** Malkmus, R. (2006): Herbstbeobachtungen an Libellen in Ost-Portugal. *Nachrichten des naturwissenschaftlichen Museum der Stadt Aschaffenburg* 108: 25-31. (in German, with English summary) ["During a journey to the eastern parts of Portugal in November 2004 six species of Odonata were recorded. In the mid of this month 3 species (*Lestes viridis*, *Aeshna mixta*, *Sympetrum striolatum*) were observed at oviposition. Several new distribution data could be located for *Aeshna cyanea* and *Aeshna mixta*." (Author)] Address: Malkmus, R., Schulstr. 4, 98759 Wiesthal, Germany

**9661.** Martens, A. (2006): Paarungssysteme bei Libellen - aktueller Kenntnisstand und offene Fragen. In: Buchwald, R. (Hrsg.) (2006): *Habitatwahl, Fortpflanzungsverhalten und Schutz mitteleuropäischer Libellen (Odonata)*. Ergebnisse der 23. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen (GdO), 19.-21.3. 2004, Oldenburg. ISBN: 3-89995-278-2. 128 pp: 30-32. (in German, with English summary) ["A brief review is given on new findings on sperm competition and related aspects in dragonflies since 1999." (Author)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**9662.** Michalsky, J. (2006): Dragons & Damsels. *Paradise Magazine - in flight with Air Niugini* 203(6): 46-50. (in English) [The author reports on his fascination of Papua New Guinean dragonflies, gives some general information on biology and ecology of Odonata, and outlines some facts on rare or specialised species inhabiting the country.] Address: not stated

**9663.** Monteiro, B.R. (2006): Distribuicao dos lepidopteros o odonatas da Reserve Natural da Serra da Malcata. *Depto Biol., Univ. Avciro*: 121 pp.. (in Portuguese) [Portugal; the paper includes distribution maps of 22 odonate species (including e.g. *Macromia splendens*, *Oxygastra curtisii*, *Pyrrhosoma nymphula*, *Coenagrion caerulescens*) in the Reserve.] Address: not stated

**9664.** Ngai, J.T.; Srivastava, D.S. (2006): Predators accelerate nutrient cycling in a bromeliad ecosystem. *Science* 314: 963. (in English) ["The availability of nutri-

ents in ecosystems is determined by resource supply and recycling rates and affects important ecosystem properties (1–3). The relative roles of abiotic supply and food web configuration in determining resource-processing rates remain contentious and poorly understood. Under anthropogenic pressure, ecosystems are predicted to lose predators disproportionately, affecting ecosystem processes (4). Current ecological theory predicts that predator loss will affect nutrient cycling by changing prey abundance (density-mediated effects, as in a trophic cascade) (5) or prey foraging efficiency (trait-mediated effects) (6). These changes can further affect nutrient cycling by altering the species composition or size structure of the prey community. In this study, we examined the effects of predators on nutrient cycling by using the detritus-based insect community in bromeliads. We demonstrate that predation can have counterintuitive effects on nutrient cycling. Leaves of tank-forming bromeliads (e.g., *Vriesea* and *Guzmania* genera) are tightly interlocking, forming wells that collect water and leaf litter and provide habitat for aquatic insect larvae. The detritus not only supports the insect community but also provides a source of nutrients for the bromeliad. A natural gradient also exists in predation where the major predator, a damselfly larva (*Mecistogaster modesta*), becomes more abundant as the plant grows. Although it has been hypothesized that aquatic insects increase nutrient flux to the bromeliad, this relationship has never been documented. First, we ran fertilization experiments to determine whether nitrogen (N) or phosphorus (P) limit the productivity of the plant and insect components of this ecosystem. (7). Both tissue nutrient ratios and fertilization experiments showed that N, rather than P, primarily limits productivity of bromeliads and can limit insect productivity [Supporting Online Material (SOM) text and tables S1 and S2], so we focused on the effects of trophic structure on N cycling. Leaf detritus enriched in  $^{15}\text{N}$  was used to trace the movement of N through the food web in bromeliads containing either no insects, detritivores only, or detritivores and predators. The presence of detritivores alone did not affect the amount of N entering bromeliads from the enriched detritus (Fig. 1A). However, in the presence of both detritivores and predators, there was a significant enrichment in  $^{15}\text{N}$  in bromeliad leaves compared with plants containing detritivores alone, indicating that the presence of predators increased the flow of N from litter to bromeliads. This is surprising given that previous studies, consistent with the predictions of density or trait-mediated effects, have shown that predators decrease litter decomposition by reducing detritivore abundance (8) or by decreasing the foraging rate (9) of detritivorous arthropods. We hypothesize that the detritivorous insects, which pupate relatively rapidly, constitute a loss of litter-derived N for bromeliads when they emerge. A survey indicated that detritivorous insects generally have higher N:P ratios than those found in typical litter (Fig. 1B), suggesting that, as leaf litter is consumed, the insects will preferentially retain N in their body tissues and release P. Predation by longer-lived damselfly larvae converts the mobile pool of N contained in detritivores into fecal pellets that can be decomposed by microbes or leached to release N in a form available to the bromeliad. Thus, insects facilitate nutrient uptake by the plant, but only if both predators and detritivores are present. These results emphasize the importance of the temporal and spatial scales of dispersal for nutrient flux. The emergence of adult insects means that, although detritivores increase re-

source flux over larval time scales by releasing nutrients from litter, these insects act as a nutrient sink for bromeliads over their entire life span. The faster emergence rate of detritivores compared with that of predators allows predation to reduce the loss of N from the bromeliad. Although we use insects in bromeliads to examine biotic effects on nutrient cycling, our results can give insights into other systems where mobility differs between trophic levels. Some trophic interactions, for instance, involve migratory and nonmigratory species or species that undergo ontogenetic niche shifts. This mechanism may also apply if the prey species has a very different range size than its predator. Given the increased extinction risk of higher trophic levels, understanding the mechanisms whereby predators drive important ecosystem processes is critical in predicting anthropogenic impacts on natural systems." (Authors)] Address: Ngai, Jacqueline, Department of Zoology, University of British Columbia, 6270 University Boulevard, Vancouver, British Columbia V6T 1Z4, Canada. E-mail: ngai@zoology.ubc.ca

**9665.** Röske, W. (2006): Artenschutz mit Tradition: Coenagrion mercuriale in Baden-Württemberg. In: Buchwald, R. (Hrsg.) (2006): Habitatwahl, Fortpflanzungsverhalten und Schutz mitteleuropäischer Libellen (Odonata). Ergebnisse der 23. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen (GdO), 19.-21.3. 2004, Oldenburg. ISBN: 3-89995-278-2. 128 pp: 54-58. (in German, with English summary) ["Since the early 1990s, a continuous species protection project for *C. mercuriale* has been carried out in the administrative region of Freiburg (federal state of Baden-Württemberg, south-western Germany). The main topics of this project are public relations work, the organisation of concrete measures, and the monitoring of the populations. The primary objectives of the programme are described, and information on funding, on the type of management actions taken, and on the population development of *C. mercuriale* is given." (Author)] Address: Röske, W., Hofmatte 22, 79232 March, Germany. E-mail: Wolfgang.Roeske@ifo-freiburg.de

**9666.** Sauer, H. (2006): Rudolf Malkmus zum 65. Geburtstag. Zeitschrift für Feldherpetologie 13: 1-12. (in German) [R. Malkmus, Aschaffenburg, Bayern, Germany is a profiled herpetologist who also has published several odonatological papers.] Address: Sauer, H., Berliner Straße 65, D-63619 Bad Orb, Germany

**9667.** Schiel, F.-J. (2006): Bilanz des Artenschutzprojekts *Leucorrhinia pectoralis* in Baden-Württemberg. In: Buchwald, R. (Hrsg.) (2006): Habitatwahl, Fortpflanzungsverhalten und Schutz mitteleuropäischer Libellen (Odonata). Ergebnisse der 23. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen (GdO), 19.-21.3. 2004, Oldenburg. ISBN: 3-89995-278-2. 128 pp: 46-51. (in German, with English summary) ["*L. pectoralis* is a very rare species in the German federal state Baden-Württemberg. Stable, autonomous populations which do not depend on steady immigration of individuals from other populations exist exclusively in the southeastern region „Oberschwäbisches Hügel- und Moorland". As the species is listed in the Annexes II and IV of the European habitats directive, the populations of *L. pectoralis* in SW-Germany have been the subject of increased attention since 1997: Between 1997 and 2000, intensive investigations and management measures were financed by a LIFE-Nature-Project called "Endangered Dragonfly Species in SW-Germany". Dur-



ing the years 2001 through 2003, these actions were continued as projects financed by the "Bezirksstelle für Naturschutz und Landschaftspflege" Tübingen. The purpose of this paper is to evaluate the protection actions that have been taken during the last seven years. Since 1997, 67 management measures were undertaken in 14 different mire areas. The most urgent type of management action was the removal of dense vegetation from inhabited peat bogs (In 11 mires), followed by cutting trees and shrubs along the shorelines (in 8 mires), electrofishing (in 2 mires), and mowing of dense reed vegetation (*Phragmites australis*), removal of eutrophicated soil and extensification of grassland utilization in the surrounding of 1 reproduction site, respectively. Only in three mires the management measures showed no success so far, two of which are situated in a distance of many kilometres from the margin of the populated area and therefore more or less isolated. At all sites in which small populations were still present when the implementation of management measures started, the number of individuals of *L. pectoralis* increased on account of the actions taken. Whereas, in 1997, the species was recorded in only 20 peat waters located in 9 mires, it reproduced in 40 peat waters of 12 mires in 2003. These findings show that the balance of the species protection project *L. pectoralis* is positive. Nevertheless, further management actions will remain absolutely necessary in order to guarantee the long-term survival of the species in Baden-Württemberg. It is recommended to employ Wildermuth's rotation model, which has been successfully tested over many years in Switzerland." (Author) Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**9668.** Schmidt, E. (2006): Zur Odonatenfauna von Freizeit-Angelteichen im Westmünsterland. In: Buchwald, R. (Hrsg.) (2006): Habitatwahl, Fortpflanzungsverhalten und Schutz mitteleuropäischer Libellen (Odonata). Ergebnisse der 23. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen (GdO), 19.-21.3. 2004, Oldenburg. ISBN: 3-89995-278-2. 128 pp: 92-102. (in German, with English summary) ["The dragonfly fauna of some fishing ponds is recorded. These ponds have a regulated water feeding by a nearby rivulet, they remain filled with water throughout the year, there is no feeding of the fishes (like carps), which all are large enough for being taken by angle (no spawn), and a replacement for the output by fishing. The number of dragonfly species is rather high, but nearly no species are endangered, and most species have only small abundances. Only *Platycnemis pennipes* and *Gomphus pulchellus* in the region are favoured at these fishing ponds. Nevertheless these ponds enrich the dragonfly fauna in Westfalian lowlands, which are poor in natural stagnant water bodies." (Author)] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**9669.** Sohni, V.; Finch, O.-D. (2006): Bedeutung eines renaturierten Hochmoor-Restes bei Oldenburg (Oldb.) für die Libellenfauna. In: Buchwald, R. (Hrsg.) (2006): Habitatwahl, Fortpflanzungsverhalten und Schutz mitteleuropäischer Libellen (Odonata). Ergebnisse der 23. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen (GdO), 19.-21.3. 2004, Oldenburg. ISBN: 3-89995-278-2. 128 pp: 104. (in German) ["We examined the odonate assemblages of 11 water systems situated

within a protected remnant peat bog in the north-eastern part of Cloppenburg district, Lower Saxony, Germany in summer 2001. A total of 30 species was recorded, representing half of the species known to occur between the rivers Ems and Weser. 13 species (45%) are listed in the Red Data Books of either Germany and/or Lower Saxony. Two species, *Ceriatrigon tenellum* and *Aeshna subarctica*, are listed as endangered, with the former being confirmed to reproduce within the study site. Species richness at the water systems ranged from 5 to 18 species per system. Besides high densities of eurytopic species like *Lestes sponsa* and *Pyrrosoma nymphula*, we found some stenotopic species confined to acidic bogs occurring in lower numbers. The number of bog specialists found in our study area is in concordance with the situation of other bogs in early stages of regeneration. Regeneration of the investigated bog was initiated by measures in 1988. Subsequent measures like the sealing of drainages increased the ratio of bog specialists vs. generalist species in the study area. The occurrence of *Ceriatrigon tenellum* and *Aeshna subarctica* justifies taking measures in the future." (Authors) The results have been published in detail in Dosera 2004: 119-135.] Address: Finch, O.-D., Universität Oldenburg, Terrestrische Ökologie, 26111 Oldenburg, Germany. E-mail: Oliver.d.finch@uni-oldenburg.de

**9670.** Velasco, J.; Millán, A.; Hernández, J.; Gutiérrez, C.; Abellán, P.; Sánchez, D.; Ruiz, M. (2006): Response of biotic communities to salinity changes in a Mediterranean hypersaline stream. *Saline Systems* 2(1): 15 pp. (in English) ["This study investigates the relationship between salinity and biotic communities (primary producers and macroinvertebrates) in Rambla Salada, a Mediterranean hypersaline stream in SE Spain. Since the 1980's, the mean salinity of the stream has fallen from about 100 g L<sup>-1</sup> to 35.5 g L<sup>-1</sup>, due to intensive irrigated agriculture in the watershed. Furthermore, large dilutions occur occasionally when the water irrigation channel suffers cracks. [...] Salinity was the first factor determining community composition and structure in Rambla Salada stream followed by the type of habitat." (Authors) *Anax* sp. is the single odonate taxon mentioned in table 4.] Address: Velasco, Josefa, Department of Ecology and Hydrology, University of Murcia, 30100 Murcia, Spain E-mail: jvelasco@um.es

**9671.** Vershinin V.L.; Ivanova N.L. (2006): Peculiar features of the trophic relations of an introduced species *Rana ridibunda* (Pallas, 1771) depending on habitat conditions. *Volga Ecological Journal* 2006(2/3): 119-123. (in Russian, with English summary) [Russia; Odonata are preyed by the frog *R. ridibunda*.] Address: Vershinin, V.L., Institute of Plant and Animal Ecology, UB RAS Russia, 620144 Ekaterinburg, 8 Marta, 202, Russia

**9672.** Wildermuth, H (2006): Sequenzielle Mehrfachpaarung beim gleichen Vierfleckpaar (Libellula quadrimaculata) - Zufall oder Gesetzmäßigkeit?. In: Buchwald, R. (Hrsg.) (2006): Habitatwahl, Fortpflanzungsverhalten und Schutz mitteleuropäischer Libellen (Odonata). Ergebnisse der 23. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen (GdO), 19.-21.3. 2004, Oldenburg. ISBN: 3-89995-278-2. 128 pp: 33-34. (in German, with English summary) ["Repetitive mating sequences of up to six times between the same male and female of the Four-spotted Chaser were recorded, interrupted by oviposition, rest, or attempted de-

parture of the female. These repeated matings were recorded several times and are, therefore, believed to occur regularly if the pair is not disturbed by rival males, which often happened. The phenomenon is discussed with respect to individual fitness and sperm competition." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wilder-muth.ch

**9673.** Wildermuth, H. (2006): *Nehalennia speciosa* in der Schweiz ausgestorben - und in Europa? In: Buchwald, R. (Hrsg.) (2006): *Habitatwahl, Fortpflanzungsverhalten und Schutz mitteleuropäischer Libellen (Odonata)*. Ergebnisse der 23. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen (GdO), 19.-21.3. 2004, Oldenburg. ISBN: 3-89995-278-2. 128 pp: 63-64. ["*N. speciosa* was recorded in Switzerland from 1867 until 1990. Intensified search for the species during the subsequent years remained unsuccessful. The 17 localities where it was recorded partially in rather high numbers until the early seventies of the last century concentrated on a small area in the eastern Swiss Plateau. It is believed that *N. speciosa* became extinct because of desiccation of its formerly already damaged habitats during a long lasting dry period in 1976, combined with changes in the vegetation due to slow eutrophication. In view of strong regressive tendencies of the species in whole Europe the future of the species in the western Palearctic region depends largely on the conservation of the last large populations in southern Bavaria, Poland, Belorussia and perhaps also Russia." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wilder-muth.ch

## 2007

**9674.** Caspari, S.; Bettinger, A. (2007): Konzept: Die Saarländische Naturschutzstrategie. Modul: Regionale Biodiversitätsstrategie (Arten, für deren Erhalt unsere Region / das Saarland besondere Verantwortung trägt). Landesamt für Umwelt- und Arbeitsschutz (LUA), Zentrum für Biodokumentation des Saarlandes (ZfB), Am Bergwerk 10, D-66578 Landsweiler-Reden. <http://www.saarland.de/dokumente/themanaturschutz/Biodiv110707.pdf>: 42 pp. (in German) [*Cordulegaster bidentata* is the only odonate species that the Federal State Saarland should be responsible for its protection within the borders of Germany. This is due to the fact that significant parts of the German populations are restricted to this region.] Address: Caspari, S.; Bettinger, A., Landesamt für Umwelt- und Arbeitsschutz (LUA), Zentrum für Biodokumentation des Saarlandes (ZfB), Am Bergwerk 10, D-66578 Landsweiler-Reden, Germany. E-mail: SCaspari@biodokumentation.saarland.de

**9675.** Chang, C.H.; Ting, K.; Chen, K.T. (2007): Microstructure and nanomechanical properties of the wing membrane of dragonfly. *Advanced Materials Research* 79-82: 1325-1328. (in English) ["The flight mechanics of dragonflies including hovering and taking off backwards, flight sideways and vertical directions has been attentions in Bionics. The dragonfly wing consists of the networks of various veins and membranes to make the structural properties complicated. In the past investigations, surface characteristics of dragonfly wing were measured by nanoindentation test. Thus the aim of this study will comprehensively concern the nanomechanical properties of veins, membrane and pterostigma of the wing of the dragonfly with nanoindentation. In the

mean time, the modulus and hardness of the wing of the dragonfly's composites including lengthwise vein, transverse vein, membrane and pterostigma are measured. The value of modulus of lengthwise vein is greater than the other structures. The value of modulus of transverse vein is the smallest due to its soft behavior. Its hardness is also smaller than others." (Authors)] Address: Chang Ching-Hsin, National Chung Hsing University, 250, Kuo Kuang Rd., Taichung 402. Taiwan. E-mail: chang.chhs@gmail.com

**9676.** Chuzakova, T.A.; Poljakova, N.V. (2007): Macrozoobenthos of some Samarskaya Luka waters. *Samarskaya Luka* 16(3) (21): 538-546. (in Russian, with English summary) [The macrozoobenthic fauna of 6 streams and 2 ponds of the National Park Samarskaya Luka was investigated. The list of 72 taxa includes *Cordulegaster boltonii* and *Erythromma najas*.] Address: Chuzakova, T.A., St. Petersburg State University, Biological Faculty, Department of Ichthyology and Hydrobiology, St. Petersburg

**9677.** De Marmels, J. (2007): Reportes de Odonata nuevos para Venezuela. *Entomotropica* 22(1) (issued in 2010): 45-47. (in Spanish, with English summary) ["Four species are added to the Venezuelan checklist: *Neoneura rufithorax* Selys, 1886 (Zygoptera: Protoneuridae); *Phyllocycla pegasus* (Selys, 1869) (Anisoptera: Gomphidae); *Aeschnosoma elegans* Selys, 1871 (Anisoptera: Corduliidae) and *Brechmorhoga flavopunctata* (Martin, 1897) (Anisoptera: Libellulidae). Five are deleted from that list: *Euthore hyalina* (Selys, 1853) (Zygoptera: Polythoridae); *Heteragrion macilentum* Hagen in Selys (Zygoptera: Megapodagrionidae), 1862; *Anomalophlebia nitida* Belle, 1995 (Anisoptera: Gomphidae); *Phyllocycla diphylla* (Selys, 1854) (Anisoptera: Gomphidae) and *Macrothemis declivata* Calvert, 1909 (Anisoptera: Libellulidae)." (Author)] Address: De Marmels, J., Museo del Instituto de Zoología Agrícola "Francisco Fernández Yépez" (MIZA), Facultad de Agronomía, Univ. Central de Venezuela, Apartado 4579, Maracay 2101-A, Venezuela. E-mail: demarmjc@gmail.com

**9678.** Gassmann, D. (2007): Die Ligula der Kleinlibellen im Rasterelektronenmikroskop - Morphologische Strukturen und evolutionsbiologische Bedeutung. *Mikrokosmos* 96(3): 183-187. (in German) [Detailed description of morphology and function of the ligula in Zygoptera with special emphasis on *Coeliccia membranipes*, *Torrenticnemis filicornis*, *Idiocnemis obliterata*, *I. strumidens*, and *Thaumatagrion funereum*. The phylogenetic importance of differences in the structure of the ligula is outlined.] Address: Gassmann, D., Institute of Evolutionary and Ecological Sciences, Leiden University, c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: gassmann@naturalis.nnm.nl

**9679.** Gondat, L.; Arluziaga, I. (2007): Zarauzko (Euskal Herria) erreketako makroornogabe bentikoen faunaren ezagutzari zenbait ekarpen. *Heteropterus - Revista de Entomología* 7(1): 111-121. (in Euskarian, with Spanish and English summaries) ["Contribution to the knowledge of benthic macroinvertebrate fauna from Zarautz streams (The Basque Country)." The checklist includes *Calopteryx virgo*, *Chalcolestes viridis*, *Boyeria irene*, and *Cordulegaster boltonii*.] Address: Gondat, L., EHU/UPV Donostiako Irakasleen Eskola; Matematika-ren eta Zicntzia Esperimentalen Didaktika Saila, Oñati plaza 3; 20009 Donostia, Spain

- 9680.** Kalniņš, M.; Medne, M. (2007): The spatial allocation of dragonflies (Odonata) communities in raised bogs of Latvia. Book of abstracts: Daugavpils University Institute of Systematic Biology. 4th International Conference "Research and Conservation of Biological Diversity in Baltic region". Daugavpils, 25 - 27 April, 2007. Daugavpils University Academic Press "Saule": 50. (in English) [Verbatim: "The communities of different dragonfly species and their spatial allocation have been poorly studied in Latvia. Research in dragonflies 'communities' spatial allocations in bogs were undertaken in Sudas bog, (Cesis district), Taures bog (Valka district) and Lielais Kemeru tirelis bog (Tukums and Riga districts) in 2005 - 2006. Individual researches were taken also in other bogs of Latvia. Research surveys included quantitative adult registration along 100 m long patches inspection. Sloughs registration in several habitats or groups of species has been done additionally. Different characteristic bog habitats were selected as patches for examination: large water pools complexes in open bog areas, lakes in the bogs inclusive lakes with woody coasts, lake with woody coasts located at the edge of bog, the watercourse at edge of bog, beavers over flooded watercourse in the dif of bog, complexes of water pools with woody edges and water pools in the middle of the wood. 26 dragonfly species were examined during current research: 20 species in Sudas bog, 6 species in Taures and 13 species in Lielais Kemeru tirelis bog. Major diversity of species has been registered near the watercourses with rich vegetation (14 species) and in large complexes of water pools (10 species). Lower diversity has been confirmed in bog lakes situated on open areas (7 species) and in open patches of the bog without water pools (3-4 species). *Sympetrum danae* has been registered in all examined patches of Sudas bog, *Libellula quadrimaculata*, *Lestes sponsa* and *Enallagma cyathigerum* – in 80 % of examined patches of Sudas bog. Meanwhile, *Anax imperator* was found only in water pools, but *Pyrrhosoma nymphula* – along watercourses with grassy coasts. Due to sloughs research also *Aeshna subarctica* was registered but during adult registration this species was found only in Taures bog."] Address: Kalniņš, M., Nature Protection Board, Eksporta iela 5, Riga, LV-1010, Latvia. E-mail: martins.kalnins@dap.gov.lv
- 9681.** Kiel, E.-F. (2007): Erhaltungszustand der FFH-Arten in Nordrhein-Westfalen. Ergebnisse des FFH-Berichtes 2001 bis 2006. Natur in NRW 2/2007: 12-17. (in German) [Documentation of the present conservation status of *Coenagrion mercuriale*, *C. ornatum*, *Stylurus flavipes*, and *Leucorrhinia pectoralis* in Nordrhein-Westfalen, Germany.] Address: Kiel, E.-F., LANUV, Fachbereich 24, Leibnitzstr. 10, 45659 Recklinghausen, Germany. E-mail: ernst-friedrich.kiel@lanuv.nrw.de
- 9682.** Krüner, U. (2007): Der Südliche Blaupfeil, *Orthetrum brunneum* (Fonscolombe, 1837), am Entwässerungsgraben der Halde Emil Mayerisch, Kreis Düren (NRW). Entomologie heute 19: 51-57. (in German, with English summary) ["The drainage ditch at the hard coal dump Emil Mayerisch is colonized by *O. brunneum* since 15 years. The larval growth was studied in 1993. Due to the optimal environmental conditions a part of the population emerged one year after oviposition while another part needed two years. Phenological data of exuviae and imagoes from 1992 to 2006 show a flying time from June to August. Until now the population of *O. brunneum* could be preserved by regular removing of mud and aquatic plants." (Author)] Address: Krüner, Ulrike, Gelderner Str. 39, 41189 Mönchengladbach, Germany. E-mail: kruener@t-online.de
- 9683.** Machida, K.; Oikawa, T. (2007): Structure analyses of the wings of *Anotogaster sieboldii* and *Hybris subjacens*. Key Engineering Materials 345-346: 1237-1240. (in English) ["The wings of a dragonfly have many complicated structures. The configuration of the costal vein of the wings of a dragonfly is different from them of other insects. So, we paid attention to the configuration of the costal vein of the wings in this study. In order to know the functions and structures of the wings of a dragonfly, several 3-D models of the wing of *Anotogaster sieboldii* were created, and calculated with the 3-D finite element method. In addition, we created a 3-D model of the wing of *Hybris subjacens* which has the configuration of original wing, and compared the models of *Anotogaster sieboldii* and *Hybris subjacens*. As a result, it was clarified that the arch configuration of the costal vein controls the bending and the torsion of the wings." (Authors)] Address: Kenji Machida, K., Tokyo University of Science, 2641 Yamazaki, Noda-shi, Chiba, 278-8510, Japan. E-mail: mac@rs.noda.tus.ac.jp
- 9684.** Maibach, A.; Flöss, I. (2007): 19. Symposium der Schweizerischen LibellenkundlerInnen. Nouvelles. Centre Suisse de la Cartographie de la Faune 32: 33-36. (in German or French) [Abstracts of the following lectures are presented: René Hoess: Neuere und ältere Funde von *Coenagrion scitulum* in der Schweiz; Gilles Carrón & Olivier Schær: *Leucorrhinia albifrons*, *Gomphus vulgatissimus* et *Coenagrion mercuriale* à Genève; Moritz Frei & Daniel Kury: Erfassung von Libellen - ein Methodenvergleich; Frank Hampel: Beobachtungen eines Anfängers am Gattikerweiher und anderswo; Sandrine Angélibert, N. Indermuehle, D. Luchier, B. Oertli, J. Perfetta: Les Odonates adultes: quelle place dans la biodiversité aquatique du Canton de Genève?; David Leclerc: Mise en place d'une liste d'espèces de libellules prioritaires pour le bassin genevois («Liste rouge» régionale); Hansruedi Wildermuth: Erfolgreiche Förderung einer Population von *Orthetrum coerulescens* durch technische Naturschutzmassnahmen; Nicola Indermuehle, B. Oertli, A. Maibach, O. Schær & S. Lezat: L'échantillonnage des Odonates adultes: inventaire exhaustif et/ou «rapid assessment method»? Résultats préliminaires; Sandrine Angélibert, N. Indermuehle, D. Luchier, B. Oertli, J. Perfetta: Les Odonates adultes: quelle place dans la biodiversité aquatique du Canton de Genève?; Traute Fliedner: Biotopzerstörung durch Viehtritt nicht nur auf Alpweiden, sondern auch in Naturschutzgebieten; Gerhard Vonwil: Flutmulden – wenig bekannte Libellenrefugien] Address: Centre Suisse de Cartographie de la Faune (CSCF), Passage Maximilien de Meuron 6, 2000 Neuchâtel, Switzerland
- 9685.** Ott, J. (2007): Hat die Klimaänderung eine Auswirkung auf das Netz Natura 2000? - erste Ergebnisse aus Untersuchungen an Libellenzönosen dystropher Gewässer im Biosphärenreservat Pfälzerwald. Naturschutz und Biologische Vielfalt 46: 65-90. (in German) ["Dragonflies are suitable indicators for the quality of aquatic environments and for environmental changes. Dragonflies recently have been used as monitoring organisms to demonstrate the effects of climatic change, e.g. via the range expansion of southern species to the north or via the shifts within community composition. First results from a study in the transboundary biosphere reserve "Pfälzerwald-Vosges du Nord" are pre-



sented. The dragonfly fauna and the environmental conditions of the so called "Wooge", mainly dystrophic lakes (Natura 2000-code 3160), were monitored and compared with previous investigations. Most of these waters are part of the national Natura 2000 network. As a consequence of the effects of climatic changes and also synergistic effects (e.g. ground water extraction, drying/freezing out, lacking maintenance, increasing fragmentation) the aquatic systems have changed dramatically in the last couple of years. Water levels have dropped between one and two meters, reaching extreme situation in July 2006, where some waters even dried out completely. As a consequence, the dragonfly fauna also has changed: many of the stenoeicous and endangered moorland species, which are characteristic for the dystrophic waters, have disappeared from most of the waters (e.g. *S. arctica*, *A. juncea*, *L. dubia*, *C. hastulatum*). These species now are nearly extinct in the German part of the biosphere reserve. At the same time, these lakes have been colonised by generalists and widely distributed species, which are now dominating the waters and dragonfly communities (e.g. *O. cancellatum*, *L. depressa*, *G. pulchellus* - also *A. Imperator*) indicating the strong disturbance. Some of the waters even have dried out completely and, thus, totally lost their value for the aquatic fauna. In addition, species typical for astatic waters and thermophilic species like *Lestes virens*, *L. barbarus* and *Ischnura pumilio* are rapidly invading the area, indicating a change in the biological communities as well. If summer droughts and synergistic effects continue at current rates — and the scenarios show an ongoing impact in the region - and if no immediate management and mitigation measurements are undertaken, the remaining waters will lose their importance for the Natura 2000 network shortly and devalue this concept completely." (Author)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**9686.** Santos, J.A. (2007): Libelulas e libelinhas. *Maddressilva* 7: 6-7-9, 11. (in Portuguese) [This is an illustrated, brief general description of odonate biology, with a key to the families occurring in Algarve, Portugal. References to some regional species are made family wise.] Address: Santos, J.A., Associacao Almargem, Alto di S. Domingos 14, PT-8100-756 Louie, Portugal

**9687.** Smith, A.J.; Bode, R.W.; Kleppel, G.S. (2007): A nutrient biotic index (NBI) for use with benthic macroinvertebrate communities. *Ecological Indicators* 7(2): 371-386. (in English) ["Aquatic macroinvertebrates have been among the principal biological communities used for freshwater monitoring and assessment for several decades, but macroinvertebrate biomonitoring has not incorporated nutrient measures into assessment strategies. Two nutrient biotic indices were developed for benthic macroinvertebrate communities, one for total phosphorus (NBI-P), and one for nitrate (NBI-N). Weighted averaging was used to assess the distributions of 164 macroinvertebrate taxa across TP and NO<sub>3</sub>- gradients and to establish nutrient optima and subsequent nutrient tolerance values. Both the NBI-P and NBI-N were correlated with increasing mean TP and NO<sub>3</sub>- values ( $r = 0.68$  and  $r = 0.57$ , respectively,  $p < 0.0001$ ). A three-tiered scale of eutrophication for TP and NO<sub>3</sub>- (oligotrophic:  $\leq 0.0175$  mg/l TP,  $\leq 0.24$  mg/l NO<sub>3</sub>-, mesotrophic:  $> 0.0175$  to  $\leq 0.065$  mg/l TP,  $> 0.24$  to  $\leq 0.98$  mg/l NO<sub>3</sub>-, eutrophic:  $> 0.065$  mg/l TP,  $> 0.98$  mg/l NO<sub>3</sub>-) was also established through cluster analysis of

invertebrate communities using Bray-Curtis (quantitative) similarity. Significant differences ( $p < 0.0001$ ) were detected between median NBI-P and NBI-N scores among the three trophic states. Therefore, the nutrient biotic indices (NBIs) appear to accurately reflect changes in stream trophic state. Multimetric water quality assessments were also used to identify thresholds of impairment among the three trophic states. Hodges-Lehman estimation indicated that the greatest change in assessment results occurred between the mesotrophic and eutrophic states. The eutrophic state also represented the highest percentage of overall impairment. Therefore, the suggested threshold for nutrient impairment is the boundary between mesotrophic and eutrophic (0.065 mg/l TP and 0.98 mg/l NO<sub>3</sub>-). The corresponding NBI-P score (6.1) and NBI-N score (6.0) for this threshold incorporate predictive capabilities into the NBIs. The NBI and index score thresholds of impairment will provide monitoring programs with a robust measure of stream nutrient status and serve as a useful tool in enforcing regional nutrient criteria." (Authors) The index includes "Ophiogomphus sp. and undetermined Gomphidae".] Address: Smith, A.J., New York State Department of Environmental Conservation, Stream Biomonitoring Unit, Albany, NY 12233-3502, USA. E-mail: ajsmith@gw.dec.state.ny.us

**9688.** Staudacher, K.; Füreder, L. (2007): Habitat complexity and invertebrates in selected Alpine springs (Schütt, Carinthia, Austria). *Internat. Rev. Hydrobiol.* 92(4-5): 465-479. (in English) ["The invertebrate fauna from eight selected springs of the landslide area of Schütt (Carinthia, Austria) with contrasting environmental factors was investigated. The role of habitat structure on the community composition was studied with a particular focus on the spring-dwelling animals colonizing the aquatic and the adjacent aquatic-terrestrial transition zones. The crenocoenosis was predominantly composed of Chironomidae, Plecoptera, Trichoptera, Mollusca and Ostracoda and the number of spring-specialists was high. Habitat complexity, variable microhabitat composition and the concomitance of lotic and lentic areas in the eucrenal zone furthered a high species diversity and abundance. Even the aquatic-terrestrial transition zone was inhabited by high numbers of crenobionts and crenophiles. Moreover, the connectivity of aquatic and terrestrial habitats positively affected the structural and functional organisation of invertebrate assemblages in the spring biotopes." (Authors) The list of taxa includes *Cordulegaster bidentata* and *Aeshna cf. caerulea*.] Address: Staudacher, Karin, River Ecology and Invertebrate Biology, Institute of Ecology, University of Innsbruck, Technikerstr. 25, A-6020 Innsbruck, Austria. E-mail: karin.staudacher@student.uibk.ac.at

**9689.** Xiao, K.; Bai, K.; Wang, W.s.; Song, F. (2007): Experimental study on the microstructure and nanomechanical properties of the wing membrane of dragonfly. *Acta Mechanica Sinica* 23(3): 281-285. (in English) ["Detailed investigations on the microstructure and the mechanical properties of the wing membrane of the dragonfly are carried out. It is found that in the direction of the thickness the membrane was divided into three layers rather than a single entity as traditionally considered, and on the surfaces the membrane displays a random distribution rough microstructure that is composed of numerous nanometer scale columns coated by the cuticle wax secreted. The characteristics of the surface structure are measured and described. The

mechanical properties of the membranes taken separately from the wings of live and dead dragonflies are investigated by the nanoindentation technique. The Young's moduli obtained here are approximately two times greater than the previous result, and the reasons that yield the difference are discussed." (Authors)] Address: Song, F., Slate Key Laboratory of Nonlinear Mechanics (LNM), Institute of Mechanics, Chinese Academy of Sciences, Beijing 100080, China. E-mail: songf@lnm.imech.ac.cn

## 2008

**9690.** Bechly, G. (2008): Additions to the fossil dragonfly fauna from the Lower Cretaceous Crato Formation of Brazil (Insecta: Odonata). *Palaeodiversity* 3, Supplement: 11-77. (in English, with German summary) ["Several interesting new discoveries of fossil odonates from the Lower Cretaceous Crato Formation of NE Brazil are presented. Two new taxa of damselflies (*Euarchistigma peterknobli* n. sp. and *Santanagrion longipes* n. gen., n. sp.) are described, and a new specimen of *Euarchistigma marialuiseae* with preserved colour pattern, distinct from the type species, is featured. Among the dragonflies totally three new families (*Megaphlebiidae* n. fam., *Magnathemidae* n. fam., and *Cratopetaliidae* n. fam.), nine new genera, and ten new species (*Paracordulagomphus aberrans* n. gen., n. sp.; *Paracordulagomphus divergens* n. gen., n. sp.; *Pauciphlebia novaolindense* n. gen., n. sp.; *Cratogomphus erraticus* n. gen., n. sp.; *Cratohagenius erichweberi* n. gen., n. sp.; *Megaphlebia rayandressi* n. gen., n. sp.; *Magnathemis marcusthorhalli* n. gen., n. sp.; and *Cratopetalia whiteheadi* n. gen., n. sp.) are described. A further putative new dragonfly genus and species is discussed and featured, but not formally described because of the poor preservation of the single available specimen. The original descriptions of *Euarchistigma marialuiseae*, *Cratostenophlebia schwickerti*, *Eotanypteryx paradoxa*, *Paramesuropetala gigantea*, *Cordulagomphus hanneloreae* and *Cordulagomphus winkelhoferi* are emended with new data and supplemented with drawings and photos. The newly discovered counter plate of the holotype of *Cratopetala petrulevicusii* is featured. Some errors concerning collection numbers and depositions of fossil odonates in Martill et al. (2007) are corrected and new collection numbers are updated for the Senckenberg museum collection." (Author)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail: bechly@gmx.de

**9691.** Beckmann, H.; Berlin, A.; Blumrich, B.; Eitner, M.; Gottschalk, H.-J.; Grawe, D.; Thiele, V.; Wolf, F.; Zilch, M.; (2008): Entomofaunistische Untersuchungen im Bereich des Baggersees bei Alt Gaarz (NSG „Seen- und Bruchlandschaft südlich Alt Gaarz, Landkreis Müritz, Mecklenburg-Vorpommern). *Archiv der Freunde der Naturgeschichte in Mecklenburg* XLVII: 5-26. (in German) [Germany; the list of Odonata totals to 21 species, and includes the regional rare *Onychogomphus forcipatus*.] Address: Thiele, V., Ahornring 10, 19292 Möllen, Germany. E-mail: mv.thiele@t-online.de

**9692.** De Vlinderstichting (2008): Monitoring Dragonflies in Europe. Programme & Abstracts of International Symposium, Wageningen, 13-14 June 2008. De Vlinderstichting, Wageningen: 26 pp. (in English) [Oral presentations: Groenendijk, D., V. Mensing & C. Plate: Ten

years dragonfly monitoring in the Netherlands: results and lessons for the future: - Ott, J.: What can monitoring studies of dragonflies tell us? From single waters to landscapes, from short term to long term projects; - Grönhagen, N & K.-J. Conze: How to detect trends in heterogeneous data accurately? The example of the preparation of the new red list of dragonflies in Northrhine-Westphalia; — Oertli, B.: The local species richness: a metric for a long term monitoring; - Torralba-Burrial, A. & F.J. Ocharan: Monitoring dragonfly species as river ecological status bioindicators; - Van Strien, A.: Detecting trends in dragonfly data: difficulties & opportunities; - Bell, S.: People count too: volunteers and biodiversity monitoring in Europe; - De Knijf, G.: The dragonfly inventory project in Flanders (Belgium): thirty years of collecting data. Are there any trends detectible?; - Dyatlova, E.S.: Dragonflies of the proposed National Park "Nizhnednestrevsky": monitoring and conservation; — Thompson, D.J.: Monitoring *Coenagrion mercuriale*: the UK experience; - Termaat, T, J. Bouwman & C. Plate: Monitoring threatened species in the Netherlands; - Luque, P. & M. Lockwood: The Catalan Dragonfly Monitoring Scheme; - Kalkmam, V.: Progress report on the atlas and red list of European dragonflies; - Van Swaay, C: Lessons from the Butterfly Monitoring Network in Europe; - Poster presentations: Azpilueeta Amerin, M. & A. Cordero Rivera: Monitoring *Oxygastra curtisii* and *Macromia splendens*: their habitat and life cycle; - Oertli, B. & P. Nicolet: The European Pond Conservation Network (EPCN); - Sanchez Guillen, R.A. & A. Cordero Rivera: Relative frequency of *Ischnura elegans* and *I. graellsii* (Odonata: Coenagrionidae) in the Galician coast; — Termaat, T, VI Kalknum & J.H. Bouwman: Trends in ranges of dragonflies in the Netherlands: does climate change play a role?; - Termaat, T, V Mensing, D. Groenendijk & J. Bouwman: Dragonfly protection in the Netherlands: a stepwise approach.] Address: Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands

**9693.** Geraeds, R.P.G. (2008): Larven van de Gewone bronlibel in de Rode Beek (Nationaal Park De Meinweg). *natuurhistorisch maandblad* 97(6): 129-132. (in Dutch, with English summary) ["The Meinweg nature reserve hosts the largest population of *Cordulegaster boltonii* in the Netherlands. The species is known to breed in three brooks in the reserve, the Bosbeek, Nartheciumbeekje and Venbeek brooks. The Rode Beek brook, also situated in this nature reserve, was never considered as a breeding water for this species. In October 2007, the Rode Beek brook was surveyed (with a net) to establish the presence of larvae of *C. boltonii*. The survey yielded 23 larvae in the stretch from the Dutch-German border, where the brook enters the Netherlands, to the Gitstapper water mill. The species was not found downstream of this mill, where the brook has been canalised and runs through open farmland, making it an unsuitable habitat for this species. The survey showed, however, that the brook does function as a breeding water for *C. boltonii* at the Meinweg reserve. The larvae we caught ranged in age from 1 to 4 or 5 years, proving that the Rode Beek brook actually hosts a population of *C. boltonii*." (Author)] Address: Geraeds, R.P.G., Bergstraat 70, 6131 AW Sittard, The Netherlands

**9694.** Golovatyuk, L.V.; Zinchenko, T.D.; Shitikov, V.K. (2008): An indicative assessment of macrozoobenthos organisms in flowing waters. *Inland Water Biology* 1(3):

260-273. (in English) [*Calopteryx splendens*, *Coenagrion puella*, *Erythromma najas*, *Gomphus vulgatissimus*, *Ischnura elegans*, *Libellula quadrimaculata*, *Platycnemis pennipes*, *Stylurus flavipes*, *Sympetrum flaveolum*, and *Sympetma fusca* were used as indicators for saprobic conditions in rivers of the middle and lower Volga River, Russia. Original Russian Text © L.V. Golovatyuk, T.D. Zinchenko, V.K. Shitikov, 2008, published in *Biologiya Vnutrennikh Vod*, No. 3, 2008, pp. 66–79.] Address: Zinchenko, T.D., Institute of the Ecology of the Volga River Basin, Russian Academy of Sciences, ul. Komzina 10, Tolyatti, 445003, Russia. E-mail: tdz@mail333.com

**9695.** Haller, R.; Nössing, T.; Werth, F.; Festi, A. (2008): *Libellen (Odonata) am Schlern (Südtirol, Italien)*. *Gredleriana* 8: 287-300. (in German, with English summary) [In 2006 and 2007, 19 odonate species were recorded in the Schlern massif, South Tyrol, Italy. *Cordulegaster bidentata* (regionally threatened with extinction), *Sympetrum fonscolombii*, and *Crocothemis erythraea* are noteworthy. The rest of species are regionally common.] Address: Haller, R., St. Peterweg 83, 39018 Terlan, Italy. E-mail: reinhold.haller@brennercom.net

**9696.** Hocking, D.J.; Semlitsch, R.D. (2008): Effects of experimental clearcut logging on gray treefrog (*Hyla versicolor*) tadpole performance. *Journal of Herpetology* 42: 689-698. (in English) ["Clearcutting detrimentally affects the populations of many amphibian species. However, Gray Treefrogs (*Hyla versicolor*) have shown a preference for breeding sites located in clearcuts near forested habitat. To test the implications of this preference, we examined Gray Treefrog tadpole performance in cattle tanks along a gradient from clearcut to forest habitat. We replicated this design at three experimental clearcut sites. Tadpole performance was measured as length of the larval period, size at metamorphosis, and survival. We also examined the influence of temperature, periphyton productivity, and invertebrate predator abundances (anisopteran and dyticide beetle larvae) on tadpole performance. Time to metamorphosis was shorter in the clearcuts, but metamorphs tended to be smaller than metamorphs in the forest tanks. Survival was also greater in the clearcuts than in the forest treatments. Higher temperatures in the clearcuts primarily contributed to tadpole performance whereas invertebrate predators did not appear to influence performance. Although clearcuts benefited tadpoles through higher survival and shorter larval periods, there are potential fitness consequences for small metamorphs emerging in clearcuts." (Authors)] Address: Hocking, D.J., University of New Hampshire, 215 James Hall, Durham, New Hampshire 03824 USA. E-mail: dhocking@unh.edu

**9697.** Karpelson, M.; Wei, G.-Y.; Wood, R.J. (2008): A review of actuation and power electronics options for flapping-wing robotic insects. 2008 IEEE International Conference on Robotics and Automation Pasadena, CA, USA, May 19-23, 2008: 779-786. (in English) ["Flapping-wing robotic insects require actuators with high power densities at centimeter to micrometer scales. Due to the low weight budget, the selection and design of the actuation mechanism needs to be considered in parallel with the design of the power electronics required to drive it. This paper explores the design space of flapping-wing microrobots weighing 1g and under by determining mechanical requirements for the actuation mechanism, analyzing potential actuation

technologies, and discussing the design and realization of the required power electronics. Promising combinations of actuators and power circuits are identified and used to estimate microrobot performance." (Authors) A reference to Odonata is made.] Address: Karpelson, M., School of Engineering and Applied Sciences, Harvard University, Cambridge, MA 02138, USA. E-mail: michaelk@seas.harvard.edu

**9698.** Khan, M.R.; Irshad, M.; Rafi, M.A. (2008): *Insect Fauna of Azad Jammu and Kashmir*. MK Printers, Islamabad. ISBN 978-969-8909-01-07: 143 pp. (in English) ["Due to importance of insects in agriculture, forestry, household and human/animal health of AJ & K, it is essential to document the insect fauna of the area. In the present compilation 941 insect species have been reported. These belong to order Coleoptera, Diptera, Heteroptera, Hymenoptera, Isoptera, Lepidoptera, Neuroptera, Odonata and Orthoptera. The present list has been compiled through the available literature and personal efforts of authors. Forty-nine species have been collected by the authors and reported first time from AJ & K. Efforts have been made to collect all the published material." (Publisher)] Address: Rafi, M.A., National Agricultural Research Centre, Islamabad, National Insect Museum, Pakistan. E-mail: arafiam@yahoo.com

**9699.** Khrokalo, L.; Nazarov, N. (2008): Odonata of the Poliskyi Nature Reserve, Ukraine. IDF-Report 13: 17-28. (in English) ["Twenty-eight Odonata species were recorded in the Poliskyi Nature Reserve (Zhytomyr oblast', North Ukraine) in 2006 and 2007, 18 of which were reported for the first time from this location. This included such rare species as *Somatochlora arctica* (second record in the Ukraine, first record for 100 years), *Leucorrhinia dubia*, *L. rubicunda* and *L. albifrons*. A breeding site and a dense population of *Nehalennia speciosa* were found in a bog near the river. *Zholobnytsya*. The record of *Orthetrum coerulescens* is the northernmost in Ukraine." (Authors)] Address: Khrokalo, Lyudmyla, Institute of Environment & Biotechnologies, National Agricultural University of Ukraine, Geroiv Oborony str.15, Kyiv, Ukraine 03041. E-mail: Khrokalo@mail.ru

**9700.** Khrokalo, L.; Krylovskaya, S. (2008): Distribution and current status of *Coenagrion armatum* (Charpentier, 1840) in Ukraine. IDF-Report 13: 1-16. (in English) ["The 14 known localities of *C. armatum* in Ukraine are listed and the 27 dragonfly species recorded are presented. An expedition devoted to revisit 10 of them in spring 2007 did not result in a confirmation at any of them. Here, all localities are described in detail and possible reasons for the absence of the species are discussed. These include habitat alterations because of anthropogenic impact, such as agricultural activity, as well as decreasing competitiveness against Mediterranean species that spread in response to altered climatic conditions. Proposed measures of conservation of *C. armatum* in Ukraine include a) the inclusion into the Red Data Book of Ukraine under category I (Endangered) and b) additional studies, monitoring and habitat conservation." (Authors)] Address: Khrokalo, Lyudmyla, Institute of Environment & Biotechnologies, National Agricultural University of Ukraine, Geroiv Oborony str.15, Kyiv, Ukraine 03041. E-mail: khrokalo@mail.ru

**9701.** Kochurova, T.I. (2008): The bottom invertebrates of small rivers in an area where pesticides were buried. *Inland Water Biology* 1(3): 287-295. (in English)



["The effect of Kilmezskii pesticide disposal site on the zoobenthos of Osinovka and Loban' rivers (the Vyatka River basin, Kirovskaya oblast) is reviewed. A faunistic list of water invertebrates in these rivers is published for the first time, qualitative and quantitative indices of zoobenthos development are given, and the condition of watercourses is assessed using bioindicative methods. The peculiarities of benthic communities of the Osinovka River and its tribute, i.e., a significant impoverishment of species composition, the simplification of structural organization, and low bioindicative indices, allow us to assume that the burial has a negative effect on zoobenthos condition." (Author) The following Odonata taxa are considered: *Calopteryx virgo*, *C. splendens*, *Platycnemis pennipes*, *Gomphus* sp., and *Somatochlora metallica*. Original Russian Text © T.I. Kochurova, 2008, published in *Biologiya Vnutrennikh Vod*, No. 3, 2008, pp. 93–101.] Address: Kochurova, T.I., Vyatka State University of Humanities, ul. Krasnoarmeiskaya 26, Kirov, 610002, Russia. E-mail: ecolab@vshu.kirov.ru

**9702.** Krach, J.E. (2008): *Libellenvorkommen im Landkreis Eichstätt*. *facetta*, Suppl. 3 - Berichte der entomologischen Gesellschaft Ingolstadt e.V.,: 338 pp. (in German) [The author presents a detailed study based on 1227 water body situated in the Landkreis Eichstätt, Bayern, Germany. A total of 52 odonate species was recorded; the species are treated in a monographic style providing information on distribution (detailed map), frequency, habitat, phenology, co-occurring species, and some cases also conservation measures and vernacular naming of species. The big population of *Coenagrion ornatum* is of more than regional importance] Address: Krach, J.E., Oberstimmerstr. 62, 85051 Zuchering, Germany. E-mail: JEKrach@gmx.de

**9703.** Lemelin, R.H. (2008): Dragonfly tourism. In: M. Lück (Ed.). *Encyclopedia of Tourism and Recreation in Marine Environments*. Wallingford, Oxfordshire: CABI: 145. (in English) [Verbatim: "Dragonfly Tourism: While the activity of enjoying (viewing, photographing, collecting) Odonata (dragonflies and damselflies) is a relatively new leisure phenomenon in Western society, in some Asian countries such as China and in Japan dragonflies have a long history of being involved in popular culture and are even raised as pets (Mitchell and Lasswell, 2005). Dragonfly gatherings (i.e. counts and educational outings) in North America and Europe are, however, increasing in popularity. For example, popular Odonata activities include the Valley Nature Centre's Annual Dragonfly Days in Weslaco, Texas, annual Odonata meetings (e.g. the Great Lakes Odonata Meeting) and counts (e.g. the Algonquin Park Odonata Count). Elsewhere, dragonflies are viewed in various sanctuaries found in Japan and the UK (Moore, 1997, 2001). The most notable dragonfly attraction may perhaps be the dragonfly awareness trails located in the National Botanical Gardens in Pietermaritzburg, South Africa (Suh and Samways, 2001). Individuals are also building 'dragonfly ponds' to attract Odonata to their homes (Moore, 2002). Conservative estimates place the number of Odonata enthusiasts belonging to a formal association at over 3000 worldwide. This number increases dramatically if one was to include participants in the growing number of dragonfly events. Facilitating the growth of these leisure activities, but more specifically the viewing of dragonflies, is the availability of field guides (Dunkle, 2000, Mead, 2003, Jones et al, 2006),

associations (e.g. Dragonfly Society of the Americas, Worldwide Dragonfly Association) and online verification of specimens (e.g. Digital Dragonflies). While concerns over the emerging role of Odonata in marine leisure activities (e.g. boat activity) have been noted (Samways, 2005), the greatest concerns over anthropogenic disturbances of Odonata in coastal areas are the loss of suitable habitat (i.e. drained wetlands) and declining water quality (Medland, 2004). Some coastal species may be particularly vulnerable. For example, the Seaside Dragonlet (*Erythrodiplax berenice*), found primarily along the Atlantic Coast from Venezuela's north to southern Canada, breeds mostly in brackish water (salt marshes and estuaries) in coastal areas (Mitchell and Lasswell, 2005; Fig. D6). Odonata are important bio-indicators for both aquatic and semi-aquatic habitats and they can be used as flagship species for tourism and leisure strategies (Moore, 1997)." (Author)] Address: Lemelin, H., Lakehead University, School of Outdoor Recreation, Parks and Tourism, 955 Oliver Rd., Thunder Bay, Ontario, P7B 5E1, Canada. E-mail: harvey.lemelin@lakeheadu.ca

**9704.** Li, Y.; Wang, X.S. (2008): Investigation on characteristics of structure and simulation analysis for dragonfly wing vein. *Advanced Materials Research* 33-37: 785-788. (in English) ["In this work, the microstructure of the dragonfly wing vein was investigated by the finite element method (FEM). It is a bionic view to simulate the microstructure of the wing vein, which could be used to construct the micro air vehicles (MAVs). From the FEM results, the sandwich structure of the dragonfly wing vein was proved, which could supply more torsional deformation and reduce the weight of dragonfly. And the protein layer in the sandwich structure almost not bear the bending loadings, which could protect the protein not to be destroyed. It could assist us to utilize such design for the new micro air vehicle (MAV), especially ornithopter." (Authors)] Address: Li, Y., Dept of Engineering Mechanics, Tsinghua University, 100084, Beijing, P.R. China. E-mail: Lee2002hu@yahoo.com.cn

**9705.** Marquez Rodríguez, J.; Ferreras-Romero, M. (2008): Contribution to the knowledge of the Iberian distribution of *Macromia splendens* (Pictet, 1843) (Odonata: Cordulidae). *Boln. Asoc. esp. Ent.* 32(3-4): 371-374. (in Spanish) [A larva of *M. splendens* was caught 2-III-2007, in a tributary of the River Guadiamar, near Cañaverero, Spain (coordinates: 10x10 km: 29S QB36; altitude 160 m a.s.l.).] Address: Rodríguez, J.M., Departamento de Sistemas Físicos, Químicos y Naturales (Zoología), Universidad Pablo de Olavide, A-376 km 1, 41013 Sevilla, Spain.

**9706.** Naranjo López, C.; Trapero Quintana, A. (2008): Clave dicotómica para la identificación de las especies cubanas del orden Odonata, en estado larval. *Cocuyo* 17: 28-36. (in Spanish, with English summary) ["A dichotomous key for the identification of the 81 Cuban species of the order Odonata, in the larval stage, is presented for the first time. It keys to the level of the six families that comprise the group and in each family keys the 42 genera and all known larvae occurring in the Cuban archipelago. Eleven taxa whose larvae are unknown to science are not keyed. All key characters are based on literature, no new distinguishing morphological data are presented and known larvae are described. The key constitutes an important systematic tool for the study of biodiversity of the dragonflies in the Cuban archipelago." (Authors)] Address: Naranjo Ló-

pez, C., Departamento de Biología. Universidad de Oriente. Patricio, Lumumba s/n. C.P. 90500. Santiago de Cuba, Cuba. E-mail: naranjo@jcnl.uo.edu.cu

**9707.** Schorr, M. (2008): Die Libellen des Mt Dulit, Borneo, Sarawak, Malaysia – revisited. Spendenaufwurf des International Dragonfly Fund e.V.. IDF-Report 13: 29-32. (in German) [Plea for donations to support an odonatological expedition organised by Rory Dow, UK to the Dulit region.] Address: Schorr, M., Schulstr. 7B, 54314 Zerf, Germany. E-mail: bierschorr@online.de

**9708.** Silina, A.E.; Prokin, A.A. (2008): The trophic structure of macrozoobenthos in marsh water bodies of the forest-steppe zone. *Inland Water Biology* 1(3): 231-240. (in English) [The trophic structure of macrozoobenthos was studied in a lake and three marshes of different succession stages in a secondary steppe of the Zorinsky part of the Central Chernozem Reserve. Odonata are treated at the genus level. Original Russian Text © A.E. Silina, A.A. Prokin, 2008, published in *Biologiya Vnutrennikh Vod*, No. 3, 2008, pp. 35–44] Address: Silina, A.E., Voronezh State University, pl. Universitetskaya 1, Voronezh, 394600 Russia. E-mail: allasilina@list.ru

**9709.** Tavares, J.P. (2008): Die Falken der einsamen Inseln. *Der Falke* 55(11): 413-418. (in German) [General note on *Falco eleonorae*'s diet, which also includes Odonata.] Address: not stated

**9710.** Termaat, T. (2008): Hulp bij het determineren van libellen Glazenmakers. *Vlinders* 4 2008: 21-23. (in Dutch) [Detailed notes on field characteristics of the members of the genera *Aeshna* and *Brachytron* occurring in the Netherlands.] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands

**9711.** Termaat, T. (2008): Hulp bij het determineren van libellen Heidelibellen. *Vlinders* 3 2008: 20-21. (in Dutch) [Detailed notes on field characteristics of the members of the genus *Sympetrum* occurring in the Netherlands.] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands

**9712.** Termaat, T. (2008): Libellenet online! *Vlinders* 4 2008: 24-25. (in Dutch) [The web page of the Dutch dragonfly watchers was launched: <http://www.libellenet.nl/>] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands

**9713.** Trapero Quintana, A.D.; Torres Cambas, Y. (2008): Actualización sistemática de la odonofauna cubana (Insecta: Odonata). *Cocuyo* 17: 25-28. (in Spanish, with English summary) ["This paper updates the Cuban list of the Odonata to 85 species grouped in seven families and 42 genera. *Protoneura viridis* Westfall, 1964, *Erythrodiplax bromeliicola* Westfall 2000, *Macrothemis inequiunguis* Calvert 1895, *Orthemis discolor* (Burmeister 1839) and *Telebasis vulnerata* (Hagen 1861) are considered new records. *E. bromeliicola* and *M. inequiunguis* were reported by foreign authors on surveys from the last century. Endemism remains with five species from suborder Zygoptera while 11 species were changed to different genera." (Authors)] Address: Trapero Quintana, A.D., Depto de Biología. Universidad de Oriente. Patricio, Lumumba s/n. C.P. 90500. Santiago de Cuba, Cuba. E-mail: atrapero@cint.uo.edu.cu; traperoquintana76@yahoo.es

**9714.** Wang, J.Z. (2008): Dragonfly flight. *Physics Today* (October 2008): 74-75. (in English) [Introduction into biophysics of flight in planes and dragonflies.] Ad-

dress: Wang, Z. Jane, Theoretical and Applied Mechanics, Cornell University, Ithaca, New York 14853, USA. E-mail: z.jane.wang@cornell.edu

## 2009

**9715.** Allen, K. (2009): The ecology and conservation of threatened damselflies. Integrated catchment science programme. Science report: SC040027/SR1: VII, 142 pp. (in English) ["Background: This report presents the results of an autecological study of *Ischnura pumilio* in south-west England. *I. pumilio* has a sparse, localised distribution in the UK and is classed as "scarce" in the British Red Data Book of Insects. The aim of this study was to raise the ecological understanding of this species to a similar level to that of other threatened odonates such as *Coenagrion mercuriale* with a view to better informing its conservation management. Fieldwork was conducted in the New Forest, Hampshire and at a variety of sites throughout Cornwall and Devon. Main objectives: The primary aim of this study was to examine the dispersal potential, survival rates, population sizes and habitat requirements of *I. pumilio* in the south of England. Similar work on other species, such as *C. mercuriale*, has been useful in guiding conservation efforts, but there are very few studies of *I. pumilio*. It is hoped that this study will inform conservation management and allow more effective monitoring and surveillance of this species. Results: Intensive mark-release-recapture (MRR) studies were conducted at two sites during 2005 and 2006. These revealed that, despite a reputation as long range dispersers, *I. pumilio* were generally very sedentary with movement characteristics similar to those of other similar sized odonates. No movement between sites was recorded and 88 per cent of individuals moved less than 50m (net) in their lifetime. Movement distance was inversely dependent on population density, indicating a tendency to move towards conspecifics or areas of more suitable habitat. The presence of parasitic mites (*Hydryphantas* spp.) significantly increased movement distance. Males consistently moved further than females. Longer intervals between captures resulted in greater movement distances. Surveys of vegetation and environmental factors were conducted at 31 sites with *I. pumilio* records from the previous 10 years. The species occurred at sites with a range of water depths, management regimes and levels of pH, grazing, pollution and disturbance. Occupied habitats generally had slow-flowing water, some bare ground at the water's edge and low levels of shade. A low overall count for odonate species was also associated with the presence of *I. pumilio*. Areas away from water were found to be important for the species and over 30 per cent of matings were recorded at least 10m from water. Existing sites should be actively managed up to 25m from water, and new habitat created, where possible, with dispersal potential in mind. Survival and recapture rates for Scarce Blue-tailed Damselflies and *C. mercuriale* were estimated using single and multistate MRR modelling techniques. The resulting rates were used to estimate population sizes for *I. pumilio* populations surveyed in 2005 and 2006, and two *C. mercuriale* populations in south England surveyed during 2001 and 2002. Survival generally decreased with age and time in the season and a negative effect of parasites was also indicated. Removing a leg for genetic analysis was not found to affect survival. The sex of mature individuals had no, or negligible ef-

fect on their survival rates. *Ischnura pumilio* was found to exist in much smaller populations than *C. mercuriale* and so may suffer greater levels of inbreeding. A comparison of monitoring methods showed that transect walk estimates were a reliable method of estimating abundance and provided a good basis for further work to develop a predictive relationship. Conclusions and recommendations: Despite the strength of some UK populations, such as Latchmoor, *I. pumilio* still requires conservation management at sites that have poorer quality habitat and smaller populations. Many populations are isolated, based on the range of movements observed in this study, and without dispersal to augment genetic diversity even strong populations are at risk of developing high levels of inbreeding. This study has examined several aspects of the species' ecology and is the first large scale study of *I. pumilio* that has been conducted. This report presents estimates of dispersal potential, survival rates and habitat requirements and discusses these with respect to the species' conservation management. Key findings and recommendations include: • The species was found at sites with a range of water depths, management regimes and levels of pH, pollution, grazing and disturbance. However, sites generally had slow-flowing water, with some bare ground in and around the water's edge and were relatively open in terms of shade from tall vegetation. • Management of areas away from water should be incorporated into any habitat management plan, as different individuals may be present and may exhibit different behaviours. A buffer of 25m may be sufficient for the necessary roosting, mating and feeding requirements of *I. pumilio*. • A monitoring program to establish the current status of these and other key odonate sites across the UK would be beneficial. Monitoring of adult *I. pumilio* at existing sites may be achieved using transect walks, which are a useful method for large-scale monitoring. • The ability of *I. pumilio* to colonise newly formed habitat is still open to question. No long-range dispersal movements were recorded in this study and no upward flight behaviour was observed. • In this report, the estimated maximum population sizes for the two studies of *C. mercuriale* are among the highest recorded for any damselfly. However, *I. pumilio* populations were much smaller and as such may be more at risk of genetic effects such as inbreeding." (Author) Available at: <http://publications.environment-agency.gov.uk/pdf/SCHO0809BQVW-e-e.pdf> Address: Environment Agency, Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, BS32 4UD, UK. [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk); Allen, Kathrine, University of Liverpool Liverpool, L69 3BX, UK

**9716.** Becker, I.; Sigalas, V. (2009): Von Pfauen, Libellen und Fledermäusen - Geheimnisvolle Tierwelt im Jugendstil. Veröffentlichungen des Bröhan-Museums 14: 63 pp. (in German) [This is a catalogue directed to animals in art nouveau including two pages (14-15) on dragonflies.] Address: Bröhan-Museum, Landesmuseum für Jugendstil, Art Deco und Funktionalismus (1889-1939), Schloßstr. 1a, 14059 Berlin, Germany

**9717.** Bethoux, O.; De la Horra, R.; Benito, M.I.; Barrenechea, J.F.; Galán, A.B.; López-Gómez, J. (2009): A new triadotypomorphan insect from the Anisian (Middle Triassic), Buntsandstein facies, Spain. *Journal of Iberian Geology* 35(2): 179-184. (in English, with Spanish summary) ["The species *Rabru rubra* sp. nov., a new triadotypomorphan insect from the Iberian Ranges, is

described on the basis of a newly discovered specimen, found in fine grained sandstones of alluvial origin, in the lowermost part of the Eslida Formation (Buntsandstein facies), in the central part of the Iberian Ranges. The occurrence of a triadotypomorphan suggests an Anisian age of the Eslida Formation. The species represents the oldest Mesozoic insect described from Spain, and provides interesting information to better appreciate the process of ecosystems recovery after the Permian-Triassic boundary crisis." (Authors) Odonatoptera] Address: Béthoux, O., Freiberg University of Mining and Technology, Institute of Geology, Department of Palaeontology, Bernhard-von-Cotta Str. 2, D-09596 Freiberg, Germany. E-mail: [obethoux@yahoo.fr](mailto:obethoux@yahoo.fr)

**9718.** Borisov, S.N. (2009): Dragonflies (Odonata) of a thermal spring in «Altyn Emel» Nature Park (South East Kazakhstan). *Euroasien entomological journal* 8(3): 362. (in Russian, with English summary) [*Ischnura elegans*, *I. pumilio*, *Orthetrum brunneum*, and *O. anceps* are newly recorded from a thermal spring (t=32 °C) of Altyn Emel National Park in South-East Kazakhstan (43.921° N, 78.793° E).] Address: Borisov, S.N., Siberian Zoological Museum, Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia. E-mail: [borisov-s-n@yandex.ru](mailto:borisov-s-n@yandex.ru)

**9719.** Bouwman, J.; Groenendijk, D.; Termaat, T.; Platte, C. (2009): Dutch Dragonfly Monitoring Scheme. A Manual. Report number VS2009.015, Dutch Butterfly Conservation, Wageningen & Statistics Netherlands, Den Haag, Netherlands: 21 pp. (in English) [Handout with detailed instructions to choose a transect, count and document specimens, and supply data to the Dutch organisers.] Address: Bouwman, J.H., Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: [jaap.bouwman@vlinderstichting.nl](mailto:jaap.bouwman@vlinderstichting.nl)

**9720.** Burkart, W.; Kappes, E.; Kappes, W.; Martens, A.; Weihrauch, F. (2009): In memoriam Wolfgang Lopau (29. März 1938-29. Juli 2009). *Libellula* 28(3/4): 221-232. (in German, with English summary) ["Wolfgang Lopau, better known to most of his friends as 'Lopi', was without doubt the worldwide acknowledged authority on the Odonata of Greece and surrounding regions. In this obituary his life is portrayed, and his professional impact on international odonatology as well as the spirit of co-operation and friendship in his work is emphasized. A list of Lopi's odonatological publications is appended." (Authors)] Address: Burkart, W., Am Emel 7, D-27412 Wilstedt, Germany. E-mail: [weguburkart@gmx.de](mailto:weguburkart@gmx.de)

**9721.** Catling, P.M. (2009): Dragonflies (Odonata) emerging from brackish pools in saltmarshes of Gaspé, Quebec. *Canadian Field-Naturalist* 123(2): 176-177. (in English) ["*Enallagma hageni*, *Lestes disjunctus*, *Sympetrum costiferum*, *S. danae*, *S. internum*, and *S. obtrusum* were observed emerging from brackish pools with an overall salinity range of 6.0-17.3 ppt in three saltmarshes in Gaspé, Quebec. *Lestes* congener, *Libellula quadrimaculata*, and species of *Sympetrum* were prominent among the larvae in these pools." (Author)] Address: Catling, P.M., 170 Sanford Avenue, Ottawa, Ontario K2C 0E9 Canada; E-mail: [catlingp@agr.gc.ca](mailto:catlingp@agr.gc.ca)

**9722.** David, S.; Smiga, M. (2009): Dragonflies (Insecta: Odonata) of Považské podolie region in the vicinity of the town of Trenčín. *Folia faunistica Slovaca* 14(16): 107-112. (in Slovakian, with English summary) [Slovakia; between 2002 until 2004, 21 Odonata species were



found at 11 localities studied. Dominant species were *Ischnura elegans*, *Platycnemis pennipes*, *Orthetrum albistylum*, and *O. cancellatum*. The community of Odonata was classified as *Orthetrum – Libellula depressa* odonatocenosis.] Address: David, S., Katedra ekológie a environmentalistiky, Fakulta prírodných vied, Univerzita, Konštatná Filozofa v Nitre, Tr. A. Hlinku 1, SK – 949 74 Nitra, Slovakia. E-mail: stanislav.david@savba.sk

**9723.** Eggers, T.O.; Martens, A. (2009): Limnische Neozoa in Deutschland: Verbreitungsmuster und Ausbreitungstrends. Deutsche Gesellschaft für Limnologie (DGL). Erweiterte Zusammenfassungen der Jahrestagung 2008 (Konstanz), Hardegsen 2009 : 378-381. (in German) [*Gomphus pulchellus* is considered to have spread along canals ("Hauptmigrationsachse") and nearby situated gravel pits from west to east. Annotation (Martin Schorr): Range extension of *G. pulchellus* is without any doubt, however it is questionable if this expansion was triggered by canals. The later did not exist (with one exception only - Mittellandkanal) and were realised decades after the first records of the species east of the River Rhine.] Address: Martens, A., Abteilung Biologie, Pädagogische Hochschule Karlsruhe, Bismarckstr. 10, 76133 Karlsruhe, Germany. E-mail: martens@ph-karlsruhe.de

**9724.** Festi, A.; Nössing, T.; Winkler, F.; Werth, A. (2009): Erhebungen der Libellenfauna (Odonata) im Naturpark Trudner Horn (Südtirol, Italien). *Gredleriana* 9: 231-248. (in German, with English summary) ["The Odonata fauna of the area of the „Trudner Horn“ Natural Park (Parco Naturale Monte Corno), which is characterized from several still-water and moorland biotopes, was investigated during the summer of 2008. A total of 22 species of Odonata was identified. Most of those are considered typical generalists of the low mountains. The rarest species of the studied area are the specialized moorland dragonflies like *Aeshna caerulea*, *Leucorrhinia dubia*, *Somatochlora alpestris* and *S. arctica*. Those where found only in a few spots and are to be considered endangered in reason of a progressive loss of habitat due to a deterioration of the moorland biotopes." (Authors)] Address: Festi, A., Dreieheiligenstr. 24, I-39100 Bozen, Italy. E-mail: alex.festi@rol-mail.net

**9725.** Gilroy, J.J.; Anderson, G.Q.A.; Grice, P.V.; Vickery, J.A.; Watts, P.N.; Sutherland, W.J. (2009): Foraging habitat selection, diet and nestling condition in Yellow Wagtails *Motacilla flava* breeding on arable farmland. *Bird Study* 56(2): 221-232. (in English) ["Yellow Wagtails (Aves) showed seasonally variable foraging preferences, favouring field margin and crop habitats, although habitat availability did not influence brood productivity ... Samples taken in June tended to be dominated by flies and beetles (both adults and larvae) While flies continued to dominate the diet in July, beetles were much less prevalent, and adult damselflies became increasingly frequent in samples. It is not known whether this shift is associated with changes in foraging habitat preference, or the relative scarcity of damselflies across the whole study area prior to strong emergences of the commonest species *Enallagma cyathigerum*, and *Ischnura elegans* in late June. The ability to switch between prey items and/or foraging habitats can be important in multi-brooded species that face sharp seasonal peaks in the abundance of invertebrate taxa." (Authors)] Address: Gilroy, J.J., School of Biological

Sciences, University of East Anglia, Norwich, NR4 7TJ, UK. Email: james.gilroy@googlemail.com

**9726.** Goffart, P.; Devillers, C.; Bertrand, S. (2009): Observations récurrentes du Leste verdoyant (*Lestes virens*) dans la région de Spa-Malchamps: une population reproductrice s'y maintient-elle? *Les naturalistes Belges* 90(3-4): 47-54. (in French, with English summary) ["A male adult *Lestes virens* was captured near Spa, Liège province, in September 2006. A female probably belonging to this species was also observed. A second male individual was captured at the same place late August 2007. The possibility that a small relict breeding population is maintaining itself in the area seems most likely. But where does it hides and in what state is it (numbers)?" (Authors)] Address: Goffart, P., Observatoire de la Faune, de la Flore et des Habitats (OFFH), Département cle l'Etude du Milieu naturel et agricole (DEMna) Service Public Wallon (SPW) - DGARNE - Direction de la Nature et de l'Eau. Avenue Maréchal Juin, 23 B-5030 Gembloux, Belgium. E-mail: Philippe.GOFFART@spw.wallonie.be

**9727.** Goffart, P. (2009): Nouvelle émergence du *Sympetrum méridional* (*Sympetrum meridionale*) en Wallonie. *Les naturalistes Belges* 90(3-4): 55-61. (in French, with English summary) ["The capture of a male Southern Darter (*Sympetrum meridionale*) currently emerging in the vegetation of a marl pool in the Belgian Lhotaringy (south of the Luxembourg province), Vance, August 6, 2007 is reported and commented. It is the third recent record (after 2000) of this species in Wallonia. This probably comes up in a wave of colonization, which reached the Netherlands in 2006. The species could be under-detected in our region because of its superficial resemblance with other darters widespread in our region. The diagnostic characters are recalled." (Author)] Address: Goffart, P., Observatoire de la Faune, de la Flore et des Habitats (OFFH), Département cle l'Etude du Milieu naturel et agricole (DEMna) Service Public Wallon (SPW) - DGARNE - Direction de la Nature et de l'Eau. Avenue Maréchal Juin, 23 B-5030 Gembloux, Belgium. E-mail: Philippe.GOFFART@spw.wallonie.be

**9728.** Ichinose, T.; Ishi, J.; Morita, T. (2009): Relationship between distribution of Odonata species and environmental factors on the irrigation ponds in Awaji Island, central Japan, analyzing spatial autocorrelation. *Journal of rural planning association* 27(special issue): 191-196. (in Japanese, with English summary) ["Odonata were surveyed from May to October 2002 at 38 small irrigation ponds in the northern part of Awaji Island, Japan. The investigation was conducted nine times on each pond. A total of 1568 individuals from 28 species was recorded. We selected nine species with at least 40 individuals recorded, and correlated them with environmental factors, as conductivity,  $\text{NO}_2$ ,  $\text{NO}_3$ ,  $\text{NH}_4$ ,  $\text{PO}_4^{3-}$ , COD, surrounding land uses within 50 meters from the edge of pond, the number of aquatic water plant species, and autocovariates explaining spatial autocorrelation, using Generalized Linear Models (GLM). The result showed that  $\text{NO}_3$ , COD, surrounding grassland, woodland and the number of water plant species were critical factors for the distribution of some Odonata species." (Authors)] Address: Ichinose, T., Fac. of Environment and Information Studies, Keio University, Japan

**9729.** Ivinskis, P.; Rimšaitė, J. (2009): Odonata of Purvinas wetland in eastern Lithuania. *Acta Biol. Univ. Daugavp.* 9(1): 39-42. (in English) [Between 2005-2007

36 odonate species were recorded in the in northeastern part of Lithuania in Purvinas wetland. The list of records includes rare species as *Nehalennia speciosa*, *Coenagrion armatum*, *Sympecma paedisca*, *Somatochlora flavomaculata*, *Leucorrhinia pectoralis* and *L. albifrons*.] Address: Ivinskis, P., Jolanta Rimšaitė. Institute of Ecology of Vilnius university, Akademijos 2, LT – 08412, Vilnius, Lithuania. E-mail: entlab@centras.lt

**9730.** Jarju, L.B.S.; Fillinger, U.; Green, C.; Louca, V.; Majambere, S.; Lindsay, S.W. (2009): Agriculture and the promotion of insect pests: rice cultivation in river floodplains and malaria vectors in The Gambia. *Malaria Journal* 8(1): 12 pp. (in English) ["Background: Anthropogenic modification of natural habitats can create conditions in which pest species associated with humans can thrive. In order to mitigate for these changes, it is necessary to determine which aspects of human management are associated with the promotion of those pests. *Anopheles gambiae*, the main Africa malaria vector, often breeds in rice fields. Here the impact of the ancient practice of 'swamp rice' cultivation, on the floodplains of the Gambia River, on the production of anopheline mosquitoes was investigated. Methods: Routine surveys were carried out along 500 m transects crossing rice fields from the landward edge of the floodplains to the river during the 2006 rainy season. Aquatic invertebrates (including 'Zygoptera' and 'Anisoptera') were sampled using area samplers and emergence traps and fish sampled using nets. Semi-field experiments were used to investigate whether nutrients used for swamp rice cultivation affected mosquito larval abundance. Results: At the beginning of the rainy season rice is grown on the landward edge of the floodplain; the first area to flood with fresh water and one rich in cattle dung. Later, rice plants are transplanted close to the river, the last area to dry out on the floodplain. Nearly all larval and adult stages of malaria vectors were collected 0–100 m from the landward edge of the floodplains, where immature rice plants were grown. These paddies contained stagnant freshwater with high quantities of cattle faeces. Semi-field studies demonstrated that cattle faeces nearly doubled the number of anopheline larvae compared with untreated water. Conclusion: Swamp rice cultivation creates ideal breeding sites for malaria vectors. However, only those close to the landward edge harboured vectors. These sites were productive since they were large areas of standing freshwater, rich in nutrients, protected from fish, and situated close to human habitation, where egg-laying mosquitoes from the villages had short distances to fly. The traditional practice of 'swamp rice' cultivation uses different bodies of water on the floodplains to cultivate rice during the rainy season. A consequence of this cultivation is the provision of ideal conditions for malaria vectors to thrive. As the demand for locally-produced rice grows, increased rice farming will generate great numbers of vectors; emphasizing the need to protect local communities against malaria." (Authors)] Address: Lindsay, S.W., School of Biological and Biomedical Sciences, Durham University, Durham, UK, E-mail: Steve.Lindsay@lshrm.ac.uk

**9731.** Jongerius, S.R.; Lentink, D. (2009): Structural analysis of a dragonfly wing. *Experimental Mechanics* 50(9): 1323-1334. (in English) ["Dragonfly wings are highly corrugated, which increases the stiffness and strength of the wing significantly, and results in a lightweight structure with good aerodynamic performance.

How insect wings carry aerodynamic and inertial loads, and how the resonant frequency of the flapping wings is tuned for carrying these loads, is however not fully understood. To study this we made a three-dimensional scan of a dragonfly (*Sympetrum vulgatum*) fore- and hindwing with a micro-CT scanner. The scans contain the complete venation pattern including thickness variations throughout both wings. We subsequently approximated the forewing architecture with an efficient three-dimensional beam and shell model. We then determined the wing's natural vibration modes and the wing deformation resulting from analytical estimates of 8 load cases containing aerodynamic and inertial loads (using the finite element solver Abaqus). Based on our computations we find that the inertial loads are 1.5 to 3 times higher than aerodynamic pressure loads. We further find that wing deformation is smaller during the downstroke than during the upstroke, due to structural asymmetry. The natural vibration mode analysis revealed that the structural natural frequency of a dragonfly wing in vacuum is 154 Hz, which is approximately 4.8 times higher than the natural flapping frequency of dragonflies in hovering flight (32.3 Hz). This insight in the structural properties of dragonfly wings could inspire the design of more effective wings for insect-sized flapping micro air vehicles: The passive shape of aeroelastically tailored wings inspired by dragonflies can in principle be designed more precisely compared to sail like wings—which can make the dragonfly-like wings more aerodynamically effective." (Authors)] Address: Lentink, D., Faculty of Aerospace Engineering, Delft University of Technology, 2600 GB Delft, The Netherlands. E-mail: david.lentink@wur.nl

**9732.** Lafontaine, R.-M.; de Schaezen, R. (2009): Que s'est-il passé depuis l'an 2000 pour les libellules méridionales en Wallonie et à Bruxelles? *Les naturalistes Belges* 90(3-4): 33-46. (in French, with English summary) ["A previous study showed that at the end of last century southern species of dragonflies were seen more regularly in Wallonia and Brussels. Data collected since then show, first, installation confirmed for all species during the 2000s and, secondly, a good correlation between changes in the number of observations and mean annual temperatures. This development, which can be regarded as favourable, is discussed and put into perspective." (Authors)] Address: Lafontaine, René-Marie, 'Unité Biologie de la Conservation, Institut royal des Sciences naturelles de Belgique, Rue Vautier 29, B-1000 Bruxelles, Belgium. E-mail: rene-marie.lafontaine@sciencesnaturelles.be

**9733.** Leong, T.M.; Tay, S.L. (2009): Encounters with *Tetracanthagyna plagiata* (Waterhouse) in Singapore, with an observation of oviposition (Odonata: Anisoptera: Aeshnidae). *Nature in Singapore* 2: 115-119. (in English) ["One of the females was spotted flying low (waist level) over a sandy forest stream, perched on a moss-covered, decomposing log beside the stream and began to arch its abdomen in order to insert its ovipositor into the soft, moist wood. The female deliberately scraped an dug into the branch for over a minute, after which it flew off downstream." (Authors)] Address: Leong, T.M., Central Nature Reserve, National Parks Board, 601 Island Club Road, Singapore 57S775. E-mail: leongtziming@nparks.gov.sg

**9734.** Liang, Z.; Dong, H. (2009): Computational study of wing-wake interactions between ipsilateral wings of dragonfly in flight. *American Institute of Aeronautics and*

Astronautics Paper 2009-4192: 7 pp. (in English) ["Bilateral and ipsilateral wing-wing interactions can be commonly observed in insect flights. As a representative example of ipsilateral wing-wing interaction, dragonflies in flight have been widely studied. It has been discovered that they utilize changes of phase between ipsilateral forewings and hindwings at different kinds of flying mode. In the current study, we present a direct numerical simulation of a modeled dragonfly in slow flight as reported in Azuma et al (1985). Realistic morphologies of wing, body, and kinematics are used for maximum including wing and body features of a dragonfly. This work aims to study the relations between waketopology and aerodynamic performance due to wing-wing and wing-wake interactions of dragonfly ipsilateral wings. Current high fidelity numerical results are also compared with lowerfidelity aerodynamic modeling method discussed in Azuma et al (1985).] Address: Dong, H., Department of Mechanical & Materials Engineering, Wright State University, Dayton, OH 45435, USA. E-mail: haibo.dong@wright.edu.

**9735.** Liu, T.J.-C.; Wang, L.-J.; Liu, W.-C.; Wu, H.-C. (2009): Biomechanical analyses of hind wing of dragonfly. *Journal of Advanced Engineering* 4(1): 19-24. (in Chinese, with English summary) ["The purpose of this paper is to investigate the deformation and bending stiffness of the hind wing of the dragonfly *Anax panybeus*. Using the finite element analysis, the results show that the membrane almost provides no contributions for the bending stiffness. But the smallest veins have contributions to support the wing. From the results due to the wind pressure, the maximum stress occurs at the corrugation region in the middle of the wing." (Authors)] Address: Liu, T.J.-C., Dept of Mechanical Engineering, Ming Chi Univ. of Technology, Taishan, Taipei, Taiwan, R.O.C. E-mail: jinchee@mail.mcut.edu.tw

**9736.** Maiolini, B.; Carolli, M. (2009): Odonata in Trentino (NE-Italy): historical and recent data. *Studi Trentini di Scienze Naturali, Acta Biologica* 84: 11-18. (in English, with Italian summary) ["The historical presence of Odonata in Trentino was reconstructed using data from the collections of the Natural Science Museum of Trento and from existing literature. Recent (2006-2007) observations by the authors in selected biotopes were conducted to start an updated list of species for the Trento Province. Odonata are one of the most interesting invertebrate taxa due to their ecological and trophic features, which allow their use as good and useful indicators of the ecological quality of freshwater biotopes and their neighbouring areas, and of the impact of human activities. The updated database (1699 records) comprises 64 species (77% of the Italian species). Large part of the records regarded lowland areas, but altitudinal preferences in some Odonata species were evident. The database comprises common and widespread species, as *Aeshna juncea*, *A. cyanea*, *Platycnemis pennipes*, *Ischnura elegans*, *Sympetrum striolatum* and *Coenagrion puella*. Rare species were represented by *Epitheca bimaculata*, *C. ornatum*, *Sympetma paedisca*, *Leucorrhinia pectoralis*, *Ophiogomphus cecilia*, *Somatochlora flavomaculata*, *Sympetrum depressiusculum*. Some of these were recorded before the 50's only in floodplain wetlands of the Adige Valley, which were claimed in the second half of last century, thus causing a local extinction. Recent and spatially limited observations allowed recording the presence of 24 species." (Authors)] Address: Maiolini, B., Sezione di

Zoologia degli Invertebrati e Idrobiologia, Museo Tridentino Scienze Naturali, Via Calepina 14, 38122 Trento, Italia. E-mail: maiolini@mtsn.tn.it

**9737.** Miller, F.P.; Vandome, A.F.; Mcbrewster, J. (2009): *Insect Wing*. Alphascript Publishing. ISBN: 6130242862: 168 pp. (in English) [Articles taken from Wikipedia (and including a few references to Odonata), poorly arranged (e.g. very small letter types), and sold for maximum profit purposes. Before buying this book, you should order a display copy.]

**9738.** Nakamura, M.; Okamiya, T.; Hasegawa, M.; Hasegawa, M. (2009): Cooperative breeding in the endemic Madagascan Chabert's Vanga *Leptopterus chabert*. *Ornithological Science* 8: 23-27. (in English) ["To examine the breeding system of the endemic Madagascan Chabert's Vanga *Leptopterus chabert* (Aves), we studied the contributions made by adults to nest building, incubating, brooding, and feeding the young at six nests. The study was conducted during November and December in 1999, 2000, and 2005 at Ankara-fantsika Strict Nature Reserve. During the nest-building stage, two adults (perhaps a heterosexual pair) delivered nest materials. Two adults participated in incubating and brooding. During the nestling period, several (3-4) adults delivered food (mainly bees, dragonflies, and moths) to the nestlings at two nests. They also mobbed animals that approached the nest. During the post-fledging period, several (3-4) adults fed the fledglings in two family groups. These observations suggest that Chabert's Vangas are cooperative breeders in which several adults feed the young of one brood." (Authors)] Address: Nakamura, M., Laboratory of Animal Ecology, Department of Biology, Joetsu University of Education, 1 Yamayashiki-machi, Joetsu, Niigata 943-8512, Japan

**9739.** Oliveira, D.E.; De Marco Jr., P. (2009): Is there a trade-off between the melanin allocated to the immune system and to camouflage on larvae of the dragonfly *Micrathyrina catenata* Calvert, 1909 (Odonata: Libellulidae)? *Neotropical Biology and Conservation* 4(3): 133-136. (in English, with Portuguese summary) ["In insects, the immune system responds to the presence of antigens involving them in melanin. However, the melanin is also allocated into the exoskeleton's pigmentation, used to camouflage. We aimed to test the existence of a trade-off between the allocation of melanin to the immune system and to camouflage on the larvae of *Micrathyrina catenata*. We conducted the study in the Reserva do km 41, 80 kilometer distant from Manaus, Amazonas, Brazil. We implanted a nylon line into the abdomen of 30 larvae and observed if had or not deposition of melanin in the line. We counted the number of individuals who responded to implant depositing melanin and, later, we took photos of the larvae's heads and calculate gray intensity. We used a t test for independent samples. 76% of larvae responded to treatment depositing melanin on the implants. There were no significant differences in the intensity of gray between the larvae that responded to the implants and those who did not responded. There is no trade-off to allocation of melanin for camouflage and for the immune system. This should happen because the immune system is not limited by the acquisition of resources or the camouflage's demand for melanin is not enough to influence the immune system." (Authors)] Address: De Marco, P., Laboratório Ecologia Teórica e Síntese, Departamento de Biologia Geral, Universidade Federal de Goiás, BR-



74001-970, Goiania, GO, Brazil. E-mail: pdemarco@icb.ufg.br

**9740.** Perchard, R.; Long, R. (2009): The rediscovery of Dainty Damselfly *Coenagrion scitulum* (RAMB.) in Jersey. *Atropos* 38: 3-5. (in English) [UK; La Rocque, south-eastern corner of Jersey, 16-VI-2009; Grands Vaux, 6km north-west of La Rocque, 7-VII-2009] Address: Perchard, R., 4 New Road, Gorey Village, St Martin, Jersey, JE3 6UN, UK

**9741.** Phoenix, J.; Hentschel, W. (2009): Die Hochmoore um Prebuz/Frühbuss, Rolava/Sauersack und Jelení/Hirschenstand (Erzgebirge) – bedeutsame Lebensräume für moorgebundene Libellenarten. *Sborník Oblastního muzea v Moste, rada přírodovědná* 31: 31-42. (in German and Czech, with English summary) ["The raised bogs on top of the western part of the Iron Mountains, situated in the communities of Prebuz, Rolava and Jelení are important habitats for dragonflies. In the years 2005 – 2009 the occurrence of species confined to bogs as *Aeshna subarctica elisabethae*, *Somatochlora alpestris* and *S. arctica* have been recorded in this bogland for the first time. The suggestion to preserve this bogland in an expanded scale is also of use to dragonfly protection. In the context with climate change a long-term monitoring of dragonflies is recommended." (Authors)] Address: Phoenix, J., Goethestr. 22, 01824 Königstein, Germany. E-mail: juergen.phoenix@t-online.de

**9742.** Pick, C.; Schneuer, M.; Burmester, T. (2009): The occurrence of hemocyanin in Hexapoda. *FEBS J.* 276(7): 1930-1941. (in English) ["Hemocyanins are copper-containing, respiratory proteins that have been thoroughly studied in various arthropod subphyla. Specific O(2)-transport proteins have long been considered unnecessary in Hexapoda (including Insecta), which acquire O(2) via an elaborate tracheal system. However, we recently identified a functional hemocyanin in the stonefly *Perla marginata* (Plecoptera) and in the firebrat *Thermobia domestica* (Zygentoma). We used RT-PCR and RACE experiments to study the presence of hemocyanin in a broad range of ametabolous and hemimetabolous hexapod taxa. We obtained a total of 12 full-length and 5 partial cDNA sequences of hemocyanins from representatives of Collembola, Archeognatha, Dermaptera, Orthoptera, Phasmatodea, Mantodea, Isoptera and Blattaria. No hemocyanin could be identified in Protura, Diplura, Ephemeroptera, Odonata, or in the Eumetabola (Holometabola + Hemiptera). It is not currently known why hemocyanin has been lost in some taxa. Hexapod hemocyanins usually consist of two distinct subunit types. Whereas type 1 subunits may represent the central building block, type 2 subunits may be absent in some species. Phylogenetic analyses support the Pancrustacea hypothesis and show that type 1 and type 2 subunits diverged before the emergence of the Hexapoda. The copperless insect storage hexamerins evolved from hemocyanin type 1 subunits, with *Machilis germanica* (Archeognatha) hemocyanin being a possible 'intermediate'. The evolution of hemocyanin subunits follows the widely accepted phylogeny of the Hexapoda and provides strong evidence for the monophyly of the Polyneoptera (Plecoptera, Dermaptera, Orthoptera, Phasmatodea, Mantodea, Isoptera, Blattaria) and the Dictyoptera (Mantodea, Isoptera, Blattaria). The Blattaria are paraphyletic with respect to the termites." (Authors)] Address: Burmester, T., Biozentrum Grindel und Zoologisches Museum, Universi-

tät Hamburg, Hamburg, Germany. E-mail: thorsten.burmester@uni-hamburg.de.

**9743.** Pivko Knežević, A. (2009): The evaluation of the effect of sewage treatment plant Celje on the river Savinja regarding longitudinal changes of macroinvertebrate community. Graduation thesis (University studies), University of Ljubljana, Biotechnical faculty, Dept. of Biology: 82 pp, 3 app. (in Slovenian, with English summary) ["The aim of our research was to evaluate effect of Central sewage treatment plant Celje (CSPC) on the river Savinja, Slovenia. We assumed that because of its nutrient content, discharge of CSPC causes changes in the number, diversity and structure of macroinvertebrate community in the river. We measured physical, chemical and biological parameters and sampled macroinvertebrates three times at three different locations (location Polule upstream of the CSPC and locations Tremerje and Laško downstream of the CSPC). We determined 80 taxa of macroinvertebrates. The values of Shannon – Wiener index of diversity showed high diversity at all tree researched locations. Values were the highest at location Tremerje, where also the most taxa were present. High diversity at location Tremerje was probably consequence of diverse substrat in the river bed. Saprobic index (SI) was low due to high aeration of water. Referring to values of SI, we can classify the studied part of river Savinja ti the 1. – 2. quality class. Value of SI was slightly increasing down the stream (from Polule to Laško). Analysis of macroinvertebrate functional feeding groups showed dominance of detritivores, followed by grazers, miners, filtrators and predators. Cluster analysis of data showed that temporal differences were bigger than spatial differences. Seasonal impacts affected macroinvertebrate community more than environmental variables at different locations." (Author) The study includes the following odonate species: *Calopteryx splendens*, *Platycnemis pennipes*, *Gomphus vulgatissimus*, and *Onychogomphus f. forcipatus*.] Address: Pivko Knežević, Alijana, University of Ljubljana, Biotechnical faculty, Dept. of Biology, SI – 1000 Ljubljana, Večna pot 111, Slovenia

**9744.** Reels, G.T. (2009): Dragonfly emergence at a small newly-created pond in Hong Kong. *Hong Kong Entomological Bulletin* 1(2): 32-37. (in English) ["Dragonfly emergence was monitored at a small (0.02ha) pond in Hong Kong from March 2004 to July 2005. The pond was created in late 2003, with emergent vegetation established along the margin. Dragonfly exuviae were much more abundant in 2004 (597 exuviae in 12 species) than in 2005 (49 exuviae in three species). Exuviae abundance was highest in March in 2004; April in 2005. In 2004, exuviae were recorded until September; in 2005, they were not recorded after May. Exuviae were estimated to have an average persistence of 3.4 days in the field. Emergence patterns varied between species. Most aeshnids and libellulids emerged in March and April 2004, although *Anax guttatus* had a second pulse of emergence in June 2004; *Sinictinogomphus clavatus* and *Ictinogomphus pertinax* (Gomphidae), and *Epopthalmia elegans* (Corduliidae) were late emergers in 2004. Their exuviae first appearing in June or July. The two gomphid species emerged in greater numbers in April and May 2005. The dramatic decline of emergence in 2005 was probably due to the growth and proliferation of predatory fish in the pond. More dragonfly species were recorded as adults than as exuviae, suggesting adult immigration. Surveys of

adult dragonflies alone may not give a completely accurate impression of the value of particular ponds for breeding dragonflies." (Author)] Address: Reels, G.T., H-3-30 Fairview Park, Yuen Long, N.T. Hong Kong. E-mail: gtreels@cyberdude.com

**9745.** Rehfeld, G.; Bachmann, V. (2009): Renaturierung der Schunteraue im Flurbereinigungsgebiet Hon-delage/Dibbesdorf: Monitoring von Libellen und Amphibien. LaReG, Braunschweig: 29 pp. (in German) [Twenty three Odonata species have been recorded for the period 2007-2008 at the Schunter and its oxbow, Braunschweig, Niedersachsen, Germany.] Address: Rehfeldt, G., Zool. Inst. TU Braunschweig, Fasanenstr. 3, 38092 Braunschweig, Germany. E-mail: G.Rehfeldt@tu-bs.de

**9746.** Strausfeld, N.J.; Sinakevitch, I.; Brown, S.M.; Farris, S.M. (2009): Ground plan of the insect mushroom body: functional and evolutionary implications. *J. Comp. Neurol.* 513(3): 265-291. (in English) ["In most insects with olfactory glomeruli, each side of the brain possesses a mushroom body equipped with calyces supplied by olfactory projection neurons. Kenyon cells providing dendrites to the calyces supply a pedunculus and lobes divided into subdivisions supplying outputs to other brain areas. It is with reference to these components that most functional studies are interpreted. However, mushroom body structures are diverse, adapted to different ecologies, and likely to serve various functions. In insects whose derived life styles preclude the detection of airborne odorants, there is a loss of the antennal lobes and attenuation or loss of the calyces. Such taxa retain mushroom body lobes that are as elaborate as those of mushroom bodies equipped with calyces. Antennal lobe loss and calycal regression also typify taxa with short nonfeeding adults, in which olfaction is redundant. Examples are cicadas and mayflies, the latter representing the most basal lineage of winged insects. Mushroom bodies of another basal taxon, the Odonata, possess a remnant calyx that may reflect the visual ecology of this group. That mushroom bodies persist in brains of secondarily anosmic insects suggests that they play roles in higher functions other than olfaction. Mushroom bodies are not ubiquitous: the most basal living insects, the wingless Archaeognatha, possess glomerular antennal lobes but lack mushroom bodies, suggesting that the ability to process airborne odorants preceded the acquisition of mushroom bodies. Archaeognathan brains are like those of higher malacostracans, which lack mushroom bodies but have elaborate olfactory centers laterally in the brain." (Authors) Two dragonfly species: *Calopteryx splendens*, *Libellula depressa* and one mayfly species: *Potamanthus luteus* were collected near streams and rivers in the vicinity of Würzburg, Bayern, Germany. *Perithemis tenera* (Odonata) and Japanese beetles (*Popillia japonica*, Scarabaeidae, Coleoptera) were collected in the Morgantown, West Virginia, region, USA.] Address: Strausfeld, N.J., Arizona Research Laboratories, Division of Neurobiology, University of Arizona, Tucson, Arizona 85721, USA. E-mail: flybrain@neurobio.arizona.edu

**9747.** Strickland, G.; Strickland, J. (2009): Damsellies of Louisiana. The Entomology Club at Louisiana State University: 65 pp. (in English) ["The Odonata have been treated in many wonderful technical and popular guides at both the national and regional levels. Many of these guides provide detailed accounts of each species, including range maps, habitat information, and keys for

species identification. Style of illustration varies from guide to guide, but often photographs of specimens in situ are used. Although these photos are aesthetically pleasing, important characters for species level identification are frequently sacrificed in the process. In addition, the specimen's true life size can be hard to determine. Because of constraints placed on the size of the field guides, photos of specimens showing individual variation due to sex, age, etc. are typically only included when this variation is extreme. This book is not meant to replace other books, but to be used as a local and regional supplement to a field guide of your choice. [...] Gayle and Jeanell Strickland have worked tirelessly to compile each of these species plates. The checklist was compiled by Bill Mauffray. The main purpose of this book is to make Gayle and Jeanell's photographic plates available to a wider audience and especially to aspiring students of the Odonata. We are grateful for their peerless contributions to highlighting the fauna of Louisiana and allowing us to produce this book from their work." (Editors) The authors use a scanner to produce their brilliant figures. The method is introduced in detail. Supplemental material can be accessed at: <http://members.fotki.com/gstrick3/>] Address: Gayle & Jeanell Strickland, Baton Rouge LA, USA. E-mail: gstrick3@cox.net

**9748.** Termaat, T. (2009): Hulp bij het determineren van libellen. *Pantserjuffers. Vlinders* 3/2009: 16-18. (in Dutch) [Detailed notes on field characteristics of the Lestidae (*Lestes dryas*, *L. sponsea*, *L. virens*, *L. barbarus*, *Chalcolestes viridis*) occurring in the Netherlands.] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands

**9749.** Termaat, T. (2009): Hulp bij het determineren van libellen Blauwe waterjuffers. *Vlinders* 2/2009: 12-14. (in Dutch) [Detailed notes on field characteristics of *Enallagma cyathigerum* and the species of the genus *Coenagrion* occurring in the Netherlands] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands

**9750.** Utz, R.M.; Hilderbrand, R.H.; Boward, D.M. (2009): Identifying regional differences in threshold responses of aquatic invertebrates to land cover gradients. *Ecological Indicators* 9(3): 556-567. (in English) ["Conversion of land from natural to urban or agricultural cover degrades stream ecosystems and results in loss of biodiversity. We compared cumulative frequency distributions to measure responses to land use gradients for aquatic invertebrate taxa to agricultural, urban, and impervious surface cover gradients across the state of Maryland, USA. The technique identifies the upper limit threshold above which taxa cease to occur as well as a lower limit of detection of effect for negatively affected taxa. Urban development and impervious surface cover negatively affected the distributions of 44-56% of the 180 taxa tested, depending on region. Across similar taxa, negative responses occurred at lower levels of urban land covers in the Piedmont compared to the Coastal Plain physiographic province, which suggests that Piedmont aquatic biodiversity may be more vulnerable to urbanization. Most taxa were capable of tolerating high levels of agricultural development, although a number of common taxa in the Coastal Plain and Highlands regions were found to be agriculture-sensitive. Some taxa traditionally used as indicators were tolerant of very high levels of human-altered land uses, suggesting that such taxa require

examination prior to use as indicators of landscape stressors. Our analysis method appears to be sufficiently flexible and sensitive to be used for a variety of taxa and systems for stressor detection, ecosystem monitoring, and spatially explicit forecasts of taxa loss as watershed land cover changes." (Authors) Odonata were found to be positively associated with urbanized land cover.] Address: Utz, R.M., University of Maryland Center for Environmental Science Appalachian Laboratory, 301 Braddock Road, Frostburg, MD 21532, USA. E-mail: rutz@al.umces.edu

**9751.** Wildermuth, H. (2009): Buchbesprechung: Libellen schützen, Libellen fördern. Leitfaden für die Naturschutzpraxis. Entomo Helvetica 2: 32. (in German) [Book review: "Schweizerische Arbeitsgemeinschaft Libellenschutz (SAGLS). 1. Auflage. Beiträge zum Naturschutz in der Schweiz Nr. 31/2009. A4, broschiert. 88 Seiten, 164 Farbfotos, 7 Zeichnungen und Grafiken, 1 Tabelle. ISSN 1421-5527. Zu beziehen bei: Pro Natura, Postfach, CH-4018 Basel. E-Mail: mailbox@pronatura.ch. Art. Nr. 4631. Preis: Fr. 34.-, für Mitglieder Pro Natura Fr. 29.-; Französische Ausgabe: Groupe de travail pour la conservation des libellules de Suisse (GTCLS): Protéger et favoriser les libellules. Guide pratique de protection de la nature. Contribution à la protection de la nature en Suisse No 32/2009. Pro Natura, case postale, 4018 Bâle. E-Mail: mailbo x@pronatura.ch. Art. no 5632."] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**9752.** Wohlfahrt, B.; Vamosi, S.M. (2009): Antagonistic selection or trait compensation? Diverse patterns of predation-induced prey mortality due to the interacting effects of prey phenotype and the environment. *Evol. Biol.* 36: 386-396. (in English) ["Differentiation among closely related prey species may result from differing adaptations to heterogeneous environments. Many studies have focused on competition for shared resources as a major factor promoting differentiation, with considerably less attention focused on interacting effects of abiotic factors and predator-prey relationships. To further investigate the effects of interacting selective factors on the outcomes of mortality and survival in aquatic prey, we conducted interrelated laboratory studies examining the effects of water colour and plant density on predator-induced mortality in four dytiscid species (Coleoptera: Dytiscidae) that varied in body size (total body length), and body colouration pattern. Body size was more strongly phylogenetically conserved than colouration pattern, and larger body size generally resulted in decreased predator-induced mortality rates. In contrast, the effectiveness of body colouration patterns in decreasing prey mortality risk depended on water colour and prey body size. In clear water, small and patterned dytiscids had mortality rates equal to medium-sized plain beetles, thereby compensating for differences in mortality risk due to body size differences. Under dark water conditions, small dytiscids experienced higher mortality rates compared to medium-sized dytiscids; however, the effectiveness of colouration patterns in medium-sized beetles decreased to the point that it became detrimental to survival, revealing antagonistic selection. We suggest that colouration patterns are not ubiquitous in prey species and cospecialization in larger size and presence of colouration patterns does not generally result in higher prey survival, because the effectiveness of the two antipredator defences may be

restricted to certain phenotype environment combinations. Our results illustrate how interactions between prey phenotype and variable environmental conditions among habitats dominated by the same predator can lead to adaptive trade-offs, which can increase the number of possible outcomes of predator mediated selection." (Authors) *Aeshna juncea* larvae were used in laboratory experiments on predation-induced mortality in 4 dytiscid species (Coleoptera). Some notes on the larvae are provided based on brief and clear definitions of various types of their behaviour.] Address: Wohlfahrt, Bianca, Dept Biol. Sci., Univ. Calgary, 2500 Univ. Dr. NW, Calgary. T2N 1N4. Canada

**9753.** Zhang, Z.-S.; Lu, X.-G.; Wang, Q.-C.; Zheng, D.-M. (2009): Mercury, cadmium and lead biogeochemistry in the soil-plant-insect system in Huludao City. *Bull. Environ. Contam. Toxicol.* 83: 255-259. (in English) ["Mercury, cadmium, and lead concentrations of ashed plants and insects samples were investigated and compared with those of soil to reveal their biogeochemical processes along food chains in Huludao City, Liaoning Province, China. Concentration factors of each fragments of the soil-plant-herbivorous insect-the carnivorous insect (= "Dragonfly") food chain were 0.18, 6.57, and 7.88 for mercury; 6.82, 2.01, and 0.48 for cadmium; 1.47, 2.24, and 0.57 for lead, respectively. On the whole, mercury was the most largely biomagnified, but cadmium and lead were not greatly accumulated in the carnivorous insects as expected when the food chain extended to the secondary consumers. Results indicated that concentration factors depended on metals and insects species of food chains." (Authors)] Address: Zhang, Z.-S., Key Laboratory of Wetland Ecology and Environment, Northeast Institute of Geography and Agro ecology, CAS, Changchun, China. E-mail: zzslycn@163.com

## 2010

**9754.** Abbott, J.C. (2010): OdonataCentral: The past, present and future. *Argia* 22(4): 10-14. (in English) [Extensive report on activities to launch, run, and improve the functionality of the website of the Dragonfly Society of the Americans with special reference to the management of species records.] Address: Abbott, J.C., Patterson Labs 219, School Bio. Sci., Univ. Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**9755.** Abbott, J.C. (2010): Book Review: Dragonflies of Alaska, Second edition. *Argia* 22(4): 22. (in English) [Compared with the first edition of the book, additional three species had to be considered.] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**9756.** Abilhoa, V.; Vitule, J.R.S.; Bornatowski, H. (2010): Feeding ecology of *Rivulus luelingi* (Aplouscheiloidei: Rivulidae) in a Coastal Atlantic Rainforest stream, southern Brazil. *Neotropical Ichthyology* 8(4): 813-818. (in English, with Portuguese summary) ["Odonata - Libellulidae (nymphs)" occurred in 10.1% of the 129 studied stomach of *Rivulus luelingi* from a Coastal Atlantic Rainforest stream in southern Brazil.] Address: Vitule, J.R.S., Departamento de Engenharia Ambiental, Setor de Tecnologia, Universidade Federal do Paraná. 81531-970 Curitiba, Paraná, Brazil. E-mail: biovitule@gmail.com



- 9757.** Alcocer, J.; Bernal-Brooks, F.W. (2010): Limnology in Mexico. *Hydrobiologia* 644: 15-68. (in English) [The paper "deals with the geography, geology, and climate of the Mexican territory as the basis to further explain the development of Limnology as a science in this country. An early knowledge started with the Aztecs, with evidence of practical solutions for a life within a lake. After the conquest of the American territories by the Spaniards, the exploration of the new territories provided the main source of information relative to natural resources. In 1938, the Mexican government established the Estación Limnológica de Pátzcuaro and the pioneer studies appeared under the name of Spanish scientists not only here but also at the Universidad Nacional Autónoma de México and the Instituto Politécnico Nacional. During the 1970s, the participation of Mexican limnologists began and the attempt to build-up a conceptual framework in its own for lakes, reservoirs, and rivers. This article outlines the main limnological characteristics of Mexican water bodies, highlights the peculiarities of a transitional zone between the tropics and subtropics, and describes the government structure for management and administration. A fast development in this area of knowledge got underway with the creation of the Asociación Mexicana de Limnología in 1997 and the collaboration with international counterparts." (Authors) Table 10 with a list of benthic macroinvertebrates characteristic of some Mexican lakes includes some Odonata.] Address: Alcocer, J., Proyecto de Investigación en Limnología Tropical, FES Iztacala, Universidad Nacional Autónoma de México, Av. de los Barrios No. 1, Los Reyes Iztacala, Tlalnepantla, Estado de México 54090, Mexico. E-mail: jalcocer@servidor.unam.mx
- 9758.** Allen, K.A.; Le Duc, M.G.; Thompson, D.J. (2010): Habitat and conservation of the enigmatic damselfly *Ischnura pumilio*. *Journal of Insect Conservation* 14(6): 689-700. (in English) ["*Ischnura pumilio* is threatened in the UK and its habitat requirements are not well understood. This study tests previously held notions of the habitat requirements of *I. pumilio*, investigates the features of a habitat influencing odonate species composition and provides recommendations for habitat creation and management for *I. pumilio* persistence. Thirty-one sites across south west England with past *I. pumilio* records were surveyed in 2006. Environmental variables and odonate abundance were recorded. Odonate species composition and *I. pumilio* abundance were related to environmental variables using multivariate techniques and GLM. *Ischnura pumilio* was found at a wide variety of habitat types; key habitat features were a muddy substrate with some open ground, turbid water, and low levels of shade. It was associated with increased structural diversity of vegetation away from water but low maximum height; characteristic of early-successional sites. The variables predicting odonate composition were location, shade, level of disturbance, water depth, and cover of terrestrial dwarf shrubs and Sphagnum species. Vegetation height and structure were also highly influential to at least 20 m from water. This study indicates that odonate habitat management should include adjacent hinterland. Management for *I. pumilio* may be complicated by the species' use of two habitat types, each with associated problems. Furthermore, odonate species diversity was negatively associated with *I. pumilio* abundance, which may cause conflict of interest when managing habitats." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk
- 9759.** Altmüller, R.; Clausnitzer, H.-J. (2010): Rote Liste der Libellen Niedersachsens und Bremens. 2. Fassung, Stand 2007. Informationsdienst Naturschutz Niedersachsen 4/10: 209-260. (in German, with English summary) [Germany; "This Red List of dragonflies in Lower Saxony and Bremen was derived from a stock of 136.441 datasets, the majority of which were contributed by volunteer faunists participating in Lower Saxony's Fauna Survey Programme. By the end of 2006, 68 species of Odonata had been recorded, equalling 84 % of 81 species occurring in Germany. Of the former, 21 species have been accorded a status of 0 - 3 denoting the extent to which these species are threatened. For one species, threat status is not discernible for the time being. Nine species are naturally extremely rare, necessitating careful monitoring. All in all, 31 species (= 46 %) feature in this Red List, with additional 4 species featuring as 'near threatened'. Besides listing the threat categories on state level, the threat categories have been further regionalized into "western lowlands", "eastern lowlands" and "uplands". Causes of threat are various forms of habitat destruction, e.g. drainage of bogs, mires and wet grasslands as well as amelioration and maintenance of water courses. More recently, eutrophication of wet lowlands adds to the risks." (Authors)] Address: Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz (NLWKN) - Naturschutzinformation, PF 91 07 13, 30427 Hannover, Germany.
- 9760.** Andersson, J.; Karjalainen, S. (2010): Pellingin sudenkorennot [The dragonflies of Pellinki archipelago]. *Crenata* 3(1): 34-37. (in Finnish) ["The article gives a detailed overview of the dragonfly fauna of Pellinki archipelago at the Finnish south coast 50 km W Helsinki. Earliest Finnish records of *Aeshna mixta* and *Sympetma paedisca* are both from Pellinki (both made in 2002). In total 33 species have been observed in the area, including *Ischnura pumilio*, *Aeshna viridis*, *A. serrata* and *Orthetrum coerulescens*. Due to its favourable geographical position several other interesting migrating insect species, like *Locusta migratoria* (Orthoptera) has been encountered on the archipelago." (Asmus Schröter)] Address: Karjalainen, S., Neidonpuistontie 6 D 8, FI-02400 Kirkkonummi, Finland. Email: sk@korento.net
- 9761.** Andres, C. (2010): Zur Verbreitung der Kleinen Zangenlibelle (*Onychogomphus f. forcipatus*) an der Tauber. *mercuriale* 10: 35-42. (in German, with English summary) ["In July 2010, the river Tauber between Archshofen and the embouchure into the Main river at Wertheim was surveyed for *O. f. forcipatus*. It was a „cursory scan" restricted to a search for imagoes at sites which appeared suitable for the species. One to three males of *O. f. forcipatus* could be found at 26 places. Most sightings were made at bypass water courses" that had been created" not earlier than 11 years ago. The places where the dragonflies were found and the possible dispersal along the river Tauber are discussed." (Author)] Address: Andres, C., Planungsbüro Andrena, Burgweg 22, 97956 Werbach, Germany. E-mail: andrena@gmx.de
- 9762.** Arnoldo, P.; Moreira, J.; Oliveira, I. (2010): Habitat associations of Odonata in mountainous water sites

in northeastern Portugal. *Odonatologica* 39(3): 185-193. (in English) ["A total of 19 species was recorded in a survey carried out at 28 water sites located in the Alvão Natural Park, NE Portugal. Multivariate statistical procedures were used to analyse the relationship between the species and the characteristics of their habitat, in order to determine different species biotope preferences. Aside from species with unspecific habitat requirements, 2 main species assemblages could be detected. *Enallagma cyathigerum*, *Sympetrum fonscolombii*, *S. sanguineum*, *Ischnura pumilio*, *Lestes virens* and *Anax imperator* preferred permanent water bodies characterized by high temperatures, while *Calopteryx virgo*, *Pyrrhosoma nymphula*, *Cordulegaster boltonii* and *Onychogomphus uncatatus* preferred sites with fast-flowing water characterized by low and moderate temperatures. Conservation strategies should take these patterns and habitat requirements into consideration." (Authors)] Address: Arnoldo, P., Forest and Landscape Department, University of Trás-os-Montes and Alto Douro, PT-5000-911 Vila Real, Portugal

**9763.** Arribère, M.A.; Campbell, L.M.; Rizzo, A.P.; Arcagni, M.; Revenga, J.; Ribeiro Guevara, S. (2010): Trace elements in plankton, benthic organisms, and forage fish of Lake Moreno, northern Patagonia, Argentina. *Water, Air, & Soil Pollution* 212(1-4): 167-182. (in English) ["The Northern Patagonian Andean range shared by Chile and Argentina has numerous glacial oligotrophic lakes protected in a series of National Parks. Recent baseline surveys indicated that concentrations in muscle and liver tissues from various fish species from across Nahuel Huapi and Los Alerces National Parks in Argentina were comparable or higher than similar fish species from other parts of the world. As a result, Lake Moreno, in Nahuel Huapi National Park, was chosen to investigate multiple element sinks, trends, and transfer in a representative Patagonia aquatic food web. The metals and metalloids Ag, As, Ba, Br, Cs, Co, Cr, Fe, Hg, K, Na, Rb, Se, and Zn were analyzed in three size plankton fractions, submerged macrophytes, biofilm, insect larvae, amphipods, decapods, gastropods (snails), annelids (earthworms), and forage fish. Except for nanoplankton (10–53 µm; small-celled algae, rotifers) and microplankton (53–200 µm; larger algae, ciliates, zooplankton nauplii), which share elemental compositional similarities, each taxon category had its own distinctive compositional pattern, revealed by principal component analysis. Nano- and microplankton tend to be relatively elevated in some metals, including As, Co, Cr, Fe, Hg, Zn, and Rb, followed by biofilm. Shredder-scrapper Trichoptera (caddisflies) have higher concentration of most of the studied elements than other insect larvae taxa, especially carnivorous Odonata (Anisoptera, dragonflies), which were associated with lower elemental contents. Those trends point to an overall tendency for biodiminishing element concentrations with trophic level in the benthos of Lake Moreno." (Authors)] Address: Arribère, Maria, Laboratorio de Análisis por Activación Neutrónica, UAIN, Centro Atómico Bariloche, Comisión Nacional de Energía Atómica (CNEA), Bustillo 9500, 8400 Bariloche, Argentina. E-mail: arribere@cab.cnea.gov.ar

**9764.** Bailowitz, R. (2010): *Lestes australis* (Southern Spreadwing), new for Arizona. *Argia* 22(4): 4. (in English) [Apache, Cochise, and Graham Counties, USA, July and August 2010] Address: Bailowitz, R., USA. E-mail: raberg2@q.com

**9765.** Bailowitz, R. (2010): *Enallagma novaehispaniae* Calvert (Neotropical Bluet), another new species for Arizona. *Argia* 22(4): 3. (in English) [16-XI-2010, Maricopa county, range extension of app. 225 km to the northwest of its known Mexican range.] Address: Bailowitz, R., USA. raberg2@q.com

**9766.** Barbosa dos Santos, S.; Rodrigues, S.L.; Menezes Nunes, G.K.; Brum Barbosa, A.; Macedo de Lacerda, L.E.; Miyahira, I.C.; Viana, T.A.; Lopes de Oliveira, J.; Cardoso Fonseca, F.; Campos da Silva, P. (2010): Estado do conhecimento da fauna de invertebrados nao-marinheiros da Ilha Grande (Angra dos Reis, RJ). *Oecologia Australis* 14(2): 504-549. (in Portuguese, with English summary) ["Ilha Grande, a continental island located at Southern of Rio de Janeiro state, Brazil, has important remnants of Atlantic Rainforest. However, the knowledge of the non-marine invertebrate fauna is not sufficiently well known, concerning not only taxonomic groups but also geographic areas. Considering the relevance of biodiversity inventories to conservation, allied to the absence of organized information about the existing data, we prepared a taxonomic list of the non-marine invertebrates reported to Ilha Grande, including distributional data, based on primary data of ongoing research projects and literature. The list is composed of 465 taxa of non-marine invertebrates, mainly Arthropoda (72.9%), followed by Mollusca (22.15%). [...] (Authors) 41 Odonata taxa (39 at the species level) are listed from the Ilha Grande.] Address: Barbosa dos Santos, Sonia, Universidade do Estado do Rio de Janeiro (UERJ), Inst. de Biologia Roberto Alcântara Gomes, Depto de Zoologia, Laboratório de Malacologia Limnica e Terrestre, Rua São Francisco Xavier, 524, PHLC, sala 525/2, Maracanã, Rio de Janeiro, Brasil. CEP: 20550-900, Brazil. E-mail: sbsantos@uerj.br

**9767.** Barndt, D. (2010): Beitrag zur Arthropodenfauna des Naturparks Dahme-Heideseen (Land Brandenburg) - Faunenanalyse und Bewertung - (Coleoptera, Auchenorrhyncha, Heteroptera, Hymenoptera part., Saltatoria, Díptera part., Araneae, Opiliones, Chilopoda, Diplopoda u.a.). *Märkische entomologische Nachrichten* 12(2): 195-298. (in German, with English summary) [Between 2004 and 2008, a total of 1600 species was identified. 11 species were recorded for the first time in Brandenburg, Germany and 8 species were rediscovered. The list of taxa includes Odonata; but most of the odonatalogical data are taken from published sources.] Address: Barndt, D., Bahnhofstr. 40d, 12207 Berlin-Lichterfelde Ost, Germany. E-mail: dr.barndt@kabelmail.de

**9768.** Beatty, C.; Fraser, S.; Pérez-Jvostov, F.; Sherratt, T. (2010): Dragonfly and damselfly (Insecta, Odonata) distributions in Ontario, Canada: Investigating the influence of climate change. *BioRisk* 5: Special issue: Monitoring climatic change with dragonflies: 225-241. (in English) ["We analysed temperature data and odonate distribution data collected in the province of Ontario, Canada, over approximately sixty years. Analysis of temperature data from 31 weather stations collected in the years 1945–2000 showed an overall significant increase in the minimum, maximum and mean monthly temperatures; these trends were not adjusted for changes in urbanisation. Comparison of county level presence/absence data for odonates from the 1950's and 2002 found a slight decrease in the northernmost distributions of some species, although no significant patterns were evident. Lower sampling coverage in the larger, more northerly counties in Ontario, as well as the

assessment of distributions based on county records may limit the sensitivity of our approach in detecting changes in odonate species distributions over time. Future work should focus on increasing the coverage, uniformity and geographic detail of available datasets, as well as evaluating range change through testing predictions based on the ecology and biogeography of odonate species." (Authors)] Address: Beatty, C., Dept Biology, Santa Clara University, 500 El Camino Real, Santa Clara, California 95053-0268, USA. E-mail: cbeatty@scu.edu

**9769.** Bellstedt, R. (2010): Gratulation zum 75. Geburtstag an Dr. Wolfgang Zimmermann. *Mitteilungen des Thüringer Entomologenverbandes* 17(1/2): 52-53. (in German) [W. Zimmermann is one of the most profiled German odonatologists, and was and is still active in Thüringen.] Address: Bellstedt, R., Brühl 2, D-99867 Gotha, Germany

**9770.** Betoux, O.; Beattie, R. (2010): *Iverya averyi* gen. nov. and sp. nov., a New Triadotypomorphan Species from the Middle Triassic at Picton, New South Wales, Australia. *Acta Geologica Sinica - English Edition* 84(4): 688-692. (in English) ["A new specimen assigned to the species *Iverya averyi* gen. nov. and sp. nov. is described. This species is considered as a triadotypomorphan insect, a poorly known group of Triassic stem-odonatans. Like other triadotypomorphans, this species exhibits an area between MA and MP that is comparatively broad, and a cubitoanal area involving an AA stem distinct from CuA + CuP + AA emitting several posterior branches. Diagnostic character states of the new species are listed. Although incomplete, the specimen provides new information on the wing morphology of triadotypomorphans. This discovery might contribute to better assessment of the phylogenetic position of triadotypomorphan species with respect to other stem-odonatans." (Authors)] Address: Beattie, R., Department of Earth and Marine Sciences, The Australian National University, Canberra, ACT 0200 Australia and P.O. Box 320, Berry, NSW 2535 Australia. E-mail: Robert.beattie@anu.edu.au

**9771.** Bieger, L.; Carvalho, A.B.P.; Strieder, M.N.; Maltchik, L.; Stenert, C. (2010): Are the streams of the Sinos River basin of good water quality? Aquatic macroinvertebrates may answer the question. *Braz. J. Biol.* 70(4, suppl.): 1207-1215. (in English, with Portuguese summary) ["The main objective of this study was the assessment of the water quality of the Sinos River basin (Rio Grande do Sul state, Brazil) through biotic indices based on the macroinvertebrate community ("Family Biotic Index – FBI", and "Biological Monitoring Working Party Score System – BMWP"). Three lower order streams (2nd order) were selected in each one of three main regions of the basin. In each stream, the samplings were performed in three reaches (upper, middle, and lower), totalling 27 reaches. Two samplings were carried in each reach over one year (winter and summer). A total of 6,847 macroinvertebrates distributed among 54 families were sampled. The streams from the upper region were of better water quality than the lower region. The water quality did not change between the upper, middle and lower reaches of the streams. However, the upper reaches of the streams were of better water quality in all the regions of the basin. The water quality of the streams did not vary between the summer and the winter. This result demonstrated that water quality may be analysed in both studied seasons (summer

and winter) using biotic indices. The analysis of the results allows us to conclude that the biotic indices used reflected the changes related to the water quality along the longitudinal gradient of the basin. Thus, aquatic macroinvertebrates were important bioindicators of the water and environmental quality of the streams of the Sinos River basin." (Authors) Odonata are treated at the family level.] Address: Maltchik, L., Ecology and Conservation of Aquatic Ecosystems, Universidade do Vale do Rio dos Sinos – UNISINOS, CEP 93022-000, São Leopoldo, Rio Grande do Sul, Brazil. E-mail: maltchik@unisinobrazil.br

**9772.** Billqvist, M. (2010): Två nya trollsländor i Sverige – *Aeshna affinis* och *Anax parthenope* påträffade 2010. *fauna och flora* 105(3): 20-23. (in Swedish) [*Aeshna affinis*: 5-VIII-2010, Svarta håll, Revingefältet, Öland?, Sweden; *Anax parthenope*: 15-VII-2010, Hornsjön, Öland, Sweden (57°11'38"N, 16°57' 7"E)] Address: E-mail: magnus.billqvist@naturskyddsforeningen.se

**9773.** Bogacka-Kapusta, E.; Kapusta, A. (2010): Feeding strategies and resource utilization of 0+ perch, *Perca fluviatilis* L., in littoral zones of shallow lakes. *Archives of Polish Fisheries* 18: 163-172. (in English) [The diet of *P. fluviatilis* L., in two lakes (Goslawskie and Dolgie Wielkie, Poland) includes Anisoptera and Zygoptera without further differentiation to species level.] Address: Bogacka-Kapusta, Elżbieta, Dept of Ichthyology, The Stanislaw Sakowicz Inland Fisheries Institute in Olsztyn, Oczapowskiego 10, 10-719 Olsztyn-Kortowo, Poland. E-mail: ela@infish.com.pl

**9774.** Bried, J.; Mazzacano, C. (2010): Review of Wildlife Action Plans for Odonata conservation. *Argia* 22(4): 15-16. (in English) ["We found that the wildlife action plans have disturbing gaps. The first state wildlife action plans were developed in 2001-2005, when 441 distinct species were known from the US. Although nearly two-thirds (277) of these species were appointed as Species of Greatest Conservation Need (SGCN) overall (191 dragonfly and 86 damselfly species), over half the states neglected to assign dragonfly SGCN, damselfly SGCN, or both. Most (89%) of the 277 SGCN odonates were recognized as such in five or fewer states; 95 species (34%) were assigned in one state only, with Alaska and Hawaii contributing 30 of these. States in the west and south listed proportionately fewer odonate SGCN than those in the Great Lakes, Mid-Atlantic, and New England regions. We believe this reflects patterns of legal authority, information availability, and involvement by odonatists rather than geographic patterns of true conservation need. Nationally, it appears that few odonatists were involved in wildlife action plans relative to available expertise (potentially only -5% of DSA members), and that Odonata were underrepresented or omitted as SGCN in many states." (Authors)] Address: Bried, J., Albany Pine Bush Preserve Commission, Albany, NY, USA. E-mail: jbried@albanypinebush.org

**9775.** Bried, J.T.; Ervin, G.N. (2010): Randomized intervention analysis for detecting non-random change and management impact: Dragonfly examples. *Ecological Indicators* 11(2): 535-539. (in English) ["The quasi-experimental approach of before–after control–impact (BACI) sampling can help decide when changes are due to human activities rather than natural variability. Detailed arguments for and against BACI designs and analytic methods are widespread in the literature, but far less attention has been paid to the mechanics of



analyzing a BACI experiment. This paper demonstrates randomized intervention analysis with user-friendly software, where observations are paired in time before and after intervention. We provide examples using dragonfly count data in vegetation removal experiments." (Authors)] Address: Bried, J., Mississippi State Univ., Dept Biol. Sciences, Rm 130 Harned, PO Box GY, Mississippi State, MS 39762, USA. E-mail: jbried@TNC.org

**9776.** Brook, J.; Brook, G. (2010): Return of the Dainty Damselfly *Coenagrion scitulum* to the UK. *Dragonfly News* 58: 18-19. (in English) [*Coenagrion scitulum* was discovered in Kent, UK on 21-VI-2010; after the record from 16-VI-2009 on the Channel Island Jersey, this is the second record of this species after 1953, the year the colony along the British coast near Hadleigh was wiped out by a sea water flood.] Address: not stated

**9777.** Chambers, C.P.; Whiles, M.R.; Rosi-Marshall, E.J.; Tank, J.L.; Royer, T.V.; Griffiths, N.A.; Evans-White, M.A.; Stojak, A.R. (2010): Responses of stream macroinvertebrates to Bt maize leaf detritus. *Ecological Applications* 20(7): 1949-1960. (in English) ["In the mid-western United States, maize detritus enters streams draining agricultural land. Genetically modified Bt maize is commonly planted along streams and can possibly affect benthic macroinvertebrates, specifically members of the order Trichoptera, which are closely related to target species of some Bt toxins and are important detritivores in streams. The significance of inputs of Bt maize to aquatic systems has only recently been recognized, and assessments of potential nontarget impacts on aquatic organisms are lacking. We conducted laboratory feeding trials and found that the leaf-shredding trichopteran, *Lepidostoma liba*, grew significantly slower when fed Bt maize compared to non-Bt maize, while other invertebrate taxa that we examined showed no negative effects. We also used field studies to assess the influence of Bt maize detritus on benthic macroinvertebrate abundance, diversity, biomass, and functional structure in situ in 12 streams adjacent to Bt maize or non-Bt maize fields. We found no significant differences in total abundance or biomass between Bt and non-Bt streams, and trichopterans comprised only a small percentage of invertebrate biomass at all sites (0–15%). Shannon diversity did not differ among Bt and non-Bt streams and was always low ( $H'$  range = 0.9–1.9). Highly tolerant taxa, such as oligochaetes and chironomids, were dominant in both Bt and non-Bt streams, and macroinvertebrate community composition (including "Odonata") was relatively constant across seasons. We used litterbags to examine macroinvertebrate colonization of Bt and non-Bt maize detritus and found no significant differences among litter or stream types. Our in situ findings did not support our laboratory results; this is likely because the streams we studied in this region are highly degraded and subject to multiple, persistent anthropogenic stressors (e.g., channelization, altered flow, nutrient and pesticide inputs). Invertebrate communities in these streams are a product of these degraded conditions, and thus the impact of a single stressor, such as Bt toxins, may not be readily discernable. Our results add to growing evidence that Bt toxins can have sublethal effects on nontarget aquatic taxa, but this evidence should be considered in the context of other anthropogenic impacts and alternative methods of pest control influencing streams draining agricultural regions." (Authors)] Address: Whiles, M.R., Department of Zoology and Center for Ecology, Southern Illinois

University, Carbondale, Illinois 62901 USA. E-mail: mwhiles@zoology.siu.edu

**9778.** Chelmick, D. (2010): Studying British dragonflies in the 1970s: the wilderness years. *J. Br. Dragonfly Society* 26(2): 57-63. (in English) [David Chelmick tells a lot of nice stories with some emphasis on Cyril Hammond who published probably the most influencing book on British amateur odonatology. That book gives some insight into the development of amateur odonatology in UK, especially into the early steps with mapping the distribution of Odonata on the British Isles.] Address: Chelmick, D.G., 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK. E-mail: dgc@david.chelmick.com

**9779.** Chelmick, D. (2010): The Scarce Emerald Damselfly *Lestes dryas* Kirby with notes on the family Lestidae in the Western Palearctic. *J. Br. Dragonfly Society* 26(2): 66-83. (in English) ["*L. dryas* is a species of marginal habitats and has a life history adapted to temporary waters that dry out in summer. It has one of the largest overall areas of distribution of any UK dragonfly species and is one of only seven circumboreal species that occur in the Western Palearctic. In lowland areas it is much threatened by agricultural practice but in uplands, which today provide its key habitats in our region, it is probably overlooked." (Author)] Address: Chelmick, D., Macromia Scientific, 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK. E-mail: dgc@davidchelmick.com

**9780.** Chertoprud, M.V. (2010): Biogeographic zonation of the Eurasian fresh waters based on the macrobenthic faunas. *Journal of General Biology* 71(2): 144-162. (in Russian, with English summary) ["Spatial differentiation of the Eurasian freshwater faunas is analyzed based on the original and published data on the aquatic insects, crustaceans, and molluscs (about 8800 species in total). The Hacker-Dice similarity index is employed as a principal criterion of differentiation. The schemes of biogeographic zonation are constructed for the nine large macrobenthic taxa, namely, Odonata, Ephemeroptera, Plecoptera, Hemiptera, Coleoptera, Trichoptera, Malacostraca, Gastropoda, and Bivalvia. Discussed are principal discordances in distribution of three different ecological-systematic groups of the macrobenthos, namely, limnophylic insects, rheophylic insects, and crustaceans with molluscs. A generalized zonation system of the Eurasian fresh waters is elaborated, which is fundamentally divided into Palaearctic and Oriental Regions. The former is further divided into five subregions: Euro-Ob, Near East, Central Asia, Eastern Siberia, and Japan. The latter is divided into three subregions: Indo-Himalaya, China, and Malay. Preliminary classification of the provinces is also provided. Disagreements between the biogeographic systems of different authors are discussed." (Author)] Address: Chertoprud, M.V., Moscow Lomonosov State University, Faculty of Biology, 119992 Moscow, Leninskie Gory, Russia. E-mail: lymnaea@yandex.ru

**9781.** Conze, K.-J.; Grönhagen, N.; Lohr, M.; Menke, N. (2010): Trends in occurrence of thermophilous dragonfly species in North Rhine-Westphalia (NRW). *Bio-Risk* 5: Special issue: Monitoring climatic change with dragonflies: 31-45. (in English) ["Since 1996 the "Workgroup Odonata in North Rhine-Westphalia" ("AK Libellen NRW") has built up a data base including about 150.000 data sets concerning the occurrence of drag-

onflies in North Rhine-Westphalia (NRW). This data confirms an increase and spread of some thermophilous dragonfly species in NRW, and the effects of climate change evidenced by an increasing average temperature, are considered to be important reasons for this process." (Authors)] Address: Conze, K.-J., Arbeitskreis Libellen Nordrhein-Westfalen, Listerstr. 13, 45147 Essen, Germany. E-mail: [kjc@loekplan.de](mailto:kjc@loekplan.de)

**9782.** Cooper, I.A. (2010): Ecology of sexual dimorphism and clinal variation of coloration in a damselfly. *American Naturalist* 176(5): 566-572. ["Sexual selection, more so than natural selection, is posited as the major cause of sex differences. Here I show ecological correlations between solar radiation levels and sexual dimorphism in body color of a Hawaiian damselfly. *Megalagrion calliphya* exhibits sexual monomorphism at high elevations, where both sexes are red in color; sexual dimorphism at low elevations, where females are green; and female-limited dimorphism at midelevations, where both red and green females exist. Within a midelevation population, red females are also more prevalent during high daily levels of solar radiation. I found that red pigmentation is correlated with superior antioxidant ability that may protect from UV damage and confer a benefit to damselflies in exposed habitats, including males, which defend exposed mating habitats at all elevations, and females, which are in shaded habitats except at high elevation. This study characterizes the ecology of sexual dimorphism and provides a new, ecological hypothesis for the evolution of female-limited dimorphism." (Author)] Address: Cooper, Idelle, Dept of Zoology, Michigan State University, Kellogg Biological Station, Hickory Corners, Michigan 49060, USA. E-mail: [cooperi@msu.edu](mailto:cooperi@msu.edu)

**9783.** Cordero-Rivera, A.; Lorenzo Carballa, M.O. (2010): Three sisters in the same dress: cryptic speciation in African odonates. *Molecular Ecology* 19: 3840-3841. (in English) ["The discovery of cryptic species (i.e. two or more distinct but morphologically undistinguishable species) has grown exponentially in the last two decades, due mainly to the increasing availability of DNA sequences. This suggests that hidden in the known species, many of which have been described based solely on morphological information, there might be a high number of species waiting to be discovered. In this issue Damm et al. (2010) use a combination of genetic, morphological and ecological evidence to identify the first cryptic species complex found within dragonflies (insect order Odonata). Their findings add more evidence for the importance of combining information from different disciplines to new species' discovery (DeSalle et al. 2005)." (Authors)] Address: Cordero-Rivera, A., Grupo ECOEVO, Universidade de Vigo, EUET Forestal, Campus Universitario, 36005, Pontevedra, Galiza, Spain

**9784.** Costa, J.M.; Carriço, C.; Santos, T.C. (2010): *Neocordulia pedroi* sp. nov. (Odonata: Corduliidae) from southeastern Brazil. *Zootaxa* 2685: 51-56. (in English) ["*Neocordulia* (*Mesocordulia*) *pedroi* sp. n. is described and illustrated based on a reared adult male from Tapiuã stream, Estação Biológica de Santa Lúcia, Santa Teresa municipality, Espírito Santo State, Brazil. The holotype is deposited in the Museu Nacional, UFRJ, Rio de Janeiro, Brazil. This new species can be separated of the other species of the genus by the following characters: cerci strongly convergent and vesica spermalis with shorter flagellum." (Authors)] Address: Costa, Jani-

ra, Departamento de Entomologia Museu Nacional – Universidade Federal do Rio de Janeiro – Quinta da Boa Vista – São Cristóvão – Rio de Janeiro – RJ – Brasil – 20940-040. E-mail: [jmcosta@globocom](mailto:jmcosta@globocom)

**9785.** Crumrine, P.W. (2010): Body size, temperature, and seasonal differences in size structure influence the occurrence of cannibalism in larvae of the migratory dragonfly, *Anax junius*. *Aquatic Ecology* 44: 761-770. (in English) ["The aim of this study was to test the hypotheses that body size and seasonal differences in temperature and size structure influence cannibalism in larval dragonflies. In the first two experiments, larvae that were either similar or different in size were paired to examine the potential for intra- and intercohort cannibalism. In the third experiment, size structure of an assemblage of larvae and water temperature were manipulated to explore the seasonal dynamics of cannibalism. Cannibalism was common between individuals that differed in body size by one or more instars. Cannibalism also occurred between individuals similar in size but the rate varied across developmental stages. Results suggest that cannibalism may be most common when water temperatures are warm and late-instar larvae are present at high densities. These results highlight the importance of intra- and intercohort cannibalism as factors that can influence the population dynamics of generalist predators." (Author)] Address: Crumrine, P.W., Dept of Biological Sciences & Program in Environmental Studies, Rowan University, Glassboro, NJ 08028, USA. E-mail: [crumrine@rowan.edu](mailto:crumrine@rowan.edu)

**9786.** da Silva, M.J.; Figueiredo, B.R.S.; Ramos, R.T.C.; Medeiros, E.S.F. (2010): Food resources used by three species of fish in the semi-arid region of Brazil. *Neotropical Ichthyology* 8(4): 825-833. (in English, with Portuguese summary) [The analysis showed no Odonata species in the diet of *Prochilodus brevis*. Anisoptera were found to be 1.25% of the *Astyanax aff. bimaculatus*'s food while in *Hoplias malabaricus* both Anisoptera (3.75%) and Zygoptera (11.36%) were present as food items.] Address: Medeiros, E.S.F., Grupo de Ecologia de Rios do Semiárido, Universidade Estadual da Paraíba, Centro de Ciências Biológicas e Sociais Aplicadas. Campus V, 58020-540 João Pessoa, Paraíba, Brazil. E-mail: [elviomedeiros@uepb.edu.br](mailto:elviomedeiros@uepb.edu.br)

**9787.** Damm, S.; Schierwater, B.; Hadrys, H. (2010): An integrative approach to species discovery in odonates: from character-based DNA barcoding to ecology. *Molecular Ecology* 19(18): 3881-3893. (in English) ["Modern taxonomy requires an analytical approach incorporating all lines of evidence into decision-making. Such an approach can enhance both species identification and species discovery. The character-based DNA barcode method provides a molecular data set that can be incorporated into classical taxonomic data such that the discovery of new species can be made in an analytical framework that includes multiple sources of data. We here illustrate such a corroborative framework in a dragonfly model system that permits the discovery of two new, but visually cryptic species. In the African dragonfly genus *Trithemis* three distinct genetic clusters can be detected which could not be identified by using classical taxonomic characters. In order to test the hypothesis of two new species, DNA-barcodes from different sequence markers (ND1 and COI) were combined with morphological, ecological and biogeographic data sets. Phylogenetic analyses and incorporation of all data sets into a scheme called taxonomic circle high-

ly supports the hypothesis of two new species. Our case study suggests an analytical approach to modern taxonomy that integrates data sets from different disciplines, thereby increasing the ease and reliability of both species discovery and species assignment." (Authors)] Address: Damm, Sandra, ITZ, Ecology & Evolution, TiHo Hannover, Bünteweg 17d, 30559 Hannover, Germany. E-mail: sandra.giere@ecolevol.de

**9788.** Das, S.; Roy, S.; Mukhopadhyay, A. (2010): Diversity of arthropod natural enemies in the tea plantations of North Bengal with emphasis on their association with tea pests. *Current Science* 99(10): 1457-1463. (in English) ["A study was undertaken to explore the diversity of arthropod natural enemies in sub-Himalayan tea plantations of North Bengal, India. The study revealed the presence of 94 species of predators (including *Ceragriion* sp., *Pseudagriion* sp., *Ictinogomphus* sp., *Anax* sp.) and 33 of parasitoids in the region. New records on tea pest-natural enemy associations were made on the basis of field observations as well as laboratory rearing. Among the predators, spider and ladybird fauna, and among the parasitoid groups, Braconidae and Ichneumonidae were dominant during the survey period." (Authors)] Address: Das, Soma, Entomology Research Unit, Department of Zoology, University of North Bengal, Darjeeling 734 013, India

**9789.** David, S. (2010): Recenzia knihy: Dolný A et al., 2007: *Vážky ěskej republiky. Folia faunistica Slovaca* 15(11): 99-100. (in Slovakian) [book review: Dolný Aleš, Bárta Dan, Waldhauser Martin, Holuša Otakar, Hanel Lubomír, Lízler Robert, 2007: *Vážky ěské republiky: Ekologie, ochrana a rozšíření (The Dragonflies of the Czech Republic: Ecology, Conservation and Distribution)*. Vlašim: ěský svaz ochránců přírody Vlašim, 672 s.] Address: David, S., Katedra ekológie a environmentalistiky Fakulty prírodných vied, Univerzity Konštatína Filozofa v Nitre, Tr. A. Hlinku 1, 949 74 Nitra, Slovakia. E-mail: sdavid@ukf.sk

**9790.** Davies, P.J.; Wright, I.A.; Findlay, S.J.; Jonasson, O.J.; Burgin, S. (2010): Impact of urban development on aquatic macroinvertebrates in south eastern Australia: degradation of in-stream habitats and comparison with non-urban streams. *Aquatic Ecology* 44: 685-700. (in English) ["Internationally, waterways within urban areas are subject to broad-scale environmental impairment from urban land uses. In this study, we used in-stream macroinvertebrates as surrogates to measure the aquatic health of urban streams in the established suburbs of northern Sydney, in temperate south eastern Australia. We compared these with samples collected from streams flowing in adjacent naturally vegetated catchments. Macroinvertebrates were collected over a 30-month period from riffle, edge and pool rock habitats and were identified to the family level. Macroinvertebrate assemblages were assessed against the influence of imperviousness and other catchment and water quality variables. The study revealed that urban streams were significantly impaired compared with those that flowed through naturally vegetated non-urban catchments. Urban streams had consistently lower family richness, and sensitive guilds were rare or missing. We found that variation in community assemblages among the instream habitats (pool edges, riffles and pool rocks) were more pronounced within streams in naturally vegetated catchments than in urban waterways." (Authors) Odonata are treated at the family level.] Address: Davies, P.J., Ku-ring-gai Council, Locked

Bag 1056, Pymble 2073, Australia. E-mail: pdavies@mkc.nsw.gov.au

**9791.** de Almeida, M.C.; Cortes, L.G.; de Marco, P. (2010): New records and a niche model for the distribution of two Neotropical damselflies: *Schistolobos boliviensis* and *Tuberculobasis inversa* (Odonata: Coenagrionidae). *Insect Conservation and Diversity* 3(4): 252-256. (in English) ["1. Two new records for the Neotropical damselflies, *S. (Telagriion) boliviensis* and *T. (Leptobasis) inversa*, previously known only from the Amazonia, are presented from the Brazilian Cerrado. 2. Potential distribution models for the two species were built first using only previous occurrence points from the literature, and later adding the new records. The first niche models had low capacity to predict the new records for both species. The models with all biogeographical information increased overall distributional area for both species and indicated priority areas for inventory outside its original distribution. The results reinforce the use of modelling as a tool to increase faunal knowledge in poorly studied areas, allowing an initial evaluation of conservation status and the indication of priority areas for inventories." (Authors)] Address: De Marco Júnior, P., Laboratório de Ecologia Teórica e Síntese, Depto de Ecologia, ICB, Universidade Federal de Goiás, Rodovia Goiânia-Nerópolis, km 5, Campus II, Setor Itatiaia, CP 131, CEP 74001-970, Goiânia (GO), Brasil. E-mail: pdemarco@icb.ufg.br

**9792.** De Knijf, G.; Anselin, A. (2010): When south goes north: Mediterranean dragonflies (Odonata) conquer Flanders (North-Belgium). *BioRisk* 5: Special issue: Monitoring climatic change with dragonflies: 141-153. (in English) ["Since 1980, eight southern dragonfly species have been regularly recorded in Flanders. They show a significant increase in relative abundance, relative area as well as indications of reproduction since the beginning of the nineties, with peak occurrence mainly in the 1995-1999 period. Since 2000, numbers are lower but more species were simultaneously present. Three species, *Lestes barbarus*, *Crocothemis erythraea* and *Sympetrum fonscolombii*, show a combination of earlier arrival, earlier reproduction with a higher frequency and higher maximum ranges and can be considered as stable populations in Flanders. All other southern species show in general a later arrival, only one confirmed or probable reproduction and have much lower maximum ranges. Two other species, reaching their northern limit of distribution in Flanders, *Erythromma viridulum* and *E. lindenii* have clearly expanded their relative area since the eighties. Their relative abundance also increased although this shows more fluctuations." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**9793.** DePalma, R.; Cichocki, F.; Dierick, M.; Feeney, R. (2010): Preliminary notes on the first recorded amber insects from the Hell Creek Formation. *The Journal of Paleontological Sciences JPS*. C.10.0001: 1-7. (in English) ["Insects, the most diverse of living organisms today, inhabit virtually every terrestrial and freshwater ecosystem on earth. Yet the strata of the Upper Cretaceous Hell Creek Formation, although deposited in a luxuriant subtropical biome during the initial diversification of flowering plants, until now have revealed practically no insect fossils. Here, we provide a preliminary report on the discovery of the first amber insects from the Hell Creek Formation. This well-preserved assem-



blage of amber insects includes members of the Diptera (Suborders Nematocera and Brachycera) and Odonata (Suborder Zygoptera). The discovery will enable future studies to develop a better paleoecological understanding of the Hell Creek that includes the essential role of insects." (Authors)] Address: DePalma, R., Dept. of Paleontology, Palm Beach Museum of Natural History, 2805 E. Oakland Park Blvd., Suite 402, Ft. Lauderdale, FL 33306, Rdepalma@PBMNH.org

**9794.** Deviche, P. (2010): Copulating pair of *Ischnura barberi* (Desert Forktail) and *I. ramburii* (Rambur's Forktail). *Argia* 22(4): 17-18. (in English) [A heterospecific pair of a male *Ischnura barberi* and a female *I. ramburii* was observed at 14-IX-2010 at aricopa, Arizona, USA.] Address: Deviche, P.J. E-mail: deviche@asu.edu

**9795.** Dixon, J.R.; Gennard, D.E. (2010): The influence of meteorological conditions on the flight activity of the Blue-tailed Damselfly *Ischnura elegans* (Vander Linden), the Azure Damselfly *Coenagrion puella* (Linnaeus) and the Emerald Damselfly *Lestes sponsa* (Hanse-mann). *J. Br. Dragonfly Society* 26(2): 84-97. (in English) ["The flight activity was compared for *I. elegans*, *C. puella* and *L. sponsa* at an exposed pond and a sheltered pond at Rimac, Saltfleetby National Nature Reserve, Lincolnshire in July and August 1998. Meteorological conditions (air temperature, light intensity, cloud cover, wind speed and direction were investigated in relation to flight activity of the species. Flight activity of all three species increased with rising air temperature, light intensity and declining cloud cover. These factors appear to be the main ones that exert control on day to day variation in flight activity of these three species. Their relative importance varies from species to species, which is most likely to be due to the nature of the exoskeletons (which influences the rate of solar radiation absorption), size (which influences rate of warming and power requirements) and behaviour. Only *C. puella* showed any relationship between mating activity (tandem wheel flight) and meteorological conditions." (Authors)] Address: Dixon, J.R., Department of Environmental Science, University of Lincolnshire and Humberside 61 Bargate, Grimsby DN34 5AA, UK

**9796.** Dogramaci, M.; DeBano, S.J.; Wooster, D.E.; Kimoto, C. (2010): A method for subsampling terrestrial invertebrate samples in the laboratory: Estimating abundance and taxa richness. *Journal of Insect Science* 10:25 (available online: [insectscience.org/10.25](http://insectscience.org/10.25)): 17pp. (in English) ["Significant progress has been made in developing subsampling techniques to process large samples of aquatic invertebrates. However, limited information is available regarding subsampling techniques for terrestrial invertebrate samples. Therefore a novel subsampling procedure was evaluated for processing samples of terrestrial invertebrates collected using two common field techniques: pitfall and pan traps. A three-phase sorting protocol was developed for estimating abundance and taxa richness of invertebrates. First, large invertebrates and plant material were removed from the sample using a sieve with a 4 mm mesh size. Second, the sample was poured into a specially designed, gridded sampling tray, and 16 cells, comprising 25% of the sampling tray, were randomly subsampled and processed. Third, the remainder of the sample was scanned for 4-7 min to record rare taxa missed in the second phase. To compare estimated abundance and taxa richness with the true values of

these variables for the samples, the remainder of each sample was processed completely. The results were analyzed relative to three sample size categories: samples with less than 250 invertebrates (low abundance samples), samples with 250-500 invertebrates (moderate abundance samples), and samples with more than 500 invertebrates (high abundance samples). The number of invertebrates estimated after subsampling eight or more cells was highly precise for all sizes and types of samples. High accuracy for moderate and high abundance samples was achieved after even as few as six subsamples. However, estimates of the number of invertebrates for low abundance samples were less reliable. The subsampling technique also adequately estimated taxa richness; on average, subsampling detected 89% of taxa found in samples. Thus, the subsampling technique provided accurate data on both the abundance and taxa richness of terrestrial invertebrate samples. Importantly, subsampling greatly decreased the time required to process samples, cutting the time per sample by up to 80%. Based on these data, this subsampling technique is recommended to minimize the time and cost of processing moderate to large samples without compromising the integrity of the data and to maximize the information extracted from large terrestrial invertebrate samples. For samples with a relatively low number of invertebrates, complete counting is preferred." (Authors) Zygoptera only were caught in pan but not in pitfall traps.] Address: Dogramaci, M., Dept of Fisheries and Wildlife, Hermiston Agricultural Research and Extension Center, Oregon State University, Hermiston, OR 97838

**9797.** Dolný, A.; Drozd, P.; Petříková, M.; Harabiš, F. (2010): Sex ratios at emergence in populations of some Central European Gomphidae species (Anisoptera). *Odonatologica* 39(3): 217-224. (in English) ["At emergence (F-0) a significant bias for females was observed within the Moravian (Czech Republic) populations of *Gomphus flavipes*, *G. vulgatissimus* and *Ophiogomphus cecilia*. Males represented 45.6% of all specimens (43.5% in the first and 46.4% in the second research year). The results of the  $\chi^2$  test supported the female-biased sex ratio in populations of all 3 species. The sex ratio in populations varied significantly in time during the emergence season, caused by the fact that all 3 species demonstrated a significant protandric trend. The greatest changes in sex ratio during the emergence season were demonstrated by *G. flavipes* (coefficient value -0.007542); the smallest were recorded in *G. vulgatissimus* (CV -0.008617). Environmental impact did not prove to act be a factor which has an effect on the sex ratio of species with phenotypical determination of sex." (Authors)] Address: Dolný, A., Department of Biology and Ecology, Faculty of Natural Sciences, University of Ostrava, Chittussiho 10, CZ-71000 Slezská Ostrava, Czech Republic. E-mail: ales.dolny@osu.cz

**9798.** Donnelly, N. (2010): Book Review: *Dragonflies & Damselflies of the Rocky Mountains*. *Argia* 22(4): 22-23. (in English) [Dubois, B. (2010): *Dragonflies & Damselflies of the Rocky Mountains*. Kollath Stensaas. ISBN 10: 0979200687. 200 pp. The review includes some personal and general annotations on the lack of information on high altitude Odonata in USA.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**9799.** Dow, R.A.; Unggang, J. (2010): The Odonata of Binyo Penyilam, a unique tropical wetland area in Bintu-

lu Division, Sarawak, Malaysia. *Journal of Threatened Taxa* 2(13): 1349-1358. (in English) ["Binyo Penyilam is a unique wetland conservation area within the Sarawak Planted Forest Project zone in Sarawak's Bintulu Division. A variety of forest and open habitats are present in the area; these are characterised. An annotated list of 61 species of Odonata from 11 families collected in the area to-date is presented. At least seven of these species had not been found in Sarawak prior to their discovery at Binyo Penyilam, of these four – *Pseudagrion coomansi*, *Merogomphus femoralis*, *Brachygonia puella* and *Chalybeothemis fluviatilis* – have still not been found elsewhere in the state; no other location is known for the genus *Merogomphus* in Borneo. Although under-sampling makes assessments of the conservation status of south-east Asian Odonata difficult, at least 16 of the species found at Binyo Penyilam can be considered to be of potential conservation concern, at least within Sarawak." (Authors)] Address: Dow, R.A., National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**9800.** Dragonfly Society of the Americas (2010): *Argia* 22(4). *Argia* 22(4): 23 pp. (in English) [Calendar of Events, 1; In This Issue 1; Minutes of the 2010 Annual Meeting of the Dragonfly Society of the Americas, S. Valley; 2010 Treasurer's Report J. Daigle 2; Request for *Orthemis* specimens J. Daigle, 8; Minutes of the 2010 Annual Meeting of the Dragonfly Society of the Americas, S. Valley; High Oxygen Levels Spawn Monster Dragonflies, 16] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**9801.** Dubois, B. (2010): *Dragonflies & Damselflies of the Rocky Mountains*. Kollath Stensaas. ISBN-10: 0979200687: 200 pp. (in English) [This guide covers the mountainous western interior and adjacent lowlands of USA. The author begins with a complete and easily digested description of odonate morphology, followed by an account of odonate biology, both on larval and adult stages. The author gives a brief characteristic of the Rockies themselves, emphasizing the elevation-defined life zones which govern the distribution of nearly all living creatures, and which have much less relevance in the remainder of North America. The species accounts of the approximately 100 species are thorough, and include not only good colour photos of the adults but also numerous black and white drawings of details. The book contains a description for each species, plus valuable clues for their quick identification. Range maps include the entire western United States, making this a useful guide for a much larger area than the title implies.]

**9802.** Dupont, P. (2010): Plan national d'actions en faveur des Odonates. Office pour les insectes et leur environnement / Société Française d'Odonatologie – Ministère de Ecologie, de l'Energie, du Développement durable et de la Mer: 170 pp. (in French) [This French species action plan considers the following 18 odonate species: *Aeshna caerulea*, *Coenagrion caerulescens*, *C. lunulatum*, *C. mercuriale*, *C. ornatum*, *G. flavipes*, *G. graslinii*, *L. albifrons*, *L. caudalis*, *L. pectoralis*, *Lestes macrostigma*, *Lindenia tetraphylla*, *Macromia splendens*, *Nehalennia speciosa*, *Ophiogomphus cecilia*, *Oxygastra curtisii*, *Sympetma paedisca*, and *Sympetrum depressiusculum*.] Address: <http://www.developpement-durable.gouv.fr/1-Qu-est-ce-qu-un-plan-national-d.html>

**9803.** Ferrari, M.C.O.; Wisenden, B.D.; Chivers, D.P. (2010): Chemical ecology of predator-prey interactions in aquatic ecosystems: a review and prospectus. *Can. J. Zool.* 88: 698-724. (in English, with French summary) ["The interaction between predator and prey is an evolutionary arms race, for which early detection by either party is often the key to success. In aquatic ecosystems, olfaction is an essential source of information for many prey and predators and a number of cues have been shown to play a key role in trait-mediated indirect interactions in aquatic communities. Here, we review the nature and role of predator kairomones, chemical alarm cues, disturbance cues, and diet cues on the behaviour, morphology, life history, and survival of aquatic prey, focusing primarily on the discoveries from the last decade. Many advances in the field have been accomplished: testing the survival value of those chemicals, providing field validation of laboratory results, understanding the extent to which chemically mediated learning may benefit the prey, understanding the role of these chemicals in mediating morphological and life-history adaptations, and most importantly, the selection pressures leading to the evolution of chemical alarm cues. Although considerable advances have been made, several key questions remain, the most urgent of which is to understand the chemistry behind these interactions." (Authors) This review includes several references to Odonata.] Address: Ferrari, Maud, Department of Environmental Science and Policy, University of California, Davis, One Shields Avenue, Davis, CA 95616, USA. E-mail: mcferrari@ucdavis.edu

**9804.** Folz, H.-G. (2010): Gabel-Azurjungfer (*Coenagrion scitulum* RAMBUR, 1842) in Rheinhessen angekommen (Insecta: Odonata: Coenagrionidae). *Fauna und Flora in Rheinland-Pfalz* 11(4): 1411-1412. (in German) [3-06-2010, Gau-Bickelsheim, Landkreis Alzey-Worms, Rheinland-Pfalz, Germany] Address: Folz, H.-G., Hausener Str. 8, 55270 Engelstadt, Germany. E-mail: folz-engelstadt@gmx.de

**9805.** Folz, H.-G. (2010): Ergänzende Libellenfunde in den Landkreisen Mainz-Bingen und Alzey-Worms, Rheinhessen (Insecta: Odonata). *Fauna und Flora in Rheinland-Pfalz* 11(4): 1163-1174. (in German, with English summary) [Rheinland-Pfalz, Germany; records of 43 species are documented.] Address: Folz, H.-G., Hausener Str. 8, 55270 Engelstadt, Germany. E-mail: folz-engelstadt@gmx.de

**9806.** Folz, H.-G. (2010): Spitzenfleck - *Libellula fulva* MÜLLER, 1764 - zahlreich bei Bingen (Insecta: Odonata: Coenagrionidae). *Fauna und Flora in Rheinland-Pfalz* 11(4): 1415-1417. (in German) [09-VI-2010, Landkreis Mainz-Bingen, Rheinland-Pfalz, Germany] Address: Folz, H.-G., Hausener Str. 8, 55270 Engelstadt, Germany. E-mail: folz-engelstadt@gmx.de

**9807.** Fortin, B.L. (2010): Selenium dynamics in Canadian Rocky Mountain lakes. M.Sc. thesis, Department of Biological Sciences, University of Alberta, Edmonton: 142 pp. (in English) ["I investigated, water, invertebrates and fishes from lakes in Banff National Park and Kananaskis Country, Alberta for selenium (Se), an element known to be toxic to vertebrates. At some depths, Se concentrations in sediment exceeded recognized thresholds for bird and fish reproductive impairment. Se concentrations in water were over USEPA guidelines after spring melt runoff. In aquatic invertebrates, Se concentrations exceeded values known to

cause reproductive impairment in fish and bird predators. Se concentrations in all fish species exceeded known thresholds for reproductive impairment in avian consumers and the majority surpassed concentrations that would negatively affect wildlife and human consumers. Se concentrations in some fish species have significantly increased over the past 6-16 years. The strongest predictors of fish Se concentrations were growth rate, condition factor, age, weight, trophic position (within lakes) and vegetation type (among lakes). These results suggest that consumption advisories are desirable for several lakes in the Banff and Kananaskis area, and that Se concentrations in fish from other area lakes should be investigated." (Author) Odonata (= Aeshnidae, Coenagrionidae, Libellulidae) mean Se concentrations exceeded the established toxicity thresholds for fish and bird diets in all lakes. Mud Lake would be the only exception, where the mean Se concentration of Odonates was very close to, but did not exceed the threshold for fish reproductive impairment.] Address: Fortin, Barbra Linda, Dept Biol. Sciences, University of Alberta, Canada. E-mail: bfortin@ualberta.ca

**9808.** Franzen, J. (2010): Nachweis der Gabel-Azurjungfer - *Coenagrion scitulum* RAMBUR, 1842 - in der Kiesgrube Platten bei Wittlich (Insecta: Odonata: Coenagrionidae). *Fauna und Flora in Rheinland-Pfalz* 11(4): 1413-1414. (in German) [11/18-VII-2010, Platten, Landkreis Bernkastel-Kues, Rheinland-Pfalz, Germany] Address: Franzen, J., Auf Cales 54, 56814 Bremm, Germany. E-mail: juergen@jfranzen.de

**9809.** Friebe, R. (2010): They call me the wanderer. *Frankfurter Allgemeine Sonntagszeitung* 10. Januar 2010: 52. (in German) [Extensive report on the studies of Charles Anderson published as Anderson, R.C. (2009): Do dragonflies migrate across the western Indian Ocean? *Journal of Tropical Ecology* 25(4): 347-358.] Address: not stated

**9810.** Fujiwara, Y.; Kobayashi, S. (2010): A study on the distribution of *Mnais costaris* Selys the dragonfly in Ehime Prefecture. *Bulletin of the Ehime Prefectural Science Museum* 15: 1-8. (in Japanese, with English summary) [*M. costaris* was recorded in Imabari and Saijo city, eastern part of Ehime prefecture, Japan. This species has a limited distribution in Shikoku Island. In Ehime prefecture, it is thought living only in the middle part, thus it was categorized as threatened species. In general, any investigation on the distribution of this taxon is insufficient in eastern and northern part of prefecture, and the discovery of new habitats is likely. The taxonomic status of *Mnais costaris* Selys and *M. pruinosa* Selys still awaits clarification, and intensified field work can help to improve the data basis.] Address: Kobayashi, S., Professional Graduate Division of Arts and curator of Natural Ehime Prefectural Science Museum, Niihama, Ehime Prefecture, 792-0060, Japan

**9811.** Gahl, M.K.; Calhoun, A.J.K. (2010): The role of multiple stressors in ranavirus-caused amphibian mortalities in Acadia National Park wetlands. *Canadian Journal of Zoology* 88(1): 108-121. (in English, with French summary) ["Recent studies suggest that multiple sublethal stressors compromise amphibian immune systems and increase susceptibility to disease. We examined two aspects of multiple stressors and incidence of ranavirus-caused amphibian mortalities in free-living amphibian populations: (1) among-pond differences in physical, chemical, and biological stressors (eg. family

Belostomidae, order Hemiptera; family Dytiscidae, order Coleoptera; some suborder Anisoptera, order Odonata) that may exacerbate mortality events, and (2) temporal changes in within-pond stressors that coincide with mortality events. At the among-pond scale, we used principal components analysis and logistic regression followed by Akaike's information criterion (QAICc) to identify stressors associated with disease incidence. Of the stressors we investigated, aluminum, temperature, and conductivity were most correlated with outbreaks, but it was unclear whether they increased ranavirus-caused mortality events. Sublethal stressors were difficult to isolate in the field and few were significantly associated with ranavirus across all breeding ponds. Our results suggest that each wetland, because of varied physical, biological, and chemical settings, will have its own suite of stressors that sublethally affect amphibians." (Authors)] Address: Gahl, M.K., Dept of Plant, Soil, and Environmental Sciences, University of Maine, 5722 Deering Hall, Orono, ME 04469, USA

**9812.** Gashtarov, V.; Beshkov, S. (2010): *Lindenia tetraphylla* (Vander Linden, 1825) (Odonata: Gomphidae) a new genus and species for the Bulgarian fauna. *Entomologist's Rec. J. Var.* 122: 272-274. (in English) [16.vi.2009; Marena Hill, near Novo Konomladi, Bulgaria N 41°26'48"; E 23°18'44", 114 metres a.s.l., *L. tetraphylla*, female. "During the next few days, many other individuals of the same species were observed flying around the same long pathway, with approximately 8-10 individuals on 17 June 2009 and the last observation on the afternoon of 20 June." This species record the total number of known Odonata in Bulgarian to 67.] In fact *L. tetraphylla* is the 69th species reported for Bulgaria. (M. Marinov)] Address: Gashtarov, V., P.O. Box 1733, 1000 Sofia, Bulgaria. E-mail: vgashtarov@yahoo.com; Beshkov, S., National Museum of Natural History, Tzar Osvooboditel Blvd 1, 1000 Sofia, Bulgaria. E-mail: beshkov@mnhs.com

**9813.** Goforth, C.L. (2010): Behavioural responses of *Enallagma* to changes in weather (Zygoptera: Coenagrionidae). *Odonatologica* 39(3): 225-234. (in English) ["Odonates exhibit a variety of weather associated behaviours, including abandoning ponds just before storms begin. They may be able to detect changes in weather that alert them to approaching storms and allow them to escape the water's edge before it begins to rain. *E. annexum* and *E. boreale* were observed at a Colorado marsh (USA) to determine which weather factors contributed to the weather-induced behaviours they exhibit. They were observed for 191 five-minute periods and their flight activity quantified. Weather parameters were measured during each interval to account for rapid changes in conditions. Based on results from multiple regression analysis, it is clear that light intensity is the strongest weather parameter affecting zygopteran flight activity, but temperature, wind speed, and the presence of rain are also significant. The 2 species exhibited pond abandonment behaviour during storms. It is likely that storms are dangerous to zygopterans and their apparent ability to detect impending storms is a survival mechanism. Alternatively, pond abandonment behaviour may be triggered by the same factors necessary to trigger roosting and the zygopterans simply return to their roosting sites during storms." (Author)] Address: Goforth, C.L., Department of Biology, Olin Hall, Colorado College, Colorado Springs, Colorado 80903, USA



- 9814.** Gomez-Anaya, J.A.; Novelo-Gutierrez, R. (2010): Richness and structure of an Odonata larval assemblage from Río Pinolapa, Tepalcatepec, Michoacán, Mexico in relation to their habitat characteristics. *Odonatologica* 39(4): 287-303. (in English) ["The odonate larval assemblage from Río Pinolapa (RP) in the municipality of Tepalcatepec, Michoacán, is described. Sampling was conducted twice in each season (8 trips in total), and additionally some physicochemical variables of the river channel were recorded. Strata (shores, riffles and eddies) and seasonal variation of assemblages are described and compared using classical diversity measures such as Shannon's diversity index, Simpson's diversity index as a dominance measure, Margalef's richness index and Pielou's evenness index. For comparing strata and seasonal diversity the Renyi's diversity profiles were used. A Cluster Analysis was performed on a Bray-Curtis similarity matrix to explore the faunal relationships among year seasons and strata. CCA was also performed to investigate the relationships between the physicochemical and species abundance matrixes. As results, 28 species (12 Zygoptera and 16 Anisoptera) were recorded as larvae. Most abundant species were *Erpetogomphus elaps*, *Brechmorhoga praecox* and *Phyllogomphoides luisi*. The highest number of species was registered in winter and the lowest in summer. Among strata the highest abundance was recorded in riffles, although the shoreline had the largest number of species. The most similar assemblages were those of autumn and winter. Shore habitats were more heterogeneous than eddies and riffles and this could explain the larger number of species. The Clench's model explains better the data. Additionally, we used the slope of cumulative number of species curve for assessing completeness of the RP list. CCA was significant, with pH, autumn, shoreline and riffles the most important variables. This means that species variation is related to physicochemical, temporal and strata conditions in RP." (Authors)] Address: Gomez-Anaya, J.A., Instituto de Ecología, A.C., Apartado Postal 63, MX-91070, Xalapa, Veracruz, Mexico. E-mail: antonio.gomez@inecol.edu.mx
- 9815.** Gonzalez-Tokman, D.M.; Gonzalez-Santoyo, I.; Lanz-Mendoza, H.; Cordoba Aguilar, A. (2010): Territorial damselflies do not show immunological priming in the wild. *Physiological Entomology* 35(4): 364-372. (in English) ["Adaptive immunity allows vertebrates to gain protection against repeated pathogenic infections. Analogous responses (priming) have been recently uncovered in invertebrates. However, whether such responses are widespread is not known. The present study investigated the presence of immunological priming in males of a species whose phylogenetic position places it in one of the less derived insect orders. It is hypothesized that the efficiency of such a response could be related to animal condition, as assessed by the expression of a sexually selected ornament. *Hetaerina americana* Fabricius (Odonata: Calopterygidae) males bear a conspicuous ornament (a red wing spot), which is evolutionarily maintained via male territorial competition. Using field-collected animals, a group of males is challenged with bacteria before exposure to a higher dose of the same or a different bacteria, and survival is compared with that of infected males not previously challenged, as well as control groups. Gram-positive and Gram-negative bacteria are used. To explore how long priming may take to work, the second exposure is carried out either after 1 or 5 days. Red spot and body size are entered in the analysis as predictors of survival within and between groups. There is no difference in survival among groups, which suggests no priming effect. Overall, red spot and body size are not consistent in explaining survival." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx
- 9816.** Hacker, H.H.; Segerer, A.H. (2010): Herbert K. Pröse (1933-2009). *Beiträge zur bayerischen Entomofaunistik* 10: 1-11. (in German) [H.K. Röse, a well-known specialist in Microlepidoptera and Neuroptera, started his scientific career with some publications on Odonata in Bavaria, Germany.] Address: Hacker, H.H., Kilianstr. 10, 96231 Bad Staffelstein, Germany. E-Mail: hermann-heinrich.hacker@t-online.de
- 9817.** Hämäläinen, M. (2010): Sudenkorentolajien ensilöydöt Suomessa [The discovery of Finnish dragonflies: a chronological list.]. *Crenata* 3(1): 2-7. (in Finnish with English summary) ["The history of the discovery of the Finnish dragonfly fauna is briefly outlined. The first dragonfly record from Finland was published by Pehr Adrian Gadd in 1751. Gadd's brief Latin and Swedish descriptions fits the male of *Leucorrhinia rubicunda* well. The next author Johan Julin (1792, 1803) listed 10 species from northern Finland. Edvard Hisinger (1861) published the first synopsis of Finnish dragonflies, totaling 35 species. In the 20th century, knowledge of the local fauna started to increase due to the activity of K.J. Valle, who, beside research papers and notes, also authored two national guide books (1922, 1952). The publication of Sami Karjalainen's acclaimed book on Finnish dragonflies in 2002 increased the number of dragonfly enthusiasts greatly. This led to increasingly better knowledge of the distribution of species and discovery of novelties moving to Finland from south. Table 1 summarizes the number of known species by decade from the beginning of 19th century. Table 2 lists the known 55 Finnish dragonfly species in chronological order based on the publication of the first record and gives relevant references." (Author)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 Univ. of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi
- 9818.** Haesloop, U. (2010): Nachweis der Westlichen Geisterlibelle *Boyeria irene* in Norddeutschland. *Lauterbornia* 70: 33-35. (in German, with English summary) ["A larva of the Western Spectre *Boyeria irene* (Fonscolombe, 1838) was caught in 2009-05-26 in the lower part of the Oertze, a tributary of the Aller, which is located in the catchment area of the Weser River. This is the first mentioned record of this Mediterranean species in Northern Germany. Discussion of the circumstances of the finding." (Author)] Address: Haesloop, U., Spezialbüro für gewässerfaunistische Untersuchungen im Norddeutschen Tiefland, Jenaer Str. 10; D-28215 Bremen, Germany. E-Mail: haesloop@freenet.de
- 9819.** Harabiš, F.; Dolný, A. (2010): Ecological factors determining the density-distribution of Central European dragonflies (Odonata). *Eur. J. Entomol.* 107(4): 571-577. (in English) ["Habitat specificity is the most important factor affecting the regional distribution of dragonflies. Nevertheless, species with the highest specificity are not always the scarcest. Several important determinants of dragonfly density-distribution relationships were identified. Altitude preference and altitude range

are significantly associated with dragonfly distribution. Some of the species that are habitat specialists but occur over a wide range of altitudes should be classified as rare but not endangered. This very simple principle is based on the assumption that habitat specialists have a very limited number of suitable biotopes. Obviously, dragonflies with a marginal distribution prefer a narrow range of altitudes (especially in terms of temperature limitation) and biotopes (effect of biogeography, marginality). Surprisingly, there is no "critical" life stage that is significantly associated with the regional distribution of dragonflies, although most species spend most time in the larval stage. Knowledge of the dispersal ability of particular species is limited, although it could significantly affect species survival and distribution." (Authors)] Address: Harabiš, F., Department of Ecology, Czech University of Life Sciences Prague, Kamycka 129, 165 21 Praha 6 – Suchbátka, Czech Republic. E-mail: harabis.f@gmail.com

**9820.** Haritonov, A.Yu.; Kiauta, B. (2010): At the centenary of Dr B.F. Belyshev's birth: The impact of his work on Siberian odonatology. *Odonatologica* 39(4): 305-318. (in English) ["A brief appreciation of B.F. Belyshev's (1910-1993) work is presented and its impact on the current development of odonatology in Siberia is outlined. The bibliography (1993-2010, partim) of the members of his "school" is appended." (Authors)] Address: Kiauta, B., *Odonatologica* Editorial Office, P.O. Box 124, NL5854 ZJ Bergen / LB, The Netherlands. E-mail: mbkiauta@gmail.com

**9821.** Hassall, C.; Thompson, D.J. (2010): Accounting for recorder effort in the detection of range shifts from historical data. *Methods in Ecology & Evolution* 1(4): 343-350. (in English) ["1. Climate-induced range shifts have been detected in a large number of plant and animal taxa and a significant portion of these shifts have been found using records collected over a long period of time. However, the absence of standardized collecting procedures in some historical data sets introduces bias and skew into the data which can result in misleading conclusions. A range of different methods has been employed to account for this heterogeneity, but these methods have yet to be compared using a single data set. 2. We tested the accuracy of published methods for accounting for this heterogeneity. An extensive, heterogeneous data base of sightings of Odonata from the United Kingdom was analysed using four published methods to control for uneven recorder effort. For each method, five different range statistics were calculated. The results were compared and tested against changes in temperature over time to select the most accurate method. 3. Significant variation existed between results derived using different methods to account for uneven recorder effort. Range statistics were also shown to exhibit different biases to varying recorder effort, particularly those most commonly used in published studies. 4. A combination of existing methods is recommended to control for temporal variation in recorder effort. This focuses on random resampling of the more heavily recorded time period. A novel range statistic based on a gamma frequency distribution, which avoids the inherent bias of existing statistics, is suggested as a descriptor for range margins. 5. When the most robust methods to control for uneven recorder effort were combined with the most robust range statistics describing the range shift, British Odonata as a group were shown to be tracking isotherms between 1960 and 2005. 6.

Accurate description of past range shifts is essential for correct predictions of future trends and for making decisions concerning conservation priorities. We strongly recommend the use of the best performing methods outlined here to ensure consistency and accuracy in future studies." (Authors)] Address: Hassall, C., Department of Biology, Carleton University, Ottawa, ON, Canada K1S 5B6. E-mail: chassall@connect.carleton.ca

**9822.** Hertzog, M. (2010): Beobachtung eines frisch geschlüpften Weibchens von *Boyeria irene* am Seerhein (Odonata: Aeshnidae). *AGBU e.V. (Arbeitsgruppe Bodensee-ufer)* – Thema des Monats November 2010 – [www.bodensee-ufer.de](http://www.bodensee-ufer.de): 3 pp. (in German) [17-VIII-2007, Gottlieben, Kanton Thurgau, Switzerland] Address: Manfred Hertzog, M., Rebhaldenstr. 19, CH-596 Scherzingen, Switzerland. E-mail: mhertzog@bluewin.ch

**9823.** Hilling, B. (2010): Beautiful Demoiselle *Calopteryx virgo* resting with wings spread. *Atropos* 41: 57- [Verbatim: "On 17 May 2009 at Swallowfield, along the River Loddon south of Reading, I found a *C. virgo* resting with its wings open. It sat for some 30 minutes in this position, allowing photographs to be taken. Normally, of course, both species of demoiselle occurring in Britain rest with their wings characteristically folded above the body. It was a rather cold, mainly cloudy and occasionally wet day. In the first photographs the tip of one of the wings was obscured by a leaf; hoping to get better pictures I gently blew on the damselfly whereupon it closed its wings. To my great surprise a minute or so later it spread its wings as illustrated here, maintaining this position some further 25 minutes. Only when a very short interlude of sunshine came along did the insect fly."] Address: Hilling, B., 28 Hampton Road, Worcester Park, Surrey, KT4 8ET, UK

**9824.** Hoffmann, J. (2010): Do climate changes influence dispersal and population dynamics of dragonflies in the western Peruvian Andes? *BioRisk* 5: Special issue: Monitoring climatic change with dragonflies: 47-72. (in English) ["For nine dragonfly species (five aeshnids and four libellulids) all previous and verifiable data are related to the vertical climate zones and nature regions of the western Peruvian Andes and the Peruvian Pacific coast. Climate changes due to the El Niño and La Niña phenomena, as well as the global climate change have an influence on the different natural regions and also restrict aquatic biotopes. These changes influence the dispersal and behavior of some dragonflies and concern also loss of habitats as well as alterations of biotic and abiotic factors at and in water. However new waters and habitats also are formed in most nature regions. Specialists like *Rhionaeschna peralta*, a species of high mountain regions and the Puna, are not able to react to habitat losses by adaptation, while other species such as *R. maita* and *R. marchali* do colonize new habitats also in higher altitudes. While the here represented aeshnids change their distribution ranges within the vertical nature regions of the west Andes, this is suspected for three of the four libellulids (*Orthemis ferruginea*, *O. discolor* and *Pantala flavescens*) as latitudinally respectively longitudinally immigrations and expansions of their areals. For all species discussed, a seasonally earlier flight beginning is detectable, but for no species an extension of their flight time. Altogether, the above named three libellulid do react more flexibly and faster to the alterations by climate changes than the majority of the five aeshnid species. The influence of increased

UV-B and UV-A radiation possibly affects also the site occurrence of some species in high altitudes of the Andes." (Author)] Address: Hoffmann, J., Alauda, Wendenstr. 435, D-20537 Hamburg, Germany. E-mail: hoffmann.joa@t-online.de

**9825.** Holmes, P. (2010): Seasons' Summary. East Keswick Wildlife Trust Newsletter 35: 2. (in English) [East Keswick, Leeds, West Yorkshire, England. "A notable addition to the species of the Parish is that of *Orthetrum cancellatum*. One was seen on the bridle path down to the river and a group of about 25 were found at a pond on land owned by David Cook (permission had been given). This dragonfly is unusual in that it prefers bare ground on which to perch rather than prominent branches and twigs. Their usual range is south of The Wash with scattered populations up to the Humber so our sightings have confirmed its expansion northwards. Other species seen were Southern Hawker, a few of which were emerging from the Hirsts' garden pond, Emperor Dragonfly, Brown Hawker, 4-spot Chaser, Blue-tailed Damselfly, Common Blue and Azure Damselfly. During the day of the survey we did not visit Ox Close so did not see the Banded Demoiselles which had made their usual spectacular appearance." (Author)] Address: E-mail: paul@ox-close.co.uk

**9826.** Holomuzki, J.R.; Klarer, D.M. (2010): Invasive reed effects on benthic community structure in Lake Erie coastal marshes. *Wetlands Ecol. Manage.* 18: 219-231. (in English) ["We examined how dominance (% canopy cover) and invasion history of common reed, *Phragmites australis*, affected benthic macroinvertebrate diversity and density in 8 marshes along Lake Erie's southern shoreline. We also compared macroinvertebrate densities among patches (0.25 m<sup>2</sup>) of reed, cattail (*Typha* spp.), and native flora (e.g., *Sagittaria*, *Sparganium*) and epiphytic algal communities on submerged stems of reed and cattail. Narrow-leaf cattail (*T. angustifolia*) is also a common invasive plant to these wetlands, but does not greatly change plant community composition or ecosystem conditions like reed. Macroinvertebrate diversity (Shannon-Weaver H<sub>0</sub>) was positively related to reed cover and was highest (4.6) in two marshes with \*35- and 5-year invasion histories. Shading from high reed cover increased H<sub>0</sub>-diversity, in part, by reducing the abundance of floating duckweed, which harboured many *Hyalella azteca* amphipods. Percent Ephemeroptera, Odonata, and Trichoptera was low to moderate across marshes, regardless of reed cover and invasion history. Macroinvertebrate density was not affected by reed cover or average plant stem density, and did not differ among plant types. However, epiphyton densities and % diatoms were greater on reed than on cattail, suggesting reed provides a better feeding habitat for microalgal grazers than *Typha*. Abundance rankings of common species in these diatom-dominated communities were also typically dissimilar between these plant types. Although % grazers was unrelated to epiphyton densities and % diatoms, grazer identity (snails) differed between natural and diked marshes, which had different microalgal food supplies. Our findings suggest that *Phragmites* does not necessarily adversely affect macroinvertebrate community structure and diversity and that invasion history alone has little effect on the H<sub>0</sub>-diversity–reed dominance relationship." (Authors) Dominant odonates were *Anax junius*, *Drury*, *Ischnura verticalis*, and *I. posita*.] Address: Holomuzki, J.R., Department of Evolution, Ecol-

ogy, and Organismal Biology, Ohio State University, 1760 University Drive, Mansfield, OH 44906, USA. E-mail: holomuzki.3@osu.edu

**9827.** Huang, D.-Y.; Petrulevicius, J.F.; Nel, A. (2010): New morphological data from the Jurassic of Inner Mongolia confirms the damselfly aspect of *Protomyrmeleontidae* (Insecta: Odonatoptera). *Eur. J. Entomol.* 107(4): 615-620. (in English) ["*Protomyrmeleon daohugouensis* sp. n. and *Protomyrmeleon lini* sp. n., two new species of *Protomyrmeleontidae* from the Middle Jurassic of Jiulongshan Formation are the first Chinese representatives of this Mesozoic odonatopteran family. The type specimen of *P. lini* is exceptionally well preserved, showing several particular wing and body structures that were unknown, viz. unique shape of tarsal claws, extreme thoracic skewness, presence of three pairs of long spurs on all femora and tibiae. The type "A" (sensu Nel et al., 2005) of wing venation (i.e. with a very long bridge between IR<sub>2</sub> and RP<sub>3/4</sub>) corresponds to that of the *protomyrmeleontid* fore wing. The nearly complete absence of the meso-metathoracic interpleural suture, newly discovered in the *Protomyrmeleontidae*, can be considered as a synapomorphy of the clade *Protozygoptera* + *Odonata*." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**9828.** Hunt, R.J.; Swift, M.C. (2010): Predation by larval damselflies on cladocerans. *Journal of Freshwater Ecology* 25(3): 345-351. (in English) ["We quantified the strike and capture efficiency, handling time, and functional response of *Enallagma hageni* and *Ischnura verticalis* larvae feeding on several sizes of the cladocerans *Polyphemus pediculus*, *Daphnia pulex*, and *Holopedium gibberum*. Both species were most efficient at capturing and ingesting *P. pediculus*, the smallest and most vulnerable prey, followed by *D. pulex*, a larger, faster prey. *H. gibberum* was rarely eaten due to a protective gelatinous sheath. The handling time was shortest for *P. pediculus* and longest for *D. pulex* due to a combination of size and carapace protection. Both damselfly species exhibited a Type II functional response with a maximum of 20-30 prey eaten per hour. Both *E. hageni* and *I. verticalis* larvae are efficient predators that selectively capture *P. pediculus* and small *D. pulex*; they avoid *H. gibberum*. Due to this differential predation, these larvae may substantially alter zooplankton community composition." (Authors)] Address: Swift, M.C., Dept of Biology, St. Olaf College, Northfield, Minnesota 55057 USA. E-mail: swift@stolaf.edu

**9829.** Johnson, J. (2010): *Ischnura barberi* (Desert Forktail) found in Oregon. *Argia* 22(4): 4-5. (in English) [18-IX-2010, Borax Lake, Harney County, Oregon, USA] Address: Johnson, J., 3003 Unander Avenue, Vancouver, WA 98660, USA. E-mail: jtjohnson@comcast.net

**9830.** Johnson, J. (2010): Using wing vein coloration to identify *Argia agrioides* (California Dancer) and *A. nahuana* (Aztec Dancer). *Argia* 22(4): 19-20. (in English) ["Recently, I discovered what appears to be another helpful character for identifying both males and females of these species in the field or in good quality, well-exposed photos. On *nahuana*, the subcosta, radius anterior, radius posterior first branch, and cubitus are noticeably paler (light brown or golden) than other major veins. In particular, the pale subcosta and radius anterior contrast with the darker costa, and especially compared with the costa proximal to the nodus (some-



times more obvious, sometimes more subtle — possibly depending on the angle and lighting). On agrioides the wing veins are relatively uniform in tone without any contrastingly pale veins, or if there is any difference in tone, the costa is paler than the other veins." (Author)] Address: Johnson, J., 3003 Unander Avenue, Vancouver, WA 98660, USA. E-mail: jtjohnson@comcast.net

**9831.** Johnson, J. (2010): A nymph found out of water. *Argia* 22(4): 18-19. (in English) [Libellula cf quadrimaculata was found crawling out of water at Great Meadow near Lake of the Woods, Klamath County, Oregon, USA, 20-VIII-2010.] Address: Johnson, J., 3003 Unander Av., Vancouver, WA 98660, USA. E-mail: jtjohnson@comcast.net

**9832.** Johnson, P.T.; Bowerman, J. (2010): Do predators cause frog deformities? The need for an eco-epidemiological approach. *Journal of Experimental Zoology Part B: Molecular and Developmental Evolution* 314B(7): 515-518. (in English) ["Renewed controversy has emerged over the likely causes and consequences of deformed amphibians, particularly those with missing limbs. The results of a series of experiments by Balengée and Sessions (2009) implicate aquatic predators (i.e. dragonfly larvae) in causing such abnormalities. Skelly and Benard (2010), however, argued that the small scale of these experiments and the absence of a correlation between predator abundance and deformity frequencies in natural amphibian populations undermine such a conclusion. Drawing upon our experiences with frog malformations, we suggest that the study of amphibian deformities has been hindered by two, inter-related problems. First, empirical studies often fail to critically define the expected baseline level of abnormalities and differentiate between "epidemic" and "endemic" frequencies of malformations. Second, recognizing the likelihood of multiple causes in driving amphibian malformations, continued research needs to embrace a "multiple lines of evidence" approach that allows for complex ethologies by integrating field surveys, diagnostic pathology, comparative modelling, and experiments across a range of ecological scales. We conclude by highlighting the results of a recent study that uses this approach to identify the role of aquatic predators (i.e., fishes and dragonflies) in causing high frequencies of deformed frogs in Oregon. By combining long-term data, comparative data and mechanistic experiments, this study provides compelling evidence that certain predators do cause deformities under ecologically relevant conditions. In light of continuing concerns about amphibian deformities and population declines, we emphasize the need to integrate ecological, epidemiological, and developmental tools in addressing such environmental enigmas." (Authors)] Address: Pieter T.J. Johnson, Ecology and Evolutionary Biology, University of Colorado, Ramaley N122, Campus Box 334, Boulder, CO 80309. E-mail: pieter.johnson@colorado.edu

**9833.** Juutinen, R. (ed.) (2010): Restoration decision-making in boreal spring complexes – an assessment of insect fauna and summary of the whole project. *Metsähallituksen luonnonsuojelujulkaisu*. Sarja A 193: 133 pp. (in Finnish, with Swedish and English summaries) ["Restoration of springs has been evoked as a tool for enhancing the natural state of disturbed springs. However, preliminary vegetation mapping as well as research and monitoring concerning restoration of springs has thus far been scarce. At 2008 Metsähallitus Natural Heritage Services launched a pilot project aiming to as-

sess the flora and fauna, natural state and restoration needs of 30 spring complexes. This publication presents the results for insect fauna and recommendations for restoration. In the first part of this publication it is assessed whether the natural state of a spring complex affects the overall abundance of individuals, species diversity, community structure and conservation value based on adult aquatic insects and/or semiaquatic flies. In addition, the chosen response variables are compared between aquatic insects and semiaquatic flies. Naturalness was not found to be among the most important factors affecting the overall abundance of individuals, species diversity, community structure and conservation value based on adult aquatic insects and/or semiaquatic flies. The spring complexes with highest conservation value were partially different, when based on aquatic insects or semiaquatic flies. The most important conclusion concerning restoration decision-making is that even seriously disturbed spring complexes can harbour valuable, endangered species. And, on the other hand, pristine spring complexes can be species-poor and harbour no taxa with high conservation value. In the second part, restoration needs and possibilities of the studied spring complexes based on flora and fauna, and other field data and subsequent analyses are assessed for each study site. Sites are presented in detail with maps and factors affecting restoration are discussed. Also, the required conservation measures concerning endangered or otherwise valuable species are stated. One aim of this project was to make possible a thorough and scientific monitoring of restoration success. Methods used are documented in detail and planned so that they can be accurately repeated. Species surveys conducted in 2008 thus serve as a baseline survey before restoration." (Author) *Coenagrion hastulatum*, *C. johanssoni*, *C. lunulatum*, and *Leucorrhinia dubia* were sampled at very few localities and in very small abundances.] Address: Juutinen, R., Metsähallitus, luontopalvelut, Finland. E-mail: riikka.juutinen@metsa.fi

**9834.** Karjalainen, S. (2010): *Suomen Sudenkorennot (The Dragonflies of Finland)* (2nd edition, 2010). ISBN-13: 9789513154257: 239 pp. (in Finnish) ["The new edition of the book covers all the 55 species of dragonfly recorded in Finland, of which 54 were observed in the field and photographed by the author over a period of more than 15 years. All the insects were photographed free in the wild. The first part of the book provides a broad general introduction to dragonfly life. In the main part of the book, a double page spread is reserved for each of the 55 local species. On the left page is one full page photo and on the right 1-2 smaller photos, distribution map, diagrams showing flight season and size and a brief text giving identification characters, habitats and habits. Brief instructions are given in English to help interpret data given in specific accounts. This revised edition includes updated maps and photos along with new information gathered since the publication of the original book." (Publisher)] Address: Karjalainen, S., Neidonpuistontie 6 D 8, FI-02400 Kirkkonummi, Finland. Email: sk@korento.net

**9835.** Kharitonov, A.; Eremina, E.E. (2010): Dragonflies (Odonata) of the Southern Urals - the experience of regional faunistic studies. *Eurasian Entomological Journal* 9(2): 263-271. (in Russian, with English summary) ["The results of long-term faunistic research on South Ural dragonflies are summarized. Data on the

abundance, occurrence, flight period and biotopical distribution of 69 species are provided. It is concluded that the structure of this regional odonate fauna has been markedly changed over time, especially in recent years." (Authors)] Address: Eremina, Ekatherina, Post Box 2775, Chelyabinsk 454014 Russia. E-mail: karmiska@mail.ru

**9836.** Khrokalo, L. (2010): Expansion of *Crocothemis erythraea* in Ukraine. *BioRisk* 5: Special issue: Monitoring climatic change with dragonflies: 211-223. (in English) ["A noticeable expansion of some Mediterranean species takes place in Europe during last several decades and this data are related to climatic effects clearly. The present work is a review of literature and original data on distribution of *C. erythraea* in Ukraine. In the beginning and middle of XX century in Ukraine *C. erythraea* was observed in southern area at Dnieper valley, in outmost southwest at Danube delta at the west of Ukraine in Transcarpathian and Forecarpathian. Next, this species was registered at the foothills of Carpathian Mountains. During last three decades *C. erythraea* was also recorded at the north and east (central regions, eastern, northern and northeastern areas). Since 2000 new points have been registered in Odessa, Kherson, Vinnytsya, Cherkasy, Chernihiv, Kyiv administrative regions and in Crimea." (Author)] Address: Khrokalo, Lyudmila, P.O. Box 16, Kyiv-118, Ukraine 03118. E-mail: lkhrokalo@mail.ru

**9837.** Kipping, J. (2010): *Lestinogomphus silkeae* sp. nov. from the Okavango and Zambezi Rivers (Odonata: Gomphidae). *International Journal of Odonatology* 13(2): 255-265. (in English) ["*Lestinogomphus silkeae* sp. nov. from the northern Okavango Delta in Botswana, the Kavango River in northern Namibia and the middle Zambezi River in Zimbabwe is described and illustrated (holotype male: Botswana, Xaro Lodge, 09 vi 2000, dep. at ZMBH). The shape of the male appendages distinguishes this species from all others in the genus. The new species is compared with the widespread type species of the genus, *L. angustus*." (Author)] Address: Kipping, J., Naturkundliches Museum 'Mauritianum' Altenburg, Parkstrasse 1, 04600 Altenburg, Germany. E-mail: kipping@mauritianum.de

**9838.** Kita, H. (2010): Charm of dragonflies. *Japic News* 313: 8-9. (in Japanese) [Verbatim: "Now the season of fresh green is coming. I like it so much. The season is also the one for rice sprouts and for rice planting. And in the season we see various insects in neighbouring nature, ponds and streams. Among them dragonflies are popular insects and here I will tell you about them. I have been engaged in public information in a pharmaceutical company. My job is to publicize charmingly correct and useful information to people. And I am very pleased if I can tell you a charm of dragonflies. I am a member of The Japanese Society for Odonatology, and have been studying the ecology of dragonflies, traveling from the north, Hokkaido, to the south of Iriomote Island or the Ogasawara Islands, almost all over Japan for taking photographs of them in nature. Japan is a long and narrow mountainous island, however, it is rich in water, and about 200 odonatas inhabit it. At Shiretoko I chased species of cool region being frightened of bears, and landed on a desert island of Ogasawara in a small boat and photographed an indigenous species there. As mentioned above, I am continuing travel for dragonflies besides working in a pharmaceutical company. It may be my life work. What makes me so much be interested in dragonflies? I think it is the

flight of them. The dragonfly is an insect with excellent flight ability. In Japan tomo is derived from "tobu bou", "tobu": to fly, and "bou": a stick that is a flying stick. Most of the life of dragonflies, though it varies by the species, is occupied by flight behaviour. Some dragonflies fly at a flight speed of more than 100 km/h, and they can catch preys in the air as well as they can fly so far a distance, and can copulate and lay eggs in the air and can hover or can turn a somersault so skillfully. The present day aerodynamics is not a match for their flight technique. The secret is due to the mechanism of the flight muscles and the wings. They have four thoracic muscles with each wings directly attached to it, and they can move them separately, different from other insects, therefore, they can fly straight without up and down movement like butterflies. Also the beautiful water habitat of them is attractive. In this season I am relieved with a sound of streams in neighbouring nature, and when a dragonfly will appear at such a scene, it will be much more the best. Thus, I cannot tell you all of the charms of dragonflies. Photographing dragonflies is my pleasure and expression of the charm of them. In my boyhood, I used reflex cameras with micro-lenses. But now, digital cameras became widespread. If you want to take ecological photos of dragonflies, you are required to use a digital reflex camera with a few conversion lenses of a micro 100 mm a wide lens, a fish-eye lens and a stroboscope. These apparatuses made us everybody enjoy readily insect photographing now. Since ancient times of Emperor "Jinmu" our land was called "Akitsu-shima". Akitsu is an old name of dragonfly, and its origin is when Emperor Jinmu looked out over the land from the hill of Asuka, it resembled the shape of copulation by dragonflies, or a lot of swarms of dragonflies were seen. Also, according to Kojiki, when Emperor Yuryaku visited Yoshino for hunting, a horsefly stung his arm, a dragonfly caught it and preyed. Then, he praised the dragonfly so much, and thereafter, dragonflies were called "kachi-mushi"; insect of victory, and became a representative of lucky insects. Dragonflies have been used for one of old wife's remedy, effects of whooping cough, tonsillitis and asthma. Kuro-yaki, char, and decoction are said to be useful for the effects. The species for it is said to be aka-tombo, *Sympetrum* species. Dr. Ogata, Akira, former president of The Pharmaceutical Society of Japan had investigated whether kuro-yaki of aka-tombo included the effect of sedation or not. He roasted aka-tombo at temperatures 200-300 degrees C for 34 hours, and then, after extraction by alcohol, he refined it, which had an effect of sedating the cramp of the muscle of the bronchi. He noticed that old wife's remedy was effective. Also, dried *Orthetrum* species seems to have been used for a tonic in Taiwan and China. Moreover, we might have used dragonflies for food according to a survey in the Taisho era (1910's). We ate insects such as locusts and larvae of wasps from long time ago, so dragonflies might have been an important source of protein. When people of ancient times saw aka-tombo flying in tandem over the rice paddies in the harvest time of autumn, they might have felt as if the aka-tombo delivered the harvest to them. Dragonflies were very familiar insects for us from ancient times. I hear the most popular children's song is "Aka-tombo" and the important and typical scenery of Japan for us seems to be aka-tombo perching on the harvested ears of rice. However, recently it is often said that dragonflies decreased. Now water environment was contaminated and beautiful water edges are being lost by exploitation here and there in Japan. Larvae of

dragonflies are underwater dwellers, and when the suitable water environment is lost, they cannot live. I experienced often that nice habitats were lost in a few years. The extremely decreasing of dragonflies may be largely due to the change of water environment. It is doubtful whether we can live in such an environment or not, where dragonflies cannot live as well as such scenery as that relieve us is lost. Dragonflies and nature seem to warn us." (Translation: Naoya Ishizawa)] Address: Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan.

**9839.** Klausnitzer, B. (2010): Entomologische Schulen in der Oberlausitz - Ergebnisse vorbildlicher, bis heute wirkender Freizeitforschung. Berichte der Naturforschenden Gesellschaft der Oberlausitz 18: 21-42. (in German) [Michael Rostock is the most prominent regional odonatologist at the end of the 19th and beginning of the 20th century in Sachsen, Germany.] Address: Klausnitzer, B., Lannerstr. 5, 01219 Dresden, Germany

**9840.** Klausnitzer, H. (2010): Bericht über die 18. Tagung Sächsischer Entomologen. Entomologische Nachrichten und Berichte 54(3/4): 174. (in German) [The report includes a note on the lecture of Thomas Brockhaus on *Somatochlora alpestris* and reasons of its occurrence in the Erzgebirge-mountains, Sachsen, Germany.] Address: Klausnitzer, Hertha, PF 202731, 01193 Dresden, Germany

**9841.** Kleinsteuber, W. (2010): Zur aktuellen Verbreitung der Grundwanze *Aphelocheirus aestivalis* (Fabricius, 1794) in Thüringen (Heteroptera: Aphelocheiridae). Mitteilungen des Thüringer Entomologenverbandes 17 (1/2): 2-10. (in German) [Along four rivers (24 sampling sites) in Thüringen, Germany, the distribution of the heteropteran *Aphelocheirus aestivalis* was studied. Sampling also resulted in locating many macroinvertebrate species, including *Calopteryx splendens*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, and *Platycnemis pennipes*.] Address: Kleinsteuber, W., Hirtenweg 15, 04425 taucha, Germany. E-mail: aquahet@gmx.net

**9842.** Koehler, G.; Frey, W.; Hauptlorenz, H.; Schindler, H. (2010): Konzept zur ökologischen Bewertung und Entwicklung der Wooge im Biosphärenreservat Pfälzerwald. Berichte des Fachgebietes Wasserbau und Wasserwirtschaft der TU Kaiserslautern 20: 312 pp. (in German) [Rheinland-Pfalz, Germany; Odonata are treated on pages 122 - 139.] Address: Koehler, G., FG Wasserbau und Wasserwirtschaft, Technische Universität Kaiserslautern, Paul-Ehrlich-Straße 14, 67663 Kaiserslautern, Germany

**9843.** Kohl, S. (2010): Binsenjungfer-Weibchen (*Lestes sponsa*) überfällt Paarungsrad der Zwerglibelle (*Nehalennia speciosa*). *mercuriale* 10: 49-50. (in German) [Switzerland, 3-VII-2010: Predation by a female *Lestes sponsa* on a copulating pair of *Nehalennia speciosa*.] Address: Kohl, S., Fuchsgasse 5, CH-8610 Uster, Switzerland. E-mail: stefan.kohl@bluewin.ch

**9844.** Kohler, N. (2010): Recent discoveries in Montana. *Argia* 22(4): 5-8. (in English) [Montana, USA; Records of the following species are documented and discussed: *Ischnura damula*, *Argia apicalis*, *A. moesta*, *A. immundum*, *Macromia pacifica*, *Calopteryx aequabilis*, *Lestes forcipata*, *Aeshna subarctica*, *Somatochlora ensigera*.] Address: Kohler, N.S. E-mail: nskohler@bresnan.net

**9845.** Kondratieff, B.C.; Durfee, R.S. (2010): Aquatic Insects (Ephemeroptera, Odonata, Hemiptera, Coleoptera, Trichoptera, Diptera) of Sand Creek Massacre National Historic Site on the Great Plains of Colorado. *Journal of the Kansas Entomological Society* 83(4): 322-331. (in English) ["The Great Plains of Colorado occupies over two-fifths of the state, yet very little is known about the aquatic insects of this area. This paper reports on the aquatic insects found in temporary and permanent pools of Big Sandy Creek within the Sand Creek Massacre National Historic Site, on the Great Plains of Colorado. A total of 107 distinguishable taxa were collected representing six orders and 27 families of insects. The orders Coleoptera (39% or 42 taxa), Diptera (23% or 25 taxa), and Odonata (21% or 23 species) dominated this site. Most of these taxa are geographically widespread and considered common." (Authors)] Address: Kondratieff, B.C., Colorado State University, Department of Bioagricultural Sciences and Pest Management, Fort Collins, CO 80523-1177, USA

**9846.** Langheinrich, U.; Braumann, F.; Lüderitz, V. (2010): Niedermoor- und Gewässerrenaturierung im Naturpark Drömling (Sachsen-Anhalt). *Waldökologie, Landschaftsforschung und Naturschutz* 10: 23-29. (in German, with English summary) [oas 30, "The Drömling Natural Park is the largest fen area in Central Germany. The management and development plan defines the re-wetting of fens, the preservation and development of extensively used wetlands and the improvement of the ecological status of water bodies as the main aims. In 11 areas, re-wetting already started or will start in the near future. Habitat quality of canals and ditches was enhanced by building shallow water zones and careful management. Function of canals and ditches changes stepwise from drainage to irrigation. Furthermore, new shallow ponds were created. This contribution presents examples for implementation of measures and first results of scientific evaluation. All the measures help to maintain and enhance aquatic and amphibic biodiversity and conservation value. A high total number of species correlates well with the occurrence of endangered species. 50 of such Red Lists species (including 14 Odonata species) were found among aquatic macroinvertebrates and 20 among aquatic macrophytes. These values are above average compared to other fens in Germany. However, the maintenance of diverse landscape and water body structure demands high management efforts. A rising problem for native diversity is the appearance of invasive neozoons." (Authors)] Address: Langheinrich, Uta, Hochschule Magdeburg-Stendal, FB Wasser- und Kreislaufwirtschaft, Breitscheidstr. 2, 39114 Magdeburg, Germany. E-mail: uta.langheinrich@hs-magdeburg.de

**9847.** Leipelt, K.G.; Suhling, F.; Gorb, S.N. (2010): Ontogenetic shifts in functional morphology of dragonfly legs (Odonata: Anisoptera). *Zoology* 113: 317-325. (in English) ["Anisopteran leg functions change dramatically from the final larval stadium to the adult. Larvae use legs mainly for locomotion, walking, climbing, clinging, or burrowing. Adults use them for foraging and grasping mates, for perching, clinging to the vegetation, and for repelling rivals. In order to estimate the ontogenetic shift in the leg construction from the larva to the adult, this study quantitatively compared lengths of fore, mid, and hind legs and the relationships between three leg segments, femur, tibia, and tarsus, in larval and adult Anisoptera of the families Gomphidae, Aeshnidae, Cor-



dulegastridae, Corduliidae, and Libellulidae, represented by two species each (*Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Cordulegaster insignis*, *C. picta*, *Orthetrum cancellatum*, *Sympetrum sanguineum*, *Cordulia aenea*, *Somatochlora metallica*, *Aeshna cyanea*, and *Anax imperator*). We found that leg segment length ratio as well as ontogenetic shift in length ratios was different between families, but rather similar within the families. While little ontogenetic shift occurred in Aeshnidae, there were some modifications in Corduliidae and Libellulidae. The severest shift occurred in Gomphidae and Cordulegastridae, both having burrowing larvae. These two families form a cluster, which is in contrast to their taxonomic relationship within the Anisoptera. Cluster analysis implies that the function of larval legs is primarily responsible for grouping, whereas adult behavior or the taxonomic relationships do not explain the grouping. This result supports the previous hypothesis about the convergent functional shift of leg characters in the dragonfly ontogenesis." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**9848.** Lentink, D.; Jongerius, S.R.; Bradshaw, N.L. (2010): Chapter 14: The scalable design of Flapping Micro-Air Vehicles inspired by insect flight. In: D. Floreano, Zufferey, J.-C.; Srinivasan, M.V.; Ellington, C. (Eds.): *Flying Insects and Robots*. Springer-Verlag Berlin Heidelberg. 1st Edition. 2010, XII, 316 pp. ISBN: 978-3-540-89392-9: 185-205. (in English) ["Here we explain how flapping micro air vehicles (MAVs) can be designed at different scales, from bird to insect size. The common believe is that micro fixed wing airplanes and helicopters outperform MAVs at bird scale, but become inferior to flapping MAVs at the scale of insects as small as fruit flies. Here we present our experience with designing and building micro flapping air vehicles that can fly both fast and slow, hover, and take-off and land vertically, and we present the scaling laws and structural wing designs to miniaturize these designs to insect size. Next we compare flapping, spinning and translating wing performance to determine which wing motion results in the highest aerodynamic performance at the scale of hummingbirds, house flies and fruit flies. Based on this comparison of hovering performance, and our experience with our flapping MAV, we find that flapping MAVs are fundamentally much less energy efficient than helicopters, even at the scale of a fruit fly with a wing span of 5 mm. We find that insect-sized MAVs are most energy effective when propelled by spinning wings. [...] We used dragonfly wings (*Sympetrum vulgatum*) as an inspiration to develop design principles for such stiffer micro-wings with venation-like tear-stoppers." (Authors)] Address: Lentink, D., Experimental Zoology Group, Wageningen University, 6709 PG Wageningen, The Netherlands; Faculty of Aerospace Engineering, Delft University of Technology, 2629 HS Delft, The Netherlands. E-mail: david.lentink@wur.nl

**9849.** Lin, C.-P.; Chen, M.-Y.; Huang, J.-P. (2010): The complete mitochondrial genome and phylogenomics of a damselfly, *Euphaea formosa* support a basal Odonata within the Pterygota. *Gene* 468(1-2): 20-29. (in English) ["This study determined the first complete mitochondrial genome of a damselfly, *Euphaea formosa* (Insecta: Odonata: Zygoptera), and reconstructed a phylogeny based on thirteen protein-coding genes of mitochondrial genomes in twenty-five representative hexapods to ex-

amine the relationships among the basal Pterygota. The damselfly's mitochondrial genome is a circular molecule of 15,700 bp long, and contains the entire set of thirty-seven genes typically found in insects. The gene arrangement, nucleotide composition, and codon usage pattern of the mitochondrial genome are similar across the three odonate species, suggesting a conserved genome evolution within the Odonata. The presence of the intergenic spacer s5 likely represents a synapomorphy for the dragonflies (Anisoptera). Maximum parsimony, maximum likelihood, and Bayesian analyses of both nucleotide and amino acid sequences cannot support the three existing phylogenetic hypotheses of the basal Pterygota (Palaeoptera, Metapterygota, and Chistomyaria). In contrast, the phylogenetic results indicate an alternative hypothesis of a strongly supported basal Odonata and a sister relationship of the Ephemeroptera and Plecoptera. The unexpected sister Ephemeroptera + Plecoptera clade, which contradicts with the widely accepted hypothesis of a monophyletic Neoptera, requires further analyses with additional mitochondrial genome sampling at the base of the Neoptera." (Authors)] Address: Lin, C.-P., Department of Life Science, Tunghai University, Taichung, Taiwan. E-mail: treehops@thu.edu.tw

**9850.** Locklin, J.L. (2010): Gregarine parasitism in dragonfly populations of Central Texas with an assessment of fitness costs in *Erythemis simplicicollis*. Ph.D. thesis, Dept. of Biology, Baylor University: XI, 88 pp. (in English) ["Dragonfly parasites are widespread and frequently include gregarines (Phylum Apicomplexa) in the gut of the host. Gregarines are ubiquitous protozoan parasites that infect arthropods worldwide. More than 1,600 gregarine species have been described, but only a small percentage of invertebrates have been surveyed for these apicomplexan parasites. Some consider gregarines rather harmless, but recent studies suggest otherwise. Odonate-gregarine studies have more commonly involved damselflies, and some have considered gregarines to rarely infect dragonflies. In this study, dragonfly populations were surveyed for gregarines and an assessment of fitness costs was made in a common and widespread host species, *Erythemis simplicicollis*. Adult dragonfly populations were surveyed weekly at two reservoirs in close proximity to one another and at a flow-through wetland system. Gregarine prevalences and intensities were compared within host populations between genders, among locations, among wing loads, and through time. Host fitness parameters measured included wing load, egg size, clutch size, and total egg count. Of the 37 dragonfly species surveyed, 14 species (38%) hosted gregarines. Thirteen of those species were previously unreported as hosts. Gregarine prevalences ranged from 2% – 52%. Intensities ranged from 1 – 201. Parasites were aggregated among their hosts. Gregarines were found only in individuals exceeding a minimum wing load, indicating that gregarines are likely not transferred from the naiaid to adult during emergence. Prevalence and intensity exhibited strong seasonality during both years at one of the reservoirs, but no seasonal trend was detected at the wetland. The seasonal trend at the reservoir suggests that gregarine oocyst viability parallels increasing host population densities and may be short-lived. Prevalence and intensity also differed between dragonfly populations at the locations. Regression analyses revealed that host species, host gender, month, and year were significant explanatory variables related to grega-

rine prevalence and intensity. The fitness parameters measured were not correlated with presence or intensity of gregarines, suggesting that either gregarines do not affect wing loading and egg production in *E. simplicicollis*, or that virulence depends on parasite intensity and/or the specific gregarine species infecting the hosts. Our results emphasize the importance of considering season, hosts, and habitat when studying gregarine-dragonfly ecology." (Author)] Address: Locklin, J.L., Department of Biology, Baylor University, One Bear Place 76798, Waco, TX 97388, USA. E-mail: jasonlocklin@baylor.edu

**9851.** Locklin, J.L.; Vodopich, D.S. (2010): Eugregarine parasitism of *Erythemis simplicicollis* (Say) at a constructed wetland: A fitness cost to females? (Anisoptera: Libellulidae). *Odonatologica* 39(4): 319-331. (in English) ["Eugregarine parasites infect a wide variety of invertebrates. Some authors suggest that eugregarines are rather harmless, but recent studies suggest otherwise. Among odonate-eugregarine investigations, Zygoptera have been more frequently studied than Anisoptera. Adult dragonfly populations were surveyed for eugregarines at a constructed, flow-through wetland system and the fitness cost of infection was assessed in a common and widespread dragonfly host species, *E. simplicicollis*. Populations were sampled weekly throughout the flight season. Host fitness parameters measured included wing load, egg size, clutch size, and total egg count. Of the 22 host species surveyed, 8 hosted eugregarines and 2 of these odonate species were previously undocumented as hosts. While eugregarine parasitism has been shown to exhibit seasonality, parasite prevalence and intensity in *E. simplicicollis* in this study showed no seasonal trend. The fitness parameters measured were not correlated with the presence or intensity of eugregarines. These findings suggest that either eugregarines do not affect wing loading and egg production in *E. simplicicollis*, or that virulence depends on parasite intensity and/or the specific eugregarine species infecting the hosts." (Authors)] Address: Locklin, J.L., Department of Biology, Baylor University, One Bear Place 97388, Waco, TX 76798, USA

**9852.** Mabry, C.; Dettman, C. (2010): Odonata richness and abundance in relation to vegetation structure in restored and native wetlands of the prairie pothole region, USA. *Ecological Restoration* 28(4): 475-484. (in English) ["Over the past couple of decades, 2,200,000 ha of wetlands and grasslands have been restored in the prairie pothole region, USA. However, many restored and remnant wetlands in the region are dominated by two invasive plant species, reed canary grass (*Phalaris arundinacea*) and cattail (*Typha* spp.), which form dense monotypic stands. These restorations are usually evaluated as habitat for waterfowl and other birds; however, there is a need to evaluate their success for invertebrates. Odonata are ideal organisms to include in our evaluations of restored wetland habitat quality for both ecological and practical reasons. To examine the association between vegetation structure and odonate assemblages in shoreline vegetation of prairie pothole wetlands, we compared odonate richness and abundance in dense, monotypic stands to that of vegetation with diverse vertical structure. We also observed the use of these two different habitats by odonate species classified as "of conservation concern" in Iowa. Odonate species richness was substantially greater in the mixed-structure vegetation than in monotypic

stands. A similar trend was found in odonate species with a "vulnerable" or "uncommon" conservation status. The number of occurrences of species of conservation concern was four times greater in mixed than in monotypic vegetation. A comparison of our data to those collected in the 1990s for one monotypic vegetation site further supported this conclusion. Many odonate species are targets for conservation and can readily benefit from wetland restoration and reconstruction if the sites are managed for proper vegetation structure." (Authors)] Address: Mabry McMullen, Cathy, Iowa State Univ., Dep.t of Natural Resource Ecology & Management, 339 Science Hall II, Ames, Iowa 50011, USA. E-mail: mabry@iastate.edu

**9853.** Machado, A.B.M. (2010): *Oxyagrion mirnae* spec. nov. from Brazil (Zygoptera: Coenagrionidae). *Odonatologica* 39(4): 353-356. (in English) ["The new species is described, illustrated and compared with the other 25 congeners. Holotype male: Virginia, Minas Gerais, Brasil, 3-II-2010; deposited in author's collection." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil. E-mail: angelo@icb.ufmg.br

**9854.** Mäkinen, J. (2010): Kirja-arvostelu: Sami Karjalainen - Suomen sudenkorennot [Review of new edition of Suomen sudenkorennot (The Dragonflies of Finland) by Sami Karjalainen]. *Crenata* 3(1): 40. (in Finnish) [The publication of the first edition of Suomen sudenkorennot in 2002 raised the interest in dragonflies in Finland enormously. Finnish Dragonfly Society was founded few years later. There are a number of reasons why the publication of new edition is important. The book has been sold out for many years and no other Finnish guides are available. After the publication of the first edition significant changes in Finnish fauna and distribution areas of many species have happened. Also maps and flight charts are updated with new information. The new edition includes 92 new photos and 17 pages more than the first edition. Thirteen species from neighbouring areas are also presented in the book, including all Scandinavian species. All of them are presented with Finnish (vernacular) names for the first time. (Asmus Schröter)] Address: Mäkinen, J. E-mail: makisenjussi@gmail.com

**9855.** Mäkinen, J. (2010): Sudenkorennoille oma suojelualue [A nature reservation area for dragonflies]. *Crenata* 3(1): 38-39. (in Finnish) ["Finnish Dragonfly Society has started a project, which aims for a nature reservation area for dragonflies. Fundraising has already begun. When enough money has been collected, a bog with a good dragonfly fauna will be bought and then protected." (Asmus Schröter)] Address: Mäkinen, J. E-mail: makisenjussi@gmail.com

**9856.** Mäkinen, J.; Koskinen, J.; Tuohimaa, J. (2010): Sudenkorentokatsaus 2009 [Dragonfly review 2009]. *Crenata* 3(1): 8-33. (in Finnish with English summary) ["This article presents the most interesting dragonfly records from Finland in 2009. For each observed species the following information is presented: first and last records of the summer, greatest sums and northernmost records. Seven new provincial records were made: *Coenagrion lunulatum* was found for the first time in Keski-Pohjanmaa, *Aeshna crenata* in Pohjois-Savo, *Aeshna viridis* and *Orthetrum coerulescens* in

Uusimaa, *Orthetrum cancellatum* in Pohjois-Karjala and *Leucorrhinia albifrons* in Pohjois-Pohjanmaa. A map of Finnish biogeographical provinces is shown in the end of the article. Table 1 presents the total number of records of each species, as well as their rankings between 2007 and 2009. Most of the records for this article were gathered from Hatikka database ([www.hatikka.fi](http://www.hatikka.fi)). The records were made by 104 observers. Their names (abbreviations are used for the members of the Finnish Dragonfly Society) are presented in the end of the article." (Authors)] Address: Mäkinen, J. E-mail: [makisenjussi@gmail.com](mailto:makisenjussi@gmail.com)

**9857.** Magoba, R.N.; Samways, M.J. (2010): Recovery of benthic macroinvertebrate and adult dragonfly assemblages in response to large scale removal of riparian invasive alien trees. *Journal of Insect Conservation* 14(6): 627-636. (in English) ["Invasive alien organisms can impact adversely on indigenous biodiversity, while riparian invasive alien trees (IATs), through shading of the habitat, can be a key threat to stream invertebrates. We ask here whether stream fauna can recover when the key threat of riparian IATs is removed. Specifically, we address whether IAT invasion, and subsequent IAT removal, changes benthic macroinvertebrate and adult dragonfly assemblages, for the worse or for the better respectively. Natural riparian zones were controls. There were statistically significant differences between stream reaches with natural, IAT-infested and IAT-cleared riparian vegetation types, based on several metrics: immature macroinvertebrate taxon richness, average score per macroinvertebrate taxon (ASPT), a macroinvertebrate subset (Ephemeroptera, Plecoptera, Trichoptera and Odonata larvae; EPTO), and adult dragonfly species richness. Reaches with natural vegetation, or cleared of IATs, supported greater relative diversity of macroinvertebrates than reaches shaded by dense IATs. Greatest macroinvertebrate ASPT and EPTO were in reaches bordered by natural vegetation and those bordered by vegetation cleared of IATs, and the lowest where the riparian corridor was IATs. Highest number of adult dragonflies species was along streams cleared of dense IATs. Overall, results showed that removal of a highly invasive, dense canopy of alien trees enables recovery of aquatic biodiversity. As benthic macroinvertebrate scores and adult dragonfly species richness are correlated and additive, their combined use is recommended for river condition assessments." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: [samways@sun.ac.za](mailto:samways@sun.ac.za)

**9858.** Maltchik, L.; Stenert, C.; Bender Kotzian, C.; Marques Pires, M. (2010): Responses of odonate communities to environmental factors in southern Brazil wetlands. *Journal of the Kansas Entomological Society* 83(3): 208-220. (in English, with Portuguese summary) ["Odonate larvae play an important role in wetland systems, providing food for many fish species and birds. Besides, they are important predators in these ecosystems. However, studies of factors that determine odonate species richness and distribution in wetlands are scarce in the Neotropical region. The objectives of this study were to: 1) conduct a survey of the diversity of odonate larvae in southern Brazil wetlands, and 2) determine how much variation in odonate richness, abundance and composition is explained by wetland area, altitude, water conductivity and nitrate, hydroperiod, and dominant aquatic vegetation in 140 wetlands in

an extensive area of the Neotropical region (280,000 km<sup>2</sup>, southern Brazil). A total of 4,039 individuals distributed among five families and 28 genera were collected. Libellulidae, Coenagrionidae and Aeshnidae were the families that showed the greatest richness. *Erythrodiplax* was observed in more than 70% of the sampled wetlands, and comprised 61% of individuals collected. Richness was negatively associated with wetland area and nitrate concentration. Odonate abundance was negatively associated with water conductivity and nitrate, and it was higher in aquatic beds than in emergent wetlands. Richness and abundance were higher in permanent than in intermittent wetlands. Variation in odonate composition was correlated with wetland altitude, area and water conductivity. Hydroperiod and dominant aquatic vegetation also influenced composition. Our results showed that southern Brazil wetlands are important habitats for 28 odonate genera, and that richness, abundance and composition are influenced mainly by hydroperiod, nitrate, and aquatic vegetation type. These results should be seen as important to determine the environmental factors that shape and maintain odonate diversity in southern Brazil wetlands." (Authors)] Address: Maltchik, L., Laboratório de Ecologia e Conservação de Ecossistemas Aquáticos, Universidade do Vale do Rio dos Sinos, UNISINOS, Av. Unisinos, 950, CEP 93022-000, Sao Leopoldo, Rio Grande do Sul, Brasil. E-mail: [maltchik@unisinos.br](mailto:maltchik@unisinos.br)

**9859.** Marrocco, J.; Demasi, L.; Venkataraman, S. (2010): Investigating the structural dynamics implication of flexible resilin joints on dragonfly wings. San Diego State University Access proceedings 10-09: 6 pp. (in English) ["The practical application of relatively small, light weight micro air vehicles by biomimicry is of great interest to the engineering community. The goal of this research project is to improve the understanding of the structural construction of insect wings. A dragonfly insect has been chosen, as it has a very revealing structure and is an insect that has unique flight capabilities. Dragonfly wings are able to withstand the forces imposed upon them by the surrounding air, inertial forces caused by acceleration and decelerating their own weight. The basic design of a dragonfly wing is a pleated membrane stiffened by tubes at the apexes of the pleats, forming a particularly rigid and strong structure. This tubular pleated membrane provides a stiff structure along the length (span wise) direction of the wing and a flexible structure along the width (chord wise direction) of the wing. The tailoring flexibility in the wing is essential as it can play significant role in the aerodynamics wing airfoil shape it can achieve, in addition to the benefits of gust alleviations, and damage tolerance. The investigation into the material composition and architecture on the dragon fly wings revealed that while a large part of the wing structure is made of chitin protein, there is a regular pattern of joints on the wing made of less stiffer resilin protein. The focus of this effort is to understand the effect and implications of the resilin joints on the structural dynamics of the wing. To achieve this goal a finite element structural analysis tool has been used and a detailed model of the dragonfly wing was created. Main focus of the present analysis is to understand how the presence of flexible resin joints affects the natural vibration and mode shapes of the dragonfly wing." (Authors)]; <http://www.csrc.sdsu.edu/csrc/access/reports/AP10-09.pdf>] Address: Marrocco, J., Department of Biology, Department of Aerospace Engineering and Engi-



neering Mechanics, San Diego State University, USA.  
E-mail: JosephMarrocco@yahoo.com

**9860.** Martens, A.; Hazevoet, C.J. (2010): Dragonflies (Insecta, Odonata) of São Vicente, Cape Verde Islands: 10 species on a desert island. *Zoologia Caboverdiana* 1 (2): 112-115. (in English) [Records of the following species are documented and briefly discussed: *Lestes pallidus*, *Ischnura senegalensis*, *Anax ephippiger*, *A. imperator*, *Crocothemis erythraea*, *Orthetrum trinacria*, *Pantala flavescens*, *Sympetrum fonscolombii*, *Tramea limbata*, *Trithemis annulata*, and *Zygonyx torridus*.] Address: Hazevoet, C.J., Instituto de Investigação Científica Tropical - Jardim Botânico Tropical, Unidade de Zoologia, Rua da Junqueira 14, 1300-343 Lisboa, Portugal

**9861.** Martens, A. (2010): Ecology of the dragonflies at the westernmost spot of Africa, the island of Santo Antão, Cape Verde (Odonata). *International Journal of Odonatology* 13(2): 241-254, pl. IVa. (in English) ["From 12 to 25 August 2009, the odonate fauna of Santo Antão, Cape Verde was surveyed by recording adults and collecting larvae and exuviae at 26 localities, mostly situated in the northwest of the island. Based on the results of this survey and literature data on the Cape Verde it appears that the resident odonate fauna consists of only five species, namely *Anax imperator*, *Crocothemis erythraea*, *Orthetrum trinacria*, *Trithemis annulata* and *Zygonyx torridus*. Three additional species, *Anax ephippiger* and *Pantala flavescens*, which were recorded as single adults in this study, and *Sympetrum fonscolombii*, which was previously recorded in another study, represent seasonal invaders that do not establish permanent populations on the island. Surprisingly, there is no zygopteran species recorded from the island, although a few occur on the neighbouring islands. The breeding habitats of the resident odonates on the island comprise short perennial stream sections in large wadi beds ('ribeiras') that are intensely used for agriculture, as well as artificial irrigation tanks. The odonate assemblage is very uniform, although *Z. torridus* prefers micro-habitats with flowing water and *O. trinacria* is found only in micro-habitats with fine sediments. In the absence of fish, crabs and large water beetles, the larva of *A. imperator* appears to be the top predator in freshwater habitats." (Author)] Address: Martens, A., University of Education Karlsruhe, Bis-marckstraße 10, 76133 Karlsruhe, Germany. E-mail: martens@ph-karlsruhe.de

**9862.** Matthews, J. (2010): Anthropogenic climate change impacts on ponds: a thermal mass perspective. *BioRisk* 5: Special issue: Monitoring climatic change with dragonflies: 193-209. (in English) ["Small freshwater aquatic lentic systems (lakes and ponds) are sensitive to anthropogenic climate change through shifts in ambient air temperatures and patterns of precipitation. Shifts in air temperatures will influence lentic water temperatures through convection and by changing evaporation rates. Shifts in the timing, amount, and intensity of precipitation will alter the thermal mass of lentic systems even in the absence of detectable ambient air temperature changes. These effects are likely to be strongest in ponds (standing water bodies primarily mixed by temperature changes than by wind), for whom precipitation makes up a large component of inflows. Although historical water temperature datasets are patchy for lentic systems, thermal mass effects are likely to outweigh impacts from ambient air temperatures in

most locations and may show considerable independence from those trends. Thermal mass-induced changes in water temperature will thereby alter a variety of population- and community-level processes in aquatic macroinvertebrates." (Authors) This review includes data on Odonata.] Address: Matthews, J.H., University of Texas, Section of Integrative Biology, Austin, USA. E-mail: johoma@gmail.com

**9863.** Mauersberger, R. (2010): *Leucorrhinia pectoralis* can coexist with fish (Odonata: Libellulidae). *International Journal of Odonatology* 13(2): 193-204. (in English) ["The Palaearctic libellulid *Leucorrhinia pectoralis* is generally considered to be a species inhabiting fish-free water bodies. Yet, a long-term monitoring study of 38 water bodies in NE Germany resulted in 16 species of fish being recorded in reproductive habitats of *L. pectoralis*, with *Rutilus rutilus* and *Carassius carassius* as the most numerous and widespread fish species. Only 14 water bodies were certainly or probably without fish. The seasonal numbers of exuviae of *L. pectoralis* at the water bodies ranged between 0.1 and 136 per 10 m of bank section. The abundance of *L. pectoralis* was higher in fish-free water bodies (an average of 28.0 exuviae/10 m) than in fish-inhabited waters (1.7 exuviae/10 m). The emergence success of *L. pectoralis* depended on the density and species composition of the fish. If only one non-piscivorous fish species (*Carassius carassius*, *Tinca tinca*) was present at low density, the abundance of exuviae averaged 6.5/10 m. In water bodies containing a multispecies fish fauna that included piscivorous species, combined with high fish density only 0.7 exuviae/10 m were found on average. At localities where the fish fauna was dominated by *Perca fluviatilis* virtually no emergence of *L. pectoralis* occurred." (Author)] Address: Mauersberger, R., Prenzlauer Allee 66, 17268 Templin, Germany. E-mail: rue.mau@web.de

**9864.** Mauersberger, R.; Bukowsky, N. (2010): Moor-Wiedervernässung als Maßnahme zur Grundwasseranreicherung und Hochwasserableitung - Praxisbeispiel aus dem Naturpark Uckermärkische Seen. *Naturschutz und Landschaftspflege in Brandenburg* 19(3/4): 167-169. (in German) [The revitalisation of two bogs in Brandenburg, Germany resulted in a significant increase in population density of *Aeshna viridis* and *Leucorrhinia pectoralis*. No details are given.] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-mail: FoerderevereinUeckermark.Seen@t-online.de

**9865.** Mauersberger, R.; Gunnemann, H.; Rowinsky, V.; Bukowsky, N. (2010): Das Mellenmoor bei Lychen - ein erfolgreich revitalisiertes Braunmoosmoor im Naturpark Uckermärkische Seen. *Naturschutz und Landschaftspflege in Brandenburg* 19(3/4): 182-186. (in German) [Brandenburg, Germany; the revitalisation of the intermediate bog resulted in local range extensions and population increase of several Odonata, including the rare *Leucorrhinia pectoralis*.] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-mail: FoerderevereinUeckermark.Seen@t-online.de

**9866.** Mbabazi, D.; Makanga, B.; Orach-Meza, F.; Hecky, R.E.; Baliwa, J.S.; Ogutu-Ohwayo, R.; Verborg, P.; Chapman, L.; Muhumuza, E. (2010): Intra-lake stable isotope ratio variation in selected fish species and their possible carbon sources in Lake Kyoga (Uganda): implications for aquatic food web studies. *African Journal of Ecology* 48(3): 667-675. (in English, with French summary) ["The stable isotopes of nitrogen ( $\delta^{15}\text{N}$ ) and

carbon ( $\delta^{13}\text{C}$ ) provide powerful tools for quantifying trophic relationships and carbon flow to consumers in food webs; however, the isotopic signatures of organisms vary within a lake. Assessment of carbon and nitrogen isotopic signatures in a suite of plants, invertebrates, and fishes in Lake Kyoga, indicated significant variation between two sites for  $\delta^{13}\text{C}$  (paired  $t = 6.305$ ;  $df = 14$ ,  $P < 0.001$  and  $\delta^{15}\text{N}$  paired  $t = 1.292$ ;  $df = 14$ ;  $P < 0.05$ ). The fish fauna in Bukungu was generally more  $\delta^{13}\text{C}$  enriched (mean  $\delta^{13}\text{C} = -16.37 \pm 1.64\text{‰}$ ) than in Iyingo (mean  $\delta^{13}\text{C} = -20.80 \pm 2.41\text{‰}$ ) but more  $\delta^{15}\text{N}$  depleted (mean  $\delta^{15}\text{N} = 5.57 \pm 0.71\text{‰}$ ) than in Iyingo (mean  $\delta^{15}\text{N} = 6.92 \pm 0.83\text{‰}$ ). The simultaneous shifts in phytoplankton and consumer signatures confirmed phytoplankton as the major source of carbon for the food chain leading to fish. Limited sampling coverage within lakes may affect lake wide stable isotope signatures, and the same error is transferred into trophic position estimation. Consideration of potential intra-lake spatial variability in isotope ratios and size is essential in evaluating the spatial and trophic structure of fish assemblages." (Authors) Odonata are treated at the order level.] Address: Mbabazi, D., National Fisheries Resources Research Institute, PO Box 343, Jinja, Uganda. E-mail: mbabazidismas@yahoo.com

**9867.** McHugh, E.S. (2010): The northward extension and new county records of five Kansas dragonflies. *Argia* 22(4): 8-9. (in English) [During the 2010 field season *Libellula deplanata*, *Tramea carolina*, *Celithemis fasciata*, *Dythemis fugax*, and *D. velox* were found further north in Kansas than had been previously reported.] Address: Earl S. (Mick) McHugh DDS, Kansas City, USA. E-mail: Emchugh2@kc.rr.com

**9868.** Miller, F.P.; Vandome, A.F.; Mcbrewster, J. (2010): Dragonfly: Odonata, Epiprocta, Eye, Damselfly, Insect, Insect Wing, Predation, Mosquito, Fly, Bee, Ant, Butterfly, Wetland, Larva, Nymph (Biology). Alphascript Publishing. ISBN: 6130601638: 168 pp. (in English) [Articles taken from Wikipedia (focusing on Odonata), poorly arranged (e.g. very small letter types), and sold for maximum profit purposes. Before buying this book, you should order a display copy.]

**9869.** Mollov, I.; Boyadzhiev, P.; Donev, A. (2010): Trophic role of the Marsh frog *Pelophylax ridibundus* (Pallas, 1771) (Amphibia, Anura) in the aquatic ecosystems.. *Bulgarian Journal of Agricultural Science* 16(3): 298-306. (in marsh frog, diet, trophic spectrum, niche breadth, South Bulgaria) ["During our study we identified 1356 prey items, divided in 64 prey categories in the trophic spectrum of *Pelophylax ridibundus* from the surrounding of Skutare Village (Plovdiv District, South Bulgaria). The average number of prey items per stomach for all studied seasons is as follows: spring 1994 - 11.93 (SD=18.31); autumn 1994 - 9.65 (SD=13.44); spring 1995 - 11.84 (SD=16.34) and totally - 11.49 (SD =38.67). The most important prey category for the whole period of study is Coleoptera (31.93%), followed by Diptera (27.65%) and Hymenoptera (13.42%)." (Authors) Odonata, mainly Zygoptera contributed with 3% to the prey items.] Address: Mollov, I., Univ. of Plovdiv "Paisii Hilendarski", Faculty of Biology, Department of Ecology and Environmental Conservation, 4000 Plovdiv, Bulgaria. E-mail: mollovi@yahoo.com

**9870.** Monroe, E.M.; Lynch, C.; Soluk, D.A.; Britten, H.B. (2010): Nonlethal tissue sampling techniques and microsatellite markers used for first report of genetic di-

versity in two populations of the endangered *Somatochlora hineana* (Odonata: Corduliidae). *Annals of the Entomological Society of America* 103(6): 1012-1017. (in English) ["Techniques for obtaining DNA noninvasively or nonlethally are highly desirable in molecular genetic studies of protected species, and several advances have been made in these types of sampling and extraction techniques. Insects present a unique set of difficulties in this regard that are not present when working with most vertebrates. This study evaluated the effectiveness of several nonlethal sampling techniques for larval and adults of the federally listed endangered dragonfly *Somatochlora hineana*. Fecal pellets and shed exuviae from captive *S. hineana* larvae did not provide high enough quality DNA for microsatellite analyses. Invasive, but nonlethal, wing clips from adults and tarsi from larvae provided high-quality DNA that amplified 10 microsatellite markers for this species. Ten loci were polymorphic in 94 specimens with four to 14 alleles per locus. Two populations in WI had average observed heterozygosity of 0.47, which is within the range reported for other odonates. Our sampling techniques and these new microsatellite markers provide an essential tool for determining the genetic structure of *S. hineana* populations throughout its range." (Authors)] Address: Monroe, Emy, Department of Biology, University of South Dakota, 414 E. Clark Avenue, Vermillion, SD 57069, USA. E-mail: emy.monroe@usd.edu.

**9871.** Morimoto, M.; Yamamura, Y.; Watanabe, M. (2010): Conservation ecology of the brackish water damselfly, *Mortonagrion Hirosei* Asahina: Dynamics of a newly established reed community (Zygoptera: Coenagrionidae). *Odonatologica* 39(4): 333-340. (in English) ["The endangered *M. Hirosei* perches in the understory of dense reed communities in brackish water. To aid the conservation of a population, a new reed community (2110 m<sup>2</sup>) was established in abandoned rice paddy fields adjacent to the original, threatened community (500 m<sup>2</sup>) by transplanting reed rhizomes in January 2003; brackish water was supplied to the new community. It was assessed whether the new community developed into a suitable habitat for *M. Hirosei* by comparing it to the original community in 2005. Shoot height, density, and aboveground biomass of the reeds and relative light intensity in the community were measured periodically during the growing season. Reed height and biomass were significantly lower in the new community than in the original one. This suggests that 3 yr after transplantation the new community was still underdeveloped. However, shoot density and relative light intensity in the understory were not significantly different between the two communities. Thus, the new reed community was offered in 2005 to *M. Hirosei* adults as a suitable habitat." (Authors)] Address: Yamamura, Y., College of Science, Ibaraki University, Mito, Ibaraki 310-8512, Japan. E-mail: yama@mx.ibaraki.ac.jp

**9872.** Mousat, F.; Dumont, H.J.; Karrom, M.; Ali, N.M. (2010): Dragonflies from northern Syria (Insecta: Odonata). *Zoology in the Middle East* 51: 105-112. (in English) ["Nineteen stations distributed across the northern part of Syria were inventoried for dragonflies between 2006 and 2010. About 37 species were recorded, and four species are added to the list of known Syrian species. Because of a generalized decrease in the water quality of Syrian rivers, and an increasing number of rivers falling dry, lotic species such as the calopterygids have suffered and the remaining populations have be-

come reduced to disjunct islands. *Calopteryx splendens hyalina*, once extending from Lake Hula to the Wadi Af-rin, now appears to have become extinct in the Orontes valley, and only survives in few short Syrian coastal rivers." (Authors)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@ugent.be

**9873.** Müller, G.A.; Name, F.T.; Pacheco, F.C.L.; Marcondes, C.B. (2010): Analysis of an alternative method for the study of bromeliad-associated fauna in plants with different foliar organization. *Anais da Academia Brasileira de Ciências* 82(4): 903-906. (in English, with Portuguese summary) ["The efficiency of an alternative method of collection (by suction of water) for the study of Culicidae and Chironomidae (Diptera), Scirtidae (Coleoptera) and Coenagrionidae (Odonata; Leptagrion sp1 and sp2) in bromeliads with different foliar architecture in a restinga at Florianópolis, SC, Brazil, was studied. The alternative method was less efficient to collect Culicidae and Chironomidae (Wilcoxon test  $p < 0.05$ ) and was more efficient to Scirtidae and Coenagrionidae (Wilcoxon test  $p > 0.05$ ) from *Aechmea lindenii*. This method was less efficient to collect insects of all groups from *Vriesea friburgensis* (Wilcoxon test  $p < 0.05$ ). The alternative method was efficient to estimate the diversity of these insects in both species of bromeliads. The higher mobility of immature forms of beetles and dragonflies, and the availability of only one tank in *Aechmea lindenii*, contrasting to several tanks in *Vriesea friburgensis* that help the suction of these immature, probably influenced the results, which indicated that the suction method should not replace the dismantling in the study of Culicidae and Chironomidae. This method can be useful to get immature forms of Scirtidae and Coenagrionidae in one-tank bromeliads." (Authors)] Address: Müller, G.A., Departamento de Zoologia, Setor de Ciências Biológicas, Universidade Federal do Paraná Caixa Postal 19020, Centro Politécnico, 81531-980 Curitiba, PR, Brasil

**9874.** Müller, J. (2010): Dr. rer. nat. Wolfgang Zimmermann zum 75. Geburtstag. *Entomologische Nachrichten und Berichte* 54(3/4): 271-274. (in German) [Wolfgang Zimmermann is one of the leading limnologists - with focus on Ephemeroptera and Odonata - in Thüringen, Germany. For several decades he was and is involved in many odonatological activities. The paper compiles milestones in his professional and voluntary life, and adds an updated bibliography.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**9875.** Muzon, J.; Spinelli, G.R.; Rossi, G.C.; Marino, P.I.; Diaz, F.; Melo, C. (2010): Nuevas citas de insectos acuáticos para la Meseta de Somuncurá, Patagonia, Argentina. *Rev. Soc. Entomol. Argent.* 69(1-2): 111-116. (in Spanish, with English summary) [Total of 12 Odonata species have been recorded on the Somuncurá plateau (Argentinean Patagonia). Six of them (*Andinagrion peterseni*, *Rhionaeschna absoluta*, *R. variegata*, *Progomphus joergenseni*, *Dasythemis mincki clara*, and *Erythrodiplax atroterminata*) are listed.] Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina. E-mail: muzon@ilpla.edu.ar

**9876.** Nagy, H.B. (2010): Population dynamics of *Libellula fulva* Müller, 1764 in the lowland creeks of landscape Bihari-sík. PhD-thesis, University of Debrecen: VIII, 113 pp. (in Hungarian, with English summary)

[Hungary; "In quantitative ecology few invertebrates are better study targets than dragonflies and damselflies. Dragonflies were used as model organisms in the development of mark-recapture methods, because their study yielded in a relatively short period large amount of data. I carried out my studies on two sites located near two lowland creeks, in the Bihar Plain, Hajdú-Bihar County, Hungary between 2002 and 2007. [...] In the first part of my dissertation I estimated the population sizes for each study day and year, for the comparison of the two populations studied at the two sites. In the second part I analysed the effect of males' density on their mating behaviour. For this analysis I determined the number of assessed matings (mating frequency) and fights (fight frequency) per individual from the daily number of matings which was divided by the daily estimated population sizes. Then I compared the mating and fight frequency in the function of the yearly population sizes between the two sites. In the third part I studied how the temperature and rainfall affected daily male density, their fight and mating habits and site fidelity. In the last part of the dissertation I analysed whether there could be a discrepancy between the body size of males in the smaller and larger populations; and whether there could be any correlation between the body size and behaviour of males. My results showed that the populations near Ártánd were significantly smaller than the populations near Bojt. The density of males did not affect their intraspecific aggression, but at higher population densities males mate less than at lower ones. In the case of the larger population the site fidelity of males decreased as compared to the smaller population. The frequencies of matings and fights showed a weak significantly positive correlation with the daily mean temperatures. The number of larger and medium sized males was higher in the site near Bojt than near Ártánd, where the frequency of larger males corresponded with the frequency of smaller ones." (Author)] Address: Nagy Beáta, Dept of Taxonomy & Ecology, Babeş-Bolyai Univ., 400006 Cluj Napoca, Clinicilor str. 5-7, Romania. E-mail: nagy.beata@gmail.com

**9877.** Narita, S.; Pereira, R.A.S.; Kjellberg, F.; Kageyama, D. (2010): Gynandromorphs and intersexes: potential to understand the mechanism of sex determination in arthropods. *Terrestrial Arthropod Reviews* 3(1): 63-96. (in English) ["Arthropods are sexually dimorphic. An arthropod individual usually differentiates into a male or a female. With very low frequencies, however, individuals with both male and female morphological characters have repeatedly been found in natural and laboratory populations of arthropods. Gynandromorphs (i.e., sexual mosaics) are genetically chimeric individuals consisting of male and female tissues. On the other hand, intersexes are genetically uniform (i.e., complete male, complete female or intermediate in every tissue) but all or some parts of their tissues have either a sexual phenotype opposite to their genetic sex or an intermediate sexual phenotype. Possible developmental processes (e.g., double fertilization of a binucleate egg, loss of a sex chromosome or upregulation/downregulation of sex-determining genes) and causal factors (e.g., mutations, genetic incompatibilities, temperatures or endosymbionts) for the generation of gynandromorphs and intersexes are reviewed and discussed." (Authors) The paper includes a list of publications with reference to gynandromorphs in Odonata.] Address: Kageyama, D., National Institute of Agrobio-



logical Sciences, Owashi 1-2, Tsukuba, Ibaraki 305-8634, Japan. E-mail: e-mail: kagymad@aff rc.go.jp

**9878.** Nattress, B. (2010): Wing-folding behaviour in the Golden-ringed Dragonfly *Cordulegaster boltonii* (Donovan). *J. Br. Dragonfly Society* 26(2): 64-65. (in English) [26-VI-2006, Kinlochewe, Wester Ross, Scotland, UK; an observation of *C. boltonii* folding its wings over its back is reported. This behaviour is not related to bad (e.g. rainy) weather.] Address: Nattress, B., 25 West Lea Drive, Tingley, Wakefield, West Yorks. WF3 1DH, UK

**9879.** Nedjah, R.; Bouchecker, A.; Samraoui, F.; Menai, R.; Alfarhan, A.; Al-Rasheid, K.A.S.; Samraoui, B. (2010): Breeding ecology of the Purple Heron *Ardea purpurea* in Numidia, north-eastern Algeria. *Ostrich* 81(3): 189-196. (in English) ["During 2002-2007, we assessed the status of the Purple Heron *Ardea purpurea* in Numidia, Algeria by surveying all the major wetlands in the region. We located six distinct breeding sites; four of these were not previously known. We also investigated nest site selection and determined the species' reproductive success at Dakhla, a dunary pond during two successive years (2006 and 2007). The egg laying period was comparable to that reported for southern Europe (March-May) and a seasonal change of breeding success was recorded. A growth curve was derived for developing nestlings and the impact of an ectoparasite (mite) infestation upon nestling's growth was considered. We also examined 73 food boluses regurgitated by nestlings and identified 329 prey items. Fish, mainly *Gambusia holbrooki* and *Cyprinus carpio*, dominated by mass, whereas insects, mainly aquatic Coleopteran larvae and aeshnids (Odonata), were the most frequent prey (67.1%). Loss of habitat is identified as a major threat to the future of colonial herons in Algeria." (Authors)] Address: Nedjah, R., Laboratoire de Recherche et de Conservation des Zones humides, Dept de Biologie, University of Guelma, Guelma, Algeria

**9880.** Nel, A.; DePalma, R.A.; Engel, M.S. (2010): A possible hemiphlebiid damselfly in late cretaceous amber from South Dakota (Odonata: Zygoptera). *Transactions of the Kansas Academy of Science* 113(3&4): 231-234. (in English) ["The first damselfly in Late Cretaceous amber from South Dakota is described and figured. The specimen preserves the forewing apex of a possible hemiphlebiid, a group of relict damselflies today that were apparently widespread and diverse during the Cretaceous." (Authors)] Address: DePalma, R.A., Division of Vertebrate Paleontology, Natural History Museum, and Department of Geology, 1475 Jayhawk Boulevard, University of Kansas, Lawrence, Kansas 66045-7613, USA. E-mail: paleogen@aol.com

**9881.** North East Scotland Biological Records Centre (2010): Dragonflies and Damselflies: a distributional atlas for Aberdeenshire, Aberdeen City, Moray and the Cairngorms 1900-2008. North East Scotland Biological Records Centre: II, 44 pp. (in English) ["This colourful A5 booklet is an interesting new addition to the growing range of county dragonfly atlases. It differs from many in not being the result of a specific survey or driven by key individuals; rather it is essentially a 'summary statement' of all the dragonfly records from the region that are currently held on the National Biodiversity Network (NBN) database, and is dedicated to the International Year of Biodiversity. There is a brief introduction to dragonflies and to recording, then for each species

there follows a short summary of identification features and habitat preference, a detailed flight period diagram based on local data, a summary map of past/present national distribution, and a detailed (1km grid square resolution) map of local distribution that also shows key geographical features. Records are assigned either to 'confirmed breeding' or to 'presence', but are not subdivided by time period due to the scarcity of information from many areas — a familiar problem for much of Scotland, though this is gradually being overcome. There are several strengths to this book and relatively few errors or omissions, most of which arise out of the need for succinctness. Unfortunately the photograph illustrating a female *Sympetrum striolatum* is a *S. danae*. In the section on *Aeshna caerulea* the authors could have been more strongly dismissive of erroneous English records that have somehow recently appeared in the NBN database, though this fortunately doesn't affect their own regional treatment. This publication serves both as a statement of the known biodiversity of Odonata in northeast Scotland, and more importantly as an incentive for further study. It is a well-produced and professional example of what can be done with modern data handling and publishing packages, and I would strongly recommend it to all dragonfly-watchers who are ever likely to visit the Aberdeenshire area, or who have an interest in Scotland in general." (taken from: Adrian Parr, *Atropos* 41: 48-49, 2010)] Address: Available free from NESBReC whilst stocks last. Send a self-addressed A5 envelope with 81 p stamp to NESBREC, Room G29, University of Aberdeen, 23 St Machar Drive, Aberdeen, AB24 3RY, UK

**9882.** Oertli, B. (2010): The local species richness of dragonflies in mountain waterbodies: an indicator of climate warming? *BioRisk* 5: Special issue: Monitoring climatic change with dragonflies: 243-251. (in English) ["With climate warming, many Odonata species are extending their geographical area. In Switzerland, as in many parts of the world, this phenomenon may lead to a regional increase in species richness. The local richness (the richness of individual waterbodies) is also expected to increase, particularly in the alpine or subalpine areas where the waterbodies are particularly species-poor. Based on the species richness recorded in 109 waterbodies scattered all across Switzerland, a model is presented here relating the local species richness (adult dragonflies) to environmental variables, including the mean annual air temperature. This model predicts a sharp increase in species richness for alpine or subalpine waterbodies, which is expected to double or even treble before the end of this century. This increase would mainly be the consequence of the immigration of eurythermal species extending their geographical range, together with potential local extinctions of the cold stenothermal species." (Author)] Address: Oertli, B., University of Applied Sciences Western Switzerland, École d'Ingénieurs HES de Lullier, 150 route de Presinge, CH-1254 Jussy / Geneva, Switzerland. E-mail: beat.oertli@hesge.ch

**9883.** Offenberger, M. (2010): Libellen auf Fernreise. Fliegen die Insekten jedes Jahr 18 000 Kilometer von Indien nach Afrika und zurück? *Süddeutsche Zeitung* 25/7/2010: 22. (in German) [This report in a nationwide German newspaper is based on Anderson, R.C. (2009): Do dragonflies migrate across the western Indian Ocean? *Journal of Tropical Ecology* 25(4): 347-358.] Address: Offenberger, Monika

**9884.** Olberg, R.M. (2010): Insect Optic Glomeruli: exploration of a universal circuit for sensorimotor processing. Air Force Office of Scientific Research, 875 N. Randolph Street, Room 31 I 2, Arlington., VA 22203-1768. Contract No.: AFRL-SR-AR-TR-10-0109: 33 pp. (in English) ["Electrophysiological investigations of dragonfly target-selective descending neurons yielded the following findings: (1) Outdoor experiments with 2 families of dragonflies with different prey capture strategies (*Aeshna canadensis* and *Pachydiplax longipennis*) revealed family-specific differences in the receptive fields. (2) Real objects moving in 3 dimensions elicited greater responses to nearby small objects than predicted from responses to images on a flat visual display. (3) Outdoor experiments and experiments with expanding images on a flat display revealed looming-object preference of 2 TSDNs, which appear to predict time-to-contact. (4) TSDNs showed extremely high spike rates with the raised body temperatures (30°-35°C) seen in naturally behaving dragonflies. (5) Two TSDNs were tuned to looming objects, coding for time-to-contact. (6) Two TSDNs were identified whose spikes carry predictive information about future object position. Investigation of flight behavior revealed that take-off direction is a linear function of the prey's angular velocity 28 ms before takeoff. Collaboration with Dr. Anthony Leonardo (HHMI-JFRC) led to development of a flight arena, a chronic electrode implantation technique, and a miniature telemetry chip, paving the way for wireless recording of TSDN activity during prey interception." (Author)] Address: Olberg, R.M., Department of Biological Sciences, Union College, Schenectady, NY 12308, USA. E-mail: olbergr@union.edu

**9885.** Orr, A.G.; Ngiam, R.W.J.; Leong, T.M. (2010): The larva of *Tetracanthagyna plagiata*, with notes on its biology and comparisons with congeneric species (Odonata: Aeshnidae). *International Journal of Odonatology* 13(2): 153-166, pl. la. (in English) ["The F stadium larva of both sexes of *Tetracanthagyna plagiata* is described and figured based on exuviae from which confirmed adult specimens had been reared. Larvae were originally collected in small, slow forest streams in Singapore, and in captivity were fed on local shrimp and small fish species. The known larvae of *Tetracanthagyna* species, *T. degorsi*, *T. plagiata* and *T. waterhousei* are compared and characters for separating the three species are tabled and figured. *T. plagiata* larvae reared in captivity exhibited obligate ambush predation and ballistic defaecation." (Authors)] Address: Orr, A.G., Griffith, School of the Environment, Griffith University, Nathan, Q4111, Australia. E-mail: agorr@bigpond.com

**9886.** Orrock, J.L.; Dill, L.M.; Sih, A.; Grabowski, J.H.; Peacor, S.D.; Peckarsky, B.L.; Preisser, E.L.; Vonesh, J.R.; Werner, E.E. (2010): Predator effects in predator-free space: the remote effects of predators on prey. *The Open Ecology Journal* 3: 22-30. (in English) ["Predators can have remote effects on prey populations that are connected by migration (i.e. prey metapopulations) because predator-mediated changes in prey behavior and abundance effectively transmit the impact of predators into predator-free prey populations. Behavioral changes in prey that might give rise to remote effects are altered rates of migration or activity in the presence of predation risk (called non-consumptive effects, fear- or  $\mu$ -driven effects, and risk effects). Changes in prey abundance that may result in remote effects arise from changes in prey density due to direct predation (i.e.

consumptive effects, also called N-driven effects and predation effects). Remote effects provide a different perspective on both predator-prey interactions and spatial subsidies, illustrating how the interplay among space, time, behavior, and consumption generates emergent spatial dynamics in places where we might not expect them. We describe how strong remote effects of predators may essentially generate "remote control" over the dynamics of local populations, alter the persistence of metapopulations, shift the importance of particular paradigms of metacommunity structure, alter spatial subsidies, and affect evolutionary dynamics. We suggest how experiments might document remote effects and predict that remote effects will be an important component of prey dynamics under several common scenarios: when predators induce large changes in prey dispersal behavior, when predators dramatically reduce the number of prey available to disperse, when prey movement dynamics occur over greater distances or shorter timescales than predator movement, and when prey abundance is not already limited by competitors or conspecifics." (Author) The paper also includes references to Odonata.] Address: Orrock, J.L., Department of Zoology, University of Wisconsin, Madison, WI, 53706, USA. E-mail: jorrock@wisc.edu

**9887.** Ott, J. (2010): Zur aktuellen Situation der Moorlibellen im «Pfälzerwald» – wie lange können sie sich in Zeiten des Klimawandels noch halten?. *Annales scientifiques de la réserve de Biosphère transfrontalière Vosges du Nord-Pfälzerwald* 15 (2009-2010): 123-139. (in German, with French and English summary) ["In this contribution, the situation is analyzed with regard to mire dragonflies in the German part of the Pfälzerwald-Vosges du Nord Biosphere Reserve, in which a comparison is made between their distribution up to 2007 and their development in the past few decades. While most types of mires were still fairly widespread up until the nineteen-eighties, they have since shrunk significantly, something which is attributable to a number of causes (among other, biotope degradation). In most recent years, this regression process has been accelerated still further due to the extreme dryness in 2003 and the general climate change. Most types are now only found in isolated waters and/or have very small populations. Possible regeneration and resettlement processes are hindered by other communities, which have been established in the meantime in the water bodies, and these water bodies also have changed their structure (succession processes involving water and riverbank vegetation). The dystrophic ponds areas (FFH habitat type, Natura 2000-Code 3160) are in this context not only losing their unique features, but also their significance for the Natura 2000 network, which is very well indicated by the dragonfly coenoses." (Author)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**9888.** Ott, J. (2010): Bemerkungen zum Vorkommen von *Aeshna affinis* VANDER LINDEN, 1820, *Somatochlora arctica* (ZETTERSTEDT, 1840) und *Crocothemis erythraea* (BRULLÉ, 1832) (Insecta: Odonata: Aeshnidae, Corduliidae, Libellulidae) in Woogen des Biosphärenreservates Pfälzerwald-Vosges du Nord. *Fauna und Flora in Rheinland-Pfalz* 11(4): 1291-1310. (in German, with English summary) [The author presents the situation of *A. affinis*, *S. arctica*, and *C. erythraea* in the German part of the biosphere reserve "Palatinate forest – Northern Vosges". Whereas *S. arctica* has only

a single but stable population, *A. affinis* and *C. erythraea* show a remarkable expansion in higher altitudes and also in waters of the centre of the dense forest. Meanwhile *C. erythraea* is found indigenous even in an acidic moorland water (pH 5). Possible consequences for nature protection and the protection of the generally rare moorland dragonfly species are discussed.] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**9889.** Ott, J. (2010): Dragonflies and climatic change - recent trends in Germany and Europe. *BioRisk 5: Special issue: Monitoring climatic change with dragonflies: 253-286.* (in English) ["In this paper the trends of dragonfly expansions during the last decades in Germany and Europe are summarized. It is shown, that there is a general expansion of many species to the north: Mediterranean species expanded to Central and Northern Europe, whereas some African species expanded to Southern Europe, some are even new to the continent. In general this means an increase of biodiversity, but looking at the ecological effects, in the medium term a decrease can be expected for moorland and alpine species. Dragonflies can be regarded as a good indicator group for climatic change. Already now in some areas or regions negative effects on waters bodies and their dragonfly communities can be observed and more will occur if e.g. temperature rises or precipitation decreases. The consequences for nature conservation strategies – such as the NATURA 2000 network – are outlined and the general need for monitoring programmes is emphasised." (Author)] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**9890.** Ott, J. (2010): Die Zweigestreifte Quelljungfer - Ein typischer Pfälzer Bachdrache. *Heimatjahrbuch des Landkreises Kaiserslautern 2011: 59-60.* (in German) [Rheinland-Pfalz, Germany; this is a brief general introduction into dragonfly biology exemplified with *Cordulegaster boltonii*.] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**9891.** Owens, D.C. (2010): Seasonal variation in terrestrial insect subsidies to tropical streams and implications for the diet of *Rivulus hartii*. *Natural Resources, School of Dissertations & Theses in Natural Resources, University of Nebraska, USA: VIII, 73 pp.* (in English) [Trinidad; "Terrestrial invertebrates subsidize fish diets in lotic ecosystems. Seasonality strongly influences terrestrial invertebrate abundance in temperate regions and alters their delivery to streams. Seasonal changes in the tropics are characterized by distinct wet and dry periods, with marked variation in invertebrate abundance. However, little is known about how these seasonal changes affect invertebrate subsidies and their ecological consequences for tropical streams. We measured the effect of rainfall and canopy density on terrestrial invertebrate falling input, as well as seasonal variation in falling input, benthic and drifting invertebrate, and *Rivulus hartii* (Hart's *Rivulus*) diet composition during both the wet and dry seasons at three stream sites in Trinidad. Rates of input of terrestrial invertebrates showed seasonal trends in biomass and abundance. Rainfall magnitude and canopy density were directly correlated with falling input. The delivery of terrestrial invertebrates increased from an average of 52 mg m<sup>-2</sup> day<sup>-1</sup> to 72 mg m<sup>-2</sup> day<sup>-1</sup> from wet to dry season. Conversely, average benthic invertebrate

abundance and biomass decreased from 382 mg m<sup>-2</sup> in the dry season to 130 mg m<sup>-2</sup> in the wet season, presumably due to displacement and mortality resulting from severe flow conditions. A 75% increase in drifting invertebrate biomass was driven by a terrestrial invertebrate biomass that more than doubled during the wet season. Prey selectivity in *Rivulus* diets mirrored this seasonal variation in prey invertebrate availability, as percent composition of terrestrial invertebrate volume in *Rivulus* guts also doubled during the wet season. We conclude that terrestrial invertebrates are a substantial energetic subsidy for tropical river ecosystems, and the spatial and temporal variation in delivering these resources from wet to dry season have profound effects on consumer-resource dynamics." (Author) Macrozoobenthic taxa including Odonata are treated at the order level. This paper is posted at DigitalCommons@University of Nebraska - Lincoln. <http://digitalcommons.unl.edu/natresdiss/8>] Address: Owens, D.C., University of Nebraska at Lincoln, USA. E-mail: davidchristopherowens@yahoo.com

**9892.** Papazian, M.; Mary-Sasal, N. (2010): Description of male *Rhyothemis phyllis apicalis* Kirby, 1889 (Anisoptera: Libellulidae). *Odonatologica 39(4): 357-361.* (in English) ["The male allotype is described and illustrated from the Northern Province of New Caledonia, and compared with the *R. p. phyllis* from Thailand. The habitats of *R. p. apicalis* are described and a list of odonate species recorded during the 1999 and 2000 surveys is added." (Authors)] Address: Papazian, M., Le Constellation Bât.A, 72 Avenue des Caillols, F-13012 Marseille, France. E-mail: papazianmcm@wanadoo.fr

**9893.** Parr, A. (2010): Monitoring of Odonata in Britain and possible insights into climate change. *BioRisk 5: Special issue: Monitoring climatic change with dragonflies: 127-139.* (in English) ["The history of recording and monitoring of Odonata in Britain is briefly described. Results are then presented which suggest that the country's Odonata fauna is currently in a period of flux, in a manner consistent with the actions of a high-level regulatory factor such as climate change. The ranges of many resident species are shifting. *Leucorhinia dubia* has recently been lost from southern England, but many species are presently expanding their ranges to the north and west, some (such as *Aeshna mixta* and *Anax imperator*) with considerable speed. In addition to these changes, a number of 'southern' species have started to appear in Britain for the very first time. These include *Lestes barbarus*, *Erythromma viridulum* (which has now become a locally-common resident in southeast England), *Anax parthenope* and *Crocothemis erythraea*. In addition to these distributional changes, some recent trends in flight times are also discussed. Evidence indicates that many species are now emerging significantly earlier than in the past, though trends relating to the end of the flight period are less clear cut." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**9894.** Parr, A. (2010): Records of exotic Odonata in Britain during 2010. *Atropos 41: 39-42.* (in English) [Recent UK records of *Ischnura senegalensis* and *Crocothemis servilia* resulting from indoor fish tanks resp. aquatic plant nurseries are documented.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk



**9895.** Parr, A.J. (2010): Migrant and dispersive dragonflies in Britain during 2009. *J. Br. Dragonfly Society* 26(2): 98-107. (in English) ["The 2009 season saw major arrivals of *Sympetrum fonscolombii* during the late spring and summer, and a significant hot weather movement of many migratory/dispersive species during a short period around the end of June/early July. Other significant finds included the discovery of singleton *Lestes barbarus* at three sites on the East Anglian coast during August. The highlight of the year was, however, the discovery of large numbers of *Lestes viridis* in southeast Suffolk, under circumstances strongly suggestive of the presence of a recently-established breeding population." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**9896.** Paula, M.C.; Fonseca-Gessner, A.A. (2010): Macroinvertebrates in low-order streams in two fragments of Atlantic Forest in different states of conservation, in the State of São Paulo (Brazil). *Braz. J. Biol.* 70(3, suppl.): 899-909. (in English, with Portuguese summary) ["The presence of a riparian forest is one of the main factors that act directly on the ecology of a fluvial system, and the relation of the forest and the lotic environments might have an important influence on the distribution of the macroinvertebrates. In this context, the benthic macroinvertebrate communities in four low-order streams in São Paulo (Brazil) were analysed, with the aim of assessing the state of recovery of the surrounding forest fragments. The benthic organisms were sampled in the winter, a period of low rainfall. Of the 6,331 specimens of macroinvertebrates collected, 124 taxa belonging to 48 families were identified. The results showed greater diversity in the Canchim Farm streams and greater abundance in the Lake Park streams. Cluster analysis showed that the stream Canchim distanced itself from the others, being considered reference." (Authors) Taxa including Odonata are treated at the genus level.] Address: Paula, M.C., Programa de Pós-graduação em Ecologia e Recursos Naturais, Universidade Federal de São Carlos – UFSCar, Rod. Washington Luiz, Km 235, CP 676, CEP 13565-905, São Carlos, SP, Brazil. E-mail: marciacdp@ig.com.br

**9897.** Perez-Bilbao, A.; Alonso, A.I.; Garrido, J. (2010): Phenology of aquatic insects in a protected wetland (Natura 2000 network) in northwestern Spain. *Limnetica* 29(2): 379-386. (in English, with Spanish summary) ["The aim of this study was to gather new data about the life cycle phenologies of several species of aquatic insects in the "Gándaras de Budino" (Galicia, NW Spain) protected wetland, included in the Natura 2000 network. During an annual cycle (2004-2005), three shallow lakes and four streams were sampled monthly using a semi-quantitative sampling method. The body lengths of the larvae and nymphs of thirteen species were measured, and their life cycles were analysed. All species had univoltine or semivoltine cycles. Additionally, a possible correlation between larval and nymphal lengths and water temperature was examined. We found a significant correlation for two species: the water beetle (*Noterus laevis*) and the dragonfly (*Boyeria irene*)." (Authors) The following Odonata species have been studied: *Coenagrion mercuriale*, *C. puella*, *Pyrrhosoma nymphula*, *Calopteryx virgo*, *Boyeria irene*, *Onychogomphus uncatatus*, and (*Cordulegaster boltonii*.) Address: Pérez-Bilbao, Amaia, Department of Ecology and

Animal Biology, Faculty of Biology, University of Vigo. 36310, Vigo, Spain. Email: amaiapb@uvigo.es

**9898.** Pessacy, P.; Costa, J.M. (2010): *Epipleoneura angeloi* (Odonata: Protoneuridae), a new species from the central region of Brazil. *Zootaxa* 2721: 55-61. (in English, with Portuguese summary) [*Epipleoneura angeloi* sp. nov., is described and illustrated based on males from Mato Grosso and Goiás states, central region of Brazil.] Address: Pessacy, P., Universidad Nacional de La Patagonia "San Juan Bosco", LIESA, Sarmiento 849, 9200, Esquel, Chubut, Argentina. E-mail: pablopessacq@yahoo.com.ar

**9899.** Plotnikova, S.I. (2010): About the olfactory system of the dragonfly *Aeschna* genus. *Journal of Evolutionary Biochemistry and Physiology* 46(4): 420-421. (in English) [Original Russian Text © S. I. Plotnikova, 2010, published in *Zhurnal Evolyutsionnoi Biokhimi i Fiziologii*, 2010, Vol. 46, No. 4, p. 352. Verbatim: Strausfeldt [1] thinks that of the most essential significance in life of insect are two systems of the subesophageal ganglion — the visual and the olfactory ones. The olfactory system in dragonflies is poorly developed. However, in 17 dragonfly species [2] organs of chemical perception were observed, and later, on antennae of *Libellula depressa*, chemoreceptor celoconical sensillae were revealed [3] after which they were found to perceive some odors in imago [4]. In the *Aeshna* sp. larva, we have managed to trace the nerve from antenna to the subesophageal ganglion and to reveal on it a nodule, in which sensory fibers of antenna receptors are terminated. It has its own interneurons and the interneuron connecting this nodule with lateral protocerebrum [5]. When visiting laboratory of Invertebrate Neurophysiology of Sechenov Institute of Evolutionary Physiology and Biochemistry. Strausfeldt examined the total methylene blue-stained preparations of A.A. Zavarrin and found in neuropil of this nodule the olfactory glomerulus, which confirmed our point of view of the nodule olfactory significance. It is also to be noted that, besides, this nodule contains motor neurons of antenna muscles and that it is connected with the  $\beta$ -lobe of the mushroom body. The most interesting is connection of the nodule with aid of the interneuron with lateral protocerebrum. The cerebral branching of this interneuron is going forwards along the lateral protocerebrum and is spreading onto its significant part; the same area of lateral protocerebrum contains lateral processes of Canyon cells. Thus, there is present here the characteristic chain of the neurons that have been described by Strausfeldt [1] in other insects in the olfactory nervous system: the olfactory bulb (it corresponds to the nodule on the olfactory nerve), protocerebrum and Canyon cells in the area, in which in other insects and in the *Aeshna* imago (the Strausfeldt's preparation) there is located the mushroom body calyx. Thus, the general plan of structure of the *Aeshna* olfactory system is the same as in other insects, but its nuclei are expressed poorly. The weak development of the *Aeshna* olfactory system is compensated by development of its visual system that has not only the huge visual blades, but also unites all structures of the subsophagal ganglion. It seems that the strong development of the visual system resulted in development of the unique locomotion providing the high rate and maneuver flight allowing this ancient insect genus to survive until our time."] Address: Plotnikova, S.I., Sechenov Institute of Evolutionary Physiology and

Biochemistry, Russian Academy of Sciences, St. Petersburg, Russia. E-mail: gorelkin@iephb.ru

**9900.** Poinar, G.; Bechly, G.; Buckley, R. (2010): First record of Odonata and a new subfamily of damselfly ies from Early Cretaceous Burmese amber. *Palaeodiversity* 3: 15-22. (in English, with German summary) ["A new subfamily, genus and species of damselfly, *Palaeodisparoneura burmanica* n. gen., n. sp. (Platycnemididae; Palaeodisparoneurinae n. subfam.) is described as the first fossil odonate from Early Cretaceous Burmese amber. This fossil taxon is tentatively considered as sistergroup of Recent Disparoneurinae. The remains of a lizard in the same piece of amber suggest that the damselfly may have been targeted as prey." (Authors)] Address: Poinar, G. Jr., Department of Zoology, Oregon State University, Corvallis, OR 97331, USA: E-mail: poinarg@science.oregonstate.edu

**9901.** Popova, O.N.; Haritonov, A.Yu. (2010): Population dynamics and migration in the dragonfly *Libellula quadrimaculata* L., 1758 (Odonata, Libellulidae). *Eurasian entomological journal* 9(2): 231-238. (in Russian, with English summary) [ISEA SO RAN Biological Station near Chany Lake, Russia; Long-term data of population dynamics and spatial distribution of *L. quadrimaculata* are provided. "Counts of dragonflies, conducted from 1972 to 2009, demonstrate that *L. quadrimaculata* population size varied significantly during this period, the minimum density being 250 times lower than the maximum one (i.e. 0.04 vs 10 larval specimens per 1 m<sup>2</sup>). The population density correlates with the water supply of the region, the dragonfly numbers reaching their highest values in one or two years after a maximum water level. A mass migration in *L. quadrimaculata* which occurred in the southwestern part of the West-Siberian Plain in the Ishym River Valley, is described in detail. The reason for the mass migrations is an excessive growth in population density. As a result, a mass exodus from native habitats takes place which not only optimizes their population size but also increases the input of chemical elements and organic matter into the soil ecosystem from eutrophic water bodies." (Authors)] Address: Popova, Olga, Institut Sistemati i Zkologii Zhivotnykh, 630091 Novosibirsk, Ul. Frunse 11, Russia. E-mail: pc@eco.nsc.ru

**9902.** Radhakrishnan, V.; Zawal, A.; Ramaraju, K. (2010): First record of parasitized *Trithemis pallidinervis* (Kirby) from Tamil Nadu, India by *Arrenurus* larvae with a description of larval morphology (Anisoptera: Libellulidae; Acari: Hydrachnidia). *Odonatologica* 39(3): 243-252. (in English) ["Out of a total of 20 adult *T. pallidinervis* specimens, collected in Tamil Nadu, India, 164 larvae of *Arrenurus* sp. were found; prevalence: 57.5%, intensity: 5-12. They were attached to the mesosternum and metasternum. Their morphology is very similar to that of *A. cuspidator* and *A. maculator*, but differs by the absence of Mp1 tripartite seta, V2 seta and secondary seta in PIII 1 and the presence of secondary setae on both sides of V3 setae. They also differ from *A. maculator* by the absence of hairbrush on the base of C1 seta." (Author)] Address: Radhakrishnan, V., Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore - 641 003, Tamil Nadu, India

**9903.** Rasmussen, R.D.; Dixon, J.W. (2010): An unusual occurrence of Golden-winged Skimmer (*Libellula auripennis* Burmeister, 1839) (Anisoptera: Libellulidae) in Iowa. *Argia* 22(3): 12-13. (in English) ["On 10 July

2010 two male *L. auripennis* were observed near the Horseshoe Bend Division of the Port Louisa National Wildlife Refuge (41.1096° N, 091.0777° W) in Louisa County, Iowa." (Authors)] Address: Ryan D. Rasmussen, R.D., Muscatine Soil and Water Conservation District, 3500 Oakview Dr, Ste A, Muscatine, Iowa 52761, E-mail: ryan.rasmussen@ia.nacdn.net

**9904.** Ratti, J.; Vachtsevanos, G. (2010): A biologically-inspired micro aerial vehicle. Sensing, modeling and control strategies. *Journal of Intelligent and Robotic Systems* 60(1): 153-178. (in English) ["This paper introduces a novel framework for the design, modeling and control of a Micro Aerial Vehicle (MAV). The vehicle's conceptual design is based on biologically-inspired principles and emulates a dragonfly (Odonata-Anisoptera). We have taken inspiration from the flight mechanism features of the dragonfly and have developed indigenous designs in creating a novel version of a Flapping Wing MAV (FWMAV). The MAV design incorporates a complex mechanical construction and a sophisticated multi-layered, hybrid, linear/non-linear controller to achieve extended flight times and improved agility compared to other rotary wing and FWMAV Vertical Take Off and Landing (VTOL) designs. The first MAV prototype will have a ballpark weight including sensor payload of around 30 g. The targeted lifting capability is about twice the weight. The MAV features state of the art sensing and instrumentation payload, which includes integrated high-power on-board processors, 6DoF inertial sensors, 3DoF compasses, GPS, embedded camera and long-range telemetry capability. A 3-layer control mechanism has been developed to harness the dynamics and attain complete navigational control of the MAV. The inner-layer is composed of a 'quad hybrid-energy controller' and two higher layers are at present, implementing a linear controller; the latter will be replaced eventually with a dynamic adaptive non-linear controller. The advantages of the proposed design compared to other similar ones include higher energy efficiency and extended flight endurance. The design features elastic storage and re-use of propulsion energy favouring energy conservation during flight. The design/modeling of the MAV and its kinematics & dynamics have been tested under simulation to achieve desired performance. The potential applications for such a high endurance vehicle are numerous, including air-deployable mass surveillance and reconnaissance in cluster and swarm formations. The efficacy of the design is demonstrated through a simulation environment. The dynamics are verified through simulations and a general linear controller coupled with an energy based non-linear controller is shown to operate the vehicle in a stable regime. In accordance with specified objectives a prototype is being developed for flight-testing and demonstration purposes." (Authors)] Address: Vachtsevanos, G., Intelligent Control Systems Laboratory, School of Electrical & Computer Engineering, Georgia Institute of Technology, 777 Atlantic Dr. NW, Atlanta, GA 30332-0250, USA. E-mail: gjv@ece.gatech.edu

**9905.** Rawson, A.; Lim, R.P.; Tremblay, L.A.; Warne, M.S.J.; Ying, G.-g.; Laginestra, E.; Chapman, J.C. (2010): Benthic macroinvertebrate assemblages in remediated wetlands around Sydney, Australia. *Ecotoxicology* 19(8): 1589-1600. (in English) ["To investigate potential high organisational level impacts of persistent organic pollution in the wetlands in the Sydney Olympic Park (SOP) remediated site, the benthic macroinverte-

brate assemblages of seven wetlands within SOP and two off-site reference wetlands were examined. Sediment cores were collected, stained and preserved from each study site and the macroinvertebrates identified to the appropriate taxonomic level (class, order, family, subfamily) (in Odonata: Coenagrionidae & Corduliidae). Data were analysed for taxon richness and macroinvertebrate abundance and multivariate techniques were used to identify chemical/physical characteristics of the sediment, which were important influences on the differences in the assemblage between study sites. Macroinvertebrate abundance was highly variable between study sites and taxon richness was low across all sites. Oligochaetes, nematodes, ostracods and chironomids were the most common taxa found and were the most important in influencing differences between the macroinvertebrate assemblages among the study sites. Sediment grain size and chemical characteristics of the sediments (RPAH, RPCB, TCDDeq and heavy metal concentrations) were important in separating the study sites based on taxon richness and abundance. Canonical correspondence analysis separated the macroinvertebrate assemblages at newly two created wetlands from those at other study sites including the urban reference sites. Increased sediment POP contamination (particularly as measured TCDDeq and RDDT concentrations) is a likely contributor in excluding pollution sensitive taxa and, therefore, alterations to benthic macroinvertebrate assemblages. Further, the influence of TOC suggests the significance of catchment inputs in contributing to changes in macroinvertebrate assemblage. The SOP remediation led to the establishment of wetlands with benthic communities representative of those expected in urban wetlands." (Authors)] Address: Rawson, C.A., Department of Environmental Sciences, Institute of Water and Environmental Resource Management (IWERM), University of Technology, Sydney (UTS), PO Box 123, Broadway, Sydney, NSW 2001, Australia. E-mail: C.Rawson@curtin.edu.au

**9906.** Reels, G.T. (2010): Seasonal emergence of dragonflies (Odonata: Anisoptera) at ten ponds in Hong Kong. *Hong Kong Entomological Bulletin* 2(1): 24-31. (in English) ["Dragonfly emergence was monitored at ten ponds in Hong Kong, using emergence traps, for periods of varying duration between February 2004 and September 2007. Three newly created ponds, five re-profiled ponds and two long-established former commercial fish ponds were included in the study. Exuviae abundance varied considerably between ponds and years, as did the number of species recorded. There was an overall declining trend over the four year period. The causes of these variations were not determined. Dragonfly emergence was strongly seasonal in all four years, with > 80% of total annual emergence occurring in March to May in most ponds. A winter emergence peak, dominated by *Pantala flavescens*, was recorded in ponds which had only been filled in the preceding summer." (Author)] Address: Reels, G.T., H-3-30 Fairview Park, Yuen Long, N.T. Hong Kong. E-mail: gtreels@cyberdude.com

**9907.** Resende, D.C.; De Marco, P. (2010): First description of reproductive behavior of the Amazonian damselfly *Chalcopteryx rutilans* (Rambur) (Odonata, Polythoridae). *Revista Brasileira de Entomologia* 54(3): 436-440. (in English, with Portuguese summary) ["Polythoridae comprise a widespread group of species in the New World tropics, but little is known about their behav-

ior or life history. Here, we described the reproductive behavior of Amazonian *Chalcopteryx rutilans*, using mark-recapture techniques. Males were resident and territorial, though we found disputes (complex flight manoeuvres) to be rare. Trunks (rotting wood) were important to male persistence in sites, as these are the locations preferred by females for oviposition. The mating system of *C. rutilans* may be comparable to the resource limitation category, described by Conrad & Pritchard (1992), where males cannot control female access to oviposition sites. So, female choice becomes important and apparently, the observed displays (in which males flash the coppery coloration of their hind wings) may be related to attraction of females to territories, as in a lek system." (Authors)] Address: Resende, D.C., Laboratório de Bioinformática e Evolução, Depto. de Biologia Geral, Universidade Federal de Viçosa, 36570-000 Viçosa-MG, Brazil. E-mail: dcresende@ig.com.br

**9908.** Risely, K. (2010): A mixed bag for Britain's birds. *BTOnews* 290: 21-22. (in English) [Recent increase in population and northward range extension in UK of the Hobby (*Falco subbuteo*; Aves) is explained as follows: "Numbers are increasing and the species' range expanding, perhaps in response to climate change affecting dragonfly numbers and range, a key food source for this dashing falcon."] Address: not stated

**9909.** Ross, A.J. (2010): A review of the Carboniferous fossil insects from Scotland. *Scottish Journal of Geology* 46: 157-168. (in English) ["The known fossil insects of Carboniferous age from Scotland are reviewed. Of the seven recorded, one record is highly dubious and rejected, and another is herein identified as a crustacean. The remaining five insects belong to three orders: The extinct order Protodonata (giant dragonflies) is represented by the holotype of *Truemanina multiplicata* (Bolton 1922). The extinct order Palaeodictyoptera is represented by the holotypes of *Lithomantis carbonarius* Woodward 1876 and the nymph *Idoptilus peachii* (Woodward 1887b) comb. nov. The order Blattodea (cockroaches) is represented by the lost holotype of '*Lithomylacris*' *kirkbyi* Woodward 1887a and a nearly complete cockroach, herein identified as *Archimylacris*? sp. The localities and ages are reviewed and the five insect specimens came from the Coal Measures (Westphalian) of Ayrshire and Fife." (Author)] Address: Ross, A.J., Department of Natural Sciences, National Museums Collection Centre, National Museums Scotland, 242 West Granton Road, Edinburgh, EH5 1JA, UK. E-mail: a.ross@nms.ac.uk

**9910.** Rosset, V.; Lehmann, A.; Oertli, B. (2010): Warmer and richer? Predicting the impact of climate warming on species richness in small temperate waterbodies. *Global Change Biology* 16: 2376-2387. (in English) ["Climate change is expected to affect communities worldwide. Many studies focus on responses at the regional level and show an increase in species richness. However, less is known about the consequences of climate change at the local scale (in ecosystems). Small waterbodies, such as ponds, could play an important role for the assessment of the impact of future changes in climate at the local level. We evaluated here the potential changes due to climate warming in the species richness for various groups (plants, snails, beetles, dragonflies, amphibians) across 113 lowland and high altitude ponds in Switzerland. We modelled the relationships between species richness and environmental variables (including temperature) and predicted species



richness changes for the end of the century (2090–2100; using the A2 IPCC scenario). Temperature rise could significantly increase pond species richness. For the five taxonomic groups pooled, species richness would potentially increase from 41 to 75 (183%) in lowland ponds. In presently species-poor high altitude ponds, the potential increase would be particularly marked, with a proportional increase (1150%; from 14 to 35 species) almost double that in lowland areas. A strong increase in species richness also resulted from models including changes in additional variables, such as land-use or water quality. Future reductions in water quality (e.g. increase in nutrients) may limit the predicted increase in lowland species richness or, conversely, result in a greater increase in species richness in high altitude areas. Nutrient enrichment is shown to affect the taxonomic groups differentially, with plant species richness the most negatively influenced. Climate warming could therefore affect species richness of temperate ponds not only regionally, but also at the local, within ecosystems-scale; species richness could increase markedly in temperate regions, and especially so at higher altitude." (Author)] Address: Rosset, Veronique, Dept of Nature Management, Hepia University of Applied Sciences Western Switzerland, hepia Geneva technology, architecture and landscape, CH 1254 Jussy-Geneva, Switzerland. E-mails: veronique.rosset@hesge.ch

**9911.** Rüppele, G.; Hilfert-Rüppele, D. (2010): Kinematic analysis of maiden flight of Odonata. *International Journal of Odonatology* 13(2): 181-192. (in English) [The maiden flight of *Calopteryx splendens*, *Coenagrion puella*, *Aeshna cyanea*, *Cordulia aenea*, *Libellula quadrimaculata* "was filmed by slow motion up to 500 f/s and analysed frame by frame. The aim of this study was to find out if the maiden flight differs among various species as well as between teneral and adults within the same species with respect to wing beat frequency, phase-relationship between fore- and hind wings, flight speed and acceleration. All the values of the flight parameters were much lower in maiden flight than in the flight of adults. The possible reasons for the weakness of the maiden flight are discussed." (Authors)] Address: Hilfert-Rüppele, Dagmar, An der Wasserfurche 32, 38162 Cremlingen, Germany. E-mail: d.hilfert-rueppell @tu-bs.de

**9912.** Šácha, D. (2010): Dragonflies (Odonata) observed during monitoring of species of the European importance in southern Slovakia. *Folia faunistica Slovaca* 15(6): 43-46. (in Slovakian, with English summary) [In 2007, at 6 sites in southern Slovakia 16 odonate species were observed. Three of them are protected by the European law: *Cordulegaster heros*, *Gomphus flavipes*, and *Ophiogomphus cecilia*. In addition, records of *Onychogomphus forcipatus* and *Coenagrion pulchellum* are of regional interest.] Address: Šácha, D., Podtatranského 31, 031 01 Liptovský Mikuláš, Slovakia. E-mail: dusan.sacha@vazky.sk

**9913.** Samways, M. (2010): Impacts of extreme weather and climate change on South African dragonflies. *BioRisk* 5: Special issue: Monitoring climatic change with dragonflies: 73-84. (in English) ["The absence of ice sheets for many millions of years, yet variable topography and changing climate, has generated considerable biodiversity in South Africa. There is no evidence to date that anthropogenic climate change has affected odonate populations in the region. One reason is that the highly varying weather and climate constitutes considerable background noise against which any effects of

modern climate change must be measured. Evidence is accumulating that the Holocene interglacial and gradual warming has left some species with isolated populations in montane areas among a matrix of arid land. Many South African odonate species are remarkably vagile and elevationally tolerant, readily immigrating into and emigrating from pools during wet and dry phases respectively. Some species take this movement to greater extremes by moving the southern margins of their geographical range back and forth with varying climate. After floods, populations of riverine odonates can recover within a year, although where the riparian corridor has been stripped of its trees, the recovery is very slow. Various synergistic impacts, particularly from invasive alien woody plants, area severe impact on many riverine species, and reducing their ability to respond positively to changing environmental conditions. Large-scale removal of these woody aliens is greatly benefiting the odonates' ability to survive in the short-term and to restore natural corridors for movement in the face of possible future climatic changes." (Author)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**9914.** Samways, M.; Niba, A. (2010): Climate and elevational range of a South African dragonfly assemblage. *BioRisk* 5: Special issue: Monitoring climatic change with dragonflies: 85-107. (in English) ["Elevation and climate are interrelated variables which have a profound affect on biota. Flying insects such as dragonflies can rapidly disperse and optimal habitat conditions at appropriate elevations. Such behaviour is likely to be especially important in geographical areas which are subject to major climatic events such as El Niño. Accordingly, we studied dragonflies and environmental variables in a series of reservoirs over an elevational range of 100–1350 m a.s.l. at the same latitude on the eastern seaboard of South Africa. The aim was to determine how elevation and climate (as regional processes), as well as local factors, influence species assemblage variability, habitat preference and phenology. Certain environmental variables strongly explained the main variation in species assemblage. These included local factors such as pH, marginal grasses, percentage shade, exposed rock, marginal forest and to a lesser extent, marshes and flow. Different species showed various tolerance levels to these variables. Elevation and climate as regional processes had very little influence on dragonfly assemblages in comparison with these environmental factors. These odonate species are essentially sub-tropical, and are similar to their tropical counterparts in that they have long flight periods with overlapping generations. Yet they also have temperate characteristics such as over-wintering mostly as larvae. These results indicate evolutionary adaptations from both temperate and tropical regions. Furthermore, most were also widespread and opportunistic habitat generalists. The national endemics *Pseudagrion citricola* and *Africallagma sapphirinum* only occurred at high elevations. However, the endemic *Agriocnemis falcifera* was throughout all elevations, suggesting regional endemism does not necessarily equate to elevational intolerance. Overall, the results suggest that many millennia of great climatic variation have led to a highly vagile and elevation-tolerant dragonfly assemblage which readily occupies new water bodies. Such an assemblage is likely to be highly tolerant of global climate change, so long as there is sufficient water to keep the

reservoirs at a constant level." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**9915.** Samways, M.J. (2010): The rare Ghost Duskdarter dragonfly *Zyxomma petiolatum* on Desroches Island, Seychelles. *Phelsuma* 18: 98. (in English) [Verbatim: "On each evening at dusk, between 11th and 21st April 2010, the rare *Zyxomma petiolatum* was hawking the northern shoreline of coralline Desroches Island, Amirantes, Seychelles. It also attempted to lay eggs in swimming pools. What is surprising is that this sandy island is virtually waterless, with only a small pool for tortoises. These dragonfly individuals may have come from the granitic Seychelles, where it has been recorded (Bowler 2006). However, its rarity there, and in Asia (Bedjaniè et al. 2007), does not make it a normal candidate for migratory behaviour, suggesting that there is also a chance that it might be breeding in very small semi-permanent pools on Desroches Island. The only other odonate recorded on Desroches at the same time, was *Tramea limbata*, a well-known long-distance migrant."] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**9916.** Sarfaty, A.; Pruett-Jones, S. (2010): Coloration indicates body size in *Calopteryx maculata* (Odonata: Calopterygidae). *International Journal of Odonatology* 13(2): 167-180. (in English) ["*Calopteryx maculata* has become a model system for studying behaviour and reproduction in odonates. Its iridescent coloration is thought to be important in intraspecific interactions but no study has yet measured coloration in a quantitative manner. In a recent study, Fitzstephens & Getty (2000. *Animal Behaviour* 60: 851-855) showed that lipid levels predict coloration as determined by Munsell chips, such that fat males were blue and lean males were green. In this study we quantified color in *C. maculata* with a spectrometer to test the prediction of Fitzstephens & Getty (2000) using quantitative measures. We found that body size, but not lipid levels, correlates with color. In our study, larger males were green and smaller males blue. Territorial males did not differ from non-territorial males in color, size, or lipid levels. Coloration thus predicts size in male *C. maculata*, but the significance of this in intraspecific interactions remains unclear." (Authors)] Address: Sarfaty, Anna, Department of Ecology and Evolution, University of Chicago, 1101 East 57th St., Chicago IL 60637, USA. E-mail: asarf@uchicago.edu

**9917.** Sauber, F. (2010): Hommage à Jos Hoffmann (1911–2000). *Bull. Soc. Nat. luxemb.* 111: 145-149. (in French) [In the 1960ies, J. Hoffmann contributed significantly to the knowledge of the odonate fauna in Luxembourg.] Address: not stated

**9918.** Schlotmann, F. (2010): Arealerweiterung der Gemeinen Winterlibelle (*Sympecma fusca*) (Odonata: Libellidae) in Rheinhessen – eine Folge der Klimaänderung und von anthropogener Gewässerunterhaltung. *Fauna und Flora in Rheinland-Pfalz* 11(4): 1385-1396. (in German, with English summary) ["Due to findings in the early 1980 decade in Rheinhessen (Rhineland-Palatinate, Germany) *S. fusca* had a distribution gap that has been explained by climatic parameters and a lack of woodland. New investigations have shown that since 1984 the species has silently expanded its range across

the whole region of about 1400 square kilometers. *S. fusca* prefers shallow ponds of anthropogenic origin that are in an early stage of natural succession and typically have developed reed or cattail stands along the littoral zone. This kind of habitat can be frequently found in flood retention basins and nature conservation ponds and the species seems to be profiting much of these types of stagnant waters. Additionally, the effects of the man-made climate change are thought to be a reason for the expansion. In contrast to most literature statements the winter habitats in Rheinhessen cannot be wooded areas, because these are missing in the region. Wintering seems to take place in habitats of the open landscape like hedges and elements of fallow land. The pioneer character of the species is pointed out." (Author)] Address: Schlotmann, F., Weserstr. 11, 55296 Harxheim, Germany. E-mail: frank.schlotmann@gmx.net

**9919.** Schlumprecht, H.; Bittner, T.; Jaeschke, A.; Jentsch, A.; Reineking, B.; Beierkuhnlein, C. (2010): Gefährdungsdiskussion von FFH-Tierarten Deutschlands angesichts des Klimawandels. Eine vergleichende Sensitivitätsanalyse. *Naturschutz und Landschaftsplanung* 42(10): 293-303. (in German, with English summary) ["Risk Assessment of Animal Species of the EU Habitats Directive in View of Climate Change: Climate change presumably means greater vulnerability for many animal species of the Habitats Directive. This susceptibility was comparatively estimated for all German animal species of the Habitats Directive based on a uniform database of ecological traits using a uniform methodology. The estimated additional vulnerability was analysed with reference to the Red List status for Germany, the Annexes of the Habitats Directive, to species group and habitat constellation. The results show that endangerment increases in line with the Red List status. Species of Annex II are more endangered than species of Annex IV or V. Beetles are probably more vulnerable than other species groups. Species essentially requiring small structures (mainly butterflies, beetles) are additionally endangered, followed by species requiring aquatic habitats and surroundings or species found exclusively in aquatic habitats. Species which do not necessarily require unfragmented habitats but at least specific or limited habitat patches, or species with a large home range appear to be less vulnerable. The consequences for the conservation of species within Natura 2000 are discussed." (Authors) The analysis includes five odonate species: *Coenagrion hylas*, *C. ornatum*, *Ophiogomphus cecilia*, *Oxygastra curtisii*, *Sympecma paedisca*.] Address: Schlumprecht, H., Büro für ökologische Studien, Oberkonnorsreuther Str. 6a, 95448 Bayreuth, Germany. E-Mail kontakt@bfoes.de

**9920.** Schneider, T.; Schneider, J. (2010): Occurrence, behaviour, and habitat preference of the Levant Pincertail, *Onychogomphus macrodon* Selys, 1887 in Turkey (Insecta: Odonata). *Zoology in the Middle East* 49: 79-88. ["The current status and distribution of the rare and threatened *O. macrodon* was studied in Turkey 2006-2009. Despite an intensive search for the species, it was found only at one locality in the middle course of the Ceyhan river. Other localities in Turkey, from where the species has been reported in the literature which could not be confirmed. The habitat preference of the species is described and observations on the behaviour of both sexes were made. Some morphological details are described and notes on the colour are given. Litera-

ture records are summarised and reasons for the decline of this species are discussed." (Authors)] Address: Schneider, T., Arnold-Knoblach-Ring 76, 14109 Berlin-Wannsee, Germany. E-mail: karin.thomas.schneider@gmx.de.

**9921.** Schorr, M. (2010): Umzug der Libellensammlung Jurzitza von Karlsruhe nach Frankfurt, Senckenbergmuseum. *Libellennachrichten* 23: 12-14. (in German) [The important collection of Gerhard Jurzitza, Karlsruhe, Germany with many thousand Southamerican specimens and including holo- and paratypes was translocated from his private property to the Senckenberg Museum in Frankfurt, Germany.] Address: Schorr, M., Schulstr. 7B, 54314 Zerf, Germany. E-mail: bierschorr@online.de

**9922.** Schröter, A. (2010): On a collection of dragonflies from eastern Georgia, with the first record of *Sympetrum arenicolor* (Odonata: Libellulidae). *Libellula* 29(3/4): 209-222. (in English, with Georgian and German summary) ["On a short field trip in 2006 to eastern Georgia, 14 Odonata species were recorded at six localities. A male of *Sympetrum arenicolor* was collected in the outskirts of Tbilisi. This species is new for the Georgian fauna. All species are annotated and a list of the sampled localities is given." (Author)] Address: Schröter, A., Rasenweg 10, D-37130 Gleichen, Germany. E-mail: asmustim@gmx.de

**9923.** Shieh, S.-H.; Chi, Y.-S. (2010): Factors influencing macroinvertebrate assemblages in artificial subtropical ponds of Taiwan. *Hydrobiologia* 649: 317-330. (in English) ["Macroinvertebrate assemblages and its association with environmental factors at the 11 artificial subtropical ponds of Taiwan were examined using the multivariate analysis software STATICO. The aims of the study were to determine whether spatial and seasonal variation of macroinvertebrate assemblages changed seasonally, to examine which environmental factors determined the spatial and temporal structure of macroinvertebrate assemblages, and to compare between-pond variations in the taxon composition of macroinvertebrates. Macroinvertebrates were collected seasonally by a corer and a sweep net in 2007, and 13 physical and chemical factors were measured at the same time. A total of 31 macroinvertebrate taxa were collected during the sampling period, and the most dominant taxa were Chironomidae (31.7% of total animal abundance) and Tubificidae (22.4%). STATICO identified pond size, pond depth, sediment depth, and altitude as the major abiotic factors and *Bufo melanostictus* (Amphibia) as the major biotic factor to influence macroinvertebrate assemblages at these ponds. These factors changed with seasonality. For example, the abundance of *B. melanostictus* was the most important factor during the spring but became much less important in other seasons. According to the spatial distribution patterns of macroinvertebrate assemblages, macroinvertebrates could be split into two groups based on their dispersal. The active dispersers, such as insect taxa, were strongly associated with pond size and the passive dispersers, such as non-insect taxa, were strongly associated with the pond depth and/or sediment depth. The results of this study suggested that pond size might influence macroinvertebrate assemblages through their dispersal mechanisms and that the environmental factors which influenced the macroinvertebrate assemblages most changed with seasons in this study area." (Authors) Odonata were represented by nine taxa.] Address:

Shieh, S.-H., Department of Ecology, Providence University, 200 Chung-Chi Rd, Shalu, Taichung, 43301, Taiwan, ROC, E-mail: shshieh@pu.edu.tw

**9924.** Siraj, S.; Yousuf, A.R.; Bhat, F.A.; Parveen, M. (2010): The ecology of macrozoobenthos in Shallabugh wetland of Kashmir Himalaya, India. *Journal of Ecology and the Natural Environment* 2(5): 84-91. (in English) ["Macrozoobenthos comprise of an important group of aquafauna by way of their contribution to ecosystem stability, besides acting as potential bioindicators of trophic status. Being efficient energy converters, they constitute an important link in the aquatic food web. In view of importance of such an aquatic bioresource, on one hand, and scarcity of information about them, on the other, the present study aimed at working out the species composition, distribution pattern and abundance of macrozoobenthos in relation to several physico-chemical parameters of the Shallabugh wetland of Kashmir Himalaya. The data collected on various physico-chemical parameters showed wide seasonal and site-specific fluctuations. Dissolved oxygen concentration fluctuated between 3 - 12 mg/l, while as free CO<sub>2</sub> ranged from 1 - 19 mg/l showing also high values of bicarbonates of Ca and Mg, nitrogen and total phosphorus. The pH of the wetland remained mostly alkaline but at the emergent macrophytic site it showed a slight acidic trend (6.6) in during late summer. Benthos of the Shallabugh wetland was represented by Arthropoda, Annelida and Mollusca, and was studied in relation to abiotic and biotic factors for one year. Perusal of the results revealed that Arthropoda, Annelida and Mollusca were represented by 10, 7 and 6 species respectively. The abundance of some specific pollution indicator species, especially Annelids such as *Limnodrilus* sp, *Tubifex tubifex* and *Branchiura sowerbyii*, is depictive of transition in trophic status of the wetland from meso- to eutrophy. In view of the eutrophication-induced changing biotic community structure, the present study calls for urgent management and restoration of the Shallabugh wetland ecosystem." (Authors) "*Lestes spec.*" larvae were recorded only once at site W2.] Address: Siraj, S., Centre of Research for Development (CORD), University of Kashmir, Srinagar, J & K, India, 190006. E-mail: mashah75@yahoo.com.

**9925.** Skvortsov, V.E. (2010): The dragonflies of Eastern Europe and Caucasus: An illustrated guide. KMK Scientific Press Ltd. Moscow. ISBN: 9785873176571: 623 pp. (in bilingual Russian and English) [Reviewed by **Asmus Schröter**:

Mainly due to the language barrier 20 years after the fall of the Iron Curtain both exchange and cooperation between Odonatologists from Europe and Russia and the successor states of the former Soviet Union still remains on an unsatisfying low level. The result is a considerable mutual lack of knowledge of the respective Odonata fauna of the other side's part of the world. Whilst on the one hand European Russia and the Caucasus region faunistically are still largely terra incognita for most of the European odonatologists, their Russian speaking colleagues on the other hand are frequently unaware of the situation in the West. According to the book author's introduction one of the aims of his work is to function as a link between Russian and English-speaking Odonatologists and in this perspective this consequently bilingual guide of the Odonata fauna of European Russia and the Caucasus region conceptually fills this gap.



The book to be discussed covers the European part of Russia, stretching to the Yamal Peninsula and Tyumen Province in the east. Moreover, the territories of Moldova, Estonia, Lithuania, Latvia, Belarus, Ukraine and Georgia, Armenia and Azerbaijan are considered.

Almost all of the 120 species which are subject of the book are depicted, including numerous detail drawings of appendages, secondary genitalia, wings, larvae and other features substantial for determination. Beside the author's introduction and a concise and well illustrated introduction on morphology of imago and larvae, the main part of the book consists of a dichotomous identification key. The key is organized from suborder down to species level, whereas each species additionally is shortly described in an extra chapter, supplying information on flight period, measurements, distribution and ecology whenever available.

As a special feature of the key and probably a novelty in dragonfly guides, diagnostic traits of the larvae and wing venation (whenever available) are incorporated in the key.

The chapters following the key offer distribution maps based on more than 350 localities, a list of localities, toponyms and administrative items. With extra schemes in a larger scale in some species special attention is paid to the complicated situation of the species rich Caucasus region. The book ends with species annotations and comments on distribution and a list of references.

When first paging through, the most conspicuous feature of the voluminous book is without doubt the more than 2000 (!) aesthetically appealing drawings and illustrations, which alone makes the book a remarkable piece of odonatological artwork. These drawings were made exclusively for this book. Some images, however, show unrealistic proportions, f. ex. the much too big terminalia of the males in *Coenagrion australocaspicum* (page 200) and *ponticum* (208), the inadequately big head in the depicted male of *Cordulegaster insignis charpentieri* (374) etc.

However, the majority of the drawings in view of accuracy and clarity satisfy high scientific demands.

Generally the book's importance as a profound and comprehensive fully illustrated diagnostic key for Russian speaking people interested in the dragonflies of the region cannot be assessed highly enough, as to date no up-to-date dragonfly guide for the region was available.

As the level of odonatological exploitation in the considered region, compared to the Asian part within the area of the former Soviet Union, curiously still remains on a lower level, the book hopefully will have a positive effect on the faunistic survey of the region encouraging more people interested in nature to deal with dragonflies.

As far as the authors second aim is concerned - to provide a complete revision of the faunistic data of European Russia and the Caucasus especially for non-Russian speaker - unfortunately the book does not meet the requirements.

Beside many unnecessary spelling errors, even very eye catching ones in bold headlines, f. ex. "*Cordulegasler*" (359), in author names, f. ex. "*Kolentai*" (359) or species names, f. ex. constantly "*stirolatum*" (459 onwards), several inconsistencies concerning the contents hamper the reader, f. ex. an incomplete list of abbreviations (23), not allowing the interpretation of several ab-

brevisions in the section "general distribution" in species descriptions, f. ex. MDT, ME, TEA, AM etc.

The same goes for missing entries concerning the navigation of the headers and footers of the key, f. ex. in *Onychogomphus lefebvrei* (346) no indication to the annotation on page 593 is given, the latter being written inconsistently on one and the same page (346) "*lefebvrei*" (species description) and "*lefebvrei*" (footer below) etc.

Several contents are incorrect displayed, f. ex. *Onychogomphus assimilis* is stated for Lagodekhi NE Georgia in the species annotation (593; i. e. Bartenev 1932), but this is not plotted on the species distribution map (583).

Data given for several species concerning the status in the region are blurred and lost in vagueness, f.ex. in *Onychogomphus lefebvrei*:

Whilst the genus introduction (340) ["The only species widespread over the region is *O. forcipatus*; however, three other species occur in its Caucasus part where field separation of all the congeners is complicated."] implicitly mentions this species as part of the regional fauna and thus leads to the assumption, that *O. lefebvrei* definitively occurs in Caucasus, it is relativised in the following annotation "only reported from NW Caucasus; no exact data cited" (593). Thus, the reader is left in the lurch about the status of *O. lefebvrei* in the region and it remains unclear for which reason this species is dealt with at all etc.

Other data are out of date and incorrect, f. ex. in *Ophiogomphus*:

Four North Asian members of the genus *Ophiogomphus* are known from the area of the former Sowjet Union, not only three! (338/339): *O. cecilia* (Geoffroy in Fourcroy, 1785) (= *O. serpentinus* (Charpentier, 1825), *O. obscurus* Bartenev, 1909, *O. reductus* Calvert, 1898 and *O. spinicornis* Selys, 1878. For *O. spinicornis* in Russia see Kosterin (2003). Even though the latter three are not very likely to be found in the covered area, they are now widely accepted as full species (inter alia Asahina (1979), Haritonov & Borisov (1990).

Moreover, several species included in the key do decidedly not occur in the considered region, but have been recorded in adjacent areas and countries and might be considered as hopeful candidates to be discovered once. Those species are marked with an asterisk, and thus being clearly designated as such. However, at least some of the included species marked with an asterisk, like *Oxygastra curtisii* and *Somatochlora borisi*, are in hardly any respect connected to the region and according to the author included just on account of interest to show the fascinating taxonomical variety of dragonflies (16/17). However, I would have cautioned the author from doing so, as the pure mention of such species bearing no relation to the region or the content of the book at all, is just another unnecessary source of misunderstanding.

The same applies for the dubious Lithuanian record of *Sympetrum eroticum* (Stanionyte 1989) which, although clearly marked with an asterisk, should have better been neglected at all.

Some further species are presented in a very general way and a more precise and differentiated contemporary presentation or at least the attempt to do so would have been desirable:

*Gomphus flavipes*: Unfortunately no indication on the occurrence of *Gomphus ubadschii* Schmidt, 1953 (sub

(*Gomphus flavipes lineatus* Bartenev, 1929) is given and only the nominate taxon is considered (337). *Lineatus* was described from Poti/Georgia by Bartenev (1929) and it appears likely that all records of *flavipes* from Transcaucasia in fact pertain to *ubadschii*.

*Aeshna juncea*: The bewildering phenotypical variability of *A. juncea* in the Caucasus region and the doubtful status of two regional taxa *atshischgho* Bartenev, 1929 and *crenatooides* Bartenev, 1929 are mentioned shortly (285), but unfortunately no new information or interpretation is given. Especially against the background of recent records of specimens of *A. juncea* of the "mongolica-type" with distinctly enlarged yellow thorax pattern in adjacent NE Turkey

(<http://www.libellen.org/epallage/pubs/juncea.html>)

further information on distribution and colouration of Caucasian populations would have been highly appreciated. From this perspective "the comma-like spot below spiracle" presented as diagnostic feature in the key (274) to separate *subarctica* from *juncea* may apply elsewhere, but should be treated with some caution in the Caucasus region.

However, such weak points are of minor importance and do not affect the general quality of the book. Much more serious in this context is, however, the frequent uncritical reviewing and subsequent repeating of obviously or probably erroneous records. Undoubtedly, the book boasts an impressive amount of data and contains the essence of virtually the complete literature relevant for the region and one can easily imagine the huge amount of work behind it. However, one main problem - beside the language barrier - most of the European Odonatologists are constantly facing while dealing with (mainly old) faunistic data from Russia and the Caucasus, are the numerous doubtful records and unclear status of several taxa described from the region. In this respect the book unfortunately does hardly provide any progress as it does largely not represent the current state of knowledge and unfortunately contains such doubtful data throughout. Considering the stated aim of the author on the one hand, to improve the insufficient communication between East and West (9), and the nature of many of the erroneous data presented on the other hand, one could easily get the impression, that the author itself became a victim of insufficient exchange with colleagues from elsewhere as obvious errors like *Cordulegaster princeps* etc. might easily have been avoidable just by a few words from an expert of the region. Those mistakes cast a shadow on the pleasure to read and work with this otherwise useful book.

The following seven species and taxa dealt with in identification key and species description, which are presented as part of the fauna of the area covered by the book are either doubtful or with the outermost probability erroneous and should be therefore deleted from the species list at all:

1. *Platycnemis latipes*: Stated for Kabardino-Balkaria (Russian Caucasus).

*P. latipes* is a western Mediterranean Endemic confined to Iberia and France and definitively not part of Russia and adjacent countries. According to the cited reference (594) ([Byuleten' gosudarstvennogo muzeya Gruzii] 6:85-96) another specimen from that area was considered (...) "a form of *P. pennipes* closely resembling *P. latipes*." However, obviously the same goes for that particular specimen stated as *P. latipes*. Another explanation

might be confusion with the similar regional congener *P. dealbata*.

2. *Coenagrion mercuriale*: Stated for Armenia, Azerbaijan and Belarus (588/589). This species has been rejected by Tally et al. (2004) from the checklist of Armenia, and Dijkstra (2006: 110) consider even all records of *C. mercuriale* from Eastern Europe to be erroneous. Hence, the occurrence of this western Mediterranean species in the Caucasus region generally seems to be most unlikely.

3. *Onychogomphus forcipatus unguiculatus*: Both taxa *albotibialis* and *unguiculatus* are stated for Caucasus (593). However, Boudot et al. (1990) outlined the nature and distribution of the subspecies of *Onychogomphus forcipatus*, whereupon the taxon *O. f. unguiculatus* is confined to the western Mediterranean and is replaced by *O. f. albotibialis* in Asia Minor. Therefore, *O. f. unguiculatus* is certainly not part of the regional fauna. As far as the Caucasus is concerned Reinhardt (1992) and Schröter (2010b) decidedly assigned specimens from Georgia to *O. f. albotibialis*.

4. *Gomphus davidi*: *G. davidi* is stated for Caucasus without further information (336). However, *Gomphus davidi* is a Levantine Endemic restricted to a small range within Turkey, Israel, Jordan, Lebanon and Syria (Suhling & Müller 1996, Kalkman 2006, Boudot et al. 2009) and most probably does neither occur nor will ever be expected in the Caucasus or elsewhere within the region covered by this book.

5. *Cordulegaster princeps*: *C. princeps* is an endemic confined to the Middle and High Atlas of Morocco (Boudot 2001, Van Pelt (2006), Boudot et al. 2009) and thus the stated record from Tbilisi/Georgia is with the outermost certainty erroneous and one could hardly imagine another Palaearctic dragonfly species, whose occurrence in Georgia is as unlikely as this.

6. *Cordulegaster coronata*: Included in the diagnostic key (364) and in the species description (367), but no further information or data are given - "no regional data" (367), "no local record" (590). However, this Central Asian species is very unlikely to occur within the considered region. In addition to all this, images which should depict *Cordulegaster coronata* are erroneous and both images of the male in top and lateral view (375) do for sure not show this species! *C. coronata* has a much yellower overall appearance and the yellow abdominal markings do laterally not descend onto the underside of the segments, every segment additionally shows yellow apical patches and on segments 8 and 9 very distinctive shaped yellow "double-7 spots" are present. For accurate drawings of males of *C. coronata* see Fraser (1929), Schmidt (1961) and for photos of both sexes Schröter (2010a).

7. *Brachythemis impartita* (Karsch, 1890) (see: Dijkstra & Matushkina, 2009: sub *B. leucosticta*): *Brachythemis impartita* has an Afrotropical distribution and comes closest to the considered region in the Near East, where it is locally very common. Notably only a few records from adjacent southern Turkey are known to date (Kalkman 2006, Dijkstra 2006). Although a wandering individual could not be excluded a priori, the cited very old single record (586; referring to Bartenev 1912d) appears to be erroneous beyond doubt.

*References:*

Asahina, S. 1979. Notes on Chinese Odonata. XI. On two North Chinese Gomphids, with special reference to Palaearctic Ophiogomphus species. Tombo 22: 2-11

- Boudot J.-P., G. Jacquemin & H.J. Dumont 1990. Revision of the subspecies of *Onchogomphus forcipatus* (Linnaeus, 1758) in Europa and Asia Minor, and the distribution of *Onchogomphus forcipatus unguiculatus* (Vander Linden, 1823) (Odonata: Gomphidae). *Bulletin et Annales de la Société Royale Belge d'Entomologie* 126: 95-111
- Borisov, S.N. & A.Y. Haritonov. 2007. The Dragonflies (Odonata) of Middle Asia. Part 1. Caloptera, Zygoptera. *Eurasian entomological journal* 6(4): 343-360
- Borisov S.N. & A.Y. Haritonov .2008. The Dragonflies (Odonata) of Middle Asia. Part 2 (Anisoptera). *Eurasian Entomological Journal* 7: 97-123
- Boudot J.-P. 2001. Les Cordulegaster du Paléarctique occidental: identification et répartition (Odonata, Anisoptera, Cordulegasteridae). *Martinia* 17: 1-34
- Boudot, J.-P., Kalkman, V. J., Azpilicueta Amorín, M., Bogdanovic, T., Cordero Rivera, A., Degabriele, G., Dommanget, J.-L., Ferreira, S., Garrigós, B., Jovic, M., Kotarac, M., Lopau, W., Marinov, M., Mihokovic, N., Riservato, E., Samraoui, B. & Schneider, W. 2009. Atlas of the Odonata of the Mediterranean and North Africa. *Libellula Supplement* 9. 256 pp.
- Fraser, F.C. 1929. A revision of Fissilaboidea (Cordulegasteridae, Petaliidae, and Petaluridae) (Order Odonata). Part I. Cordulegasteridae. *Memoirs of the Indian Museum* 9: 69-167, 4 pls.
- Haritonov, A. Yu., Borisov S. N. 1990: Eurasian species of the genus *Ophiogomphus* (Odonata, Gomphidae). - In G. S. Zolotarevko, (ed.): *Redkie gel'minty, kleshchi i nasekomye (Novye i maloizvestnye vidy fauny Sibiri) [Rare Helminths, Mites and Insects. (New and Little-Known Species of the Fauna of Siberia)]* 21: 43-51. (in Russian).
- Kalkman, V.J. 2006. Key to the dragonflies of Turkey, including species known from Greece, Bulgaria, Lebanon, Syria, the Trans-Caucasus and Iran. *Brachytron* 10: 3-82
- Kalkman, V. J. 2006. *Brachythemis Brauer, 1868 - "Groundlings"*. In: Dijkstra, K.-D.B. & R. Lewington *Fieldguide to the dragonflies of Britain and Europe: 297-299*. British Wildlife Publishing. Gillingham.
- O. E. Kosterin & V. V. Zaika. 2003. Odonatological expeditions to the Tyva Republic (Tuva) 2000-2002, IDF-Report 5: 1-44
- Reinhardt K. 1992. Beobachtungen von Libellen an Fließgewässern in Georgien (Odonata). *Entomologische Nachrichten und Berichte* 36: 243-248
- Suhling F & Müller O. 1996. Die Flußjungfern Europas (Gomphidae). *Die Neue Brehm-Bücherei* 628, Westarp, Magdeburg and Spektrum, Heidelberg, 237 pp.
- Schmidt, E. 1961. Ergebnisse der Deutschen Afghanistan-Expedition 1956 der Landessammlungen für Naturkunde Karlsruhe sowie der Expeditionen J. Klapperich, Bonn, 1952-1953 und Dr. K. Lindberg, Lund (Schweden) 1957-1960. - *Beitr. Naturk. Forsch. SüdwDtl.* 19: 399-435
- Schröter A. 2010a. The Odonata of Kyrgyzstan, part I Critical national checklist, annotated list of records and collected data of the summer half-years 2008 and 2009. *International Dragonfly Fund -Report* 28: 1-72
- Schröter, A. 2010b. On a collection of dragonflies from eastern Georgia, with the first record of *Sympetrum aricolor* (Odonata: Libellulidae). *Libellula* 29 (3/4) 209-222
- Stanionyte, A.P. 1989. New and rare insects in Lithuania. In: V. Jonaitis (Ed.): *New and rare insect species of the Lithuanian SSR; records and descriptions of 1989: 9-11*
- Tailly M., V. Ananian & H. J. Dumont .2004. Recent dragonfly observations in Armenia, with an updated checklist. *Zoology in the Middle East* 31: 93-102
- Van Pelt, G. J. 2006. *Cordulegaster* Leach, 1815 - "Goldenrings". In: Dijkstra, K.-D.B. & R. Lewington *Fieldguide to the dragonflies of Britain and Europe: 297-299*. British Wildlife Publishing. Gillingham.]
- Author: Schröter, A. Rasenweg 10, D-37130 Gleichen, Germany. E-mail: asmustim@gmx.de:
- 9926.** Smallshire, D.; Beynon, T. (2010): *Dragonfly Monitoring Scheme Manual*. British Dragonfly Society: 12 pp. (in English) [Handout with detailed instructions to choose a transect, count and document specimens, and supply data to the Dutch organisers. The BDS acknowledges the help and encouragement of De Vlinderstichting (Dutch Butterfly Conservation) in the production of this manual, which was based largely on Ketelelaar, R. & C. Plate (2001) *Manual Dutch Dragonfly Monitoring*.] Address: Prentice, S., Dragonflies in Focus Project Officer, British Dragonfly Society, c/o Natural England, Parkside Court, Hall Park Way, Telford TF3 4LR, UK. E-mail: stephen.prentice@naturalengland.org.uk
- 9927.** Smith, P.; Snook, D.; Muscutt, A.; Smith, A. (2010): Effects of a diesel spill on freshwater macroinvertebrates in two urban watercourses, Wiltshire, UK. *Water and Environment Journal* 24(4): 249-260. (in English) ["The impacts of a spill of approximately 9800 L of diesel on a small stream and the River Ray (near Swindon, Wiltshire, UK) were examined using kick-net sampling of freshwater macroinvertebrate families at impacted and reference sites. Initial impacts (10 days after the spill) 50 m downstream of the spill were severe, with only 9% survival of individuals (excluding oligochaete worms) and 56% survival of invertebrate families. The percentage survival of macroinvertebrates increased progressing downstream from the spill, with no detectable impacts beyond approximately 4 km downstream. The crustacean families Asellidae and Gammaridae were particularly sensitive to the diesel spill. The recovery of the macroinvertebrate community was assessed 13.5 months after the spill. At this time, recovery was almost complete, with only minor impacts at the sites closest to the spill. The use of live laboratory sorting of samples from impacted sites provided essential information on the impacts of the diesel spill." (Authors) Appendix A: Calopterygidae; Coenagrionidae] Address: Smith, P., Aquatronics Ltd., Glenthorne, Searle Street, Crediton, Devon EX17 2DB, UK. Email: phil@aquatronics.com
- 9928.** Smith-Patten, B.D.; Patten, M.A. (2010): Broken antehumeral stripes in a male *Enallagma civile* (Familial Bluet). *Argia* 22(3): 20. (in English) [Two avoid identification confusion it is important to consider that life and dried specimens may differ in appearance: Broken antehumeral stripes on a male *E. civile* collected near Fonda, Dewey County, Oklahoma, USA, 23-V-2010 are shown by the authors. These stripes were symmetric in life, but postmortem desiccation of the specimen has distorted this symmetry.] Address: Smith-Patten, Brenda, Dept of Recent Invertebrates, Sam Noble Oklahoma Museum of Natural History, University of Oklahoma, Norman, Oklahoma 73072, E-mail: argia@ou.edu



- 9929.** Spitzer, S. (2010): Striped Saddlebags (*Tramea calverti*) new for Illinois. *Argia* 22(4): 9. (in English) [7-IX-2010, Montrose Dunes along Lake Michigan, north of Chicago, Illinois USA] Address: Spitzer, S. E-mail: steven0703@yahoo.com
- 9930.** Suhling, F.; Marais, E. (2010): *Crenigomphus kavangoensis* sp. nov. from the Okavango River, Namibia (Odonata: Gomphidae). *International Journal of Odonatology* 13(2): 267-276, pl. Ib, c. (in English) ["A new species of *Crenigomphus* is described and illustrated from a type series of eight males and eight females, all collected along the Okavango River in Namibia during December 2004, three non-type adult specimens and several exuviae (holotype male: Namibia, N'Kwazi Lodge, 19 xii 2004, deposited at NMNW). Both sexes lack foliations at S8-9 as occur in some *Crenigomphus*, but the male is peculiar in having exceptionally long cerci. The latter character is normally present in the genus *Paragomphus*. Other characters typical of *Crenigomphus* include all wings having a bright yellow costal border, S10 longer than S9 in males, colouration mostly ochreous with few darker markings, and the strong blackish serration at the posterior end of the cerci. The larval characters based on exuviae, one associated with an emerged male, do not allow clear separation from *Paragomphus*." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de
- 9931.** Szekers, J.; Csányi, B. (2010): Seasonal investigations on the macroinvertebrate fauna of the stream Burnót-Patak. *Acta Biol. Debr. Oecol. Hung.* 21: 189-196. (in Hungarian, with English summary) [Hungary; "Our survey on the macroinvertebrate fauna was conducted at 4 sampling sites at Burnót stream and an additional site of the inflowing Sásdi stream 3 times in 2009. The results were evaluated according to the seasonal variability of the macroinvertebrate fauna. Furthermore we analyzed the seasonal changes in species diversity and differences in diversity at sampling sites. We found that the rich runoff of the stream during spring was more favourable for the macroinvertebrates than it was in other periods of the year. The stream dried out in summer, resulted in a decreased number of taxa, lower abundance and lower diversity." The list of taxa includes "Corduliidae juv." and *Libellula fulva*.] Address: Szekers, J., VITUKI Environmental and Water Management Research Institute Non-profit Ltd., Kvassay Jenő út 1., H-1095 Budapest, Hungary. E-mail: szekeresj@vituki.hu
- 9932.** Szivák, I.; Deák, C.; Kálmán, Z.; Soós, N.; Mauchart, P.; Lökkös, A.; Rozner, G.; Móra, A.; Csabai, Z. (2010): Contribution to the aquatic macroinvertebrate fauna of the mountains Mecsek with the first record of *Limnius opacus* P.J.W. MÜLLER, 1806 in Hungary. *Acta Biol. Debr. Oecol. Hung.* 21: 197-222. (in English, with Hungarian summary) [In 2005, 2008 and 2009 faunistic and quantitative samplings were carried out at 54 sampling sites in the mountains Mecsek. The species list includes many records of *Cordulegaster heros*, and a single record of *Calopteryx virgo*.] Address: Szivák, I., University of Pécs, Department of General and Applied Ecology, Ifjúság útja 6, H-7624 Pécs, Hungary. E-mail: szivaki@gamma.ttk.pte.hu
- 9933.** Tajima, V.; Watanabe, M. (2010): Sperm transfer process in the non-territorial *Ischnura asiatica* (Brauer) during copulation (Zygoptera: Coenagrionidae). *Odonatologica* 39(3): 253-258. (in English) ["According to the movements of the male abdomen, the copulation process in *I. asiatica* is divided into 3 stages (I, II and III). The mean duration of each stage was  $75.8 \pm 8.8$  min,  $6.4 \pm 0.3$  min and  $15.8 \pm 0.9$  min for stage I, II and III, respectively (S.E.). No sperm transfer was found during stage I. The prolonged duration in stage I was related to the time of onset of copulation. Sperm was transferred into the bursa copulatrix during stage II. Although stage III was a phase without apparent abdominal movement, the sperm transfer was continued, following the sperm migration from the bursa copulatrix to the spermatheca. Immediately after copulation termination, the estimated number of sperm was  $64,500 \pm 4,425$  in the bursa copulatrix and  $43,143 \pm 6,397$  in the spermatheca (S.E.). The role of each stage in copulation will be discussed from the viewpoint of sperm competition." (Authors)] Address: Tajima, V., Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan. E-mail: tj@ies.life.tsukuba.ac.jp
- 9934.** Takahashi, Y.; Yoshimura, J.; Morita, S.; Watanabe, M. (2010): Negative frequency-dependent selection in female color polymorphism of a damselfly. *Evolution* 64(12): 3620-3628. (in English) ["Negative frequency-dependent selection (NFDS) is one of the most powerful selective forces maintaining genetic polymorphisms in nature. Recently many prospective cases of polymorphisms by NFDS have been reported. Some of them are very complicated, although strongly supportive of the NFDS. Here we investigate NFDS in wild populations of the dimorphic damselfly *Ischnura senegalensis*, in which females occur as andromorphs and gynomorphs. Specifically, we (1) test fitness responses to morph frequencies, (2) built a simple population genetic model, and (3) compare the observed and predicted morph-frequency dynamics. Fitnesses of the two morphs are an inverse function of its own frequency in a population, and are about equal when their frequencies are similar. Thus the conditions necessary for NFDS are satisfied. The long-term field surveys show that the morph frequencies oscillate with a period of two generations. Morph frequencies in a small population undergo large oscillations whereas those in a large population do small oscillations. The demographic properties of the observed dynamics agree well with those of our model. This example is one of the simplest confirmed cases of NFDS maintaining genetic polymorphisms in nature." (Authors)] Address: Watanabe, M., Grad. School of Life & Environmental Sc., Univ. Tsukuba, Tennodai, Tsukuba, Ibaraki 305-8572, Japan
- 9935.** Tang, H.B.; Wang, L.K.; Hämäläinen, M. (2010): *A Photographic Guide to the Dragonflies of Singapore*. ISBN-13: 9789810861551: 222 pp. (in English) [This fieldguide includes details of all 124 species currently found in Singapore "and almost all are illustrated in brilliant colour photographs. There are additional chapters covering Odonata taxonomy, morphology, ecology and conservation and tips on where to find and how to study them." (Publisher)] Address: Nature's Niche Pte Ltd, 10 Lorong Lada Hitam, Singapore 778793, Singapore
- 9936.** Taylor, P.; Smallshire, D. (2010): A change in status of the Dainty Damselfly *Coenagrion scitulum* (Rambur) in the United Kingdom. *J. Br. Dragonfly Society* 26(2): 108-109. (in English) ["The revised list of Odonata in the United Kingdom produced by Taylor et al. (2009) contained 42 species in Category A, a further

12 species in Category B and 3 species in Category C (former breeding species not recorded since 1970). The discovery of at least four *Coenagrion scitulum* adults in Kent during June and July 2010 and the identification of two exuviae from the same species, require *C. scitulum* to be moved from Category C to Cat. B (vagrant species)." (Authors)] Address: Taylor, Pam, Decoy Farm, Decoy Rd, Potter Heigham, Norfolk, NR29 5LX, UK

**9937.** Termaat, T.; Kalkman, V.; Bouwman, J. (2010): Changes in the range of dragonflies in the Netherlands and the possible role of temperature change. *BioRisk* 5: Special issue: Monitoring climatic change with dragonflies: 155-173. (in English) ["The trends of 60 Dutch dragonfly species were calculated for three different periods (1980–1993, 1994–1998 and 1999–2003). Comparing period 1 and period 3 shows that 39 of these species have increased, 16 have remained stable and 5 have decreased. These results show a revival of the Dutch dragonfly fauna, after decades of ongoing decline. The species were categorized in different species groups: species with a southern distribution range, species with a northern distribution range, species of running waters, species of fenlands and species of mesotrophic lakes and bogs. The trends of these different species groups were compared with the all-species control group. As expected, a significantly higher proportion of the southern species show a positive trend than the all-species group. In the northern species group on the contrary, a significantly higher proportion of the species show a negative trend than the all-species group. Different explanations for these results are discussed, such as climate change, improved quality of certain habitats and degradation of other habitats. It is likely that the observed increase of southern species is at least partly caused by the increasing temperatures. The less positive picture of the northern species group is probably more influenced by other environmental factor than directly by climate change. Three out of six southern species which have become established since 1990 have done so during the aftermath of large invasions. It is concluded that dragonflies are well capable of using changing climate circumstances to colonise new habitats." (Authors)] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands

**9938.** Thienel, F.; Holtmann, B. (2010): Libellen (Odonata) im EU-Vogelschutzgebiet Südradde sowie in den NSG Molberger Dose und Hahnenmoor. *Feuchtwiesen-Info* 10: 25-28. (in German) [Niedersachsen, Germany. Between 2009 and 2010 a total of 30 odonate species was recorded. The list of species includes regionally rare or threatened species as *Ceragrion tenellum* and *Sympetrum depressiusculum*.] Address: Thienel, F., St. Antoniort 1, 49610 Quakenbrück, Germany

**9939.** Tom, K.R.; Newman, M.C.; Schmerfeld, J. (2010): Modeling mercury biomagnification (South River, Virginia, USA) to inform river management decision making. *Environmental Toxicology and Chemistry* 29: 1013-1020. (in English) ["Mercury trophic transfer in the South River (VA, USA) was modelled to guide river remediation decision making. Sixteen different biota types were collected at six sites within 23 river miles. Mercury biomagnification was modelled using a general biomagnification model based on  $\delta^{15}N$  and distance from the historic mercury release. Methylmercury trophic transfer was clearer than that for total Hg and, therefore, was used to build the predictive model ( $r^2_{\text{prediction}} = 0.76$ ).

The methylmercury biomagnification factors were similar among sites, but model intercept did increase with distance down river. Minimum Akaike's Information Criterion Estimation (MAICE) justified the incorporation of distance in the model. A model with a very similar biomagnification factor to the South River (95% confidence intervals [CI] = 0.38–0.52) was produced for a second contaminated Virginia river, the North Fork Holston River (95% CI = 0.41–0.55). Percent of total Hg that was methylmercury increased monotonically with trophic position. Trophic models based on  $\delta^{15}N$  were adequate for predicting changes in mercury concentrations in edible fish under different remediation scenarios." (Authors) Organisms analyzed from the South and Holston Rivers (VA, USA) include "Gomphidae" and "Zygoptera".] Address: Newman, M.C., College of William and Mary—VIMS, Gloucester Point, Virginia 23062, USA. E-mail: newman@vims.edu

**9940.** Trockur, B.; Boudot, J.-P.; Fichet, V.; Goffart, P.; Ott, J.; Proess, R. (2010): Atlas der Libellen / Atlas des libellules (Insecta, Odonata). *Fauna und Flora in der Großregion / Faune et Flore dans la Grande Région*, Band 1; Hrsg./Éd.: Zentrum für Biodokumentation (Landsweiler-Reden): 201 pp. (Bilingual in German and French, with English summary) ["All data on dragonflies collected in the databases of the five partner regions of the „Sar-Lor-Lux+-region" have been put together and on this basis, actual maps have been compiled. Existing databases of four regions were completed with the data up to the year 2006. Furthermore, for the first time ever, a database on dragonflies was established for the German federal state Rhineland-Palatinate. Concerning the depiction of the total number of 117 053 records, two time spans are compared: before 1990, and from 1990 onwards whereupon 70 % of all records originate from the second period. In the „Großregion", a total of 75 species are known, whereas in each of the three big regions (regarding their extension) Wallonia, Lorraine and Rhineland-Palatinate, 67 species have been detected. On the basis of the total number grid cells (10x6 minutes, about 134 km<sup>2</sup> each grid cell) where a species was recorded, a simple analysis of the most common and the rarest species is conducted, as well as of the species with the biggest increase and the biggest decline during the two time spans which have been compared. In addition, maps showing the "dragonfly hotspots" (areas with a high number of different species) in the "Großregion" were created by summarizing all species per grid cell. All species listed in the different Red Lists and in the Annexes II and IV of the EC Habitats Directive are presented in a table. Range expansions or changes within the faunas - observed or expected - are described and discussed; some remarkable species of the "Großregion" are presented and described. All species are described in a single chapter by one of the five authors — representing the five regions — who were also responsible for the photos of the species and typical biotopes thus emphasizing the cross-border cooperation. Finally, the experiences made in compiling the atlas are discussed and suggestions for further cross-border cooperation are presented." (Authors)] Address: Zentrum für Biodokumentation, Am Bergwerk Reden 11, 66578 Schiffweiler, Germany. E-mail: info.biodoku@lua.saarland.de

**9941.** White, E.L.; Corser, J.D.; Schlesinger, M.D. (2010): Distribution and Status of the Odonates of New York. A Partnership between The Nature Conservancy

and the NYS Department of Environmental Conservation, 625 Broadway, 5th Floor Albany, NY 12233-4757: 424 pp. (in English) ["The New York Dragonfly and Damselfly Survey (NYDDS) began in 2005, spanned five field seasons through 2009, and relied heavily on citizen scientists to help collect data over a large geographic area. Its primary goal was to document the current distribution of all odonate species in New York State. This cooperative project between the New York State Department of Environmental Conservation (NYSDEC), Division of Fish, Wildlife and Marine Resources, and the New York Natural Heritage Program was funded through New York State Wildlife Grant T-2-1 in cooperation with the U.S. Fish and Wildlife Service Division of Wildlife and Sport Fish Restoration. Survey efforts were directed toward under-surveyed regions, areas with potential high diversity, and locations with potential for harboring Species of Greatest Conservation Need (SGCN). NYDDS volunteers were trained at workshops held throughout the state during the summers of 2005-2007. The training was designed for beginners from all walks of life and focused on basic odonate biology, taxonomy, and identification, as well as field capture and specimen preservation techniques. Nearly 300 people were trained at these workshops, some of whom were NYSDEC or NY Natural Heritage staff. We focused most of our survey efforts on adults rather than larvae due to their relative ease of identification. Surveys were completed from April through October in or near aquatic breeding habitats such as lakes, ponds, bogs and fens, rivers and streams, marshes, swamps, and forest seeps. Wooded areas and fields near aquatic habitats were also fruitful survey sites, as adults use these areas to mature, roost, and forage. We took many steps to ensure that data received from volunteers were accurate. Participants were provided with a list that noted, for each species (and in some cases, for each sex) the level of verification necessary for record confirmation (observation, photograph or specimen). These photo and specimen vouchers were verified by odonate experts. Our five-year sampling effort yielded many important finds. Most notable were five species added to the list of known odonates for the state, bringing the cumulative total to 194 species, one of the highest diversities of any U.S. state. Owing to the efforts of entomologists, odonatologists, and odonate enthusiasts prior to the NYDDS, New York has records extending back to the late 1800s. This existing county distribution information was compiled by odonatologist Thomas Nick Donnelly of the Dragonfly Society of the Americas in 1999 and again in 2004. We were unable to confirm the presence of 15 of the 189 Odonata species ever documented in New York by Donnelly, and every one of these species was rare in the state to begin with. Participants visited over 2,170 survey sites statewide and a total of 4,383 surveys were conducted, including repeat visits. We confirmed over 18,000 individual species records based on our verification protocol. NYDDS yielded 1,111 new county records beyond these preexisting data. Each county's documented richness increased by 18 species on average, and we documented at least 75 species in two-thirds of New York's 62 counties. A list was compiled for each county as well as a distributional map and phenology chart for all 194 species and full species accounts are included for all 48 SGCN. We calculated draft S-ranks for rare species using NatureServ's Element Rank Calculator and we found that of N's 194 odonate species, 26% are likely to be ranked as critically imperiled (S1) or imperiled

(S2). Surveys for the state historical *Williamsonia lintneri* were unsuccessful, but produced leads in the Grafton and Rome areas. We completed at least five group surveys in western NY for the Federally Endangered *Somatochlora hineana* in appropriate habitat; we did not confirm the species, and it seems unlikely to be present, with the nearest known population occurring in Michigan. Multiple surveys have often been required before the presence of *S. hineana* was confirmed at new sites discovered in Wisconsin and other states, so future survey work may yet prove fruitful. Surveys for New York's state-threatened damselflies in Suffolk county revealed two new sites for *Enallagma recurvatum* (previously known from nine ponds), seven new sites for *Enallagma pictum* (previously known from three ponds), and *Enallagma minusculum* is known from three locations (two in Suffolk county and one in Queens). These surveys will inform the development of a Recovery Plan for these species. Analyses of survey effort showed that the state was sampled sufficiently to document its odonate fauna. Similarly, each of the state's seven ecoregions was well sampled, while some counties could have used additional survey effort. Such counties where additional survey effort would be most productive were identified and survey effort, ecological and biogeographical explanations were forwarded as possible reasons for the apparent lower species richness in western vs. eastern New York. Since odonates are noted indicators of water quality, biodiversity, and ecological change, our findings should help inform future conservation efforts in freshwater habitats. Along with previous distribution information, this report provides baseline information on the distribution and status of odonates in New York against which to measure future change. Much like the 2000-2005 Breeding Bird Atlas followed up on the 1980-1985 Atlas, leading to some highly informative analyses of distributional shifts, we hope that in the future this survey effort will be similarly revisited to assess shifts in odonate distributions. Monitoring of this sort may be the only way to know whether we are maintaining New York's dragonfly and damselfly biodiversity in the face of continuing global change." (Authors)] Address: White, E., NYSDEC-DFWMR, NY Natural Heritage Program, 625 Broadway, 5th Floor, Albany, NY 12233-4757, USA: E-mail: nydds@gw.dec.state.ny.us

**9942.** Wildermuth, H. (2010): *Somatochlora flavomaculata* als Beute von Radnetzspinnen (Araneae: Araneidae). *mercuriale* 10: 43-46. (in German, with English summary) [Switzerland; *S. flavomaculata* "has been recorded three times deadily entangled in orb webs. In all cases ovipositing females were concerned, in two of them also males were caught, probably after they had grasped an ovipositing female. The findings are discussed with respect to gender-specific predation-proneness of *S. flavomaculata* by orb-web spiders." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**9943.** Wildermuth, H. (2010): Ein Dreigespann der Großen Moosjungfer (*Leucorrhinia pectoralis*). *mercuriale* 10: 47-48. (in German) [Intraspecific triple connection in *Leucorrhinia pectoralis* (Odonata: Libellulidae).] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**9944.** Wildermuth, H. (2010): Monitoring the effects of conservation actions in agricultural and urbanized landscapes – also useful for assessing climate change?.



BioRisk 5: Special issue: Monitoring climatic change with dragonflies: 175-192. (in English) ["Various methods for measuring the success of conservation actions and for evaluating aquatic habitats are outlined, based on quantified dragonfly monitoring. They are discussed with respect to their practicability and information value, counts of adult males and especially of exuviae yielding the most valuable results. These are presented by actual examples of mire ponds, streams, ditches and rivers from central Europe, making allowance for the dynamics of the habitats and their dragonfly community. Records of detailed data, if repeated subsequently at the same localities with the same methods, are considered a useful basis for preparation of distribution maps and for comparison of the fauna over the time. Fauna shifts in horizontal and vertical distribution over the time should be judged critically with respect to climate change as they could also be caused by anthropogenic habitat changes." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hans-ruedi@wildermuth.ch

**9945.** Willigalla, C.; Fartmann, T. (2010): Libellen-Diversität und -zönosien in mitteleuropäischen Städten. Ein Überblick. *Naturschutz und Landschaftsplanung* 42(11): 341-350. (in German, with English summary) ["Since 1986 nearly 30 Odonata surveys in cities have been published in Central Europe. 77% (62 species) of the total Odonata fauna of Germany have been found in cities. This high Odonata species richness can be explained by the structural richness due to the high natural diversity of habitats within the biogeographical regions of the cities. However, increased urbanization leads to homogenization of the Odonata fauna. The Odonata assemblages of the cities are more similar than those of not built-up areas, which was indicated by a significantly higher Sørensen coefficient. Within the city borders an urban gradient can be observed. To the city centre the total number of species and the proportion of specialists markedly decreases. In the cities' centers, the Odonata communities only occur rudimentarily, and not even the 21 most frequent species have been found in all cities. The highest species diversity in cities was reported before 1975 with a decreasing trend thereafter. Since the 1990ies the number of species recorded in cities has increased again, probably because of the improvement of the total quality of lotic waters. Approximately 37% of the total Odonata fauna of Germany can be classified as "urbano-neutral" to moderately "urbano-philous". Correspondingly, 63% of all species are restricted to non-sealed areas and can be classified as (moderately) urbanophobe." (Authors)] Address: Willigalla, C., Willigalla - Ökologische Gutachten, Am großen Sand 22, D-55124 Mainz, Germany. E-mail: christoph@willigalla.de

**9946.** Worthen, W.B. (2010): Emergence-site selection by the dragonfly *Epitheca spinosa* (Hagen). *South-eastern Naturalist* 9(2): 251-258. (in English) ["Odonates are vulnerable during emergence, when they shed their exuvia to take flight as adults. Emergence-site selection should adapt to the local mortality risks. Here, I characterized emergence-site selection of *E. spinosa* by noting the substrate, height, and distance from water of exuviae in a 300 m × 5 m plot at Weston Lake, Congaree National Park, Hopkins, SC, USA. Of the 82 *E. spinosa* exuviae sampled, 52 (63.4%) were found on trees with corky bark (*Nyssa aquatica* [Water Tupelo], *Nyssa biflora* [Swamp Tupelo], *Fraxinus penn-*

*sylvanica* [Green Ash]), while no exuviae were found on the peeling, flaky trunks of *Taxodium distichum* (Bald Cypress) or the smooth, platy trunks of *Acer rubrum* (Red Maple). However, 26 (31.7%) exuviae were on *T. distichum* pneumatophores. This pattern was significantly different from the relative abundances of these substrate types ( $\chi^2 = 19.8$ ,  $df = 3$ ,  $P < 0.001$ ). Most exuviae (93.9%) were on substrates touching the water, suggesting that larvae climb directly from the water to their emergence site. The mean height of exuviae on trees was  $3.3 \pm 1.37$  m, with a range from 1.8–7.7 m. High-climbing by *E. spinosa* larvae may be an adaptation to flooding at Weston Lake; major flood events (>3 m) are common (5 of the last 10 years) during their March–April emergence period." (Author)] Address: Worthen, W.B., Biology Dept, Furman Univ., Greenville, SC 29613, USA. E-mail: wade.worthen@furman.edu

**9947.** Zawal, A.; Czachorowski, S. (2010): Dragonflies (Odonata) and caddisflies (Trichoptera) of water reservoirs in the suburban landscape of Swinoujscie (north-west Poland). *Natura Montenegrina, Podgorica* 9(3): 481-488. (in English) ["In 2007, ten dragonfly species and eight caddisflies species were recorded in periodical water reservoirs situated at the site where a liquefied natural gas terminal was going to be constructed. The encountered dragonfly and caddisfly fauna was typical of periodical reservoirs. Three communities of these insects were differentiated. Faunistic similarities among the reservoirs only partly corresponded to habitat diversity and reservoir types, which might indicate that species composition depends also on colonization processes, which are well described by the model of ecological islands." (Authors)] Address: Zawal, A., Department of Invertebrate Zoology S Limnology, University of Szczecin. 71-415 Szczecin. Wąska 13. Poland. E-mail: zawal@univ.szczecin.pl

**9948.** Zha, L.-S.; Jiang, Y.-H. (2010): *Epophthalmia bannaensis* spec. nov., a new dragonfly from Yunnan, China (Anisoptera: Corduliidae). *Odonatologica* 39(4): 363-366. (in English) ["The new species is described and illustrated. Holotype male: China, Yunnan: Xishuangbanna Tropical Botanical Garden (21.55°N, 101.13°E), 500m, 4-VIII-2004; deposited at the Institute of Zoology, Shaanxi Normal University, Xi'an, China. It is related to *Epophthalmia frontalis* Selys, but is easily separated based on structural differences of the secondary and caudal genitalia and slight differences in colouration." (Authors)] Address: Jiang, Y.-H., Yuntai-xiang Culture Station, Xinpu district, Lianyungang, Jiangsu-222064, China. E-mail: Jiangyh26@yahoo.com.cn

**9949.** Zhang, H.; Tong, X. (2010): Descriptions of the final instar larvae of three Chinese *Idionyx* species (Odonata: Anisoptera: Corduliidae). *Zootaxa* 2716: 53-63. (in English) ["The larvae of *Idionyx carinata* Fraser, 1926, *I. selysi* Fraser, 1926 and *I. victor* Hämäläinen, 1991 are described and illustrated for the first time based on final stage larvae reared in laboratory. *Idionyx selysi* is newly recorded from China. A generic diagnosis and biological information are provided." (Authors)] The paper also includes impressive figures of the imaginal stages of the species studied.] Address: Tong, X., Department of Entomology, College of Natural Resources and Environment, South China Agricultural University, Guangzhou, 510642, Guangdong Province, P. R. of China. E-mail xtong@scau.edu.cn

**9950.** Zhang, H.-m.; Tong, X.-l. (2010): Chlorogomphinae dragonflies of Guihou province (China) with first descriptions of Chlorogomphus tunti Needham and Watanabeopetalia usignata (Chao) larvae (Anisoptera: Cordulegastriidae). *Odonatologica* 39(4): 327-338. (in English) [Chlorogomphus papilio, C. nasutus, C. suzukii, C. tunti, and Watanabeopetalia usignata are recorded from Guihou province. Four of them are new for the region. C. tunti and W. usignata larvae are described based on the specimens reared in the laboratory. The adults are illustrated and some biological information is provided.] Address: Tong, X.-L., Dept of Entomology, College of Natural Resources and Environment, South China Agricultural University, Guangzhou-510642, China. E-mail: xtong@scau.edu.cn

**9951.** Zhang, H.-m.; Yeh, W.-c.; Tong, X.-i. (2010): Descriptions of two new species of the genus *Planaeschna* from China (Odonata: Anisoptera: Aeshnidae). *Zootaxa* 2674: 51-60. (in English) ["Two new species of *Planaeschna* McLachlan, *P. laoshanensis* sp. nov. from Shandong, China and *P. nankunshanensis* sp. nov. from Guangdong, China are described and illustrated and diagnosed from their congeners. Description of the final stadium larva of *Planaeschna nankunshanensis* is also provided." (Authors)] Address: Tong, X.-i., Department of Entomology, College of Natural Resources and Environment, South China Agricultural University, Guangzhou, 510642, Guangdong Province, P. R. of China. E-mail: xtong@scau.edu.cn

**9952.** Zoder, S. (2010): *Libellula fulva* MÜLLER, 1764 (Spitzenfleck) am Unteren Inn (Odonata, Anisoptera, Libellulidae). *Mitteilungen der zoologischen Gesellschaft Braunau* 10(1): 91-94. (in German) [Studies of ditches in the lower River Inn region (Landkreise Passau and Rottal-Inn, Bayern, Germany) prior 2008 didn't prove any records of *L. fulva*. First unpublished records from this region of this species dates from 2008. In 2009 and 2010 two additional small populations were found. This is assessed as range extension of *L. fulva*, which also is observed in others west- and central European regions. The paper also includes a record of the rare *Coenagrion ornatum*.] Address: Zoder, S., Am Ziegelstadelberg 17, D-94094 Roththalmünster, Germany. E-mail: Sebastian.Zoder@gmail.com

## 2011

**9953.** Cannings, R.A.; Cannings, S.G. (2011): Chapter 10: Odonata (dragonflies and damselflies) of the montane Cordillera ecozone. In: *Assessment of Species Diversity in the Montane Cordillera Ecozone*. Edited by G.G.E. Scudder and I.M. Smith. Royal British Columbia Museum: 1-31 (in English). ["The Odonata are energetic aerial predators of other insects; the aquatic larvae are voracious predators of invertebrates and small vertebrates. Over 5500 species of the order are described worldwide; the Montane Cordillera Ecozone supports about 40% of the Canadian fauna. A checklist and systematic overview of the Suborders Zygoptera and Anisoptera, their 10 families and 81 species (19 of which are listed as potentially endangered, threatened, or vulnerable), and an analysis of their biogeographic elements are presented. Twenty-eight species of Boreal origin (35%) are recorded. Of these, 13 (16%) are Widespread Boreal, 9 (11%) are Southern Boreal, 4 (5%) are Northern Boreal, and 2 (3%) are Western Boreal. Transition species total 18 species (22%) and there are 12

(15%) Cordilleran species. Nine species (11%) are Western, 8 (9%) are Austral, and 6 (8%) are widespread species according to our definitions. Ecozone aquatic habitats and their typical species are divided into 12 categories: large lakes (wave-washed shores with little vegetation), small lakes and ponds (floating, but little emergent vegetation), alkaline ponds, ephemeral ponds, cattail/bulrush marshes (including margins of lakes and ponds), sedge marshes, small peatland ponds with aquatic moss, three types of fens, streams and springs. Stress on dragonfly populations is discussed under the headings of draining of wetlands, flooding of wetlands, fish introductions, lakeshore modifications, livestock disturbance, hot springs development, logging, and climate change. Recommendations for inventory and taxonomic research are noted." (Authors) Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street, Victoria, BC, V8W 9W2, Canada

**9954.** Chakravorty, J.; Ghosh, S.; Meyer-Rochow, V.B. (2011): Practices of entomophagy and entomotherapy by members of the Nyishi and Galo tribes, two ethnic groups of the state of Arunachal Pradesh (North-East India). *Journal of Ethnobiology and Ethnomedicine* 2011, 7:5 doi:10.1186/1746-4269-7-5: 35 pp. (in English) [We prepared a consolidated list of edible and therapeutic insects used in Arunachal Pradesh (N.E. India) by two tribal societies (i.e., the Nyishi of East Kameng and the Galo of West Siang). The list is based on thorough, semi-structured field-interviews with 20 informants of each tribal group. At least 81 species of local insects, belonging to 26 families and five orders of insects, namely Coleoptera (24 species), Orthoptera (17 species), Hemiptera (16 species), Hymenoptera (15 species) and Odonata (9 species), are being used as food among members of these two indigenous societies. However, Nyishi use overall more species of insects as food than Galo people do and consume mostly Coleoptera and Hemiptera; amongst the Galo, on the other hand, Odonata and Orthoptera dominate. The selection of the food insects amongst the Nyishi and Galo is dictated by traditional tribal beliefs as well as the taste and availability of the insects. Depending on the species, only particular or all developmental stages are consumed. Some food insects may be included in the local diet throughout the year, others only when seasonally available. Commonly specimens are being prepared for consumption by roasting, frying or boiling. Twelve species of insects are deemed therapeutically valuable by the locals and are being used by the tribes investigated to treat a variety of disorders in humans and domestic animals. Members of the Galo use a greater number of insect species for remedial purposes than the Nyishi. With the degradation of natural resources, rapid population growth, and increasing influence of 'westernization', the traditional wisdom of entomophagy and entomotherapy is at risk of being lost. There is thus an urgent need to record the role insects play as components of local diets and folk remedies and to assess insect biodiversity in the light of these uses." (Authors)] Address: Meyer-Rochow, V.B., School of Engineering and Science, Jacobs University, Research II (rm. 37) D-28759 Bremen, Germany. E-mails: b.meyer-rochow@jacobs-university.de

**9955.** Do Manh, C.; Bui Minh, H.; Nguyen Thi, H.; and Phan Quoc, T. (2011): Anisoptera of Cuc Phuong National Park, North Vietnam. *International Dragonfly Report* 33: 1-18 (in English) [During three field trips in

2006 and 2010 to Cuc Phuong National Park in northern Vietnam, a total of 19 anisopteran taxa was recorded. The most interesting records are documented here with field photographs of living specimens or collection material. Observations on their biology and behaviour are also noted." (Authors)] *Asiagomphus xanthenatus* *acco* Asahina, 1996 is given species rank. Address: Do Manh Cuong, Hom thu so 16, Buu Dien 10210, 35 Thai Thinh, Hanoi, Vietnam. E-mail: docuong@gmail.com

**9956.** Feld, C.K.; Tangelder, M.; Klomp, M.J.; Sharma, S. (2011): Comparison of river quality indices to detect the impact of organic pollution and water abstraction in Hindu Kush-Himalayan rivers of Nepal. *Journal of Wetlands Ecology* 4: 112-127. (in English) ["Several assessment methods exist for river quality classification in the Hindu Kush-Himalayan region. While rapid field bioassessment (RFB)1 applies on-site screening protocols, more sophisticated multi-habitat sampling (MHS) is employed to generate biotic scores using benthic macroinvertebrates as bioindicators. This study presents the comparison of River Quality Classifications (RQC) according to i) 40 RFB records based on two slightly different RFB protocols and ii) 20 qualitative benthic macroinvertebrate samples used to calculate two different scores (average scores per taxon; ASPT). Sensory attributes, such as odour, colour, foam and epilithic algal cover, were used in addition to biological samples for RFB. All samples were taken at two river basins in Nepal, the Punyamata river (12 stations, stressor: organic pollution) and the Khimti river (8 stations, stressor: damming and water abstraction). RQCs revealed organic pollution to impact benthic invertebrate communities in the Punyamata river, while the impact of water abstraction and damming was not detectable in the Khimti basin based on the methods compared. Furthermore, a pollution gradient was clearly detectable based on 66 macroinvertebrate families and genera found in our samples. Our results confirm the applicability of RFB protocols and scoring systems to assess the impact of organic pollution in Nepalese rivers. Further research, however, will be required to adjust the protocols and taxon scores to assess also the impact of other stressors present in the region." (Authors) Gomphidae is the only Odonata family included in the study. No species names are represented.] Address: Feld, C.K., University of Duisburg-Essen, Faculty of Biology and Geography, Applied Zoology/Hydrobiology, D-45117 Essen, Germany. E-mail: christian.feld@uni-due.de

**9957.** Fredricks, T.B.; Giesy, J.P.; Coefield, S.J.; Sexton, R.M.; Haswell, M.M.; Tazelaar, D.L.; Bradley, P.W.; Moore, J.N.; Roark, S.A.; Zwiernik, M.J. (2011): Dietary exposure of three passerine species to PCDD/DFs from the Chippewa, Tittabawassee, and Saginaw River floodplains, Midland, Michigan, USA. *Environmental Monitoring and Assessment* 172(1-4): 91-112. (in English) ["Dietary exposure of house wrens (*Troglodytes aedon*), tree swallows (*Tachycineta bicolor*), and eastern bluebirds (*Sialia sialis*) to polychlorinated dibenzofurans (PCDFs) and polychlorinated dibenzo-p-dioxins (PCDDs) near Midland, Michigan (USA) was evaluated based on site-specific data, including concentrations of residues in bolus samples and individual invertebrate orders and dietary compositions by study species. Site-specific dietary compositions for the three species were similar to those reported in the literature, but differed in their relative proportions of some dietary items. Oligochaeta (non-depurated) and Brachycera (Diptera) con-

tained the greatest average concentrations of SPCDD/DFs of the major site-specific dietary items collected via food web-based sampling. Average ingestion values of SPCDD/DFs from site-specific bolus-based and food web-based dietary concentrations for nestlings at study areas (SAs) were 6- to 20-fold and 2- to 9-fold greater than at proximally located reference areas (RAs), respectively. Average ingestion values of total 2,3,7,8-tetrachlorodibenzo-p-dioxin equivalents (TEQWHO?-?Avian) from site-specific bolus-based and food web-based dietary concentrations for nestlings at SAs were 31- to 121-fold and 9- to 64-fold greater than at proximally located RAs, respectively. Estimates of SPCDD/DFs and TEQWHO?-?Avian tissue concentrations based on nestling dietary exposures were greater than those measured. Plausible explanations include nestling metabolism of 2,3,7,8-tetrachlorodibenzofuran and assimilation rates of less than the 70% assumed to occur over the nestling growth period. Profiles of the relative concentrations of individual PCDD/DF congeners in samples of invertebrates and bolus at SAs on the Tittabawassee River downstream of the source of contamination were dominated by 1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin (22% to 44%) and 2,3,7,8-tetrachlorodibenzofuran (18% to 50%)." (Authors)] Address: T. B. Fredricks, T.B., Dept of Zoology, Michigan State Univ., East Lansing, MI 48824, USA. E-mail: fredri29@msu.edu

**9958.** Gäde, G.; Simek, P.; Fescemyer, H.W. (2011): Adipokinetic hormones provide inference for the phylogeny of Odonata. *Journal of Insect Physiology* 57(1): 174-178. (in English) ["Adipokinetic neuropeptides from the corpora cardiaca of 17 species of Odonata encompassing mainly the families Corduliidae and Libellulidae were isolated and structurally elucidated using liquid chromatography coupled with ion trap electrospray ionization mass spectrometry. It became evident that all species of the family Corduliidae studied express the peptide code-named Libau-AKH (pGlu-Val-Asn-Phe-Thr-Pro-Ser-Trp amide), which is also present in all but one libellulid species, *Erythemis simplicicollis* which expresses Erysi-AKH (pGlu-Leu-Asn-Phe-Thr-Pro-Ser-Trp amide). This divergence from all other Libellulids is due to a nonsynonymous missense single nucleotide polymorphism (SNP) in the nucleotide coding sequence (CDS) of prepro-AKH CDS and supports the polyphyletic nature of Sympettrinae and other subfamilies of libellulids. Despite this exception, these findings then support the hypothesis that Corduliidae and Libellulidae are closely related as stated in most phylogenies. The presence of Anaim-AKH (pGlu-Val-Asn-Phe-Ser-Pro-Ser-Trp amide) in Macromiidae likely distinguishes species in this family from Corduliidae. Current molecular genetic phylogenies and our AKH findings suggest that *Syncordulia gracilis*, which expresses Anaim-AKH, does not belong in Corduliidae. Evolution of AKHs in anisopteran Odonata are likely due to nucleotide substitution involving nonsynonymous missense SNPs in the CDS of prepro-AKH." (Authors)] Address: Gäde, G., Zoology Dept, Univ. of Cape Town, Rondebosch 7701, South Africa. E-mail: gerd.gade@uct.ac.za

**9959.** Gorb, S.N. (2011): Insect-Inspired Technologies: Insects as a Source for Biomimetics. Vileinskas, A. (Ed.): *Insect Biotechnology. Biologically-Inspired Systems*, 2011, Volume 2, Part 3: 241-264. (in English) ["The understanding of functional principles of insect materials, structures, sensors, actuators, locomotion,



control systems, and behaviour is of major scientific interest. On the other hand, this basic knowledge is also highly relevant for technical applications. One of the greatest challenges for today's engineering science is miniaturization. Insects have solved many problems correlated with extremely small size, during their evolution. Zoologists, entomologists, morphologists, and neurobiologists have collected a huge amount of information about the structure and function of such living micro-mechanical systems. This information can be utilized to mimic them for industrial applications. Insect solutions may be applied in the following main technology areas: (1) materials science and technology, (2) surface science, (3) science of adhesives, (4) optics, (5) photonics, (6) sensorics, and (7) robotics. A few selected examples are discussed in this chapter, but with over one million described species as a source for inspiration, one can expect many more ideas from entomological science for biomimetics." (Author) The paper includes references to Odonata.] Address: Gorb, S.N., Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**9960.** Honkavaara, J.; Dunn, D.W.; Ilvonen, S.; Suhonen, J. (2011): Sympatric shift in a male sexual ornament in the damselfly *Calopteryx splendens*. *Journal of Evolutionary Biology* 24(1): 139-145. (in English) ["Character displacement is a process by which interactions between two species that exhibit similar traits, results in geographical patterns of trait divergence in one or both species. These traits evolve to reduce costs of interspecific interactions in sympatry and thus differ from their condition in allopatry. In male damselflies *Calopteryx splendens*, large wing spots are sexually selected. However, in sympatric populations with *Calopteryx virgo*, wing spot size decreases as *C. virgo* abundance increases. The stability of this pattern is unclear, because previous studies have focused on sympatric populations with potentially fluctuating relative abundances. We studied the wing spot sizes of *C. splendens* in both sympatric and allopatric populations. Our data show that male *C. splendens*' wing spots are larger in allopatry than in sympatry with *C. virgo*. We suggest that both interspecific aggression and avoidance of interspecific reproductive interactions may result in this pattern, although their relative importance remains unclear." (Authors)] Address: Honkavaara, J., Department of Biology, Section of Ecology, University of Turku, 20014 Turku, Finland. E-mail: johhon@utu.fi

**9961.** Kuitunen, K.; Kotiaho, J.S.; Luojumäki, M.; Suhonen, J. (2011): Selection on size and secondary sexual characters of the damselfly *Calopteryx splendens* when sympatric with the congener *Calopteryx virgo*. *Canadian Journal of Zoology* 89(1): 1-9. (in English) ["Male mating success is often determined by body size or secondary sexual characters because of female mate choice or competition for females. In addition to intraspecific interactions, interspecific interactions may interfere with intraspecific selection. In this study, we investigated sexual selection on size and sexual characters of male banded demoiselle (*Calopteryx splendens* (Harris, 1780)) in wild populations sympatric with the beautiful demoiselle (*Calopteryx virgo* (L., 1758)). As secondary sexual characters, male *C. splendens* have pigmented wing spots whose size appears to be under positive selection. Male *C. virgo* resemble male *C. splendens* that have the largest wing spots, leading to

interspecific male-male aggression and possibly also to heterospecific matings via mistaken species recognition. If interspecific interactions interfere with intraspecific sexual selection on wing-spot size of *C. splendens*, their effects should increase with the increasing relative abundance of *C. virgo*. Our results did not show the expected positive selection on wing-spot size in *C. splendens*, suggesting that interspecific interactions might interfere with sexual selection. Also, we observed no relationship between the strength of interspecific sexual selection and the relative abundance of *C. virgo*. However, there was a positive intraspecific density-dependent sexual selection for larger size. Although the present results are tentative, we suggest that interspecific interactions should be considered along with intraspecific selection when studies of sexual selection are performed in the wild." (Authors)] Address: Suhonen, J., Department of Biological and Environmental Science, P.O. Box 35, FI-40014, University of Jyväskylä, Finland

**9962.** Mishra, A.S.; Nautiyal, P. (2011): Factors governing longitudinal variation in benthic macroinvertebrate fauna of a small Vindhyan river in Central Highlands ecoregion (central India). *Tropical Ecology* 52(1): 103-112, 2011: 103-112. (in English, with Portuguese and Spanish summary) ["Variation in the taxonomic composition of benthic macroinvertebrate fauna was examined in the Paisuni river at four stations (P1 to P4) located longitudinally along the river, with P1 being nearest the source of origin. The fauna was dominated by insects at all the stations. Total density increased from P1 to P3, decreased at P4 and differed significantly among the stations. Increase in the relative abundance from P1 to P4 was observed for Baetidae, Chironomidae and Gomphidae, and a decrease for Leptophlebiidae, Heptageniidae, Neophemeridae, Rhyacophilidae and Thiaridae. Ordination analysis indicated that Rhyacophilidae was the characteristic taxon at P1, Thiaridae at P2 and Chironomidae at stations P3 and P4. Ordination also revealed that current velocity, substratum and landuse were the major environmental factors influencing the relative composition of macroinvertebrates. The longitudinal variation in taxonomic composition and assemblages showed a change of trophic status due to direct human interference at P2. Collectors were abundant at all stations but predominated the assemblages from P3 to P4. The balance between collectors, scrapers and predators shifted to predominance by collectors indicating heterotrophic conditions at P3 and P4 in contrast to autotrophic conditions at P1 and P2. Hence, two ecological zones are evident in the Paisuni river." (Authors)] Address: Mishra, A.S., Aquatic Biodiversity Unit, Department of Zoology, H.N.B. Garhwal University, Srinagar Garhwal 246174, Uttarakhand, India. E-mail: shivama2000@yahoo.co.in

**9963.** Ott, J. (2011): Wie helfe ich einer Libelle? Lebensweise und Schutz der Libellen. [www.bund.net](http://www.bund.net): 16 pp. (in German) [This is a basic introduction to dragonflies and their habitat requirements within the framework of the activities of the BUND (Friends of the Earth) directed to dragonfly conservation in 2011.] Address: Bund für Umwelt und Naturschutz Deutschland e.V., Friends of the Earth Germany, Am Köllnischen Park 1, 10179 Berlin. Germany. E-Mail: [info@bund.net](mailto:info@bund.net). [www.bund.net](http://www.bund.net)

**9964.** Outomuro, D.; Johansson, F. (2011): The effects of latitude, body size, and sexual selection on wing shape in a damselfly. *Biological Journal of the Linnean*

Society 102(2): 263-274. (in English) ["Under natural selection, wing shape is expected to evolve to optimize flight performance. However, other selective factors besides flight performance may influence wing shape. One such factor could be sexual selection in wing sexual ornaments, which may lead to alternative variations in wing shape that are not necessarily related to flight performance. In the present study, we investigated wing shape variations in a calopterygid damselfly along a latitudinal gradient using geometric morphometrics. Both sexes show wing pigmentation, which is a known signal trait at intra- and interspecific levels. Wing shape differed between sexes and, within the same sex, the shape of the hind wing differed from the front wing. Latitude and body size explained a high percentage of the variation in wing shape for female front and hind wings, and male front wings. In male hind wings, wing pigmentation explained a high amount of the variation in wing shape. On the other hand, the variation in shape explained by pigmentation was very low in females. We suggest that the conservative morphology of front wings is maintained by natural selection operating on flight performance, whereas the sex-specific differences in hind wings most likely could be explained by sexual selection. The observed sexual dimorphism in wing shape is likely a result of different sex-specific behaviours." (Authors)] Address: Outomuro, D., Depto de Biología de Organismos y Sistemas, E-33071 University of Oviedo, Spain. E-mail: outomuro.david@gmail.com

**9965.** Phan Quoc, T.; Do Manh, C.; Hämäläinen, M. (2011): Xuan Son National Park, a paradise for Caloptera damselflies in northern Vietnam. *International Dragonfly Fund Report 32*: 1-34 (in English) ["During three field trips in 2009-2010 to Xuan Son National Park in Phu Tho province in northern Vietnam, a total of 13 species of damselflies of the superfamily Calopterygoidea were recorded. These records are documented here with field photographs of living damselflies. Observations on their biology and behaviour are also noted. Three of the species are reported from Vietnam for the first time: *Rhinocypha arguta*, an undescribed *Matrona* species and *Vestalaria miao*. The last species was first found in Huu Lien Nature Reserve in Lang Son province in June 2008." (Authors)] Address: Phan Quoc, T.; Vietnam National Museum of Nature, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam. E-mail: phanquoctoan-84@gmail.com

**9966.** Scheibler, E.E.; Ciocco, N.F. (2011): Distribution of macroinvertebrate assemblages along a saline wetland in harsh environmental conditions from Central-West Argentina. *Limnologica - Ecology and Management of Inland Waters* 41(1): 37-47. (in English) ["The goal was to examine how macroinvertebrate taxonomic richness and density respond to spatial-temporal changes and to the influence of water physicochemical characteristics along the Bañado Carilauquen (BC). Benthic samplings were conducted seasonally and environmental parameters were recorded in five reaches of the BC. Cluster analysis was applied to compare taxonomic richness among sites. Community structure and spatial-temporal variation were explored using logarithmic regression. CCA was applied to explore the relationship between species and environmental variables. A total of 36 taxa were identified, predominantly insects. A growing gradient of conductivity and hardness was registered between headwaters (HD; relatively soft waters) and outlet (OL; very hard and saline waters). Total

density of taxa showed significant differences among sampling sites and climate seasons. A decline in richness and density was observed from HD to OL. The spatial conductivity gradient is the major factor modulating macroinvertebrate distribution along this saline arid wetland. With the exception of the headwaters, hard, eutrophic, polysaprobic and contaminated waters such as those of the BC represent critical conditions for the development of macroinvertebrate assemblages." (Authors) Odonata taxa in the Bañado Carilauquen are: *Rhionaeshna absoluta* and *Ischnura fluviatilis*.] Address: Scheibler, Erica, IADIZA, CCT CONICET Mendoza, sede Cricyt. Avda. Ruiz Leal s/n. Parque General San Martín, CC 507, 5500 Mendoza, Argentina. E-mail: escheib@mendoza-conicet.gov.ar

**9967.** Simaika, J.P.; Samways, M.J. (2011): Comparative assessment of indices of freshwater habitat conditions using different invertebrate taxon sets. *Ecological Indicators* 11(2): 370-378. (in English) ["Monitoring changes in population levels of a wide range of species in biodiversity research and conservation requires practical, easy-to-use and efficient assessment and monitoring methods. Dragonflies (Insecta: Odonata) are a valuable tool for assessing aquatic systems and have been used as indicators of ecological health, ecological integrity, and environmental change, including climatic change, as well as indicators of habitat recovery. We field-tested a freshwater ecological integrity index, the Dragonfly Biotic Index (DBI), based on dragonfly assemblages at the local scale, and compared the DBI to a biodiversity index (average taxonomic distinctness, AvTD) as well as to a standard freshwater benthic macroinvertebrate-based freshwater health index (South African Scoring System, using Average Score Per Taxon, ASPT). We sampled 20 river sites, selected a priori. Adult dragonflies and benthic macroinvertebrates were collected using standardized methods. Environmental variables were collected in situ, and water samples taken. Temperature and pH were the most important physical environmental variables in explaining the assemblage structure, and we found significant abiotic-biotic relationships, as well as biotic-biotic relationships. Overall, dragonflies were more sensitive to changes in river condition than were macroinvertebrates, in part because they were responding at the species rather than higher taxonomic level. AvTD scores did not show any significant relationship with changes in river condition. Furthermore, sites with low biotic scores (indicating disturbance) had high AvTD values. In contrast, DBI site value and ASPT scores were highly significantly correlated. We conclude that dragonfly assemblages in the form of a DBI are an excellent tool for environmental assessment and monitoring freshwater biodiversity, with the potential to replace labour-intensive benthic macroinvertebrate-based freshwater quality assessments, such as SASS." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**Many thanks to all who contributed to this issue of OAS! A special thank to Pawel Buczyński, Asmus Schröter and Naoya Ishizawa for linguistic help.**

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105; E-mail: K.Reinhardt@sheffield.ac.uk

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: mg\_marinov@yahoo.com

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

## 1997

**9968.** Anders, U.; Ruppell, G. (1997): Zeitanalyse der Balzflüge europäischer Prachtlibellen-Arten zur Betrachtung ihrer Verwandtschaftsbeziehungen (Odonata, Calopterygidae). *Entomologica Generalis* 21(4): 253-264. (in German, with English summary) ["The courtship flights of males of *Calopteryx virgo*, *C. splendens*, *C. xanthostoma* and *C. haemorrhoidalis* where filmed with a slow motion camera in N' Germany and S' France. The shots where taken under unmanipulated conditions as well as in a provoked situation, with a fixed female. The parameters wingbeat frequency and phase relationship from hind- and forewings where studied. The most important differences are: In *C. splendens* and *C. xanthostoma* the fore- and hindwings move nearly absolutly counterwise. That means, while the forewings are at the start of the upstroke, the hind-wings are at the start of the downstroke. So here the phase relationship is 180°. Phase relationship in *C. virgo* is 100°. Here the forewings reach the changing points before the hindwings. *C. haemorrhoidalis* move the hindwings nearly synchronously to the forewings but with a very small amplitude. In reference to the wingbeat frequency and the continuity of the phase relationship, the *Calopteryx*-males court more intensively in the unmanipulated situation, than in the provoked one. With respect to the studied parameter, there is no difference between *C. splendens* and *C. xanthostoma*, in contrast to *C. haemorrhoidalis* and *C. virgo*, which are different to each other and to the first two." (Authors) Address: Ruppell, G., An der Wasserfurche 32, 38162 Cremlingen, Germany

**9969.** Groot, T. de (1997): Gevlekte witsnuitlibel (*Leucorrhinia pectoralis*) in De Wieden. *Brachytron* 1(1): 27-28. (in Dutch) [5-VI-1996, De Wieden, Nationaal Park Weerribben-Wieden, The Netherlands] Address: not stated.

## 1998

**9970.** Ou, Y.-j.; Chen, Q.-j.; Chen, F.-h. (1998): A preliminary research report of Odonata insects in Heilongjian Province. *Natural Science Journal of Harbin Normal University* 14(6): 89-93. (in Chinese, with English summary) [China; 46 regional Odonata species are documented. The list of species includes *Aeshna nigroflava* and *Macromia daimoji* (new records in China), and

*Gomphidia confluens* and *Sympetrum imitans* (new records in Northeastern China).] Address: Ou, Y.j., Heilongjiang Nongken Normal College, China

## 1999

**9971.** Arnaud, L. (1999): La compétition spermatique chez les insectes: les stratégies d'assurance de la paternité et la préséance du sperme. *Biotechnol. Agron. Soc. Environ.* 3(2): 86-103. (in French, with English summary) ["Sperm competition in insects: paternity assurance and sperm precedence. The prediction that insects, as a result of polyandry, extreme sperm longevity within the female and high efficiency of sperm utilisation at fertilisation, are preadapted to sustain a very high level of sperm competition is demonstrated across numerous studies. In many insects, males have evolved strategies to decrease sperm competition risk. Paternity assurance mechanisms such as mating plugs or mate guarding do not necessarily influence the number of eggs laid by the female but are taken by male to reduce the probability of his sperm to be preceded by the sperm of another male. Each of these mechanisms influencing mating has an adaptative significance in promoting male reproductive success. However, female insects are polyandrous and they play an active role in mate choice and in discrimination between the ejaculates of different males. Also, they have co-evolved strategy to increase their own reproductive success and to counteract the costs resulting from paternity assurance mechanisms. They can control paternity before copulation (pre-copulation, pre-insemination), during copulation, and because fertilisation takes place within their bodies after insemination, and after fertilisation through selective abortion. A male's reproductive success can be determined as the product of his mating success (mate per lifetime) and his fertilisation success (average number of progeny sired per mate). Male fertilisation success is generally studied in terms of sperm precedence where the proportion of the female progeny fathered by a given male is examined. Sperm precedence can be studied using different methods, each having advantages and disadvantages. Although female insects behave polyandrously, most sperm competition studies investigate sperm precedence when only two males are mated with a female. To determine if the results obtained in double-mating experiments fit well with reality, it is thus important to examine last-male mating



success in experiments where females are mated with more than two males. Moreover, within a species, high fertilisation success variations are observed between males of different populations or even of the same population. These variations result from interaction between factors such as sperm number, sperm length, pre- and/or post-copulatory female choice, paternity assurance mechanism efficiency, female sperm storage organ morphology, etc." (Author) The paper includes many references to Odonata.] Address: Arnaud, L., Unité de Zoologie générale et appliquée. Faculté universitaire des Sciences agronomiques de Gembloux. Passage des Déportés 2, 5030 Gembloux Belgium. E-mail: arnaud.l@fsagx.ac.be

**9972.** Huber, A. (1999): Odonatological survey on the River Somes/Szamos Romania. In: Sárkány-Kiss, A. & Hamar, J. (eds.): The Somes/Szamos River Valley: a study of the geography, hydrobiology and ecology of the river system and its environment. Tiscia monograph series: 207-213. (in English) [26 odonate species were recorded at 25 sampling points along the or nearby the river Somes. The list includes the legally protected species *Stylurus flavipes* and *Ophiogomphus cecilia*.] Address: Huber, A., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

**9973.** Cannings, R. (2000): Dragons and Damsels in the Columbia/Kootenay Region. *Boreus* 20(2): 9-10. (in English) [Verbatim: "Fire-breathing dragons and damsels in distress at Cranbrook? Knights in shining armour riding to the rescue from Fort Steele? Not likely. Just a handful of keen biologists and volunteers searching for dragonflies and damselflies (the insect Order Odonata) for the Royal British Columbia Museum's Living Landscapes project in the Columbia Basin. As part of the project, the Museum, the B.C. Conservation Data Centre (CDC) (Ministry of Environment, Lands and Parks) and Parks Canada joined forces to study the dragonflies of southeastern British Columbia. Parks Canada enthusiastically provided logistic and financial support for the inventory in the four national parks in the region. The area we explored is the Columbia River Basin exclusive of the Okanagan River drainage. In British Columbia this area is commonly called "The Kootenays" after the Kootenay River -- the largest of the Canadian tributaries of the Columbia River. Through 1998 and 1999 we criss-crossed the region to document occurrence and habitat requirements of the dragonflies of the Kootenays (in the rest of the article I use the term "dragonflies" to include the closely related damselflies). Although the Museum had dragonfly specimens and a species list for the region that represented our knowledge up to 1997, no comprehensive survey for dragonflies had ever been made; some of the recorded populations were known only from collections made almost a century ago. Dragonflies are invertebrates that seldom receive the attention they deserve from biologists and resource managers. But they are of great ecological importance. They are major predators in aquatic habitats, often dominating the large invertebrates, especially in fish-free systems. Both the underwater larvae and the flying adults live mainly along the edges of water bodies, thriving in the rich and sensitive interface between land and water. Many species are habitat-specific and their presence can be used to characterize healthy wetlands of all sorts. Furthermore, unlike most invertebrates, dragonflies are identifiable in the field by experts, and surveys can proceed with speed and effi-

ciency. Finally, because they are large, colourful, diurnal creatures with fascinating behaviour, dragonflies are excellent subjects for nature interpretation programs and public education about aquatic ecosystems in general. The Living Landscapes Project is designed to take the museum's resources to the diverse regions of the province, stimulating local residents and organizations to conceive their own research projects and participate in the Museum's research, collections and public programming activities. In the Columbia Basin we wanted to improve our scientific knowledge about British Columbia dragonflies, and we were keen to gather information for use in wetland management and conservation planning -- issues of great concern in the region. But we also wanted to create simple educational materials that would promote the understanding of dragonflies and their relationship to diverse and healthy wetland habitats. In addition to the main report on the internet, complete with photographs and distribution maps of every species, we decided to produce slide shows and videos for distribution to parks, naturalist groups and schools. Finally, we had a long-term goal -- to involve a few residents of the regional community in the detailed study of dragonflies and the long-term monitoring of selected species and localities. The region, with its maze of deep valleys and high mountains, is rich in dragonfly habitats. Mountain fens and bogs, trickling springs, warm lake beaches, grassland alkali ponds and rich cattail marshes all beckoned. We added nine dragonflies to the fifty-seven species that were listed from the Columbia Basin before the start of the project. The additions were: *Calopteryx aequabilis*, *Lestes forcipatus*, *Coenagrion interrogatum*, *Stylurus olivaceus*, *Somatochlora cingulata*, *S. forcipata*, *S. minor*, *S. walshii* and *Leucorrhinia glacialis*. The inventory also improved our understanding of the status of other species rarely recorded in the Columbia Basin. Thirteen are considered rare and of management concern, based on collections in museums. However, with increased study, species such as *Aeshna tuberculifera* and *S. cingulata* proved to be more widespread than initial records suggested. Dean Nicholson, a Cranbrook volunteer, found *Gomphus graslinellus* at Wasa Lake in the Rocky Mountain Trench, far to the east of the only other regional record at Christina Lake. *Argia vivida* is a Kootenay specialty, because its Canadian range is centred in the region and because it is restricted there to the outlets of hot springs that are such a feature of the area's mountain ridges. Although we found a few new populations of *Argia*, it's still considered vulnerable -- it has been eliminated from some springs and most of the others are threatened by development. *C. aequabilis*, *L. forcipatus* and *S. forcipatus* are species new to British Columbia. *Calopteryx* represents a new family of Odonata for British Columbia: the *Calopterygidae*. This spectacular damselfly, with its metallic green body and brown-banded wings, had been recorded as close to British Columbia as Stevens County, Washington; for several decades we had suspected that it lived in the streams of the Boundary district. However, we had not managed to find it there until July 1999, when Leah Ramsay (wide-eyed with amazement!) discovered it dancing along Christina Creek, the outlet of Christina Lake. In 1998, in a wetland near Donald in the Rocky Mountain Trench, Leah also found *Lestes forcipatus*, not confirmed elsewhere in Canada west of Manitoba. Here is a good example of an uncommon species that had been overlooked simply because it was not expected and because it closely resembles the wide-

spread and abundant *L. disjunctus*. Since the discovery, more localities were found, and some of our old specimens of *L. disjunctus* have been re-identified as *L. forcipatus*. Inventories do not simply gather new records; they force curators to re-evaluate old collections! Finding *S. forcipata* was a goal that had eluded us for years. In the 1920s Edmund Walker of the Royal Ontario Museum had collected this elusive dragonfly about three kilometres from the British Columbia/Alberta boundary in Banff National Park. This ancient collection had remained the only record west of Manitoba. Surely it also had to live in "small spring runs following devious courses" (as Walker had described the habitat) west of the Continental Divide. After much searching, we finally came across it in Kicking Horse Pass, Yoho National Park). Gord Hutchings, a long-time RBCM volunteer, netted a dragonfly hovering over a small trickling seep near Ross Lake. "This looks different!" he yelled, slogging back to the rest of us examining a boggy pond. Sure enough -- *S. forcipata*! Two years and much searching later, we now have mapped the species at three peatland sites in Yoho and Kootenay National parks. This emerald is clearly a sparsely distributed member of the Rocky Mountain dragonfly community, and an inhabitant of an apparently rare habitat as well. The 66 species now known from the Columbia Basin represent 76% of the 87 species recorded from British Columbia, and 33% of the 201 recorded in Canada. At least six more species are thought to occur in the region, and several more than that will probably be added to the list. With more study of Columbia Basin dragonflies, especially by the enthusiastic residents who continue to monitor some special habitats, our understanding of these important and lovely insects will surely grow. The full report of this project, complete with photographs and distribution maps of the species, is found at <http://www.livinglandscapes.bc.ca/cbasin/wwwdragon/pdf/dragonflies4.pdf>. (Author)] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street Victoria, British Columbia V8W 9W2. Canada. E-mail: [rcannings@royalbcmuseum.bc.ca](mailto:rcannings@royalbcmuseum.bc.ca)

**9974.** Cannings, R. (2000): Dragonfly Society of the Americas Annual Field Meeting. 27 July-1 August 2000, Nanaimo and points East. *Boreus* 20(2) (<http://www.sfu.ca/biology/esbc/boreus/Bor202.html>): ?-?. (in English) [Verbatim: "The 2000 annual field meeting of the Dragonfly Society of the Americas was held in Nanaimo. Every year, the Society organizes a field meeting somewhere in North America; this one was a first for Western Canada. Thirty-two participants came from as far away as Florida, Texas, Vermont, North Carolina and even England to observe, collect and talk about the dragonfly fauna of British Columbia and the world. On 28 July, unfortunately, the sky was overcast and a light rain was falling – not a good omen for entomologists who pray for sun. Once the rain stopped and the temperature rose, dragonflying would be good, but in the meantime, one group who were keen see something moving went to Nanoose Bay to look for birds. Between watching Merlins and Peregrine Falcons they managed to record *Aeshna multicolor*, *Anax junius* and *Sympetrum pallipes*, species that the second group, which headed right to dragonfly habitat, failed to record. The larger group went off to the Nanaimo Lakes watershed. They were rewarded with improving weather and managed to find 15 species including *Cordulegaster dorsalis*, *Ophiogomphus occidentis*, *Somatochlora semicircularis* and *S. walshii*. For the locals, the highlight was

confirming that *Lestes forcipatus* indeed occurred on the BC coast – it had been overlooked all these years in the hordes of the widespread *L. disjunctus*. The next day at this site others found two more species, one of them *A. tuberculifera*. Saturday 29 July dawned with much better weather. The group headed north to Hamilton Marsh near Coombs. Collectors and photographers spread out over this large, rich fen and managed to see 25 species – *A. canadensis*, *A. interrupta*, *A. palmata*, *A. multicolor*, *Pachydiplax longipennis*, *S. obtrusum* and *S. occidentale* were abundant. The specialty of the site, *A. tuberculifera*, was finally caught. Later, at Bowser Bog, a peatland species, *Aeshna sitchensis*, excited the southerners. Evening meetings took care of business. In addition, various members showed photographs of foreign faunas. Explaining the local fauna, Rob Cannings gave an overview of the dragonflies of British Columbia. He showed slides of species from representative families found in the province and his biogeographical maps indicated how diverse this part of North America truly is. The field trip to the Okanagan Valley the next day showed us some of this diversity. On Sunday (30 July) morning the crowd dispersed, some heading home via Vancouver or Victoria, others continuing on the field trip to the Okanagan Valley. The weather was sunny and hot for the rest of the meeting. Half the group drove up to Cypress Provincial Park to see a *Tanypteryx hageni* colony, the only one known in Canada. A few burrows, complete with larvae, were found in the mud and moss of a road cut; adults were yet to emerge. Part of the group, led by Syd Cannings, drove east via Rolley Creek in the Fraser River Valley to look for *Octogomphus specularis*. A second bunch under the watchful eye of Rob Cannings, headed up the Coquihalla Highway from Hope, eager to find high altitude species near the summit of Highway 97C on the plateau east of Okanagan Lake. The highlight here among the fens and ponds (some of the latter man-made dug-outs for watering cattle) was *Somatochlora hudsonica*; this is the most so otherly record of the species in British Columbia. *S. albicincta* and *S. minor* were also collected, along with *Coenagrion resolutum*, *A. sitchensis*, and other species. *S. semicircularis*, a common Cordilleran species, literally swarmed in the Beaked Sedge fens. The night was spent to the south at Oliver. On Monday (31 July), a small group keen to see *S. hudsonica* returned to the area at the summit of Highway 97C; they were not disappointed – *Somatochlora* and *Aeshna* abounded. The main crew visited the bottomlands of the Okanagan River north of Osoyoos. Along the oxbows and main river channel cruised *Macromia magnifica* and *O. occidentis*. *Erythemis collocata*, a rarity here at the extreme northern limit of its range, swarmed over its favourite pond and a lone *Pachydiplax longipennis*, a common species to the south but a new species to the Interior of British Columbia, appeared here, too. *Libellula forensis* and *L. pulchella* were abundant. In the afternoon, collectors split up and went off in various directions into the pine and fir-clad hills surrounding the valley. Many species, including *A. eremita*, *A. interrupta*, *A. multicolor*, and *S. costiferum*, were recorded. At a dry sedge marsh a lucky group recorded *S. madidum*, *L. dryas* and a population of *A. constricta*, the latter another common species to the south that is scarce here at its northern outposts. The last day (1 August) again dawned clear and warm; at 05:00 it was already about 80 degrees F and by 06:30 *A. multicolor*, was flying around the motel parking lot (the afternoon temperature in the valley reached about

100 degrees). But we were heading high in the hills to the northeast to escape the heat and find more northern species. Dick Cannings and his 13 year-old son Russell, Okanagan residents, led the day's jaunt to several lakes and fens over dusty gravel logging roads. John Abbott of Texas provided a memorable quote as he anticipated the dragonflies to come -- "There'd better be plenty of 'em and they'd better be easy to catch!" At Solco Lake, a sunny and quiet oasis in the Engelmann Spruce/ Lodgepole Pine woods at 5500 feet, the high-lights were *Somatochlora cingulata* (common, and for once, flying along the shore and easy to catch) and *C. interrogatum*. We stopped at two fens dominated by Beaked Sedge, *A. juncea* and *S. semicircularis*. One of them had a sluggish stream and lots of *S. minor*. Both had adjacent mossy, rather dry areas thick with *A. sitchensis*. At each place a single *S. whitehousei* showed up, the most southerly records in British Columbia – even more surprising because appropriate habitat couldn't be found anywhere." (Author) (<http://www.sfu.ca/biology/esbc/boreus/Bor202.html>) Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street Victoria, British Columbia V8W 9W2. Canada. E-mail: [rcannings@royalbcmuseum.bc.ca](mailto:rcannings@royalbcmuseum.bc.ca)

**9975.** Cannings, S.G. (2000): The Quebec Emerald out West. *Boreus* 20(2): 11. (in English) [Verbatim. "In the summer of 2000, staff from the B.C. Conservation Data Centre (Ministry of Environment, Lands & Parks) and the Royal B.C. Museum organized a dragonfly survey of east-central British Columbia. This was the first year of a larger northern B.C. inventory, part of the Royal B.C. Museum's Living Landscapes project, and partly funded by a grant from the Habitat Conservation Trust Fund. See the article by Rob Cannings in this issue that discusses a similar dragonfly inventory in the Columbia/Kootenay region in 1998-99. Dragonflies are one of our best-known insect groups, but this vast study area of snowy mountains, boggy and marshy valleys, and plateaus awash with warm lakes was literally a big blank spot on our dragonfly distribution maps for the province. We knew that we might find that some of the 'rare' dragonflies on our provincial list are more common than we previously thought (and we did, but that's another story), but we weren't prepared for the discovery of the year! It all began with the capture of an odd-looking female emerald (a medium-sized, dark-metallic dragonfly with brilliant green eyes) in the huge fens near the headwaters of the Parsnip River north of Arctic Lake. That one was put back in the collection box with the plan of checking on it further when time allowed, but then forgotten for the moment. Two days later, I teamed up with Sid Dunkle, a dragonfly expert from Texas, and we drove to a fabulous set of terraced fens near timberline at McBride. The common dragonflies there were, *Somatochlora whitehousei*, a rarely-collected beast of shallow fen pools. Sid was ecstatic with these northern specialties, and we even added the very rare *Leucorhinia patricia*, to our list as well! But then Sid caught a female emerald that was unfamiliar to him and I realized that it was the same as the one I had caught a couple of days earlier. We scratched our heads for a while, then resumed searching for more. Soon I caught a male, which was certainly different than any other emerald I had ever seen! We eliminated candidate species one after another and were soon faced with the amazing conclusion that this was a Quebec Emerald! *Somatochlora brevicincta*, is one of the Holy Grails of northern dragonflies—known for many years from only

two localities in a remote area of central Quebec, it has been recently located in a handful of peatlands in Newfoundland, Nova Scotia, New Brunswick, and Maine. Despite these recent discoveries, to find it in British Columbia was unexpected, to say the least—and we've now challenged our colleagues from Alberta to Ontario to fill in the huge gap in central Canada! We continued searching, but after another day of trembling fen-treading we still had found only a handful of specimens. The day after that we returned to the Parsnip River, but arrived there shortly after a tremendous cloudburst had just cleared, and very few dragonflies were flying. We did, however, find a couple more Quebec Emeralds patrolling the rich fens there! And to top things off, during the following week my brother Rob Cannings and Andrew Harcombe found them at two more sites in the Rocky Mountains north and east of McBride. Nowhere are these dragonflies common, and we certainly did not find them in most of the 'appropriate'-looking fens we sampled. Their full distribution and habitat requirements remain a mystery, both within British Columbia and across the boreal and sub-boreal regions of North America. We'll be out again this summer, searching and hoping!" (Author)] Address: Cannings, S.G., Canadian Wildlife Service, 91780 Alaska Highway, Whitehorse, YT, Y1A 5B7, Canada

**9976.** Geraeds, R.P.C. (2000): Observations of *Ophiogomphus cecilia*, Fourcroy, 1785) along the river Roer. *Brachytron* 4(2): 3-7. (in Dutch, with English summary) ["*O. cecilia* has always been a rare dragonfly in the Netherlands. It has been extinct since 1936. In 1995 and 1996 several animals were found along the Geleenbeek. Between August 24 and September 9, 2000, the species was seen in low numbers along the river Roer near Melick. Besides, the species was found near the German border south of Vlodrop once. Two females were observed ovipositing. The river Roer appears to be a suitable habitat for this species. Further investigation must make clear if *O. cecilia* can establish itself in the Roer." (Author)] Address: Geraeds, R.P.G., Bergstraat 70, NL-6131 AW Sittard, The Netherlands

## 2001

**9977.** Meads, M.J.; Fitzgerald, B.M. (2001): List of invertebrates on Mokoia Island, Lake Rotorua. Conservation Advisory Science Notes No. 343: 9 pp. (in English) [A survey of invertebrates was undertaken on Mokoia Island, Lake Rotorua, for three days in February 2000, with the emphasis on larger ground-dwelling taxa. The species list (124 taxa) includes *Hemicordulia australiae*.] Address: Meads, M.J., Ecological Research Associates of New Zealand Inc., PO Box 48-147, Silverstream, Upper Hutt, New Zealand

## 2002

**9978.** Bossart, J.L.; Carlton, C.E. (2002): Insect conservation in America: status and perspectives. *American Entomologist* • Summer 2002: 82-92. (in English) ["The conservation attention allotted to odonates is especially noteworthy considering that only a tiny fraction (<1%) of insect species occurring in America are dragonflies or damselflies. Indeed, nearly 75% of all named Odonata species are state-listed species-of-concern." (Authors)] Address: Bossart, Janice L., Dept of Biology,



The College of New Jersey, P.O. Box 7718, Ewing, NJ 08628, USA. E-mail: bossart@tcnj.edu

**9979.** Curry, J. (2002): Rare Odonata of Indiana. Newsletter of the Michigan Entomological Society V47(3-4): 10. (in English) ["Rare species of dragonflies in Indiana fall into one of three categories: (1) southern species at the northern fringe of their ranges in southern Indiana; (2) northern species at the southern fringe of their ranges in northern Indiana; (3) and species once more common to the state which have apparently become rare due to habitat changes. Most of the species in categories 1 and 2 are common within their ranges and need not be of concern to Indiana conservationists. Those in category 3 apparently need protection if they are to survive. The only way to protect them is through habitat preservation. Representative southern species (category 1) include *Macromia pacifica*, *Ariogomphus submedianus*, *Gomphus hybridus*, and *Neurocordulia molesta*. Representative northern species include *Aeshna canadensis*, *A. tuberculifera*, *Gomphus ventricosus*, *Epitheca canis*, *Libellula julia*, and *Nannothemis bella*. Species that were once more widespread in Indiana but now have become rare due to habitat change include *Tachopteryx thoryi*, *Anax longipes*, *Cordulegaster obliqua*, and perhaps, *Somatochlora hineana*."] (Author)] Address: Curry, J., Dept of Biology, Franklin College, 501 E. Monroe Street, Franklin, IN 46131, USA. Email: jcurry@franklincollege.edu

**9980.** Horecký, J.; Stuchlík, E.; Chvojka, P.; Bitušík, P.; Liška, M.; Pšenaková, P.; Špaček, J. (2002): Effects of acid atmospheric deposition on chemistry and benthic macroinvertebrates of forest streams in the Brdy Mts (Czech Republic). Acta Soc. Zool. Bohem. 66: 189-203. (in English) ["Water chemistry and macroinvertebrates of 8 streams in the Brdy Mts (Central Bohemia) differing in pH value were studied during a synoptic survey in December 1997. Together 73 macroinvertebrate taxa (including *Cordulegaster boltonii*) were identified, varying in number from 9-25 at sites of critical pH (3.8-4.3), contrary to 25.28 taxa at non-acidified sites (pH around 6.7). The fauna of streams was dominated by Chironomidae (Diptera) and Plecoptera, Trichoptera were less abundant. In three strongly acidified streams the predominance of Plecoptera exceeded 50% of all macroinvertebrates. The absence of some aquatic insects (like e.g. Ephemeroptera, some Trichoptera, most Diptera, and some Plecoptera) at sites with pH < 4.8 is discussed."] (Authors)] Address: Horecký, J., Dept of Hydrobiology, Charles Univ., Vinická 7, CZ.128 44 Praha 2, Czech Republic. E-mail: horecky@natur.cuni.cz

**9981.** Kitowski, I. (2002): Behaviour of Montagu's Harrier juveniles during the post-fledging dependency period in southeast Poland. Ethologia 11(2): 202-207. [The dependency period of 51 fledglings Montagu's Harrier (*Circus pygargus*) was studied on calcareous peat-bogs near Chelm (SE Poland). The juveniles fledged on average 33.6 days after hatching, and continued to depend on their parents for 17-31 days. A progression was observed in the flight behaviour ability of the fledglings. With progressing dependency period the rate of successfully aerial prey transfers increased. Juveniles tried to catch dragonflies in the air. However, no attempt was successful.] Address: Kitowski, I., Dept of Nature Conservation, Maria Curie-Skłodowska Univ., Akademicka 19, 20-033 Lublin, Poland. E-mail: kitowign@biotop.umcs.lublin.pl

**9982.** Lemoine, G. (2002): Sur les traces des insectes dans les dunes flamandes. Week-end à Zuydcoote. Insects 126: 25-27. (in French) [*Lestes barbarus*, *Crocothemis erythraea*, and *Sympetrum flaveolum* were recorded from the North Sea coast near Zuydcoote, France.] Address: not stated

**9983.** Wykle, J. (2002): The Year of the Dragonfly. WV Wildlife Diversity News 19(3): 1, 8. (in English) [Report on the meeting of the Dragonfly Society of the Americas in Lewisburg, West Virginia, USA on June 20-22, 2002. "Throughout the week, a total of 99 species were observed or collected. Eight of these had never been documented in West Virginia! Also, 171 county records were gathered."] (Author)] Address: jwykle@dnr.state.wv.us

## 2003

**9984.** Heidenreich, U.; Hering, J. (2003): Mönchgrasmücke *Sylvia atricapilla* erbeutet Großlibelle. Ornithologische Mitteilungen 55(2): 49. (in German) [garden in Limbach-Oberfrohna, Saxony, Germany; a blackcap is reported to have taken as food a freshly emerged *Aeshna cyanea*; 22-VI-2002.] Address: Heidenreich, U., Am Hohen Hain 23 d, 09212 Limbach-Oberfrohna, Germany

**9985.** Hellmund, W. (2003): Endlich aufgespürt - die Späte Adonislibelle. Unsere Libellen - Versuch einer Bestandsaufnahme Teil VII. Troisdorfer Jahreshefte: 11-13. (in German) [Wahner Heide near Köln resp. Troisdorf, Nordrhein-Westfalen, Germany, 28-VIII-2001.] Address: Hellmund, W., Von-Loe-Str. e 11, 53840 Troisdorf, Germany

**9986.** Kalkman, V.J.; Wasscher, M.T. (2003): Rare dragonfly species in the Netherlands in 1998. Brachytron 7(1): 15-23. (in Dutch, with English summary) ["The submitted Dutch records of a selected number of rare dragonfly species are reviewed annually. Acceptability is judged independently by each of the committee members, based on the documentation available (e.g. descriptions, drawings and pictures). In this report the records of 1998 are presented. Of each accepted record the province, nearby city, date(s), number, sex and observers are given. In addition, not (yet) accepted records and records received without documentation are listed. Highlights of the odonatological year 1998 were undoubtedly the records of the first adult specimens of *Gomphus flavipes* since 1902. These records made clear that the larva found in 1996, which constituted the first record since 1902, was the forerunner of the return of this species in The Netherlands. Remarkable was the discovery of two populations of *Somatochlora arctica* on one single day bringing the known number of populations to three. In the dune-area a population of *Leucorhinia pectoralis* was found after absence as breeding species for several decades. Also the first records ever for *Sympecma fusca* for the dune-area were made. In 1998 the third and fourth Dutch records of *Anax parthenope* were made. One of which constituted the highlight of the day for an excursion of 25 members of the Dutch Society for the Study of Dragonflies (NVL)."] (Authors)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**9987.** Schlüter, T. (2003): Fossil insects in Gondwana – localities and palaeodiversity trends. *Acta zoologica cracoviensia*, 46(suppl. – Fossil Insects): 345-371. (in English) ["The faunal history of insects in the various fragments of Gondwana is presented. The first part of the paper summarizes the current knowledge of its insect-bearing localities, particularly their stratigraphy and fossil content, emphasizing the record of the higher systematic groups. The second part discusses some trends of their palaeobiodiversity as evidenced from the above mentioned sites. Generally, the knowledge of the fossil Gondwanan insect faunae is still much lower than that of the Laurasian ones, but has considerably increased over the last decade. Altogether about 85 localities are known from Gondwana, with a maximum of sites in Permian and a minimum in Jurassic times. Best represented is South America. Fossil insects of Gondwana are probably less known than those of Laurasia due to inadequate exploration rather than unfavourable conditions for the formation of deposits." (Author) Many references to Odonata are made.] Address: Schlüter, T., UNESCO Nairobi Office; P. O. Box 30592 Nairobi, Kenya. E-mail: Thomas.Schlueter@unesco.unon.org

**9988.** Sinakevitch, I.; Douglass, J.K.; Scholtz, G.; Loesel, R.; Strausfeld, N.J. (2003): Conserved and convergent organization in the optic lobes of insects and isopods, with reference to other Crustacean taxa. *J. Comp. Neurol.* 467: 150-172. (in English) ["The shared organization of three optic lobe neuropils—the lamina, medulla, and lobula—linked by chiasmata has been used to support arguments that insects and malacostracans are sister groups. However, in certain insects, the lobula is accompanied by a tectum-like fourth neuropil, the lobula plate, characterized by wide-field tangential neurons and linked to the medulla by uncrossed axons. The identification of a lobula plate in an isopod crustacean raises the question of whether the lobula plate of insects and isopods evolved convergently or are derived from a common ancestor. This question is here investigated by comparisons of insect and crustacean optic lobes. The basal branchiopod crustacean *Triops* has only two visual neuropils and no optic chiasma. This finding contrasts with the phyllocarid *Nebalia pugettensis*, a basal malacostracan whose lamina is linked by a chiasma to a medulla that is linked by a second chiasma to a retinotopic outswelling of the lateral protocerebrum, called the protolobula. In *Nebalia*, uncrossed axons from the medulla supply a minute fourth optic neuropil. Eumalacostracan crustaceans also possess two deep neuropils, one receiving crossed axons, the other uncrossed axons. However, in primitive insects, there is no separate fourth optic neuropil. Malacostracans and insects also differ in that the insect medulla comprises two nested neuropils separated by a layer of axons, called the Cuccati bundle. Comparisons suggest that neuroarchitectures of the lamina and medulla distal to the Cuccati bundle are equivalent to the eumalacostracan lamina and entire medulla. The occurrence of a second optic chiasma and protolobula are suggested to be synapomorphic for a malacostracan / insect clade. [...] Columnar and stratified arrangements of centrifugal terminals are seen in dragonflies, such as *Aeshna Canadensis*, the lamina of which comprises discrete rows of optic cartridges each supplying a sheet of axons into the first optic chiasma (see, Meinertzhagen, 1976). In *Aeshna* (Fig. 4E), each centrifugal GABAergic ending bifurcates to provide a system of tangential processes and systems of climbing fibers to

three or four optic cartridges. These fibers end as beaded tufts at the level of the incoming receptor axons (Fig. 4E)." (Authors)] Address: Strausfeld, N.J., ARL, Division of Neurobiology, Univ. of Arizona, Tucson, AZ, 85721, USA. E-mail: flybrain@neurobio.arizona.edu

**9989.** Smith, S.G.F. (2003): Ionocytes in the dragonfly nymph *Erythemis simplicicollis* (Say). Proceeding of the ninth symposium on the natural history of the Bahamas: 135-138. (in English) ["Nymphs of *E. simplicicollis* are known to inhabit brackish water environments as well. Presence and location of ionocytes, or ion transport cells, were compared in nymphs of two different species, *Anax junius* (a freshwater species) and *E. simplicicollis*. The nymphs were held in tanks of three different salinities for a total of thirteen days, and then subjected to a silver nitrate staining technique to allow us to identify ionocytes on the gill tissues. Patches of ionocytes were found at the base of the rectal gill leaflets in *E. simplicicollis*. No similar patches were observed in *A. junius* nymphs, regardless of salinity. Patch density of ionocytes in *E. simplicicollis* increased as the salinity increased, which suggests that this species is able to respond to changes in salinity." (Author)] Address: Smith, Sherilyn, Dept of Biology, Le Moyne College, Syracuse, NY 13214, USA

## 2004

**9990.** Benard, M.F. (2004): Predator-induced phenotypic plasticity in organisms with complex life histories. *Annu. Rev. Ecol. Evol. Syst.* 35: 651-673. (in English) ["Predator-induced phenotypic plasticity is widespread in nature and includes variation in life history, morphology, and behaviour. In organisms with complex life histories, predator-induced phenotypic plasticity in the larval period has been widely documented. Several models predict how organisms should alter their size at and time to metamorphosis in response to an increased risk of predation. A survey of empirical studies finds that these theoretical predictions are frequently met. However, no one model performs the best. Additionally, there are several results not predicted by any model. Predator-induced plasticity in metamorphic traits may be related to predator-induced changes in larval morphology and behaviour. Predictions of predator effects on larval traits are generally met, except for direct costs of predator-induced morphological phenotypes. Future work should incorporate more detailed studies of growth rate, morphology, and behaviour during the larval period, as well as studies of size-specific mortality rates in the presence and absence of predators." (Author) This review includes references to Odonata.] Address: Benard, M.F., Section of Evolution and Ecology, Center for Population Biology, Univ. of California, Davis, California 95616, USA. E-mail: mfbenard@ucdavis.edu

**9991.** Godunko, R.; Klymyshyn, O. (2004): Scientific heritage of Józef Dzierżewicz. *Proc. State Nat. hist. Mus., Lviv* 19: 187-190. (in Ukrainian, with English summary) [The entomological work of J. Dzierżewicz (1844-1918) is honoured. Dzierżewicz published in 1902 a classic work on the Odonata of Galicia, a region with shifting administrative responsibility between Poland and Ukraine: "Ważki Galicyi i przyległych Krajów Polskich (Odonata Halicae) (reliquarumque provinciarum Poloniae). Muzeum Imienia Dzierżewiczkich we Lwowie V. 176 pp.] Address: not stated

**9992.** Prokofiev, I.V. (2004): Role of dragonflies (Odonata) in bird diet. Russian ornithological journal 13 (257): 299-303. (in Russian) [In a total of 5855 food samples in bird species of the Leningrad region (Russia) between 1955 and 2000, 181 Odonata species could be detected. 116 items were caught by *Muscicapa striata* (n=44), *Ficedula hypoleuca* (n=10), *Lanius collurio* (n=27), *Motacilla flava* (n=24) and *M. alba* (n=11). The rest was preyed by 24 additional bird species. Odonata species recorded include *Libellula quadrimaculata*, *Sympetrum* sp., *Libellulidae* indet., *Lestes* sp., *Sympecma* sp. *Lestidae* indet., *Cordulia aenea*, *Somatochlora flavomaculata*, *Coenagrion* sp., *C. pulchellum*, *C. hastulatum*, *Coenagrionidae* indet., *Cordulegaster boltonii*, *Aeshna* sp., *Aeshnidae* indet. *Lestidae* or *Coenagrionidae*, *Libellulidae* or *Aeschnidae* and *Odonata* indet.] Address: not stated.

## 2005

**9993.** Ajay, J.C.; Balakrishnan, M. (2005): Abundance and richness of insects in Kazhakuttom. Bulletin of the National Institute of Ecology 16: 19-27. (in English) ["Abundance, density and richness of insects in Kazhakuttom Grama Panchayat of Kerala was studied using transect and quadrat methods. During the present investigation, 94 species of insects belonging to 42 families of 9 orders were located." Odonata were treated at the family level and represented by five taxa (5.31%).] Address: Balakrishnan, M., Department of Biology, Addis Ababa University, Post Box No. 1176, Addis Ababa, Ethiopia; E-mail: balak212@yahoo.com

**9994.** Alonso, A.; Camargo, J.A. (2005): Estado actual y perspectivas en el empleo de la comunidad de macroinvertebrados bentónicos como indicadora del estado ecológico de los ecosistemas fluviales españoles. Ecosistemas 14(3): 87-99. (in Spanish, with English summary) ["Fluvial ecosystems are nowadays affected by several anthropogenic activities. Impounded and channelized rivers, organic matter pollution, eutrophication, and mining activities, among others, cause changes in the structure and function of biological communities inhabiting rivers and streams. Benthic macroinvertebrate communities are sensitive to those environmental impacts. These communities enclose invertebrates that dwell the bottom substrate and that can be detected with the naked eye. The study of those communities permits to assess the health of fluvial ecosystem. In this article we review the main traits of macroinvertebrate communities that are used as environmental indicators, and we show several cases of Spanish fluvial bioassessments. Besides the future necessities in fluvial macroinvertebrate bioassessment are discussed." (Authors) *Cordulegaster boltonii*] Address: Alonso, A., Dpto. Interuniversitario de Ecología. Sección de Alcalá. Edificio de Ciencias. Universidad de Alcalá. E-28871, Alcalá de Henares, Spain

**9995.** Borisov, S.N. (2005): Aperiodic changes in number of *Lestes macrostigma* (Eversmann, 1836) (Odonata, Lestidae) in forest-steppe of West Siberia. Euroasian entomological journal 4(1): 30-32. (in Russian, with English summary) ["An increase in the number of *L. macrostigma* in the lower reaches of the Karasuk river (forest-steppe of Novosibirsk Ob-last') during 2000-2001 is recorded. Formerly, only a single record in 1973 had been recorded. Possible reasons for number fluctuations are discussed. Extreme variation in

wing venation is shown." (Author)] Address: Borisov, S.N., Siberian Zoological Museum, Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**9996.** Elliott, N.B.; Smith, D.L.; Smith, S.G.F.; Carey, E. (2005): Establishment of the National Bahamian Entomological collection. Proceedings of the 10th Symposium on Natural History of the Bahamas: 34-36. (in English) [437 specimens are included into the collection and based on material in 2003; no details other than geographic are dealt with. The specimens are listed according the 13 islands of the Bahamas: New Providence, Cat Island, Acklins, Great Inagua, Mayaguana, North Andros, South Andros, Grand Bahama, Eleuthera, Long Island, Great Exuma, Great Abaco, San Salvador] Address: Smith, D.L., Department of Biology Le Moyne College Syracuse, NY 13214, USA

**9997.** Geraeds, R.P.G.; Schaik, V.A. van (2005): Ecological aspects of the dragonfly *Ophiogomphus cecilia* along the river Roer: monitoring exuviae in 2002 and 2003 and a comparison of survey methods. Natuurhistorisch Maandblad 94(1): 1-6. (in Dutch, with English summary) ["In the year 2000, a population of *O. cecilia* was discovered along the river Roer. Since monitoring exuviae of this species along the banks of the Roer is hampered by the limited accessibility of the terrain, we used a boat (provided by the local water board) to hold surveys in 2002 and 2003. Four of such boat surveys in each of these years, during June, July and August, yielded 86 exuviae of *Ophiogomphus cecilia*. By contrast, 47 land surveys during the same period only yielded another 19 exuviae. This indicates that boat surveys are the most suitable method, allowing more locations to be accessed and monitored. Most larvae emerge vertically (59%) and close to the banks (0-0.25 m). They preferably seem to emerge amid the vegetation. The average length of the exuviae was 29.5 mm.] Address: Schaik, V.A. van, Hoosveld 56, 6075 DB Herkenbosch

**9998.** Jacobi, B. (2005): Neue und selten nachgewiesene Insekten in Oberhausen. Elektronische Aufsätze der Biologischen Station Westliches Ruhrgebiet 1.8: 1-6. (in German) [*Sympecma fusca*; Germany, Oberhausen, Zentrum, roofgarden of the Elsa-Brändström-Gymnasium, 18-VII-2003.] Address: Jacobi, B., Dieckerstr. 26, 46047 Oberhausen, Germany. E-mail: h.b.jacobi@gmx.de

**9999.** Jourde, P. (2005): Une nouvelle espèce de libellule pour la Charente-Maritime: la Cordulie splendide *Macromia splendens* (Pictet, 1843) (Odonata, Anisoptera, Macromiidae). Annales de la société des sciences naturelles de la Charente-Maritime 9(5): 529-534. (in French, with English summary) [In 2004, *M. splendens* was recorded for the first time in Charente-Maritime, along the rivers La Dronne, Lary, Né and Charente. It is the 61st Odonata species found in Charente-Maritime, France.] Address: Jourde, P., LPO, La Corderie Royale, BP 90263, F-17305 Rochefort, France. E-mail: philippe.jourde@lpo.fr

**10000.** Kawakami, Y.; Ichisawa, K.; Watanabe, K. (2005): A list of the insect collection of Mt Daisen Museum of Nature and History, Tottori, Japan. Bulletin of the Tottori Prefectural Museum 42: 21-27. (in Japanese, with English title) [19 odonate species: *Calopteryx cornelia*, *Mnais pruinosa* nawai, *M. pruinosa* pruinosa, *Tanypteryx pryeri*, *Anisogomphus maacki*, *Davidius*



nanus, *Stylogomphus suzukii*, *Sinogomphus flavolimbat*, *Anotogaster sieboldii*, *Anax nigrofasciatus nigrofasciatus*, *A. parthenope julius*, *Epophthalmia elegans*, *Nannophya pygmaea*, *Crocothemis servilia mariannae*, *Sympetrum pedemontanum elatum*, *S. risi risi*, *S. speciosum speciosum*, *S. croceolum*, and *Rhyothemis fuliginosa* are listed.] Address: Kawakami, Y., Tottori Prefectural Mus., Higashi-machi 2-124, Tottori, 680-0011, Japan

**10001.** Keppner, E.J.; Keppner, L.A. (2005): Some dragonflies and damselflies (Insecta: Odonata) from Bay County, Florida. For: The St. Andrew Bay Environmental Study Team, Inc.: 33 pp. (in English) [USA; records of 43 Odonata species are recorded. Most are new records for the County.] Address: Keppner, E.J., c/o The St. Andrew Bay Environmental Study Team, PO Box 2465, Panama City, Florida 32402, USA

**10002.** Lagunov, A.V. (2005): Insects from the Red Book of Russian Federation in the fauna of the Chelyabinsk region. Annotated list. Proceedings of the Chelyabinsk Scientific Center of UB RAS 2: 110-114. (in Russian) [According an oral communication of AY Kharitonov to the author, *Ischnura aralensis* is known from the Chelyabinsk region (Bashkortostan).] Address: Lagunov, A.V., Ilmensky state reserve, Ural branch of Russian Academy of Science, Miass, Russia. E-mail: lagunov@ilmeny.ac.ru

**10003.** Ma, S. (2005): Buzz of life in our bay. The Hamilton Spectator, Thursday, August 25, 2005: Go 5. (in English) [General account on insects including Odonata.] Address: not stated

**10004.** Sharapova, T.A.; Abdullina, G.H. (2005): On studying the water invertebrates of the west Siberian southern tundras. Bulletin of Environment, Forestry and Landscape 5: 97-115. (in Russian) [The paper reports on fauna of Jamal Peninsula and compiles data from the Gydan Peninsula including old records of *Somatochlora sahlbergia* published by Belyshev & Kharitonov (1981).] Address: Sharapova, T.A., Institute of Northern Development, Siberian Branch of the RAS, Tyumen, Russia

**10005.** Xu, Q.-h. (2005): Note on the female sex of *Amphigomphus hansonii* Chao (Odonata: Gomphidae). Entomological Journal of East China 14(2): 191-192. (in Chinese, with English summary) ["The female of *Amphigomphus hansonii* Chao, 1954 is described for the first time and illustrated. It was collected at Hua'an County, Fujian Province of China, 2004-06-26. The specimen is deposited in Zhangzhou Education College, Fujian, China." (Author)] Address: Xu, Qi-han, (Zhangzhou Education College, Zhangzhou, Fujian 363000, China

**10006.** Bernard, R. (2006): New locality of *Somatochlora arctica* (Zetterstedt, 1840) (Odonata: Corduliidae) in western Poland. Wiad. Entomologiczne 25: 55-56. (in Polish) [Kobyła Łąka, 50°50.N 15°22.E, UTM: WS23, 18 VIII 2005] Address: Bernard, R., Dept of General Zoology, Adam Mickiewicz Univ., Umultowska 89, PL-61-702 Poznań, Poland; E-mail: bernard@amu.edu.pl

## 2006

**10007.** Cheung, F. (2006): Will Luk Keng become another Sham Chung? Porcupine 34: 28. (in English) ["In

a biweekly adult dragonfly survey started in February 2005, more than one third of the total Odonate species in Hong Kong were recorded, including the globally-endangered *Mortonagrion hirosei*, and six locally-uncommon species (Wilson, 2004): *Cercion calamorum*, *C. melanotum*, *Pseudagrion microcephalum*, *Gomphidia kelloggi*, *Macrodiplax cora* and *Nannophyopsis clara*." (Author)] Address: not stated

**10008.** Craves, J.A. (2006): *Archilestes grandis* (Rambur) (Odonata: Lestidae): new for Michigan. Great Lakes Entomologist 39(1/2): 88-90. (in English) [27-IX-2005, retention pool in Livonia, Wayne County, Michigan, T1S R9E, sec 7, USA.] Address: Craves, J.A., 15911 Andover Dr., Dearborn, MI 48120, USA. E-mail: jcraves@umd.umich.edu

**10009.** Eda, S. (2006): Two cases of triple-connection in the Odonata. Tombo 48: 32. (in Japanese) [*Lestes temporalis*, *Sympetrum frequens*] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**10010.** Fukunaga, K.; Iomita, M.; Murata, M.; Matsumura, K.; Shirai, M. (2006): Analysis of mitochondrial DNA in the exuviae of *Libellula angelina* Selys (Libellulidae). Tombo 48: 21-22. (in English, with Japanese summary) ["DNA analyses were made from the exuviae of *Libellula angelina* Selys and *L. quadrimaculata asahinai* Schmidt. The partial fragments of the mitochondrial 16 S rRNA gene were amplified by using a polymerase chain reactions PCR method. Amplified genetic sequences extracted from two *L. angelina* individuals were 100% identical, but differed from that of *L. quadrimaculata asahinai*. These results indicate that the use of exuviae is efficient for analyzing DNA sequences in odonate species." (Authors)] Address: not stated

**10011.** Futahashi, R.; Futahashi, H. (2006): The Odonate fauna of the Noto Peninsula, Hokuriku District, Honshu (2). Tombo 48: 18-20. (in English, with Japanese summary) [*Paracercion sexlineatum*, *Sympetma paedisca*, and *Sympetrum maculatum* are regionally noteworthy. "Two migratory species, *Sympetrum fonscolombii* and *Trapezostigma virginia*, and a supposed hybrid between *Anax nigrofasciatus nigrofasciatus* Oguma, 1915 and *Anax parthenope julius* Brauer, 1865 are newly recorded from this peninsula." (Author)] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**10012.** Gärtner, E.; Olthoff, M.; Scherzer, H. (2006): Die Libellenfauna des Helstorfer Moores (Niedersachsen) unter besonderer Berücksichtigung eines Reliktvorkommens der Zwerglibelle (*Nehalennia speciosa*) und deren Habitatstruktur. Telma 36: 133-154. (in German, with English summary) ["The Helstorfer Moor, a small bog north of Hannover (Lower Saxony, Germany), has been exploited by peat cutting over some centuries. In a two-year-inventarisation 35 Odonata species were found, among these many rare typical species of peat bogs. After one single male had been discovered by Pryswhitt, in 2003 a large population of *Nehalennia speciosa* was found in the Helstorfer Moor, situated in a distance of about 20 km from another population near Hannover. The imagoes of this species predominantly occur in the northern part of the bog, where the peat waters are hydrologically influenced by flowing water and/or adjacent springs. In the small larval ponds *Utricularia minor* is the characteristic plant species. The peat water is strongly or weakly acid, the conductivity is be-

low 100  $\mu$ S. The imagoes of *Nehalennia* were found in sections dominated by *Molinia caerulea*, in part mixed with sparse stands of trees (*Pinus silvestris*, *Betula pubescens*). The habitat is part of a Nature Reserve of 410 hectares, well protected against external detrimental influences." (Authors)] Address: Olthoff, M., Naturförderstation im Kreis Coesfeld, Borkener Str. 13, 48653 Coesfeld, Germany. E-Mail: matthias.olthoff@gmx.de

**10013.** Handke, K.; Adena, J.; Handke, P. (2006): Landschaftsökologische Untersuchungen auf dem Golfplatz Achim (Niedersachsen). Ein Vergleich mit dem Ausgangsbestand und einem Referenzgebiet. *Naturschutz und Landschaftsplanung* 38(7): 214-224. (in German, with English summary) ["On the golf course in Achim (ca. 113 ha) (near Bremen, Lower Saxony, Germany) and on an adjacent reference site (ca. 294 ha) an ecological survey was conducted in 2004. The investigation comprised habitat types, endangered plant species, breeding birds, amphibians, dragonflies, butterflies and grasshoppers. About 35 ha of the golf-course are intensively used whilst the remaining area consists of poor grassland, afforestation sites, and more than 70 water areas. On the golf-course five endangered plant and 43 animal species were identified. Compared to 1996 13 species of the Red Data Book have disappeared and 34 species were registered for the first time. As expected mainly breeding birds of the open agricultural landscape have disappeared whilst particularly amphibians and dragonflies have newly colonised the golf course area, and bird species of hedges and woodlands have expanded. Ornithological importance has slightly increased. Compared to the former conditions the amount of habitat types of very high and high value has markedly increased (1995: 4.6%, 2004: 25%). Furthermore, the poor grassland sites and most of the water areas and their shores developed positively. The large amphibian populations of species like newt (*Triturus cristatus*) and natter jack (*Bufo calamita*) as well as a dragonfly fauna of national importance have also to be pointed out. All in all, the investigations reveal a positive development of fauna and flora on the golf-course area. Compared to the reference site the golf course has a significantly higher importance for habitat types and fauna. The study shows that the potential for nature conservation measures is high on oligotrophic grounds and that various animal species colonise such areas in a short time period." (Authors)] Address: Handke, K., Riedenweg 19, 27777 Ganderkesse, Germany. E-mail: k.handke@oekologische-gutachten.de

**10014.** Ishikawa, H.; Yano, M. (2006): A record of *Neurothemis fluctuans* (Fabricius, 1793) from Tokyo. *Tombo* 48: 36. (in Japanese) [28-IX-2005]. Address: not stated in English.

**10015.** Kawashima, I.; Karube, H. (2006): External morphology of the last instar larva of probable *Petaliaeschna flavipes* Karube (Anisoptera, Aeshnidae, Brachytroninae) from Laos, Indochina. *Tombo* 48: 7-11. (in English, with Japanese summary) ["The external morphology of the last instar larva of what is presumed to be *Petaliaeschna flavipes* Karube, 1999 from Laos is reported and illustrated based on an exuvia. The characters are compared with those of the genera *Cephalaeschna* Selys, 1883 (Fraser, 1943; Asahina, 1961) and *Periaeschna* Martin, 1909 (Matsuki & Lien, 1984)." (Authors)] Address: Kawashima, I., 1-50-9 Nagasawa, Yokosuka, Kanagawa, 239-0842 Japan

**10016.** Kawashima, I.; Sasamoto, A. (2006): Description of the last instar larva of *Periaeschna laidlawi* (Förster) (Anisoptera, Aeshnidae) from Malaysia, south-western Asia. *Tombo* 48: 12-17. (in English, with Japanese summary) ["The external morphology of the last instar larva of *P. laidlawi* from Malaysia is described and illustrated for the first time, and is compared with the larvae of *P. magdalena* Martin from Taiwan (Matsuki & Lien, 1984) and *Cephalaeschna* spp. from Assam (Fraser, 1943; Asahina, 1961)." (Authors)] Address: Kawashima, I., 1-50-9 Nagasawa, Yokosuka, Kanagawa, 239-0842 Japan

**10017.** Kita, H. (2006): A female of *Sympetrum speciosum speciosum* that copulated after refusing in tandem position. *Tombo* 48: 27-28. (in Japanese, with English summary) ["A female *Sympetrum s. speciosum* repeatedly showed a refusal behaviour [i.e., not complying with taking a copula position by bending abdomen forward) while in tandem with a male, although she did finally copulated with the male. The female is not fully mature and this may be the cause of this unusual behaviour." (Author)] Address: Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan

**10018.** Kita, H. (2006): A male of *Indolestes boninensis* (Odonata, Lestidae) connected with a dead female. *Tombo* 48: 28-29. (in Japanese, with English summary) ["A male *I. boninensis* in tandem with a dead female which had lost her abdomen posterior to the 5th segment, was observed in Otôto-jima Island of the Ogasawara Islands. This male showed some movement that seemed to prompt the female to oviposition." (Author)] Address: Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan

**10019.** Kita, H. (2006): A heterospecific "Type AB" triple-connection between a male *Sympetrum infuscatum* (Selys, 1883) and a copulating pair of *S. maculatum* Oguma, 1915. *Tombo* 48: 25-26. (in Japanese, with English summary) ["... Ojiya City, Niigata Prefecture. The male *S. infuscatum* showed, while in the triple connection, swing movements that resembled typical tandem oviposition behaviour in the air above grassland suitable for oviposition for this species. From this behaviour, and similar examples cited, it was guessed that a male *Sympetrum* might show oviposition movements in tandem without experiencing copulation with the connected partner (s) if it was in tandem with a heterospecific individual or in triple connection." (Author)] Address: Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan

**10020.** Lagunov, A.V. (2006): Red book listed arthropods in fauna of the Chelyabinsk region. *Proceedings of the Chelyabinsk Scientific Center of UB RAS* 4: 33-37. (in Russian) [Russia; *Aeshna viridis*, *Leucorrhinia albifrons*, *Leucorrhinia caudalis* and *Ophiogomphus cecilia* are listed. (55°09'17"N 61°22'33"E)] Address: Lagunov, A.V., Ilmensky state reserve, Ural branch of Russian Academy of Science, Miass, Russia. E-mail: lagunov@ilmenny.ac.ru

**10021.** Lagunov, A.V. (2006): Insects from the Red Book of Russian Federation in fauna Ilmensky Reserve and prospects of their conservation. *Proceedings of the Chelyabinsk Scientific Center of UB RAS* 1: 88-91. (in Russian) [In July 2004 several specimens of *Anax imperator* were observed in the Uchalinsky district (Bashkortostan). According an oral communication of AY Haritonov to the author, also *Ischnura aralensis* is known

from the same region.] Address: Lagunov, A.V., Ilmeny state reserve, Ural branch of Russian Academy of Science, Miass, Russia. E-mail: lagunov@ilmeny.ac.ru

**10022.** Nakada, A. (2006): An observation of heterogeneric copulation between *Deielia phaon* (Selys, 1883) male and *Orthetrum albistylum speciosum* (Uhler, 1853) female. Tombo 48: 23-24. (in English, with Japanese summary) [4-VI-2005] Address: not stated in English

**10023.** Naraoka, H. (2006): Four continental Symptetrum dragonflies (Libellulidae) collected in Aomori Prefecture, northern Honshu, Japan, in 2005. Tombo 48: 33-34. (in Japanese, with English summary) ["Symptetrum depressiusculum, *S. cordulegaster*, *S. vulgatum imitans* and *S. f. flaveolum* were collected from Aomori Prefecture in autumn of 2005. The former three species are well known migrants from Continental Eurasia. *S. f. flaveolum* is new to Honshu, and is considered to have migrated from Eurasia continent or Hokkaido. A female, instead of males, of *S. vulgatum imitans* was recorded for the first from Japan." (Author)] Address: Naraoka, H., 36-71, Aza-Motoizumi, Fukunoda, Itayanagi-cho, Kita-gun, Aomori Prefecture, 038-3661, Japan

**10024.** Romstöck-Völkl, M.; Völkl, W.; Rebhan, H.; Franke T.; Krug, R. (2006): Auswirkungen einer naturschutzorientierten Teichwirtschaft im NSG Craimoosweiher. Ergebnisse einer zehnjährigen Untersuchung auf Libellenfauna und Unterwasservegetation. Naturschutz und Landschaftsplanung 38(8): 251-258. (in German, with English summary) ["Between 1995 and 2005 the effects of near-natural fish farming (main fish species: carp) on odonate fauna and submersed vegetation were studied in the nature reserve "Craimoosweiher" in Northern Bavaria, Germany. The natural potential of carp increase has been estimated to approx. 150 kg/ha related to a water area of 14 ha. This potential was reached with a stocking rate of only 1500 - 2000 specimens K2 (=\* two year old carps) (approx. 600 and 1000 kg input, according to fish size). Increased stocking rate led to reduced carp growth. Further, the biomass reduction could not be raised by a higher stocking rate. A total of 28 odonate species was recorded in the pond, with 15 species occurring in all years of investigation. The average annual species number was relatively constant and varied between 16 and 23 species. However, winter draining in 1996 and 2003 led to a subsequent reduction in the density of all damselfly species. The population density of *Erythromma najas* was influenced most conspicuously; *Erythromma viridulum* and *Coenagrion pulchellum* completely disappeared after winter drainage. The species-rich submersed vegetation (13 species of Angiospermae, 2 species of Bryophyta-Hepaticae, 3 species of Characeae) was dominated by *Ceratophyllum submersum* and *Najas minor*. Like the odonate fauna, the submersed vegetation was negatively influenced by winter drainage. However, the plant species recovered faster than the odonates. Additionally, high fish density (especially roach) led to a decrease in submersed vegetation density and species number. At the same time this decrease of vegetation had a negative influence on the odonate fauna. A reduction of fish density enhanced both submersed vegetation and odonate fauna. The case study "Craimoosweiher" allows the conclusion that freshwater fishery and nature conservation measures not necessarily contradict each other."] Address: Völkl, W., Ökologische Planung, Hohe Eiche 6, 95517 Seybothenreuth, Germany. E-mail: wolfgang.voelk@t-online.de

**10025.** Savard, M. (2006): Un bel exemple d'atlas pratique pour la conservation de la biodiversité des insectes à l'échelle humaine! Bulletin de l'entomofaune 33: 12-14. (in French) [Book review of: Jourde, Philippe. 2005. Les libellules de Charente-Maritime. Annales de la Société des Sciences Naturelles de la Charente-Maritime, Supplément décembre 2005. Société des Sciences naturelles de La Rochelle. ISSN 0373.9929. 144 pages] Address: not stated

**10026.** Schmidt, Eb. (2006): Stichwort: Hochmoor. Naturzeit 3(5): 5. (in German) [Concise characterisation of bog ecology including a few passing references to Odonata.] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**10027.** Sugano, T.; Umeda, T. (2006): The first record of *Neurothemis fluctuans* (Fabricius, 1793) from Kanagawa Prefecture. Tombo 48: 35. (in Japanese) [26-VIII-2005] Address: not stated in English

**10028.** Vonička, P. (2006): The occurrence of dragonfly *Leucorrhinia pectoralis* (Odonata: Libellulidae) in the Jizerske hory Mountains (Northern Bohemia). Vážky 2005: sborník referátu VIII. celostátního semináře odonatologu ve Žďárských vrších: seminář uspořádaly ve dnech 23.-26.6.2005 Správa CHKO Žďárské vrchy, ZO CSOP Vlašim a Vlastivedné muzeum a galerie v České Lipe / editor sborníku Lubomír Hanel. -- Vyd. 1. - Vlašim: ZO CSOP Vlašim, 2006. ISBN 80-86327-52-3: 162-164. (in Czech, with English summary) [Czech Republic, Na Kotli bog, 14-VI-2005, 930m a.s.l., 1 male.] Address: Vonička, P., Severočeské muzeum, Masarykova 11, 46001 Liberec, Czech Republic. E-mail: pavel.vonicka@muzeumlb.cz

**10029.** Watanabe, K. (2006): *Sympetrum fonscolombi* emerged out in winter at Ishigaki Is.. Tombo 48: 17. (in English, with Japanese summary) ["The last instar larvae of *S. fonscolombii* were collected from a swimming pool at Ishigaki on Jan. 14, 2006. From them a male and a pair emerged out on Jan. 18 and on Feb. 11 respectively." (Author)] Address: not stated in English

**10030.** Yamamoto, T.; Nishiura, N. (2006): A few atypical oviposition behavior in *Epitheca marginata* (Selys) (Anisoptera: Corduliidae). Tombo 48: 30-32. (in Japanese, with English summary) ["Three cases of atypical oviposition behaviour of *E. marginata* were observed in Kyoto Prefecture, Japan: 1) A female did oviposition without perching after copulation. During oviposition she repeatedly released egg masses by striking the water surface with the tip of abdomen, while the partner male flew around her. 2) A female repeated perching and flying oviposition about eight times. The oviposition was carried out by striking the water surface with the tip of abdomen. While perching, the female made an egg mass. The egg masses after oviposition did not take an usual form of "eggs-string" or "eggs-strand", but took a form of several small fragments of egg-masses. 3) When a female arriving at a pond immediately began flying oviposition without perching, like that of *Sympetrum* species." (Authors)] Address: not stated in English.

## 2007

**10031.** Abro, A. (2007): Microanatomy of the terminal male genital tract in the dragonfly *Aeshna juncea* (L.) (Odonata: Anisoptera: Aeshnidae). Entomologist's



monthly magazine 143(1718/1720): 175-179. (in English) ["Males of Odonata eject sperm into the copulatory apparatus of secondary genitalia situated below the base of their abdomen; during copulation the penis of this apparatus becomes inserted into the female vaginal canal. The micro-anatomy of the vesicula seminalis and the terminal ejaculatory canal in adult males of *A. juncea* reveals in these tubular segments the presence of a powerful muscular coat that is presumed to play a decisive role during the intramale sperm translocation which is usually of brief duration. Sperm bundles dispersed in a gelatinous carrier-substance are thought to be ejected by violent contraction of that musculature." (Author)] Address: Abro, A., Division of Anatomy, Dept of Biomedicine, University of Bergen, Jonas Lies vei 91, N-5009 Bergen, Norway

**10032.** Bechly, G. (2007): Chapter 11.5 Odonata: damselflies and dragonflies. In: Martill, D.M., Bechly, G. & Loveridge, R.F. (eds) (2007): *The Crato fossil beds of Brazil: Window into an ancient world.* xvi + 625 pp. - Cambridge University Press, Cambridge, UK: 184-222. (in English) ["Even though they constitute only about 2% of the fossil insects found (Bechly 1998c), dragonflies are not rare in the Crato Formation, so that more than 1,000 specimens of about 46 different species have been discovered so far. No other fossil locality yields more fossil odonates, either in the number of individuals or in the number of species, than the limestones of the Crato Formation. Furthermore, Crato Formation examples are outstanding because of their completeness and very beautiful preservation." (Author) Information on these taxa is compiled, including detailed descriptions of the following new taxa: *Euarchistigma marialuiseae* sp. nov., *Cratostenophlebia schwickerti* sp. nov., *Eotanypteryx paradoxa* sp. nov., *Cordulagomphus winkelhoferi* sp. nov., *Cordulagomphus haneloreae* sp. nov. and (*Procordulagomphus michaeli* sp. nov.) Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail [bechly@gmx.de](mailto:bechly@gmx.de)

**10033.** Benton, T.; Dobson, J. (2007): *The Dragonflies of Essex.* Lopinga Books: XII + 228 pp. (in English) ["Nineteen years have passed since Ted Benton produced the first *Dragonflies of Essex*, as good as it was this volume far surpasses it in scope and production. A hard backed washable and illustrated cover conceals 228 pages with numerous colour photographs and distribution maps. A chapter on biology and conservation is followed by a very useful illustrated guide to many of the best Essex sites for Dragonflies. The main body of the book, the species accounts includes sections on identification, flight period, habits, distribution and conservation. Excellent photographs of each species are included within the accounts as well as an Essex distribution map of each species. Early records are also discussed at the conclusion of each account. Chapter four is devoted to a history of dragonfly recording in Essex, dealing with many notable entomologists from Victorian times until the present day. There are appendices on former Essex species, possible future arrivals and a couple of rare species as well as a plant list. An extensive bibliography is included and the whole is fully indexed. All in all a first class book essential for all Essex field naturalists as well as dragonfly specialists. It is well bound and produced on quality paper, place your order today." From: Del Smith, <http://www.essexfieldclub.org.uk/portal/p/Dragonflies%20of%20Essex>] Address:

Dobson, J., 158 Main Rd, Danbury, Essex CM3 4DT, UK. E-mail: [johndobson@mammals.fsnet.co.uk](mailto:johndobson@mammals.fsnet.co.uk)

**10034.** Besse-Lototskaya, A.; Verdonschot, R.C.M.; Verdonschot, P.F.M.; Klostermann, J. (2007): Effect of climate change on the Netherlands government policies: the case of brooks and brook valleys (a study of literature *Alterra-Rapport 1536*: 134 pp. (in Dutch) [In appendix 2, the the ecological preferences and tolerances of the following species are tabled: *Calopteryx splendens*, *C. virgo*, *Cordulegaster boltonii*, *Gomphus flavipes*, *G. vulgatissimus*, *Ophiogomphus cecilia*, *Orthetrum brunneum*, *O. coerulescens*.] Address: Alterra, P.O. Box 47, NL-6700 AA Wageningen

**10035.** Brockhaus, T. (2007): *Die Libellenfauna der Döbrichauer Wiesen, östlich von Torgau (Odonata).* *Sächsische Entomologische Zeitschrift* 2: 2-8. (in German) [Döbrichauer Meadows, east of Torgau, Sachsen, Germany, 31 Odonata species - including the regionally rare species *Brachytron pratense*, *Leucorrhinia pectoralis*, *Sympetrum meridionale*, *Somatochlora flavomaculata*, *Coenagrion pulchellum*, *Lestes virens*, *Orthetrum coerulescens*, *Anaciaeschna isoceles*, *Cordulia aenea* - were observed between 2003 and 2006.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: [T.Brockhaus@t-online.de](mailto:T.Brockhaus@t-online.de)

**10036.** Corbet, P.S. (2007): *Dr Syoziro Asahina: fond recollections of fifty years of friendship.* *Tombo* 50: 7-9. (in English) [P.S. Corbet met S. Asahina for the first time at 29 November 1953 in London. In this paper, he gives a brief insight in a long lasting odonatological friendship between himself and Dr. S. Asahina.]

**10037.** Eda, S.; Kawashima, I.; Sasamoto, A.; Suito, Y.; Inoue, K. (2007): A checklist of publications by Dr Syoziro Asahina (1928-). *Tombo* 50: 27-48. (in Japanese and English) [Between 1928 and 1988, Dr. Asahina wrote 985 publications, on most cases referring to Odonata.] Address: Sasamoto, A., Yakuoji Tawaramotoko, Shiki-gun, Nara, 636-0341 Japan

**10038.** Eda, S. (2007): On the puncta of nodi on the wings of *Libellula quadrimaculata asahinai* Schmidt. *Tombo* 49: 48. (in Japanese, with English summary) ["The puncta of nodi on the wings of *L. quadrimaculata asahinai* vary in size. The photograph shows an example of the "extremely reduced type". The note also advises on two specimens of the "disappeared type".] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: [SND 02767@nifty.com](mailto:SND 02767@nifty.com)

**10039.** Eda, S. (2007): On a mature male of *Planaeschna milnei* (Selys) with the reflecting wings. *Tombo* 49: 30. (in Japanese) [Japan; an old male of *P. milnei* with heavily damaged wings is documented.] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: [SND 02767@nifty.com](mailto:SND 02767@nifty.com)

**10040.** Eda, S. (2007): Advance of the Japanese Society for Odonatology in these 50 years. *Tombo* 50: 1-6. (in Japanese, with English summary) ["On October 7, 1957, the Japanese Club of Odonatology was founded by only 14 members, and managed by Asahina, S., Ando, H. C and Eda, S.C. This Club to study only Odonata is through to be the first in the World. Annual meetings were held once a year. The bulletin "TOMBO" was published in every year. After 10 years, 1967, the Club changed into the Society, chiefly because of members' activity and partly of increasing in number. Dr. Asahina

became the first president. On November 2, 1997, 40th anniversary of the Society, Dr. Eda became the second president and Dr. Asahina got the Honorary President. At present members are about 380 persons including foreigners, and are gradually increasing." (Author)] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**10041.** Eda, S. (2007): An abnormal connection between two males of *Leucorrhinia dubia orientalis* Selys. Tombo 50: 76. (in Japanese) [Photo of a "tandem" between two males of *L. orientalis*.] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**10042.** Eda, S. (2007): A recollection of *Lestes temporalis* Selys as a noxious insect to mulberry and fruit trees. Tombo 49: 35-40. (in Japanese, with English summary) ["In 1915, Fukaya reported that *L. temporalis* used to lay eggs into the branches of mulberry and fruits trees near the pond, after that the branches become death, therefore the insect is not beneficial but noxious. Thereafter some papers and books described *L. temporalis* belongs to noxious insects. Moreover "Explanatory Diagram of Noxious Insects to Mulberry Tree" by SUZUKI (1930) showed *Lestes temporalis* Selys at the top. In 1987, however, that name of the insect disappeared from "Major Insect and other Pests of Economic Plants in Japan". (Author)] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**10043.** Eda, S. (2007): An introduction to "Fundamental Study of Animals for Teaching Material" - rare books as a phantom. Tombo 49: 40-43. (in Japanese, with English summary) [The book introduced by S. Eda was published 1926 by Bunyosha, Tokyo. This book presently is hard to get from any antiquarian. It was directed to teachers to introduce animals to pupils of elementary school and contains excellent explanations of dragonflies in volume 1 on pages 141-165 for 4th year pupils.] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**10044.** Eda, S. (2007): Color patterns of the larvae of *Epiophlebia superstes* Selys. Tombo 49: 22. (in Japanese, with English summary) ["The 13 instar larvae of *Epiophlebia superstes* may be divided into 3 types such as black, brown and Panda, in colour. Most of them are black type and the last 2 types are very few. All of the last (14) instar larvae belong to black type. Regarding the Panda type the 6 instar larva is youngest at the present time." (Author)] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**10045.** Futahashi, R.; Futahashi, H. (2007): A record of black mutant of *Nannophya pygmaea* Rambur, 1842. Tombo 50: 71-72. (in Japanese, with English summary) ["An extremely melanized male of *N. pygmaea* was captured in Toyama Prefecture on July 15, 2007. This specimen had black coloration instead of normal reddish coloration around the whole body, and was caught by a normal male perhaps because it looked like a female." (Authors)] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**10046.** Gallardo, B.; Garcia, M.; Cabezas, A.I.; Gonzalez, E.; Ciancarelli, C.; Gonzalez, M.; Francisco A. Comin, F.A. (2007): First approach to understanding ri-

parian wetlands in the Middle Ebro River floodplain (NE, Spain): Structural characteristics and functional dynamics. *Limnetica* 26(2): 373-386. (in English) ["In Spring of 2005, the relationships between the physical and chemical characteristics of the aquatic and benthic environments and macroinvertebrate assemblages in seven wetlands representative of the floodplain of the Middle Ebro River (NE Spain), were analyzed. The selected wetlands differed in their hydrological connectivity, local environmental conditions and anthropic influence. Through multivariate analyses, two environmental gradients and three main wetland groups were detected. The hydrological connectivity differences generate a heterogenous landscape of structurally and functionally different wetlands in the Ebro Middle floodplain. Confined wetlands, such as older ox bow lakes, showed higher salt and organic matter contents and lower macroinvertebrates' density and biodiversity than did the other wetlands. This suggests that confinement and lack of disturbance events have led to water salinization and eutrophication, habitat homogenization and natural succession of the communities towards more adapted structures with lower biodiversity. Wetlands that still maintain some functional relationship with the river, such as newer ox bow lakes, constructed wetlands, and backwaters, show a higher inorganic nutrient concentration and suspended solids. They also show higher taxa richness and evenness, which suggests that higher disturbance frequencies enhance habitat's heterogeneity and resource availability, and therefore primary and secondary production that allow adapted and opportunistic species to coexist. The progressive flow regulation tends to homogenise this complex system, endangering its conservation. Therefore, the key processes identified here should be taken under consideration for the planning and execution of ecological monitoring, management and restoration." (Authors) Odonata are treated at the order level.] Address: Gallardo, Belinda, Pyrenean Institute of Ecology (CSIC). Avda. de Montañana 1005, Zaragoza. 50192. Spain: E-mail: belinda@ipe.csic.es

**10047.** Geraeds, R.P.G.; Schaik, V.A. van (2007): De Gevlekte glanslibel langs de Venbeek, De situatie in 2005 en 2006 en een overzicht van de begeleidende Libellenfauna. *Natuurhistorisch Maandblad* 96(7): 198-201. (in Dutch, with English summary) [*Somatochlora flavomaculata* along the Venbeek brook. Situation in 2005 and 2006 and an overview of the accompanying dragonfly fauna. "The Venbeek brook is a shallow, spring-fed and slowly flowing ditch in an agricultural area in the western part of the 'De Meinweg' National Park. It has a rich vegetation and features a thick (10 to 40 cm) layer of organic sediment covering a sandy bottom. The site was surveyed regularly in both years from May till October, mostly in June. *S. flavomaculata* was found along the Venbeek brook in June and July, which is the main flight period in the Netherlands. On 10 June 2005, 19 males were counted, the largest number of males seen on a single day in these two years. Most mating wheels were seen in June, especially in 2005. Males were seen most frequently, often patrolling patrolling above richly vegetated parts of the ditch or above land near bushes and trees. Only once, on 30 June 2006, was an ovipositing female observed; its behaviour is described in this article. *S. flavomaculata* is accompanied by 28 other dragonfly species along the Venbeek brook, some of which are rare or even very rare in the province of Limburg. Examples include *Calopteryx virgo*, *Brachytron pratense* and *Cordulegaster bol-*

tonii. Hence, this particular brook can be regarded as a very important dragonfly habitat. This is somewhat remarkable because it is basically a straight ditch flowing through farmland, which is normally not the best habitat for rare dragonflies. Nevertheless, its special characteristics have resulted in the occurrence of many dragonfly species." (Authors)] Address: Schaik, V.A. van, Hoosveld 56, 6075 DB Herkenbosch

**10048.** Geurten, R.H.; Nordström, K.; Sprayberry, J.D. H.; Bolzon, D.M.; O'Carroll, D.C. (2007): Neural mechanisms underlying target detection in a dragonfly centrifugal neuron. *Journal of Experimental Biology* 210: 3277-3284. (in English) ["Visual identification of targets is an important task for many animals searching for prey or conspecifics. Dragonflies utilize specialized optics in the dorsal acute zone, accompanied by higher-order visual neurons in the lobula complex, and descending neural pathways tuned to the motion of small targets. While recent studies describe the physiology of insect small target motion detector (STMD) neurons, little is known about the mechanisms that underlie their exquisite sensitivity to target motion. Lobula plate tangential cells (LPTCs), a group of neurons in dipteran flies selective for wide-field motion, have been shown to take input from local motion detectors consistent with the classic correlation model developed by Hassenstein and Reichardt in the 1950s. We have tested the hypothesis that similar mechanisms underlie the response of dragonfly STMDs. We show that an anatomically characterized centrifugal STMD neuron (CSTMD1) gives responses that depend strongly on target contrast, a clear prediction of the correlation model. Target stimuli are more complex in spatiotemporal terms than the sinusoidal grating patterns used to study LPTCs, so we used a correlation-based computer model to predict response tuning to velocity and width of moving targets. We show that increasing target width in the direction of travel causes a shift in response tuning to higher velocities, consistent with our model. Finally, we show how the morphology of CSTMD1 allows for impressive spatial interactions when more than one target is present in the visual field." (Authors)] Address: Nordström, Karin, Department of Neuroscience, Uppsala University, PO Box 593, 751 24 Uppsala, Sweden. E-mail: karin.nordstrom@neuro.uu.se

**10049.** Haritonov, Yu.A.; Borisov, S.N.; Popova, O.N. (2007): Odonatological researches in Russia. *Eurasian Entomological Journal* 6(2): 143-156. (in Russian, with English summary) ["A brief historical survey of dragonfly studies in the former USSR is presented. The Institute of Systematics and Ecology of Animals (Russian Academy of Sciences, Siberian Branch, Novosibirsk) has provided an important centre for odonatological research in Russia. The basic results of faunal, zoogeographic and ecological investigations are adduced. A list of odonate species of Russia and adjacent territories and distribution in regions (European lowlands, Caucasus, Ural, Middle Asia, Siberia, Russian Far East) are provided." (Authors) The odonate species are regionally checked.] Address: Haritonov, A.YU.; Laboratory of Insect Ecology, Biological Institute of the Siberian Branch of the Academy of Sciences, Frunze str. 11, RUS-630091 Novosibirsk, Russia. E-mail: pc@eco.nsc.ru

**10050.** Hisamatsu, S.; Takechi, L. (2007): *Tamea virginia* (Rambur, 1842) overwinters as larval stages in Ehime prefecture. *Tombo* 50: 69-70. (in Japanese, with English summary) ["We collected later instar larvae, ex-

uviae, and teneral adults of *T. virginia* in Matsuyama City, Ehime Prefecture in springs of 2005 and 2007. These observations indicated, for the first time, that this species over-wintered as larval stages in Ehime Prefecture." (Authors)] Address: not stated in English

**10051.** Irusta, J.B. (2007): *Ecologia comportamental reprodutiva de Diastatops obscura Fabricius (Insecta, Odonata)*. Tese apresentada, Universidade Federal do Rio Grande do Norte: 99 pp. (in partly bilingual Portuguese and English) ["In this thesis I discuss the reproductive behaviour and ecology of the libellulid *Diastatops Obscura Fabriciás, 1775*, (Insecta: Odonata) in natural conditions. Populations of this species were studied on the middle stretch of the Pitimbu River, Pamaririm municipality, Rio Grande do Norte, Brazil, during four discontinuous periods between 2002 and 2004. The objectives include the description of strategies and behaviours of both sexes, with especial interest in the intra-male competition for territories and females, the mate selection by females and the importance of male body size and other secondary characters on their reproductive success; from an adaptationist point of view. It was observed that the behaviour of males and females in the reproductive areas are interrelated: the males came earlier to compete for the best territories and the females waited the result of that competition to be fertilized by dominants males, which preferably occupied areas near the river margin. The reproductive success of males with territories on the margin, estimated by number of copulations, ovipositions and days acting as territorial, was better than obtained by more separated territorial males and by satellite males. The body size of males is an important factor for the copulation and opposition taxes and for the number of territorial days, favouring the biggest individuals. I also discuss the apparently importance of wing brilliance and wing integrity on male reproductive success. On intersexual relationships, I proved that females of *D. obscura* participate in mate selection, rejecting non-territorial males or substituting their sperm for other of higher status." (Author)] Address: Irusta, J.B., Univ Fed Rio Grande Norte, Sect Psychobiol, Dept Physiol, Caixa Postal 1511, Campus Univ, BR-59072970 Natal, RN, Brazil. E-mail: banuelos@ufrnet.br

**10052.** Itoh, S. (2007): A case of horizontal perching in *Pantala flavescens* (Fabricius). *Tombo* 49: 43. (in Japanese, with English summary) ["Adults of *P. flavescens* usually take more or less vertical position while resting. A male adult was observed perching on a tree branch in horizontal position in the early afternoon on September 14, 2006 at Hachimantai, Iwate Prefecture." (Author)] Address: Itoh, S., Kinoshita 4-9-7-102, Wakabayashiku, Sendai-shi, Miyagi, 984-0047 Japan

**10053.** Kakichi, K.; Kakichi, K.; Futahashi, R. (2007): The first collecting records of *Tholymis tillarga* (Fabricius, 1798) (Libellulidae) from Toyama prefecture, Honshu, Japan. *Tombo* 50: 60. (in Japanese, with English summary) [24-VII-2007 and 17-VIII-2007; "Two males of *T. tillarga* were captured at Miyaaa in Himi-shi, Toyama Prefecture, Honshu, Japan. This is the first record from Toyama Pref., and the northernmost record of this species from Japan." (Authors)] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**10054.** Karube, H. (2007): The southernmost record of dragonfly in Japanese territory. *Tombo* 50: 76. (in Japa-



nese) [Bruno Bird Island (20°25'31"N, 136°4'11"E), *Pantala flavescens*, 12-17.X.2007] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**10055.** Karube, H. (2007): Occurrence of a new species of the genus *Procordulia* (Anisoptera, Corduliidae) from northern Vietnam. Tombo 50: 47-50. (in English, with Japanese summary) [*Procordulia asahinai* sp. nov. is described from northern Vietnam. "It is related to *P. artemis* Lieftinck, 1930, which has been recorded from high altitude mountain zones of West Malaysia, Sumatra, and Java. But it is distinguished from the latter by the following characters: 1) larger and stouter body, 2) rather robust superior appendages with developed triangular lateral projections in male, 3) longer cerci in female, 4) female valvula valvae with rounded apices. Discovery of this new species demonstrates the expansion of the known distribution limit of *Procordulia* to about 1,800 km north in Asian Continent." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**10056.** Karube, H. (2007): On the scientific name of the Japanese name "Kiioharabiro-tombo". Tombo 50: 71-72. (in Japanese) [*Lyriothemis tricolor* Ris, 1916] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**10057.** Kawashima, I.; Sasamoto, A. (2007): Descriptions of the last two instar larvae of *Heliaeschna filostyla* Martin, 1906 (Anisoptera, Aeshnidae, Aeshninae) from Sulawesi Island, Indonesia. Tombo 49: 9-14. (in English, with Japanese summary) ["The external morphology of the last two instar larvae of *Heliaeschna filostyla* from Sulawesi Island, Indonesia are described and illustrated for the first time. The external characters of these last instar larvae are compared with those of two species belonging to the same tribe, *Gynacantha japonica* from the mainland of Japan and *G. ryukyuensis* from the Ryukyu Islands, SW Japan." (Authors)] Address: Kawashima, I., 1-50-9 Nagasawa, Yokosuka, Kanagawa, 239-0842 Japan

**10058.** Keppner, E.J.; Keppner, L.A. (2007): Dragonflies and Damselflies (Odonata) of the St. Andrew Bay Ecosystem and Bay County, Florida. For: St. Andrew Bay Environmental Study Team, Inc. and Friends of St. Andrew Bay: 14 pp. (in English) ["The St. Andrew Bay ecosystem supports a significant number of species of odonates considering that the collection currently has 49% of the total number of species reported from Florida. The presence of the number of species of odonates is indicative of the variety of aquatic habitats that the area supports. The inventory establishes the presence of a number of species not previously reported from Bay County or the ecosystem (24 Anisoptera and 23 Zygoptera) including Phantom Darner, Swamp Darner, Laura's Clubtail, Gray Petaltail, etc. Keppner and Keppner (in press) provide a list of the new records for Bay County, Florida. The survey extended the range of two species, Everglades Sprite and Phantom Darner in Florida. Collecting will continue in an attempt to document the species listed as possibly occurring in the county and ecosystem. Anyone who collects a specimen of odonate can aid in this endeavour to document the species in Bay County and the St. Andrew Bay ecosys-

tem by depositing the specimen(s) in our collect or another collection that will be available for examination by interested individuals." (Authors)] Address: Keppner, E. J., c/o The St. Andrew Bay Environmental Study Team, PO Box 2465, Panama City, Florida 32402, USA

**10059.** Kita, H.; Ozono, A. (2007): Notes on the oviposition of a libellulid species, *Brachythemis contaminata* (Fabricius, 1793) in Ishigaki-jima Is., Yaeyama Isis., SW Ryukyus. Tombo 49: 33-34. (in Japanese, with English summary) ["'Contact flying oviposition into water' of *B. contaminata* has been recorded on Ishigaki-jima Is. Oviposition "occurred just after copulation, with females settling on twigs projecting from the water surface or on floating reed leaves. Eggs were attached via the distal abdominal segments onto the surface of these plant materials, as reported by Muraki (1990)." (Authors)] Address: not stated in English

**10060.** Krassilov, V.; Silantjeva, N.; Hellmund, M.; Hellmund, W. (2007): Insect egg sets on angiosperm leaves from the Lower Cretaceous of Negev, Israel. *Cretaceous Res.* 28: 803-811. (in English) ["Egg set impressions on fossil leaves, a new field of palaeontological research, links insect palaeoecology with that of the host plant. Zygopteran egg sets from the Albian of Makhtesh Ramon, central Negev, Israel, were deposited on narrow leaves of an angiospermous *Acaciaephyllum*-like morphotype. Their pattern resembles the extant and Tertiary "Coenagrionid Type", attesting to evolutionary conservatism of this oviposition mode since the time of early angiosperms. A comparison with the Palaeozoic-Jurassic proto-Odonata egg sets suggests a change in oviposition modes in several steps that can be related to the evolution of wetlands. The Albian remains are among the earliest of a modern aspect supposedly related to the advent of angiosperms. A wetland source community has been previously suggested for *Acaciaephyllum*-like leaves on taphonomic grounds, and the finding of damselfly egg sets provides additional evidence in favour of such a habitat, thus having a bearing on the palaeoecology of Early Cretaceous angiosperms." (Authors)] Address: Krassilov, V., Inst. Evol., Univ. Haifa, Mount Carmel, Haifa-31905, Israel

**10061.** Lagunov, A.V. (2007): "Red Book" species of invertebrates Ilmen Reserve (south Ural). *Bulletin of the Orenburg State University* 12: 76-82. (in Russian) [Russia; *Calopteryx virgo*, *C. splendens*, *Ischnura aralensis*, *Aeshna viridis*, *Leucorrhinia albifrons* and *Ophiogomphus cecilia* are listed as rare in the reserve.] Address: Lagunov, A.V., Ilmensky state reserve, Ural branch of Russian Academy of Science, Miass, Russia. E-mail: lagunov@ilmeny.ac.ru

**10062.** Macaulay, D. (2007): Survey of the Odonate Fauna in Kakwa Wildland Park - June - July, 2006. Prepared for the Alberta Natural Heritage Information Centre, Parks Resource Management Coordination Branch, Alberta Tourism, 2nd Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta T5K 2J6, Canada: 27 pp. (in English) ["A total of 21 odonate species were found during the 2006 survey of the Kakwa WP. ... There may be as many as 52 odonate species that occur in the area. Most of the species recorded for Kakwa WP were common and have wide distributions across Canada. Of the 21 species recorded, 10 are either rare or uncommon. The rare species were *Aeshna septentrionalis* (S1-rank), *Somatochlora forcipata* (S1-rank), and *S. kennedyi* (S1-rank). The uncommon species

were *Aeshna subarctica* (S2-rank), *A. sitchensis* (S3-rank), *S. albicincta* (S2-rank), *S. franklini* (S2-rank), *S. whitehousei* (S2-rank), *S. hudsonica* (S3-rank) and *Enallagma hageni* (S3-rank). The Kakwa WP odonate survey was successful and a wide variety of species were found. The diversity of suitable habitats in the park supports a diversity of odonate species. Future surveys in the park, if conducted over the course of the spring and summer months, would likely add several more species to what is currently known." (Author)] Address: not stated

**10063.** Matsuhira, K. (2007): A new record of *Sympetrum fonscolombii* from Amami-Ōshima Is., Amami Islands. Tombo 49: 28. (in Japanese) [21-IV-2006, Japan] Address: not stated in English

**10064.** Matsuhira, K. (2007): The first record of *Rhipidolestes okinawanus* (Asahina, 1951) from Yoro-jima Is., Amami Islands. Tombo 49: 44. (in Japanese) [Japan, 17-VI-2006.]

**10065.** Móra, A.; Barnucz, B.; Boda, P.; Csabai, Z.; Cser, B.; Deák, C.; Papp, L. (2007): On the macroinvertebrate fauna of inflows of Lake Balaton. Acta biol. Debrecina Oecol. Hung. 16: 105-167. (in Hungarian, with English summary) [Documentation on literature data and unpublished material of 35 Odonata species recorded from the streams in the catchment of the Balaton Lake, Hungary.] Address: Móra, A., Balaton Limnol. Res. Inst., Hung. Acad. Sei. Klebeisberg Kuno 3, 8237 Tihany, Hungaria

**10066.** Naraoka, H. (2007): Reproductive behaviour of the damselfly *Lestes japonicus* Selys (Odonata: Lestidae), with the comparison of other two Japanese *Lestes*. Tombo 50: 61-66. (in Japanese, with English summary) ["The reproductive behaviour of *L. japonicus* was observed at two small marshes in Fukaura-machi and Rokkasho-mura, Aomori Prefecture and in a insectarium built in the garden, from 2004 to 2006. The males formed tandem with the female without courtship and display by quick pursuing at when the female flight away. The male did intra-male sperm translocation of 77.5+-22.7s (n=24) in mean, after the tandem pair perched. Copulation duration was 17m42s+-5m54s (n=29) in mean, and it was divided into two stages (I:16m28s+-5m57s, n=25; II: 82s+-20s, n=27). Stage III was not recognized. The reproductive behaviour, which was bimodal type of 8:00-11:00h and 13:00-17:00h, is considered with the difference of the utilization of the host plant, space and hour of the oviposition, in the relation of other Japanese two *Lestes*."] Address: not stated in English

**10067.** Ozono, A.; Karube, H.; Muramatsu, M. (2007): A new record for the Japanese fauna *Neurothemis ramburii ramburii* (Kaup in Brauer, 1866) from Yonaguni-jima Is. SW, Ryukyus. Tombo 49: 23-26. (in Japanese, with English summary) [*Neurothemis ramburii* was newly recorded on 17-V-2006 and in November 2006. The specimens probably originate from Taiwan. The November-record was an ovipositing female, which gives the opportunity that a population will be founded.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**10068.** Paraschiv, G.-M.; Schroeder V.; Samargium M.D.; Sava, D. (2007): Ecological study of zoobenthos communities from the Matita and Merhei lakes (Danube

delta). Research Journal of Agricultural Science 39(2): 489-498. (in English, with Romanian summary) [Romania; Odonata are only listed at the order level; several ecological indices are outlined in an annex on the basis of Odonata larvae sampling.] Address: Paraschiv, Gabriela-Mihaela, University Ovidius, Constanta, Romania. E-mail: gmparaschiv@gmail.com

**10069.** Richardson, G.M. (Ed.) (2007): One of North America's rarest dragonflies discovered in Canada. Ontario Insects 13(1): 9-10. (in English) [*Somatochlora hineana*, Minesing Wetlands, Ontario, 20/27-VI-2007.] Address: Richardson, G.M., 18 McDonald St. West. Listowel, ON, N4W 1 K4, CA

**10070.** Sadyrin, V.M. (2007): The growth, somatic and exuvial production of *Leucorrhinia dubia* V.D.L. (Odonata, Libellulidae). In: T.M. Mikheyeva, [Ed.]. Lake ecosystems: biological processes, anthropogenic transformation, water quality: materials of the III Intern. Sci. Conf., September 17-22, 2007, Minsk – Narodn / Belarusian state university. ISBN 978-985-476-521-1: 250. (in Russian, with English title) [The influence of different temperatures on larval length and mass increase of *L. dubia* was studied in the laboratory.] Address: Sadyrin, V.M., Inst. Biol. Russ. Acad. Sei., Syktyvkar, Russia. E-mail: v.sadyrin@ib.komisc.ru

**10071.** Sasamoto, A.; Karube, H. (2007): Descriptions of two new species of *Drepanosticta* (Zygoptera, Platystictidae) from Sumatra, Indonesia, with a note of unknown female of *D. pytho*. Tombo 50: 51-57. (in English, with Japanese summary) ["Two new species of *Drepanosticta*, *D. asahinai* sp. nov. (holotype male, Mt. Sorik, Marapi, W. Sumatra) and *D. sumatrana* sp. nov. (holotype male, Bandar Baru, N. Sumatra), are described and illustrated, these two species are easily distinguished from the other allied species in the structures of prothorax and anal appendages etc. In addition, we make a brief description on a hitherto unknown female of *D. pytho*, which has a peculiar structure in prothorax, and has not been recorded for 70 years since original description." (Authors)] Address: Sasamoto, A., Yakuoji Tawaramoto-cho, Shiki-gun, Nara, 636-0341 Japan

**10072.** Sasamoto, A.; Kawashima, I. (2007): Description of the last instar larva of *Amphigomphus nakamurai* Karube, 2001 (Anisoptera, Gomphidae, Onychogomphinae) from Northern Vietnam, Indo-China. Tombo 49: 5-9. (in English, with Japanese summary) ["The external morphology of the last instar larva of *A. nakamurai* from N. Vietnam, Indo-China is described and illustrated for the first time. The external characters are compared with those of two species belonging to the same tribe, *Onychogomphus viridicostus* and *Nihonogomphus viridis* from Japan." (Authors)] Address: Kawashima, I., 1-50-9 Nagasawa, Yokosuka, Kanagawa, 239-0842 Japan

**10073.** Schaik, V.A. van; Geraeds, R.P.G. (2007): Herontdekking van de Gaffellibel langs de Swalm. Natuurhistorisch Maandblad 96(11): 299-302. (in Dutch, with English summary) [At 24-VII-2006, *Ophiogomphus cecilia* was recorded for the first time after a gap of 70 years along the river Swalm, The Netherlands. Following this record, an intensified study proved several additional records of this species in the Swalm.] Address: Schaik, V.A. van, Hoosveld 56, 6075 DB Herkenbosch, The Netherlands

**10074.** Sharapova, T.A. (2007): The Odonata larvae in the periphyton of West Siberia. Questions of aquatic

entomology of Russia and adjacent lands: Materials of the Third All-Russia Symposium on Amphibiotic and Aquatic Insects. Voronezh State University. ISBN 978-5-9273-1169-9: 374-376. (in Russian, with English summary) ["Data on the species composition of Odonata larvae and their role in freshwater zooperiphyton communities of various water bodies of West Siberia are given." (Author). The following taxa are listed: *Coenagrion lunulatum*, *C. pulchellum*, *Enallagma cyathigerum*, *Libellula depressa*, *Sympecma paedisca*, *Leucorrhinia albifrons*, *Aeshna grandis*, *A. juncea*, *A. caerulea*, *A. viridis*, *Anax* sp., *Calopteryx splendens*, *Somatochlora metallica*, *Ischnura elegans*, *Erythromma humerale*. Locality data are lacking.] Address: Sharapova, T.A., Inst. of Northern Develop., Siberian Branch of the RAS, Tyumen, Russia.

**10075.** Shimizu, N. (2007): A record of nocturnal oviposition in *Boyeria maclachlani* (Selys) (Aeshnidae: Brachytroninae). Tombo 50: 74-75. (in Japanese, with English summary) ["Nocturnal oviposition behaviour was observed for the first time in *Boyeria maclachlani*. I observed a female of this species to lay eggs from 18:45 to 20:35 in August 21, 1995 (Sunset Time: 18:36 PM). Next year and later, I observed 16 females to lay eggs at nighttime: a latest example among them lasted until 21:05 on August 13, 2000 (Sunset Time: 18:44 PM)."] (Author)] Address: not stated in English

**10076.** Shivakumar, K.N.; Lingaiah, S. (2007): Ultra lightweight materials for bio inspired microsystems. 16th International Conference on Composite Materials kyoto, Japan: 7 pp. (in English) ["Ultra lightweight nanofiber fabrics play a vital role in the development of Microsystems. Polyacrylonitrile, polybenzimidazole and Nylon-66 polymer based ultra lightweight nanofiber fabrics were produced using electrospinning technique. SEM characterization showed that the diameter of Nylon-66 nanofibers varied from 50-300 nm. The average modulus and strength of Nylon-66 nanofiber fabric was 2.4 GPa and 154 MPa respectively. An attempt to build dragonfly's wing using carbon fiber as grid and electrospun fabric as skin was made. Three types of phenomenological dragonfly wings such as carbon fiber grid, electrospun Nylon-66 nanofiber fabric bonded carbon fiber grid and commercial Nylon-6 film bonded carbon fiber grid were made. The flexural stiffness to weight ratio of electrospun Nylon-66 fabric bonded wing was 160% higher than that of commercial Nylon-6 film bonded wing. This shows the potential application of ultra lightweight electrospun nanofiber fabric for building Microsystems." (Authors)] Address: Shivakumar, K.N., Center for Composite Materials Research, Dept of Mechanical & Chemical Engineering, North Carolina A & T State University, Greensboro, NC 27411, USA. E-mail: kunigal@ncat.edu

**10077.** Ueda, A.; Karube, H.; Noerdjito, W.A.; Fukuyama, K. (2007): A new record of *Brachythemis contaminata* (Fabricius, 1793) from Borneo. Tombo 49: 29-30. (in Japanese, with English summary) ["*B. contaminata* was newly recorded from Borneo at the reservoir in lowland *Acacia mangium* plantation of East Kalimantan (12 km point on the road from Balikpapan to Samarinda, E. Kalimantan, Indonesia) (lat. 1°16'8" S, long. 116°90'8" E). Specimens are stored at Zoological Museum, Research Center for Biology, Indonesian Institute of Sciences (LIPI), JL Ir. Juanda no.18 Bogor, Indonesia." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**10078.** Usada, M. (2007): An observation of the oviposition site of *Chlorogomphus okinawensis* Ishida. Tombo 49: 31-32. (in Japanese, with English summary) [Okmawa-jima Island, Ryukyu Islands, Japan. A female laid eggs on damp sand at a riverside. The oviposition site was very similar to that of *C. b. brunneus*.] Address: not stated in English

**10079.** Verberk, W.C.E.P.; Kuper, J.T.; Lamers, L.P.M.; Christianen, M.J.A.; Esselink, H. (2007): Restoring fen water bodies by removing accumulated organic sludge: what are the effects for aquatic macroinvertebrates?. Proc. Neth. Entomol. Soc. Meet. 18: 115-124. (in English) [Only *Pyrrhosoma nymphula* and *Erythromma najas* are mentioned. They are associated with dredged water bodies. "Pristine freshwater fens harbour many species of aquatic macroinvertebrates. Effects of eutrophication and desiccation have strong negative impacts on macroinvertebrate assemblages. To restore degraded fens, the removal of accumulated organic sludge by dredging seems a necessary step. However, degraded fens may harbour relic populations of rare and characteristic species as was found for raised bogs and shallow soft water lakes. This study investigates the effectivity of dredging by comparing dredged and undredged water bodies in two areas (SW & MP). To help interpret the observed differences, a third least impacted area is sampled in addition (WD). Abiotic conditions clearly differed between areas, but when comparing dredged and undredged water bodies, only turbidity was lower in dredged water bodies. Coverage of submerged vegetation was higher in dredged water bodies, especially in MP. For aquatic macroinvertebrates, strong differences between dredged and undredged water bodies were found for both SW and MP. Dredged water bodies in MP resembled WD most strongly, in abiotic conditions, vegetation, and invertebrates. Nevertheless, a number of species commonly occurring in WD were mainly associated with undredged water bodies, indicating incomplete restoration of certain key factors. Results indicate that dredging contributes to ecological restoration of fens. To maximise effectiveness of dredging, internal and external supply of nutrients should be minimized, removal of organic sludge should be near-complete, while retaining small patches of vegetation and recesses as sources of individuals to facilitate recolonisation. Furthermore, this study shows that taking fauna into account can yield new information which is not uncovered by researching solely abiotic conditions and vegetation. In contrast to raised bogs and shallow soft water lakes, no relic populations of rare and characteristic species were found in degraded, undredged fen water bodies. These differences may be related to differences in ecosystem functioning, with characteristic fen species having a lower persistence and a higher recolonisation rate." (Authors)] Address: Verberk, W. Dept Animal Ecol., Radboud Univ. Nijmegen, PO Box 9010, 6500 GL Nijmegen, The Netherlands, E-mail: W.Verberk@science.ru.nl

**10080.** Weida, S. (2007): Record of a gynandromorphic individual of *Sympetrum maculatum* Oguma, 1915 (Anisoptera: Libellulidae). Tombo 50: 67-68. (in Japanese, with English summary) ["On August 31, 2006, a gynandromorphic individual of *S. maculatum* was captured for the first time at Noto-jima Island, off the Noto Peninsula, Ishikawa Pref., Japan. This individual roughly bears male characteristics on the left-hand side and female characteristics on the right-hand side." (Author)] Address: not stated in English



**10081.** Westermann, K.; Weihrach, F. (2007): Eindeutige Indizien für eine bivoltine Entwicklung von *Anax imperator* in einigen Gewässern Süddeutschlands. *mercuriale* 7: 12-17. (in German) [The bivoltine development of *A. imperator* at two localities in Baden-Württemberg, Germany is document and discussed in detail.] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**10082.** Zhou, Z.-h. (2007): Taxonomic and faunistic studies on the superfamily Calopterygoidea from China (Odonata: Zygoptera). *Special Zoology*, Institute of Entomology, Guizhou University, Guiyang, China: VII + 80 pp. (in Chinese, with English summary) ["The present dissertation is a systematic study on the superfamily Calopterygoidea from China. It mainly deals with the morphology, taxonomy and faunal analysis of the Chinese Calopterygoidea. Totally 4 families, 20 genera and 84 species are treated in the taxonomic part, of which 2 new species and 1 first female record are described: 1 new combination is proposed as well. The new taxa are listed as follows: New species: *Mnais leigongshanus* sp. nov., *Bayadera unimaculata* sp. nov.; new combination: *Rhinocypha maolanensis* (Zhou and Bao, 2002) comb. nov.; first female record: *Rhinocypha maolanensis* (Zhou and Rao, 2002) comb. nov. The faunal structures of the Chinese Calopterygoidea at generic and specific levels were examined. 20 known genera only constitute 3 types of distribution in zoogeographic regions in the world. Among them, 12 genera are distributed in Oriental region, which make up 60%. while 7 genera in Oriental + Palaearctic region, accounting for 35%. 20 genera in total distribute in Oriental region, accounting for 100%. It is clear that Oriental genera make up the majority of the Chinese Calopterygoidea at genera level. 84 known species of Chinese Calopterygoidea are mainly distributed in Oriental region, in which the number of species makes up 83.33% of Chinese species in total. All the known species constitute 16 types of distribution in seven Chinese zoogeographic sub-regions. Among them, 16 species are present only in Central China sub-regions, 15 in South China sub-regions, 10 in Central China + South China sub-regions, 9 in Southwest China sub-regions, 9 in Southwest China + South China sub-regions, 8 in Central China + South China + Southwest China sub-regions, accounting for 19.05%, 17.86%, 11.90%, 10.71%, 10.71% and 9.52%, respectively. It is obvious that Oriental species make up the majority of Chinese Calopterygoidea at species level and they distribute mainly in Central China and South China sub-regions." (Author) "Please note that this thesis may not constitute a published work in terms of Article 8 of the CODE. So, the two new species group names are not yet available names and should not be included in catalogues. Moreover, Haomiao Zhang and I have some doubts of their status as valid species." (Matti Hämäläinen, e-mail-note from 220052011)] Address: not available

## 2008

**10083.** Barbier, G.; Bécan, R.; Claude, J.-F.; Dussaix, C.; Kerihuel, C. (2008): Entomofaune sarthoise: nouvelles espèces apparues depuis ving ans. *Troglodyte* 21 / 22: 9-21. (in French) [France, La Sarthe Department; *Ophiogomphus cecilia*: 6.VII-1996, SO Mans, Saint-Mars-d'Outille; *Leucorrhinia caudalis*, 18-VI-2005, SO of La Flèche.] Address: Kerihuel, C., 2 imp. Ravault, F-

72190 Coulaines, France. E-mail: christian.kerihuel@wanadoo.fr

**10084.** Borisov, S.N. (2008): Anthropogenic influence on the dragonfly fauna (Odonata) in an oasis of Pamir-Alai. *Siberian Journal of Ecology* 15(1): 43-52. (in Russian, with English summary) ["Development of irrigation in the plains around the Pamir-Alai caused the formation of new habitats for Odonata: numerous water bodies of artificial irrigation systems which are unique in the hydrological regime. They serve as the main and often sole biotopes for the larvae. Thus, a number of initially mountainous rheophil and eurytopic oxyphilic species became able to adjust to the desert zone when warm water flows - channels and aryks - appeared there. The mountainous and boreomontan limnophilic species survive the least anthropogenic action. The negative anthropogenic action is connected with the disappearance or change of natural biotopes of dragonflies. It is essential in the submountain zone for stenoecic obligate rheophilic and hemerophobic species that do not populate artificial water flows." (Author)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**10085.** Buidin, C.; Rochepault, Y. (2008): Habitat des larves de la libellule *Somatochlora brevicincta* Robert en Minganie, Québec, Canada. *Naturaliste Canadien* 132(2): 30-37. (in French) [Imaginal and larval habitats of *S. brevicincta* are described in detail.] Address: Buidin, C. E-mail: balbu1@globetrotter.net

**10086.** Cannings, R.A. (2008): Grassland dragonflies. *BC Grasslands (Summer 2008)*: 15-17. (in English) ["Wherever grasslands are punctuated by ponds, marshes or lakeshores, dragonflies can be abundant. While they usually fly or perch around the edge of water bodies, many also move far into the dry, grassy landscape, especially when they are hunting for prey or when young adults are awaiting sexual maturity. [...] Of the 87 species known in British Columbia, Canada at least 50 can be found around grassland waters, although not all of these are common or widespread. [...] There is no specialized dragonfly fauna in BC grasslands. The species that occur in the grasslands are the same as those found in marshes and on pond edges in other ecosystems around the province. However, some dragonflies are more often found in grassland waters than are their close relatives, and a few are able to withstand the high salinities of alkaline ponds, typical of many of our dry grassland habitats." (Author) Following this introduction, the paper introduces typical Odonata family wise.] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street Victoria, British Columbia V8W 9W2. Canada. E-mail: rcannings@royalbcmuseum.bc.ca

**10087.** Cooper, I.A. (2008): Ecological causation of sex differences and a female-limited dimorphism in Hawaiian damselflies. PhD thesis, Faculty of the University Graduate School, Dept of Biology, Indiana University: VI + 98 pp + app. (in English) ["Evolution theory posits that sexual selection, more so than natural selection, drives sex differences, such as bright males and intersexual mimicry. However, female-limited dimorphism has not been fully explained by sexual selection even though this phenomenon includes what appears to be intersexual mimicry of bright males. This dissertation presents evidence that natural selection over an eco-

logical gradient may explain sexual dimorphism and female-limited dimorphism in a damselfly species, as well as macroevolutionary patterns of sexual dimorphism throughout a damselfly genus. I documented new cases of female-limited colour dimorphism in the endemic Hawaiian *Megalagrion* damselflies. Two species, *M. calliphya* and *M. hawaiiense*, contain a typical, green female morph (gynomorph) as well a red female morph (andromorph) that is similar in colour to the males. In *M. calliphya*, I describe habitat differences between the sexes and patterns of colour variation in males and females over an elevational gradient on Hawaii Island that varies in temperature and solar radiation. Using transplant experiments, I determined that body temperature does not differ between the female morphs according to hue, although it is affected by body brightness. Therefore, environmental temperature is not a selective agent on the female-limited dimorphism. However, solar radiation may select for red individuals, including andromorphs, under exposed conditions. A comparison of antioxidant ability between the female morphs as well between males over an elevational gradient indicated that red pigmentation is an effective antioxidant that may enable red individuals to exist where free radicals are produced from high radiation levels. Finally, I extend the ecological explanation for the female-limited dimorphism to patterns of sex differences throughout the *Megalagrion* genus as well a case of female-limited dimorphism in a distantly related species (*Nehalennia irene*). (Author) Address: Cooper, Idelle A., 1001E, 3Rdst. Jordanhall, Bloomington, IN 47405, USA

**10088.** Delarze, R.; Gonseth, Y. (2008): Lebensräume der Schweiz. Ökologie - Gefährdung - Kennarten. 2. Auflage. ott-Verlag. Bern: 424 pp. (in German) [Odonata are used as bioindicative important taxa to characterise springs, running and standing waters in Switzerland.] Address: Gonseth, Y., Centre Suisse de Cartographie de la Faune, Terreaux 14, CH-2000 Neuchâtel, Switzerland. E-mail: yves.gonseth@cscf.unine.ch

**10089.** Klenke, F. (2008): Änderungen im Bestand der Naturschutzgebiete in Sachsen im Jahre 2006. Naturschutzarbeit in Sachsen 49: 83-88. (in German) [The paper compiles amendments in the Saxonian nature conservation areas (extensions, new dedications by law). A few Odonata are listed as follows: NSG D 105 Grenzwiesen Fürstenau und Fürstenauer Heide (ca. 507 ha, Landkreis Sächsische Schweiz-Osterzgebirge): *Somatochlora alpestris*. NSG D 106 Rutschung P (ca. 112 ha, Landkreis Görlitz): *Leucorrhinia pectoralis*, *Coenagrion lunulatum*, *C. pulchellum*.] Address: not stated

**10090.** Macaulay, D. (2008): Survey of the Odonate Fauna in Willmore Wilderness Park. Prepared for: Parks Resource Management Coordination Branch, Alberta Tourism, 2nd Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta T5K 2J6, Canada: 15 pp. (in English) [Alberta, Canada; "Willmore Wilderness Park (about 4596.7 km<sup>2</sup> in size) is located in the northern portion of Alberta's Rocky Mountains just west of Grand Cache and north of Jasper National Park." (Author) In 2007, 17 Odonata species were collected at 18 localities. *Aeshna eremita*, *A. septentrionalis*, *A. juncea*, *A. palmata*, *Libellula quadrimaculata*, *Leucorrhinia hudsonica*, *Sympetrum internum*, *Cordulia shurtleffii*, *Somatochlora albicincta*, *S. cingulata*, *S. hudsonica*, *S. semicircularis*, *Lestes unguiculatus*, *Coenagrion resolutum*, *C. interrogatum*, *Enallagma boreale* E. hageni] Address: not stated

**10091.** Nikolaeva, N.E. (2008): Analysis of freshwater invertebrate fauna, caught in underwater light-trap. TSU Herald. A series of Biology and Ecology 7: 95-105. (in Russian, with English summary) [White-light diodes were used as the source of light in traps. More than 80 taxa were caught. Larval *Lestes sponsa*, *L. virens*, *Sympetrum flaveolum*, *S. vulgatum* and *S. danae* were attracted by light. *Coenagrion* responded weakly, whereas *Aeshna*, *Cordulia* and *Libellula* larvae were not phototactic.] Address: Nikolaeva, N.E., Tver State University, 33, Zhelyabova st., 170100, Tver, Russia

**10092.** Salcher, M. (2008): Libellen der Mooswälder. In: Helge Körner (Hrsg.): Die Mooswälder. Natur- und Kulturgeschichte der Breisgauer Bucht. Lavori-Verlag. Freiburg im Breisgau: 261-276. (in German) [The paper includes both a general introduction into dragonfly biology and a discussion of regional Odonata fauna. In the region of the western Freiburger Bucht, Baden-Württemberg, Germany a total of 48 odonate species was recorded (literature and author's data). Special emphasis is given to *Calopteryx splendens*, *C. virgo*, *Coenagrion mercuriale*, *Orthetrum coerulescens*, *Libellula fulva*, *Cordulegaster boltonii*, and *Sympetrum pedemontanum*.] Address: Salcher, M., Ferdinand-Weiß-Str. 92, 79106 Freiburg, Germany

**10093.** Shivakumar, K.N.; Lingaiah, S.; Sadler, R.L. (2008): Ultra lightweight material for building microsystems. American Institute of Aeronautics and Astronautics: 8 pp. (in English) ["Electrospinning technology was used to produce ultra lightweight nanofiber fabrics from Nylon-66. The fiber diameter ranged from 50-300 nm depending on the collector speed, polymer concentration, distance, and the voltage. Tensile properties were conducted using a specially designed test specimen and fixture, and micro tension test machine. The average tensile modulus and strength were 960 MPa and 60.7 MPa, respectively, which are 6 to 10 times higher than those reported in the literature. This nanofiber fabric was used as a membrane to construct a dragonfly wing from a carbon grid. The specific flexural stiffness to nanofiber fabric wing was 260% of commercial Nylon-6 film wing. This study demonstrates a potential application of using electrospun nanofiber fabrics for microsystems." (Authors)] Address: Shivakumar, K.N., Center for Composite Materials Research, Dept of Mechanical & Chemical Engineering, North Carolina A & T State University, Greensboro, NC 27411, USA. E-mail: kunigal@ncat.edu

**10094.** Wang, Y.; Kalyanasundaram, S.; Young, J. (2008): Design and fabrication of dragonfly test bed for aerodynamic characterization. In: Jonghyuk, K. & R. Mahony (eds): Proceedings of the 2008 Australasian Conference on Robotics & Automation, December 3 - 5, 2008, Canberra, Australia. ISBN 978-0-646-50643-2: 6 pp. (in English) ["This paper focuses on the design of an electro-mechanical device for studying the aerodynamic behaviour of flapping wings. The experimental device is designed to mimic the flight behaviour of dragon fly. Wing flapping speed is precisely controlled by controlling the motor speed. Wing flapping amplitude could be varied by changing the rotating arm length. Wing rotation amplitudes during down- and up- stroke could be different and are controlled separately by two different springs. A six degree of freedom sensor is placed at the wing root to collect the force and torque data. The test of a wing with a dragonfly hind-wing contour but enlarged 11 times, showed the device met the

design expectation, and further more, the phase-averaged data for lift force in one flapping cycle had the similar pattern as the ones obtained via CFD simulations as well as the one calculated based on a real dragonfly's flight behaviour." (Authors)] Address: Wang, Y., Dept of Engineering, Australian National University, Canberra, Australia. E-mail: Yutong.Wang@anu.edu.au

**10095.** Whitfield, J.B.; Kjer, K.M. (2008): Ancient rapid radiations of insects: Challenges for phylogenetic analysis. *Annual Review of Entomology* 53: 449-472. (in English) ["Phylogenies of major groups of insects based on both morphological and molecular data have sometimes been contentious, often lacking the data to distinguish between alternative views of relationships. This paucity of data is often due to real biological and historical causes, such as shortness of time spans between divergences for evolution to occur and long time spans after divergences for subsequent evolutionary changes to obscure the earlier ones. Another reason for difficulty in resolving some of the relationships using molecular data is the limited spectrum of genes so far developed for phylogeny estimation. For this latter issue, there is cause for current optimism owing to rapid increases in our knowledge of comparative genomics. At least some historical patterns of divergence may, however, continue to defy our attempts to completely reconstruct them with confidence, at least using current strategies." (Authors) The Palaeoptera problem (Odonata, Ephemeroptera, and their extinct stem lineages, along with the extinct Palaeodictyoptera) is discussed in detail.] Address: Whitfield, J.B., Department of Entomology, University of Illinois, Urbana, Illinois 61821, USA. E-mail: jwhitfie@life.uiuc.edu

**10096.** Zasyapkina, I.A. (2008): Examination of the amphibiotic insect fauna of the Tauskaya Bay coasts. *Bulletin of the North-East Scientific Center FEB RAS* 4: 35-44. (in Russian, with English summary) [Russia; Odonata are treated at the family level.] Address: E-mail: irina492008@yandex.ru

**10097.** Zivic, N.; Vukanic, V.; Babovic-Jaksic, T.; Miljanovic, B. (2008): Distribution of macrozoobenthos in the tributaries of the river Ibar in the northern part of Kosovo and Metohija. *Natura montenegrina* 7(2): 401-411. (in English, with Serbian summary) [Cordulegaster boltonii, Ophiogomphus cecilia, Gomphus vulgatissimus, Onychogomphus forcipatus, and Libellula quadrimaculata are recorded from the Socanska, Josanicka and Ibar rivers.] Address: Zivic, N., Fac. Sei. & Math., Univ. Pristina, Kosovska Mitrovica, Kosovo. E-mail: nebzivic@gmail.com

## 2009

**10098.** Amoroso, N.A.; Chalcraft, D.R. (2009): PS 78-28: Effects of dragonfly colonization history on the biodiversity of aquatic communities. The 94th ESA Annual Meeting (August 2 - 7, 2009) (in English) [Verbatim: "Background/Question/Methods: It is clear that current interactions among species in a system can have an important role in controlling the biodiversity of that system. Some studies, however, have shown that the timing of species arrival to a community could influence the strength of species interactions within ecological communities. Such priority effects should be important in frequently disrupted environments, such as temporary ponds, which provide opportunities for new collec-

tions of species to colonize the refilled pond. In temporary ponds, the top predators are often larval dragonflies but their presence is dependent, in part, on the timing in which adult dragonflies find and oviposit in the pond. We tested the hypothesis that the biodiversity of aquatic invertebrates present in temporary ponds is influenced by the arrival time of larval dragonflies. Specifically, we hypothesize that ponds with early-arriving dragonflies will have a lower biodiversity of aquatic insects compared to ponds where dragonfly colonization is continuously inhibited or where dragonflies arrive late in the summer. To test this hypothesis, we experimentally altered the timing in which dragonflies could oviposit eggs into artificial ponds (modified stock tanks). After a four month period, the insect biodiversity of each pond was sub-sampled and quantified. Results / Conclusions: We found that ponds allowing early dragonfly colonization produced more metamorphosed dragonflies than ponds preventing early dragonfly colonization. Preliminary results suggest that ponds with only late-arriving dragonflies had more late-instar dragonflies than ponds always allowing dragonfly colonization. The fewest late-instar dragonflies were found in ponds with only early-arriving dragonflies. Hence, early-arriving dragonflies appear to inhibit late-arriving individuals. In addition, dragonfly oviposition caused differences in insect communities among ponds, yet dragonfly arrival time does not influence total insect species richness in ponds. We found that ponds which prevented dragonfly colonization had greater beetle species richness than ponds allowing dragonfly colonization but dragonfly arrival time did not influence beetle richness. Total abundance of beetles did not vary among treatments. Trends indicate that chironomid abundance is greatest in ponds with only late-arriving dragonflies and least in ponds where dragonflies can continuously oviposit. These results suggest predatory dragonflies have important effects on insect assemblages in ponds. The timing of dragonfly arrival, however, seems to play an important role in influencing the abundance of some taxa (e.g., dragonflies or flies) but did not affect the abundance or biodiversity within other taxa (e.g., beetles) or in the number of insect species found." (Authors)] Address: not stated

**10099.** Babu, R.; Mondal, S.B. (2009): First record of *Rhinocypha trifasciata* Selys from Maharashtra, India (Odonata: Zygoptera: Chlorocyphidae). *Rec. zool. Surv. India* 109(3): 115-116. (in English) [2 males, 1 female, Burgaon, Nagpur, India, 26-III-2004.] Address: Babu, R., Zool. Surv. India, M-Block, New Alipore, Kolkata-700053, India

**10100.** Baker, R.L.; McGuffin, M.E. (2009): Technique and observer presence affect reporting of behaviour of damselfly larvae. *Jl N. Am. benthol. Soc.* 26(1): 145-151. (in English) ["We experimentally tested for systematic biases in techniques commonly used to study behaviour of larval aquatic insects. We determined whether larval Zygoptera responded to the presence of an observer and whether live observation missed some behaviours. We found significant differences between behaviours recorded during live observations and behaviours videotaped in the absence of an observer. All behaviours, except Rotate, were exhibited less frequently in the presence of an observer. These results suggest that larvae respond to the presence of observers as if they were predators. Live observation also missed some behaviours. The duration of Crawl For-



ward, which can be very subtle, and the frequency of Rotate, which can be very rapid and is easily missed, were greater when recorded from the videotape than by a live observer. Wherever possible, use of video recording systems is preferable over reliance on live observations." (Authors)] Address: Baker, R.L., Dept Ecol. & Evol. Biol, Univ. Toronto, Mississauga, ON, M5S 3B2, Canada. E-mail: rbaker@credit.erin.utoronto.ca

**10101.** Berezovikov, N.N. (2009): Notes on the feeding flights of the White-winged tern *Chlidonias leucopterus* during the breeding period. Russian ornithological journal 18(494): 1118-1121. (in Russian) [Long-distance feeding flights of *C. leucopterus* are correlated with feeding aggregations of (crepuscular) dragonflies.] Address: Berezovikov, N.N., Lab. of Ornithology & Herpetology, Inst. Zoology, Center for Biological Research of the Ministry of Education & Science, Prospect Al Farabi, 93, Akademgorodok, Almaty 050060, Kazakhstan. E-mail: berezovikovn@mail.ru

**10102.** Bylak, A.; Kukuła, K.; Kukuła, E. (2009): Influence of regulation on ichthyofauna and benthos of the Różanka stream. *Ecology & Hydrobiology* 9(2-4): 211-223. [Poland; the density of *Calopteryx virgo* (the only Odonata species listed in this paper) reached up to 192 indiv./m<sup>2</sup> at one station where the river was modified into a channel (table. 3). Contrary to the fish fauna, channel regulation seems not to have negative effects on *C. virgo*. Curiously enough, the species was not to detect in unimpaired sections of the river (station 4, 5).] Address: Bylak, Aneta, Dep of the Environmental Biology, University of Rzeszów, ul. Prof. S. Pigoń 6, 35-310 Rzeszów, Poland. E-mail: abylak@univ.rzeszow.pl

**10103.** Chaput-Bardy, A.; Fleurant, C.; Lemaire, C.; Secondi, J. (2009): Modelling the effect of in-stream and overland dispersal on gene flow in river networks. *Ecological Modelling* 220(24): 3589-3598. (in English) ["Modelling gene flow across natural landscapes is a current challenge of population genetics. Models are essential to make clear predictions about conditions that cause genetic differentiation or maintain connectivity between populations. River networks are a special case of landscape matrix. They represent stretches of habitat connected according to a branching pattern where dispersal is usually limited to upstream or downstream movements. Because of their peculiar topology, and the increasing concern about conservation issues in hydrosystems, there has been a recent revival of interest in modelling dispersal in river networks. Network complexity has been shown to influence global population differentiation. However, geometric characteristics are likely to interact with the way individuals move across space. Studies have focused on in-stream movements. None of the work published so far took into consideration the ability of many species to disperse overland between branches of the same network though. We predicted that the relative contribution of these two dispersal modalities (in-stream and overland) would affect the overall genetic structure. We simulated dispersal in synthetic river networks using an individual-based model [using *Calopteryx splendens*]. We tested the effect of dispersal modalities, i.e. the ratio of overland/in-stream dispersal, and two geometric parameters, bifurcation angle between branches and network complexity. Data revealed that if geometrical parameters affected population differentiation, dispersal parameters had the strongest effect. Interestingly, we observed a quadratic relationship between  $p$  the proportion of overland dispersers and population differentiation.

We interpret this U-shape pattern as a balance between isolation by distance caused by in-stream movements at low values of  $p$  and intense migrant exchanges within the same branching unit at high values of  $p$ . Our study is the first attempt to model out-of-network movements. It clearly shows that both geometric and dispersal parameters interact. Both should be taken into consideration in order to refine predictions about dispersal and gene flow in river network.] Address: Chaput-Bardy, Audrey, Laboratoire Paysages et Biodiversité, UFR Sciences, 2 Bd Lavoisier, 49045 Angers cedex 01, France. E-mail: audrey.chaput-bardy@univ-angers.fr

**10104.** Charest, P. (2009): Première mention au Québec de la demoiselle *Ischnura hastata* (Say, 1839) (Odonata: Coenagrionidae). *Naturaliste Canadien* 133 (1): 29-30. (in French) [*I. hastata*, was recorded in a gravel pit near Maurice, Québec, Canada (46° 24' 51" N, 72° 35' 55" E) at 13-IX-2008.] Address: Charest, Pierrette. E-mail: chapie1@videotron.ca

**10105.** de Araujo, N. A. de; Pinheiro, C.U.B. (2009): Ecological relations between the ichthyologic fauna and the ciliary vegetation of the lacustrine area of Low Pindaré River in the Baixada Maranhense Region and their implications on the sustainability of regional fishing. *Boletim do laboratório de hidrobiologia* 22: 55-68. (in Portuguese, with English summary) ["The lacustrine area of Penalva, in the Baixada Maranhense region, is formed by the lakes Cajari, Capivari, Lontra and Formoso, which encompass a diversified ciliary vegetation. Those environments, subject to the influence of seasonal floods, provide a variety of habitats for shelter, reproduction and feeding of fish species. Some of the fish species, as they feed from fruits and seeds from ciliary plant species they help in the process of seed dispersion, contributing to the reproductive success of the plants. This research aimed at studying the relationship between the ichthyologic fauna of the lacustrine area of Penalva and the ciliary vegetation and its implications in the sustainability of the regional fishing. More specifically, to analyze the relationship among the different plant species and the reproductive period, feeding habits and shelter of the fish species, investigating which species are dependent on the ciliary vegetation and which species function as seed dispersers. The methodology included, in a first phase, interviews with fishermen (key informants), by using semi-structured questionnaires, to record the traditional knowledge on fish and vegetation. In a second phase, monthly collections of fish specimens from the lakes Cajari and Capivari were carried out in the period April, 2007 to June, 2008; following the collections, the specimens were taken to laboratory analyses. The results showed that fishermen possess a vast knowledge on the relationship between the ichthyofauna and the regional ciliary vegetation, making clear the dependence between fish and plants. In this study eleven fish species were identified as seed dispersers of eleven ciliary plant species. In the rainy season, when extensive vegetation areas are flooded, the biggest number of fish specimens was recorded with full stomachs, as well as the biggest number of males and females in the maturation phase, confirming the importance of the ciliary forests for the ichthyofauna." (Author) Odonata are treated at the order level.] Address: Pinheiro, C.U.B., to de Oceanografia e Limnologia, Av. dos Portugueses s/n, Campus do Bacanga, CEP 65080-040, São Luís-MA, Brazil. E-mail: cpinheiro@elo.com.br

**10106.** Dijkstra, K.D.B. (2009): Dragonflies and damselflies (Odonata) of the Lower Malagarasi Basin, western Tanzania. In: Malagarasi Aquatic Rapid Biodiversity Assessment. Mott MacDonald. 53-60 (report): 98-104 (appendix). (in English) ["Eighty eight species were recorded, although two genera (*Lestinogomphus* and *Neurogomphus*) were found as larvae only and cannot be identified to species. *Agriocnemis victoria*, *Ceragrion corallinum*, *Pseudagrion sudanicum*, *Ictinogomphus regisalberti*, *Trithemis dichroa* and *T. grouti* were recorded from Tanzania for the first time, while a single *Pseudagrion* species appears to be new to science. None of the recorded species are included in the Malagarasi Aquatic Rapid Biodiversity Assessment IUCN Red List as globally or regionally threatened, nor are any rangerestricted or confined to the Malagarasi Basin, although the new species may be unique to Lake Tanganyika (see discussion). Table B.2 summarizes observed habitat preferences, further discussion of the ecology of the species will be provided within the final report." (Author)] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: [dijkstra@nmm.nl](mailto:dijkstra@nmm.nl)

**10107.** Geraeds, R.P.G. (2009): De Gaffellibel langs de Vlootbeek. *Natuurhistorisch Maandblad* 98(6): 121-125. (in Dutch, with English summary) ["The green Snaketail along de Vlootbeek brook: discovery of the third dutch population in a canalised brook. On 3 May 2008, twelve larvae of *Ophiogomphus cecilia* were caught along the upper stretches of the Vlootbeek brook in Posterholt (NL), near the German border. Two more larvae were caught in the German Kitschbach brook, which is connected to the Vlootbeek. In the course of July, 18 exuviae were found along the Vlootbeek. This brook is the third location in the Netherlands where this species has been found, the other two being the Roer and Swalm rivers. Both are large, naturally meandering streams, whereas the Vlootbeek is a canalised brook. At the sites where the finds were made, the brook is 1 to 1.5 m wide and 10 to 30 cm deep. The water quality is not too good, as it contains high levels of sulphate, nitrate, phosphate, copper and nickel. The oxygen level is favourable, however. Almost all of the larvae and exuviae were found along a 300 m stretch of the brook, where the substrate is dominated by sand that locally contains grit. Upstream and downstream of this location, the substrate was covered with algae in May, while the substrate further downstream is dominated by silt, making these stretches of the Vlootbeek unsuitable for the larvae of the Green Snaketail. The algae had disappeared in July. Although the occurrence of the Green Snaketail is normally associated with larger natural rivers and brooks, we now find that the species also occurs in small, canalised streams with a mediocre water quality. The oxygen level appears to be an important factor for the larvae of this species. The other two locations where this species has been found, the Roer and Swalm rivers, are also characterised by relatively poor water quality (with high levels of nutrients) but favourable oxygen levels." (Author) Larvae also were found in the near situated Kitschbach (Nordrhein-Westfalen, Germany).] Address: Geraeds, R.P.G., Bergstraat 70, 6131 AW Sittard, The Netherlands

**10108.** Groppali, R. (2009): Odonati europei e riscaldamento globale. *Studi Trent. Sci. Nat.*, 86: 115-118. (in Italian, with English summary) ["European Odonata and

global warming - Odonata used as biological indicators can give data about global warming: some species can fly over long distances and quickly respond to environmental changes. In Europe the consequences of this phenomenon could be: dominance of southern origin species in areas with continental climate (e.g. actually in north-western Germany the dominant species are mediterranean), northward expansion of occupied areas (e.g. in Lombardy are increasing 7 southern species, and 16 in Europe) or displacement to higher altitudes in the mountains, local extinction of relict mountain populations, living in south-European territories with isolated populations, or of microthermic species in plain territories, with 7 threatened species, phenological modifications (larval life length and adult emergence moment, flight times, perhaps passage from mono- to bivoltinism). If also some elements can disturb the analysis, e.g. the increase of suitable habitat for some expanding species, the available data examination, including recent studies in southern Sardinia, confirms the variations originated from climatic warming in Europe, also with the recent colonisation of 4 African species." (Author)] Address: Groppali, R., Laboratorio di Ecologia degli Invertebrati e Conservazione della Natura del Dipartimento di Ecologia del Territorio, Università di Pavia, Via S.Epifanio 14, 27100 Pavia, Italy. E-mail: [groppali@et.unipv.it](mailto:groppali@et.unipv.it)

**10109.** Karube, H. (2009): Present status of Odonata species at Ogasawara Islands and conservation effort to preserved endangered endemic species. *Japanese journal of limnology* 70(3): 239-245. (in Japanese) ["The five endemic species of Odonata inhabiting the oceanic islands of Ogasawara have been rapidly declining from the mid-1980s. The reason for that decline is likely due to predation by an invasive alien species, 'green anoles'. Currently, almost all the endemic Odonates have gone extinct from the main islands of Chichi-jima and Haha-jima. Although these endemic Odonates have still managed to survive in a few satellite islands, there are only small aquatic habitats which readily dry up when severe droughts hit Ogasawara. Our recent efforts to construct artificial conservation ponds in these satellite islands appear to be effective. Three endemic species are currently breeding in those ponds, and the total population has increased. Based on these encouraging results, we continue to stress the importance of an integrated action plan, including the development of areas protected from green anoles predation and the construction of more permanent ponds." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: [paruki@nh-kanagawa-museum.jp](mailto:paruki@nh-kanagawa-museum.jp)

**10110.** Kim, D.G.; Jeong, M.-H.; Tae, J.-Y.; Yeon, J.-B. (2009): Relationship between temperature and egg development of *Nannophya pygmaea* Rambur (Odonata: Libellulidae), an endangered dragonfly in Korea. *Korean J. Environ. Biol.* 27(3): 292-296. (in Korean, with English summary) ["This study was conducted to estimate relationship between temperature and egg development of *N. pygmaea*, using eight different temperature conditions (17, 20, 22, 25, 28, 30, 33, and 36°C). Eggs of *N. pygmaea* were collected from female adults inhabited a small wetland in Mungyeong-si, Gyeongsangbuk-do, Korea, in June 2007. As a result, hatching rates were 2.86, 17.09, 24.32, 39.67, 34.43, 40.57, 44.79, and 1.75% at 17, 20, 22, 25, 28, 30, 33, and 36°C, respectively. The nonlinear model of the tempera-

ture related to egg development was well fit to the modified Sharpe and DeMichele model. The derived lower developmental threshold temperature for egg hatching was 14.02°C ( $y = 0.005988x - 0.084$ ,  $r^2 = 0.99$ ), and the derived optimal development temperature was 30~35°C.] Address: Yeon J.B, Korean Ent. Inst., Korea Univ., Seoul 136-701, Korea. E-mail: yjbae@korea.ac.kr

**10111.** Lee, T. E.; Patel, A.J.; Johnson, B.W.; Vogtsberger, R.C. (2009): Noteworthy records of Dragonflies (Odonata: Anisoptera) from Jones and Taylor Counties of Central Texas. *Texas Journal of Science* 61: 157-160. (in English) [USA; records of the following species are presented: *Rhionaeschna multicolor*, *Didymops transversa*, *Epitheca costalis*, *Neurocordulia xanthosoma*, *Libellula luctuosa*, *Pachydiplax longipennis*, *Plathemis lydia*, and *Tramea lacerata*.] Address: Lee, T.E., Dept of Biology, Abilene Christian University Abilene, Texas 79601, USA. E-mail: lee@biology.acu.edu

**10112.** Müller, J.; Steglich, R. (2009): Fundort- und Artenliste eigener Libellen-Nachweise im Jahre 2008 in Sachsen-Anhalt - Odonatologischer Jahresbericht 2008. *halophila*, Mitteilungsblatt der Fachgruppe Faunistik und Ökologie Staßfurt 53: 7-13. (in German) [Locality records from 2008 including species of regional importance: *Crocothemis erythraea*, *Libellula fulva*, *Leucorrhinia caudalis*, *L. pectoralis*, *Orthetrum coerulescens*, *Soma-tochlora flavomaculata*, *Sympetrum meridionale*, *Coenagrion mercuriale*, *Erythromma lindenii*, *Ceriagrion tenellum*, *Aeshna affinis*.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**10113.** Muranyi, D.; Tarjanyi, N.; Schöll, K. (2009): First record of the genus *Atrichops* Verrall, 1909 in Hungary (Diptera: Athericidae). *Opusc. Zool. Budapest* 40(2): 103-105. (in English) [Hungary, Pest county, Börzsöny Mts, Kismaros, Morgó Stream above the bridge of the forest railway terminal, N 47°49.751' E 19°00.777', 200 m a.s.l., 28-X-2008: *Calopteryx virgo* and *Onychogomphus forcipatus*.] Address: Muranyi, D., Magyar Természettudományi Múzeum Állattára (Department of Zoology, Hungarian Natural History Museum), H-1088 Budapest, Baross utca 13, Hungary. E-mail: muranyi@zool.nhmus.hu

**10114.** Nationalpark Hainich (Hrsg.) (2009): Artenbericht 2008: Tiere, Pflanzen und Pilze im Nationalpark Hainich. Kenntnisstand zum 31.12.2008. Hrsg.: Nationalpark Hainich Verwaltung, Bei der Marktkirche 9. D-99947 Bad Langensalza: 134 pp. (in German) [Thüringen, Germany; on pages 23-24, 43 Odonata species are listed. Of special regional interest are records of *Coenagrion mercuriale*, *Lestes barbarus*, *Crocothemis erythraea*, *Leucorrhinia pectoralis*, *L. rubicunda*, *Orthetrum coerulescens*, and *Sympetrum pedemontanum*.] Address: Nationalpark Hainich Verwaltung, Bei der Marktkirche 9, 99947 Bad Langensalza, Germany

**10115.** Ngiam, R.W.J. (2009): The record of *Archibasis rebeecae* Kemp, 1989 in Singapore (Odonata: Zygoptera: Coenagrionidae). *Nature in Singapore* 2: 449-452. (in English) [1 male, small sandy stream in Central Catchment Nature Reserve, 22-V-2009] Address: Robin Wen Jiang Ngiam, R.W.J., National Biodiversity Centre, National Parks Board, 1 Cluny Rd, Singapore 259569. E-mail: ngiamwenjiang@nparks.gov.sg

**10116.** Nishu, S. (2009): Report of the survey trips of The Hyogo Society of Odonatology in 2002-2008. The

Odonate Fauna of Aonogahara. *Sympetrum Hyogo* 11: 45-59. (in Japanese, with English summary) [Except 2003 and 2004, several trips during 2002 and 2008 were made to study the odonate fauna of Aonogahara, Japan. Prior this study, *Symetrum maculatum* was seen in numbers here, but only one male was seen during the study period. *Sympetrum uniforme* is likewise an endangered species, but was recorded in good numbers throughout these years here. *Lestes japonicus* and *Sympetrum gracile* are abundant but population number is strongly diminishing.] Address: Nishu, S., 247 Gunge Shonomoto, Mikage-cho, Higashinda-ku, Kobe, Hyogo, 658-0057, Japan. E-mail: Snishu@mx2.nisiq.net

**10117.** Obolewski, K.; Strzelczak, A. (2009): Epiphytic fauna inhabiting *Stratiotes aloides* in a new lake of the Slowiński National Park (Smoldzińskie lake, Poland). *Ecology & Hydrobiology* 9(2-4): 257-267. (in English) ["Qualitative and quantitative structure of phytophilous macrofauna inhabiting *Stratiotes aloides* L. have been studied in a newly formed Smoldzińskie Lake in the area of the Slowiński National Park during vegetation period (V-IX) in year 2008. Jointly 27 taxa (including *Aeshna grandis* and *Calopteryx* sp.) inhabiting the studied plant species were identified and their number varied in time. The highest amount of epiphytic fauna taxa was observed in June (22) and September (20) while the lowest in August (13). The quality of lake waters significantly influenced both density and biomass of fauna inhabiting and mining the leaves of water soldiers. On the basis of qualitative and quantitative structure of epiphytic fauna, the quality of lake waters was assessed, which - according to BMWP-PL index - corresponded to class III. The analyses of benthofauna inhabiting pleustonic vegetation, as a part of biomonitoring, seem to complete the ecological assessment of aquatic ecosystems." (Author)] Address: Obolewski, K., Dept of Water Ecology, Pomeranian Univ., Arciszewskiego St. No 22 b, 76-200 Słupsk, Poland. E-mail: obolewsk@apsl.edu.pl

**10118.** Post, M. (2009): Libellen im Raum Neustadt an der Weinstraße (TK 6614 und 6615). *POLLICHIA-Kurier* 25(2): 47-49. (in German) [Rheinland-Pfalz, Germany; records of 40 species are briefly commented.] Address: E-Mail: libellen-nw@web.de

**10119.** Post, M. (2009): Weitere Libellenbeobachtungen im Raum Neustadt. *POLLICHIA-Kurier* 25(4): 40. (in German) [Rheinland-Pfalz, Germany; records from 2009 of the following species are briefly noted: *Sympetrum fonscolombii*, *Brachytron pratense*, *Aeshna affinis*, *Coenagrion mercuriale*, *Libellula fulva*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*] Address: E-Mail: libellen-nw@web.de

**10120.** Prunier, F. (2009): Presencia de *Macromia splendens* (Pictet, 1843) (Odonata: Corduliidae) en el embalse del Tranco de Beas (Jaén). *Zool. baetica* 20: 97-99. (in Spanish) [A larva of *M. splendens* was captured in the Tranco de Beas reservoir (Jaén, Spain) (UTM 30S 0520/4226), 620 a.s.l., 30-VIII-2007.] Address: Prunier, F., Centro Internacional de Estudios y Convenciones Ecológicas y Medio Ambientales (CIECEM), Matalascañas, Huelva, Spain. E-mail: florent.prunier@yahoo.fr

**10121.** Sadeghi, S.; Mohammadalizadeh, J. (2009): Additions to the Odonata fauna of Iran. *Iranian Journal of Science & Technology, Transaction A*, Vol. 33, No. A4: 355-359. (in English) [Forty eight species of Odonata from 46 sampling sites in Iran were recorded bet-



ween early May 2001 to mid June 2002. *Libellula fulva*, *Sympetrum sinaiticum*, and *Paragomphus sinaiticus* are recorded from Iran for the first time.] Address: Sadeghi, S., Department of Biology, College of Sciences, Shiraz University, Shiraz, Iran

**10122.** Schaik, V.A. van; Geraeds, R.P.G. (2009): The emergence period of the *Gomphus vulgatissimus* - A three year study along the river Roer, The Netherlands. *Natuurhistorisch Maandblad* 98(8): 153-158. (in Dutch, with English summary) ["From 2001 to 2003, a 150 m stretch of the river Roer was examined to analyse some aspects of the emergence period of *G. vulgatissimus*. Exuviae were collected every other day, from the start till the end of the emergence period. During these three years, 1585 exuviae were collected: 385 in 2001, 510 in 2002 and 690 in 2003. The emergence period seems to be very constant over the years, lasting 31 to 35 days. It took 8(9) to 11(12) days (average 9) for 50% of the population to emerge (EM50). The overall sex ratios in 2001, 2002 and 2003 were 1.0 (49.9% females), 0.7 (57.3% females) and 0.8 (55.2% females), respectively. The sex ratios changed during the emergence period. From the start of emergence until the moment when EM50 was reached, the sex ratios were 1.5 (40.6% females), 1.1 (48.4% females) and 0.9 (52.5% females) in 2001, 2002 and 2003, respectively. During the period from EM50 until the end of emergence, the sex ratios were 0.6 (63.5% females), 0.4 (71.6% females) and 0.7 (59.2% females), respectively. The predominance of females in this period was significant in all three years." (Authors)] Address: Schaik, V.A. van, Hoosveld 56, 6075 DB Herkenbosch, The Netherlands

**10123.** Seemann, R. (2009): Otto le Roi (1878 - 1916) – Zoologe aus Leidenschaft. *Archiv der Freunde der Naturgeschichte in Mecklenburg XLVIII*: 5-70. (in German, with English summary) [Otto le Roi was one of the most profiled German odonatologists in the early 20th century with an extraordinary broad knowledge in many zoological groups. "Correspondence can give information about people's lives and about contemporary history. Both aspects can also be taken from the correspondence between the Mecklenburger Otto Hermann Held (1875 - 1945) and the Rhinelander by choice, Otto August le Roi (1878 -1916). 214 letters and cards from Otto le Roi dating from between 1899 and 1916 have survived in the scientific inheritance of the apothecary and ornithologist Otto Held, kept in the archives of the federal state natural history collections at the MÜRITZEUM in Waren. The paper concerned here centres on the versatile zoologist Dr. Otto le Roi, whose promising scientific career as assistant to the Bonn zoologist Professor Alexander Koenig ended at the eastern front in the First World War in October 1916. With the aid of further records and publications, an attempt has been made to trace the short life of le Roi, who initially in 1896 started training to become an apothecary. Scientific curiosity that became evident at an early stage and a special passion for ornithology influenced his further development. He made contact with numerous notable scientists in order to learn and to gain ideas for his scientific work. Two personalities had a formative influence on the life of le Roi: Johannes Thienemann and Alexander Koenig. Le Roi made the acquaintance of Thienemann, who was in charge of the ornithological station at former Rossitten, during a fairly long stay on the Kurische Nehrung (Courland Spit) in 1902. Professor Alexander Koenig became le Roi's teacher, mentor and fatherly

friend in Bonn. As assistant at the Koenig Museum and a member of the Deutsche Ornithologische Gesellschaft (German Ornithological Society), the zoologist le Roi, who had meanwhile received a doctorate, was given the possibility of working with the most notable zoologists of that time. The war, however, put an end to this promising research scientist existence." (Author) Le Roi has written 12 papers and notes referring to Odonata. Some of these papers belong to the most cited German odonatological papers.] Address: Seemann, Renate, Naturhistorische Landessammlung im MÜRITZEUM Waren, Zur Steinmole 1, 17192 Waren, Germany

**10124.** Sharma, G.; Ramamurthy, V.V.; Kumar, R. (2009): Collection of damselflies and dragonflies (Odonata: Insecta) in National Pusa collection, Division of Entomology, Indian Agricultural Research Institute, New Delhi, India. *Biological Forum* 1(2): 47-50. (in English) [273 Odonata species are represented in the collection; these are listed without further details.] Address: Sharma, G., Desert Regional Centre, Zoological Survey of India (Ministry of Environment & Forests), Post-Jhalamand, Pali Road, Jodhpur-Rajasthan, India

**10125.** Wang, Y.; Kalyanasundaram, S.; Young, J. (2009): Effects of angle-of-attack on lift and thrust. Experimental study via test apparatus with passive wing rotation. *Proceedings of the 6th WSEAS International Conference on FLUID MECHANICS (FLUIDS'09)* ISSN: 1790-5095: 126-139. (in English) ["This paper focuses on the effect of mean angle-of-attack (AOA) on aerodynamic forces of flapping wings. The study was conducted with the aid of a test bench, which provided an active flapping motion in a vertical stroke plane and meanwhile a passive rotating motion about the longitudinal axis of the tested wing having the planform of a dragonfly's hindwing. AOA effect was studied together with the wing stiffness effect using Taguchi's DOE method in order to extract the major effects with minimum expenditure both in labor and time. The experimental results indicated that during downstroke, the lift decreased with the decreasing of the overall AOA monotonically, but thrust increased. However, during upstroke, the relationship between the effects of mean AOA and aerodynamic forces were not monotonic: larger and smaller AOAs were beneficial to the lift; smaller AOA was detrimental to the thrust; and the effect of larger AOA on thrust was close to the one caused by medium AOA." (Authors)] Address: Wang, Y., Department of Engineering, Australian National University, Canberra, 0200, Australia. E-mail: yutong.wang@anu.edu.au

## 2010

Aliberti Lubertazzi, M.A.; Ginsberg, H.S. (2010): Emerging dragonfly diversity at small Rhode Island (U.S.A.) wetlands along an urbanization gradient. *Urban Ecosystems* 13(4): 517-533. (in English) ["Natal habitat use by dragonflies was assessed on an urban to rural land-use gradient at a set of 21 wetlands, during two emergence seasons (2004, 2005). The wetlands were characterized for urbanization level by using the first factor from a principal components analysis combining chloride concentration in the wetland and percent forest in the surrounding buffer zone. Measurements of species diversity and its components (species richness and evenness) were analyzed and compared along the urbanization gradient, as were distributions of individual

species. Dragonfly diversity, species richness, and evenness did not change along the urbanization gradient, so urban wetlands served as natal habitat for numerous dragonfly species. However, several individual species displayed strong relationships to the degree of urbanization, and most were more commonly found at urban sites and at sites with fish. In contrast, relatively rare species were generally found at the rural end of the gradient. These results suggest that urban wetlands can play important roles as dragonfly habitat and in dragonfly conservation efforts, but that conservation of rural wetlands is also important for some dragonfly species." (Authors)] Address: Aliberti Lubertazzi, Maria, Dept of Plant Sciences and Entomology, Woodward Hall, Univ. of Rhode Island, Kingston, RI 02881, USA. E-mail: alibertilubertazzi@gmail.com

**10126.** Amaya Vallejo, V.A.; Ledezma; J. (2010): Libélulas (Odonata: Anisoptera) de la colección entomológica del museo de historia natural Noel Kempff Mercado, Santa Cruz de la Sierra, Bolivia. *Kempffiana* 6(2): 40-47. (in Spanish, with English summary) ["A list of genera and species of Anisoptera deposited in the entomological collection of Noel Kempff Mercado Natural History Museum is presented. The 1401 Anisoptera specimens registered since 1986 were examined, and 261 unidentified specimens were identified and incorporated to the collection, adding to a total of 1662 collected specimens from five of the nine Bolivian departments (Santa Cruz, Cochabamba, La Paz, Tarija, and Beni). There were 1650 individuals identified to species and 12 to genera level. The infraorder is represented by three families: Aeshnidae, Gomphidae, and Libellulidae, with 41 genera and 149 species. The best represented genera are *Erythrodiplax* (24%), *Micrathyria* (14%) and *Erythemis* (11%). *Orthemis* sp. probably *O. tambopatae* von Ellenrieder 2009, *Macrothemis hahneli* Ris 1913, *Macrothemis flavescens* Kirby 1897, *Rhionaeschna confusa* Rambur 1842 and *Zenithoptera Selys* 1869 are reported as new records for the country." (Authors)] Address: Ledezma, Julieta, Directora Sección de Entomología, Museo de Historia Natural Noel Kempff Mercado, Santa Cruz de la Sierra, Bolivia. E-mail: jledezma@museonoelkempff.org

**10127.** Arulprakash, R.; Gunathilagaraj, K. (2010): Odonata fauna of Tamil Nadu Agricultural University campus, Coimbatore India. *Notulae Odonatologicae* 7(6): 53-55. (in English) [26 species are listed; *Anax guttatus*, *Gynacantha hyaline*, *Epophthalmia frontalis*, and *Tholymis tillarga* were attracted by a light source.] Address: Arulprakash, R., Dept Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore-641003, Tamil Nadu, India. E-mail: arulprakash@gmail.com

**10128.** Arulprakash, R.; Gunathilagaraj, K. (2010): Odonate fauna of Tamil Nadu Agricultural University campus, Coimbatore, India. *Notulae Odonatologicae* 7(6): 53-55. (in English) ["An annotated list of 26 species is presented. *Anax guttatus*, *Gynacantha hyalina*, *Epophthalmia frontalis* and *Tholymis tillarga* were attracted by a light source." (Authors)] Address: Arulprakash, R., Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore-641 003, Tamil Nadu, India. E-mail: avrarulprakash@gmail.com

**10129.** Babu, R.; Nandy, S. (2010): New Odonata records from Himachal Pradesh, India. *Notulae Odonatologicae* 7(6): 55-57. (in English) ["The records are presented of 19 species, all new to the fauna of the state.

The occurrence of Platystictidae (Drepanosticta, Protosticta) and that of the genera *Aeshna*, *Gynacanthaeschna*, *Megalogomphus* and *Zygonyx* in Himachal Pradesh is documented for the first time."] Address: Babu R., Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053, India. E-mail: rbabu2000@rediffmail.com

**10130.** Blakely, T.J.; Harding, J.S.; Clews, E.; Winterbourn, M.J. (2010): An illustrated guide to the freshwater macroinvertebrates of Singapore. Canterbury Educational Printing Services, University of Canterbury, New Zealand. ISBN 978-0-473-16730-1: 74pp. (in English) [On pages 46-50, a key to the Odonata at the family level is provided.] Address: School of Biological Sciences, University of Canterbury, Private Bag 4800, Christchurch 8140, New Zealand

**10131.** Bößneck, U.; Sparmberg, H. (2010): Die Schutzgebiete der Landeshauptstadt Erfurt (Thüringen). Teil XVII: Flora und Fauna des GLB "Am Entenpfuhl" bei Stotternheim. *Thüringer Faunistische Abhandlungen* XV: 33-54. (in German, with English summary) [Thüringen, Germany. The total of 422 species recorded in 2008 and 2009 includes only *Sympeca fusca*, *Ischnura elegans*, *Enallagma cyathigerum*, and *Aeshna grandis*.] Address: Bößneck, U., Stadtverwaltung Erfurt, Umwelt- und Naturschutzamt, Stauffenbergallee 18, 99085 Erfurt, Germany. E-mail: ulrich.boessneck@erfurt.de

**10132.** Bonifait, S.; Villard, M.-A. (2010): Efficiency of buffer zones around ponds to conserve odonates and songbirds in mined peat bogs. *Ecography* 33(5): 913-920. (in English) ["Patch isolation resulting from habitat loss and fragmentation generally has detrimental effects on associated species. Peatlands may be especially sensitive to such effects because peat mining results in drastic changes in the hydrology of natural remnants. This study aimed to assess the efficiency of conservation zones surrounding ponds in mined bogs for two taxa: songbirds and odonates. We compared songbird distribution and odonate assemblages between ponds isolated by peat mining (n=6-12) and control ponds (n=11-13) located in natural bogs. Birds did not show major responses to pond isolation, whether in terms of their relative abundance or reproductive activity. However, longer-term data would be required to confirm this trend. In contrast, odonate abundance, as estimated from exuviae, was higher in natural ponds than in isolated ones. Some taxa, especially bog specialists, were more sensitive than others. Hence, pond isolation by peat mining significantly altered the structure of odonate assemblages. Pond size also influenced odonate abundances and distribution. Effective conservation of bog ponds should account not only for variations in the response of different taxa, but also for pond structural diversity, which influence species response to isolation." (Authors)] Address: Villard, M.-A., Chaire de recherche du Canada en conservation des paysages, Dépt de biologie, Univ. de Moncton, Moncton, NB E1A 3E9 Canada. E-mail: marc-andre.villard@umoncton.ca

**10133.** Borisov, S.N. (2010): Geographic variations in the life cycle of *Sympecma paedisca* (Brauer, 1877) (Odonata, Lestidae) in the plains of Central Asia. *Eurasian entomological journal* 9(2): 249-254. (in Russian, with English summary) ["Latitudinal changes in life cycle of *Sympecma paedisca* from forest-steppe zone of South Siberia (53° N) to deserts of Tadjikistan depression (37° N) are shown. The species is univoltine with long-term imaginal period, including aestivation and hi-

bernation. To the south, the reproductive period of the species is moderately extended and moved to spring-time. Latitudinally there is a more significant change in the ratio of aestivation and hibernation period duration. In the northern part, the areal time from exclusion to imago wintering covers less than 3 months and the imago winters for 7 months, while in southern part these periods last 6 and 4 months respectively. During the pre-reproductive period dragonflies make bidirectional migrations. Aestivation appeared far from where the imago emerged from its pupa, but the wintering imago returns to these habitats. In the plains (forest-steppe) of Siberia, dragonfly migrations are shorter than in central Asia. Dragonflies from the former, after emergence, move to the mountains for the whole summer period, and return to the plains in late autumn. This strategy avoids the high summer temperatures experienced in the central Asian plains. However, some dragonflies remain in the plains throughout the summer in habitats from where they emerged from their pupae." (Author)] Address: Borisov, S.N., Siberian Zoological Museum, Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia.

**10134.** Boudot, J.-P. (2010): Abondance, synchronisme et sex-ratio à l'émergence chez *Epitheca bimaculata* (Charpentier, 1825) en Lorraine (NE France) (Odonata, Anisoptera: Corduliidae). *Martinia* 26(1-2): 9-17. (in French, with English summary) ["Population size in *Epitheca bimaculata* varies considerably with space and time in Lorraine (northeast France). However, emergences are always synchronized with an EM50 index ranging from 4 to 6 days, irrespective of the population size. The daily sex ratio (male to female ratio) shows a constant imbalance in favour of females throughout the emergence time, with values ranging from 0.59 to 0.97 and an overall value of 0.74 at the end of emergence (i.e. 42% of males, 58% of females). These results are compared to published data from other countries and the reasons for such a constant imbalance in sex ratio are discussed. The hypotheses of i) a segregation of male and female according to banks orientation, ii) a differential phenology between males and females, do not account for such an imbalance, which is a frequent trend in Anisoptera, particularly Corduliidae." (Author)] Address: Boudot, J.-P., LIMOS, UMR CNRS 7137, Universités de Nancy, Faculté des Sciences, B.P. 239, F-54506 - Vandœuvre-lès-Nancy Cedex, France. E-mail: jean-pierre.boudot@limos.uhp-nancy.fr

**10135.** Cannings, R. (2010): *Calopteryx aequabilis* (River Jewelwing) in Northeastern British Columbia. *Boreus* 30(2): 29-30. (in English) [25-VII-2009, Hay River east of Fort Nelson, BC (10V 649049E 6504599N). "Given the occurrence of *C. aequabilis* in the boreal forests of northern Alberta (Acorn 2004), its presence in northeastern BC has long been suspected. The species is now known from two populations and two localities in the province, almost 1200 km apart. Although the southern population still must be considered endangered, the addition of the northern population to the provincial fauna requires a modest reduction in the species' conservation rank, but probably maintaining its presence on the provincial red list." (Author)] Address: Cannings, R., Curator of Entomology, Royal British Columbia Museum, 675 Belleville Street, Victoria, BC V8W 9W2, Canada. E-mail: rcannings@royalbcmuseum.bc.ca

**10136.** Chaudhry, M.T.; Aslam, M.; Naeem, M. (2010): New record of genus *Gynacanthaeshna* Fraser, 1922 (Odonata: Anisoptera: Aeshnidae) from Pakistan. *Pakistan Journal of Zoology* 42(4): 501-503. (in English) [*Gynacanthaeshna sikkima* was collected from Rawalpindi. This species is a new record for Pakistan.] Address: Chaudhry, M.T., PMAS-Arid Agriculture Univ., Rawalpindi (Pakistan). Dept. of Entomology, Pakistan. E-mail: chtariq273@hotmail.com

**10137.** Clausnitzer, H.-J.; Hengst, R.; Krieger, C.; Thomas, A. (2010): *Boyeria irene* in Niedersachsen (Odonata: Aeshnidae). *Libellula* 29(3/4): 155-168. (in German, with English summary) ["A population of *B. irene* was recorded in Lower Saxony, northern Germany, on the river Örtze, a tributary of the river Aller. Adults were recorded from 2008 to 2010 at ten different localities along the lower reaches of the river over 20 km, and reproduction was proved by the finding of 37 exuviae. On a small brook situated close to river Örtze, three exuviae and imagines were additionally found." (Authors)] Address: Clausnitzer, H.-J., Eichenstr. 11, 29348 Eschede, Germany. E-mail: H.-J.Clausnitzer@t-online.de

**10138.** Collier, A.; Nair, V.; Taylor, S.; Zettler, J. (2010): Apparent risk of predation by dragonfly naiads (Odonata: Libellulidae) inhibits tadpole growth (*Rana sphenoccephala*). *BIOS* 81(2): 45-54. (in English) ["We reared 120 *Rana sphenoccephala* tadpoles in 1.5 m long chambers (10 tadpoles per chamber) made from vinyl rain gutters. The chambers contained predatory late-instar dragonfly naiads (Odonata: Libellulidae) confined at one end in clear tubes drilled with aeration holes. The number of confined predators varied between control (n = 0), low (n = 1), and high density conditions (n = 5). Tadpoles were free to swim throughout each chamber, although food was isolated at one end adjacent to the predator tubes. In an additional high density predator condition, food was isolated at the opposite end of the chamber away from the predator tubes. There were a total of three replicates for each of the four conditions. Tadpoles from each condition were individually weighed (g) and their total length (mm) was recorded at regular intervals throughout the trial. Tadpoles raised in the high density condition with multiple predators surrounding their only food source were significantly shorter in length and weighed significantly less than those reared in all other conditions. When multiple predators and larval food were isolated at opposite ends of the chamber, tadpole growth did not statistically differ from that of control animals. Tadpoles raised with multiple predators surrounding their food also possessed slightly deeper tails, although these results were not statistically significant. Our results suggest that the inhibition of tadpole growth observed in this study may be linked to behavioral changes when perceived predation risks are high." (Authors)] Address: Collier, A., Dept Biology, Armstrong Atlantic State Univ., 11935, Abercorn Street, Savannah, GA, 31419, USA. E-mail: alex.collier@armstrong.edu

**10139.** Curtis, A.E.; Paton, P.W.C. (2010): Assessing detection probabilities of larval amphibians and macroinvertebrates in isolated ponds. *Wetlands* 30(5): 901-914. (in English) ["Isolated ponds provide vital habitat for an array of vertebrates and invertebrates (including Libellulidae, excluding Damselflies). Given the potential decline in protection of isolated ponds and the increase in urbanization in northeastern North America, knowledge of the condition of this aquatic resource is essential for developing revisions to existing regula-



tions, conservation efforts, and restoration initiatives. We were interested in the ability of rapid assessment methods, which require only one site visit, to estimate the condition of isolated ponds. During 2008, we conducted dip-net surveys at 10-day intervals from mid-May to late July 2008 at each of 36 isolated ponds in Rhode Island. We calculated detection probabilities for larval amphibian species and predatory macroinvertebrate families and assessed factors influencing detection probabilities. Most taxa displayed distinct seasonal phenologies in detection probabilities. Pond depth and vegetative characteristics also influenced detection probabilities of many taxa. Based on seasonal variation in detection probabilities, rapid assessment methods would not be effective to monitor overall biodiversity of isolated ponds in southern New England. Rather, multiple visits would be required to estimate occupancy rates of pond-breeding amphibians or aquatic macroinvertebrates if they were used as ecological indicators of pond condition." (Authors)] Address: Curtis, Annie, Natural Resources Office, Massachusetts Army National Guard, Bldg. 2808 Richardson Road, Camp Edwards, MA 02542, USA. E-mail: annie.curtis@us.army.mil

**10140.** Dehondt, F.; Mora, F.; Ferrez, Y. (2010): Redécouverte en France de *Nehalennia speciosa* (Charpentier, 1840) (Odonata, Zygoptera: Coenagrionidae). *Martinia* 26(1-2): 3-8. (in French, with English summary) [In July 2009, *N. speciosa* has been rediscovered by chance by a botanist in a peat bog located in the south of the Jura department, France. The habitat is characterised as a predominately *Eriophoro-Caricetum lasiocarpae*. The current knowledge about its biology and distribution in France are discussed.] Address: Dehondt, F., 22A rue de la Rotonde, F-25000 Besançon, France. E-mail: fdehondt4@yahoo.fr

**10141.** Deutschmann, U.; Dettmann, K.; Eifler, M.; Halletz, S.; Hengmith, K.; Ludwig, R.; Plotz, A.; Schuster, A.; Woog, D.; Zessin, W.; Ziegler, W. (2010): Erfassung und Bewertung der Insektenfauna im FFH-Gebiet „Wald- und Moorlandschaft um den Röggeleiner See“ bei Dechow, Mecklenburg (Lepidoptera, Coleoptera, Heteroptera, Orthoptera, Odonata). *Virgo*, Mitteilungsblatt des Entomologischen Vereins Mecklenburg 13(2): 4-35. (in German) [Mecklenburg-Vorpommern, Germany; in 2008, 19 common distributed Odonata species were recorded. These are briefly discussed.] Address: Zessin, W., Lange Str. 9, 19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**10142.** Dlugolecki, L. (2010): A characterization of seasonal pools in Central Oregon's high desert. MSc Thesis, Oregon State University: XIV + 76 pp. (in English) ["Seasonal wetlands in arid and semi-arid lands provide an important source of surface water in otherwise dry lands. Central Oregon's high desert, located in the Northern Great Basin (NGB) is dotted with hundreds of seasonal pools, locally called playas. The playas hold water or snow during parts of winter and spring but typically dry up during summer months. The mechanisms of seasonal pool hydrology, especially in the NGB, are poorly understood and have not been thoroughly examined. There is high seasonal variability and inter-annual variability in surface water amounts in the playas. [...]"] (Author) The thesis includes a list of aquatic macroinvertebrates observed during the 2007 inventory period and the frequency of observation at a playa. Odonata are treated at the genus/species level (*Anax junius*, *Rhionaeschna californica*, *Libellula pulchella*, *L. saturata*).

Address: Laura Dlugolecki, Laura, U.S. Environmental Protection Agency, Office of Water (4100T), Healthy Watersheds Project, 1200 Pennsylvania Avenue, N.W., Washington, D.C. 20460, USA

**10143.** Donnelly, N. (2010): Book review: *Damselfly genera of the New World: An illustrated and annotated key to the Zygoptera*. *Argia* 22(3): 21-23. (in English) [Rosser W. Garrison, Natalia von Ellenrieder, and Jerry A. Louton. 2010, The Johns Hopkins University Press, Baltimore. ISBN 978-8018-9670-5. 490 pp, 2586 fgs., 24 colour pls., \$125.00. (Incl. additions and corrections for previous book, *The Dragonfly Genera (Odonata: Anisoptera) of the New World*, 2006, by the same authors)] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**10144.** Dow, R.A.; Choon, C.Y.; Ng, Y.F. (2010): A review of the genus *Amphicnemis* in Peninsular Malaysia and Singapore, with descriptions of two new species (Odonata: Zygoptera: Coenagrionidae). *Zootaxa* 2605: 45-55. (in English) ["The *Amphicnemis* species occurring in Peninsular Malaysia and Singapore are reviewed, and two new species are described: *A. bebar* and *A. hoisen* (holotype for both: Malaysia, Pahang, Sungai Bebar). Keys to both sexes of all species are provided. *A. ecornuta* is recorded from Borneo for the first time. A summary of the distributions of the named species of *Amphicnemis* occurring in Sundaland is given. Four species of *Amphicnemis* are now known from Peninsular Malaysia and Singapore, and twelve from Borneo." (Authors)] Address: Dow, R.A., National Museum of Natural History Naturalis, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk; Ng, Y.F., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.my

**10145.** Dragonfly Society of the Americas; Alcock, J. (2010): *Argia* 22(3). *Argia* 22(3): 1-23. (in English) [oas 31, In This Issue; DSA is on Facebook; Calendar of Events; 2010 DSA Annual Meeting in Orono, Maine Donnelly, N.; Congratulations Dennis Paulson!; Photos Needed; 2011 Dragonfly Society of the Americas Annual Meeting at Colorado State University, Fort Collins, Colorado by Kondratieff, B.C.; International Odonata Research Institute 'Garage Sale' for DSA Members; A Call for Papers for BAO; Request for Annual DSA Meeting Proposals; Drink Beer?URL] Address: Alcock, J., Department of Biology, Arizona State University, Tempe, Arizona 85287-1501, USA. E-mail: j.alcock@asu.edu

**10146.** Duquef, M.; Salack, P. (2010): Nouvelle capture en Guyane d'*Aphylla producta* Selys, 1854 (Odonata, Anisoptera: Gomphidae). *Martinia* 26(1-2): 48. (in French) [Corossony, 24-XI-2008] Address: Duquef, M., 25 rue Paul Baroux, Blangy-Tronville, F-80440 Boves, France

**10147.** Eutropio, F.J.; Gomes, L.C. (2010): Dieta alimentar de *Trichomycterus longibarbus* Costa, 1992 e *Pimelodella transitoria* Miranda Ribeiro, 1905 (Siluriformes): um caso de competição interespecífica. *Natureza on line* 8(2): 67-70. (in Portuguese, with English summary) [The catfish *Trichomycterus longibarbus* and *Pimelodella transitoria* are associated with submerged litter streams of Yellow Wood, REBIO de Duas Bocas, Brazil. Their stomach contents were analyzed and identified up to the lower taxonomic level. The food items were dominated by Chironomidae and Odonata, while *T. longibarbus* preyed exclusively on Odonata.]

Address: Eutrópio, F.F., Programa de Mestrado em Ecologia de Ecossistemas. Centro Universitário Vila Velha - UVV. Rua Comissário José Dantas de Melo, 21, Boa Vista, Vila Velha, Espírito Santo, Brasil. CEP 29101-770. E-mail: eutropiofj@gmail.com

**10148.** Finkenzeller, M. (2010): First record of *Pantala flavescens* for Croatia (Odonata: Libellulidae). *Libellula* 29(3/4): 205-208. (in German, with English summary) ["On a short holiday trip to the island of Krk, Croatia, at least three individuals of *P. flavescens* were observed, patrolling along a beach near Stara Baska. This is the first record for Croatia." (Author)] Address: Finkenzeller, M., Staufferstraße 24, D-88239 Wangen, Germany. E-mail: michael.finkenzeller@web.de

**10149.** Fiuczynski, K.D.; Hallau, A.; Hastädt, V.; Herold, S.; Kehl, G.; Lohmann, G.; Meyburg, B.-U.; Meyburg, C.; Sömmer, P. (2010): Der Baumfalke in der modernen Kulturlandschaft. *Greifvögel und Falkneri* 2009/2010: 230-244. (in German) [The paper includes detailed descriptions on hunting methods of hobbies (Aves: *Falco subbuteo*) on dragonflies, and documents a successful hunt and final catch of an *Aeshna* sp.] Address: not stated

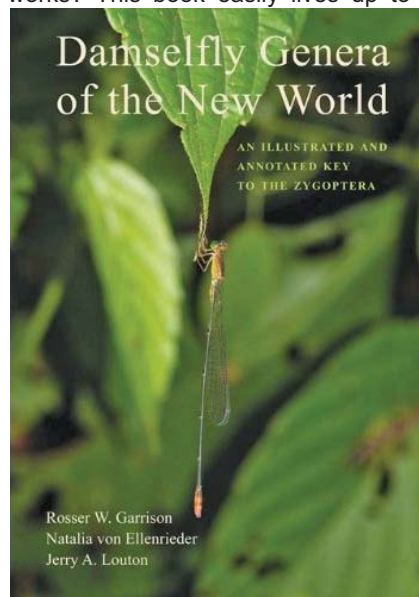
**10150.** Frank, M. (2010): Nachweis der Zierlichen Moosjungfer (*Leucorrhinia caudalis* Charpentier, 1840) im Landkreis Nordwest-Mecklenburg. *Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 13(2): 71-72. (in German) [Kleekamp, Germany; records from 05.06.2010 and 10.07.2010 are documented.] Address: Frank, M., Zur Traubenmühle 5A, 55268 Nieder-Olm, Germany. E-mail: mikel.frank@gmx.de

**10151.** Gander, A. (2010): *Nehalennia speciosa* (Charpentier, 1840) dans la Grande Cariçaie: une population singulière d'importance internationale (Odonata: Coenagrionidae). *Entomo Helvetica* 3: 189-203. (in French, with English and German summaries) ["A population of *N. speciosa*, one of the most endangered odonate species of Europe, was detected in 2007 in the nature reserves named 'Grande Cariçaie' on the southern shore of Lake Neuchâtel, Switzerland. In order to secure adequate maintenance measures of the habitat aimed at the conservation of this species, corresponding investigations were conducted in 2008. The purpose of these studies was on one hand to specify the local distribution and the ecological requirements of *N. speciosa* and on the other hand to evaluate the impact of mowing the marsh meadows on the attractiveness of the different sites within the colonized area. 29 transect runs comprising 6466 m in length allowed to sample 30 ha of the marsh. In total 391 individuals of *N. speciosa* were recorded on an area of 9 ha, 94 % of them being situated within flooded stands of large sedges (Magnocaricion). Marsh meadows without maintenance are not colonized. The number of years after cutting the vegetation in maintained allotments is not decisive for the habitat choice. The singularities of the species' local ecology, the importance of the population on the European scale and the modalities of conservation of *N. speciosa* in the nature reserves of the Grande Cariçaie are discussed." (Author)] Address: Gander, Antoine, Grande Cariçaie, ch. de la Cariçaie 3, CH-1400 Cheseaux-Noréaz, Switzerland. E-mail: a.gander@grande-caricaie.ch

**10152.** Garrison, M. (2010): Damselflies of Chicago-land. A Photo Field Guide, version 1. Published by The Field Museum, Chicago. 140 pp. (in English) [Introduction: 5; Basic anatomy: 10; Life cycle: 17; Mating: 19;

Ovipositioning: 21; Feeding: 23; Predation: 25; Field guide key: 27; Damselfly taxonomy: 33; Families Broadwings: 35; Spreadwings: 43; Pond damsels: 67; Checklist: 121; Potential species: 124; References: 136; Index of species: 138. This guide is available as a free download in PDF format: <http://fm2.fieldmuseum.org/plantguides/damselflies>] Address: Garrison, Marla, Biology Faculty McHenry County College Crystal Lake, IL, USA. E-mail: mgarriso@mcchenry.edu

**10153.** Garrison, R.W.; Ellenrieder, N. von; Louton, J.A. (2010): Damselfly genera of the New World: An illustrated and annotated key to the Zygoptera. Johns Hopkins University Press; 1 edition. ISBN-10: 0801896703. 528 pp. (in English) ["This book follows by four years its companion volume on the Anisoptera of the New World by the same authors (Garrison et al. 2006, reviewed in *Florida Entomologist* 90: 290-291). Although about the same number of genera (124 Anisoptera, 118 Zygoptera) are treated in the two books, the dragonflies are treated in 368 pages with 1626 figures, the damselflies in 490 pages with 2586 figures. This points out the considerably greater degree of work and detail the authors put into the second volume. In addition, while preparing to write and writing this volume, the first two authors have become the pre-eminent odonate taxonomists of the New World tropics, publishing no fewer than 17 papers (since 2000) to clarify the taxonomy of numerous groups, some of them large. Before this, the largest family, Coenagrionidae, was a taxonomic quagmire, and now a fair modicum of order has emerged from the chaos. How else to build a key to genera that actually works? This book easily lives up to the expectations



promised by the dragonfly volume, including comprehensive, extremely well illustrated keys; detailed morphological descriptions of each genus; and brief descriptions of natural history wherever known. The writing is clear, but its conciseness fails to convey how much work at the microscope must have gone into the keys and descriptions. And most of us will be unable to imagine the amount of time that went into producing the figures. They are meticulous and superb, by the standards of any scientific illustrator. They are lavishly provided, often more than one species in a genus. I am constantly engaged by the morphological diversity of damselflies that one can see under magnification, and this book shows it all. Many of them were used before, in their recently published papers, but the majority appear uniquely in this book. Having worked with the authors on several genera, I can add that they are impeccably accurate. The three-dimensional rendering of medio-dorsal views of terminal appendages is so much

more helpful than the old standard of dorsal and lateral views that one wonders why the excellent illustrators of a century ago didn't come up with it. There are a lot more photos in this book than in the dragonfly book, 81 vs. 24, and the beauty and variety of New World damselflies are shown off to the fullest. All the families are represented, and there was a real effort made to get all the genera. Many have not been photographed. Everything about this volume invites the term "comprehensive." The maps of generic ranges are of great value to the biogeographer and might be used to point out poorly surveyed regions. The long list of references provides access to the taxonomic and biological literature of all New World damselflies, and to that all-important opportunity to identify specimens to species. The list that attributes a locality to every figure is a nice touch. If there are mistakes in the volume, I did not find them with my level of scrutiny. The very timely Appendix lists additions and corrections to the Anisoptera volume, and such a list will doubtless be generated for this volume in a few years. Like Philip Corbet's grand book on Odonata (Corbet 1999), the two superb volumes from these authors are perfectly placed to show us what still needs to be done: 1) databasing and georeferencing existing collections to give an even clearer picture of regional biodiversity; 2) many more surveys and much more collecting over neotropical regions that are still poorly known; 3) modern taxonomic revisions of genera that have not yet received that treatment; and 4) sets of keys to species, especially regional keys such as those by Lencioni (2005, 2006). Finally, regional photo-illustrated field guides to all species!" (Dennis Paulson). Orders: The Johns Hopkins University Press, 2715 North Charles Street, Baltimore, Maryland 21218-4363, USA

**10154.** Gauquie B. (2010): Habitats de l'Orthetrum brun (Orthetrum brunneum) et de l'Orthetrum bleuissement (Orthetrum coerulescens) sur le territoire du Parc naturel des Plaines de l'Escaut et dans le bassin carrier tournois. Les naturalistes Belges 91(3-4): 37-53. (in French, with English summary) ["During this last five years, I undertook a specific search on two rare Orthetrum species in Belgium, *O. coerulescens* and *O. brunneum*, both recently discovered in Western Hainaut province. The exploration area is Tournai and the territory of the Natural Park of the Plains of the Scheide, which extends east to west from Bernissart to Antoing. *O. brunneum* was found on five sites and *O. coerulescens* on three sites. Following data analysis, it seems that in the region *O. coerulescens* is more a stenotopic species, selecting only limestone quarries and *O. brunneum* is an eurytopic species, occupying more varied environments, nevertheless at least four abiotic parameters characterize in common the breeding sites of the two species: a sunny environment, a shallow water, with good physico-chemical conditions and constantly renewing seepage, or flow resurgence. If these ecological requirements are met, it appears that, among other factors (biotic or abiotic), the vegetation structure is of crucial importance for the reproduction of either species. At sites with still water, *O. brunneum* proves to be a pioneer species essentially, eventually disappearing when the vegetation becomes too high. For *O. coerulescens*, eutrophication is really a non-favorable factor, but the vegetal cover did not appear to be influential." (Author)] Address: Gauquie B., Chargé de mission Recherches et milieux naturels, Parc naturel des Plaines de l'Escaut, rue des Sapins 31, 7603 Bon-Secours, Belgium. E-mail: bgauquie@plainesdelescaut.be

**10155.** Goffart, P. (2010): Southern dragonflies expanding in Wallonia (south Belgium): a consequence of global warming? BioRisk 5: Special issue: Monitoring climatic change with dragonflies: 109-126. (in English) ["The occurrence of seven southern Odonata species (*Crocothemis erythraea*, *Lestes barbarus*, *Sympetrum fonscolombii*, *Anax parthenope*, *Coenagrion scitulum*, *Aeshna affinis*, *S. meridionale*) has been watched in Wallonia over the last two decades (from 1981 to 2000). They have clearly expanded in the meantime and this pattern is still highly significant when the data are corrected for the increase of sampling efforts. Moreover, reproduction evidences have been collected recently (from 1993 onwards) for all these species and several settled and have now resident populations in Wallonia. In a second step, all present regular and irregular resident species of Wallonia were looked for change in range size and observation rate per visit between two six years periods of a survey and monitoring scheme, from 1989 to 2000. Analysis was achieved on grid cells visited at the right time at both periods, a procedure designed to neutralize the spatio-temporal heterogeneity of sampling. The comparison of results in relation to the distribution types of species and their habitat preferences show a significant global trend toward an increase for southern species during the investigated time interval, contrasting with other groups of species. If there is a tendency to rise for species preferring eutrophic still waters, this proves to be clearly due to the southern species sub-group, the other dragonflies of this habitat type showing a stable or even decreasing trend. Three distinct hypotheses are examined and discussed as possible explanations of the expansion pattern of southern species: (1) global warming, (2) change in aquatic habitats, especially eutrophication, and (3) intrinsic population dynamics. The rise of temperatures appears to be the main factor explaining the observed expansions." (Author)] Address: Philippe Goffart, P., Observatoire de la Faune, de la Flore et des Habitats (OFFH), Département de l'Étude du Milieu naturel et agricole (DEMna), Service Public Wallon (SPW) - DGARNE - Direction de la Nature et de l'Eau, Avenue Maréchal Juin, 23, B-5030 Gembloux, Belgium. E-mail: philippe.goffart@spw.wallonie.be

**10156.** Grand, D. (2010): *Tramea basilaris* (Palisot de Beauvois, 1805): un nouveau Libellulidae pour l'île de la Réunion (Odonata, Anisoptera: Libellulidae). *Martinia* 26(1-2): 18. (in French) [pond near Gol à Saint-Louis, 23-I-2003] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France. E-mail: danielgrand@yahoo.fr

**10157.** Gros, P. (2010): Die Libellenfauna des Mandlinger Moores (Gemeindegebiet Radstadt, Sllbg): Erster inernalpiner Nachweis der Großen Moosjungfer *Leucorhinia pectoralis* (Charpentier, 1825) aus dem Bundesland Salzburg und erste Meldung der Glänzende Binsenjungfer *Lestes dryas* Kirby, 1890 aus dem Ennstal Österr. (Odonata). *Mitteilungen aus dem Haus der Natur Salzburg* 18: 29-34. (in German, with English summary) [A total of 29 odonate species are listed for the locality Mandlinger Moor, Austria. "*L. pectoralis* and *L. dryas*" are reported from Salzburg's part of the Enns river valley for the first time. For *L. pectoralis*, it is the first report inside the alpine region in Salzburg. In this Austrian county, these two dragonfly species are currently only known from very few sites. Details of these discoveries are given. Beyond that, all dragonfly spe-



cies recently found in this area are listed." (Author)] Address: Gros, P., Haus der Natur, Museumsplatz 5, 5020 Salzburg, Austria. E-mail: patrick.gros@hausdernatur.at

**10158.** Helitas, N.; Lambret, P. (2010): Observation d'un tandem de *Lestes sponsa* (Hansemann, 1836) se laissant dériver à la surface d'un plan d'eau (Odonata, Zygoptera: Lestidae). *Martinia* 26(1-2): 29-34. (in French, with English summary) [A tandem of *L. sponsa* was observed landing and drifting on the surface of a lake in the Vosges mountains (northeastern France). Thermoregulatory behaviour is discussed as a possible cause of this behaviour.] Address: Helitas, N., 4 rue de Longeville - F-55000 Savonnières devant Bar, France. E-mail: nicolas.helitas@wanadoo.fr

**10159.** Hertzog, M. (2010): Beobachtung eines frisch geschlüpften Weibchens von *Boyeria irene* am Seerhein (Odonata: Aeshnidae). *Libellula* 29(3/4): 169-174. (in German, with English summary) ["On 17-VIII-2007 a general female *B. irene* was found and documented photographically near Gottlieben, Canton of Thurgau, Switzerland, west of Constance, where a 4 km-section of the River Rhine connects the upper with the lower part of Lake Constance. This is the first record of reproduction of this species in the Lake Constance basin." (Author)] Address: Hertzog, M., Rebhaldenstrasse 19, CH-596 Scherzingen, Switzerland. E-mail: mhertzog@bluewin.ch

**10160.** Horváth, G.; Blaho, M.; Egri, A.; Kriska, G.; Seres, I.; Robertson, B. (2010): Reducing the maladaptive attractiveness of solar panels to polarotactic insects. *Conservation Biology* 24(6): 1644-1653. (in English, with Spanish summary) ["Human-made objects (e.g., buildings with glass surfaces) can reflect horizontally polarized light so strongly that they appear to aquatic insects to be bodies of water. Insects that lay eggs in water are especially attracted to such structures because these insects use horizontal polarization of light off bodies of water to find egg-laying sites. Thus, these sources of polarized light can become ecological traps associated with reproductive failure and mortality in organisms that are attracted to them and by extension with rapid population declines or collapse. Solar panels are a new source of polarized light pollution. Using imaging polarimetry, we measured the reflection-polarization characteristics of different solar panels and in multiple-choice experiments in the field we tested their attractiveness to mayflies, caddis flies, dolichopodids, and tabanids. At the Brewster angle, solar panels polarized reflected light almost completely (degree of polarization  $d = 100\%$ ) and substantially exceeded typical polarization values for water ( $d = 30-70\%$ ). Mayflies (Ephemeroptera), stoneflies (Trichoptera), dolichopodid dipterans, and tabanid flies (Tabanidae) were the most attracted to solar panels and exhibited oviposition behaviour above solar panels more often than above surfaces with lower degrees of polarization (including water), but in general they avoided solar cells with nonpolarizing white borders and white grates. The highly and horizontally polarizing surfaces that had nonpolarizing, white cell borders were 10- to 26-fold less attractive to insects than the same panels without white partitions. Although solar panels can act as ecological traps, fragmenting their solar-active area does lessen their attractiveness to polarotactic insects. The design of solar panels and collectors and their placement relative to aquatic habitats will likely affect populations of aquatic insects that use polarized light as a behavioural cue." (Authors)] Address: Horváth, G., Biooptics Laboratory, Department of Biological Physics, Loránd Eötvös University, 1117 Budapest, Pázmány Péter sétány 1, Hungary. E-mail: gh@arago.elte.hu

(Authors) The paper includes references to Odonata.] Address: Horváth, G., Biooptics Laboratory, Department of Biological Physics, Loránd Eötvös University, 1117 Budapest, Pázmány Péter sétány 1, Hungary. E-mail: gh@arago.elte.hu

**10161.** Houard, X.; Lorthiois, M. (2010): Premiers indices formels d'autochtonie d'*Anax parthenope* (Selys, 1839) en Haute-Normandie (Odonata, Anisoptera: Aeshnidae). *Martinia* 26(1-2): 39-40. (in French) [28-VII-2009, oviposition, Val-de-Reuill, France] Address: Houard, X., Conservatoire des Sites Naturels de Haute-Normandie, Rue Pierre de Coubertin, BP 424, F-76850 St-Étienne-du-Rouvray Cedex, France. E-mail: x.houard@gmail.com

**10162.** Imler, E.; Olberg, R.; Leonardo, A. (2010): 3D reconstructions and flight statistics of dragonfly prey-capture trajectories. Abstracts of the 9th International Congress of Neuroethology, Salamanca (Spain) 2-7 August 2010. P 395: 649. (in English) ["Dragonflies are among evolution's finest aerial hunters; intercepting prey in mid-air, they rarely miss their targets. Most previous studies of dragonfly prey capture have taken place outdoors and have been limited by environmental variability and availability of adult dragonflies in these situations. These single camera studies have been restricted to 2D analyses, and have missed long complex flights due to the narrow field-of-view (FOV) required by outdoor conditions. To enable more sophisticated studies of prey capture, we have constructed a fully indoor flight arena that can be used to study dragonfly behaviour in a controlled environment. The flight arena is 5.5m x 4m x 4.5m in size, and is illuminated to 10mW/cm<sup>2</sup>. The end result is a bright, windless, temperature and humidity controlled environment in which adult dragonflies can forage year round. Individual animals gained up to 100mg of weight per day, and lived as long as 3 weeks. We have focused our studies on libellulid dragonflies (*L. lydia*, *L. luctuosa*), because they will forage readily from a single perch positioned in the focal zone of a high speed camera array (2 cameras; 1000fps). We have analyzed over 150 prey capture trajectories of both the dragonfly and its prey (*Drosophila*) in a 3D recording volume of ~1m<sup>3</sup>, with sub-millimeter tracking accuracy. Foraging success rates were ~80%, with a mean flight time of 361 ± 124ms – on the order of 15 wing strokes. Dragonfly flight accelerations were very high, over double those of its prey (dragonfly: mean acceleration 18 m/s<sup>2</sup>, max 75 m/s<sup>2</sup>; *Drosophila*: mean acceleration 8 m/s<sup>2</sup>, max 42 m/s<sup>2</sup>). When the dragonfly failed to catch its prey, mean flight times increased by 20%, and mean accelerations increased by 10% (dragonfly) and 30% (*Drosophila*). The data suggest the presence of a narrow "trigger zone" above and slightly forward of the dragonfly's head, which most prey pass through in the moments before a foraging flight begins." (Authors)] Address: Olberg, R.M., Department of Biological Sciences, Union College, Schenectady, NY 12308, USA. E-mail: olberg@union.edu

**10163.** Jeon, D.-Y.; Lee, S.-L.; Son, J.-W.; Cha, Y.-W.; Yoo, P.-J. (2010): Assessments of ecosystem health in middle reaches of Suyoung River. *The Annual Report of Busan Metropolitan City Institute of Health & Environment* 20(1): 98-121. [A total of 44 species including five, not further specified Odonata species was recorded between September 2008 to October 2010 in the middle reach of the Suyoung river in Busan, South Korea.] Address: E-mail: Jeon1st@korea.kr

- 10164.** Karolinska, E.O.; Gram, B.M. (2010): New finds of dragonflies (Odonata) in Kharkiv region. *Vestnik zoologii* 44(6): 524. (in Ukrainian, with English title) [Ukraine; records of the following taxa are documented: *Sympetma paedisca*, *Anax parthenope*, *Orthetrum brunneum*, *Orthetrum coerulescens anceps*, *Crocothemis erythraea*, *Sympetrum fonscolombii*, *S. striolatum*, *S. depressiusculum*, and *Leucorrhinia rubicunda*.] Address: not stated
- 10165.** Kipping, J. (2010): The dragonflies and damselflies of Botswana – an annotated checklist with notes on distribution, phenology, habitats and Red List status of the species (Insecta: Odonata). *Mauritiana (Altenburg)* 21: 126-204. (in English, with German summary) ["Between 2000 and 2010, 111 species of Odonata have been recorded mainly from northern Botswana. Together with other published and unpublished records, this increases the checklist of the Odonata of Botswana to 127 species, of which 21 species have not been recorded before in Botswana. This updated checklist provides information for each recorded species on distribution, phenology, preferred habitats and specific notes, where appropriate. A detailed list of records is given, the localities sampled by the author are described in the appendix. The Red List status according to the IUCN assessment is given. Distribution patterns of the Odonata species in different freshwater ecoregions are discussed." (Authors)] Address: Kipping, J., Naturkundliches Museum Mauritium Altenburg, Parkstr. 1, 04600 Altenburg, Germany. E-mail: kipping@mauritianum.de
- 10166.** Klimaszuk, P.; Heymann, D. (2010): Vertical distribution of benthic macroinvertebrates in a meromictic lake (Lake Czarne, Drawieński National Park). *Oceanological and Hydrobiological Studies* XXXIX(4): 99-106. (in English) ["Investigations of the distribution of benthic macroinvertebrates in Lake Czarne were conducted in fall 2005 and spring 2006. Samples were taken in three transects (at a depth of 0.5 m and at 5 m intervals). It was noted that macrobenthos only inhabit depths to 10 m. Laminar sediments from 15 m to 29 m indicate that macrobenthos never inhabit the deepest part of the lake in spite of temporary oxygen abundance (between 15 and 20 m during the winter and spring mixing periods). The largest diversity and biomass of macrozoobenthos was observed in the littoral zone at a depth of 0.5 m. At a depth of 5 m in the characean stands and at a depth of 10 m the number and biomass of benthic macroinvertebrates were significantly smaller. The reason for the decrease of benthos density seems to be gradual oxygen depletion." (Authors) Odonata larvae could be found up to a depth of app. 5 m. Odonata occurred at densities of 15 ind./m<sup>2</sup>.] Address: Klimaszuk, P., Department of Water Protection, University of Adam Mickiewicz ul. Umultowska 89, 61–614 Poznań, Poland. E-mail: pklim@amu.edu.pl
- 10167.** Knijf, G. de; Termaat, T. (2010): Statut et distribution de *Sympetrum meridionale* (Selys, 1841) dans le nord ouest de l'Europe, en particulier en Belgique et aux Pays-Bas (Odonata, Anisoptera: Libellulidae). *Martinia* 26(3/4): 81-82. ["The more and more frequent presence of *S. meridionale* in Northwestern Europe is detailed. The habitats where breeding occurs are briefly described."] Address: De Knijf, G., Matrouwstraat 10, 9661 Parike-Brakel, Belgium. E-mail: geert.deknijf@inbo.be
- 10168.** Kosterin, O.E.; Borisov, S.N. (2010): Dragonflies (Odonata) of the Dzhungarskiy Alatau mountains, South-East Kazakhstan. *Euroasian entomological journal* 9(2): 299-302. (in Russian, with English summary) ["An annotated list of 24 species of Odonata collected on expeditions to the Dzhungarian Alatau Mountains in 1993–1994 and 2006–2007 is given. Water bodies fit for odonate breeding are sparse and located mostly in foothills; however, *Sympetma* spp., *Sympetrum* spp. and *Aeshna mixta* migrate to the mountains in the pre-reproductive period." (Authors)] Address: Kosterin, O. E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru
- 10169.** Krieg-Jacquier, R.; Lathuilière, M. (2010): *Cordulegaster bidentata* Selys, 1843 dans le département de l'Ain. État des connaissances en 2009 (Odonata, Anisoptera: Cordulegasteridae). *Martinia* 26(1-2): 35-39. (in French, with English summary) [2008 and 2009, in the Ain department (Eastern France, Rhône-Alpes region) records of *C. bidentata* were added to the regional list of Odonata. The distribution of the species in the Ain and the adjacent Departments is mapped.] Address: Krieg-Jacquier, R., 18 rue de la Maçonne F-73000 Barberaz, France. E-mail: regis.krieg.jacquier@gmail.com
- 10170.** Krieg-Jacquier, R.; Grand, D.; Mora, F. (2010): Fragments odonatologiques sur le Doubs, 2009 (Régions Franche-Comté et Bourgogne). *Martinia* 26(1-2): 41-47. (in French, with English summary) [In summer 2009, eight Odonata species could be added to the regional list of (autochthonous) species: *Chalcolestes viridis*, *Erythromma viridulum*, *Boyeria irene*, *Gomphus pulchellus*, *G. vulgatissimus*, *Onychogomphus forcipatus*, *Somatochlora metallica*, and *Crocothemis erythraea*. Distribution maps of these species are updated.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France. E-mail: danielgrand@yahoo.fr
- 10171.** Kunz, B. (2010): Heterospecific copulation with subsequent oviposition in Libellulidae (Odonata). *Libellula* 29(3/4): 223-230. (in English, with German summary) [Sardinia, Italy; Baden-Württemberg, Germany; "Two cases of heterospecific mating in two different genera of Libellulidae were documented photographically from pair formation to subsequent oviposition. The pairs consisted of male *Orthetrum trinacria* x female *O. cancellatum* and of male *Sympetrum danae* x female *S. striolatum*. Copulation and oviposition took place in the genus specific manner. Due to the rare observation of these events the full course of the behaviour is described and the possible reproductive success of heterospecific pairing is discussed." (Author)] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: libellen@berndkunz.de
- 10172.** Kyek, M.; Wittmann, H. (2010): Die Geländeabsenkung Oberau – ein Naturschutzprojekt der besonderen Art - Kurzbericht über den Zustand des Naturhaushaltes kurz nach Fertigstellung. *Mitteilungen aus dem Haus der Natur, Salzburg* 18: 91-102. (in German, with English summary) ["During the late winter months of 2008 the Mayr-Melnhof forest management newly created the "Oberau" wetland, covering an area of 11 hectares. The biotope is located between the Antheringer Au lowland forest and the Haunsberg hill. From the area the humus layer was removed, gravel extracted and 13 new near-natural ponds built. Most of the area immediately adjacent to the ponds was assigned to be left

to natural succession, in some parts grey alder, ash trees, willows and, for the Red-backed Shrike, thorny shrubs were planted. Rough pasture surrounds the forest. Preliminary botanical, ornithological, entomological and herpetological analyses of the area's species inventory prove it to be a species-rich and exciting biotope. The Oberau project was implemented within a short period of time, but has already a sustained positive influence on the "Salzachauen" Natura 2000 Area. It remains to hope that in the interest of supporting biodiversity a large number of similar projects may be initiated in the future." (Authors) 17 odonate species were recorded including *Sympetrum pedemontanum*.]

**10173.** Lambert, P. (2010): Un mâle de *Lestes macrostigma* (Eversmann, 1836) prisonnier de *Juncus maritimus*. *Martinia* 26(1-2): 49-51. (in French, with English summary) [The right forewing of a male *L. macrostigma* that was accidentally pierced by a stem of *Juncus maritimus*.] Address: Lambert, P., Amis des Marais du Vigueirat, F-13104 Mas Thibert, France. E-mail: philambret@hotmail.com

**10174.** Leonardo, A.; Imler, E.; Olberg, R. (2010): Guidance laws underlying prey capture in the dragonfly. Abstracts of the 9th International Congress of Neuroethology, Salamanca (Spain) 2-7 August 2010. P 363: 235. (in English) [Verbatim: "Dragonflies are nature's consummate aerial predators; flying at extremely high speeds, they catch small moving insect prey; escapes are rare. We have constructed the first indoor dragonfly flight arena in order to unravel the computations and circuit dynamics underlying this remarkable behaviour. We will present data from an array of high speed cameras that allows us to reconstruct the trajectory of the dragonfly and its prey (*Drosophila*). From these data, we can test quantitatively the hypothesis (Olberg et al., 2000) that dragonflies use a strategy of proportional navigation to intercept their prey. Starting with the three-dimensional coordinates of the dragonfly and its prey, we calculate the azimuthal and elevational line-of-sight position of the prey as a function of time. The numerical derivatives of these line-of-sight vectors are then estimated, and their drift rates are compared to the dragonfly's acceleration vector normal to its bearing. The extent to which these numbers are consistent with different models of proportional navigation and other guidance laws will be discussed." (Authors)] Address: Olberg, R.M., Dept Biol. Sciences, Union College, Schenectady, NY 12308, USA. E-mail: olbergr@union.edu

**10175.** Lopez Salmeron, A.; Mendoza-Cuenca, L. (2010): Efecto del parasitismo por ácaros acuáticos en la adecuación de *Argia* sp. (Odonata: Coenagrionidae). *Biológicas* 12(2): 122-128. (in Spanish, with English summary) ["In the late three decades a deep interest in theoretical and empirical knowledge of sexual selection, have showed that it is common in nature. In dragonfly species such as *Argia* sp. (Odonata: Coenagrionidae), where males did not perform any precopulatory display and the sexual harassment to females occurs very frequently, we would expect that females use traits to discriminate between males. We evaluated, using capture-recapture marking and through behavioral observations, if mites attack affects individual survival of *Argia* sp. from one population with high levels of parasitism by aquatic mites, and also if parasitism levels could be used by females to discriminate among males. Our results showed that mites attack males with higher intensity, despite females are bigger and could potentially

house a higher number of mites. Parasitism by aquatic mites reduces both individual survival of males and females and male's mating success, and bigger males are less attacked, have a higher survival and obtain higher numbers of matings. These results suggest that females could use male size as an indicator to their capacity to resist the attack from mites." (Authors)] Address: Mendoza-Cuenca, L. E-mail: lmendoza@lca.unam.mx

**10176.** Martens, A. (2010): New Odonata records from Atiu and Rarotonga, with an overview of the species known from the Cook islands. *Notulae odonatologicae* 7(6): 57-59. (in English) ["In September and October 1995, 6 species were collected at Atiu and 4 at Rarotonga. Of these 5 species are recorded for the first time from Atiu. The odonate fauna of the Cook Islands is poorly known; an island-annotated list of the hitherto recorded 9 species is presented." (Author)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, 76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**10177.** Martinov, A.V.; Martinov, V.V. (2010): Distribution of *Cordulegaster bidentata* (Selys, 1843) (Odonata, Cordulegasteridae) in Ukraine. *Euroasian Entomological Journal* 9(2): 303-307. (in Russian, with English summary) [*C. bidentata* is widespread in mountainous and sub-mountainous regions of the Ukrainian Carpathian settling at altitudes between 400 - 1000 m a.s.l. It prefers habitats with low water temperature and a moderate water velocity, providing sedimentation of sand and small gravel, a prerequisite for larval development. It is also tolerant of anthropogenic loads and is therefore present in artificial water bodies. In general, the status of *C. bidentata* populations on the territory of Ukrainian Carpathian Mountains is considered by the authors as satisfactory. Since the majority of known populations occur within the boundaries of nature conservation sites, no additional protective measures are taken for necessary. All known localities are listed.] Address: Martinov, A.V., Dept. Gen. & Appl. Ent., Schmalhausen Inst. Zool. Natn. Acad. Sci., Khmelnytskygo 15, 01601 Kyiv, Ukraine

**10178.** Martinov, A.V. (2010): The Odonata fauna of the basin of the river Severskyi Donets in its middle current (Eastern Ukraine). *International Dragonfly Fund - Report* 31: 1-41. (in English) ["A list of 57 Odonata species from 108 localities recorded in the basin of the river Severskyi Donets in its middle range (Eastern Ukraine) is provided. This compilation includes literature and museum data as well as results from field surveys realized between 2001 and 2009. Annotations to the history of regional odonate research are made. Brief descriptions of typical dragonfly habitats in the floodplain of Severskyi Donets are presented. Locality wise notes on the reproductive status for most of the species are made." (Author)] Address: Martynov, A.V., Entomology Department, Schmalhausen Institute of Zoology NAS of Ukraine, Kyiv, Ukraine. Email: martynovav@ukr.net

**10179.** Matos, R. (2010): Analysis of biogeography of stream Botafogo, Presidente Prudente – Sao Paulo – Brazil. *Geotas, Departamento de Geografia da FCT/UNESP, Presidente Prudente* 10(1): 70-85. (in Portuguese, with English summary) [Limnological data of the main channel within the basin of the Botafogo stream system and water source are taken and discussed with emphasize on the implications resulting from urbaniza-



tion in this area. Odonata are treated at the family level.] Address: Matos, R., Grupo de Pesquisa Gestão Ambiental e Dinâmica Socioespacial (GADIS), Rua Roberto Simonsen, 305; rmatos789@gmail.com.

**10180.** Mauscherning, I.; Jödicke, K.; Neumann, C.; Winkler, C. (2010): Artenhilfsprojekt Grüne Mosaikjungfer und Kriebsschere in Dithmarschen. Bündnis Naturschutz in Dithmarschen e.V. (Hrsg.): Faltblatt, 6 pp. (in German) [Leaflet with a brief introduction into conservation tasks to protect habitats of *Aeshna viridis* and *Stratiotes aloides* in Schleswig-Holstein, Germany.] Address: Bündnis Naturschutz in Dithmarschen e.V., Meldorfer Str. 17, 25770 Hemmingstedt, Germany. E-mail: info@buendnis-dithmarschen.de

**10181.** Mikolajewski, D.J.; De Block, M.; Rolff, J.; Johansson, F.; Beckerman, A.P.; Stoks, R. (2010): Predator-driven trait diversification in a dragonfly genus: covariation in behavioral and morphological antipredator defense. *Evolution* 64(11): 3327-3335. (in English) ["Proof for predation as an agent shaping evolutionary trait diversification is accumulating, however, our understanding how multiple antipredator traits covary due to phenotypic differentiation is still scarce. Species of the dragonfly genus *Leucorrhinia* underwent shifts from lakes with fish as top predators to fishless lakes with large dragonfly predators. This move to fishless lakes was accompanied by a partial loss and reduction of larval spines. Here, we show that *Leucorrhinia* also reduced burst swimming speed and its associated energy fuelling machinery, arginine kinase activity, when invading fishless lakes. This results in patterns of positive phylogenetic trait covariation between behavioral and morphological antipredator defense (trait cospecialization) and between behavioral antipredator defense and physiological machinery (trait codependence). Across species patterns of trait covariation between spine status, burst swimming speed and arginine kinase activity also matched findings within the phenotypically plastic *L. dubia*. Our results highlight the importance of predation as a factor affecting patterns of multiple trait covariation during phenotypic diversification." (Authors)] Address: Mikolajewski, D.J., Laboratory of Aquatic Ecology and Evolutionary Biology, Katholieke Universiteit Leuven, Charles Debériotstraat 32, 3000 Leuven, Belgium. E-mail: d.j.mikolajewski@sheffield.ac.uk

**10182.** Mill, P.; Brooks, S.; Parr, A. (2010): 26. Dragonflies (Odonata) in Britain and Ireland. In: Maclean, N. (Ed.): *Silent Summer; The State of Wildlife in Britain and Ireland*. Cambridge University Press: 471-494. (in English) ["Although three species of dragonfly became extinct in Britain and Ireland in the 1950s, the outlook for most of the present resident species is favourable, providing that appropriate freshwater habitat is increased and pollution reduced. A number of species are extending their range northwards, mostly as a result of overall temperature increase, but at least one also as a result of reduction in river pollution. Three northern species are showing some sign of a retraction northwards of their southern range margins and this could lead to a serious problem if temperatures continue to rise. A further species currently restricted to the East Anglian coast is threatened by projected sea-level rise. According to IUCN criteria, of our 39 breeding species (17 zygopteran and 22 anisopteran) two are classed as 'endangered', four as 'vulnerable' and six as 'near threatened' in Britain. One of these 'near threatened' species is classed as 'vulnerable' in Ireland and Ireland

has a further species classed as 'vulnerable'. One resident species in Britain has become established only this century and a further two species have begun breeding on a regular basis and may become established as permanent residents in the near future.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**10183.** Nationalpark Hainich (Hrsg.) (2010): Artenbericht 2009: Tiere, Pflanzen und Pilze im Nationalpark Hainich. Kenntnisstand zum 31.12.2009. Hrsg.: Nationalpark Hainich Verwaltung, Bei der Marktkirche 9. D-99947 Bad Langensalza. 135 pp: 24-25. (in German) [Thüringen, Germany; on pages 24-25, 44 Odonata species are listed.] Address: Nationalpark Hainich Verwaltung, Bei der Marktkirche 9. D-99947 Bad Langensalza

**10184.** Ngiam, R.W.J. (2010): *Heliogomphus cf. retroflexus* Ris, 1912, (Odonata: Anisoptera: Gomphidae), a possible new record for Singapore. *Nature in Singapore* 3: 221-225. (in English) [As pointed out in Ngiam et al 2011, the description of the larvae of this taxon and presented in this paper is not valid for *H. retroflexus* and refers to *Microgomphus chelifera*.] Address: Ngiam, R.W.J., National Biodiversity Centre, National Parks Board, 1 Cluny Road, Singapore 259569. E-mail: ngiamwenjiang@nparks.gov.sg

**10185.** Nordström, K.; Bolzon, D.; O'Carroll, D. (2010): Slow facilitation of small target motion responses. Abstracts of the 9th International Congress of Neuroethology, Salamanca (Spain) 2-7 August 2010. P 393: 617. (in English) [Verbatim: "Many insect species pursue small moving targets, e.g. the predatory dragonflies chase and capture small prey. To overcome the inherently limited resolution of the compound eye, many insects that pursue targets have developed acute zones. The optical specializations are accompanied by neural hardware giving selective responses to small targets. In the dragonfly lobula (3rd optic ganglion) small target motion detectors (STMD) respond to small moving targets (1-3°), with no response to larger bars or to wide-field stimuli (1,2). STMDs are exquisitely sensitive neurons, detecting targets with an effective neural contrast as low as 2% (3). This performance is especially impressive considering the ability to respond to small targets against moving backgrounds, and the lack of sustained responses to clutter within moving natural scenes. What mechanisms provide STMDs with a high-enough gain to allow responses to low-contrast targets, while still avoiding breakthrough responses to target-like features in natural backgrounds? It is possible that a summation mechanism plays a role, enabling responses to build up as targets move continuously across the receptive field. To investigate the presence of facilitation mechanisms, we record intracellularly from the recently characterized Centrifugal STMD1 (CSTMD1) (2,4). Its large centrifugal axon allows for more stable recordings than usual for STMDs. We show that CSTMD1 has a slow facilitation mechanism where responses continue to grow for several hundred milliseconds as targets move across the receptive field. This gives a partial explanation for the ability of STMDs to respond to low contrast targets: only continuous motion of a target with the correct spatiotemporal profile allows responses to continue to build up to maximum firing frequencies. References: 1. O'Carroll. 1993. *Nature* 362, 541. 2. Geurten, et al. 2007. *J Exp Biol* 210, 3277. 3. Nordström, et al. 2006. *PLoS Biol* 4, 378. 4. Bolzon,

et al. 2009. *J Neurosci* 29, 14143." (Authors)] Address: Nordström, Karin, Department of Neurosciences, Uppsala University, PO Box 593, 751 24 Uppsala, Sweden. E-mail: karin.nordstrom@neuro.uu.se

**10186.** Noskov, Yu.A.; Boyarisheva, E.A.; Belevich, O. E.; Yurchenko, Yu.A. (2010): Species sensitivity distribution of a freshwater Arthropoda community to the insecticide Esfenvalerate in the south of Western Siberia. *Eurasian Entomological Journal* 9(4): 583-589. (in Russian, with English summary) [The sensitivity of 18 insect larva species including *Sympetrum flaveolum* and *Lestes sponsa* to the pyrethroid insecticide Esfenvalerate is studied. The results of this study showed that the widely used laboratory test object *Daphnia magna* is ineffective to predict impacts of Esfenvalerate. The odonate species react less sensitive as *D. magna*.] Address: Noskov, Yu.A., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia. E-mail: yuranoskov@mail.ru

**10187.** Olberg, R.; Leonardo, A. (2010): Towards wireless monitoring of neural activity during dragonfly prey interception flights. Abstracts of the 9th International Congress of Neuroethology, Salamanca (Spain) 2-7 August 2010: 25. (in English) [Verbatim: "In response to an insect passing overhead, the foraging dragonfly takes off on an interception trajectory, aiming a point ahead of the flying prey. If the potential prey deviates in its flight path, the dragonfly corrects its own course so that the bearing to the prey is held constant, a strategy that ensures interception. During the foraging flight the dragonfly adjusts its head angle to maintain the prey's image centered on the dorsal fovea of its compound eye. Eight pairs of identified neurons are implicated in controlling the dragonfly's flight path as it intercepts its flying prey. These target-selective descending neurons (TSDNs) descend from the brain of the dragonfly to the thoracic ganglia. They show directionally selective responses to small objects moving relative to the dragonfly. Their receptive fields are located in the dorso-frontal quadrant of the visual field, the region that views prey during the foraging flight. Intracellular stimulation of any of these neurons evokes small adjustments in wing position and attitude. Details of the neural control of prey interception are not obvious. For example, because the dragonfly rotates its head to fixate the prey's image, the signal that indicates the prey's drift is probably very brief. In addition, the dragonfly must factor in its own head angle in determining the bearing of the prey. To more fully understand the neural underpinnings of this complex flight behavior, we are developing the means to monitor TSDN activity from a dragonfly in free flight. Extracellular TSDN activity will be recorded from the mesothoracic ganglion, amplified and transmitted from a lightweight telemetry chip mounted on the dragonfly. Neuronal activity will be correlated with the 3-dimensional trajectories of the dragonfly and its flying prey, reconstructed from high-speed video recordings. Our goal in this approach is to understand how visual information is translated into steering commands for interception in a freely flying insect." (Authors)] Address: Olberg, R.M., Department of Biological Sciences, Union College, Schenectady, NY 12308, USA. E-mail: olberg@union.edu

**10188.** Olberg, R.; Imler, E.; Seeman, S.; Shulman, D.; Worthington, A. (2010): The responses of target-selective descending neurons in the dragonfly to 3-di-

mensional object movements outdoors under blue sky. Abstracts of the 9th International Congress of Neuroethology, Salamanca (Spain) 2-7 August 2010: 76. (in English) [Verbatim: "Dragonflies make their living by foraging on flying insects. Eight pairs of identified neurons are implicated in controlling the dragonfly's flight path as it intercepts its flying prey. These target-selective descending neurons (TSDNs) descend from the brain of the dragonfly to the thoracic ganglia. They show directionally selective responses to small objects moving relative to the dragonfly. Their receptive fields are located in the dorso-frontal quadrant of the visual field, the region that views prey during the foraging flight. When stimulated intracellularly with high-frequency, depolarizing current pulses, each of these neurons evokes small adjustments in wing position and attitude. To understand the behavior of the TSDNs under more natural environmental conditions, we studied their responses outdoors, under blue sky, to the movement of opaque white beads of three sizes (2, 4, and 8 mm) around the immobilized dragonfly. The bead movements were videotaped (100 frames/s) for 3-dimensional reconstruction of their paths. The extracellularly recorded TSDN spikes were sorted and correlated with bead positions and velocities. We recorded from dragonflies of two genera: *Aeshna* (which forages from continuous flight) and *Pachydiplax* (which takes off to forage from a perch). The outdoor recordings revealed several new properties of the neurons and their receptive fields, three of which are presented here. (1) Receptive fields are not identical between genera, a result that may be related to their markedly different foraging strategies. (2) Three-dimensional receptive field reconstruction showed that size selectivity varies with object distance. (3) The higher light levels and ambient temperatures outdoors resulted in TSDN spike rates of 900 Hz or greater, much higher than have ever been observed in laboratory experiments." (Authors)] Address: Olberg, R. M., Dept Biological Sciences, Union College, Schenectady, NY 12308, USA. E-mail: olberg@union.edu

**10189.** Outomuro, D.; Ocharan, F.J.; Herrero, F.; Pérez-Andueza, G. (2010): Primera cita de *Oxygastra curtisii* (Dale, 1834) para la provincia de Ávila (Odonata: Corduliidae). *Boletín de la Sociedad Entomológica Aragonesa* 46: 615-616. (in Spanish, with English summary) ["A new Spanish locality for the endangered *O. curtisii* is described. It constitutes the first record of the species from Ávila province and its highest recorded altitude in the Iberian Peninsula (1205 m a.s.l.). The Iberian distribution of the species is briefly discussed, with special reference to other, nearby populations." (Authors)] Address: Ocharan, F.J., Depto de Biología de Organismos y Sistemas, Univ. de Oviedo, E-33071 Oviedo, Spain: E-mail: focharan@oonreo.uniovi.es

**10190.** Outomuro, D. (2010): Patrones morfológicos latitudinales en poblaciones ibéricas de *Calopteryx* Leach, 1815 (Odonata, Calopterygidae): posibles causas ambientales y evolutivas. *Boln. Asoc. Esp. Ent.* 33(3-4) (2009): 299-319. (in Spanish, with English summary) ["Latitudinal morphological patterns in Iberian *Calopteryx* Leach, 1815 (Odonata, Calopterygidae) populations: possible environmental and evolutionary factors. - The morphological clines related with latitudinal or altitudinal gradients, generally caused by natural selection, can be modified by sexual selection, especially when it plays a major role in interpopulation divergence. Two species of *Calopteryx* damselflies [*C. virgo* merid-

ionalis, *C. xanthostoma*] were studied at three different latitudes in the Iberian Peninsula. Latitudinal patterns in size and secondary sexual traits were recorded. A modified converse Bergmann rule explains size patterns. Patterns in secondary sexual traits are better explained by a balance between sexual selection processes within and between the two species. These processes are influenced by latitudinal differences in relative abundances, in the sense that the most abundant species displaces the traits of the other species because of sexual interference, in order to reduce reproductive effort costs between species. Differences in relative abundances are supported by the distribution frequencies of both species in the Iberian Peninsula. The third Iberian species might cause a reinforcement polymorphism in one of the species studied." (Author)] Address: Outomuro, D., Depto de Biología de Organismos y Sistemas, Universidad de Oviedo. 33071 Oviedo, Spain. E-mail: outomuro.david@gmail.com

**10191.** Outomuro, D.; Ocharan, F.J. (2010): *Gomphus simillimus* Sélys, 1840 (Odonata, Gomphidae) en la cuenca del Segura y el sur de la cuenca del Duero (SE y Centro de España). *Boln. Asoc. Esp. Ent.* 34(1-2): 245-248. (in Spanish) [All known records of *G. simillimus* in Spain are mapped. Current additions result from the river Segura basin and the south of the river Duero basin (SE and Central Spain).] Address: Outomuro, D., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo. 33071 Oviedo, Spain. E-mail: outomuro.david@gmail.com

**10192.** Parkinson, D. (2010): Plateau des Tailles: réponse positive des libellules suite aux travaux de restauration du projet LIFE. *Les naturalistes Belges* 91(3-4): 55-67. (in French, with English summary) [Belgium; "In peatlands of the southern slope of the plateau des Tailles, numerous water bodies were created during "plateau des Tailles" LIFE Nature project. Dragonflies found on restored sites were surveyed annually from 2006 to 2010. Following restoration's work, the number of dragonfly species recorded increased from 15 to 28. Several endangered species have expanded their range and their numbers. Through their response to the restoration works, the species studied show very different dispersal abilities and ecological requirements. Odonata are an excellent indicator taxonomic group to assess the quality of peatlands restoration." (Author)] Address: Parkinson, D., Les Floxhes, 4, 4160 Anthisnes, Belgium. E-mail: denis.parkinson@gmail.com

**10193.** Pinto, A.P.; Lamas, C.J.E. (2010): *Navicordulia aemulatrix* sp. nov. (Odonata, Corduliidae) from northeastern Santa Catarina State, Brazil. *Revista Brasileira de Entomologia* 54(4): 608-617. (in English, with Portuguese summary) ["*Navicordulia aemulatrix* sp. nov. from northeastern Santa Catarina State, Brazil. *Navicordulia aemulatrix* sp. nov. (holotype male deposited in MZSP: Brazil, Santa Catarina State, [São Bento do Sul municipality, 26°14'58"S, 49°22'59"W], [railroad station] Rio Vermelho, II.1952) is described and illustrated based on three males. The long cercus (2.9-3.2 mm) places this species in the longistyla-group together with *N. kiautai*, *N. longistyla* and *N. nitens* but it differs from them mainly by the shape of cercus, with carinated part occupying 0.33 of cercus total length, and also by dorsal, ventromedial and ventrolateral tubercles developed. An unusual process on tergal portion of prothorax is reported for the first time in *Navicordulia*. The rate of description of new species of South American 'Corduliidae' is dis-

cussed. A map with records of Atlantic Forest *Navicordulia* species and a list of Brazilian corduliids by state are also presented." (Authors)] Address: Pinto, A.P., Museu de Zoologia, Universidade de São Paulo, Av. Nazaré 481, Ipiranga 04263-000 São Paulo-SP, Brazil. E-mail: odonataangelo@hotmail.com

**10194.** Poulin, B.; Lefebvre, G.; Paz, L. (2010): Red flag for green spray: adverse trophic effects of Bti on breeding birds. *Journal of Applied Ecology* 47(4): 884-889. (in English) ["The expanding use of selective pest-control agents provides a unique opportunity to study food web interactions in the field while addressing major environmental issues. *Bacillus thuringiensis israelensis* (Bti) is the most commonly used microbial agent to control mosquitoes worldwide. Using breeding house martins *Delichon urbicum* as a model species, we assessed the effect of Bti spraying on foraging rates and chick diet prior to and during 3 years of Bti spraying in the Camargue, France. Some 9051 feeding flights and 14 857 prey items were recorded in the early, mid and late nesting season at up to three control and three treated sites. Breeding parameters were assessed during 1 year at two control and two treated sites. [...] Nematocera, Araneae and Odonata were taken significantly more often at control sites, whereas Hymenoptera (flying ants) accounted for a larger portion of the diet at treated sites (Table 2). ... Because Odonata and Araneae are favourite prey of swallows' nestlings (Foelix 1996; McCarty & Winkler 1999), and major predators of Nematocera (Foelix 1996; Corbet 1999), their lower intake at treated sites suggests an indirect effect of Bti treatments through the food web." (Authors)] Address: Poulin, Brigitte, Tour du Valat Research Center, Le Sambuc, 13200 Arles, France. E-mail: poulin@tourduvalat.org

**10195.** Principe, R.E.; Gualdoni, C.M.; Oberto, A.M.; Raffaini, G.B.; Corigliano, M.C. (2010): Spatial-temporal patterns of functional feeding groups in mountain streams of Córdoba, Argentina. *Ecología Austral* 20: 257-268. (in English) ["Trophic structure of benthic communities is influenced by the availability of food resources which indeed may be conditioned by stream size, shading and substrate. This study aims to analyze the distribution of macroinvertebrate Functional Feeding Groups in different habitats of mountain streams (Córdoba, Argentina) and to assess the environmental variables conditioning this distribution at the habitat level. Four streams were sampled in two hydrological periods (high and low discharge) and three benthic samples were taken in riffles and runs of coarse and fine substrate. Gathering collectors were dominant in most of the habitats, streams and periods except in riffles during the low water period in which filtering collectors dominated. At the habitat level, current velocity, substrate, abundance of macroalgae and twigs and leaves were the most important variables explaining functional feeding group distribution. Functional feeding group abundances varied in relation to the stream, the hydrological period and the habitat. The dominance of collectors demonstrates the importance of the role of this functional group and that fine detritus is the main food resource in these lotic ecosystems. The phenology and life history of the species, and the amount and type of organic matter retained in each habitat may explain the observed spatial-temporal patterns." (Authors) Odonata - including "*Progomphus* sp." are treated at the family level.] Address: Principe, Romina, Univ. Nacional de Río Cuarto, Depto de Ciencias Naturales, Río Cuarto, Pcia. de Córdoba, Argentina



**10196.** Reels, G. (2010): Dragonfly surveys in Hainan, China, 2007-2008. *Agrion* 14(2): 34-38. (in English) ["The first field trip (18-26 May 2007) centred on sites in and around Yinggeling Nature Reserve in central Hainan, with two days at Ganzaling Nature Reserve in southern Hainan. The next trip (17-23 June 2007) was to the Wanning region of southeast Hainan. This was followed by two trips to Wuzhishan Nature Reserve (16-23 April and 8-14 August 2008); the latter trip also involving sites between Wuzhishan and Wanning, and in the Wanning region. In total, 28 days of field work were conducted, and 98 species recorded (vouchered, photographed, or, in the case of common and easily-recognised species, unambiguously sighted). Four species had not previously been found in Hainan (the first three of these were reported by Wilson et al., 2008): *Lestes praemorsus*, *Rhyothemis obsolescens*, *R. pluto* and *Zygomma petiolatum*. New locality records were made for five interesting species previously known from only a single location in Hainan: *Rhinagrion hainanense* and *Nannophyopsis clara* (first reported by Wilson & Reels, 2001) *Dysphaea gloriosa* and *Rhipidolestes cyanoflavus* (first reported by Wilson et al., 2008), and *Hylaeothemis clementia* (unpublished; Dragonfly surveys in Hainan, China, 2007-2008 Graham Reels one male collected by Bosco Chan at Yinggeling, 2005; det. by G.T. Reels – the first specimen of this genus for China). By an extraordinary coincidence, a female specimen of a new *Sinosticta* species that was subsequently named *S. sylvatica* Yu & Bu, 2009, was collected by team member Hilario Padilla on the same date (25 May 2007) that Yu Xin, working completely independently, collected the first of his two males, and both records were made in Yinggeling, by groups unaware of each other's existence! The following year, I found this species to be quite common around Wuzhishan." (Author)] Address: Reels, G., H-3-30 Fairview Park, Yuen Long, Hong Kong. E-mail: gtreels@gmail.com

**10197.** Relyea, R.A. (2010): COS 53-2: New effects of Roundup® on amphibians: Predation, stratification, and induction of tadpole morphology. The 95th ESA Annual Meeting (August 1-6, 2010): (in English) [Verbatim: "Background/Question/Methods: To understand the impacts of anthropogenic chemicals on natural communities, we often must base our predictions on short-term, single-species tests that are conducted as part of the regulation process. While a valuable first-step, these tests tell us little about the impacts of contaminants under more natural conditions. Thus, many ecotoxicologists have moved to testing contaminants under more natural conditions where natural stressors are abundant. Among the many natural stressors, predator stress is a common one whose interactions with pesticides have only been examined under laboratory conditions. Using two mesocosm experiments, I examined how predation stress interacted with the effects of Roundup®, the most widely applied herbicide in the world. The first experiment, conducted with three spring-breeding species of anurans, crossed four concentrations of Roundup with the presence of no predators, caged adult newts, or caged dragonfly larvae. The second experiment, conducted with three species of summer-breeding anurans, crossed four concentrations of Roundup with the presence of no predators, caged dragonfly larvae, or lethal dragonfly larvae. Results/Conclusions: In the first experiment, Roundup and the caged-predator treatments had interactive effects on

tadpole survival, mass, and relative morphology. Increased herbicide concentrations caused increased tadpole mortality, but the amount of mortality decreased in the presence of caged dragonflies. Tadpole mass exhibited little effect of the herbicide when no predators or caged newts were present, but mass declined with higher herbicide concentrations when caged dragonflies were present. Not surprisingly, the cues from caged dragonflies induced adaptive morphological changes in the tadpoles. What was surprising is that the herbicide induced the same morphological changes in the tadpoles as the larval dragonflies. In the second experiment, Roundup and the predator treatments also had interactive effects. Increased herbicide concentrations again caused increased mortality and the amount of mortality again declined with caged dragonflies. With lethal dragonflies, however, there mortality was reduced similarly across all herbicide concentrations. Tadpole mass increased with higher herbicide concentrations when predators were absent, was unaffected by the herbicide when caged dragonflies were present, and decreased with higher herbicide concentrations when lethal dragonflies were present. Once again, the morphology of the tadpoles was induced similarly by caged dragonflies and the herbicide. Collectively, these results suggest that the effects of Roundup on larval amphibians can differ tremendously depending on community context. Moreover, the herbicide is somehow able to induce anti-predator responses." (Author)] Address: Relyea, R.A., Dept Biol. Sci., Univ. of Pittsburg, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**10198.** Righi-Cavallaro, K.O.; Roche, K.F.; Froehlich, O.; Cavallaro, M.R. (2010): Structure of macroinvertebrate communities in riffles of a Neotropical karst stream in the wet and dry seasons. *Acta Limnologica Brasiliensia* 22(3): 306-316. (in English, with Portuguese summary) ["Aim: Our study evaluated the effects of physical and chemical variables and seasonality on diversity and structure of the macroinvertebrate fauna in riffles of a Neotropical chalk stream; Methods: Sampling was performed during the dry (September 2003) and rainy (March 2004) seasons, in five sites. Five samples were taken at each point with a Surber sampler. Physical and chemical variables were also evaluated; Results: Temperature, pH, orthophosphate and total nitrogen were very similar for both seasons, while riffle length, conductivity, alkalinity, ammonia, phosphorus and leaf litter had different values. The total number of organisms collected was 25114 belonging to at least 50 families. Insects dominated in the samples. The highest abundance was found for the dry period. Temporary stretches were sampled in rainy season in order to complement the faunal inventory; Conclusions: The environmental seasonality was an important factor for structuring the macroinvertebrate fauna, with a significant difference between the invertebrate compositions in the sampling periods. The results of this study demonstrate the influences of seasonality on the temporal variation of communities." (Authors) Odonata are treated at the family level.] Address: Righi-Cavallaro, Karina, Departamento de Biologia, Faculdade de Filosofia, Ciências e Letras, Universidade de São Paulo – USP, Av. Bandeirantes, 3900, CEP 14040-901, Ribeirão Preto, SP, Brazil. E-mail: karina.righi@gmail.com

**10199.** Roland, H.-J. (2010): Schlupfphänologie von *Anax imperator* und *A. parthenope* an einem Braunkohlerestloch in der Wetterau (Odonata: Aeshnidae). *Libel-*

lula 29(3/4): 143-154. (in German, with English summary) ["Between 06-vi-2010 and 11-x-2010, at an open-cast brown coal mining lake 35 km north of Frankfurt on the Main, 937 exuviae of *A. imperator* and 1026 of *A. parthenope* were collected. By the use of these systematically taken data, emergence charts were produced that allow the comparison of both species. While the emergence chart for *A. imperator* had one peak, the one for *A. parthenope* was double-peaked during the emergence period. The size of *A. imperator* exuviae fluctuated during the emergence period, while *A. parthenope* showed a clear trend of increasing in size until the first emergence peak and stayed at a high level from then on." (Author)] Address: Roland, H.-J., Im Mühlahl 35, 61203 Reichelsheim, Germany. E-mail: Hjuergenroland@aol.com

**10200.** Roland, H.-J. (2010): Haltbarkeit von Anax-Exuvien am Ort der Emergenz (Odonata: Aeshnidae). *Libellula* 29(3/4): 231-240. (in German, with English summary) ["In the context of a systematic collection of exuviae at an open-cast mining lake in the Wetterau, Hesse, Germany, it was noted that exuviae of *Anax imperator* and *A. parthenope* were able to remain for many months, until the emergence period of the following year, at their emergence sites. The prerequisite is that the imagines have emerged fixed to a substrate that does not alter during that time. In many cases it will be impossible to tell whether an exuvia has been hanging at a site for three days or three weeks. Hence, phenological statements based on records of exuviae are only possible when the monitoring is conducted at short intervals." (Author)] Address: Roland, H.-J., Im Mühlahl 35, 61203 Reichelsheim, Germany. E-mail: Hjuergenroland@aol.com

**10201.** Rümpler, F.; Peter, H.-U. (2010): Der ehemalige Truppenübungsplatz "Jenaer Forst" - Erfolgskontrolle landschaftspflegerischer Maßnahmen. *Landschaftspflege und Naturschutz in Thüringen* 47(3): 118-133. (in German) [Seven Odonata species are listed and briefly discussed. Special emphasis is given to the regionally rare *Orthetrum brunneum*.] Address: Rümpler, F., Friedrich-Schiller-Univ. Jena, Inst. für Ökologie, Dornburger Str. 159, 07743 Jena, Germany. E-mail: Florian.Ruemppler@gmx.de

**10202.** Sánchez, M.; Realpe, E.; Salazar, C. (2010): A Neotropical polymorphic damselfly shows poor congruence between genetic and traditional morphological characters in Odonata. *Molecular Phylogenetics and Evolution* 57(2): 912-917. (in English) ["The Neotropical damselfly genus *Polythore* consists of nineteen described morphospecies. We used the COI barcode locus (799bp), male genitalia, wing venation, and geometrical pattern variation to clarify specific status in four *Polythore procera* populations in the Andean foothills of Colombia. Morphological data corroborates that all populations are *Polythore procera*, but molecular data suggests two well-supported reciprocal monophyletic clades. A high genetic divergence (3%) was observed between them, and different degrees of gene flow were estimated by MDIV among populations. Our results support a recent (1.4 mya) possible speciation with morphological stasis where unknown reproductive mechanisms may be involved." (Authors)] Address: Sánchez Melissa, Laboratorio de Zoología y Ecología Acuática, Universidad de los Andes, Cr 1 No 18A - 10 J307. Tel: (571)-3394949 ext. 2765. Bogotá, Colombia. E-mail: melsanc@gmail.com

**10203.** Schweighofen, W.; Hochebner, T.; Rotheneder, G. (2010): *Lestes macrostigma* im westlichen Niederösterreich (Odonata: Lestidae). *Libellula* 29(3/4): 175-182. (in German, with English summary) ["During the summer of 2010, *L. macrostigma* was recorded in the Alpine foothills of Lower Austria for the first time. A maximum of three pairs, exhibiting reproductive behaviour, was observed. The conditions of the habitat are characterised, potential migration paths are discussed, and the reproductive behaviour of one pair is depicted in detail." (Authors)] Address: Schweighofen, W., Ötscherblick 10, 3661 Artstetten, Austria. E-mail: wolfgang.schweighofer@schule.at

**10204.** Sharma, G. (2010): Studies on the reproductive behaviour of *Ischnura aurora* (Brauer) (Odonata: Insecta) around Dholbaha Dam (Punjab Shivalik), India. *Biological Forum* 2(1): 6-8. (in English) ["Courtship is well marked and male demonstrate a circular territory with a radius of about 30-50cm. The courtship wheel lasts for about 15-18 minutes performed by perching on vegetation. Oviposition is endophytic among the aquatic vegetation and lasts for 15-20 minutes. The duration of reproductive behaviour lasts for 50-85 minutes." (Author)] Address: Sharma, G., Zoological Survey of India (Ministry of Environment and Forests), Post-Jhalamand, Pali Road, Jodhpur, (RJ) India

**10205.** Sites, R.W.; Vitheepradit, A. (2010): Recovery of the freshwater lentic insect fauna in Thailand following the tsunami of 2004. *The Raffles Bulletin of Zoology* 58(2): 329-348. (in English) ["The tsunami of 26 December 2004 inundated the coastlines of many Southeast Asian countries, including Thailand. The force of the surge was devastating to the extent that hundreds of thousands of humans were killed, whereas the effect on non-human biota, including insects, remains largely unreported. Along the Andaman Sea coastline of Thailand, we sampled lentic (pond) habitats within the area directly affected by the tsunami and other reference ponds slightly inland to determine the rate and trajectory of community recovery following extirpation. Our first samples were taken five months after the tsunami, which marked the end of a dry season. By that time, many impacted ponds already had substantial freshwater recharge through rainfall, and conductivity had fallen to approximately 10% that of seawater. An insect community with a mean richness of 20 taxa was present already, whereas the unaffected inland ponds had a mean richness of 27 taxa. Insect tolerance to salinity in general appears to be greater and taxonomically more widespread than previously considered. Three additional sampling periods were spaced over the next 12 months. Two-way ANOVA tests for species richness among higher taxa revealed significant differences among sampling periods for total Insecta and four orders separately (Odonata, Hemiptera, Coleoptera, and Diptera), and six subordinate taxa (Anisoptera, Zygoptera, Gerridae, Notonectidae, Dytiscidae, and Chironomidae). Patterns of species richness in impacted ponds across sampling periods were evaluated with Discriminant Function Analysis separately using ordinal and family richness values. Using ordinal richness values, 55.0% of the ponds were classified to the correct sampling period, whereas when using family richness values, 92.5% of the ponds were classified correctly. A parsimony analysis was performed to evaluate community succession and recovery trajectory. Numerous tangential trajectories are evident, suggesting that the

communities of the impacted ponds are not assembling toward the taxonomic composition of the unaffected ponds, but to one or more alternative stable states. Taxonomic composition was evaluated also by clustering Jaccard's Similarity scores. On each of the four sampling dates and overall, fidelity of pond type based on the taxonomic composition is distinct, suggesting that the community in the impacted ponds has not demonstrated any signs of shifting toward that of the unaffected ponds. In addition to the evaluation of inundated and unaffected pond communities, a series of peat swamps that had been collected in 1994 and 1995 were resampled to obtain comparable post-tsunami data. We found only 16 of the 33 taxa previously recorded and substantially fewer individuals." (Authors) Only odonate morphospecies are listed.] Address: Sites, R.W., Enns Entomology Museum, Division of Plant Sciences, University of Missouri, Columbia, Missouri 65211, USA. E-mail: sitesr@missouri.edu

**10206.** Sivtseva, L.V. (2010): New data on the dragonfly fauna (Odonata) of central Yakutia. Euroasian entomological Journal 9(2): 295-298. (in Russian, with English summary) [Russia; 28 species are recorded including new regional records: *Coenagrion glaciale*, *Nihonogomphus ruptus*, *Somatochlora exuberata*, *S. graeseri*.] Address: Sivtseva, L.V., Institute of Biological Problems of Cryolithozone, Lenina ave. 41, Yakutsk 677980 Russia. E-mail: sivtseval@mail.ru

**10207.** Staufer, M. (2010): Beobachtungen zur Mortalität wandernder *Sympetrum striolatum* und *S. vulgatum* an einem Autobahnzubringer im Nordburgenland (Odonata: Libellulidae). *Libellula* 29(3/4): 183-196. (in German, with English summary) ["Studies of the traffic mortality of insects have been restricted so far to the investigation of road kills. In this study a different research approach has been used to quantify the relative traffic risk for dragonflies. During the morning hours of four days a total of 906 Darters (*S. vulgatum* and *S. striolatum*) were counted whilst they were crossing a state dual carriageway which was heavily used by vehicles. Most dragonflies moved when temperatures reached 25°C. All days showed a traffic risk of 5.9 to 7.6 % due to collisions with vehicles or their airstreams. The collision rate was highest within 50-60 Minutes from the beginning of the first flight activities of the respective day and decreased to zero after 100 minutes." (Author)] Address: Staufer, Martina, Dept für Biodiversität der Tiere, Fak. für Lebenswissenschaften, Univ. Wien, Rennweg 14, 1030 Wien, Austria. E-mail: mstaufer@web.de

**10208.** Staufer, M.; Holusa, O. (2010): First record of *Cordulegaster heros* in the Czech Republic, with notes on *Cordulegaster* spp. in southern Moravia (Odonata: Cordulegasteridae). *Libellula* 29(3/4): 197-204. (in German, with English summary) ["On 19-VIII-2009 a dead female of *C. heros* was found in Buchlovický stream in Buchlovice village in the Chriby hills of the Czech Republic. The potential occurrence of permanent populations of *C. heros* and records of other *Cordulegaster* species in southern Moravia are discussed." (Authors)] Address: Staufer, Martina, Dept für Biodiversität der Tiere, Fak. für Lebenswissenschaften, Univ. Wien, Rennweg 14, 1030 Wien, Austria. E-mail: mstaufer@web.de

**10209.** Stephan, U. (2010): Mitgliederversammlung am 17. April 2010 in Kißlegg. *mercuriale* 10: 57-60. (in German) [Report on the meeting of the regional dragonfly society for the Federal State Baden-Württemberg,

Germany.] Address: Stephan, Ulrike, Im Westengarten 12, 79241 Ihringen, Germany

**10210.** Stollard, J.; Stollard, J. (2010): Damsels and Dragons. *The Wood Duck* 63(8): 175-176. (in English) [Ontario, Canada; brief introduction into Odonata systematics and who to observe dragonflies.] Address: Stollard, J. E-mail: jjstollard@sympatico.ca

**10211.** Strobbe, F.; McPeck, M.A.; De Block, M.; Stoks, R. (2010): Fish predation selects for reduced foraging activity. *Behav. Ecol. Sociobiol.* 65(2): 241-247. (in English) ["Despite the importance of foraging activity for the growth/predation risk trade-off, studies that demonstrated predator-induced survival selection on foraging activity under semi-natural conditions are relatively rare. Here, we tested for fish-induced selection for reduced foraging activity in two larval *Enallagma* damselflies using a field enclosure experiment. Fish imposed considerable mortality in both damselfly species and survival selection on foraging activity could be detected in *Enallagma geminatum*. We did not detect selection in *Enallagma hageni*, probably because this species already was not eating very much in the absence of fish compared to *E. geminatum*. Both species responded strongly to the presence of predators by reducing their foraging activity. The documented survival selection on foraging activity was detected despite the already low activity levels in fish lake prey species and despite strong predator-induced plasticity in this trait." (Authors)] Address: Stoks, R., Department of Biology, Laboratory of Aquatic Ecology and Evolutionary Biology, University of Leuven, Ch. Debériotstraat 32, 3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.be

**10212.** Tamm, J. (2010): Keineswegs nur braun: Vom blauen Fleck an der Flügelbasis von *Sympetma fusca* (Odonata: Lestidae). *Libellula* 29(3/4): 241-246. (in German, with English summary) ["Males of *S. fusca* have been observed spreading and whirring their wings immediately before copulation. During this behaviour the light blue patches on the wing bases, which are present in both sexes in spring time, conspicuously became visible. The colour patches are virtually invisible in the normal perching position, in which the wings are folded above the abdomen. These colour patches might be used as a precopula signal inviting the female to accept the partner." (Author)] Address: Tamm, J., Elgershäuser Str. 12, 34131 Kassel, Germany. E-mail: jochen.Tamm@t-onl.jne.de

**10213.** Tang, H.B.; Wang, L.K.; Mmalainen, M. (2010): A photographic guide to the dragonflies of Singapore. Raffles Museum of Biodiversity Research. ISBN 981 0861551: 222 pp. (in English) [All 124 species currently found in the country are covered and almost all are illustrated in brilliant colour photographs. There are additional chapters covering Odonata taxonomy, morphology, ecology and conservation and tips on where to find and how to study them.] Address: <http://rmbn.nus.edu.sg>

**10214.** Torralba-Burrial, T.; Outomuro, D.; Alonso-Naveiro, M. (2010): Teratología alar en *Sympetrum flaveolum* (Linnaeus, 1758) (Odonata: Libellulidae). *Boletín de la Sociedad Entomológica Aragonesa* 46(1): 583-584. (in Spanish, with English summary) [A teratology involving the apical area of the left forewing of a *Sympetrum flaveolum* male is described.] Address: Outomuro, D., Depto de Biología de Organismos y Sistemas, Universidad de Oviedo. 33071 Oviedo, Spain. E-mail: outomuro.david@gmail.com



**10215.** Trapero-Quintana, A.; Reyes-Tur, B.; Mateu-Arebaló, J. (2010): Distancia sobre el agua durante la emergencia en larvas de Odonata para tres cuerpos dulceacuáticos de Cuba Oriental. *Dugesiana* 17(2): 103-111. (in Spanish, with English summary) ["The distance reached over the water surface at the time of emergence by species of Odonata in three ecosystems from the Santiago de Cuba province, was estimated. A positive correlation between height and species size was found in the three localities. The greater heights were registered in Guásima and Arroyo, the best conserved areas and with a few stressing elements. In general, anisopterans reached the superior heights, whereas zygopterans tend to be close to the water surface. Females reached major heights than the males." (Authors)] Address: Trapero-Quintana, A., Universidad de Oriente. Depto de Biología. Patricio Lumumba s/n 90500. Santiago de Cuba, Cuba. E-mail: atrapero@cint.uo.edu.cu

**10216.** Villanueva, J.R.; Mohagan, A.B. (2010): Diversity and Status of Odonata across Vegetation Types in Mt. Hamiguitan Wildlife Sanctuary, Davao Oriental. *Asian Journal of Biodiversity* 1(1): 35-45. (in English) ["Diversity and status of Odonata in Mt. Hamiguitan Wildlife Sanctuary was determined after a year of sampling in five vegetation types: agroecosystem (400 masl), dipterocarp (900 masl), montane (1200 masl), mossy (1400 masl) and pygmy (1600 masl) using 2-Km transect walk sampling to provide information on species richness trend and ecological status of Odonata. Study showed 31 species with 94% endemism for damselflies and 33.3% for dragonflies. Species richness and endemism were low in agroecosystem  $H' = 0.631$  and 1 endemic; high and increasing in the dipterocarp  $H' = 2.298$  and 4 endemic to dense montane forest with  $H' = 3.056$  and 18 endemic; decreasing in mossy  $H' = 2.036$  and pygmy  $H' = 1.846$ . The effects of disturbance on diversity showed highest in agroecosystem ( $d = 83\%$ ), mossy and pygmy had intermediate value  $d = 27\%$  and  $d = 24\%$ . Low disturbance was observed in Montane  $d = 10\%$ , dipterocarp  $d = 18.5\%$ . Bray-curtis similarity index for species composition showed four discernible clusters of habitats. Results suggest that Odonata has preference for dense forest, undisturbed vegetation, optimum temperature and presence of aquatic habitat." (Authors)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**10217.** Waldhauser, M. (2010): Faunistic records of dragonflies (Odonata) from the Czech Republic. *Sborník referátů XIII. celostátního semináře odonatologů v Podyjí*: 59-71. (in Czech, with English summary) [The paper documents species that are protected by law, rare or regionally significant: *Sympecma paeidisca*, *Coenagrion lunulatum*, *C. scitulum*, *Brachytron pratense*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Somatochlora flavomaculata*, *S. arctica*, *S. alpestris*, *Orthetrum albistylum*, *Sympetrum depressiusculum*, *S. meridionale*, *S. pedemontanum*, *Leucorrhinia albifrons*, *L. pectoralis*, *L. rubicunda*.] Address: Waldhauser, M., Správa CHKO Lužické hory, Školní 12, Jablonné v Podještědí, CZ 47 125. Czech Republic. E-mail: martin.waldhauser@nature.cz

**10218.** Waldhauser, M.; Mikat, M.; Dolný, A. (2010): *Coenagrion ornatum* (Selys, 1850) (Odonata, Coenagrionidae) distribution and ecology in the Czech Republic – new information based on records in 2010.

*Sborník referátů XIII. celostátního semináře odonatologů v Podyjí*: 91-107. (in Czech, with English summary) ["The distribution of *C. ornatum* in the Czech Republic is far more extensive than considered up to 2009. Before 2008 only one recent population from the Piletický brook watershed and five historical records from Bohemia and Moravia were known. In 2009 twenty-five new localities with *C. ornatum* were discovered. Thirty-five new localities with *C. ornatum* were discovered in 2010. These localities are distributed in Bohemia as well as in southern Moravia which means further confirmation of this species distribution within the whole area of Moravia and Silesia. Furthermore, three localities with larvae occurrence were discovered in Bohemia. The new *C. ornatum* localities are situated mostly in open farmland or mining areas at altitudes below 250 m a.s.l. *C. ornatum* prefers sunny parts of brooks and amelioration ditches with lush littoral vegetation (e.g. *Sparganium erectum*, *Veronica beccabunga*, *Potamogeton* spp., *Berula erecta*). However, it also occurs along degraded and regulated sections of the streams where the vegetation is dominated by *Phalaris arundinacea* and *Urtica dioica*." (Authors)] Address: Waldhauser, M., Správa CHKO Lužické hory, Školní 12, Jablonné v Podještědí, CZ 47 125, Czech Republic. E-mail: martin.waldhauser@nature.cz

**10219.** Wesolek, B.E.; Genrich, E.K.; Gunn, J.M.; Somers, K.M. (2010): Use of littoral benthic invertebrates to assess factors affecting biological recovery of acid- and metal-damaged lakes. *Journal of the North American Benthological Society* 29(2): 572-585. (in English) ["Biological recovery of aquatic ecosystems from acidification damage is a slow process. In lakes near the massive Cu and Ni smelters in Sudbury, Canada, the delays might be caused by residual metals, habitat damage, altered predator-prey interactions, or other persistent ecological stressors. Assessments of benthic invertebrate communities in 24 Sudbury lakes were conducted to evaluate the relative importance of these delaying factors" (The analysis includes Odonata which are treated at the order level). "At the time of sampling, all lakes had chemically recovered to a pH >6.0, but they varied widely in the duration of time above this threshold and in current metal concentrations, watershed contributions of organic matter, littoral habitat composition, and fish community composition. A model developed with redundancy analyses (RDA) of 4 groups of environmental variables (i.e., water chemistry, fish communities, physical lake descriptors, and littoral habitat) accounted for 74.9% of the variance in benthic invertebrate community metrics across these environmental gradients. Fish species richness, duration of pH recovery, and % boulder habitat were the most significant variables and explained 22%, 9%, and 8% of the variance in benthic invertebrate community metrics, respectively. Damaged systems clearly need sufficient time to recover from severe disturbances. However, our study suggests that remediation techniques, such as manipulation of predator-prey interactions through fish introductions, might speed the recovery of benthic invertebrate communities." (Authors)] Address: Wesolek, B.E., Cooperative Freshwater Ecology Unit, Biology Dept, Laurentian Univ., 935 Ramsey Lake Road, Sudbury, Ontario, Canada, P3E 2C6. E-mail: bxwesolek@laurentian.ca

**10220.** Yakubovich, V.S. (2010): First record of the dragonfly *Orthetrum albistylum speciosum* (Uhler, 1858)

(Odonata: Libellulidae) from Khabarovskii Krai. Far Eastern Entomologist 219: 11-12. (in English) [Russia: Khabarovskii krai, vicinity of Khabarovsk: Bolshchekhtsirsky State Nature Reserve, mouth of Chirki River; 48°X11'4" N, 134°X40'5" E, 6-8.VII 2009, 6 males, 2 females (V. Yakubovich); vicinity of Korfovskii, 48°X12'5"N, 135°X2'7" E, 21.VI 2008, 1 female (V. Yakubovich); vicinity of Chernaya Rechka, 48°X27'1" N, 135°X18'2" E, 30.VI 2010, 2 males (V. Yakubovich).] Address: Yakubovich, V.S., Dept of Biology, Far Eastern Medical University, Murav'ev-Amursky Street 35, Khabarovsk 680000, Russia. E-mail: Presid11@mail.ru

**10221.** Yu, W.-y.; Li, Z.-h.; Huan, G.c.; Lu, J. (2010): On fauna and diversity of Odonata in Nanjing, Jiangsu province. Resources and Environment in the Yangtze Basin 19(5): 514-521. (in Chinese, with English summary) [43 (+ 2 taxa) Odonata species were caught between 2005 to 2008 at seven localities near Nanjing, China. The characteristic of the fauna is that Oriental species take the most part. There are 13 species belonging to Oriental, which accounted for 28.89% in total. Palearctic species, which accounted for 11.11% in total. Calculating species richness (S), species composition similarity (Cs) and species diversity index (H' / H) for the seven habitats showed that the species richness decreased in the following sequence: Zijin Mountain (30) = Lao Mountain (30) > Jianguan Mountain (24) > Jiangxinzhou Alluvion (19) > Fang Mountain (18) > Donglu Mountain (13) > Jinniu Lake (9); the species diversity decreased in a different sequence: Jianguan Mountain (2.9298) > Zijin Mountain (2.9150) > Lao Mountain (2.7258) > Fang Mountain (2.6574) > Jiangxinzhou Alluvion (2.5478) > Donglu Mountain (1.9025) > Jinniu Lake (1.6700). The dragonfly species composition between Fang Mountain and Donglu Mountain had the highest similarity (0.7742), while Jinniu Lake and Lao Mountain had the lowest similarity (0.4103).] Address: Yu, W.-y., Dept of Life Science, Nanjing Xiaozhuang College, Nanjing 211171, China

**10222.** Zessin, W.; Brauckmann, C. (2010): *Aulertupus tembrocki* n. gen. et sp. (Odonatoptera: Meganisoptera: Aulertupidae n. fam.) aus dem Ober-Karbon von Mazon Creek, Illinois (USA). Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg 13(2): 36-43. (in German, with English summary) [Along "Oligotypus makowskii" Carpenter & Richardson, 1971 and *Paralogopsis longipes* Handlirsch, 1911, *Aulertupus tembrocki* gen. n., sp. n. is the third giant dragonfly sp. (Meganisoptera) from the famous nodules of Westphalian C/D (Moscovian) age of the Mazon Creek collection sites in Illinois, USA, which is described and illustrated on adults. It is assigned here to Aulertupidae fam. n. The 3 recently described additional species from the same locality (Kukalová-Peck 2009) are based on larvae and cannot be grouped on family level." (Authors)] Address: Zessin, W., Lange Str. 9, 19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**10223.** Zessin, W. (2010): Kurzfassungen der Vorträge auf der Tagung des Entomologischen Vereins Mecklenburg am 13. März 2010 im Natureum am Schloss Ludwigslust. Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg 13(2): 64-68. (in German) [A cooperation of the Ent. Ver. Meckl.-Vorp. with three odonatological societies is mentioned.] Address: Zessin, W., Lange Str. 9, 19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**10224.** Zessin, W. (2010): Die Kleine Königslibelle (Odonata: Aeshnidae: *Anax parthenope*) neu am Waldsee in Kraak, Landkreis Ludwigslust, Mecklenburg. Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg 13(2): 69-70. (in German) [Germany; a record of *A. parthenope* at 2-VIII-2010 is documented and discussed.] Address: Zessin, W., Lange Str. 9, 19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

## 2011

**10225.** Abbott, J.C. (2011): Dragonflies and Damselflies (Odonata) of Texas. Odonata Survey of Texas. Vol. 5: 323 pp. (in English) ["This is the fifth volume of the Dragonflies and Damselflies (Odonata) of Texas to be published and serves as an update of records including all those reported in 2010. As with earlier volumes, this book is meant to serve as a guide to the distributions and seasonality of all 238 species occurring in the state. The interest in dragonflies and damselflies in North America, and Texas specifically, continues to grow as does our knowledge of the fauna. Judging by the increasing number of records submitted since 2005, The Odonata Survey of Texas (OST) appears to be a success. I hope this volume continues to increase interest and excitement for the Odonata fauna in Texas." (Author) These compilation of data is organised in the following chapters: Statistical Summary of Odonata in Texas (page 1), Abundance & Distribution of Texas Odonata (page 3), Diversity of Texas Odonata by County (page 4), Checklist of Dragonflies & Damselflies of Texas (page 5), Dragonflies and Damselflies of Texas Conservation Ranks (page 8), Seasonality of Odonata in Texas (page 12), Dragonflies & Damselflies of Texas Listed by County (page 29), Distribution Maps of Texas Odonata (page 69), Appendix: Collection Guidelines for the Odonata Survey of Texas (page 308), The Dragonfly Society of the Americas Guidelines for Collecting (page 309), Specific Collecting & Preservation Instructions (page 311), Guidelines for Field Notes & Data Recording (page 313), Odonata Field Guides, Resources, Societies, & Suppliers (page 316), Glossary of Terms Relating to Odonata (page 318), and Index to Maps (page 320)] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**10226.** Abbott, J.C.; Hibbits, T.D. (2011): *Cordulegaster sarracenia*, n. sp. (Odonata: Cordulegasteridae) from east Texas and western Louisiana, with a key to adult Cordulegasteridae of the New World. Zootaxa 2899: 60-68. ["*C. sarracenia* is described from spring seepages in pitcher plant bogs of southeast Texas and western Louisiana. It is most closely related to *C. sayi* of the *C. diastatops* group. It is unique among all North American species of its genus in having the mesepimeral and metepimeral stripes distinctly paler than the mesepisternal stripes in combination with yellow bands on S3-8 that are interrupted middorsally by the carina." (Authors)] Address: Abbott, J.C., Curator of Entomology, Texas Natural Science Center, Brackenridge Field Laboratory, Univ. of Texas at Austin, 2907 Lake Austin Blvd., Austin, Texas 78703, USA. E-mail: jcabbott@mail.utexas.edu

**10227.** Anjos-Santos, D.; Carricio, C.; Costa, J.M.; Santos, T.C. (2011): Description of the final instar larvae of *Acanthagrion gracile* (Rambur) and *Acanthagrion lancea* Selys (Odonata: Coenagrionidae). Zootaxa

2832: 44-50. (in English) ["The final instar larvae of *A. gracile* and *A. lancea* are described and illustrated based on reared specimens from Rio de Janeiro and Espírito Santo States, Brazil, being compared with the other known larvae of this genus." (Authors)] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@acd.ufrj.br

**10228.** Aura, C.M.; Raburu, P.O.; Herrmann, J. (2011): Macroinvertebrates' community structure in Rivers Kipkaren and Sosiani, River Nzoia basin, Kenya. *Journal of Ecology and the Natural Environment* 3(2): 39-46. (in English) [From December 2006 to May 2007 seven sites were sampled for macrozoobenthos. A total of 1499 macroinvertebrates belonging to 13 orders, 28 families and 31 genera were collected. The taxa list includes "*Aeschenia* sp., *Gomphus* sp., *Agrion* sp.".] Address: Aura, C.M., Kenya Marine and Fisheries Research Institute, P.O. Box 81651-80100, Mombasa, Kenya. E-mail: auramulanda@yahoo.com

**10229.** Barry, M.J. (2011): Effects of copper, zinc and dragonfly kairomone on growth rate and induced morphology of *Bufo arabicus* tadpoles. *Ecotoxicology and Environmental Safety* 74(4): 918-923. (in English) ["It is well documented that many amphibian species can detect chemical signals from predatory invertebrates and subsequently develop alternate phenotypes that are protective against predation. The effects of metallic pollutants on the development of predator-induced morphology have not previously been reported. Tadpoles of the Arabian toad *Bufo arabicus* were exposed for 20 days to copper (0, 10 or 100 µg/L), zinc (0, 10 or 100 µg/L) and kairomones of larval dragonflies (*Crocothemis erythraea* 1 dragonfly/12 L) in a fully crossed design. The effects of these treatments of growth and body shape were measured. Measured copper concentrations after 24 h were 4.25 µg/L±1.30 (10 µg/L nominal) and 34.9 µg/L±2.15 (100 µg/L nominal). Measured zinc concentrations were 3.04 µg/L±0.1 (10 µg/L nominal) and 26.3 µg/L±12.3 (100 µg/L nominal). Tadpoles exposed to 34.9 µg/L copper were significantly lighter and had a shorter body length than other groups. There was no direct effect of zinc on growth or tadpole shape. Tadpoles exposed to dragonfly kairomones were heavier, wider and had deeper bodies when viewed laterally and had longer tails but overall length was not affected. At 4.25 µg/L copper differences between the control and predator-exposed phenotypes increased but at 34.9 µg/L the phenotypes converged, indicating that copper may inhibit the induced response." (Author)] Address: Barry, M.J., Biology Department, Sultan Qaboos University, P.O. Box 36 Al Khod, Muscat 123, Oman. E-mail: mjbarry@squ.edu.om

**10230.** Bauer, S.; Nolet, B.A.; Giske, J.; Chapman, J.W.; Åkesson, S.; Hedenström, A.; Fryxell, J.M. (2011): Cues and decision rules in animal migration. In: Milner-Gulland, E.J., Fryxell, J.M.; Sinclair, A.R.E. (eds.): *Animal Migration. A Synthesis*. Oxford University Press: 68-87. (in English) [The paper provides a concise compilation on current knowledge in insect migration. Odonatological text passages are: "Some insect migrations are highly noticeable; among the most impressive of natural phenomena are the mass migrations in enormous cohesive swarms of a few species (e.g. the desert locusts *Schistocerca gregaria*, the dragonfly *Aeshna bonariensis*, and the monarch butterfly *Danaus*

*plexippus*), which rival the largest flocks and herds of migratory birds and mammals in terms of biomass, and far exceed them in total numbers. [...] Green darner dragonflies have a number of simple decision rules that guide their autumn migrations along the eastern seaboard of North America in a favourable, southerly direction (Wikelski et al. 2006). They initiate migratory flights on days following two preceding nights of dropping temperatures, which are highly likely to be associated with persistent northerly air flows, and then simply fly in the downwind direction while avoiding being carried over large water bodies (and thus out to sea). [...] Odonata have regular, bidirectional seasonal long-distance migrations that involve movements that are directed in predictable ways but not targeted at a specific site or region." (Authors)] Address: Bauer, Silke, Netherlands Institute of Ecology (NIOO-KNAW), PO Box 1299, 3600 BG Maarssen, The Netherlands

**10231.** Bolliger, J.; Keller, D.; Holderegger, R. (2011): When landscape variables do not explain migration rates: An example from an endangered dragonfly, *Leucorhinia caudalis* (Odonata: Libellulidae). *Eur. J. Entomol.* 108(2): 327-330. (in English) ["*L. caudalis* is a dragonfly species threatened throughout Europe. Despite evidence of the recent extension of its distribution range, it is unknown whether *L. caudalis* regularly or hardly ever migrates among ponds. The contemporary migration patterns of the species were investigated using Bayesian assignment tests and the migration rates related to landscape structural and thematic variables (distance between ponds, forest area, area of water body, area of hedgerow). Migration rates of *L. caudalis* are independent of any landscape element. Thus, landscape structure is not a barrier or corridor for migration in this species. The tendency of *L. caudalis* to disperse is largely independent of the nature of the landscape, at least at the scale of the present study." (Authors)] Address: Bolliger, Janine, Swiss Federal Research Institute WSL, Zürcherstr. 111, 8903 Birmensdorf, Switzerland. E-mail: janine.bolliger@wsl.ch

**10232.** Bonnaud, E.; Medina, F.M.; Vidal, E.; Nogales, M.; Tershy, B.; Zavaleta, E.; Donlan, C.J.; Keitt, B.; Le Corre, M.; Horwath, S.V. (2011): The diet of feral cats on islands: a review and a call for more studies. *Biological Invasions* 13(3): 581-603. (in English) ["Cats are among the most successful and damaging invaders on islands and a significant driver of extinction and endangerment. Better understanding of their ecology can improve effective management actions such as eradication. We reviewed 72 studies of insular feral cat diet from 40 islands worldwide. Cats fed on a wide range of species from large birds and medium sized mammals to small insects with at least 248 species consumed (27 mammals, 113 birds, 34 reptiles, 3 amphibians, 2 fish and 69 invertebrates). Three mammals, 29 birds and 3 reptiles recorded in the diet of cats are listed as threatened by the IUCN. However, a few species of introduced mammals were the most frequent prey, and on almost all islands mammals and birds contributed most of the daily food intake. Latitude was positively correlated with the predation of rabbits and negatively with the predation of reptiles and invertebrates. Distance from landmass was positively correlated with predation on birds and negatively correlated with the predation of reptiles. The broad range of taxa consumed by feral cats on islands suggests that they have the potential to impact almost any native species, even the smallest



ones under several grams, that lack behavioral, morphological or life history adaptations to mammalian predators. Insular feral cat's reliance on introduced mammals, which evolved with cat predation, suggests that on many islands, populations of native species have already been reduced." (Authors) The list of prey items also considers (unidentified) Odonata.] Address: Bonnaud, E., Mediterranean Institute for Ecology and Palaeoecology (UMR CNRS/IRD), Aix-Marseille University (Université P. Cezanne), Bâtiment Villemin, Domaine du Petit Arbois, Avenue Philibert, BP 80 13545 Aix-en-Provence cedex 04, France. E-mail: elsa.bonnaud@univ-cezanne.fr

**10233.** Brodin, T.; Drotz, M.K. (2011): Larval behavioral syndrome does not affect emergence behavior in a damselfly (*Lestes* congener). *Journal of Ethology* 29(1): 107-113. (in English) ["Activity is a key behavioural trait that often mediates a trade-off between finding food for growth and evading predation. We investigated how activity of the damselfly *Lestes* congener is affected by larval state and predator presence and if larval behavioural type (BT) can be used to predict larval emergence behaviour. Activity level of individual larvae was studied without predators at two different physiological states (hungry, fed) and in two predator treatments (familiar or unfamiliar predator cues). Larvae did not adjust their activity depending on state or when subjected to unfamiliar predator cues but a general reduction in activity was seen in the familiar predator treatment. Hence, active individuals remained active compared to their conspecifics, independent of state or predator treatment illustrating the presence of a behavioural syndrome. However, we found no correlation between larval BT and emergence behaviour. Active individuals did not differ from less active individuals in any emergence characteristics. The results illustrate that the larval BT occurs in many situations keeping active larvae active even in maladaptive situations. Furthermore, we show that damselfly emergence behaviour can be completely decoupled from larval BT, indicating a loss of stability in individual BT during critical stages in ontogeny." (Authors)] Address: Brodin, T., Dept of Ecology and Environmental Science, Umeå University, S-90187 Umeå, Sweden. E-mail: tomas.brodin@emg.umu.se

**10234.** Burroni, N.E.; Marione, M.C.; Freire, M.G.; Schweigmann, N.; Loetti, M.V. (2011): Invertebrate communities from different wetland types of Tierra del Fuego. *Insect Conservation and Diversity* 4(1): 39-45. (in English) ["1. Loss or deterioration of wetlands, which represent highly valuable environments, is a worldwide phenomenon. Sustainable management of wetlands, however, requires detailed understanding of the factors controlling their communities. The present study report the taxonomic composition and richness of invertebrate assemblages in different wetland types in Tierra del Fuego. 2. Aquatic invertebrates from 79 freshwater wetlands in Tierra del Fuego were inventoried in January 2001 and 2002 (austral summer). All wetlands were classified into six categories: roadside pools, floodplain pools, flooded quarries, peatland ponds, beaver ponds and large ponds. The wetland type effect on the taxonomic richness was analysed by one-way ANOVA. To identify wetland types with similar invertebrate communities, cluster analysis has been performed using occurrence frequency of each taxa in each wetland type and the Jaccard similarity index. 3. A total of 35 taxa were identified, including 21 microcrustaceans, 12 insects

(including "Anisoptera"), 1 gastropod and 1 cnidarian. Copepods and cladocerans were among the most frequent taxa (occurrence frequency >40%) in most wetland types. No significant differences in taxonomic richness were found among wetlands types ( $P = 0.076$ ). The cladogram based on invertebrate taxonomic composition resulting from similarity in taxonomic composition among wetland types showed three distinct clusters; one included flooded quarries, peatland ponds, beaver ponds and floodplain pools, the second one the large ponds and the third one roadside pools. 4. Our results suggest that the wetland types studied have different conservation values, like the clusters obtained in the cladogram show. Artificial wetlands, such as the roadside pools, could play an important role in maintaining connectivity between isolated fragments of pristine, natural wetlands." (Authors)] Address: Loetti, Maria Veronica, Grupo de Estudio de Mosquitos, Departamento de Ecología, Genética y Evolución, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Pabellón II, Ciudad Universitaria, C1428EHA Buenos Aires, Argentina. E-mail: vloetti@ege.fcen.uba.ar

**10235.** Catling, P.; Kostiuik, B.; Tate, D. (2011): River Jewelwing, *Calopteryx aequabilis* Say, new to Northwest Territories. *Argia* 23(1): 13. (in English) [10-VII-2010, Mackenzie Highway bridge over Kakisa River, 60°98'87" N 117°24'41"W, Canada] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**10236.** Chale, F.M.M. (2011): Preliminary studies on the ecology of *Mbasa* (*Opsaridium microlepis* (Günther)) in Lake Nyasa around the Ruhuhu River. *Journal of Ecology and the Natural Environment* 3(2): 58-62. (in English) [Tanzania; Odonata contributed with 12% to the diet of *Opsaridium microlepis*; diet was dependent from age stage of fishes, and thus only 30% of the juvenile consumed Odonata.] Address: Chale, F.M.M., Department of Life Science, Faculty of Science, Technology and Environmental Studies, The Open University of Tanzania, P.O. Box 23409, Dar es Salaam, Tanzania. E-mail: francischale@gmail.com

**10237.** Cielocha, J.; Cook, T.J.; Clopton, J. (2011): Host utilization and distribution of Nubenocephalid gregarines (Eugregarinorida: Actinocephalidae) parasitizing *Argia* spp. (Odonata: Zygoptera) in the Central United States. *Comparative Parasitology* 78(1): 152-160. (in English) ["Gregarine host specificity has been the cornerstone of gregarine taxonomy for nearly a century. Several laboratory experiments have accepted strict host specificity by failure to cross-infect distantly related hosts with unrelated gregarine species. These empirical studies are not feasible for all gregarine hosts, especially nondomesticated groups. Additionally, studies of gregarine distributions have always focused on insect hosts of disparate groups, rather than targeting potential hosts species within a single genus and their congeneric gregarines. This study addresses host utilization of nubenocephalid gregarines parasitizing the odonate genus *Argia*. Populations of 9 species of adult *Argia* were collected, dissected, and observed for gregarine infection during the April–September flight seasons in 2007 from 17 localities in the central United States. On average, 2.5 species of *Argia* were collected at each locality. A species of *Nubenocephalus*—*Nubenocephalus nebraskensis*, *Nubenocephalus secundus*, or *Nubenocephalus* spp.—was collected from every infected population of *Argia* except for the *Argia vivida* popula-

tion at Prairie Dog Town Fork-Red River, Randall County (Co.), Texas, U.S.A. *Nubenocephalus secundus* utilizes at least 7 of the 9 argid hosts sampled whereas *N. nebraskensis* was collected from only 2 argid species. Only *Argia translata* was observed to host both *N. secundus* and *N. nebraskensis*. These patterns of host utilization by nubenocephalid gregarines represent an ecotypic gregarine assemblage rather than a vicariant assemblage, demonstrating that nubenocephalid gregarines do not differentiate between species of *Argia* as hosts." (Authors)] Address: Cielocha, Joanna, Dept of Biological Sciences, Sam Houston State Univ., Huntsville, Texas 77341-2166, USA. E-mail: biotjc@shsu.edu

**10238.** Dia, A.; Dumont, H.J. (2011): The Odonata of Lebanon (Insecta: Odonata). *Zoology in the Middle East* 52: 63-70. (in English) ["In a year-long survey of the Odonata of Lebanon, 29 species of the approximately 49 known or expected to live in the country were recorded. Some endangered species should be considered for urgent protection. Others are doing well. A brief biogeographic analysis of the fauna is given. The almost complete absence of species typical of semi-arid to arid environments is to be noted." (Authors)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@ugent.be

**10239.** Dijkstra, K.-D.B.; Clausnitzer, V.; Mézière, N.; Kipping, J.; Schütte, K. (2011): Chapter 5. The status and distribution of dragonflies and damselflies (Odonata) in central Africa. In: *The Status and Distribution of Freshwater Biodiversity in Central Africa* Brooks, E.G. E., Allen, D.J. and Darwall, W.R.T. (Compilers): 62-76. (in English) ["Equatorial Africa is naturally dominated by almost continuous Guineo-Congolian lowland rainforest, which has a gradual transition of riverine forests and woodland into peripheral savannahs. The highest odonate diversity in tropical Africa is found here : all African countries with well over 200 species have a considerable portion of this forest within their borders (Dijkstra and Clausnitzer 2006). Although many species range throughout Africa's forested heart, it can be subdivided into four main areas of endemism (Dijkstra 2007a), of which only the more westerly Upper Guinea lies outside the central Africa assessment region (see Dijkstra et al. 2010). The three others are (1) the Lower Guinea, with the Cameroon highlands as its focus, (2) the Congo Basin, and (3) the slope east of the Congo River towards the Albertine Rift. Each area, which agree reasonably with the freshwater ecoregions of Thieme et al. (2005), is discussed separately below, as is the large area of more open habitats to the south of the rainforest belt that dominates Katanga and adjacent Angola and Zambia. Central Africa has the richest, but also the least known and probably (currently) least imperilled, odonate fauna in Africa. Therefore this report focuses primarily on what we do and, especially, do not know. Much emphasis is given on recent discoveries, including collection work conducted as part of the central African freshwater biodiversity assessment and fieldwork by the authors in Cameroon and Gabon (all results otherwise still unpublished). We attempt to provide information on all threatened (or Near Threatened) and Data Deficient species in the region, their status being Least Concern unless indicated." (Authors)] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: dijkstra@nbn.nl

**10240.** Do, M.C.; Karube, H. (2011): *Nihonogomphus schorri* sp. nov. from Huu Lien Nature Reserve, Lang Son Province, Vietnam (Odonata: Gomphidae). *Zootaxa* 2831: 63-68. (in English) ["A new species *Nihonogomphus schorri* Do & Karube, sp. nov. is described on the basis of male specimens collected from Huu Lien Nature Reserve, Lang Son Province, northern Vietnam. It is close to the Chinese species *N. bequaerti* Chao, 1954 due to the similarity of hamules, anal appendages and vesicle, but is easy to separate from that species by the vesica spermalis structure and body markings." (Authors)] Address: Do Manh, C., 409 – 57A, 22/20 Nguyen Cong Hoan, Hanoi, Vietnam. E-mail: docuong@gmail.com

**10241.** Do, M.C. (2011): Notes on three species of gomphid dragonflies from Vietnam (Odonata: Gomphidae). *International Dragonfly Fund - Report* 36: 1-9. (in English) ["First records for Vietnam of *Fukienogomphus promineus* Chao, 1954 and *Gomphidia abbotti* Williamson, 1908 are documented with emphasis on morphological details. The previously published record of *Sieboldius gigas* (Martin, 1904) in Do et al. (2011) has to be corrected into *Megalogomphus sommeri* (Selys, 1854)." (Author)] Address: Do, M.C., 409 – 57A, 22/20 Nguyen Cong Hoan, Hanoi, Vietnam Email: docuong@gmail.com

**10242.** Dolný, A.; Barta, D.; Lhota, S.; Rusdianto; Drozd, P. (2011): Dragonflies (Odonata) in the Bornean rain forest as indicators of changes in biodiversity resulting from forest modification and destruction. *Tropical Zoology* 24(1): 63-86. (in English) ["Dragonfly assemblages represent sensitive indicators of environmental conditions including the water environment and forest structure. However, an understanding the ecology of tropical forest odonates remains one of the most significant gaps in our knowledge of the order. We sampled odonates at Sungai Wain Protection Forest, East Kalimantan, Indonesia. Relatively high dragonfly species richness (88 species) was found during 35 survey days divided between two seasons. Seasonal differences in the species diversity were fairly small, in accordance with the fact that the climate in Kalimantan is generally stable. The highest species diversity was observed in intact primary forest: 60% of all recorded species were found there and 32% of all species were exclusive to this habitat. The proportion of biotope specialists decreased along the gradient - intact primary forest, slightly degraded primary forest, secondary forest, heavily degraded forest and non-forest. The ordination obtained from detrended correspondence analysis showed, along the main axis, a gradient in community similarity corresponding to the degree of forest degradation. The evidence indicates that, within the applied spatial scale, any forest degradation results in fewer species, with a pronounced change in the species composition, and an overall reduction in taxonomic diversity." (Authors)] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic. E-mail: Alnes.Dolny@osu.cz

**10243.** Dow, R.A.; Reels, G.T. (2011): *Coeliccia southwelli* sp. nov. (Odonata: Zygoptera: Platycnemididae) from Mount Dulit, Sarawak. *Zootaxa* 2832: 63-68. (in English) ["*Coeliccia southwelli* sp. nov. is described from Mount Dulit, Miri and Kapit Divisions, Sarawak, Malaysian Borneo. It belongs to the borneensis-group of species, and is the sixth species from this group to

be described from Borneo. New material of other borneensis-group species is put on record." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**10244.** Doxon, E.D.; Davis, C.A.; Fuhlendorf, S.D. (2011): Comparison of two methods for sampling invertebrates: vacuum and sweep-net sampling. *Journal of Field Ornithology* 82(1): 60-67. (in English, with Spanish summary) ["With numerous invertebrate sampling techniques available, deciding which technique to use under certain circumstances may be difficult. Many researchers interested in invertebrate abundance and availability relative to the foraging ecology of birds may use a technique (e.g., vacuum sampling or sweep-netting) without understanding the impacts their choice may have on the samples collected and the ability of the method to meet research objectives. We compared the characteristics, including overall biomass, morphospecies richness, average size, diversity, and body length categories, of invertebrates collected using a sweep-net and a Dietrick vacuum sampler along paired transects in Woodward County, Oklahoma, from May to July 2007 and 2008. These sampling techniques differed in the taxa collected, with the orders Diptera, Homoptera, and Hymenoptera dominating vacuum samples and the orders Homoptera, Orthoptera, and Araneae dominating sweep-net samples. Although morphospecies richness was similar for the two techniques, the mean size of invertebrates collected and overall invertebrate biomass were greater for sweep-netting than vacuum sampling. Vacuum sampling was more effective at collecting small (e.g., <5 cm) invertebrates, whereas sweep-netting captured large (>5 cm) orthopteran and lepidopteran larvae at higher rates. Thus, our results indicate that neither sampling method effectively sampled all invertebrate families and investigators should be aware of the potential biases of different sampling techniques and be certain that the technique selected will allow study objectives to be met." (Authors) Comparing the mean relative biomass collected for Odonata by vacuum sampling and sweep-netting, no significant differences resulted.] Address: Doxon, Elizabeth, Department of Natural Resource Ecology and Management, Oklahoma State University, 008C Agricultural Hall, Stillwater, Oklahoma 74078, USA. E-mail: edoxon@utk.edu

**10245.** Eckberg, J.R. (2011): Las Vegas Wash Invertebrate Inventory, 2000-2010. Prepared for: Research and Environmental Monitoring Study Team, Las Vegas Wash Coordination Committee: VI + 22 pp, appendix. (in English) ["This report summarizes previously documented, as well as undocumented, invertebrate specimens identified along the Las Vegas Wash (Wash), where this wildlife group has a significant impact on ecological components. Four of the six major environmental resource categories laid out in the Las Vegas Wash Comprehensive Adaptive Management Plan are impacted by invertebrates: water quality, soils, vegetation, and fish and wildlife. Living in both aquatic and terrestrial environments, many invertebrates serve as indicators of environmental quality in both areas. Insects are the primary pollinator for many plants along the Wash and provide many other benefits such as controlling herbivores and seed dispersal. Many insects can be primary consumers of plant material and secondary consumers of other insects. They are also the food source for a wide variety of birds, small mammals, fish, reptiles and amphibians. Cataloging these species will

help researchers by providing baseline information and will provide managers' information on the species impacted by work being done. Further study of this animal group is needed to better understand their true impact on the ecological system at the Wash." (Author) The following Odonata are listed in an appendix: *Anax junius*, *Rhionaeschna multicolor*, *Hetaerina americana*, *Argia* sp. *A. alberta*, *A. moesta*, *A. sedula*, *A. vivida*, *Enallagma civile*, *Ischnura cervula*, *I. denticollis*, *Erpetogomphus compositus*, *Erythemis collocata*, *Libellula comanche*, *L. luctuosa*, *L. saturata*, *Orthemis ferruginea*, *Pantala hymenaea*, *Sympetrum corruptum*, *Tramea lacerata*, *T. onusta*.] Address: Eckberg, J.R., Southern Nevada Water Authority, 100 City Parkway, Suite 700, Las Vegas, Nevada 89106, USA

**10246.** Everard, M.; Fletcher, M.S.; Powell, A.; Dobson, M.K. (2011): The feasibility of developing multi-taxa indicators for landscape scale assessment of freshwater systems. *Freshwater Reviews* 4: 1-19. (in English) ["The use of bird assemblages as wetland indicators is now well established in the UK. An indicator based on a single taxonomic group can, however, have limitations. Conversely, a multi-taxa approach can potentially provide a more robust reflection of the health of fresh waters. In this paper, we consider the inherent suitability of different taxonomic groups for inclusion in a multi-taxa indicator, based upon taxon characteristics, species richness and prevalence across a range of freshwater habitats, and their practical suitability, based upon quality and quantity of available data. We conclude that, in addition to birds, there are six candidate groups of taxa throughout the world that are currently suitable for inclusion in a multi-taxa indicator. These are: mammals, amphibians and reptiles, fish, dragonflies and damselflies (based on adult recording), benthic macroinvertebrates and macrophytes. Of these taxa, all but amphibians and reptiles and fish are suitable for inclusion in a UK indicator. The types and limitations of currently available datasets are reviewed. We provide recommendations for advancing this approach in the assessment of freshwater systems. [...] Odonata are part of the aquatic macroinvertebrate fauna as larvae, but as adults they are also very suitable as candidates for inclusion in a multi-taxa indicator, as they are easy to see and distinguishable in the field, and provide information about the status of the terrestrial shoreline of habitats as well as the underwater component. Most are also highly mobile, and they will rapidly colonise new or restored sites and abandon impacted sites. Worldwide, the dragonfly and damselfly fauna is relatively well known (Kalkman et al., 2008), and their conspicuous nature and often high alpha diversity makes them an attractive option for biomonitoring. Adult Odonata are the most thoroughly recorded emergent aquatic invertebrates in the UK. The Dragonfly Recording Network is co-ordinated by the British Dragonfly Society and operates within guidelines based upon recommendations given by the National Biodiversity Network. However, the quantity and spread of data is not currently adequate to be considered a robust national monitoring programme." (Authors)] Address: Fletcher, M.S., Freshwater Biological Association, The Ferry Landing, Far Sawrey, Ambleside, Cumbria, LA22 0LP, UK. E-mail: mfletcher@fba.org.uk

**10247.** Feindt, W.; Damm, S.; Hadrys, H. (2011): Speciation in the neotropical giant damselfly *Megaloprepus caerulatus* reflects forest fragmentation (Pseudostigmatidae: Odonata). In: Niekisch, M. & B. Streit (Eds.): Status and future of tropical biodiversity. Conference of



the Society for Tropical Ecology, Gesellschaft für Tropenökologie e.V. - gto, Goethe University, 21 - 24 February 2011, Frankfurt a. M., Programme & Abstracts: 190. (in English) [Verbatim: "Increasing fragmentation rates of tropical forests disturb ecological dynamics and result in loss of biological and genetic diversity. Odonates, which are sensitive indicator organisms, face the destruction of tropical forests as probably the most important threat (Kalkman et al. 2008). Due to their complex life cycle and specific habitat preferences odonates come to know an increasing importance for measuring environmental health and identifying driving factors controlling biodiversity. *Megaloprepus caerulatus* the world's largest damselfly is widespread in the Neotropics from the South of Mexico to Bolivia (Davies & Tobin 1984, Finke & Hedström 2008). It is highly restricted to primary forests and old grown secondary forests, which provide water filled tree holes needed for reproduction. Females exclusively oviposit in water filled tree holes, which are defended by males. The size and the density of these microhabitats ultimately affect larval abundance and survivorship (Fincke 2006) resulting in changes in population size and structure. We used two mitochondrial sequence marker (ND1 and 16S rDNA) and microsatellites to analyze the population structure and diversities between populations covering the northern range of *M. caerulatus* between Mexico and Panama. High sequence divergences and an absence of gene flow indicate complete separation of all populations studied. Our results suggest ongoing speciation processes within the genus *Megaloprepus* probably driven by ongoing fragmentation of their forest habitats. Genetic distances at the species level suggest that the *Megaloprepus caerulatus* is not a single species rather than a group of at least three species. Our data illustrate the impact of tropical rainforest fragmentation on genetic isolation of a habitat specialized species and demonstrate how important it is to evaluate genetic diversities of indicator species. Together with general monitoring data the knowledge about conservation genetic parameters allow to propose refined conservation decisions in tropical forests." (Authors)] Address: Feindt, Wiebke, ITZ, Ecology and Evolution, TiHo Hannover, Bünteweg 17d, 30559, Hannover, Germany. E-mail: feindt.wiebke@gmail.com

**10248.** Fincke, O.M. (2011): Excess offspring as a maternal strategy: constraints in the shared nursery of a giant damselfly. *Behavioral Ecology* 22(3): 543-551. (in English) ["Maternal reproductive strategies should optimize the quality and quantity of surviving offspring. In *Megaloprepus caerulatus*, a damselfly that exhibits male-biased size dimorphism, larval siblicide, and a disproportionate fitness advantage from large sons, mothers lay many more eggs in water-filled tree holes than can survive to emergence. Using field experiments, I tested the siblicide advantage of excess offspring (i.e., faster development and/or larger survivors) in small and large holes and 2 alternative functions of excess offspring (predator satiation and insurance against nonpredator mortality). In small pots, the sole siblicidal survivors emerged larger than noncannibals but no sooner. However, doubling or even quadrupling a modest clutch of 25 failed to produce larger offspring. In large tubs, the size advantage that survivors gained from siblicide was constrained by a trade-off between offspring size and number. A clutch of 20 produced half as many but larger offspring than one of 100. When multiple females contributed eggs to a large nursery,

size of survivors was independent of the mother's clutch size. Finally, large clutches failed to satiate dragonfly predators, and although 25 neonates were better than 2 as insurance against nonpredator mortality, a clutch of 50 provided no additional benefit. In natural and experimental holes, survivorship was female biased, suggesting that sons suffered greater mortality than daughters. Because mothers seemed unable to adaptively bias offspring sex ratio, excess offspring may compensate for the lower survivorship of sons, particularly in large nurseries where males garner a disproportionate size advantage relative to females." (Author)] Address: Fincke, Ola, Ecology and Evolutionary Biology Program, Department of Zoology, University of Oklahoma, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**10249.** Florencio, M.; Diaz-Paniagua, C.; Serrano, S.; Bilton, D.T. (2011): Spatio-temporal nested patterns in macroinvertebrate assemblages across a pond network with a wide hydroperiod range. *Oecologia* 166(2): 469-483. (in English) ["Nestedness has been widely used to measure the structure of biological communities and occurs when species-poor sites contain subsets of species-rich ones. Here, we examine nested patterns across the macroinvertebrate assemblages of 91 ponds in Doñana National Park, Spain, and explore temporal variation of nestedness and species richness in 19 temporary ponds over 2 years with differing rainfall. Macroinvertebrate assemblages were significantly nested; both pond spatial arrangement and environmental variation being important in driving nested patterns. Despite the nested structure observed, a number of taxa and ponds deviate from this pattern (termed idiosyncratic), by occurring more frequently than expected in species-poor sites, or having assemblages dominated by species largely absent from species-rich sites. Aquatic adults of winged insects, capable of dispersal, were more highly nested than non-dispersing taxa and life-history stages. Idiosyncratic taxa were found in ponds spanning a wide range of hydroperiods, although nestedness was higher in more permanent waterbodies. Monthly sampling demonstrated a gradual increase of species richness and nestedness from pond filling to April–May, when the most temporary ponds started to dry. Although the degree of nestedness of individual pond assemblages varied from month to month, the overall degree of nestedness in the two study years was practically identical despite marked differences in hydroperiod. Our results suggest that differential colonization and environmental variation are key processes driving the nested structure of Doñana ponds, that macroinvertebrate assemblages change in a predictable manner each year in response to cycles of pond wetting and drying, and that connectivity and environmental variability maintain biodiversity in pond networks." (Authors) Larvae of *Lestes virens* are largely restricted to long hydroperiod sites, and some *Sympetrum* dragonfly larvae occurred preferentially in ponds with short and intermediate hydroperiods.] Address: Florencio, Margarita, Donana Biological Station-CSIC, P.O. Box 1056, 41080 Seville, Spain. E-mail: margarita@ebd.csic.es

**10250.** Gall, B.G.; Stokes, A.N.; French, S.S.; Schlepforst, E.A.; Brodie, E.D.; Brodie, E.D. (2011): Tetrodotoxin levels in larval and metamorphosed newts (*Taricha granulosa*) and palatability to predatory dragonflies. *Toxicon* 57(7-8): 978-983. (in English) ["Some populations of the newt *Taricha granulosa* possess extremely high concentrations of the neurotoxin tetro-

dotoxin (TTX). Tetrodotoxin is present in adult newts and their eggs, but has been assumed to be absent from the larval stage. We tested larval and metamorphosed juveniles for the presence of TTX and evaluated the palatability of these developmental stages to predatory dragonfly nymphs. All developmental stages retained substantial quantities of TTX and almost all individuals were unpalatable to dragonfly nymphs. Tetrodotoxin quantity varied greatly among individuals. When adjusted for mass, TTX concentrations declined steadily through metamorphosis. Several juveniles were palatable to dragonflies and these individuals had significantly lower TTX levels than unpalatable juveniles. These results suggest that despite previous assumptions, substantial quantities of TTX, originally deposited in the embryo, are retained by the developing larvae and metamorphosed juveniles and this quantity is enough to make them unpalatable to some potential predators." (Authors)] Address: Gall, B.G., 5305 Old Main HL, Logan UT, 84321, USA. E-mail: brian.gall@usu.edu

**10251.** Gassmann, D.; Richards (2011): Odonata (damselflies and dragonflies) of the Nakanai Mountains, East New Britain proving, Papua New Guinea RAP. Rapid Biological Assessments of the Nakanai Mountains and the upper Strickland Basin: surveying the biodiversity of Papua New Guinea's sublime karst environments 60: 61-69. (in English) ["Odonatological results of a biodiversity assessment ... in April 2009 are presented. Thirty-two species of Odonata were collected at three different elevations (200-1,700 m) in the Nakanai Mountains and, to a minor extent, on the coastal fringe of Jacquinot Bay. Ten species are recorded from New Britain island for the first time. An undescribed species of *Pseudagrion* Selys and a species or subspecies of *Tetrathemis* Brauer new to science were found. Eleven odonate taxa appear to be endemic to the island and some species were only found at particular elevations suggesting that more odonate species await discovery on the island. Due to the karst topography of the Nakanai Mountains, surface water that is essential for the development of odonate larvae is very scarce in the region. Natural forest cover is crucial for the survival of forest-dwelling habitat specialists, particularly those occupying the limited above-ground aquatic habitats that do exist. The designation of a World Heritage Area in the Nakanai Mountains will be an important first step to protect New Britain's unique aquatic invertebrate fauna from extinction." (Authors)] Address: Gassmann, D., Institute of Evolutionary and Ecological Sciences, Leiden University, c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: gassmann@naturalis.nnm.nl

**10252.** Geseke, C.; Hill, B.; Möller, L.; Roland, H.-J.; Stübing, S. (Red.) (2011): Atlas der Libellen Hessens. FENA Wissen 1: 184 pp. (in German) [Hessen, Germany; 65 Odonata species are mapped and introduced with information on habitat, phenology, morphology, and population trends.] Address: Hessen-Forst, Forsteinrichtung und Naturschutz, Europastr. 10-12, 35394 Gießen, Germany. E-mail: naturschutzdaten@forst.hessen.de

**10253.** Gossum, H. van; Bots, J.; Heusden, J. van; Hammers, M.; Huyghe, K.; Morehouse, N.I. (2011): Reflectance spectra and mating patterns support intraspecific mimicry in the colour polymorphic damselfly *Ischnura elegans*. *Evol. Ecol.* 25: 139-154. (in English) ["Coexistence of female colour morphs in animal popula-

tions is often considered the result of sexual conflict, where polymorphic females benefit from reduced male sexual harassment. Mate-searching males easily detect suitable partners when only one type of female is present, but become challenged when multiple female morphs coexist, which may result in frequency-dependent mate preferences. Intriguingly, in damselflies, one female morph often closely resembles the conspecific male in body coloration, which has led to hypotheses regarding intra-specific male-mimicry. However, few studies have quantitatively evaluated the correspondence between colour reflectance spectra from males and male-like females, relying instead on qualitative visual assessments of coloration. Using colour analyses of reflectance spectra, we compared characteristics of the body coloration of ontogenetic male and female colour morphs of the damselfly *Ischnura elegans*. In addition, we evaluated whether males appear to (1) discriminate between immature and mature female colour morphs, and (2) whether male-like females experience reduced male mating attention and low mating frequencies as predicted from male-mimicry. Spectral reflectance data show that immature female morphs differ substantially in coloration from mature individuals. Mating frequencies were much lower for immature than mature female morphs. For the male-like female morph, measures of colour were statistically indistinguishable from that of both immature and mature conspecific males. Mating frequencies of male-like females were lower than those of other mature female morphs under field and experimental conditions. Together, our results indicate that males may use the observed spectral differences in mate choice decisions. Furthermore, male-like females may be regarded as functional mimics that have reduced attractiveness and lowered rates of sexual harassment by mate-searching males." (Authors)] Address: Van Gossum, H., Evolutionary Ecology Group, University of Antwerp, Groenenborgerlaan 171, 2020 Antwerp, Belgium. E-mail: hans.vangossum@ua.ac.be

**10254.** Grant, P.B.C.; Samway, M.J.; Simaika, J.P. (2011): Threats to dragonflies on land islands can be as great as those on oceanic islands. *Biological Conservation* 144(3): 1145-1151. (in English) ["We ask whether oceanic islands and equivalent-sized continental blocks, which we call here 'land islands', are similar or not in their species richness, number of range-restricted species, and in number of threatened species. We used sites in southern Africa and islands in the Western Indian Ocean. We chose dragonflies as they are taxonomically tractable, well surveyed, and provide a range of characteristics from narrow-range endemics to widely-spread and vagile opportunists. We then selected as many oceanic islands as possible where there were sufficient data to make comparisons with land islands of a similar area in African savanna, grassland and mountains rich in endemic species. Generalized Linear Mixed Models were used to analyse the overall, range-restricted and threatened species richness for all islands (both oceanic and land) and then for the two types of island separately. Species richness increased with island size, with oceanic and land island size relationships being similar. Land islands overall had significantly more range-restricted species. Species on land islands were as threatened as those on oceanic islands. However, the land islands of the Western Cape were under a higher level of threat than oceanic islands of comparative size. The large islands of Madagascar and Sri Lanka were outliers with very high levels of threat. Trans-

lated into conservation, the results illustrate that over-generalizations about island faunas being more threatened than continental ones are not necessarily valid. While not wishing to draw attention away from the urgent conservation action needed on many tropical islands, we argue that comparisons of oceanic versus land islands detract from the more urgent task of local conservation action based on the special needs of any particular area, whether land or oceanic. It is more meaningful to establish how threats operate and how to mitigate them on small populations rather than focusing purely on any particular island type per se." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**10255.** Grant, P.B.C.; Samway, M.J. (2011): Micro-hotspot determination and buffer zone value for Odonata in a globally significant biosphere reserve. *Biological Conservation* 144(2): 772-781. (in English) ["Reserves are frequently constrained in design and size by various financial, social or political factors. Maintenance of existing reserves must therefore rely on strategic management practices, and prioritization of conservation activities within them. Identification of global and regional hotspots have been effective for prioritizing conservation activities. Yet, identification of micro-hotspots, or overlapping areas of endemic and rare species that are under threat at the landscape scale, have largely been ignored. From a reserve management point of view, knowledge of critical micro-hotspots within a reserve, are focal points for directing cost effective, conservation initiatives, especially removal of invasive alien plants which are a major threat to biodiversity. Using diversity patterns of dragonfly assemblages, many endemic and threatened, within a biosphere reserve located in the core of a global biodiversity hotspot, we investigated the concept of micro-hotspots. As biosphere reserves contain zones with varying degrees of anthropogenic impact, we also investigated the value of buffer and transition zones for complementing the dragonfly fauna of the reserve core. We found a distinct micro-hotspot within the protected core zone which shows concordance for both endemism and species richness. We conclude that focused conservation actions to remove invasive alien plants within this micro-hotspot would help insure its continued integrity. Furthermore, while there is greater habitat degradation within the buffer and transition zones, they support many additional species, but not those necessarily endemic or threatened. The complementary value of buffer and transition zones therefore lies in increasing habitat heterogeneity and species richness of the whole reserve." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**10256.** Guo, C.; Liu, F.; Yuan, S.-x.; Ren, B.-z. (2011): Dynamic study of insect community in Heilihe National Nature Reserve. *Journal of Jilin Agricultural University* 2/2011: 1-6. (in Chinese, with English summary) [Insect fauna of five habitats (*Quercus mongolica* -, *Betula platyphylla* - *Corylus heterophylla* -, man-made coniferous forest edge communities and riverside meadow community) from Heilihe National Natural Reserve in Chifeng of Inner Mongolia, China were studied from June to October in 2007. The total of more than 4000 specimens obtained belong to 11 orders, 65 families, 176 genera and 223 species." (Authors) Taxa including

Odonata are listed at the order level.] Address: Guo, Cheng, Department of Life Sciences, Chifeng University, Chifeng 024000, China

**10257.** Hämäläinen, M.; Yu, X.; Zhang, H. (2011): Descriptions of *Matrona oreades* spec. nov. and *Matrona corephaea* spec. nov. from China (Odonata: Calopterygidae). *Zootaxa* 2830: 20-28. (in English) ["*Matrona oreades* Hämäläinen, Yu & Zhang, spec. nov. (holotype male, China, Gansu, Wenxian, Bikou, alt. 950m, 9/13 vii 2005) and *Matrona corephaea* Hämäläinen, Yu & Zhang, spec. nov. (holotype male, China, Zhejiang, West Tianmushan, alt. 700m, 8 viii 2007) are described and illustrated for both sexes. These two species differ markedly from the members of the *Matrona basilaris* species group by their sparser venation and absence of bluish-white reticulation at the wing base." (Authors)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: matti.hamalainen@helsinki.fi

**10258.** Harabiš, F.; Dolný, A. (2011): The effect of ecological determinants on the dispersal abilities of central European dragonflies (Odonata). *Odonatologica* 40(1): 17-26. (in English) ["Individual species dispersal ability deserves special attention mainly because of negative impact of human induced changes on freshwater ecosystems. This study is focused on Central European dragonflies, because there is a high concentration of very experienced odonatologists in this region. It is more difficult to estimate dispersal ability of distant taxa than closely related species. This study supports the widespread awareness of limited dispersal abilities of habitat generalists. Although there are a variety of life-history groups between both suborders, the majority of species with limited dispersal abilities are from the suborder Zygoptera. Mediterranean elements, often referred to as those expanding due to global warming, embody higher dispersal abilities than Siberian elements. Lentic species may benefit from the stable conditions of standing waters in comparison to lotic ones, although this preference is not so strong according to authors' analysis." (Authors)] Address: Harabiš, F., Department of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences, CZ-165 21 Prague 6, Czech Republic. E-mail: harabis.f@gmail.com

**10259.** Holly, M. (2011): New and rare dragonflies (Odonata) in the Bieszczady National Park recorded in the years in 2009 and 2010. *Odonatrix* 7(1): 19-23. (in Polish, with English summary) ["The author studied small water bodies created for amphibians in the Bieszczady National Park in the years 2009 and 2010. *Lesites dryas* and *Cordulia aenea* have been recorded for the first time in the park. Records of additional species are given too, of which *Aeshna juncea* is of special interest. Two sites of *Cordulegaster bidentata* were also found in the Bieszczady National Park." (Author)] Address: Holly, M., Ośrodek Naukowo-Dydaktyczny Bieszczadzkiego Parku Narodowego, ul. Bełska 7, 38-700 Ustrzyki Dolne, Poland. E-mail: marekholly@wp.pl

**10260.** Huang, C.-C.; Lin, S.-C. (2011): Lineage-specific late Pleistocene expansion of an endemic subtropical gossamer-wing damselfly, *Euphaea formosa*, in Taiwan. *BMC Evolutionary Biology* 2011, 11:94: (in English) ["Background: Pleistocene glacial oscillations have significantly affected the historical population dynamics of temperate taxa. However, the general effects of recent climatic changes on the evolutionary history and



genetic structure of extant subtropical species remain poorly understood. In the present study, phylogeographic and historical demographic analyses based on mitochondrial and nuclear DNA sequences were used. The aim was to investigate whether Pleistocene climatic cycles, paleo-drainages or mountain vicariance of Taiwan shaped the evolutionary diversification of a subtropical gossamer-wing damselfly, *Euphaea formosa*. Results: *E. formosa* populations originated in the middle Pleistocene period (0.3 Mya) and consisted of two evolutionarily independent lineages. It is likely that they derived from the Pleistocene paleo-drainages of northern and southern Minjiang, or alternatively by divergence within Taiwan. The ancestral North-central lineage colonized northwestern Taiwan first and maintained a slowly growing population throughout much of the early to middle Pleistocene period. The ancestral widespread lineage reached central-southern Taiwan and experienced a spatial and demographic expansion into eastern Taiwan. This expansion began approximately 30,000 years ago in the Holocene interglacial period. The ancestral southern expansion into eastern Taiwan indicates that the central mountain range (CMR) formed a barrier to east-west expansion. However, *E. formosa* populations in the three major biogeographic regions (East, South, and North-Central) exhibit no significant genetic partitions, suggesting that river drainages and mountains did not form strong geographical barriers against gene flow among extant populations. Conclusions: The present study implies that the antiquity of *E. formosa*'s colonization is associated with its high dispersal ability and larval tolerance to the late Pleistocene dry grasslands. The effect of 3 late Pleistocene climatic changes on the subtropical damselfly's historical demography is lineage-specific, depending predominantly on its colonization history and geography. It is proposed that the Riss and Würm glaciations in the late Pleistocene period had a greater impact on the evolutionary diversification of subtropical insular species than the last glacial maximum (LGM)." (Authors)] Address: Lin, C.P., Department of Life Science & Center for Tropical Ecology and Biodiversity, Tunghai University, Taichung, Taiwan 40704. E-mail: treehops@thu.edu.tw

**10261.** Kadoya, T.; Akasaka, M.; Aoki, T.; Takamura, N. (2011): A proposal of framework to obtain an integrated biodiversity indicator for agricultural ponds incorporating the simultaneous effects of multiple pressures. *Ecological Indicators* 11(5): 1396-1402. (in English) ["One of the promising approaches to monitoring biodiversity is assessing the status of pressures driving the biodiversity state. To achieve this, we need to identify the principal pressures that cause simultaneous biodiversity loss across taxonomic groups and clarify how multiple pressures act synergistically or at least simultaneously to decrease biodiversity in the focal ecosystem. Here, we used a series of 64 ponds as a case study and we developed a framework for an integrated biodiversity indicator that took into consideration the estimated relative importance of multiple pressures. The indicator is defined as a function of the pressure(s) and is parameterized to explain a number of individual indicators of biodiversity, such as richness, abundance, and functional diversity of focal taxa. We selected aquatic macrophytes, Odonata, and benthic macroinvertebrates as the focal taxa. In addition, we focused on three types of pressure: eutrophication (represented by total phosphorus, total nitrogen, suspended solids, chlorophyll a, and density of cyanobacteria of pond water), habitat de-

struction (land-use type around the pond and pond bank protection), and invasive alien species (abundance of bluegill, largemouth bass, red swamp crayfish, and American bullfrog). We then evaluated the relationships among direct pressures and the individual biodiversity indicators and used a hierarchical Bayesian approach to calculate the integrated biodiversity indicator. Using this framework, we demonstrated that eutrophication had greater effects on the state of biodiversity of the agricultural ponds than did habitat destruction or the presence of invasive alien species. We also showed that the integrated indicator could well explain the behaviours of several individual biodiversity indicators, including total richness, endangered species richness, and functional diversity of focal taxa. These results demonstrate the advantages of the framework in providing a more practical method for assessing biodiversity, and quantifying the relative importance of the major threats to biodiversity to prioritize strategies in conservation planning and policy making." (Authors)] Address: Kadoya, T., Environmental Biology Division, National Institute for Environmental Studies, 16-2, Onogawa, Tsukuba, Ibaraki 305-8506, Japan

**10262.** Kerbiriou, C.; Bargain, B.; Le Viol, I.; Pavoine, S. (2011): Diet and fuelling of the globally threatened aquatic warbler at autumn migration stopover as compared with two congeners. *Animal Conservation* 14(3): 261-270. (in English) ["The effective conservation of aquatic warbler *Acrocephalus paludicola*, one of the most threatened western Palaearctic migratory passerines, requires good knowledge of its ecological needs at stopover sites. In particular, identifying its diet, which controls the accumulation of fat reserves during migration, facilitates the selection and management of adequately protected areas. Further key information includes the relationship between prey species abundance and habitats of aquatic warbler on stopover. We performed standardized mist netting in the Audierne marshes (western France) during 12 years, which resulted in the capture of 1200 aquatic warblers, and provided measurements for mass gain and the collection of faeces to infer the birds' diet. Invertebrate sampling was carried out in the three main Audierne marsh habitats (reed bed, fen mire and meadow). In order to go beyond prey digestibility bias, we also studied two closely related *Acrocephalus* species, present at migration stopover sites during the same period. We found that the diet composition of aquatic warbler observed at migration stopover sites is based on large-sized prey (Odonata, Orthoptera, Lepidoptera). Like sedge warblers, aquatic warblers put on weight during migration stopovers (daily mass gain=0.38 g). This increase in weight suggests that the aquatic warblers might have adopted a strategy for long-distance migration with few stopovers only. Owing to great differences in diet, conservation management for the threatened aquatic warbler at stopover sites should not rely on existing knowledge about sedge and reed warblers. Similarities in the diet of aquatic warbler between nesting areas and migration stopover areas and the relationship between habitat and prey abundance suggest that fen mires play an important role in the quality of the foraging habitat at stopover sites." (Authors)] Address: Kerbiriou, C., UMR 7204 MNHN-CNRS-UPMC Conservation des Espèces, Restauration et Suivi des Populations (CERSP), Muséum National d'Histoire Naturelle, Paris, France

**10263.** Kloskowski, J. (2011): Impact of common carp *Cyprinus carpio* on aquatic communities: direct trophic

effects versus habitat deterioration. *Fundamental and Applied Limnology / Archiv für Hydrobiologie* 178(3): 245-255. (in English) ["*C. carpio*, a worldwide introduced benthivorous fish, has been implicated in the degradation of native environments through initiation of a shift to a phytoplankton-dominated turbid state, which is associated with dramatic biodiversity loss. This study combined surveys of ponds containing either low total biomass of small-sized carp or high densities of large-sized carp with an enclosure/exclosure experiment, in order to quantify the direct (trophic) and indirect (via habitat deterioration) impacts of carp on pond communities. High-density ponds supported substantially lower biodiversity and were more turbid than low-density ponds. The subsequent field experiment examined the effects of carp presence/absence and of clear-water versus moderately turbid conditions mediated by carp on the survival to metamorphosis of larval anurans *Pelobates fuscus* and *Hyla arborea*, on Zygotera and Anisoptera densities, and on the biomass of submerged macrophytes. The presence of enclosed one-year old carp resulted in the complete elimination of larval anurans and the absence of Odonata. The effects of the habitat conditions were not significant, apart from better survival of *P. fuscus* in the moderately turbid carp exclosures than in clear water. Submerged plants were more abundant in clear-water than in turbid treatments, with a negligible effect of enclosures/exclosures. These results suggest that carp predation and related effects may be primarily responsible for animal diversity loss in invaded communities, as they may act prior to, or independent of, the ecosystem switch to a turbid phase." (Authors)] Address: Kloskowski, J., Dept of Nature Conservation, Institute of Biology, M. Curie-Skłodowska University, Akademicka 19, 20-033 Lublin, Poland. E-mail: januszkl@poczta.umcs.lublin.pl

**10264.** Klymko, J. (2011): *Ophiogomphus anomalus*, Extra-striped Snaketail, a new species for Nova Scotia. *Argia* 23(1): 21-22. (in English) [Medway River between Bangs Falls and Riversdale, Canada, 18-VI. and 20-VII-2010] Address: Klymko, J., Canada. E-mail: jklymko@mta.ca

**10265.** Konopko, D. (2011): New locality of the Pygmy Damselfly *Nehalennia speciosa* (Charpentier, 1840) (Odonata: Coenagrionidae) in the Tricity Landscape Park. *Odonatrix* 7(1): 24-27. (in Polish, with English summary) ["*N. speciosa* inhabits mainly small natural water bodies with the area less than 1 ha, great amount of mud sedge *Carex limosa* and slender sedge *C. lasiocarpa* as well as submerged vegetation. In Poland, 75 sites of this species have been discovered so far of which 44 are regarded as contemporary. In the Tricity Landscape Park, the Pygmy Damselfly was discovered for the first time in July 2006 at the site about 1,1 km NE away from Kamień in the commune of Szemud (Konopko 2007). The next site was discovered in July 2009, in a peat bog bordered from NE with Zawiat Lake situated in the vicinity of Bieszkowice, in the commune of Wejherowo. The central point of the peat bog is a dystrophic water body with the Sphagnum moss mat separated from the lake by 90 meter-width belt of *Vaccinio uliginosi*-*Pinetum sylvestris* Kleist 1929 bog woodland. *N. speciosa* are present in *Carex limosa* swamp. The population is small; the highest number of individuals was 70. During earlier studies this species was not found in the peat bog. The colonization of this site was probably made before our eyes. Except for *N. speciosa*,

32 dragonfly species were observed in the peat bog in which four of them are under protection: *Aeshna subarctica*, *Leucorrhinia albifrons*, *L. caudalis* and *L. pectoralis*. In the future, in the area of the peat bog, the forming of the nature reserve called „Bieszkowickie Moczary” is planned, however, nowadays the steps for establishing the second refuge for the *N. speciosa* in the area of the Tricity Landscape Park are taken." (Author)] Address: Konopko, D., ul. Dedala 8/2/9, 81-197 Gdynia, Poland. E-mail: darkon27@wp.pl

**10266.** Kovalenko, K.E.; Dibble, E.D. (2011): Effects of invasive macrophyte on trophic diversity and position of secondary consumers. *Hydrobiologia* 663(1): 167-173. (in English) ["Invasive species are one of the widespread stressors of aquatic ecosystems. Several studies document food web effects of invasive fish, but little information is available on the effects of invasive macrophytes. We studied differences in food chain length as well as trophic position and trophic diversity of fish and odonates in lakes dominated by native plants or invasive Eurasian watermilfoil. Trophic position and food chain length were determined using baseline-adjusted  $\delta^{15}\text{N}$  isotope signatures. Trophic diversity, or isotope niche width, was estimated from convex hull area analysis. Results show that trophic position of secondary consumers was not affected by the invasive macrophyte, whereas trophic diversity was greater in watermilfoil-dominated lakes. The direction of isotopic niche expansion was different in fish and odonates, suggesting potential decoupling in predator-prey interactions. This study shows that dominant non-native macrophytes may cause significant changes in food web structure of invaded ecosystems. Trophic diversity may be a more sensitive indicator of environmental stress than trophic position and has the potential to be used for assessment of invasive species impacts and restoration success." (Authors)] Address: Kovalenko, Katya, Biological Sciences, University of Windsor, Windsor, ON N9B 3P4, Canada. E-mail: katya@uwindsor.ca

**10267.** Koyama, T.; Takano, H.; Yokoyama, T. (2011): Micropores in the Vitelline Layer of the Eggs of the Dragonfly *Oligoaeschna pryeri*: A Preliminary Observation from the Viewpoint of Oxygen Uptake. *Advances in experimental medicine and biology* 915: 307-310. (in English) ["In dragonfly eggs, oxygen diffusing in, and carbon dioxide diffusing out, encounter barriers in the shell. According to Tullett and Board, in avian eggs the most important of these barriers results from the geometry of the pores through the shells. As in birds, dragonfly egg shells consist of three layers: the exochorion, endochorion and the innermost vitelline membrane. Trueman has described pores and fine anchorlike structures in the endochorion but the vitelline membrane does not seem to have been studied. In the present work we have used scanning electron microscopy to examine the vitelline membrane in hatching eggs of *Oligoaeschna pryeri*. We have assumed that the numerous openings seen on the micrographs are pores through the membrane. Results are expressed as means  $\pm$  SD. The pore diameter, pore area and number per  $\mu\text{m}^2$  of the vitelline membrane were  $74.7 \pm 61.3$  nm,  $4380 \pm 3555$  nm<sup>2</sup> and  $4.16 \pm 1.3$  pores/ $\mu\text{m}^2$  ( $4.16 \times 10^8$  pores/cm<sup>2</sup>), respectively. The total pore area was calculated to be 18,222 nm<sup>2</sup>/ $\mu\text{m}^2$ . In avian egg shells pore density depends on the weight of the egg. Results given by Tullett and Board suggest that an egg weighing 1 g may have a pore density of 300 pores/cm<sup>2</sup>, which is

much lower than the present result for dragonflies. It seems likely that the difference reflects the fact that in *Oligoaeshna pryeri* the eggs are immersed in water." (Authors)] Address: Koyama, T., Hokkaido University, Sapporo, Japan. E-mail: tomkoyamajp@yahoo.co.jp.

**10268.** Lampo, C.; Riservato, E.; Lencioni, V. (2011): Contributo alla conoscenza dell'odonatofauna della Val di Ledro (Trentino). *Studi Trent. Sci. Nat.* 88: 53-59. (in Italian, with English summary) ["In 2009-2010 the odonatofauna from two lakes, Ampola and Ledro (southern Trentino, NE-Italy) was studied. Larvae, exuviae and adults were collected. In all, 21 species were identified, all of them already known for the Trentino Province but only three already found in the study area. The occurrence in Trentino of two species, *Somatochlora flavomaculata* and *Aeshna isosceles*, is confirmed after 30 years. As expected, a higher species richness was recorded in Lake Ampola, being a protected site since 1990: 16 species of which 9 with evidence of reproduction. Only 9 species (of which 5 reproductive, with modified phenology) were observed at Lake Ledro, impacted by water abstraction with consequent high level fluctuations." (Authors)] Address: Lencioni, Valeria, Museo Civico di Storia Naturale di Verona, Lungadige Porta Vittoria 9, 37122, Verona, Italia. E-mail: lencioni@mtsn.tn.it

**10269.** Li, Y.; Nel, A.; Ren, D.; Zhang, B.; Pang, H. (2011): A new Chinese Mesozoic dragonfly clarifies the relationships between *Rudialeschnidae* and *Cymatophlebiidae* (Odonata: Aeshnoptera). *Zootaxa* 2802: 51-57. (in English) ["A very well preserved fossil specimen of *Rudialeschna limnobia* Ren & Guo, 1996, is described and diagnosis for *Rudialeschna* is emended. Its clear morphological structures, including body characters, clarify and confirm the affinities of *Rudialeschna* and the *Rudialeschnidae* with *Cymatophlebia* Deichmüller, 1886, and the *Cymatophlebiidae*, previously inferred only through venational characters." (Authors)] Address: Ren, D., College of Life Sciences, Capital Normal University Beijing 100048, China. E-mails: rending@mail.cnu.edu.cn

**10270.** Lima Silveira, T.C.; Rodrigues, G.G.; Coelho de Souza, G.P.; Würdig, N.L. (2011): Effects of cutting disturbance in *Schoenoplectus californicus* (C.A. Mey.) Soják on the benthic macroinvertebrates. *Acta Scientiarum. Biological Sciences*, Maringá 33(1): 31-39. (in English, with Portuguese summary) ["Lagoons are considered protected areas because these systems play a key ecological role. However, the extraction of macrophyte *Schoenoplectus californicus* is held for manufacture of handicrafts, being an alternative income for riverbank communities. This study evaluated the impact of *S. californicus* experimental cutting on benthic macroinvertebrates through a field experiment. Macroinvertebrates were sampled at 1, 12, 26 and 60 days after the macrophyte cutting in demarked plots (1 m<sup>2</sup>), as well at control plots. The families number was not statistically different (ANOVA,  $p > 0.05$ ), but the total density of invertebrates, and the density of *Ceratopogonidae* were significant (ANOVA,  $p < 0.05$ ) for interaction between sampling date and treatment. A Principal Components Analysis identified that the level of the water column was the variable that most influenced the variation between the samples gathered in the experiment. We concluded that the cutting of *S. californicus*, in this area, as the intensity of the cut held, did not affect considerably the aquatic macroinvertebrates. The results

suggest that the small-scale extractivism in these regions carries little effect because the fauna of adjacent areas probably can quickly colonize the disturbed areas. ... Because only the fauna associated with sediment have been assessed in this study, some taxa more active or rare, were not sampled in larger quantities, among them Odonata, Ephemeroptera and Hyallellidae (Table 1). The sampler used (corer) is more effective in collecting taxa with little mobility, i.e. most of detritivores." (Authors)] Address: Rodrigues, G.G., Depto de Zoologia, Centro de Ciências Biológicas, Programa de Pós-graduação em Desenvolvimento e Meio Ambiente, Universidade Federal de Pernambuco, Av. Prof. Moraes Rego, 1235, 50670-420, Cidade Universitária, Recife, Pernambuco, Brazil. E-mail: gilberto.rodrigues@ufpe.br

**10271.** Mac Nally, R.; Wallis, E.; Lake, P.S. (2011): Geometry of biodiversity patterning: assemblages of benthic macroinvertebrates at tributary confluences. *Aquatic ecology* 45(1): 43-54. (in English) ["We assessed whether tributaries in upland catchments (=watersheds) affected assemblages of benthic macroinvertebrates in mainstems, as has been reported in northern hemisphere systems. Eight confluences of small to medium streams (stream orders 1-4, 2.2-10.8 m wide) were studied in the Acheron River basin in Victoria, Australia. For each confluence, two transects were sampled at each of five zones relative to the confluence: two zones upstream in the mainstem, one zone upstream in the tributary, one zone at the confluence and one zone downstream in the mainstem. Surveys were conducted in both high-flow and lowflow conditions. In mainstems, there was no change in macroinvertebrate density, taxonomic richness or functional feeding group composition downstream relative to upstream of the confluences. While tributaries statistically had distinctive benthic macroinvertebrate assemblages compared to mainstems, these distinctions were small. In low flows, densities in tributaries were substantially lower than in mainstems, but densities during high flows were more similar (albeit only about one-third as high as in low flow) in tributaries and mainstems. An inverse pattern was evident for taxonomic richness, where richness in tributaries and mainstems was similar in low flows but was greater in mainstems than in tributaries in high flows. We found little evidence of tributary effects in macroinvertebrate assemblages in this basin, which is at odds with some previous results from other continents. To explain this divergence, we suggest a conceptual model outlining factors that control variation in effects of tributaries on assemblages of benthic macroinvertebrates in mainstems." (Authors) The "Supporting information" to this paper includes a list of taxa recorded in the Acheron River catchment and including "Synthemistidae" and "Telephlebiidae".] Address: Mac Nally, R., Australian Centre for Biodiversity, School of Biological Sciences, Monash University, Melbourne 3800, Australia. E-mail: Ralph.MacNally@sci.monash.edu.au

**10272.** Marin, A.A.; Dumbrava-Dodoaca, M., Petrovici, M.; Herlo, G. (2011): The human impact on benthic community structure and dynamics of different ecosystems from Lunca Muresului Nature Park (West of Romania). *Aquaculture, Aquarium, Conservation & Legislation. International Journal of the Bioflux Society* 4(1): 72-78. (in English, with Romanian and Hungarian summaries) [Macrozoobenthos of Mures River and Caramidariei Lake, within the area of Lunca Muresului Nature Park, Romania, was investigated to get information



on impacts of pollution to these water bodies. Taxonomic work considered only order level insects, including Odonata.] Address: Dumbrava-Dodoaca, Malina, West University of Timisoara, Faculty of Chemistry Biology and Geography, Department of Biology, Timisoara, Romania. E-mail: malinadumbrava@yahoo.com

**10273.** Martens, A.; Grabow, K. (2011): Early stadium damselfly larvae (Odonata: Coenagrionidae) as prey of an aquatic plant, *Utricularia australis*. *International Journal of Odonatology* 14(1): 101-104. (in English) ["Two third stadium larvae of Coenagrionidae (probably *Coenagrion puella* or *Ischnura elegans*) were recorded in the bladders of *U. australis* sampled from a garden pond in Karlsruhe, Germany, in June 2010. These are the first records of odonate larvae as prey of carnivorous aquatic macrophytes." (Authors)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, PF 111062, 76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**10274.** Medlock, J.M.; Vaux, A.G.C. (2011): Assessing the possible implications of wetland expansion and management on mosquitoes in Britain. *European Mosquito Bulletin* 29: 38-65. (in English) ["The expansion of existing wetlands, their creation from arable land, and the creation of new saltmarsh to alleviate coastal erosion and flooding are important UK issues as the environment sector adapts to the possible impacts of climate change and continues to meet its goals in providing increased wetland habitat for wildlife, and an outdoor space for human 'well-being'. Concerns have been raised over the potential impacts that such initiatives might have on mosquitoes and the possible future transmission of infectious diseases. This paper aims to firstly review wetland management and design strategies used in North America and Australia in relation to managing mosquitoes in wetlands, and secondly specifically discuss possible mitigating strategies for the key British mosquito species of freshwater wetland habitats in order to guide future research in this field. Developing this evidence-base is a crucial element in preparing for the emergence of mosquito-borne disease in the UK and in aiding policy makers in their assessments of the risks and impacts associated with wetland expansion on mosquito nuisance and disease risk. It is important to ensure that biodiversity gain and habitat restoration can advance without inadvertently elevating the risks from disease vectors." (Authors) Passing references to Odonata as predators of mosquitoes are made.] Address: Medlock, J.M., Medical Entomology & Zoonoses Ecology Group, Microbial Risk Assessment, Emergency Response Department, Health Protection Agency, Porton Down, Salisbury, Wiltshire SP4 0JG, UK. E-mail: jolyon.medlock@hpa.org.uk

**10275.** Minova, S.; Balla, M.; David, S. (2011): First record of *Hemianax ephippiger* (Odonata: Aeschnidae [sic] from Slovakia. *Folia faunistica Slovaca* 16(1): 25-26. [E Slovakia, Vychodoslovenska rovina Plain; Inacovce (N 48°41'31.6", E 22°3'53.7"), 2 pairs of adults flying in tandem, 23.5.2007; loc. Ibid. 1 mating pair, 6.6.2007.] Address: Minov, Slávká, State Nature Conservancy of the Slovak Republic, Administration of the Protected Landscape Area Latorica, M. R. Štefánika 1755, SK-075 01 Trebišov, Slovakia. E-mail: slavka.minova@sopsr.sk

**10276.** Miyazaki, R.; Lehmkuhl, D.M. (2011): Chapter 6: Insects of the Saskatchewan River System in Sas-

katchewan. In: *Arthropods of Canadian Grasslands (Volume 2): Inhabitants of a Changing Landscape*. Edited by K. D. Floate. Biological Survey of Canada. ISBN 978-0-9689321-5-5: 119-157. (in English, with French summary) ["The diversity of aquatic insects in the Saskatchewan River system in Saskatchewan is high. This reflects the postglacial recruitment of species from as far away as the Colorado River system and Eurasia, but also the diverse nature of the waterway itself. Clear, cool waters flow over a variety of rubble, gravel, and sand substrates and harbour habitats of submerged branches, logs, and growing vegetation. Of the more than 1,000 species of aquatic and semi-aquatic insects that inhabit waters on the grasslands of the Canadian prairie, at least half occur in streams and rivers. This chapter provides an overview of the latter species, with an emphasis on mayflies (Ephemeroptera), stoneflies (Plecoptera), caddisflies (Trichoptera), and non-biting midges (Chironomidae) and only brief mention of other insect species. Aquatic insects often represent a large biomass with great biodiversity in pristine prairie rivers. This is still the case for some areas of the Saskatchewan River, which shows minimal damage and appears to be in its near original state. Elsewhere, however, dams, sewage, and agricultural runoff have degraded aquatic habitats over large expanses. Laws protecting flowing waters in Canada are weak, and large areas of these waters require detailed study to increase our understanding of the biodiversity and ecological roles of aquatic insects." (Authors) Odonata are treated at pages 150-152.] Address: Miyazaki, R., Department of Biology, University of Saskatchewan, Saskatoon, Saskatchewan, Canada S7N 5E2

**10277.** Muzon, J.; Lozano, F. (2011): Description of the final instar larva of *Progomphus joergenseni* Ris (Ephemeroptera: Gomphidae). *Zootaxa* 2762: 56-60. (in English) ["The final instar larva of *P. joergenseni* is described and illustrated for the first time based on specimens collected in Río Negro Province, northern Patagonia, Argentina. Right mandibular molar crest shows an extreme reduction in the number of teeth with no intermediates between teeth a and b. Antennal, leg and paraprocts morphology suggest a close relationship with the species included in the *Pygmaeus* group, but *P. joergenseni* differs from them because of its larger size and longer anal pyramid." (Authors)] Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina. E-mail: muzon@ilpla.edu.ar

**10278.** Nagel, L.; Zanuttig, M.; Forbes, M.R. (2011): Escape of parasitic water mites from dragonfly predators attacking their damselfly hosts. *Canadian Journal of Zoology* 89(1): 213-218. (in English, with French summary) ["Many parasites are transmitted trophically, whereas others can either succumb to, or escape from, the predators of their hosts. We examined the extent to which larval arrenurid water mites (*Arrenurus planus* Marshall, 1908 and *Arrenurus pollictus* Marshall, 1910) parasitizing *Lestes forcipatus* and *L. disjunctus* escape from predatory libellulid dragonflies that are consuming their hosts. We hypothesized that the brightly coloured mites would be avoided by feeding dragonflies. However, all partially engorged *A. pollictus* mites were eaten while their host was being consumed in staged predation trials. In contrast, half of the fully engorged mites detached and therefore escaped consumption. Trials with *A. planus* mites showed that they detached more readily than their congeners, which may be due to se-

lection on those temporary pond mites to survive desiccation stress following detachment. The effect of dragonfly predation on transitioning of mites from parasitic larvae to their free-living aquatic stages therefore depends on the degree of engorgement and the mite species." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**10279.** Neiss, U.G.; Fiorentin, G.L.; De Marmels, J. (2011): The larva of *Allopodagrion brachyurum* De Marmels, 2001 (Odonata: Zygoptera: Megapodagrionidae) from Southern Brazil. *Zootaxa* 2836: 44-50. (in English) ["The larva of *A. brachyurum* is the first known for the genus. The larva is described and illustrated based on exuviae of reared larvae collected in the upper course of the Rio dos Sinos, in Caraá município, Rio Grande do Sul, Brazil. The larva of *A. brachyurum* can be distinguished from all other neotropical megapodagrionid larvae primarily by the presence of a well developed obtuse tubercle in sub-vertical orientation on each side of occiput; two blunt tubercles on top of the head; and caudal gills thin, stiff, triquetral and extremely long, as long as body." (Authors)] Address: Neiss, U.G., Coordenação de Pesquisas em Entomologia, Instituto Nacional de Pesquisas da Amazônia/INPA, Caixa Postal 478, CEP 69011-970, Manaus, AM, Brazil. Bolsista Doutorado/CNPq. E-mail: ulisses.neiss@gmail.com

**10280.** Nelson, S.M. (2011): Response of stream macroinvertebrate assemblages to erosion control structures in a wastewater dominated urban stream in the southwestern U.S. *Hydrobiologia* 663: 51-69. (in English) ["Effects of stream erosion control structures on aquatic macroinvertebrates were studied (2000–2009) in a wastewater dominated drainage (Wash) in Las Vegas, Nevada. Mainstem sites with and without structures, wastewater treatment plant outfalls, a reference site above treatment plant inputs, and tributary sites were sampled. Ordination suggested hydrology and channel characteristics (current velocity, stream depth, and width), and water quality (conductivity) were primary factors in organizing macroinvertebrate communities, with some variables altered at structures. Treatment plant inputs changed hydrology (increased flows), water chemistry (conductivity decreased below treatment plants), and temperature. Assemblages differed between site types, with midges and damselflies important at tributary sites and Fallceon mayflies and Smicridea caddisflies common at erosion control structures. Locally unique communities developed at structures which also may have facilitated exotic species invasions. Analyses showed that taxa richness increased over time at these sites and differed significantly from richness at sites without structures. Structures appeared important in retaining organic matter and, among mainstem sites, coarse particulate organic matter was highest, but variable, at structures and at wetlands above the structures. Erosion control structures, coupled with warm effluent, high baseflows, and altered water quality resulted in development of a macroinvertebrate community that did not trend towards reference or tributary sites. In this case, ecological communities at structures used for river restoration were not on a continuum between disturbed and reference sites. Goal setting of community responses at these structures would have required insight beyond the simple use of reference site attributes." (Author) Odonata are treated at the family

level.] Address: Nelson, S.M., Technical Service Center, Bureau of Reclamation, Denver Federal Center, Bldg. 56, Rm. 2010, P.O. Box 25007 (86-68220), Denver, CO 80225, USA. E-mail: snelson@usbr.gov

**10281.** Ngiam, R.W.J.; Sun, S.W.; Sek, J.Y. (2011): An update on *Heliogomphus cf. retroflexus* Ris, 1912 with notes on *Microgomphus chelifera* Selys, 1858 in Singapore (Odonata: Anisoptera: Gomphidae). *Nature in Singapore* 4: 95-99. (in English) ["Ngiam (2010) published a paper describing two gomphid larvae collected from the Central Catchment Nature Reserve which had been reared unsuccessfully. The two larvae were believed to be from the genus *Heliogomphus*, and based on their antennal morphology, Ngiam discussed the possibility that the larvae could be *Heliogomphus cf. retroflexus*. However the two larvae were not reared to adulthood and *Heliogomphus retroflexus* adults have never been recorded locally. Singapore is also well outside the known distribution range of *Heliogomphus retroflexus* and no other *Heliogomphus* species other than *Heliogomphus kelantanensis* Laidlaw, 1902 has been recorded in Singapore (Tang et al., 2010). Thus the exact identity of the two mysterious gomphid larvae remains unsolved. Recently more larvae similar to those collected by Ngiam (2010) were collected and two individuals were reared to adulthood. The identity of the larva is finally revealed to be *Microgomphus chelifera* Selys, 1858. In this paper, larvae from the genus *Heliogomphus* and *Microgomphus* are discussed. In addition, the successful rearing of *Microgomphus chelifera* larvae provides an update on its local status." (Authors)] Address: Robin Wen Jiang Ngiam, R.W.J., National Biodiversity Centre, National Parks Board, 1 Cluny Road, Singapore 259569. E-mail: ngiamwenjiang@nparks.gov.sg

**10282.** Nóbrega, C.C.; De Marco Jr. P. (2011): Unprotecting the rare species: a niche-based gap analysis for odonates in a core Cerrado area. *Diversity and Distributions* 17(3): 491-505. ["Aim: We evaluated Odonata distribution data and predicted the compositional resemblance based on niche-based species distribution models to analyse the following questions: (1) How is estimated species richness distributed, and how can it be preserved under the actual network of conservation units (a gap analysis approach)? (2) How is the estimated odonate beta diversity distributed, and is there a better distribution of conservation units (a priority setting approach)? (3) Is the probability of being under protection a function of the potential species range size? and (4) Will the current conservation network proposals protect odonate taxa? Location: Central Brazil in a core Cerrado area. Methods: We generated odonate species distribution predictions based on MaxEnt and maps derived from estimated species richness, beta diversity and gap analysis for all species predicted to occur in the study area. Then, we compared these maps with current conservation units, land-use patterns and proposals for the establishment of conservation units. Results: Raw odonate species records provided limited utility for setting conservation priorities without the use of niche-based models. However, area under the receiver operating curve (AUC) values were characterized by substantial variation that was related to the number of records. No current conservation units overlapped the areas with higher predicted richness and beta diversity, and in general, conservation units were not preserving restricted/rare species. There was a direct linear correlation between species range size and the

proportion of its range protected in the current network of conservation units. Finally, we identified three areas with high odonate beta diversity where conservationist actions should be implemented. Main conclusions: Current conservation units and future suggested areas do not overlap regions with high conservation values for odonates. Conservation units protect species at random, and the level of protection has a direct relationship with species range size; thus, wide-range species are expected to be more protected than restricted or threatened species." (Authors)] Address: De Marco Júnior, P., Laboratório de Ecologia Teórica e Síntese, ICB 1, Universidade Federal de Goiás, CP 131, 74.001-970, Goiânia, GO, Brazil. E-mail: pdemarco@icb.ufg.br

**10283.** Novelo Gutierrez, R.; Gomez Anaya, J.A. (2011): The larva of *Progomphus lambertoi* Novelo-Gutiérrez, 2007 (Odonata: Gomphidae). *Zootaxa* 2872: 58-62. (in English) ["The larva of *Progomphus lambertoi* is described and illustrated; it belongs to the obscurus-group of *Progomphus*. It appears closely related to *P. belyshevi* Belle and *P. borealis* McLachlan based on stature and size of abdominal dorsal protuberances but is easily separated from these species by abdominal colour pattern." (Authors)] Address: Gomez Anaya, J.A., Instituto de Ecología, A.C. Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: antonio.gomez@in-econol.edu.mx

**10284.** Ojha, N.; Clausnitzer, V.; Suhling, F.; Schaab, G. (2011): Adding a distribution modelling tool for conservationists of the African Odonata database. In: Niekisch, M. & B. Streit (Eds.): Status and future of tropical biodiversity. Conference of the Society for Tropical Ecology, Gesellschaft für Tropenökologie e.V. - gtö, Goethe University, 21 - 24 February 2011, Frankfurt a. M., Programme & Abstracts: 163. (in English) [Verbatim: "Species distribution models have often been employed to find the potential habitat range. Making use of the unique African Odonata database which covers over 800 species, we present a logistic-regression based modelling tool for predicting their potential distribution. Thus, the scientifically collected database has the potential to be useful for conservation related applications; as determining the species potential distribution range is one of them. E.g. the potential distribution range can aid in the assessment of IUCN's threat status. Odonata serve as good indicator species for conservation and environmental monitoring and planning for various reasons: they are easy to monitor, the taxonomy is straight forward, they inhabit aquatic (larvae) and terrestrial (adults) habitats, and they are top predators. Here we present the example of modelling, currently based on presence-only data, of two Odonata species in tropical Africa categorised as vulnerable in the IUCN red list of threatened species. The tool applies the maximum likelihood method based on the expectation-maximisation approach. In order to develop a tool in particular useful to conservationists, emphasis is given mainly to a) functions to ensure proper harmonisation of raster and vector datasets, b) a user-friendly graphical user interface, and c) a comprehensive help system. *Coryphagrion grandis*, mainly residing in the coastal areas of Kenya and Tanzania and *Pseudagrion bicoerulans*, mainly found in the montane areas of Kenya, Uganda and Tanzania have been threatened by wood extraction (deforestation), agriculture and water pollution. Therefore, the variables used for modelling are surrogates of a) climate (like 6 bioclimatic variables), b) habitat (land-co-

ver, elevation), c) resources (vegetation index, distance to water) and d) potential anthropogenic impact (population density). These example species show the model's usefulness in e.g. identifying areas in need of conservation for these species in East-Africa. An assessment of the sensitivity of the variables in regard to the predicted habitat ranges can help to project relative impacts caused by the various variables." (Authors)] Address: Ojha, Nirmal, Hochschule Karlsruhe, Karlsruhe, Germany. E-mail: nirmal.ojha@hs-karlsruhe.de

**10285.** Olthoff, M.; Ikemeyer, D. (2011): Erstnachweis von Hochmoor-Mosaikjungfer (*Aeshna subarctica*) und Arktischer Smaragdlibelle (*Somatochlora arctica*) im Amtsvenn-Hündfelder Moor (Kreis Borken) (Anisoptera: Aeshnidae, Corduliidae). *Natur und Heimat* 71(1): 1-8. (in German, with English summary) ["*A. subarctica* and *S. arctica* were recorded for the first time in the nature reserve Amtsvenn-Hündfelder Moor in the district of Borken (Westphalia, Germany) in 2010. Both species are bog specialists confined to Sphagnum-dominated bog pools. While the reproduction of *S. arctica* could not be proved, *A. subarctica* breeds in Sphagnum-dominated peat cuttings. It is assumed that the observed individuals of the latter species are part of a cross-border metapopulation, comprising further peat bogs in the district of Borken, the adjacent Netherlands and Lower Saxony."] Address: Olthoff, M., Biologische Station Zwillbrock e.V., Zwillbrock 10, 48691 Vreden, Germany. E-mail: matthias.olthoff@gmx.de

**10286.** Ordóñez, C.; Lougheed, V.L.; Gardea-Torresdey, J.L.; Bain, L.J. (2011): Impact of Metals on Macroinvertebrate Assemblages in the Forgotten Stretch of the Rio Grande. *Arch. Environ. Contam. Toxicol.* 60: 426-436. (in English) ["The objective of this study was to examine how changes in the benthic macroinvertebrate community structure and a variety of abiotic variables, such as conductivity and sediment metal concentrations, are modified along the Forgotten River stretch of the Rio Grande. This stretch receives industrial effluent, raw sewage, and agricultural return flow from the El Paso (TX, USA)—Ciudad Juárez (CHI, Mexico) metroplex and then flows relatively undisturbed for 320 km before its next significant input. The high degree of use, followed by the 320-km undisturbed stretch, makes the Forgotten River a unique study site to examine downstream attenuation of contaminants and other abiotic variables to determine their potential effects on macroinvertebrates. Five different sites along the Forgotten Stretch were sampled over a 2-year period. Metal concentrations were low throughout the stretch and were predominantly correlated to percent sediment organic matter rather than explained spatially. Several sensitive invertebrate species, such as Leptophlebiidae, increased in relative abundance downstream, whereas the percentage of tolerant invertebrates decreased. Nonmetric multidimensional scaling separated the macroinvertebrate communities upstream from those downstream, with the more sensitive species being found predominantly downstream and more tolerant taxa associated upstream. Additionally, there was a distinct seasonal gradient to the community. The most important drivers of the community assemblage appear to be distance downstream and seasonality, as well as water conductivity and concentrations of sediment cadmium, which was the only metal that exceeded protective criteria. This study did not provide evidence of the downstream attenuation of heavy metals in the sedi-



ments in the Forgotten Stretch; however, downstream changes in macroinvertebrates toward more sensitive taxa suggests that other, unmeasured contaminants might be affecting biological communities in this isolated stretch of an international waterway." (Authors) Odonata are treated at the family level.] Address: Bain, L.J., Dept of Biological Sciences, Clemson University, Clemson, SC, USA. E-mail: lbain@clemson.edu

**10287.** Ott, J. (2011): GNOR Arbeitskreise. AK Libellen. Neue Informationen für Libellenfreunde. GNOR info 112: 30-31. (in German) [The following books are introduced: Libellenatlas für die SAAR-LOR-LUX-Plus-Großregion and "Monitoring Climate Change with Dragonflies" (Bio-risk online) as well as information are given on the current campaign on dragonflies in Germany of BUND.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**10288.** Ott, J. (2011): Moorlibellen. Verlierer und Gewinner. BUNDmagazin 2/: 21. (in German) [General account on the dragonflies of bogs in the framework of the present campaign of the German section of "Friends of the Earth and directed to the protection of dragonflies.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**10289.** Outomuro, D.; Ocharana, F.J. (2011): Wing pigmentation in Calopteryx damselflies: a role in thermoregulation? Biological Journal of the Linnean Society 103(1): 36-44. (in English) ["Body melanization may show adaptive variation related to thermoregulation ability, and it is to be expected that the degree of melanization will change among populations or closely related species across environmental gradients of solar radiation and/or environmental temperature. Some melanized secondary sexual traits may also play a role in sexual selection, leading to interpopulation variation, which would not be predicted by thermoregulation pressures alone. We studied the relationships between the interpopulation variation in wing pigmentation level (i.e. melanized secondary sexual trait) of two closely related species of Calopteryx damselfly, and both solar radiation and maximum environmental temperature estimates. Wing pigmentation differs between these species, is gender specific and is used in species' discrimination. Only *C. virgo meridionalis* males showed a significant negative partial correlation between wing pigmentation degree and temperature. However, *C. virgo meridionalis* females showed a positive significant partial correlation between wing pigmentation degree and solar radiation. Wing pigmentation in *C. xanthostoma* males was not related to solar radiation or temperature. Thus, thermoregulation pressures poorly explained the observed variations in wing pigmentation between populations, although they might have an adaptive significance at the species' level. As wing pigmentation showed important latitudinal variation, several other selection pressures which might act on melanized traits are briefly discussed." (Authors)] Address: Outomuro, D., Departamento de Biología de Organismos y Sistemas, University of Oviedo, E-33071, Spain. E-mail: outomuro.david@gmail.com

**10290.** Patterson, R.J.; Smokorowski, K.E. (2011): Assessing the benefit of flow constraints on the drifting invertebrate community of a regulated river. River research and applications 27: 99-112. (in English) [Ontario, Canada; "The downstream effects of hydroelectric dam operations on the abundance and diversity of the

macroinvertebrate drift community of a regulated river were compared to that of an unregulated river, longitudinally and across three seasons. The regulated river operated under minimum flow and ramping rate (rate of change of flow) restrictions resulting in a 'modified peaking' regime, which means the facility could still peak, but at a slower rate and may not reach maximum turbine flows in the short time typically required to respond to market energy demand. The unregulated river had no dams or other water control structures. There was a trend of increasing abundance and diversity with distance from the dam on the regulated river, with no discernable trend along the unregulated river. While feeding guild proportions did not vary along the unregulated river, within the regulated river feeding guild proportions changed longitudinally as scrapers and collector gatherers increased, and filterers and predators decreased with distance downstream. The regulated river had similar or higher abundance across all seasons, with lower diversity in the spring. Seasonal average discharge was found to be lowest in summer on both rivers, with the regulated river benefiting from a minimum flow to help maintain higher abundance and diversity. Overall, our examination of the drifting invertebrate community on a regulated river support that operational constraints associated with modified peaking regimes helped mitigate the typical negative effects associated with river regulation." (Authors) Taxa - including Odonata - are treated at the order level.] Address: Smokorowski, Karen, Great Lakes Laboratory for Fisheries & Aquatic Sciences, Fisheries & Oceans Canada, 1219 Queen Street East, Sault Ste. Marie, ON, P6A 2E5, Canada. E-mail: Karen.Smokorowski@dfo-mpo.gc.ca

**10291.** Perez-Gutierrez, L.; Montes-Fontalvo, J.M. (2011): Heteropodagrion croizati sp. nov. (Odonata: Megapodagrionidae) with a key to the known species of the genus. Zootaxa 2810: 63-68. (in English) ["Heteropodagrion croizati sp. nov. is described and illustrated on the basis of two males and one female (holotype male: Colombia, Putumayo Dept., Mocoa, PNN Churumbelos (1°09'40.93'N 76°39'49.13'W) alt. 1000m, 28-I-2010. The new species is characterized by male paraproct surpassing length of cercus, genital ligula distally bilobulate, trumpet-shaped, and with laterally expanding distal lobes, and female with basal pale rings on all abdominal segments. A key for the known species of Heteropodagrion and the closely related Mesagrion leucorrhinum is provided." (Authors)] Address: Pérez-Gutiérrez, L., Grupo de investigación en Biodiversidad del Caribe colombiano. Depto de Biología, Universidad del Atlántico, km 7 antigua vía Puerto Colombia, Barranquilla, Colombia. E-mail: talysker@gmail.com

**10292.** Pérez-Santigosa, N.; Florencio, M.; Hidalgo-Vila, J.; Díaz-Paniagua, C. (2011): Does the exotic invader turtle, *Trachemys scripta elegans*, compete for food with coexisting native turtles? Amphibia-Reptilia 32(2): 167-175. (in English) ["Nowadays, established populations of exotic turtles, *Trachemys scripta elegans*, coexist with native turtles in the wild in southern Spain. We analysed the diet of this exotic species and compared it with the diet of the two native species (*Mauremys leprosa* and *Emys orbicularis*) in two ponds. The exotic turtle is an opportunistic omnivore. In one of our study ponds where exotic invasive crayfish were very abundant, adult and juvenile exotic turtles fed mainly on this prey. In the other study pond, juveniles fed mainly on animal matter and adults ate similar proportions of plants and animals. Na-

tive turtles also ingested mainly crayfish in the first study pond, but *M. leprosa* were mainly herbivorous in the second pond. We did not detect strong differences among the diets of the three species. While native species significantly differ in their diets, the exotic turtles did not differ from some groups of native ones. Exotic turtles had the widest range of food, overlapping the food spectra of different age groups of the two native species in both localities. Comparing with previous reports on native turtles diet of the same area, our results did not reveal changes in the diet which could be associated to interactions with exotic turtles, but the observed shift to a higher proportion of animals in the diet in one of the ponds were mainly due to the high abundance of exotic crayfish." (Authors) Odonata contributed significantly to the diet of all turtle species.] Address: Díaz-Paniagua, Carmen, Estación Biológica de Doñana (CSIC), P.O. Box 1056, 41080 Sevilla, Spain, Email: poli@ebd.csic.es

**10293.** Popa, M.; Zaharia, A. (2011): Early jurassic ovipositories on Bennettitalean leaves from Romania. *Acta Paleontologica Romaniae* 7: 285-290. (in English) ["Early Jurassic (Hettangian–Sinemurian) rare insect ovipositories occurring on *Pterophyllum* sp. bennettitalean (cycadeoidalean) leaves are described from Pregheda, a former open cast mine for bituminous coals belonging to the Sirinia Basin, Danubian Units of the South Carpathians, Romania. These ovipositories are represented by groups of 2-3 elliptical bodies, distributed with their longer axis parallel to the leaf venation, and associated in four distinct rows, parallel to the rachis, two rows on each side of it, a peculiar pattern for the ichnospecies *Paleoovoides rectus* (Vasilenko) Sarzetti et al. 2009 to which the material is assigned. The Hettangian–Sinemurian ovipositories recorded in Pregheda belong to fossil representatives of the Odonata. They were generated after the leaf's abscission, in a wetland area associated with a coal-generating marsh." (Authors)] Address: Popa, M., Univ. of Bucharest, Fac. of Geology & Geophysics, Laboratory of Palaeontology, 1, N. Bălcescu Ave., 010041, Bucharest, Romania. E-mail: mihai@mepopa.com

**10294.** Rantala, M.J.; Honkavaara, J.; Dunn, D.W.; Suhonen, J. (2011): Predation selects for increased immune function in male damselflies, *Calopteryx splendens*. *Proc. R. Soc. B* 278(1709): 1231-1238. (in English) ["Predation selects for numerous traits in many animal species, with sick or parasitized prey often being at high risk. When challenged by parasites and pathogens, prey with poor immune functions are thus likely to be at a selective disadvantage. We tested the hypothesis that predation by birds selects for increased immune function in a wild population of male damselflies *Calopteryx splendens*, while controlling for a trait known to be under selection by bird predation, dark wing-spots. We found that selection on both immune function and wing-spot size was significantly positive, and that selection on either trait was independent of selection on the other. We found no evidence of nonlinear quadratic or correlational selection. In contrast to previous studies, we found no phenotypic correlation between immune function and wing-spot size. There was also no difference in immune response between territorial and non-territorial males. Our study suggests that predation may be an important agent of selection on the immune systems of prey, and because the selection we detected was directional, has the potential to cause phenotypic change in populations." (Authors)] Address: Rantala, M.J., Dept of

Biology, University of Turku, FIN-20024 Turku, Finland. E-mail: markus.rantala@utu.fi

**10295.** Remsburg, A.J. (2011): Relative influence of prior life stages and habitat variables on dragonfly (Odonata: Gomphidae) densities among lake sites. *Diversity* 3(2): 200-216. (in English) ["Many aquatic species have discrete life stages, making it important to understand relative influences of the different habitats occupied within those populations. Although population demographics in one stage can carry over to spatially separated life stages, most studies of habitat associations have been restricted to a single life stage. Among Gomphidae, recruitment via adult oviposition establishes initial population sizes of the aquatic larvae. However, spatial variability in larval survivorship could obscure the relationship between adult and larval densities. This study uses surveys conducted during 2005 and 2006 of Gomphidae larval, emergence, and adult stages from 22 lake sites in northern Wisconsin, USA, to investigate (1) whether the Gomphidae density of each life stage correlated spatially with that of the preceding life stage and (2) what habitat factors help explain variation in densities at each life stage. Results indicated that adult densities from the previous season helped predict densities of early-instar larvae. This finding suggests that oviposition site selection controlled the local larval distribution more than larval survivorship or movement. Late-instar larval densities helped predict densities of emerging Gomphidae later the same season, suggesting that variation in survivorship of final-instar larvae among sites is small relative to the variation in larval recruitment. This study demonstrates that locations with higher densities of odonates in the water also have higher densities of odonates on land. In addition to the densities of Gomphidae in previous life stages, water clarity helped predict larval densities, and riparian wetland vegetation helped predict emergent dragonfly densities." (Author)] Address: Remsburg, Alysa, Unity College, 90 Quaker Hill Rd, Unity, ME 04988, USA. E-mail: aremsburg@unity.edu

**10296.** Rival, D.; Schönweitz, D.; Tropea, C. (2011): Vortex interaction of tandem pitching and plunging plates: a two-dimensional model of hovering dragonfly-like flight. *Bioinspiration & Biomimetics* 6(1) 016008: (in English) ["The force evolution and associated vortex dynamics on a nominal two-dimensional tandem pitching and plunging configuration inspired by hovering dragonfly-like flight have been investigated experimentally using time-resolved particle image velocimetry. The aerodynamic forces acting on the flat plates have been determined using a classic control-volume approach, i.e. a momentum balance. It was found that only the tandem phasing of  $\alpha = 90^\circ$  was capable of generating similar levels of thrust when compared to the single-plate reference case. For this tandem configuration, however, a much more constant thrust generation was developed over the cycle. Further examination showed that the force and vortex development on the fore-plate was unaffected by the tandem configuration and that nearly all variations in performance could be attributed to the vortex interaction on the hind-plate. By calculating the trajectory and strength of the hind-plate's trailing-edge vortex, the chain-like vortex interaction mechanism responsible for improved performance at  $\alpha = 90^\circ$  could be identified. The underlying result from this study suggests that the dominant vortex interaction in dragonfly flight is two dimensional and that the spanwise flow

generated by root-flapping kinematics is not entirely necessary for efficient propulsion but potentially due to evolutionary restrictions in nature." (Authors)] Address: Rival, D., Institute of Fluid Mechanics and Aerodynamics, Technische Universität Darmstadt, Germany. E-mail: derival@ucalgary.ca

**10297.** Roberts, N.W.; Porter, M.L.; Cronin, T.W. (2011): The molecular basis of mechanisms underlying polarization vision. *Phil. Trans. R. Soc. B* 366(1565): 627-637. (in English) ["The underlying mechanisms of polarization sensitivity (PS) have long remained elusive. For rhabdomic photoreceptors, questions remain over the high levels of PS measured experimentally. In ciliary photoreceptors, and specifically cones, little direct evidence supports any type of mechanism. In order to promote a greater interest in these fundamental aspects of polarization vision, we examined a varied collection of studies linking membrane biochemistry, protein-protein interactions, molecular ordering and membrane phase behaviour. While initially these studies may seem unrelated to polarization vision, a common narrative emerges. A surprising amount of evidence exists demonstrating the importance of protein-protein interactions in both rhabdomic and ciliary photoreceptors, indicating the possible long-range ordering of the opsin protein for increased PS. Moreover, we extend this direction by considering how such protein paracrystalline organization arises in all cell types from controlled membrane phase behaviour and propose a universal pathway for PS to occur in both rhabdomic and cone photoreceptors." (Authors) *Hemiodulia tau* is presented as ultraviolet-sensitive, blue-sensitive and green-sensitive. According a personal information given by the author, at present the development of polarization vision in odonates from larval stages through to adult is studied.] Address: Roberts, N.W., School of Biological Sciences, Univ. of Bristol, Woodland Road, Bristol BS8 1UG, UK. E-mail: nicholas.roberts@bristol.ac.uk

**10298.** Rosario, K.; Marinov, M.; Stainton, D.; Kraberger, S.; Wiltshire, E.J.; Collings, D.A.; Walters, M.; Martin, D.P.; Breitbart, M.; Varsani, A. (2011): Dragonfly cyclovirus, a novel single-stranded DNA virus discovered in dragonflies (Odonata: Anisoptera). *Journal of General Virology* 92: 1302-1308. (in English) ["We describe Dragonfly cyclovirus (DfCyV), a new species of ssDNA virus discovered using viral metagenomics in dragonflies (Libellulidae family) from the Kingdom of Tonga (Tongatapu and Vava'u islands). Metagenomic sequences of DfCyV were similar to viruses of the recently proposed Cyclovirus genus within the Circoviridae family. Specific PCR resulted in the recovery of twenty-one DfCyV genomes from three dragonfly species (*Pantala flavescens*, *Tholymis tillarga*, and *Diplacodes bipunctata*). The 1741 nucleotide DfCyV genomes share >95% nucleotide identity and are classified into eleven subtypes representing a single strain. The DfCyV genomes share 48-63% genome-wide nucleotide identity to cycloviruses identified in human faecal samples. Recombination analysis revealed three recombinant DfCyV genomes suggesting that recombination plays an important role in cyclovirus evolution. To our knowledge this is the first report of a circular ssDNA virus identified in insects, and the data may help elucidate evolutionary links among novel Circoviridae recently identified in animals and environmental samples." (Authors)] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: mgmarinov@yahoo.com

**10299.** Rowe, R.J.; Davies, C.; Davies, D.; Pohe, S.R.; Simpson, E.H. (2011): *Tramea loewii* (Odonata: Libellulidae), a dragonfly newly arrived in New Zealand. *New Zealand Journal of Zoology* 38(2): 189-193. (in English) ["Two adult females of the large, migratory dragonfly *Tramea loewii* were observed at Lake Rotokawau, Northland in 2005 and 2007. Larvae found at nearby Lake Waipara in 2007 indicate the species had bred in New Zealand. Given appropriate climatic conditions, this species may be expected to expand its range within the northern reaches of the country. Queensland and New Caledonia are likely sources for the New Zealand population. Morphological characters are provided to enable identification of adults and larvae in the field." (Authors)] Address: Rowe, R.J., School of Tropical Biology, James Cook University, Townsville 4811, Australia. E-mail: Richard.Rowe@jcu.edu.au

**10300.** Samways, M.J.; Pryke, J.S.; Simaika, J.P. (2011): Threats to dragonflies on land islands can be as great as those on oceanic islands. *Biological Conservation* 144(3): 1145-1151. (in English) ["We ask whether oceanic islands and equivalent-sized continental blocks, which we call here 'land islands', are similar or not in their species richness, number of range-restricted species, and in number of threatened species. We used sites in southern Africa and islands in the Western Indian Ocean. We chose dragonflies as they are taxonomically tractable, well surveyed, and provide a range of characteristics from narrow-range endemics to widely-spread and vagile opportunists. We then selected as many oceanic islands as possible where there were sufficient data to make comparisons with land islands of a similar area in African savanna, grassland and mountains rich in endemic species. Generalized Linear Mixed Models were used to analyse the overall, range-restricted and threatened species richness for all islands (both oceanic and land) and then for the two types of island separately. Species richness increased with island size, with oceanic and land island size relationships being similar. Land islands overall had significantly more range-restricted species. Species on land islands were as threatened as those on oceanic islands. However, the land islands of the Western Cape were under a higher level of threat than oceanic islands of comparative size. The large islands of Madagascar and Sri Lanka were outliers with very high levels of threat. Translated into conservation, the results illustrate that over-generalizations about island faunas being more threatened than continental ones are not necessarily valid. While not wishing to draw attention away from the urgent conservation action needed on many tropical islands, we argue that comparisons of oceanic versus land islands detract from the more urgent task of local conservation action based on the special needs of any particular area, whether land or oceanic. It is more meaningful to establish how threats operate and how to mitigate them on small populations rather than focusing purely on any particular island type per se." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**10301.** Schmidt Dalzochio, M.; Rodrigues, M.E. (2011): Description of the larva of *Archilestes exoletus* (Hagen in Selys) (Odonata: Lestidae). *Zootaxa* 2756: 65-68. (in English) ["The larva of *A. exoletus* is described and illustrated based on exuviae of reared larvae collected in Cascavel, State of Paraná, Brazil. The larva of *A. exole-*



tus can be distinguished from other species of Archilestes of which the larva has been described by the absence of a lateral spine at the margin of the 4th abdominal segment and having the cleft of the ligula closed." (Authors)] Address: Schmidt Dalzochio, Marina, Laboratory of Ecologia e Conservação de Ecossistemas Aquáticos, University of Vale do Rio dos Sinos, 93022-000, São Leopoldo, RS, Brazil. E-mail: mahsdalzochio@gmail.com

**10302.** Scudder, G.G.E.; Lucas, L.; Warman, L. (2011): Rarity and richness biodiversity hotspots of the montane Cordillera ecozone. In Assessment of Species Diversity in the Montane Cordillera Ecozone. Edited by G.G.E. Scudder and I.M. Smith. Royal British Columbia Museum: 1-7. (in English) ["Based upon available geo-reference distributional data on more than 15 taxa of native animals (including Odonata) and vascular plants in British Columbia, biodiversity hotspots were determined and mapped on the 1:50 000 NTS grid. Rarity hotspots are shown for provincially Red-listed animals and plants, and for the potentially rare and endangered freshwater and terrestrial invertebrates. Richness hotspots were determined for the freshwater animals, the terrestrial animals, and the vascular plants. It is shown that the Montane Cordillera Ecozone in British Columbia is a major hotspot region in the province for all the categories mapped. Some of the conservation implications are discussed." (Author)] Address: Scudder, G.G.E., Dept of Zoology, Univ. of British Columbia, Vancouver, BC, V6T 1Z4, Canada.

**10303.** Sesterhenn, T.M. (2011): Effects of predators and injury over different time scales in the damselfly *Ischnura posita* (Odonata: Coenagrionidae). *Annals of the Entomological Society of America* 104(2): 358-363. (in English) ["Sublethal appendage injury or loss has been shown to alter many behaviors of animals, including foraging and predation avoidance. But most studies of this phenomenon to date have been short-term in scope, and longer term studies may produce different results as seen in some studies on predator effects. Larval damselflies routinely autotomize their caudal lamellae and encounter predators, making them ideal for comparisons of short-term and longer term effects of appendage loss and predator exposure. In this study, I examined activity and foraging of larval *I. posita*, testing for effects of lamella loss and predator cues both in the short term (1 h) and the longer term (8 d). I predicted that both predators and injury would decrease activity and foraging for a short time and that these effects would diminish over time. Results indicated that only the most severe injuries affected foraging, delaying first prey capture when no predator was present; but injury did not affect total prey caught. In the 1-h experiment, damselflies had lower activity in the presence of predator cues, with no effect of injury, whereas the 8-day experiment showed no effect of predator cues on activity. I did not find a major effect of injury or predator cues on activity or foraging of larval damselflies; no effects were detectable over the entire 8-d study. I conclude that the ecological implications of such injuries in nature may often be negligible." (Author)] Address: Sesterhenn, T.M., Department of Biology, University of Kentucky, Lexington, KY 40506-0225, USA. E-mail: tsest@uky.edu

**10304.** Sibley, F.C. (2011): New species for Nebraska. *Argia* 23(1): 20-21. (in English) [New records for the Nebraska, USA State list are: *Argia nahuana*, *Enallagma vesperum*, *Nasiaeschna pentacantha*, *Dromogomphus*

sp., *Erpetogomphus designatus*, *Stylurus plagiatus*, *Epitheca spinigera*, and *Tramea calverti*.] Address: Sibley, F.C., The Conservation Agency, 6 Swinburne St. Jamestown, RI 02835, USA. E-mail: fcsibley@empacc.net

**10305.** Staniczek, A.H. (2011): Rivers and other freshwater habitats. Focus on aquatic insects. *Patrimoines naturels* 70: 251-257. (in English) [The paper includes a key to Odonata and an annotated species list of Odonata (n = 17) from Espiritu Santo, Vanuatu. *Agriocnemis exsudans*, *Ischnura aurora*, *Vanuatubasis santoensis*, *Vanuatubasis* sp., *Pseudagrion microcephalum*, *Pseudagrion* sp., *Anax guttatus*, *Hemicordulia fidelis*, *Diplacodes bipunctata*, *D. haematodes*, *D. trivialis*, *Neurothemis stigmatizans*, *Rhyothemis phyllis*, *Orthetrum serapia*, *O. villosovitatum*, *Tramea propinqua*, *Pantala flavescens*.] Address: Staniczek, A.H., Dept of Entomology, State Museum of Natural History, Rosenstein 1, 70191 Stuttgart, Germany. E-mail: arnold.staniczek@smns-bw.de

**10306.** Stoks, R.; De Block, M. (2011): Rapid growth reduces cold resistance: Evidence from latitudinal variation in growth rate, cold resistance and stress proteins. *PLoS ONE* 6(2): e16935. doi:10.1371/journal.pone.0016935: 6 pp. (in English) ["Background: Physiological costs of rapid growth may contribute to the observation that organisms typically grow at submaximal rates. Although, it has been hypothesized that faster growing individuals would do worse in dealing with suboptimal temperatures, this type of cost has never been explored empirically. Furthermore, the mechanistic basis of the physiological costs of rapid growth is largely unexplored. Methodology/Principal Finding: Larvae of the damselfly *Ischnura elegans* from two univoltine northern and two multivoltine southern populations were reared at three temperatures and after emergence given a cold shock. Cold resistance, measured by chill coma recovery times in the adult stage, was lower in the southern populations. The faster larval growth rates in the southern populations contributed to this latitudinal pattern in cold resistance. In accordance with their assumed role in cold resistance, Hsp70 levels were lower in the southern populations, and faster growing larvae had lower Hsp70 levels. Yet, individual variation in Hsp70 levels did not explain variation in cold resistance. Conclusions/Significance: We provide evidence for a novel cost of rapid growth: reduced cold resistance. Our results indicate that the reduced cold resistance in southern populations of animals that change voltinism along the latitudinal gradient may not entirely be explained by thermal selection per se but also by the costs of time constraint-induced higher growth rates. This also illustrates that stressors imposed in the larval stage may carry over and shape fitness in the adult stage and highlights the importance of physiological costs in the evolution of life-histories at macro-scales." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U. Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**10307.** Sychra, J.; Adamek, Z. (2011): The impact of sediment removal on the aquatic macroinvertebrate assemblage in a fishpond littoral zone. *J. Limnol.* 70(1): 129-138. (in English) [Bottom sediment removal, a widely used technique in restoration management of standing water bodies, has a strong influence on communities of aquatic organisms. As most information on the impact of sediment removal on the aquatic environment comes from studies on lakes, the aim of this study was to describe macroinvertebrate assemblage

succession in a fishpond (Štěpánek fishpond, Bohemian-Moravian highlands, Czech Republic) littoral zone following restoration by sediment removal during the winter of 2003/2004. Semi-quantitative hand net sampling was undertaken one year before (2003) and in each of the following five years (2004–2008) after sediment removal. A significant decrease in both abundance (approx. 90% of individuals) and diversity (approx. 30% of taxa) of macroinvertebrates was detected immediately after pond restoration. The values gradually increased over subsequent years, reaching comparable abundance and diversity three years after sediment removal. A significant shift was recorded in the taxonomic and functional composition of the macroinvertebrate assemblage after sediment removal. Mayfly larvae were the dominant invertebrates before restoration, while chironomid larvae and oligochaetes dominated after sediment removal. Phytophilous taxa, grazers and scrapers, and swimming or diving invertebrates were common in 2003, whilst open-water taxa preferring mud and other mostly inorganic microhabitats, gatherers/collectors, and burrowing/boring invertebrates were relatively common after sediment removal. In 2008, the assemblage reverted towards the situation before sediment removal, probably connected with a lower water level and accelerated macrophyte bed succession. Principal Component Analysis on the species data confirmed the differences in invertebrate taxonomic structure among sampling years. Succession of the fishpond invertebrate assemblage in the years following sediment removal was mainly influenced by fish farming practice and local conditions, i.e. the presence of macrophyte beds, mesohabitat changes following restoration, and the presence of other water bodies in the surroundings." (Authors) Odonata taxa reported are: *Platycnemis pennipes*, *Coenagrion* sp., *Ischnura elegans*, *Ischnura* sp., and *Libellula depressa*.] Address: Sychra, J., Dept of Botany and Zoology, Faculty of Science, Masaryk Univ., Kotlářská 2, 611 37 Brno, Czech Republic. E-mail: dubovec@seznam.cz

**10308.** Takahashi, Y.; Watanabe, M. (2011): Male mate choice based on ontogenetic colour changes of females in the damselfly *Ischnura senegalensis*. *Journal of Ethology* 29(2): 293-299. (in English) ["While male mate choice behaviour has been reported in many taxa, little is known about its plasticity and evolutionary consequences. In *I. senegalensis*, females exhibit colour dimorphism (gynomorph and andromorph). The body colour of gynomorphs changed ontogenetically in accordance with sexual maturation, while little change occurred in andromorphs. To test the male mate choice between sexually immature and mature females of both morphs, binary choice experiments were conducted. Virgin males that were reared separately from females after emergence did not show significant preference between sexually immature and mature females for both morphs, indicating that virgin males were unable to discriminate female reproductive status. On the other hand, males that had experienced copulation with gynomorphs preferred sexually mature gynomorphs to sexually immature ones. However, males that had experienced copulation with andromorphs could not discriminate between sexually immature and mature andromorphs, probably due to the absence of significant ontogenetic change in their thoracic colour. Therefore, female body colour is an important cue for males in discriminating between sexual maturation stages. Learned mate discrimination depending on copulation experien-

ce might help males to detect potential mates effectively and avoid sexually unreceptive immature female. We finally discuss the adaptive significance of the ontogenetic colour change in females." (Authors)] Address: Takahashi, Y., Graduate School of Life & Environmental Sciences, Univ. of Tsukuba, 1-1-1 Tennodai, Tsukuba, Ibaraki Japan. E-mail: yuyuyuyu@ies.life.tsukuba.ac.jp

**10309.** Todd, B.D.; Bergeron, C.M.; Hepner, M.J.; Burke, J.N.; Hopkins, W.A. (2011): Does maternal exposure to an environmental stressor affect offspring response to predators? *Oecologia* 166(1): 283-290. ["There is growing recognition of the ways in which maternal effects can influence offspring size, physiological performance, and survival. Additionally, environmental contaminants increasingly act as stressors in maternal environments, possibly leading to maternal effects on subsequent offspring. Thus, it is important to determine whether contaminants and other stressors can contribute to maternal effects, particularly under varied ecological conditions that encompass the range under which offspring develop. We used aquatic mesocosms to determine whether maternal effects of mercury (Hg) exposure shape offspring phenotype in the American toad (*Bufo americanus*) in the presence or absence of larval predators (dragonfly naiads). We found significant maternal effects of Hg exposure and significant effects of predators on several offspring traits, but there was little evidence that maternal effects altered offspring interactions with predators. Offspring from Hg-exposed mothers were 18% smaller than those of reference mothers. Offspring reared with predators were 23% smaller at metamorphosis than those reared without predators. There was also evidence of reduced larval survival when larvae were reared with predators, but this was independent of maternal effects. Additionally, 5 times more larvae had spinal malformations when reared without predators, suggesting selective predation of malformed larvae by predators. Lastly, we found a significant negative correlation between offspring survival and algal density in mesocosms, indicating a role for top-down effects of predators on periphyton communities. Our results demonstrate that maternal exposure to an environmental stressor can induce phenotypic responses in offspring in a direction similar to that produced by direct exposure of offspring to predators." (Authors)] Address: Todd, B.D., Department of Fish and Wildlife Conservation, Virginia Tech, 100 Cheatham Hall, Blacksburg, VA, 24061, USA

**10310.** Topkara, E.T.; Ozbek, M.; Tasdemir, A.; Yildiz, S.; Balik, S.; Ustaoglu, M.R. (2011): Determination of pollution level of Yuvarlak stream (Koycegiz-Mugla) by using benthic macro invertebrates. *Journal of Animal and Veterinary Advances* 10(9): 1194-1201. (in English) [Turkey; Odonata are treated at the genus level.] Address: Topkara, E.T., Dept of Hydrobiology, Faculty of Fisheries, Ege University, 35100 Bornova-Izmir, Turkey

**10311.** Vanderhaeghe, F. (2011): *Lestes dryas* in the west of Vlaams-Brabant. "In Flanders. Libellenvereniging Vlaanderen —nieuwsbrief 5(1): 2-3. (in Dutch, with English summary) [*L. dryas* is mainly confined to the Antwerp en Limburg Campine region, with more scattered stations elsewhere. In July 2010 the author discovered two males at a pond in Merchtem, about 5 km from where this species had also been found also in 1997. Although this species shows important dispersion capacities, we suggest it is that a local population could be present and in general it would be wise to have a

good search for this species elsewhere also." (Author)] Address: Floris Vanderhaeghe. E-mail: floris.vanderhaeghe@inbo.be

**10312.** Wendzonka, J.; Buczyński, P. (2011): Literatura i recenzje [Literature and reviews]: – Recenzja. Bellmann H. 2010. Przewodnik entomologa. Ważki. MULTICO Oficyna Wydawnicza. 280 ss. ISBN 978-83-7073-706-1. [Review. Bellmann, H. 2010. [Entomologist's guide. Dragonflies]. MULTICO Oficyna Wydawnicza. 280 pp. ISBN 978-83-7073-706-1.]. Odonatrix 7(1): 27-30. (in Polish, with English summary) ["The reviewed work is the first general book about dragonflies from over 100 years in Poland. It has been translated from the German edition. It contains general information about dragonflies of Central Europe with keys to adults (relatively good) and larvae (very poor) and individual descriptions of all species with good photographs and drawings. Unfortunately, the publisher has not consulted this edition with any Polish odonatologists and the book contains a lot of mistakes and omissions." (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**10313.** Wiesenborn, W.D. (2011): Nitrogen Contents in Riparian Arthropods is most dependent on allometry and order. Florida Entomologist 94(1): 71-80. (in English, with Spanish summary) ["I investigated the contributions of body mass, order, family, and trophic level to nitrogen (N) content in riparian spiders and insects collected near the Colorado River in western Arizona. Most variation (97.2%) in N mass among arthropods was associated with the allometric effects of body mass. Nitrogen mass increased exponentially as body dry-mass increased. Significant variation (20.7%) in N mass adjusted for body mass was explained by arthropod order. Adjusted N mass was highest in Orthoptera, Hymenoptera, Araneae, and Odonata and lowest in Coleoptera. Classifying arthropods by family compared with order did not explain significantly more variation (22.1%) in N content. Herbivore, predator, and detritivore trophic-levels across orders explained little variation (4.3%) in N mass adjusted for body mass. Within orders, N content differed only among trophic levels of Diptera. Adjusted N mass was highest in predaceous flies, intermediate in detritivorous flies, and lowest in phytophagous flies. Nitrogen content in riparian spiders and insects is most dependent on allometry and order and least dependent on trophic level. I suggest the effects of allometry and order are due to exoskeleton thickness and composition. Foraging by vertebrate predators, such as insectivorous birds, may be affected by variation in N content among riparian arthropods." (Author)] Address: Wiesenborn, W.D., U.S. Bureau of Reclamation, Lower Colorado Regional Office, P.O. Box 61470, Boulder City, NV 89006

**10314.** Wong-Munoz, J.; Cordoba-Aguilar, A.; Cueva del Castillo, R.; Serrano-Meneses, M.A.; Payne, J. (2011): Seasonal changes in body size, sexual size dimorphism and sex ratio in relation to mating system in an adult odonate community. Evolutionary Ecology 25(1): 59-75. (in English) [Study area: 27 lakes of the Columbia National Wildlife Refuge (USA) in 1997, which occur in the centre of the Columbia Basin in eastern Washington State (46°550' N, 119°150' W; USA. "Seasonal environments impose developmental time constraints on insects which can be reflected in body size and sex ratio. By tracking these two aspects in recently emerged adults of 10 species of an odonate community in a number of lakes, we investigated whether (a) body size in both sexes

decreased as the flight season progressed and whether this led to seasonal changes in sexual size dimorphism (SSD); (b) SSD patterns were related to mating systems; (c) biases in sex ratio could be explained by mortality rates associated with the largest sex (e.g. in species with male-biased SSD, a female-biased sex ratio; in species with female-biased SSD, a male-biased sex ratio). Our results indicated that adults in most species, but not all, tend to reach a smaller body size as the season progressed. However, the opposite pattern was found in a few species. Predictions about the relation between SSD and mating systems were confirmed: a female-biased SSD in nonterritorial species and monomorphism for territorial species. However, predictions of biases in sex ratio according to SSD were not met in all species. Interestingly, changes in body size and SSD along the season were lake-specific in two species in which these patterns could be examined. These results, although partially supportive of environmental and sexual selection patterns acting on size and sex ratio as documented in other odonate species, indicate that we are still far from understanding seasonal constraints in these animals." (Authors) 14 species (*Aeshna californica*, *A. multicolor*, *Anax junius*, *Erythemis collocata*, *Libellula forensis*, *Pachydiplax longipennis*, *Sympetrum costiferum*, *S. occidentale*, *Enallagma boreale*, *E. carunculatum*, *Ischnura cervula*, *I. perparva*, *Lestes congener*, *Tramea lacerata*) were caught, but only 10 species used for the analysis, as the small sample size of the remaining four prevented statistical analysis.] Address: Córdoba-Aguilar, A., Depto de Ecol. Evol., Inst. Ecología, Univ. Nacional Autónoma de México, Ciudad Universitaria, Apdo. Postal 70-275, 04510 México DF, Mexico. E-mail: acordoba@ecologia.unam.mx

**10315.** Zhang, H.-m.; Tong, X.-l. (2011): Descriptions of *Boyeria karubei* Yokoi and *Periaeschna f. flinti* Asahina larvae from China (Anisoptera: Aeshnidae). Odonatologica 40(1): 57-65. (in English) ["The final stage larvae of the 2 species are for the first time described and illustrated based on laboratory reared specimens. The reared adults are also illustrated and discussed. Some biological notes are provided." (Authors)] Address: Zhang, H.-m., Dept of Entomology, College of Natural Resources & Environment, South China Agricultural Univ., Guangzhou-510642, China. zhanghaomiao6988@gmail.com

**10316.** Zhang, Z.-Q. (2011): Describing unexplored biodiversity: Zootaxa in the International Year of Biodiversity. Zootaxa 2768: 1-4. (in English) ["In the International Year of Biodiversity (2010), Zootaxa published 1,582 papers (including 92 monographs) in 405 issues, with a total of 32,330 pages. These papers included descriptions of 3,951 new taxa, of which 3,664 are of the species-group, 268 of the genus-group and 19 of the family-group. It is estimated that the total new animal species described in 2010 is most likely to be between 15,000 and 20,000, and Zootaxa has thus contributed 18 to 24% of the total." (Author) Odonata species: 30 and Odonata genus: 3.] Address: Zhang, Z.-Q., Landcare Research, Private Bag 92170, Auckland 1142, New Zealand. E-mail: ZhangZ@landcareresearch.co.nz

**Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for linguistic help and Werner Piper for contributing many papers to this issue.**



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105; E-mail: K.Reinhardt@sheffield.ac.uk

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: mg\_marinov@yahoo.com

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

## 1997

**10317.** Croyle, B.T. (1997): Population and community ecology of stream macroinvertebrates: the role of disturbance. M.Sc. thesis, Zoology, Texas Tech University, Lubbock: VII + 98 pp. (in English) [Texas, USA. "Quantifying factors that influence the abundance, distribution, or diversity of species within communities is a major focus of ecology and conservation biology. As concerns for the preservation and maintenance of worldwide biodiversity increase, identifying and understanding these factors becomes a critical endeavour. This goal should not be limited to large preserves of endangered habitat such as Yellowstone National Park or the plains of Africa. Indeed, knowledge gained from addressing such topics in small, accessible localities is of interest in its own right, and may prove useful when dealing with endangered habitats. Streams play vital roles in terrestrial ecosystems, as a source of water, in cycling nutrients, and as habitat for many organisms during part or all of their life cycles. This study assesses factors that affect the community structure of streams (i.e. the distribution, abundance, and diversity of aquatic macroinvertebrates)." (Author) The list of taxa sampled includes *Hetaerina americana*, *Agria* sp., *Basiaeschna*, *Dromogomphus*, *Hagenius brevistylus*, *Eretogomphus* sp., *Libellula* sp., *Brechmorhoga mendax*, and *Macromia* sp.] Address: not stated

## 1999

**10318.** Erickson, B.R. (1999): Fossil lake Wannagan (Paleocene: Tiffanian) Billings county, North Dakota. Miscellaneous series No. 87 North Dakota Geological Survey: IV + 9 pp. (in English) ["Fossil Lake Wannagan is a new name for a local freshwater lake of undetermined size that existed as part of a floodplain system during the Late Paleocene. It is located in the upper breaks of the badlands of the Little Missouri River in western North Dakota. Fossil Lake Wannagan is recognized from: sediments of fluvial, paludal and lacustrine character; a section of shoreline with well-defined beach cusps; and an exceptionally well-preserved freshwater assemblage of fossils. A sequence of stratified sediments records the brief history of its development and termination by crevasse splay deposition. Limnogeological and paleoenvironmental aspects of this ancient lake are presented along with its age and correlations. The name "Fossil Lake Wannagan" is, herein, introduced for the first time."

(Author) *Gomphaeschna schrankii* is listed as member of the Wannagan creek fauna.] Address: Erickson, B.R., Department of Paleontology, The Science Museum of Minnesota, St. Paul, Minnesota 55101, USA

## 2000

**10319.** Ketelaar, R.; Clausen, W.; Busse, R.; Eilk, J.L. van (2000): *Coenagrion ornatum* in Europe and its chances in The Netherlands. *Brachytron* 4(2): 8-15. (in Dutch) ["*C. ornatum* is a rare damselfly in Europe with an intriguing outpost north of Osnabrück, 90 kilometers from the Dutch border (Germany). *C. ornatum* is present here in very small streams with extensive *Berula erecta* vegetation. The species is in serious decline and is currently reproducing in moderate numbers (tens of individuals) at only one location. The main reasons for the decline of *C. ornatum* in central Europe are the cold winter of 1995 / 1996 when many localities became deep frozen, the lack of management practice, or too intensive management, habitat destruction, dessication and eutrofication. This article discusses the possible occurrence of this species in The Netherlands. Although suitable habitat is locally present and the dispersal capacities of *C. ornatum* seems to be rather well developed, climatic conditions and the lack of a large source population appear to be limiting factors. For the moment, it is not likely that *C. ornatum* can be recorded in The Netherlands." (Authors)] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: ketelaar@vlinderstichting.nl

**10320.** Luzon-Ortega, J.M.; Tierno de Figueroa, J.M. (2000): First records of Odonata (Insecta, Odonata) from the Sierra de Huetor Natural Park (Granada, Spain). *Boletín de la Asociación Española de Entomología* 24(1-2): 257-259. (in Spanish) [16 Odonata species from 12 localities are documented.] Address: Luzon-Ortega, J. M., Departamento de Biología Animal y Ecología, Facultad de Ciencias, Universidad, 18707, Granada, Spain

**10321.** Petr, J. (2000): Aquatic insects (Odonata, Heteroptera, Trichoptera, Coleoptera) of small lakes in selected peatbogs of the Bohemian Forest and their relation to some environmental factors. *Silva Gabreta* 5: 121-134. (in Czech, with English summary) [*Aeshna juncea*, *A. subarctica*, *Anax imperator*, *Sympetrum danae*, *Leucorhinia dubia*, *Cordulia aenea*, *Coenagrion hastulatum*, and *Ischnura elegans* are reported from four localities in the

Modravské peatbog area studied during 1993-1995.] Address: Petr, J., Jihočeská univerzita, Pedagogická fakulta, Jeronýmova 10, CZ-37115 České Budejovice, Czech Republic

## 2002

**10322.** Kadoorie Farm & Botanic Garden; Reels, G.T. (2002): Report of Rapid Biodiversity Assessments at Maershan Nature Reserve, Northeast Guangxi, China, 1998 and 2001. South China Forest Biodiversity Survey Report Series: No. 16 (Online Simplified Version): ii + 20 pp. (in English) ["Thirty-one dragonfly species were recorded during the survey, including some undescribed species. Most frequently encountered were *Copera ciliata*, *Idionyx carinata*, and *Orthetrum triangulare*. Some of these records represent extensions of the known range: The *Oligoaeschna* is an important record; very few *Oligoaeschna* specimens have been obtained from China and none from continental China. The female of *O. petalura* from Hainan is undescribed; *O. pyanan* is known from Hainan. *Boyeria sinensis* has not previously been recorded from Guangxi. Several species recorded, including *Bayadera melanopteryx*, *Indocnemis orang*, *Planaeschna suichangensis*, *Idionyx carinata* and *Somatochlora dido*, are indicators of high stream integrity." (Author)] Address: Reels, G., H-3-30 Fairview Park, Yuen Long, Hong Kong. E-mail address: gtreels@gmail.com

**10323.** Kadoorie Farm and Botanic Garden; Wilson, K. (2002): Report of a Rapid Biodiversity Assessment at Qingshitan Headwater Forest Nature Reserve, Northeast Guangxi, China, 25 to 26 August 1998. South China Forest Biodiversity Survey Report Series (Online Simplified Version) No. 17: ii + 12 pp. (in English) ["Sixteen species of odonates were recorded, including two which have not yet been identified. The record of *Calopteryx melli* is important, as the genus had not been recently recorded from China and was previously known only from Guangdong. The Qingshitan record follows the first provincial record for the species, made at Huaping on 16 August 1998." (Authors)] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: wilsonkd@ntlworld.com

**10324.** Kano, K.; Miyahata, T. (2002): So many victims in *Sympetrum frequens* floating on the water surface. Tombo 45: 27-28. ["On August 25, 2002, we found many dead specimens of *Sympetrum frequens* floating on the water surface of Shobu-ike pond (alt. 700 m asl) at the hillside of Mt. Akagi, Japan, where the ambient temperature seemed low and several individuals of *S. frequens* perched on grasses at the water edge looked white because they were drenched with dew drops. A few of them flew up weakly, and soon *Aeshna nigroflava* grasped one of them, but he did not eat but released it. The *S. frequens* fell on the water surface, became the victim of water striders. According to the weather data of Akagi station rainfall continued for 15 days from the beginning of August, and rainfall at night might have lowered the body temperature of *S. frequens*, and caused such accidents." (Author)] Address: Kano, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**10325.** Karube, H. (2002): Two new species of the genus *Planaeschna* (Odonata: Aeshnidae) from central Vietnam. Tombo 45: 7-11. (in English) [*Planaeschna owadai* sp. nov. (holotype male, Bach Ma National Park, Thua Thien Fue, central Vietnam, 4-X-2001, M. Owada

leg.) and *P. bachmaensis* sp. nov. (holotype male, Bach Ma National park, Thua Thien Fue, central Vietnam, 7-VI-2001, H. Karube leg.) are described. The former is closely related to *P. intersedens* from northern India, and the latter is related to *P. suichangensis* from South China. The holotypes are deposited in the collection of the National Science Museum, Tokyo, Japan.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan

**10326.** Kawashima, I (2002): Description of the larva of aeshnid dragonfly *Sarasaeschna niisatoi* (Karube, 1998) (Aeshnidae: Gomphaeschninae) from northern Vietnam. Tombo 45: 15-19. (in English) ["The larval morphology in last two instars of *S. niisatoi* is described and illustrated. The external larval characters of this species are compared with the larvae of *S. pryeri* and *S. kunigamiensis*.] Address: Kawashima, I., Nagasawa 1-50-9, Yokosuka-shi, Kanagawa, 239-0842 Japan

**10327.** Rahaman, A.A. (2002): Mangrove insect fauna of Muthupet, Tamil nadu. National Seminar on Conservation of Eastern Ghats, March 24-26, 2002, held at Tirupati, Andhra Pradesh: 327-338. (in English) [India; this is an additional frustrating example on ongoing rack and ruin of proper taxonomy and taxa identification in African and Asian countries: "Among the delicate Odonates Aeshnid sp and *Rhyotherus varigata* were of common occurrence.": "*Rhyotherus varigata*, *Acisoma panorpoides*, *Aris vivida*, *Crocothemis erythraea*, *Orthetrum brunneum*, *Libellula luctuosa*, 3 unidentified species."] Address: Rahaman, A.A., 21, Vidhya Nagar, Erode-638009, India

**10328.** Rocha, C.F.D.; Dutra, G.F.; Vrcibradic, D.; Menezes, V.A. (2002): The terrestrial reptile fauna of the Abrolhos Archipelago: species list and ecological aspects. Braz. J. Biol 62(2): 285-291. (in English, with Portuguese summary) [Bahia, Brazil; the diet of the lizard, *Tropidurus torquatus* is dominated by ants, but also included one unidentified Odonata specimen.] Address: Rocha, C.F.D., Departamento de Ecologia, Instituto de Biologia, Universidade do Estado do Rio de Janeiro, Rua São Francisco Xavier, 524, Maracanã, CEP 20550-019, Rio de Janeiro, Brazil. E-mail: cfdrocha@uerj.br

**10329.** Yokoi, N.; Kano, L. (2002): Odonata collected in Lak Sao and its neighbouring regions, central Laos, in spring. Tombo 45: 23-26. (in Japanese, with English summary) [A total of 40 Odonate species recorded in Lak Sao and its neighbouring regions, central Laos, during April 29 to May 3, 2001 is listed. Among them are 14 species recorded from Laos for the first time. Some taxonomically and zoogeographically interesting species are illustrated.] Address: Yokoi, N., 2-37-11, Kaisei, Koriyama, Fukushima, 963-8851 Japan

## 2003

**10330.** Aberlenc, H.-P.; Lentenois, P. (2003): Les insectes du bois de Païolive. In: Holthof, J.F. & Schnetzler, J. (Eds), *De Saint-Eugène en Païolive, Montmélian et les Vans, La Fontaine de Siloé et Saint-Eugène en Païolive*. 320 pp: 55-72. (in French) [Département Ardeche, France. The Bois de Païolive is a forest situated at the eastern fringe of the Cevennen. It grows on a karstic plateau south of the river Chassezac within the administrative area of the villages Les Vans, Banne and Berriasset-Casteljau. A total of 38 Odonata species is listed, in-

cluding *Coenagrion mercuriale*, *Oxygastra curtisi*, and *Macromia splendens*. This species protected by the European law are briefly commented. Supplemental data to the regional fauna are updated in Aberlenc (2008) and Aberlenc (2011: [www.aberlentomo.fr/1listeinsectespaioilive29jan2011.doc](http://www.aberlentomo.fr/1listeinsectespaioilive29jan2011.doc)) Address: Aberlenc, H.P., CIRAD, UMR CBGP, TA A-55/L, 34398 Montpellier cedex 5, France

**10331.** Bass, D. (2003): A survey of freshwater macroinvertebrates in Tobago. *Living World - Journal of the Trinidad and Tobago Field Naturalists' Club*, 2003: 64-69. (in English) ["A survey of macroinvertebrates inhabiting the freshwater environments of Tobago was made during April, May, and June of 1996. This collection yielded 61 species, bringing the total number of freshwater macroinvertebrate taxa known from Tobago to 112. Dominant taxa included a few species of gastropods, decapod crustaceans, ephemeropterans, odonates, hemipterans, and coleopterans. Species richness was usually greatest in streams having cobble substrates and flowing through undisturbed forested land. Generally this macroinvertebrate fauna is sparse when compared to that of continents, most likely due to the relatively small size of Tobago and to a much lesser extent, human disturbance of freshwater environments in some areas of the island. Further studies are likely to find additional species that were previously unknown to occur on Tobago, some of which may be endemic to the island." (Author) The following taxa are listed: *Argia* sp., *Dythemis* sp., *Erythemis vesicula*? *Ischnura ramburii*, *Micrathyrta* sp.] Address: Bass, D., Biology Dept, Univ. of Central Oklahoma, Edmond, Oklahoma, USA 73034. E-mail: [Dbass@ucok.edu](mailto:Dbass@ucok.edu)

**10332.** Birkin, E.; Quin, B.; Jelinek, A. (2003): *Hemiphysalia damselfly* / *Hemiphysalia mirabilis*. *Flora & Fauna Action Statement* 46: 1-5. (in English) [State of Victoria, Australia; distribution and conservation status of *H. mirabilis* are outlined, and the major conservation objectives and intended regional management actions are listed.] Address: Publishers: Dept Sustainability & Environment, 8 Nicholson St. East Melbourne, Victoria 3002 Australia

**10333.** Eda, S. (2003): Annual meeting of the Japanese Society for Odonatology in 2003. *Tombo* 46: 33-34. (in Japanese, with English summary) ["The Annual meeting of the Japanese Society for Odonatology was held at saga city in Kyushu, on May 31 and June 1, 2003, and 53 members attended." (Author)] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: [SND 02767@nifty.com](mailto:SND 02767@nifty.com)

**10334.** Eda, S. (2003): Annual meeting of the Japanese Society for Odonatology in 2002. *Tombo* 45: 35. (in Japanese, with English summary) [The Annual meeting of the Japanese Society for Odonatology was held at Shibaura Institute of Technology in Tokyo, Japan, on November 23 and 24, 2002. 78 members attended.] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: [SND 02767@nifty.com](mailto:SND 02767@nifty.com)

**10335.** Eda, S. (2003): On the black stripes on the lateral sides of thorax appeared in *Sympetrum e. eroticum* (Selys). *Tombo* 46: 33. (in Japanese, with English summary) ["On September 28, 2003, a male of *S. e. eroticum* having black stripes instead of black spots on the first lateral sutures was captured at the lake Kutsuzawa-ko in Shiojin City, Nagano Prefecture. Though the black stripes are somewhat slender, they resemble to that of *S. darwinianum*." (Author)] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: [SND 02767@nifty.com](mailto:SND 02767@nifty.com)

**10336.** Fukunaga, K.; Tomita, M.; Sumida, W.; Toshiro, K. (2003): Discovery of *Libellula angelina* Selys at Mishima Island of Hagi City in Yamaguchi pref. *Tombo* 46: 29-30. (in Japanese, with English summary) [13-V-2003; Mishima, a small island of the Japanese Sea about 45 km remote from the main island of Honshu, Japan.] Address: not stated in English

**10337.** Ishikawa, H. (2003): A new record of *Ictinogomphus pertinax* (Selys) from Kanagawa pref. *Tombo* 45: 40. (in Japanese, with English summary) [On August 13, 2002, a male of *I. pertinax* was captured at Futatsu-ike pond in Yokohama, Kanagawa Prefecture, Japan. This species has rapidly spread its distribution to the north and east during the past ten years. This is the first record for the Kanagawa Prefecture and the Kanto district, and thought to be the northern most and eastern most record of distribution at present." (Author)]

**10338.** Kano, K. (2003): *Copera tokyoensis* Asahina bitten by an ant on the mesotibia. *Tombo* 46: 8. (in Japanese, with English summary) ["On July 6, 2003, I observed that a deceased ant *Lasius japonicus* was attached to the mesotibia of *Copera tokyoensis* in Itakura, Gunma Prefecture, Japan] Address: Kano, K., 5-19-17-01, Koishikawa, Bunkyo-ku, Tokyo, 112-0002, Japan

**10339.** Kawashima, I. (2003): Redescription of the larva of the aeshnid dragonfly, *Sarasaeschna kunigamiensis* (Ishida, 1972) (Aeshnidae) from Okinawa-jima Is., Ryukyu Isls. *Tombo* 46: 13-16. (in English) ["Many external characters of this species are closely allied to those of *S. pryleri* (Martin, 1909) from the mainland of Japan, not to *S. niisatoi* (Karube, 1998) from northern Vietnam." (Author)] Address: Kawashima, I., Nagasawa 1-50-9, Yokosuka-shi, Kanagawa, 239-0842 Japan

**10340.** Kojo, T. (2003): On the nocturnal roosting in *Orthetrum albistylum speciosum*. *Tombo* 45(1/4): 36-38. (in Japanese, with English summary) ["The author observed three cases of nocturnal roosting by males of *O. albistylum speciosum* during middle and late August, 2001, in a condominium garden in a suburban area of Saitama Prefecture, Kanto District, Japan. The observations on all cases were made from the moment they touched the branches of low trees in the late afternoon to the moment of flight in the early morning. Roosting time was about 12 hours on average. They hung vertically on the branch with their wings spread and their dorsum to the west. After the dark, they became insensitive and never moved at any time during their roost. Just before flying off, they appeared sometimes to warm up by clipping wings and bobbing abdomen." (Author)] Address: not transliterated into English

**10341.** Kojo, T. (2003): *Sympetrum infuscatum* changes posture in the nocturnal roosting. *Tombo* 46: 23-28. (in Japanese, with English summary) ["The author observed the nocturnal roosting posture, *S. infuscatum* during the period from Aug. to Sept. 2001 and again in Aug. to Sept. 2002 in a condominium garden in a suburban area of Saitama Prefecture, Kanto District, Japan. In this report, I describe the changes in the roosting posture using photographs. One of the typical characteristics of *S. infuscatum* is that adults change posture during a period of nocturnal roosting. More precisely, although they hang horizontally during the beginning of the nocturnal roosting period, they gradually change posture to a vertical direction during the middle of the night and then change posture again to a horizontal position before flying off in the early morning. This is a remarkable difference from *Or-*



thetrum albistylum speciosum which does not change posture during nocturnal roosting." (Author)] Address: not stated in English transliteration

**10342.** Marine, N. (2003): Triple connection of *Orthetrum albistylum speciosum* (Uhler). Tombo 46: 34. (in bilingual in Japanese and English) [20-VII-1997; Nakamura City, Kochi Prefecture, Japan.] Address: not stated in English transliteration

**10343.** Miyagawa, T. (2003): A new record of *Trithemis aurora* from Kumamoto pref., Kyushu. Tombo 45: 39. (in Japanese, with English summary) [male and female specimens of *T. aurora* were found on September 12, 2002. This is the first record from the Kumamoto Prefecture, Kyushu, Japan.] Address: not transliterated into English

**10344.** Müller, O. (2003): Interaktion zwischen invasiven Amphipoden und Gomphidenlarven. Libellennachrichten 8/9: 10. (in German) [The paper introduces to the potential treat of Odonata larvae caused by the invasive neozon species *Dikerogammarus villosus*.] Address: Müller, O., Fischerstr. 45, 15230 Frankfurt/Oder, Germany. E-mail: o.mueller@gauss-gymnasium.de

**10345.** Ozono, A. (2003): A case of oviposition of *Lestes sponsa* (Hansemann) into mud and dead plants. Tombo 46: 31-32. (in Japanese, with English summary) ["*L. sponsa* has been known to lay eggs into the living tissues of aquatic plants and grass on the water's edge. During observation at an artificial irrigation pond in Hojo City, Ehime Prefecture, Japan on October 12 and 13 in 2001, some pairs of *L. sponsa* laid their eggs into the stalks of the dead plants in the water's edge, and some others laid eggs into the fragments of plants or into the mud of the bottom of the pond of which the water level had fallen and exposed at those times, though most pairs laid eggs into the living tissues of *Potamogeton* and/or into grass of the shore." (Authors)] Address: not transliterated into Japanese

**10346.** Taketo, A. (2003): Recent information on the odonate fauna of Ishikawa pref. Tombo 46: 21-22. (in Japanese, with English summary) ["Recent habitat situation of several rare odonate species (incl. *Asiagomphus pryeri* and *Gynacantha japonica*) in Ishikawa Prefecture, Hokuriku District, Japan, in 2002 were reported. Adults of *Mnais pruinosa* nawai Yamamoto were taken from Notojima Is., a solitary island in Nanao Bay. Exuviae of two stream dwellers, *Anisogomphus maacki* and *Sieboldius albardae* were found in a typically lentic habitat, Lake Shibayama-gata in Kaga City." (Author)] Address: Taketo, A., 1-19, Ishibiki 1-chome, Kanazawa City, 920, Japan

**10347.** Teixeira, M.D.; Nacinovic, I.B. (2003): Food of Roseate Spoonbill, *Ajaia ajaja* (Linnaeus, 1758) in central Brazil (Ciconiiformes, Threskiornithidae). Arqs Mus. nac. Rio de J. 61(1): 49-54. (in Portuguese, with English summary) [Odonata larvae were found in the stomachs of 5 out of the 20 spoonbills examined from Bananal island, state of Tocantins.] Address: Teixeira, M.D., Museu Nacional/UFRJ, Departamento de Vertebrados. Quinta da Boa Vista, São Cristóvão, 20940-040, Rio de Janeiro, RJ, Brasil

**10348.** Teixeira, R.; Vrcibradic, D. (2003): Diet of *Leptodactylus ocellatus* (Anura; Leptodactylidae) from coastal lagoons of southeastern Brazil. Cuad. herpetol. 17(1-2): 111-118. [Only one Odonata specimen has been established in the diet of fifty-seven specimens of *L. ocellatus*. No species name provided.] Address: Vrcibradic, D., Se-

tor de Ecologia, Instituto de Biologia, Universidade do Estado do Rio de Janeiro, Rua São Francisco Xavier 524, 20550-011, Rio de Janeiro, RJ, Brasil. E-mail: da-vor@centroin.com.br

**10349.** Van Swaay, C.A.M.; Groenendijk, D.; Ketelaar, R. (2003): Monitoring butterflies and dragonflies in The Netherlands in 2002. Rapport VS2003.005, De Vlinderstichting, Wageningen: 31 pp. (in Dutch, with English summary) ["In 2002 dragonflies were counted every fortnight between May and September at 306 sites. The average number of dragonflies per transect were higher than previous years (table 2; figure 9). Like other years *Enallagma cyathigerum* was the most common species with almost 80000 individuals. For the first time indices are presented for a number of species (chapter 8). An alarming decreasing trend was detected for *Leucorrhinia pectoralis*. Another Red List species, *Lestes virens*, shows a positive trend. A translation for the Dutch vernacular names is given in chapter 10." (Authors)] Address: Groenendijk, D., De Vlinderstichting, Postbus 506, NL 6700 AM Wageningen, The Netherlands. E-mail: dick.groenendijk@vlinderstichting.nl

**10350.** Watanabe, K. (2003): A brief observation on the oviposition of *Tetracanthagyna plagiata* in West Malaysia. Tombo 46: 30. (in English) [Verbatim: "Species of *Tetracanthagyna* are known to oviposit in moss-covered branches 5 m or more above streams in thick forest (Corbet 1999). During my odonatological survey in west Malaysia in May, 2002, I had an opportunity to observe egg-laying behaviour by a female *T. plagiata*. The female, sitting in oviposition posture, was found on a decayed wood in a lowland jungle, at an altitude of 30 m, 20 km north of Kota Tinggi, Johor at 9:10 a.m. on May 5. Up until the time the insect was captured by me for a voucher, she continued to lay eggs into the decayed wood, about 150 cm above the water surface of a river. The surface of the wood was not covered with moss, a different situation from that observed by Corbet (1999). As the place of oviposition was above the water, it is likely that the hatched larvae drop down into the river water." (Author)] Address: Watanabe, K., 145-1, Maesato, Ishigaki, 907-0002 Japan

**10351.** Watcharee, L. (2003): The diet and feeding factors of the Wrinkle-lipped Free-tailed Bat (*Tadarida plicata*) at Khao-Chong-Pran, Ratchaburi Province. Master of Science (Forestry) thesis, Major Field: Forest Biology, Department of Forest Biology, The Pattaya School. University College of Agriculture Pattaya: 90 pp. (in Thai, with English summary) [Thailand; Odonata contributed with 6% to the diet of *T. plicata*] Address: not stated

## 2004

**10352.** Cowell, B.C.; Remley, A.H.; Lynch, D.M. (2004): Seasonal changes in the distribution and abundance of benthic invertebrates in six headwater streams in central Florida. *Hydrobiologia* 522(1-3): 99-115. (in English) ["Seasonal variations in invertebrate assemblages at two sites (upstream and downstream) on six central Florida headwater streams were compared by sampling at quarterly intervals with core and dip net samplers. Two of the streams were reclaimed following phosphate mining (app. 6 yr prior to this study), two received runoff from mined lands, and two were disturbed by agriculture and/or residential developments. Physical and chemical characteristics of the reclaimed streams differed markedly from those of the non-reclaimed streams; principal differences

between the streams were in current velocity, percent organic matter (POM), Mn, conductivity and alkalinity. Annual mean densities of meiofauna and smaller macrofauna for the 12 stream sites ranged from 20 896 to 175 212 m<sup>2</sup> and the mean for all sites was 56 492 m<sup>2</sup>. The reclaimed streams and one of the streams influenced by agriculture had annual means of less than 40 000 m<sup>2</sup>, 3- to 5-fold lower than the other streams. Fall and winter core densities were 2.4-fold greater than those for spring or summer when drought and low dissolved oxygen prevailed. Meiofauna comprised 68.91% of the core sample invertebrates in reclaimed streams but only 43.62% in the non-reclaimed streams; principal functional groups were: gathering collectors - 61.5%, predators - 19.3% and filtering collectors - 15%. The taxonomic composition of the reclaimed streams was predominated by crustaceans (60.71%) while chironomids and annelids were more abundant (71.92%) in the non-reclaimed streams. Dip net sampling added 21 larger macrofauna species (Odonata, Hemiptera and Coleoptera) to our list of taxa, producing a total of 209 species. Species richness and diversity (H and N2) indices were lower in the reclaimed streams, but evenness was more variable. The Czekanowski-Dice-Sørensen similarity index showed that the reclaimed stream sites were quite similar to each other, but differed markedly from the other stream types; there was large variation both within and between seasons. For central Florida headwater streams, drought appears to have a larger influence on invertebrates than the type of land use, however this relationship should be confirmed using streams of similar hydrology." (Authors) The following Odonata taxa have been collected: *Anax junius*, *Boyeria vinosa*, *Gynacantha nervosa*, *Brachymesia grvida*, *Pachydiplax longipennis*, *Hagenius brevistylus*, *Argia* sp., *Calopteryx maculata*, and *Enallagma* sp.] Address: Cowell, B., Dept Biol., Univ. S. Florida, Tampa, FL, 33620, USA. E-mail: cowell@chuma1.cas.usf.edu

**10353.** Eda, S. (2004): Two cases of interspecific tandem formation between different genera. Tombo 47: 52. (in English, with Japanese summary) [(1) Tandem between male of *Stylurus oculatus* and female of *Anisogomphus maacki*, September 18, 2003, at Miya-gawa river in Suwa city and (2) tandem between male of *Anax parthenope julius* and female of *Aeshna nigroflava*, September 16, 2004 at Ebinoko-ike pond in Shiojiri city, Japan.] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**10354.** Grosser, N.; Schmidt, P. (2004): Die Tier- und Pflanzenarten nach Anhang IV der Fauna-Flora-Habitatrichtlinien im Land Sachsen-Anhalt. Naturschutz im Land Sachsen-Anhalt 41 (Sonderheft): 1-142. (in German) [The legally protected species in Sachsen-Anhalt (Germany) are treated in a monographic style. Information for each species including *Aeshna viridis*, *Stylurus flavipes*, and *Leucorrhinia albifrons* is presented and is dealing with its threat category and conservation status in Germany and Sachsen-Anhalt, biology and ecology, biogeographic distribution, regional distribution. Brief description of the taxon and regional threats and protection measures are presented as well. The profiles are prepared by Rosemarie Steglich and Joachim Müller.] Address: Steglich, Rosmarie, Zollstr. 1/128, 39114 Magdeburg, Germany. E-mail: roeseli@mdcc-fun.de

**10355.** Hampe, A. (2004): Comunidades de libélulas (Odonata) en el río Barbate (Cádiz): relictos glaciales y colonizadores orientales. Revista de la Sociedad Gaditana de Historia Natural 4: 205-215. [Odonate communities of

the Barbate river: glacial relicts and oriental colonizers.) The odonates of the upper and middle reach of the Río Barbate (Alcalá de los Gazules, Cádiz, Spain) were surveyed, and their flight phenology, larval development and biogeographic origin were compared. Faunistic similarity was very low. No species reproduced at both upper and middle reach. More species were recorded at the middle reach (19 vs 12). The flight phenologies showed similar patterns, although species abundances grew remarkably through the summer at the middle reach but not at the upper reach. Semivoltine species occurred only at the upper reach whereas species with two or more generations per year formed an important fraction of 77 % at the middle reach. These were mostly Libellulidae that have probably colonized southern Spain from the eastern Mediterranean Basin after the Pleistocene glaciations. In contrast, the species of the high tracks have most probably been present in the area during longer times and are (at least) glacial relicts." (Author)] Address: Hampe, A., UMR 'Biodiversité, Gènes & Communautés' (INRA), 69, Route d'Arcachon, F-33612 Cestas Cedex - France. E-mail: arndt.hampe@pierroton.inra.fr

**10356.** Kawashima, I.; Yoshida, M. (2004): External morphology of the last instar larvae (exuviae) of hybrids between *Sympetrum maculatum* Oguma and *S. darwinianum* (Selys) (Libellulidae). Tombo 47: 37-40. (in Japanese, with English summary) ["The external morphology of the last instar larvae (exuviae) of hybrid individuals between male *Sympetrum maculatum* Oguma, 1915 and female *S. darwinianum* (Selys, 1883) are described and illustrated. Hybrid exuviae showed the intermediate state of parent species in the external characters and almost could not be distinguished from each other. However, the lateral abdominal spines are long and slender, and more resemble those of *S. maculatum*, but are only slightly different distinguished from *S. darwinianum*. Moreover, the hybrids were clearly larger than each of the parent individuals." (Authors)] Address: not transliterated into English

**10357.** Lawton, J.H. (2004): Japan prize commemorative lecture: Biodiversity, conservation and sustainability. Notes Rec. R. Soc. Lond. 58(3): 321-333. (in English) [John H. Lawton, who stated his scientific career 1969 with a Ph.D. thesis at the University of Durham, UK, on "Studies on the ecological energetics of damselfly larvae (Odonata; Zygoptera)", was awarded the 2004 Japan Prize for 'Observational, experimental and theoretical achievements for the scientific understanding and conservation of biodiversity'. In this framework he gave a lecture on 21 April 2004, in Tokyo, Japan, on the occasion of the 20th Anniversary of the Japan Prize. This lecture focuses on bracken ecology, and includes no references to Odonata.] Address: Lawton, J.H., Natural Environment Research Council, Polaris House, Swindon SN2 1EU, UK and Centre for Population Biology, Imperial College, Silwood Park, Ascot SL5 7PY, UK

**10358.** Naraoka, H. (2004): Fluctuations of the daily activity and the reproductive behaviour of *Mortonagrion selenion* (Ris). Tombo 47: 53-57. (in Japanese, with English summary) ["The adult behaviour of *M. selenion* was examined in a period between 2000 and 2004, at a rice field in Kuroishi-City, Aomori Pref. Japan. Adults appeared from the middle of June to early August with a peak from late June to middle July. The mate-searching flights of males and copulations commenced at nearly 4:00 am or around sunrise and ended about 8:00 am. After that, males spent their time perched during almost every hour of the day. Copulation is divided into 3 stages.

Stage I was very longer when the male's abdomen was pumping ( $x=2\text{ h }23\text{ m }20\text{ s} \pm 37\text{ m }34\text{ s}$ ,  $n=13$ ). Stage II with intermittent pumping and Stage III with no pumping were short,  $1\text{ m }57\text{ s} (\pm 31.8\text{ s})$  and  $19.8\text{ s} (.5.5\text{ s})$  in mean, respectively. The total duration of copulation was negatively correlated ( $P<0.01$ ) with the time of day (Fig. 2). The male may guard female during pre-oviposition from rival males." (Author)] Address: Naraoka, H., 36-71, Aza-Motoizumi, Fukunoda, Itayanagi-cho, Kita-gun, Aomori Prefecture, 038-3661, Japan

**10359.** Notario, A.; Castresana, L. (2004): Contribución al estudio de la entomofauna del Monte del Estado Seladores-Contadero (Jaén). *Investigación agraria. Sistemas y recursos forestales* 13(1): 191-200. (in Spanish, with English summary) [Spain; records of the following species are listed: *Erythromma lindenii*, *Ceragrion tenellum*, *Ischnura graellsii*, *Calopteryx haemorrhoidalis*, *Orthetrum coerulescens*, and *Trithemis annulata*.] Address: Notario, A., Depto de Ingeniería Forestal. ETS de Ingenieros de Montes. Universidad Politécnica de Madrid. Spain. Address: E-mail: anotario@montes.upm.es

**10360.** Seymour, A. (Ed.) (2004): Monitoring forest degradation and animal populations in the forests of Central Buton: preliminary results from the pilot study. <http://www.opwall.com/Library/Opwall%20library%20pdfs/Reports/Indonesia/Indonesia%20Terrestrial/Management/2004%20Forest%20science%20programme%20summary.pdf>: 96 pp. (in English) [A total of 808 odonate specimens were collected; details are not given.]

**10361.** Yeh, W.-C.; Chen, Y.-M. (2004): Taxonomic notes on two odonate species from Taiwan. *Tombo* 47: 25-26. (in English) ["The taxonomic status of the enigmatic *Anisogomphus* sp. described by Matsuki (1978) is verified to be *A. maacki* (Selys). *Neurobasis chinensis chinensis* (Linnaeus) is reported from Taiwan for the first time based on an old specimen collected from Lanyu Island in eastern Taiwan and deposited in the collection of the National Museum of Natural Science in Taichung." (Author)] Address: Yeh, W.-C., Division of Forest Protection, Taiwan Forestry Research Institute (TFRI), 53 Nanhai Rd. Taipei Taiwan

## 2005

**10362.** Brunken, G. (2005): Zur Odonatenfauna eines Tongrubengewässers bei Zwinge (Eichsfeldkreis). *Naturkundliche Berichte zur Fauna und Flora in Süd-Niedersachsen* 10: 113-121. (in German) [Thüringen, Germany; between May and October 2005, in a clay pit near Zwinge (Eichsfeldkreis) 26 Odonata species were found. The habitat is characterised by a high diversity and high abundances of species.] Address: Brunken, G., Kalklage 1, 37077 Göttingen, Germany

**10363.** Murphy, G.W.; Newcomb, T.J.; Orth, D.J.; Reeser, S.J. (2005): Food habits of selected fish species in the Shenandoah River Basin, Virginia. *Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies* 59: 325-335. (in English) ["Food habits of redbreast sunfish (*Lepomis auritus*), smallmouth bass (*Micropterus dolomieu*), and white sucker (*Catostomus commersoni*) populations in the Shenandoah River Basin, Virginia, were assessed during 2002 to identify dietary pathways and patterns potentially affecting mercury uptake. Aquatic insects (71% to 83%) were the principal food item of redbreast sunfish, while small-

mouth bass mainly consumed aquatic insects (32% to 48%), crayfish (19% to 31%), and fish (22% to 29%). Principal food items of white sucker included aquatic insects (20% to 26%) and detritus (66% to 70%). Dipterans, ephemeropterans, and trichopterans were the main taxa of aquatic insects consumed by all species." (Authors) The contribution of Odonata to the diet of the fish species is quite limited.] Address: Murphy, G.W., Delaware Division of Fish and Wildlife, 4876 Hay Point Landing Road, Smyrna, DE 19977, USA

**10364.** Resende, D.C. (2005): *Libellulidae* (Anisoptera: Odonata) phylogeny and body size and thermoregulation effects on behavioural evolution. Tese. Universidade Federal de Viçosa: VII + 93 pp. (in Portuguese, with English summary) ["Adult males of *Libellulidae* (Anisoptera: Odonata) are classified as perchers or fliers as a function of the time spent in flight. Insect thermoregulation depends on body length and may restrict behaviour. The family *Libellulidae* (Anisoptera: Odonata) had its monophyly corroborated by several phylogenetic hypothesis. I proposed here a phylogenetic hypothesis for *Libellulidae* using morphologic characters, including 33 Brazilian genera and four genera from other regions. Using this phylogeny, I tested if flight ability depends on body length, expecting that larger species control better the body temperature. I also tested if species that spent more time in flight have an increase in their hind wing anal area or an increase in their abdomen surface as adaptations to thermoregulation. Three *Corduliidae* species were used to polarize the characters in the phylogeny and branch support was estimated by Bootstrap. Species behaviour was obtained from an Odonata data bank and I was used a phylogenetic autocorrelation to exclude phylogenetic dependence of species. *Macrothemis*, *Miathyria*, *Tremea*, *Oligoclada*, *Rhodopygia*, *Erythemis*, *Brachymesia*, *Uracis*, *Perithemis*, *Diastatops*, *Zenithoptera*, *Nephepeltia* and *Elasmothemis* genera had their monophyly corroborated. *Palpopleurinae* is a paraphyletic group and *Brachydiplacinae*, *Leucorrhininae*, *Trithemistinae*, *Libellulinae*, *Sympettrinae* and *Tremeinae* were polyphyletic groups. Morphometry and behavioural measures showed high phylogenetic dependence. Flying time was dependent on species body weight. There was no relationship between hind wing anal area or abdomen surface and species flying time. However, total wing area increased with species body length, suggesting a possible natural selection leading to passive fly in larger species. There was a reduction in body length during *Libellulidae* evolution. It is possible that basal species, with large bodies and solar radiation dependence, are more restricted to open areas and that occupation of shadow environments caused a directional body length reduction. Decreasing of body length may have affected geographic distribution and diversification rates, affecting the conservation strategies to this group." (Author)] Address: Resende, D.C., Laboratório de Bioinformática e Evolução, Departamento de Biologia Geral, Universidade Federal de Viçosa, 36570-000, Viçosa-MG, Brasil. E-mail: dcreseende@ig.com.br

**10365.** Yanoviak, S.P.; Fincke, O.M. (2005): Sampling methods for water-filled tree holes and their artificial analogues. In: Leather, S.R. (Ed.): *Insect Sampling in Forest Ecosystems*: 168-185. (in English) [Conclusions: "Although there is a growing number of studies documenting the insect fauna of water filled tree holes around the world (Kitching 2000, Yanoviak 2001a), current knowledge remains overwhelmingly biased towards potential



disease vectors. Despite considerable interest in the ecology of this system, few studies have addressed the importance of microbial diversity and ecology in tree holes (e.g. Walker & Merritt 1988; Walker et al. 1991). Decomposer microbes (bacteria and fungi) form a critical link between the nutrient base (e.g. leaf litter) and secondary consumers (e.g. mosquito larvae) in tree holes (Fish E.; Carpenter 1982). Various other microorganisms, such as microcrustaceans, rotifers, and protozoans, also occur in tree holes (Kitcing 2000, Yanoviak 2001a), and may function as prey or competitors with the macrofauna. Microbial ecology has been largely overlooked in tropical tree holes, and several basic questions remain to be answered for this system in general. For example, what regulates microbial diversity and productivity in tree holes? How does the composition of detritus affect decomposer assemblages? Does microbial diversity influence macroorganism diversity or productivity? Are microbial assemblages more species-rich in tropical tree holes? The ecology of microorganisms has been examined in other phytotelmata (e.g. Addicott 1974, Cochran-Stafira & von Ende 1998, Carrias et al. 2001), and these studies exemplify the kinds of investigations that are needed in tree holes. Likewise, few studies have addressed the ecological importance of inorganic nutrients (e.g. nitrogen and phosphorus) in tree holes (e.g. Carpenter 1982; Walker et al. 1991). Microbial and nutrient dynamics have been described for many large freshwater systems, and some of the techniques commonly used by stream and lake ecologists to quantify these parameters could be transferred to tree holes. In summary, water-filled tree holes are tractable habitats for ecological and behavioural studies; sampling their insect fauna is a relatively simple process, and the use of artificial holes is an inexpensive way to increase sample size and control multiple factors for experiments. The extent to which inferences from tree hole data have a more general application for freshwater systems remains to be seen. Nevertheless, given their important ecological role, these aquatic microhabitats merit much more attention than they have received, especially in tropical forests." (Authors) The paper includes references to Odonata.] Address: Finke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: finke@ou.edu

## 2006

- 10366.** Airaud, J.-Y.; Rochelet, B.; Cotre, N. (2006): *Anax napolitain* (*Anax parthenope*). La Virgule. Bulletin de liaison du groupe «Entomo» de Deux-Sèvres Nature Environnement 1: 9. (in French) [Departement Deux-Sèvres, France; the following records of *A. parthenope* are documented: 1 male, Plibou, 27/06/06; 2 mâles, Étang du Bois de Bressuire (Chiché), 24/07/06; 1 male, Forgeaux (Petite Boissière), 06/08/06; 1 male, Étang des Mothes, 7/09/06.] Address: not stated
- 10367.** Baranovskiy, B.A.; Ivan'ko, I.A.; Zagubizhenko, N.I. (2006): Vlianiie rezhima osveschennosti pribrezhnoi zony ozera Kniaginya na sostav macrophytnikh biogidrocenozov. – [Influence of the illuminance conditions on macrophytes communities at the coastal zone of Knyaginya lake]. Ecology 14(2): 12-16. (in Russian, with English summary) [Lake Knyaginya, valley of the Samara river, situated in the southeastern part of European Russia; results from a study to investigate the influence of light regime on the occurrence of macrozoobenthos and higher vegetation are presented. The taxa-list includes *Aeshna grandis*, *A. cyanea*, *Anax imperator*, and *Coenagrion sp.*] Address: Baranovskiy, B.A., Visnyk of Dnipropetrovsk University. Biology, Dnipropetrovsk, 49050 Ukraine
- 10368.** Brady, V.J.; Bradley J.C.; Gathman, J.P.; Burton, T.M. (2006): Does facilitation of faunal recruitment benefit ecosystem restoration? An experimental study of invertebrate assemblages in wetland mesocosms. Restoration Ecology 10(4): 617-626. (in English) ["We used wetland mesocosms (1) to experimentally assess whether inoculating a restored wetland site with vegetation/sediment plugs from a natural wetland would alter the development of invertebrate communities relative to unaided controls and (2) to determine if stocking of a poor invertebrate colonizer could further modify community development beyond that due to simple inoculation. After filling mesocosms with soil from a drained and cultivated former wetland and restoring comparable hydrology, mesocosms were randomly assigned to one of three treatments: control (a reference for unaided community development), inoculated (received three vegetation/sediment cores from a natural wetland), and stocked + inoculated (received three cores and were stocked with a poorly dispersing invertebrate group—gastropods). All mesocosms were placed 100 m from a natural wetland and allowed to colonize for 82 days. Facilitation of invertebrate colonization led to communities in inoculated and stocked + inoculated treatments that contrasted strongly with those in the unaided control treatment. Control mesocosms had the highest taxa richness but the lowest diversity due to high densities and dominance of Tanytarsini (Diptera: Chironomidae). Community structure in inoculated and stocked + inoculated mesocosms was more similar to that of a nearby natural wetland, with abundance more evenly distributed among taxa, leading to diversity that was higher than in the control treatment. Inoculated and stocked + inoculated communities were dominated by non-aerial invertebrates, whereas control mesocosms were dominated by aerial invertebrates. These results suggest that facilitation of invertebrate recruitment does indeed alter invertebrate community development and that facilitation may lead to a more natural community structure in less time under conditions simulating wetland restoration." (Authors) Taxa collected from wetland mesocosms and a nearby natural wetland included *Aeshniidae*, *Orthemis sp.*, and *Coenagrionidae*.] Address: Brady, Valerie, Natural Resources Research Institute, University of Minnesota Duluth, 5013 Miller Trunk Highway, Duluth, MN 55804, USA.
- 10369.** Chandra, G.; Chatterjee, S.N.; Ghosh, A. (2006): Role of dragonfly (*Brachytron pratense*) nymph as bio-control agent of larval mosquitoes. Bul. Penel. Kesehatan 34(4): 147-151. (in English) ["The failure of traditional vector control operations through chemical insecticides renewed interest in biological control method. In the present study Dragonfly (*Brachytron pratense*) nymph has been proved to be a strong biocontrol agent of *Anopheles subpictus* larvae in the laboratory condition. Average daily larval feeding rate of *B. pratense* nymph decreased when the search area was increased. Feeding rate increased when prey density was increased. In the field conditions also, *B. pratense* played very effective role as predator of different species of larval mosquitoes." Please note: *B. pratense* is not a member of Indian dragonfly fauna. ]

**10370.** Hobart, H. (2006): And they don't even bite or sting! Newsletter of the Indian Ponds Association 6(4): 7. (in English) [General account on dragonflies.] Address: Hobart, H., Indian Ponds Ass., P.O. Box 383, Merstons Mills, MA 02648, USA

**10371.** Odin, N. (2006): Reports from Coastal Stations - 2006: Landguard Bird Observatory, Suffolk. Atropos 30: 72-73. (in English) [UK; *Erythromma viridulum* on 6-VIII-2006; *Libellula quadrimaculata* on 2-VII-2006] Address: not stated

**10372.** Stav, G.; Kotler, B.P.; Blaustein, L. (2006): Direct and indirect effects of dragonfly (*Anax imperator*) nymphs on green toad (*Bufo viridis*) tadpoles. *Hydrobiologia* 579 (1): 85-93. (in English) ["We conducted an artificial pond experiment to assess the direct and indirect effects of predation on *Bufo viridis* tadpoles. We ran three treatments: free *Anax* (unrestrained predatory dragonfly nymph *Anax imperator*), caged *Anax* (non-consumptive effects), and control (no *Anax*). *Anax* showed both strong consumptive and non-consumptive effects on *Bufo* tadpoles. Free *Anax* eliminated all of the tadpoles within six days. Tadpoles preferred the shady side of the ponds. Caged *Anax* caused tadpoles to increase their spatial preferences. Tadpoles avoided the center of the pond, and in the presence of the caged predator, they were found in the center even less. Tadpoles also showed a strong preference for crowding together, and in the presence of a caged *Anax*, they tended to crowd more. Moreover, *Bufo* metamorphosed earlier and at a larger size in the caged *Anax* ponds, possibly by providing extra food resources due to the extra organic matter excreted by the predators." (Authors)] Address: Stav, G., Jacob Blaustein Institute for Desert Research, Mitrani Dept of Desert Ecology, Ben-Gurion Univ. of the Negev, Sede-Boqer Campus, 84990 Negev, Israel. E-mail: gstav@tulane.edu

**10373.** Tavares, A.S.; Odinetz, O.; Enricone, A. (2006): The Podostemaceae family in Amazonian rivers and insect community associated. *Insula* 35: 19-50. (in Portuguese, with English summary) [In most cases Odonata larvae (*Libellulidae*, *Agrionidae*) contributed very few to the insect biomass living between the leaves of several species of the Podostemaceae family.] Address: Tavares, A.S., Universidade Federal de Santa Catarina, Departamento de Botânica, Campus Universitário, Trindade, Florianópolis, se, 88040-900. Brasil. E-mail: asprada@ccb.ufsc.br.

## 2007

**10374.** Environment & Heritage Service (2007): Northern Ireland Species Action Plan: Irish Damselfly *Coenagrion lunulatum*. March 2007. <http://www.Belfast-hills.org/minisite/adultversion/draftirishdamselflysapmar07-2.pdf>: 11 pp. (in English) [This is a detailed schedule for protecting *C. lunulatum* in Northern Ireland.] Address: Environment & Heritage Service, Klondyke Building, Cromac Av., Gasworks Business Park, Lower Ormeau Road, Belfast, BT7 2JA, UK. [www.ehsni.gov.uk](http://www.ehsni.gov.uk)

**10375.** Geraeds, R.P.G. (2007): Golden-ringed dragonfly along the Venbeek brook. *Natuurhistorisch Maandblad* 96(1): 17-18. (in Dutch, with English summary) ["In Limburg, *Cordulegaster boltonii* is known to occur in the Haeselaarsbroek and Meinweg nature reserves. At Meinweg, which houses the largest population in the Netherlands, the species occurs along the Boschbeek, Roode

beek and Nartheciumbeek brooks. Recently, specimens have also been observed along the Venbeek brook, probably representing the fourth subpopulation of *C. boltonii* at the Meinweg reserve." (Author)] Address: Geraeds, R.P.G., Bergstraat 70, 6131 AW Sittard, The Netherlands

**10376.** Hermans, J.T. (2007): De Gewone bronlibel in de Meinweg [The Golden-ringed dragonfly at the Meinweg National Park]. *Natuurhistorisch Maandblad* 96(6): 165-169. (in Dutch, with English summary) ["*Cordulegaster boltonii* has always been a rare species in the Netherlands, whose main area of distribution in the country is restricted to the province of Limburg. The population of *C. boltonii* at the 'De Meinweg' National Park is the largest in the Netherlands. At the Meinweg area, the species has three sub-populations along the Bosbeek, Nartheciumbeek and Venbeek brooks. The sub-population along the Venbeek brook is the result of recent colonisation. The habitats in which the species occurs at the Meinweg National Park are shallow streams, which are characterised by their small size, the presence of organic litter as a biotope for the larvae and the fact that they are fed from local springs producing oxygenous groundwater with a low mineral content and a constant low temperature. In 2006, several individuals were marked with different colours to investigate possible exchanges between the sub-populations, but no such exchanges could be confirmed. *Calopteryx virgo* and *Orthetrum coerulescens* are the most characteristic accompanying dragonfly species at the Meinweg. One of the main threats to the presence of *C. boltonii* at this nature reserve is that the streams where they breed run dry during periods of drought." (Author)] Address: Hermans, J.T., Hertestraat 21, 6067 ER Linne, The Netherlands.

**10377.** New, T.R. (2007): The Hemiphlebia damselfly, *Hemiphlebia mirabilis* Selys (Odonata, Zygoptera) as a flagship species for aquatic insect conservation in south-eastern Australia. *The Victorian Naturalist* 124(4): 269-272. (in English) ["The endemic *H. mirabilis* has been a focus of conservation attention since its rediscovery in Victoria was publicised in the mid 1980s. It was listed under the state's Flora and Fauna Guarantee Act (FFG) in 1991. Discovery of additional colonies has indicated that *Hemiphlebia* is far more widespread than earlier supposed, and continued study indicates that it is variously secure or vulnerable in different places – rather than 'endangered', as previously thought. The history of study of the species is summarised briefly, and its values in promoting awareness of insect conservation as a 'flagship species' in southern Australia are discussed." (Author)] Address: New, T.R., Dept of Zoology, La Trobe University, Victoria, 3086, Australia. E-mail: T.New@latrobe.edu.au

**10378.** Olias, M.; Günther, A. (2007): Libellen. In: Grüne Liga Osterzgebirge e.V.: Naturführer Ost-Erzgebirge, Band 1: Pflanzen und Tiere. Sandstein-Verlag. Dresden: 350-363. (in German) [Sachsen, Germany; Czech Republic; 17 regional Odonata species are introduced giving information of morphology, habitat, phenology and sibling species. A Czech version of the paper is also available: Olias, M. & Günther, A. (2007): Vážky. In: Grüne Liga Osterzgebirge e.V.: Přírodou východního Krušnohří. - 1. Svazek: Přehled rostlin a živočichu, Sandstein Verlag Dresden: 298-309.] Address: Günther, A., Naturschutzinstitut Freiberg, Waisenhausstr. 10, 09599 Freiberg, Germany. E-mail: a.guenther@abo.freiepresse.de

**10379.** Parkes, K. (2007): Broda-bodied Chaser Survey 2007. *Atropos* 32: 58. (in English) [Verbatim: "Following

the success of the Banded Demoiselle survey, the BDS repeated the format for the 2007 season, requesting records of Broad-bodied Chaser *Libellula depressa*. Collaboration with Flytech encouraged younger participants, with a free remote controlled dragonfly being given to the first 15 confirmed records from under 16-year olds. The response was again very good with over 700 records received, despite the inclement weather for much of the flight period. The survey repeated last year's achievements, with confirmed records of Broad-bodied Chaser in several new areas. The full results of the survey and a selection of the stunning photos sent by contributors can be found via the BDS website at <http://www.dragonflysoc.org.uk>. Look there next year for a new survey to get involved in." Address: Parkers, Katharine, BDS Conservation Officer, c/o Natural England (West Mids), Attingham Park, Shrewsbury SY4 4TW, UK. E-mail: [katharine.parkes@naturalengland.org.uk](mailto:katharine.parkes@naturalengland.org.uk)

**10380.** Perović, G.; Perović, F. (2007): Preliminary results of research into dragonflies (Odonata) in Medimurje, Croatia. *Entomol. croat.* 10(1/2): 87-103. (in Croatian, with English summary) [During 1998-2005, 31 Odonata species were documented. *Sympetrum pedemontanum* is recorded for the first time from Croatia. Records of *Coenagrion ornatum* and *Lestes dryas* are also considered of regional interest.] Address: Perović, F., Hrvatski prirodoslovni muzej, Demetrova 1, Zagreb, Croatia

**10381.** Pollheimer, M. (2007): Streifzüge durch die Tierwelt des Kremstals. *LANIUS – Information* 16(3-4): 3-5. (in German) [*Onychogomphus forcipatus*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Calopteryx splendens*, *C. virgo*, and *Cordulegaster boltonii* are listed for the river Krems, Austria.] Address: <http://www.lanius.at/cms/fileadmin/Files/Lanius-Info/Laniusinfo3-42007.pdf>

**10382.** Sahuquillo, M.; Poquet, J.M.; Rueda, J.; Miracle, M.R. (2007): Macroinvertebrate communities in sediment and plants in coastal Mediterranean water bodies (Central Iberian Peninsula). *Ann. Limnol. - Int. J. Lim.* 43(2): 117-130. ["Sediment and plant-associated macroinvertebrates were sampled in six shallow water bodies along the central part of the coast of Mediterranean Spain. The size of ponds, salinity and hydroperiod were highly variable. Seventy-one taxa were recorded, some of them were endemic or uncommon species, evidencing the important contribution of these ponds to biodiversity. Crustaceans and gastropods of biogeographical interest were found in the most primeval site. Correspondence analysis showed that macroinvertebrate assemblages responded to environmental variables such as salinity, temporality and eutrophication. The brackish water fauna was dominated by crustaceans, while *Oligochaeta* and insect larvae were abundant in freshwater conditions. *Oligochaeta* were abundant at localities with high trophic level, whereas localities with semi-permanent waters were dominated by chironomids. The density of macroinvertebrates was clearly related with trophic state but we did not find significant relationships between density and salinity or water permanence. For plant associated samples our results showed negative relationships between species richness and temporality or salinity, contrary to sediment samples, where the *Oligochaeta/Chironomidae* ratio in sediments and the percentage of sensitive taxa (Ephemeroptera, Odonata, Trichoptera) were useful indices, and were dependent on pond typology. This study emphasizes the broad ecological variety of ponds found in these wetlands and their importance for biodiversity. Some ponds act as permanent biodiversity reservoirs in

fluctuant marshes with seasonal dryness, calling for more attention on their ecological relevance for management strategies." (Authors) Odonata taxa are mentioned as follows: *Sympetrum fonscolombii*, *Ischnura elegans*, *Pyrhosoma nymphula*, *Coenagrionidae*, *Libellulidae*, *Corduliidae*, *Lestidae*.] Address: Sahuquillo, M., Departament de Microbiologia i Ecologia, Facultat de Biologia, Universitat de València, E-46100 Burjassot, València, Spain

**10383.** Salcher, M. (2007): Beobachtungen zur Ausbreitungsfähigkeit der Zarten Rubinjungfer (*Ceriatagrion tenellum*) auf dem Bodanrück (Odonata: Coenagrionidae). *Mercuriale* 7: 8-11. (in German) [Baden-Württemberg, Germany; the successful colonisation of new habitat resp. establishment of a new population, 750 m apart from the next known population, is documented by comparison of old bank data with new records. In addition, specimens were found up to 6,5 km remote from source populations in habitats not suited for this species.] Address: Salcher, M., Ferdinand-Weiß-Str. 92, 79106 Freiburg, Germany

**10384.** Sierra, R.; Burke, R. (2007): Dietary habits of Diamondback Terrapin *Malaclemys terrapin* in the Jamaica Bay Wildlife Refuge, New York, Section VII. In: W.C. Nieder & J.R. Waldman (eds.): Final report of the Tibor T. Polgar Fellowship Program 2006, Hudson river Foundation, NY: 20 pp. (in English) [The diet of this turtle species includes Odonata larvae identified to order level.] Address: not stated

**10385.** Stange, G.; Schmeling, F.; Berry, R.; Lenz, G.; (2007): The temporal resolution of flight attitude control in dragonflies and locusts: Lessons for the design of flapping-wing MAVs. Australian National University Canberra. Research School of Biological Sciences. Contract Number: FA48690610059; Report Number: A038474: 16 pp. (in English) ["In order to identify stability constraints in flapping-winged MAVs, within the context of longitudinal stabilization of flight attitude, the question is examined whether insects are capable of controlling flight attitude at the temporal resolution of a single wing beat. It is found that the phenomenon of phase locking between a periodic light flash and the wingbeat of insects is suitable for the examination of the time resolution with which vision contributes to stabilization. In tethered locusts, flying in a wind tunnel with a wingbeat frequency of 22 Hz, phase locking can be readily obtained by a periodic stimulus of UV light. It is suggested that the effect is a by-product of the animal continuously trying to apply corrections. Therefore, in the closed-loop situation of free flight, frequency components of the visual input at or above wing beat rate are also present and must contribute to stability control. The response is mediated by the median ocellus. In dragonflies, with a wingbeat frequency of 50 Hz, the effect is not observed. This suggests that organisms or MAV of the size and wingbeat rate of locusts require active damping by visual inputs, whereas the same is not necessary in smaller systems." (Authors)] Address: Stange, G., Centre for Visual Sciences, Research School of Biological Sciences and ANU Electron Microscopy Unit, Australian National University, P.O. Box 475, Canberra, ACT, 0200, Australia. E-Mail: [gert.stange@anu.edu.au](mailto:gert.stange@anu.edu.au)

## 2008

**10386.** Aberlenc, H.-P. (2008): Les Insectes du Bois de Païolive: premier supplément à l'inventaire. *Les Cahiers de Païolive* 1: 155-167, pl. 17-18. (in French) [Departement



ment Ardeche, France. This paper contents additions to the list published in 2003 viz. *Sympecma fusca*, *Aeshna mixta*, *Anax parthenope*, *Gomphus graslinii*, *G. simillimus*, *G. vulgatissimus*, *Sympetrum fonscolombii*, and *S. pedemontanum*. *Calopteryx splendens* was deleted from the regional list.] Address: Aberlenc, H.P., CIRAD, UMR CBGP, TA A-55/L, 34398 Montpellier cedex 5, France

**10387.** George, B.M.; Batzer, D. (2008): Spatial and temporal variations of mercury levels in Okefenokee invertebrates: Southeast Georgia. *Environmental Pollution* 152: 484-490. (in English) [USA; "Accumulation of mercury in wetland ecosystems has raised concerns about impacts on wetland food webs. This study measured concentrations of mercury in invertebrates of the Okefenokee Swamp in Georgia, focusing on levels in amphipods, odonates, and crayfish. We collected and analyzed total mercury levels in these invertebrates from 32 sampling stations across commonly occurring sub-habitats. Sampling was conducted in December, May, and August over a two-year period. The highest levels of mercury were detected in amphipods, with total mercury levels often in excess of 20 ppm. Bioaccumulation pathways of mercury in invertebrates of the Okefenokee are probably complex; despite being larger and higher in the food chain, levels in odonates and crayfish were much lower than in amphipods. Mercury levels in invertebrates varied temporally with the highest levels detected in May. There was a lack of spatial variation in mercury levels which is consistent with aerial deposition of mercury." (Authors)] Address: George, B.M., School of Science and Technology, Georgia Gwinnett College, 1000 University Center Lane, Lawrenceville, GA 30043, USA. E-mail address: bgeorge@ggc.usg.edu

**10388.** Holuša, O.; Vaněk, J. (2008): The fauna of dragonflies (Odonata) in the Krkonoše Mts. *Opera Corcontica* 45: 81-98. (in Czech, with English summary) [Between 1982-2004, 25 odonate species were found at 19 localities in the Krkonoše National Park (i.e. in the Giant Mts.) and adjacent localities of the Podkrkonosi Region. E-dominant species are: *Aeshna caerulea*, *Enallagma cyathigerum*, *Sympetrum danae*, *A. juncea*, dominant species: *Leucorrhinia dubia*, *S. vulgatum*, *Lestes sponsa*, *S. sanguineum* and *Somatochlora alpestris*. The population of *A. caerulea* in the Krkonose Mts. is the most stable and the largest population in the Czech Republic. Only two reophilous species in lower abundance - *Calopteryx splendens* and *Cordulegaster bidentata* - were found.] Address: Holuša, O., Bruzovská 420, CZ-738 01 Frýdek-Místek. E-mail: holusao@email.cz

**10389.** Huber, A. (2008): Data to the Odonata fauna of North-East Hungary III. *Folia historico-naturalia Musei Matraensis* 32: 93-102. (in Hungarian, with English summary) ["The author present the results of his dragonfly collecting carried out in the lowland following the river Bodrog and Takta (Bodrogekőz and Taktaköz) and in the territory enclosed by the river Hernád, river Sajó and the state border between Hungary and Slovakia. The collecting took place between 11.05.2005 and 03.07.2008. The data come mainly from the Bodrogekőz, Taktaköz, Aggtelek-mountains, the Putnok-hills and the valley of the Sajó river. The author found 46 dragonfly species in this area, 37 as larva, 35 as exuvium and 40 as imago. 7 species (*Aeshna affinis*, *Ischnura elegans*, *Lestes dryas*, *L. sponsa*, *Leucorrhinia pectoralis*, *Sympecma fusca*, *Sympetrum flaveolum*) are new in larval or exuvial form to the Bodrogekőz, and 5 species (*Anax imperator*, *Crocothemis erythraea*, *Epitheca bimaculata*, *Erythromma viridulum*,

*Leucorrhinia pectoralis*) to the Taktaköz." (Author)] Address: Huber, A., Aggteleki Nemzeti Park Igazgatóság, H-3758 Jósavafő, Hungaria. E-mail: epitheca@freemail.hu

**10390.** Kawiisar-ul-Yaqoob; Paiidit, A.K.; Wani, S.A. (2008): Some aspects of habitat ecology of aquatic entomofauna in two freshwater lakes of Kashmir Himalaya. Sengupta. M. & Dalwani, R. (Eds): *Proceedings of Taal 2007: The 12th World Lake Conference: 1916-1921.* (in English) ["The present investigation deals with the habitat ecology of lacustrine insects of Dal and Nilnag lakes of Kashmir valley 111 relation to the depth of water column and the quality and quantity of aquatic macrophytes. Three main categories of aquatic insects belonging to four different orders viz, Coleoptera, Hemiptera, Diptera and Odonata (*Macromia* sp., *Aeshna* sp., *Coenagrion* sp., *Lestes* sp., *Helocordulia* sp.) have been recognized. It has been seen that the quality of water, the diversity and density of aquatic vegetation and suitable substratum are among the favourable factors increasing the potential of aquatic insects to inhabit their suitable ecological niches." (Authors)] Address: Kawiisar-ul-Yaqoob, Aquatic Ecology Laboratory, P.G. Dept of Environmental Science, The University of Kashmir, Srinagar 190006, J&K, India

**10391.** Lucker, T. (2008): Wirkungen von Revitalisierungsmaßnahmen am Beispiel des Ise-Projektes. *Schriftenreihe des Deutschen Rates für Landespflege* 81: 76-80. (in German) [Niedersachsen, Germany; the Ise is a small brook formerly strongly influenced by agricultural land use. In the early 1990th, adjacent land was bought and extensified. The brook itself was revitalised. A monitoring proved the success of the conservation measurements. *Ophiogomphus cecilia*, *Cordulegaster boltonii* and *Calopteryx virgo* extended their ranges along the brook.] Address: Lucker, T., Aktion Fischotterschutz e. V., Sudendorfallée 1, 29386 Hankensbüttel, Germany. E-mail: t.lucker@otterzentrum.de

**10392.** Müller, J.; Steglich, R. (2008): Zur Reproduktion der Frühen Heidelibelle *Sympetrum fonscolombii* (Odonata: Libellulidae) in der Bodeniederung bei Unseburg. *Entomologische Mitteilungen Sachsen-Anhalt* 16(1): 41-47. (in German) [The paper outlines some current discussion on the taxonomic status of the species and document recent records from the Bode-region, Sachsen-Anhalt, Germany. The authors also include a compilation of the records from Sachsen-Anhalt and present field characters of the species.] Address: Müller, J., Frankfelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.J-Mueller@t-online.de

**10393.** Perova, S.N. (2008): The taxonomic composition of macrozoobenthos in central Russian small Karst lakes. *Inland Water Biology* 1(4): 371-379. (in English) ["The macrozoobenthos taxonomic composition in small karst lakes of Vladimir oblast is studied for the first time. In the structure of bottom communities, 149 taxa one rank below the genus have been found. Chironomid larvae and other amphibiotic animals, as well as oligochaetes, prevail. Most of them are species widely distributed in the surface waters of European Russia. The highest macrozoobenthos species diversity was recorded in neutral lakes, and the lowest diversity was in lakes with weakly acidic waters." (Author) *Epitheca bimaculata*, *Coenagrion* sp., *Cordulia aenea*, *Platycnemis pennipes*, *Somatochlora arctica*, *S. flavomaculata*, *S. sahlbergi* are listed; these taxa are partly taken for misidentified by R. Bernard, a specialist in this regional fauna. Original Rus-

sian Text © S.N. Perova, 2008, published in *Biologiya Vnutrennikh Vod*, No. 4, 2008, pp. 63–71] Address: Perova, S.N., Papanin Institute for the Biology of Inland Waters, Russian Academy of Sciences, Borok, Yaroslavl oblast, 152742 Russia. E-mail: perova@ibiw.yaroslavl.ru

## 2009

**10394.** Carriço, C.; Santos, T.C.; Costa, J.M.; Trapero Quina, A.D. (2009): Occurrence of *Neoneura maria* (Scudder, 1866) (Odonata: Protoneuridae) for the Province of Santiago de Cuba. *Biota Neotropica* 9(4): 261-263. (in Portuguese, with English summary) ["During the period 2005-2006 the macroinvertebrates associated with the root system of *Eichhornia crassipes* (Mart.) Solms, 1883 were studied in the overflow Chalons dam in Santiago de Cuba. The larva of *N. maria*, endemic for Cuba, reported to the three Sectors of the island, was collected and constitute the first report for the Provincia de Santiago de Cuba." (Authors)] Address: Carriço, C., Programa de Pós-graduação em Biologia Animal - PPGBA, Instituto de Biologia, Univde Federal Rural do Rio de Janeiro - UFRJ BR 465, Km 7, CEP 23890-000, Seropédica, RJ, Brasil. E-mail: carrico82@hotmail.com

**10395.** Corbet, P.S. (2009): List of publications including observations on Odonata. *Agrion* 13(2): 90-96. (in English) [List of publications including observations on Odonata compiled by Philip S. Corbet up to 2000, thereafter by Sarah A. Corbet, and further additions abstracted from IDF Report 14: 1-39 compiled by Hoffmann & Schorr, 2008]

**10396.** Crewe, M.D.; Coheir, C. (2009): *Viridithemis viridula* Fraser, 1960: discovery of the first known male. *Agrion* 13(2): 54-55. (in English) [8-XI-2007, Madagascar, Zombitse Forest, part of the Zombitse-Vohibasia National Park. GPS: S 22.88339 E 44.69447, 800 metres asl.; start of the main rain season.] Address: Crewe, M.D.: E-mail: mike.sturmus@btinternet.com

**10397.** Hacet, N. (2009): The easternmost record of *Somatochlora borisi* Marinov, 2001 from Turkish Thrace, with a zoogeographic assessment on the distribution of the species (Odonata: Corduliidae). *J. Ent. Res. Soc.* 11 (2): 51-56. (in English) ["A synopsis of the known distribution of this endemic species is given. The present records add an additional locality (Istanbul-Çatalca, Incegiz village, 41°11'N 28°24'E, 70 m asl, 24-VI-1998), which is the easternmost one for this species not only for Turkey, but also for its whole range. The morphological features of the species are discussed, and its distribution is mapped. A zoogeographic evaluation on the distribution of *S. borisi* in the Balkans is included. The localization of this species underlines the biologic and zoogeographic importance of the Balkans in terms of biodiversity for the whole Eurasia." (Author)] Address: Hacet, Nurten, Trakya University, Faculty of Arts and Sciences, Dept of Biology, TR-22030 Edirne, Turkey. E-mail: nhacet@hotmail.com

**10398.** Hankinson, C. (2009): Naturally curious. *Findlay Spring* 2009: 16-17. (in English) [Ohio, USA; "Dwight Moody, Ed.D., an outdoorsman, educator and researcher, has conveyed his enthusiasm for the natural world to thousands of students during his 34-year tenure as professor of natural science at The University of Findlay. He retired from full-time teaching in 2008, but maintains his ties with the institution by serving as an adjunct faculty member and continuing his research... In addition, he

has done Odonata surveys at Kitty Todd Nature Preserve for the Nature Conservancy in Toledo, Ohio, in 2001-02 and the Sheldon Marsh Nature Preserve in Sandusky, Ohio, in 2002-03. Much of his work is also funded by research grants, including one from the Ohio Department of Natural Resources to establish the status of the Ohio Emerald Bog Skimmer in 1994. In 2007-08 the Ohio Historical Society funded "A State-wide Survey for the Federally Endangered Hine's Emerald Dragonfly." (Author)] Address: not stated

**10399.** Hu, P.; Zha, L.-s. (2009): Records of Edible Insects from China. *Agricultural Science & Technology* 10(6): 114-118. (in Chinese, with English summary) [Larvae of *Anax parthenope julius*, *Gomphus cuneatus*, *Crocothemis servilia*, *Orthetrum albistylum*, *O. triangulare melania*, *Pantala flavescens*, and *Sympetrum uniforme* are listed as edible among a list of 283 species out of 13 insect orders and 73 families classified as edible.] Address: Hu, P., Tianyi Middle School, Huaibei City, Huaibei 235000, China

**10400.** Humala, A.E.; Polevoi A.V. (2009): On the insects fauna of south-east Karelia. *Proceedings of the Karelian Scientific Center, Russian Academy of Sciences* 4: 53-75. (in Russian, with English summary) ["At the verge of the 21st century, the insect fauna of SE Karelia remained rather poorly known compared with other parts of the republic. Systematic entomological research that began in the areas of Karelia east of Lake Onego in the 1990s yielded substantial amounts of material on the insect fauna. This paper is the first publication of all data on the insect fauna in south-east Karelia (biogeographic provinces Karelia transonegensis, Karelia pudogensis) known to the authors. In addition, data on the species distribution, their biology and «red-list» status are provided for some most interesting findings." (Authors) 40 sampling sites were studied for their fauna. 30 Odonata species are listed. The list includes species as *Coenagrion armatum*, *C. hastulatum*, *C. johanssoni*, *C. pulchellum*, *Aeshna caerulea*, *A. crenata*, *A. subarctica elisabethae*, *Somatochlora arctica*, *S. flavomaculata*, *S. metallica*, *Epitheca bimaculata*, and *Leucorrhinia caudalis*.] Address: Humala, A., Forest Research Institute, Karelian Research Centre, Russian Academy of Science, 11 Pushkinskaya St., 185910 Petrozavodsk, Karelia, Russia. E-mail: humala@krc.karelia.ru

**10401.** Kiany, M.; Minaei, K. (2009): The dragonfly family Libellulidae (Insecta: Odonata: Anisoptera) of Shiraz and its vicinity (Fars Province, Iran). *Iran Agricultural Research* 27/28: 65-78. (in English, with summary in Farsi) [Thirteen libellulid species were collected near Shiraz and its vicinity (Fars province, Iran) by studying 19 localities. *Orthetrum anceps*, *O. taeniolatum*, *O. chrysostigma*, *Sympetrum fonscolombii*, *S. meridionale*, *Crocothemis servilia*, *Trithemis kirbyi*, and *Pantala flavescens* are new provincial additions. All species are listed locality wise in a table and briefly discussed. The paper includes a welcome identification key of the regional Libellulidae detailed on the genus and species level and furnished with informative figures.] Address: Kiany, M., Department of Plant Protection, College of Agriculture, Shiraz University, Shiraz, I. R. Iran. E-mail: mohsen.kiany1@gmail.com

**10402.** Kronenbitter, J. (2009): Laichhabitatwahl des Kleinen Granatauges (*Erythromma viridulum*) (Zygoptera: Coenagrionidae). *Der Einfluss verschiedener Habitatparameter*. Diplomarbeit. Bayerische Julius-Maximilians-Universität Würzburg: 201 pp. (in German, with English

summary) ["Human-induced climate change has caused distributional shifts of many species of Odonata in Europe within the last few decades. Among them, *E. viridulum*, a naturally holo-mediterranean distributed species is today found in many parts of Germany. Within just a decade the number of locations it has been identified in Bavaria has increased nearly tenfold. According to a number of authors, besides the influence of climate change, this increase in its distribution can also be explained by its having been previously overlooked. This is due to the fact that individuals of this species are commonly found far from the vicinity of water bodies. Until now, a systematic survey of *E. viridulum* has been hindered by the fact that no studies which allow quantitative statements about the habitat requirements of the species exist. The method of statistical habitat modelling I used in this study provides the opportunity of identifying and quantifying the relevant habitat factors which determine the presence of a species at a habitat. The data acquisition was undertaken in the area around Würzburg and Haßfurt in the North of Bavaria, Germany. I surveyed 92 standing water bodies for the presence of *E. viridulum* and recorded various potentially relevant parameters. The forecast values of the habitat models I created on the basis of this data proved to be a good representation of the likelihood of the presence of this species. The occurrence probability increased with the low isolation of a water body, a large expanse of open water surface without any swamp plants, a low degree of shading and the presence of immersed leaf vegetation, especially large stands and plants with an extremely fine-branched leaf structure. Relationships between preferred parameter values and the biology of the species are discussed. To identify suitable breeding sites, damselflies need to discriminate between different values of the relevant habitat parameters and polarotaxis plays a major role in this. At artificial ponds I undertook experimental measurements over different light regimes of the reflection-polarisation patterns of the water surface, of different ground colours and of immersion leaf vegetation at several depths. I showed the possibility of distinguishing between different parameter values on the basis of very few characteristics of the reflection-polarisation patterns. For damselflies this suggests the advantage of being able to select a preferred breeding site from a distance simply on the basis of visual information." (Author)] Address: Kronenbitter, Jenja, Schwabenstr. 21., D-76646 Bruchsal, Germany

**10403.** Lingane, P.J. (2009): The design and fabrication of a micro mechanical dragonfly. Senior Thesis. Project Report. Submitted March 19, 2009: 51 pp, app. (in English) ["The goal this project was to create a scaled model of a flapping wing aerial vehicle. The design was initially based on a remote controlled model available at many toy stores. This model was in the form of a dragonfly but about four times the size in each dimension. My project was to scale this down, ideally to the size of a real dragonfly. This however was difficult, and a half scaled prototype (twice life size) was constructed instead. Scaling was done using dimensionless fluid parameters such as the Reynolds and Strouhal numbers which effectively related the various properties of each model. Testing and modification of the prototype were carried out, and in the process an analytical model was made to model the dynamics. Although still not flying, the prototype will hopefully soon be ready for testing against the theory. In the future, more testing will be completed, and minor modifications made to get the scaled prototype flying. All of this is part of a larger goal to miniaturize a flapping flying ro-

bot of which this project is only a part." (Author)] Address: Lingane, P.J., Department of Mechanical Engineering, Union College, Schenectady, NY, USA

**10404.** Mey, E. (2009): Beobachtungen an Libellen (Insecta, Odonata) in Thüringen, insbesondere in der Umgebung von Rudolstadt. Rudolstädter naturhistorische Schriften 15: 39-98. (in German, with English summary) [Germany; "The scientific study of dragonflies and damselflies in Thüringen goes back to the first half of the 18th century, is connected with the rise of natural history cabinets, and had its hesitant beginnings in the pre-Linné era in (e.g.) the work of the Nordhausen natural theologian F. C. Lesser. For the first concrete data between 1773 and 1818 we have to thank A. C. Kühn and A. J. G. K. Batsch, but above all J. M. Bechstein and G. L. Scharfenberg. All available historical records up to the middle of the 20th century are here collected together according to their faunistic aspects and annotated. At least nine Odonata eruptions from various regions of Thüringen are known from the last 250 years or more: 1746, 1806, 1816, 1822, 1839, 1853, 1857, 1881, and 1917. They concern population explosions of a single species each time: *Libellula depressa* (twice) and *L. quadrimaculata* (five times). The original accounts are documented here. No Odonata eruptions have been recorded in Thüringen for more than 90 years. Between the end of the 18th century and about 1950, 47 species of Odonata were recorded in Thüringen. However, during this period of more than 150 years faunistic interest in dragonflies and damselflies was only sporadic. Between 1952 and the present day, reports of 17 further species have been published, bringing the total number of Odonata species recorded in Thüringen to 64. From 1984 to 2008 an attempt was made to record the entire Odonata species spectrum occurring in and around Rudolstadt (eastern Thüringen). The material consists of around 2000 data points. It deals with parts of the following natural landscapes: the central Thüringer Wald (Forest), the high Thüringen shale hills, the Schwarzsaale-Sornitz region, the Ilm-Saale-Ohdruf shell limestone plateau, the Paulinzella bunter sandstone woodland area, the Saale sandstone plateau, and the central Saale Valley. Within this region, 48 Odonata species have been recorded, including some older valuable specimens in the Natural History Museum in Rudolstadt (*Cordulegaster bidentata*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, and *Leucorrhinia rubicunda*). In addition, some observations on the life style of *Cordulegaster boltonii* made by the author are given. Contrarily to other reports, there are no confirmed records of *Somatochlora arctica* from Thüringen." (Author)] Address: Mey, E., Naturhistorisches Museum im Thüringer Landesmuseum Heidecksburg zu Rudolstadt, Schloßbezirk 1, 07407 Rudolstadt, Germany. E-mail: mey-rudolstadt@t-online.de

**10405.** Müller, Z.; Kiss, B.; Juhász, P. (2009): Faunistical data to complete the nationwide occurrence of Ornate Damselfly [*Coenagrion ornatum* (Selys-Longchamps, 1850)]. *Folia historico naturalia musei Matraensis* 33: 97-101. (in English) [The authors add 42 watercourses inhabited by *C. ornatum* to the known 63 localities for the species in Hungary; data were obtained from studies from 2003 to 2009.] Address: Müller, Z., BioAqua Pro Kft. H-4032 Debrecen, Soó R. 21, Hungary. E-mail: mullerz@bioaquaapro.hu

**10406.** Ou, J.-f.; Huang, H.; Liu, G.-q.; Yu, H.; Zheng, J.-h.; Zhang, T.-p. (2009): Research on diversity of Odonata in Zhuhai area, Guangdong Province. *Journal of Environmental Entomology* 31(4): 356-360. (in Chinese, with



English summary) [Between 2006 and 2008, 24 Odonata species were recorded in the Zhuhai region, Guangdong Province, China. *Paracercion hieroglyphicum* and *P. calamorum* are new records for the province.] Address: Guangdong Entomological Institute, Guangzhou 510260, China

**10407.** Schilling, E.G.; Loftin, C.S.; Hury, A.D. (2009): Macroinvertebrates as indicators of fish absence in naturally fishless lakes. *Freshwater biology* 54: 181-202. ["1. Little is known about native communities in naturally fishless lakes in eastern North America, a region where fish stocking has led to a decline in these habitats. (2.) Our study objectives were to: (i) characterise and compare macroinvertebrate communities in fishless lakes found in two biophysical regions of Maine (USA): kettle lakes in the eastern lowlands and foothills and headwater lakes in the central and western mountains; (ii) identify unique attributes of fishless lake macroinvertebrate communities compared to lakes with fish and (iii) develop a method to efficiently identify fishless lakes when thorough fish surveys are not possible. (3.) We quantified macroinvertebrate community structure in the two physiographic fishless lake types (n = 8 kettle lakes; n = 8 headwater lakes) with submerged light traps and sweep nets. We also compared fishless lake macroinvertebrate communities to those in fish-containing lakes (n = 18) of similar size, location and maximum depth. We used nonmetric multi-dimensional scaling to assess differences in community structure and t-tests for taxon-specific comparisons between lakes. (4.) Few differences in macroinvertebrate communities between the two physiographic fishless lake types were apparent. Fishless and fish-containing lakes had numerous differences in macroinvertebrate community structure, abundance, taxonomic composition and species richness. Fish presence or absence was a stronger determinant of community structure in our study than differences in physical conditions relating to lake origin and physiography. (5.) Communities in fishless lakes were more speciose and abundant than in fish-containing lakes, especially taxa that are large, active and free-swimming. Families differing in abundance and taxonomic composition included Notonectidae, Corixidae, Gyridae, Dytiscidae, Aeshnidae, Libellulidae and Chaoboridae. (6.) We identified six taxa unique to fishless lakes that are robust indicators of fish absence: *Graphoderus liberus*, *Hesperocorixa* spp., *Dineutus* spp., *Chaoborus americanus*, *Notonecta insulata* and *Callicorixa* spp. These taxa are collected most effectively with submerged light traps. (7.) Naturally fishless lakes warrant conservation, because they provide habitat for a unique suite of organisms that thrive in the absence of fish predation. ... A total of 46 Hemiptera, Coleoptera, Odonata and Chaoborus taxa were identified from submerged light trap and littoral sweeps, with eight taxa abundant in most fishless lakes. The total number of captured macroinvertebrates and total species richness, as well as richness at the family level, did not differ between fishless kettle lakes and fishless headwater lakes. No taxa collected in littoral sweeps showed significant differences in abundance or per cent occurrence between fishless kettle lakes and fishless headwater lakes. The total number of macroinvertebrates captured in submerged light traps was greater in fishless lakes than fish-containing lakes, with greater abundances of Hemiptera, Coleoptera and Odonata in fishless lakes. Odonates associated with fishless lakes were Aeshnidae, Libellulidae and Coenagrionidae, with *Aeshna eremita* and *Leucorrhinia glacialis* more abundant, as well as present in more lakes lacking

fish. Seven species were unique but not widespread among fishless lakes, including *Leucorrhinia patricia* in two lakes. Four species were unique to fish-containing lakes, *Enallagma geminatum* and *E. carunculatum*, *Lesites vigilax* and the haliplid *Haliplus connexus*. None of these was widespread, each occurring in two fish-containing lakes."(Authors)] Address: Gaenzle Schilling, E., Department of Wildlife Ecology, University of Maine, 5755 Nutting Hall, Orono, ME 04469-5755, USA. E-mail: emily.schilling@umit.maine.edu

**10408.** Schweighofer, W. (2009): Seltener Besuch aus der Sahelzone – die Schabracken-Königslibelle. *LANI-US-Information* 18(3-4): 7-8. (in German) [Niederösterreich, Austria; the author reports three records of *Anax ephippiger* emergence in 2009 from a gravel pond near Pöchlarn and two shallow storm water retention ponds near Rohr/Loosdorf and Nenndorf/Markersdorf.] Address: Schweighofer, W., Ötscherblick 10, A-3661 Artstetten, Austria. E-mail: wolfgang.schweighofer@schule.at

**10409.** Sharapova, T.A. (2009): [Study of the zooperiphyton of the River Demyankov]. *Bulletin of Environment, Forest and Landscape* 9: 146-154. (in Russian) [The river Demyankov is situated at app. 59 N 71 E in Russia. *Somatochlora graeseri* is the single odonate species mentioned.] Address: Sharapova, T.A., Institute of Northern Development, Siberian Branch of the RAS, Tyumen, Russia

**10410.** Srivastava, S.K.; Babu, N.; Pandey, H. (2009): Traditional insect bioprospecting – as human food and medicine. *Indian Journal of Traditional Knowledge* 8(4): 485-494. (in English) ["The wisdom that indigenous people have regarding bioprospecting is embedded in their belief system and their culture. Food insects play an important role in the new insect focus. Ants, bees, termites, caterpillars, water bugs, beetle larvae, flies, crickets, katydids, cicadas, and dragonfly nymphs are among a long list of edible insects that provide nutrition for the people of Asia, Australia, Africa, South America, the Middle East, and the Far East. Insects represent an important food source for a wide variety of other animal species. By weight, termites, grasshoppers, caterpillars, weevils, houseflies and spiders are better sources of protein than beef, chicken, pork or lamb. The traditional healers use insects as medicine. Chemicals produced by insects against self defense can be used for antibacterial and anticancer drugs. The nutritional and economic value of edible insects is often neglected and we should further encourage their collection and commercialization, given the benefits to the environment and human health. It is an interesting concept, managing pest insects by developing them into a sought after delicacy." (Authors)] Address: SK Srivastava, S.K., National Research Centre for Women in Agriculture, (NRCWA), (Indian Council of Agricultural Research), P.O. Baramunda, Bhubaneswar 751 003, Orissa, India. E-mail: srivastavasknrcwa@yahoo.com

**10411.** Stenman, K.; Johansson, F. (2009): Röd flickslända och finnmyrten – två nya arter för Piteå kommun. *Skörvöpparn*, Umeå 1: 25-26. (in Swedish) [Sweden; *Pyrrhosoma nymphula* was observed ca 30 km V Piteå; N 7257639, O 1735730; RT90.] Address: Johansson, F., Department of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**10412.** Theischinger, G.; Miller, J.; Miller, R.; Krogh, M. (2009): Rediscovery of *Austrocordulia leonardi* in the suburbia of Sydney. *Agrion* 13(2): 50-53. (in English) [A.

leonardi is considered as one of Australia's rarest dragonflies. "Ecological information accumulated during the recent search for the species is presented and discussed." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**10413.** Torralba Burrial, A.; Ocharan, F.J. (2009): Temporalidad y perturbaciones antrópicas en las comunidades de macroinvertebrados de la subcuenca del río Arba (Zaragoza, NE España). Boletín de la Real Sociedad Española de Historia Natural. Sección biológica 103: 131-144. (in Spanish, with English summary) ["Benthic macroinvertebrate communities of the Arba river basin (Aragon, NE Spain) have been studied with the aim of evaluating its ecological status. In the summer of 2001 two samplings campaigns were carried out with a Surber net, coincident with the season of lower flow. Community structure was studied by means of taxa richness and diversity, equitability and dominance indices. Water quality was evaluated by taxa number of Ephemeroptera, Plecoptera and Trichoptera (EPT groups), IASPT and IBMWP indices, using this last one to classify the ecological status of the sampled reaches. In the upper reaches the superficial water is reduced to isolated pools; nevertheless they maintain diverse communities with high values in the IBMWP. There were differences among tributaries due to the diverse degree of anthropic disturbance that they support, being more serious in the downstream part of the basin. Temporality and anthropic disturbance explain the composition of the benthic macroinvertebrate communities in these Mediterranean rivers." (Authors) The taxa list includes 'Aeshnidae' and 'Gomphidae'.] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

**10414.** Xu, C.; Zhang, G. (2009): Biodiversities of Daqing wetland and counter measures for protection. Chinese Agricultural Science Bulletin 25(11): 215-219. (in Chinese, with English summary) [From March 2007 to December 2008, the biodiversity of Daqing Longfeng and Zhalong wetland nature reserve, Dangnai section was studied. 469 plant and 316 vertebrate species were found. Sympetrum croceolum and Coenagrionidae are also mentioned in the text.] Address: Xu, C., Department of Life Science, Daqing Normal College, Daqing Heilongjiang 163712, China. E-mail: changjunxu@126.com

**10415.** Zhao, Y.; Tong, J.; Sun, J.; Chen, D.; Zhang, J. (2009): Property tests of nano indentation on membranous wings of dragonflies. Journal of Agricultural Mechanization Research 2009(11): 26-29. (in Chinese, with English summary) ["The nano - mechanical behaviour of dragonfly membranous wings was investigated with a nano - indenter. The holding time and the loading rate were selected 20 s and 53  $\mu$ N/s by the method of test optimization. In nano - indentation experiment, 6 indentation measurements were done in an area of 0.075mm - 0.01mm and then took the mean value as the nano - mechanical parameter of this position. It was shown that the maximums of the reduced modulus and the hardness of the living dragonfly *Anax parthenope julius* and *Pantala flavescens* are about at position of 0.7 L of their wings, where L is the total length of their wings. The maximums of the reduced modulus and the hardness of the *Sympetrum striolatum* are at position of 0.5 L of its wing, where L is the total length of the wing. The reduced modulus and the hardness of *A. parthenope julius* are maximum on the corresponding parts among the three drag-

onflies, related to the large somatotype." (Authors)] Address: The College of Mechanical and Power Engineering, Henan Polytechnic Univ., Jiaozuo 454000, China

## 2010

**10416.** Anderson, C.N.; Grether, G.F. (2010): Character displacement in the fighting colours of *Hetaerina* damselflies. Proc. R. Soc. B 277(1700): 3669-3675. (in English) ["Aggression between species is a seldom-considered but potentially widespread mechanism of character displacement in secondary sexual characters. Based on previous research showing that similarity in wing coloration directly influences interspecific territorial aggression in *Hetaerina* damselflies, we predicted that wing coloration would show a pattern of character displacement (divergence in sympatry). A geographical survey of four *Hetaerina* damselfly species in Mexico and Texas showed evidence for character displacement in both species pairs that regularly occurs sympatrically. *Hetaerina titia*, a species that typically has large black wing spots and small red wing spots, shifted to having even larger black spots and smaller red wing spots at sites where a congener with large red wing spots is numerically dominant (*H. americana* or *H. occisa*). *H. americana* showed the reverse pattern, shifting towards larger red wing spots where *H. titia* is numerically dominant. This pattern is consistent with the process of agonistic character displacement, but the ontogenetic basis of the shift remains to be demonstrated." (Authors)] Address: Anderson, C.N., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Circuito Exterior s/n, Apdo. Postal 70-275, México D.F. 04510, Mexico. E-mail: cndanderson1980@gmail.com

**10417.** Anonymus (2010): Listing Actions: Two Hawaiian Damselflies. Endangered Species Bulletin 35(2): 39. (in English) [Verbatim: "On June 24, the Service listed two species of Hawaiian damselflies as endangered. The flying earwig Hawaiian damselfly (*Megalagrion nesiotis*) historically occurred on the islands of Hawai'i and Maui but is now found only on the latter. The Pacific Hawaiian damselfly (*M. pacificum*) once lived on all of the main Hawaiian Islands (except Kaho'olawe and Ni'ihau) but now occurs only on the islands of Hawai'i, Maui, and Molo'ka'i. Damselflies are close relatives of dragonflies, which they resemble in appearance. With the extensive modification of stream and wetland habitats and the degradation of native forests, Hawaii's native damselflies, including the two species most recently listed, experienced a tremendous reduction in habitat. In addition, predation by a number of nonnative species that have been both intentionally and, in some cases, inadvertently introduced into the Hawaiian Islands is a continuing threat to all of the state's native damselflies."] Address: not stated

**10418.** Barros, P.; Moreira, P.; Ferreira, S. (2010): Contribution to the knowledge of the Odonata fauna of northern Portugal. Boletín de la S.E.A. 46(1): 533-539. (in English, with Spanish summary) ["The known distribution of 36 species of dragonfly in Portugal is extended with 220 records from 50 localities in the north of the country, collected between 2008 and 2009. The new data include information from three Sites of Community Importance of the Natura 2000 network: PTCON0003-Alvão-Marão, PTCON0025-Montemuro and PTCON0021-Rio Sabor e Maças; and five protected areas: Serra da Estrela Natural Park, Azibo's Lagoon Protected Landscape, Alvão Natural Park, Douro International Natural Park and Mon-

tesinho Natural Park." (Authors) The records include the legally protected Odonata species *Coenagrion mercuriale*, *Gomphus graslinii*, *Macromia splendens*, and *Oxygastra curtisii*.] Address: Ferreira, Sónia, CIBIO/UP - Centre de Investigate) em Biodiversidade e Recursos Geneticos, Universidade do Porto, Campus Agrário de Vairao, P-4485-661 Vairão, Portugal. E-mail: hiporame@gmail.com

**10419.** Bedjanic, M. (2010): Three new Drepanosticta species from Sri Lanka (Zygoptera: Platystictidae). *Odonatologica* 39(3): 195-215. (in English) ["*D. mojca* sp. n. (holotype male: 10km NE of Deniyaya; Matara distr.; Southern prov.; N 6.360, E 80.460; 02-V-2003; to be deposited at Sri Lanka National Museum, Colombo), *D. bine* sp. n. (holotype male: Opanayake, Ratnapura distr.; Sabaragamuwa prov.; N 6.620, E 80.660; 13-X-1970; deposited at National Museum of Natural History, Smithsonian Institution, Washington, USA) and *D. anamia* sp. n. (holotype male: Katugas Falls near Ratnapura; Ratnapura distr.; Sabaragamuwa prov.; N 6.680, E 80.410; 04-V-2003; to be deposited at Sri Lanka National Museum, Colombo), are described. Their currently known distribution, phenology, ecology and threat status are presented and discussed. The remarkable Drepanosticta diversity in Sri Lanka makes the island a globally important Platystictidae hotspot." (Author)] Address: Bedjanic, M., Kolodvorska 21b, SI-2310 Slovenska Bistrica, Slovenia. E-mail: matjaz.bedjanic@yahoo.com

**10420.** Behrends, T. (2010): NABU-Landesstelle Wasser meldet ersten Monitoring-Erfolg: Kleine Königslibelle wiederentdeckt. *Betrifft Natur - Magazin des NABU Schleswig-Holstein* 2/10: 11. (in German) [The current situation of *Anax parthenope* in Schleswig-Holstein, Germany is briefly discussed on the basis of most recent records.] Address: Behrends, T., NABU-Landesstelle Wasser, Langes Str. 43, 24306 Plön. Germany. E-mail: Thomas.Behrends@NABU-SH.de

**10421.** Belevich, O.E.; Yurchenko, Yu.A. (2010): Twilight activity of dragonflies of the genus *Aeshna* Fabricius, 1775 (Odonata, Aeshnidae) in the southern part of West Siberia. *Euroasian entomological journal* 9(2): 275-279. (in Russian, with English summary) [The paper provides information on crepuscular feeding aggregation of eight Aeshnidae (*Aeshna affinis*; *A. crenata*; *A. grandis*; *A. juncea*; *A. mixta*; *A. serrata*; *A. subarctica*; *A. viridis*) in the forest zone of southern W Siberia (Novosibirsk region, Russia). *A. viridis* was the dominant crepuscular species with abundances of 80-100% of all Aeshnidae caught at one place. This behaviour can be recorded over the summer season, starting in early June, with a peak occurring in the second half of July, and ending in the early September. The average duration of the crepuscular flight was ca 1 h. The extreme values of temperatures with feeding activity varied between 9.5 and 25.5°C. Swarming dragonflies concentrated mainly near the forest edges or solitarily standing trees.] Address: Belevich, O.E., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Bran, Frunse str. 11, Novosibirsk 630091 Russia

**10422.** Bönsel, A. (2010): Zum Vorkommen der Libellenarten aus den Anhängen der FFH-Richtlinie in Mecklenburg-Vorpommern (Odonata). *Naturschutzarbeit in Mecklenburg-Vorpommern* 53(1/2): 24-33. (in German) [Maps of the distribution of the legally protected Odonata species *Aeshna viridis*, *Stylurus flavipes*, *Leucorrhinia albifrons*, *L. caudalis*, and *L. pectoralis* in Mecklenburg-Vor-

pommern, Germany are presented.] Address: Bönsel, A., Vasenbusch 15, D-18337 Gresenhorst, Germany. E-mail: andre.boensel@gmx.de

**10423.** Buczyński, P. (2010): Polish and dedicated to Poland odonatological papers. 8. The year 2009 and supplement to the year 2008. *Odonatrix* 6(2): 61-64. (in Polish, with English summary) [The author presents a list of Polish and dedicated to Poland odonatological papers that were published in the year 2009 (33 papers in 2009, 8 papers in 2008).] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**10424.** Buczyński, P.; Buczyńska, E. (2010): Another record of dragonflies (Odonata) in a light trap. *Odonatrix* 6(1): 1-2. (in Polish, with English summary) ["On June 15, 2007 in the valley of the River Raba near the village Marszowice (southern Poland) *Platycnemis pennipes* (2 males) and *Ischnura elegans* (1 male) were caught to a light trap. Both species occurred numerously on the river or in an adjacent gravelpit and they were probably activated by the strong light." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**10425.** Cross, D.; Jefferys, E. (2010): Catalogue of insects collected by William Sharp Macleay in Cuba 1825-1836. *Proceedings of the Linnean Society of New South Wales* 131: 27-35. (in English) ["All of William Sharp Macleay's labelled Cuban insects are now in a separately labelled Cuban insect cabinet in the Macleay Museum. There are over 7,349 labelled, pinned and partially identified. Other unlabelled specimens are still to be found throughout the collection. The geographical area where Cuba lies is also within the bio-geographical area for the southern United States, the Bahamas, the Caribbean and the northern most areas of South America. The biological scientists of these surrounding countries will find the information and knowledge of the distributions of insects of Cuba found in 1825 to 1836 of tremendous interest in relation to the possible distributions of insect faunas found or no longer found in these areas today." (Authors) The 24 Odonata specimens are still unidentified.] Address: Cross, D., Univ. of Sydney, Faculty of Agriculture, Food and Natural Resource, NSW 2006, Australia. E-mail: dcro3102@uni.sydney.edu.au

**10426.** Davis, J.M.; Rosemond, A.M.; Eggert, S.L.; Cross, W.F.; Wallace, J.B. (2010): Nutrient enrichment differentially affects body sizes of primary consumers and predators in a detritus-based stream. *Limnol. Oceanogr.* 55(6): 2305-2316. (in English) ["We assessed how a 5-yr nutrient enrichment affected the responses of different size classes of primary consumers and predators in a detritus-based headwater stream. We hypothesized that alterations in detritus availability because of enrichment would decrease the abundance and biomass of large-bodied consumers. In contrast, we found that 2 yr of enrichment increased the biomass and abundance of all consumers regardless of body size. Furthermore, during the fourth and fifth year of enrichment, the abundance and biomass of large-bodied primary consumers continued to increase, while small-bodied primary consumers returned to pretreatment levels. The size structure of a dominant primary consumer (*Pycnopsyche* spp.) also shifted during the 5-yr enrichment: its average and maximum individual body size increased in the treatment stream compared with the reference stream. Positive en-



richment effects also occurred on small-bodied predators, but not on large-bodied predators. Thus, enrichment increased prey body size, but these positive effects on large prey did not propagate up to higher trophic levels to affect large predators. Because consumer body size can be an important species-specific trait determining population dynamics and ecosystem processes, these observed shifts in consumer size distributions suggest a potentially important pathway for global increases in nutrient enrichment to alter stream structure and function...The predator community was dominated by app. 20 taxa of invertebrate (e.g., Beloneuria [Plecoptera], Ceratopogonidae [Diptera], Cordulegaster, Hexatoma [Diptera], and Lanthus)." (Authors)] Address: Davis, J.M., Stream Ecology Center, Dept of Biological Sciences, Idaho State Univ., Pocatello, Idaho, USA. E-mail: jmdavis@isu.edu

**10427.** Dow, R.A. (2010): A review of the *Teinobasis* of Sundaland, with the description of *Teinobasis cryptica* sp. nov. from Malaysia (Odonata: Coenagrionidae). *International Journal of Odonatology* 13(2): 205-230, pl. II. (in English) ["*Teinobasis cryptica* sp. nov. (holotype male: Borneo, Sarawak, Bahagian Samarahan, Kota Samarahan, old UNIMAS campus, disturbed peat swamp forest, 25 ii 2008, RMNH) from Malaysia is described from both sexes and compared with other *Teinobasis* species known to occur in Malaysia. The members of the genus known from Sundaland are reviewed. Records of *T. ruficollis* from Borneo are clarified. New records of other Bornean species are listed. The females of *T. laidlawi*, *T. rajah* and *T. ruficollis* are described for the first time. Keys are given to both sexes of all named species from the genus known from peninsular Malaysia, Singapore and the Greater Sunda Islands and the species are placed provisionally into two groups: the *laidlawi*-group and *ruficollis*-group. The former group also includes *T. rubricauda* from the Palawan region of the Philippines, which may be a junior synonym of *T. laidlawi*." (Author)] Address: Rory A. Dow, Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**10428.** Dozark, K.G. (2010): Sediment effects on aquatic macroinvertebrates in a prairie pothole, Oak Lake, in eastern South Dakota. Dissertation, South Dakota State University: 90 pp. (in English) ["The Clean Water Act aims to maintain the physical, chemical, and biological integrity of the nation's waters. Sedimentation is a major pollutant to world, national, and state waterbodies. The developments of Total Maximum Daily Loads (TMDLs) are required to improve water quality problems through the use of Best Management Practices (BMPs). Sedimentation can be detrimental to aquatic ecosystems by reducing feeding ability, smothering habitat, clogging respiratory apparatuses, and increasing scouring and abrasion to exoskeletons of aquatic organisms. This study examined the influence of regional sediment loads on aquatic macroinvertebrate communities in the littoral zone of a prairie pothole lake, Oak Lake. Ten emergent macrophyte bed and ten rocky shoreline locations were treated with varying levels of soil to simulate regional sediment loads of 25 tons/km<sup>2</sup>, 250 tons/km<sup>2</sup>, 2,500 tons/km<sup>2</sup> and 25,000 tons/km<sup>2</sup>. Five plots were treated and sampled at each of ten locations during the summers of 2005 and 2006. Invertebrates were subsampled, identified to the lowest practical taxonomic level, and classified into habitat and feeding guilds. A total of 129 invertebrate taxa were identified throughout the experiment. Macrophyte beds contained an average of 23 genera and rocky

shores contained an average of 18 genera. Sedimentation significantly decreased the percentages of collector-gatherers and sprawlers in both habitats. Percentages of gliders, swimmers, and scrapers increased with the addition of sediment in both habitats. Macrophyte beds exhibited an increase in Ephemeroptera, Trichoptera, and Odonata richness following sedimentation. The percentage of sprawlers in rocky shorelines was significantly decreased due to sedimentation. These relationships were log linear. Oligochaeta, *Caenis latipennis*, Endochironomus and Coenagrionidae abundances were reduced following treatment in macrophyte beds. In rocky habitats abundances of Oligochaeta, water mites, and *Hyalella azteca* increased following treatment. However, *C. latipennis* and *Hydra* abundances decreased. Overall, macroinvertebrate communities changed little following sedimentation. Other studies suggest that macroinvertebrate communities in the Prairie Pothole region are tolerant to environmental disturbances and changes. Non-anthropogenic factors, such as lake morphology, may be more influential to macroinvertebrate communities than anthropogenic factors, such as human development along lake shorelines. Future studies should examine possible macroinvertebrate threshold levels with higher sediment loads than were used in this study." (Author)] Address: not stated

**10429.** Dudarev, A.N. (2010): Strekozy (Insecta, Odonata) verkhovo bolota „El'nya" [Dragonflies (Insecta, Odonata) of the high peat bog „El'nya"]. *Vesnik Vitebskaya dzerzhavnaga universiteta* 2010(2): 80-84. (in Russian) [Belarus; 20 Odonata species have been found in the bog of El'nya, Belarus. Dominant species are *Lestes sponsa*, *Sympetrum flaveolum* and *Enallagma cyathigerum*. Noteworthy species are also *Coenagrion hastulatum*, *C. pulchellum*, *Somatochlora flavomaculata*, *Leucorrhinia albifrons*, *L. rubicunda*, and *L. dubia*.] Address: Dudarev, A.N., UO Vitebsk State Univ., PM Masherau, Belarus

**10430.** Geraeds, R.P.G. (2010): Habitat and development of larvae of the Club-tailed dragonfly in the river Roer. *Natuurhistorisch Maandblad* 99(11): 249-255. (in Dutch, with English summary) ["The locations and timing of emergence of in the river Roer (in the Dutch province of Limburg) have been thoroughly investigated in recent years. It is assumed that the dragonflies generally emerge close to their larval habitat. Since surveys of actual larval habitats in the Netherlands have been very rare, four transects of the Roer were checked for the presence of larvae of the Clubtailed dragonfly (*Gomphus vulgatissimus*) during 2006-2009. The goal was to discover what type of substrate the larvae prefer, and if the places where the dragonflies emerge are situated close to the actual larval habitats, as well as to find out how long larval development along the river Roer takes. The survey of larvae was carried out in four transects (Muytert, Melicker Ohé, Zwarte Berg and Roermond). The larvae were caught with a hand brailer which is normally used for fish and amphibian surveys. For each of the larvae caught, I noted the type of substrate in which it was caught and its distance to the riverbank, measured the width of its head and determined its sex. Larvae of the Clubtailed dragonfly develop in 14 stages (F13 to F0), and the stage of development can be identified by measuring the width of the head. The last hibernation before emergence always takes place in the final stage of development (F0). The larvae do not grow during hibernation, i.e. from October to May. Each transect was investigated eight times during the 2006-2009 period, and 615 larvae of *G. vulgatissimus*

simus were caught. Most were caught at the Melicker Ohé transect (245), while only four larvae were caught at the Roermond transect. Most larvae were found within a 1 m distance of the riverbank, and almost 50% even within 0.50 m from the bank. The largest distance from the bank at which larvae were caught was 5 m. Most larvae were found in mixed substrates, dominated by a combination of silt and detritus. Only a few larvae were found in substrates dominated only by silt, detritus, sand or gravel. The widths of the larval heads ranged from 1.3 to 6.5 mm. According to Müller (1995) and Kern (1999), this means that the larvae were in the last seven developmental stages (F6 to F0). Most of the larvae were in the final stage (F0). Surveys during hibernation yielded only larvae in the last six stages (F5 till F0). The distribution of developmental stages of larvae caught during hibernation shows that most of the larvae of the population in the River Roer develop over a period of three years, which means that most of the larvae hibernate successively in stages F4, F2 and F0." (Author)] Address: Geraeds, R.P.G., Bergstraat 70, 6131 AW Sittard, The Netherlands

**10431.** Grand, D. (2010): Observations tardives d'*Aeshna mixta* Latreille, 1805 dans la Dombes (Ain) à l'automne 2009 (Odonata, Anisoptera: Aeshnidae). *Martinia* 26(1-2): 52. (in French) [France; data on fall phenology of *A. mixta* (and *Sympetrum meridionale*, *S. striolatum*) are presented.] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France. E-mail: danielgrand@yahoo.fr

**10432.** Hacet, N.; Çamur-Elipek, B.; Kirgiz, T. (2010): A study on the Odonate larvae of Turkish Thrace: with larval identification keys to the considered taxa. *J. Entomol. Res. Soc.* 12(2): 57-74. (in Odonata, larvae, identification key, Turkish Thrace, Turkey) ["A total of 26 species were recorded based on larval specimens collected from the region during sampling period between years 1982 and 2009. New localities for the odonate species, except *Callaeschna microstigma*, *Gomphus flavipes*, *Cordulegaster insignis*, and *Sympetrum fonscolombii*, were added to their distributional ranges inside the region. Furthermore, *Anax imperator*, *Brachytron pratense*, and *Libellula fulva* were recorded from the provinces where they had not previously been found. Keys including illustrations of the larvae recorded in the region were provided." (Authors)] Address: Hacet, Nurten, Trakya University, Faculty of Science, Department of Biology, TR-22030 Edirne, Turkey. E-mails: nhacet@hotmail.com

**10433.** Han, J.-s.; Chang, J.W.; Kang, I.-m.; Kim, S.-t. (2010): Flow visualization and force measurement of an insect wing based on dragonfly hovering. 28th AIAA Applied Aerodynamics Conference, 28 June - 1 July 2010, Chicago, Illinois: (in English) ["Flow visualization and aerodynamic force measurements were conducted in order to investigate the flow phenomena around the wing of a hovering dragonfly. Two pairs of 4-bar linkage mechanisms were installed in a flapping model and driven by a stepping motor. The fore- and hindwing have a phase difference angle of 180°. The stroke amplitude, pitch angle and incidence angle of the model were 75°, 0-90° and 60°, respectively. A wing beat frequency of 0.087 was chosen, and the corresponding Reynolds number was 2.0×10<sup>3</sup> based on the forewing. Each wing generated LEV at the start of downstroke and the LEV was developed and maintained on the upper surface of the wing. Aerodynamic forces were also generated in the downstroke motion in all cases. When the wings stroke together, the LEV on the hindwing was deformed by the

forewing, and the forces on the hindwing are lower than in the hindwing only cases. These results indicate that the wing-wing interaction have a negative effect on the generation of aerodynamic forces." (Authors)] Address: Chang, J.W., Korea Aerospace University, Hanggongdae-gil 100, Deogyang-gu, Goyang-city, Gyeonggi-do, Republic of Korea. E-mail: jwchang@kau.ac.kr

**10434.** Hanson, M.A.; Palik, B.J.; Church, J.O.; Miller, A.T. (2010): Influences of upland timber harvest on aquatic invertebrate communities in seasonal ponds: efficacy of forested buffers. *Wetlands Ecology and Management* 18(3): 255-267. (in English) ["We assessed community responses of aquatic invertebrates in 16 small, seasonal ponds in a forested region of north central Minnesota, USA, to evaluate potential influences of timber harvest and efficacy of uncut forested buffers in adjacent uplands. Invertebrate data gathered before (2000) and during the first 4 years following clearcut timber harvest (2001–2004) indicated that tree removal was followed by shifts in aquatic invertebrate communities in adjacent seasonal ponds. Retention of forested buffers appeared to partially mitigate influences of tree removal, but benefits of buffers may be limited by wind throw or other factors. Additional research is needed to clarify relationships between ecological characteristics of seasonal ponds and upland silviculture activities, and to better document efficacy and longevity of forested buffers." (Authors) Odonata are treated at the order level.] Address: Hanson, M.A.; Minnesota Dept of Natural Resources, Wetland Wildlife Populations & Research Group, 102 23rd St. NE, Bemidji, MN 56601, USA. E-mail: mark.hanson@dnr.state.mn.us

**10435.** Hippke, M. (2010): Bemerkenswerte entomologische Beobachtungen in Mecklenburg-Vorpommern (2010): Odonata (Libellen). *Virgo - Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 13(2): 70. (in German) [Germany. Records of *Anax parthenope*, *Leucorrhinia caudalis*, *Aeshna affinis*, *A. subarctica*, and *Erythromma viridulum* are documented.] Address: Hippke, M., Wiesenring 29, 19370 Parchim, Germany. E-Mail: Mathias-Hippke@web.de

**10436.** Höttinger, H. (2010): Die Libellen- und Tagfalterfauna des „Tiergartens“ in Schützen am Gebirge (Burgenland, Österreich). *Beiträge zur Entomofaunistik* 11: 13-26. (in German, with English summary) [Austria; "The Esterházy-"Tiergarten" at Schützen am Gebirge in the Leitha mountains exists since 1756, has 1.200 hectare in size and is surrounded by a wall. The area is characterized by partly semi-open and park like structure, some parts of ancient woodland and high diversity of habitats. Data on the fauna of the area were sparse until yet. Therefore in the year 2009 outline mapping on birds, bats, amphibians and insects (butterflies, dragonflies, saproxylic beetles) was ordered from the owner, the Esterházy company. [...] 36 of the 58 species of dragonflies reported from Burgenland were found and about five further species can be expected. Notably four "critically endangered" species from the Austrian red list were recorded (*Coenagrion ornatum*, *C. scitulum*, *Lestes dryas* and *L. virens*). Two species are classified as "endangered" (*Libellula fulva*, *Lestes barbarus*) and further six species "vulnerable". At least 22 of the 36 species possibly or sure can reproduce in the area." (Author)] Address: Höttinger, H., Institut für Zoologie, Department für Integrative Biologie und Biodiversitätsforschung, Universität für Bodenkultur, Gregor Mendel Str. 33, 1180 Wien, Austria. E-Mail: helmut.hoettinger@boku.ac.at

- 10437.** Joniak, T. (2010): Benthic fauna of humic lakes of Drawieński National Park – history of research and state of knowledge. In: Joniak, T. (Ed.), *Functioning and protection of marsh ecosystems. Vol 3. Benthic fauna of Polish national parks.* Department of Water Protection Faculty of Biology A. Mickiewicz University, Poznań: 40-46. (in Polish, with English summary) ["The work present the history of research and state of knowledge of macrozoobenthos of humic lakes in Drawieński National Park, Poland. The specific feature of humic lakes is the presence of dissolved, mainly humic organic matter. The process of lake humification is connected with the inflow of organic substances cause significant changes in the water environment as well as the formation of a specific association of hydrobionts. The increase in the concentration of humic acids in lake waters leads to changes in the abiotic features of the environment, such as high water colour, decline in the thickness of the trophogenic zone, pH decrease (<6.5), limitation of the bioavailability of biogenic compounds. In these conditions some groups of benthic fauna are not found (for example Crustacea, Mollusca), and species diversity and number are reduced." (Author) The following Odonata species are mentioned: *Cordulia aenea*, *Enallagma cyathigerum* and *Ischnura elegans*.] Address: Joniak, T., Adam Mickiewicz University of Poznań, Faculty of Biology, Department of Water Protection, Umultowska str. 89, 61-614 Poznań, Poland. E-mail: e-mail: tjoniak@amu.edu.pl
- 10438.** Jović, M.; Stanković, M.; Andus, L. (2010): *Aeshna grandis* (Linnaeus 1758) - A new species in Serbian fauna (Odonata: Aeshnidae). *Bulletin of the Natural History Museum* 3: 137-140. (in English, with Serbian summary) [10-VIII-2009, Badovinci (NW Serbia)] Address: Jović, M., Natural History Museum, Njegoševa 51, 10000 Belgrade, Serbia. E-mail: milos.jovic@nhmbeo.rs
- 10439.** Kery, M.; Gardner, B.; Monnerat, C. (2010): Predicting species distributions from checklist data using site-occupancy models. *Journal of Biogeography* 37(10): 1851-1862. (in English) ["Aim (1) To increase awareness of the challenges induced by imperfect detection, which is a fundamental issue in species distribution modelling; (2) to emphasize the value of replicate observations for species distribution modelling; and (3) to show how 'cheap' checklist data in faunal/floral databases may be used for the rigorous modelling of distributions by site-occupancy models. Location: Switzerland. Methods: We used checklist data collected by volunteers during 1999 and 2000 to analyse the distribution of *Aeshna cyanea*, a common dragonfly in Switzerland. We used data from repeated visits to 1-ha pixels to derive 'detection histories' and apply site-occupancy models to estimate the 'true' species distribution, i.e. corrected for imperfect detection. We modelled blue hawker distribution as a function of elevation and year and its detection probability of elevation, year and season. Results: The best model contained cubic polynomial elevation effects for distribution and quadratic effects of elevation and season for detectability. We compared the site-occupancy model with a conventional distribution model based on a generalized linear model, which assumes perfect detectability ( $p = 1$ ). The conventional distribution map looked very different from the distribution map obtained using site-occupancy models that accounted for the imperfect detection. The conventional model underestimated the species distribution by 60%, and the slope parameters of the occurrence–elevation relationship were also underestimated when assuming  $p = 1$ . Elevation was not only an important predictor of blue hawker occurrence, but also of the detection probability, with a bell-shaped relationship. Furthermore, detectability increased over the season. The average detection probability was estimated at only 0.19 per survey. Main conclusions: Conventional species distribution models do not model species distributions per se but rather the apparent distribution, i.e. an unknown proportion of species distributions. That unknown proportion is equivalent to detectability. Imperfect detection in conventional species distribution models yields underestimates of the extent of distributions and covariate effects that are biased towards zero. In addition, patterns in detectability will erroneously be ascribed to species distributions. In contrast, site-occupancy models applied to replicated detection/non-detection data offer a powerful framework for making inferences about species distributions corrected for imperfect detection. The use of 'cheap' checklist data greatly enhances the scope of applications of this useful class of models." (Authors)] Address: Kéry, M., Swiss Ornithological Institute, 6204 Sempach, Switzerland. E-mail: marc.kery@vogelwarte.ch
- 10440.** Kołeczek, D.; Tończyk, G. (2010): *Ischnura elegans* (Zygoptera: Coenagrionidae) as a prey of *Machimus* sp. (Diptera: Asilidae). *Odonatrix* 6(1): 3. (in Polish, with English summary) [Skórzyn (western Poland, 52°07' 17,18"N, 15°02'21,18"E)] Address: Kołeczek Dagmara, Instytut Ekologii Stosowanej, Skórzyn 44a, 66-614 Maszewo, Poland. E-mail: instytut@ies.zgora.pl
- 10441.** Koltthoff, D. (2010): *Libellen im Landkreis Leer.* Verlag H. Risius. Weener: 82 pp. (in German) [Niedersachsen, Germany. 34 Odonata species are characterised in a monographic style.]
- 10442.** Krieg-Jacquier, R. (2010): *Epithea bimaculata* (Charpentier, 1825) dans le département de l'Ain (Odonata, Anisoptera, Corduliidae). *Martinia* 26(3/4): 83-97. (in French, with English summary) [*E. bimaculata* was found in the Ain department, France at 19 localities. At two of them a univoltin development of specimens is possible.] Address: Krieg-Jacquier, R., 18 rue de la Maconne F-73000 Barberaz, France. E-mail: regis.krieg.jacquier@gmail.com
- 10443.** Kück, P.; Meusemann, K.; Dambach, J.; Thormann, B.; Reumont, B.M. von; Wägele, J.W.; Misof, B. (2010): Parametric and non-parametric masking of randomness in sequence alignments can be improved and leads to better resolved trees. *Frontiers in Zoology* 2010, 7: 12 pp. (in English) ["Methods of alignment masking, which refers to the technique of excluding alignment blocks prior to tree reconstructions, have been successful in improving the signal-to-noise ratio in sequence alignments. However, the lack of formally well-defined methods to identify randomness in sequence alignments has prevented a routine application of alignment masking. Here, the effects on tree reconstructions of the most commonly used profiling method (GBLOCKS), which uses a predefined set of rules in combination with alignment masking, are compared with a new profiling approach (ALISCORE) based on Monte Carlo resampling within a sliding window, using different data sets and alignment methods. While the GBLOCKS approach excludes variable sections above a certain threshold which choice is left arbitrary, the ALISCORE algorithm is free of a priori rating of parameter space and therefore more objective. ALISCORE was successfully extended to amino acids using a proportional model and empirical substitution matrices to score randomness in multiple sequence



alignments. A complex bootstrap resampling leads to an even distribution of scores of randomly similar sequences to assess randomness of the observed sequence similarity. Testing performance on real data, both masking methods, GBLOCKS and ALISCORE, helped to improve tree resolution. The sliding window approach was less sensitive to different alignments of identical data sets and performed equally well on all data sets. Concurrently, ALISCORE is capable of dealing with different substitution patterns and heterogeneous base composition. ALISCORE and the most relaxed GBLOCKS gap parameter setting performed best on all data sets. Correspondingly, Neighbour-Net analyses showed the most decrease in conflict. Alignment masking improves signal-to-noise ratio in multiple sequence alignments prior to phylogenetic reconstruction. Given the robust performance of alignment profiling, alignment masking should routinely be used to improve tree reconstructions. Parametric methods of alignment profiling can be easily extended to more complex likelihood based models of sequence evolution which opens the possibility of further improvements." (Authors) The data set includes *Libellula quadrimaculata* and *Cordulia aenea*.] Address: Kück, P., Zool. Forschungsmus. A. Koenig, Adenauerallee 160, D-53113 Bonn, Germany. E-mail: patrickkueck@web.de

**10444.** Kulijer, D.; Marinov, M. (2010): Odonata from Bulgaria in the collection of National Museum of Bosnia and Herzegovina. *Acta entomologica serbica* 15(2): 161-169. (in English, with Serbian summary) ["The entomological collection of the National Museum of Bosnia and Herzegovina is one of the oldest Balkan insect collections. 87 dragonfly specimens from 19 species that originate from Bulgaria were found in this collection. In this paper we present the oldest and till now unknown records of dragonflies from Bulgaria from this collection. Some interesting and new distribution data on several species are also presented and discussed." (Authors) The collection includes the following taxa: *Calopteryx splendens*, *C. splendens balcanica*, *Calopteryx virgo*, *Lestes sponsa*, *L. dryas*, *L. barbarus*, *L. macrostigma*, *S. fusca*, *Ischnura elegans*, *I. pumilio*, *Coenagrion puella*, *Platycnemis pennipes*, *Gomphus flavipes*, *Sympetrum sanguineum*, *S. flaveolum*, *S. meridionale*, and *Crocotthemis erythraea*. The occurrence of *C. s. balcanica* in Bulgaria needs further confirmation.] Address: Kulijer, D., National Museum of Bosnia and Herzegovina, Zmaja od Bosne 3, 71000 Sarajevo, Bosnia and Herzegovina. E-mail: dejan.kulijer@gmail.com

**10445.** Lamond, B. (2010): Drugstore Dragonfly. *The Wood Duck* 64(4): 85. (in English) [Brantford, Ontario, Canada, 8-VIII-2010, a female *Stylurus scudderi* flew through an open door into a pharmacy perching at the ceiling. The paper includes additional regional records of this Odonata species.] Address: Lamond, B. E-mail: bill-lamond@hotmail.com

**10446.** Levy, D.E.; Seifert, A. (2010): Parameter study of simplified dragonfly airfoil geometry at Reynolds number of 6000. *J. Theor. Biol.* 266(4): 691-702. (in English) ["Aerodynamic study of a simplified Dragonfly airfoil in gliding flight at Reynolds numbers below 10,000 is motivated by both pure scientific interest and technological applications. At these Reynolds numbers, the natural insect flight could provide inspiration for technology development of Micro UAV's and more. Insect wings are typically characterized by corrugated airfoils. The present study follows a fundamental flow physics study (Levy and Seifert, 2009), that revealed the importance of flow separation

from the first corrugation, the roll-up of the separated shear layer to discrete vortices and their role in promoting flow reattachment to the aft arc, as the leading mechanism enabling high-lift, low drag performance of the Dragonfly gliding flight. This paper describes the effect of systematic airfoil geometry variations on the aerodynamic properties of a simplified Dragonfly airfoil at Reynolds number of 6000. The parameter study includes a detailed analysis of small variations of the nominal geometry, such as corrugation placement or height, rear arc and trailing edge shape. Numerical simulations using the 2D laminar Navier-Stokes equations revealed that the flow accelerating over the first corrugation slope is followed by an unsteady pressure recovery, combined with vortex shedding. The latter allows the reattachment of the flow over the rear arc. Also, the drag values are directly linked to the vortices' magnitude. This parametric study shows that geometric variations which reduce the vortices' amplitude, as reduction of the rear cavity depth or the reduction of the rear arc and trailing edge curvature, will reduce the drag values. Other changes will extend the flow reattachment over the rear arc for a larger mean lift coefficients range; such as the negative deflection of the forward flat plate. These changes consequently reduce the drag values at higher mean lift coefficients. The detailed geometry study enabled the definition of a corrugated airfoil geometry with enhanced aerodynamic properties, such as range and endurance factors, as compared to the nominal airfoil studied in the literature." (Authors)] Address: Levy, D.E., School of Mechanical Engineering, Faculty of Engineering, Tel-Aviv Univ., Tel Aviv, Israel

**10447.** Malikova, E.I. (2010): Zoogeographically interesting dragonfly (Odonata) records from the Upper Amur region. *Eurasian Entomological Journal* 9(2): 291-294. (in Russian, with English summary) ["New records of 10 species are reported. *Lestes temporalis*, *Paracercion calamorum*, *Anax parthenope julius* and *Sinictinogomphus clavatus* are recorded for the first time from the region. The W Palaearctic *Orthetrum cancellatum*, reported from Upper Amur (Blagoveshchensk, Amurskaya Oblast, Russia), probably migrated from Chinese Inner Mongolia, following a mass migration of the beet webworm (*Loxostege sticticalis*) in 2008." (Author) Address: Malikova, E.I., Blagoveshchensk St. Pedagog. Univ., Lenina 104, RUS-675000 Blagoveshchensk, Russia

**10448.** Michalczyk, W.; Buczyński, P. (2010): The second recent locality of *Coenagrion ornatum* (Odonata: Coenagrionidae) in the southeastern Poland. *Odonatrix* 6(1): 15-21. (in Polish, with English summary) ["*Coenagrion ornatum* is a critically endangered species in Poland. It has been known from 24 localities so far, of which only one is preserved till now - in Śniatycze situated east of Zamosc (south-eastern Poland). The authors give and discuss a new species locality situated west-north-west of Zamość, ca. 40 km from Śniatycze, in the village of Średnie Duże (50°50'32"N, 23°01'15"E, UTM: FB43). The species inhabits the River Rakówka. The discovery was made on 13 July, thus the estimating of population number is uncertain, however, it can be at least equally numerous as the population in Śniatycze which is regarded as large and stable. New data moves the boundary of the current range of *C. ornatum* in Poland a bit to the north. The presence of the species in south-eastern Poland is probably associated with its occurrence in western Ukraine, where it was recorded at ca. 20 localities. Although many of them are historical ones, there is also fresh data from the Shatsk Lake District (Chokalo,

Werwes 2009). *Rakówka* seems to be untypical as a habitat of *C. ornatum* due to high values of river section and flow velocity. However, the calculated parameters of flow turned out to be similar to these from the other localities of this species. The discussed locality is seriously endangered due to its localization in the centre of a village - the small river is fragmented into many stretches with different type of using. *C. ornatum* has been observed on the stretch of the total length of ca 200 m, however, the numbers were different. In places with the least favourable conditions (with the bottom of concrete and removed vegetation) the species was absent. Passive and active protection of this locality is a must." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**10449.** Michalkiewicz, M. (2010): Long-term changes of macrozoobenthos Rosnowskie Duże Lake. In: Joniak, T. (Ed.), Functioning and protection of marsh ecosystems. Vol 3. Benthic fauna of Polish national parks. Department of Water Protection Faculty of Biology A. Mickiewicz University, Poznań: 61-68. (in Polish, with English summary) ["The paper presents the results of bottom macrofauna found in Rosnowskie Duże Lake in the years 1986-2006. The study included 2 profundal stations and 3 of the littoral. The dominant forms in the profundal where Chaoborus and Chironomidae, while in the littoral Gastropods, *Asellus aquaticus* and Chironomidae. Most frequently occurred in the littoral was *Potamopyrgus antipodarum*, which reached an average size of over 23000 individuals per 1 m<sup>2</sup> of the bottom. The variability in individual basins of benthofauna's lake affected different physical-chemical parameters of water." (Author) Odonata are not specified in detail.] Address: Michalkiewicz, M., Poznań University of Technology, Institute of Environmental Engineering, Division of Water Supply and Environment Protection, Piotrowo str. 5, 60-965 Poznań, Poland. E-mail: drmichal@poczta.onet.pl

**10450.** Muehlbauer, J.D.; Doyle, M.W.; Bernhardt, E.S. (2010): Macroinvertebrate community responses to a dewatering disturbance gradient in a restored stream. *Hydrol. Earth Syst. Sci. Discuss.* 7: 9599-9630. (in English) [Timberlake mitigation site, Carolina, USA. "Dewatering disturbances are common in aquatic systems and represent a relatively untapped field of disturbance ecology, yet studying dewatering events along gradients in non-dichotomous (i.e., wet/dry) terms is often difficult. Because many stream restorations can essentially be perceived as planned hydrologic manipulations, such systems can make ideal test-cases for understanding processes of hydrological disturbance. In this study we used an experimental drawdown in a 440 ha stream / wetland restoration site to assess aquatic macroinvertebrate community responses to dewatering and subsequent rewetting. The geomorphic nature of the site and the design of the restoration allowed dewatering to occur predictably along a gradient and decoupled the hydrologic response from any geomorphic (i.e., habitat heterogeneity) effects. In the absence of such heterogeneous habitat refugia, reach-scale wetted perimeter and depth conditions exerted a strong control on community structure. The community exhibited an incremental response to dewatering severity over the course of this disturbance, which was made manifest not as a change in community means but as an increase in community variability, or dispersion, at each site. The dewatering also affected inter-species abundance and distributional pat-

terns, as dewatering and rewetting promoted alternate species groups with divergent habitat tolerances. Finally, our results indicate that rapid rewetting – analogous to a hurricane breaking a summer drought – may represent a recovery process rather than an additional disturbance and that such processes, even in newly restored systems, may be rapid." (Authors) The supplementary material contains the taxa lists identified to the genus level (*Anax*, *Enallagma*, *Ischnura*, *Erythemis*, *Miathyria*, *Pachydiplax*.)] Address: Muehlbauer, J.D., Curriculum for the Environment and Ecology, Univ. of North Carolina, Chapel Hill, NC, USA. E-mail: jeffreym@unc.edu

**10451.** Müller, J.; Westermann, A.; Steglich, R. (2010): Erstnachweis der Zierlichen Moosjungfer (*Leucorrhinia caudalis*) in Sachsen-Anhalt. *Naturschutz in Sachsen-Anhalt* 47(1-2): 52-53. (in German) [08-VI. and 11-VI-2008, limestone quarry west of Schwanebeck, Sachsen-Anhalt, Germany; 17.VI.2008, gravel pit east of Hohenwarthe, Sachsen-Anhalt, Germany.] Address: Müller, J., Frankelfelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**10452.** Palacios, M.J.; Pérez, J.; Sánchez, A.; Muñoz, P. (coords.). (2010): Catálogo Regional de Espedes Amenazadas de Extremadura. Fauna I. Consejería de Industria, Energía y Medio Ambiente. Junta de Extremadura: 342 pp. (in Spanish) [The following species are introduced in details: *Macromia splendens*, *Aeshna juncea*, *Gomphus simillimus*, *G. graslinii*, *Onychogomphus uncutus*, *Orthetrum nitidinerve*, *Coenagrion mercuriale*, *C. caeruleum*, *C. scitulum*, *Oxygastra curtisii*. Special emphasis is given on regional distribution, habitat and conservation measures.] Address: Junta de Extremadura, Plaza del Rastro, S/N, 06800 Merida, Spain

**10453.** Papp, J. (2010): In memoriam Dr Henrik Steinmann (1932–2009). *Annales historico-naturales Musei nationalis hungarici* 102: 5-19. (in English) [27-III-1932 - 26-XI-2009. To odonatologists Steinmann was known as author of the two volumes of "World Catalogue of Odonata, Vol. I. Zygoptera. – Das Tierreich. The Animal Kingdom, Part 110. – 500 pp." and "World Catalogue of Odonata, Vol. II. Anisoptera. – Das Tierreich. The Animal Kingdom, Part 111. – 636 pp." both published in 1997.] Address: Papp, J., Dept of Zoology, Hungarian Natural History Museum, 1088 Budapest, Baross utca 13, Hungary

**10454.** Relyea, R.A.; Edwards, K. (2010): What doesn't kill you makes you sluggish: How sublethal pesticides alter predator-prey interactions. *Copeia* 2010(4): 558-567. (in English) ["Pesticides commonly occur in ecological communities at relatively low concentrations, leading to growing interest in determining the sublethal effects of pesticides. Such effects should affect individuals and, in turn, alter interspecific interactions. We sought to determine how sublethal concentrations (0.1 and 1.0 mg/L) of two common pesticides (carbaryl and malathion) affected predator and prey behaviour as well as subsequent predation rates. We conducted a series of experiments using three species of larval amphibians (Gray Treefrogs, *Hyla versicolor*; Green Frogs, *Rana clamitans*; and American Bullfrogs, *R. catesbeiana*) and three species of their predators (larval dragonflies, *Anax junius*; adult water bugs, *Belostoma flumineum*; and adult Red-spotted Newts, *Notophthalmus viridescens*). We found that the pesticides frequently reduced the activity of all three tadpole species. For the two invertebrate predators (*Anax* and *Belostoma*), the pesticides were lethal, precluding us from examining sublethal effects on predator-prey inter-

actions. However, newt survival was high and the addition of the pesticides reduced the predation rates of newts in one of the three tadpole species. There were no effects of the pesticides on the striking frequency of the newts or on their prey capture efficiency. Thus, the mechanism underlying the pesticide-induced reduction in predation rates remains unclear. What is clear is that sublethal concentrations of pesticides have the potential to alter prey behavior and species interactions and thereby alter the composition of ecological communities." (Authors)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**10455.** Roland, H.-J.; Roland, U.; Pollard, E. (2010): Incidental records of dragonflies and damselflies (Order Odonata) in Cambodia. *Cambodian Journal of Natural History* 2010(2): 97-102. (in English) [The authors publish an updated version of Roland & Roland (2010) New records of Odonata on a birding trip to Cambodia 12th-26th February 2010. *Agrion* 14(2): 30-33.] Address: Roland, H.-J., Im Mühlahl 35, 61203 Reichelsheim, Germany. E-mail: Hjuergenroland@aol.com

**10456.** Sage, W. (2010): Fahrt der ZGB zum Neusiedler See vom 12. bis 16.052010. *Mitteilungen der Zoologischen Gesellschaft Braunau* 10(1): 119-132. (in German) [Austria, Neusiedler See, 12-16.052010; *Anaciaeschna isoceles* and *Libellula quadrimaculata* are listed.] Address: Sage, W., Seibersdorfer Str. 88a, 84375 Kirchdorf am Inn, Germany

**10457.** Sathe, T.V.; Bhusnar, A.R. (2010): Biodiversity of mosquitovorous dragonflies (Order: Odonata) from Kolhapur district including Western Ghats. *Biological Forum* 2(2): 38-41. (in English) ["Biodiversity protection and conservation is on national and international agenda and responsible for sustainable development of a region or a country and secondly dragonflies are potential bio control agents of mosquitoes. Therefore, biodiversity of mosquitovorous dragonflies of Kolhapur district including Western Ghats of Maharashtra has been studied. In all, 43 species of dragonflies were found feeding on mosquitoes. The important genera includes *Gomphus*, *Burmagomphus*, *Cyclogomphus*, *Microgomphus*, *Anax*, *Macromia*, *Orthetrum*, *Potomarcha*, *Pantala*, *Chlorogomphus*, *Epophthalmia*, *Indionyxa*, *Amphithemis*, *Hylaeothemis*, *Heliogomphus*, *Davidiodes*, *Bradinopyga*, *Crocothemis* and *Lameligomphus*." (Authors)] Address: Sathe, T.V., Dept of Zoology, Shivaji University Kolhapur (MS), India

**10458.** Schweighofer, W. (2010): Naturkundliche Beobachtungen am ÖBB-Becken Nenndorf bei Markersdorf. *LANIUS—Information* 19(3-4): 7-8. (in German) [Niederösterreich, Austria; ca 48°11'N, 15°30'E; in 2009 and 2010, in a shallow storm-water retention pond 33 Odonata species have been recorded including *Lestes barbarus*, *L. virens*, *Coenagrion scitulum*, *Orthetrum albistylum*, *Anax parthenope*, *Sympetrum flaveolum*, *S. fonscolombii*, *S. pedemontanum*, and *S. meridionale*. The author emphasizes on records of *Anax ephippiger* and *Lestes macrostigma*.] Address: Schweighofer, W., Ötscherblick 10, A-3661 Artstetten, Austria. E-mail: wolfgang.schweighofer@schule.at

**10459.** Simard, G. (2010): *Flying Dragons*. Editions Alatus. ISBN: 978-2-9526011-5-3: 144 pp. (in English) ["Flying Dragons rule supreme over the world of insects. High-speed manoeuvres, instant changes of direction, hovering, reverse flight, dragonflies can do almost anything on the wing. The photographs of Ghislain SIMARD

open a fresh window into a world where aerial motions are too fast to be observed by human eyes. The photographer's lens offers a journey through miniature landscapes around ponds, canals, streams, rivers and peat bogs. The chapters are arranged to show the diversity of behaviour that these spectacular insects enjoy. Frail Damselflies are unpredictable, Broad-bodied Chasers always return to the same roost, Keeled Skimmers mate in flight, Common Darters play with their reflections in the water while the Emperor flaunts its aerial prowess. The briskness of dragonflies' actions turns the photography of their flight into an almost impossible task. To shoot such actions, high-speed equipment dedicated to flying insects is required. Some tools have even been designed specifically to arrest dragonflies in flight. The final section of the book details this working method for wildlife photographers." (Publisher) Coffee table book] Address: not stated

**10460.** Singh, H.; Gusain, O.P.; Gusain, M.P. (2010): Benthic insect-substratum relationship along an altitudinal gradient in a Himalayan stream, India. *International Journal of Ecology and Environmental Sciences* 36(4): 215-231. (in English) ["Takoli Gad is a small spring-fed tributary of the River Alaknanda (a tributary of River Ganga) in Tehri district of Uttarakhand (India). Insect-substratum relationship was studied at five sampling sites representing an altitudinal gradient in Takoli Gad during January 2000 to February 2002. The swift flowing stream is largely dominated by pebbles and boulders (>32 nun). In general, the substrate composition ranged from coarse sand ( $\phi = 0$ ) to small pebbles ( $\phi = -4$ ). The benthic fauna comprised of 34 genera belonging to 09 orders and 25 families of insects. It included mostly the nymphs and larvae of Ephemeroptera, Plecoptera, Trichoptera, Coleoptera, Lepidoptera, Odonata, Neuroptera, Diptera and Hemiptera. The total benthic density was maximum during winter III (3408.0 ind. m<sup>2</sup>) at downstream site, and minimum during monsoon I (283.0 ind. m<sup>2</sup>) in the middle stretch. The Simpson Index of Diversity (D) for substrate heterogeneity was low for headwater region of the stream. The Index of Representation (IR) revealed that the heterogeneous substratum was the preferred habitat of most of the taxa during the winter. The distribution of the benthic insects varied slightly along the longitudinal gradient. Many genera were seasonally absent in different sections of the stream. Seasonal variation in the density of benthic insects was correlated with the change in the substrate composition, notably during the rainy season when the mean grain size changes to cobbles (Md = 8). A relatively stable substrate composition during winter together with low to moderate current velocity (0.4-0.6 m s<sup>-1</sup>) and shallow water depth (0.14-0.20 m) along with abundant detritus favours a rich and diverse insect community. Further, clustering method also shows the substratum during winter to be preferred by majority of the taxa." (Authors) Odonata taxa are *Hagenius!* and *Ophiogomphus*.] Address: Singh, T., Freshwater Biology Unit, Department of Zoology, HNB Garhwal University, Srinagar-Garhwal 246174, Uttarakhand, India

**10461.** Skevington, J.H.; Beatty, C.D.; Van Gossom, H.; Donnelly, T.W.; Sherratt, T.N.; Rashed, A.; Kelso, S. (2010): Molecular phylogenetics of *Nesobasis* and *Melanesobasis* (Odonata: Coenagrionidae): exploring the evolution of a large insular insect radiation. *Cladistics* 26: 224-225. (in English) [Verbatim: "In 1990 Nick Donnelly revised a large part of the Fijian damselfly fauna. An unusual anomaly was discovered—some species appeared to be heavily female biased. In an effort to better under-



stand this phenomenon, we decided to create a phylogenetic hypothesis for the two large, near-endemic, Fijian genera, *Nesobasis* and *Melanesobasis*. These putative sister taxa had never been studied phylogenetically; however, Donnelly postulated the existence of several species groups and some sister species relationships based on a few characters. We refute the concept that *Nesobasis* and *Melanesobasis* are sister taxa and provide quantitative evidence supporting most of Donnelly's perceptions about relationships within *Nesobasis*. Two mitochondrial genes (COI and 12S) and one nuclear gene complex (ITS1 and ITS2, and ribosomal 5.8S rDNA) were sequenced for 45 taxa in our analysis. This represents most of the extant species of *Nesobasis* and *Melanesobasis* and all of the numerous undescribed species. Female-biased species were found in more than one lineage. Results and analytical methods will be discussed and ecological traits will be explored in light of our phylogenetic hypothesis." (Authors)] Address: Skevington, J.H., Agriculture and Agri-Food Canada, Canadian National Collection of Insects, Arachnids and Nematodes, 960 Carling Avenue, Ottawa, ON, K1A 0C6, Canada

**10462.** Straka M. (2010): Preliminary studies on the durability of damselfly (Odonata: Zygoptera) exuviae. *Odonatrix* 6(2): 46-49. (in English, with Polish summary) ["Twenty exuviae of *Coenagrion puella* were marked and observed for three weeks in 2005. The number of marked exuviae rapidly declined and after 23 days there were only 30% of exuviae left; these were so weather-worn that it was impossible to identify them. To collect 50% of the exuviae it would be necessary to visit a locality 10 days after emergence." (Author)] Address: Straka, M., Institute of Botany and Zoology, Faculty of Science, Masaryk University, Kotlářská 2, Brno, Czech Republic. E-mail: [michal.straka@centrum.cz](mailto:michal.straka@centrum.cz)

**10463.** Tończyk, G.; Zemko, K. (2010): Preliminary estimation of population total abundance of *Leucorrhinia caudalis* and *L. pectoralis* in "Zdręczno Lake" nature reserve (Tuchola Forest, Poland). *Odonatrix* 6(1): 9-14. (in Polish, with English summary) ["A study upon the total abundance of *Leucorrhinia caudalis* and *L. pectoralis* was performed at the beginning of June 2008 in the nature reserve „Zdręczno Lake”, Tuchola Forest, Poland. The abundance estimation was based upon the number of exuviae collected within the reserve, among the reed and shore vegetation, also in some distance from the shore. Altogether 76 samples were gathered, each composed of exuviae collected from the area of 1m<sup>2</sup>. In total 101 exuviae of *L. caudalis* (mean density: 1.33 ind/m<sup>2</sup>, density range: 0-7 ind/m<sup>2</sup>, SD=1.32) and 176 exuviae of *L. pectoralis* (mean density: 2.32 ind/m<sup>2</sup>, density range: 0-7 ind/m<sup>2</sup>, SD=1.68) were found. Based on aerial photographs the total area of habitat available for *Leucorrhinia* larvae in Zdręczno Lake was estimated to be from 12,179 m<sup>2</sup> (1.2 ha) to 65,969 m<sup>2</sup> (6.6 ha). Concluding, the total population abundance in the reserve was calculated as 16,198 - 97,739 individuals for *L. caudalis* and 28,255 - 153,048 individuals for *L. pectoralis*." (Authors)] Address: Tończyk, G., Katedra Zoologii Bezkręgowców i Hydrobiologii, Uniwersytet Łódzki, ul. Banacha 12/16, 90-237 Łódź, Poland. E-mail: [karolzemko@vp.pl](mailto:karolzemko@vp.pl)

**10464.** Tończyk, G.; Osobka, M. (2010): Macrofauna colonising yellow water-lily (*Nuphar lutea* (L.) Sibth. & Sm.) – distribution and structure analysis. In: Joniak, T. (Ed.), *Functioning and protection of marsh ecosystems. Vol 3. Benthic fauna of Polish national parks.* Department of Water Protection Faculty of Biology A. Mickiewicz Uni-

versity, Poznań: 74-79. (in Polish, with English summary) [Poland; "Macroinvertebrates associated with aquatic vegetation (epiphytic fauna) are among the ecofunctional groups having key importance in inland aquatic ecosystems. Our study in the Pilica River oxbow-lake revealed taxonomic composition (on genus/species level), dynamics and colonisation rate of community inhabiting yellow water-lily. In total we found 112 taxa differing in spatial distribution. The community is not highly specific as it consists mainly of predators and animals feeding on periphyton. Only caterpillars of aquatic moth were characteristic for the plant green parts. The colonisation rate is directly dependent on food availability (thickness of periphyton) and indirectly on the oxbow-lake trophy." (Authors) The following Odonata species are listed: *Enallagma cyathigerum*, *Coenagrion puella*, *C. pulchellum*, *Erythromma najas*, *Aeshna cyanea*, and *Somatochlora flavomaculata*.] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii, Uniwersytetu Łódzkiego, ul. Banacha 12/16, PL-90-237 Łódź, Poland. E-mail: [tonczyk.grzegorz@gmail.com](mailto:tonczyk.grzegorz@gmail.com)

**10465.** Torralba-Burrial, A.; Alonso-Naveiro, M. (2010): Biodiversidad de odonatos de la sierra de Fonfría y cuenca del Jiloca (Teruel): faunística. *Xiloca* 38: 111-147. (in Spanish, with English summary) ["Odonata communities from 21 localities in Fonfría Mountains and Jiloca River Basin (province of Teruel, Spain) were surveyed. Thirty five species were found during this study, including first records of *Coenagrion scitulum* and *Libellula quadrimaculata* to Teruel province, and confirming the reproduction of *Lestes sponsa*, *L. virens* and *Aeshna cyanea*. Populations of the threatened *C. mercuriale*, *C. caerulescens*, *C. scitulum*, *Onychogomphus uncatus* and *Sympetrum flaveolum* are interesting from a conservation point of view." (Authors)] Address: Torralba Burrial, A., Depto de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: [antoniob@hot-mail.com](mailto:antoniob@hot-mail.com)

**10466.** Vanappelghem, C.; Hubert, B. (2010): Suivi de la population de *Coenagrion mercuriale* (Charpentier, 1840) dans la Réserve naturelle régionale des dunes et hauts de Dannes-Camiers (Pas-de-Calais) (Odonata, Zygoptera: Coenagrionidae). *Martinia* 26(3/4): 131-137. (in French, with English summary) [A monitoring of *C. mercuriale* and its habitat in the dunes and hills of the Dannes-Camiers Regional Natural Reserve (Pas-de-Calais department, France) revealed that an anthropogenic caused seasonal variation of the water depth could be related with the population decline between 2006 and 2007 compared with 2008 and 2009.] Address: Vanappelghem, C., 14, rue Brûle Maison, 59000 Lille, France. E-mail: [cedvana@free.fr](mailto:cedvana@free.fr)

**10467.** Watson, G.S.; Watson, J.A.; Hu, S.; Brown, C.L.; Cribb, B.W.; Myhra, S. (2010): Micro and nanostructures found on insect wings – designs for minimising adhesion and friction. *International Journal of Nanomanufacturing* 5(1/2): 112-128. (in English) ["Adhesion and friction have been measured on insect wings where contamination (water and/or contaminating particles) can potentially have a detrimental effect on their flight capabilities or daily functioning. Adhesion forces as low as 2 nN were recorded in air for particles with radii of 10-15 nm, and 20 nN for particles of 31 nm radius. The effective coefficients of friction were in the range of 0.01 to 0.10. The low adhesion and frictional values demonstrate that only very low out-of-plane and in-plane forces are required to

remove contaminants of nanometre and micron dimensions from the cuticle membranes. Many of the surfaces demonstrate superhydrophobic properties and will not only reduce the effects of contact with surfaces but also promote a self-cleaning function for removing foreign bodies. It has also been demonstrated that surface structures and properties can be duplicated on polymer surfaces by using the wing membrane as a 'natural template'. (Authors) *Rhyothemis phyllis chloe* is among the insects studied.] Address: Watson, G.S., School of Pharmacy and Molecular Sciences, James Cook University, Townsville, QLD 4811, Australia

**10468.** Wellenreuther, M.; Sánchez-Guillén, R.A.; Cordero, A.; Hansson, B. (2010): Development of 12 polymorphic microsatellite loci in *Ischnura elegans* (Odonata: Coenagrionidae). *Molecular Ecology Resources* 10: 576-579. (in English) ["We isolated and characterised 12 polymorphic microsatellite loci 35 for *I. elegans* by screening a genomic library enriched for microsatellite motifs. The loci showed high variability for the number of alleles, and the expected and observed heterozygosities, and thus will be useful for future molecular studies. Cross-amplification in *I. graellsii*, *I. ramburii* and *I. pumilio* showed that the majority of the microsatellites also produced polymorphic products in these species." (Authors)] Address: Wellenreuther, Maren, Department of Animal Ecology, Ecology Building, Lund University, SE-22362 Lund, Sweden. E-mail: Maren.wellenreuther@zoekol.lu.se

**10469.** Whisenant, A.; Snyder, W. (2010): Bioassessment of Lake Mexia. *Water Quality Technical Series. WQTS-2010-01*: 70 pp. (in English) [Lake Mexia, USA was investigated in the 2002 A concern, due to depressed dissolved oxygen concentrations, was raised following the taxa list prepared for the impaired water bodies. In response to the concern, a dissolved oxygen monitoring project and concurrent bioassessment were conducted [...] in 2002 and 2003. The bioassessment included fish, benthic macroinvertebrate, zooplankton, aquatic macrophyte and shoreline habitat surveys. *Argia* sp., *Enallagma/Coenagrion*, *Acanthagrion* sp., *Epithea* sp., and *Gomphus* sp. are listed from the locality.] Address: Whisenant, A., Water Resources Branch, Texas Parks and Wildlife Department, Tyler, TX, USA

**10470.** Yang, G.-h.; Mao, B.-y.; Zhang, D.-z. (2010): A new species of the genus *Nychogomphus* from Yunnan, China (Odonata, Gomphidae). *Acta Zootaxonomica Sinica* 35(4): 880-882. (in Chinese, with English summary) ["*Nychogomphus bidentatus* n.sp. is described and figured. This new species is similar to *N. flavicaudus* and *N. lui* in the colour pattern of thorax, but can be separated from the later two species by the following distinct characters: 1) antehumeral stripe complete; 2) superior appendages of male with two subapical teeth; 3) inferior appendages black. Holotype male, China, Yunnan, Lingcang, Gengma (98°50'N, 23°25'E), 7 Aug. 2004, collected by MAO Ben-Yong, deposited at Dali University, Yunnan, China. Etymology. The name *bidentatus* is derived from the Latin, in reference to the two subapical teeth present on male superior appendages." (Authors)] Address: Yang, G.-h., College of Science and Chemistry, Dali University, Yunnan 671000, China

**10471.** Yurchenko, Yu.A.; Belevich, O.E. (2010): Daily dynamics of distribution of *Enallagma cyathigerum* (Charpentier, 1840) (Odonata, Coenagrionidae) in different biotopes of the forest-steppe zone of the southern part of West Siberia. *Euroasian entomological journal* 9(2): 280-

284. (in Russian, with English summary) [Barabinskoy steppe in the south of Western Siberia, Russia; the selection of biotopes within the habitat of *E. cyathigerum* depends on its physiological development status. Immediately after emergence, dragonflies dismigrate from the water. "After reaching maturity, they prefer open habitats, away from water, where they copulate during the first half of the day. As the mated pairs return to the water for oviposition, during the second half of the day, the number of individuals in all terrestrial habitats decreases sharply. Near-water habitats are transient. To move in strong winds (up to 7 m/s), *E. cyathigerum* uses the space between plants over the soil surface." (Authors)] Address: Belevich, O.E., Inst. Anim. Syst. & Ecol., Russ. Acad. Sci., Frunze 11, RUS-630091 Novosibirsk

**10472.** Zawal, A. (2010): New locality of *Crocothemis erythraea* in western Poland. *Odonatrix* 6(1): 6-8. (in Polish, with English summary) [17.07.2008; Dzwonów (53°24'43"N, 15°12'37"E) is the northernmost site of this species in Poland.] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Wąska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**10473.** Zawal, A.; Stojanovski, S.; Smiljkov, S. (2010): Preliminary investigation on Odonata from the lake Orchid (Macedonia). *Second Balkan Conference on Biology 21-23 May 2010, Plovdiv. 50 Years University of Plovdiv: 636-638.* (in English) [476 specimens of imaginal Odonata - collected in June 2009 at 21 stations - resulted in 17 species. Only 12 of these are presented in the paper.] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Wąska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**10474.** Zhukov, O.N.; Bezmaternykh; D.M. (2010): [Zoo-benthos of lakes in the the northern region of Kazakhstan]. *World of science, culture and education* 6(25): 277-281. (in Russian) [In 2009 and 2010, 15 lakes have been investigated. 58 species of benthic invertebrates were identified, including *Coenagrion vernale* (= *C. lunulatum*); this taxon is reported for three of the 15 lakes.] Address: Zhukov, O.N., Et. IWEP SB RAS, Barnaul, Russia. E-mail: jukova@iwep.asu.ru

**10475.** Zoder, S. (2010): *Libellula fulva* MÜLLER, 1764 (Spitzenfleck) am Unteren Inn (Odonata, Anisoptera, Libellulidae). *Mitteilungen der Zoologischen Gesellschaft Braunau* 10(1): 91-94. (in German) [Bayern, Germany; four records of the regionally rare *L. fulva* are documented: (1) 24.05.2010, Schambach, near Geigen (48.19°53.48"N, 13.15°10.59"E), Bad Füssing / LK Passau; *Coenagrion ornatum* also occurred in the same stretch of the ditch, (2) 05.06.2010, near Grießer (48.17°29.15"N, 13.7°54.10"E), Ering, LK Rottal-Inn. (3) 02.07.2008, 25.05.2009, "Biotop" Eglsee (48°14'37"N, 13°07'15"E), Ering. (4) 05.06.2009, (48°17'05"N, 13°00'00"E), Simbach am Inn/LK Rottal-Inn.] Address: Zoder, S., Am Ziegelstadelberg 17, 94094 Rottalmünster, Germany

## 2011

**10476.** Acharya, S. (2011): Presage Biology: Lessons from nature in weather forecasting. *Indian Journal of Traditional Knowledge* 10(1): 114-124. (in English) ["The method used by local and indigenous peoples for predicting rainfall and other weather conditions solely on the

basis of bio-indicators – the phenology of plants and behavior of animals – is coined as a new term: Presage Biology. Some of these activities of floral and faunal diversity are described in their application to predict oncoming rain, based a literature review as well as personal observations of present author as well as other reference sources pertaining to India and different parts of the world. ... When humidity reaches saturation, a couple of hours before dragonflies move in swarms indicating rain." (Author)] Address: Dept of Botany, Tipura (Central) Univ., Suryamaninagar 799130, West Tripura, India. E-mail: phytosandeep@yahoo.com

**10477.** Acorn, J.H. (2011): Sand hill arthropods in Canadian grasslands. In: *Arthropods of Canadian Grasslands (Volume 2): Inhabitants of a Changing Landscape*. Edited by K. D. Floate. Biological Survey of Canada: 25-43. (in English) ["Sand hill environments in the Canadian grasslands can be classified as sandstone outcrops, upland dunes, sand features associated with water, non-human disturbances, anthropogenic disturbances, beach dunes, or sandbars. Insects and other arthropods use these environments for burrow construction, access to sand-associated host plants, open ground predation and scavenging, thermoregulation, and locomotion in a quiet substrate. The arthropod faunas of sand hills in the Canadian grasslands are diverse, include organisms that are specific to sand hills, and include a number of rare or endemic taxa. Dune stabilization is cause for conservation concern, whereas the threat of global warming may reverse the stabilizing trend and create larger areas of open drifting sand. .. Various Anisoptera are often found perched on open ground, including non-vegetated sand, from which they fly up in pursuit of prey and potential mates (Dunkle 2000). Typical open-ground species include *Ophiogomphus severus* and *Stylurus intricatus*, as well as species in the genus *Sympetrum*. Most other anisopterans prefer to perch in vegetation, as do species of Zygoptera. However, on sand hill sites near water, various damselflies (e.g., *Enallagma* spp., *Coenagrion* spp., *Letes* spp.) will forage in the relatively open vegetation on and around open sand patches." (Author)] Address: Acorn, J.H., Department of Renewable Resources, 751 General Services Building, University of Alberta, Edmonton, Alberta, Canada, T6G 2H1

**10478.** Adeogun, A.O.; Fafioye, O.O. (2011): Impact of effluents on water quality and benthic macroinvertebrate fauna of Awba stream and reservoir. *J. Appl. Sci. Environ. Manage.* 15(1): 105-113. (in English) [Nigeria; the paper includes the following nearctic Odonata taxa: "*Macromia magnifica*, *Herlocordulia* [sic] species, *Progomphus* species".] Address: Adeogun, A.O., Department of Zoology, University of Ibadan, Ibadan, Nigeria. E-mail: ainaadeogun@yahoo.com

**10479.** Adriaens, T.; Vercruyse, W.; Feys, S. (2011): An exceptional dragonfly spring in 2011. *Libellenvereniging Vlaanderen - nieuwsbrief* 5(2): 4-7. (in Dutch, with English summary) ["A very sunny and dry spring clearly led to a number of exceptional observations of dragonflies in Belgium and further western Europe. After a message from Portugal telling that thousands of *Anax ephippiger* migrated north it was hoped that a few of these would be seen in the low countries as well. In Belgium between 22th of April and 24th of May at least 12 specimens of this species were observed, an unequalled number for the country. *Brachytron pratense* had been historically known from the neighbourhood of Ghent and had been rediscovered in 2002. But this spring this rather rare spe-

cies was found in a lot of sites in the province of Eastern Flanders and was even discovered for the first time in the province of Western Flanders." (Authors)] Address: Adriaens, T., Instituut voor Natuurbehoud, Kliniekstr 25, B-1070 Brussel, Belgium. E-mail: tim.adriaens@instnat.be

**10480.** Aguilera Arango, A.; Isaza Guzmán, G.; González, R. (2011): Diversidad y abundancia de la artopofauna en bromelias de bosques de Manglar de la Bahía de Buenaventura (Valle, Colombia). *Boletín del Museo de Entomología de la Universidad del Valle* 12(1): 1-11. (in Spanish, with English summary) [2047 specimens from 42 arthropod genera were collected that breed in bromeliads (*Guzmania musaica* and *Tillandsia* sp.) of mangrove swamps, near the village of Punta Soldado in the Buenaventura's bay (Colombia). Samples include 41 (3.95%) specimens of *Leptagrion* sp.] Address: Aguilera Arango, Gustavo Isaza Guzmán lexis, Universidad del Valle, sede Pacifico. Depto de Biología, Avenida. Simón Bolívar Km 9 Buenaventura, Colombia. E-mail: 23@yahoo.com

**10481.** Anderson, C.N.; Grether, G.F. (2011): Multiple routes to reduced interspecific territorial fighting in *Hetaerina* damselflies. *Behavioral Ecology* 22(3): 534-534. (in English) ["Interspecific territoriality may be adaptive if territories contain depletable resources that are valuable to both species, but it can also arise as a maladaptive by-product of intraspecific territoriality. In the latter scenario, sympatric species ought to diverge in ways that reduce interspecific fighting. We studied 4 *Hetaerina* damselfly species that can be found in sympatry in North America. Prior work showed that sympatric populations have diverged from each other in wing coloration and competitor recognition in 2 of the 4 sympatric species pairs (*H. titia* / *H. occisa*, *H. titia*/*H. americana*). Here, we show that sympatric populations of these 2 species pairs overlap completely in habitat use, and yet, interspecific territorial fights occur much less frequently than intraspecific fights. Experimentally manipulating the wing coloration of male *H. occisa* and *H. americana* to more closely resemble *H. titia* increased the rate of interspecific fights, which provides direct evidence that divergence in wing coloration is partly responsible for the low rate of interspecific fights. We found that interspecific fighting is also reduced in the other 2 species pairs (*H. occisa* / *H. cruentata*, *H. americana* / *H. cruentata*), even though prior work showed that heterospecific territory intruders are attacked just as aggressively as conspecific territory intruders. In these cases, however, the sympatric species differ sufficiently in habitat use to reduce the interspecific encounter rate and thereby account for the reduced rate of interspecific fighting. Thus, interspecific fighting is reduced relative to intraspecific fighting in all 4 species pairs, albeit through different mechanisms. ] Address: Anderson, C.N., Department of Ecology and Evolutionary Biology, University of California, Los Angeles, 621 Charles E. Young Drive South, Los Angeles, CA 90095-1606, USA. E-mail: cndanderson1980@gmail.com

**10482.** Andrew, R.J.; Thaokar, N.; Dhamani, A.A. (2011): Oviposition and details of egg shell fine structure in *Ceragrion coromandelianum* (Fabricius) (Zygoptera: Coenagrionidae). *Odonatologica* 40(3): 169-178. (in English) ["In central India, floating leaves of *Nymphaea nouchali* form a perfect site for landing and oviposition for *C. coromandelianum*. Experiments with *N. nouchali* leaves suggest that oviposition occurs preferentially within distinct region of the leaf lamina. Oviposition is maximal in the lateral region of the lamina (LRL) which was the most popular site over the whole period of observation and



least in the petiolar region (PRL) while at the basal and apical regions (BRL & ARL) the total number of oviposition are similar to each other and intermediate between the lateral and petiolar regions. There is a direct correlation between the position of leaf lamina region used for oviposition and the day of oviposition. There is also a direct association between the day of the bouts of oviposition and the position of the leaf lamina region used for oviposition. In *C. coromandelianum*, visual and tactile cues play an important role in leaf lamina preference. It is not the toughness of the leaf lamina (thickness of the epidermis) but its submergence which is an important decisive factor for oviposition. 1 Scanning electron microscopic examination of the egg reveals that it is elongate and cylindrical with a pointed anterior and rounded posterior end. The egg chorion is composed of an outer, thin, lightly corrugated exochorion and an inner, thick, smooth, non-porous endochorion. The anterior end is surrounded by 5 micropylar orifices. Each orifice is semicircular and continues as a long horizontal streak on the endochorion and concludes at a bifid terminal point. This forms the entry point of the micropylar chute which penetrates the endochorion. The vitelline envelope below the endochorion is thin and smooth." (Authors)] Address: Andrew, R.J., Post Graduate Dept of Zoology, Hislop College, Civil lines, Nagpur-440001, India. E-mail: rajuandrew@yahoo.com

**10483.** Anjos-Santos, D.; Pessacq, P.; Costa, J.M. (2011): Description of the last instar larva of *Neoneura kiautai* Machado (Odonata: Protoneuridae). *Zootaxa* 2916: 65-68. (in English) ["Here we describe the last instar larva of *Neoneura kiautai* Machado, 2007 based on specimens collected in Rio de Janeiro State, Brazil, therefore increasing the known distribution area of this species formerly known only from Minas Gerais and Espírito Santo States, Brazil (Machado, 2007)."] (Authors)] Address: Anjos-Santos, D., Museu Nacional, Univde Federal do Rio de Janeiro, Depto de Entomologia, Setor de Insetos Aquáticos, Quinta da Boa Vista, São Cristóvão, 20940-040, Rio de Janeiro, Brazil. E-mail: danielleanhos2@yahoo.com.br

**10484.** Ashton, H. (2011): "Damselfly Genera of the New World: An Illustrated and Annotated Key to the Zygoptera". *Reference Reviews* 25(6): 36-37. (in English) [Book review of: Rosser W. Garrison, Natalia von Ellenrieder & Jerry A. Louton. 2010, The Johns Hopkins University Press, Baltimore. ISBN 978-8018-9670-5. 490 pp, 2586 fgs., 24 color pls., \$125.00. (Incl. additions and corrections for previous book, *The Dragonfly Genera (Odonata: Anisoptera) of the New World, 2006*, by the same authors)] Address: not stated

**10485.** Aweng-Eh, R.; Ismid, S.; Maketab, M. (2011): Effects of land use on benthic macroinvertebrate assemblages at three rivers in Endau catchment area, Kluang, Johor, Malaysia. *Journal of Applied Sciences in Environmental Sanitation* 6(2): 97-103. (in English) ["Study was conducted for six times from November 2008 to June 2010 to determine the effect of land use on benthic macroinvertebrate assemblages in Mengkibol, Madek and Dengar rivers. Eight stations were selected which two stations from each river except Dengar which has two sampling reach comprised of four stations. A 500 meter reach of the stream was selected for each sampling site. One sampling reach comprises of two sampling stations where one station is located at the upper reach, while the other station is situated at the lower reach. Surber Net measuring 500 micron mesh size combined with a rectangular quadrat of 30 cm x 30 cm (0.09 m<sup>2</sup>) was used to

sample macroinvertebrates. The results showed that undisturbed river has complete sensitive taxa namely Ephemeroptera, Plecoptera and Trichoptera (EPT). Meanwhile, there were only two sensitive taxa namely Ephemeroptera and Trichoptera were found in the river which flows through palm oil plantation. Similar scenario was found in the river which flows through logging area where there were also two sensitive taxa namely Ephemeroptera and Trichoptera found in this river. In addition, the results obtained for urban river was the other way round where there was an absent of all three sensitive taxa (EPT) in the river which flows through urban area. Most of the macroinvertebrate taxa that were found in this station are pollution resistant taxa comprised Diptera, Odonata, Mesogastropoda, Basommatophora, Hirudinea and Haptotaxida. The results can be use as a biological indicator for river water quality assessment." (Authors) Records of Odonata are as follows: Forest (Un-disturbed): none; Agriculture (Palm Oil): "Arigomphus, Hagenius, Dromogomphus, Gomphaeschna, Somatochlora"; Logging: Arigomphus, Dromogomphus; Urban (Kluang Town): Ophiogomphus, Helocordulia. Identification was done using keys from North America.] Address: Aweng-Eh, R., Faculty of Agro Industry and Natural Resources, Universiti Malaysia Kelantan (UMK), Malaysia. E-mail: aweng@umk.edu.my

**10486.** Bader, T.J.; Bednarz, J.C. (2011): Parental care and diet of Mississippi Kites (*Ictinia mississippiensis*) in eastern Arkansas. *Journal of Raptor Research* 45(2): 109-118. (in English, with Spanish summary) [USA; Odonata were the second most common food item (26.1%) fed to the nestlings.] Address: Bader, T., USDA-Agriculture Research Service, Stuttgart National Aquaculture Research Center, PO Box 1050, Stuttgart, AR 72160, USA. E-mail: troybader@hotmail.com

**10487.** Bahaar, S.W.N.; Bhat, G.A. (2011): Taxocoenosis and distribution of nektonic fauna in the rice fields of Kashmir (J and K) India. *Pakistan Journal of Biological Sciences* 14(8): 483-489. (in English) [The study includes records of unidentified Odonata larvae.] Address: Bhat, G.A., Terrestrial Ecology Laboratory, Dept of Environmental Science, Univ. of Kashmir, Srinagar-190 006, J and K, India

**10488.** Ballare, E.F.; Ware, J.L. (2011): Dragons fly, biologists classify: an overview of molecular odonate studies, and our evolutionary understanding of dragonfly and damselfly (Insecta: Odonata) behavior. *International Journal of Odonatology* 14(2): 137-147. (in English) ["Here, we review the history of odonate systematics, with an emphasis on discrepancies among studies. Over the past century, relationships among Odonata have been reinterpreted many times, using a variety of data from wing vein morphology to DNA. Despite years of study, there has been little consensus about odonate taxonomy. In this review, we compare odonate molecular phylogenetic studies with respect to gene and model selection, optimality criterion, and dataset completeness. These differences are discussed in relation to the evolution of dragonfly behaviour." (Authors)] Address: Ware, Jessica L., Rutgers, The State Univ. of New Jersey, Cook College, 93 Lipman Drive, New Brunswick, New Jersey 08901, USA

**10489.** Bazin, N. (2011): Un point sur la saisie des libellules et des papillons. *Actualités naturalistes de la Drôme Julliet* 2001 - No 3: 8-10. (in French) [This paper lists some books and www-links related to French Odonata.] Address: not stated

- 10490.** Beganyi, S.R.; Batzer, D.P. (2011): Wildfire induced changes in aquatic invertebrate communities and mercury bioaccumulation in the Okefenokee Swamp. *Hydrobiologia* 669(1): 237-247. (in English) ["Fire is an important natural disturbance in the Okefenokee Swamp. From April–June 2007, wildfire burned 75% of the wetland area. With the existence of extensive pre-fire data sets on community structure and total mercury of invertebrates, the fire presented an opportunity to assess impacts of wildfire on invertebrates. Post-fire collection of samples occurred in September, December, and May, 2007–2009. Sample sites included 13 burned and 8 non-burned (reference) sites. Comparisons of data among pre-fire, post-fire reference, and post-fire burned sites revealed that the major difference between pre-fire communities and post-fire communities was a decrease in the number of water mites. We also found a decrease in mercury concentrations in amphipods, odonates, and crayfish post-fire. The differences between pre-fire and post-fire samples may be confounded by drought conditions during the baseline study. NMDS ordinations and ANOSIM tests suggested that habitat was an important factor; communities in burned cypress differed from reference cypress. Unexpectedly, burned sites had lower mercury concentrations in odonates and crayfish, with variation again being greatest in cypress stands. These findings and others suggest mercury levels do not follow a predictable pattern but can vary with pre-fire concentrations, variation in water levels, and burn intensity. We found that wildfire in the Okefenokee had little impact on invertebrates in prairies and scrub-shrub thickets, but can affect indicator organisms (*Oecetis*, *Ischnura*, and *Sigara*) in cypress stands. Our study suggests that vegetation type and burn intensity may have impacts on the invertebrate communities and mercury concentrations of organisms." (Authors)] Address: Bowman, Sarah, Department of Evolution, Ecology, and Organismal Biology, 300 Aronoff Laboratory, 318W. 12th Avenue, Columbus, OH 43210, USA. E-mail: Bowman.1210@osu.edu
- 10491.** Beisel, J.-N.; Peltre, M.-C.; Usseglio-Polatera, P. (2011): Einfluss der Salzbelastung auf die aquatische Biozönose der Mosel. Abschlussbericht. Laboratoire des Interactions Ecotoxicologie, Biodiversité, Ecosystèmes (LIEBE) - CNRS UMR 7146, A272010rev17052011. Im Auftrag der IKSMS, UPV-Metz, CNRS UMR 7146: 62 pp. (in German) [The paper includes a passing note on fluctuating asymmetry by larval *Calopteryx splendens* along a salinity gradient along the river Meurthe, France] Address: <http://www.iksms-cipms.org/servlet/is/391/>
- 10492.** Berck, K.-H.; Stübing, S. (2011): Ein Beleg der Pokaljungfer *Erythromma lindenii* (Sélys, 1840) aus Hessen im Jahr 1954. *Libellen in Hessen* 4: 60-61. (in German) [A small collection of 18 specimens of Odonata collected in the 1950th in Hessen, Germany contained interesting records from the faunistic point of view and gives a little insight in range extension processes. *Erythromma lindenii*, very rare in Germany in the 1950th, was recorded 1954 near Rödelheim. *Lestes barbarus* was found at 26-VIII-1956 near Bad Homburg. *Sympetrum depressiusculum* was recorded in summer 1955 near Rödelheim.] Address: Stübing, S., Am Eichwald 27, 61231 Bad Nauheim. E-mail: stefan.stuebing@gmx.de
- 10493.** Boissinot, A. (2011): Nouvelle station de *Coenagrion pulchellum* pour les Deux-Sèvres. *La Virgule, Bulletin de liaison sur les insectes et autres invertébrés du Poitou-Charentes* 2: 24. (in French) [2-VI-2010, Gourgé, Department Deux-Sèvres, France] Address: not stated
- 10494.** Borisov, S.N. (2011): Migrant dragonflies in Middle Asia. 1. *Anax ephippiger* (Burmeister, 1839) (Odonata, Aeshnidae). *Euroasian Entomological Journal* 10(2): 125-130. (in Russian) ["Data on the distribution, phenology and autumnal migrations of *A. ephippiger* in Middle Asia, Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan and Tajikistan are presented. The period of spring arrivals lasts 2.5 months from April to mid-June and the hatching period lasts from late May to September. Annual (2008–2010) autumnal migrations in a southern direction were established in Chok-Pak mountain range by ornithological traps from 28 August to 13 October. A fast univoltine life-cycle within pre-imaginal development and prolonged pre-reproductive period, including wintering migrations, is probably characteristic for *A. ephippiger* in Middle Asia." (Author)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru
- 10495.** Botero-Botero, A.; Ramírez-Castro, H. (2011): Trophic ecology of *Brycon henni* (Pisces: Characidae) in the Portugal de Piedras river, upper Cauca basin, Colombia. *Rev. MVZ Córdoba* 16(1): 2349-2355. (in Spanish, with English summary) [Trichoptera, Diptera and Odonata contributed significantly to the diet of *B. henni*.] Address: Botero-Botero, A., Univd Nacional Experimental de los Llanos "Ezequiel Zamora" - UNELLEZ (Guanare, Venezuela), Fundación Neotrópica-Colombia, La Tebaida, Quindío, Colombia. E-mail: albotero33@yahoo.com
- 10496.** Bouton, N.; Iserbyt, A.; van Gossum, H. (2011): Thermal plasticity in life-history traits in the polymorphic blue-tailed damselfly, *Ischnura elegans*: No differences between female morphs. *Journal of Insect Science* 11 (112): 11 pp. (in English) ["Female polymorphism is observed in various animal species, but is particularly common in damselflies. The maintenance of this polymorphism has traditionally been explained from frequency and density dependent sexual conflict, however, the role of abiotic factors has recently attracted more interest. Here, the role of ambient temperature in shaping life-history was investigated for the three female morphs of *I. elegans*. Eggs were obtained from the three mature female morphs for two populations in the Netherlands. Using a split-brood design, eggs of both populations were divided between a cold and a warm treatment group in the laboratory, and egg survival and hatching time were measured. Significant thermal plasticity was found in both hatching time and egg survival between both temperature treatments. However, individuals born to mothers belonging to different colour morphs did not differ in their response to temperature treatment. Independent of colour morph, clear differences in both life-history traits between the populations were found, suggesting local adaptation. Specifically, individuals from one population hatched faster but had lower egg survival in both thermal regimes. The selection force establishing fast hatching could be (facultative) bivoltinism in one of the populations compared to univoltinism in the other. This would be in line with the more southern (and more coastal) location of the presumed bivoltine population and the inverse relation between voltinism and latitude known from earlier studies. However, other natural selection forces, e.g. deterioration of the aquatic habitat, may also drive fast hatching." (Authors)] Address: Bouton, N., Evolutionary Ecology Group, Dept of Biology, University of Antwerp, Groenenborgerlaan 171, 2020 Antwerp, Belgium. E-mail: nielsbouton@yahoo.com

**10497.** Brasil, M.A.; Freitas Horta, G. de.; Fraxe Neto, H.J.; Barros, T.O.; Colli, G.R. (2011): Feeding ecology of *Acanthochelys spixii* (Testudines, Chelidae) in the Cerrado of Central Brazil. *Chelonian Conservation and Biology* 10(1): 91-101. ["We studied the diet of *Acanthochelys spixii* in a wild population in the Cerrado of central Brazil for 19 months, investigating ontogenetic, sexual, and inter-individual variation. The diet consisted mainly of nymphs of Odonata, although other insects, amphibians, and plant material were also present. We observed no ontogenetic shifts in diet composition (e.g., no shift from carnivorous juveniles to herbivorous adults), which can be related to the high abundance of prey at the study site. There was no association between prey size and turtle carapace length, with larger animals still taking small prey. Dietary niche overlap was high, and there was no difference in niche breadth between sexes. However, differences in diet composition suggested differential habitat use, with males using more the periphery and females using more the center of ponds. Diet composition varied more among males than among females, which can result from higher diversity of prey at the pond margins, higher movement rates, or larger home range of males. The high frequency of empty stomachs (41%) reflected life-history characteristics of turtles (e.g., low metabolism, ectothermy, late sexual maturity, and great longevity). The importance of prey categories sensitive to pollution in the diet of *A. spixii* highlights the integrity of the study sites and the vulnerability of these populations to the rapid degradation of Cerrado biome." (Authors)] Address: Fraxe Neto, H.J., Programa de Pós-Graduação em Biologia Animal, Universidade de Brasília, 70910-900 Brasília, DF, Brazil. E-mail: hfraxe@senado.gov.br

**10498.** Broglio-Micheletti, S.M.F.; Campello Diniz, M.C.; Da Silva-Dias, N.; Nascimento de Araujo, A.M.; Girón-Pérez, K.; Da Silva Madalena, J.A. (2011): Insects associated to *Alpinia purpurata* (Vieill.) K. Schum. (Zingiberaceae) in Maceió and Rio Largo, AL, Brazil. *Revista Caatinga* 24(1): 1-8. (in Portuguese, with English summary) ["Due the fast growing in flowers and ornamental plants production and their high export potential, it is important to identify the insects species associated with *Alpinia purpurata* (Vieill.) K. Schum crops and to establish their role in this agroecosystem/production system The insects were collected from *A. purpurata* cv. Pink Ginger and Red Ginger plants cultivated in two farms with different agroecological characteristics, located in two recognized tropical flower production areas/regions, Maceió and Rio Largo cities/localities, Alagoas state, during one year. They were identified and its frequency analyzed according with a numerical scale. According to the results was collected 790 insects of which 69 were identified to specific level, belonging to 59 families of 9 ordens. Results showed Hymenoptera individuals as the most frequent, mainly predator ants and/or associated with phytophagous insects (sucking), besides natural enemies, followed by Hemiptera and Lepidoptera orders, which involved recognized agricultural pests. Insects belonging to the order Odonata ("Coenagrionidae, Libellulidae") and Orthoptera were found less frequently." (Authors)] Address: Broglio-Micheletti, Sonia, Depto de Fitossanidade, CECA/UFAL, Rod. BR 104, Km 85, 57100-000, Rio Largo - AL, Brazil. E-mail: soniamfbroglio@gmail.com

**10499.** Broyer, J.; Curtet, L. (2011): The influence of fish farming intensification on taxonomic richness and biomass density of macrophyte-dwelling invertebrates in French fishponds. *Knowledge and Management of Aquatic Eco-*

*systems* (2011) 400, 10: 12 pp. (in English, with French summary) ["Fishponds are man-made ecosystems where fish farming may strongly interfere with biodiversity. Intensified practices could be suspected to have a negative impact on animal and plant communities. We investigated the hypothesis that, in French fishponds, taxonomic richness and biomass density of macrophyte-dwelling macro-invertebrates could be influenced by fish stock density and pond fertilization. With a sample of 95 water bodies from three of the most important fishpond regions, studied in 2000, 2001 or 2002, we compared a series of models in which macrophyte cover (in three classes), emergent shore vegetation (in % of pond area) and invertebrate biomass in pond sediment were also considered. Among explanatory variables, macrophyte and helophyte abundance were included in the best models explaining variation in invertebrate taxonomic richness and in biomass density. Taxonomic richness was lower when abundance of both macrophytes and emergent shore vegetation was low (< 10% and < 7.5%, respectively). Biomass density was higher when macrophyte cover was >= 10% provided that emergent vegetation was abundant (>=7.5%). We conclude that fish farming intensification in French fishponds may affect aquatic invertebrate communities, mainly through its impact on the development of aquatic vegetation." (Authors) Odonata are treated at the family level.] Address: Broyer, Joel, Office National de la Chasse et de la Faune Sauvage, Direction des études et de la recherche, 01330 Birieux, France. E-mail: joël.broyer@oncfs.gouv.fr

**10500.** Buden, D.W. (2011): The Odonata of Fais Island and Ulithi and Woleai Atolls, Yap State, Western Caroline Islands, Federated States of Micronesia. *Micronesica* 41(2): 215-222. (in English) ["51 adults of nine species of Odonata were collected by the author on Ulithi Atoll, Fais Island, and Woleai Atoll, Micronesia, between December 2007 and December 2009. Together with a previously Yap and Ulithi, they include 13 first island records and three easternmost records for the Caroline Islands. Breeding on one or more of the islands is confirmed for seven species. Five of the nine species (*Anax guttatus*, *Diplacodes bipunctata*, *Pantala flavescens*, *Tholymis tillarga*, and *Tramea transmarina*) are widespread throughout Micronesia and are the species most likely to be encountered on the smallest and most remote islands, often with very limited available water." (Author) The rest of the nine species are: *Anaciaeschna jaspidea*, *Macrodiplax cora*, *Rhyothemis phyllis*, and *Neurothemis terminata*. *Agriocnemis femina* was collected on Mogmog Island on 25-X-2001.] Address: Buden, D.W.; Division of Natural Sciences and Mathematics, College of Micronesia-FSM, P.O. Box 159, Kolonia, Pohnpei, Federated States of Micronesia 96941. E-mail: donbuden@comfsm.fm

**10501.** Butler, S.G. (2011): Description of the last instar larva of *Ictinogomphus acutus* (Laidlaw) from Sarawak, with a key to the larvae of the congeneric species (Anisoptera: Gomphidae). *Odonatologica* 40(2): 123-129. (in English) ["A male final instar larva is described, illustrated and compared with the exuviae of congeneric species. The exuviae of *I. decoratus melaenops* (Sel.), which also occurs in Sarawak (Malaysia), differ from *I. acutus* by having apical margin of labium convex to straight, without strong marginal teeth; no processes between eye and antennae; lateral ventral head processes are not visible dorsally; dorsal spines are highly arched; and anal appendages extend beyond spines on segment 9." (Author)] Address: Butler, S.G., Red Willow, All Stretton,



Shropshire SY6 6HN, UK. E-mail: sgbutler15@btopen-world.com

**10502.** Byers, E.; Norris, S. (2011): Climate change vulnerability assessment of Species of Concern in West Virginia. Project Report. Elizabeth Byers and Sam Norris, West Virginia Division of Natural Resources, P.O. Box 67, Elkins WV 26241, USA. February 14, 2011: 72 pp. (in English) ["This project assessed and ranked the relative climate change vulnerability of 185 animal and plant species in West Virginia. Most species were selected based on their status as Species of Greatest Conservation Need within the West Virginia Wildlife Conservation Action Plan." *Leucorrhinia glacialis* (Index score: Highly vulnerable), *Aeshna mutata*, *Calopteryx amata*, *Telebasis byersi* (Index score: Moderately vulnerable), *Cordulegaster erronea*, *Gomphus fraternus* (Index score: Presumed stable) were assessed for climate change vulnerability, with a wide range of resulting scores. "Some of these species are mobile and already on the southern edge of their range, and are predicted to shift their populations entirely out of West Virginia due to climate change stress. Species associated with ephemeral wetlands and headwater streams tend to have the highest risk, especially where these are tied to cold-temperature habitats. Dietary specialization confers additional risk for half of the species assessed." (Authors)] Address: Elizabeth Byers & Sam Norris, West Virginia Division of Natural Resources, P.O. Box 67, Elkins WV 26241. USA

**10503.** Carriço, C.; Costa, J.M.; Santos, T.C. (2011): Description of the larva of *Neocordulia machadoi* Santos, Costa & Carriço, 2010 (Odonata: Corduliidae) from Brazil. *Biota Neotropica* 11(2): 71-73. (in English, with Portuguese summary) [The larva of *N. machadoi* is described and illustrated based on an exuvia collected at Cachoeira da Eubiose stream, São Tomé das Letras, Minas Gerais State, Brazil. (21° 43' 0" S 44° 58' 60" W; 15.X.2009, J.M. Costa & C. Carriço leg. (emerged 02.XI.2009).] Address: Carriço, C., Instituto de Biologia, Programa de Pós-graduação em Biologia Animal - PPGBA, Universidade Federal Rural do Rio de Janeiro UFRJ, BR 465, Km 7, CEP 23890 -000, Seropédica, Rio de Janeiro - RJ, Brazil. E-mail: carrico82@hotmail.com

**10504.** Chetelat, J.; Amyot, M.; Garcia, E. (2011): Habitat-specific bioaccumulation of methylmercury in invertebrates of small mid-latitude lakes in North America. *Environmental Pollution* 159(1): 10-17. (in English) ["We examined habitat-specific bioaccumulation of methylmercury (MeHg) in aquatic food webs by comparing concentrations in pelagic zooplankton to those in littoral macroinvertebrates from 52 midlatitude lakes in North America. Invertebrate MeHg concentrations were primarily correlated with water pH, and after controlling for this influence, pelagic zooplankton had significantly higher MeHg concentrations than littoral primary consumers but lower MeHg than littoral secondary consumers. Littoral primary consumers and pelagic zooplankton are two dominant prey for fish, and greater MeHg in zooplankton is likely sufficient to increase bioaccumulation in pelagic feeders. Intensive sampling of 8 lakes indicated that habitat-specific bioaccumulation in invertebrates (of similar trophic level) may result from spatial variation in aqueous MeHg concentration or from more efficient uptake of aqueous MeHg into the pelagic food web. Our findings demonstrate that littoralepelagic differences in MeHg bioaccumulation are widespread in small mid-latitude lakes." (Authors) Greater MeHg in Odonata compared to all other invertebrates was probably due to their higher trophic

level.] Address: Chételat, J. Groupe de recherche interuniversitaire en limnologie, Département de sciences biologiques, Université de Montréal, Montréal, Québec H3C 3J7, Canada

**10505.** Cicek, K. (2011): Food composition of Uludag frog, *Rana macrocnemis* Boulenger, 1885 in Uludag (Bursa, Turkey). *Acta Herpetologica* 6(1): 87-99. (in English) ["Feeding habit and food preferences of *R. macrocnemis* were studied in 2006 and 2007 in Uludag (Bursa, Turkey). Stomach contents of 165 (87 males, 58 females, 20 juveniles) individuals were analyzed and a total of 2,129 prey items were determined. It was found that the species fed mainly on a variety of invertebrates and especially on insects (96.5%). The most frequently consumed prey items were Coleoptera (62.8%), Diptera (14.4%), and Hymenoptera (9.8%). There was no significant sex- and age-dependent difference in the feeding regime. It appears that the species is feeding less in the breeding period and more in the post-breeding period. It was also evident that there was an increase in the consumption of Coleoptera depending on the elevation." (Author) Odonata contributed with ca 8% to the insect diet.] Address: Çiçek, K., Ege University, Faculty of Science, Biology Department, Zoology Section, 35100, Bornova, Izmir, Turkey. E-mail: kerim.cicek@ege.edu.tr

**10506.** Conn, A.T.; Ling, C.S.; Burgess, S.C. (2011): Biomimetic Analysis of Insect Wing Kinematics for Flapping MAVs. *International Journal of Micro Air Vehicles* 3(1): 1-11. (in English) ["Despite significant interest for over a decade in developing micro air vehicles (MAVs) that mimic the flight performance exhibited by insects, no design has achieved this challenge. This has principally been due to limitations in actuation devices, which have resulted in constrained flapping motions that require conventional rudder and aileron control surfaces. Recent advances in "artificial muscle" actuation technologies mean that reproducing the complex wing kinematics of insects with sufficient power density for MAV flight has become feasible. Consequently, there is a need to analyse the wing kinematics of insects and how they are modulated for controlled, manoeuvrable flight. It is also important to understand how wing kinematics affect the unsteady aerodynamic mechanisms that crucially augment lift and thrust force production. In this paper a biomimetic analysis of insect wing kinematics based on established biological literature is presented, that aims to aid the development of agile and controllable flapping MAVs." (Authors) References to Odonata are made] Address: Conn, A.T., Dept of Mechanical Engineering, Univ of Bristol, Bristol, U.K.

**10507.** Conniff, K.L.; van der Poorten, N.E.; Gunasingha, S. (2011): Description of the female of *Mortonagrion ceylonicum* Lieftinck, 1971 and amended description of the male (Zygoptera, Coenagrionidae) with notes on habitat, distribution and behaviour. *International Journal of Odonatology* 14(1): 49-53. (in English) ["The female of *M. ceylonicum* is described and figured for the first time. The female was described briefly by Laidlaw (1924) but was not assigned to a genus or species. An amended description of the male is also provided. Additional notes on habitat, distribution and behaviour are given." (Author)] Address: Conniff, Karen L., IWMI, PO Box 2075, Colombo 1, Sri Lanka. E-mail: karoconniff@gmail.com

**10508.** Contreras-Garduno, J.; Cordoba-Aguilar, A.; Martinez-Becerril, R.I. (2011): The relationship between male wing pigmentation and condition in *Erythrodiplax funerea* (Hagen) (Anisoptera: Libellulidae). *Odonatologica* 40(2):

89-94. (in English) ["Theory predicts that sexual traits ought to be related to physiological indicators of condition. In Zygoptera, for example, wing pigmentation expression (i.e. a sexual trait) correlates positively with male immune response, fat reserves and muscle mass. Here, it is for the first time investigated for anisopterans, whether such relationships hold in male *E. funerea*. Males in territorial activity, were collected and challenged to induce a melanization-based immune response. Male wing pigmentation was then correlated with melanin, fat reserves and muscle mass. Unlike previous results in Zygoptera, pigmentation was negatively related with immune response but no significant relation was found with fat and muscle mass. Furthermore, immune response showed no relationship with fat content or muscle mass. Possibly, the extremely high levels of male aggression observed in this species may have caused males to make an unusually high allocation of resources to wing pigmentation which may have impaired immune response." (Authors)] Address: Contreras-Garduno, J., Departamento Biología, División de Ciencias Naturales y Exactas, Universidad de Guanajuato, campus Guanajuato. Noria Alta s/n, Noria Alta, MX-36050 Guanajuato, Guanajuato, Mexico. E-mail: jcont@ecologia.unam.mx

**10509.** Corbi, J.J.; dos Santos, F.A.; Zerlin, R.; dos Santos, A.; Froehlich, C.G.; Trivinho-Strixino, S. (2011): Assessment of chromium contamination in the Monte Alegre stream: a case study. Brazilian archives of biology and technology 54(3): 613-620. (in English) [São Paulo, Brazil. The aim of this work was to study the contamination by chromium of the sediments of the Monte Alegre stream and of the larvae of Odonata (studied at the family level) as well as the possible impact caused by them on the stream macroinvertebrates community. It was found that chromium contaminated the sediments and the aquatic biota although, the stream macroinvertebrates community structure did not appear to be modified.] Address: Corbi, J.J., Depto de Biologia; Fac. de Filosofia Ciências e Letras; Univde de São Paulo; Ribeirão Preto - SP - Brasil. E-mail: julianocorbi@yahoo.com.br

**10510.** Corbi, J.J.; Froehlich, C.G.; Trivinho Strixino, S.; dos Santos, A. (2011): Evaluating the use of predatory insects as bioindicators of metals contamination due to sugarcane cultivation in neotropical streams. Environ Monit. Assess. 177(1-4): 545-554. (in English) ["Streams located in areas of sugarcane cultivation receive high concentrations of metal ions from soils of the adjacent areas causing accumulation of metals in the aquatic sediment. This impact results in environmental problems and leads to bioaccumulation of metal ions in aquatic organisms. In the present study, metal concentrations in different predatory insects were studied in streams near sugarcane cultivation and compared to reference sites. Possible utilisation of predatory insects as bioindicators of metal contamination due to sugarcane cultivation from 13 neotropical streams was evaluated. Ion concentrations of Al, Cd, Cr, Cu, Zn, Fe, and Mn in adult Belostomatidae (Hemiptera) and in larvae of Libellulidae (Odonata) were analysed. Nine streams are located in areas with sugarcane cultivation, without riparian vegetation (classified as impacted area) and four streams were located in forested areas (reference sites). Metal concentrations in insects were higher near sugarcane cultivations than in control sites. Cluster analysis, complemented by an ANOSIM test, clearly showed that these insect groups are good potential bioindicators of metal contamination in streams located in areas with sugarcane cultivation and can be

used in monitoring programmes. We also conclude that Libellulidae appeared to accumulate higher concentrations of metals than Belostomatidae." (Authors)] Address: Corbi, J.J., Depto de Biologia, Faculdade de Filosofia Ciências e Letras, Universidade de São Paulo-USP, CEP: 14040-900, Ribeirão Preto, SP, Brazil, julianocorbi@yahoo.com.br

**10511.** Craves, J.A.; O'Brien, D. (2011): *Tamea calverti* (Odonata: Libellulidae): New for Michigan with notes on other new reports for the Great Lakes region. The Great Lake Entomologist 44(1-2): 78-82. (in English) ["Beginning in late summer 2010, the Neotropical *T. calverti* was observed in a major northward movement in eastern North America. This species appeared for the first time in three Great Lakes states and Canada (Ontario). A specimen from Michigan is the first and only voucher in the Great Lakes, and an observation in Minnesota established a new northernmost report for North America." (Authors)] Address: Craves, Julie, Rouge River Bird Observatory, University of Michigan-Dearborn, Environmental Interpretive Center, Dearborn, MI 48128, USA. E-mail: jcraves@umd.umich.edu

**10512.** da Silva, F.H.; Favero, S.; Sabino, J.; dos Anjos Garnes, S.J. (2011): Biotic indexes for the evaluation of environmental quality in stretches of the Correntoso river, Pantanal do Negro, Mato Grosso do Sul State, Brazil. Acta Scientiarum. Biological Sciences, Maringá 33(3): 289-299. (in Portuguese, with English summary) ["Six collections were taken in different seasonal periods; ebb, dry and wet. The organisms were collected using a mesh D net sweeping five times through the roots of macrophyte banks at each sample. Three environments were compared (open, intermediary, closed) by adding the information from six collection sites. Family richness, absolute and relative abundance of insect samples and an evaluation of water quality were analyzed by using the BMWP index, BMWP-ASPT index, IBF index and Shannon diversity index, with log<sub>2</sub>. A total of 60 families from 12 orders of Insecta Class (including Odonata) were recorded, totalling 19,773 specimens. Among the indexes applied, the BMWP index was the one that best represented the conditions of the studied environment." (Authors)] Address: da Silva, F.H., Programa de Pós-graduação em Meio Ambiente e Desenvolvimento Regional, Universidade para o Desenvolvimento do Estado e da Região do Pantanal, Rua Alexandre Herculano, 1400, 79037-280, Jardim Veraneio, Campo Grande, Mato Grosso do Sul, Brasil. E-mail: ambienteffhs@yahoo.com.br

**10513.** Dahanukar, N.; Diwekar, M.; Paingankar, M. (2011): Rediscovery of the threatened Western Ghats endemic sisorid catfish *Glyptofox poonaensis* (Teleostei: Siluriformes: Sisoridae). Journal of Threatened Taxa 3(7): 1885-1898. (in English) [India; The diet of *G. poonaensis* includes a zygopteran larva.] Address: Dahanukar, N., Indian Institute of Science Education and Research, Sai Trinity, Garware Circle, Pune, Maharashtra 411021, India. Email: n.dahanukar@iiserpune.ac.in

**10514.** De Knijf, G.; Muusse, T. (2011): Predation of *Brachytron pratense* on *Libellula quadrimaculata* and on *Cordulia aenea*. Brachytron 14(1): 54-58. (in Dutch, with English summary) ["During a first visit to the nature reserve De Weerribben (Overijssel, the Netherlands) on 9 May 2009, a female *B. pratense* was observed during a successful kill. Its prey turned out to be a *L. quadrimaculata* which was caught in flight. After having eaten the eyes and weak parts of the head, the female *B. pratense*

flew off. A second visit to the same locality on 20 May 2011 resulted in the observation of a male *B. pratense* which caught a *C. aenea*. Some time later a second male was seen attacking another *C. aenea*. The thorax of the latter was partly eaten by *B. pratense*. After one minute the male *Brachytron* flew away, leaving behind the still living male of *C. aenea*. To our knowledge, these are the first published reports of hunting behaviour by *B. pratense* on other dragonflies." (Authors)] Address: Muusse, T., Billitonstraat 19, 3312SB Dordrecht, The Netherlands. E-mail: theomuusse@chello.nl

**10515.** Demayo, C.G.; Harun, S.A.; Torres, M.A.J. (2011): Procrustes analysis of wing shape divergence among sibling species of *Neurothemis* dragonflies. *Australian Journal of Basic and Applied Sciences* 5(6): 748-759. (in English) ["This study was conducted to determine wing shape divergence in several species of *Neurothemis* dragonflies collected from Northern Mindanao, Philippines. These includes the species *N. terminata terminata* (Ris, 1911), *N. fluctuans* (Fabricius, 1793), *N. ramburii ramburii* (Kaup & Brauer, 1866). The identification of these species are sometimes difficult as the males of these species have similarities in their colored wings ranging from red to brown. For the females, *N. terminata terminata* also show extensive female-limited polymorphism expressed as intra-specific color variations. Since the quantitative description, analysis and interpretation of shape and shape variation in biology have become a fundamental area of research; the geometric method of morphometrics was used in this study aimed at comparing the shapes themselves. In this methodology, the generalized least square fitting analysis done via procrustes superimposition of landmarks from the fore- and hind wings was used. The landmark data were converted to shape residuals via Procrustes-fitting and is comprised of three steps: (1) translation to a common centroid, (2) rotation to a common centroid size and (3) rotation to minimize sum of squared differences between landmark sets. To illustrate ordination of the shapes' consensus, the consensus shape data (mean shape) of the separate populations was measured by a relative warp ordinations plot using *tpsRelw* 1.36. Results of the relative warp analysis showed significant variation among the *Neurothemis* species. The first extracted relative warp showed differences in the shape of the pterostigma and disparity in the distance between the distal end of the radial planate supplement and the distal margin of the wings bounded by the end points of the intercalary vein and the radial branch. Differences in the shape of the pterostigma were also observed and accounting for the variations in the shapes of the hind wing. Distance matrices were also constructed for the four data sets: left and right fore-wing; left and right hind wing. Results of the comparison via correlation analyses of the four matrices of distances among the species are indicative of the significant contribution of the shape of the fore-wing as compared to the hind wing in discriminating among species. The results of the present study clearly show the importance of geometric morphometric analysis and the utility of wing morphology in the taxonomy and discrimination of sibling species of *Neurothemis*." (Authors) Reagan Villanueva wrote on 02.08. 2011: The species they labelled as *N. fluctuans* is actually a small *N. ramburii*.] Address: Demayo, C.G., Dept of Biological Sciences, College of Science and Mathematics, MSU-Iligan Institute of Technology, Iligan City, Philippines. E-mail: cgdemayo@gmail.com

**10516.** Diao, P.-p.; Yu, A.-c. (2011): Odonata in the Siming Mountains, Ningbo. *Chinese Journal of Applied Entomology* 48(2): 435-441. (in Chinese, with English summary) ["Field surveys were conducted on the Odonata in the Siming Mountains of the Ningbo Region from 2009 to 2010. 460 Odonata specimens were collected, and a total of 43 species in 32 genera and 9 families identified. The Libellulidae were the dominant family (17 species, 39.5%) of which *Orthetrum* was the dominant genera (5 species, 15.6%). 25 genera (78.1%) were represented by single species. Oriental and Oriental-Palearctic Realm species were the most common. Water pollution and over-utilization of marshes are the main threats to the Odonata and other local aquatic organisms." (Authors)] Address: Diao, P.-p., College of Modern Science and Technology, China Jiliang University, Hangzhou, China

**10517.** Dominguez-Granda, L.; Lock, K.; Goethals, P.L.M. (2011): Application of classification trees to determine biological and chemical indicators for river assessment: case study in the Chaguana watershed (Ecuador). *Journal of Hydroinformatics* 13(3): 489-499. (in English) ["Benthic macroinvertebrates were sampled in the Chaguana river basin in SW Ecuador in March (wet season) and September (dry season) of 2005 and 2006. Aquatic insects dominated the macrobenthos, with Trichoptera, Diptera, Ephemeroptera, Hemiptera and Odonata being the orders with the highest diversity and Ephemeroptera and Diptera being most abundant. No systematic differences in richness and abundance were observed between dry and wet seasons, which is in agreement with the literature. It is concluded that, in the neotropics, macroinvertebrates can probably be sampled for water quality assessments during the whole year: however, sampling soon after spates should be avoided. Using multivariate analysis, stations could be clustered into three groups based on their macroinvertebrate community composition: sites with low, intermediate and high human impact. Classification trees indicated that stations with low human impact had low conductivities, while stations with high conductivities were characterised as highly impacted if the dissolved oxygen concentration was low and intermediately impacted if the dissolved oxygen concentration was high. Classification trees also indicated that Leptophlebiidae (Ephemeroptera) were characteristic for sites with low impact; in sites with intermediate impact, this family was absent but Hydropsychidae (Trichoptera) were present; when both families were absent, impact was high." (Authors)] Address: Lock, K., Ghent Univ., Laboratory of Environmental Toxicology and Aquatic Ecology, J. Plateaustraat 22, B-9000 Gent, Belgium. E-mail: Koen.Lock@UGent.be

**10518.** Dressler, B. (2011): Arktische Smaragdlibelle *Somatochlora arctica*, Wiederfund im Spessart. *Libellen in Hessen* 4: 50-52. (in German) [Documentation of records of *S. arctica* without locality data from the Spessart middle range mountain, Hessen, Germany from 22-VII and 02-IX-2010.] Address: Dressler, B., Samlandweg 75, 61118 Bad Vilbel, Germany

**10519.** Dronzikova, M.V. (2011): Data on the fauna of Odonata of the Tom' River basin. *Amurian zoological journal* 3(2): 107-123. (in Russian, with English summary) ["Basing on collections mostly from Kuznetskaya Depression and Gornaya Shoria Mts., data on distribution of 48 species of Odonata in the Tom' River basin (West Siberia) are reported, 13 species added to the fauna from literature sources. In additions, collections made at Lake Teletskoe, NE Altai, are reported as well.



*Coenagrion lanceolatum* is reported for the environs of Guryevsk town (Kuznetskaya depression) and Lake Teletskoe, that considerably extends its known range to the west. *Anax parthenope parthenope*, probably a southern colonist, is reported from Kemerovo Province; its steady population existing within the city of Novokuznetsk. New data on the life history of some species at Novokuznetsk are reported." (Author)] Address: Dronzikova, M.V., Kuzbass State Pedagogical University, Pionersky Ave. 13, Novokuznetsk, 654027, Russia. E-mail: m\_dronzikova@mail.ru

**10520.** Dumont, H.J.; Kiany, M.; Sadeghi, S. (2011): First record of *Rhodischnura nursei* (Morton) from Iran (Zygoptera: Coenagrionidae). *Odonatologica* 40(3): 251-254. (in English) ["*R. nursei* is for the first time reported from the South of Iran, a considerable widening of the range of this rather ill-known species towards the West, and redefining its geographical range as West-Oriental and rather typical of semi-arid climates. The nearest certified record from Pakistan is situated some 1000 km NE of the locations in Iran, but it can be supposed that numerous populations live in the gap. The specimens, collected in Rudan and Ziarat Ali, Hormozgan province, S Iran, lived along the grassy shores of 2 slow-flowing rivers, a habitat that is also typical of the species further East. A female found at Sarbaz, Beluchistan, confirms that this small and inconspicuous species may be widespread in suitable biotopes of southern and eastern Iran, and probably in the West of Pakistan as well." (Authors)] Address: Kiany, M., Department of Plant Protection, College of Agriculture, Shiraz University, Shiraz, I. R. Iran. E-mail: mohsen.kiany1@gmail.com

**10521.** Facco Jacomassa, F.A. (2011): Observations of a nest of the Plumbeous Kite, *Ictinia plumbea* (Gmelin, 1788) (Falconiformes: Accipitridae) in southern Brazil. *Revista Biotemas* 24(1): 77-82. (in Portuguese, with English summary) ["[...] In early November, the presence of nestlings was confirmed (one in each breeding season), and this time the parents fed the chicks with small insects (Hymenoptera and Coleoptera) and carried out the maintenance of the nest. The nestlings that were developing into young birds were fed with larger insects (Odonata, Lepidoptera – *Myelobia smerintha* and Orthoptera – *Tropidacris collaris*). [...]"] (Author)] Address: Facco Jacomassa, F.A., Laboratório de Ornitologia e Animais Marinhos, Bloco D, Centro 2, Universidade do Vale do Rio dos Sinos, Avenida Unisinos, 950 – B, CEP 93.022-000, São Leopoldo – RS, Brasil. E-mail: fabioafj@gmail.com

**10522.** Ferraz Luiz, T.; Roquetti Velludo, M.; Carvalho Peret, A.; Luiz Rodrigues, J.; Moldenhauer Peret, A. (2011): Diet, reproduction and population structure of the introduced Amazonian fish *Cichla piquiti* (Perciformes: Cichlidae) in the Cachoeira Dourada reservoir (Paranaíba River, central Brazil). *Rev. Biol. Trop.* 59(2): 727-741. (in English) ["The Blue Peacock Bass (*Cichla piquiti*), native to the Tocantins-Araguaia river basin of the Amazon system, was introduced into the basin of the Paranaíba River, Paraná River system. Cachoeira Dourada reservoir is one of a series of dams on the Paranaíba River in central Brazil, where this fish has become established. A study of its feeding spectrum, combined with information about its reproductive characteristics and population structure, would enable the current state of this species in the reservoir to be assessed and might provide useful data for the management of other species native to this habitat. This study showed that the peacock bass has no predators or natural competitors in the reservoir and that

reproduces continuously, with high reproductive rates, and has a smaller median length at first maturity (L50) than other species of *Cichla*. Its successful establishment in habitats strongly affected by human activity should cause changes in the whole structure of the local fish communities. Nonetheless, in this reservoir, there appears to be some sharing of the functions of this species with native carnivorous fish, a situation that may be sustained by the presence of a wide variety of foraging fish." (Authors) Odonata were found in 0,81% of the stomachs of *C. piquiti*.] Address: Ferraz Luiz, Tatiane, Population Dynamics Laboratory, Department of Hydrobiology, Federal University of São Carlos (UFSCar) Washington Luís Highway (SP-310), km 235. São Carlos, SP, Brazil. Zip Code 13565-905. E-mail: tatianeferrazluiz@hotmail

**10523.** Fulan, J.A.; Raimundo, R.; Figueiredo, D.; Correia, M. (2011): Abundance and diversity of dragonflies four years after the construction of a reservoir. *Limnetica* 29(2): 279-286. (in English, with Portuguese summary) [Southern Portugal, 38°08'N, 7°35'E. "Few studies have investigated the impacts of river impoundments on reservoir constructions. Reservoir construction deeply changes dragonflies' habitat structures, especially in relation to shoreline vegetation. This study investigated the effects of the impoundment of the Guadiana River and its tributaries on dragonflies four years after the construction of a reservoir. A total of 17 dragonfly species (11 Zygoptera and ten Anisoptera), representing six families, were recorded in 21 sites in the years 1999 and 2003. *Aeshna mixta*, *Coenagrion caeruleum*, *C. scitulum*, *Sympetrum foscolum*, *S. meridionale* and *S. striolatum* were sampled just before the impoundment took place, and *Anax parthenope*, *Onychogomphus forcipatus*, *Orthetrum coerulescens*, *Trithemis annulata*, *Platycnemis acutipennis* and *P. latipes* were recorded only after the construction of the reservoir. We concluded that the construction of the Alqueva Reservoir four years earlier did not change the dragonfly species richness, possibly because of species overlap, but that the species composition was modified. Changes in marginal vegetation may have been important to new species compositions." (Authors)] Address: Fulan, J.A., Unive Federal do Amazonas (UFAM). CEP: 69800-000, Humaitá, AM, Brasil. E-mail: joaofulan@ig.com.br

**10524.** Fulan, J.A.; Davanso, R.C.S.; Henry, R. (2011): A profundidade como fator determinante na variação anual da densidade dos macroinvertebrados associados à *Salvinia auriculata* Aublet. *Revista Brasileira de Biociências* 9(2): 214-219. (in Portuguese, with English summary) ["(The depth as a factor in determining annual change density of macroinvertebrates associated with *Salvinia auriculata* Aublet). The aim of this work was to study the effects of water annual variation of Paranapanema River and others variables on macroinvertebrates that lives in macrophytes roots, from March 2006 to February 2007. The sampled was realized with a hand-net (mesh size: 0.25 mm) and 0.07 m<sup>2</sup> circle area. We measured air and water temperature, depth, dissolved oxygen, pH, K25 and suspended matter. The normality was tested and a Canonical Correspondence Analysis (CCA) was realized. Telebasis showed high density in period studied. There was a high variation in depth: 6.07 m in April 2006 to 1.83 m in November 2007. The CCA showed that Culicidae, Ephemeroptera, Ostracoda, Calopterygidae, Coryphaeschna and Cyanallagma were significative correlated with the depth. We concluded that the effect of the depth on larvae Odonata can not have been direct, but indirect by the effect in your substrate as aquatic plant." (Au-

thors)] Address: Fulan, J.A., Universidade Federal do Amazonas (UFAM). CEP: 69800-000, Humaitá, AM, Brasil. E-mail: joaofulan@ig.com.br

**10525.** Gall, B.G.; Brodie III, E.D. Brodie, Jr. E.D. (2011): Survival and growth of the caddisfly *Limnephilus flavastellus* after predation on toxic eggs of the Rough-skinned Newt (*Taricha granulosa*). *Can. J. Zool.* 89: 483-489. (in English) ["*T. granulosa* possesses a powerful neurotoxin, tetrodotoxin, in the skin that is secondarily deposited in the ova. Although assumed to serve an antipredator function in the eggs, empirical evidence of the toxin's role in preventing egg predation is lacking. In this study, we characterized the aquatic macroinvertebrate community at a location sympatric with extremely toxic newts and estimated the abundance of caddisflies. We tested aquatic macroinvertebrates sympatric with toxic newts for their capacity to consume the toxic eggs, and examined the propensity of egg predation and its effect on growth of the only known predator of newt eggs, caddisfly larvae. *Limnephilid* caddisfly larvae were the only invertebrate observed to consume substantial quantities of toxic newt eggs. Survival and growth of *L. flavastellus* continued when larvae consumed toxic eggs and did not differ from *L. flavastellus* that also had access to an alternative food source (detritus). *L. flavastellus* that had access to eggs + detritus consumed a similar number of eggs compared with those provided with eggs only. These results, combined with the abundance of caddisflies, suggest that caddisflies are important predators of eggs of *T. granulosa*." (Authors) Macroinvertebrates collected at Soap Creek ponds and tested for their propensity to consume toxic eggs of *T. granulosa* included Odonata. Eggs were offered to Libellulidae (n specimens=11), Aeshnidae (n=1) and Coenagrionidae (n=6). In any case the offered eggs were consumed.] Address: Gall, B.G., Dept of Biology, Utah State University, 5305 Old Main Hill, Logan, UT 84322, USA. E-mail: brian.gall@usu.edu

**10526.** Ganai, A.H.; Parveen, S.; Abdel Mola, H.R., Ahmad, U.; Kabir, H.A. (2011): Diversity and community structure of aquatic insects in some derelict waterbodies of Aligarh, Uttar Pradesh, India. *J. Curr. Sci.* 16(1): 155-163. (in English) [Monthly population densities of the taxa (all at the order level) are presented and discussed. "Odonata formed the fifth (from six) most dominant group of the aquatic insects in the selected ponds. The population density of Odonata ranged from minimum of (3 No./m<sup>2</sup>) during November. 2009 to a maximum of (63 No./m<sup>2</sup>) in June, 2009 in pond I, whereas, it varied from Nil during, January. 2010 to (15 No./m<sup>2</sup>) in April and June 2009 in pond II. Odonate insects were collected mainly during March to October, 2009 with abundance in summer." (Authors)] Address: Ganai, A.H., Limnology Research Laboratory, Department of Zoology, Aligarh Muslim University, Aligarh, (U.P.), India

**10527.** Gassmann, D. (2011): *Pseudagrion lorenzi* sp. nov., a new damselfly species from New Britain island, Papua New Guinea (Odonata: Coenagrionidae). *International Journal of Odonatology* 14(2): 149-162. (in English) ["*Pseudagrion lorenzi* sp. nov. is described from New Britain island, Papua New Guinea. Male and female characters are illustrated by means of scanning electron microscopy. A differential diagnosis with *Pseudagrion civicum* Lieftinck, 1932 from New Guinea and *Pseudagrion incisurum* Lieftinck, 1949 from the Solomon Archipelago is provided. The female of *P. incisurum* is described for the first time." (Authors)] Address: Gassmann, D., National Centre for Biodiversity (NCB Naturalis), PO Box

9517, NL-2300 RA Leiden, The Netherlands. E-mail: dirk.gassmann@ncbnaturalis.nl

**10528.** Gergs, A.; Classen, S.; Hommen, U.; Preuss, T.G. (2011): Identification of realistic worst case aquatic macroinvertebrate species for prospective risk assessment using the trait concept. *Environmental Science and Pollution Research* 18(8): 1316-1323. ["Approaches in environmental risk assessment for pesticides are becoming more and more realistic. Thereby, risk assessment has to be protective in a way that no long-lasting (adverse) effects on populations will occur in the environment. Since this imperative includes species generally showing high population vulnerability due to their life history traits, prospective risk assessment should be based on realistic worst cases. Based on life history traits, the purpose of the current study was to verify whether a worst case combination of low potential for intrinsic recovery and low ability for recolonisation can be found in the field. Methods: Combinations of traits related to dispersal ability and reproduction of macroinvertebrates were investigated using monitoring data from edge of field water bodies in Germany. The relative distribution of traits was analyzed across different agricultural regions and across sites of different potential for exposure to pesticides. Species were sorted in a tiered approach in order to gain a list of realistic worst case species. Results: Life history traits were found equally distributed across different regions. Thereby, dispersal ability and voltinism were not randomly combined. Within the data analysed, low dispersal ability was found to be exclusive to semivoltine taxa. Owing to their appearance in reference sites, poor dispersal ability and a long time reproduction, three species were considered potentially worst case. Conclusions: The trait approach was found to be suitable in comparing trait distributions within different regions and in compiling a list of critical taxa for consideration in environmental risk assessment." (Authors) The paper includes a few passing notes on voltinism and dispersal of Odonata.] Address: Gergs, A., Institute for Environmental Research, RWTH Aachen University, Aachen. Germany. E-mail: andre.gergs@bio5.rwth-aachen.de

**10529.** Goncalves, C.; Pereira Souza, U.; Volcan, M.V. (2011): The opportunistic feeding and reproduction strategies of the annual fish *Cynopocilius melanotaenia* (Cyprinodontiformes: Rivulidae) inhabiting ephemeral habitats on southern Brazil. *Neotropical Ichthyology* 9(1): 191-200. (in English, with Portuguese summary) [Odonata larvae play a minor role as food of *C. melanotaenia*.] Address: Gonçalves, Cristina da Silva, Programa de Pós-Graduação em Ciências Biológicas, Universidade Estadual Paulista "Júlio de Mesquita Filho", Departamento de Zoologia, Av. 24-A, 1515, 13506-900 Rio Claro, SP, Brazil. cristina.silva.goncalves@gmail.com

**10530.** Gonzales Soriano, E.; Noguera, F.; Onate Ocaña, L. (2011): A biodiversity hotspot for odonates in Mexico: the Huasteca Potosina, San Luis Potosí. *Odonatologica* 40(3): 179-190. (in English) ["The Huasteca Potosina (HP) represents the second hotspot for Odonata diversity in Mexico. A total of 11 families, 49 genera and 126 species for the region are recognized. Estimated richness values using the nonparametric estimators ICE and Chao<sup>2</sup> were 174.3 and 204.55 species respectively. The Odonata diversity of the HP is surpassed in Mexico only by that of the region of Los Tuxtlas with 139 species" (Authors)] Address: Gonzales Soriano, E., Departamento de Zoología, Instituto de Biología, Universidad Nacional Autónoma de México, Avenida Universidad 3000, MX-

04510 Ciudad Universitaria, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**10531.** González-Tokman, D.; Córdoba-Aguilar, A.; González-Santoyo, I.; Lanz-Mendoza, H. (2011): Infection effects on feeding and territorial behaviour in a predatory insect in the wild. *Animal Behaviour* 81(6): 1185-1194. (in English) ["Sick animals may change their feeding behaviour to compensate for infections. However, there is little information regarding whether infection affects (1) feeding behaviour of predators, (2) feeding behaviour using an experimental approach in the wild, (3) other costly behaviours and/or (4) physiological components of condition. We experimentally infected males of the predatory damselfly *Hetaerina americana* in a field experiment. We hypothesized that infection would reduce feeding behaviour. We further predicted a reduction in territorial activity, an increase in immune response (measured by the activity of phenoloxidase, PO) and a reduction of fat reserves and flight-associated muscle mass (two traits usually traded off with immune ability and territorial behaviour). We also infected males in a laboratory experiment that controlled for food supply and territorial activity, and measured the same physiological characters. Immune challenges in the field experiment unexpectedly increased feeding rate but did not change territorial activities. Muscle mass was reduced in the field but not in the laboratory, probably because of differences in the presence of energetically expensive territorial activities. In the laboratory, starvation and infection reduced PO activity and fat stores but did not affect muscle mass. Thus, our field and laboratory results support the idea that increased feeding compensates for infections in predators." (Authors)] Address: Córdoba-Aguilar, A., Centro de Investigaciones Biológicas, Univ. Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**10532.** Gosden, T.P.; Stoks, R.; Svensson, E.I. (2011): Range limits, large-scale biogeographic variation, and localized evolutionary dynamics in a polymorphic damselfly. *Biological Journal of the Linnean Society* 102: 775-785. (in English) ["Studies of heritable colour polymorphisms allow investigators to track the genetic dynamics of natural populations. By comparing polymorphic populations over large geographic areas and across generations, issues about both morph stability and evolutionary dynamics can be addressed, increasing our understanding of the potential mechanisms maintaining genetic polymorphisms. In the present study, we investigated population morph frequencies in a sex-limited heritable colour polymorphic damselfly (*Ischnura elegans*), with three discrete female morphs. We compared the frequencies of these three female morphs in 120 different populations from ten European countries at differing latitudes and longitudes. There were pronounced differences in morph frequencies both across the entire European biogeographic range, as well as at a smaller scale within regions. We also found considerable between-population variation at the local scale within regions, particularly at the edges of the range of this species. We discuss these findings in the context of recent models of adaptive population divergence along the range of a species. This polymorphism is thus highly dynamic, with stable morph frequencies at the core of the species range but fluctuating morph dynamics at the range limits. We finish with a discussion of how local interactions and climatic factors can be expected to have a strong influence on the biogeographic patterns in this species and other sexually se-

lected polymorphisms." (Authors)] Address: Gosden, T.P., School of Biological Sciences, Univ. of Queensland, St Lucia 4072 QLD, Australia. E-mail: t.gosden@uq.edu.au

**10533.** Grant, P.B.C.; Samways, M.J. (2011): Micro-hotspot determination and buffer zone value for Odonata in a globally significant biosphere reserve. *Biological Conservation* 144(2): 772-781. (in English) ["Reserves are frequently constrained in design and size by various financial, social or political factors. Maintenance of existing reserves must therefore rely on strategic management practices, and prioritization of conservation activities within them. Identification of global and regional hotspots have been effective for prioritizing conservation activities. Yet, identification of micro-hotspots, or overlapping areas of endemic and rare species that are under threat at the landscape scale, have largely been ignored. From a reserve management point of view, knowledge of critical micro-hotspots within a reserve, are focal points for directing cost effective, conservation initiatives, especially removal of invasive alien plants which are a major threat to biodiversity. Using diversity patterns of dragonfly assemblages, many endemic and threatened, within a biosphere reserve located in the core of a global biodiversity hotspot, we investigated the concept of micro-hotspots. As biosphere reserves contain zones with varying degrees of anthropogenic impact, we also investigated the value of buffer and transition zones for complementing the dragonfly fauna of the reserve core. We found a distinct micro-hotspot within the protected core zone which shows concordance for both endemism and species richness. We conclude that focused conservation actions to remove invasive alien plants within this micro-hotspot would help insure its continued integrity. Furthermore, while there is greater habitat degradation within the buffer and transition zones, they support many additional species, but not those necessarily endemic or threatened. The complementary value of buffer and transition zones therefore lies in increasing habitat heterogeneity and species richness of the whole reserve." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**10534.** Guillermo-Ferreira, R.; Del-Claro, K. (2011): Resource defense polygyny by *Hetaerina rosea* Selys (Odonata: Calopterygidae): Influence of age and wing pigmentation. *Neotrop. entomol.* 40(1): 78-84. (in English) ["Current evidence suggests that in *Hetaerina* damselflies males exhibit lek mating system. In this study, in order to answer if the same occurs in *H. rosea*, we manipulated vegetation substrates used as territories and quantified the number of visiting females, males defending territories and fight intensity. We also examined whether body size and wing pigmentation are selectable traits in male-male competition, and if age affects male territorial behaviour. Our results showed that males with larger pigmented areas won more contests, independently of body size. Old males changed from territoriality to sneaking strategy. Contrary to other *Hetaerina* species, males of *H. rosea* do not display lek behaviour, but defend resources according to the resource defense polygyny strategy." (Authors)] Address: Del-Claro, K., Instituto de Biologia, LECl, Univ Federal de Uberlândia, CP 593, 38400-902, Uberlândia, MG, Brasil. E-mail: delclaro@ufu.br

**10535.** Hardiman, N.; Burgin, S. (2011): Effects of trampling on in-stream macroinvertebrate communities from canyoning activity in the Greater Blue Mountains World Heritage Area. *Wetlands Ecology and Management* 19(1):



61-71. (in English) ["Perceived growth in the adventure recreation sport of canyoning in the Greater Blue Mountains World Heritage Area (Australia) has raised concerns with park management that such activity is resulting in unsustainable visitor impacts to canyon ecosystems. Three levels of trampling intensity were applied within an upland section of a canyon stream to assess the impact of trampling on benthic macroinvertebrate communities. After an initial detrimental effect from trampling, there was a rapid recovery of the macroinvertebrate community. Recovery occurred within one day of trampling ceasing, and overall community composition was similar among treatments after 15 days. However, by day 15 the untrampled sites showed a substantial decrease in animal abundance. This indicated that adjacent habitat contributed greatly to the recolonisation of animals into trampled areas." (Authors) The study includes one specimen of Corduliidae.] Address: Burgin, Shelley, College of Wealth and Science, Univ. of Western Sydney, South Penrith Distribution Centre, Locked bag 1797, Sydney, NSW 1797, Australia. E-mail: s.burgin@uws.edu.au

**10536.** Haritonov, A.; Popova, O. (2011): Spatial displacement of Odonata in south-west Siberia. *International Journal of Odonatology* 14(1): 1-10. (in English) ["A brief account is presented of mass dragonfly migrations observed previously in Russia and West Siberia in particular. A mass migration in *Libellula quadrimaculata* is described in detail. It occurred on 1 July 1981 in the south-western part of the West Siberian Plain in the valley of the Ishym River. From 1968 to 2008 we studied population dynamics, spatial distribution and displacement in dragonflies in the West Siberian forest-steppe. Detailed research was conducted at the biological station of the Russian Academy of Sciences near the Chany Lake. Mass migrations in *L. quadrimaculata* and some *Leucorhinia* spp. followed situations with an extremely high population density and local mass aggregations and occurred with a period of c.10 years, correlated with fluctuation of water level in the region, mainly in the south. It is suggested that dragonfly migration not only optimizes their population size but increases the rate of transport of chemical elements and organic matter to dry land from eutrophic water bodies, which increases the importance of dragonflies to ecosystems at large." (Authors)] Address: Haritonov, A.YU.; Laboratory of Insect Ecology, Biological Institute of the Siberian Branch of the Academy of Sciences, Frunze str. 11, RUS-630091 Novosibirsk, Russia. E-mail: pc@eco.nsc.ru

**10537.** Haritonov, A.Yu.; Popova, O.N. (2011): [Dragonfly (Odonata) migration in the south west Siberian plain]. *Zoologicheskii zhurnal* 90(3): 302-310. (in Russian) ["Brief information on mass dragonfly migrations observed previously in Russia, and in Western Siberia in particular, is presented. From 1969 to 2009, the authors studied the dynamics of dragonfly population, their spatial distribution and displacements in the West-Siberian forest-steppe. The main studies were conducted in the Chany Lake basin (the Biological Station of the Institute of Animal Systematics and Ecology, Siberian Division, Russian Academy of Sciences). The spatial redistribution of dragonflies is regarded as a balance of homing and wandering activities. Homing results in a relative stability of local dragonfly populations and communities. Wandering is a result of dispersal of dragonflies from their emergence sites and colonization of new habitats that is especially important due to the short time of existing the larval biotopes - shallow water bodies. The formation of more or less constant

migration routes is a peculiar variant of wandering activities. Mass exodus from native habitats at excessive growth of the population density takes special place in dragonfly migrations. Exodus flight leads to death of all or most individuals not only. In addition, it optimizes not only the number of dragonfly populations, but also intensifies the removal of chemical elements and organic matter from eutrophic water bodies. An original generalized classification of special displacement of dragonflies is proposed." (Authors)] Address: Haritonov, A.YU.; Laboratory of Insect Ecology, Biological Institute of the Siberian Branch of the Academy of Sciences, Frunze str. 11, RUS-630091 Novosibirsk, Russia. E-mail: pc@eco.nsc.ru

**10538.** Hasumi, M.; Hongorzul, T.; Terbish, K. (2011): Animal species diversity at a land-water ecotone in Mongolia. *Limnology* 12(1): 37-45. (in English) [The biodiversity of wetland ecosystems has received scant attention in Mongolia. We measured amphibian and macroinvertebrate species diversity at a complicated land-water ecotone of a pond within a wetland complex in Shaamar during July 2005. From our study area (0.5-ha grassland and an adjacent pond), we sampled 4,926 animals including 1 mammal, 4 amphibian, and 26 aquatic macroinvertebrate (>2 mm) species with a biomass of 4,444 g. Among these, a backswimmer (*Notonectidae* sp. 1) was a dominant species, representing 65% of the total number of animals collected (3,209) and 22% of the mass (999 g). Our study area was small but contained 4 amphibian species (*Hyla japonica*, *Rana amurensis*, *Bufo raddei*, and *Salamandrella keyserlingii*) in a mixed community with Shannon Diversity Index ( $H'$ ) of 1.678 and Pielou's Evenness Index ( $J'$ ) of 1.211. No larvae or tadpoles of any amphibian species were found in the pond, indicating their early metamorphosis.  $H'$  and  $J'$  with 26 macroinvertebrate species were estimated to be 1.828 and 0.561, respectively. This suggests that low macroinvertebrate species diversity relative to high species richness is due to low evenness resulting from considerable numbers of a backswimmer. In 6 sites sampled in the pond, mean water pH revealed high alkalinity (range 9.01–10.45). The presence of our taxa in a highly alkaline environment indicates that they may be alkaliphilic." (Authors) The paper includes records of "Aeshnidae sp., Libellulidae sp. 1, Libellulidae sp. 2, *Cercion* sp.".] Address: Hasumi, M., Biological Institute, Faculty of Science, Niigata University, Niigata 950-2181, Japan. E-mail: mhasumi@bio.sc.niigata-u.ac.jp

**10539.** Henry, J.R. (2011): A comparative study of dragonfly flight in variable oxygen atmospheres. M.Sc. thesis, Arizona State University: V + 39 pp. ["One hypothesis for the small size of insects relative to vertebrates, and the existence of giant fossil insects, is that atmospheric oxygen levels have constrained body sizes because oxygen delivery would be unable to match the needs of metabolically active tissues in larger insects. This study tested whether oxygen delivery becomes more challenging for larger insects by measuring the oxygen-sensitivity of flight metabolic rates and behaviour during hovering for 11 different species of dragonflies that range in mass by an order of magnitude (*Aeshna multicolor*, *Anax junius*, *Libellula comanche*, *L. luctuosa*, *L. saturata*, *Macrodiplox balteata*, *Pachydiplax longipennis*, *Pantala flavescens*, *P. hymenaea*, *Tramea lacerata*, *T. onusta*). Animals were flown in 7 different oxygen concentrations ranging from 30% to 2.5% to assess the sensitivity of their behaviour and flight metabolic rates to oxygen. I also assessed the oxygen-sensitivity of flight in low-density air (nitrogen re-

placed with helium), to increase the metabolic demands of hovering flight. Lowered atmosphere densities did induce higher metabolic rates. Flight behaviours but not flight metabolic rates were highly oxygen-sensitive. A significant interaction between oxygen and mass was found for total flight time, with larger dragonflies varying flight time more in response to atmospheric oxygen. This study provides some support for the hypothesis that larger insects are more challenged in oxygen delivery, as predicted by the oxygen limitation hypothesis for insect gigantism in the Paleozoic." (Authors)] Address: not stated

**10540.** Herzog, S.K.; Martínez, R.; Jørgensen, P.M.; Tiessen, H. (eds) (2011): Climate change and biodiversity in the tropical Andes. Inter-American Institute for Global Change Research (IAI) and Scientific Committee on Problems of the Environment (SCOPE). ISBN: 978-85-99875-05-6: 348 pp. (in English) [The paper includes a passing reference to Odonata: "In rivers of the Ecuadorian páramo, dominant groups include Planariidae (Turbellaria), Oligochaeta, Hyalellidae (Amphipoda), Baetidae (Ephemeroptera), Hydroptilidae, Limnephilidae (Trichoptera), Chironomidae, Simuliidae (Diptera), and Elmidae (Coleoptera) (Jacobsen 2008). In general, diversity decreases with elevation for these orders, and this pattern is particularly pronounced in Hemiptera and Odonata, which do not occur in the high zone of Ecuador (Encalada 1997) despite being very diverse in the lowlands (Jacobsen 2004). Several important families, such as Gripopterygidae (Plecoptera), Anomalosychidae, and Limnephilidae (both Trichoptera), on the other hand are restricted to high-Andean elevations." (Authors)] Address: <http://www.icsu-scope.org/Latest%20News/CCampBiodiversityinTropicalAndes.pdf>

**10541.** Honkanen, M. (2011): Perspectives on variation in species richness: area, energy and habitat heterogeneity. *Jyväskylä Studies in Biological and Environmental Science* 219: 46 pp. (in English) ["Species richness (i.e. number of species) tends to differ from one area to another. Two major patterns observed in the nature are 1) species-area relationship which states that larger areas contain usually larger species richness, and 2) species-energy relationship which postulates that the amount of energy encompassed in the area determines species richness. Even though both of these relationships may result from multiple mechanisms, which may be also intertwined, for instance through heterogeneity of habitats, they are not often studied simultaneously. In addition to broaden our theoretic knowledge understanding the mechanisms that produce species richness could help us to protect biodiversity. I studied the effects of area, energy, and habitat heterogeneity on species richness and related adjacent mechanisms in three taxa. My results showed that bird species richness was determined mainly by total energy (measured as tree volume and growth) in an area through its effects on the number of individuals. Bird species richness was further limited by the density of energy and its spatial dispersion, most likely because increased habitat heterogeneity benefits specialists. Also aquatic macrophyte species richness was determined by a multiple of factors and one of them was potential productivity (a measure of energy). Whilst potential productivity increased species richness, species turnover showed a unimodal relationship with it. Thus, potential productivity may decrease the regional species diversity as the species turnover between lakes may be reduced. Finally, Odonata species richness was determined by habitat heterogeneity (measured as aquatic macrophyte species

density), and the relationship was shaped by just a handful of common species. My results help to build up the theoretic knowledge about the mechanisms behind species richness patterns and have important implications for species conservation." (Author)] Address: Honkanen, Merja, University of Jyväskylä, Department of Biological and Environmental Science, P.O. Box 35, FI-40014 University of Jyväskylä, Finland

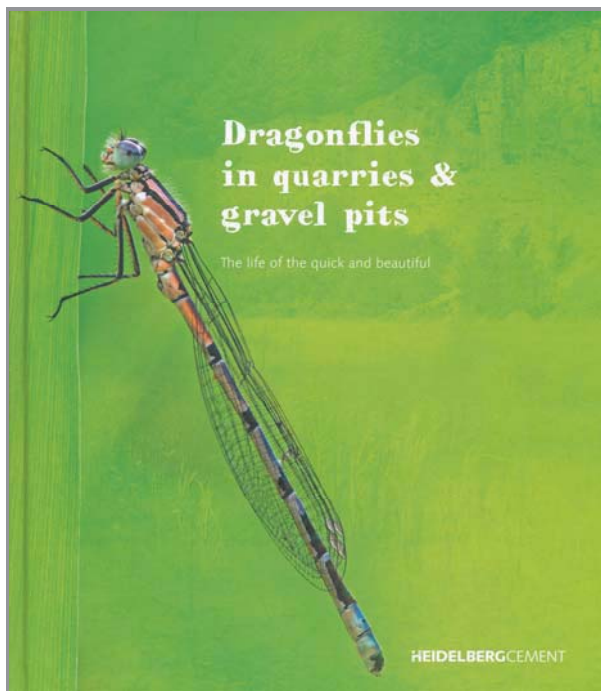
**10542.** Horn, M.Y.; Rodrigues, K.A.; Anzotegui, L.M. (2011): Primeras evidencias de interacción insecto-planta en el Neógeno del noroeste de la Argentina. *Rev. bras. paleontol.* 14(1): 87-92. (in Portuguese, with English summary) ["This study provides the first evidence for plant-insect associations from fossil leaf impressions of the San José and Palo Pintado formations, dated as middle and upper Miocene age, from northwestern Argentina. The size, shape and arrangement of leaf damage on several plant hosts consists of various chew marks made by mandibulate insects occurring along the leaf blades of *Malvaciphyllum quenquiadensis* Anzotegui and *Cristalli* (Malvaceae), hole feeding along the leaf edge of *Nectandra saltensis* Anzotegui (Lauraceae), mines within the internal tissues of *M. quenquiadensis*, and oviposition scars in *Cedrela* sp. (Meliaceae). Based on specific, identifiable features of the plant damage, the likely producers responsible for this damage include external foliage feeders such as Orthoptera, Phasmoptera and Coleoptera; leaf miners from the Lepidoptera but possibly Hymenoptera and Diptera; and ovipositing insects representing the Odonata. Many of these insect groups were previously known from earlier Paleogene deposits of Argentina, and similar ovipositional damage has been documented from the early Eocene of Rio Negro and middle Eocene of Chubut in Patagonia, indicating geochronological continuity and occurrence in marsh and open woodland plant communities under warm and seasonal climatic conditions." (Authors)] Address: Horn, Marcicel Yanina, Secretaría General de Ciencia y Técnica, Universidad Nacional del Nordeste, Centro de Ecología Aplicada del Litoral, Ruta 5, km 2,5 3400, Corrientes, Argentina. E-mail: yaninahorn@hotmail.com

**10543.** Horn, R. (2011): Zwei Funde der Südlichen Heide libelle *Sympetrum meridionale* (Sélys 1841) in Nordhessen. *Libellen in Hessen* 4: 48-49. (in German) [24-VIII-2006, NSG near Felsberg-Altenburg, Hessen, Germany; 12-IX-2010, Riedforst near Melsungen, Hessen, Germany] Address: Horn, R., Aussiedlerhof 2, 34212 Melsungen-Kirchhof, Germany. E-mail: Reinhard-Horn@t-online.de

**10544.** Infante-Rodriguez, D.A.; Novelo-Gutierrez, R.; Mercado, G.; Williams, T. (2011): Spinosad toxicity to *Simulium* spp. larvae and associated aquatic biota in a coffee-growing region of Veracruz State, Mexico. *Journal of Medical Entomology* 48(3): 570-576. (in English) ["Spinosad is a naturally derived insecticide that has shown potential as a mosquito larvicide. To determine the activity of spinosad against blackflies, late-instar larvae from a community comprising *Simulium tritatum* (63.6%) and seven other species, including three known vectors of onchocerciasis in Mexico (*S. metallicum*, *S. ochraceum*, and *S. callidum*), were subjected to concentration-mortality laboratory bioassays following World Health Organization guidelines. Cephalic capsule measurements confirmed the relatively homogeneous distribution of experimental larvae. The 50% lethal concentration of spinosad was estimated at 1.48 ppm spinosad (95% confidence interval: 1.07-2.33) for a 10-min exposure period, whereas

larvae treated with 0.05 ppm of the organophosphate temephos experienced 61% mortality. Immature aquatic insects were identified to genus and tested for their susceptibility to spinosad in the laboratory. After exposure to 12 ppm spinosad for 10 min, ephemeropterans, odonates, trichopterans, and hemipterans did not experience significantly increased mortality over that of untreated controls, whereas a significant increase in mortality was observed in spinosad-treated Plecoptera (P 0.001). Tilapia and trout fry exposed to 12 ppm spinosad for 10 min did not experience increased mortality at 24-h postexposure over that of the controls. We conclude that spinosad is less toxic than temephos to these blackfly species, but is likely to have a low impact on nontarget members of the aquatic community." (Authors)] Address: Williams, T., Instituto de Ecología AC, AP 63, Xalapa, Veracruz 91070, Mexico

**10545.** INULA (2011): Dragonflies in quarries & gravel pits. The life of the quick and beautiful. Biodiversity in mineral extraction sites 1: 98 pp. (in English) [This splendid illustrated book combines general information on dragonflies exemplified on typical habitats of gravel pits. On page 94/95 a list of 48 species from 16 localities studied in 2010 and scattered over Germany (Niedersachsen, Baden-Württemberg, Nordrhein-Westfalen, Mecklenburg-Vorpommern, Bayern) is presented. A German version of the book is also available.] Address: HeidelbergCement AG, Berliner Straße 6, 69120 Heidelberg, Germany. E-mail: michael.rademacher@htc-gmbH.com

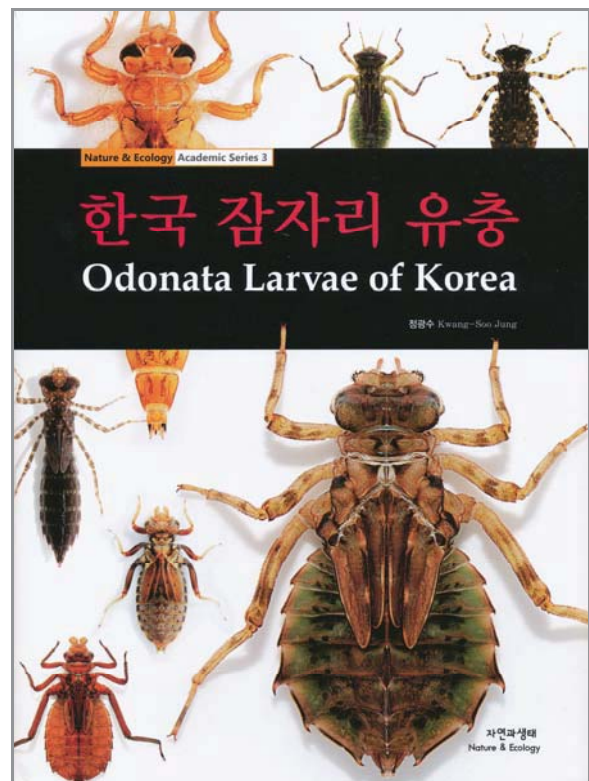


**10546.** Itoh, S. (2011): A new record of *Sympetrum speciosum speciosum* Oguma, 1915 from Miyagi Prefecture, the northern Honshū, Japan. Tombo 53: 99-100. (in Japanese) [14-X-2010] Address: Itoh, S., Kinoshita 4-9-7-102, Wakabayashi-ku, Sendai-shi, Miyagi, 984-0047 Japan

**10547.** Janananda, B.G. (2011): Characterization of changes in Megalagrion opsin genes to detect signatures of selection. Open Access Theses. Paper 259: Master of Science thesis, Department of Biology (Arts and Sciences), University of Miami. 59 pp. (in English) ["Megalagrion damselflies have radiated into new breeding habitats in-

dependently at least six times in the Hawaiian archipelago, and have evolved bright body coloration numerous times. We hypothesize that these radiations are correlated with specific changes in the opsin proteins. We isolated and characterized two opsin genes from nine different Megalagrion species. The opsin phylogeny is consistent with the phylogeny based on breeding habitat preference of Megalagrion species supporting the correlation between the evolutionary changes of vision and habitat shifts. dN/dS ratios of opsin sequences show that these genes are evolving under purifying selection, though some sites of the opsin genes might be evolving under positive selection. Two terrestrial-breeding Megalagrion species show higher rates of opsin gene evolution that are correlated with a rapid transformation in their breeding habitats from aquatic to terrestrial. These results support the hypothesis that opsin gene evolution has played a role in Megalagrion radiation in Hawaii." (Author)] Address: E-mail: bhagya@bio.miami.edu

**10548.** Jung, K.-S. (2011): Odonata Larvae of Korea. Nature & Ecology. Academic Series 3. 400 pp (In Korean). Orders should be directed to: E-mail: econature@econature.co.kr or the author: tootootoo@korea.com



**10549.** Kalkman, V.J.; Villanueva, R.J.T. (2011): A synopsis of the genus *Rhinagrion* with description of two new species from the Philippines (Odonata: Megapodagrionidae). International Journal of Odonatology 14(1): 11-31. (in English) ["A synopsis is given of the knowledge of the genus *Rhinagrion*. The males of two new species are described from the Philippines: *R. schneideri* sp. nov. (holotype: Samar Island, Hinubangan, San Isidro, 31 March–5 April 1992) and *R. reinhardi* sp. nov. (holotype: Mindanao Island, Surigao del Sur, Carmen, 24-IV-1995). *Rhinagrion yokoi* is synonymized with *R. hainanense* and *R. viridatum* is removed from synonymy with *R. mimma*. A key to the males is given and the distribution of all species is discussed and maps are provided. The scant information available on behaviour and habitat is summarized." (Authors)] Address: Kalkman, V.J., European In-



vertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**10550.** Kalnins, M.; Bernard, R.; Mikelson, I. (2011): Protected aquatic insects of Latvia – *Nehalennia speciosa* (CHARPENTIER, 1840) (Odonata: Coenagrionidae). *Latvijas entomologs* 50: 41-54. (in English) ["*N. speciosa* "is protected by the Regulations of the Cabinet of Ministers of Latvia. Published and all known unpublished data have been used to present and analyse its distribution, population size, habitat selection and conservation status. The distribution of *N. speciosa* has been mapped using a basic grid of 5x5 km squares in the Baltic grid system. In total, *N. speciosa* has been recorded from 36 squares and 38 localities occurring sparsely or in small concentrations over a large part of the country apart from its western territories. The majority of the recent localities are situated in northeastern and southeastern Latvia. The known pattern of the species' distribution partly results from the abundance and density of appropriate habitats and possibly a climatic influence. However, this also may be a consequence of an insufficient and uneven odonatalogical exploration of the country. The majority of the species' populations seem to be small. *N. speciosa* has mostly been recorded in primary habitats in Latvia, such as complexes of lakes with *Sphagnum* fens, transition mires and bogs, with a diverse, not only small, size of water body. *N. speciosa* inhabits spatially restricted fragments of these habitats, i.e. a transition-mire zone bordering the open water table or fen and boggy patches with a higher water level, both habitats overgrown with a specific vegetation predominated by narrow-leaved sedges. Post-excavation peaty pools in degraded raised bogs with natural regeneration play a major role among rare secondary habitats of the species. The flight season of the *N. speciosa* in Latvia ranges mainly from mid June to late July. The conservation status of the species in Latvia is described and conservation measures are suggested." (Authors)] Address: Kalnins, M., Nature Conservation Agency, Siguldas novads, Baznīcas iela 7, LV-2150, Sigulda, Latvia. E-mail: martins.kalnins@daba.gov.lv

**10551.** Kawashima, I.; Sasamoto, A.; Phan, Q.T.; Do, M.C. (2011): First discovery and description of female and larva of *Rhinagrion hainanense* Wilson and Reels, 2001 (= *R. yokoi* Sasamoto, 2003) (Zygoptera: Megapodagrionidae) from Vietnam. *Tombo* 53: 93-99. (in English) ["In this paper, we revise *Rhinagrion yokoi* Sasamoto, 2003 as a junior synonym under *R. hainanense* Wilson & Reels, 2001. We describe the female and larval morphology of *R. hainanense* for the first time. The larval characteristics of *R. yokoi* agree with those of the genus *Rhinagrion*, and can be distinguished from the allied species, *R. mima* (Karsch, 1891), by the caudal gills. The male marking variation is also briefly mentioned." (Authors)] Address: Phan Quoc Toan, Vietnam National Museum of Nature, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam. E-mail: phanquoctoan84@gmail.com

**10552.** Khan, F.R.; Irving, J.R.; Bury, N.R.; Hogstrand, C. (2011): Differential tolerance of two *Gammarus pulex* populations transplanted from different metallogenic regions to a polymetal gradient. *Aquatic Toxicology* 102(1-2): 95-103. (in English) ["The River Hayle, Cornwall, UK exhibits pronounced Cu and Zn concentration gradients which were used to compare the metal handling abilities of two populations of *Gammarus pulex* (Crustacea: Amphipoda). One population was native to the Hayle region (Drym) and presumably has been historically impacted

by elevated Cu and Zn levels, whilst naïve gammarids were collected from the River Cray, Kent, UK. Both populations were subject to a 32 day in situ exposure at four R. Hayle sites (Drym, Godolphin, Relubbus and St. Erth). Mortality (LT50), Cu and Zn accumulation and sub-cellular distribution, and oxidative stress (malondialdehyde production) increased with the expected Cu and Zn bioavailabilities at the four sites (i.e. Godolphin > Relubbus > St. Erth > Drym). The naïve population experienced greater metal induced effects in terms of Cu and Zn accumulation, oxidative stress responses and lower LT50s. Analysis of Cu and Zn sub-cellular distribution, however, revealed no significant differences in metal handling. In both populations each metal was localised predominantly to the sub-cellular fraction containing metal bound to metallothionein-like proteins (MTLP) or that holding both metal-rich granules (MRG) and exoskeleton, MTLP and MRG binding being indicative of metal detoxification. However, a greater capacity for detoxified metal storage is not a mechanism implicated in the perceived tolerance of the historically impacted gammarids. Instead our results suggest that the historically impacted population was adapted for lower uptake of Cu and Zn leading to lower bioaccumulation, stress response and ultimately mortality. These results demonstrate not only the usefulness of the in situ methodology, but also that differences in population exposure history can cause significant differences in metal responses during exposure at higher concentrations." (Authors) Larvae of *Cordulegaster boltonii* settled at one of the five studied sections the river. Hydrochemical parameters at the section Relubbus of River Hayle are: heavy metals in dissolved water: Cu:  $10.7 \pm 0.9$  Zn:  $664.5 \pm 43.9$ ; heavy metals in sediment: Cu:  $1279.6 \pm 17.6$  Zn:  $479.2 \pm 68.0$ ; Total hardness:  $96.6 \pm 2.1$ ; pH:  $6.68 \pm 0.03$ ; Conductivity:  $69.6 \pm 0.1$ ] Address: Khan, F.R., Nutritional Sciences Division, King's College London, Franklin-Wilkins Building, 150 Stamford Street, London SE1 9NH, UK.

**10553.** Kiauta, B. (2011): Obituary: Professor Dr Tone Wraber (1938-2010) in memoriam. *Notulae odonatologicae* 7(7): 67-68. (in English) [T. Wraber, a profiled botanist, also was interested in dragonflies, especially in the associations between plants and ovipositing odonates.] Address: Kiauta, B., P.O. Box 124, NL-5854 ZJ Bergen/LB, The Netherlands. E-mail: mb.kiauta@12move.nl

**10554.** Kingston, N. (2011): Checklist of protected & rare species in Ireland. Unpublished National Parks & Wildlife Service Report: 16 pp. (in English) [According to the Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000 the following Odonata species are legally protected in Ireland: *Somatochlora arctica*, *Cordulia aenea*, *Coenagrion lunulatum*, *Ischnura pumilio*, and *Lestes dryas*.] Address: not stated

**10555.** Kiyoshi, T.; Takahashi, J.-I.; Yamanaka, T.; Tanaka, K.; Hamasaki, K.; Tsuchida, K.; Tsubaki, Y. (2011): Taxonomic uncertainty of a highly endangered brook damselfly, *Copera tokyoensis* Asahina, 1948 (Odonata: Platycnemididae), revealed by the mitochondrial gene genealogy. *Conservation Genetics* 12(3): 845-849. (in English) ["In the Japanese main islands, two brook damselfly species are sympatrically distributed. One is highly endangered damselfly, *Copera tokyoensis*, Asahina, 1948, and the other is a congeneric common species, *C. annulata* (Selys, 1863). Mitochondrial gene genealogy reconstructed by the maximum likelihood method showed that they are not reciprocally monophyletic. These two congeneric species might have experienced mitochondrial introgress-

sions possibly through hybridizations. The effect of hybridization against endangered species is generally poorly understood. Taxonomic uncertainty might also explain this situation because extremely dispersed pattern of the haplotype network could not be appeared by once or twice hybridization. Three closely located populations of *C. tokyoensis* in the Kanto district showed significant population differentiation. It might suggest the low dispersal tendency of this endangered species." (Authors)] Address: Yamanaka, T., National Institute for Agro-Environmental Sciences, 3-1-3 Kannondai, Tsukuba, 305-8604, Japan. E-mail: apple@affrc.go.jp

**10556.** Knijf, G. de; Flenker, U.; Vanappelghem, C.; Mancini, C.O.; Kalkman, V.J.; Demolder, H. (2011): The status of two boreo-alpine species, *Somatochlora alpestris* and *S. arctica*, in Romania and their vulnerability to the impact of climate change (Odonata: Corduliidae). *International Journal of Odonatology* 14(2): 111-126. (in English) ["It is expected that climate change will have a great impact on many species and habitats. This will be greater if populations are found at the edge of their range or are isolated, and could lead to regional extinction. Here we investigate the possible impact on two boreo-alpine dragonfly species, *Somatochlora alpestris* and *S. arctica*, at their range margins. Both species were unknown for most parts of south-eastern Europe. In 2007 we found 15 localities for *S. alpestris* and two for *S. arctica* in the Carpathian Mountains of Romania. Both species are there confined to mountain peat bogs. All localities are situated between 1300 m and 2100 m altitude, with the majority restricted to a small range between 1600 m and 1800 m. Based on the factor altitude we predict a hypothetical distribution map for *S. alpestris*. The underlying models exclusively rely on the ultimate factor "altitude" and explain more than 60% of the deviance. In addition, we assessed the impact of climate change for two scenarios: a 1.5°C temperature increase and a 3°C increase. The first resulted in altitudinal range shifts of +200 m and in a distributional shrinkage of 40%, the latter corresponds to an upward range shift of 600 m and a loss of 90% of the area. Habitat specialists, especially those at their margins of distribution, are hardly able to keep pace with climate change. It seems unlikely that mountain peat bogs will develop at rates comparable to those of current climate change. This may effect regional extinctions of boreo-alpine species." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstr. 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**10557.** Knijf, G. De (2011): Trip report of the excursion to the National Park Weerribben (The Netherlands) on 7th of May 2011. *Libellenvereniging Vlaanderen - nieuwsbrief* 5(2): 13-15. (in Dutch, with English summary) ["We first visited a the freely accessible part of the Weerribben, called Woldlakebos. Here we found two males of *Sympecma paedisca*, several individuals, most of them tenerals of *Aeshna isocetes*, *Leucorrhinia pectoralis* and *L. rubicunda*. The most common species here were *Coenagrion pulchellum*, *Brachytron pratense* and *Cordulia aenea*. In the afternoon, we had the chance to go to a strictly protected part of the Weerribben where more than 50 adults of *Coenagrion armatum* could be observed. Other interesting species here were *Sympecma paedisca* and *Leucorrhinia pectoralis*." (Author)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**10558.** Kosterin, O.E.; Skalon, N.V.; Skalon, T.N. (2011): Interesting findings of Odonata in the Kuznetskiy Alatau

Mts. north-eastern foothills. *Amurian zoological journal* III(2): 124-127. (in Russian, with English summary) ["A small collection taken on July 3, 2010 at Lake Ishkol' situated at NE foothills of the Kuznetskiy Alatau Mts., in Sharypovo District of Krasnoyarskiy Krai Province, yielded 8 Odonata species of which 4 were important faunistic findings: the known Siberian ranges of the western species *Coenagrion pulchellum*, *Leucorrhinia albifrons* were extended to the north-east and the earlier presumed Central Siberian range disjunctions were filled for *Coenagrion glaciale* and *Leucorrhinia caudalis*." (Authors) The records also include the following taxa: *Enallagma cyathigerum* risi, *Erythromma najas*, *Leucorrhinia rubicunda*, and *Libellula quadrimaculata*.] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**10559.** Kosterin, O.E. (2011): Odonata of the Cambodian coastal regions revisited: beginning of dry season in 2010. *International Dragonfly Fund - Report* 40: 1-108. (in English) ["Results of the odonatological survey of the coastal SW regions of Cambodia on November 28 - December 11, 2001, are presented, including field notes, enumeration of all records by locality, discussion of interesting specimens and their taxonomy and of seasonality aspects. Fifteen (14 named) species have been added to the known fauna of Cambodia: *Aristocypha fenestrella* (Rambur, 1842), *Rhinagrion viridatum* Fraser, 1938, *Letes elatus* Hagen in Selys, 1862, *L. platystylus* Rambur, 1842, *Aciagrion tillyardi* Laidlaw, 1919, *Agriocnemis f. femina* (Brauer, 1868), *Archibasis viola* Lieftinck, *Ceragrion calamineum* Laidlaw, 1951, *Mortonagrion aborense* (Laidlaw, 1914), *M. falcatum* Lieftinck, 1934, *Pseudagrion microcephalum* (Rambur, 1842), 1948, *Paragomphus capricornis* (Förster, 1914), *Hemicordulia undescr. spec.*, *Macrodiplax cora* (Brauer, 1867), *Nannophya pygmaea* Rambur, 1842, plus a provisionally identified *Ceragrion indochinense* Asahina, 1976. The country list now achieves 106 named species (not counting *Prodasi-neura verticalis sensu* Asahina, 1983, *C. indochinense* and *Hemicordulia* sp.). *Coeliccia megumii* Asahina, 1984 is synonymised with *C. kazukoae* Asahina, 1984. The differences between *Ceragrion olivaceum* Laidlaw, 1914 and *C. calamineum* Lieftinck, 1951 are discussed." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**10560.** Kouamé, M.K.; Dietoa, M.Y.; Edia, E.O.; Da Costa, S.K.; Ouattara, A.; Gourène, G. (2011): Macroinvertebrate communities associated with macrophyte habitats in a tropical man-made lake (Lake Taabo, Côte d'Ivoire). *Knowledge and Management of Aquatic Ecosystems* 400, 03: 18 pp. (in English, with French summary) ["An ecological study was done on Lake Taabo with the main objective of characterising macroinvertebrate communities associated with the microhabitats created mainly by *Eichhornia crassipes* and other littoral native macrophytes. We sampled organisms in patches of those aquatic macrophytes. Also, some abiotic variables (temperature, transparency, turbidity, pH, TDS, conductivity, dissolved oxygen, NH, NO, NO<sub>2</sub>, PO and SiO) were measured. Overall, forty-three taxa of macroinvertebrates were identified. Ten of them were exclusively associated with water hyacinth while five were only associated with littoral macrophytes. Macroinvertebrate taxa with some of the highest family richness were Gastropoda, Coleoptera, He-

teroptera, Odonata and Diptera. The taxon with highest density in both microhabitats was Chironomidae. Although higher values of taxonomic richness (Rs), the Shannon index (H') and evenness (J) were obtained with the water hyacinth habitat, significant differences between the two microhabitats were not observed. Canonical Correspondence Analysis revealed that samples of *E. crassipes* collected in the dry season were characterised by Gastropoda and Odonata, as well as higher values of transparency and ammonia-nitrogen. Baetidae, Hydrophilidae, Chironomidae, Ceratopogonidae, Coenagrionidae, Naucoridae and Ostracoda were most abundant in both *E. crassipes* and littoral macrophyte habitats during the rainy season. This season was characterised by higher levels of nitrates and conductivity." (Author) Taxa are treated at the family level.] Address: Kouamé, M.K., Laboratoire d'Environnement et de Biologie Aquatique (LEBA), UFR – Sciences et Gestion de l'Environnement, Université d'Abobo-Adjamé, Abidjan, Côte d'Ivoire. E-mail: martinkouame@yahoo.fr

**10561.** Křoupalová, V.; Bojková, J.; Schenková, J.; Pařil, P.; Horsák, M. (2011): Small-scale distribution of aquatic macroinvertebrates in two spring fens with different groundwater chemistry. *International Review of Hydrobiology* 96(3): 235-256. (in English) ["We examined responses of macroinvertebrate assemblages to environmental and temporal variations along spring source-spring brook transects in two fen habitats, sharply differing in groundwater chemistry, and compared the patterns among individual taxonomical groups. We hypothesised a different importance of environmental heterogeneity and seasonal changes primarily linked to strong tufa precipitation, which causes stronger environmental filtering in the calcareous fen. In concordance, we observed that assemblages of the more homogenous calcareous fen primarily changed over time, due to seasonal shifts in source availability and favourable conditions. Their spatial distribution was determined by the amount of CPOM, tufa crusts and temperature variation, but a substantial part of the assemblage exhibited spatial uniformity (Plecoptera, Clitellata, and especially Trichoptera and Diptera). The assemblages of the more heterogeneous Sphagnum-fen were primarily driven by water pH and substrate and the season was a notably weaker predictor. We found that different macroinvertebrate groups can display various responses to the measured variables shaping the overall pattern obtained based on the whole community. Further, greater environmental heterogeneity can result in temporally stable species distribution patterns even at very small spatial scales within a single site." (Authors) The study includes data on *Aeshna cyanea*, *Cordulegaster boltonii*, and *Pyrhosoma nymphula*.] Address: Kroupalová, Vendula, Department of Botany and Zoology, Faculty of Science, Masaryk University, Kotlářská 2, CZ-61137 Brno, Czech Republic. E-mail: kroupalova@seznam.cz

**10562.** Kuitunen, K.; Gorb, S.N. (2011): Effects of cuticle structure and crystalline wax coverage on the coloration in young and old males of *Calopteryx splendens* and *Calopteryx virgo*. *Zoology* 114(3): 129-139. (in English) ["Male secondary sexual characters, such as colour patterns, are often investigated at the macroscale level. However, micro- and nanoscale levels of morphological investigations may reveal functional features responsible for a particular coloration, thus providing more information, e.g., about the condition dependence of male sexual characters. The aim of this paper was to investigate cuticle colour and its structure in males of two con-

generic damselfly species, *Calopteryx splendens* and *Calopteryx virgo*, and reveal possible colour changes with age. According to spectrometer measurements, *C. splendens* males were bluer and had a greater saturation of blue in their abdomen than *C. virgo* males, which were, in turn, greener and had more green saturation. Although the two species differed in the number of structural layers and the spacing of the layers, it seems that intactness of the wax crystals covering the epicuticle was most often the morphological trait which was related to the colour parameters measured from males' cuticles. The effect of the crystalline wax coverage on cuticle colour was also confirmed by removing the wax using chloroform: after the treatment, the hue was bluer, the cuticle had a greater brightness and greater blue saturation, but less green saturation. Age differences influencing the colour and structure of the cuticle were also observed: older males had more blue and green saturation and had more intact wax coverage than did younger males. Although multilayer reflection should be responsible for the iridescent colour of males, our results suggest that wax coverage plays an important role in the colour tuning of the male cuticle. This may have a considerable signal function, indicating the males' viability to competing males or to females." (Authors)] Address: Kuitunen, Katja, Centre of Excellence in Evolutionary Research, Department of Biological and Environmental Sciences, University of Jyväskylä, P.O. Box 35, FI-40014 Jyväskylä, Finland. E-mail: katja.m.m.kuitunen@jyu.fi

**10563.** Lacerda, C.H.F.; Hayashi, C.; Galdioli, E.M.; Fernandes, C.E.B. (2011): Predation of *Piaractus mesopotamicus* and *Oreochromis niloticus* larvae by *Pantala flavescens* with different length classes. *Acta Scientiarum. Biological Sciences* 33(4): 377-382. (in English, with Portuguese summary) ["We used 120 larvae of *P. mesopotamicus*, 120 of *O. niloticus*, and also 24 larvae of *P. flavescens*, distributed in 24 aquariums. An aquarium (2 L) containing one larvae of Odonate and 10 larvae of fish were considered an experimental unit. After the beginning, each three hours (18:00, 21:00, ..), the remnant larvae of fish (alive) in each experimental unit was quantified, and we replaced the consumed larvae, so that we always had 10 larvae of fish at each aquarium after each counting. For both fish species, there was a slight increase in consumption by the Odonate with intermediate size, but the values did not differ statistically ( $p > 0.05$ ). Larvae of Odonate in the treatments with greater length presented a lower consumption ( $p < 0.05$ ) than in other treatments." (Authors)] Address: Lacerda, C.H.F., Laboratório de Ecologia e Gerenciamento de Ecossistemas Costeiros e Estuarinos, Depto de Oceanografia, Univde Federal de Pernambuco, Cidade Universitária, 50740-550, Recife, Pernambuco, Brazil. E-mail: lacerdachf@hotmail.com

**10564.** Lagrue, C.; Azémar, F.; Besson, A.; Lamothe, S.; Lecerf, A. (2011): Novel ligature methods for studying sublethal effects of sit-and-wait predators: test using *Cordulegaster boltonii* (Donovan, 1807) larvae (Anisoptera: Cordulegasteridae). *Odonatologica* 40(2): 95-103. (in English) ["A novel method of labial palp ligature was tested as a substitute for palp ablation for studying sublethal effects of larvae of *C. boltonii* on prey populations and their consequences for ecosystem functioning. Two alternative types of ligature were designed to test for neutral or aggressive, but non-lethal, predator-prey interaction effects. Ligature efficiency in preventing prey capture was very high and the effects on larval survival and



emergence success were negligible. Potential advantages and drawbacks, compared to other methods, are discussed. The results indicate that this fully reversible method should be applied whenever possible, especially for naturally rare or endangered odonate species." (Authors)] Address: Lagrue, C. Université de Toulouse, UPS, INP, EcoLab (Laboratoire d'écologie fonctionnelle), 29 rue Jeanne Marvig, 31055 Toulouse, France. E-mail: clement.lagrue@gmail.com

**10565.** Lambret, P.H.; Stoquert, A. (2011): Diel pattern of activity of *Lestes macrostigma* at a breeding site (Odonata: Lestidae). *International Journal of Odonatology* 14(2): 175-191. (in English) ["Monitoring methods always recommend gathering data during the maximal activity of adults. Hence monitoring the threatened *Lestes macrostigma* requires knowledge of its activity pattern. Dragonfly "activity" is ambiguous and its intensity can be assessed in different ways, including by the threshold of response to a predator stimulus, i.e. "awareness". We studied the daily pattern of activity of *L. macrostigma* at the breeding site by monitoring the frequencies of behaviours, especially those of different flights, flight duration and speed, and awareness. We also assessed the abundance together with the probability to detect the species. The pattern of behaviour was characterized by reproduction but also feeding and roosting. Flight activity was more intense in early morning for males, around midday for pairs, and in the evening for males and females. Flight speed was highest around midday. These patterns were related to ambient temperatures and to a trade-off between the needs to mate and to feed. Awareness was almost constant all day long, suggesting new insights on daily activity variations in the Odonata, especially when perching. Slight differences between males and females indicated opposite trends. The pattern of abundance was singularly trimodal. This abundance depends on the true presence at the breeding site and to a probability of detection. The timing of monitoring is therefore not to be related to the activity per se, but to the abundance of adults. We recommend gathering data on *L. macrostigma* during early morning." (Authors)] Address: Lambret, P.H., Marais du Vigueirat, 13104 Mas-Thibert, France. E-mail: philambret@hotmail.com

**10566.** Lamond, B. (2011): Arrow Clubtail in Waterworks Park - Part 2. *The Wood Duck* 64(6): 132. (in English) [*Stylurus spiniceps*; 18-IX-2010, Waterworks Park, Brantford, Ontario, Canada.] Address: Lamond, B. E-mail: bill-lamond@hotmail.com

**10567.** Lamond, B. (2011): Arrow Clubtail in Waterworks Park Brantford - Part 1. *The Wood Duck* 64(5): 109. (in English) [female *Stylurus spiniceps*; 6-IX-2010, Grand River in Brantford, Ontario Canada.] Address: Lamond, B. E-mail: bill-lamond@hotmail.com

**10568.** Lamond, B. (2011): Mottled Darner at Point Pelee National Park. *The Wood Duck* 64(7): 154-155. (in English) [*Aeshna clepsydra*; 9-X-2010, Point Pelee National Park, Ontario, Canada.] Address: Lamond, B. E-mail: bill-lamond@hotmail.com

**10569.** Lamond, B. (2011): Four species of Saddlebags at Point Pelee National Park. *The Wood Duck* 64(9): 206-207. (in English) [8-X-2010, Point Pelee, Ontario, Canada; records of the following species are documented: *Anax junius*, *Libellula pulchella*, *Pachydiplax longipennis*, *Erythemis simplicicollis*, *Sympetrum vicinum*, *S. corruptum*, *Pantala flavescens*, *P. hymenaea*, *Tramea calverti*, *T. lac-*

*erata*, *T. carolinea*, *Tramea onusta*.] Address: Lamond, B. E-mail: bill-lamond@hotmail.com

**10570.** Leggett, R.; Kirchoff, B.K. (2011): Image use in field guides and identification keys: review and recommendations. *AoB PLANTS* 2011 plr004 doi:10.1093/aob-pla/plr004: 37 pp. (in English) ["Background and aims: Although illustrations have played an important role in identification keys and guides since the 18th century, their use has varied widely. Some keys lack all illustrations, while others are heavily illustrated. Even within illustrated guides, the way in which images are used varies considerably. Here, we review image use in paper and electronic guides, and establish a set of best practices for image use in illustrated keys and guides. Scope: Our review covers image use in both paper and electronic guides, though we only briefly cover apps for mobile devices. With this one exception, we cover the full range of guides, from those that consist only of species descriptions with no keys, to lavishly illustrated technical keys. Emphasis is placed on how images are used, not on the operation of the guides and key, which has been reviewed by others. We only deal with operation when it impacts image use. Main points: Few illustrated keys or guides use images in optimal ways. Most include too few images to show taxonomic variation or variation in characters and character states. The use of multiple images allows easier taxon identification and facilitates the understanding of characters. Most images are usually not standardized, making comparison between images difficult. Although some electronic guides allow images to be enlarged, many do not. Conclusions: The best keys and guides use standardized images, displayed at sizes that are easy to see and arranged in a standardized manner so that similar images can be compared across species. Illustrated keys and glossaries should contain multiple images for each character state so that the user can judge variation in the state. Photographic backgrounds should not distract from the subject and, where possible, should be of a standard colour. When used, drawings should be prepared by professional botanical illustrators, and clearly labelled. Electronic keys and guides should allow images to be enlarged so that their details can be seen. [...] Fig. 5 Facing pages from *Damselflies of Chicagoland* (Garrison 2010) showing the use of marginal coloured bands (Table 1: Best Practice 2) to indicate seasonal appearance (left margin of left page), species group (lower right corner of right page) and size (upper right corner of right page). The solid rectangle in the size band indicates the minimum body length. The solid and hashed bands, taken together, indicate the maximum length." (Authors)] Address: Kirchoff, B.K., Dept Biology, Univ. of North Carolina at Greensboro, PO Box 26170, Greensboro, NC 27402, USA. E-mail: kirchoff@uncg.edu

**10571.** Lenkungsgruppe des AK Libellen in Hessen (2011): Aufruf zur Suche nach der Gefleckten und der Schwarzen Heidelibelle (*Sympetrum flaveolum*, *S. danae*). *Libellen in Hessen* 4: 59. (in German) [*Sympetrum danae* and *S. flaveolum* seem to suffer significant depression in regional occurrence. The members of the dragonfly working group in Hessen, Germany are asked to give special emphasis on both species during field studies.] Address: c/o Stübing, S., Am Eichwald 27, 61231 Bad Nauheim. E-mail: stefan.stuebing@gmx.de

**10572.** Letsch, H.O.; Kjer, K.M. (2011): Potential pitfalls of modelling ribosomal RNA data in phylogenetic tree reconstruction: Evidence from case studies in the Metazoa. *BMC Evolutionary Biology* 2011, 11:146: 12 pp. (in Eng-

lish) ["Background: Failure to account for covariation patterns in helical regions of ribosomal RNA (rRNA) genes has the potential to misdirect the estimation of the phylogenetic signal of the data. Furthermore, the extremes of length variation among taxa, combined with regional substitution rate variation can mislead the alignment of rRNA sequences and thus distort subsequent tree reconstructions. However, recent developments in phylogenetic methodology now allow a comprehensive integration of secondary structures in alignment and tree reconstruction analyses based on rRNA sequences, which has been shown to correct some of these problems. Here, we explore the potentials of RNA substitution models and the interactions of specific model setups with the inherent pattern of covariation in rRNA stems and substitution rate variation among loop regions. Results: We found an explicit impact of RNA substitution models on tree reconstruction analyses. The application of specific RNA models in tree reconstructions is hampered by interaction between the appropriate modelling of covarying sites in stem regions, and excessive homoplasy in some loop regions. RNA models often failed to recover reasonable trees when single-stranded regions are excessively homoplastic, because these regions contribute a greater proportion of the data when covarying sites are essentially downweighted. In this context, the RNA6A model outperformed all other models, including the more parametrized RNA7 and RNA16 models. Conclusions: Our results depict a trade-off between increased accuracy in estimation of interdependencies in helical regions with the risk of magnifying positions lacking phylogenetic signal. We can therefore conclude that caution is warranted when applying rRNA covariation models, and suggest that loop regions be independently screened for phylogenetic signal, and eliminated when they are indistinguishable from random noise. In addition to covariation and homoplasy, other factors, like non-stationarity of substitution rates and base compositional heterogeneity, can disrupt the signal of ribosomal RNA data. All these factors dictate sophisticated estimation of evolutionary pattern in rRNA data, just as other molecular data require similarly complicated (but different) corrections." (Authors)] Address: Letsch, H.O., Zoologisches Forschungsmuseum Alexander Koenig, Zentrum für molekulare Biodiversitätsforschung, Adenauerallee 160, 53113 Bonn, Germany. E-mail: h.letsch.zfmk@uni-bonn.de

**10573.** Li, Y.-j.; Nel, A.; Ren, D.; Pang, H. (2011): A new genus and species of hawk dragonfly of uncertain affinities from the Middle Jurassic of China (Odonata: Aeshnoptera). *Zootaxa* 2927: 57-62. (in English) ["The new aeshnopteran genus and species *Sinocymatophlebiella hastinercus* is described from the Middle Jurassic Jiulongshan Formation of Inner Mongolia. It shows important similarities with the Jurassic genus *Cymatophlebiella* from Karatau, suggesting they could belong to the same family, but the latter genus is too poorly known to accurately establish its affinities. The present discovery supports the evolutionary scenario of a Jurassic rapid and massive diversification of the Aeshnoptera, followed by important extinctions during the Late Mesozoic." (Authors)] Address: Ren, D., College of Life Sciences, Capital Normal Univ. Beijing 100037, China. E-mail: rendong@mail.cnu.edu.cn

**10574.** Lin, S.-C.; Huang, C.-C.; Chiu, C.-H.; Yang, P.-S.; Shieh, S.-H. (2011): Relationships between water quality variables and benthic invertebrate assemblages in mountain ponds of northeastern Taiwan. *Taiwan Journal of Biodiversity* 13(1): 37-51. (in Chinese, with English sum-

mary) ["A seasonal survey of water quality and benthic macroinvertebrates was conducted for a mountain lake Chia-Lo and three mountain ponds, Che-Tui, Hao-Mai, and Wei-Tan, in the northeastern Taiwan, 2002 to 2003. A total of 14,719 specimens of benthic macroinvertebrates were collected. They were consisted of 22 taxa, of that seven taxa belonged to Odonata, six taxa to Diptera, three taxa to Tricoptera, two taxa to each of Hemiptera and Coleoptera, and a taxon to each of Oligochaeta and Ephemeroptera. *Notonecta saramao* and *Sympetrum speciosum taiwanum* were found to be the endemic species. Relationships between the water quality and the benthic macroinvertebrate assemblages were assessed with the coinertia analysis. The results showed that turbidity and ammonia were related to water saprobity, and pH and total hardness to water acidification. They were the most important water quality variables that explained the formation and distributional pattern of macroinvertebrate assemblages in the mountain ponds. Oligochaeta was recommended as a bio-indicator for the water saprobity, and *Dicrotendipes* sp. and *Cloeon* sp. for water acidification." (Authors) The following odonate taxa have been sampled: *Ceragrion fallax fallax*, *Lestes cyaneus*, *Aeshna petalura taiyal*, *Anax nigrofasciatus*, *Sympetrum speciosum taiwanum*, *Orthetrum japonicum internum*, and *O. melania*.] Address: Shieh, S.-H., Dept of Ecology, Providence University, Taichung, Taiwan. E-mail: shshieh@pu.edu.tw

**10575.** Lingenfelder, U. (2011): *Coenagrion scitulum* im südwestdeutschen Raum – eine aktuelle Übersicht (Odonata: Coenagrionidae). *Libellula* 30(1/2): 51-64. (in German, with English summary) ["Recently, *C. scitulum* has been expanding strongly in southwestern Germany and adjacent regions, as evidenced by lots of new records in the last five years (2006-2010). This expansion can be regarded as another example of Mediterranean animals expanding northwards, caused by climatic change. Including the summer of 2010, records of *C. scitulum* are known from 34 localities in Rheinland-Pfalz (2006-2010), eight localities in the Saarland (2008-2010), four localities in Hessen (2008, 2010) and five localities in Alsace, northeastern France (2007-2009). In 2010 the species was also rediscovered in Baden-Württemberg. The flight period of *C. scitulum* in southwestern Germany starts in mid-May and ends in early August. Sites with reproduction are predominantly stillflat and warm standing waters with rich aquatic vegetation.] Address: Lingenfelder, U., Seeburgstr. 1, 67716 Heltersberg, Germany. E-mail: u.lingenfelder@vr-web.de

**10576.** Lorenzo-Carballa, M.O.; Beatty, C.D.; Haitlinger, R.; Valdecasas, A.G.; Utzeri, C.; Vieira, V.; Cordero-Rivera, A. (2011): Larval aquatic and terrestrial mites infesting parthenogenetic *Ischnura hastata* (Odonata: Coenagrionidae) from the Azores islands. *Experimental and Applied Acarology* 54(3): 225-241. (in English) ["We report here the prevalence of parasitism by water mites (*Arrenurus* sp.) and terrestrial mites (*Leptus killingtoni*) on parthenogenetic *I. hastata* from the Azores islands. *L. killingtoni* was only found on the island of Pico, and the prevalence of infestation was highly variable among the different ponds studied, ranging from 0 to 41%. *L. killingtoni* was observed on three of the four odonate species from the archipelago: *I. hastata*, *I. pumilio*, and *Sympetrum fonscolombii*, all of them new hosts for this species. Aquatic mites have been found parasitizing *I. hastata* females on the island of São Miguel. The prevalence of mite parasitism by *Arrenurus* sp. on *I. hastata* was very low, ranging from 12% (2003) to 1% (2008), and in most

of the studied ponds, no mites were found attached to females. Although *I. hastata* coexists with a sexual congener species in the Azores (*I. pumilio*), they are syntopic in only a small fraction of ponds. Therefore, a comparison between *I. hastata* and *I. pumilio* was insufficient to test the predictions of the Red Queen Hypothesis, and further research on parasitism rates in both species needs to be done. In any case, the low prevalence of mite parasitism found in the Azores, coupled with the fact that most of the populations in the archipelago are almost free from competitors and predators, could explain the persistence of these *I. hastata* parthenogenetic populations, despite their low levels of genetic variation." (Authors)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Univ. de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**10577.** Lotfy, N.M.; Hassanein, M.A.; Abdel-Gawad, F.K.; El-Taweel, G.E.; Bassem, S.M. (2011): Detection of *Salmonella* spp in aquatic Insects, fish and water by MPN-PCR. *World Journal of Fish and Marine Sciences* 3(1): 58-66. (in English) ["Salmonellosis had become an increasing problem in industrialized countries during the last few decades. The natural habitat of *Salmonella* spp. is the gastrointestinal tract of mammals, birds and reptiles. Therefore, *Salmonella* species may reach aquatic environments through faecal contamination and it has been isolated from freshwater fish culture ponds in many countries. This accounts for the occasional detection of *Salmonella* from fish and fishery products. The present study focused on the use of some aquatic insects and fish as bioindicators for transmission of *Salmonella* in the River Nile, Egypt. Six hundred and seventy *Salmonella* isolates were isolated from aquatic insects, fish and water during the year 2009/2010. Seven hundred and ten random isolates of typical colonies of salmonellae were determined by MPN method and then confirmed by PCR and nested PCR. Five hundred and fourteen isolates were *Salmonella* spp. +ve when tested by PCR from which only 144 isolates were +ve when tested by the nested PCR assay. Results also indicated that PCR and the nested PCR assay are rapid and simple assays for sensitive and specific identification of *Salmonella* spp. in water, fish and aquatic insects. It could be concluded that aquatic insects and fish could act as bioindicators of zoonotic diseases. [...] In the control point in the main stream of River Nile before branches 55 isolates were tested for the presence of *Salmonellae*; 78% were *Salmonellae* spp. +ve from which 25.6% were +ve when tested by Nested PCR." (Authors) This sample point resulted also in records of *Enallagma* (*Azuragrion*) *vansomereni*.] Address: Fagr Abdel-Gawad, Department of Water Pollution, National Research Center, Dokki, Giza, Postal code 12622, Egypt. E-mail: fagrabdlgawad@gmail.com

**10578.** Lozano, F.; Muzón, J.; Palacio, A. del (2011): Description of final stadium larva of *Erythrodiplax connata* and *E. basifusca* and redescription of that of *E. minuscula* (Odonata: Libellulidae). *International Journal of Odonatology* 14(2): 127-135. (in English, with Spanish summary) ["In this contribution the final stadium larvae of *E. connata* and *E. basifusca* are described and that of *E. minuscula* is redescribed. Diagnoses are provided for the larvae of the genus *Erythrodiplax* and for those included in the *connata* group. *E. connata* lacks lateral spines on abdominal segments, a character which has not been observed in any other larvae of the genus. Finally, due to the fact that the larvae of *E. connata* could not be reared successfully until emergence, differences with other sympatric

Patagonic Libellulidae are discussed." (Authors)] Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina. E-mail: muzon@ipla.edu.ar

**10579.** Mahmoud, S.; Abbas, J. (2011): Impacts of habitat destruction on wetland biodiversity. *World Applied Sciences Journal* 12(10): 1897-1902. (in English) ["As more human demand on water resources impacts all part of the world, tirese ecosystems have been always being damaged by human. This study was carried out during Aug-2010 between Suloukli and Shormast wetlands in the north of Iran to assess the degree of water pollution via contrasting biodiversity of wetlands. In this study 31 and 16 species macrofauna and species macrophytes were identified in Suloukli and Shormast wetlands respectively. The Shannon-Wiener index ( $H = 3.737$  Bit. per ind) calculated for Suloukli that was more than value ( $H = 2.773$ ) of Shormast and rarefaction statistical method estimated in these areas that showed the values of expected number of species of the Shormast was lower than Suloukli wetland. It was concluded that Shormast wetland was stressed with physical pollutions of tourism such as infusion of solid garbages and yachting." (Authors) The list of taxa includes *Ischnura elegans*, *Anax imperator*, *Libellula depressa*, and *Sympetrum* sp.] Address: Mahmoud, S., Dept of Environment & Energy, Islamic Azad Univ. Science and Research Branch, Tehran, Iran

**10580.** Makbun, N.; Kulsarin, J.; Buranapanichpan, S.; Hämäläinen, Doi Suthep-Pui M. (2011): Additional records of Odonata from National Park, Chiang Mai province, Thailand. *Notulae odonologicae* 7(7): 61-65. (in English) ["A total of 83 species were recorded ... during June 2009 and December 2010. A list of these is presented together with some comments. Three Zygoptera and five Anisoptera species are recorded from the Park for the first time. These additions increase the total number of the known odonate species from Doi Suthep-Pui and its immediate surroundings to 134 species (61 Zygoptera and 73 Anisoptera)." (Authors)] Address: Makbun, N., Entomology Division, Department of Entomology and Plant Pathology, Faculty of Agriculture, Chiang Mai University, 239 Huay Keaw Rd, Suthep, Muang, Chiang Mai, 50200, Thailand. E-mail: duen@hotmail.com

**10581.** Matushkina, N.A.; Lambret, P. (2011): Ovipositor morphology and egg laying behaviour in the dragonfly *Lestes macrostigma* (Zygoptera: Lestidae). *International Journal of Odonatology* 14(1): 69-82. (in English) ["*L. macrostigma* is a stenotopic dragonfly species of Western Palaearctic distribution that has high conservation status almost throughout its range. It inhabits mainly brackish water with a typical plant species, sea club-rush *Bolboschoenus maritimus*. Due to the absence of special investigations, the nature of this insect-plant association is not clearly understood, but it was supposed that *L. macrostigma* prefers egg laying in *B. maritimus*. In this paper we describe the ovipositor morphology and the egg laying behaviour of *L. macrostigma* in detail. The cutting ovipositor reveals several morphological peculiarities recorded previously in other lestids. The internal surface of the valves reveals rich microsculpture. Numerous single and clustered sensilla of different shape are found on the valves and styli and are probably involved in oviposition-plant recognition by females and/or in production of an egg clutch. Oviposition is carried out in stems of *B. maritimus* and *Juncus maritimus*. An egg clutch consists of a row of single eggs deposited in line along the long axis of a plant. Results are discussed in the light of possible morphological and behavioural adaptation to oviposition



into specific plant substrates." (Authors)] Address: Lambret, P.H., Marais du Vigueirat, 13104 Mas-Thibert, France. E-mail: philambret@hotmail.com

**10582.** McMurray, P.D.; Simon, T.P. (2011): New county distribution records of dragonflies and damselflies (Odonata) in Florida, Kentucky, and Tennessee. *Journal of the Kentucky Academy of Science* 72(1): 59-62. (in English) ["A total of 30 new odonate county distribution records are presented for counties in Florida, Kentucky, and Tennessee. The known odonate fauna of Madison County, Kentucky, is increased from 16 to 27 species and the fauna of Claiborne County, Tennessee, is increased from 18 to 27 species. Libellulidae and Coenagrionidae species accounted for the majority of the new records, 15 and 7, respectively." (Authors)] Address: McMurray, P.D., Indiana State Univ., Biology Dept., 600 Chestnut Street, Science Building Room 281, Terre Haute, Indiana 47809, USA. E-mail: paul.mcmurray79@gmail.com

**10583.** McPeck, M.A.; Symes, L.B.; Zong, D.M.; McPeck, C.L. (2011): Species recognition and patterns of population variation in the reproductive structures of a damselfly genus. *Evolution* 65(2): 419-428. (in English) ["The selection pressures imposed by mate choice for species identity should impose strong stabilizing selection on traits that confer species identity to mates. Thus, we expect that such traits should show nonoverlapping distributions among closely related species, but show little to no variance among populations within a species. We tested these predictions by comparing levels of population differentiation in the sizes and shapes of male cerci (i.e., the clasper structures used for species identity during mating) of six *Enallagma* damselfly species. Cerci shapes were nonoverlapping among *Enallagma* species, and five of six *Enallagma* species showed no population variation across their entire species ranges. In contrast, cerci sizes overlapped among species and varied substantially among populations within species. These results, taken with previous studies, suggest that cerci shape is a primary feature used in species recognition used to discriminate conspecific from heterospecifics during mating." (Authors)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**10584.** Melo, M.C.; Scheibler, E.E. (2011): Description of the immature stages of *Sigara* (*Tropocorixa*) *jensenhaarupi* (Hemiptera: Heteroptera: Corixidae: Corixini), with ecological notes. *Revista Mexicana de Biodiversidad* 82: 117-130. (in English, with Spanish summary) [Argentina; the authors established a high diversity of macroinvertebrates associated with *S. (T.) jensenhaarupi*. Odonata species sampled in northern Mendoza included adults and larvae of: *Ischnura ultima*, *I. fluviatilis*, *I. cf. fluviatilis*, *Andinagrion peterseni*, *Rhionaeschna variegata*, *R. absoluta*, *Progomphus joergenseni*, *Erythrodiplax connata*, *E. corallina*, and *Dasythemis mincki clara*. The collection at Loicas (a temporary pond) revealed larvae of *R. variegata*, *Cyanallagma interruptum*, and *A. peterseni*.] Address: Melo, María, Depto Sistemática, Instituto de Limnología "R.A. Ringuelet" (ILPLA) (CCT La Plata CONICET- UNLP), C.C. 712, 1900 La Plata, Argentina. E-mail: cecimelo@ilpla.edu.ar

**10585.** Meyer Guevara, M. (2011): Insectos acuáticos y calidad del agua en la cuenca y embalse del río Peñas Blancas, Costa Rica. *Rev. Biol. Trop.* 59(2): 635-654. (in Spanish, with English summary) ["Aquatic insects and water quality in Peñas Blancas watershed and reservoir. - The aquatic insects have been used to evaluate water

quality of aquatic environments. The population of aquatic insects and the water quality of the area were characterized according to the natural and human alterations present in the study site. During the monthly-survey, pH, DO, temperature, water level, DBO, PO<sub>4</sub> and NO<sub>3</sub> were measured. Biological indexes (abundance, species richness and the BMWP-CR) were used to evaluate the water quality. No relation between environmental and aquatic insects was detected. Temporal and spatial differences attributed to the flow events (temporal) and the presence of Peñas Blancas reservoir (spatial). In the future, the investigations in Peñas Blancas watershed need to be focused on determining the real influence of the flows, sediment release and the possible water quality degradation because of agriculture activities." (Author) Odonata are treated at the genus level: *Hetaerina*, *Cora*, *Argia*, *Heteragrion*, *Palaemnema*, *Phyllogomphoides*, *Brechmorhoga*, *Perithemis*.] Address: Meyer Guevara, Mora, Unidad de Cuenca del río Peñas Blancas, UEN Proyectos y Servicios Asociados, Instituto Costarricense de Electricidad, San José, Costa Rica, Apdo. 10032-1000; entomomeyer@gmail.com

**10586.** Miriglu, A.; Kartal, V.; Salur, A. (2011): Odonata of the eastern Black Sea region of Turkey, with some taxonomic notes. *Odonatologica* 40(2): 105-122. (in English) ["The work is based on a collection of 2759 specimens, referable to 50 species/subspecies brought together during 2005-2007 from 154 localities. *Sympecma fusca*, *Coenagrion ornatum*, *Erythromma viridulum orientale*, *Anax parthenope*, *Onychogomphus forcipatus albotibialis*, *O. lefebvrei*, *Sympetrum depressiusculum* and *S. meridionale* are new for the region. The *O. lefebvrei* record is the northernmost one within Turkey. Geographic distribution and taxonomic characters of *Calopteryx splendens amasina*, *C. s. waterstoni*, *C. virgo festiva*, *Ischnura elegans ebneri*, *I. e. pontica*, *Onychogomphus lefebvrei* and *Sympetrum haritonovi* are discussed." (Authors)] Address: Miriglu, A., Department of Biology, Faculty of Arts and Sciences, Ondokuz Mayıs University, 55139 Samsun, Turkey. E-mail: alimiroglu@gmail.com

**10587.** Moreno Pallares, M.I. (2011): Distribución espacio-temporal de náyades de odonatos en los humedales La Vaca y Santa María del Lago, Bogotá, Colombia. M.Sc. thesis. Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Sede Bogotá: (in Spanish, with English summary) ["We evaluated the spatial and temporal variation of communities of dragonflies naiads and the association to the habitat rehabilitation status in wetlands la Vaca and Santa María del Lago. There were carried out four samples in each wetland during a year. Using standard techniques for collecting macroinvertebrates, in stations at the entry, exit and water mirrors of the wetlands. We found a gradient in the distribution of the abundance of nymphs observed in both wetlands, where naiads community had the most of number of individuals in the spatial sampling stations that are located at larger distances from the dumping sites. Comparing the composition between wetlands, heterogeneity was found in both wetland communities through assessment of beta diversity. The gradient in the distribution of the abundance of naiads observed in both gradients in both wetlands is more suited to a species response in terms of tolerance to environmental variables. The two wetlands showed aggregate variable decreased to the water outlets in the concentrations of solids, BOD<sub>5</sub>, COD, nitrogen, phenols, SAAM, nutrients in the microbiological factors, which matched the increase of

naiads in points distant from the dumping. The spatial distribution of Odonata in terms of biotic and abiotic parameters showed that the composition of nymphs can provide information on the ecological conditions of the system it inhabits." (Author)] Address: not stated

**10588.** Moya, N.; Domínguez, E.; Goitia, E.; Oberdorff, T. (2011): Desarrollo de un índice multimétrico basado en macroinvertebrados acuáticos para evaluar la integridad biológica en ríos de los valles interandinos de Bolivia. *Ecología Austral* 21: 135-147. (in Spanish, with English summary) ["We developed a multimetric index that could discriminate natural from anthropogenic variability in 91 sites (63 reference sites and 28 disturbed sites) fairly evenly distributed across the upper Grande River Basin (Bolivia). To do so, we examined 12 candidate metrics for their potential to indicate degradation and reflecting different aspects of macroinvertebrate assemblage structure and function. Initially, using the reference sites, we developed statistical models describing the response of the different metrics to the natural environmental variability. In a second step, using sites experiencing three types of anthropogenic disturbances (i.e., agriculture, urban and mining activities), we quantified the deviation in the response of each metric model between reference and disturbed conditions. From the initial 12 metrics, we retained only 5 metrics in the final index (total richness, total abundance, richness of Ephemeroptera, Plecoptera and Trichoptera (EPT), percentage of EPT abundance and percentage of scrapers abundance). These metrics were the most effective ones in responding to anthropogenic disturbances. Our final index performed well in discriminating between reference and disturbed sites, giving a significant negative linear response to a gradient of physical and chemical anthropogenic disturbances. This index can be used as a monitoring tool to evaluate the biological integrity and aquatic biodiversity of the Bolivian inter-Andean valleys streams." (Authors) "Odonata" are treated at the family level: "Coenagrionidae, Aeshnidae, Corydalidae, Arctiidae"] Address: Moya, N., UMR BOREA, IRD 207, Unidad de Limnología y Recursos Acuáticos (ULRA), Universidad Mayor de San Simón, Cochabamba, Bolivia. E-mail: nabor.moya@gmail.com

**10589.** Murakami, T.; Hodoki, Y. (2011): Comparison of population density and species composition of aquatic insect between the upstream and downstream reaches of a flood control dam without impoundment; a case study of the Masuda-gawa Dam in Shimane Prefecture, Japan. *Kaname Osamu* 57: 75-79. (in Japanese, with English summary) ["We compared the population density and species composition of aquatic insect communities up- and downstream of two types of dams to evaluate the effects of rivercrossing construction on benthic invertebrates. One is the Masuda-gawa Dam, a so called "dry dam" or "uncontrolled dam" because its invariably open gates are set at the bottom of the construction to maintain river continuity, and the other is the Sasaura Dam with a reservoir behind the construction: Both are located on the Masuda River System, Shimane Prefecture. Population densities and species compositions upstream the two dams did not show large difference, and were dominated by several insect species belonging to Heptageniidae (Ephemeroptera). In the downstream reaches of both dams, however, the population density of two net-spinning caddis flies (Hydropsychidae, Trichoptera), which are frequently found in high densities in Japanese dammed rivers, was higher than the up-stream reaches; by 50-fold in the case of Sasaura Dam and by 7-fold in the Masuda-

gawa Dam. The difference in the density increment of net-spinning caddis flies between the two dams may indicate that dry dam poses less influence on lotic environment." (Authors) In the case of the taxon "Gomphidae" at Masuda-gawa Dam the ratio between up- and downstream density was 0,4 (96 : 37), and at Sasakura Dam 1,1 (43 : 48).] Address: not transliterated into English

**10590.** Murphy, J.F.; Nagorskaya, L.L.; Smith, J.T. (2011): Aquatic macroinvertebrate communities in lakes exposed to Chernobyl-derived ionising radiation. *Journal of Environmental Radioactivity* 102(7): 688-694. (in English) ["Littoral (lake shore) macroinvertebrate communities were studied in eight natural lakes affected by fallout from the Chernobyl accident. The lakes spanned a range in <sup>137</sup>Cs contamination from 100 -15500 kBq m<sup>2</sup> and estimated external dose rates ranged from 0.13 - 30.7 nGy h<sup>-1</sup>. General linear models were used to assess whether abundance of individuals, taxon richness, Berger-Parker dominance and Shannon-Wiener diversity varied across the lakes. Step-wise multiple regressions were used to relate variation in total abundance, taxon richness, Berger-Parker dominance, Shannon-Wiener diversity, taxon richness within major groups of macroinvertebrates and abundance of the more common individual taxa to the measured environmental characteristics (conductivity, pH, total hardness and phosphate; lake area, lake maximum depth and total external dose) of the lakes. No evidence was found in this study that the ecological status of lake communities has been influenced by radioactive contamination from the Chernobyl accident. Indeed, the most contaminated lake, Glubokoye, contained the highest richness of aquatic invertebrates. Taxon richness in the eight study lakes varied from 22 (Svyatskoe #7) to 42 (Glubokoye) which spans a range typical for uncontaminated lakes in the region. Since <sup>90</sup>Sr is readily-absorbed by Mollusca, estimated dose rates to this group exceeded those for other invertebrate groups in two lakes (Perstok and Glubokoye). However this study found no association between mollusc diversity or abundance of individual snail species and variation between lakes in the external radiation dose. Indeed Glubokoye, the lake most contaminated by <sup>90</sup>Sr, had the highest richness of freshwater snails per sample (an average of 8.9 taxa per sample)." (Authors) The study includes the following Odonata species: *Coenagrion armatum*, *C. hastulatum*, *Aeshna viridis*, *A. cyanea*.] Address: Smith, J.T., School of Earth & Environmental Sciences, University of Portsmouth, Burnaby Bldg, Burnaby Road, Portsmouth PO1 3QL, UK. E-mail: Jim.Smith@port.ac.uk

**10591.** Nagy, H.B.; László, Z.; Köver, S.; Szállassy, N.; Dévai, G. (2011): Population size effects on the behaviour of *Libellula fulva* (Odonata: Libellulidae) males, a five year study. *North-western journal of zoology* 7(1): 39-46. (in English) ["We tested the hypothesis that population density alters male territorial and mating behaviour of dragonflies. We predicted that males at higher densities fight more and mate less. During five years we studied two *Libellula fulva* populations along two small lowland creeks in East Hungary. Using mark-resight method we marked a total number of 1454 dragonfly males. Our results show that on the two study sites there were different population densities. At higher population densities the number of matings per male decreased, but population size had no effect on the frequency of intraspecific fights. However, the long run study showed remarkable difference from the outcome of partial analyzes which underlines the importance of studies overtaken through several years."]

(Authors)] Address: Nagy, H. Beáta, Department of Hydrobiology, University of Debrecen, H-4032 Debrecen, Egyetem tér 1, Hungary. E-mail: nagy.beata@gmail.com

**10592.** Nasadiuk, I. (2011): Structure of larvae communities of some water insects from streams within the city of Uzhgorod. *Sci. Bull. Uzhgorod Univ. (Ser. Biol.)* 30: 113-117. (in Ukrainian, with English summary) [Ukraine; data on the biomass of *Gomphus vulgatissimus* are presented.] Address: Nasadiuk, I., Uzhgorod national university, A. Voloshina St. 32, Uzhgorod 88000, Ukraine, e-mail: Nasadiukilia@mail.ru

**10593.** Nelson, B.; Ronayne, C.; Thompson, R. (2011): Ireland Red List No.6: Damselflies & Dragonflies (Odonata). National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland: 27 pp. (in English) ["Based on almost 32,000 records for Ireland, the 24 species of resident Odonata are evaluated for their conservation status using International Union for the Conservation of Nature (IUCN) criteria (IUCN, 2001, 2003). Four (17%) of the Irish species are assessed as threatened, and one species as near threatened. The populations of all five species need to be thoroughly surveyed and monitoring programmes for each initiated. Causes of the decline in each species need to be determined, existing and possible threats identified, and protective measures introduced. The remaining species are all assessed as least concern. The Irish odonate fauna is a limited one, reflecting the recent geological history of the island; its location off the western edge of the European continent; the climate, and the range of habitats present. Despite this, the fauna is not without interest and in particular when compared to that of Great Britain. The most interesting species of the Irish fauna is *Coenagrion lunulatum* which is mainly a northern Eurasian species that is absent from Great Britain. The Irish population of *Lestes dryas* is also of interest because of its association with the turloughs of the western limestone. Three of the threatened odonates, *Somatochlora arctica*, *Cordulia aenea* and *C. lunulatum*, are found in low nutrient status wetlands and the change brought about by enrichment of these habitats is regarded as the primary threat to these species. The decline of these should act as a warning of the negative trend in the state of these wetlands which are a distinctive feature of many Irish counties. These three are also predominantly northern species and the Irish populations lie at the southern edge of their ranges. In the long term the impact of climate change may be significant. Climate change may actually benefit the remaining threatened species, *Ischnura pumilio*, and the near threatened *L. dryas*, but the immediate threat to these species is habitat loss. Both these damselflies are dependent on specific hydrological conditions which are easily damaged and altered." (Authors)] Address: Thompson, R., 8 Weaver's Court, Banbridge, Co. Down BT32 4RP, Ireland

**10594.** Neseemann, H.; Tachamo Shah, R.D.; Shah, D.N.; Sharma, S. (2011): Morphological characters of *Epiophlebia laidlawi* Tillyard larvae, with notes in the habitat and distribution of the species in Nepal (Anisozygoptera: Epiophlebiidae). *Odonatologica* 40(3): 191-202. (in English) ["Based on 78 specimens recorded from 14 forest streams at the elevations between 1800 and 2850 m a.s.l. in central Nepal, nine larval instars are described and illustrated. *E. laidlawi* is for the first time documented from the Sim and Indrawati watersheds. The habitats are described and clearly indicated that the species is widespread but has a restricted range. The protection of the habitats is essential

for its conservation." (Authors)] Address: Neseemann, H., Centre for Environmental Science, Central University of Bihar, BIT Campus, Patna 800 014, Bihar, India. E-mail: hneseemann2000@yahoo.co.in

**10595.** Nomura, F., do Prado, V.H.M., da Silva, F.R., Borges, R.E., Dias, N.Y.N. and Rossa-Feres, D. d. C. (2011): Are you experienced? Predator type and predator experience trade-offs in relation to tadpole mortality rates. *Journal of Zoology* 284(2): 144-150. (in English) ["Cryptic behavior and unpalatability are common defensive strategies that occur in different taxonomic groups, but the effectiveness of these defensive strategies is context dependent, varying with predator type and co-occurring species. We tested this assumption by measuring the mortality rates of *Eupemphix nattereri* (cryptic behavior) and *Rhinella schneideri* (unpalatable) tadpoles in association with the predatory fish *Oreochromis niloticus* (vertebrate) and the dragonfly larvae of *Aeshna* sp. (invertebrate). We designed a second experiment to evaluate whether fish predators are capable of learning to avoid unpalatable prey once they have encountered it. Our results showed that fish preyed selectively on palatable tadpoles, avoiding unpalatable tadpoles and that the odonate larvae were more efficient in preying on the more active unpalatable tadpoles and less efficient in capturing those tadpoles that presented cryptic behaviors. Additionally, our data suggest that the antipredator traits of tadpoles can interact with each other, with cryptic tadpoles showing lesser mortality when co-occurring with unpalatable tadpoles and odonate predators. Unpalatable tadpoles also increase the mortality of cryptic tadpoles in the presence of experienced fish predators. These prey traits interact in modifying the prey preference of the predator, which constitutes a prey-induced trait-mediated interaction (TMI). This type of TMI is dependent on the system complexity (number of predator and prey species interactions) and could define food web properties, such as the role of predators and the number of competitor species in the system." (Authors)] Address: Nomura, F., Departamento de Ecologia, Universidade Federal de Goiás, Goiânia, GO, Brazil. E-mail: faustonomura@yahoo.com.br

**10596.** Nordström, K.; Bolzon, D.M.; O'Carroll, D.C. (2011): Spatial facilitation by a high-performance dragonfly target-detecting neuron. *Biology Letters* 7(4): 588-592. (in English) ["Many animals visualize and track small moving targets at long distances—be they prey, approaching predators or conspecifics. Insects are an excellent model system for investigating the neural mechanisms that have evolved for this challenging task. Specialized small target motion detector (STMD) neurons in the optic lobes of the insect brain respond strongly even when the target size is below the resolution limit of the eye. Many STMDs also respond robustly to small targets against complex stationary or moving backgrounds. We hypothesized that this requires a complex mechanism to avoid breakthrough responses by background features, and yet to adequately amplify the weak signal of tiny targets. We compared responses of dragonfly STMD neurons to small targets that begin moving within the receptive field with responses to targets that approach the same location along longer trajectories. We find that responses along longer trajectories are strongly facilitated by a mechanism that builds up slowly over several hundred milliseconds. This allows the neurons to give sustained responses to continuous target motion, thus providing a possible explanation for their extraordinary sensitivity." (Authors)] Hemicordulia tau] Address: Nordström, Karin,



Department of Neuroscience, Uppsala University, PO Box 593, 751 24 Uppsala, Sweden. E-mail: karin.nordstrom@neuro.uu.se

**10597.** Nwani, C.D.; Odoh, G.E.; Ude, E.F.; Okogwu, O.I. (2011): Food and feeding habits of *Gnathonemus petersii* (Osteichthyes: Mormyridae) in Anambra River, Nigeria. *Int. Aquat. Res.* 3: 45-51. (in English) [The most dominant food group - expressed as 'index of food significance' - was Insecta (IFS = 48.23) (IFS of anisopteran larvae: 1,77) followed by detritus (IFS = 31.07) while the least was Arachnida (IFS = 0.20).] Address: Nwani, C.D., Department of Applied Biology, Ebonyi State University, P.M.B. 053, Abakaliki, Nigeria. E-mail: didigwunwani@yahoo.com

**10598.** Ohtaka, A.; Narita, T.; Kamiya, T.; Katakura, H.; Araki, Y.; Im, S.; Chhay, R.; Tsukawaki, S. (2011): Composition of aquatic invertebrates associated with macrophytes in Lake Tonle Sap, Cambodia. *Limnology* 12(2): 137-144. (in English) ["Faunal composition of aquatic invertebrate communities associated with submerged parts of several species of macrophytes were studied in different areas in littoral Lake Tonle Sap in Cambodia, with special reference to those in root systems (interrhizon) of a free-floating water hyacinth (*Eichhornia crassipes*). Nine phyla of invertebrates were collected, of which oligochaetes, shrimps and *Limnoperna* mussels were abundant along with meiobenthic crustaceans. The macrophyte-associated invertebrates in Lake Tonle Sap might be unique in having abundant sessile animals, such as sponges, bryozoans and *Limnoperna* mussels. The *Limnoperna* mussels attached to macrophytes were more abundant in offshore and inundated forest than in secluded vegetational stands toward the shoreline. It suggests that water movement can be an important factor determining the distribution and abundance of the sessile animals by controlling larval dispersions and might be associated with the hydrological characteristic of the lake, i.e., the lake opens to the large Mekong River with drastic seasonal changes in water level." (Authors) Taxa - including Odonata - are treated at the order level.] Address: Ohtaka, A., Faculty of Education, Hirotsuki University, Hirotsuki, Aomori 036-8560, Japan. E-mail: ohtaka@cc.hirotsuki-u.ac.jp

**10599.** Oke, O.A. (2011): Inventory of insect species on *Eichhornia crassipes* (Water Hyacinth) on Ogun river, South - Western, Nigeria. *Journal of Emerging Trends in Engineering and Applied Sciences (JETEAS)* 2(3): 379-382. (in English) [Insecta "were surveyed with the objective of determining if any of them could serve as a bio-control agent of water hyacinth. They were collected by means of using insect sweep net, on monthly basis for 18 months. The insect species collected included [...] *Acisoma panorpoides* [...]. Adult insect species performed different kinds of activities on the water hyacinth such as feeding, resting, mating and tunneling into the petiole of water hyacinth. However, all these activities of the insects had no visible damaging effects on the growth and proliferation of water hyacinth on Ogun River, hence they could not be used as bio-control agents for water hyacinth." (Author)] Address: Oke, O.A., Dept of Biological Sciences, Univ. of Agriculture, Abeokuta, Nigeria

**10600.** Olthoff, M.; Menke, N.; Rodenkirchen, J. (2011): *Leucorrhinia caudalis* in der Ville bei Köln: Wiederfund für Nordrhein-Westfalen (Odonata: Libellulidae). *Libellula* 30(1/2): 1-12. (in German, with English summary) ["Between 2008 and 2011, *L. caudalis* was recorded in the 'Ville' lakeland, an agglomeration of more than 40 anthro-

pogenic lakes situated in a brown coal strip mining reclamation area close to Cologne (North Rhine-Westphalia, Germany). The species had been observed in North Rhine-Westphalia for the last time more than 60 years ago. It has been rediscovered at three of the Ville lakes. In addition, the occurrences of endangered species like *Aeshna isoceles*, *Brachytron pratense* and *Libellula fulva*, which have colonized most of the Ville lakes in the meantime, is remarkable." (Authors)] Address: Olthoff, M., Martin Luther-Str. 1a, 48147 Münster, Germany. E-mail: mattias.olthoff@gmx.de

**10601.** Orr, A.G.; Ngiam, R.W.J. (2011): A description of the larva of *Heliaeschna uninervulata* Martin (Odonata: Aeshnidae) from Singapore, with notes on its relationships. *International Journal of Odonatology* 14(2): 163-169. (in English) ["The larva of *H. uninervulata* is described and figured for the first time. Its characters mostly fall within the limits of variation of *Gynacantha* species. Comparison of the larval characters of *H. filostyla*, the only other member of the genus for which the larva is known, suggests that it is not congeneric with *H. uninervulata*." (Authors)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**10602.** Oscoz, J.; Galicia, D.; Miranda, R. (eds.) (2011): Identification Guide of Freshwater Macroinvertebrates of Spain. Springer: 300 pp. (in English) ["Identification keys of the most important taxonomic groups of benthic invertebrates recorded in Spanish watersheds are displayed. Some non-Iberian taxa are included, with the aim to facilitate correct taxonomic classification. Identification keys are accompanied by a series of plates. These plates include photographs of the most important taxonomic groups, with more or less detail, to facilitate group identification." (Authors) Odonata are treated on pages 33-34 and 87-94. Compilers are Francisco Javier Ocharan, David Outomuro and Antonio Torralba-Burrial, Dept of Biology of Organisms and Systems, University of Oviedo, Catedrático Rodrigo Uría s/n, Oviedo, E-33071 Spain.] Address: Oscoz, J., Dept of Zoology and Ecology, School of Sciences, University of Navarra, Irunlarrea 1, Pamplona 31008, Spain. E-mail: joscoz@alumni.unav.es

**10603.** Pan, B.-z.; Wang, Z.-Y.; He, X.-B. (2011): Studies on assemblage characteristics of macrozoobenthos in the West River. *Acta hydrobiologica Sinica* 35(5): 1-6. (in Chinese, with English summary) ["To conserve and manage the West River, field investigations of macrozoobenthos were conducted in November 2009 (at low water level) and May 2010 (at high water level). Altogether 70 taxa of macrozoobenthos belonging to 30 families and 59 genera were identified (including *Lamelligomphus* sp., *Leptogomphus* sp., *Megalogomphus* sp.). ... The average density and biomass of total macrozoobenthos were 140 ind/m<sup>2</sup> and 0.23 g dry weight/m<sup>2</sup>, respectively. Macrozoobenthic density peaked in the cobbles, while biomass reached the maximum in the bedrock. Detrended Correspondence Analysis (DCA) revealed that substrate played an important role in structuring macrozoobenthic assemblages. The higher substrate stability was more favorable to survival of benthic animals. Macrozoobenthic assemblages in soft sediment were characterized by dominance of collector-gatherers (mainly Tubificidae and Chironominae), while macrozoobenthos in stone substrates were dominated by scrapers (e.g. *Semilucospora* spp.) or collector-filterers (e.g. *Limnoperna lacustris*). In recent years, channel regulation projects have

led to reduction of habitat quality and habitat loss, which will have a negative impact on survival of benthic animals." (Authors)] Address: Pan, B.-z., State Key Laboratory of Hydroscience and Engineering, Tsinghua University, Beijing 100084, China

**10604.** Papazian, M.; Viricel, G. (2011): Anomalie morphologique chez *Calopteryx xanthostoma* (Charpentier, 1840) (Odonata Calopterygidae). *L'entomologiste* 67(3): 113-114. (in French) [A male *Calopteryx xanthostoma* with pseudopterostigmata is documented.] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France. E-mail: mpapazian@ecologie.re

**10605.** Parry, G.S.; Burton, S.; Cox, B.; Forman, D.W. (2011): Diet of coastal foraging Eurasian otters (*Lutra lutra* L.) in Pembrokeshire south-west Wales. *European Journal of Wildlife Research* 57(3): 485-494. (in English) ["The importance of the marine environment to Eurasian otters is currently poorly understood. Wales is one of the few countries where coastal activity has been recorded and an increase in marine otter sightings could indicate remarkable developments within Welsh populations. The trophic niche of coastal otter populations around Pembrokeshire was investigated over a 12-month period. Marine activity was more widespread than previously thought and marine prey formed the largest component of otter diet, although, otters also consumed freshwater and terrestrial prey throughout the year. Otter diet was very diverse compared to other European coastal populations and a spring contraction in trophic niche width coincided with the estimated timing of breeding activity. Seasonal variation in prey composition was predominantly due to differences in the consumption of alternate prey types. In areas where wetlands are fragmented and populations of freshwater fish are declining, the marine environment may become an increasingly important habitat for otters. It is necessary to define the historical importance of coastal populations to otter conservation. Coastal areas are often subject to pressure from human activities, so the impact of disturbance needs to be assessed. Importantly, there is no verified otter survey method for coastal areas, so the use of marine habitat is likely to be underestimated." (Authors) Odonata contributed with 0,2% of relative frequency of occurrence to the otter diet on the Pembrokeshire coast between July 2007–June 2008.] Address: Forman, D.W., Dept of Pure and Applied Ecology, Conservation Ecology Research Team, School of the Environment and Society, Swansea Univ., Singleton Park, Swansea SA2 8PP. UK. E-mail: d.w.forman@swansea.ac.uk

**10606.** Paulson, D.R.; Dunkle, S.W. (2011): A Checklist of North American Odonata. Including English Name, Etymology, Type Locality, and Distribution. Originally published as Occasional Paper No. 56, Slater Museum of Natural History, University of Puget Sound, June 1999; completely revised March 2009; updated February 2011: 86 pp. (in English) ["The checklist includes all 461 species of North American Odonata considered valid at this time. For each species the original citation, English name, type locality, etymology of both scientific and English names, and approximate distribution are given. Literature citations for original descriptions of all species are given in the appended list of references." (Authors)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**10607.** Payne, J.L.; McClain, C.R.; Boyer, A.G.; Brown, J.H.; Finnegan, S.; Kowalewski, M.; Krause, R.A.; Lyons,

S.K.; McShea, D.W.; Novack-Gottshall, P.M.; Smith, F.A.; Spaeth, P.; Stempien, J.A.; Wang, S.C. (2011): The evolutionary consequences of oxygenic photosynthesis: a body size perspective. *Photosynth. Res.* 107: 37-57. (in English) ["The high concentration of molecular oxygen in Earth's atmosphere is arguably the most conspicuous and geologically important signature of life. Earth's early atmosphere lacked oxygen; accumulation began after the evolution of oxygenic photosynthesis in cyanobacteria around 3.0–2.5 billion years ago (Gya). Concentrations of oxygen have since varied, first reaching near-modern values \*600 million years ago (Mya). These fluctuations have been hypothesized to constrain many biological patterns, among them the evolution of body size. Here, we review the state of knowledge relating oxygen availability to body size. Laboratory studies increasingly illuminate the mechanisms by which organisms can adapt physiologically to the variation in oxygen availability, but the extent to which these findings can be extrapolated to evolutionary timescales remains poorly understood. Experiments confirm that animal size is limited by experimental hypoxia, but show that plant vegetative growth is enhanced due to reduced photorespiration at lower O<sub>2</sub>:CO<sub>2</sub>. Field studies of size distributions across extant higher taxa and individual species in the modern provide qualitative support for a correlation between animal and protist size and oxygen availability, but few allow prediction of maximum or mean size from oxygen concentrations in unstudied regions. There is qualitative support for a link between oxygen availability and body size from the fossil record of protists and animals, but there have been few quantitative analyses confirming or refuting this impression. As oxygen transport limits the thickness or volume-to-surface area ratio — rather than mass or volume — predictions of maximum possible size cannot be constructed simply from metabolic rate and oxygen availability. Thus, it remains difficult to confirm that the largest representatives of fossil or living taxa are limited by oxygen transport rather than other factors. Despite the challenges of integrating findings from experiments on model organisms, comparative observations across living species, and fossil specimens spanning millions to billions of years, numerous tractable avenues of research could greatly improve quantitative constraints on the role of oxygen in the macroevolutionary history of organismal size. [...] Despite widespread awareness of Late Paleozoic gigantism, there have been few attempts to determine whether organisms the size of Carboniferous giants would be prohibited at present-day oxygen levels or whether the magnitude of temporal variation in maximum size within the relevant taxa has been of the magnitude predicted by modeled changes in pO<sub>2</sub>. Okajima (2008) (*Lethaia* 41(4): 423-430) was the first to examine the link between insect size and oxygen concentration quantitatively through the Phanerozoic, using newly compiled data on the sizes of fossil dragonflies. She found that the variation in maximum size of dragonflies through time has been much greater than predicted by variation in atmospheric oxygen concentrations, assuming respiration via diffusion through tracheae, and assuming that the sizes of Carboniferous dragonflies represent an oxygen-limited maximum size. If oxygen limited maximum body size in the Carboniferous, it has not consistently done so during other periods. Alternatively, if oxygen is limiting in the modern, then anatomical or physiological differences must exist between the Protodonata and Odonata to explain the inability of the Odonata to achieve similarly large sizes. The latter interpretation is suggested by the fact that all of the largest Paleozoic specimens belong to the Protodonata;

Paleozoic members of the Odonata exhibit sizes comparable to the largest in the Mesozoic and Cenozoic. Alternatively, the simplifying assumption of oxygen diffusion through tracheae may be inaccurate; there is emerging evidence for active tracheal breathing in insects (Socha et al. 2008; Westneat et al. 2003). Okajima (2008) proposed still another alternative: although variation in oxygen may have contributed to size evolution, maximum size of Mesozoic and Cenozoic dragonflies was limited by ecological competition with flying vertebrates. A further possibility, not examined by Okajima (2008), is that the trend in maximum size of fossils is poorly correlated with the true evolutionary pattern. Temporal variation in the quality of the insect fossil record (Labandiera 2005; Smith and Cook 2001) makes it difficult to determine the extent to which variation in maximum size in the fossil record reflects biological reality versus variation in the quality of available material. For example, the Carboniferous contains an unusually extensive record of the coastal marsh environments that may be most likely to house large insects." (Authors)] Address: Payne, J.L., Dept of Geological and Environmental Sciences, Stanford Univ., 450 Serra Mall, Bldg. 320, Stanford, CA 94305, USA. E-mail: jlpayne@stanford.edu

**10608.** Perez-Gelabert, D.E.; Bastardo, R.H.; Medrano, S. (2011): Entomofauna del Parque Nacional Loma Nalga de Maco y Alrededores, provincia Elías Pina, República Dominicana. *Novitates Caribaea* 4: 80-90. (in Spanish, with English summary) ["Data derived mainly from the published zoological literature are compiled on the diversity of insects known from Parque Nacional Loma Nalga de Maco and surroundings located in northwestern Dominican Republic. A total of 133 species belonging to 9 insect orders were found. We recommend a basic inventory specifically dedicated to the insects of this protected area." (Authors) The following Odonata species are listed from Rio Limpio: *Enallagma coecum*, *Ischnura ramburii*, *Phyllolestes ethelae*, *Dythemis rufinervis*, *Erythemis vesiculosa*, *Macrothemis celeno*, *Orthemis ferruginea*, and from Loma de Las Tayotas: *Scapania frontalis*. The complete data set results from Flint, O. S., Jr., R. H. Bastardo y D. E. Perez-Gelabert. 2006. Distribution of the Odonata of the Dominican Republic. *Bulletin of American Odonatology*, 9: 67-84.] Address: Perez-Gelabert, D.E., Department of Entomology, U. S. National Museum of Natural History, Smithsonian Institution, P. O. Box 37012, Washington, DC 20013-7012, USA. E-mail: perezd@si.edu

**10609.** Perez-Gutierrez, L.A.; Palacino-Rodriguez, F. (2011): Updated checklist of the Odonata known from Colombia. *Odonatologica* 40(3): 203-225. (in English) ["The checklist includes 335 species, of which 98 species are added to the latest figure published, while 21 previously listed species are removed from the list since they were based on unverifiable records. The number of species hitherto known from Colombia is low if compared to that from some other S American countries, such as Brazil (660 species), Venezuela (487) and Peru (368). A summary of the exploration of Odonata diversity in Colombia is provided." (Authors)] Address: Perez-Gutierrez, L.A., Depto de Biología, Facultad de Ciencias Básicas, Universidad del Atlántico, km 7 antigua vía Puerto Colombia, Barranquilla, Colombia; E-mail: talysker@gmail.com

**10610.** Perez-Gutierrez, L.A.; Montes-Fontalvo, J.M. (2011): Rediscovery of *Mesagrion leucorrhinum* (Zygoptera: Megapodagrionidae): a "formal" description of female and ultimate stadium of larva with notes on habits. *International Journal of Odonatology* 14(1): 91-100. (in Eng-

lish) ["Adult female and ultimate stadium larva of *Mesagrion leucorrhinum* are formally described and illustrated based on material from three locations in Antioquia, Meta and Cundinamarca Departments, Colombia. The species is sexually dimorphic. The female is distinguishable from other related genera by a pair of notches in the prothoracic anterior lobe and shares with *Heteropodagrion* and *Dimeragrion* females a yellowish, scarcely sclerotized region dorsally between the posterior margin of S7 and anterior border of S8. The larva is very similar to *Heteropodagrion*. Differences for separating them are: the pro-, meso- and metathoracic supracoxal processes are less prominent in *Mesagrion*, and the length of the terminal filament of the middle gill is notably longer in *Mesagrion*. The specimens were also compared with other related genera. Observations on habits are added." (Authors)] Address: Perez-Gutierrez, L.A., Grupo de investigación en Biodiversidad del Caribe colombiano, Depto de Biología, Univ. del Atlántico, km 7 antigua vía Puerto Colombia, Barranquilla, Colombia. E-mail: talysker@gmail.com

**10611.** Petrulevicius, J.F.; Huang, D.; Nel, A. (2011): A new genus and species of damselfly-dragonfly (Odonata: Isophlebioidea: Campterothlebiidae) in the Middle Jurassic of Inner Mongolia, China. *Acta Geologica Sinica* 85(4): 733-738. (in English) ["The campterothlebiid new genus and species *Ctenogampsophlebia reni* is described from the Middle Jurassic of Inner Mongolia, China. It shows close similarities with the Lower to Middle Jurassic genera *Gampsophlebia*, and *Petrophlebia*, with closed and short subdiscoidal cells, confirming the attribution of these two other genera to the Campterothlebiidae." (Authors)] Address: Huang, D.-y., Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China. E-mail: huangdiyong@sina.com

**10612.** Phan, Q.T.; Hämäläinen, M. (2011): *Matrona taoi* spec. nov., a new damselfly species from northern Vietnam (Odonata: Calopterygidae). *Zootaxa* 2927: 63-68. (in English) ["*Matrona taoi* Phan & Hämäläinen, spec. nov. (holotype male, from Vietnam, Phu Tho province, Xuan Son National Park, Xom Coi, alt. 442 m, 15 xi 2010, deposited in Vietnam National Museum of Nature, Hanoi) is described from both sexes, illustrated and compared with other species in the genus." (Authors) Erratum: "The figure legend on p. 65 should read: FIGURES 3-4. *Matrona taoi* sp. nov. 3) habitus of paratype male (right hind wing incomplete at base); 4) habitus of paratype female."] Address: Phan, Q.T., Dept of Biology, Vietnam National Museum of Nature, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam. E-mail: phanquoctoan84@gmail.com

**10613.** Qian, C.; Wang, Z.-m.; Zhao, D.-f. (2011): New record of Odonata in the Northeast area and Jilin Province in China. *Journal of Jilin Agricultural University* 2/2011: 1-4. (in Chinese, with English summary) [New records in Northeast area are *Sympetrum ruptum*, *Libellula basilinea* McLachlan, 1894 (= *L. quadrimaculata*), *Somatochlora dido* and *Ischnura elegans*. In addition to these species, *S. croceolum* and *S. imitans* are new for the Jilin province.] Address: Qian, C., College of Agronomy, Jilin Agriculture Univ., Changchun 130118, China

**10614.** Rajabi, H.; Moghadami, M.; Darvizeh, A. (2011): Investigation of microstructure, natural frequencies and vibration modes of dragonfly wing. *Journal of Bionic Engineering* 8(2): 165-173. (in English) ["Investigation on the microstructural and morphological aspects of dragonfly wings was carried out using scanning electron micro-



scope. Then, based on this study and the previous reports, a precise three-dimensional numerical model was developed and natural frequencies and vibration modes of dragonfly forewing were determined by finite element method. The results shown that dragonfly wings are made of a series of adaptive materials, which form a very complex composite structure. This bio-composite fabrication has some unique features and potential benefits. Furthermore, the numerical results show that the first natural frequency of dragonfly wings is about 168 Hz and bending is the predominant deformation mode in this stage. The accuracy of the present analysis is verified by comparison of calculated results with experimental data. This paper may be helpful for micro aerial vehicle design concerning dynamic response." (Authors)] Address: Rajabi, H., Faculty of Engineering, Islamic Azad Univ., Lahijan Branch, Lahijan, Iran. E-mail: harajabi@hotmail.com

**10615.** Rak, A.-E.; Said, I.; Mohamed, M.; Abas, A. (2011): Effect of logging activities on water quality and benthic macroinvertebrate assemblages of Madek River Basin, Kluang, Johor, Malaysia. *Journal of Applied Sciences and Environmental Management* 15(2): 337-340. (in English) ["The study was conducted to determine the effect of logging activities on water quality and benthic macroinvertebrate assemblages for the Madek River basin. The study area was situated in Kluang, Johor, Malaysia. Two sampling stations 500 meters apart are upstream and the other, downstream located at Madek River which flows through a logging area in Kluang Forest Reserve were identified. The sampling was conducted four (4) times from November 2008 to August 2009. ... There were only two sensitive taxa namely Ephemeroptera and Trichoptera found in this station. ..." (Authors)] The benthic macro-invertebrate composition for Madek River "includes" the Nearctic genera *Arigomphus* and *Dromogomphus*.] Address: Rak, Aweng-Eh, Faculty of Agro Industry and Natural Resources, Universiti Malaysia Kelantan (UMK), Malaysia. E-mail: aweng@umk.edu.my

**10616.** Reels, G.T. (2011): Emergence patterns and adult flight season of Anisoptera at a managed wetland site in Hong Kong, southern China. *International Journal of Odonatology* 14(1): 33-48. (in English) ["Anisoptera emergence in the seasonal tropics was monitored at a 35-ha managed wetland site in Hong Kong from February 2004 to November 2007. Exuviae records of 18 species from multiple emergence screens, exuviae traps and transect surveys were combined. The presence of adults during this period was also monitored. The study site comprised a mosaic of ponds separated by narrow bunds. Exuviae of larvae living amongst dense submerged vegetation, and adults of crepuscular species, were probably under-recorded. Anisoptera emergence was strongly seasonal in all four years, commencing in March, with EM50 – the point at which 50% of the annual population has emerged, expressed as number of days since the start of emergence – falling between April and June, for most species; but emergence also showed considerable inter-year variation, particularly after EM50. Emergence of three species continued into December in at least one year. Extended emergence periods were generally ascribed to multivoltinism associated with unregulated life cycles, presumably facultative in the case of tropical-temperate species. The migrant *Pantala flavescens* showed no clear seasonality in emergence patterns. Composite species emergence periods over the four years ranged from two to 11 months, with no clear difference between tropical and tropical-temperate species. No species were

univoltine. Adult flying seasons usually commenced in March or April, and in eight species continued until at least November, although it is unlikely that any adults survived to the following spring. Five species were on the wing for six months or less. There was considerable phenological variation among species, with life histories commonly intermediate between those of equatorial and higher latitude species." (Author)] Address: Reels, G., H-3-30 Fairview Park, Yuen Long, Hong Kong. E-mail: gtreels@gmail.com

**10617.** Reeves, M.K.; Perdue, M.; Blakemore, G.D.; Rinnella, D.J.; Holyoak, M. (2011): Twice as easy to catch? A toxicant and a predator cue cause additive reductions in larval amphibian activity. *Ecosphere* 2(6) art 72: 20 pp. (in English) ["Toxicants may harm predators or prey differentially, hindering clear determination of multiple stressor effects on predation dynamics in polluted aquatic systems. We built on a prior field study in which we demonstrated that a chemical contaminant, copper (Cu) and odonate predators were correlated with more frequent observations of skeletal abnormalities in Alaskan wood frog (*Rana sylvatica*) tadpoles. Our prior study established a multiple stressor effect linked to an important environmental phenomenon (malformed amphibians) but did not provide clear mechanisms that might guide management. We here investigated behavioral mechanisms because of their potential to produce large changes in predation dynamics, and because in published studies low concentrations of Cu produced behavioral changes in predator-detection in fish. Surprisingly, low but environmentally relevant concentrations of Cu (5 µg/L) combined with chemical cues from a predator (*Aeshna sitchensis*) to produce large changes in the behavior of larval amphibians. Experiments demonstrated that a low concentration of Cu did not inhibit the ability of wood frog tadpoles to detect chemical cues of predators by olfactory means, but produced strong behavioral effects, causing tadpoles to reduce activity and alter microhabitat use. These results occurred with Cu at an exposure level lower than any we could find reported as toxic to amphibians in the literature. When Cu and predator cues were administered together, the activity reduction was additive and stronger at earlier life stages. We suggest that Cu intoxication would be disadvantageous to larval amphibian prey with prolonged exposure to predators during development, and we present field data from 2010 that support this assertion. Our study demonstrates the need to use sensitive behavioral assays and to investigate multiple stressor mechanisms to understand how multiple threats combine to affect organisms in nature." (Authors)] Address: Reeves, Mari K., United States Fish and Wildlife Service, Anchorage Fisheries and Ecological Services Office, 605 West 4th Avenue, Room G-61, Anchorage, Alaska 99501 USA. E-mail: marireeves@fws.gov

**10618.** Riedel, I.R.; Marinoni, R.C.; Martins-Opohs, N. (2011): Spatio-temporal trends of insect communities in southern Brazil. *Journal of Entomology*, 2008: 1897-1902. (in English) ["In this study, insect seasonality using Malaise traps at eight stations was investigated from abundance collections taken between August 1986 and July 1988 in four climatic regions and one transitional region of Paraná State, Southern Brazil. Temperature and humidity were also measured to represent environmental conditions at the eight stations One station was located in the coastal region, one in the coastal mountain range, one in the first and third plateaus and three stations were located in the second plateau. All insects were counted

aiKl identified to order. Randomization-based techniques were used to assess insect abundance variation by season for the nine most abundant taxa. An Analysis of Similarity (ANOSIM) using stations and seasons as factors and a non-metric multidimensional scaling (NMDS) to assess the 2-D projection of station along axes of abundance were used to assess insect community dissimilarities. A Mantels test assessed correlations between the abundance similarity matrix and the matrix for the environmental factors. Of the most common orders, the most abundant was Diptera, followed by Hymenoptera, Lepidoptera, Collembola, Homoptera, Coleoptera, Psocoptera, Orthoptera and Hemiptera. Insect orders were generally most abundant during the spring and summer, but least abundant during the winter. Following ANOSIM analysis, station location and season best explained variations in abundance. The NMDS analysis found that the coastal station differed most from all the other stations. Humidity was positively correlated with insect abundance." (Authors) Taxa including Odonata are treated at the order level.] Address: Riedel, I.R., Gulf Coast Research Laboratory, University of Southern Mississippi, 703 E. Beach Dr. Ocean Springs, MS 39564, USA

**10619.** Robson, B.J.; Chester, E.T.; Austin, M. (2011): Why life history information matters: drought refuges and macroinvertebrate persistence in non-perennial streams subject to a drier climate. *Marine and Freshwater Research* 62(7): 801-810. (in English) ["In some arid, semi-arid or Mediterranean climate regions, increased water extraction combined with climate change will prolong periods of drought in non-perennial streams, but the effects on macroinvertebrate populations are poorly understood. Drought refuges allow species to survive drying but their use depends on species' traits, and refuge availability depends on landscape structure. This review evaluates the utility of existing ecological concepts for predicting the role of drought refuges for sustaining biodiversity in non-perennial streams. We also suggest traits that may determine invertebrate species' resistance or resilience to prolonged drying. Parts of the likely responses by populations to increased stream drying are described by existing ecological concepts, such as the biological traits of species and their interaction with the habitat template, barriers to dispersal and metapopulation dynamics, the use of drought refuges, habitat fragmentation and population and landscape genetics. However, the limited knowledge of invertebrate life histories in non-perennial streams restricts our ability to use these concepts in a predictive manner. In particular, reach or pool occupancy by species cannot be accurately predicted, but such predictions are necessary for evaluating potential management actions such as the use of environmental flows to sustain drought refuges during dry periods." (Authors) The paper includes several references to Odonata.] Address: Robson, Belinda, School of Environmental Sciences, Murdoch University, 90 South Street, Murdoch, WA 6150, Australia. E-mail: b.robson@murdoch.edu.au

**10620.** Rondineli, G.; Gomiero, L.M.; Carmassi, A.L.; Braga, F.M.S. (2011): Diet of fishes in Passa Cinco stream, Corumbatai River sub-basin, São Paulo state, Brazil. *Braz. J. Biol.* 71(1): 157-167. (in English, with Portuguese summary) [576 stomachs of 28 fish species were analysed for diet. They contained "immature" Odonata as well as "immature" additional specimens from different insect orders. Possibly "immature" should be read as "larvae" (pers. comm.).] Address: Rondineli, Giulianna, Departamento de Produção Vegetal, Centro de Ciências Agrár-

ias, Univde Federal do Espírito Santo – UFES, Alto Universitário, s/n, Guararema, CP 16, CEP 29500-000, Alegre, ES, Brazil. E-mail: giulianna.rondineli@gmail.com

**10621.** Rosa, B.F.J.V.; da Silva, M.V.D.; de Oliveira, V.C.; Martins, R.T.; da G. Alves, R. (2011): Macroinvertebrates associated with bryophyta in a first-order Atlantic forest stream. *Zoologia* 28(3): 351-356. (in English) ["During three months of the dry season of 2007 and three months of the rainy season of 2008, samples of bryophytes attached to stones were collected randomly, along a 100 m stream reach. ... Chironomidae larvae were dominant in the two periods of study, followed by Ceratopogonidae in the rainy season, and Naididae in the dry season. The orders EPT contributed 14 families. ... This habitat provides refuge during spates, and thus minimizes downstream transport of the macroinvertebrate fauna." (Authors) Few specimens of "Calopterygidae and Coenagrionidae" were found during the rainy season; Odonata are classified as "adominant".] Address: Rosa, Beatriz, Laboratório de Invertebrados Bentônicos, Programa de Pós-graduação em Ciências Biológicas, Comportamento e Biologia Animal, Departamento de Zoologia, Instituto de Ciências Biológicas, Universidade Federal de Juiz de Fora. 36036-330 Juiz de Fora, Minas Gerais, Brazil. E-mail: beatrizjabour@yahoo.com.br

**10622.** Rosset, V.; Oertli, B. (2011): Freshwater biodiversity under climate warming pressure: Identifying the winners and losers in temperate standing waterbodies. *Biological Conservation* 144(9): 2311-2319. (in English) ["Climate warming is affecting the biodiversity all around the world, resulting in the expansion or contraction of the geographical range of species, and leading to colonisation (winners) and extinction (losers) events in ecosystems. It is crucial for the conservation of biodiversity to identify these potential winners and losers. We focus here on small standing waterbodies in Switzerland and on five taxonomic groups: vascular plants, snails, beetles, dragonflies and amphibians. We first assessed the sensitivity of each species to climate warming through their thermal preferences, using current altitudinal and latitudinal distribution, as a surrogate for temperature. We then evaluated the resilience of species to perturbations through five ecological and biogeographical criteria applicable to the perturbation "warming": dispersal ability, degree of habitat specialisation, geographical extent in the study area, future trend in geographical extent, and future trend of habitat availability for species. Potential winners and losers of a warming climate could be quantified through their thermal preferences. The proportion of potential losers ranged from zero species for snails to 33% of the regional species pool for dragonflies. The set of potential winners was much larger, ranging from 53% for amphibians to 61% for dragonflies. A multimetric index combining the five resilience criteria enabled the further prioritisation of the species along a gradient of extinction risk. This potential threat from climate warming is not reflected by the current Red Lists of dragonflies and amphibians, suggesting that conservation management could gain from a complementary label indicating the degree of sensitivity to warming. Highlights: › Climate warming will lead to colonisation (winners) and extinction (losers) events. › We quantified the potential winners and losers in Swiss small standing waterbodies. › The proportion of losers was smaller than the proportion of winners. › A resilience index further prioritizes the species along an extinction risk gradient. › The potential threat from climate warming is not reflected by the current Red Lists." (Au-

thors)] Address: Rosset, Véronique, University of Applied Sciences Western Switzerland, Hepia, Geneva Technology, Architecture and Landscape, 1254 Jussy-Geneva, Switzerland. E-mail: veronique@rosset.org

**10623.** Ruzzante, D.E.; Walde, S.J.; Macchi, P.J.; Alonso, M.; Barriga, J.P. (2011): Phylogeography and phenotypic diversification in the Patagonian fish *Percichthys trucha*: the roles of Quaternary glacial cycles and natural selection. *Biological Journal of the Linnean Society* 103: 514-529. (in English) ["Current patterns of genetic and morphological diversity are the product of historical climatic and geomorphological events, and of contemporary selection processes acting upon this diversity. Here we examine the phylogeographic and phenotypic patterns of diversity within *Percichthys trucha*, a widely distributed Patagonian fish species complex that inhabits Andean and steppe freshwater environments. Molecular analysis (mtDNA control region) of 21 populations distributed throughout its latitudinal range revealed little evidence of phylogeographic structure and no evidence of species-level genetic divergence east of the Andes. The complex, however, exhibits high levels of intra- and interpopulation phenotypic variation. Patterns of among-population divergence in morphology were most easily explained by differences in predation pressure among populations; dorsal fin spines (commonly a defensive characteristic) were longer in environments with greater densities of potentially piscivorous fish. Trophic characters were highly variable within populations, suggesting an important role for resources in generating within-population morphological variation. The very shallow levels of divergence shown by the molecular data most likely reflect the historical mixing of populations as a result of the climatic and landscape changes that affected Patagonia throughout the Quaternary. The phenotypic divergences, in contrast, are probably the result of differing contemporary selection regimes acting on currently disjoint populations. [...] The two diet items with the highest loading on PC1 are Odonata and Chironomid larvae and pupae [...] Some of the variation in diet could be associated with variation in morphology: for instance, populations that relied heavily on Odonata tended to have relatively short gill rakers and jaws compared with those that did not feed on Odonata. We do not know the nature of any links between diet and trophic morphology for *Percichthys*: adult morphology is almost certainly influenced by the diet of early developmental stages, and diet can also be affected by predation regime." (Authors)] Address: Ruzzante, D., Dept of Biology, Dalhousie University, Halifax, Nova Scotia, B3H 4J1, Canada. E-mail: dan-iel.ruzzante@dal.ca

**10624.** Rychła, A.; Benndorf, J.; Buczyński, P. (2011): Impact of pH and conductivity on species richness and community structure of dragonflies (Odonata) in small mining lakes. *Fundamental and Applied Limnology / Archiv für Hydrobiologie* 179(1): 41-50. ["Although acidification in freshwaters reduces the richness of aquatic species in general, dragonflies are less affected. However, detailed knowledge regarding the effects of very acidic (pH < 4.0) and highly conductive (> 700  $\mu\text{S cm}^{-1}$ ) water on dragonfly species richness and composition is still scarce. To assess this, 19 anthropogenically influenced waters with a wide range of pH (2.64 - 6.81) and conductivity (113 - 2620  $\mu\text{S cm}^{-1}$ ) were investigated in the Muskau Arch area (western Poland, eastern Germany). Of the 41 dragonfly species found, 31 were autochthonous. Both total (St) and autochthonous (Sa) species richness correlated positively with pH and negatively with conductivity. How-

ever, the correlations for autochthonous species were strongly influenced by the samples from the extremely acidic (pH 2.64 - 2.86) and most ion-rich (conductivity > 1200  $\mu\text{S cm}^{-1}$ ) waters, where no species developed. The Sa values from acidic waters with slightly higher pH values (between 3.0 and 4.0) did not differ significantly from those found in neutral waters. Nevertheless, species preferring acidic or neutral conditions, respectively, were clearly separated, showing a direct or indirect effect of pH on the community structure in the area. We thus conclude that only pH values below 3.0 and conductivity above 1200  $\mu\text{S cm}^{-1}$  have a detrimental effect on dragonflies. Other acidic waters are suitable habitats for specialists, which do not develop in neutral waters. Thus, moderate acidification enhances the dragonfly species richness of a region like the Muskau Arch area." (Authors)] Address: Rychła, Anna, Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Department of Limnology of Stratified Lakes, Alte Fischerhütte 2, 16775 Stechlin, Germany. E-mail: a.rychla@igb-berlin.de

**10625.** Šacha, D. (2011): How many dragonflies are there in your garden pond? *Notulae odonatologicae* 7(7): 66-67. (in English) ["In an old, small garden pond in the city of Liptovský Mikuláš, N Slovakia (max. depth ca 30 cm, water volume ca 150 l, cleaned and aried-out annually before winter), *Pyrrhosoma nymphula* (26 larvae), *Aeshna cyanea* (7) and *Libellula depressa* (36) were observed in 2009, but in 2010 only *A. cyanea* could be recorded, with an abundance of 190 larval individuals." (Author)] Address: Šacha, D., Podtatranského 31, SK-031-01 Liptovský Mikuláš, Slovakia. E-mail: dusan.sacha@vazky.sk

**10626.** Samways, M.J.; Sharratt, N.J.; Simaika, J.P. (2011): Effect of alien riparian vegetation and its removal on a highly endemic river macroinvertebrate community. *Biological Invasions* 13(6): 1305-1324. (in English) ["Invasive alien trees along river banks can reduce indigenous biodiversity, while their removal can restore it. We assessed here family- and species level responses of river benthic macroinvertebrate assemblages to three riparian vegetation types (natural, alien trees, cleared of alien trees) in the Cape Floristic Region biodiversity hotspot. High species beta diversity of this highly endemic fauna meant that between-river, as well as seasonal effects, dominated assemblage patterns. SASS5, a qualitative, rapid bioassessment technique, based on the sensitivity of the families present, was used as a measure of river health and, indirectly, of water quality. SASS indicated a decline in water quality conditions after alien clearing, a likely response to the greater insolation and apparent erosion of cleared banks, resulting in elevated temperatures and suspended solids and lowered oxygen levels. Overall, cleared and natural sites were more similar to each other than to alien sites, suggesting some post-clearing recovery. However, many sensitive, endemic taxa survived in alieninvaded sites, and more than in the natural sites. These endemic species made use of shady, cool, high oxygen levels under the alien tree canopy. However, endemics declined in overall abundance in sites cleared of aliens, being replaced by more tolerant, widespread taxa. Clearance of the alien trees opened up the rivers to sunny conditions, which had a major impact on community composition. Vegetation types, oxygen levels and river width were important environmental variables affecting these macroinvertebrate responses. Re-establishment of invertebrate biodiversity matched that of indigenous vegetation, with the most sensitive endemic taxa only recovering after establishment of bushy



indigenous and shade-producing fynbos. Therefore, for biodiversity conservation objectives to be achieved, it is essential that indigenous plants are maintained and encouraged during and after clearing to ensure the recovery of endemic and sensitive taxa." (Authors) All taxa are identified on the species level and include Ephemeroptera, trichoptera, Odonata, and Plecoptera.] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**10627.** Sánchez-Guillén, R.A.; Wellenreuther, M.; Cordero-Rivera, A.; Hansson, B. (2011): Introgression and rapid species turnover in sympatric damselflies. *BMC Evolutionary Biology* 11:210. (in English) ["Background: Studying contemporary hybridization increases our understanding of introgression, adaptation and, ultimately, speciation. The sister species *Ichnura elegans* and *I. graellsii* are ecologically, morphologically and genetically similar and hybridize. Recently, *I. elegans* has colonized northern Spain, creating a broad sympatric region with *I. graellsii*. Here, we review the distribution of both species in Iberia and evaluate the degree of introgression of *I. graellsii* into *I. elegans* using six microsatellite markers (442 individuals from 26 populations) and five mitochondrial genes in sympatric and allopatric localities. Furthermore, we quantify the effect of hybridization on the frequencies of the genetically controlled colour polymorphism in females of both species. Results: In a principal component analysis of the microsatellite data, the first two principal components summarised almost half (41%) of the total genetic variation. The first axis revealed a clear separation of *I. graellsii* and *I. elegans* populations, while the second axis separated *I. elegans* populations. Admixture analyses showed extensive hybridization and introgression in *I. elegans* populations, consistent with *I. elegans* backcrosses and occasional F1-hybrids, suggesting hybridization is on-going. More specifically, approximately 58% of the 166 Spanish *I. elegans* individuals were assigned to the *I. elegans* backcross category, whereas not a single of those individuals was assigned to the backcross with *I. graellsii*. The mitochondrial genes held little genetic variation, and the most common haplotype was shared by the two species. Conclusions: The results suggest rapid species turnover in sympatric regions in favour of *I. elegans*, corroborating previous findings that *I. graellsii* suffers a mating disadvantage in sympatry with *I. elegans*. Examination of morph frequency dynamics indicates that hybridization is likely to have important implications for the maintenance of multiple female morphs, in particular during the initial period of hybridization." (Authors)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Univde de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**10628.** Sasamoto, A.; Yokoi, N.; Teramoto, T. (2011): Description of a new *Sinorogomphus* from Northern Laos (Odonata: Chlorogomphidae). *International Journal of Odonatology* 14(1): 83-89. (in English) ["*Sinorogomphus hiten* sp. nov. is described and illustrated from both sexes (holotype male: Laos, Oudomxay province [20°36'14" N, 102°3'21" E, 1075 m a.s.l.], deposited in the National Science Museum, Tokyo, Japan). This is also a first record of the genus from Laos. The new species is easily differentiated from the other congeners in the male by its characteristic anal appendages, i.e. a moderately obtuse ventral spine on cerci and conspicuous paired bifurcate dorsal spines on epiproct, and by the undeveloped valvulae

lae vulvae in the female. Additionally we briefly mention our observations of the species in the field." (Authors)] Address: Sasamoto, A., 190-4 Yakuoji Tawaramoto, Shiki-gun, Nara prefecture, 636-0341, Japan. E-mail: aksmt@sea.plala.or.jp

**10629.** Schletterer, M.; Schönhuber, M.; Füreder Sathe, T.V. (2011): Laboratory mass culture technique for *Paramecium caudatum* (Protozoa: Paramecidae). *J. Curr. Sci.* 16(1): 133-135. (in English) ["*P. caudatum* is found in freshwater ponds, pools, ditches, rivers, lakes etc. and useful for rearing of dragonfly naiads *Crocothemis servillia servillia*. Dragonfly naiads are used in biological control of mosquitoes. Early instar naiads preferably feed on *paramecium*. Therefore, mass culture technique for *P. caudatum* has been developed under laboratory conditions (27±1°C, 75±1%R.H., 10 hr photoperiod). The glass aquarium of size 45 x 22 x 28 cm (Length x width x height) was used for mass culture of *P. caudatum*. ½ Lit of *paramecium* initial culture obtained from glass jar method was taken in 5 lit of distilled water in glass aquarium equipped with sliding cap, an aerator, some hydrilla plants and *paramecium* food (500 gm of folks and corn husk with equal proportion, growth medium with 50 drops of skimmed milk to develop bacteria as food for *paramecium*). The *paramecium* can reproduce by simple division 2-3 times per day. Thus, huge number of *paramecium* can be developed. The culture was allowed to reproduce 4 days to one week and then replaced and or used." (Author)] Address: Sathe, T.V., Dept of Zoology, Shivaji Univ., Kolhapur 416 004, Maharashtra, India

**10630.** , L. (2011): Biodiversity of diatoms and macroinvertebrates in an east European lowland river, the Tudevka River (Tver Region, Russia). *Boreal Environment Research* 16: 79-90. (in English) ["The Middle reaches (3Trubi and Krasny Stan) were characterised by *Paraleptophlebia cf cincta*, *Sialis morio*, *Erbpobdella octoculata* and a diverse Odonata fauna." (Authors)] Address: Schletterer, M., University of Innsbruck, Institute of Ecology, Dept River Ecology and invertebrate Biology, Technikerstr. 25. A-6020 Innsbruck, Austria. E-mail: schletterer@gmx.at

**10631.** Schmidt Dalzochio, M.; Costa, J.M.; Uchoa, M.A. (2011): Diversity of Odonata (Insecta) in lotic systems from Serra da Bodoquena, Mato Grosso do Sul State, Brazil. *Rev. Bras. entomol.* 55(1): 88-94. (in English, with Portuguese summary) ["A systematic survey was carried out in four lotic systems from Serra da Bodoquena, the largest natural forests of the State, from August 2007 to November 2008. 548 specimens belonging to 33 species, distributed in 5 families were sampled. Libellulidae was dominant, with 13 species, followed by Gomphidae, Coenagrionidae, Protoneuridae and Calopterygidae." (Authors)] Address: Schmidt Dazochio, Marina, Laboratório de Ecologia e Conservação de Ecossistemas Aquáticos, Universidade do Vale do Rio dos Sinos, Av. Unisinos, 950, Cristo Rei, 93022-000 São Leopoldo-RS, Brazil. E-mail: mahsdalzochio@gmail.com

**10632.** Schröter, A. (2011): Review of the distribution of *Somatochlora sahlbergi* (Odonata: Corduliidae). *International Dragonfly Fund - Report* 41: 1-27. (in English) ["Based on data collected from literature, museum collections, national databases and personal communications, an up-to-date map of the worldwide distribution of *Somatochlora sahlbergi* is presented. A new hypothesis is presented indicating that occurrences are at least regionally correlated with *palsa mires*. Two examples of larval habitats in Europe are illustrated and described, including the

first observation of reproduction in Norway and the first record of co-occurrence with Zygoptera in Europe. The exuvia of *S. sahlbergi* is illustrated and distinguishing features briefly discussed." (Author) Address: Schröter, A., Rasenweg 10, D-37130 Gleichen, Germany. E-mail: asmustim@gmx.de

**10633.** Shah, R.D.T.; Shah, D.N.; Neseemann, H. (2011): Development of a macroinvertebrate-based Nepal Lake Biotic Index (NLBI): an applied method for assessing the ecological quality of lakes and reservoirs in Nepal. *Int. J. Hydrology Science and Technology* 1(1/2): 125-146. (in English) ["In Nepal, the impairment status of lakes and reservoirs has generally been measured and classified based on nutrient concentrations and physico-chemical parameters, typically with no direct measurement of biological communities. In response to the recent focus on the bioassessment of lakes and reservoirs, the macroinvertebrate-based Nepal Lake Biotic Index (NLBI) has been developed. Benthic samples were collected from reference and impaired lakes during 2006 and 2009 from two ecological zones: Terai-Siwaliks and Mid-Hills. We used a tolerance score based on a ten-point scoring system ranging from very pollution sensitive to very pollution tolerant taxa to calculate the NLBI. In reference to the transformation scale, the calculated NLBI describes the lake water quality as high, good, fair, poor and bad. Candidate metrics of richness measures and tolerance measures discriminated well between the reference and impaired lakes (Mann-Whitney U test,  $p < 0.01$ ). The relationships between the biological metrics and the environmental variables were also established with the lake water quality class (LWQC). Further, the validation of the NLBI performance was done by assessing nine lakes/reservoirs from both the zones. Thus, the index presented here provides an effective method to measure the ecological condition of lakes and reservoirs in Nepal." (Authors) Taxa - including Odonata - are treated at the order level.] Address: Shah, R.D.T., Hindu Kush Himalayan Benthological Society, Bhaktapur, P.O. Box 20791, Sundhara, Kathmandu, Nepal. E-mail: ramdevishah@hkhbenso.org

**10634.** Sharma, K.K.; Chowdhary, S. (2011): Macroinvertebrate assemblages as biological indicators of pollution in a Central Himalayan River, Tawi (J&K). *International Journal of Biodiversity and Conservation* 3(5): 167-174. (in English) [Jammu and Kashmir, India; "Benthic macroinvertebrate assemblages at sub-tropical River of Jamu, River Tawi, corresponding to different catchment land uses, were assessed in 2008 to 2009 as indicators of water quality. The relative diversity, species richness, dominance, evenness indices, physico-chemical parameters and percentage of Annelida + Arthropoda + Mollusca (AAM) individuals were determined. Significant spatio-temporal variation was observed in relative diversity, with Diptera dominating the study area instead of Annelida, Odonata, Ephemeroptera, Hemiptera and Gastropoda. Significant relationships were recorded between physico-chemical parameters [...] and the occurrence of specific genera. Significant changes in macroinvertebrate assemblages were primarily due to changes in water quality. As elsewhere, macroinvertebrate communities proved to be good indicators of water quality and should be used as bioindicators in long-term monitoring of this river." (Authors) The taxa list includes "Ophiogomphus sps., Perithemis sps., Progomphus sps." probably identified by use of "Pennak, R.W. (1978). Fresh water invertebrates of United States."] Address: Sharma, K.K., Dept of Zoology,

University of Jammu-180006, Jammu and Kashmir, India. E-mail: prof.ksharma@gmail.com

**10635.** Sheewai, P.; Tan, J.; Ngiam, R.W.J. (2011): New record of dragonfly, *Zygomma obtusum* Albarada, 1881 in Singapore (Odonata: Anisoptera: Libellulidae). *Nature in Singapore* 4: 241-244. (in English) [30-III-2011, forest edge in Pulau Ubin, Singapore] Address: Ngiam, R.W.J., National Biodiversity Centre, National Parks Board, 1 Cluny Road, Singapore 259569. E-mail: ngiamwenjiang@nparks.gov.sg

**10636.** Shoukry, N.M.; Morsy, T.A. (2011): Arthropod borne diseases at Toshka, Upper Egypt. *World Journal of Zoology* 6(2): 126-133. (in English) ["The Egyptian Government plan to move in 25 years from an inhabited area of 6-25% of the total Nile land area to a larger one to compensate the huge increase of Egyptian populations. The decision was recently made to begin a development project at Toshka, on the western bank of the River Nile, Upper Egypt. Toshka depression is more or less close to Wadi Halfa of Sudan. Therefore, it was necessary to develop of Toshka on the west bank of the River Nile. Consequently, two specialized teams, one is national and the other is from WHO, were interested to study the health risk impact of the project on the vector-borne diseases and pests and to plan recommendations for prevention and feasible control of these diseases. The present study was initiated during spring of 2007 & 2008, as spot light survey, on wild rodents and the arthropods having medical and/or veterinary importance. Whilst *Psammomyes obesus* Cretzschmar, 1828 was the only recognized rodent, the following arthropods were identified: the scorpion, *Buthus quinquestriatus* Hanté en E., the insects, *Cephus tabidus* (F.), *Ischnura senegalensis* (Rambur, 1842), *Mantis religiosa* Linnaeus, 1758 and *Tabanus taeniola* Palisot de Beauvois, *Culicoides riethi* Kieffer, *Anopheles sergenti* Theobald and *Phlebotomus papatasi* (Scopoli). The medical, veterinary and agriculture importance of each species have been discussed and feasible control measures were suggested." (Authors) In contrast to this statement any medical, veterinary or agricultural importance of *I. senegalensis* is not discussed.] Address: Morsy, T.A., Dept of Parasitology, Faculty of Medicine, Ain Shams University, Cairo, 11566, Egypt. E-mail: morsyegypt2000@yahoo.com.

**10637.** Silva, F.L.; Oliveira, H.R.N.; Escarpinati, S.C.; Fonseca-Gessner, A.A.; Paula, M.C. (2011): Colonization of leaf litter of two aquatic macrophytes, *Mayaca fluviatilis*, *Aublet* and *Salvinia auriculata*, *Aublet* by aquatic macroinvertebrates in a tropical reservoir. *Ambi-Água, Taubaté* 6(1): 30-39. (in English, with Portuguese summary) ["Decomposition and colonization of *S. auriculata* and *M. fluviatilis* by macroinvertebrates were analyzed during 40 days to determine whether differences existed on colonization by aquatic macroinvertebrates of two macrophytes with distinct habits (submerged versus fluctuant). Leaf litter of *S. auriculata* and *M. fluviatilis* were incubated in 24 litter bags (12 of each species), in a small reservoir surrounded by a cerrado fragment with low level of anthropic impact. After 10, 20, 30 and 40 days, the litter bags were removed and aquatic macroinvertebrates community was analyzed. 220 macroinvertebrates were associated with *S. auriculata* and 261 were associated with *M. fluviatilis*, identified in 24 taxa. Both macrophyte species were colonized mainly by macroinvertebrate predators. *Ablabesmyia* with predator and collector food mechanisms was present in all sampling. The data showed an expressive increase of abundance during the process of decomposi-

tion and a decrease at the end of the experiment, in both macrophytes. Cluster analysis permitted inference that the colonization of the leaf litter by macroinvertebrates was determined by incubation time of leaf litter not by the habit of macrophytes (submerged or fluctuant)." (Authors) A single specimen of "Lestidae" was found among leaf litter of *M. fluviatilis* on the tenth and twentieth days.] Address: da Silva, F.L., Univde Federal de São Carlos - UFSCar, Depart. de Hidrobiologia, Laboratório de Entomologia Aquática, Brasil. E-mail: fabelha@hotmail.com

**10638.** Soluk, D.A.; Zercher, D.S.; Worthington, A.M. (2011): Influence of roadways on patterns of mortality and flight behavior of adult dragonflies near wetland areas. *Biological Conservation* 144(5): 1638-1643. (in English) ["The relatively low population size and long adult lifespan of dragonflies (Odonata, Anisoptera) makes them one of the few non-vertebrate groups likely to be impacted by direct roadway mortality. We studied adult dragonfly mortality and behaviour associated with roadways for a number of species. Daily mortality rates for dragonflies were estimated from standardized surveys along predetermined lengths of roads. Relative abundance and flight behaviour around and across roadways, a potentially important mortality factor, was determined from timed roadside observations. Observed flight behaviour provided no evidence that roads act as significant barriers to dispersal for adult dragonflies. Estimated mean number killed ranged from 2 to 35 dragonflies/km/day. Species varied greatly in their susceptibility to motor vehicles. Two species (*Plathemis lydia* and *Libellula luctuosa*) made up more than 70% of the dead dragonflies collected, but only represented 14% and 31% of live dragonflies observed, respectively. The relatively low flight heights of these two species over roads (typically under 2 m) may explain their susceptibility; however, another common species (*Tamea lacerata*) also exhibited low flight height but did not experience high mortality, possibly because of its increased flight agility. Large numbers of adult dragonflies were killed over the entire flight season by motor vehicle collisions, exhibiting the need for assessing the long-term impact of roadway mortality on dragonfly population dynamics." (Authors)] Address: Zercher, Deanna, The Nature Conservancy, 11304 North Prairie Road, Lewistown, IL 61542, USA. E-mail: dzercher@tnc.org

**10639.** Spyra, A. (2011): Autochthonic and allochthonic plant detritus as zoobenthos habitat in anthropogenic woodland ponds. *Oceanological and Hydrobiological Studies* 40(1): 27-35. (in English) ["Regardless of origin, all water bodies situated inside forests form a unique habitat for many freshwater animals due to the allochthonous detritus covering the bottom, composed mostly of leaves from waterside trees. For many years these woodland ponds have been considered to be advantageous to regional biodiversity. Investigations were carried out in eight anthropogenic woodland ponds, formed as a consequence of coal mining activities, situated in forest complexes in Upper Silesia (Southern Poland), to evaluate the impact of allochthonic and autochthonic plant detritus on the formation of zoobenthic communities, together with insolation intensity. In sites covered by a layer of allochthonic plant matter, zoobenthos were more abundant compared to places covered by autochthonic detritus. The density of zoobenthos in sun-exposed sites was two to three times greater than in shaded sites." (Author) Taxa - including Coenagrionidae, Aeschnidae, Libellulidae - are treated at the family level.] Address: Spyra, Aneta, Dept of Hydrobiology Faculty of Biology and Environmental Pro-

tection, The University of Silesia, ul. Bankowa 9, 40-007 Katowice, Poland. E-mail: aneta.spyra@us.edu.pl

**10640.** Staniczek, A.H.; Bechly, G.; Godunko, R.J. (2011): Coxoplectoptera, a new fossil order of Palaeoptera (Arthropoda: Insecta), with comments on the phylogeny of the stem group of mayflies (Ephemeroptera). *Insect Systematics & Evolution* 42(2): 101-138. (in English) ["*Mickoleitia longimanus* gen. et sp.n. is described from the Lower Cretaceous limestone of the Crato Formation in Brazil. It is attributed to a new family Mickoleitiidae and a new fossil insect order Coxoplectoptera within the palaeopterous Ephemera, based on the presence of an elongated costal brace. This fossil insect exhibits a very peculiar combination of derived characters like specialized forelegs with strongly elongated, free coxae, single-clawed pretarsus, and distinctly skewed pterothorax as in dragonflies. On the other hand, several plesiomorphies are present that exclude this taxon from modern Ephemeroptera, namely large hind wings with widened anal area and numerous cross veins that separate the elongate costal brace from the costal margin. Fossil larvae described by Willmann as larval *Cretereismatidae* are herein attributed to Mickoleitiidae fam. n., based on the shared presence of broad hind wing buds with distinctly broadened anal area, wing bud venation similar to the adult holotype, and subchelate forelegs with elongate free coxae. These larvae are also highly autapomorphic in the structure of their abdominal gills and laterally flattened body with vertically oval section that is unique within Ephemera. On the other hand they possess plesiomorphic lateral wing pads with pronounced articulation like Palaeozoic pterygote larvae, while wing pads in modern insects are always secondarily fused to the tergum. A similar fossil larva from the Jurassic of Transbaikals was earlier described as *Mesogenesia petersae* and classified within modern mayflies. It is herein attributed to Mickoleitiidae fam.n. Coxoplectoptera are recognized as putative sister group of modern Ephemeroptera based on the shared presence of only 7 pairs of abdominal gills, while Permoplectoptera still have retained 9 pairs of gills. The phylogenetic reclassification of the mayfly stem group by Willmann is critically discussed and modified." (Authors) Phylogenetic relationships to dragonflies are discussed.] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail bechly@gmx.de

**10641.** Strobbe, F.; McPeck, M.A.; De Block, M.; Stoks, R. (2011): Fish predation selects for reduced foraging activity. *Behavioral Ecology and Sociobiology* 65(2): 241-247. (in English) ["Despite the importance of foraging activity for the growth/predation risk trade-off, studies that demonstrated predator-induced survival selection on foraging activity under semi-natural conditions are relatively rare. Here, we tested for fish-induced selection for reduced foraging activity in two larval *Enallagma* damselflies using a field enclosure experiment. Fish imposed considerable mortality in both damselfly species and survival selection on foraging activity could be detected in *Enallagma geminatum*. We did not detect selection in *E. hageni*, probably because this species already was not eating very much in the absence of fish compared to *E. geminatum*. Both species responded strongly to the presence of predators by reducing their foraging activity. The documented survival selection on foraging activity was detected despite the already low activity levels in fish lake prey species and despite strong predator-induced plasticity in this trait." (Authors)] Address: Stoks, R.,



Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: rob-by.stoks@bio.kuleuven.ac.be

**10642.** Stübing, S. (2011): Hinweise zu Vorkommen und Bestimmung der Gefleckten Smaragdlibelle *Somatochlora flavomaculata* (Vander Linden, 1825) in Hessen. *Libellen in Hessen* 4: 53-58. (in German) [*Somatochlora flavomaculata* is very rare in Hessen, Germany. It was discovered in July 2010 at two localities in the valley of the river Kinzig. The author presents a brief compilation of records in Hessen, and gives notes on the habitat and field characters of *S. flavomaculata*.] Address: Stübing, S., Am Eichwald 27, 61231 Bad Nauheim. E-mail: stefan.stuebing@gmx.de

**10643.** Suhail, M.A.; Arshad, M.; Arif, J.; Gogi, M.D. (2011): Conservation of beneficial insects for sustainable agriculture. In: H. Gökçekuç et al. (eds.): *Survival and Sustainability, Environmental Earth Sciences, Part 9*. Springer-Verlag Berlin Heidelberg: 1463-1468. (in English) ["Insects are the most diverse group of organisms and are 3/4th of all described forms of life. Potentially they are highly indicative of environmental change through close adaptation to their environment. Migratory insect species are at the verge of extinction owing to increasing trend in global warming. Insect fauna also represent the majority of links in the community food chain and they likely have the largest biomass of the terrestrial animals. While the positive values of the insect fauna is remarkably more than that of their negative values. They act as pollinators and bio-control agents in the agro-ecosystem and have better impact for the development of sustainable agriculture. Thus, knowledge about them is fundamental to study the environment. One to three million insect species are identified worldwide while 2,000 from Pakistan. Out of which more than 954 species from 10 orders are identified/explored by the "Insect Biodiversity and Biosystematics Lab", Department of Agri-Entomology, University of Agriculture, Faisalabad, Pakistan. Of the described species in the order Orthoptera (Grasshoppers, Crickets, 279), Odonata (Dragonflies, 130), Lepidoptera (Moths and Butterflies, 82), Diptera (Syrphids, Fruitflies, Clypterate species 187), Homoptera (Aphids, Whiteflies, 65), Thysanoptera (Thrips, 52), Neuroptera (Antlion, Chrysopids, 42), Dictyoptera (Mantids, 32), Hemiptera (Reduviid & Anthocorid Bugs, 11) and Hymenoptera (Braconids, 17). The abundance of bee forage plants throughout the year determines the growth of honey bee colonies and hence the productivity of bee farming. Pakistan is endowed with more than 700 plant species. Out of which entomophilous crops cover 7.3 million hectares of land and forest more than 10 million hectares which can support 0.4–0.5 million honey bee colonies. Despite fairly abundant floral sources and quite suitable climatic conditions for keeping bees in the country, honey production (1000 tonnes) from 3,00,000 colonies is much below to its exploitable potential. All of this work has been completed by students M.Sc/Ph.D theses research and many students are working on different groups of insect fauna and their biodiversity. Eleven species of scarabid beetles (Coleoptera) have been identified recently on molecular level by DNA characterization. Many other identified species specimens, are placed in the departmental insectarium, which are not mentioned in this report." (Authors)] Address: Suhail, M.A., Dept of Agricultural Entomology, Insect Biodiversity and Biosystematics Research Laboratory, University of Agriculture, Faisalabad, Pakistan. E-mail: dranjumsuhailuaf@yahoo.com

**10644.** Suvorov, A. (2011): Comparative molecular genetics of *Nehalennia speciosa* (Charpentier) from geographically distant populations (Zygoptera: Coenagrionidae). *Odonatologica* 40(2): 131-136. (in English) ["The populations from western Russia, the Russian Far East and Japan are compared using Cytochrome Oxidase I (COI) gene and Internal Transcribed Spacer 1 (ITS1) region of rDNA sequences. The exceptionally low variation is discussed." (Author)] Address: Suvorov, A., Dept of Entomology, Faculty of Biology, Lomonosov Moscow State University, 119992 Moscow, Russia. E-mail: antony.suvorov@gmail.com

**10645.** Szkokan-Emilson, E.J.; Wesolek, B.E.; Gunn, J.M. (2011): Terrestrial organic matter as subsidies that aid in the recovery of macroinvertebrates in industrially-damaged lakes. *Ecological Applications* 21: 2082-2093. (in English) ["The importance of allochthonous carbon to the productivity of stream ecosystems in temperate ecozones is well understood, but this relationship is less established in oligotrophic lakes. The nearshore littoral zones, at the interface of terrestrial and aquatic systems, are areas where the influence of terrestrial subsidies is likely greatest. We investigated the response of nearshore communities to variation in the quantity and composition of allochthonous materials, determined the landscape characteristics that regulate the variation of this subsidy, and explored the potential for terrestrial restoration practices to influence the export of organic matter to lakes. Stepwise multiple regressions revealed that diversity of nearshore macroinvertebrate families increased with the amount of fine particulate organic matter (FPOM) captured in sediment traps. The quantity of FPOM (g) increased with forest cover, and the relative amount of FPOM (percentage of total particulate material) in the traps increased with surface area of wetland in the catchments. These models suggest that terrestrially derived subsidies are important in smelter-impacted watersheds, and that the restoration of forests and wetlands will speed the return of nearshore consumer community diversity in industrially damaged lakes." (Authors) Predators include (at the family level) Aeshnidae, Coenagrionidae, Corduliidae, and Libellulidae.] Address: Szkokan-Emilson, E.J., Cooperative Freshwater Ecology Unit, Biology Dept, Laurentian Univ., 935 Ramsey Lake Road, Sudbury, Ontario P3E 2C6 Canada. E-mail: exszkokanemilson@laurentian.ca

**10646.** Takhelmayum, K.; Gupta, S. (2011): Distribution of aquatic insects in phumdis (floating island) of Loktak Lake, Manipur, northeastern India. *Journal of Threatened Taxa* 3(6): 1856-1861. (in English) ["A study was made on the temporal fluctuations of distribution of aquatic insects around Phumdi Live (PL), Phumdi Mixed (PM) and Phumdi Dry (PD) areas of Loktak Lake. Phumdis are a heterogeneous mass of soil, vegetation and organic matter. The study revealed the presence of predators, and the absence of herbivores and detritivores in both PL and PM, the PD area was totally devoid of insects. Although both the habitats supported the same predator groups hemiptera and odonata, diversity and density in terms of family and species were higher in PL than in PM. Temporal fluctuations revealed that the Shannon-Weiner's Diversity Index values were highest in June for both PL (0.726) and PM (0.47). In both the sites the highest density was recorded in February. The relative abundance of hemiptera was higher than that of odonata in most of the months in PL. Phumdi Mixed was represented by one species of hemiptera only, in the month of February and dominated by odonates otherwise. Community composi-

tion of Odonata larvae did not show any difference between the two habitats. Although the study revealed low diversity and density of insects in both sites, the PL community provided a better habitat to aquatic insects than that of PM. These are of value as fish food and in turn for fish production." (Authors) (Most probably mis-) Identified taxa are *Tramea* sp., *Leucorrhinia* sp., and *Sympetrum* sp.] Address: Gupta, S., Dept of Ecology & Environmental Science, Assam University, Silchar, Assam 788011, India. E-mail: susmitau@rediffmail.com

**10647.** Tennessee State Parks Division of Resource Management. All Taxa Biodiversity Inventory (ATBI) (2011): Odonata (Damselflies and Dragonflies) of Tennessee. leaflet: (in English) ["The leaflet gives a checklist of the Tennessee, USA-Odonata currently known. I suppose it is intended for ticking and giving to the authoritatives, while no communication data are included. Curious paper ... It may be useful to visit the following page: <http://tn.gov/environment/parks/atbi/>. On the top there is a picture of a *Gomphus sandrius*, the Tennessee Clubtail, which occurs in only five counties in the Central Basin area of Middle Tennessee, USA." (Author)] Address: see <http>

**10648.** Terzani, F.; Cianferoni, F.; Giugliano, L.; Mazza, G.; Rocchi, S.; Zinetti, F. (2011): Segnalazioni faunistiche italiane, 503: *Lestes virens virens* (Charpentier, 1825) (Odonata: Lestidae). *Boll. Soc. ent. ital.* 143(1): 40. (in Italian) [Tuscany, Italy, Arcipelago Toscano, Isola di Capraia, Stagnone 14-IX-2007] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**10649.** Theischinger, G.; Richards, S.J. (2011): *Nannophlebia kalkmani* spec. nov., a remarkable new species from Papua New Guinea (Anisoptera: Libellulidae). *Odonatologica* 40(2): 137-142. (in English) ["The new species is described from the foothills of the Muller Range, Western Province, Papua New Guinea. Holotype male: Gugusu, alt. 515 m a.s.l., 4-IX-2009; deposited at RMNH, Leiden. Diagnostic characters of the adult male are illustrated and the affinities of the species are discussed." (Authors)] Address: Richards, S.J., Herpetology Dept, South Australian Museum, North Terrace, Adelaide, S.A. 5000, Australia. E-mail: steve.richards@samuseum.sa.gov.au

**10650.** Tomazelli Jr., O.; Franco, G.M.S.; Casaca, J.M.; Munarini, A.C. & Dal Magro, J. (2011): Effect of the *Melia azedarach* L. on the predation of common carp fingerlings (*Cyprinus carpio*) by larvae of *Neuraeschna* (Odonata: Aeshnidae). *Braz. J. Aquat. Sci. Technol.* 15(1): 19-25. (in Portuguese, with English summary) ["The presence of larvae of predator insects in fish farming ponds is one of the factors that contribute to the reduction of the survival of fingerlings and consequently to the decrease of production profits. Dragonflies ... are among the insects that have a harmful effect on fish farming. The larvae are aggressive carnivores and predate post-larvae fish and fingerlings, and thus become economically relevant plagues. The objective of this work is to study the occurrence of Odonata larvae in fish ponds and evaluate the effect of *Melia azedarach* extract adsorbed in silica to control Odonata larvae predation on common carp. ... *Neuraeschna* ... was used in the biological tests. During the predation tests of common carp fingerlings (*C. carpio*) by the *Neuraeschna* larva, the average consumption was of 5,2 and 7,2 fingerlings in the treatments with and without Cinamono Ethanolic extract (EEC), respectively. The

adoption of good practises in Aquaculture and the sustainability of fish farming require the adoption of natural products." (Authors)] Address: Dal Magro, J., Programa de Pós-Graduação em Ciências Ambientais, Universidade Comunitária da Região de Chapecó, Caixa Postal 1141, CEP 89.809-000, Chapecó – SC, Brazil. E-mail: jacir@unochapeco.edu.br

**10651.** Trapero-Quintana, A.; Reyes-Tur, B.; Mateu-Arebalo, J. (2011): Distancia sobre el agua durante la emergencia en larvas de Odonata para tres cuerpos dulceacuícolas de Cuba Oriental. *Dugesiana* 17(2): 103-111. (in Spanish, with English summary) ["The distance reached over the water surface at the time of emergence by species of Odonata in three ecosystems from the Santiago de Cuba province, was estimated. A positive correlation between height and species size was found in the three localities. The greater heights were registered in Guásima and Arroyo, the best conserved areas and with a few stressing elements. In general, anisopterans reached the superior heights, whereas zygopterans tend to be close to the water surface. Females reached major heights than the males." (Authors)] Address: Reyes-Tur, B., Univ. de Oriente. Depto de Biología. Patricio Lumumba s/n 90500. Santiago de Cuba, Cuba. E-mail: breyes@cnt.uo.edu.cu

**10652.** Tschanz, B.; Hegglin, D.; Gloor, S.; Bontadina, F. (2011): Hunters and non-hunters: skewed predation rate by domestic cats in a rural village. *Eur. J. Wildl. Res.* 57: 597-602. (in English) [Finstersee (70 households, 0.25 km<sup>2</sup>, 47°10'N 8°37'E), Switzerland; "Domestic cats *Felis catus*, as companion animals provided with supplemental food, are not limited by the availability of wild prey and locally occur at extraordinary high densities. There is growing concern about the potential impact of large cat numbers on native prey populations. In the present study, we quantified the minimum number of animals killed in a rural village in Switzerland by asking owners (1) to estimate the predation rate in advance and (2) to record prey animals returned home by their pets. The frequency distribution of the numbers of prey items was markedly skewed: 16% of the cats accounted for 75% of prey, irrespective of sex, age or breed. A large fraction of owners considerably overestimated their cat's predation, indicating that surveying predation rates by means of a questionnaire alone is not sufficient. The observed average rate of predation within 48 days in spring was 2.29 prey items/cat/month (N=32 cats); major prey types were rodents (76.1%) and birds (11.1%). The absolute number of prey items taken per area is striking and indicates that cat predation represents an important factor in ecosystems. Its role may be momentous in intensively fragmented urban habitats, where cat densities are especially high." (Authors) 25 of the prey items accounted to insects and included four Odonata specimens.] Address: Bontadina, F., SWILD, Urban Ecology and Wildlife Research, Wuhrstr. 12, 8003, Zürich, Switzerland. E-mail: fabio.bontadina@swild.ch

**10653.** Tumilovich, O.N. (2011): Emperor Dragonfly, *Anax imperator* (Leach, 1815). In: W.P. Dedkov, G.W. Grishanov (eds), *Red Data Book of the Kaliningrad Region. Animals, Plants, Funges, Ecosystems.* The Publishing House of the Immanuel Kant State University of Russia, Kaliningrad: 95. (in Russian) [distribution map of *A. imperator* in the Kaliningrad region of Russia (situated between Poland and Lithuania)] Address: Tumilovich, Olga, Kaliningrad State Technical University, 236000 Kaliningrad, Russia. E-mail: Leventetuibrambler.ru

**10654.** Tunmore, M. (2010): Reports from Costal Stations - 2008: Lizard Peninsula. *Atropos* 39: 39-41. (in English) [ *Sympetrum fonscolombii*; at light: *Aeshna mixta* and *Sympetrum striolatum*] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: atropos@atroposed.freeseerve.co.uk

**10655.** Uieda, V.S.; Pinto, T.L.F. (2011): Feeding selectivity of ichthyofauna in a tropical stream: space-time variations in trophic plasticity. *Community Ecology* 12(1): 31-39. (in English) ["In studies on the partitioning of resources, one issue which has been largely neglected is the change in feeding habits based on the availability of food in the environment, an aspect which is dealt with here with regard to the ichthyofauna of a tropical stream. Feeding preference was analyzed for eight species of fish which consumed high percentages of aquatic insects, based on a collection of fish and invertebrates during both the dry season (June 2006) and the wet season (December 2006) and in two different stretches of the stream, one of which shaded by gallery forest ("closed area") and the other just bordered by herbaceous vegetation ("open area"). Based on a quantitative analysis of the composition of the benthic fauna and the diet of the ichthyofauna, the electivity index was calculated in order to assess potential alterations in the feeding preferences in line with seasonal and spatial modifications to the structure of the habitat and the supply of food. The analysis of the abundance of aquatic insects in the environment showed a predominance of Ephemeroptera in all situations analyzed (areas and seasons), with this insect group being the food item preferred by the majority of fish. However, space-time variations were observed in prey selection by the ichthyofauna. The analysis of supply, consumption and preference demonstrated somewhat varied situations for the majority of species, with both high and low selectivity for items consumed in low and high percentages, with the preferred item varying both spatially and seasonally. The sole exception to this was *Phalloceros harpagos*, choosing Diptera-Chironomidae in all the situations analyzed." (Authors) Odonata are represented at the family level by Aeshnidae, Calopterygidae, Coenagrionidae, and Corduliidae] Address: Uieda, V.S., UNESP — Univ Estadual Paulista Department of Zoology C.P. 510 18618-970 Botucatu, SP Brazil. E-mail: vsuieda@ibb.unesp.br

**10656.** van Damme, K.; Banfield, L. (2011): Past and present human impacts on the biodiversity of Socotra Island (Yemen): implications for future conservation. *Zoology in the Middle East, Supplementum* 3: 31-88. (in English) ["The Socotra Archipelago (Yemen) is globally recognized for its outstanding biodiversity and endemism, designated on this basis a UNESCO World Heritage Site in 2008. The island underwent long geological and political isolation, ensuring preservation of unique ecosystems until the start of the new millennium. Now, Socotra Island is undergoing rapid development, out of balance with conservation. Major causes for biodiversity loss in other global insular ecosystems such as habitat fragmentation and degradation, pollution, invasive species and the impact of tourism, are becoming pressing issues that deserve close attention. Unsustainable resource use, the loss of traditional land management and illegal trade in biota are worrying phenomena that further increase the pressures on Socotra's ecosystems. We provide the first comprehensive review of potential human impacts on Socotra before the 21st century, an updated discussion of some of the principal threats to its biodiversity in recent

times, discussing local examples within a historical context of known extinction processes on islands, and underline the importance of traditional knowledge in the protection of Socotran ecosystems." (Authors) The paper includes references to the local extinction of *Rhyothemis semihyalina* (Odonata) in the Hadiboh Plain.] Address: Van Damme, K., Department of Biology, Ghent University, K. L. Ledeganckstr. 35, 9000 Ghent, Belgium. E-mail: kay.vandamme@gmail.com.

**10657.** Van Duzor, R.G. (2011): Community structure and secondary production of aquatic macroinvertebrates in coastal wetland ponds of the west copper river Delta, Alaska, following tectonic uplift. M.Sc. thesis, Dept Biology, Loyola University Chicago: 75 pp. (in English) ["The Great Alaska Earthquake of 1964 (magnitude 9.2) greatly altered the coastal landscape in southcentral Alaska and had particularly dramatic effects on the Copper River Delta (CRD), an ecologically and economically important area within the Chugach National Forest. The earthquake caused tectonic uplift (up to 3.5m) of the CRD coastal tidal marsh and transformed it into a perched freshwater marsh. Copper River Delta ponds, which are crucial habitat to a myriad of migrating songbirds, shorebirds, and waterfowl, are of particular interest to wildlife managers in the CRD and along the Pacific coasts of North, Central and South America. This study was conducted to characterize the general ecology of CRD ponds, with particular focus on aquatic insect communities. Twelve ponds in two geomorphologic zones were studied to compare physicochemical characteristics, aquatic insect community structure and annual secondary production. Six ponds were in the Uplifted Marsh (UM), which was formed as a result of the tectonic uplift, and six ponds were in the Outwash Plain (OP), an area that was present before the earthquake and was relatively unaffected by tectonic activity. Uplifted Marsh and OP ponds were similar with respect to basic physicochemical parameters. *Callicorixa vulnerata* (Uhler 1861) (Hemiptera: Corixidae) was the numerically dominant non-dipteran taxon in 11 of the 12 study ponds and represented 30-81% of all non-dipterans collected. Densities of the numerically dominant predators, *Aeshna* spp. and *Enallagma* spp. were higher in OP ponds (<1-20/m<sup>2</sup>) compared to UM ponds (<1-4/m<sup>2</sup>), and production was 5X higher in OP than in UM ponds (507 vs. 97 mg AFDM/m<sup>2</sup> /yr). In contrast, secondary production of aquatic insect primary consumers such as *Agyrpnia* spp. (Trichoptera: Phryganeidae) and *Nemotaulius hostilis* (Hagen 1873) (Trichoptera: Limnephilidae), although found in relatively low densities (<1-3.3/m<sup>2</sup>), was almost 10X higher in UM ponds than in OP ponds (246 vs. 30 mg AFDM/m<sup>2</sup> /yr). Overall, annual secondary production of non-dipterans was greater in UM ponds than in OP ponds (3091 vs. 2205 mg AFDM/m<sup>2</sup> /yr). Results from this study indicate distinct differences in aquatic insect community structure, secondary production, and functional feeding group composition in UM and OP ponds. Creation of the UM ecosystem by tectonic disturbance increased the availability of suitable habitats for aquatic insects, particularly primary consumers, e.g., Trichoptera, and omnivores, e.g., *C. vulnerata*, which subsequently colonized UM ponds to take advantage of the newly abundant primary food resources (aquatic vegetation). In comparison, more mature OP ponds supported higher densities of aquatic insect predators, particularly Odonata, while supporting lower densities of Trichoptera and *C. vulnerata*." (Author)] Address: not stated



**10658.** van Hardenbroek, M.; Heiri, O.; Wilhelm, M.F.; Lotter, A.F. (2011): How representative are subfossil assemblages of Chironomidae and common benthic invertebrates for the living fauna of Lake De Waay, the Netherlands? *Aquatic Science* 73: 247-259. (in English) ["The distribution of benthic invertebrates and their subfossil remains was examined within the basin of De Waay, a dimictic, eutrophic lake in the Netherlands. We focused on Chironomidae, but also report the abundances of 11 invertebrate groups that potentially produce chitinous remains that are preserved in the fossil record, although their remains could only be identified at a coarser taxonomic resolution. Most living invertebrates sampled in different seasons were constrained to the littoral zone, with the exception of a few taxa (*Ceratopogonidae*, *Chaoborus flavicans*, and *Chironomus*) that are adapted to low oxygen conditions in the seasonally anoxic profundal zone. In contrast, assemblages of invertebrate remains in lake surface sediments were similar in the entire lake basin, suggesting that considerable numbers of invertebrate remains are transported and redeposited off-shore in Lake De Waay, due to its steep bathymetry. These results indicate that a single sediment sample obtained from the centre of this lake contains subfossil invertebrate remains originating from the entire lake basin. In Lake De Waay, the majority of taxa found in the living assemblages were identified as remains in lake surface sediments, at least for the Chironomidae that could be identified at a similar taxonomic level in living and subfossil assemblages. [...] Our results indicate that subfossil assemblages in surface sediment samples provide spatially integrated and representative samples of the living assemblage. However, a combined approach examining both the living benthic invertebrate fauna and invertebrate remains in lake surface sediments will potentially give a more complete and detailed overview of benthic invertebrates in a lake ecosystem than an approach based exclusively on one of these groups." (Author) *Aeshna mixta* and *Ischnura elegans* were representatives of the living assemblage, "Odonata" of the subfossil.] Address: van Hardenbroek, M., Laboratory of Palaeobotany & Palynology, Institute of Environmental Biology, Palaeoecology, Utrecht University, Budapestlaan 4, 3584 CD Utrecht, The Netherlands. E-mail: m.r.vanhardenbroek@uu.nl

**10659.** Vantiegheem, P.; De Groote, D.; Dewolf, J. (2011): Rediscovery of *Leucorrhinia caudalis* (Charpentier, 1840) in Belgium after a century of absence. *Libellenvereniging Vlaanderen - nieuwsbrief* 5(2): 2-3. (in Dutch, with English summary) [21-V-2011; "A population of *L. caudalis* was found at an old sand pit in Fouches, province of Luxembourg, in the very south of Belgium. In the following weeks the species was seen at four other places. These constitute the first sightings and the discovery of a population of *Leucorrhinia caudalis* in Belgium since the records of the 19th century." (Authors)] Address: Vantiegheem, P. E-mail: ptr.vantiegheem@gmail.be

**10660.** Varsani, A. (2011): Novel virus from dragonflies. *Microbiology Today* Aug. 2011: 192-193. (in English) [For details see: OAS No. 10298.]

**10661.** Vilenica, M.; Micetić Stanković, V.; Franković, M. (2011): Dragonfly fauna (Insecta, Odonata) in the Turo-polje region (Croatia). *Natura Croatica* 20(1): 141-158. (in English, with Croatian summary) ["This study presents the results of dragonfly fauna research in the Turo-polje region of Croatia. Faunal analyses were conducted in the period from 1986–2009, with some interruptions, while an ecological analysis (composition of dragonflies ac-

ording to habitat characteristics such as vegetation structure, air temperature, cloudiness) was conducted in the period 2007–2009. Faunal and ecological analyses were carried out at seventeen and nine localities, respectively. A total of 35 dragonfly species was recorded, indicating high species richness in comparison to the total number of 67 species known in Croatia. Zoogeographic analysis of the recorded dragonfly species showed the domination of the Holo-Mediterranean element which indicates complex glaciation and interglaciation processes during the geological past in Europe, when the Croatian territory served as a refugium. The results show that the distribution and abundance of dragonflies are indicative of habitat characteristics (vegetal structure, cloudiness and air temperature). Dragonflies prefer mosaic habitats (diverse vegetation structure) with average air temperatures ranging from 26–28°C and sunny weather. Since this research was conducted in only a part of the whole Turo-polje region, and only adult specimens were sampled, further research should be focused on the life cycles of dragonflies and their distribution throughout the entire Turo-polje region." (Authors)] Address: Vilenica, Marina, Faculty of Teacher Education, University of Zagreb, Dept in Petrinja, Trg Matice hrvatske 12, 44250 Petrinja, Croatia. E-mail: marina.vilenica@gmail.com

**10662.** Villanueva, R.J.T. (2011): Odonata fauna of Dimabok Lake and its surroundings, Davao Oriental, Mindanao Island, Philippines. *International Dragonfly Fund - Report* 38: 1-29. (in English) ["During three visits in October and December 2010 and May 2011, a total of 56 Odonata species was recorded. All species reported here represent first Odonata records in the area. The most noteworthy discoveries were one novelty (*Hydrobasileus vittatus*) to the Philippine fauna and two first records (*Tetracanthagyna brunnea* and *Aethriamanta gracilis*) from Mindanao Island. Seven species represent either new species to science or potentially new species; one *Drepanosticta* and one *Amphicnemis* are new to science, and another *Drepanosticta*, *Amphicnemis*, *Pseudagrion*, *Gomphidia* and *Urothemis* are potentially new to science." (Author)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., Davao City, 8000 Philippines. E-mail: rjtvillanueva@gmail.com

**10663.** Villanueva, R.J.T.; Gil, J.R.S. (2011): Odonata Fauna of Catanduanes Island, Philippines. *International Dragonfly Fund - Report* 39: 1-38. (in English) ["During a two week survey in April 2011, twenty six sites on Catanduanes Island, Philippines were explored. 42 Odonata species are new island records, raising the known species of the island into 60. Among the new island records are three *Amphicnemis* species new to science." (Authors)] Address: Gil, J.R.S., #310 Rizal Avenue Extension Street, San Vicente, Virac, Catanduanes, 4800 Philippines. E-mail: giljohnronel@yahoo.com

**10664.** Villanueva, R.J.T.; Schorr, M. (2011): Two new damselfly species from Polillo Island, Philippines (Odonata: Platystictidae). *Zootaxa* 3017: 46-50. (in English) ["*Drepanosticta wildermuthi* spec. nov. and *Sulcosticta vantoli* spec. nov. are described and illustrated. The two species are compared with their nearest relatives, *D. moorei* van Tol & Müller and *S. viticula* van Tol, respectively. *Drepanosticta wildermuthi* spec. nov. has shorter anterior lobe processes compared to *D. moorei*. *Sulcosticta vantoli* spec. nov. has a simpler paraproct structure compared to *S. viticula*." (Authors)] Address: Schorr, M., Schulstr. 7B, 54314 Zerf, Germany. E-mail: bierschorr@online.de

- 10665.** Wan, F.-x.; Jiang, Y.-h.; Wan, J. (2011): Description of *Bayadera bidentata* Needham and *Asiagomphus cuneatus* (Needham) larvae from Huangshan Mountain, China (Zygoptera: Euphaeidae; Anisoptera: Gomphidae). *Odonatologica* 40(2): 143-147. (in English) ["The morphology of the last instar larvae is described and illustrated for the first time, based on specimens from Anhui. Notes on their ecology and habitat are provided." (Authors)] Address: Wan, F.-x., Nanjing Forestry University, Nanjiang, Jiangsu-210037, China
- 10666.** Wang, Q.; Yuan, X.-z.; Liu, H. (2011): Community and biodiversity of aquatic insects attached on the stones in upland headwater stream of southwestern China: A case study of Yudu stream in Chongqing. *Acta Hydrobiologica Sinica* 35(5): 1-6. (in Chinese, with English title) [The taxa list includes "Euphaeidae"; in general the abundance of Odonata at the four sampling sites was very low.] Address: Yuan, X.-z., College of Resource and Environment Science, Chongqing University, Chongqing 400030, China. E-mail: xzyuan63@yahoo.com.cn
- 10667.** Weihrauch, F.; Karle-Fendt, A.; Krach, J.E.; Lohr, M.; Seidenbusch, R. (2011): *Coenagrion scitulum* in Bayern: Richtigstellung und Statusbericht (Odonata: Coenagrionidae). *Libellula* 30(1/2): 33-42. (German, with English summary) ["The published first record of *C. scitulum* in Bavaria (Germany) pertained in fact to misidentified exuviae of *C. puella* or *C. pulchellum*. The reasons for this misidentification are analysed and new features for the discrimination of *C. scitulum* exuviae from other, similar species are presented. In addition, all hitherto known records of *C. scitulum* in Bavaria are listed, including the actual first record. All records but one were hitherto taken in the lowlands of river Danube in the region of Ingolstadt, and a further distribution of *C. scitulum* along the Danube is regarded as most likely." (Authors) Address: Weihrauch, F., Jägerstr. 21A, 85283 Wolnzach, Germany. E-mail: florian.weihrauch@t-online.de
- 10668.** Weinländer, M.; Füreder, L. (2011): Crayfish as trophic agents: Effect of *Austropotamobius torrentium* on zoobenthos structure and function in small forest streams. *Knowledge and Management of Aquatic Ecosystems* (2011) 401, 22: 15 pp. (in English, with French summary) [Austria; "Crayfish are among the largest and most threatened invertebrates in freshwater habitats. Due to their size, behaviour and feeding activity they may affect structure and function of aquatic ecosystems and their organisms. Despite their importance in many freshwaters and available information on their ecology for several species little is known about the European crayfish *A. torrentium*. In order to evaluate the potential effects of indigenous crayfish presence on the structural and functional composition of the zoobenthic community, we measured population size and densities of three *A. torrentium* populations and compared macroinvertebrate assemblages and physicochemical parameters in three streams with and three without crayfish. The experimental setup considered crayfish effects at a large scale in defined reaches of pristine headwaters in association with the whole benthic fauna under natural conditions. Presence of *A. torrentium* significantly affected zoobenthic abundance, diversity and the relative proportions of functional feeding groups. In crayfish streams, especially Trichoptera and collector gatherers were more abundant and diverse, while sites without crayfish had significantly higher abundances and diversities of shredders and wood feeders. Our study provided strong evidence that the presence of the indigenous crayfish *A. torrentium* had important effects on the trophic cascades of headwater stream communities." (Authors) Odonata are only treated at the order level.] Address: Alpine Stream Ecology and Invertebrate Biology, Institute of Ecology, University of Innsbruck, Technikerstr. 25, 6020 Innsbruck, Austria. E-mail: martin.weinlaender@student.uibk.ac.at
- 10669.** Wellenreuther, M.; Sanchez-Guillen, R.A.; Cordeiro-Rivera, A.; Svensson, E.I.; Hansson, B. (2011): Environmental and climatic determinants of molecular diversity and genetic population structure in a coenagrionid damselfly. *PLoS ONE* 6(6): e20440. doi:10.1371/journal.pone.0020440: 16 pp. (in English) ["Identifying environmental factors that structure intraspecific genetic diversity is of interest for both habitat preservation and biodiversity conservation. Recent advances in statistical and geographical genetics make it possible to investigate how environmental factors affect geographic organisation and population structure of molecular genetic diversity within species. Here we present a study on a common and wide ranging insect, the blue tailed damselfly *Ischnura elegans*, which has been the target of many ecological and evolutionary studies. We addressed the following questions: (i) Is the population structure affected by longitudinal or latitudinal gradients? (ii) Do geographic boundaries limit gene flow? (iii) Does geographic distance affect connectivity and is there a signature of past bottlenecks? (iv) Is there evidence of a recent range expansion and (v) what is the effect of geography and climatic factors on population structure? We found low to moderate genetic sub-structuring between populations (mean  $F_{ST} = 0.06$ ,  $D_{est} = 0.12$ ), and an effect of longitude, but not latitude, on genetic diversity. No significant effects of geographic boundaries (e.g. water bodies) were found.  $F_{ST}$ - and  $D_{est}$ -values increased with geographic distance; however, there was no evidence for recent bottlenecks. Finally, we did not detect any molecular signatures of range expansions or an effect of geographic suitability, although local precipitation had a strong effect on genetic differentiation. The population structure of this small insect has probably been shaped by ecological factors that are correlated with longitudinal gradients, geographic distances, and local precipitation. The relatively weak global population structure and high degree of genetic variation within populations suggest that *I. elegans* has high dispersal ability, which is consistent with this species being an effective and early coloniser of new habitats." (Authors)] Address: Wellenreuther, Maren, Section for Animal Ecology, Ecology Building, Lund University, Sölvegatan 37, SE-223 62 Lund, Sweden. E-mail: maren.wellenreuther@zoekol.lu.se
- 10670.** White, E.; Zaremba, V.; Diehl, S. (2011): Flying jewels of New York. *New York State Conservationist* 65(6): 2-7. (in English) [This general account on the New York, USA-Odonata includes the note from Bill Chase on page 6 "Searching for Dragons -Finding Myself". For details see: <http://www.dec.ny.gov/docs/administrationpdf/0611consmagweb.pdf>.] Address: not stated
- 10671.** Wiesenborn, W.D. (2011): UV-excited fluorescence on riparian insects except Hymenoptera is associated with nitrogen content. *Psyche* Volume 2011, Article ID 875250: 6 pp. (in English) ["I photographed ultraviolet-excited fluorescence of external resilin on insects in 7 orders, 17 families, and 18 genera collected from shrubs and trees alongside the Colorado River in western Arizona, USA. The localized blue-fluorescence characteristic of resilin was emitted by a variety of structures including sutures and wing articulations on Odonata and Diptera and

membranous wings, compound eyes, or ocelli on Hemiptera, Neuroptera, and Hymenoptera. Different widespread, but blotchy, light-blue fluorescence was observed on cuticles of immature Orthoptera and adult Hemiptera. Insects in Hymenoptera and Coleoptera fluoresced least. Ranked amounts of fluorescence, relative to body area, were positively correlated with ranked nitrogen contents (%N of body dry-mass) of insects in genera excluding Hymenoptera. Nitrogen concentrations in insect exoskeletons appear to increase as abundances of resilin and other fluorescent, elastic proteins increase. These structural compounds may be an important nitrogen source for insectivorous vertebrates." [Figure 3 shows the blue fluorescence in UV light on ventrolateral and dorsal views of the thorax of *Pachydiplax longipennis*.] "Most fluorescence ... was produced by translucent white cuticle attached to the axillary and humeral plates below the base of each front and hind wing. The articulations above the wings similarly fluoresced blue. Broad bands of whitish cuticle ventrally joining the thorax and abdomen also fluoresced. Narrow bands of fluorescence were detected between the front coxa and trochanter, at the bases of the middle and hind coxae, and at the margins of the abdominal sternum." (Author) Address: Wiesenborn, W.D., USDI Bureau of Reclamation, Lower Colorado Regional Office, P.O. Box 61470, Boulder City, NV 89006, USA

**10672.** Winter, A.-E., de (2011): *Somatochlora flavomaculata* in the Eemshaven. *Brachytron* 14(1): 49-53. (Dutch, with English summary) ["This article describes the observation of *Somatochlora flavomaculata* in the Eemshaven harbour area, Groningen, in the Northern part of the Netherlands on 27 June 2008. Other observations in the Northern part of the Netherlands are discussed as well as wandering individuals in the rest of the country. The species is known to wander and has even been found in the Wadden Islands. The nearest populations in the Netherlands are in swamps and peat moor areas of North-west Overijssel / South-east Friesland, 80 km to the South and West of the Eemshaven area. The species also occurs in North-west Germany, where in 2008 a new population was discovered in Ochsenweide, Niedersachsen, a moorland that lays 50 km to the East of the Eemshaven area. Wandering *Somatochlora flavomaculata* individuals observed elsewhere could originate from the nearby Dutch or German populations." (Author) Address: Winter, A.-E., de, Landschapsbeheer Groningen, Talmaweg 23, 9981 CW Uithuizen, The Netherlands. E-mail: a.e.de.winter@Landschapsbeheergroningen.nl

**10673.** Winterbourn, M.J.; Pohea, S.R.; Ball, O.J.-P. (2011): Establishment of larval populations of the dragonfly *Tamea loewii* Kaup, 1866 (Odonata: Libellulidae) in lakes of northern New Zealand. *New Zealand Journal of Zoology* 38(2): 173-179. (in English) [*T. loewii* "was first seen in New Zealand in 2005, on the Aupouri Peninsula, Northland, and is likely to be self-introduced from Australia. To determine whether the species had become established on the Peninsula, an aquatic survey of 17 lakes was carried out in November 2008. Larvae were found in eight lakes, including six at the southern end of the Peninsula. Most colonised lakes were surrounded by pasture and had dense marginal beds of sedges and rushes where most larvae were collected. Six of an estimated 14 larval instars were found, the penultimate (F-1) and antepenultimate (F-2) instars being most common. The most abundant prey items in the guts of 17 late-instar larvae were Corixidae, chironomid larvae and damselfly larvae. The potential effect of *T. loewii* on resident lake faunas is dis-

cussed briefly." (Authors)] Address: Winterbourn, M.J., School of Biological Sciences, University of Canterbury, Christchurch, New Zealand. Email: michael.winterbourn@canterbury.ac.nz

**10674.** Yoshida, M. (2011): Odonata in the upper and middle reaches of the Yahagi River, 2nd report. *Yahagi Research* 15: 27-42. (in Japanese, with English translation of title) [A total of 63 Odonata species down- and upstream of a dam in the Yahagi River, Japan were recorded. 62 species were found downstream of the dam, and only 33 species were recorded in the upstream stretch of the river. The running waters dwelling species were lacking from the upstream sections of the river.] Address: not transliterated into English

**10675.** Yu, X.; Bu, W. (2011): A description of the remarkable larva of *Pseudolestes mirabilis* Kirby (Odonata: Pseudolestidae). *International Journal of Odonatology* 14 (2): 105-110. (in English) ["The larva of the Chinese endemic *Pseudolestes mirabilis* is described and figured for the first time. Specimens were collected from Hainan, the only known locality for this species. The presence of ventral paired gill tufts on S10 and sack-like caudal gills indicate that among other zygopteran families this species may be most closely related to the Amphipterygidae, but other characters, especially those of the adult suggest it may be sufficiently unique to warrant placement in its own family." (Authors)] Address: Yu, X., Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, 300071, PR China. E-mail: nk\_yuxin@yahoo.cn

**10676.** Zaldívar Ezquerro, C.; Rodríguez, P.C.; Latasa Asso, T. (2011): Provisional catalogue and biogeographical analysis of the Odonata of La Rioja (Spain). *Boletín de la S.E.A.* 48(1): 389-393. (in English, with Spanish summary) ["49 species are included (23 Zygoptera and 26 Anisoptera) in the provisional catalogue, of which 22 species are recorded from La Rioja, Spain for the first time. A biogeographical analysis of these taxa is also provided." (Authors)] Address: Zaladrana Odonatology Group and the Institute of La Rioja Studies Research Plan: "Order of Odonata insects in the autonomous region of La Rioja", C/. General Urrutia, 61 F. 26006 Logroño (La Rioja, Spain. E-mail: carlos.zaldivar@larioja.org

**10677.** Zhang, H.-j.; Sei, L. (2011): Study on *Gynacantha* genus (Odonata: Aeshnidae) from China. *Journal of Anhui Agricultural Sciences* 39(13): 7562-7564, 7566. (in Chinese, with English summary) [Nine *Gynacantha* species are known from China. *G. japonica* Barteneff, 1909 and *G. saltatrix* Martin, 1909 are new records for Shaanxi Province. Information on the distribution of the taxa in China are given. The species are illustrated and keyed.] Address: Zhang, H.-j., Shaanxi Bioresource Key Laboratory, Shaanxi Univ. of Technology, Hanzhong, Shaanxi 723000, China

**10678.** Zhang, Z.-q. (2011): Describing unexplored biodiversity: Zootaxa in the International Year of Biodiversity. *Zootaxa* 2768: 1-4. (in English) [In the International Year of Biodiversity (2010), Zootaxa published 30 Odonata species new to science including three new genera.] Address: Zhang, Z.-q., Landcare Research, Private Bag 92170, Auckland 1142, New Zealand. E-mail: ZhangZ@landcareresearch.co.nz

**Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for linguistic help and Geert de Knijf, Werner Piper for contributing many papers to this issue.**



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105; E-mail: K.Reinhardt@sheffield.ac.uk

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: mg\_marinov@yahoo.com

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

## 1997

**10679.** Carl, M. (1997): Die stillgelegte Kiesgrube Jesenwang - Artenreservoir für den Landkreis Fürstentfeldbruck (Oberbayern). 1. Bestandsaufnahme der Wasserinsekten (Ephemeroptera, Odonata, Heteroptera, Planipennia, Coleoptera, Trichoptera). Nachrichtenblatt der Bayerischen Entomologen 46(3/4): 81-89. (in German, with English summary) [The aquatic insect fauna of a gravel-pit in southern Bavaria was studied. The 80 species include 11 common Odonata species.] Address: Carl, M., Gollnbergstr. 12, 82299 Türkenfeld, Germany

**10680.** Onore, G. (1997): A brief note on edible insects in Ecuador. Ecology of food and nutrition 36(2-4): 277-285. (in English) ["Ecuador still conserves the ancestral tradition of entomophagy, notably in the countryside where the native population is relatively isolated from technological progress. Eighty-three (83) edible species are listed for the country; none of them are a main dish but many of the insects are used to complement other animal protein sources in the diet. The most common edible insects belong to the orders Coleoptera and Hymenoptera, which are consumed either in the larval or adult stage." (Author) *Aeshna brevifrons* is reported as part of the food of the ethnic group of Quichuas.] Address: Giovanni Onore, G., Departamento de Biología, Pontificia Universidad Católica del Ecuador, Apartado 17.01.2184, Quito, Ecuador. E-mail: GONORE@puce.edu.ec

## 1998

**10681.** Zilihona, I.; Heinonen, J.; Nummelin, M. (1998): Arthropod diversity and abundance along the Kihansi gorge (Kihansi River) in the southern Udzungwa Mountains, Tanzania. Journal of East African Natural History 87: 233-240. (in English) ["Arthropod diversity and abundance at the order level was investigated along the Kihansi Gorge in the southern Udzungwa Mountains between June and August 1997 by using sweep netting, timed Lepidoptera counts, malaise-traps, solar powered lighttraps, baited pitfall-traps, sticky-traps and baited butterfly traps. The study was undertaken to predict the possible effects of damming the Kihansi River above the fierce waterfall in the gorge. The gorge was divided into four micro-habitats, two of which are affected by

waterfall spray (open spray, forest spray), and two of which were not affected directly by the waterfall (forest and riverine sites). The highest arthropod diversity was found in the forest spray, whereas the open spray contained the least. The forest spray area harboured the rarest arthropod orders. Arthropods are most abundant in the riverine site where 31 % of all sampled arthropods were recorded. The forest spray channel, forest site and open spray channel follow with 28%, 23 % and 18 % of the sample respectively. It is suggested that the Mhalala Stream should be diverted to the gorge to replace the dammed Kihansi River. This would maintain at least partially the extraordinary micro-climate of the gorge and possibly retain the specialised arthropod community." (Authors) A single zygopteran specimen (no species details) was found.] Address: Zilihona, I., Tanzania Forestry Research Institute, Silvicultural Research Centre, P.O. Box 95, Lushoto, Tanzania

## 1999

**10682.** Sierro, A.; Keim, C. (1999): Activité entomologique valaisanne pour 1997 et 1998. Observations rassemblées dans le cadre de la Société entomologique valaisanne (SEV) sous l'expertise de Gilles Carron, Paul Marchesi et Christophe Praz. Bull. Murithienne 117: 61-71. (in German/French) [Switzerland. Records of the following species are documented: *Sympetma paedisca*, *Ischnura elegans*, *Coenagrion puella*, *Erythromma najas*, *E. viridulum*, *Somatochlora flavomaculata*, *Libellula depressa*, *Orthetrum cancellatum*, *Sympetrum depressiusculum*, and *S. fonscolombii*] Address: Sierro, A., Chelin, 3978 Flanthey, Switzerland

## 2000

**10683.** Kefford, B.J. (2000): The effect of saline water disposal: implications for monitoring programs and management. Environmental Monitoring and Assessment 63: 313-327. (in English) ["In an effort to combat rising groundwater tables and expanding saline lakes, saline water has been disposed of into the aquatic environment, despite there being little information as to the environmental effects. Monitoring of the effect of saline lake water disposal on aquatic macroinvertebrates and water quality was conducted in the Barwon River, south west Victoria, Australia, in association with toxicity tests.

The disposal of saline lake water was associated with changes in macroinvertebrate community structure. Contrary to expectations, increases in electrical conductivity (a measure of salinity) was not the only water quality parameter associated with saline water disposal. An experiment was conducted where the toxicity of saline lake water was compared to that of a prepared solution of the same electrical conductivity. Toxicity was greater in the saline lake water than the prepared solution. The results suggest that saline water disposal is impacting on macroinvertebrate fauna but electrical conductivity is not the only factor responsible. These results have consequences for both management of aquatic resources and for monitoring programs which are discussed." (Author) Odonata (*Nososticta*, *Austrolestes annulosus* and *Ischnura heterostriata*) were reported with an increase in abundance.] Address: Kefford, B.J., Dept of Biotechnology and Environmental Biology, RMIT University, PO Box 71, Bundoora, 3083, Victoria, Australia. E-mail: ben.kefford@rmit.edu.au

**10684.** Sierro, A.; Keim, C.; Marchesi, P. (2000): Activité entomologique pour 1999 et 2000. Observations rassemblées dans le cadre de la Société sous l'expertise de Gilles Carron. Bull. Murithienne 118: 93-103. (in German/French) [Switzerland. records of the following species are documented: *Calopteryx virgo*, *C. splendens*, *Lestes viridis*, *Sympetma fusca*, *S. paedisca*, *Erythromma najas*, *E. lindeni*, *Ischnura pumilio*, *Aeshna caerulea*, *Anacischna isosceles*, *Anax parthenope*, *A. ephippiger*, *Cordulegaster bidentata*, *C. boltonii*, *Somatochlora arctica*, *S. flavomaculata*, *Orthetrum coerulescens*, *Leucorrhinia albifrons*, *Sympetrum fonscolombii*, and *S. depressiusculum*] Address: Sierro, A., Chelin, 3978 Flanthey, Switzerland

## 2001

**10685.** Kawashima, I. (2001): Description of the female adult of *Oligoaeschna niisatoi* Karube, 1998 (Aeshnidae). Tombo 43: 18-20. (in English) [The female adult of *O. nusatoi* is described, based on materials from northern Vietnam: Materials examined: 2 females, Mt. Pia Oac, Cao Bang Province, N. Vietnam, 17-V-1998.] Address: Kawashima, I., Nagasawa 1-50-9, Yokosuka-shi, Kanagawa, 239-0842 Japan

**10686.** Naraoka, H. (2001): Discovery of *Ischnura elegans elegans* (Van der Linden) in Aomori Prefecture (Coenagrionidae). Tombo 43: 29-30. (in Japanese, with English summary) ["In Japan, *Ischnura elegans elegans* has so far been recorded from northern and eastern Hokkaido. In autumn of 2000, I collected 6 males of this species at a pond, Uchmuma (40° 56' N141° 20' E), Rokkasho village, Aomori Prefecture. On average the body sizes of the specimen from Uchinuma were smaller than those from Hokkaido. The dates of collection (17 Sept. -1 Oct.) at Uchinuma were far later than those in Hokkaido (June - August). These facts suggest that the generation time (the length of one generation) may be reduced in the Uchinuma population." (Author)] Address: Naraoka, H., Motozumi 36-71, Fukunoda, Itayanagi, Kitatsugaru-gun, Aomori 038-3661, Japan. E-mail: sbnkq127@ybb.ne.jp

**10687.** Ohshima, Y.; Karube, H. (2001): Discovery of *Davidius moiwanus sawanoi* from Okayama Prefecture. Tombo 43: 12-13. (in Japanese, with English summary) ["*D. moiwanus sawanoi* has hitherto been known only

from Yahata-kogen, northwestern Hirosima Prefecture, excepting a record at Izumo, Shimane Prefecture, Japan. In the spring of 2000, several adults and larvae of this subspecies were collected from a valley in northern Okayama Prefecture. This habitat is 150 km distant from the east end of Yahata-kogen. Some features of the morphology of this subspecies and the habitat are briefly described." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**10688.** Rademacher, M. (2001): Steiniges Ödland – Das verkannte Paradies. Publisher: HeidelbergCement AG, Berliner Straße 6, 69120 Heidelberg, Germany: 24 pp. (in German) [This is a tie-in to a film produced by the HeidelbergCement AG, Heidelberg, Germany to demonstrate biodiversity in excavated quarries. Odonata are represented by *Orthetrum brunneum*, *Libellula depressa*, *Anax imperator*, and *Enallagma cyathigerum*. They are illustrated and briefly introduced into habitat and habits.] Address: HeidelbergCement AG, Werk Schelklingen, Zementwerk1/1, 89601 Schelklingen, Germany. E-mail: michael.rademacher@htc-gmbH.com

**10689.** Wada, S. (2001): The first records of *Macromia daimoi* from Fukui Prefecture. Tombo 43: 37-38. (in Japanese, with English summary) [Some larvae and adults of *M. daimoi* were collected at the Mmamigawa River, Obama-sni, Fukui Prefecture, Japan. These are the first records of the species from Fukui Prefecture.] Address: not stated

## 2002

**10690.** Eislöffel, F. (2002): Die Fauna des Soonwaldes. In: Kirschner, Monika & Hans-Werner Ziemer (Redaktion): Die Soonwaldkonferenz. Zukunftsregion zwischen Hunsrück und Nahe 25. Oktober bis 26. Oktober 2002: 22-26. (in German) [The paper gives a condensed overview on the regional fauna and highlights in the eastern part of the Middle range mountain Hunsrück, Rheinland-Pfalz, Germany. Extensive odonatalogical studies on the Soonwald-Odonata were published by the author in 1985 and 1989. Special emphasis is given to the species of brooks and boggy ponds.] Address: Schlotmann, F., Weserstraße 11, D-55296 Harxheim, Germany. E-mail: frank.schlotmann@gmx.net

**10691.** Garcia-Aviles, J. (2002): Biodiversidad de los humedales del Parque Regional del Sureste. II. Libéllulas. Consejería de Medio Ambiente. Centro de Investigaciones Ambientales de la Comunidad de Madrid "Fernando González Bernáldez". Serie Documentos 36: 60 pp. (in Spanish) [A total of 53 Odonata species is known from the municipal of Madrid, Spain. A study of the regional fauna of the Parque Regional del Sureste resulted in 17 species. These are mapped, and briefly characterised in a monographic style presenting information on general distribution, regional distribution in the park, faunistic data prior the study, habitat preferences and phenology. In addition, similar information is also provided for the rest of the Odonata fauna of the Madrid municipal.] Address: not stated

**10692.** Marches, P.; Sierro, A.; Fournier, J. (2002): Chronique entomologique valaisanne pour 2001 et 2002. Observations rassemblées dans le cadre de la Société entomologique valaisanne (SEV). Bull. Murith-

ienne 120: 25-32. (in Bilingual in French and German) [Switzerland; The paper includes records of *Calopteryx virgo*, *C. splendens*, *Lestes sponsa*, *Coenagrion hastulatum*, *Aeshna isosceles*, *A. juncea*, *A. mixta*, *Cordulia aenea*, *Somatochlora alpestris*, *Crocothemis erythraea*, *Leucorrhinia dubia*, *L. albifrons*, *Orthetrum cancellatum* and *O. coerulescens*.] Address: Marches, P., Route du Châtel 57, 1880 Bex

**10693.** Tatenhorst, L.; Kaschek, N.; Meyer, E.I. (2002): Der Steinbeißer (*Cobitis taenia* L.): Aspekte zur Ökologie einer bedrohten Art. Schöling-Verlag, Münster: 133 pp + 9 pp Anhang. (in German) [*Calopteryx splendens* and *Ischnura elegans* were found to co-occur with the fish species *C. taenia* along the brook Steinfurter Aa, Nordrhein-Westfalen, Germany.] Address: Meyer, Elisabeth, Westfälische Wilhelms-Universität Münster, Institut für Evolution und Ökologie der Tiere, Abteilung Limnologie, Hüfferstr. 1, 48149 Münster, Germany. E-mail: meyer@uni-muenster.de

### 2003

**10694.** Boulton, A.J. (2003): Parallels and contrasts in the effects of drought on stream macroinvertebrate assemblages. *Freshwater Biology* 48(7): 1173-1185. (in English) [(1) It is axiomatic that unusually long dry periods (droughts) adversely affect aquatic biota. Recovery after drought is rapid by macroinvertebrates that possess strategies to survive drying or are highly mobile but other taxa take longer to recolonise depending on the timing, intensity, and duration of the dry phase. (2) Although drought acts as a sustained 'ramp' disturbance, impacts may be disproportionately severe when certain critical thresholds are exceeded. For example, ecological changes may be gradual while a riffle dries but cessation of flow causes abrupt loss of a specific habitat, alteration of physicochemical conditions in pools downstream, and fragmentation of the river ecosystem. Many ecological responses to drought within these habitats apparently depend on the timing and rapidity of hydrological transitions across these thresholds, exhibiting a 'stepped' response alternating between gradual change while a threshold is approached followed by a swift transition when a habitat disappears or is fragmented. (3) In two Australian intermittent streams, drought conditions eliminated or decimated several groups of macroinvertebrates, including atyid shrimps, stoneflies and free-living caddisflies. These taxa persisted during the early stages of the drought but did not recruit successfully the following year, despite a return to higher-than-baseflow conditions. This 'lag effect' in response to drought emphasises the value of long-term survey data. Although changes in faunal composition were inconsistent among sites, marked shifts in taxa richness, abundance and trophic organisation after the riffle habitat dried provide evidence for a stepped response. (4) Responses by macroinvertebrate assemblages to droughts of differing severity in English chalk streams were variable. The prolonged 1988-92 drought had a greater impact than shorter droughts in the early 1970s but recovery over the next 3 years was swift. Effects of the 1995 summer drought were buffered by sustained groundwater discharge from the previous winter. These droughts tended to reduce available riverine habitats, especially via siltation, but few taxa were eliminated because they could recolonise from perennial sections of the chalk streams. (5) In the contrasting environments

of the intermittent streams studied in England and Australia, there are parallels in the rapid rates of recolonisation. However, recruitment by taxa that lack desiccation-resistant stages or have limited mobility is delayed. Currently, long-term data on these systems may be insufficient to indicate persistent effects of droughts or predict the impacts of excessive surface or groundwater abstraction or the increased frequency and duration of droughts expected with global climate change." (Author) The paper includes a reference to Odonata.] Address: Boulton, A.J., Ecosystem Management, University of New England, Armidale, NSW, 2351, Australia. E-mail: aboutlton@metz.une.edu.au

### 2004

**10695.** Alling, V.; Andersson, P.; Fridriksson, G.; Rubio Lind, C. (2004): Oskarshamn site investigation. Biomass production of Common reed (*Phragmites australis*), infauna, epiphytes, sessile epifauna and mobile epifauna. Common reed biotopes in Oskarshamn's model area. Svensk Kärnbränslehantering AB, Swedish Nuclear Fuel and Waste Management Co, Box 5864, SE-102 40 Stockholm, Sweden: 19 pp + app.. (in English) ["The aim of the study was to determine and estimate the total amount of Common reed biomass, *Phragmites australis*, both standing crop and the rhizome biomass, in SKB's regional modelling area in Simpevarp, Oskarshamn. The biomasses of infauna and mobile epifauna are determined as well as the carbon content in the sediment. The grand mean value for reed biomass in the Oskarshamn area is 1,254.3 g/m<sup>2</sup>. Mean value for reed rhizome biomass in the same area is 3,705.6 g/m<sup>2</sup>. The result from the standing crop biomass measurement corresponds with earlier studies of reed biomass, but the mean biomass value for the rhizome was almost the double. Two of the infauna taxa, Diptera and Gastropoda, were found in all of the five sites where Gastropoda represented the greatest biomass and Diptera the highest abundance. Epiphytes, such as macro algae, could not be detected on any reed straws. The mobile epifauna sampling did result in a relative high number of different taxa. Gastropoda and Anisoptera were the taxa that showed the highest biomass value with a relatively low abundance number. Taxa showing the reversed relation between biomass and abundance were Isopoda and possibly Diptera. Carbon content of the sediment, sampled in the edge of the reed stands was approx 11% with high variation between the sites." (Authors)] Address: Svensk Kärnbränslehantering AB, Swedish Nuclear Fuel and Waste Management Co, Box 5864, SE-102 40 Stockholm, Sweden

**10696.** Arab, A.; Lek, S.; Lounaci, A.; Park, Y.S. (2004): Spatial and temporal patterns of benthic invertebrate communities in an intermittent river (North Africa). *Ann. Limnol. - Int. J. Lim.* 40(4): 317-327. (in English) ["The spatial and temporal distribution patterns of benthic macroinvertebrates were studied in an intermittent river in Algeria (Chelif wadi, North Africa), by using the self-organizing map (SOM), an unsupervised artificial neural network. The samples were collected monthly at 8 sampling sites (630 to 20 m above sea level) and community variation was analysed in space and time. Overall, the study sites showed a very poor macroinvertebrate fauna: more than 60% of samples contained less than 11 species, and 99% had less than 30 species.



Furthermore, most species displayed very low abundance: 66% of the species were represented by less than 20 individuals (abundance). Among the identified taxa, Chironomidae was the dominant taxon at all sampling sites except at the most upstream site (630 m a.s.l.) where it was replaced by Coleoptera. Concerning monthly changes, the species richness was very low in August and October. Through the learning process of the SOM, samples were classified into four clusters by the SOM, and the classification was mainly related to the location of the sampling sites. Benthic macroinvertebrates were divided into four classes, which revealed the influence of pollution on their longitudinal distribution in this stream. According to the distribution gradients of the environmental variables on the SOM map, their influence on the classification of the sampling sites could be assessed effectively." (Authors) The following taxa - based on larval identification - are listed: *Erythronema lindeni*, *Platynemis acutipennis*, *Coenagrion armatum*, *Stylurus flavipes*, *Gomphus pulchellus*, *Libellula depressa*, *Libellula quadrimaculata*, *Somatochlora arctica*, *Libellula fulva*, and *Gomphus vulgatissimus*.] Address: Park, Y.S., Laboratoire Dynamique de la Biodiversité (LADYBIO), UMR 5172, CNRS - Université Paul Sabatier, 118 route de Narbonne, 31062 Toulouse cedex 4, France. E-mail: park@cict.fr

**10697.** Matsubara, K. (2004): Daily activity and reproductive behaviors of *Calopteryx atrata* Selys (Zygoptera: Calopterygidae). Tombo 47: 47-52. (in Japanese, with English summary) ["The daily activity and reproductive behaviours of a territorial damselfly *C. atrata* were investigated at the upper Tafuse River in Saga-shi, Saga Prefecture, Northern Kyushu. The average number of active males did not notably change from early morning to late afternoon, and almost all active males were territorial. Although the average number of active females was always less than that of active males, the female numbers increased from 10:00 am to 17:00 pm, when reproductive behaviour was frequently observed, and fell abruptly in the late afternoon when females flew to roosting sites for the night. A territorial male established a territory containing one or more oviposition sites and several perching sites. The territorial and mating behaviours of *C. atrata* males were frequently observed from early morning and their frequency peaked around noon, thereafter decreasing until late afternoon. On the other hand, feeding flights were observed less frequently in the daytime but their frequency increased abruptly during the late afternoon, when the territorial and mating behaviours of males were less. Territorial males defended against intruding conspecific males by aerial displays. They normally chased intruders out of their territories with brief pursuit flights. On the other hand, escalated combats sometimes occurred between territorial males and intruders. During these combats, flight speed increased, involving back-and-forth chasing and circling or spiralling by both males, lasting much longer (up to an hour or more) over other oviposition sites. When a territorial male found a female approaching an oviposition site within his territory, he began a pair-forming display and courtship flight. After copulation, the males performed a non-forming display and courtship flight. After copulation, the male performed a non-contact guarding behaviour for the ovipositing female inside his territory. During her oviposition, he chased approaching males out of his territory." (Author)] Address: Matsubara, K., Department of Applied Biological Sciences, Faculty of Agriculture, Sa-

ga University, Honjo 1, Saga 840-8502, Japan. E-mail: mkd0335@hotmail.com

**10698.** Torralba-Burrial, A.; Ocharan, F.J. (2004): Presencia y comportamiento invernal de adultos de *Sympetrum striolatum* en el NE de España (Odonata: Libellulidae). Boln Asoc. esp. Ent. 28(3/4): 189-191. (in Spanish, with English translation of title) [At Hoya de Huesca (Bandaliés, NE Spain) several territorial *S. striolatum* males were observed on 26 & 29-XII-2001, 13 & 21-I-2002 and 2-II-2002 (medium air temperature, range 5.5-7.0°C).] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

## 2005

**10699.** Borisov, S.N. (2005): Summer migration of species of *Sympetma* Burmeister, 1839 (Odonata, Lestidae) in northern Tien-Shan. Euroasian ent. J. 4(3): 256. (in Russian, with English summary) ["The details are provided on the migration of *S. gobica*, *S. fusca* and *S. paedisca* from the lowlands to the foothills of northern Tien-Shan in June 2005." (Author)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**10700.** Eggers, T.O. (2005): Wirkung extremer Wasserstände auf die Benthoszönose der Mittleren Elbe. Deutsche Gesellschaft für Limnologie (DGL): Tagungsbericht 2004 (Potsdam): 314-318. (in German, with English summary) ["In the last both summers extreme water discharges could be recognized at the River Elbe. In the summer 2002 the discharge of the Elbe was very high, while in 2003 the discharge was very low. Both extreme discharges influenced the aquatic macroinvertebrate assemblage significantly. This effect could be noticed on soft substrates within the groyne fields as on the hard substrate and littoral sections along the groynes." (Author)] Address: Eggers, T.O., Zoologisches Institut, TU Braunschweig, Spielmannstr. 8. 38092 Braunschweig, Germany. E-mail: t.eggers@tu-braunschweig.de

**10701.** Gunzburger, M.S.; Travis, J. (2005): Critical literature review of the evidence for unpalatability of amphibian eggs and larvae. Journal of Herpetology 39(4): 547-571. (in English) ["We examined 142 papers, which contained 603 separate predator-prey trials, to investigate whether unpalatability is an important defense against predation for amphibian eggs and larvae. Although unpalatability is often cited as an antipredator defense, it was rarely demonstrated that 89% of the trials that we reviewed found prey to be palatable. The most extensively studied taxa, the genera *Bufo* and *Rana*, were diagnosed unpalatable at rates comparable to all other taxa. Diagnoses of unpalatability were not always consistent for a prey species across different predators and were influenced by experimental method. Despite these limitations and our conservative definition of unpalatability, several patterns emerged. First, across all taxonomic groups, eggs and hatchlings were unpalatable more often than mobile larval stages. Second, species that breed in temporary ponds were more likely to be palatable to fish predators than those that breed in permanent habitats. Third, fish and caudates were more likely to find amphibian prey unpalatable than insect

predators. We conclude that unpalatability is rare, but when it occurs, it is a property of an ensemble (predator, prey, and alternative prey) and a life-history stage in a particular circumstance but is not a species-specific attribute. We suggest methods of experimentation that could strengthen future research on the palatability of amphibian eggs and larvae. [...] The most common predators used in trials were salamander adults and larvae, which found prey unpalatable in 15 of 123 trials. Other predators finding prey unpalatable in some trials were aquatic insects (odonate naiads, coleopterans, heteropterans, and others), snakes (*Thamnophis* spp.), tadpoles, snails, mammals, and turtles. Vertebrate predators (fish and salamander adults and larvae) were twice as likely to find prey unpalatable than insect predators (Odonata, Hemiptera, and Coleoptera;  $\chi^2 = 5.16$ ,  $P = 0.023$ )." (Authors)] Address: Gunzburger, Margaret, United States Geological Survey, Florida Integrated Science Center, 7920NW71st Street, Gainesville, Florida 32653-3701, USA. E-mail: margaretagunzburger@usgs.gov

**10702.** Kazantzidis, S.; Goutner, V. (2005): The diet of nestlings of three Ardeidae species (Aves, Ciconiiformes) in the Axios Delta, Greece. *Belg. J. Zool.* 135(2): 165-170. (in English) ["The diets of the little egret (*Egretta garzetta*), the night heron (*Nycticorax nycticorax*) and the squacco heron (*Ardeola ralloides*) were studied by analyzing nestling regurgitations collected during five breeding seasons (1988-1990 and 1994-1995) at a heronry in the Axios Delta (Northern Greece). In total, 267 regurgitations from little egrets, 247 from night herons and 19 from squacco herons (only in 1995) were collected and analyzed. Each prey item was identified to the lowest possible taxon. The dry mass of each prey taxon was also estimated from oven-dried prey specimens collected in the field. Little egret: At least 58 different taxa were identified among 5,108 prey items (1,499 g dry mass). By number, fish were the most important prey category (39.6%), followed by insects (32.1%) and amphibians (24.9%) (Fig.1). From a total of 22 fish species identified, *Aphanius fasciatus*, *Gambusia affinis* and *Gasterosteus aculeatus* represented 85.5% of all items. Of at least 27 species of insects, the majority were larvae of Odonata, Dytiscidae and Hydrophilidae (94.3% of all insect larvae). Among imagoes, *Gryllotalpa gryllotalpa* and *Zygoptera* spp. (Odonata) prevailed, making up 72.2% of all items." (Authors) Approximately 90% less Odonata contributed to the diet of Night herons and Squacco herons.] Address: Kazantzidis, S., Forest Research Institute, National Agricultural Research Foundation, GR-57006 Vassilika, Thessaloniki, Greece. E-mail: savkaz@fri.gr

**10703.** Onore, G. (2005): Edible insects in Ecuador. Paoletti M.G. (ed.) 2005. *Ecological Implications of Minilivestock. Potential of Insects, Rodents, Frogs and Snails* Science Publishers, Enfield N.H., USA: 343-352. (in English) ["In Ecuador the ancestral tradition of entomophagy still exists, particularly in the countryside where the native population is relatively isolated from technological progress. 82 edible species are listed for the country; none is a main dish but many are used to complement other animal protein sources in the diet. The most common edible insects belong to orders Coleoptera and Hymenoptera and are consumed at either the larval or the adult stage." (Author) *Aeshna brevifrons* is counted to the food of the ethnic group of Quichuas.] Address: Onore, G., Departamento de Bio-

logia, Pontificia Universidad Católica del Ecuador, Apartado 17-01-2184, Quito, Ecuador. E-mail: GON-ORE@puce.edu.ec

**10704.** van Duinen, G.-J.; Dees, A.; Esselink, H. (2005): Baseline survey of aquatic invertebrates in the wetland restoration area of Raessaare Bog. Report Bargerveen Foundation/Department of Animal Ecology, Radboud University Nijmegen, The Netherlands: 17 pp. (in English) [Faunistic data taken from the Raessaare bog, SW Estland, include *Aeshna subarctica*, *Anax imperator*, *Coenagrion hastulatum*, *Leucorrhinia rubicunda*, *Libellula quadrimaculata*, *Orthetrum cancellatum*, *Somatochlora arctica*, *S. flavomaculata*, *S. metallica*, and *Sympetrum danae*.] Address: Bargerveen Foundation/Department of Animal Ecology, Radboud University Nijmegen, P.O. Box 9010, NL-6500 GL Nijmegen, The Netherlands. E-mail: G.vanDuinen@science.ru.nl

**10705.** Ward-Campbell, B.M.S.; Beamish, F.W.H.; Kongchaiya, C. (2005): Morphological characteristics in relation to diet in five coexisting Thai fish species. *Journal of Fish Biology*: 1266-1279. (in English) ["Morphological characteristics and intestinal content were analysed for five species of coexisting freshwater fishes in Thailand: *Rasbora caudimaculata*, *Schistura desmotes*, *Dermogenys pusillus*, *Xenentodon cancila* and *Monopterus albus* (all found in riffle habitats in Thai streams). *R. caudimaculata*, *S. desmotes* and *D. pusillus* fed predominantly on ephemeropterans, hymenopterans and dipterans, *X. cancila* fed predominantly on fishes, and larger aquatic invertebrates such as Odonata, and *M. albus* fed on detritus as well as invertebrate prey such as crustaceans and Odonata. Intestine length, mouth height, mouth width, eye position and mouth orientation varied among all five species. Canonical analysis of discriminance of mouth height, width and intestine length showed a clear dispersion of species, which was supported by intestine content. Evolutionary processes leading to the present differences in morphological characters resulted in each of the five species consuming a different portion of the available resource base, thereby facilitating coexistence." (Authors)] Address: Ward-Campbell, B.M.S., Department of Biology, Burapha University, Bangsaen, Chonburi 20131, Thailand. E-mail: bwardcampbell@hotmail.com

**10706.** Wendler, S. (2005): Jungfernzeugung auf den Azoren. *Biologie in unserer Zeit* 35(5): 299. (in German) [Brief report on the parthenogenetic reproduction of *Ischnura hastata* on the Azores, Portugal directed to teachers and students.] Address: not stated

## 2006

**10707.** Borisov, S.N. (2006): Dragonfly night breeding (Odonata) in temperate latitudes western Asia. *Siberian Journal of Ecology* 13(4): 449-455. (in Russian, with English summary) ["The night emergence was established for 30 species and subspecies of dragonflies in temperate latitudes of West Asia. This phenomenon is most characteristic of the plains in Middle Asia, where 20 species with night transformation are known; for a half of them, it is obligate. In southern mountains and in West Siberia, the night emergence was observed for seven taxons. The adaptive value of dragonfly issue and flying away from water reservoirs during the dark period lies in avoidance of extremely high day temperature, dryness and insolation, on the one hand, and

preying on the other." (Author) Results and discussion consider the following species *Anormogomphus kirtschenkoi*, *Lindenia tetraphylla*, *Sympecma gobica*, *S. fusca*, *S. paedisca*, *Coenagrion armatum*, *Ophiogomphus reductus*, *Stylurus flavipes*, *Anax ephippiger*, *Lestes macrostigma*, *Anax imperator*, *A. parthenope*, *Aeshna grandis*, *A. crenata*, *A. mixta*, *A. affinis*, *Crocothemis servilia*, *C. erythraea*, *Sympetrum vulgatum vulgatum*, *S. vulgatum decoloratum*, *S. flaveolum*, *S. striolatum*, *S. fonscolombii*, *S. meridionale*, *S. arenicolor*, *Orthetrum sabina*, *O. brunneum*, *O. albistylum*, *Selysiothemis nigra*, and *Pantala flavescens*.] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Bran, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**10708.** Bowman, N. (2006): Reports from Coastal Stations - 2005: Eccles-on-sea, Norfolk. *Atropos* 27: 70-71. (in English) ["It was also a quiet year for Odonata with even the resident population of *Erythromma viridulum* present in depressingly low numbers. However, some fresh primary migrants were noted, particularly on 29 August when 80 were counted, including some 30 pairs in tandem." (Author)] Address: not stated

**10709.** Canedo, C.; Garcia, J.P.; Fernandes, R.; Pomal, J.P. (2006): Diet of *Pipa carvalhoi* (Amphibia, Pipidae) is not influenced by female parental care. *Herpetological Review* 37(1): 44-45. (in English) [Odonata larvae contributed between 0 – 0.2% to the diet, while chironomid larvae were consumed exclusively to near 100%.] Address: Canedo, C., Departamento de Vertebrados, Museu Nacional/UFRJ, Quinta da Boa Vista, 20940-040 Rio de Janeiro, RJ, Brazil. E-mail: canedo@mn.ufrj.br

**10710.** Clancy, S. (2006): Reports from Coastal Stations - 2005: Dungeness area, Kent. *Atropos* 27: 60-62. (in English) ["Odonata records of interest in the area included at least nine different male *Anax parthenope* in the Dungeness area as follows: two at Cooke's Lake on 22 June, two at the Water Tower pits on 23 June with one still there on 24th, one at the Water Tower Pits on 3 July, one on Lade Pit on 17 July, one at Hooker's Pits on 20 July, one at the Long Pits on 1 August, and one at New Diggings on 25 and 27 August. In contrast, there were only three records of single male *Sympetrum fonscolombii* on the RSPB Reserve during the season, these occurring on 23 June and 3 /11 July." (Author)] Address: not stated

**10711.** Deans, M. (2006): Reports from Coastal Stations - 2005: Bawdsey Peninsula, Suffolk. *Atropos* 27: 68-69. [*Sympetrum striolatum* at artificial light on 17-VIII, 22-IX, and 7-X-2006.] Address: not stated

**10712.** Dewick, S. (2006): Reports from Coastal Stations - 2005: Curry Farm, Bradwell-on-sea, Essex. *Atropos* 27: 66-67. (in English) ["Little significant recording of Odonata was attempted in 2005, but it is worth noting that Common Darter *Sympetrum striolatum* once again continued to be seen in numbers very late in the year, the last being seen on 22 November (three). Night-time immigration appears to have been very limited, the only records of this species in the light-trap being singles on 25 & 31 July, 16 & 29 August and 3, 20, 21 & 27 September, two being noted on 11 September. A single Migrant Hawker *A. mixta* was also recorded at light on 15 August." (Author)] Address: Dewick, S.; Curry Farm, Bradwell-on-Sea, Southminster, Essex, CM0 7NL, UK

**10713.** Harvey, R. (2006): Reports from Coastal Stations - 2005: Minsmere RSPB Reserve, Suffolk. *Atropos* 27: 69-70. (in English) ["It was an excellent year for *Aeshna isosceles* with records on 20 dates from 2 June to 20 July. This compares with sightings on ten dates from 9 June to 10 July in 2004. The peak count was five on 26 June. A female observed ovipositing on the levels on 17 July was the first definite proof of breeding on the reserve. In contrast there were no records of *Erythromma viridulum* at the regular locations." (Author)] Address: not stated

**10714.** Hunter, I. (2006): Reports from Coastal Stations - 2005: Elms Farm, Icklesham, East Sussex. *Atropos* 27: 59-60. (in English) [*Erythromma viridulum* in high abundances is reported.] Address: not stated

**10715.** Jarman, N. (2006): Reports from Coastal Stations - 2005: Kingsdown Beach, Kent. *Atropos* 27: 62-63. (in English) [UK; *Erythromma viridulum*] Address: not stated

**10716.** Knill-Jones, S. (2006): Reports from Coastal Stations - 2005: Isle of Wight. *Atropos* 27: 56-57. (in English) [UK; records of *Erythromma viridulum*, *Brachytron pratense*, and *Sympetrum flaveolum* are reported.] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: atropos@atroposed.freereserve.co.uk

**10717.** Kovács, T.; Kovács, T. sr (2006): Records of larval Ephemeroptera, Odonata and Plecoptera from the upper part of the Hungarian section of Ipoly River, with notes on aquatic Heteroptera and Coleoptera. *Folia Historico-Naturalia Musei Matraensis* 30: 159-165. (in Hungarian, with English summary) [Records of *Calopteryx splendens*, *C. virgo*, *Erythromma najas*, *E. viridulum*, *Ischnura elegans pontica*, *Stylurus flavipes*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Onychogomphus forcipatus*, and *Somatochlora metallica* are presented] Address: Kovács, T., Mátra Museum. H-3200 Gyöngyös, Kossuth Lajos u. 40., Hungaria. E-mail: koati@t-online.hu

**10718.** Lambrechts, J.; Knijf, G. de (2006): Dragonflies in the Høge Kempen National Park. *LIKONA* 2005: 50-57. (in Dutch, with English summary) [50 Odonata species are documented for the Park; it which is considered an odonate hotspot in Flanders (Belgium). The odonate fauna is reviewed with species presented mostly with their vernacular names. Special emphasize is given to *Coenagrion hastulatum*, *Cordulegaster boltonii*, *Somatochlora arctica* and *S. flavomaculata*.] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**10719.** Lyons, R. (2006): Dan Hull gets county record. *Proof sheet* 14(2): 1. (in English) [*Libellula saturata*, 18-IX-2006, at Shore Acres, Coos County, Oregon, USA.] Address: c/o Proof Sheet, Oregon Coast Photographers' Association INC., P.O. Box 5646, Charleston, OR 97420, USA

**10720.** Martin, J. (2006): Lebendnachweise der Kleinen Flussmuschel (*Unio crassus* PHILLIPSSON, 1788) im Rahmen einer Molluskenbergung am Komplexbauwerk Wehr und Schleuse Kossenblatt. *Naturschutz und Landschaftspflege in Brandenburg* 15(1): 13-16. (in German) [In the framework of a study in *Unio crassus* in Brandenburg, Germany, also records of larval *Aeshna*



sp., *Gomphus vulgatissimus*, and *Somatochlora metallica* were made.] Address: Martin, J., Kopernikusstr. 34, 14482 Potsdam, Germany

**10721.** Morgan, L. (2006): Reports from Coastal Stations - 2005: Skomer Island NNR, Pembrokeshire. Atropos 27: 74-75. (in English) ["A total of seven species of Odonata was recorded in 2005. *Enallagma cyathigerum* and *Ischnura elegans*, both breeding species, were recorded in their highest annual numbers with a daily maximum of 30 and 50 respectively on 27 June. A single *Orthetrum cancellatum* on 10 July was a new record for the Island — this species may become a more regular Island visitor in future years with its breeding range now expanded to include Pembrokeshire. A single *Libellula depressa* on 19 June was the first record of this species since 2000." (Author)] Address: not stated

**10722.** Odin, N. (2006): Reports from Coastal Stations - 2005: Landguard Bird Observatory, Suffolk. Atropos 27: 67. (in English) [UK; *Sympetrum striolatum*, *Coenagrion puella*] Address: not stated

**10723.** Parr, A.J. (2006): Dragonflies at Light: an appeal for information. Atropos 27: 87. (in English) ["Although dragonflies are normally day-flying, some records of nocturnal activity are not unknown. Typically such records refer to individuals caught in MV moth traps, or attracted to streetlights and other types of light. It is planned to take a closer look at such records in a future issue of Atropos. While there is some literature available, a lot of information must also exist only in field notebooks. I would be pleased to hear from anyone who has any information relating to Odonata at light. This might involve either dragonflies or damselflies, and while the analysis will have a strong UK bias, information from abroad would also be gratefully received. Please send information to me at the address below or to the Atropos editorial address." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: [Adrian.parr@bbsrc.ac.uk](mailto:Adrian.parr@bbsrc.ac.uk)

**10724.** Parr, A.J. (2006): Migrant dragonflies in 2005 including recent decisions and comments by the Odonata Record Committee. Atropos 27: 33-38. (in English) [UK; the following species are involved: *Lestes barbarus*, *Pyrrhosoma nymphula*, *Erythromma viridulum*, *Aeshna mixta*, *Anax imperator*, *A. parthenope*, *Libellula depressa*, *L. fulva*, *Orthetrum cancellatum*, *Sympetrum striolatum*, *S. fonscolombii*, *S. flaveolum*, *S. sanguineum*, *S. danae*] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: [Adrian.parr@bbsrc.ac.uk](mailto:Adrian.parr@bbsrc.ac.uk)

**10725.** Scott, D.A. (2006): Reports from Coastal Stations - 2005: Dursey Island, Co. Cork. Atropos 27: 75- [Ireland; *Sympetrum striolatum*] Address: not stated

**10726.** Scott, M.A.; Scott, W.J.; Scott, T.R. (2006): Reports from coastal stations - 2005: Longstone Heritage Centre, St Mary's, Isles of Scilly. Atropos 27: 47-49. (in English) ["Five species of Odonata were recorded. The highlight was *Anax parthenope* seen and photographed on 25 September, this being the first for the Isles of Scilly. Also new for the site was *Pyrrhosoma nymphula* on 9 June (possibly another first for the Islands). *Ischnura elegans* were present during June/July and several larvae were found on 10 June. Only three singles each of *Sympetrum striolatum* and *Aeshna mixta*

were seen in August/ September." (Authors)] Address: not stated

**10727.** Solly, F. (2006): Reports from Coastal Stations - 2005: Isle of Thanet. Atropos 27: 64-65. (in English) ["Dragonfly recording was limited to the Kingsgate area, a lack of standing water reducing the potential. However, a good range of species for the site was recorded in the spring/early summer period. A *Brachytron pratense* on 15 May was only the third area record, whilst single *Libellula quadrimaculata* on 1 June and *Orthetrum cancellatum* on 7 June were the second Thanet records. This season's only *Anax imperator* was noted on 28 May, and *Libellula depressa* occurred on four dates between 28 May and 22 June. Damselfly records are always unusual on Thanet so records of up to three *Coenagrion pulchellum* on three dates between 26 May & 2 June, *Coenagrion puella* on 6 June, single *Ischnura elegans* on 17 & 30 June, and *Enallagma cyathigerum* on 17 June were well above average. *Sympetrum striolatum* was recorded from 1 July but remained scarce until 30 were seen on 2 August, after which it was present on most days until late October. The year's first record of *Aeshna mixta* involved 20 on 1 August, this species occurring most days after this until mid-October." (Author)] Address: not stated

**10728.** Spence, B. (2006): Reports from Coastal Stations - 2005: Spurn Point, east Yorkshire. Atropos 27: 72-73. (in English) [UK; "The season started off quite well for Odonata with very good numbers of *Libellula quadrimaculata*, *Orthetrum cancellatum* and *Anax imperator* in late June. However, after this numbers dropped considerably and the rest of the season produced very much below average numbers for all species. The only records of note were single *Sympetrum fonscolombii* on 22 & 27 June and 5 & 10 July." (Author)] Address: not stated

**10729.** Troake, P. (2006): Reports from Coastal Stations - 2005: Gibraltar Point, Lincolnshire. Atropos 27: 71-72. (in English) [UK; *Sympetrum fonscolombii*; *Lestes sponsa*] Address: not stated

**10730.** Tunmore, M. (2006): Reports from Coastal Stations - 2005 : Lizard Peninsula, Cornwall. Atropos 27: 49-51. (in English) ["It was generally a poor year for Odonata, one highlight being a *Ceriagrion tenellum* seen near Predannack on 17 July. Records of single *Aeshna mixta* at light on 10 September and Common Darter *Sympetrum striolatum* on 24 September were suggestive of immigration, but it was one of the worst recent years for *S. fonscolombii* with five seen on Goonhilly Downs on 9 July, two near Predannack on 10 July, followed by two at Windmill Farm on 17 July and one there on 10 August." (Author)] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: [atropos@atroposed.free-serve.co.uk](mailto:atropos@atroposed.free-serve.co.uk)

## 2007

**10731.** Bouwman, J.; Bakker, S.; de Boer, P.; van Hijum, E.; Hylkema, G. (2007): Beheerplan De Wylde-merk 2008-2012. Rapport VS2007.034, De Vlinderstichting, Wageningen: 15 pp. (in Dutch) [In 2007, De Wylde-merk was established as the first dragonfly sanctuary of the Netherlands. A management plan was prepared for the site. A total of 10 different pools or reed-

beds are identified as as suitable habitat for dragonflies. Conservation measures that must be taken to improve the habitat function are suggested.] Address: De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands

**10732.** Faucheux, M. (2007): Sensilla and cuticular structures in the marval caudal appendages of *Erythromma lindenii* (SÉLYS, 1840), (Odonata: Zygoptera: Coenagrionidae). *Entomology Bulletin* 77: 113-120. (in English, with French summary) ["The cuticular structures and the sensilla on the larval caudal appendages (caudal lamellae) of *E. lindenii* have been studied using scanning electron microscope. Four types of sensilla are visible on the external face of the two lateral lamellae and both faces of median lamella. The aporous sensilla filiformia are vibroreceptors which detect a predatory or hostile presence. The aporous sensilla campaniformia are proprioceptors which may play the role of osmoreceptors here. An olfactory function is presumed for the multiporous sensilla coeloconica and a tactile function for the aporous spatula-shaped sensilla chaetica. The sensilla filiformia and the sensilla campaniformia have already been described on the caudal lamellae of Odonata. The sensilla coeloconica and the spatula-shaped sensilla chaetica are observed for the first time on these appendages." (Author)] Address: Faucheux, M.J., Laboratoire d'Endocrinologie des Insectes Sociaux, Université de Nantes, 2 rue de la Houssinière, B.P. 92208, F-44322 Nantes Cedex 03, France. E-mail: faucheux.michel@free.fr

**10733.** Faucheux, M. (2007): Multiporous and aporous sensilla on the larval antennae of the relict dragonfly *Epiophlebia superstes* (SÉLYS, 1889) (Odonata, Anisozygoptera: Epiophlebiidae). *Entomology Bulletin* 77: 121-128. (in English, with French summary) ["The larval antennal sensilla of the relict dragonfly, *E. superstes* have been studied by means of scanning electron microscope. Five types of sensilla are present: curved aporous sensilla chaetica, aporous sensilla filiformia, multiporous sensilla coeloconica, sensilla ampullacea and sensilla basiconica. A tactile function is attributed to the curved sensilla chaetica, a chemoreceptive function to the sensilla ampullacea and sensilla basiconica, a chemoreceptive or hygroreceptive function to the sensilla coeloconica, a vibroreceptive function to the sensilla filiformia. *Epiophlebia*, which lives in the turbulent waters of mountain streams, differs from the other larvae of Zygoptera and Anisoptera, whose habitat is calm water, by the reduced number of sensilla filiformia. *Libellula depressa*, a previously studied anisopteran species, and *Epiophlebia* (Anisozygoptera) both possess sensilla coeloconica. The presence of sensilla coeloconica is common both to the antennae of the final-stadium larva of *Epiophlebia* and of adult Odonats." (Author)] Address: Faucheux, M.J., Laboratoire d'Endocrinologie des Insectes Sociaux, Université de Nantes, 2 rue de la Houssinière, B.P. 92208, F-44322 Nantes Cedex 03, France. E-mail: faucheux.michel@free.fr

**10734.** Holuša, O.; Jeziorski, P. (2007): Collection of dragonflies (Insecta: Odonata) in the Ostravian Museum (Czech Republic). *Práce a Stud. Muz. Beskyd (Přir. Vědy)* 19: 143-150. (in Czech, with English summary) [The collections of the Ostravian Museum, Ostrava town harbour 718 specimens in 39 species. "The material was collected mainly in the northern Moravia and Silesia (Czech Republic), but also in Bohemia, Slovakia and Croatia, Macedonia, Hungaria during the years 1920-

1982. Besides rather common dragonfly species in the whole territory of the Czech Republic, the collection also includes several scarce and rare ones, such as *Coerulescens*, *Orthetrum albistylum*, *O. coerulescens*, and *Sympetrum depressiusculum*." (Authors)] Address: Holuša, O., Bruzovská 420, 738 01 Frýdek - Místek, Czech Republic. E-mail: holusao@ email.cz

**10735.** Martins, F.A.; Del Claro, K. (2007): Distribuição espacial e abundância de *Oxyagrion microstigma* (Odonata: Coenagrionidae) em uma área de Cerrado. *Anais do VIII Congresso de Ecologia do Brasil*, 23 a 28 de Setembro de 2007, Caxambu - MG: 1-2. (in Portuguese) [The territorial behaviour of *O. microstigma* is briefly described and further work in this species is suggested.] Address: Martins, F.A., Universidade Federal de Uberlândia, Instituto de Biologia, Laboratório de Ecologia Comportamental e Interações, Rua Ceará, s/nº Bloco 2D - Campus Umuarama, 38400902, Uberlândia, MG - Brasil - Caixa Postal: 593

**10736.** Naraoka, N.; Iakahashi, K. (2007): The landing from the water and the terrestrial period before emergence of the final instar larvae of *Epiophlebia superstes* Selys (Anisozygoptera: Epiophlebiidae). *Tombo* 49: 15-21. (in Japanese, with English summary) ["The exiting of the final instar larvae of *Epiophlebia superstes* from water to terrestrial hiding sites before emergence was investigated in the spring of 2005 and 2006, at a mountain stream (width: 2-3 m, water depth: 20-60 cm, altitude: 520-550 m) in Nurukawa-mura, Hirakawa-shi, Aomori prefecture, Japan. The number of larvae walking on the snow (snow depth: 3-4 m) was counted during the period from 3 to 29' April. Over 14 days during 2005 and 2006, we found 193 and 188 larvae on the snow, respectively. Most of the larvae climbed and crawled westward (90.3%) on the snow cover from the mountain stream in the morning, while some larvae climbed and crawled eastward (25.8%) or changed their course to the east from the west as the sun moved from the east to the south (ca. 10 : 30). The larvae moved to land without snow cover 13-36 m away from the stream, and hid under fallen leaves. It took 1.5-4.5 hours to move from the stream to the hiding sites. When hiding sites were not available, the larvae continued walking on the snow for 5-6 hours travelling as far as 40-60 m from the stream. Exiting from the water was observed from 8:00 to 15:00 h with a peak between 10:00-11:00 h, and were mostly in the morning (67.7%) rather than in the afternoon (33.3%). The number of exits from the water was also influenced by weather conditions: 33 + 11 (s.d.) (n=5) on fine days, 24+11(s. d.) (n=7) on fine-cloudy days and 4±2 (s. d.) (n=5) on cloudy days. Walking velocities of the larvae on slope (0-80) and on vertical surfaces (90°C) on the snow were 8-66 (n=89) and 15.3 ±5. 2 (s. d.) (n=23) cm/minute, respectively. The larvae moved faster at higher ambient temperature. The body temperature of larvae varied between 3.5 and 15.5°C, with a mean of 7±3.8°C (s. d.) (n=17' Fig, 5), which correlated with the ambient temperature. We could not observe any adult emergence in May or early July, the time that is supposed to be the emergence period for this species in the study area (Naraoka, 2004). Some larvae were collected in mid and late April and were brought to the lower altitudes (16 m) to observe their emergence periods. The larvae collected in mid April emerged 30.2 ±1.3 (s. d.) days (n=5) after exiting the water but those collected in late April emerged 24.0 ± 1.2 (s. d.) days (n=5) after leaving the water. Also,

some exiting larvae were collected in late April, and were kept in containers in the study area. They emerged  $29.3 \pm 1.3$  (s. d.) days (n=4) after departing the stream (Tabl. 2). We concluded that the final instar larvae of *E. superstes* leave the water area before their emergence during April, and their terrestrial period of life is 25-35 days." (Authors)] Address: Naraoka, H., 36-71, Aza-Motoizumi, Fukunoda, Itayanagi-cho, Kita-gun, Aomori Prefecture, 038-3661, Japan

**10737.** Nishiura, N. (2007): Records of *Sympetrum fonscolombii* and *S. uniforme* in Osaka Prefecture. Tombo 49: 27-29. (in Japanese, with English summary) [A male of the migrating species, *S. fonscolombii* was collected for the first time from Osaka Prefecture, Japan (20-XI-2005), and two males of the "Red listed" species *S. uniforme* were captured at the same place and at the same day. Therefore, "it would be plausible to guess that the insects arrived at the capture sites riding in the same wind."] Address: not stated in English

**10738.** Sasamoto, A. (2007): Description of a new *Nososticta* species from Biak Island, Indonesia (Zygoptera: Protoneuridae). Tombo 49: 1-4. (in English, with Japanese summary) ["*Nososticta hiroakii* sp. nov. (holotype male, Biak Island, Indonesia), is described and illustrated. This new species is distinguished from the allied species, *N. circumscripta* (Selys, 1886) and *N. exul* (Selys, 1886) by maculation and coloration of thorax, and by wing venation." (Author)] Address: Sasamoto, A., 108 Ujien, 9-1 Gokasyo-Hirano, Uji, Kyoto, 611-0011 Japan

**10739.** Takahashi, K. (2007): Other Miscellaneous Insects. Flora and fauna inventory report Tanzawa Ooyama. Tanzawa Ooyama Scientific Research Survey: 311-408. (in Japanese) [Records of the following species are presented: *Calopteryx atrata*, *C. cornelia*, *Mnais* spp., *Lestes sponsa*, *L. temporalis*, *Sympetma paedisca*, *Indolestes peregrinus*, *Mortonagrion selenion*, *Aciaagrion migratum*, *Ischnura asiatica*, *Paracercion calamorum*, *P. sieboldii*, *P. hieroglyphicum*, *Epiophlebia superstes*, *Tanypteryx pryri*, *Sarasaeschna preyri*, *Boyeria maclachlani*, *Planaeschna milnei*, *Aeschnophlebia longistigma*, *Gynacantha japonica*, *Polycanthagyna melanictera*, *Aeshna juncea*, *Anaciaeschna martini*, *Anax parthenope julius*, *A. nigrofasciatus*, *Anisogomphus maacki*, *Asiagomphus melaenops*, *Davidius nanus*, *D. fujiana*, *Lanthus fujiacus*, *Stylogomphus suzukii*, *Sinogomphus flavolimbatus*, *Nihonogomphus viridis*, *Onychogomphus viridicostus*, *Sieboldius albardae*, *Sinicinogomphus clavatus*, *Anotogaster sieboldii*, *Epopthalmia elegans*, *Macromia amphigena*, *Somatochlora uchidai*, *Lyriothemis pachygastra*, *Libellula quadrimaculata asahinai*, *Orthetrum albistylum speciosum*, *O. japonicum*, *O. triangulare melania*, *Deielia phaon*, *Crocothemis servilia mariannae*, *Sympetrum pedemontanum elatum*, *S. darwinianum*, *S. frequens*, *S. eroticum*, *S. parvulum*, *S. risi*, *S. infuscatum*, *S. baccha matutinum*, *S. speciosum*, *S. croceolum*, *Pseudothemis zonata*, *Rhyothemis fuliginosa*, and *Pantala flavescens*.] Address: not stated

**10740.** Thomas, B. (2007): Kleinvieh & Co: Sonstige. Naturspiegel 65: 26. (in German) [*Sympetrum striolatum* was recorded at 15-XII-2006 in Lüseckamp/Niederkrüchten and *Leucorrhinia rubicunda* at 4.IV-2005 in NSG Heidemoore. These are phenologically interesting data for Nordrhein-Westfalen, Germany, and western central Europe.] Address: Thomas, Barbara, P.-Ther-

stappen-Str. 92, 41334 Nettetal, Germany. E-mail: barbara-thomas@web.de

**10741.** Vanappelghem, C. (2007): Protocol du Nouvel Atlas des Odonates de la région Nord-Pas-de-Calais. Le Héron 40(1): 43-52. (in French) [This manual introduces in mapping the Odonata in Nord-Pas-d-Calais, France.] Address: Vanappelghem, C., 14, rue Brûle Maison, F-59000 Lille, France. E-mail: cedvana@free.fr

## 2008

**10742.** Arbeitskreis Libellen des Entomologischen Fachausschusses des NABU Brandenburg; Müller, O.; Dieke, M.; Lemke, M. (Red.) (2008): 27. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen in Potsdam, 07.-09. März 2008. Abstracts zur 27. Jahrestagung der Gesellschaft deutschsprachiger Odonatologen in Potsdam, 07.-09. März 2008: 82 pp. (in German) [In the framework of the 27th meeting of the German speaking Odonatologists, the following lectures were held: Katrin Vohland: Der Klimawandel und seine Auswirkungen auf die belebte Umwelt; Oliver Schweiger: Artenarealverschiebung als Folge des Klimawandels; Frank Suhling: Ökologische Folgen von Klimaveränderungen für Libellen: Überlegungen und Fakten; Jürgen Ott: Auswirkungen der Klimaänderung auf die Verbreitung der Libellen in Deutschland und Europa - ein Rückblick und aktuelle Trends; Göran Sahlén & Ida Flenner: Dragonfly community reorganisation in boreal forest lakes: rapid species turnover driven by global warming?; Thomas Brockhaus: *Somatochlora alpestris* auf dem Berge. Glaziale Lebensräume und rezente Refugien eiszeitlicher Libellen. Ida Flenner: Global warming - effects on life cycle of *Orthetrum cancellatum*: do populations from different latitudes respond differently? Eberhard G. Schmidt: Fritz Peus (1904-1978) Ein Berliner mit westfälischen Wurzeln (Poster); Hajnalka Gyulavári, Beáta Nagy, Csaba, Cserhádi, István Grigorsky, Margit Miskolczi & György Dévai The characterization of an Hungarian population of *Chalcolestes viridis* possessing a controversial taxonomical status (Poster); Rüdiger Mauersberger & Michael Kruse: Libellenland Brandenburg; Oliver Brauner: Beobachtungen zum Vorkommen einiger südlich verbreiteter Libellenarten unter dem Einfluss der klimatischen Entwicklungen in Brandenburg; Helmut Donath: Welche Libellenarten sind durch den Klimawandel besonders bedroht? Ergebnisse nach 30 Jahren Faunistik im Gebiet des Naturparks Niederlausitzer Landrücken; Paweł Buczyński: Expansion nach Norden - Neues von mediterranen Libellenarten in Polen; Georg Rüppell & Dagmar Hilfert-Rüppell: Warum holen die Männchen von *Calopteryx splendens* bei Verfolgungsflügen die Weibchen nicht ein?; Gerrit Joop: Gestresste Libellen: Einfluss natürlicher Feinde auf das Immunsystem; Kamilla Koch: Wen stört's ... Der Einfluss von Störungen durch Männchen auf das Eiablageverhalten von Weibchen; Hanno Schmidt & Kamilla Koch: Wie sicher kann Mann sich sein: Vaterschaftstests bei *Orthetrum coerulescens*; Karl Westermann: Zur Problematik der Bestimmung des Geschlechterverhältnisses einer großen Population von *Onychogomphus forcipatus* bei der Emergenz; Reinhard Jödicke: Hochsommer im April 2007: Einfluss der Wärme auf den Saisonbeginn von Moorlibellen in Nordwestdeutschland; Eberhard G. Schmidt: Achtzig Jahre Libellenerfassungen in einem nordwestdeutschen Hochmoor (Weißes Venn NW Dülmen/Westmünsterland); Georg



Rüppell & Dagmar Hilfert-Rüppell: Libellen - immer neue Fragen; Stanislav Gorb: Dragonfly functional morphology and its relevance for bionics; Andreas Martens: Großlibellenlarven mit kellenförmiger Fangmaske als effektive Prädatoren von Schwimmkäfern: von Freilandbefunden zur strikten Habitattrennung auf einer tropischen Insel zum experimentellen Beweis; Klaus Guido Leipelt: Ökomorphologie der Beine von Larven und Imagines bei Großlibellen; Dirk J. Mikolajewski: Wenn Dornen zu Fallen werden: Antagonistische Selektion durch Fische und invertebrate Prädatoren; Natalia Matushkina: Phylogenetic implication of the ovipositor-related characters in Odonata (Poster); Andreas Pix: Variabilität und Individualität im Feinadernetz des Anisopterenflügels (Poster); Anna Farkas, Anikó Mári, Éva Prill, Margit Miskolczi, Tibor Jakab & György Dévai Analysis of body mass, body size and energy content data on Gomphidae (Poster); Hansruedi Wildermuth: Der Kleine Blaupfeil *Orthetrum coerulescens* an kleinen Moorgräben: ein Naturschutzprojekt; Viola Clausnitzer: Status der Libellen weltweit - erste Ergebnisse des „Red List Index Projektes“; Boris Schröder: Modellierung von Atlasdaten durch Verbreitungsmodelle - ökologisches Verständnis, Verbreitungsvorhersagen und Ableitung von Schutzmaßnahmen; Klaus-Jürgen Conze, Mathias Lohr, Thomas Brockhaus, Rüdiger Mauersberger & Frank Suhling: Libellen in Deutschland - Arbeitsstand und Fragestellungen für das Atlasprojekt auf Bundesebene; Éva Prill, Anna Farkas, Tibor, Jakab & György Dévai Vergleichende Analyse kalorimetrischer Untersuchungsergebnisse bei Libellen; Tom Kirschey & Jens Meisel: Die Libellen im 100-Seen-Programm des NABU Brandenburg; Holger Hunger: Das Artenschutzprogramm Libellen des Landes Baden-Württemberg]

**10743.** Balian, E.V.; Segers, H.; Leveque, C.; Martens, K. (2008): The Freshwater Animal Diversity Assessment: an overview of the results. *Hydrobiologia* 595: 627-637. (in English) ["We present a summary of the results included in the different treatments in this volume. The diversity and distribution of vertebrates, insects, crustaceans, molluscs and a suite of minor phyla is compared and commented upon. Whereas the available data on vertebrates and some emblematic invertebrate groups such as Odonata ( $n = 5,680$  species) allow for a credible assessment, data are deficient for many other groups. This is owing to knowledge gaps, both in geographical coverage of available data and/or lack of taxonomic information. These gaps need to be addressed urgently, either by liberating data from inaccessible repositories or by fostering taxonomic research. A similar effort is required to compile environmental and ecological information in order to enable cross-linking and analysis of these complementary data sets. Only in this way will it be possible to analyse information on freshwater biodiversity for sustainable management and conservation of the world's freshwater resources." (Authors)] Address: Balian, Estelle, Freshwater Laboratory, Royal Belgian Institute of Natural Sciences, Vautierstraat 29 B-1000, Brussels, Belgium. E-mail: Estelle.Balian@naturalsciences.be

**10744.** Belova, Y.N. (2008): Chapter 2. Order Odonata. In: Belova, Y.N.; Dolganova, M.N.; Kolesova, N.S.; Shabunov, A.A.; Filonenko, I.V.: Diversity of insects of the Vologda region. Vologda: Center of operative printing "Kopernik". 368 pp. ISBN 978-5-87822-369-0: 16-25. (in Russian, with English summary) [This study on the fauna of the Vologda region, Russia includes 33

Odonata species. These are treated on pages 16-25. Records and habitat preferences are documented. Most records result from 2003-2005 study period.

**10745.** Cannings, R.A. (2008): Dunes, dragonflies and dikdiks: a short trip to Namibia and South Africa. *Boreus* 28(1): 32-34. (in English) [Brief report from a trip in April and May 2007 to southern Africa. It includes some notes on the WDA congress in Namibia.] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street Victoria, British Columbia V8W 9W2. Canada. E-mail: rcannings@royalbcmuseum.bc.ca

**10746.** Domek, P.; Joniak, T.; Piotrowicz, R. (2008): Spatial and seasonal variation of macrozoobenthos in disharmonic lakes of the Drawa National Park. In: R. Goldyn, P. Klimaszyk, N. Kuczyńska-Kippen & R. Piotrowicz (eds): The Functioning and Protection of Water Ecosystems. Department of Water Protection, Faculty of Biology, Adam Mickiewicz University, Poznań 2008: 39-44. (in English) ["The spatial and seasonal variation in species composition, density and biomass of macrozoobenthos in three disharmonic lakes of the Drawa National Park in the profundal zone and in the peatbog zone were compared. Investigations in all the lakes indicated higher values of all parameters in spring than in autumn. The profundal zone was dominated by Diptera, while the littoral zone was dominated by Ephemeroptera. The total biomass of organisms in the profundal zone was much higher than in the peatbog zone. The greatest biomass of a single species was noted in the oligohumic lake, 16 698 mg·m<sup>-2</sup> for *Chaoborus flavicans* (Meig.) (Diptera: Chaoboridae). The peatbog zone was a better habitat for macroinvertebrates than the profundal zone. A great influence on the deep-water biocoenosis of benthic fauna was exerted by the quality of the bottom sediments." (Authors) Odonata taxa recorded are: *Aeshna* sp., *Cordulia aenea*, *Enallagma cyathigerum*, *Gomphus vulgatissimus*, and *Ischnura elegans*.] Address: Domek, P., Dept of Water Protection, Fac. Biology, Adam Mickiewicz Univ., Umultowska 89, 61-614 Poznań, Poland. E-mail: domekp@amu.edu.pl

**10747.** Eagles-Smith, C.A.; Suchanek, T.H.; Colwell, A.E.; Anderson, N.L. (2008): Mercury trophic transfer in a eutrophic lake: The importance of habitat-specific foraging. *Ecological Applications* 18(8) Supplement, 2008: A196-A212. (in English) ["Mercury (Hg) trophic transfer and bioaccumulation in fish from a mineimpacted eutrophic lake were examined in relation to foraging habitat, trophic position, and size. Diet analysis indicated that there were clear ontogenetic shifts in foraging habitats and trophic position. Pelagic diet decreased and benthic diet increased with increasing fish length in bluegill, black crappie, inland silverside, and largemouth bass, whereas there was no shift for prickly sculpin or threadfin shad. Stable carbon isotope values ( $\delta^{13}C$ ) were inversely related to the proportion of pelagic prey items in the diet, but there was no clear relationship with benthic foraging. There were distinct differences between pelagic and benthic prey basal  $\delta^{13}C$  values, with a range of approximately 28‰ in pelagic zooplankton to approximately 20‰ in benthic caddisflies. Profundal prey such as chironomid larvae had intermediate  $\delta^{13}C$  values of approximately 24‰, reflecting the influence of pelagic detrital subsidies and suppressing the propagation of the benthic carbon isotope signal up the food chain. Fish total mercury (TotHg) concentrations varied with habitat-specific foraging, trophic position,

and size; however, the relationships differed among species and ages. When controlling for the effects of species, length, and trophic position, TotHg and  $\delta^{13}\text{C}$  were positively correlated, indicating that Hg trophic transfer is linked to benthic foraging. When examined on a species-specific basis, TotHg was positively correlated with  $\delta^{13}\text{C}$  only for bluegill, largemouth bass, and threadfin shad. However, diet-based multiple regression analyses suggested that TotHg also increased with benthic foraging for inland silverside and black crappie. In both species, benthic prey items were dominated by chironomid larvae, explaining the discrepancy with  $\delta^{13}\text{C}$ . These results illustrate the importance of foraging habitat to Hg bioaccumulation and indicate that pelagic carbon can strongly subsidize the basal energy sources of benthic organisms." (Authors) Diet items of the studied fishes include Odonata.] Address: Eagles-Smith, C., US Geological Survey, Western Ecological Research Center, Davis Field Station, One Shields Avenue, Davis, California 95616 USA. E-mail: ceagles-smith@usgs.gov

**10748.** Jackson, J.I.; Boutle, R. (2008): Ecological functions within a sustainable urban drainage system. 11th International Conference on Urban Drainage, Edinburgh, Scotland, UK, 2008: 10 pp. (in English) ["Sustainable Urban Drainage Systems (SUDS) are regarded as engineering solutions to urban storm water control and flood risk. Additional benefits from SUDS in the built environment include sediment entrapment and remediation of water quality from urban runoff through the use of retention/detention systems. Biodiversity value of SUDS is alluded to but few studies have evaluated conservation potential or monitored ecological processes that may occur within them." (Authors) Biodiversity (including Odonata) was studied at the family level.] Address: Jackson, Janet, School of Applied Scienc., Park Campus, Boughton Green Road, Northampton, NN2 7AL, UK. E-mail: janet.jackson@northampton.ac.uk

**10749.** Kuczyńska-Kippen, N. (2008): Spatial distribution of zooplankton communities between the Sphagnum mat and open water in a dystrophic lake. Polish Journal of Ecology 56(1): 57-64. (in English) ["Composition and dynamics of zooplankton (Rotifera, Crustacea) communities were studied in a dystrophic lake (Drawieński National Park, northern Poland). This lake is a typical mid-forest lake of a small area (ca. 0.65 ha) but relatively deep ( $Z_{\text{max}} = 6.8\text{m}$ ) and covered with a peat (Sphagnum sp.) mat. The study was made in the shallow part of the lake ( $Z = 0.5\text{m}$ ). Zooplankton was collected twice in August 2004, in triplicate subsamples, taken from three stations (1. under the peat mat, 2. the transitional zone between the peat mat and open water area and 3. open water zone) from two different sites within the same lake." (Author) The following Odonata taxa are listed: Cordulia aenea, Enallagma cyathigerum, Ischnura elegans, Pyrrhosoma nymphula, and Leucorhinia sp."] Address: Kuczyńska-Kippen, Natalia, Dept of Water Protection, Institute of Environmental Biology, Adam Mickiewicz University, Umultowska 89, 61-614 Poznań, Poland. E-mail: kippen@hot.pl

**10750.** Lee, E.-H.; Jang, H.-K.; Paik, M.-Y.; Yoon, J.; Kim, J.G.; Bae, Y.J. (2008): A preliminary study on a restoration of habitats for Nannophya pygmaea Rambur (Odonata: Libellulidae). Kor. J. Env. Eco. 22(1): 35-42. (in Korean, with English summary) ["This study was conducted to provide basic information that can be used to restore habitats of N. pygmaea. N. pygmaea is

an endangered species of wildlife fauna in Korea and its habitats are distributed very scarcely in Korea. Ten wetland sites throughout Korea, where N. pygmaea inhabited were investigated from June 2006 to August 2007. Investigation was made on landscape properties, habitat sizes, vegetation types, water environments, and water sources. N. pygmaea was generally found in the abandoned paddy fields surrounded by mountains. The habitats ranged from 113.4 m<sup>2</sup> to 1,153.1 m<sup>2</sup> in area, and were mostly dominated by Juncus effusus and Persicaria thunbergii. The water level was 2.6-7.3 cm, and the water temperature ranged from 16°C to 27.8 °C. The elevation of the habitats ranged from 139 to 243 m a.s.l., which was mostly lower than that of other high mountain wetland habitats. In conclusion, the habitats of N. pygmaea can be restored at wetlands, which have similar condition with field habitat such as abandoned paddy fields in the beginning stage of oligotrophy. Because N. pygmaea is sensitive to microtopography and other surrounding environments, the approach to restore the habitats for N. pygmaea should consider those microhabitat conditions shown in this study." (Authors)] Address: Lee, Eun-Heui, Division of Environmental Life Sciences, Seoul Women's Univ., Korea.

**10751.** Légaré, S.; Labonté, P.; Champoux, L. (2008): Impacts des précipitations acides sur la faune benthique des lacs québécois. Naturaliste Canadien 132 (2): 67-74. (in French, with English summary) ["Despite significant reductions in emissions observed in Canada and the United States for three decades, acid rain still represent one of the most serious threats to ecosystems in eastern Canada. The Canadian Wildlife Service has set up a monitoring network to document the current impacts and long-term acid deposition on aquatic fauna. Between 2001 and 2003, the animal communities of 33 lakes in southern Quebec have been inventoried. The results show that the acidity of water affects benthic invertebrates by reducing their abundance and the number of taxa present. Some families of amphipods, gastropods and mayflies appear particularly vulnerable to acidification and have good potential as bio-indicator for monitoring on the long term. An increase in the number of taxa was observed from east to west of the study area. Other chemical, physical, biological and geographical influence community composition and should be considered." (Authors) Canonical Correspondance Analyses also included at the family level Gomphidae and Corduliidae] Address: Légaré, S. E-mail: Stephane.legare@ec.gc.ca

**10752.** Ott, J. (2008): Libellen als Indikatoren der Klimaänderung – Ergebnisse aus Deutschland und Konsequenzen für den Naturschutz. Insecta 11: 75-89. (in German) [The author reviews his recent (1988-2008) research on Odonata as indicators of climatic change in Germany and on implications of the latter for nature conservation. Emphasis is given to Crocothemis erythraea.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**10753.** Subramanian, K.A.; Samir, A.; Ramachandra, T.V. (2008): Odonates as indicators of riparian ecosystem function-A case study from south western Karnataka. Fraseria (N.S.) 7: 83-95. (in English) ["The influence of riparian land use on the diversity and distribution were investigated by sampling 113 localities covering 4 districts in south-western Karnataka, India. A total of 55 species in 12 families were recorded. Streams, rivers and lakes had higher diversity than marshes and

sea coast. However, lakes had low endemism than streams and rivers. Streams flowing through evergreen forests had higher diversity and endemism. Human impacted riparian zones such as paddy fields had relatively lower species richness. However, streams flowing through forestry plantations had higher diversity than other natural riparian zones such as dry deciduous, moist deciduous and semi evergreen forests. Myristica swamps-a relict evergreen forest marsh had low diversity and high endemism. Odonate communities of lentic ecosystems, and human impacted streams and rivers were characterized by widespread generalist species. Endemics and habitat specialists were restricted to streams and rivers with undisturbed riparian zone. The study documents possible odonate community change due to human impact: The influence of riparian landuse change on odonate community is also discussed." (Authors)] Address: Subramanian, K.A., Zoological Survey of India, Western Regional Station, Pune-411 044 Maharashtra, India. E-mail: subbuka.zsi@gmail.com

**10754.** Ware, J.L. (2008): Molecular and morphological systematics of Libelluloidea (Odonata: Anisoptera) and Dictyoptera. Dissertation, Graduate School-New Brunswick Rutgers, The State University of New Jersey: III + 260 pp. (in English) ["Libelluloidea are highly successful dragonflies with unique behaviour and life histories. The systematics of Libelluloidea (Odonata: Anisoptera) has historically been in conflict, with little agreement about the number of families that are comprised in this large, heterogeneous group. For my PhD thesis, I have assembled the most comprehensive molecular and morphological libelluloid dataset to date, in an attempt to revise and simplify libelluloid taxonomy, and to answer questions about the evolutionary history of the group. I ran Bayesian and parsimony analyses to recover phylogenetic hypotheses with which I explore the success of Libelluloidea. Divergence estimation, a method by which nodes of a tree are dated, was first explored under different evolutionary models for a subset of libelluloid taxa in order to determine whether treatment of hydrogen-bonded ribosomal nucleotides affected the age of divergence estimates. Using methodology based on these results, I was able to estimate divergence dates and diversification rates for the first large-scale dating analysis of dragonflies. On a smaller scale, I also completed a study of Syncordulia, a vulnerable genus of endemic South African libelluloid dragonflies whose systematics was not yet confirmed. Additional studies of phylogenetic methodology were undertaken in my thesis work for another large and heterogeneous group, the Dictyoptera (Mantodea, Blattodea and Isoptera). In this study, the effect of outgroup selection was determined using a broad, comprehensive taxon set for which we had both molecular and morphological data. These results suggest that the evolution of sociality, on which much of the recent discussion in dictyopteran systematics has focused, cannot be reliably determined when different outgroups recover dramatically conflicting topologies." (Author)] Address: Ware, Jessica L., Rutgers, The State University of New Jersey, Cook College, 93 Lipman Drive, New Brunswick, New Jersey 08901, USA. E-mail: jware@amnh.org

## 2009

**10755.** Broyer, J.; Curtet, L.; Bouniol, J.; Vieille, J. (2009): L'habitat de *Leucorrhinia pectoralis* Charpentier,

1825 (Odonata, Libellulidae) dans les étangs piscicoles de la Dombes (Ain). Bulletin mensuel de la Société linnéenne de Lyon 78: 77-84. (in French, with English summary) [On the basis of a study of 50 fishponds in 2000 and 47 in 2008 in the Dombes region (Ain-Department, France), the habitat of *Leucorrhinia pectoralis* is analysed. "This species was found in ponds characterized by areas of medium size (about 0.60 m) helophytes in more than 60% of the perimeter, with patches free of emergent vegetation in about one third of their total surface area and connected over a distance of more than 100 m to surrounding littoral woods which may be present in 30 to 80% of pond's periphery. Habitat units with both helophytes and littoral woods seem to secure adequate shelters which enable to tolerate the presence of high fish stock density in water bodies." (Author)] Address: Broyer, Joel, Office National de la Chasse et de la Faune Sauvage, Direction des études et de la recherche, 01330 Birieux, France. E-mail: joel.broyer@oncfs.gouv.fr

**10756.** Collen, B.; Ram, M.; Dewhurst, N.; Clausnitzer, V.; Kalkman, V.; Cumberlidge, N.; Baillie, J.E.M. (2009): Broadening the coverage of biodiversity assessments. In: Vié, J.-C., Hilton-Taylor, C. & Stuart, S.N. (eds.) (2009): *Wildlife in a Changing World – An Analysis of the 2008 IUCN Red List of Threatened Species*. Gland, Switzerland: IUCN. 180 pp: 67-75. (in English) [The chapter includes information on three species with restricted range (*Platycnemis pempipes*, *Amanipodagrion gilliesi*, *Oreocnemis phoenix*), impact of climate change on *Hemiphysalis mirabilis*, and a reference to *Viridithemis viridula* (known from a single female, Madagascar).] Address: IUCN, Rue Mauverney 28, CH-1196 Gland, Switzerland

**10757.** Dijkstra, K.D.; Tchiboza, S.L.; Ogbogu, S.S. (2009): Chapter 5. The status and distribution of dragonflies (Odonata). In: Darwall, W.R.T., & K.G. Smith (Editors). *The Status and Distribution of Freshwater Biodiversity in Western Africa*. IUCN: 41-55. (in English) [An overview of the regional Odonata fauna in relation to the freshwater ecoregions is presented. Species, conservation status, patterns of species richness, and the major threats to dragonflies are outlined. Conservation recommendations, i.e. conservation measures and the required research, are suggested. Information is organised in the following chapters: 5.1 Overview of the regional Odonata in relation to the freshwater ecoregions; 5.1.1 Widespread endemics of western Africa; 5.1.2 Xeric freshwaters and Lake Chad basin; 5.1.3 Savannah dry forest rivers and inner Niger delta; 5.1.4 Large river deltas; 5.1.5 Moist forest rivers; 5.1.6 Highland and mountain systems; 5.2 Conservation status; 5.3 Patterns of species richness; 5.4 Major threats to dragonflies; 5.4.1 Habitat degradation; 5.4.2 Damming large rivers; 5.4.3 Mining; 5.5 Conservation recommendations; 5.5.1 Conservation measures; 5.5.2 Research action required; 5.6 References.] Address: Dijkstra, K.D., Curator of invertebrates, National Zoological Collection of Suriname, University of Suriname, P.O. Box 9212, Paramaribo, Suriname. E-mail: Dijkstra@naturalis.nnm.nl

**10758.** Henriques-Oliveira, A.L.; Nessimian, J.L. (2009): Phoresy and commensalism of Chironomidae larvae (Insecta: Diptera) in the state of Rio de Janeiro, Brazil. *Lundiana* 10(1): 11-18. (in English) ["Chironomid larvae are frequently found living in phoretic or commensal association with aquatic animals in all regions of the



world. In Brazil, new records have been available in the literature in the last years mainly for the state of São Paulo. In collects performed in several streams and rivers in the state of Rio de Janeiro and bordering areas, chironomid larvae were found living in association with Corydalidae (Megaloptera); Perlidae (Plecoptera); Leptophlebiidae (Ephemeroptera); Aeshnidae and Libellulidae (Odonata: Rhionaeschna punctata, Elasmotheremis canacriodes, Brechmorhoga sp.), Sericostomatidae (Trichoptera); Elmidae (Coleoptera) and catfishes of the families Trichomictoridae and Loricariidae (Pisces). These new records are presented in the present study." (Authors)] Address: Henriques-Oliveira, Ana Lucia, Lab. de Entomologia, Departamento de Zoologia, Instituto de Biologia, CCS, Universidade Federal do Rio de Janeiro, Ilha do Fundão, CP 68044, CEP 21944-970 Rio de Janeiro, RJ., Brazil. E-mail: anahenri@biologia.ufrj.br

**10759.** Holuša, O. (2009): [Mysterious forest dragonflies. Where can we see our Cordulegaster species?]. Vesmír 88: 2-4. (in Slovakian) [The paper presents pictures of larvae and imagines of the three Slovakian Cordulegaster species *C. bidentata*, *C. boltonii*, and *C. heros* together with their habitats.] Address: Holuša, O., Muzeum Beskyd, prirodovedné oddelení, Zámecké náměstí 1264, CZ-738 01 Frydek-Místek. E-mail: holusao@post.cz

**10760.** Kim, D.G.; Yoon, T.J.; Oh, C.G.; Kim, J.G.; Lee, E-H.; Bae, Y.J. (2009): Laval growth rate of *Nannophya pygmaea* (Odonata: Libellulidae), an endangered dragonfly in Korea. Korean Journal of Limnology 42(3): 290-294. (in Korean, with English summary) ["Larval development of *N. pygmaea* was studied using an introduced larval population in an artificial wetland habitat. Artificial habitat was created in a green house which imitated a small wetland in Boryeong-si, Chungcheongnam-do, Korea, where *N. pygmaea* inhabited. A total of 300 *N. pygmaea* larvae were introduced to the artificial habitat in June 2007. Larvae were recaptured five times between June 2007 and November 2008 for measurement of body length. As a result, the initial and recaptured populations (Recaptured I, II, III, IV, and V populations, respectively) contained two body size groups [initial 6.20±0.34mm and 7.94±0.46mm (mean ± SD); Recaptured I 2.84±0.43mm and 5.16±0.83 mm; Recaptured II 5.96±0.66mm and 8.02±0.35mm; Recaptured III 5.97± 0.73 mm and 7.82 ±0.37 mm; Recaptured IV 7.04 ± 0.93 mm and 8.52 ±0.39 mm; Recaptured V 5.72±0.60mm and 7.71 ±0.30 mm]. Our rearing experiment evidenced that the recaptured I-V populations are the offspring of the initial population and the offspring grew approximately 3 mm at 470 degree days. It was also estimated that *N. pygmaea* larvae need approximately 100 degree days to grow 0.7 mm in body length." (Authors)] Address: Bae, Y.J., College of Life Sciences and Biotechnology, Korea University, Seoul 136-701, Korea. E-mail: yjbae@korea.ac.kr

**10761.** Kiss, B.; Juhász, P.; Müller, Z.; Ködöböcz, V. (2009): Adatok a Kis-Balaton és közvetlen környéke vízi makroszkópikus gerinctelen (Bivalvia, Gastropoda, Malacostraca, Ephemeroptera, Odonata, Heteroptera, Coleoptera és Trichoptera) faunájának ismeretéhez. Folia Historico-Naturalia Musei Matraensis 33: 61-72. (in Hungarian, with English summary) [Presens/absence data of 142 macrozoobenthic taxa are presented from the territory of Lake Kis-Balaton, and its surroundings, Hungary. Record data of 14 Odonata species are documented: *Anaciaeschna isosceles*, *Anax imperator*,

*Brachytron pratense*, *Libellula fulva*, *Orthetrum albistylum*, *O. cancellatum*, "*Crocothemis servilia*", *Calopteryx splendens*, *Coenagrion puella*, *C. pulchellum* *interruptum*, *Erythromma najas*, *E. viridulum*, *Ischnura elegans* *pontica*, and *Platycnemis pennipes*.] Address: Kiss, B., BioAqua Pro Kft., H-4032 Debrecen, Soó R. 21. Hungary. E-mail: bkiss@bioaquapro.hu

**10762.** Lagunov, A.V. (2009): ["Red Book" Invertebrates in the city of Chelyabinsk]. Proceedings of the Chelyabinsk Scientific Center 3(45): 23-27. (in Russian) [The paper includes records of (1) *Calopteryx virgo*: Chelyabinsk (River Valley. Miass) in Miass on Simskom, Minyar ponds in the vicinity of borhood Castle, Kyshtym and Ozersk, near the village. Koelga, Breda, and vicinity Magnitogorsk, (2) *Calopteryx splendens*: Magnitogorsk, Miass and Chelyabinsk, near the Castle near Shem, (3) *Aeshna viridis*: in the vicinity of Chebarkul and Magnitogorsk and (4) *Ophiogomphus cecilia*: in Magnitogorsk.] Address: Lagunov, A.V., Ilmen State Reserve, Ural Division, Miass, etc. Avtozavodtsev, 16, 456 317, Russia. E-mail: lagunov@mineralogy.ru

**10763.** Mitra, A.; Mitra, B. (2009): Pictorial Handbook on Common Dragon and Damselflies (Odonata: Insecta) of Mangroves of Sunderbans, India. Zoological Survey of India: viii + 56 pp. (in English) ["Contents: Acknowledgements. 1. Introduction. General morphology. Habit, habitat and behavioural patterns. Economic importance. Systematic list. Field Identification. I. Closed Wing Pond Damselflies: Superfamily Coenagrionoidea. Family Coenagrionidae. Subfamily Pseudagrioninae: 1. Genus *Ceriagrion*: i. *Ceriagrion cerinorubellum* (Brauer, 1865). ii. *Ceriagrion coromandelianum* (Fabricius, 1798). 2. Genus *Pseudagrion*: iii. *Pseudagrion australasiae* Selys, 1876. iv. *Pseudagrion decorum* (Rambur, 1842). Subfamily Coenagrioninae: 3. Genus *Cercion*: v. *Cercion malayanum* (Selys, 1876). Subfamily Ischnurinae: 4. Genus *Ischnura*: vi. *Ischnura senegalensis* (Rambur, 1842). vii. *Ischnura aurora aurora* (Brauer, 1865). Subfamily Agriocnemidinae: 5. Genus *Agriocnemis*: viii. *Agriocnemis pygmaea* (Rambur, 1842). Subfamily Argiinae: 6. Genus *Onychargia*: ix. *Onychargia atrocyana* Selys, 1865. II. Angle Wing Club-Tails: Superfamily Aeshnoidea. Family Gomphidae. Subfamily Lindeniinae: 7. Genus *Ictinogomphus*: x. *Ictinogomphus rapax* (Rambur, 1842). III. Dippers and Perchers: Superfamily Libelluloidea. Family Libellulidae. Subfamily Brachydiplactinae: 8. Genus *Brachydiplax*: xi. *Brachydiplax sobrina* (Rambur, 1842). Subfamily Libellulinae: 9. Genus *Lathrecista*: xii. *Lathrecista asiatica asiatica* (Fabricius 1798). 10. Genus *Orthetrum*: xiii. *Orthetrum sabina sabina* (Drury, 1770). Subfamily Symptetrinae: 11. Genus *Acisoma*: xiv. *Acisoma panorpoides panorpoides* Rambur, 1842. 12. Genus *Brachythemis*: xv. *Brachythemis contaminata* (Fabricius, 1793). 13. Genus *Bradinopyga*: xvi. *Bradinopyga geminata* (Rambur, 1842). 14. Genus *Crocothemis*: xvii. *Crocothemis servilia servilia* (Drury, 1770). 15. Genus *Diplacodes*: xviii. *Diplacodes trivialis* (Rambur, 1842). 16. Genus *Neurothemis*: xix. *Neurothemis tullia tullia* (Drury, 1773). Subfamily Trithemistinae: 17. Genus *Trithemis*: xx. *Trithemis pallidinervis* (Kirby, 1889). Subfamily Trameinae: 18. Genus *Rhyothemis*: xxi. *Rhyothemis variegata variegata* (Linnaeus, 1763). 19. Genus *Pantala*: xxii. *Pantala flavescens* (Fabricius, 1798). 20. Genus *Tramea*: xxiii. *Tramea virginia* (Rambur, 1842). 21. Genus *Tholymis*: xxiv. *Tholymis tillarga* (Fabricius, 1798). Subfamily Urothemistinae: 22. Genus *Macrodiplax*: xxv. Macro-

diplex cora (Brauer, 1867). 23. Genus *Urothemis*: xxvi. *Urothemis signata signata* (Rambur, 1842). Suggested readings. Related websites." (Authors)] Address: Mitra, A., Northern Regional Station, Zoological Survey of India, 218 Kaulagarh Roads, Dehra Dun - 248195, India

**10764.** Ngiam, R.W.J. (2009): The biology and distribution of *Pseudagrion rubriceps rubriceps* Selys, 1876 (Odonata: Zygoptera: Coenagrionidae) in Singapore. *Nature in Singapore* 2: 209-214. (in English) [An oviposition was recorded at 29-I-2009 in Toa Payoh Town Park, Singapore. The partners were paired with the female submerged during the oviposition.] Address: Ngiam, R.W.J., National Biodiversity Centre, National Parks Board, 1 Cluny Road, Singapore 259569, Republic of Singapore. E-mail: ngiam wenjiang@nparks.gov.sg; yanrobin@hotmail.com

**10765.** Pliūraitė, V.; Mickenienė, L. (2009): Benthic macroinvertebrate communities in agriculturally impaired streams. *Environmental Research, Engineering and Management* 3(49): 10-20. (in English, with Lithuanian summary) [12 Lithuanian streams were studied for their macrozoobenthos with emphasis on impacts caused by agricultural use of adjacent lands. The total of 67 taxa includes *Calopteryx splendens* (1 loc.) and *Gomphus vulgatissimus* (3 loc.).] (Authors)] Address: Pliūraitė, Virginija, Institute of Ecology of Vilnius University, Akademijos 2, LT-08412 Vilnius, Lithuania. E-mail: virga@ekoi.lt

**10766.** Samokhin, D.M. (2009): [Current status of red-listed insect species in the reserve "Voroninsky"]. *Proceedings of the National Nature Reserve "Voroninsky" 1*: 141-155. (in Russian) [Inzhavinsky and Kirsanovsky Districts of the Tambov Region, Russia; *Anax imperator*, *Aeshna cyanea*, *A. juncea*, *A. viridis* and *Sympetrum pedemontanum* are listed together with some basic information on habitats and phenology.] Address: not stated

**10767.** Solly, F.; Milton, P.; Sawyer, D.; Hodge, T.; Hunt, B. (2009): Reports from Coastal Stations - 2009: Isle of Thanet, Kent. *Atropos* 39: 55-56. (in English) [UK; records of *Erythromma viridulum*, *Orthetrum cancellatum* and *Sympetrum fonscolombii* are briefly discussed.] Address: not stated

**10768.** Toyosaki, I.; Takashi, Y.; Oohara, K. (2009): Records of *Trithemis aurora* (Odonata, Libellulidae) in Tokushima Prefecture, Shikoku, Japan. *Bulletin of the Tokushima Prefectural Museum* 19: 39-44. (in Japanese) [The northward range extension of *T. aurora* is documented with details.] Address: Toyosaki, I., Tokushima Prefectural Museum, Bunka-no-Mori Park, Hachimancho, Tokushima 770-8070, Japan

**10769.** Tumilovich, O.A. (2009): On dragonfly fauna of Kaliningrad district. *151(2)*: 192-196. (in Russian, with English summary) [31 dragonfly species were revealed in the Kaliningrad district. *Sympetrum depressiusculum*, *S. fonscolombii*, and *Chalcolestes viridis* were found for the first time. *Libellula quadrimaculata* is the most abundant and dominant regional species.] Address: Tumilovich, Olga, Kaliningrad State Technical University, 236000 Kaliningrad, Russia. E-mail: Leventetuirambler.ru

**10770.** Weitzel, M. (2009): Bemerkenswerte Spätherbst- und Winterbeobachtungen von Köcherfliegen und Libellen im extrem milden Winter 2006/2007 aus dem Moselgebiet. *Dendrocopos* 36: 81-85. (in German) [This

paper includes several outstanding interesting data on phenology of Odonata in the Trier-region, Rheinland-Pfalz, Germany. Imaginal specimens were found from *Calopteryx splendens* on 26/27.III.2007 and 10.IV.2007; *Calopteryx virgo* on 29.III. and 12.IV.2007; *Lestes sponsa* on 26.11. and 23.12.2006 and 1.1.2007; *Pyrrhosoma nymphula* on 8.III./26.III. and 6.IV.2007; *Ischnura elegans*: mass emergence on 2.IX.2006; *Enallagma cyathigerum* on 26.XI.2006; *Coenagrion puella* on 31.III. 2007; *Erythromma lindenii* on 30.X.2006; *Aeshna mixta* on 25.XI.2006; *Aeshna cyanea* on 25.XI., 31.XII.2006, 19.I. 2007; *Gomphus vulgatissimus* freshly emerged in mid October 2006; *Gomphus pulchellus* freshly emerged on 2.IX.2006; *Sympetrum striatum* on 26.XI.2006, 9.I. and 18.I.2007; *Sympetrum sanguineum* 27.XI.2006.] Address: Weitzel, M., Graf-Reginar-Str. 43, 54294 Trier, Germany. E-mail: matthias-weitzel@web.de

**10771.** Winkler, C.; Klinge, A.; Drews, A. (2009): Verbreitung und Gefährdung der Libellen Schleswig-Holsteins – Arbeitsatlas 2009. *Faunistisch-Ökologische Arbeitsgemeinschaft Schleswig-Holstein (FÖAG) e.V. und Ökologie-Zentrum der Christian-Albrechts-Universität Kiel in Kooperation mit dem Landesamt für Landwirtschaft, Umwelt und ländliche Räume des Landes Schleswig-Holstein (Herausgeber): II + 43 pp.* (in German) [66 Odonata species are mapped, their threats and populations trends are assessed and classified in a Red List. The maps differ between records from 1850-1995 and 1996-2009. Seven of the species must be assessed as extinct, six have been recorded only very rarely as single individuals, and 53 are currently resident. ] Address: Drews, A., Landesamt für Landwirtschaft, Umwelt und ländliche Räume, Hamburger Chaussee 25, 24220 Flintbek. Germany. E-mail: arne.drews@llur.landsh.de

**10772.** Zia, A., M. A. Rafi, Z. Hussain and M. Naeem. (2009): Occurrence of Odonata in Northern Areas of Pakistan with seven new records. *Halteres* 1(1): 48-56. (in English) ["Detailed surveys were carried out from two districts viz. Poonch and Sudhnoti of Kashmir Valley during summer seasons of 2007 and 2008 to make an updated record of inhabiting Odonata. Ten localities were selected on the basis of variables keeping in view the habitat requirements of Odonata. The present study provides a record of 16 anisopterous species spreading to 9 genera and 29 zygopterous species spreading to 14 genera. Among these *Lestes patricia* is a new record for the country. The distribution, synonymy, richness and abundance of the species are discussed in this paper. The Kashmir Valley is rich in insect biodiversity, the odonate fauna of this valley needs to be further explored." (Authors)] Address: Rafi, M.A., National Insect Museum, National Agriculture Research Centre, Islamabad – Pakistan

## 2010

**10773.** Altamiranda-S., M.; Perez-G., L.A.; Gutierrez-M., L.C. (2010): Composition and microhabitat preference of Odonata larvae (insecta) in the San Juan de Tocagua swamp (Atlántico, Colombia). *Caldasia* 32(2): 399-410. (in Spanish, with English summary) ["We evaluated the response of the assembly of Odonata larvae to the available substrates on the shoreline of the Swamp San Juan de Tocagua, Atlántico, Colombia. We sampled the habitats from September 2006 to March 2007 to estimate diversity, richness and abundance of larval odonates. We also measured physical

and chemical parameters of the water body. The species showed a broad occupancy of the substrate, with greater cover and permanence on the floating macrophytes and the muddy bottom. The species of the bottom of the swamp were not associated with a particular type of texture. The measured physicochemical factors were not associated with the diversity, richness and abundance of the larvae in the system, suggesting that the variation in the values of these parameters does not explain the response of the assembly during the study." (Authors) The following taxa are involved into the study: *Ischnura ramburii*, *Telebasis* sp., *T. salva*, *T. filiola*, *Triacanthagyna septima*, *Coryphaeschna adnexa*, *Dythemis sterilis*, *Erythemis plebeja*, *E. attala*, *Erythrodiplax umbrata*, *E. fervida*, *Miathyria simplex*, *Perithemis mooma*, and *Tramea onusta*.] Address: Altamiranda-S., M., Universidad Nacional de Colombia sede Medellín, Apartado 3840, Medellín, Colombia. E-mail: maltamiranda@gmail.com.

**10774.** Balzan, M.V. (2010): An integrative ecological approach towards insect conservation in a Mediterranean agricultural landscape: The case of Insect (Odonata) fauna in the Maltese Islands. 40th Anniversary Conference. Gesellschaft für Ökologie. Book of Abstracts August 30th to September 03rd, 2010: 364. (in English) [Verbatim: An integrative ecological approach to the assessment of conservation of insect groups within highly modified Mediterranean agricultural landscapes is proposed. A hierarchical multiscale analysis was carried out and investigated how habitat characteristics at multiple scales, ranging from the immediate habitat structure to the local agricultural landscape characteristics, influence a target group (Insecta: Odonata) distributions. Multivariate statistical procedures were used to analyse the relationship between Odonata assemblage patterns and environmental variables. Moreover, stakeholders were considered as an inherent part of the landscape, and consequently local ecological knowledge together with stakeholders' perception of insect conservation was carried out. Results from this study suggest that Odonata populations are influenced by habitat characteristics at multiple scales, ranging from the physical properties and characteristic vegetation to landscape composition and diversity. Concurrently, this study identified farmers' perception of insects in agricultural landscapes, their conservation, cause of decline of 'beneficial' species, and persistent pest problems arising from resource management actions. Grounded in these findings, an iterative and integrative ecosystem-based management approach is proposed for the conservation of insect species in the agricultural landscapes.] Address: Balzan, M.V., Malta College of Arts, Science and Technology

**10775.** Bazova, N.V.; Bazov, A.V. (2010): Ecology of odonate larvae (Odonata) in the Selenga river. Eurasian Entomological Journal 9(2): 285-289. (in Russian, with English summary) [Between 1987-2005, data on the occurrence, abundance and biomass of *Ophiogomphus* sp. larvae in the channel part of the Selenga (from its outlet on Lake Baikal to the Mongolian border), are analysed, based on 2316 quantitative samples, taken from 25 vertical sections from beneath the ice (December and March). Habitat parameters were noted to a depth of 1-2 m, with a low stream velocity (0.0-0.4 m/s). During the under-the-ice period, larvae move to the deeper parts of the channel because of the significant fall of water level and the increasing of the ice thickness near

the bank (up to 2 m). This is considered as a normal behaviour in *Ophiogomphus* sp.] Address: Bazova, N.V., Institute of General and Experimental Biology, ul. Sakhyanovoy 6, Ulan-Ude, 670042 Russia

**10776.** Bowman, N. (2010): Reports from Coastal Stations - 2009: Eccles-on-Sea, Norfolk. *Atropos* 39: 62. (in English) ["Odonata were generally scarce during 2009. The resident *Erythromma viridulum* population seemed at a very low ebb until numbers of presumed immigrants appeared in mid-August." (Author) see also Harvey & Higott (2009)] Address: not stated

**10777.** Brucet, S.M.; Boix, D.; Quintana, X.D.; Jensen, E.; Nathansen, L.W.; Trochine, C.; Meerhoff, M.; Gascon, S.; Jeppesena (2010): Factors influencing zooplankton size structure at contrasting temperatures in coastal shallow lakes: Implications for effects of climate change. *Limnol. Oceanogr.* 55(4): 1697-1711. (in English) ["We assessed the importance of temperature, salinity, and predation for the size structure of zooplankton and provided insight into the future ecological structure and function of shallow lakes in a warmer climate. Artificial plants were introduced in eight comparable coastal shallow brackish lakes located at two contrasting temperatures: cold-temperate and Mediterranean climate region. Zooplankton, fish, and macroinvertebrates were sampled within the plants and at open-water habitats. The fish communities of these brackish lakes were characterized by small-sized individuals, highly associated with submerged plants. Overall, higher densities of small planktivorous fish were recorded in the Mediterranean compared to the cold-temperate region, likely reflecting temperature-related differences as have been observed in freshwater lakes. Our results suggest that fish predation is the major control of zooplankton size structure in brackish lakes, since fish density was related to a decrease in mean body size and density of zooplankton and this was reflected in a unimodal shaped biomass-size spectrum with dominance of small sizes and low size diversity. Salinity might play a more indirect role by shaping zooplankton communities toward more salt-tolerant species. In a global-warming perspective, these results suggest that changes in the trophic structure of shallow lakes in temperate regions might be expected as a result of the warmer temperatures and the potentially associated increases in salinity. The decrease in the density of large-bodied zooplankton might reduce the grazing on phytoplankton and thus the chances of maintaining the clear water state in these ecosystems." (Authors) Macroinvertebrate predators of zooplankton sampled include coenagrionid larvae and *Ischnura elegans*.] Address: Brucet, Sandra, National Environmental Research Institute, Dept of Freshwater Ecology, Aarhus University, Silkeborg, Denmark. E-mail: sandra.brucet-balmana@jrc.ec.europa.eu

**10778.** Cade, M. (2010): Reports from Coastal stations - 2009: Portland Bird Observatory, Dorset. *Atropos* 39: 44-45. (in English) [*Sympetrum fonscolombii* was recorded on five dates between 28 May and 23 June 2009.] Address: not stated

**10779.** Clancy, S. (2010): Reports from Coastal Stations - 2009: Dungeness area, Kent. *Atropos* 39: 50-53. (in English) [Records of *Sympetrum fonscolombii* and *Anax parthenope* are documented] Address: not stated

**10780.** Deans, M. (2010): Reports from Coastal Stations - 2009: Bawdsey Peninsula, Suffolk. *Atropos* 39:



58-59. (in English) [Chalcolestes viridis, Sympetrum striolatum (at light)] Address: not stated

**10781.** Dekeukeleire, D. (2010): Waarneming van een mannetje Bosbeekjuffer (*Calopteryx virgo*) aan de Sassegembeek te Oubraken. *Limoniet* 2010(1/2): 70. (in Dutch) [18-VII-2010, 50°47'N 3°44'E, Oubraken, provincie Oost-Vlaanderen, Belgium] Address: Dekeukeleire, D. E-mail: daan.dekeukeleire@gmail.com

**10782.** Dewick, S. (2010): Reports from Coastal Stations - 2009: Curry Farm, Bradwell-on-Sea, Essex. *Atropos* 39: 56-57. (in English) [Sympetrum striolatum was active on 10-XII-2009.] Address: Dewick, S.; Curry Farm, Bradwell-on-Sea, Southminster, Essex, CM0 7NL, UK

**10783.** Diehl, D.A.; Lücke, Y.A. (2010): Die aktuelle Situation der Libellen im Landkreis Darmstadt-Dieburg. *Collurio* 28: 122-130. (in German) [Hessen, Germany; the regional status/threats of the following Odonata species are outlined: *Aeshna affinis*, *Anaciaeschna isocles*, *Calopteryx virgo*, *Cordulegaster bidentata*, *Crocothemis erythraea*, *Erythromma najas*, *E. viridulum*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Orthetrum brunneum*, *Sympetrum pedemontanum*, *S. danae*, and *S. fonscolombii*.] Address: Diehl, D.A., Naturkunde-Institut Langstadt, Breuberger Weg 4, 64832 Langstadt, Germany. E-mail: biologodd@aol.com

**10784.** Dronsikova, M.V. (2010): Behaviour of *Libellula quadrimaculata* (Linnaeus, 1758) larva (Odonata, Libellulidae) and its modification during ontogenesis. *Euroasian ent. J.* 9(2): 255-262. (in Russian, with English summary) ["A series of aquarian experiments to study the behaviour of larvae of dragonflies *L. quadrimaculata* from egg to imago have been undertaken. The complexity and individuality of larvae behaviour during ontogenesis is revealed. Many features in behaviour become apparent following the 6th larval stage and allows consider development of behaviour in ontogenesis. Larval aggression against conspecific individuals chiefly depends on their experience in earlier contacts. It is found that *L. quadrimaculata* larvae have a tendency to spatial aggregation, the number of clusters changing with increasing of larval sizes and age." (Author)] Address: Dronsikova, M.V., Kuzbass St. Pedag. Acad., Pros. Pionerskiy 13, RUS-654027 Novokuznetsk

**10785.** Druvietis, I.; Sprinģe, G.; Briede, A.; Kokoritē, I.; Pārele, E. (2010): A comparative assessment of the bog aquatic environment of the Ramsar site of Teiči Nature Reserve and North Vidzeme Biosphere Reserve, Latvia. In: M. Klavinš (ed.): *Mires and Peat*. University of Latvia Press. 216 pp.: 19-40. (in English) [In most cases Odonata - listed in appendix 2 - are treated at the genus level.] Address: Druvietis, I., Institute of Biology, Univ. of Latvia, Miera St 3, Salaspils, LV-2169, Latvia.

**10786.** Gligorović, B.; Pešić, V.; Zeković, A. (2010): A contribution to the knowledge of the dragonflies (Odonata) of the river Brestica (Montenegro). *Natura Montegrina, Podgorica* 9(2): 151-159. (in English, with Serbian summary) ["In 2007 Odonata fauna along the River Brestica in the surrounding of Spuz was studied. 273 specimens classified into 19 species were collected. Species structure of collected specimens in this area is interesting because the River Brestica is one of the few absolutely flat rivers in Montenegro." (Authors)] Address: Gligorović, B., Dept of Biology, Faculty of Sci-

ences. Univ. of Montenegro. Cetinjski put b.b., 81000 Podgorica. Montenegro. E-mail: bogid@t-com.me

**10787.** Gligorović, B.; Pešić, V.; Gligorović, A. (2010): A contribution to the knowledge of the dragonflies (Odonata) from the River Morača (Montenegro). *Acta entomologica serbica* 15(2): 149-159. (in English, with Serbian summary) [The records of 35 species (including *Coenagrion ornatum*, *Gomphus schneideri*, *Stylurus flavipes*, *Lindenia tetraphylla*, *Somatochlora meridionalis*) are presented. *Trithemis annulata* is for the first time recorded from Montenegro. *Calopteryx s. splendens* occurs in the upper and middle and *C. s. balcanica* in the lower course of the river. *O. c. coerulescens* is recorded from Lukovci and Manastirski Lug, *O. c. anceps* from Podgorica. Records of *Platycnemis pennipes nitidula*, *Chalcolestes viridis* and *C. parvidens* are briefly discussed.] Address: Gligorović, B., Univ. Montenegro, Fac. of Sci., Dep.t of Biology, Cetinjski put b.b., 81000 Podgorica, Montenegro. E-mail: bogic1@t-com.me

**10788.** Haritonov, A.Yu. (2010): A dedication to Dr Boris Feodorovich Belyshev on his 100th birthday: retrospective and perspectives of odonatology in Siberia. *Eurasian entomological journal* 9(2): 223-230. (in Russian) ["A biographical sketch on the outstanding odonatologist Boris Feodorovich Belyshev is presented, with an analysis of his scientific work and that of the scientific school he founded. A comprehensive list of his odonatalogical publications is also provided." (Author)] Address: Haritonov, A.YU.; Laboratory of Insect Ecology, Biological Institute of the Siberian Branch of the Acad. of Sciences, Frunze str. 11, RUS-630091 Novosibirsk, Russia. E-mail: pc@eco.nsc.ru

**10789.** Harvey, R.; Higgott, J. (2010): Reports from Coastal Stations - 2006: Minsmere RSPB Nature Reserve, Suffolk. *Atropos* 39: 60-61. (in English) [Records of *Sympetrum fonscolombii*, *Anaciaeschna isosceles*, *Erythromma najas* and *E. viridulum* are reported. *E. viridulum* was recorded on 17-VIII during a major influx of the ladybird beetle *Coccinella septempunctata*, and thus may have indicated a fresh immigration from continental Europe.] Address: not stated

**10790.** Heads, M. (2010): Point of view: Old taxa on young islands: A critique of the use of island age to date island-endemic clades and calibrate phylogenies. *Systematic Biology* 60: 1-15. (in English) ["The age of a clade has been estimated by using the age of its oldest fossils, the age of islands or strata that the clade is endemic to, and the age of tectonic events that are spatially related to the clade's geographic distribution (Heads 2005a). These dates can be used to calibrate a phylogeny and to calculate the ages of other related clades. This paper focuses on the use of islands in calibration, but the two other methods are also discussed briefly." (Author) The paper includes a reference to *Megalagrion*.] Address: Heads, M., Buffalo Museum of Science, 1020 Humboldt Parkway, Buffalo, NY 14211-1293, USA. E-mail: michael.heads@yahoo.com

**10791.** Holuša, O.; Kúdela, M. (2010): New records of *Cordulegaster heros* (Odonata: Cordulegasteridae) on its northern area border in Slovakia. *Acta Musei Beskydensis* 2: 75-87. (in English, with Slovakian summary.) [During 1997-2009, the regional occurrence of *C. heros* was studied in the southern part of Slovakia. So far, four regions with its occurrence are known now: the Borská nížina Lowland, the Malé Karpaty Mts. in the western Slovakia, the Revúcka vrchovina Highlands

and the Stolické vrchy Hills in central Slovakia. The species was found - based on records of larvae - at 44 localities, situated an altitude between 194 and 516 m a.s.l. and a concentration of records between 201-300 m a.s.l. The distribution in Slovakia is mapped, and some characteristic habitats are pictured.] Address: Holusa, O., Department of Forest Protection and Game Management, Faculty of Forestry and Wood Technology, Mendel University of Agriculture and Forestry Brno, Zemědělská 3, CZ-613 00 Brno, Czech Republic. E-mail: holusao@email.cz

**10792.** Holusa, O. (2010): The results of the faunistic research of dragonflies (Insecta: Odonata) in the region of Místek town. *Acta Musei Beskydensis* 2: 63-74. [Between 1992 to 2009, 38 Odonata species were found at 25 localities in the region of Místek town in the northern Moravia, Czech Republic. Regionally rare species are: *Anax parthenope*, *A. ephippiger*, *Crocothemis erythraea*, *Orthetrum brunneum* and, *Sympetrum pedemontanum*. Emphasis is given to the habitats of *Cordulegaster bidentata* and *Onychogomphus forcipatus*. The common occurrence of *Orthetrum albistylum* in the region is also emphasized.] Address: Holusa, O., Dept of Forest Protection and Game Management, Faculty of Forestry and Wood Technology, Mendel University of Agriculture and Forestry Brno, Zemědělská 3, CZ-613 00 Brno, Czech Republic. E-mail: holusao@email.cz

**10793.** Hunter, I.; Hunter, S. (2010): Reports from Coastal Stations - 2009: Elms Farm, Icklesham, East Sussex. *Atropos* 39: 49-50. (in English) [Abundance of *Erythromma viridulum* accounted to 331 individuals.] Address: not stated

**10794.** Jarman, N.; Morris, T. (2010): Reports from Coastal Stations - 2009: Kingsdown Beach and St Margaret's at Cliffe, Kent. *Atropos* 39: (in English) [UK; *Sympetrum fonscolombii* at 29-VIII and 5-IX-2009] Address: not stated

**10795.** Kaize, J.; Kalkman, V.J. (2010): On a collection of dragonflies (Odonata) from the Island of Mioswaar (Papua Barat, Indonesia). *SUGAPA (Suara Serangga Papua)* 5(2): 71-76. (in English) ["A total of 28 species of dragonflies were collected during fieldwork from the 18th to 27th of August 2009. One of these (*Argiolestes roon*) has since been described as new to science while several others are still undescribed (*Argiolestes spec.*) or might be new to science. This small collection shows that the Island of Mioswaar has a rich and diverse dragonfly fauna comparable with that of the mainland. A number of the species have their main range or their nearest relatives on the Bird's Head Peninsula showing that the dragonfly fauna of Mioswaar is more related with that of the Bird's Head than with that of the vast other part of the mainland of New Guinea." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**10796.** Kern, D. (2010): *Fliegende Edelsteine. Libellen im Landkreis Diepholz*. WM-Verlag, Weyhe-Melchiorshausen: 156 pp. (in German) [This regional faunistic research (Niedersachsen, Germany) is based on more than 8000 data from 57 Odonata species sampled over 30 years. It introduces the regional natural history, maps all records and presents threats to each Odonata species. The study is arranged in a monographic style

with photographs to each species.] Address: Kern, D., Taxusweg 2, D-27232 Sulingen, Germany

**10797.** Knill-Jones, S. (2010): Reports from Coastal Station - 2009: Isle of Wight, Hampshire. *Atropos* 39: 45-47. (in English) [*Cordulia aenea*, *Brachytron pratense* and *Sympetrum fonscolombii* were brought on record.] Address: not stated

**10798.** Latha, C.; Thanga, V.S.G. (2010): Choice of bio-indicator species for estuaries of south Kerala: An approach based on macroinvertebrate. *The Ecoscan* 4(4): 285-289. (in English) ["Spatial and temporal patterns of macroinvertebrate community structure were used to assess the water quality of two estuaries in south Kerala viz., Kadinamkulam and Veli. A total of 14,660 individuals representing 24 taxa and 3 phyla viz., Mollusca, Arthropoda and Annelida were collected from the sampling sites. The dominance of taxa varied with seasons as well as sites. Species abundance was highest at V2 followed by K. Species richness, abundance and diversity were found to be lowest in site K2. Diversity index ranged from 0.27 to 2.33. At V1, there was no significant difference ( $p > 0.05$ ), K1 was found to be significantly different from K2 and V2; K2 was significantly different from sites K3 and V3; K3 differed significantly from V2 ( $p < 0.05$ ); V3 was significantly different from V2 ( $p < 0.01$ ). Kadinamkulam was found to be highly polluted than Veli considering the richness and abundance of macroinvertebrates in the estuaries. The indicator species chosen for Kadinamkulam was Culicidae and Chironomidae; whereas they were Peracaridae and Planorbidae for Veli. [...] Corduliidae, Aeshnidae, Coenagrionidae were present only in V1 and V2." (Authors)] Address: Latha, C., Department of Zoology, M. S. M College, Kayamkulam, University of Kerala - 690 502, India. E-mail: lathachin@yahoo.co.in

**10799.** Löschau, M. (2010): Rotfußfalke (*Falco vespertinus*) auf nächtlicher Libellenjagd bei Vollmond. *Otis* 18: 115. (in German, with English summary) [Zachow, Havelland, Brandenburg, Germany; a female *F. vespertinus* successfully caught dragonflies at night under a full moon.] Address: Löschau, M., Falstaffweg 46, 13593 Berlin, Germany. E-mail: martin.loeschau@web.de

**10800.** Lojková, S. (2010): Contribution to the knowledge of dragonflies (Odonata) of selected localities of Bratislava. *Folia faunistica Slovaca* 15(16): 135-142. (in Slovakian, with English summary) [Slovakia; In 2008, the Odonata of 12 localities in the Malé Karpaty Mts (DFS-090) and the Podunajská rovina lowland (DFS-790) were studied. 29 species were identified representing 41 % of Odonata the species reported for Slovakia. Of special interest are the species protected by European law: *Cordulegaster heros* and *Leucorrhinia pectoralis*] Address: Lojková, Sona, Katedra zoológie, Prírodovedecká fakulta UK v Bratislave, Mlynská dolina B-1, 84215 Bratislava. Slovakia. E-mail: lojkova@fns.uniba.sk

**10801.** McNeely, J. (2010): Monitoring climate change with Dragonflies: Foreword. *BioRisk* 5 (Special issue: Monitoring climatic change with dragonflies): 1-2. (in English) ["Monitoring Climate Change with Dragonflies provides an important new tool for dealing with arguably the most important environmental challenge facing modern humanity. It provides a solid foundation on which subsequent research can be built, and can help ensure that responses to climate change are as appro-

priate as possible." (Author)] Address: McNeely, J.A., IUCN, Gland, Switzerland. E-mail: jam@iucn.org

**10802.** Odin, N. (2010): Reports from Coastal Stations - 2009: Landguard Bird Observatory, Suffolk. *Atropos* 39: 57-58. (in English) [Records of *Sympetrum fonscolombii* on 21-VII and of *Chalcolestes viridis* on 14-IX-2009.] Address: not stated

**10803.** Oregon Biodiversity Information Center (2010): Rare, Threatened and Endangered Species of Oregon. Institute for Natural Resources, Portland State University, Portland, Oregon: 105 pp. (in English) [USA; only *Eretopomphus compositus* and *Gomphus lynnae* are checklisted.] Address: Publishers: 1322 S.E. Morrison St., Portland, OR 97214-2531, USA

**10804.** Orr, A.G.; Kalkman, V.J. (2010): *Arrhenocnemis parvibullis* sp. nov. (Odonata: Platycnemididae), a new calicnemiine damselfly from Papua New Guinea, with a description of the female of *A. amphidactylis* Lieftinck, 1949. *Australian Entomologist* 37(4): 137-146. (in English) ["*Arrhenocnemis parvibullis* (Odonata: Platycnemididae), from the Muller Range of Papua New Guinea is described and its habits and habitat discussed. It represents the third species of this distinctive genus, known from just 16 specimens. The recently discovered female of *A. amphidactylis* is described for the first time." (Authors)] Address: Orr, B., Griffith School of Environment, Griffith University, Nathan, Qld. 4111, Australia

**10805.** Parr, A. (2010): Migrant dragonflies in 2009, including recent decisions and comments by the Odonata Records Committee. *Atropos* 39: 26-33. (in English) ["The 2009 season saw major arrivals of *Sympetrum fonscolombii* during the late spring and summer, and a significant hot weather movement of many migratory/dispersive species during a short period around the end of June/early July. Other significant finds included the discovery of singleton *Lestes barbarus* at three sites on the East Anglian coast during August. The highlight of the year was, however, the discovery of large numbers of *Lestes viridis* in southeast Suffolk, under circumstances strongly suggestive of the presence of a recently-established breeding population." (Author) A total of 18 Odonata species is documented and discussed.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**10806.** Paulson, D.A. (2010): Review: GARRISON, R. W., VON ELLENRIEDER, N., AND LOUTON, J. A. 2010. *Damselfly Genera of the New World, an Illustrated and Annotated Key to the Zygoptera*. The Johns Hopkins University Press, 490 pp., 2586 figs., 108 maps. ISBN 978-0-8018-9670-5. Hardback, \$84.37 (amazon.com). *Florida Entomologist* 93(4): 666. (in English) [Verbatim: "This book follows by four years its companion volume on the Anisoptera of the New World by the same authors (Garrison et al. 2006, reviewed in *Florida Entomologist* 90: 290-291). Although about the same number of genera (124 Anisoptera, 118 Zygoptera) are treated in the two books, the dragonflies are treated in 368 pages with 1626 figures, the damselflies in 490 pages with 2586 figures. This points out the considerably greater degree of work and detail the authors put into the second volume. In addition, while preparing to write and writing this volume, the first two authors have become the pre-eminent odonate taxonomists of the New World tropics, publishing no fewer than 17 papers (since 2000) to clarify the taxonomy of numerous

groups, some of them large. Before this, the largest family, Coenagrionidae, was a taxonomic quagmire, and now a fair modicum of order has emerged from the chaos. How else to build a key to genera that actually works? This book easily lives up to the expectations promised by the dragonfly volume, including comprehensive, extremely well illustrated keys; detailed morphological descriptions of each genus; and brief descriptions of natural history wherever known. The writing is clear, but its conciseness fails to convey how much work at the microscope must have gone into the keys and descriptions. And most of us will be unable to imagine the amount of time that went into producing the figures. They are meticulous and superb, by the standards of any scientific illustrator. They are lavishly provided, often more than one species in a genus. I am constantly engaged by the morphological diversity of damselflies that one can see under magnification, and this book shows it all. Many of them were used before, in their recently published papers, but the majority appear uniquely in this book. Having worked with the authors on several genera, I can add that they are impeccably accurate. The three-dimensional rendering of medio-dorsal views of terminal appendages is so much more helpful than the old standard of dorsal and lateral views that one wonders why the excellent illustrators of a century ago didn't come up with it. There are a lot more photos in this book than in the dragonfly book, 81 vs. 24, and the beauty and variety of New World damselflies are shown off to the fullest. All the families are represented, and there was a real effort made to get all the genera. Many have not been photographed. Everything about this volume invites the term "comprehensive." The maps of generic ranges are of great value to the biogeographer and might be used to point out poorly surveyed regions. The long list of references provides access to the taxonomic and biological literature of all New World damselflies, and to that all-important opportunity to identify specimens to species. The list that attributes a locality to every figure is a nice touch. If there are mistakes in the volume, I did not find them with my level of scrutiny. The very timely Appendix lists additions and corrections to the Anisoptera volume, and such a list will doubtless be generated for this volume in a few years. Like Philip Corbet's grand book on Odonata (Corbet 1999), the two superb volumes from these authors are perfectly placed to show us what still needs to be done: 1) databasing and georeferencing existing collections to give an even clearer picture of regional biodiversity; 2) many more surveys and much more collecting over neotropical regions that are still poorly known; 3) modern taxonomic revisions of genera that have not yet received that treatment; and 4) sets of keys to species, especially regional keys such as those by Lencioni (2005, 2006). Finally, regional photo-illustrated field guides to all species!" Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**10807.** Rozner, G.; Lökkös, A.; Ferincz, A. (2010): Preliminary studies on the distribution of Large Golden Ringed Dragonfly (*Cordulegaster heros* Theischinger, 1979) and Golden Ringed Dragonfly (*Cordulegaster bidentata* Selys, 1843) in the Kőszeg-mountains. *Folia Historico-Naturalia Musei Matraensis* 34: 37-40. (in English) ["In former studies the occurrence of *C. bidentata* was reported from the Kőszeg Mountainins, Bakony Mountains and Northern Mountains, *C. heros* was found in the Mecsek, the Sopron Mountains, the Örség and nowa-



days it has been observed in the Zselic Hills. In the years 2008 and 2010 our examinations confirmed the occurrence of *C. heros* also in several waterflows of Kőszeg Mountains." These findings enlarge the known regional range of distribution of *C. heros*, and evidence the co-occurrence of the two species in Hungary.] Address: Rozner, G., Managership of Balaton-felvidéki National Park, H-8229 Csopak, Kossuth u. 16, Hungary

**10808.** Sacha, D. (2010): Results of the research on dragonflies (Odonata) in the area within the Pieniny National Park. Pieniny – Przyroda i Człowiek 11: 69-79. (in Slovakian, with English summary) ["There are 34 species of Odonata reported from 15 sites in the area within the Pieninský národný park administration. [...] 14 species were reported in this territory for the first time, 14 species are Redlisted in Slovakia, 7 are protected under national law, 1 is a species of Community interest. The most interesting findings are: *Coenagrion hastulatum*, *Sympetrum pedemontanum*, *Orthetrum coerulescens*, *Leucorrhinia dubia*, *L. pectoralis* and *L. rubicunda*." (Author)] Address: Šácha, D., Podtatranského 31, 031 01 Liptovský Mikuláš, Slovakia. E-mail: [du-san.sacha@vazky.sk](mailto:du-san.sacha@vazky.sk)

**10809.** Sato, T.; Tsurusaki, N. (2010): Preliminary report of insect fauna occurring in the Tottori Sand Dunes. Bulletin of the Tottori Prefectural Museum 47: 45-81. (in Japanese, with English summary) ["On the basis of literature records and specimens newly obtained, a total of 600 insect species belonging to 130 families of 13 orders (excluding Endognatha) are catalogued as a preliminary list of insect fauna of the Tottori Sand Dunes (s.str., Tottori City, Honshu, Japan), which is the largest coastal dunes in Japan facing the Sea of Japan to the north." (Authors) 38 Odonata species are reported.] Address: Sato, T., Suzukake-dai 1-38-306, Sanda City, Hyogo Prefecture, 669-1322 Japan. E-mail: [satotakamushi@yahoo.co.jp](mailto:satotakamushi@yahoo.co.jp)

**10810.** Sharma, C.; Saini, D.S. (2010): Studies on the zygopterous dragon fly larval forms from Rewa. International journal of pharmacy & life sciences 1(6): 350-356. (in English) [India; *Pseudagrion decorum*, *Ischnura delicata* and *I. senegalensis* is described ("principal morphological changes and extent of variations occurring during development") and compared.] Address: Sharma C., Zoological Laboratory, Janata P.G. College, Rewa, (M.P.) - India

**10811.** Spence, B. (2010): Reports from Coastal Stations - 2009: Spurn Point, East Yorkshire. Atropos 39: 63-64. (in English) ["It was not a particularly outstanding year for Odonata and the only notable event was a small arrival of Red-veined Darter *Sympetrum fonscolombii* on 14 June, when nine were seen. However, with calmer weather during August up to 20 Small Red-eyed Damselfly *Erythromma viridulum* were counted on several dates during the month." (Author)] Address: not stated

**10812.** Taylor, R.E.; Forman, D.W.; Greig, C.; Parry, G.S. (2010): Otters, the unexpected entomophage? The Biologist 57(3): 121-125. (in English) [In April - June, "Aeshna" was found in 10 - 15 % of otter spraints from rivers in Gower, UK, between January 2005 and December 2007.] Address: Forman, D.W., Conservation Ecology Research Team, Department of Pure and Applied Ecology at the School of the Environment and Society, Swansea University, Singleton Park, Swansea SA2 8PP, UK. E-mail: [d.w.forman@swansea.ac.uk](mailto:d.w.forman@swansea.ac.uk)

**10813.** Toth, S. (2010): Dragonfly fauna of the Transdanubium hills and surroundings. Natura Somogyiensis 16: 5-188. (in Hungarian, with English summary) [Hungary, Balaton region and Mecsek Mountains; records of 58 Odonata species are documented in detail and mapped. The phenology of most of the species is illustrated, and the historical development of regional odonatological faunistics is presented.] Address: Toth, S., Széchenyi u. 2, H-8420 Zirc, Hungaria. E-mail: [flycatcher@freemail.hu](mailto:flycatcher@freemail.hu)

**10814.** Tunmore, M. (2010): Reports from Coastal Stations - 2008: Lizard Peninsula. Atropos 39: 39-41. (in English) [*Sympetrum fonscolombii*; at light: *Aeshna mixta* and *Sympetrum striolatum*] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: [atropos@atroposed.freeserve.co.uk](mailto:atropos@atroposed.freeserve.co.uk)

**10815.** van Dijk, T. (2010): Effects of neonicotinoid pesticide pollution of Dutch surface water on non-target species abundance. MSc Thesis, Sustainable Development, Track Land use, Environment and Biodiversity (SD: LEB), Utrecht University: 75 pp. (in English) ["Conclusions: Neonicotinoid pesticides are applied in the largest amounts where potatoes, horticultural products and chicory are grown. In these areas, which are mainly found in the Dutch provinces of Zuid-Holland, Noord-Holland, Zeeland and Groningen, imidacloprid can be found in the surface water in concentrations often far exceeding the MTR norm of formerly 13 ng/l and presently 67 ng/l. Neonicotinoid pesticides work by inhibiting nerve impulses in susceptible species, particularly insects, which leads to their demise and, at lower concentrations, several sublethal effects including reduced learning and signalling, and starvation of the individual or colony. The effects of neonicotinoid pesticides on many non-target species have been reported in scientific literature – in this study, toxicity data from previous research were listed for 44 different species. Flying insects quite consistently appeared to be the most vulnerable to neonicotinoids, and therefore species abundance of three orders of flying insects was combined with imidacloprid concentrations in the Dutch surface water, to see whether any correlation between these properties existed. Six other orders, of aquatic insects and crustaceans, were also included in this analysis. Species abundance for the flying insect order Diptera tends to decrease with increasing imidacloprid concentration. This was shown by all three different methods of analysis used: classification by number of times the MTR norm, classification by groups with equal n, and visualisation of data in scatter plots. All methods yielded significant results for Diptera. The order Hydracarina showed an opposite effect, as abundances were higher at high imidacloprid concentrations. Results for the other orders were often more ambiguous. However, after a square root transformation had been applied to the data, the significance of the finding that Coleoptera, Amphipoda and Odonata are negatively influenced by the presence of imidacloprid was shown to be at a 93, 89 and 87% confidence level, respectively. Also, the scatter plots of transformed data for all orders showed declining trend lines for separate species and sometimes for all species together, and these were significant for Diptera and all species of Amphipoda together, and had a relatively high level of significance for a species of Trichoptera and most species of Heteroptera. This indicates that if the amount of data available had permitted

analysing separate species, more significant differences might well have been found, as the presence of insensitive species may have distorted results for the entire order. If analysis of separate species had been possible, the hypothesis drafted for this study might have been confirmed unequivocally. As is, the hypothesis has been confirmed for Diptera, and, less strongly, for Coleoptera, Amphipoda, Heteroptera and Odonata. It was invalidated for Hydracarina, and for the other orders results were ambiguous." (Author)] Address: not stated

**10816.** Vieira, C.; Goncalves, V.; Cardoso, A.C.; Patanita, I. (2010): Registo de quatro novas especies de Odonata para a Ribeira do Vasco, Sitio de Interesse Comunitario do Guadiana (Portugal). Boletim de la S.E.A. 47(2): 461-462. (in Portuguese) [2009, *Sympecma fusca*, *Coenagrion caerulescens*, *Gomphus graslinii*, *Libellula quadrimaculata*] Address: not available

**10817.** Yum, J.W.; Lee, H.Y.; Bae, Y.J. (2010): Taxonomic review of the Korean Zygoptera (Odonata). Entomological Research Bulletin 26: 41-55. (in English) ["Korean Zygoptera are reviewed and catalogued with synonyms, type and bibliographic information, Korean localities, distribution, and taxonomic remarks. As a result, 35 nominal species belonging to 4 families are included as follows. Calopterygidae: *Calopteryx atrata*, *C. japonica*, *Matrona basilaris*, and *Mnais pruinosa*; Coenagrionidae: *Aciagrion migratum*, *Ceriagrion auranticum*, *C. melanurum*, *C. n nipponicum*, *Coenagrion concinuum*, *Coe. ecornutum*, *Coe. hastulatum*, *Coe. hylas*, *Coe. lanceolatum*, *Enallagma cyathigerum*, *E. deserti*, *Ischnura asiatica*, *I. elegans*, *I. senegalensis*, *Mortonagrion selection*, *Nehalennia speciosa*, *Paracercion calamorum*, *P. hieroglyphicum*, *P. melanotum*, *P. plagiosum*, *P. sieboldii*, and *P. v-nigrum*; Platycnemididae: *Copera annulata*, *C. tokyoensis*, and *Platycnemis phyllopora*; Lestidae: *Indolestes peregrinus*, *Lestes dryas*, *L. japonicus*, *L. sponsa*, *L. temporalis*, and *Sympecma paedisca*. *Calopteryx cornelia* Selys, *Agrionemis pygmaea* Rambur, *Platycnemis foliacea sasaki* Asahina, and *Lestes hanlimensis* Kim are inappropriately known Zygoptera species in Korea." (Authors)] Address: Bae, Y.J., Division of Life Sciences, College of Life Sciences and Biotechnology, Korea University, 5-ga, Anam-dong, Seongbuk-gu, Seoul 136-701, Korea. E-mail: yjbae@korea.ac.kr

**10818.** Zhang, H.; Hämäläinen, M.; Tong, X. (2010): *Indocypha catopta* sp. nov. from Guizhou, China (Odonata: Chlorocyphidae). International Journal of Odonatology 13(2): 231-240, pl. III. (in English) ["*Indocypha catopta* sp. nov. (holotype male: China, Guizhou, Maolan National Nature Reserve 28 vii 2008, to be deposited in the Collection of Aquatic Insects and Soil Animals, Department of Entomology, South China Agricultural University, Guangzhou) is described, illustrated and compared with all known *Indocypha* species. The uncertain taxonomic status of some Chinese *Indocypha* species is briefly discussed. The correct spelling of the species-group name of *I. silbergliedi* is established." (Authors)] Address: Zhang, H., Dept of Entomology, College of Natural Resources and Environment, South China Agricultural University, Guangzhou-510642, China. E-mail: zhanghaomiaoo6988@gmail.com

**10819.** Abbott, J.C. (2011): The female of *Leptobasis melinogaster* González-Soriano (Odonata: Coenagrionidae). International Journal of Odonatology 14(2): 171-174. (in English) ["The female of *L. melinogaster* is formally described and illustrated. Female *L. melinogaster* can be distinguished from the seven other known congeners by the shape and presence of a ventral lobe below the rounded lateral margins of the posterior and median lobes of the prothorax as well as by the dark apices on the femora." (Author)] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., Univ. of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**10820.** Abbott, J.C. (2011): Dragonflies and Damselflies (Odonata) of Texas. Odonata Survey of Texas. Vol. 5. Austin, Texas: VI + 322 pp. (in English) [Information on Texas, USA Odonata is provided in the following chapters: Statistical Summary of Odonata in Texas; Abundance & Distribution of Texas Odonata; Diversity of Texas Odonata by County; Checklist of Dragonflies & Damselflies of Texas; Dragonflies and Damselflies of Texas Conservation Ranks; Seasonality of Odonata in Texas; Dragonflies & Damselflies of Texas Listed by County; Distribution Maps of Texas Odonata; Appendix: (1) Collection Guidelines for the Odonata Survey of Texas. (2) The Dragonfly Society of the Americas Guidelines for Collecting. (3) Specific Collecting & Preservation Instructions. (4) Guidelines for Field Notes & Data Recording. (5) Odonata Field Guides, Resources, Societies, & Suppliers (6) Glossary of Terms Relating to Odonata. (7) Index of maps.] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**10821.** Abdel-Gawad, F.K.; Hassanein, M.A.; Lofty, N.M.; Bassem, S.M. (2011): Evaluation of DNA damage in fish and aquatic insects induced by environmental pollutants in River Nile. World Applied Sciences Journal 14(7): 1085-1090. (in English) ["The development of comet assay for aquatic organisms is of particular relevance in light of the importance of fisheries testing for environmental pollutants. Various tests in organisms have been utilized for the detection and identification of toxic substances in the air, water and soil. In the present study, the comet assay was applied on fish and aquatic insects to conduct an environmental assessment of River Nile. The collected samples from the mixed point of waste water represented the highest degree of DNA damage concerning damage stages and comet% followed by the mixed point of agriculture drain when compared with samples collected from control site. Results of DNA damage by one way ANOVA analysis of tail moment of fish and aquatic insects collected from this study demonstrates the potential application of the comet assay to different aquatic sites were not significantly different from samples collected from control site ( $P=0.08$ ). While when analyzing other comet parameters (comet% and tail length) samples were significantly different ( $P=0.04$ ). The results suggested a genotoxicity of the aquatic environment at River Nile and that the comet assay in fish and aquatic insects provided adequate sensitivity to be utilized as a tool in the monitoring of water pollution and environmental risk assessment." (Authors) The study includes *Enallagma (Azuragrion) vansomereni*.] Address: Fagr Abdel-Gawad, Dept of Water Pollution, National Research Cen-

ter, Dokki, Giza, Postal code 12622, Egypt. E-mail: fagr-abdlgawad@gmail.com

**10822.** Ahani, M. (2011): Environmental assessment of downstream water from Latian Dam using benthics as a biological index. International Conference on Chemical, Environmental and Biological Sciences (ICCEBS'2011): 302-307. (in English) [Iran; "This paper reports the results of a study on the environmental assessment of the downstream water using benthics as a biological index of water quality in Jajrood River. The research was carried out at four sampling sites of a downstream section of Latian Dam in the fall-winter and spring seasons. Using the Hilsenhoff Biotic Index to assess water quality at the sampling sites, the monthly and seasonal flow water changes were investigated in the Jajrood catchment for a period of 30 years. Statistical investigations indicate that spring is the wettest season in the Jajrood catchment, and the result of a paired t-test indicates that the seasonal differences of all benthic families except Rhyacophilidae is significant. According to the Hilsenhoff Biotic Index results, the water quality downstream of Latian Dam was average at three sampling sites, and the water quality was only good at site 2. The dominant benthic families were Chironomidae and Caenidae. In this study, the presence of pollution-tolerant families in the sampling sites indicates that these sites are ecologically unhealthy and that the flow water at the downstream section of Latian Dam differs considerably from the environmental flow water requirements of aquatic ecosystems during the fall-winter and spring seasons." (Author) Odonata (Platycnemidae, Coenagrionidae) are only represented in spring in low abundances.] Address: Ahani, M., Department of Environment planning and management, Faculty of Environment, Tehran University, Tehran, Iran. Email: Monireh Ahani@yahoo.com

**10823.** Akin, S.; Sahin, C.; Verep, B.; Turan, D.; Mutlu Gözler, A.; Bozkurt, A.; Çelik, K.; Çetin, E.; Aracı, A.; Sargın, Y (2011): Feeding habits of introduced European perch (*Perca fluviatilis*) in an impounded large river system in Turkey. African Journal of Agricultural Research 6(18): 4293-4307. (in Akin, S., Faculty of Agriculture, Department of Fisheries and Aquatic Sciences, Gaziosmanpasa University 60240 Tokat, Turkey. E-mail: senol.akin@gop.edu.tr) ["The feeding habits of perch were documented by analyzing gut contents of more than 3300 specimens collected seasonally at nine stations located along the impounded large river in Turkey. Perch largely preferred fish (36%), insects (54%), other crustaceans (16%) and daphnia (13%). Spatial analysis showed that perch substantially preferred fish in the river section above the dam lakes and insects, crustacean and fish in the river section below the dam lake and in dam lakes. The perch at every size seemed to prefer fish with the highest and lowest percentage obtained for 0 to 80 and 141 to 200 mm. Insects and crustaceans were important for 81 to 140 mm and 0 to 120 mm length, respectively. Crustaceans were important in June, November and July. Insects and fish except for June 2009 constituted an important portion of the diets during every sampling month. The perch showed a piscivory feeding habit, a result obtained by trophic level calculated by stomach contents (3.87) and stable isotope (3.91) methods. Trophic level change little during the ontogeny with relatively higher value obtained for the larger length. The perch inhabiting in the river section above the dam lakes had the highest trophic level compared to the other sites. Diet breadth of perch was

lower and higher for larger and middle length (101 to 140 mm), respectively. The diet breadth was higher in dam lakes, indicating opportunistic feeding habits in lakes. Being the most abundant fish species in the study system and showing predatory feeding habits suggested that perch may have an effect on local fish assemblage and itself through predation." (Authors) The diet includes very few Odonata specimens.] Address: not stated

**10824.** Amaya Vallejo, V.; Novelo-Gutierrez, R. (2011): The larva of *Palaemnema mutans* Calvert, 1931 (Odonata: Platystictidae). Zootaxa 3049: 59-63. (in English, with Spanish summary) ["The larva of *P. mutans* is described, illustrated, and compared with larvae of the genus described to date. *P. mutans* differs from the other species in having a shorter body length, a larger number of teeth in the internal molar lobe of the left mandible and shorter caudal lamellae, as well as an apical filament proportionally longer than in any other species. The hypopharynx is described for the first time for the genus. This is the first record of *P. mutans* for Colombia." (Authors)] Address: Amaya Vallejo, Vanessa, Universidad de los Andes, Laboratorio de Zoología y Ecología Acuática LAZOE. Cra 1 N°18A- 12, Lab J307 Bogotá, Colombia. E-mail: stolenseason@gmail.com

**10825.** Ammerschlaeger, J.; Hübner, T.; Kiel, E.-F. (2011): Maßnahmen zur Anpassung an den Klimawandel in NRW. Möglichkeiten, die Auswirkungen des Klimawandels auf Arten und Lebensräume abzuschwächen. Natur in NRW 4/11: 11-14. (in German) [Measures to deaden climatic effects on the regional fauna are discussed. Dragonflies most serious susceptible by the effects and therefore of concern are *Somatoclora arctica*, *S. flavomaculata*, *Thecagaster bidentata*, *Aeshna subarctica elisabethae*, *Leucorrhinia dubia*, *L. rubicunda*, *Coenagrion lunulatum*, and *C. hastulatum*.] Address: Hübner, T., LANUV, Leibnitzstr. 10, 45659 Recklinghausen, Germany. E-mail: thomas.huebnerlanu.nrw.de

**10826.** Andrew, R.J.; Thakkar, N.; Dhamani, A.A. (2011): Eggshell ultrastructure of the damselfly *Ceragrion coromandelianum* (Zygoptera: Coenagrionidae). National Seminar on Biodiversity and Intangible Natural Heritage on 28th September, 2011. Organised by National Museum of Natural History Zoological Survey of India, Tansen Marg, New Delhi (MoEF, Govt. of India), M-Block, New Alipore, Kolkata (MoEF, Govt. of India) on September 28th, 2011: 23. (in English) [Verbatim: Scanning electron microscopic examination of the egg of *C. coromandelianum* reveals that it is elongate and cylindrical with a pointed anterior and rounded posterior end. The egg chorion is composed of an outer, thin, lightly corrugated exochorion and an inner, thick, smooth, non-porous endochorion. The anterior end is circumscribed by five micropylar orifices. Each orifice is semicircular and continues as a long horizontal streak on the endochorion and concludes at a bifid terminal point. This forms the entry point of the micropylar chute which penetrated the endochorion. The vitelline envelope lodged below the endochorion is thin and smooth.] Address: Dhamani, A.A., Nevjabai Hitkarini College, Brahmapuri, Dist.- Chandrapur (MS), India

**10827.** Andrew, R.J. (2011): Diversity in the egg shell ultrastructure of dragonflies (Insecta: Odonata). National Seminar on Biodiversity and Intangible Natural Heritage on 28th September, 2011. Organised by National Museum of Natural History Zoological Survey of India,



Tansen Marg, New Delhi (MoEF, Govt. of India), M-Block, New Alipore, Kolkata (MoEF, Govt. of India) on September 28th, 2011: 24-25. (in English) [Verbatim: The present report describes the ultrastructural diversity of the egg shell of five odonates exhibiting different mode of oviposition and fertilization. The dragonflies lay eggs in and around water bodies because of their amphibiotic nature. The type of water body and substrate used for oviposition has a profound influence on the ultrastructural modifications of the eggshell. The eggshell is divided into an external chorion and an inner vitelline envelope. The chorion is further differentiated into an outer exochorion and an inner endochorion. Both the layers of the chorion exhibit ultrastructural radial and regional complexities. Scanning electron microscopic investigations reveal that the radial complexity is customized in accordance with the mode of oviposition whereas the regional complexity is modified for effective fertilization and complements the fertilization pore of the vagina. The functional significance of the egg chorion is described, classified and discussed in the light of recent literature.] Address: Andrew, R.J., Shri Dnyanesh Mahavidyalaya, Navargaon, Dist. Chandrapur- 441 223, (MS), India

**10828.** Angert, A.L.; Crozier, G.G.; Rissler, L.J.; Gilman, S.E.; Tewksbury, J.J.; Chunco, A.J. (2011): Do species traits predict recent shifts at expanding range edges. *Ecology Letters* 14: 677-689. (in English) ["Although some organisms have moved to higher elevations and latitudes in response to recent climate change, there is little consensus regarding the capacity of different species to track rapid climate change via range shifts. Understanding species abilities to shift ranges has important implications for assessing extinction risk and predicting future community structure. At an expanding front, colonization rates are determined jointly by rates of reproduction and dispersal. In addition, establishment of viable populations requires that individuals find suitable resources in novel habitats. Thus, species with greater dispersal ability, reproductive rate and ecological generalization should be more likely to expand into new regions under climate change. Here, we assess current evidence for the relationship between leading-edge range shifts and species traits. We found expected relationships for several datasets, including diet breadth in North American Passeriformes and egg-laying habitat in British Odonata. However, models generally had low explanatory power. Thus, even statistically and biologically meaningful relationships are unlikely to be of predictive utility for conservation and management. Trait-based range shift forecasts face several challenges, including quantifying relevant natural history variation across large numbers of species and coupling these data with extrinsic factors such as habitat fragmentation and availability. [...] British Odonata: Lm analyses of Odonata range shifts yielded low to moderate explanatory power ( $R^2 = 0.10-0.24$ ; Table 3). Egg habitat, which is associated with clutch size, had a marginally significant positive effect in most top-ranked models and was the variable with highest relative importance (Table 3), but confidence intervals surrounding the model-averaged regression coefficient for egg habitat contained zero (Fig. 1c). In phylogenetically corrected analyses, egg habitat became a statistically significant predictor variable (Fig. 2c; Table 3). Specifically, exophytic species (large clutches laid on water or land) shifted 0.83 standard deviations (65.69 km) further north, on average, than endophytic species (small clut-

ches laid in plants)."] Address: Angert, Amy, Department of Biology and Graduate Degree Program in Ecology, Colorado State University, Fort Collins, CO 80523, USA. E-mail: amy.angert@colostate.edu

**10829.** Appel, E.; Gorb, S.N. (2011): Resilin-bearing wing vein joints in the dragonfly *Epiophlebia superstes*. *Bioinspiration & Biomimetics* 6(4) 046006 doi: 10.1088/1748-3182/6/4/046006: 11 pp. (in English) ["In this study, we compared the dorsal and ventral patterns of three vein joint types and three types of resilin patches in the wings of the dragonfly *E. superstes*. The joint types were classified according to their general structure and the resilin patch types according to their arrangement at joints and in the adjacent wing membrane. Resilin patches are found in both dorsal and ventral pleat valleys of the corrugated wings of *E. superstes*, which results in different patterns of resilin distribution on the dorsal and ventral sides of the wing. In addition to its probable function in conferring flexibility to stressed joints, resilin may also have a damping function. Our results suggest that resilin patches in the leading edge may be loaded in compression, whereas in the trailing area, they may be involved in angle widening and thus loaded in tension. Possible adaptations to the deformability of different areas of the wing, e.g. during the process of camber formation, are discussed."] Address: Gorb, S.N., Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**10830.** Appel, E.; Gorb, S.N. (2011): Resilin in dragonfly wings. Abstracts - DGaaE-Entomologentagung 21.-24.3.2011 Berlin: 27. (in English) ["Resilin is well known for its rubber-like properties, including long-range (visco-) elasticity, ability to store kinetic energy, absorb shocks, and enhance flexibility of cuticular structures. In insect flight systems it has already been described in vein joints, veins, folding lines, transitions between veins and wing membrane, as well as in wing hinges and elastic muscle tendons in various species, including Coleoptera and Dermaptera. In contrast to wings of neopteran insects, where resilin plays a crucial role in wing folding, examinations on the distribution of resilin in wings of Odonata is especially important for understanding wing mechanics during flight, because the rather stiff corrugated wings of representatives of this order cannot be folded. Previously, only wings of the damselfly *Enallagma cyathigerum* Charp. (Coenagrionidae) have been studied (Gorb, 1999). In the present study we combined (1) fluorescence microscopy, (2) scanning electron microscopy, and (3) simple mechanical tests to elucidate the distribution of resilin patches in wings of the basal anisozygopteran species, *Epiophlebia superstes* Selys (Epiophlebiidae). Resilin patches are mainly located in wing vein joints situated in pleat valleys, thus their distribution distinctly differs between the dorsal and ventral wing sides. Our morphological results complement data from previous experimental studies (Wootton & Newman, 1986; Kim et al., 2009) to suggest that resilin is involved in either compression or tension, depending on the location in either narrow pleats at the leading edge (compression) or shallower pleats at the trailing area (allowing the angle widening). This morphological basis enables rather stiff, ultralight, and corrugated wings to bear deformations, e.g. during camber formation, without material damage or fatigue, thus enabling the strong lift production Odonata are

known for." (Authors)] Address: Appel, Esther, Dept of Functional Morphology and Biomechanics, Zoological Institute, Christian Albrechts University, Kiel, Germany, estherappel@gmx.de

**10831.** Asimea, O.A.; Zakka, U. (2011): The effect of petroleum waste on insect occurrence, speciation and distribution at the Brass Terminal in Niger delta area of Nigeria. *Journal of Emerging Trends in Engineering and Applied Sciences* 2(5): 782-786. (in English) ["Species occurrence and distribution of insects was investigated around Brass oil terminal where petroleum waste was constantly released into the Brass river through a man made canal. Random soil samples were collected from various locations distributed between Brass community and the oil terminal. At each sampling location, the soil samples were analysed for physico-chemical parameters using standard methods. Insects were collected using sweep net and traps. Electrical conductivity, pH and nutrient parameters of soil were within acceptable limits, microclimatic conditions like ambient temperature and relative humidity were within permissible range. Twenty-eight species of insects representing 23 families in 9 orders was recorded at Okpoma community that recorded 28.49 mg/kg THC and 12.85 mg/kg TPH. Twenty five insect species representing 17 families in 8 orders were recorded at the tank farm that had 51.09 mg/kg and 40.69 mg/kg TPH and only 5 species representing 4 families were encountered along the banks of effluent canal that had a value of 1261.41 mg/kg and 935.85 mg/kg TPH. Species common in hydrocarbon contaminated environment were *Camponotus sericeus*, *Crioceris latipennis* (Chrysomelidae), *Gryllus pennsylvanicus*, and *Allonemobius fasciatus* (Gryllidae). These species were able to tolerate hydrocarbon impacted environment. The aim of this investigation is to identify insect species that thrive in petroleum waste polluted environment and to explore their use as bio indicators of petroleum hydrocarbon pollution." (Authors) *Agriocnemis pygmaea*, *A. femina*, *Umma longistigma*, and *Orthetrum abbotti* are listed in the appendix to the paper.] Address: Zakka, U., Department of Crop and Soil Science, Faculty of Agriculture, University of Port Harcourt, Nigeria

**10832.** Bae, Y.J. (2011): Odonata. Insects of Korea 4 (1): Korea University. 72 pp. (in English) [The paper exclusively includes 39 Zygoptera. The species are treated in a monographic style including information on synonymy, morphology of imagines and larvae, (regional) distribution and records from Korea. The following species are excluded from the Korean list of Odonata: *Calopteryx cornelia*, *Agriocnemis pygmaea*, *Platycnemis foliacea sasakii*, and *Lestes hanllimensis* Kim, 1998. (Kim, J.H., 1998. The Odonata and Orthoptera, etc. of Korea in Color. Kyo-Hak Publ., Seoul. pp. 18-98. (in Korean).] Address: Bae, Y.J., Division of Life Sciences, College of Life Sciences and Biotechnology, Korea University, 5-ga, Anam-dong, Seongbuk-gu, Seoul 136-701, Korea. E-mail: yjbae@korea.ac.kr

**10833.** Bagachanova, A.K.; Vinokurov, N.N.; Evdokarova, T.G.; Ermakova, Yu.V.; Nogovitsyna, S.N.; Popov, A.A. (2011): Taxonomic diversity of insects from the relic steppes of the Mid Lena River valley (Central Yakutia). *Arid Ecosystems* 1(1): 38-45. (in English) [Odonata are represented by 12 species without giving any details.] Address: Bagachanova, A.K., Institute for Biological Problems of the Cryolithozone, Siberian Branch, Russian Academy of Sciences, pr. Lenina 41, Yakutsk, 677007 Russia. E-mail: vinok@ibpc.ysn.ru

**10834.** Baierl, E. (2011): Ein Algerischer Sandläufer *Psammotromus algirus* erbeutet ein Paarungsrad von *Orthetrum chrysostigma* (Squamata: Lacertidae; Odonata: Libellulidae). *Libellula* 30(1/2): 89-91. (in German, with English summary) ["On 13-VI-2005, on Rio Genal in Andalusia, Spain, a Large *Psammotromus* was observed and photographed capturing and feeding on a mating wheel of *O. chrysostigma*." (Author)] Address: Baierl, E., Neisser Str. 3, 40880 Ratingen, Germany. E-mail: edgar.baierl@t-online.de

**10835.** Bakare, S.S.; Andrew, R.J. (2011): The genital ducts of the male dragonfly *Anax guttatus* (Anisoptera: Aeshnidae). National Seminar on Biodiversity and Intangible Natural Heritage on 28th September, 2011. Organised by National Museum of Natural History Zoological Survey of India, Tansen Marg, New Delhi (MoEF, Govt. of India), M-Block, New Alipore, Kolkata (MoEF, Govt. of India) on September 28th, 2011: 23-24. (in English) [Verbatim: Light and transmission electron microscopic (TEM) studies reveal marked variations in the ultra structure of the male genital duct as it terminates into the sperm sac. TEM studies show two types of cells, the brush border cells with short motile irregular microvilli and the smooth border cells in the wall of vasa deferentia. Moreover, the seminal vesicles contain only the cells with brush border. Large number of electron dense granules and cell-coat particles accumulate in the lumen of vasa deferentia. A dense layer of globules mostly mucoproteins aggregate around the hyaline cap of the sperm bundles in the vasa deferentia. The chemical composition varies in the seminal fluid of vasa deferentia, seminal vesicles and sperm sac. Changes occur in the seminal fluid as it moves down successively through the vas deferens, seminal vesicle and ultimately in the sperm sac. The seminal fluid is stored and condensed in the sperm sac. Histochemical studies demonstrate chemical composition of the seminal fluid as a mixture of protein, carbohydrate and lipid. Presence of dense quantity of DNA and RNA in the nuclei and cytoplasm of the epithelial cells and mercury bromophenol blue stained granular material suggests that the central canal, vasa deferentia and seminal vesicles are well-equipped with the cellular machinery required for protein synthesis. Histochemical tests demonstrate, in addition, large amount of mucopolysaccharides and lipids. SDS-PAGE of seminal fluid reveals 7 and 12 protein bands in the vasa deferentia and seminal vesicles, respectively.] Address: Andrew, R.J., Shri Dnyanesh Mahavidyalaya, Navargaon, Dist. Chandrapur- 441 223, (MS), India

**10836.** Barrios, M.; Wolff, M. (2011): Initial study of arthropods succession and pig carrion decomposition in two freshwater ecosystems in the Colombian Andes. *Forensic Science International* 212(1-3): 164-172. (in English) ["Entomological succession and trophic roles of arthropods associated with different stages of carcass decomposition were studied to estimate the post-mortem submersion interval in two freshwater ecosystems in the Colombian Andes, at an altitude of 2614 m. Pig carcasses were employed as models placed 68 m apart, one in a stream (lotic) and another in an artificial lake (lentic). Decomposition time to skeletal remains was 74 days in the lake and 80 days in the stream. Six phases of decomposition were established: submerged fresh, early floating, floating decay, bloated deterioration, floating remains and sunken remains. A total of 18,832 organisms associated with the carcasses were

collected: 11,487 in the lake (four orders, 19 families and 33 species) and 7345 in the stream (eight orders, 15 families and 25 species). Organisms were classified in the following ecological categories: shredders, collectors, predators, necrophagous, sarcosaprophagous and opportunists. Physical and chemical properties of the habitats, such as water temperature, CO<sub>2</sub> and conductivity, varied according to rainfall. In the lake, shredders (Coleoptera: Tropisternus sp. and Berosus sp.) and collectors (Diptera: Chironomus sp.) were found to be associated with submerged phases. Predators (Odonata) were only present during the first phases. Coleoptera (Dytiscidae) were found during floating decay and bloated deterioration stages. In the stream, shredders (Hyalella sp.) and collectors (Simulium sp.) were found during all stages, whereas the predator Oxelytrum discolle was found exclusively during the floating stages, during which body temperature increased in a fashion similar to active decay in terrestrial environments." (Authors)] Address: Wolff, Marta, Grupo de Entomología Universidad de Antioquia, Medellín, Colombia. E-mail: mariabape@gmail.com

**10837.** Baudermann, S.; Martens, A. (2011): Ortstreue und tagesrhythmischer Ortswechsel der Larven von Cordulegaster bidentata in Quellrinnensalen (Odonata: Cordulegasteridae). Libellula 30(3/4): 133-144. (in German, with English summary) ["C. bidentata colonizes spring runnels with minimal water depth. The significance of small depressions as microhabitats and the activity patterns of the larvae in such border zones are not well known. In August and September 2010, respectively, in two spring runnels in the Kocher valley near Künzelsau, Baden-Württemberg, Germany, the daily movement of the larvae has been investigated. Tin cans, serving as artificial pools, were buried at the bottom of the very shallow water in an area of 4 m<sup>2</sup> at both localities. Prepared with removable plastic containers inserted in the tin frame, the presence of larvae was recorded every 12 h for ten days. The artificial pools were regularly colonized by C. bidentata larvae after a short time. Immigration and emigration took place during night as well as during daytime, with a significant preference for the nighttime." (Authors)] Address: Baudermann, Sandra, Eichholzweg 3, 74653 Künzelsau, Germany. E-mail: sbaudermann@yahoo.de

**10838.** Bedjanič, M. (2011): Coenagrion hastulatum (Charpentier, 1825), new for the dragonfly fauna of Bosnia and Herzegovina (Odonata: Coenagrionidae). Natura Sloveniae 13(2): 31-36. (in English, with Slovenian summary) ["At the high-altitude Donje Bare and Gornje Bare Lakes in the surroundings of Tjentište village, Zelengora Mts., Sutjeska National Park, SE Bosnia and Herzegovina, Coenagrion hastulatum was recorded on 26 June 2011. The occurrence of the species on the southern border of its European range is outlined and discussed. Faunistic records on a total of 22 species observed at 11 localities in the southeastern part of the country between 26 and 29 June 2011 are appended." (Author)] Address: Bedjanič, M., Kolodvorska 21b, SI-2310 Slovenska Bistrica, Slovenia. E-mail: matjazbedjanic@yahoo.com

**10839.** Benigno, G. (2011): Invertebrate drift in neighboring perennial and seasonal tributaries of the Sacramento River. Master of Science thesis, Biological Sciences California State University, Chico: IX + 33 pp. (in English) ["While seasonal floodplains are known to provide abundant food and important rearing habitat for na-

tive and anadromous fish in California, the value of other types of seasonally aquatic habitats is less well understood. The use of seasonally flowing tributaries of the Sacramento River as non-natal rearing habitat for salmonids and as spawning areas for native fish has been previously documented. In order to evaluate food availability in Sacramento River tributaries, I compared invertebrate drift in a seasonal tributary with a neighbouring perennial tributary through the duration of seasonal tributary flow, from November 2005 through June 2006. I compared drift density, taxonomic diversity, and community composition between the two tributary types. Overall drift abundance was greater in seasonal tributary samples. Taxonomic richness in the seasonal tributary was comparable to the perennial tributary, although community composition was different between the two tributary types. Specifically, chironomid larvae and small crustaceans were abundant in seasonal tributary drift, while terrestrial invertebrates were the primary component of perennial tributary drift. The results illustrate that seasonally flowing tributaries can provide greater prey availability to fish that use these habitats compared with perennial tributaries." (Author) The taxa list includes a few Odonata.] Address: Benigno, Gina, Biology Department, California State Univ., Chico, CSU Chico, Holt Hall, Chico, CA 95927, USA

**10840.** Beukema, J. (2011): Recensis: Juwelenschwinger/Gossamer Wings. D. Hilfert-Rüppell & G. Rüppell, 2007; Die Prachtlibellen Europas. G. Rüppell, 2005. Brachytron 14(1): 67-68. (in Dutch) [review] Address: Beukema, J.J., Linieweg 19, NL-1783 BA Den Helder, The Netherlands, E-mail: jsr@nioz.nl

**10841.** Borisov, S.N. (2011): Migrant dragonflies in Middle Asia. 2. Sympetrum fonscolombii (Selys, 1840) (Odonata, Libellulidae). Eurasian Entomological Journal 10(4): 415-421. (in Russian, with English summary) ["Data on the distribution, phenology and migrations of Sympetrum fonscolombii in Middle Asia are presented. The first spring-time generation is represented by immigrant specimens from the southern part of the range. Pre-imaginal development lasts about 2 months. Development of two generations during summer and autumn is probable. In autumn the dragonflies migrate in a southerly direction. 2008–2010 migrations were studied in the Chok-Pak mountain range in Western Tien-Shan Mountains (N42.53°, E70.60°) by «Rybachinsky-type» by means of ornithological traps. Migrations lasted from the end of August until October. The intensity of migrations increased with the onset of cold air masses. Sequential expansion of different generations is probably characteristic, being an adaptive strategy of S. fonscolombii aimed at maximising the use environmental resources both spatially and temporally." (Author)] Address: Borisov, S.N., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**10842.** Bosch, J.G. van 't, (2011): Rare dragonflies in the Netherlands in 2002, 2003, 2004 and 2005, CWNO-reports 4. Brachytron 14(1): 40-48. (in Dutch, with English summary) ["This is the fourth report of the Dutch Committee for records of rare odonates (CWNO). In this report, records from the period 2002-2005 are reviewed. Acceptability is judged independently by each of the committee members, based on the documentation available (e.g. descriptions, drawings, pictures or collected material). Only accepted records are reviewed.



wed. Of each accepted record the Province, nearby city, location, date, number, gender and observers are given. In most cases only the first record is given; subsequent records of the same individual or population are accepted on the basis of the first record and are not reviewed. From this record on, observations marked with an asterisk \*, are regarded as a 'known location'. New records from a known location will not be reviewed in future. The three categories of species that are considered by the CWNO are described. The third category is a new one: only proof and indication of reproduction are currently considered for *Anax parthenope* and *Aeshna affinis*. Species that are no longer considered by the CWNO are *Crocothemis erythraea* (after 2003) and *Orthetrum coerulescens* (after 2006). Records of these species in 2002-2005 are not reviewed in this article. 2002 – A new population of *Sympetrum depressiusculum* was discovered near Budel (Noord-Brabant/ Limburg). Several new populations of *Somatochlora flavomaculata* were found. 2003 – The most spectacular discovery in 2003 was the first observation for The Netherlands of *Coenagrion scitulum* near Tegelen (Limburg). Subsequent searches did not result in additional observations. The fourth ever observation (fifth individual) of *Anax ephippiger* for the Netherlands was at Schiermonnikoog (Friesland). The fourth population of *Somatochlora arctica* was discovered at Vragenderveen (Gelderland). 2004 – The most memorable in 2004 was the third ever observation for The Netherlands of *Sympetrum meridionale*, at Cadzand-bad (Zeeland) 2005 – The most spectacular event in this four-year period was without doubt the discovery of a population of *Leucorrhinia albifrons* near Oldeberkoop (Friesland). The previous observation was a single male in 1994 at nearby Appelscha. The fourth ever observation of *S. meridionale* was at Berghem (Noord-Brabant). The fifth population of *Somatochlora arctica* and the first population for Overijssel was discovered at Landgoed Twickel." (Author) Records of the followingspecies are presented in some details: *Cordulegaster boltonii*, *Leucorrhinia albifrons*, *L. pectoralis*, *Coenagrion armatum*, *C. scitulum*, *C. hastulatum*, *Calopteryx virgo*, *Sympecma paedisca*, *Aeshna affinis*, *A. subarctica elisabethae*, *Anax parthenope*, *A. ephippiger*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Somatochlora arctica*, *S. flavomaculata*, *Crocothemis erythraea*, *Orthetrum brunneum*, *O. coerulescens*, *Sympetrum depressiusculum*, *S. meridionale*] Address: Bosch, J.G. van 't, Newtonplein 62, 2562 JX Den Haag. E-mail: cwno@brachytron.nl

**10843.** Brandt, K.; Buchwald, R. (2011): Die Bedeutung von Kompensationsgewässern für die Libellenfauna der Stadt Oldenburg (Odonata). *Libellula* 30(3/4): 111-132. (in German, with English summary) ["As only very few natural standing waters still exist, compensation ponds have a potentially high value for the aquatic fauna and flora in the city of Oldenburg (Lower Saxony, Germany). In order to analyse their value for the odonate fauna a study of 17 ponds in Oldenburg was carried out in 2009. Altogether 28 species of Odonata were recorded and 21 species were regarded as potentially or definitely autochthonous at one or some pond(s). These 28 species amount to 39 % of the total odonate fauna of the region Weser-Ems. The total odonate fauna of the standing water bodies of Oldenburg comprises 32 species. Therefore, 66 % of its potential fauna was recorded at the 17 compensation ponds. We found a wide range of 0-19 species of Odonata at one pond. Both the open water surface and the period in which a pond

dries up in the summer months are decisive for odonate diversity. Furthermore, some influence of the trophic level on the species diversity could be recognized. Among others, *Coenagrion puella*, *Ischnura elegans*, *Pyrrhosoma nymphula* and *Libellula quadrimaculata* were the species with the highest frequency, all being widespread and euryoecious. In addition, rather rare and stenoecious species were found at single ponds. We summarize that some compensation ponds in the city of Oldenburg are species-rich and have a high value for the dragonfly fauna of the region; the same is true for the total species diversity of all studied ponds for the Odonata diversity of Oldenburg. With this study other authors' results regarding compensation ponds and/or urban waters are discussed and modifications suggested, but in essence they are confirmed." (Authors)] Address: Brandt, Kirsten, Kaiser-Friedrich-Str. 15, 53113 Bonn, Germany. E-mail: Kirsten.Brandt@gmx.net

**10844.** Brochard, C.; van der Ploeg, E. (2011): Looking for the best spot: how far will *Cordulegaster insignis* walk? *Brachytron* 14(1): 64-66. (in Dutch, with English summary) ["In this short portrait, some of the habitat preferences, larval ecology and emerging behaviour of *Cordulegaster insignis* are discussed. During a search for larval skins in Mugla province, Turkey, 70 exuviae were found during three visits. They were mainly found in trees, at an altitude varying from a few cm to 8 m from the ground. The maximum distance from the nearest water was 30 meters." (Authors)] Address: Brochard, C., Marsstraat 77, 9742 EL Groningen, The Netherlands

**10845.** Brockhaus, T. (2011): Informationen zum Projekt der Libellenfauna Deutschlands. *Libellennachrichten* 26: 5-7. (in German) [The author reports on the current status of the book on the German Odonata-fauna.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**10846.** Buckland-Nicks, A. (2011): Mercury bioaccumulation in dragonflies (Odonata: Anisoptera) from two lakes in Kejimikujik National Park, Nova Scotia. In: Atlantic Division of the Canadian Association of Geographers. Programm and Abstracts 23th Annual Meeting and Conference October 14th - 16th, 2011 Mount Allison University, Sackville, NB: 8. (in English) [Verbatim: Anisoptera are important vectors for mercury in aquatic and terrestrial food chains. Dragonfly naiads, adults, and exuviae were collected from two acidic lakes in Kejimikujik National Park, Nova Scotia (Canada) in order to compare mercury bioaccumulation patterns between their life stages and body sections. Samples were dried, digested, and analyzed for methylmercury (MeHg), divalent mercury (Hg(II)), and total mercury (THg) using gas chromatography-atomic fluorescence spectroscopy (AFS). MeHg concentrations in naiad and adult dragonflies were comparable to fish, at  $234 \pm 113$  ng g<sup>-1</sup> d.w. (n=64) and  $232 \pm 68$  µg g<sup>-1</sup> d.w. (n=28), respectively. There was no significant difference between naiad and adult MeHg concentrations (p>0.05). Mean MeHg concentration in exuviae ( $6 \pm 4$  ng g<sup>-1</sup> d.w.; n=32 ) was 50-fold lower than naiads and adults, however Hg(II) concentrations were not significantly different. Emerging adults had between 1.5 and 3-fold higher Hg(II) than naiads and adults but similar MeHg. Within the naiad population, MeHg and THg increased with age and weight, with a large increase in variation. The oldest

and heaviest naiads had both the lowest and highest MeHg. Bioaccumulation patterns of Hg(II) in dragonfly life stages may indicate MeHg detoxification mechanisms. However, the adults still have a high potential for transferring substantial amounts of MeHg to terrestrial predators.] Address: Buckland-Nicks, Amy, Department of Earth and Environmental Science, Acadia University, Wolfville, NS, USA. E-mail: a.buckland@gmail.com

**10847.** Buczyński, P.; Dawidowicz, Ł.; Wagner, G.; Jarska, W. (2011): *Anax ephippiger* (Burmeister, 1839) (Odonata: Aeshnidae) in Polish part of the Lithuanian Lake District. *Odonatrix* 7(2): 48-49. (in Polish, with English summary) ["One hunting female of *A. ephippiger* was recorded on June 3, 2011, in a xerothermic meadow near the Lake Perty in Kleszczówek in NE Poland (54°16'40" N, 22°53'50" E). It is the northernmost record of the species in Poland so far. The area of studies is probably situated within the migrating route of the species whose migrations reach Latvia in this part of Europe. The recorded specimen belonged to the first generation, no data on reproduction and development of the second generation is available." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**10848.** Busch, R.; Masius, P. (2011): Erstnachweise von *Anax parthenope* und *Leucorrhinia caudalis* auf der Insel Usedom (Odonata: Aeshnidae, Libellulidae). *Libellula* 30(3/4): 151-155. (in German, with English summary) [Mecklenburg-Vorpommern, Germany; "On 27-VI-2011, a female *L. caudalis* was observed laying eggs at the Lake 'Krebssee' near Korswandt. *A. parthenope* was recorded at four different sites between 27-VI- and 29-VII-2011. Considering available odonatological data, it is certain that all sites were populated only very recently. Reflecting that the rediscoveries of both species in Mecklenburg-West Pomerania dated from 1999, the ongoing spread in distribution is discussed." (Authors)] Address: Busch, R., Waldstr. 27A, 56479 Westernohe, Germany. E-mail: busch.westernoho@freenet.de

**10849.** Butkas, K.J.; Vadeboncoeur, Y.; Vander Zanden, M.J. (2011): Estimating benthic invertebrate production in lakes: a comparison of methods and scaling from individual taxa to the whole-lake level. *Aquatic Sciences - Research Across Boundaries* 73(1): 153-169. (in English) [Sparkling Lake, Wisconsin, USA. "Studies of aquatic invertebrate production have been primarily conducted at the level of individual taxa or populations. Advancing our understanding of the functioning and energy flow in aquatic ecosystems necessitates scaling-up to community and whole-lake levels, as well as integrating across benthic and pelagic habitats and across multiple trophic levels. In this paper, we compare a suite of non-cohort based methods for estimating benthic invertebrate production at subpopulation, habitat, and whole-lake levels for Sparkling Lake, WI, USA. Estimates of the overall mean benthic invertebrate production (i.e. whole-lake level) ranged from 1.9 to 5.0 g DM m<sup>-2</sup> y<sup>-1</sup>, depending on the method. Production estimates varied widely among depths and habitats, and there was general qualitative agreement among methods with regards to differences in production among habitats. However, there were also consistent and systematic differences among methods. The size-frequency method gave the highest, while the regression model of Banse and Mosher (*Ecol Monogr* 50:355-379, 1980) gave the lowest production estimates. The regression model of Plan-

te & Downing (*Can J Fish Aquat Sci* 46:1489-1498, 1989) had the lowest average coefficients of variation at habitat (CV = 0.17) and whole-lake (CV = 0.08) levels. At the habitat level, variance in production estimates decreased with sampling effort, with little improvement after 10-15 samples. Our study shows how different production estimates can be generated from the same field data, though aggregating estimates up to the whole-lake level does produce an averaging effect that tends to reduce variance." (Authors) Odonata taxa - with the exception of *Hagenius brevistylus* - are treated at the family level.] Address: Vander Zanden, M.J., Center for Limnology, Univ. of Wisconsin-Madison, 680 N. Park St., Madison, WI 53706, USA. E-mail: mjevanderzand@wisc.edu

**10850.** Cannings, R. (2011): Book review: *Dragonflies and Damselflies. Model Organisms for Ecological and Evolutionary Research*. Córdoba-Aguilar, A. [ed.]. 2008. *Dragonflies and Damselflies. Model organisms for ecological and evolutionary research*. Oxford University Press, Oxford, UK. pp. Hardback, ISBN 978-0-19923069-3. £73 (£18.25-special discount for direct orders to publisher). Paperback, ISBN 978-0-19956758-4. £32.50. *Florida Entomologist* 94(3): 727-728. (in English) [book review] Address: Cannings, R., Royal British Columbia Museum 675 Belleville St., Victoria BC Canada, V8W 9W2 RCanning@royalbcmuseum.bc.ca

**10851.** Cano-Villegas, J.F. (2011): Actualización del catálogo odonológico de la provincia de Córdoba (Andalucía, España) (Insecta: Odonata). *Boletín de la S.E.A.* 48(1): 479-483. (in Spanish, with English summary) [The author presents data on the presence of six species not previously recorded from Córdoba province (Spain), and one recorded only once. Records of *Erythromma viridulum*, *Coenagrion scitulum*, *Paragomphus genei*, *Orthetrum trinacria*, *Orthetrum brunneum*, *Sympetrum meridionale*, and *Trithemis kirbyi* are documented in details and mapped.] Address: Cano Villegas, F.J., C/Montemayor, 4 1°-2; 14003-Córdoba, Spain. E-mail: ficanovi2@hotmail.com

**10852.** Cardoza Martínez, G.F.; Estrada Rodríguez, J.L.; Alonzo Rojo, F.; Mar Tovar, C.L.; Gelwick, F. (2011): Espectro trófico del bagre *Ictalurus punctatus* (Siluriformes: Ictaluridae), en la presa Lázaro Cárdenas, Indé, Durango, México. *Hidrobiológica* 21(2): 210-216. (in Spanish, with English summary) [9,4% of studied stomachs (n=240) of *Ictalurus punctatus* included Odonata as diet.] Address: Cardoza Martínez, G.F., Centro de Estudios Ecológicos, Escuela Superior de Biología, Universidad Juárez del Estado de Durango, Avenida Universidad S/N, Fraccionamiento Filadelfia Gómez Palacio, Durango. 35010 México. E-mail: E-mail: biologogabriel@hotmail.com

**10853.** Carriço, C.; Costa, J.M.; Mallet, J.; Silva, F.M.; Carvalho Queiroz, M.M. (2011): First record of *Phyllocycla hamata* Belle, 1990 (Insecta: Odonata: Gomphidae), from Mato Grosso state, Brazil. *Check List* 7(6): 837-838. (in English) ["Six males of *P. hamata* were collected in the Reserva Florestal da Usina Hidroelétrica da Fumaça, Jauru Salto Mato Grosso state, Midwestern Brazil and represent the first record for that state. The specimens examined have been deposited in the Museu Nacional, UFRJ, Rio de Janeiro, RJ, Brazil. This species is included in the volsella group and can be separated from the other species in this group by the cerci shorter than segment 10 (S10), with a very long

internal hook." (Authors)] Address: Carriço, C., Universidade Federal do Rio de Janeiro, Depto de Entomologia Museu Nacional, Quinta da Boa Vista s/n. CEP 20940-040. São Cristóvão, Brazil. E-mail: carrico82@hotmail.com

**10854.** Carriço, C.; Costa, J.M.; Santos, T.C.; Anjos-Santos, D. (2011): Description of the last instar larva of *Phyllocycla gladiata* (Hagen in Selys) (Anisoptera: Gomphidae). *EntomoBrasilis* 4(1): 26-29. (in English, with Portuguese summary) ["The larva of the last instar of *P. gladiata* is described and illustrated based in only one exuviae, collected at Camorim River, Jacarepaguá, Rio de Janeiro State, Brazil. Exuviae is deposited in the Museu Nacional (UFRJ), Rio de Janeiro, Brazil." (Authors)] Address: Costa, J.M., Depto de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@acd.ufrj.br

**10855.** Chester, E.T.; Robson, B.J. (2011): Drought refuges, spatial scale and recolonisation by invertebrates in non-perennial streams. *Freshwater Biology* 56(10): 2094-2104. (in English) ["1. If resistance traits drive recolonisation after drought, then drought refuges should contribute strongly to assemblage composition within streams. If resilience traits drive recolonisation, macroinvertebrates emerging from refuges may disperse widely, colonising many streams. To determine whether the contribution of drought refuges to macroinvertebrate recolonisation in non-perennial streams was mostly local (within stream) or broader scale (across streams), we measured the association between the composition of invertebrate assemblages in different types of in-stream drought refuge and the assemblage composition of streams when flow resumed. 2. We sampled 16 streams of varying hydrological regime on the western side of the Victoria Range in the Grampians National Park, Victoria, Australia. Drought refuges (perennial pools, dry sediment, damp sediment, seeps, patches of leaf litter, beneath stones) were identified and sampled during autumn. Most taxa were found in perennial pools; few taxa were found aestivating beneath stones or having desiccation-resistant stages in dry sediment. Perennial pools and perennially flowing reaches were the refuges that harboured the greatest diversity of macroinvertebrate taxa. 3. Streams were sampled again during spring. Assemblage composition of non-perennial reaches in spring was unrelated to composition in nearby refuges in the previous autumn. In contrast, assemblage composition in perennial reaches during spring was strongly correlated with composition during autumn. Therefore, drought refuges did not directly influence assemblage composition locally within non-perennial streams. Rather, both perennially flowing reaches and perennial pools acted as drought refuges across the broader landscape. Resilience traits are likely to drive recolonisation in these streams. 4. Monitoring of drought refuges in a particular stream will therefore not predict species composition when flow resumes. Drought refuges are likely to sustain biodiversity over larger spatial scales such as groups of streams or whole drainage networks. Consequently, stream networks will need to be managed as entities rather than as single waterways and the focus of drought refuge protection should be on perennial pools and reaches." (Authors) The following Odonata are reported: *Procordulia jacksoniensis*, *Austroaeschna subapicalis*, *Austargiolestes* sp.] Address: Robson, Belinda, School of Environ-

mental Science, Murdoch Univ., South St, Murdoch, WA 6150, Australia. E-mail: b.robson@murdoch.edu.au

**10856.** Cicek, K.; Ayaz, D. (2011): Food composition of the European pond turtle (*Emys orbicularis*) in Lake Sülüklü (Western Anatolia, Turkey). *Journal of Freshwater Ecology* 26(4): 571-578. (in English) ["We examined the seasonal changes in the food composition of *E. orbicularis* in Lake Sülüklü (Manisa, Turkey) during spring and summer 2010. The stomach contents of 110 (40 males, 62 females, eight juveniles) *E. orbicularis* individuals were analyzed, and 461 prey items were found. Gastropods (2.2%), earthworms (0.4%), insects (67.2%), fishes (6.9%), amphibians (15.0%), and plant material (8.2%) constituted the food of the species. Food consisted primarily of insects and other invertebrates during the breeding season and of vertebrate and plant material (especially seeds and roots) during the post-breeding season. Based on these results, the European pond turtle is a generalist opportunistic omnivore whose diet is most strongly influenced by prey availability ... Terrestrial prey items (adult Odonata, Anisobalidae, Cicadidae, adult Hymenoptera, Formicidae, Cerambycidae, Staphylinidae, Muscidae, and Culicidae) constituted only 8.7% of the stomach contents." (Authors)] Address: Cicek, K., Zoology Section, Dept of Biology, Faculty of Science, Ege Univ., TR-35100 Bornova, Izmir, Turkey

**10857.** Cordoba-Aguilar, A.; Gonzalez-Tokman D.M. (2011): Male harassment and female energetics in the territorial damselfly *Hetaerina americana* (Fabricius) (Zygoptera: Calopterygidae). *Odonatologica* 40(1): 1-15. (in English) ["The possible energetic costs due to male harassment in *H. americana* females were explored by investigating: (a) changes in thoracic and abdominal fat during / adulthood, (b) the fat budget after each of the 2 matings that females engage in during 2 seasons of varying male harassment, (c) the fat imbalance due to male harassment in the thorax (where fat is used mainly for flying) and abdomen (where fat is used to produce eggs), (d) whether re-mating takes longer when harassment is high compared to when harassment is low, and (e) the feeding rate after each mating in both seasons to see whether female balance the energetic resources they spend. Females gained fat resources after emergence but lost fat when they became old. Fat decreased more in the 'high harassment' season than in the 'low harassment' season; in the former, fat was reduced more intensively after a second mating. Thoracic fat decreased to a lower level after the second mating in the 'high harassment' season compared with the 'low harassment' season. When harassment was high, re-mating took longer than when harassment was low. Feeding was similar between seasons. These results suggest substantial energetic costs for females due to male harassment." (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**10858.** Cortes, L.; Almeida, M.C.; Pinto, N.S.; De Marco, P. (2011): Fogo em Veredas: Avaliação de Impactos sobre Comunidades de Odonata (Insecta). *Biodiversidade Brasileira* 1(2): 128-145. (in Portuguese, with English summary) ["The marshes are open areas of Cerrado (Brazilian savannas), which play an essential role in protecting water sources. Moreover, the marshes are also considered of great importance to direct use of rural people living in the Cerrado. These



conflicts of use of the marshes are now a major challenge for biodiversity conservation. This study aimed to test the effect of fire on the richness and composition of Odonata (dragonflies) in burned and unburned marshes within the Estação Ecológica Serra Geral do Tocantins (EESGT). Species richness was estimated for each of the sampled marshes through non-parametric method of first order Jackknife. The analysis of indicator species was made by IndVal. The similarity in community composition of Odonata were obtained through the index of Chao. In total we sampled 33 species of Odonata, distributed among five families. No species of Odonata were associated specifically with burned or unburned environments. The marshes burned recently showed a greater similarity in community composition of Odonata than unburned marshes and the same pattern is evident when considering only the suborder Zygoptera. This work with Odonata communities has shown that there is impact of fire on species composition of the suborder Zygoptera which has less ability to disperse. This reinforces the idea that the fire is known to be one of the main threats to protected areas of the Cerrado and a threat to the biodiversity of EESGT marshes. If decisions of fire management are taken, it is crucial that it come together with research monitoring marshes in EESGT." (Authors) Address: Côrtes, Lara, Instituto Chico Mendes de Conservação da Biodiversidade/ICMBio, Estação Ecológica Serra Geral do Tocantins, Avenida Beira Rio Quadra 02 número 06 Centro, Rio da Conceição, Tocantins, Brazil, 77303-000. E-mail: lara.cortes@icmbio.gov.br

**10859.** Couteyen, S.; Papazian, M. (2011): Redescription of the male *Coenagriocnemis reuniense* (Fraser, 1957), with notes on the mesostigmal plate and key to the males of the genus (Zygoptera: Coenagrionidae). *Odonatologica* 40(1): 39-44. (in English) ["*Coenagriocnemis* Fraser, 1949, an endemic genus to the Mascarene Archipelago (Indian Ocean), is currently represented by 4 species. After examination of its male anal appendages, *C. reuniense* male an endemic species to La Réunion, is redescribed. The mesostigmal plate, which has a very unusual structure, is illustrated and commented upon. A key to the *Coenagriocnemis* males is provided." (Authors)] Address: Couteyen, S., UMR PVBMT (Peuplements végétaux et bio-agresseurs en milieu tropical), Université de la Réunion, Faculté des sciences et technologies, 15 Avenue René-Cassin, BP 7151, F-97715 Saint-Denis cedex, France. E-mail: scouteyen@ecologie.re

**10860.** Crespo, J.G. (2011): A review of chemosensation and related behavior in aquatic insects. *Journal of Insect Science* 11(62): 1-39. (in English, with Spanish summary) ["Insects that are secondarily adapted to aquatic environments are able to sense odors from a diverse array of sources. The antenna of these insects, as in all insects, is the main chemosensory structure and its input to the brain allows for integration of sensory information that ultimately ends in behavioural responses. Only a fraction of the aquatic insect orders have been studied with respect to their sensory biology and most of the work has centred either on the description of the different types of sensilla, or on the behaviour of the insect as a whole. In this paper, the literature is exhaustively reviewed and ways in which antennal morphology, brain structure, and associated behaviour can advance better understanding of the neurobiology involved in processing of chemosensory information are

discussed. Moreover, the importance of studying such group of insects is stated, and at the same time it is shown that many interesting questions regarding olfactory processing can be addressed by looking into the changes that aquatic insects undergo when leaving their aquatic environment." (Author) Odonata are treated at pages 8-12.] Address: Crespo, J.G., Department of Biology, University of Utah, Salt Lake City, UT 84112, USA

**10861.** Curry, B. (2011): Striped Saddlebags (*Tremea calverti*). New to Canada. *The Wood Duck* 64(8): 178-179. (in English) [29-IX-2010; Point-Pelee Nationalpark, Ontario, Canada] Address: not stated

**10862.** da Costa, J. M. (2011): First records of some species of some dragonfly (Odonata) species in the Narew National Park. *Odonatrix* 7(2): 50-51. (in English, with Polish summary) [2010, Narew National Park, Poland; *Leucorrhinia dubia*, *L. rubicunda* and *L. pectoralis* were added to the regional list increasing the known Odonata to 47 species.] Address: Joao Matos da Costa, Narwia.ski Park Narodowy, Kurowo 10, 18-204 Kobylin Borzomy, Poland. E-mail: joao.mcosta@npr.pl

**10863.** Davis, R.B.; Nicholson, D.B.; Saunders, E.L.; Mayhew, P.J. (2011): Fossil gaps inferred from phylogenies alter the apparent nature of diversification in dragonflies and their relatives. *BMC Evolutionary Biology* 2011, 11:252 doi:10.1186/1471-2148-11-252: (in English) ["Background: The fossil record has suggested that clade growth may differ in marine and terrestrial taxa, supporting equilibrium models in the former and expansionist models in the latter. However, incomplete sampling may bias findings based on fossil data alone. To attempt to correct for such bias, we assemble phylogenetic supertrees on one of the oldest clades of insects, the Odonatoidea (dragonflies, damselflies and their extinct relatives), using MRP and MRC. We use the trees to determine when, and in what clades, changes in taxonomic richness have occurred. We then test whether equilibrium or expansionist models are supported by fossil data alone, and whether findings differ when phylogenetic information is used to infer gaps in the fossil record. Results: There is broad agreement in family-level relationships between both supertrees, though with some uncertainty along the backbone of the tree regarding dragonflies (Anisoptera). "Anisozygoptera" are shown to be paraphyletic when fossil information is taken into account. In both trees, decreases in net diversification are associated with species-poor extant families (Neopetalidae, Hemiphlebiidae), and an upshift is associated with Calopterygidae + Polythoridae. When ghost ranges are inferred from the fossil record, many families are shown to have much earlier origination dates. In a phylogenetic context, the number of family-level lineages is shown to be up to twice as high as the fossil record alone suggests through the Cretaceous and Cenozoic, and a logistic increase in richness is detected in contrast to an exponential increase indicated by fossils alone. Conclusions: Our analysis supports the notion that taxa, which appear to have diversified exponentially using fossil data, may in fact have diversified more logistically. This in turn suggests that one of the major apparent differences between the marine and terrestrial fossil record may simply be an artifact of incomplete sampling. Our results also support previous notions that adult colouration plays an important role in odonate radiation, and that Anisozygoptera should be grouped in a single inclusive taxon with Anisoptera,

separate from Zygoptera." (Authors)] Address: Davis, R.B., Dept Biol., Univ. of York, York, YO10 5YW, UK. E-mail: davis@ut.ee

**10864.** De Marmels, J.; Neiss, U.G. (2011): Description of the larva of *Gynacantha auricularis* Martin, 1909 (Odonata: Aeshnidae). *Zootaxa* 3137: 64-68. (in English) ["The ultimate stadium larva of *G. auricularis* is described and illustrated based on exuviae of a male and a female reared larvae from Manaus, Brazil. The larva resembles that of *G. gracilis* in having a small lateral spine also on abdominal segment 5, while the prementum morphology and size and distribution and number of palpal setae are similar to those species with lateral spine absent on segment 5. The larvae were found in rainwater pools with abundant leaf litter, in the interior of Amazonian lowland forest." (Authors)] Address: Neiss, U.G., Coordenação de Pesquisas em Entomologia, Instituto Nacional de Pesquisas da Amazônia/INPA, Caixa Postal 478, CEP 69011-970, Manaus, AM., Brazil. E-mail: ulisses.neiss@gmail.com

**10865.** Do, M.C. (2011): *Burmagomphus schneideri* sp. nov., a new dragonfly from the south of Vietnam (Odonata: Gomphidae). *International Journal of Odonatology* 14(3): 223-231. (in English) ["*B. schneideri* sp. nov. (Rung Giong, Kanak commune, K'fBang district, 14°8'42.05"N, 108°36'37.33"E Gia Lai Province in the southern part of Vietnam, leg. Do, 27-IV-2010, to be deposited in Vietnam National Museum of Nature) is described from the male sex and compared with males of the closely related species *B. vermicularis* and *B. arboreus*. Full illustrations of topotypical male *B. vermicularis* are provided the first time (Huu Lien, Lang Son, North Vietnam)."] (Author)] Address: Do, M.C., 409 – 57A, Tap the Bo Thuy San, 22/20 Nguyen Cong Hoan, Hanoi, Vietnam. E-mail: docuong@gmail.com

**10866.** Do, M.C. (2011): *Coelliccia sasamotoi* sp. nov. from Vietnam and Laos (Odonata: Platycnemididae). *International Journal of Odonatology* 14(3): 193-197. (in English) ["*C.a sasamotoi* sp. nov. is described based on specimens of both sexes collected from central Vietnam and Laos. It differs from related species in details of coloration, the shape of the male terminalia, and the shape of the posterior lobe of the female pronotum." (Author)] Address: Do, M.C., 409 – 57A, Tap the Bo Thuy San, 22/20 Nguyen Cong Hoan, Hanoi, Vietnam. E-mail: docuong@gmail.com

**10867.** Dobrzańska, J.; Filipowicz, S.; Sikora, A.; Pełnia-Iwanicka, E. (2011): Dragonflies (Odonata) of chosen oxbow lakes of the Vistula river in Warsaw. *Odonatrix* 7(2): 33-40. (in Polish, with English summary) ["The aim of this study was to assess the species assemblage of dragonflies of three chosen oxbow lakes of the Vistula river within the borders of Warsaw, Poland. There were: Goławskie Lake, Powsinkowskie Lake and Wilanowskie Lake. The inventory of Odonata was conducted from May to October 2010. In overall, 24 species of Odonata were recorded. Most of them are considered to be common or very common in Poland. It was observed that the less surroundings of the lake were altered by human the more dragonflies from Siberian and West Siberian faunal elements were recorded. Due to the fact that researches were conducted only on three lakes this observations do not authorize us to state general conclusions about influence of urbanization on species assemblage of dragonflies. Authors are going to study this issue in further researches." (Au-

thors)] Address: Dobrzańska, Julia, Katedra Kształtowania Środowiska, Wydział Budownictwa i Inżynierii Środowiska, Szkoła Główna Gospodarstwa Wiejskiego w Warszawie, Nowoursynowska 159, 02-776 Warszawa, Poland. E-mail: juliadobrzanska@sggw.pl

**10868.** Dolata, P.T. (2011): The site of the Lilypad Whiteface *Leucorrhinia caudalis* (Charpentier, 1840) (Odonata: Libellulidae) and the Goldeneye *Bucephala clangula* (Linnaeus, 1758) (Aves: Anseriformes) in the River Noteć valley near Czarnków (northern Wielkopolska). *Odonatrix* 7(2): 55-57. (in Polish, with English summary) [16-VI-2010, *L. caudalis* was found on the peat excavation near Czarnków in north part of the Wielkopolska region (Czarnków-Trzcianka district, Poland; 52°55'08" N, 16°32'26" E, UTM: XU06).] Address: Dolata, P.T., Południowowielkopolska Grupa Ogólnopolskiego Towarzystwa Ochrony Ptaków, ul. Wrocławska 60 A/7, 63-400 Ostrów Wielkopolski, Poland. E-mail: p.dolata@op.pl

**10869.** Donoughe, S.; Crall, J.D.; Merz, R.A.; Combes, S.A. (2011): Resilin in dragonfly and damselfly wings and its implications for wing flexibility. *Journal of Morphology* 272(12): 1409-1421. (in English) ["Although there is mounting evidence that passive mechanical dynamics of insect wings play an integral role in insect flight, our understanding of the structural details underlying insect wing flexibility remains incomplete. Here, we use comparative morphological and mechanical techniques to illuminate the function and diversity of two mechanisms within Odonata wings presumed to affect dynamic wing deformations: flexible resilin vein-joints and cuticular spikes. Mechanical tests show that joints with more resilin have lower rotational stiffness and deform more in response to a load applied to an intact wing. Morphological studies of 12 species of Odonata (*Calopteryx augustipennis*, *Lestes rectangularis*, *Ischnura verticalis*, *I. posita*, *Enallagma divagans*, *Aeshna verticalis*, *Aeshna constricta*, *Sympetrum vicinum*, *S. rubicundulum*, *Erythemis simplicicollis*, *Somatochlora tenebrosa*, *Epithea cynosura*) reveal that resilin joints and cuticular spikes are widespread taxonomically, yet both traits display a striking degree of morphological and functional diversity that follows taxonomically distinct patterns. Interestingly, damselfly wings (suborder Zygoptera) are mainly characterized by vein-joints that are double-sided (containing resilin both dorsally and ventrally), whereas dragonfly wings (suborder Epiprocta) are largely characterized by single-sided vein-joints (containing resilin either ventrally or dorsally, but not both). The functional significance and diversity of resilin joints and cuticular spikes could yield insight into the evolutionary relationship between form and function of wings, as well as revealing basic principles of insect wing mechanical design." (Authors)] Address: Donoughe, S., Dept of Cell and Developmental Biology, Univ. of Pennsylvania Medical School, Philadelphia, Pennsylvania. E-mail: donoughe@fas.harvard.edu

**10870.** Dow, R.A. (2011): *Mortonagrion indraneil* spec. nov. from Borneo, and a redescription of *M. arthuri* Fraser (Odonata: Zygoptera: Coenagrionidae). *Zootaxa* 3093: 35-46. (in English) ["*M. indraneil* spec. nov. is described from locations in Sarawak, Malaysian Borneo. Both sexes of *M. arthuri* Fraser are re-described based on recent material. Records of *M. amoena* Ris from Borneo in fact refer to *M. indraneil*; there is no evidence that *M. amoena* occurs on Borneo. Relationships between *Argiocnemis*, *Agriocnemis* and *Mortonagrion* are discussed." (Author)] Address: Dow, R.A., NCB Natu-

ralis, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**10871.** Dow, R.A.; Ngiam, R.W.J. (2011): *Chlorogomphus manau* sp. nov. from Sarawak, Malaysia (Odonata: Chlorogomphidae). *International Journal of Odonatology* 14(3): 269-274. (in English) ["*Chlorogomphus manau* sp. nov. (holotype male: Borneo, Sarawak, Kapit Division, Hose Mountains, 15 April 2011, RMNH) from Malaysia is described from the male and compared with other regional *Chlorogomphus* species." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**10872.** Dow, R.A.; Ngiam, R.W.J. (2011): Two damselflies new to Singapore: *Amphicnemis bebar* Dow, Choong & Ng and *Teinobasis cryptica* Dow (Odonata: Zygoptera: Coenagrionidae). *Nature in Singapore* 4: 393-396. (in English) [Recent records of *A. bebar* and *T. cryptica* increase the list of Odonata species known to Singapore to 127.] Address: Ngiam, R.W.J., National Biodiversity Centre, National Parks Board, 1 Cluny Rd, Singapore 259569. E-mail: ngiamwenjiang@nparks.gov.sg

**10873.** Edwards, G.M. (2011): The functional morphology and ecology of jet propulsion swimming in larval dragonflies under predation from suction-feeding fish. Ms.Thesis, Integrative Biology, University of Guelph, Ontario, Canada: 82 pp + VI app. (in English) ["A functional understanding of how phenotypic traits may affect growth, reproduction and survival is necessary to understand their ecological and evolutionary consequences. Larval anisopteran dragonflies swim using jet propulsion, likely controlled by abdominal traits and perhaps to escape fish predators. I investigated whether abdominal morphology explains swimming performance and if either explains the distribution of larvae among ponds that vary in predation risk. I recorded and measured the swimming performance of dragonflies responding to simulated attack and tested relationships with abdominal traits expected to influence jet thrust force generation. Variation in swimming performance was explained by abdomen dry weight, ventral surface area, and abdominal segment 10 width across genera as hypothesized. High-performance dragonflies were more likely to occur in ponds containing predatory fish. This is the first investigation of the morphology responsible for jet propulsion, and the relationship between swimming performance and larval dragonfly ecology." (Author)] Address: not stated

**10874.** Eggens, G.; Bouwman, J.H. (2011): From salty polder to dragonfly jewel. *Brachytron* 14(1): 3-13. (in Dutch, with English summary) [The Netherlands; "The relatively recent origin of the Dutch Province of Flevoland enables us to obtain new insights into the colonisation of 'new' land by dragonflies. After a slow start many species seem to have found Flevoland. Especially the species of lowland peat-marshes seem to have profited from the new water surfaces available there. Rare species such as *Leucorrhinia pectoralis* and *Libellula fulva* already reproduce here and species such as *Aeshna viridis* and *Somatochlora flavomaculata* are likely to make an appearance soon. Fen species and species of running water also have colonised Flevoland successfully. In view of all recent and planned nature developments, the future of dragonflies in Flevoland looks very bright." (Authors)] Address: Eggens, G., Wittesteijn 24, 8303 XV Emmeloord, The Netherlands. E-mail: vlinders.libellen.eggens@home.nl

**10875.** Fairweather, A.D.; McAlpine, D.F. (2011): History and status of the Natural History Society of New Brunswick entomology collection: 1897-1931. *J. Acad. Entomol. Soc.* 7: 14-19. (in English, with French summary) ["The Natural History Society of New Brunswick (NHSNB; 1862-1932) played a key role in the creation of the New Brunswick Museum (NBM), transferring its insect collection to the NBM upon the museum's opening in 1932. Here we review the history of the NHSNB insect collection, amassed mainly between 1897 and 1910, and report on the collectors involved and the experts and institutions sourced for specimen exchange and assistance with insect identification. The NHSNB entomology collection provides an important historical perspective on the early development of entomological research in Atlantic Canada and illustrates the wide-ranging scientific contacts established by one entomologist working in the Maritimes in the late 19th and early 20th centuries. William McIntosh, the principal collector, established contacts with various well-known amateur and professional entomologists across Canada and in the northeastern United States, gaining identification assistance in particular from specialists associated with the U.S. National Museum-U.S. Department of Agriculture. An inventory of the extant NHSNB insect specimens shows that 7,248 of an estimated 19,467 specimens present in 1914 remain, principally Lepidoptera, Coleoptera, Hymenoptera and Diptera. Despite losses, specimen records of scientific significance remain. About 30% of the 142 odonate species currently known from the Maritimes and southeastern Quebec are first documented on the basis of NHSNB specimens collected from 1898—1900, a 1906 specimen of *Eumorpha labruscae* (Lepidoptera: Sphingidae) remains the only one from Canada, and beetles that document the first occurrence of adventives help to establish timelines for the introduction of non-native Coleoptera to the Maritimes." (Authors)] Address: McAlpine, D.F., New Brunswick Museum, 277 Douglas Avenue, Saint John, New Brunswick E2K 1E5, Canada. E-mail donald.mc-alpine@nbm-mnb.ca

**10876.** Ferreira, S.; Boudot, J.-P.; Tarroso, P.; Brito, J.C. (2011): Overview of Odonata known from Mauritania (West Africa). *Odonatologica* 40(4): 277-285. (in English) ["The current knowledge on the odonate fauna of Mauritania (20 species) is summarized based on literature and unpublished records. In all, 55 localities are listed along with their precise topographic positions. The fauna of Mauritania is poorly explored: 8 species are known from a single locality and *Trithemis annulata*, widespread in Africa, is brought here on record for the country for the first time." (Authors)] Address: Ferreira, Sonia, CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, Universidade do Porto, Campus Agrário de Vairão, PT-4485-661 Vairão, Portugal. E-mail: hiporame@gmail.com

**10877.** Ferreira, S.; Boudot, J.-P.; Tarroso, P.; Brito, J.C. (2011): Overview of Odonata known from Mauritania (West Africa). *Odonatologica* 40(4): 277-285. (in English) ["The current knowledge on the Odonata fauna of Mauritania (20 species) is summarized based on literature and unpublished records. In all, 55 localities are listed along with their precise topographic positions. The fauna of Mauritania is poorly explored: 8 species are known from a single locality and *Trithemis annulata*, widespread in Africa, is brought here on record for the country for the first time." (Authors)] Address: Ferreira,



Sonia, CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, Universidade do Porto, Campus Agrário de Vairão, PT-4485-661 Vairão, Portugal. E-mail: hiporame@gmail.com

**10878.** Ferreira, N.; Feijó, C.; Giorgi, A.; Leggieri, L. (2011): Effects of macrophyte heterogeneity and food availability on structural parameters of the macroinvertebrate community in a Pampean stream. *Hydrobiologia* 664(1): 199-211. (in English) ["Environmental heterogeneity in natural ecosystems influences several parameters at the population and community levels. In freshwater ecosystems, habitat heterogeneity can be provided by macrophyte species with different structural shapes. Previous studies suggest that aquatic plants with more complex architectures will support higher number, biomass, and taxon richness of macroinvertebrates than plants with simpler shape. We investigated the influence of macrophyte structural heterogeneity (quantified by fractal dimension) and food availability (represented by epiphytic biomass) on several parameters (number of individuals, biomass, body size distribution, taxon richness, and diversity) of the macroinvertebrate community in a Pampean stream. Four submerged macrophyte species (*Egeria densa*, *Elodea ernstae*, *Ceratophyllum demersum*, and *Stuckenia striata*) and associated macroinvertebrates were sampled in late spring, summer, and autumn. Plants were photographed and fractal dimension was estimated from the images by the box-counting method. Fractal dimension was independent of plant surface area per unit of macrophyte biomass and differed significantly among species. Mean fractal dimension varied between 1.29 and 1.62, and increased following the sequence *E. densa* -> *S. striata* -> *E. ernstae* -> *C. demersum*. Macrophyte species with higher fractal dimension supported a greater abundance of macroinvertebrates, especially those of small body size (500–1,000 µm); but fractal dimension was unrelated to macroinvertebrate biomass, richness, and diversity. However, overall animal biomass was significantly associated to the epiphytic abundance. Consequently, macrophyte heterogeneity influences macroinvertebrate density and body size distribution, while animal biomass depends on epiphytic food resources provided by plants. ... Other groups such as Odonata (8%) ... were also present." (Authors) "] Address: Ferreira, N., Leggieri Instituto de Ecología y Desarrollo Sustentables (INEDES) and Departamento de Ciencias Básicas, Univ. Nacional de Lujan, B6700APJ, Ruta 5 y Avenida Constitución, Ciudad de Lujan, Buenos Aires, Argentina. E-mail: nicolasferreiro@conieet.gov.ar

**10879.** Festi, A. (2011): *Aeshna subarctica elisabethae*, new to the fauna of Italy (Odonata: Aeshnidae). *Libellula* 30(1/2): 65-76. (in English, with Italian and German summaries) ["In August 2009 a single adult male of *A. subarctica elisabethae* was collected at the 'Lago Nero' peat bog (municipality of Capriana; province Trento, northeastern Italy). This specimen represents the first Italian record of the species and adds a further record of *A. subarctica* to the few known records in the southern Alps. During a targeted search in the summer of 2010, the species was found in three other sites in the region Trentino-South Tyrol in northern Italy, where it now has to be considered as autochthonous." (Author)] Address: Festi, A., Dreiheiligenstr. 24, 39100 Bozen, Italy. E-mail: alex.festi@rolmail.net

**10880.** Flenker, U. (2011): Odonata of the Romanian Carpathians with notes on *Somatochlora alpestris* and

on the first Romanian record of *Aeshna subarctica* (Odonata: Corduliidae, Aeshnidae). *Libellula* 30(3/4): 183-201. (in English, with German summary) ["The Odonata fauna of the Romanian Carpathians was investigated during a summer expedition from 18-VII- to 14-VIII-2009. The work was mostly focused on boreo-alpine species. It is demonstrated that *Somatochlora alpestris* is present in all parts of the Romanian Carpathians. *Aeshna subarctica* has been detected in Romania for the first time. The corresponding record represents the first known occurrence of this species in a rather large area. *Aeshna juncea* is much more widespread in the region than has been known before. *Aeshna cyanea* is present and abundant in forested areas. *Sympetrum danae* has been recorded for the first time in the Romanian western Carpathians." (Author)] Address: Flenker, U., Manfred Donike Institute, German Sport Univ. Cologne, Am Sportpark Müngersdorf 6, 50933 Köln, Germany. E-mail: u.flenker@biochem.dshs-koeln.de

**10881.** Friman, M. (2011): Vantaan Vestran sudenkorennot [The dragonflies of Vestra/Vantaa]. *Crenata* 4: 36-39. (in Finnish, with English summary) [The article reviews the dragonfly fauna of Vestra, a district of Vantaa. The presented area measures 5, 2 square kilometres and is situated at the western edge of Helsinki Metropolitan Area. Between 1998 and 2010 a total of 26 species have been encountered, inter alia, *Ophiogomphus cecilia* and *Coenagrion armatum*. (Asmus Schröter)] Address: Reference address: Finnish Dragonfly Society/ Suomen sudenkorentoseura ry. www.sudenkorento.fi; Jussi Mäkinen makisenjussi@gmail.com

**10882.** Fritzlar, F.; Brettfeld, R.; Petzold, F. (2011): Dr. Wolfgang Zimmermann erhielt Medallie "Für Verdienste um die Entomologie". *Landschaftspflege und Naturschutz in Thüringen* 48(2): 108-109. (in German) [Wolfgang Zimmermann is the most profiled odonatologists in Thüringen, Germany. In April 2011, he was awarded with the medal of German "Entomofaunistic Society" due to his merits in entomology.] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany

**10883.** Fulan, J.A.; Henry, R.; Souza Davanso, R.C. (2011): Effects of daily changes in environmental factors on the abundance and richness of Odonata. *Acta Limnologica Brasiliensia* 23(1): 23-29. (in English, with Portuguese summary) ["Aim: The aim of this work was to investigate the effects of daily changes in surface water abiotic factors on the abundance of Odonata larvae and the genus richness in a lateral lake isolated from a tropical river during the nycthemeral cycle in dry and wet seasons; Methods: Macrophytes were sampled on a single day at 6-hours intervals for 24 hours (at 12:00 AM, 6:00 AM, 12:00 PM and 6:00 PM) in dry and wet periods. At each site, abiotic factors were measured as follows: air temperature, surface water temperature, dissolved oxygen, pH, and electric conductivity. Canonical correspondence analysis (CCA) of abiotic and biological data and sampling periods was made using CANOCO program; Results: A total of 249 and 265 Odonata larvae from six genera (*Acanthagrion*, *Cyanalagma*, *Telebasis*, *Erythemis*, *Erythrodiplax* and *Tauriphila*) were sampled in association with macrophytes in wet and dry seasons, respectively. *Telebasis* presented the highest frequency of occurrence and was collected in all nycthemeral cycle sampling periods in both seasons. The highest abundance of dragonflies was recorded at 6:00 AM and 12:00 AM in wet and dry seasons, respectively. Anoxia was detected in wet sea-

son during the entire nycthemeral cycle, while in the dry season, the highest variability in oxygen content was observed during sunlight. Canonical correspondence analysis showed that the abundances of Telebasis and Erythemis were positively related to water electrical conductivity, temperature, and depth, while for Acanthagrion and Tauriphila, abundance showed a positive relationship to water oxygen and pH. The variability of the abundance of Odonata due to surface water temperature, dissolved oxygen, electrical conductivity, pH, and depth during the daily cycle was therefore evidenced; Conclusions: We suggested that the better sampling period Odonata larvae must be carried in the morning, since that we recorded the highest densities of both wet and dry stations at that hour. We point out that our data must to be examined with caution because the low sampling effort and the reduced taxonomic resolution." (Authors)] Address: Fulan, J.A., Universidade Federal do Amazonas (UFAM). CEP: 69800-000, Humaitá, AM, Brasil. E-mail: joaofulan@ig.com.br

**10884.** Gandara, J.A.; Rodríguez, R.E., Ramos, T.S. (2011): Notas corológicas de Orhetrum brunneum (Fonscolombe, 1837) (Odonata, Libellulidae) y aportación de una nueva cita para Galicia (N.W. Península Ibérica). Archivos Entomológicos 5: 149-152. (in Spanish, with English summary) [Unpublished and bibliographical distributional records of *O. brunneum* for the NW of the Iberian Peninsula are compiled, reporting also a new record for Galicia: León and Zamora (Spain), Ourense (Galicia), Bragança, Vila Real (Portugal).] Address: Gándara, J., Barrio do Souto, 10 B. 36740 San Salvador de Tebra, Tomiño (Pontevedra), Spain. E-mail: lcgandara@yahoo.es

**10885.** Gassmann, D. (2011): Expeditionsbericht: Conservation International Rapid Biodiversity Assessment der Nakanai Mountains, New Britain (Papua-Neuguinea). GbFS (Gesellschaft für Biologische Systematik) news 25: 28-31. (in German) [Report from an expedition realised from 2.-27-IV-2009 with focus on odonatalogical results, and including some notes on regional odonatological history.] Address: Gassmann, D., Institute of Evolutionary and Ecological Sciences, Leiden University, c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: gassmann@naturalis.nnm.nl

**10886.** Geraeds, R.P.G.; Haese, U. (2011): Rheophile Libellen in einigen grenzüberschreitenden Wasserläufen im deutsch-niederländischen Naturpark Maas-Schwalm-Nette. Natuurhistorisch Maandblad 100(10): 199-204. (in German, with English summary) ["A few brooks and rivers that cross the German-Dutch border in the Maas-Swalm-Nette nature park are of special value regarding rheophilic dragonflies, and the distribution of some of these species in the Netherlands is mainly – or even completely – restricted to a few of these streams. As a result, the Dutch parts of the brooks and rivers have been closely investigated. Since the distribution of most of these species in the German parts of these streams was unknown, however, surveys in 2009 and 2010 recorded rheophilic dragonflies in the Swalm, Roer, Rode Beek and Kitschbach streams in the border region. Species that were surveyed included *Calopteryx splendens*, *C. virgo*, *Cordulegaster boltonii*, *Gomphus flavipes*, *G. vulgatissimus*, *Ophiogomphus cecilia* and *Onychogomphus forcipatus*. *C. splendens* is the most common species in the area; it occurs in all streams on both sides of the border. The *C. virgo* is rare and was found only along the Rode Beek brook, in the

German as well as Dutch parts. *C. boltonii* appears to be plentiful along the Rode Beek. In 2010, it was also found upstream of the Dalheimer Mühle in Germany, its first record in Germany. In 2007, two larvae were caught in the Dutch part of the river Swalm, near the border. The species was also occasionally spotted along the German part of the Swalm in the past. A few exuviae were found there in 2010, making it clear that there is also a population in Germany. The presence of *G. flavipes* is restricted to the Dutch part of the river Roer, where the species mainly inhabits the downstream parts. Only one specimen was spotted in the study area, near Vlodrop, in 2010. *G. vulgatissimus* is a widespread species along the running waters we investigated. It occurs on both sides of the Dutch-German border along the Swalm, Roer and Kitschbach. This species was first spotted along the German part of the Roer in 2009. *O. cecilia* was known to live along the Dutch parts of the rivers Swalm and Roer, and the German Kitschbach brook. In 2009 and 2010, the species was also found along the German parts of the Swalm and Roer, though it was not spotted along the Kitschbach in these years. *O. forcipatus* very rarely appears in the study area. This species was spotted only twice in the past: along the Roer in 2000 and along the Rode Beek in 2008. The Roer harbours a small population downstream of the study area. The animal that was seen along the Rode Beek brook was probably a drifter from the Roer population." (Authors)] Address: Haese, U., Am Gut Bau 28, 52072 Aachen, Germany

**10887.** Giugliano, L.; Terzani, F. (2011): The dragonflies of the retrodunal wetlands in the Migliarino, San Rossore, Massaciuccoli Regional Park (Odonata). Boll. soc. entomol. ital. 143(1): 3-13. (in Italian, with English summary) ["The biodiversity of the Regional Park of Migliarino, San Rossore and Massaciuccoli has been the subject of monitoring studies since a long time. The scope of this study is to fill the knowledge gap about the Odonata inhabiting the park, as at the present time there is no specific knowledge about the Odonata community located in the retrodunal ponds of park. Past surveys, although undertaken only sporadically, have produced a census of 29 species and samples have been collected – 28 in adult phase, 13 in larval phase and 11 like exuviae. The results of this study evidenced many interesting issues in terms of conservation, with several aspects which encourage further research." (Authors)] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**10888.** Gliwa, B.; Stukonis, V. (2011): *Erythromma viridulum* (Odonata: Coenagrionidae) - A new species to Lithuania. New and rare for Lithuania insect species 23: 5-7. (in English, with Lithuanian summary) [Radviliškis district, Lithuania; *Erythromma viridulum* Lake Kragai, 05-VIII-2007, 7 ind. (1 dead male, 3 tandems), 24-VII-2008, 8 ind. (4 tandems); pond Juodupio Tvenkinys, 29-VIII-2011, ~50 ind.] Address: Gliwa, B., Lithuanian Entomological Society, Akademijos 2, LT-08412 Vilnius, Lithuania. E-mail: gliwa@sargeliai.org

**10889.** Gordon, S. (2011): 2011 Oregon Aeshna Blitz. Bulletin of the Oregon Entomological Society Fall 2011: 1-2. (in English) [USA; Brief report on some new faunistic and phenological data obtained during the 2011 Oregon Aeshna Blitz held at Horse Lake in Douglas County on 27-VIII-2011.] Address: not stated

- 10890.** Gospodinova, H.; Wunsch, H.-W.; Heydrich, S. (2011): Erster Entwicklungsnachweis von *Epitheca bimaculata* in Nordrhein-Westfalen (Odonata: Corduliidae). *Libellula* 30(1/2): 13-18. (in German, with English summary) ["On 25-IV-2011, at a pond in the 'Wahner Heide', near the Cologne-Bonn airport, the emergence of a female of *E. bimaculata* was documented by photographs. Ecdysis started on 11:16 h CEST and was completed by 12:45 h when the female took her maiden flight. This is the first record of the species for 27 years and the first evidence of reproduction of *E. bimaculata* in North Rhine-Westphalia, Germany at all." (Authors)] Address: Wunsch, H.-W., Am Burgberg 11, 50126 Bergheim, Germany. E-mail: willi@waldschrat-online.de
- 10891.** Graves, P.H.; Ciccotto, P.J. (2011): The nymphal odonate fauna of two watersheds in the Lower Potomac River Basin, Maryland, with emphasis on rare taxa. *Northeastern Naturalist* 18(4): 445-456. (in English) ["Sixty percent of Maryland's odonate species are considered to be in need of conservation. To prioritize areas for the protection of biodiversity, the Maryland Department of Natural Resources (MD DNR) has identified 10 watersheds with the highest rates of occurrence of imperiled and rare stream species, including odonates. We examined the lotic-breeding odonate fauna of two of these high priority watersheds to determine the distribution and status of several imperiled odonate species in Maryland. Odonate nymphs from two Lower Potomac River basin watersheds, Zekiah Swamp Run and Breton Bay, were collected by volunteers and MD DNR's Maryland Biological Stream Survey from 2000–2010 and were identified to species level when possible. Thirty-four species were collected during this survey, 10 of which are state-listed species. The data collected in this survey detail the distributions, habitats, and microhabitats of rare odonates in two priority watersheds in Maryland that can be used to aid in the conservation of these species and their habitats." (Authors)] Address: Graves III, P.H., Monitoring and Nontidal Assessment Division, Maryland Department of Natural Resources, 580 Taylor Avenue, Tawes Building C-2, Annapolis, MD 21401. USA. E-mail: pgraves@dnr.state.md.us.
- 10892.** Guillermo-Ferreira, R.; Del-Claro, K. (2011): Oviposition site selection in *Oxyagrion microstigma* Selys, 1876 (Odonata: Coenagrionidae) is related to aquatic vegetation structure. *International Journal of Odonatology* 14(3): 275-279. (in English) ["Oviposition site selection is crucial in the life history of odonates since females must find a suitable habitat to enhance larval survival and development. Males perch at these sites to get access to females to mate. Here we studied how different types of vegetation influence site selection of the damselfly *O. microstigma* in a Neotropical savanna pond. We identified and quantified the aquatic plants on the study site and investigated the relationship between plant species density, male site fidelity and female oviposition. The results showed that male density increased with higher densities of the Cyperaceae *Eleocharis* sp. but with lower densities of the Pontederiaceae, *Pontederia parviflora*. The number of males was also positively correlated with the number of ovipositing females and the duration of oviposition bouts. The females were found ovipositing on sites with *Eleocharis* sp., which was used as an oviposition substrate. We suggest that the species composition of aquatic vegetation in the environment, as well as the distribution and abundance of plants, can be a major determinant factor of damselfly habitat selection." (Authors)] Address: Guillermo-Ferreira, R., Departamento de Biologia, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, SP, Brazil. E-mail: delclaro@ufu.br
- 10893.** Hanel, L. (2011): [*Anaciaeschna isocela* again in Podblanicko]. *Pod Bláníkem* 15(3): 5. (in Czech) [Czech Republic, near Vlašim (49°42'15"N 14°53'54"E), 5-VI-2011] Address: Hanel, L., Správa chránené krajinné oblasti Bláník, 257 06 Lounovice pod Bláníkem 8, Czech Republic. E-mail: blanik@schkocr.cz
- 10894.** Hasty, J.M.; Yang, P. (2011): Survey of immature mosquito predators from Taro fields on the Island of Kauai, Hawaii. *Proceedings of the Hawaiian Entomological Society* 43: 13-22. (in English) ["A survey of predators of immature mosquitoes was conducted on the island of Kauai, Hawaii, in taro fields, major larval mosquito habitat of *Culex quinquefasciatus* Say. The survey consisted of examinations of samples from taro field water in two series: monthly at five locations and weekly at two of the same five locations. Copepods (*Macrocyclus albidus* Jurine), mosquito eating fish (*Gambusia affinis* Baird and Girard and *Poecilia reticulata* Peters) and aquatic insects, including backswimmers (*Buenoa pallipes* Fabricius) and larvae of *Odonata* spp., were the most commonly observed predators. While copepods were observed at all locations, backswimmers and mosquito fish were variably present. Copepod populations from all locations fluctuated during the surveys. For the two sites sampled on a weekly basis, adult mosquito counts were higher at Lihue (65.60 per gravid-trap-day) than at Hanapepe (39.91) while larvae were more frequently present at Hanapepe (79% of weeks) than Lihue (33%). There was no clear relationship at these sites between the relative abundance of the most frequently collected mosquito-feeding insects, copepods, and numbers of adult mosquitoes trapped." (Authors)] Address: Hasty, J.M., Department of Health, Sanitation Branch, Vector Control Section, 99-945 Halaia Valley St. Aiea, HI 96701, USA
- 10895.** Heijligers, H. (2011): De Ravenvennen. *Libellenreservaat in Limburg*. *Vlinders* 2/2011: 26-27. (in Dutch) [30 Odonata species occur within the nature reserve De Ravenvennen, The Netherlands. The location is briefly introduced, but no details on its fauna are given.] Address: Heijligers, H.W.G., Lottumseweg 27, NL-5872 AA Broekhuizen, The Netherlands
- 10896.** Hermans, J.; Sennert, G. (2011): Die Libellenfauna des Naturparks Maas-Schwalm-Nette. *Naturhistorisch Maandblad* 100(10): 216-225. (in German, with English summary) ["The dragonfly fauna of the Maas-Schwalm-Nette nature park is extremely rich, with 57 species found in this region between 1980 and 2010. One of the most important reasons for this large number of species is the diversity of biotopes and habitats. The area includes many types of water body: stagnant and running waters, nutrient-poor to nutrient-rich waters with several transitional stages in between, waters fed by percolating groundwater and water bodies in various stages of vegetation development. Other reasons for the presence and settlement of so many species include improved water quality, targeted habitat management of fens and pools involving the development and restoration of biotopes and habitats, and changing climate conditions. The article briefly summarises de-



velopments in the distribution patterns of some species. Examples of species whose populations and distribution patterns have stabilized include *Coenagrion lunulatum*, *Aeshna juncea*, *Leucorrhinia rubicunda* and *L. dubia*. Some species, such as *Sympecma fusca*, *Somatoclora flavomaculata* and *Aeshna isosceles*, have benefited from the current climate change and extended their area of distribution. The rise in average annual temperatures has allowed some Mediterranean dragonfly species to extend their distribution northward and establish viable populations in several locations. Examples of such species are *Crocothemis erythraea* and *Orthetrum brunneum*. *O. coerulescens* is a dragonfly that took advantage of the restoration of some habitats in heath and moorland biotopes, where new small streams were created." (Authors)] Address: Hermans, J.T.; Hertestraat 21, 6067 ER Linne, The Netherlands

**10897.** Hodge, P.J. (2011): Insect survey at Markstake Common, East Sussex. Report No.1 for site visits on 21st June, 29th July & 13th September 2010 (<http://www.chaileycommons.org.uk/USERIMAGES/EntomologicalSurveyMarkstakeCommon,2010%5B1%5D.pdf>): (in English) [UK; *Coenagrion puella*; *Pyrhosoma nymphula*] Address: Hodge, P.J., Consultant Entomologist, 8 Harvard Road, Ringmer, Lewes, East Sussex, BN8 5HJ, UK. E-mail: peter.hodge@mypostoffice.co.uk

**10898.** Höpstein, G. (2011): Der Südliche Blaupfeil (*Orthetrum brunneum*) in der Sandgrube bei Remschütz. *Landschaftspflege und Naturschutz in Thüringen* 48(2): 95-98. (in German, with English summary) [Thüringen, Germany. In July 2008, a small reproductive population of *O. brunneum* was observed. No specimens in 2009 could be traced, but at 26-VI-2010 a few exuviae and again a small reproductive population were found.] Address: Höpstein, G., Flecke 17, 07422 Bad Blankenburg, Germany

**10899.** Holuša, O. (2011): Observation of swarming behaviour in *Selysiotthemis nigra* on the island of Evia, Greece (Odonata: Libellulidae). *Libellula* 30(3/4): 233-236. (in English, with German summary) ["On 10-VII-2009 a group of about 80 adults of *S. nigra* was observed near Kalyvia in northern Evia. The group consisted of both sexes and flew in a space of 80 x 30 m over the road and in adjacent non-forest areas. It is suggested that the aggregation was part of a migrating swarm." (Author)] Address: Holuša, O., Department of Forest Protection and Wildlife Management, Faculty of Forestry and Wood Technology, Mendel University in Brno, Zemědělská 3, CZ-613 00 Brno, Czech Republic. E-mail: holusao@email.cz

**10900.** Hopkins, G.R.; Gall, B.G.; Brodie, D.E. (2011): Ontogenetic shift in efficacy of antipredator mechanisms in a top aquatic predator, *Anax junius* (Odonata: Aeshnidae). *Ethology* 117(12): 1093-1100. (in English) ["The ability of prey to escape predation often lies in the occurrence and efficacy of their predator avoidance and antipredator behaviours, which are often coupled with specialized morphology. How the use and efficacy of these behaviours change throughout ontogeny may be indicative of the vulnerability and ecological roles these animals experience throughout their lives. We examined the antipredator behaviour of a large dragonfly nymph, *Anax junius*, from a historically fishless pond where these animals have traditionally been classified as top predators. These dragonfly nymphs displayed a series of distinct aggressive antipredator behaviours

when grasped that involved stabbing with lateral and posterior spines and seizing with labial hooks. Larger (older) nymphs displayed these aggressive behaviours significantly more than smaller (younger) animals in simulated predation trials. During encounters with live larval salamander predators (*Ambystoma tigrinum*), all large nymphs, but only 12.5% of small nymphs successfully escaped predation attempts by the amphibians through the use of antipredator behaviour. Large nymphs were also significantly more active than smaller nymphs in the presence of salamander larvae. Despite often being considered top predators in fishless ponds, our study demonstrates that their true role is more complex, depending on ontogeny and body size, and that effective antipredator behaviour is likely necessary for survival in these systems." (Authors)] Address: Hopkins, G.R., Dept of Biology, Utah State University, 5305 Old Main Hill Logan, UT 84322, USA. E-mail: garth.hopkins@usu.edu

**10901.** Hunger, H. (2011): Wiederfund von *Coenagrion scitulum* in Baden-Württemberg nach fast 90 Jahren (Odonata: Coenagrionidae). *Libellula* 30(1/2): 43-50. (in German, with English summary) [*Coenagrion scitulum* "had hitherto been recorded in Baden-Württemberg, Germany, only once, back in 1922. In the line of an increasing number of sightings in the neighbouring regions since the beginning of the 21st century, *C. scitulum* was rediscovered in May 2010 ca 12 km southwest of Freiburg im Breisgau." (Author)] Address: Hunger, H., INULA - Institut für Naturschutz und Landschaftsanalyse, August-Ganther-Str. 16, 79117 Freiburg i.Br., Germany. E-mail: holger.hunger@inula.de

**10902.** Ilvonen, S.; Ilvonen, J.J.; Kaunisto, K.M.; Krams, I.; Suhonen, J. (2011): Can infection by eugregarine parasites mediate species coexistence in *Calopteryx damselflies*? *Ecological Entomology* 36(5): 582-587. (in English) ["1. Parasitism may be an important factor determining the coexistence of closely related species. Although host-parasite interactions can affect the ecology and distribution of the host species, virtually nothing is known about how other interspecific interactions affecting the host, such as competition or predation, relate to the parasite burden of the host. 2. We studied parasite-mediated competition between two closely related *Calopteryx damselflies*, *C. virgo* L. and *C. splendens* Harris. We investigated a total of 31 populations, including 18 allopatric and 13 sympatric populations. We measured the occurrence of gut parasites, eugregarines. 3. We found that the prevalence of eugregarines was higher in *C. virgo* than in *C. splendens*. On average, more than half of the *C. virgo* individuals were infected by eugregarines both in allopatric and sympatric populations. However, hardly any allopatric *C. splendens* populations had eugregarines, but most of sympatric populations had infected individuals. 4. According to our results, co-existence of the host species affects the likelihood of the subordinate species showing higher levels of parasitism. Interspecific aggression, lower species genetic heterozygosity, and the difference in host species immunity are proposed as possible explanations for greater parasite burdens in the inferior species at sympatric sites." (Authors)] Address: Suhonen, J., Dept of Biology, Section of Ecology, University of Turku, FI-20014 Turku, Finland. E-mail: juksuh@utu.fi

**10903.** Iserbyt, A.; van Gossom, H. (2011): Show your true colour: cues for male mate preference in an intra-specific mimicry system. *Ecological Entomology* 36(5):

544-548. (in English) ["1. Polymorphism limited to the female sex occurs in a variety of animal species and has been shown to be an attractive model system for examining general questions in signal detection theory. 2. When observed in damselflies, typically one female morph is an example of sexual dimorphism, whereas the other is considered as a functional malemimic that resembles the male's phenotype in several traits. 3. While several studies focused on male harassment and subsequent cost/benefit trade-offs in female morphs, it remains understudied at the proximate level, which precise cues are relevant to mate-searching males for discriminating among potential mates. 4. In the present study, we scored male mate preference to natural and manipulated phenotypes in the polymorphic damselfly *Nehalennia irene* Hagen. 5. In contrast to expectation, male preference did not change when colour was manipulated and male preference remained consistently for andromorph > male > gynomorph across treatments. 6. This suggests that cues other than body coloration primarily affect male mate preference in the present study system." (Authors)] Address: Iserbyt, A., Evolutionary Ecology Group, University of Antwerp, Groenenborgerlaan 171, B-2020 Antwerp, Belgium. E-mail: arne.iserbyt@ua.ac.be

**10904.** Iskaros, I.A.; Gindy, N.N.; El Dardir, M. (2011): Long - term fluctuations of macrobenthic invertebrates in Aswan Water Reservoir, Egypt. *International Journal of Environmental Science and Engineering* 1: 37-48. (in English) [The list of taxa includes also unidentified Odonata (larvae of Zygoptera).] Address: Iskaros, I.A., National Institute of Oceanography and Fisheries, Aswan, Egypt

**10905.** Jeong, J.-C.; Cha, J.-Y.; Kwon, J.-M.; Choi, J.-K.; Nam, S.-H.; Choi, M.; Kim, Y.; Cho, Y. (2011): Historical review of the insect fauna and protected species in Byunsanbando National Park. *Journal of National Park Research* 2(2): 85-128. (in Korean, with English summary) [The insect fauna in Byunsanbando National Park, Korea comprises of 1,365 species, and includes 24 Odonata species. These are listed in a table.] Address: Cho, Y., Department of Biology, Daejeon University, Daejeon 300-716, Korea. E-mail: themoth@dju.kr

**10906.** Johnson, J. (2011): The brief history of *Paltothermis lineatipes* in Oregon. *Bulletin of the Oregon Entomological Society* Fall 2011: 3. (in English) [Little Cottonwood Creek, Pueblo Mountains a few miles south of Fields, Oregon, USA. The author reports on the first record of *P. lineatipes* on 25-VIII-2011.] Address: Johnson, J., 3003 Unander Avenue, Vancouver, WA 98660, USA. E-mail: jjjohnson@comcast.net

**10907.** Johnson, J. (2011): Desert odonate trip (17–19 June 2011). Odonate species list. *Bulletin of the Oregon Entomological Society*. Summer 2011: 6. (in English) [Oregon, USA. For the trip-details see Lyons (2011): "With the extended cool wet period this spring, we were too early for most species. The following species were seen, photographed or collected: *Rhionaeschna* sp. (presumably *californica*), *Libellula composita*, *L. nodisticata*, *Plathemis subornata*, *Erythemis collocata*, *Sympetrum corruptum*, *Argia alberta*, *Ischnura cervula*, *I. denticollis*, *I. perparva*, and *Amphiagrion abbreviatum*." (Author)] Address: Johnson, J., 3003 Unander Avenue, Vancouver, WA 98660, USA. E-mail: jjjohnson@comcast.net

**10908.** Johnson, J. (2011): Snaketail emergence. *Bulletin of the Oregon Entomological Society* Summer 2011:

10. (in English) [Depiction of an emerging female *Ophigomphus severus* on the Burnt River in Baker County, Oregon, USA, on 3 July 2011.] Address: Johnson, J., 3003 Unander Avenue, Vancouver, WA 98660, USA. E-mail: jjjohnson@comcast.net

**10909.** Juen, L.; De Marco, P. (2011): Odonate biodiversity in terra-firme forest streamlets in Central Amazonia: on the relative effects of neutral and niche drivers at small geographical extents. *Insect Conservation and Diversity* 4: 265-274. (in English) ["1. The Amazon region is formed primarily by a dense network of acid and nutrient-poor streamlets. The stability of environmental conditions coupled with spatial constraints to dispersal turns these streamlets into an interesting arena to compare neutral and niche drivers for community organisation. Here, we evaluated the relative importance of local environmental conditions and regional dispersal limitation to determine beta-diversity and distributional patterns of species richness of the adult Odonata assemblage present in the Adolpho Ducke Forest Reserve (Manaus, Amazon) river basins. 2. Samples were taken in 24 streamlets distributed in four river sub-basins (pairwise distances up to 10 km) during the rainy season. The samples consisted of visual surveys for adult individuals of Odonata present in 100 m transects along each streamlet; each transect was divided into 20 segments of 5 m. 3. A total of 17 species were observed and 23 ( $\pm 4.8$ ) were estimated using a jackknife procedure. Four sub-basins were statistically similar based on species richness and beta-diversity. Distance among the streamlets had a low predictive power for species richness, while beta-diversity patterns were mainly explained by local environmental variables (channel width and depth). The low values of the beta-diversity index may be attributed to the high similarity of the environment, which presented little variation in abiotic conditions. 4. Low dispersal constraints and environmental stability are the primary explanations for low beta-diversity at this spatial extension. Nevertheless, the importance of local environmental variables to determine beta-diversity suggests its inclusion as criteria for setting conservation priorities for this group." (Authors)] Address: Correspondence: Leandro Juen, Programa de Pós Graduação em Ecologia e Evolução, Depto de Ecologia, Univ. Federal de Goiás, 74001-970 Goiânia, Goiás, Brazil. E-mail: leandrojuen@yahoo.com.br

**10910.** Kaize, J.; Kalkman, V.J. (2011): Records of dragonflies (Odonata) from Kabupaten Asmat and Kabupaten Mappi (Papua, Indonesia). *SUGAPA (Suara Serangga Papua)* 5(3): 99-107. (in English, with Papuan summary) ["Records of dragonflies collected at Katan and Senggo (both Kabupaten Mappi) and at Vriendschap River (Kabupaten Asmat) in 2009 are presented. In total 47 species belonging to seven families were collected, the majority of these belong to the Coenagrionidae (14 species) or to Libellulidae (26 species). The collection includes several poorly known species such as *Plagulibasis ciliata* and *Nososticta rangifera*. *Austrocnemis maccullochi* is recorded for Indonesia for the first time. One male of an undescribed *Palaiargia* is briefly characterized but is not officially described." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**10911.** Kalkman, V.J.; Theischinger, G.; Richards, S.J. (2011): Dragonflies and Damselflies of the Muller

Range, Papua New Guinea. In: Richards, S.J. and Gamui, B.G. (editors). 2011. Rapid Biological Assessments of the Nakanai Mountains and the upper Strickland Basin: surveying the biodiversity of Papua New Guinea's sublime karst environments. RAP Bulletin of Biological Assessment 60. Conservation International. Arlington, VA: 175-181. (in English) ["We conducted a survey of dragonflies at three elevations in the Muller Range of centralwestern Papua New Guinea (PNG) from 4-25 September 2009. Thirty-six species were documented, of which 31 were found only at the lowland site. Diversity at Camp 1 (Gugusu; ~500 m) was similar to that documented from the limited number of other sites studied in the central mountain range, and the dragonfly community conformed with a number of patterns previously observed at low elevations in the central ranges: (1) Higher level taxonomic diversity (number of families) is high in proportion to the number of species; (2) the majority of species are dependent on running water; (3) most of the species associated with running water are endemic to New Guinea while most species occupying standing water habitats are more widespread and often also occur outside New Guinea. At least six species new to science were found at Gugusu reinforcing the view that many species of dragonflies still await discovery in New Guinea. This is probably especially so for the southern slopes of the central mountain range in PNG because this area remains relatively unexplored. Diversity was extremely low at Camp 2 (Sawetau; 1,600-2,000 m; 1 species) and Camp 3 Apalu Reke; 2,875 m; 4 species). The karst area at camp 2 is largely devoid of aquatic habitats and hence has a very poor dragonfly fauna. Camp 3 was above the altitudinal limit of all but a few species. However the discovery of the presumed larvae of *Papuagrion* at Camp 3 constitutes the first record of larvae of this genus. Its life-style (aboreal and semi-terrestrial) is unique among dragonflies and warrants more research. We also report on a small collection of dragonflies assembled during the 2008 RAP survey at Tualapa near Wanakipa Village in the upper Strickland River catchment on the northern edge of the Muller Range. Opportunistic collecting at elevations between 845-1,422 m around Tualapa Camp documented 18 species of dragonflies including only the second records of the poorly known *Hylaeargia magnifica* and the recently described *Argiolestes verrucatus*." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**10912.** Kalniņš, M. (2011): Spāru (Odonata) dienvīdu sugu izplatība Latvijā un blakus teritorijās. Latvijas Universitātes 69. zinātniskā konference. Bioloģijas sekcija, Zooloģijas un dzīvnieku ekoloģijas apakšsekcija, 2011. gada 3.-4. februāris: 1 p. [The range extension in the past 20 years of 19 southern Odonata in Latvia is commented: *Lestes barbarus*, *L. viridis*, *Sympetrum fusca*, *Coenagrion ornatum*, *Erythromma viridulum*, *Aeshna affinis*, *A. crenata*, *A. serrata*, *Anax parthenope*, *A. ephippiger*, *Orthetrum albistylum*, *O. coerulescens*, *O. brunneum*, *Sympetrum depressiusculum*, *S. fonscolombii*, *S. meridionale*, *S. eroticum*, *S. pedemontanum*, *Crocothemis erythraea*. Published records of *S. eroticum* and *S. meridionale* are considered doubtful.] Address: Kalniņš, M., University of Latvia, Faculty of Biology, Kronvalda bulv. 4, LV 1586, Riga, Latvia. E-mail: martins.kalnins@daba.gov.lv

**10913.** Karraker, N.E. (2011): Are toad tadpoles unpalatable: evidence from the behaviour of a predatory dragonfly in South China. *Amphibia-Reptilia* 32(3): 413-418. (in English) ["Predators are important determinants of amphibian community structure in aquatic habitats, and larval odonates can be significant predators of amphibian larvae. Despite their toxicity as adults, the palatability of bufonid eggs and tadpoles to vertebrate and invertebrate predators remains widely debated. I tested the palatability of hatchling tadpoles of the Asian common toad (*Bufo melanostictus*) and four other amphibians in Hong Kong to larvae of the dragonfly *Pantala flavescens*. Attempted predation of *Bufo melanostictus* hatchling tadpoles by *P. flavescens* resulted in 100% mortality of hatchlings, but none were consumed. All other amphibians were palatable to *P. flavescens*. Development of toxins may not protect early-stage bufonids from invertebrate predators that detect prey by visual cues and then make a debilitating strike. These findings present the first report of unpalatability of bufonid tadpoles to an invertebrate predator and provide evidence that unpalatability of early stage bufonids to odonates may decrease through ontogeny." (Author)] Address: Karraker, Nancy, School of Biological Sciences, University of Hong Kong, Hong Kong SAR, China. E-mail: karraker@hkucc.hku.hk

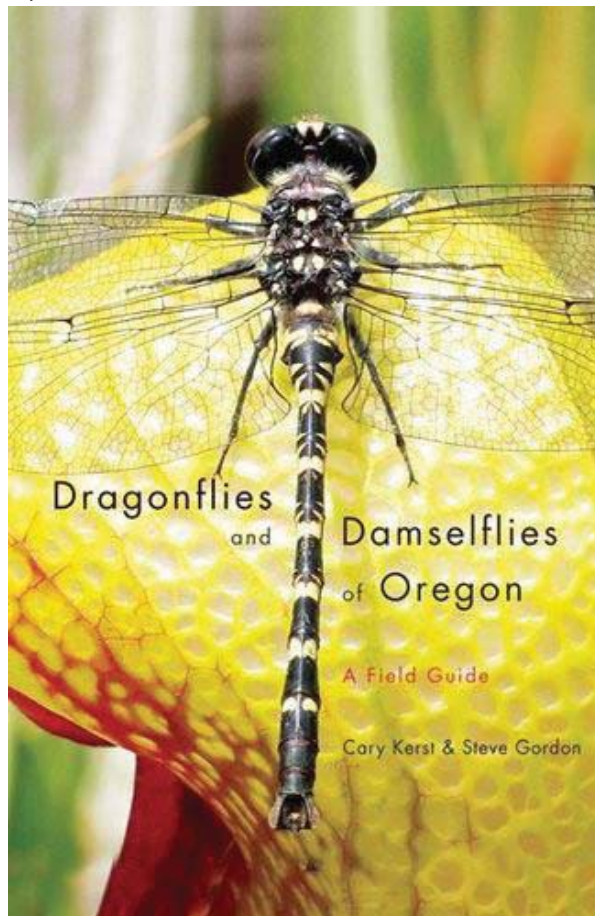
**10914.** Keller, D.; Brodbeck, S.; Flöss, I.; Vonwil, G.; Holderegger, R. (2011): Ausbreitung und Besiedlungsgeschichte der Zierlichen Moosjungfer *Leucorrhinia caudalis* in der Schweiz (Odonata: Libellulidae). *ENTOMO HELVETICA* 4: 139-152. (in German, with English and French summaries) ["*Leucorrhinia caudalis* is considered a threatened dragonfly species in Central Europe. In Switzerland, the species was formerly widespread in the lowlands, but only a single known population was left in the 1980s. However, a spread has been observed in the 1990s, where close-by ponds at a distance of 0.5–7 km have been colonised. Additionally, two new populations at distances of 30 km and 50 km were discovered in the 2000s. In the present study, a combination of a mark-resight study with genetic methods was applied to investigate current migration and genetic footprints of colonisation history in Switzerland. Both the mark-resight and the genetic study showed that *L. caudalis* is a sedentary species that migrates only rarely, seldom exceeding distances of 5 km. The genetic results reflected the recent colonisation history in Switzerland. The oldest and largest population was genetically the most variable and acted as source for recent colonisations. The close-by but only recently founded populations also showed high genetic variability, implicating that close ponds are relatively easily colonised and establish well if functional connectivity is ensured." (Authors)] Address: Keller, Daniela, Eidg. Forschungsanstalt WSL, Zürcherstr. 111, CH-8903 Birmensdorf, Switzerland. E-mail: daniela.keller@wsl.ch

**10915.** Kerst, C. (2011): Pins to envelopes. *Bulletin of the Oregon Entomological Society* Fall 2011: 5. (in English) [Verbatim: The Oregon State University Arthropod Collection has a number of cabinet drawers of pinned Odonate specimens. Pinned specimens require considerable cabinet space for storage, and specimens are less secure from damage by pests. The modern method of storing Odonata specimens is to place them in polypropylene envelopes after processing. The data for each specimen is printed on a 3 × 5 card and placed inside the envelope. I have begun the process of mov-



ing the pinned specimens into envelopes. This is a time-consuming procedure involving relaxing specimens in a moist air-tight environment. After relaxing, the specimens are removed from pins, positioned, and placed in an acetate envelope along with labels. After air drying, the specimen data are entered into a spreadsheet from which the 3 × 5 cards are printed. The original data labels are glued to the cards along with a bar code and placed in the poly envelopes along with the specimen. The end of the poly envelopes is folded over and taped closed. Specimens are well protected in these envelopes and hopefully will be useful for another hundred years. Data for specimens are also then available in the collection's database. There are a few interesting specimens that I have come across to date. A specimen of *Gomphus lynnae* from Rome, Oregon was collected in 1952. This species was described by Dennis Paulson in 1983. There is a specimen of *Aeshna palmata* collected by P. P. Calvert on 22 July 1896, and a specimen of *Rhionaeschna californica* labeled J. G. Needham from 5 July of the same year. Both specimens are from Olympia, Washington. It's a delight to come across specimens collected by these pioneering odontologists.] Address: not stated

**10916.** Kerst, C.; Gordon, S. (2011): *Dragonflies and Damselflies of Oregon. A Field Guide.* Oregon State University Press. 304 pp. (in English) ["Growing interest in watching and identifying dragonflies and damselflies has sharpened the need for an authoritative resource like *Dragonflies and Damselflies of Oregon*, a definitive field guide devoted solely to dragonflies and damselflies found in the state. Cary Kerst and Steve Gordon include information on identification, as well as biology and behaviour, using common terms useful to the novice and experienced enthusiast alike. The book features stun-



ning colour photographs of male and female of all species currently known in Oregon, along with helpful illustrations and charts with important identification characteristics. *Dragonflies and Damselflies of Oregon* presents the life cycle and larval habits of dragonflies and damselflies, along with photographs of the larvae of families. The Oregon range for each species is mapped, and the size range of adults is provided in text and illustration. The book also includes a description of the best sites in Oregon to observe these amazing insects, a useful tool for viewing uncommon species in spectacular settings." (Publisher)

**10917.** Kolshorn, P. (2011): *Kleinvieh & Co: Libellen.* *Naturspiegel* 83: 26. (in German) [Regional data of *Leucorrhinia pectoralis* and *Anax parthenope* from De Wittsee/Nettetal and *Elmpter Schwalmbruch/Niederkrüchen*, Nordrhein-Westfalen, Germany are documented.] Address: not stated

**10918.** Kosterin, O.E.; Zaika, V.V. (2011): *Fauna of dragonflies and damselflies (Odonata) of Tuva.* *Amurian zoological journal* III(3): 210-245. (in Russian, with English summary) ["The known odonate fauna of Tuva in Siberia, Russia, is documented. It includes 47 species. In the southern Ubsu-Nur depression 29 species were recorded (2 just there); in the Central Tuvinian depression 34 species (6 just there) and in the Todzha depression 32 species (9 just there). The fauna of the more humid taigaous region of Todzha contains lacks 7 species found elsewhere in Tuva. In spite of Todzha's position in the north-east, its fauna shows a more western character and includes a population of *Calopteryx splendens* with a high proportion of two morphs of an-drochromic females and a male morph with wings coloured to the tips. Todzha is inhabited by *Enallagma c. cyathigerum* with a variably melanised abdomen, while in the Central Tuvinian and Ubsu-Nur depressions, *E. c. risi* occurs. In Turan and the Upper Kaa-Khem basin, intergradation between both taxa takes place. In Todzha, *Somatochlora exuberata* and *S. metallica abocanica* are sympatric without intermediate forms and with habitat segregation, thus proving their status as separate species. Todzha is inhabited by *Ophiogomphus obscurus* while the rest of Tuva harbours *O. spinicornis*. The status of vicariant western/eastern pairs of taxa in the genus *Leucorrhinia*: *dubia/orientalis* and *rubicunda/intermedia*, is discussed in detail." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**10919.** Kuitunen, K. (2011): *Sudenkorentolajien risteytyminen [Hybridization in dragonflies].* *Crenata* 4: 4-9. (in Finnish, with English summary) [In animals, matings between species or interspecific hybridization can occur in nature. Here, I review existent literature about matings between heterospecifics and occurrence of hybrids in Odonates. It seems that tandems between species are relatively common, especially within genera. However, these tandems do not always lead to matings and more rarely to origin of hybrid individuals. Premating reproductive isolation and hybridization has been studied in more detail with *Calopteryx* damselflies, and it seems that within this genus hybridization might occur because of the behaviour of males. (Asmus Schröter)] Address: Reference address: Finnish Dragonfly Society/ Suomen sudenkorentoseura ry. www.sudenkorento.fi; Jussi Mäkinen makisenjussi@gmail.com

- 10920.** Lambertz, M.; Schmied, H. (2011): Records of the exotic damselfly *Ischnura senegalensis* (Rambur, 1842) from Bonn (Germany). *Bonn zoological Bulletin* 60(2): 211-213. (in English, with German summary) ["We report on specimens of the damselfly *Ischnura senegalensis* (Odonata: Zygoptera: Coenagrionidae) accidentally introduced to western Germany. The odonates were encountered in Bonn and their origin could clearly be correlated with commercially distributed exotic aquarium plants." (Authors)] Address: Lambertz, M., Institut für Zoologie, Rheinische Friedrich-Wilhelms-Universität Bonn, Poppelsdorfer Schloß, 53115 Bonn, Germany. E-mail: lambertz@uni-bonn.de
- 10921.** Lambertz, M.; Spieth, V.; Denking, J.; Traunspurger, W. (2011): On dragonfly nymphs (Insecta: Odonata: Anisoptera) from the caldera of the Cerro Azul volcano, Isla Isabela (Galápagos Archipelago, Ecuador). *Bonn zoological Bulletin* 60(2): 207-210. (in English, with German summary) ["We describe nymphs of *Pantala hymenaea*, encountered during an expedition to the caldera of the Cerro Azul volcano on Isabela island in February 2009. This faunistic shortnote provides the first specieslevel identification of odonates from a caldera lake of an active Galápagos volcano." (Authors)] Address: Lambertz, M., Institut für Zoologie, Rheinische Friedrich-Wilhelms-Universität Bonn, Poppelsdorfer Schloß, 53115 Bonn, Germany. E-mail: lambertz@uni-bonn.de
- 10922.** Lange, M.; Weisser, W.W.; Gossner, M.M.; Kowalski, E.; Türke, M.; Joner, F.; Fonseca, C.R. (2011): The impact of forest management on litter-dwelling invertebrates: a subtropical-temperate contrast. *Biodivers. Conserv.* 20: 2133-2147. (in English) [In Brazil, the study was conducted in the Sao Francisco de Paula National Forest, Rio Grande do Sul State, Brazil. In Germany, the study was conducted in the area of Hainich-Dün, a range of hills in the North-West of Thuringia. "Land use intensification in forests is a main driver of global biodiversity loss. Although historical state of land use differs between subtropical and temperate zones, gradients of land-use intensities similarly range from unmanaged to very intensively managed forests. Irrespective of similar land use forces in both climate zones, comparative studies on land use effects are still rare. Such studies are, however, promising in discovering more general impacts and geographical specifics of land use intensification. We studied litter-dwelling invertebrates along a gradient of increasing land use intensity in subtropical forests in Southern Brazil and temperate forests in Central Europe using similar sampling designs. Effects of land use intensity on the entire community were analyzed on the level of orders and feeding guilds. In both climate zones a similar number of individuals were caught when standardized to 100 pitfall trap days, but taxa richness was higher in the subtropics. Moreover, community composition differed between both climate zones. In both regions, land use intensity did not affect taxa richness, but invertebrate abundance was affected in opposite ways; while increasing land use intensity resulted in a decrease of invertebrate abundance in the subtropics, an increase was observed in the temperate zone and this was mostly consistent regarding different feeding guilds. Management practices should take into account that the effect of land use intensity on biodiversity can differ drastically among climatic regions." (Authors) Taxa including Odonata are treated at the order level.] Address: Lange, M., Inst. Ecol., Friedrich-Schiller-  
Univ. Jena, Dornburger Str. 159, 07743 Jena, Germany. E-mail: m.lange@uni-jena.de
- 10923.** Lencioni, F.A.A. (2011): Rediscovery of *Telebasis erythrina* (Selys, 1876), with notes on habitat and conservation (Zygoptera: Coenagrionidae). *Odonatologica* 40(4): 327-331. (in English) ["*T. erythrina* was previously known from 5 males, all collected in Minas Gerais (Brazil). 4 males of the type series are deposited in IRSN and the fifth specimen, collected in Santa Barbara, MG, Private Reserve Peti, 18-X-1980, is deposited in ABMM collection (now UFMG). Recently the species has been rediscovered in São Paulo state, and data on habitat and conservation are presented here for the first time." (Author)] Address: Lencioni, F.A.A., Rua Anibal 216, Jardim Coleginho, Vila Zezé, BR-12310-780 Jacareí, São Paulo, Brazil. E-mail: odonata@zygoptera.bio.br
- 10924.** Lewington, R. (2011): Artwork versus photography, set specimens versus natural posture. *Atropos* 43: 3-11. (in English) [The author, one of the most profiled insect illustrators worldwide, discusses pros and contras of illustration versus photographs and shows on several examples how both can/must be combined. He also uses examples from the brilliant European Odonata fieldguide prepared from K.D. Dijkstra and himself.] Address: Lewington, R., 22 Chambray Close, Appleford on Thames, Oxfordshire, OX14 4NT, UK. E-mail: rlewington@btopenworld.com
- 10925.** Li, Y.-j.; Nel, A.; Ren, D.; Zhang, B.-l.; Pang, H. (2011): New discoveries of Neogene hawk dragonflies (Insecta, Odonata, Aeshnidae) from Shandong province in China. *Zoosystema* 33(4): 577-590. (in English, with French summary) ["*Epiaeschna matutina* (Zhang, 1989) is re-described and species diagnosis is amended. Two new species, *Aeshna shanwangensis* n. sp. and *Aeshna forficatum* n. sp., are described from the Middle Miocene deposit of Shanwang Formation, Shandong Province, East China. Comparison with other related fossil and recent species is provided." (Authors)] Address: Li, Y.-j., State Key Laboratory of Biocontrol & Institute of Entomology, Sun Yat-Sen Univ., Guangzhou 510275, China. E-mail: liyongjunsysu@126.com
- 10926.** Liebelt, R.; Lohr, M.; Beinlich, B. (2011): Zur Verbreitung der Gestreiften und der Zweigestreiften Quelljungfer (*Cordulegaster bidentata* und *C. boltonii*) im Kreis Höxter (Insecta, Odonata, Cordulegastridae). *Beiträge zur Naturkunde zwischen Egge und Weser* 22: 3-18. (in German) [The paper broadly introduces into the two taxa emphasizing morphological, ecological and phenological characters and information. The focus is set on the regional distribution in the western part of Nordrhein-Westfalen, Germany.] Address: Liebelt, R., Büro für Ökologie u. Landschaftsplanung, Altes Forstamt 1, 37691 Boffzen, Germany. E-mail: ralf.liebelt@freenet.de
- 10927.** Lyons, R. (2011): New County record for *Aeshna constricta*, the Lance-tipped Darner (Odonata: Aeshnidae). *Bulletin of the Oregon Entomological Society* Fall 2011: 4-5. (in English) [The new record comes from second week of August 2011/or 2010?; edge of Ladd Marsh (a few miles SE of LaGrande, Union Co.) in the NE corner of the state (45° 17.24' N 117° 57.80' W).] Address: not stated
- 10928.** Lyons, R. (2011): Desert Odonate Hunt 2011. *Bulletin of the Oregon Entomological Society* Summer 2011: 2-5. (in English) [Report on a trip to the desert region of eastern Oregon, USA on 17–19 June, 2011: "It



could have been a more productive trip at least as far as the odonates go, but it was fun to get back out to the desert with friends. And, I found some katydids during the daytime, in vegetation - rare event for me! - I had a good time and look forward to next year's trip." For species details see: Johnson (2011).] Address: E-mail: pondhawk@uci.net

**10929.** Lyons, R.E.; Wong, D.C.; Kim, M.; Lekieffre, N.; Huson, M.G.; Vuocolo, T.; Merritt, D.J.; Nairn, K.M.; Dudek, D.M.; Colgrave, M.L.; Elvin, C.M. (2011): Molecular and functional characterisation of resilin across three insect orders. *Insect Biochemistry and Molecular Biology* 41(11): 881-890. (in English) ["Resilin is an important elastomeric protein of insects, with roles in the storage and release of energy during a variety of different functional categories including flight and jumping. To date, resilin genes and protein function have been characterised only in a small number of flying insects, despite their importance in fleas and other jumping insects. Microscopy and immunostaining studies of resilin in flea demonstrate the presence of resilin pads in the pleural arch at the top of the hind legs, a region responsible for the flea's jumping ability. A degenerate primer approach was used to amplify resilin gene transcripts from total RNA isolated from flea (*Ctenocephalides felis*), buffalo fly (*Haematobia irritans exigua*) and dragonfly (*Aeshna* sp.) pharate adults, and full-length transcripts were successfully isolated. Two isoforms (A and B) were amplified from each of flea and buffalo fly, and isoform B only in dragonfly. Flea and buffalo fly isoform B transcripts were expressed in an *Escherichia coli* expression system, yielding soluble recombinant proteins Cf-resB and Hi-resB respectively. Protein structure and mechanical properties of each protein before and after crosslinking were assessed. This study shows that resilin gene and protein sequences are broadly conserved and that crosslinked recombinant resilin proteins share similar mechanical properties from flying to jumping insects. A combined use of degenerate primers and polyclonal sera will likely facilitate characterisation of resilin genes from other insect and invertebrate orders." (Authors)] Address: CSIRO Livestock Industries, St Lucia, QLD 4067, Australia. E-mail: Russell.Lyons@csiro.au

**10930.** Machado, A.B.M.; Lencioni, F.A.A. (2011): *Austrotepuibasis* gen. nov. with descriptions of three new species from Brazil (Zygoptera: Coenagrionidae). *Odonatologica* 40(1): 27-37. (in English) ["*Austrotepuibasis* is described along with 3 new species, viz.: *A. alvarengai* sp. n. (holotype male: Mato Grosso, SINOP, X-1970), *A. demarmelsi* sp. n. (holotype male: Pará, Fordlândia, II-1957), and *A. manolisi* sp. n. (holotype male: Mato Grosso, Alta Floresta, Cristalino Jungle Lodge, Rio Cristalino, 10-IX-2006). The new genus is close to *Tepuibasis* De Marmels, 2007 with which it shares the presence of an articulated ventrobasal lobe on cercus and differs mainly by the absence of the spiny auricle-like processes in penis, absence of dorsal cleft on female tergum of S10 and other structural and colour characters. Whereas *Tepuibasis* is endemic to the high Pantepui region of Venezuela, *Austrotepuibasis* occurs in low altitude Amazon region of the Tapajós-Xingu province in Brazil." (Authors)] Address: Machado, A.B.M., Depto Zool., Inst. Cienc. Biol., Univ. Federale de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil. E-mail: angelo@icb.ufmg.br

**10931.** Mäkinen, J.; Metsälä, P.; Tuohimaa, J. (2011): *Sudenkorentokatsaus 2010* [Dragonfly review 2010].

*Crenata* 4: 10-35. (in Finnish, with English summary) ["The article presents the most interesting dragonfly (Odonata) records from Finland in 2010. For each observed species the following information is presented: first and last records of the summer, greatest sums and northernmost records. *Anax imperator* and *Sympetrum pedemontanum* were found for the first time in Finland. *A. imperator* photographed in Lågskär, Åland Islands, 12.07.2010. A male *S. pedemontanum* was collected in Hanko 30.07.2010. Seven new provincial records were made: *Sympecma paedisca* in Etelä-Häme, *Somatochlora alpestris* in Etelä-Savo, *Somatochlora flavomaculata* in Pohjois-Pohjanmaa, *Orthetrum coerulescens* in Pohjois-Häme, *Sympetrum sanguineum* in Pohjois-Häme and Pohjois-Karjala and *Sympetrum vulgatum* in Kainuu. A map of Finnish biogeographical provinces is shown in the end of the article. Tabel 1 (Taulukko 1) presents the total number of records of each species, as well as their rankings between 2008 and 2010. Picture 1 (Kuva 1) presents the number of dragonfly species in 50x50 km squares reported in Finland in 2010. Most of the records for this article were gathered from Hatikka database ([www.hatikka.fi](http://www.hatikka.fi)). The records were made by 100 observers. Their names (abbreviations are used for the members of the Finnish Dragonfly Society) are presented in the end of the article. (Asmus Schröter)] Address: Reference address: Finnish Dragonfly Society/ Suomen sudenkorentoseura ry. [www.sudenkorento.fi](http://www.sudenkorento.fi); Jussi Mäkinen [makisenjussi@gmail.com](mailto:makisenjussi@gmail.com)

**10932.** Maker, P. (2011): Vagrant Emperor *Anax ephipiger* (Burmeister) in Cornwall. *Atropos* 43: 44-45. (in English) [14-X-2010, Dodman Head on the south Cornwall coast, UK; "As it turned out this record was just the beginning of an unprecedented occurrence of this species in Britain. Two mid-winter records (Pembrokeshire and Cornwall) were followed by an influx of the species in April with many more sightings in Cornwall. Indeed, I was lucky enough to see another male at Windmill Farm NR on 24 April; there were at least two more at this site the following day." (Author)] Address: Maker, P., 2 Southleigh, South Street, Grampound Road, Truro, TR2 4DZ, UK

**10933.** Manger, R. (2011): Copula of *Sympecma fusca* and *Sympecma paedisca* observed for the second time in the Netherlands. *Brachytron* 14(1): 59-63. (in Dutch, with English summary) ["In 2008, a copula of *S. fusca* and *S. paedisca*, with oviposition ensuing, was observed in the Dutch region of De Weerribben, Overijssel. The year before that, a similar copula was observed in a different location. The earlier copula took a shorter time than the 2008 one. It would seem that in areas where both species reproduce, *S. fusca* behaves dominantly towards *S. paedisca*. The increasing spread of *S. fusca* northward as seen in the last few decades could cause competition in the use of reproduction waters in De Weerribben and similar areas between the two species. It is not known whether interbreeding between the two species could actually lead to (viable) progeny." (Author)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: [rmanger@planet.nl](mailto:rmanger@planet.nl)

**10934.** Marinov, M.; Doscher, C. (2011): Spatial modelling of Odonata habitats in the Pacific. 1: Introduction to the techniques in spatial modelling. *Odonatologica* 40 (4): 287-304. (in English) ["The habitat modelling schemes are briefly reviewed with emphasis on their implication in various fields of science. The best practical so-



lutions for habitat modelling encompassing large geographical units are sought. They are exploited and considered for a macro-scale project aiming in producing predictive habitat models for Odonata species inhabiting a vast territory of the Pacific. The present publication is the first part of a series of papers dealing with this mapping scheme. It represents the study area, explains some common terminology used in Geographical Information Systems (GIS)-based modelling and ecology, and introduces the methodology developed specifically for the purposes of the current investigation." (Authors)] Address: Marinov, M., Freshwater Ecology Research Group, University of Canterbury, Private Bag 4800, Christchurch-8140, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

**10935.** Martínez, E.; da Silva, G.; Romay, C.D. (2011): First records of *Anax parthenope* (Odonata: Aeshnidae) for Galicia and data on its habitat and behaviour. *Chiloglossa* 3: 7-13. (in Galician, with English summary) [The first records of *A. parthenope* for Galicia are presented. They were obtained in five municipalities in the western Spanish coast (Sanxenxo - two places -, Barro, A Illa de Arousa, Vimianzo and Cedeira) between 26/06/2010 and 31/08/2010, and referred to a minimum of 25 individuals. The study presents very detail data on species habitat and behaviour, including an observation of its reproduction in Vimianzo.] Address: Martínez, E., Lugar de Gondarifo, 13, 36990 Sanxenxo (Galicia), Spain. E-mail: emidoel@yahoo.es.

**10936.** Martínez-Coronel, M.; Pérez-Gutiérrez, M. (2011): Composición de la dieta de *Craugastor lineatus* (Anura: Craugastoridae) de Chiapas, México. *Acta Zoológica Mexicana* (n. s.) 27(2): 215-230. (in Spanish, with English summary) ["The ontogenetic and seasonal changes in the diet of *C. lineatus* were described. We obtained 121 prey items from 54 stomachs by dissection, prey and prey parts were counted and identified to ordinal level. Twenty two food categories were identified. Frogs consumed mainly Aranae, Chilopoda, Coleoptera, Hymenoptera, Isopoda, Orthoptera, and plants, although the representation of each category varied ontogenetically and temporally. The maximum length of the prey items was positively correlated with frog body size; meanwhile, the number of prey items was negatively correlated with frog body size. Juveniles consumed more Coleoptera and Isopoda, while adults captured more Aranae, Orthoptera and Chilopoda. Sixteen items were consumed in wet season, with Diptera, Isopoda, Lepidoptera and Acari as exclusive. During the dry season were ingested 18 items, with Phasmatoidea, Odonata, Psocoptera, Diplopoda and Pseudoescorpionida as exclusive." (Authors)] Address: Martínez-Coronel, M., Departamento de Biología, UAM-I. Av. San Rafael Atlixco 186, Col. Vicentina, CP. 09340, México, D. F. E-mail: marti17@hotmail.com

**10937.** Matushkina, N.A.; Klass, K.-D. (2011): Morphology of female external genitalia in *Phenes raptor* (Odonata: Petaluridae). *International Journal of Odonatology* 14(3): 199-215. (in English) ["The exoskeleton of the female genitalic region in *Phenes raptor* is described based on light microscopy and scanning electron microscopy. It is shown that in this species the pattern of sclerites, articulations, processes, and apodemes is overall the same as in other ovipositor-bearing Odonata, i.e. Zygoptera, the anisozygopteran *Epiophlebia*, and the anisopteran Aeshnidae. However, many morphological details differ among all these taxa. Fifty-four characters

were scored for *P. raptor* in order to be included in a previously compiled dataset for phylogenetic analysis of ovipositor-bearing Odonata. These characters include only few specific similarities between *P. raptor* and either Aeshnidae or *Epiophlebia*. Instead, *P. raptor* shows a number of features that are unique among ovipositor-bearing Odonata. Absence of serration on the ovipositor in *P. raptor* and reduction of the interlocking mechanism connecting the two first valves medially is probably correlated with the endosubstratic egg-laying of the female. The ovipositor bears numerous sensilla of different shape, which probably detect suitable places for oviposition." (Authors)] Address: Matushkina, Natalia, Department of Zoology, Biological Faculty, Kyiv National University, vul. Volodymirs'ka 64, Kyiv, 01033, Ukraine. E-mail: odonataly@gmail.com

**10938.** McCauley, S.J.; Rowe, L.; Fortin, M.J. (2011): The deadly effects of "nonlethal" predators. *Ecology* 92: 2043-2048. (in English) ["Nonconsumptive predator effects are widespread and include plasticity as well as general stress responses. Caged predators are often used to estimate nonconsumptive effects, and numerous studies have focused on the larval stages of animals with complex life cycles. However, few of these studies test whether nonconsumptive predator effects, including stress responses, are exclusively sublethal. Nor have they assessed whether these effects extend beyond the larval stage, affecting success during stressful life-history transitions such as metamorphosis. We conducted experiments with larvae of *Leucorrhinia intacta* that exhibits predator-induced plasticity to assess whether the mere presence of predators affects larval survivorship, metamorphosis, and adult body size. Larvae exposed to caged predators with no ability to attack them had higher levels of mortality. In the second experiment, larvae reared with caged predators had higher rates of metamorphic failure, but there was no effect on adult body size. Our results suggest that stress responses induced by exposure to predator cues increase the vulnerability of prey to other mortality factors, and that mere exposure to predators can result in significant increases in mortality." (Authors)] Address: McCauley, S.J., Dept of Biological Sciences, California Polytechnic State University, San Luis Obispo, California 93407-0401 USA. E-mail: smccauley@calpoly.edu

**10939.** Menetrey, N.; Oertli, B.; Lachavanne, J.-B. (2011): The CIEPT: A macroinvertebrate-based multimeric index for assessing the ecological quality of Swiss lowland ponds. *Ecological Indicators* 11(2): 590-600. (in English) ["Since ponds are limnologically different from rivers and lakes, and as there is a lack of specific methods to assess their ecological quality, we developed a method to assist managers in routine biomonitoring of ponds. For this work, a total of 36 lowland permanent ponds were selected from an existing dataset of 134 Swiss ponds that were classified along a gradient from reference to degraded sites. Site degradation was characterised by seven variables indicative of pond ecological condition: (i) one descriptor of plant communities (macrophyte species richness); (ii) one descriptor of trophic state (total phosphorus and total nitrogen (PN)), and (iii) five anthropogenic stressors linked to land use (percentage of semi-natural areas within a 50-m radius of the site, connectivity with other wetlands within 1 km, percentage of agricultural activities and pastures in the pond catchment, and dominant land use in terms of surface area). A total of 55 potential

macroinvertebrate and amphibian metrics were tested to assess their relationship to site degradation. The metrics were based on taxonomic richness (total and selected macroinvertebrate groups), intolerance of degradation, conservation values, and biological/ecological traits. The selection of the metrics to be integrated into the index followed a stepwise procedure. To be selected, a metric had to fulfil four criteria. It must have: (1) a significant relationship with at least one of the seven indicators of pond ecological condition; (2) the ability to discriminate between reference and degraded sites; (3) a relative scope of impairment inferior to 1 (low inherent variability of a metric); (4) no redundancy with other metrics used in the index. To produce the index, 18 combinations of selected metrics were tested. The final index (CIEPT) was built using three metrics: genera richness of Coleoptera (C), macroinvertebrate family richness (I), and Ephemeroptera, Plecoptera and Trichoptera (EPT) family richness. The CIEPT responded significantly to pond ecological condition and was tested successfully with an external dataset to confirm suitability. The CIEPT index could be a useful and relatively low cost tool to assist site managers in assessing the ecological quality of ponds." (Authors) Taxa (including Odonata) are treated at the order level.] Address: Menetrey, Nathalie, Laboratory of Ecology and Aquatic Biology, University of Geneva, Ch. des Clochettes 18, 1206 Geneva, Switzerland

**10940.** Metsälä, P. (2011): Koivuluoto 7.-8.8.2010. *Crenata* 4: 42-43. (in Finnish) [The article presents a trip report to Koivuluoto, a small and remote island ca. 30 km southwest from the city of Kotka, Finland. A total of 16 species could be recorded during the trip, inter alia, *Aeshna serrata* and *Sympecma paedisca*. (Asmus Schröter)] Address: Reference address: Finnish Dragonfly Society/ Suomen sudenkorentoseura ry. www.sudenkorento.fi; Jussi Mäkinen makisenjussi@gmail.com

**10941.** Meurgey, F. (2011): Redescription of the larva of *Argia concinna* (Ramburg, with the description of that of *A. telesfordi* Meurgey from the West Indies (Zygoptera: Coenagrionidae). *Odonatologica* 40(1): 45-50. (in English) ["The last instar larva of *A. concinna* is redescribed, based on specimens from Guadeloupe, and that of *A. telesfordi* is described and illustrated for the first time, based on specimens from Saint Vincent in the Lesser Antilles. Notes on their ecology and larval habitat are provided." (Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**10942.** Millán, A.; Velasco, J.; Gutiérrez-Cánovas, C.; Arribas, P.; Picazo, F.; Sánchez-Fernández, D.; Abellán, P. (2011): Mediterranean saline streams in southeast Spain: What do we know? *Journal of Arid Environments* 75(12): 1352-1359. (in English) ["Many Mediterranean streams in arid and semiarid areas are naturally saline systems due to the presence of evaporitic rocks of Miocene or Triassic origin. Despite the fact that these aquatic ecosystems are rare in Europe, they are common in southeast of Spain. The environmental constraints of these semiarid saline streams are imposed by both geological and climatic conditions. This paper is a compilation and summary of the principal results obtained from various studies on semiarid saline streams in the Iberian southeast. Available data for these typical environments in the region covers diverse issues such as those regarding their physical and chemical features,

typology, biodiversity, community structure and ecosystem functioning, as well as different ecological and evolutionary aspects of their biota (e.g. ecophysiological responses, life cycles and phylogeography). Issues concerning the conservation of these habitats, such as the main human uses, impacts, threats and their management are also summarised. Finally, topics in need of further research are provided. The current knowledge of saline streams in southeastern Spain highlights the physical and ecological singularity of these environments, and their high conservation value. Saline streams are particularly interesting due to their halotolerant/halophilic biota and high number of rare and endemic species. ... Odonata (*Aeshnidae*, *Libellulidae* and *Coenagrionidae*) [...] are scarce with most inhabiting hyposaline streams (Mellado et al., 2008)." (Authors) (Mellado, A., Suárez, M.L., Vidal-Abarca, M.R., 2008. Biological traits of stream macroinvertebrates from a semiarid catchment: patterns along complex environmental gradients. *Freshwater Biology* 53: 1-21.) Address: Millán, A., Depto de Ecología e Hidrología, Facultad de Biología, Univ. de Murcia, Campus de Espinardo, 30100 Murcia, Spain. E-mail: acmillan@um.es

**10943.** Mlynarek, J.J.; Bert, D.G.; Peralta-Vázquez, G.H.; James, J.A.; Forbes, M.R. (2011): Relationships between gregarine infection in damselflies, wetland type, and landscape characteristics. *The Canadian Entomologist* 143(5): 460-469. (in English) ["Although human-modified landscapes are characterized by the loss of natural habitats, new habitats also can be created and exploited by many species. The importance of landscape change to invertebrate associations (particularly host-parasite associations) is understudied. Our objective was to determine whether prevalence and intensity of gregarine parasitism in *Ischnura verticalis* differed between 17 artificial and 7 natural wetlands in landscapes that varied in amount of forest and wetland cover and road density determined at spatial extents of 500m and 1km from each wetland. Wetlands were located in and around Ottawa, Ontario, and Gatineau, Quebec, Canada. Wetland type did not account for significant variation in principal components based on forest and wetland cover and road density at either spatial extent. Gregarine prevalence was higher in damselflies collected from natural wetlands than in those collected from artificial wetlands and was positively associated with increasing forest cover. In contrast, gregarine intensity was inversely related to road density. Our results suggest that parasitism of damselflies by gregarines is associated with wetland type and landscape characteristics, although the mechanisms producing such relationships are unknown." (Authors)] Address: Mlynarek, Julia, Dept Biol., Carleton Univ., 1125 Colonel By Drive Ottawa, ON Canada K1S 5B6. E-mail: jmlynare@connect.carleton.ca

**10944.** Monnerat, C.; Hoess, R. (2011): Libellen aus Jordanien, dem Westjordanland und dem Libanon, gesammelt von Johann Friedrich Klapperich zwischen 1956 und 1969 (Odonata). *Libellula* 30(1/2): 77-88. (in German, with English and French summaries) ["This collection of J.F. Klapperich (1913-1987) is deposited in the Natural History Museum of Geneva, Switzerland. It consists of 224 specimens representing 21 species, all labelled with date and locality. This material, collected by Klapperich during several voyages, is of great historical importance. It gives information on an otherwise almost neglected period between older studies and

more recent investigations in Jordan that began in the 1980s. Looking back, this material represents the earliest record for Jordan for twelve species. Special emphasis is put on *Crocothemis sanguinolenta*, *Diplacodes lefebvrei*, *Onychogomphus lefebvrei*, *Orthetrum trinacria* and *Pantala flavescens*." (Authors)] Address: Monnerat, C. CSCF, 14 rue des Terreaux, CH-2000 Neuchâtel, Switzerland. E-mail: christian.monnerat@cscf.unine.ch

**10945.** Muusse, T.; Veurink, G. (2011): *Leucorrhinia caudalis* found reproducing in De Weerribben. *Brachytron* 14(1): 14-27. (in Dutch, with English summary) ["Recent discoveries show a viable population of *L. caudalis* in the two adjoining nature reserves of De Weerribben and De Wieden in the eastern part of The Netherlands. The species had been thought to be extinct for the last forty years, until the accidental discovery of specimens in 2009 and 2010. In 2011 this led to a sustained search effort which was crowned with success. The species shows a marked preference for clear water with a submerged vegetation for ovipositing. Males prefer floating lily pads as a basis for guarding their territories, but make do with other perches at need. Protection of the habitat is in order. Current maintenance policies of both nature reserves seem to fulfil the requirements, offering hope for the future. The species has also been rediscovered in Belgium and Luxemburg. On the European Red List the species is still marked as 'near threatened'." (Authors)] Address: Muusse, T., Billitonstraat 19, 3312 SB Dordrecht, The Netherlands. E-mail: pr.nvl@brachytron.nl

**10946.** Muzon, J. (2011): *Comentario Bibliográfico: Garrison, R.W., N. von Ellenrieder & J.A. Louton. 2010. Damselfly Genera of the New World. An illustrated and annotated key to the Zygoptera. The Johns Hopkins University Press, Baltimore, EUA. 490 pp., 2.586 figuras, 24 láminas color y 108 mapas. ISBN 13: 978-0-8018-9670-5, ISBN 10: 0-8018-9670-3. Rev. Soc. Entomol. Argent. 70(1-2): 147. (in Spanish) [review paper]* Address: Muzón, J., Instituto de Limnología "Dr. Raúl A. Ringuelet", CC 712, 1900 La Plata, Argentina. E-mail: muzon@ilpla.edu.ar

**10947.** Nagel, L.; Mlynarek, J.J.; Forbes, M.R. (2011): Immune response to nylon filaments in two damselfly species that differ in their resistance to ectoparasitic mites. *Ecological Entomology* 36(6): 736-743. (in English) ["1. Insects commonly resist parasites using melanotic encapsulation. Many studies measuring immune response use the amount of melanin deposited on an artificial object that has been inserted into the animal as a proxy of the amount of resistance that the host is capable of mounting to natural parasites. 2. The relevance of this methodology to immune response in natural insect populations needs further study. Here, we examined two temperate damselfly species to elucidate the relationships among damselfly size, natural resistance to mites, and the immune response mounted by the same damselflies against nylon filaments. 3. The damselfly species that had high rates of melanotic encapsulation of mites in nature deposited more melanin on the nylon inserts than the species with low rates of natural resistance. 4. In females of this species, those that had resisted mites naturally melanised the nylon filament more aggressively than those that did not resist mites. 5. Our results show some support for the use of nylon filaments to assess natural patterns of immune response in these damselflies, but also suggest that cau-

tion should be used in interpreting the responses." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**10948.** Naraoka, H. (2011): Report on the number of dorsal and lateral spines of the larvae of the gomphid dragonfly, collected in Aomori prefecture (Odonata: Gomphidae). *New Entomol.* 60(1,2): 12-14. (in Japanese, with English summary) [From 1961 to 2009, 105 exuviae of *Gomphus postocularis* were collected in Aomori Prefecture, northern Japan. More than 93% of the exuviae, exhibited the dorsal and lateral spines on the 9th and 7th-9th abdominal segments, respectively. All exuviae were quite small in size. These results demonstrate the exuviae belonging to the northern Japanese type of *G. postocularis*. In comparison the southern Japanese type of the species has dorsal spines along the 8th-9th, and lateral spines along the 6th-9th abdominal segments.] Address: Naraoka, H., Motoizumi 36-71, Fukunoda, Itayanagi, Kitatsugaru-gun, Aomori 038-3661, Japan. E-mail: sbnkq127@ybb.ne.jp

**10949.** Ngiam, R.W.J.; Davison, G.W.H. (2011): A checklist of dragonflies in Singapore parks (Odonata: Anisoptera, Zygoptera). *Nature in Singapore* 4: 349-353. (in English) ["In total, 51 species of odonates from six families were recorded from the 19 parks surveyed, accounting for 42% of odonate species extant in Singapore." (Authors)] Address: Ngiam, R.W.J.C, Cluny Rd, Singapore 259569. E-mail: ngiamwenjiang@nparks.gov.sg

**10950.** Niehuis, M. (2011): Zum 65. Geburtstag von Gerd Reder. *Fauna und Flora in Rheinland-Pfalz* 12(1): 329-339. (in German) [Rheinland-Pfalz, Germany; G. Reder is a well known worker on Hymenoptera with a broad field of interests in regional fauna including Odonata.] Address: Niehuis, M., Im Vorderen Großthal, 76857 Albersweiler, Germany. E-mail: Niehuis@t-online.de

**10951.** Obolewski, K.; Gotkiewicz, W.; Strzelczak, A.; Osadowski, Z.; Astel, A.M. (2011): Influence of anthropogenic transformations of river bed on plant and macrozoobenthos communities. *Environmental monitoring and assessment* 173(1-4): 747-763. (in English) ["This study describes the influence of urban area on plant communities and benthic invertebrates inhabiting the Slupia River (northern Poland). Ten plant communities and 37 macrozoobenthos taxa (including "Aeshnidae" and *Lestes viridis*) were determined during four seasonal samplings at 25 sampling sites (October 2005 and January, April, and August 2006). The obtained data set was statistically evaluated in order to reveal the influence of anthropogenic transformations on the investigated communities against the background of other abiotic factors. Multivariate regression tree (MRT) method was used for vegetation, while for benthic fauna, both MRT and artificial neural network (ANN) methods were applied. The following explanatory variables were used: season, water temperature, and salinity; location of a sampling site; degree of human impact on the riverbed; microhabitat; and substrate type. MRT analyses showed significant differences in plant community structure depending on the location of a sampling site, indicating the influence of anthropogenic pressure, while macrozoobenthos composition differed significantly only between seasons. The overall ANN



model proved the importance of type and location of a sampling site for the approximation of benthic fauna density. Additionally, influence of the explanatory variables on the consecutive macrozoobenthos taxa was analyzed on the basis of separate ANN." (Authors)] Address: Astel, A.M., Institute of Biology and Environmental Protection, Pomeranian Academy in Słupsk, 22b Arciszewskiego St., 76-200 Słupsk, Poland. E-mail: astel@apsl.edu.pl

**10952.** Olthoff, M.; Hannig, K.; Wittjen, K.; Zimmermann, T. (2011): Biologische Vielfalt auf dem Truppenübungsplatz Borkenberge. Vereinbarkeit von militärischer Nutzung und Naturschutz. *Natur in NRW* 3/11: 37-41. (in German) [Nordrhein-Westfalen, Germany. The paper briefly highlights *Leucorrhinia pectoralis*, *Somatochlora arctica*, *Orthetrum coerulescens* and *Ceragrion tenellum*.] Address: Olthoff, M., Biologische Station Zwillbrock e.V., Zwillbrock 10, 48691 Vreden, Germany. E-mail: matthias.olthoff@gmx.de

**10953.** Orendt, C.; Faasch, H. (2011): First record of *Lipiniella moderata* Kalugina, 1970 (Diptera, Chironomidae) from Germany. *Lauterbornia* 72: 7-12. (in German, with English summary) [Niedersachsen; *Ischnura elegans* was co-occurring.] Address: Orendt, C., WaterBio-Assessment, Brandvorwerkstr. 66, 04275 Leipzig, Germany. E-mail: orendt@hydro-bio.de

**10954.** Orłowski, G.; Karg J.; Czarnicka J (2011): Frugivory and size variation of animal prey in Black Redstart *Phoenicurus ochruros* during summer and autumn in south-western Poland. *Ornis fennica* 88: 161-171. (in English) [Analyses of faeces of the Black Redstart *Phoenicurus ochruros* from the countryside of south-western Poland revealed a significant increase in the proportion of plant items (mainly berries of *Sambucus nigra* / *racemosa*) between July and October; for animal prey items an inverse trend was found. During summer-autumn, no significant trends in the mass of all animal prey were found. The most numerous animal prey were three genera of ants (*Lasius*, *Formica* and *Myrmica*; 44.1% by number of all animal prey). Large numbers of undamaged seeds of several species of shrubs in the analyzed faeces, including non-native species, indicate that the Black Redstart is a potential disperser of woody plants in rural landscapes of Europe." (Authors) The diet also includes an unidentified Libellulidae.] Address: Orłowski, G., Institute for Agricultural and Forest Environment, Polish Academy of Sciences, Bukowska 19, 60-809 Poznań, Poland. E-mail orlog@poczta.onet.pl

**10955.** Ouden, A. den; Roosmalen, J. van (2011): Favorite hibernating spots of *Sympetma fusca*. *Brachytron* 14(1): 28-39. (in Dutch, with English summary) ["In the period between 2006 and 2011, hibernating *S. fusca* have been studied at several sites in the Dutch provinces of Noord-Brabant, Limburg, Gelderland and Noord-Holland. Observations have been made on habitat preference and weather-driven behaviour of the species in winter. Furthermore, experience on the best search strategy was gained. Most hibernating damselflies of the inland populations were found in bushes of *Calluna vulgaris* or, less often, tussocks of *Molinia caerulea*. Most hibernating damselflies of the coastal dunes population were found on branches of *Salix repens*. All locations had a southward exposure in common, offering sunny conditions. They were all shielded from the wind by surrounding forest edges. The damselflies were most easily found during bleak weather con-

ditions, when they are unable to turn away from the observer. The light-colored thorax and globular eyes are the features easiest to spot. During cold periods the damselflies choose lower positions in the vegetation compared to warmer periods. During snowfall they are often completely buried. Survival has been reported after night temperatures down to -18 °C. The results of this study show many similarities with previous studies on hibernating *S. paedisca*, although the latter species has been found to hibernate on locations much further away from suitable reproduction waters. Further study is required to obtain more information on hibernating *Sympetma* species and might help to explain the changing distribution patterns of these species in The Netherlands." (Authors)] Address: Ouden, A. den, Dr. Kanterslaan 166, 5361 NK Grave, The Netherlands. E-mail: andeno@planet.nl

**10956.** Palacino-Rodriguez, F. (2011): Taxonomía y filogenia del género *Erythemis* Hagen, 1861 (Odonata: Libellulidae). Universidad Nacional de Colombia, Facultad de Ciencias, Departamento de Biología Sede, Bogotá: 141 pp. (in Spanish, with English summary) ["*Erythemis* Hagen, 1861 (Odonata: Libellulidae) is a genus comprised of ten species distributed in the Nearctic and the Neotropics. Currently, the taxonomy of the group is based on characters of the thorax, hind femur, genitalia and wings. However, it is possible to confuse species groups as *Erythemis attala* - *E. plebeja* and *E. credula*, a situation that is repeated in *E. haematogastra* - *E. carmelita* - *E. mithroides* and *E. simplicicollis* - *E. collocata* and *E. vesiculosa*. The problems for the species made it necessary to revise the characters currently working and propose other to help recognize the variability within species, between species and propose to define phylogenetic relationships within the group. The characters were examined in specimens from five entomological collections in the country and two overseas, after examination, were assessed with multivariate approaches such as discriminant analysis and Principal Component Analysis. For phylogenetic analysis we used parsimony method, including as outgroup species of related genera *Sympetrum*, *Libellula*, *Perithemis*, *Rhodopygia*, *Pantala*, *Miathyria* and *Brachymesia*. For the basic tree search heuristic method was used with the software under the package Nona Winclada softwares. Dichotomous keys were developed, and diagnosis for males and females of the species and developed a hypothesis about the phylogenetic relationships within the group. The most reliable morphometric characters for separating the species are related to the wings and coloration. The characters of colour are highly variable and present overlap between some species, but in other cases, help to differentiate them. The review of a female close to *E. attala* and a male close to *E. mithroides* show that their characteristics apart from the rest of the species the genre, but more samples need to be included in the analysis to establish it as a new species. The complexity and ambiguity of some characters proposed in the literature led to his careful review to re-code and assess their taxonomic value, finding that this information is useful in separating species of the genus. Of the 109 characters are only nine peer reviewed, finding that *Erythemis* is not a natural group as a recodification of the character associated with the posterior femoral structure showed that it is shared by *Rhodopygia* and *Erythemis* genus, and *Libellula* and *Perithemis*. According to these results, it is necessary to explore a greater number of characters of the genitalia and care-

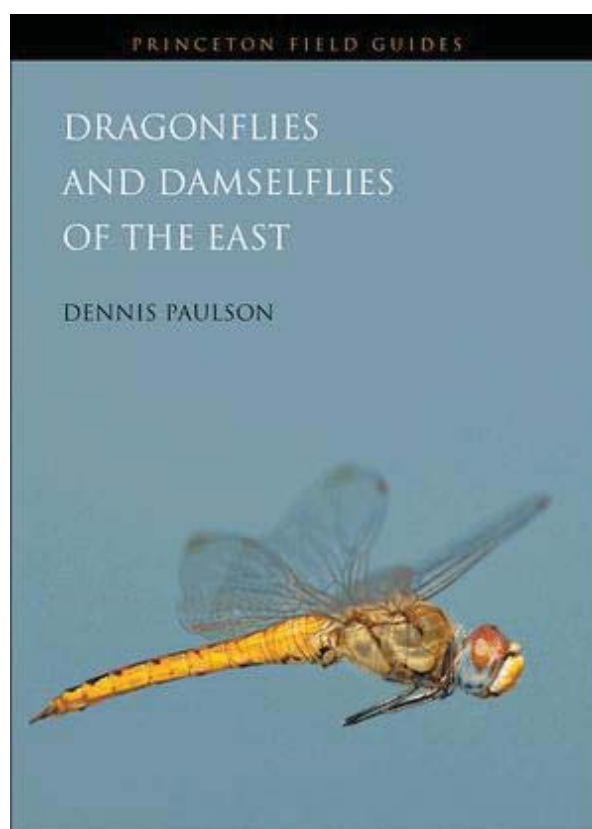
fully review the length and width ratio of hind femur to assess if the thickened condition presents this structure helps to resolve conflicts. It is also necessary to reassess the largest possible number of characters and other outgroups species, in order to find homologous characters to help resolve relationships within this genus and other genera of Libellulidae." (Author)] Address: Palacino-Rodríguez, F., Instituto de Ciencias Naturales, Universidad Nacional de Colombia, A. A. 7495, Bogotá - Colombia. E-mail: fpalacinor@unal.edu.co

**10957.** Palatitz, P.; Fehervari, P.; Soltsz.; Kotyman, L.; Neidert, D.; Harnos, A. (2011): Exploratory analyses of foraging habitat selection of the Red-footed falcon (*Falco vespertinus*). *Acta Zoologica Academiae Scientiarum Hungaricae* 57(3): 255-268. ["The foraging habitat selection of *F. vespertinus* was investigated in a characteristic Hungarian habitat between 2006–2008. Potentially available habitat types were assessed within a 10 km<sup>2</sup> study site with remote sensing technologies. Altogether 18 adult birds were equipped with tail-mount VHF radio-tags and individually followed until visual contact to record location and foraging behaviour. Foraging areas were assessed with 100% Minimum Convex Polygons (MCP), global Manly's selectivity measures were used to detect population level habitat preference, and the eigenanalysis of selection ratios was carried out to partition the variability in individual habitat preference. We found large individual variability in the extent of foraging areas. Females had significantly smaller foraging areas compared to males, while males at the largest colony had significantly larger foraging areas compared to males of the smaller colonies. Global Manly's selectivity measures showed that birds significantly avoided intertilled crops, water surface" (in spite the fact that Odonata strongly contribute to the diet of this falcon species) ", woods and artificial surfaces. The eigenanalysis of selection ratios partitioned individual habitat selection rates into two distinct groups; the first using grasslands and alfalfa while the second group of birds preferring grasslands and cereals. Positive habitat preference towards arable habitat types, indicate that species specific conservation efforts of this declining raptor should also focus on agricultural land use practices." (Authors)] Address: Palatitz, P., MME / BirdLife Hungary, H-1121 Budapest, Költő u. 21, Hungary. E-mail: palatitz.peter@mme.hu

**10958.** Parr, A.J. (2011): The Vagrant Emperor Anax ephippiger in Britain and Europe during early 2011. *J. Br. Dragonfly Society* 27(2): 80-87. (in English) ["Early 2011 saw major movements of *A. ephippiger* in southern and western Europe. These peaked during April and resulted in the largest arrivals of Vagrant Emperor ever seen in Britain. Oviposition was even observed at a site on the Lizard Peninsula in Cornwall on 26 April, this being the first recorded instance in the UK. British records of Vagrant Emperor during January-May 2011 are detailed and some meteorological background to the movements is presented." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**10959.** Paulson, D.R. (2011): *Dragonflies and Damselflies of the East*. Princeton University Press. 576 pp. (in English) ["This is the first fully illustrated guide to all 336 dragonfly and damselfly species of eastern North America—from the rivers of Manitoba to the Florida cypress swamps—and the companion volume to Dennis Paulson's acclaimed field guide to the dragonflies and damselflies of the West. *Dragonflies and Damselflies of the East* features hundreds of color photos that depict all the species found in the region, detailed line drawings to aid in-hand identification, and a colour distribution map for every species—and the book's compact size and user-friendly design make it the only guide you need in the field. Species accounts describe key identification features, distribution, flight season, similar species, habitat, and natural history. Paulson's authoritative introduction offers a primer on dragonfly biology and identification, and also includes tips on how to study and photograph these stunningly beautiful insects." (Publisher)]

son's acclaimed field guide to the dragonflies and damselflies of the West. *Dragonflies and Damselflies of the East* features hundreds of color photos that depict all the species found in the region, detailed line drawings to aid in-hand identification, and a colour distribution map for every species—and the book's compact size and user-friendly design make it the only guide you need in the field. Species accounts describe key identification features, distribution, flight season, similar species, habitat, and natural history. Paulson's authoritative introduction offers a primer on dragonfly biology and identification, and also includes tips on how to study and photograph these stunningly beautiful insects." (Publisher)]



East features hundreds of color photos that depict all the species found in the region, detailed line drawings to aid in-hand identification, and a colour distribution map for every species—and the book's compact size and user-friendly design make it the only guide you need in the field. Species accounts describe key identification features, distribution, flight season, similar species, habitat, and natural history. Paulson's authoritative introduction offers a primer on dragonfly biology and identification, and also includes tips on how to study and photograph these stunningly beautiful insects." (Publisher)]

**10960.** Pavitt, A. (2011): The Future of British Odonata. Determining temporal range dynamics from distribution patterns and dispersal. M.Sc. thesis, Imperial College London, Silwood Park: 7 + 69 pp. (in English) ["Temporal range dynamics (range shift and change index), dispersal morphometrics (wing length, wing aspect ratio, and thoracic volume), and distribution pattern (residual D) were investigated in British Odonata. Initial analyses discounted range shift from this study due to the absence of evidence that the data were showing directional shift rather than non-directional expansion. A significant proportion of change index (Teller et al. 2002) was described by combining the three dispersal traits and residual D. Species with increasing range size were those with long, broad wings, large thoracic volumes and a more aggregated distribution. This morphology is found in the anisopteran (dragonflies) suborder, which showed a substantially greater increase in occupancy than the smaller and weaker zygopteran (damselflies). In a preliminary investigation into the extant representativeness of museum collections, there was found to be no differences in wing length with recently caught, wet specimens." (Author)] Address: not stated

- 10961.** Pawłowski, J. (2011): Polish Carpathian Mts. as a refugium of the endangered species of invertebrates. *Roczniki Bieszczadzkie* 19: 231-245. (in Polish, with English summary) [The focus is set on species listed in the Polish Red Data Book of Animals. The list of species includes *Nehalennia speciosa*, *Somatochlora alpestris*, and *S. arctica*.] Address: Pawłowski, J., Muzeum Przyrodnicze ISiEZ PAN, ul. Św. Sebastiana 9, 31-049 Kraków, Poland. pawlowski@muzeum.pan.krakow.pl
- 10962.** Pérez-Gutiérrez, L.A.; Montes-Fontalvo, J.M. (2011): Description of the last stadium larvae of *Argia medullaris* Hagen in Selys and *A. variegata* Förster (Odonata: Coenagrionidae). *International Journal of Odonatology* 14(3): 217-222. (in English) ["Detailed descriptions and illustrations are provided of the ultimate instar larvae of *Argia medullaris* and *Argia variegata* from Colombia. The principal features are outlined and compared with other species. *Argia medullaris* differs from other species of the genus by the parallel width of the lateral gills and prominent ligula; the *A. variegata* larva can be separated from other species by the absence of setae and spines on male and female gonapophyses and its peculiar madicolous habit." (Authors)] Address: Pérez-Gutiérrez, L.A., Grupo de investigación en Biodiversidad del Caribe colombiano, Depto de Biol., Univ. del Atlántico, km 7 antigua vía Puerto Colombia, Barranquilla, Colombia. E-mail: talysker@gmail.com
- 10963.** Persson, S. (2011): Is the dragonfly composition changing in Central Sweden? Examensarbete/ Bachelor's thesis; Högskolan i Halmstad • Box 823 • 301 18 Halmstad: 15 pp. (in English) ["The dragonfly communities in Sweden may be affected in many ways. Loss of habitats, habitat alteration or even environmental toxins might have a negative impact on the communities. A new threat to the communities and to the species in general is climate change. In this study I examined whether the dragonfly composition had changed in an area in central Sweden between 1997 and 2010. I did a nestedness matrix to see if the dragonfly composition (only using partivoltine species) was more or less nested in 2010 than it was in 1997, i.e. if there was more unexpected species recorded in the area. I also looked at the surrounding of the lakes and whether the species were considered to be generalist species or specialist species. I found that the dragonfly composition had changed during these 13 years and that the composition was more nested in 1997 than in 2010, i.e. there was more unexpected species in the 2010 survey. I also recorded seven new species for the area and that six species had disappeared. Six species had gone from being generalists to being specialists. The surroundings had not changed significantly and I thus see climate change as a possible explanation to these changes." (Author)] Address: Persson, Suzanna / Sahlén, G., Högskolan i Halmstad, Box 823, 301 18 Halmstad, Sweden
- 10964.** Petrulevieius, J.F.; Wappler, T.; Nel, A.; Rust, J. (2011): The diversity of Odonata and their endophytic ovipositions from the Upper Oligocene Fossilagerstätte of Rott (Rhineland, Germany). *ZooKeys* 130: 67-89. (in English) [A commented list of fossil Odonata from the Oligocene outcrop of Rott is given, together with descriptions of new traces of oviposition in plant tissues, very similar to ichnotaxa already known from the early Eocene Laguna del Hunclo floras of Patagonia. The joint presences of odonatan larvae and traces of oviposition demonstrate the autochthony of these insects in the palaeolake of Rott, confirming the existence of a diverse and abundant aquatic entomofauna, a situation strikingly different to that in the contemporaneous Oligocene palaeolake of Céreste (France).] (Authors)] Address: Wappler, T., Steinmann Institut für Geologie, Mineralogie, Paläontologie, Univ. Bonn, Nussallee 8, 53115 Bonn, Germany. E-mail: twappler@uni-bonn.de
- 10965.** Piatti, L.; Souza, F.L. (2011): Diet and resource partitioning among anurans in irrigated rice fields in Pantanal, Brazil. *Braz. J. Biol.* 71(3): 653-661. (in English, with Portuguese summary) [Odonata contributed to the diet of *L. chaquensis* and *L. podicipinus*.] Address: Piatti, Liliana, Programa de Pós-Graduação em Ecologia e Conservação, Universidade Federal de Mato Grosso do Sul – UFMS, CEP 79070-900, Campo Grande, MS, Brazil. E-mail: lilianapiatti@gmail.com
- 10966.** Pinto, A.P.; Lamas, C.J.E. (2011): Description of the female of *Navicordulia aemulatrix* Pinto & Lamas and additional notes on the male (Odonata: Cordulidae). *Neotropical Entomology* 40(6): 698-703. (in English) ["The female of *N. aemulatrix* is described and illustrated for the first time based on a single specimen from the same locality of the type series (state of Santa Catarina, [municipality of São Bento do Sul, 26°14'58"S, 49°22'59"W, railroad station] Rio Vermelho, 29.I.1952, in MZSP). In addition, further morphological notes for the male are provided based on three specimens collected at the type locality and at a new locality in the state of Santa Catarina (Timbó municipality). The pronotal process present in *N. aemulatrix* is re-evaluated and considered non-homologous to that found in *Neocordulia setifera* (Hagen in Selys) as previously suggested." (Authors)] Address: Pinto, A.P., Museu de Zoologia, Univ de São Paulo, Av. Nazaré 481, Ipiranga, 04263-000, São Paulo, SP, Brazil. E-mail: odonataangelo@hotmail.com
- 10967.** Pinto, N. (2011): Occurrence of *Orthemis cultriformis* (Calvert) (Odonata: Libellulidae) to the Goiás State (Brazil). *EntomoBrasilis* 4(1): 36-37. (in Portuguese, with English summary) [The record was collected during August 2009, at Lago Samambaia, Samambaia Campus of Universidade Federal de Goiás.] Address: Pinto, N.S., Universidade Federal de Goiás, Instituto de Ciências Biológicas, Campus Samambaia, Brazil. E-mail: nelsonsilvapinto@gmail.com
- 10968.** Pix, A. (2011): Variation des Analdreiecks bei *Cordulegaster bidentata* (Odonata: Cordulegastridae). *Libellula* 30(1/2): 25-32. (in German, with English summary) ["In 208 anal triangles of male *C. bidentata* that were photographed between 2004 and 2010 in the Weser Hills in Hesse, Germany, cell numbers varied from two to six cells. The most frequent forms were those with three and four cells. Furthermore, between forms of similar cell number topological different types were observed." (Author)] Address: Pix, A., Mönchehofstr. 1, 34127 Kassel, Germany. E-mail: andreas.pix@t-online.de
- 10969.** Pix, A. (2011): Ein Gynander von *Cordulegaster bidentata* aus dem Weserbergland (Odonata: Cordulegastridae). *Libellula* 30(1/2): 19-24. (in German, with English summary) ["A gynandromorph adult of *C. bidentata* was photographed on 07-vii-2008 in the Reinhardswald (Hesse, Germany) near the village of Reinhardshagen. The base of the left hind wing had the shape of a male wing, the right one of a female wing. There were also some peculiarities on the body, mainly a du-



bious thorn on the ninth abdominal segment and asymmetric colour patterns on the abdomen. The individual was recorded among 528 cases of resting male *C. bidentata* that have been documented by photographs during seven years." (Author) Address: Pix, A., Mönchehofstr. 1, 34127 Kassel, Germany. E-mail: andreas.pix @t-online.de

**10970.** Pozdeev, I.V. (2011): Benthosfauna of some watercourses and waterbodies of Udmurtyia. Bulletin of the Udmurt State University. 75(3): 75-84. (in Russian, with English summary) [Udmurt Republic, Russia, rivers Kama, Cheptsya, Kil'mez' and their tributaries & the Votkinsk reservoir; *Aeshna caerulea* is listed from the river Kama (!) and *Epitheca bimaculata* from the river Cheptsya.] Address: Pozdeev I.V., candidate of biology, State Research Institute of Lake and River Fisheries, 614002, Perm, Chernyshevskogo st., 3, Russia. E-mail: pozdeevivan@mail.ru

**10971.** Prunier, F. (2011): Aportacion al conocimiento de la odonatofauna (Insecta: Odonata) de las Sierras de Cazorla, Segura y Las Villas (Jaen, sureste de España). Boletín de la S.E.A. 48(1): 472-474. (in Spanish, with English summary) [Records of 34 Odonata species are documented. New dragonfly records from the Sierras de Cazorla, Segura y Las Villas Natural Park, are *Aeshna affinis* and *Libellula quadrimaculata*. Data of the legally protected species *Coenagrion mercuriale*, *Gomphus graslini*, *Macromia splendens*, and *Oxygastra curtisii* are noteworthy.] Address: Prunier, Florent, Asociación de Educación Ambiental El Bosque Animado. C/ Maestro Priego López, 7, 2D 14004 Córdoba, Spain. E-mail: aeaebosqueanimado.info@gmail.com

**10972.** Pynnönen, P. (2011): Keisarikorento Virossa ja Ruotsissa [Emperor Dragonfly in Estonia and Sweden]. *Crenata* 4: 41. (in Finnish, with English summary) [In the context of the first Finnish record of *Anax imperator* the current status of the species in adjacent Estonia and Sweden is briefly reviewed. (Asmus Schröter)] Address: Reference address: Finnish Dragonfly Society/Suomen sudenkorentoseura ry. www.sudenkorento.fi; Jussi Mäkinen makisenjussi@gmail.com

**10973.** Qiu, L.; Zhan, Z.; Lin, R.; Wu, W.; Chen, Y. (2011): Investigation and study on natural enemies in Longan orchards in Fujian province. *Journal of Agriculture* 2011: 17-22. (in Chinese, with English summary) [China; the list of taxa amounts to 144 species (Arachnida, insecta), and includes *Orthetrum sabina*, *Pantala flavescens*, *Crocothemis servilia*, *Sinictinogomphus clavatus*, *Agriocnemis femina*, *A. pygmaea*, and *Pseudagrion* sp.] Address: Qiu Liangmiao, Institute of Plant Protection, Fujian Academy of Agricultural Sciences, Fuzhou 350013, Fujian, China. E-mail: bjndqlm@163.com

**10974.** Rabina, E.; Llamas, A. (2011): Nueva cita de la libélula *Gomphus vulgatissimus* L., 1758 para la Península Ibérica en Ancín, Navarra. *Munibe (Ciencias Naturales-Natur Zientziak)* 59: 4 pp; no pagination. (in Spanish, with English summary) [26-V-2010, "Ríos Ega-Urederra (ES ES2200024)", Ancín, Navarra (30TWN6523), Spain.] Address: Rabina, E., Gestión Ambiental, Viveros y Repoblaciones de Navarra, C/ Padre Adoain, 219, 31015 Pamplona / Iruña, Spain

**10975.** Rada, B.; Santic, M. (2011): The Iliric Biotic Index for Karst Rivers in Croatia. *Science Prospects* 5 (20): 146-149. (in English) [In this study we present the

results of a ten year survey of the aquatic macroinvertebrate fauna along the four karst rivers: Jadro, Trnovnica, Grab and Ruda, all of them situated in the Middle Dalmatia region of Croatia, in an attempt to construct the Iliric Biotic Index, which will be more applicable for the water quality analysis than the most frequently applied biotic index in Croatia, the Italian Modification of Extended Biotic Index. The rivers geologically belong to the Dinaric karst, unique geological phenomena in Europe. The Iliric Biotic Index was proposed as the standard of karst river water quality in Croatia in accordance with the EU Water Framework Directive." (Authors) Odonata are assessed as "macroinvertebrate group with families without indicator values for karst rivers."] Address: Rada, B., University of Split, Split, Croatia

**10976.** Ramírez, A.; Altamiranda-Saavedra, M.; Gutiérrez-Fonseca, P.; Springer, M. (2011): The neotropical damselfly genus *Cora*: new larval descriptions and a comparative analysis of larvae of known species (Odonata: Polythoridae). *International Journal of Odonatology* 14(3): 249-256. (in English, with Spanish summary) ["The final larval stadium of four species of *Cora* are described and compared with known species in the genus. *Cora skinneri* Calvert, 1907, *C. semiopaca* Selys, 1878 and *C. lugubris* Navás, 1934 are described and illustrated for the first time using material from Costa Rica for the first two and from Colombia for the latter. A redescription of *C. marina* Selys, 1868 from specimens collected in Costa Rica is also included for comparison. Although all species are very similar as larvae, two major groups can be differentiated based on the shape of the caudal gills. The three species here described for the first time are very similar, but can be separated from each other using a combination of characters." (Authors)] Address: Ramírez, A., Institute for Tropical Ecosystem Studies, Univ. of Puerto Rico, PO Box 190341, San Juan, 00919 Puerto Rico. E-mail: aramirez@ramirezlab.net

**10977.** Reis, E.F.; Pinto, N.S.; Carvalho, F.G.; Juen, L. (2011): Environmental integrity effect on fluctuating asymmetry in *Erythrodiplax basalis* (Libellulidae: Odonata) (Kirby). *EntomoBrasilis* 4(3): 103-107. (in Portuguese, with English summary) ["Constituted by simple and cheaply techniques, measures of changes in ontogenetic development are good biomonitoring tools. One of these techniques commonly used is the Fluctuating Asymmetry (FA). In this study, we explore the effects of riparian vegetation removal on the levels of FA on hind wings traits of *E. basalis*. The results showed that traits present normal distribution and zero mean, which allows us to assume that observe levels of asymmetry are FA. It was also evident that FA indexes are not correlated to the wing length, and present low levels of measurement error. There is no significantly evidence of increase in the FA levels in degraded areas in comparison with preserved areas for the measured variables (wing length, wing width on the nodus level, distance between triangle and nodus and distance between anal loop and nodus). The hypothesis that individuals collected in altered areas present higher levels of FA in wing traits was not corroborated. This may result from the fact that *E. basalis* is a species with good dispersal capability, and the specimens sampled in disturbed areas may have developed elsewhere and were only using the areas as a point of foraging and therefore was not detected AF. Another factor that corroborates this prediction is the fact that other studies using

Zygoptera species that have lower dispersal ability, significant levels of physical activities has been detected." (Authors)] Address: Ferreira dos Reis, Eva, Pontifícia Universidade Católica de Goiás, Brazil. E-mail: evadosreis@hotmail.com.

**10978.** Ribeiro Loiolal, G.; De Marco, P. (2011): Behavioral ecology of Heteragrion consors Hagen (Odonata, Megapodagrionidae): a shade-seek Atlantic forest damselfly. *Revista Brasileira de Entomologia* 55(3): 373-380. (in English, with Portuguese summary) ["The intensity of the inter- and intra-sexual selection can affect male behavioural traits as territorial fidelity and aggressiveness allowing the existence of different strategies. However, its differential success could be affected by environmental – as the diel variation in temperature – and physiological constrains – as the variation in thermoregulatory abilities. In this context, we present a behavioural analysis of *H. consors* trying to characterize its mating system, diel activity pattern, temporal budget, territoriality and reproductive biology. These data were obtained based on field observations using the focal individual method and mark-recapture techniques in 120 m of a shaded Atlantic Forest stream in Brazil. The males of this species were territorial, varying in its local fidelity, while the females appear sporadically. Males were perched in the majority of the time, but were also observed in cleaning movements, longitudinal abdominal flexion, wing flexion and sperm transfer during perch. The males presented a perched thermoregulatory behaviour related to an exothermic regulation. Foraging and agonistic interactions were rare, but dominate the other behavioural activities. Abdominal movements associated to long lasting copula pointed to the existence of sperm competition in this species. Males performed contact post-copulatory guarding of the females. These observations pointed to a non-resource mating system for this species." (Authors)] Address: Ribeiro Loiolal, G., Programa de Pós-Graduação em Ciências Biológicas, Biologia Animal, Universidade Federal do Espírito Santo, Departamento de Ciências Biológicas, Avenida Marechal Campos 1468, Maruípe, 29040-090 Vitória-ES, Brasil. E-mail: geovannirl@hotmail.com

**10979.** Riva-Murray, K.; Chasar, L.C.; Bradley, P.M.; Burns, D.A.; Brigham, M.E.; Smith, M.J.; Abrahamsen, T.A. (2011): Spatial patterns of mercury in macroinvertebrates and fishes from streams of two contrasting forested landscapes in the eastern United States. *Ecotoxicology* 20(7): 1530-1542. (in English) ["Controls on mercury bioaccumulation in lotic ecosystems are not well understood. During 2007–2009, we studied mercury and stable isotope spatial patterns of macroinvertebrates and fishes from two medium-sized (80 km<sup>2</sup>) forested basins in contrasting settings. Samples were collected seasonally from multiple sites across the Fishing Brook basin (FBNY), in New York's Adirondack Mountains, and the McTier Creek basin (MCSC), in South Carolina's Coastal Plain. Mean methylmercury (MeHg) concentrations within macroinvertebrate feeding groups, and mean total mercury (THg) concentrations within most fish feeding groups were similar between the two regions. However, mean THg concentrations in game fish and forage fish, overall, were much lower in FBNY (1300 and 590 ng/g dw, respectively) than in MCSC (2300 and 780 ng/g dw, respectively), due to lower trophic positions of these groups from FBNY (means 3.3 and 2.7, respectively) than MCSC (means 3.7 and 3.3, respectively). Much larger spatial variation in to-

pography and water chemistry across FBNY contributed to greater spatial variation in biotic Hg and positive correlations with dissolved MeHg and organic carbon in streamwater. Hydrologic transport distance (HTD) was negatively correlated with biotic Hg across FBNY, and was a better predictor than wetland density. The small range of landscape conditions across MCSC resulted in no consistent spatial patterns, and no discernable correspondence with local-scale environmental factors. This study demonstrates the importance of local-scale environmental factors to mercury bioaccumulation in topographically heterogeneous landscapes, and provides evidence that food-chain length can be an important predictor of broad-scale differences in Hg bioaccumulation among streams." (Authors) The guild of predators is represented by "Aeshnidae and Libellulidae." Address: Riva-Murray, Karen, U.S. Geological Survey, 425 Jordan Road, Troy, NY 12180, USA. E-mail: krmurray@usgs.gov

**10980.** Rogers, J. (2011): The Gardener's Corner: A bit about dragonflies. September 14, 2011 – The SCOPE: 10. (in English) [General account on Odonata.] Address: not stated

**10981.** Roland, H.-J.; Sacher, T.; Roland, N. (2011): New records of Odonata for Cambodia - results from a trip through various places of the country - November 14th - December 1st 2010. *International Dragonfly Fund - Report 35: 1-22.* (in English) ["On our trip to Cambodia from November 14th to December 1st 2010 eight new species for the country have been verified. These are *Libellago lineata*, *Lestes praemorsus*, *Argiocnemis rubescens*, *Pseudagrion pruinosum*, *Epophthalmia frontalis*, *Indothemis carnatica*, *Indothemis limbata*, and *Orthetrum glaucum*. This publication raises the list of Cambodian Odonata to over 90 published species. This figure is considered as less than half of the actual species number that inhabits the country. Given the scarce observations based on opportunistic samples only and largely insufficiently land coverage we predict that a few new species to the science are to be expected from the future research. This opens still many opportunities to study dragonflies in Cambodia at locations nobody ever has looked for Odonata before." (Authors)] Address: Roland, H.-J., Im Mühlahl 35, 61203 Reichelsheim, Germany. E-mail: Hjuergenroland@aol.com

**10982.** Rolfe, A.K. (2011): Diet of three mormoopid bats (*Mormoops blainvillei*, *Pteronotus quadridens*, and *Pteronotus portoricensis*) on Puerto Rico. Masters Theses and Doctoral Dissertations. Paper 349. <http://commons.emich.edu/theses/349>: VII + 98 pp. (in English) [This study used visual analysis to determine the percent volume and percent frequency of orders of insects in the guano of the bats. The most common orders for all three species were Coleoptera, Hymenoptera, and Lepidoptera, although the relative proportions of these orders differed among species. Odonata were also found in 13–21% of the pellets.] Address: not stated

**10983.** Romay, C.D.; Cordero-Rivera, A.; Romeo, A.; Cabana, M.; Cabana, D.X.; Fernández-Martínez, M.Á. (2011): Galician names for the dragonflies and damselflies of the Iberian Peninsula. *Chioglossa* 3: 21-36. (in Galician, with English summary) ["A list of Galician names for the 77 species of dragonflies of the Iberian Peninsula is proposed. Traditional names of Anisoptera and Zygoptera are used, with modifiers proposed by the authors." (Author)] Address: Cosme D. Romay, C.D., G.

N. Hábitat, Rúa Camariñas, 8, baixo, 15002 A Coruña (Galicia), Spain. E-mail: cdromay@gmail.com

**10984.** Rudolph, R. (2011): J.W. Goethes Wasserpapillon: Geschichte eines Libellengedichtes. *Odonatologica* 40(4): 305-315. (in German, with English summary) ["In 1770 the young Johann Wolfgang (von) Goethe (1749-1832), the German poet, universally acknowledged to be one of the giants of world literature, published his earliest poems, among which 'Die Freuden' refers to Odonata. As a metaphor, Goethe's poem depicts the irritating flight pattern as well as the changing reflections of body and wing colour of *Calopteryx* damselflies. The text of this poem is near to plagiarism, for it is but an abridged translation of the French poem 'Le plaisir et le papillon' by A.M.H. Blin de Sainmore, published in 1764. Goethe substitutes a damselfly, a "Wasserpapillon", for the butterfly of the French poem. Some linguistic aspects of the term "Wasserpapillon" are discussed." (Author)] Address: Rudolph, R., Kloosterweg 25, NL-5853 EE Siebengewald, The Netherlands

**10985.** Šácha, D. (2011): New records of dragonflies (Insecta: Odonata) of mountain ranges in Liptov and Spiša regions. *Folia faunistica Slovaca* 16(2): 109-114. (in Slovakian, with English summary) ["A research of dragonflies was carried out on 10 wetland sites in the Nízke Tatry and the Kozie chrby Mts, plus occasional observations on 3 sites in Tatry and the Vel'ká Fatra mountain ranges (Northern Slovakia) in 2005–2009. There were 22 species reported, among them 5 are protected and 9 are redlisted in Slovakia. A male of *Sympetrum fonscolombii* was observed in the altitude of 978 m, which is the highest record of this species in Slovakia. A new site of *Somatochlora alpestris* was discovered in the Nízke Tatry Mts, and presence of *Aeshna subarctica* was confirmed in Tatry Mts." (Author)] Address: Šácha, D., Podtatranského 31, SK-031-01 Liptovský Mikuláš, Slovakia. E-mail: dusan.sacha@vazky.sk

**10986.** Šácha, D.; Bedjanič, M. (2011): Rediscovery of the endangered River Clubtail *Gomphus flavipes* (Charpentier, 1825) in Slovenia after half a century (Odonata: Gomphidae). *Natura Sloveniae* 13(2): 37-43. (in Slovenian, with English summary) ["The species was recorded on 15 July 2011 along the Mura River side arm channel east of Petišovci, NE Slovenia. Its currently known distribution in Slovenia and neighbouring countries is presented. Due to its status as a protected species according to Annex IV of the EU Habitat Directive and up to now also the status of probably extinct and protected species according to Slovene legislation, the need for preservation of its habitats as well as need for further field studies in Slovenia are exposed." (Authors)] Address: Bedjanič, M., Kolodvorska 21b, SI-2310 Slovenska Bistrica, Slovenia. E-mail: matjazbedjanic@yahoo.com

**10987.** Saikko, P.; Pynnönen, P.; Soilevaara, L. (2011): Keisarikorento (*Anax imperator*) ensi kertaa Suomessa 12.7.2010 Lemlandin Lågskärillä [The first Finnish record of Emperor Dragonfly (*Anax imperator*) on Lågskär, Lemland municipality, Åland Islands]. *Crenata* 4: 40. (in Finnish, with English summary) ["*A. imperator* was recorded for the first time in Finland on 12.7.2010 at Lemland, Lågskär island in Åland archipelago. A male patrolled one day on a small pond and it was no seen on following days. (Asmus Schröter)] Address: Reference address: Finnish Dragonfly Society/ Suomen sudenko-

rentoseura ry. www.sudenkorento.fi; Jussi Mäkinen makisenjussi@gmail.com

**10988.** Sang, A.; Teder, T. (2011): Dragonflies cause spatial and temporal heterogeneity in habitat quality for butterflies. *Insect Conservation and Diversity* 4: 257-264. (in English) ["1. Mortality caused by natural enemies is an essential but largely overlooked aspect of habitat quality for herbivorous insects. Quantitative data on mortality sources and their spatiotemporal variation are especially scarce for adult insects. 2. Here we report the results of an extensive field study aimed to quantify spatial and seasonal variation in dragonfly predation on adult butterflies in their natural habitats in temperate calcareous grasslands. We rely on direct observations of actual predation events during standardised transect walks. 3. Dragonflies were found to exert high mortality in butterflies. Their impact on butterflies was dependent on predator abundance, which strongly varied among habitat patches and during the season. This suggests that dragonflies can generate substantial spatiotemporal heterogeneity in habitat quality for butterflies in terms of survival. 4. Obtaining prior knowledge of where and when predators are abundant, and avoiding such sites for butterfly conservation, could considerably improve the efficiency of butterfly conservation practices." (Authors)] Address: Sang, Anu, Dept of Zoology, Institute of Ecology and Earth Sciences, Univ. of Tartu, Vanemuise 46, 51014 Tartu, Estonia. E-mail: anu.sang@ut.ee

**10989.** Santolamazza, S.; Baquero, E.; Cordero-Rivera, A. (2011): Incidence of *Anagrus obscurus* (Hymenoptera: Mymaridae) egg parasitism on *Calopteryx haemorrhoidalis* and *Platycnemis pennipes* (Odonata: Calopterygidae: Platycnemididae) in Italy. *Entomological Science* 14(3): 366-369. (in English) ["Very little is known about the incidence of egg parasitoids in odonates, perhaps because Odonata eggs are well protected by stems or leaves, sometimes below water. In Central Italy (Pontecorvo, Frosinone Province) two damselflies, *Calopteryx haemorrhoidalis* and *Platycnemis pennipes*, occur in high densities. In August 2007 we collected 30 stems of the aquatic plant *Potamogeton* sp. used as substrate for oviposition and incubated eggs in the laboratory. Most stems (24 for *C. haemorrhoidalis* and 23 for *P. pennipes*) contained Odonata eggs. Parasitoids emerged from 12 stems, with a mean parasitism of 2% for *C. haemorrhoidalis* and 6% for *P. pennipes*, and a maximum of 14% and 50%, respectively. Furthermore, we observed egg-laying of 19 females of *C. haemorrhoidalis* and 11 of *P. pennipes*, and marked the stems where oviposition was observed. Clutches remained in the river for five days and were then collected and incubated. Parasitoids emerged from 11 of 30 stems, with an average parasitism of 8% for *C. haemorrhoidalis* and 3% for *P. pennipes* (maximums of 50% and 29%, respectively). All parasitoids belonged to the family Mymaridae, and were identified as *Anagrus* (*Anagrus*) *obscurus* Förster, 1861, sensu Soyka, 1955. This is the first time that this species is described as an egg parasitoid of odonates, and that the egg parasitoid of *C. haemorrhoidalis* and *P. pennipes* is identified. Our data suggest that egg parasitism might be a significant selective factor for both odonates in the studied locality, affecting female oviposition behaviour." (Authors)] Address: Santolamazza, Serena, Misión Biológica de Galicia (CSIC), Departamento de Genética Vegetal, P.O.



Box 28, 36080 Pontevedra, Spain. Email: anaphes@gmail.com

**10990.** Sawamura, M. (2011): [Heterogenic copula between a male *Sympetrum frequens* and a female *S. croceolum*]. *New Entomol.* 60(1, 2): 14. (in Japanese) [06-XII-2010; Omachi pond, Gyotoku, Japan] Address: not stated

**10991.** Schlotmann, F. (2011): Die Entwicklung der Libellenfauna (Insecta: Odonata) des Soonwaldes (Rheinland-Pfalz) im Lauf von drei Jahrzehnten - eine Analyse ökologischer Faktoren. *Fauna und Flora in Rheinland-Pfalz* 12(1): 241-265. (in German, with English summary) ["Due to the dominance of oligo- and dystrophic ponds the community of damselfly and dragonflies in the Soonwald forest is characterized by moorland species. According to different current publications these species are decreasing in many parts of Europe. This can best be explained by increasing competition of ubiquitous species that are expanding their ranges into the specific bog habitats as an effect of the man made climate change. Stemming against this trend in the Soonwald forest the species of the peatbog habitats have yet managed to keep their populations while competitors like *Anax imperator*, *Libellula depressa* und *Sympetrum striolatum* have started to colonise the ponds of the area. A significant increase of Mediterranean species couldn't be proved yet, but first tendencies could be found: The darters *Sympetrum sanguineum* and *S. striolatum* have started to crowd out the genus' species of the Eurosiberian element which are *S. danae*, *S. flaveolum* and *S. vulgatum*. In general many population trends on the local scale go in line with the trends that have been described on a Western European scale. These are the increases of *Calopteryx virgo*, *Lestes virens*, *A. imperator*, *Cordulia aenea* and *S. sanguineum* as well as the decreases of *Enallagma cyathigerum* and *Leucorrhinia rubicunda*. The only ecological parameter that seemed to have significantly influenced the composition of the species community within the three decades was drought resistance. Species that winter in the egg stage had been increasing significantly. This mirrors the progressing problem of pond desiccation in the Soonwald forest which is caused by forestry (drainage and melioration), abstraction of drinking water (sinking of the ground water table) and subtle changes in the precipitation regime driven by the man made climate change. These are also the main challenges for conservation efforts in other peatlands in western and central Europe." (Author)] Address: Schlotmann, F., Weserstr. 11, D-55296 Harxheim, Germany. Email: frank.schlotmann@gmx.net

**10992.** Schmidt Dalzochio, M.; Souza, L.O.I.; Uchoa, M.A.; Costa, J.M. (2011): First Records of Odonata (insecta) from the Bodoquena Mountains, Mato Grosso do Sul, Brazil. *EntomoBrasilis* 4(3): 135-138. [21 Odonata species are reported from six regional streams, located at deciduous and semideciduous Atlantic forest.] Address: Costa, J.M., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, São Cristóvão, BR-20942-040 Rio de Janeiro, Brazil. E-mail: jcosta@acd.ufrj.br

**10993.** Schröter, A. (2011): A mass migration of *Aeshna affinis* in southern Kyrgyzstan: attempt to provide a spatial and temporal reconstruction (Odonata: Aeshnidae). *Libellula* 30(3/4): 203-232. (in English, with German summary) ["A mass migration of *A. affinis* is reported for

the first time. The phenomenon with preceding mass emergence took place in June 2009 in the Jalalabad province in southern Kyrgyzstan. The genesis of the mass migration is summed up, reconstructed and compared with common hypotheses and literature. With reference to the ecology of *A. affinis* in Europe, the prevailing ecological and climatic conditions are discussed." (Author)] Address: Schröter, Asmus, Rasenweg 10, 37130 Gleichen, Germany. E-mail: AsmusTim@gmx.de

**10994.** Schweighofer, W. (2011): Ein Jahr mit *Sympetma fusca* in Niederösterreich (Odonata: Libellulidae). *Libellula* 30(3/4): 157-172. (in German, with English summary) ["In pre-alpine Lower Austria the spatial and temporal presence of *S. fusca* in its terrestrial habitats was investigated. A mark-recapture study from early September to mid-November 2010 gave information regarding individual displacement. During October one male moved at least 4.6 km and crossed the river Danube. From September on, the new generation entered supposed hibernation sites and stayed there in an active state until the onset of winter in early November. Observations indicated that the species predominantly hibernated in leaf litter. The first hibernating individuals re-appeared in mid-March near the breeding site and started to oviposit two weeks later. Most of the marked individuals retrieved in spring had hibernated not more than 200 m away from the water." (Author)] Address: Schweighofer, W., Otscherblick 10, A-3661 Artstetten, Austria. E-mail: wolfgang.schweighofer@schule.at

**10995.** Sharma, G.; Dhadeech, S.N. (2011): Comparative studies on the reproductive behaviour of damselfly, *Neurobasis chinensis chinensis* (Linnaeus) at Ravi river, Chamba (H. P.) and of dragonfly, *Orthetrum sabina sabina* (Drury) at Kailana lake, Jodhpur (Rajasthan). National Seminar on Biodiversity and Intangible Natural Heritage on 28th September, 2011. Organised by National Museum of Natural History Zoological Survey of India, Tansen Marg, New Delhi (MoEF, Govt. of India), M-Block, New Alipore, Kolkata (MoEF, Govt. of India) on September 28th, 2011: 64-65. (in English) [Verbatim: The reproductive behaviour of *N. chinensis* was studied three times around Ravi river, Chamba, Himachal Pradesh during September-October, 2007. Courtship is well marked and male demonstrate a circular territory with a radius of about 2-4 m, guarded or defended by the resident male from the intruding conspecific males by wing opening or abdomen raising. As female entered into the territory, the male started following her and got success to bind in tandem link, catching hold her prothorax by its anal appendages. The before wheel tandem lasted for 3-5 minutes. After that the female tried to interlock its vulvar region with the secondary copulatory apparatus of male to form the spectacular courtship wheel. The courtship wheel lasts for about 4-6 minutes and is performed of perching on vegetation or stone near water body. After finding suitable oviposition spot, the male releases the grip on female prothorax. The after wheel tandem lasted for 5-7 minutes. Oviposition is endophytic among the aquatic vegetation. The female went down underwater till their thorax wings and head above water using her ovipositor to grip the oviposited vegetation. This underwater oviposition continued for 6-8 minutes. During oviposition the male hovers in air around female to defend her from intruding intra- or interspecific males. The duration of reproductive behaviour of *N. chinensis* lasts for 18-26 minutes. The repro-

ductive behaviour of *O. sabina* was studied five times in Kailana lake, Jodhpur, Rajasthan, India during January, 2008 to July, 2008. Courtship is well marked and male demonstrate a circular territory with a radius of about 1-3 meters, guarded or defended by the resident male from the intruding conspecific males. As female entered into the territory, the male started following her and got success to bind in tandem link, catching hold her prothorax by its anal appendages. Before wheel tandem lasted for 5-12 seconds. After that the female tried to interlock its vulvar region with the secondary copulatory apparatus of male to form the copulatory wheel. The courtship wheel lasts for about 4-9 minutes and is performed of perching on vegetation or boundary wall of water body. After completion of copulation, the male release the grip on female prothorax, hovers around and guarded female from the intruding conspecific males during oviposition. Oviposition is exophytic, the eggs are laid by dripping the tip of the abdomen several times in water and lasts for 2-4 minutes. The duration of reproductive behaviour lasts for 10-15 minutes. The study reveals that there is variation in reproductive behaviours of both the species in all the stages.] Address: Sharma, G., Zoological Survey of India, Desert Regional Centre, Jhalamand, Pali Road, Jodhpur-342 005, Rajasthan, India. E-mail: drgaurav.zsi.india@gmail.com

**10996.** Sharma, G.; Choudhary, M.S. (2011): Status of damselflies and dragonflies (Odonata: Insecta) in North India with a note on the swarms of *Pantala flavescens* (Fabricius) in Rajasthan, India-Gaurav Sharma and Mahinder Singh Choudhary. National Seminar on Biodiversity and Intangible Natural Heritage on 28th September, 2011. Organised by National Museum of Natural History Zoological Survey of India, Tansen Marg, New Delhi (MoEF, Govt. of India), M-Block, New Alipore, Kolkata (MoEF, Govt. of India) on September 28th, 2011: 10-11. (in English) [Verbatim: So far 164 species and subspecies of Odonata under 70 genera are recorded from North India (Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, Delhi, Uttarakhand, Uttar Pradesh & Rajasthan). The swarms *P. flavescens* a migratory species in India, was recorded in the months of May to August, 2008. The swarms in the agricultural fields are many a times mistaken by farmers in Rajasthan as those of desert locust, *Schistocerca gregaria* (Forsk.)]. Every year the Locust Warning Organisation. Established by Ministry of Agriculture, Government of India receives complaints from farmers regarding outbreak of desert locust, but at many a times these are swarms of *P. flavescens*. There is therefore, an urgent need to publish monographs to create awareness among farmers on the biology and behaviour of dragonfly and desert locust, so that they can differentiate between the two and register correct recordings to the government.] Address: Sharma, G., Zoological Survey of India, Desert Regional Centre, Jhalamand, Pali Road, Jodhpur-342 005, Rajasthan, India. E-mail: drgaurav.zsi.india@gmail.com

**10997.** Sherratt, T.N.; Hassall, C.; Laird, R.A.; Thompson, D.J.; Cordero-Rivera, A. (2011): A comparative analysis of senescence in adult damselflies and dragonflies (Odonata). *Journal of Evolutionary Biology* 24 (4): 810-822. (in English) ["Any population whose members are subject to extrinsic mortality should exhibit an increase in mortality with age. Nevertheless, the prevailing opinion is that populations of adult damselflies and dragonflies do not exhibit such senescence. Here,

we challenge this contention by fitting a range of demographic models to the data on which these earlier conclusions were based. We show that a model with an exponential increase in age-related mortality (Gompertz) generally provides a more parsimonious fit than alternative models including age-independent mortality, indicating that many odonates do indeed senesce. Controlling for phylogeny, a comparison of the daily mortality of 35 odonate species indicates that although male and female mortalities are positively correlated, mortality tends to be higher in males of those species that exhibit territoriality. Hence, we show for the first time that territoriality may impose a survivorship cost on males, once the underlying phylogenetic relationships are accounted for." (Authors)] Address: Sherratt, T.N., Dept of Biology, Carleton Univ., 1125 Colonel By Drive, Ottawa, ON, Canada K1S 5B6. E-mail: sherratt@ccs.carleton.ca

**10998.** Shibaeva, M.N.; Matveeva, Y.P.; Masyutkina, Y.A. (2011): [Diversity, bioindication and ecological status of zoobenthos species in the lakes of Kaliningrad]. *Bulletin of the Baltic Federal University. Immanuel Kant*. 2011 7: 91-696. (in Russian, with English summary) [This article presents the results of a research on zoobenthos species composition in the Kaliningrad region, Russia. Odonata taxa listed are as follows: *Coenagrion puella*, *Coenagrion* sp., *Erythromma najas*, *Ischnura pumilio*, *Libellula depressa*, *Platycnemis pennipes*, and *Sympetrum* sp.] Address: Shibaeva, Maria, Associate Professor, Kaliningrad State Technical University, Russia. E-mail: msh@klgtu.ru

**10999.** Sloane, T. (2011): Freshwater invertebrates of Inner Sister Island. In: Harris, S.; Reid, A. (eds.): *Inner (West) Sister Island Scientific Expedition 2010*. Hamish Saunders Memorial Trust, New Zealand and Resource Management and Conservation Division, DPIPWE, Hobart, Nature Conservation Report Series 11/2: 136 pp. (in English) [Tasmania, Australia: "Inner Sister Island, at 748 hectares, is one of the largest of the approximately one hundred outer islands in the Furneaux Group in eastern Bass Strait. The island occurs at 39°41'48" latitude, 147°54'56" longitude. The island is about 5 km from west to east and 2.7 km north to south at its widest." In December 2011, two Odonata species were recorded. "Nymphs of the widespread *Hemicordulia tau* were collected in Elbow pond. This species is well known for colonising ephemeral habitats and has considerable thermal and salinity tolerance. Adults of *Adversaeschna brevistyla* were seen around the central part of the island, and smaller dragonflies seen in the same area were possibly adults of *H. tau*." (Author)] Address: Resource, Management and Conservation Division, Department of Primary Industries, Parks, Water and Environment, GPO Box 44 Hobart TAS 7001, Australia. www.dpipwe.tas.gov.au

**11000.** Stanton, D.J.; Allcock, J.A. (2011): Habitat characteristics and odonate communities at selected sites used by *Mortonagrion hirosei* Asahina (Zygoptera: Coenagrionidae) in Hong Kong. *Journal of Threatened Taxa* 3(12): 2242-2252. (in English, with Chinese abstract) ["*M. hirosei*, a Near Threatened species, is recorded from several isolated sites across its entire range in eastern Asia. Previous research has indicated a strong affinity for brackish wetlands, including reedbeds and marshes, where potential predation or competition by other odonates is reduced. Results from surveys conducted in Hong Kong during 2009-2011 provide information on the habitat at a number of sites occupied

by *M. hirosei* and report on the presence of populations in mangrove and mangrove-mosaic habitats as well as brackish marsh, often in association with a diversity of other odonates. Information is also provided on two previously unreported sites in Hong Kong. These new findings indicate that the species uses a greater diversity of habitats than the odonate-poor *Phragmites* reedbeds in which it has been well-studied in Japan, and consequently may be more widespread than previously supposed. Given that coastal habitats are threatened throughout its range, it is hoped this broader understanding of the species' habitat requirements will encourage others to explore other coastal sites and to aid in its conservation." (Authors)] Address: Stanton, D.J., Asia Ecological Consultants Ltd., 127 Commercial Centre, Palm Springs, Yuen Long, Hong Kong. Email: davidstanton@asiaecol.com.hk

**11001.** Starr, F.; Starr, K. (2011): New arthropod records from Maui Nui. Bishop Museum Occasional Papers 109: 35-42. (in English) [Verbatim: "Odonata: Libellulidae: *Tramea lacerata* Hagen, 1862 New island record: Well distributed throughout the mainland U.S. and the Hawaiian islands since at least 1935 (Williams, 1936), *Tramea lacerata* (black saddlebags, raggedy skimmer) was previously known from all the main Hawaiian islands except Ni'ihau and Kaho'olawe (Nishida, 2002). this large distinctive skimmer is here documented from Kaho'olawe, where several were found hawking for insect prey by a wetland and nearby kiawe (*Prosopis pallida*) trees. Material examined. Kaho'olawe: Kaukukapapa, near wetland, 10 ft [3 m], 27 Dec 2010, Starr, Starr, & Bruch 101227-01 (1 specimen)."] Address: Starr, F., United States Geological Survey Biological Resources Division, P.O. Box 369, Makawao, Hawaii 96768, USA

**11002.** Steele, D.B.; Siepielski, A.M.; McPeck, M.A. (2011): Sexual selection and temporal phenotypic variation in a damselfly population. *Journal of Evolutionary Biology* 24(7): 1517-1532. (in English) ["Temporal variation in selection can be generated by temporal variation in either the fitness surface or phenotypic distributions around a static fitness surface, or both concurrently. Here, we use within- and between-generation sampling of fitness surfaces and phenotypic distributions over 2 years to investigate the causes of temporal variation in the form of sexual selection on body size in the damselfly *Enallagma aspersum*. Within a year, when the average female body size differed substantially from the average male body size, male body size experienced directional selection. In contrast, when male and female size distributions overlapped, male body size experienced stabilizing selection when variances in body size were large, but no appreciable selection when the variances in body size were small. The causes of temporal variation in the form of selection can only be inferred by accounting for changes in both the fitness surface and changes in the distribution of phenotypes." (Authors)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**11003.** Suceška, S.; Karacic, J. (2011): Balkan goldenring, *Cordulegaster heros* Theischinger, 1979 (Odonata: Cordulegasteridae), a new species of Odonata in the fauna of Bosnia and Herzegovina. *Acta entomologica serbica* 16(1/2): 1-7. (in English) [Boračko Lake, Bosnia and Herzegovina; from 11th July to 29th August 2011, the authors collected five male individuals of *C. heros*.]

Address: Suceška, Sabina, University of Sarajevo, Faculty of Sciences, Department for Biology, Zmaja od Bosne 33-35, 71000 Sarajevo, Bosnia and Herzegovina. E-mail: ssuceška@hotmail.com

**11004.** Suriano, M.T.; Fonseca-Gessner, A.A.; Roque, F.O.; Froehlich, C.G. (2011): Choice of macroinvertebrate metrics to evaluate stream conditions in Atlantic Forest, Brazil. *Environ. Monit. Assess.* 175: 87-101. (in English) ["The development of biomonitoring programs based on the macroinvertebrate community requires the understanding of species distribution patterns, as well as of the responses of the community to anthropogenic stressors. In this study, 49 metrics were tested as potential means of assessing the condition of 29 first- and second-order streams located in areas of differing types of land use in São Paulo State, Brazil. Of the sampled streams, 15 were in well-preserved regions in the Atlantic Forest, 5 were among sugarcane cultivations, 5 were in areas of pasture, and 4 were among eucalyptus plantations. The metrics were assessed against the following criteria: (1) predictable response to the impact of human activity; (2) high taxonomic resolution, and (3) operational and theoretical simplicity. We found that 18 metrics were correlated with the environmental and spatial predictors used, and seven of these satisfied the selection criteria and are thus candidates for inclusion in a multimetric system to assess low order streams in São Paulo State. These metrics are family richness; Ephemeroptera, Plecoptera and Trichoptera (EPT) richness; proportion of Megaloptera and Hirudinea; proportion of EPT; Shannon diversity index for genus; and adapted Biological Monitoring Work Party biotic index." (Authors) The basal analysis included "Odonata".] Address: Suriano, Marcia Thais, Laboratório de Entomologia Aquática. FFCLRP, Universidade de São Paulo, Ribeirão Preto, São Paulo, Brazil. E-mail: marciasuriano@yahoo.com.br

**11005.** Taylor, P. (2011): Review: Dragonflies & damselflies in the hand. *Nature Manitoba News* 3(6): 8-9. (in English) [Dragonflies and Damselflies in the Hand: An Identification Guide to Boreal Forest Odonates in Saskatchewan and Adjacent Regions, by Gordon Hutchings and David Halstead. *Nature Saskatchewan Special Publication No. 29*, 158 pages, \$24.95. Available from Nature Saskatchewan: email: info@naturesask.ca, call (306) 780-9273 or mail 206 - 1860 Lorne St., Regina, SK S4P 2L7.] Address: not stated

**11006.** Teixeira da Silva, E.; Ribeiro Filho, O.P.; Neves Feio, R. (2011): Predation of native anurans by invasive bullfrogs in southeastern Brazil: Spatial variation and effect of microhabitat use by prey. *South American Journal of Herpetology* 6(1): 1-10. (in English, with Portuguese summary) ["Invasive predators are one of the causes of population declines of anurans around the world. The American Bullfrog (*Lithobates catesbeianus*) stands out among these predators. Based on field observations and stomach content analysis, predation on native anurans by invasive Bullfrogs was investigated in two localities of Southeastern Brazil. The spatial variation in predation and similarity in microhabitat use by native species and Bullfrogs were also determined. Anurans of the families Bufonidae, Hylidae, Leiuperidae and Microhylidae were found among Bullfrog prey. The species preyed upon had medium to high similarity with Bullfrogs regarding microhabitat use. Anurans had high relative importance in the diet of adult Bullfrogs from the site where natural vegetation is preserved. Thus, the



possible negative impact of predation by Bullfrogs can be more significant on anuran species which use microhabitats similar to those used by the invasive frogs. This impact may also be higher in preserved sites, increasing the necessity of monitoring and controlling the spread of this invasive species to natural areas. However, as factors other than predation are known to contribute toward negative impacts, further studies are required to clarify the status of invasive Bullfrogs in Brazil." (Authors) Diet also included Odonata larvae and imagines.] Address: Teixeira da Silva, E., Centro de Estudos em Biologia, Instituto Superior de Educação, Centro Universitário de Caratinga, Rua Niterói 230, CEP 35300-345, Caratinga, MG, Brasil. E-mail: etsbio@yahoo.com.br

**11007.** Tennessen, K.J. (2011): *Perigomphus angularis* spec. nov. from central Ecuador (Odonata: Gomphidae). *Zootaxa* 2915: 66-68. (in English) [Description of the new species on the basis of one male is presented from Morona Santiago Province, Ecuador. The type locality is a small stream 1 km S of Rio Pasanac bridge, Hwy. 45 (1°57'0.4"S, 077°51'46.8"W; elev. 820 m.a.s.l.). The record was obtained on 16 Sept. 2005, K. J. Tennessen leg. (FSCA).] Address: Tennessen, K.J., P.O. Box 585, Wautoma, Wisconsin 54982, USA. E-mail: ktennessen@centurytel.net

**11008.** Teske, A. (2011): Herbstlebensräume von *Sympetma paedisca* (BRAUER, 1877) und *S. fusca* (VANDER LINDEN, 1820) im Bereich Thülsfelder Talsperre (LK Cloppenburg). *Drosera* 2010: 149-158. (in German, with English summary) ["From 2009 until 2011, the occurrence, autumn habitats, and behaviour of *S. paedisca* and *S. fusca* were studied in the north-west of Lower Saxony, Germany. At the beginning of autumn 2010, one large occurrence of *S. paedisca* and two smaller ones were recorded in the area of the Thülsfelder Talsperre. *S. fusca* was found exclusively in the area of the large occurrence of *S. paedisca*. The sites are microclimatically favoured open forest areas with withered grass, *Calluna vulgaris*, withered *Tanacetum vulgare* and piles of dead wood. Whether these sites are only late summer habitats respectively autumn or winter habitats remains to be clarified. As no further occurrence of *S. paedisca* was confirmed the population and suitable habitats in the area of the Thülsfelder Talsperre have a high nature conservation value. Possible reasons of endangering and measures to protect *Sympetma*-species are discussed as well as appropriate methods to find out late summer and autumn habitats." (Author)] Address: Teske, Ariane, AG Terrestrische Ökologie, Institut für Biologie und Umweltwissenschaften (IBU), Fakultät V, Universität Oldenburg, 26111 Oldenburg, Germany. E-Mail: teske.loek@web.de

**11009.** Tumore, M. (2011): Some news from the first half of the year. *Atropos* 43: 85. (in English) [UK; "The first half of 2011 was very exciting indeed for Odonata and Lepidoptera enthusiasts alike. The year had barely begun when a Vagrant Emperor *Anax ephippiger* was spotted in Pembrokeshire on 9 January, closely followed by another in Cornwall on 19 February. These two records came hot-on-the-heels of the individual recorded in Cornwall in October 2010, which was the first documented British record in a decade. [...] Following the rediscovery in Britain of *Coenagrion scitulum* last year, the species has appeared again on the Isle of Sheppey, Kent. In June many observers have been able to see this mythical damselfly for the first time in

Britain." (Author)] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: atropos@atroposed.freeserve.co.uk

**11010.** van Grunsven, R. (2011): *Recensis: A distribution atlas of dragonflies (Odonata) in Poland*. R. Bernard, P. Nuczynski, G. Tonczyk & J. Wendzonka, 2009. *Brachytron* 14(1): 70-71. (in Dutch) [review] Address: not stated

**11011.** Vilariño, V.S. (2011): Nuestra fauna: Odonatos del Cañón de Río Lobos. *Boletín electrónico de la Casa del Parque del Cañón del Río Lobos* 9: 10-20. (in Spanish) [Castilia & Leon, Spain; 27 Odonata species are briefly introduced; each species is presented by a photograph.] Address: Vilariño, V.S., Spain. E-mail: salvilvi@jcy.es

**11012.** Villanueva, R.J.T. (2011): Odonata of Siargao and Bucas Grande islands, The Philippines. *International Dragonfly Fund - Report 34*: 1-25. (in English) ["Odonata were recorded and voucher specimens were collected between August 3-13 and August 16-20, 2010. This account lists 51 species of Odonata for both islands, 47 species in Siargao and 24 species in Bucas Grande. Thirty seven species are new island records for Siargao Island while the 24 species recorded in Bucas Grande represent the first island records. Three species are new to science, and two of which (*Drepanosticta schorri* n. sp., *Pseudagrion schieli* n. sp.) are described in the present paper. Four species previously listed (Hämäläinen & Müller, 1997) remained elusive during the present survey." (Author)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**11013.** Wahizatul, A.A.; Long, S.H.; Ahmad, A. (2011): Composition and distribution of aquatic insect communities in relation to water quality in two freshwater streams of Hulu Terengganu, Terengganu. *Journal of Sustainability Science and Management* 6(1): 148-155. (in English) ["The impact of human disturbance and agricultural activity on aquatic insect communities in two freshwater streams (Sungai Peres and Sungai Bubu) in Hulu Terengganu, Terengganu, Malaysia were studied. A total of 3409 individuals of aquatic insects representing 42 families from 9 orders were successfully collected from August until November 2006. [...] (Authors) Odonata are treated at the family level.] Address: Wahizatul, A.A., Department of Biological Sciences, Faculty of Science and Technology, Universiti Malaysia Terengganu, 21030 Kuala Terengganu, Terengganu, Malaysia. E-mail: wahizatul@umt.edu.my

**11014.** Wan, F.-x.; Jiang, Y.-h.; Wan, J. (2011): Descriptions of *Anax immaculifrons* Rambur and *Tetracanthagyna waterhousei* McLachlan exuviae from China (Anisoptera: Aeshnidae). *Odonatologica* 40(4): 339-345. (in English) ["The male and female exuviae of the 2 specimens are described and illustrated from Zhuhai (Guangdong) and some notes on larval ecology and behaviour are provided. Larval morphology of the Guangdong *A. immaculifrons* is compared to that of the larvae from the westernmost known population of this sp., i.e. from the island of Karpathos, Greece." (Authors)] Address: Wan, F.-x., Nanjing Forestry University, Nanjiang, Jiangsu-210037, China

**11015.** Wasscher, M. (2011): *Recensis: Die Falkenlibellen Europas*. H. Wildermuth, 2008. *Brachytron* 14(1): 68-69. (in Dutch) [review] Address: Wasscher, M.,

Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands,  
E-mail: marcel.hilair@12move.nl

**11016.** Watanabe, M.; Suda, D.; Iwasaki, H. (2011): The number of eggs developed in the ovaries of the dragonfly *Sympetrum infuscatum* (Selys) in relation to daily food intake in forest gaps (Anisoptera: Libellulidae). *Odonatologica* 40(4): 317-325. (in English) ["Daily food intake of *S. infuscatum* was estimated using the quantity of faeces produced. Dry weight of faeces excreted during 24 h after capture was measured for each sex of both sexually immature and mature stages. The grain-like faeces (faecal pellets) contained many fragments of cuticle of prey insects. In the laboratory, there was a relationship between the amount of daily faeces excreted and the quantity of daily food intake. Although both sexes excreted a similar amount of faeces in the immature stages, mature females had greater faecal weight than males, suggesting that females fed on more prey than males. The estimated daily dry weight of prey insects was about 17.7 mg in females. The relationship between the number of mature eggs in the ovaries and the quantity of food intake indicated that about 8 days were needed to accumulate enough mature eggs in the ovaries to lay in rice paddy fields. The duration of the mature stage in // was one and a half months, hence the number of visits to rice paddy fields must be 6, confirming the importance of food intake during visits to the forest gaps between bouts of oviposition." (Authors)] Address: Watanabe, M., Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan

**11017.** White, H. (2011): Natural history of Delmarva dragonflies and damselflies. University of Delaware Press. 284 pp. (in English) ["This book provides the first

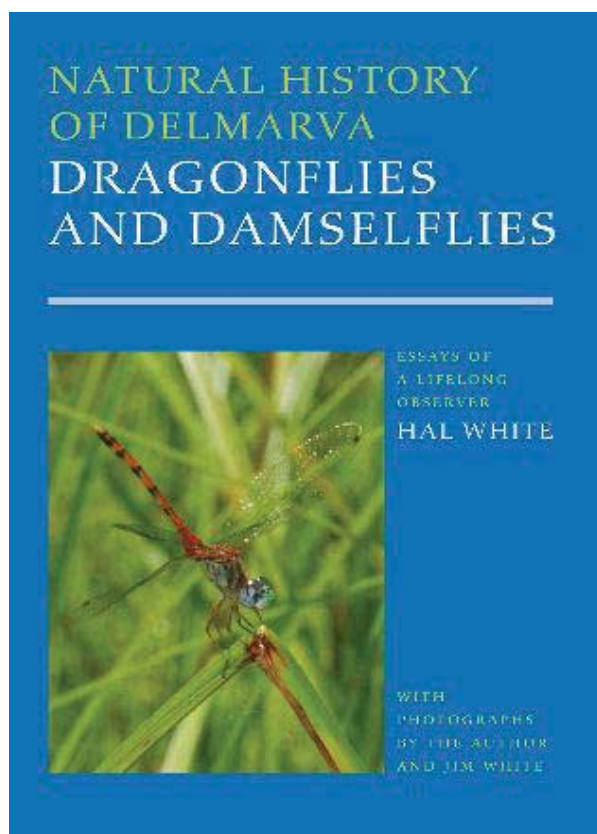
selfies of the Delmarva Peninsula. It includes colour photographs of all 129 species known to occur in the region. Each species serves as a prompt for a short essay. The collection offers an eclectic introduction to the world of dragonflies and the people who study them. There is something here for everyone from the casual reader to the expert." (Publisher) Address: White, III, H.B., Department of Chemistry and Biochemistry, University of Delaware, Newark, Delaware 19716, USA

**11018.** Wildermuth, H. (2011): Werden Weibchen von Großlibellen häufiger zur Beute von Webspinnen als Männchen? (Odonata: Anisoptera; Araneae). *Libellula* 30(3/4): 173-181. (in German, with English summary) ["Single females of *Leucorrhinia pectoralis*, *Libellula quadrimaculata* and *Sympetrum striolatum* trapped in orb webs of *Larinioides cornutus* and *Argiope bruennichi* in Switzerland as well as a female *Brachythemis contaminata* attacked by a wolf spider (*Pardosa pseudoannulata*) in Thailand are described and photographically documented. It is discussed if and why more females than males of some anisopteran species may be prone to predation by spiders." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**11019.** Wildermuth, H. (2011): Ein Betonbehälter für Gießwasser als Entwicklungshabitat von *Aeshna cyanea* und *Libellula depressa* (Odonata: Aeshnidae, Libellulidae). *Libellula* 30(3/4): 145-150. (in German, with English summary) ["During emptying a small concrete water tank for the annual cleaning procedure in late autumn 2011, one fully grown larva of *Aeshna cyanea* and 167 half grown to fully grown larvae of *Libellula depressa* appeared. The larvae must have developed in one season. It is discussed what the larvae might have been feeding on in a tank that was lacking any vegetation." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**11020.** Xu, Q.-h.; Zhang, H.-m. (2011): The last-stadium larva and systematic status of *Planaeschna suichangensis* Zhou & Wei, 1980 (Odonata: Anisoptera: Aeshnidae). *Zootaxa* 3049: 64-68. (in English) ["The final stadium larva of *Planaeschna suichangensis* is described and illustrated. Its larval morphological characters indicate that *P. suichangensis* is a valid species closer to *P. risi* than to *P. taiwana*." (Authors)] Address: Zhang, H., Department of Entomology, College of Natural Resources and Environment, South China Agricultural University, Guangzhou 510642, China. E-mail: zhanghaomiao6988@gmail.com

**11021.** Yu, X.; Bu, W. (2011): A preliminary phylogenetic study of Megapodagrionidae with focus on the Chinese genera *Sinocnemis* Wilson & Zhou and *Priscagrion* Zhou & Wilson (Odonata: Zygoptera). *Hydrobiologia* 665: 195-203. (in English) ["A cladistic analysis of the megapodagrionid damselflies was performed on a data matrix of 44 morphological characters and 39 terminal taxa with emphasis on defining the phylogenetic position of the Chinese genera *Sinocnemis* Wilson & Zhou and *Priscagrion* Zhou & Wilson which have rarely been used in a cladistic study before. *Sinocnemis* is recovered as the sister group to all other reduced-venation groups, including *Chorismagrion* + *Perissolestes*, *Hemiphlebia*, and all coenagrionoids; *Priscagrion* is close to *Austroargiolestes*. *Sinocnemis henanensis* is confirmed as a good species." (Authors)] Address: Yu, X., Institute



comprehensive coverage of the dragonflies and dam-

of Entomology, College of Life Sciences, Nankai Univ., Tianjin 300071, China. E-mail: nkyuxin@yahoo.cn

**11022.** Yu, X.; Bu, W. (2011): Chinese damselflies of the genus *Coenagrion* (Zygoptera: Coenagrionidae). *Zootaxa* 2808: 31-40. (in English) ["We review and update species of *Coenagrion* recorded from China, including distributional information. A key to the males is provided including figures of the genital ligula and caudal appendages. A distributional record of *Coenagrion armatum* is excluded from China. *Coenagrion bifurcatum* Zhu & Ou-yan, 2000, is assigned as a junior synonym of *Coenagrion johanssoni* (Wallengren, 1894). *Coenagrion chusanicum* Navás, 1933 is assigned as a junior synonym of *Paracercion hieroglyphicum* (Brauer, 1865). *Coenagrion dorothea* Fraser, 1924 is newly combined as *Paracercion dorothea* (Fraser, 1924) comb. nov. *Coenagrion impar* Needham, 1930 and *Cercion yunnanensis* Zhu & Han, 2000 are both treated as junior synonyms of *Paracercion dorothea*. *Coenagrion holdereri* (Förster, 1900) is redescribed here based on fresh specimens." (Authors)] Address: Yu, X., Institute of Entomology, Life Sciences College, Nankai University, Tianjin, 300071 China. E-mail: nkyuxin@yahoo.cn

**11023.** Zabłocki, P.; Wolny, M. (2011): First record of the Vagrant Emperor *Anax ephippiger* (Burmeister) (Odonata: Aeshnidae) for the Opolskie Voivodship (Southwest Poland). *Forum Faunistyczne* 1(1): 35-38. (in Polish, with English summary) [13-VII-2011, one male of *A. ephippiger*, sandpit near Grabówka village (UTM: CA07), Poland.] Address: Zabłocki, P., Dział Przyrody Muzeum Śląska Opolskiego, ul. Leśnicka 28, 47-154 Góra Św. Anny, Poland. E-mail: przyroda@muzeum.opole.pl

**11024.** Zagainova, O.S., Markov, N.I. (2011): The diet of Asian badger, *Meles leucurus* Hodgson, 1847, in Samarovskii Chugas Nature Park, Western Siberia. *Russian Journal of Ecology* 42(5): 414-420. (in English) [The diet structure of *M. leucurus* on Bol'shoi Chukhtinskii Island (Khanty-Mansi Autonomous Area) was studied by means of coprological analysis. Two unidentified Odonata contributed to the food of the badgers.] Address: Zagainova, O.S., Institute of Plant and Animal Ecology, Ural Branch, Russian Academy of Sciences, ul Vos'mogo Marta 202, Yekaterinburg, 620144 Russia. E-mail: zagainovao@mail.ru

**11025.** Zhang, H.; Kalkman, V.J.; Tong, X. (2011): A synopsis of the genus *Philosina* with descriptions of the larvae of *P. alba* and *P. buchi* (Odonata: Megapodagrionidae). *International Journal of Odonatology* 14(1): 55-68. (in English) ["A synopsis of the genus *Philosina* is provided. Larvae of the two known species, *P. alba* and *P. buchi* are described for the first time. The distribution of both species is discussed and information on behaviour and habitat is summarized. The specialized larvae of *Philosina* show a strong resemblance to those of *Rhinagrion*, suggesting that they are sister genera. The unique characters of the larva, especially the arrangement and structure of the caudal lamellae, mean that neither genus fits into any of the currently recognized families of Zygoptera. It is noted that these genera could be placed in their own family. However, caution is exercised pending a better understanding of the family Megapodagrionidae based on DNA work, and they are therefore retained in Megapodagrionidae." (Authors)] Address: Zhang, H., Department of Entomology, College of Natural Resources and Environment, South

China Agricultural University, Guangzhou 510642, China. E-mail: zhanghaomiao6988@gmail.com

**11026.** Zhang, H.-j.; Huo, K.-k. (2011): A study of the genus *Coeliccia* Kirby, 1890 from Shaanxi (China), with the description of *C. wilsoni* Zhang & Yang spec. nov. (Zygoptera: Platycnemididae). *Odonatologica* 40(1): 51-56. (in English) ["The new species is described and illustrated. Holotype male and allotype female: China, Shaanxi prov., Nanzheng co., alt. 1200 m a.s.l., 28-VII-2006; deposited in the Shaanxi Bio-Resource Key Laboratory, Shaanxi University of Technology, Hanzhong, China. Figs of the penile structure and the dorsum of the male caudal appendages of *C. sexmaculata* Wang are also provided." (Authors)] Address: Zhang, H.-j., Shaanxi Bio-Resource Key Laboratory, Shaanxi University of Technology, Hanzhong-723000, China. E-mail: hjzhang663@sohu.com

**11027.** Zia, A.; Naeem, M.; Rafi, M.A.; Naz, F.; Afshen, S.; Ilyas, M. (2011): Damselflies (Zygoptera: Odonata) of Pakistan: Part 1. *Journal of Insect Science* 11:102: 27 pp. (in English) ["The present study is an effort to document bio-geographical distribution for Zygoptera of Pakistan. Damselflies were collected throughout the country and territory of Azad Jammu and Kashmir during 2004-2009. A total of 2692 specimens were collected yielding 9 families, 21 genera, and 48 species and subspecies. Three of these species, *Libellago lineata lineata* (Burmeister), *Elatoneura atkinsoni* (Selys), and *Elatoneura souteri* (Fraser), are recorded for the first time from Pakistan. Distribution, habitats, previous records, and zoogeographic affiliation for all collected taxa are discussed. Help was also taken from published literature on Zygoptera of Pakistan, and specimens housed at National Insect Museum were also studied. In total, 53 species are accounted for providing an updated record for all modern taxa of damselfly fauna of Pakistan." (Authors)] Address: Zia, S.A., National Insect Museum, National Agriculture Research Centre, Islamabad, Pakistan

**11028.** Żurawlew, P. (2011): The locality of *Sympetrum meridionale* (Selys, 1841) (Odonata: Libellulidae) in the Sieradz Basin (Central Poland). *Odonatrix* 7(2): 54-55. (in Polish, with English summary) ["On August 12, 2010 during the inspection of ca. 1000-meter long stretch of a ditch situated in meadows (51°43'31" N, 18°38'09" E), extending along the rampart of Jeziorsko reservoir in Proboszczowice, Poland (UTM: CC33), at least 20 males and 5 females of *S. meridionale* were found. The discovery of this locality is another evidence of the expanding range of this species towards the north." (Authors)] Address: Żurawlew, P., Kwileń 67a, 63-313 Chocz, Poland. E-mail: grusleon@gmail.com.pl

**11029.** Żurawlew, P. (2011): Rediscovery of *Onychogomphus forcipatus* (Linnaeus, 1758) in an isolated distribution island within the GnieŹnieńskie Lakeland (central-western Poland). *Odonatrix* 7(2): 52-53. (in Polish, with English summary) [8-VII-2010 and 9-VII-2011 in Przybrodzin, near Lake Powidzkie, Poland (UTM: XU91; 52°25'45" N, 17°55'47" E)] Address: Żurawlew, P., Kwileń 67a, 63-313 Chocz, Poland. E-mail: grusleon@gmail.com.pl

**Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for multiple help and Geert de Knijf and Werner Piper for contributing many papers to this issue.**



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105; E-mail: K.Reinhardt@sheffield.ac.uk

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: mg\_marinov@yahoo.com

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

## 1997

**11030.** Prejs, A.; Koperski, P.; Prejs, K. (1997): Food-web manipulation in a small, eutrophic Lake Wirbel, Poland: the effect of replacement of key predators on epiphytic fauna. *Hydrobiologia* 342: 377-381. (in English) ["The effect of fish removal on the invertebrate fauna associated with *Stratiotes aloides* was studied in a shallow, eutrophic lake. The biomass of invertebrate predators was approximately 2.5 times higher in the invertebrate dominated year (1992) than in the fish-dominated year (1991), while the density of non-predatory invertebrates in 1991 was ca half that in the invertebrate-dominated year. The decrease was due to a sharp fall in the density of epiphytic chironomids, with the density of plant-mining chironomids being far less affected. Marked declines in the density of non-predatory invertebrates in the invertebrate-dominated year were most probably caused by invertebrate predators. Once freed from suppression induced by fish, invertebrate predators were able to control the density of epiphytic prey more effectively than fish. ... In summer 1991, prior to fish removal, the total biomass of predators was estimated at 15 g f.w m<sup>2</sup> of which fish accounted for 90%. In summer 1992, after rotenone treatment, the total biomass of predators was 10 g f.w. m<sup>2</sup>, of which approximately 90% was made up by invertebrates. The increase in the biomass of invertebrate predators in 1992 resulted from sharp rises in the biomass of Odonata larvae, Heteroptera and Argyroneta aquatica, which were particularly distinct in late spring (June), early summer (July) (Heteroptera and *A. aquatica*) and summer (July–September) (Odonata). In the case of Odonata biomass and density, the significance of differences between 1991 and 1992 was confirmed by Student's test (biomass: P = 0.01, density: P = 0.003)." (Authors)] Address: Prejs, A., Department of Hydrobiology, University of Warsaw, Banacha 2, 02-097 Warsaw, Poland

## 1998

**11031.** Sabine, M.E.J. (1998): Macroinvertebrate communities of different-aged beaver ponds. Master of Science thesis, University of New Brunswick: 81 pp. (in English) ["Previous studies of waterfowl utilization of beaver ponds for breeding and brood-rearing have found higher waterfowl use of new beaver ponds (c 5

years old) than old beaver ponds. These studies have concluded, based on waterfowl use only, that new beaver ponds are more productive for waterfowl than old beaver ponds. I tested the hypothesis that productivity in beaver ponds, in terms of macroinvertebrates and water quality, declined with beaver pond succession. In 1993 and 1994, fifteen and nine beaver ponds, respectively, of three different age groups (new, mid-aged, old) were sampled for invertebrates and water quality to quantify differences among age groups. No significant differences ( $p < 0.05$ ) were found in invertebrates or water quality among different age classes. Significant differences were found in most measures over the different sampling periods, with invertebrates being higher in the earlier sampling periods, while nutrients were higher in the later sampling periods. The former is most likely due to a peak in insect emergence early in the summer, while the latter is probably a result of a water level drop between periods. Highly significant differences were also noted for most measures among individual ponds, and this pond variability probably masked any patterns of different age classes. Nutrients and invertebrates were relatively low throughout the study area, which may also have hidden any true differences in age classes of beaver ponds. Because of the low productivity in the study site, beaver pond management for waterfowl would not be feasible or cost-effective in this area." (Authors) Odonata are treated at the family level.] Address: not stated

**11032.** Yabu, S.; Nakashima, A.; Akiyama, T.; Takefuji, M.; Nagano, O. (1998): Studies on the formation of wetland type biotope with recycled water in the industrial open space of the bay coast. *Environmental Engineering Research* 35: 295-303. (in English) [The paper reports on the ability of *I. senegalensis*, *Crocothemis servilia*, *A. parthenope julius*, and *Orthetrum albistylum speciosum* to use eutrophicated water bodies as habitat.] Address: Yabu, S., Fac. of Systems Engineering, Wakayama University, Japan

## 1999

**11033.** Comisión Centroamericana de Ambiente y Desarrollo (CCAD); IUCN; WWF (1999): Listas de Fauna de Importancia para la Conservación en Centroamérica y México: listas rojas, listas oficiales y especies en Apéndices CITES.. WWF Centroamérica. San José,

Costa Rica: 230 pp. (in Spanish) [Odonata are redlisted country wise for Guatemala, El Salvador, Costa Rica, Nicaragua, Panama, Belize, Honduras, and Mexico. For details see: <http://acesortguatemala.org/docs/listadode-faunaaproteger.pdf>]

**11034.** Amakye, J.S. (1999): Effect of Temephos 20EC on non-target saxicolous fauna of a tropical African Island river at first treatment. *West African journal of applied ecology* 7: 109-121. (in English) ["River Musola on Bioko Island in the Republic of Equatorial Guinea was treated with temephos 20EC, a Simutium larvicide, in March 1999 under a pilot experiment to eradicate *Simulium damnosum* s.l. from that island. The mean density of the saxicolous macroinvertebrates prior to temephos treatment of the river was  $5.946.7 \pm 2,065.7$  individuals  $m^2$ . The density of macroinvertebrates observed 24 h after treatment with temephos was  $4.062.2 \pm 2,588.0$  individuals  $m^2$ , indicating 31.7% reduction in the density of the population. There was 100% reduction in density of Odonata, Hydroptilidae, Ecnomidae, Leptoceridae and Tanyptodinae in the post treatment samples. Baetidae and Orthocladiinae were affected significantly by temephos ( $P \leq 0.1$ ). Whereas impact of temephos on *Cheumatopsyche digitata* (Trichoptera: Hydropsychidae) was marginal (-16.7%), there was complete loss of *C. falcifera* (100%) from the river, following treatment with the larvicide, indicating differential response to the larvicide by these sympatric species. In general, 'Filtering Collectors' (73%) dominated the saxicolous biocoenosis prior to treatment with temephos. However, no 'Grazers' or 'Scrapcrs' were present in the saxicolous community of the section of the river studied during the pretreatment period. The 100% reduction in density observed for many taxa in the biocoenosis, in the immediate post treatment period was attributed to the low discharge of the river and the low population densities of the various taxa observed at the time of the experiment, as well as the extremely heterogeneous nature of the river bottom. It is proposed that the gallery forests be maintained to aid conservation of the faunistic diversity of the river." (Author)] Address: Amakye, J.S., CSIR-Water Research Institute, P O Box AH 38, Achimota, Ghana. E-mail: [wri@ghana.com](mailto:wri@ghana.com)

**11035.** Holíř, J. (1999): Příspěvek k poznání vážek (Odonata) Žamberka a okolí [Contribution to the knowledge of dragonflies (Odonata) of Žamberk and neighborhood]. *Orlické hory a Podorlicko*, 1999/9: 190-191. (in Czech) [Czech Republic; between June and October 1995, at five localities 16 Odonata species have been recorded. Habitats are briefly characterised, and record data are presented.] Address: not stated

## 2000

**11036.** Dondini, G.; Vergari, S. (2000): Carnivory in the greater noctule bat (*Nyctalus lasiopterus*) in Italy. *J. Zool.*, London 251: 233-236. (in English) [In 59 faces of *N. lasiopterus*, nine fragments of Libellulidae were found.] Address: Dondini, G., Museo di Storia Naturale, sezione di Zoologia 'La Specola', Università di Firenze, Via Romana 17, 1-50125 Firenze, Italy

**11037.** Huertas Dionisio, M.; Sánchez Rodríguez, J.L. (2000): Los odonatos de la provincia de Huelva (Andalucía, España). *Boletín de la Sociedad Entomológica Cordobesa* 12: 35-81. (in Spanish, with English summary) [54 Odonata species are briefly introduced and

their regional distribution basing on current and literature data is mapped.] Address: Huertas Dionisio, M., Berdigón 9, 4°, 21003 Huelva, Spain.

## 2001

**11038.** Fukui, M. (2001): Annual fluctuation of the population of *Libellula angelina* at Okegayanuma, Iwata, Shizuoka Prefecture. *Tombo* 43: 41-44. (in Japanese, with English summary) ["The annual fluctuation of the population of *L. angelina*, was investigated in Okegayanuma, Iwata, Shizuoka Pref., Japan. Imagines were counted by observation, from 1991 to 2000 (each year between Apr. 29. and May 3 on every day). Exuviae were collected every second or third day from 1993 to 2000 between Apr. 10 to May 20. Compared with 1994, the population of *L. angelina* had decreased sharply to one-sixth in 1995 due to a heat wave and drought during the previous summer. Moreover, the population had decreased to only 47 individuals in 1999 due to a sudden increase in the population of American crawfish. From 1999, a species conservation plan for *L. angelina* was started by Iwata Minami High School students." (Author)] Address: Fukui, M., 60-1. Kamo, Kikugawa-cho. Ogasa-gun. Shizuoka, 439-0031, Japan

**11039.** Fukui, M.; Ema, S. (2001): New records of *Anaiaeschna jaspidea* from Shizuoka Prefecture. *Tombo* 43: 40. (in Japanese, with English title) [Japan; 1-X-2000] Address: Fukui, M., 60-1. Kamo, Kikugawa-cho. Ogasa-gun. Shizuoka, 439-0031, Japan

**11040.** Futahashi, R. (2001): A new record of *Sympetrum maculatum* from Shizuoka Prefecture. *Tombo* 43: 38-39. (in Japanese, with English summary) [A male of *S. maculatum* was a new record for Shizuoka Prefecture. This is an unusual migratory record because of the following facts: the locality, Enshu-hama (Hamamatsu), is more than 70 kilometers away from the nearest habitats known at present; no other sighting has thus been recorded there despite the investigations carried out by many odonatologists; the captured individual was found just after a typhoon and no plant translocation from other habitats has been recorded in the area.] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**11041.** Futahashi, R.; Futahashi, H.; Araki, Y. (2001): Recent findings concerning Odonata in Hokuriku district. *Tombo* 43: 31-36. (in Japanese, with English summary) [Japan; "*Lyriothemis pachygastra* was recorded for the first time from Toyama Prefecture. *Sympetrum s. speciosum* was newly recorded from the Noto peninsula. Exuviae and larvae of *Aeshna mixta soneharai* were recorded from Toyama Prefecture, Hokuriku district for the first time. Four migratory species, *Anax guttatus*, *Sympetrum cordulegaster*, *S. depressiusculum* and *Trapezostigma virginia* were recorded at several sites in Toyama and Ishikawa Prefecture. Some males that seemed to be hybrids between *Anax n. nigrofasciatus* and *Anax parthenope julius* were recorded at several sites in Toyama Prefecture. Some adults of *Aeschnophlebia longistigma*, which usually disappear by the end of August were recorded in September. Recent records of the following 5 sharply decreased species in this area were reported: *Gynacantha japonica*, *Asiagomphus pryleri*, *Gomphus postocularis*, *Somatochlora clavata*, *Sympetrum maculatum*. Distributional records of Odonata in the Hokuriku district were reported including

several species rare in this area: *Cercion sexlineatum*, *Sympetma paedisca*, *Aeshnophlebia anisoptera*, *Davidius moiwanus taruu*, *Stylogomphus suzuku*, *Sympetrum striolatum imitoides*." (Authors)] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**11042.** Kano, K. (2001): A cleaning behavior of *Davidius moiwanus moiwanus* (Okumura) after oviposition. Tombo 43: 57-58. (in Japanese, with English summary) ["A cleaning movement of a female of *D. m. moiwanus* was observed at a small stream at the Shiga Heights, Nagano Prefecture, Japan, on July 20, 2000. The female, after oviposition, moved onto a mugwort leaf near the waters edge with some eggs attached to her abdominal tip. She repeatedly rubbed her abdominal tip by bending her abdomen against the underside of the leaf and scraped off the eggs into the water. This behaviour lasted for 30 seconds. As the eggs are not very sticky, the behaviour should be regarded as a selfcleaning rather than epiphytic oviposition, which has been reported in *Malgassophlebia*, *Tetrathemis* and *Micrathyria*." (Author)] Address: Kano, K., 5-19-17-601 Koishikawa, Bynkyo-ku, Tokyo, 112-0002, Japan

**11043.** Karube, H.; Yeh, W.C. (2001): *Sarasaeschna* gen. nov., with descriptions of female *S. minuta* (Asahina) and male peile structure in *Linaeschna* (Anisoptera: Aeshnidae). Tombo 43: 1-8. (in English) [A new genus, *Sarasaeschna* gen. nov. is established to accommodate the species currently classified under *Lieftinck's pryeri* - Section of *Oligoaeschna* auct. with the description of the unknown female of *S. minuta* (Asahina) and comments on male penile structures of *Linaeschna polli* Martin.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**11044.** Kita, H. (2001): *Rhyothemis fuliginosa* Selys carrying her exuvia on the tip of abdomen. Tombo 43: 28. (in Japanese, with English summary) ["In Chiba Prefecture on July 25, 1999, I observed a female of *R. fuliginosa* carrying her exuvia on the posterior end of abdomen. She was able to drink water from the pond surface in flight even though she was handicapped." (Author)] Address: Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan

**11045.** Kita, H.; Futahashi, R. (2001): A female hybrid between *Anax nigrofasciatus nigrofasciatus* Oguma, 1915 and *A. parthenope julius* Brauer, 1865 (Aeshnidae) from Miyagi Prefecture. Tombo 43: 54-55. (in Japanese, with English summary) ["One female specimen, which is supposed to be the interspecific hybrid between *Anax n. nigrofasciatus* and *A. parthenope julius*, was captured in Miyagi Pref., N. Honshu, Japan, in 1973. The following are the main characteristics of this specimen: 1) a T-shaped black stripe on the top of the antefrons like *A. n. n.*, and a light blue stripe running along the black line like *A. p.j.* 2) the thickness of each black line on the 1st and the 2nd lateral sutures is intermediate between the two species 3) the whole shape of each light-coloured spot on the abdomen is similar to that of *A. p.j.* 4) the size of the silvery white spot on the underside of the 3rd abdominal segment and the tip shape of its cercus is intermediate between the two species 5) wings are similar to those of mature *A. n. n.*, uniformly transparent, having blackish antenodals and 6) the brown femurs are characteristic of *A. p. j.*, but the number of the prickles is similar to that of an ordinary *A. n. n.*" (Au-

thors)] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**11046.** Knysh, N.P. (2001): About pinning (catching) of prey by Red-backed Shrike. Berkut 10(2): 218-225. (in Russian, with English summary) [Sumy (NE Ukraine): 50°55'11"N, 34°46'55"E. The prey items of *Lanius collurio* include one imago of *Anaciaeschna isocela* and two of unidentified Aeshnidae. Diet was analysed between 1967 and 2001, and refers to 1234 objects pinned on thorns and knots of plants.] Address: Knysh, N.P., Sumy Pedagogical University, Dep. of Zoology, Romenska str. 87, 40002 Sumy, Ukraine

**11047.** Kojo, T. (2001): An observation of a long roosting time in *Pantala flavescens* Fabricius. Tombo 43: 56. (in Japanese, with English summary) ["A young female of *P. flavescens* rested for more than 19 hours from 15:30, 19th to 10:40, 20th August 2000, on a branch of bamboo at a garden among condominiums in a suburb of Saitama Prefecture, Japan." (Author)] Address: not stated in English

**11048.** Roque, F.O.; Trivinho-Strixino, S. (2001): Benthic macroinvertebrates in mesohabitats of different spatial dimensions in a first order stream (Sao Carlos - SP). Acta Limno. Bras. 13(2): 69-77. (in English, with Portuguese summary) [Brazil. Odonata are treated at the family level.] Address: Roque, F.O., Programa de Pós Graduação em Ecologia e Recursos Naturais UFSCar, Brazil. E-mail: pfor@iris.ufscar.br

**11049.** Willet, J. (2001): Dragonflies and damselflies: Opportunities for further recording in the Forth Valley. Forth Naturalist and Historian 24: 57-64. (in English) [The author provides background information to Odonata, and suggests locations where Odonata recording could be focussed. Status and distribution of the 15 species found in the Forth Valley, Scotland, UK are outlined.] Address: not stated

**11050.** Yokoi, N. (2001): Nine species of dragonflies records for the first time in Laos. Tombo 43: 25-28. (in Japanese, with English summary) ["The author visited Lak Sao, central Laos near the Vietnam boundary, in March 2000 and studied dragonflies which inhabited a mountain stream there. The mean temperature was around 20°C in the mountain zone, and most of the dragonflies were still at the early adult stage. Seven newly recorded species of dragonflies were taken from Lak Sao. In particular, the Chinese species *Leptogomphus elegance*, *Megalogomphus sommeri* and *Macromia hamifera* were recorded for the first time from Indochina. An additional two species were later collected from south Laos and Vietnam bringing the reported total of species in this paper to nine." (Author)] Address: Yokoi, N., 2-37-11, Kaisei, Koriyama, Fukushima, 963-8851 Japan

**11051.** Yokoyama, T. (2001): Larval growth of some dragonflies at the veranda of a condominium in Sapporo. Tombo 43: 58-59. (in Japanese, with English summary) [The larval growths, from hatching to the beginning of the first winter, of seven Odonata species (*Anax parthenope julius*, *Coenagrion lanceolatum*, *Orthetrum triangulare melania*, *Aeshna nigroflava*, *Somatochlora graesseri aureolora*, *Paracercion c. calamorum*, and *Somatochlora uchidai*) were observed in Sapporo, Hokkaido, Japan.] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan



## 2002

**11052.** Brooker, J.S. (2002): *Enallagma civile* (Odonata: Coenagrionidae) life history and production in a west Texas playa. Master of Science (Biology), University of North Texas: 46 pp. (in English) ["This study was conducted to describe the life history of *E. civile* and the other Odonates that inhabit playa habitats in the Southern High Plains of Texas. It was learned that *E. civile* has a low secondary production estimate of 66.8 mg/m<sup>2</sup>. It was also determined that this species had a developmental time of approximately 21 days in a playa setting. Another important fact was that *E. civile* was the earliest colonizer of all of the Odonate species studied. It was recorded in the playa at least one week earlier than all of the other Odonates. Odonate populations in the playa continued to increase in size throughout the study. Some populations grew more quickly than others. For instance, *Lestes disjunctus*, had the population that grew the slowest. Its average population estimate per m<sup>2</sup> changed from 0 to approximately 3 in an eight-week time period. On the opposite end of the spectrum, *E. civile*, had an average population estimate per m<sup>2</sup> which increased in size from 2 to approximately 670 naiads in the same eight-week time period. When the playa began to lose water and thus dwindled in size, the Odonate populations all had significant decreases in size. The naiads either became prey for another organism, emerged or died due to lack of water or lack of food. None of the species in this study were able to continue increases in their population sizes during this time. The period after this drought is what is unique. Some of the species continued to have numbers that dwindled, while others maintained relatively similar amounts of naiads. One species, *Anax junius*, actually had a population explosion after the drought when the playa began to refill close to the beginning of September. During the course of this study, much was learned about the niches that Odonates occupy in a playa. The populations of some prominent dragonfly species were studied and their quantities were estimated for different periods during one season. Sizes of head capsules were studied in an effort to determine the development of Odonate populations over a period of time. In addition, field sampling showed high points in population sizes and trends in growth. Research was conducted of the life histories of Odonates and a lot of information was gained about the productivity of dragonflies. This study was a valuable proponent to the collection of information available about playa habitats." (Author)] Address: Jennifer Suzanne Booker, not further details

**11053.** Herren, B.; Herren, K. (2002): Die Libellen der Gemeinde Burgdorf und angrenzender Gebiete. Das Burgdorfer Jahrbuch 69: 65-76. (in German) [The paper introduces the biology of dragonflies and gives a brief local history of dragonfly faunistic studies in Burgdorf (Switzerland) and adjacent localities. Thirty species have been recorded at seven localities, between 1990 and 2001.] Address: Herren, B. & K., Oberfelderstr. 46, CH-3550 Langnau, Switzerland. E-mail: schule.rosig@bluewin.ch

**11054.** Jeschke, J.M. (2002): Funktionelle Reaktionen von Konsumenten: die SSS Gleichung und ihre Anwendung. Dissertation, Fakultät für Biologie, Ludwig-Maximilians-Universität München: 192 pp. [Chapter 5 of the thesis "Correlates and Consequences of Predator Confusion" uses Odonata in laboratory experiments: "When confronted by a swarm of their prey, many predators

become confused and are thus less successful in their attacks. It is unknown how widespread this confusion effect is and largely unknown which predator or prey traits facilitate or impede it. We therefore performed corresponding experiments in the predator-prey systems *Aeshna cyanea* (Odonata) – *Daphnia magna* (Crustacea), *Libellula depressa* (Odonata) – *D. magna*, *Chaborus obscuripes* (Diptera) - *Daphnia obtusa*, and *Triturus alpestris* (Alpine newt) – *D. obtusa*. We combine our results with literature data and find that predators have become confused in 70% of the 20 predator-prey systems studied to date. Tactile predators appear to be generally susceptible, whereas visual predators seem susceptible only if their prey is highly agile. This difference arguably results from the superiority of the latter in singling out individual prey. To allow a better understanding of the ecological, ethological, and evolutionary consequences of predator confusion, we examine its effects on functional responses. We theoretically and empirically show that the widespread assumption confusion would let a functional response become dome-shaped is not necessarily true. The response can alternatively remain qualitatively unchanged and is affected only in a quantitative way. Thus, a non-dome-shaped response is no indication for the absence of predator confusion." (Author) Additional reading: Jeschke, J.M.; Tollrian, R. (2005): Effects of predator confusion on functional responses. *Oikos* 111: 547-555; Jeschke, J.M.; Tollrian, R. (2007): Prey swarming: which predators become confused and why? *Animal behaviour* 74: 387-393.] Address: Jeschke, J.M., Department Biologie II, Ludwig-Maximilians-Universität München, Karlstr. 25, 80333 München, Germany

**11055.** SaintOurs, F. (2002): Drainage to Dragonflies: Conservation of aquatic invertebrates in rivers and streams of eastern Massachusetts. Fall 2002 Conservation Perspectives. <http://www.nescb.org/epublications/fall2002/saintours.html> (1 of 13)6/3/2005 3:31:12 AM: 13 pp. (in English) [The author outlines some general remarks on the potential of Odonata as monitoring organisms for aquatic systems health.] Address: SaintOurs, F., Dept of Biology, University of Massachusetts Boston, USA. E-mail: fred.saintours@umb.edu

## 2003

**11056.** Kipping, J. (2003): Odonata recorded from the Okavango Delta. In: Alonso, L.E. & Nordin L.-A. (2003): A rapid biological assessment of the aquatic ecosystems of the Okavango Delta, Botswana: High water survey. RAP Bulletin of Biological Assessment 27, Conservation International, Washington DC: 137-139. (in English) ["Comprehensive collections of Odonata were made by JK at the geo-reference sites in the Upper Panhandle (UPH) but following his return to Maun on June 9th, only occasional specimens were collected in the other three focal areas. A further list was however compiled by JK from the HOORC site at the western end of Chief's Island, a habitat typical of much of the CHI focal area. These records are combined into a systematic checklist of species known from the delta but to avoid confusion regarding distribution patterns across the delta, this list is given below and is excluded from Appendix 3, the main species-list. This appendix is divided into four sections. Section 1 lists the species collected by JK in the UPH focal area; section 2 lists those collected by other team members in the LPH, MGR and

CHI focal areas; section 3 gives the combined checklist and section 4 contains ecological notes by JK on habitat use by Odonata at the HOORC site on Chief's Island." (Author) For details see: <http://www.biocart.de/naturschutz/pdf/RAP-Botswana.pdf>] Address: Kipping, J., BioCart - Ökologische Gutachten & Studien, Albrecht-Dürer-Weg 8, 04425 Taucha, Germany. E-mail: [BioCartKipping@web.de](mailto:BioCartKipping@web.de)

**11057.** Paukert, C.P.; Willis, D.W. (2003): Aquatic invertebrate assemblages in shallow prairie lakes: fish and environmental influences. *Journal of Freshwater Ecology* 18(4): 523-536. (in English) [Nebraska Sandhill region, Nebraska, USA. 30 natural lakes were studied for their fauna. Nine Odonata species were recorded. No species details are given.] Address: Paukert, C.P., Dept for Wildlife & Fisheries Services, P.O. Box 2140B, South Dakota State Univ., Brookings, SD, 57007, USA

**11058.** Veling, K.; Mensing, V. (2003): Butterfly and dragonfly observations. *Vlinders* 18(1): 8-9. (in Dutch, with English summary) [The authors provide Instructions for the collecting of reliable distribution data in the Netherlands.] Address: Veling, K., De Vlinderstichting Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: [Kars.Veling@vlinderstichting.nl](mailto:Kars.Veling@vlinderstichting.nl)

**11059.** Ades, G.W.J.; Kendrick, R.C. (2004): Hong Kong Fauna. A checklist of selected taxa. 2. ed.. Fauna Conservation Department, Kadoorie Farm & Botanical Garden Company: 91 pp. (in English) [Based on the publications of K.D. Wilson, the list compiles 35 Zygoptera (plus two subspecies) and 74 Anisoptera.] Address: Kadoorie Farm and Botanic Garden (KFBG) Corporation, Lam Kam Road, Tai Po, New Territories, Hong Kong. E-mail: [info@kfbg.org](mailto:info@kfbg.org)

**11060.** Barnes, D.K. (2004): Use of benthic macroinvertebrates to assess impacts of agricultural land use in nontidal coastal plain streams. MSc. Thesis, Department of Environmental Sciences, University of Virginia: X + 151 pp. (in English) ["During recent history, anthropogenic activities in coastal watersheds have played a major role in increasing nutrient transport to rivers and offshore waters, often with detrimental consequences. Research on nutrient enrichment has focused primarily on lakes, rivers, and estuaries, while enrichment in coastal plain streams has been greatly understudied. Benthic macroinvertebrates are often extremely sensitive to enrichment, and as a result, are commonly used in biomonitoring of nutrient pollution. This study examined the impacts of agricultural land use in coastal streams on Virginia's Eastern Shore, through assessment of macroinvertebrate community structure and monitoring of a variety of chemical and physical parameters. Nine catchments ranging in agricultural land use from 28 to 91 % of watershed area were sampled seasonally from June 2003 to March 2004. Water and sediments were analyzed for nutrients, chlorophyll, organic matter, and dissolved oxygen. To assess macroinvertebrate community structure, sediment cores were collected, sieved through 0.5 mm mesh, and organisms retained on the sieves were identified to genus where possible. Twenty-one metrics of community structure were calculated, including measures of taxonomic richness, taxonomic composition, tolerance, feeding roles, and delta<sup>15</sup>N signatures. Though nitrate fluxes were higher in watersheds with higher % agriculture, elevated loadings were not related to changes in autotrophic biomass, decomposition, or macroinvertebrate commu-

nities that were predicted to occur with increasing nutrient enrichment. Therefore, the sampling reaches are likely on the low end of the nutrient enrichment spectrum, perhaps because of depleted nutrient concentrations potentially resulting from low surface runoff and/or retention by riparian vegetation. However, the streams are probably towards the high end of the scale with respect to allochthonous organic enrichment. Increased inputs of riparian detritus were linked to elevated decomposition, increased abundance of macroinvertebrates, and a shift in community structure toward dominance by tolerant taxa, all patterns which were hypothesized to occur in response to nutrient enrichment. Overall, nutrient pollution from cropland agriculture in coastal watersheds with flat topography and forested riparian zones was insufficient to produce undesirable changes in nontidal streams. In these systems, local factors were more important than watershed land use in dictating macroinvertebrate community structure." (Author) Taxa - including Odonata - are treated at the genus level.] Address: not stated

**11061.** Eda, S. (2004): Annual meeting of the Japanese Society for Odonatology in 2004. *Tombo* 47: 58. (in Japanese, with English caption.) [The Annual meeting of the Japanese Society for Odonatology was held at Prefectural Museum of Nature and Human Activities in Sanda city, Hyogo Prefecture, on November 20 and 21, 2004 and 86 members attend.] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: [SND02767@nifty.com](mailto:SND02767@nifty.com)

**11062.** Futahashi, R. (2004): Record of the migrant species, *Sympetrum fonscolombii*, in Kôto-ku, Tokyo. *Tombo* 47: 46. (in Japanese, with English summary) [A male of *S. fonscolombii* was captured in Koto-ku, Tokyo, on 23-X-2004. This is the second record of the species from Kanto district, Japan.] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**11063.** Futahashi, R.; Hayashi, F. (2004): Distribution patterns of two damselfly species, *Mnais costalis* and *M. strigata*, in the Boso peninsula, Chiba prefecture. *Tombo* 47: 41-46. (in Japanese, with English summary) ["A total of 106 *Mnais* damselflies collected from the Boso Peninsula, Chiba Prefecture, central Japan, were classified into *M. strigata* Selys, 1853 (48 males, 9 females), *M. costalis* Selys, 1869 (40 males, 8 females), and their hybrid F1 (1 female) based on DNA sequences of a nuclear ribosomal internal transcribed spacer 1 (ITS 1). The peculiar forma *edai* Asahina, 1976 known from this peninsula was identified as one wing-colour form of *M. strigata*. The two species were distributed parapatrically with a narrow contact zone; i. e., *M. strigata* was restricted to the southern mountainous area of the Boso Peninsula, while *M. costalis* was distributed in the northern area of the Kanto plain. The two species were quite similar in their external morphology, excluding some different relationships between head width and forewing length and between pterostigma length and widths." (Authors)] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**11064.** Futahashi, R.; Hayashi, F. (2004): DNA analysis of hybrids between *Sympetrum e. eroticum* and *S. baccha matutinum*. *Tombo* 47: 31-36. (in English, with Japanese summary) ["The parent species of interspecific hybrids can be determined using nuclear and mito-

chondrial DNA analyses, as the latter is inherited maternally. In this study, we examined DNA from three field-caught individuals that appeared morphologically to be hybrids between two *Sympetrum* dragonflies, *S. eroticum eroticum* (Selys, 1883) and *S. baccha matutinum* Ris, 1911. All three hybrids had mixed nuclear DNA sequences (ribosomal RNA internal transcribed spacers 1 and 2 regions) of *S.e.e.* and *S.b.m.*, but had mitochondrial DNA sequences (large subunit ribosomal RNA gene) of *S.b.m.* only. This suggests that these hybrids were derived from interspecific mating between male *S.e.e.* and female *S.b.m.* Interspecific mating tandems have been reported in the field, and all but one involved male *S.e.e.* X female *S.b.m.* Therefore, male *S.e.e.* are apt to catch females of another species, and the direction of gene flow with hybridization between the two species is non-reciprocal." (Authors)] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**11065.** Hämäläinen, M.; van Tol, J. (2004): Note on the nomenclature of the Japanese *Mnais* species. Tombo 47: 12. (in English) [Verbatim: Hayashi & al. (2004) revised the taxonomy of the Japanese *Mnais* taxa. Two good species, *M. costalis* Selys, 1869 and *M. strigata* Selys, 1853 were recognized and *M. nawai* Yamamoto, 1956 was downgraded to synonymy with *M. costalis*. The authors claimed that *Mnais strigata* is the correct name of the taxon traditionally called *M. pruinosa* Selys, 1853 and presented the latter as a synonym. The act was justified as follows: "... *M. strigata* appeared before *M. pruinosa* in Selys' (1853) paper; so by page precedence *strigata* is the valid name. However, this act was not in agreement with the International Code of Zoological Nomenclature (ICZN, 1999). The descriptions of *Mnais strigata* and *M. pruinosa* were printed on p. 20 and 20-21, respectively, in Selys Longchamps (1853). When these taxa are ranked as synonyms, the correct name must be selected according to the rules of Article 24 (Precedence between simultaneously published names, spellings or acts). Article 24. 2.1 determines that the precedence is fixed by the action of the first author citing in a published work those names or acts and selecting from them; this author is termed the "First Reviser". In this case Selys Longchamps (1873) was the "First Reviser", since on p. 473 (p. 9 in reprint) he explicitly considered *costalis* and *strigata* as varieties of *Mnais pruinosa*, thus giving precedence to the name *pruinosa*. Consequently: *Mnais pruinosa* Selys, 1853; Synonym: *Mnais strigata* Hagen in Selys, 1853.] Address: Hämäläinen M., Dept Applied Zool., P.O. Box 27, FIN-00014 University of Helsinki, Finland; E-mail: [mati.hamalainen@helsinki.fi](mailto:mati.hamalainen@helsinki.fi)

**11066.** Kopij, G.; Nuttall, R.J.; de Swardt, D.H. (2004): An analysis of avian (Aves) stomach contents from South Africa. Durban Museum Novitates 29: 21-30. (in English) ["Stomachs were taken from birds collected during the years 1983-1998, mainly in the semi-arid grasslands and associated habitats of central South Africa, especially from the Free State Province. For each species for which stomach contents were analysed, the following information is given: age and sex of specimen(s) (if known), locality of collection, and dietary items found in the stomach. Previously, only anecdotal, or very general information on the diet of many southern African bird species has been available." (Authors) Odonata were found - partly in considerable amounts - in the stomachs of the following species: Black-necked Grebe (*Podiceps nigricollis*), Dabchick (*Tachybaptus ru-*

*ficollis*), Yellow-billed Egret (*Egretta intermedia*), Squacco Heron (*Ardeola ralloides*), Sacred Ibis (*Threskiornis aethiopicus*), Glossy Ibis (*Plegadis falcinellus*), African Spoonbill (*Platalea alba*), Black-winged Stilt (*Himantopus himantopus*), Burchell's Courser (*Cursorius rufus*), White-winged Tern (*Chlidonias leucopterus*), and White-throat (*Sylvia communis*.)] Address: Kopij, G., Dept Biol., National University of Lesotho, P.O. Roma 180, Lesotho. E-mail: [g.kopij@nul.ls](mailto:g.kopij@nul.ls)

**11067.** Kosterin, O.E. (2004): Odonata. In: Ministry of Nature Resources of Russian Federation Sokhondo Biosphere Nature Reserve & Russian Academy of Sciences, Siberian Branch Institute of Systematics and Ecology of Animals Siberian Zoological Museum: Biodiversity of the Sokhondo Nature Reserve. Arthropoda. Novosibirsk - Chita 2004: 81-87. (in Russian) [The Sokhondo Nature Reserve is situated in in the Kyra district of the Zabaikalsky Territory in the highest part of Khen-tei-Chikoi Upland, Russia. Its area occupies 2110 km<sup>2</sup> (for a map see: <http://arctoa.ru/ru/Archive-ru/18/7afonina-sokhondo.pdf>). The following species are discussed in detail: *Lestes dryas*, *L. sponsa*, *Sympecma paedisca*, *Coenagrion hylas*, *C. johanssoni*, *C. armatum*, *C. glaciale*, *C. lunulatum*, *C. ecornutum*, *Erythromma najas humerale*, *Enallagma cyathigerum*, *Anax parthenope*, *Aeshna juncea*, *Aeshna crenata*, *Aeshna caerulea*, *Ophiogomphus obscurus*, *Ophiogomphus spinicornis*, *Cordulia aenea*, *Somatochlora exuberata*, *Somatochlora graeseri*, *Somatochlora alpestris*, *Somatochlora shalbergi*, *Epitheca bimaculata*, *Pantala flavescens*, *Libellula quadrimaculata*, *Sympetrum danae*, *Sympetrum pedemontanum*, *Sympetrum vulgatum imitans*, *Leucorrhinia (rubicunda) intermedia*, and *Leucorrhinia (dubia) orientalis*.] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: [kosterin@bionet.nsc.ru](mailto:kosterin@bionet.nsc.ru)

**11068.** Monnerat, C.; Hoess, R.; Juillerat, L. (2004): *Sympetrum depressiusculum* (Odonata: Libellulidae) en 2002 et 2003 dans la région des Trois lacs. Bulletin roman d'entomologie 22(1): 39-45. (in French, with German summary) [In 2002, *S. depressiusculum* was found at eight localities in Seeland, Switzerland. The authors suppose a significant influx from that species. Most productive localities were the water bodies resulting from a mitigation measure in 1999 in the Staatsmoos bei Müntschemier (BE). There, at 13-VII-2003 a successful reproduction was noticed. In spite of this, in 2003 only few specimens could be observed. The authors suppose the lack of source populations and suboptimal regional habitats.] Address: Monnerat, C. CSCF, 14 rue des Terreaux, CH-2000 Neuchâtel, Switzerland. E-mail: [christian.monnerat@cscf.unine.ch](mailto:christian.monnerat@cscf.unine.ch)

**11069.** Oates, J.F.; Bergl, R.A.; Linder, J.M. (2004): Africa's Gulf of Guinea Forests: Biodiversity Patterns and Conservation Priorities. *Advances in Applied Biodiversity Science* 6: 90 pp. (in English) [Verbatim: Odonata have been surveyed in southwest Cameroon by Vick (1999), who has carried out field work at several sites over three years, and examined literature and museum records. Vick lists 179 known species and estimates that the fauna probably contains at least 200 species. He speculates that "few parts of Africa of equivalent area can match" the dragonfly species richness of S.W. Cameroon — he notes that Belize (similar in area to southwest Cameroon) has 170 recorded species and that Kenya (which is 24 times larger) has 194 species.



He also observes that the area is rich in ancient relicts and endemics, although he does not list them specifically.] Address: Conservation International, Center for Applied Biodiversity Science, 1919 M Street, NW, Suite 600, Washington, DC 20036, USA

**11070.** Preston, D.J.; McShane, M.K.K.; Evenhuis, N. L.; Samuelson, G.A.; Arakaki, K.T.; Polhemus, D.A. (2004): Arthropod survey of the Waiākea 1942 Lava Flow Natural Area Reserve and selected Kīpuka within the Mauna Loa Kīpuka Mosaic, Hawai'i. Contribution No. 2004-009 to the Hawaii Biological Survey: II + 44 pp. (in English) [USA; the following species were observed: *Anax strenuus*, *Pantala flavescens*, *Megalagrion amaurodytum peles*, *M. calliphya microdemas* and *Megalagrion hawaiiense*.] Address: Polhemus, D.A., Hawaii Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, Hawaii, 96817-2704, USA

**11071.** Sasamoto, A. (2004): On the true taxonomic status of *Stylogomphus lawrenceae malayanus* (Anisoptera: Gomphidae). *Tombo* 47: 27-30. (in English) ["*S. lawrenceae malayanus* Sasamoto, 2001 from the Malay Peninsula is regarded as a good species based on the comparison of its type specimens with the specimens including some paratypes of *S. lawrenceae* Yang et Davies, 1996." (Author)] Address: Sasamoto, A., 190-4 Yakuoji, Tawaramoto-chō, Shiki-gun, Nara, 636-0341, Japan. E-mail: akssmt@sea.plala.or.jp

**11072.** Tsuyuki, K.; Sudo, S. (2004): The properties of wing and airflow of flying insects. 24th International Congress of the Aeronautical Sciences: 10 pp. ["This paper describes the results of some experiments concerning wing morphology and flight performance of several flying insects; cicadas, dragonflies (*Sympetrum frequens*) and bumblebees. Firstly, the surface shapes of three insect wings were visualized by a distinct three-dimensional image. The surface shapes showed a difference of functions for flapping flight between each wing. Secondly, the distribution of velocity fields around a flapping dragonfly, a flapping bumblebee and a flapping cicada were visualized with a PIV system to identify the airflow generated by the wings. Periodical vortex rings were observed in the result with the bumblebee. Finally, the successful observation of a flapping cicada the free flight is reported." (Authors)] Address: Sudo, S., Faculty of Systems Science and Technology, Akita Prefectural University, Yurihonjo 015-0055 Japan. E-mail: sudou@iwakimu.ac.jp

**11073.** Yodo, T; Iguchi, K. (2004): Feeding habits of the alien species, Smallmouth Bass in the Nogu River, Central Japan. *Suisanzoshoku* 52(4): 395-400. (in Japanese, with English summary) ["Stomach contents of 82 larvae and juveniles and 30 young and adults of smallmouth bass *Micropterus dolomieu* collected in the Nogu River, Nagano Prefecture were examined. The Nogu River is a moderate to rapidly flowing stream and the current velocities of sampling stations were 16.5 to 73.4 cm/s (mean, 57.3). Smallmouth bass larvae and juveniles mainly fed on aquatic insects which were represented by chironomid larvae or baetid nymphs. Although, aquatic insects such as baetid and heptageniid nymphs were also important prey of young and adult smallmouth bass, they fed on various prey including fishes with a well developed swimming ability such as ayu *Plecoglossus altivelis altivelis* or masu salmon *Oncorhynchus masou masou*. With growth their main prey items shifted from stationary to slow moving benthic

and finally to free swimming species. We conclude that smallmouth bass damage to the stream-dwelling fishes as competitors for prey resources in addition to the direct predator." (Authors) Diet is listed at the family level including Gomphidae, Libellulidae, and Corduliidae.] Address: Yodo, T., Dept of Life Sciences, Faculty of Biore-sources, Mie Univ., 1515 Kamihama, Tsu, Mie 514-8507, Japan

## 2005

**11074.** Abbott, J. (2005): New and notable records of Odonata from Texas. *Southwestern entomologist* 30(3): 169-174. (in English) ["A dramatic increase in interest in the North American Odonata fauna in the last few years has led to many new discoveries, particularly in southern areas where subtropical species seem to be expanding their range northward. I report the occurrence of eight Odonata species previously unknown from Texas: *Argia oenea*, *Enallagma antennatum*, *Leptobasis melinogaster*, *Aeshna persephone*, *Anax concolor*, *Phyllocycla breviphylla*, *Erythemis attala*, and *E. mithroides*. These discoveries include four species previously unknown from the United States and the first occurrence of the genus *Leptobasis* in the country. Additionally, I discuss recent records of several other species rarely reported from Texas." (Author)] Address: Abbott, J.C., Patterson Labs 219, School Bio. Sci., Univ. Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**11075.** Boissinot, A. (2005): Deux nouvelles espèces d'insectes pour les Deux-Sèvres cet été – Une Libellule: *Sympetrum danae*. *Bull. Deux-Sèvres Nature Environnement* 34-2: 26-27. (in French) [zone humide du For-gineau, Cantal, France, August 2005.] Address: Deux-Sèvres Nature Environnement, 7 rue Crèmeau, 79000 NIORT, France. E-mail: contact@dsne.org

**11076.** Paulson D.R. (2005): Dragonflies in the canopy. *WHAT'S UP? The Newsletter of The International Canopy Network* 12(1): 7-8. (in English) [Verbatim: In the past few years, I have made dry-season visits to undisturbed rainforest sites in southern Venezuela and southern Peru, and it got me thinking about dragonflies and their use of three-dimensional space in forests. We know very little about this. When we see them in forested areas, it's either at or near ground level or - if in clearings or light gaps - perhaps in flight well above us, cruising around after flying insects. These recent visits are the first ones during which I have actively searched for dragonflies in the tropical rainforest canopy. Unfortunately, I could do so only from ground level, as neither of these sites had canopy access, so I was limited to what I could see by scanning with binoculars. I know that many odonates perch on tips of leaves and twigs, so I spent time scanning such potential perches, and if conditions were right, I could sometimes see they were occupied. It's well known that productivity is higher where there is sunlight, and of course there is much more sunlight at the upper levels of the canopy than down on the forest floor, where the aquatic breeding habitats for most dragonflies are located. Thus dragonflies feeding in rain forests should tend to move upward into the canopy, all other things being equal. In Venezuela, where the forest was fairly open, we saw numerous anisopterans perched high in the trees, usually on twigs. They varied in size but were obviously libellulids, including at least *Erythrodiplax*, *Micrathyria*, and *Orythemis*. The most easily identifiable were the little black-

winged beauties of the genus *Zenithoptera*, which perch with wings drooped and form tiny black parasols at the tips of upward pointing twigs and vines. The pale line through midwing distinguishes them easily from *Diastatops*, a related genus with all black or black and red wings, which I saw once in a similar situation. In Peru, we saw *Zenithoptera* again in the same sorts of places, as well as *Micrathyria*, *Misagria*, and *Orthemis* well up in the trees. However, *Erythrodiplax* in that forest usually perched low. At least some of these dragonflies were surely spending the dry season as immatures, delaying reproductive activity until the rains began, but others were probably reproductively active. While watching odonates at a sun-drenched grass bed in a small forest swamp completely surrounded by trees, I saw several *Zenithoptera fasciata* drop vertically out of the canopy like a falling leaf, land in the sun on the grass with wings closed, then droop them suddenly to catch the sun with their brilliant blue upper surfaces. Each of these individuals stayed for only a minute or two, then suddenly ascended back into the canopy, disappearing as mysteriously as they appeared. I assume they were visiting the mating rendezvous site, although surprisingly briefly. I spent time along a small sandy stream in the Peruvian forest, and at one place the stream was wide enough to present a vertical wall of foliage on either side, well insolated at midday. I scanned this foliage wall with binoculars and found damselflies mostly of the genera *Argia* and *Hetaerina* spread all across it, perched on leaf tips. I saw none above about 10 meters in height, but it surely became more difficult to see them at higher levels if they were up there. Among them was a female *Heteragrion* and a female of the rare *Heliocharis amazona*. As I watched, one after another launched itself out into the open at intervals after flying insect prey. Open air, sunshine, and abundant perch sites combined to make this an ideal spot for a damselfly picnic. These odonates all forage by sallying forth to capture flying insects, as far as I know, and their perches, right out in the open, are just as appropriately situated for them as they are for flycatchers, jacamars, and other sallying birds of the same habitat. One morning it was exceptionally windy, with tall canopy trees swaying and creaking, and this was the final bit of evidence that convinced me the canopy was full of odonates. There were more individuals and more species in evidence along the trail than I saw at any other time, and I could explain their presence only by the hypothesis that the winds had forced them down to lower levels. With limited evidence, I believe that rain forests are full of dragonflies at all levels, especially during the dry season when they're not breeding. They may be there as well during the wet season. I know people who have observed dragonfly behavior in and above rainforest canopies from canopy walkways and towers, but I haven't been so fortunate. This remains a dream that I hope to fulfill sometime, somewhere.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**11077.** Serafin, E. (2005): Feeding strategies of dragonfly larvae, or how to get out a caddisfly from its case. *Odonatrix* 1(2): 25-26. (in Polish, with English summary) ["This note presents the techniques of foraging of dragonfly larvae on caddisfly larvae, with some comments on dealing with caddis cases. Researches showed that the success of dragonflies in catching larval caddisflies were associated with rupturing a case as well as its construction. Hard and strongly built cases

were a handicap for obtaining larvae by dragonflies." (Author)] Address: Buczyńska, Edyta, Konrada Wallenroda Str. 2b/37, 20-607 Lublin, Poland

**11078.** Ternois, V. (2005): L'Agrion de Mercure *Coenagrion mercuriale* (Charpentier, 1840): synthèse de trois années d'observations dans le Nord-est aubois et la frange haut-marnaise limitrophe (Odonata, Zygoptera, Coenagrionidae). *Naturelle*, Le bulletin de l'association des Naturalistes de Champagne-Ardenne Mai 2005: 45-53. (in French) [Champagne-Ardenne, France; the author reports on regional efforts to study *C. mercuriale*. He gives suggestions for further studies on phenology, habitat preferences and co-occurring species.] Address: Ternois, V., 22, route de Sauvage-Magny 52220 Anglus, France. E-mail: vincathe@wanadoo.fr

**11079.** Willet, J. (2005): New dragonfly in central Scotland. *BRISC Recorder News* No 59: 4-5. (in English) [*Aeshna cyanea*, Plean Country Park, five miles east of Stirling, UK, 22-VIII-2005] Address: not stated

## 2006

**11080.** Indermühle, N.; Oertli, B. (2006): Restoration of riverine ponds along the Rhone River (Teppes de Verbois, Canton of Geneva, Switzerland): what is the gain for Odonata? *Archives des Sciences A* 59(2-3): 243-250. (in English, with French summary) ["The Teppes de Verbois Site is a recent example of riverine pond restoration in the canton of Geneva (Switzerland). Between 1999 and 2001, four permanent and several small temporary ponds (total surface of the waterbodies: about 7 ha) have been dug on the site of an ancient gravel pit. During 2004, the four permanent ponds were sampled for Odonata once a month from May to September. Adult Odonata were identified and their abundance estimated. A total of 25 species was identified, representing more than half of the species occurring in the canton of Geneva. Two species among them are Swiss Red List species: *Orthetrum albistylum* (EN) and *Gomphus pulchellus* (VU). They are considered as target species for the management of the restored Teppes de Verbois site. The creation of these off-channel habitats appears to have very positive impacts on Odonata. On the level of the canton, the species richness of the Teppes de Verbois has reached (and partly even outmatched) the richness of the other nature reserves, after only four years of colonisation. On a regional scale, the new ponds improve the network of alluvial habitats, allowing each Odonata metapopulation to become more abundant and to find more breeding sites. On a national and international level, the high abundance of *Gomphus pulchellus* is of particular interest, as this dragonfly is the only European endemic species occurring in the canton of Geneva." (Authors)] Address: Oertli, B., Dept of Nature Management, University of Applied Sciences of Western Switzerland, EIL HES de Lullier-Geneva, 150 route de Présinge, CH-1254 Jussy, Switzerland. E-mail: beat.oertli@etat.ge.ch

**11081.** Kim, S.-T.; Jung, M.P.; Kim, H.S.; Shin, J.-H.; Lim, J.-H.; Kim, W.T.; Lee, J.H. (2006): Insect fauna of adjacent areas of DMZ in Korea. *Journal of Ecology Field Bulletin* 29(2): 125-141. (in English) ["Insect fauna in adjacent areas of Demilitarized Zone (DMZ) in Korea was surveyed seasonally in 2001 - 2003. The survey area was divided into 3 regions (eastern mountain, middle inland, and western coastal regions) in accord-

ance with administrative districts and topography. Sampling methods such as sweeping, sieving, beating, brushing and suction were used depending on the environmental and military conditions. Total 361 genera and 437 species of 116 families belonging to 14 orders were identified. Among these, 46 species were new to insect fauna of DMZ areas. Species richness was the highest in the eastern mountain region. Numbers of habitat-common and -specific species were 96 (22%) and 195 (47.2%), respectively. The insect species community similarity was highest (0.64) between eastern mountain region and western coastal region. Insect orders showing high species richness were Coleoptera (38.9%), Lepidoptera (19.2%), Orthoptera (9.4%), and Hemiptera (9.2%). These results will be useful information for study of history on the change of insect fauna and future conservation in DMZ areas." (Authors) The paper lists 10 Odonata species from the Eastern mountain and Middle inland regions.] Address: Kim, Seung-Tae, Dept of Forest Environment, Korea Forest Research Institute, Seoul 130-712, Korea. Lee, J.H.: E-mail: jh7lee@snu.ac.kr

**11082.** Lailvaux, S.P.; Irschick, D.J. (2006): A functional perspective on sexual selection: insights and future prospects. *Animal Behaviour* 72: 263-272. (in English) ["A large number of sexual selection studies have focused on examining the morphological and behavioural factors involved in male combat and female choice, such as whether large males achieve higher reproductive success compared with smaller males. However, until recently, the mechanistic reasons why such cues are linked to male dominance or female choice have been elusive. An emerging body of work shows that physiological and whole-organism performance capacities are important in individual reproductive success. Males with high performance or other physiological capacities (e.g. endurance, biting) often enjoy an advantage over males with poorer performance capacities during male-male contests. In contrast, few studies have examined links between performance and female choice. Here, we highlight recent key literature integrating sexual selection, performance and physiology. We also point to areas where a more rigorous investigation of underlying physiological processes may yield insights into sexual selection. In particular, we note that current progress in several important areas may be hampered by an inadequate physiological understanding of condition. We suggest a conceptual approach that may shed light on the physiological factors underlying condition, and we point out several other potentially important avenues for future research." (Authors) The review includes studies on *Calopteryx maculata* and *C. virgo*.] Address: Lailvaux, S.P., Functional Morphology Laboratory, Department of Biology, University of Antwerp, Universiteitsplein 1, Wilrijk B-2610, Belgium. E-mail: slailvaux@gmail.com

**11083.** Reis Monteiro, B. (2006): Distribuição dos Lepidópteros e Odonatas da Reserva Natural da Serra da Malcata. Universidade de Aveiro, Departamento de Biologia. Ano lectivo: 2005/2006: 121 pp. (in Portuguese) [Portugal; the paper lists and maps 22 Odonata species from the nature reserve. The list includes *Coenagrion caerulescens*, *Oxygastra curtisii* and *Macromia splendens*. For details see: <http://portal.icnb.pt/NR/rdonlyres/148CB72B-A944-4DCF-8B1C-FE469FEBA9DE/0/RNSMLepidopterosOdonatasDistribuicao2006.pdf>] Address: not stated

**11084.** Biggs, K.; Manolis, T. (2007): Dragonflies of North America. A color and learn book with activities. Azalea Creek Publishing: 48 pp. (in English) ["Colour & learn about the gorgeous dragonflies & damselflies of North America. Colouring pages about the life history and biology of Odonata. Colouring pages for 37 common species of Dragonflies and Damselflies. Includes activities: crossword puzzle, other word games, and cut out finger puppets. Small coloured images for all the pages are provided on the inside covers. Available on a CD-ROM (interactive PDF format): (ISBN 0-9677934-5-9): The same pages as the book, but interactive, and with one bonus page! Colour the pages over and over again! Colour some pages to look like juvenile males; others as mature males or females. Print multiple copies of all or some of the pages for your classroom &/or friends." (Publisher) For more details see: <http://southwestdragonflies.net/ColoringBook/#CD>] Address: Biggs, Kathy, 308 Bloomfield Road, Sebastopol CA, 95472, USA. E-mail: bigsnest@sonic.net

**11085.** Dyuzhaeva, I.V. (2007): Concerning the role of the Samara State University Botanical Garden in urban insects preservation. *Samara Luka: Bull.* 16(1-2): 174-181. (in Russian, with English summary) ["During 30-years researches within the botanical garden territory, 773 species of insects from 15 groups, 123 families and 553 genera have been revealed. After 1990 here about 50 species of insects have ceased to meet or became extremely rare." (Author) Taxa - including Odonata - are treated at the family level.] Address: not stated

**11086.** Faucheux, M.; Meurgey, F. (2007): Première description des sensilles sur l'antenne larvaire d'un Anisoptère; *Aeshna cyanea* (Odonata: Anisoptera; Aeshnidae). *Comparaison avec les antennes des Zygoptères.* *Bull. Soc. Sci. Nat. Ouest Fr.* 29(4): 192-202. ["The sensilla on the larval antennae of *A. cyanea* have been described by means of scanning electron microscopy and compared with those of Zygoptera, the larval antenna comprises a scape, a pedicel and a 5-segmented flagellum. No sensillum has been observed on the scape. The pedicel bears two sensillum types: typical aporous sensilla chaetica and spatula-shaped aporous sensilla chaetica. A few aporous sensilla filiformia are distributed on the whole length of the flagellomeres. Other sensilla filiformia are lined up to a circle at the apex of these flagellomeres. An aporous curved sensilla chaeticum occurs at the apex of the 4th flagellomere. Two sensilla campaniformia are located on the 5th flagellomere. Judging from their morphological characteristics and their position on the antennae, the typical sensilla chaetica of the pedicel are proprioceptors, those of the flagellum are tactile; the spatula-shaped sensilla chaetica are proprioceptors; the sensilla filiformia are vibroreceptors; the curved sensillum chaeticum is a proprioceptor making possible the positioning of the flagellomeres, and the apical sensilla campaniformia probably provide an osmoreceptive function. No chemoreceptor has been observed. The larval antennal sensory equipment of the anisopteran *Aeshna cyanea* resembles that of the larvae of Zygoptera." (Authors)] Address: Faucheux, M.J., Laboratoire d'Endocrinologie des Insectes Sociaux, Université de Nantes, 2 rue de la Houssinière, B.P. 92208, F-44322 Nantes Cedex 03, France. E-mail: faucheux.michel@free.fr



**11087.** Gabriels, W. (2007): Multimetric assessment of freshwater macroinvertebrate communities in Flanders, Belgium. PhD thesis. Faculty of Bioscience Engineering, Ghent University, Belgium. ISBN-number: 978-90-5989-203-3: 207 pp + appendices. (in English) [Since the Belgian Biotic Index (BBI) does not meet all the requirements of the European Water Framework Directive (WFD; EU, 2000), a new index, the Multimetric Macroinvertebrate Index Flanders (MMIF) for assessing rivers and lakes is proposed. This index is developed using the database of macroinvertebrate samples provided by the Flemish Environment Agency. The MMIF is calculated based on macroinvertebrate community data obtained using the same sampling and identification procedure as the BBI. The index calculation is a type-specific multimetric system based on five equally weighted metrics, which are taxa richness, number of Ephemeroptera, Plecoptera and/or Trichoptera taxa, number of other sensitive taxa (including Odonata at the family level), the Shannon-Wiener diversity index, and the mean tolerance score. The final index value is expressed as an EQR ranging from zero for bad status to one for high status. The MMIF combines the robustness of the BBI and the long-term experience in Flanders with the flexibility of multimetric indices, while at the same time taking into account the technical requirements of the WFD. For details see: <https://archive.ugent.be/retrieve/4808/Gabriels2007PhD-thesis.pdf>] Address: not stated

**11088.** Henriques-de-Oliveira, C.; Baptista, D.F.; Nessimian, J.L. (2007): Sewage input effects on the macroinvertebrate community associated to *Typha domingensis* Pers in a coastal lagoon in southeastern Brazil. *Braz. J. Biol.* 67(1): 73-80. (in English, with Portuguese summary) ["This study was carried out at Imboassica Lagoon, located in an urban zone in the municipality of Macaé, Rio de Janeiro state, Brazil. This lagoon has been subject to anthropogenic impacts due to the increasing city population, such as the input of sewage. Areas of variable degree of anthropogenic influence in the lagoon were compared regarding the structure of the macroinvertebrate community associated to *Typha domingensis* leaves. For sampling, we used 35 x 20 cm net plastic bags, with 6.8 mm mesh containing *T. domingensis* leaves for colonization. Two different sampling stations were selected: station A, under direct input of sewage; and station B with lesser sewage influence. The bags were removed after 20, 40 and 75 days of colonization. For each sample the Shannon-Wiener Diversity, Pielou Evenness, Jaccard Similarity Indices, Correspondence Analysis and taxonomic richness were calculated. A total of 31,874 individuals were sampled, belonging to 34 taxa. The main taxonomical groups were: Oligochaeta (41%), Chironomidae (40%), Ancyliidae (4.6%), Polymitarcyidae (4%) and Thiaridae (3%). At station A, the taxonomic richness, the Evenness and Diversity values were lower than in station B. On the other hand, the total density was three times higher in station A than in B. It was already possible to discriminate the community structure of each sampling station in the first sampling. Trichoptera and Ephemeroptera were the main exclusive groups of station B and are considered good water quality indicators due to their high sensibility to contamination. The major contribution to discriminate between the macroinvertebrate communities of the two sample stations came from Chironomidae, Oligochaeta and Ephemeroptera." (Authors) Taxa including Odonata are treated at the family or genus level. Odonata, mainly Coenagrionidae, represented

only 0.5% of all specimens collected.] Address: Henriques-de-Oliveira, C., Laboratório de Entomologia, Departamento de Zoologia, Instituto de Biologia, Universidade Federal do Rio de Janeiro, CP 68044, CEP 21944-970, Cidade Universitária, Rio de Janeiro, RJ, Brazil. E-mail: [crikes@acd.ufrj.br](mailto:crikes@acd.ufrj.br)

**11089.** Holuša, O. (2007): Výsledky faunistického průzkumu vážek (Odonata) na území národního parku Podyjí a na několika lokalitách v okolí. *Thaynesia (Znojmo)* 7: 239-247. (in Czech, with English summary) [Czech Republic; between 1999 and 2005, 33 Odonata species were found at 19 localities within the boundaries of the National park of Podyjí and in its surroundings. Of regional interest are *Anax parthenope*, *Crocothemis erythraea*, *Leucorrhinia pectoralis*, and *Coenagrion scitulum*.] Address: Holuša, O., Mendelova zemědělská a lesnická Univerzita v Brně, Lesnická a dřevařská fakulta, Ústav lesnické botaniky, dendrologie a geobiocenologie, Zemědělská 3, 613 00 Brno, Bruzovská 420, 73 801 Frýdek-Místek. E-mail: [holusao@email.cz](mailto:holusao@email.cz)

**11090.** KNNV (Koninklijke Nederlandse Natuurhistorische Vereniging) (2007): Verslag van het kamp Elbeta-lae in Gartow (D), Gehouden van 8 t/m 22 juli 2007. KNNV- AKC Kamp Gartow am See 2007. <http://www.knnv.nl/akc/2007%20verslagen/Gartow/Gartow.pdf>: 23 pp. (in Dutch) [Niedersachsen, Germany. An excursion to the floodplain of the river Elbe resulted in the observation of 22 Odonata species. These are documented without any details in a cumulative list.] Address: not stated

**11091.** Meurgey, F. (2007): A contribution to the knowledge of the Odonata of Dominica (British West Indies) November 11 - December 07 2006. *NHMN (Nantes Museum of Natural History) Contribution to odonatology* 4: 22 pp. (in English) ["The dragonfly fauna of the Lesser Antilles actually counts 135 species - 59 without Trinidad, which is definitely South American - there are 37 species in Guadeloupe (Meurgey, 2006b) and 24 in Martinique (Meurgey, 2005). It seems that the paucity of species in Dominica is due to 1) the lack of standing water habitats (95% of Odonata reproduce in standing water), and 2) the lack of studies, with only two surveys. The number of species from Martinique, which is quite equal to those from Dominica, is due to a high level of disturbances, pollutions and urbanization. We think that the fauna of Dominica could be reach 30-35 species. The origin of the dragonfly fauna of the Lesser Antillean Islands is still poorly known. Dominica is situated near the middle of the Lesser Antilles and its dragonfly fauna is mainly composed with South American species. These species have strongest relative abundances and, in general, are the most frequently observed. There is no endemic species on Dominica. Two species, however, have a worldwide distribution restricted to some Lesser Antilles islands (Guadeloupe, Dominica and Martinique): *Argia concinna* and *Protoneura ailsa*. Antillean species: Four species restricted to the West Indies occurs in Dominica. *Enallagma coecum* is mentioned from Cuba to Ste Lucia, but seems to be replaced in the Greater Antilles by *Enallagma cardenium*. *Orthemis macrostigma*, at that time, occurs only in the Lesser Antilles and seems to be replaced by others undescribed species in the Greater Antilles. *Tramea insularis* is mentioned in the Greater Antilles from Cuba to Puerto-Rico, and in the Lesser Antilles, only on Guadeloupe and Dominica. Finally, *Brechmorhoga grenadensis* is restricted to some Lesser Antillean islands (Guadeloupe,

Dominica, Martinique, Grenada). South American and Central American species: On the 25 species occurring in Dominica, 17 have a South American or Central American centred distribution. Some of these species occurs both in Central and South America: *Ischnura hastata*, *Ischnura ramburii*, *Lestes forficula*, *Lestes tenuatus*, *Telebasis corallina*, *Anax concolor*, *Rhionaeschna psilus*, *Triacanthagyna trifida*, *Brachymesia furcata*, *Brachymesia herbida*, *Erythemis vesiculosa*, *Erythrodiplax umbrata*, *Dythemis sterilis*, *Miathyria marcella*, *Micrathyria aequalis*, *Micrathyria didyma*, *Tramea abdominalis*. Wide ranging species: This group comprises *Anax ephippiger* and *Pantala flavescens*, which is a cosmopolitan species, present in all continents, excepted Europe. Considered as a pioneer in newly or disturbed habitats, with a short larval development, *Pantala flavescens* is scarce on Dominica and fairly common in neighbouring islands. More astounding is the lack of *Anax junius* on Dominica. This North American species occurs both in the Antilles and South America, as well as Russia, east Asia and Polynesia. Common in Guadeloupe and Martinique, where this species regularly breed, it was never mentioned from Dominica." (Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**11092.** Thompson, D.J.; Watts, P.C.; Saccheri, I.J. (2007): 12. Conservation genetics for insects. Stewart, A.J.A., T.R. New & O.T. Lewis (eds): *Insect Conservation Biology: Proceedings of the Royal Entomological Society's 23rd Symposium: The 22nd Symposium of the Royal Entomological Society: 280-300.* (in English) ["The importance of inbreeding and genetic drift for population persistence is likely to vary considerably among insect species, depending on their genetic load (of deleterious mutations) and the need to adapt to environmental change over differing spatial and temporal scales. It would therefore be valuable to collect more data on inbreeding depression in insects and also to characterize the ecological context of selective environments, which determine the relative magnitude of hard versus soft selection and the demographic consequences of selection. While purely ecological management is aimed at maintaining a given census population size, genetic management is focused on the maintenance of effective population size. As we have discussed, these two measures of population size may differ by an order of magnitude or more, but in most insects both remain something of a mystery. This said, we summarize the features that predispose many insects to such genetic effects ... The second major genetic issue is the number of founders or immigrants that should be introduced. Inbreeding depression can be largely avoided with effective population sizes greater than 50 (1% inbreeding per generation), which may be equivalent to 100 or 1000 individuals. Maintaining genetic diversity, particularly the contribution of rare alleles, would require an effective population size closer to 1000 (Nunney and Campbell, 1993). ... We can illustrate (at least the first of these issues in practical terms by returning to the endangered damselfly *Coenagrion mercuriale*. ... Newly restored habitat close to existing sites can expect natural recolonization in ecological time (or could be augmented from existing strong populations in the Itchen Valley or Beaulieu Heath, New Forest). Those populations in which genetic erosion has taken place, for example Nant Isaf in Anglesey and the Devon sites of Aylesbeare Common and Colaton Ra-

leigh Common, should clearly be augmented from the UK stronghold sites. The issue is straightforward for the Devon sites where the habitat and phenology is similar to key sites within New Forest, so the source for the material to be reintroduced can be identified clearly. The issue is less clear-cut for the Nant Isaf site, which is one of only two fen sites for *C. mercuriale* in the UK. The other fen site, in Oxfordshire, is also genetically depauperate, whereas the UK stronghold sites are not fens. We can be less confident that augmentation would be successful, though there would appear to be no options other than waiting for the Nant Isaf population to become extinct." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**11093.** van Nieukerken, E.J.; Huijbregts, J. (2007): *Tijdschrift voor Entomologie* 150 volumes: one and a half century of Systematic Entomology in a changing world. *Tijdschrift voor Entomologie* 150: 245-261. (in English) ["The *Tijdschrift voor Entomologie* started in 1857 and 1858 with volume 1, and has now existed for 150 years. A brief history is presented, and details are given on editors (including biographies), composition, publication dates, indexes, authorship, division of articles over biogeographic regions and taxonomic groups, illustrated with graphs and tables. The complete index of 150 volumes is published online at the same time as this issue, as are pdf files of volumes 141 to 148, and some papers of this issue." (Authors) The paper also includes a portrait of Jan van Tol, leading taxonomist in south-east Asian Odonata. ] Address: van Nieukerken, E.J., National Museum of Natural History Naturalis, PO Box 9517, 2300 RA Leiden, The Netherlands. E-mail: nieukerken@naturalis.nl

**11094.** Wildermuth, H. (2007): *Salamander, Prachtlibelle und Quelljungfer. Naturschutzinventar fünf ausgewählter Fliessgewässer-Organismen und ihrer Lebensräume in der Gemeinde Rüti ZH 2005-2007.* © 2007 Prof. Dr. Hansruedi Wildermuth, Haltbergstrasse 43, 8630 Rütli. hansruedi@wildermuth.ch: 42 pp. (in German) [Between April 2005 and May 2007, the system of running waters (37 brooks and ditches) in Rütli, Switzerland, was studied for selected species focusing on *Calopteryx splendens*, *C. virgo*, *Cordulegaster bidentata*, and *C. boltonii*. Characteristic species of the water bodies are *C. virgo* and *C. boltonii* (and *Salamandra salamandra*, Amphibia). Rare are *C. splendens* and *C. bidentata*. The distribution patterns and underlying ecological factors are discussed in detail. Both, natural and/or anthropogenic factors limit the usability of the water bodies as habitat. Measures to improve habitats for the studied species are proposed.] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

## 2008

**11095.** Baus, E. (2008): Une menace de plus pour la biodiversité? *Science Connection* 21: 35-37. (in French) [Belgium; the paper briefly refers to present discussion of climate change as an addition threat for biodiversity. *Crocothemis erythraea* is noted and pictured.] Address: Baus, Erika c/o Editeur responsable: Philippe Mettens, Rue de la Science, 8, B - 1000 – Bruxelles, Belgium

**11096.** Bonifait, S.; Defos du Rau, P.; Soulet, D. (2008): Les Odonates de la Réserve Nationale de Chasse et de Faune Sauvage d'Orlu (département de l'Ariège, France). *Martinia* 24(2): 35-44. (in French, with English summary) ["20 Odonata species were identified during a survey realized in 2004 in the Orlu protected area (Ariège Pyrenees, montane ecosystem: 915-2765 m). In addition to adult survey, further data were obtained from searches of larvae and exuviae. A small population of *Coenagrion mercuriale* was found between 1300 and 1425 m, a new altitudinal limit for this species, as far as we know. The odonate community of Orlu includes few species but shows comparatively high inter-site variability, especially in flowing habitats. Lentic habitats are characterized by a boreo-montane assemblage richer and typical of peaty ponds, composed of *C. hastulatum*, *Aeshna juncea*, *Leucorrhinia dubia*, *Enallagma cyathigerum*, *Libellula quadrimaculata* and *Somatochlora metallica*. The degree of wetlands' use by cattle and fishery management are the main conservation issues for Odonates in the Orlu protected area." (Authors)] Address: Bonifait, S., ONCFS – Cellule technique, D.R. Sud-Ouest, 10 bis route d'Ax, F-31120 Portet sur Garonne, France. E-mail: sylvainbonifait@yahoo.fr

**11097.** Ellenrieder, N. von; Lozano, F. (2008): Blues for the red Oxyagrion: a redefinition of the genera *Acanthagrion* and *Oxyagrion* (Odonata: Coenagrionidae). *International Journal of Odonatology* 11(1): 95-113. (in English, with Spanish summary) ["Examination of diagnostic features for all known species of *Acanthagrion* and *Oxyagrion* shows color pattern alone not to be a reliable diagnostic character. Both genera are redefined based on morphological characters, and some colour pattern characters which further aid in their diagnoses. A preliminary phylogenetic analysis indicates both genera are monophyletic. They are distinguished from other genera of Neotropical coenagrionids by their decumbent cerci with a dorso-basal tubercle in males correlated with the presence of paired mesepisternal fossae in females. *Acanthagrion* and *Oxyagrion* can be unequivocally distinguished from each other by the minimum width of abdomen, shape of distal portion of genital ligula and position of lateral lobes of genital ligula relative to flexure in males, development of mesepisternal carinae and of dark mid-dorsal and humeral stripes in females, and ratio of caudal lamellae to abdominal length in ultimate larval instars. According to our redefinition we transfer *A. ablutum* (a 'blue' species), *A. hermosae* and *A. imeiriense* to *Oxyagrion*, and *O. egleri* to *Acanthagrion*. The generic placement of '*A. taxaense*' and '*O. pseudocardinale*' is deemed doubtful." (Authors)] Address: Ellenrieder, Natalia von, California State Collection of Arthropods, CDFA, 3294 Meadowview Road, Sacramento, CA 95832. Email: natalia.ellenrieder@gmail.com

**11098.** Geraeds, R.P.G. (2008): Two larvae of the Golden-ringed dragonfly found in the Swalm brook. *Natuurhistorisch Maandblad* 97(5): 122-124. (in Dutch, with English summary) ["During a survey of the Swalm brook by the fish study group of the Natuurhistorisch Genootschap on 29 September 2007, a larva of the Golden-ringed dragonfly (*Cordulegaster boltonii*) was caught, near the German border. Since this species is very rare in the Netherlands, the site was visited again on 5 October 2007, and a second larva was found at this location. Until recently, the populations of *C. boltonii* in the Meinweg and Haeseraalbroek nature reserves were the only known populations in the Netherlands, but the species

has frequently been spotted at other locations since the end of the previous century. Also, two new breeding sites have been found in the province of Limburg, viz. the Aalsbeek/Molenbeek and Venbeek brooks. Since the Dutch part of the Swalm brook does not appear to be an ideal breeding water for *C. boltonii*, it is not likely that this brook actually hosts a population. The larvae probably reached the Dutch part of the Swalm by larval drift from the upstream German part or from one of its tributaries. It is thus possible that *C. boltonii* may some day colonise smaller streams like the Eppenbeek and Teutebeek brooks in the Swalm valley." (Author)] Address: Geraeds, R.P.G., Bergstraat 70, NL-6131 AW Sittard, The Netherlands

**11099.** Hothem, R.L. (2008): Mercury contamination in Foothill Yellow-legged Frogs (*Rana boylei*) and invertebrates from Harley Gulch, California, 2007. Administrative Report. Prepared for: The Bureau of Land Management, U.S. Department of the Interior, U.S. Geological Survey, Western Ecological Research Center: 24 pp. (in English) [USA "Fish and wildlife may bioaccumulate mercury (Hg) to concentrations that adversely affect their reproduction, growth, and survival. In May 2007, we collected aquatic invertebrates and *Rana boylei* from sites within the Harley Gulch watershed for comparison with those collected from Harley Gulch in earlier years and from reference sites. Aquatic invertebrates were analyzed for both total Hg and MeHg. Methylmercury concentrations in water striders and larval dragonflies collected in 2007 were higher from below the confluence of the west and east forks of Harley Gulch (lower Harley Gulch) than from the East Fork. Dragonflies ("*Aeshnidae*, *Libellulidae*") from the West Fork wetland pond were also higher than the East Fork. All samples had higher MeHg concentrations than references collected from the Bear River at the Highway 20 Bridge in 1999-2002. The 2007 samples, collected at Harley Gulch in the spring (May) had lower concentrations of Hg than the samples collected in the fall (October) of 2002. All frogs were analyzed for total Hg at a contract laboratory; selected frogs were also analyzed for methylmercury (MeHg). Mercury concentrations in frogs from lower Harley Gulch in 2007 were similar to frogs collected in 1997 and 1998 from lower Harley Gulch and from upstream in the Turkey Run and Abbot Mine drains. Mercury concentrations in foothill yellow-legged frogs collected from lower Harley Gulch were significantly higher than both frogs collected from the east branch of Harley Gulch in 2007 and those from three reference sites sampled in 1997. In 31% of the frogs collected from lower Harley Gulch in 2007, the concentration of total Hg exceeded the FDA criterion (1.0 ig/g) for regulation of commercial fish, and all frogs exceeded the EPA criterion (0.3 ig/g) for issuance of human health advisories for fish consumption. The Hg concentrations in frogs collected from lower Harley Gulch and the mine drains in 1997-1998 and from lower Harley Gulch in 2007 all exceeded the MeHg criterion for the protection of piscivorous wildlife (0.077 ig/g). Mercury bioaccumulation in frogs and invertebrates corroborated previous findings that identified the presence of significant sources of Hg within the Harley Gulch subwatershed." (Author)] Address: Hothem, R.L., Dixon Field Station, U.S. Geological Survey, Western Ecological Research Center, 6924 Tremont Road, Dixon, CA 95620, USA

**11100.** Jakab, T.; Dévai, G. (2008): The occurrence of the riverine dragonfly-species (Odonata: Gomphidae) in



Hungary according to data of larvae and exuviae. *Acta Biol. Debr. Oecol. Hung* 18: 53-65. (in Hungarian, with English summary) [Records of *Gomphus vulgatissimus*, *Stylurus flavipes*, *Ophiogomphus cecilia*, and *Onychogomphus forcipatus* in southwestern Hungary (River; Dráva, Gyöngyös (Kőszeg), Hernád, Ipoly, Kerka, Maros, Rába, Sajó, Szamos or upper reaches of the Tisza) are documented and mapped.] Address: Jakab, T., Kosuth Lajos Gimnázium, 5350 Tiszafüred, Baross Gábor út 36, Hungary

**11101.** Kamsia, B.; Zainodin, J.; Darmesah, G.; Noraini, A.; Amran, A. (2008): Effect of water parameters on Ephemeroptera abundance in Telipok River, Sabah Malaysia. *WSEAS Transactions on Environment and Development* 5(4): 447-451. (in English) ["This research was conducted to investigate the relationship between Ephemeroptera with water parameter such as pH, conductivity, turbidity, dissolved oxygen and total suspended solid in Telipok River, Sabah (Malaysia) using multiple linear regression. There were 32 possible models were considered in this work derived from the four significant correlation coefficients (between the dependents and independents variables). Eight selection criteria (8SC) were used in selecting a best model which signified the abundance of Ephemeroptera in the river. In order to understand the effect of the water parameters on Ephemeroptera numerical illustrations given in this work." (Authors) Odonata (not further detailed) are well represented at all sampling stations.] Address: Kamsia, B., Environmental Science Programme, School of Science & Technology, Universiti Malaysia Sabah, Locked bag 2073, 88999 Kota Kinabalu, Malaysia. bkamsia@ums.edu.my

**11102.** Kucuk, S.; Alpbaz, A. (2008): The impact of organic pollution on the Kirmir Creek and Sakarya River in Turkey. *Water Resources* 35(5): 591-597. (in English) ["The qualitative and quantitative characteristics and seasonal distribution of macroinvertebrates in the Kirmir Creek are determined by samples of bottom sediments and water." (Authors) Taxa including Libellulidae are treated at the family level.] Address: Kucuk, S., Adnan Menderes University, Faculty of Agriculture 09100, Aydin, Turkey

**11103.** Rijpkema, B. (2008): De natuur dichtbij: Ontdek Vlinders & Libellen – Op pad in 25 bijzondere gebieden. KNNV Uitgeverij, Zeist. ISBN 978-90-5011-272-7: 128 pp. (in Dutch) [The author introduces the butterfly and dragonfly fauna of 25 Dutch nature reserves. She invites people to walk through these reserves and get acquainted with the species diversity "from bogs to dunes, from forests to heathland". Background information, as pictures to identify the species and trails where to explore the species, will help to spend some pleasurable times. Be inspired by the crisp text and beautiful pictures, pull on your hiking shoes and explore the Dutch wealth of butterflies and dragonflies!]

**11104.** Timms, B.V. (2008): The ecology of episodic saline lakes of inland eastern Australia, as exemplified by a ten year study of the Rockwell-Wombah Lakes of the Paroo. *Proceedings of the Linnean Society of New South Wales* 129: 1-16. (in English) ["Studies on salt lakes are mostly snapshots of their unique characteristics and relationships. Longer term studies provide different perspectives on variability in hydrology, salinity and biological communities. Such a study on five lakes near the Paroo River in the northwestern Murray-

Darling Basin showed most hold water episodically for about 80% of the time, but each fluctuate over a characteristic salinity range : unnamed lake 0.6 - 19 gL<sup>-1</sup>, Wombah 1.2-30 gL<sup>-1</sup>, North Blue 0.3 - 31 gL<sup>-1</sup>, Mid Blue 0.7 - 103 gL<sup>-1</sup>, and Bulla 1.8 - 262 gL<sup>-1</sup>. Generally, instantaneous biodiversity is low and not necessarily correlated with salinity, but unlike southern seasonal salt lakes, species accumulation lists are long, approaching 80 species of invertebrates, 50 bird species and a few fish species per lake. Diversity is promoted by salinity fluctuation and habitat heterogeneity. Most species reach peak abundance in any season as long as conditions are within their physiological salinity tolerances. Invertebrate fauna is of inland affinities, but with some localized substractions and additions explained by hydrology and/or salinity; waterbird numbers are influenced by events elsewhere in Australia as well as by local conditions. Like most naturally salinised lakes, production can be high, especially at low to moderate salinities and algal blooms occur naturally from time to time." (Author) Littoral invertebrates in the five lakes include the following Odonata species: *Austrolestes annulosus*, *Ischnura heterosticta*, *Xanthagrion erythroneurum*, *Diplacodes bipunctata*, *Hemicordulia tau*, *Hemianax papuensis*, and *Tramea loewii*.] Address: Timms, B., School of Environmental and Life Sciences, University of Newcastle, Callaghan, NSW, 2308, Australia. Email: brian.timms@newcastle.edu.au

**11105.** Zawal, A.; Jaskuła, R. (2008): First data for parasitizing on *Sympetrum meridionale* (Selys [sic]) by *Arenurus* (Acari: Hydrachnidia) larvae from Montenegro. *Natura Montenegrina* 7(3): 354-359. (in English) ["Six males of *S. meridionale* from Montenegro were found with 158 parasitic larvae of *A. papillator*. All the larvae were attached to lower surface of wings. More larvae were attached to the 2nd pair of wings (85 larvae) and a little fewer were attached to the 1st pair of wings (56 larvae). The water mite larvae preferred Cu-1 veins for attaching followed by M4 veins." (Authors)] Address: Jaskuła, R., Department of Invertebrate Zoology & Hydrobiology, University of Łódź, 90-237 Łódź, Banacha 12/16, Poland. E-mail: radekj@biol.uni.lodz.pl

## 2009

**11106.** Chan, T. (2009): Taxonomic studies of the larval stage of Aeshnidae (Odonata) in Taiwan. Master thesis, Graduate Institute of Biological Resources and Technology, National Dong Hwa University, Taiwan: V + 110 pp. (in Chinese, with English summary) ["The Aeshnidae is the second largest family of Odonata in Taiwan, with 23 species now assigned to 9 genera. Seventeen species of larval aeshnids from 8 genera collected in Taiwan were taxonomically studied. Based on literature records and examination of an extensive collection, of larval of *Periaeschna magdalena* Martin, 1909, *Planaeschna risi risi* Asahina, 1964, *P. taiwana* Asahina, 1951, *Aeshna petalura taiyal* Asahina, 1938, *Polycanthygyna erythromelas* (McLachlan, 1896), *Polycanthygyna melanictera* (Selys, 1883), *Anaciaeschna jaspidea* (Burmeister, 1839), *A. martini* Selys, 1897, *Anax nigrofasciatus nigrofasciatus* Oguma, 1915, *A. panyheus* Hagen, 1867, *A. parthenope julius* Brauer, 1865, *Gynacantha japonica* Barteneff, 1909, *G. ryukyuensis* Asahina, 1962 are redescribed. The larval *Sarasaeschna pyanan* (Asahina, 1951), *S. lien* (Yell & Chen, 2000), *Planaeschna ishigakiam flavostria* Yeh, 1996, *Polycantha-*

gyna ornithocephala (McLachlan, 1896) are described and illustrated for the first time. In addition, a key to all 17 larval aeshnids species is provided for identification. Description, diagnostic characters, distribution and habitats of each species are provided." (Author)] Address: not stated

**11107.** Ferenti, S.; Covaciu-Marcov, S.-D. (2009): The food composition of some *Bombina* populations from Livada forest (Satu Mare county, Romania). *Bihorean Biologist* 3(2): 143-150. (in English) [Odonata larvae contributed very little to the diet of the six *Bombina* hybrid populations from Livada Forest.] Address: Ferenti, Sara, University of Oradea, Faculty of Sciences, Universitatii Str., No. 1, 410087- Oradea, Romania. E-mail: ferentisara@yahoo.com

**11108.** Guerbaa, K.; Doucet, G.; Hennequin, E.; Lolive, N. (2009): Les Odonates de l'étang de Landes (Lussat, 23). *Epops* 78: 32-40. (in French) [The lake is situated near Lussat, Département de la Creuse, Région Limousin, France. 48 Odonata species are briefly introduced including 15 redlisted French species: *Aeshna isoceles*, *A. affinis*, *A. mixta*, *Anax parthenope*, *Brachytron pratense*, *Epithea bimaculata*, *Lestes virens*, *L. barbarus*, *L. dryas*, *Coenagrion hastulatum*, *C. pulchellum*, *C. scitulum*, *Sympetrum danae*, *S. meridionale*, *S. vulgatum*.] Address: Société Limousine d'Odonatologie – 11 rue Jauvion, 87000 Limoges. assoslo@wanadoo.fr

**11109.** Lissak, W.; Nowak, M. (2009): Bodenständigkeitsnachweis des Kleinen Blaupfeils (*Orthetrum coerulescens*) (Fabricius, 1798) im nördlichen Vorland der Schwäbischen Alb. *Mercuriale* 9: 15-20. (in German) [Several observations of *O. coerulescens* in 2008 and 2009 along the Streifenbach near Eislingen/Fils, Landkreis Göppingen, Baden-Württemberg, Germany are reported. This stretch of the brook was heavily modified in the course of construction measures along a street, but providing a suitable habitat for this species of shallow slightly running waters.] Address: Lissak, W., Schubartstr. 12, D-73092 Heiningen, Germany. E-mail: W.Lissak@naturschutzzentrum-schopfloch.de

**11110.** Musée Vert (2009): Libellules entre ciel et eau. Musée Vert, Le Mans: 6 pp. (in French) [This is a brochure on a dragonfly exhibit, organized 4 Feb. - 26 July 2009, by the Muséum d'histoire naturelle de Nantes.] Address: Musée Vert, muséum d'histoire naturelle du Mans, 204, avenue Jean Jaurès 72100 Le Mans, France. E-mail: musee.vert@ville-lemans.fr

**11111.** Perinkova, P.; Fischer, O.A. (2009): Dragonflies (Insecta: Odonata) of Trebic Region and its surroundings. *Acta rerum naturalium* 7: 103-120. (in Czech, with English summary) ["In total 38 dragonfly species were found in 134 localities of the Trebic Region and its surroundings (Czech Republic, Southwest Moravia, 49°27' - 48°58'N 15°36' -16°18'E) in 2001-2004 and 2006-2007. An atypical intra-species tandem of two males of *Leucorrhinia pectoralis* was observed. Nine dragonfly imagoes of four species were obtained by short-term breeding of the last instar larvae in a laboratory. The number of species was influenced by elevation, the numbers of the species were 38 and 19 at elevations of 241 - 449 m and 600 - 650 m a.s.l., respectively. The occurrence of dragonfly species in localities was confirmed by findings of 87 dragonfly exuvia and 318 imagoes collected. The most important localities with 17, 16, and 15 dragonfly species found were Oslavicka and Rapotice, Budisov near Trebic, and Hrutov, respectively.

The area under study is therefore valuable and interesting from a faunistic point of view." (Authors) The following species are of regional interest: *Lestes barbarus*, *L. virens*, *L. dryas*, *Erythromma viridulum*, *Coenagrion hastulatum*, *Aeshna isoceles*, *Anax parthenope*, *Orthetrum albistylum*, *Crocothemis erythraea*, *Sympetrum danae*, *L. pectoralis* and *Onychogomphus forcipatus*.] Address: Perinkova, P., Muzeum Vysociny Trebic, Prirodovedne prac., Zámek c 1, CZ-674 01 Trebic, Czech Republic. E-mail: p.perinkova@zamek-trebic.cz

**11112.** Reece, B.A. (2009): Diversity, distribution, and development of the Odonata of the southern high plains of Texas. Ph.D. thesis, Graduate Faculty of Texas Tech University: IX + 117 pp. (in English) ["The diversity, distribution, and developmental patterns of odonates were examined in the playa system of the Southern High Plains of Texas, USA from 2003-2008. Comparisons were made in these factors between playas surrounded by the two dominant forms of land use (cropland, grassland). Controlled field and lab experiments were performed to examine the causal relationship between environmental variables and growth, development, and survival of larvae of a focal species. Land-use type did have an influence on certain variables, but not consistently or on all variables. Over one hundred new county records were discovered, indicating how little is known about this system. In addition, the dragonfly holdings at the Museum of Texas Tech University were sorted, identified, and compiled, revealing numerous other new county records." (Author)] Address: Reece, B.A., Dept of Biological Sciences, Texas Tech University, Lubbock, TX 79409-3131, USA. E-mail: b.reece@ttu.edu

**11113.** Rödder, D.; Dambach, J. (2009): Modelling future trends of relict species. In: Habel, J.C. & T. Assmann (eds.): *Relict Species: Phylogeography and conservation biology*. Springer, Berlin: 373-383. (in English) ["Distribution patterns of species vary over space and time. This becomes most evident considering the differences between the current and Last Glacial Maximum (LGM, 21,000 BP) distribution patterns of species in the Northern hemisphere. Most warm-adapted species experienced reduction and fragmentation of ranges because of intrusion by uninhabitable continental ice sheets causing distributional shifts and fragmentation of primary habitats. On the other hand, cold-adapted species were able to expand their ranges. Today, ranges of those species are restricted to current refugia as can be observed in glacial relict species. Understanding refugial distributions of species has been a core task in historical bio-geography. Before the 1990s, refugia were preliminarily identified based on disjunctions of species distributions, distribution patterns of sister species, and the fossil records. More recently, phylogeographic approaches based on intraspecific molecular analyses and spatial modelling approaches based on ecological properties of species have been developed." (Authors) *Aeshna caerulea* and *Bombina variegata* are used as model organisms. Today's distribution of *A. caerulea* was taken from Kuhn & Burbach (1998) and Sternberg & Buchwald (2000) and its potential distribution computed with Maxent 3.2.1 derived from current climatic conditions. Higher Maxent values suggest higher climatic suitability. Figure 2b,c show potential distributions of *A. caerulea* assuming two different paleoclimatic scenarios depicting climatic conditions as expected for 21,000 BP (b) CCSM; 2C: MIROC; for details see Rödder et al. 2008, Chap. 22. Areas of currently known dis-

tribution of *A. caerulea* are highly congruent with the proposed potential distribution of the CEM even in small and disjunctive ranges. Projections of the CEM onto palaeoclimatic scenarios suggest potential migration pathways during the LGM connecting most current refugia." Address: Rödder, D., Dept of Biogeography, Univ. of Trier, D-54286 Trier, Germany. E-mail: roedder@uni-trier.de

**11114.** Suhling, F.; Samways, M.J.; Simaika, J.P.; Kipping, J. (2009): Chapter 5. The status and distribution of dragonflies (Odonata). In: Darwall, W.R.T., Smith, K.G., Tweddle, D. & Skelton, P. (eds): The status and distribution of freshwater biodiversity in southern Africa. Gland, Switzerland: IUCN and Grahamstown, South Africa: SAIAB. ISBN: 978-2-8317-1126-3: viii + 120 pp. (in English) ["The southern African region covered here contains 22 of the freshwater ecoregions defined by Thieme et al. (2005). These 22 ecoregions are categorized under six major habitat types, which are the basis for this report. The biological distinctiveness and current conservation status of each ecoregion, summarized from Appendix D of Thieme et al. (2005), is listed in Table 1.1 in Chapter 1 of this report. We comment here on the status of these ecoregions relative to the occurrence of endemic, rare and threatened dragonfly species." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**11115.** Tumilovich, O.A. (2009): New species of odonatafauna of the Kaliningrad region. Abstract. International conference "Biodiversity, protection and prospects of Baltic seashore habitats. Klaipeda 09-11 September 2009." Vilnius: 49-50. (in English) [Between 2004 and 2007, 35 Odonata species were recorded in this westernmost Russian exclave between Poland and Lithuania. New regional records are *Chalcolestes viridis*, *Ceragrion tenellum*, *Sympetrum depressiusculum*, and *S. fonscolombii*. Polish Odonata experts doubt the existence of a *C. tenellum* population in the region.] Address: Tumilovich, Olga, Kaliningrad State Technical University, 236000 Kaliningrad, Russia. E-mail: Levente@rambler.ru

**11116.** Vinnersten, T.Z.; Lundström, J.O.; Petersson, E.; Landin, J. (2009): Diving beetle assemblages of flooded wetlands in relation to time, wetland type and Bti-based mosquito control. *Hydrobiologia* 635: 189-203. (in English) ["The aquatic predatory insect assemblages, especially adult dytiscid assemblages, were studied in eight open temporary wetlands (wet meadows) and two forested wetlands (alder swamps) around Lake Färnebofjärden in the River Dalälven floodplains, central Sweden during spring and summer floods from 2002 to 2006." A total of 6,863 aquatic predatory insects caught in activity traps included 10 specimens of *Coruliidae*, 5 of *Coenagrionidae*, 2 of *Libellulidae* and each 1 of *Aeshnidae* and *Lestidae*.] Address: Vinnersten, T.Z.P., Department of Ecology and Evolution/Population Biology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18 D, 752 36 Uppsala, Sweden. E-mail: Thomas.Persson@ebc.uu.se

**11117.** Ware, J.L.; Louton, J. (2009): In the muck: collecting, rearing and imaging dragonfly and damselfly larvae for Encyclopedia of Life Odonata pages. *The Bug Dispatch* 1(2): 3-4. (in English) [The paper discusses in detail the "preparation of specimens for digital photography, with the goal to produce a large number

of useful images in a reasonable amount of time."] Address: Ware, Jessica, Division of Invertebrate Zoology, American Museum of Natural History, 79th and Central Park West, New York, NY, 10024, USA. E-mail: jware@amnh.org

**11118.** Zhang, Z.-s.; Wang Q.-c.; Lü, X.-g.; Zheng, D.-m.; Sun, X.-j.; Zhang, X.-y.; Zhang, S.-q. (2009): Heavy metal contents in insects collected from the Huludao City suffering pollution by zinc smelting and Chlor-Alkali production. *Environmental Science* 30(7): 2077-2081. (in Chinese, with English summary) [Verbatim: 14 insect species (including "dragonfly larvae"), which were classified to three groups: the herbivorous, the polyphagous and the carnivorous, and earthworms were collected from the grasslands in Huludao City, Liaoning Province, China. [...] Mercury, cadmium and lead contents were 0.168, 9.19 and 12.58 mg·kg<sup>-1</sup> in the herbivorous insects, 0.375, 24.43 and 17.71 mg·kg<sup>-1</sup> in the polyphagous insects, 0.928, 29.78 and 18.39 mg·kg<sup>-1</sup> in the carnivorous insects. It showed that heavy metal pollution in biota in Huludao City was heavy. Bioaccumulation abilities to heavy metals significantly differed with insect species. Snails and dragonflies could accumulate more mercury than the other insects, and spiders could accumulate the most cadmium and lead in all species. These three metals investigated in insects were all sorted as the herbivorous < the polyphagous < the carnivorous. Cadmium and lead contents between the polyphagous and the carnivorous varied slightly. Correlation analysis showed that cadmium and lead contents were significantly related, but mercury and cadmium or mercury and lead were not. It indicated that cadmium and lead in insects were from the same pollution sources while mercury was more complex.] Address: Zhang, Z.-s., Key Laboratory of Wetland Ecology and Environment, Northeast Institute of Geography and Agricultural Ecology, Chinese Academy of Sciences, Changchun 130012, China

## 2010

**11119.** Acuna Cors, A.M. (2010): Etnoecología de insectos comestibles y su manejo tradicional por la comunidad indígena de los Reyes Metzontla, Municipio de Zapotitlán Salinas, Puebla. Tesis. Maestro en Ciencias, Especialista en Estrategias para el Desarrollo Agrícola Regional. Colegio de Postgraduados, Puebla: XII + 199 pp. (in Spanish, partly English) [The ethnology of edible insects and their traditional use by the indigenous community of Los Reyes Metzontla, Municipality of Zapotitlán Salinas, Puebla, Mexico is studied. The thesis includes a few remarks on Odonata as human food referring to a broader Mexican context. Immature *Anax*-specimens were collected mainly in the lakes of Xochimilco and Texcoco. Indians of central Mexico ate dragonfly larvae which taste like shrimp; these larvae are of considerable nutritional value as sources of protein and calories. According to studies done by Ramos-Elorduy (1998), the protein content of the larvae is 56.22% providing 431.33 kcal calories per 100g.] Address: not stated

**11120.** Anwander, H. (2010): Kartierung von Storchschnabelbläuling, Sumpfschrecke, Laubfrosch und Co. Ausarbeitung eines Pflegekonzepts für das Erlentbachtal. Auftraggeber: Landschaftspflegeverband Günzburg e.V., 89335 Ichenhausen: 25 pp. (in German) [The paper refers to *Calopteryx virgo*, and shows a picture of



a male *C. virgo* caught in a spiders net.] Address: Anwander, H., Am Sandberg 7, 89358 Kammeltal-Ettenbeuren, Germany. E-mail: asw.anwander@t-online.de

**11121.** Bechly, G. (2010): Fossile Insekten aus den Plattenkalke der Crato-Formation. Katalog Mineralientage München 2010: 105-111. (in German) [Among many impressive photographs of different taxa, the odonate *Cratostenophlebia schwickerti* is portrayed.] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, 70191 Stuttgart, Germany. E-mail bechly@gmx.de

**11122.** Beintema, A.J.; van der Winden, J.; Baarspul, T.; de Krijger, J.P.; van Oers K.; Keller, M. (2010): Black Terns *Chlidonias niger* and their dietary problems in Dutch wetlands. *Ardea* 98: 365-372. (in English) ["Black Terns have shown a decrease of well over 90% as a breeding bird in The Netherlands during the twentieth century. Two hypotheses have been put forward for this decline: the disappearance of the floating plant *Water Soldier* *Stratiotes aloides*, which used to be the favourite nesting substrate of the terns, and a decrease of available insect food for the chicks, notably dragonflies. Both effects are attributed to eutrophication of surface waters. Reproductive bottlenecks vary greatly among areas and habitats. In river landscapes, no signs of food shortage could be found, and loss of nesting substrate has been successfully compensated for by offering artificial nest rafts. Extremely low fledging success in moors and in lowland grasslands is caused by food problems. In this case, artificial rafts are less successful. With decreased insect availability, fish and earthworms have become more important in the chicks' diet, but these are less reliable as a food source. Fledging success greatly depends on the amount of fish in the diet. Also, a minimum amount of fish is always needed to cover the calcium need of the chicks. In north-eastern Poland, there were no problems with either nesting places or food for the chicks." (Authors) Frequency of Odonata as diet depends on the habitat. The study also analysed Calcium content in Odonata. ("Aeshna spec., *Libellula quadrimaculata*, *Sympetrum cyathigerum* [sic], *Lestes sponsa* and *Lestes spec.*")] Address: Beintema, A.J., Alterra, P.O. Box 47, 6700 AA Wageningen, The Netherlands. E-mail: albert@beintema.nl

**11123.** Bernard, R.S. (2010): Découverte de *Perithemis tenera* (Say, 1839) (Odonata: Libellulidae), une nouvelle libellule pour le Québec. *Le Naturaliste canadien* 134 (1): 23-24. (in French) [Canada; Centre d'interprétation de la nature du lac Boivin, Montérégie near Granby (45° 29' 41,9" N, 72° 41 '19,3" E), 15-VIII-2007] Address: Bernard, Roxanne Sarah. E-mail: roxannesbernard@hotmail.com

**11124.** Buczyński, P.; Żurawlew, P.; Michalczyk, W. (2010): New data on the occurrence of *Crocothemis erythraea* (Brullé, 1832) (Odonata: Libellulidae) in Poland. *Odonatrix* 6(2): 50-60. (in Polish, with English summary) [The paper documents data of *C. erythraea* from 22 Polish localities recorded in 2009. 20 localities are new additions to the known sampling sites of *C. erythraea* in Poland. The paper discusses the range extension and presents data on a second generation of the species and its phenology.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**11125.** Chaudhry, M.T. (2010): Systematics of dragonflies (Anisoptera: Odonata) of Pakistan. Ph.D. thesis, Department of Entomology, Faculty of Crop and Food Sciences, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan: 14 + 190 pp. (in English) ["Extensive field survey to collect Anisopterous fauna of Pakistan was carried out during 2006 – 2009 in different Agro ecological regions of Pakistan. A total of 1349 specimen belonging to 5 families, 39 genera and 68 species were collected and identified. ... Seven species, viz, *Anaciaeschna jaspidea*, *Anax indicus*, *Gynacanthaeschna sikkima*, *Ephthalma vittata vittata*, *Macromia moorei*, *Onychogomphus biforceps*, and *Rhodthemis rufa* are reported first time from Pakistan and have been added to the existing anisopterous fauna of the country. Details for the collected material i.e. valid names, their synonyms, measurement of body parts (abdomen, forewing and hindwing length), habitat description, date of collection, distribution range in Pakistan as well as international distribution and differential characters from published description for new records to country have been provided. Coloured images of new to Pakistan species, geographical and climatic condition of all sixty-eight species are also presented first time. Taxonomic keys for families, genera and species are also presented. Check lists of all ten agroecological regions are presented first time from Pakistan. As a whole 68 species were recorded from Pakistan with 153 new localities record for 45 species, which include 61 species of Anisoptera that have been reported previously from Pakistan. It was an addition to science and this addition will explore new areas of biological control." (Author)] Address: Chaudhry, M.T., PMAS-Arid Agriculture Univ., Rawalpindi (Pakistan). Dept. of Entomology, Pakistan. E-mail: chtariq273@hotmail.com

**11126.** Da Costa, J. M. (2010): New data of the Odonata order in the Narew National Park. *Odonatrix* 6(2): 33-36. (in English) [In 2009, the author studies of 6 areas of the Narew National Park, Poland resulted in 23 Odonata species. An additional study of published and unpublished inventarisations proved the occurrence of 44 species within the boundaries of the park.] Address: Joao Matos da Costa, J.M., Narwiański Park Narodowy, Kurowo 10, 18-204 Kobylin Borzymy, Poland. E-mail: joao.mcosta@nnp.pl

**11127.** Das, S.K.; Sahu, H.K.; Rout, S.D. (2010): Odonates of Baripada Division of Similipal Biosphere Reserve. *Tigerpaper - Regional Quarterly Bulletin on Wildlife and National Parks Management* 24(2): 13-16. (in English) ["This study records the distribution of 31 species of odonates in the Baripada Division of SBR [...] *Pantala flavescens* and *Orthetrum sabina* were more abundant during the monsoon season. [...] *Ischnura aurora* was more abundant than others inside the study area. [...] The prey of the adults consists mostly of the harmful insects of crops, orchards and forests, and thus has a regulatory impact on agroforestry. Their aquatic larvae constitute a natural biological control over mosquito larvae and thus help to control several epidemic diseases like malaria, dengue, filarial, etc. (Mittra, 2002). But several developmental activities such as the construction of buildings, roads, and stone crushers in the peripheral areas have a direct impact on the population of the odonates as their habitats and food are being destroyed by such activities. In temperate regions, the greatest threat to many Odonata species is the intensification of modern agriculture (Moore,

1991a). It may lead to the local extinction of sensitive species. Public awareness is required to conserve these odonates and their habitats. An extensive odonatological survey needs to be carried out to explore the rich diversity of these elegant insects." (Authors) Address: Das, S.K., Department of Wildlife and Conservation Biology, North Orissa University, Sri Ramchandra Bihar, Takatpur, Baripada, Orissa-757003, India. E-mail: sunit.das219@gmail.com

**11128.** Davenport, J.M.; Chalcraft, D.R. (2010): COS 116-3: Contrasting effects of different types of habitat complexity on predator-prey interactions. The 95th ESA Annual Meeting (August 1 -- 6, 2010): (in English) [Verbatim: Background/Question/Methods: Habitat complexity is often viewed as an important factor that can reduce the impact of predators on prey by providing refugia for prey. Sit-and-wait predators, however, may perform better in complex environments that provide more perches or hiding places for the predator. Although natural environments are composed of many structural elements (types of habitat complexity) few researchers have examined how multiple types of habitat complexity affect predator-prey interactions. We conducted an experiment in artificial ponds to examine how different types of habitat complexity (amount of benthic leaf litter versus amount of emergent vegetation) influence the effect of a sit-and-wait top predator (larval dragonflies; *Anax* spp.) on fitness components of an intermediate predator (larval salamanders; *Ambystoma opacum*). We expected that 1) increasing amounts of emergent vegetation will enhance the effect of *Anax* on *A. opacum* fitness components by increasing perch sites for *Anax* to hunt from, 2) increasing amounts of litter will reduce the effect of *Anax* on *A. opacum* fitness components by providing benthic refugia for *A. opacum*, and 3) the effect of emergent vegetation on the foraging success of *Anax* will be greatest in ponds with less leaf litter due to the fact that there is less refuge space. Results/Conclusions: We observed a trend in ponds with no *Anax* for *A. opacum* to have higher survivorship when there was a low amount of leaf litter present in the pond. *Anax* reduced *A. opacum* survivorship but the extent of reduction depended on the amount and type of habitat complexity present. Specifically, increasing amounts of emergent vegetation in ponds with low amounts of litter enhanced the negative effect of *Anax* on *A. opacum* survival. Increasing amounts of emergent vegetation in ponds with a high abundance of leaf litter, however, caused non-linear changes in the effect of *Anax* on *A. opacum*. Although a high abundance of emergent vegetation in ponds with a high abundance of litter enhanced the effect of *Anax* on *A. opacum* survival, a low abundance of emergent vegetation in ponds with a high abundance of litter reduced the effect of *Anax* on *A. opacum* survival. Our study found that the amount of habitat complexity may have unexpected effects on intermediate predator performance in the absence of top predators. Our results also demonstrate that different types of habitat complexity can alter predator-prey interactions in different ways – some forms of complexity benefit the predator while other forms benefit prey.] Address: Davenport, J.M., East Carolina University, USA

**11129.** Díaz, F.; Schmitt, F. (2010): Primer registro de Garza chiflón (*Syrigma sibilatrix*) en Chile. Boletín Chileno de Ornitología 16(1): 48-50. (in Spanish, with English summary) [The first record of the Whistling Heron is

documented. The specimen was observed trying to catch flying dragonflies. It is unclear if this attempt was successful.] Address: Díaz, F., Gonzalo Barros 099, Lampa, Chile. E-mail: fdiazsegovia@gmail.com

**11130.** Domaine, E.; Desrosiers, N.; Skinner, B. (2010): Les insectes susceptibles d'être désignés menacés ou vulnérables au Québec. Naturaliste Canadien 134(2): 16-26. (in French) [In 2006, 30 species of insects were added to the list of wildlife species likely to be classified as threatened or vulnerable in Quebec, Canada. Among them are ten Odonata species (*Lestes vigilax*, *Nasiaeschna pentacantha*, *Gomphaeschna furcillata*, *Gomphus ventricosus*, *Ophiogomphus anomalus*, *Somatochlora incurvata*, *Williamsonia fletcheri*, *Erythemis simplicicollis*, *Erythrodiplax berenice*, *Sympetrum corruptum*). Updated relevant information for each species is given to assess their precarious status: regional distribution, habitat, life cycle, diet, factors that threaten them and important information for conservation.] Address: Domaine, Eric. E-mail: e.domaine@bphenviro.com

**11131.** Downie, J.R.; Hancock, E.G.; Muir, A.P. (2010): The diet of the paradoxical frog *Pseudis paradoxa* in Trinidad, West Indies. The Herpetological Journal 20(2): 111-114. ["The diet of adult and late metamorphic *P. paradoxa* in Trinidad was assessed from stomach contents. *P. paradoxa* consumed a wide taxonomic and size range of invertebrates, mostly insects, but also arachnids, crustaceans (crabs) and annelids. There was little evidence for ontogenetic changes in prey taken, but larger females had taken larger prey than smaller individuals. Although most prey items could have been captured above the water surface, some must have been taken below the surface. The significance of these findings is discussed in the light of *Pseudis*'s unique life history and evolution (individuals are essentially full size at metamorphosis; adults are fully but secondarily aquatic) and in comparison with previous reports." (Authors) Imaginal Odonata accounted to 8.7%, and larval to 1.4% of all prey items. Compared with the mass of the additional prey, Odonata seem to have a significant contribution to nutrition of *P. paradoxa*.] Address: Muir, Anna, Institute of Biodiversity, Animal Health and Comparative Medicine, Room 411, Graham Kerr Building, University of Glasgow, G12 8QQ, UK

**11132.** Duan, C.-f.; Pan, J.; Zhao, P. (2010): Checklist of Odonata in the collection of Kaili university. Journal of Kaili University 28(3): 47-49. (in Chinese, with English summary) [39 Odonata species are reported resulting on a collection of 300 specimens collected during 2002 to 2009 in Qiandongnan Miao and Dong Autonomous Prefecture of Guizhou Province, China.] Address: College of the Environmental and Life Sciences, Kaili University, Kaili, Guizhou, 556011, China

**11133.** Falkowski, M. (2010): Inwentaryzacja przyrodnicza oraz analiza wpływu planowanej małej retencji w Nadleśnictwie Celestynów na środowisko przyrodnicze [Inventory of nature and assessment of the impact on the natural environment by planned small retention reservoirs in the forest district Celestynów]. EcoFalk: 38 pp. (in Polish) [Poland; the study of biota resulted in nine common Odonata species.] Address: EcoFalk, Michal Falkowski, Biuro Badań, Monitoringu i Ochrony Przyrody, ul. Sokołowska 83/17, 08-110 Siedlce, Poland. E-mail: mfzuraw@wp.pl

**11134.** Ferro, M.L.; Parys, K.A.; Gimmel, M.L. (2010): Dragonflies and Damselflies of Louisiana. CreateSpace: 182 pp. (in English) ["Celebrate the beauty and diversity of nature with this field guide to Louisiana's dragonflies and damselflies. This level of detail can't be found in any other guide currently available; it provides both top and side high resolution scanned images of 118 species of dragonflies and damselflies known from the state of Louisiana and adjoining states. All species are represented by life-sized images, and smaller species are shown as both life-sized and enlarged images. In addition, both male and female specimens are provided for most species. A photographic "head shot" of each species is also included and most species showing variation in colour pattern are represented by multiple photographs. Close-up photographs illustrating taxonomically important characters are given for most species."] (Publisher)] Address: www.createpace.com/

**11135.** Frank, M. (2010): Zum Vorkommen der Feuerlibelle (*Crocothemis erythraea* Brullé) in Nordwestmecklenburg im fünften Jahr nach der Erstfeststellung dort. *Virgo - Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 13(2): 72-74. (in German) [Between 2005 and 2010, imagines of *C. erythraea* were observed in each year at carp-production water bodies near Schönberg, Germany. In spite of these observations no proof of successful reproduction was obtained although breeding is considered as very probable.] Address: Frank, M., Zur Traubenmühle 5A, 55268 Nieder-Olm, Germany. E-mail: mikel.frank@gmx.de

**11136.** Gauquie, B. (2010): Habitats de l'Orthétrum brun (*Orthetrum brunneum*) et de l'Orthétrum bleuissant (*Orthetrum coerulescens*) sur le territoire du Parc naturel des Plaines de l'Escaut et dans le bassin carrier tournoisien. *Les Naturalistes belges* 91(3-4): 37-53. (in French, with English summary) ["During this last five years, I undertook a specific search on two rare *Orthetrum* species in Belgium (*O. coerulescens* and *O. brunneum*), both recently discovered in Western Hainaut province. The exploration area is Tournai and the territory of the Natural Park of the Plains of the Schelde, which extends east to west from Bernissart to Antoing. *O. brunneum* was found on five sites and *O. coerulescens* on three sites. Following data analysis, it seems that in the region *O. coerulescens* is more a stenotopic species, selecting only limestone quarries and *O. brunneum* is an eurytopic species, occupying more varied environments, nevertheless at least four abiotic parameters characterize in common the breeding sites of the two species: a sunny environment, a shallow water, with good physicochemical conditions and constantly renewing seepage, or flow resurgence. If these ecological requirements are met, it appears that, among other factors (biotic or abiotic), the vegetation structure is of crucial importance for the reproduction of either species. At sites with still water, *O. brunneum* proves to be a pioneer species essentially, eventually disappearing when the vegetation becomes too high. For *O. coerulescens*, eutrophication is really a non-favourable factor, but the vegetal cover did not appear to be influential."] (Author)] Address: Gauquie, B., Chargé de mission Ressources et milieux naturels, Parc naturel des Plaines de l'Escaut, rue des Sapins 31, 7603 Bon-Secours, Belgium. E-mail: bgauquie@plainesdelescaut.be

**11137.** Gołab, M.J.; Potoczek, M.; Śniegula, S. (2010): New records of *Cordulegaster bidentata* Sélys, 1843 (Odonata: Cordulegastriidae) from the Beskid Wyspowy

Mts. and the Bieszczady Mts. *Wiad. entomol.* 29(3): 205. (in Polish, with English translation of the title) [Beskid Wyspowy: Słopnice (UTM: DA50), 17 VIII 2009. 1 male, 9 IX 2009; Beskid Wyspowy: Chomranice (DA70), 7 VIII 2008. 1 larva, 27 VII 2009, 1 male, 2 XI 2009; Bieszczady: Ustrzyki Górne vic. (FV14), 10 IX 2008. 2 males] Address: Gołab, Maria, Institute of Nature Conservation, Mickiewicza 33, Kraków, Poland. E-mail: marysiagolab@gmail.com

**11138.** Gonzalez, S.C.; Touchon, J.C.; Vonesh, J.R. (2010): PS 19-152: The interactions between competition, predation, and phenotypic plasticity on the survival and growth of two Neotropical hyliid tadpoles. The 95th ESA Annual Meeting (August 1 -- 6, 2010): (in English) [Verbatim: Background/Question/Methods: Recent literature reviews reveal that competition typically has stronger effects on growth than the presence of predators, while predation has larger effects on survival. Further, past studies show that predators typically lessen the negative effect of competition on growth and also make interspecific competition beneficial for the survival of focal species. We examine the independent and combined effects of competition and predation for survival and growth of the tadpoles of two co-occurring Neotropical hyliid frogs (*Agalychnis callidryas* and *Dendropsophus ebraccatus*). Our experiment crossed tadpole species composition (single and mixed at single total density) with the presence or absence of a free-roaming predator (*Anax* sp. dragonfly larva) using a 3x2 factorial design. Six replicates were conducted in 300 L mesocosms at the Smithsonian Tropical Research Center, Gamboa, Panama. Results/Conclusions: Dragonfly larvae were effective predators of both species, but had larger effects on *A. callidryas* survival. *A. callidryas* grew faster in the presence of *D. ebraccatus*, suggesting it is a more effective competitor. *A. callidryas* reduced *D. ebraccatus* growth in the absence of dragonflies; however, this effect disappeared when predators were present. Though our results are largely consistent with similar previous studies, one interesting difference did emerge. Not only did predation have larger effects on survival than competition, but predator presence resulted in a much larger reduction in tadpole growth than competition – even though predation increased per capita resource levels. This can be attributed to either changes in feeding behaviour or metabolic costs of alteration of phenotypically plastic traits. Thus, in our study, predator effects dominated survival and growth and highlight the importance of top-down effects, as well as costs associated with phenotypic plasticity, in shaping interactions between these species.] Address: not stated

**11139.** Gonzalez-Bellido, P.T.; Olberg, R.; Leonardo, A. (2010): Attack of the dragonfly: receptive fields and anatomy of the target selective descending neurons. Abstracts of the 9th International Congress of Neuroethology, Salamanca (Spain) 2-7 August 2010. P 396: 650. (in English) ["Dragonflies detect prey against a clear sky and then follow an interception trajectory to capture their target. These flights typically last 350ms from take-off to interception, and the accuracy afforded by the dragonfly retina is paramount for success. Despite this, little is known about the spatial and temporal response properties of the neurons underlying this behaviour. We have begun to record intracellularly in libellulid dragonflies (*L. lydia* and *L. luctuosa*) from a class of neurons that respond solely to small moving targets (Ol-



berg, 1986). Using a custom-built 360Hz DMD projector, we have begun to make 0.25° resolution measurements of target-selective descending neuron (TSDN) spatiotemporal receptive fields, in an effort to develop quantitative circuit models of these cells. After mapping a TSDN receptive field, the cell is filled with a tracer dye (Lucifer yellow and/or neurobiotin) to confirm its identity, its three-dimensional structure, and its pre- and post-synaptic targets. Standard histological techniques do not adequately preserve the fragile structure of the dragonfly nerve cord. In libellulids, the diameter of TSDN axons ranges from 16-25µm, while the cervical connective is only 230µm wide - over 1/3 the volume of the cord is comprised of the cytosol within these axons. Consequently, it is necessary to embed the cord in resin to prevent rupture during semi-thin sectioning. The dehydration required for resin causes major deformation and shrinkage of the cervical connective in protocols in which osmium is omitted to preserve fluorophore signals. Whole-mounted cords are sufficiently transparent for 2-photon imaging, but the brain and ganglia are too thick to be optically sectioned in this manner. We will discuss the development of a tissue clearing protocol suitable for large insects, that preserves the anatomy of the ventral cord, keeps background fluorescence low, fluorophore signal high and antigenicity intact." (Authors)] Address: Olberg, R.M., Dept of Biological Sciences, Union College, Schenectady, NY 12308, USA. E-mail: olberg@union.edu

**11140.** Groner, M.L.; Buck, J.C.; Blaustein, A.R.; Rolins-Smith, L.A.; Reinert, L.K.; Relyea, R.A. (2010): COS 39-8: Scared sick? Effects of sublethal exposure to predators and pesticides on life history traits and disease susceptibility in wood frogs. The 95th ESA Annual Meeting (August 1 -- 6, 2010): (in English) [Verbatim: Background/Question/Methods: Recent reviews hypothesize that pathogen-associated amphibian declines may be exacerbated by immunosuppression triggered by exposure to contaminants and/or stress hormones released in response to environmental changes. Currently, there are few empirical data in support of these hypotheses. We exposed wood frog tadpoles (*Rana sylvatica*) to sublethal concentrations of malathion (0, 10, 100 ppb), and cues from caged dragonfly predators (*Anax junius*). We measured effects of these treatments on life history traits (growth, development and survival) and the susceptibility of wood frog metamorphs to the fungal pathogen *Batrachochytrium dendrobatidis* (B.d.). Results/Conclusions: Both treatments had mild negative effects on wood frog development, but not growth. Survival was also slightly lower in the highest pesticide treatment when predators were present, but not when predators were absent, supporting past evidence that these stressors can have synergistic negative effects on survival. Surprisingly, mortality rates in frogs exposed to B.d. were lower in individuals stressed by predator cues, while malathion did not effect survival. Overall these data fail to show that contaminants and predator stress cause higher rates of mortality associated with B.d., although they do show that environmental context can alter life history traits and disease susceptibility. Further tests are needed to show whether such stressors alter immune system function and if these results are robust for other pathogens.] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**11141.** Grunsven, R.H.A.; Termaat, T. (2010): Record of young *Aeshna mixta* at an unusual location. *Brachytron* 13(1/2): 44-46. (in Dutch, with English summary) ["A teneral female *A. mixta* was seen on the ferry Pride of Bilbao, 40 kilometers west of the tip of Brittany, France. Age estimation of teneral dragonflies is discussed. This records shows that teneral looking dragonflies might have covered quite a long distance." (Authors)] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands

**11142.** Guan, Z.; Brydegaard, M.; Lundin, P.; Wellenreuther, M. (2010): Insect monitoring with fluorescence lidar techniques: field experiments. *Applied Optics* 49(27): 5133-5142. (in English) ["Results from field experiments using a fluorescence lidar system to monitor movements of insects are reported. Measurements over a river surface were made at distances between 100 and 300 m, detecting, in particular, damselflies entering the 355 nm pulsed laser beam. The lidar system recorded the depolarized elastic backscattering and two broad bands of laser-induced fluorescence, with the separation wavelength at 500 nm. Captured species, dusted with characteristic fluorescent dye powders, could be followed spatially and temporally after release. Implications for ecological research are discussed." (Authors) The paper includes a reference to Odonata] Address: Guan, Zuguang, Department of Biology, Lund University, SE-223 62 Lund, Sweden. E-mail: zuguang.guan@fysik.lth.se

**11143.** Haislip, N.A.; Hoverman, J.T.; Miller, D.L.; Gray, M.J. (2010): COS 53-6: Predators and infectious diseases: Does the threat of predation increase susceptibility to Ranavirus in larval anurans. The 95th ESA Annual Meeting (August 1 -- 6, 2010): (in English) [Verbatim: Background/Question/Methods: The emergence of infectious diseases has sparked concern throughout the scientific community because they threaten global biodiversity, and consequently can impact the structure and function of ecological communities. Ecological stressors may be important components contributing to the emergence of infectious diseases. While organisms are surrounded by a diversity of ecological stressors, predation risk is one of the common stressors in nature. In response to predators, prey can adaptively alter their behaviour, morphology, and life history traits. Although enhancing survival, the stress of predators can suppress immune function, which may increase susceptibility to pathogens. Thus, predator-rich communities may be hotspots for disease emergence. For over three decades, amphibian populations have been declining across the globe. While there are many hypothesized causes of these declines, the emergence of infectious diseases is receiving increased attention. More specifically, ranaviruses have been reported as the etiologic agent in amphibian die-offs on five continents, in four Canadian provinces, and in over thirty U.S. states, infecting dozens of species. Other than the association with amphibian die-off events, little is known about the ecology of the amphibian-ranavirus system. Our goal was to determine if the risk of predation increases the susceptibility of tadpoles from four amphibian species (*Hyla chrysoscelis*, *Lithobates clamitans*, *Lithobates sylvaticus*, and *Pseudacris feriarum*) to ranaviral infection and disease. Our experimental design was a factorial combination of two virus treatments and three predator treatments. The virus treatments consisted of a no-virus control and a virus exposure of 103 plaque-

forming units mL<sup>-1</sup>. The predator treatments were a no-predator control and predator cues from either larval dragonflies (*Anax* sp.) or adult water bugs (*Belostoma flumineum*). Each of the six treatments was replicated five times for a total of thirty experimental units. Results/Conclusions: We found that tadpoles of the four species reduced activity by 22-48% following continuous exposure to invertebrate predator cues. In addition, virus exposure resulted in reduced activity for *Hyla chrysoscelis* and *Lithobates clamitans*, and significantly reduced survival by 17-100% across all species. Exposure to predator cues did not affect survival or infection rates, and did not interact with the virus treatments. Together, our results suggest that the expression of adaptive inducible defenses in anuran larvae does not increase ranaviral disease risk. However, additional studies are needed that test other natural (e.g., competition) and anthropogenic (e.g., pesticide) stressors to understand disease risk within natural communities.] Address: not stated

**11144.** Hermans, J.T. (2010): De Libellenfauna van Zuid-Limburg. *Natuurhistorisch Maandblad* 99(9): 189-200. (in Dutch, with English summary) ["The article presents an overview of our present knowledge about the dragonflies of the southern part of the province of Limburg. 55 species of dragonflies were observed between 1990 and 2007. Dragonflies of oligotrophic waters (moorland pools or bogs) such as *Ceriagrion tenellum*, *Leucorrhinia rubicunda*, *Aeshna juncea* or *Somatochlora arctica* are restricted to the area around the villages of Brunssum and Schinveld. Species such as *Ischnura elegans*, *Coenagrion puella*, *Aeshna cyanea* and *Libellula depressa*, which show no preference for a particular type of water, are widespread and abundant in Southern Limburg. Species which prefer running waters are found in the valleys of the river Meuse and the larger brooks, such as Geul and Gulp. Some dragonfly habitats, such as pools and limestone quarries, are discussed separately. Several pools in the Mergelland (the southwestern part of Southern Limburg) have disappeared and many are in a deplorable state due to lack of maintenance. The most common species breeding in such pools are *A. cyanea*, *I. elegans* and *L. depressa*. Limestone quarries are of great importance for dragonflies. The sheltered situation and the continuing limestone extraction provide a special and warm habitat. Most of the dragonfly species recorded there, like *Ischnura pumilio*, *Orthetrum brunneum* and *O. coerulescens* need the dynamic environment found in these quarries." (Author)] Address: Hermans, J.T.; Hertestraat 21, 6067 ER Linne, The Netherlands. E-mail: j.hermans@trian-gel-linne.nl

**11145.** Holland, M.P.; Marino, J.A. (2010): PS 15-120: Predator cues and parasitism: Effects of two stressors on anuran larvae. The 95th ESA Annual Meeting (August 1 -- 6, 2010): (in English) [Verbatim: Background/Question/Methods: Parasite infection and predatory stress often simultaneously impact wildlife populations, with potentially complex effects on the traits and fitness of the affected animals. For instance, nonconsumptive predator effects may decrease the ability of a potential prey individual to tolerate intense macroparasite infections. In this study, we examined the responses of green frog (*Rana clamitans*) larvae to echinostome (*Digenea*: *Echinostomatidae*) parasite infection and predator chemical cue. In two aquaria experiments, we measured activity levels, growth, and mor-

ality of larvae after exposure to echinostome cercariae, larval *Anax* (Odonata) predator cue, or the combination of cercariae and predator cue. Due to the costs associated with each stressor, we predicted that the combination treatment would result in synergistic effects on behaviour, growth, and mortality. Results/Conclusions: As expected, individuals exposed to predator cue showed decreased activity levels and growth in comparison to controls. Exposure to predator cue did not affect mortality. Infected individuals showed decreased activity level and higher mortality, but growth was not affected. Contrary to our predictions, we did not observe an interaction between these stressors with respect to either traits or mortality. These results suggest that, at least at a small scale, we can treat these stressors as additive. However, further studies that incorporate additional interactions between these natural enemies may demonstrate other important synergisms.] Address: Holland, Manja P., University of Michigan, USA

**11146.** Koleček, J. (2010): First record of the Dark Whiteface (*Leucorrhinia albifrons*) in the district Vsetín (Eastern Moravia, the Czech Republic). *Acta Carp. Occ.* 1: 97-98. (in Czech, with English summary) ["*L. albifrons* is considered to be a critically endangered species in the Czech Republic. This report gives the first information of occurrence in the region based on an observation of one mature male at pond in Valašskáé Bystrice village (Eastern Moravia, Vsetín district) on 27.vii.2008 at altitude 600 m a.s.l. Occurrence of this species is unusual in this higher altitude in the Czech Republic." (Author)] Address: Koleček, J., Katedra zoologie, Přírodovědecká fakulta Univerzity Palackého, tř. Svobody 26, CZ-771 46 Olomouc, Czech Republic. E-mail: j.kolecek@email.cz

**11147.** Kranenborg, B.; van Vliet, T.; Termaat, T.; Keteelaar, R. (2010): Index of almost 40 years of publications by the Dutch Society for Dragonfly Studies. *Brachytron* 13(1/2): 65-96. (in Dutch, with English summary) ["In this index we present an overview of all articles published in magazines and journals of the Dutch Society for Dragonfly Studies and its predecessors. It encompasses the following magazines: *Contactbrief NLO*, *Contactblad NLO*, *Libellennieuwsbrief*, *NVL-nieuwsbrief* and *Brachytron*. In total 453 articles of 200 authors are presented in this index. A separate index of keywords is published on the website of the Dutch Society for Dragonfly Studies ([www.brachytron.nl](http://www.brachytron.nl)) and can be downloaded." (Authors)] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands

**11148.** Meutter, F. van de (2010): Colonisation and habitat preference of *Crocothemis erythraea* in De Maten (Genk, Belgium). *Brachytron* 13(1/2): 32-40. (in Dutch, with English summary) ["This study describes the arrival and colonization of a pond complex situated in North-eastern Belgium by *C. erythraea*. The presence of *C. erythraea* was monitored by both samplings for larvae and observations of adults. The prevalence of adults and especially larvae increased exponentially during the course of this study, indicating that a large metapopulation could be established within only a few years. The presence of *C. erythraea* larvae was positively related to low cover of floating-leaved vegetation and a high raver of submersed filamentous algae and other vegetation. The presence of adults was positively related to water temperature, possibly reflecting a preference for ponds with a high insolation. We found a weak match between ponds where patrolling males were

seen and the presence of larvae, possibly indicating that different pond types are selected, although we may have missed larvae occurring at low densities. The colonization of the study area is part of an ongoing northern range shift of this species and exemplifies how quickly a locality may be colonized, and next could serve as a source of dispersal that engage in new colonization events." (Author)] Address: Van de Meutter, F., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: frank.vandemeutter@bio.kuleuven.ac.be

**11149.** Nikulin, A.D. (2010): Variability of foraging behaviour of bats (Chiroptera, Vespertilionidae) in European part of Russia. *Pleocotus et al.* 13: 44-47. (in Russian, with English summary) [In total, 5517 fragments of arthropods from droppings of 374 specimens of 11 bat species have been identified. Eleven orders of insects have been revealed: Ephemeroptera, Dermaptera, Hemiptera, Neuroptera, Coleoptera, Diptera, Lepidoptera, Trichoptera, Hymenoptera, Orthoptera, Odonata and one order of spiders (Aranei). No species details are given.] Address: Nikulin, A.D., St. Petersburg State University, University Nab. 7/9, St. Petersburg 199034, Russia. [Nidus@inbox.ru](mailto:Nidus@inbox.ru)

**11150.** Ott, J. (2010): The big trek northwards: recent changes in the European dragonfly fauna. In: Settele, J., L. Penev, T. Georgiev, R. Grabau, V. Grobelnik, V. Hammen, S. Klotz, M. Kotarac & I. Kuehn (Eds): *Atlas of Biodiversity Risk* Pensoft Publishers. Sofia: 82-83. (in English) [This is a somewhat simplistic and monocausal author conclusion on current range extensions in some European resp. African dragonflies, and omitting e.g. recent or former studies on *Erythromma viridulum* and *Anax parthenope*.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: [L.U.P.O.GmbH@t-online.de](mailto:L.U.P.O.GmbH@t-online.de)

**11151.** Ott, J. (ed.) (2010): Monitoring climate changes using Dragonflies. *BioRisk* 5 (Special issue: Monitoring climatic change with dragonflies): 286 pp. (in English) [Contents: Foreword by Jeff McNeely - Editor's foreword by Jürgen Ott - Climate change impacts on biodiversity: the ALARM approach for the assessment of multiple risks and the consequences for dragonflies by Josef Settele et al. - Trends in occurrence of thermophilous dragonfly species in North Rhine-Westfalia (NRW) - The „Arbeitskreis (AK) Libellen Nordrhein-Westfalen (NRW)“ by Klaus Juergen Conze, Nina Groenhagen, Mathias Lohr & Norbert Menke - Do climatic changes influence dispersal and population dynamics of dragonflies in the western Peruvian Andes? by Joachim Hoffmann - Impacts of extreme weather and climate change on South African dragonflies by Michael Samways - Climate and evaluational range in a South African dragonfly assemblage by Michael Samways & Augustine Niba - Southern dragonflies expanding in Wallonia (south Belgium): a consequence of global warming? By Philippe Goffart - Dragonfly and Damselfly (Insecta: Odonata) Distributions in Ontario, Canada: Investigating the Influence of Climatic Change by Christopher D. Beatty, Stewart Fraser, Felipe Perez-Jvostov & Thomas N. Sherratt - The local species richness of Dragonflies in mountain waterbodies: an indicator of climatic warming? by Beat Oertli - Monitoring of Odonata in Britain and possible insights into climate change by Adrian Parr - Effects of climatic changes on dragonflies - results and recent trends in Europe by Jürgen Ott - When south goes north: Mediterranean dragonflies (Odonata) conquer

Flanders (North-Belgium) - Geert De Knijf & Anny Anselin - Changes in the range of dragonflies in the Netherlands and the possible role of temperature change by Tim Termaat, Vincent J. Kalkman & Jaap H. Bouwman - Monitoring the effects of conservation actions in agricultural and urbanized landscapes - the dragonfly example - by Hansruedi Wildermuth - Anthropogenic climate change impacts on ponds: a thermal mass perspective by John H. Matthews - Expansion of *Crocothemis erythraea* in the Ukraine by Lyudmyla A. Khrokalo.] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: [L.U.P.O.GmbH@t-online.de](mailto:L.U.P.O.GmbH@t-online.de)

**11152.** Parkinson, D. (2010): Plateau des Tailles: Réponse positive des libellules suite aux travaux de restauration du projet LIFE. *Les Naturalistes belges* 91(3-4): 55-67. (in French, with English summary) ["In peatlands of the southern slope of the plateau des Tailles, Belgium, numerous water bodies were created during "plateau des Tailles" LIFE Nature project. Dragonflies found on restored sites were surveyed annually from 2006 to 2010. Following restoration's work, the number of dragonfly species recorded increased from 15 to 28. Several endangered species have expanded their range and their numbers. Through their response to the restoration works, the species studied show very different dispersal abilities and ecological requirements. Odonata are an excellent indicator taxonomic group to assess the quality of peatlands restoration." (Author)] Address: Parkinson, D., Les Floxhes, 4, 4160 Athisnes, Belgium. E-mail: [denis.parkinson@gmail.com](mailto:denis.parkinson@gmail.com)

**11153.** Ren, L.-f.; et al. (2010): Study on Fauna and Diversity of Odonata in Xuzhou, Jiangsu Province. *Journal of Anhui Agricultural Sciences* 38(23): 12525-12527, 12534. (in Chinese, with English summary) [China; 21 Odonata species are listed and discussed from different point of views with respect to diversity and distribution patterns.] Address: Ren, Li-fen, Biochemical and Environmental Engineering College, Nanjing Xiaozhuang University, Nanjing, Jiangsu 211171, China

**11154.** Ruiters, E.J.; Kleukers, R.M.J.C.; Verstrael, T.J. (2010): Cooperation for dragonflies. *Brachytron* 13(1/2): 47-54. (in Dutch, with English summary) ["In 2007 the Dutch Society for Dragonfly Studies (NVL) celebrated its 10<sup>th</sup> anniversary. For ten years the NVL closely cooperated with Dutch Butterfly Conservation (De Vlinderstichting) and European Invertebrate Survey (EIS-NL). This cooperation turned out to be successful and resulted in some remarkable projects. For example: the realization of the atlas on Dutch dragonflies in 2002. This publication appeared as volume 4 in the series *Fauna of The Netherlands*. Another notable event was the Dutch/German symposium at Kranenburg (Germany) in 2004. Cooperation across borders is one of the main goals of the NVL, because after all dragonflies do not acknowledge borders and conservation is a matter of international importance. At this moment the NVL is involved by the realization of an Atlas on European Dragonflies (Kalkman, in prep.). On a national scale the NVL is working on more ecological knowledge of specific species. In 2002-2007 the ecology of *Sympecma paeidisca* was studied, resulting in a special edition of *Brachytron* which presented the results (*Brachytron* 11 (1). 2007). This publication appeared courtesy of Dutch Butterfly Conservation and EIS-NL. Hopefully, the successful cooperation between the three organizations will be preceded for at least another ten years." (Authors)] Address: Ruiters, E., [Cornells Houtmanstraat 10](mailto:Cornells Houtmanstraat 10)



8023 EA Zwolle, The Netherlands. E-mail: e.j. ruiters@planet.nl

**11155.** Schrijvershof, P. (2010): *Coenagrion scitulum* near Cadzand-Bad in Zeeuws-Vlaanderen, The Netherlands in 2007. *Brachytron* 13(1/2): 41-43. (in Dutch, with English summary) ["On June 24, 2007, four males of *C. scitulum* were recorded in the Kievittepolder, near Cadzand-Bad in Zeeuws-Vlaanderen (Zeeland). This is the second documented record of this species in The Netherlands. The discovery took place after records earlier that year along the northern part of the west coast of Belgium. On July 1st, others recorded the species at the same locality and at a second site near Cadzand-Bad. Reproductive behaviour was observed and photographed. It is likely that *C. scitulum* will settle in The Netherlands and will be expanding its range in years to come." (Author)] Address: Schrijvershof, P.G., Corellistraat 14, 2901 KB Capelle a/d IJssel, The Netherlands. E-mail: Marike.paul@hetnet.nl

**11156.** Settele, J.; Fanslow, G.; Fronzek, S.; Klotz, S.; Kühn, I.; Musche, M.; Ott, J.; Samways, M.J.; Schweiger, O.; Spangenberg, J.H.; Walther, G.R.; Hammen, V. (2010): Climate change impacts on biodiversity: a short introduction with special emphasis on the ALARM approach for the assessment of multiple risks. *BioRisk* 5 (Special issue: Monitoring climatic change with dragonflies): 3-29. (in English) [This introduction reference extensively to Odonata, mainly on the publications of J. Ott.] Address: Settele, J., UFZ, Helmholtz Centre for Environmental Research, Department of Community Ecology, Theodor-Lieser-Str. 4, 06120 Halle, Germany. E-mail: Josef.Settele@ufz.de

**11157.** Silver, C.A. (2010): Macroinvertebrate communities of temporary prairie pothole wetlands. M.Sc. thesis, Dept Biol. Sci., University of Calgary: XI + 143 pp. (in English) ["Macroinvertebrate communities were sampled in rotationally grazed, temporary wetlands in the prairie pothole region. Seven wetlands were grazed when temporary wetlands contained water (early grazed), and six wetlands were grazed when temporary wetlands were dry (late grazed). Late grazed wetlands contained more abundant and diverse macroinvertebrate communities than early grazed wetlands. Phylogenetic comparison of macroinvertebrates from temporary wetlands with those from permanent wetlands suggested the temporary community was influenced by environmental filtering, while the permanent community was influenced by biotic interactions, indicating fewer groups were able to survive the short wet period of temporary wetlands, compared to permanent wetlands. Both taxonomic and functional traits perspectives demonstrated that rotational grazing created two distinct habitats, by allowing late grazed wetlands to escape grazing pressure during the wet season. Given contrasting patterns observed between permanent and temporary wetlands, macroinvertebrate diversity at the landscape level is best served by maintaining wetlands of varying permanence." (Author) Taxa including Odonata are treated at the genus level.] Address: Silver, Carly Ann, Dept of Biological Sciences, University of Calgary, T2N 1N4, Calgary, Alberta, Canada. E-mail: carlysilver8@gmail.com

**11158.** Smith, G.R.; Boyd, A.; Dayer, C.B.; Ogle, M.E.; Terlecky, A.J.; Dibble, C.J. (2010): Effects of sibship and the presence of multiple predators on the behavior of Green Frog (*Rana clamitans*) tadpoles. *Ethology* 116 (3): 217-223. (in English) ["In nature, prey are exposed

to multiple predators simultaneously. We examined the effects of the cues of two potential predators, mosquitofish and odonate larvae, individually and in combination on the behaviour of *R. clamitans* tadpoles. In addition to examining the behavioural response of green frog tadpoles to multiple predators, we examined variation in behaviour among tadpoles from different egg masses (i.e. different sibships). Sibships differed in activity level and there was a significant predator cue by sibship interaction. Two sibships were relatively more active in the control and odonate predator cue treatments but showed reduced activity in treatments containing mosquitofish cues, whereas the remaining sibships showed consistently low levels of activity in all predator cue treatments, including the control. The use of the vegetated side of the aquarium did not differ between tadpoles exposed to the different predator cues. Sibship had no effect on tadpoles' use of the vegetated side of the aquarium, and there was no interaction between sibship and predator cue. Our results suggest that green frogs did not respond to simultaneous exposure to multiple predator cues any differently than they did to exposure to individual predator cues. More importantly, our results suggest variation, possibly genetically based, in behavioural responses of tadpoles to predators, and thus selection on these behaviours is possible. Of particular interest is that there was variation in behavioural responses to a non-native predator (*Gambusia affinis*), suggesting an evolutionary response to an invasive predator is possible." (Authors)] Address: Smith, G.R., Dept Biol., Denison Univ., Granville, OH 43023, USA. E-mail: smithg@denison.edu

**11159.** Sudo, S (2010): Micro swimming robots based on small aquatic creatures. In: Amitava Mukherjee (ed.), *Biomimetics Learning from Nature*, ISBN 978-953-307-025-4, 534 pages, Publisher: InTech 2010: (in English) ["Conclusion: The swimming behaviour of small aquatic creatures was analyzed using the high speed video camera system. Based on the swimming analysis of the aquatic creatures, the micro swimming mechanism and micro diving robot propelled by alternating magnetic field were produced. The swimming characteristics of the micro mechanism and micro diving robot were developed. The swimming mechanism and diving robot swam successfully in the water. Frequency characteristics of the swimming mechanism and diving beetle robot were examined. The diving robot showed the higher swimming velocities at  $f_0=4-12\text{Hz}$ . These experiments show the possibility of achievement of the micro robot driving by the wireless energy supply system. The results obtained are summarized as follows: (1) In the power stroke of the diving beetle swimming, hind legs are extended and driven backward to generate forward thrust. While in recovery stroke, hind legs are returned slowly to their initial position. (2) In forward swimming of the dragonfly nymph, only the fore pair and the middle pair of legs are active as a thrust generator. The orbits of fore- and middle-legs show almost the same, and draw the circle partially of the orbit. (3) The micro swimming mechanism composed of the NdFeB permanent magnet and film fin are driven by the alternating magnetic field. The swimming velocity of the micro mechanism depends on the frequency of alternating magnetic field at the constant voltage. (4) Flow visualization around the micro mechanism was created by the motion of powder and slow shutter speed photographic technique. The forward and backward surface flows and vortex flows around the micro mechanism were

generated by the robot driving. (5) Visualization photographs of flow field around the tethered opossum shrimp show the generation of tow vortices in right and left sides of the body. (6) The diving robot can dive into the water by sweeping the frequency of magnetic field. The diving robot can swim backward by the change of magnetic field frequency." (Author)] Address: Sudo, S., Faculty of Systems Science and Technology, Akita Prefectural University, Yurihonjo 015-0055 Japan. E-mail: sudou@iwakimu.ac.jp

**11160.** Tończyk, G. (2010): Dragonflies and damselflies (Odonata) of the Tatra Mountains - history and present-day. In: Mirek Z. (ed) Nauka a zarządzanie obszarem Tatr i ich otoczeniem. Tom II: Człowiek i środowiska. Tatrzański Park Narodowy, Polskie Towarzystwo Przyjaciół Nauk o Ziemi - Oddział Krakowski, Zakopane: 101-105. (in Polish, with English summary) ["Studies upon Odonata in the Tatra Mts. have long, nearly 150 year old tradition. So far almost 20 scientific papers concerning this group have been published. The studies were conducted since the mid 19th century, with particular intensity in 1920s. The list of species reported in the publications counts from 25 to 39 species. Such a big count difference results from unprecise delimitation of the Tatra and Podtatrze areas as well as from including in the list occasional visitors from neighbouring regions. Unfortunately, lack of contemporary studies makes impossible to define the present state of odonatofauna in the Tatra Mts. Only 14 species are represented in the data collected after 1990. Also, it is hard to precise the number of species breeding and developing in this area - most probably it is 26 species. In most valuable species, one can include locally occurring *Somatochlora alpestris*, and *S. arctica*, the latter recently not confirmed from the area. Both species are included in the Polish Red List of Threatened Odonata Species, respectively in categories NT and EN. In the Polish section of the Tatra Mts., Toporowe tarns and Smreczyński tarn can be recognised as centres of their breeding and diversity." (Author)] Address: Tończyk, G., Zakład Limnologii i Ekologii Bezkręgowców, Katedra Zoologii Bezkręgowców i Hydrobiologii Uniwersytetu Łódzkiego, ul. Banacha 12716, PL-90-237 Łódź, Poland. E-mail: tonczyk.grzegorz@gmail.com

**11161.** Veling, K. (2010): Dragonfly working groups: more than the sum of its parts. *Brachytron* 13(1/2): 55-64. (in Dutch, with English summary) ["At least 38 dragonfly working groups exist in The Netherlands, ranging from working groups studying dragonflies only, to working groups studying other insect groups as well. Group excursions, inventories of nature areas, identification courses and publication of regional distribution atlases are among the many activities organised by working groups. Studying dragonflies together is very stimulating and has several advantages. By working together, mapping the dragonflies of a whole region becomes possible in an effective way. The amount of work can be divided and members can replace each other during vacations. During the process, less experienced dragonfly enthusiasts learn quickly from more experienced recorders. Furthermore, working groups have a more formal position, e.g. when giving advices to nature managers. But the main reason for many people to join a dragonfly working group might well be that watching dragonflies together is just much more fun!" (Author)] Address: Veling, K., De Vlinderstichting Postbus 506,

6700 AM Wageningen, The Netherlands. E-mail: Kars.Veling@vlinderstichting.nl

**11162.** Wasscher, M.; Goudsmits, K. (2010): *Coenagrion scitulum* back in Northwestern Europe. *Brachytron* 13(1/2): 19-25. (in Dutch, with English summary) ["On 16 June 2003 the *C. scitulum* was recorded for the first time in The Netherlands. The second author collected the species in the central part of the province of Limburg, south of Tegelen. Characteristics of identification, European flight season and preferred habitat are given. The occurrence of the species in Northwestern Europe is described. It was present in Belgium from ca. 1850 until 1973, with two records at only short distance of the Dutch border. It appeared in Northern France before 1990 in Champagne-Ardenne and in 1991 in Lorraine, in Luxemburg in 1997, Wallonia in 1998, Flanders in 1999 and in the Eifel in Germany in 2002. *C. scitulum* is listed as Least Concern on the forthcoming European Red list." (Authors)] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: m.wasscher@broekhuis.nl

**11163.** WWF Japan; Yasumura, S. (Ed.) (2010): Nansei Islands Biological Diversity Evaluation Project Report. WWF Japan, Nihonseimei-Akabanebashi Bld. 6F 3-1-14, Shiba, Minato-ku, Tokyo, Japan (Publ.): 214 pp. (in English) [The following Odonata species were selected as indicator species: *Chlorogomphus okinawensis*, *Chlorogomphus brunneus keramensis*, *Rhipidolestes amamiensis*, and *Zyxomma obtusum*.] Address: not stated

**11164.** Yu, W.-y.; Li, Z.-h.; Song, D.-j.; Hua, C.; Hu, N.; Ji, J.; Yuan, X.-j.; Yang, X.; Zhou, J. (2010): Studies on diversity of Odonata in Zijin mountain, Lao mountain and Jiangjun mountain of Nanjing. *Journal of Yangzhou University (Agricultural and Life Science Edition)* 31(2): 91-94. (in Chinese, with English summary) [China; the regional survey conducted between 2005 and 2007, resulted in 43 Odonata species.] Address: Yu, W.-y., Dept of Life Sci, Nanjing Xiaozhuang Univ, Nanjing 211171, China. E-mail: ywy138519@126.com

**11165.** Zhang, X.-j.; et al. (not stated) (2010): Study on molecular phylogeny to the species of Anisoptera (Insecta: Odonata) based on CO II complete genes. *Journal of Anhui Agri. Sci.* 38(5): 2264-2267. (in Chinese, with English summary) [Verbatim: "Objective: The research aimed to study the molecular phylogeny to the species of Anisoptera (Insecta: Odonata) based on CO II complete genes. Method: Non-special primers were designed on the CO II genes of Odonata. CO II complete genes of 6 genera, including 8 species of 5 families in Anisoptera, had been sequenced and analyzed. The phylogenetic trees were reconstructed using ClustalX1.8, ContigExpress, MEGA2.1, PHYLIP3.6a and MrBayesV3.0 softwares, and maximum parsimony and maximum likelihood methods, respectively. Results: The results show that A + T contents of CO II genes of Libellulidae are lower (68.6%) in Insecta, which proves Odonata is an original group. Every sequence includes 2 Cys, which differs from the other groups of Insecta. Do not agree with the view of raising Macrominae into Macromidae. Agree with the views of putting both Aeshnidae and Cordulegastridae into Aeshnidae, and raising Gomphidae into a superfamily. Order of the evolution relationship of 5 families is: Gomphidae -> Cordulegastridae -> Aeshnidae -> Corduliidae -> Libellulidae. Conclusion: The study can provide the relative basis for

molecular phylogeny study of Odonata." The study includes the following taxa: *Orthertrum albistylum*, *O. sabina*, *Sympetrum eroticum*, *S. kunckeli*, *Epophthalmia elegans*, *Anax parthenope julius*, *Anotogaster kuchenbeiseri*, *Davidius bicornutus*, and *Pseudagrion civicum*.] Address: Zhang, X.-j., Dept of Laboratory Medicine, Bengbu Medical College, Bengbu, Anhui 233000, China

**11166.** Żurawlew, P.; Pawlak, S.; Dolata, P.T. (2010): Data on the occurrence of *Sympetrum meridionale* and *S. pedemontanum* in the southern Great Poland and in the Wieluń Land. *Odonatrix* 6(1): 30-32. (in Polish, with English summary) [Eight sites for *S. meridionale* and one for *S. pedemontanum* are documented.] Address: Żurawlew, P., Kwileń 67A, 63-313 Chocz, Poland. E-mail: grusleo@wp.pl

## 2011

**11167.** Adandedjan, D.; Laleye, P.; Ouattara, A.; Gourene, G. (2011): Distribution of benthic insect fauna in a West African Lagoon: The Porto-Novo Lagoon in Benin. *Asian Journal of Biological Sciences* 4(2): 116-127. (in English) ["The distribution of aquatic insect fauna of Porto-Novo lagoon was studied through seasonally sampling from July 2007 to June 2008. A total of 52 taxa belonging to 7 orders and 29 families were recorded. The richest taxonomic diversity was observed for Heteroptera, Ephemeroptera and Odonates. Certain species such as *Diplonychus* sp. (Belostomidae), *Chironomus* sp., *Chironomus formosipennis* and *Polypedium fuscipenne* (Chironomidae) and *Libellulidae* (*Libellula* sp.) were the most constant taxa observed during the sampling period. The distribution pattern observed thanks to the Kohonen map (SOM) is characterized by a rich assemblage and varied from upstream to downstream. The highest specific diversity (69.29%) was got during the low rainy season (October) and the lowest (29.8%), during the high dry season (February). This pattern resulted from the species reproductive process of most insects orders, in relation with a decrease of the rate of the salinity and an increased water temperature. But then, the low rate of species richness recorded during the dry season will be explained by the lacking of efficient recruiting and a strong predation during this period. Besides, hydrological factors and human activities could be also the important factors of controlling the distribution of this fauna. The invasion of the lagoon by the floating vegetation can be advanced as a factor of forage of the temporal variations of the organisms." (Authors) The identification of Odonata is suspicious, because the taxa list includes European representatives.] Address: Adandedjan, D., Laboratoire d'Hydrobiologie et d'Aquaculture, FSA-UAC, Faculté des Sciences Agronomiques- Université d'Abomey-Calavi, 01 BP 526 Cotonou Bénin

**11168.** Ahmadi, R.; Mohebbi, F.; Hagigi, P.; Esmaily, L.; Salmanzadeh, R. (2011): Macro-invertebrates in the wetlands of the Zarrineh estuary at the south of Urmia Lake (Iran). *Int. J. Environ. Res.* 5(4): 1047-1052. (in English) ["This research summarizes the data on benthic macro invertebrates collected from 25 points in the Urmia Lake wetlands during November 2008 to February 2009. The purpose of the study was to assess the effects of elevated salinity and nutrient (nitrogen and phosphorus) levels on macro invertebrate abundance and composition. A total of 32 taxa were collected, and the common taxa, including Chironomidae (midges), Corixidae (wa-

ter boatmen), Erythemis (damselflies) [sic], Ephemerella (mayflies), Hyalella (amphipods), and snails. Samples at ponds with salinities greater than 10 ppt showed a shift in community composition to salt-tolerant taxa and a reduction in total diversity. The corixid *Trichocorixa verticalis*, the brine shrimp *Artemia partenogenetica*, and the dipteran *Ephydra* are salt-tolerant species that only occur at high salinity levels. Ponds relatively high in nutrients had fewer total taxa, reduced abundance and diversity of aquatic beetles, lower diversity index values, and a greater dominance by chironomids than ponds low in nutrients. It is suggested to allocate about 10 × 10<sup>6</sup> cubic meters freshwater of the represented rivers to these wetlands to improve their trophic condition and transfer their hypereutrophic waters into the Urmia Lake for more production of the macro invertebrates both in the wetlands and on the lake." (Authors) Identification is said to be realised by Watson, J.A.L. & Arrell, A.F. (1991). *Odonata* (Dragonflies and Damselflies). Ch. 17 in CSIRO (ed) *The Insects of Australia*. A textbook for students and research workers. Carlton, Melbourne University press, pp. 294-310. Even in this case it is an enigma to identify and find *Erythemis* - an American species - in Iran.] Address: Ahmadi, R., Iranian Artemia Research Center, P.O. Box: 57157-1367 Urmia, Iran. E-mail: rezaahmadi1342@gmail.com

**11169.** Anderson, C.N.; Cordoba-Aguilar, A.; Drury, J. P.; Grether, G.F. (2011): An assessment of marking techniques for odonates in the family Calopterygidae. *Entomologia Experimentalis et Applicata* 141(3): 258-261. (in English) ["Herein, we describe an alternative ... marking technique for calopterygid damselflies and evaluate potential effects on biology and behaviour. Briefly, abdominal sections 3–6 are marked with unique combinations of paint marks. We report on the use of this marking technique from two calopterygid populations ... Results: For *H. titia*, probabilities of resighting, given a specific colour ranged from 46.4 to 51.6%. No single colour significantly affected the probability of resighting (Table 1). In *C. haemorrhoidalis*, probabilities of resighting given a specific colour ranged from 70.9 to 77.4%. As with *H. titia*, no colour significantly affected the probability of resighting in the *C. haemorrhoidalis* study (Table 2). A significantly higher proportion of *C. haemorrhoidalis* was resighted in the census following abdomen marking (73.8%) than in the census following wing marking (55.0%;  $v_2 = 6.13$ , d.f. = 1,  $P = 0.013$ ). In the *H. titia* territory intrusion tests, the average rate of attack toward abdomen marked conspecific intruders was not significantly different from the rate of attack toward unmanipulated intruders (signed-rank test:  $z = 1.193$ ,  $P = 0.23$ ;  $n = 14$ )."] (Authors)] Address: Anderson, C.N., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Circuito Exterior s/n, Apdo. Postal 70-275, México D.F. 04510, Mexico. E-mail: cndanderson1980@gmail.com

**11170.** Andrew, R.J.; Verma, P.; Rathodi, M.K. (2011): Post ovipositional changes in the egg chorionic ultrastructure of the dragonfly *Pantala flavescens* (Fabricius) (Insecta: Odonata: Anisoptera). *Biological Forum* 3(2): 22-24. (in English) ["The ultrastructure of the egg chorion of *P. flavescens* is described using the light and scanning electron microscope. The egg of *Pantala flavescens* is oval and the chorion is distinctly divided into an outer exochorion and an inner endochorion. The egg measures about  $720 \pm 20 \times 530 \pm 10 \mu\text{m}$  in unwetted condition. The endochorion is light yellow, but turns



brown within a few hours in water. The exochorion which envelopes the endochorion as a thin covering which expands into a transparent thick, sticky, jelly-like structure when it comes in contact with water and therefore, the egg in wet condition bloats and measures  $870 \pm 20 \times 550 \pm 20 \mu\text{m}$ . The apically placed micropylar apparatus is nipple shaped, formed of a small sperm storage chamber (atrium) and a median projecting micropylar stalk. The stalk is of 'concave cone' type and possesses a pair of subterminal orifices. A circular groove demarcates the exochorion and the micropylar apparatus." (Authors)] Address: Andrew, R.J., Dept Zool., Shri Shivaji ESA's Science College, Congress Nagar, Nagpur - 440012 (MS), India

**11171.** Arimoro, F.O.; Nwadukwe, F.O.; Mordi, K.I. (2011): The influence of habitat and environmental water quality on the structure and composition of the adult aquatic insect fauna of the Ethiope River, Delta State, Nigeria. *Tropical zoology* 24(2): 159-171. (in English) ["The abundance and taxonomic richness of the adult aquatic insect fauna were determined at two sites located 2 km apart on the Ethiope River. Adults were collected by ultraviolet light traps and sweep nets on seven occasions between May and November 2010. Twenty-eight (28) different taxa were identified and 869 individuals were caught at sites 1 and 2 combined. The orders represented were Diptera, Odonata, Trichoptera, Ephemeroptera and Plecoptera in decreasing order of abundance. The distribution of these organisms varied from site 1 to 2 according to the different human activities, abiotic factors and riparian vegetation at the sites. Generally, the most dominant taxonomic order was Diptera, closely followed by Odonata, while the least dominant was Plecoptera. Margalef's species richness (d), Shannon-Weiner diversity and evenness (E) indices were significantly higher ( $P < 0.05$ ) at site 1." (Authors)] Address: Arimoro, F.O., Dept of Animal & Environmental Biology, Delta State Univ., P. M. B. 1, Abraka, Nigeria. E-mail: fransarimoro@yahoo.com

**11172.** Arnaiz, O.L.; Wilson, A.L.; Watts, R.J.; Stevens, M.M. (2011): Influence of riparian condition on aquatic macroinvertebrate communities in an agricultural catchment in south-eastern Australia. *Ecol. Res.* 26: 123-131. (in English) ["Riparian vegetation is known to affect aquatic macroinvertebrate communities through contributions of organic matter and shading. Despite the widespread degradation of riparian vegetation in Australia, there are relatively few studies examining the effect of changes in riparian vegetation on in-stream macroinvertebrate assemblages on individual catchments. In particular, information is lacking on the responses of macroinvertebrate communities in catchments dominated by agriculture, where farms that are managed at the paddock scale result in riparian vegetation condition varying over relatively short distances. In this study, macroinvertebrate assemblages were assessed from 12 reaches along a 25-km section of a small agricultural stream in southeastern Australia. Riparian condition was assessed using in-stream coarse woody debris (CWD) levels and the rapid appraisal of riparian condition (RARC) index, a numerical system for categorising the health of riparian areas that incorporates sub-indices reflecting habitat continuity, vegetation cover, plant debris levels, native vegetation dominance, and other indicative features. There was a significant positive correlation between RARC scores and macroinvertebrate taxon richness ( $p < 0.01$ ), and also between

CWD scores and macroinvertebrate taxon richness ( $p < 0.05$ ). In contrast, there was no significant correlation observed between riparian condition and the other macroinvertebrate indices (abundance, Shannon diversity, SIGNAL and SIGNAL2). Macroinvertebrate communities were significantly different in stream reaches from different riparian condition categories (ANOSIM;  $p < 0.05$ ). Our results indicate that efforts to rehabilitate riparian vegetation may have a positive effect on in-stream biota even when implemented at a relatively small scale by individual landholders. ... Corduliidae (Odonata) were unique to 'very poor' riparian condition reaches." (Authors)] Address: Stevens, M., E H Graham Centre for Agricultural Innovation (Industry & Investment NSW and Charles Sturt University), Yanco Agricultural Institute, Private Mail Bag, Yanco, NSW 2703, Australia. E-mail: mark.stevens@industry.nsw.gov.au

**11173.** Arulprakash, R.; Gunathilagaraj, K. (2011): Odonate (Insecta) fauna of temporary water bodies of Salem, Tamil Nadu. *Bugs R All* 17: 30. (in English) [Six temporary water bodies, which dry up in the summer month, in the Salem district of Tamil Nadu, India were sampled for their Odonata species composition. Sampling was done in July - September, 2006 and January - April, 2007. A total of 205 individuals were collected and total to 15 species. These are listed in a table together with their habitats and number of individuals collected.] Address: Arulprakash, R., Dept Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore 641003, India. E-mail: avrarulprakash@gmail.com

**11174.** Averill, M. (2011): *Sympetrum fonscolombii* in Lanzarote, an example of coping with arid climates. *Agrion* 16(1): 10-11. (in English) ["The observation on 9-III-2010, in Lanzarote, arose after having struggled to find any standing water and was at a place where rain water had collected. Wet weather in February had led to water building up in an area dissected by a gully beside the road at W  $13^{\circ} 29.272'$ , N  $29^{\circ} 04.291'$ , half a kilometre west of Guatiza. The silty ponded water had very little emergent vegetation, and other than the bare banks the only supports were dead woody stems. The only species in fact found at the site was *S. fonscolombii* and these were freshly emerged adults. Approximately 200 exuviae were hanging in the bushes. Judging by the silt marks on the vegetation, levels had been much higher and as the summer months approached the water would eventually dry out. There have been 14 species of dragonfly recorded for the Canary Isles (Weihrauch 2011) but Lanzarote would have less than this due to the dry conditions and lack of permanent water bodies, which pose a problem for breeding species." (Author)] Address: Averill, M., 49 James Road, Kidderminster, Worcs, UK, DY10 2TR. E-mail: mike.averill@blueyonder.co.uk

**11175.** Azarak, P.A.; do Nascimento, S.P.; de Carvalho, C.M. (2011): Anfíbios do lavrado de Roraima. *Biologia Geral e Experimental* 11(1): 4-14. (in Portuguese, with English summary) [The paper presents identification keys and comments on habitats, reproduction and diet of 16 species of anurans from the lavrado of Roraima, region of Tepequém, Brasil. The diet of a few species also includes Odonata.] Address: Azarak, Priscila, Instituto Nacional de Pesquisas da Amazônia, Núcleo de Pesquisas de Roraima, Rua Cel. Pinto 341, Boa Vista, Rr, CEP 69301-315, Brasil. E-mail: priscilazarak@hotmail.com

**11176.** Bakare, S.S.; Andrew, R.J. (2011): Spermatogenesis and sperm bundle formation in the dragonfly *Anax guttatus* (Burmeister) (Insecta: Odonata: Aeshnidae). *The Bioscan* 6(4): 587-590. (in English) ["In *A. guttatus*, the freshly moulted adults contain primary spermatogonia to fully-formed spermatozoa indicating commencement of spermatogenesis in the ultimate nymphal stage. All the progametes of a single cyst exhibit a single stage of spermatogenesis. Vigorous process of spermiogenesis occurs in the adult dragonfly, leading to the formation of spermatozoa and sperm bundle. The "shuttle cock" shaped sperm bundles are formed with a conical head cap. The central canal secretes thick viscous seminal fluid around the sperm bundle which facilitates downward migration of sperm bundles from the central canal to the vas deferens. In mature adults, the vasa deferentia, seminal vesicles and sperm sac are completely packed with the sperm bundle embedded in viscous seminal fluid secreted by epithelial cells of the genital ducts. The acellular wall of cyst containing mature spermatozoa undergoes ultrastructural changes which help the sperm bundle to move towards the central canal." (Authors)] Address: Andrew, R.J., Dept of Zoology, Hislop College, Civil Lines, Nagpur - 440 001 (M.S.) India. E-mail: rajuandrew@yahoo.com

**11177.** Baker, R.A. (2011): Parasites of damselflies and dragonflies: a review of recent work. *J. Br. Dragonfly Society* 21(2): 88-104. (in English) ["Odonata are invaded by a number of parasites which occur as both endoparasites (gregarines and trematodes) and ectoparasites (blood sucking flies and aquatic mites). Recently published material brings to light new work on the impact of these parasites on their hosts, the life cycle of some of the parasites and the ecology and behaviour of their parasitic association." (Author)] Address: Richard A. Baker, R.A., Faculty of Biological Sciences, University of Leeds, Leeds LS2 9JT, UK

**11178.** Baumart, J.; Dalosto, M.; Santos, S. (2011): Effects of carbofuran and metsulfuron-methyl on the benthic macroinvertebrate community in flooded ricefields. *Acta Limnologica Brasiliensia* 23(2): 138-144. (in English, with Portuguese summary) ["This study evaluated the effect of the insecticide carbofuran and the herbicide metsulfuron-methyl on the abundance and diversity of benthic macroinvertebrates in a paddy ricefield. To achieve this goal, two pesticide treatments [the insecticide carbofuran (IC) and the herbicide metsulfuron-methyl (HM)] and a control (Co) treatment with no added pesticide were established in an experimental area of the Plant Science Department of the Federal University of Santa Maria. Soil samples were collected in triplicate from each treatment 30 days before and 1, 10, and 51 days after the pesticide application, for macrofauna identification. Among the 21 taxa identified, Trichoceridae was present only in Co, Hydroptilidae was recorded only in IC, and Corixidae in HM. In Co, the most abundant group was Annelida, while in IC and HM Diptera (Chironomidae) was dominant. Significant differences were observed between Co and IC, in the density of Odontoceridae (Control>IC) and Hydrophilidae (Control<IC), and between Co and HM in the density of Odontoceridae (Control>HM) and Hirudinea (Control<HM). In spite of the possible negative effects of the pesticides on the benthic community, the assemblages recovered rapidly." (Authors) Odonata are treated at the family level; to the abstracters it remains unclear in what extent they are afflicted by the insecticides.] Ad-

dress: Baumart, Joele, Programa de Pós-Graduação em Biodiversidade Animal, Centro de Ciências Naturais e Exatas, Departamento de Biologia, Laboratório de Carcinologia, Universidade Federal de Santa Maria – UFSM, CEP 97105-900, Santa Maria, RS, Brazil. E-mail: jobaumart@gmail.com

**11179.** Behr, H. (2011): Nachweis einer dritten Moosjungfer-Art am Waldsee bei Kleekamp (NWM): Östliche Moosjungfer, *Leucorrhinia albifrons* (Burmeister, 1839). *Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 14(1): 85-86. (in German) [*L. albifrons*, Waldsees near Kleekamp, Nordwestmecklenburg, MTB 2135/4, Germany; 2.6.2011] Address: Behr, H., Herrengrabenweg 57, 19061 Schwerin, Germany. E-mail: hauke-behr@web.de

**11180.** Bentley, G.; Tyrrell, M. (2011): Maiden flight behaviour in the Hairy Dragonfly *Brachytron pratense* (Müller). *J. Br. Dragonfly Society* 27(2): 132-133. (in English) [Northamptonshire, UK. "An account is presented of observations of recently emerged *B. pratense* taking maiden flights immediately on wing opening, followed by extended periods resting in trees with wings closed." (Authors)] Address: Bentley, G., 21 Cotswold Avenue, Northampton, Northants, NN5 6BT, UK

**11181.** Bernard, R.; Heiser, M.; Hochkirch, A.; Schmitt, T. (2011): Genetic homogeneity of the Sedgling *Nehalennia speciosa* (Odonata: Coenagrionidae) indicates a single Würm glacial refugium and trans-Palaeartic postglacial expansion. *Journal of Zoological Systematics and Evolutionary Research* 49(4): 292-297. (in English) ["The phylogeographic structures of taiga species often support the hypothesis of East Palaeartic refugia for these taxa, but the phylogeographic structures of northern temperate and southern boreal bog species are still poorly understood. Therefore, we analysed the genetic diversity and differentiation of a stenotopic damselfly, *N. speciosa*, across its trans-Palaeartic range by means of sequencing two mitochondrial gene fragments, 16S rRNA-ND1 and cytochrome c oxidase II. Only four single nucleotide polymorphisms were detected over the 1130 sequenced nucleotides. This low genetic diversity and differentiation and thus the lack of phylogeographic structure imply postglacial expansion from a single Würm Ice Age refugium, most likely located in the Far East of Asia, i.e. Manchurian refugium. From here, the species could have colonized large parts of the Palaeartics, including Europe, during the postglacial." (Authors) Individuals from 12 localities all over the natural range of *N. speciosa* were collected. Five of these localities are in Europe: one in Bavaria (Germany), three in Poland and one in Lithuania. The remaining seven localities are in Asia, two of them in the West Siberian Lowland, one in the Amur Province, one in the Russian Far East and three in Japan.] Address: Bernard, R., Dept of General Zoology, Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznań, Poland; E-mail: bernard@amu.edu.pl

**11182.** Bernard, R.S.; Savard, M.; Crépin, D. (2011): L'inventaire de libellules à la pointe Taillon: une diversité étonnante! *Bulletin de conservation. Les parcs nous ont dévoilé...* 2011: 18-20. [Nine localities in Pointe-Taillon National Park, Québec, Canada were studied for their Odonata fauna between June 1 and August 9, 2010. A total of 51 species is listed in a table.] Address: Bernard, Roxanne Sarah. E-mail: roxannesbernard@hotmail.com

**11183.** Boda, R.; Rozner, G.; Czirok, A.; Szivak, I.; Csabai, Z. (2011): New data on the distribution of *Cordulegaster heros* Theischinger, 1979 in Mecsek Mountains and its surroundings. *Acta Biol. Debr. Oecol. Hung.* 26: 21-28. (in English, with Hungarian summary) [*C. heros* is a Natura 2000 species and the only legally strictly protected dragonfly in Hungary. Older Hungarian records of the species are known from Sopron Mountains, Őrség and Mecsek, and more recently from the Zselic Hills and Kőszeg Mountains. Between 2008 and 2010, 468 individuals of *C. heros* from 69 sampling sites along the Mecsek Mountains and its surroundings could be added to the list of localities with records of this rare and endangered species.] Address: Boda, R., University of Pécs, Department of Ecology and Hydrobiology, Ifjúság útja 6, H-7624 Pécs, Hungary. E-mail: reka86@gamma.ttk.pte.hu

**11184.** Boets, P.; Lock, K.; Goethals, P.L.M. (2011): Using long-term monitoring to investigate the changes in species composition in the harbour of Ghent (Belgium). *Hydrobiologia* 663: 155-166. (in English) ["The macroinvertebrate community of the harbour of Ghent was studied by analysing 135 samples taken at different sampling locations from 1990 until 2008. The results showed that the current Crustacea and Mollusca communities are mainly represented, in terms of abundances, by alien species. In total, seven alien and four indigenous crustacean species were found. Mollusc diversity was higher, with a total of 14 species, four of which were alien. Macroinvertebrate diversity was very low at the beginning of the 1990s, but increased due to the improvement of the chemical water quality achieved by sanitation and stricter environmental laws. This is reflected by the dissolved oxygen concentration, which increased from an average of 2 mg/l to an average of 9 mg/l, allowing more sensitive species to establish. Since 1993, the number of alien taxa has augmented, whereas the number of native taxa has remained stable. The improvement of the chemical water quality and the simultaneous increase in total number of species were also reflected in an increase of the Multimetric Macroinvertebrate Index Flanders, which is used to assess the ecological water quality in Flanders. Due to intensive international boat traffic and the low species diversity, the harbour of Ghent is highly vulnerable for invasions. Stronger regulations and a better understanding about the contribution of shipping, shortcuts via artificial water ways, habitat degradation and environmental pollution are required to reduce the further spread of alien species." (Authors) *Coenagrion puella*, *Ischnura elegans*] Address: Boets, P., Laboratory of Environmental Toxicology and Aquatic Ecology, Ghent University, J. Plateaustraat 22, 9000 Ghent, Belgium. E-mail: pieter.boets@ugent.be

**11185.** Bourret, A.; McPeck, M.A.; Turgeon, J. (2011): Regional divergence and mosaic spatial distribution of two closely related damselfly species (*Enallagma hageni* and *Enallagma ebrium*). *J. Evol. Biol.* 25(1): 196-209. (in English) ["North American *Enallagma* damselflies radiated during the Pleistocene, and species differ mainly by reproductive structures. Although morphologically very different, *Enallagma hageni* and *Enallagma ebrium* are genetically very similar. Partitioning of genetic variation (AFLP), isolation by distance and clustering analyses indicate that these morphospecies are locally differentiated genetically. Spatial analyses show that they are rarely sympatric at local sites, and their

distributions form a mosaic of patches where one is clearly dominant over hundreds of square kilometers. However, these morphospecies are also not genetically more similar when they are sympatric, indicating that hybridization is probably not occurring. Given that these morphospecies are ecologically equivalent, strong assortative mating, reproductive interference and fast post-glacial recolonisation may explain the origin and maintenance of these distributional patches across eastern North America. By limiting opportunities for gene flow, reproductive interference may play an unsuspected role in accelerating genetic differentiation in the early phases of nonecological speciation." (Authors)] Address: Turgeon, Julie, Dépt de biologie, Univ. Laval, 1045 avenue de la Médecine (Vachon 3048), Quebec City, QC G1V 0A6, Canada. E-mail: julie.turgeon@bio.ulaval.ca

**11186.** Buczyński, P. (2011): First records of *Lestes barbarus* (Fabricius, 1798) and *Erythromma viridulum* (Charpentier, 1840) (Odonata: Lestidae, Coenagrionidae) in islands Wolin and Uznam. *Odonatrix* 7(2): 57-58. (in Polish, with English summary) [In August 2011, on the islands of Uznam and Wolin (northwestern Poland) two autochthonous populations of *L. barbarus* and *E. viridulum* were found. *L. barbarus* was recorded in a sand-excavation in Świnoujście while *E. viridulum* in a park pond in Świnoujście and a ditch in the bird sanctuary „Karsiborska Kępa”. The author discusses the importance of anthropogenic waters on range expansion of thermophilous dragonflies towards the north.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**11187.** Buczyński, P. (2011): Polish and dedicated to Poland odonatological papers. 9. The year 2010. *Odonatrix* 7(2): (in Polish, with English summary) [73 publications from 2010 are added to the list of Polish papers on Odonata.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**11188.** Cabana, M.; Romeo, A.; Cordero, A. (2011): Primeras citas de *Sympetrum flaveolum* (Odonata: Libellulidae) en Galicia. *Chioglossa* 3: 15-19. (in Galician, with English summary) [First records of *S. flaveolum* in Galicia (NW Spain) are documented. In 2010, the species was found in mountain ponds, between 1300 and 1500 m.a.s.l., in localities of Lugo and Ourense provinces.] Address: Cabana O., M., Dpto. de Biología Animal, Biología Vegetal e Ecología, Facultade de Ciencias. Univ. da Coruña, Campus da Zapateira, s/n. 15.071 A Coruña, Spain. E-mail: mcohylla@yahoo.es

**11189.** Chovanec, A.; Schindler, M. (2011): Gewässertypspezifische Bewertung von Restrukturierungsmaßnahmen an einem Tieflandbach durch libellenkundliche Untersuchungen (Insecta: Odonata). *Beiträge zur Entomofaunistik* 12: 25-40. (in German, with English summary) ["Dragonfly surveys as a tool for assessing the restoration of a small lowland brook. The ecological status of a restored stretch of a small river in the lowland areas of eastern Austria was assessed by a dragonfly survey. Restoration measures were carried out in a retention area by river widening and the construction of back waters. The assessment which is oriented towards the Water Framework Directive (WFD) is based on the comparison between the status quo and a river-type-specific reference condition; key elements are the species composition and the Odonata Habitat Index (OHI).



A total of 21 species were recorded at two sites situated in the restored area, 16 species of them were classified as autochthonous. The species list and OHI values reflect the broad range of relevant dragonfly habitats. The ecological status of this river stretch was ranked as class II ("good ecological status") in the 5-tiered WFD classification scheme. Species numbers recorded at two canalised and straightened stretches of the river system (6 species / 5 autochthonous species) and OHI values show a significant deviation from the river-type-specific reference condition." (Authors)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Österreich. E-Mail: a.chovanec@kabsi.at

**11190.** Clausnitzer, V.; Dijkstra, K.D.; Kipping, J. (2011): Globally threatened dragonflies (Odonata) in Eastern Africa and implications for conservation. *Journal of East African Natural History* 100(1&2): 89-111. (in English) ["This paper presents the status of East African dragonfly species (Odonata) listed globally as threatened on "The IUCN Red List of Threatened Species". The area considered includes Ethiopia, Kenya, Uganda, Burundi, Rwanda, Tanzania and Malawi. From a total of 323 species known from these countries, 31 are listed in one of the categories "Near Threatened", "Vulnerable", "Endangered" and "Critically Endangered", while nine are marked as "Data Deficient". Ecoregions with high numbers of threatened species are the Ethiopian and East African montane forests, Eastern Arc forests and Northern Zanzibar-Inhambane coastal forest mosaic. The highest species diversity is found in the Albertine Rift montane forests ecoregion. Information concerning the distribution, conservation status and biology of these species is given and conservation issues are discussed." (Authors)] Address: Clausnitzer, Viola, Senckenberg Museum of Natural History Görlitz, PF 300154, 02806 Görlitz, Germany. E-mail: viola.clausnitzer@senckenberg.de

**11191.** Crabtree, A.G. (2011): Modelling a small pond odonate population: Exploring the complex life history dynamics of *Pachydiplax longipennis* (Odonata: Libellulidae). M.Sc. thesis. Northern Illinois University: 150 pp. (in English) ["Members of the insect order Odonata are excellent examples of organisms that demonstrate complex life histories. Both the larval and adult stages must be studied to understand the dynamics of such species. A population of *P. longipennis* was studied at a small fishless pond in north central Illinois in 2008 and 2009. Additionally, a dynamic population model of the species was developed using the graphical modelling software, STELLA, to further understand the life history dynamics of *P. longipennis*. The larval dragonfly community in the pond was composed of nine species, all of which were also present as adults. The adult dragonfly community contained an additional four species, for a total of 13. Although, the maximum larval density of *P. longipennis*, which occurred in the middle of the summer, was ~15 m<sup>2</sup> in 2008 and 2009, mean density was higher in 2009. Based on this maximum density, it was estimated the maximum larval population size for the pond was ~170,000. Head capsule width and total length of larvae were used to identify 14 larval instar classes for the species. Changes in head capsule width between adjacent instar classes generally conformed to Dyar's Ratio, with the exception of the changes between the first and last two instars. Skipping of instar classes was common among larvae reared in the lab. Mean maximum *P. longipennis* adult abundance occur-

red in July in both 2008 and 2009. It was higher in 2008 than that observed in 2009, ~12 per 10 m sector versus 8 per 10 m sector. The estimated adult population size in 2009 based on mark-recapture data using Craig's estimation method was 2,000. Average clutch size, determined from six captured, mated females, was 1,238±431 eggs per clutch. Average clutch survivorship was 27.51%±16.38. A density-ceiling model generated a stable population of *P. longipennis* larvae and adults that cycled in 54 week intervals. Short term (2 years) results predicted an early instar larval population of ~175,000 individuals, a late instar larval population of ~40,000, and an adult population of ~4,000. Long term (20 years) results predict early instar larval population of ~300,000 individuals, a late instar larval population of ~75,000, and an adult population of ~6,000. Long term estimates were comparable to those predicted by larval and adult sampling. Sensitivity analysis of varying mortality rates found that changing early instar larval mortality rate had a significant impact on observed abundances in all modelled life stages, while changes in breeding adult mortality had little effect. Simulations of ten different survivorship scenarios of larval and adult mortality resulted in three specific categories of response in terms of larval and adult abundances: one or both reached carrying capacity, both went extinct, or either or both stabilized at an intermediate abundance. Scenario results also suggested a greater importance of larval stage mortality rates, similar to the results of the sensitivity analysis. A density-dependent model generated unrealistic results in both short term and long term simulations." (Author)] Address: not stated.

**11192.** Daraž, B. (2011): New localities of *Nehalennia speciosa* (Charpentier, 1840) in southeastern Poland (Odonata: Coenagrionidae). *Odonatrix* 7(1): 14-18. (in Polish, with English summary) ["Two new localities of *N. speciosa* were found in 2010 in southeastern Poland, in the south of the Sandomierz Basin (Kotlina Sandomierska), in two nature reserves: "Bagno Przeclawskie" (50°11'15"N, 21°25'15" E, UTM: EA35.35) and "Torfy" (50°02'38" N, 21°17'45" E, EA24).] Address: Daraž, B., ul. Kościelna 41, 35-505 Rzeszów, Poland. E-mail: bda-raz@poczta.onet.pl

**11193.** David, S. (2011): Výskyt a ekologická charakteristika *Somatochlora meridionalis* Nielsen, 1935 na Slovensku [Occurrence and ecological characteristics of *Somatochlora meridionalis* Nielsen, 1935 in Slovakia]. In: Stoukal, E. (ed.) 2011: Zborník abstraktov z konferencie 18. Feriencove dni 2011, Bratislava, 24.-25.11. 2011. *Faunima*, Bratislava, 34 pp: 9. (in Slovakian) [In Slovakia, *S. meridionalis*, is known from five localities (šahy, 1974, 1 female, leg. J. švec; Tešmak, 1996 1 male, leg. S. David; Bol', 2003, 1 male, leg. G. Tóthová; Veličná, 2008, 1 male, leg. K. Janeková; Chrastnice, 2010-2011, 1 male larva, leg. S. David).] Address: David, S., Katedra ekologie a environmentalistiky FPV UKF v Nitre, Tr. A. Hlinku 1, 949 74 Nitra, Slovakia. stanislav.david@savba.sk, stanislav.david@gmail.com

**11194.** Day, L. (2011): Odonata seen at Tatai, Koh Kong Province, Cambodia. *International Dragonfly Fund - Report 42*: 7-10. (in English) ["32 Odonata species have been recorded in March 2011 near Tatai River situated at the foothills of the Cardamon Mountains, Cambodia. The list of taxa including *Heliaeschna crassa* Krüger, 1899 and *Orchithemis pulcherrima* Brauer, 1878 which are new additions to the Cambodian Odonata fauna."

(Author)] Address: Day, L., P.O. Box 67, Nathon, Koh Samui, Surat Thani, 84140, Thailand

**11195.** Delclos, P.; Rudlof, V.H.W. (2011): Effects of size structure and habitat complexity on predator-prey interactions. *Ecological Entomology* 36(6): 744-750. (in English) ["(1) A predator's ability to suppress its prey depends on the level of interference among predators. While interference typically decreases with increasing habitat complexity, it often increases with increasing size differences among individuals. However, little is known about how variation in intrinsic factors such as population size structure alters predator-prey interactions and how this intrinsic variation interacts with extrinsic variation. (2) By experimentally varying the level of vegetation cover and the size structure of the predatory *Ischnura posita*, we examined the individual and interactive effects of variation in habitat complexity and predator size structure on prey mortality. (3) Copepod prey survival linearly increased as the *I. posita* size ratio decreased and differed by up to 31% among different predator size structures. Size classes had an additive effect on prey survival, most likely because intraspecific aggression appeared size-independent and size classes differed in microhabitat preference: large *I. posita* spent 14% more time foraging on the floor than small larvae and spent more time in the vegetation with increasing habitat complexity. Despite this difference in microhabitat use among size classes, habitat structure did not influence predation rates or interference among size classes. (4) In general, results suggest that seasonal and spatial variation in the size structure of populations could drive some of the discrepancies in predator-mediated prey suppression observed in nature, and this variation could exceed the effects of variation in habitat structure." (Authors)] Address: Rudolf, V.H.W., Department of Ecology and Evolutionary Biology, Rice University, Houston, TX 77005, USA. E-mail: Volker.rudolf@rice.edu

**11196.** Deutschmann, U. (2011): Auswertung des Fotowettbewerbs des Entomologischen Vereins Mecklenburg e.V. für das Jahr 2011. *Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 14(1): 91-92. (in German) [The winner of a regional photo competition was Michael Frank, Nieder-Olm with „Blaue Augen im Flug“ (Flying blue eyes), showing a male *Aeshna affinis*. The third place was a picture of *Coenagrion puella* with a small Hymenoptera sitting on the eyes of the damselfly: „Der falsche Landeplatz“ (wrong landing site), Rolf Ludwig, Schwerin.] Address: Deutschmann, U., Feldstr. 5, 19067 Dobbin am See, OT Buchholz, Germany. E-mail: uwedeutschmann@web.de

**11197.** Dufrene, M.; Baltus, H.; Cors, R.; Fichet, V.; Moës, P.; Warlomont, P.; Dierstein, A.; Motte, G. (2011): Bilan du monitoring des libellules dans les sites restaurés par le projet LIFE « Tourbières » sur le Plateau de Saint-Hubert. *Les Naturalistes Belges* 92(3-4): 37-54. (in French, with English summary) ["The project LIFE «Tourbières», that got started in 2003 and ended in 2007, has allowed the restoration of more than 600 ha of wet areas on the Plateau de Saint-Hubert. The creation of more than 3000 pools and water surfaces with a large surface diversity represents an huge potential of habitats for Dragonflies. The monitoring program launched at the end of the project reveals that the species number has doubled there in five years to reach 37 species. Numerous rare species in Ardenne and on the plateau are now occupying numerous habitat patches.

Logically, the abundance of several pioneer species like *Libellula depressa*, *Orthetrum coerulescens*, *Ischnura pumilio*, ... are well developed. However, typical peat-bog species like *Aeshna juncea*, *Leucorrhinia dubia* and *Somatochlora arctica* show also a large extension. The monitoring program should be re-launched this winter to follow the dynamic of this biological group." (Authors)] Address: Dufrene, M., Service Public Wallon (SPW) - Direction Générale Opérationnelle (DG03) - Département de l'Etude du Milieu naturel et agricole (DEMna), Av. Maréchal Juin, 23, B-5030 Gembloux, Belgium. E-mail: Marc.Dufrene@spw.wallonie.be

**11198.** Epstein, D.M. (2011): 15N tracer and modelling analyses of nutrient transport through lakes in a subalpine watershed. M.Sc. thesis, Ecology, Utah State University, USA. All Graduate Theses and Dissertations. Paper 932. <http://digitalcommons.usu.edu/etd/932>: 107 pp. (in English) ["Lakes have historically been overlooked as important nutrient processors within their watersheds. In general ecologists have focused on streams as zones of uptake and transformation, while viewing lakes as simple nutrient traps. However, recent research has highlighted the large influence that lakes may have on water chemistry within their watersheds. Within the field of limnology, researchers have traditionally focused on the pelagic zone for in-lake production. Further research in shallow lakes has highlighted the role benthic production within the littoral zone plays in the lake ecosystem. The greater influence of lakes is highlighted when comparing watersheds containing lakes with watersheds composed of solely stream channels. To assess the influence that lakes have on water chemistry and nutrient transport, both field and modelling analyses were performed for Bull Trout Lake, Idaho. In 2008 a large field sampling effort was conducted along with a 15N tracer experiment to characterize the limnology of Bull Trout Lake (Idaho) and nitrogen uptake and transport through the lake. Following the termination of the field season a multi-lake ecosystem model was developed with the use of a one-dimensional lake water quality model. Results from both experiments demonstrated the role of Bull Trout Lake as a nutrient processor and source within its watershed and further suggested the added influence additional lakes might have on water chemistry. The outcomes of the tracer study indicated that pelagic primary producers have the first opportunity to assimilate nitrogen delivered by the inflow stream; however, nutrients incorporated into plants within the littoral zone are held on to longer. Further the tracer experiment demonstrated the small role that large organisms have in ecosystem nutrient dynamics. The multi-lake model demonstrated the effect of BTL as a nutrient source within the watershed and indicated that although multiple lakes in sequence may have additive effects, most of this influence is expressed in the first two lakes of a series. Our research provides examples of valuable tools in limnological research. While whole-lake tracer studies have rarely been performed, they are extremely effective in understanding ecosystems. Additionally, even though lake models may be simplifications of natural systems, they can provide an efficient means of understanding lake functioning and testing hypotheses." (Author) The thesis includes data on Odonata, but without any taxonomic details.] Address: Epstein, D.M., Utah State University

**11199.** Ferreira Rezende, C.; Mazzoni, R.; Pellegrini Caramaschi, E.; Rodrigues, D.; Moraes, M. (2011): Prey

selection by two benthic fish species in a Mato Grosso stream, Rio de Janeiro, Brazil. *Rev. Biol. Trop.* 59(4): 1697-1706. ["Key to understand predator choice is the relationship between predator and prey abundance. There are few studies related to prey selection and availability. Such an approach is still current, because the ability to predict aspects of the diet in response to changes in prey availability is one of the major problems of trophic ecology. The general objective of this study was to evaluate prey selection by two species (*Characidium cf. vidali* and *Pimelodella lateristriga*) of the Mato Grosso stream, in Saquarema, Rio de Janeiro, Brazil. Benthos and fishes were collected in June, July and September of 2006 and January and February of 2007. Fish were collected with electric fishing techniques and benthos with a surber net. ... The most abundant families in both benthos and diet of both fish species were the same, indicating that these species consume mainly most abundant prey in the environment. We concluded that prey selection occurs even for preys that had small abundance in the environment. However, it is the availability of the macroinvertebrate resources that determines the major composition of items in diet of fish, demonstrating that the abundance is the factor that most influences the choice of prey." (Authors) Relative density (%) of Odonata during the five sampling months (150 samples) accounted to 0.32%. Odonata contributed 0.47% and 1.25% to the diet items in *Characidium cf. vidali vidali* and *Pimelodella lateristriga* respectively.] Address: Ferreira Rezende, Carla, Laboratório de Ecologia de Peixes, Instituto de Biologia, Departamento de Ecologia, Universidade Federal do Rio de Janeiro, Av. Mal. Trompowski, s/n CCS Bloco Alha do Fundão, 21941-590, Rio de Janeiro, RJ, Brazil. E-mail: carlarezende

**11200.** Fincke, O.A.; Tylczak, L.A. (2011): Effects of zebra mussel attachment on the foraging behaviour of a larval dragonfly, *Macromia illinoiensis*. *Ecological Entomology* 36(6): 760-767. (in English) ["(1) Larvae of *M. illinoiensis* are often colonised by the zebra mussel, *Dreissena polymorpha* Pallas, a recent invader to North America. To determine how mussel attachment affects an individual's foraging behaviour, we quantified capture of *Hexagenia limbata* Hexes mayfly prey and the distance moved by newly-molted final instars before and after an individual's colonisation with zebra mussels. (2) In night trials, larvae sprawled above the sand, and caught more mayflies than individuals in daytime trials, but the estimated distance travelled did not differ. When resting under a layer of sand with only its eyes exposed during the day, an individual could capture a mayfly prey using a sit-and-wait ambush strategy. When sprawled above the sand, some larvae caught prey that rested on their legs. (3) When mussel-free, individuals captured more prey than they did when carrying zebra mussels, although mussel attachment per se did not affect the estimated distance that a larva moved. (4) During day trials, but not night ones, the increasing mussel load of colonised individuals decreased prey capture and the distance moved in an apparent step-wise function. Although the number of mussels carried did not differ, night foragers carried a heavier load. Independent of time of the day, the distance an individual travelled when mussel-free was predictive of the number of prey it caught when colonised, suggesting that the greater general activity of some individuals helped mitigate negative effects that mussel attachment had on prey capture. (5) Our results add to a growing number of nega-

tive effects of zebra mussel colonisation on sprawling and hiding dragonfly larvae. Although the impact of these costs on dragonfly populations remains to be determined, a decrease in this guild of predators whose life cycle spans aquatic and terrestrial habitats might have cascading effects across ecosystems." (Authors)] Address: Fincke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**11201.** Fleck, G. (2011): Phylogenetic affinities of Petaluridae and basal Anisoptera families (Insecta: Odonata). *Stuttgarter Beiträge zur Naturkunde A, Neue Serie* 4: 83-104. (in English, with German English) ["The petalurid genus *Phenes* has a larval proventriculus with only four dental folds. This genus is considered as the sister group of remaining Petaluridae and placed in the *Pheninae* subfam. nov. Two possible phylogenies of the Petaluridae are proposed and diagnoses of Tachopteryginae, Tanypteryginae, and Petalurinae are amended. The Petalurinae are split into Petalurini tribe nov. and Uropetalini tribe nov. The Petaluridae, Austropetalidae and Aeshnidae are gathered in the new clade Siphonoprocta taxon nov. with Petaluridae sister taxa of (Aeshnidae + Austropetalidae). The relative positions of the main basal clades Gomphida, Siphonoprocta and Cavilabiata are not solved. Within Cavilabiata the Cordulegastroidea and Neopetalidae are considered sister taxa and are gathered in the Cordulegastroidea comb. nov., and the Chlorogomphidae are considered to represent the sister group of all remaining Cavilabiata or to represent the sister group of the Cordulegastroidea." (Author)] Address: Fleck, G., Zoologisches Forschungsinstitut und Museum Alexander Koenig, Adenauerallee 160, 53113 Bonn, Germany. E-mail: gfleck@uni-bonn.de

**11202.** Flynn, K.E.; Moon, D.C. (2011): Effects of habitat complexity, prey type, and abundance on intraguild predation between larval odonates. *Hydrobiologia* 675 (1): 97-104. (in English) ["Intraguild predation is an important interaction in which predators feed on a shared prey as well as on each other. It occurs frequently between larval odonates in freshwater lentic communities, and understanding the factors influencing this interaction remains an important objective. An experiment carried out in mesocosms and utilizing a factorial design investigated the strength of intraguild interactions between *Sympetrum vicinum*, and *Enallagma civile*, under two levels each of habitat complexity (high or low), prey abundance (high or low) and prey type (amphipods or blackworms). Effects of treatments on size, mortality and emergence of larval odonates were evaluated. Shared prey abundance had little impact on intraguild interactions, affecting only the mass of the intraguild prey *E. civile*. Habitat complexity affected the size of *E. civile*, as length and wet mass were significantly greater in low complexity mesocosms. Prey type seemed to be the most important factor in the experiment, influencing all response variables measured. When shared prey consisted of larger, more active blackworms, intraguild predation decreased, and *E. civile* experienced lower mortality, achieved greater length and mass, and had greater emergence success. Results of this study suggest that prey type and habitat complexity can be more important than prey abundance in mediating intraguild predation." (Authors)] Address: Moon, D.C., Dept Biol. Univ. of North Florida, Jacksonville, FL, USA. E-mail: dmoon@unf.edu



**11203.** Fritz, L.L.; Heinrichs, E.A.; Machado, V.; Andreis, T.F.; Pandolfo, M.; de Salles, S.M.; de Oliveira, J.V.; Fiuza, L.M. (2011): Diversity and abundance of arthropods in subtropical rice growing areas in the Brazilian south. *Biodiversity and conservation* 20(10): 2211-2224. (in English) ["This paper describes a survey of arthropods in rice-growing areas of Rio Grande do Sul, Brazil, undertaken to identify the main groups of insect pests and their natural enemies present in three producing regions during the stages of crop development. The study was conducted during the crop years 2007/2008 and 2008/2009 in the municipalities of Cachoeira do Sul, Eldorado do Sul and Capivari do Sul. A total of 44,231 arthropods were collected: 26,821 in 2007/2008 and 17,410 in 2008/2009. Spatial and temporal patterns were analyzed utilizing the 28 principal families and applying the Morisita–Horn coefficient and the Detrended Correspondence Analysis (DCA). Both results demonstrated variances of abundance and richness from 1 year to the next in the evaluated areas. The results indicate that the arthropod communities in southern Brazilian rice crop agro-ecosystems are formed of a few families with high abundance and a large number of other smaller families. Among the phytophagous arthropods found, Pentatomidae, Orthoptera and planthoppers were predominant while the natural enemies were mainly predatory mites, spiders, Hymenoptera and Odonata. This study demonstrates that irrigated rice fields located in subtropical areas of the Brazilian South sustain a great variety of arthropods which facilitate studies on bio-diversity conservation and the development of sustainable management of the pests." (Authors)] Address: Heinrichs, E.A., Dept of Entomology, University of Nebraska, Lincoln, Entomology Hall, Lincoln, NE 68583-0816, USA. E-mail: eheinric@vt.edu

**11204.** Gliwa, B. (2011): On the names of dragonflies and damselflies. New and rare for Lithuania insect species 23: 115-119. (in Lithuanian, with English summary) ["The paper criticizes the common view in Lithuania to call the scientific names of taxa "Latin" and introducing an additional layer of "Lithuanian scientific names". It is outlined that the scientific names aren't Latin but following the ICZN rules only. They can be seen as a part of the sociolect used by Lithuanian zoologists, which is a subset of the Lithuanian language. There is no need for additional Lithuanian taxa names in science. However, vernacular names can be useful in a wider discussion. Wherever possible, traditional names should be used. Adaption of the scientific names or translation are recommended ways of forming. Creation of new ad hoc names should be limited to a minimum. There is no need to normalize vernacular names." (Author)] Address: Gliwa, B., Lithuanian Entomological Society, Akademijos 2, 08412 Vilnius, Lithuania. E-mail: gliwa@sargeliai.org

**11205.** Gonzalez, S.C.; Touchon, J.C.; Vonesh, J.R. (2011): Interactions between competition and predation shape early growth and survival of two Neotropical hyliid tadpoles. *Biotropica* 43(5): 633-639. (in English, with Spanish abstract) ["Experimental studies in temperate regions have revealed that competition and predation interact to shape aquatic communities. Predators typically reduce the effect of competition on growth and competitors provide alternative prey subjects, which may also alter predation. Here, we examine the independent and combined effects of competition and predation on the survival and growth of hatchling tadpoles of two widespread co-occurring Neotropical hyliid frogs

(*Agalychnis callidryas* and *Dendropsophus ebraccatus*). Using 400 L mesocosms, we used a 2 × 3 factorial substitutive design, which crossed tadpole species composition with the presence or absence of a free-roaming predator (*Anax amazili* larva). Dragonflies were effective predators of both species, but had larger effects on *A. callidryas* survival. Both species had similar growth rates when alone, whereas *A. callidryas* grew 30% faster than *D. ebraccatus* when they co-occurred, suggesting interspecific rather than intraspecific competition had relatively stronger effects on *D. ebraccatus* growth, while the opposite was true for *A. callidryas*. Predator presence dramatically reduced growth rates of both species and erased this asymmetry. Results suggest that the effects of predator induction (i.e., nonconsumptive effects) on growth were larger than both consumptive and competitive effects. Our study demonstrates that predators have strong effects on both survival and growth of prey, highlighting the potential importance of predators in shaping prey populations and tropical aquatic food web interactions." (Authors)] Address: Vonesh, J.R., Tyson Research Center, Washington Univ. at St. Louis, P.O. Box 258, Eureka, MO 63025, USA

**11206.** Greeney, H.F.; Dyrz, A. (2011): Breeding biology of Pale-edged Flycatcher (*Myiarchus cephalotes*) in northeastern Ecuador. *Ornitología Colombiana* 11: 49-57. (in English, with Spanish summary) ["We made observations on the reproductive habits of *M. cephalotes* nesting in nest boxes and under the eaves of human dwellings in northeastern Ecuador. We found a total of six nests, likely built by the same two pairs. Nest construction lasted around 23 days at one nest and was performed only by the female. Most clutches are initiated during the drier months, but there may be some breeding year-round. Clutch size ranged from two to three eggs. Only females incubated and spent the night on the nest. Patterns of attendance during incubation were fairly regular and eggs were covered for 62% of daylight hours. Incubation period was 18 days at two nests. At two nests eggs hatched synchronously and at a third two eggs hatched 24 h prior to the final egg. The nestling period was 18 days. Based on observations of one banded pair in 2008 and 2009, females provide the majority of nestling care (61%). Nestlings were provisioned with a large percentage of adult Lepidoptera and cicadas, with females bringing predominantly Lepidoptera and males favouring cicadas. After leaving the nest, young birds remained with their parents for at least 10 weeks and were still provisioned by them for at least the first nine weeks." (Authors) Odonata accounted to 2.1% of the nestlings diet.] Address: Greeney, H.F., Yanayacu Biological Station & Center for Creative Studies c/o Foch 721 y Amazonas, Quito, Ecuador. E-mail: revmmoss@yahoo.com

**11207.** Gros, P. (2011): Aufruf zur Erfassung der Libellenfauna Salzburgs. *Salzburger Entomologische Arbeitsgemeinschaft / Haus der Natur. Newsletter* 2/2011: 6-9. (in German) [The author presents the current status on data recording on the Odonata fauna of the Federal State Salzburg, Austria. Understudied regions are listed.] Address: Gros, P., Haus der Natur, Museumsplatz 5, A-5020 Salzburg, Austria. E-Mail: patrick.gros@hausdernatur.at

**11208.** Gros, P. (2011): Die Südliche Heidelibelle *Sympetrum meridionale* (Sélys 1841) nun auch in Salzburg nachgewiesen: Ein bislang unpublizierter Fund (Insecta: Odonata). *Mitteilungen aus dem Haus der Natur* 19:

98-99. (in German, with English summary) ["S. meridionale is newly reported for the Austrian county of Salzburg. During a revision of the dragonflies' collection of the Museum "Haus der Natur" (Salzburg), a 55 years old specimen belonging to that species was found." (Author)] Address: Gros, P., Haus der Natur, Museumsplatz 5, 5020 Salzburg, Austria. E-mail: patrick.gros@hausdernatur.at

**11209.** Gros, P. (2011): Endlich ein Beleg zur eindeutigen Untermauerung des ehemaligen Vorkommens der Vogel-Azurjungfer *Coenagrion ornatum* (Selys 1850) aus der Umgebung der Stadt Salzburg (Insecta: Odonata). Mitteilungen aus dem Haus der Natur 19: 95-97. (in German, with English summary) ["In central Europe, *C. ornatum* is obviously a rare and declining species. In the Austrian county of Salzburg, this species was reported only once (St. Quentin 1959). Unfortunately, no collection specimen was known so far, though *C. ornatum* can be very easily confused with close related species. During a revision of the dragonflies' collection of the Museum "Haus der Natur" (Salzburg), a 70 years old specimen belonging to that species was found, confirming its historical occurrence in Salzburg." (Author)] Address: Gros, P., Haus der Natur, Museumsplatz 5, 5020 Salzburg, Austria. E-mail: patrick.gros@hausdernatur.at

**11210.** Gualdoni, C.M.; Duarte, C.A.; Medeot, E.A. (2011): Estado ecológico de dos arroyos serranos del sur de Córdoba, Argentina. *Ecología Austral* 21: 149-162. (in Spanish, with English summary) ["Ecological status of two mountain streams of the south of Córdoba, Argentina: The development of methodology that allows us to assess the environmental deterioration of fluvial systems from the biotic components has been of high attention in the last time. With the aim to evaluate the ecological state of two mountains streams in sections that cross communes of tourist interest, indexes of water and riparian forest quality were combined. In each stream, two stations were selected, one downstream and the other upstream of the recreation areas. Environmental data were registered and benthos samples were collected in the main geomorphological units, during high and low water periods. Metric indexes and Índice Biótico Carcarañá (IBC) based on benthic macroinvertebrates were calculated, and the marginal forest quality was determined by the Riparian Quality Index (QBR). The results were integrated by a modification of index ECOSTRIMED to evaluate the ecological status of the fluvial system. In both streams, the physico-chemical variables showed normal values and the metric indexes determined that the water quality vary between "moderately deteriorated" and "little deteriorated", whereas the IBC revealed a "unpolluted environment" in all sampling situations. Application of QBR showed that the riparian forest with important alterations and extreme degradation were located close to urban areas, while in the other reaches the alteration degree was translated in judgments of acceptable and good quality. When combining the results of the metric indexes with those of the QBR, in both streams were obtained quality judgments that indicated "good" and "intermediate" ecological status in the stretches located upstream of urban areas and "intermediate" in the stretches downstream of recreation areas. The results of this study contribute to corroborate that, from a biological perspective; the application of a set of metric is the most efficient and economic methodology, to evaluate the quality of the water since they integrate infor-

mation derived from diverse aspects of the benthonic community. Although in the studied streams the water didn't have very good biological quality, in urban reaches, the degradation or elimination of the marginal vegetation was the main determinant of the altered ecological quality." (Authors) Taxa - including Odonata - are treated at the order level.] Address: Gualdoni, Cristina, Dto. de Ciencias Naturales, Facultad de Ciencias Exactas, Físico-Químicas y Naturales, Universidad Nacional de Río Cuarto. Río Cuarto, Córdoba, Argentina. E-mail: cgualdoni@exa.unrc.edu.ar

**11211.** Gutierrez, Jr., P.M.; Torres, M.A.J.; Demayo, C.G. (2011): Thin-plate spline (TPS) and correlation based on distances (CORIANDIS) analyses as tools for the analysis of morphological differences in dragonfly wings. 2011 2nd International Conference on Environmental Science and Technology, IPCBEE vol. 6, IACSIT Press, Singapore: V2-375-V2-379. (in English) ["This study was aimed to analyzed the morphological disparity in the wing shape and venation of five different dragonfly species namely: *Pantala flavescens*, *Aethriamanta brevipennis*, *Libellula incestra*, *Libellula croceipennis*, and *Gomphus externus* using Thin-Plate Spline (TPS) coupled with CORIANDIS analysis. These were done for triangle, anal loop and outline shape of the left and right forewings and hindwings of the dragonfly samples. Results showed that the locations of the species in the "compromise" space reflect a high similarity between species 2 and 3 (*A. brevipennis* and *L. incestra* respectively) however, species 1, 4 and 5 (*P. flavescens*, *L. croceipennis* and *G. externus*, respectively) show disparity with each other. Furthermore, there is congruence of anal loops (left forewings and right forewings) characters in species 1 (*P. flavescens*) and the triangle left forewing and anal loop right forewing in species 4 (*L. croceipennis*). Stacked bar graphs also shows that species 1 (*P. flavescens*) departs considerably from other species, although this seems to be largely a function of disparity of character 1 (triangle right forewing) alone. Species 3 and 4 (*L. incestra* and *L. croceipennis* respectively) show close similarity of outline left hind wing (dark red). The high similarity of the character is maybe due to the fact that these two different species belong to the same genus. Species 2 and 3 (*A. brevipennis* and *L. croceipennis*) also indicate close similarity of outline left hind wing and anal loop right hind wing characters (dark red and yellow-green respectively). Species 5 (*G. externus*) indicates high level disparity of outline left hind wing (dark red) character from other dragonfly species. Results of this study suggests that Thin-Plate Spline (TPS) and CORIANDIS analysis can be used as a tool for morphological disparity in dragonfly wings using various characters like triangle, anal loop and outline." (Authors) Comment of Reagan Villanueva: "Well, you are right about the ID. They listed 2 species totally impossible in the country and two near impossible. I think the right ID is *Rhodothemis rufa* for *Libellula croceipennis*, *Aethriamanta brevipennis* is *Orthetrum prunosum clelia* (young male), *Libellula incestra* as *Potamarcha congener*; *Gomphus externus* as *Ictinogomphus tenax* female. The good thing, the *Pantala* is correctly identified."] Address: Gutierrez, Jr., P.M., Misamis Occidental National High School, Gov. Anselmo Bernad St., Poblacion 1, Oroquieta City, Philippines. E-mail: gutierrezpedrojr@yahoo.com

**11212.** Gyulavári, H.A.; Felföldi, T.; Benken, T.; Szabó, L.J.; Miskolczi, M.; Cserhádi, C.; Horvai, V.; Márialigeti,

K.; Dévai, G. (2011): Morphometric and molecular studies on the populations of the damselflies *Chalcolestes viridis* and *C. parvidens* (Odonata, Lestidae). *International Journal of Odonatology* 14(4): 329-339. (in English) ["Morphometric and genetic differences were analysed for two closely related damselflies, *Chalcolestes viridis* and *C. parvidens*. A total of 305 male individuals were collected from six European countries (Austria, Croatia, Germany, Greece, Hungary and Portugal). Measurements from a total of 28 populations of *C. viridis* and *C. parvidens* and several intermediate forms were collected to determine if they can be definitely distinguished using simple morphometric characters. DNA sequences from two independent loci (nuclear ribosomal ITS region and mitochondrial cytochrome oxidase I gene) were analysed to test whether these taxa represent separate monophyletic groups as well as to compare the genetic distance with those found between well-accepted European *Lestes* species. Discriminant analysis revealed that *C. viridis* and *C. parvidens* are differentiated in morphometric space. Individuals with intermediate anal appendage traits overlapped with both *C. viridis* and *C. parvidens* which raised the possibility that they are merely subspecies of a single species. However, genetic analysis of both investigated DNA regions showed that the two *Chalcolestes* taxa did not share haplotypes, indicating their status as true species. Furthermore, they formed a monophyletic group separated from the investigated *Lestes* species, supporting the recognition of the genus *Chalcolestes*. The two *Chalcolestes* species are very closely related compared with European *Lestes* species, suggesting that their divergence occurred relatively recently." (Authors)] Address: Gyulavári, Hajnalka Anna, Dept of Hydrobiology, Univ. of Debrecen, Egyetem t. 1. H-4032, Debrecen, Hungary. Email: hgyulavari@gmail.com

**11213.** Hämäläinen, M. (2011): *Dysphaea haomiao* sp. nov. from China and Vietnam (Odonata: Euphaeidae). *International Journal of Odonatology* 14(4): 305-311. (in English) ["*Dysphaea haomiao* sp. nov. (holotype male, China, Guizhou, Libo County, Xiaoqikong Scenic Area, Zhangjiang River, alt. c.450 m, 7 May 2007) is described and illustrated for both sexes. The male differs from its closest congeners, *Dysphaea basitincta* and *D. gloriosa*, by the blackish, completely opaque coloration of its wings." (Author)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**11214.** Hamasaki, K.; Yamanaka, T.; Tanaka, K.; Nakatani, Y.; Iwasaki, N.; Sprague, D.S. (2011): Environmental characteristics accounting for odonate assemblages in rural reservoir ponds in Japan. *JARQ* 45(2): 187-196. (in English) ["To clarify the effect of environmental factors on odonate assemblages in rural reservoir ponds, we surveyed the odonate adults in 70 study ponds in Ibaraki Prefecture, Japan, during three sampling periods in 2005. Cluster analysis, indicator species analysis (INSPAN), and non-metric multidimensional scaling (NMDS) were used in combination to determine the relationship between odonate assemblages and environmental variables, i.e., biotic, physicochemical, and regional variables (the types of land use surrounding the ponds). A total of 41 odonate species were recorded in the study ponds, and 24 of them, excluding rare species, were used for each analysis. The study ponds were classified into six groups, and significant indicator species were selected from four of these

groups. Examination of the correlation between each environmental variable and NMDS axes 1 and 2 revealed the profound effects of the presence of forest, paddy field, or open area around the ponds on the indicator species composition of each group. It was also revealed that the aquatic vegetation and forests around the ponds provide desirable conditions for the odonates and, in contrast, concrete revetment has a detrimental effect. These results suggest that the recent decrease of forests around ponds and the reconstruction with concrete revetment will have a negative effect on the odonate assemblages in ponds." (Authors)] Address: Hamasaki, K., Biodiversity Division, National Institute for Agro-Environmental Sciences (NIAES) (Tsukuba, Ibaraki 305-8604, Japan. E-mail kenjih@affrc.go.jp

**11215.** Hardersen, S.; Leo, P. (2011): Dragonflies of Iglesiasiente (SW Sardinia) and additional records of rare or poorly known species from Sardinia (Odonata). In: Nardi G., Whitmore D., Bardiani M., Birtele D., Mason F., Spada L. & Cerretti P. (eds), *Biodiversity of Marganai and Montimannu (Sardinia). Research in the framework of the ICP Forests network. Conservazione Habitat Invertebrati* 5: 243-253. (in English, with Italian summary) ["This paper presents the current knowledge on the odonate fauna of the Iglesiasiente (SW Sardinia). Historical data and recent investigations have resulted in a total of 28 species (11 Zygoptera and 17 Anisoptera) for this area, representing 67% of the species known from Sardinia. Additionally, new data are presented for other areas of Sardinia on the following species, considered rare and/or protected: *Lestes macrostigma*, *Sympetma fusca*, *Coenagrion scitulum*, *Lindenia tetraphylla*, *Orthemum nitidinerve*, *O. trinacria* and *Brachythemis impartita*." (Authors)] Address: Leo, P., Via Tola 21, 09128 Cagliari, Italy. E-mail: piero.leo@tiscali.it

**11216.** Harris, W.E.; Forman, D.W.; Battell, R.D.; Battell, M.T.R.; Nelson, A.K.; Brain, P.F. (2011): Odonata colour: more than meets the eye?. *International Journal of Odonatology* 14(3): 281-289. (in English) ["Interpretations of behavioural visual cues, based on human perception of colour, may mislead because of the difference in our visual range compared to other animals. Investigations into ultraviolet (UV) reflectance have shown that this can be an important mode of communication in many animals. The present study focused on 10 species of British Odonata (*Brachytreron pratense*, *Aeshna mixta*, *A. cyanea*, *A. grandis*, *Sympetrum striolatum*, *S. sanguineum*, *Libellula depressa*, *L. quadrimaculata*, *Calopteryx splendens*, *Coenagrion puella*). Digital photography was used to capture images of UV reflectance of the body using a Schott UV pass filter to eliminate all other portions of the spectrum. Percentage cover of UV reflectance was determined and all but one of the 10 species sampled were found to reflect UV in one or both sexes. Most of the reflectance tended to occur on the ventral surface. Patterns of UV reflectance varied among species suggesting a variety of possible functions that are briefly discussed. A potential evolutionary mechanism for the development of UV reflectance in Odonata is proposed." (Authors)] Address: Forman, D.W., Pineham House, Haversham, Milton Keynes, Buckinghamshire, MK19 7DP, UK. E-mail: d.w.forman@swansea.ac.uk

**11217.** Hassall, C.; Hollinshead, J.; Hull, A. (2011): Environmental correlates of plant and invertebrate species richness in ponds. *Biodiversity and Conservation* 20: 3189-3222. (in English) ["Ponds (lentic water bodies <2



ha) constitute a considerable biodiversity resource. Understanding the environmental factors that underlie this diversity is important in protecting and managing the habitat. We surveyed 425 ponds for biological and physical characteristics with 78 of those also surveyed for chemical characteristics. A total of 277 invertebrate species and 265 plant species were found. Species richness varied between 2 and 99 (mean  $27.2 \pm 0.6$  SE) for invertebrates and 1 and 58 (mean  $20.8 \pm 0.4$  SE) for plants. Generalised additive models were used to investigate variables that correlate with the species richness of plants and invertebrates, with additional models to investigate insect, Coleoptera, Odonata, Hemiptera, Trichoptera and Mollusca species richness. Models performed reasonably well for invertebrates in general ( $R^2 = 30.3\%$ ) but varied between lower-order invertebrate taxa (12.7–34.7%). Ponds with lower levels of shading and no history of drying contained higher numbers of species of plants and all invertebrate groups. Aquatic plant coverage positively correlated with species richness in all invertebrate groups apart from Trichoptera and the presence of fish was associated with high invertebrate species richness in all groups apart from Coleoptera. The addition of chemistry variables suggested non-linear relationships between oxygen demand and phosphate concentration and higher-order richness. We demonstrate that the composition of biological communities varies along with their species richness and that less diverse ponds are more variable compared to more diverse ponds. Variables positively correlated with richness of one taxon may be negatively correlated with that of another, making comprehensive management recommendations difficult. Promoting a high landscape-level pond biodiversity will involve the management of a high diversity of pond types within that landscape." (Authors) Address: Hassall, C., Dept of Biology, Carleton University, Ottawa, ON K1S 5B6, Canada. E-mail: chassall@connect.carleton.ca

**11218.** Haught, S.; von Hippel, F.A. (2011): Invasive pike establishment in Cook Inlet Basin lakes, Alaska: diet, native fish abundance and lake environment. *Biol. Invasions*. 13: 2103-2114. (in English) ["Northern pike (*Esox lucius*) were introduced to the northern Susitna Basin of south-central Alaska in the 1950's, and have since spread throughout the upper Cook Inlet Basin. Extirpations of several native fish populations have been documented in this area. It is hypothesized here that invasive pike remodel the ecology of lakes by removing vulnerable prey types and that these changes are reflected in the diet of invasive pike. Trends in pike diet suggest that pike switch to less desirable but more abundant macroinvertebrate prey as preferred fish prey are eliminated. The impacts of pike introduction were studied in detail for one species of resident fish, the threespine stickleback (*Gasterosteus aculeatus*). Stickleback abundance decreases as pike invasion progresses. Conductivity is a significant environmental predictor of stickleback abundance, with higher conductivity apparently mitigating population reduction. Higher conductivity water may lessen the physiological costs of developing more robust armor, which reduces vulnerability to predation. Maximum lake depth also appears to predict stickleback abundance, though this trend was only marginally significant. Deeper lakes may provide an open-water refuge from pike predation by allowing stickleback to exist outside of the pike inhabited littoral zone. These findings indicate the importance of diverse habitat types and certain chemical and physical charac-

teristics to the outcome of invasion by fish predators." (Authors) Where stickle backs were absent, more Odonata larvae were preyed by pikes.] Address: Haught, S., Department of Biological Sciences, University of Alaska Anchorage, 3211 Providence Dr., Anchorage, AK 99508-4614, USA. E-mail: stormyhaught@gmail.com

**11219.** Hochebner, T. (2011): Neue faunistische Nachweise vom GÜPL Völtendorf. *LANIUS-Information* 20(1/2): 4-5. (in German) [Niederösterreich, Austria; *Lestes dryas*: 11.8.2008 and 14.08.2008; *Sympetrum pedemontanum*: 14.8.2008] Address: not stated

**11220.** Holuša, O. (2011): A dark colour form of *Cordulegaster heros* (Odonata: Cordulegastridae). *Cas. Slez. Muz. Opava (A)* 60: 235-237. (in English) [11-VII-2010, 40 males and 5 females of *C. heros* were found at the Kamenný potok stream, Modra-Piesok village, in the southern part of the Malé Karpaty Mts ( $48^{\circ}22'17''N$ ,  $17^{\circ}17'59''E$ , 332 m a.s.l.) Western Slovakia. Differences between the typical abdominal colour pattern and the dark colour form are described.] Address: Holuša, O., Dept. of Forest Protection and Wildlife Management, Faculty of Forestry and Wood Technology, Mendel University in Brno, Zemědělská 3, CZ-613 00 Brno. E-mail: holusao@post.cz

**11221.** Ignatavicius, G.; Raulinaitis, M.; Gerdvilis, N. (2011): Assessment of the effects of mechanical bottom sludge removal from lakes Didžiulis and Lentvaris (Trakai District) based on macrozoobenthos indicators. *Environmental Engineering. The 8th International Conference*, May 19–20, 2011, Vilnius, Lithuania: 115-119. (in English) [Lithuania; "Two lakes in Trakai district – Didžiulis and Lentvaris were heavily polluted in the past by discharges of municipal wastewater without proper treatment. This anthropogenic impact resulted in large amounts of bottom sludge in both lakes, high amounts of biogenic substances and deterioration of water ecosystems. In both lakes, methods of mechanical lake restoration were applied in 2008 by removing 80000 m<sup>3</sup> of bottom sludge from the northern part of Lake Didžiulis and 60000 m<sup>3</sup> of bottom sludge from the southern part of Lake Lentvaris. The objectives of this article are 1) to examine composition of local macrozoobenthos communities in both lakes prior and after sludge removal and 2) evaluate changes and trends of ecological status in restored parts of both lakes by using two most popular in Lithuania indices based on macrozoobenthos: Trent Biotic Index and Danish River Fauna Index." (Authors) The list of taxa includes *Erythromma najas*, *Ischnura elegans*, *Platycnemis pennipes*, *Gomphus vulgatissimus*, *Epithea bimaculata* and *Leucorrhinia dubia*] Address: Ignatavicius, G., Vilnius university, Universiteto str. 3, LT-01513 Vilnius, Lithuania. E-mail: gytautas.ignatavicius@gf.vu.lt

**11222.** Ishizawa, N. (2011): Behaviour of dragonflies during the 2009 partial solar eclipse in Japan (Odonata: Libellulidae). *International Journal of Odonatology* 14 (4): 313-319. (in English) ["Behaviour of dragonflies was observed during the partial solar eclipse in Saitama, Japan, on 22 July 2009. The solar eclipse started at 09:54 h, reached its maximum magnitude of 74.9% at 11:12 h, and ended at 12:29 h. Light intensity at the peak of the eclipse was 1005 lx, a reduction by 28.2% of that at the start, and the ambient temperature was rather constant because of cloudiness. Dragonflies were active until immediately before the eclipse maximum and thereafter ceased their movements; one *Orthetrum*

*albistylum speciosum* male perched atypically with its body axis nearly parallel to its perch. They resumed activities after a long delay, c.40 minutes after the peak. One female of *Pseudothemis zonata* oviposited near a perching male soon after the peak, but the male did not interfere with it. The inactivation of dragonflies in a solar eclipse may be related to the light intensity." (Author)] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozawa City, Saitama Pref., Japan. E-mail: greffect708@jcom.home.ne.jp

**11223.** Jeziorski, P.; Holuša, O. (2011): *Gomphus pulchellus* Sélys, 1840 does not belong to the dragonfly (Odonata) fauna of the Czech Republic. *Cas. Slez. Muz. Opava (A)* 60: 217-222. (in English, with extensive Czech summary) [*Gomphus pulchellus* is eliminated from the Czech list of Odonata. "This decision is based on the revision of the material deposited in all major Czech and Slovak museums, on the revision of several other dragonfly collections, as well as on an extensive faunistic research carried out by the authors during the last twenty years. In addition, the published data were critically evaluated. In summary, no documented specimens in museums or private collections was found, and there are no recent records from the Czech Republic. Hence deletion of *G. pulchellus* from the species list of the Czech Republic is suggested. Reasons for the absence in the Czech Republic are discussed." (Authors)] Address: Jeziorski, P., Na Bělidle 1, CZ-735 64 Havířov-Suchá, Czech Republic. E-mail: jezirko@post.cz

**11224.** Jones, G. (2011): Challenges facing conservation of rare damselfly and stonefly in Cairngorms. *Scottish Invertebrate News* 2(2): 10. (in English) [*Coenagrion hastulatum* is listed as endangered on the Odonata Red Data List for Great Britain 2008 and most of its known UK breeding sites are in the Cairngorms National Park. As one of our most endangered damselflies it also appears on the Scottish Biodiversity List. In 1996 the Northern damselfly was confirmed as breeding at 21 of 26 historic sites. Of these, only 10 were found to be producing more than 100 adults. A high proportion of these were on the RSPB's Abernethy Reserve. Two additional sites for the species have recently been identified, one of which has historic records of Northern damselfly up until 1914. However, it is a both are currently threatened as they are within the footprint of proposed developments: a large new town. An Camas Mor, on Rothiemurchus Estate (the other side of the River Spey from Aviemore) and a supermarket car park for a new Tesco store in Aviemore. Understanding the factors that limit the dispersal of the Northern damselfly could guide conservation efforts for the shrinking semi-natural habitat around Aviemore. If breeding lochans are saved, attention will need to be given to the management of nearby scrubby-ground that is used for foraging and during maturation of recently emerged adults." (Author)] Address: not stated

**11225.** Kálmán, A.; Boda, R.; Kálmán, Z.; Mauchart, P.; Rozner, G.; Szivák, I.; Soós, N.; Csabai, Z. (2011): Contribution to the aquatic macroinvertebrate fauna of the Zselic hill region, SW Hungary. *Acta Biol. Debr. Oecol. Hung.* 26: 99-115. (in English, with Hungarian summary) [Records of *Aeshna affinis*, *Libellula quadrimaculata*, *Orthetrum cancellatum*, *O. coerulescens*, *Sympetrum striolatum*, *Calopteryx virgo*, *Lestes sponsa*, *Platycnemis pennipes*, and *Ischnura elegans* are documented.] Address: Kálmán, A., Vak Botlyán utca 118/A, H-

8651 Balatonszabadi, Hungary. E-mail: xelgon001@gmail.com

**11226.** Kalniņš, M. (2011): The distribution of southern dragonfly (Odonata) species in Latvia and adjacent territories. *Environmental and Experimental Biology* 9: 43-52. (in English) ["The aim of the present study was to summarize published and unpublished information on changes of the dragonfly fauna in Latvia and adjacent territories during the last 20 years and to provide a prognosis of future changes. All published and unpublished data were summarized for the selected species. Unsystematic inspection of the potential habitats was carried out in the field, mostly in southern and central parts of the country. The identification of specimens in collections was checked. In total 19 species were identified whose borders of distribution areas or separate localities are relatively close to the territory of Latvia or which are known as species that rapidly disperse in the northern direction. Seven of these species are mentioned in the literature as probable for Latvia. Five of the species that are included in the lists were recorded for the first time in Latvia during the last 20 years." (Author) The following species are discussed in detail: *Lestes barbarus*, *Chalcolestes viridis*, *Sympetma fusca*, *Coenagrion ornatum*, *Erythromma viridulum*, *Aeshna affinis*, *A. serrata*, *A. crenata*, *Anax parthenope*, *A. ephippiger*, *Orthetrum coerulescens*, *O. albistylum*, *O. brunneum*, *Sympetrum depressiusculum*, *S. fonscolombii*, *S. meridionale*, *S. eroticum*, *S. pedemontanum*, and *Crocothemis erythraea*.] Address: Kalniņš, M., Nature Conservation Agency, Siguldas novads, Baznīcas iela 7, LV-2150, Sigulda, Latvia. E-mail: martins.kalnins@daba.gov.lv

**11227.** Karlsson, T. (2011): The Sedgling *Nehalennia speciosa* in Sweden (Odonata: Coenagrionidae). *Entomologisk Tidskrift* 132(3): 129-140. (in Swedish, with English summary) ["*N. speciosa* is redlisted as endangered in Sweden. This paper presents the current knowledge of the species in Sweden. Records of the species, its distribution and status are presented, and the habitat at the current localities for the species are described. *Nehalennia speciosa* was considered extinct in Sweden, but during the period 2006-2011 six new localities have been found. The species is generally thought being highly stenotopic. It is confined to water with low trophy, pH and conductivity, and with a specific vegetation consisting of submerged vegetation (*Sphagnum* mosses and *Utricularia*) and formations of narrow-leaved plants (mostly selected *Carex lasiocarpa* and *C. limosa*). The habitat in Sweden seems, however, to differ some. The current localities for the species are nutrient poor wetlands with a vegetation like the one described above (*C. lasiocarpa* predominates), but they are all mires rich in minerals with fairly high pH (7.0-8.0) and conductivity (11.7-15.5). Changes in vegetation structure (mainly domination of *Phragmites australis*) are the main threat to the species, and management by mowing is needed." (Author)] Address: Karlsson, T., Västanågatan 27B, 582 35 Linköping, Sweden. E-mail: tommy.karlsson@bredband.net

**11228.** Kharitonov, A.Yu.; Popova, O.N. (2011): Migrations of dragonflies (Odonata) in the south of the West Siberian plain. *Entomological Review* 91(4): 411-419. (in English) ["The paper presents a summary of mass dragonfly migrations observed previously in Russia, in particular in West Siberia. From 1969 to 2009, the authors studied the dynamics of dragonfly population,

their spatial distribution and movements in the West Siberian forest-steppe. The main studies were conducted in the Lake Chany basin (the Biological Station of the Institute of Animal Systematics and Ecology, Siberian Division, Russian Academy of Sciences). The spatial redistribution of dragonflies is regarded as a balance of homing and wandering behaviour. Homing results in a relative stability of local dragonfly populations and assemblages, while wandering leads to dispersal of dragonflies from their emergence sites and colonization of new habitats; the latter is especially important due to the ephemeral nature of many shallow reservoirs where the nymphs develop. The formation of more or less constant migration routes is a peculiar variant of wandering activities. A special type of dragonfly migrations is mass exodus from native habitats, triggered by excessive population growth and leading to elimination of all or most individuals. Such migrations not only optimize the size of dragonfly populations but also facilitate removal of nutrients and organic matter from eutrophic water bodies. An original generalized classification of dragonfly migrations is proposed." (Authors)] Address: Haritonov, A.Y., Institute of Systematics & Ecology of Animals, SB RAS, Frunze str. 11, Novosibirsk 630091, Russia. E-mail: haritonov59@gmail.com, pc@eco.nsc.ru

**11229.** Kishe-Machumu, M.A.; Witte, F.; Wanink, J.H.; Katunzi, E.F.B. (2011): The diet of Nile perch, *Lates niloticus* (L.) after resurgence of haplochromine cichlids in the Mwanza Gulf of Lake Victoria. *Hydrobiologia* 682: 111-119. (in English) ["Haplochromine cichlids used to be the main prey of the introduced Nile perch, *Lates niloticus*, in Lake Victoria. After depletion of the haplochromine stocks at the end of the 1980s, Nile perch shifted to the shrimp *Caridina nilotica* and to a lesser degree to its own young and the cyprinid *Rastrineobola argentea*. In the present study, we investigated the Nile perch diet in the northern Mwanza Gulf after resurgence of some of the haplochromine species and compared it with data collected in the same area in 1988/1989. It became clear that haplochromines are again the major prey of Nile perch. The dietary shift from invertebrate feeding (shrimps) to feeding on fish (haplochromine cichlids) occurs at a smaller size than it did when Nile perch were taking primarily dagaa and juvenile Nile perch as their fish prey. The apparent preference for haplochromines as prey has reduced the degree of cannibalism considerably, which may have a positive impact on Nile perch recruitment." (Authors) The quantity of Odonata didn't change between the two periods compared.] Address: Kishe-Machumu, M.A., Tanzania Fisheries Research Institute, P.O. Box 78850, Dar es Salaam, Tanzania. E-mail: mkishe@yahoo.com

**11230.** Klemmer, A.J. (2011): The influence of stream-derived detritus subsidies on lake benthic community composition and trophic interactions. M.Sc. thesis, Fac. Grad. Studies (Forestry), University of British Columbia, Vancouver: XII + 77 pp. (in English) ["Cross-ecosystem subsidies are important for the structure and functioning of communities within many ecosystems. Increases in subsidies have been modelled to increase trophic cascade strength within recipient systems, because of the donor-controlled addition of a resource. Streams receive high inputs of detrital subsidies and what is not processed within the system is transported downstream. Therefore, streams that flow into lakes have the potential to provide large amounts of detritus to lakes compared to the transfer of detritus from forested lake

edges. I hypothesized that streams would increase detritus standing stocks around stream mouths in lakes, that streams would affect the benthic invertebrate community composition, and that those effects would change with distance from the lake shore. To test this I conducted a survey of detritus standing stocks and benthic invertebrate communities at six stream/lake interface and six forest/lake interface sites within two lakes. I found that streams and distance into lakes affected detritus standing stocks, but the effect was only seen when individual pairings of stream and forest sites were examined. I also found that headwater streams significantly altered invertebrate community composition in the lake littoral zone, even up to a distance of 27 meters into the lakes, with some taxa only found at stream/lake interfaces. These results suggest that streams alter the amount of basal resources through subsidies and contribute to whole lake biodiversity. My second hypothesis was that increased detritus in lakes would increase trophic cascade strength. To test this hypothesis, I conducted an in-lake cage experiment in which I manipulated detritus standing stocks (5 densities) and presence of a top-predator (trout). I found that increasing subsidies altered strength of trophic cascades. But unexpectedly, low detritus treatments experienced the strongest positive effect on algal biomass. At intermediate detritus levels there was a switch in the indirect effects of predators, and at the highest detritus densities predators had a negative indirect effect on algal biomass. These results provide evidence that along a gradient of detritus subsidies, trophic cascade strength experiences threshold responses in where predators may have strong, but opposite indirect effects on primary production." (Author) Taxa including Odonata are treated at the genus level.] Address: not stated

**11231.** Kloskowski, J. (2011): Differential effects of age-structured common carp (*Cyprinus carpio*) stocks on pond invertebrate communities: implications for recreational and wildlife use of farm ponds. *Aquacult. Int.* 19: 1151-1164. (in English) ["Sustainable development of common carp *Cyprinus carpio* pond fisheries in Europe postulates their multifunctional use, integrating exploitation of aquaculture resources with recreational services and maintenance of high levels of local biodiversity. Age classes of farmed carp are grown separately and pond ecosystems may be differently affected by different ontogenetic stages of fish. To examine these relationships, a study was conducted on spring and summer diet of carp, invertebrate abundance and community structure, and water quality characteristics in ponds stocked with three carp age classes in SE Poland. With the exception of young-of-the-year fish in spring, benthic dipterans prevailed in the diets of all carp age classes and their consumption increased from spring to summer. Zooplankton featured in the diet of carp only in spring. Medium- and large-sized cladocerans predominated among microcrustaceans found in the guts of one- and two-year-old carp. Consequently, in summer, total biomass of medium- and large-sized cladoceran grazers was substantially lower in ponds stocked with older-age fish than in ponds used for production of 1-summer-old fingerlings. The relatively sparse submerged vegetation cover and low water transparency in ponds with older fish stocks compared to ponds with young-of-the-year carp indicate a transition to a turbid water state mediated by a trophic cascade mechanism in the presence of older-age fish. ... Densities of macroinvertebrates were significantly affected by the age of carp in the ponds.



With the exception of Diptera there were differences in the densities of all individual macroinvertebrate groups between pond categories. In all macroinvertebrate taxa, densities decreased with carp age, but the differences between pond categories were significant only in Ephemeroptera and Odonata between 0+ and older carp cohorts." (Authors)] Address: Kloskowski, J., Department of Nature Conservation, Institute of Biology, M. Curie-Skłodowska University, Akademicka 19, 20-033 Lublin, Poland. E-mail: januszkl@poczta.umcs.lublin.pl

**11232.** Knott, K.E.; Keränen, I.; Kuitunen, K.; Wellenreuther, M. (2011): Microsatellite markers for identifying hybrids of the damselflies *Calopteryx splendens* and *C. virgo*. *Molecular Ecology Resources* 11: 757-758. (in English) ["*Calopteryx splendens* and *C. virgo* hybridize in nature. We developed nineteen microsatellite loci for molecular identification of hybrids. Lack of shared alleles at several loci allowed unquestionable identification. Seventeen loci are polymorphic in at least one of the target species, broadening the utility of the loci for population genetic studies." (Authors)] Address: Knott, Emily, Department of Biological and Environmental Science, 15 University of Jyväskylä, PO Box 35, FIN-40014 Jyväskylä, Finland. E-mail: emily.knott@jyu.fi

**11233.** Koch, K.; Fuchs, N.; Sahlén, G. (2011): Morphology of follicle cells of Libellulidae (Odonata). *International Journal of Odonatology* 14(3): 257-267. (in English) ["In libellulids, mature oocyte size varies within and between individual ovaries. The regulating mechanism is not yet understood. Variations in the contents of the follicle cells, and thereby their ability to secrete material into the oocyte, might explain some of the observed differences in oocyte size. We therefore investigated the follicle cell surface, the interstitial space width between follicle cells and between follicle cells and oocytes, the number of nuclei, and the cell compartment proportions using scanning and transmission electron microscopy. In all investigated species, the follicle cells were covered by a basal lamina. We found cytoplasmic microvilli and septate junctions. As we could not find any pores or other structures on the cell surface, endocytosis seems to be the only mechanism transporting material into the follicle cells. Larger follicle cells had larger interstitial gaps between follicle cells and oocytes, larger nuclei and a larger mitochondrial area. Larger interstitial spaces between follicle cells and oocytes may afford more room that can be filled with material from the follicle cell layer. More mitochondria could provide more energy/ATP needed for the transport of the material. The quantity of free ribosomes and the mean number of nuclei seemed to be even more important to the productivity of the follicle cell. All these variations in cell contents cause productivity differences among follicle cells and may explain some of the size differences between oocytes within individual ovaries in libellulids." (Authors) Studied specimens: *Crocothemis erythraea* (n = 15), *Leucorrhinia dubia* (n = 16), *Pantala flavescens* (n = 7), and *Sympetrum striolatum* (n=5)] Address: Koch, Kamilla, Department of Ecology, University of Mainz, Becherweg 13, 55128 Mainz, Germany. Email: Kochka@uni-mainz.de

**11234.** Kosterin, O.E.; Holden, J. (2011): Some photographic records of Odonata in Cambodia. *International Dragonfly Fund - Report* 42: 1-6. (in English) ["Between 2006 and 2011, 22 Odonata species were photographed in southwestern Cambodia. *Agriocnemis lacteola* Selys, 1877 and *Coelicia yamasakii* Asahina, 1984 are

new additions to the regional fauna." (Authors)] Address: Holden, J., 67 High Street, Meppershall, Beds, UK. E-mail: jeremyholden1@yahoo.co.uk

**11235.** Kovács, T.; Olajos, P.; Szilágyi, G. (2011): Records of Ephemeroptera, Odonata and Plecoptera from Lithuania, with notes on aquatic arthropods. *Folia historico naturalia musei Matraensis* 35: 21-32. (in English) [Records of 19 Odonata species are documented. Legally protected species are *Gomphus flavipes* and *Ophiogomphus cecilia*.] Address: Kovács, T., Mátra Museum, Kossuth Lajos u. 40, H-3200 Gyöngyös, Hungary. E-mail: koati@t-online.hu

**11236.** Krčmar, S.; Bogdanovc, T.; Mikuška, A.; Jukić, M.; Zahirović, Ž. (2011): Poster: Contributions to the knowledge of the insects fauna on the Bansko Hill area: Horse flies (Diptera: Tabanidae) and Dragonflies (Odonata). *SIEEC* 22: 1 pp. (in English) [Bulgaria; Verbatim: The studies of horse flies and dragonflies of the Bansko Hill surroundings were carried out from April to September 2010. The following methods were used: collecting by canopy traps with attractants or entomological nets, the method of strolling and observing. Mapping and digital analyses of the data were done using ArcView 9.2 program. On the basis of the 362 collected specimens of horse flies and literature data a total of 19 species of 6 genera and 2 subfamilies were recorded. On the basis of the 618 collected individuals at different stages of life (larvae - exuvia and adult individuals), a total of 27 species of ... Odonata were recorded. ... *Coenagrion ornatum*, *Anax ephippiger*, *Libellula fulva*, *Orthetrum coerulescens* and *Sympetrum flaveolum* are new for the Bansko Hill. ... The dragonfly species with highest abundance based on frequency of encounter were: *Aeshna mixta*, *C. puella*, *Ischnura elegans*, *O. albistylum*, *S. striolatum*. *Sympecma fusca*, *S. depressiusculum* and *S. fonscolombii* had lowest abundance. ... See also: <http://bib.irb.hr/prikazi-rad?rad=525955>] Address: stjepan@unios.hr

**11237.** Kweka, E.J.; Zhou, G.; Gilbreath, T.M.; Afrane, Y.; Nyindo, M.; Githeko, A.K.; Yan, G. (2011): Predation efficiency of *Anopheles gambiae* larvae by aquatic predators in western Kenya highlands. *Parasites & Vectors* 2011, 4:128: 7 pp. (in English) ["Background: The current status of insecticide resistance in mosquitoes and the effects of insecticides on nontarget insect species have raised the need for alternative control methods for malaria vectors. Predation has been suggested as one of the important regulation mechanisms for malaria vectors in long-lasting aquatic habitats, but the predation efficiency of the potential predators is largely unknown in the highlands of western Kenya. In the current study, we examined the predation efficiency of five predators on *Anopheles gambiae* s.s larvae in 24 hour and semi-field evaluations. Methods: Predators were collected from natural habitats and starved for 12 hours prior to starting experiments. Preliminary experiments were conducted to ascertain the larval stage most predated by each predator species. When each larval instar was subjected to predation, third instar larvae were predated at the highest rate. Third instar larvae of *An. gambiae* were introduced into artificial habitats with and without refugia at various larval densities. The numbers of surviving larvae were counted after 24 hours in 24. In semi-field experiments, the larvae were counted daily until they were all either consumed or had developed to the pupal stage. Polymerase chain reaction was used to confirm the presence of *An. gambiae* DNA in predator

guts. Results: Experiments found that habitat type ( $P < 0.0001$ ) and predator species ( $P < 0.0001$ ) had a significant impact on the predation rate in the 24 hour evaluations. In semi-field experiments, predator species ( $P < 0.0001$ ) and habitat type ( $P < 0.0001$ ) were significant factors in both the daily survival and the overall developmental time of larvae. Pupation rates took significantly longer in habitats with refugia. *An. gambiae* DNA was found in at least three out of ten midguts for all predator species. *Gambusia affinis* was the most efficient, being three times more efficient than tadpoles. Conclusion: These experiments provide insight into the efficiency of specific natural predators against mosquito larvae. These naturally occurring predators may be useful in biocontrol strategies for aquatic stage *An. gambiae* mosquitoes. Further investigations should be done in complex natural habitats for these predators." (Authors) The dragonfly larvae's efficacy in reducing the survival rates of third instar larvae of *An. gambiae* s.s was assessed in semi-field experimental settings. Their efficiency was estimated as high as 59.6%.] Address: Kweka, E.J., Centre for Global Health Research, Kenya Medical Research Institute, P. O. Box 1578, Kisumu 40100, Kenya. E-mail: pat.kweka@gmail.com

**11238.** Lambert, J.-L.; Ternois, V. (2011): Nouvelles découvertes de *Boyeria irene* (Fonscolombe, 1838) en Champagne-Ardenne et premières mentions pour le département de la Marne (Odonata, Anisoptera: Aeshnidae). *Martinia* 27(2): 101-113. (in French, with English summary) ["*B. irene* is a recent acquisition of Odonata distribution in the French Champagne-Ardenne region. The first observation of this species seems to date back from 1995, in the Aube department. During the last decade, the species was suspected to be present in the Marne department in 2004, was rediscovered in the Aube department in 2006 and was mentioned for the first time in the Haute-Marne in 2007. Observations have increased in the region during the past few years, suggesting the presence of well established populations. When unpublished IBGN data (equivalent to BMWP in the UK) were discovered, targeted prospections were organized in 2010, with the aim to check their reliability. These field investigations not only confirmed these historical data, but also allowed us to discover new localities. The authors present the conditions in which *B. irene* was discovered and update its distribution map in the region." (Authors)] Address: Ternois, V., CPIE du Pays de Soulaines, Domaine de Saint-Victor, 10200 Soulaines-Dhuys, France. E-mail: cpie.pays.soulaines@wanadoo.fr

**11239.** Landis, D.A.; Fiedler, A.K.; Hamm, C.A.; Cuthrell, D.L.; Schools, E.H.; Pearsall, D.R.; Herbert, M.E.; Doran, P.J. (2011): Insect conservation in Michigan prairie fen: addressing the challenge of global change. *Journal of Insect Conservation* 16(1): 131-142. (in English) ["Prairie fen is a globally rare, groundwater dependent peatland community restricted to discrete portions of the glaciated north central USA. Prairie fen harbours a diverse flora composed of sedge wetland and tallgrass prairie species ... Here we investigate how global change drivers, including land use change, climate change, and invasive species, may interact to threaten this important community. Specifically, we examine how characteristics of prairie fen habitats—e.g., formation and distribution—interact with the biology of rare fen insects to suggest appropriate short to long term conservation strategies. Our results suggest that

prairie fen associated insects are rare for a variety of reasons, including host plant specialization, habitat specialization, and shifting landscape context that limits opportunities for dispersal. We recommend that current conservation efforts focus on stabilization and restoration of existing prairie fens, coupled with directed surveys to monitor population change in insects of concern, and restoration of the landscape matrix to facilitate metapopulation dynamics. In the future, due to the severely fragmented nature of Michigan landscapes, captive rearing and assisted migration may be necessary to conserve some prairie fen insect species. Overall, the effective conservation of fen associated insects will require a shared vision by multiple actors and a willingness to pursue that vision over a long time frame." (Authors) Tab. 1 list insects of conservation concern in prairie fen and associated aquatic communities in Michigan, USA, including *Cordulegaster erronea* and *Williamsonia fletcheri*.] Address: Landis, D.A., Department of Entomology, 204 Center for Integrated Plant Systems, Michigan State University, East Lansing, MI 48824-1311, USA. E-mail: landisd@msu.edu

**11240.** Lawrence, J.E.; Deitch, M.J.; Resh, V.H. (2011): Effects of vineyard coverage and extent on benthic macroinvertebrates in streams of Northern California. *Annales de Limnologie - International Journal of Limnology* 47(4): 347-354. (in English) ["Vineyards are a dominant feature of many landscapes in Mediterranean-climate regions. We examined the effects of streamflow declines, associated with vineyard water-withdrawals for frost protection, on benthic-macroinvertebrate communities at three sites along three small streams in the Mediterranean-climate region of Northern California. One site was heavily affected by water withdrawals for frost protection, the other two were not. In addition, we examined relationships between vineyard coverage and benthic-macroinvertebrate community response using data from 59 sampling events at 39 sites along 35 small streams in Napa County, California. We tested three a priori hypotheses in terms of the response of biological traits of benthic macroinvertebrates to high vineyard coverage: (1) proportion of individuals with semi-voltine (i.e., one generation every 2 years) life cycles would be lower compared to those with uni- and multi-voltine cycles, (2) proportion of individuals able to undergo diapause would be higher, and (3) proportion of individuals with the ability to burrow into the substrate would be higher. In the three-site study, we found that vineyard water-withdrawals for frost protection coincided with consistently lower values in both the benthic-macroinvertebrate index of biotic integrity (B-IBI) developed for Northern California streams and the ratio of Ephemeroptera–Plecoptera–Trichoptera to Odonata–Coleoptera–Hemiptera individuals (EPT/OCH), a metric developed for European Mediterranean streams. In the broader-scale study, we observed that vineyard-coverage levels above about 20% coincided with lower values of the B-IBI. The semi-voltine life-cycle trait was lower above this level, whereas the diapause and burrowing traits were not affected." (Authors)] Address: Lawrence, J.E., Department of Environmental Science, Policy, and Management, University of California, Berkeley, CA 94720-3114, USA. E-mail: jlawrence@berkeley.edu

**11241.** Liechti, T.; Jödicke, R. (2011): Nachweis von *Sympetma fusca* unter Laubstreu (Odonata: Lestidae). *Mercuriale* 11: 39-42. (in German, with English summary) ["On a sunny day in late autumn *S. fusca* was ob-

served in northern Switzerland leaving its concealment in leaf litter and warming up in the sun until it was able to fly. Hiding of imagoes ready for hibernation under dead leaves was assumed but never observed before. This new evidence of concealment is discussed in the context with many recent winter records of individuals perching freely in the vegetation." (Authors)] Address: Liechti, T., creato - Genossenschaft für kreative Umweltplanung, Limmatauweg 9, CH - 5408 Ennetbaden, Switzerland. E-mail: t.liechti@creato.ch

**11242.** Lillig, M. (2011): Im Gespräch mit Dr. Bernd Trockur. Umweltmagazin Saar 2/2011: 35. (in German) [B. Trockur is a leading regional odonatologist, engaged in the fauna of the German federal state Saarland. Some brief information is given on personal motivation to treat Odonata, the regional situation in the framework of global warming and measures to enhance regional dragonfly populations.] Address: Lillig, M., Krämersweg 55 66123 Saarbrücken, Germany: E-mail: martin.lillig@t-online.de

**11243.** Lorenzo-Carballa, M.O.; Hadrys, H.; Cordero-Rivera, A.; Andres, J.A. (2011): Population genetic structure of sexual and parthenogenetic damselflies inferred from mitochondrial and nuclear markers. *Heredity* 108: 386-395. (in English) ["It has been postulated that obligate asexual lineages may persist in the long term if they escape from negative interactions with either sexual lineages or biological enemies; and thus, parthenogenetic populations will be more likely to occur in places that are difficult for sexuals to colonize, or those in which biological interactions are rare, such as islands or island-like habitats. *Ischnura hastata* is the only known example of natural parthenogenesis within the insect order Odonata, and it represents also a typical example of geographic parthenogenesis, as sexual populations are widely distributed in North America, whereas parthenogenetic populations of this species have only been found at the Azores archipelago. In order to gain insight in the origin and distribution of parthenogenetic *I. hastata* lineages, we have used microsatellites, mitochondrial and nuclear DNA sequence data, to examine the population genetic structure of this species over a wide geographic area. Our results suggest that sexual populations of *I. hastata* in North America conform to a large subdivided population that has gone through a recent spatial expansion. A recent single long distance dispersal event, followed by a demographic expansion, is the most parsimonious hypothesis explaining the origin of the parthenogenetic population of this species in the Azores islands." (Authors)] Address: Lorenzo-Carballa, Olalla, Departamento de Ecología e Bioloxía Animal, Grupo de Ecología Evolutiva e da Conservación, Universidade de Vigo, EUET Forestal, Campus Universitario, Pontevedra, España 36005, Spain. E-mail: olalla.lorenzo@uvigo.es

**11244.** Mancu, C.-O. (2011): The dragonfly (Insecta: Odonata) collection of Iasi Museum of Natural History (Romania). *Travaux du Muséum National d'Histoire Naturelle «Grigore Antipa»* 54(2): 379-393. (in English, with French and Romanian summaries) ["The dragonfly specimens deposited in the Iasi Museum of Natural History were inventoried and analyzed, resulting a total of 3162 adult specimens from 45 species. The majority of these specimens were collected by Constantin Visarion Mândru in 51 localities of Romania. The material includes important new distribution records of three *Natura* 2000 species (*Coenagrion ornatum*, *Cordulegaster*

*heros* and *Gomphus flavipes*). *Coenagrion scitulum*, *Somatochlora meridionalis* and *Sympetrum danae* are species rarely reported from Romania." (Author)] Address: Mancu, C., Babe.-Bolyai University, Biology and Geology Faculty, Ecology and Taxonomy Department 5-7 Clinicilor Str., 400006, Cluj-Napoca, Romania. E-mail: cosminovidiu@yahoo.com

**11245.** Marinov, M. (2011): Dragonflies (Insecta: Odonata) from the Western Rhodopes (Bulgaria and Greece). In: Beron P. (ed) *Biodiversity of Bulgaria. 4. Biodiversity of Western Rhodopes (Bulgaria and Greece) II*. Pensoft & Nat. Mus. Natur. Hist. Sofia: 145-161. (in English) ["A total of 52 Odonata species are reported here for the Western Rhodopes with six new species for the region: *Lestes barbarus*, *L. macrostigma*, *Erythromma najas*, *Cordulegaster bidentata*, *Sympetrum vulgatum*, *S. flaveolum*. At least 58 species could be expected within the Western Rhodopes area. The same number was given as probable for the eastern part of the mountain by MARINOV 2004." (Publisher) *Note of the editor*: This paper is a poor reprint of the original publication Marinov, M., 2007. Odonata of The Western Rhodopes, with special reference to the wetlands North of the town of Smolyan, South Bulgaria. *Notulae Odonatologicae* 6(9): 97-108. It suffers several major faults, which are entirely due to the lack of communication between the editors of the volume and the author of the paper. The later saw it already integrated amongst other articles and printed out without being able to make any final comments and suggestions for improvement. People interested in the region are advised to search for the original paper and not consider this low quality reprint in their research.]]

**11246.** Maroneze, D.M.; Tupinambas, T.H.; Alves, C.B.M.; Vieira, F.; Pompeu, P.S.; Callisto, M. (2011): Fish as ecological tools to complement biodiversity inventories of benthic macroinvertebrates. *Hydrobiologia* 673: 29-40. (in English) ["Sampling benthic macroinvertebrates in large rivers has several limitations, arising not only from the selectivity of traditional sampling gears but also from difficulty in capturing organisms that inhabit the deeper zones and high current velocities. Considering the importance of benthic macroinvertebrates as a food resource for fishes, the sampling restrictions in sediment collection done by dredges, and the importance of surveying benthos biodiversity, the objective of this study was to evaluate the stomach contents of five commonly occurring insectivorous fish species as a means of complementing a benthic macroinvertebrate inventory. Three sampling campaigns (fish and benthic macroinvertebrate) were conducted in a reach of the Araguari River (Minas Gerais, Brazil), approximately 9 km long and 90 m wide. *Astyanax altiparanae* Garutti & Britski 2000, *Leporinus friderici* (Bloch 1794), *Leporinus amblyrhynchus* Garavello & Britski 1987, *Iheringichthys labrosus* (Lütken 1874) and *Pimelodus maculatus* Lacepede 1803 were the fish species collected and studied. To determine benthic macroinvertebrate taxonomic richness, a total of 54 Van Veen sediment samples were obtained. We compared lists of the benthic taxa found in fish stomachs with those from the sediment samples. The differences in the taxonomic composition of the benthic macroinvertebrate communities between the sediment samples and each fish species stomachs contents were assessed through NMDS and ANOSIM analyses, using a Sorensen similarity index with the presence/absence of taxa data. Independ-



ent of sampling period, additional benthic macroinvertebrate families or classes were provided by identifying fish stomach contents. We found a total of 30 taxa in this study (including "Coenagrionidae, Gomphidae, Libellulidae"), including 5 unique taxa (or 17% of the total) in the sediment samples, 9 unique taxa (30%) in the stomach samples, and 16 taxa (53%) common to both. The NMDS and ANOSIM analyses showed a significant separation between Van Veen sediment samples and two fish species stomach contents— *L. amblyrhynchus* and *P. maculatus*. These results indicate that fish can be used as additional samplers and are an efficient method to complement the benthic taxonomic inventory obtained through traditional sediment sampling techniques in large areas, as river segments and catchments." (Authors)] Address: Callisto, M., Laboratório de Ecologia de Bentos, Departamento de Biologia Geral, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Av. Antônio Carlos, 6627, C.P. 486, Pampulha, CEP 30161-970 Belo Horizonte, MG, Brazil. E-mail: callistom@ufmg.br

**11247.** Martins, F.A.; del Claro, K. (2011): Natural history in dragonfly (Odonata) interactions of Cerrado vegetation. *Capa* 5(2): 20 pp. (in Portuguese, with English summary) ["The description of dragonfly species natural history involves the study of important features on Odonata community, as interspecific and intraspecific interactions and climatic parameters. This study aimed to investigate the most important features those can contribute to the inclusion of *Ischnura ramburii* in interaction ecology studies on Cerrado. The study was conducted at a permanent pond, in a nature reserve at Clube de Caça e Pesca Itororó de Uberlândia. Behaviour observations were done and species biology data were quantified. Predation behaviour usually occurs on the pond, in areas with prey abundance. Individuals use their legs to catch their prey. The breeding happens in the air. The oviposition is endofitic and during it, female and male remain on tandem position. Female eventually remains submerged during the egg lay. On agonistic interactions between intraspecific and interspecific males were observed the behavioural patterns: i) tolerance; ii) perch; iii) caution display and; iv) attack. Besides this, faceoff, behaviour in which two damselflies stand face to face for some seconds, was observed in this species. It was verified higher abundance on the hottest months of the year (spring and summer). It wasn't found a direct correlation between the environment middle temperature and abundance of individuals, along the seasons ( $r_s = 0,800$ ;  $p > 0,05$ ), but is verified a trend to correlation." (Authors)] Address: Martins, F.A., Laboratório de Ecologia Comportamental e Interações, Instituto de Biologia, Universidade Federal de Uberlândia, Rua Ceará, s/nº Bloco 2D - Campus Umuarama, 38400-902, Uberlândia, MG - Brasil - Caixa Postal: 593. E-mail: fernandaalvesmartins@yahoo.com.br

**11248.** Mathys, B.A. (2011): First record of Aplomado Falcon (*Falco femoralis*) for the West Indies. *The Wilson Journal of Ornithology* 123(1): 179-180. (in English) [Puerto Rico; "I was able to observe the falcon for ~8 hrs over 5 days. It was perched on fence posts or small trees (<7 m tall) for the majority of this time. Its observed hunting style was similar to a female Merlin that I observed daily at the lagoon. This Merlin successfully captured dragonflies, and the Aplomado Falcon's prey items were assumed to be similar. However, no specific prey items were identified." (Author)] Address: Mathys,

B.A., Natural Sciences and Mathematics, The Richard Stockton College of New Jersey, P. O. Box 195, Pomona, NJ 08240, USA. E-mail: Blake.Mathys@stockton.edu

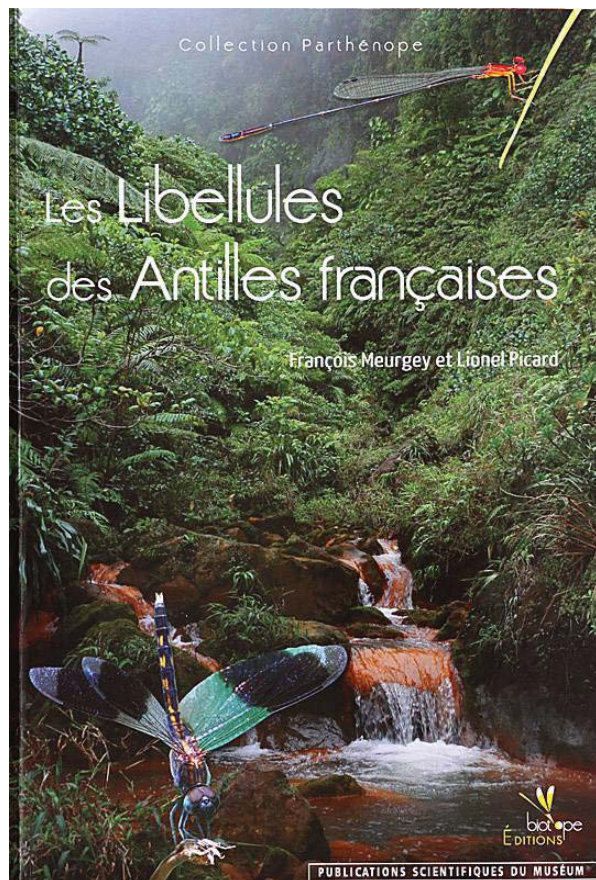
**11249.** Matushkina, N.A. (2011): Morphology of exophytic ovipositors in dragonflies (Odonata: Gomphidae, Corduliidae, Libellulidae), with particular reference to ovipositor muscles and sensilla. *International Journal of Odonatology* 14(3): 223-248. (in English) ["A comparative study of female external genitalia was carried out in representatives of three dragonfly families that lay eggs exophytically, with special emphasis placed on skeletal musculature and sensilla. Female external genitalia are characteristically represented by the vulvar lamina and rudiments on the 9th sternum. In a gomphid, *Gomphus vulgatissimus*, and a cordulid, *Cordulia aenea*, the vulvar laminae bear numerous styloconic sensilla and sparse campaniform sensilla. In addition, the rudiments of *C. aenea* are richly furnished with basiconic sensilla, each with an apical pore. In corduliids and libellulids the ovipositor musculature is formed by two antagonistic muscles, contractions of which cause up- and downward movements of the middle part of the 9th sternum, where rudiments are usually located. Characteristically, gomphid females lack both the ovipositor-related muscles and rudiments. Based on the present results, the rudiments may be reasonably homologized with the gonapophyses of the 9th segment of the plesiomorphic well-developed ovipositor. The proposed functional interpretations of the ovipositor derivatives in Odonata with exophytic oviposition are discussed in light of their egg laying behaviour." (Author) The analysis includes the following taxa: *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Lindenia tetraphylla*, *Cordulia aenea*, *Epithea bimaculata*, *Somatochlora metallica*, *Orithetrum cancellatum*, *Sympetrum vulgatum*, and *S. sanguineum*.] Address: Matushkina, Natalia, Department of Zoology, Biological Faculty, Kyiv National University, vul. Volodymirs'ka 64, Kyiv, 01033, Ukraine. E-mail: odonataly@gmail.com

**11250.** Mayon, N. (2011): Répartition de deux Gomphidae rhéophiles (*Gomphus vulgatissimus* et *Onychogomphus forcipatus*) le long de la Sûre: premiers résultats, tendances et hypothèses. *Les Naturalistes Belges* 92(3-4): 55-66. (in French, with English summary) [Belgium; west of the border to Luxembourg; "The distribution of *G. vulgatissimus* and *O. forcipatus* has been studied in four sites along the Sure river, based on exuviae findings. The results showed significant differences in species ratio between sites, suggesting a downstream gradient. Those results were thus examined under the habitat point of view. Although additional studies are requested to closely characterize the distribution of the two species, it is likely that the results revealed a distribution dependent of habitat types present at each place rather than a strict longitudinal distribution. However, this hypothesis must be considered with reserve due to the single sampling method." (Author)] Address: Mayon, N., Parc Naturel Haute-Sûre et Forêt d'Anlier. Chemin du Moulin 2, B-6630 Martelange, Belgium. E-mail: nicolas@parcnaturel.be

**11251.** Mayoral, H. (2011): Particle size, critical shear stress, and benthic invertebrate distribution and abundance in a gravel-bed river of the Southern Appalachians. M.Sc. Thesis, College of Arts and Sciences, Georgia State University: X + 66 pp. (in English) ["To determine the relationship between the abundance and den-

sity of benthic invertebrates, and the critical shear stress of individual grain sizes, a reach along Smith Creek, was divided into ten 2m x 2m quadrants. Within each quadrant, five randomly selected clasts for each grain size ranging from 2.26 to 25.6 cm were cleaned for benthic invertebrates. Wolman pebble counts for each quadrant were also conducted and used to determine the critical Shields stress per grain size fraction from the model given by Wiberg and Smith (1987) that explicitly accounts for particle hiding/sheltering effects in mixed-bed rivers. Particle entrainment values were then compared with estimated bankfull Shields stress values to determine sediment transport potential during bankfull flow. Invertebrate abundance was strongly positively correlated with critical Shields stress up to the 18.0 cm grain size, indicating a preference for certain grain sizes; while density was positively correlated with all grain sizes present." (Author) Among 9114 collected specimens only one Odonata was represented.] Address: Mayoral, Helen, College of Arts and Sciences, Georgia State University, USA. E-mail: hmayoral1@student.gsu.edu

**11252.** McAlpine, D.F. (2011): Insect Collections of Canada Series: New Brunswick Museum, Saint John, NB. Newsletter of the Biological Survey of Canada 30 (1): 8-16. (in English) [The paper includes a picture of Paul Brunelle, and some passing references on regional representation of specimens in the collection.] Address: McAlpine, D.F., Research Curator, Zoology Section, & Head, Department of Natural Science, E-mail: donald.mcalpine@nbm-mnb.ca



**11253.** Meurgey, F.; Picard, L. (2011): Les libellules des Antilles françaises: Ecologie, biologie, biogéographie et identification. Collection Parthénope. Biotope. 440 pp. (in French) [This is a richly illustrated field guide to the

dragonflies of the French Antilles. It contains chapters describing the environment of the Antilles, the morphology and biology, and biogeography and ecology of dragonflies, as well as measures taken towards their protection and conservation. Furthermore the guide provides determination keys and 41 species accounts. In addition, it describes several walks around islands of particular interest to people wanting to observe dragonflies.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**11254.** Miroglu, A. (2011): First record of the Black Darter, *Sympetrum danae* (Sulzer, 1776) (Odonata: Libellulidae), from Turkey. Zoology in the Middle East 53: 129-130. (in English) [I collected a female at Taslidere (Ardahan region), eastern Turkey, at 1901 m a.s.l., on 27.vii.2010. Taçhdere is situated at 41°03'N, 42°51'E. The habitat consists of high elevation ponds and a sluggish stream, and is associated with sedges and bulrush species. The material is deposited in the collection of the Biology Department of Ondokuz Mayıs University, Samsun (Turkey). This is the first record from Turkey." (Author)] Address: Miroglu, A., Ondokuz Mayıs University, Faculty of Science and Arts, Department of Biology, 55139, Kurupelit, Samsun, Turkey

**11255.** Mochon, A. (2011): Découverte de la courtisane d'Amérique (*Hetaerina americana*), odonate, au Québec. Le naturaliste canadien 135(2): 34-37. (in French) [Records of *H. americana* in Québec, Canada are documented: (1) 12-IX-2009, Yamaska River (45,324905° N; 72,649808°E) (31H/07), near Bromont, and (2) 29-VIII-2010, Yamaska Nord River (45,415431°N; 72,626556°E) (31H/07), app. 1 km near Réservoir Choynière.] Address: not stated

**11256.** Mochon, A. (2011): La découverte de la courtisane d'Amérique (Odonata: *Hetaerina americana*) au Québec. Bulletin de conservation. Les parcs nous ont dévoilé... 2011: 21-23. (in French) [The recent records of *H. americana* in Québec, Canada are documented in detail: (1) 12-IX-2009, Yamaska River (45,324905°N; 72,649808°E) (31H/07), near Bromont, and (2) 29-VIII-2010, Yamaska Nord River (45,415431°N; 72,626556°E) (31H/07), app. 1 km near Réservoir Choynière. The paper also includes brief notes on *Gomphaeschna furcillata* and *Enallagma civile*.] Address: not stated

**11257.** Molina, C.I.; Gibon, F.-M.; Oberdorff, T.; Dominguez, E.; Pinto, J.; Marin, R.; Roulet, M. (2011): Macroinvertebrate food web structure in a floodplain lake of the Bolivian Amazon. Hydrobiologia 663: 135-153. (in English) [Two stable isotopes  $\delta^{13}C$  and  $\delta^{15}N$  were used to identify the energy sources and trophic relationships of the main freshwater macroinvertebrates in a floodplain lake of the Beni River (Bolivian Amazonia). Four energy sources (seston, bottom sediment, periphyton, and aquatic macrophytes) and macroinvertebrate communities were collected during three periods of the river hydrological cycle. Macroinvertebrates showed greater temporal variation in isotope values than their food sources. Six trophic chains were identified: four were based on steston, periphyton, C3 macrophytes, and bottom sediments, and the last two chains on a combination of two carbon sources. One mixed steston and periphyton sources during the wet season while the other mixed periphyton and macrophytes sources during the wet and dry seasons. Periphyton was the most



important energy source supporting the highest number of trophic levels and consumers. The macrophytic contribution was only significant during the dry season. Bottom sediments constituted a marginal energy source. As each season is associated with different physical and chemical conditions, processes organizing macroinvertebrate food web structure in the Beni floodplain seem strongly linked to hydrological seasonality." (Authors) The authors analyzed 243 macroinvertebrate samples representing 38 taxa. The dominant taxa were *Belostoma* sp., (Hemiptera), *Dythemis* sp., *Limnetron* sp. (Odonata), *Hydrophilus* spp. (Coleoptera), *Palaeomonetes ivonicus* (Crustacea, Decapoda) and *Pomacea scalaris* (Mollusca, Gasteropoda). Ten out of the 38 taxa are Odonata (treated at the genus level).] Address: Molina, C.I., Instituto de Ecología, Unidad de Limnología, UMSA, Casilla Postal #10077, La Paz, Bolivia. E-mail: camoar6088@gmail.com

**11258.** Moser, I. (2011): Bestandesaufnahmen der Kleinen Binsenjungfer, der Sumpfgrippe und der Sumpfschrecke im Feuchtland ausserhalb der Naturschutzgebiete Bannriet, Spitzmäder, Eich und Burst. Ergebnisse 2011. Editors: Verein Pro Riet Rheintal, Altstätten, Switzerland: 23 pp. (in German) [In 2011, 14 localities improved by nature conservation measures (ceasing melioration, building water bodies) between 1994 and 2007 were studied with respect to occurrence of *Lestes virens*. All these habitats are situated outside legally protected areas. *L. virens* was established in seven of the fourteen localities. It was confirmed as reproducing in three of them.] Address: Verein Pro Riet Rheintal, Schwalbenweg 16, 9450 Altstätten, Switzerland. www.pro-riet.ch

**11259.** Muehlbauer, J.D.; Doyle, M.W.; Bernhardt, E.S. (2011): Macroinvertebrate community responses to a dewatering disturbance gradient in a restored stream. *Hydrology and Earth System Sciences* 15: 1771-1783. (in English) [North Carolina, USA; "Dewatering disturbances are common in aquatic systems and represent a relatively untapped field of disturbance ecology, yet studying dewatering events along gradients in non-dichotomous (i.e. wet/dry) terms is often difficult. Because many stream restorations can essentially be perceived as planned hydrologic manipulations, such systems can make ideal test-cases for understanding processes of hydrological disturbance. In this study we used an experimental drawdown in a 440 ha stream/ wetland restoration site to assess aquatic macroinvertebrate community responses to dewatering and subsequent rewetting. The geomorphic nature of the site and the design of the restoration allowed dewatering to occur predictably along a gradient and decoupled the hydrologic response from any geomorphic (i.e. habitat heterogeneity) effects. In the absence of such heterogeneous habitat refugia, reach-scale wetted perimeter and depth conditions exerted a strong control on community structure. The community exhibited an incremental response to dewatering severity over the course of this disturbance, which was made manifest not as a change in community means but as an increase in community variability, or dispersion, at each site. The dewatering also affected inter-species abundance and distributional patterns, as dewatering and rewetting promoted alternate species groups with divergent habitat tolerances. Finally, our results indicate that rapid rewetting – analogous to a hurricane breaking a summer drought – may represent a recovery process rather than an additional dis-

turbance and that such processes, even in newly restored systems, may be rapid." (Authors) The supplementary material lists *Anax*, *Enallagma*, *Ischnura*, *Erythemis*, *Miathyria*, and *Pachydiplax*.] Address: Muehlbauer, J.D., Curriculum for the Environment & Ecology, University of North Carolina, Chapel Hill, NC, USA. E-mail: jeffreym@unc.edu

**11260.** Müller, J.; Steglich, R. (2011): Fundort- und Artenliste eigener Libellen-Nachweise (Odonata) in Sachsen-Anhalt für die Jahre 2009 und 2010. *halophila - Mitteilungsblatt der Fachgruppe Faunistik und Ökologie, Staßfurt* 54: 15-19. (in German) [Records from 47 localities in Sachsen-Anhalt, Germany are documented.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**11261.** Ndome, C.B.; Udo, I.U.; Akpan, I.I.; Udom, C. (2011): Effect of water quality and bottom soil properties on the diversity and abundance of macrozoobenthic fauna of some tropical growth-out earthen fish ponds. *Ecologia* 2(1): 12-22. (in English) ["This study was conducted to investigate the effect of water quality and bottom soil properties on the diversity and abundance of macrobenthic fauna in some tropical grow-out earthen fish ponds. The aim was to enhance the proper management of soil and water qualities in relation to various groups of benthic organisms found in ponds. Physico-chemical parameters, bottom soil properties and benthic community assemblages were studied in three selected commercial fish farms in Calabar, Cross River State, Nigeria. ... In general, Farms with optimum physicochemical parameters, high sand and low clay content had the highest assemblages of macrobenthic organisms. Farm managers should pay particular attention to the physico-chemical parameters and soil properties as they are determinant factors of macrobenthic assemblage within the fish ponds. These will enhance high productivity of the grow-out fish ponds since they form the major bulk of fish food." (Authors) Relative abundance of dragonfly larvae was estimated as 9.6, 15.6, and 21.7% for each of the three studied farms.] Address: Udo, I.U., Dept of Fisheries and Aquaculture, Institute of Oceanography, University of Calabar, P.M.B. 1115, Calabar, Cross River State, Nigeria

**11262.** Nelson, B. (2011): A review of notable records of Irish odonates post DragonflyIreland (2004-2010), including confirmation of the Golden-ringed Dragonfly *Cordulegaster boltonii* (Donovan) on the Irish list. *J. Br. Dragonfly Society* 27(2): 105-131. (in English) ["Notable records of Irish odonates in the period post DragonflyIreland (2004-2010) are presented, including confirmation of *C. boltonii* on the Irish list. Range expansions of several species are documented and the occurrences of migrant species are reviewed and discussed. An updated Irish checklist is provided and reference made to the Irish Red List." (Author)] Address: Nelson, B., National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, 7 Ely Place, Dublin 2, Ireland. E-mail: brian.nelson@environ.ie

**11263.** Obara, K.; Mishima, H.; Yodoe, K. (2011): Insects Fauna in the Sada-cho, Shimane Prefecture. *Bull. Hoshizaki Green Found.* 5: 139-160. (in Japanese, with English summary) [Japan; from May to October 2000, 647 species belonging to 13 orders were recorded. The following Odonata are listed from the region: *Ischnura asiatica*, *Cercion calamorum calamorum*, *C. sieboldii*, *Copera annulata*, *Lestes temporalis*, *Calopteryx atrata*,



*C. cornelia*, *Mnais pruinosa*, *M. nawai*, *Epiophlebia superstes*, *Asiagomphus melaenops*, *Davidius nanus*, *Stylogomphus suzukii*, *Onychogomphus viridicostus*, *Sieboldius albardae*, *Anotogaster sieboldii*, *Planaeschna milneii*, *Anax nigrofasciatus nigrofasciatus*, *A. parthenope julius*, *Macromia amphigena amphigena*, *Orthetrum albistylum speciosum*, *O. japonicum japonicum*, *O. triangulare melania*, *Crocothemis servilla mariannae*, *Sympetrum darwinianum*, *S. frequens*, *S. eroticum eroticum*, *S. parvulum*, *S. pedemontanum elatum*, *S. infuscatum*, *S. croceolum*, *Pantala flavescens*] Address: Otsu, 426-7, Izumo City, Shimane Prefecture, 693-0011, Japan

**11264.** Outomuro, D.; Ocharan, F.J. (2011): The larval-life history of *Calopteryx virgo meridionalis* in northern Spain and the voltinism of the south-western European species of the genus *Calopteryx* (Odonata: Calopterygidae). *Entomologia generalis* 33(1-2): 125-135. (in English, with German summary) ["A larval population of *C. virgo meridionalis* was monitored in northern Spain for a period of 18 months. Larvae were measured in the field and then released. Egg hatching was followed by rapid larval growth. Last stadium larvae were first collected in January. The larval life history and the developmental curve of the study population support a univoltine cycle with only one developing cohort throughout the year. Re-analysing previously published data, the developmental curves of several species of *Calopteryx* Leach 1815, from south-western Europe were compared. Results are discussed within the context of latitudinal shifts of voltinism and evidence a decrease in developmental time southwards, i.e. from semivoltinism to univoltinism. However, other factors such as altitude, local environmental conditions and specific larval requirements must also be considered." (Authors)] Address: Outomuro Priede, D., Dpto. Biología de Organismos y Sistemas, Universidad de Oviedo, C/ Catedrático Rodrigo Uria, s/n, E-33071 Oviedo, Spain. E-mail: outomuro.david@gmail.com

**11265.** Pan, B.-Z.; Wang, H.-J.; Liang, K.-M.; Wang, H.-Z. (2011): Macrozoobenthos in Yangtze floodplain lakes: patterns of density, biomass, and production in relation to river connectivity. *Journal of the North American Benthological Society* 30(2): 589-602. (in English) ["A systematic investigation of macrozoobenthos was conducted in Yangtze floodplain waters to reveal patterns of density, biomass, and production in relation to river connectivity. In the Yangtze connected lakes, 78 taxa belonging to 33 families and 62 genera were identified. Macrozoobenthos density was 327 individuals/m<sup>2</sup>, biomass was 1.40 g dry mass/m<sup>2</sup>, and production was 3.23 g dry mass m<sup>2</sup> y<sup>-1</sup>. The assemblages were characterized by high diversity, high production, and high bivalve-filterer abundance. The key factor determining the macrozoobenthic assemblages was river connectivity. As river connectivity increased, 3 types of response patterns were observed: 1) density, biomass, and production of collector-filterers (mainly *Bivalvia*), shredders (e.g., *Stictochironomus*), and predators (e.g., *Dytiscidae*) showed unimodal changes, i.e., first increased and then decreased; 2) density, biomass, and production of collector-gatherers (mainly *Tubificidae* and *Chironomidae*) decreased continuously; and 3) density of scrapers (mainly *Gastropoda*) decreased, whereas their biomass and production changed unimodally. At an intermediate level of river connectivity, biomass and production of total macrozoobenthos reached maxima, whereas density decreased with increasing river connectivity.

Previous research showed that a diversity of zoobenthos also peaks at moderate connectivity with rivers. Therefore, to maintain high productivity as well as high biodiversity in the Yangtze floodplain, protecting the remnants of riverconnected lakes and linking disconnected lakes freely with the mainstream are crucial." (Authors) The list of taxa includes for Dongting Lake '*Dromogomphus* sp.', a nearctic species not occurring in China.] Address: Wang, H.-Z., State Key Laboratory of Freshwater Ecology and Biotechnology, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan, Hubei 430072, China. E-mail: wanghz@ihb.ac.cn

**11266.** Parr, A.J. (2011): Migrant and dispersive dragonflies in Britain during 2010. *J. Br. Dragonfly Society* 21(2): 69-79. (in English) ["The year 2010 was a relatively low-key one for many of our commoner migrant species but some highly noteworthy events took place with rarer species. Literally dozens of *Aeshna affinis* were seen in southeast England during late July-August, principally around the Thames Estuary. With oviposition being noted, it is even possible that local breeding populations may become established. Southeast England also saw several records of *Lestes barbarus* during the year, as well as the discovery of new sites for *Lestes viridis* away from the recently-established Suffolk population. Perhaps the highlight of the year was the re-discovery of *Coenagrion scitulum*, after an absence from the UK of nearly 60 years. Arrivals of this species must however have taken place prior to 2010, since, in addition to adults, small numbers of exuviae were also discovered, indicating that successful breeding had already taken place. Clearly Britain's dragonfly fauna is currently going through a period of considerable flux." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**11267.** Parr, A.J. (2011): The Vagrant Emperor *Anax ephippiger* in Britain and Europe during early 2011. *J. Br. Dragonfly Society* 21(2): 80-87. (in English) ["Early 2011 saw major movements of *A. ephippiger* in southern and western Europe. These peaked during April and resulted in the largest arrivals of Vagrant Emperor ever seen in Britain. Oviposition was even observed at a site on the Lizard Peninsula in Cornwall on 26 April, this being the first recorded instance in the UK. British records of Vagrant Emperor during January-May 2011 are detailed and some meteorological background to the movements is presented." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**11268.** Peck, S.B. (2011): CDF Checklist of Galapagos Dragonflies and Damselflies - FCD Lista de especies de Libélulas, caballitos del diablo de Galápagos. In: Bungartz, F., Herrera, H., Jaramillo, P., Tirado, N., Jiménez-Uzcategui, G., Ruiz, D., Guézou, A., Ziemmeck, F. (eds.). Charles Darwin Foundation Galapagos Species Checklist - Lista de Especies de Galápagos de la Fundación Charles Darwin. Charles Darwin Foundation / Fundación Charles Darwin, Puerto Ayora, Galapagos. Last updated 13 Apr 2011: 3 pp. (in English) [The paper compiles published records reaching up to 2001.] Address: <http://www.darwinfoundation.org/datazone/checklists/terrestrial-invertebrates/odonata/>

**11269.** Petruck, A.; Stöffler, U. (2011): On the history of chloride concentrations in the River Lippe (Germany) and the impact on the macroinvertebrates. *Limnologica*

- Ecology and Management of Inland Waters 41(2): 143-150. (in English) ["The River Lippe is situated at the northern part of the Rhenish-westphalian coal mining area, Germany and has a long history of being affected by mining water discharge. There has, however, been a massive decrease in the discharge of mining water over the past few decades. While early in the last century concentrations of up to 3500 mg l<sup>-1</sup> of chloride were observed, the mean concentration is now below 400 mg l<sup>-1</sup>. At the same time the water quality has improved greatly so factors other than chloride concentration may be influencing the macroinvertebrate community. Macroinvertebrate data collected from three sites along the River Lippe was analyzed for a change in the occurrence of salt tolerant species in an area where mining water discharge ended in 2000. It was found that also during the period of discharges the macroinvertebrate community was dominated by freshwater species and therefore the impact of mining water discharges in the upper River Lippe is considered to be minor. It was also found that for some species (*Nais elinguis*, *Bithynia tentaculata* and *Gammarus tigrinus*) their proposed salinity preference did not correlate with their occurrence in the field. This may be an area that requires further research. ... The predominant taxa of the collected individuals were Crustacea (18.24%), Gastropoda (15.59%), Ephemeroptera (10.61%) Odonata (10.40%), Diptera (9.75%), Trichoptera (9.63%), Lamellibranchata (6.73%) and Coleoptera (5.02%) ..."] (Authors)] Address: Petruck, A., Emscher-Genossenschaft/Lippeverband Essen, Kronprinzenstr. 24, 45128 Essen, Germany. E-mail: petruck.andreas@eglv.de

**11270.** Petrulevicius, J.F.; Wappler, T.; Nel, A.; Rust, J. (2011): The diversity of Odonata and their endophytic ovipositions from the Upper Oligocene Fossilagerstätte of Rott (Rhineland, Germany). *ZooKeys* 130: 67-89. (in English) ["A commented list of fossil Odonata from the Oligocene outcrop of Rott is given, together with descriptions of new traces of oviposition in plant tissues, very similar to ichnotaxa already known from the early Eocene Laguna del Huncó floras of Patagonia. The joint presences of odonatan larvae and traces of oviposition demonstrate the autochthony of these insects in the palaeolake of Rott, confirming the existence of a diverse and abundant aquatic entomofauna, a situation strikingly different to that in the contemporaneous Oligocene palaeolake of Céreste (France)."] (Authors)] Address: Wappler, T., Steinmann Institut für Geologie, Mineralogie, Paläontologie, Universität Bonn, Nussallee 8, 53115 Bonn, Germany. E-mail: twappler@uni-bonn.de

**11271.** Pinto, A.P.; Lamas, C.J.E. (2011): *Oligoclada mortis* sp. nov. from Rondônia State, Brazil, and distributional records of other species of the genus (*Odonata*: Libellulidae). *International Journal of Odonatology* 14(4): 291-303. (in English) ["*Oligoclada mortis* sp. nov. (holotype male deposited in MZSP: Brazil, Rondônia State, Porto Velho municipality, gT[ransec t]5-21, seg[ment]12 (09.35 19 S, 65.02 50 W, 106m asl, 13 v 2010, leg. Nogueira & Mendes) is described and illustrated based on two males. The new species fits within Borrer's Group III, differing from all other described species in the genus by the combination of an entirely black labium, a large posterior hamule, sickle-shaped and ventrally longer than the genital lobe, and long cerci, with the ratio between epiproct and cerci less than 0.67. A key to males of the seven species of Group III and distributional records based on the specimens de-

posited in the DZRJ and MZSP Brazilian collections are also presented. The new species is the eighth species of *Oligoclada* reported from Rondônia, this being the richest Brazilian State for this genus." (Authors)] Address: Pinto, A.P., Museu de Zoologia, Universidade de São Paulo, Av. Nazaré 481, Ipiranga 04263-000, São Paulo, SP, Brazil. E-mail: odonataangelo@hotmail.com

**11272.** Piper, W. (2011): *Libellennachrichten mit neuem Herausgeber*. *Libellennachrichten* 26: 14. (in German) [Martin Lemke is introduced as new co-editor of the newsletter of the German speaking odonatologists.] Address: Piper, W., Kollenhof 31, D-22527 Hamburg, Germany. E-mail: info@werner-piper.de

**11273.** Poiron, C.; Meurgey, F. (2011): The Odonata of St Lucia (Lesser Antilles) - Survey Report March 9-30 2011. *L'Herminier Natural History Society - Contribution to odonatology # 2*: 21 pp. (in English) ["The dragonfly fauna of the Lesser Antilles actually numbers 48 valid species (Meurgey & Poiron, in prep). There are 38 species in Guadeloupe (Meurgey, 2006b), 30 in Martinique (Meurgey, 2005) which both are the richest islands. Species richness decrease to the south with only 7 species in St. Vincent (Meurgey, 2010) and 19 in Grenada (Meurgey, 2009). Saint Lucia appear as a medium rich island, and the paucity of species could be due to 1) the lack of standing water habitats (95% of Odonata reproduce in standing water), and 2) the lack of studies, with only two surveys known to us. Among surveyed stations, 62% belongs to lotic habitats and 30% to lentic habitats. The remaining pertain to specific habitats: trail, grassland, ditch... The number of species in Martinique, which is quite equal to those of St Lucia, is due to a high level of disturbances, pollutions and urbanization. We think that the fauna of St Lucia could reach 30-35 species. Hurricane Tomas passed by the Island in November 2010. He especially opened many forested areas. We observed that several streams and rivers are now open, without canopy and colonized by vagrant species such as *Pantala flavescens*, *Orthemis macrostigma* or *Tramea abdominalis*. We also saw trees down across rivers creating microhabitats and promoting the development of some species such as *Protoneura ailsa*. This information must be verify with further surveys before and after the passage of an hurricane. It is difficult to have an idea of what species could be present in these habitats before Tomas. As for other islands, the odonate fauna of St Lucia is dominated by wide ranging species. Two of them, *Ischnura ramburii* and *O. macrostigma* are the commonest species in a great variety of habitat. The most interesting thing is that these two common species are followed by Lesser Antillean endemics (*P. ailsa* and *Dythemis sterilis*), which have been recorded from 20 (26%) and 27 (36%) localities respectively." (Authors)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**11274.** Popoola, K.O.K.; Otalekor, A. (2011): Analysis of aquatic insects' communities of Awba Reservoir and its physico-chemical properties. *Research Journal of Environmental and Earth Sciences* 3(4): 422-428. (in English) ["This study was conducted to assess the Awba reservoir insects' communities and the health status through the determination of insects' abundance, composition, distribution and water qualities parameters. Water samples and insects were collected bi-weekly from August through December, 2009. Insects were

sampled using standard entomological methods, while water samples was analyzed using standard Winkler's titrimetric and APHA methods to determine the chemical properties. Water analyses and insects' identifications were conducted in the laboratory in Dept of Zoology, University of Ibadan, Oyo State. The results show that only DO and phosphate-phosphorus had significant difference ( $p < 0.05$ ). A total of 1,154 insects were recorded, Chironomidae and Culicidae were most abundant. The chemical properties and the distinct taxa found in the water suggest that the water body is polluted and may be dangerous to the health of people around the reservoir." (Authors) The paper contains information on heavy metal (zinc, copper, lead, cadmium) impact on Odonata identified at the genus level.] Address: Popoola, K., Department of Zoology, University of Ibadan, Oyo State, Nigeria

**11275.** Rocha-Ramírez, A.; Peñaloza-Daniel, A. (2011): *Caecidotea xochimilca* (Isopoda, Asellidae), a new species from Lake Xochimilco, Mexico, with a key to Mexican species of the genus *Caecidotea*. *Crustaceana* 84(1): 93-106. (in English, with Spanish abstract) [*Caecidotea xochimilca* n. sp. is described from specimens found in the roots of the water hyacinth in Lake Xochimilco, Mexico City. Those alkaline waters also harbour *Ischnura denticollis* and *Rhionaeschna multicolor*.] Address: Rocha-Ramírez, A., Laboratorio de Ecología, Facultad de Estudios Superiores Iztacala, Universidad Nacional Autónoma de México, Av. de los Barrios #1, Los Reyes Iztacala, CP 54090 Tlalnepantla, Estado de México, Mexico

**11276.** Russo, L.; Stehouwer, R.; Heberling, J.M.; Shea, K. (2011): The composite insect trap: An innovative combination trap for biologically diverse sampling. *PLoS ONE* 6(6): e21079. doi:10.1371/journal.pone.0021079: 7 pp. (in English) ["Because insects are so diverse, most trapping methods are specifically tailored to a particular taxonomic group. For scientists interested in the broadest possible spectrum of insect taxa, whether for long term monitoring of an ecosystem or for a species inventory, the use of several different trapping methods is usually necessary. We describe a novel composite method for capturing a diverse spectrum of insect taxa. The Composite Insect Trap incorporates elements from four different existing trapping methods: the cone trap, malaise trap, pan trap, and flight intercept trap. ... We collected almost 15,000 specimens of 21 different orders ... over a period of three months during the summer of 2009. All of these specimens were identified to the order level. At this resolution, we found great diversity. The majority of the insects in the traps were Diptera (56%), Hemiptera (26%), Coleoptera (7%), and Hymenoptera (7%), but there were representatives from the insect orders Blattodea, Collembola, Dermaptera, Ephemeroptera, Lepidoptera, Mecoptera, Neuroptera, Odonata, Orthoptera, Plecoptera, Psocoptera, Thysanoptera, Trichoptera, and non insect arthropods such as Acari (mites), Araneae, Opiliones, and Diplopoda." (Authors)] Address: Russo, Laura, Biology Dept, Pennsylvania State University, University Park, Pennsylvania, USA. E-mail: lar322@psu.edu

**11277.** Šácha, D. (2011): Addition to the knowledge of dragonflies (Insecta: Odonata) of the Turiec region. *Folia faunistica Slovaca* 16(3): 151-155. (in Slovakian, with English summary) [In 2007, nine wetland sites in the Turiec region (Northern Slovakia) were studied for their Odonata. A total 25 species is reported, including 6

legally protected and 8 redlisted Slovakian species. Species of community interest according the European law are *Leucorrhinia pectoralis* reported for the first time from Turiec region, *Coenagrion ornatum* and *Ophiomphus cecilia*.] Address: Šácha, D., Podtatranského 31, 031 01 Liptovský Mikuláš, Slovakia. E-mail: du-san.sacha@vazky.sk

**11278.** Sánchez-Guillén, R.A.; Hansson, B.; Wellenreuther, M.; Svensson, E.I.; Cordero-Rivera, A. (2011): The influence of stochastic and selective forces in the population divergence of female colour polymorphism in damselflies of the genus *Ischnura*. *Heredity* 107(6): 513-522. (in English) ["Disentangling the relative importance and potential interactions of selection and genetic drift in driving phenotypic divergence of species is a classical research topic in population genetics and evolutionary biology. Here, we evaluate the role of stochastic and selective forces on population divergence of a colour polymorphism in seven damselfly species of the genus *Ischnura*, with a particular focus on *I. elegans* and *I. graellsii*. Colour-morph frequencies in Spanish *I. elegans* populations varied greatly, even at a local scale, whereas more similar frequencies were found among populations in eastern Europe. In contrast, *I. graellsii* and the other five *Ischnura* species showed little variation in colour-morph frequencies between populations. FST-outlier analyses revealed that the colour locus deviated strongly from neutral expectations in Spanish populations of *I. elegans*, contrasting the pattern found in eastern European populations, and in *I. graellsii*, where no such discrepancy between morph divergence and neutral divergence could be detected. This suggests that divergent selection has been operating on the colour locus in Spanish populations of *I. elegans*, whereas processes such as genetic drift, possibly in combination with other forms of selection (such as negative frequency-dependent selection), appear to have been present in other regions, such as eastern Europe. Overall, the results indicate that both selective and stochastic processes operate on these colour polymorphisms, and suggest that the relative importance of factors varies between geographical regions." (Authors)] Address: Sánchez-Guillén, Rosa, Depto de Ecología e Biología Animal, E.U.E.T. Forestal, Univ. de Vigo, Pontevedra, Spain. E-mail: rguillen@uvigo.es

**11279.** Schmera, D.; Baur, B. (2011): Testing a typology system of running waters for conservation planning in Hungary. *Hydrobiologia* 665(1): 183-194. (in English) ["Landscape and site classifications are increasingly being used in conservation planning and biodiversity management. We examined the utility of a simple typology system for predicting the conservation value of running-water sites in Hungary using aquatic invertebrates. Aquatic invertebrates (444 species) were collected by kick and sweep sampling technique, in a few cases also with a net, at 317 running-water sites covering the entire area of Hungary. On the basis of three criteria (naturalness, altitude and size of catchment area) we obtained a typology scheme distinguishing five running-water types: artificial lowland stream, natural highland river, natural highland stream, natural lowland river and natural lowland stream. We expressed the conservation value of each site using the numbers of native species, unique native species, red-list species, protected species and alien species. Furthermore, the conservation value of each river type was expressed by a measure of beta diversity. Our results show that any interpretation



of the effect of a single criterion might be misleading. Consequently, the use of the whole typology system is recommended. The study revealed that all stream types are valuable to a certain extent because they maintain distinct biological communities. We found that the conservation value of artificial watercourses is comparable to that of natural running-water sites. We identified that natural lowland rivers and artificial lowland streams are the ones mostly exposed to species invasions. These findings are essential in maintaining and protecting conservation values of any freshwater ecosystem, and may contribute to management decisions on running waters in Hungary." (Authors) Odonata are included into this study; but no species details are given.] Address: Schmera, D., Section of Conservation Biology, Department of Environmental Sciences, University of Basel, St. Johanns-Vorstadt 10, 4056 Basel, Switzerland. E-mail: denes.schmera@unibas.ch

**11280.** Seibert, J.R.; Phelps, Q.E.; Tripp, S.A.; Garvey J.E. (2011): Seasonal diet composition of adult Shovelnose Sturgeon in the Middle Mississippi River. *The American Midland Naturalist* 165(2): 355-363. (in English) ['Coenagrionidae' and 'Gomphidae' contributed 1,39% to the mass of diet from 123 specimens of shovelnose sturgeon (*Scaphirhynchus platyrhynchus*) in the Middle Mississippi River (MMR) between Cairo, IL and St. Louis, MO (RKM 0–320), USA. "Dominant prey items throughout all seasons (winter, spring, summer and fall) were Chironomidae, Hydropsychidae, Ephemeridae and Corophiidae respectively. Corophiidae is an exotic amphipod that has not previously been documented in the MMR. The total abundance of diet items was high during winter through spring and low during summer through fall. Ephemeridae dominated in winter. Hydropsychidae was the most important prey item during spring through summer. Corophiidae dominated diets in the fall. Temperature and perhaps low river discharge appeared to affect prey consumed, with high temperatures and low discharge during summer through fall causing low energy intake, lowered condition and likely poor growth." (Authors)] Address: Phelps, Q.E., Fisheries and Illinois Aquaculture Center, Department of Zoology, Southern Illinois University, Carbondale 62901, USA. E-mail: qphelps@siu.edu

**11281.** Shama, L.S.; Campero-Paz, M.; Wegner, K.M.; De Block, M.; Stoks, R. (2011): Latitudinal and voltinism compensation shape thermal reaction norms for growth rate. *Molecular Ecology* 20(14): 2929-2941. (in English) ["Latitudinal variation in thermal reaction norms of key fitness traits may inform about the response of populations to climate warming, yet their adaptive nature and evolutionary potential are poorly known. We assessed the contribution of quantitative genetic, neutral genetic and environmental effects to thermal reaction norms of growth rate for populations of *Ischnura elegans*. Among populations, reaction norms differed primarily in elevation, suggesting that time constraints associated with shorter growth seasons in univoltine, high-latitude as well as multivoltine, low-latitude populations selected for faster growth rates. Phenotypic divergence among populations is consistent with selection rather than drift as QST was greater than FST in all cases. QST estimates increased with experimental temperature and were influenced by genotype by environment interactions. Substantial additive genetic variation for growth rate in all populations suggests that evolution of trait means in different environments is not constrained. Heritability of

growth rates was higher at high temperature, driven by increased genetic rather than environmental variance. While environment-specific nonadditive effects also may contribute to heritability differences among temperatures, maternal effects did not play a significant role (where these could be accounted for). Genotype by environment interactions strongly influenced the adaptive potential of populations, and our results suggest the potential for microevolution of thermal reaction norms in each of the studied populations. In summary, the observed latitudinal pattern in growth rates is adaptive and results from a combination of latitudinal and voltinism compensation. Combined with the evolutionary potential of thermal reaction norms, this may affect populations' ability to respond to future climate warming." (Authors)] Address: Shama, Lisa, Lab. Aquatic Ecol. & Evolutionary Biology, Univ. of Leuven, Ch. Deberiotstr. 32, BE-3000 Leuven, Belgium. E-mail: lisa.shama@awi.de

**11282.** Siregar, A.Z.; Rawi, C.S.M.; Nasution, Z. (2011): Abundance and diversity of Odonata in upland rice field at Manik Rambung, north of Sumatera. *Proceedings of the 7th IMT-GT UNINET and the 3rd International PSU-UNS Conferences on Bioscience*: 55-61. (in English) [19 species (*Argiocnemis rubescens*, *Argiocnemis femina*, *A. pygmaea*, *Ischnura senegalensis*, *Pseudagrion microcephalum*, *P. pruinatum*, *P. rubriceps*, *Ictinogomphus acutus*, *Acisoma panarpoides*, *Crocothemis servilia*, *Diplacodes trivialis*, *Neurothemis fluctuans*, *N. terminata*, *Orthetrum sabina*, *O. testaceum*, *Pantala flavescens*, *Potomarcha congener*, *Tholymis tillarga*, *Trithemis aurora*) are recorded from a ten ha rice field plot in Manik Rambung village, Simalungun District, North of Sumatra (2°53' 52.8"N 99° 00'24.4"E). The farmers practice rice culture by combining it with fish farming during the season of paddy planting.] Address: Nasution, Z., Dept. Agrotechnology Universitas Sumatera Utara, Malaysia. E-mail: zuliyanti@yahoo.com

**11283.** Soto, D.X.; Roig, R.; Gacia, E.; Catalan, J. (2011): Differential accumulation of mercury and other trace metals in the food web components of a reservoir impacted by a chlor-alkali plant (Flix, Ebro River, Spain): Implications for biomonitoring. *Environmental Pollution* 159(6): 1481-1489. (in English) ["Comparative studies of biomonitors of trace metal contamination are relatively scarce. We took advantage of a point source pollution in a reservoir (Flix, Spain) to compare trace metal (Hg, Pb, Cd, Se, As, Zn, Cu, Cr) bioaccumulation patterns among 16 food web components. Our results indicate that most organisms are suitable for Hg biomonitoring, whereas other metals are better monitored by only some of them. Biofilms and zebra mussel were the organisms with larger and more diverse biomonitoring capacity. However, we show that using groups of biomonitors increase the scope and strengths of the conclusions and specific goals can be better addressed. We conclude providing an overview of the strengths and weaknesses of the main organisms considered for biomonitoring trace metals in rivers and reservoirs." (Authors) Fig. 5. presents data on mercury and other trace metal concentrations in Coenagrionidae (*Erythromma* sp., *Ischnura* sp.) from the Flix reservoir.] Address: Soto, D., Centre for Advanced Studies of Blanes (CEAB-CSIC), Accés a la Cala St. Francesc 14, 17300 Blanes, Spain

**11284.** Tajiri, R.; Misaki, K.; Yonemura, S.; Hayashi, S. (2011): Joint morphology in the insect leg: evolutionary history inferred from Notch loss-of-function phenotypes in *Drosophila*. *Development* 138: 4621-4626. (in Eng-

lish) ["Joints permit efficient locomotion, especially among animals with a rigid skeleton. Joint morphologies vary in the body of individual animals, and the shapes of homologous joints often differ across species. The diverse locomotive behaviours of animals are based, in part, on the developmental and evolutionary history of joint morphogenesis. We showed previously that strictly coordinated cell-differentiation and cell-movement events within the epidermis sculpt the interlocking ball-and-socket joints in the adult *Drosophila* tarsus (distal leg). Here, we show that the tarsal joints of various insect species can be classified into three types: ball-and-socket, side-by-side and uniform. The last two probably result from joint formation without the cell differentiation step, the cell-movement step, or both. Similar morphological variations were observed in *Drosophila* legs when Notch function was temporarily blocked during joint formation, implying that the independent acquisition of cell differentiation and cell movement underlay the elaboration of tarsal joint morphologies during insect evolution. These results provide a framework for understanding how the seemingly complex morphology of the interlocking joint could have developed during evolution by the addition of simple developmental modules: cell differentiation and cell movement. ... The proximal tarsal joint of the bristletail (*Archeognatha*), the tarsal joints of the firebrat (*Apterygota*) and those of *Orthetrum albistylum*, *Epiophlebia superstes*, *Ischnura senegalensis* (Paleoptera) consisted of two pieces of hard cuticle that lined the cavity and were positioned side by side, without one enwrapping the other." (Authors)] Address: Tajiri, R., Laboratory for Morphogenetic Signaling, RIKEN Center for Developmental Biology, Kobe 650-0047, Japan. E-mail: rtajiri1@gmail.com

**11285.** Taniwaki, R.H.; Smith, W.S. (2011): Using benthic macroinvertebrates for biomonitoring the anthropic activity in the drainage basin of Itapararanga reservoir, Votorantim – SP, Brazil. *J. Health. Sci. Inst.* 29(1): 7-10. (in Portuguese, with English summary) [The Itapararanga reservoir is the main supply source of potable water for the Sorocaba region, and it supplies the municipalities of Ibiúna, Piedade, São Roque, Cotia, Vargem Grande Paulista, Mairinque, Alumínio and Votorantim. Four sets of samples were taken over the period between September 2008 and April 2009, with each set consisting of following 5 sampling points: two from the lakes adjacent to the reservoir, one from a nearby stream, one from a point in the Itapararanga reservoir and one from the local Chave Waterfall. ... 22 taxa were found including 'Gomphidae, Coenagrionidae, Libellulidae, Aeshnidae, and Protoneuridae.' Using the BMWP biotic index, the authors assess overall condition as acceptable, although there is some evidence of contamination.] Address: Taniwaki, R.H., Rua João Delgado Hidalgo, 164 – Apto. B-73, Sorocaba-SP, CEP 18016-180, Brasil. E-mail: rht.bio@gmail.com

**11286.** Ternois, V.; Lambert, J.-L.; Druart, D. (2011): Du nouveau sur la présence de l'Aeschna paisible *Boyeria irene* (Fonscolombe, 1836) en Haute-Marne (Odonata: Anisoptera: Aeshnidae). *Bulletin de la Société de sciences naturelles et d'archéologie de la Haute-Marne* 10: 17-20. (in French) [The authors provide an updated review of all known published and personal observations of *B. irene* in the French Department Haute-Marne.] Address: Ternois, V., CPIE du Pays de Soulaines, Domaine de Saint-Victor, 10200 Soulaines-Dhuys, France. E-mail: cpie.pays.soulaines@wanadoo.fr

**11287.** Thompson, D.J.; Hassall, C.; Lowe, C.D.; Watts, P.C. (2011): Field estimates of reproductive success in a model insect: behavioural surrogates are poor predictors of fitness. *Ecology Letters* 14(9): 905-913. (in English) ["Understanding, and therefore measuring, factors that determine fitness is a central problem in evolutionary biology. We studied a natural population of *Coenagrion puella* over two entire breeding seasons, with over a thousand individuals uniquely marked and genotyped, and all mating events at the rendezvous site recorded. Using a parentage analysis, fitness of individuals in the first generation was quantified as the numbers of offspring that survived to maturity. Although mating behaviour can be predicted by environmental and demographic variables, the numbers of mature offspring produced (fitness) cannot, and crucially, are poorly correlated with behavioural observations of mating. While fitness of both sexes was positively related to mating behaviour and to female's ectoparasite burden, these behavioural observations explained little more variance in offspring production than environmental and demographic variables. Thus, we demonstrate that behavioural measures of reproductive success are not necessarily reliable estimates of fitness in natural populations." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), Univ. of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**11288.** Torreias, S.R.; Ferreira-Keppler, R.L. (2011): Macroinvertebrates inhabiting the tank leaf terrestrial and epiphyte bromeliads at Reserva Adolpho Ducke, Manaus, Amazonas. *Braz. Arch. Biol. Technol.* 54(6): 1193-1202. (in English) ["The aim of this work was to investigate the diversity of macroinvertebrates and also verify if the abundance and diversity of Diptera were influenced by the abiotic factors. The samples were collected from the epiphytic and terrestrial bromeliads *G. brasiliensis* (1 and 3m) in wet and dry seasons at Reserva Adolpho Ducke analyzed total of 144 samples were analyzed from a total of 15,238 individuals collected. These contained 14,097 insects and, among these, 8,258 were immature Diptera, represented by eight most abundant families: Chironomidae, Ceratopogonidae and Culicidae. The relationship of Diptera diversity was influenced by the seasons and stratifications ( $p=0.01$ ); the abundance was influenced by the volume of water ( $p=0.02$ ) and the relationship between the season and volume of water in the terrestrial bromeliads was significant ( $p=0.01$ ). This study represented the first contribution to knowledge of community of macroinvertebrates associated to bromeliads *G. brasiliensis* in Central Amazon." (Authors) Conagrionidae (predator) are represented by 50 specimens equal 0.33% of all arthropoda (100% = 15,238).] Address: Torreias, Sharlene Roberta da Silva, Coordenação de Biodiversidade/ INPA; C. P.: 478; 69011-970; Manaus - AM - Brazil. E-mail: rtorreias@gmail.com

**11289.** Torres-Cambas, Y.; Cordero-Rivera, A. (2011): Limited spermathecal sperm removal ability in the damselfly *Hypolestes trinitatis* (Gundlach) (Odonata: Megapodagrionidae). *International Journal of Odonatology* 14(4): 321-328. (in English) ["It has been hypothesized that sperm removal ability in male Odonata has promoted sexual conflict over the sperm stored in the reproductive tract of the female. Although there is evidence supporting this hypothesis, most studies have been conducted in a small number of species from spe-

cific families. We explored sperm removal ability in the Antillean Megapodagrionidae, *H. trinitatis* through examination of specialized structures on the genital ligula ("penis") and through measurement of sperm volumes stored in the sperm storage organs (bursa copulatrix and spermathecae) at different stages of the copula. Males removed sperm from the bursa, but not from the spermathecae. The penis has four finger-like terminal processes covered by spines which could contribute to sperm removal. Given the width of the penile processes, males could introduce them into the spermathecae to remove sperm; however this does not seem to occur. A possible explanation for the sperm removal pattern of *H. trinitatis* could be that the penile processes are prevented to reach the sperm stored due to their position in relation to the spermathecae during the copulation." (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**11290.** Torres-Cambas, Y.; Fonseca-Rodríguez, R. (2011): Sex ratio, survival, and recapture rate in a Cuban population of the damselfly *Hypolestes trinitatis* (Odonata: Megapodagrionidae). *Acta ethologica* 14: 69-76. (in English) ["Male-biased sex ratios in adult odonate populations have been the subject of vigorous discussion between the students of this order of insects. The debate has centered on whether the observed male bias in many populations is real, perhaps due to unequal survival rates, or whether it is an artifact caused by differences in recapture probabilities. A mark-recapture study to assess the relative contribution of survivorship and recapture rates on male-biased sex ratio was performed in a Cuban population of the damselfly *Hypolestes trinitatis*. Maximum likelihood theory and Akaike information criterion were used for parameter estimation and model selection, respectively. Females in the sample were outnumbered two to one by males. Estimated recapture and survival rates were 0.188 (females) and 0.638 (males), and 0.933 (females) and 0.944 (males), respectively. Recapture rates only partially explained the bias since the population sex ratio estimated after correcting for differences in this parameter was male biased (1.5). The observed higher survival probabilities in males could have generated the male-biased population sex ratio. Therefore, we concluded that the observed male-biased population sex ratio in *H. trinitatis* is real." (Authors)] Address: Y. Torres-Cambas, Y., Depto de Biología, Facultad de Ciencias Naturales, Univ. de Oriente, Patricio Lumumba s/n, 90500 Santiago de Cuba, Cuba. E-mail: ytorres@cnt.uo.edu.cu

**11291.** Trewick, S.A.; Wallis; G.P.; Morgan-Richards, M. (2011): The invertebrate life of New Zealand: A phylogeographic approach. *Insects* 2(3): 297-325. (in English) ["Phylogeography contributes to our knowledge of regional biotas by integrating spatial and genetic information. In New Zealand, comprising two main islands and hundreds of smaller ones, phylogeography has transformed the way we view our biology and allowed comparison with other parts of the world. Here we review studies on New Zealand terrestrial and freshwater invertebrates. We find little evidence of congruence among studies of different taxa; instead there are signatures of partitioning in many different regions and expansion in different directions. A number of studies have revealed unusually high genetic distances within putative species, and in those where other data confirm this

taxonomy, the revealed phylogeographic structure contrasts with northern hemisphere continental systems. Some taxa show a signature indicative of Pliocene tectonic events encompassing land extension and mountain building, whereas others are consistent with range expansion following the last glacial maximum (LGM) of the Pleistocene. There is some indication that montane taxa are more partitioned than lowland ones, but this observation is obscured by a broad range of patterns within the sample of lowland/forest taxa. We note that several geophysical processes make similar phylogeographic predictions for the same landscape, rendering confirmation of the drivers of partitioning difficult. Future multi-gene analyses where applied to testable alternative hypotheses may help resolve further the rich evolutionary history of New Zealand's invertebrates." (Authors) The paper briefly refers on Nolan, L.; Hogg, I.D.; Sutherland, D.L.; Stevens, M.I.; Schnabel, K.E. allozyme and mitochondrial DNA variability within the New Zealand damselfly genera *Xanthocnemis*, *Austrolestes*, and *Ischnura* (Odonata). *New Zeal. J. Zool.* 2007, 34, 371-380.] Address: Trewick, S.A., Phoenix Lab, Ecology Group, Inst. Natural Resources, Massey Univ., Private Bag 11-222, Palmerston North 4442, New Zealand

**11292.** von Ellenrieder, N. (2011): Odonata (dragonflies and damselflies) of the Kwamalasamutu region, Surinam. O'Shea, B.J., L.E. Alonso, & T.H. Larsen, (eds.). 2011. A Rapid Biological Assessment of the Kwamalasamutu region, Southwestern Suriname. *RAP Bulletin of Biological Assessment* 63. Conservation International, Arlington, VA: 56-78. (in English) ["94 Odonata species, representing one-third of the species known from Suriname, were registered at forest rivers, streams, and swamps; in particular 57 species were found at the Kutari River Site (Camp 1), 52 at the Sipaliwini River Site (Camp 2), and 65 at the Werehpai Site (Camp 3). 14 species represent new records for Suriname, of which four, belonging to the genus *Argia*, are new to science, and five represent first records of a species at a new locality since their original descriptions, increasing considerably their known extent of occurrence. The results indicate a healthy watershed and well preserved forest at all three sites; if forest cover and stream morphology are maintained in the area, the present odonate assemblages are expected to persist." (Author)] Address: Ellenrieder, Natalia von, California State Collection of Arthropods, CDFA, 3294 Meadowview Rd, Sacramento, CA 95832. Email: natalia.ellenrieder@gmail.com

**11293.** Walia, G.K.; Kaur, H.; Kaur, J. (2011): Karyotypic variations in the chromosome complement of *Pantala flavescens* (Fabricius) of the family Libellulidae (Anisoptera: Odonata). *Cytologia* 76(3): 301-307. (in English) ["Male germ cell complement of *P. flavescens* has been investigated. Specimens were collected from the surrounding area of the Harike wetlands in the Punjab state of India. The species possesses 2n male=23m as the diploid chromosome number, which is less than the type number, 2n male=25m, of the family. In the chromosome complement, one autosomal bivalent is extraordinarily large due to the fusion of 2 autosomes and is responsible for the reduction in chromosome number. Precocious segregation of the m bivalent has also been noticed in some meiotic cells. This type of variations in the chromosome number and behaviour of m chromosomes indicate that the species is under the process of karyotypic evolution." (Authors)] Address: Walia, G.K., Department of Zoology, Punjabi University



**11294.** Watt, T. (2011): New pond gets approval of Emerald damselflies. *Scottish Invertebrate News* 2(2): 7. (in English) [Verbatim: The North East Ranger Service has been watching damselflies starting to colonise the new pond at Castle Fraser in Aberdeenshire, just five months after it was dug on a snowy day in March. Pairs of *Lestes sponsa* have been seen flying together around the pond and then settling on emergent vegetation to lay their eggs. The neighbouring flight pond at Castle Fraser is home to 10 species of dragonflies and damselflies including *Coenagrion hastulatum*, which is a red data book species found in the British Isles only in a few locations in Scotland. They also have the most northern record in Britain of the azure damselfly, which is more common further south. The new pond was created to provide a safety net in case anything happened to the existing populations of these and the other damselflies, and also to allow their populations to hopefully increase.] Address: not stated

**11295.** Watts, P.C.; Thompson, D.J. (2011): Developmental plasticity as a cohesive evolutionary process between sympatric alternate-year insect cohorts. *Heredity* 108(3): 236-241. (in English) ["Many species, particularly insects, pass through a series of distinct phases during their life history, with the developmental timing directed towards appropriate resources. Any factor that creates variation in developmental timing may partition a population into discrete populations—or 'cohorts'. Where there is continued failure to recruit outside the natal cohort then alternate cohorts will have their own internal dynamics, eventually leading to independent demographic and evolutionary trajectories. By contrast, continued variation in development rates within a cohort—cohort splitting—may homogenise otherwise independent demographic units. Using a panel of 14 microsatellite loci, we quantify the genetic signature of apparent demographic isolation between coexisting, but alternate, semivoltine cohorts of *Coenagrion mercuriale* at locations that span its distribution in the UK. We find consistently low levels of genetic divergence between sympatric cohorts of *C. mercuriale*, indicative of developmental plasticity during the larval stage (unregulated development) whereby some individuals complete their development outside the predominant 2-year (semivoltine) period. Thus, individuals that alter their developmental rate successfully recruit to a different cohort. Despite maintaining contrasting population sizes, gene flow between alternate cohorts broadly is sufficient to place them on a similar evolutionary trajectory and also buffers against loss of genetic diversity. Such flexible larval development permits a response to local conditions and may facilitate response to environmental change."] Address: Watts, P.C., School of Biological Sciences, The Biosciences Building, Crown Street, University of Liverpool, Liverpool, L69 7ZB, UK. E-mail: p.c.watts@liv.ac.uk

**11296.** Weech, S.A.; Scheuhammer, A.M.; Wayland, M. E. (2011): Selenium accumulation and reproduction in birds breeding downstream of a uranium mill in northern Saskatchewan, Canada. *Ecotoxicology* 21(1): 280-288. (in English) ["Selenium (Se) concentrations in aquatic invertebrates and bird eggs collected along the treated effluent receiving environment of the Key Lake uranium mill in northern Saskatchewan were significantly greater than from nearby reference areas, and in some cases (e.g., eggs of common loons — *Gavia immer*) were higher than commonly used thresholds for adverse re-

productive effects in birds (i.e., 5 µg/g dry weight in diet; 12–15 µg/g dry weight in eggs). Mean Se concentrations in tree swallow (*Tachycineta bicolor*) eggs reached a maximum of 13.3 µg/g dry weight at the point of treated effluent discharge and exhibited a gradient of decreasing Se concentrations with increasing distance from the effluent discharge, probably reflecting both effluent dilution and local site fidelity by nesting swallows. In some cases, high intra-clutch variability in Se concentrations in mallard (*Anas platyrhynchos*) and tree swallow eggs was observed in high-Se sites, suggesting that a single egg randomly sampled from a nest in an area of higher Se exposure may not be representative of Se concentrations in other eggs from the same nest. Overall, tree swallow reproductive success was similar in both exposed and reference areas... Odonata larvae, Trichoptera larvae and Hirudinea tended to have the highest Se concentrations, whereas near-surface insects such as Corixidae, Gerridae) and Gyrinidae had lower Se concentrations. In general, Se concentrations in invertebrates tended to be highest at Wolf and Unknown lakes, which are closest to the treated effluent discharge."] (Authors)] Address: Weech, S., Minnow Environmental Inc, 101-1025 Hillside Avenue, Victoria, BC V8T 2A2, Canada. E-mail: sweech@minnow-environmental.com

**11297.** Weidel, B.; Carpenter, S.R.; Kitchell, J.F.; Vander Zanden, M.J. (2011): Rates and components of carbon turnover in fish muscle: insights from bioenergetics models and a whole-lake <sup>13</sup>C addition. *Can. J. Fish. Aquat. Sci.* 68: 387-399. (in English, with French summary) ["Stable isotopes are widely employed to describe energy flow in aquatic communities, though interpretation of results can be confounded by the fact that organisms integrate over vastly different time scales. We used results from a 56-day whole-lake <sup>13</sup>C addition and a bioenergetic modelling approach to estimate dorsal muscle carbon turnover rates in a natural setting for three sizes of bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), and yellow perch (*Perca flavescens*). Generally, dynamic <sup>13</sup>C models with a metabolic tissue replacement term were better supported than models predicting isotopic change from growth alone, except when relative growth rates were highest (age 0 bluegill). Across species and size classes, the percentage of carbon change due to tissue replacement was variable (2%–80%) and independent of fish size. The half-life of <sup>13</sup>C in age 0 fishes was similar and ranged from 8 to 18 days. In contrast, adult tissue half-lives were much longer (116–173 days). Based on these and previously published estimates, fish mass (g) was a strong predictor of fish carbon turnover rates,  $\ln(\ln) = -3.65 - 0.20 \ln(\text{mass})$ ,  $r^2 = 0.71$ ."] (Authors) Benthic diet classifications included Odonata. Odonata larvae contributed significantly to the diet of the studied fish species.] Address: Weidel, B., Center for Limnology, University of Wisconsin, Madison, Wisconsin 53706, USA. E-mail: weidel@wisc.edu

**11298.** Weihrauch, F. (2011): A review of the distribution of Odonata in the Macaronesian Islands, with particular reference to the Ischnura puzzle. *J. Br. Dragonfly Society* 27(1): 28-46. (in English) ["The Macaronesian Islands, comprising five archipelagoes in the North Atlantic Ocean (Azores, Madeira, Savage Islands, Canary Islands and Cape Verde Islands), do not harbour many species of Odonata. Acknowledged records of 20 species (7 Zygoptera, 13 Anisoptera) are known today from

Macaronesia. However, a unique mixture of one endemic and 19 species that originated from three continents makes these islands a very attractive travel destination for odonatologists. In this study, the existing literature on the occurrence of Odonata in Macaronesia is summarised and evaluated. Special account is given concerning the historical development of the knowledge of the distribution of *Ischnura* species in Macaronesia." (Author)] Address: Weihrauch, F., Jägerstr. 21A, 85283 Wolnzach, Germany. E-mail: Florian.Weihrauch@t-online.de

**11299.** Westermann, K. (2011): Die Asiatische Keiljungfer (*Gomphus flavipes*) am Restrhein zwischen Weisweil (Landkreis Emmendingen) und Rust (Ortenaukreis) – eine neu eingewanderte oder bisher übersehene Art?. *Naturschutz südl. Oberrhein* 6: 155-156. (in German, with English summary) [2008; "During daily collections of *Onychogomphus forcipatus* exuviae along a 200m control section on branches of the river Rhine in the district of Emmendingen, Baden-Württemberg, Germany, nine exuviae of *G. flavipes* were found. An additional search at five spots along a 5 km section of the river Rhine was made. One to nine exuviae per spot and a total of 19 exuviae of *G. flavipes* were counted." (Authors)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**11300.** Westermann, K. (2011): Erfolgreiche Entwicklung der Kleinen Königslibelle (*Anax parthenope*) in einem Hochwasserkanal. *Naturschutz südl. Oberrhein* 6: 153-154. (in German, with English summary) [Baden-Württemberg, Germany; "In the lower reaches of the Leopoldskanal, an overflow channel with temporarily high discharge, a small number of exuviae of *A. parthenope* were found in 2005 and 2009." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**11301.** Westermann, K. (2011): Zweigipfelige Emergenzperiode der Kleinen Zangenlibelle (*Onychogomphus forcipatus*) im Fluss-System Elz-Leopoldskanal-Restrhein. *Naturschutz südl. Oberrhein* 6: 157-166. (in German, with English summary) [Baden-Württemberg, Germany; "In 2006, 2008, 2009, and 2010 a total of 14900 exuviae of *O. forcipatus* were collected at six sampling sections along the Elz-Leopoldskanal-Restrhein river system. The sampling sections were up to 25 km away from each other. The emergence period was between 40 and 76 days along the different sections. It began as early as 21st of May. The last imagines emerged on 12th of August. The emergence period always consisted of two main peak phases of mostly two to three weeks followed by a longer phase of lower emergence. Weather and water discharge had no effect on the seasonal pattern of emergence. It is possible that individuals from different larval stadia emerged during the different emergence phases. There may have been different conditions for development during the different phases. On isolated days the emergence rates were significantly decreased due to flooding, persistent strong winds or continuous rain. At one section the emergence rates increased significantly on three days following flooding during the previous nights. The floodings possibly caused drifting of larvae that were ready to emerge." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**11302.** Wildermuth, H. (2011): Beeinflussen Elritzen die Libellenfauna kleiner Moorgewässer? (Teleostei: Cyprini-

dae; Odonata). *Libellula* 30(3/4): 93-110. (in German, with English summary) ["Nine small man-made moorland ponds, three containing minnow *Phoxinus phoxinus*, one inhabited by minnow and goldfish *Carassius gibelio forma auratus*, and five without fish, were studied in a long-term study near Zürich, Switzerland, with respect to their dragonfly fauna. The species composition and the developmental success of the Anisoptera were assessed for each pond on the basis of continuous exuviae collecting. In fish-free water bodies, the numbers of indigenous Odonata species and the abundance of exuviae were significantly higher than in minnow-inhabited waters. *L. pectoralis* only emerged from ponds lacking fish. The impact of minnow populations on the invertebrates of small artificial peat ponds is discussed with regard to practical implications for nature conservation." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**11303.** Wildermuth, H. (2011): Libellenausstellung im Naturschutzzentrum Neeracherried (Schweiz). *Libellen-nachrichten* 26: 16-18. (in German) [Report on an exhibition devoted to Odonata in Neerach, Switzerland] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**11304.** Wilson, R.J.; Maclean, I.M.D. (2011): Recent evidence for the climate change threat to Lepidoptera and other insects. *J. Insect Conserv.* 15: 259-268. (in English) ["Climate change is now estimated by some biologists to be the main threat to biodiversity, but doubts persist regarding which species are most at risk, and how best to adapt conservation management. Insects are expected to be highly responsive to climate change, because they have short life cycles which are strongly influenced by temperature. Insects also constitute the most diverse taxonomic group, carrying out biotic interactions of importance for ecological functioning and ecosystem services, so their responses to climate change are likely to be of considerable wider ecological significance. However, a review of recent published evidence of observed and modelled effects of climate change in ten high-ranking journals shows that comparatively few such studies have focused on insects. The majority of these studies are on Lepidoptera, because of the existence of detailed contemporary and historical datasets. These biases in published information may influence conclusions regarding the threat of climate change to insect biodiversity. Assessment of the vulnerability of insect species protected by the Bern Convention on the Conservation of European Wildlife and Natural Habitats (including Odonata) also emphasises that most information is available for the Lepidoptera. In the absence of the necessary data to carry out detailed assessments of the likely effects of climate change on most threatened insects, we consider how autecological studies may help to illuminate the potential vulnerability of species, and draw preliminary conclusions about the priorities for insect conservation and research in a changing climate." (Authors)] Address: Wilson, R.J., Centre for Ecology and Conservation, University of Exeter, Cornwall Campus, Penryn TR10 9EZ, UK. E-mail: R.J.Wilson@exeter.ac.uk

**11305.** Wu, C.; Zhang, A. (2011): Catalogue of Odonata from Beijing and geographical distribution. *Journal of Beijing university of agriculture* 26(3): 15-19. (in Wu, C., College of Plant Science and Technology, Beijing University of Agriculture, Beijing 102206, China) ["In order

to understand the biodiversity of Odonata insects from Beijing, specimens were collected by sweep net and naiad breeding from 2008 to of 2010. The collection sites include water areas from Yanqing, Huairou, Miyun, Mentougou, Fangshan, Pinggu, Changping, Daxing and downtown parks. A catalogue of 62 species of 41 genera of 9 families of Odonata from Beijing was provided (3 species recorded in literatures included) based on identification of more than 400 specimens and the geographical distribution of dragonflies is briefly analyzed. One family and 16 species are firstly reported for Beijing and some mistaken identifications are revised. The result shows the Palaearctic species are predominant in Odonata fauna from Beijing accounting for 53.2% and water pollution is the main reason leading to species decrease of Odonata from plain areas of Beijing." (Authors)] Address: E-mail: zhangaihuan@126.com

**11306.** Yakovlev, A.V.; Yakovlev, V.A. (2011): [Ecology of aquatic ecosystems (Part 2: Protected species of aquatic organisms in Republic of Tatarstan): training manuals for training and field practice]. Kazan University: 34 pp. (in Russian) [The paper briefly introduces morphology, habitat and biology of *Aeshna grandis* and *Calopteryx virgo*.] Address: not stated

**11307.** Zessin, W.; Brauckmann, C.; Gröning, E. (2011): *Rasnitsynala sigamborum* gen. et sp. n., a small odonopterid ("Eomeganisoptera", "Erasipteridae") from the early Late Carboniferous of Hagen-Vorhalle (Germany). *ZooKeys* 130: 57-66. (in English) ["Besides *Erasipteroides valentini* (Brauckmann in Brauckmann, Koch & Kemper, 1985), *Zessinella siope* Brauckmann, 1988, and *Namurotypus sippeli* Brauckmann & Zessin, 1989, *Rasnitsynala sigamborum* gen. et sp. n. is the fourth species of the Odonatoptera from the early Late Carboniferous (Early Pennsylvanian: Namurian B, Marsdenian) deposits of the important Hagen-Vorhalle Konservat-Lagerstätte in Germany. With its wing-span of about 55 mm it is unusually small even for the "Eomeganisoptera". Its venation resembles other small "Eomeganisoptera", in particular *Z. siope*. This is why it is here assigned to the probably paraphyletic "Erasipteridae" Carpenter, 1939." (Authors)] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schweinin.de

## 2012

**11308.** Ajuzie, C.C. (2012): Macroinvertebrate communities in two tropical reservoirs (Lamingo and Liberty reservoirs) in Jos, Nigeria. *Nature and Science* 10(2): 8-18. (in English) [The reservoirs are located in the biotite granite-rockstream Lamingo village in Jos North Local Government Area of Plateau state, Nigeria. Taxa are treated at the family level, including Gomphidae and Libellulidae.] Address: Ajuzie, C.C., Applied Fisheries and Hydrobiology Unit, Department of Zoology, University of Jos, Nigeria. E-mail: efulecy@yahoo.com

**11309.** Almeida, D.; Copp, G.H.; Masson, L.; Miranda, R.; Murai, M.; Sayer, C.D. (2012): Changes in the diet of a recovering Eurasian otter population between the 1970s and 2010. *Aquatic Conservation: Marine and Freshwater Ecosystems* 22(1): 26-35. (in English) ["... Otter spraints from the River Glaven catchment (north Norfolk, eastern England) were collected seasonally between 2009 and 2010 from three habitat types (ponds, 'retenus' (small in-stream reservoirs), and stream

stretches). ... Otter diet composition varied greatly, with predation on aquatic invertebrates, crayfish, fish, and tetrapods. Fruit seeds were also found in the spraints. Diet generally reflected habitat, ... Of the minor prey types, terrestrial invertebrates were represented by snails (Gastropoda: Helicidae) and beetles (Coleoptera: Geotrupidae, Tenebrionidae). Apart from crayfish, freshwater invertebrates included snails (Gastropoda: Lymnaeidae), shrimps (Amphipoda: Gammaridae), dragonfly nymphs (Odonata: Anisoptera), adults of water skaters (Heteroptera: Gerridae), adults of water boatmen (Heteroptera: Notonectidae), caddisfly larvae (Trichoptera) and adults of diving beetles (Coleoptera: Dytiscidae)." (Authors)] Address: Copp, G.H., Salmon & Freshwater Team, Cefas, Pakefield Road, Lowestoft, Suffolk NR33 OHT, U.K. E-mail: gordon.copp@cefas.co.uk

**11310.** Anderson, C.N.; Grether, G.F.; Cordoba-Aguilar, A. (2012): Characterization of 12 microsatellite loci in the waterfall damselfly (*Paraphlebia zoe*) for use in population genetic applications. *Conservation Genetics Resources* 4(1): 175-177. (in English) ["*P. zoe*, is distributed in cloud forest areas in the Mexican states of Veracruz, Hidalgo, and San Luis Potosi. We developed twelve microsatellite loci for *P. zoe* from representative samples from the state of Veracruz. Microsatellites were tested for polymorphism on a panel of 24 individuals. The number of alleles ranged from 3 to 11, observed heterozygosity from 0.083 to 0.875, and the fixation index from 0.021 to 0.563. These loci are the first to be described and characterized for *P. zoe* and should prove useful for population genetics in support of the conservation of this vulnerable species." (Authors)] Address: Anderson, C.N., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Circuito Exterior s/n, Apdo. Postal 70-275, México D.F. 04510, Mexico. E-mail: cndanderson1980@gmail.com

**11311.** Aweng, E.R.; Suhaimi, O.; Nur Izzati, S. (2012): Benthic macroinvertebrate community structure and distribution in Sungai Pichong, Gunung Chamah, Kelantan, Malaysia. *American International Journal of Contemporary Research* 2(1): 163-167. (in English) [Only 'Aeshnidae' are mentioned.] Address: Aweng, E.R., Faculty of Agro Industry and Natural Resources, Universiti Malaysia Kelantan (UMK), Malaysia

**11312.** Bonada, N.; Doledec, S.; Statzner, B. (2012): Spatial autocorrelation patterns of stream invertebrates: exogenous and endogenous factors. *Journal of Biogeography* 39: 56-68. (in English) ["Aim To investigate spatial autocorrelation of taxonomic stream invertebrate groups (richness and composition) at a large geographical scale and to analyse the importance of exogenous and endogenous factors. Location The Mediterranean Basin. Methods For exogenous factors, we used large-scale factors related to climate, geology and river zonation; for endogenous factors, we used the dispersal mode of each taxonomic group. After describing and analysing spatial patterns of genus richness and genus composition of stream invertebrate groups in the Mediterranean Basin, we computed Moran's I before and after accounting for the exogenous factors and related it to the endogenous factors. Results In relation to genus richness, most of the taxonomic groups did not show significant spatial autocorrelation, suggesting that no main large-scale exogenous or endogenous factors were important and that local-scale factors were probably controlling taxonomic richness. In contrast, for ge-



nus composition, all taxonomic groups except Odonata had significant spatial autocorrelation before accounting for the environment. After accounting for the environment, most taxonomic groups still had a significant spatial autocorrelation, but it decreased with their increasing dispersal ability (from Crustacea to Coleoptera). Thus, spatial taxonomic composition of groups with the strongest dispersal potential is mainly related to exogenous factors, whereas that of groups with weaker dispersal potential is related to a combination of exogenous and endogenous factors. Main conclusions Our results illustrate the importance of dispersal as an endogenous factor causing spatial autocorrelation and suggest that ignoring endogenous factors can lead to misunderstandings when explaining large-scale community patterns." (Authors)] Address: Bonada, N., Grup de Recerca Freshwater Ecology & Management (FEM), Departament d'Ecologia, Facultat de Biologia, Universitat de Barcelona, Barcelona, Diagonal 645, 08028 Barcelona, Catalonia, Spain

**11313.** Bonato, K.O.; Delariva, R.L.; da Silva, J.C. (2012): Diet and trophic guilds of fish assemblages in two streams with different anthropic impacts in the northwest of Paraná, Brazil. *Zoologia* 29(1): 27-38.[The diets of the fish assemblages in two streams in the Maringá region of Paraná are described. The assemblages are under the influence of different anthropogenic impacts. Fish were collected every two months from October 2006 to October 2007. Volumetric method was used to analyze the stomach contents of 599 fish belonging to 15 species. With the exception of *Pimelodella gracilis* (Valenciennes, 1835) and *Rhamdia quelen* (Quoy & Gaimard, 1824) Odonata larvae seem to play a minor role as fish diet.] Address: Delariva, Rosilene, Centro de Ciências Biológicas e da Saúde, Universidade Estadual do Oeste do Paraná. Rua Universitária 2069, Caixa postal 711, 85819-110 Cascavel, PR, Brazil. E-mail: rldelariva@hotmail.com

**11314.** Brandon, A. (2012): North Wales Dragonfly Newsletter No. 60. 8th March 2012. North Wales Dragonfly Newsletter 60: 12 pp. (in English) [UK; The paper presents detailed distribution maps of the following Odonata species: *Aeshna cyanea*, *A. grandis*, *A. juncea*, *A. mixta*, *Anax imperator*, *Gomphus vulgatissimus*, *Sympetrum danae*, *S. sanguineum*, *S. striolatum*, *Orthetrum cancellatum*, *O. coerulescens*, *Calopteryx splendens*, *C. virgo*, *Lestes sponsa*, *Platycnemis pennipes*, *Coenagrion mercuriale*, *C. puella*, *C. pulchellum*, *Enallagma cyathigerum*, *Ischnura elegans*, *I. pumilio*, *Pyrrhosoma nymphula*, *Erythromma najas*, and *Ceriagrion tenellum*.] Address: Brandon, A., North Wales Dragonfly Recorder, Bryn Heilyn, Rowen, Conwy LL32 8YT, UK. E-mail: allanrowenconwy@sky.com

**11315.** Brinesh, R.; Janardanan, K.P. (2012): Studies on the life-cycle of *Ganeo tigrinus* Mehra & Negi, 1928 (Digenea). *Systematic Parasitology* 82(1): 13-19 (in English) ["The life-history stages of *G. tigrinus* infecting the Indian bull frog *Hoplobatrachus tigerinus* (Daudin) are described, those from cercaria to egg-producing adult having been established in the laboratory. Non-irradiated xiphidiocercariae are released by the planorbis snail *Indoplanorbis exustus* (Deshayes). Metacercariae occur in the haemocoel of dragonfly nymphs (Libellulidae) and become infective to the frog *H. tigerinus* within 15 days. The pre-patent period is 45 days. Growth and development of both metacercariae and adults are described in detail. Comments on the systematic position

of *Ganeo Klein*, 1905 are included." (Authors) Address: Brinesh, R., Dept of Zoology, University of Calicut, Kerala 673 635, India. E-mail: brineshr@gmail.com

**11316.** Butler, G.L.; Wooden, I.J. (2012): Dietary habits of a large, long-lived endangered Australian percichthyid, the eastern freshwater cod *Maccullochella ikei*. *Endang. Species Res.* 16: 199-209. (in English) ["The diet of *M. ikei* Rowland, 1985 was studied over 2 consecutive years in the Mann and Nymboida River system, Australia, to determine summer and winter feeding habits. Food items were extracted using non-destructive gastric lavage. In total, 268 *M. ikei* were gut-flushed over the 2 yr of the study; 191 contained at least 1 food item. A large variety and broad size range of items were recovered, from small aquatic insects to relatively large terrestrial animals. We found significant differences between the food items consumed by *M. ikei* in summer and winter. Seasonal differences related to the increased occurrence of crustaceans, small fish and terrestrial animals in the diet of *M. ikei* during winter, and more aquatic insects and molluscs in summer. Food items differed significantly among size classes, with larger *M. ikei* consuming fewer crustaceans and more large fish and terrestrial animals. Our study revealed that *M. ikei* displays high plasticity in seasonal dietary habits, changes diet and foraging tactics as it grows, and appears to not always consume what would be considered optimal forage...." (Authors) Aquatic insects were nearly exclusively represented by Odonata (*Hemicordulia intermedia*, *H. tau*, *Hemigomphus* sp., *Hemianax papuensis*, Zygoptera) and estimated to app. 10% of the total food weight.] Address: Butler, G.L., Department of Primary Industries NSW, Grafton Fisheries Centre, PMB 2, Grafton, New South Wales 2460, Australia. E-mail: gavin.butler@industry.nsw.gov.au

**11317.** Chand, S. (2012): Journal of Experimental Zoology, India 15(1): 213-218 (in English) [A continuous forty hours of treatment of last instar naiad of *T. auroa* under LC<sub>50</sub> concentration, 5.12×10<sup>-7</sup> and 7.60×10<sup>-8</sup> ppm of chlorpyrifos and quinalphos respectively has proved toxic and induced histopathological derangements in various tissues of midgut. The mesenteron has observed to be prone to both the pesticides. The chlorpyrifos separated the epithelial folds and widen the inter fold space up to the basement membrane. The quinalphos penetrated inside the epithelial folds and damaged cellular mass. Both the pesticides induced the movement of cytoplasmic contents at various degrees towards the apical end of the epithelial folds. This movement presumed to be the genesis of intense vacuolation at the basal ends of all the epithelial cells. The continuous pressure of the internal cellular contents and weekend cell boundaries have caused the violent exclusion of cell contents. The nuclear membrane at many places damaged by chlorpyrifos and severely affected by quinalphos." (Author)] Address: Chand, S., Dept Zol., R.P.G. College, Jamuhai, Jaunpur - 222 001, India

**11318.** Chand, S. (2012): Impact of pyrethroid and organophosphorus pesticides on the level of various amino acids in the gut tissues of naiad of *Trithemis aurora* (Burm.) dragonfly (Libellulidae: Odonata). *Journal of Experimental Zoology, India* 15(1): 291-298 (in English) [The occurrence and level of various amino acids in different regions of gut tissues of last instar naiad of *T. aurora* were analysed through the one dimensional paper chromatography. In various regions of gut there observed the levels of different amino acids. Among twenty

four amino acids several amino acids were observed missing in various gut tissues. Several amino acids were observed in moderate concentration and several amino acids in high concentration. Some of the amino acids were in feeble concentration. Impact of pyrethroid and organophosphorus pesticides was observed on the level of various essential and non essential amino acids in gut regions. The  $2.691 \times 10^{-5}$ ,  $2.5 \times 10^{-3}$ ,  $5.12 \times 10^{-7}$ ,  $7.6 \times 10^{-8}$  ppm of LC<sub>50</sub> concentrations of cypermethrin, deltamethrin, chlorpyrifos and quinalphos applied respectively for 40 hrs. to observe the impact of these pesticides on the distribution and level of various amino acids. It was found that there was a great change in the distribution and level of various amino acids in various regions of gut under pesticidal stress." (Author) Address: Chand, S., Dept of Zoology, R.P.G. College, Jammu, Jaunpur - 222 001, India

**11319.** Clausnitzer, V.; Dijkstra, K.D.B.; Koch, R.; Boudot, J.-P.; Darwall, W.R.T.; Kipping, J.; Samraoui, B.; Samways, M.J.; Simaika, J.P.; Suhling, F. (2012): Focus on African freshwaters: hotspots of dragonfly diversity and conservation concern. *Frontiers in Ecology and the Environment* 10(3): 129-134. (in English) ["This is the first continent-wide overview of insect diversity and status sufficiently fine-scaled to be used in conservation planning. We analyze patterns of richness and the conservation status of African Odonata to determine threats to species and freshwater habitats, location of diversity hotspots, necessary conservation actions, and research gaps. Major centers of dragonfly diversity in Africa are tropical forest areas that include highlands. Most threatened species – as classified by the International Union for Conservation of Nature global Red List – are concentrated in highlands from Kenya to South Africa (together with the Cape Floristic Region), western Africa (including mountains on the Cameroon–Nigeria border), and Ethiopia. Currently available knowledge can be applied throughout Africa's freshwater systems to help minimize or mitigate the impact of future development actions, allowing dragonflies to act as "guardians of the watershed". The private sector can be advised to safeguard sensitive habitats and species when selecting sites for development. Key sites and species for monitoring can be identified by checking the distribution of threatened species at [www.iucnredlist.org](http://www.iucnredlist.org)." (Authors)] Address: Clausnitzer, Viola, Heinelstr. 3, 02826 Görlitz, Germany. E-mail: [violacl@t-online.de](mailto:violacl@t-online.de)

**11320.** Combes, S.A.; Rundle, D.E.; Iwasaki, J.M.; Crall, J.D. (2012): Linking biomechanics and ecology through predator–prey interactions: flight performance of dragonflies and their prey. *The Journal of Experimental Biology* 215: 903-913. (in English) ["Aerial predation is a highly complex, three-dimensional flight behavior that affects the individual fitness and population dynamics of both predator and prey. Most studies of predation adopt either an ecological approach in which capture or survival rates are quantified, or a biomechanical approach in which the physical interaction is studied in detail. In the present study, we show that combining these two approaches provides insight into the interaction between hunting dragonflies (*Libellula cyanea*) and their prey (*Drosophila melanogaster*) that neither type of study can provide on its own. We performed >2500 predation trials on nine dragonflies housed in an outdoor artificial habitat to identify sources of variability in capture success, and analyzed simultaneous predator–prey flight kinematics from 50 high-

speed videos. The ecological approach revealed that capture success is affected by light intensity in some individuals but that prey density explains most of the variability in success rate. The biomechanical approach revealed that fruit flies rarely respond to approaching dragonflies with evasive maneuvers, and are rarely successful when they do. However, flies perform random turns during flight, whose characteristics differ between individuals, and these routine, erratic turns are responsible for more failed predation attempts than evasive maneuvers. By combining the two approaches, we were able to determine that the flies pursued by dragonflies when prey density is low fly more erratically, and that dragonflies are less successful at capturing them. This highlights the importance of considering the behaviour of both participants, as well as their biomechanics and ecology, in developing a more integrative understanding of organismal interactions." (Authors)] Address: Combes, S.A., Harvard University, Concord Field Station, 100 Old Causeway Road, Bedford, MA 01730, USA. E-mail: [scombes@oeb.harvard.edu](mailto:scombes@oeb.harvard.edu)

**11321.** Curry, C.J.; Zhou, X.; Baird, D.J. (2012): Congruence of biodiversity measures among larval dragonflies and caddisflies from three Canadian rivers. *Freshwater Biology* 57(3): 628-639. (in English) ["(1) Scientists tasked with collecting taxon richness and assemblage variation data for conservation purposes have identified biomonitoring studies as potential sources of information. This approach assumes that biodiversity patterns revealed by biomonitoring reflect those of the wider community, an assumption not thoroughly tested in riverine ecosystems. (2) We compared patterns of taxon richness and assemblage variation in an important biomonitoring group (Trichoptera) with a group with high conservation significance (Odonata) at 34 sites across three fifth-order catchments. We also explored the effect of abundance on observed patterns by rarefying the larval Trichoptera data set. (3) Our results indicate that Trichoptera do not fully reflect site-scale taxon richness or assemblage variation in Odonata. The magnitude of odonate assemblage variation was much greater than that of Trichoptera for one of the catchments. Odonata and Trichoptera richness was moderately correlated in two catchments, while assemblage variation was strongly correlated in another pair of catchments. However, comparisons based on rarefied data eliminated differences in the magnitude of assemblage variation and strengthened correlations in richness and assemblage variation, suggesting the lack of congruence in these measures might be due to differences in abundance among groups. Further, incomplete taxonomy may mask additional assemblage variation, particularly in Trichoptera. (4) Conservation planning in riverine ecosystems based on proxies derived from biomonitoring data should proceed cautiously until we understand how well the resulting information reflects biodiversity patterns in under-sampled taxa and habitats. Future studies of biodiversity congruence should consider both richness and assemblage variation as each provides valuable information for conservation-related decisions. The taxonomic resolution and relative abundance of comparison groups can potentially impact the strength, direction and statistical significance of patterns. Researchers should employ species-level taxonomy and account for differences in abundance among groups through rarefaction where at all possible and DNA-based taxonomy methods can support this." (Authors)] Address: Colin J. Curry, Canadian Rivers Insti-

tute and Department of Biology, University of New Brunswick, PO Box 4400 Fredericton, New Brunswick, Canada E3B 5A3. E-mail: colin.curry@unb.ca

**11322.** Dallas, H.F.; Rivers-Moore, N.A. (2012): Critical thermal maxima of aquatic macroinvertebrates: towards identifying bioindicators of thermal alteration. *Hydrobiologia* 679: 61-76. (in English) ["Water temperature is an important abiotic driver of aquatic ecosystems. It influences many aspects of an organism's existence including its growth, feeding and metabolic rates; emergence; fecundity; behaviour and ultimately survival. All organisms have an optimum temperature range within which they survive and are able to thrive. Determining upper thermal limits provides insight into the relative sensitivity of organisms to elevated temperatures. Thermally sensitive taxa may be useful as bioindicators of thermal alteration and used in the generation of target thermal thresholds for aquatic systems. This study determined the upper thermal limit (CT<sub>max</sub>) of a range of aquatic macroinvertebrates from rivers in the south-western Cape, South Africa, using the dynamic Critical Thermal Method. The study focused on the taxonomic level of family as an initial screening tool for ranking thermal sensitivity. Of the 27 families examined, four were both thermally sensitive and highly suitable as test organisms, including Paramelitidae, Notonemouridae, Telo-ganodidae and Philopotamidae. Five families were moderately sensitive and highly suitable, including Palae-monidae, Heptageniidae, Leptophlebiidae, Corydalidae and Aeshnidae. Preliminary experiments to determine potential sources of variation in CT<sub>max</sub> revealed that thermal sensitivity was relatively uniform within families, but that acclimation temperature influenced CT<sub>max</sub>. Further investigation of the influence of thermal history, acclimation temperature and rate of temperature change on CT<sub>max</sub> is necessary. Target water temperatures for river management will be derived using CT<sub>max</sub> data, in addition to longer duration experimental data, which will be linked to in situ temperature data." (Authors)] Address: Dallas, Helen, Freshwater Research Unit, Department of Zoology, University of Cape Town, Private Bag X3, Rondebosch 7700, South Africa. E-mail: helen.dallas@uct.ac.za

**11323.** de Sousa, V.T.T.; Barreto, T.F.; Rossa-Feres, D. (2012): Predation risk and jumping behavior in *Pseudopaludicola aff. falcipes* tadpoles. *Behavioral Ecology* 22(5): 940-946. (in English) ["Tadpoles of *Pseudopaludicola aff. falcipes* are capable of jumping out of small temporary puddles where they occur. In this system, odonate naiads are the main predators. Considering the hypothesis that jumping behaviour represents an anti-predator tactic, we addressed the following predictions: 1) tadpoles will jump more frequently from puddles with predators than from puddles without predators; 2) tadpole mortality will increase if tadpoles are prevented from jumping; 3) it would be more common to find tadpoles in puddles where predators are absent; and 4) predator and prey coexistence would be more probable in large puddles than in small ones. To test predictions 1) and 2), we conducted 2 laboratory experiments. In Experiment 1, we evaluated the jump frequency of tadpoles in 3 treatments (tadpoles in the presence or absence of a predator, or using an inanimate object as predator presence control). In Experiment 2, we compared tadpole survival in 2 conditions: Tadpoles were allowed or not to jump. To test predictions 3) and 4), we conducted a field study to determine how predators and

prey are distributed throughout the habitat. Experiments demonstrated that jumping behaviour occurred more frequently when a predator was present and that tadpoles prevented from jumping were more susceptible to predation. The field study indicated that tadpoles and odonate naiads were distributed in a negatively associated, but puddle-size dependent pattern. Our results are congruent with the predictions, therefore, confirming the jumping behaviour as an effective antipredator tactic." (Authors)] Address: de Sousa, Verônica Thiemi, Depto de Zoologia e Botânica, Universidade Estadual Paulista—UNESP, Rua Cristóvão Colombo, 2265, Jardim Nazareth, CEP 15054-000, São José do Rio Preto—SP, Brasil. E-mail: veronicathiemi@hotmail.com

**11324.** Di, T.N.; Liu, L.J.; Jia, Z.X.; Li, J.Q.; Zhou, H.; Li, X.Y.; Chen, L.Q. (2012): Laser bionic strengthening local grid of mould surface. *Journal Applied Mechanics and Materials* 101-102: 893-896. (in English) ["For the short life of enterprise hot work die directly caused to problems in the waste of resources and the rising cost of production. Based on studying the biological prototype of crack-resistance of dragonfly wings and finding surface thermal fatigue crack is one of the main factors affecting life of the hot work mould, it is put forward thoughts about the local laser bionic strengthening the grid mould surface. Different from the traditional mould surface integral laser transformation hardening (LTH) technology, by using laser melting simulating dragonfly wings to block localized crack in the partial surface of mold, bionic strengthened die life is improved within 1~1.5 times. Experiment results on die steel shows that it is provided a new method to improve the service life of die casting mold and promoting this technology will bring significant economic benefits for the mold industry." (Authors)] Address: Di, Tienan, Ningbo Institute of Technology, Zhejiang University, Ningbo. 315100, China. E-mail: waynedil@163.com

**11325.** Didham, R.K.; Blakely, T.J.; Ewers, R.M.; Hitchings, T.R.; Ward, J.B.; Winterbourn, M.J. (2012): Horizontal and vertical structuring in the dispersal of adult aquatic insects in a fragmented landscape. *Fundamental and Applied Limnology / Archiv für Hydrobiologie* 180(1): 27-40 (in English) ["Determining the relative importance of longitudinal dispersal of adult aquatic insects along stream corridors versus their lateral dispersal through upland terrestrial habitats is crucial to understanding the impact of land-use change on ecological and evolutionary processes within streams. However, there is a curious mismatch between trap capture studies, which find low lateral movement rates away from streams, and many population genetic studies, which show low levels of genetic divergence among streams, implying high rates of lateral movement. Here, we take advantage of a serendipitous observation of high relative capture frequencies of adult aquatic insects in the forest canopy, to question whether the flight-height preferences of adults might resolve this apparent 'interbasin dispersal paradox'. In a large-scale study of the effects of habitat fragmentation on invertebrate community structure, 347 passive flight interception traps were deployed at ground level (10,211 trap-days sampling effort) and canopy level (7,595 trap-days) to determine not only the horizontal component of land-use impacts on adult aquatic insects, but also the vertical component of adult movement through the forest canopy in a heavily-fragmented landscape. Two-thirds of adult aquatic insects (Ephemeroptera, Pleco-



ptera, Trichoptera, Megaloptera and Odonata [*Austrolestes colenisonis*]) were captured in the forest canopy, rather than at ground level. Multivariate ordination analysis showed that vertical trapping height and surrounding terrestrial land use had the greatest effects on species composition of dispersing adults, whereas distance to the nearest stream had no significant effect. Of the species that were abundant enough to test statistically, the majority of caddisfly and mayfly species were captured significantly more frequently in the canopy than expected by chance alone, whereas stoneflies were more frequently captured at ground level. These results provide a unique insight into the possible reason why long-distance dispersal of aquatic adults has so rarely been observed. The prosaic explanation may simply be that adults of many species disperse through the forest canopy, and well above ground level." (Authors) Address: Didham, R., School of Animal Biology, University of Western Australia, 35 Stirling Highway, Crawley WA 6009, Australia. E-mail: raphael.didham@uwa.edu.au

**11326.** Dow, R.A.; Ng, Y.F.; Choong, C.Y. (2012): Odonata of Sungai Bebar, Pahang, Malaysia, with four species recorded for the first time from mainland Asia. *Journal of Threatened Taxa* 4(3): 2417-2426. (in English, with Malaysian summary) ["Records are presented of Odonata collected in September 2009 from the Sungai Bebar and the surrounding area, in Pekan Forest Reserve, southeastern Pahang, Peninsular Malaysia. A total of 50 species from nine families were collected. Two of the species listed, *Amphicnemis bebar* and *A. hoisen*, were first discovered during this survey. Another four previously known species were recorded in mainland Asia for the first time: *Elatoneura coomansi*, *Elatoneura longispina*, *Brachygonia ophelia* and *Tyriobapta laidlawi*." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow230@yahoo.co.uk

**11327.** Dow, R.A.; Ngiam, R.W.J. (2012): Odonata collected in the Hose Mountains, Kapit Division, Sarawak, Malaysia in April 2011. *International Dragonfly Fund - Report 44*: 1-18. ["The results of an odonatological expedition to the Hose Mountains in central Sarawak, Malaysian Borneo made in April 2011 are presented. During the two-week expedition more than sixty-three species of Odonata were collected, bring the number of species of Odonata known from the Hose Mountains to over ninety-three; a number greater than that recorded from a some of Sarawak's National Parks. Species of particular interest collected on the expedition include *Drepanosticta* new species, *Protosticta ?tubau* Dow, 2010 and, most notably, *Chlorogomphus manau* Dow & Ngiam, 2011, which was discovered during the expedition" (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow230@yahoo.co.uk

**11328.** Ehisianya, C.N.; Emeasor, K.C.; Echendu, T.N. C.; Egesi, C.N.; Mbanaso, E.N.A. (2012): Preliminary sampling of arthropod fauna of transgenic cassava in confined field trial. *African Journal of Biotechnology* 11(21): 4802-4809. (in English) ["Water (Basin and pitfall) and sweepnet traps were used to ascertain the population dynamics of the arthropod fauna of transgenic cassava in a confined field trial (CFT) at National Root Crops Research Institute (NRCRI), Umudike, Nigeria. The trial took place from August to November, in 2009 and February to July, in 2010 to identify the major arthropods associated with the crop and to monitor

changes in their populations for effective management. Trapped arthropods were sorted and identified by means of a hand lens and a taxonomic key and their relative abundance determined. Most of the order (seven out of the eight recorded) were trapped in the basin and sweepnet traps. Twenty families and numerous mostly unidentified genera and species were collected during the sampling period. Isoptera were the most abundant group, most of which were trapped while foraging and prospecting for nectar, mate, oviposition site, or were accidentally caught. This was followed by Coleoptera and Orthoptera. The least abundant order was Spirostreptida. Basin traps capture the highest number of arthropods of diverse families, followed by pitfall then sweepnet. A lower arthropod weekly mean abundance was recorded in 2009 (129.55) than in 2010 (132.08)." (Authors) *Anax* sp. accounted in 2009 to a relative abundance in catches of app. 7%, and in 2010 of app. 1%.] Address: Ehisianya, C.N., National Root Crops Research Institute, Umudike, Abia State, Nigeria. E-mail: colpino@yahoo.co.uk

**11329.** Ferreira, G.L.; Flynn, M.N. (2012): Índice biótico BMWP' na avaliação da integridade ambiental do Rio Jaguari-Mirim, no entorno das Pequenas Centrais Hidrelétricas de São Joaquim e São José, município de São João da Boa Vista, SP. *RevInter Revista Intertox de Toxicologia, Risco Ambiental e Sociedade* 5(1): 128-139. (in Portuguese, with English summary) [Brazil, BMWP' index (Biological Monitoring Working Party); "Seven sampling sites in Jaguari-Mirim River were established, around the São Joaquim and São Jose PCHs (Small Power Plants). At each sampling site sediment was collected in September, 2008 and March, 2009. The local benthic community at each site was sieved and identified to family level, when possible. A total of 2,341 individuals, 1,262 in the dry period (September) and 1,079 in the wet period (March) were counted and identified. Water quality for each sampling point was classified as good, acceptable, doubtful, critical or very critical in accordance to BMWP' index values. The majority of the sites attained the classification doubtful for water quality. It was concluded that the local benthic community was considered disturbed." (Authors) Only 'Gomphidae' are represented at the sampling sites.] Address: E-mail: m.flynn@intertox.com.br. Finland. <http://www.helcom.fi>

**11330.** Fleck, G.; Neiss, U.G. (2012): A new species of the genus *Aeschnosoma* Selys, 1870 (Odonata: Anisoptera: Corduliidae s.s.). *Zootaxa* 3159: 47-58. (in English) ["The larva, the adult male and the adult female of *Aeschnosoma hamadae* sp. nov. are described and illustrated. This species belongs to the *A. elegans* group of species. A comparison with other species of this group is given." (Authors)] Address: Fleck, G., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleckgunther@gmail.com

**11331.** Fleck, G.; Neiss, U.G.; Hamada, N. (2012): The larva of *Dictierias* Selys, 1853 (Odonata: Heliocharitidae [= Dicteriidae]), and taxonomic and phylogenetic notes on Heliocharitidae. *Zootaxa* 3164: 32-40. (in English) ["The larva of *Dictierias* Selys, 1853, a monotypic genus, is described and illustrated for the first time. It is morphologically very close to the larva of *Heliocharis* Selys, 1853. The larvae of these two genera are compared, and a larval diagnosis for the family is provided. The family Heliocharitidae (= Dicteriidae) shares derived characters with some Calopterygoidea and is pro-

bably related to Calopterygidae. The larvae of Heliocharitidae are also amazingly similar to those of some Megapodagrionidae, and long-legged Megapodagrionidae related to Megapodagrion could be related to the family Heliocharitidae and could represent a basal stem within the Calopterygoidea." (Authors)] Address: Hamada, N., Instituto Nacional de Pesquisas da Amazônia/ INPA, Coordenação de Pesquisas em Entomologia/ CPEN, Caixa Postal 478, CEP 69011-970, Manaus, AM, Brazil. E-mail: nhamada@inpa.gov.br

**11332.** Forbes, M.R.; Mlynarek, J.J.; Allison, J.; Hecker, K.R. (2012): Seasonality of gregarine parasitism in the damselfly, *Nehalennia irene*: understanding unimodal patterns. *Parasitol. Res.* 110(1): 245-250. (in English) ["We studied parasitism by gut protozoans (Apicomplexa: Eugregarinidae) in *N. irene*. We tested whether there was any seasonal pattern, as has been found for other parasites of damselflies and which has implications for selection on emergence and breeding. Using aggregate data from 12 date-by-site comparisons involving five sites, we found that both prevalence and intensity of gregarine parasitism were seasonally unimodal. Parasitism first increased and then declined seasonally after peaking midseason. This damselfly species has shown seasonal increases in density followed by declines at several sites including a site sampled in this study. Therefore, similar seasonal changes in a directly transmitted parasite were expected and are now confirmed. Other factors that might account for seasonal changes in parasitism by gregarines are either unlikely or can be discounted including sampling of older damselflies mid-season but not late in the season, or sex biases in parasitism and overrepresentation of the more parasitized sex mid-season." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton Univ., 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**11333.** Getachew, M.; Ambelu, A.; Tikub, S.; Legesse, W.; Adugna, A.; Kloos, H. (2012): Ecological assessment of Cheffa Wetland in the Borkena Valley, northeast Ethiopia: Macroinvertebrate and bird communities. *Ecological Indicators* 15(1): 63-71. (in English) ["A comparative study of macroinvertebrates and bird communities was undertaken to assess the ecological integrity and human impact in Cheffa Wetland, northeastern Ethiopia. The study was undertaken from February to May 2010. Physicochemical parameters of the water, birds, macroinvertebrates - including Odonata, but no taxonomic details on macroinvertebrates are given - and human impact classes were assessed at 10 sites in the wetland exposed to different anthropogenic activities. [...] The results revealed that human interference in wetland may result in serious ecological imbalances in the natural life cycle and impact on human welfare. Long-term studies are required to predict changes in wetland ecology and population dynamics, with the objective of developing appropriate measures by federal, regional and local stakeholders to ensure wetland restoration and sustainability." (Authors)] Address: Ambelu, A., Dept of Environmental Health Sciences & Technology, Jimma University, P.O. Box 378, Jimma, Ethiopia. E-mail: argaw.ambelu@ju.edu.et, aambelu@yahoo.com

**11334.** Giugliano, L.; Hardersen, S.; Santini, G. (2012): Odonata communities in retrodunal ponds: a comparison of sampling methods. *International Journal of Odonatology* 15(1): 13-23. (in English) ["Dragonflies are commonly used as indicators of environmental quality

and different methods have been employed to monitor odonate assemblages, such as surveys of all adults, evaluations based on breeding adults, sampling of larvae and collection of exuviae. Results obtained with different sampling methods may not be interchangeable, as the different life stages (e.g. larvae, adults) differ in mobility (aquatic, aerial) and as they are subjected to different ecological constraints. Therefore generalization about habitat quality based on only one survey method might be questionable. Additionally, detectability of species might vary when different methods are used. In this study, nine retrodunal ponds in the Migliarino, San Rossore, Massaciuccoli Regional Park (Tuscany, Italy) were repeatedly and contemporaneously sampled during May–September 2008 with the following methods: all adults, breeding adults, larvae and exuviae. In total, 22 species were detected and the results showed that the four methods were not interchangeable. First, some species were only found using certain methods. Second, univariate measures of diversity obtained with the four sampling methods were considerably different. Alpha diversity was maximal when computed on all adults and minimal with exuviae; breeding adults and larval collection had intermediate values. Beta diversity showed an inverse trend, with the lowest value for "all adults" surveys and higher values for all the others. Finally, congruence among the assemblages revealed by the four methods was generally low. The results show that the four survey techniques are not interchangeable and that monitoring of Odonata has to be based on a carefully chosen method, which should reflect the aim of the study." (Authors)] Address: Hardersen, S., Centro Nazionale per lo Studio e la Conservazione della Biodiversità Forestale, Corpo Forestale dello Stato, Strada Mantova, 29, I-46045 Marmirolo (MN), Italy. E-mail: s.hardersen@gmail.com

**11335.** Goertzen, D. (2012): Biodiversität im städtischen Raum: Analyse und Entwicklung von Managementkonzepten für städtische Stillgewässer am Beispiel der Libellenfauna von Großstädten. *Treffpunkt Biologische Vielfalt* 11: 125-129. (in German) [The paper discusses the following questions using an example from the urban environment in Dortmund, Nordrhein-Westfalen, Germany. What factors are relevant for urban waterbodies? How many Odonata species are living in such waterbodies? What can be done to increase biodiversity in these habitats?] Address: Goertzen, Diana, Institut für Geoökologie, Technische Universität Braunschweig, Langer Kamp 19c, 38106 Braunschweig, Germany. E-mail: diana.goertzen@industrielibellen.de

**11336.** Greenwood, M.J.; Harding, J.S.; Niyogi, D.K.; McIntosh, A.R. (2012): Improving the effectiveness of riparian management for aquatic invertebrates in a degraded agricultural landscape: stream size and land-use legacies. *Journal of Applied Ecology* 49: 213-222. [New Zealand; "(1) Riparian management has been embraced by water and land managers globally to offset the deleterious effects of intensive agricultural land use on aquatic ecosystems. However, the documented responses of stream communities to riparian management have been variable, particularly in highly degraded systems. (2) We used boosted regression trees and structural equation models to assess the effects of riparian condition and stream size on the invertebrate communities of 64 agricultural waterways on the Canterbury Plains, New Zealand. We hypothesized that small streams would be more degraded than larger wa-

terways but would show a greater increase in the abundance of pollution-sensitive aquatic invertebrates in response to riparian management. We also predicted that land-use legacies of poor in-stream habitat would reduce the effectiveness of current riparian management. The two strongest determinants of community structure were primarily in-stream habitat, where sedimentation and low water velocity had negative impacts on stream communities, and stream size, with smaller waterways generally more impacted than large waterways. Not surprisingly, with >150 years of agriculture and patchy riparian management on the plains, current management has not greatly improved in-stream habitat and thus had little effect on the abundance of sensitive aquatic insect (EPT) taxa. (3) Managed streams did, however, have more pollution-sensitive communities in general. This was largely mediated by decreased stream temperature, narrower/deeper channels and greater organic matter resources in streams with riparian planting and restricted stock access. Thus, if water velocity and sedimentation issues can be mitigated, then riparian management should become more effective. (4) Synthesis and applications. Within the context of a degraded agricultural landscape, we identified factors limiting the effectiveness of riparian management for stream invertebrate communities. Riparian management should primarily target and protect small streams and those without degraded in-stream habitat. Intensive management, such as in-stream habitat or channel morphology modification, may be needed to address historical factors (e.g. low velocity and sedimentation), which otherwise may continue to limit community recovery." (Authors) *Austrolestes colenonis* and *Xanthocnemis* are listed in the supplementary material.] Address: Greenwood, Michelle, School of Biological Sciences, University of Canterbury, Private Bag 4800, Christchurch, New Zealand. E-mail: m.greenwood@niwa.co.nz

**11337.** Hager, B.J.; Kalantari, N.J.; Van Scholte, A. (2012): The distribution of *Cordulegaster* (Odonata: Cordulegasteridae) nymphs in seeps and springs of Nelson Swamp (Madison County, NY). *Northeastern Naturalist* 19(sp6): 67-76 (in English) ["Given the presence of foraging and reproducing adult *Cordulegaster* (spiketail) dragonflies in Nelson Swamp (Madison County, NY), we examined nymph distribution and abundance in the seeps and springs found within the swamp. From 9 September–4 November 2010, we surveyed 8 sites along Chittenango Creek in order to determine: (1) the species present and their distribution / occurrence among sites, (2) factors influencing species presence and abundances, and (3) patterns in size and age distribution among and within sites. For sites, we delineated habitat zones (inlet, middle, outlet), determined the benthic substrate, and measured shoreline perimeters. For nymphs, we measured head width, body length, and wing pad length and identified some to species. The majority of spiketails we identified were *C. diastatops*; *C. maculata* was also present. Most nymphs occurred in inlets with muck and cobble bottoms and in water depths less than 10 cm. Spiketail densities ranged from 0.13–8.13 individuals/m of shoreline. Smaller individuals occurred in cobble substrate, while muck substrates had individuals of larger size and greater abundance. We demarcated at least 2 age cohorts of nymphs based on their body measurements in relation to growth patterns observed in other spiketail species." (Authors) Address: Hager, Barbara, Environmental Studies Pro-

gram, Cazenovia College, 22 Sullivan Street, Cazenovia, NY 13035. USA. E-mail: bhager@cazenovia.edu.

**11338.** Harabis, F.; Dolný, A. (2012): Underground mining can contribute to freshwater biodiversity conservation: Allogenic succession forms suitable habitats for dragonflies. *Biological Conservation* 145: 109-117 (in English). ["Human-induced changes negatively affect all components of freshwater ecosystems and comprise the major cause of global loss of diversity and the biotic homogenization of freshwater faunas. The high diversity of dragonflies in heavily industrialized areas is therefore paradoxical, to say the least. We compared diversity of dragonflies in three main freshwater habitat types (natural and human-made) occurring in Upper Silesia (Central Europe). We used multivariate methods and diversity indices for a general analysis, comprising both species richness and the species composition of assemblages. We recorded 50 species in mine subsidence pools from the total of 54 sampled species. These included a high proportion of habitat specialists (typically threatened species). We emphasize that secondary habitats (e.g. spontaneously originated mine subsidence pools) should not a priori be regarded as ecological traps, because these often are the available habitats with highest quality. These habitats significantly outweigh ponds in species richness and proportion of habitat specialists. The conservation potential of specific secondary habitats lies in the fact that these habitats can substitute for very rare natural wetlands often restricted to higher elevations. We assume that high diversity in this type of secondary habitats is not random, but rather that it depends on environmental heterogeneity caused by a specific allogenic succession process occurring as a direct consequence of mining. Highlights: \*Dragonflies as bioindicators in lentic habitats of strongly man-modified landscape. \*Several specific secondary habitats substitute for natural habitats. \*High species richness and habitat specialists in mine wetlands are not random. \*This phenomenon is closely associated with a specific allogenic succession. \*The secondary habitats should not a priori be regarded as ecological traps." (Authors)] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic. E-mail: Alnes.Dolny@osu.cz

**11339.** Harabis, F.; Dolný, A. (2012): Human altered ecosystems: suitable habitats as well as ecological traps for dragonflies (Odonata): the matter of scale. *Journal of Insect Conservation* 16(1): 121-130. (in English) ["Habitat loss and degradation can be considered as major threats to freshwater invertebrates. These often irreversible processes lead to reduction of habitat patch quality and cause local extinctions of dragonflies, notably of habitat specialists. However, the biodiversity of specific secondary habitats is very high. Here, we present findings from a 10-year study that intensively monitored odonate fauna in the Upper Silesian industrial coal region having many secondary habitats characterized by very frequent disturbances due to soil instability. We evaluated qualitative changes in the dragonfly assemblages on 10 patches using a modified dragonfly biotic index. Data analysis was supplemented by a model examining population dynamics of the threatened dragonfly *Leucorrhinia pectoralis*, using the capture-mark-recapture method, as an effective indicator of habitat quality. We show that dynamics of environmental conditions in secondary habitats are reflected in popula-



tion dynamics of dragonfly populations and assemblages. As frequency of *L. pectoralis* population extinctions within the patch is considerable and independent of size and spatial isolation of single habitats, these can be regarded as ecological traps. Nevertheless, the metapopulation dynamics may be a key adaptation of dragonflies to frequent freshwater habitat disturbances. We suggest that local extinctions are effectively balanced with (re-)colonization of newly emerging freshwater habitats. These findings have implications for potential conservation management of specific human-made habitats, because secondary habitats with a great diversity of succession stages arising directly as a consequence of environmental instability may be considered as partial alternatives to natural habitats in cultural landscapes." (Authors)] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic. E-mail: Alnes.Dolny@osu.cz

**11340.** Hassall, C.; Thompson, D.J. (2012): Study design and mark-recapture estimates of dispersal: a case study with the endangered damselfly *Coenagrion mercuriale*. *Journal of Insect Conservation* 16: 111-120. (in English) ["Accurate data on dispersal ability are vital to the understanding of how species are affected by fragmented landscapes. However, three factors may limit the ability of field studies to detect a representative sample of dispersal events: (1) the number of individuals monitored, (2) the area over which the study is conducted and (3) the time over which the study is conducted. Using sub-sampling of mark-release-recapture data from a study on *C. mercuriale*, we show that maximum dispersal distance is strongly related to the number of recaptured individuals in the mark-release-recapture study and the length of time over which the study is conducted. Median dispersal distance is only related significantly to the length of the study. Spatial extent is not associated with either dispersal measure in our analysis. Previously consideration has been given to the spatial scale of dispersal experiments but we demonstrated conclusively that temporal scale and the number of marked individuals also have the potential to affect the measurement of dispersal. Based on quadratic relationships between the maximum dispersal distance, recapture number and length of study, we conclude that a previous study was of sufficient scale to characterise the dispersal kernel of *C. mercuriale*. Our method of analysis could be used to ensure that the results of mark-release-recapture studies are independent of levels of spatial and temporal investment. Improved confidence in dispersal estimates will enable better management decisions to be made for endangered species." (Authors)] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), Univ.Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**11341.** Horst, J. (2012): Synergistic effects of stress and pesticides on the growth and development of *Hyla versicolor* (Eastern gray tree frog). Bachelor of Arts, Biology. The College of Wooster: (in English) ["Amphibian populations have been significantly declining worldwide over the past twenty years, and the possible causes of such declines are currently under research. This study was undertaken to determine the synergistic effects of stress and pesticides on *H. versicolor*. Experimentation took place in twenty 150 gal cattle tanks. Treatments in-

cluded a blank control, a pesticide control, predator stress with pesticide, and drought stress with pesticide. All pesticide treatments included Roundup® at ecologically relevant concentrations of 3 ppm. Predator stressed treatment groups were exposed to Anax sp. (dragonfly larvae) predator cues, and drought stressed treatment groups were manipulated by removing water every four days. Survivorship, weight at metamorphosis, and days to metamorphosis data were analyzed. Survivorship (K-W test; chi square = 15.727,  $p = 0.001$ ) and days to metamorphosis (ANOVA;  $F = 21.508$ ,  $df = 3$ ,  $p = 0.00$ ) were significantly negatively affected when tadpoles were exposed to multiple stressors. Survivorship of the predator/pesticide treatment was significantly lower than that of drought/pesticide treatment groups. Days to metamorphosis were also significantly fewer when exposed to Roundup® alone. Mass at metamorphosis was not significantly affected (ANOVA;  $F = 1.555$ ,  $df = 3$ ,  $p = 0.239$ ). The synergism of Roundup® and stressors that tadpoles commonly encounter significantly affected *H. versicolor* larvae survivorship and growth." (Author)] Address: not stated

**11342.** Hosmani, S. (2012): Diversity and nestedness pattern of adult Odonata assemblages around Hadhinaru lake of Mysore, Karnataka. *Abhinav* 1(3): 20-28. (in English) [India; 23 Odonata species are listed.] Address: Hosmani, S., Dept of Biotechnology, SBRR Mahajana First Grade College, Jayalakshampuram, Mysore, India. E-mail: profsph@yahoo.co.in

**11343.** Hubenov, Z. (2012): Estimation of the faunistic diversity of the Kresna Gorge. *Historia naturalis bulgarica* 20: 107-120. (in English, with Bulgarian summary) ["A total of 3199 species has been established in the Kresna Gorge, belonging to 355 families, 75 orders, 16 classes and 5 types. The taxa with Mediterranean type of distribution for some of the investigated groups are over 70%. Three hundred and eighteen species are rare (19.4%), endemics - 83 species (4.6%) and relicts - 16 species (5.3% of the Bulgarian relicts). The number of taxa with conservation significance is about 400 (12.5%), of which 42 species are of the highest category – world importance." (Authors) The paper refers to the 21 Odonata species document from the region according Marinov (2001): Dragonflies (Odonata) of Kresna Gorge (SW Bulgaria). – In: Beron P. (ed.). Biodiversity of Kresna Gorge (SW Bulgaria). National Museum of Natural History & Institute of Zoology, BAS, Sofia, 109-113.] Address: Zdravko Hubenov, national Museum of natural History – bAS, Tsar osvoboditel blvd. 1, 1000 Sofia, Bulgaria. E-mail: zhubenov@nmnhs.com

**11344.** Hunger, H.; Schiel, F.-J. (2012): Description of *Protallagma hoffmanni* sp. nov. from the Peruvian Andes (Odonata: Coenagrionidae), including description of its larva. *Zootaxa* 3202: 28-50. (in English, with Spanish summary) ["*P. hoffmanni*, is described, illustrated, and diagnosed based on a series of males, females, and larvae collected at Laguna Querococha (male holotype: Ancash region, Peru, S 09° 43' 33.6" W 077° 19' 51.8", 3,980 m a.s.l., MHNL)." (Authors)] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), August-Ganther-Straße 16, D-79117 Freiburg, Germany. E-mail: holger.hunger@inula.de

**11345.** Ishizawa, N. (2012): Oviposition behaviour of *Sympetrum frequens* (Selys) (Odonata: Libellulidae). *International Journal of Odonatology* 15(1): 1-12. (in English) ["Oviposition behaviour by *S. frequens*, a species

endemic to Japan, has been observed throughout its entire breeding season, which extended for about one month after the harvest of rice. Approximately 50% of oviposition events occurred during the first week of the reproduction period. Sunny oviposition sites were preferentially selected by ovipositing pairs. The starting time of oviposition was highly correlated with the ambient temperature ( $T_a$ ), the days elapsed since the beginning of the oviposition period, and the weather of the day. The mean duration of oviposition (DO) was  $325.0 \pm 194.7$  s in tandem oviposition (TO) and  $152.5 \pm 101.8$  s in oviposition of the female alone (single oviposition; SO), and DO was poorly correlated with  $T_a$ . Dip rate (DR) was constant throughout the oviposition bout; however, wing-stroke frequency (WSF) of the tandem male declined from the start of oviposition to its end. The WSF of males in TO was  $39.4 \pm 2.8$  Hz, significantly higher than that of tandem females ( $34.5 \pm 3.0$  Hz,  $p < 0.0001$ ), but that of females in SO was as high as that of tandem males ( $39.7 \pm 3.7$  Hz). WSF was negatively correlated with  $T_a$ . In TO the male expends more energy than the female and it controls flight direction, so for the female TO is energetically less costly than SO. Furthermore, flying-oviposition into mud is more effective than non-contact flying-oviposition as the number of eggs per dip in the former exceeds one and more eggs are deposited per time unit than in the latter." (Author)] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozava City, Saitama Pref., Japan. E-mail: greffect708@jcom.home.ne.jp

**11346.** Jaffar, A.R. (2012): Observations of the dragonfly, *Camacina gigantea* (Brauer) at the Night Safari, Singapore (Insecta: Odonata: Libellulidae. Nature in Singapore 5: 7-11. (in English) [Seven male *C. gigantea* were sighted at a pond in the Gaur exhibit on 29 Sep. 2011.] Address: Jaffar, A.R., Night Safari, 80 Mandai Lake Road, Singapore 729826. E.mail: razak.jaffar@wrs.com.sg

**11347.** Ji, J.; Zhang, Y.; Chen, X.; Lin, J.; Sun, L. (2012): The effect of repeated release of the predatory mite *Neoseiulus* (*Amblyseius*) *cucumeris* on arthropod communities in citrus ecosystems. Biodiversity Science 20(1): 24-31. (in Chinese, with English summary) ["In order to study the effect of repeated release of *N. cucumeris* on the species composition and diversity of arthropod community in citrus ecosystems, we established bio-control orchards, natural orchards and chemical control orchards in the Mawei and Jin'an experimental field of Fuzhou, China. Our results indicated that the species richness of bio-control orchards was higher than that of natural or chemical control orchards at both sites. Diversity and evenness indices were higher in bio-control orchards than those of other orchards in the Mawei site, and those of chemical control orchards were the lowest. Among the variously managed orchards in Jin'an, evenness and diversity indices were highest in the natural orchards and lowest in chemical orchards. Our study suggests that citrus ecosystem arthropod diversity can be enhanced by releasing *N. cucumeris* to fight against the citrus pest mites while reducing the spraying of pesticide." (Authors) Odonata species have been recorded from Biocontrol and Chemical Control orchards.] Address: Zhang, Y., Institute of Plant Protection, Fujian Academy of Agricultural Sciences, Fuzhou 350013

**11348.** Jiménez-Cortés, J.G.; Serrano-Meneses, M.A.; Córdoba-Aguilar, A. (2012): The effects of food short-

age during larval development on adult body size, body mass, physiology and developmental time in a tropical damselfly. Journal of Insect Physiology 58(3): 318-326. (in English) ["Few studies have looked jointly at the effects of larval stressors on life history and physiology across metamorphosis, especially in tropical insects. Here we investigated how the variation of food availability during the larval stage of the tropical and territorial *Hetaerina americana* affects adult body size and body mass, and two physiological indicators of condition – phenoloxidase activity (an indicator of immune ability) and protein concentration. We also investigated whether larval developmental time is prolonged when food is scarce, an expected situation for tropical species whose larval time is less constrained, compared to temperate species. Second instar larvae were collected from their natural environments and reared in one of two diet regimes: (i) "rich" provided with five *Artemia salina* prey every day, and (ii) "poor" provided with two *A. salina* prey every day. In order to compare how distinct our treatments were from natural conditions, a second set of last-instar larvae were also collected and allowed to emerge. Only body size and phenoloxidase increased in the rich regime, possibly to prioritize investment on sexually selected traits (which increase mating opportunities), and immune ability, given pathogen pressure. The sexes did not differ in body size in relation to food regimes but they did differ in body mass and protein concentration; this can be explained on the basis of the energetically demanding territorial activities by males (for the case of body mass), and female allocation to egg production (for the case of protein). Finally, animals delayed larval development when food was scarce, which is coherent for tropical environments. These findings provide key insights in the role of food availability in a tropical species." (Authors)] Address: Córdoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**11349.** Johansson, H.; Ingvarsson, P.K.; Johansson, F. (2012): Cross-species amplification and development of microsatellites for six species of European coenagrionid damselflies. Conservation Genetics Resources 4(1): 191-196. (in English) ["We describe the cross-amplification and development of new loci for six species of closely related European damselflies. First, twenty-nine published microsatellites for the damselflies *Coenagrion puella* and *C. mercuriale* were multiplexed using M13-tagged primers, tested on 23 individuals, and then cross-species amplified on 21–26 individuals of *C. armatum*, *C. johanssoni*, *C. pulchellum* and *C. scitulum*. Second, sixteen new primers were developed for use in *C. armatum*, *C. johanssoni* and *C. scitulum*, and screened on 21 individuals. Values for observed heterozygosities and number of alleles ranged between 0.00–0.87 and 2–19 respectively (over all loci and species). For all species the tested loci provide a minimum of 1–8 usable markers for population genetic studies." (Authors)] Address: Johansson, Helena, Department of Biosciences, Helsinki University. P.O. Box 65. 00014 Helsinki. Finland. E-mail: helena.z.johansson@helsinki.fi

**11350.** Kanai, K.; Moriyama, T.; Nakamine, K. (2012): The recorded insects on Kuro-shima (Osumi Islands) in October of 2010. Research Report of Kagoshima Prefectural Museum 31: 73-78. (in Japanese, with English title) [The Osumi Islands are the northernmost group of

the Satsunan Islands, which are part of the Ryukyu Archipelago, and lie south of the Osumi Peninsula about 60 km from Kyu-shu (30°48'N 130°25'E), Japan. The islands are of volcanic origin and have a total area of approximately 1,030 km<sup>2</sup>. The climate is subtropical. Records of *Agriocnemis femina*, *Ischnura asiatica*, *Orthetrum glaucum*, *Pantala flavescens*, *Trithemis aurora* are documented.] Address: Kanai, K., Kagoshima Prefectural Museum, 1-1 Shiroyama-cho, Kagoshima City, 892-0853, Japan

**11351.** Kim, M.; Yoo, J.-c. (2012): Diet of yellow bitterns (*Ixobrychus sinensis*) during the breeding season in South Korea. *Journal of Ecology and Field Biology* 35(1): 9-14. (in English) ["Yellow bitterns are a small wetland bird common to Asian countries including South Korea, Japan, and China. The aim of this study is to describe diet of yellow bitterns during the breeding season in artificial wetland of northeastern South Korea between May to August 1999-2001. For the purposes of this paper, we observe the frequency of nest visiting by parents during the chick rearing period. A total of 98 boluses regurgitated by 52 chicks aged 1 day to 11 days after hatching form the sample and are shown to contain 323 food items. A bolus contained mean 3.8 items and weighs 0.2 g to 7.7 g. The most regularly occurring food items recorded are fish (63%) and insects (33%). In terms of fish, top mouth minnows (*Pseudorasbora parva*) and crucian carps (*Carassius auratus*) are frequently observed. In terms of insects, there are mosquitoes (Diptera), instars of dragonfly (Libellulidae), damselflies (Coenagrionidae) and water bugs (*Diplonychus japonicus*). Yellow bitterns were also shown to feed on bullfrogs (*Rana catesbeiana*), shrimp (Palaemonidae), and spiders (Araneae). The size of fish in a bolus ranged from 15.56 mm to 93.73 mm (mean, 37.08 mm). The amount of food can be observed to increase with the age of chicks ( $r = 0.279$ ,  $P = 0.025$ ,  $N = 64$ ) but parents did not provide larger fish as chicks grew. Parent birds visited nests more frequently when they have a larger brood ( $F_{1,21} = 14.529$ ,  $P = 0.001$ ). Our results suggest that fish is the most important prey during the breeding season and that age of chicks is related to amount of diet in yellow bitterns." (Authors)] Address: not available

**11352.** Koizumi, N.; Quinn, T.W.; Jinguji, H.; Nishida, K.; Watabe, K.; Takemura, T.; Mori, A. (2012): Development and characterization of 23 polymorphic microsatellite markers for *Sympetrum frequens*. *Conservation Genetics Resources* 4(1): 67-70. (in English) ["23 polymorphic microsatellite markers for *Sympetrum frequens* were developed and characterized. The number of distinct alleles per locus in 32 individuals ranged from 2 to 23. The observed heterozygosity ranged from 0.031 to 0.938, while the expected heterozygosity varied from 0.031 to 0.922. No loci deviated significantly from Hardy-Weinberg equilibrium, no linkage disequilibrium was observed between pairs of loci and no loci showed evidence of null alleles. These microsatellite markers are expected to contribute to future investigations of genetic variation and structure in *S. frequens* populations." (Authors)] Address: Koizumi, N., Institute for Rural Engineering, National Agriculture and Food Research Organization, Tsukuba, Ibaraki 305-8609, Japan. E-mail: koizumin@affrc.go.jp

**11353.** Kontula, T.; Haldin, J. (Eds.) (2012): Checklist of Baltic Sea Macro-species. *Baltic Sea Environment Proceedings* 130: 203 pp. (in English) [Odonata species are listed together with their rough regional distribution.]

Address: Published by: Helsinki Commission, Katajanokanlaituri 6 B, FI-00160 Helsinki

**11354.** Kosterin, O.E. (2012): Odonata of the Cambodian coastal regions in late rainy season of 2011. *International Dragonfly Fund - Report 45*: 1-102. (in English) ["Results of the odonatological survey of the coastal SW regions of Cambodia in August 12-28, 2011 are presented. Those include general notes on the Odonata fauna in late rainy season, enumeration of all records by locality, discussion of interesting specimens and their taxonomy, and notes on habitats and habits of some species. Of 87 named Odonata species encountered during the trip, 15 are reported for the first time for Cambodia, namely *Aciagrion hisopa* (Selys, 1876), *Anax immaculifrons* Rambur, 1842, *Burmagomphus divaricatus* Lieftinck, 1964, *Gomphidictinus perakensis* (Laidlaw, 1902), *Merogomphus parvus* (Krüger, 1899), *Nepogomphus walli* (Fraser, 1924), *Idionyx thailandica* Hämäläinen, 1985, *Macromia cupricincta* Fraser, 1924, *Macromia septima* Martin, 1904, *Macromia rapida* Martin, 1907, *Agrioptera insignis* (Rambur, 1842), *Lyriotheemis elegantissima* Selys, 1883, *Onychothemis testacea* Laidlaw, 1902, *Orthetrum luzonicum* (Brauer, 1868), *Orthetrum testaceum* (Burmeister, 1839). The country list now reaches 125 named species.] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**11355.** Kraus, F.; Medeiros, A.; Preston, D.; Jarnevich, C.S.; Rodda, G.H. (2012): Diet and conservation implications of an invasive chameleon, *Chamaeleo jacksonii* (Squamata: Chamaeleonidae) in Hawaii. *Biological Invasions* 14(3): 579-593. (in English) [Diet sample of 34 *C. jacksonii* from Maui, Hawai'i, USA included two specimens of *Megalagrion blackburni*.] Address: Medeiros, A., US Geological Survey Pacific Island Ecosystems Research Center, Haleakala Field Station, P.O. Box 369, Makawao, HI 96768, USA. E-mail: acm@aloha.net

**11356.** Lawrence, J.E.; Deitch, M.J.; Resh, V.H. (2012): Effects of vineyard coverage and extent on benthic macroinvertebrates in streams of Northern California. *Annales de Limnologie* 47(4): 347-354. (in English) ["Vineyards are a dominant feature of many landscapes in Mediterranean-climate regions. We examined the effects of streamflow declines, associated with vineyard water-withdrawals for frost protection, on benthic-macroinvertebrate communities at three sites along three small streams in the Mediterranean-climate region of Northern California. One site was heavily affected by water withdrawals for frost protection, the other two were not. In addition, we examined relationships between vineyard coverage and benthic-macroinvertebrate community response using data from 59 sampling events at 39 sites along 35 small streams in Napa County, California. We tested three a priori hypotheses in terms of the response of biological traits of benthic macroinvertebrates to high vineyard coverage: (1) proportion of individuals with semi-voltine (i.e., one generation every 2 years) life cycles would be lower compared to those with uni- and multi-voltine cycles, (2) proportion of individuals able to undergo diapause would be higher, and (3) proportion of individuals with the ability to burrow into the substrate would be higher. In the three-site study, we found that vineyard water-withdrawals for frost protection coincided with consistently lower values in both the benthic-macroinvertebrate index of biotic in-



tegrity (B-IBI) developed for Northern California streams and the ratio of Ephemeroptera–Plecoptera–Trichoptera to Odonata–Coleoptera–Hemiptera individuals (EPT / OCH), a metric developed for European Mediterranean streams. In the broader-scale study, we observed that vineyard-coverage levels above about 20% coincided with lower values of the B-IBI. The semi-voltine life-cycle trait was lower above this level, whereas the diapause and burrowing traits were not affected." (Authors)] Address: Lawrence, J., Dept Environ. Science, Policy & Management, Univ. of California, Berkeley, CA 94720-3114, USA. E-mail: jlawrence@berkeley.edu

**11357.** Li, J.-k.; Nel, A.; Zhang, X.-p.; Fleck, G.; Gao, M.-x.; Lin, L.; Zhou, J. (2012): A third species of the relict family Epiophlebiidae discovered in China (Odonata: Epiroctophora). *Systematic Entomology* 37(2): 408-412. (in English) ["Epiophlebia sinensis sp.n., a third species of the relict odonatan family Epiophlebiidae, is described from two male adults collected in Heilongjiang province, China. The new species lives in an environment rather similar to that of the two other species, *E. superstes* and *E. laidlawi*, i.e. along cold streams in a coniferous and deciduous forest. Possible explanations for the lack of fossil Epiophlebiidae and the biogeography of these damselfly-dragonflies are proposed." (Authors)] Address: Zhang, X.-p., Key Lab. of Remote Sensing Monitoring of Geographic Environment, College of Heilongjiang Province, Harbin Normal University, 150000 Harbin, China. E-mail: hellozxp@163.com

**11358.** Li, Y.-j.; Nel, A.; Ren, D.; Pang, H. (2012): A new damselfly-dragonfly from the Lower Cretaceous of China enlightens the systematics of the Isophlebioidea (Odonata: Isophlebioptera: Campterophlebiidae). *Cretaceous Research* 34: 340-343. (in English) ["A new genus and species of isophlebioid, *Parafleckium senjituense*, is described from the Lower Cretaceous Yixian Formation in China. As it has several significant structures currently considered as typical of either the Campterophlebiidae or the Isophlebiidae, and it helps to clarify knowledge of the morphology and taxonomy of this group of damselfly-dragonflies. We propose an emendation of the diagnoses of these two families." (Authors)] Address: Li, Y.-j., State Key Lab. of Biocontrol and Institute of Entomology, Sun Yat-Sen University, Guangzhou 510275, China. E-mail: liyongjunsysu@126.com

**11359.** Lozano, F.; Muzon, J.; Scattolini, C. (2012): Description of the final stadium larva of *Telebasis obsoleta* (Selys, 1876) (Odonata: Coenagrionidae). *Zootaxa* 3186: 54-58. (in English, with Spanish summary) ["The final stadium larvae of *Telebasis obsoleta* is described and illustrated based on one reared specimen from Argentina. Notes on habitat and new provincial records of Odonata are also provided. The larva of *Telebasis obsoleta* has five palpal setae, a feature shared only with the larva of *T. demerara*. All other known *Telebasis* species have six or seven palpal setae. *Telebasis obsoleta* and *T. demerara* can be distinguished by the presence of two small denticles near the tip of the prementum in *T. obsoleta*, and by the colour pattern of the distal half of the caudal lamellae." (Authors)] Address: Lozano, F., Centro Regional de Estudios Genómicos (UNLP) Av. Calchaquí km 23,4, 1888, Florencio Varela, Buenos Aires, Argentina. E-mail: federicolozano82@gmail.com

**11360.** McClure, C.J.W.; Rolek, B.W.; McDonald, K.; Hill, G.E. (2012): Climate change and the decline of a once common bird. *Ecology and Evolution* 2(2): 370-

378. (in English) ["Climate change is predicted to negatively impact wildlife through a variety of mechanisms including retraction of range. We used data from the North American Breeding Bird Survey and regional and global climate indices to examine the effects of climate change on the breeding distribution of the Rusty Blackbird (*Euphagus carolinus*), a formerly common species that is rapidly declining. We found that the range of the Rusty Blackbird retracted northward by 143 km since the 1960s and that the probability of local extinction was highest at the southern range margin. Furthermore, we found that the mean breeding latitude of the Rusty Blackbird was significant and positively correlated with the Pacific Decadal Oscillation with a lag of six years. Because the annual distribution of the Rusty Blackbird is affected by annual weather patterns produced by the Pacific Decadal Oscillation, our results support the hypothesis that directional climate change over the past 40 years is contributing to the decline of the Rusty Blackbird. Our study is the first to implicate climate change, acting through range retraction, in a major decline of a formerly common bird species." (Authors) The breeding success and site selection of Rusty Blackbirds is closely tied to shallow water and macroinvertebrate prey, particularly odonates (Matsuoka et al. 2010). Therefore, the decline of the species is discussed in the framework of altering diet availability, mainly Odonata.] Address: McClure, C.J.W., Dept of Biological Sciences, 331 Funchess Hall, Auburn University, Alabama 36849, USA. E-mail: chrimcc@gmail.com

**11361.** McGuffin, M.; Baker, R.L. (2012): Larval *Ischnura verticalis* (Odonata: Coenagrionidae) respond to visual cues of predator presence. *Journal of Insect Behavior* 25(2): 143-154. (in English) ["Larvae of some species of damselflies respond to chemical cues of fish predators but, while larvae of many species are thought to detect prey through vision, there is little evidence that larvae respond to visual cues of predator presence. This laboratory study indicated larval *Ischnura verticalis* behaviours are affected by visual cues and, to a much lesser extent, chemical cues of fish; there was no significant interaction between the effects of visual and chemical cues. Responses to chemical cues of fish did not depend on whether fish were fed *I. verticalis* larvae versus commercial fish food. Larvae were more active in the spring than the fall when they were likely in diapause. Results suggest larvae can use vision to detect large, active predators but can also detect predators through olfaction when visual cues are unreliable." (Authors)] Address: Baker, R.L., Dept Ecology & Evol. Biology, Univ. of Toronto, 25 Willcocks Street, Toronto, ON, Canada M5S 3B2. E-mail: robert.baker@utoronto.ca

**11362.** Müller, O.; Taron, U.; Jansen, A.; Schneider, T. (2012): Description of the larva of *Boyeria cretensis* Peters and comparison with *B. irene* (Fonscolombe) (Anisoptera: Aeshnidae). *Odonatologica* 41(1): 47-54. ["*B. cretensis* larva, endemic to the Mediterranean island of Crete, is described and illustrated from specimens collected at the Mili river near Rethymno in NW Crete, Greece and biometric data are provided from larval stadia F-0 to F-6. Based on a biometric analysis, exuviae of the W Palaearctic *B. cretensis* and *B. irene* have been compared. In respect to some characters only small morphological differences have been found. However, major differences exist in the length of the body, abdomen, cerci, prementum and paraprocsts; also in the paraprocst-epiproct ratio; this applies to both

males and females. Measurements of *B. irene* need to be taken from a wider geographical range to cover the variation in this species; this is discussed." (Authors)] Address: Müller, O., Birkenweg 6d, D-15306 Libbenichen, Germany. E-mail: olemueller@bioscience-art.de

**11363.** Neiss, U.G.; Hamada, N. (2012): Larvae of *Epipleoneura manauensis* Santos and *Roppaneura beckeri* Santos with a key to the genera of known Neotropical Protoneuridae larvae (Odonata: Zygoptera). *International Journal of Odonatology* 15(1): 31-43. (in English, with Spanish summary) ["The larva of *E. manauensis* is described and illustrated based on last-stadium larvae and exuviae of reared larvae collected in a black-water stream in Manaus, Amazonas State, Brazil. The larva of *R. beckeri* is described and illustrated based on exuviae of reared larvae collected from the water accumulated in the axils (phytotelmata) of *Eryngium floribundum* (Umbelliferae), in Florestal, Minas Gerais State, Brazil. The larva of *E. manauensis* can be distinguished from that of *E. metallica*, the only other species in the genus *Epipleoneura* with described larvae, by the presence of four palpal setae (three in *E. metallica*) and by the transverse dark band on the distal third of the gills (colour pattern absent in *E. metallica*). The larva of *R. beckeri* can be distinguished from all other described Neotropical Protoneuridae larvae by the presence of eight to nine palpal setae. An illustrated key to the genera of known Neotropical Protoneuridae larvae is provided." (Authors)] Address: Neiss, U.G., Instituto Nacional de Pesquisas da Amazônia/INPA, Coordenação de Biodiversidade/CBio, Avenida André Araújo, n. 2936, Caixa Postal 478, CEP 69011-970, Manaus, Amazonas, Brazil. E-mail: ulisses.neiss@gmail.com

**11364.** Nel, A.; Bechly, G.; Prokop, J.; Béthoux, O.; Fleck, G. (2012): Systematics and evolution of Paleozoic and Mesozoic damselfly-like Odonoptera of the 'Protozygopteran' grade. *Journal of Paleontology* 86: 81-104. (in English) ["The Paleozoic to Mesozoic grade 'Protozygoptera' is revised. It appears to be composed of two main lineages, namely the superfamily Permagrionoidea, and the Archizygoptera. The latter taxon forms a monophyletic group together with Panodonata (= crown-Odonata plus their closest stem-relatives). Therefore, the 'Protozygoptera' as previously understood is paraphyletic. Diagnostic characters of the 'Protozygoptera', Permagrionoidea, and Archizygoptera are re-evaluated. The *Permolestidae* is considered as a junior synonym of the *Permagrionidae*. The following new taxa are described: *Permolestes sheimogorai* new species, *Permolestes soyanaensis* new species, *Epilestes angustapterix* new species, *Solikamptilon pectinatus* new species (all in *Permagrionidae*); *Lodeviidae* new family (for *Lodevia*); *Luseiidae* new family (including *Luseia breviata* new genus and species); *Kennedyia azari* new species, *Kennedyia pritykinae* new species, *Kennedyia ivensis* new species, *Progoneura grimaldii* new species (all in *Kennedyidae*); *Engellestes chekardensis* new genus and species (in *Bakteniidae*); and *Azaronera permiana* new genus and species (in *Voltzialestidae*). The *Kaltanoneuridae* and *Oboraneuridae* are revised. The evolution of protozygopteran Odonoptera during the transition from the Permian to the Triassic is discussed. The larger taxa of the permagrionoid lineage apparently did not cross through the Permian–Triassic boundary, unlike the more gracile Archizygoptera. This last group shows a remarkable longevity from the late Carboniferous to the Early Cretaceous. It also presents a great

taxonomic and morphological stability, with genera ranging from the Permian to the Triassic, and a wing venation pattern nearly unchanged from the late Carboniferous to the Late Triassic. The mass extinction at the end of the Permian period seemingly had a minor effect on these tiny and delicate insects." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**11365.** Ng, Y.F.; Choong, C.Y., Centre for Insect Systematics, Faculty of Sciences and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor D.E. Malaysia. E-mail: ngyf@ukm.my; cychoon@ukm.my

**11366.** Ngiam, R.W.J.; Leong, T.M. (2012): Larva of the phytotelm-breeding damselfly, *Pericnemis stictica* Selys from forests in Singapore (Odonata: Zygoptera: Coenagrionidae). *Nature in Singapore* 5: 103-115. (in English) ["The final instar larva of *P. stictica* is described and illustrated here for the first time, based on the exuviae of specimens reared in captivity. The emergence sequence was documented for a male and a female specimen. The larvae were obtained from phytotelms in forests at the Bukit Timah Nature Reserve and Central Catchment Nature Reserve. A comparison is made with the only other known species in the genus, *P. triangularis* Laidlaw (from Borneo). Possible future research on the biology and conservation of *P. stictica* is suggested." (Authors)] Address: Leong, T., Dept Biol. Sci., Nat. Univ. of Singapore 14 Science Drive 4, Singapore 117543, Republic of Singapore. E-mail: dbsleong@nus.edu.sg

**11367.** Novelo-Gutiérrez, R.; Gómez-Anaya, J.A. (2012): Description of the larva of *Argia percellulata* (Odonata: Coenagrionidae). *International Journal of Odonatology* 15(1): 45-50. (in English) ["The larva of *Argia percellulata* is described and figured. It falls into the group of *Argia* larvae with a very prominent ligula and one palpal seta, but differs from its closest relatives by having tibiae usually with two well-defined dark rings, posterior margin of sternite 6 smooth, and posterior margin of sternite 7 smooth medially and with spiniform setae laterally. Larvae were found under cobblestones in open, wide, shallow streams where the water flow was slow to moderate, close to the shoreline within a cloud forest. The larva is compared with four other species apparently closely related." (Authors)] Address: Novelo-Gutiérrez, R., Depto de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**11368.** Ohba, S.-y.; Inatani, Y. (2012): Feeding preferences of the endangered diving beetle *Cybister tripunctatus orientalis* Gschwendtner (Coleoptera: Dytiscidae). *Psyche*, Article ID 139714, doi:10.1155/2012/139714: 3 pp. (in English) ["The numbers of *C. tripunctatus orientalis* (Cto) diving beetles are declining in most regions of Japan, and it is included in the Red Data List of species in 34 of 47 prefectures of Japan. However, basic ecological information about Cto, such as its feeding habits, remains unknown. In order to elucidate the feeding habits of Cto larvae, feeding preference experiments were carried out in 2nd and 3rd instar larvae. The number of Odonata nymphs consumed was significantly higher than the number of tadpoles consumed, indicating that Cto larvae prefer Odonata nymphs to tadpoles. In addition, all the first instar larvae of Cto developed into second instars when they were supplied

with motionless Odonata nymphs, but their survival rate was lower when they were supplied with motionless tadpoles. These results suggest that Cto larvae prefer insects to vertebrates." (Authors)] Address: Ohba, Shinya, Center for Ecological Research, Kyoto University, Otsu 520-2113, Japan. E-mail: oobug@hotmail.com

**11369.** Outomuro, D.; Bokma, F.; Johansson, F. (2012): Hind wing shape evolves faster than front wing shape in Calopteryx damselflies. *Evolutionary Biology* 39(1): 116-125. (in English) ["Wing shape has been shown in a variety of species to be influenced by natural and sexual selection. In damselflies, front- and hind wings can beat independently, and functional differentiation may occur. Males of Calopteryx damselflies show species-specific nuptial flights that differ in colour signalling with the hind wings. Therefore, hind wing shape and colour may evolve in concert to improve colour display, independent of the front wings. We predicted that male hind wing shape evolves faster than front wing shape, due to sexual selection. Females do not engage in sexual displays, so we predicted that females do not show differences in divergence between front- and hind wing shape. We analysed the non-allometric component of wing shape of five European Calopteryx taxa using geometric morphometrics. We found a higher evolutionary divergence of hind wing shape in both sexes. Indeed, we found no significant differences in rate of evolution between the sexes, despite clear sex-specific differences in wing shape. We suggest that evolution of hind wing shape in males is accelerated by sexual selection on pre-copulatory displays and that this acceleration is reflected in females due to genetic correlations that somehow link the rates of wing shape evolution in the two sexes, but not the wing shapes themselves." (Authors)] Address: Outomuro, D., Depto de Biología de Organismos y Sistemas, Universidad de Oviedo. 33071 Oviedo, Spain. E-mail: outomuro.david@gmail.com

**11370.** Pompilio, L.; Rivella, E.; Buffa, G.; Filippa, G.; Freppa, M. (2012): Torbiere e libellule nelle Montagne dell'Ossola. Arpa Piemonte, Via Pio VII, 9 – 10135 Torino – Italia: 56 pp. (in Italian) [Italy; nine Odonata species (*Ischnura pumilio*, *Coenagrion puella*, *Aeshna cyanea*, *A. juncea*, *Somatochlora arctica*, *S. alpestris*, *Libellula quadrimaculata*, *Sympetrum sanguineum*, *Leucorrhinia dubia*) are briefly treated in a monographic style. Their distributions in Piemonte e Valle d'Aosta and in Italy are mapped.] Address: Arpa Piemonte, Via Pio VII, 9, 10135 Torino, Italy. [www.arpa.piemonte.it](http://www.arpa.piemonte.it)

**11371.** Popova, O.N.; Kharitonov, A.Yu. (2012): Estimation of the carry-over of substances by dragonflies from water bodies to land in the forest-steppe of West Siberia. *Contemporary problems of ecology* 5(1): 34-39. (in English) ["The results of many years' monitoring of the number and distribution of dragonflies in the Chany area of the Baraba forest-steppe are presented. An estimation of the biomass carry-over by dragonflies from water bodies to land ecosystems is given. The data presented provide evidence of the important role of dragonflies in the migration of substances from water bodies to land." (Authors)] Address: Haritonov, A.YU.; Laboratory of Insect Ecology, Biological Institute of the Siberian Branch of the Academy of Sciences, Frunze str. 11, 630091 Novosibirsk, Russia. E-mail: [pc@eco.nsc.ru](mailto:pc@eco.nsc.ru)

**11372.** Ratti, J.; Vachtsevanos, G. (2012): Inventing a biologically inspired, energy efficient micro aerial vehicle. *Journal of Intelligent & Robotic Systems* 65(1-4):

437-455. (in English) ["In recent years, research efforts have focused on the design, development and deployment of unmanned systems for a variety of applications ranging from intelligence and surveillance to border patrol, rescue operations, etc. Micro Aerial Vehicles are viewed as potential targets that can provide agility and accurate small area coverage while being cost-effective and can be easily launched by a single operator. The small size of MAVs allows such flight operations within confined space but the control effectors must provide sufficient maneuverability, while maintaining stability, with only limited sensing capability onboard the platform. To meet these challenges, researchers have long been attracted by the amazing attributes of biological systems, such as those exhibited by birds and insects. Birds can fly in dense flocks, executing rapid maneuvers with g-loads far in excess of modern fighter aircrafts, and yet never collide with each other, despite the absence of air traffic controllers. This paper introduces a novel framework for the design and control of a Micro Air Vehicle. The vehicle's conceptual design is based on biologically-inspired principles and emulates a dragonfly (Odonata-Anisoptera). A sophisticated multi-layered Hybrid & Linear/Non-Linear controller to achieve extended flight times and improved agility compared to other Rotary and Flapping Wing MAV designs. The paper addresses the design and control features of the proposed QV design and gives an overview on the developmental efforts towards the prototyping of the flyer. The potential applications for such a high endurance vehicle are numerous, including air-deployable mass surveillance in cluster and swarm formations. The disposable nature of the vehicle would help in battle-field deployment as well, where such a MAV would be made available to soldiers for proximity sensing and threat level assessment. Other applications would include search and rescue operations and civilian law-enforcement." (Authors)] Address: Vachtsevanos, G., Intelligent Control Systems Laboratory, School of Electrical & Computer Engineering, Georgia Institute of Technology, 777 Atlantic Dr. NW., Atlanta, GA 30332-0250, USA. E-mail: [gjv@ece.gatech.edu](mailto:gjv@ece.gatech.edu)

**11373.** Relyea, R.A. (2012): New effects of Roundup on amphibians: Predators reduce herbicide mortality; herbicides induce antipredator morphology. *Ecological Applications* 22: 634-647. (in English) ["The use of pesticides is important for growing crops and protecting human health by reducing the prevalence of targeted pest species. However, less attention is given to the potential unintended effects on nontarget species, including taxonomic groups that are of current conservation concern. One issue raised in recent years is the potential for pesticides to become more lethal in the presence of predatory cues, a phenomenon observed thus far only in the laboratory. A second issue is whether pesticides can induce unintended trait changes in nontarget species, particularly trait changes that might mimic adaptive responses to natural environmental stressors. Using outdoor mesocosms, I created simple wetland communities containing leaf litter, algae, zooplankton, and three species of tadpoles (wood frogs [*Rana sylvatica* or *Lithobates sylvaticus*], leopard frogs [*R. pipiens* or *L. pipiens*], and American toads [*Bufo americanus* or *Anaxyrus americanus*]). I exposed the communities to a factorial combination of environmentally relevant herbicide concentrations (0, 1, 2, or 3 mg acid equivalents [a.e.]/L of Roundup Original MAX) crossed with three predator-cue treatments (no predators, adult



newts [*Notophthalmus viridescens*], or larval dragonflies [*Anax junius*]). Without predator cues, mortality rates from Roundup were consistent with past studies. Combined with cues from the most risky predator (i.e., dragonflies), Roundup became less lethal (in direct contrast to past laboratory studies). This reduction in mortality was likely caused by the herbicide stratifying in the water column and predator cues scaring the tadpoles down to the benthos where herbicide concentrations were lower. Even more striking was the discovery that Roundup induced morphological changes in the tadpoles. In wood frog and leopard frog tadpoles, Roundup induced relatively deeper tails in the same direction and of the same magnitude as the adaptive changes induced by dragonfly cues. To my knowledge, this is the first study to show that a pesticide can induce morphological changes in a vertebrate. Moreover, the data suggest that the herbicide might be activating the tadpoles' developmental pathways used for antipredator responses. Collectively, these discoveries suggest that the world's most widely applied herbicide may have much further-reaching effects on nontarget species than previously considered." (Author)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**11374.** Ren, H.-H.; Wang, X.-S.; Chen, Y.-L.; Li, X.-D. (2012): Biomechanical behaviors of dragonfly wing: relationship between configuration and deformation. *Chinese Physics B* 21(3) (034501): 10 pp. (in English) ["In this paper, the natural structures of a dragonfly wing (*Pantala flavescens*), including the corrugation of the chordwise cross-section, the sandwich microstructure veins, and the junctions between the vein and the membrane, have been investigated with experimental observations, and the morphological parameters of these structural features are measured. The experimental result indicates that the corrugated angle among the longitudinal veins ranges from 80° to 150°, and the sandwiched microstructure vein mainly consists of chitin and protein layers. Meanwhile, different finite element models, which include models I and I\* for the planar forewings, models II and II\* for the corrugated forewings, and a submodel with solid veins and membranes, are created to investigate the effects of these structural features on the natural frequency/modal, the dynamical behaviours of the flapping flight, and the deformation mechanism of the forewings. The numerical results indicate that the corrugated forewing has a more reasonable natural frequency/modal, and the first order up-down flapping frequency of the corrugated wing is closer to the experimental result (about 27.00 Hz), which is significantly larger than that of the planar forewing (10.94 Hz). For the dynamical responses, the corrugated forewing has a larger torsional angle than the planar forewing, but a lower flapping angle. In addition, the sandwich microstructure veins can induce larger amplitudes of torsion deformation, because of the decreasing stiffness of the whole forewing. For the submodel of the forewing, the average stress of the chitin layer is much larger than that of the protein layer in the longitudinal veins. These simulative methods assist us to explain the flapping flight mechanism of the dragonfly and to design a micro aerial vehicle by automatically adjusting the corrugated behaviour of the wing." (Authors)] Address: Wang, X.-S., Dept of Engineering Mechanics, AML, Tsinghua University, Beijing 100084, China. E-mail: xshuwang@tsinghua.edu.cn

**11375.** Šácha, D.; Racko, L. (2012): New site of the species of the Community interest *Coenagrion ornatum* (Odonata: Coenagrionidae) in Northern Slovakia. *Folia faunistica Slovaca* 17(1): 7-9. (in Slovakian, with English summary) [The rare *C. ornatum* was found near Šuja village, Strážovské hills and Zilina Valley (49°03'44" N, 18°37'05" E), 476 m a.s.l. Larvae and exuvia of *C. ornatum* were located along a small, shallow and slow flowing sunlit springfen creek with carbonate geology. Emergence took place on vegetation just above the water, up to 10 cm from the surface. Co-occurring species are *Calopteryx virgo*, *Lestes sponsa*, *Pyrrhosoma nymphula*, *Coenagrion puella*, *Enallagma cyathigerum*, *Ischnura elegans*, *I. pumilio*, *Platycnemis pennipes*, *Aeshna cyanea*, *Libellula depressa*, *Orthetrum coerulescens*, *O. brunneum*, *Sympetrum pedemontanum* and *S. sanguineum*. *Thecagaster bidentata*, typical for such habitats, was not found. This record is the 5th for Slovakia.] Address: Šácha, D., Podtatranského 31, 031 01 Liptovský Mikuláš, Slovakia. E-mail: dusan.sacha@vazky.sk

**11376.** Salur, A.; Dogan, Ö.; Yagiz, Y. (2012): Odonata Fauna of Pülümür (Turkey: Tunceli prov.). *Munis Entomology & Zoology* 7(1): 359-362. (in English) [Between July and September 2010, 24 Odonata species were recorded at 14 localities. All these are first regional records. Species are presented with details about their localities.] Address: Salur, A., Hitit Üniversitesi, Faculty of Arts & Sciences, Department of Biology, 19030 Çorum, Turkey. E-mail: alisalur@gmail.com

**11377.** Salur, A.; Miroglu, A.; Okçu, B. (2012): Odonata fauna of Tokat province (Turkey). *Munis Entomology & Zoology* 7(1): 339-343. (in English) [30 Odonata species from the Tokat province in the central part of Black Sea Region of Anatolia were recorded between 2005 and 2010. The localities of these records are documented.] Address: Salur, A., Hitit Üniversitesi, Faculty of Arts & Sciences, Department of Biology, 19030 Çorum, Turkey. E-mail: alisalur@gmail.com

**11378.** Sánchez-Guillén, R.A.; Wellenreuther, M.; Cordero-Rivera, A. (2012): Strong asymmetry in the relative strengths of prezygotic and postzygotic barriers between two damselfly sister species. *Evolution* 66(3): 690-707. (in English) ["One of the longest debates in biology has been over the relative importance of different isolating barriers in speciation. However, for most species, there are few data evaluating their relative contributions and we can only speculate on the general roles of pre- and postzygotic isolation. Here we quantify the absolute and cumulative contribution of 19 potential reproductive barriers between two sympatric damselfly sister species, *Ischnura elegans* and *I. graellsii*, including both premating (habitat, temporal, sexual and mechanical isolation) and postmating barriers (prezygotic: sperm insemination success and removal rate, oviposition success, fertility, fecundity; postzygotic: hybrid viability, hybrid sterility and hybrid breakdown). In sympatry, total reproductive isolation between *I. elegans* females and *I. graellsii* males was 95.2%, owing mostly to a premating mechanical incompatibility (93.4%), while other barriers were of little importance. Isolation between *I. graellsii* females and *I. elegans* males was also nearly complete (95.8%), which was caused by the cumulative action of multiple prezygotic ( $n = 4$ , 75.4%) and postzygotic postmating barriers ( $n = 5$ , 7.4%). Our results suggest that premating barriers are key factors in preventing gene flow between species, and that the relative strengths of premating barriers is highly asym-

metrical between the reciprocal crosses." (Authors)] Address: Sánchez-Guillén, Rosa, Depto de Ecología e Biología Animal, E.U.E.T. Forestal, Universidade de Vigo, Pontevedra, Spain. E-mail: rguillen@uvigo.es

**11379.** Sánchez-Herrera, M.; Ware, J.L. (2012): Biogeography of dragonflies and damselflies: Highly mobile predators. In: Stevens, L. (Ed.): Global Advances in Biogeography. InTech: 291-306. (in English) ["Conclusion: The biogeography of Odonata is a rich area of study that needs further attention. As one of the basal-most taxa in Insecta (Grimaldi and Engel, 2005), our understanding of the origin of flying insects will be greatly improved by additional study, particularly through research that includes thorough analyses of stem and crown group taxa. Future work should explore the biogeography of lesser-studied zygopteran groups from South America, and expand understanding of species rich groups like the Libelluloidea and Gomphidae. Odonata have been heralded as model indicators for climate change, due in part to their great dispersal capabilities, and earlier emergence has been documented in our warming climate (e.g., Hassell et al., 2007). Range expansion of tropical taxa is predicted into higher latitudes. Although some Odonata ranges fluctuate with environmental changes, northward range expansions have been reported over the last 40 years among several European taxa (e.g., Hickling et al., 2005). The future biogeographical distribution of Odonata undoubtedly will be influenced directly and indirectly by anthropogenically altered climate." (Authors)] The paper reviews the following subjects: "2. What are dragonflies and damselflies? Real hunters; 2.1 Ecology and behaviour; 2.2 Species diversity and biogeography; 2.3 Dispersal in Odonata, flight behaviour and migration; 3. Anisoptera phylogeny; 3.1 Biogeography of the dragonfly superfamily Libelluloidea and Australian endemism; 4. Biogeography of Zygoptera." For details see: <http://www.intechopen.com/books/global-advances-in-biogeography/biogeography-of-dragonflies-and-damselflies-the-highly-mobile-predators->] Address: Ware, Jessica, Rutgers, Univ. of New Jersey, Cook College, 93 Lipman Drive, New Brunswick, New Jersey 08901, USA. E-mail: jware@amnh.org

**11380.** Shinohara, S.; Obata, A.; Seki, M.; Ichihara, K.; Ishida, E.H. (2012): Study of airfoils for the unique micro wind turbine blade. Design for innovative value towards a sustainable society: 691-696. (in English) ["An airfoil of insect's wing is completely different from the conventional streamlining airfoil, and it has very thin corrugated cross section. As you can see from the flight of insects, their wings are used in the low speed region, functioning in a speed region different to the ones in which streamlining airfoil is used. Studies on the aerodynamic characteristics of the corrugated wing in the low speed region are very limited, with many aspects still remaining unknown. In order to clarify aerodynamic characteristics of corrugated airfoil in the low speed region, we have developed our own system composed of micro three-component balance and swirl-type experimental water channel, and investigated the aerodynamic characteristics of the corrugated airfoil and curved plate having smooth cross section in the low speed regions ( $Re=7,000$  and  $11,000$ ). This investigation revealed that, in the low speed regions the aerodynamic characteristics of the corrugated airfoil was equivalent to or superior than those of the curved plate, and it was also found that the aerodynamic characteristics of the

curved plate were very susceptible to the changes in Reynolds number whereas those of the corrugated wing were insusceptible to the changes. In the past, a small wind turbine has not been paid much attention as a source of alternative energy because of its low availability in low wind speed region and of its difficulty in handling it. All of these issues inherent in the small wind turbine will be solved by adopting the corrugated wing in the wind turbine. All of these findings from our investigation are reported in this paper." (Authors)] The paper includes references to Odonata wing morphology.] Address: Seki, M., Department of Aerospace Engineering, and Micro Flying Robot Laboratory, Nippon Bunri University, 1727 Ichigi, Oita 870-3979, Japan

**11381.** Smith, A.J.; Cook, T.J. (2012): Revision of the genus *Prismatospora* and description of *Prismatospora cloptoni* n. sp. (Apicomplexa: Actinocephalidae: Acanthosporinae) from naiads of the Green Darner, *Anax junius* (Odonata: Anisoptera: Aeshnidae), in east Texas, U.S.A. Comparative Parasitology 79(1): 9-14. (in English) ["*Prismatospora cloptoni* n. sp. (Apicomplexa: Eugregarinida: Actinocephalidae: Acanthosporinae) is described from naiads of *A. junius* collected from the pond at the Sam Houston State University Center for Biological Field Studies, Walker County, Texas, USA. This is the second species described in the genus, and it confirms the generic hypothesis of *Prismatospora*. The generic diagnosis is revised to reflect common characters of its constituent species." (Authors)] Address: Cook, Tamara J., Department of Biological Sciences, Sam Houston State University, Box 2116, Huntsville, Texas 77341-2116, USA. E-mail: tcook@shsu.edu

**11382.** Sun, J.; Bhushan, B. (2012): The structure and mechanical properties of dragonfly wings and their role on flyability. Comptes Rendus Mécanique 340(1): 3-17. (in English) ["Dragonfly wings possess great stability and high load-bearing capacity during flapping flight, glide, and hover. Scientists have been intrigued by them and have carried out research for biomimetic applications. Relative to the large number of works on its flight aerodynamics, few researchers have focused on the insect wing structure and its mechanical properties. The wings of dragonflies are mainly composed of veins and membranes, a typical nanocomposite material. The veins and membranes have a complex design within the wing that give rise to whole-wing characteristics which result in dragonflies being supremely versatile, maneuverable fliers. The wing structure, especially corrugation, on dragonflies is believed to enhance aerodynamic performance. The mechanical properties of dragonfly wings need to be understood in order to perform simulated models. This paper focuses on the effects of structure, mechanical properties, and morphology of dragonfly wings on their flyability, followed by the implications in fabrication and modelling." (Authors)] Address: Bhushan, B., Nanoprobe Laboratory for Bio- & Nanotechnology and Biomimetics (NLB2), The Ohio State University, 201 W. 19th Avenue, Columbus, OH 43210-1142, USA. E-mail: bhushan.2@osu.edu

**11383.** Takahara, T.; Kohmatsu, Y.; Maruyama, A.; Yamaoka, R. (2012): Predator-specific inducible morphological changes in two Japanese anuran tadpoles. Herpetology Notes 5: 43-47. (in English) ["We evaluated inducible morphological changes in tadpoles of two anuran species, the Japanese tree frog (*Hyla japonica*) and the wrinkled frog *Glandirana* (*Rana*) *rugosa*, against two predator types, which were represented by

a predatory fish (*Carassius auratus*) and the nymph of a dragonfly (*Anax parthenope julius*). In the presence of fish cues, *H. japonica* developed shallower tail fins, whereas *G. rugosa* did not exhibit such morphological change. Both tadpole species developed deeper tail fins in the presence of dragonfly nymph cues. The predator specific responses for the species' tadpoles are likely to optimize avoidance of lethal attacks by predators. The interspecific differences in inducible morphological defence traits might be related to the balance with the effects of other defensive traits and explained by the frequency and time of their encounters with predators." (Authors)] Address: Takahara, T., Graduate School of Science and Technology, Matsugasakigogyokaido, Sakyo-ku, Kyoto Institute of Technology, Kyoto 606-8585, Japan. E-mail: takahara@hiroshima-u.ac.jp

**11384.** Tango, L.K.; Foote, D.; Magnacca, K.N.; Foltz, S.J.; Cutler, K. (2012): Biological inventory of anchialine pool invertebrates at Pu'uuhouua o Honaunau National Historical Park and Pu'ukohola Heiau National Historic Site, Hawai'i Island. Pacific Cooperative Studies Unit Technical Report No. 181. 24 pp (in English) ["A single male *Megalagrion xanthomelas*, was sighted perched on sedges at the water hole at Waikulu (site 9). Another male and a tandem pair of this endemic damselfly were also observed at the Makaloa pond (site 3) along with several male non-indigenous *Ischnura ramburii*. A lone indigenous *Pantala flavescens* was observed near the trail leading to Waikulu spring and later one was observed flying over Haleipalala. A tandem pair of the indigenous *Anax junius* was observed ovipositing at the water's edge at the Makaloa pond. These same two native dragonflies, *A. junius* and *P. flavescens*, were observed at PUHE along with the adventive *Tamea lacerata* and *I. ramburii*. *Megalagrion* damselflies were not observed at PUHE." (Authors)] Address: Tango, Lori, Pacific Cooperative Studies Unit, Univ. of Hawai'i at Manoa, Dept Botany, 3190 Maile Way Honolulu, Hawai'i 96822, USA

**11385.** Termaat, T.; Kalkman, V.J. (2012): Odonata Red List Report 2011 using Dutch and IUCN criteria. *Brachytron* 14(2): 75-187. (in Dutch, with English summary) ["In this report a proposal is published for a revised Red List for Dragonflies. When the Dutch Ministry of Economic Affairs, Agriculture and Innovation publishes this list in the government gazette, the Red List of 1997 will be replaced. In addition, this report presents a regional Red List following the internationally used criteria of IUCN, so that the situation in The Netherlands can be compared with that in other countries. All 65 species regularly reproducing in The Netherlands were assessed in order to decide whether they should be red-listed according to the criteria of the Dutch government. Red List species are species that became extinct after 1900 and species that are threatened. The threatened species are subdivided in four categories. ... The 2011 Red List includes the following numbers of species per category: 5 Extinct in The Netherlands, 4 Critically endangered, 6 Endangered, 6 Vulnerable, and 2 Susceptible. Thus, the Red List comprises 23 species (35% of the assessed species). The other 42 species are Not threatened at present. In order to make a clean comparison between the new Red List and the 1997 Red List, the latter has been reconstructed using the current improved method and partly with additional data. The reconstructed 1997 Red List comprises 27 species (44% of the assessed species). These are categorised

as follows: 8 species Extinct in the Netherlands, 4 Critically endangered, 8 Endangered, 6 Vulnerable en 1 Susceptible. The other 34 species were Not threatened at present. A comparison between both Red Lists shows a fairly positive picture. The 2011 Red List includes three species less than the 1997 list, despite the fact that four species appear on the Red List for the first time (two of which after becoming recently established). Three species previously extinct in The Netherlands have reappeared. And most species of running waters and fens show a positive trend. Species of softwater lakes are increasing too, but alarming exceptions exist. According to the IUCN criteria, which chiefly assess the situation over the past ten years, 19 species feature on the Red List. These are categorized as follows: 3 Regionally Extinct, 2 Critically Endangered, 4 Endangered, 3 Vulnerable, and 7 Near Threatened. By IUCN criteria, the other 46 species are assessed as not threatened and belong to Least Concern. The most important causes of decline of dragonflies are habitat destruction due to intensified use of land and environmental problems such as acidification, eutrophication, and desiccation. These threats were strongest in the period 1950-1980. Most habitat-specialised species had their strongest decline during those years. From the 1990s onward many species have reversed their negative trend, due to improvement of the environment and nature restoration measures. The higher number of warm summers has also had a positive influence on some species. Potential negative effects of climate change on northern and northeastern dragonfly species are still insufficiently known. To enable Red List updating, the data collected by volunteers within the framework of distribution research and the Dutch Dragonfly Monitoring Scheme are indispensable." (Authors)] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands. E-mail: tim.termaat@vlinderstichting.nl

**11386.** Theischinger, G.; Jacobs, S. (2012): Surprise re-discovery of *Acanthaeschna victoria*, a key taxon in dragonfly evolution (Odonata, Aeshnoidea, Telephlebitidae). *Agrion* 16(1): 3-9. (in English) ["During monitoring by the Office of Environment and Heritage in south-eastern New South Wales a rather large number of larvae of the rare and elusive dragonfly species *A. victoria*, a key taxon in dragonfly evolution, were found at three new localities. The southernmost of these at Nadgee extends the range of the species south by more than 200 km to 5 km from the NSW/Victoria border and suggests that the species will eventually be found in Victoria. Rearing of the larvae in Sydney confirmed the hitherto only supposed identity of the larvae, and provided for the first time information on the morphology of the female larva and on the coloration of the subadult imagines. The rearing also provided new information on food of the larvae, life history and phenology. Some of the reared subadults were released in their natural habitat, and specimens were preserved for future DNA analysis for phylogenetic studies. A thought is given to the possible future usage – when more data are available – of *A. victoria* as an indicator species for ecological condition and climate change." (Authors)] Address: Theischinger, G., Water Science, Office of Environment & Heritage, Dept of Premier & Cabinet, PO Box 29, Lidcombe NSW 1825, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**11387.** Umar, D.M.; Marinov, M.G.; Schorr, M.; Chapman, H.M. (2012): Odonata attracted by light - a new topic for myth-busters. *International Dragonfly Fund* -



Report 43: 1-52. (in English) ["Six Odonata species were collected during night light trapping on the Mambilla Plateau, Taraba State Nigeria. Being predominantly diurnal insects, Odonata captured in light traps have always been considered as an anomaly. The new data initiated an extensive interrogation of all records on Odonata collected near artificial light sources. A total of 415 records (402 published and 13 new) are presented here with a summary of previous discussions and new discussion points. The general conclusion is that Odonata are mainly confused by, rather than attracted to the light. New avenues for further research in this field are suggested based on previous important studies undertaken on Odonata morphology and physiology." (Authors)] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

**11388.** Verdonschot, R.C.M.; Peeters, E.T.H. (2012): Preference of larvae of *Enallagma cyathigerum* (Odonata: Coenagrionidae) for habitats of varying structural complexity. *Eur. J. Entomol.* 109(2): 229-234. (in English) ["In macrophyte-rich lentic ecosystems, higher numbers of damselfly larvae occur in areas where there is structurally complex vegetation than in those where the plant architecture is relatively simple. Biotic interactions rather than morphological constraints are considered to underlie this pattern. We investigated whether the preference of the larvae of *E. cyathigerum* for a particular habitat was retained in absence of prey, predators and / or conspecifics. A series of laboratory choice experiments was conducted in which combinations of sediment and artificial plants differing in structural complexity were offered simultaneously to the larvae. Larvae preferred patches with structurally complex vegetation over patches with simply structured vegetation or lacking vegetation. Patches with simply structured vegetation were preferred over those with bare sediment, but the number of larvae showing a clear choice, which is regarded as an indication of the strength of the preference for a particular habitat, was relatively low compared to the number of individuals responding when complex vegetation was present. Based on the results presented, we conclude that the preference of *E. cyathigerum* larvae for structurally complex vegetation is independent of the presence of predators, prey or competitors. This suggests that this behaviour of the larvae is either learned or an innate response." (Authors)] Address: Verdonschot, R. Dept of Freshwater Ecology, Centre for Ecosystem Studies, Alterra, Wageningen UR, P.O. Box 47, 6700 AA, Wageningen, The Netherlands. E-mail: ralf.verdonschot@wur.nl

**11389.** Willigalla, C.; Fartmann, T. (2012): Patterns in the diversity of dragonflies (Odonata) in cities across Central Europe. *Eur. J. Entomol.* 109: 235-245. (in English) ["Urbanisation is an important cause of species extinctions. Although urban water systems are also highly modified, studies on aquatic or semi-aquatic organisms are rare. The aim of this study is to identify the factors that determine species richness of Odonata in 22 Central European cities and along an urban-rural gradient within six of them. With 64 indigenous species in total and an average of 33 species per city, the species richness of Odonata in Central European cities is comparatively high. A generalised linear model indicates that species richness is positively related to city area. Additional predictors are climatic variables (temperature amplitude, sunshine duration and July temperature) and the year last studied. Since most cities are usually lo-

cated in areas with naturally high habitat heterogeneity, we assume that cities should be naturally rich in dragonflies. The role of city area as a surrogate for habitat and structural richness most likely explains why it is strongly associated with Odonata species richness. The relationship between species richness and the climatic variables probably reflects that Odonata species richness in Central Europe is limited by warm and sunny conditions more than by availability of water. The temporal effect (the year last studied) on species richness is likely to be a consequence of the recent increase in Mediterranean species associated with global warming. Urbanisation clearly has an adverse effect on the species diversity of Odonata. Species richness increases along a gradient from the centre of a city to the rural area and is significantly highest in rural areas. This pattern probably reflects a gradient of increasing habitat quality from the centre of cities to rural areas. Moreover, the number of water bodies is generally very low in the city centres. Based on our results, we make recommendations for increasing the abundance and number of species of dragonflies in cities." (Authors)] Address: Fartmann, T., Dept Community Ecol., Inst. Landscape Ecology, Univ. of Münster, Robert-Koch-Str. 28, 48149 Münster, Germany. E-mail: fartmann@uni-muenster.de

**11390.** Wohlfahrt, B.; Vamosi, S.M. (2012): Predation and habitat isolation influence the community composition-area relationship in dytiscid beetles (Coleoptera: Dytiscidae). *Community Ecology* 13(1): 1-10 (in English) ["A major goal in ecology remains the understanding of patterns in diversity and distributions of species in natural communities. The species-area relationship is an important tool for investigating differences among communities, and may be also influenced by habitat isolation and dominant predator presence. In this two-year study, we evaluated the influences of habitat area, isolation and predation on community composition of dytiscids in two geographical regions dominated by different top predators (large predaceous dragonfly larvae or fish). Contrary to expectations, surface area, isolation and predator presence/absence alone did not significantly influence dytiscid species richness and total abundance, but in association with other environmental variables, such as submerged macrophyte growth forms. Components of habitat heterogeneity likely outweighed effects of area and predation regime on prey species diversity. However, differences in the set of abundant species were best explained by habitat surface area. Thus, in contrast to species diversity, gradients in community composition were not outweighed by components of heterogeneity. In this study, predator presence was not correlated with habitat isolation. Instead, our results revealed that the effect of predator presence/absence on prey community composition and the resulting set of coexisting species may depend on habitat isolation. Within regions, the effect of large predaceous dragonfly larvae on species composition may depend on pond surface area, whereas the presence of fish influenced species composition alone and in association with area. We advocate that regional differences in environmental gradients be considered when community composition is evaluated." (Authors)] Address: Wohlfahrt, Bianca, Department of Biological Sciences, Univ. of Calgary, 2500 University Drive NW, Calgary, T2N 1N4, Canada. E-mail: bianca\_wohlfahrt@freenet.de

**11391.** Wong, D.C.C.; Pearson, R.D.; Elvin, C.M.; Merritt, D.J. (2012): Expression of the rubber-like protein,

resilin, in developing and functional insect cuticle determined using a *Drosophila* anti-rec 1 resilin antibody. *Developmental Dynamics* 241(2): 333-339. (in English) ["Background: The natural elastomeric protein, insect resilin, is the most efficient elastic material known, used to store energy for jumping and flight in a variety of insects. Here, an antibody to recombinant *Drosophila melanogaster* pro-resilin is used to examine resilin expression in *Drosophila* and a wider range of insects. Results: Immunostaining of *Drosophila* embryos reveals anti-resilin reactivity in epidermal patches that exhibit a dynamic spatial and temporal expression through late embryogenesis. Resilin is also detected in stretch receptors in the embryo. In developing adult *Drosophila*, resilin pads are described at the base of wings and at the base of flexible sensory hairs in pupae. Resilin is also detected in embryos of the tephritid fruitfly, *Bactrocera tryoni*, and two well-known concentrations of insect resilin: the flight muscle tendon of the dragonfly and the pleural arch of the flea. Conclusions: The anti-Rec1 antibody developed using *Drosophila* pro-resilin as antigen is cross-reactive and is useful for detection of resilin in diverse insects. For the first time, resilin expression has been detected during embryogenesis, revealing segmental patches of resilin in the developing epidermis of *Drosophila*." (Authors) Odonata are discussed at the order level.] Address: Merritt, D., School of Biological Sciences, The University of Queensland, Brisbane, Queensland, Australia. E-mail: d.merritt@uq.edu.au

**11392.** Xu, Q.-h. (2012): A description of the final stadium larva of *Leptogomphus elegans* Lieftinck, with a discussion of taxonomic characters of the larvae of the genus *Leptogomphus* Selys (Odonata: Gomphidae). *International Journal of Odonatology* 15(1): 25-29. (in English) ["The final stadium larva of *L. elegans* is described and illustrated for the first time. The taxonomic characters of the larvae of the genus *Leptogomphus* Selys are discussed and summarized." (Author)] Address: Xu, Q.-h., Department of Biological and Environmental Engineering, Zhangzhou City University, Zhangzhou, Fujian 363000, PR China. E-mail: qihanx@yahoo.com.cn

**11393.** Yu, X.; Hämäläinen, M. (2012): A description of *Echo perornata* spec. nov. from Xizang (Tibet), China (Odonata: Calopterygidae). *Zootaxa* 3218: 40-46. (in English) ["*Echo perornata*, spec. nov. (holotype male, China, Xizang Autonomous Region [Tibet], Motuo [Medog], alt. 850m, 1 vii 1983) is described and illustrated for both sexes. The new species has a pale pterostigma shaped quite similarly to that of *Echo margarita* Selys, 1853, but it differs in wing colour pattern and structure of the penis. *E. margarita* is recorded from China (Yunnan, Ruili) for the first time." (Authors)] Address: Yu, X., Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, 300071, China. E-mail: nkyuxin@yahoo.cn

**11394.** Yu, G.a.; Huang, H.Q.; Wang, Z.; Brierley, G.; Zhang, K. (2012): Rehabilitation of a debris-flow prone mountain stream in southwestern China – Strategies, effects and implications. *Journal of Hydrology* 414–415: 231-243. (in English) ["Rehabilitation of Shengou Creek, a small, steep mountain stream in southwestern China that is prone to debris flows, started more than 30 years ago through an integrated program of engineering applications (check dams and guiding dikes), biological measures (reforestation), and social measures (reducing human disturbance). Small and medium-sized check

dams and guiding dikes were constructed on key upper and middle sections of the creek to stabilize hillslopes and channel bed. Meanwhile, *Leucaena leucocephala*, a drought-tolerant, fast-growing, and highly adaptive plant species, was introduced to promote vegetation recovery in the watershed. The collective community structure of tree, shrub, and herb assemblages in the artificial *L. leucocephala* forest, which developed after 7 years, enhanced soil structure and drastically reduced soil erosion on hillslopes. Cultivation of steep land was strictly controlled in the basin, and some inhabitants were encouraged to move from upstream areas to downstream towns to reduce disturbance. These integrated measures reduced sediment supply from both hillslopes and upstream channels, preventing sediment-related hazards. The development of natural streambed resistance structures (mainly step-pool systems) and luxuriant riparian vegetation aided channel stability, diversity of stream habitat, and ecological maintenance in the creek. These findings are compared with Jiangjia and Xiaobaini Ravines, two adjacent non-rehabilitated debris-flow streams which have climate and geomorphologic conditions similar to Shengou Creek. Habitat diversity indices, taxa richness, biodiversity, and bio-community indices are much higher in Shengou Creek relative to Jiangjia and Xiaobaini Ravines, attesting to the effectiveness of rehabilitation measures" (Authors) The density of benthic macroinvertebrates (ind/m<sup>2</sup>) including Gomphidae, Aeshnidae, Cordulegasteridae and Euphaeidae is presented in table 5.] Address: Huang, H.Q., Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, 11A Datun Road, Chaoyang District, Beijing 100101, China. E-mail: huanghq@igsrr.ac.cn

**11395.** Zhu, B.L.; Wu, H.P.; Xiao, T.H. (2012): Study of aerodynamic interactions of dual flapping airfoils in tandem configurations. *Applied Mechanics and Materials* 160: 301-306. (in English) ["The unsteady viscous flow fields of dual flapping airfoils in tandem configurations are simulated by a Navier-Stokes Solver based on dynamic deformable hybrid meshes. Aerodynamic interactions of three motion models are studied including flapping fore airfoil with fixed aft airfoil, two airfoils flapping in phase and out-of-phase. The results indicate that the aft airfoil in the wake of the flapping fore airfoil has great influence on the aerodynamic performance. When the fore airfoil flaps with a fixed aft airfoil, the thrust generation and thrust propulsive efficiency were enhanced by 65% and 44% respectively, compared to that of single flapping airfoil. When the two airfoils stroke in phase, the thrust generation is twice over that of single flapping airfoil. However the out-of-phase stroking has relatively much lower thrust...In fact, the flapping wing MAV's cruising speed is about several meter per second. The aerodynamic force of dual flapping airfoils was studied based on like dragonfly wing [7-8], now it is still difficult that apply to MAV due to complexity of flapping configuration." (Authors)] Address: Zhu, B., Nanchang Hangkong University, Nanchang 330063. China. E-mail: Jzhubaoli@126.com



**Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for multiple help, and Geert de Knijf and Werner Piper for contributing many papers to this issue.**

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105; E-mail: K.Reinhardt@sheffield.ac.uk

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

## 1998

**11396.** Bambaradeniya, C.N.B.; Fonscka, K.T.; Ambagahawatte, C.L. (1998): A preliminary study of fauna and flora of a rice field in Kandy, Sri Lanka. *Cey. J. Sci. (Bio. Sci.)* 25: 1-22. (in English) ["A study of the fauna and flora of a rice-field ecosystem was carried out during a single cultivation cycle, in a terraced paddy field (0.5ha) located at Ampitiya, Kandy during May-October 1992. The occurrence of animals and plants was studied in relation to the different ecological phases of the paddy field, growth stage of the paddy plant, and agronomic practices. A total of 77 species of invertebrates, 45 species of vertebrates and 34 species of weeds was recorded from the study site. 95% of the invertebrate fauna consisted of arthropods, represented by 53 families in four classes. About half of the vertebrates recorded were birds consisting of 22 species in 14 families. Monocot weeds belonging to the families Commelinaceae, Cyperaceae and Poaceae dominated the field at different stages of the cultivation cycle. The aquatic phase encompassing the vegetative and reproductive stages of the rice plant supported the greatest number of invertebrate fauna (68 species). The application of insecticides resulted in a considerable decrease in the numbers of invertebrate fauna." (Authors) The list of taxa includes *Orthetrum sabina*, *Neurothemis tullia* and *Agriocnemis* spp.] Address: Bambaradeniya, C.N.B., Dept of Zoology, University of Peradeniya, Peradeniya, Sri Lanka

**11397.** Nel, A.; Bechly, G.; Jarzembowski, E.; Martínez-Delclòs, X. (1998): A revision of the fossil petalurid dragonflies (Insecta: Odonata: Anisoptera: Petalurida). *Paleontologia Lombarda Nuova serie X*: 1-68. (in English, with French and Italian summaries) ["A new family, genus and species of Petalurida, *Cretapetalura brasiliensis* gen. nov. et sp. nov. (Cretapetaluridae fam. nov.) is described from the Lower Cretaceous Santana Formation of the Araripe Basin of Brazil, and a new subfamily, genus and species of Petalurida, *Pseudocymatophlebia henningi* gen. nov. et sp. nov. (Pseudocymatophlebiinae subfam. nov. in Aktassiidae) is described from the Lower Cretaceous Weald Clay of England. A new species *Aktassia pritykinae* sp. nov. is described from the Lower Cretaceous of Mongolia. The description of new material enables us to revise the phylogenetic position of the

genera *Protolindenia* Deichmüller 1886, *Aeschnogomphus* Handlirsch 1906, *Mesuropetala* Handlirsch 1906, and *Cymatophlebia* Deichmüller 1886 from the Upper Jurassic of Germany, and to designate neotypes for *Protolindenia wittei* and *Mesuropetala koehleri*. *Aeschnogomphus* and *Aktassia* Pritykina 1968 are considered to be sister-genera within the Petalurida - Aktassiidae (subfamily Aktassiinae stat. nov.). *Aeschnogomphus buchi* (Hagen 1848) is recognized as valid name for *Aeschnogomphus charpentieri* (Hagen 1848). *Mesuropetala*, formerly considered to be a petalurid, is regarded as a basal Aeshnoptera; and *Protolindenia*, formerly considered to be a gomphid, is transferred to the Petalurida, as most basal member of the stem-group of Petaluridae. The phylogenetic positions of *Mesuropetala auliensis* Pritykina 1968, *Mesuropetala costalis* Pritykina 1968, *Protolindenia aktassica* Pritykina 1968 (in *Kazakhophlebiella* gen. nov. et comb. nov.) and *Protolindenia deichmuelleri* Pritykina 1968 (in *Pritykiniella* gen. nov. et comb. nov.) (all Upper Jurassic taxa from Karatau, Turkestan, Russian Federation), are discussed. Also, the phylogenetic positions of *Miopetalura shanwangica* Zhang 1989 and *Miopetalura orientalis* (Hong 1985) (Middle Miocene of China) are discussed and these taxa are transferred from the Petaluridae to the Gomphides- Lindeniinae and Anisoptera incertae sedis respectively. The English Lower Cretaceous *Aeschnopsis perampla* (Brodie 1845) and *Cymatophlebiopsis pseudobubas* Handlirsch 1939 are revised, synonymised and considered to belong to Anisoptera incertae sedis. The Lower Cretaceous genus *Necrogomphus* Campion 1923 with two species *N. petrificatus* (Hagen 1850) and *N. jurassicus* (Giebel 1850) is revised and also referred to Anisoptera incertae sedis. The phylogenetic positions of *Protolindenia*, *Aeschnogomphus*, *Aktassia*, *Pseudocymatophlebia* gen. nov., and *Cretapetalura* gen. nov. within the Petalurida are discussed and a phylogenetic analysis of the fossil and extant Petalurida is presented. The Petalurida are identified as sister-group of all remaining extant Anisoptera (Euanisoptera). The new phylogenetic system of Anisoptera by Bechly (1996) is confirmed, and new phylogenetic definitions of the taxon names of Petalurida are proposed. The evolution and historical biogeography of Petalurida is discussed." (Authors)] Address: Nel, A., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimr1.mnhn.fr



**11398.** Poinar, G.O.; Bozidar, I.; Curcic, P.M.; Coken-dolpher, J.C. (1998): Arthropod phoresy involving Pseudoscorpions in the past and present. *Acta arachnol.* 47(2): 79-96. (in English) ["Pseudoscorpions form phoretic associations with a wide range of arthropods, including at least 44 families of insects and three families of arachnids. The present work brings up to date phoretic associations between pseudoscorpions and different arthropods and discusses the long-standing controversy over whether this behaviour is basically a predatory response or adapted solely for dispersal. That phoresy in pseudoscorpions is of long standing and obligatory in many cases is demonstrated by its continuance for millions of years, as shown by the fossil record. A member of the Chthoniidae attached to a moth in Baltic amber is reported for the first time." (Authors)] The paper refers to Dunkle, S.W. (1984): First record of pseudoscorpions phoretic on dragonflies. *Notul. Odonatol.* 2: 48] Address: Poinar, Jr., G.O., Dept of Entomology, Oregon State Univ., Corvallis, Oregon 97331, USA.

#### 1999

**11399.** Zamora-Munoz, C.; Soler, J.J. (1999): Asymmetry and sexual selection in insects. *Bol. S.E.A.*: 703-712. (in Spanish, with English summary) [This review paper refers in a chapter to *Coenagrion puella* (Harvey, I.F.; Walsh, K.J., 1993: Fluctuation asymmetry and lifetime mating success are correlated in males of the damselfly *Coenagrion puella* (Odonata: Coenagrionidae). *Ecol. Entomol.* 18(3): 198-202.)] Address: Zamora Muñoz, Carmen, Departamento de Biología animal y ecología, Facultad de Ciencias, Universidad de Granada, 18071-Granada, Spain. E-mail: czamora@ugr.es

#### 2000

**11400.** Yousuf, M.; Abbasi, M.L.; Khaliq, A. (2000): Description of a new allotype of *Bayadera longicauda* Fraser (Euphaeidae: Odonata) from Azad Kashmir. *Pakistan Entomologist* 22(1-2): 45-46. (in English) ["A single female specimen of *Bayadera longicauda* Fraser has been collected from Muzaffarabad district of Azad Kashmir. As it represents a new allotype, its detailed description is given." (Authors)] Address: Yousuf, M., Dept. of Agricultural Entomology, University of Agriculture, Faisalabad, Pakistan

#### 2001

**11401.** Gaino, E.; Rebor, M. (2001): Apical antennal sensilla in nymphs of *Libellula depressa* (Odonata: Libellulidae). *Invertebrate Biology* 120(2): 162-169. (in English) ["In an ultrastructural study of the apical antenna of the last nymphal stages of *L. depressa*, we found long sensilla trichodea, 2 sensory pegs, and a coeloconic sensillum on the last article of the flagellum (the distal part of the antenna). The long sensilla trichodea are mechanoreceptors, almost identical to the long filiform hairs of some terrestrial insects and the first sensilla of this kind to be described in aquatic insects. Particular attention was given to the complex coeloconic sensillum, a compound sensillum innervated by 2 groups of 3 neurons wrapped in a dendritic sheath. A cuticular sleeve envelops the distal portion of the outer dendritic segment. The cuticle of the coeloconic sensillum shows

wide channels and is contiguous to the underlying granular and fibrillar layer. Similar structures on the antennae of the adults of other dragonflies were identified as chemoreceptors in previous studies. We hypothesize that this larval coeloconic sensillum might likewise have a chemosensory function, responding to molecules that diffuse through the cuticle and the underlying granular and fibrillar layer, as no clear pore or pore-tubule system is visible. Alternative functions are also explored on the basis of morphological details." (Authors)] Address: Rebor, Manuela, Dipartimento di Biologia Cellulare e Ambientale, Università di Perugia, 06123 Perugia, Italy. E-mail: rebora@unipg.it

#### 2002

**11402.** HYDRA Institut Konstanz (2002): Koordinierte biologische Untersuchungen am Hochrhein 2000; Makroinvertebraten. Schriftenreihe Umwelt Nr. 345: 98 pp. (in German, with French, Italian and English summaries) ["The present report gives the results of the third part of a long-term monitoring of the macroinvertebrates on the High Rhine riverbed. In 2000, as in previous investigations, representative cross-sections of the river were examined with the help of a diver. In comparison with the results for 1990 and 1995, conspicuous changes in the benthic population could be observed in the navigable part of the river. A dense scheme of additional riparian samples produced new faunistic and zoogeographical information. Based on the biological characterisation now available, current deficits are shown and the requirements for ecological improvement are formulated." (Authors)] The study includes records of *Calopteryx splendens*, *C. virgo*, *Platycnemis pennipes*, *Ischnura elegans*, *Gomphus simillimus*, *G. vulgatissimus*, and *Onychogomphus forcipatus*] Address: HYDRA, Institut für angewandte Hydrobiologie, Büro Peter Rey, Fürstenbergstr. 25, 78467 Konstanz, Germany. E-mail: hydra.konstanz@hydra-institute.com

**11403.** Robson, B.; Sherwood, J.; McKay, S.F.; Kelly, L.M. (2002): Floodplain wetlands of the Gellibrand estuary: What type of invertebrate community?. *Ecological management & restoration* 3(2): 139-141. (in English) ["Along the south coast of Australia, wetlands on the floodplains of lowland rivers and estuaries have been severely altered by agriculture and urbanization. Efforts to restore or rehabilitate these wetlands are hampered by insufficient knowledge of the original condition of these wetlands, or their variability in time and space. This research describes the macroinvertebrate community of wetlands on the floodplain of the Gellibrand River and estuary, which has suffered comparatively few human impacts. The aim of the research was to describe the variability of macroinvertebrate communities as a baseline for the future management of these wetlands, and to contribute to the general understanding of estuary-floodplain wetlands, thereby improving the basis for their management. The Gellibrand River has a catchment area of approximately 1200 km<sup>2</sup> draining the western slopes of the Otway Ranges, and entering the Southern Ocean at Princetown. From a mean annual flow of 315 000 mL, 25 000 mL are removed per annum for agricultural and domestic use (O'May & Wallace 2001), and flows are closer to natural regimes than most other Western Victorian rivers. The estuary is a bar-built, salt-wedge estuary that becomes completely blocked by the sand bar in most years, during summer

and autumn. Over past decades, the estuary mouth has been opened artificially in most years. to prevent flooding of agricultural land and roads adjacent to the wetlands. At its maximum, the salt-wedge penetrates approximately 10 km upstream from the river mouth, but the estuary may also be completely fresh during high winter discharge (Mckay 2000). The wetlands surrounding Princetown cover 119 ha and are listed as nationally important (Environment Australia 2001). This listing regards the wetlands as an important habitat for animals at vulnerable stages of their life cycle and a refuge from adverse conditions, such as drought. They are a good example of coastal brackish and freshwater marshes, with an important ecological and hydrological role as part of a large wetland complex." (Authors) The list of taxa includes seven Odonata larvae, but no details are given.] Address: Robson, Belinda, School of Ecology & Environment, Deakin Univ., PO Box 423, Warrnambool, Vic 3280. E-mail: brobson@deakin.edundau

**11404.** Slaats, J. (2002): Libellen kijken in Nederland: Deurnesche Peel. *Brachytron* 6(1): 25-27. (in Dutch) [This regenerated bog is situated along the border of the two Netherlands provinces Noord-Brabant and Limburg. 37 Odonata species are listed from the locality including *Coenagrion lunulatum* and *Leucorrhinia rubicunda*.] Address: Slaats, J., Astense Weg 6, 5768 PD Mejel, The Netherlands. E-mail: jsl@occ.nl

**11405.** Wakasugi, K.; Osada, M.; Mizutani, M.; Fukumura, K. (2002): Measurement of the dispersal distance of the *Ischnura asiatica*. Appropriate spacing of sanctuaries for aquatic animal life. *Transactions of the Japanese society of irrigation, drainage and reclamation engineering* 70(3): 421-426. (in Japanese, with English summary) ["One of the major concerns in rural areas these days is destruction of habitats of aquatic animal life and consequent loss of biodiversity, partly attributed to implementation of farmland consolidation projects. To cope with this problem, increasing efforts have been made to create animal sanctuaries in and around project areas. What we have yet to know, however, is how best to space these sanctuaries across the tracts of consolidated farmland. Obviously an index for their minimal spacing required is the dispersal distance of the aquatic life in question. In this study, we targeted at the aquatic dragonflies of the *Ischnura asiatica*, supposedly low in flight ability, and investigated how far they flew away from their breeding ground and what environmental factors affected where they reappeared, using the mark-and-recapture method. We conducted the field survey in Utsunomiya City during the August-September period, 2000. The survey revealed that they moved no farther than 1.1-1.2km and submerged fallow paddies greatly affected where they reappeared." (Authors)] Address: not available

**11406.** Wasscher, M.; de Groot, T. (2002): De Vechtplassen. *Brachytron* 6: 10-12. (in Dutch) [Bog between Utrecht and Randneen, The Netherlands; 29 species are checklisted from the locality.] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: marcel.hilair@12move.nl

### 2003

**11407.** Hutchinson, R.; Goulet, H. (2003): Book Reviews: Ontario Odonata. Volume 3 (including observations for the year 2001). Edited and compiled by Paul

M. Catling, Colin D. Jones and Paul Pratt. 2002. The Toronto Entomologists' Association, Toronto, Canada. *The Canadian Field-Naturalist* 117(3): 487. (in English) ["The third volume (208 pages) on Odonata (the order that includes dragonflies and damselflies) of Ontario is now available. About 25 papers are included, treating new Ontario records, notes on Odonata species rarely captured, changes in distribution patterns, annotated lists of Odonata from a region, characterization of species commonly confused, book reviews, an up-to-date checklist of 166 species (80% of the Canadian fauna!) and changes in abundance for many species since Walker's work in the 1940s, and a checklist of species. The lists of Ontario records are most impressive, comprising about 62% of Volume 3, and summarizing in a database format the information about species, locality, number of males, females and immatures for each record. Though the bulk of the records are for 2001, additional records not previously published cover the years 1996 to 1998. The total number for these four years is an impressive 6059 records. Including similar lists in volumes 1 and 2, 15370 records are now databased for 1996 to 2001. Specimens in collections previously added to about 13000 Ontario specimens. This is an exceptional contribution to the natural history of Ontario, providing a solid base to show the distribution of each species, and for the conservation of Ontario Odonata. Hopefully in time, this information could lead to books on Odonata of Ontario. About 1800 databased specimens of Odonata of Ontario are deposited as voucher in the Canadian National Collection, which has been massively upgraded in the past two years (Figure 1). Among the many articles, the one by Paul Catling on the characterization of males and females of *Lestes disjunctus* and *L. forcipatus* was most welcome. Both species have often been confused by many students. The editors intend to produce this type of document for another two years. By then it is hope that about 25000 records will have been entered. These records will become the base for future work on Odonata of Ontario as well as a time capsule at the very end of the 20th and beginning of the 21st century. We must congratulate the 31 contributors listed with their address and e-mail coordinates on page 105. Such a massive effort could not be done singly. To purchase copies of the 2000, 2001 and 2002 documents, contact Alan J. Hanks, 34 Seaton Drive, Aurora, Ontario, Canada L4G 2K1; Phone: (905) 727-6993, e-mail: A.Hanks@aci.on.ca." (Authors)] Address: Goulet, H., K. W. Neatby Building, 960 Carling Avenue, Ottawa, Ontario K1A 0C6 Canada

**11408.** Tóth, S. (2003): Dragonfly (Odonata) fauna of the Látrányi Puszta Nature Conservation Area. *Natura Somogyiensis* 5: 85-97. (in Hungarian, with English summary) [Hungary; 22 Odonata species are reported during a baseline study in 2000 and 2001. Among others, a good population of *Coenagrion ornatum* is worth to be reported.] Address: Tóth, S., Széchenyi u. 2, 8420 Zirc, Hungaria. E-mail: flycatcher@freemail.hu

**11409.** Xu, D.-i.; Li, Z.-s.; Liu, Y.-f.; Zhuang, J.-x.; Wei, G.-r.; You, M.-s. (2003): Investigation on arthropod species in paddy fields. *Jour. of Northwest Sci-Tech Univ. of Agri. and For. (Nat. Sci. Ed.)* 31(5): 101-105. (in Chinese, with English summary) [Gutian, Fujian Province, China. The list of 208 taxa includes *Pantala* sp. and *Crocothemis* sp.] Address: Xu, D.-i., College of Plant Protection, Fuifan Agriculture and Forestry University, Fuzhou, Fujian 350002, China.

**11410.** Zhang, B.; Pang, H.; Jia, F.; Hang, G. (2003): An investigation of Odonata from Dawuling Natural Reserve of Guangdong. *Natural Enemies of Insects* 25(2): 55-58. (in Chinese, with English summary) [Records of 49 Odonata species from Dawuling Natural Reserve, Guangdong, China are reported. Four species (*Nepogomphus walli*, *Sympetrum uniforme*, *Ischnura mildredae* and *Calicnemis erythromelas*) are new additions to the regional fauna. All specimens are deposited in the Zhongshan University.] Address: Pang, H., Institute of Entomology and State Key Laboratory for Biocontrol, Zhongshan University, Guangzhou, China 510275, China. E-mail: lsshpang@zsu.edu.cn

## 2004

**11411.** Fore, L.S. (2004): Development and testing of biomonitoring tools for macroinvertebrates in Florida streams. Final Report. Prepared for: Russel Frydenborg & Ellen McCarron, Florida Department of Environmental Protection, 2600 Blair Stone Rd., Tallahassee, FL 32399-2400, USA: IV + 62 pp + app. (in English) ["Florida DEP assesses the chemical, physical and biological condition of hundreds of stream sites each year. This study used measures of hydrologic condition, riparian and channel habitat condition, water chemistry, and intensity of human land use to define a gradient of human disturbance for stream sites. I evaluated the sensitivity and tolerance of over 1000 stream macroinvertebrate taxa using the human disturbance gradient (HDG). I tested for correlation between the HDG and 36 biological measures of the stream macroinvertebrate assemblage (metrics) and selected the 10 most highly correlated metrics within six categories of biological organization. The six categories (and their selected metrics) were taxonomic richness (total number of taxa, number of Trichoptera taxa, and number of Ephemeroptera taxa); feeding group (percentage filterer individuals); voltinism (long-lived taxa richness); habit (clinger taxa richness); community structure (percentage dominance of the most abundant taxon and percentage Tanytarsini midges); and sensitivity and tolerance (sensitive taxa richness and percentage very tolerant individuals). Metrics were combined into an overall stream condition index (SCI) by transforming metric values into unit-less scores and summing the scores. The SCI was highly correlated with HDG for an independent data set (Spearman's  $r = -0.81$ ,  $p < 0.001$ ). SCI was independent of watershed size and geographic region (panhandle, peninsula and northeast). Across 10 years of sampling, the index showed a similar response to the HDG. SCI was somewhat higher for winter vs. summer samples (3.5%). A large portion of the variability of SCI was due to subsampling in the laboratory (49%). Confidence intervals based on estimates of SCI variance defined 3.7 categories of biological condition that the SCI could detect assuming a single sample. For two site samples, the SCI could detect five categories of biological condition. Biological metrics were also tested for a second stream macroinvertebrate sampling protocol (BioRecon) based on sorting of invertebrates in the field and taxonomic identification in the laboratory. Of the 10 SCI metrics, six taxa richness metrics were tested using BioRecon data; all were highly correlated with both SCI and HDG. From these metrics the BioRecon index was calculated as the sum of scores for the six metrics. The BioRecon index could detect 2.5 categories of biological condition for one sample and 3.5 categories for two

samples. ... Included in the list were all taxa in the Cordulegastridae and selected taxa in the families Aeshnidae, Gomphidae and Libellulidae ..." (Authors)] Address: Fore, Leska, Statistical Design, 136 NW 40th St., Seattle, WA 98107, USA. E-mail: leska@seanet.com

**11412.** Rodrigues, D.J.; Uetanabaro, M.; Prado, C.P.A. (2004): Seasonal and ontogenetic variation in diet composition of *Leptodactylus podicipinus* (Anura, Leptodactylidae) in the southern Pantanal, Brazil. *Rev. Esp. Herp.* 18: 19-28. (in English, with Portuguese summary) ["The foraging strategies of amphibians allow them to capture a wide variety of prey, diet variation being generally associated with morphological, physiological, and behavioural traits that facilitate the location, identification, and digestion of food items. Herein we present the diet composition of *L. podicipinus* and variations regarding the number and type of prey consumed by juveniles, males and females during the wet and dry seasons, in the southern Pantanal, Brazil. Sampling was conducted at three different times during the dry season, and three different times during the wet season between June 1998 and May 1999. The quantitative analysis showed that the diet of *L. podicipinus* is composed mainly by Coleoptera (51.0%), Hymenoptera (9.1%), Diptera (8.7%), Aranae (5.3%), and Orthoptera (4.7%). In the wet season, males captured more prey than juveniles and females, but in the dry season there were no differences. Males and females ingested larger prey compared to juveniles. The frog *L. podicipinus* is an opportunist and generalist predator, and the availability of prey in the environment may be an important factor determining its diet composition in the Pantanal." (Authors) Odonata larvae occurred in low frequencies in the stomachs analyzed.] Address: Rodrigues, D.J., Departamento de Biologia, Universidade Federal de Mato Grosso do Sul, Caixa Postal 549, 79070-900, Campo Grande, MS, Brazil. E-mail: poxo@inpa.gov.br

**11413.** Suh, A.N. (2004): Dragonfly assemblage dynamics and conservation at small reservoirs in KwaZulu-Natal, South Africa. Ph.D.-Thesis. University of KwaZulu-Natal, Pietermaritzburg: XX + 177 pp. (in English) ["A study of the odonate fauna was carried out at the edge of a major escarpment, in eastern South Africa, using the same methodology as has been used in the temperate regions to obtain a sub-tropical perspective. The study used the macroecology approach to compare patterns and responses of these animals (at the developmental stages of larva, teneral and adults) to seasonal, topographical and anthropogenic disturbances. The habitats used were small, but well-established reservoirs located at five elevational gradients: Stainbank Nature Reserve (100 m), Krantzklouf Nature Reserve (450 m), National Botanical Gardens Pietermaritzburg (790 m) Cedara (1050 m) and Mondi Goodhope Estate (1350 m). Although this is essentially a local component of a larger macroecological study, it is shown that even though species and identities differ between temperate, tropical and sub-tropical ecoregions, the general pattern of community response to these variables is similar. Odonate species phenologies in this sub-tropical study showed great similarity to their tropical counterparts by reason of their adults being highly elevation-tolerant, with long flight periods and over-lapping generations. Yet they also show temperate characteristics by overwintering principally as larvae and eggs. The Libellulidae, followed by the Coenagrionidae were the most abundant, elevation-tolerant families, with national ende-



mics constituting only 6.5% of the total species sampled. Classification and ordination methods identified and characterised sub-sites to ecologically meaningful biotopes for odonates. This also allowed inferences as to how the various landscape disturbances at the five elevations affect species richness and abundance. Species that responded to these impacts were potential indicator groups that can assist in the planning and management of the landscape for conservation of biodiversity. Some management recommendations for these landscapes are given. Individual odonate species developmental stages and their environmental relations were investigated using both univariate and multivariate analyses. The solutions to these analyses were then used to describe how odonate species are distributed along major environmental gradients. It was shown that regional processes e.g. elevation and insolation alongside local variables e.g. pH, marginal grasses, percentage shade, exposed rock, marginal forest, marsh and flow greatly accounted for adult (aerial stage) assemblage variation and distribution. Turbidity, floating/submerged vegetation and water depth (also influenced by regional factors), highly explained larval (aquatic stage) variation. Elevation has therefore, an indirect effect in that it determines climate, which in turn, determines soil and vegetation types which then determine species presence and absence. Also, although these artificial water bodies do not increase the 'extent of species occurrence', they are important in increasing their 'area of occupancy'. Dragonflies play a major role in conservation. The Japanese culture has strongly illustrated how dragonflies feature in everyday life more than any other country in the world. While many parks and Botanical Gardens feature dragonfly trails in their nature trails in Britain, this does not necessarily cater for threatened species. Conservation of invertebrates in urban environments in South Africa for example by ecological landscaping designed to encourage dragonflies has been particularly rewarding. A core of regularly occurring odonate species occupied the dragonfly trail at the National Botanical Gardens in Pietermaritzburg, while other species visited the study site at irregular periods. This is likely to be the case for a longer term, say ten years or more. Also, the trail, with updated information on species phenologies, variability and habitat preferences continues to play a valuable role in sensitising an increasingly urbanised population to biodiversity and conservation issues. Odonates remain a major component when assessing ecological components of aquatic biotopes, with the assemblage composition at anyone locality capable of changing over time. This has been extensively illustrated in the northern hemisphere. Medium to longer term changes in odonate population at established reservoirs as demonstrated in this study at the National Botanical Gardens in Pietermaritzburg, South Africa, makes it possible to determine whether a species in a conservation area is being given enough protection from local anthropogenic impacts and effects of unpredictable weather conditions. This in turn enables one to understand how concepts of residency and succession underpin conservation management decisions. In conclusion, this study has addressed some salient aspects of species inventory, monitoring and conservation practice at a local scale that also play a central role in conventional biodiversity conservation practice of a global nature. Information on species phenologies enhances their awareness-raising in addition to providing valuable insights into their population dynamics and conservation, especially for those under threat.

In addition, baseline data from this study and similar ones is useful in conserving biodiversity (as subjects) or in multi-taxa studies (as tools) in conserving ecosystems and/or landscapes. Finally, the macroecological approach employed in this study has great potential for teasing apart local effects from regional and/or global ones, and can contribute to the conservation of biodiversity at both small and large scales." (Author)] Address: Suh, Augustine c/o Samways, M.J., Dept Ento. & Nematol., Univ. Stellenbosch, Priv. Bag X1, 7602, Matieland, South Africa. E-mail: samways@sun.ac.za

## 2005

**11414.** Buczyński, P. (2005): Materials to the knowledge of dragonflies (Odonata) of Lublin region. Part III. Collection of the Department of Zoology and Hydrobiology of the University of Agriculture in Lublin. *Wiad. entomol.* 24(4): 197-212. (in Polish, with English summary) ["The Odonata collection of the University of Agriculture in Lublin, Poland made between 1950 and 1993 is documented. Nearly all specimens result from the Lublin region in SE Poland. The collection includes 40 species, and the most interesting are: *Sympecma paedisca*, *Coenagrion lunulatum*, *Nehalennia speciosa*, *Aeshna viridis*, *Orthetrum brunneum*, *O. coerulescens*, *Leucorrhinia caudalis*, *L. pectoralis*. The larvae collected during the studies in a lake littoral with the use of light traps (white, yellow, red, green and blue light) are a curiosity. Despite systematic studies conducted in two lakes near Sosnowica (1967-68, 100 samples), the larvae were caught only twice to yellow light. Six specimens represent *Enallagma cyathigerum*, *Coenagrion puella*, *C. pulchellum*, and *Erythromma najas*. It is very probable that those species, very numerous in the littoral of lakes of Western Polesie, were collected by chance; this was certainly not related to positive phototaxy." (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**11415.** Krech, M.; Biele, S. (2005): Odonatologische Untersuchungen an Kleingewässern in der Rostocker Heide (Hansestadt Rostock) unter besonderer Berücksichtigung der FFH-Arten *Leucorrhinia albifrons* und *Leucorrhinia pectoralis*. *Archiv der Freunde der Naturgeschichte in Mecklenburg* 44: 91-103. (in German) [Mecklenburg-Vorpommern, Germany; between 2003 and 2005, a total of 36 Odonata species is reported. Species of special interest are *Lestes barbarus*, *Erythromma viridulum*, and the *Leucorrhinia rubicunda*, *L. dubia*, *L. albifrons* and *L. pectoralis*. Water level fluctuation, desiccation and shade are triggers for changes of habitat characteristics caused by succession of vegetation and silting up.] Address: Krech, M., Auf der Großen Mühle 7, D-99198 Erfurt-Linderbach, Germany

## 2006

**11416.** Ackerman, J. (2006): Lustkämpfe der Libellen. Die wilden Zeiten der Paarung. *National Geographic Deutschland* 2006(4): 90-105. (in German) [This is a popular account on dragonfly biology based on meetings/interviews with Philip Corbet and Ola Fincke.] Address: Ackerman, Jennifer, 500 Camden Place, Winnipeg, Manitoba, Canada R3G 2V7. E-mail: joeackerman@hotmail.com

**11417.** De Vries, H.H.; Mensing, V. (2006): Kansen voor de groene glazenmaker in Noord-Brabant. Rapport VS 2006.007. De Vlinderstichting, Wageningen: 24 pp. (in Dutch) [The study outlines the ecology of *Aeshna viridis*, and documents in detail potential habitats of that species in the province Noord-Brabant, The Netherlands.] Address: Mensing, V. c/o Postbus 506, 6700 AM Wageningen, The Netherlands

**11418.** Eales, H.T. (2006): A survey of the dragonflies and butterflies on selected Northumbrian water sites in Northumberland and Durham, 2006. <http://www.nwl.co.uk/Dragonflyandbutterflysurvey2006.pdf>. II, 29 pp. (in English) [UK; 16 Odonata species from eight localities are documented.] Address: Eales, H.T., 11 Ennerdale Tee, Low Westwood, Durham, NE 17 7PN, UK

**11419.** Escoto Rocha, J.; Escoto Moreno, A.; Delgado Saldivar, L. (2006): Odonata de los Estados de Guanajuato, Jalisco y San Luis Potosí, Depositados en la Colección Entomológica de la Universidad Autónoma de Aguascalientes. *Investigación y Ciencia* 14(34): 31-35. (in Spanish) [The following 16 Odonata species are deposited in the the entomological collection of the University of Aguascalientes, Mexico: *Lestes alacer*, *Hetaerina occisa*, *Hetaerina titia*, *Argia barreti*, *Ischnura demorsa*, *Libellula saturata*, *Sympetrum illotum*, *Sympetrum corruptum*, *Macrothemis pseudimitans*, *Brechmorhoga mendax*, *Pantala flavescens*, *Dythemis sterilis*, *Pseudoleon superbus*, *Tauriphila azteca*, *Rhionaeschna multicolor*, and *Phyllogomphoides duodentatus*.] Address: Escoto Rocha, J., Av. Universidad # 940, Ciudad Universitaria, C. P. 20131, Aguascalientes, Ags. Mexico. E-mail: jerjaem@yahoo.com

**11420.** Rainey, W.E.; Power, M.E.; Clinton, S.M. (2006): Temporal and spatial variation in aquatic insect emergence and bat activity in a restored floodplain wetland. Final Report to CALFED. <http://baydelta.ucdavis.edu/files/crg/reports/AquaticInsectBatRaineyetal2006.pdf>. 54 pp. (in English) [The paper includes a passing reference on preying of the Hoary bat *Lasiurus cinereus* on Odonata]

**11421.** Santos Moreira, J.P. (2006): Caracterização da Fauna Odonotológica da Zona do Parque Natural do Alvão. Relatório de Estágio. Licenciatura em Ecologia Aplicada. Universidade de Trás-os-Montes e Alto Douro. Vila Real: 61pp. (in Portuguese) [Parque Natural do Alvão, Portugal; between May and September 2006, 19 Odonata species were sampled at 28 locations within the boundaries of the park. The species are treated in a monographic way. The regional distribution is mapped.] Address: not stated

**11422.** Schmidt, Eb. (2006): Libellen beobachten in der Stadt am Kleingarten-Teich. *Naturzeit im Münsterland* 3(5): 14-16. (in German) [The author introduces the biology of Odonata and gives hints how to observe dragonflies from a deck chair.] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**11423.** Tom, S.; Foote, D.; Ziegler-Chong, S. (2006): Thermoregulation in montane and coastal species of native Hawaiian damselflies - from May 31, 2005 to August 5, 2005. *Hohonu* 6: 93-96. (in English) ["Thermoregulation in native Hawaiian damselfly genus *Megalagrion* can be used to determine slight changes in temperature in regards to global warming. Hawaiian damselflies are an indicator species of habitat health and degradation. Through field and lab experiments the males and

females of the *M. calliphya* and *M. xanthomelas* species were found to have different thermoregulatory processes due to their different colorations and place in which they inhabit. The temperature differences exhibited by different sexes and between two female colour morphs show that there is a significant difference, and may be the cause of their different behaviour choices." (Authors)] Address: not stated

**11424.** Zhang, D.-h.; Zhang, Z.-g. (2006): A summary of resource of Odonata in Shanxi province. *Journal of Agricultural Sciences* 27(1): 45-50. (in Chinese, with English summary) [117 Odonata species are listed] Address: Zhang, D.-h., School of Life Science, Ningxia University, Yinchuan 750021, China

## 2007

**11425.** Bechly, G. (2007): [Book Review] Rosser W. Garrison, Natalia von Ellenrieder & Jerry A. Louton (2006): *Dragonfly Genera of the New World*. *Aquatic Insects* 29(1): 72-75. (in English) [review] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail [bechly@gmx.de](mailto:bechly@gmx.de)

**11426.** Bouwman, J.; de Boer, P.; van Hijum, E.; Hylkema, G. (2007): Wyldemerck eerste officiële libellenreservaat [Wyldemerck - the first official dragonfly sanctuary. *Vlinders* 3 2007: 18-19. (in Dutch) [After several years of planning and construction, in May 12, 2007 near Bar in Gaasterland, The Netherlands, a sanctuary and special reserve for dragonflies was opened. Access is given to several habitat types by walking along the shorelines of the habitats which provide an optimal view to the species. At six places tables with information on Odonata are presented.] Address: Bouwman, J.H., Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: [jaap.bouwman@vlinderstichting.nl](mailto:jaap.bouwman@vlinderstichting.nl)

**11427.** Holuša, O.; Mückstein, P. (2007): Dragonflies (Odonata) of the Zárské vrchy Mts, Faunistic-ecological study. *Parnassia* 2: 77 pp. (in Czech, with English summary) [Czech Republic; 42 Odonata species from 59 localities are reported, mapped and discussed in great detail. The regional list also includes the legally protected species *Leucorrhinia albifrons* and *L. pectoralis*.] Address: Holuša, O., Bruzovská 420, CZ-738-01 Frýdek-Místek, Czech Republic

**11428.** Kalashian, M. Yu.; Danchenko, A.V.; Khachatryan, H.G.; Karagyan, G.H. (2007): Must be conserved. IUCN Red List Species of Invertebrate Animals in the Fauna of Armenia. Prepared within the CEPF/ WWF funded project "Create baseline data on rare invertebrate animal for the National red book and prepare materials for the Caucasus Red Book and IUCN's Red list". Published with support of UNEP/ Armenia "Implementation of the Article 6 of the UN Framework Convention on Climate Change in Armenia" Project and WWF Armenian Branch: 28 pp. (in Armenia, Russian, and English) [Distribution in Armenia, and some ecological and conservation key factors are given for *Onychogomphus assimilis*.] Address: not stated

**11429.** Lockwood, M. (2007): Els odonats del Parc Natural de la Zona Volcànica de la Garrotxa. *Annals de la Deligació de Garrotxa de la ICHN* 2: 49-53. (in Catalan) [NE Catalonia, Spain; records of 35 Odonata spe-

cies are listed.] Address: Lockwood, M., La Devesa, 3, 1", E-17850 Besalu, Spain. E-mail: mike@walkingcatalonia.net

**11430.** Malkmus, R. (2007): Ein neuer Spessartbewohner - die Frühe Heidelbelle. *Spessart* 101(9): 23. (in German) [Heigenbrücken, Bayern, Germany, 24-V-2007; *Sympetrum fonscolombii*] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany

**11431.** Meurgey, F. (2007): Étude sur l'écologie et la distribution de *Protoneura romanae* (Zygoptera; Protoneuridae) espèce endémique de la Guadeloupe. Parc National de Guadeloupe / Muséum d'Histoire Naturelle de Nantes: 31 pp. + annexes. (in French) [In a detailed study, the author outlines the spatial and altitudinal distribution of *P. romanae*. Its larval habitat features and ecology are described too.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**11432.** Trueman, J.W.H. (2007): A brief history of the classification and nomenclature of Odonata. *Zootaxa* 1668: 381-394. (in English) ["The classification of insect order Odonata is traced from Linnaeus' *Systema Naturae*, through 19th and 20th century morphology-based taxonomies, to molecular phylogenies published before November, 2007. Past and present nomenclatural difficulties are reviewed and the current situation in regard to rival taxonomies is outlined. Ordinal classifications based on morphological data continue to suffer from intractable uncertainty concerning wing vein homologies between Odonata and other Pterygota, but molecular analyses may soon show where the phylogenetic tree of Odonata should be rooted. The natural classification will become much clearer once this has been achieved." (Author)] Address: Trueman, J.W.H., School of Botany and Zoology, The Australian National Univ., Canberra, Australia. E-mail: John.Trueman@anu.edu.au

**11433.** Tsuyuki, K.; Sudo, S.; Igarashi, S. (2007): Aerodynamic characteristics of flapping motion of a two-dimensional wing model shaped like a dragonfly wing section. *Journal of the Japan Society for Aeronautical and Space Sciences* 55(No. 645): 459-466. (in English) ["This paper describes the aerodynamic characteristics of flapping motion of a dragonfly wing model. The orbit and feathering angle of a dragonfly wing were measured using a high-speed video camera. The measurement data was used to formulate two mathematical models: linear and Fourier models. The aerodynamic characteristics of a thin plate and dragonfly wing models, which were investigated using a numerical simulation, revealed that the linear model generated a high vertical force during descent and high thrust force during ascent. Although the Fourier model could not generate a high thrust force during ascent, it generated a higher vertical force than the linear model. During the flapping motion in both the models, a marginal difference was observed between the forces generated at the top and bottom. When the feathering angle approached the stroke angle, the resultant force direction acting on the wing models was reversed." (Authors)] Address: Sudo, S., Akita Prefectural University, Ebinokuchi 84-4, Yurihonjo-shi 015-0055, Japan, E-mail sudo@akita-pu.ac.jp

**11434.** van der Straaten, J. (2007): Hoe fotografeer je vlinders (en libellen)? [How to shoot butterflies (and dragonflies)?]. *Vlinders* 2 2007: 12-14. (in Dutch) [The

paper introduces to butterfly and dragonfly photography techniques.] Address: not stated

## 2008

**11435.** Benard, M.F.; McCauley, S.J. (2008): Integrating across life-history stages: consequences of natal habitat effects on dispersal. *Am. Nat.* 171(5): 553-567. (in English) ["Ecological and evolutionary processes are affected by forces acting at both local and regional scales, yet our understanding of how these scales interact has remained limited. These processes are fundamentally linked through individuals that develop as juveniles in one environment and then either remain in the natal habitat or disperse to new environments. Empirical studies in a diverse range of organisms have demonstrated that the conditions experienced in the natal habitat can have profound effects on the adult phenotype. This environmentally induced phenotypic variation can in turn affect the probability that an individual will disperse to a new environment and the ecological and evolutionary impact of that individual in the new environment. We synthesize the literature on this process and propose a framework for exploring the linkage between local developmental environment and dispersal. We then discuss the ecological and evolutionary implications of dispersal asymmetries generated by the effects of natal habitat conditions on individual phenotypes. Our review indicates that the influence of natal habitat conditions on adult phenotypes may be a highly general mechanism affecting the flow of individuals between populations. The wealth of information already gathered on how local conditions affect adult phenotype can and should be integrated into the study of dispersal as a critical force in ecology and evolution." (Authors) The paper includes references to Odonata.] Address: McCauley, S.J., Center for Population Biology, Univ. of California, Davis, CA 95616, USA. E-mail: sjmccauley@ucdavis.edu

**11436.** Jeworutzki, L.; Frobels, K. (2008): Die Gestreifte Quelljungfer in der Hersbrucker Alb. <http://www.bund-naturschutz.de/uploads/media/3-22.1.0801.pdf>: 19 pp. [Germany; condensed version of a presence-absences study of the larvae of *Cordulegaster bidentata* in Bavarian springs. The results are mapped and many instructive photographs are published from habitats and threats for the species. For a full version of the paper see: <http://www.bund-naturschutz.de/uploads/media/3-22.1.0801.pdf>]

**11437.** Kukuła, K.; Bylak, A.; Kukuła, E.; Wojton, A. (2008): The influence of European beaver *Castor fiber* L. on fauna in the mountain stream. *Roczniki Bieszczadzkie* 16: 375-388. (in Polish, with English summary) [Niedźwiedzi stream, a tributary of the San, in the Bieszczady National Park, E Poland; Odonata are listed at the genus level.] Address: Kukuła, K., Uniwersytet Rzeszowski, Katedra Biologii Środowiska, ul. Cegielniana 12, PL-35-959 Rzeszów, Poland. E-mail: kku-kula@univ.rzeszow.pl

**11438.** Malkmus, R. (2008): Wo sich Libellen wohlfühlen - die Steinbacher Sandgrube. *Spessart* 102(8): 14-15. (in German) [near Lohr, Bayern, Germany; 32 Odonata species including *Sympetrum depressiusculum* are documented from the study site.] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany



**11439.** Marczak, D. (2008): Z Kampinoskiego Parku Narodowego. Ważki. [From the Kampinoski National Park. Dragonflies]. Parki Narodowe 3/2008: 17-19. (in Polish) [A total of 45 Odonata species are known from the Polish National Park Kampinoski located north-west of Warsaw. Details are given of *Aeshna affinis*, *A. viridis*, *Ophiogomphus cecilia*, *Leucorrhinia albifrons* and *Sympetrum pedemontanum*.] Address: Marczak, D. E-mail: owady@kampinoski-pn.gov.pl

**11440.** Martin, M. (2008): Diversity of dragonflies (Odonata) and protected species in Estonia. Ent. Tidskr. 129 (2008) Poster abstracts: 230-231. (in English) [Verbatim: Dragonflies are relatively large and conspicuously active insects. Despite of this more thorough data about ecological features of different species, including biotopical preferences and zoogeographical distribution is still not characterized in Estonia. The accumulation of new material is very occasional. Mainly only faunistic data has been collected and lists of species for several districts have been established. All data we have now is very fragmented and based only on occasional observations. There have been written only two more thorough papers concerning the dragonfly fauna in Estonia: First was made by H. Kauri in 1942 (MSc Theses, unpublished) second by Janika Ruusma in 1980 (Graduation Theses, unpublished). The first records about Estonian dragonflies can be found from year 1778. Nowadays 54 species of dragonflies have been registered. Among these species seven species - *Cordulegaster boltonii*, *Eitheca bimaculata*, *Libellula fulva*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Sympecma paedisca* (All category III, Rare) and *Anax imperator* (IV, Care demanding) are listed in our Red Databook. From year 2004 only 5 NATURA 2000 species – *Ophiogomphus cecilia* (II,IV category by EU habitats directive), *Aeshna viridis* (IV), *Leucorrhinia albifrons*, (IV) *L. caudalis*, (IV) and *L. pectoralis* II,IV). protected in Estonia (Category III). Among these protected species *Aeshna viridis* Eversman is the most rare one, whose distribution data has been rarely updated over past ten years. For *Ophiogomphus cecilia* more distribution data has been collected. Among protected *Leucorrhinia* species, *Leucorrhinia albifrons* is most common. This species is common inhabitant of all bogs water bodies over all territory except island Hiiumaa. Two other species *L. caudalis* and *L. pectoralis* have been very rare in Estonia until now. But in recent years these two species have become quite common in small water bodies in South-East and East Estonia. By opinion of authors there were two main reasons: 1) under changing social conditions fishing-nets were allowed to use to catch fish from small lakes. Before it was not allowed. After this from several lakes big fish, dangerous for dragonfly nymphs, were captured out; 2) distribution of beavers. These creatures have created several small water bodies. It seems that conditions in these water bodies were very acceptable for these two species.] Address: Martin, M., Institute of Zoology and Hydrobiology of University of Tartu, Estonia

**11441.** Ruf, T. (2008): Ein Neuankömmling im Main-Spessart: Der Südliche Blaupfeil. Spessart 102(8): 16. (in German) [Bayern, Germany; two regional records of *Orthetrum brunneum* from June 2008 are briefly documented.] Address: not stated

**11442.** Sudo, S.; Takagi, K.; Tsuyuki, K.; Yano, T.; Nishida, K. (2008): The dragonfly flight by a pair of wings and frequency characteristics of wings. Proceedings of the

XIth International Congress and Exposition, June 2-5, 2008 Orlando, Florida USA. Society for Experimental Mechanics Inc.: 8 pp. ["This paper describes the dragonfly flight by a pair of wings and the frequency characteristics of dragonfly wings related to the aerodynamic characteristics. In the first place, free flight by two pairs of wings and a pair of wings of dragonflies was analyzed with a high-speed video camera system. It was confirmed that the dragonfly can fly by a pair of wings. In the second place, the tethered flight of a fly was also studied for comparison. It was confirmed that insect wings undergo strong deformation during the flight. In the third place, the surface shape of dragonfly wings was measured by the three-dimensional, optical shape measuring system. It was clear that the difference of elevation was especially remarkable between the longitudinal veins at the leading edge part. In the fourth place, the dynamic responses of dragonfly wings to the excitation vibration were examined over the relatively wide range of frequency. It was found that natural frequency of dragonfly wings was related to the flapping frequency of the dragonfly." (Authors) *Sympetrum infuscatum*] Address: Sudo, S., Akita Prefectural University, Ebinokuchi 84-4, Yurihonjo-shi 015-0055, Japan, E-mail sudo@akita-pu.ac.jp

**11443.** Zia, A.; Naeem, M.; Rafi, A.; Hassan, S.A. (2008): A list of damselflies (Zygoptera: Odonata) recorded from Azad Jammu and Kashmir (AJ&K). Pakistan Journal of Scientific and Industrial Research 51(6): 329-332. (in English) ["In the intensive survey of the valley of Kashmir for updating the record of damselflies inhabiting the region, a total of 15 genera and 31 species of damselflies were collected during the summer season of three consecutive years (2005-2007) which are reported." (Authors)] Address: Zia, A., National Insect Museum, NARC-Islamabad, Pakistan

## 2009

**11444.** Girilovich, I.S.; Dzhus, M.A. (2009): Nature monument of republic importance "Oak Forest". Belarus Natn. Univ. (BGU), Minsk: 93 pp. (in Russian) [The protected area (surface 24 ha) is situated SW of Minsk (Belarus). *Gomphus vulgatissimus*, *Calopteryx splendens*, *C. virgo*, *Leucorrhinia dubia*, *L. pectoralis*, *L. rubicunda*, *Somatochlora flavomaculata*, *S. metallica*, *Lesites dryas*, *L. sponsa*, *L. virens*, *Libellula fulva*, *Libellula quadrimaculata*, and *Sympetrum flaveolum* are listed on pp. 75-76.] Address: Publishers: Prospect Nezavisimosti 4, BY-220050 Minsk, Belarussia

**11445.** Holuša, O. (2009): The finding of *Somatochlora sahlbergi* (Odonata: Corduliidae) in the northern Norway. Acta Musei Beskydensis 1(1): 97-102. (in English, with Czech summary) [Gandvik, Sor-Varanger, province of Finnmark, northern Norway (N 70°00'16.65", E 29°15'02.21", altitude 81 m a.s.l.), 29-VII-2001; the habitat is described and the ecological requirements and distribution of the species are briefly discussed.] Address: Holuša, O., Dept of Forest Protection and Game Management, Faculty of Forestry and Wood Technology, Mendel University of Agriculture and Forestry Brno, Zemědělská 3, CZ-613 00 Brno, Czech Republic. E-mail: holusao@email.cz

**11446.** Huskens, K. (2009): Libellen gekiekt. Minicursus libellenfotografie [Dragonflies snapped. Basic course in dragonfly photographing]. Vlinders 3 2 009: 10-13. (in

Dutch) [The author gives some basic information on dragonfly photographing.] Address: Huskens, K., De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands

**11447.** Koopmans, I. (2009): Jaarverslag 2008. *Vlinders* 2/2009: 15-18. (in Dutch) [Highlights from the current work realised in 2008 and including several projects on Odonata are briefly introduced.] Address: Koopmans, Ineke, De Vlinderstichting, Postbus 506, NL 6700 AM Wageningen, The Netherlands

**11448.** Lin, J.-L.; Wei, C.-Y.; Lin, C.-Y. (2009): Aerodynamic performance of thin wings at low Reynolds numbers. *Aircraft Engineering and Aerospace Technology* 81(1): 51-58. (in English) ["Purpose: The purpose of this paper is to explore the aerodynamic performance of wings with different shapes at low Reynolds numbers. Design/methodology/approach: The airfoils of these wings are made from aluminum plates, and the maximum chord length and wingspan are 15 cm. Wings A-D are plates with 6 percent Gottingen camber but different wing platforms. The forward-half sections of wings E and F are dragonfly-like, whereas the rear-half sections of wings E and F are flat and positively cambered, respectively. The aspect ratios of these wings are close to one, and the ratios of plate thickness to the maximum chord length are 1.3 percent. Experimental results indicate that the wings with Gottingen camber have a superior lift and lift-to-drag ratio, whereas the wings with dragonfly-like airfoils perform well in terms of drag and pitch moment. Findings: The aerodynamic measurements of the wings demonstrate that the wing with the Gottingen camber airfoil, a swept-back leading edge and a straight trailing edge is suitable for the use in micro aerial vehicle (MAV). An MAV is fabricated with this wing and the aerodynamic performance of the MAV is examined and compared with the bare wing data. Originality/value: This paper develops several criteria to the design of MAV-sized wings. For example, the thickness ratio of airfoil must be small, usually less than 2 percent. Besides, the airfoil must be cambered adequately. Furthermore, a wing platform with a swept-back leading edge and a straight trailing edge would contribute to the successful flights of MAVs." (Authors)] Address: Lin, J.-L., Department of Aeronautics and Astronautics, Air Force Academy, Gangshan, Taiwan

**11449.** Lockwood, M. (2009): Les poblacions de *Coenagrion hastulatum*, *Sympetrum pedemontanum* i *Sympetrum vulgatum* a la Cerdanya, 2008. *Ker - Revista de l'Associació Grup de Recerca de Cerdanya* 1(1): 14-25. (in Catalan) [Cerdanya is a region of the eastern Pyrenees divided between France and Spain. Regional records of the three taxa are documented and discussed in great detail.] Address: Lockwood, M., Grupo Oxygastra, Institució Catalana d'Història Natural, Carrer del Carme, 47; 08001 Barcelona, Spain. E-mail: mike@walkingcatalonia.net

**11450.** Malkmus, R. (2009): *Cordulegaster bidentata*. Die Gestreifte Quelljungfer im Spessart. *MKK-Mitteilungsblatt. Zentrum für Regionalgeschichte* 34: 8. (in German) [Bayern, Germany, 2009; new records from the krenal and epithrithral of the streams Kahl and Laufach resp. their tributaries, are documented.] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany

**11451.** Malkmus, R. (2009): Die Geburt einer Libelle. *Spessart* 103(5): 17-19. (in German) [Bayern, Germany; the emergence of *Gomphus pulchellus* is reported and

illustrated in detail.] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany

**11452.** Malkmus, R. (2009): Neu für den Spessart - Die Gestreifte Quelljungfer. *Spessart* 103(9): 22. (in German) [Bayern, Germany, 2009; new records of *Cordulegaster bidentata* from the krenal and epithrithral of the streams Kahl and Laufach resp. their tributaries, are documented.] Address: Malkmus, R., Schulstr. 4, 98759 Wiesthal, Germany

**11453.** Moody, D. (2009): Mating behaviour in male territoriality *Enallagma vesperum* (Odonata: Coenagrionidae) on ponds in Ohio and northern Michigan. *Ohio Journal of Sciences* 109(3): 67-70. (in English) ["The crepuscular damselfly *E. vesperum*, was studied to document and clarify mating behaviour. This paper is a descriptive synthesis of observations which answer basic questions regarding mating behaviour of *E. vesperum*. Beginning in July 2004 and continuing in the summers through September 2009, approximately 140 hours of direct observation on a lake in Northern Michigan and a lake and two ponds in Ohio were logged to support the results and conclusions. The literature regarding mating behaviour in *E. vesperum* provides little information about male territoriality. The results from this six-year study offer strong evidence of male territory selection and territory defense. Copulatory behaviour and ovipositional behaviour were also recorded. In most coenagrionid species, males remain in tandem with ovipositing females unless the females submerge. In this study, however, females were observed ovipositing in tandem or individually into surface vegetation." (Author)] Address: Moody, D.L., Biology Dept, Univ. of Findlay, Findlay, OH, USA. E-mail: moody@findlay.edu

**11454.** Reimer, R.W.; Feulner, G.R.; Hornby, R.J. (2009): Errata and Addenda: Updated illustrated checklist of dragonflies of the UAE – including a third species of *Ischnura* damselfly. *Tribulus* 18: 28-36. (in English) [*I. fontainei* is added to the checklist United Arab Emirates Odonata, bringing the status of the known species up to 27. Some errors in the identification of the photographs in that paper are corrected.] Address: Feulner, G.R., P.O. Box 31045, Dubai, United Arab Emirates. E-mail: grfeulner@gmail.com

**11455.** *Salwinia* Ekoklub (Ed.) (2009): *Bioróżnorodność rzeki Tugi. Przewodnik. - Biodiversity of the River Tuga. A guide.* *Salwinia* Ekoklub, Nowy Dwór Gdański: iv + 39 pp. (in Polish) [Poland; six Odonata species are listed for Tuga River. Due to mislabelling of the specimen (*P. Bucz.*), the representation of *Coenagrion armatum* is wrong] Address: not stated

**11456.** Schmidt, Eb. (2009): Am Beispiel Karpfenanzucht im Teichgut Hausdülmen. *Artenvielfalt durch Fischkultur. Naturzeit im Münsterland* 6(1): 14-15. (in German) [The author outlines the importance of carp breeding ponds for biodiversity. The ecological situation of carp pond management is compared with primary habitats in the pre-Alps region and water bodies in continental climates influence by nival discharge regimes.] Address: Schmidt, E., Coesfelder Str. 230, 48249 Dülmen, Germany

**11457.** Sircom, J. (2009): Determinants of the biodiversity and composition of stream insect communities. Ph. thesis. Dalhousie University Halifax, Nova Scotia: 111 pp. (in English) ["The North Mountain of the Annapolis Valley, NS, in eastern Canada, is a ~200 km basalt

ridge drained by many small first or second order streams in independent catchments. The area is fairly uniform geologically, presenting an opportunity to compare streams of similar chemistry, slope and aspect that vary in other respects, such as invertebrate community structure. In this thesis, I examine two macroinvertebrate functional groups to determine key factors influencing their abundance, composition and diversity across catchments. Chapters 2 and 3 are concerned with the predatory invertebrate guild in eight of the streams, in two groups separated by ~65 km. In Chapter 2, I assessed factors influencing composition of the predator guild using similarity matrices. Similarity in predator composition declined with distance, and streams that were more similar in disturbance (spates) were more similar in predator composition. Similarity within one family, Rhyacophilidae, was related to similarity in fish population. Chapter 3 reports the results of laboratory experiments involving two widespread species. Field data suggested an asymmetric interaction between *Sweltsa onkos* (Plecoptera: Chloroperlidae) and *Rhyacophila vibox* (Trichoptera: Rhyacophilidae); behavioural observations in artificial streams supported this. In the presence of *R. vibox*, *S. onkos* had higher mortality and injury rates, and grew less. The results of these chapters suggest that, although disturbance is important in shaping community structure, the results of interspecific interactions can be detected at large scales. *S. onkos* can only attain high numbers in streams where fish predation reduces the abundance of *R. vibox*. Chapter 4 examines biodiversity patterns in the macroinvertebrate detritivore guild in 25 streams encompassing ~80 km of the ridge. Using density and richness of the detritivore community, detrital resource quantity, and top predator abundance, I looked for evidence in support of several mechanisms that can lead to positive species-energy relationships. Patterns conformed to expectations of the 'More Individuals Hypothesis'. It appears that taxonomic richness of the detritivore guild increases with detrital resource availability because more taxa can attain their minimum viable population size where more resources are available." (Author) The thesis includes a few references to Odonata.] Address: not stated; Sircom, Julie

**11458.** Tatarinov, A.G.; Kulakova, O.I. (2009): [Dragonflies]. [Fauna of the European North-East of Russia. T. 10]: 214 pp. (in Russian, with English summary) [50 Odonata species from the European northeastern Russia are keyed (larvae and imagines) and mapped.] Address: not stated

**11459.** Veling, K. (2009): Fotowedstrijd blijkt succes. *Vlinders* 1 2009: 4-9. (in Dutch) [Nine photographs with dragonflies are presented.] Address: Veling, K., De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands

**11460.** Zhao, Y.; Tong, J.; Sun, J.; Chen, D.; Zhang, J. (2009): Collection and processing of the point clouds of dragonfly *Pantala flavescens* Fabricius wing by reverse engineering. *Journal of Agricultural Mechanization Research* 31(11): 18-21. (in Chinese, with English summary) ["The digital point groups of geometrical surfaces of *P. flavescens* membranous wings were obtained through measuring with a 3D scanner. Using reverse engineering software, imageware, the scanning data point groups of the dragonfly wing were processed, including of deleting error points, smoothing the scanning data by Gaussian filter and reducing the data by chordal

deviation method. Based on the shape features of the dragonfly wing, the boundary curves were picked up by circle-select points from the scanning data point groups and then were connected two by two to form a whole. The 3-dimensional models of the dragonfly wing were reconstructed with the boundary curves and the scanning data point groups." (Authors)] Address: Zhao, Y., College of Mechanical and Power Engineering, Henan Polytechnic University, Jiaozuo 454000, China

## 2010

**11461.** Aly, M.Z.Y.; Osman, K.S.M.; Ibraheem E.E.; Nour, A.N. (2010): Diversity of some aquatic and aerial odonatus dwellers of the River Nile in Upper Egypt. *Egypt. Acad. J. biolog. Sci.* 3(2): 83-93. (in English, with Arabian summary) [This study is unquestionably a result of the great personal enthusiasm and broad literature review on ecology of Odonata. Unfortunately the authors used for identification of imagos the German books of Sternberg & Buchwald (1999, 2000), and for larvae Carchini (1983) with its Italian focus.] Address: Aly, M.Z.Y., Department of Zoology, Faculty of Science, South Valley University, Egypt

**11462.** Banerjee, S.; Aditya, G.; Saha, N.; Saha, G.K. (2010): An assessment of macroinvertebrate assemblages in mosquito larval habitats—space and diversity relationship. *Environmental Monitoring and Assessment* 168: 597-611. (in English) ["The aquatic bodies designated as mosquito larval habitats are diverse in size and species composition. The macroinvertebrate predators in these habitats are elements that influence the abundance of mosquito species, providing a basis for biological control. Assessment of species assemblage in these habitats will indicate the possible variations in the resource exploitation and trophic interactions and, therefore, can help to frame biological control strategies more appropriately. In the present study, the species composition is being investigated in five different mosquito larval habitats at a spatial scale. A random sample of 80 each of the habitats, grouped as either small or large, was analyzed in respect to the macroinvertebrate species assemblage. The species composition in the habitats was noted to be an increasing function of habitat size (species number =  $1.653 + 0.819$  habitat size) and, thus, the diversity. The relative abundance of the mosquito immatures varied with the habitat, and the number of useful predator taxa was higher in the larger habitats. In the smaller habitats—plastic and earthen structures and sewage drains, the relative and absolute number of mosquito immatures per sampling unit were significantly higher than the pond and rice field habitats. This was evident in the cluster analysis where the smaller habitats were more related than the larger habitats. The principal component analysis on the species diversity yielded four and six components, respectively, for the smaller and larger habitats for explaining the observed variance of species abundance. The species composition in the habitats was consistent with the earlier findings and support that the abundance of coexisting macroinvertebrate species regulates the relative load of mosquito immatures in the habitats. The findings of this study may be further tested to deduce the relative importance of the habitats in terms of the productivity of mosquito immatures at a temporal scale." (Authors) The paper includes a reference to a zygopteran specimen.] Address: Banerjee, S., Dept of Zoology,



Univ. of Calcutta, 35 Ballygunge Circular Road, Kolkata, 700019, India. E-mail: soumyajitb@gmail.com

**11463.** Borah, P.; Kumar Acharjee, B.; Das, M.; Kumar Saikia, P. (2010): Diversity and distribution of damselflies in Gauhati University campus, Assam, India. *NeBIO* 3(2): 33-36. (in English) [Seven taxa (*Archilestes californica* [sic!], *Ceriagrion coromandelianum*, *Rhodischnura nursei*, *Agriocnemis pygmaea*, *Dysphaea ethela*, *Ischnura aurora*, Unidentified) are listed.] Address: Acharjee, B.K., Kendriya Vidyalaya, Dimapur – 797106, Nagaland, India. E-mail: biswajitacharjee79@gmail.com

**11464.** Bota-Sierra, C.; Baena-Bejarano, N.; Bermudez, R.C. (2010): Primeros registros de *Gomphomacromia fallax* (Odonata: Corduliidae) en Colombia. *Revista Colombiana de Entomología* 36(2): 333-334. (in Spanish, with English summary) [Four records of *G. fallax* from 2008 and 2009 extends the northern range of its known distribution in South America. The species is found in the forested areas of the Colombian Andes between 1.700 and 2.800 m a.s.l.] Address: Bota-Sierra, C., Estudiante de Biología de la Univ. del Antioquia. Grupo de Entomología Universidad de Antioquia. A.A. 1226, Colombia. E-mail: corneliobota@gmail.com

**11465.** Chaudhry, M.T.; Aslam, M. (2010): *Anax indicus* Lieftinck, 1942 (Odonata: Anisoptera: Aeshnidae) an addition in the fauna of Pakistan. *Pakistan J. Zool.* 42(1): 99-101. (in English) ["*A. indicus* is recorded for the first time from Pakistan; it is the fourth species of the genus to be recorded from the country. A key to all species of *Anax* known from Pakistan is presented." (Authors)] Address: Chaudhry, M.T., Department of Entomology, PMAS, Arid Agriculture University, Rawalpindi, Pakistan. E-mail: chtariq273@hotmail.com

**11466.** Chen, Y.H.; Zhao, Y.; Huang, W.M.; Shu, D.W. (2010): Kinematics of dragonfly (*Sympetrum flaveolum*) flight. 6th World Congress of Biomechanics (WCB 2010). August 1-6, 2010 Singapore, IFMBE Proceedings 31(1): 56-59. (in English) ["The kinematics of the flapping flight of *S. flaveolum* is investigated. The flapping patterns of the hindwing are recorded and studied thoroughly using a high speed video camera with the highest shuttle speed and resolution as reported so far on study of insect flights. The overall results indicate that the flapping pattern of a dragonfly hindwing at the nodus and the pterostigma can be either a simple figure-eight or a double figure-eight, which is a new discovery. The angle of attack and the wing attitude are studied quantitatively. The relative position of the leading edge and trailing edge implies the presence of lift-enhancing mechanisms after stroke reversal. It is also found that the spanwise leading edge spar of a dragonfly wing is not one rigid piece, but two pieces hinged at the nodus with physical constraint of fort degrees. The elastic modulus of the costa of a hindwing is estimated through vibration tests using a vibrometer." (Authors)] Address: Chen, Y.H., School of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore

**11467.** Dmitriew, C. (2010): Evolutionary ecology of growth in insects: What maintains variation in growth trajectories at the phenotypic and genotypic levels? Doctoral thesis, Department of Ecology and Evolutionary Biology, University of Toronto: VI, 222 pp. (in English) ["Growth rates are highly variable, both within and among genotypes and populations. The resolution of the trade-off between size and age at maturity has been

the study of extensive research by life historians. The fitness advantages of large body size and rapid development time are well supported, leading to two predictions. First, realized growth rates should be maximized. Second, growth rate will be subject to strong stabilizing or directional selection, and consequently, low genetic variability. In real populations, despite the advantages of rapid growth, animals often, in fact, grow at rates lower than the maximum rate that is physiologically possible, even in the absence of external constraints on growth rate (e.g. resource restriction or risk of predation while foraging). This implies that growth may have direct fitness consequences that are independent of the size and age of maturity, thereby lowering the optimal rate of growth. In addition to inducing plastic declines in growth rate, such costs may also select for lower intrinsic rates of growth. Despite the strong fitness effects arising from attaining a large body size quickly, variation in growth rate persists at both the phenotypic and genetic levels. The evolutionary and ecological factors contributing to this variation in growth rate are the focus of this thesis. Growth rate variation in insect model species was produced by the manipulation of resource levels during development. By comparing fitness-associated traits and body composition of adults from different treatment groups, I identify direct costs of rapid growth that could explain why animals benefit from growth at submaximal rates. In the second part of the thesis, the relationship between environmental variation and genetic variance in growth rate is investigated by quantitative genetic analysis of body size at different ages and in different growth environments. The results of this analysis suggest that environmental stress can lead to increased genetic variance via decanalization. This has consequences for the evolvability of growth rates in changing environments." (Author) See also: Dmitriew, C., Cooray, M. & Rowe, L. 2007. Effects of early resource-limiting conditions on patterns of growth, growth efficiency and immune function at emergence in a damselfly (Odonata: Coenagrionidae). *Can. J. Zool.* 85: 310-318.] Address: Dmitriew, C., Dept of Ecology and Evolutionary Biology, University of Toronto, Toronto ON M5S 3G5, Canada. E-mail: dmitriew@zoo.utoronto.ca

**11468.** Donnelly, N. (2010): Book Review: "Field Guide to the Dragonflies and Damselflies of New Jersey", by Allen E. Barlow, David M. Golden, and Jim Bangma. New Jersey Department of Environmental Protection, Division of Fish and Wildlife, 2009, 285 pages (many in color), spiral bound. The price is \$36 and it can be ordered through the Conserve Wildlife New Jersey Foundation, <<http://www.conservewildlifenj.org/support/cwf/publications.html>>. *Argia* 22(1): 18-19. (in English) [„This New Jersey guide now fills an important gap: thorough coverage of the heart of the Middle Atlantic states. It will be very useful from Maryland to southern New England, and west at least through Pennsylvania and New York. The guide is arranged in three parts. The first, and shortest, part is introductory and covers study techniques and basic morphology. The second, and longest, part covers the description, habits, habitat of each New Jersey species. The individual accounts are fairly exhaustive, including description, statement of abundance, similar species, where and when to find them, behaviour, and overall range. For a few confusing groups there are black and white illustrations of body parts necessary for identification. The third section consists of very good colour illustrations of each species, with a county-level range map for New Jersey. These il-

illustrations are all photos, and I think the printing has been faithful to the colours." (Author)] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: [tdonnel@binghamton.edu](mailto:tdonnel@binghamton.edu)

**11469.** Doucet, G. (2010): Clé de détermination des exuvies des Odonates de France. Site Internet: <http://guillaume.doucet.free.fr/>: 64 pp. (in French) [The first part of the book, devoted to the physiognomy of exuviae, describes their structure and the associated terminology. The second part, which is in the form of a dichotomous key, allows determination of exuviae species (or subspecies) level. The guide is illustrated with over 200 photos, and allows identification of more than 70 taxa or two-thirds of French odonates.] Address: SFO, 7, rue Lamartine, F-78390 Bois d'Arcy, France

**11470.** Gauci, C.; Sciberras, A. (2010): First records of *Orthetrum chrysostigma* (Odonata: Libellulidae) Burmeister, 1839 in the Maltese Islands. *Central Mediterranean Naturalist* 5(2): 78-80. (in English) [Four records between 2008-2010 of *O. chrysostigma* from Malta are documented.] Address: Sciberras, A., 131, "Arnest", Arcade Str., Paola, Malta. E-mail: [bioislets@gmail.com](mailto:bioislets@gmail.com)

**11471.** Goenendijk, D. (2010): Mysterious and beautiful, the Northern Emerald. *Vlinders* 3/2010: 18-21. (in Dutch, with English summary) [*Somatochlora arctica* is one of the least known and rarest dragonflies of north-west Europe; in the Netherlands it is listed as a threatened species. One of the most characteristic species of living raised bog, its decline has been paralleled by the loss and degradation of such wetland habitat. We set up a Species Protection Plan which came into action in 2005. Seven Dutch populations are now known. Priority was given to locating the breeding grounds and understanding the adult's behaviour. Both males and females were seen frequenting small pools of about a metre deep. The surface was almost completely covered with rather dried out looking *Sphagnum* moss, often with other bog plants growing in it. We saw females ovipositing, and found larvae in various stages and their empty skins (exuviae). These pools have been targeted for conservation measures. On the short term, managers are given on-site advice either on how to protect them or how to dig new ones, depending on the local situation. On the long term, it is important that hydrological plans for the restoration of the bog include such pools, thus ensuring suitable breeding grounds for this rare and beautiful species." (Authors)] Address: Groenendijk, D., De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: [dick.groenendijk@vlinderstichting.nl](mailto:dick.groenendijk@vlinderstichting.nl)

**11472.** Gordon, D.P. (2010): New Zealand inventory of biodiversity Vol. 2. Kingdom Animalia. Chaetognatha, Ecdysozoa, Ichnofossils. 544 pp. Canterbury University Press: 250-252. (in English) [On pages 250-252, the author introduces to the biology of the regional Odonata fauna.] Address: Canterbury University Press, University of Canterbury, Private Bag 4800, Christchurch 8140, New Zealand

**11473.** Hannon, E.R.; Hafernik, J.E. (2010): Re-introduction of the San Francisco fork-tail damselfly into an urban park, California, USA. In: Soorae, P. S. (ed.) (2010) *Global re-introduction perspectives: Additional case-studies from around the globe*. IUCN/SSC Re-introduction Specialist Group, Abu Dhabi, UAE, xii + 352 pp: 33-36. (in English) [*Feasibility: Most of the watershed that drains into Glen Canyon has been lost to*

*urbanization. However, *I. gemina* persists in small, isolated wetlands similar to those in the canyon. Because adults usually move only short distances during their lifetimes, damselflies released at a site have a good chance of remaining and reproducing at that site enhancing prospects for success. The Glen Park neighbourhood also is home to a group of citizens committed to maintaining native plants and animals in Glen Canyon. Their participation in active management of introduction sites could be key to future success. Implementation: We conducted a project during 1996 and 1997 to re-introduce *I. gemina* into Glen Canyon. The receiving site for adult damselflies was a linear asphalt channel on the rim of the easternmost slope of Glen Canyon Park. The channel carries water from a permanent seep. This channel was the sole breeding area for *I. gemina* in Glen Canyon prior to its local extinction (Garrison & Hafernik, 1981b; Hafernik & Garrison, 1986). We surveyed surrounding wetlands on the San Francisco Peninsula to find a source of stock for reintroduction. Our surveys indicated that the nearest large population of *I. gemina* was in a wetland approximately 12 km south of Glen Canyon. We assessed biotic and abiotic characteristics of the receiving site and found adequate larval food for *I. gemina* in the channel and in newly created ponds in the canyon bottom. Neither habitat contained fish, although the ponds contained larval dragonflies (*Aeshna* sp.), which could prey on *I. gemina* larvae. To restore habitat for *I. gemina*, we cleared aquatic vegetation that had grown in and over the channel. This work left the site relatively free of aquatic vegetation with open and sun-exposed areas. In addition, the California Conservation Corps implemented a habitat restoration project in the bottom of the canyon. They removed riparian trees and shrubs (e.g., *Salix* spp.) from a large seep and constructed three new pond-like habitats in Islais Creek near the seep. At the source site, we collected approximately 40 mating pairs on three separate days. This number was deemed appropriate since it was not likely to negatively impact the source population, it provided an adequate sample of genetic diversity of the source population, and it allowed new releases to approximate the number of adult damselflies previously found at the channel. We carefully transferred damselflies into small plastic vials with a source of moisture. We transported them to our laboratory in a cooler containing ice to limit stress from handling, warm temperatures, and light. In the laboratory, we marked individuals on their wings with a unique number using an indelible ink pen. We released the damselflies at the channel the following morning to give them a chance to feed before their midday peak mating period. We chose mating pairs because they provided an equal number of males and females for reintroduction. Secondly, it assured that individuals transferred were reproductively active, which increased the chance of oviposition at the receiving site. Thirdly, pairs are conspicuous while unpaired females are usually cryptically coloured and forage and rest away from the water (Hafernik, 1989). Lastly, we chose mating adults because juvenile damselflies are more easily damaged in handling than reproductively mature ones. We re-introduced captured adults instead of lab-reared adults because re-introducing mated females maximized the likelihood of establishing a new population quickly. Alternatively, another life history stage, such as eggs or larvae, could have been used for the reintroduction. However, this procedure would have been more labour intensive and would not have allowed comparison of the behaviour of newly released*

adults with prior research in the canyon. Post-release monitoring: We monitored the re-introduced population daily to estimate mortality and movement patterns and to observe their behaviour. After a large initial decrease in recapture rate compared to previous years, survival and movement patterns were similar to those of previous studies. As in previous studies, some damselflies dispersed from the channel to the ponds below. We observed damselflies behaving normally and mating and ovipositing into aquatic vegetation. At least two generations of new adults were observed in 1996. In 1997, damselflies emerged in the spring, but did not persist into the fall. Subsequent yearly visits to Glen Canyon have found no individuals of *I. gemina*. Future plans by the City of San Francisco call for re-introducing the damselfly again if it is not observed in the next five years. Success will require active management of wetlands in the canyon to control invasive vegetation. Additional re-introductions are being considered in restored wetlands in the Presidio of San Francisco, a U.S. National Park. Reason(s) for success/failure: (1) Successfully trans-located the species. (2) Species behaviour upon release was not impacted. (3) Unable to maintain or "re-create" natural processes to keep habitat suitable through time." (Authors)] Address: Hafernik, J.E., Dept of Biology, San Francisco State Univ., 1600 Holloway Ave., San Francisco, CA 94132, USA. E-mail: hafernik@sfsu.edu

**11474.** Heidemann, H.; Dommanget, J.-L. (2010): Analyse d'ouvrage: Protéger et favoriser les libellules. Guide pratique de protection de la nature par Hansruedi Wildermuth et Daniel Küry. *Martinia* 26(1-2): 58-60. (in French) [Review of Wildermuth, H.; Küry, D. (2009): Libellen schützen, Libellen fördern. Leitfaden für die Naturschutzpraxis. Beiträge zum Naturschutz in der Schweiz 31. 88 pp.] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**11475.** Henheik, H. (2010): Die Libellenfauna des Landkreises Reutlingen. *Mercuriale* 10: 15-34. (in German, with English summary) ["Distribution, frequency and phenology of the Odonata species of a 40 x 40 km area located on the central Swabian Alb (Baden-Württemberg, Germany) have been described for the past 10 years. In this karst landscape, which holds few surface waters, 48 species were detected. Reproductive activities were recorded for 36 of these species. Some of them did not breed regularly.] Address: Henheik, H., In Angeräcker 1, 72829 Engstingen, Germany. E-mail: hhenheik@googlemail.com

**11476.** Holly, M. (2010): Ważki w Bieszczadach [Dragonflies in Bieszczady Mts]. *Bieszczady* 10/2010: 19-21. (in Polish) [Poland; the author introduces into the regional Odonata fauna and outlines faunistic interesting species.] Address: Holly, M., Ośrodek Naukowo-Dydaktyczny Bieszczadzkiego Parku Narodowego, ul. Belska 7, PL-38-700 Ustrzyki Dolne, Poland. E-mail: marekholly@wp.pl

**11477.** Kalkman, V.J. (2010): Odonata - libellen. In: J. Noordijk, R.M.J.C Kleukers, E.J. van Nieuwerkerken, A.J. van Loon (eds.): *De Nederlandse biodiversiteit: Hoofdstuk 5: 203-205.* (in Dutch) [Brief general introduction in dragonfly biology and biodiversity in The Netherlands.] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**11478.** Kampwerth, U. (2010): „Die Letzten werden die Ersten sein“: Koexistenz von Cordulegaster-Larven und Köcherfliegen (Trichoptera: Limnephilidae) in temporären Fließgewässern. *Mercuriale* 10: 1-13. (in German, with English summary) ["In the past 20 years, larvae of the dragonflies *Cordulegaster boltonii* and *C. bidentata* have been found with high constancy in temporary woodland streams which are also known to be habitats of the caddisflies *Stenophylax mitis* and *Glyptotaelius pellucidus*, respectively. The question arises whether any relationship between these dragonflies and these caddisflies exists which could explain the frequent coexistence in evolutionary terms. ..."] (Author) Drought resistance of eggs and larvae, use of temporary running waters as habitat and advantage of *Cordulegaster* oviposition near egg deposits of *G. pellucidus* are discussed in detail.] Address: Kampwerth, Ute, Steubenstr. 202, 63225 Langen, Germany. E-mail: Ute.Kampwerth@googlemail.com

**11479.** Kjærstad, G.; Andersen, T.; Brittain, J.E.; Olsvik, H. (2010): Norsk Rødliste for arter 2010. The 2010 Norwegian Red List for Species. *Døgnfluer, øyenstikkere, steinfluer, vårfluer - Ephemeroptera, Odonata, Plecoptera, Trichoptera.* In: Kålås, J.A., Viken, Å., Henriksen, S. & Skjelseth, S. (red.) 2010. Norsk rødliste for arter 2010. Artsdatabanken, Norge Sjøtun, K., Fredriksen, S., Heggøy, E.: 227-234. (in bilingual Norwegian and English) [The following species are redlisted: *Brachytron pratense*, *Calopteryx splendens*, *Coenagrion lunulatum*, *Epitheca bimaculata*, *Gomphus vulgatissimus*, *Lestes dryas*, *Leucorrhinia albifrons*, *Leucorrhinia caudalis*, *Leucorrhinia pectoralis*, *Libellula depressa*, *Onychogomphus forcipatus*, *Orthetrum cancellatum*, *Platycnemis pennipes*, *Somatochlora flavomaculata*, *S. sahlbergi*, and *Sympetrum sanguineum*. "Sympetrum vulgatum, has been removed from the Red List. It has been increasingly observed since 2006 and seems to have expanded its range, probably in response to the rising temperature associated with climate change. The majority of dragonfly species have been moved from the two highest categories of threat (CR and EN) to VU or to NT, primarily due to an increasing frequency of observations and better knowledge about their occurrence." (Authors)] Address: Olsvik, H., N-6694 Foldfjorden, Norway. E-mail: haolsvik@frisurf.no

**11480.** Kosterin, O.E.; Zaika, V.V. (2010): Odonata of Tuva, Russia. *International Journal of Odonatology* 13 (2): 277-327, pl. IVb. (in English) ["The odonate fauna of Tuva in Siberia, Russia, is documented, based mainly on data from expeditions in 1990, 2000 and 2004, and examination of collections preserved in Novosibirsk. The checklist of Tuvian Odonata presently includes 47 species. In the southern Ubsu-Nur depression 29 species were recorded (two just there); in the Central Tuvian depression 34 species (six just there) and in the Todzha depression 32 species (nine just there). The fauna of the more humid taiga region of Todzha, separated from the arid remainder of Tuva by the Obruchev Mts, contained some forest species but lacked seven species found elsewhere in Tuva. In spite of Todzha's position in the north-east, its fauna showed a more western character and included a population of *Calopteryx splendens* with a high proportion of androchromic females and males with wings coloured to the tips. Todzha was also inhabited by *Enallagma c. cyathigerum* with a variably melanized abdomen, while in the Central Tuvian and Ubsu-Nur depressions, *E. c.*



risi occurred. In Turan and the Upper Kaa-Khem basin, intergradation between both taxa took place. In Todzha, *Somatochlora exuberata* and *S. metallica abocanica* were sympatric without intermediate forms and with habitat segregation, thus proving their status as separate species. Todzha was also inhabited by *Ophiogomphus obscurus* while the rest of Tuva harboured *O. spinicornis*. (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**11481.** Łabędzki, A.; Chrzanowski, A.; Kuźmiński, R.; Mazur, A.; Rutkowski, P. (2010): The Natura 2000 system and the problem of dragonfly protection in Poland. *Zarządzanie Ochroną Przyrody w Lasach IV*: 94-104. (in Polish, with English summary) ["As a result of forest habitat survey carried out in the years 2006-2007 in State Forests, it was found that many insect species are present in a much higher number of sites than previously thought. The success of the survey was much due to the composition of teams that carried out the survey. Prevention of forest damaging insects connected with performance of forest management tasks may pose a direct threat to dragonfly refuges. In Poland there exists a dissonance between the red list of Polish dragonflies and the protection measures with respect to these insects [Bernard et al. 2002, 2009]. The list of protected species includes all endangered species, but only to a limited extent it translates to real protection policy and practical protection measures. The species *Leucorrhinia pectoralis* and *Ophiogomphus cecilia* are among those unthreatened which was confirmed in the course of the survey carried out. The scope of survey did not include the *Coenagrion ornatum* (Selys) species. Currently, it is a critically endangered species in Poland which, in order to be preserved in national habitats, requires active protection measures that should be undertaken as a priority." (Authors) The Polish distribution of *Ophiogomphus cecilia*, *Coenagrion ornatum*, and *Leucorrhinia pectoralis* is mapped in detail.] Address: not stated

**11482.** López, L.I.; Gutiérrez, P.; Mora, J.M. (2010): Macrofauna Acuática de la Quebrada Santa Inés, Subcuenca del Río Yeguaré, Honduras. *Ceiba* 51(1): 17-28. (in Spanish, with English summary) ["Santa Inés is a stream of the Yeguaré River sub basin, located in the departments of Francisco Morazán and El Paraíso, Honduras. Santa Inés supplies water to several human communities. Three stations were sampled to study the macroinvertebrate community composition of the Santa Inés stream. A group of 3,525 individuals was collected in the stream belonging to 55 families. The dominant group was Ephemeroptera, an order generally abundant in mountain streams. On the trophic structure, predators were constant along the stream, while filter-feeding insects were the second dominant group in Santa Inés with 25% of the individuals. Santa Inés contains a high structural complexity, where all possible trophic groups of aquatic macroinvertebrates in a river system are represented. The micro basin geography of the Santa Inés stream, the current land use and the community of aquatic macroinvertebrates found in the stream makes it an ideal study subject under the River Continuum Concept." (Authors) 18% of specimens belong to the Odonata. All are treated at the genus level.] Address: López, Lucía Isabel, Consultora Ambiental, Zamorano, Honduras. E-mail: luciaisa2@gmail.com

**11483.** Lorenzo-Carballa, M. O.; Cordero-Rivera, A.; Andrés, J.A. (2010): Islands and parthenogenesis: genetical and ecological correlates of asexual reproduction in *Ischnura hastata* (Insecta: Odonata, Coenagrionidae). In: Pérez-Mellado, V. & Ramon, M. M. (eds.), *Islands and Evolution*, Institut Menorquí d'Estudis. *Recerca*, 19. Maó, Menorca: 281-307. (in English, with Spanish summary) ["The concept of "geographic parthenogenesis" refers to the observed pattern of non-overlapping distributions of sexual and parthenogenetic lineages of the same species. Hypotheses proposed to explain this phenomenon mostly lay on the idea that parthenogenetic lineages can persist in the long term if they are able to escape from the interaction with either sexual lineages and/or biological enemies (namely, predators and parasites). Therefore parthenogenetic reproduction will be more likely to occur in places that are difficult for sexuals to colonize or in stable environments. Islands have been traditionally regarded as ideal habitats for parthenogens, due mainly to their isolation and to the fact that they usually have less number of species than mainland (and thus the number of biological interactions in islands will be also lower). The analysis of patterns of mite ectoparasitism in sexual and parthenogenetic populations discards host-parasite interactions as the cause of geographic parthenogenesis in this species. The low incidence of parasitism observed in the parthenogenetic populations, where no mites have been found at most of the studied ponds, is likely to be due to the lack of parasites in the islands. Therefore, the habitat stability of the Azores, coupled with a low incidence of biological interactions must have allowed the persistence of this parthenogenetic population despite the lack of genetic variation observed, thus adding new evidence on the importance of islands as favorable habitats for parthenogenetic reproduction." (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**11484.** Marinov, M. (2010): Spatial modelling of dragonfly habitats in New Zealand (Odonata: Insecta). Dissertation. Master of Applied Sciences, Environmental Management. Lincoln University: VI + 69 pp. (in English) ["While New Zealand is poor in Odonata species the 17 species thus far established have great natural importance (Moore 1989). Ten of them are endemic to the islands representing the country. Those include four genera known to occur only in this part of the world (Rowe 1987). This poses a great responsibility on New Zealand to protect this natural treasure. Damselflies and dragonflies are considered well protected within the national parks, but the loss of habitats could severely impact them in the future. This suggests that a habitat assessment should be prepared for the whole country that will serve as base-line data set for monitoring the development of the natural environment for the Odonata species in New Zealand. 14 species have been selected for this analysis. Their biological features and ecological requirements were considered in preparing a working habitat assessment methodology. Habitat models were developed using ArcGIS 9.2 software. Multistep spatial analysis was carried out to reclassify the layers containing the important information on the land topology representing crucial elements in the Odonata species habitats. The final outputs are individual species maps where the New Zealand territory is marked with four different colour classes corresponding to the ranks of im-

portance that each area is considered to have for individual species. The models are named probabilistic in that they reveal the areas where the ecological demands of the species are approached at a maximum level. However, they should not be used as distribution maps. Probabilistic models are contrasted against deterministic models used in other Odonata habitat models. The strengths and weaknesses are discussed and some important conclusions and recommendations are described and suggested." (Author) Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: mgmarinov@yahoo.com

**11485.** Marinov, M.; McHugh, P. (2010): Comparative study of the Chatham Islands Odonata: morphological variability, behaviour and demography of the endemic *Xanthocnemis tuanuii* Rowe, 1987. International Dragonfly Fund - Report 30: 1-44. (in English) ["Faunistic investigations on adult insects and molecular research on larvae have identified the existence of at least four species of Odonata on the Chatham Islands. The species resemble their New Zealand counterparts, although there are morphological deviations from the typical diagnostic features. Molecular evidence is not concordant with earlier morphological results as far as the genus *Xanthocnemis* is concerned. Genetic data suggest there are two species on the island while morphological investigations revealed just one. This topic needs further clarification and is given special attention in the present study. The main aim of the present study is to establish the taxonomic position of Chatham Island *Xanthocnemis* species and its relation to New Zealand main island fauna. It also provides some data on the biology of the local species and estimates of key demographic parameters (i.e., survival and abundance). The results show that Chatham Islands inhabitants are close morphologically to their New Zealand main island counterparts. Between-island differences in wing area and abdomen-to-body length ratio were found, but were largely attributable to the harsh environment on the Chatham Islands and its influence on body size. Chatham *Xanthocnemis* exhibited low survival rates and a great diversity of female colour morphs and certain behavioural traits (like underwater oviposition), which are suspected to be due to a composite influence of low summer temperatures, constant winds, and low pH. Ultimately, the taxonomic status of the Chatham Island *Xanthocnemis* species needs further confirmation based on molecular analysis of adults." (Authors) ] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: mgmarinov@yahoo.com

**11486.** Randsdale, N. (2010): Dragonflies of La Brenne & Vienne. Naturetrek Tour Report 23 - 30 June 2010: 13 pp. (in English) ["This two-centre holiday in central-western France gave us an excellent insight into both the dragonfly fauna and abundant butterflies, birds and other wildlife of the region. After spending the first few days in the Brenne, land of a thousand lakes, we visited the myriad ponds of the Pinail reserve on our way to Moulismes, where we spent two days visiting small étangs, gravel pits, rivers and streams in the southern Vienne. This wide range of sites and habitats yielded a final total of 41 species of dragonflies – an excellent total by European standards. The group also saw 40 species of butterflies, including 6 fritillary species, 14 orchid species, and 97 bird species, not to mention a wide range of other animals and plants that the combined talents of the group helped to find and identify. The cold

spring had not done us many favours when looking for one or two of the scarcer odonata species, but as ever, there were compensations, namely orchid species still in full bloom, and still lots of the 'early' butterflies." (Author)] Address: Naturetrek Cheriton Mill Cheriton Alresford Hampshire SO24 0NG England

**11487.** Sadeghi, S.; Kiani, M. (2010): The study of wing shape variation of *Calopteryx splendens* (Odonata: Calopterygidae) in Zagros Mountain sides. 16th National and 4th International Conference of Biology, Ferdowsi University of Mashhad, Mashhad, Iran, 14-16 September 2010: 591. (in bilingual in Farsi and English) [Verbatim: *Calopteryx splendens* Harris (1782) is a widespread damselfly, found in most of Europe, large parts of Siberia and much of west and central Asia. There is great variation among males in wing coloration. Traditionally subspecific taxa have been distinguished by the size and position of the pigmented wing spot, and by (mating) behavior. About a dozen of subspecies have been recognized, all of which are more or less geographically confined, but often with overlapping ranges and strong variation in wing spot size. We used geometric morphometrics method to quantify morphological data and analyze the wing shape of *C.splendens* populations irrespective of wing spot, than traditional morphometrics method, in Zagros Mountainsides. In this study six similar populations which are systematically known as *C.s.intermedia*, based on their wing spot size, were evaluated. Nineteen different points were digitized as landmarks on left fore wing of males using GPA (Generalized Procrustes Analysis). Our results in geometric morphometrics (regardless of wing spot) confirmed significant wing shape differences between entire populations except Markazi and Lorestan. These observations suggest that wing spot similarity necessarily cannot reflect the full genetic similarity and evolutionary grouping of populations and therefore, is not an infallible character in *Calopteryx splendens* subspecies.] Address: Kiany, M., Payam-e Noor University, Bam, Iran. E-mail: mohsen.kiany1@gmail.com

**11488.** Smith, P.H. (2010): Dragonflies and climate change. *Coastlines* 2010(1): 17. (in English) [Sefton Coast, North West of England, near Liverpool, UK. "Up to 1991, only 14 species had been recorded in the Sefton Coast sanddune system, ten of them breeding here. Today, the total number recorded is 20, of which 14 are probably breeding. This represents a 43% increase in dragonfly diversity in only 20 years. The extra species fall mainly into two groups: (a) Those with mainly southern British distributions that have moved north; (b) Long-distance migrants from continental Europe, these appearing during summer heat-waves. Of the first group, two dragonflies, *Anax imperator* and *Sympetrum sanguineum* had already arrived here by 1990. *A. imperator* was first seen during the hot summer of 1976 but did not become well-established until the mid-1990s. *S. sanguineum* first appeared in 1989 at a time when the nearest breeders were in south Cheshire. Again, by the mid-1990s, this attractive insect had viable breeding populations in several duneland ponds. More recent colonists are *Libellula depressa* (established mid-1990s), *Aeshna mixta* (early 2000s) and *Orthetrum cancellatum* (mid-2000s). Three species fall into the migrant group: *Sympetrum flaveolum*, *S. fonscolombii* and *Anax parthenope*. Occasional individuals have appeared here only in warm summers, such as those of 1995, 1999, 2003 and 2006. Most recently, the brief

heat-wave of early July 2009 saw an influx of *S. fonscolombii* up to eight being seen at Sands Lake, Ainsdale. *Calopteryx splendens* fits less easily into the above categories. Although it has greatly increased in north-west England, this seems more to do with improving water-quality in the slow-moving rivers and streams where it breeds, than to increasing temperatures. This distinctive insect now occurs abundantly on Downholme Brook, just inland of Formby, so it is perhaps not surprising that there have been two recent sightings in the dunes. Following their arrival on the Sefton Coast, most of the dragonflies mentioned above have continued to move north and are now becoming established in Scotland. Many studies, both in this country and in Europe, have linked these trends to climate change. Other species may soon follow, one possibility being *Erythromma viridulum*, which first appeared on the Essex coast in 1999. It now breeds over large parts of south-east England and, by 2006, had reached Derbyshire and Humberside. Recent poor summers have slowed its progress but it should get here eventually." (Author)] Address: Smith, P.H., c/o Ed.: L. Lander, Sefton Council Planning & Development Dept, Magdalen House, 30 Trinity Rd, Bootle, L20 3NJ, UK

**11489.** Tavares, J.; Vieira, V.; Teixeira, T.; Teixeira, M.; Oliveira, L. (2010): Lepidópteros, odonatos e himenópteros (Insecta) observados na ilha de Santa Maria, Açores. XIV Expedição Científica do Departamento de Biologia - Santa Maria 2009 - Rel. Com. Dep. Biol. 36: 113-120. (in Portuguese, with English summary) [Santa Maria island (Azores, Portugal); July 12-19, 2009, *Ischnura hastata*, *I. pumilio*, *Anax imperator* and *Sympetrum fonscolombii*] Address: Tavares, J., Depto de Biologia da Universidade dos Açores, Rua da Mãe de Deus, 13-A Apartado 1422 - 9501-801 Ponta Delgada, Portugal

**11490.** Thompson, D.J.; Watts, P.C. (2010): Dragonflies of the New Forest. In: A. Newton eds. Biodiversity in the New Forest. Newbury, Berkshire, Pisces Publications. 248 pp: 36-45. (in English) [UK; "In this chapter we discuss the odonate diversity of the New Forest from a UK perspective, specifically addressing the issue of why there are more species than might be expected given the area and latitude of the National Park. Second, we consider those species resident in the New Forest that are of conservation interest nationally. Finally, we examine in detail the jewel in the crown of the New Forest's odonates, southern damselfly *Coenagrion mercuriale*, which is rare, threatened and protected throughout Europe, and for which the New Forest is an internationally important area." (Authors) Alongside with other data the paper includes information on imaginal mobility, population growth plotted against season, and dispersal.] Address: Thompson, D.J., Population Biology Research Group, School of Biological Sciences (Nicholson Building), University of Liverpool, P.O. Box 147, Liverpool, L69 3BX, UK. E-mail: d.j.thompson@liv.ac.uk

**11491.** Thompson, D.J. (2010): Re-introduction of the Southern Damselfly to Venn Ottery Common, Devon, UK. In: Soorae, P. S. (ed.) (2010) Global re-introduction perspectives: Additional case-studies from around the globe. IUCN/SSC Re-introduction Specialist Group, Abu Dhabi, UAE, xii + 352 pp: 29-32. (in English) ["Following the publication of the UK's Biodiversity Action Plan in 1994 a steering group was set up to look after the interests of the southern damselfly. It contained representatives from English Nature, the Countryside Council for Wales, the Environment Agency, the Wildlife Trusts and

Liverpool University, a centre of expertise in dragonfly and damselfly research. One of the aims of the plan devised by this group was to research the ecology of the species and ultimately to begin re-introductions into sites from which it had gone extinct in the UK. One of the early findings of a Studentship funded by the group was that southern damselfly sites had declined in number by more than 30% since 1960. Once the habitat requirements of the southern damselfly had been established the search began for sites from which it had gone extinct and for which habitat restoration was feasible. Venn Ottery Common, a Devon Wildlife Trust reserve lost southern damselfly in 1989, largely due to injudicious ditch digging which altered water courses to the detriment of southern damselfly, coupled with a relaxation of grazing which led to the spread of tussocks of *Molinia caerulea* which effectively covered the runnels passing down the site. It was chosen as the first re-introduction site for four reasons. First, it had lost southern damselfly relatively recently and water chemistry tests revealed that the water quality was within the range acceptable. Second, there was a strong resolve on the part of the site owners, Devon Wildlife Trust to restore southern damselfly to the site and to raise funds so to do. Third, there was enthusiastic local support from the two people most responsible for improving the status of southern damselfly on two other sites on the East Devon Pebble Beds, Aylesbeare and Colaton Raleigh Commons (Kerry, 1989). Finally there was the possibility that a meta-population structure might be established, and with it gene flow between populations (Thompson, Watts & Saccheri, 2007). From 2002 onwards researchers at Liverpool University had estimated genetic variation in all the known sites for southern damselfly in the UK and had determined population sizes and some of them. Beaulieu Heath in the New Forest was chosen as the donor site for the re-introduction on the grounds that it had the highest population density recorded in the UK and contained the most genetically diverse population. Licences to undertake the work were obtained at the national level from Natural England, from the Forestry Commission representing the donor site and from Devon Wildlife Trust representing the recipient site. On 10th June 2007, 57 mature individuals were taken from Beaulieu Heath to Venn Ottery Common in three modified cylindrical butterfly rearing cages. The water level at Venn Ottery had dropped surprisingly in the ten days since the site had been visited previously. The decision was taken to stop the re-introduction until the water supply at Venn Ottery was more reliable, but the animals transported were released in any case. Between the summer of 2007 and spring 2009 Devon Wildlife Trust make great efforts to secure the water supply to the runnels in which southern damselfly was likely to breed. Large numbers of birch trees were removed and Devon cattle were brought in to graze the site. In addition a fast-flowing, unsuitable stream on the edge of the site was transformed by the introduction of eleven dams which produced in parts conditions for southern damselfly similar to those at the other two East Devon Pebblebed sites. Growth of *Potamogeton polygonifolius*, a favoured oviposition plant for southern damselfly, was encouraged. By summer 2009 conditions at Venn Ottery were looking much better, with a steady flow of water down the runnels into which it was hoped that southern damselflies would breed. The re-introduction program was set to proceed. It was given a timely boost by the discovery of some breeding adults on the site, which must have been descendants of the



cohort introduced in 2007. Four hundred females and 100 males were transported from Beaulieu Heath to Venn Ottery Common over the course of ten days in six different batches. The car journey lasted roughly three hours but only three individuals did not survive the journey. Exclusively mated females (distinguishable by their muddy abdomen tips) were taken in the first two trips. Females store sperm and oviposit alone in the absence of males. As males were re-introduced later during the programme they would mate with females on site and by removing sperm deposited during previous matings in the New Forest (a unique feature of damselfly mating behaviour) would guarantee the highest genetic diversity per introduced female. Almost all individuals seemed unaffected by the car journey and many had begun to show reproductive behaviour within minutes of being released at Venn Ottery. Southern damselflies have a two-year life cycle in the UK. The first monitoring took place in 2009 in order to check whether any of the 2007 pilot introductions had bred. ... The pilot reintroduction in 2007 led to breeding adults being recorded on site in 2009, prior to the main re-introduction effort." (Author)] Address: Thompson, D.J., School of Biological Sciences, University of Liverpool, Crown Street, Liverpool, L69 7ZB, UK. E-mail: d.j.thompson@liv.ac.uk

**11492.** Yu, W.-y.; Li, C.-h.; Huang, C.; Liu, J.; Jian, Y.-p.; Hu, N.; Ji, J. (2010): On fauna and diversity of Odonata in Nanjing, Jiangsu province. Resources and environment in the Yangtze basin 19(05): 514-521. (in Chinese, with English summary) [China; between 2005 and 2008, 45 Odonata species have been recorded.] Address: Yu, W.-y., Dept of Life Science, Nanjing Xiaozhuang College, Nanjing, 211171, China

## 2011

**11493.** Adnan, M.; Raza, S.A. (2011): Taxonomic studies of damselflies (Zygoptera: Odonata): With special emphasis on rice ecosystem of district Gujrat. VDM Verlag Dr. Müller: 56 pp. (in English) [nv, "Zygopterans are economically very important because they have a role in insect pest management; especially they mostly feed on the pests of rice like water fleas, larvae of mosquitoes and bugs. Rice is one of the major crops grown in Gujrat, so current project was designed to explore the Zygopterous fauna of District Gujrat. Adult samples were caught with a light and strong insect collecting net having a handle 2ft length and ring diameter of about 20 cm. Ethyl acetate as a killing chemical was used in glass jars. After softening with water bath, samples were placed and stretched over thermopore sheets and pinned properly and carefully. Identification was carried out by using standard keys. Seven species of damselflies were recorded from 14 different localities of Distt. Gujrat (July-August, 2010). The species recorded from the distt. Gujrat were *Agriocnemis pygmaea*, *Ceragrion coromandelianum*, *Pseudagrion hypermelas*, *Pseudagrion spencei*, *Enallagma parvum*, *Ischnura aurora* and *Rhodischnura nursei*. *Ischnura aurora* is the most common and abundant specie found in all localities of the district while *Pseudagrion spencei* is rare in this district." (Publisher)]

**11494.** Almeida, E.; Nunes, A.; Andrade, P.; Alves, S.; Guerreiro, C.; Rebelo, R. (2011): Antipredator responses of two anurans towards native and exotic predators. *Amphibia-Reptilia* 32: 341-350. (in English) ["When faced with the risk of predation, tadpoles of many am-

phibian species are known to modify their phenotype. In this work we studied the effect of an exotic species, the red swamp crayfish (*Procambarus clarkii*), on the phenotype of two species of amphibians with different reproduction habitats: the Iberian painted frog, *Discoglossus galganoi*, that normally reproduces in temporary water bodies and the common toad, *Bufo bufo*, that reproduces in permanent water bodies. The responses were compared with the ones shown in the presence of a native predator, dragonfly (Aeshnidae) larvae. Behaviour, growth and morphology of tadpoles were monitored in a factorial experiment with five treatments. Our results showed that only the permanent habitat species altered its behaviour and life-history traits in the presence of *P. clarkii*; however, this was mediated by chemical cues from consumed conspecifics. Antipredator responses of *B. bufo* towards the exotic crayfish were similar to the ones towards the native predator, while *D. galganoi* responded to the dragonfly larvae but not to *P. clarkii*. This may be the result of infrequent colonization events of temporary habitats by the crayfish. Therefore, the consequences of the introduction of *P. clarkii* might be more serious for *D. galganoi* and other species living in temporary habitats. Species breeding in permanent habitats, more prone to having generalized antipredator responses, may be relatively protected against this exotic crayfish although the effectiveness of these responses still needs to be tested." (Authors)] Address: Almeida, Erika, Centro de Biologia Ambiental, D.B.A., F.C.U.L., Bloco C2, Piso 3, 1749-016 Lisboa, Portugal. E-mail:erikaroldao@gmail.com

**11495.** Aluthwattha, R.G.S.T. (2011): Population structure and dynamics of *Nerothemis tullia* [sic] (Odonata: Libellulidae) with water availability in rice field ecosystem. Proceedings of 16th International Forestry and Environment Symposium 2011. Sixteenth Annual Symposium organized by Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Nugegoda, Sri Lanka was held on 28 - 29 October 2011 at Golden Rose Recreation Complex, 261, Maharagama Road, Boralesgamuwa, Sri Lanka: (in English) [Verbatim: Dragonflies are important insects in rice field ecosystem (RFE) as pest predators. Rice fields in return serve as a good breeding and feeding ground for dragonflies though RFE undergo several changes during a crop cycle. However habitat conditions vary mainly on the climatic regions and farming practices. The selected RFE in wet zone lowland for sampling comprised deferent habitats, two shallow streams, non cultivated fields, cultivated fields, small water pools, ponds and water wells. The most common dragonfly in marshes and paddy fields, *Neurothemis tullia* was studied to understand its population structure and dynamics with the water availability. Sampling was conducted from May 2010 to November 2010 covering one cultivation cycle. Two sampling methods i.e., random sampling along 5m X 50m transects and systematic sampling in pre-identified colonies were used. Colonies were identified in advanced, numbered consecutively and every third colony was observed. *N. tullia* adult male, adult female, juvenile male and teneral female were distinguish by general morphological characters and recorded separately. Activeness of *N. tullia* individuals were recorded as number of catches (of prey) or tries for per 10 minutes. Other associated Odonata were also recorded. Water level and flow rate in streams were measured as indicators of water availability in RFE. Systematic sampling recorded higher density (2.50 individuals/m<sup>2</sup>)

while random sampling produced lesser density (0.19 individuals/m<sup>2</sup>). However random sampling method recorded higher diversity of Odonata in RFE. Number of individuals were positively correlated ( $r = 7.68$ ) with water level. Flow rate had no significance relationship with individual density. Activity of colony peaks between 9.00 hr to 11.00 hr and minimum around 13.00 hr. Second peak occurred around 16.00 hr - 17.00 hr. Number of both male and female juveniles sharply reduced towards the drier months whilst number of both adult male and female increased. During the dry period in September, density reduced to minimum and juveniles became scarce. In November with the beginning of rain, number and activity of *N. tullia* increased and more colonies observed at water holes and in field proper of paddy fields. Sampling along transects can be recommended for study of Odonata diversity whilst systematic sampling is more suitable for study of population dynamic and structure. The study is being continued for second crop cycle. Though common species are neglected in conservation practices, consequences of sudden decline in common species that occur in higher number, such as *N. tullia* is unpredictable. This study implies the necessity of their conservation as they have complex ecosystem interactions and intense ecosystem service.] Address: not stated

**11496.** Arulprakash, R.; Gunathilagaraj, K. (2011): Impact of agrochemicals on the abundance and diversity of Odonata in rice fields. *Indian Journal of Plant Protection* 39(3): 191-195. (in English) ["A study was designed to ascertain the impact of agrochemicals on the biodiversity of Odonata in rice fields at a Wetland farm. Adult Odonata diversity was assessed at weekly intervals from two rice fields, one with normal application of agrochemicals and other without any agrochemicals application (control). Eighteen and ten species of Odonata were recorded in Control Rice Field (CRF) and Agrochemicals Applied Rice Field (AARF), respectively. Odonata abundance, diversity and species richness was higher in CRF than AARF. Among the different stages of the rice crop, active tillering stage had Maximum abundance, diversity and species richness of Odonata. Among the families, Libellulidae was dominant in both CRF and AARF. *Diplacodes trivialis* and *Pantala flavescens* were dominant in CRF and AARF, respectively and *Ischnura aurora* was abundant in both CRF and AARF. Eight species of Odonata, which were present in CRF and absent in AARF, may be identified as indicator Odonata species for agrochemicals contamination in rice ecosystem." (Authors)] Address: Arulprakash, R., Dept of Agricultural Entomology, Agricultural Research Station, Pattukkottai-614 602, Tamil Nadu, India. E-mail: avrarulprakash@gmail.com

**11497.** Babu, R.; Mitra, A. (2011): A record of *Gomphidia t-nigrum* Sel. from Himachal Pradesh, India (Anisoptera: Gomphidae). *Notul. odonatol.* 7(8): 75-76. (in English) ["On 22-IV-2006, the first author collected a male from the vegetation along the Savah river, Rampur, Una (31°26'N/76°15'E, alt. 396 m a.s.l.). So far this species is not known to have been reported from Western Himalaya earlier. The specimen agrees fairly well with Fraser's (1934) description, save for the length of hindwing (38-40 mm) and the number of cells in anal triangle (5-7)." (Authors)] Address: Babu, R., Zool. Survey of India, M-Block, New Alipore, Kolkata-700 053 India

**11498.** Babu, R. (2011): Observations on Odonata behaviour during the nearly total solar eclipse of 22 July

2009 in India. *Notul. odonatol.* 7(8): 69-70. (in English) ["The observations were carried out on the southern fringe of Calcutta. When the eclipse was approaching the near-totality phase, all Zygoptera and Anisoptera became motionless. This is ascribed to the drop of temperature, since the sky was moderately overcast during the eclipse and the decrease in light intensity was in the early morning less apparent." (Author)] Address: Babu, R., Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053 India

**11499.** Bönsel, A.; Frank, M. (2011): Eine Momentaufnahme von *Crocothemis erythraea* (Brulle, 1832) und *Aeshna affinis* Vander Linden, 1820 in der nordostdeutschen Jungmoränenlandschaft von Mecklenburg-Vorpommern (Odonata). *Entomologische Nachrichten und Berichte* 55(1): 37-42. (in German, with English summary) [Mecklenburg-Vorpommern, Germany; records of *C. erythraea* (32 localities, 7 with exuviae) and *A. affinis* (25 localities, 3 with exuviae) are mapped and discussed in terms of global warming.] Address: Bönsel, A., Krähenberger Holz 8, 18337 Marlow, Germany

**11500.** Boyce, D. (2011): Invertebrate survey of blanket bog on Dartmoor, 2010. privately published: 37 pp. (in English) [UK; *Aeshna juncea* and *Sympetrum danae* are listed.] Address: not stated

**11501.** Buy, DD.; Matushkina, N. (2011): Sex differences in the wing fluctuating asymmetry in a damselfly *Calopteryx splendens* (Odonata, Calopterygidae). Proceedings of the International Conference "Fundamental problems of entomology in the XXI century ". St. Petersburg, 16-20 May 2011. Edited by E. Kipyatkova and D.L. Musolina. - St. Petersburg: Publishing House of St. Petersburg State University, 2011, 198 pp: 23. (in Russian) [Verbatim: Fluctuating asymmetry (FA) is defined as small random deviations from perfect bilateral symmetry in living organisms (Van Valen, 1962). It is believed that elevated levels of FA may indicate that the stabilizing mechanisms are not able to fully compensate for the deviations of which are caused by negative factors such as extreme environmental conditions (including its pollution) or limited gene flow. The study of dragonflies in the FA aims to describe the state of the population as a whole, its individual members or to identify the signs, subject to a special press stabilizing selection. In the latter case, the study mainly relate to the wings of males who use drawing as a demonstration of a wing element or territorial and sexual behaviour. The aim of our work was to compare the level of dimensional parameters of wing FA in representatives of different sexes damselflies *Calopteryx splendens*. Males of this species have a spot on the distal halves of both pairs of wings, which, during the special demonstration flights are presented conspecific males (under the protection of the territory) and females (courtship). And in the process of courting the front wings of males *S. splendens* remain almost stationary. Wings of females of this species are transparent, and, apparently, the signal is not important. Material for our study included 36 females and 49 males selected on the river Vorskla (50°17'37 "N 34°49'40" E). We studied three characteristics lengths covered with the distance from the base of vein M before the end of bk (wing length), distance from base to knot M (the length of the proximal part of the wing), the distance from the knot before the end of R.2 (the length of the distal part of the wing). It is shown that the FA distal parts of the forewings of males was significantly (approximately 2.5-fold) than in females. However, within

the same sex FA of forewing most of the indicators was significantly higher than the rear. Length of the proximal and distal parts of the wing significantly correlated in females and males do not correlate. The results allow to conclude tentatively that male *C. splendens* dimensional characteristics of the distal part of the front wing, the carrier signal spot, may have a stronger influence of stabilizing selection, but this hypothesis requires further experimental verification.] Address: Matushkina, Natalia, Department of Zoology, Biological Faculty, Kyiv National University, vul. Volodymirs'ka 64, Kyiv, 01033, Ukraine. E-mail: odonataly@gmail.com

**11502.** Cabana Otero, M.; Barreiro, A.R.; Cordero Rivera, A. (2011): Primeras citas de *Lestes sponsa* (Hanse-mann, 1823) y nuevas observaciones de *Aeshna juncea* (Linnaeus, 1758) (Odonata) en Galicia (Noroeste de la Península Ibérica). *Boletín de la SEA* 49: 341-343. (in Spanish, with English summary) [Galicia (north-western Spain); four records of *Lestes sponsa* (2010/11) and one of *A. juncea* (2010) are documented, mapped and discussed in detail. Co-occurring species are listed.] Address: Cabana Otero, M., Depto de Biología Animal, Biología Vegetal e Ecología. Facultad de Ciencias. Univ. de da Coruña. Campus da Zapa-teira, s/n. 15071 A Coruña, Spain. E-mail: mcohyala@yahoo.es

**11503.** Chowdhury, S.H.; Mohiuddin, M. (2011): A check-list of the Odonata from the eastern region of Bangladesh With sometaxonomic notes. *University Journal of Zoology, Rajshahi Universit* 30: 61-66. (in English) ["A survey of the Odonate fauna was conducted in the Sylhet and Srimangal Districts of Sylhet Division and Chittagong, Khagrachari, Rangamati, Bandarban and Cox's Bazar Districts of Chittagong Division. The designated areas were visited periodically for nearly seven years from 1994 to 2000. The present paper includes a list of the odonate species collected during the survey period. A total of 764 specimens were collected which comprised 49 species of Anisoptera in 32 genera, and 47 species of Zygoptera in 18 genera. Of these 15 species in 8 genera of the former and 27 species in 11 genera in the latter suborder are new records from Bangladesh. The collection also includes females of three species and males of two species that happen to be new to science. The specimens are preserved in our personal collection." (Authors)] Address: Chowdhury, S.H., Department of Zoology, University of Chittagong, Chittagong 3114, Bangladesh

**11504.** de Ávila, A.C.; Stenert, C.; Maltchik, L. (2011): Partitioning macroinvertebrate diversity across different spatial scales in southern Brazil coastal wetlands. *Wetlands* 31: 459-469. (in English) ["The main goals of this study were: (1) test how beta diversity of aquatic macroinvertebrates varies among samples from different spatial scales in permanent and intermittent wetlands; and (2) test how beta diversity of aquatic macroinvertebrates varies among different wetland habitat types. Four collections were carried out over 1 year in 16 freshwater coastal wetlands in southern Brazil. The habitat types identified were: 1) hydrophytes, represented by submersed and floating plants; 2) reed-like emergent plants; and 3) leafy emergent plants. Additive partitioning of diversity was used to decompose the total variation in macroinvertebrate composition (regional diversity) into alpha (fine spatial scale) and beta components (intermediate and broad spatial scales). A total of 51,290 macroinvertebrates distributed among 63 families were collected (including: Aeshnidae, Coenagri-

onidae, Libellulidae). Additive partitioning of diversity showed similar patterns for both permanent and intermittent wetlands. In general, alpha diversity component was much lower than beta components. The beta diversity was greater among wetlands than among distinct habitats within wetlands. We found a strong evidence of scale dependence on diversity partitioning of macroinvertebrate communities, with beta diversity at broad spatial scale making a large contribution to total diversity in coastal wetlands of southern Brazil." (Authors)] Address: Maltchik, L., Lab. de Ecologia e Conservação de Ecossistemas Aquáticos, Universidade do Vale do Rio dos Sinos, UNISINOS, Av. Unisinos, 950, CEP 93022-000, Sao Leopoldo, Rio Grande do Sul, Brasil. E-mail: maltchik@unisinos.br

**11505.** Edward, J.B.; Ugwumba, A.A.A. (2011): Macroinvertebrate fauna of a tropical southern reservoir, Ekiti State, Nigeria. *Continental Journal of Biological Sciences* 4(1): 30-40. (in English) ["A survey of the macroinvertebrate fauna of Egbe Reservoir, Ekiti State, Nigeria was carried out. Sampling of surface waters and macroinvertebrates was carried out twice in a month from September 2004 to December 2006. Physico-chemical parameters determined include pH, conductivity, alkalinity, dissolved oxygen and biochemical oxygen demand (BOD) using APHA methods. Macroinvertebrates were collected by kick sampling and with Van veen grab. Data analysis was done using descriptive statistics, Duncan multiple range, pearson correlation, paired t tests and diversity indices. 18 taxa of macroinvertebrates in two Phyla of Mollusca and Arthropoda were identified. Gastropods had the highest numerical abundance (41.8 %), diversity ( $d=0.61$ ,  $H=1.56$ ) and evenness ( $J=0.87$ ). Odonata and Ephemeroptera (Insecta) had the lowest diversity ( $d=0.00$ ,  $H=0.00$  and  $d=0.14$ ,  $H=0.13$ ) and numerical abundance (0.4% and 6.3%, respectively). The gastropod, *Melanoides tuberculata*, which is the most abundant macroinvertebrate is an indicator of polluted water. This suggests that the reservoir may be tending towards organic pollution. This is further confirmed by the low abundance of Ephemeroptera and Odonata which are indicators of clean water. Measures should be taken to prevent the reservoir from further deterioration and eventual eutrophication." (Authors)] Address: Edward, J.B., Dept of Zoology, University of Ado Ekiti, P.M.B. 5363, Ado Ekiti Ekiti State, Nigeria

**11506.** Faucheux, M.J. (2011): Présence constante des sensilles chétiformes incurvées et des sensilles filiformes sur les antennes des larves d'Odonates. Étude d'*Argia concinna* (Rambur, 1842), espèce endémique de Guadeloupe et Dominique (Odonata: Zygoptera: Coenagrionidae: Arginae). *Bulletin de la Société des sciences naturelles de l'Ouest de la France* 33(4): 186-194. (in French, with English summary) ["The larval antennae of *A. concinna*, an endemic species of the Lesser Antilles which lives in the troubled waters of mountain streams are here studied by means of scanning electron microscope. Five types of sensilla are identified: aporous sensilla chaetica which are tactile mechanoreceptors, numerous aporous sensilla filiformia present on both faces and with a vibroreceptive function, a proprioceptive sensillum campaniformium at the apex of the pedicel and another sensillum campaniformium at the base of the first flagellomere, aporous curved sensilla chaetica which are proprioceptors acting on the joints of the flagellomeres: F 2-F 3, F 3-F 4, a flattened and curved aporous sensillum chaeticum adjacent to F 4-F



5. These results underline the numerical importance of the sensilla filiformia in relation to life in a troubled environment." (Author)] Address: Fauchaux, M.J., Laboratoire d'Endocrinologie des Insectes Sociaux, Faculté des Sciences et des Techniques, 2 rue de la Housinière, B.P. 92208, 44322 Nantes, France. E-mail: fauchaux.michel@free.fr

**11507.** Ferreira, W.R.; Paiva, L.T.; Callisto, M. (2011): Development of a benthic multimetric index for biomonitoring of a neotropical watershed. *Braz. J. Biol.* 71(1): 15-25. (in English, with Portuguese summary) ["Biotic indices are important tools for evaluating water quality in Biomonitoring Programmes of river basins. The objective of this study was to develop a Benthic Multimetric Index (BMI) to evaluate the water quality in a Neotropical catchment in southeastern Brazil. Thirty metrics were evaluated and six were selected to calculate the BMI: family richness, % Oligochaeta, % Chironomidae + Oligochaeta (% CHOL), % EPT (Ephemeroptera, Plecoptera and Trichoptera), % Collector-gatherers, and BMWP-CETEC biotic index. Sampling was carried in triplicate at 21 sampling sites (8 in the river channel and 13 in the tributaries) during 4 annual collecting trips from June 2004 to November 2007, making a total of 945 samples. Scores (5, 3 or 1) were attributed to each chosen metric and were added up to establish the water quality criteria (a score of 6-12 – poor; 13-18 – intermediate; 19-24 – good; and 25-30 – very good water quality). Our results indicated that 48% of the sampling sites analysed in the catchment basin presented very good water quality, 14% good quality, 19% regular, and 19% poor water quality. This methodology proved to be an efficient tool for evaluating water quality in the Biomonitoring Programme of the Velhas River basin, and that it may serve to evaluate water quality in other river basins in South America." (Authors) The paper includes references to Odonata without giving any details.] Address: Ferreira, W., Laboratório de Ecologia de Bentos, Departamento de Biologia Geral, Universidade Federal de Minas Gerais – UFMG, Rua Marley Moura Abreu, 79, Vale do Jatobá, CEP 30668-530, Belo Horizonte, MG, Brazil. E-mail: wander@icb.ufmg.br

**11508.** Feulner, G.; Karki, N. (2011): Damsel in disguise. *Gazelle*, Dubai 26(3): 4. (in English) [Verbatim: Damselflies of the genus *Ischnura* (bluetails) are notoriously difficult to distinguish in the field. For the three species present in the UAE and Northern Oman (*I. evansi*, *I. senegalensis* and *I. fountainae*), Bob Reimer of Al-Ain has recently sorted out visual identification of the males (see *Tribulus* vol. 18), but identification of *Ischnura* females continues to tax even experts. One reason is that the females of most species exhibit multiple colour patterns, including a pattern that mimics that of the male (androchrome colouration), featuring a blue band around the penultimate abdominal segment. We were forcefully reminded of the phenomenon of androchrome colouration in late January when we observed a 'male' *Ischnura* in a large irrigation ditch at the Ruwayah plantations. As we watched (and attempted to confirm an identification), the 'male' curled its abdomen and began to deposit eggs on a sloping reed stem, where it angled beneath the water. It was obviously a female! The same animal continued to edge backwards along the reed, still looping its abdomen and depositing eggs at increasingly lower levels, until its head was c.3cm below the water surface. The androchrome female remained fully submerged for approximately 5 minutes. When it

ascended the reed and re-emerged at the surface, a real male was waiting ahead of it; whether this was by design or inadvertence, we cannot say. Within another minute, the pair attempted copulation in the wheel position; the male grasped the female's neck but the (androchrome) female seemed only half-hearted and failed in her efforts to maintain a reciprocal hold on the male. Three times in the course of several minutes the tandem pair fell onto the surface of the water in the channel, but each time they were able to take flight and find a perch. In the end, however, they disengaged and went their separate ways, evidently without consummation. Another noteworthy point about this observation is that it was made in late January, and a second observation, of the sister species *I. senegalensis*, was made a day later at Dubai's "Pivot Fields". Thus, although it is sometimes said that the local damselflies emerge only "later in the season" than most of the dragonflies, this is not strictly true in all cases.] Address: Feulner, G.R., P.O. Box 31045, Dubai, United Arab Emirates. E-mail: grfeulner@gmail.com

**11509.** Fliedner-Kalies, T.; Fliedner, H. (2011): Libellen im Kanton Schwyz. *Ber. schwyz. naturf. Ges.* 16: 208 pp. (in German) [Following a long lasting inventory a total of 62 species of canton Schwyz (Switzerland) are presented monographically. The introductory chapters present an outline of the history of exploration of the regional Odonata fauna and of general Odonata biology, descriptions of Odonata biotopes and information on the impact of climate change. The concluding chapter is devoted to Odonata protection and conservation. An exhaustive regional bibliography is appended. Each species is presented with a brief description of the taxa, sections on distribution, habitats, biology and the conservation status, with photographs of both sexes, a phenology graph and a distribution map.] Address: Publishers: Arvenweg 10, CH-8840 Einsiedeln, Switzerland

**11510.** Fontaneto, D.; Tommaseo-Ponzetta, M.; Galli, C.; Riséd, P.; Glewe, R.H.; Paoletti, M.G. (2011): Differences in fatty acid composition between aquatic and terrestrial insects used as food in human nutrition. *Ecology of Food and Nutrition* 50(4): 351-367. (in English) [Italy; "Edible insects may be a source of long-chain polyunsaturated fatty acids (LC-PUFA). The aim of this article is to test for differences in aquatic and terrestrial insects used in human nutrition. We implemented linear models and discovered that differences in the proportion of LC-PUFA between aquatic and terrestrial insects do exist, with terrestrial insects being significantly richer in particular omega-6 fatty acids. In conclusion, any kind of insect may provide valuable sources of LC-PUFA. Because terrestrial insects are more abundant and easier to collect, they can be considered a better source of LC-PUFA than aquatic ones." The study includes *Gomphus vulgatissimus*. "Odonata were consumed in northern Italy in Piedmont region until the early 1940s. Children used to extensively collect adult dragonflies, mainly of the genus *Gomphus*, in May–June, open their thorax and suck the muscular content, known as the "dragonfly tuna" (Boano et al. 2007, and pers. comm. from C. Cerri and C. Cantoia)." (Authors)] Address: Fontaneto, D., Department of Invertebrate Zoology, Swedish Museum of Natural History, Stockholm, Sweden. E-mail: d.fontaneto@imperial.ac.uk

**11511.** García-Alzate, C.A.; Román-Valencia, C.; González, M.I.; Barrero, A.M. (2011): Composition and temporal variation of aquatic insect community (Insecta) in

Sardineros Creek, Verde River drainage, upper Cauca, Colombia. *Rev. Invest. Univ. Quindío* 21: 21-28. (in Spanish, with English summary) ["We reviewed the composition and variation of aquatic insects from Sardineros Creek, a tributary of Verde river, Quindío river, Upper Cauca, Colombia. 2743 specimens were collected in low rainfall and 1020 during high rainfall. Diptera and Trichoptera were the most abundant. Diversity indices of Shannon-Wiener, Simpson's dominance were low in both climatic periods, while the Margalef richness was high. The index indicated a low diversity as a result of the reduced dissolved oxygen and increased conductivity during the period of high rainfall, which made the declining water quality as good (BMWP/Col: 191) during the low rainfall to acceptable (BMWP/Col: 65) at the high rainfall. Hotelling's T-Squared test probe significant differences between seasons in the community structure ( $P=0,042$ ,  $F= 4, 6$ ) and proportion test explain the structure change in 74% of the families analyzed; we propose that seasonality was the variable that most influences in the abundance and diversity of aquatic insects." (Authors) Taxa are treated at the family level and include Brechmorhoga, Progomphus, Phyllogomphoides, Hetaerina, and Aeshna.] Address: García-Alzate, C.A., Universidad del Quindío, Laboratorio de Ictiología, A. A. 2639, Armenia, Quindío, Colombia. E-mail: cagarcia@uniquindio.edu.co

**11512.** Gligorović, B.; Pešić, V.; Gligorović, A. (2011): Contribution to the knowledge of the dragonflies (Odonata) of the Plavsko lake area (Montenegro). *Natura Montenegrina, Podgorica* 10(3): 237-243. (in English) [15 species] Address: Gligorović, B., Dept of Biology, Faculty of Sciences, University of Montenegro, Cetinjski put b.b., 81000 Podgorica, Montenegro, E-mail: bogic1@cg.yu

**11513.** Guillermo-Ferreira, R.; Del-Claro, K. (2011): Territoriality and male-biased sexual size dimorphism in *Argia reclusa* (Odonata: Zygoptera). *Acta ethologica* 15(1): 101-105. (in English) ["In Odonata, many species present sexual size dimorphism (SSD), which can be associated with male territoriality in Zygoptera. We hypothesized that in the territorial *A. reclusa*, male-male competition can favour large males, and consequently, drive selection pressures to generate male-biased SSD. The study was performed at a small stream in southeastern Brazil. Males were marked, and we measured body size and assessed the quality of territories. We tested if larger territorial males (a) defended the best territories (those with more male intrusions and visiting females), (b) won more fights, and (c) mated more. Couples were collected and measured to show the occurrence of sexual size dimorphism. Results indicated that males are larger than females, and that territorial males were larger than non-territorial males. Larger territorial males won more fights and defended the best territories. There was no difference between the mating success of large territorial and small non-territorial males. Although our findings suggest that male territoriality may play a significant role on the evolution of sexual size dimorphism in *A. reclusa*, we suggest that other factors should also be considered to explain the evolution of SSD in damselflies, since non-territorial males are also capable of acquiring mates." (Authors)] Address: Guillermo-Ferreira, R., Departamento de Biologia, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, SP, Brazil. E-mail: delclaro@ufu.br

**11514.** Hämäläinen, M. (2011): Notes on the taxonomic status of *Vestalis submontana* Fraser, 1934 from South India (Zygoptera: Calopterygidae). *Notul. odonatol.* 7(8): 71-73. (in English) ["*V. submontana* Fraser, 1934 (type locality: India, [Tamil Nadu], Nilgiris, Gudalur) is upgraded to full species and *V. gracilis montana* Fraser, 1934 is synonymised with it. Distinguishing characters separating *V. submontana* from its South Indian congeners are provided." (Author)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**11515.** Himmler, H. (2011): Rezensionen: Fauna und Flora in der Großregion 1: Atlas der Libellen. Bernd Trockur, Jean-Pierre Boudot, Violaine Fichet, Philippe Goffart, Jürgen Ott & Roland Proess, 2010, 201 Seiten, durchgehend farbig bebildert. 978-3-938381-31-1, 24,90 €. *Pollichia-Kurier* 27(4): 49-50. (in German) [review] Address: Himmler, H., c/o POLLICHIA, Bismarckstr. 33, 67433 Neustadt a. d. Weinstraße, Germany

**11516.** Hoess, R. (2011): Libellen. *Berner Naturschutz* 5.2011: 8 pp. (in German) [The author introduces the regional Odonata fauna of Kanton Bern, Switzerland and informs on habitats and threats of the 59 species occurring there.] Address: Hoess, R., Normannenstr. 35, 3018 Bern, Switzerland. E-mail: ReneHoess@1st.ch

**11517.** Honkanen, M.; Sorjanen, A.-M.; Mönkkönen, M. (2011): Deconstructing responses of dragonfly species richness to area, nutrients, water plant diversity and forestry. *Oecologia* 166(2): 457-467. ["Understanding large-scale variation in species richness in relation to area, energy, habitat heterogeneity and anthropogenic disturbance has been a major task in ecology. Ultimately, variation in species richness results from variation in individual species occupancies. We studied whether the individual species occupancy patterns are determined by the same candidate factors as total species richness. We sampled 26 boreal forest ponds for dragonflies and studied the effects of shoreline length, water vascular plant species density (WVPSD), availability of nutrients, intensity of forestry, amount of Sphagnum peat cover and pH on dragonfly species richness and individual dragonfly species. WVPSD and pH had a strong positive effect on species richness. Removal of six dragonfly species experiencing strongest responses to WVPSD cancelled the relationship between species richness and WVPSD. By contrast, removal of nine least observed species did not affect the relationship between WVPSD and species richness. Thus, our results showed that relatively common species responding strongly to WVPSD shaped the observed species richness pattern whereas the effect of least observed, often rare, species was negligible. Also, our results support the view that, despite of the great impact of energy on species richness at large spatial scales, habitat heterogeneity can still have an effect on species richness in smaller scales, even overriding the effects of area." (Authors)] Address: Honkanen, M., Department of Biological and Environmental Science, University of Jyväskylä, P.O. Box 35, 40014 Jyväskylä, Finland. E-mail: merja.t.honkanen@jyu.fi

**11518.** Iorio, E.; Delfosse, E. (2011): Découverte de l'araignée *Dolomedes fimbriatus* (Clerck, 1757) (Araneae, Pisauridae) et de la libellule *Oxygastra curtisii* (Dale, 1834) (Odonata, Corduliidae) dans la vallée de la Brague (Alpes-Maritimes, France). *Revue de l'Association Roussillonnaise d'Entomologie* 20(1): 34-40. (in

French, with English summary) [21-VIII-2010; "The discoveries of the spider *Dolomedes fimbriatus* and of the dragonfly *Oxygastra curtisii* at Biot (Alpes-Maritimes department, France), beside the Brague river - between «les Soullières» and «les Chappes» (IGN 1/25000), 15 m a.s.l. 43°37.571' N; 07°04.250' E (WGS 84) - are detailed by the authors who also briefly recall their general distribution and their ecological preferences. The bibliographical data show that *D. fimbriatus* was previously known only by two old (more of 70 years) and doubtful stations in Provence-Alpes-Côte d'Azur region, and that *O. curtisii* has only been observed in one other river of the Alpes-Maritimes department 80 years ago. After the available chorological and ecological data and the rarefaction of their life environments in Alpes-Maritimes department, both species are considered as being rare in the concerned department and even throughout the French coastal mediterranean area for *D. fimbriatus*." (Authors)] Address: Iorio, E., ECO-MED, Pôle Entomologie, Tour Méditerranée, 65 av. Jules Cantini, 13298 Marseille Cedex 20, France. E-mail: e.iorio@ecomед.fr

**11519.** Iorio, E. (2011): Observation de *Gomphus graslinii* Rambur, 1842 dans les Bouches-du-Rhône (Odonata, Anisoptera: Gomphidae). *Martinia* 27(1): 39-43. (in French, with English summary) [21-VI-2010; "G. graslinii has been observed for the first time in Provence-Alpes-Côte d'Azur region, in the vicinity of the city of Arles (Bouches-du-Rhône department, France), on the part of the Canal de la Vallée des Baux located between "the Barbegal" Castel and the "étang de la Gravière", nearby the latter. Several other species have been listed in this place, among which *Oxygastra curtisii*. This canal seems to be convenient to the reproduction of *G. graslinii* and *O. curtisii*." (Author)] Address: ECO-MED (Ecologie & Médiation), Pôle Entomologie, Tour Méditerranée, 65 av. Jules Cantini, F-13298 Marseille Cedex 20 France. E-mail: e.iorio@ecomед.fr

**11520.** Iserbyt, A.; Bots, J.; Van Dongen, S.; Ting, J.J.; Van Gossum, H.; Sherratt, T.N. (2011): Frequency-dependent variation in mimetic fidelity in an intraspecific mimicry system. *Proceedings of the Royal Society B: Biological Sciences* 278(1721): 3116-3122. (in English) [*Nehalennia irene*; "Contemporary theory predicts that the degree of mimetic similarity of mimics towards their model should increase as the mimic/model ratio increases. Thus, when the mimic/model ratio is high, then the mimic has to resemble the model very closely to still gain protection from the signal receiver. To date, empirical evidence of this effect is limited to a single example where mimicry occurs between species. Here, for the first time, we test whether mimetic fidelity varies with mimic/model ratios in an intraspecific mimicry system, in which signal receivers are the same species as the mimics and models. To this end, we studied a polymorphic damselfly with a single male phenotype and two female morphs, in which one morph resembles the male phenotype while the other does not. Phenotypic similarity of males to both female morphs was quantified using morphometric data for multiple populations with varying mimic/model ratios repeated over a 3 year period. Our results demonstrate that male-like females were overall closer in size to males than the other female morph. Furthermore, the extent of morphological similarity between male-like females and males, measured as Mahalanobis distances, was frequency-dependent in the direction predicted. Hence, this study provides direct quantitative support for the prediction

that the mimetic similarity of mimics to their models increases as the mimic/model ratio increases. We suggest that the phenomenon may be widespread in a range of mimicry systems." (Authors)] Address: Iserbyt, A., Evolutionary Ecology Group, University of Antwerp, Groenenborgerlaan 171, 2020 Antwerp, Belgium. E-mail: arne.iserbyt@ua.ac.be

**11521.** Itoh, S., Nakase, J.; Naraoka, H. (2011): Occurrence of *Tramea virginia* (Rambur, 1842) in Miyagi Prefecture, Tohoku District, Japan. *Tombo* 53: 121-122. (in Japanese, with English summary) ["*T. virginia*, distributed in southwestern Japan, was recorded from Miyagi prefecture, northeastern Honshu, Japan in 2010. The occurrence of this migratory species is discussed in relation to the summer meteorological conditions of that year." (Authors)] Address: Itoh, S., Kinoshita 4-9-7-102, Wakabayashi-ku, Sendai-shi, Miyagi, 984-0047 Japan

**11522.** Jeremis, M.; Ritschel, G. (2011): Die Naturausstattung im Schluckenauer Zipfel. *Berichte der Naturforschenden Gesellschaft der Oberlausitz* 19: 3-16. (in German, with English summary) [*Lestes dryas*, *Anaciaeschna isosceles*, *Ophiogomphus cecilia*, *Cordulegaster bidentata*, and *Leucorrhinia dubia* are briefly discussed from this most northern part of Czech Republic (Din, region Ústí nad Labem)] Address: not stated

**11523.** Karube, H. (2011): Vietnamese Odonata collected in 1992-2003 surveys (2) Macromiidae and Corduliidae. *Tombo* 53: 81-91. (in English, with Japanese summary) ["This is the second report of Vietnamese Odonata collected in 1992-2003 based on my own collection and the National Science Museum's collection. In this part, I report 13 species belonging to the families Corduliidae and Macromiidae. Among the 13 species, one novel species is described from the family Corduliidae, in the genus *Idionyx*, under the name *Idionyx asahinai* sp. nov. This species resembles *I. carinata* described from southern China, but can be easily distinguished by simpler male inferior appendage and unicorn-shaped female ocellar tubercle. Moreover, the following 6 species were recorded from Vietnam for the first time; *Epopthalmia frontalis frontalis* Selys, 1871, *Macromia clio* Ris, 1916, *Macromia cupricincta* Fraser, 1924, *Macromia genialis shanensis* (Fraser, 1927), *Idionyx victor* Hamalainen, 1991, and *Idionyx carinata* Fraser, 1926." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**11524.** Karube, H.; Futahashi, R.; Odajima, T.; Odajima, A.; Odojima, K. (2011): An occurrence of a South-eastern Asiatic species, *Pseudagrion australasiae* Selys in Japan: a possible case of accidental introduction. *Tombo* 53: 111-114. (in Japanese, with English summary) ["In 2009, we found a mature male of a South-eastern Asiatic species, *Pseudagrion australasiae* Selys, 1876 in Kanagawa prefecture, central Honshu, for the first time in Japan. As the great distance from the source can hardly be covered by migration by the insects themselves, it is plausible that eggs or larvae of this species were transported into Japan without intention through import of aquatic plants from Southeast Asia." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**11525.** Kerst, C.; Gordon, S. (2011): Dragonflies and damselflies of Oregon. A field guide. Oregon State University Press. ISBN 978-0-87071-589-1: 304 pp. (in



English) ["Growing interest in watching and identifying dragonflies and damselflies has sharpened the need for an authoritative resource like *Dragonflies and Damselflies of Oregon*, a definitive field guide devoted solely to dragonflies and damselflies found in the state. Cary Kerst and Steve Gordon include information on identification, as well as biology and behaviour, using common terms useful to the novice and experienced enthusiast alike. The book features stunning colour photographs of male and female of all species currently known in Oregon, along with helpful illustrations and charts with important identification characteristics. *Dragonflies and Damselflies of Oregon* presents the life cycle and larval habits of dragonflies and damselflies, along with photographs of the larvae of families. The Oregon range for each species is mapped, and the size range of adults is provided in text and illustration. The book also includes a description of the best sites in Oregon to observe these amazing insects, a useful tool for viewing uncommon species in spectacular settings. *Dragonflies and Damselflies of Oregon* is an essential reference for odonatists, entomologists, birders, butterfly watchers, fishermen, wetland experts, naturalists, gardeners, artists, photographers, and all outdoor enthusiasts. 91 species descriptions, with ID charts; Full-colour photographs of all species known in Oregon, with illustrations and charts; Description of 30 best locations in Oregon to observe dragonflies; Tables of illustrations used as pictorial keys; Useful appendices and index" (Publisher)] Address: Publisher: Oregon State University Press, 121 The Valley Library, Corvallis, OR 97331, USA

**11526.** Ledger, M.E.; Edwards, F.K.; Brown, L.E.; Milner, A.M.; Ward, G. (2011): Impact of simulated drought on ecosystem biomass production: an experimental test in stream mesocosms. *Global Change Biology* 17(7): 2288-2297. (in English) ["Climate models predict widespread shifts in precipitation patterns and increases in the frequency of extreme events such as droughts, but consequences for key processes in affected ecosystems remains poorly understood. A 2-year manipulative experiment used a series of stream mesocosms to test the effect of recurrent drought disturbance on the composition and secondary production of macroinvertebrate consumer assemblages and functional groups. On average, secondary production in drought-disturbed communities (mean  $4.5 \text{ g m}^{-2} \text{ yr}^{-1}$ ) was less than half of that that in controls (mean  $10.4 \text{ g m}^{-2} \text{ yr}^{-1}$ ). The effects of the drought differed among functional feeding groups, with substantial declines for detritivore shredders (by 69%) and engulfing predators [including *Cordulegaster boltonii*] (by 94%). Contrasting responses were evident among taxa within most functional feeding groups, ranging from extirpation to irruptions in the case of several small midge larvae, but production of most species was suppressed. Taxon-specific responses were related to body mass and voltinism. The ratio of production to biomass (community P/B) increased under drought, reflecting a shift in production from large long-lived taxa to smaller taxa with faster life cycles. This research provides some of the first experimental evidence of the profound effects that droughts can have on both the structure and functioning of aquatic ecosystems." (Authors)] Address: Ledger, M., School of Geography, Earth & Environ. Sci., Univ. Birmingham, Edgbaston, Birmingham B15 2TT, UK. E-mail: m.e.ledger@bham.ac.uk

**11527.** Liess, M.; Beketov, M. (2011): Traits and stress: keys to identify community effects of low levels of toxicants in test systems. *Ecotoxicology* 20(6): 1328-1340.

(in English) ["Community effects of low toxicant concentrations are obscured by a multitude of confounding factors. To resolve this issue for community test systems, we propose a trait-based approach to detect toxic effects. An experiment with outdoor stream mesocosms was established 2-years before contamination to allow the development of biotic interactions within the community. Following pulse contamination with the insecticide thiacloprid, communities were monitored for additional 2 years to observe long-term effects. Applying a priori ecotoxicological knowledge species were aggregated into trait-based groups that reflected stressor-specific vulnerability of populations to toxicant exposure. This reduces inter-replicate variation that is not related to toxicant effects and enables to better link exposure and effect. Species with low intrinsic sensitivity showed only transient effects at the highest thiacloprid concentration of 100 lg/l. Sensitive multivoltine species showed transient effects at 3.3 lg/l. Sensitive univoltine species were affected at 0.1 lg/l and did not recover during the year after contamination. Based on these results the new indicator SPEARmesocosm was calculated as the relative abundance of sensitive univoltine taxa. Long-term community effects of thiacloprid were detected at concentrations 1,000 times below those detected by the PRC (Principal Response Curve) approach. We also found that those species, characterised by the most vulnerable trait combination, that were stressed were affected more strongly by thiacloprid than non-stressed species. We conclude that the grouping of species according to toxicant-related traits enables identification and prediction of community response to low levels of toxicants and that additionally the environmental context determines species sensitivity to toxicants." (Authors) *Aeshna* sp., *Ischnura elegans*, *Leucorrhinia* sp., *Libellula quadrimaculata*, *Orthetrum coerulescens*, and *Sympetrum striolatum* are assessed as "non-sensitive univoltine taxa".] Address: Liess, M., Department System-Ecotoxicology, UFZ - Helmholtz Centre for Environmental Research, Leipzig 04318, Germany. E-mail: matthias.liess@ufz.de

**11528.** Lökkös, A.; Jäch, M.A.; Kovacs, T. (2011): First record of *Hydraena schuleri* Ganglbauer, 1901 (Coleoptera: Hydraenidae) in Hungary. *Folia Historico-Naturalia Musei Matraensis* 35: 109-110. (in English) [*H. schuleri* is recorded for the first time from Hungary (Mátra and Pilis Mountains). The locality in the Mátra Mountains (N47°52'37.2", E19°57'57.1", 520 m, UTM grid: DU20) is a typical shaded mountain stream. From this area several interesting insect species are known including *Cordulegaster bidentata* (Kovács & Ambrus 2010).] Address: Lökkös, A., University of Pannonia, Georgikon Faculty, Dept of Animal Sciences and Animal Husbandry, H-8360 Keszthely, Hungary. E-mail: a.lokkos@gmail.com

**11529.** Lüderitz, V.; Speierl, T.; Langheinrich, U.; Völkl, W.; Gersberg, R.M. (2011): Restoration of the Upper Main and Rodach rivers – The success and its measurement. *Ecological Engineering* 37(12): 2044-2055. (in English) ["Large-scale restoration of streams and rivers is a mandatory prerequisite for the implementation of the European Water Framework Directive (WFD) to reach good ecological status of water bodies. This contribution analyzes the success of the largest river restoration in Germany at the Upper Main (Bayern). Sections with a length of more than 18 km were restored be-

tween 1990 and 2008, including re-connection of former oxbow-lakes, multiple-channelling, and establishment of wide riparian buffer zones. Measuring the success of restoration by means of a multimetric assessment system, we found a clear success of restoration indicated by the status of hydromorphology and by the biological parameters, including macroinvertebrates, fishes, and macrophytes. Unlike non-restored reaches, the restored reaches attained a good ecological status. As such, the restoration of the Upper Main is shown to be a pilot project for the implementation of the WFD on a large scale." (Authors) With the exception of Ophiogomphus cecilia, all species listed below profit from restoration measures: *Aeshna cyanea*, *Calopteryx splendens*, *Coenagrion puella*, *Cordulegaster boltonii*, *Gomphus pulchellus*, *G. vulgatissimus*, *Ischnura elegans*, *Onychogomphus forcipatus*, *Platycnemis pennipes*, and *Pyrrosoma nymphula*.] Address: Lüderitz, V., University of Applied Sciences Magdeburg, Dept of Water and Waste Management, Breitscheidstr. 2, 39114 Magdeburg, Germany. E-mail: Volker.Luederitz@HS-Magdeburg.de

**11530.** Malikova, E.I.; Medvedev, A.F. (2011): New record of *Sympetrum risi* Bartenev, 1914 in Amur region. *Amurian zoological journal* III(3): 246-247. (in Russian, with English summary) [All *S. risi* specimens were collected in Amurskaya oblast in vic. of Blagoveshchensk (50°33'60"N, 127°39'27" E; 19.08.2011) and Raichikhinsk (49°47'36" N, 129°23'06" E; 15.09.2011). Diagnostic characters of *S. risi* and its relative *S. infuscatum* Selys, 1883 are discussed. Two colour morphs are noted in the females of *S. risi*, with heteromorph females closely resembling *S. infuscatum*.] Address: Malikova E.I., Department of Zoology, Blagoveshchensk State Pedagogical University, Lenina str. 104, Blagoveshchensk, 675000, Russia. E-mail: emalikova@inbox.ru

**11531.** Manger, R. (2011): Interspecific mating of *Sympetma fusca* (Vander L.) and *S. paedisca* (Brauer) observed for the second time in The Netherlands (Zygoptera: Lestidae). *Notul. odonatol.* 7(8): 74-75. (in English) ["On 26 April 2008, interspecific mating of *S. fusca* male and *S. paedisca* female, with oviposition ensuing, was observed in the Weerribben, in NE Netherlands. In 2007, a similar mating was brought on record from Drenthe, but its duration was shorter. It would seem that, in areas where both species reproduce, *S. fusca* behaves dominantly. The increasing expansion of *S. fusca* northward, as seen in the last few decades, could cause competition between the 2 species in the use of waters suitable for reproduction in the Weerribben and in similar areas. It is not known whether interbreeding could lead to viable progeny." (Author)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rmanger@planet.nl

**11532.** Marinov, M. (2011): Damselflies and Dragonflies of the Nakorotubu Range, Ra and Tailevu Provinces, Viti Levu, Fiji. In: Morrison, C., Nawadra, S., and Tuiwawa, M. (ed.). A rapid biodiversity assessment of the Nakorotubu Range, Ra and Tailevu Provinces, Fiji. *RAP Bulletin of Biological Assessment* 59: 90-128. (in English) ["A total of 32 Odonata taxa were found during the RAP-Fiji in the Nakorotubu range, Ra and Tailevu Provinces, Fiji. These taxa represent more than 50% of the all species recorded for the whole Fijian archipelago and about 78% of the species established for Viti Levu. The significance of the group for environmental appraisals is discussed, individual behavioural traits and short ecological information are provided for each spe-

cies observed during the investigation, and a preliminary habitat classification scheme is suggested for the species collected from the study area. Due to problems with species taxonomy only general conservation recommendations are proposed without specifying local management actions that need to be taken." (Author)] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

**11533.** Mola, L.M.; Rebagliati, P.J.; Rodríguez Gil, S.G.; Adilardi, R.S. (2011): Variaciones meióticas y evolución cromosómica en insectos y arácnidos con cromosomas holocinéticos. *Journal of Basic & Applied Genetics* 22(1) (Article 12): 6 pp. (in Spanish, with English summary) ["Cytogenetic studies in model groups of insects (Odonata [*Rhionaeschna bonariensis*] and Heteroptera) and arachnids (Dysderoidea and Buthidae) with holokinetic chromosomes allowed us to identify differences in autosomes and sex chromosomes meiotic behaviour (pre-or post-reductional meiosis, chiasmatic or achiasmatic meiosis, telokinetic or holokinetic activity). Also, we detected differences in the frequency and distribution of chromosomal mutations (fusions, fragmentations and translocations both in homozygosity or heterozygosity) in the karyotype evolution mechanisms." (Authors)] Address: Mola, L.M., Lab. de Citogenética y Evolución, Depto de Ecología Genética y Evolución. Facultad de Ciencias Exactas y Naturales. Universidad de Buenos Aires. Intendente Güiraldes y Costanera Norte, 1428 Ciudad Universitaria. Ciudad Autónoma de Buenos Aires. Argentina. E-mail: limola@ege.fcen.uba.ar

**11534.** Neff, M.R.; Jackson, D.A. (2011): Effects of broad-scale geological changes on patterns in macroinvertebrate assemblages. *Journal of the North American Benthological Society* 30(2): 459-473. (in English) ["Understanding the broad-scale factors that influence biological communities has long been a goal of community ecology. We used benthic macroinvertebrate data to identify broad geographical patterns in macroinvertebrate community composition and specifically to examine the influence of the Precambrian Shield on stream abiotic and biotic conditions. The Precambrian Shield is a geological feature that encompasses most of northern North America. Geology differs between Shield and off-Shield areas, creating distinctly different physical and chemical conditions in aquatic systems. We focused our regional scale study on south-central Ontario, where both Shield and off-Shield conditions are found in adjacent areas. We used constrained and unconstrained multivariate analyses to examine patterns in biotic, abiotic, and spatial variables. Our results showed that, in low-order lotic systems, macroinvertebrate communities differ between Shield and off-Shield streams. Shield streams have higher dissolved O<sub>2</sub>, velocity, and discharge, larger amounts of woody debris, and greater canopy cover than off-Shield streams. In contrast, off-Shield streams have higher conductivity, alkalinity, pH, turbidity, and water temperature, and frequently are surrounded by meadow, cultivated, or pastured land. In general, macroinvertebrate communities at off-Shield sites had a greater proportion of taxa preferring pool or depositional habitats, whereas macroinvertebrate communities at Shield sites contained taxa typically associated with riffles or erosional habitats. Analysis of spatial location indicated that the Shield/off-Shield distinction probably is the result of a combination of intertwined abiotic and spatial factors." (Authors) Taxa including

Odonata are treated at the family level.] Address: Neff, Margaret, Department of Ecology and Evolutionary Biology, University of Toronto, Toronto, Ontario M5S 3G5 Canada. E-mail addresses: maggie.neff@utoronto.ca

**11535.** Nesemann, H.; Sharma, G.; Sinha, R.K. (2011): Benthic macro-invertebrate fauna and "marine elements" sensu Annandale (1922) highlight the valuable dolphin habitat of river Ganga in Bihar - India. *TAPROBANICA: The Journal of Asian Biodiversity* 3(1): 18-30. (in English) ["From the main channel of River Ganga 95 invertebrate taxa (including *Asiagomphus* spec. and *Macrogomphus* spec.) have been recorded in the endangered Gangetic Dolphin (*Platanista gangetica*) habitat over an observation period of ten years. Mollusks, Annelids and Arthropods are the dominating benthic groups that constitute the detritivores, filter-feeders and sediment feeders, scrapers/grazers and herbivores. The benthic sediment fauna is rich in diversity and high in abundance. This enables carnivores to occupy a large variety of specialized ecological niches. ... Only two taxa are certainly recognized as non-indigenous neozoans, whereas the remaining fauna shows pristine and stable ecological conditions. In this aspect River Ganga differs from regulated large rivers, where faunal change has largely replaced the original species inventory. Despite the heavy pollution in parts of the river, the original composition of biological diversity is still persisting in the middle reaches of the Ganga. This provides hope for the survival of the Gangetic Dolphin." (Authors)] Address: Sharma, G., Zoological Survey of India, Gangetic Plains Regional Centre, Road No. 11-D, Rajendra Nagar, Patna-800 016, India. E-mail: gprszsapatna@rediffmail.com

**11536.** Nesemann, H.; Shah, R.D.T.; Shah, D.N. (2011): Key to the larval stages of common Odonata of Hindu Kush Himalaya, with short notes on habitats and ecology. *Journal of Threatened Taxa* 3(9): 2045-2060. (in English) ["The order Odonata is one of the most widely studied groups among insects from the oriental region. They colonize in both stagnant and running water bodies of wide water quality. Hitherto, the existing literature on the Odonata contained numerous publications with coloured figures of adults, helpful for identification. Identification key with figures on larval stages, using their coloration as distinguishing characters are largely missing. The current work attempts to provide an identification key to aquatic larvae of the most common families of Zygoptera, Anisoptera and Anisozygoptera with colour illustrations. The specimens were collected from Nepal and India (northern part). Each family is represented by several examples to demonstrate the range of morphological variability. This key helps determination of aquatic larvae Odonata up to family level without enormous efforts in field and laboratory." (Authors)] Address: Nesemann, H., Centre for Environmental Science, Central University of Bihar, BIT Campus, Patna, Bihar 800014, India. E-mail: hnese-mann2000@yahoo.co.in

**11537.** Neves dos Santos, A.F.G.; Neves dos Santos, L.; Araújo, F.G. (2011): Digestive tract morphology of the Neotropical piscivorous fish *Cichla kelberi* (Perciformes: Cichlidae) introduced into an oligotrophic Brazilian reservoir. *Rev. Biol. Trop. (Int. J. Trop. Biol.)* 59(3): 1245-1255. (in English, with Portuguese summary) [Odonata were found in 11.36% in the diet of 254 *C. kelberi* stomachs collected in Lajes Reservoir.] Address: Araújo, F.G., Departamento de Biologia, Universidade

Federal Rural do Rio de Janeiro, Antiga BR 465, Km 47, Seropédica, Brasil. E-mail: gerson@ufrjr.br

**11538.** Nilsson, E.; Solomon, C.T.; Wilson, K.A.; Willis, T.V.; Larget, B.; Vander Zanden, M.J. (2011): Effects of an invasive crayfish on trophic relationships in north-temperate lake food webs. *Freshwater Biology* 57(1): 10-23. (in English) ["(1) The introduction of invasive species is one of the main threats to global biodiversity, ecosystem structure and ecosystem processes. In freshwaters, invasive crayfish alter macroinvertebrate community structure and destroy macrophyte beds. There is limited knowledge on how such invasive species-driven changes affect consumers at higher trophic levels. (2) In this study, we explore how the invasive rusty crayfish *Orconectes rusticus*, a benthic omnivore, affects benthic macroinvertebrates, as well as the broader consequences for ecosystem-level trophic flows in terms of fish benthivory and trophic position (TP). We expected crayfish to decrease abundance of benthic macroinvertebrates, making most fish species less reliant on benthic resources. We expected crayfish specialists (e.g. *Lepomis* sp. and *Micropterus* sp.) to increase their benthic dependence. (3) In 10 northern Wisconsin lakes, we measured rusty crayfish relative abundance (catch per unit effort, CPUE), macroinvertebrate abundance, and C and N stable isotope ratios of 11 littoral fish species. We used stable isotope data and mixing models to characterise the trophic pathways supporting each fish species, and related trophic structure to crayfish relative abundance, fish body size and abiotic predictors using hierarchical Bayesian models. (4) Benthic invertebrate abundance was negatively correlated with rusty crayfish relative abundance. Fish benthivory increased with crayfish CPUE for all 11 fish species; posterior probabilities of a positive effect were >95%. TP also increased slightly with crayfish CPUE for some species, particularly smallmouth bass, largemouth bass, rock bass and Johnny darter. Moreover, both fish body size and lake abiotic variables explained variation in TP, while their effects on benthivory were small. (5) Rusty crayfish abundance explained relatively little of the overall variation in fish benthivory and TP. Although rusty crayfish appear to have strong effects on abundances of benthic macroinvertebrates, energy flow pathways and trophic niches of lentic fishes were not strongly influenced by invasive rusty crayfish." (Authors) Odonata are represented in some of the studied lakes but not treated.] Address: Nilsson, E., Department of Biology /Limnology and Marine Ecology, Ecology Building, Lund University, SE-223 62 Lund, Sweden. E-mail: erika.ja.nilsson@gmail.com

**11539.** Ohba, S.-Y.; Trang Huynh, T.T.; Le, L.L.; Ngoc, H.T.; Hoang, S.L.; Takagi, M. (2011): Mosquitoes and their potential predators in rice agroecosystems of the Mekong delta, southern Vietnam. *Journal of the American Mosquito Control Association* 27(4): 384-392. (in English) ["*Culex tritaeniorhynchus*, *Cx. gelidus*, and *Cx. quinquefasciatus*, known vectors of Japanese encephalitis (JE), are distributed in rice agroecosystems in Asian countries. Very few integrated studies on the breeding habitats of rice-field mosquitoes, including JE vectors, have been conducted in Vietnam. We investigated the mosquito fauna and potential predators (including 'Zygoptera' and 'Anisoptera') in 8 rice growing areas in the Mekong Delta region of southern Vietnam, during the wet and dry seasons of 2009. Mosquitoes and their predators were collected from a variety of aquatic habi-



tats (rice fields, ponds, wetlands, shrimp ponds, ditches, canals, and rivers). [...] Based on a stepwise generalized linear model, the abundance of mosquitoes and their predators in rice fields was high when the rice plant length was short and water depth was shallow. Therefore, the use of insecticides during the earlier stages of rice growth should be avoided in order to preserve the predator populations." (Authors)] Address: Ohba, S.-Y., Department of Vector Ecology & Environment, Institute of Tropical Medicine (NEKKEN), Nagasaki University, Sakamoto, Nagasaki 852-8523, Japan. E-mail: oobug@ecology.kyoto-u.ac.jp

**11540.** Ozono, A.; Futahashi, R.; Ozono, A. (2011): An interspecific hybrid between *Anax parthenope julius* female and *A. panybeus* male. *Tombo* 53: 115-118. (in Japanese, with English summary) ["A male interspecific hybrid between *Anax panyheus* Hagen, 1867 and *Anax parthenope julius* Brauer, 1865 was recorded from Amami-Oshima Island, Kagoshima Prefecture, Japan, which shows intermediate characteristics between both species. The results of nuclear and mitochondrial DNA analyses suggest that this specimen was derived from interspecific mating between a male *Anax panyheus* and a female *Anax parthenope julius*." (Authors)] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**11541.** Pfau, H.K. (2011): Functional morphology of the head movability and arrestment of *Aeshna cyanea* and some other dragonflies (Insecta: Odonata). *Entomologia generalis* 33(4): 217-234. (in English) ["The functional morphology of the neck sclerites and muscles, which are responsible for head movability and arrestment, is described. The musculature is divided (unsharp) in muscles for head-movements and muscles for head-arrestment and disengagement. A new mechanism of the cervicalia is described: the cervicalia-1/-3 constitute, together with the propleural suspension, a kinematic system with 5 links and 5 joints, which is activated by two pairs of antagonistic muscles. The muscles determine (on both sides) the distance between a pad of the cervical sclerite 2 and the head (which is articulated frontally to the cervicalia-1) by an alteration of both the lateral and longitudinal distances. -The head-suspension of dragonflies represents a serious mechanical weak point [Mittelstaedt 1950, Gorb 1998]. Since the head is continuously adjustable nearer or farther to the pads of the cervicalia-2, a gradual adaptation to risks of injury is possible. By strong contraction of the arrester-muscles an elastic bending property of the cervicalia-1 is utilized. The tangential approach and differently strong hooking of microtrichia fields effect a variable frictional damping of passive deflections of the head. Pressure-spring and tension-spring properties, mainly of the proximal bending zone of the cervicalia-1, also serve to protect the vulnerable head-joint. - The evolution of the punctiform head-articulation of the Odonata is reconstructed. Based on the different relative size of the cervical sclerites, the efficiency of different head-arrester systems is evaluated. Epallage fatigue, *Epiophlebia superstes* and the Anisoptera indicate an improved effectiveness of the head-arrester functions, which is possibly correlated to enhanced flight capabilities and increased risks of head-joint damage." (Author)] Address: Pfau, H.-K., Rathenastr. 14, 65326 Aarbergen, Germany. E-mail: clauspfau@web.de

**11542.** Regan, E.; Nelson, B.M McCormack, S.; Nash, R.; O'Connor, J.P. (2011): Countdown to 2010: Can we

assess Ireland's insect species diversity and loss?. *Proceedings of the Royal Irish Academy* 110(2): 109-117. (in English) ["In light of the Convention on Biological Diversity, this paper summarises the known insect species numbers for Ireland and questions whether this is a true reflection of our insect diversity. The total number of known species for Ireland is 11,422. Using species accumulation curves and a comparison with the British fauna, this study shows that the Irish list is incomplete and that the actual species number is much higher. However, even with a reasonable knowledge of the species in Ireland, insects are such speciose, small, and inconspicuous animals that it is difficult to assess species loss. It is impossible to know at one point in time the number of insect species in Ireland and, although it is useful to summarise the known number of species, it is essential that biodiversity indicators, such as the Red List Index, are developed. ... For example, while 32 species of the Odonata have been recorded in Ireland, only 24 (75%) of these species are known to have established breeding populations (Nelson and Thompson 2004)."] Address: Regan, E., School of Natural Sciences, Trinity College Dublin, National Biodiversity Data Centre, Dublin 2, WIT West Campus, Waterford, Ireland

**11543.** Reinhardt, K (2011): *Ischnura pumilio* (Charp.) on the island of Giglio: first record from the Tuscan archipelago, Italy (Zygoptera: Coenagrionidae). *Notul. odonatol.* 7(8): 76. (in English) [17-IX-1997, single female specimen.] Address: Reinhardt, K., Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. E-mail: K.Reinhardt@sheffield.ac.uk

**11544.** Rojas-Riano, N.C. (2011): First record of the damselfly genus *Anisagrion* (Odonata: Coenagrionidae) from Colombia. *Revista Colombiana de Entomología* 37(1): 164-165. (in English, with Spanish summary) ["The genus *Anisagrion* and the species *A. inornatum* are reported for the first time from Colombia. Currently the genus is known from Central America, Venezuela, and Ecuador. ... 3 male *Anisagrion inornatum* (Selys, 1876): Colombia. Boyacá Department. Santa María. Icacuye. 4°53'42,8"N 73°16'43"W. 843 m.a.s.l. 28-dec-2008. A. Penagos & F. Palacino. Insect Collection of the Instituto de Ciencias Naturales [ICN 043490, 043491, 043494]."] (Author) ] Address: Rojas-Riano, Nancy, Biologist. Graduate student M.Sc., Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Sede Bogotá. Carrera 30 no. 45-03 AA. 7495. Bogotá D.C., Colombia. E-mail: ncrojasr@unal.edu.co

**11545.** Sakenin, H.; Samin, N.; Shakouri, M.J.; Mohebbi, H.R.; Ezzatpanah, S.; Moemen Beitollahi, S. (2011): A faunistic survey of the insect predators in some regions of Iran. *Calodema* 142: 1-10. (in English) ["The use of biological control is a fundamental tactic for pest suppression within an effective Integrated Pest Management (IPM) program. Biological control refers to the use of natural enemies against a pest population to reduce the pest's density and damage to a level lower than would occur in their absence. Biological control is designed with predators, parasitoids and pathogens. Some of these predaceous insects from many regions of Iran are studied in this paper. A total of 89 insect predator species from six orders ... were collected as biological control agents in agroecosystems of some regions of Iran." (Authors): *Cordulegaster picta*, *Cordulia aenea*, *Gomphus davidi*, *Libellula pontica*, *Orthetrum coerulescens*, *Sympetrum pedemontanum*.] Address:

Sakenin, H., Department of Plant Protection, Islamic Azad University, Qaemshahr Branch, Mazandaran, Iran. E-mail: hchelave@yahoo.com

**11546.** Sandaas, K. (2011): Forekomst av øyestikkeren bred blålibelle *Libellula depressa*. Ås kommune Akershus 2010. Med tillegg om Nesodden, Frogn, Enebakk og Oppegård kommuner: 1-7. (in Norwegian) [Records of *L. depressa* in Ås, Norway from 2003 and 2010 are compiled and discussed.] Address: Sandaas, K., Naturfaglige konsulenttjenester, Øvre Solåsen 9, 1450 Nesoddtangen, Norway. E-mail: kjell.sandaas@gmail.com

**11547.** Sano, K.; Miyoshi, K.; Ishikawa, S.; Liepvisay, N.; Kurokura, H. (2011): Impact of predation by water insects on fish seed production in Lao PDR. *Japan Agricultural Research Quarterly* 45(4): 461-465. (in English) ["The predation of cultured larval fish by water insects presents a serious issue for aquaculture development in rural areas of the Lao People's Democratic Republic (Lao PDR). In this study, the species composition of predatory water insects was monitored in a fish nursing pond. Laboratory predation experiments were then performed to examine the predation potential of water insects on 3 major cultured fish species, including *Barbonymus gonionotus*, *Cirrhinus cirrhosus*, and *Cyprinus carpio*. ... The results suggested that larvae of Coenagrionidae, Libellulidae, and Dytiscidae and adults and larvae of Notonectidae are potential predators of fish seed in nursing ponds. In this survey, predatory water insects were removed by drying the pond, and then filtering water using fine mesh nets after the pond had been refilled. The biomass of Coenagrionidae, Libellulidae, and Dytiscidae larvae was low 3 days after refilling and increased gradually over time, which suggests that the drying and filtering methods were effective for the removal of larvae of these 3 families, because they cannot fly. Coenagrionidae, Hydrophillidae and Dytiscidae individuals spawn the eggs on vegetation growing in the water. The removal of plants may therefore be more effective for the extirpation of these water insects than drying out the pond." (Authors)] Address: Sano, K., Fisheries and Aquaculture International Co. Ltd., Shinjuku, Tokyo 160-0004, Japan. E-mail: s-kousuke@mtj.biglobe.ne.jp

**11548.** Schiel, F.-J. (2011): Breiten sich Kleine und Glänzende Binsenjungfer (*Lestes virens*, *L. dryas*) derzeit in der Oberrheinebene aus? (*Odonata: Lestidae*). *Mercuriale* 11: 11-16. (in German, with English summary) ["Since 2000, *L. virens* has been recorded at 14 sites in the upper Rhine valley of the German federal state of Baden-Württemberg and *L. dryas* at six sites. Between 1958 and 1999, the former species was recorded at eight sites, the latter at three sites in this part of the upper Rhine valley. This significant increase in records suggests a range extension of both species. Most records are from the nature area „Hardtebenen“ in the surroundings of Karlsruhe - characterized by sandy soils - and the wet lowland nature area „Kinzig-Murg-Rinne“ in the neighbouring south. The distribution of both species in the upper Rhine valley east of the River Rhine in Baden-Württemberg corresponds with that of the valley west of the River Rhine in Alsace (France) and the German federal state of Rhineland-Palatine." (Author)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, 77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**11549.** Sciberras, A. (2011): First record of a successful breeding of *Anax ephippiger* Burmeister, 1839 in the Maltese Islands (*Insecta, Odonata*). *Naturalista sicil.* Ser. IV, 35(2): 157-162. (in English, with Italian summary) [teneral male, il-Qammieh, 23-VIII-2010] Address: Sciberras, A., 131, "Arnest", Arcade Str., Paola, Malta. E-mail: bioislets@gmail.com

**11550.** Sciberras, A. (2011): Dragonfly migration causes sensation. *The Sunday Times*, April 17th: 68. (in English) [18-III-2011, around 4000 *Anax ephippiger* were seen NE of Gozo, Malta.] Address: Sciberras, A., 131, "Arnest", Arcade Str., Paola, Malta. E-mail: bioislets@gmail.com

**11551.** Sheshurak, P.N.; Voblenko, A.S.; Kedrov, B.Yu.; Gromova, A.G.; Gavriley, M.A. (2011): Animals as prey of the Domestic cat (*Felis catus* Linnaeus, 1758) in the Chernigov region (Ukraine). *Prirodnichy Almanac* 16: 178-186. (in Russian, with Ukrainian and English summaries) [The prey of *F. catus* includes *Aeshna mixta*, *Orthetrum cancellatum*, *Sympetrum flaveolum*, *S. vulgatum*, *S. danae*, and *S. sanguineum*.] Address: Sheshurak, P.N., Nizhyn State University. Nikolai Gogol Nezhyyn, Chernihiv region, Ukraine. E-mail: sheshurak@mail.ru

**11552.** Siesa, M.E. (2011): Freshwater communities and biological invasions: *Odonata, Amphibia* and *Procambarus clarkii*. Tesi di Dottorato. Scuola di Dottorato in Terra, Ambiente e Biodiversità, Corso di Dottorato di Ricerca in Scienze Naturalistiche e Ambientali, XXIII ciclo, Dipartimento di Biologia, Università degli studi di Milano: 144 pp. (in English) ["This research work analyses processes and dynamics occurring during the early stages of a biological invasion in freshwater habitats. I analysed processes determining the *Procambarus clarkii* invasion and the impact on native amphibians and odonates that have complex life cycles, I surveyed 148 among temporary and permanent wetlands of running and standing waters in a region that is at the edge of the invasion range of *P. clarkii*. I performed repeated sampling sessions in each wetland obtaining both qualitative and quantitative data on freshwater communities, I characterized each wetland using standard parameters, and I used GIS software for the description of the surrounding landscape. I analysed all data using spatial models and considering the spatial autocorrelation (for details see chapter 2). Data analysis showed that the environmental features are important in determining the early phases of the crayfish invasion; in the study area, *P. clarkii* spreads more frequently in association with large and permanent wetlands in human-altered landscapes, and the autocorrelation of its populations is stronger at distances up to 2500 m suggesting that dispersion affect invasion processes up to this distance (chapter 2). Further analysis showed that environment shapes both alien invasive species (AIS) and freshwater communities, but considering the optimal environmental features for *P. clarkii* and for amphibians and odonates, I observed important differences related to wetland size, depth, hydroperiod, exposition, presence of aquatic macrophytes, and surrounding landscape features (chapters 2, 3, and 5). The observed relationships among distribution and composition of native communities and distribution of *P. clarkii* suggests that the invasive crayfish has only a limited direct impact on adult amphibians and odonates, but the analysis of juvenile stages of native communities (larvae of amphibians, larvae and exuviae of odonates) showed the dra-

matic loss of their abundance and richness in wetlands invaded by the crayfish, indicating that, despite adults attempt reproduction in invaded sites, *P. clarkii* causes, with its activities, the fall down of their reproductive success (chapters 4 and 5). This research confirms the strong negative impact of AIS on native communities. My data indicate that *P. clarkii* determines the loss of reproductive sites, and the decrement of the reproductive success when native populations use the invaded sites for breeding (chapters 4, 5, and 6). This research highlights the importance of studying the early stages of an invasion, confirming that in this phase AIS populations have larger environmental needs that might make them more vulnerable at management actions (chapters 2, 3, and 6). Through the analysis and description of the mechanisms determining the AIS impact on native communities, this research helps to identify the ongoing processes at early stages of the AIS invasion, and the consequences that the invasive crayfish will have in the near future, allowing managers to start conservation actions before that the invasion consequences become irreversible." (Author)] Address: not stated

**11553.** Sivaperuman, C.; Kumar Shah, S.; Venkataraman, K. (2011): New records of odonates from Andaman and Nicobar Islands. *Biological Forum* 3(2): 69-70. (in English) [*Zygomma petiolatum*, *Tramea limbata similata*, *Diplacodes nebulosa*, and *Cratilla lineata* are listed without details; the first three species were probably found in 2007 and *C. lineata* in 2005.] Address: Sivaperuman, C., Zoological Survey of India, Andaman and Nicobar Regional Centre, Port Blair

**11554.** Souto, R.; Facure, K.G.; Pavanin, L.A.; Jacobucci, G.B. (2011): Influence of environmental factors on benthic macroinvertebrate communities of urban streams in Vereda habitats, Central Brazil. *Acta Limnologica Brasiliensia* 23(3): 293-306. (in English, with Portuguese summary) ["Aim: Veredas and the aquatic and semi-aquatic communities play a key role in watershed protection in the Cerrado Biome. Information about the effects of physical and chemical variables and habitat integrity on benthic communities has been increased in recent years; however, there is no study evaluating the influence of urbanization on macroinvertebrates of Vereda streams. Thus, improving the knowledge of the relationship between abiotic properties and benthic fauna is very important for understanding the functioning of ecological processes and health of aquatic ecosystems. This study investigated the influence of physical and chemical variables on benthic macroinvertebrate communities along a gradient of anthropogenic disturbance in four Vereda streams in Uberlândia (MG), one in a preserved area and three in the urban area; Methods: samplings were collected during the dry and rainy seasons; Results: principal component analysis separated the stream in the preserved area from those in the urban area by having lower values of BOD, COD, sediment size, conductivity, detergents, pH, deposited solids and total dissolved solids. Pollution sensitive groups (e.g., Ephemeroptera and Trichoptera) were associated to the stream in the preserved area, and more tolerant groups (e.g., Chironomidae and Oligochaeta) had greater abundance in the streams of the urban area. Canonical Correspondence Analysis indicated that dissolved oxygen, conductivity, BOD, oil and grease, and turbidity explained 56% of the variance in the distribution and abundance of macroinvertebrates; Conclusions: Benthic communities of Vereda streams in urban areas in

the Cerrado Biome seem to be highly affected by human activities that increase water organic pollution and sedimentation." (Authors) Odonata are treated at the family level.] Address: Pavanin, L.A., Instituto de uímica, Universidade Federal de Uberlândia-UFU, CEP 38408-100, Uberlândia, MG, Brazil. E-mail: pavanin@ufu.br

**11555.** Španić, R.; Cipčić, A.; Bogdanović, T.; Franković, M. (2011): State of research into dragonflies (Odonata) of Karlovac county, Croatia, with special reference to NATURA 2000 species. *Entomologia Croatica* 15: 209-221. (in English, with Croatian summary) ["42 dragonfly species were previously reported for Karlovac County. Historical as well as recently collected but unpublished records add seven more species to records for the analysed territory, raising the number of dragonfly species to 49. Analysis revealed uneven temporal and spatial distribution of records, showing that the SE part of the county (Kordun subregion) is the most underexplored. Although most of the published and unpublished data were collected during the last 25 years it is obvious that odonatological inventory was not conducted systematically but rather accidentally. Furthermore, only three NATURA 2000 species (*Cordulegaster heros*, *Leucorrhinia pectoralis* and *Ophiogomphus cecilia*) with very low number of records have been reported for Karlovac County." (Authors)] Address: Španić, R., Institute for Research and Development of Sustainable Ecosystems, Jagodno 100A, Novo Čiče 10415, Croatia, robertspanic047@yahoo.com

**11556.** Stih, A.; Zdravec, M.; Hlavati, D.; Koren, T. (2011): First data about the dragonfly (Insecta, Odonata) fauna in the Vugrovec area, Zagreb and the first checklist of the dragonflies of Zagreb. *Entomologia Croatica* 15(1-4): 223-235. (in English) ["The fauna of Zagreb has been well investigated during the last two centuries, which is evident from a series of publications. Even so, only limited data on dragonfly fauna of Zagreb have been published, and there is no current checklist. During the three years period (2009-2011) we conducted a survey of the dragonfly and damselfly fauna (Insecta, Odonata) in Vugrovec village, located on the eastern slopes of Mt Medvednica. The aim of this study is to present the first data on dragonflies from the Vugrovec area and to compile the first checklist of dragonflies of Zagreb. The suborder Zygoptera is represented in Vugrovec by 4 families and 5 species, while the suborder Anisoptera is represented by 4 families and 9 species in the area. After a review of all the available literature, in conjunction with the newly collected data, a checklist of dragonflies of Zagreb was created, including 44 species, 14 of which are listed in the Red Book of Dragonflies of Croatia. This indicates a high richness in comparison to the 70 known species from Croatia." (Authors)] Address: Koren, T., Science and Research Centre Koper, University of Primorska, Koper, Slovenia

**11557.** Sućeska, S.; Karačić, J. (2011): Lesser Empor dragonfly *Anax parthenope* (Selys, 1839) (Insecta: Aeshnoidea: Aeshnidae), a new species on Odonata of Bosnia and Herzegovina. *Natura Montenegrina* 10(4): 467-472. (in English) [Boracko Lake, 29-VII-2011] Address: Sućeska, Sabina, University of Sarajevo, Faculty of Sciences, Department for Biology, Zmaja od Bosne 33-35, 71000 Sarajevo, Bosnia and Herzegovina. E-mail: ssuceska@hotmail.com



**11558.** Takahashi, Y.; Morita, S.; Yoshimura, J.; Watanabe, M. (2011): A geographic cline induced by negative frequency-dependent selection. *BMC Evolutionary Biology* 2011, 11:256: 10 pp. (in English) ["Background: Establishment of geographic morph frequency clines is difficult to explain in organisms with limited gene flow. Balancing selection, such as negative frequency-dependent selection (NFDS), is instead suggested to establish a morph frequency cline on a geographic scale at least theoretically. Here we tested whether a large-scale smooth cline in morph frequency is established by NFDS in the female-dimorphic damselfly, *Ischnura senegalensis*, where andromorphs and gynomorphs are maintained by NFDS. Results: We found a large-scale latitudinal cline in the morph frequency: andromorph frequency ranged from 0.05 (South) to 0.79 (North). Based on the empirical data on the numbers of eggs, the number of ovariole, abdomen length and latitude, the potential fitness of andromorphs was estimated to be lower than that of gynomorphs in the south, and higher in the north, suggesting the gene-by-environment interaction. From the morph-specific latitudinal cline in potential fitness, the frequency of andromorphs was expected to shift from 0 to 1 without NFDS, because a morph with higher potential fitness wins completely and the two morphs will switch at some point. In contrast, NFDS led to the coexistence of two morphs with different potential fitness in a certain geographic range along latitude due to rare morph advantage, and resulted in a smooth geographic cline of morph frequency. Conclusion: Our results provide suggestive evidence that the combination of NFDS and gene-by-environment interaction, i.e., multi-selection pressure on colour morphs, can explain the geographic cline in morph frequency in the current system." (Authors)] Address: Takahashi, Y., Division of Ecology and Evolutionary Biology, Graduate School of Life Sciences, Tohoku University, 6-3, Aoba, Aramaki, Aoba, Sendai, Miyagi 980-8578, Japan. E-mail: takahashi.yum@gmail.com

**11559.** Torralba Burrial, A.; Alonso-Naveiro, M. (2011): Biodiversidad de odonatos de la sierra de Fonfria y cuenca del Jiloca (Teruel): análisis de comunidades. *Xiloca* 39: 151-168. (in Spanish, with English summary) ["Odonata communities from 21 localities in Fonfria Mountains and Jiloca River Basin (province of Teruel) were surveyed. 35 species were found during this study. Community analysis shown three groups: 1) temporary and semitemporary ponds of Fonfria Mountains; 2) Huerva River, some fluvial reaches and other ponds, and 3) rest of the fluvial reaches of Pancrudo and Jiloca Rivers. Biogeographical analysis shown high percentage of Mediterranean elements, mainly Holomediterranean and Ibero-Maghrebian; Ethiopian elements were scarce." (Authors)] Address: Alonso-Naveiro, Maria, Departamento de Biología de Organismos y Sistemas. Universidad de Oviedo. 33071 Oviedo, Spain

**11560.** Trung, H.D.; Le Trong Son, Mai Phu Quy (2011): Preliminary data on the aquatic insect in Hai Van area, Thua Thien - Hue province. *Vietnam Journal of Biology* 33(3): 9-14. (in English) [10 Odonata species contribute with 18,87% to the total of 53 species recorded.] Address: not accessible

**11561.** Uwimana, C. (2011): Impact of rice cropping on abundance of benthic macroinvertebrates in Nyanza, Sovu and Kibabara marshes, Huye district. Memoir submitted for partial fulfillment of the award of Bachelor's degree in Biology, National university of Rwanda,

Faculty of Science, Biology Department, Option: Zoology and conservation, Huye: 19 pp. (in English) [Rwanda; "The main purpose of this study was to assess the impact of rice cropping on water quality using benthic macroinvertebrates communities as bioindicators. The study was developed in Munyazi stream and surrounding rice irrigated fields in Nyanza, Sovu and Kibabara marshlands and the samples were collected in August during dry season and also maturation/cut period, three sites in Munyazi stream and other three sites in surrounding rice irrigated fields. 16 organisms were identified on order level, thus many of them could be identified on family level; Gastropoda of Planorbidae family were the most abundant taxa along with Ephemeroptera and Hemiptera, but the Ephemeroptera taxa was only found in Munyazi stream sample sites. The results showed a bare presence or absence of organisms sensitive to pollution in rice irrigated fields sample sites such as Ephemeroptera, Plecoptera and Trichoptera but also showed the presence, sometimes highly presented, in Munyazi stream sample sites. The rice cropping affected significantly the diversity and distribution of benthic macroinvertebrates organisms, meaning affecting water quality ( $t=2.67, df=50, p=0.01$ ). The type of crops management and irrigation techniques, the use of pesticides are the main cause of the low diversity and low richness in benthic macroinvertebrates communities of rice irrigated fields. The benthic biodiversity loss observed in some sample sites, prove that environmental alteration is caused by rice cropping techniques, is at the origin of habitats reduction and degradation, simplification of ecosystem and impoverishment of water quality." (Author) In Munyazi Stream and surrounding rice fields Odonata accounted to 26% to sampled specimens.] Address: Uwimana, Catherine; no stated

**11562.** van Swaay, C.; Termaat, T.; Plate, C.; Plantenga, W. (2011): Wel geteld, niets gezien [Well counted, nothing seen]. *Vlinders* 2011: 14. (in Dutch) [Monitoring transect counts without study site records of butterflies or dragonflies between 1999 and 2010 are presented. In the case of butterflies, an increase of such zero-hits and and decrease of butterfly number is evident. In the case of dragonflies, zero-hits got more less and abundance of Odonata seems to have increased.] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands. E-mail: tim.termaat@vliinderstichting.nl

**11563.** Vega-Sanchez, Y.; Isarraras-Hernandez, L.; Castillo-Ayala, P.; Mendoza-Cuenca, L. (2011): Morfología alar y territorialidad en *Hetaerina vulnerata*. *Biológicas* 13(1): 29-35. (in Spanish, with English summary) ["The ubiquity of territorial defense in males of Calopterygidae is an interesting feature to evaluate the implications of morphological traits, sexual cues and ecological factors associated with territorial behaviour in odonates. The males of the genus *Hetaerina*, defend permanent territories in sunny areas close to riverbanks, through ritualized fights, chasing and displaying their wing against intruding males. It has been suggested that these traits have been evolved by sexual selection mainly because male's quality is expressed by honest signals, such as wing pigmentation levels, body size, thorax size (estimated of the amount of fat and muscle flight), and wings size. However, there is little evidence of variation in these traits among populations and alternative mating strategies which are common within *Hetaerina* genus. In this paper we document that

those traits not involved in territorial defense in males of *Hetaerina vulnerata* (Selys, 1853) not vary between populations, while the morphological traits involved in the success of male territorial behaviour are modified between populations and mating strategies. Our results highlight the importance of ecological features and levels of anthropogenic disturbance of natural populations in the reproductive success and the evolution of mating systems in Odonata." (Authors)] Address: Mendoza-Cuenca, L., Lab. de Ecología de la Conducta, Facultad de Biología. Univd Michoacana de San Nicolás de Hidalgo. Edificio "R", Ciudad Universitaria, Av. Francisco J. Múgica s/n. Col. Felicitas del Río, C.P. 58030. Morelia, Michoacán, México. E-mail: lmendoza@lca.unam.mx

**11564.** Wu, F.c.; Meng, W.; Cao, Y.-j.; Li, H.-x.; Zhang, R.-q.; Feng, C.-l.; Yan, Z.-g. (2011): Derivation of aquatic life water quality criteria for cadmium in freshwater in China. *Research of Environmental Sciences* 24(2): 172-184. (in Chinese, with English summary) ["Cadmium is a poisonous heavy metal which is toxic, hard to degrade and easy to reside. It can cause adverse effects on aquatic organisms and ecosystems. In order to control effectively the adverse effects which Cd might bring to aquatic life in Chinese freshwaters, it is urgent for China to derive regional aquatic life criteria for Cd, which could provide a basis for the establishment and revision of water quality standards. In this study, all available toxicity data of Cd to Chinese representative species in freshwater were collected in order to protect the freshwater ecosystem and biota system. Three widely used criteria derivation methods concerning the assessment factor method, toxicity percentile rank method and species sensitivity distribution method were used to derive aquatic life criteria for Cd. Meanwhile, the criteria values for freshwater in China and the derivation process were studied and compared among the three methods. The results showed that for the assessment factor method, the criteria of freshwater Cd was expressed by one value, which was 0.15 µg/L; for toxicity percentile rank method, the criteria included criteria maximum concentration and criteria continuous concentration, which were 7.30 µg/L and 0.12 µg/L, respectively; for species sensitivity distribution method, the criteria of short term hazardous concentration and long term hazardous concentration were 32.50 µg/L and 0.46 µg/L, respectively. Finally, this study analyzed the advantages and disadvantages of these three methods and compared the difference of the Cd criteria in this research and other existing reference values in China and abroad. In addition, the possible reasons which caused this difference and the key factors which influenced the aquatic life criteria were also discussed." (Authors) The paper refers Tollett et al. 2009. Differential toxicity to Cd, Pb, and Cu in dragonfly larvae (Insecta: Odonata). *Arch. Environ. Contam. Toxicol.* 56(1): 77-84 where they report about to *Pachydiplax longipennis* tolerance to different metal concentrations.] Address: Wu, F.c., State Environmental Protection Key Laboratory for Lake Pollution Control, Chinese Research Academy of Environmental Sciences, Beijing 100012, China

**11565.** Xu, M.; Fincke, O.M. (2011): Tests of the harassment-reduction function and frequency-dependent maintenance of a female-specific color polymorphism in a damselfly. *Behav. Ecol. Sociobiol.* 65: 1215-1227. (in English) ["Colour polymorphisms have provided classical examples of how frequency-dependent selection maintains genetic variation in natural populations. Here

we tested for the first time, the hypothesized adaptive function of a female-specific colour polymorphism in odonates to lower male harassment towards females generally. Under conditions controlling for sex ratio, population density and morph frequency, we also tested two major frequency-dependent selection hypotheses for the maintenance of the polymorphism. Using groups of captive *Enallagma hageni*, whose females are either green or a male-like blue, we varied morph frequency at two sex ratios. We quantified sexual harassment towards females by visual observations, and by the presence of dust on females that was transferred from dusted males. Per capita harassment rate for the female-monomorphic treatments did not differ from that of the female polymorphic treatments. At a male-biased sex ratio, per capita harassment rate towards blue, but not green females increased with morph frequency, providing partial support for frequency-dependent selection resulting from male learning of female morphs. Even at high frequency, green females were not harassed more than blue, contrary to the prediction that males should always recognize green females as mates. Moreover, frequency-dependent harassment towards blue females was not detectable using harassment measured with dust evidence, which greatly underestimated the incidence of sexual harassment. Our findings identified problems with the use of insectaries and the dusting technique to quantify male sexual harassment towards females, as well as with a past insectary experiment on *Ischnura elegans* that failed to demonstrate frequency-dependent harassment." (Authors)] Address: Xu, Mingz, Ecology and Evolutionary Biology Program, Department of Zoology, University of Oklahoma, Norman, OK 73019, USA. E-mail: xumingzi@ou.edu

**11566.** Yamasaki, T. (2011): In Memoriam: Syoziro Asahina (1913–2010). *Species Diversity* 16: 81-83. (in English) [Obituary] Address: Yamasaki, T., Tokyo Metropolitan University, 1-1 Minami-Osawa, Hachioji, Tokyo, 192-0397 Japan. E-mail: peripatus@jcom.home.ne.jp

**11567.** Yu, W.-y.; Li, Z.-h.; Zhou, J.; Yuan, X.-j.; Yang, X. (2011): A study on the fauna and variety of Odonata insects in Nanjing Jiangjun mountain. *Journal of Nanjing Xiaozhuang University* 6: 77-79. (in Chinese, with English summary) [Without giving species (n = 24) details, several ecological indices are applied on Odonata fauna of Nanjing Jiangjun mountain, China.] Address: Yu, W.-y., Institute of Applied Ecology, Nanjing Xiaozhuang University, Nanjing 211171, China

**11568.** Yu, W.-y.; Li, Z.-h.; Hunga, C.; Wang, Q. (2011): Odonata fauna and its diversity in Jiangsu Province of China. *Chinese Journal of Ecology* 30(7): 1375-1381. (in Chinese, with English summary) [Applying line transect methodology, a total of 53 species were recorded between 2005 and 2010. Several ecological indices are calculated.] Address: Yu, W.-y., Institute of Applied Ecology, Nanjing Xiaozhuang University, Nanjing 211171, China. E-mail: ywy138519@126.com

## 2012

**11569.** Ahn, S.J.; Park, C.G. (2012): Terrestrial Insect Fauna of the Junam Wetlands Area in Korea. *Korean Jour. Appl. Entomology* 51(2): 111-129. (in Korean, with English summary) ["Terrestrial insect fauna was surveyed in the Junam wetland area, which consists of the Junam, Dongpan, and Sannam wetlands, by visual

counting and pictures. A sweep net collection was conducted from May to October 2010. A neighboring artificial lotus wetland was also surveyed for comparison. A total of 5,730 insects were surveyed, representing 268 species in 85 families and 12 orders. Sixty-three species of coleopterans were surveyed, followed by 60 species of Lepidoptera, and 37 species of Hemiptera. Coleopteran individuals were 25.9% of the total insect numbers surveyed, comprising most abundant group. This was followed by Odonata, Lepidoptera, and Orthoptera at 22.3%, 15.4%, and 12.7%, respectively. In total, 197 species were surveyed in the Dongpan wetland, 175 in the Junam wetland, and 154 species in the Sannam wetlands. However, only 86 species were surveyed in the artificial lotus wetland. *Galerucella nipponensis* in Coleoptera, *Crocothemis servilia mariannae* in Odonata, and *Polygonia c-aureum* in Lepidoptera were the most abundant in all four wetlands. Community analyses showed that the dominance index was highest in the artificial lotus wetland at 0.25 and lowest in Junam wetland at 0.08. Diversity indices were relatively high in all wetlands at 4.48, 4.44, 4.28, and 3.87 in Junam, Dongpan, Sannam, and the artificial lotus wetland, respectively. The insect fauna similarity index was highest in the Junam and Dongpan wetlands at 0.96. The lotus wetland showed the lowest similarity of the three wetlands with values of 0.45-0.53." (Authors)] Address: Park, C.G., Institute of Agriculture and Life Sciences, Gyeong-sang National University, Jinju 660-701, Rep. of Korea. E-mail: parkeg@gnu.ac.kr

**11570.** Altamiranda-S. M.; Ortega-M., O. (2012): Estructura poblacional de *Polythore gigantea* (Odonata: Polythoridae) en sistemas lóticos con diferentes estados de conservación en Antioquia, Colombia. *Rev. Biol. Trop.* 60(3): 1205-1216. (in Spanish, with English summary) ["Population structure of *Polythore gigantea* (Odonata: Polythoridae) in lotic systems with different conservation states in Antioquia-Colombia. The knowledge about population structure and dynamics of some Neotropical species, especially those living in lotic systems is still barely studied. This study had the aim to assess if the conservation status of some lotic systems, is related to some demographic variables of *P. gigantea*, so this may be used as a model for ecological monitoring. For this, we evaluated the population structure of *P. gigantea* three times per month (almost one sampling event every eight days) in four streams of the state of Antioquia, Colombia, from March-June 2009. The specimens were collected using entomological nets along a transect of 200m in the littoral zone of each stream. The insects were marked on the wings and the population size was estimated with the mark-recapture method. Our results showed that the largest population size was recorded for the stream "La Catedral" with approx 299 individuals, followed by the stream "La Doctora" with 218 individuals. Nevertheless, no significant differences in population size among the evaluated streams were found; and no statistical relationships were found between vegetation variables and the population size of *P. gigantea*. However, taking into account the limited dispersal capacity of *P. gigantea*, its survival in the studied streams was considered to be at risk, due to the continuous modification of large riparian forest areas, which cause the increase of forest patches, with different levels of interconnection, and hinder long-term permanence of populations." (Authors)] Address: Altamiranda-S. M. Universidad Nacional de Colombia sede Medellín, Grupo de investigación en ecología y sistemática de in-

sectos (GIESI), Calle 59A No 63-20, Medellín Colombia. E-mail: maltamiranda2@gmail.com

**11571.** Amava-Perilla, C.; Fajardo-Medina, G.E.; Moreno-Fonseca, C.J.; Holwell, G. (2012): Dragonfly (Anisoptera:Odonata) diversity from the northern Meta region of Colombia. *Entomology: Te Tai Tokerau. 61st conference of the New Zealand Entomological Society, Whangarei, New Zealand. 17th-20th April, 2012: 24.* (in English) [Verbatim: The dragonflies (Odonata: Anisoptera) are highly diverse in the tropics, representing a major predatory component of ecosystems at both the larval and adult stages. We assessed diversity of dragonflies, for 14 sampling sites in the north of Meta region of Colombia, South America. Sampling took place biannually during May and November for 2003-2011. All the collected material was preserved in acetone immersion for 12 hours and identified to species. We collected 946 individuals from 86 species representing three families: Libellulidae, Aeshnidae and Gomphidae. These ranged from the highly abundant *Uracis imbuta* (Libellulidae) representing 237 collected specimens with a large distribution in the localities, through to species where only a single individual was collected. We compared the previous study lists made in the country and we report for the first time 17 new reports for the country and 15 new reports for Meta region.] Address: Amava-Perilla, Catalina, School of Biological Science, Univ. of Auckland, New Zealand. E-mail: cama012@aucklanduni.ac.nz.

**11572.** Amaya-Vallejo, V.; Novelo-Gutierrez, R. (2012): *Desmogomphus anchicayensis* spec. nov. from Colombia (Anisoptera: Gomphidae). *Odonatologica* 41(1): 25-29. (in English) ["The new species is described and illustrated based on larvae collected in the Anchicayá zone, Valle del Cauca, Colombia. Holotype Male: F2 larva, 12-IX-2008; deposited in Instituto de Ecología, Xalapa, Mexico. It differs from the two described congeners in the position of dorsal and lateral abdominal hooks, the presence of a beveled edge in the dorsal surface of the prementum and an angled ventral margin of the paraprocts. Specimens are rare and difficult to collect because they inhabit threatened habitats in an area restricted to researchers." (Authors)] Address: Amaya-Vallejo, V., Laboratorio de Zoología y Ecología Acuática, LAZOE, Universidad de los Andes, Cra 1, N°18A-12, Lab J307, Bogotá, Colombia. E-mail: stolenseason@gmail.com

**11573.** Ananian, V.; Tailly, M. (2012): *Cordulegaster vanbrinkae* Lohmann, 1993 (Odonata: Anisoptera) discovered in Armenia. *International Dragonfly Fund - Report* 46: 1-11. (in English) ["On 13 July 2010, in a woodland near the village of Verin Khotanan, Armenia, five males of *Cordulegaster vanbrinkae* were captured. These specimens are documented, compared with the holotype from Iran and discussed in detail. The current protection situation of this species in Armenia is briefly commented. In addition, the locus typicus information of the holotype from Iran is corrected and detailed." (Authors)] Address: Ananian, V., 1 179 Bashinjaghian Str., apt. 23, 0078, Yerevan, Armenia. Gomphus@gmx.com

**11574.** Anderson, D. (2012): Field meeting to Strumpshaw Fen, Norfolk 24th June 2012. *Wild about Beds - Newsletter of the Bedfordshire Natural History Society* 163: 12. (in English) [Verbatim: This joint meeting of the BNHS, the Beds Bird Club and the British Dragonfly Society took place on one of those unfortunate days as far as dragonfly watching was concerned. The tempera-



ture was just 13°C and overcast, but 16 hardy souls assembled for the meeting. We started in the RSPB Reserve Reception area and were immediately rewarded with good views of two Otters, a fly-past pair of Bearded Tits and distant views of several Marsh Harriers. On leaving Reception we made our way out into the meadows and dykes, but very soon the rain came in increasing force with the most spectacular displays of rolling thunder and strong winds; not in any way dragonfly watching conditions! In the afternoon in only light rain we did find a few Azure, Blue-tailed and Large Red Damselflies and one each of Four-spotted Chaser, Scarce Chaser and Black-tailed Skimmers, but that was our total, with none of the hoped for Norfolk Chasers or Swallowtail Butterflies. We did see a few piles of Chinese Water Deer droppings, but that was about all. We will just have to go again another day, or another year, for Strumpshaw Fen is a great site.] Address: <http://www.bnhs.co.uk/main/docs/wab163.pdf>

**11575.** Andrew, R.J. (2012): Effect of paper mill effluent on the egg chorion of the dragonfly *Anax guttatus* (Burmeister) (Anisoptera: Aeshnidae). *Odonatologica* 41(1): 31-36. (in English) ["The egg of *A. guttatus* is endophytic and is cylindrical with a pointed anterior and a rounded posterior end. The chorion is divided into 2 layers, a thin, outer exochorion and a tough, thick, inner endochorion. The exochorion is modified anteriorly into a collar which is sculptured with 18-20 tiers of rectangular hexagonal impressions. Profound morphological and structural modifications are found in the eggs incubated in paper mill effluent for 5 days. The eggs became distorted due to swelling and the posterior rounded end became angular. The membranous exochorion degraded and transformed into thin, plate-like flakes which are shed, exposing the endochorion. The non-laminated, uniformly thick endochorion is converted into a laminated structure of overlapping plates with uneven thickness. The collar became pitted with minute perforations and started to disintegrate and detach from the egg and the hexagonal impressions became obliterated. 100% mortality was found in paper mill effluent treated eggs for 5 days, whereas eggs kept in pond water only had 10-13% mortality." (Author)] Address: Andrew, R.J., Post Graduate Dept of Zoology, Hislop College, Civil lines, Nagpur-440001, India. E-mail: [rajuandrew@yahoo.com](mailto:rajuandrew@yahoo.com)

**11576.** Andrew, R.J. (2012): Field notes on emergence of *Pantala flavescens* (Fabricius) in central India (Anisoptera: Libellulidae). *Odonatologica* 41(2): 89-90. (in English) ["A total of 611 exuviae were collected within a period of 45 days during April-May, 2004 from the walls of an open cement drain at Nagpur, India. The daily record of this collection revealed that 50% of the total emergence was completed by the 14th day and the sex ratio is considerably in favour of males (1.4:1). The females emerge earlier (protogyny) and the ME50 for female and male was observed on the 10th and 18th day, respectively. Protogyny probably provides adequate time for the female to develop her ovaries. 194 exuviae (31.75%) were collected from the north wall, which was completely in shade, and 417 (68.25%) from the south wall, which receives sunlight throughout the day. On the north wall, 44.7% exuviae were collected at a height of 30-45 cm from the water level, while from the south wall, 57.2% exuviae were collected at a height up to 15 cm and 28.4% between 15-30 cm. The present findings indicate that sunlight and temperature not only determi-

ne the choice of direction of the emerging larva but also initiate an early commencement of Stage I of metamorphosis (shortening the time between the surfacing of the larva and splitting its thoracic cuticle), which results in the shorter distance climbed by the larvae on the south wall for the final moult." (Author)] Address: Andrew, R.J., Dept of Zoology, Hislop College, Civil Lines, Nagpur- 440010, MS, India. E-mail: [rajuandrew@yahoo.com](mailto:rajuandrew@yahoo.com)

**11577.** Anonymus (2012): Tesco, the Lochan and the Damsel Fly. The Cairngorms Campaigner Spring 2012: 9. (in English) [Verbatim: Tesco, wanting to build a new supermarket Aviemore, have wanted the destruction of a small lochan on the site on grounds of safety. However the lochan, described by Aviemore Community Council as a "cesspit" and by ecological consultants for Tesco as having the very highest conservation value, harbours the northern damselfly (*Coenagrion hastulatum*). This species is on the Scottish Biodiversity List, which is a list of species considered by Scottish Ministers to be of principal importance to conservation. The Northern Damselfly is listed as 'endangered' on the Odonata Red Data List for Great Britain 2008. The solution recommended by CNPA planners is to relocate the species to other nearby sites prior to development. However, relocation can be a tricky thing. As the Park Authority's own Biodiversity Officer put it in his advisory paper on the issue, "...a translocation programme is not a quick or guaranteed option. It is handicapped by the lack of knowledge of the key habitat requirements for this species, and the need for a suitable donor site nearby. A donor site must not hold a current population of Northern damselfly and should meet the habitat requirements of the species. There is a complex process involved and this can take a number of years, hence the preference for retaining the population in situ." After all, if the species is present on one site and not others close by, there is probably a reason. In other words, you can relocate the species, but that is no guarantee it will thrive there. Therein lay the problem as the CNPA planner is recommending relocation, but that development would go ahead before it is known whether it has been successful. Badenoch and Strathspey Conservation Group, diligent as ever, wrote to the Authority questioning the legality of this procedure. Currently, it seems that Tesco may now have realised that translocating this species is a longer term project than formerly realised.] Address: Cairngorms Campaign, PO Box 10037, Alford, AB33 8WZ, UK

**11578.** Anonymus (2012): Bedfordshire's Steve Cham wins national conservation award. Wild about Beds - Newsletter of the Bedfordshire Natural History Society 163: 2. (in English) [Verbatim: The 2011 Marsh Award for Insect Conservation was given to Steve Cham for his outstanding and exemplary contribution to Insect Conservation. Steve Cham has had a lifetime fascination for Natural History with his interest in Entomology nurtured while working at Rothamsted Experimental Station during the early part of his career. Having moved on he continued his interest and personal research as a volunteer. He has been a member of the British Dragonfly Society (BDS) since its formation in 1983 and has published a number of papers in its journal. Steve became national co-ordinator for the Dragonfly Recording Network (DRN) after the scheme was transferred from the BRC. He was quick to see the benefits to conservation of providing Odonata data to the NBN and the

DRN dataset was used as a pilot during the development of the gateway. Steve has also been an active member of the Dragonfly Conservation Group of the BDS for over a decade and has been involved in a number of conservation initiatives that benefit these insects. Steve is author of several books on Dragonflies including the Dragonflies of Bedfordshire and a two volume field guide to the larvae and exuviae of British Dragonflies. He is also co-author of Dragonflies of Hampshire. Steve lectures on his favourite subject and is the leader on various courses. His photographs have been used widely. Steve is currently involved on the working party for the next national atlas of British Dragonflies.] Address: <http://www.bnhs.co.uk/main/docs/wab163.pdf>

**11579.** Anonymus (2012): A new partnership explores the world through the eyes of dragonflies. *flylines* July 2012: 6-7. (in English) [Verbatim: When one watches the stained-glass wings of dragonflies as they flit across ponds and alight upon reeds, it's hard to imagine that these seemingly fragile creatures can migrate thousands of miles. Many don't know that, in fact, there may be as many as 16 dragonfly species in North America that migrate at least occasionally, including five that are regular migrants. Large groups of dragonflies have frequently been documented heading south in the fall, some flying over large bodies of water despite their apparent fragility. The research, however, on the phenomenon of dragonfly migration is still in its infancy. There is so much more to learn. Therefore, a number of individuals and organizations have gotten together to form the Migratory Dragonfly Partnership (MDP), coordinated by The Xerces Society in Portland, Oregon, and sponsored by US Forest Service International Programs. The purpose of the partnership is to develop a network of citizen scientist monitors across Canada, Mexico, and the United States in order to track the spring and fall movement of the best-known migratory dragonflies in North America. The MDP will develop tools and resources to enable participants to monitor the timing, location, duration, and direction of travel of dragonfly flight and to identify the species involved. Regular monitoring and centralized reporting among participants across three nations will help us answer some of the many questions currently surrounding dragonfly migration and provide information needed to create cross-border conservation programs to protect and sustain the phenomenon. One of the first projects will be Dragonfly Pond Watch, a volunteer-based program to investigate the annual movements of two major migratory dragonfly species in North America: *Anax junius* and *Tamea lacerata*. By visiting the same wetland or pond site on a regular basis, participants will note the arrival of migrant dragonflies moving south in the fall or north in the spring, as well as record when the first resident adults of these species emerge in the spring. People should care about dragonflies for two reasons: First, they are great indicators of water quality in wetlands. Dragonflies are excellent species for monitoring the current biological condition of wetlands and for predicting future changes in those environments. Also, they are voracious predators on insect pests, including mosquitoes and a variety of biting flies. Dragonflies can't eliminate mosquitoes or other pesky flies, but the number would be much worse without hungry dragonflies eating their fill. Our studies will help us learn more about the life cycles of these critically important species. For information about the Migratory Dragonfly Partnership, please contact: Scott Hoffman Black, The Xerces So-

ciety, 628 NE Broadway, Suite 200, Portland, OR 97232. Tel: (503)232-6639, E-mail: [dragonfly@xerces.org](mailto:dragonfly@xerces.org). You can also visit <http://migratorydragonflypartnership.org> and <http://www.xerces.org/dragonfly-migration/projects>.] Address: <http://gis.fs.fed.us/global/wings/newsletter/2012/july2012watanewsletter.pdf>

**11580.** Anusa, A.; Ndagurwa, H.G.T.; Magadza, C.H.D. (2012): The influence of pool size on species diversity and water chemistry in temporary rock pools on Domboshawa Mountain, northern Zimbabwe. *African Journal of Aquatic Science* 37(1): 89-99. (in English) ["The effect of pool size (area and depth) on species diversity and physicochemical characteristics of rock pool habitats on Domboshawa Mountain, northern Zimbabwe, was studied from December 2006 to May 2007. Pools were categorised based on maximum depth. Pool duration was a key factor structuring pool communities, driving their species diversity and nutrient content. Active predatory insects (Coleoptera, Odonata, Hemiptera) and zooplankton (Cladocera, Copepoda, Rotifera species) were associated with long-lived pools. As pool duration increased, early phytoplankton communities dominated by short-residence green algae were replaced by blue-green algae. The number of species present increased as pool area increased. Using depth as a proxy for disturbance, species composition in rock pools was influenced by the duration of inundation. A unique rock pool community with a filter-feeding component dominated by Cladocera, and from which large branchiopods were absent, is described. Nutrient status and community diversity in rock pools are determined by pool size, and pool depth, a proxy for habitat duration, is a major structuring factor in these temporary aquatic habitats." (Authors)] Address: Anusa, A., Tropical Resources Ecology Programme (TREP), Department of Biological Sciences, Faculty of Science, University of Zimbabwe, PO Box MP 167, Mount Pleasant, Harare, Zimbabwe

**11581.** Balzan, M.V. (2012): Associations of dragonflies (Odonata) to habitat variables within the Maltese Islands: A spatiotemporal approach. *Journal of Insect Science* 12:87 available online: [insectscience.org/12.87](http://insectscience.org/12.87): 18 pp. (in English) ["Relatively little information is available on environmental associations and the conservation of Odonata in the Maltese Islands. Aquatic habitats are normally spatio-temporally restricted, often located within predominantly rural landscapes, and are thereby susceptible to farmland water management practices, which may create additional pressure on water resources. This study investigates how odonate assemblage structure and diversity are associated with habitat variables of local breeding habitats and the surrounding agricultural landscapes. Standardized survey methodology for adult Odonata involved periodical counts over selected water-bodies (valley systems, semi-natural ponds, constructed agricultural reservoirs). Habitat variables relating to the type of water body, the floristic and physiognomic characteristics of vegetation, and the composition of the surrounding landscape, were studied and analyzed through a multivariate approach. Overall, odonate diversity was associated with a range of factors across multiple spatial scales, and was found to vary with time. Lentic water-bodies are probably of high conservation value, given that larval stages were mainly associated with this habitat category, and that all species were recorded in the adult stage in this habitat type. Comparatively, lentic and lotic seminatural water-bodies were more diverse than agricultural reservoirs

and brackish habitats. Overall, different odonate groups were associated with different vegetation life-forms and height categories. The presence of the great reed, *Arundo donax* L., an invasive alien species that forms dense stands along several water-bodies within the Islands, seems to influence the abundance and/or occurrence of a number of species. At the landscape scale, roads and other ecologically disturbed ground, surface water-bodies, and landscape diversity were associated with particular components of the odonate assemblages. Findings from this study have several implications for the use of Odonata as biological indicators, and for current trends with respect to odonate diversity conservation within the Maltese Islands." (Author)] Address: Balzan, M.V., Institute of Life Sciences, Scuola Superiore Sant'Anna, Piazza Martiri della Libertà, Pisa, PI, Italy. E-mail: m.balzan@sss.up.it

**11582.** Barndt, D. (2012): Beitrag zur Kenntnis der Arthropodenfauna der Zwischenmoore Butzener Bagen, Trockenes Luch und Möllnsee bei Lieberose (Land Brandenburg) (Coleoptera, Heteroptera, Hymenoptera part., Auchenorrhyncha, Saltatoria, Diptera part., Diplopoda, Chilopoda, Araneae, Opiliones, u.a.). *Märkische Entomologische Nachrichten* 14(1): 147-200. (in German, with English summary) ["Two sphagnum-dominated mires and one calcareous fen in the eastern part of Germany were investigated. The paper presents 562 species of Arthropods identified in the years 2008 and 2009 using pitfall traps. The study determines the endangerment and dispersion of the species. 4 species were recorded for the first time in Brandenburg and 1 species was rediscovered. - 63 species that are typical for transitional mires or lagg zones were detected; of these, 19 species are critically endangered (CR) or endangered (EN). The calcareous fen Möllnsee could not be analyzed because of overflowing damage caused by mismanagement; the results of two alternative habitats are given. The aim of this research is to assist adequate restoration for those highly endangered fen systems." (Author) Odonata were not part of the study. The following species are reported based on historical data: *Coenagrion hastulatum*, *Aeshna juncea*, *Leucorrhinia albifrons*, *L. caudalis*, *L. dubia*, *L. pectoralis* and *L. rubicunda*.] Address: Barndt, D., Bahnhofstr. 40d, 12207 Berlin-Lichterfelde Ost, Germany. E-mail: dr.barndt@kabelmail.de

**11583.** Beaumont, E.; Beaumont, A. (2012): Large White-faced Darter *Leucorrhinia pectoralis* (Charpentier) in Suffolk. *Atropos* 46: 11-13. (in English) [Second record of *L. pectoralis* in UK: 16-VI-2012, Dunwich Heath, Walberswick, Suffolk] Address: Edwina & Alan Beaumont, 52 Squires Walk, Lowestoft, Suffolk, NR32 4LA, UK

**11584.** Bedjanič, M.; Vinko, D. (2012): New records of *Epallage fatime* (Charpentier, 1840) in Macedonia (Odonata: Euphaeidae). *Natura Sloveniae* 14(1): 15-22. (in English, with Slovenian summary) ["Formerly known from Macedonia only from two old records made in the southeasternmost part of the country, the species has been newly recorded on 20-VII-2008 at the Luda Mara stream south of Kavadarci (S Macedonia), on 24-VII-2008 at the Konska Reka stream west of Gevgelija (SE Macedonia) and on 26-IV-2010 at the Sermeninska Reka stream northwest of Gevgelija (SE Macedonia). At all localities, the species' development has been confirmed. Its currently known distribution in Macedonia and the neighbouring countries is presented and a short

zoogeographical discussion provided." (Authors)] Address: Vinko, D., Slovenska 14, SI-1234 Mengeš, Slovenia; E-mail: damjan.vinko@gmail.com

**11585.** Bitzer, L.J. (2012): Chronic toxicity testing in mining influenced streams of West Virginia. Theses and Dissertations. Paper 252: 119 pp. (in English) ["Whole effluent toxicity (WET) tests have become a common tool in the evaluation of effluent for discharge acceptability. In this study, four years of toxicity data from 119 sampling locations were analyzed to determine relationships with ions and conductivity as indicators of toxicity. West Virginia Stream Condition Index (WVSCI) scores were also examined to evaluate correlations between stream scores, conductivity, and IC25 endpoints from toxicity results. Conductivity was not an indicator of toxicity in the range of conductivities tested. Streams dominated by mining effluent sometimes exhibited toxicity to *Ceriodaphnia dubia*; however, toxicity was not found to be related to ionic concentration in the range tested. Although mortality and reproductive impairment were often demonstrated in the mining effluent dominated streams, there were no relationships established between survival and reproductive endpoints and the ionic concentrations. Benthic macroinvertebrate communities in the streams sampled indicated some level of impairment. Only a weak relationship was demonstrated between habitat assessment scores and WVSCI scores. No apparent relationship between conductivity and WVSCI was observed. ... The results showed that, under conditions of constant acid mine drainage, the Odonata, Ephemeroptera and Plecoptera were completely eliminated. The Trichoptera, Megaloptera and Diptera were reduced in number of species." (Author)] Address: not stated. Bitzer, Leah J.

**11586.** Borisov, S.N. (2012): Migrant dragonflies in Middle Asia. 3. *Pantala flavescens* (Fabricius, 1798) (Odonata, Libellulidae). *Eurasian Entomological Journal* 11(1): 37-41. (in Russian, with English summary) ["Data on the distribution, phenology and migrations of *P. flavescens* in Middle Asia are presented. The first spring-time generation is represented by immigrant specimens from the southern part of the range. Pre-imaginal development lasts about two months. Large numbers of specimens are recorded from rice fields. After emergence, adult dragonflies can accumulate locally, but in late summer or early autumn the second generation of dragonflies probably migrate in a southerly direction. Directional flights were recorded at the beginning of August in East Pamir." (Author)] Address: Borisov, S.N., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze Street 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**11587.** Borisov, S.N. (2012): Translatitudinal migrations of dragonflies (Odonata) in Middle Asia. *Proceedings of the Russian Entomological Society* 83(1): 62-72. (in Russian, with English summary) ["Characteristic seasonal translatitudinal migrations are observed for three Middle Asian species of dragonflies (*Sympetrum fonscolombii*, *Pantala flavescens*, *Anax ephippiger*). In the spring, viripotent adults of dragonflies arrive from the southern parts of their ranges to Middle Asia where the second generation develops. In the autumn, descendants of immigrants come back to the south. Live strategy of *Anax p. parthenope* remains unknown, and at present we can ascertain only obligate character of the autumn southward migrations of these dragonflies. The



annual natural autumn migrations of *S. fonscolombii*, *A. ephippiger* and *A. p. parthenope* are observed during three seasons (2008–2010) on the pass Chokpak in Western Tien Shan with the help of ornithological traps. The autumn migrations of *P. flavescens* were also observed in August, 1980 in the East Pamir. Consecutive moving of different generations of dragonflies' migrants is the strategy achieves the fullest use of the environment resources. It also includes dwelling behind the northern limits of the basic ranges where overwintering of immature stages is impossible. Other adaptive importance of this strategy is hedge from possible disappearance (drying) of reservoirs suitable for larvae development. Initially this ability was probably developed in species migrants in the conditions of a monsoon climate where they develop in the seasonal temporary reservoirs filled with monsoon rains." (Author)] Address: Borisov, S.N., Institute of Systematics and Ecology of Animals, Siberian Branch of the Russian Academy of Sciences, Novosibirsk 630091, Russia. E-mail: borisov-s-n@yandex.ru

**11588.** Boudot, G.-P.; De Knijf, G. (2012): Nouvelles données sur les Odonates du Maroc oriental et méridional (Odonata). *Martinia* 28: 1-28. (in French, with English summary) ["During four spring and summer Odonatological trips in Morocco carried out from 2009 to 2011 with the intention to contribute to the management plan of the Moulouya valley and to gain additional information on the overall Odonatological richness of the country, 45 species were observed. *Cordulegaster boltonii algerica* and *Pyrrosoma nymphula* were found for the first time east of the Moulouya River that extends their range of about 90 km to the east in the country. *Selysiothemis nigra* was found in the north-east, in a locality where it was not recorded earlier. *Orthetrum ransonnetii* was found in three new localities and was documented for the first time far out of the Saharan fringes, i.e. in the High Atlas Mountains, 1800 m a.s.l., an area with a significant snow cover in winter. New and flourishing populations of *Cordulegaster princeps* were found in formerly poorly accessible areas, so that the range of this High and Middle Atlas endemic appears now more continuous than in the past. The IUCN status of threatened species is specified." (Authors)] Address: Boudot, J.-P., LIMOS, UMR CNRS 7137, Universités de Nancy, Faculté des Sciences, B.P. 239, F-54506 - Vandoeuvre-lès-Nancy Cedex, France. E-mail: jean-pierre.boudot@limos.uhp-nancy.fr

**11589.** Brandon, A. (2012): Odonata news and events from across the vice counties of Anglesey, Merionethshire, Caernarvonshire, Denbighshire and Flintshire. *North Wales Dragonfly Newsletter* 65: 9 pp. (in English) [The following contents are presented: New records for 10 km squares (hectads); Tetrad SH51 finally yields up some dragonflies; New Small Red Damsel locality in Merionethshire; Variable Azure Bluets in Snowdonia; More news of melanistic Common Bluets; Forthcoming dragonfly events; Snowdonian dragons and damsels: Field trip to the Gwydyr Forest, Sunday 22nd July; Some topical species.] Address: Brandon, A., North Wales Dragonfly Recorder, Bryn Heilyn, Rowen, Conwy LL32 8YT, UK. E-mail: allanrowenconwy@antispam sky.com

**11590.** Brekelmans, F. (2012): Gaffelilbel terug in Noord-Brabant sinds 1935. Bureau Waardenburg BV, Culemborg. Persbericht. 31 juli 2012: (in Dutch) [Ophiogomphus cecilia back in Noord-Brabant. Last record

dates back to 1935. 27-VIII-2012, River Dommel near Valkenwaard, The Netherlands.] Address: Bureau Waardenburg BV, Postbus 365, 4100 AJ Culemborg, The Netherlands

**11591.** Bried, J.T.; Hager, B.J.; Hunt, P.D.; Fox, J.N.; Jensen, H.J.; Vowels, K.M. (2012): Bias of reduced-effort community surveys for adult Odonata of lentic waters. *Insect Conservation and Diversity* 5(3): 213-222. (in English) ["(1) Repeat surveys are needed to capture a representative spectrum of adult odonate richness at a site, but specifics on frequency and duration of surveys and associated inferential biases are poorly understood. (2) Weekly 1 h surveys of mature male dragonflies and damselflies were repeated at least 15 times at 19 ponds, lakes and wetlands scattered throughout North America. For each site, we tallied the data remaining when the weekly frequency was reduced to 75% (every 1.5 weeks), 50% (biweekly), 33% (triweekly), and 25% (monthly) and the 1 h survey to 50, 40, 30, 20 and 10 min subsets. (3) Reducing the original effort by half (i.e. to 30 min biweekly) retained about 80% of the species on average. The smallest effort (10 min monthly) retained about 49% of species. The greatest rate of information loss occurred between 20 and 10 min. (4) Across-site analysis found that data subsets correlated to the original data set ( $r > 0.81$ ) despite up to 50% species loss. Strong correlations ( $r = 0.98$ ) remained with 10–15% species loss. (5) Biweekly surveys lasting 20–40 min each may provide a representative and cost-effective sample of adult odonate richness in lentic study sites. Losing a handful of species should not greatly undermine richness and compositional comparisons among sites." (Authors)] Address: Bried, J., Albany Pine Bush Preserve Commission, Albany, NY, USA. E-mail: jbried@albanypinebush.org

**11592.** Brockhaus, T. (2012): Die Gemeine Keiljungfer *Gomphus vulgatissimus* (L., 1758) nach über 100 Jahren wieder in der Region Chemnitz (Odonata: Gomphidae). *Mitteilungen Sächsischer Entomologen* 98: 19-20. (in German) [Germany, Sachsen, Chemnitz-Einsiedel, 31-V-2011, three ind. *G. vulgatissimus* along the river Zwönitz (RW 4569559, HW 5627224).] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**11593.** Brockhaus, T. (2012): Westpaläarktische Verbreitungsmuster von Libellen - Zeugnisse einer kaltzeitlichen Libellenfauna? Die Beispiele *Sympecma paedisca* und *Somatochlora metallica* (Odonata: Lestidae, Corduliidae). *Libellula Supplement* 12: 211-226. (in German, with English summary) ["Western Palaearctic distribution patterns of dragonflies - evidence of glacial faunal relicts? The examples of *Sympecma paedisca* and *Somatochlora metallica* (Odonata: Lestidae, Corduliidae) - The Western range margins of the transpalaearctic species, *S. paedisca* and *S. metallica*, have a particular shape and populations disjunct from the main range. Current theory suggests that these distribution patterns arose from a recolonisation after the Pleistocene. In this study I propose that these patterns are better explained by processes that happened during, rather than after, the Pleistocene. Specifically, *S. paedisca* probably recolonised the Western range during the warmer interglacial periods. *Somatochlora metallica* probably is a eurythermic glacial species whose historic Doggerland range was divided during the last glacial period in a Southern and a northern part. The testing of these hypotheses will be possible by genetic studies.

The colonisation hypotheses of the two species are supported by a number of shared ecological characters:

- They have a transpalearctic distribution with clearly disjunct populations at the range margins.
- They are cold stenothermic, or eurythermic. None are habitat specialists in their main range but become habitat specialists towards the range margins.
- These species are also able to survive under current, often anthropogenic, large-scale landscape changes and to colonise new habitats within their range.
- The species have reduced dispersal ability on their Western palaeartic range margins, though the reasons are unknown." (Author)]

Address: Brockhaus, T., An der Morgensonne 5, 09387 Jahnsdorf/Erzgebirge, Germany. E-mail: t.brockhaus@t-online.de

**11594.** Brucet, S.; Boix, D.; Nathansen, L.W.; Quintana, X.D.; Jensen, E.; Balayla, D.; Meerhoff, M.; Jeppesen, E. (2012): Effects of temperature, salinity and fish in structuring the macroinvertebrate community in shallow lakes: Implications for effects of climate change. *PLoS ONE* 7(2): e30877. doi:10.1371/journal.pone.0030877: 11 pp. (in English) ["Climate warming may lead to changes in the trophic structure and diversity of shallow lakes as a combined effect of increased temperature and salinity and likely increased strength of trophic interactions. We investigated the potential effects of temperature, salinity and fish on the plant-associated macroinvertebrate community by introducing artificial plants in eight comparable shallow brackish lakes located in two climatic regions of contrasting temperature: cold-temperate and Mediterranean. In both regions, lakes covered a salinity gradient from freshwater to oligohaline waters. We undertook day and night-time sampling of macroinvertebrates associated with the artificial plants and fish and free-swimming macroinvertebrate predators within artificial plants and in pelagic areas. Our results showed marked differences in the trophic structure between cold and warm shallow lakes. Plant-associated macroinvertebrates and free-swimming macroinvertebrate predators were more abundant and the communities richer in species in the cold compared to the warm climate, most probably as a result of differences in fish predation pressure. Submerged plants in warm brackish lakes did not seem to counteract the effect of fish predation on macroinvertebrates to the same extent as in temperate freshwater lakes, since small fish were abundant and tended to aggregate within the macrophytes. The richness and abundance of most plant-associated macroinvertebrate taxa decreased with salinity. Despite the lower densities of plant-associated macroinvertebrates in the Mediterranean lakes, periphyton biomass was lower than in cold temperate systems, a fact that was mainly attributed to grazing and disturbance by fish. Our results suggest that, if the current process of warming entails higher chances of shallow lakes becoming warmer and more saline, climatic change may result in a decrease in macroinvertebrate species richness and abundance in shallow lakes. ... The only taxa not related to salinity were Malacostraca, Odonata and Polychaeta, but the relative abundances of these taxon groups were low at all salinities. Diptera, one of the most salinity-tolerant groups, dominated in most of the lakes in the two climatic regions." (Authors)]

Address: Brucet, Sandra, National Environmental Research Institute, Department of Freshwater Ecology, Aarhus University, Silkeborg, Denmark. E-mail: sandra.brucet-balmana@jrc.ec.europa.eu

**11595.** Büsse, S.; von Grumbkow, P.; Hummel, S.; Shah, D.N.; Tachamo Shah, R.D.; Li, J.; Yoshizawa, K.; Wedmann, S.; Hörnschemeyer, T. (2012): Phylogeographic analysis elucidates the influence of the ice ages on the disjunct distribution of relict dragonflies in Asia. *PLoS ONE* 01/2012; 7(5):e38132. DOI:10.1371/journal.pone.0038132: 8 pp + suppl.. (in English) ["Unusual biogeographic patterns of closely related groups reflect events in the past, and molecular analyses can help to elucidate these events. While ample research on the origin of disjunct distributions of different organism groups in the Western Palearctic has been conducted, such studies are rare for Eastern Palearctic organisms. In this paper we present a phylogeographic analysis of the disjunct distribution pattern of the extant species of the strongly cool-adapted *Epiophlebia* dragonflies from Asia. We investigated sequences of the usually more conserved 18 S rDNA and 28 S rDNA genes and the more variable sequences of ITS1, ITS2 and CO2 of all three currently recognised *Epiophlebia* species and of a sample of other odonatan species. In all genes investigated the degrees of similarity between species of *Epiophlebia* are very high and resemble those otherwise found between different populations of the same species in Odonata. This indicates that substantial gene transfer between these populations occurred in the comparatively recent past. Our analyses imply a wide distribution of the ancestor of extant *Epiophlebia* in Southeast Asia during the last ice age, when suitable habitats were more common. During the following warming phase, its range contracted, resulting in the current disjunct distribution. Given the strong sensitivity of these species to climatic parameters, the current trend to increasing global temperatures will further reduce acceptable habitats and seriously threaten the existences of these last representatives of an ancient group of Odonata." (Authors)]

Address: Büsse, S., Johann-Friedrich-Blumenbach-Institute of Zoology and Anthropology, Department of Morphology, Systematics and Evolutionary Biology, Georg-August-University Göttingen, Göttingen, Germany

**11596.** Bußmann, M. (2012): Libellen auf Boa Vista, Kapverdische Inseln (Odonata). *Libellula* 31(1/2): 61-75. (in German, with English summary) [Cape Verde; "During a stay from 15- to 29-xii-2010, seven dragonfly species were recorded: *Anax ephippiger*, *A. imperator*, *Crocothemis erythraea*, *Orthetrum trinacria*, *Pantala flavescens*, *Sympetrum fonscolombii*, and *Trithemis annulata*, most species both as adults and as exuviae. *Anax imperator* and *S. fonscolombii* were recorded on Boa Vista for the first time." (Author)]

Address: Bußmann, M., Amselstr. 18, 58285 Gevelsberg, Germany. E-mail: m.bussmann@maerkischer-kreis.de

**11597.** Caesar, R.M. (2012): Phylogeny of the genus *Argia* (Odonata: Coenagrionidae) with emphasis on evolution of reproductive morphology. Dissertation, Doctor of Philosophy, The Ohio State University: XVIII + 191 pp. (in English) ["The damselfly genus *Argia* is found throughout the New World where some species are common and abundant members of lotic freshwater and adjacent ecosystems. *Argia* species are not only important predators of aquatic and terrestrial invertebrates but are themselves an important prey item to a variety of other insects and vertebrates. The distribution of species is highly variable within the genus and some species are locally threatened or endangered due to range limitation and habitat loss. Odonata may be use-

ful indicators of aquatic ecosystem health as well as indicators of climate change. There are approximately 120 species described with at least twenty suspected undescribed species. The taxonomy of the North American species is well known, but the Central and South American species are in need of revision. The phylogeny of the genus has never been studied using modern, repeatable methods. Therefore the evolutionary history of the genus has never been thoroughly explored. The reproductive biology of Odonata is unique among insects and provides a model system for testing hypotheses related to character evolution by sexual selection and other mechanisms of evolution. *Argia* species have unique morphologies of male and female secondary sexual characters, the modified cerci and paraprocts of males and the corresponding plates of the female pro- and meso-nota that are grasped by males during copulation and oviposition. The patterns of variation in these structures, both within and among species, may reveal the extent to which sexual and natural selection help shape the current diversity of the group. This dissertation presents phylogenetic hypotheses for the genus *Argia* using data from external morphology and ribosomal DNA. Maximum parsimony and maximum likelihood analyses were performed on the data, resulting in topologies that are mostly congruent, well-resolved, and moderately to highly supported. The variation in male cercus morphology is examined using three dimensional morphometrics where shape is quantified from computer tomography models. The phylogenetic hypotheses are used to examine patterns of cercus variation across the genus. The same methods are applied to populations of the widespread species *Argia moesta* in an attempt to test whether intrasexual selection applies to these important reproductive structures." (Author)] Address: Caesar, R.M., Dept of Entomology, Ohio State Univ., Columbus, OH, USA. E-mail: caesar.6@osu.edu

**11598.** Cham S. (2012): A study of Southern Hawker *Aeshna cyanea* emergence from a garden pond. *J. Br. Dragonfly Society* 28(1): 1-20. (in English) ["The construction in 2001 of a garden pond in close proximity to the author's house provided an opportunity for close study of emergence patterns, behaviour and predation of Southern Hawker *Aeshna cyanea*. This study discusses the impact of weather conditions and predation on emergence success over a period of several years. Exhaustive daily exuviae counts reveal differences in patterns of emergence in each year, influenced by larval development as well as periods of heavy rain and low temperatures. Predation by birds and wasps had a significant effect on the survival of emerging adults in some years." (Author)] Address: Cham, S., 24 Bedford Avenue, Silsoe, Bedford, MK45 4ER UK. E-mail: SteveCham1@compuserve.com

**11599.** Chand, S. (2012): Organophosphorus pesticides inflicted impairments in the midgut histo-architecture of naiad of *Trithemis aurora* (Burm.) (Odonata: Libellulidae). *Journal of Experimental Zoology, India* 15 (1): 213-218. (in English) ["A continuous forty hours of treatment of last instar naiad of *T. aurora* under LC50 concentration,  $5.12 \times 10^{-7}$  and  $7.60 \times 10^{-8}$  ppm of chlorpyrifos and quinalphos respectively has proved toxic and induced histopathological derangements in various tissues of midgut. The mesenteron has observed to be prone to both the pesticides. The chlorpyrifos separated the epithelial folds and widen the inter fold space up to the basement membrane. The quinalphos pene-

trated inside the epithelial folds and damaged cellular mass. Both the pesticides induced the movement of cytoplasmic contents at various degrees towards the apical end of the epithelial folds. This movement presumed to be the genesis of intense vacuolation at the basal ends of all the epithelial cells. The continuous pressure of the internal cellular contents and weekend cell boundaries have caused the violent exclusion of cell contents. The nuclear membrane at many places damaged by chlorpyrifos and severely affected by quinalphos." (Author)] Address: Chand, S., P G Department of Zoology, R.P.G. College Jamuhai, Jaunpur - 222 002, India.

**11600.** Chen, Y.; Wang, X.; Ren, H.; Yin, H.; Jia, S. (2012): Hierarchical dragonfly wing: Microstructure-bio-mechanical behavior relations. *Journal of Bionic Engineering* 9(2): 185-191. (in English) ["The dragonfly wing, which consists of veins and membrane, is of biological hierarchical material. We observed the cross-sections of longitudinal veins and membrane using Environmental Scanning Electron Microscopy. Based on the experiments and previous studies, we described the longitudinal vein and the membrane in terms of two hierarchical levels of organization of composite materials at the micro- and nano-scales. The longitudinal vein of dragonfly wing has a complex sandwich structure with two chitinous shells and a protein layer, and it is considered as the first hierarchical level of the vein. Moreover, the chitinous shells are concentric multilayered structures. Clusters of nano-fibrils grow along the circumferential orientation embedded into the protein layer. It is considered as the second level of the hierarchy. Similarly, the upper and lower epidermises of membrane constitute the first hierarchical level of organization in micro scale. Similar to the vein shell, the membrane epidermises were found to be a paralleled multilayered structure, defined as the second hierarchical level of the membrane. Combining with the mechanical behaviour analysis of the dragonfly wing, we concluded that the growth orientation of the hierarchical structure of the longitudinal vein and membrane is relevant to its biomechanical behaviour." (Authors)] Address: Wang, X., Department of Engineering Mechanics, AML, School of Aerospace, Tsinghua University, Beijing 100084, P. R. China. E-mail: xshwang@tsinghua.edu.cn

**11601.** Chowdhury, S.H. (2012): Importance of the Eastern Region of Bangladesh in Insect Conservation with Special Reference to Odonata. *Proceedings of the International Conference on Biodiversity – Present State, Problems and Prospects of its Conservation*. January 8-10, 2011. University of Chittagong, Chittagong 4331, Bangladesh: 11-13. (in English) ["Studies on Odonata of the eastern region of Bangladesh revealed some interesting intraspecific variations. The landscape of this region with hills and forests has resulted into isolated habitats for the weak-flying odonates. Such isolation causes intensive inbreeding and resultant intraspecific variations are likely to lead to speciation. Early measures of protection of this area are recommended for conservation of odonate species." (Author)] Address: Chowdhury, S.H., Ex-Faculty, Department of Zoology, University of Chittagong, Chittagong 4331, Bangladesh. E-mail; shafique1939@yahoo.com

**11602.** Cicort-Lucaciu, A.-S.; Covaciu-Marcov, S.-D.; Bogdan, H.V.; Sas, I. (2012): Implication upon herpetofauna of a road and its reconstruction in Carei Plain Natural Protected Area (Romania). *Ecologia Balkanica* 4(1): 99-105. ["In autumn 2011 we monitored a 5 km



long road, paved with cobblestone, situated in Carei Plain Natural Protected Area, a road that is due to be modernized and continued across the border into Hungary. Dead bodies from eight different animal groups were observed on the road, amphibians presenting the greatest amount. The most frequent were the *Triturus dobrogicus* corps, a species with conservation importance. The amphibians were affected in the areas where the road is neighbouring the wetlands, while on the opposite pole sits the area with acacia plantations. The high number of mortalities recorded on the road, despite the low traffic speed, is alarming. It is likely that the modernization of the road that will surely increase its traffic and the speed of the vehicles, will make the situation even worse. However, the rebuilding could contribute to the reduction in the impact on amphibians, if certain measures are considered while planning the action. Thus, in the areas near the wetlands, there should be undercrossings, fences and speed limits. In this way, the modernization would at least represent an experiment regarding the diminution of the road's impact on amphibians." (Authors) The victims of traffic include Odonata which are not further specified or quantified.] Address: Cicort-Lucaciu, A.-S., University of Oradea, Faculty of Sciences, Department of Biology, Universitatii str. 1, Oradea 410087, Romania. E-mail: cicortlucaciu@yahoo.com

**11603.** Clapham, M.E.; Karr, J.A. (2012): Environmental and biotic controls on the evolutionary history of insect body size. *Proceedings of the National Academy of Sciences* 109(2): 10927-10930. (in English) ["Giant insects, with wingspans as large as 70 cm, ruled the Carboniferous and Permian skies. Gigantism has been linked to hyperoxic conditions because oxygen concentration is a key physiological control on body size, particularly in groups like flying insects that have high metabolic oxygen demands. Here we show, using a dataset of more than 10,500 fossil insect wing lengths, that size tracked atmospheric oxygen concentrations only for the first 150 Myr of insect evolution. The data are best explained by a model relating maximum size to atmospheric environmental oxygen concentration ( $pO_2$ ) until the end of the Jurassic, and then at constant sizes, independent of oxygen fluctuations, during the Cretaceous and, at a smaller size, the Cenozoic. Maximum insect size decreased even as atmospheric  $pO_2$  rose in the Early Cretaceous following the evolution and radiation of early birds, particularly as birds acquired adaptations that allowed more agile flight. A further decrease in maximum size during the Cenozoic may relate to the evolution of bats, the Cretaceous mass extinction, or further specialization of flying birds. The decoupling of insect size and atmospheric  $pO_2$  coincident with the radiation of birds suggests that biotic interactions, such as predation and competition, superseded oxygen as the most important constraint on maximum body size of the largest insects." (Authors)] Address: E-mail: mclapham@ucsc.edu.

**11604.** Contador, T.A.; Kennedy, J.H.; Rozzi, R. (2012): The conservation status of southern South American aquatic insects in the literature. *Biodivers. Conserv.* 21: 2095-2107. (in English) ["We provide a comprehensive review of publications regarding the conservation of aquatic and terrestrial insects at a global scale and with an emphasis on southern South America. We reviewed three prominent conservation journals (*Conservation Biology*, *Biodiversity and Conservation*, and *Biological*

*Conservation*) and found that only 5 % of all the works published between 1995 and 2008 focus on the conservation of aquatic insects. The highest percentage of publications on the conservation of aquatic insects comes from Europe (2.3 %), while the lowest percentage comes from South America (0.1 %). To assess the trends of aquatic insect research in southern South America, we conducted a literature search using *Zoological Records*, *Biological Abstracts*, and *Current Contents*. We conclude that there is a gap in research regarding the conservation of freshwater and terrestrial insects, as reflected by the low amount of publications that specifically focus on the description and identification of new insect species and their conservation. In order to help overcome this gap in conservation research, we propose three ideas that could help enhance the research and conservation initiatives regarding these organisms: (1) focus research on understudied regions of the world, such as the Magellanic sub-Antarctic ecoregion, (2) increase the amount of funding available for taxonomic research focused on the description and identification of new aquatic and terrestrial insect species, and (3) increase the amount of public education programs which focus on field experiences and direct encounters with aquatic insect biodiversity and their habitats." (Authors) The total number of publications about the orders Plecoptera, Trichoptera, Ephemeroptera, Odonata, and Diptera (Chironomidae), published between the years 1975 and 2010 in southern South America is figured.] Address: Contador, Tamara, Dept of Biological Sciences, University of North Texas, Denton, TX, USA. E-mail: tac0097@unt.edu

**11605.** Contreras-Garduno, J.; Villanueva, G.; Alonso-Salgado, A. (2012): Phenoloxidase production: The importance of time after juvenile hormone analogue administration in *Hetaerina americana* (Fabricius) (Zygotera: Calopterygidae). *Odonatologica* 41(1): 1-6. (in English) ["It has been suggested that juvenile hormone (JH) negatively affects the phenoloxidase (PO), a key enzyme of the immune response in invertebrates. However, this negative effect has only been recorded over a short time period (2 to 3 h) after the administration of JH (or a JH analog). In the present study, using *H. americana*, it was corroborated that PO decreased a short time (3 h) after the administration of methoprene, a JH analog (JHa), but no effect was observed 24 h after the JHa application. This suggests that the time after the application of JHa should be taken into account in order to assess its actual effect on the immune response and PO expression and in studies that use the JH as a link between secondary sexual characters and immune response." (Authors)] Address: Contreras-Garduno, J., Depto de Biología, División de Ciencias Naturales y Exactas, Univ. de Guanajuato, Noria Alta s/n, Noria Alta, MX-36050 Guanajuato, Guanajuato, Mexico

**11606.** Cordoba-Aguilar, A.; Ruiz-Silva, D.; Gonzalez-Tokman, D.; Contreras-Garduno, J.; Peretti, A.; Moreno-Garcia, M.A.; Rantala, M.J.; Koskimäki, J.; Kortet, R.; Suhonen, J. (2012): No firm evidence of immunological costs of insect oviposition and copulation: A test with dragonflies (ygoptera). *Odonatologica* 41(1): 7-15. (in English) ["The immune response is a costly trait as investment in immunity is frequently traded off against life history components. In insects, for example, experimental tests have provided evidence that oviposition and copulatory activities impair immune ability in the form of encapsulation ability. Here such tests are repli-

cated by using four zygopteran spp., viz. *Argia joergenseni*, *Calopteryx splendens*, *C. virgo* and *Hetaerina americana* having encapsulation, phenoloxidase and nitric oxide activity 1 three key components in the insect immune response 1 as dependent variables. The results provide no consistent results. Only in *A. joergenseni* there was any evidence of oviposition activity (or, in the case of *H. americana*, submergence) affecting encapsulation, but neither in *C. splendens* nor in *H. americana* did copulation have any such effect. In *H. americana*, nitric oxide activity was lower in // that had been submerged but there was no effect on phenoloxidase activity. Thus, former observations indicating that oviposition and copulation negatively affect the immune response, cannot be generalized" (Authors)] Address: Cordoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**11607.** Costa-Pereira, R.; Severo-Neto, F. (2012): Dining out: *Bryconops caudomaculatus* jumps out of water to catch flies. *Revista Chilena de Historia Natural* 85: 241-244. (in English, with Spanish captions) [*Bryconops caudomaculatus* (Günther, 1864) (Characiformes, Iguanodontidae). "We collected data on a lentic backwater on the Cravari river (12°31'49" S / 57°52'51" W), Mato Grosso, Brazil, during November 2009. ... All 34 stomachs were full and we found 23 food items in the diet of *B. caudomaculatus*. Allochthonous food items (IAi = 0.98) had an alimentary importance far greater than autochthonous (IAi = 0.02), and were present in 97 % of stomachs. Flying adults of Phoridae flies were the most frequent and important food items. Furthermore, one of the individuals of *B. caudomaculatus* had 42 Phoridae flies in its stomach content. Other groups of Diptera, mainly Chironomidae adults, were also found in stomach contents. Non-flying terrestrial insects (Coleoptera, Homoptera, Cercopidae and Hymenoptera-Formicidae) and aquatic larvae (Odonata, Ephemeroptera and Diptera) showed low alimentary index." (Authors)] Address: Costa-Pereira, R., Programa de Pós-Graduação em Ecologia e Conservação, Universidade Federal de Mato Grosso do Sul, Brazil. E-mail: brycon@ymail.com

**11608.** Cothran, R.D.; Chapman, K.; Stiff, A.R.; Relyea, R.A. (2012): "Cryptic" direct benefits of mate choice: choosy females experience reduced predation risk while in precopula. *Behavioral ecology and sociobiology* 66(6): 905-913. (in English) ["Despite the central role that female mate choice plays in the production of biological diversity, controversy remains concerning its evolution and maintenance. This is particularly true in systems where females are choosy but do not receive obvious direct benefits such as nuptial gifts that increase a female's survival and fecundity. In the absence of such direct benefits, indirect benefits (i.e., the production of superior offspring) are often invoked to explain the evolution of mate choice. However, females may receive less obvious, or "cryptic," direct benefits, particularly in species with prolonged pre-mating interactions (e.g., precopulatory mate guarding). We assessed the "cryptic" direct benefits of female choice for large male size in two species of freshwater amphipods that do not receive obvious direct benefits. Females paired with large males experienced decreased predation from fish. However, we found that the size of a female's mate did not affect her predation risk against predatory dragonflies or the harassment she received

by single males while paired. Our results demonstrate that even when females receive no traditional direct benefits, female choice for large male size can still provide important direct benefits. Such "cryptic" direct benefits may be common, especially in species with prolonged mating interactions, and are likely important for fully understanding the evolution of mate choice." (Authors)] Address: Relyea, R.A., Dept Biol. Sciences, University of Pittsburg, Pittsburgh, Pennsylvania 15260, USA. E-mail: rarelyea@pitt.edu

**11609.** Couteyen, S.; Papazian, M. (2012): Catalogue et affinités géographiques des Odonata des îles voisines de Madagascar (Insecta: Pterygota). *Ann. soc. entomol. Fr.* (n.s.) 48(1-2): 199-215. (in French, with English summary) ["Catalogue and geographical affinities of the Odonata of the neighbouring islands of Madagascar (Insecta: Pterygota). A thorough bibliographic analysis shows that 71 species and sub-species of Odonata are recorded in the neighbouring islands of Madagascar, from the archipelagos of Mascarenes, Comoros and Seychelles. In these islands, the maximum endemism rate is about 34%, but more significant in Mascarenes (34%) than in Comoros (23%) or in Seychelles (19%). The odonatological fauna is dominated by the Libellulidae (36 taxa) and Coenagrionidae (18 taxa). Each archipelago owns at least one of the 23 endemic taxa found in these islands. Seychelles have two endemic monospecific genera: *Allolestes* et *Leptocnemis*. Mascarenes have two endemic genera: *Thalassothemis* and *Coenagriocnemis*. The last one demonstrated a progressive radiation in the archipelago. The neighboring islands of Madagascar are characterized by a radiation of two genera at regional level, viz. *Hemicordulia* and *Gynacantha*. The geographical affinities of this fauna are mainly Afrotropical. Colonization from Africa is not a random sample of the continental pool, but a selection of a few species with specific abilities. In the neighbouring islands of Madagascar, the specific richness of the populations of Odonata with African affinities decreases with the geographical isolation." (Authors)] Address: Couteyen, S., Association Réunionnaise d'Ecologie (AReE) 188 Chemin Nid-Joli, F-97430 Le Tampon, La Réunion, France. E-mail: scouteyen@ecologie.re

**11610.** Das, S.K.; Ahmed, R.A.; Sajan, S.K.; Dash, N.; Sahoo, P.; Mohanta, P.; Sahu, H.K.; Rout, S.D.; Dutta, S.K. (2012): Diversity, distribution and species composition of odonates in buffer areas of Similipal Tiger Reserve, Eastern Ghat, India. *Academic Journal of Entomology* 5(1): 54-61. (in English) ["A total of 58 species representing 37 genera from 9 family were recorded from the multiple use area of the reserve. (Table 1) Libellulidae was the dominant family with 31 species, followed by Coenagrionidae (11), Calopterygidae (3), Platycnemididae (3), Protoneuridae (2), Lestidae (2), Chlorocyphidae (2), Gomphidae (2) and Aeshnidae (2). *Orthetrum* was found to be the most species rich genera with 7 species." (Authors)] Address: Department of Wildlife and Conservation Biology, North Orissa University, Sriram Chandra Vihar, Takatpur-757003, Baripada, Orissa, India

**11611.** Do, M.C.; Bui, M.H.; Vu, V.L. (2012): Description of female of *Nihonogomphus schorri* Do & Karube from Huu Lien Nature Reserve, Lang Son province, North Vietnam (Anisoptera: Gomphidae). *Odonatologica* 41(2): 173-175. (in English) ["The female, collected from the type locality of the species, Huu Lien Nature

Reserve, Lang Son Province, North Vietnam, is described and illustrated in detail." (Authors)] Address: Do, M.C., 1 409 – 57A, Tap The Bo Thuy San, 22/20 Nguyen Cong Hoan, Ba Dinh, Hanoi, Vietnam. E-mail: docuong@gmail.com

**11612.** Dow, R.; Orr, B. (2012): *Telosticta*, a new damselfly genus from Borneo and Palawan (Odonata: Zygoptera: Platystictidae). *The Raffles Bulletin of Zoology* 60(2): 361-397. (in English) ["*Telosticta* new genus is described from Borneo and Palawan, with genotype *Protosticta feronia* Lieftinck. Other previously named species transferred to *Telosticta* are *Drepanosticta dupophila* Lieftinck, *Protosticta paruatia* van Tol, and *P. tubau* Dow. Eleven new species are described: *T. belalongensis*, *T. berawan*, *T. bidayuh*, *T. janeus*, *T. dayak*, *T. gading*, *T. kajang*, *T. longigaster*, *T. santubong*, *T. serapi*, and *T. ulubaram*. The relationships of *Telosticta* within the Platystictidae are discussed." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**11613.** Ellwood, E.R.; Diez, J.M.; Ibáñez, I.; Primack, R.B.; Kobori, H.; Higuchi, H.; Silander, J.A. (2012): Disentangling the paradox of insect phenology: are temporal trends reflecting the response to warming? *Oecologia* 168(4): 1161-1171. (in English) ["The strength and direction of phenological responses to changes in climate have been shown to vary significantly both among species and among populations of a species, with the overall patterns not fully resolved. Here, we studied the temporal and spatial variability associated with the response of several insect species to recent global warming. We use hierarchical models within a model comparison framework to analyze phenological data gathered over 40 years by the Japan Meteorological Agency on the emergence dates of 14 insect species (including *Orthetrum albistylum* and *Sympetrum frequens*) at sites across Japan. Contrary to what has been predicted with global warming, temporal trends of annual emergence showed a later emergence day for some species and sites over time, even though temperatures are warming. However, when emergence data were analyzed as a function of temperature and precipitation, the overall response pointed out an earlier emergence day with warmer conditions. The apparent contradiction between the response to temperature and trends over time indicates that other factors, such as declining populations, may be affecting the date phenological events are being recorded. Overall, the responses by insects were weaker than those found for plants in previous work over the same time period in these ecosystems, suggesting the potential for ecological mismatches with deleterious effects for both suites of species. And although temperature may be the major driver of species phenology, we should be cautious when analyzing phenological datasets as many other factors may also be contributing to the variability in phenology." (Authors)] Address: Ellwood, Elizabeth, Dept of Biology, Boston University, Boston, MA 02215, USA. E-mail: eellwood@bu.edu

**11614.** Emiliyamma, K.G.; Palot, M.J.; Radhakrishnan, C. (2012): *Microgomphus souteri* Fraser, a new addition to the Odonata (Insecta) fauna of Kerala, southern India. *Journal of Threatened Taxa* 4(6): 2667-2669. (in English) [06-VI-2010, 1 male, Aralam Wildlife Sanctuary, Kannur District, Kerala, India] Address: Emiliyamma, K.G., Zoological Survey of India, Western Ghat Regional Centre, Jaferkhan Colony, Eranhipalam P.O.,

Kozhikode, Kerala 673006, India. E-mail: kgemily@gmail.com

**11615.** Endersby, I. (2012): Watson and Theischinger: the etymology of the dragonfly (Insecta: Odonata) names which they published. *Journal and Proceedings of the Royal Society of New South Wales* 145(443 & 444): 34-53. (in English) ["Tony Watson and Günther Theischinger have been prolific publishers on the taxonomy of Australian Odonata since the late 1960s. Between them they have named about 12% of the Australian genera and 28% of the species. The etymology of the scientific name of each of their taxa is given as quoted in the original description or deduced." (Author)] Address: Endersby, I., 56 Looker Road, Montmorency, VIC 3094 Australia. E-mail: endersby@mira.net

**11616.** Endersby, I.D. (2012): Etymology of the dragonflies (Insecta: Odonata) named by R.J. Tillyard, F.R.S. *Proceedings of the Linnean Society of New South Wales* 134: 1-16. (in English) ["R.J. Tillyard described 26 genera and 130 specific or subspecific taxa of dragonflies from the Australasian region. The etymology of the scientific name of each of these is given or deduced." (Author)] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@mira.net

**11617.** Endersby, I.D. (2012): Etymology of the Dragonflies (Insecta: Odonata) named by R.J. Tillyard - Corrigendum. *Proceedings of the Linnean Society of New South Wales* 134(1): 3 pp. (in English) [The following corrections should be made to the previous paper - Endersby, I.D. (2012). Etymology of the dragonflies (Insecta: Odonata) named by R.J. Tillyard, F.R.S.] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@mira.net

**11618.** Farag Mahmoud, M. (2012): Insects associated with Sesame (*Sesamun indicum* L.) and the impact of insect pollinators on crop production. *Pestic. Phytomed.* (Belgrade) 27(2): 117-129. (in English, with Serbian summary) ["A survey of insects associated with sesame, *Sesamun indicum* L. (Pedaliaceae) was conducted at the Agriculture Research Farm of The Faculty of Agriculture, University of Suez Canal during the growing seasons 2010 and 2011. All different insect species found on the experimental site were collected for identification. Sampling was done once a week and three times a day. Three methods were used to collect insects from the sesame plants (a sweep net, pitfall traps, digital camera and eye observation). A total of 31 insect species were collected and properly identified during the survey. Insects recorded on the plants were divided into four groups, true pollinators (Hymenoptera), other pollinators (Diptera, Coleoptera and Lepidoptera), pests (Orthoptera, Odonata [*Ischnura senegalensis*, *Crocthemis erythraea*], Hemiptera and Homoptera) and natural enemies (Coleoptera, Hymenoptera, Neuroptera and Dictyoptera). For studying the impact of insect pollination on sesame production, the experiment was divided in two: opened and non-opened pollination of sesame. 50 plants from nonopened pollination were covered with a perforated paper bag to allow the air to pass through and to prevent insects from approaching the plants. Quantitative and qualitative parameters were measured as follows: pod weight, number of seeds in each pod, weight of 1000 seeds, germination (%), seedlings vigour and oil content (%). Results clearly demonstrate that the opened pollination improved the



crop production." (Author)] Address: Farag Mahmoud, M., Suez Canal University, Faculty of Agriculture, Plant Protection Department, 41522 Ismailia, Egypt. E-mail: mfaragm@hotmail.com

**11619.** Fauchaux, M. (2012): Comparaison des antennes larvaires et de leurs sensilles chez deux espèces d'Argia, *A. concinna* (Rambur, 1842) et *A. telesfordi* Meurgey, 2009, endémiques des Petites Antilles (Odonata: Zygoptera: Coenagrionidae). Bull. Soc. Sc. Nat. Ouest de la France, nouvelle série 34(2): 76-81. (in French, with English summary) ["The larvae of *A. concinna* and *A. telesfordi* live in different biotopes, the first in white water and on gravelly soil, the second in streams of almost stagnant water with a muddy bottom. The study of larval antennal sensilla of *A. telesfordi* has been carried out and compared with sensilla of *A. concinna* previously described so as to discover the impact of the biotope on sensory equipment. *A. telesfordi* possesses the same sensillum types as *A. concinna*, that is: sensilla chaetica, curved sensilla chaetica, flattened and curved sensilla chaetica, sensilla filiformia and sensilla campaniformia. These five types are all non-porous sensilla. The resemblance between the types, the location and number of sensilla of both species is so surprising that one might think that we have to do with the same species. The antennal larval sensory equipment of the two species is by no means influenced by the lives of the latter in different biotopes." (Author)] Address: Fauchaux, M.J., Laboratoire d'Endocrinologie des Insectes Sociaux, Faculté des Sciences et des Techniques, 2 rue de la Houssinière, B.P. 92208, 44322 Nantes, France. E-mail: fauchaux.michel@free.fr

**11620.** Fleck, G. (2012): Preliminary notes on the genus *Aeschnosoma* Selys 1870 (Odonata: Anisoptera: Corduliidae s. str.). Ann. soc. entomol. Fr. (n.s.) 48(1-2): 225-228. (in English, with French summary) ["Three new species of the genus *Aeschnosoma* are briefly described and illustrated. *A. pseudoforcipula* n. sp. and *A. heliophila* n. sp., both from the Brazilian Central Plateau are respectively related to the two Amazonian species *A. forcipula* Hagen in Selys 1871, and *A. auripennis* Geijskes 1970. *A. louissiriusi* n. sp. from Northern Brazil is not closely related to any known species. Based on larval and adult derived characters, the genus *Aeschnosoma* appears closely related to the Australian genus *Pentathemis* Karsch 1890, and also to the Madagascan genus *Libellulosoma* Martin 1907. The clade *Aeschnosomata* nov. is erected to receive the three genera. Some putative plesiomorphies would place this clade sister group of the remaining Corduliidae s.str." (Author)] Address: Fleck, G., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleckgunther@gmail.com

**11621.** Fleck, G.; Neiss, U.G. (2012): The larva of the genus *Paracordulia* Martin, 1907 (Odonata: Corduliidae s.s.) and a generic key to the larvae of Corduliidae s.l. occurring in South America. Zootaxa 3412: 62-68. (in English) ["The ultimate stadium of a larva of the genus *Paracordulia* Martin, 1907 is described and illustrated for the first time. It represents the last New World corduliid larva unknown at the generic level. The reared female differs slightly from other known female specimens, and thus no species name can be assigned to it. A key to the South American genera of corduliid larvae is given." (Authors)] Address: Neiss, U.G., Instituto Nacional de Pesquisas da Amazônia/INPA, Coordenação de Biodiversidade/CBio, Avenida André Araújo,

n. 2936, Caixa Postal 478, CEP 69011-970, Manaus, Amazonas, Brazil. E-mail: ulisses.neiss@gmail.com

**11622.** Fraker, M.E.; Luttbeg, B. (2012): Predator-prey space use and the spatial distribution of predation events. Behaviour 149(5): 555-574. (in English) ["In many systems, predators and prey interact spatially. A number of game theoretic models (joint ideal free distributions, IFD) have suggested that a population-level distribution of mobile predators and mobile prey in which predators match the distribution of the prey's resources and prey are more evenly distributed will be stable. However, prey can often manage their exposure to predation risk by adjusting their space use and their level of apprehension or vigilance, while predators have been shown to behaviourally manage the risk level perceived by their prey. We used a system of predatory larval *Anax junius* and southern leopard frog (*Rana sphenoccephala*) tadpoles to explore how these species respond spatially to habitat features when alone (non-game situations) and together (game situations), then how predation events are distributed in relation to these features. In game and non-game situations, dragonflies avoided each other and showed no preference for tadpole resource patches, while tadpoles favoured their resource patches, avoided caged, feeding dragonflies, and used a combination of avoidance and activity reduction to reduce their predation risk. Predation events were generally distributed closer to resource patches and farther from caged predators. The results suggest that dragonflies and tadpoles do not directly follow joint IFD predictions, but manage fear and risk through their behavioural strategies. The results also suggest that stationary or slowly-changing habitat features can anchor predator-prey spatial distributions, but that they are likely to be temporally variable in some systems." (Authors)] Address: Fraker, M.E., Dept of Zoology, Oklahoma State Univ., Stillwater, OK 74078-3052, USA

**11623.** Franković, M. (2012): On a small Odonata collection from the Hatta Pools, northern Oman. Notul. odonatol. 7(9): 80-82. (in English) ["Records are provided for 14 species. *Orthetrum abbotti* Calvert is recorded for the first time from the southern part of the Arabian peninsula." (Author)] Address: Franković, M., State Agency for Environment Protection, Avenija Vukovar 78, 10000 Zagreb, Croatia

**11624.** Franković, M.; Ozimec, R. (2012): An unusual record of *Calopteryx virgo* (L.) larva emerging in the Mاتیšičeva cave system, Karlovac county, Croatia (Zygoptera: Calopterygidae). Notul. odonatol. 7(9): 86-87. (in English) ["The Matesiceva cave system near the town of Slunj, located in the Kordun area of central Croatia, the second author (RO) found on 15-V-1999 a last instar of a living *C. virgo* larva climbing up from water on the cave wall, some 40 cm above the water table. The water and air temperatures were 10.2 and 10.0°C, respectively. Since larval and adult dragonflies mainly depend on vision as a primary sense (F. Johansson, 1992, Notul. odonatol. 3: 139-141) and the larva was found in complete darkness, some 400 m from the Matesiceva cave entrance (Fig. 1), it was obvious that the possible emergence was to end the life of this individual." (Authors)] Address: Franković, M., State Agency for Environment Protection, Avenija Vukovar 78, 10000 Zagreb, Croatia

**11625.** Futahashia, R.; Kuritab, R.; Manoc, H.; Fukatsua, T. (2012): Redox alters yellow dragonflies into

red. Proceedings of the National Academy of Sciences 109(31): 12631-12626. (in English) ["Body colour change associated with sexual maturation—so-called nuptial coloration—is commonly found in diverse vertebrates and invertebrates, and plays important roles for their reproductive success. In some dragonflies, whereas females and young males are yellowish in colour, aged males turn vivid red upon sexual maturation. The male-specific coloration plays pivotal roles in, for example, mating and territoriality, but molecular basis of the sex-related transition in body coloration of the dragonflies has been poorly understood. Here we demonstrate that yellow/red colour changes in the dragonflies are regulated by redox states of epidermal ommochrome pigments. Ratios of reduced-form pigments to oxidized-form pigments were significantly higher in red mature males than yellow females and immature males. The ommochrome pigments extracted from the dragonflies changed colour according to redox conditions in vitro: from red to yellow in the presence of oxidant and from yellow to red in the presence of reductant. By injecting the reductant solution into live insects, the yellow-to-red colour change was experimentally reproduced in vivo in immature males and mature females. Discontinuous yellow/red mosaicism was observed in body coloration of gynandromorphic dragonflies, suggesting a cell-autonomous regulation over the redox states of the ommochrome pigments. Our finding extends the mechanical repertoire of pigment-based body colour change in animals, and highlights an impressively simple molecular mechanism that regulates an ecologically important colour trait." (Authors)] Address: Futahashia, R., Biomedical Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba 305-8566, Japan. E-mail: ryo-futahashi@aist.go.jp

**11626.** Gainzarain, J.A. (2012): La fauna de libélulas del parque natural de Izki. *sustrai* 98: 66-71. (in Spanish) [General account on the Odonata of the natural Park Izki, Alava Province, Spain.] Address: not stated

**11627.** Gołąb, M.J.; Śniegula, S. (2012): Changes in reproductive behavior in adult damselfly *Calopteryx splendens* (Odonata: Calopterygidae) in response to flood. *Entomological Science* 15(3): 280-287. (in English) ["The reproductive behaviour *C. splendens* males and females inhabiting the Nida River, south Poland, was studied and compared during a pre-flood and a post-flood year. The flood disturbance in 2010 caused a decrease in aquatic macrophytes, thus reducing availability of potential territories and consequently, significantly influencing male behaviour towards a frequent non-territorial strategy. Many males in the post-flood population had damaged wings due to extremely aggressive contests. Male–male tandems were commonly observed; this is an uncommon behaviour in *C. splendens*. Although the sex ratio was male-biased throughout the whole study, we observed more males in the post-flood year. We also observed less-frequent copulations and ovipositions during the post-flood year. The only unchanged characteristic was population density, which did not differ before and after the flood disturbance. Floods have significant impact on damselfly reproductive sites and this, due to changes in behaviour and sex ratio, may result in further consequences on population dynamics." (Author)] Address: Gołąb, Maria J., Dept of Ecosystem Conservation, Institute of Nature Conservation, Polish Academy of Sci., Mickiewicza 33, 31-120 Kraków, Poland. Email: marysiagolab@gmail.com

**11628.** Golfieri, B.; Surian, N.; Hardersen, S.; Maiolini, B. (2012): Assessment of morphological and ecological conditions of Italian alpine rivers using the Morphological Quality Index (IQM) and Odonata. *IS.Rivers* 2012. 1ère conférence internationale sur les Recherches et Actions au service des fleuves et grandes rivières 26 au 28 juin 2012 / Lyon - FRANCE: 3 pp. (in English, with French summary) ["In the recent years many assessment methods have been developed to evaluate ecological and morphological conditions of rivers considering the requirements of the EU Water Framework Directive. Bioindicators are commonly aquatic organisms, but their use could lead to an incomplete evaluation of the status for the whole river corridor, for instance in large gravel-bed rivers. Dragonflies instead, as proposed in previous works, should offer a more complete evaluation of the ecological conditions of the river-floodplain system, due to the environmental characteristics that they indicate. In this study, the Italian Morphological Quality Index (IQM), joined with an Odonata based assessment system, are used to analyze the relationships between the ecological and morphological status of the fluvial environment. Another aim of the research is to test dragonflies as an ecological indicator over a set of reaches with different channel morphologies and human impacts. Preliminary results from five reaches show a good correspondence between the two assessment systems, confirming the positive correlation between ecological and morphological conditions of river reaches and the good potential of Odonata as bioindicators in riverine ecosystems." (Authors)] Address: Golfieri, B., Dipartimento di Geografia, Università degli Studi di Padova, Via del Santo 26, 35123 Padova, Italia. E-mail: brunogolfieri@libero.it

**11629.** Gonçalves, J.F.; Rezende, F.; França, J.; Callisto, M. (2012): Invertebrate colonisation during leaf processing of native, exotic and artificial detritus in a tropical stream. *Marine and Freshwater Research* 63(5): 428-439. (in English) ["The relationship between leaf breakdown and colonisation by invertebrates in tropical aquatic ecosystems is poorly understood, especially in regard to the added problem of the potential effects of exotic species. To assess the colonisation by invertebrates during leaf breakdown in a third-order headwater stream in south-eastern Brazil, we conducted an experiment using the native species *Miconia chartacea*, the exotic species *Eucalyptus grandis* and artificial leaves. We hypothesised that the quality of the detritus and the leaf shape influence invertebrate colonisation because of the quality of the food and refuge offered by leaf detritus. Invertebrate density and richness were higher on leaves of *E. grandis* than on those of *M. chartacea*. Taxon richness did not differ among *M. chartacea* and the two sizes of artificial leaves offered, probably as a function of the chemical composition of *E. grandis*. Total invertebrate density was significantly higher in the organic detritus, suggesting that detritus provides food for the organisms. Our results indicate that the colonisation of invertebrates is probably affected by the chemical composition of detritus. Contrary to expectations, the community of invertebrates had no difficulty in colonising *E. grandis*, although it is an exotic species. In addition, the shredder activity did not influence leaf breakdown. These results may indicate that the invertebrates in this stream tend to behave as generalist feeders." (Authors) Taxa including Odonata are treated at order level.] Address: Gonçalves Jr., J.F., Universidade Federal de Minas Gerais, Instituto de Ciências Biológicas,

Departamento de Biologia Geral, Laboratório de Ecologia de Bentos, CP. 486, Belo Horizonte, MG, 30161-970, Brazil. Email: jfjunior@unb.br

**11630.** Greig, H.S.; Kratina, P.; Thompson, P.L.; Pajunen, W.J.; Richardson, J.S.; Shurin, J.B. (2012): Warming, eutrophication, and predator loss amplify subsidies between aquatic and terrestrial ecosystems. *Global Change Biology* 18: 504-514. (in English) ["The exchange of organisms and energy among ecosystems has major impacts on food web structure and dynamics, yet little is known about how climate warming combines with other pervasive anthropogenic perturbations to affect such exchanges. We used an outdoor freshwater mesocosm experiment to investigate the interactive effects of warming, eutrophication, and changes in top predators (including 'Ischnura' and 'Libellula') on the flux of biomass between aquatic and terrestrial ecosystems. We demonstrated that predatory fish decoupled aquatic and terrestrial ecosystems by reducing the emergence of aquatic organisms and suppressing the decomposition of terrestrial plant detritus. In contrast, warming and nutrients enhanced cross-ecosystem exchanges by increasing emergence and decomposition, and these effects were strongest in the absence of predators. Furthermore, we found that warming advanced while predators delayed the phenology of insect emergence. Our results demonstrate that anthropogenic perturbations may extend well beyond ecosystem boundaries by influencing cross-ecosystem subsidies. We find that these changes are sufficient to substantially impact recipient communities and potentially alter the carbon balance between aquatic and terrestrial ecosystems and the atmosphere." (Authors)] Address: Greig, H.S., School of Biological Sciences, University of Canterbury, Christchurch 8140, New Zealand. E-mail: hamish.greig@canterbury.ac.nz

**11631.** Guan, Z.; Han, B.-P.; Vierstraete, A.; Dumont, H.J. (2012): Additions and refinements to the molecular phylogeny of Calopterygidae s.l. (Zygoptera: Calopterygidae). *Odonatologica* 41(1): 17-24. (in English) ["Of 8 previously unstudied calopterygine taxa, the ITS 1 and 2 was sequenced and inserted into a pre-existing phylogenetic tree of all Eurasian and American genera. ITS is mainly appropriate for looking at shallow phylogenetic relationships, and resolved the relationship within and between genera best, with weak support for relationships at the subfamily level. Thus, *Atrocalopteryx-Matrona* was found to be a complex but very robust clade, while *Vestalis* s.l. was confirmed to consist of 2 distinct genera. The generic versus specific or subspecific status of few other taxa is discussed. Within *Mnais* and *Vestalis*, the position was tested of 2 suspected "aberrant" members, *M. gregoryi* and *V. beryllae*. Both were confirmed to belong to the genera to which they had been traditionally assigned." (Authors)] Address: Han, B.-P., Institute of Hydrobiology, Jinan University, Guangzhou-510632, China. E-mail: tbphan@jnu.edu.cn

**11632.** Guan, Z.; Han, B.-P.; Dumont, H.J. (2012): *Atrocalopteryx melli orohainani* ssp. nov. on the island of Hainan, China (Zygoptera: Calopterygidae). *Odonatologica* 41(1): 37-42. (in English) ["The new subspecies is described from the mountain core of Hainan, southern China, where it usually occurs at altitudes not lower than 300 m a.s.l. It lives on the same type of small, shaded rivers as the nominate ssp. on the continent, and is distinguished by its larger size, slightly less enflamed wings, and a 2.6% difference in the sequence of

the barcoding portion of the mitochondrial DNA-cytochrome c oxidase subunit I gene (COI). Holotype male: Diaoluoshan mountain, 6-VIII-2011; deposited in the Inst. Hydrobiol., Jinan Univ., Guangzhou. It is argued that this geographically defined ssp. evolved because of persistent poor gene flow with continental populations, caused by the lowland "panhandle" between Hainan and the continent. This barrier was probably functioning equally well during interglacials (like at present) as during pleniglacials (when Hainan was connected to the mainland), because lack of suitable environments (small sized running waters), and dry and cold conditions continued to limit the contact with *A. melli* of the mainland." (Authors)] Address: Han, B.-P., Institute of Hydrobiology, Jinan University, Guangzhou-510632, China. E-mail: tbphan@jnu.edu.cn

**11633.** Günther, A. (2012): Wiederfund von *Somatochlora arctica* in Brandenburg (Odonata: Corduliidae). *Libellula Supplement* 12: 143-150. (in German, with English summary) ["*S. arctica* belongs to the very rare dragonfly species in the lowlands of Central Europe and was regarded as extinct or presumably extinct in the state of Brandenburg (Germany) since 1984. After a visual observation in 2001, the rediscovery for Brandenburg succeeded in 2008 in a peat bog southwest of Eisenhüttenstadt. At this site the species was also recorded in 2012." (Author)] Address: Günther, A., TU Bergakademie Freiberg, Institut für Biowissenschaften, AG Biologie/Ökologie, Leipziger Str. 29, 09599 Freiberg, E-mail: andre.guenther@ioez.tu-freiberg.de

**11634.** Hämäläinen, M.; Valtonen, P. (2012): Recollections of Günther Peters' visit to Finland in 1986. *Libellula Supplement* 12: 23-28. (in English, with German summary) ["The authors recount some personal memories of three day-trips they arranged to facilitate Günther Peters' studies on aeshnids during his two week research visit to Finland in July 1986. G. Peters' predictions of the future increase of Finnish dragonfly diversity, and how they have been come true, are briefly discussed." (Authors)] Address: Valtonen, P., Kaukolankuja 2, FI-36200 Kangasala, Finland. E-mail: pho.valtonen@elisanet.fi

**11635.** Haislip, N.A.; Hoverman, J.T.; Miller, D.L.; Gray, M.J. (2012): Natural stressors and disease risk: does the threat of predation increase amphibian susceptibility to ranavirus?. *Canadian Journal of Zoology* 90(7): 893-902. (in English, with French summary) ["Emerging infectious diseases have been identified as threats to biodiversity, yet our understanding of the factors contributing to host susceptibility to pathogens within natural populations remains limited. It has been proposed that species interactions within communities affect host susceptibility to pathogens, thereby contributing to disease emergence. In particular, predation risk is a common natural stressor that has been hypothesized to compromise immune function of prey through chronic stress responses possibly leading to increased susceptibility to pathogens. We examined whether predation risk experienced during the development of four larval anuran species increases susceptibility (mortality and infection) to ranaviruses, a group of viruses responsible for amphibian die-offs. Using controlled laboratory experiments, we exposed each species to a factorial combination of two virus treatments (no virus or virus) crossed with three predator-cue treatments (no predators, larval dragonflies, or adult water bugs). All four amphibian species reduced activity by 22%-48% following continuous exposure to predator cues. In addition,



tion, virus exposure significantly reduced survival by 17%–100% across all species. However, exposure to predator cues did not interact with the virus treatments to elevate mortality or viral load. Our results suggest that the expression of predator-induced plasticity in anuran larvae does not increase ranaviral disease risk." (Authors)] Address: Hoverman, J.T., Center for Wildlife Health, Department of Forestry, Wildlife, and Fisheries, University of Tennessee, Knoxville, TN 37996, USA. E-mail: jason.hoverman@gmail.com

**11636.** Hamilton, R.; Kourtev, P.S.; Post, C.; Dillard, J.; Knepper, K.J.; Cowart, R. (2012): Physicochemical characteristics and benthic macroinvertebrate communities in temporary surface waters of Northern Stark County, Ohio. *The Open Entomology Journal* 6: 1-12. (in English) ["Natural habitats located in urbanized regions are increasingly being impacted by residential, commercial and agricultural development, but little is known about their biotic and abiotic characteristics. Temporary aquatic habitats are less protected by environmental regulations than permanently flooded habitats, and they have been historically understudied. We sampled temporary aquatic habitats including vernal pools, other emergent wetlands and intermittent streams in northeastern Ohio over a two-year period to characterize the macroinvertebrate communities and abiotic characteristics of each habitat type. Duration of inundation of the habitat was the single largest contributing factor to benthic macroinvertebrate community structure. Macroinvertebrate community variability was greater among habitat types than within types suggesting that different habitats type do play a role in selecting for different invertebrate species. Macroinvertebrate abundance and diversity, and functional feeding group patterns differed among seasons. Dissolved oxygen, oxidation-reduction potential and conductivity explained a significant portion of the variability in macroinvertebrate community structure, and these differed among habitat types. Our results suggest that abiotic characteristics have a greater role in determining macroinvertebrate community structure than habitat type." (Authors) Taxa including Aeshnidae, Lestidae and Libellulidae are treated at family level.] Address: Hamilton, R., Dept of Biological Sciences, Kent State University at Stark, North Canton, OH 44720, USA

**11637.** Hartung, M. (2012): Bestimmung von Exuvien der Gattung *Aeshna* in Mitteleuropa mittels einer Matrix mit reellen Zahlen (Odonata: Aeshnidae). *Libellula Supplement* 12: 123-131. (in German, with English summary) ["Determination of the exuviae of the genus *Aeshna* in Central Europe using a matrix of real figures (Odonata: Aeshnidae) - The identification of exuviae is possible using different methods. Schmidt (1936) had published a table with measurement results of the exuviae belonging to the genus *Aeshna*. Based on this table an identification matrix was created using a modified calculation method according to Lapage et al. (1973). The modification consisted in the transformation of the calculation for the use of real figures, which are commonly used for the measurement of insects. Twenty exuviae of *Aeshna cyanea* controlled by adult emergence were measured according to Schmidt (1936). These measurements were standardized. The mean of results was used as a new value in the identification matrix. The newly identified exuviae were identified as *A. cyanea* in 19 of 20 specimens." (Author)] Address: Hartung, M., An der Kirche 17, 14947 Nuthé-Urstromtal, OT Liebätz, Germany. Email: aeh.matthias.hartung@t-online.de

**11638.** Hassall, C. (2012): Predicting the distributions of under-recorded Odonata using species distribution models. *Insect Conservation and Diversity* 5(3): 192-201. (in English) ["(1) Absences in distributional data may result either from the true absence of a species or from a false absence due to lack of recording effort. I use general linear models (GLMs) and species distribution models (SDMs) to investigate this problem in North American Odonata and present a potential solution. (2) I use multi-model selection methods based on Akaike's information criterion to evaluate the ability of water-energy variables, human population density, and recording effort to explain patterns of odonate diversity in the USA and Canada using GLMs. Water-energy variables explain a large proportion of the variance in odonate diversity, but the residuals of these models are significantly related to recorder effort. (3) I then create SDMs for 176 species that are found solely in the USA and Canada using model averaging of eight different methods. These give predictions of hypothetical true distributions of each of the 176 species based on climate variables, which I compare with observed distributions to identify areas where potential under-recording may occur. (4) Under-recording appears to be highest in northern Canada, Alaska, and Quebec, as well as the interior of the USA. The proportion of predicted species that have been observed is related to recorder effort and population density. Maps for individual species have been made available online (<http://www.odonatacentral.org/>) to facilitate recording in the future. (5) This analysis has illustrated a problem with current odonate recording in the form of unbalanced recorder effort. However, the SDM approach also provides the solution, targeting recorder effort in such a way as to maximise returns from limited resources." (Author)] Address: Hassall, C., Biology Dept, Carleton Univ., Ottawa, ON K1S 5B6, Canada. E-mail: chassall@connect.carleton.ca

**11639.** Helm, S.R. (2012): Notes on prey of a Green Heron from Oregon. *Northwestern Naturalist* 93(1): 85-87. (in English) [*Butorides virescens* was observed to catch three "bright orange dragonflies (Odonata) in 5 attempts".] Address: Steven R. Helm, S.R., US Army Corps of Engineers, PO Box 2946 (CENWP-PM-E), Portland, OR 97208, USA. E-mail: steve.r.helm@usace.army.mil

**11640.** Hepenstrick, D.; Holderegger, R.; Keller, D. (2012): Monitoring von Populationen der Helm-Azurjungfer *Coenagrion mercuriale* (Odonata: Coenagrionidae): Was taugen zwei Begehungen pro Saison? *Entomologia Helvetica* 5: 139-145. (in German, with English and French summaries) ["Conservation measures of endangered zygopteran species are frequently accompanied by minimal monitoring. Such a monitoring comprises two censuses per year, in which the number of imagines is determined. For *C. mercuriale* we have evaluated whether minimal monitoring results in a reliable assessment of population size. Therefore, we compared two different datasets, collected from the same populations on the Swiss Plateau in 2009. One dataset represented minimal monitoring with two censuses per year. The other dataset presented a more profound estimation of real population sizes. For this latter dataset, counts were conducted on every day with suitable weather conditions during the reproductive phase. Statistical evaluation showed a high agreement of the two methods. Therefore, we conclude that even minimal monitoring results in a reliable assessment of popula-

tion size. This result may also hold true for other damselfly species." (Authors)] Address: Hepenstrick, D., ZHAW Institut für Umwelt und Natürliche Ressourcen, Grüental, Postfach, CH-8820 Wädenswil, Switzerland. E-mail: daniel.hepenstrick@zhaw.ch

**11641.** Hettyey, A.; Rölli, F.; Thürlimann, N.; Zürcher, A.-C.; van Buskirk, J. (2012): Visual cues contribute to predator detection in anuran larvae. *Biological Journal of the Linnean Society* 106(4): 820-827. (in English) ["The ability of prey to detect predators directly affects their probability of survival. Chemical cues are known to be important for predator detection in aquatic environments, but the role of other potential cues is controversial. We tested for changes in behaviour of *Rana temporaria* tadpoles in response to chemical, visual, acoustic, and hydraulic cues originating from dragonfly larvae (*Aeshna cyanea*) and fish (*Gasterosteus aculeatus*). The greatest reduction in tadpole activity occurred when all cues were available, but activity was also significantly reduced by visual cues only. We did not find evidence for tadpoles lowering their activity in response to acoustic and hydraulic cues. There was no spatial avoidance of predators in our small experimental containers. The results show that anuran larvae indeed use vision for predator detection, while acoustic and hydraulic cues may be less important. Future studies of predator-induced responses of tadpoles should not only concentrate on chemical cues but also consider visual stimuli." (Authors)] Address: Buskirk, J. v., Inst. Zool., Univ. of Zürich, 8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

**11642.** Hobson, K.A.; Soto, D.X.; Paulson, D.R.; Wasenaar, L.I.; Matthews, J.H. (2012): A dragonfly ( $\delta^2\text{H}$ ) isoscape for North America: a new tool for determining natal origins of migratory aquatic emergent insects. *Methods in Ecology and Evolution* 3(4): 766-772. (in English) ["(1) Tracking insect migration at continental scales is intractable using exogenous markers because of tiny body size and high improbability of recapture. Naturally occurring endogenous isotopic markers, such as tissue  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$ , are a means of assigning origins to both vertebrate and invertebrate populations, but the success depends upon derivation of a robust algorithm linking measured tissue isotope values with large-scale geospatial isotopic patterns (isoscapes) in the terrestrial hydrosphere. (2) We derived a North American dragonfly wing  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  isoscape from known-origin dragonflies of three species (*Aeshna interrupta*, *A. umbrosa* and *Pachydiplax longipennis*) obtained across North America. A strong relationship ( $r^2 = 0.75$ ) was found between wing  $\delta^2\text{H}$  and hydrologic geospatial  $\delta^2\text{H}$  patterns, and between wing  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  ( $r^2 = 0.92$ ). The strong coupling between emergent insect tissue and hydrologic spatial patterning suggested that this dragonfly isoscape may be applicable to other aquatic emergent migratory insects in North America and elsewhere. (3) As a proof of concept, we used the wing isoscape algorithm to map the probability of natal origin of *Anax junius* migrating through southern Texas. Results showed that these Texan dragonflies were a mix of local and far-distant migrant (e.g. northern United States) individuals. We suggest that this isoscape algorithm opens new opportunities to quantify the migration and natal origins of dragonflies and other aquatic emergent insects where conventional methods have failed." (Authors)] Address: Hobson, K.A., Environment Canada, 11 Innovation Blvd., Saskatoon, SK, Canada S7N 3H5. E-mail: keith.hobson@ec.gc.ca

**11643.** Hoffmann, J. (2012): Zum achzigsten Geburtstag von Professor Dr. Günther Peters. *Libellula Supplement* 12: 3-17. (in German) [Introduction to the Günther Peters festschrift on the occasion of his 80th birthday.] Address: Hoffmann, J., Hallesdorfer Str. 21, 22179 Hamburg, Germany. E-mail: hoffmann.joa@t-online.de

**11644.** Huang, S.C.; Reinhard, J.; Norval, G. (2012): The reproductive biology and daily activity patterns of *Ischnura heterosticta* (Burmeister) in eastern Australia (Zygoptera: Coenagrionidae). *Odonatologica* 41(2): 99-107. (in English) ["The reproductive behaviour was observed at a pond in Fig Tree Pocket, Brisbane, Australia, from Oct. 2010 to Jan. 2011. In total, 769 individuals were marked in the field for observations pertaining to the daily activity patterns and reproductive cycle of this sp. Forty-one *I. heterosticta* pairs were collected and kept in the laboratory for detailed observations of the reproductive behaviours, copulation duration and oviposition, and to determine the duration of larval development. It started to form mating pairs from ca 5:00 to 9:00 am, foraged from ca 9:00 am to 13:00 pm, and finally females oviposited mainly from ca 13:00 pm to 16:30 pm. Oviposition usually occurred in the following days after mating. Mating pairs formed the tandem position for about 13 s, then copulated in the wheel position on average for 195 min, and upon completion of insemination formed a tandem position again for about 12 s. On average, females spent 145 min in actual oviposition, laying several hundred eggs on floating vegetation. Ovipositing females were not guarded by males. The eggs hatched within 10 to 21 days, and the larvae took 3 to 5 months to develop into adults." (Authors)] Address: Huang, S.C., Queensland Brain Institute, University of Queensland, Brisbane, QLD 4072, Australia. E-mail: shaochang.huang@uqconnect.edu.au

**11645.** Husain, A.; Husain, H.J.; Sharma, G. (2012): New records of dragonflies (Insecta: Odonata: Anisoptera) from Chhatarpur District, Bundelkhand, Madhya Pradesh, India with their conservation status and distribution. *Journal on New Biological Reports* 1(1): 12-16. (in English) ["*Orthetrum pruinosum neglectum*, *Potamarcha congener*, *Diplacodes trivialis*, *Bradinopyga geminata*, *Pantala flavescens* and *Trithemis aurora* are being recorded for the first time from Chhatarpur district of Bundelkhand Division in Madhya Pradesh. *O. pruinosum neglectum*, *P. congener*, *D. trivialis* and *T. aurora* are new to this Division of Madhya Pradesh. All the six species dealt here are classified as 'Least Concern' under Lower Risk category of IUCN red List of Threatened Species." (Authors)] Address: Sharma, G., Zoological Survey of India, 535, New Alipore, Kolkata-700 053, India. E-mail: drgaurav.zsi.india@gmail.com

**11646.** Hyslop, E.J.; Hunte-Brown, M. (2012): Longitudinal variation in the composition of the benthic macroinvertebrate fauna of a typical North coast Jamaican river. *Rev. Biol. Trop.* 60(1): 291-303. (in English) ["Benthic macroinvertebrate fauna plays a major role in river ecosystems, especially those of tropical islands. Since there is no information on the distribution of benthic invertebrates along a Jamaican river, we report here on the composition of the benthic fauna of the Buff Bay river, on the Northern coast of Jamaica. A total of 14 samples were collected from five sites, using kick nets and a Surber sampler, between May 1997 and October 1998. We also examined the applicability of the rhithron/potamon model, and some of the premises of

the River Continuum Concept (RCC) in relation to the distribution of invertebrate taxa. The results showed a total of 38 taxa of identified invertebrates. A group of dominant taxa, composed mainly of immature stages of insects, occurred at all sites. Two notable characteristics of the river were the absence of a true potamonic fauna and the low representation of the shredder functional feeding group in the community. We conclude that, while there was minor variation in the composition of the benthic macroinvertebrate fauna among the sites, this was a response to local conditions within the river system. The characteristics of the community did not conform to either of the models." (Authors) The following taxa are listed: *Scapania frontalis*, *Dythemis rufinervis*, *Orthemis ferruginea*, and *Enallagma* sp.] Address: Hyslop, E.J., Department of Life Sciences, University of the West Indies, Mona campus, Kingston 7, Jamaica. E-mail: eric.hyslop@uwimona.edu.jm

**11647.** Iorio, E. (2012): Nouvelles données sur la répartition et l'écologie de *Sympetrum depressiusculum* (Selys, 1841) dans les Bouches-du-Rhône (Odonata, Anisoptera: Libellulidae). *Martina* 28(1): 25-36. (in French, with English summary) [In "2010 and 2011, the autochthony of *S. depressiusculum* has been emphasized in several new locations in Saint-Martin-de-Crau and Salon-de-Provence (Bouches-du-Rhône department, southern France). These locations are sedimentation tanks along motorways with clear and well brightened up waters on a muddy/rocky substratum, with many helophytes and with winter desiccation. The dominant plant species in the ponds where *S. depressiusculum* reproduces are, in decreasing order of frequency/abundance: *Typha domingensis*, *Cyperus eragrostis*, *Scirpoides holoschoenus* and *Schoenoplectus lacustris*. The Odonatological regular cortège is, in decreasing order of frequency/abundance: *Ischnura elegans*, *S. fonscolombii*, *Crocothemis erythraea*, *Orthetrum cancellatum* and *Anax imperator*. The odonatological occasional cortège is, in decreasing order of frequency/abundance: *S. sanguineum*, *O. coerulescens*, *O. brunneum*, *Anax parthenope*, *O. albistylum* and *S. striolatum*. Several cases of predation on *S. depressiusculum* and other Anisoptera species by *Argiope bruennichi* (Scopoli, 1772) (Araneae: Araneidae) have been observed. This spider seems to be an efficient predator in this kind of habitat." (Author)] Address: Iorio, E., ECO-MED (Ecologie & Médiation), Pôle Entomologie, Tour Méditerranée, 65 av. Jules Cantini, F-13298 Marseille Cedex 20, France. E-mail: e.iorio@ecomed.fr

**11648.** Irineu de Souza, L.O.; Pepinelli, M.; Neiss, U.G. (2012): The larva of *Neoneura ethela* Williamson, 1917 (Odonata: Protoneuridae). *Zootaxa* 3318: 63-67. (in English) ["The last-instar larva of *N. ethela* is described and illustrated based on one larva collected from a thermal water river in Brazil, State of Goiás and reared in the laboratory. The larva of *N. ethela* can be distinguished from all other South America *Neoneura* larvae by the following combination of characters: one pair of premental setae, S8-10 with a row of short spines along distal border, lateral gills a little longer than length of abdomen, ventral border of lateral gill armed with a row of about 24 spines. We provide a key to the species of known South American larvae of *Neoneura*." (Authors)] Address: Neiss, U.G., Instituto Nacional de Pesquisas da Amazônia/INPA, Coordenação de Biodiversidade/CBio, Avenida André Araújo, n. 2936, Caixa

Postal 478, CEP 69011-970, Manaus, Amazonas, Brazil. E-mail: ulisses.neiss@gmail.com

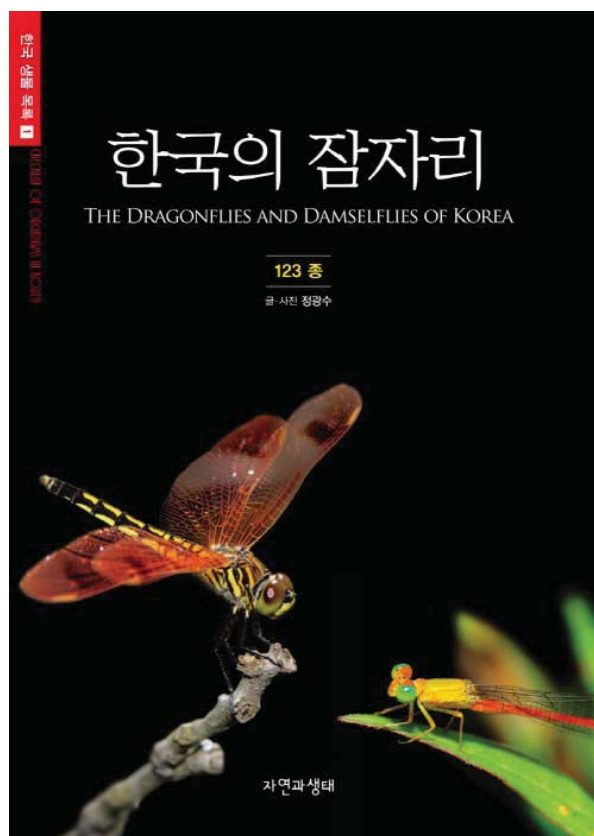
**11649.** Iserbyt, A.; Van Gossum, H.; Stoks, R. (2012): Biogeographical survey identifies consistent alternative physiological optima and a minor role for environmental drivers in maintaining a polymorphism. *PLoS ONE* 7(2): e32648. doi:10.1371/journal.pone.0032648: 10 pp. (in English) ["The contribution of adaptive mechanisms in maintaining genetic polymorphisms is still debated in many systems. To understand the contribution of selective factors in maintaining polymorphism, we investigated large-scale (>1000 km) geographic variation in morph frequencies and fitness-related physiological traits in the damselfly *Nehalennia irene*. As fitness-related physiological traits, we investigated investment in immune function (phenoloxidase activity), energy storage and fecundity (abdomen protein and lipid content), and flight muscles (thorax protein content). In the first part of the study, our aim was to identify selective agents maintaining the large-scale spatial variation in morph frequencies. Morph frequencies varied considerably among populations, but, in contrast to expectation, in a geographically unstructured way. Furthermore, frequencies co-varied only weakly with the numerous investigated ecological parameters. This suggests that spatial frequency patterns are driven by stochastic processes, or alternatively, are consequence of highly variable and currently unidentified ecological conditions. In line with this, the investigated ecological parameters did not affect the fitness-related physiological traits differently in both morphs. In the second part of the study, we aimed at identifying trade-offs between fitness-related physiological traits that may contribute to the local maintenance of both colour morphs by defining alternative phenotypic optima, and test the spatial consistency of such trade-off patterns. The female morph with higher levels of phenoloxidase activity had a lower thorax protein content, and vice versa, suggesting a trade-off between investments in immune function and in flight muscles. This physiological trade-off was consistent across the geographical scale studied and supports widespread correlational selection, possibly driven by male harassment, favouring alternative trait combinations in both female morphs." (Authors)] Address: Iserbyt, A., Evolutionary Ecology Group, Antwerp Univ., Antwerp, Belgium. E-mail: arne.iserbyt@ua.ac.be

**11650.** Janssens, L.; Stoks, R. (2012): How does a pesticide pulse increase vulnerability to predation? Combined effects on behavioral antipredator traits and escape swimming. *Aquatic Toxicology* 110-111: 91-98. (in English) ["An increasing number of studies have documented that sublethal pesticide exposure can change predator-prey interactions. Most of these studies have focused on effects of long-term pesticide exposure on only one type of antipredator traits and have not directly linked changes in these traits to mortality by predation. To get a better mechanistic understanding of how short-term pesticide pulses make prey organisms more vulnerable to predation, we studied effects of 24 h exposure to a sublethal concentration of the insecticide endosulfan and the herbicide Roundup on the major antipredator traits and the resulting mortality by predation in larvae of the damselfly *Enallagma cyathigerum*. A pulse of both pesticides affected antipredator traits involved in avoiding detection by predators as well as traits involved in escape after detection. After a pesticide pulse, larvae increased activity levels and even further in-



creased the number of walks when predation risk was present. Further, an endosulfan pulse tended to reduce escape swimming speed. In contrast, previous exposure to Roundup caused the larvae to swim faster, yet less often when attacked. Importantly, although both studied pesticides induced maladaptive changes in overall activity, only for endosulfan this resulted in an increased mortality by predation. Our study highlights that considering changed predator-prey interactions may improve ecological risk evaluations of short pesticide pulses, yet also underscores the need (1) to consider effects on all important antipredator traits of the prey as trait compensation may occur and (2) to effectively score the outcome of predator-prey interactions in staged encounters." (Authors)] Address: Janssens, Lizanne, Laboratory of Aquatic Ecology and Evolutionary Biology, Univ. of Leuven, Deberiotstr. 32, 3000 Leuven, Belgium. E-mail: lizanne.janssens@bio.kuleuven.be

Jung, K.-S. (2012): The dragonflies and damselflies of Korea. Checklist of organisms in Korea 1. 272 pp. (in Korean) [[http://www.econature.co.kr/?mid=ecobook-&search\\_target=extra\\_vars5&search\\_keyword=20120320&document\\_srl=72694](http://www.econature.co.kr/?mid=ecobook-&search_target=extra_vars5&search_keyword=20120320&document_srl=72694)]



Address: Jung, Kwangsu, 102-601., Dalvitmaul apt., Hwajung-dong, Koyangsi, 412-270, Gyunggido, Korea. E-mail: tootootoo@korea.com

**11651.** Kadoya, T.; Washitani, I. (2012): Use of multiple habitat types with asymmetric dispersal affects patch occupancy of the damselfly *Indolestes peregrinus* in a fragmented landscape. *Basic and Applied Ecology* 13: 178-187. (in English, with German summary) ["To appropriately predict the patch occupancy of animals, it is often essential to consider not only the habitat structure but also shifts in the habitat requirements of animals with changes in life stage. In addition, asymmetric dis-

persal among different types of habitat patches is likely to accompany use of multiple habitat types due to differences in the ease with which migrants can find the habitats, to changes in the dispersal ability of animals according to their life stage, or to both factors. However, few studies have explicitly elucidated the contribution of these processes to patch connectivity and to predictions of patterns of patch occupancy. In the present study, we evaluated the effects of multi-type habitat use on patch connectivity of the damselfly *Indolestes peregrinus*. After emergence, adults of this species move from their native ponds to woodlands for hibernation and return to aquatic habitats for oviposition in the next spring. We recorded the occurrence of *I. peregrinus* at newly created artificial ponds and attempted to explain patch occupancy using a series of Bayesian statistical models, which incorporate (1) local environment only, (2) both local environment and single-type habitat use connectivity, and (3) both local environment and multi-type habitat use connectivity. In addition, we considered two situations in the third model: symmetric or asymmetric dispersal. Comparing the performance of the candidate models revealed that the best model was the third model assuming asymmetric dispersal and it explained 18.8% of the deviance. The result suggests that multi-type habitat use is important for determining patch connectivity of *I. peregrinus*, and that there is asymmetry in the connectivity from pond to woodland patches and vice versa for the damselfly. Both multi-type habitat use and asymmetric dispersal processes are likely to apply to many other taxa and landscapes." (Authors)] Address: Kadoya, T., Center for Environmental Biology and Ecosystem Studies, National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba, Ibaraki 305-8506, Japan. E-mail: kadoya@nies.go.jp

**11652.** Kalkman, V.J.; Kleukers, M.J.C.R.; Tavares, J.T. (2012): First well documented records of *Orthetrum trinacria* for Greece and Turkey (Odonata: Libellulidae). *Libellula* 31(1/2): 89-96. (in English, with German summary) ["Two records of *O. trinacria*, one taken in Turkey and the other in Greece, are documented by photographs. Former records of *O. trinacria* from Greece and Turkey are considered as doubtful, making these observations the first well documented for this species in both countries. Range expansion of dragonflies in the eastern Mediterranean is discussed and it is suggested that the present records of *O. trinacria* in Greece and Turkey might be a first indication that this species will become established along the coastal regions of the eastern Mediterranean." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**11653.** Kalkman, V.J.; Orr, A.G. (2012): The Australian monsoon tropics as a barrier for exchange of dragonflies (Insecta: Odonata) between New Guinea and Australia. *Hydrobiologia* 693: 55-70. (in English) ["Recent studies show a remarkable scarcity of faunal exchange events between Australia and New Guinea in the Pleistocene despite the presence of a broad land connection for long periods. This is attributed to unfavourable conditions in the connecting area associated with the long established northern Australian Monsoon Climate. This would be expected to have impacted strongly on freshwater faunas with the following results: (1) limited overlap in species, (2) most higher taxonomic groups pre-

sent in both areas sharing no species or even genera and (3) shared species dominated by lentic species with high dispersal capacity. Testing these predictions for dragonflies showed the turnover in the family, genus and species composition between Australia and New Guinea to be higher than anywhere in the world with only 50% of families and subfamilies, 33% of the genera and 8% of the species being shared. Only one of the 53 shared species favours lotic waters compared with 64% of the 652 combined Australian–New Guinean species. These results agree with our predictions and indicate that the dragonfly fauna of Australia and New Guinea have effectively been separated during the Pleistocene probably due to the prolonged unfavourable climatic conditions in the intervening areas" (Authors)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**11654.** Keller, D.; van Strien, M.J.; Holderegger, R. (2012): Do landscape barriers affect functional connectivity of populations of an endangered damselfly? *Freshwater Biology* 57(7): 1373-1384. (in English) ["(1) Landscape genetic approaches were used to assess functional connectivity of populations of the endangered damselfly *Coenagrion mercuriale* in a fragmented agricultural landscape in Switzerland. Spatial genetic clustering methods combined with interpolation by kriging and landscape genetic corridor analysis were applied to identify landscape elements that enhance or hinder dispersal and gene flow. (2) Spatial genetic clustering analysis divided the sampled populations into a northern and a southern genetic group. The boundary between the two groups coincided with a hill ridge intersecting the study area. Landscape corridor analysis identified five landscape elements that significantly affected gene flow. Elevation change, Euclidian distance, patches of forest and flowing waterbodies acted as barriers, whereas open agricultural land enhanced gene flow between populations of *C. mercuriale*. (3) This study showed that movement of *C. mercuriale* was not restricted to its preferred habitat (i.e. streams). Populations linked via continuous open agricultural land were functionally well connected if they were not more than about 1.5–2 km apart. In contrast, substantial elevation change and larger forest patches separated populations. These findings may serve as a basis to define conservation units and should be considered when planning connectivity measures, such as determining the locations of stepping stones, or the restoration of streams." (Authors)] Address: Keller, Daniela, WSL Swiss Federal Research Institute, Zürcherstr. 111, CH-8903 Birmensdorf, Switzerland. E-mail: daniela.keller@wsl.ch

**11655.** Keppner, E.J. (2012): Occurrence of the Widow Skimmer (*Libellula luctuosa*) in Holmes County, Florida. *Argia* 24(2): 21-22. (in English) [USA; May 19, 2012] Address: Keppner, E.J. E-mail: ekeppner@bellsouth.net

**11656.** Khelifa, R.; Zebba, R.; Kahalerras, A.; Mahdjoub, H. (2012): Clutch size and egg production in *Orthetrum nitidinerve* Selys, 1841 (Anisoptera: Libellulidae): effect of body size and age. *International Journal of Odonatology* 15(2): 51-58. (in English) ["Clutch size is an important fitness component often quantified artificially by inducing oviposition in libellulid females. Female behaviour and egg production of the yellow-veined skimmer, *Orthetrum nitidinerve*, were studied in northeast Algeria during its reproductive season. Data on reproductive

behaviour and biology of this Mediterranean endemic species has not been published previously. Males guarded territories within the wetland while females came only to lay their eggs and then went back to terrestrial habitat. In this study we induced oviposition, which depletes all the female eggs, to obtain estimations of egg deposition rate and subsequently clutch size. On average an induced clutch was ca. 2200 eggs while a natural one was about 970 eggs. Artificial clutches were positively correlated to body length but negatively related to mature lifespan. The rate of egg deposition was higher in the afternoon than in the morning, probably because of differences in temperature. During their mature lifespan females oviposited between one and three artificial clutches." (Authors)] Address: Khelifa, R., Dépt d'écologie et du génie de l'environnement, Faculté des Sciences de la Nature et de la Vie et des Sciences de la Terre et de l'Univers, Université, 08 Mai 1945, Guelma, 24000, Algeria

**11657.** Khelifa, R. (2012): Description of the final instar larva of *Calopteryx exul* Selys, 1853 (Zygoptera: Calopterygidae). *International Journal of Odonatology*: 107-114. (in English) ["The last instar larva of *C. exul* is described and illustrated based on larvae collected from the Seybouse River (northeast Algeria) and reared in the laboratory. A comparative analysis of three other congeneric species is presented." (Author)] Address: Khelifa, R., Département d'Écologie et du Génie de l'Environnement, Faculté des Sciences de la Nature et de la Vie et des Sciences de la Terre et de l'Univers, Université 08 Mai 1945, Guelma, 24000, Algeria

**11658.** Klecka, J.; Boukal, D.S. (2012): Who eats whom in a pool? A comparative study of prey selectivity by predatory aquatic insects. *PLoS ONE* 7(6): e37741: 13 pp. (in English) ["Predatory aquatic insects are a diverse group comprising top predators in small fishless water bodies. Knowledge of their diet composition is fragmentary, which hinders the understanding of mechanisms maintaining their high local diversity and of their impacts on local food web structure and dynamics. We conducted multiple-choice predation experiments using nine common species of predatory aquatic insects, including adult and larval Coleoptera, adult Heteroptera and larval Odonata, and complemented them with literature survey of similar experiments. All predators in our experiments fed selectively on the seven prey species offered, and vulnerability to predation varied strongly between the prey. The predators most often preferred dipteran larvae; previous studies further reported preferences for cladocerans. Diet overlaps between all predator pairs and predator overlaps between all prey pairs were non-zero. Modularity analysis separated all primarily nectonic predator and prey species from two groups of large and small benthic predators and their prey. These results, together with limited evidence from the literature, suggest a highly interconnected food web with several modules, in which similarly sized predators from the same microhabitat are likely to compete strongly for resources in the field (observed Pianka's diet overlap indices >0.85). Our experiments further imply that ontogenetic diet shifts are common in predatory aquatic insects, although we observed higher diet overlaps than previously reported. Hence, individuals may or may not shift between food web modules during ontogeny." (Authors) The following Odonata species were used in the experiment: *Coenagrion puella* (F-0) (water column), *Libellula depressa* (F-2), *Libellula depressa*

(F-0), *Sympetrum sanguineum* (F-0) and *Anax imperator* (F-0) (all: bottom).] Address: Klecka, J., Department of Ecosystems Biology, Faculty of Science, University of South Bohemia, České Budějovice, Czech Republic. E-mail: kleckj01@prf.jcu.cz

**11659.** Knillmann, S.; Stampfli, N.C.; Noskov, Y.A.; Bekeov, M.A.; Liess, M. (2012): Interspecific competition delays recovery of *Daphnia* spp. populations from pesticide stress. *Ecotoxicology* 21(4): 1039-1049. (in English) ["Xenobiotics alter the balance of competition between species and induce shifts in community composition. However, little is known about how these alterations affect the recovery of sensitive taxa. We exposed zooplankton communities to esfenvalerate (0.03, 0.3, and 3 lg/L) in outdoor microcosms and investigated the longterm effects on populations of *Daphnia* spp. To cover a broad and realistic range of environmental conditions, we established 96 microcosms with different treatments of shading and periodic harvesting. Populations of *Daphnia* spp. decreased in abundance for more than 8 weeks after contamination at 0.3 and 3 lg/L esfenvalerate. The period required for recovery at 0.3 and 3 lg/L was more than eight and three times longer, respectively, than the recovery period that was predicted on the basis of the life cycle of *Daphnia* spp. without considering the environmental context. We found that the recovery of sensitive *Daphnia* spp. populations depended on the initial pesticide survival and the related increase of less sensitive, competing taxa. We assert that this increase in the abundance of competing species, as well as sub-lethal effects of esfenvalerate, caused the unexpectedly prolonged effects of esfenvalerate on populations of *Daphnia* spp. We conclude that assessing biotic interactions is essential to understand and hence predict the effects and recovery from toxicant stress in communities." (Authors) The paper contains a passing reference to Odonata.] Address: Knillmann, Saskia, Department of System Ecotoxicology, Helmholtz Centre for Environmental Research, UFZ, Permoserstrasse 15, 04318 Leipzig, Germany. E-mail: saskia.knillmann@ufz.de

**11660.** Koch, K.; Ziegler, D.A.; Griebeler, E.M. (2012): Nischenmodell für *Sympetrum striolatum* (Odonata: Libellulidae). *Libellula Supplement* 12: 151-160. (in German, with English summary) ["In this study, we assessed whether it is possible to establish ecological niche models for euryoecious species using *Sympetrum striolatum* as a model species. Presence-only data of this species, climate and land use data at the resolution of ordinance survey type maps (OSM) from six different Southern German federal states and from the time period 1950-2006 were used for modelling. Based on these data we calculated four different models applying the Software Max-Ent. Each model initially considered 19 pairwise uncorrelated environmental variables plus one climate and one precipitation variable based on different periods: "no egg or larval development", with averaged mean monthly temperatures below 4°C (December-February), "larvae", with averaged mean monthly temperatures above 4°C (March-November), "adult", the main flight season of *S. striolatum* (June-October), and "whole life cycle" the mean annual temperature. In general, model accuracy and performance was low. Nevertheless, all models identified the same variables as the most important predictors of the spatial distribution of *S. striolatum*. The different temperature variables showed the highest independent contribution to the overall vari-

ance explained by the models, whereas the contribution of the fraction of conifer forest, the fraction of soil with pH 7.5-8, and the difference between maximum and minimum altitude in meters within an OSM was lower. As the environmental variables identified by the models are consistent with the biology of our model species, we conclude that ecological niche models are reliable for euryoecious species." (Authors)] Address: Koch, Kamilla, Abteilung Ökologie, Institut für Zoologie, Johannes Gutenberg-Universität Mainz, Johann-Joachim-Becherweg 13, D-55128 Mainz, Germany. E-mail: kochka@uni-mainz.de

**11661.** Kosterin, O.E. (2012): A rapid survey of Odonata on Bokor Plateau, Preah Monivong National Park, Cambodia. *Cambodian Journal of Natural History* 2012(1): 75-88. (in English, with Cambodian summary) ["Bokor Plateau, in the coastal area of Cambodia, supports a mixture of upper hill evergreen forest and wetlands, including Sphagnum peat-moss bogs, at approximately 1,000 m elevation. Despite being within Preah Monivong National Park, the recent construction of a resort on the plateau has destroyed most of its accessible wetlands before their biodiversity was fully investigated. The findings of three rapid surveys, which preceded the loss of the wetlands, are presented here. During six days in total, 45 species of Odonata were recorded on Bokor Plateau (1 Calopterygidae, 1 Euphaeidae, 2 Chlorocyphidae, 2 Lestidae, 11 Coenagrionidae, 1 Platycnemididae, 1 Protoneuridae, 1 Aeshnidae, 2 Corduliidae and 23 Libellulidae), comprising 10 lotic and 35 lentic species. Only four species, *Aciagrion tillyardi*, *Idyonyx ?thailandica*, *Lyriothemis elegantissima* and *Orthetrum pruinatum neglectum*, were not recorded at lower elevations during the same period. *Aciagrion tillyardi* appeared to breed in peat-moss habitats on the plateau, but no obligate peat-moss species were found. Numerous non-breeding individuals of the common species *Ceriagrion olivaceum*, *Neurothemis intermedia*, *Potamarcha congener* and *Tholymis tillarga* were found on the plateau in December, and *Pantala flavescens* in April and to a lesser extent in August, most of which had probably dispersed from lower elevations to forage. No very rare or localised endemic species were detected, but this may be explained by the short survey period." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**11662.** Kuitunen, K.; Haukilehto, E.; Raatikainen, K.J.; Hakkarainen, H.; Miettinen, M.; Hogmander, H.; Kotiaho, J.S. (2012): Do allopatric male *Calopteryx virgo* damselflies learn species recognition? *Ecology and Evolution* 2(3): 615-621. (in English) ["There is a growing amount of empirical evidence that premating reproductive isolation of two closely related species can be reinforced by natural selection arising from avoidance of maladaptive hybridization. However, as an alternative for this popular reinforcement theory, it has been suggested that learning to prefer conspecifics or to discriminate heterospecifics could cause a similar pattern of reinforced premating isolation, but this possibility is much less studied. Here, we report results of a field experiment in which we examined (i) whether allopatric *Calopteryx virgo* damselfly males that have not encountered heterospecific females of the congener *C. splendens* initially show discrimination, and (ii) whether *C. virgo* males learn to discriminate heterospecifics or learn to associ-



ate with conspecifics during repeated experimental presentation of females. Our experiment revealed that there was a statistically nonsignificant tendency for *C. virgo* males to show initial discrimination against heterospecific females but because we did not use sexually native individuals in our experiment, we were not able to separate the effect of innate or associative learning. More importantly, however, our study revealed that species discrimination might be further strengthened by learning, especially so that *C. virgo* males increase their association with conspecific females during repeated presentation trials. The role of learning to discriminate *C. splendens* females was less clear. We conclude that learning might play a role in species recognition also when individuals are not native but have already encountered potential conspecific mates." (Authors)] Address: Kuitunen, Katja, Dept of Biological and Environmental Science, Centre of Excellence in Evolutionary Research, Univ. of Jyväskylä, P.O. Box 35, FIN-40014 Jyväskylä, Finland. E-mail: katja.m.m.kuitunen@jyu.fi

**11663.** Kumar Das, M.; Bordoloi, S. (2012): Diversity of fish and insect fauna of Diyung Thiep watershed, Arunachal Pradesh. International journal of advanced biological research 2(2): 289-292. (in English) [The taxa list includes *Cordulegaster* sp., *Sympetrum* sp., and the Nearctic *Argia* sp.] Address: Biodiversity laboratory, Resource Management and Environment Division, Institute of advanced study in Science and Technology, Paschim Boragaon, Bigyan Path Garchuk, Guwahati-781035, Assam, India

**11664.** Lau, D.C.P.; Vrede, T.; Pickova, J.; Goedkoop, W. (2012): Fatty acid composition of consumers in boreal lakes – variation across species, space and time. *Freshwater Biology* 57(1): 24-38. (in English) [Sweden] (1) Fatty acids (FAs) have been widely applied as trophic biomarkers in aquatic food web studies. However, current knowledge of inter- and intraspecific variation in consumer FA compositions across spatial and temporal scales is constrained to a few pelagic taxa. (2) We analysed the FAs of 22 taxa of benthic macroinvertebrates (including *Aeshna* spp., *Corduliidae*, *Zygoptera*), zooplankton and fish collected from the littoral, pelagic and profundal habitats of nine boreal oligotrophic lakes over spring, summer and autumn. We quantified and compared the FA variance partitions contributed by species identity (i.e. an integrative effect of phylogenetic origin, life history and functional feeding guild of individual taxa), site and season using partial redundancy analysis both on all consumers and on benthic arthropods alone. (3) Species identity alone contributed 84.4 and 72.8% of explained FA variation of all consumers and benthic arthropods, respectively. Influences of site, season and all joint effects accounted for 0–11.3% only. Fatty acid profiles of primary consumers differentiated below class level, but those of predators were distinguishable only when they became more taxonomically distinct (i.e. among classes or higher). (4) Pelagic and profundal consumers showed stronger reliance on autochthonous resources than did their littoral counterparts as reflected by their higher x3 to x6 FA ratios. Polyunsaturated FAs (PUFAs) were increasingly retained with trophic levels, and saturated FAs (e.g. FA 16 : 0) gradually reduced. Ecologically, this trade-off enhances the trophic transfer efficiency and confirms the importance of PUFA-rich autotrophs in aquatic food webs. (5) Our findings indicate strong interspecific differences in FA requirements and assimila-

tion among aquatic consumers from a wide range of taxonomic levels, habitats and lakes. Consumers were able to maintain homeostasis in FA compositions across spatial and temporal changes in resource FAs, but consumer homeostasis did not limit the effectiveness of FAs as trophic biomarkers." (Authors)] Address: Lau, Danny, Department of Aquatic Sciences and Assessment, Swedish University of Agricultural Sciences, Box 7050, 75007 Uppsala, Sweden. E-mails: danny.lau@slu.se, dcplau@gmail.com

**11665.** Lee, Y.-H.; Lin, C.-P. (2012): Morphometric and genetic differentiation of two sibling gossamer-wing damselflies, *Euphaea formosa* and *E. yayeyamana*, and adaptive trait divergence in subtropical East Asian islands. *Journal of Insect Science* 12 | Article 53: 17 pp. (in English) ["Insular species frequently demonstrate different tendencies to become smaller or larger than their continental relatives. Two sibling gossamer-wing damselflies, *E. formosa* (Odonata: Euphaeidae) from Taiwan and *E. yayeyamana* from the Yaeyama Islands of Japan, have no clear structural differentiation, and can only be recognized by their geographical distribution, sizes, and subtle differences in wing shape and coloration. This study combined morphometric and genetic techniques to investigate the adaptive significance of trait divergence and species status in these two *Euphaea* damselflies. Phylogenetic analyses of the mitochondrial *cox2* sequences demonstrated that the two damselflies are monophyletic lineages and constitute valid phylogenetic species. The landmark-based geometric morphometrics indicated that the two damselflies are different morphological species characterized by distinctive wing shapes. The larger *E. formosa* exhibited broader hind wings, whereas *E. yayeyamana* had narrower and elongated forewings. The body size and wing shape variations among populations of the two species do not follow the expected pattern of neutral evolution, suggesting that the evolutionary divergence of these two traits is likely to be subjected to natural or sexual selection. The decreased body size, elongated forewings, and narrower hind wings of *E. yayeyamana* may represent insular adaptation to limited resources and reduced territorial competition on smaller islands." (Authors)] Address: Lin, C.-P., Department of Life Sciences and Center for Tropical Ecology and Biodiversity, Tunghai University, Taichung, 40704, Taiwan. E-mail: treehops@thu.edu.tw

**11666.** Lee, Y.-H.; Lin, C.-P. (2012): Pleistocene speciation with and without gene flow in *Euphaea* damselflies of subtropical and tropical East Asian islands. *Molecular Ecology* 21(15): 3739-3756. (in English) ["Climatic oscillations during the Pleistocene period could have had a profound impact on the origin of tropical species by the alternation of allopatric isolation and interpopulation gene flow cycles. However, whether tropical speciation involves strictly allopatric isolation, or proceeds in the face of homogenizing gene flow, is relatively unclear. Here, we investigated geographical modes of speciation in four closely related *Euphaea* damselfly species endemic to the subtropical and tropical East Asian islands using coalescent analyses of a multilocus data set. The reconstructed phylogenies demonstrated distinct species status for each of the four species and the existence of two sister species pairs, *Euphaea formosa*/*E. yayeyamana* and *E. decorata*/*E. ornata*. The species divergence time of the sibling *Euphaea* damselflies dates back to within the last one Mya of the Middle to

Lower Pleistocene. The speciation between the populous *E. formosa* of Taiwan and the less numerous *E. yayeyamana* of the Yaeyama islands occurred despite significant bidirectional, asymmetric gene flow, which is strongly inconsistent with a strictly allopatric model. In contrast, speciation of the approximately equal-sized populations of *E. decorata* of the southeast Asian mainland and *E. ornata* of Hainan is inferred to have involved allopatric divergence without gene flow. Our findings suggest that differential selection of natural or sexual environments is a prominent driver of species divergence in subtropical *E. formosa* and *E. yayeyamana*; whereas for tropical *E. decorata* and *E. ornata* at lower latitudes, allopatric isolation may well be a pivotal promoter of species formation." (Authors)] Address: Lin, C.-P., Department of Life Science & Center for Tropical Ecology and Biodiversity, Tunghai University, Taichung 40704, Taiwan. E-mail: treehops@thu.edu.tw

**11667.** Leslie, A.W.; Smith, R.F.; Ruppert, D.E.; Bejleri, K.; McGrath, J.M.; Needelman, B.A.; Lamp, W.O.P (2012): Environmental factors structuring benthic macroinvertebrate communities of agricultural ditches in Maryland. *Environ. Entomol.* 41(4): 802-812. (in English) ["Agricultural drainage ditches are artificial structures used to optimize soil hydrology for crop production and secondarily have been co-opted as a tool to manage the quality of water draining from agricultural lands. We investigated the relationship between the aquatic macroinvertebrate community and environmental variables associated with physical and biogeochemical processes that affect water quality. Aquatic macroinvertebrates were sampled along with physical and chemical measures of the soil and water from 29 agricultural drainage ditches on the Eastern Shore of Maryland. Cluster analysis and multivariate ordination showed that ditches that had higher flow velocities supported communities of lotic invertebrates (i.e., Stenelmis, Prosimulium) versus those that had properties of linear wetlands, which supported communities of lentic invertebrates (i.e., Oligochaeta, Caecidotea). Taxon richness varied from four to 31 taxa per ditch, and was higher within ditches that had higher flow velocities. Small ditches had low diversity, but may have provided refugia from fish predators. Macroinvertebrate communities did not show a significant linear relationship with water quality or with nutrient concentrations within the soil or water. The addition of flow-control structures designed to improve the quality of water draining from agricultural lands may decrease the quality of ditches as habitat for certain aquatic macroinvertebrates. Management decisions for drainage ditches may consider tradeoffs between the benefits of ditches as a source of biodiversity and as a tool for improving water quality." (Authors) Taxa are treated at genus level and include *Dromogomphus*, *Libellula*, *Amphiagrion*, and *Argia*.] Address: Leslie, A.W., Dept of Entomology, Univ. of Maryland, College Park, MD 20742, USA. E-mail: aleslie@umd.edu

**11668.** Letsch, H.O.; Meusemann, K.; Wipfler, B.; Schütte, K.; Beutel, R.; Misof, B. (2012): Insect phylogenomics: results, problems and the impact of matrix composition. *Proc. R. Soc. B* 279(1741): 3282-3290. (in English) ["In this study, we investigated the relationships among insect orders with a main focus on Polyneoptera (lower Neoptera: roaches, mantids, earwigs, grasshoppers, etc.), and Paraneoptera (thrips, lice, bugs in the wide sense). The relationships between and within these groups of insects are difficult to resolve because only

few informative molecular and morphological characters are available. Here, we provide the first phylogenomic expressed sequence tags data ('EST': short sub-sequences from a c(copy) DNA sequence encoding for proteins) for stick insects (Phasmatodea) and web-spinners (Embioptera) to complete published EST data. As recent EST datasets are characterized by a heterogeneous distribution of available genes across taxa, we use different rationales to optimize the data matrix composition. Our results suggest a monophyletic origin of Polyneoptera and Eumetabola (Paraneoptera + Holometabola). However, we identified artefacts of tree reconstruction (human louse *Pediculus humanus* assigned to Odonata or Holometabola (insects with a complete metamorphosis); mayfly genus *Baetis* nested within Neoptera), which were most probably rooted in a data matrix composition bias due to the inclusion of sequence data of entire proteomes. Until entire proteomes are available for each species in phylogenomic analyses, this potential pitfall should be carefully considered." (Authors) *Ischnura elegans* was included in analyses.] Address: Harald O. Letsch, H.O., Dept für Tropenökologie und Biodiversität der Tiere, Universität Wien, Rennweg 14, 1030 Wien, Austria. E-mail: harald.letsch@univie.ac.at

**11669.** Li, Y.J.; Han, G.; Nel, A.; Ren, D.; Pang, H.; Liu, X.L (2012): A new fossil petalurid dragonfly (Odonata: Petaluroidea: Aktassiidae) from the Cretaceous of China. *Alcheringa* 36(3): 319-322. (in English) [oas 36; "Pseudocymatophlebia boda n. sp. is described from Lower Cretaceous strata of Inner Mongolia, China. It provides additional morphological characters for this genus, which has been previously recorded from the Lower Cretaceous of England. Together with *Aktassia*, it is the second aktassiid genus with a very wide distribution, even though this family remains known only from Eurasia. Furthermore, a new name, *Brachaktassia* gen. nov., is proposed to replace the brachiopod genus *Aktassia* Popov, 1976." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimr1.mnhn.fr

**11670.** Li, Y.; Nel, A.; Ren, D.; Pang, H. (2012): New gomphaeschnids and progobiaeschnids from the Yixian Formation in Liaoning Province (China) illustrate the tremendous Upper Mesozoic diversity of the aeshnopteran dragonflies. *Geobios* 45(4): 339-350. (in English) ["One new genus and five new species of Odonata are described and figured from the Yixian Formation of northeastern China, viz. two gomphaeschnids *Sinojoria magna* nov. sp. and *S. cancellosa* nov. sp., plus three progobiaeschnids *Mongoliaeschna hadrens* nov. sp., *M. exiguusens* nov. sp., and *Decoraeschna preciosus* nov. gen., nov. sp. These new discoveries confirm the apparently sudden great diversification in China of the clade Aeshnoptera during the Middle-Upper Jurassic, together with the Upper Mesozoic to modern lineages of dragonflies. At the same time some 'ancient' groups of Odonata became extinct." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimr1.mnhn.fr

**11671.** Li, Y.-J.; Nel, A.; Ren, D.; Zhang, B.-L.; Pang, H. (2012): Reassessment of the Jurassic damsel-dragonfly genus *Karatawia* (Odonata: Campteropteropterygidae). *Zootaxa* 3417: 64-68. (in English) ["A new species *Karatawia sinica* Li, Nel et Ren, sp. nov. is described from the Middle Jurassic Jiulongshan Formation, and compared with the other species of this genus. As it is based on a

new fossil with fore- and hindwings preserved, it confirms the attribution of *Karatawia sibirica* to this genus, of *Karatawia* to the Campteroptlebiidae, and the synonymy of the *Karatawiidae* with this family. Otherwise, the two other species *K. mongolica* and *K. shurabica*, which are based on more incomplete specimens, are more properly to be considered as Campteroptlebiidae incertae sedis." (Authors)] Address: Ren, D., College of Life Science, Capital Normal University, 105 Xisanhuanbeilu, Haidian District, Beijing 100048, China. E-mail: rendong@mail.cnu.edu.cn

**11672.** Lin, S.-C.; Chen, Y.-F.; Shieh, S.-H.; Yang, P.S. (2012): Patterns of mitochondrial and wing morphological differentiation in Taiwanese populations of *Psolodesmus mandarinus* McLachlan (Zygoptera: Calopterygidae). *Odonatologica* 41(2): 109-121. (in English) ["To investigate the patterns of molecular and morphological differentiation, the mitochondrial cytochrome oxidase I and 16S ribosomal DNA genes and wing morphology data were analyzed. Both phylogenetic and population genetic analyses revealed two lineages, an Eastern and a Western lineage existing on each side of the longitudinal Central Mountain Range. For wing traits, the latitudinal clines mainly altered across the populations in northern Taiwan and the transition zone was broad. For female wing size, however, the latitudinal cline shifted at 24.19 degrees N latitude, which is close to the current criteria (24.33 degrees N latitude line) for dividing 2 geographical subspecies, *P. m. mandarinus* and *P. m. dorothea*." (Authors)] Address: Yang, P.S., Department of Entomology, National Taiwan University, Taipei 106, Taiwan. E-mail: psyang@ntu.edu.tw

**11673.** Lis, L.; Buczyński, P. (2012): *Leucorrhinia pectoralis* (Charpentier, 1825) (Odonata: Libellulidae) in secondary habitats in the former sulphur mine "Jeziórko" near Tarnobrzeg (Sandomierz Basin). *Odonatrix* 8(1): 19-22. (in Polish, with English summary) ["In the year 2011, *L. pectoralis* was recorded in the former borehole sulphur mine „Jeziórko” (E of Tarnobrzeg, south-eastern Poland). The species was observed in two drainage canals of mining subsidence (sites 1 and 3) as well as along the road running through the area of flood lands in mining subsidence (site 2). At sites 2 and 3 the species was very numerous (on May 28, more than 100 specimens per 100m of observation transect), at site 3 numerous territorial males were observed. For the *L. pectoralis* the examined areas are typical secondary habitats to which this species is being adapted and in the suitable stages of succession it often forms large populations in Poland. New data is essential for the knowledge about the distribution of this species in Poland (Bernard et al. 2009). It fills the gap on the map of distribution situated between central Poland and the Lublin Region. It is also the first one from the central part of the Sandomierz Basin, the area with very little data in general so far. This situation results mainly from the lack of respectively targeted studies on odonatofauna of this macroregion." (Authors)] Address: Lis, L., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: lisulis@o2.pl

**11674.** Liu, V. (2012): Dragonflies and Damselflies of Las Galarias. *The Hum...* 7(1): 3-4. (in English) [Verbatim: Almost all dragonflies and damselflies (order: Odonata, or Odes for short) are dependent upon freshwater habitats in which the larval stages grow and develop, and we have plenty of those here at Reserva Las Galarias (RLG)! On sunny days they are often ob-

served throughout the reserve and can most frequently be found along the forest creeks and boggy areas of Peccary Trail, with the pond being a particular hotspot. Having been successful in obtaining identifications for many of the butterfly species on the reserve, we decided to try our luck with odes and sent off some photos to Bill Haber and Dave Wagner ("Odonata of Ecuador" project) with the ambitious hope that they might also be willing to help us identify what we have. With many thanks to Bill and Dave, we can report that 20 different species have been identified at RLG, with some additional 'interesting' species yet to be confirmed. Odes occur in greater abundance and higher diversity at lower elevations, but at higher elevations, such as RLG, there is a greater possibility of endemic species being found. We are still excitedly awaiting the identifications for our 'interesting' species. To check out Bill and Dave's on-going website-based inventory of the Odes of Ecuador, which will soon include records from RLG, visit their website at: <http://efg.cs.umb.edu/~whaber/OdonataofEcuador/index.html>] Address: Liu, Vicki, c/o Las Galarias Foundation Inc., 24140 Gessner Rd., North Olmsted, OH 44070, USA

**11675.** Locklin, J.L.; Huckabee, J.S.; Gering, E.J. (2012): A method for rearing large quantities of the damselfly, *Ischnura ramburii* (Odonata: Coenagrionidae), in the laboratory. *Florida Entomologist* 95(2): 273-277. (in English, with Spanish summary) ["Laboratory based experimental designs typically require large sample sizes of genetically related organisms at the same developmental stage. Several described methods for rearing damselflies have been published, but these methods require laborious techniques when rearing large quantities of damselflies simultaneously. We have developed a relatively easy and inexpensive method for rearing large quantities of a coenagrionid damselfly that streamlines previously published methods and employs new techniques that increase efficiency and yield. Culturing large numbers of damselflies in the laboratory is manageable and opens diverse research avenues." (Authors)] Address: Locklin, J.L., Department of Biology, Temple College, 2600 South First St., Temple, TX 76504, USA. E-mail: jason.locklin@templejc.edu

**11676.** Lozano, F.; Anjos-Santos, D. (2012): *Acanthagrion hildegarda* Gloger, 1967 (Odonata: Zygoptera: Coenagrionidae): New records and geographic distribution map. *Check List* 8(1): 177-180. (in English) ["*A. hildegarda* is a common inhabitant of lentic environments in Argentina and Uruguay. However, precise georeferenced data are scarce in the literature. This work provides the first updated georeferenced list of localities and map of distribution of *A. hildegarda*, including new country records for Brazil and departmental records for Uruguay, accompanied by illustrations and scanning photographs of its main diagnostic characters." (Authors)] Address: Lozano, F., Instituto de Limnología "Dr. R.A. Ringuelet" (CONICET – CCT La Plata), C.C. 712, 1900, La Plata, Argentina. E-mail: lozano@ilpla.edu.ar

**11677.** Lunde, K.B.; Resh, V.H. (2012): Development and validation of a macroinvertebrate index of biotic integrity (IBI) for assessing urban impacts to Northern California freshwater wetlands. *Environmental Monitoring and Assessment* 184(6): 3653-3674. (in English) ["Despite California policies requiring assessment of ambient wetland condition and compensatory wetland mitigations, no intensive monitoring tools have been developed to evaluate freshwater wetlands within the



state. Therefore, we developed standardized, wadeable field methods to sample macroinvertebrate communities and evaluated 40 wetlands across Northern California to develop a macroinvertebrate index of biotic integrity (IBI). A priori reference sites were selected with minimal urban impacts, representing a best-attainable condition. We screened 56 macroinvertebrate metrics for inclusion in the IBI based on responsiveness to percent urbanization. Eight final metrics were selected for inclusion in the IBI: percent three dominant taxa; scraper richness; percent Ephemeroptera, Odonata, and Trichoptera (EOT); EOT richness; percent Tanyptodinae/Chironomidae; Oligochaeta richness; percent Coleoptera; and predator richness. The IBI (potential range 0–100) demonstrated significant discriminatory power between the reference (mean=69) and impacted wetlands (mean=28). It also declined with increasing percent urbanization ( $R^2=0.53$ ,  $p<0.005$ ) among wetlands in an independent validation dataset ( $n=14$ ). The IBI was robust in showing no significant bias with environmental gradients. This IBI is a functional tool to determine the ecological condition at urban (stormwater and flood control ponds), as well as rural freshwater wetlands (stockponds, seasonal wetlands, and natural ponds). Biological differences between perennial and nonperennial wetlands suggest that developing separate indicators for these wetland types may improve applicability, although the existing data set was not sufficient for exploring this option." (Authors) Taxa are treated at the genus level.] Address: Lunde, K.B., Environmental Science, Policy, and Management, University of California, Berkeley, 130 Mulford Hall #3114, Berkeley, CA 94720, USA. E-mail: klunde@berkeley.edu

**11678.** Maasri, A.; Gelhaus, J. (2012): Stream invertebrate communities of Mongolia: current structure and expected changes due to climate change. *Aquatic Biosystems* 2012, 8:18 doi: 10.1186/2046-9063-8-18: 24 pp. (in English) ["Background: Mongolia's riverine landscape is divided into three watersheds, differing in extent of permafrost, amount of precipitation and in hydrological connectivity between sub-drainages. In order to assess the vulnerability of macroinvertebrate communities to ongoing climate change, we consider the taxonomic and functional structures of stream communities in two major watersheds: The Central Asian Internal Watershed (CAIW) and the Arctic Ocean Watershed (AOW), together covering 86.1% of Mongolia's surface area. We assess the consequences of the hydrological connectivity between sub-drainages on the nestedness and distinctness of the stream communities. And accordingly, we discuss the expected biotic changes to occur in each watershed as a consequence of climate change. Results: Gamma and beta diversities were higher in the CAIW than the AOW. High community nestedness was also found in the CAIW along with a higher heterogeneity of macroinvertebrate assemblage structure. Assemblages characteristic of cold headwater streams in the CAIW, were typical of the drainages of the Altai Mountain range. Macroinvertebrate guilds of the CAIW streams exhibited traits reflecting a high stability and low resilience capacity for eutrophication. In contrast, the community of the AOW had lower nestedness and a combination of traits reflecting higher stability and a better resilience capacity to disturbances. Conclusion: Higher distinctness of stream communities is due to lower connectivity between the drainages. This was the case of the stream macroinvertebrate communities of the two major Mongolian watersheds,

where connectivity of streams between sub-drainages is an important element structuring their communities. Considering differences in the communities' guild structure, hydrological connectivity and different magnitudes of upcoming impacts of climate change between the two watersheds, respective stream communities will be affected differently. The hitherto different communities will witness an increasing differentiation and divergent adaptations for the upcoming changes. Accordingly, in an increasing awareness to protect Mongolia's nature, our results encourage adapting conservation planning and management strategies specifically by watershed." (Authors) The taxa list includes *Lestes*, *Ophiogomphus*, and *Leucorrhinia*.] Address: Maasri, A., The Academy of Natural Sciences of Drexel University, 1900 Ben Franklin Parkway, Philadelphia, PA 19103-1195, USA. E-mail: alainmaasri@gmail.com

**11679.** Machado, A.B.M. (2012): *Leptagrion cyanostigma* sp. nov. from Brazil with a study of blue pterostigma in Zygoptera (Odonata: Coenagrionidae). *International Journal of Odonatology* 15(2): 81-86. (in English) ["A new species, *Leptagrion cyanostigma* sp. nov., is described and illustrated based on 1 male and 1 female collected in the State of Bahia, Brazil. The species is generically unique by having a blue pterostigma with a black center. A survey of other Zygoptera possessing blue pterostigmata is carried out." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federele de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil. E-mail: angelo@icb.ufmg.br

**11680.** Machado, A.B.M. (2012): On the generic status of *Schizocordulia* Machado, 2005 (Anisoptera: Corduliidae). *Odonatologica* 41(1): 43-45. (in English) ["R.W. GARRISON et al. (2006, *Dragonfly genera of the New World*, Hopkins Univ. Press, Baltimore) synonymized *Schizocordulia* Machado, 2005 with *Aeschnosoma* Selys, 1870, alleging that the characters used to separate them are specific rather than generic. However, a study of the literature revealed that except for size all these characters have always been regarded as generic and therefore *Schizocordulia* is revalidated as a good genus." (Authors)] Address: Machado, A.B.M., Depto de Zoologia, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Avenida Antônio Carlos, 6627, Caixa Postal 486, BR-31270-901, Belo Horizonte, Minas Gerais, Brasil. E-mail: angelo@icb.ufmg.br

**11681.** Maltchik, L.; Schmidt Dalzochio, M.; Stenert, C.; Rolon, A.S. (2012): Diversity and distribution of aquatic insects in Southern Brazil wetlands: implications for biodiversity conservation in a Neotropical region. *Rev. Biol. Trop.* 60(1): 273-289. (in English) ["The selection of priority areas is an enormous challenge for biodiversity conservation. Some biogeographic methods have been used to identify the priority areas to conservation, and panbiogeography is one of them. This study aimed at the utilization of panbiogeographic tools, to identify the distribution patterns of aquatic insect genera, in wetland systems of an extensive area in the Neotropical region (~280 000km<sup>2</sup>), and to compare the distribution of the biogeographic units identified by the aquatic insects, with the conservation units of Southern Brazil. We analyzed the distribution pattern of 82 genera distributed in four orders of aquatic insects (Diptera, Odonata, Ephemeroptera and Trichoptera) in Southern Brazil wetlands. Therefore, 32 biogeographic nodes corresponded to the priority areas for conservation of the aquatic

insect diversity. Among this total, 13 were located in the Atlantic Rainforest, 16 in the Pampa and three amongst both biomes. The distribution of nodes showed that only 15% of the dispersion centers of insects were inserted in conservation units. The four priority areas pointed by node cluster criterion must be considered in further inclusions of areas for biodiversity conservation in Southern Brazil wetlands, since such areas present species from different ancestral biota. The inclusion of such areas into the conservation units would be a strong way to conserve the aquatic biodiversity in this region." (Authors)] Address: Maltchik, L., Lab. Ecol. & Conservation of Aquatic Ecosystems, Av. Unisinos, 950 CEP 93.022-000, UNISINOS, São Leopoldo, RS, Brazil; UNISINOS, São Leopoldo, Brazil. E-mail: maltchik@unisinos.br

**11682.** Mantle, B.L.; La Salle, J.; Fisher, N. (2012): Whole-drawer imaging for digital management and curation of a large entomological collection. *ZooKeys* 209: 147-163. (in English) ["Whole-drawer imaging is shown to be an effective tool for rapid digitisation of large insect collections. On-line, Whole-drawer images facilitate more effective collection management, virtual curation, and public engagement. The Whole-drawer imaging experience at the Australian National Insect Collection is discussed, with an explanation of workflow and examples of benefits." (Authors)] Figure 8 presents a whole-drawer image of dragonfly specimens used for a pilot study investigating the error associated with direct and indirect measures of morphological characters, such as wing length.] Address: Mantle, Beth Louise, Australian National Insect Collection, CSIRO Ecosystem Sciences, GPO Box 1700, Canberra, ACT, 2601, Australia. E-mail: beth.mantle@csiro.au

**11683.** Martens, A.; Grabow, K.; Radkowsch, A. (2012): Ganzjährige Flugzeit von *Ischnura elegans* in Mitteleuropa durch Nutzung von Tropengewächshäusern (Odonata: Coenagrionidae). *Libellula* 31(1/2): 1-6. (in German, with English summary) ["In the water-lily house of the Botanical Garden of the KIT in Karlsruhe, Germany, adults of *I. elegans* were recorded several times between November 2010 and mid-January 2011, and on 13-i-2011 an egg clutch and several larvae. In the heated greenhouse of another Botanical Garden in Karlsruhe situated next to the palace of Karlsruhe, a female *I. elegans* emerged on 15-i-2012. Heated greenhouses with pools offer a good opportunity for year-round development in odonates. With open windows and gardening activities of the staff a good exchange with the free-living population is given. *Ischnura elegans* seems to be the only odonate species north of the Alps being able to survive under indoor conditions; this ability offers the opportunity for a habitat change, a continuous development and a year-round flight season of this species." (Authors)] Address: Martens, A., Biologie, Pädagogische Hochschule Karlsruhe, Bismarckstraße 10, D-76133 Karlsruhe, Germany. E-mail: martens@ph-karlsruhe.de

**11684.** Martin, S.; Bertaux, A.; Le Ber, F.; Maillard, E.; Imfeld, G. (2012): Seasonal changes of macroinvertebrate communities in a stormwater wetland collecting pesticide runoff from a vineyard catchment (Alsace, France). *Archives of Environmental Contamination and Toxicology* 62(1): 29-41. (in English) ["Agricultural land use may influence macroinvertebrate communities by way of pesticide contamination associated with agricultural runoff. However, information about the relation between runoff-related pesticides and communities of benthic macroinvertebrates (including not further de-

tailed Odonata) in stormwater wetland that receive agricultural runoff does not currently exist. Here we show changes in macroinvertebrate communities of a stormwater wetland that collects pesticide-contaminated runoff from a vineyard catchment. 16 runoff-associated pesticides, including the insecticide flufenoxuron, were continuously quantified at the inlet of the stormwater wetland from April to September (period of pesticide application). In parallel, benthic macroinvertebrate communities, pesticide concentrations, and physicochemical parameters in the wetland were assessed twice a month. Twenty-eight contaminated runoffs ranging from 1.1 to 114 m<sup>3</sup> entered the wetland during the study period. Flufenoxuron concentrations in runoff-suspended solids ranged from 1.5 to 18.5 µg kg<sup>-1</sup> and reached 6 µg kg<sup>-1</sup> in the wetland sediments. However, flufenoxuron could not be detected in water. The density, diversity, and abundance of macroinvertebrates largely varied over time. Redundancy and formal concept analyses showed that concentrations of flufenoxuron, vegetation cover, and flow conditions significantly determine the community structures of stormwater wetland macroinvertebrates. This study shows that flow conditions, vegetation cover, and runoff-related pesticides jointly affect communities of benthic macroinvertebrates in stormwater wetlands." (Authors)] Address: Imfeld, G., Laboratory of Hydrology and Geochemistry of Strasbourg, Univ. of Strasbourg/ENGEES, UMR 7515 CNRS 1, rue Blessig, 67084 Strasbourg, France. E-mail: imfeld@unistra.fr

**11685.** Martínez-Sanz, C.; Cenzano, C.S.S.; Fernández-Aláez, M.; García-Criado, F. (2012): Relative contribution of small mountain ponds to regional richness of littoral macroinvertebrates and the implications for conservation. *Aquatic Conservation: Marine and Freshwater Ecosystems* 22(2): 155-164. (in English) ["Biodiversity is a central concept in conservation programme design. Until recently, ponds were neglected habitats probably owing to their small size and to the ignorance of their real conservation value. The classical theory of species-area relationship (SAR) might apparently support such a view by predicting low richness values in small habitat patches. SAR theory does not take into account the fact that groups of small habitat patches can significantly contribute to regional richness, regardless of their overall small area. This work intends to contribute to the SLOSS (single large or several small) debate with data on littoral macroinvertebrates from mountain ponds. Do groups of small ponds support communities with higher biodiversity than a single large lake? Littoral macroinvertebrate richness, both local and regional, were measured in 17 ponds and one large lake from Sanabria Natural Park (NW Spain). In order to guarantee valid comparisons among systems, observed and estimated richness, as well as rarefaction methods were used. Although local richness in the lake was much higher than in any single pond, regional richness of ponds widely exceeded the value measured in the lake regardless of their small overall area. Six to seven ponds were enough to obtain an accumulated average richness equivalent to that in the lake. This pattern may be caused partly by increased habitat heterogeneity as proposed by the niche theory. Metacommunity theory might help to explain the high regional richness measured in the group of ponds in the study area. Whatever the explanation, it is evident that groups of mountain ponds strongly contribute to regional richness, a conclusion that should be taken into account by management programmes. There is a gap in this re-

spect in European legislation (the EC Habitats Directive and Water Framework Directive), which fails to include groups of ponds as an additional habitat category." (Authors) The following taxa have been listed from these ponds, but their identification remains unclear because they are associated with running waters: *Coenagrion/Ischnura*, *Erythromma lindenii*, *Enallagma*, *Lestes*, *Boyeria irene*, *Cordulegaster*, *Gomphus*, *Onychogomphus cf. forcipatus*, and *Sympetrum*.] Address: Martínez-Sanz, C., Area of Ecol., Fac. Biology and Environmental Science, Univ. of León, Campus de Vegazana, s/n. C.P. 24071, León, Spain. E-mail: cmars@unileon.es

**11686.** Mauersberger, R. (2012): Über Neuansiedlungen von *Nehalennia speciosa* in Brandenburg und Mecklenburg-Vorpommern (Odonata: Coenagrionidae). *Libellula Supplement* 12: 199-209. (in German, with English summary) ["New colonizations of *Nehalennia speciosa* in Brandenburg and Mecklenburg-Vorpommern, Germany (Odonata: Coenagrionidae) - From 2006 to 2012 the new colonization of seven habitats in the north of Brandenburg and the south of Mecklenburg-Vorpommern was recorded. Most of the sites are influenced by rising water levels, e.g. because of the rewetting of mires. Two successful examples of colonization by artificial introduction of individuals are given. All habitats are mesotrophic but with a high variability of calcium carbonate content." (Author)] Address: Mauersberger, R., Prenzlauer Allee 66, 17268 Templin, Germany. E-mail: rue.mau@web.de

**11687.** Michalski, J.; Opper, S. (2012): *Lanthanusa bilineata* sp. nov. from New Guinea (Odonata: Libellulidae). *International Journal of Odonatology* 15(2): 75-80. (in English) ["*Lanthanusa bilineata*, a new libellulid from the mountains of central New Guinea (holotype male: Mekil Research Station (04°48' S, 141°39' E), leg. 1 September 2004, dep. at RMNH, Leiden), is described. The new species combines characteristics previously used to distinguish between *Huonia* and *Lanthanusa* with wing venation characteristic of the genus *Huonia* and accessory genitalia characteristic of *Lanthanusa*. We propose a revision of the *Huonia/Lanthanusa* complex to clarify the characteristics distinguishing the genus *Lanthanusa*." (Authors)] Address: Michalski, J., 223 Mount Kemble Avenue, Morristown New Jersey 07960, USA. E-mail: huonia@aol.com

**11688.** Mickovic, B.; Lenhardt, M.; Đikanovic, V.; Skoric, S.; Strelnikova, A. (2012): Diet of juvenile sterlets (*Acipenser ruthenus* Linnaeus 1758) from the Danube river by Belgrade. *BALWOIS 2012 – Ohrid, Republic of Macedonia – 28 May, 2 June 2012*: 4 pp. (in English) [Serbia; "...stomach content in juvenile sterlets are presented. The fishes were collected during the period June – November 2003, at four sampling sites along the course of the Danube River through the Belgrade Region. A total of 178 fish of 0+ and 1+ age were examined. ... 37 species from 12 macrozoobenthic-groups have been found." In August, the diet included one specimen of *Gomphus* sp. "In general, the range of food items taken indicates that sterlet in Danube is a generalized invertebrate predator, which probably takes food items according to their abundance and seasonal occurrence." (Authors)] Address: Mickovic, B., Institute for multidisciplinary research, University of Belgrade, Belgrade, Serbia. E-mail: baneklej@imsi.rs

**11689.** Moisan, P.; Labandeira, C.C.; Matushkina, N.A.; Wappler, T.; Voigt, S.; Kerp, H. (2012): Lycopsid-arthro-

pod associations and odonatopteran oviposition on Triassic herbaceous Isoetites. *Palaeogeography, Palaeoclimatology, Palaeoecology* 344–345: 6-15. (in English) ["Associations between lycopsid and herbivorous arthropods are rare in the fossil record and equally sparse among the three surviving lineages of Lycopodiaceae, Selaginellaceae and Isoëtaceae. However, from the Middle–Upper Triassic Madygen Formation of southwestern Kyrgyzstan, we describe the first association between an isoetalean host, Isoetites (a quillwort), and a pattern of elliptical egg insertion scars that altered the host's live plant tissues. This ovipositional damage, in some cases deployed in a stereotypical zigzag pattern, was most likely caused by small damselfly-like insects from the extinct suborder Archizygoptera of the order Odonoptera (dragonflies). If this identification is correct, it indicates considerable behavioral stasis of dragonflies extending deep into the Mesozoic. Our detection of lycopsid ovipositional damage adds to the list of major plant hosts from the preangiospermous Mesozoic that were resources for host use by egg-laying dragonflies, particularly horsetails, ferns, and seed plants that included conifers, peltasperms, corystosperms, ginkgophytes, bennettitaleans and probably cycads. Highlights: We describe the first record of oviposition on lycopsids. This ovipositional damage was likely caused by small damselfly-like insects. Lycopsids are the least herbivorized group of vascular plants in time and space." (Authors)] Address: Matushkina, Natalia A., Dept of Zoology, Biological Faculty, National Taras Shevchenko Univ. of Kyiv, vul. Volodymirs'ka, 64, Kyiv UA-01033, Ukraine. E-mail: odonatally@gmail.com

**11690.** Müller, J. (2012): Zur Wiederentdeckung von *Cordulegaster bidentata* im Ostharz (Odonata: Cordulegasteridae). *Libellula Supplement* 12: 177-186. (in German, with English summary) ["Including the rediscovery of *C. bidentata* in 1992 after 80 years in the eastern part of the Harz Mountains in seven areas with a main presence in the Zillierbachtal and its side valleys near Wernigerode, Saxony-Anhalt, Germany, the species has been recorded 36 times in 12 years, including four times in larval stage. The localities are situated between 300 and 546 m above sea level in headwaters in spruce and mixed forest areas. The classification in a Red List is briefly discussed." (Author)] Address: Müller, J., Frankefelde 3, D-39116 Magdeburg, Germany. E-mail: faunoek.jmueller@t-online.de

**11691.** Müller, O.; Schiel, H.-J. (2012): Description of the final instar larva of *Rhionaeschna elsia* (Calvert, 1952) (Odonata: Aeshnidae). *Libellula Supplement* 12: 133-142. (in English, with German summary) ["The final instar larva of *Rhionaeschna elsia*, a species endemic to the Coastal desert of Peru, is described and depicted for the first time and compared with the last larval instars /exuviae of the closely related species of the 'Neureclipta group'. Whereas the prementum is very similar in all five species, exuviae of *R. elsia* can be clearly distinguished from those of *R. absoluta*, *R. bonariensis* and *R. diffinis* by its comparatively long cerci and the very short lateral spines on segments 6 to 9. Especially, the lateral spine on segment 6 is significantly shorter than that of the other species and was even missing completely in two of the six exuviae investigated. In both features *R. elsia* is very similar to *R. galapagoensis*, as described by Needham (1904)." (Authors)] Address: Müller, O., Birkenweg 6d, 15306 Lin-



dendorf-Libbenichen, Germany. E-mail: mueller.ole@googlegmail.com

**11692.** Nation, J.L. (2012): Review: Paulson, Dennis. 2011. Dragonflies and Damselflies of the East. Princeton University Press, Princeton, NJ, USA. 538 pp. Paperback, ISBN 978-0-691-12283-0 (also available in hardback). \$29.95 (pbk). Florida Entomologist 95(2): 532. (in English) [Verbatim: With publication of Dragonflies and Damselflies of the East and the previously published Dragonflies and Damselflies of the West (2009), Dennis Paulson has made available the first comprehensive field guides to all the Odonata in the United States and Canada. One of the author's goals with these two volumes is to make it possible to "identify any of the 461 species of dragonflies and damselflies now known to occur in the United States and Canada." A second goal is to provide natural history about each species to stimulate both amateur and professional interest, perhaps making knowledge and pleasure in Odonata rival that of butterflies and birds. The present book is beautifully illustrated with colour photographs of the male and female of each species (no female photo available for a few species) and a colour coded map of the US and Canada where the species is found. The entire book is printed on acid-free glossy paper. The first 47 pages of the book give general background about dragonflies and damselflies, general natural history, colours, comments about common names that are only recently available for many of the species, how to collect and preserve odonates, threats to the conservation of odonates, and a couple of pages explaining the general nature of the species accounts given with each species. The section on how to collect, label, preserve, and store odonates will be valuable to young collectors, as is the section of labeled illustrations of the morphological and anatomical features needed to identify species in this introductory section. The photographer is identified with each photo, and where no name is given, the photo is by Paulson himself. In the 14 cm × 21.5 cm-format of the paperback volume that I have, the male and female color pictures with accompanying text typically comprise about 1 page (although a new species does not necessarily start at the top of each page). In a green colour bar across the page above the text about each species Paulson gives the common name, scientific name, total body length in mm and hindwing length in mm. Below the bar is the text including Description, Identification, Natural history, Habitat, Flight Season, Distribution (in addition to the colour coded map) and occasionally a comment about the species or former common name. Illustrations and text on damselflies, the Zygoptera, begin on page 49 (and continue to page 164) with damselflies organized into the Broad-winged Damsel family, the Spreadwing family, and the Pond Damsel family. Pages 165 to 517 comprise dragonflies, the Anisoptera, organized by families as follows: Petaltails, Darners, Clubtails, Spiketails, Cruisers, Emeralds, and Skimmers. On page 519 Paulson lists 4 species now found in the west that were not known there in his 2009 book on western dragonflies and damselflies. There is a list of books, some technical publications, and websites for Odonata on pages 521-522, a glossary on pages 523-525, and finally an index listing common and scientific names and page or pages where the species is described or illustrated. The photos are numbered, but apparently only indicate sequential position in the book. Dragonflies and Damselflies of the East is a valuable book for anyone interested in insect natu-

ral history and conservation. The price is fantastic for such a thorough and beautiful book. I recommend this book for every professional and amateur entomologist as a wonderful addition to a personal library; for collectors of odonates, it is indispensable.] Address: Nation, J.L., Univ. of Florida, Gainesville, USA. E-mail: jln@ufl.edu

**11693.** Nel, A.; Ilger, J.-M.; Brauckmann, C.; Prokop, J. (2012): *Bechala sommeri* Ilger & Brauckmann, 2012 enlightens the Namurian griffenfly diversity (Insecta: Odonoptera: Bechalidae). *Insect Systematics & Evolution* 43(2): 161-169. (in English) ["*B. sommeri* Ilger, the type species of the type genus of the early Late Carboniferous (Namurian) family Bechalidae Ilger & Brauckmann, 2012, is redescribed. It does not belong to the order Megaseoptera as previously proposed. The taxon is clearly attributable to Odonoptera for the typical venation characters as CuA separating from MP obliquely, a true arculus with concave RP and convex MA emerging from a composite vein R+MA, short ScP, and presence of convex intercalaries IR2 and IR1 between the main branches of RP3/4, RP2 and RP1. We transfer this taxon with the monospecific family Bechalidae to Odonoptera. A new diagnosis is given for Bechalidae and its type genus *Bechala*. Furthermore, the presence of an oblique subnodal crossvein very far from the ending of ScP and close to the base of RP2 confirms the hypothesis that the subnodus is a structure originally independent of the nodus with a different function in relation to wing tracheation. The Bechalidae are included in a clade (Meganeuridae-Sinierasipteridae-Bechalidae-Lapeyridae-Nodialata), in contrast to a sister group relationships between the two clades Meganisoptera (=Namurotypidae-Paralogidae-Kargalotypidae-Kohlwaldiidae-Meganeuridae) and Odonatoclada (=Lapeyridae-Nodialata), while the potential relationships between the Campylopteridae and the Lapeyridae and Nodialata are rejected. *Bechala* represents a 'damselfly-like' ecological niche in the Namurian, showing the high diversity of the earliest known Odonoptera, strongly suggesting an Early Carboniferous, if not Late Devonian age for this pterygote clade." (Author)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrns1.mnhn.fr

**11694.** New, T.R. (2012): Book review: Dennis Paulson: Dragonflies and damselflies of the east. Princeton University Press, Princeton, New Jersey, 2011, 538 pp. *Journal of insect conservation* 16: 645. (in English) [review] Address: New, T.R., Department of Zoology, La Trobe University, Melbourne, VIC 3086, Australia. E-mail: T.New@latrobe.edu.au

**11695.** Ng, Y.F.; Choong, C.Y.; Dow, R.A. (2012): Odonata records from Kuala Tahan, Pahang, Peninsular Malaysia in December 2010. *Notul. odonatol.* 7(9): 82-86. (in English) ["Odonata records from the Kuala Tahan area in Pahang, Peninsular Malaysia are presented. 65 species were collected in the area in December 2010, of which 43 appear to be the first records for the area and two of which are the first records from Pahang state. *Chalybeothemis chini* is reported away from its type locality for the first time." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**11696.** Nilsson-Örtman, V.; Stoks, R.; De Block, M.; Johansson, F. (2012): Generalists and specialists along a latitudinal transect: patterns of thermal adaptation in six species of damselflies. *Ecology* 93(6): 1340-1352.

(in English) ["Tropical organisms colonizing temperate environments face reduced average temperatures and dramatic thermal fluctuations. Theoretical models postulate that thermal specialization should be favoured either when little environmental variation is experienced within generations or when among-generation variation is small relative to within-generation variation. To test these predictions, we study six temperate species of damselflies differing in latitudinal distribution. We developed a computer model simulating how organisms experience environmental variation (accounting for diapause and voltinism) and performed a laboratory experiment assaying thermal sensitivities of growth rates. The computer model showed opposing latitudinal trends in among- and within-generation thermal variability: within-generation thermal variability decreased towards higher latitudes, whereas relative levels of among-generation thermal variability peaked at mid-latitudes (where a shift in voltinism occurred). The growth experiment showed that low-latitude species were more thermally generalized than mid- and high-latitude species, supporting the prediction that generalists are favoured under high levels of within-generation variation. Northern species had steeper, near-exponential reaction norms suggestive of thermal specialization. However, they had strikingly high thermal optima and grew very slowly over most of the thermal range they are expected to experience in the field. This observation is at present difficult to explain. These results highlight the importance of considering interactions between life-history and environmental variation when deriving expectations of thermal adaptation." (Authors)] Address: Nilsson-Örtman, V., Umeå University, Dept. of Ecology and Environmental Science, Sweden. E-mail: viktor.nilsson@emg.umu.se

**11697.** Nuno de Santos, L. (2012): New data on the distribution of *Orthetrum trinacria* in the Algarve, southern Portugal (Odonata: Libellulidae). *Libellula* 31(1/2): 77-87. (in English, with German summary) ["Data on the occurrence of *O. trinacria* in the Algarve were published for the first time in 2002, and since then the species was considered uncommon and showing a limited distribution in the region. Between March and October 2011 I carried out a systematic survey, gathered unpublished records from different sources dating from 2007 to 2011, and concluded that the species is nowadays widespread in the Algarve, living in many permanent lentic systems. A large number of artificial ponds recently built and scattered throughout the region, plus the dispersion capacity of the species, as well as global warming, are potential causes to explain this apparent colonization, but additionally an increase in field research should not be underestimated." (Authors)] Address: Nuno de Santos, L., Universidade do Algarve, Campus de Gambelas, P-8005-139 Faro, Portugal. E-mail: [odonata@nsloureiro.pt](mailto:odonata@nsloureiro.pt)

**11698.** O'Donnell, E. (2012): Site guide: Cape Clear Island, West Cork, Ireland. *Atropos* 46: 15-25. (in English) [The site description includes a checklist of 11 Odonata species] Address: O'Donnell, E., Knockea, Lyre, Clonakilty, West Cork, Ireland. E-mail: [Bobolink300@gmail.com](mailto:Bobolink300@gmail.com)

**11699.** Olberg, R.M. (2012): Visual control of prey-capture flight in dragonflies. *Current Opinion in Neurobiology* 22(2): 267-271. (in English) ["Interacting with a moving object poses a computational problem for an animal's nervous system. This problem has been elegantly solved by the dragonfly, a formidable visual predator on

fly. The dragonfly computes an interception flight trajectory and steers to maintain it during its prey-pursuit flight. This review summarizes current knowledge about pursuit behaviour and neurons thought to control interception in the dragonfly. When understood, this system has the potential for explaining how a small group of neurons can control complex interactions with moving objects. Highlights: \*To catch prey the dragonfly computes an interception flight trajectory. \*Target-Selective Descending Neurons (TSDNs) control prey capture flights. \*Constant-angle strategies underlie interception of moving objects. \*Proportional navigation results in a constant-bearing interception strategy. \*This model illustrates control of complex behaviour by a small number of neurons." (Author)] Address: Olberg, R.M., Dept of Biological Sciences, Union College, 807 Union Street, Schenectady, NY 12308, USA. E-mail: [olbergr@union.edu](mailto:olbergr@union.edu)

**11700.** Orwa, P.O.; Raburu, P.; Njiru, J.; Okeyo-Owuor, J.B. (2012): Human Influence on macroinvertebrate community structure within Nyando wetlands, Kenya. *International Journal of Aquatic Science* 3(2): 21 pp. (in English) ["The study set out to investigate the changes in macroinvertebrate community along different disturbance gradients within Nyando wetlands with an aim of determining how macroinvertebrates in Nyando wetlands respond to human disturbances. Triplicate macroinvertebrate samples were collected monthly from October 2010 to April 2011 using a scoop net (500 µm mesh size) in three transects. They were sorted live, counted and identified to genus level. Water samples for total phosphorus and total nitrogen were collected and analyzed using standard methods. Physico-chemical parameters were taken in-situ using electronic meters. Macroinvertebrates were analyzed for richness, diversity, dominance, and abundance. The abundance and diversity was correlated with physico-chemical parameters using Pearson correlation analysis. Kruskal-Wallis test was used to test spatial differences in macroinvertebrate community and repeated measures ANOVA to test variation in water quality parameters. A total of 45 genera were identified with hemipterans dominating. The statistical analysis revealed significant spatiotemporal differences in macroinvertebrate abundance and water quality parameters. Macroinvertebrate abundance showed a strong negative correlation with nutrient levels. Sites with higher disturbance recorded lower richness and abundance compared to the less disturbed sites. The results indicated that macroinvertebrates in Nyando wetlands respond to human disturbance and can be used to monitor ecological integrity of the wetland." (Authors) Taxa identification (including Odonata) was made using two keys not specified for African taxa.] Address: Orwa, P.O., Department of Fisheries and Aquatic Sciences, Chepkoilel University College, Eldoret, Kenya. E-mail: [patorwa@yahoo.com](mailto:patorwa@yahoo.com)

**11701.** Phoenix, J. (2012): *Aeshna subarctica* im sächsischen und böhmischen Erzgebirge/Krusné hory (Odonata: Aeshnidae). *Libellula Supplement* 12: 107-111. (in German, with English summary) ["Distribution of *A. subarctica elisabethae* in the Saxon and Czech Ore Mountains: Compilation of historical and actual records with supplementary observations in its Contemporary habitats in the Western part of the Ore Mountains." (Author)] Address: Phoenix, J., Goethestr., 22, 01824 Königstein, Germany. E-mail: [juergen.phoenix@t-online.de](mailto:juergen.phoenix@t-online.de)

**11702.** Pinto, Â.P.; Garrison, R.W.; Paulson, D.R.; Donnelly, T.W.; May, M.L. (2012): Case 3584 *Erythemis*

Hagen, 1861: proposed precedence over *Lepthemis* Hagen, 1861 (Insecta, Odonata). Bulletin of Zoological Nomenclature 69(2): 92-100. (in English) ["The purpose of this application, under Articles 23.9.3 and 81.1 of the Code, is to conserve the widespread usage of the generic name *Erythemis* Hagen, 1861 for a group of common dragonflies from the New World over the simultaneously published nominal genus *Lepthemis* Hagen, 1861, selected to take precedence by the First Reviser action (Article 24.2), whenever these names are considered to be synonyms. This proposal seeks to achieve the least change in the nomenclature of the species currently placed in these two genera, in strict accordance with Principle 4 of the Code." (Authors)] Address: Pinto, A.P., Museu de Zoologia, Universidade de São Paulo, Av. Nazaré 481, Ipiranga 04263-000, São Paulo, SP, Brazil. E-mail: odonataangelo@hotmail.com

**11703.** Pinto, N.S.; Juen, L.; Cabette, H.S.R.; De Marco, P. (2012): Fluctuating asymmetry and wing size of *Argia tinctipennis* Selys (Zygoptera: Coenagrionidae) in relation to riparian forest preservation status. Neotropical entomology 41(3): 178-185. (in English) ["Effects of riparian vegetation removal on body size and wing fluctuating asymmetry (FA) of *A. tinctipennis* studied in the River Suiá-Miçú basin, which is part of the Xingu basin in Brazilian Amazonia. A total of 70 specimens (n=33 from preserved and n=37 from degraded areas) was measured. Five wing measures of each wing (totalizing ten measured characters) were taken. Preserved and degraded points presented non-overlapped variations of a Habitat Integrity Index, supporting the environmental differentiation between these two categories. FA increases in degraded areas approximately four times for the width between the nodus and proximal portion of the pterostigma of forewings (FW), two times for the width of the wing in the region of nodus of FW, and approximately 1.7 times for the number of postnodal cells of FW. The increase is almost five times for the width between the nodus and the proximal portion of the pterostigma of hind wings (HW), three times for the number of postnodal cells of HW, and approximately 1.6 times the width between quadrangle and nodus of HW. Individuals of preserved sites were nearly 3.3% larger than for degraded sites, based on mean hind wing length. Our results supports that the development of *A. tinctipennis* in degraded areas is affected by riparian vegetation removal and may reflect in wing FA variations. Consequently, these FA measures may be a useful tool for bioassessment using Odonata insects as a model." (Authors)] Address: Pinto, A.P., Museu de Zoologia, Universidade de São Paulo, Av. Nazaré 481, Ipiranga 04263-000 São Paulo-SP, Brazil. E-mail: odonataangelo@hotmail.com

**11704.** Pokhrel, L.R.; Dubey, B. (2012): Potential impact of low-concentration silver nanoparticles on predator-prey interactions between predatory dragonfly nymphs and *Daphnia magna* as a prey. Environ. Sci. Technol. 46(14): 7755-7762. (in English) ["This study investigated the potential impacts of low-concentration citrate-coated silver nanoparticles (citrate-nAg; 2 µg L<sup>-1</sup> as total Ag) on the interactions of *Daphnia magna* Straus (as a prey) with the predatory *Anax junius* nymph using the behavioral, survival, and reproductive endpoints. Four different toxicity bioassays were evaluated: (i) horizontal migration; (ii) vertical migration; (iii) 48-h survival; and (iv) 21-day reproduction; using four different treatment combinations: (i) *Daphnia* + citrate-nAg; (ii) *Daphnia* +

Predator; (iii) *Daphnia* + citrate-nAg + Predator; and (iv) *Daphnia* only (control). *Daphnia* avoided the predators using the horizontal and vertical movements, indicating that *Daphnia* might have perceived significant risk of predation. However, with citrate-nAg + predator treatment *Daphnia* response did not differ from control in the vertical migration test, suggesting that *Daphnia* were unable to detect the presence of predator with citrate-nAg treatment and this may have potential implication on daphnids population structure owing to predation risk. The 48-h survival test showed a significant mortality of *Daphnia* individuals in the presence of predators, with or without citrate-nAg, in the test environment. Average reproduction of daphnids increased by 185% with low-concentration citrate-nAg treatment alone, but was severely compromised in the presence of predators (decreased by 91.3%). *Daphnia* reproduction was slightly enhanced by ca. 128% with citrate-nAg + predator treatment. Potential mechanisms of these differential effects of low-concentration citrate-nAg, with or without predators, are discussed. Because silver dissolution was minimal, the observed toxicity could not be explained by dissolved Ag alone. These findings offer novel insights into how exposure to low-concentration silver nanoparticles could influence predator-prey interactions in the fresh water systems." (Authors)] Address: Brajesh Dubey, B., Environmental Engineering, School of Engineering, Univ. of Guelph, 50 Stone Road East, Guelph, Ontario, Canada. E-mail: bdubey@uoguelph.ca.

**11705.** Pryke, J.S.; Samways, M.J. (2012): Conservation management of complex natural forest and plantation edge effects. Landscape Ecology 27(1): 73-85. (in English) ["Timber plantation forestry is a major threat to indigenous grassland biodiversity, with ecological networks (ENs) currently being used to mitigate this threat. Being composed mostly of linear corridors, ENs create more edge than would occur naturally. To determine the minimum width of corridors for maximising biodiversity conservation, we need first to establish the extent of edge effects from plantation blocks into corridors. We compared arthropod diversity along transects that ran from within plantation blocks into grassland corridors. We also studied the edge effects of natural forest adjacent to natural grasslands within ENs. Sites in grasslands of neighbouring protected areas acted as natural reference sites against which the biodiversity of the EN transects were compared. Two types of exotic plantation trees and various tree age classes were studied. We found a 32 m edge zone from plantation blocks into grassland corridors. Few significant edge effects from plantation blocks occurred at greater distances than this, which suggested that grassland corridors with a width <64 m are essentially all edge. However, and importantly, this situation was complex, as different arthropod taxonomic groups responded differently to edges of plantation blocks and natural forest patches. Natural forest supported many additional species, not just within the forest, but also in associated grassland corridors. This means that maintaining natural forest imbedded within the ENs will protect both indigenous grassland and indigenous forest species as well as help maintain biodiversity across this timber production landscape. ... Dragonflies responded in a similar way to butterflies, with an increase in species richness between the wooded areas and the open grassland corridors, although no edge effect was noticeable for either the plantation blocks or natural forest patches." (Authors)] Address: Samways, M.J., Dept Entomol. &



Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**11706.** Raebel, E.M.; Merckx, T.; Feber, R.E.; Riordan, P.; Thompson, D.J.; Macdonald, D.W. (2012): Multi-scale effects of farmland management on dragonfly and damselfly assemblages of farmland ponds. *Agriculture, Ecosystems & Environment* 161: 80-87. (in English) ["Agricultural intensification has contributed to severe declines in odonate (dragonfly and damselfly) populations. Odonates require healthy waterbodies for their larval stages and resource-rich terrestrial landscapes as adults. As such, farmland management at both local and larger landscape scales may be needed to reverse population declines. We sampled odonate adults and exuviae from lowland farmland ponds in England, to investigate relationships between odonate species richness and surrounding land-use. The more mobile dragonflies (Anisoptera) were influenced most strongly by landscape variables at the largest scale (i.e. 1600 m radius), while less mobile damselflies (Zygoptera) were affected by variables at more local scales (i.e. 100/400 m radii). A greater number of landscape variables affected exuvial species richness compared to adult species richness. Exuvial species richness was higher when 2 m wide cross-compliance buffer strips around ponds were present. However, no ponds in the study had buffer strips that were established through England's basic agri-environment scheme (Entry Level Scheme: ELS) agreements, and we observed a negative relationship between ELS area and exuvial species richness. Exuvial species richness increased with the amount of water, but not the number of ponds, in the landscape surrounding a focal pond. The observed odonate responses to local and surrounding land-use lend support to the development of agri-environment scheme policies that encourage landscape-scale, as well as local, scheme implementation and management. We predict that both landscape-scale and quality-targeted management of farmland ponds would benefit odonates, irrespective of mobility level and life-stage." (Authors)] Address: Raebel, Eva, Wildlife Conservation Research Unit, Department of Zoology, University of Oxford, The Recanati-Kaplan Centre, Tubney House, Abingdon Road, Tubney, Abingdon OX13 5QL, UK. E-mail: evamraebel@gmail.com

**11707.** Reels, G.T. (2012): The curious case of the cannibal coenagrionid. *Insect news* 4: 13-14. (in English) [Verbatim: It has often struck me that members of the coenagrionid genus *Ceriagrion* appear to be unusually voracious predators of other zygopterans. However, an observation that I made two years ago indicated that one species, at least, is even capable of reckless acts of cannibalism. At ca 1030h on 25 July 2008 I was walking along a small stream at Luk Keng, N.T., Hong Kong (altitude ca. 20 m a.s.l.) when I noticed a male *Ceriagrion auranticum* grappling with a mature female of the same species. The male had seized the female's thorax just above the wing bases with his mandibles. At first I assumed that this was simply a clumsy mating attempt, particularly since the female was making little obvious effort to free herself. However, in the ensuing five minutes, the male, rather than letting go and trying to mate, proceeded to munch his way up the female's thorax, until he reached the pronotum. The entangled pair made several short flights during this period, possibly because I was disturbing them while trying to photograph the action, or maybe because the female, hav-

ing realised she was not hosting an amorous suitor, was belatedly attempting to escape. The male then spent some time chewing through the female's head attachment until her head fell off. Then he dragged the body to another perch to devour the thorax. Gruesome stuff.] Address: Reels, G., H-3-30 Fairview Park, Yuen Long, Hong Kong. E-mail address: gtreels@gmail.com

**11708.** Richardson, A. (2012): Assessment of locations of refugia for ancient and relictual invertebrate fauna within the proposed ENGO forest conservation areas. IVG FC Report 3A Ancient Fauna Refugia. A report for the Tasmanian Forest Agreement. March 2012: 17 pp. (in English) [Tasmania, Australia. *Hemiphlebia mirabilis*, *Synthemiopsis* and *Archipetalia* are considered.] Address: Richardson, A., Sch. Zool., Univ. Tasmania, P.O. Box 252-C52, Hobart, TAS 7001, Australia

**11709.** Ryan, K.; Salvaggio, C. (2012): A feature-based classifier for dragonflies and damselflies. Rochester Institute of Technology, College of Science, Center for Imaging Science, Rochester, New York, United States: 9 pp. (in English) ["Unique patterns present in the wings of Odonata can be used to determine their family, genus, and species. A method for classifying Odonata using a particular pattern known as the triangle was developed using scanned images of the wings. Digital image processing techniques, such as image segmentation and feature detection, are used to determine properties of the triangle useful for classification. These properties are then compared against a triangle property database of known Odonata. A prototype implementing this method has been shown to demonstrate a high degree of accuracy." (Authors) The following species are included in the study: *Aeshna canadensis*, *A. verticalis*, *Gomphus lividus*, *G. spicatus*, *Sympetrum obtrusum*, and *S. rubicundulum*.] Address: Ryan, Kyle, Salvaggio, C., Rochester Institute of Technology, 54 Lomb Memorial Drive Chester F. Carlson Center for Imaging Science, Rochester, USA. E-mail: kjr6491@rit.edu; salvaggio@cis.rit.edu

**11710.** Šácha, D.; Racko, L. (2012): First observation of *Libellula fulva* (Odonata: Libellulidae) in Northern Slovakia. *Folia faunistica Slovaca* 17(2): 179-182. (in Slovakian, with English summary) [June 2011, near Žilina (49°11'01" N, 18°52'23" E, 390 m a.s.l.)] Address: Šácha, D., Podtatranského 31, 031 01 Liptovský Mikuláš, Slovakia. E-mail: dusan.sacha@vazky.sk

**11711.** Sadeghi, S.; Kiany, M. (2012): Wing shape variation in *Calopteryx splendens* (Harris) populations in the Zagros mountains, Iran (Zygoptera: Calopterygidae). *Odonatologica* 41(2): 123-134. (in English) ["*C. splendens* is found in most of Europe, large parts of Siberia and much of west and central Asia. There is great variation among males in wing coloration. Traditionally, sub-specific taxa have been distinguished by the size and position of the pigmented wing spot and by mating behaviour. About a dozen subspecies have been recognized, all of which are more or less geographically confined, but often with overlapping ranges and strong variation in wing spot size. Here, a geometric morphometrics is used to quantify morphological data and analyze the wing shape independent of wing spot size in 6 Zagros mountain populations, traditionally known as *C. s. intermedia*, based on wing spot size. 19 different points were digitized as landmarks on the left forewings of males, using GPA (Generalized Procrustes Analysis). The results reveal significant wing shape differences

between all populations except Markazi and Lorestan on the one hand and Fasa and Kazeroon on the other hand. These observations confirm the role of geographic (here Dena, Oshtoran Kooh and Zard Kooh mountains of more than 4000 m altitude) and climatic barriers in population isolation, but also suggest that wing spot similarity does not necessarily reflect the full genetic similarity and evolutionary grouping of populations. Based on the wing shape analyzed, *C. splendens* is split into 2 distinguishable population groups in central and southern Zagros with 2 different gene pools, even though they show the same wing spot size, i.e., a long-term isolation among the groups investigated has occurred and the wing spot is not an infallible character for identifying *C. splendens* subspecies." (Authors)] Address: Kiany, M., Payam-e Noor University, Bam, Iran. E-mail: mohsen.kiany1@gmail.com

**11712.** Saha, N.; Aditya, G.; Banerjee, S.; Saha, G.K. (2012): Predation potential of odonates on mosquito larvae: implications for biological control. *Biological Control* 63(1): 1-8. (in English) ["Predation potential of the larval odonates *Ceriatrigon coromandelianum* and *Brachydiplax chalybea* on the II and IV instar larvae of *Culex quinquefasciatus* was evaluated under simulated natural conditions in the laboratory. A type II functional response was exhibited by the odonates, with the attack rate and handling time differing significantly between prey sizes for *C. coromandelianum*. The per capita prey consumption varied between vegetated and open habitat conditions and between the days as reflected through the Clearance Rate (CR). Results of univariate ANOVA revealed that prey consumption varied significantly ( $P < 0.05$ ) with the prey and predator densities for both the odonate predators, whereas habitat structure had significant effects only in case of *B. chalybea*. Thus, the use of larvae of *C. coromandelianum* and *B. chalybea* can facilitate conservation and biological control simultaneously under suitable habitat conditions." (Authors)] Address: Saha, Nabaneeta, Department of Zoology, University of Calcutta, 35 Ballygunge Circular Road, Kolkata 700019. India. E-mail: nabaneetasaha@gmail.com

**11713.** Sakai, M.; Natuhara, Y.; Imanishi, A.; Imai, K.; Kato, M. (2012): Indirect effects of excessive deer browsing through understory vegetation on stream insect assemblages. *Population ecology* 54(1): 65-74. (in English) ["Over the past decade, the abundance of sika deer has rapidly increased around Japan. Previous studies have showed overabundance of deer causes drastic reduction of forest understory vegetation, leading excessive soil erosion. However, no study has investigated the effects of excessive deer browsing on aquatic insect assemblages via sediment runoff. These effects are important to understand whether the terrestrial alteration by deer influences aquatic ecosystems. In a primary deciduous forest catchment in Ashiu, Kyoto, a deer exclusion fence has been in place since 2006. We compared forest floor cover, overland flow, stream environment, and aquatic insect assemblages in first-order streams and catchments inside and outside of the deer-exclosure from May-2008 to April-2009. The floor inside the deer-exclosure catchment was covered by lush understory vegetation, whereas outside was almost bare. The overland flow runoff rate at midslope and the dominance of fine sediment deposition in the streambed were higher outside than inside. Among aquatic insects, burrowers, which are tolerant against

fine sediment deposition, were significantly more abundant outside than inside, whereas clingers exhibited the opposite patterns. Collector-gatherers, which feed on fine detritus, were significantly more abundant outside than inside. Meanwhile, filterers were more abundant inside. The Simpson's diversity index of the aquatic insect assemblages was higher inside than outside. These results suggest that the demise of understory vegetation due to excessive deer browsing has indirectly caused changes in the aquatic insect assemblages of this catchment via increased sediment runoff and subsequent sandy sedimentation of the streambed." (Authors) Richness and abundance of aquatic insect during the course of the study resulted in Odonata as follows: Exclosure catchment (without deer): 7 taxa, 13 specimens; Control catchment (with deer): 8 taxa 39, specimens] Address: Sakai, M., Graduate School of Global Environmental Studies, Kyoto University, Japan

**11714.** Samraoui, F.; Nedjah, R.; Bouchecker, A.; Alfahhan, A.H.; Samraoui, B. (2012): Patterns of resource partitioning by nesting herons and ibis: How are odonata exploited? *Comptes Rendus Biologies* 335: 310-317. (in English, with French summary) ["Herons and ibis are colonially nesting waders which, owing to their number, mobility and trophic role as top predators, play a key role in aquatic ecosystems. They are also good biological models to investigate interspecific competition between sympatric species and predation; two processes which structure ecological communities. Odonata are also numerous, diverse, mobile and can play an important role in aquatic ecosystems by serving as prey for herons and ibis. A relationship between prey size and bird predator has been observed in Numidia wetlands (NE Algeria) after analyzing food boluses regurgitated by six species of birds (Purple Heron, Black-crowned Night Heron, Glossy Ibis, Little Egret, Squacco Heron and Cattle Egret) during the breeding period, which also shows a temporal gradient for the six species. Both the Levins index and preliminary multivariate analysis of the Odonata as prey fed to nestling herons and ibis, indicated a high degree of resource overlap. However, a distinction of prey based on taxonomy (sub-order and family) and developmental stage (larvae or adults) reveals a clear size dichotomy with large-sized predators (Purple Heron, Black-crowned Night Heron and Glossy Ibis) preying on large preys like Aeshnids and Libellulids and small-sized predators feeding mainly on small prey like Zygoptera. Overall, the resource utilization suggests a pattern of resource segregation by coexisting nesting herons and ibis based on the timing of reproduction, prey types, prey size and foraging microhabitats." (Authors)] Address: Samraoui, B., Laboratoire de Recherche des Zones Humides, Université d'Annaba, 4 rue Hassi-Beida, Annaba, Algeria. E-mail: bsamraoui@yahoo.fr

**11715.** Schiel, F.-J.; Buchwald, R. (2012): Parasitierung von *Lestes dryas* durch die Wassermilbe *Arrenurus papillator* in einer mittellitalienischen Karst-Hochebene (Odonata: Lestidae; Hydrachnidia). *Libellula* 31(1/2): 31-39. (in German, with English summary) ["Infestation of *Lestes dryas* by the water mite *Arrenurus papillator* in a karst high plain in central Italy (Odonata: Lestidae; Hydrachnidia) – A population of *L. dryas* was investigated between 06-vii-2009 and 11-vii-2009 in the Pian Piccolo di Castelluccio, Perugia province, Umbria, Italy. More than 49 % of the captured imagines (1,014 of 2,058) were infested by water mites. The degree of infestation

was 52 % of males, and 33 % of females. The proportion of infested individuals decreased during the six days' survey. The mite-load per adult ranged from one to 36 larval mites with a median value of nine mites (n = 165). The decreasing infestation rate in the observation period suggests an infection during emergence. The mite larvae, attached to both *L. dryas* and the syntopic *Sympetrum flaveolum*, were identified as *Arrenurus papillator*." (Authors)] Address: Buchwald, R., Institut für Biologie und Umweltwissenschaften, Carl von Ossietzky Universität, IBU-A1, 26111 Oldenburg, Germany. rainer.buchwald@uni-oldenburg.de

**11716.** Schmidt, E.G. (2012): Die ökologische Nische von *Sympetrum depressiusculum* in Nordwestdeutschland (Odonata: Libellulidae). *Libellula Supplement* 12: 161-176. (in German, with English summary) ["*S. depressiusculum* is a Southern Continental species of lowland river marshes and mires. The natural distribution area reaches Germany in the pre-alpine region and the Upper Rhine valley. Oviposition takes place in marsh ponds and mires, which are dry during winter and flooded late in spring, usually during May, when the sun is high. Then thermic conditions are best for development of eggs and larvae and also structure and food supply fit well. In other parts of Germany, similar conditions are simulated by breeding of carp, another Southern Continental species with a similar preference of micro-habitat for breeding. Therefore, at these carp breeding ponds *S. depressiusculum* is established far north of its natural margin of distribution. In northwestern Germany the warm Atlantic climate is rather unsuitable, and the species is dependent there on carp breeding ponds. For hunting and resting, the species prefers marshland with tall herb Vegetation and similar plants surrounding the breeding ponds. Here, the males search for females late in the morning and rest in tandem position until early noon. Then copulation takes place near the water, followed by egg-laying in tandem position over shallow water between the low bank weeds. Egg-laying can also be seen at unsuitable ponds (e.g. with permanent water) with similar bank Vegetation. Hence, the establishment of the species can only be proved by emergence, not solely by reproductive activities. The carp breeding ponds in northwestern Germany are stocked until autumn. Therefore egg-laying by *S. depressiusculum* on dry ground, as in its primary natural range, is unusual. These carp breeding ponds are also valuable for nature conservation because of rare Vegetation and birds. Carp breeding ponds are therefore an example for a classical management form that casually serves for nature conservation. Actually carp breeding in northwestern Germany cannot survive the cut-throat competition with cheap imports from climatically favoured countries as, e.g., Hungary. So nature conservation must help." (Author)] Address: Schmidt, E., Coesfelder Str. 230, 48249 Dülmen, Germany

**11717.** Schmidt Dalzochio, M.; Stenert, C.; Maltchik, L. (2012): Odonata, Aeshnidae, *Anax amazili* (Burmeister, 1839): First record for southern Brazil. *Check List* 8(3): 551-553. (in English) [*A. amazili* occurs, in South America, from French Guiana to Argentina. In Brazil it is distributed in the northeast and southeast of the country. Records - made in 2002 and 2009 - from the state of Rio Grande do Sul in southern Brazil, extend its current distribution about 1000 km to the south of the continent.] Address: Stenert, Cristina, Laboratório de Ecologia e Conservação de Ecossistemas Aquáticos, Univer-

sidade do Vale do Rio dos Sinos. Av. Unisinos, 950, 93022-000, São Leopoldo, RS, Brasil. E-mail: cstenert@unisinos.br

**11718.** Schorr, M. (2012): Beitrag zur Kenntnis der Gattung *Ophiogomphus* in der Mongolei auf Basis der Aufsammlung von Günther Peters aus dem Jahre 1964 sowie Erstnachweis von *Ophiogomphus obscurus* Bartenev, 1909 für die Mongolei (Odonata: Gomphidae). *Libellula Supplement* 12: 187-198. (in German, with English summary) ["The Odonata collected by Günther Peters during 1964 in Mongolia, and identified as *Ophiogomphus cecilia*, were reexamined. The specimens were identified as *O. reductus* and *O. spinicornis*. The prothorax is a useful morphological character to distinguish between these two species. *Ophiogomphus obscurus*, collected in 2004 at the Ider Gol, a headwater river of the Selenge River in northern Mongolia, is a new species to the dragonfly fauna of the country." (Author)] Address: Schorr, M., Schulstr. 7B, 54314 Zerf, Germany. E-mail: bierschorr@online.de

**11719.** Schröter, A. (2012): Obere vertikale Verbreitungsgrenze und Habitatspektrum von *Aeshna juncea* im kirgisischen Tian Shan (Odonata: Aeshnidae). *Libellula Supplement* 12: 49-76. (in German, with English summary) ["Based on the hitherto highest Central Asian locality with reproduction record of *A. juncea* at a mountain lake (3,016 m a.s.l.) in the central Tian Shan in Kyrgyzstan the present knowledge on ecology and altitudinal distribution of the species in Kyrgyzstan and Central Asia is reviewed. In context with further records referring to oviposition in a fast flowing mountain river fed by snow water, determinants for the upper altitudinal limit, cold tolerance and specific habitat preferences in Central Asia are discussed. With reference to European populations of *A. juncea* at the upper altitudinal and at the northern latitudinal limit, the prevailing specific climatic and ecological conditions in Kyrgyzstan are outlined and compared. Moreover, with reference to Kyrgyz specimens, the taxon *A. juncea mongolica* Bartenev, 1929 is critically reviewed." (Author)] Address: Schröter, A., Rasenweg 10, 37130 Gleichen, Germany. E-mail: asmustim@gmx.de

**11720.** Schröter, A.; Schneider, T.; Schneider, E.; Karjalainen, S.; Hämäläinen, M. (2012): Observations on adult *Somatochlora sahlbergi* – a species at risk due to regional climate change? (Odonata: Corduliidae). *Libellula* 31(1/2): 41-60. (in English, with German summary) ["Behavioural and autecological observations on adults of *Somatochlora sahlbergi* from northern Finland are presented with hitherto unpublished new aspects of imaginal behaviour. A new interpretation and evaluation of possible threats to its survival is considered in the light of new insights into the chorology and habitat preferences of the species. Threats to the restricted Fennoscandian population, chiefly resulting from the rapidly changing ecological conditions in its subarctic ecosystem, triggered by current trends in regional climate change, are outlined." (Authors)] Address: Schröter, A., Rasenweg 10, 37130 Gleichen, Germany. E-mail: AsmusTim@gmx.de

**11721.** Seehausen, M. (2012): *Ischnura ramburii* mit Wasserpflanzen nach Europa importiert (Odonata: Coenagrionidae). *Libellula* 31(1/2): 7-13. (in German, with English summary) ["The present study describes the first European record of the American damselfly *I. ramburii* (Selys, 1850). The larva was found on aquatic



plants from a pet shop in Wiesbaden, Hesse, Germany. Identification is specified in comparison to species of the quite similar-looking European *Ischnura elegans*-Group and the differences between *Ischnura ramburii* and the Afro-Asian *Ischnura senegalensis* (Rambur, 1842) are mentioned according to circa 50 individuals of each species from the Bavarian State Collection of Zoology in Munich. The main difference is the curve at the hind margin of the pronotum: It is much broader in *I. ramburii* than in *I. senegalensis*. Specific distribution routes of the aquatic plants are still unknown because the distributor predominantly imports plants from Asia and also has a nursery for rearing in the Netherlands. But maybe he had imported plants for rearing from America containing eggs of *I. ramburii*. The exuvia and the imago are stored in the zoological collection of the Wiesbaden Museum, Hesse, Germany." (Author)] Address: Seehausen, M., Museum Wiesbaden Hessisches Landesmuseum für Kunst und Natur, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**11722.** Seidl, I. (2012): Management-intervention costs for damselfly *Coenagrion mercuriale* in the Oberaargau. In: Swiss Federal Institute for Forest, Snow and Landscape Research WSL (ed) 2012: ENHANCE. Enhancing ecosystem connectivity through intervention – benefits for nature and society? Final Report. Birmensdorf, Swiss Federal Research Institute WSL, 81 pp: 79-81. (in English) ["One of the species investigated in Oberaargau that potentially benefits management-interventions is *C. mercuriale*, a focus species of Smaragd. Thanks to the Smaragd-Project and its conservation schemes, there is detailed knowledge and experience about useful protection measures. Also data is available about the cost the various measures involve. Based on the study of the conservation cost for Swiss biotopes (Ismail et al. 2007), the management-intervention costs for the damselfly have been calculated. Cost data were gathered from reports of Trägerverein SMARAGD-Gebiet Oberaargau, from the Federal office of agriculture and in an interview with a conservation consultant. Preliminary costs are: 2500 CHF per year and municipality with rivers providing a habitat for the damselfly, and 3700 CHF per year and ha riverbank (buffer zone). Furthermore, there are non-recurring cost of 1500 CHF/ha riverbank. Thanks to the Smaragd-Project and generous funding by various organisations, suitable measures have been realised." (Author)] Address: Seidl, Irmi, Swiss Federal Research Institute WSL, Zürcherstr. 111; 8903 Birmensdorf, Switzerland

**11723.** Seifert, L.I.; Scheu, S. (2012): Linking aquatic and terrestrial food webs – Odonata in boreal systems. *Freshwater Biology* 57(7): 1449-1457. (in English) ["(1) It is increasingly realised that aquatic and terrestrial systems are closely linked. We investigated stable isotope variations in Odonata species, putative prey and basal resources of aquatic and terrestrial systems of northern Mongolia during summer. (2) In permanent ponds,  $\delta^{13}\text{C}$  values of Odonata larvae were distinctly lower than those of putative prey, suggesting that body tissue comprised largely of carbon originating from isotopically light carbon sources. Presumably, prey consumed during autumn and winter when carbon is internally recycled and/or methanotrophic bacteria form an important basal resource of the food web. In contrast, in a temporary pond,  $\delta^{13}\text{C}$  values of Odonata larvae were similar to those of putative prey, indicating that their

body carbon originated mainly from prey species present. (3) Changes in  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  values between larvae and adults were species specific and reflected differential replacement of the larval isotopic signature by the terrestrial diet of adult Odonata. The replacement was more pronounced in Odonata species of permanent ponds than in those of the temporary pond, where larvae hatched later in the year. Replacement of larval carbon varied between tissues, with wings representing the larval isotopic signature whereas thoracic muscles and eggs reflected the  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  values of the terrestrial diet of adults. (4) The results suggest that because of their long larval development, Odonata species of permanent ponds carry the larval signature, which is partly replaced during their terrestrial life. Terrestrial prey forms the basis for egg production and thus the next generation of aquatic larvae. In temporary ponds, in contrast, Odonata species rely on prey from a single season, engage in a prolonged aquatic phase and hatch later, leaving less time to acquire terrestrial prey resources for offspring production. Stable isotope analysis provided important insights into the food webs of the waterbodies and their relationship to the terrestrial system. ... Odonata species included *Aeshna crenata*, *A. juncea* and *Leucorrhinia orientalis* at site 1, *A. crenata*, *A. juncea*, *Coenagrion johanssoni* and *L. orientalis* at site 2, *A. crenata* and *L. orientalis* at site 3, and *Lestes sponsa*, *Symetrum danae* and *S. flaveolum*." (Authors)] Address: Seifert, Linda I., Department of Animal Ecology, Johann Friedrich Blumenbach Institute of Zoology and Anthropology, Georg August University Göttingen, Berliner Str. 28, 37073 Göttingen, Germany. E-mail: linda.seifert@uni-potsdam.de

**11724.** Shapoval, A.P.; Buczyński, P. (2012): Remarkable Odonata caught in ornithological traps on the Courish Spit, Kaliningrad Oblast, Russia. *Libellula* 31(1/2): 97-109. (in English, with Russian and German summaries) ["With respect to the distribution of Odonata, the European part of Russia belongs to the most poorly studied areas of Europe. Records of 12 dragonfly species at the northern limits of their distribution are provided and discussed based on materials collected on the Courish Spit, Kaliningrad Oblast, western Russia, in ornithological "Rybachy" traps in the years 2007-2011. Six species were recorded for the first time in the Kaliningrad Oblast (*Aeshna affinis*, *Orthetrum albistylum*, *O. brunneum*, *O. coerulescens*, *Crocothemis erythraea*, and *Sympetrum meridionale*), and occurrence of two species was confirmed (*Lestes viridis* and *Sympetrum fonscolombii*). The data suggests that the migration route of dragonflies runs along the coast of the Baltic Sea." (Authors)] Address: Shapoval, A.P., Biological Station Rybachy, Russian Academy of Sciences, Zoological Institute, St. Petersburg, 199034 Russia. E-mail: apshap@mail.ru

**11725.** Sharkey, C.R. (2012): The role of polarized light in prey capture in an aquatic predator. *Frontiers in Behavioral Neuroscience*. Conference abstract. Tenth International Congress of Neuroethology, College Park, Maryland USA, 5 Aug - 10 Aug, 2012 doi: 10.3389/conf.fnbeh.2012.27.00187: (in English) ["Sensitivity to polarized light has been demonstrated, through behavioural and electrophysiological studies, to be a common component of arthropod visual systems. Amongst terrestrial insects, polarized light has been shown to influence behaviours such as navigation (Dacke et al., 2011), signalling (Sweeney et al., 2003) and the detec-

tion of water bodies (Schwind, 1991). Different areas of insect eyes have evolved specialized polarization detectors for different visual tasks. The function of polarization sensitivity (PS) in aquatic insects, however, is less clear. Whilst dragonfly adults have been shown to possess PS in the ventral region of the eye, thought to aid water and horizon detection in the terrestrial environment (Laughlin, 1976), the visual system of dragonfly larvae is less well characterized, and the potential for aquatic insect larvae to possess polarization vision was previously unknown. The central aim of this study was to discover if polarization vision in dragonfly larvae is adapted to the specific visual environment of aquatic larvae versus its future aerial adult requirements. By removing the front analyser of a liquid crystal display (LCD) monitor, the intensity contrast of displayed objects and patterns is removed from the screen and, instead, only polarized light is emitted with the normal intensity contrast of displayed objects replaced by a polarization angle "contrast". We used this system to present polarized stimuli on a polarized background with a contrasting angle of polarization. This technology, first used by Pignatelli et al. (2011), allows us to manipulate the angles of polarization presented and to present moving polarization stimuli. The angular difference between stimuli and background was varied across trials to test the minimum angular difference dragonfly (*Anax* sp.) larvae are able to detect. Animals demonstrated tracking, hunting, and prey capture behaviours when presented with a moving polarization stimulus 0.4 by 0.4cm in size. The time for which animals tracked the stimulus decreased as angular polarization contrast was reduced. Results suggest that the minimum angular discrimination lies between 26 and 22 degrees, a value much higher than that known for cuttlefish, octopus and fiddler crabs (Pignatelli et al., 2011; How et al., 2012). Parallel experiments using a similar stimulus made visible as intensity contrast rather than a polarization angle contrast, showed that animals responded decreased as intensity contrast was lowered, but animals responded more strongly to intensity than polarization contrast. These findings will be discussed in light of the animal's visual environment and visual physiology. The structure of the larval retina has also been examined, using transmission electron microscopy, to locate potential polarization sensitive cells. Microvilli of photoreceptor cells show similarities in both structure and shape to adult ventral retinal photoreceptors. However, unlike the adult ventral retina, our behavioural work shows larval polarization spectral sensitivity lies outside the UV spectral range (Laughlin, 1976). This is the first behavioural data that suggests the innate use of polarization sensitivity in prey capture." (Author)] Address: Sharkey, Camilla, Univ. Bristol, Ecology of Vision Group, Bristol, BS8 1UG, UK, cs7750@bristol.ac.uk

**11726.** Shi, S.-x.; Liu, Y.-z.; Chen, J.-m. (2012): Journal of Hydrodynamics, Ser. B 24(3). An experimental study of flow around a bio-inspired airfoil at Reynolds number  $2.0 \times 10^3$ : 410-419. (in English) ["The fluid flow around a bio-inspired airfoil with corrugated surfaces and its smooth counterpart at chord Reynolds number  $Re = 2.0 \times 10^3$  and different Angle-Of-Attack ( $0^\circ$ ,  $4^\circ$ ,  $8^\circ$  and  $12^\circ$ ) were measured by using Particle Image Velocimetry (PIV). The global characteristics of the fluid flow around two airfoils were analyzed by ensemble-averaged velocity field, distribution of reverse flow intermittency, and time-series flow visualizations. At  $0^\circ$ , no significant variation of the global flow patterns was recog-

nized for both configurations. The statistical results of reverse flow intermittency results demonstrated that the protruding peaks of the corrugated airfoil delay flow separation occur at  $4^\circ$ . At large AOAs ( $8^\circ$  and  $12^\circ$ ), however, the flow is massively separated in both configurations, the combination of large separation bubble above the corrugated airfoil and small recirculation zones in the upstream upper valley results in earlier separation of the flow. At  $AOA=8^\circ$ , the wake region behind the corrugated airfoil is considerably shortened in comparison to the smooth one, indicating a remarkable reduction of the time-mean lift and drag forces, however, at  $12^\circ$ , the wake region behind the corrugated one is slightly larger than that behind the smooth one. For the case of  $8^\circ$  and  $12^\circ$ , the time-series flow visualizations demonstrate the intensified vortex shedding process of the corrugated airfoil, which would give rise to enhanced dynamic loading. Due to the fact that dragonfly wing is practically flexible, it is speculated that the wing structure of a gliding dragonfly might be sophisticatedly deformed in response to the periodic loading to reduce the drag." (Authors)] Address: Shi, S.-x., Key Laboratory of Education Ministry for Power Machinery and Engineering, School of Mechanical Engineering, Shanghai Jiao Tong University, Shanghai 200240, China

**11727.** Simonis, P.; Berthier, S. (2012): How nature produces blue color. Photonic crystals - Introduction, applications and theory. In: Alessandro Massaro (Ed.): Electrical and Electronic Engineering. Publisher: InTech, March, 2012. ISBN 978-953-51-0431-5. 344 pp: 3-24. (in English) ["Tyndall scattering has long been recognized to be responsible for blue coloration of the sky (Tyndall, 1869) and the colour of blue eyes (Mason, 1924). It appears when small particles or voids with dimensions of the order of the wavelength of blue light (about 500 nm) are present in the propagation medium. In that case, the small wavelengths of the incident white light will be scattered and the longer wavelengths will pass undisturbed through the medium. Thus, the red and yellow wavelengths are transmitted and the blue and violet colours are scattered by the composite medium, giving out a non-iridescent light blue diffusion spectrum. In this phenomenon, the particle's sizes and refractive indexes control the coloration. As shown here above, the intensity of the reflected light by such a system is inversely proportional to the 4th power of the wavelength. The amplitude of the reflected light and its angular distribution will depend on the particle's sizes. [...] Scattered blues have early been assigned to insects. The scattering occurs in the epidermal cells beneath a transparent cuticle. In the odonate order such as aeschnids, agrionids and libelluloids (*Libellula pulchella*, *Mesothemis simplicicollis*, *Enallagma cyathigerum*, *Aeshna cyanea*, *Anax walsinghami*) the bright blue diffuse coloration on their body or wings (Mason, 1926; Parker, 2000; Parker, 2005; Veron, 1973) originates from scattering centers under the cuticle. Dragonflies (Mason, 1926) and some other adult insects can also develop a waxy bloom on the surface of their cuticle. The Tyndall effect is then produced by this waxy material and coloration can be destroyed by washing it with a wax solvent (Parker 2000)." (Author)] Address: Simonis, Priscilla, Institut des Nanosciences de Paris (INSP), University Pierre et Marie Curie, Paris, France

**11728.** Sivaperuman, C.; Kumar Shah, S. (2012): Species diversity and abundance of Odonata in Ritchie's

Archipelago, Andaman and Nicobar islands. *Biological Forum Spl. Iss.* 4(1): 65-69. (in English) ["The Ritchie's Archipelago is a cluster of smaller islands which lie some 25-30 km east of Andaman. This study was conducted during 2008-2011. Different islands in the Ritchie's archipelago were surveyed to assess the species diversity and distribution of Odonates. Total of thirty one species belong to 8 families were recorded during the study period. Highest number of species was observed from the family Libellulidae. The diversity index was varied in different islands. The distribution patterns and diversity of dragonflies are discussed in this paper. An extensive Odonatological survey needs to be carried out to explore the rich diversity of these graceful insects and come up with a representative checklist of Odonates for Ritchie's Archipelago." (Authors)] Address: Sivaperuman, C., Zoological Survey of India, Andaman and Nicobar Regional Centre, Port Blair- 744 102, India. E-mail: csivaperuman@yahoo.co.in

**11729.** Śniegula, S.; Johansson, F.; Nilsson-Örtman, V. (2012): Differentiation in developmental rate across geographic regions: a photoperiod driven latitude compensating mechanism? *Oikos* 121: 1073-1082. (in English) ["Genetic differentiation and phenotypic plasticity in growth rates along latitudinal gradients may benefit our understanding of latitudinal compensating mechanisms in life history patterns. Here we explore latitudinal compensatory growth mechanisms with respect to photoperiod in northern and southern populations of two damselfly species, *Coenagrion puella* and *C. pulchellum*. In addition we compared size of field-collected adults from southern and northern populations. Eggs from females in copulating tandems were collected at two or three localities for each species in each geographic region. Eggs were transported to the laboratory and the experiment started when the eggs hatched. The role of photoperiod on the expression of larval growth rate was evaluated under controlled laboratory conditions. Both species had lower growth rate when reared in the northern photoperiod, which is counter to expectations if species use photoperiodic cues to trigger compensatory growth. Instead, both species displayed countergradient variation in growth rates, which probably enable northern populations to compensate for the shorter growth season in the north. The smaller size of field-collected adults from northern populations also supports the view that these species compensate for the shorter growth season by investing in growth and development but accomplish this at the expense of decreased final size." (Authors)] Address: Śniegula, S., Dept of Ecosystem Conservation, Inst. Nature Conserv., Polish Academy of Sci., al. Mickiewicza 33, 31-120 Kraków, Poland. E-mail: szymon.sniegula@gmail.com

**11730.** Sommerkamp, A. (2012): Libellen. Fliegende Edelsteine. *Mein schöner Garten* 7/2012: 94-95. (in German) [This is a popular account on dragonflies in a well known German garden magazine.] Address: not stated

**11731.** Stenert, C.; Maltchik, L.; Rocha, O. (2012): Diversity of aquatic invertebrates in rice fields in southern Brazil. *Biology and Conservation* 7(1): 67-77. (in Portuguese, with English summary) ["Irrigated rice fields have been cultivated for thousands of years, and a high diversity of invertebrate species has been associated with these agricultural areas. Investigations on the structure and diversity of aquatic invertebrates in rice fields are scarce in southern Brazil. Thus, the main goal

of this study was to conduct an inventory of the aquatic invertebrate diversity in rice fields and irrigation canals in an important rice cultivation area in Rio Grande do Sul to preserve the biota in these agroecosystems. Six collections were carried out along a cultivation cycle (June 2005 – June 2006) in six rice fields and four irrigation canals in the Coastal Plain of Rio Grande do Sul. A total of 26,579 individuals in 119 invertebrate taxa distributed among seven Phyla were collected over the cultivation cycle investigated in rice fields and irrigation canals. The arthropods were the invertebrates which showed the greatest amount of sampled taxa. Collectors, predators, and omnivores were the prevalent functional feeding groups in this study. Naididae, Chironomidae, Spongillidae, Libellulidae (differed at the genus level), and Tubificidae families were those which showed the highest number of genera and species. The invertebrate composition was different between rice fields and irrigation canals over the rice cultivation cycle. Besides, some were more frequent over the rice cultivation period whereas other ones were more associated with the non-cultivation period. Rice fields and irrigation canals are systems colonized by a variety of aquatic and terrestrial invertebrates, and they present a high biologic diversity which can be hardly found in other cultivation areas." (Authors)] Address: Maltchik, L., Universidade do Vale do Rio dos Sinos, Laboratório de Ecologia e Conservação de Ecossistemas Aquáticos. Avenida Unisinos, 950. CEP 93022-000. São Leopoldo, RS, Brazil. E-mail: maltchik@unisinos.br

**11732.** Stoks, R.; Córdoba-Aguilar, A. (2012): Evolutionary ecology of Odonata: A complex life cycle perspective. *Annual Review of Entomology* 57: 249-265. (in English) ["Most insects have a complex life cycle with ecologically different larval and adult stages. We present an ontogenetic perspective to analyze and summarize the complex life cycle of Odonata within an evolutionary ecology framework. Morphological, physiological, and behavioural pathways that generate carry-over effects across the aquatic egg and larval stages and the terrestrial adult stage are identified. We also highlight several mechanisms that can decouple life stages including compensatory mechanisms at the larval and adult stages, stressful and stochastic events during metamorphosis, and stressful environmental conditions at the adult stage that may overrule effects of environmental conditions in the preceding stage. We consider the implications of these findings for the evolution, selection, and fitness of odonates; underline the role of the identified numerical and carry-over effects in shaping population and metapopulation dynamics and the community structure across habitat boundaries; and discuss implications for applied conservation issues." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**11733.** Subramanian, S.V. (2012): Application of auto-tracking to the study of insect body kinematics in maneuver flight. Master of Science in Engineering, Wright State University, Mechanical Engineering, Dayton: XI + 147 pp. (in English) ["There is a need to explain the complex phenomena that underlies the seemingly effortless flight modes of the dragonfly (Anisoptera). However, measuring the body kinematics during flight is labour intensive. Thus a robust system was developed that automatically tracks and quantifies the body kinematics of a dragonfly during voluntary and escape take-offs, as



well as maneuvers. Ultimately, the tool, which was developed using a custom code in C++ using the open source library OpenCV (Open Computer Vision), would be used to analyze bulk samples of high speed videos providing raw images at the rate of approximately 1000 frames per second from pair-wise orthogonal positions in space. As a result, there would be a considerably large database of information which may then be used to formulate, generalize and classify standard flight strategies used. Perceptibly, there is also a need to validate the outputs of this tool by comparing it to the outputs of a manual reconstruction." (Author)] Address: Subramanian, S.V., 209 Russ Engineering Center, 3640 Colonel Glenn Highway, Dayton, Ohio, 45435, USA

**11734.** Suri Babu, B.; Sharma, G. (2012): On some aspects of territoriality and reproduction of *Pseudagrion microcephalum* (Rambur) (Insecta: Odonata: Zygoptera: Coenagrionoidea). *Biological Forum Spl. Iss.* 4(1): 25-31. (in English) ["The territoriality and reproductive behaviour of *Pseudagrion microcephalum* (Rambur) has been studied in detail in a temporary monsoon pond, Jagdalpur, District Bastar, State Chhattisgarh, India. The territoriality is strongly demonstrated by males towards both conspecific and heterospecific males. Precopulatory courtship display is present and brief, lasted for 8 to 13 seconds ( $X=9.5$ ;  $N=30$ ). Intramale sperm translocation has occurred after the seizure of the female only and lasted for 10 to 20 seconds ( $X=14.25$ ;  $N=10$ ). The copulatory wheel was formed during the perched condition and stage I lasted for 15 to 35 minutes ( $X=25.15$ ;  $N=20$ ) and stage II lasted for 05 to 08 minutes ( $X=6.5$ ;  $N=20$ ). The surface and below water oviposition is performed by both in tandem and female alone in underwater guarded by male on the above water surface. Behavioural comparisons of various stages have been drawn with other members of the genus *Pseudagrion* Selys." (Authors)] Address: Suri Babu, B., Forensic Science Laboratory, Police Control Room, Jagdalpur-494001 (M.P.), India. E-mail: drsuri@rediffmail.com

**11735.** Takahara, T.; Kohmatsu, Y.; Maruyama, A.; Doi, H.; Yamanaka, H.; Yamaoka, R. (2012): Inducible defense behavior of an anuran tadpole: cue-detection range and cue types used against predator. *Behavioral Ecology* 23(4): 863-868. (in English) ["Inducible behavioural defense in response to predator cue detection is a key phenomenon in predator-prey interactions. The mechanisms by which prey use chemical/visual cues to avoid predation remain little known. We hypothesized that the distance at which prey species detect predator cues would be related to avoiding detection by the predator. To test this hypothesis, we performed laboratory experiments using an anuran tadpole (*Hyla japonica*) and a predatory dragonfly nymph (*Anax parthenope julius*). Tadpole activity level was reduced as a function of exposure to chemical cues from the dragonfly predator, but activity levels did not change when tadpoles were exposed to potential visual cues from the dragonfly. The distances over which tadpoles detected predator cues were longer than those over which the dragonfly predator detected tadpoles. The differences in cue-detection ranges between tadpoles and dragonfly predators are related both to predator avoidance by tadpoles and effective foraging strategies by dragonfly predators. Chemical cue detection as a trigger of inducible defense by prey species may shape predator-prey relationships in aquatic habitats." (Authors)] Address:

Takahara, T., Institute for Sustainable Sciences and Development, Hiroshima Univ., 701-3, ASOM, Hiroshima University, 1-3-1 Kagamiyama, Higashi-Hiroshima, 739-8530 Japan. E-mail: takahara@hiroshima-u.ac.jp

**11736.** Tennessen, K.J. (2012): Two new species of *Metaleptobasis* from Central Ecuador (Odonata: Coenagrionidae). *International Journal of Odonatology* 15(2): 87-97. (in English) ["Two new species of *Metaleptobasis* from Ecuador are described and illustrated. *Metaleptobasis gibbosa* (holotype male, allotype female: Ecuador, Pastaza Province, forest wetlands, Los Copales, between Mera and Shell, 01°29'30" S, 078°04'19" W, elevation 1070 m, 20-22 September 2005, leg. K. J. Tennessen; deposited in Florida State Collection of Arthropods) appears related to *M. mauffrayi* based on large, scythe-shaped posterior hamules; it differs by having cerci about 0.8 times the length of paraprocts, paraprocts wide in proximal half and posterior margin of S10 straight in dorsal view; the female has small denticles on the posteroventral margin of S8 but lacks a distinct vulvar spine. *Metaleptobasis knopfi* (holotype male, allotype female: Ecuador, Sucumbios Province, swamp-forest and stream, 52 km NE of Chaco, 00°00'04" S 077°24'07" W, elevation 685 m, 18 August 1980, leg. K. W. Knopf; deposited in Florida State Collection of Arthropods) appears related to *M. minteri* based on colour pattern, small posterior hamule and morphology of the genital ligula; it differs by having rear of head completely tan, S10 produced posteromedially and cerci more than half as long as paraprocts; the female of *M. knopfi* has larger, more erect mesepisternal horns than *M. minteri*." (Author)] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**11737.** Theischinger, G. (2012): Classification of the *Austroaeschna* group of genera including the introduction of four new subgenera [*Glaciaeschna* subgen. nov., *Montiaeschna* subgen. nov., *Occidaeschna* subgen. nov. and *Petersaeschna* subgen. nov.]. *Libellula Supplement* 12: 29-48. (in English, with German summary) ["A brief account in German language is given of the fieldwork of Günther Peters in Australia for the completion of a phylogenetic study of the Gondwanian aeshnids of this continent (Peters & Theischinger 2007). The *Austroaeschna* group of genera as defined based on this study includes the genera *Austroaeschna* Selys, *Austrophlebia* Tillyard and *Dromaeschna* Förster, with *Austroaeschna* comprising the subgenera *Austroaeschna* s. str. and *Pulchraeschna* Peters & Theischinger. 4 more monophyla of *Austroaeschna* are introduced as the new subgenera *Glaciaeschna*, *Montiaeschna*, *Occidaeschna* and *Petersaeschna*. Apomorphic and additional unspecified, mostly diagnostic characters are given, and relationships are discussed." (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**11738.** Tiple, A.D.; Paunikar, S.; Talmale, S.S. (2012): Dragonflies and Damselflies (Odonata: Insecta) of Tropical Forest Research Institute, Jabalpur, Madhya Pradesh, central India. *Journal of Threatened Taxa* 4(4): 2529-2533. (in English) [Gour River on Mandla Road (79°59'23.500E 21°08'54.300N) about 10km south east of Jabalpur. The campus is spread over an area of 1.09km<sup>2</sup>; semi-arid type of climate with a mean annual precipitation of 1358mm. A total of 48 species were recorded, among them, eight previously unrecorded spe-

cies were included in the check list of Madhya Pradesh. "Of the total 48 species 15 were very common, 15 were common, 16 rare and two very rare in occurrence. Most odonates recorded belong to the Libellulidae (20 species) with one new record (i.e., *Orthetrum luzonicum*). Coenagrionidae (13) species were recorded with one new record (*Agriocnemis femina*). The family Gomphidae includes three species with one new record (i. e. *Macrogomphus annulatus*). Aeshnidae (four) species were recorded with two new records (i.e., *Anax imbecillifrons*, *Hemianax ephippiger*). Only two species were recorded from the Protoneuridae, Lestidae. Family Platycnemididae, Chlorocyphidae and Macromiidae (with one new record, *Epophthalmia vittata*) recorded one species respectively from Madhya Pradesh." (Authors)] Address: Tiple, A.D., Forest Entomology Division, Tropical Forest Research Institute, Jabalpur, Madhya Pradesh 482021, India. E-mail: 1 ashishd-tiple@yahoo.co.in

**11739.** Trapero-Quintana, A.; Reyes-Tur, B.; Cuellar Araujo, N. (2012): Morphofunctional groups of Odonata larvae in three freshwater ecosystems from eastern Cuba. *Odonatologica* 41(2): 135-150. (in English) ["Five morphofunctional groups were determined, based on the morphological characters of the exuviae and the behaviour of the larvae, in three freshwater habitats from Santiago de Cuba. The exuviae were collected weekly over a year, within an 8 m transect and 1 m wide. in the water-ground transition, directly on vegetation, rocks or ground. The most diverse group was the lamellates with 12 species, followed by the epibenthonics with 11; the least diverse was the hidden group which included the only 2 Gomphidae known from Cuba, together with *Cannaphila insularis funerea* and *Orthemis ferruginea*, all gallery diggers. The Zygoptera were represented by over 25% of the species observed in each habitat, whilst the Aeshnidae always had less than 10% of the individuals. The Libellulidae, the most diverse family within the Anisoptera, accounted for the greatest diversity among the morphofunctional groups." (Authors)] Address: Reyes-Tur, B., Depto de Biología, Universidad de Oriente, Ave. Patricio Lumumba s/n 90500, Santiago de Cuba, Cuba. E-mail: breyes@cnt.uo.edu.cu

**11740.** Treiber, R.; Moratin, R. (2012): Libellen des Oberrheins - Les libellules du Rhin Supérieur. *Naturschutzzentrum Kaiserstuhl* (Hrsg.): 36 pp. (in bilingual in German and French) [Germany, France, River Rhine-region; 58 regional odonate species are briefly introduced (morphological key characteristics, photograph), and overview of the biology and ecology of Odonata is given. Six additional species from adjacent regions are shown by photographs.] Address: Treiber, R., c/o Naturschutzzentrum Kaiserstuhl, Bachenstr. 42, 79241 Ihringen, Germany. E-mail: reinhold.treiber@gmx.de

**11741.** Tubić, B.; Zorić, K.; Vasiljević, B.; Tomović, J.; Atanacković, A.; Marković, V.; Paunović, M. (2012): Saprobiological analyze of the Ibar River based on aquatic macroinvertebrates. *BALWOIS 2012 - Ohrid, Republic of Macedonia* - 28 May, 2 June 2012: 5 pp. (in English) ["In this paper aquatic macroinvertebrate community of the Ibar River (Serbia) was presented. Community structure and composition, together with field data, were used to estimate water status of the river including the characterisation of the species with regard to saprobic conditions and preference to the mineral substrate type. Sampling was carried out during 2011 at five sampling sites. A total of 57 taxa (including Gom-

phus vulgatissimus and *Onychogomphus forcipatus*) have been identified. Insect were found to be the dominant component of the community in regard to taxa richness and abundance. According to the ecological classification of the taxa with regard to saprobic conditions the most species belong to the beta-mesosaprobic group. Species that preferred macrolithal type of substrate, lithophilous species, were significantly represented. Recorded community indicates indicates good to poor ecological status of the Ibar River (I-V class according national classification scheme)." (Authors)] Address: Tubić, Bojana, Institute for Biological Research "Siniša Stankovic", Belgrade, Serbia

**11742.** van der Porten, N. (2012): *Macromidia donaldi* pethiyagodai subsp. nov. from Sri Lanka (Odonata: Corduliidae). *International Journal of Odonatology* 15(2): 99-106. (in English) ["*M. donaldi* pethiyagodai subsp. nov. (holotype male: Sri Lanka, Ratnapura District, near Kudawe, 6°26'N, 80°25'E, 03 July 2007; paratype female, same location, 17 April 2008, to be deposited in the Sri Lanka National Museum, Colombo) is described and figured. Its phenotype differs from that of *M. d. donaldi* from India. This is the first record of the genus *Macromidia* from Sri Lanka. The habitat characteristics and species behaviour are briefly outlined." (Author)] Address: van der Poorten, Nancy, 17 Monkton Ave., Toronto, Ontario M8Z 4M9, Canada. E-mail: nmgvdp@gmail.com

**11743.** Van Praet, N.; Covaci, A.; Teuchies, J.; De Bruyn, L.; Van Gossum, H.; Stoks, R.; Bervoets, L. (2012): Levels of persistent organic pollutants in larvae of the damselfly *Ischnura elegans* (Odonata, Coenagrionidae) from different ponds in Flanders, Belgium. *Science of the total environment* 423: 162-167. (in English) ["We investigated the accumulation of persistent organic pollutants in *I. elegans* in 16 ponds in Flanders, widely differing in the surrounding land use. Concentrations of polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs), p,p'-dichlorodiphenyldichloroethylene (p,p'-DDE) and hexachlorobenzene (HCB) were measured. From all targeted PBDE-congeners, only three congeners (IUPAC nos. 47, 99, 100) were above the limit of quantification (LOQ). The  $\Sigma$  PBDE concentrations ranged from < LOQ up to 0.51 ng g<sup>-1</sup> ww. From the targeted PCB-congeners, thirteen were detectable (IUPAC nos. 95, 99, 101, 105, 118, 138, 149, 153, 156, 170, 180, 183, and 187). A high variation in  $\Sigma$  PCB concentrations was observed between the ponds, ranging from < LOQ (0.67 ng g<sup>-1</sup> ww) up to 9.91 ng g<sup>-1</sup> ww in the damselflies from the pond at Sijsele. In all investigated Flemish ponds, p,p'-DDE concentrations were > LOQ (0.20 ng g<sup>-1</sup> ww) with values up to 3.30 ng g<sup>-1</sup> ww in the pond at Hamme. In fifteen ponds, the HCB concentrations were > LOQ (0.05 ng g<sup>-1</sup> ww) with values up to 0.24 ng g<sup>-1</sup> ww. For the available data in the literature a comparison with different species was done for some of the sampled ponds. The monitored ponds can be separated in three groups based on their contamination. The first group is characterised by a relative low POP content ( $\Sigma$  PBDEs,  $\Sigma$  PCBs, HCB). Group 2 contained more HCB and p,p'-DDE than the overall mean while this was the case for PBDEs and PCBs in group 3. The vectors of both contaminated groups are situated nearly perpendicular which is suggesting a different pollution sources." (Authors)] Address: Van Praet, N., Dept of Biology, Ecophysiology, Biochemistry & Toxicology Group, University of Antwerp, Groenenborgerlaan 171, 2020 Antwerp, Belgium. E-mail: nander.vanpraet@ua.ac.be

**11744.** van Strien, M.J.; Keller, D.; Holderegger, R. (2012): A new analytical approach to landscape genetic modelling: least-cost transect analysis and linear mixed models. *Molecular Ecology* 21(16): 4010-4023. (in English) ["Landscape genetics aims to assess the effect of the landscape on intraspecific genetic structure. To quantify interdemelandscape structure, landscape genetics primarily uses landscape resistance surfaces (RSs) and least-cost paths or straight-line transects. However, both approaches have drawbacks. Parameterization of RSs is a subjective process, and least-cost paths represent a single migration route. A transect-based approach might oversimplify migration patterns by assuming rectilinear migration. To overcome these limitations, we combined these two methods in a new landscape genetic approach: least-cost transect analysis (LCTA). Habitat-matrix RSs were used to create least-cost paths, which were subsequently buffered to form transects in which the abundance of several landscape elements was quantified. To maintain objectivity, this analysis was repeated so that each landscape element was in turn regarded as migration habitat. The relationship between explanatory variables and genetic distances was then assessed following a mixed modelling approach to account for the nonindependence of values in distance matrices. Subsequently, the best fitting model was selected using the statistic. We applied LCTA and the mixed modelling approach to an empirical genetic dataset on the endangered damselfly, *Coenagrion mercuriale*. We compared the results to those obtained from traditional least-cost, effective and resistance distance analysis. We showed that LCTA is an objective approach that identifies both the most probable migration habitat and landscape elements that either inhibit or facilitate gene flow. Although we believe the statistical approach to be an improvement for the analysis of distance matrices in landscape genetics, more stringent testing is needed." (Authors)] Address: Keller, Daniela, WSL Swiss Federal Research Institute, Zürcherstr. 111, CH-8903 Birmensdorf, Switzerland. E-mail: daniela.keller@wsl.ch

**11745.** Vandekerkhove, J.; Namiotko, T.; Hallmann, E.; Martens, K. (2012): Predation by macroinvertebrates on *Heterocypris incongruens* (Ostracoda) in temporary ponds: impacts and responses. *Fundamental and Applied Limnology / Archiv für Hydrobiologie* 181(1): 39-47. (in English) ["We conducted laboratory experiments to assess the potential impact of different macroinvertebrate taxa on populations and individuals of the ostracod *H. incongruens* a common inhabitant of temporary ponds. Our data show that nymphs of *Anax imperator* and adults of the pigmy backswimmer (*Plea minutissima* (Leach, 1817)), and to a lesser extent adults of the common backswimmer (*Notonecta glauca* Linnaeus, 1758), can dramatically reduce population densities of *H. incongruens*, and potentially also alter the size structure of the populations. Direct and indirect interactions among predators significantly reduced the predation efficiency of predators when multiple predatory species were combined. In consequence, predation pressure estimates should not be based on predator densities in biotically diverse systems. We also demonstrate that the predation pressure on *H. incongruens* is reduced through behavioral adaptations, such as migration to the open water and reduction of swimming activity. These behaviors are induced by taxon-specific chemical cues." (Authors)] Address: Namiotko, T., University of Gdańsk, Department of Genetics, Laboratory of Lim-

nozoology, Kladki 24, 80-822 Gdańsk, Poland. E-mail: namiotko@biotech.ug.gda.pl

**11746.** Vasin, A.E.; Gherasimov, Y.L.; Djuzhaeva, I.V.; Satchkova, Y.V.; Selezneva, E.S. (2012): Invertebrates in the ecosystem of pond on Amineva Street in the Samara city in 2010. *Vestnik of Samara State University, Natural Science Series, Biology* 94(3/2): 45-52. (in Russian, with English summary) [Russia; *Coenagrion armatum*, *C.hastulatum*, *Erythromma najas* and *Sympetrum flaveolum* are listed from the study site.] Address: Vasin, A.E., Dept of Zoology, genetics, and general ecology of Samara State University, ul. Acad. Pavlov, 1, 443 011, Samara, Russia. E-mail: yuger55@list.ru

**11747.** Vianna, D.M.; De Marco, P. (2012): Higher-taxon and cross-taxon surrogates for Odonate biodiversity in Brazil. *Natureza & Conservação* 10(1): 34-39. (in English) ["Odonate distributional patterns have recently become a focus of a global biodiversity evaluation, but it may present large gaps in biogeographical information, especially in tropical areas, which suggests the need of a surrogate approach for setting conservation priorities. Here we assemble available information of distribution of Brazilian odonate species and try to evaluate two different surrogate possibilities: i) a higher-taxon approach based on genera richness, and ii) a cross-taxon approach using the larger-sized Libellulidae species. The species richness distribution pattern shows a bias toward areas near research centers or with easy accessibility. Only 29% of the territory had any distributional information about odonates. A higher association of genera richness and species richness was observed and remained high even after controlling for differences in sampling effort. Libellulidae species richness was also a good surrogate, despite the low cover of available information of Brazilian territory. Our results support the use of higher-taxon over other approaches but highlight the importance of intensify sampling especially at the Cerrado, Caatinga and Amazonian biomes." (Authors)] Address: De Marco Júnior, P., Departamento de Biologia Geral, Universidade Federal de Goiás – UFG, Campus II, CP 24241, CEP 74690-970, Goiânia, GO, Brazil. E-mail: pdemarco@icb.ufg.br

**11748.** Vieira, V. (2012): Teratologias alar e abdominal observadas em *Sympetrum fonscolombii* (Sélys, 1840) (Odonata: Libellulidae) dos Açores. *Boletín de la Sociedad Entomológica Aragonesa* 50: 541-542. (in Portuguese, with Spanish and English summaries) ["Wing teratology is reported in the male of *S. fonscolombii*. Also, the description is included of a teratological female presenting a deformed, strangled abdomen. The teratology is probably caused by extension problems during emergence. These cases constitute the first known cases of teratology of this species involving the Azores." (Author)] Address: Vieira, V., Univde dos Açores, Depto de Biologia & Grupo da Biodiversidade dos Açores, Rua da Mãe de Deus, Apart. 1422, 9501-801 Ponta Delgada (Açores), Portugal. E-mail: vvieira@uac.pt

**11749.** Vilas Souto, J. (2012): *Aeshna isoceles* (Müller, 1767) (Odonata: Aeshnidae), primera cita para Galicia (N.O. Península Ibérica). *Archivos Entomológicos* 7: 83-84. (in Galician, with Spanish & English summaries) [*A. isoceles*, first record for Galicia, Spain, 16-VI-2012, near Laxe (A Coruña), Lagoa de Traba (UTM 29TMH98)] Address: Vilas Souto, J., c/ Feliciano Barrera 11-D- 2ªA. E-15706 Santiago de Compostela (A CORUÑA) Spain. E-mail: roi-77@hotmail.com



**11750.** Villanueva, R.J.T. (2012): Three new species, *Diplacina guentherpetersi* sp. nov., *D. holgerhungeri* sp. nov. and *D. paragua* sp. nov., from the Philippines (Odonata: Libellulidae). *Libellula Supplement* 12: 227-236. (in English, with German summary) ["Three new species of the genus *Diplacina* from the Philippines are described and illustrated. The northernmost species of the genus *Diplacina guentherpetersi* sp. nov., was collected on the Calayan Island (Masidel River, Centro II, Calayan, Calayan Island, Philippines, 26-iv-2008, leg. R.J. Villanueva). Two males of *Diplacina holgerhungeri* sp. nov. are from Polillo Island [Malat River, Burdeos, Polillo Island (Quezon Province), Philippines, 22-23-ii-2012, leg. H. Cahilog], while two other males are from the same island (Salipsip area, Polillo, Polillo Island, Philippines, 20-21-iv-2009, leg. R.J. Villanueva). A small species, *Diplacina paragua* sp. nov., is from Palawan Island (Tinadtad Falls, Irawan, Puerto Princesa, Palawan Island, Philippines, 29-i-2010, all six specimens leg. R.J. Villanueva & H. Cahilog)." (Author)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., 8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**11751.** Vyas, V.; Bharose, S.; Yousuf, S.; Kumar, A. (2012): Distribution of macrozoobenthos in River Narmada near water intake point. *Journal of Natural Sciences Research* 2(3): 18-24. (in English) ["...Presently, the study was carried out on a selected reach of river Narmada (India) near water intake point. Aim of the study was to assess the distribution of macrozoobenthos near water intake point on river Narmada. Loss in the distribution of macrozoobenthos fauna was recorded in lower reaches and in front of water intake point which indicates that ecological conditions are degrading and in near future situation can be alarming in the respect of ecology." (Authors) The paper includes the neotropical taxon *Aphylla*, and seems to be one of these increasing obscure papers without consideration of regional taxonomic literature.] Address: Kumar, A., Department of Environmental Sciences and Limnology, Barkatullah University, Bhopal- 462-026, India. E-mail: ankitlimno@yahoo.co.in

**11752.** Watanabe, M.; Kato, K. (2012): Oviposition behaviour in the dragonfly *Sympetrum infuscatum* (Selys) mistaking dried-up rice paddy fields as suitable oviposition sites (Anisoptera: Libellulidae). *Odonatologica* 41 (2): 151-160. (in English) ["Tandem oviposition behaviour of *S. infuscatum* was studied in rice paddy fields that were dried due to agricultural procedures in the cool temperate zone of Japan. Oviposition site selection is probably mainly visual because every tandem pair is attracted to structurally similar rice paddy fields without any water. Observations of flying behaviour of tandems was carried out on sunny days without winds. All pairs flew about to search for a suitable oviposition site in the rice paddy fields. They hovered to start oviposition while in tandem. Females of tandems flicked their abdomen while on the wing to aid egg release; each height of these oviposition flights was measured. They separated after completion of the oviposition bout. Vertical changes in the air temperature, relative humidities and light intensities above and below the top of the rice plants were measured. Oviposition site selection was related to the vertical decline of vapour pressure above the rice plants, suggesting that the horizontal surface of rice paddy fields horizontally reflects highly polarized light. Eggs that had fallen on dried-up rice paddy soil diapaused throughout the winter and started to develop the

following spring when the field was filled with enough water for rice planting. Therefore, there is a mechanism for suitable habitat selection for larval development under seasonal changes in man-made water supplies for the cultivation of rice plants." (Authors)] Address: Kato, K., Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan. E-mail: kankyo.envr.tsukuba.ac.jp

**11753.** Wellenreuther, M.; Larson, K.W.; Svensson, E.I. (2012): Climatic niche divergence or conservatism? Environmental niches and range limits in ecologically similar damselflies. *Ecology* 93(6): 1353-1366. (in English) ["The factors that determine species' range limits are of central interest to biologists. One particularly interesting group are odonates (dragonflies and damselflies), which show large differences in secondary sexual traits and respond quickly to climatic factors, but often have minor interspecific niche differences, challenging models of niche-based species co-existence. We quantified the environmental niches at two geographic scales to understand the ecological causes of northern range limits and the co-existence of two congeneric damselflies (*Calopteryx splendens* and *C. virgo*). Using environmental niche modelling, we quantified niche divergence first across the whole geographic range in Fennoscandia and second only in the sympatric part of this range. We found evidence for interspecific divergence along the environmental axes of temperature and precipitation across the northern range in Fennoscandia, suggesting that adaptation to colder and wetter climate might have allowed *C. virgo* to expand further northwards than *C. splendens*. However, in the sympatric zone in southern Fennoscandia we found only negligible and non-significant niche differences. Minor niche differences in sympatry lead to frequent encounters and intense interspecific sexual interactions at the local scale of populations. Nevertheless, niche differences across Fennoscandia suggest that species-differences in physiological tolerances limit range expansions northwards, and that current and future climate could have large effects on the distributional ranges of these and ecological similar insects." (Authors)] Address: Wellenreuther, Maren, Dept of Biology, Univ. of Lund, Sweden. E-mail: maren.wellenreuther@biol.lu.se

**11754.** Wiederman, S.D.; O'Carroll, D.C. (2012): Feature saliency in a dragonfly neuron. *Front. Behav. Neurosci.* Conference Abstract: Tenth International Congress of Neuroethology, College Park, Maryland USA, USA, 5 Aug - 10 Aug, 2012. doi: 10.3389/conf.fnbeh.2012.27.00223: 1 p. (in English) ["*Hemicordulia tau* pursues moving prey, often against a cluttered, visual surround. This already complex small target detection task may even occur in the presence of multiple target-like features (e.g. other potential prey and conspecifics). Yet this is only one of many challenging visual behaviours exhibited by these impressive predators, despite a small brain. To understand the neural basis for such behaviour we use electrophysiological techniques to record intracellularly from feature detecting neurons, referred to as small target motion detectors (STMDs). STMDs likely underlie the dragonfly's ability to discriminate prey motion as they provide velocity-tuned responses selective for objects of no more than a few degrees size (O'Carroll 1993). One such neuron, the centrifugal STMD (CSTMD1) is a potential candidate for mediating higher-order mechanisms of attention towards targets in the presence of distractors. CSTMD1 gives a

locally enhanced response when a target moves along a continuous trajectory (Nordström et al. 2011). Furthermore, the neural response is entirely suppressed by the presence of a second object in a visual region of the other eye (Bolzon et al. 2009). CSTMD1 takes dendritic input from one eye and has an axon that traverses the brain. The neuron arborizes in two regions on the contralateral side, with one output aligning with the input of the mirror-symmetric CSTMD1. It is possible that the two CSTMD1 neurons work together in transferring target information from one side of the brain to the other during target pursuit, but the details of these mechanisms remain unclear. To elucidate a functional role for CSTMD1, we presented two target stimuli of varying sizes and contrasts. We found that a second 'distracter' target presented in the excitatory receptive field, suppresses the response of the neuron as its size is increased. Conversely, a second feature presented to the contralateral eye reveals inhibition that is itself size-tuned. Finally, we investigated how the saliency of two targets (of varying size and contrast) is encoded by the neuron through a simple form of selective attention. Putting this all together, the neuron is inhibited by either a large feature in the ipsilateral (excitatory) visual field or a small target in the contralateral eye. Additionally, if presented with multiple targets in the excitatory region, the neuron exhibits a simple form of visual attention via a competitive winner-takes-all interaction. This research was supported by the US Air Force Office of Scientific Research (FA2386-10-1-4114)." (Authors)] Address: Wiederman, S.D., The University of Adelaide, School of Medical Sciences, Adelaide, SA, 5005, Australia. E-mail: steven.wiederman@adelaide.edu.au

**11755.** Wildermuth, H. (2012): *Aeshna caerulea* in den Schweizer Alpen (Odonata: Aeshnidae). *Libellula Supplement* 12: 77-106. (in German, with English summary) ["The present knowledge on the horizontal and vertical distribution, phenology, ecology and behaviour of *A. caerulea* in Switzerland is reviewed with a side glance on the remaining occurrences of the species in Europe. In the Swiss Alps *A. caerulea* has been recorded on 71 squares of 1 km<sup>2</sup> from 2000 to 2011 and observed to breed between 1318 m and 2230 m a.s.l. The lower vertical distribution is probably confined by the mild climatic conditions and interspecific competition while the upper limit is mainly restricted by the lack of suitable breeding habitats with lush Vegetation, organic matter and corresponding thermal conditions. Larval habitats, emergence, reproductive behaviour and thermoregulation are described in detail and photographically documented. The species is endangered prevailing by grazing livestock that destroys the breeding habitats, but also by tourism and climate change. Possible Conservation measures are suggested and discussed." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**11756.** Wildermuth, H. (2012): Die Verbreitung der an Libellen (Odonata) parasitierenden Gnitze *Forcipomyia paludis* (Macfie, 1936) in der Schweiz (Diptera: Ceratopogonidae). *Entomo Helvetica* 5: 71-83. (in German, with English and French summary) ["All hitherto known records of *Forcipomyia paludis* in Switzerland are listed in detail and mapped. This species has been found attached to 25 odonate species at 33 localities that are mainly situated on the Swiss Plateau between 196 and 640 m a.s.l." (Author)] Address: Wildermuth, H., Halt-

bergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**11757.** Wong, K.-C.; Yeh, W.-C.; Chan, T.-W. (2012): Description of the final stadium larvae of *Polycanthagyna ornithocephala* (McLachlan, 1896) from Taiwan, with a key to the known larvae of the genus (Odonata: Anisoptera: Aeshnidae). *Zootaxa* 3238: 64-68. (in English) ["The final stadium larvae of *Polycanthagyna ornithocephala* is described and compared to those of its congeners occurring in Taiwan. A key is provided to identify the known larvae of three *Polycanthagyna* species. General habitus of adult and larva are also discussed." (Authors)] Address: Wong, K.-C., Dept of Natural Resources and Environmental Studies, National Dong Hwa Univ., No. 1, Sec. 2, Da Hsueh Rd., Shoufeng, Hualien 97401, Taiwan. E-mail: kcwong@mail.ndhu.edu.tw

**11758.** Wünsch, H.-W.; Gospodinova, H. (2012): Deutsche Wespe *Vespula germanica* erbeutet *Sympetrum striolatum* vor dem Jungfernflug (Hymenoptera: Vespidae; Odonata: Libellulidae). *Libellula* 31(1/2): 25-30. (in German, with English summary) ["On 01-vii-2011 at a pond near Siegburg-Stallberg, North Rhine-Westphalia, Germany, a freshly emerged individual of *S. striolatum* lacking the abdomen was seen crawling on a leaf of stinging nettle. Several metres away a wasp was devouring the abdomen of the dragonfly. It is discussed why the dragonfly was still able to walk after the loss of the abdomen." (Authors)] Address: Gospodinova, Heide, Am Burgberg 11, 50126 Bergeheim, Germany. E-mail: willi@waldschrat-online.de

**11759.** Xu, Q.-h. (2012): Description of the last instar larva of *Amphigomphus hansonii* Chao, with notes on the systematic status of the genus *Amphigomphus* Chao (Anisoptera: Gomphidae). *Odonatologica* 41(1): 55-59. (in English) ["The larva is described and illustrated based on 2 specimens from Fujian province (China), and a comparison with *Nihonogomphus lieftincki* and *Orientogomphus armatus* larvae is provided. Judging from larval morphological characters, the genus *Amphigomphus* is closer to *Orientogomphus* than to *Nihonogomphus*." (Author)] Address: Xu, Q.-h., Department of Biological and Environmental Engineering, Zhangzhou City University, 10 Xi-Yang-Ping Road, Zhangzhou Fujian-363000, China. E-mail: qihanx@yahoo.com.cn

**11760.** Yam, L.Y. (2012): *Anax indicus* Lieftinck, 1942 (Odonata: Aeshnidae, *Anax*) - a new record for Hong Kong. *Insect News* 4: 2-4. (in English) [25-IX- 2010, at Yuen Tun Ha (Tai Po, Hong Kong); a Chinese vernacular name is proposed and the species is compared with *Anax guttatus* and *A. parthenope julius*] Address: Yam, L.Y., The Hong Kong Polytechnic University, Hung Horn, Hong Kong, eddieyly@yahoo.com.hk

**11761.** Yoshihara, A.; Miyazaki, A.; Maeda, T.; Imai, Y.; Itoh, T. (2012): Spectroscopic characterization of dragonfly wings common in Japan. *Vibrational Spectroscopy* 61: 85-93. (in English) ["A series of Fourier Transform infrared (FT-IR) absorption, X-ray diffraction (XRD), and Brillouin light scattering (BLS) studies on the wings of six species of dragonfly common in Japan, including the largest *Anotogaster sieboldii* and much smaller *Lestes temporalis*, was performed at room temperature. XRD and FT-IR results indicate that dragonfly wing is comprised of a randomly oriented microcrystalline or an amorphous-like  $\alpha$ -chitin. We observed a pair of longitudinal acoustic (LA) phonon peaks and a broad quasi-elastic scattering peak in backscattering BLS spectra.

LA phonon frequencies and full widths at half maximum were found to be  $19.5 \pm 0.4$  GHz and  $1.0 \pm 0.2$  GHz for the 488 nm excitation and independent of their sizes and species." (Authors)] Address: Yoshihara, A., Dept of Basic Sciences, Ishinomaki Senshu Univ., Ishinomaki, 986-8580 Miyagi, Japan. E-mail: yosihara@isenshu-u.ac.jp

**11762.** Yu, X.; Bu, W.-J. (2012): Erratum - YU, X. & BU, W.-J. (2011) Chinese damselflies of the genus *Coenagrion* (Zygoptera: Coenagrionidae). *Zootaxa* 2808, 31-40. *Zootaxa* 3152: 68: 68. (in English) ["Among the SEM photos for male caudal appendages (Figures 1-11), figure 10 should be *C. tengchongensis* and figure 11 should be *C. lunulatum*." (Authors)] Address: Yu, X., Institute of Entomology, Life Sciences College, Nankai University, Tianjin, 300071 China. E-mail: nkyuxin@yahoo.cn

**11763.** Zessin, W.; Brauckmann, C. (2012): Eine neue fossile Libelle: *Paralogobora guentherpetersi* gen. nov., sp. nov. aus dem Unterperm von Obora, Tschechische Republik, und eine neue Gattung: *Oligomazon* gen. nov. für *Oligotypus makowskii* (Meganisoptera: Paralogidae). *Libellula Supplement* 12: 237-245. (in German, with English summary) ["A new fossil dragonfly: *Paralogobora guentherpetersi* gen. nov., sp. nov. from the Early Permian of Obora, Czech Republic, and a new genus: *Oligomazon* gen. nov. for *Oligotypus makowskii* (Meganisoptera: Paralogidae) - With *Paralogobora guentherpetersi* gen. nov. and sp. nov. a new Permian (Late Autunian) genus and species from Obora, Czech Republic, is described and assigned to the family Paralogidae Handlirsch 1906, which is only documented by a few Late Carboniferous and Early Permian taxa: *Paralogus aeschnoides* Scudder 1893 from the Westphalian D of Silver Spring, Rhode Island, USA; *Paralogus hispanicus* Nel et al. 2009 from the Late Carboniferous/Early Permian transitional beds of Cantera de Ladrillos, Cordoba, Spain; *Oligotypus tillyardi* Carpenter 1931 from the Early Permian (Artinskian, Wellington Formation) of Elmo, Kansas, USA, and the contemporaneous Midco Insect Beds of Noble County, Oklahoma, USA, as well as *Oligotypus makowskii* Carpenter & Richardson 1971 from the Westphalian C/D (Pit 11) of Mazon Creek, Illinois, USA. The new species is not only the smallest, but also the stratigraphically youngest one of the Paralogidae. For *Oligotypus makowskii* a new genus is introduced: *Oligomazon* gen. nov." (Authors)] Address: Zessin, W., Lange Str. 9, 19230 Jasnitz, Germany. E-mail: zessin@zoo-schweinin.de

**11764.** Zhan, K.; Ji, B.-Z.; Liu, S.W.; Qing, Z.H. (2012): Research of bionic design on tools with chewing mouthparts of insects. *Advanced Materials Research* 426: 270-274. (in English) ["Bionic design is a new method in engineering design. The mouthparts especially for the chewing ones of the insects are discussed in this article. To improve the tool life and cutting properties are always the critical for the cutting tool design aim. The foreground of cutting tool design is discussed using the mouthpart of insect as bionic design object. The basic structure of the chewing mouthpart, type of mandibles, geometry, hardness, and element contained, moving mechanism and so on will be described. The research can also make direction at new tool material and tool geometry parameter design." (Authors) The paper includes a reference to Odonata.] Address: Zhang, K., College of mechanical engineering and electronics, Nanjing University of Aeronautics and Astronautics, Nanjing 210016. P.R. China. E-mail: zhangkai360973@163.com

**11765.** Zhao, H.X.; Yin, Y.J.; Zhong, Z. (2012): Multi-levels, multi-scales and multi-functions in the fine structure of the wing veins in the dragonfly *Pantala flavescens* (Fabricius) (Anisoptera: Libellulidae). *Odonatologica* 41(2): 161-172. (in English) ["The internal fine structure of the wing veins is explored and the relationships between the structures and the functions of dragonfly wing veins are revealed. SEM photographs of the cross-sections of dragonfly wing veins have shown that: (a) the micro/nano structures vary along the axis of a vein, i.e. different cross-sections have different micro/nano structures. 1 (b) In a given cross-section, the micro/nano structures are at multi-levels and multi-scales. 1 (c) At a large scale, the structures of the veins are of diversities and disorders. The larger the size scale, the more complicated the structures and the higher are the diversities and disorders. The smaller the size scale, the simpler are the structures, and the higher are the unifications and orders. 1 (d) At nano scale, we may induce an unified assembling mode for the vein's structures, i.e. "nano fibres -> nano layers (or nano bunches)". 1 (e) Both the mechanical and the biological functions of the micro/nano structures of the veins are optimized." (Authors)] Address: Zhong, Z., School of Aerospace Engineering and Applied Mechanics, Tongji Univ., Shanghai 200092, China. E-mail: zhongk@tongji.edu.cn

**11766.** Zimmermann, W. (2012): Günther Peters als Lehrer und Freund eines späten Studenten. *Libellula Supplement* 12: 19-21. (in German, with English summary) ["Günther Peters as a teacher and friend of a late Student - Some personal reminiscences of the author relating to situations he has experienced during his life together with Günther Peters are briefly outlined." (Author)] Address: Zimmermann, W., Thomas-Müntzer-Str. 05, 99423 Weimar, Germany. E-mail: wolfgang.zimmermann.we@kabelmail.de

**Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for multiple help, and Geert de Knijf for contributing many papers to this issue.**



<http://quiettraveler.wordpress.com/2012/07/01/dragonflies-and-damselflies/>



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105; E-mail: K.Reinhardt@sheffield.ac.uk

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

## 1997

**11767.** Hahn, N.S.; Agostinho, A.A.; Goitein, R. (1997): Feeding ecology of curvina *Plagioscion squamosissimus* (Hechel, 1840) (Osteichthyes, Perciformes) in the Itaipu Reservoir and Porto Rico floodplain. *Acta limnologica Brasiliensia* 9: 11-22. (in English, with Portuguese summary) [Fish samplings were carried out from November 1983 to September 1988, at different sites of the Paraná River basin (Brazil), comprising the section between the Paranapanema and Iguazu Rivers. The stomach contents analysis of all individuals of Itaipu Reservoir and Porto Rico' area showed that curvina feeds basically on fish (> 80%) and insects (> 18%). At Itaipu Reservoir, among the insects, Odonata were represented by 18.5% of the food items, while at Porto Rico they accounted to 6.23% of the diet.] Address: Hahn, N.S., Núcleo de Pesquisas em Limnologia, Ictiologia e Aquicultura (NUPELIA), Universidade Estadual de Maringá, Av. Colombo, 5.790, 87020-900 - Maringá - PR - Brasil

## 1998

**11768.** Nilsson, A.N.; Malmqvist, B.; Báez, M.; Blackburn, J.H.; Armitage, P.D. (1998): Stream insects and gastropods in the island of Gran Canaria (Spain). *Annls Limnol.* 34(4): 413-435. (in English, with French summary) ["The current status of the stream-living insects and gastropods of the island of Gran Canaria in the Atlantic Canary Islands is documented. Data from semi-quantitative kick samples taken in 11 streams are supplemented by non-standardized collecting in the same and ten additional streams. The kick samples included some 9,000 specimens of 98 taxa, and in total 123 taxa were recorded from the studied streams in 1994 and 1995. The stream fauna was dominated by Diptera with some 80 taxa, followed by Coleoptera with 37 species known from the island. The kick samples yielded 11-36 species per stream and visit, whereas up to 48 species were scored when all collecting methods were included. Local diversity given as Fisher's  $\alpha$  ranged from 3.2 to 10.3. Clustering showed only weak spatial patterns and resulted in much higher similarities among localities when based on the semi-quantitative samples than when based on presence/absence including records from all collecting methods. Species distributions among localities

were not significantly nested. The faunal similarity with the adjacent island of Tenerife is striking. Six of the Tenerife species are seemingly absent from Gran Canaria, whereas Gran Canaria has 13 species not found in Tenerife. Most of the 22 aquatic insect species in Gran Canaria only known from older records, prefer lentic habitats not included in our study. All except one of the five species endemic to Gran Canaria are considered extinct or on the edge of extinction. Increased future extinction rates are predicted as a response of the extreme habitat loss, with only three permanent streams known on the island today." (Authors) The following Odonata taxa are listed: Libellulidae indet., *Orthetrum chrysostigma*, *Sympetrum fonscolombii*, *Trithemis artemisa* and *Zygonyx torrida*.] Address: Nilsson, A.N., Department of Animal Ecology, University of Umea, SE-901 87 Umea, Sweden

**11769.** Onore, G.; Cevallos, V. (1998): Massive movement of *Panoquina sylvicola* in southern Ecuador (Lepidoptera: Hesperidae). *Tropical Lepidoptera* 9(1): 28. (in English) ["A large mass of *P. sylvicola* (Herrich-Schäffer), accompanied by limited numbers of *Siproeta epaphus* Latreille (Nymphalidae) and an unidentified species of Aeshnidae dragonfly (Odonata), were observed moving west to east near Loja, Ecuador, on 18 April 1992." (Authors)] Address: Onore, G., Dept. de Biología, Pontificia Universidad Católica del Ecuador, 12 de Octubre y Rocca, Quito, Ecuador

## 1999

**11770.** Glotzhober, R.C. (1999): Three new state records of Odonata from Ohio, with additional county records. *Ohio Biological Survey Notes* 2: 25-33. (in English) ["Since 1995 the members of the Ohio Odonata Survey have newly recorded three dragonfly species to the state list: *Lanthus vernalis*, *Neurocordulia molesta*, and *Somatochlora incurvata*. In addition, survey workers have collected a total of 712 new county records. The total Odonata species and subspecies in Ohio now numbers 159." (Author)] Address: Glotzhober, R., Ohio Natural history society, 1982 Velma Ave., Columbus OH 43211-2497, USA. E-mail: bglotzhober@ohiohistory.org

**11771.** Labhart, T.; Meyer, E.P. (1999): Detectors for polarized skylight in insects: A survey of ommatidial specializations in the dorsal rim area of the compound eye. *Microsc. Res. Tech.* 47: 368-379. (in English) ["Apart

from the sun, the polarization pattern of the sky offers insects a reference for visual compass orientation. Using behavioral experiments, it has been shown in a few insect species (field crickets, honey bees, desert ants, and house flies) that the detection of the oscillation plane of polarized skylight is mediated exclusively by a group of specialized ommatidia situated at the dorsal rim of the compound eye (dorsal rim area). The dorsal rim ommatidia of these species share a number physiological properties that make them especially suitable for polarization vision: each ommatidium contains two sets of homochromatic, strongly polarization-sensitive photoreceptors with orthogonally-arranged analyzer orientations. The physiological specialization of the dorsal rim area goes along with characteristic changes in ommatidial structure, providing actual anatomical hallmarks of polarized skylight detection, that are readily detectable in histological sections of compound eyes. The presence of anatomically specialized dorsal rim ommatidia in many other insect species belonging to a wide range of different orders indicates that polarized skylight detection is a common visual function in insects. However, fine-structural disparities in the design of dorsal rim ommatidia of different insect groups indicate that polarization vision arose polyphyletically in the insects." (Authors) The study includes data on *Sympetrum striolatum*.] Address: Labhart, T., Zoologisches Institut der Universität Zürich, 8057 Zürich, Switzerland

#### 2000

**11772.** Wegner, E. (2000): Freshwater and land arthropods endangered with mosquito control treatments. *Wiad. entomol.* 18, Suppl. 2: 275-283. (in Polish, with English summary) ["Mosquito control in Poland is based almost solely on the use of broad-spectrum insecticides, which affect most arthropods. The tendency to control mosquitoes in Poland increases and there is a danger of annihilation of a great number of arthropod species in areas subject to mosquito control treatments unless modern microbial control means are employed in Poland. For this reason there is a necessity of a programme of mosquito control based on the environmentally aware methods. The specialists in biology and ecology of animals, especially those who deal with invertebrates, which co-occur with larvae or adult mosquitoes, would be very helpful to give their suggestions concerning protection for nontarget animals (including Odonata). On the basis of this information an environmentally acceptable programme and a detailed scenario of treatment actions would be proposed." (Author)] Address: Wegner, Elżbieta, Muzeum i Instytut Zoologii PAN, ul. Wilcza 64, 00-679 Warszawa, Poland. E-mail: wegner@robal.miiz.waw.pl

#### 2001

**11773.** Eda, S. (2001): Obituary of Imato Sonehara. *Tombo* 43: 60. (in Japanese, with English title) [brief obituary with reference to *Aeshna mixta soneharai* Asahina]

**11774.** Kagimoto, B. (2001): The historical background of the discovery of *Orthetrum poecilops miyajimaense* Yuki et Doi, 1938. *Tombo* 43: 45-50. (in Japanese, with English summary) ["*Orthetrum poecilops miyajimaense*, was discovered by Jiro Yuki at Yamashiroura in Miyajima (Itsukushima) island, Hiroshima Prefecture, Japan.

Yuki was a member of the Hiroshima Mountaineering Club, and joined a walking hemircular tour of Miyajima island on June 21, 1936. On the touring course, unfamiliar dragonflies were found in a place called Yamashiroura. In 1938, Yuki described these dragonflies as a new species, *Orthetrum miyajimaense* together with Hironobu Doi, who was an amateur odonatologist. In this paper, it was written that on the day Yuki collected these insects, the weather was fine. However, by checking an old record of weather conditions, I have confirmed that the day was cloudy. A study on the relationship between Yuki and Doi revealed that they were members of the Chosen Natural History Society, and Giichi Shigemura, who was Yuki's teacher in the middle school, was Doi's superior officer in the Imperial Gift Science Museum." (Author)] Address: not stated

**11775.** Ramos Hernández, J.M.; de Armas, L.F. (2001): Distribución geográfica de *Remartinia secreta* y *Crocothemis servilia* en Cuba (Odonata: Aeshnidae, Libellulidae). *Cocuyo* 10: 12-13. (in Spanish) [Records of both species are detailed; no maps are given.] Address: Ramos Hernandez, J.M., C # 9 e/ Algerdo Ferrer y Agramonte, Cabaiguán, Sancti-Spiritus, Cuba 62400

#### 2002

**11776.** Fischer, U. (2002): Weiterer Fund der Südlichen Mosaikjungfer (*Aeshna affinis* V. D. Linden, 1820) in Thüringen. *Mitteilungen des Thüringer Entomologenverbandes* 9(2): 23-24. (in German) [30-VII-2002, "Teiche Zeulenroda-Troppach", Landkreis Greiz, Thüringen, Deutschland] Address: Fischer, U., A.-Günther-Str. 12, 08340 Schwarzenberg, Germany

**11777.** Sformo, T. (2002): Minimum flight temperature and thermoregulatory performance of sub-arctic dragonflies. Society for Inetgrative and Comparative Biology 2002 Annual Meeting. Anaheim, California, January 2-6: (in English) [Verbatim: "Sub-arctic dragonflies (Odonata: Anisoptera), an order of insect previously not studied in Alaska, provide a unique system with which to examine questions of thermal biology. Two potential adaptations are the ability to initiate flight at low temperature and to thermoregulate. To establish minimum flight temperatures, I record the lowest temperature at which a species can maintain level flight, both in the lab and in the field. To determine thermoregulating ability, I measure thoracic temperature (T<sub>th</sub>) of individual dragonflies using a thermocouple. T<sub>th</sub> is then compared to the dragonfly model providing the operative environmental temperature (T<sub>e</sub>). By regressing T<sub>th</sub> on T<sub>e</sub>, the slope of the regression line indicates thermoregulatory ability (Thermoregulation Performance Index). I predict that northern dragonflies will have lower minimum flight temperatures than comparable species from lower latitudes. I also predict a general pattern wherein more massive species are able to thermoregulate by both physiological and behavioural means, while less massive species rely solely on behavioural repositioning. The relationship between T<sub>th</sub> of living specimens and T<sub>e</sub> is examined for each species and compared across species to examine relative thermoregulating ability. I show, contrary to speculation by Vogt and Heinrich (1983), that minimum flight temperature of northern dragonflies are not different from comparable species from Maine, although they differ from species in Florida. Minimum temperatures range from 14°C for *S. danae* to 22°C for aeshnids. Finally, I conclude that the relative thermoregulating ability is a function of mass,

which ranges from 0.09g for the least to 0.86g for the most massive, while the Thermoregulatory Performance Index ranges from 0.90 (a thermal conformer) to 0.14 (a thermal regulator), respectively."] Address: Sformo, T., Univ. Alaska, Fairbanks, AK, 99701, USA. E-mail: rfts@uaf.edu

### 2003

**11778.** Goudsmits, K. (2003): *Coenagrion scitulum*, the first record for the Netherlands. *Brachytron* 7(1): 27-29. (in Dutch, with English summary) [June 16, 2003, a male *C. scitulum* was captured near Tegelen in the south eastern part of The Netherlands.] Address: Goudsmits, K., Eerste Dorpstraat 7a, NL-3701 HA Zeist, The Netherlands

**11779.** Woods, M.; McDonald, R.A.; Harris, S. (2003): Predation of wildlife by domestic cats *Felis catus* in Great Britain. *Mammal Review* 33(2): 174-188. (in English) ["A questionnaire survey of the numbers of animals brought home by domestic cats *Felis catus* was conducted between 1 April and 31 August 1997. A total of 14 370 prey items were brought home by 986 cats living in 618 households. Mammals made up 69% of the items, birds 24%, amphibians 4%, reptiles 1%, fish <1%, invertebrates 1% and unidentified items 1%. A minimum of 44 species of wild bird, 20 species of wild mammal, four species of reptile and three species of amphibian were recorded." (Authors) Among the prey items, Odonata accounted to 25 specimens, representing 0.6% of all prey items.] Address: McDonald, R.A., The Game Conservancy Trust, Forest in Teesdale, Barnard Castle DL12 0HA, UK. E-mail: rmcDonald@gct.org.uk

### 2004

**11780.** Butler, H.J.B.; Kok, O.B. (2004): Dietary composition of cattle egrets (*Bubulcus ibis*) in the central Free State. *SA Tydskrif vir Natuurwetenskap en Tegnologie* 23(4): 90-98. (in Dutch, with English summary) ["Analysis of 152 stomach samples of adult *B. ibis* collected over a period of five years in the central Free State showed this species to be mainly insectivorous. The Insecta, occurring in almost all stomach samples, are represented by prey items from 13 orders of which the Orthoptera, followed by the Coleoptera, Isoptera, Diptera and Lepidoptera, showed the highest frequency of occurrence. Amongst the non-insect invertebrates, the Araneae and Solifugae occurred most frequently. Based on dry mass the Orthoptera and Isoptera constitute by far the most important components. Prey items of vertebrates combined represent only ca. 10% of the diet. Overall, the stomach contents of 75 chicks correspond with that of the adults, except that vertebrates make a significant contribution to the diet during the first week of the nesting phase. In general cattle egrets can be considered opportunistic feeders that concentrate on easily obtainable food sources which become sporadically available (partly because of their regular association with mammalian hosts)." (Authors) Odonata contribute only very little to the diet of *B. ibis*.] Address: Kok, O.B., Departement Dierkunde en Entomologie, Universiteit van die Vrystaat, Posbus 339, Bloemfontein, 9300, South Africa. E-mail: kokob.sci@mail.uovs.ac.za

**11781.** Dicke, M. (2004): From Venice to Fabre: insects in western art. *Proc. Neth. Entomol. Soc.* 15: 9-14. (in

English) ["Insects are not only special to entomologists, they have also been a source of inspiration to artists throughout the centuries. From the 13th century until present artists have depicted insects in twodimensional and three-dimensional works. Insects have often been used as symbols for the brevity of life, for the transcendence of the soul, but also because of the beauty of their forms and colours. Some artists paint or sculpt with insects themselves, either dead or still alive. Over the past 7 years I have visited 180 art museums and recorded the representation of insects in the works on display. As a result I have gained an entomological view of the history of art. This has provided insight both in the history of art itself as well as in the role of insects in its development. At present I have seen 3,045 works of art in which insects are represented. The majority occur in the Netherlandish still-lives of the 17th and 18th centuries, in surrealist works and in Jugendstil works. Some artists have depicted only a single insect while others have represented over 100 insects in a single work of art. Of some artists I know only a single work with insects, while of others more than 100 works are known." (Author) Approximately 450 paintings created between 13<sup>th</sup>-21st centuries include Odonata.] Address: Dicke, M., Laboratory of Entomology, Wageningen University, P.O. Box 8031, NL-6700 EH Wageningen, The Netherlands; E-mail: marcel.dicke@wur.nl

**11782.** Kharchenko, L.P.; Mikhaylov, V.A.; Gramma, V.N.; Malovichko, L.V. (2004): Insects in nutrition of *Merops apiaster* (Aves: Coraciiformes: Meropidae) (Third report). *The Kharkov Entomological Society Gazette* 2003 (2004) 11(1-2): 137-142. (in Russian) [125 fecals of *Merops apiaster* contain fragments of 2 250 specimens of insects from 10 orders and 52 families. Dominating taxa belong to the Hymenoptera, mostly the honey-bee. The following Odonata taxa have been found: *Calopteryx splendens*, *Calopteryx* sp., *Lestes* sp., *Coenagrion* sp., *Anax* sp., *Aeshna* sp., *Cordulia aenea*, *Sympetrum* sp. and *Libellula* sp.] Address: Kharchenko L. P., Department of Zoology, Kharkov State Pedagogical University, ul. Blukhera 2, Kharkov, 61168, Ukraine

**11783.** Müller, J. (2004): Flugkünstler mit Vorliebe für Fast Food. In: Röller, O. & J. Müller: *Naturschätze aus der Pfalz*. Pollichia Sonderdruck Nr. 9: 112-115. (in German) [Rheinland-Pfalz, Germany. General introduction to dragonflies, and brief notes on the (regional) activities of Jürgen Ott related to Odonata.] Address: POL-LICHIA, Bismarckstr. 33, 67433 Neustadt/Weinstraße, Germany. E-mail: hauptverein@pollichia.de

**11784.** Wade, S.; Corbin, T.; McDowell, L.M. (2004): *Critter Catalogue*. A guide to the aquatic invertebrates of South Australian inland waters. Environment Protection Authority. ISBN 1 876562 67 6: VI + 186 pp. (in English) [Odonata (larvae) are introduced on pages 100-103.] Address: Environment Protection Authority, GPO Box 2607, Adelaide SA 5001, Australia

### 2005

**11785.** Brunelle, P.M. (2005): *Odonata Survey 2005: (Damselflies and Dragonflies)*, Whites Point Property, Digby County, Nova Scotia. Prepared for: Bilcon of Nova Scotia Corp., P.O. Box 2113, Digby, Nova Scotia, Canada B0V 1A0: 17 pp. (in English) [6-8-VIII-2005; "We visited all freshwater and brackish habitats at the appropriate time of day and weather condition for effec-



tive sampling of these insects. I documented all aquatic habitats, and we took 51 records of 21 species. Only one species we encountered is of some conservation concern - *Lestes forcipatus*, which is ranked as undetermined due to past confusion with the similar and common *L. disjunctus* - the balance being species common in Nova Scotia. I suggest in Table 1 other Odonata species which may be found in the aquatic habitats of the property, depending upon season of survey. The principal Odonata diversity on the property occurs in man-made habitats. Whether this diversity will persist through active industrial activities will be dependent upon the nature of those activities. During the reclamation phase of the project, efforts should be made to ensure that the freshwater aquatic habitats recover their diversity in Odonata. This may be beneficial, as small still-water habitats are rare along North Mountain, and that area of the province may host migratory Odonata (*Anax junius* in particular) which would benefit from the presence of those habitats. At this time, there is no indication of rare Odonata in the natural bog and stream habitats present on the property, and hence no particular concern that the still-water species will compete with them. If rare Odonata are discovered in the future outside of the man-made habitats, consideration should be given to removing the constructed still-water habitats during the reclamation phase." (Author)] Address: Brunelle, P.M., 6044-1 Compton Avenue, Halifax, Nova Scotia, Canada B3K 1E7. E-mail: pmb@ns.sympatico.ca

**11786.** Febria, C.M.; Magnusson, A.K.; Williams, D.D. (2005): Seasonal abundance and prey selection of the nymphs of three sympatric species of *Sympetrum* (Odonata: Libellulidae) in an intermittent pond. *Canadian Entomologist* 137: 723-727. (in English) ["Odonates are obligate predators, and the composition of their diet is reflective of their microhabitat and effectiveness in detecting and capturing prey. In an intermittent woodland pond in southern Ontario, Canada, three species of *Sympetrum* were found to coexist: *S. internum*, *S. costiferum*, and *S. obtrusum*. *Sympetrum* species spend most of their life cycle in the aquatic stage and consume prey at all nymphal stadia. They overwinter in the egg stage, hatch in early spring, and typically emerge in late June to late July. To better understand the role of coexisting *Sympetrum* nymphs in this intermittent pond environment, and to evaluate potential mechanisms behind their coexistence, we collected seasonal abundance and body size data for 2 years and analyzed gut contents of each species. In addition, we experimentally tested the prey selection and predatory rate of two different size classes of *Sympetrum* nymphs and two of their potential competitors, *Lestes* sp. and *Acilius* sp. (Coleoptera: Dytiscidae), in laboratory microcosms." (Authors) ] Address: Febria, Catherine, Surface and Groundwater Ecology Research Group, Dept Life Sciences, Univ. Toronto at Scarborough, Ontario, Canada M1C 1A4. E-mail: catherine.febria@utoronto.ca

**11787.** Nel, A.; Petrulevicius, J.F.; Jarzembowski, E.A. (2005): New fossil Odonata from the European Cenozoic (Insecta: Odonata: Thaumtoneuridae, Aeshnidae, ? Idionychidae, Libellulidae). *Neues Jahrbuch für Geologie und Paläontologie - Abhandlungen* 235(3): 343-380. (in English) ["A new genus and species of the fossil subfamily Thaumtoneuridae: *Dysagrioninae Primorilestes violetae* is described from the Early Oligocene of the Far East of Russia. The aeshnid *Aeschnophlebia andreasi* sp. n. is described from the Late Eocene/Early

Oligocene of the UK. *Oligoaeschna* (?) *anglica* Cockerell & Andrews, 1916 is redescribed on the basis of new, more complete material from the same strata. The hindwing structures of *Oligoaeschna jungi* Piton & Theobald, 1939 are described on the basis of a complete wing from the Oligocene of France. *Aeshna stavropolensis* sp. n. (Aeshnidae), *Mioidionyx stavropolensis* gen. n. sp. n. (?Idionychidae), two wings attributed to *Sympetrum* aff. *elongatum* Gentilini, 1989, and two unnamed Pantalinae (Libellulidae) are described from the Middle Miocene of Stavropol (North Caucasus, Russia). *Libellula ukrainensis* sp. n. is described from the Late Miocene of Crimea (Ukraine). The libellulid *Jeanlegrandia oligocenica* gen. n. sp. n. is described from the Late Oligocene of France. These new discoveries confirm the high diversity of the Cenozoic odonofauna of the Palaearctic Region." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

## 2006

**11788.** Holland, R.A.; Wikelski, M.; Wilcove, D.S. (2006): How and why do insects migrate? *Science* 313: 794-796. (in English) ["Countless numbers of insects migrate within and between continents every year, and yet we know very little about the ultimate reasons and proximate mechanisms that would explain these mass movements. Here we suggest that perhaps the most important reason for insects to migrate is to hedge their reproductive bets. By spreading their breeding efforts in space and time, insects distribute their offspring over a range of environmental conditions. We show how the study of individual long-distance movements of insects may contribute to a better understanding of migration. In the future, advances in tracking methods may enable the global surveillance of large insects such as desert locusts." (Authors) Several references to Odonata (*Rhionaeschna bonariensis*, *Anax junius*) are made.] Address: Wikelski, M., Department of Ecology and Evolutionary Biology, Princeton Univ., Princeton, NJ 08544, USA. E-mail: wikelski@princeton.edu

## 2007

**11789.** Cottle, N. (2007): *Brachythemis leucostica* (Burmeister, 1839) (Anisoptera: Libellulidae): A new dragonfly species for Cyprus, and *Trithemis arteriosa* (Burmeister, 1839) (Anisoptera: Libellulidae): a rarely recorded dragonfly species in Cyprus. *Bulletin of the Amateur Entomologists Society* 66: 59-62, plate 4. (in English) [*Brachythemis impartita* was observed on 11-VIII-2006 at Akhna Dam, Cyprus (35.02.50N 033.47.55E, 34 metres ASL). Records on *Trithemis arteriosa* from five localities are documented.] Address: Cottle, N., c/o CAO, JSSU(CYP), BFPO 59., Cyprus. E-mail: nwcottle@gmail.com

**11790.** Unrine, J.M.; Hopkins, W.A.; Romanek, C.S.; Jackson, B.P. (2007): Bioaccumulation of trace elements in omnivorous amphibian larvae: Implications for amphibian health and contaminant transport. *Environmental Pollution* 149: 182-192. (in English) ["Despite the influence that amphibians have on the flow of energy and nutrients in ecological systems, the role that amphibians play in transporting contaminants through food webs has received very little attention. This study

was undertaken to investigate bioaccumulation of trace elements (Mn, Se, V, As, Pb, Zn, Hg, Cd, Cu) in amphibians relative to other small aquatic organisms in a contaminated wetland. We collected bullfrog larvae (*Rana catesbeiana*) along with three other species of small vertebrates and four species of invertebrates (*Tramea* sp., *Erythemis* sp.) from a site contaminated with a wide array of trace elements and analyzed them for trace element concentrations and stable nitrogen and carbon isotope composition. We found that amphibian larvae accumulated the highest concentrations of most trace elements, possibly due to their feeding ecology. These results suggest that omnivorous amphibian larvae can serve as a critical link for trace element trophic transfer. Their propensity to accumulate trace elements may have important implications for amphibian health in contaminated environments and should be further investigated." (Authors)] Address: Urine, J.M., Savannah River Ecology Laboratory, University of Georgia, P.O. Drawer E, Aiken, SC 29802, USA. E-mail address: urine@srel.edu

**11791.** Wang, Z. (2007): The Fauna Dragonflies of Henan Odonata. Henan Science and Technology Press: 189 pp, 43 plates. (in Chinese) [96 Odonata species of the Henan province (China) are treated in a monographic way. All species are documented on colour plates. The book includes sections on morphology of imagines and larvae plus identification keys. Each species is represented with information on synonymy, morphology, b&w drawings, regional distribution and phenology.] Address: Wang Zhi-guo, Henan Academy of Science, Zhengzhou, Henan, 450002 China

**11792.** Winkel, S.; Kuprian, M. (2007): Die Helm-Azurjungfer (*Coenagrion mercuriale*) bei Gelnhausen (Main-Kinzig-Kreis). Mitteilungsblatt Zentrum für Regionalgeschichte 33: 60-65. (in German) [Hessen, Germany; on 12-VII-2006, along a ditch of 140 m length, 88 males of *C. mercuriale* were recorded.] Address: Winkel, Sibylle, Pommernstr. 7, D-63069 Offenbach, Germany. E-mail: Si-winkel@t-online.de

**11793.** Zhang, D.-z. (2007): Research on the resource of the dragonfly and damselfly in Ningxia. Journal of Anhui Agri. Sci. 35(27): 8538-8539, 8553. (in Chinese, with English summary) [38 species from the Ningxia province, China are documented] Address: Zhang, D.-z., School of Life Science, Ningxia University, Yinchuan, Ningxia 750021, China

## 2008

**11794.** Andrew, R.J.; Subramaniam, K.A.; Tiple, A.D. (2008): Common Odonates of Central India. E-book for "The 18th International Symposium of Odonatology", Hislop College, Nagpur, India: 50 pp. (in English) [The book introduces 45 Indian Odonata species found in the water bodies of the forest surrounding the City of Nagpur, India.] Address: Andrew, R.J., Department of Zoology, Shri Shivaji ESA's Science College, Congress Nagar, Nagpur - 440012 (MS), India

**11795.** Balik, S.; Rusen Ustaoglu, M.; Özdemir Mis, D.; Aygen, C.; Tasdemir, A.; İlhan, A. (2008): First observations on the aquatic fauna inhabiting freshwaters ponds of Turkish Republic of Northern Cyprus. E.U. Journal of Fisheries & Aquatic Sciences 25(4): 347-351. (in Turkish, with English summary) ["Aquatic fauna of 12 reser-

voirs located in Turkish Republic of Northern Cyprus were investigated during the period of 16-22 June 2002. Some of the physico-chemical features of the sampling localities were determined as well. Total of 62 taxa comprising 24 rotifers, 16 crustaceans, 18 insects and 3 fishes and one amphibian were determined. All of the determined taxa except *Rana ridibunda* were firstly reported from Turkish Republic of Northern Cyprus." (Authors) The Odonata taxa list includes *Anax* sp., *Leucorrhinia* sp., and *Coenagrion* sp.] Address: Balık, S., Ege Üniversitesi, Su Ürünleri Fakültesi, Su Ürünleri Temel Bilimler Bölümü, Yıcsular Biyolojisi Anabilim Dalı, Bornova 35100, İzmir, Turkey. E mail: m.rusen.ustaoglu@ege.edu.tr

**11796.** Fulan, J.A.; Raimundo, R.; Figueiredo, D. (2008): Habitat characteristics and dragonflies (Odonata) diversity and abundance in the Guadiana River, eastern of the Alentejo, Portugal. Boln. Asoc. esp. Ent. 32(3-4): 327-340. (in English, with Spanish summary) ["In this study, we investigated the environmental variable that affected the dragonfly diversity and abundance in the Guadiana River in the period of March to July in 1999 and 2000. A total of 105 sites were investigated where 19 species of dragonflies, ten species of Anisoptera and nine species of Zygoptera were recorded. Canonical Correspondence Analysis (CCA) indicated that environmental factors were related to some species. *C. lindennii*, *C. tenellum*, *C. caerulescens*, *C. scitulum*, *E. viridulum* and *I. pumilio* (all Zygoptera) occurred in conditions of a relatively high percentage of cover of reeds. The occurrence of Anisoptera species such as *C. boltonii*, *O. caerulescens* and *O. nitidiverve* were influenced by shade." (Author)] Address: Fulan, J.A., Department of Zoology, Institute of Biosciences, State University of São Paulo, Campus of Botucatu, 18618-000 Botucatu, SP, Brazil; E-mail: joaofulan@ig.com.br

**11797.** Muramy, D.; Kovacs, T. (2008): Review and contribution to the Odonata fauna of Maramures, Romania. Studia Universitatis "Vasile Goldis", Seria Stiintele Vietii (Life Sciences Series) 18(Suppl.): 229-234. ["An annotated list of the 36 Odonata species reported from Maramures, Romania, and data of the Odonata material collected between 2004 and 2008 are given. Eleven species (*Lestes sponsa*, *Platycnemis pennipes pennipes*, *Enallagma cyathigerum*, *Ischnura pumilio*, *Anaciaeschna isosceles isosceles*, *Anax imperator*, *A. parthenope*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus forcipatus*, *Orthetrum cancellatum cancellatum*, *Sympetrum danae*) are new records for the area. Taxonomical characters of the *Leucorrhinia dubia dubia* population found in the Rodna Mts are briefly discussed, and notes given on the faunistic rarities of the peat bogs of Maramures." (Authors)] Address: Murányi D., Hungarian Natural History Museum, Department of Zoology, Baross u. 13, H-1088, Budapest, Hungary, Tel. +36-1-267-7007, Fax. +36-1-3171-669, email: muranyi@zool.nhmus.hu

**11798.** Villeda Callejas, María del Pilar; Barrera Escorcia, Héctor; Lara Vázquez, José Ángel; Ruiz Puga, Pablo (2008): Histología del tubo digestivo de *Dythemis velox* (Libellulidae: Odonata). Revista de Zoología 19: 1-6. (in Spanish, with English summary) ["In the present work we analyze the morphology and the histology of digestive apparatus of *Dythemis velox*. It is observed that the estomodeo lacks of gastric caeca, and in a cross section are the layers of the circular muscle, the longitudinal muscle, epithelia that consist of a layer of cylindrical cells, and the intimate one that limits the lumen.

The mesodeo is limited by the cardiac valve in the previous end, and folds conformed by longitudinal muscle and followed of a columnar epithelia with microvilli that rest on a basal membrane, it lacks of a cuticular layer and in its place we observed a thin peritrophic membrane. The Proctodeo has great amount of folds towards the lumen of epithelial cells covered by a fine cuticular membrane. We conclude that the histology of the digestive tract of *D. velox* is very similar to that observed by other authors in saproxylofagous coleopterans." (Authors)] Address: Villeda Callejas, María del Pilar, Laboratorio de Zoología, UNAM. Av. de los Barrios No. 1, Los Reyes Iztacala, Tlalnepantla, Estado de México. México C.P. 54090 correo: mapilivilleda@yahoo.com.mx

## 2009

**11799.** Clarke, D. (2009): Males of the Common Blue Damselfly (*Enallagma cyathigerum*) targeting an ovipositing female Emperor Dragonfly (*Anax imperator*). *The Carlisle Naturalist* 17(1): 11-12. (in English) [Verbatim: On the calm sunny afternoon of 4th July 2008 a female Emperor Dragonfly was ovipositing near the edge of one of the pools on Scaleby Moss, Carlisle. Whilst watching her I noticed that she was being 'harassed' by several males of the Common Blue Damselfly, which were frequent, though not in 'swarming' numbers. I took some photographs, and two in particular confirm what I saw. In one shot, two Common Blue males are apparently 'buzzing' her (from in front and behind) and in the other a male is actually perched on her arched abdomen, facing forwards, his head just behind her wing bases, whilst she is laying eggs into vegetation just below the water surface. The Emperor showed no apparent response to this attention. At first glance this behaviour looked rather like aggression, but the biological advantage to a small weak predator of attacking a very much larger and aggressive one would seem limited, to say the least - and insects don't act like small birds mobbing raptors. My preferred explanation was that the coloration of this female Emperor - a typical greenish form with dark dorsal abdominal strip - was sufficiently similar to that of the normal colour phase of a female Common Blue as to present a 'super-stimulus' to males of that species, releasing a mating behavioural response. The alternative - which I am very reluctant to concede - is that what I saw was purely coincidental: the 'buzzing' Blues were just going about their business; the Emperor just happened to be a convenient perch for one of them. As opportunities to watch Emperors up here are still relatively few (though increasing), I had submitted this note to the Newsletter of the British Dragonfly Society. It appears in issue No. 54, along with a couple of very good images of the same behaviour taken in southern England, so this may actually be a frequent phenomenon.] Address: Clarke, D., Burnfoot, Cumwhitton, Brampton, Cumbria CA8 9EX, UK

**11800.** Farkas, A.; Jakab, T.; Schnitthen, C.; Dévai, G. (2009): Folyami szitakötök (Odonata: Gomphidae) populációinak exuviumokon alapuló felmérése a Szamos olcsvai szakaszán. *Hidrológiai Közlöny* 89(6): 101-104. (in Hungarian, with English summary) [Exuviae of *Gomphus vulgatissimus*, *Stylurus flavipes* and *Ophiogomphus cecilia* were collected on 3, 20 m long shorelines on the left bank of River Szamos between Olcsva and Olcsvaapáti belonging to the settlement Olcsva,

Hungary. Data are analysed in terms of emergence curve, abundance, sex-ratio, phenology and substrate preference.] Address: Farkas, Anna, Department of Hydrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary. E-mail: flavipes@gmail.com

**11801.** Farkas, A.; Jakab, T.; Dévai, G. (2009): Assessment of riverine dragonfly populations (Odonata: Gomphidae) on the basis of exuviae on the reach of the river Tisza at Váosnaményi. *Acta biologica Debrecina. Supplementum oecologica hungarica* 20: 65-78. (in Hungarian, with English summary) [Exuviae of *Gomphus vulgatissimus*, *Stylurus flavipes* and *Ophiogomphus cecilia* were collected on three, 20 m long shorelines on the left bank of River Tisza, belonging to the settlement Vásárosnamény, Hungary. Data are analysed in terms of emergence curve, abundance, sex-ratio, phenology and substrate preference.] Address: Farkas, Anna, Department of Hydrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary. E-mail: flavipes@gmail.com

**11802.** Glitz, D. (2009): Libellen. Geländeschlüssel für Rheinland-Pfalz und das Saarland. NABU Rheinland-Pfalz. Mainz: 108 pp. (in German) [This is an identification key to the Odonata of the federal states Rheinland-Pfalz and Saarland (Germany). It includes dichotomous keys, black & white drawings and a section of informative colour photographs of the species. Photographs of species, habitats and examples of habitat conservation measures are added to the book on a CD. ] Address: NABU Rheinland-Pfalz e.V., Frauenlobstr. 15-19, 55118 Mainz, Germany. E-mail: Kontakt@NABU-RLP.de

**11803.** Holuša, O. (2009): Notes to the first record of *Somatochlora meridionalis* (Odonata: Corduliidae) in the Czech Republic. *Acta Musei Beskydensis* 1(1): 89-95. (in English, with Czech summary) [July 2006, near Vlachovice-Vrbitice village, SE Czech Republic, foothills of the Bílé Karpaty Mts.] Address: Holuša, O., Department of Forest Protection and Game Management, Faculty of Forestry and Wood Technology, Mendel University of Agriculture and Forestry Brno, Zemědělska 3, CZ-613 00 Brno, Czech Republic. E-mail: holusao@email.cz

**11804.** Jinguji, H.; Ueda, T.; Goka, K.; Hidaka, K.; Matsura, T. (2009): Effects of Imidacloprid and Fipronil insecticide application on the larvae and adults of *Sympetrum frequens* (Libellulidae: Odonata). *Transactions of the Japanese Society of Irrigation, Drainage and Rural Engineering* 77(1) (259): 35-41. (in Japanese) ["The insecticides fipronil and imidacloprid are effectively used against sucking insect pests of rice. Since these agents are absorbed by rice seedlings and stored in their tissues, they are usually applied to nursery boxes before planting. The effects of imidacloprid and fipronil on the life history of *S. frequens* larvae and adults were monitored using an experimental micro-paddy lysimeter (350mm× 500mm× 300mm (H)) for the duration of the cultivation period. Three lysimeters were treated with imidacloprid, three with fipronil, and the remaining three were left untreated and were used as controls. Three hundred eggs were laid on the soil surface of each of the nine lysimeters and the larval populations, larval development, and emergence patterns of *Sympetrum frequens* were observed in each lysimeter. The absence of *S. frequens* larvae from fipronil-treated-lysimeters



was most remarkable and exuviae were not observed. Imidacloprid-treated-lysimeters had approximately 60% of the larvae observed in control lysimeters. In addition, larvae in the imidacloprid lysimeter had lower mean specific growth rates and the length of adult wings was decreased relative to those observed in the control lysimeter. Emergence in imidacloprid lysimeters was also significantly lower than it was in the control. The application of fipronil and imidacloprid to seedling in the nursery box, and the subsequent transplanting of these into an experimental lysimeter, was associated with a decrease in the abundance of *S. frequens* larvae and adults." (Authors)] Address: Jinguji, H., School of Food, Agricultural and Environmental Sciences, Miyagi University, 2-2-1 Hatatate, Taihaku-ku, Sendai, Miyagi 982-0215, Japan. E-mail: jinguji@myu.ac.jp

**11805.** Kooi, R.E. (2009): Jan van Tol, a born manager in entomology. *Entomologische Berichten* 69(1): 16-17. (in Dutch, with English summary) ["Jan became a member of The Netherlands Entomological Society (NEV) around 1980. When he visited his secondary school he was already interested in aquatic entomology. He finished his biology study at the Leiden University in 1976. Between 1977 and 1986 Jan was the coordinator of EIS-Nederland. In that time he became involved in the research work of DC Geijskes on dragonflies. In 1986 he got the opportunity to become a curator of the National Museum of Natural History at Leiden (= currently Naturalis). His research field is the diversity, phylogeny and biogeography of Odonata of Southeast Asia. Jan was president of the NEV from 1998 to 2008." (Author)] Address: unknown

**11806.** Meschini, A.; Massa, B.; Bruno, M. (2009): Dieta, ritmi di foraggiamento ed importanza degli Anfibi durante l'allevamento dei pulli di Ghiandaia marina *Coracias garrulus* nella Maremma laziale. *Alula* XVI(1-2): 249-251. (in Italian, with English summary) [Maremma lazio is the area north of Rome and south of Tuscany, Italy. The study demonstrates that in European Roller (Aves: *Coracias garrulus*) the chicks diet comprises in 52.83% of amphibians. Odonata account to 5.66%.] Address: Meschini, A., S.R.O.P.U. (Stazione Romana per l'Osservazione e la Protezione degli Uccelli) c/o LYNX Natura e Ambiente srl – Via Britannia, 36 – Roma, Italy. E-mail: a.meschini@gmail.com

**11807.** Nicolai, B.; Mammen, K. (2009): Bedeutende Libellen-Vorkommen im Nordharzvorland: Helm-Azurjungfer *Coenagrion mercuriale* - Kleiner Blaupfeil *Orthetrum coerulescens* und Südlicher Blaupfeil *Orthetrum brunneum* (Odonata). *Abhandlungen und Berichte aus dem Museum Heineanum* 8: 17-34. (in German, with English summary) [In 2008 and 2009, *C. mercuriale*, *O. brunneum* and *O. coerulescens* were recorded along ditches near Halberstadt, Sachsen-Anhalt, Germany. Information on habitat, biology, phenology, threats and conservation measures are provided.] Address: Nicolai, B., Museum Heineanum, Domplatz 36, 38820 Halberstadt, Germany. E-mail: nicolai@halberstadt.de

**11808.** Rosset, V. (2009): Local biodiversity should increase with climate change: case-study for ponds from the Swiss National Park. 4th Symposium of the Hohe Tauern National Park, Conference Volume for Research in Protected Areas, September 17th to 19th, 2009, Castle of Kaprun: 283-286. (in English) ["Climate change is expected to have a significant impact on biodiversity worldwide (Thomas et al. 2004). Many studies focus on

responses to climate change at the regional level, such as species distribution shifts, and evidence that enrichment of regional biodiversity could happen in many areas of the world (Hickling et al. 2006). Less is known, however, about the consequences of climate change on the species richness in ecosystems (local scale). Alpine areas are particularly sensitive to climate change (Beniston 2003). Small waterbodies like ponds are abundant and widespread, and because of their small size they shelter simple communities, particularly at high altitude. Therefore, alpine ponds should play an important role as sentinel and early warning systems in the assessment of the future changes in local biodiversity. The Macun ponds of the Swiss National Park are part of a unique and exceptional area for such investigation and monitoring. ... predictions for alpine ponds evidence that a temperature increase would enhance pond diversity for the five taxonomic groups: +139% for vascular plants, apparition of Gastropoda, + 185% for Coleoptera, +454% for Odonata ..." (Author)] Address: Rosset, Veronique, Department of Nature Management, Hepia University of Applied Sciences Western Switzerland, hepia Geneva technology, architecture and landscape, CH 1254 Jussy-Geneva, Switzerland. E-mails: veronique.rosset@hesge.ch

**11809.** Ruppell, G.; Hilfert-Ruppell, D. (2009): Flugmanöver von *Calopteryx splendens* (Calopterygidae, Odonata) an der Oker nördlich von Braunschweig, analysiert mit einer neuen Zeitlupentechnik. *Braunschweiger naturkundliche Schriften* 8(2): 421-438. (in German, with English summary) ["By means of a new digital slow motion technique flight manoeuvres of *C. splendens* were filmed and analysed in the summer 2008 at the Oker River north of Braunschweig, Germany. This new method allowed to detect new details even in basic flight behaviour. Furthermore rare manoeuvres were analyzed: compensation movements after crashing by gusts, changing the direction of flight, escaping manoeuvres from *Anax imperator*, aggressive flights between females and a crash with male and female. In all this flight manoeuvres *C.splendens* showed that the special mode of wing beating by moving both wing pairs in parallel is useful not only for signalling but for a very good manoeuvrability, too." (Authors)] Address: Hilfert-Ruppell Dagmar, Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: d.hilfert@tu-bs.de

**11810.** Schröder, R.; Walguarnay, J.W.; Butler, M.A. (2009): The damselfly compound eye in stream habitat: Biological design for object detection in a dark complex habitat. *Proceedings of the Army Science Conference* (26th) Held in Orlando, Florida on 1-4, December 2008: 8 pp. (in English) ["Habitats characterized by high spatial variation in absolute light levels and spectral quality present a challenge to animals that rely on visual orientation and visual target discrimination. Insects, in particular, face several difficulties in visual performance related to the small absolute size and simplicity of visual components comprising their compound eyes, including the lack of a focusing mechanism, relatively limited light capture and coarse spatial resolution. Therefore, an understanding of the morphological and behavioural means by which insects overcome these limitations in order to perform highly demanding visual tasks can provide insight into both ecological specialization and artificial visual system optimization. We investigated optical geometry, perch orientation and microhabitat selec-

tion in the Hawaiian damselfly *Megalagrion xanthomelas*, a sit-and-wait predator that intercepts aerial prey among heterogeneous vegetation bordering streams and wetlands. We found that while the eyes of *M. xanthomelas* are roughly spherical, maximum visual acuity appears concentrated in an oblong region shifted below the equatorial frontal plane. This optical geometry corresponds well with typical orientations of damselflies resting on perches and suggests an arrangement maximizing detection of prey or conspecifics travelling along stream margins. We discuss the visual morphology and behaviour of *M. xanthomelas* in relation to available light environments and in comparison to the visual systems of other species." (Authors)] Address: Butler, Marguerite, University of Hawaii, Department of Zoology, 2538 McCarthy Mall, 96822 Honolulu, HI, USA. E-mail [mbutler@hawaii.edu](mailto:mbutler@hawaii.edu)

**11811.** van Tol, J.; Reijnen, B.T.; Thomassen, H.A. (2009): Phylogeny and biogeography of the Platystictidae (Odonata). PhD Thesis. University of Leiden: 3-70. (in English) ["Conclusions: Methods. – We used both morphological and molecular characters for our phylogenetic analyses. Although the most parsimonious tree of the morphological character set showed many homoplasies, the strict consensus tree of the parsimony analysis was highly resolved, although the branches are poorly supported. However, we consider the significant congruence of this consensus tree with a tree based on molecular characters of a smaller taxon sample, a distinct indication of the robustness of the morphological character analysis. Relationships. – To establish the relationships and estimate the age of the odonate family Platystictidae, we studied a wide assemblage of species of southeast Asia representing the Zygoptera families Lestidae, Platystictidae, Platycnemididae, Protoneuridae, Megapodagrionidae and Coenagrionidae. Based on molecular characters, we ascertained that the Platystictidae represents an ancient monophyletic lineage of the Zygoptera. We confirmed the monophyly of the Platycnemididae, and the sister group relationship of the presently recognized subfamilies. The Protoneuridae were established as the sister group of the Platycnemididae. The family Megapodagrionidae seems to be a para- or even polyphyletic assemblage, which clearly needs further revision. Previous studies, such as Rehn (2003), found a different topology in the phylogenetic reconstruction of the Zygoptera, but our results agree broadly with Bybee et al. (2008), who added molecular characters to the morphological dataset of Rehn (2003). For a further understanding of the phylogeny of Zygoptera, we suggest inclusion of various small families of southeast Asia, such as the Isostictidae, a further expansion of the Coenagrionidae taxon sampling, and, in our set, addition of taxa of the New World. The subfamily Sinostictinae (only studied on morphology) 4 represents the most basal clade in the phylogeny of the Platystictidae. The Palaemnematinae of the New World are the sister group of the Platystictinae in our analysis based on a limited taxon sample. Based on our morphological study, it appeared that the Palaemnematinae are not monophyletic, but share a common ancestor with the genus *Platysticta* (Sri Lanka) and some species of *Drepanosticta* confined to New Guinea. Characters. – We have used the topology of the phylogenetic tree based on molecular characters to analyse the changes in character states of the morphological characters. We found that not many morphological characters exclusively define monophyletic groups as based on the mo-

lecular character set. Parallel development of the same character state appeared to be a common phenomenon. This conclusion was confirmed by our independent analysis of the morphological data set plotted on the tree based on molecular characters. Our results confirmed the supposition by Orr (2003) that *Protosticta Selys sensu Davies & Tobin (1984)* cannot be considered an monophyletic group. The reduction of the Ab vein has occurred several times during evolution (Fig. 51). On the other hand, some other wing venational character states, such as the position of the IR3, only developed once. Somewhat unexpectedly, also some characters of the anal appendages appeared to be very homoplastic. A long and conspicuous dorsal denticle on the superior appendage of the male evolved various times. For a further understanding of the phylogeny of the Platystictidae, we suggest a more extensive taxon sampling first, and an increased number of genetic markers in the molecular analyses. Biogeography. – The present 'tropical amphi-transpacific distribution' of the Platystictidae evolved from African ancestors that reached Asia via India, and the New World via the 'North Atlantic Land Bridge'. The evolution of the subfamily Platystictinae can be understood in relation to the palaeogeography of the Malesian region since the Eocene. Our limited taxon sample for molecular characters permitted only a very rough indication of a biogeographical scenario. Our reconstruction of the phylogeny based on the morphological characters, including more species of Platystictidae, permitted a more detailed scenario. Based on the occurrence of basal clades in southeast China (*Sinostictinae*) and Sri Lanka (*Platysticta* and some *Drepanosticta*), in combination with the presence of this family in the New World, we consider an origin of the ancestors of this family in Africa (where it does not occur at present) as the most likely scenario. The American taxa must have dispersed from Eurasia (Europe) via the North Atlantic Land Bridge during the Eocene, while the Asian clade dispersed into the region after India and Asia made their first contact about 50 Ma. Whether the species of New Guinea used a route via Asia (pre-Eocene Papuan Arc, suggesting evolution of the family in Asia), or via Australia (no recent representative in that continent), needs further study, including estimates of cladogenesis using a molecular clock. The cladogram of the Platystictinae and the present distribution of the species, indicate an eastward dispersal in which Sulawesi has played a prominent role. The widespread occurrence of one lineage from the Philippines to the northern Moluccas and New Guinea is presumably due to a geologically recent dispersal, probably during the Miocene or later. This study of the Platystictidae confirms the complicated nature of the historical biogeography of southeast Asia. A similar study of the Calicnemiinae (*Platycnemididae*) (Gassmann 2005, van Tol & Gassmann 2007) revealed a different scenario. The family *Platycnemididae* is very diverse at the genus level in New Guinea, is very speciose with two closely related genera in the Philippines, but is unknown from Sulawesi and Halmahera. New Guinea was apparently populated from the mainland of southeast Asia via the Izu-Bonin Arc, whereafter this group dispersed into western direction to reach the Philippines. Ancient lineages of the Calicnemiinae are found on New Guinea, as is also the case in the Platystictidae and various other groups of aquatic insects. Polhemus (1995) has stressed the role of a 'pre-Eocene' arc for aquatic Heteroptera. Such an arc may also have played a role in the origin of present distribu-

tion patterns in the Calicnemiinae and the Platystictidae. The historical biogeography of Malesia certainly asks for more, well-founded phylogenies of groups with similar ecology. The importance of estimates of timing of cladogenesis of those groups should be emphasized. This is considered the most reliable method to study the congruence between different cladograms, and area cladograms, in order to arrive at a reconstruction of the distributional history of the biotas of southeast Asia and the West Pacific. Species diversity. – Finally, it is an intriguing question how the huge diversity of the endemic flora and fauna of Malesia evolved. The present and palaeo-geography of the region strongly suggest that dispersal is the overwhelmingly universal mechanism in which the islands of Malesia were populated. Species with high dispersal power will be most successful in populating vacant islands, and are the most likely candidates as inhabitants of isolated islands. However, dispersive species frequently reach the same places, so that even such relatively isolated populations cannot evolve isolating mechanisms due to frequent gene flow between populations. Thus, dispersive species usually have large distributional ranges. On the other hand, it is unlikely that species with low dispersal power will ever reach isolated islands. The composition of island biotas was described in the dynamic equilibrium model of island biogeography by MacArthur & Wilson (1963, 1967), which is mainly a theory on an ecological time scale. Whittaker et al. (2008) recently proposed ‘a general dynamic theory of oceanic island biogeography’, in which also the geological life cycle of islands is incorporated. During the life cycle of an island, the complexity of habitats increases in relation to the development of an increasingly complex topography. Such conditions may provide opportunities for radiation of local plant and animal groups, as well as for individuals that newly reach the island. Small distributional ranges in Malesia are common in very different groups of plants and animals. The present distributional patterns of biotas are supposed to reflect events in the geological past, and congruent patterns of area relationships are frequently found in southeast Asia. Such patterns are usually attributed to vicariance events, but palaeogeographical data of southeast Asia hardly support the hypothesis that splitting of islands has frequently occurred. We presume that the dynamics of origin, movements with the continental plates, and final disappearance of the islands of the archipelago have been a more dominant driving force in the evolution of taxa. The resulting variation in proximity of islands to other islands or continental fragments during their geological history provided an environment in which completely different biotas could be ‘exchanged’. This aspect provides a further dimension in Whittaker’s et al. (2008) theory on island biogeography. Apparently, the biotas of Malesia evolved in a fragile balance, in which rare occasions of (common) dispersal events were interrupted with long periods without dispersal and radiation of local populations. The isolation of the islands in the Indo-Australian region during the Cenozoic strongly depended on the continuous reorganisation of the islands. During periods of low colonization rate, founder populations usually evolve isolating mechanisms (see Heaney, 2000). Specimens from new dispersal events, even from the same source population, may then no longer be able to mix with descendants of previous dispersal events, enabling the involvement of new species in the same area. In some cases, the flora and fauna of present-day larger islands, such as Sulawesi and New Guinea, which are them-

selves combinations of palaeo-islands that merged in the geological past, reflect the highly complex nature of evolution on the palaeo-islands, and the subsequent evolution of the biotas after the amalgamation of their habitats.” (Authors)] Address: Tol, J. van, National Museum of Natural History, P.O. Box 9517, NL-2300 RA Leiden, The Netherlands

**11812.** Bouwman, J.H. (2010): Two new populations of *Somatochlora arctica* in Overijssel. *Brachytron* 13(1/2): 26-31. (in Dutch, with English summary) [“In 2008 two new populations of *S. arctica* were discovered in the southeastern part of the province for Overijssel, The Netherlands. These populations are the second and third for Overijssel. One population is located at the crossborder nature reserve Witte veen where it can be found in a peat area which is dominated by *Eriophorum angustifolium*, *Molinea caerulea* and *Sphagnum*-mosses. The second population is located in both the Overijssel as the Gelderland part of Het Lankeet. During the first visit the actual reproduction site couldn’t be found. In late summer 2008 the probable reproduction site was found. This beautiful peat area is dominated by *Narthecium ossifragum*, *Eriophorum angustifolium* and *Sphagnum* species like *S. cuspidatum* en *S. magellanicum*. On the 20th of May 2009 31 exuviae and several juveniles were found here, which shows that a big population is present here. Probably more populations can be found in the next years.” (Author)] Address: Bouwman, J.H., Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: jaap.bouwman@vlinderstichting.nl

**11813.** Briggs, N.; Schneider, E.G.; Sones, J.; Puryear, K. (2010): Inventory of Odonata (Dragonflies and damselflies) at Gateway National Recreation Area. Natural Resource Technical Report NPS/NCBN/NRTR—2010/296: XV + 79 pp. (in English) [New York & New Jersey, USA; “In order to expand knowledge of odonate biodiversity and to make recommendations for management, we conducted a comprehensive baseline inventory of Odonata at Gateway National Recreation Area (GATE). During 2004 and 2005 we conducted a checklist inventory at sites where odonates could potentially breed, as well as at potential migratory and foraging sites. Checklist walks are unrestricted, complete searches that provide an efficient means for initial determination of species presence. During the combined 2004 and 2005 field seasons, 37 species of odonates were documented across 38 sites surveyed. Two New York state listed species were observed, *Ischnura ramburii* and *Libellula needhamii*. Of the 4,671 individuals sighted during 2004 and 2005, 353 were collected as voucher specimens, representing 35 of the 37 species recorded. The most abundant odonate species at GATE were *Enallagma civile*, *Pachydiplax longipennis*, *Ischnura hastata*, and *Epiaeschna heros*. GATE is located within the odonate migration corridor and offers critical habitat for migrating odonates. Migrating odonates were observed during both years of this study in the Jamaica Bay Unit at Fort Tilden and at Breezy Point. The Jamaica Bay Unit showed the greatest species richness of the three Park Units at GATE. In particular, Big John’s Pond and West Pond at Jamaica Bay Wildlife Refuge contained permanent water and supported considerable odonate activity, including two state-listed species, *I. ramburii* and *L. needhamii*. The Staten Island Unit generally lacks permanent water and abundant habitat that can be used for breeding by odonates. Nonetheless,



sites containing permanent water, such as Freshwater Pond and Peeper Road, provided good foraging and breeding habitat for a suite of odonate species, including two state-listed species, *I. ramburii* and *L. needhamii*. The Sandy Hook Unit contains several unique coastal habitats, including sand dunes, salt and freshwater marshes, and freshwater ponds that provided valuable foraging, breeding, and migratory habitats for odonate species. Of particular importance to breeding odonates were freshwater ponds such as Newest, North, and Exclamation Point Pond. Overall, GATE contains several marshes and coastal ponds that are appropriate for odonate reproduction, as well as several sites that offer good foraging and critical migration habitat." (Authors)] Address: Rhode Island Natural History, P.O. Box 1858, Kingston, Rhode Island 02881, USA

**11814.** Brunelle, P.M. (2010): Dragonflies and damselflies (Odonata) of the Atlantic Maritime Ecozone. In: D.F. McAlpine and I.M. Smith (eds.). Assessment of Species Diversity in the Atlantic Maritime Ecozone. NRC Research Press, National Research Council Canada, Ottawa, ON: 333-369. (in English, with French summary) ["The 142 Odonata species recorded from the Atlantic Maritime Ecozone include 28% of the North American total, a large percentage for a comparatively small area. This diversity is due to the great breadth of aquatic habitat types in the ecozone. There has been a dramatic increase in knowledge of the odonates of the region in the last 20 years, much of it provided by informed amateur surveyors. Based on this information, federal and provincial governments and conservation authorities have recently been able to assign status ranks to odonate species. These ranks greatly facilitate consideration of the odonates when assessing human impact in the environment, and encourage further study of these insects. However, much remains to be done. Many species have not been adequately surveyed; subnational status ranks for numbers of odonates occurring in the Atlantic Maritime Ecozone are "undetermined", indicating the need for further focussed survey. This chapter includes a synopsis of species characteristics and conservation status, along with information on habitat preferences. A review of surveyors and survey efforts is also provided, as are suggestions that should help guide future efforts that will increase our understanding of the order in the ecozone." (Author)] Address: Brunelle, P.-M., 2460 John Street, Halifax, Nova Scotia, B3K 4K7, Canada. E-mail: paulmbrunelle@gmail.com

**11815.** Chertoprud, M.V. (2010): Diversity and classification of rheophilic communities of macrobenthos in middle latitudes of European Russia. *Journal of General Biology* 72(1): 51-73. (in Russian, with English summary) ["Based on original data (450 samples from 115 streams of European Russia middle latitudes – from Pskov to Kostroma Regions) the attempt is made to describe the overall diversity of rheophilic communities dwelling on streams bottom and in macrophytes. In total, 39 community types were identified by the Braun-Blanquet method; their taxonomical and structural characteristics are described; the associations with biotopes are outlined; and a biotopical nomenclature is proposed. All communities are subdivided into four biotopical classes: crenal (springs and springbrooks with mixed substrates), rhithral (stony and woody substrates), phythal (macrophytes), and pelal (soft ground). It is shown that all communities may be divided by their organization as R-type or M-type community. 36 out of 39

studied communities belong to R-type and are characterized mainly by prevalence of insect, unstable dominance, and rather distinct association to the biotope. In M-type communities (3 out of 39 studied communities) eurybiontic mollusk *Viviparus viviparus* and amphipod *Dikerogammarus haemobaphes* predominate; these communities are interbiotopic, with stable species structure and high total abundance. The effect of the study spatial scale on the definition of communities is discussed along with problems of the communities dynamics." (Author) *Calopteryx splendens* is listed as species of the Hypoxylorhithral, Limnophytal and Rhizorheophytal coenoses and *Platycnemis pennipes* of the Rhizorheophytal coenosis.] Address: Chertoprud, M.V., Moscow Lomonosov State University, Faculty of Biology, 119992 Moscow, Leninskie Gory, Russia. E-mail: lymnaea@yandex.ru

**11816.** Faschinger, C. (2010): Zur Evolution der Linse in verschiedenen Augen: Erstaunliches. *Spektrum der Augenheilkunde* 24(3): 174-180. (in German, with English summary) ["After the evolution from epithelial cells to eye spots, which can detect light, the development went further on to compound eyes or single-chambered eyes. But the real improvement in creating a good picture was the evolution of the lens. Lenses have the main property of refraction of the light. They are found on top of the compound eyes as chitin lenses or crystalline cones in every single ommatidium with many different refractory properties as well as in single-chambered eyes either as a gelatinous mass or as an epithelial lens-shaped part inside the eye ball. Sometimes a lens is not enough to gather information and an additional mirror helps to survive. Some of the wonderful curiosities that happened in nature are described." (Author) The paper includes references to Odonata.] Address: Faschinger, C., Universitäts-Augenklinik der Medizinischen Universität Graz, Auenbruggerplatz 4, 8036 Graz, Austria. E-mail: christoph.faschinger@meduni-graz.at

**11817.** Hamill, S.E. (2010): Recovery strategy for the Rapids Clubtail (*Gomphus quadricolor*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario: vi + 15 pp. (in English) ["*G. quadricolor* is a small, brightly coloured dragonfly which lives in clear, cool, medium to large rivers with wooded shorelines, gravel shallows, and muddy pools. Adult males perch on exposed rocks in the rapids. Adult females inhabit shoreline forests, moving to the rapids when ready to mate. Eggs are laid over the rapids and the nymphs live in quiet, muddy, downstream pools. This species is a globally rare to uncommon dragonfly found throughout Eastern North America, in a range extending from Maine to Minnesota, including southern Ontario. In Ontario it has been found in only four rivers: the Credit, the Thames, the Humber and the Mississippi. The population in the Credit River may be extirpated. The species is listed as endangered on the Species at Risk in Ontario (SARO) List under the Endangered Species Act, 2007. Threats to survival and recovery include dam construction, shoreline alteration, pollution, removal of shoreline forests, exotic predatory species, roadkill and climate change. Limiting factors include low population numbers, limited distribution and apparent sensitivity to specific habitat features. Knowledge gaps include a lack of understanding of the reasons for its limited distribution and for its habitat sensitivity. The recovery goal is to ensure the long-term survival of *G. quadricolor* in the

province by protecting existing populations and by restoring populations in appropriate habitat where feasible. The recovery objectives are to: (1.) protect, maintain and improve habitat in the four rivers in Ontario where *G. quadricolor* has been found; (2.) implement a monitoring program for the locations where *G. quadricolor* is known to exist; (3.) conduct additional inventory for *G. quadricolor* in suitable habitat; and, 4. initiate research to address knowledge gaps for *G. quadricolor*. It is important to ensure adequate protection of habitat and water quality for the species' survival and recovery. The locations where the species has been found in the Credit, Thames, Humber and Mississippi Rivers should all be prescribed as habitat in a habitat regulation. At each location, the area prescribed as habitat should include the section of the river containing the rapids and the pools below the rapids, plus the wooded shores on either side extending inland to include any forest which is within 800 metres of the shoreline."(Author)] Address: not stated

**11818.** Jinguji, H.; Tsuyuzaki, H.; Ueda, T. (2010): Effects of temperature and light on the hatching of overwintering eggs in three Japanese Sympetrum species. *Paddy and Water Environment* 8(4): 385-391. (in English) ["The aim of the present study was to obtain quantitative information on egg hatching with respect to temperature and light to clarify the effect of cultivation methods on three Japanese Sympetrum species. Eggs of three Sympetrum species were collected on October 2005 at Akita prefecture located at north of Japan, and the eggs had been laid on soil surface of paddy field till April 2006. The eggs (3 trays with 50 eggs each) were held under four constant temperatures (8, 13, 18 and 23°C) with a photoperiod (L:D 14:10; relative light intensity 3,000 Lux) and 23°C in darkness. No *S. infuscatum* eggs, but 67 and 60% *S. frequens* and *S. darwinianum* hatched in constant darkness. This result suggests that *S. frequens* and *S. darwinianum* do not require light for hatching, but *S. infuscatum* requires light for hatching. Eggs of *S. darwinianum* and *S. infuscatum* did not hatch at 8°C. In *S. frequens*, some eggs hatched but the hatching rate was significantly lower at 8°C than at higher temperatures ( $P < 0.05$ ). At higher temperatures, the hatching rate did not differ significantly for three Sympetrum species. At 13°C, *S. infuscatum* hatched fastest, 0.18 for *S. infuscatum*, 0.11 for *S. darwinianum* and 0.08 for *S. frequens*. The mean head width of second stadium larva of *S. frequens*, *S. darwinianum* and *S. infuscatum* were  $0.4 \pm 0.01$ ,  $0.4 \pm 0.01$  and  $0.6 \pm 0.01$  mm (SD), respectively. These results suggest that *S. infuscatum* may have a competitive advantage over *S. frequens* and *S. darwinianum* under conditions that favour *S. infuscatum* through hatching speed." (Authors)] Address: Jinguji, H., School of Food, Agricultural and Environmental Sciences, Miyagi University, 2-2-1 Hatate, Taihaku-ku, Sendai. Miyagi 982-0215, Japan. E-mail: jinguji@myu.ac.jp

**11819.** Klymko, J. (2010): Odonate Surveys on the Tusket, Medway, and Lahave Rivers. Atlantic Canada CDC Canada Atlantique. Report to Nova Scotia Species at Risk Conservation Fund, December 21, 2010: 12 pp. (in English) ["The 2010 fieldwork on major rivers in southern Nova Scotia has significantly increased our understanding of the distribution and status of several rare dragonfly and damselfly species. The surveys demonstrate that exuvia-based collecting can detect elusive species, and can turn up new species on wa-

terways where adults have been well-surveyed. The occurrence of *Ophiogomphus anomalus* in Nova Scotia indicates appropriate habitat may occur for the COSEWIC Special Concern Pygmy Snaketail in Nova Scotia. Most importantly findings indicate there is still much to be learned about Nova Scotia's Odonata. Additional fieldwork on large Nova Scotia rivers would certainly produce new locations for rare species, and likely add species to the provincial list. Large Nova Scotia rivers that have received little attention to date include the St. Mary's (15 records, no exuvia), Clyde (41 records, 1 exuvia), Annapolis River (37 records, 1 exuvia), Roseway (5 records, no exuvia), Stewiacke (3 records, no exuvia), Musquodobit (3 records, 1 larva) (ADIP 2010)." (Author)] Address: Klymko, J., Zoologist, Atlantic Canada Conservation Data Centre. E-mail: jklymko@mta.ca

**11820.** Kovacs, T.; Ambrus, A.; Robotka, A.G. (2010): New data to the occurrence of the riverine dragonfly-species (Odonata: Gomphidae) in North-West Hungary. *Hidrológiai Közlöny* 90(6): 75-77. (in Hungarian, with English summary) [Records of *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Onychogomphus forcipatus* and *Stylurus flavipes* from 27 sampling sites along four rivers in north-west Hungary are published.] Address: Kovács, K., North Transdanubian Regional Environmental, Nature Conservation and Water Management Inspectorate, Laboratory, Török Ignác u. 68., H-9028 Győr, Hungary

**11821.** Krakowska, K. (2010): [Three fish ponds. Guide on the educational path in the community of Żmigród]. Fundacja EkoRozwoju, Wrocław: 57 pp. (in Polish) [Poland, 60 km N of Warsaw. On pages 35-37 a few Odonata species are briefly introduced.] Address: Fundacja EkoRozwoju, 50-134 Wrocław, ul. Białoskórnicza 26, Poland

**11822.** Lambret, P. (2010): Une enquête sur *Lestes macrostigma* (Eversmann, 1836) (Odonata, Zygoptera: Lestidae). *Martinia* 26 (3-4): 178-181. (in French, with English translation) ["The workshop on *L. macrostigma* held during the Odonatological meeting of Saint-Laurent (France), June 26th-28th, 2010, is dealt with. After a recall about the conservation status of the species, the author presented an online survey about its French-Mediterranean distribution and its habitat. Basing on recent studies, a monitoring scheme is proposed and discussed by the participants." (Author)] Address: Lambret, P., Marais du Vigueirat, F-13104 Mas-Thibert, France. E-mail: philambret@hotmail.com

**11823.** NPTS (2010): Research and monitoring. Annual report 2009. Nature Protection Trust of Seychelles Research and monitoring. Annual report 2009: 28 pp. (in English) ["2.5.3. Odonata ...: Jardin Marron - *Allolestes maclachlani* and *Leptocnemis cyanops* abundant in forest; Grande Barbe - *Ceragrion glabrum* observed 31st March; *Tramea limbata* at coast, *Tenibasis alluaudi* at south end of Grande Barbe in December. This species has now been found in all the wooded parts of Grande Barbe; Mon Plaisir - two *Zygonyx luctifera* observed patrolling small canopy gaps on 29th March; La Passe - *Tramea limbata* present all year but uncommon until December; Anse Patates - one pair of *Orthetrum stemmale* in December." (Authors)] Address: Gerlach, R., PO Box 207, Victoria, Mahé, Seychelles. E-mail: jstgerlach@aol.com

**11824.** Rebora, M.; Piersanti, S. Gaino, E. (2010): The antennal sensory function in the oldest pterygote in-

sects: an ultrastructural overview. In: A. Méndez-Vilas and J. Díaz (Eds.): *Microscopy: Science, Technology, Applications and Education*. Vol 4(1): 137-145. (in English) ["Paleoptera (Odonata and Ephemeroptera) represent the oldest pterygote insects. In consideration that antennae are one of the main site of not-visual insect perception, ultrastructural investigations under SEM and TEM have been recently performed on the flagellum of species belonging to several families of Odonata and Ephemeroptera, to clarify the sensory function of the antennae in Paleoptera. These antennae appear very reduced and are constituted by scape, pedicel and an aristate flagellum, mainly monoarticulated in Ephemeroptera and composed of 1-4 flagellomeres in Odonata. Several sensory structures have been identified on the ventro-lateral side of the flagellum in both orders with two main possible functions: thermo-hygroreception and olfaction. Studies on the sensory biology of these aquatic insects can contribute to clarify interesting aspects of their biology. In addition, studies on Paleoptera sensilla light into the evolution of insect sensory abilities." (Authors)] Address: Rebor, Manuela, Dipartimento di Biologia Cellulare e Ambientale, Università di Perugia, 06123 Perugia, Italy. E-mail: rebor@unipg.it

**11825.** Rybak, J.; Pasternak, G. (2010): Analysis of water quality in the area of Wrocław's aquiferous layers with macroinvertebrates as bioindicators. *Ochrona Środowiska* 32(2): 27-34. (in Polish, with English summary) ["For the purpose of this study, seven biotic systems were chosen to assess the quality of wet pond water within the aquifer of Wrocław and in the bordering old Olawa river basin: BMWP-PL, ASPT, BBI, FBI, TBI, CBS and EPT. They all entail zoobenthic communities (including *Platycnemis pennipes*), whose composition changes with increasing pollution of the aquatic environment. The results obtained were compared with the values of some physicochemical parameters of the water, which enabled the applicability of the biotic systems to be evaluated. The water within the area under study was also analyzed for biodiversity. For this purpose calculations were performed to determine the domination and frequency of particular species and families at the sampling sites, as well as to establish the values of the Hurlbert and Margalef biodiversity indices. Both physicochemical and biological parameters make it clear that water quality in the area of the aquiferous layers is generally poor: species of comparatively high resistance to water pollutants were found to occur even at sampling sites characterized by great biodiversity. Water quality in all of the wet ponds examined has been classified either as acceptable or in some instances even as unacceptable. The results obtained support the applicability of the BMWP-PL index and recommend its use on a larger scale in Poland." (Authors)] Address: Rybak, Justyna, G. Pasternak: Politechnika Wrocławska, Wydział Inżynierii Środowiska, Zakład Biologii i Ekologii, Wybrzeże S. Wyspiańskiego 27, 50-370 Wrocław, Poland. E-mail: justyna.rybak@pwr.wroc.pl

**11826.** Tatarkiewicz, D. (2010): Sites of the emergence of *Libellula fulva* (Odonata: Libellulidae) in the forest of Puszcza Notecka. *Odonatrix* 6(1): 21-29. (in Polish, with English summary) [The paper details the environmental characteristics of the emergence sites taken between 2002-2004 near a village Chojno, Poland (52°41'N 16°12'E).] Address: Tatarkiewicz, D., Department of Biology and Environmental Protection, University School of Physical Education, Królowej Jadwigi St.

27/39, 61-871 Poznań, Poland. E-mail: dawid.tatarkiewicz@poczta.fm

**11827.** Tennessen, K (2010): Brief notes on *Ischnura* behavior. *Argia* 22(3): 17-18. (in English) [Verbatim: *Ischnura verticalis*: Females of some species of *Ischnura* mate only once in their lifetime, and they probably mate that one time early in their adult existence. Ola Fincke (1987) reported monogamy to be the norm in *Ischnura verticalis* (Say), the Eastern Forktail. She found that young females (mostly orange) and mature females (mostly grayish-blue) reject approaching males, whereas females that have aged and darkened somewhat but have not yet turned blue were often receptive, once, to mating attempts by males. Furthermore, females that copulated for more than 20 minutes could not be induced to mate again, apparently receiving enough sperm to serve their needs for the rest of their lives (i.e., to fertilize all eggs they may develop). This knowledge helps explain much of the behaviour of the two sexes of this species compared to most other coenagrionids, such as males being nonaggressive towards other males and females ovipositing alone and not being "bothered" much by intruding males. The signals that unreceptive females of *I. verticalis* show males are quite striking. Grieve (1937) was the first to observe females flexing their abdomen ventrally and fanning their wings at approaching males, but he misinterpreted this posturing as an attempt by females to attract males and assumed it was courtship behaviour. Bick (1966) correctly interpreted this behaviour as a signal to a male that the female was unreceptive to mating. I have seen this behaviour numerous times. The following photos (Fig. 1) I took in central Wisconsin show a male hovering near a female and the female wing-whirring and bending the apical half of her abdomen downward to refuse his approach. Males usually leave such females after a few seconds. This scenario (not the posture) is remindful of the age-old rejection at a high school dance, so it's hard for us fellows not to feel sorry for these "ambitious" males. *Ischnura hastata*: This species might also be monogamous, although literature on the natural history of this species is sparse. A population in the Azores is actually parthenogenetic (Lorenzo-Carballo & Cordero-Rivera, 2009); it is the only odonate known to be able to produce viable eggs without sperm, and all resulting offspring are female. However, all known mainland North American populations consist of both males and females. Very little is known about mating and oviposition in this species. Recently, I found several populations in Wisconsin Marquette, Shawano and Waushara counties) and so far have observed oviposition only once, at a ditch-like wetland in Marquette County. A female perched on the surface of the stem of a small rush that had fallen into the water and repeatedly poked her ovipositor into that stem and a nearby stem (Fig. 2). I was able to get two photographs before a male *I. verticalis* pounced on her, at which she flew into nearby vegetation. Further patient observation of this species will likely be rewarded with much-needed knowledge of its reproductive behaviour.] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**11828.** Yakubovich, V.S. (2010): First record of the dragonfly *Orthetrum albistylum speciosum* (Uhler, 1858) (Odonat: Libellulidae) from Khabarovskii Krai. *Far Eastern Entomologist* 219: 11-12. (in English, with Russian summary) [The following records are communicat-



ed: Khabarovskii krai, vicinity of Khabarovsk: Bolshshekheksirsky State Nature Reserve, mouth of Chirki River; 48°11'4" N, 134°40'5" E, 6-8.VII 2009, 6 males, 2 females; vicinity of Korfovskii, 48°12'5"N, 135°27" E, 21.VI 2008, 1 female; vicinity of Chernaya Rechka, 48°27'1" N, 135°18'2" E, 30.VI 2010, 2 males.] Address: Yakubovich, V.S., Department of Biology, Far Eastern Medical University, Murav'ev-Amursky Street 35, Khabarovsk 680000, Russia. E-mail: Presid11@mail.ru

## 2011

**11829.** Abbott, J.C. (2011): Damselflies of Texas. A Field Guide. University of Texas Press. ISBN: 978-0-292-71449-6: 292 pp. (in English) ["Damselflies of Texas ... covers 77 of the 138 species of damselflies known in North America, making it a very useful guide for the entire United States. Each species account includes: illustrations of as many forms (male, female, juvenile, mature, and colour morphs) as possible, common and scientific names, with pronunciation, distribution map, key features, identifying characteristics, discussion of similar species, status in Texas, habitat, seasonality, and general comments. In addition to photographing damselflies in the wild, the author and illustrator have developed a new process for illustrating each species by scanning preserved specimens and digitally painting them. The resulting illustrations show detail that is not visible in photographs. The book also contains chapters on damselfly anatomy, life history, conservation, names, and photography, as well as a list of species that may eventually be discovered in Texas, state and global conservation rankings, seasonality of all species in chronological order, and additional resources and publications on the identification of damselflies." (Publisher) 632 color photos, 79 b&w illus., 80 maps, 4 tables.] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**11830.** Alvarez Gandara, J.; Estévez Rodríguez, R.; Ramos, T.S. (2011): Notas corológicas de *Orthetrum brunneum* (Fonscolombe, 1837) (Odonata, Libellulidae) y aportación de una nueva cita para Galicia (N.W. Península Ibérica). Archivos entomológicos 5: 149-152. (in Spanish, with English summary) [Unpublished and bibliographical distributional records of *O. brunneum* for the NW of the Iberian Peninsula are compiled (Castilla y Leon, Galicia, Portugal).] Address: José Álvarez Gándara 1, Rafael Estévez Rodríguez 2 & Tito Salvadores Ramos 3 1 Barrio do Souto, 10 B. E-36740 San Salvador de Tebra, Tomiño (PONTEVEDRA). E-mail: lcgandara@yahoo.es

**11831.** Beckmann, H.; Berlin, A.; Blumrich, B.; Eitner, M.; Gottschalk, H.-J.; Gräwe, D.; Thiele, V.; Wolf, F.; Zilch, M. (2011): Insektenfauna des Garder Sees und seiner Seeterrassen (Landkreis Güstrow, Mecklenburg-Vorpommern) sowie Vorschläge für Maßnahmen der ökologischen Sanierung. Archiv der Freunde der Naturgeschichte in Mecklenburg 50: 5-38. (in German, with English summary) [Germany, Mecklenburg-Vorpommern; in 2008 and 2009, 10 odonata species have been recorded including *Libellula fulva*.] Address: Thiele, V., Ahornring 10, 19292 Möllen, Germany. E-mail: mv.thiele@t-online.de

**11832.** Brook, J.; Brook, G. (2011): The Dainty Damselfly *Coenagrion scitulum* (Rambur) in Kent. *Atropos* 42:

9-13. (in English) [21-VI-2010, Isle of Sheppey, Kent, UK; discovery, identification and habits of the species are outlined.] Address: Brook, J., Barrack Cottages, Lower street, Broomfield, Maidstone, Kent, ME17 1PU, UK

**11833.** Buczyński, P.; Lewandowski, K. (2011): Dragonfly (Odonata) fauna of Olsztyn (Poland). In: Piotr Indykiewicz, Leszek Jerzak, Jörg Böhner, Brendan Kavanagh (eds.): URBAN FAUNA: Studies of animal biology, ecology and conservation in European cities: 109-119. (in English) ["The field studies presented in this paper were conducted in 1987-2004 and encompassed the Rivers Łyna and Wadąg, streams near Lake Skanda and in the Słoneczny Stok residential estate (usually regulated), eutrophic lakes Skanda, Redykajny and Tyrsko, small water bodies in various parts of the city (city center, Stoneczny Stok, Gutkowo, Municipal Forest, Mazurskie Estate, Jaroty), oxbow lakes, glacial lakes, and a fen near Lake Skanda. A total of 1 914 larvae (including 1 891 identified at the species level), 28 exuviae and 1 268 imagines of 49 dragonfly species were collected, accounting for 67% of the Polish dragonfly fauna. The finding of an imago of *Sympetrum striolatum* was an important faunistic discovery which confirmed the taxon's presence in the Masurian Lakeland. So far, this species had been sighted only in larval form, and, therefore, its occurrence was uncertain. *Sympetma paedisca*, *Lestes viridis* and *Aeshna cyanea* were recorded for the first time in the Olsztyn Lakeland. For all analyzed localities, the most diverse dragonfly fauna was found in small water bodies and streams. Rivers were characterized by the lowest faunistic diversity. The abundance of the odonata fauna in small water bodies can be attributed to a high number of small ponds in post-glacial regions, which differ in stability, trophy levels and vegetation cover. A comparison between the highly developed city center and suburban districts revealed that the qualitative diversity of dragonfly fauna in peripheral areas was twice as high as that reported for downtown Olsztyn." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**11834.** Chandra, K. (2011): Insect Diversity of Sikkim, India. In: Arrawatia, M.L. & S. Tambe (eds.): Biodiversity of Sikkim. Exploring and Conserving a Global Hotspot. Published by: Information and Public Relations Department, Government of Sikkim, Gangtok: 181-206. (in English) [A total of 5892 species belonging to 2382 genera under 261 families and 22 orders of Insect is reported from the Indian state of Sikkim. The taxa are documented order wise at family level; 65 Odonata species are represented] Address: Chandra, K., Zoological Survey of India, Vijay Nagar, Jabalpur-482 002, Madhya Pradesh, India. E-mail: kailash611@rediffmail.com

**11835.** Chelmick, D. (2011): An invasion of the Southern Migrant Hawker *Aeshna affinis* Vander Linden in 2010. *Atropos* 42: 3-7. (in English) [19-VII-2010, Hadleigh, Essex, UK. The paper also discusses additional records from this invasion and gives information on identification of the species.] Address: Chelmick, D.G., 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK. E-mail: dgc@david.chelmick.com

**11836.** Chelmick, D. (2011): Vernacular names — Only for the Brits! *Atropos* 44: 49-50. (in English) [Verbatim: "Odonata is an insect order that has only come to public awareness in recent years. When I started my research

there were no vernacular names, but recent publications have changed all this and a range of English names have been invented, presumably, in order to popularise these insects and make them available to the wider world. I question the need and offer three examples. In the 1980s a particular project was to study the dragonfly *Epiptera bimaculata* in one of its key habitats, the Ardennes in northern France. I spent three days with Gennaro Coppa, who was a dedicated field-worker but whose English was non-existent. Fortunately, thanks to my 'menu French' and the fact that we both knew our dragonflies by their scientific names, we were able to converse and spent the evenings drinking beer and musing over the specific habitat requirements of *Sympetrum danae*, etc. Two years ago I was at a famous wetland in Central Spain known as the Tablas de Daimiel; it was thrashing down with rain but there on the boardwalk was a lone birdwatcher huddled behind his scope, ignoring the elements. 'I am studying *Locustella luscinioides*' he told me, then, realising that I was British, fumbled around in his notebook for his list and translated: Savi's Warbler. This autumn we took a trip to Romania (a walking holiday); the leader was a good birder but kept having to refer to a list whenever a new bird appeared. I found this strange, and upon enquiring I realised that he knew his birds by scientific names so when we found *Loxia curvirostra* he had to refer to his list in order to produce the name Crossbill. Normally he only needs the list for British groups. I am well aware that the British attitude to language is that 'we had to learn English so why shouldn't everyone else', but as a result we are becoming the naturalist laughing stock of Europe, relying upon names that nobody else needs. In addition to their irrelevance, vernacular names for dragonflies can be downright misleading. *Aeshna isosceles* (Norfolk Hawker) does occur in Norfolk but its range extends across central Europe to Mongolia. *Onychogomphus uncatatus* is known, confusingly, as the Large Pincertail and also as the Blue-eyed Hooktail. The species is virtually identical in size with its congener *Onychogomphus forcipatus*, which is known as the Small Pincertail. Even more confusing is the fact that the Blue-eyed Hooktail has green eyes in certain states and especially in females, and the Green-eyed Hooktail has blue eyes in the south of its range! Scientific names are not difficult to learn, are universal in use and provide common communication across all languages—why use anything else?" (Author)] Address: Chelmick, D., 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK. E-mail: dgc@david-chelmick.com

**11837.** Cousins, L.; Tansley, D.; Hepburn, L. (2011): Investigation into the dietary habits of the Eurasian otter (*Lutra lutra*) in the county of Essex. IUCN Otter Spec. Group Bull. 28(2): 76-83. (in English, with French and Spanish summary) ["Monitoring throughout the county of Essex (UK) has shown annual widening of otter distribution. There is, however, room for expansion and some areas remain uncolonised. This paper reports a snapshot study of spraints collected from within the areas of known distribution, providing additional insight on a growing population. Prey remains were identified to family level and data used to calculate trophic breadths over the range of stream orders. Investigative comparisons were used to detect changes in diet with stream order. Further consideration was given to the importance of crayfish predation (e.g. the signal crayfish *Pacifastacus leniusculus*). Within the sample (n= 54)

from four stream orders (Strahler 2-5), fish occurred most frequently (67%). Other groups included; invertebrates 20%, birds 7% and mammals 6%. Crayfish comprised 4% of the sample. There were no significant differences between Trophic Niche Breadth and stream order ( $H^* = 2.73$ ,  $P > 0.05$ ), a finding strengthened by subsequent statistical analysis of the data. Dietary composition was consistent within the range and period studied. Extended research could determine seasonal variation and the extent to which available prey assemblage limits distribution against wider environmental and biological variables." (Authors) Odonata contributed with 6% to prey items extracted from otter spraint (n=54).] Address: Cousins, L., Essex Wildlife Trust, Abbots Hall Farm, Great Wigborough, Colchester. CO5 7RZ, UK. E-mail: lcousi@essex.ac.uk

**11838.** Da Silva, F.L.; Mayer Pauleto, G.; Ruiz, S.S.; Biscalquini Talamoni, J.L. (2011): Aquatic macroinvertebrates survey and assessment of two artificial reservoirs into conservation units from the southeast region of Brazil. *Pan-American Journal of Aquatic Sciences* 6(1): 57-64. (in English, with Portuguese summary) ["This study aims to inventory and assess the aquatic macroinvertebrates fauna in two artificial reservoirs into conservation units with differences regarding conservation level and to anthropogenic impacts. The samplings were carried out in Caetetús Ecological Station and Bauru City Zoological Park, where some physical and chemical variables also were measured. The results obtained indicated that the Caetetús Ecological Station is more effective in the conservation of the diversity of aquatic macroinvertebrates compared to Bauru City Zoological Park. These results can be attributed to the strong anthropogenic impact suffered by the reservoir in Bauru and demonstrate the importance of these areas in maintaining the diversity of aquatic macroinvertebrates community." (Authors) Odonata taxa are treated at family level.] Address: Da Silva, F.L., Universidade Federal de São Carlos – UFSCar, Programa de Pós-graduação em Ecologia e Recursos Naturais, Laboratório de Entomologia Aquática, Departamento de Hidrobiologia, Rodovia Washington Luís, km 235, 13565-905, São Carlos, SP, Brasil. E-mail: fabelha@hotmail.com

**11839.** Fujino, Y.; Wada, S. (2011): Records of *Sympetrum croceolum croceolum* (Selys, 1883) (Odonata: Libellulidae) at Nakaikemi Marsh, Tsuruga, Fukui Prefecture, Japan. *Bulletin of the Fukui City Museum of Natural History* 58: 65-66. (in Japanese, with English summary) ["In 2008 and 2011, some adults of *S. c. croceolum* were found by Noriko Uenoyama, Hiroshi Ikegami and Yuma Fujino at Nakaikemi Marsh, Tsuruga, central Honshu, Japan, and the species was newly added to the fauna of the marsh copiously reported in Research Report from the National Institute for Environmental Studies, Japan, No. 176, 2003, including 70 species of Odonata." (Authors)] Address: Fujino, Y., 1-10-11, Tsunai-cho, Tsuruga City, Fukui, 914-0056, Japan

**11840.** Gómez-Anaya, J.A.; Novelo-Gutiérrez, R.; Campbell, W.B. (2011): Diversity and distribution of Odonata (Insecta) larvae along an altitudinal gradient in Coalcomán mountains, Michoacán, Mexico. *Rev. Biol. Trop. (Int. J. Trop. Biol.)* 59(4): 1559-1577. (in English) ["Evaluating components of landscape diversity is essential for the implementation of efficient conservation strategies. We evaluated the diversity of Odonata larval assemblages from the Coalcomán mountains (CM), Michoacán, Mexico, and related it to local (site-level) habi-

tat variables. Larvae were collected from shores, riffles and pools in five streams, counted and identified to species, twice per season during 2005. The Shannon Diversity Index (H'), Margalef's Richness Index (R), Simpson's Index as a dominance measure (D) and Pielou's Equitability (J) were used to describe the assemblages, and Renyi's Diversity Profiles were used to order diversity. A Bray-Curtis Similarity Index (BC) was used to evaluate beta diversity. Theoretical richness was estimated using non-parametric and parametric methods. A Canonical Correspondence Analysis (CCA) was applied to explore the relationships of species with site-level environmental variables. A total of 12 245 larvae from 75 species, 28 genera and 8 families were recorded. Over all sites, the dominant species were *Erpetogomphus elaps*, *Macrothemis pseudimitans* and *Argia pulla*. The number of species per locality ranged from 18 to 36, and a high number of species (76%) occurred with relative abundances lower than 1%. A differential distribution of species and abundance in streams, time and strata was observed. Renyi's diversity profiles showed diversity was higher in spring and on shores. Most BC similarity values were smaller than 25%, indicating a high turnover rate in the CM. The high turnover rate reflects a differential distribution of the species along the altitudinal gradient, supporting the hypothesis of Mexico as a betadiverse country. According to the slope of Clench's curve, a reliable list of species was gathered. The CM larval assemblage is currently the largest reported for Mexico, and our results support previous proposals of the CM as a species-rich area for conservation." (Authors)] Address: Gomez-Anaya, J.A., Instituto de Ecología, A.C., Apartado Postal 63, MX-91070, Xalapa, Veracruz, Mexico. E-mail: antonio.gomez@in-econol.edu.mx

**11841.** Hollingworth, L. (2011): A Bizarre Sighting of Common Blue Damselfly *Enallagma cyathigerum*. *Atropos* 44: 48. (in English) ["On 10 July 2011 I visited College Lake, Buckinghamshire. A Common Blue Damselfly *Enallagma cyathigerum* attracted my attention, which upon closer inspection appeared to have two bodies hinged at the top. When it flew the bodies opened like a pair of scissors. Can anyone explain what has caused this and whether it is very unusual? - The photo clearly shows a normal 'blue-phase' female Common Blue Damselfly that is also bearing the abdomen of a male, attached in the manner seen during mating i.e. with the male's claspers grasping around the rear of the female's pronotum (the small plate behind the head). What has actually happened is that a pair in tandem or in cop. has been caught by a predator, which has then removed/eaten the male's thorax. This has in turn allowed the female to escape, but with the abdomen of the male still attached. Although in most instances of pair predation a female can presumably escape simply by the pair separating, sightings of females with portions of a male abdomen attached are also reported from time to time. How long the link will persist is unknown but may apparently be some while, the male of course no longer being able to loosen his grip." (Eds.)] Address: Hollingworth, L., 23 Meadow Close, Trimley St Martin, Felixstowe, Suffolk, IP11 0UL, UK

**11842.** Holuša, O.; Dalecký, V.; Holušová, K. (2011): First record of larvae of *Cordulegaster heros* (Odonata: Cordulegastridae) in the Czech Republic. *Acta Musei Beskidensis* 3: 65-69. (in English, with Czech summary) [Two larvae of *C. heros* were found on 15-X-2011 at the

villages of Kudlovice (Kudlovický potok stream) and Jankovice (Jankovický potok stream) on the southern slopes of the Chriby Hills in the Czech Republic.] Address: Holuša, O., Muzeum Beskyd, přírodovědné oddělení, Zámecké náměstí 1264, CZ-738 01 Frýdek-Místek. E-mail: holusao@post.cz

**11843.** Just, J. (2011): *Australolestes* nom. nov. for *Austrolestes* Just, 1998 (Crustacea, Amphipoda, Ischyroceridae, Siphonocetini) homonym of *Austrolestes* Tillyard, 1913 (Insecta, Odonata). *Crustaceana* 84(3): 383. (in English) [Verbatim: "Just (1998) described *Austrolestes* subgen. nov. (type species: *Austrolestes berentsae* Just, 1998) in the siphonocetine amphipod genus *Ambicholestes* Just, 1998. Tillyard (1913) described *Austrolestes* gen. nov. (Odonata). Hence, *Austrolestes* Just, 1998 is a junior homonym of *Austrolestes* Tillyard, 1913. A new name is therefore required for *Austrolestes* Just, 1998. I hereby propose the name *Australolestes* for this subgenus. Component species: *Ambicholestes* (*Australolestes*) *berentsae* Just, 1998, *A. (Australolestes) minutus* Just 1998, *A. (Australolestes) thetis* Just, 1998. References: JUST, J., 1998. Siphonocetinae (Crustacea: Amphipoda: Ischyroceridae) 7: Australian concholestids, *Ambicholestes* n. gen., with a description of six new species, and a new, restricted diagnosis for *Caribboecetes* Just, 1983. *Records of the Australian Museum*, 50 (1): 27-54. TILLYARD, R. J., 1913. On some Australian Anisoptera, with descriptions of new species. *Proceedings of the Linnean Society of New South Wales*, 37: 404-479."] Address: Just, J., Museum of Tropical Queensland, 72-102 Flinders Street, Townsville, Queensland 4810, Australia. E-mail: jean-just@mail.dk

**11844.** Karube, H. (2011): Two new species of the family Aeshnidae (Anisoptera) from central Vietnam. *Tombo* 53: 75-80. (in English, with Japanese summary) ["Two new species of the genera *Cephalaeschna* and *Planaeschna* are described from central Vietnam. *Cephalaeschna asahina* sp. nov. is related to *C. klotsi* Asahina, 1982 from Fukien, China. It is easily distinguished from the latter by its head structure, body maculation and male caudal appendages. It is the southernmost recorded occurrence of the genus. The *Planaeschna asahina* sp. nov. is the 7th member of the genus from Vietnam. It is easily separated from other members of the genus by its peculiar thoracic and abdominal maculation, but is clearly related to *P. tamdaoensis* Asahina, 1996. These two new species were discovered in the mountain zone of Bach Ma national park of central Vietnam, which is known for the rich diversity of its Odonata fauna." (Author)] Address: Karube, H., Kanagawa Pref. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**11845.** Kawashima, I.; Suzuki, Y. (2011): A intergeneric tandem formation observed between a male *Orthetrum albistylum speciosum* (Uhler) and a female *Sympetrum frequens* (Selys). *Tombo* 53: 110. (in Japanese, with English summary) [11-X-2010; "A case of intergeneric connection between a male of *Orthetrum albistylum speciosum* (Uhler, 1853) and a female *Sympetrum frequens* (Selys, 1883) was observed in Miura-shi, Kanagawa Prefecture, C. Honshu, Japan." (Authors)] Address: Kawashima, I., Nagasawa 1-50-9, Yokosuka-shi, Kanagawa, 239-0842 Japan

**11846.** Kawashima, I.; Tsuji, I. (2011): An intergeneric tandem formation observed between a male *Anax parthenope julius* Brauer and a female *Boyeria maclachlani*



Selys. Tombo 53: 91-92. (in Japanese, with English summary) [The intergenetic connection was observed in Sagami-gawa River, Kanagawa Prefecture, C. Honshu, Japan. "Such chances are supposed to be very rare, because the two species have usually territories in different environments, i.e. the former species on still water such as ponds and marshes, while the latter on flowing waters." (Authors)] Address: Kawashima, I., 1-50-9 Nagasawa, Yokosuka, Kanagawa, 239-0842 Japan

**11847.** Kitayama, T. Futahashi, R. (2011): The first record of an interspecific hybrid between *Anax nigrofasciatus nigrofasciatus* Oguma, 1915 and *Anax parthenope julius* Brauer, 1865 from Okayama Prefecture, Honshu, Japan. Tombo 53: 119-120. (in Japanese, with English summary) ["A male of interspecific hybrid between *Anax nigrofasciatus nigrofasciatus* Oguma, 1915 and *Anax parthenope julius* Brauer, 1865 was recorded in Tomihara, Kita-ku, Okayama-shi, Okayama Prefecture, Honshu, Japan. This is the first record from Okayama Prefecture. This specimen has intermediate characteristics between *A. n. n.* and *A. p. j.*, and mixed nuclear DNA sequences of these two species. Notably, this specimen caught a female of *A. p. j.* but failed to mate." (Authors)] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**11848.** Lara, J.; Barrientos, C.; Ardiles, K.; Moreno, L.; Figueroa, R.A.; González-Acuña, D. (2011): Biología reproductiva del Trabajador (*Phleocyptes melanops*) en el centro-sur de Chile. *Ornitología Neotropical* 22: 121-130. (in Spanish, with English summary) ["We studied the breeding biology of the Wren-like Rushbird (*P. melanops*) during three reproductive seasons from 2005 to 2008 in the Santa Elena lagoon, province of Ñuble, south-central Chile. ... Prey delivered to nestling and fledglings were nymphs and naiads of Odonata (48.6% of all item prey), spiders (20%), naiads of Diptera (11.4%), Oligochaeta (11.4%), Acrididae (5.7%), and Neuroptera (2.3%)...." (Authors)] Address: González-Acuña, D., Facultad de Ciencias Veterinarias, Universidad de Concepción, Casilla 537, Chillán, Chile. E-mail: danigon@udec.cl

**11849.** Lemke, M.; Germann, A. (2011): Ein Beitrag zur Libellenfauna (Insecta: Odonata) des ehemaligen Westwalls im Saarland. *Abhandlungen de Delattinia* 37: 155-170. (in German, with French and English summaries) ["This paper reports on dragonflies living in three anti-tank ditches that were part of the former Siegfried Line in the Saarland. Three anti-tank ditches were explored - Niederwürzbach, Lautzkirchen and Webenheim - inhabited by a great variety of species: 33 at Niederwürzbach, 27 at Lautzkirchen, and 29 at Webenheim. For several species evidence of reproduction was found by mating behaviour and ovipositions. On the other hand proof of reproduction success was found by observations of emergences and findings of exuviae. The very large population of *Libellula fulva* found in the anti-tank ditch at Niederwürzbach, the observation of *Ophiogomphus cecilia*, which is listed in the appendices II and IV of the FFH-Directive as well as the autochthonous population of *Epiptera bimaculata* in the anti-tank ditch at Webenheim are especially mentionable. In addition, several endangered species were found." (Authors)] Address: Lemke, M., Burgstr. 5, 66453 Medelsheim, Germany. E-mail: info@libelleninfo.de

**11850.** Lillo, F.; Faraone, F.P.; Lo Valvo, M. (2011): Can the introduction of *Xenopus laevis* affect native amphibian populations? Reduction of reproductive occurrence

in presence of the invasive specie. *Biol. Invasions*. 13: 1533-1541. (in English) ["Biological invasions are regarded as a form of global change and potential cause of biodiversity loss. *Xenopus laevis* is an anuran amphibian native to sub-Saharan Africa with strong invasive capacity, especially in geographic regions with a Mediterranean climate. In spite of the worldwide diffusion of *X. laevis*, the effective impact on local ecosystems and native amphibian populations is poorly quantified. A large population of *X. laevis* occurs in Sicily and our main aim of this work was to assess the consequences of introduction of this alien species on local amphibian populations. In this study we compare the occurrence of reproduction of native amphibians in ponds with and without *X. laevis*, and before and after the alien colonization. The results of our study shows that, when *X. laevis* establishes a conspicuous population in a pond system, the populations of *Discoglossus pictus*, *Hyla intermedia* and *Pelophylax synklepton esculentus* show clear signs of distress and the occurrence of reproduction of these native amphibians collapses. In contrast, the populations of *Bufo bufo* do not appear to be affected by the alien species. Since the Sicilian population of *X. laevis* shows a strong dispersal capacity, proportionate and quick interventions become necessary to bound the detriment to the Sicilian amphibians populations." (Authors) The diet of *Pelophylax esculentus* included 8,5%, that of *X. laevis*; no Odonata species were recorded.] Address: Lo Valvo, M., Dipartimento di Biologia Animale "G. Reverberi", Università di Palermo, Via Archira 18, 90123 Palermo, Italy. E-mail: mlovalvo@unipa.it

**11851.** Lopes Lionello, C.; José dos Santos-Wisniewski, M.; Zaitune Pamplin, P.A. (2011): Caracterização da fauna de insetos aquáticos e diagnóstico ambiental do Córrego dos Aflitos (Alfenas, MG). *Revista de biologia e ciências da terra* 11(1): 97-107. (in Portuguese, with English summary) [Corrego dos Aflitos, located in Alfenas, Minas Gerais, Brazil; the list of taxa includes *Orthemis* and *Anatya*.] Address: Lopes Lionello, C., Graduanda do curso de Ciências Biológicas da Universidade Federal de Alfenas, Brazil. Email: crisleo-nello@hotmail.com

**11852.** Masdeu, M.; Teixeira-de Mello, F.; Loureiro, M.; Arim, M. (2011): Feeding habits and morphometry of *Iheringichthys labrosus* (Lütken, 1874) in the Uruguay River (Uruguay). *Neotropical Ichthyology* 9(3): 657-664. (in English, with Spanish summary) ["Body size and diet of organisms are fundamental attributes which determine their ecology and natural history. *I. labrosus* is one of the most common fish species of the Uruguay River. However, its natural history is poorly known and there is little information about its diet and interactions with other species. This paper describes the feeding habits of this species, relating feeding patterns to the size classes and morphometry of individuals and to the temporal variations. Fishes were captured in May and November of 2006 in three zones of the lower Uruguay River. A total of 101 stomach contents was analyzed (standard length: 60-224 mm). The species exhibited a broad feeding spectrum with most items belonging to the benthic community. We found significant diet differences between size classes and studied months. However, we have not found a close relationship between changes in morphometric variables and diet shifts between size classes." (Authors) Odonata contributed little to the diet.] Address: Masdeu, M., Grupo de Ecología y Rehabilitación

itación de Sistemas Acuáticos, Departamento de Ecología y Evolución, CURE-Facultad de Ciencias, Universidad de la República, CP 20000 Maldonado, Uruguay. E-mail: malvinish@hotmail.com

**11853.** Maxell, B.J.; Piovoa-Scott, J.; Lawler, S.P.; Pope, K.L. (2011): Indirect effects of introduced trout on Cascade frogs (*Rana cascadae*) via shared aquatic prey. *Freshwater Biology* 56(5): 828-838. (in English) [California, USA; "(1) The introduction of trout to montane lakes has negatively affected amphibian populations across the western United States. In northern California's Klamath-Siskiyou Mountains, introduced trout have diminished the distribution and abundance of a native ranid frog, *Rana* (= *Lithobates*) *cascadae*. This is primarily thought to be the result of predation on frog larvae. However, if trout feed on larval aquatic insects that are available to *R. cascadae* only after emergence, then resource competition may also affect this declining native amphibian. (2) Stomach contents of *R. cascadae* were compared between lakes that contained trout and those from which introduced trout were removed. Total prey mass in stomach contents relative to frog body mass was not significantly different between lakes with fish and fish removal lakes, but in the former *R. cascadae* consumed a smaller proportion of adult aquatic insects. The stomach contents of fish included larvae of aquatic insects that are, as adults, eaten by *R. cascadae*. (3) *Rana cascadae* consumed fewer Trichoptera and more Orthoptera at lakes with higher densities of fish. At lakes with greater aquatic habitat complexity, *R. cascadae* consumed more Hemiptera: Gerridae and terrestrial spiders (Araneae). (4) We suggest that reductions in the availability of emerging aquatic insects cause *R. cascadae* to consume more terrestrial prey where trout are present. Thus, introduced trout may influence native amphibians directly through predation and, indirectly, through pre-emptive resource competition." (Authors) Stomach contents of *R. cascadae* averaged among fish-removal lakes (n = 3 lakes, 35 frogs) [A] and those with fish (n = 4 lakes, 13 frogs) [B] expressed as per cent by number (A: 11%; B: 3% in Odonata), per cent by estimated weight (A: 9,5%, B: 1,6% in Odonata)] Address: Maxell, B.J., Dept of Ecology & Evolutionary Biology, Campus Box 334, University of Colorado, Boulder, CO 80309-0334, USA. E-mail: maxwell.b.joseph@colorado.edu

**11854.** McLoughlin, S. (2011): New records of leaf galls and arthropod oviposition scars in Permian-Triassic Gondwanan gymnosperms. *Australian Journal of Botany* 59(2): 156-169. (in English) ["Single, midrib-positioned galls and midrib-flanking oviposition scars are described from four species of Permian glossopterid foliage from Australia and South Africa. Several of these traces have been mistaken previously for glossopterid reproductive organs or fructification detachment scars. A single Early Triassic corystosperm leaf from Australia is reported bearing multiple disc-like galls on both the midrib and pinnules. A Middle Triassic taeniopterid gymnosperm leaf from Australia is described hosting oviposition scars between consecutive secondary veins flanking the midrib. These fossils attest to a much richer record of plant-arthropod interactions in the late Palaeozoic and early Mesozoic of high-latitude Gondwana than previously reported, and indicate that herbivory and reproductive strategies involving galling and foliar ovipositioning were re-established relatively soon after the end-Permian mass extinction event that saw major

turnovers in both the flora and insect fauna." (Author) The paper includes references to Odonata.] Address: McLoughlin, S., Department of Paleobotany, Swedish Museum of Natural History, Box 50007, SE-104 05, Stockholm, Sweden. Email: steve.mcloughlin@nrm.se

**11855.** Miyake, M.; Miyashita, T. (2011): Identification of alien predators that should not be removed for controlling invasive crayfish threatening endangered odonates. *Aquatic Conservation: Marine and Freshwater Ecosystems* 21(3): 292-298. (in English) ["(1.) When multiple invasive species coexist in the same ecosystem and their diets change as they grow, determining whether to eradicate any particular invader is difficult because of complex predator-prey interactions. (2.): A stable isotope food-web analysis was conducted to explore an appropriate management strategy for three potential alien predators (snakehead *Channa argus*, bullfrog *Rana catesbeiana*, red-eared slider turtle *Trachemys scripta elegans*) of invasive crayfish *Procambarus clarkii* that had severely reduced the densities of endangered odonates (*Libellula angelina*) in a pond in Japan. (3.): The stable isotope analysis demonstrated that medium- and small-sized snakeheads primarily depended on crayfish and stone moroko *Pseudorasbora parva*. Both adult and juvenile bullfrogs depended on terrestrial arthropods, and juveniles exhibited a moderate dependence on crayfish. The turtle showed little dependence on crayfish. (4.): These results suggest that eradication of snakeheads risks the possibility of mesopredator release, while such risk appears to be low in other alien predators" (Authors)] Address: Miyashita, T., Laboratory of Biodiversity Science, School of Agriculture and Life Sciences, University of Tokyo, Yayoi, Tokyo 113-8656, Japan. E-mail: tmiya@es.a.u-tokyo.ac.jp

**11856.** NPTS (2011): Research and monitoring. Annual report 2010. Nature Protection Trust of Seychelles Research and monitoring. Annual report 2010: 20 pp. (in English) ["2.5.3. Odonata ...: Jardin Marron - *Allolestes maclachlani* and *Leptocnemis cyanops* abundant in forest. Teneral *Allolestes* in June; *La Passe* - *Tramea limbata* present all year. *Orthetrum semmale* present January - March, September - December. *Anax guttatus* present January - March." (Authors)] Address: Gerlach, R., PO Box 207, Victoria, Mahé, Seychelles. E-mail: jstgerlach@aol.com

**11857.** Pérez, N.S.; Palomares, G.M.; Alabau, A.L. (2011): Libélulas de Venta del Moro. *El Lebrillo Cultural* 28: 21-37. (in Spanish) [Venta del Moro is a municipality in the comarca of Requena-Utiel in the Valencian Community, Spain. Between 27-IV and 5-XI-2010, at 36 sampling sites, a total of 29 Odonata species was recorded.] Address: not stated

**11858.** Piersanti, S.; Rebor, M.; Almaas, T.J.; Salerno, G.; Gaino, E. (2011): Electrophysiological identification of thermo- and hygro-sensitive receptor neurons on the antennae of the dragonfly *Libellula depressa*. *Journal of Insect Physiology* 57(10): 1391-1398. (in English) ["Recent ultrastructural investigations on Odonata antennal flagellum describe two types of sensilla styloconica, T1 and T2. The styloconic sensilla are located in pits, at the bottom of deep cavities, and share common features typical of thermo-hygroreceptors. In order to ascertain if the Odonata antennae are involved in hygroreception and thermoreception, we carried out electrophysiological recordings (single cell recordings, SCR) from adult males and females of *L. depressa*. After con-

tact was established, the antenna was stimulated by rapid changes in temperature and humidity. The present research shows the occurrence of a dry (DC), a moist (MC) and a cold (CC) receptor neurons on the antennal flagellum of *L. depressa*. These data demonstrate for the first time the presence of functional thermo-hygroreceptors on the antennal flagellum of dragonflies. The present results extend our knowledge of the not visual sensory modalities of Odonata, a field of research unexplored so far." (Authors)] Address: Piersanti, Silvana, Dipartimento di Biologia Cellulare e Ambientale, Via Elce di Sotto 1, 06123 Perugia, Italy. E-mail: silvanapiersanti@tiscali.it

**11859.** Pozdeev, I.V. (2011): Benthofauna of some watercourses and waterbodies of Udmurtia. Bulletin of Udmurt University, Biology, Earth sciences 2011(3): 75-84. (in Russian, with English summary) [The article presents the species list of benthic taxa inhabiting the rivers Kama, Cheptsya, Kil'mez' and their tributaries as well as the Votkinsk reservoir in the territory of Udmurt Republic. 125 taxa include *Aeshna squamata* (*A. caerulea*) and *Epiheca bimaculata*.] Address: Pozdeev I.V., candidate of biology, State Research Institute of Lake and River Fisheries, 614002, Perm, Chernyshevskogo st., 3, Russia. E-mail: pozdeevivan@mail.ru

**11860.** Pulfer, T.L.; Bahlai, C.; Mousseau, L. (2011): Recovery Strategy for Laura's Clubtail (*Stylurus laurae*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario: v + 23 pp. (in English) ["*S. laurae* is a member of the dragonfly family Gomphidae. It is found from Texas and the Florida Panhandle up to southwest Ontario, where it is found in the Norfolk Sand Plains physiographic region. Currently there are only two known populations in Ontario – Big Creek and Big Otter Creek. *S. laurae* is listed as an endangered species on the Species at Risk in Ontario (SARO) List and was assessed as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). *S. laurae* requires a high quality aquatic environment and a vegetated riparian area, preferably consisting of mature forests. It is generally found in or near small to medium sized streams with sand or silt substrate and overhanging trees or shrubs. Adults use riffles in the stream for foraging, mating and probably to lay eggs. Eggs or recently emerged larvae are carried downstream to pools. Adults are short-lived with breeding and egg-laying occurring within weeks of adult emergence. The main threat to the survival and recovery of *S. laurae* is habitat degradation or alteration to both the aquatic and terrestrial habitat. Aquatic habitat threats include changes to water flow rate, pH, dissolved oxygen, temperature, nutrient load, pollution, dam construction and changes to water quality. Terrestrial habitat threats include shoreline alteration and loss of riparian habitat. Invasive species (especially Round Goby) and road mortalities are also thought to negatively affect *S. laurae*, but the pressures these are exerting on the population are unknown and require further study. Limiting factors include a limited distribution and apparent sensitivity to specific habitat features. Knowledge gaps include an overall lack of species-specific information (including mating and foraging behaviours, physical tolerances to changes in stream condition and pesticides or herbicides), quantitative assessment of road mortalities and extent of the distribution in Ontario. The recovery goal is to ensure a viable, self-sustaining

population of *S. laurae* in Ontario. The protection and recovery objectives are to: \*protect, maintain and enhance the quantity and quality of existing *S. laurae* habitat; \*reduce or mitigate threats to *S. laurae* and its habitat where feasible; and \*increase knowledge of *S. laurae* biology in Ontario including distribution, abundance, life history and habitat needs. It is recommended that all stream reaches (aquatic resource areas [Aquatic resource areas are aggregations of stream segments with similar physical and biological characteristics] as defined by OMNR) currently occupied by *S. laurae*, as well as the naturally vegetated areas on either side of the stream, extending inland 200 metres (the typical distance the dragonflies travel between reproductive and roosting habitats) be prescribed as habitat under the Endangered Species Act, 2007." (Authors)] Address: not stated

**11861.** Rivers-Moore, N.A.; Goodman, P.S.; Nel, J.L. (2011): Scale-based freshwater conservation planning: towards protecting freshwater biodiversity in KwaZulu-Natal, South Africa. *Freshwater Biology* 56(1): 125-141. (in English) ["(1.) River systems have strong linear linkages. Innovative solutions to capture these linkages are required from aquatic conservation planners. (2.) We apply an approach to freshwater conservation planning to freshwater ecosystems of KwaZulu-Natal (South Africa), using generic conservation planning software. We used a two-step, hierarchical process to capture catchment- and local-scale dynamics, where priority primary catchments were first identified and then used at a second level for selecting priority subcatchments, which served as planning units at a finer scale. (3.) We set quantitative targets for defined freshwater biodiversity features. Priority planning units at both catchment levels were selected using modified weighted cost discounts and penalties, which included the presence of priority estuaries and free-flowing rivers, planning units falling within priority primary catchments, planning units identified as important in an existing terrestrial conservation plan and the degree of catchment degradation. Ecological processes were incorporated by discounting planning units important for surface and groundwater yield. (4.) Upstream–downstream connectivity was achieved by linking adjoining subcatchments associated with main rivers and wetlands and enhanced by setting high targets for subcatchments through which eels (*Anguilla mossambica*) must migrate. (5.) The hierarchical approach of selecting priority primary catchments and using these to affect subcatchment costs, plus the use of high targets for migratory fish species, is applicable to any freshwater conservation plan to favour planning unit selection within selected basins, while facilitating connectivity in upstream–downstream subcatchments." (Authors) The list of freshwater features used in the plan to achieve gamma, beta and alpha biodiversity representation includes *Aciagron pinheyi*, *Agriocnemis ruberrima ruberrima*, *Chlorolestes draconicus*, *Pseudagrion umsingaziense*, *Urothemis luciana*] Address: Rivers-Moore, N.A., Ezemvelo KZN Wildlife, PO Box 13053, Cascades 3202, South Africa. E-mail: blackfly1@vodamail.co.za

**11862.** Rizzo, A.; Arcagni, M.; Arribère, M.A.; Bubach, D.; Ribeiro Guevara, S. (2011): Mercury in the biotic compartments of Northwest Patagonia lakes, Argentina. *Chemosphere* 84(1): 70-79. (in English) ["We report on total mercury (THg) concentrations in the principal components of food webs of selected Northern Patagonia



Andean Range ultraoligotrophic lakes, Argentina. The THg contents were determined using Instrumental Neutron Activation Analysis in muscle and liver of four fish species occupying the higher trophic positions (the introduced *Salmo trutta*, *Oncorhynchus mykiss* and *Salvelinus fontinalis*, and the native *Percichthys trucha*) accounted for eight lakes belonging to Nahuel Huapi and Los Alerces National Parks. We studied the food web components of both the West and East branches of Lake Moreno, including benthic primary producers such as biofilm, mosses, and macrophytes, three plankton fractions, fish, riparian tree leaves, and benthic invertebrates, namely decapods, molluscs, insect larvae, leeches, oligochaetes, and amphipods. Mercury concentrations in fish muscle varied in a wide range, from less than 0.05 to 4 µg g<sup>-1</sup> dry weight (DW), without a distribution pattern among species but showing higher values for *P. trucha* and *S. fontinalis*, particularly in Lake Moreno. The THg contents of the food web components of Lake Moreno varied within 4 orders of magnitude, with the lower values ranging from 0.01 to 0.5 µg g<sup>-1</sup> DW in tree leaves, some macrophytes, juvenile salmonids or benthic macroinvertebrates, and reaching concentrations over 200 µg g<sup>-1</sup> DW in the plankton. Juvenile *Galaxias maculatus* caught in the pelagic area presented the highest THg contents of all fish sampled, reaching 10 µg g<sup>-1</sup> DW, contents that could be associated with the high THg concentrations in plankton since it is their main food source. Although Lake Moreno is a system without local point sources of contamination, situated in a protected area, some benthic organisms presented high THg contents when compared with those from polluted ecosystems." (Authors) Taxa including Odonata are treated at order level.] Address: Rizzo, A., Laboratorio de Análisis por Activación Neutrónica, Centro Atómico Bariloche, CNEA, and CONICET, Av. Bustillo km 9.5, 8400 Bariloche, Argentina

**11863.** Saunders, P. (2011): Records of Vagrant Emperor Anax epiphigger at Dungeness RSPB Reserve, Kent, April 2011. *Atropos* 44: 56-57. (in English) [UK; 23-IV-2011.] Address: Saunders, P., 7a Surrey Road, Nunhead, London, SE15 3A, UK

**11864.** Schmidt Dalzochio, M.; Urakami, Y.; Machado, I.F. (2011): *Mecistogaster amalia* (Burmeister) Odonata: Pseudostigmatidae: First Record from Rio Grande do Sul State, Brazil. *EntomoBrasilis* 4(2): 78-79. (in English, with Portuguese summary) ["*Mecistogaster* is a New World genus of Pseudostigmatidae (Odonata) that is poorly studied due to its preference for flying in forest clearings and trails. In Brazil, only one endemic species, *Mecistogaster amalia* (Burmeister), is known. The distribution of *M. amalia* extends from Southeast Brazil (Rio de Janeiro and São Paulo states) to Argentina. Herein, we report *M. amalia* for the first time in Rio Grande do Sul State, Southern Brazil. This record extends the species' range ca. 630 km from the previous report at Paranaense Forest in Misiones province." (Authors)] Address: Schmidt Dalzochio, Marina, University of Vale do Rio dos Sinos (UNISINOS), Laboratory of Ecologia e Conservação de Ecossistemas Aquáticos, Brazil. E-mail: mahsdalzochio@gmail.com

**11865.** Schwander, T.; Leimar, O. (2011): Genes as leaders and followers in evolution. *Trends in Ecology and Evolution* 26(3): 143-151. (in English) ["A major question for the study of phenotypic evolution is whether intra- and interspecific diversity originates directly from genetic variation, or instead, as plastic responses to

environmental influences initially, followed later by genetic change. In species with discrete alternative phenotypes, evolutionary sequences can be inferred from transitions between environmental and genetic phenotype control, and from losses of phenotypic alternatives. From the available evidence, sequences appear equally probable to start with genetic polymorphism as with polyphenism, with a possible dominance of one or the other for specific trait types. We argue in this review that to evaluate the prevalence of each route, an investigation of both genetic and environmental cues for phenotype determination in several related rather than in isolated species is required." (Authors) The paper includes a section of female polymorphisms in *Ischnura*.] Address: Schwander, Tanja, Wissenschaftskolleg zu Berlin, Wallotstr. 19, 14193 Berlin, Germany. E-mail: tanja.schwander@gmail.com

**11866.** Sharma, S. (2011): Book Review: Nature's Delight. Dragonflies of India: a field guide by K.A. Subramanian, published by Vigyan Prasar, A-50, Institutional Area, Sector-62, NOIDA-201309, U.P.; Pages: 168; Price: Rs.125/-; ISBN No.: 978-81-7480-192-0. *Science Reporter*, November 2011: 53. (in English) [Extensive book review.] Address: Sharma, S., Flat No.101 (FF), H2/21, Bengali Colony, Mahavir Enclave, Palam, New Delhi-110045, India. E-mail: suryakantsharma03@yahoo.co.in

**11867.** Shin, I.K.; Yi, H.B.; Bae, Y.J. (2011): Colonization and community changes in benthic macroinvertebrates in Cheonggye Stream, a restored downtown stream in Seoul, Korea. *J. Ecol. Field Biol.* 34(2): 175-191. (in English) ["Colonization patterns and community changes in benthic macroinvertebrates in the Cheonggye Stream, a functionally restored stream in downtown Seoul, Korea, were studied from November 2005 to November 2007. Benthic macroinvertebrates were quantitatively sampled 15 times from five sites in the stream section. Taxa richness (59 species in total) increased gradually over the first year, whereas the density revealed seasonal differences with significantly lower values in the winter season and after flood events. The benthic macroinvertebrate fauna may have drifted from the upstream reaches during floods and from the Han River, arrived aerially, or hitchhiked on artificially planted aquatic plants. Oligochaeta, Chironomidae, Psychodidae, and Hydropterygidae were identified as major community structure contributors in the stream. Swimmers and clingers colonized relatively earlier in the upper and middle reaches, whereas burrowers dominated particularly in the lower reaches. Collector-gatherers colonized at a relatively early period throughout the stream reaches, and collector-filterers, such as the net-spinning caddisfly (*Cheumatopsyche brevilineata*), predominated in the upper and middle reaches after a 1-year time period. Cluster analyses and multi-response permutation procedures demonstrated that the Cheonggye Stream shares more similarities with the Jungnang Stream than with the Gapyeong Stream. Detrended correspondence analysis and nonmetric multidimensional scaling demonstrated that physical environmental factors (depth, current velocity, dissolved oxygen, and pH) as well as nutrients (total nitrogen and total phosphorous), water temperature, and conductivity could affect the distribution of benthic macroinvertebrates in the study stream... Larvae of *Anax parthenope julius*, *Orthetrum albistylum speciosum*, *Ischnura asiatica*, *Cercion calamorum*, *Cercion hieroglyphicum*, and *Coenagrionoidae* sp.), aquatic

bugs (*Ranatra chinensis*), and aquatic beetles (*Potamonectes hostilis*, *Potamonectes* sp., *Hydaticus* sp., and *Dytiscidae* sp.) were found among the artificially planted aquatic plants along the stream margins during the initial study period. These aquatic insects belong to a typical lentic fauna in Korea and were probably introduced with aquatic plants when they were planted in the restored stream section. The majority of these species disappeared several months after their occurrence. The restored Cheonggye Stream was opened to the public on October 1, 2005, but pilot operations were conducted prior to the opening ceremony while the channel was under construction with artificial plantations." (Authors)] Address: Bae, Y.J., Korean Ent. Institute, Korea University, Seoul 136-701, Korea. E-mail: yjbae@korea.ac.kr

**11868.** Siepielski, A.M.; Mertens, A.N.; Wilkinson, B.L.; McPeck, M.A. (2011): Signature of ecological partitioning in the maintenance of damselfly diversity. *J. Anim. Ecol.* 80(6): 1163-1173. (in English) ["1. Ecological differences among co-occurring taxa are often invoked as an explanation for the maintenance of biodiversity. Whether these differences facilitate coexistence, which allows unequal competitors to remain in systems and thus maintain biodiversity, is still unclear. 2. Here, we used observational and experimental studies to test for ecological partitioning in ways that would promote coexistence among three co-occurring damselfly genera. We evaluated two necessary conditions for coexistence: (i) that the damselfly genera differ in their abilities to engage in interactions with other damselfly genera and environmental conditions such that their relative abundances covary differently along environmental gradients and (ii) that an increase in intrageneric abundance is more detrimental to performance-related demographic features of each genus than increases in intergeneric abundances. 3. Observational studies across 40 lakes showed that relative abundances of each genus covaried differently along an environmental gradient of lake abiotic and biotic features consistent with ecological partitioning. Field experiments in which we manipulated both intra- and intergeneric densities demonstrated that per capita growth rates of each genus are negatively density-dependent and are only limited by increases in intra- not intergeneric densities. 4. Collectively, these results show a clear signature of ecological partitioning among each genus, which should prevent competitive exclusion and maintain each genus in this system. The results do not guarantee local coexistence among the three genera but are consistent with criteria that should promote their coexistence. Our results also suggest that a food web model coupling keystone predation and apparent competition is likely necessary to explain the ecological dynamics of persistence among these genera." (Authors)] Address: McPeck, M., Dept Biol. Sci., Dartmouth College, Hanover, New Hampshire 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**11869.** Sivaperuman, C.; Kumar Shah, S.; Raghunathan, C.; Ramakrishna (2011): Diversity and distribution of odonates in Great Nikobar Biosphere Reserve (GNBR), Andaman and Nikobar islands. In: B.K. Tyagi & V. Veer, [Eds], *Entomology: ecology and biodiversity*. Scientific Publishers (India), Jodhpur, ISBN 978-81-7233-727-8: 119-127. (in English) [Between 2008-2010 at 11 localities 20 Odonata taxa were recorded.] Address: Sivaperuman, C., Zool. Surv. India, Andaman & Nikobar Isis Centre, Port Blair-744 102, Andaman & Nikobar Isis, India

**11870.** Solomon, C.T.; Carpenter, S.R.; Clayton, M.K.; Cole, J.J.; Coloso, J.J.; Pace, M.L.; Vander Zanden, M.J.; Weidel, B.C. (2011): Terrestrial, benthic, and pelagic resource use in lakes: results from a three-isotope Bayesian mixing model. *Ecology* 92(5): 1115-1125. (in English) [Wisconsin-Michigan border region, USA; "Fluxes of organic matter across habitat boundaries are common in food webs. These fluxes may strongly influence community dynamics, depending on the extent to which they are used by consumers. Yet understanding of basal resource use by consumers is limited, because describing trophic pathways in complex food webs is difficult. We quantified resource use for zooplankton, zoobenthos, and fishes in four low-productivity lakes, using a Bayesian mixing model and measurements of hydrogen, carbon, and nitrogen stable isotope ratios. Multiple sources of uncertainty were explicitly incorporated into the model. As a result, posterior estimates of resource use were often broad distributions; nevertheless, clear patterns were evident. Zooplankton relied on terrestrial and pelagic primary production, while zoobenthos and fishes relied on terrestrial and benthic primary production. Across all consumer groups terrestrial reliance tended to be higher, and benthic reliance lower, in lakes where light penetration was low due to inputs of terrestrial dissolved organic carbon. These results support and refine an emerging consensus that terrestrial and benthic support of lake food webs can be substantial, and they imply that changes in the relative availability of basal resources drive the strength of cross-habitat trophic connections." (Authors) Odonata are treated at family level: Corduliidae, Libellulidae.] Address: Solomon, C.T., Dept of Natural Resource Sciences, McGill University, Ste. Anne de Bellevue, Montreal, Quebec H9X 3V9 Canada. E-mail: chris.solomon@mcgill.ca

**11871.** Tam, T.W.; Leung, K.K.; Kwan, B.S.P.; Wu, K.K.Y.; Tang, S.S.H.; So, I.W.Y.; Cheng, J.C.Y.; Yuen, E.F.M.; Tsang, Y.M.; Hui, W.L. (2011): *The Hong Kong Dragonflies*. AFCD, Friends of Country Park and Cosmos Books Ltd. Hong Kong: 367 pp. (in bilingual in Chinese and English) ["Although Hong Kong is famous for its skyscrapers, this city has a rich and unique diversity of dragonflies. Since the first local record made in 1854, a total number of 116 dragonfly species, including two endemic species, has been recorded in Hong Kong. *The Dragonflies of Hong Kong* opens the door to the understanding and identification of these 116 dragonfly species by providing a comprehensive key of adults, and descriptions of their characteristics (larva and both male and female adults), living habits, habitat, update distributional data and local status. With its easy-to-read text in Chinese and English and over 400 spectacular photographs, this book is an essential reference for ecologists and anyone interested in these "winged jewels" of Hong Kong." (Publisher)] Address: Agriculture, Fisheries and Conservation Department, 5/F, Cheung Sha Wan Government Offices, 303 Cheung Sha Wan Road, Kowloon, China. E-mail: mailbox@afcd.gov.hk

**11872.** Tunmore, M. (2011): An influx of insects along the north Norfolk coast. *Atropos* 42: 84-85. (in English) [Verbatim: "On 21 July 2010, whilst visiting friends in North Norfolk, I went for a walk along the nearby coast. It was a dry, warm and largely sunny day with a westerly breeze of approximately Beaufort Force 4. I began my walk at Brancaster beach, walking east along the dunes at the edge of the golf course to the beach chalets and returning via the same route to the car-park. As

I walked I disturbed small numbers of Common Darter *Sympetrum striolatum* (approximately four), a Migrant Hawker *Aeshna mixta* and the occasional Blue-tailed Damsel *Ischnura elegans* (approximately six) and Common Blue Damsel *Enallagma cyathigerum* in the dunes, there being no nearby freshwater. As I approached the beach chalets I disturbed several damselflies from a small Hawthorn *Crataegus monogyna*, which returned to alight on the branches of the bush. Upon closer investigation I found a total of 15 Small Red-eyed Damsel *Erythromma viridulum* perched in this and two adjacent hawthorns, again with no nearby freshwater source. Later that afternoon I visited Titchwell RSPB reserve and walked down to the sea and west along the dunes. At the furthest point I disturbed an Anax imperator and a Painted Lady *Vanessa cardui* in the dunes and encountered an abundance of Silver Y *Autographa gamma* with an estimated 90,000 present in an area of sea lavender *Limonium* spp. At nearby Scott Head NNR summer warden Neil Lawton reported a similar mass arrival of Silver Y on this and the preceding day with 'several hundred thousand' present on 21 July. Via the Atropos Flight Arrivals webpage he also reported an arrival of Odonata on the island on 20/21 July with 10 Small Red-eyed Damsel (including two in a moth-trap), two Emperor and small numbers of *S. striolatum*, *A. mixta*, *Orthetrum coerulescens*, *I. elegans* and *E. cyathigerum*. Overnight moth-trapping there on 20 July produced an estimated 6,000 Silver Y, one Small Mottled Willow *Spodoptera exigua* and seven Marbled Clover *Heliopsis virescens*. Clearly it was a significant period for insect immigration along this part of the North Norfolk coast." Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: atropos@atropos.freeserve.co.uk

**11873.** Varadinova, E.D.; Pechlivanov, L.Z.; Stoichev, S.A.; Uzunov, Y.I. (2011): Recovering and succession of the species diversity of macrozoobenthos in Srebarna Biosphere Reserve (North-East Bulgaria). *Acta zool. bulg.* 63(1): 85-95. (in English) ["Development of the taxonomic composition of bottom macroinvertebrate fauna in Srebarna Lake Reserve is studied with a view to the changes in the environment after its reconnection with Danube River. A regime switching in the succession of the bottom invertebrate community in Srebarna Lake occurs expressed by considerable changes of its species composition after its reconnection of the with Danube by a new canal. Higher species richness in the peripheral pools of the wetland was recorded in comparison with the main open water body. Within the wetland area the local habitat parameters (modified by the flooding regime) are the leading factor that recently directly controls the bottom community development patterns and the spatial distribution of species. Succession of the faunistic complex of secondary aquatic organisms in Srebarna Lake are considered different than these in the communities of primary aquatic species being independent of the water flow." (Authors) Table 1 includes 39 Odonata species.] Address: Varadinova, Emilia, Institute of Biodiversity & Ecosystem Research, Bulgarian Academy of Sciences, 2, Yuri Gagarin Str., 1113 Sofia, Bulgaria. E-mail: emilia.varadinova@gmail.com

**11874.** Verdonschot, R.C.M.; Keizer-Vlek, H.E.; Verdonschot, P.F.M. (2011): Biodiversity value of agricultural drainage ditches: a comparative analysis of the aquatic invertebrate fauna of ditches and small lakes. *Aquatic Conservation: Marine and Freshwater Ecosystems* 21(7): 715-727. (in English) ["Drainage ditches are a common aquatic habitat in the lowland agricultural landscape of north-western Europe. The invertebrate fauna of these waters is poorly known compared with that of the semi-natural wetland fragments found in this region. While most wetlands are designated as nature reserves, drainage ditches are generally viewed purely as hydrological infrastructure in support of agriculture. To assess the conservation value for aquatic invertebrates of these man-made habitats compared with that of wetland fragments, the taxonomic composition and life-history characteristics of invertebrate assemblages inhabiting nine small lakes and nine ditches in peatlands in the Netherlands were compared, as well as the environmental characteristics potentially influencing assemblage structure. Although ditches comprised a smaller water volume, contained less diverse vegetation, displayed larger fluctuations in nutrient concentrations and were regularly managed, the total number of invertebrate taxa recorded per taxonomic group was comparable with that in small lakes, as was the number of nationally uncommon to very rare taxa. Similarity in life-history characteristics between the two water-body types was high, except that a higher proportion of atmospheric air breathers was found in ditches, and more plant miners and collector-filterers in small lakes. On a regional scale, a relatively high inter-ditch taxon dissimilarity was observed, resulting in total diversity estimates for ditches exceeding those of small lakes. This study showed that drainage ditches can be a significant habitat type for aquatic invertebrates. In the Netherlands, water bodies in peatland agricultural areas can contain a diverse invertebrate fauna, similar to that of water bodies in nearby nature reserves. ... Heteroptera and Coleoptera accounted for a significantly larger proportion of the assemblage in drainage ditches, while Odonata and Chironomidae were relatively more abundant in small lakes. (Authors)"] Address: Verdonschot, R., Freshwater Ecology, Centre for Ecosystem Studies, Wageningen, The Netherlands. E-mail: ralf.verdonschot@wur.nl

**11875.** Villanueva, R.J.T.; van der Ploeg, J.; van Weerd, M. (2011): *Drepanosticta hamalaineni* spec. nov. and *Sulcosticta sierramadrensis* spec. nov. from the northern Sierra Madre Natural Park, Luzon, The Philippines (Zygoptera: Platystictidae). *Odonatologica* 40(4): 333-338. (in English) [*D. hamalaineni* sp. n. (holotype male: Dipinintahikan area, Dipagsangan, Palanan, Isabela, Luzon Island, the Philippines, 12/20-IX-2008, to be deposited in RMNH, Leiden) and *S. sierramadrensis* sp. n. (holotype male, same locality, date and deposition) are diagnosed, described and illustrated." (Authors)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**11876.** Winkler, C.; Drews, A.; Behrends, T.; Bruens, A.; Haacks, M.; Jödicke, K.; Röbbelen, F.; Voß, K. (2011): Die Libellen Schleswig-Holsteins Rote Liste. 3. Fassung, September 2011 (Stand: November 2010). Schriftenreihe: LLUR SH – Natur - RL 22: 85 pp. (in German) [Red list of the Federal State Schleswig-Holstein, Germany. App. 50% of the regional fauna are extinct or threatened. Each of these species is introduced with details on distribution, population trends, habitats and causes of threat.] Address: Landesamt für Landwirtschaft, Umwelt und ländliche Räume des Landes Schleswig-Holstein (LLUR), Hamburger Chaussee 25, 24220 Flintbek, Germany



**11877.** Yap, C.K.; Rahim Ismail, A. (2011): Relationships of distribution of macrobenthic invertebrates and the physico-chemical parameters from Semenyih River by using correlation and multiple linear stepwise regression analyses. *Pertanika J. Trop. Agric. Sci.* 34(2): 229-245. (in English) ["The distribution of macrobenthic invertebrates at Semenyih River has been described by Yap et al. (2003a), but their relationships with physico-chemical characteristics of the river have yet to be established. By using correlation and multiple linear stepwise regression, it was found that BOD<sub>3</sub>, orthophosphate, total suspended solids and turbidity were important in structuring the stream macrobenthic invertebrate communities because they determined whether organisms could colonize and persist in the stream habitats. Thus, the invertebrates are useful as bioindicators to the health of the river ecosystem, complementing water quality analysis. Impacts of anthropogenic inputs can therefore be assessed based on the macrobenthic invertebrates' different species distribution." (Authors)] The mean number of specimens of *Leucorrhinia* sp. and *Ophiogomphus* sp. at the sampling stations of Sg. Semenyih in June, 1997 are presented. Both genera are not represented in the Malaysian fauna.] Address: Yap, C.K., Department of Biology, Faculty of Science, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia. E-mail: yapckong@hotmail.com

## 2012

**11878.** Abowei, J.F.N.; Ukoroije, B.R. (2012): The identification, types, taxonomic orders, biodiversity and importance of aquatic insects. *British Journal of Pharmacology and Toxicology* 3(5): 218-229. (in English) [The paper briefly introduces several insect orders including Odonata.] Address: Abowei, J.F.N., Department of Biological Sciences, Faculty of Science, Niger Delta University, Wilberforce Island, Nigeria

**11879.** Alquier, D.; Danflou, S.; Fusari, M.; Haber, E.; Pelozuelo, L. (2012): Observation d'une importante population de *Coenagrion caerulescens* (Fonscolombe, 1838) dans le département du Tarn (Odonata, Zygoptera: Coenagrionidae). *Martinia* 28(1): 57-64. (in French, with English summary) ["A population of *C. caerulescens* has been discovered in the western part of the Tarn Department in southern France which is, according to available information, one of the largest in France and probably in Europe. The presence of this species has been reported to national and local authorities to ensure its conservation despite the lack of legal protection at French and European levels." (Authors)] Address: Alquier, D., 110 rue de la Madeleine, F-81600 Gaillac, France. E-mail: david.alquier@sfr.fr

**11880.** An, R.-j.; Dan, K.; Li, A.-a.; Zhang, D.-M. (2012): Survey research on species of predatory natural enemy in paddy ecosystem of Tongliao areas. *Journal of Agriculture* 2012, 2(2): 21-25. (in Chinese, with English summary) [The fauna of paddy fields in Tongliao area (43° N 122° E; northeastern China, Inner Mongolia) includes *Anotogaster sieboldii*, *Pantala flavescens*, *Symptetrum meridionale*, and *Crocothemis servillia*.] Address: An, R.-j., College of Agriculture, Inner Mongolia University for the Nationalities, Tongliao 028043, Inner Mongolia, China. E-mail: anruijun1@163.com

**11881.** Ananian, V. (2012): New finds of 'critical' species of Odonata in Armenia – *Onychogomphus assimilis*

and *Libellula pontica*. *Brachytron* 15(1): 36-42. (in English) ["*Onychogomphus assimilis* and *Libellula pontica* are among the rarest and least known dragonflies in Armenia. Information on the distribution of the two species in Armenia was limited to few isolated locations reported half a century ago. The present paper presents new finds of these species from several new locations and discusses their conservation issues in the country." (Author)] Address: Vasil Ananian, V., Acopian Center for the Environment, 40 Baghramian Ave, Yerevan, 0019, Armenia. E-mail: gomphus@gmx.com

**11882.** Andem, A. B.; Okorafor, K.A.; Udofia, U.; Okete, J.A.; Ugwumba, A.A.A. (2012): Composition, distribution and diversity of benthic macroinvertebrates of Ona river, south-west, Nigeria. *European Journal of Zoological Research* 1(2): 47-53. (in English) ["Macrobenthic invertebrates' fauna of Ona River at Apata, Ibadan south-west, Oyo State, Nigeria was conducted from October, 2010 to March, 2011. Benthic samples were collected from five different stations along the river. Three phyla of macrobenthic invertebrates were encountered in the river. They were Arthropoda, represented by 3 genera, *Chironomus* (Diptera), *Progomphus* [sic] (Odonata) and *Isoperla* (Plecoptera); ... *Chironomus* larvae dominated the macrobenthic invertebrates with a total relative abundance of 59.1% while *Isoperla* larvae were the least abundant, 0.19% by number. All the macrobenthic invertebrates recorded were pollution-tolerant/Clean water species. The increase in the ecological potential of Ona River throughout the study period was best highlighted by the presence of indicator species." (Authors)] Address: Andem, A.B., Department of Zoology and Environmental Biology, University of Calabar, Cross River State, Nigeria

**11883.** Anjos-Santos, D., Pessacq, P. (2012): Description of the last instar larva of *Forcepsioneura sancta* (Hagen in Selys 1860) (Odonata: Protoneuridae). *Zootaxa* 3495: 79-82. (in English) [The last instar larva of *F. sancta* based on specimens collected in Rio de Janeiro State, Brazil, is described. The main diagnostic characters for the known larvae of Neotropical Protoneuridae genera are presented in a table.] Address: Anjos-Santos, D., Laboratorio de Investigaciones en Sistemática y Ecología animal (LIESA), Sarmiento 849, 9200, Esquel, Chubut, Argentina. E-mail: danielleanjos2@yahoo.com.br

**11884.** Arango, A.M.; Portillo, J.L.; Parra-Tabla, V.; Hernández Salazar, L.T.; Morales Mávila, J.E.; Gray, V.R. (2012): Effect of the spider *Peucea viridans* (Oxyopidae) on floral visitors and seed set of *Cnidocolus multilobus* (Euphorbiaceae). *Acta Botánica Mexicana* 100: 1-14. (in English, with Spanish summary) [The authors studied the interaction between the plant *Cnidocolus multilobus*, its floral visitors and the predator spider *P. viridans*. The diet of *P. viridans* was composed exclusively of arthropods (spiders 32%, insects 68%). Two of the 141 insect prey items were Odonata.] Address: Gray, V.R., Universidad Veracruzana, Instituto de Neuroetología, 91190 Xalapa, Veracruz, México. E-mail: vrico@uv.mx

**11885.** Arimoro, F.O.; Obi-Iyeye, G.E.; Obuken, P.J.O. (2012): Spatiotemporal variation of macroinvertebrates in relation to canopy cover and other environmental factors in Eriora River, Niger Delta, Nigeria. *Environ. Monit. Assess.* 184(10): 6449-6461. (in English) ["Canopy cover is well known to influence the distribution of macroinvertebrates in temperate streams. Very little is known

about how this factor influences stream communities in Afrotropical streams. The effects and possible interactions of environmental factors and canopy cover on macroinvertebrate community structure (abundance, richness, and diversity) were examined in four stations in Eriora River, southern Nigeria bimonthly from May to November 2010. The river supported diverse macroinvertebrates in which the upstream sampling stations with dense canopy cover were dominated by Decapoda, Ephemeroptera, Odonata, Gastropoda, Trichoptera, and Coleoptera while Diptera and Coleoptera were the benthic organisms found predominant at downstream stations with less canopy cover. Some caddisfly species such as *Agapetus agilis*, *Trichostetodes* species and the stonefly *Neoperla* species were present upstream and were found to be potential bioindicators for a clean ecosystem. The blood worm *Chironomus* species and *Tabanus* sp. were abundant at the downstream of the river and are considered potential bioindicators for an organically degrading ecosystem. Some environmental factors varied temporally with significantly higher macroinvertebrate abundance and richness in May. We found out that canopy cover and environmental factors affected macroinvertebrates abundance, diversity, and richness and that the individual taxon had varying responses to these factors. These results help identify the mechanisms underlying the effects of canopy cover and other environmental factors on Afrotropical stream invertebrate communities." (Authors)] Address: Arimoro, F.O., Dept of Animal & Environ. Biology, Delta State Univ., P. M. B. 1, Abraka, Nigeria. E-mail: fransarimoro@yahoo.com

**11886.** Armitage, P.A.; Hawczak, A.; Blackburn, H.H. (2012): Tyre track pools and puddles – Anthropogenic contributors to aquatic biodiversity. *Limnologia - Ecology and Management of Inland Waters* 42(4): 254-263. (in English) ["Twelve sites of tyre track pools and puddles situated in woodland, heath and pasture in Dorset UK were examined to determine their macroinvertebrate species richness and community changes over the course of one year. 174 taxa were found with Diptera (59) and Coleoptera (48) contributing 61% of the total. The most frequently occurring and ubiquitous groups were nematoceran dipterans, Oligochaeta, Coleoptera, Crustacea and Lamellibranchiata. Species richness varied with season and on average was highest in March and November samples. On average only 26% (range 16–40%) of the combined total number of taxa found in spring (March) and autumn (November) samples from a site were also found there in each of these seasons individually, indicating a high species turnover through the year. The tyre track pools contributed to local aquatic biodiversity by adding 29 taxa to previously published taxa lists from aquatic habitats in the area. The relative richness of the tyre track pools is attributed to their successional variation in a heterogeneous landscape. Conservation value of 9 of the 12 sites was rated Very high to High and nine regionally notable or rare taxa were recorded. It is suggested that the important conservation status of the tyre track pools warrants greater recognition and further intensive study." (Authors) The list of taxa includes *Pyrrhosoma nymphula*, *Aeshna cyanea*, *Libellula* sp., *L. depressa*, and *Sympetrum* sp.] Address: Armitage, P.A., Freshw. Biol. Ass., River Laboratory, East Stoke, Wareham, Dorset BH20 6BB, UK. E-mail: parmitage@fba.org.uk

**11887.** Asquith, C.M.; Vonesh, J.R. (2012): Effects of size and size structure on predation and inter-cohort

competition in red-eyed treefrog tadpoles. *Oecologia* 170: 629-639. (in English) ["Individual and relative body size are key determinants of ecological performance, shaping the strength and types of interactions within and among species. Size-dependent performance is particularly important for iteroparous species with overlapping cohorts, determining the ability of new cohorts to invade habitats with older, larger conspecifics. We conducted two mesocosm experiments to examine the role of size and size structure in shaping growth and survival in tadpoles of the red-eyed treefrog (*Agalychnis callidryas*), a tropical species with a prolonged breeding season. First, we used a response surface design to quantify the competitive effect and response of two tadpole size classes across three competitive environments. Large tadpoles were superior per capita effect competitors, increasing the size difference between cohorts through time at high resource availability. Hatchlings were better per biomass response competitors, and maintained the size difference between cohorts when resource availability was low. However, in contrast to previous studies, small tadpoles never closed the size gap with large tadpoles. Second, we examine the relationship between body size, size structure, and predation by dragonfly nymphs (*Anax amazili*) on tadpole survival and growth. Hatchlings were more vulnerable to predation; predator and large competitor presence interacted to reduce hatchling growth. Again, the size gap between cohorts increased over time, but increased marginally more with predators present. These findings have implications for understanding how variation in resources and predation over the breeding season will shape population size structure through time and the ability of new cohorts to invade habitats with older conspecifics." (Authors)] Address: Asquith, C.M., Department of Biology, Virginia Commonwealth University, 1000 West Cary Street, P.O. Box 842012, Richmond, VA 23284-2012, USA. E-mail: jrvolesh@vcu.edu

**11888.** Baird, I.R.C. (2012): The wetland habitats, biogeography and population dynamics of *Petalura gigantea* (Odonata: Petaluridae) in the Blue Mountains of New South Wales. PhD thesis, University of Western Sydney: (in English) ["*Petalura gigantea* is a poorly understood dragonfly with a long-lived fossorial larval habit that is unique to the Petaluridae. The species has been recorded from bogs, swamps and seepages of the coast and ranges of New South Wales, including a small number of records in the Blue Mountains. This topographically and hydrogeologically complex landscape includes a widely distributed network of wetlands characterised by considerable heterogeneity in patch size, quality and geographic separation. It provided the opportunity to elucidate the biogeography, and investigate population dynamics of this species at a landscape scale, within the context of metapopulation theory. This study was undertaken between late 2003 and early 2010. The objectives of the biogeographic component were to identify where *P. gigantea* occurs within the Blue Mountains and why it occurs there. Typologies of existing wetlands were reviewed, and a set of 22 types was identified for use in this thesis. A total of 284 swamps were surveyed, with *P. gigantea* recorded in 111 of these. The species was recorded from 6 swamp types, with potential habitat identified in an additional four swamp types. Hydrogeomorphically, these upland mires range from hanging swamps and localised seepage springs to valley-fill impeded-drainage swamps. *Petalura gigantea* has been observed utilising each of

these hydrogeomorphic expressions across a wide range of slopes and patch sizes. All of these swamp types may be considered groundwater dependent ecosystems. Hydrogeomorphic context and climate were found to be responsible for the development of peatland soils and suitable mire habitat, although selected wetland typologies varied in their usefulness as predictors of habitat suitability. Swamp types used by the species are characterised by considerable spatio-temporal heterogeneity in hydrology and spatial heterogeneity in the distribution of organic-rich soils, within and between swamps. Breeding sites are characterised by a groundwater regime that provides sufficient surface wetness to minimise risk of desiccation of eggs and early larval instars, supports the development of organic-rich peatland soils suitable for larval burrowing, and maintains some groundwater within the burrow throughout the larval stage. *Petalura gigantea* is considered to be an obligate, groundwater dependent, mire-dwelling species. Systematic exuviae surveys and modified 'Pollard Walk' imago surveys were used to study population dynamics at varying spatio-temporal scales, ranging from seasonal demographics within patches to comparison of changing relative abundance of imagines among years, both for and among patches. Seasonal demographics studied included sex ratio at emergence, pattern and duration of the emergence season, duration of the flying season and pattern of changing relative abundance of imagines across the flying season. This set of studies has identified a number of patterns in the landscape scale population dynamics of *P. gigantea* in the Blue Mountains. These include peak abundance years followed by a number of years of low or nil abundance in a large proportion of sites. The difference in relative abundance of male imagines among years was significant for each of the three main swamp types studied. Spatial synchrony in peak abundance years among sites in geographic proximity, and density-dependent male dispersal (in addition to female dispersal) from small sites with large emergence events that contributed to potential dispersal 'halo' effects, were also confirmed. These characteristics suggest a complex, spatially structured population, with patches of different sizes, quality and geographic distance, linked by variable between-patch movements across the network over varying temporal scales. These findings are consistent with metapopulation theory, and suggest a complex dynamic when the long larval stage, some likelihood of cohort splitting, landscape factors (patch size, patch quality, geographic distance, matrix effects) and stochastic exogenous factors (e.g., climate, fire) are considered. This longitudinal, landscape-scale study is the first for any petalurid and the first demographic study for any *Petalura* species. This research will further inform the dialogue in relation to the population dynamics of patchily distributed dragonflies in the context of metapopulation theory, including dynamics such as spatial synchrony, density-dependent dispersal, patch stepping stone and rescue effects. In addition to identified anthropogenic threats, a potential reduction in groundwater availability, a more intense fire regime and potential compounding effects of rapid climate change, may be the greatest threats to the persistence of these mire ecosystems and groundwater dependent species such as *P. gigantea*. The egg and early larval stages are identified as the critical phases, where climatic and fire effects may significantly reduce reproductive success. The improved understanding of the biogeography, habitat requirements and population dynamics of *P. gigantea* resulting from this

study provides a stronger foundation for conservation of the species and these mire ecosystems. *Petalura gigantea* is well placed to act as a flagship for their conservation." (Author) Available from: <http://handle.uws.edu.au:8081/1959.7/509925>.] Address: Baird, I.R.C., 3 Waimea St, Katoomba NSW 2780, Australia. [ianbaird@mountains.net.au](mailto:ianbaird@mountains.net.au)

**11889.** Bates, L.M.; Hall, B.D. (2012): Concentrations of methylmercury in invertebrates from wetlands of the Prairie Pothole Region of North America. *Environmental Pollution* 160(1): 153-160. (in English) ["Prairie wetlands may be important sites of mercury (Hg) methylation resulting in elevated methylmercury (MeHg) concentrations in water, sediments and biota. Invertebrates are an important food resource and may act as an indicator of MeHg exposure to higher organisms. In 2007–2008, invertebrates were collected from wetland ponds in central Saskatchewan, categorized into functional feeding groups (FFGs) and analyzed for total Hg (THg) and MeHg. Methylmercury and THg concentrations in four FFGs ranged from 0.2–393.5 ng·g<sup>-1</sup> and 9.7–507.1 ng·g<sup>-1</sup>, respectively. Methylmercury concentrations generally increased from gastropods with significantly lower average MeHg concentrations compared to other invertebrate taxa. Surrounding land use (agricultural, grassland and organic agricultural) may influence MeHg concentrations in invertebrates, with invertebrate MeHg concentrations being higher from organic ponds (457.5 ± 156.7 ng·g<sup>-1</sup>) compared to those from grassland ponds (74.8 ± 14.6 ng·g<sup>-1</sup>) and ponds on agricultural lands (32.8 ± 6.2 ng·g<sup>-1</sup>). Highlights: \*MeHg concentrations ranged from 0.2 to 393.5 ng·g<sup>-1</sup> and generally increased with trophic level. \*Gastropods had significantly lower average MeHg concentrations compared to other invertebrates. \*Surrounding land use may influence MeHg concentrations in invertebrates. \*MeHg concentrations were higher in organic ponds compared to grassland and agricultural ponds." (Authors) Taxa including Odonata are treated at family level. Average MeHg concentrations varied greatly among ponds for all four invertebrate groups. Average within pond invertebrate MeHg concentrations ranged from 3.3 - 1391.0 ng·g<sup>-1</sup> in Odonata.] Address: Hall, Britt, Dept of Biology, Univ. of Regina, 3737 Wascana Parkway, Regina, SK S4S 0A2, Canada. E-mail: [britt.hall@uregina.ca](mailto:britt.hall@uregina.ca)

**11890.** Beattie, R.G. & Nel, A., (2012): A new dragonfly, *Austroprotolindenia jurassica* (Odonata: Anisoptera), from the Upper Jurassic of Australia. *Alcheringa* 36(2): 189-193. (in English) ["*Austroprotolindenia jurassica* gen. et sp. nov., a new Mesozoic Australian dragonfly, is described from the Talbragar Fossil Fish Bed (Upper Jurassic) of eastern Australia. It shows some similarities with the Eurasian Mesozoic petalurid family Protolindeniidae, but its incomplete state of preservation prevents us assigning it to a particular anisopteran clade." (Authors)] Address: Beattie, R.G., PO Box 320, Berry 2535, NSW, Australia. E-mail: [rgbeattie@bigpond.com](mailto:rgbeattie@bigpond.com)

**11891.** Bernard, R. (2012): East Palaearctic *Somatochlora graeseri* Selys occurs as a postglacial relict in Europe west of the Urals (Anisoptera: Corduliidae). *Odonatologica* 41(4): 309-325. (in English) ["The East Palaearctic *S. graeseri* is characterized by a current disjunct distribution. New data from northern European Russia significantly modify the earlier known pattern of its distribution. The first European record west of the Urals is reported from the environs of Pinega village (Arkhangelsk province, Pinega region). The distribution



range of this species presented here is similar to that of *Coenagrion hylas* and *C. glaciale*. Like these species, *S. graeseri* is a postglacial relict in Europe and representative of a cold-stenothermal fauna that probably colonized the continent during the late Pleistocene and early Holocene. During the Atlantic period they withdrew far to the East, remaining only as isolates in the Urals and in Europe. The survival of *S. graeseri* in the presumptive isolate of its distribution range in the Pinega region is probably a consequence of a specific combination of severe climate and habitat/microclimatic conditions, influenced by karst. The habitat conditions of the new locality are analysed in the context of the species' requirements. The spiny exuviae of *S. graeseri* and details of the female abdominal pattern are presented and compared with those of Siberian and Far Eastern individuals to show the morphological variation of the species. The diagnostic features of the exuviae, such as the large and specifically shaped lateral and dorsal spines, the thoracic banded pattern and the laterosternal sclerites on the fourth to sixth segments of the abdomen, are described." (Author)] Address: Bernard, R., Department of General Zoology, Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznań, Poland; E-mail: [bernard@amu.edu.pl](mailto:bernard@amu.edu.pl)

**11892.** Bhardwaj, H.; Srivastava, M. (2012): A study on insect visitors of certain Cucurbit vegetable crops in an agro-ecosystem near Bikaner, Rajasthan, India. *Journal Academica* 2(3): 99-126. (in English) [Verbatim: "Only ...*Pantala flavescens* was observed to visit flowers present in the agro-ecosystem studied. It was documented throughout the period of study. The number of visits ranged from 1 to 40/man/ h on different flowers. These were also seen to visit the flowers mostly in the forenoon... *Argiocnemis femina* adults were seen from April to October and their number of visits ranged from 1 to 7/man/ h on different flowers. Its maximum number was noticed in the month of April. They visited flowers of *Cucumis* and *Lagenaria*, although *Luffa* flowers were also in their full bloom showing their preference. It was a rare visitor. These were also reckoned more during forenoon."] Address: Srivastava, M., Laboratory of Entomology, Department of Zoology, Govt. Dungar College, Bikaner 334003, Rajasthan, India

**11893.** Bischoff, W. (2012): Prof. Dr. Günther Peters zum achtzigsten Geburtstag. *Die Eidechse* 23(1): 1-3. (in German) [This is a tribute on the occasion of the eightieth birthday of the odonatologist Professor Günther Peters including a short retrospective of his life and work; the focus is set on reptiles.] Address: not stated

**11894.** Bitsch, J. (2012): The controversial origin of the abdominal appendage-like processes in immature insects: Are they true segmental appendages or secondary outgrowths? (*Arthropoda hexapoda*). *Journal of Morphology* 273(8): 919-931. (in English) ["In this article, I review the major characteristics of different types of appendage-like processes that develop at the abdominal segments of many immature insects, and I discuss their controversial morphological value. The main question is whether the abdominal processes are derived from segmental appendages serially homologous to thoracic legs, or whether they are "secondary" outgrowths not homologous with true appendages. Morphological and embryological data, in particular, a comparison with the structure and development of the abdominal appendages in primitive apterygote hexapods, and data from developmental genetics, support the hy-

pothesis of appendicular origin of many of the abdominal processes present in the juvenile stages of various pterygote orders. For example, the lateral processes, such as the tracheal gills in aquatic nymphs of exopterygote insects, are regarded as derived from lateral portions of appendage primordia, homologous with the abdominal styli of apterygotan insects; these processes correspond either to rudimentary telopodites or to coxal exites. The ventrolateral processes, such as the prolegs of different endopterygote insect larvae, appear to be derived from medial portions of the appendicular primordia; they correspond to coxal endites. These views lead to the rejection of Hinton's hypothesis (Hinton [1955] *Trans R Entomol Soc Lond* 106:455-545) according to which all the abdominal processes of insect larvae are secondary outgrowths not derived from true appendageanlagen." (Author)] Address: Bitsch, J., 30 rue du lac d'Oô, F-31500, Toulouse, France. E-mail: [collette.bitsch@orange.fr](mailto:collette.bitsch@orange.fr)

**11895.** Blanke, A.; Wipfler, B.; Letsch, H.; Koch, M.; Beckmann, F.; Beutel, R.; Misof, B. (2012): Revival of Palaeoptera—head characters support a monophyletic origin of Odonata and Ephemeroptera (*Insecta*). *Cladistics* 28: 560-581. (in English) ["The earliest branching event in winged insects, one of the core problems regarding early insect evolution, was addressed using characters of the head. The head is arguably one of the most complex body regions in insects and the phylogenetic information content of its features has been demonstrated. In contrast, the wings and other body parts related to the flight apparatus and sperm transmission are not useful in the context of this problem, as the outgroups (silverfish and bristletails) are wingless and transmit spermatophores externally. Therefore, they show profound differences in the organization of the postcephalic body, and assessment of homology and subsequent phylogenetic analysis of features of these body regions is extremely difficult. The core of this study is the investigation of head structures of representatives of the major clades of dragonflies. A detailed description of the head of *Lestes virens* is presented and was used as a starting point for the compilation of a character set and a character state matrix for the entire Dicondylia (winged insects + silverfish), with a main focus on the placement of dragonflies and consequently the basal branching event within winged insects. Our results indicate a sister-group relationship between a clade Palaeoptera (dragonflies + mayflies) and the megadiverse monophyletic lineage Neoptera. We show that despite considerable structural similarity between the odonate and neopteran mandible, the muscle equipment in dragonflies is more plesiomorphic with respect to Dicondylia than previously known. Odonata and Ephemeroptera also share presumably derived features of the antenna, maxilla, and labial musculature. Parsimony analyses of the head data unambiguously support a clade Palaeoptera." (Authors)] Address: Blanke, A., Forschungsmuseum Alexander Koenig, Adenauerallee 160, 53113 Bonn, Germany. E-mail: [blanke@uni-bonn.de](mailto:blanke@uni-bonn.de)

**11896.** Bogdan, H.V.; Covaciu-Marcov, S.D.; Cupsa, D.; Cicort-Lucaciu, A.S.; Sas, I. (2012): Food composition of a *Pelophylax ridibundus* (*Amphibia*) population from a thermal habitat in Banat region (Southwestern Romania). *Acta zool. bulg.* 64(3): 253-262. (in English) ["The food of *Pelophylax ridibundus* population from the thermal habitat from Carpinis presents great differences depending on the period. The feeding of frogs was

more reduced throughout the winter, due to low temperatures, but also during autumn, due to the drought. Although the basic lines set by the previous studies on the feeding of amphibians in thermal waters are being followed, the facts here show more nuanced reality. Thus, not just low temperatures, but also other meteorological factors (drought or heavy rains) can induce important modifications in the feeding of amphibians. The feeding of *P. ridibundus* population was affected by the variation of such meteorological conditions throughout the entire year of our study. The trophic offer of the habitat was rather reduced, but the terrestrial environment had plenty of preys for the population to feed accordingly. Thus, the number of prey taxa was high, but also very variable among the study periods." (Authors) Odonata are of minor importance as diet of the frog species] Address: Bogdan, Horia, University of Oradea, Faculty of Sciences, Dept of Biology; 1, Universitatii, Oradea 410087, Romania. E-mail: sever.covaciu@yahoo.com

**11897.** Bogdanović, T.; Marković, D.; Katusić, L. (2012): Critically endangered species of dragonfly (Odonata) in the regional park Mura-Drava. Knjiga sažetaka / Proceeding of Abstracts. 11. Hrvatski biološki kongres / 11th Croatian Biological Congress Šibenik, Croatia, 16-21. IX 2012: 203. (in English, with Croatian summary) [Verbatim: During the period from 2011 - 2012, the first systematic investigations of dragonflies of the Regional park Mura –Drava were carried out at 55 locality. The following methods were used: the method of collecting by entomological nets, the method of strolling and observing (linear transect) and the method of taking photographs. Mapping and digital analyses of the data were done by GIS technology, and the ArcView 9.0 program was used. The difference within the composition of the data chosen by the given parameters was done by cluster analysis and the ordination method of the multidimensional scaling of the statistical programme PRIMER 5.0. It was used the Bray-Curtis index of similarity. For the cluster analysis the group average method was used. On the basis of the 1136 collected individuals at different stages of life, a total of 52 species, ... of the order Odonata were established. The established qualitative structure of the dragonflies of the research area represents 72,85% of the total number of species in Croatia which proves that the investigated area is significant for the protection of the biodiversity of the dragonfly fauna. Data relating to the distribution and fluctuation of 4 critical endangered species and change in their populations well as the results of some eco-research show that the dragonflies is a very sensitive species and that the survival of stabile population directly depends on the human activity.] Address: Bogdanović, T., Dept of Biology, University of J. J. Strossmayer, Osijek, Trg Ljudevita Gaja 5, HR-31000 Osijek, Croatia. E-mail: tbogdanovic@biologija.unios.hr

**11898.** Bogdanović, T.; Franković, M.; Marguš, D. (2012): Dragonflies (Odonata) in the National Park „Krka“ – Endangerment and status. 11. Hrvatski biološki kongres / 11th Croatian Biological Congress Šibenik, Croatia, 16-21. IX 2012: 66-67. (in Croatian & English) [Verbatim: The first systematic studies of dragonflies in the National Park "Krka" were carried out from April to September 2010 at 55 localities. The following methods were used: collecting by entomological net and the linear transect method by strolling and observing. Mapping and digital analyses of the data were done by GIS technology, and the ArcView 9.0 program was used.

The difference within the composition of the qualitative and quantitative data structure was done by cluster analysis and the ordination method of the multidimensional scaling using statistical programme PRIMER 5.0. The Bray-Curtis index of similarity was used. For the cluster analysis the group average method was used. On the basis of the 1274 collected individuals at different stages of life, a total of 40 species, 23 genera, 9 families and 2 suborders of the order Odonata were established. Six species making an appearance for the first time in the area investigated have been determined: Data relating to the distribution and fluctuation of critically endangered species and changes in their populations, as well as the results of some eco-researches show that the dragonfly species are a very sensitive and that the survival of stabile population directly depends on the human activity. The established dragonfly species assemblage on surveyed area represents 54.8% of the Croatian dragonfly fauna, which proves the importance of this area to protect the biodiversity of fauna dragonfly] Address: Bogdanović, T., Josip Juraj Strossmayer University, Department of Biology, Ulica Cara Hadrijana 8/A, 31000 Osijek, Croatia. E-mail: tbogdanovic@biologija.unios.hr

**11899.** Bolotov, I.N.; Bepalaya, Yu.V.; Usacheva, O.V. (2012): Ecology and evolution of hydrobionts in hot springs of the subarctic and arctic: Formation of similar assemblages, adaptation of species, and microevolutionary processes. *Biology Bulletin Reviews* 2(4): 340-348. (in English) ["In the Subarctic and Arctic, the fauna of hydrothermal systems is considered to be an allochthonous, migration-mediated system comprised of the representatives of different taxa, which are characterized by a set of preadaptations to life in hot springs. These adaptations evolved before species had colonized this thermal anomalous environment. Hot springs characterizing by a constant temperature and hydrochemical regime appear to be the favourable sites compared to the usual local environment. The short-term existence of thermal springs on the geological time scale and their evolutionary evanescence serve as preconditions for the low fauna endemism that make up the taxa on the intraspecific and species levels. The taxonomical status of many of these forms has not yet been defined with certainty, since populations of new species and intraspecific taxonomic categories of molluscs that inhabit thermal pools may evolve similar morphological, physiological, and biochemical features independently; i.e., they may exhibit convergent similarity." (Authors) The paper refers on an older study with larval records of unidentified Odonata from thermals springs.] Address: Bolotov, I.N., Institute of Environmental Problems of the North, Urals Branch, Russian Academy of Sciences, Arkhangelsk, Russia. E-mail: inep@yandex.ru

**11900.** Borisov, S.N. (2012): Migrant dragonflies in Middle Asia. 4. *Anax parthenope parthenope* (Selys, 1834) (Odonata, Aeshnidae). *Euroasian entomological journal* 11(3): 239-248. (in Russian, with English summary) ["Data on the distribution, phenology and migrations of *Anax p. parthenope* in Middle Asia are presented. Northern limit of species range coincides with Northern boundary of Middle Asia, isolated local populations are recorded in the South of the Urals and Siberia. Annual (2008–2010) autumnal migrations in a southern direction were established in Chok-Pak mountain range (N 42°31', E 70°36') by ornithological traps.

Migration flights were recorded from the end of August to the end of October. Two seasonal cohorts with different life-cycles, migrating and residential, are supposed for Middle-Asian populations." (Author)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**11901.** Bots, J.; Breuker, C.J.; Kaunisto, K.M.; Koskimäki, J.; van Gossum, H.; Suhonen, J. (2012): Wing shape and its influence on the outcome of territorial contests in the damselfly *Calopteryx virgo*. *Journal of insect science* 12:96: 13 pp. (in English) ["Male mating success is often determined by territory ownership and traits associated with successful territory defense. Empirical studies have shown that the territory owner wins the majority of fights with challenging males. Several physical and physiological traits have been found to correlate with resource holding potential. In addition, in aerial insects, wing design may also have a strong influence on resource holding potential, since it determines efficiency and precision during flight. However, this possibility has not yet been thoroughly evaluated using the modern technique of geometric morphometrics to analyze shape. Therefore, this study examined whether wing shape affects the outcome of male-male contests in the territorial damselfly, *Calopteryx virgo*. Wing shape and also traditional flight-related morphological measures were compared between 27 pairs of winners and losers from experimental territorial contests. Contrary to expectations, there were no differences between winners and losers in all studied wing traits (shape, length, width, total surface, aspect ratio, and wing loading). However, highly significant differences in wing shape and size were detected between the fore- and hindwing. It is currently not known how these differences relate to flight performance, since previous biomechanical studies in damselflies assumed fore- and hindwings to have an identical planform." (Authors)] Address: Bots, Jessica, Evolutionary Ecology Group, University of Antwerp, Antwerp, Belgium. E-mail: jessica.bots@ua.ac.be,

**11902.** Bried, J.T.; D'Amico, F.; Samways, M.J. (2012): A critique of the dragonfly delusion hypothesis: why sampling exuviae does not avoid bias. *Insect Conservation and Diversity* 5(5): 398-402. (in English) ["(1.) A recent study comparing adult and exuvial odonate richness concluded that adult surveys overestimate the number of species reproducing successfully. The authors called this phenomenon the "dragonfly delusion" and recommended that only exuviae be used for bio-monitoring and habitat quality assessment. However, they drew this conclusion from limited surveys and detection-naïve analysis and failed to acknowledge that exuvial richness is typically biased low. (2.) Here, we quantify the exuvial bias using two related metrics: (i) species detectability from concurrent adult and exuvial surveys and (ii) estimated exuvial species richness at a site based on imperfect detectability and the regional pool (cumulative total across study sites) of exuvial species observed. (3.) Using concurrent adult and exuvial data from lakes in south-west France, we found that detectability was generally lower in 1-h exuvial searches than in 20-min adult searches and that exuvial surveys may lead to strong negative bias in richness estimation. This suggests the alleged delusion of adult surveys was exaggerated. (4.) Controlling for species de-

tection probability is crucial in making unbiased inferences on how many odonate species occupy a site and, by extension, comparing adult and exuvial species richness. Exuviae sampling avoids positive bias, not bias in general, and requires either relatively intensive search effort, statistical accounting of false species absences, or acceptance of negatively biased richness." (Authors)] Address: Bried, J., Albany Pine Bush Preserve Commission, Albany, NY, USA. E-mail: jbried@albanypinebush.org

**11903.** Buczyński, P.; Dawidowicz, Ł.; Jarska, W.; Tończyk, G. (2012): On the occurrence of *Cordulegaster boltonii* (Donovan, 1807) (Odonata: Cordulegasteridae) in the western part of the Lithuanian Lake District (Poland). *Zoology and Ecology* 22(3-4): 198-202. (in English, with Polish summary) ["The authors analyse three sites of occurrence of *C. boltonii* in the western part of the Lithuanian Lake District (Suwałki Region, north-east Poland). The area is situated within a distance of over 300 km between large agglomerations of the species' sites in the Tuchola Forest (north Poland) and in south-east Lithuania. Only one historical site is known so far from the study area (from 1911). A small but permanent distribution island probably exists in the study area, although *C. boltonii* is rare and develops in small populations. A research programme is required to explain the size of the distribution island, its relations to the sites in Lithuania and the status and threats to the species." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**11904.** Buczyński, P.; Zawal, A. (2012): Dragonflies (Odonata) of the nature reserve "Zródliśko Skrzykowe". *Parki nar. Rez. Przyr.* 31(3): 23-30. (in Polish, with English summary) [In 2006, ten Odonata species were recorded in the "Zródliśko Skrzykowe" nature reserve (NW Poland). Most valuable record was the regionally rare *Cordulegaster boltonii*.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**11905.** Burkle, L.A.; Mihaljevic, J.R.; Smith, K.G. (2012): Effects of an invasive plant transcended ecosystem boundaries through a dragonfly-mediated trophic pathway. *Oecologia* 170: 1045-1052. (in English) ["Trophic interactions can strongly influence the structure and function of terrestrial and aquatic communities through top-down and bottom-up processes. Species with life stages in both terrestrial and aquatic systems may be particularly likely to link the effects of trophic interactions across ecosystem boundaries. Using experimental wetlands planted with purple loosestrife (*Lythrum salicaria*), we tested the degree to which the bottom-up effects of floral density of this invasive plant could trigger a chain of interactions, changing the behaviour of terrestrial flying insect prey and predators and ultimately cascading through top-down interactions to alter lower trophic levels in the aquatic community. The results of our experiment support the linkage of terrestrial and aquatic food webs through this hypothesized pathway, with high loosestrife floral density treatments attracting high levels of visiting insect pollinators and predatory adult dragonflies. High floral densities were also associated with increased adult dragonfly oviposition and subsequently high larval dragonfly abundance in the aquatic community. Finally, high-flower treatments were coupled with changes in zooplankton species richness and shifts in



the composition of zooplankton communities. Through changes in animal behaviour and trophic interactions in terrestrial and aquatic systems, this work illustrates the broad and potentially cryptic effects of invasive species, and provides additional compelling motivation for ecologists to conduct investigations that cross traditional ecosystem boundaries." (Authors) The following Odonata species are included: Imagines: *Anax junius*, *Erythemis simplicicollis*, *Libellula luctuosa*, *Libellula saturata*, *Libellula pulchella*, *Pachydiplax longipennis*, *Tramea lacerata*. Larvae: *Anax junius*, *Erythemis simplicicollis*, *Libellula pulchella*, *Libellula saturata*, *Libellula* sp., *Pachydiplax longipennis*, *Pantala flavescens*.] Address: Burkle, Laura, Department of Ecology, Montana State University, Bozeman, MT 59717, USA. E-mail: Laura.A.Burkle.Adv08@alum.dartmouth.org

**11906.** Butler, S.G. (2012): Description of the last instar larva of *Brachydiplax farinosa* Kruger from Borneo (Anisoptera: Libellulidae). *Odonatologica* 41(3): 277-282. (in English) ["A male final instar larva from Sarawak is described and illustrated, and compared with that of *Brachydiplax chalybea flavovittata* Ris, using also notes and illustrations of congeners gleaned from literature." (Author)] Address: Butler S.G., Red Willow, All Stretton, Shropshire SY6 GHN, United Kingdom. E-mail: sgbutler15@btopenworld.com

**11907.** Bybee, S.M.; Johnson, K.K.; Gering, E.J.; Whiting, M.F.; Crandall, K.A. (2012): All the better to see you with: a review of odonate color vision with transcriptomic insight into the odonate eye. *Organisms diversity & Evolution* 12(3): 241-250. (in English) ["Although Odonata represent some of the most advanced visual systems among insects, odonate visual systems are not as well understood as those of model or more economically important insects. Yet, with their large and complex eyes, aquatic and terrestrial life stages, entirely carnivorous lifestyle, exceptional mating behaviours, diversity in coloration, occupancy of diverse light environments, and adult success that is completely dependent on vision, it would seem studying the visual system of Odonata at the molecular level would yield highly rewarding scientific findings related to predator/prey interactions, the physiological and molecular shifts associated with ecological shifts in light environments, and the role of vision on behavioural ecology. Here, we provide a review of odonate colour vision. The first odonate opsin sequences are published using a degenerate PCR approach for both dragonfly and damselfly lineages as well as a transcriptome approach for a single species of damselfly. These genetic data are combined with electrophysiology data from odonates to examine genotype/phenotype relationships in this visual system. Using these data, we present the first insights into the evolution and distribution of the visual pigments (opsins) among odonates. The integration of molecular and behavioural studies of odonate vision will help answer long-standing questions about how sensory systems and coloration may coevolve." (Authors)] Address: Bybee, S., Graduate Research Assistant: Branham Laboratory, Dept Entomology & Nematology, Univ. of Florida. Natural Area Drive, P.O.Box 110620, Gainesville, FL 32611-0620, USA. E-mail: seth.bybee@gmail.com

**11908.** Camara, I.A.; Diomande, D.; Bony, Y.K.; Ouattara, A.; Franquet, E.; Gourene, G. (2012): Diversity assessment of benthic macroinvertebrate communities in Banco National Park (Banco Stream, Côte d'Ivoire). *African Journal of Ecology* 50(2): 205-217. (in English, with

French summary) ["In the present study, a first inventory of benthic macroinvertebrates in the Banco Stream, Côte d'Ivoire, and the correlations between environmental variables and taxonomic richness were analysed. Seven stations were sampled monthly over a 1-year period, using a hand net (10 × 10 cm, 250 µm mesh, 50 cm length). 132 macroinvertebrate taxa were recorded. These taxa were distributed among 74 families and 15 orders belonging to Insecta (118 taxa; 89% of total richness), Oligochaeta (seven taxa), Crustacea (five taxa) and Mollusca (two taxa). Kruskal–Wallis test revealed significant difference (at least  $P < 0.05$ ) in macroinvertebrate richness between upstream stations (S1 and S2) and stations S4, S5 and S6. Chironominae and Tanypodinae (Insecta) were the two very frequent taxa in all the stations. Lumbriculidae (Oligochaeta), *Desmocarlis trispinosa* (Crustacea) and *Eurymetra* sp. (Insecta) were frequently found in the samples. Hierarchical cluster analysis revealed three groups of sampling stations according to taxonomic similarity. Taxonomic richness was significantly and negatively correlated with conductivity, while it was significantly and positively correlated with substrate types (woody debris and gravel). Due to the fact that Banco stream is the locality type of an endemic shrimp species (*Macrobrachium thysi*), this basin is of high conservation priority" (Authors) Samples were dominated by insects: Coleoptera (22%), Odonata (20.3%), Diptera (16.9%) and Trichoptera (14%)." (Authors)] Address: Camaral, Idrissa Adama, Laboratoire d'Environnement et de Biologie Aquatique, UFR-Sciences et Gestion de l'Environnement, Université d'Abobo-Adjamé, Abidjan 02, Ivory Coast. E-mail: camadams80@yahoo.fr

**11909.** Carle, F.L. (2012): A new *Epiophlebia* (Odonata: Epiophlebioidea) from China with a review of epiophlebian taxonomy, life history, and biogeography. *Arthropod Systematics & Phylogeny* 70(2): 75-83. (in English) ["*Epiophlebia diana* sp.n. is described from larval specimens collected in the mountains of western Sichuan Province, China. Epiophlebian taxonomy, life history, and biogeography are reviewed, and keys provided for determination of the known adults and larvae of *Epiophlebia* Calvert, 1903. Classification of *Epiophlebia* is revised as follows: *Epiophlebia* s.str. with *E. superstes* (Selys, 1889) [type species] and *E. sinensis* Li & Nel, 2012; and *Rheoepiophlebia* subgen.n. with *E. laidlawi* Tillyard, 1921 [type species] and *E. diana* sp.n.. Behavioural, ecological and paleontological information is also evaluated and members of *Epiophlebia* acknowledged to have inhabited small high elevation streams of the east Palaearctic for possibly 180 million years. Likely reasons are proposed for the enduring survival of *Epiophlebia*, its lack of a fossil record and the extinction of related groups." (Author)] Address: Carle, F.L., Rutgers, The State University of New Jersey, Department of Entomology, 96 Lipman Drive, New Brunswick, NJ 08901, USA. E-mail: Carle@AESOP.Rutgers.edu

**11910.** Carrere, V., Blanchon, Y. (2012): Découverte de *Gomphus flavipes* (Charpentier, 1825) en Languedoc-Roussillon (Odonata, Anisoptera: Gomphidae). *Martinia* 28(1): 66. (in French) [France; records from Codolet (20-VII-2010) and Cuxac-d'Aude (19-V., 10-VI., 20-VI-2011) are documented.] Address: Carrere, V., 19 avenue Georges Clemenceau, F-13360 Roquevaire, France. E-mail: carrerevincent@free.fr

**11911.** Casallas-Mancipe, A.; Rache-Rodriguez, L.; Rincon-Hernandez, M. (2012): Postembryonic devel-

opment of *Ischnura chingaza* Realpe under captivity conditions (Zygoptera: Coenagrionidae). *Odonatologica* 41(4): 327-335. (in English) ["The larval stages were observed and characterized under controlled conditions. The larvae were measured and described in order to establish the differences between them, using morphometric characters such as head and premental width and length, number of premental and labial setae, the length of wing pads and legs, and total length without gills, also the growth ratio of different body parts was calculated. The most important character to distinguish larval stages was the head width. There was an increase in the number of premental setae during ontogeny. Comparisons in terms of size were made, showing that females are larger than males in all observed structures. *I. chingaza* has 11 larval stages; except for the pro-larva, all of them were observed." (Authors)] Address: Casallas-Mancipe, A., Licenciada en Biología, Universidad Pedagógica Nacional, 63rd Street 78-65, South Bogota, Colombia. E-mail: acarol29@yahoo.com.ar

**11912.** Catil, J.-M.; Rousset, T. (2012): Un tandem improbable: *Gomphus pulchellus* Selys, 1840 et *Gomphus vulgatissimus* (Linnaeus, 1758), (Odonata, Anisoptera: Gomphidae). *Martinia* 28(1): 65. (in French) [9-V-2011, Ordan-Larroque, Dept. Gers, France; an interspecific tandem between *Gomphus pulchellus* and *G. vulgatissimus* is documented. Address: Catil, J.-M., CPIE Pays Gersois, Au Château, F-32300 L'Isle de Noé, France. E-mail: jmcatil@yahoo.fr

**11913.** Catling, P.M. (2012): Book reviews: Assessment of species diversity in the Atlantic Maritime Ecozone. Edited by Donald F. McAlpine and Ian M. Smith. 2010. National Research Council Press, 1200 Montreal Road, Ottawa, Ontario K1A 0R6 Canada. 785 pages. 94.00 USD. Cloth. *The Canadian Field-Naturalist* 126: 73-75. (in English) [Verbatim: "Chapter 16 by Paul-Michael Brunelle features the 142 Odonata species that are known from AME. This chapter includes such complete information on biology, habitat and systematics, all very well illustrated, that with a basic knowledge of its content, and using it as a reference, the reader is well on the way to being an expert on the group in the region. Brunelle has coordinated the Atlantic Dragonfly Inventory Program (ADIP) and has contributed about ten thousand records himself. The value of that program is immediately apparent in the extensive information available for the assessment. The section on recommendations for improvements on monitoring is especially useful. There is a little more to say on the subject of biogeography. Distributions are changing in this region as southern and western species (*Ischnura hastata*, *Enallagma civile*, *Tramea lacerata*), move north as they have further to the west (Catling 2008, Catling et al. 2009, and references therein). There are some notable patterns that correspond to those of other groups and could be obtained from Appendix Table 1. Distributions in saltmarsh have been discussed and more information on occurrence in this habitat is recently available (Catling 2009). There are a few websites that are useful for dragonflies in the region and one is devoted to a portion of the AME (<http://www.odonatanb.com>)."] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catingpp@agr.gc.ca

**11914.** Chandler, D.S.; Manski, D.; Donahue, C.; Alyokhin, A. (2012): Biodiversity of the Schoodic Peninsula: Results of the Insect and Arachnid Bioblitzes at the Schoodic District of Acadia National Park, Maine.

Maine Agricultural and Forest Experiment Station, the University of Maine. Technical Bulletin 206: 210 pp. (in English) [Records of Odonata are documented in appendix 2 on pages 76-77: *Aeshna interrupta*, *Coenagrion resolutum*, *Enallagma civile*, *Ischnura verticalis*, *Nehalennia irene*, *Lestes rectangularis*, *Leucorrhinia frigida*, *L. hudsonica*, *L. proxima*, *Libellula pulchella*, *L. semifasciata*, *Sympetrum obtrusum*, *S. rubicundulum* and *S. vicinum*.] Address: Chandler, D.S., Dept of Biological Sciences, Univ. of New Hampshire, Durham, NH, USA

**11915.** Chessman, B.C. (2012): Biological traits predict shifts in geographical ranges of freshwater invertebrates during climatic warming and drying. *Journal of Biogeography* 39(5): 957-969. (in English) ["Aim: To test the ability of biological traits to predict climate-related changes in geographical ranges of running-water invertebrates. Location: The Australian state of New South Wales and the Australian Capital Territory. Methods: I analysed data from 8928 biomonitoring samples collected during a 16-year period of generally rising air temperatures and declining precipitation. I used quantile regression to test for expansions and contractions on the climatically cooler, warmer, drier and wetter edges of the ranges of 120 invertebrate taxa, and correlated these shifts with the traits of thermophily (degree of preference for high versus low temperature) and rheophily (preference for flowing versus still water). Results: The most commonly inferred range shifts were cool-edge expansion plus warm-edge contraction (71 taxa) and wet-edge expansion plus dry-edge contraction (71), but contractions from both cool and warm extremes (36) and from both dry and wet extremes (28) were also frequent. High-temperature preference was associated with cool-edge expansion and low-temperature preference with wet-edge expansion and contraction from all other extremes. A preference for flow was associated with wet-edge expansion and dry-edge contraction. Main conclusions: Trait analysis has potential for predicting which species will expand their ranges and which will contract, but needs to be coupled with assessment of how the landscape provides each species with opportunities to track or avoid climate change. Improved quantification of climatically relevant traits and integration of trait analysis with species distribution modelling are likely to be beneficial." (Authors) Taxa (including Odonata) are treated at family level.] Address: Chessman, B.C., Office of Environment and Heritage, PO Box 3720, Parramatta, NSW 2124, Australia. E-mail: bruce.chessman@environment.nsw.gov.au

**11916.** Chuang, S.-W.; Lih, F.-L.; Miao, J.-M. (2012): Effects of Reynolds number and inclined angle of stroke plane on aerodynamic characteristics of flapping corrugated airfoil. *Journal of Applied Science and Engineering* 15(3): 247-256. (in English) ["The effects of the Reynolds number and inclined angle of stroke plane on the generating lift and thrust forces of a flapping corrugated airfoil was studied by numerical simulations with dynamic deformable meshes. The chord Reynolds number ( $Re$ ) based on the incoming airstream velocity is varied from  $10^3$  to  $10^4$  with interval of  $10^3$ . Two different inclined angles of stroke plane on the aerodynamic forces of corrugated airfoil were also considered. Due to the corrugated shape of dragonfly wings varied depending on the cross section location chosen, present tested profile of airfoil was selected from the mid-span of wing of an *Aeshna cyanea* dragonfly forewing. Unsteady flows over a corrugated thin airfoil and a flat-

plate executing flapping motion are computed with time-dependent two-dimensional laminar incompressible Navier-Stokes equations. The dynamic mesh technique is applied to model the flow field of cyclical flapping motion of a corrugated airfoil under different combinations of pitch angle and stroke amplitude. Instant vorticity contours over a complete flapping cycle of a corrugated airfoil and a flat-plate clearly reveals the flow mechanisms for lift force generation are dynamic stall, rotational circulation, and wake capture. The thrust force is dominated by the formation of leading edge vortex (LEV) and trailing edge vortex (TEV) shedding downstream to form a reverse von Karman vortex. Results indicated that there is little difference on the aerodynamic force between corrugated airfoil and flat-plate under tested range of flapping frequency. The mean lift force coefficient of corrugated airfoil was enhanced with the increasing of  $Re$ . Visible changes in the mean lift force coefficient can be identified from the variation of inclined angle of stroke plane at a fixed  $Re$ . The critical products of reduced frequency and stroke amplitude to generate the positive mean thrust force output of a corrugated airfoil was given in present work." (Authors)] Address: Chuang, S.-W., Institute of Weapon Systems, Chung Cheng Institute of Technology, National Defense University, Taoyuan, Taiwan 335, R.O.C.

**11917.** Cios, S. (2012): Oviposition by the Winter Damselfly *Sympecma* sp. (Odonata: Lestidae) on a car. *Odonatrix* 8(2): 63-64. (in Polish, with English summary) ["On 17 March 2012 at noon the author observed an individual of *Sympecma* sp. ovipositing on a sunlit car, the colour of which was metallic caper green pearl. It repeatedly touched the coat of the car with the ventral side of the body for ca. 20–30 seconds. Than it sat on the car and after a while flew away. Though oviposition on cars is well known in aquatic insects, there are relatively few such reports on the Zygoptera. This may be due to the fact that they tend to stay closer to water bodies, than Anisoptera dragonflies." (Author)] Address: Cios, S., ul. Stryjeńskich 6/4, 02-791 Warszawa, Poland. E-mail: tanislaw.cios@msz.gov.pl

**11918.** Cuber, P. (2012): The first record of Eurasian Baskettail *Epitheca bimaculata* (Charpentier, 1825) (Odonata: Corduliidae) in Silesian Province. *Odonatrix* 8(2): 52-54. (in Polish, with English summary) ["*E. bimaculata* is widely distributed in northern and eastern Poland. Its distribution becomes more local towards the west and south. It is the first record of this species in Silesian Province. The total number of seven exuviae was collected on the shores of ponds located close to Mochała on the territory of the "Forests over Upper Liswarta" Landscape Park." (Author)] Address: Cuber, P., Śląski Uniwersytet Medyczny w Katowicach, Wydział Farmaceutyczny z Oddziałem Medycyny Laboratoryjnej w Sosnowcu, Zakład Parazytologii, ul. Jedności 8, 41-200 Sosnowiec, Poland. E-mail: piotrc10@op.pl

**11919.** Cui, J.; Lackey, M.; Tew, G.; Crosby, A. (2012): Resilient synthetic PEG/PDMS hydrogels inspired by natural resilin. *Bulletin of the American Physical Society* 57(1) [APS March Meeting 2012, Monday–Friday, February 27–March 2 2012; Boston, Massachusetts]: 1 p. (in English) [Verbatim: Novel synthetic hydrogels are developed by incorporating hydrophobic polydimethylsiloxane (PDMS) into hydrophilic poly(ethylene glycol) (PEG)-based network using thiol-norbornene chemistry. The properties of these hydrogel are comparable to natural resilin, which is an elastic protein, exist-

ing in many insects, such as the tendons of flea and the wings of dragonfly, with extraordinary ability of mechanical energy storage. The energy storage efficiency (resilience) of the hydrogels is more than 97(%) even at tensile strains up to 170(%). In addition, the Young's modulus of the hydrogels ranges from 3 kPa to 300 kPa by increasing the volume fraction of the PDMS in the network. These unique properties are attributed to the well-defined network and negligible secondary structure, provided by the versatile and efficient chemistry.] Address: not stated

**11920.** Damm, S.; Hadrys, H. (2012): A dragonfly in the desert: genetic pathways of the widespread *Trithemis arteriosa* (Odonata: Libellulidae) suggest male-biased dispersal. *Organisms diversity & evolution* 12(3): 267-279. (in English) ["Water-dependent species inhabiting desert regions seem to be a contradiction in terms. Nevertheless, many species have evolved survival strategies for arid conditions. In Odonates, both larvae and adults require very different and complex water-associated habitat conditions. The present study investigates the genetic diversity, population structure and dispersal patterns of a desert inhabiting odonate species, *T. arteriosa*. Eight populations from the arid Namibia and four population sites in the more tropical Kenya were compared by using nine microsatellite loci, one non-coding nuclear fragment and the mtDNA fragment ND1. Microsatellite analyses as well as the nuclear fragment reveal a high allelic diversity in all populations with almost no genetic sub-structuring. In contrast, ND1 sequence analyses show sub-structuring and—with two exceptions—only private haplotypes. The conflicting patterns of nuclear versus mitochondrial markers suggest a male-biased dispersal in this species. Results indicate that male dispersal is dependent on the environmental stability of the habitat, while females are philopatric. This life history adaptation would allow females to save energy for mating and oviposition in the demanding environment of a desert region. The results give direct insights into the dispersal pathways of a desert-inhabiting, strongly water dependent flying insect." (Authors)] Address: Damm, Sandra, ITZ, Ecology & Evolution, TiHo Hannover, Bünteweg 17d, 30559 Hannover, Germany. E-mail: sandra.giere@ecolevol.de

**11921.** Davidson, S. (2012): *Pantala flavescens* an ancient mariner. *Agrion* 16(1): 15. (in English) [Verbatim: "In our winter when I can not see odonates I carry out research into the use of marine chronometers on sailing ships in the early 19th century. I was recently reading the Ship's Log of an East India Company ship called the Bombay sailing from Malacca to Canton in 1810 (India Office Records, 1810). I was surprised to read that Captain Archibald Hamilton recorded in his log on the 5th October 1810, mid-ocean between Cambodia, Malaya and Borneo, seeing 'Dragonflies'. They were I would suggest almost certainly *Pantala flavescens*. "Friday 5 October 1810 8 am near to Latitude 5 17' N Longitude 106 8' E. Observed a great number of dragonflies on board which had not been on board before". "Wednesday 10 October Have continued to see a number of dragonflies about the ship ever since the 5<sup>th</sup> instant more or less sometimes only flying about the Vanes at the Mast Head". Reference: India Office Records, 1810. Captain's Log HEIC Bombay L/MAR/B/48B. British Library"] Address: Simon Davidson. E-mail: simoncathlyn@hotmail.com



**11922.** De Block, M.; Stoks, R. (2012): Phosphoglucose isomerase genotype effects on life history depend on latitude and food stress. *Functional Ecology* 26(5): 1120-1126. (in English) ["(1.) Phosphoglucose isomerase (Pgi) genotypes differ in life-history traits and shifts in their frequencies are thought to contribute to latitudinal gradients in life history. Yet, it is unstudied whether the life-history effects of Pgi are invariant across latitudes. Further, while genetic variation at the Pgi locus is thought to be maintained by genotype-by-environment interactions and by life-history trade-offs involving resource allocation, the effects of food stress on Pgi genotype effects are largely unstudied. (2.) We compared Pgi allozyme genotype effects on life history between northern and southern populations of the damselfly *Ischnura elegans* in a common garden experiment where we manipulated food stress. (3.) Pgi genotypes differed in larval development time and body mass, but neither in larval growth rates nor in adult life span. (4.) The effect of the Pgi genotype on larval development time differed between latitudes, suggesting interactions with the latitude-specific genetic background and/or maternal effects. Pgi genotype effects on both development time and body mass were dependent on food stress and indicated a trade-off between both fitness-related traits associated with the Pgi gene. (5.) The newly identified interaction between the Pgi genotype and latitude, the poorly studied Pgi genotype-by-food stress interactions and the observed life-history trade-offs associated with the Pgi genotypes can all potentially contribute to maintaining genetic variation at the Pgi locus and to latitudinal patterns in life history. Both types of interactions may also explain the poorly understood differences in the Pgi genotype effects on life history among studies of the same species." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be



**11923.** Brochard, C.; Groenendijk, D.; van der Ploeg, E.; Termaat, T. (2012): *Fotogids Larvenhuidjes van Libellen*. KNNV Uitgeverij. 320 pp. ["For the first time there is now a Dutch field guide to help you name the exuviae. The first section provides background information on dragonflies and on the collection, preservation and identification of their exuviae. The second part describes the exuviae of the 80 most common dragonflies and damselflies of Northwest Europe. • Unique photographs of the exuviae, larvae, adult dragonflies and their habitats. • More than 80 species and complete for Northwest Europe. • Clear identification keys and species descriptions of exuviae Language: Dutch." (Publisher)]

**11924.** De Knijf, G. (2012): Trip report of the dragonfly excursion of 9th of June 2012 to the region of Boulogne (France). *Libellenvereniging Vlaanderen — nieuwsbrief* 6(2): 14-16. (in Dutch, with English summary) ["A visit to a small stream in the Dunes near the village of Camiers resulted in the very interesting observation of *Coenagrion mercuriale* (>20 ind.). Other species noteworthy here were *Coenagrion scitulum*, *Libellula fulva* and *Libellula quadrimaculata*. After this nice dune stream we headed southeast to an alkaline peatbog in the valley of Authie near the village of Roussent. Besides the more common species, we observed huge numbers of *Coenagrion pulchellum*, *Coenagrion scitulum* and *Libellula fulva* and a male of *Calopteryx splendens* was seen along the stream Authie." (Author)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**11925.** De Knijf, G. Opdekamp, W. (2012): Europese primeur: populatie Rivierrombout ontdekt langs een kanaal. *Libellenvereniging Vlaanderen — nieuwsbrief* 6(2): 9-10. (in Dutch, with English summary) ["On July 28 2012, volunteers of the LVV and Natuurpunt discovered *Gomphus flavipes* at the Albertkanaal near Broechem (Antwerp). There are clear indications - many exuviae were found - that it concerns a population in the canal, a unique habitat for this dragonfly species in Europe. A more thorough publication is in preparation." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**11926.** De Marmels, J. (2012): Review of the "metallic group" of species of *Argia* Rambur known from Venezuela, with description of the larva of *Argia jocosa* Hagen in Selys, 1865 (Odonata: Coenagrionidae). *International Journal of Odonatology* 15(3): 249-262. (in English) ["In Venezuela, the "metallic group" includes three species: *Argia cupraurea* Calvert, *Argia jocosa* Hagen in Selys, and *Argia orichalcea* Hagen in Selys. These are here diagnosed and illustrated, and their distribution in Venezuela is mapped. The larva of *A. jocosa* differs from the few other known larvae of the group in details of the prementum, labial palp and shape of caudal gills." (Author)] Address: Museo del Instituto de Zoología Agrícola "Francisco Fernández Yépez" (MIZA), Facultad de Agronomía, Universidad Central de Venezuela, Apartado 4579, Maracay, 2101-A, Venezuela

**11927.** Dijkstra, K.-D.B.; Kalkman, V.J. (2012): Phylogeny, classification and taxonomy of European dragonflies and damselflies (Odonata): a review. *Organisms diversity & evolution* 12(3): 209-227. (in English) ["Although Europe is the cradle of dragonfly systematics and despite great progress in the last 2 decades, many issues in naming its species and understanding their

evolutionary history remain unresolved. Given the public interest, conservation importance and scientific relevance of Odonata, it is time that remaining questions on the species' status, names and affinities are settled. We review the extensive but fragmentary literature on the phylogeny, classification and taxonomy of European Odonata, providing summary phylogenies for well-studied groups and an ecological, biogeographic and evolutionary context where possible. Priorities for further taxonomic, phylogenetic and biogeographic research are listed and discussed. We predict that within a decade the phylogeny of all European species will be known." (Authors)] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: dijkstra@nrm.nl

**11928.** Dobrzańska, J. (2012): Global changes in the local scale, or about climate of cities and dragonflies (Odonata). Proc. 22<sup>th</sup> Congr. Pol. Hydrobiol., Cracow, Poland, 19–22 Sept. 2012 ([www.iop.krakow.pl/zhp](http://www.iop.krakow.pl/zhp)): (in English) [Verbatim: Odonata are presumed to be indicators of many environmental processes including climate change. It was already stated that increases in contribution, in terms of abundance and ranges, of Mediterranean species, in Poland, can be correlated with this global process. In my previous studies on dragonflies in Warsaw I suggested a possibility of analogous phenomenon in the local scale correlated with so-called „urban heat island”. In this study I continue researches at mentioned relationship analyzing species composition of chosen oxbow lakes of the Vistula River in Warsaw and surroundings. In the analysis I mainly focus on these factors which mostly can affect microclimate of studied reservoir. Among studied parameters the most important seem to be management of neighbouring land, size of the lake and distance from the city centre. City, as the specific ecosystem, influence on water ecosystems which are inside its borders and in the vicinity in special and multidimensional way. There are many aspects of dragonflies biology, out of which we can presume that these influence can sometimes be positive and in other cases negative. In presented deliberation chosen relationships related to city's influence on water ecosystems and their possible effects on dragonflies are going to be discussed.] Address: Dobrzańska, Julia, Warsaw Univ. of Life Sciences, Fac. of Civil & Environmental Engineering ul. Nowoursynowska 159, 02-776 Warszawa, Poland. E-mail: juliadobrzanska@sggw.pl

**11929.** Dolný A.; Harabiš F.; Bárta D.; Lhota, S.; Drozd, P. (2012): Aquatic insects indicate terrestrial habitat degradation: changes in taxonomical structure and functional diversity of dragonflies in tropical rainforest of East Kalimantan. *Tropical Zoology* 25(3): 141-157. (in English) ["As a group of freshwater invertebrates, dragonflies (Odonata) are commonly used as ecological indicators of freshwater ecosystems. Despite earlier studies suggesting that adult odonates may be good indicators for complex changes in a landscape, the utility of odonates as suitable indicators to indicate health of non-aquatic (forest) habitats remains poorly understood. This study analyses the adult dragonfly assemblage pattern against spatial and temporal disturbance characteristics in Indonesia's Sungai Wain Protection Forest. The core of this reserve comprises one of the few remaining fragments of primary rain forest along the East Kalimantan coast, whereas the rest of the reserve is covered by secondary forest, scrub, grassland, and farmland. Adult dragonfly assemblages at individual sampling sites were analysed

in relation to (1) their intensity, (2) frequency of human-caused disturbances, and (3) the time since the last such disturbance, while controlling random variables (type of aquatic and terrestrial habitat) were removed. This study tests the effect of these factors on (1) species richness, (2) proportion of Zygoptera, (3) proportion of forest specialists, and (4) proportion of Borneo's endemics. The human induced disturbances in the rain forest resulted in pronounced changes in the taxonomical composition and functional diversity of the odonate fauna. Results reported here demonstrate that gradual changes in the odonate assemblages correspond to the degree of anthropogenic influences on forest environments. Adult odonates comprise an appropriately sensitive and versatile indicator group for identifying changes in terrestrial forest environments as well as in freshwater habitats." (Authors)] Address: Ales. Dolný, A., Dept of Biology and Ecology and Institute of Environmental Technologies, Faculty of Science, University of Ostrava, CZ-710 00, Ostrava, Czech Republic. Email: ales.dolny@osu.cz

**11930.** Dorazio, R.M.; Rodriguez, D.T. (2012): A Gibbs sampler for Bayesian analysis of site-occupancy data. *Methods in Ecology and Evolution* 3(6): 1093-1098. (in English) ["(1.) A Bayesian analysis of site-occupancy data containing covariates of species occurrence and species detection probabilities is usually completed using Markov chain Monte Carlo methods in conjunction with software programs that can implement those methods for any statistical model, not just site-occupancy models. Although these software programs are quite flexible, considerable experience is often required to specify a model and to initialize the Markov chain so that summaries of the posterior distribution can be estimated efficiently and accurately. (2.) As an alternative to these programs, we develop a Gibbs sampler for Bayesian analysis of siteoccupancy data that include covariates of species occurrence and species detection probabilities. This Gibbs sampler is based on a class of site-occupancy models in which probabilities of species occurrence and detection are specified as probit-regression functions of site- and survey-specific covariate measurements. (3.) To illustrate the Gibbs sampler, we analyse site-occupancy data of *Aeshna cyanea*, a common dragonfly species in Switzerland. Our analysis includes a comparison of results based on Bayesian and classical (non-Bayesian) methods of inference. We also provide code (based on the R software program) for conducting Bayesian and classical analyses of site-occupancy data." (Authors)] Address: Dorazio, R.M., Southeast Ecological Science Center, U.S. Geological Survey, 7920 NW 71st Street, Gainesville, FL 32653, USA. E-mail: bdorazio@usgs.gov

**11931.** Dow, R.A.; Orr, A.G. (2012): *Drepanosticta simuni* spec. nov. from Borneo, with notes on related species (Zygoptera: Platystictidae). *Odonatologica* 41(3): 283-291. (in English) ["The new species is described from Gunung Mulu National Park in Sarawak, Malaysian Borneo and compared with its closest congeners, *Drepanosticta barbatula* Lieftinck and *D. drusilla* Lieftinck, which are also refigured. New distribution records for the latter 2 species are documented." (Authors)] Address: Dow, R.A., NCB Naturalis, P.O. Box 9517, 2300 RA Leiden, The Netherlands rory.dow230@yahoo.co.uk

**11932.** Dow, R.A. (2012): Odonata collected at Gunung Pueh, Kuching Division, Sarawak, Malaysia in October 2012. *International Dragonfly Fund - Report* 54: 1-21. (in English) ["Records of Odonata collected from Gu-

nung Pueh and the surrounding area, in west Sarawak, in October 2012, are presented. 67 species were collected; two species were recorded in Borneo for the first time: *Libellago stigmatizans* and *Copera ciliata*. Other notable records include *Podolestes chrysopus*, *Telosticta ?gading*, *Agriocnemis minima* and *Pseudagrion coomansi*. Some additional, previously unpublished, records from the most western part of Sarawak are included in two appendices." (Author)] Address: Dow, R.A., Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**11933.** Dow, R.A. (2012): Odonata collected around the Borneo Highlands Resort on Gunung Penrissen, Kuching Division, Sarawak, Malaysia in July 2012. International Dragonfly Fund - Report 50: 1-12. (in English) ["Records of Odonata collected above 800m a.s.l. on Gunung Penrissen in western Sarawak are presented. A short note on the location of Mount Merinjak, the type locality of several species, is included. Notable records include two new species from the Platystictidae, *Bornargiolestes* species and *Acrogomphus jubilaris*. Previously unpublished records from Annah Rais, a location at the foot of Gunung Penrissen, made in 2005 and 2006, are included in an appendix." (Author)] Address: Dow, R.A., Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**11934.** Durand, E.; Renoult, J.-P. (2012): Addition à l'odonatofaune de l'Adrar mauritanien. *Poiretia* 4: 7-17. (in French, with English summary) ["In September 2006 and March 2008, we visited the Adrar area in Mauritania. Eleven Odonata species were recorded during these two visits. Four new species were added to the species list of the Adrar plateau: *Diplacodes lefebvrii*, *Trithemis kirbyi*, *Orthetrum ransonnetii* and *Anax parthenope*, the last three being new to Mauritania as well. These observations increase to 22 the total number of species recorded in the Adrar region and to 23 for the whole of Mauritania. Lastly, we confirm that *Ischnura saharensis* and *I. senegalensis* are syntopic in the Adrar region." (Authors)] Address: Durand, E., Naturalia environnement : Site Agroparc, Le Moitessier, B.P. 41, 223 rue Lawrence Durrell, 84911 Avignon, cedex 9, France. E-mail: e.durand@naturalia-environnement.fr

**11935.** Edmonds, S.T.; O'Driscoll, N.J.; Hillier, K.; Atwood, J.L.; Evers, D.C. (2012): Factors regulating the bioavailability of methylmercury to breeding rusty blackbirds in northeastern wetlands. *Environmental Pollution* 171: 148-154. (in English) [USA, Canada "Rusty blackbirds are undergoing rapid population decline and have elevated Hg concentrations while breeding in the Acadian ecoregion of North America. Factors regulating the bioavailability of methyl-Hg (MeHg) within this population's habitat were determined using water, invertebrates, and blood from adult rusty blackbirds collected for Hg-speciation, along with additional water column parameters: MeHg and THg, dissolved organic carbon, pH, dissolved oxygen, conductivity, redox potential, and temperature. Both DO<sub>2</sub> and pH were negatively related to biota MeHg, while water MeHg concentrations were positively related. Both invertebrate MeHg concentration and %MeHg increased with trophic level. Invertebrate MeHg concentrations were among the greatest reported when compared with those reported elsewhere for wetlands and waterbodies—often several times greater for similar taxa—while percent MeHg of THg

were similar. An environment with high bioavailability of MeHg in combination with a high trophic position best explains elevated Hg concentrations for this species regional population. Highlights: \*DO<sub>2</sub> and pH negatively correlate with wetland biota methylmercury. \*Water MeHg concentrations positively correlate with wetland biota methylmercury. \*Rusty blackbird blood-Hg correlates with MeHg in Araneae, Ephemeroptera, and Trichoptera, but not Odonata. \*Habitat with high MeHg bioavailability and a high trophic position explains regionally elevated Hg in the rusty blackbird." (Authors)] Address: Atwood, J.L., Biodiversity Research Institute, 19 Flaggy Meadow Road, Gorham, ME 04038, USA. E-mail: jon.atwood@briloon.org

**11936.** Egler, M.; Buss, D.F.; Moreira, J.C.; Baptista, D.F. (2012): Influence of agricultural land-use and pesticides on benthic macroinvertebrate assemblages in an agricultural river basin in southeast Brazil. *Braz. J. Biol.* 72(3): 437-443. (in English, with Portuguese summary) ["Land-use alterations and pesticide run-offs are among the main causes for impairment in agricultural areas. We evaluated the influence of different land-uses (forest, pasture and intensive agriculture) on the water quality and on benthic macroinvertebrate assemblages on three occasions: in the dry season, wet season and at the end of the wet season. Macroinvertebrates responded to this gradient of impairment: agricultural sites had significantly lower richness numbers than forested and pasture sites, and all major invertebrate groups were significantly affected. Most taxa found in forested sites were found in pasture sites, but often with lower densities. In this case, the loss of habitats due to sedimentation and the lower complexity of substrates seem to be the disruptive force for the macroinvertebrate fauna." (Authors) Taxa are treated at order level and include Odonata.] Address: Baptista, D.F., Laboratório de Avaliação e Promoção da Saúde Ambiental – LAPSA, Instituto Oswaldo Cruz – IOC, Fundação Oswaldo Cruz – FIOCRUZ, Av. Brasil, 4365, Manguinhos, CEP 21040-360, Rio de Janeiro, RJ, Brazil. E-mail: darcilio@ioc.fiocruz.br

**11937.** Egler, M.; Buss, D.F.; Moreira, J.C.; Baptista, D.F. (2012): Influence of agricultural land-use and pesticides on benthic macroinvertebrate assemblages in an agricultural river basin in southeast Brazil. *Brazilian Journal of Biology* 72(3): 437-443. (in English, with Spanish summary) ["Land-use alterations and pesticide run-offs are among the main causes for impairment in agricultural areas. We evaluated the influence of different land-uses (forest, pasture and intensive agriculture) on the water quality and on benthic macroinvertebrate assemblages on three occasions: in the dry season, wet season and at the end of the wet season. Macroinvertebrates responded to this gradient of impairment: agricultural sites had significantly lower richness numbers than forested and pasture sites, and all major invertebrate groups were significantly affected. Most taxa found in forested sites were found in pasture sites, but often with lower densities. In this case, the loss of habitats due to sedimentation and the lower complexity of substrates seem to be the disruptive force for the macroinvertebrate fauna." (Authors) Taxa - including Odonata - are treated at order level.] Address: Baptista, D.F., Laboratório de Avaliação e Promoção da Saúde Ambiental – LAPSA, Instituto Oswaldo Cruz – IOC, Fundação Oswaldo Cruz – FIOCRUZ, Av. Brasil, 4365, Manguinhos, CEP 21040-360, Rio de Janeiro, RJ, Brazil. E-mail: darcilio@ioc.fiocruz.br



**11938.** Farkas, A.; Jakab, T.; Tóth, A.; Kalmár, A.F.; Dévai, G. (2012): Emergence patterns of riverine dragonflies (Odonata: Gomphidae) in Hungary: variations between habitats and years. *Aquatic Insects* 34(Supplement 1): 77-89. (in English) ["In this paper the results of a six-year study on riverine dragonflies (Odonata: Gomphidae) emergence based on the systematic collection of exuviae are presented. The exuviae were counted to determine variations in species composition, abundance and emergence pattern of gomphids at four different sites along the rivers Tisza and Szamos, as well as at a selected site in five different years. While the number of species decreased, the abundance of exuviae increased downstream the river Tisza. The total numbers of exuviae differed significantly between the dammed and non-dammed sites. The emergence of gomphids varied in initiation, synchronisation and also in duration between sites as well as between years. The onset of emergence was dependent mainly on the species-specific temperature sums, consequently earlier or later emergence resulted from the differences in the spring water temperature. The duration of emergence in *G. flavipes* and *G. vulgatissimus* was twice as long at the dammed site, characterised by a higher larval density, as at the other sites. In the degree of synchrony *G. flavipes* showed the emergence characteristics both of the spring and the summer species. Such interyear variations at the same site might have been attributed to the differences in annual fluctuations in the water temperature, indicating that rising temperatures may influence not only the onset of emergence but the synchrony as well." (Authors)] Address: Farkas, Anna, Department of Hydrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary. E-mail: flavipes@gmail.com

**11939.** Ficetola, G.F.; Siesa, M.E.; De Bernardi, F.; Padoa-Schioppa, E. (2012): Complex impact of an invasive crayfish on freshwater food webs. *Biodiversity and Conservation* 21: 2641-2651. (in English) ["Invasive alien species can have complex effects on native ecosystems, and interact with multiple components of food webs, making it difficult a comprehensive quantification of their direct and indirect effects. We evaluated the relationships between the invasive crayfish, *Procambarus clarkii*, amphibian larvae and predatory insects, to quantify crayfish impacts on multiple levels of food webs, and to evaluate whether crayfish predation of aquatic insects has indirect consequences for their preys. We used pipe sampling to assess the abundance of crayfish, amphibian larvae and their major predators (Ditiscidae, Notonectidae and larvae of Anisoptera) in invaded and uninvaded ponds within a human dominated landscape. We disentangled the multivariate effects of *P. clarkii* on different components of food web through a series of constrained redundancy analyses. The crayfish had a negative, direct impact on both amphibian communities and their predators. Amphibian abundance was negatively related to both predators. However, the negative, direct effects of crayfish on amphibians were much stronger than predation by native insects. Our results suggest that this crayfish impacts multiple levels of food webs, disrupting natural prey-predator relationships." (Authors) Odonata included *Aeshna isoceles*, *A. cyanea*, *A. mixta*, *Libellula quadrimaculata*, *Orthetrum albistylum*, *O. cancellatum*, *Sympetrum sanguineum* / *S. striolatum*] Address: Ficetola, G.F., Dept of Environ Sciences, Univ. degli Studi di Milano Bicocca, Piazza

della Scienza 1, 20126 Milan, Italy. E-mail: francesco.cetola@unimib.it

**11940.** Fleck, G. (2012): The true larva and the female of *Aeschnosoma marizae* Santos, 1981 (Odonata: Anisoptera: Corduliidae s.s.). *Zootaxa* 3488: 80-88. (in English) ["The ultimate larval stadium and the adult female of *Aeschnosoma marizae* are described and illustrated for the first time. Larval comparison with other known species of the elegans group is given. Reared larvae of both sexes unambiguously attributed to *A. marizae* differ significantly from the previously described larvae attributed to this species, which probably do not belong to this species." (Author)] Address: Fleck, G., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleckgunther@gmail.com

**11941.** Florencio, M.; Díaz-Paniagua, C.; Gomez-Mestre, I.; Serrano, L. (2012): Sampling macroinvertebrates in a temporary pond: comparing the suitability of two techniques to detect richness, spatial segregation and diel activity. *Hydrobiologia* 689: 121-130. (in English) ["Recent and increasing interest in temporary ponds as biodiversity reservoirs fosters our need to test sampling techniques for characterising their biological communities. We compared the efficiency of dip-netting to that of fyke nets in sampling the macroinvertebrate assemblage of a temporary pond in Doñana National Park (SW Spain). We sampled the pond at four different times -morning, afternoon, evening and night- distinguishing between deep and shallow zones. In our sampling, dip-netting captured a higher number of taxa, and higher abundances of individuals than fyke nets. However, both techniques captured exclusive taxa, not recorded with the other device. Fyke nets distinguished between nocturnal and diurnal macroinvertebrates, and hence are more appropriate to study macroinvertebrate diel activity. We detected nocturnal activity in *Gerris thoracicus* larvae, and adults of *Colymbetes fuscus*, *Rhantus suturalis*, *Rhantus hispanicus* and *Hydrochara flavipes*. Conversely, larvae of *Sympetrum fonscolombii* and *Notonecta* spp., and adults of *Notonecta glauca* were mainly diurnal. The overall diel activity pattern of the macroinvertebrate assemblage depended on the diel activities of their integrating taxa and stages. Although dip-netting was more appropriate to sample macroinvertebrate assemblages in different microhabitats, fyke nets better captured nocturnal and fast-swimming invertebrates. Consequently, the joint use of both sampling techniques would capture a better picture of the representative macrofauna of a temporary pond than either one on its own." (Authors)] Address: Florencio, Margarita, Dept of Wetland Ecology, Donana Biological Station, CSIC, P.O. Box 1056, 41080 Seville, Spain. E-mail: margarita@ebd.csic.es

**11942.** Fontana-Bria, L.; Selfa, J. (2012): Revisió dels odonats valencians de la col·lecció d'artròpodes del Museu de Ciències Naturals de Barcelona. *Arxius de Miscel·lània Zoològica* 10: 1-8. (in Spanish, with English summary) [The arthropod collection at the Museu de Ciències Naturals de Barcelona (Spain) harbours a total of 33 Odonata specimens belonging to 12 species, which represent the 18% of the known species in the Valencian Country. Most of the records date from 1931, but also include records from *Anax ephippiger* from July 1902 and *Orthetrum nitidinerve* from 1905 and 1908] Address: Fontana-Bria, Laia, Lab. d'Investigació d'Entomologia, Dept. de Zoologia, Fac. de Ciències Biològiques, Univ. de Va-

lència, c/ Dr. Moliner 50, 46100 Burjassot, València, Espanya (Spain). E-mail: laia.fontana@uv.es

**11943.** Gallardo, B.; Cabezas, I.; Gonzalez, E.; Comin, F.A. (2012): Effectiveness of a newly created oxbow lake to mitigate habitat loss and increase biodiversity in a regulated floodplain. *Restoration Ecology* 20(3): 387-394. (in English) ["In 2005, an oxbow lake was constructed in a degraded floodplain area of the Ebro River (NE Spain) to mitigate habitat loss. In this study, we address the effectiveness of this restoration project through the analysis of the macroinvertebrate community that colonized the newly constructed lake, in comparison with a nearby natural oxbow lake and the adjacent river channel. To that end, water and macroinvertebrate samples were taken every 2 months in 2006. Ground movements during construction, wind-driven bottom resuspension, shore scouring, and lack of vegetation resulted in distinctive water chemistry in the constructed and natural lakes. Regarding biodiversity, only 8 months after the digging of the constructed lake the abundance, richness, Shannon, and trait diversity of macroinvertebrates exceeded that of the natural lake. It is suggested that the constructed lake provided habitat for new mobile species that rapidly dispersed to other wetlands, thus enhancing the biological diversity of the floodplain at a local scale. Furthermore, biodiversity is predicted to continue increasing in the following years, although isolation can lead to early clogging of the system. By showing a dramatic increase in aquatic biodiversity in constructed wetlands, our study suggests that wetland construction can be very effective in mitigating habitat loss and increasing biodiversity in highly degraded floodplain areas. Further monitoring is nevertheless needed to evaluate the sustainability of the newly created habitat in the long term." (Authors) Taxa include Odonata and are treated at genus level.] Address: Gallardo, Belinda, Pyrenean Institute of Ecology (CSIC). Avda. de Montañana 1005, Zaragoza. 50192. Spain: E-mail: belinda@ipe.csic.es

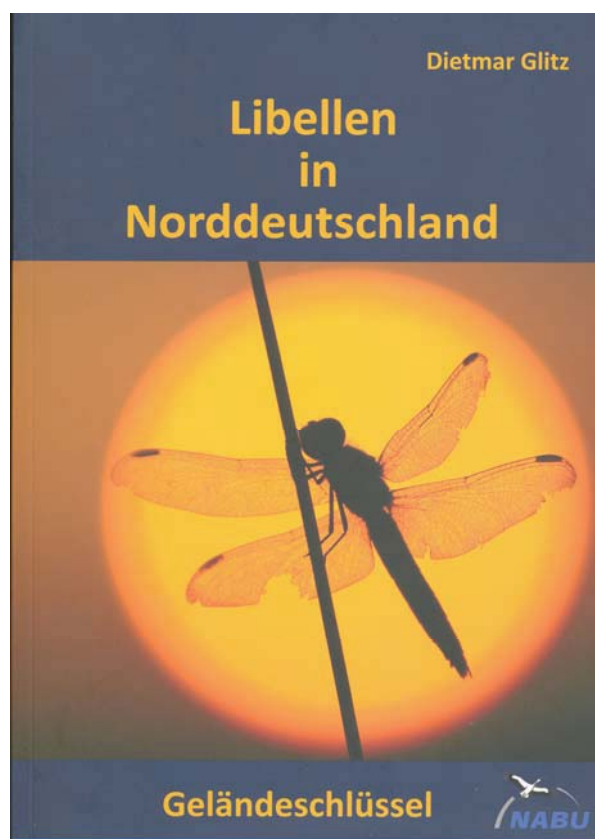
**11944.** Garrison, R.W. (2012): *Skialagma baueri* Förster 1906, a geographically misplaced damselfly, is a junior synonym of *Xiphiagrion cyanomelas* Selys 1876 (Odonata: Coenagrionidae). *Zootaxa* 3514: 84-88. (in English, with Spanish summary) ["Based on comparison of specimens and descriptions, *Skialagma baueri* Förster, 1906, described from São Paulo State, Brazil and known only from its type series, is found to be a junior synonym of *Xiphiagrion cyanomelas* Selys, 1876, a species from the Philippines and Southeast Asia." (Author)] Address: Garrison, R.W., Plant Pest Diagnostic Branch, California Department of Food and Agriculture, Sacramento, USA. E-mail: rgarrison@cdfa.ca.gov

**11945.** Gavira, O.; Carrasco, P. (2012): Nueva localidad de *Macromia splendens* (Odonata: Macromiidae) en el río Guadaiza (Málaga, España). *Zool. baetica* 23: 69-72. (in Spanish, with English captions) [On 08-IX-2012, a larva of *M. splendens* was collected in Guadaiza river (Benahavís, Málaga, Spain).] Address: Gavira, O., Camino Castillejos 9, 1.º D, 29010 Málaga, Spain. Email: ogavira@hotmail.com

**11946.** Gerlach, J. (2012): Red Listing reveals the true state of biodiversity: a comprehensive assessment of Seychelles biodiversity. *Phelsuma* 20: 9-22. (in English) [39% of Odonata species are redlisted; no details are given.] Address: Gerlach, J., Nature Protection Trust of Seychelles, PO Box 207, Mahe, Seychelles. E-mail: jst-gerlach@aol.com

**11947.** Ghahari, H.; Thipaksorn, A.; Naderian, H.; Sakenin, H.; Tajali, A.A. (2012): A faunistic study on the Odonata (Insecta) from Kurdistan province and vicinity, western Iran. *Linzer biol. Beitr.* 44/2: 1079-1085. (in English, with German summary) [Odonata from Kurdistan province, western Iran was studied in 2007 with subsequent research carried out in 2009 and 2010. A total of 25 species are represented, including records of *Ischnura intermedia*.] Address: Ghahari, H., Department of Plant Protection, Shahre Rey Branch, Islamic Azad University Tehran, Iran. E-mail: hghahari@yahoo.com

**11948.** Glitz, D. (2012): *Libellen in Norddeutschland – Geländeschlüssel*. 374 pp. Bezug: NABU-Mecklenburg-Vorpommern, Arsenalstr. 2, 19053 Schwerin, Germany. E-Mail: LGS@NABU-MV.de



**11949.** Gobbi, M.; Riservato, E.; Bragalanti, N.; Lencioni, V. (2012): An expert-based approach to invertebrate conservation: Identification of priority areas in central-eastern Alps. *Journal for Nature Conservation* 20(5): 274-279. (in English) ["The private and public agencies for nature protection often ask land managers to implement biodiversity conservation plans. Invertebrates constitute a substantial proportion of terrestrial and freshwater biodiversity and are critical to ecosystem functions. However, their inclusion in conservation planning and management is under represented, particularly in the Alps. In this paper we propose a new methodological solution and challenge for the identification of priority areas based on the integration of three approaches: invertebrate multi-taxa based; expert-based; and, GIS-based. The Trentino Province (eastern Italian Alps), was investigated as a case study. The first methodological step was to select a panel of nineteen experts which played a strategic role in the suggestion of 229 species (including Odonata), endangered or of

mandatory conservation interest. The second step was to find objective criteria for species prioritisation. These criteria, crossed with the experts taxonomical and ecological knowledge resulted in a list of 70 focal invertebrate species. The third step was to integrate with the GIS-based approach data layers from the habitat requirements of each of the 70 focal species to generate potential spatial-distributional maps. Potential distribution maps gave information about the sites (priority areas) in which the highest number of focal species could concentrate, thus suggesting where to focus future monitoring efforts. Several priority areas resulted outside the protected ones. Alluvial forest and hop-hornbeam woods were the habitats with the highest number of focal species, and thus they represent the habitats of major conservation interest and concern, because they are usually small, fragmented, and near urbanised areas located in the bottom of the valleys. The relatively simple processes involved in species and potential habitat distribution proposed in this paper can be conducted with a minimal amount of data, making it an attractive tool when time and funds are in short supply." (Authors)] Address: Gobbi, M., Department of Invertebrate Zoology and Hydrobiology, Museo delle Scienze, Via Calepina 14, I-38122, Trento, Italy

**11950.** González Soriano, E.; Trujano-Ortega, M.; Contreras-Arquieta, A.; García-Vásquez, U.O. (2012): New records of *Libellula pulchella* (Odonata: Libellulidae) and *Phyllogomphoides albrighi* (Odonata: Gomphidae) from the Cuatro Ciénegas Basin, Coahuila, Mexico. *Revista Mexicana de Biodiversidad* 83: 847-849. (in English, with Spanish summary) ["The first records of *Libellula pulchella* from México and for *Phyllogomphoides albrighi* from Coahuila are reported. These records extend the known geographic range of *Libellula pulchella* beyond south of Texas and *Phyllogomphoides albrighi* beyond west of Nuevo León. The specimens were collected in the Cuatro Ciénegas Basin, one of the most biologically interesting areas for the study of aquatic insects." (Authors)] Address: Gonzalez-Soriano, E., Depto Zoología, Inst. Biol., Universidad Autónoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**11951.** González-Soriano, E. (2012): *Argia mayi*, a new species from México (Zygoptera: Coenagrionidae). *Organisms Diversity & Evolution* 12(3): 261-265. (in English) ["A new species of *Argia* is illustrated and described from material collected in the states of Colima, Guerrero, Jalisco, Michoacán, Morelos and Oaxaca, México. *Argia mayi* n. sp. is morphologically similar to *Argia pocomana* Calvert. It differs from the latter by the morphology of the abdominal appendages in the males and by having four postquadrangular cells in FW in both sexes, blue on the dorsum of males restricted to S8-9 and an erect hind margin of the mesostigmal plate in females." (Author)] Address: Gonzalez-Soriano, E., Depto Zoología, Inst. Biol., Universidad Autónoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**11952.** González-Tokman, D.M.; Munguía-Steyer, R.; González-Santoyo, I.; Baena-Díaz, F.S.; Córdoba-Aguilar, A. (2012): Support for the immunocompetence handicap hypothesis in the wild: hormonal manipulation decreases survival in sick damselflies. *Evolution* 66(19): 3294-3301. (in English) ["The immunocompetence handicap hypothesis (ICHH) states that hormones enhance sexual trait expression but impair immunity. Previous

tests of the ICHH have been hampered by experimental design problems. Here, we report on an experimental test of the ICHH that includes manipulations of both hormones and infections in males of the territorial damselfly, *Hetaerina americana*, with accurate survival measurements. We conducted a fully factorial experiment subjecting each individual to one of three topical treatments: methoprene (a juvenile hormone analog), acetone, or control, and one of three injection treatments: bacteria, PBS, or control. We measured survival of manipulated males in both the wild and in captivity. As predicted, survival was most heavily impaired in methoprene-bacteria males than in the other groups in the wild, and no survival differences emerged in captive animals. This result confirms that survival is one cost an animal pays for increased hormonal levels. This corroborates theoretical predictions of the ICHH." (Authors)] Address: González-Tokman, D.-M., Depto de Ecología Evolutiva, Instituto de Ecología, Univ.d Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510 Mexico D.F., Mexico. Email: danielgt@miranda.ecologia.unam.mx

**11953.** Groupe Odonates Bourgogne; Ruffoni, A. (coord.) (2012): Atlas préliminaire des odonates de Bourgogne (Odonata). Société d'histoire naturelle d'Autun, Société française d'Odonatologie: 43 pp, app.. (in French) [67 Odonata species are mapped and briefly introduced for the Burgundy, France (Départements Côte-d'Or, Nièvre, Saône-et-Loire, Yonne). Information are given on current regional distribution, habitat preferences, sibling species, phenology and biological behaviour.] Address: Ruffoni, A., Société d'histoire naturelle d'Autun, Maison du Parc, F-58230 Saint-Brisson, France. E-mail: shna.ruffoni@orange.fr

**11954.** Guan, Z.; Dumont, H.J.; Han, B.-p. (2012): *Archineura incarnata* (Karsch, 1892) and *Atrocalopteryx melli* (Ris, 1912) in southern China (Odonata: Calopterygidae). *International Journal of Odonatology* 15(3): 229-239. (in English) ["The calopterygines *Archineura incarnata* and *Atrocalopteryx melli* are subtropical habitat specialists, endemic to China, and sensitive to environmental change. We identified several sites with environmental deterioration from which the species seem to have disappeared; these species can be used as indicators of human disturbance. In this paper their distribution in China is mapped and information on their habitat is given, based on literature records (from 1892 until 2012) with supplements from field investigations in 2008–2011. We analysed Chinese literature, which contained much useful information. In all, 57 sites in 12 provinces were found to contain the two species. Suitable habitats occur in small shaded headwater streamlets for *A. melli*, in rocky streams for *Ar. incarnata*. The ranges of both species form an arc that descends from 30°N, then in the east curves inland at the level of the tropic. *Archineura incarnata* is clearly the more common species, but both are perhaps not so rare as hitherto believed. The majority of populations are situated in the provinces of Guangdong, Fujian and Guangxi. Several provinces merit more study, but the absence of both calopterygids from Yunnan might well be real. *Atrocalopteryx melli* populates the mountains of Hainan, while *Ar. incarnata* is absent from the island." (Authors)] Address: Han, B.-p., Institute of Hydrobiology, Jinan University, Guangzhou, 510632, China

**11955.** Guareschi, S.; Gutiérrez-Cánovas, C.; Picazo, F.; Sánchez-Fernández, D.; Abellán, P.; Velasco, J.; Millán, A. (2012): Aquatic macroinvertebrate biodiversity:



patterns and surrogates in mountainous Spanish national parks. *Aquatic Conservation: Marine and Freshwater Ecosystems* 22(5): 598-615. (in English) ["In Spain, national parks represent the mainstay of conservation policies and attempt to protect the most representative natural ecosystems. However, studies on the ecology and conservation of aquatic biodiversity within protected areas are still scarce. This study aimed at compiling an inventory of the macroinvertebrate families inhabiting the aquatic ecosystems of each mountainous Spanish national park (Sierra Nevada, Cabañeros, Ordesa, Picos de Europa, Aigüestortes and Monfragüe). The results were used to answer two questions: (i) Which environmental variables are related to macroinvertebrate composition and richness in these protected ecosystems? (ii) Which taxon or group of taxa could act as biodiversity surrogates? Sampling was carried out in 81 aquatic ecosystems across the six national parks during the summers of 2008–2010. The national parks with the highest richness were Picos de Europa and Cabañeros. Overall, the six parks incorporated 66.2% of the taxa included in the Iberian checklist. Multivariate techniques showed that maximum altitude and the presence of lotic habitats were the most important variables related to different community compositions. The best richness model included the presence of a lotic habitat, together with the percentage of the catchment area with non-irrigated agriculture and siliceous geology. Selecting several diverse lotic and lentic water bodies at different altitudes provides the best way of representing Iberian macroinvertebrate diversity. Coleoptera family richness may be used as a macroinvertebrate biodiversity surrogate in Iberian mountainous protected areas because it displayed the highest correlation with the other taxonomic groups and remaining richness values. Such an indicator could be complemented with the use of Odonata family richness for standing waters. The adequacy of Coleoptera and Odonata as biodiversity surrogates should be tested at a wider geographic scale, and other surrogacy concepts (e.g. community composition) considered for assessing the role of this network in the protection of rare and endemic species." (Authors)] Address: Guareschi, Simone, Departamento de Ecología e Hidrología, Universidad de Murcia, Campus de Espinardo, España. E-mail: simone.guareschi@um.es

**11956.** Guillermo-Ferreira, R.; Bispo, P.C. (2012): Male and female interactions during courtship of the Neotropical damselfly *Mnesarete pudica* (Odonata: Calopterygidae). *Acta ethologica* 15(2): 173-178. (in English) ["The courtship behaviour in calopterygid damselflies is well documented; however, the behaviour of the large Neotropical genus *Mnesarete* is still unknown. Thus, here we present the first description of male–female interactions in *Mnesarete pudica*, a common damselfly in the Neotropical savanna. The male–female interactions were composed of courtship displays, mounting, and chasing. The courtship behaviour lasted  $5.23 \pm 1.65$  s and is very different from other calopterygids, consisting of hovering flights and the cross display made in front of females rather than on the oviposition site. The arrival and presence of females on a male territory are not sufficient to initiate sexual interactions; the male usually interacts with the female only after a patrolling flight. The females may present three distinct behaviours in response to male approach: (a) warding off signal (31.53%), (b) escape (28.83%), (c) and wing flipping (39.64%), which seems to stimulate male courtship. Females also may sit still, which induces males to react as if females were

signalling they are willing to mate. In this paper, we also suggest that male courtship behaviour is mediated by female signals." (Authors)] Address: Guillermo-Ferreira, R., Departamento de Biología, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, São Paulo, Brazil. E-mail: rhainerguillermo@yahoo.com.br

**11957.** Guillermo-Ferreira, R.; Bispo, P.C. (2012): Description of the larva of *Mnesarete pudica* (Hagen in Selys, 1853) (Odonata: Calopterygidae) and notes on known genera of South American Calopterygidae larvae. *Zootaxa* 3482: 77-81. (in English) ["The final instar larva of *Mnesarete pudica* is described and illustrated based on reared specimens collected in Brazil. This species can be distinguished from others by presenting: a) five palpal and three premental setae; b) no posterodorsal hooks on abdominal segments; c) lateral spines only in S9-10. *M. pudica* is compared to other South American calopterygids and biological notes are presented." (Authors)] Address: Bispo, P.C., Departamento de Ciências Biológicas, Faculdade de Ciências e Letras de Assis, Universidade Estadual Paulista, Assis, São Paulo, Brazil. E-mail: pcbispo@gmail.com

**11958.** Guillermo-Ferreira, R.; Del-Claro, K. (2012): Reproductive behavior of *Acanthagrion truncatum* Selys, 1876 (Odonata: Coenagrionidae). *International Journal of Odonatology* 15(4): 299-304. (in English) ["Behavioural data on Neotropical coenagrionids is still scanty, with very few studies on their reproductive behaviour. Here we present the first description of the reproductive behaviour of *A. truncatum* in a high density population in the Brazilian Neotropical savanna. The observations were made at a pond in an ecological reserve. Males remain at the water searching for females. Females remain in the surrounding vegetation and only approach the water to mate and oviposit. The mean duration of copulation was  $25.6 \pm 3.26$  minutes. Copulations are concentrated between 12:00 and 14:00 h (71%). Females oviposit in tandem with males, sometimes submerging to oviposit. Oviposition took  $43.08 \pm 22.17$  minutes. Female underwater oviposition seems to disrupt male guarding and females emerge from the water by themselves. Male–male interactions usually consist of chases and "facing off". This damselfly species is apparently non-territorial, since males did not defend resources and searched for females in the area." (Authors)] Address: Guillermo-Ferreira, R., Departamento de Biologia, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, São Paulo, Brazil. E-mail: rhainerguillermo@yahoo.com.br

**11959.** Guillermo-Ferreira, R.; Bispo, P.C. (2012): Description of the larva of *Mnesarete pudica* (Hagen in Selys, 1853) (Odonata: Calopterygidae) and notes on known genera of South American Calopterygidae larvae. *Zootaxa* 3482: 77-81. (in English) ["The final instar larva of *M. pudica* is described and illustrated based on reared specimens collected in Brazil. This species can be distinguished from others by presenting: a) five palpal and three premental setae; b) no posterodorsal hooks on abdominal segments; c) lateral spines only in S9-10. *M. pudica* is compared to other South American calopterygids and biological notes are presented." (Authors)] Address: Guillermo-Ferreira, R., Depto de Biologia, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Univ. de São Paulo, Ribeirão Preto, São Paulo, Brazil. E-mail: rhainerguillermo@yahoo.com.br

**11960.** Hadrys, H.; Simon, S.; Kaune, B.; Schmitt, O.; Schöner, A.; Jakob, W.; Schierwater, B. (2012): Isolation of Hox cluster genes from insects reveals an accelerated sequence evolution rate. *PLoS ONE* 7(6): e34682. doi:10.1371/journal.pone.0034682: 10 pp. (in English) ["Among gene families it is the Hox genes and among metazoan animals it is the insects (Hexapoda; including *Ischnura elegans* and *Sympetrum sanguineum*) that have attracted particular attention for studying the evolution of development. Surprisingly though, no Hox genes have been isolated from 26 out of 35 insect orders yet, and the existing sequences derive mainly from only two orders (61% from Hymenoptera and 22% from Diptera). We have designed insect specific primers and isolated 37 new partial homeobox sequences of Hox cluster genes (lab, pb, Hox3, ftz, Antp, Scr, abd-a, Abd-B, Dfd, and Ubx) from six insect orders, which are crucial to insect phylogenetics. These new gene sequences provide a first step towards comparative Hox gene studies in insects. Furthermore, comparative distance analyses of homeobox sequences reveal a correlation between gene divergence rate and species radiation success with insects showing the highest rate of homeobox sequence evolution." (Authors)] Address: Hadrys, Heike, ITZ, Ecology and Evolution, TiHo Hannover, Bünteweg 17d, D-30559, Hannover, Germany. E-mail: heike.hadrys@ecolevol.de

**11961.** Hämäläinen, M. (2012): *Platycnemis doi* sp. nov. from Huu Lien nature reserve in northern Vietnam (Odonata: Platycnemididae). *International Journal of Odonatology* 15(3): 223-228. (in English) ["*Platycnemis doi* sp. nov. (holotype male Vietnam, Lang Son province, Huu Lien nature reserve, Tan Lai, Hang Chau, altitude 200 m above sea level, 22 June 2010, deposited in RMNH, Leiden), is described on the basis of a series of male specimens. A preliminary description of the female based on a photograph taken in the field is included. The affinities of the new species are discussed." (Authors)] Address: Hämäläinen M., Dept Applied Zool., P.O.Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**11962.** Hämäläinen, M. (2012): Sudenkorennot, Kalevala ja W. F. Kirby [Dragonflies, the Kalevala and W. F. Kirby]. *Crenata* 5: 34-37. (in Finnish, with English summary) ["The origin and nomenclatorial fate of the synonymized dragonfly genus-group names Aino Kirby, 1890 and Untamo Kirby, 1889 are discussed. These names were based on two characters from the Finnish national epic, the Kalevala, which was translated into English by W. F. Kirby in 1907. Among Odonata a third and surviving name from this source is the specific epithet of *Aristocypha aino* Hämäläinen, Reels & Zhang, 2009. The article also discusses the negative attitude among other odonatologists towards Kirby's radical changes in dragonfly nomenclature in his synonymic world catalogue (1890), with particular reference to Ferdinand Karsch's satirical 1896 article 'Kirby-Gomphus and Nunney-Gomphus'. Several other Kalevala-based scientific names in other insect groups and plants are listed." (Author)] Address: Hämäläinen M., Dept Applied Zool., P.O. Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**11963.** Haileselasie, T.H. Teferi, M. (2012): Influence of water quality on the diversity and distribution of macroinvertebrates in Hiwane second order stream, northern Ethiopia. *Research Journal of Environmental and Earth Sciences* 4(4): 475-481. (in English) ["Understanding

the pattern and process related to biodiversity is a greatest challenge to the science of biological conservation. Furthermore, diversity of tropical aquatic ecosystems is severely threatened by anthropogenic activities. What is more, the continuum of most of the tropical river is interrupted by several man-made activities contributing to adverse effects which hamper provision of good quality of water. Traditionally the quality of water is assessed by physico-chemical means but recent studies have focused on the use of organisms (biota) in water quality assessment for streams and lakes. Here we assessed the influence of water quality on the diversity and distribution of macroinvertebrates in Hiwane second order stream with primary objective to determine the ecological water quality status of Hiwane stream at different sampling sites using rapid field assessment screening methodology. A total of 5 sites (stream sections) were selected and 4 of the sampling sites were within the city Hiwane. However, a reference site outside of the city of Hiwane was included. There were 29 taxa of benthic invertebrates belonging to Ephemeroptera, Odonata, Plecoptera, Coleoptera, Trichoptera, Diptera and Hirudenia, among others, recorded from the river. Among these, members of Trichoptera and Ephemeroptera were predominant in density. Furthermore, species diversity is positively correlated with water quality. Since, man-made activities has lead to depletion of biota, any human activity in the drainage area which may cause changes among physico-chemical parameter could lead to a severe impact on the benthic invertebrates of Hiwane stream river. Thus, we recommend that effluent from the town should be carefully managed." (Authors)] Address: Haileselasie, T.H., Mekelle University, College of Natural and Computational Sciences, Department of Biology, Ethiopia

**11964.** Hall, G.H. (2012): Pseudopupils in Odonata. *J. Br. Dragonfly Society* 28(1): 27-36. (in English) ["Preliminary studies have shown that pseudopupils are not always present in the eyes of immature dragonflies. Thus pseudopupils were absent in the eyes of a teneral *Aeshna juncea* and in the eyes of immature *danae* and *Cordulegaster boltonii*. In immature *A. juncea* there is some indication of their development and they are present, along with accessory pseudopupils, in the eyes of mature *Aeshna cyanea*, *S. danae* and *C. boltonii*. In contrast, pseudopupils were present in the eyes of newly emerged *Lestes sponsa*. The possible significance of these findings is discussed, including consideration that the presence or absence of pseudopupils may offer external criteria for determining the physiological age of dragonflies during maturation." (Author)] Address: Hall, G.H., Stonehaven, Darley, Harrogate, North Yorkshire, HG3 2QF, UK

**11965.** Hamill, S.E. (2012): Recovery strategy for the Pygmy Snaketail (*Ophiogomphus howei*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario: v + 13 pp. (in English) ["*O. howei* is a small, brightly-coloured dragonfly which lives in large rivers with steady flow. Adults forage in the canopy of forests surrounding the rivers. Eggs are laid into the water where they are carried downstream and eventually sink. During the day the larvae burrow into sand or gravel sediments. At night they come to the surface, drift with the current, and prey on other invertebrates or small fish. This species is a globally rare dragonfly which occurs only in Eastern North America. In Canada it has

been found in 11 locations in New Brunswick and at one site in Ontario. The Ontario location is on the Namakan River in the Rainy River district of northwestern Ontario. The species is listed as endangered on the Species at Risk in Ontario (SARO) List under Ontario's Endangered Species Act, 2007 (ESA). The greatest potential threat to *O. howei* in Ontario is the impoundment of running waters, but others include forest harvesting and invasive species. Other threats common to dragonflies, such as road-kill, recreation, construction and pollution, may be of lower concern due to the remote northern location. Limiting factors include a need for pristine conditions and the species' short travel distance. Knowledge gaps are many, but major ones are the complete lack of information on population size and the unknown precise egg-laying location in Ontario. The recovery goal is to ensure the long-term survival of *O. howei* in Ontario by protecting the existing population. The protection and recovery objectives are to: • protect and maintain the quality and quantity of habitat on the Namakan River in Ontario where *O. howei* occurs; • implement a monitoring program at the location where *O. howei* is known to exist; • conduct additional inventories for *O. howei* in suitable habitat. When adult *O. howei* and breeding sites are found, a habitat regulation should be developed to protect those areas, including the river and sections of the surrounding forest. It is recommended that 300 metres of forested habitat on either side of the river, expanding to a radius of 500 metres around the breeding site, be prescribed as habitat in the regulation." (Author)] Address: not stated

**11966.** Hammers, M.; van Gossum, H. (2012): Helping and misleading signals in female body coloration in *Ischnura elegans*. *Brachytron* 15(1): 16-24. (in Dutch, with English summary) ["Various animal species show coexistence of differently coloured and genetically inherited phenotypes. Sometimes these polymorphisms only occur in one sex, either only in males or only in females. When only occurring in females, this is considered to result from sexual conflict. Sexual conflict occurs when males and females differ in their optimal number of matings. In promiscuous species, male reproductive success typically increases with increasing numbers of matings, while for females just a few matings are optimal. Further matings are costly and reduce female reproductive success. In the damselfly *Ischnura elegans*, mature females occur as one of three differently coloured morphs. In addition, each of these morphs undergoes irreversible colour changes from immature to mature age. Intriguingly, one of the mature female morphs shows resemblance in phenotype to the conspecific male, specifically in body colouration (andromorph). The other two female morphs show different body colouration (gynomorphs). We explored three main questions concerning the occurrence and coexistence of these different female morphs in the damselfly *I. elegans*. Firstly, we asked whether variation in the relative frequencies of different female morphs occurs among populations and whether social or environmental factors can explain patterns in such variation. Among populations, large variation in female morph frequencies was observed, with andromorphs sometimes being the least, and sometimes being the most abundant female morph. Andromorph frequencies declined across populations with increasing ambient temperature. Secondly, we explored if males are aided by female body colouration to find and recognize suitable mating partners. Males appeared to avoid mating immature individuals, which

may be explained by differences in colour characteristics between immature and mature females. Thirdly, we asked whether andromorphs can be considered male-mimics that, as a result of their colour, succeed in reducing male harassment. Our work showed that andromorphs and males could not be distinguished based on colouration of their pale body parts. In line with this observation, males showed low mating interest for andromorphs, suggesting that andromorphs may indeed succeed in escaping from excessive male mating interest. Together our results show that colour signals by female damselflies may both help and hinder males in their mating decisions. Further, it appears that male harassment alone does not adequately explain female colour polymorphism in damselflies, and that other factors may play a significant role." (Authors)] Address: Hammers, M., Behavioural Ecology and Self-Organization Group & Animal Ecology Group, Centre for Ecological and Evolutionary Studies, University of Groningen, Postbus 11103, 9700 CC Groningen, The Netherlands. E-mail: martijnhammers@gmail.com

**11967.** Hannigan, E.; Kelly-Quinn, M. (2012): Composition and structure of macroinvertebrate communities in contrasting open-water habitats in Irish peatlands: implications for biodiversity conservation. *Hydrobiologia* 692: 19-28. (in English) ["The purpose of this study was to consider the relative importance of several habitat variables in explaining the patterns in the structure of macroinvertebrate assemblages in open-water habitats, in relatively intact bogs and fens, which should inform conservation strategies. It was hypothesised that variables relating to the size of the water body would differentiate the communities and that some species would be unique to certain conditions. The macroinvertebrate communities from pools >100 m<sup>2</sup>, 10.1–100 m<sup>2</sup> and Sphagnum hollows were characterised using sweep sampling for eight intact peatland sites across four bog types, and related to habitat variables including pool size, Sphagnum cover and hydrochemistry. Results showed community composition and structure differed significantly between deep, permanent pools and shallow, drought-sensitive Sphagnum hollows, with larger invertebrates, such as Odonates and Dytiscinae, rarely found in the hollows. Sphagnum cover accounted for a substantial amount of the variation in community composition. An examination of life-history strategies found species dependent on predictable conditions for juvenile development to be more abundant in pools. In contrast, taxa that could delay juvenile development until conditions were favourable were more abundant in Sphagnum hollows. These results highlight the importance of habitat heterogeneity in maintaining macroinvertebrate diversity in peatlands. ... The overall faunal abundance of these sites was dominated by Diptera ([65%] whilst Coleoptera (\*10%), Odonata (\*10%), Trichoptera (\*5%), Hemiptera (\*5%) and Ephemeroptera (\*5%) represented a small proportion of the fauna: *Lestes sponsa*, *Coenagrion puella/pulchellum*, *Enallagma cyathigerum*, *Ischnura elegans*, *Aeshna grandis*, *A. juncea*, *Libellula quadrimaculata* and *Sympetrum danae*." (Authors)] Address: Hannigan, E., Freshwater Biodiversity, Ecology and Fisheries Research Group, School of Biology and Environmental Science, Science Centre West, University College Dublin, Belfield, Dublin 4, Ireland. E-mail: edelhannigan@hotmail.com

**11968.** Hanson, M.A.; Herwig, B.R.; Zimmer, K.D.; Fieberg, J.; Vaughn, S.R.; Wright, R.G.; Younk, J.A. (2012):



Comparing effects of lake- and watershed-scale influences on communities of aquatic invertebrates in shallow lakes. *PLoS ONE* 7(9): e44644. doi:10.1371/journal.pone.0044644: 9 pp. (in English) ["Constraints on lake communities are complex and are usually studied by using limited combinations of variables derived from measurements within or adjacent to study waters. While informative, results often provide limited insight about magnitude of simultaneous influences operating at multiple scales, such as lake- vs. watershed-scale. To formulate comparisons of such contrasting influences, we explored factors controlling the abundance of predominant aquatic invertebrates in 75 shallow lakes in western Minnesota, USA. Using robust regression techniques, we modeled relative abundance of Amphipoda, small and large cladocera, Corixidae, aquatic Diptera, and an aggregate taxon that combined Ephemeroptera-Trichoptera-Odonata (ETO) in response to lake- and watershed-scale characteristics. Predictor variables included fish and submerged plant abundance, linear distance to the nearest wetland or lake, watershed size, and proportion of the watershed in agricultural production. Among-lake variability in invertebrate abundance was more often explained by lake-scale predictors than by variables based on watershed characteristics. For example, we identified significant associations between fish presence and community type and abundance of small and large cladocera, Amphipoda, Diptera, and ETO. Abundance of Amphipoda, Diptera, and Corixidae were also positively correlated with submerged plant abundance. We observed no associations between lake-watershed variables and abundance of our invertebrate taxa. Broadly, our results seem to indicate preeminence of lake-level influences on aquatic invertebrates in shallow lakes, but historical land-use legacies may mask important relationships" (Authors)] Address: Hanson, M.A., Wetland Wildlife Populations and Research Group, Minnesota Department of Natural Resources, Bemidji, Minnesota, USA. E-mail: mark.alan.hanson@state.mn.us

**11969.** Harabiš, F.; Dolný, A.; Šipoš, J. (2012): Enigmatic adult overwintering in damselflies: coexistence as weaker intraguild competitors due to niche separation in time. *Population ecology* 54: 549-556. (in English) ["Odonata, like most freshwater invertebrates, tend to overwinter in water due to the thermal properties of a water environment. Winter damselflies (genus *Sympecma*), however, hibernate as adults in terrestrial habitats. The strategy of adult overwintering combined with high mortality is associated with several unique adaptations to semiarid conditions, but winter damselflies maintain this unique life history throughout almost the entire Palaearctic. We assume that the unique strategy of adult overwintering in temperate zones is indirectly maintained by niche separation in time. We used phenological data from the Czech Republic to compare the seasonal phenology of *Sympecma* spp. with other coexisting odonate species. Seasonal population growth patterns between *S. fusca* and other coexisting species representing different life histories were compared using GLMMs and LME. The models showed negative non-linear dependence between the population growth of *S. fusca* and the estimated abundance of compared species. We found that the specific strategy of adult overwintering makes it possible to avoid seasonal maxima of competition and predation in adult and larval stages. Adults may benefit from free niches during spring while larvae may benefit from size advantage among intraguild competitors and optimal conditions for development." (Authors)] Address: Hara-

biš, F., Department of Ecology, Czech University of Life Sciences Prague, Kamycka 129, 165 21 Praha 6 – Suchbátka, Czech Republic. E-mail: harabis.f@gmail.com

**11970.** Hayasaka, D.; Korenaga, T.; Sánchez-Bayo, F.; Goka, K. (2012): Differences in ecological impacts of systemic insecticides with different physicochemical properties on biocenosis of experimental paddy fields. *Ecotoxicology* 21(1): 191-201. (in English) ["The environmental risks of pesticides are typically determined by laboratory single-species tests based on OECD test guidelines, even if biodiversity should also be taken into consideration. To evaluate how realistic these assessments are, ecological changes caused by the systemic insecticides imidacloprid and fipronil, which have different physicochemical properties, when applied at recommended commercial rates on rice fields were monitored using experimental paddy mesocosms. A total of 178 species were observed. There were no significant differences in abundance of crop arthropods among the experimental paddies. However, zooplankton, benthic and neuston communities in imidacloprid-treated field had significantly less abundance of species than control and fipronil fields. Significant differences in abundance of nekton community were also found between both insecticide-treated paddies and control. Influences on the growth of medaka fish were also found in both adults and their fries. Both Principal Response Curve analysis (PRC) and Detrended Correspondence Analysis (DCA) showed the time series variations in community structure among treatments, in particular for imidacloprid during the middle stage of the experimental period. These results show the ecological effect-concentrations (LOEC ~ 1 µg/l) of these insecticides in mesocosms, especially imidacloprid, are clearly different from their laboratory tests. We suggest that differences in the duration of the recovery process among groups of species are due to different physicochemical properties of the insecticides. Therefore, realistic prediction and assessment of pesticide effects at the community level should consider not only the sensitivity traits and interaction among species but also the differences in physicochemical characteristics of each pesticide." (Authors) Taxa are treated at the order level, but included also *Ischnura senegalensis*.] Address: Terajima, M., Center for Infectious Disease & Vaccine Research, Univ. of Massachusetts Medical School, Worcester, MA 01655, USA. E-mail: Masanori.Terajima@umassmed.edu

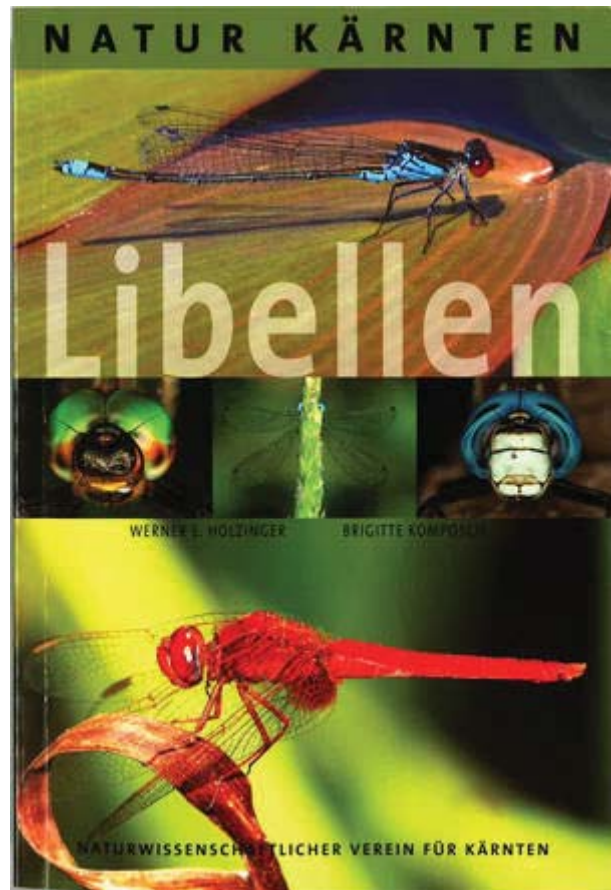
**11971.** Hellmann, G. (2012): Atlas der Libellen. Trockur, B., Boudot, J.-P., Fichet, V. et al. (2010): Atlas der Libellen – Fauna und Flora in der Großregion, Band 1. Hrsg.: Landesamt für Umwelt und Arbeitsschutz, Zentrum für Biodokumentation des Saarlandes, Am Bergwerk Reden 11, 66578 Landsweiler-Reden, info.biodoku@lua.saarland.de. 201 S., ISBN 978-3-938381-31-1, 24,90 €. *Natur in NRW* 1/2012: 49. (in German) [Review] Address: not stated

**11972.** Herrmann, J. (2012): Chemical and biological benefits in a stormwater wetland in Kalmar, SE Sweden. *Limnologia* 42: 299-309. (in English) ["A manmade stormwater wetland in Kalmar, SE Sweden, sized 1 ha and receiving water from residential and road areas, was monitored over the first years after inundation with respect to chemistry and biology. Water flow and chemistry was analysed in years 2–4, mainly on a monthly basis, but, in the final year, every second month. This revealed that total nitrogen, according to the Swedish Environmental Quality Criteria (EQC), typically showed moderate or

high concentrations, whereas total phosphorous levels were very high or extremely high. Metal (Cd, Cr, Cu, Pb and Zn) concentrations were low or moderate in terms of EQC. Yearly average reduction of nitrogen was 173 kg ha<sup>-1</sup> y<sup>-1</sup>, tending to increase over time, and for phosphorous 12.1 kg ha<sup>-1</sup> y<sup>-1</sup>, tending to decrease. Vegetation analysis was performed in years 1–4 by noting all species in 27 consecutive zones around the wetland system. This showed that one year after filling with water, the vegetation was already well established with >30 plant species in the entire pond system, and this increased only slightly. After four years, the shoreline vegetation cover had become denser, especially with larger graminoids such as common reed (*Phragmites australis*) and sea club-rush (*Bolboschoenus maritimus*), and submersed vegetation almost disappeared. There was a tendency for common species to become more dominant, and for less common species to become rarer. Using sweep net sampling of benthic invertebrates during years 0–2, ca 50 species/higher taxa were observed during the first year, largely because of the appearance of many beetles, especially dytiscids. However, these decreased the following years. Apart from these animals, in the first few months the invertebrate colonisation was dominated by chironomids and corixids, whereas later prominent increases were noticed for the isopod *Asellus aquaticus*, the snail *Physa fontinalis*, and the mayfly nymph *Cloeon dipterum*. The results are discussed in terms of wetland values for biodiversity and nutrient reduction, suggesting that these objectives seem possible to combine in stormwater wetlands." (Author) Odonata include the following taxa: *Ischnura elegans*, *Coenagrion* sp., *Lestes* sp., *Zygoptera* indet., *Libellula depressa*, *Libellulidae* indet. and *Aeshna grandis*.] Address: Hermann, J., School of Natural Sciences, Linnaeus University, SE-391 82 Kalmar, Sweden. E-mail: jan.herrmann@lnu.se

**11973.** Hof, C.; Brändle, M.; Dehling, M.; Munguia, M.; Brandl, R.; Araujo, M.B.; Rahbek, C. (2012): Habitat stability affects dispersal and the ability to track climate change. *Biology Letters* 8(4): 639-643. (in English) ["Habitat persistence should influence dispersal ability, selecting for stronger dispersal in habitats of lower temporal stability. As standing (lentic) freshwater habitats are on average less persistent over time than running (lotic) habitats, lentic species should show higher dispersal abilities than lotic species. Assuming that climate is an important determinant of species distributions, we hypothesize that lentic species should have distributions that are closer to equilibrium with current climate, and should more rapidly track climatic changes. We tested these hypotheses using datasets from 1988 and 2006 containing all European Odonata species. Bioclimatic envelope models showed that lentic species were closer to climatic equilibrium than lotic species. Furthermore, the models over-predicted lotic species ranges more strongly than lentic species ranges, indicating that lentic species track climatic changes more rapidly than lotic species. These results are consistent with the proposed hypothesis that habitat persistence affects the evolution of dispersal." (Authors)] Address: Hof, C., Center for Macroecology, Evolution and Climate, Department of Biology, University of Copenhagen, Copenhagen, Denmark. E-mail: christian.hof@sensckenberg.de

**11974.** Holzinger, W.E.; Komposch, B. (2012): Die Libellen Kärntens. Sonderreihe Natur Kärnten 6. 336 pp. Bezug: Naturwissenschaftlicher Verein für Kärnten, Museumgasse 2, Landesmuseum, 9020 Klagenfurt, Austria



**11975.** Home, J. (2012): The occurrence of the Broad-bodied Chaser *Libellula depressa* L. at a nature reserve in Hampshire over a period of 25 years and a description of pruinescence in females. *J. Br. Dragonfly Society* 28(1): 37-43. (in English) ["The main flight period of *L. depressa* is reported for the 26 year period 1985-2011 at a site in Southern England and it is noted that it has not changed over this period. The occurrence and development of pruinosity in some females at this site is described and discussed." (Author)] Address: Home, J., 78 Spring Lane, Bishopstoke. Eastleigh, Hants, S050 6BB, UK

**11976.** Home, J. (2012): Emergence, maturation time and oviposition in the Common Darter *Sympetrum striolatum* (Charpentier). *J. Br. Dragonfly Society* 28(2): 66-74. (in English) ["The most successful period of oviposition in 2005 occurred during the last half of September. However, 9% of the emergences in 2006 occurred from a pond exposed from mid-October through November 2005, indicating a second, smaller, peak of oviposition. Over the period 1990-2011 the average date for the first sighting of individuals was 17 June and the average date when first seen patrolling was 14 July. The mean time between emergence and patrolling was 28 days." (Author)] Address: Home, J., 78 Spring Lane, Bishopstoke, Eastleigh, Hants, S050 6BB, UK

**11977.** Horváth, G. (2012): Assessment of riverine dragonflies (Odonata: Gomphidae) and the emergence behaviour of their larvae based on exuviae data on the reach of the river Tisza in Szeged. *Tiscia* 39: 9-15. (in English) ["Abundance, phenology, sex ratio, emergence pattern, mortality and larval emergence behaviour of riverine Gomphidae were studied at the Lower-Tisza



reach at Szeged (168–173 rkm) during the emergence period in 2011. Three 20 meter long sampling sites were chosen and searched systematically for exuviae, dead specimens and dragonfly wings, which were left behind by bird predators. At the studied reach of the river two species form stable populations: *G. flavipes* and *G. vulgatissimus*. *G. flavipes* was much more abundant than *G. vulgatissimus*. Exuviae indicated the excess of females in the *G. vulgatissimus* population (although there were no significant difference between sexes), while in the case of *G. flavipes* the number of individuals in both sexes were almost the same. *G. vulgatissimus* started to emerge first as a 'spring species', while *G. flavipes* started to emerge about a month later showing the characteristics of a 'summer species'. The rate of mortality in the *G. flavipes* population during emergence was slight and quite normal compared to the abundance of the species. Selection of emergence support of *G. flavipes* showed that the significant majority of the larvae chose soil, but this could have been caused by the notable minority of other types of substrates at the sampling sites. The distance crawled by the larvae from the water-front to the emergence site differed significantly between the two species, *G. vulgatissimus* crawled further, and in the case of *G. flavipes* the effect of the measured background variables to the distance had not been proven." (Author)] Address: Horváth, G., Department of Ecology, University of Szeged, H-6726 Szeged, Közép fasor 52., Hungary

**11978.** Hossie, T.J.; Murray, D.L. (2012): Assessing behavioural and morphological responses of frog tadpoles to temporal variability in predation risk. *Journal of Zoology* 288(4): 275-282. (in English) ["Finely tuned adjustment of an individual's phenotype can offer substantial fitness benefits when it is closely matched with environmental change. For instance, prey may be safeguarded against unnecessary costs to growth or development when their responses to temporally variable predation risk include plastic anti-predator defences. Yet, the correspondence between perceived predation risk and related responses should differ between behavioural and morphological phenotypes when risk fluctuates because behaviour can be modified quickly, whereas morphological phenotypes require time to build. Theoretical models predict intermediate expression when risk fluctuates rapidly relative to the time required to mount a response, whereas traits that can be modified relatively quickly should more closely track current conditions. Using a tadpole-dragonfly larva system, we sought to compare the expression of behavioural and morphological defences following exposure to constant versus variable predation risk. By varying the pattern and total duration of predator cue exposure, but not cue concentration, we quantified phenotypic plasticity and trait reversibility. Our results show that strong behavioural responses were limited to early ontogeny but closely matched current level of risk. The morphology of prey experiencing a weekly changing predator environment was intermediate to that of prey in the no-predator and constantly exposed treatments. Yet, prey exposed to a predator environment for the same total duration as the weekly changing environment, but in a different exposure pattern, was morphologically unresponsive to the onset of predation risk. Finally, unexposed tadpoles gained deeper tails and smaller relative body size in late development, coincident with limb bud development. Such changes are consistent with anti-predator response and represent either an innate response when prey are more

vulnerable or shape optimization when faced with increased drag. We conclude that phenotypic expression depends critically on patterns of temporal variability in the environment, although the actual extent of expression depends on the specific trait in question." (Authors)] Address: Hossie, T.J., Ottawa-Carleton Institute of Biology, Carleton University, 1125 Colonel By Dr., Ottawa, ON, Canada K1S 5B6. Email: thossie@connect.carleton.ca

**11979.** Huang, S.-C.; Reinhard, J. (2012): Color change from male-mimic to gynomorphic: a new aspect of signaling sexual status in damselflies (Odonata, Zygoptera). *Behavioral Ecology* 23(6): 1269-1275. (in English) ["Body colour variations are used by many animal species to communicate their sexual state and are believed to have evolved through sexual selection. In Zygoptera, females sometimes come in different colour morphs: gynomorphs and male-like andromorphs, pursuing different reproductive strategies. These distinct female colour morphs are usually mature females and their colour remains stable throughout the female's life. Here, we show for the first time that blue andromorph females of the Australian damselfly *Ischnura heterosticta*, are still sexually immature, and change their body colour to green-grey gynomorph when they are ready to mate. The colour change occurs within 24h and is irreversible. Males of *I. heterosticta* rarely recognize blue andromorphs as potential mates, but mistake them for other males. The andromorphs thus avoid male sexual harassment, giving them the advantage of additional time to forage and sexually mature. The colour change to gynomorph signals the readiness to mate, and the former andromorphs have equal mating success after the colour change as other gynomorph females. Our results demonstrate that andromorph *I. heterosticta* use a complete and unique body colour change from male-mimic to gynomorphic to signal sexual maturity and regulate reproduction. Our discovery gives rise to a novel hypothesis regarding maintenance of female-limited polymorphism in *Ischnura* damselflies via this colour change mechanism." (Authors)] Address: Huang; S.-C., Queensland Brain Institute, University of Queensland, Brisbane QLD 4072, Australia. E-mail: shaochang.huang@uqconnect.edu.au

**11980.** Hughes, M.E.; Fincke, OM, (2012): Reciprocal effects between burying behavior of a larval dragonfly (Odonata: *Macromia illinoensis*) and zebra mussel colonization. *Journal of Insect Behavior* 25: 554-568. (in English) ["Invasive zebra mussels (*Dreissena polymorpha*) often colonize dragonfly larvae, especially spawning species whose survivorship to emergence as terrestrial predators is consequently reduced. Using individuals of the sprawler, *Macromia illinoensis*, as their own controls, we compared the burying behaviour of penultimate instar larvae before (i.e. baseline) and after their colonization by zebra mussels under ambient conditions. Individuals that took longer to bury themselves when mussel-free had a higher rate of colonization by mussels over a five-day period compared to those that buried faster. In contrast, the depth at which individuals buried when mussel-free was not predictive of subsequent colonization rate. Although mean bury time did not differ between baseline and when an individual carried one or more mussels, colonized larvae buried more shallowly than when mussel-free. Moreover, attached mussels increased the risk of subsequent colonization by zebra mussels. After naturally losing all of their attached mussels, bury time and depth of individuals did



not differ from their baseline behaviour, indicating that the changes in the behaviour of colonized individuals were due to mussel loads and not their time in captivity. Under natural conditions, the positive feed-back between mussel attachment and increasing vulnerability to colonization helps explain how mussel loads, which are lost at molting, can accumulate quickly over the duration of the final larval stadium. Because zebra mussel attachment decreases the crypsis that that a *M. illinoensis* gains from burying, the invasive mussel may also make dragonfly larvae more detectable to visual predators." (Authors)] Address: Fincke, Ola M., Ecology & Evolutionary Biology Program, Dept of Zoology, Univ. of Oklahoma, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**11981.** Humala, A.E.; Polevoi, A.V. (2012): Additions to the insect fauna of the "Kizhi Skerries" reserve. Proceedings of the Karelian Research Center 1(2012): 141-145. (in Russian, with English summary) [The following Odonata species are added to the Karelian (Russia) fauna: *Erythromma najas*, *Enallagma cyathigerum*, *Leestes dryas*, *Sympetrum danae*, *Leucorrhinia albifrons*, and *L. caudalis*.] Address: Humala, A., Forest Research Institute, Karelian Research Centre, Russian Academy of Sciences, 11 Pushkinskaya St., 185910 Petrozavodsk, Karelia, Russia. E-mail: humala@krc.karelia.ru

**11982.** Ingley, S.J.; Bybee, S.M.; Tennessen, K.J.; Whiting, M.F.; Branham, M.A. (2012): Life on the fly: phylogenetics and evolution of the helicopter damselflies (Odonata, Pseudostigmatidae). *Zoologica Scripta* 41(6): 637-650. (in English) ["Helicopter damselflies (Odonata: Pseudostigmatidae) form a relatively small, yet highly specialized group of odonates, including the largest extant odonate (wingspan of ~190 mm). Pseudostigmatids are found throughout Central and South America, with the exception of one species that is found exclusively in East Africa. Pseudostigmatids oviposit exclusively in phytotelmata and forage on orb-weaver spiders, which they pluck from webs. Pseudostigmatids also exhibit unique forms of both broad and narrow wings. Although the ecology of these behaviours and morphological features have been studied, their phylogenetic origins and evolutionary history are unknown. Here, we examine the origins of pseudostigmatid wing forms, oviposition in phytotelmata and spider feeding within a modern phylogenetic context, testing for single origins of each character. Phylogenetic analyses are based on 59 morphological characters and ~5 kb of sequence data. Our findings include a well-supported monophyletic Pseudostigmatidae and *Coryphagrion grandis* as sister to the Neotropical genera. The genus *Mecistogaster* is paraphyletic, with *Pseudostigma* nested within the clade. The genus *Microstigma* is supported as monophyletic and forms a sister group relationship to the clade of *Megaloprepus* and *Anomisma*. The sister group relationship to Pseudostigmatidae is less clear. On the basis of this phylogenetic analysis, we propose three new tribes (Coryphagrionini, Microstigmatini and Mecistogastriini). As Pseudostigmatidae is monophyletic, the behaviour of gleaning spiders from webs appears to derive from a single origin. There are two origins of broad wings within Pseudostigmatidae. Oviposition in phytotelmata most certainly evolved multiple times within Coenagrionoidea. These findings provide new insights into pseudostigmatid evolution that can be used to generate hypotheses regarding behaviour and morphological adaptation in this unique and threatened group of damselflies." (Authors)] Address: Ingley, S.J., Depart-

ment of Biology, 401 WIDB, Brigham Young University, Provo, UT 84602. E-mail: sjingley@byu.edu

**11983.** Jacquemin, G.; Vein, D. (2012): The aquatic insects of a standard small plain river in NE France, with emphasis on remarkable species. *Aquatic Insects* 34, Supplement 1: 11-22. (in English) ["A five-year macroinvertebrate study was conducted on a 55 km river (le Rupt-de-Mad, Lorraine region, north-eastern France), a standard for the region. A list of 300 species was drawn up, and remarkable species were listed for some better known orders: Ephemeroptera, Plecoptera, Trichoptera and Odonata. Some faunistic results are emphasised: about 42% of the identified species were more or less ubiquitous, 26% were meso- to polysaprobic species of potamon, present only in the main course of the river, while 31% were rather stenoecious species restricted to certain tributaries. Fifty-one remarkable species were listed, taking into account their regional status, according to IUCN categories: more than three quarters were hosted in the small tributaries, and 55% found exclusively in these latter (versus 23.5% only present in the main course of the river). Calcareous lotic tributaries were hosting particularly original communities with many remarkable species. Ephemeroptera, Plecoptera and Trichoptera were pertinent groups to assess the global faunistic interest of lotic habitats, but lentic habitats are probably better evaluated using other groups, e.g. Odonata and Coleoptera; the latter unfortunately poorly known from an ecological point of view." (Authors)] Address: Jacquemin, G., Biologie des Insectes, Université H. Poincaré, Nancy 1, BP 239, F-54506 Vandoeuvre-lès-Nancy, France

**11984.** Jaeschke, A.; Bittner, T.; Jentsch, A.; Reineking, B.; Schlumprecht, H.; Beierkuhnlein, C. (2012): Biotic interactions in the face of climate change: A comparison of three modelling approaches. *PLoS ONE* 7(12): e51472. (in English) ["Climate change is expected to alter biotic interactions, and may lead to temporal and spatial mismatches of interacting species. Although the importance of interactions for climate change risk assessments is increasingly acknowledged in observational and experimental studies, biotic interactions are still rarely incorporated in species distribution models. We assessed the potential impacts of climate change on the obligate interaction between *Aeshna viridis* and its egg-laying plant *Stratiotes aloides* in Europe, based on an ensemble modelling technique. We compared three different approaches for incorporating biotic interactions in distribution models: (1) We separately modelled each species based on climatic information, and intersected the future range overlap ('overlap approach'). (2) We modelled the potential future distribution of *A. viridis* with the projected occurrence probability of *S. aloides* as further predictor in addition to climate ('explanatory variable approach'). (3) We calibrated the model of *A. viridis* in the current range of *S. aloides* and multiplied the future occurrence probabilities of both species ('reference area approach'). Subsequently, all approaches were compared to a single species model of *A. viridis* without interactions. All approaches projected a range expansion for *A. viridis*. Model performance on test data and amount of range gain differed depending on the biotic interaction approach. All interaction approaches yielded lower range gains (up to 667% lower) than the model without interaction. Regarding the contribution of algorithm and approach to the overall uncertainty, the main part of explained variation stems

from the modelling algorithm, and only a small part is attributed to the modelling approach. The comparison of the no-interaction model with the three interaction approaches emphasizes the importance of including obligate biotic interactions in projective species distribution modelling. We recommend the use of the 'reference area approach' as this method allows a separation of the effect of climate and occurrence of host plant." (Authors)] Address: Jaeschke, Anja, Department of Biogeography, BayCEER, University of Bayreuth, Bayreuth, Germany. E-mail: anja.jaeschke@uni-bayreuth.de

**11985.** Jardine, T.D.; Kidd, K.A.; Rasmussen, J.B. (2012): Aquatic and terrestrial organic matter in the diet of stream consumers: implications for mercury bioaccumulation. *Ecological Applications* 22: 843-855. (in English) ["The relative contribution of aquatic vs. terrestrial organic matter to the diet of consumers in fluvial environments, and its effects on bioaccumulation of contaminants such as mercury (Hg), remains poorly understood. We used stable isotopes of carbon and nitrogen in a gradient approach (consumer isotope ratio vs. periphyton isotope ratio) across temperate streams that range in their pH to assess consumer reliance on aquatic (periphyton) vs. terrestrial (riparian vegetation) organic matter, and whether Hg concentrations in fish and their prey were related to these energy sources. Taxa varied in their use of the two sources, with grazing mayflies (Heptageniidae), predatory stoneflies (Perlidae), one species of water strider (Metrobates hesperius) and the fish blacknose dace (*Rhinichthys atratulus*) showing strong connections to aquatic sources while *Aquarius remigis* water striders and brook trout (*Salvelinus fontinalis*) showed a weak link to in-stream production. The aquatic food source for consumers, periphyton, had higher Hg concentrations in low pH waters, and pH was a much better predictor of Hg in predatory invertebrates (including Odonata) that relied mainly on this food source vs. those that used terrestrial C. These findings suggest that stream biota relying mainly on dietary inputs from the riparian zone will be partially insulated from the effects of water chemistry on Hg availability. This has implications for the development of a whole system understanding of nutrient and material cycling in streams, the choice of taxa in contaminant monitoring studies, and in understanding the fate of Hg in stream food webs." (Authors) Gomphidae, Cordulegastridae and Aeshnidae are grouped as Odonata.] Address: Jardine, T.D., School of Environment and Sustainability Toxicology Centre, University of Saskatchewan, Saskatoon SK Canada S7N 5B3. E-mail: t.jardine@griffith.edu.au

**11986.** Jödicke, R. (2012): Die Libellensammlung Lopau: Imagines (Odonata). *International Dragonfly Fund - Report* 47: 1-8. (in German, with English summary) ["The collection of Wolfgang Lopau contains 915 dragonfly imagoes of 80 taxa, which were predominantly taken in Greece. The focus of collecting activities was set on taxa with unsettled taxonomy. The collection is now deposited in the Senckenberg Institute and Museum Frankfurt." (Author)] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. E-mail: reinhard.joedicke@ewetel.net

**11987.** Johnson, J. (2012): Got clearance? The 2012 Aeshna Blitz at Three Forks, Oregon. *Bulletin of the Oregon Entomological Society* Fall 2012: 1-4. (in English) [The paper reports on an odonatological trip to Three Forks, Malheur Co., Oregon, 27 and 28 July 2012. A to-

tal of 26 species are reported.] Address: Johnson, J., 3003 Unander Avenue, Vancouver, WA 98660, USA. E-mail: jtjohnson@comcast.net

**11988.** Johnson, S.E.; Ugbah, N.K. (2012): The spatial games: investigating the spatial distribution of *Anax* and select prey as a function of predator-prey interactions. A Senior Project presented to the Faculty of the Biological Sciences Department California Polytechnic State University, San Luis Obispo in partial fulfillment of the requirements for the degree Bachelor of Science: 24 pp. (in English) ["Our study investigated the spatial distribution and movement behaviour of predatory dragonfly larvae (*Anax*) and of two prey types: mosquito larvae and amphipods. Predator-prey interactions have important consequences for the population dynamics of both predator and prey groups and these interactions can shape community structure. We measured behaviour of each prey type in the presence of the *Anax* predator and the behaviour of the predator in the presence of these alternative prey types. Observations were made in five-gallon aquaria where a grid pattern allowed us to track the number of moves made by individuals. We compiled data from ten, one hour trials for each predator-prey combination (*Anax* + amphipods and *Anax* + mosquito larvae). Prey species differed in their behaviour. Mosquito larvae spent more time near the water's surface, were more likely to utilize the artificial vegetation, and were more active than amphipods. On the other hand, amphipods utilized full range of the aquarium and had a greater number of moves than mosquito larvae. *Anax* behaviour was significantly different in the two prey treatments. *Anax* spent more time in the top portion of the aquarium during the mosquito treatments, utilized the artificial vegetation more in the amphipod treatments, had a greater number of moves in the amphipod treatments, and ate more amphipods than mosquito larvae. Our results indicate that *Anax* change their behaviour based on prey type." (Authors)] Address: not stated.

**11989.** Juen, L.; De Marco Jr, P. (2012): Dragonfly endemism in the Brazilian Amazon: competing hypotheses for biogeographical patterns. *Biodiversity and Conservation* 21(13): 3507-3521. (in English) ["Many hypotheses have been proposed to explain the origin and maintenance of the Amazonian diversity with special place for the theory of isolation by rivers and a set of hypothesis related to contemporary environmental dissimilarity. We explore those hypotheses here using the biogeographic distributional patterns of dragonflies in interfluvial areas of the Amazonian biome and also evaluate how differences among dispersal capabilities between the Anisoptera and Zygoptera suborders may contribute to those patterns. We used distributional information of 392 odonate species in the Amazonian forest in a cladistic analysis of distributions and endemism and the estimated faunistic similarity among interfluves with the Sorensen index. The environmental similarity among interfluves was analysed by discriminant analysis based on eight environmental metrics. Different metrics for geographic distance (connectivity) among interfluves were evaluated and their relation to the other variables tested by the Mantel test. The number of endemic species was linearly correlated to the area of the interfluves. General endemism patterns showed consistent resemblance to those reported for vertebrates, especially the similarity among the Rondônia and Inambari interfluves. Geographical distance has no predictive value for

dragonflies distribution, but the environmental similarity is a good predictor of proportion of shared species. The low dispersal group (Zygoptera) presented more clear patterns of distribution and a lower proportion of shared species among different interfluves. The environmental similarity can be considered the determinant factor of the distribution of dragonflies, possibly due to environmental specificity evolved during a long history of some clades in this system. The low dispersal group (Zygoptera) retained more biogeographical information about possible historical factors that determine current distribution. Also, the transport of larvae by macrophyte banks, the lateral change of river courses, the reversal of the drainage basin, together with the capacity to disperse across rivers for some species may be explanations for the lack of effect of isolation by rivers, especially for Anisoptera." (Authors)] Address: Juen, L., Instituto de Ciências Biológicas, Universidade Federal do Pará, Rua Augusto Correia, N8 1 Bairro Guama, Belém, PA 66.075-110, Brazil. E-mail: leandrojuen@ufpa.br

**11990.** Kafutshi, R.K. (2012): Le régime alimentaire du Martin-pêcheur huppé *Alcedo cristata* pendant la période de reproduction dans la région de Kinshasa (R.D. Congo). *Malimbus* 34: 12-28. (in French, with English summary) ["The diet of the Malachite Kingfisher was investigated by study of 182 regurgitated pellets collected from 65 broods during the nesting period in the rainy seasons from 2004 to 2009, in two sites in the Kinshasa area. In total, 2619 undigested remains were identified in the pellets, revealing 1100 prey. The Malachite Kingfisher's diet is rich and diverse. The prey identified were 92.7 % fishes (*Oreochromis niloticus*, *Gambusia affinis* and *Hemichromis elongatus*), 5.9 % insects (Odonata and Orthoptera) and 0.5 % frogs." (Author)] Address: Kafutshi, R.K., Université de Kinshasa, Faculté des sciences, Département de Biologie, B.P. 190 Kinshasa XI, R.D. Congo, et Université de Liège, Département des sciences de la vie (Biologie des organismes et écologie), 27 Boulevard du Rectorat B22, 4000 Liège, Belgique. E-mail: bobkisasa@yahoo.fr

**11991.** Kalniņš, M. (2012): Dragonflies (Odonata) in Latvia – history of research, bibliography and distribution from 18th century until 2010. *Latvijas Entomologs* 51: 91-149. ["This work is to summarize large number of the available unpublished data and to make - distribution maps and to present the results in an article. The existing faunistic data were presented in 82 publications up to the end of 2010. Distribution maps were developed for 59 species. For several species of dragonflies were found notable changes in the distribution." (Author)] Address: Kalniņš, M., Nature Conservation Agency, Baznīcas iela 7, Sigulda, Siguldas novads, LV-2150, Latvia. E-mail: martins.kalnins@biology.lv

**11992.** Karthika, P.; Vadivalagan, C.; Gunasekaran, C.; Anandhakumar, S. (2012): DNA Barcoding of selected dragonfly species (Libellulidae and Aeshnidae) for species authentication with phylogenetic assessment. *European Journal of Experimental Biology* 2(6): 2158-2165. (in English) ["Dragonflies are the bio indicators of the aquatic ecosystem. Knowledge and studies on the diversity of dragonflies in India is very high. Identification by traditional taxonomy often leads to misidentification. Incidence of sexual dimorphism is found to be high particularly in the Libellulidae and Aeshnidae family. In order to resolve the above mentioned problem, the accurate identification of the dragonflies was carried out by DNA barcoding using COI gene. In the present study,

selected dragonfly species (*Bradinopyga geminata*, *Crocothemis servilia*, *Diplacodes trivialis* and *Anaciaeschna jaspidea*) of the family of Libellulidae and Aeshnidae were taken and along with three other evident species (*Pantala flavescens*, *Orthetrum sabina*, and *Brachythemis contaminata*) were retrieved from GenBank. The phylogenetic tree was created using NJ (Neighbour Joining) method to determine the origin and evolutionary relationships of the species. Similarity search was performed and conformed species were submitted to the NCBI and BOLD database for species authentication. The present study concluded that the DNA barcoding is an invaluable tool for the authentication of the species. Storage of this nucleotide information in a database like BOLD would greatly help in the identification up to sub species level." (Authors)] Address: Karthika, P., Conservation Biology Laboratory, Dept of Zoology, Bharathiar University, Coimbatore

**11993.** Karube, H.; Katatani, N. (2012): Occurrence of a new species of the genus *Hemicordulia* in northeastern Laos (Anisoptera: Corduliidae). *Tombo* 54: 71-74. (in English, with Japanese summary) [*Hemicordulia edai* sp. nov. is described from northeastern Laos. "It is related to *H. asiatica* Selys, 1878 from India and Burma, but can be easily distinguished from the latter by the structure of male superior appendages and female vulvar scale." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**11994.** Kefford, B.J.; Hickey, G.L.; Gasith, A.; Ben-David, E.; Dunlop, J.E.; Palmer, C.G.; Allan, K.; Choy, S.C.; Piscart, C. (2012): Global scale variation in the salinity sensitivity of riverine macroinvertebrates: Eastern Australia, France, Israel and South Africa. *PLoS ONE* 7(5): e35224. doi:10.1371/journal.pone.0035224: 12 pp. (in English) ["Salinity is a key abiotic property of inland waters; it has a major influence on biotic communities and is affected by many natural and anthropogenic processes. Salinity of inland waters tends to increase with aridity, and biota of inland waters may have evolved greater salt tolerance in more arid regions. Here we compare the sensitivity of stream macroinvertebrate species to salinity from a relatively wet region in France (Lorraine and Brittany) to that in three relatively arid regions eastern Australia (Victoria, Queensland and Tasmania), South Africa (south-east of the Eastern Cape Province) and Israel using the identical experimental method in all locations. The species whose salinity tolerance was tested, were somewhat more salt tolerant in eastern Australia and South Africa than France, with those in Israel being intermediate. However, by far the greatest source of variation in species sensitivity was between taxonomic groups (Order and Class) and not between the regions. We used a Bayesian statistical model to estimate the species sensitivity distributions (SSDs) for salinity in eastern Australia and France adjusting for the assemblages of species in these regions. The assemblage in France was slightly more salinity sensitive than that in eastern Australia. We therefore suggest that regional salinity sensitivity is therefore likely to depend most on the taxonomic composition of respective macroinvertebrate assemblages. On this basis it would be possible to screen rivers globally for risk from salinisation." (Authors) The analysed data sets include from Israel: *Platycnemis* sp., *Pseudagrion* sp., *Lesites virens* and *L. barbarus*, and from France: *Boyeria irene*, *Ischnura elegans*, *Calopteryx splendens*, *C. virgo*,



*Somatochlora metallica*, *Onychogomphus forcipatus*, *Gomphus pulchellus*, *G. vulgatissimus*, *Coenagrion puella*, and *P. pennipes*.] Address: Kefford, B.J., Centre for Environmental Sustainability, School of the Environment, University of Technology Sydney, Broadway, New South Wales, Australia. E-mail: ben.kefford@rmit.edu.au

**11995.** Keller, D.; van Strien, M.J.; Ghazoul, J.; Holder-egger, R. (2012): Landscape genetics of insects in intensive agriculture: new ecological insights. In: Swiss Federal Research Institute WSL (ed) ENHANCE. Enhancing ecosystem connectivity through intervention - benefits for nature and society? Final Report. Birmensdorf, Swiss Federal Research Institute WSL: 27-35. (in English) ["Agricultural landscapes harbour various insect species, of which many became threatened due to fragmentation, habitat loss and agricultural intensification. Connectivity measures are being implemented to mitigate this trend. However, to determine whether structural connectivity measures are truly effective, the functional connectivity needs to be measured, which requires knowledge on species-specific migration rates as well as the identification of landscape elements enhancing or inhibiting migration. The latter is unknown for most insect species. Therefore, we studied the effects of landscape composition on migration and gene flow of insect species inhabiting an intensively managed agricultural landscape in the Oberaargau region in Switzerland. We focussed on five study species inhabiting different habitat types: ... [four grasshopper species] ... and a damselfly inhabiting ditches (*Coenagrion mercuriale*). For each of these species landscape elements that facilitated or inhibited migration and gene flow were assessed. Furthermore, we tested whether the reproductive habitat of a species was also the preferred migration habitat and whether this differed between short- and long-distance migration. Several landscape genetic approaches were applied to answer these issues. Transect analysis was used to identify landscape elements that enhance or inhibit gene flow within straight-line transects between pairs of populations. Because straightline transects assume rectilinear migration, we developed a new method, least-cost transect analysis (LCTA), which creates transects around least-cost paths to give a better representation of the landscape that a migrating individual may encounter. LCTA was used to assess most likely migration habitats for short- and long-distance dispersal and simultaneously identify landscape effects on gene flow. For both, the damselfly *C. mercuriale* and the wetland grasshopper *S. grossum*, short-distance migration occurred predominantly within their reproductive habitat. For long-distance dispersal, however, *C. mercuriale* preferred open agricultural landscapes, and *S. grossum* did not show any landscape preferences. This differentiation between short and long-distance dispersal was further analysed making use of population network topologies. With network topologies we discovered that the spatial configuration of populations may have influence on the detectability of a landscape effect on migration and should be considered in landscape genetic analyses. A simulation study is currently being set up to determine to what extent results from landscape genetic techniques are influenced by habitat fragmentation and abundance." (Authors)] Address: Keller, Daniela, WSL Swiss Federal Research Institute, Zürcherstr. 111, CH-8903 Birmensdorf, Switzerland. E-mail: mailto:daniela.keller@wsl.ch

**11996.** Kerry, L.; Baker, R.A. (2012): The terrestrial mite *Leptus killingtoni* Turk (Acari: Erythraeidae) as a para-

site of the Small Red Damselfly *Ceragrion tenellum* and other odonates. *J. Br. Dragonfly Society* 28(1): 21-26. (in English) [Odonata from three commons on the East Devon Pebblebed Heaths (UK) were checked for mites. *L. killingtoni* was observed on the head, thorax, abdomen and legs of *C. tenellum*, *Pyrrhosoma nymphula*, *Coenagrion mercuriale*, *Orthetrum coerulescens* and *Cordulegaster boltonii*. *C. mercuriale* is a new host record. "The results for *C. tenellum* are - examined 123, infested 39, prevalence (percentage of individuals parasitized) 32%. Of the 56 mites observed, 23 (41%) were found on the legs and smaller numbers on other parts of the body; i.e. 2 (4%) on the head, 13 (23%) on the thorax, 10 (18%) on the abdomen and 6 (11%) on or near the eyes ... The majority of the odonates had only one mite per host." (Authors)] Address: Kerry, L., Mount Pleasant Cottage, Stoneyford, Colaton Raleigh, Sidmouth, Devon, EX10 OHZ, UK

**11997.** Klass, K.-D.; Matushkina, N.A. (2012): The exoskeleton of the female genitalic region in *Petrobiellus takunagae* (Insecta: Archaeognatha): insect-wide terminology, homologies, and functional interpretations. *Arthropod Structure & Development* 41(6): 575-591. (in English) ["The exoskeleton of the female genitalic region (abdominal venters 7-9) in *Petrobiellus takunagae* (Machilidae-Petrobiellinae) is studied using light microscopy and SEM. Sclerites are distinguished from membrane by the degree of cuticular flexibility. However, the microsculpture of the cuticle is shown to be useful in characterising the heterogeneity of the cuticle and in detecting weak sclerotisations. The morphology of *Petrobiellus* is compared with that in *Trigoniophthalmus alternatus* (Machilidae-Machilinae) described previously. While venter 7 is similar, venters 8 and 9 show many differences in the presence/absence or fusion/separation of particular sclerites. This suggests female genitalic morphology to be a valuable character system for phylogenetic and taxonomic work in Archaeognatha. Comparison with other insect orders is aimed at detecting homologous structures and conditions. Important points are: (1) *Petrobiellus* has a sclerotised genital lobe posteriorly on venter 7, similar to *Zygentoma* and *Dictyoptera*; it bears the gonopore. (2) *Petrobiellus* has a posterior sclerite on venter 9 that is very similar to a sclerite of Odonata. (3) The morphology of the coxal lobes of venter 9 (gonoplacs) suggests their function as a sheath of the ovipositor. From female genitalic morphology we deduce the process of oviposition, describing an external egg transportation tract." (Authors)] Address: Matushkina, Natalia A., Department of Zoology, Biological Faculty, National Taras Shevchenko Univ. of Kyiv, vul. Volodymirs'ka, 64, Kyiv UA-01033, Ukraine. E-mail: odonatally@gmail.com

**11998.** Koehler, C.; Liang, Z.; Gaston, Z.; Wan, H.; Dong, H. (2012): 3D reconstruction and analysis of wing deformation in free-flying dragonflies. *The Journal of Experimental Biology* 215(17): 3018-3027. (in English) ["Insect wings demonstrate elaborate three-dimensional deformations and kinematics. These deformations are key to understanding many aspects of insect flight including aerodynamics, structural dynamics and control. In this paper, we propose a template-based subdivision surface reconstruction method that is capable of reconstructing the wing deformations and kinematics of free-flying insects based on the output of a high-speed camera system. The reconstruction method makes no rigid wing assumptions and allows for an ar-

bitrary arrangement of marker points on the interior and edges of each wing. The resulting wing surfaces are projected back into image space and compared with expert segmentations to validate reconstruction accuracy. A least squares plane is then proposed as a universal reference to aid in making repeatable measurements of the reconstructed wing deformations. Using *Erythemis simplicicollis* as a demonstration, we quantify and visualize the wing twist and camber in both the chord-wise and span-wise directions, and discuss the implications of the results. In particular, a detailed analysis of the subtle deformation in the dragonfly's right hindwing suggests that the muscles near the wing root could be used to induce chord-wise camber in the portion of the wing nearest the specimen's body. We conclude by proposing a novel technique for modelling wing corrugation in the reconstructed flapping wings. In this method, displacement mapping is used to combine wing surface details measured from static wings with the reconstructed flapping wings, while not requiring any additional information be tracked in the high speed camera output." (Authors)] Address: Koehler, C., Dept of Computer Science and Computer Engineering, Wright State University, Dayton, OH 45435, USA. E-mail: kkoehler.11@gmail.com

**11999.** Korkeamäki, E.; Metsälä, P.; Parkko, P. (2012): *Isoukonkorenon (Aeshna crenata) elinympäristöt Salpausselän harjaluueella* [Habitat selection of *Aeshna crenata* in the Salpausselkä Ridge area]. *Crenata* 5: 29-33. (in Finnish, with English summary) ["*A. crenata*, is an impressive, but rare, localized and poorly known species in Europe. A total of 45 small ponds and lakes, situated within the Salpausselkä Ridge, north of Kouvola city in south-eastern Finland, were surveyed for populations of *A. crenata* during the period 30 June - 4 September 2011. Adults and exuviae were searched for in sunny weather. *A. crenata* was found in 18 ponds. The 16 other odonate species recorded in these ponds are listed in Table 1. *A. crenata* seems to have rather specialized habitat requirements in the study area. It occurs mainly in small, circular and oligotrophic ponds with slightly swampy shoreline. These ponds - 'suppa pits' - are typical glacial age formations in the Salpausselkä Ridge. Potential threats by the human activity to the populations of *A. crenata* are briefly discussed." (Authors)] Address: Korkeamäki, E., Karkunkatu 18 a 4 b, FIN-48600 Karhula, Finland.

**12000.** Kosterin, O.E.; Makbun, N.; Dawwrueng, P. (2012): *Burmagomphus asahinai* sp. nov., a new species from Cambodia and Thailand, with a description of the male of *B. graciosus* Chao, 1954. *International Journal of Odonatology* 15(4): 275-292. (in English) ["*Burmagomphus asahinai* sp. nov. (holotype male: Cambodia, Cardamom Mts., Koh Kong Province, Thma Bang District, 6 km SW of its centre, rapids at the Thma Bang River, 25 August 2011, RMNH) is described from Koh Kong Province of Cambodia and Nakhon Nayok, Chiang Mai and Parhuap Khiri Khan Provinces of Thailand and is compared with its nearest congeners. While the mesepisternum pattern is closest to that of *B. graciosus* Chao, 1954, the female head sculpture combines structures found separately in *B. graciosus* and *B. williamsoni* Forster, 1914. A redescription of *B. graciosus*, including the hitherto unknown male, is provided based on a pair from Guizhou Province, China." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences,

Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**12001.** Krejčová, A.; Černohorský, T.; Pouzar, M. (2012): O-TOF-ICP-MS analysis of rare earth elements, noble elements, uranium and thorium in river-relating species. *International Journal of Environmental Analytical Chemistry* 92(5): 620-635. (in English) ["The determination of rare earth elements (REEs), Au, Pt, Ir, Pd, Th and U in various river species was performed by the orthogonal time-of-flight inductively coupled plasma mass spectrometry (o-TOF-ICP-MS). The method working conditions were optimised in order to minimise the presence and possible spectral interferences of oxides. Ratios MO+/M+ as well as interference of light REE and Ba oxides/hydroxides with high REEs were evaluated and confirmed to be insignificant. Using the internal standard Re, non-spectral matrix effects (originally decreasing of intensities up to 15%) were overcome and recoveries were found from 92 to 105% for all matrices analysed. For solutions, limits of detection (3s) were 0.14–0.82 for REEs, Th, U and Y, 1.18 for La, 4.3–5.6 for Au, Pt, Ir and Pd 11 for Sc (all in ng L<sup>-1</sup>). The Principal component analysis was used for classification of samples according to their places of origin successfully. The o-TOF-ICP-MS was proved to be a very sensitive and suitable technique for bio-monitoring purposes and was employed in the analysis of biota samples (fish, insect, profiles, benthal growths) originated from five different places in the river Elbe (Czech Republic)." (Authors) The study includes four samples of 'Odonata'.] Address: Krejčová, Anna, Department of Environmental and Chemical Engineering, University of Pardubice, Studentská 573, CZ 532 10 Pardubice, Czech Republic. E-mail: anna.krejcov@upce.cz

**12002.** Kulijer, D.; Baker, R.A.; Zawal, A. (2012): A preliminary report on parasitism of Odonata by water mites from Bosnia and Herzegovina. *J. Br. Dragonfly Society* 28(2): 92-101. (in English) ["The following Odonata, infested with mites, have been collected from a number of sites in Bosnia and Herzegovina - *Aeshna isosceles*, *Sympetrum flaveolum*, *Coenagrion pulchellum*, *C. puella*, *C. scitulum*, *Enallagma cyathigerum*, *Erythromma najas*, *Ischnura elegans*, *I. pumilio*, *Lestes dryas*, *Platycnemis pennipes*, and *Pyrrhosoma nymphula*. The preferred site of mite attachment on the body is the posterior ventral surface of the thorax, behind the third pair of legs. In all but one of the species of zygopteran, mites were also found between the first and second pair and/or the second and third pair of legs and, in several species, on the abdomen. Mite loads varied for different species but preliminary results suggest that the larger anisopteran can carry more mites (in *S. flaveolum* mean 42, range 1-91) than the zygopterans, the highest recorded in the latter being in *C. pulchellum* (mean 37, range 1-68) and the lowest in *L. dryas* (mean 4, range 1-11). More mites were found on female damselflies than on males. Three distinct sizes of larval mite have been noted, indicating stages in their engorgement on the host." (Authors)] Address: Kulijer, D., National Museum of Bosnia and Herzegovina, Zmaja od Bosne 3, 71000 Sarajevo, Bosnia and Herzegovina

**12003.** Kumar, C.S.; Nair, R.R.; Sivaramkrishnan, K.G.; Ganesh, D.; Janarthan, S.; Arunachalam, M.; Sivaranban, T. (2012): Influence of certain forces on evolution of synonymous codon usage bias in certain species of three basal orders of aquatic insects. *Mitochondrial DNA* 23(6): 447-460. (in English) ["Forces that influence

the evolution of synonymous codon usage bias are analyzed in six species of three basal orders of aquatic insects. The rationale behind choosing six species of aquatic insects (three from Ephemeroptera, one from Plecoptera, and two from Odonata) for the present analysis is based on phylogenetic position at the basal clades of the Order Insecta facilitating the understanding of the evolution of codon bias and of factors shaping codon usage patterns in primitive clades of insect lineages and their subtle differences in some of their ecological and environmental requirements in terms of habitat-microhabitat requirements, altitudinal preferences, temperature tolerance ranges, and consequent responses to climate change impacts. The present analysis focuses on open reading frames of the 13 protein-coding genes in the mitochondrial genome of six carefully chosen insect species to get a comprehensive picture of the evolutionary intricacies of codon bias. In all the six species, A and T contents are observed to be significantly higher than G and C, and are used roughly equally. Since transcription hypothesis on codon usage demands A richness and T poorness, it is quite likely that mutation pressure may be the key factor associated with synonymous codon usage (SCU) variations in these species because the mutation hypothesis predicts AT richness and GC poorness in the mitochondrial DNA. Thus, AT-biased mutation pressure seems to be an important factor in framing the SCU variation in all the selected species of aquatic insects, which in turn explains the predominance of A and T ending codons in these species. This study does not find any association between microhabitats and codon usage variations in the mitochondria of selected aquatic insects. However, this study has identified major forces, such as compositional constraints and mutation pressure, which shape patterns of codon usage in mitochondrial genes in the primitive clades of insect lineages." (Authors)] Address: Sivaramakrishnan, K.G., Department of Zoology, Madras Christian College, Tambaram East, Chennai 600 059, Tamil Nadu, India. E-mail: kgskrishnan@gmail.com

**12004.** Kutsarov, X.; Bechev, D.; Kostadinov, R.; Marinov, M. (2012): The Bulgarian Odonata database – current status, organisation and a case study new entries. *ZooNotes* 33: 1-25. (in English) ["Bulgarian Odonata database is analysed for the period of the last 10 years. All new entries are summarised in individual species graphs representing the trends in data compilations. Special attention is paid on the role of communities in this process with a single study case which is evident of how a small contribution could elucidate important new information on some underexplored areas. It is concluded that for the past 10 years mountain areas and large Bulgarian rivers have been understudied. These should be the priority target areas in the investigations undertaken in near future." (Authors)] Address: Kutsarov, X., 1 Kalimok-Brushlen Ltd., 18 Panteley Kiselov Str., 7600 Tutrakan, Bulgaria. E-mail: kalimok@gmail.com

**12005.** Kyerematen, R.; Gordon, C. (2012): Aquatic insect fauna of three river systems in the Akyem Abuakwa traditional area of the eastern region of Ghana. *West African Journal of Applied Ecology* 20 (3): 73-82. (in English) ["Three river systems in the Akyem Abuakwa Traditional Area: Ayensu, Birim and Densu were sampled over a period of one year during the wet, dry and intermediate seasons for aquatic insect fauna. Fifteen sampling sites were chosen based on certain parameters such as accessibility as well as the inclusion of

high and low impact sites (i.e. close to or far from a town or village) or near areas with high human activity. and submerged Four sampling methods were employed: sweeping, core sampling, sieving and washing of stones, wood fragments objects as well as aquatic plants and leaves. Fifty seven (57) species of aquatic insects belonging to 26 families of 7 orders were recorded. Hemiptera, Ephemeroptera and Odonata were the most diverse and abundant orders with Hemiptera being the most diverse order with 17 species from 8 families. The most abundant species was *Rhagovelia obesa* (Hemiptera: Veliidae). The highest number of insects was collected in December while July recorded the lowest numbers. River Densu recorded the highest number of insects while River Birim recorded the highest diversity of insects with 36 species. River Ayensu had both the lowest numbers and diversity of insects." (Authors) The Odonata are a mixture from North-American/European and African taxa.] Address: Kyerematen, R., Dept of Animal Biology & Conservation Science, Univ. of Ghana, Legon, Ghana. E-mail: nkyerematen@ug.edu.gh

**12006.** Lai, G.-J.; Shen, G.-X. (2012): Experimental investigation on the wing-wake interaction at the mid stroke in hovering flight of dragonfly. *Science China. Physics, Mechanics & Astronomy* 55(11): 2167-2178. (in English) ["This paper focuses on flow structures of the wing-wake interaction between the hind wing and the wake of the forewing in hovering flight of a dragonfly since there are arguments whether the wing-wake interaction is useful or not. A mechanical flapping model with two tandem wings is used to study the interaction. In the device, two identical simplified model wings are mounted to the flapping model and they are both scaled up to keep the Reynolds number similar to those of dragonfly in hovering flight since our experiment is conducted in a water tank. The kinetic pattern of *Aeshna juncea* is chosen because of its special interesting asymmetry. A multi-slice phase-locked stereo particle image velocimetry (PIV) system is used to record flow structures around the hind wing at the mid downstroke ( $t/T=0.25$ ) and the mid upstroke ( $t/T=0.75$ ). To make comparison of the flow field between with and without the influence of the wake, flow structures around a single flapping wing (hind wing without the existence of the forewing) at these two stroke phases are also recorded. A local vortex identification scheme called swirling strength is applied to determine the vortices around the wing and they are visualized with the iso-surface of swirling strength. This paper also presents contour lines of  $\omega_z$  at each spanwise position of the hind wing, the vortex core position of the leading edge vortex (LEV) of hind wing with respect to the upper surface of hind wing, the circulation of the hind wing LEV at each spanwise position and so on. Experimental results show that dimension and strength of the hind wing LEV are impaired at the mid stroke in comparison with the single wing LEV because of the downwash from the forewing. Our results also reveal that a wake vortex from the forewing traverses the upper surface of the hind wing at the mid downstroke and its distance to the upper surface is about 40% of the wing chord length. At the instant, the distance of the hind wing LEV to the upper surface is about 20% of the wing chord length. Thus, there must be a wing-wake interaction mechanism that makes the wake vortex become an additional LEV of the hind wing and it can partly compensate the hind wing for its lift loss caused by the downwash from the forewing. " (Authors)] Address: Shen, G.-X., FFFOM



Laboratory, School of Aeronautic Science and Engineering, Beihang University, Beijing 100191, China. E-mail: gxshen05@yahoo.com.cn

**12007.** Lambert, J.-L.; Neveu, G.; Millard, R., Genin, C. (2012): Première preuve de Pindigénat d'Ophiogomphus cecilia (Fourcroy, 1785) dans le Jura Franc-Comtois (Odonata, Anisoptera: Gomphidae). *Martinia* 28(1): 47-56. (in French, with English summary) ["O. cecilia is reported from the Hérisson River, a major tributary of the Ain River, Jura mountains, eastern France, 2011. This is the first evidence of the reproduction in the Jura mountains, as previously only a dead imago was known from the mouth of the Loue River in the Doubs River." (Authors)] Address: Lambert, J.-L., Onema, Service départemental de la Marne, F- 51520 La Veuve, France. E-mail: jean-luc.lambert@onema.fr

**12008.** Land Oberösterreich; Sefciuk, A. (Red.) (2012): Geschützte Tiere in Oberösterreich. 2. Aufl. Hrsg: Land Oberösterreich, Amt der Oö. Landesregierung, Abteilung Naturschutz, 4021 Linz, Bahnhofplatz 1, Austria: 152 pp. (in German) [The book outlines the legal protection of the fauna of the Federal State Oberösterreich, Austria, giving many illustrations of the protected species. All Odonata species are legally protected; on pages 106 and 107 a few examples of species are figured, including *Oxygastra curtisii* which is not occurring in Austria.] Address: <http://www.land-oberoesterreich.gv.at/files/publikationen/ntiere.pdf>;

**12009.** Larson, M.D. (2012): Diet of the Cascades frog (*Rana cascadae*) as it relates to prey availability in the Klamath Mountains of Northwest California. M. Sc. thesis, Humboldt State University, Natural Resources: Wildlife, California State University Campus, Arcata: 71 pp. (in English) ["Frogs in the family Ranidae are considered generalist predators that consume prey as it is encountered in the environment. However, few studies have attempted to quantify the types and relative amounts of prey available to these frogs so a thorough understanding of their foraging ecology as it relates to prey availability is lacking. This study examined the diet of *R. cascadae* as it relates to prey availability in a Klamath Mountain basin in northern California during their active season of 2007. Based on the analysis of 275 stomach samples, *Rana cascadae* consumed 3052 prey items from 110 invertebrate taxa confirming that this species is a generalist predator. However, an Index of Relative Importance indicated that five prey categories were most important in the diet: Acrididae, Aranae, Formicidae, insect larvae, and Tipulidae. Differences in diet were detected between sexes, life stages, and seasons. Adult females consumed more Acrididae in the summer than males or juveniles. Adult male and juvenile frogs showed selection for insect larvae and Tipulid flies during the summer. In the spring adult females and juveniles also selected Tipulid flies and adult males selected Elaterid beetles. All life-stages and both sexes appeared to avoid very small prey. Shifts in prey use with changes in ontogeny were documented, with frogs consuming more large prey and less small prey as they grew." (Author) Odonata contributed very low to the diet of the species.] Address: Humboldt State University, California State University Campus, 1 Harpst Street, Arcata, CA 95521, USA

**12010.** Lease, H.M.; Wolf, B.O. (2012): Lipid content of terrestrial arthropods in relation to body size, phylogeny, ontogeny and sex. *Physiological Entomology* 36(1): 29-38. (in English) ["Energy storage in arthropods has

important implications for survival and reproduction. The lipid content of 276 species of adult arthropods with wet mass in the range 0.2–6.13 g is determined to assess how lipid mass scales with body mass. The relative contribution of lipids to total body mass is investigated with respect to phylogeny, ontogeny and sex. The lipid content of adult insects, arachnids, and arthropods in general shows an isometric scaling relationship with respect to body mass (M) (Marthropod lipid =  $-1.09 \times M^{dry}$  1.01 and Marthropod lipid =  $-1.00 \times M^{lean}$  0.98). However, lipid allocation varies between arthropod taxa, as well as with sex and developmental stage within arthropod taxa. Female insects and arachnids generally have higher lipid contents than males, and larval holometabolous insects and juvenile arachnids have higher lipid contents than adults." (Authors) With the exception of Odonata, female insects and arachnids had higher lipid content than males at the level of order. Odonata are treated at family level.] Address: Lease, Hilary, Department of Biology, University of New Mexico, Albuquerque, New Mexico, USA. E-mail: hlease@unm.edu

**12011.** Lemelin, H.; Williams, G. (2012): Blossoms & butterflies, waterfalls & dragonflies: Integrating insects in the hospitality and tourism industries through swarm supposition. In: Sloan, P., C. Simons-Kaufman & W. Legrand (eds.): Sustainable hospitality as a driver for equitable development. Case studies from developing regions of the world. XXXVII, 450 pp. Taylor & Francis: 198-211. (in English) ["It is now widely agreed that the climate is changing, global resources are diminishing and biodiversity is suffering. These changes pose huge challenges on nations, organizations, businesses, communities and ultimately individuals. Developing countries, many of them considered by the World Tourism Organization to be Top Emerging Tourism Destinations (UNWTO, 2009), are already suffering the full frontal effect of environmental degradation with the UN recently reporting the existence of nearly half a million climate refugees in Africa and Asia in addition to huge swathes of the world's farming land and oceans becoming infertile. The challenge for developing countries is a triple-edged sword, how can economic prosperity be achieved without the perpetual depletion of nature's reserves, the destruction of rural habitat and the dislocation of traditional societies? Many emerging nations are looking increasingly to the tourism industry as the motor for economic development with hospitality businesses at the forefront. In line with this increasing economic necessity is the growth of concern in the West for environmental and societal stewardship. Expectations are high, Western consumers want classy lodgings and unspoilt landscapes in the knowledge that the room maid has enough money to feed and educate her family. This book is designed to give students and practitioners a guide for best practices of sustainable hospitality operations in developing countries. Based on case studies, it provides a road map of how to achieve the goals of sustainability giving benchmark examples. The book not only taps in a contemporary business subject but provides readers with a better understanding on how sustainable theories can be operationalized in hospitality and tourism business practices in developing countries. Provides an enhanced view on sustainability beyond the borders of developed countries Case studies include hands-on activities, creative business practices and applied sustainable development strategies Includes case study questions, advanced reading list and online resource features." (Publisher)] Address: Leme-

lin, H., Lakehead University, School of Outdoor Recreation, Parks and Tourism, 955 Oliver Rd., Thunder Bay, Ontario, P7B 5E1, Canada. E-mail: harvey.lemelin@lakeheadu.ca

**12012.** Lescak, E.A.; A. von Hippel, F.; Lohman, B.K.; Sherbick, M.L. (2012): Predation of threespine stickleback by dragonfly naiads. *Ecology of Freshwater Fish* 21(4): 581-587. (in English) [Alaska, USA; "Gasterosteus aculeatus populations that have evolved pelvic girdle reduction are most commonly found in lakes with low dissolved ion concentration, a lack of piscivorous fishes and abundant macroinvertebrate predators. Researchers have speculated that macroinvertebrates have a propensity to consume prey with pelvic spines. If this is true, perhaps macroinvertebrates use the stickleback's spines to facilitate capture and manipulation. This study tested whether dragonfly naiads ("Aeshna spp.") differentially prey upon stickleback possessing either a complete or reduced pelvis and documented naiad hunting and capturing behaviour. Results from an arena experiment suggest that naiads do not prey more heavily upon individuals with one pelvic phenotype over the other. However, results from trials where the naiads were presented with one stickleback with pelvic spines and another without suggest that naiads prey more heavily upon small stickleback with pelvic spines and large stickleback without pelvic spines and that they adjust their predatory behaviour based upon the pelvic phenotype of the prey." (Authors)] Address: Lescak, Emily, Department of Biological Sciences, University of Alaska Anchorage, 3211 Providence Dr., Anchorage, AK 99508, USA. E-mail: elescak@alaska.edu

**12013.** Lewylle, I.; Lambrechts, J.; De Knijf, G. (2012): Verslag van de Workshop Kempense heidelibel in Hasselt van 26/08/2012. Libellenvereniging Vlaanderen — nieuwsbrief 6(2): 2-8. (in Dutch, with English summary) ["A workshop on the Marshland darter *Sympetrum depressiusculum* was held by the Flemish dragonfly association together with Natuurpunt. Main conclusions are that this species is rapidly declining even in its Belgian strongholds (as in the whole of Europe); it is clearly time for a species protection plan including a decent monitoring scheme; the most favourable and adequate management measure is putting ponds temporarily dry, which is complex but feasible, even for volunteers in nature protection." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**12014.** Li, C.; Dong, H.; Zhang, W. Gai, K. (2012): Flow modulation and force control in insect fast maneuver. *Bulletin of the American Physical Society* 57(17) [65th Annual Meeting of the APS Division of Fluid Dynamics, Sunday–Tuesday, November 18–20, 2012; San Diego, California]: 1 pp-[Verbatim: "In this work, an integrated study combining high-speed photogrammetry and direct numerical simulation (DNS) is used to study free flying insects in fast maneuver. Quantitative measurement has shown the significant differences between quad-winged flyers such as dragonfly and damselfly and two-winged flyers such as cicada. Comparisons of unsteady 3D vortex formation and associated aerodynamic force production reveal the different mechanisms used by insects in fast turn. This work is supported by NSF CBET-1055949." (Authors)] Address: not stated

**12015.** Li, Y.; Nel, A.; Ren, D.; Pang, H. (2012): Redescription of the damsel-dragonfly *Parafleckium senjituense* on the basis of a more complete specimen (Odonata: Isophlebioptera: Campterothlebiidae). *Zootaxa* 3597: 53-56. (in English) ["*P. senjituense* Li et al., 2012 is of great importance to clarify the phylogeny of the superfamily Isophlebioidea, as it has several significant structures considered as typical of either Campterothlebiidae or Isophlebiidae (Li et al. 2012). But the established genus and species was based on forewings only. We describe a new specimen, allowing precise description of some other important characters, especially those of the male hindwing. On the basis of this specimen, the diagnosis of *Parafleckium senjituense* is amended." (Authors)] Address: Pang, H., Key Laboratory of Biodiversity Dynamics and Conservation of Guangdong Higher Education Institute, Sun Yat-Sen University, Guangzhou, China. E-mail: lsshypang@mail.sysu.edu.cn

**12016.** Li, Y.J.; Han, G.; Nel, A.; Ren, D.; Pang, H.; Liu, X.L. (2012): A new fossil petalurid dragonfly (Odonata: Petaluroidea: Aktassiidae) from the Cretaceous of China. *Alcheringa* 36(3): 319-322. (in English) ["*Pseudocymatophlebia boda* n. sp. is described from Lower Cretaceous strata of Inner Mongolia, China. It provides additional morphological characters for this genus, which has been previously recorded from the Lower Cretaceous of England. Together with *Aktassia*, it is the second aktassiid genus with a very wide distribution, even though this family remains known only from Eurasia. Furthermore, a new name, *Brachaktassia* gen. nov., is proposed to replace the brachiopod genus *Aktassia* Popov, 1976." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**12017.** Locklin, J.L.; Huckabee, J.S.; Gering, E.J. (2012): Streamlining techniques for rearing large quantities of the damselfly, *Ischnura ramburii* (Odonata: Coenagrionidae) in the laboratory. The Preliminary Program for 97th ESA Annual Meeting (August 5-10, 2012): (in English) [Verbatim: "Background/Question/Methods: Dragonflies and damselflies often served as model organisms for answering a range of ecological and evolutionary questions. Although aquatic naiads and terrestrial adults can be readily collected in the field, laboratory rearing permits researchers to regulate variables during development that are difficult to control in the field. In addition, many laboratory-based experimental designs typically require large sample sizes of genetically-related organisms at the same developmental stage. Several rearing methods have been published for Odonata, but they recommend methods that become laborious when rearing large quantities simultaneously. We reared large numbers (1,000+) of the coenagrionid damselfly, *Ischnura ramburii*, from field-collected adults (N=8) that were mated in the lab through emergence of their offspring while streamlining some previously published recommendations. We also estimated the duration of naiad survivorship in the lab without food by starving a subset of naiads (N=170). Results/Conclusions: Of the eight mated females, 157± 33.9 naiads female-1 were produced. 66.4% of the naiads successfully emerged as adults with males and females emerging a median of 75 and 77 days, respectively, after hatching. Much naiad mortality (23%) occurred during emergence when they failed to locate emergence substrates and drowned. Naiads survived a mean of 14.2 days without food, demonstrating that naiads can be maintained in the lab with infrequent feedings. We found that several previously published rearing recom-

mendations for small damselfly cultures can be modified to improve rearing efficiency. Culturing large quantities of damselfly in the lab is manageable and broadens the experimental designs of many diverse research avenues." ] Address: Locklin, J.L., Dept of Biology, Temple College, 2600 South First St., Temple, TX 76504, USA. E-mail: jason.locklin@templejc.edu

**12018.** Logan, J.D.; Janovy Jr., J.; Bunker, B.E. (2012): The life cycle and fitness domain of gregarine (Apicomplexa) parasites. *Ecological Modelling* 233: 31-40. (in English) ["Theoretical demographic models with accompanying experimental programs provide an important framework to study the life history of organisms. In this paper we examine the fitness characteristics of gregarine parasites (Apicomplexa) and how these evolutionary long-lived parasites are shaped by their own life cycle stages inside and outside a definitive insect host. Although gregarines have been investigated in experimental works, their fitness and population characteristics have not been subject to modeling efforts to help understand their longevity or interactions with their host species. We develop a dynamic, mechanistic population model represented by a system of two differential equations for two of the parasite stages: the mature parasite, or trophont, inside a definitive insect host, and the infectious oocyst stage in the water environment of the host. In contrast to many classical macroparasite models, the force of infection between oocysts and hosts is of sigmoid type. Inside the host, production of the water borne infectious state is modeled by linear production rate in the trophont population with a density-independent trophont mortality. We examine stability of model's equilibria for different parameter values and different host populations. This leads to the definition of a fitness parameter that acts as a bifurcation parameter for the model. The model shows good cause for the establishment and long-time persistence of this common, widespread parasite. It is parameterized by extensive data gathered at Cedar Point Biological Station, and numerical calculations based on those parameters illustrate the dynamics. Possible applications include parasite control in aquacultures." (Authors) The paper includes a few references to Odonata.] Address: Logan, J.D., Department of Mathematics, University of Nebraska Lincoln, Lincoln, NE 68588-0130, United States. E-mail: dlogan@math.unl.edu

**12019.** Ma, L.; Gu, W.; Wang, L.; Zhang, C.; Ding, X.; Meng, Q. (2012): Insect community niche in the Zhalong wetland. *Scientia silvae sinicae* 48(5): 81-87. (in Chinese, with English summary) ["The Zhalong wetland nature reserve (46°40'—47°20'N, 123°59'—124°40'E), situated in the west of Heilongjiang Province of China, is the largest and the most important *Grus japonensis* wetland nature reserve in China, providing indispensable livelihood for the red-crowned crane as well as a temporary habitat for the migrating birds in severe danger such as *Grus leucogeranus*, *Ciconia nigra*, *Cygnus cygnus*, *Anser albifrons* and *Ciconia boyciana*. In this paper, the niche and competition among species of insect community in different habitat in Zhalong wetland were studied. The results showed that there were obvious niche overlaps and competitions in different species which used the same resources. Space niche breadth index of main groups were similar, the same as time niche breadth index. Niche similarity coefficient of insect community indicated that the difference between each group was not big. Spider groups were important regu-

lators in the Zhalong wetland insect ecological system. But Orthoptera and Coleoptera, Odonata group space niches were not significantly overlapped. Spider groups mainly affected Orthoptera, but hardly affected other groups of predatory. This study indicates that some measures should be implemented in the habitat when the number of Orthoptera individual is very big to maintain a balance relationship between insect groups." (Authors) Taxa are treated at order level.] Address: Ma, L., Forestry School, Northeast Forestry University Harbin 150040, China

**12020.** Machado, A.B.M. (2012): *Carajathemis simone*, new genus and species from Brazil (Odonata: Libellulidae). *Anais da Academia Brasileira de Ciências* 84(4): 1039-1049. (in English, with Portuguese summary) ["*Carajathemis simone* n. gen., n.sp. from the state of Pará, Brazil, is described and illustrated based on 22 specimens collected in a "canga" (laterite) lake within the forest at the Flona de Carajás, Parauapebas Municipality. The new libellulid genus fits in the subfamily Sympetrinae and the male keys out to *Erythemis* in Garrison et al. (2006). The new taxon has a combination of characters that makes it different from all genera of Sympetrinae including *Erythemis*. The species is remarkable by its large size, pleural striping and especially by the complex and strongly dimorphic leg armature. It seems to be restricted to shallow, rainfall-dependent, iron-rich lakes." (Author)] Address: Machado, A.B.M., Depto de Zoologia, Inst. Cienc, Biol., Univ. Federa de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil. E-mail: angelo@icb.ufmg.br

**12021.** Manwar, N.A.; Rathod, P.P.; Raja, I.A. (2012): Diversity and abundance of dragonflies and damselflies of Chatri Lake region, in Pohara – Malkhed Reserve Forest, Amravati, Maharashtra (India). *International Journal of Engineering Research and Applications* (IJERA) 2(5): 521-523. (in English) [22 Odonata species are documented.] Address: Manwar, N.A., Shri Shivaji College of Arts, Commerce and Science, Akola - 444001, India

**12022.** Marinov, M. (2012): Odonata from the Kingdom of Tonga, with description of *Pseudagrion microcephalum* stainbergerorum ssp. nov. (Zygoptera: Coenagrionidae). *Odonatologica* 41(3): 225-243. (in English) ["The odonate fauna from the Kingdom of Tonga have been reviewed using published literature combined with recent data by the author. Some important taxonomic considerations are discussed and a complete reference list is provided. A species checklist is presented with a total of sixteen taxa so far known for the island groups within the country. Seven new species for the Kingdom of Tonga are reported here including *P. m. stainbergerorum* ssp. nov. (holotype ♂: Tonga, Tongatapu Island, 26-IV-2010). The new subspecies is compared with its closest relatives known from elsewhere in the Pacific, their relationships briefly discussed, and suggestions for future studies given." (Author)] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

**12023.** Marinov, M.G. (2012): Description of the larva of *Trineuragrion percostale* Ris (Odonata: Megapodagrionidae) with a key to the larvae of New Caledonian genera of Megapodagrionidae. *International Journal of Odonatology* 15(3): 241-248. (in English) ["The larva of *T. percostale* is described and illustrated based on an exuvia collected with the teneral female. Four more ex-



uviae sampled without imagines are added for comparison and discussion of morphological variations. This is the first time the larva has been associated with the correct species, although the larval description was given earlier. Lieftinck included it in his analysis of New Caledonian Odonata larval fauna under the name *Caledargiolestes uniseriatus* (by supposition). Variations in the morphological features between Lieftinck's specimens and those reported here are discussed. The key morphological features that differentiate larva of *T. percostata* from other Megapodagrionidae in the country are indicated." (Author) Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

**12024.** Marković, V.; Atanacković, A.; Tubić, B.; Vasiljević, B.; Kračun, M.; Tomović, J.; Nikolić, V.; Paunović, M. (2012): Indicative status assessment of the Danube River (Iron Gate sector 849 - 1,077 rkm) based on the aquatic macroinvertebrates. *Water Research and Management* 2(2): 41-46. [Along the Danube River in the Iron Gate Region (rkm 849 to 1077), a total of 61 macroinvertebrate taxa were recorded. Odonata taxa included *Aeshna mixta*, *Ischnura elegans*, *I. pumilio*, *Pyrrosoma nymphula* and *Sympetrum fonscolombii*.] Address: Marković, Vanja, University of Belgrade, Institute for Biological Research "Siniša Stanković", Despota Stefana 142, 11000 Belgrade, Serbia. E-mail: vanjam@ibiss.bg.ac.rs

**12025.** Martens, A.; Petzold, F.; Mayer, J. (2012): Die Verbreitung der an Libellen parasitierenden Gnitze *Forcipomyia paludis* in Deutschland (Odonata; Diptera: Ceratopogonidae). *Libellula* 31(1/2): 15-24. (in German, with English summary) ["An overview of the known records in Germany is given. So far, there are 34 localities known. One main group of records is situated in the central part of the North European Plain, another in the northern foothills of the Alps. It is suggested that a useful approach for gathering further information is to check odonate photographs. Special attention should be drawn to oval brownish spots on odonate wings." (Authors)] Address: Martens, A., Biologie, Pädagogische Hochschule Karlsruhe, Bismarckstraße 10, D-76133 Karlsruhe, Germany. E-mail: martens@ph-karlsruhe.de

**12026.** Martens, A.; Günther, A.; Suhling, F. (2012): Diversity in mate-guarding types within the genus *Anax* (Odonata: Aeshnidae). *Libellula* Supplement 12: 113-122. (in English, with German summary) ["Observations of non-contact guarding in *Anax guttatus*, *A. immaculifrons*, *A. indicus*, and *A. speratus* are reported. In all four species males were observed following their mate and hovering above her intensively during oviposition. As a result, the genus shows a high diversity in mate-guarding types, including contact-guarding (i.e., tandem oviposition), noncontact guarding and unguarded oviposition. A review on mate-guarding known to occur in the genus *Anax* worldwide is also provided." (Authors)] Address: Martens, A., Biologie, Pädagogische Hochschule Karlsruhe, Bismarckstraße 10, D-76133 Karlsruhe, Germany. E-mail: martens@ph-karlsruhe.de

**12027.** Matuszak, A.; Mörtl, M.; Quillfeldt, P.; Bauer, H.-G. (2012): Exclosure study on the exploitation of macrophytes by summering and moulting waterbirds at Lower Lake Constance. *Hydrobiologia* 697: 31-44. (in English) ["Owing to synchronous moult, most waterbird species are constrained by flightlessness and limited mobility for several weeks. As new feather production is

energy demanding, these birds need to choose a safe moulting site with appropriate food supply. Up to 20,000 waterbirds carry out moult at Lake Constance, gathering at sites where they find food close to safe hiding places from predators and human-caused disturbance. In this study, we focused on the food supply at one prominent moulting site, Mettnau Südbucht, at Lower Lake Constance. We aimed to determine the food items and quantity as well as their utilization by summering and moulting waterbirds. We conducted experiments with exclosure cages which protected macrophytes from bird grazing and compared these sites with unprotected grazed sites. In these experiments, we found that the summering and moulting waterbird community, dominated by Eurasian Coots (*Fulica atra* Linnaeus), caused a significant decline of the macrophyte biomass at 1.5-m depth (MWL), where they were responsible for a loss of over 40% of the total charophyte biomass. No grazing effect was found at a greater depth (2-m MWL). The available food consisted mostly of *Chara* spp. with a biomass density of about 350 g m<sup>2</sup>. Animal food items were negligible: Macroinvertebrates, mainly *Asellus aquaticus* Linnaeus, that were associated with the macrophytes, made up only 2% of total biomass, and were very unevenly distributed." (Authors) Odonata are treated at suborder level.] Address: Matuszak, Anja, Max Planck Institute for Ornithology, Am Obstberg 1, 78315 Radolfzell, Germany. E-mail: matuszak@orn.mpg.de

**12028.** McCoy, M.W.; Touchon, J.C.; Landberg, T.; Warkeintin, K.M.; Vonesh, J.R. (2012): Prey responses to predator chemical cues: Disentangling the importance of the number and biomass of prey consumed. *PLoS ONE* 7(10): e47495. doi:10.1371/journal.pone.0047495: 5 pp. (in English) ["To effectively balance investment in predator defenses versus other traits, organisms must accurately assess predation risk. Chemical cues caused by predation events are indicators of risk for prey in a wide variety of systems, but the relationship between how prey perceive risk in relation to the amount of prey consumed by predators is poorly understood. While per capita predation rate is often used as the metric of relative risk, studies aimed at quantifying predator-induced defenses commonly control biomass of prey consumed as the metric of risk. However, biomass consumed can change by altering either the number or size of prey consumed. In this study we determine whether phenotypic plasticity to predator chemical cues depends upon prey biomass consumed, prey number consumed, or both. We examine the growth response of red-eyed treefrog tadpoles (*Agalychnis callidryas*) to cues from a larval dragonfly (*Anax amazili*). Biomass consumed was manipulated by either increasing the number of prey while holding individual prey size constant, or by holding the number of prey constant and varying individual prey size. We address two questions. (i) Do prey reduce growth rate in response to chemical cues in a dose dependent manner? (ii) Does the magnitude of the response depend on whether prey consumption increases via number or size of prey? We find that the phenotypic response of prey is an asymptotic function of prey biomass consumed. However, the asymptotic response is higher when more prey are consumed. Our findings have important implications for evaluating past studies and how future experiments should be designed. A stronger response to predation cues generated by more individual prey deaths is consistent with models that predict prey sensitivity to per capita risk, providing a more direct link between empirical and the-

oretical studies which are often focused on changes in population sizes not individual biomass." (Authors)] Address: McCoy, M.W., Department of Biology, East Carolina University, Greenville, North Carolina, USA. E-mail: mccoym@ecu.edu

**12029.** Meadows, A.J.; Owen, J.P.; Snyder, W.E. (2012): Complex predator effects on larval mosquitoes. The Preliminary Program for 97th ESA Annual Meeting (August 5 -- 10, 2012): [Verbatim: "The study of interactions among medically important mosquitoes and their predators has the potential to offer insight into patterns of population and disease outbreaks as well as control methods. The effects of predators on mosquitoes can be particularly complex: predators impact mosquitoes both by killing them, and by inciting predator-avoidance behaviors that carry energetic costs for those mosquitoes that avoid being killed. Here, we investigate the effects of a predator, *Erythemis simplicicollis* on varying densities of larval *Culex quinquefasciatus* (Diptera: Culicidae). First in laboratory microcosms and later in the field, we examined both mosquito survivorship and whether any non-lethal effects of predator exposure carry over to affect the size of adult mosquito. Survivorship from the larval to adult stage was measured along with wing length of adults. Results/Conclusions: We found, at most densities, dragonflies were successful in reducing survivorship of mosquito larvae as well as reducing wing length compared with no-predator controls. These data suggest larval predators can ultimately help regulate adult mosquito populations, both by reducing overall densities of mosquito adults and by reducing the robustness of those mosquitoes that evade predation. Ongoing field studies are examining how predator-community structure impacts mosquitoes through both lethal and non-lethal channels."] Address: Entomology, Washington State University, Pullman, WA, USA

**12030.** Melfi, J.; Lin, H.-t.; Mischiati, M.; Leonardo, A.; Wang, Z.J. (2012): Quantifying dragonfly kinematics during unsteady free-flight. *Bulletin of the American Physical Society* 57(17) [65th Annual Meeting of the APS Division of Fluid Dynamics, Sunday–Tuesday, November 18–20, 2012; San Diego, California]: 1 pp. (in English) [Verbatim: What make dragonflies such interesting fliers are the unsteady high-speed aerial maneuvers they perform. Until recently, the study of dragonflies in mid-flight has been limited to steady-state motions such as hovering and forward flight. In this talk, we report our kinematic analyses of the dragonfly flight recorded in a custom dragonfly arena at HHMI, Janelia Farm. Dragonfly's turning motions often involve all three degrees of freedom about its body axes: yaw, roll, and pitch. We examine the wing kinematics changes associated with different turning maneuvers, and seek the key variables in the wing kinematics that are responsible for each specific maneuver.] Address: Wang, Z. Jane, Theoretical and Applied Mechanics, Cornell University, Ithaca, NY 14853, USA. E-mail: jane.wang@cornell.edu

**12031.** Melters, D.P.; Paliulis, L.V.; Korf, I.F.; Chan, S.W.L. (2012): Holocentric chromosomes: convergent evolution, meiotic adaptations, and genomic analysis. *Chromosome Research* 20: 579-593. (in English) ["In most eukaryotes, the kinetochore protein complex assembles at a single locus termed the centromere to attach chromosomes to spindle microtubules. Holocentric chromosomes have the unusual property of attaching to spindle microtubules along their entire length. Our mechanistic understanding of holocentric chromosome func-

tion is derived largely from studies in the nematode *Caenorhabditis elegans*, but holocentric chromosomes are found over a broad range of animal and plant species. In this review, we describe how holocentricity may be identified through cytological and molecular methods. By surveying the diversity of organisms with holocentric chromosomes, we estimate that the trait has arisen at least 13 independent times (four times in plants and at least nine times in animals). Holocentric chromosomes have inherent problems in meiosis because bivalents can attach to spindles in a random fashion. Interestingly, there are several solutions that have evolved to allow accurate meiotic segregation of holocentric chromosomes. Lastly, we describe how extensive genome sequencing and experiments in nonmodel organisms may allow holocentric chromosomes to shed light on general principles of chromosome segregation."(Authors) The study includes references to 'Odonata'.] Address: Chan, S.W.L., Howard Hughes Medical Institute, Chevy Chase, MD, USA. E-mail: srchan@ucdavis.edu

**12032.** Meurgey, F.; Poiron, C. (2012): An updated checklist of Lesser Antillean Odonata. *International Journal of Odonatology* 15(4): 305-316. (in English) ["An updated checklist of known Odonata occurring in the Lesser Antilles is presented along with distributional information island by island. Twelve species are removed from previous listings and 16 new records are added, bringing the total number of species to 46. Of the new records, three correspond to the descriptions of new species and one is currently under taxonomic revision (*Brechmorhoga praecox grenadensis* Kirby)." (Authors)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**12033.** Michailova, P.; Warchalowska-Sliwa, E.; Szarek-Gwiazda, E.; Kownacki, A. (2012): Does biodiversity of macroinvertebrates and genome response of Chironomidae larvae (Diptera) reflect heavy metal pollution in a small pond? *Environmental monitoring and assessment* 184(1): 1-14. (in English) ["The investigation was carried out on a small pond situated on a recent mine spoil at Boleslaw in the Olkusz region with Zn–Pb ore deposits. Water of the pond had pH 7.2–8.5 and low concentrations of heavy metals. Concentrations of Pb ( $487 \mu\text{g g}^{-1}$ ) and Zn ( $1,991 \mu\text{g g}^{-1}$ ) in the sediment were very high and potentially could lead to toxicological effects. In the pond, 48 taxa of macroinvertebrates belonging to Oligochaeta and water stages of Ephemeroptera, Odonata, Megaloptera, Trichoptera, Heteroptera, Coleoptera and Diptera (mainly Chironomidae family) were found. The influence of heavy metals on macroinvertebrates diversity was not found. Effect of heavy metal pollution was observed on the appearance of chromosome aberrations in the polytene chromosomes of Chironomidae larvae. It was manifested by two ways: (1) in *Kiefferulus tendipediformis* and *Chironomus* sp. chromosome rearrangements in fixed state (tandem fusion and homozygous inversions), indicated intensive process of speciation; (2) in *Chironomus* sp., *K. tendipediformis*, *Glyptotendipes gripekoveni* (Chironomidae) somatic chromosome rearrangements (inversions, deficiencies, specific puffs, polyploidy) affected few cells of every individual. The somatic functional and structural alterations in Chironomidae species are particular suitable as biomarkers—they can be easily identified and used for detecting toxic agents in the environment." (Authors)] Address: Michailova, Paraskeva,

Institute of Zoology, Bulgarian Academy of Sciences, 1 Tzar Osvoboditel boulv, Sofia, Bulgaria. E-mail: michailova@zoology.bas.bg

**12034.** Michalski, J.; Richards, S.; Theischinger, G. (2012): An interesting new species of *Nososticta* Hagen from southern New Guinea (Odonata, Disparoneuridae). *Zootaxa* 3590: 73-78. (in English) ["*Nososticta acuminata*, a new disparoneurid damselfly from the Lakekamu Basin in Gulf Province of Papua New Guinea, is described. It is most similar to *N. smilodon* Theischinger & Richards, but the male has uniquely pointed superior anal appendages." (Authors)] Address: Michalski, J., 1223 Mount Kemble Avenue, Morristown New Jersey 07960, USA. E-mail: huonia@aol.com

**12035.** Mirrasouli, E.; Ghorbani, R. (2012): The biological assessment of the Zaringol stream using the structure of benthic macroinvertebrates (Golestan Province). *Journal of Fisheries* 64(4): 357-369. ["This study was conducted to assess water quality level of Zarin Gol stream on macrobenthic invertebrates. Macrobenthic fauna were sampled from 9 selected sampling stations along the stream with an average distance of 22 km by using a Surber sampler every 45 days during the year. Sampling was replicated 9 times in each sampling station. Collected samples were fixed with 4% formalin, isolated, and then identified. The number of total abundance of macrobenthic fauna were counted to 2749.021 ± 1301.8 (ind/m<sup>2</sup>) belonging to 15 orders and 81 groups (families and genus). The minimum and maximum of total abundance (ind/m<sup>2</sup>) was at station 1 (370.63 ± 231.1) and at station 5 (215.73 ± 101.75), respectively. The main orders of macro benthic invertebrate communities in Zaringol stream included Diptera, Ephemeroptera, Trichoptera, Plecoptera, Oligocheta, Odonata and Amphipoda. Population structure of macro benthic invertebrates were analyzed by biotic Indices and the results showed significant differences in EPT and EPT/CHIR indices at different sampling stations (p<0.05). Hilsenhoff and Shannon diversity indices indicated no significant differences (p>0.05) along the stream. Evaluation of indicators revealed less water quality at stations 2 and 5 where located at the lowermost of fish farms. This reduction might be implicated to the effluents of water dams from fish farms running into the stream as diversity and total abundance (%) of succible macro-invertebrates decreased and that of resistant macrofauna increased due to water pollution. Hence, from the obtained results, this can be concluded that the use of benthic macro-invertebrates as bioindicator for the assessment of water quality of the stream is desirable."(Authors)] Address: E-mail: elhammirasouli@yahoo.com

**12036.** Mlynarek, J.J.; Hassall, C., Forbes, M.R. (2012): Higher gregarine parasitism often in sibling species of host damselflies with smaller geographical distributions. *Ecological Entomology* 37: 419-425. (in English) ["(1.) This study investigated inter-specific variation in parasitism by gregarines (Eugregarinorida: Actinocephalidae), among sibling species of Zygoptera, in relation to relative size of geographical ranges of host species. (2.) Gregarines are considered generalist parasites, particularly for taxonomically related host species collected at the same sites or area. Prevalence and median intensity of gregarine parasitism was obtained for 1338 adult damselflies, representing 14 species (7 sibling species pairs) across 3 families within the suborder Zygoptera. Damselflies were collected at three local sites in South-

eastern Ontario, during the same periods over the season. (3.) Five out of seven species pairs had significant differences in parasitism between sibling species. The less widespread host species was the more parasitised for three species pairs with significant differences in gregarine prevalence, and for two species pairs with differences in median intensity. The more widespread host had a higher intensity of infection as expected, in two species pairs. (4.) Future studies on ecological determinants of parasitism among related species should examine robust measures of abundance of species and representation of species regionally." (Authors)] Address: Forbes, M.R., Department of Biology, Carleton University, 209 Nesbitt Building, 1125 Colonel By Drive, Ottawa K1S 5B6, Canada. E-mail: mforbes6@gmail.com

**12037.** Mogali, S.M.; Saidapur, S.K.; Shanbhag, B.A. (2012): Tadpoles of the bronze frog (*Rana temporalis*) assess predation risk before evoking antipredator defense behavior. *Journal of ethology* 30(3): 379-386. (in English) ["Predation threat-associated behavioral response was studied in *R. temporalis* tadpoles to discover the importance of predators' visual and chemical cues (kairomones and diet-derived metabolites of consumed prey) in evoking antipredator behavior. The caged predators (dragonfly larvae) fed on prey tadpoles or insects (*Notonecta* spp.) and water conditioned with the predators provided the threat stimuli to the tadpole prey. The predators' visual cues were ineffective in evoking antipredator behaviors in the tadpole prey. However, exposure to caged tadpole-fed predators or water conditioned with tadpole-fed predators elicited predator avoidance behavior in the tadpoles; they stayed away from the predators, significantly reduced swimming activity (swimming time and distance traveled), and increased burst speed. Interestingly, exposure to water conditioned with starved predators did not elicit any antipredator behavior in the prey. Further, the antipredator responses of predator-experienced tadpoles were significantly greater than those exhibited by predator-naïve tadpoles. The study shows that *R. temporalis* tadpoles assess predation threat based exclusively on chemical cues emanating from the predators' dietary metabolites and that the inclusion of conspecific prey items in the diet of the predators is perceived as a threat. The study also shows that antipredator behavior in these tadpoles is innate and is enhanced during subsequent encounters with the predators." (Authors)] Address: Mogali, S.M., Department of Zoology, Karnatak University, Dharwad, 580 003, India

**12038.** Mollah, M.M.I.; Rahman, M.M. (2012): Abundance of predators in country bean field during summer season. *International Journal of Biosciences* 2(9): 65-70. (in English) [Arthropods are studied in an experimental field of Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh during March to June 2009. "Damsel fly" contributed with 2.16 % to the predatory arthropods.] Address: Mollah, M.M.I., Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh. E-mail: mahimam@yahoo.com

**12039.** Müller, J. (2012): Rückenwind für Libelle. Einst rare Arten tauchen in der Pfalz häufiger auf. *Die Rheinpfalz* 130 vom 6. Juni 2012: (in German) [Report in a German newspaper on increasing records of *Leucorhinia pectoralis*, activities of regional odonatologists mapping Odonata and the work of Dr. J. Ott to coordinate the current activities in updating the German Red List of threatened Odonata.] Address: not stated



**12040.** Müller, R. (2012): Gefährdete Libellen im Gartenteich - ein Ausnahmegewässer in Berlin (Odonata). *Märkische Entomologische Nachrichten* 14(1): 201-204. (in German, with English summary) [At a temporary garden pond in Berlin-Lichtenberg, Germany, among other species the rare habitat specialist *Aeshna affinis*, *Ischnura pumilio*, *Lestes barbarus*, *L. dryas*, *Sympetrum danae* and *S. flaveolum* were observed.] Address: Müller, M., Augustastr. 2, 12203 Berlin, Germany. E-mail: hydrobiologie@t-online.de

**12041.** Mukherjee, S.; Ganguli, R. (2012): Nonlinear dynamic analysis of dragonfly inspired piezoelectric unimorph actuated flapping and twisting wing. *International Journal of Smart and Nano Materials* 3(2): 103-122. (in English) ["The nonlinear equations for coupled elastic flapping-twisting motion of a dragonfly-inspired smart flapping wing are used for a flapping wing actuated from the root by a PZT unimorph in the piezofan configuration. Excitation by the piezoelectric harmonic force generates only the flap bending motion, which, in turn, induces the elastic twist motion due to interaction between flexural and torsional vibration modes. An unsteady aerodynamic model is used to obtain the aerodynamic forces. Numerical simulations are performed using a wing whose size is the same as the dragonfly *Sympetrum frequens* wing. It is found that the value of average lift reaches its maximum when the smart flapping wing is excited at a frequency closer to the natural frequency in torsion. Moreover, consideration of the elastic twisting of the flapping wing leads to an increase in the lift force. It is also found that the flapping wing generates sufficient lift to support its own weight and carry a small payload. Therefore, the piezoelectrically actuated smart flapping wing based on the geometry of a *Sympetrum frequens* wing and undergoing flapping-twisting motions can be considered as a potential candidate for use in micro air vehicle applications." (Authors)] Address: Ganguli, R., Department of Aerospace Engineering, Indian Institute of Science, Bangalore-560012, India. E-mail: ganguli@aero.iisc.ernet.in

**12042.** Mukherjee, S.; Ganguli, R. (2012): A comparative study of dragonfly inspired flapping wings actuated by single crystal piezoceramic. *Smart structures and systems* 10(1): 67-87. (in English) ["A dragonfly inspired flapping wing is investigated in this paper. The flapping wing is actuated from the root by a PZT-5H and PZT-7%PT single crystal unimorph in the piezofan configuration. The nonlinear governing equations of motion of the smart flapping wing are obtained using the Hamilton's principle. These equations are then discretized using the Galerkin method and solved using the method of multiple scales. Dynamic characteristics of smart flapping wings having the same size as the actual wings of three different dragonfly species *Aeshna multicolor*, *Anax parthenope julius* and *Sympetrum frequens* are analyzed using numerical simulations. An unsteady aerodynamic model is used to obtain the aerodynamic forces. Finally, a comparative study of performances of three piezoelectrically actuated flapping wings is performed. The numerical results in this paper show that use of PZT-7%PT single crystal piezoceramic can lead to considerable amount of wing weight reduction and increase of lift and thrust force compared to PZT-5H material. It is also shown that dragonfly inspired smart flapping wings actuated by single crystal piezoceramic are a viable contender for insect scale flapping wing micro air vehicles." (Authors)] Address: Ganguli, R., Dept of Aerospace Engineering, Indi-

an Institute of Science, Bangalore-560012, India. E-mail: ganguli@aero.iisc.ernet.in

**12043.** Nava-Bolaños, A.; Córdoba-Aguilar, A.; Munguía-Steyer, R. (2012): A test of genital allometry using two damselfly species does not produce hypoallometric patterns. *Ethology* 118(2): 203-213. (in English) ["It is widely admitted that sexual selection is the responsible force behind genital traits. However, the particular mechanisms of genital evolution are still debated. Recently, studies of genital static allometry in insects have been used to elucidate such mechanisms. Insect genital traits are often reported to show negative allometry (i.e., a slope < 1), which has generated a number of ideas on how genital traits are selected. However, many studies that have inferred selection mechanisms have omitted consideration of the function of genital traits, used unreliable indicators of body size, and only rarely included female genitalia in their analysis. We investigated whether negative allometry operates for genitalia in *Protoneura cara* and *Ischnura denticollis*. Damselflies are suitable for genital allometry tests as their genital function and body size indicators (wing length and head width) are relatively well known and established. First, we show that the aedeagus is used to physically remove sperm from both sperm storage organs (bursa and spermatheca) and that wing length and head width correlate positively with other morphological traits for the two study species. Second, we estimated genital allometry by measuring aedeagal length, vaginal length, bursal volume, and spermathecal volume. Our results indicate no consistent allometric pattern. Allometry for aedeagal length and vaginal width was not the same. Thus, there was no support for a negative allometric relationship. We urge researchers investigating allometry to look directly at how genitalia function rather than inferring function from allometric relationships only." (Authors)] Address: Córdoba-Aguilar, A., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, Mexico, D. F., Mexico. E-mail: acordoba@ecologia.unam.mx

**12044.** Nel, A.; Fleck, G. (2012): A new genus and species of Sieblosiidae from the Middle Miocene of Germany (Odonata: Epiproctophora). *Zootaxa* 3582: 64-68. (in English) ["*Germanostenolestes lutzi*, new genus and species of Sieblosiidae is described from the Middle Miocene of Öhningen (Germany). It probably belongs to the clade (Paraoligolestes + Parastenolestes (Germanolestes + Stenolestes)) sensu Nel et al. (2005). It is the third representative of the Sieblosiidae described from this outcrop, showing that this family was still quite diverse in the Middle-Late Miocene." (Authors)] Address: Fleck, G., CNRS UMR 7205, Muséum National d'Histoire Naturelle, CP 50, Entomologie, 57 Rue Cuvier, F- 75231 Paris, France. E-mail: fleckgunther@gmail.com

**12045.** Nishiyama, Y. (2012): Miura folding: Applying origami to space exploration. *International Journal of Pure and Applied Mathematics* 79(2): 269-279. (in English) ["Miura folding is famous all over the world. It is an element of the ancient Japanese tradition of origami and reaches as far as astronautical engineering through the construction of solar panels. This article explains how to achieve the Miura folding, and describes its application to maps. The author also suggests in this context that nature may abhor the right angle, according to observation of the wing base of a dragonfly." (Author)] Address: Nishiyama, Y., Department of Business Infor-

mation, Faculty of Information Management, Osaka University of Economics 2, Osumi Higashiyodogawa Osaka, 533-8533, Japan

**12046.** Novelo-Gutiérrez, R. (2012): The larva of *Libellula foliata* (Kirby, 1889) (Odonata: Libellulidae). *Organisms diversity & evolution* 12(3): 307-311. (in English) ["The larva of *L. foliata* is described based upon mature larvae from the Biosphere Reserve of "El Triunfo" in the state of Chiapas. It belongs to the small group of species without dorsal protuberances, *L. composita* (Hagen), *L. comanche* Calvert and *L. saturata* Uhler. The following combination of characters permits the separation of *L. foliata* larva from the other aforementioned larvae: tergites 6–10 uniformly colored, no lateral spines on segments 8–9, 5–6 palpal setae and 3 long premental setae. After this finding, only the larvae of *Libellula gaigei* Gloyd and *L. nodisticta* Hagen remain undiscovered for the Mexican species of *Libellula*." (Author)] Address: Novelo-Gutiérrez, R., Depto de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**12047.** Odume, O.N.; Muller, W.J.; Arimoro, F.O.; Palmer, C.G. (2012): The impact of water quality deterioration on macroinvertebrate communities in the Swartkops River, South Africa: a multimetric approach. *Journal of Aquatic Science* 37(2): 191-200. (in English) ["A multimetric approach, using 21 metrics representing five categories — abundance, composition, richness, diversity and biotic indices — was applied to investigate the impacts of water quality deterioration on macro-invertebrate communities in the Swartkops River. Macroinvertebrates were sampled seasonally between August 2009 and July 2010 using the South African Scoring System version 5 (SASS5) protocol at one reference site upstream of Uitenhage and three downstream sites. Assessment of water quality impacts on macroinvertebrates was based on the discriminatory ability of metrics between the reference and impaired sites, and on their correlation with the physico-chemical variables. The metrics' discriminatory ability was explored using box plots, and their relationships with water chemistry variables elucidated with Pearson's correlation. Trichoptera abundance, %Chironomidae + Oligochaeta, %Ephemeroptera–Trichoptera–Odonata–Coleoptera (ETOC), %Trichoptera, Ephemeroptera–Plecoptera–Trichoptera (EPT) richness, ETOC richness, Margalef's family richness index, equitability, Shannon and Simpson diversity indices, SASS5 score and average score per taxon (ASPT) discriminated between the reference and impacted sites, and also exhibited significant correlations ( $p < 0.05$ ) with water chemistry variables. Conversely, Gastropoda abundance, EPT abundance, ETOC abundance, EPT:Chironomidae ratio, %EPT, %Corixidae, %Oligochaeta + Hirudinae, Chironomidae + Oligochaeta abundance and Hemiptera + Diptera richness did not discriminate between the reference and impacted sites." (Authors)] Address: Odume, O.N., Unilever Centre for Environmental Water Quality, Institute for Water Research, Rhodes University, PO Box 94, Grahamstown, 6140, South Africa

**12048.** Ott, J. (2012): Zum starken Auftreten der Großen Moosjungfer – *Leucorrhinia pectoralis* (CHARPENTIER, 1825) – im Jahr 2012 in Rheinland-Pfalz nebst Bemerkungen zu *Leucorrhinia rubicunda* (L.) (Insecta: Odonata). *Fauna Flora Rheinland-Pfalz* 12(2): 571-590. (in German, with English summary) ["The expansion of *L. pectoralis* in Rhineland-Palatinate in 2012, which is

classified as "extinct" in the Red List, is reported. In the Palatinate the species was found in 13 waters, in one of them as autochthonous and in five others with pairing activities or oviposition. The reasons of this expansion are migrations from the feeder populations in the north and east, also due to the favourable warm and sunny spring weather, a general increase of the populations in the stem areas, as well as more local migrations from small "outpost"-populations. The species, being listed on the annexes II and IV of the European habitats directive, has now to be monitored according to the EC law. Beside *L. pectoralis* in the Palatinate also two individuals of the very rare *L. rubicunda* were registered this year." (Author)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**12049.** Outomuro, D.; Cordero-Rivera, A. (2012): Allometry of secondary, primary, and nonsexual traits in the beautiful demoiselle (*Calopteryx virgo meridionalis*). *Canadian Journal of Zoology* 90(9): 1094-1101. (in English) ["The static allometry between the size of a trait and the body size results from the net selection forces acting on the evolution of both the trait and the body size. An increased knowledge of the functional significance of traits is necessary to understand observed allometric patterns. We studied several traits of males of *C. virgo meridionalis*, for which there is a good functional knowledge of the genitalic traits and ornaments. We found positive allometry for the wing spot size (considered a secondary sexual trait) and for the distal width (but not length) of the anal appendages, which are used for grasping the female prior to copulation. Regarding the male secondary genitalia, the length but not the width of the big horns of the aedeagus showed an isometric pattern. The aedeagus shaft length showed a negative allometric pattern, while its distal width did not show a significant regression. The slopes of the regressions were higher when using wing length than when using body length as estimators of body size, with the exception of wing spot length. Results are discussed based on the functional significance of the study traits, as well as the pre- and post-copulatory selective pressures acting on them." (Authors)] Address: Outomuro, D., Population and Conservation Biology, Department of Ecology and Genetics, Evolutionary Biology Centre, Norbyvägen 18D, 75236, Uppsala, Sweden. E-mail: outomuro.david@gmail.com

**12050.** Paepke, H.-J.; Günther, R.; Plötner, J. (2012): On the occasion of the eightieth birthday of Prof. Dr. Günther Peters. *Zoosystematics and Evolution* 88(2): 141-143. (in English) [On the occasion of the eightieth birthday of the odonatologist Professor Günther Peters a short retrospective of his life and work is offered.] Address: Günther, R., Museum für Naturkunde, Leibniz-Institut für Evolutions- und Biodiversitätsforschung, Invalidenstr. 43, 10115 Berlin, Germany. E-mail: rainer.guenther@mfn-berlin.de

**12051.** Palacino-Rodriguez, F.; Contreras-Sanchez, N.A.; Cordoba-Aguilar, A. (2012): Population structure in dry and rainy seasons in *Erythrodiplax umbrata* (Linnaeus) (Odonata: Libellulidae). *Odonatologica* 41(3): 245-249. (in English) ["Mark-recapture studies in adult Odonata have revealed that rainy periods have a negative impact on population size, recapture rate, survival probability and life expectancy. One reason for this is that rainy periods are usually associated with low temperatures which indirectly and directly affect individual condition. However, given that most studies have been

carried out in temperate environments it remains to be seen whether such phenomenon occurs in other places, i.e. tropical environments. Here, this question is approached by marking-recapturing the tropical *E. umbrata*, in a field site in central Colombia. Two seasons of opposite rainfall patterns were compared: a rainy and a dry season. After checking for no marking effects, no difference was found in population size and recapture rate. However, animals from the dry season had a higher survival and life expectancy compared to animals from the rainy season. These apparently conflicting results, suggest differential effects of seasonality. A population compensation may be occurring in the rainy season (with more animals emerging at this time compared to the dry season) despite the negative effects on survival. Thus, the principle that rainy periods have a negative impact in tropical odonate species seems supported." (Author)] Address: Palacino-Rodriguez, F., Laboratorio de Artropodos, Grupo de Biotecnología, Centro Internacional de Física (CIF), Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Apdo Postal 7495, Bogota D.C., Colombia

**12052.** Parr, A.J. (2012): Migrant and dispersive dragonflies in Britain during 2011. *J. Br. Dragonfly Society* 28(2): 56-65. (in English) ["The year 2011 was noteworthy for the large, indeed unprecedented, numbers of *Anax ephippiger* noted throughout the year. There were at least three immigration waves - a slow trickle of sightings during the late winter of 2010/11, a surge of records during April and early May, and then a final run of records during October and November. Both the spring and autumn influxes were associated with spells of unseasonably hot weather with winds from the far south. Arrivals of *Sympetrum fonscolombii* were also noted during these periods. Although the summer weather was, by contrast, less spectacular, there were still significant immigrations of *Anax parthenope*, as well as of further *S. fonscolombii*. Three sightings of *Aeshna isosceles* were also made well away from the species' current UK stronghold. Many of the other key events of the year related to the consequences of immigrations seen not in 2011 but in the preceding few years, where new local breeding populations of a number of species might potentially have become established. The recently-identified colony of *Coenagrion scitulum* in Kent appeared to remain stable and there was to be proof of successful breeding by *Aeshna affinis* following the 2010 invasion, when small numbers of exuvia were discovered at Hadleigh Country Park, Essex, during June. Numbers of mature adults seen later in the year were, however, low and give some concern as to the long-term viability of this colony. Numbers of *Lestes barbarus* seen at Cliffe, Kent, following breeding attempts also noted during 2010 were, however, higher and hopefully a stable colony may develop here." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**12053.** Pawlak, S.; Wilzak, T. (2012): Natural values of the "Pastwa" mires in the middle Prosna river valley. *Przegląd Przyrodniczy* 23(1): 3-20. (in Polish, with English summary) [20 Odonata species have been observed, including *Ophiogomphus cecilia*, *Aeshna affinis*, *Somatochlora flavomaculata* and *Sympetrum meridionale*.] Address: Wilzak, T., ul. Widok 99/26, 62-800 Kalisz, Poland. E-mail: t.wilzak@wp.pl

**12054.** Petrulevicus, J.F.; Martins-Neto, R.G.; Azar, D.; Makhoul, E.; Nel, A. (2012): Full description of *Cordula-*

*gomphus primaerensis* from Santana Formation (Lower Cretaceous of Brazil) (Odonata: Aeshnoptera: Proterogomphidae). *Zootaxa* 3503: 55-60. (in English) ["Thanks to the discovery of a new specimen, we discuss and confirm the differences proposed by Petrulevičius and Martins-Neto, 2007 (in Bechly, 2007) between *Cordulagomphus* (*Procordulagomphus*) *primaerensis* Petrulevičius and Martins-Neto, 2007 and its close relative *Cordulagomphus* (*Procordulagomphus*) *michaeli* Bechly, 2007." (Authors)] Address: Petrulevicus, J.F., Museo de La Plata, División Paleozoología Invertebrados, Paseo del Bosque s/n, 1900 La Plata, and CONICET, Argentina. E-mail: levicius@museo.fcnym.unlp.edu.ar

**12055.** Petzold, F.; Seifert, D.; (†); Zimmermann, W. (2012): Untersuchungen zur Libellenfauna (Insecta: Odonata) im Ostthüringer Holzland durch Dieter Seifert (†) – ein beeindruckendes Beispiel ehrenamtlicher Forschung für den Naturschutz. *Landschaftspflege und Naturschutz in Thüringen* 49(1): 26-34. (in German, with English summary) ["From 2003 to 2010 the late D. Seifert studied the dragonfly fauna of 35 localities in the Ostthüringer Holzland region (Thuringia, Germany). Additional surveys by Zimmermann & Petzold followed in 2011. Here we represent results from five selected and most intensely surveyed localities of the protected areas „NSG An den Ziegenböcken“ and „FND Rote Pfütze“ in detail. 46 species were recorded in total, 14 of them are red listed in Thuringia and further four species are of other conservation concern. The peat bog habitats of the two protected areas „NSG An den Ziegenböcken“ and „FND Rote Pfütze“ are the most important reproduction sites of threatened species within the Ostthüringer Holzland region. Of the moorland species *Somatochlora arctica* the only reproducing population in Thuringia has been found here which is of national importance. Other remarkable species are *Aeshna juncea*, *Leucorhinia pectoralis* and *L. rubicunda*. Despite much conservation effort the current situation within the protected areas is unsatisfactory. The main conservation issue is formed by the disturbance of the natural water balance of the moorland and peat bog habitats. The application of existing management plans is urgently necessary and would help to preserve the unique character of the important area." (Authors)] Address: Petzold, F., Pappelallee 73, D-10437 Berlin, Germany. E-mail: falkpetzold@web.de

**12056.** Pickwell, A.; Gennard, D.E.; Taylor, P.; Chadd, R. (2012): The Norfolk Hawker *Aeshna isosceles* (Muller): a step further from the brink? *J. Br. Dragonfly Society* 28(1): 44-55. (in English) ["The change in the range of the Norfolk Hawker *Aeshna isosceles* between 1970 and 2009 was investigated using historic records from the Dragonfly Recording Network and an increase in range was confirmed. It is apparent that this range increase has been sustained by an increase in the number of breeding populations of *A. isosceles* and was in a generally southerly direction, although some westerly and northerly expansion has also occurred. This contrasts with the general northern range shift of most other British Odonata. The increase in the range and population numbers are considered most likely to be due to a combination of habitat restoration and improvement initiatives and water quality improvements, even though increases in recorder effort may have had an effect. Aspects of the habitat requirements of *A. isosceles* (Muller) were investigated using historic aquatic vegetation and salinity data collated with records of its distribution.



It is shown to utilise a wider variety of vegetation communities and to be more tolerant of salinity than was previously thought." (Authors)] Address: Pickwell, A., School of Life Sciences, University of Lincoln, Brayford Pool, Lincoln, LN6 7TS, UK

**12057.** Pilgrim, E.M.; von Dohlen, C.D. (2012): Phylogeny of the dragonfly genus *Sympetrum* (Odonata: Libellulidae). *Organisms diversity & evolution* 12(3): 281-295. (in English) ["The libellulid dragonfly genus *Sympetrum* has been recognized since 1833, but lacks any morphological synapomorphies to unite the taxon. Previous researchers have disagreed over which species belong in *Sympetrum*, bringing the monophyly of the genus into question. We use DNA sequence data from 6 genetic loci (16S, tRNA-valine, 12S, elongation factor 1 alpha, cytochrome oxidase subunit I, and the second internal transcribed spacer region) and 25 morphological characters (mainly genitalic) to test the monophyly of *Sympetrum* with Bayesian inference and maximum likelihood analyses. Under Bayesian inference, all *Sympetrum* species included in this study form a clade, which also contains the Hawaiian monotypic genus *Nesogonia*, often considered a close relative of *Sympetrum*. Phylogenetic analyses also reveal at least six strongly supported clades (treated as species groups) within *Sympetrum*, but relationships between these species groups remain unresolved or unsupported. Although the relationships between *Sympetrum* species groups remain unresolved, several species groups include taxa from multiple biogeographic regions/continents, and the species group sister to the rest of *Sympetrum* contains migratory species from the New World and Africa. This pattern suggests a complex biogeographic history in *Sympetrum* shaped by vicariance and dispersal. Preliminary estimates of the divergence dates of *Sympetrum* species groups outline a rapid radiation of the groups approximately 32-38 million years ago, possibly influenced by cooling and drying climates of the late Eocene and early Oligocene." (Authors)] Address: Pilgrim, E., U.S. Environmental Protection Agency, Molecular Ecology Research Branch, 26 Martin Luther King Drive, Cincinnati, OH 45268, U.S.A. E-mail: pilgrim.erik@epa.gov

**12058.** Pryke, J.S.; Samways, M.J. (2012): Importance of using many taxa and having adequate controls for monitoring impacts of fire for arthropod conservation. *J. Insect Conserv.* 16(2): 177-185. (in English) ["Fire is a key natural and anthropogenic disturbance factor across many ecosystems, and also an important conservation management tool. However, little is known about arthropod responses to fire, particularly in Mediterranean-type ecosystems, including the biodiverse Cape Floristic Region (CFR). We investigate here the relative variety of responses by different arthropod taxa to fire, and ask whether single-taxon or multi-taxon approaches better suit post-fire biomonitoring for conservation management. Sampling involved multiple techniques and was conducted before fire, 1 year after fire, and 3 years after fire, with unburned areas as controls. Before-and-after statistics were used to identify changes in arthropod populations and assemblages as a result of fire, and between treatment and control sites. However, this was against a background of the annual effects having a major influence on the arthropods, irrespective of fire. Abundance was so variable, even in control plots, that we found it an unreliable indicator of the impact of fire. Overall, arthropods were remarkably resilient to fire, with most taxa recovering in species richness and as-

semblage composition within 3 years of the fire. Although all taxa showed resilience to fire, there was nevertheless little congruence in temporal recovery of the various taxa. Our results highlight the shortcomings of monitoring fire impacts using only a single-taxon without prior testing for complementarity or sensitivity to fire, while emphasizing the importance of sampling a wide range of taxa to represent overall responses of compositional biodiversity. From this, we recommend, at least for the CFR, that a cross-section of taxa, such as butterflies, ants, and scarab beetles, be used for monitoring arthropods in recovery/fire management conservation programmes. We also recommend that such monitoring be considered against the background of large annual variation seen in unburned areas." (Authors) Odonata have been included into the sample protocol, but no results are presented.] Address: Pryke, J.S., Department of Conservation Ecology and Entomology, Stellenbosch University, Private Bag X1, Matieland 7602, South Africa. E-mail: jpryke@sun.ac.za

**12059.** Pujol-Buxó, E.; San Sebastián, O.; Garriga, N.; Llorente, G.A. (2012): How does the invasive/native nature of species influence tadpoles' plastic responses to predators? *Oikos* 122(1): 19-29. (in English) ["Although the purely ecological impacts of biological invasions have been well studied, a less thorough effort has been made in terms of their evolutionary ecology. Previous studies show that anti-predator phenotypic plasticity may be one of the major ecological forces driving survival and rapid evolution of prey facing new predators. In turn, this means that biological invasions embody a perfect case for studying the tradeoffs and evolution of phenotypic plasticity per se. Here, we studied the plastic responses of native (*Pelodytes punctatus*) and invasive (*Discoglossus pictus*) anurans facing a native (dragonfly *Anax* sp.) and two invasive (fish *Gambusia holbrooki* and crayfish *Procambarus clarkii*) predators. Marked responses were reported against the native predator from both the native and the invasive anuran, but they both responded mildly to the exotic predators as well. Native *P. punctatus* displayed a morphological reaction to invasive *P. clarkii* after scarcely 30 years of coexistence with this predatory crayfish and responded behaviourally to the invasive fish *G. holbrooki*. Invasive *D. pictus* reacted behaviourally to all predators, but unexpectedly only reacted morphologically to native *Anax* sp. All these results support high prey-predator specificity in these reactions and an evolutionary dissociation between behavioural and morphological plasticity in anurans. Each species displayed a particular set of tradeoffs between plastic responses and their costs, which is probably due to differences in ecological niche and evolutionary history, but interestingly we usually detected unexpected patterns in combinations using introduced predators. This suggests that perhaps singular plastic shifts usually occur when tadpoles face recently introduced species. Given the speed in which these evolutionary changes become noticeable and their potential in avoiding predation risk, this study supports that phenotypic plasticity might play an important role in population dynamics during biological invasions" (Authors)] Address: Pujol-Buxó, E., Depto de Biología Animal, Facultat de Biología, Univ. de Barcelona, Av. Diagonal 643, ES-08028 Barcelona, Spain. E-mail: eudaldp@hotmail.com

**12060.** Pulfer, T.L.; Evans, C.G.; Featherstone, D.; Post, R.; McCarter, J.I.; Laverty, J.F. (2012): Recovery strate-

gy for the Hine's Emerald (*Somatochlora hineana*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario: vi + 27 pp. (in English) ["*S. hineana* is a globally rare dragonfly restricted to southern Ontario, Wisconsin, Michigan, Illinois and Missouri. In Ontario it is only known to occur in the Minesing Wetlands located in the County of Simcoe. It is listed as endangered under Ontario's Endangered Species Act, 2007 due to its habitat specificity, potential threats and extremely limited geographic range. It has also been listed as endangered or extirpated throughout its known global range. The key features used to distinguish *S. hineana* from other similar species are the unique conformations of its sexual appendages on the end of the abdomen, dark metallic green thorax with two creamy yellow lateral stripes and its relatively large size (60-65 mm long and 90-95 mm wingspan). *S. hineana* is restricted throughout its range to calcareous wetlands (marshes, sedge meadows and fens) dominated by graminoid vegetation and fed primarily by groundwater seeps. Adult males occur in seepage areas and fens and adjacent margins, whereas females are usually found in dry meadows, sometimes in adjacent forest openings, only coming into wetlands to lay eggs. Adults may also utilize adjacent forests, gravel roads, trails and fields for foraging before returning to the wetlands to mate and lay eggs. *S. hineana* deposit eggs in shallow channels or sheetflow in areas of herbaceous vegetation in marshes, meadow marshes and fens. The larvae remain in cool, shallow, slowly-moving waters of spring-fed marshes, alkaline fens, mineral-rich fens with shallow creeks, springs, small pools, marl deposits and calcareous marshy streams for three to five years before emerging as adults. In some locations, larvae use crayfish burrows, mainly of Digger Crayfish or of Devil Crawfish (also known as Meadow Crayfish), as refuge habitat in the summer and winter months. Crayfish burrows are thought to be a critical component of *S. hineana* habitat where seasonal drought and freezing occurs and may be a factor limiting its distribution. The main threats to this species in Ontario are habitat loss due to changes in surface and sub-surface hydrology (including water quality), competition from invasive species (Garlic Mustard, Purple Loosestrife, Glossy Buckthorn and the non-native genotype of Common Reed) and vegetation succession from native species. The inter-species dependency of *S. hineana* on Digger Crayfish indicates that threats to the persistence of burrowing crayfish in Ontario would have a severe negative effect on *S. hineana*. The recovery goal for *S. hineana* is to prevent any loss of population or habitat functionality at extant sites or at any other extant locations which may be identified in the future in Ontario. The recovery objectives outlined to achieve this goal are as follows: • protect and maintain the quantity and quality of *S. hineana* habitat and habitat functionality, including the hydrological and hydrogeological function; • reduce or mitigate threats to *S. hineana* and its habitat; • increase knowledge of *S. hineana* biology in Ontario including distribution, abundance, life history and habitat needs; • increase public awareness and understanding of *S. hineana* and its habitat in Ontario. It is recommended that the area regulated as habitat include all extant locations. In Ontario, this currently includes only the Minesing Wetlands. In order to protect both the adult and larvae stages of *S. hineana*, it is recommended that the area prescribed as habitat include fen and wetland meadows, (i) where Hine's Emerald have been observed and (ii) that are connected by surface or ground water

to areas where *S. hineana* have been observed. In addition to these areas the prescribed habitat should also include 500 metres beyond each of these habitats. For the purposes of perching, movement and dispersal, all forests and dry meadows that are connected to the areas described above by surface water or groundwater should also be prescribed as habitat. To allow for migration and dispersal between patches it is recommended that corridors used by *S. hineana* be prescribed as habitat. Corridors are believed to be both natural (creeks, swales and other water features) and anthropogenic features (trails, utility rights-of-way and gravel roads) that have forested edges or riparian habitat (C. G. Evans and D. Featherstone, pers. comm. 2012). Due to the dependence of *S. hineana* habitat on groundwater recharge it is recommended that prescribed habitat include the Snow Valley Uplands, where the current groundwater infiltration regime is maintained." (Authors)] Address: not stated

**12061.** Raebel, E.M.; Merckx, T.; Feber, R.E.; Riordan, P.; Macdonald, D.W.; Thompson, D.J. (2012): Identifying high-quality pond habitats for Odonata in lowland England: implications for agri-environment schemes. *Insect Conservation and Diversity* 5(6): 422-432. (in English) ["(1.) Agricultural intensification has contributed to severe declines in odonate populations. The objective of our study is to benefit current measures for the conservation of odonates by establishing the conditions favourable to Odonata and focusing on ponds within agricultural land. (2.) Our landscape-scale study used exuvial counts and habitat measurements from 29 ponds across a catchment in England, over 3 years, to determine key factors affecting odonate abundance and species richness. (3.) Ponds dominated by floating and submerged vegetation were the most transparent, supported the highest abundance and species richness of exuviae, and were always fully or partially surrounded by buffer strips. Ponds lacking vegetation were turbid, yielding no exuviae even if they were buffered. English agri-environment schemes (AES) currently support pond and buffer strip creation and management. (4.) Abundance of exuviae was higher in recently created ponds compared to older ponds, whereas ponds that had dried out the previous summer had fewer exuviae. (5.) Species richness of exuviae decreased with increasing distance to the nearest viable pond, falling by more than 40% for distances over 100 m. (6.) We conclude that odonate conservation would be more effective if AES would consider the spatial scale at which ponds are created and the location, type, and quality of ponds targeted for buffer strips." (Authors)] Address: Raebel, Eva, Wildlife Conservation Research Unit, The Recanati-Kaplan Centre, Dept of Zoology, Univ. of Oxford, Tubney House, Abingdon Road, Tubney, Oxfordshire OX13 5QL, UK. E-mail: evamraebel@gmail.com

**12062.** Ramos, O.; van Buskirk, J. (2012): Non-interactive multiple predator effects on tadpole survival. *Oecologia* 169(2): 535-539. (in English) ["Interactions among and within three species of predators were estimated in terms of their effects on prey survival using short-term predation experiments. The prey were tadpoles (*Rana temporaria*), and the predators were dragonfly larvae (*Anax imperator*), newts (*Triturus alpestris*), and backswimmers (*Notonecta glauca*). Mortality rate per predator imposed by *Triturus* and *Notonecta* did not decline with predator density, whereas the predation rate of *Anax* was strongly reduced when the number of preda-

tor individuals increased. Impacts of all three predators were not altered by the presence of other species in pairwise combinations. This system is therefore characterized by interference between individual dragonflies but relatively independent effects of predator species. These results were largely predictable based on the natural history of the predators and are encouraging for attempts to model communities as assemblages of interacting species." (Authors)] Address: Buskirk, J. van, Institute of Zoology, University of Zürich, CH-8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

**12063.** Rasool, N.; Jan, U.; Shah, G.M. (2012): Feeding habits and diet composition of Brown trout (*Salmo trutta fario*) in the upper streams of Kashmir Valley. *International Journal of Scientific and Research Publications* 2(12): 1-8. (in English) ["Coenagrionidae' contribute with 0,45% to the diet of the trout (n = 108).] Address: Rasool, N., Department of Zoology, University of Kashmir, Pin-190006, India. E-mail: nusrat.r.k@gmail.com

**12064.** Rawi, C.S.; Al-Shamia, S.A.; Shah, A.S.R.; Ahmad, A.H.; Man, A. (2012): Effects of herbicides on Odonata communities in a rice agroecosystem. *Toxicological & Environmental Chemistry* 94(6): 1188-1198. (in English) ["The effects of the five herbicides propanil, quinclorax, molinate/propanil, 2,4-D amine, and bensulfuron on Odonata diversity and abundance at the experimental rice plots was investigated. A total of 13 Odonata morphospecies belonging to two families have been identified. Treated plots exhibited higher species richness (up to 12 species) than the control plot (8 species). *Ishnura* spp. was the most abundant species in the treated plots with a mean density of 194.2 individuals per m<sup>2</sup>, (ind m<sup>2</sup>) followed by *Brachythemis contaminata* (152 ind m<sup>2</sup>) and *Agriocnemis* spp. (124 ind m<sup>2</sup>). In the control plots, *Agriocnemis* spp. was the dominant species (153 ind m<sup>2</sup>) followed by *Ishnura* spp. (143 ind m<sup>2</sup>) and *Neurothemis fluctuans* (59 ind m<sup>2</sup>). In the propanil-treated plot, the highest number of odonate species (10 species) was recorded followed by the plots treated with quinclorax and molinate/propanil (9 species). On the 2,4-D amine or bensulfuron-treated plots as well as the control plot, only eight odonate species were recorded. This study revealed that herbicide application had a positive effect on Odonata diversity. This seems reasonable as Odonata are non-target organisms for herbicides. Furthermore, the decomposed weeds resulting from herbicide application would enrich the water with necessary organic matter." (Authors)] Address: Che Salmah Md Rawi, School of Biological Sciences, Universiti Sains Malaysia, 11800 Minden, Penang, Malaysia. E-mail: alshami200@gmail.com

**12065.** Reels, G.; Dow, R.; Hämäläinen, M.; Do, M.C. (2012): Chapter 5. The status and distribution of dragonflies and damselflies (Odonata) in Indo-Burma. In: Allen, D.J., Smith, K.G., and Darwall, W.R.T. (Compilers). 2012. *The Status and Distribution of Freshwater Biodiversity in Indo-Burma*. Cambridge, UK and Gland, Switzerland: IUCN. x+158pp+4pp cover: 90-101. (in English) ["The present assessment covers some 473 odonate species (in 150 genera), of which approximately 160 (34%) are thought to be endemic or near-endemic in Indo-Burma (the real figure for endemics is uncertain, given that the region impinges on, and is biogeographically contiguous with, parts of Myanmar, China and the Malay Peninsula). 14 species are considered threatened. The region has a low proportion (30.5%) of species in the cosmopolitan families Coenagrionidae and Libellulidae, most members

of which are associated with open, lentic or slow-flowing waters. The majority of species are forest- and lotic-associated, reflecting the historical biogeography of the region. New species are still being described from Indo-Burma on a fairly regular basis (for example, Do 2011a, 2011b; Do & Karube 2011; Sasamoto et al. 2011) and it is likely that the real total exceeds 500 species (Hämäläinen 2004). Knowledge of Odonata across the region is very uneven. Hämäläinen (2004) briefly summarised the history of dragonfly studies in Thailand, Viet Nam, Lao PDR and Cambodia, noting that Thailand, the most accessible and best-studied country, had the most diverse odonate fauna (c.350 species), while Cambodia's odonate fauna was the most poorly known. This is largely still the case, with Cambodia and eastern Myanmar having the least-studied odonate faunas in Indo-Burma. Knowledge of the Cambodian fauna has however improved considerably in the last two years. Kosterin (2010, 2011) made two short surveys in the Cardamom Mountain foothills in southwestern Cambodia in April at the end of the dry season ('perhaps the worst time for Odonata') and November–December 2011, in which he made 29 new species records for that country – a powerful indication of how poorly known the Cambodian odonate fauna is. In combination with other recent work (Roland and Roland 2010, Day 2011, Kosterin and Holden 2011, Roland et al. 2011) this has brought the known total to 110 species, but there is clearly much still to be done. The Laotian fauna is rather better understood, mainly due to the efforts of Dr Naoto Yokoi, who added more than one hundred new species records over the period 1994 to 2003 (Hämäläinen 2004), bringing the Lao PDR total to in excess of two hundred species. Studies of Vietnamese Odonata have advanced considerably in recent years, to the point that a useful annotated checklist of 235 species was recently published (Do and Dang 2007), with maps showing species distributions at provincial level." (Authors)] Address: Reels, G., 87 Lychee Road North, Fairview Park, Yuen Long, Hong Kong. E-mail: gtreels@gmail.com

**12066.** Ren, Y.; Dong, H. (2012): On the optimal dynamic camber formation in insect flight. *Bulletin of the American Physical Society* 57(17) [65th Annual Meeting of the APS Division of Fluid Dynamics, Sunday–Tuesday, November 18–20, 2012; San Diego, California]: 1 pp. (in English) [Verbatim: "It is widely thought that wing flexibility and wing deformation could significantly affect aerodynamic force productions over completely rigid wings in insect flights. However, there is a lack of quantitative discussion of dynamic formation of wing camber and its effect on wing's aerodynamic performance. In this work, a deformable wing is used to model the wing camber and its dynamic formation. A Direct Numerical Simulation (DNS) based computational optimization frame has been developed to obtain the optimal dynamic camber formation of dragonfly in takeoff and cruising flight. Comparative study is then performed between the optimized flexible wing and real dragonfly wing. Results have shown the maximum camber happens around 30% (downstroke) and 80% (upstroke) of one wing beat. Force production and unsteady flows of the flexible wing are also discussed."] Address: not stated

**12067.** Roland, H.-J.; Grabow, K.; Martens, A. (2012): Aerial dispersal of freshwater gastropods by dragonflies (Odonata). *International Journal of Odonatology* 15(4): 317-318. (in English) [Mecklenburg-Vorpommern; Ger-



many; "At a ditch near Tribsees in northeastern Germany a young individual of the freshwater snail *Lymnaea stagnalis* was photographed while attached to the dorsum of the abdomen of a female *Aeshna viridis*, after the odonate took off after oviposition in *Stratiotes aloides*. This is the first known case for odonate-born dispersal of freshwater gastropods." (Authors)] Address: Roland, H.-J., Im Mühlahl 35, 61203 Reichelsheim, Germany. E-mail: Hjuergenroland@aol.com

**12068.** Rossaro, B.; Boggero, A.; Lods-Crozet, B.; Free, G.; Lencioni, V.; Marziali, L.; Wolfram, G. (2012): A benthic quality index for European alpine lakes. *Fauna norvegica* 31: 95-107. (in English) ["The development of benthic quality indices for European lakes is hindered by the lack of information concerning many national lake types and pressures. Most information is from north European lakes stressed by acidification and from deep lakes subjected to eutrophication; for other lake types (the ones included in the Mediterranean areas for example) and for other pressures (hydro-morphological alteration, toxic stress) there is practically no information about the response of benthic macro-invertebrates; this hinders the possibility of an intercalibration of the indices among the member states (MS) in the EU. In the present communication three benthic quality indices are proposed considering the littoral, sublittoral and profundal zone in 5 reference and 7 non reference lakes from the Alpine region in response to eutrophication. The sensitivity values of the 177 species (including *Somatochlora metallica*, *Gomphus vulgatissimus*, *Platycnemis pennipes*) found in these lakes were calculated taking a weighted average of the values of environmental variables from lakes in which the species were present. The indicator taxa which prevailed in these lakes were Chironomids and Oligochaetes. A coinertia analysis emphasized the importance of trophic variables (transparency, nitrates, total phosphorous) in explaining the species distribution, but geographic (altitude) and morphometric (depth, volume) variables were also important. The indices enabled a separation of reference from non-reference lakes and to assign the non-reference lakes to different quality classes in agreement with the Water Framework Directive." (Authors)] Address: Rossaro, B., DeFENS - Department of Food Environmental and Nutritional Sciences, Università degli Studi di Milano, Via Celoria 2 - I 20133 Milano, Italy. E-mail: bruno.rossaro@unimi.it

**12069.** Rubach, M.N.; Baird, D.J.; Boerwinkel, M.-C.; Maund, S.J.; Roessink, I.; Van den Brink, P.J. (2012): Species traits as predictors for intrinsic sensitivity of aquatic invertebrates to the insecticide chlorpyrifos. *Ecotoxicology* 21: 2088-2101. (in English) ["Ecological risk assessment (ERA) has followed a taxonomy-based approach, making the assumption that related species will show similar sensitivity to toxicants, and using safety factors or species sensitivity distributions to extrapolate from tested to untested species. In ecology it has become apparent that taxonomic approaches may have limitations for the description and understanding of species assemblages in nature. Therefore it has been proposed that the inclusion of species traits in ERA could provide a useful and alternative description of the systems under investigation. At the same time, there is a growing recognition that the use of mechanistic approaches in ERA, including conceptual and quantitative models, may improve predictive and extrapolative power. Purposefully linking traits with mechanistic effect

models could add value to taxonomy-based ERA by improving our understanding of how structural and functional system facets may facilitate inter-species extrapolation. Here, we explore whether and in what ways traits can be linked purposefully to mechanistic effect models to predict intrinsic sensitivity using available data on the acute sensitivity and toxicokinetics of a range of freshwater arthropods exposed to chlorpyrifos. The results of a quantitative linking of seven different endpoints and twelve traits demonstrate that while quantitative links between traits and/or trait combinations and process based (toxicokinetic) model parameters can be established, the use of simple traits to predict classical sensitivity endpoints yields little insight. Remarkably, neither of the standard sensitivity values, i.e. the LC50 or EC50, showed a strong correlation with traits. Future research in this area should include a quantitative linking of toxicodynamic parameter estimations and physiological traits, and requires further consideration of how mechanistic trait-process/parameter links can be used for prediction of intrinsic sensitivity across species for different substances in ERA." (Authors) The study also uses *Anax imperator* as model organism] Address: Van den Brink, P.J., Dept of Aquatic Ecology & Water Quality Management, Wageningen Univ., P.O. Box 47, 6700 AA Wageningen, The Netherlands. E-mail: paul.vandenbrink@wur.nl

**12070.** Rudolf, V.H.W. (2012): Seasonal shifts in predator body size diversity and trophic interactions in size-structured predator-prey systems. *Journal of Animal Ecology* 81(3): 524-532. (in English) ["(1.) Theory suggests that the relationship between predator diversity and prey suppression should depend on variation in predator traits such as body size, which strongly influences the type and strength of species interactions. Prey species often face a range of different sized predators, and the composition of body sizes of predators can vary between communities and within communities across seasons. (2.) Here, I test how variation in size structure of predator communities (*Plathemis lydia*) influences prey survival using seasonal changes in the size structure of a cannibalistic population as a model system. Laboratory and field experiments showed that although the per-capita consumption rates increased at higher predator-prey size ratios, mortality rates did not consistently increase with average size of cannibalistic predators. Instead, prey mortality peaked at the highest level of predator body size diversity. (3.) Furthermore, observed prey mortality was significantly higher than predictions from the null model that assumed no indirect interactions between predator size classes, indicating that different sized predators were not substitutable but had more than additive effects. Higher predator body size diversity therefore increased prey mortality, despite the increased potential for behavioural interference and predation among predators demonstrated in additional laboratory experiments. (4.) Thus, seasonal changes in the distribution of predator body sizes altered the strength of prey suppression not only through changes in mean predator size but also through changes in the size distribution of predators. In general, this indicates that variation (i.e. diversity) within a single trait, body size, can influence the strength of trophic interactions and emphasizes the importance of seasonal shifts in size structure of natural food webs for community dynamics." (Author)] Address: Rudolf, V.H.W., Dept of Ecology & Evolutionary Biology, Rice Univ., Houston, TX 77005, USA. E-mail: volker.rudolf@rice.edu

**12071.** Ruffoni, A. (2012): Première mention de *Sympetrum flaveolum* (Linnaeus, 1758) en Bourgogne et dans le département de la Nièvre (Odonata, Anisoptera: Libellulidae). *Martinia* 28(1): 43-45. (in French, with English summary) [4-IX-2011, Montsauche-les-Settons (Département de la Nièvre, Parc naturel régional du Morvan), France] Address: Ruffoni, A., Société d'histoire naturelle d'Autun, Maison du Parc, F-58230 Saint-Brisson, France. E-mail: shna.ruffoni@orange.fr

**12072.** Runemark, A.; Wellenreuther, M.; Jayaweera, H.H.E.; Svanberg, S.; Brydegaard, M. (2012): Rare events in remote dark field spectroscopy: an ecological case study of insects. *IEEE Journal of Selected Topics in Quantum Electronics* 18(5): 1573-1582. (in English) ["In this paper, a novel detection scheme for the monitoring of insect ecosystems is presented. Our method is based on the remote acquisition of passive sunlight scattering by *Calopteryx splendens* and *C. virgo*. Procedures to identify rare events in remote dark-field spectroscopy are explained. We further demonstrate how to reduce the spectral representation, and how to discriminate between sexes, using a hierarchical clustering analysis. One-day cycle showing the temporal activities of the two sexes as well as data on activity patterns in relation to temperature and wind is presented. We also give a few examples of the potential use of the technique for studying interactions between sexes on a time scale of milliseconds." (Authors)] Address: Brydegaard, M., Lund University, Lund, Sweden. E-mail: mikkel.brydegaard@fysik.lth.se

**12073.** Santos, L.B.; dos Reis, N.R.; Orsi, M.L. (2012): Trophic ecology of *Lontra longicaudis* (Carnivora, Mustelidae) in lotic and semilotic environments in south-eastern Brazil. *Iheringia, Sér. Zool.* 102(3): 261-268. (in English, with Portuguese summary) ["The implantation of a hydroelectric power plant along a river alters the dynamics of the watercourse, transforming a lotic environment into a lentic or semilotic one, what can damage the otter's feeding. From April 2008 to March 2009 we analysed the otter's food habits in lotic (streamlet) and semilotic (hydroelectric reservoir) environments of Paranapanema Valley, in southeastern Brazil. Aiming to compare the otter's diet of these two environments, we analyzed statistically the frequency of occurrence of main items in the scats. Fishes represent the base of the diet both in the reservoir and in the streamlet and, despite of the total otter's diet showing up similarities in the two environments, the results evidenced modifications on the fish species consumed between them. In the reservoir the otters ate more exotic fish *Oreochromis niloticus* (Linnaeus, 1758) probably because it is an easy capture prey in this place. The fact that the otters get established and feed in the reservoir doesn't mean that this structure is benefic to the species because the food supplied for it consists mainly of exotic fish species." (Authors) In a single case, an unidentified dragonfly belongs to the diet of the otter.] Address: Santos, Livia, Universidade Estadual de Londrina, Rodovia Celso Garcia Cid, PR-445, Km 380, Caixa Postal 6001, 86051-980, Londrina, PR, Brasil. E-mail: liviabertolla@yahoo.com.br

**12074.** Schmit, O.; Martens, K.; Mesquita-Joanes, F. (2012): Vulnerability of sexual and asexual *Eucypris virens* (Crustacea, Ostracoda) to predation: an experimental approach with dragonfly naiads. *Fundamental and Applied Limnology / Archiv für Hydrobiologie* 181(3): 207-218. (in English) ["Through the animal kingdom,

sexual reproduction often increases predation risk. Sexual mates are usually more detectable by predators because of (visual, acoustic or chemical) sexual signalling, increased mobility during mate search, or higher visual detectability and reduced alertness of mating pairs, amongst other behaviours. In previous studies, we found that macroinvertebrate predator taxa were more common in ponds whose *Eucypris virens* ostracod populations were parthenogenetic than in populations with males present. Here, we investigate if there is a causal relationship between predation and the *E. virens* reproductive mode. We experimentally tested whether groups of sexual and parthenogenetic *E. virens* individuals were equally vulnerable to predation by dragonfly naiads. A first experiment with a balanced mixture of sexual and asexual ostracod prey was designed. In a second experiment, they were exposed separately to predation in distinct groups. Our results indicate an intense predation pressure on *E. virens*, which increased with predator size. No significant differences were found between parthenogens and sexual *E. virens* when offered mixed to *Sympetrum* odonate predators, and only a slightly higher vulnerability of asexuals was noted when offered separately. The absence of an adverse effect of sexual behaviour on predation vulnerability suggests that the association between mode of reproduction and predator abundance observed in the field is not due to the differential vulnerability of sexual and asexual *E. virens*. The faster population growth potential of parthenogens might allow them to persist in ponds where a strong top-down control could limit survival of sexuals. Alternatively, the observed field association may not indicate a causal relationship, rather the independent effects of habitat temporality on predator abundance and on the *E. virens* reproductive mode." (Authors)] Address: Martens, K., Royal Belgian Institute of natural Sciences, Freshwater Biology, Vautierstraat 29, 1000 Brussels, Belgium

**12075.** Schneider, E.; Simons, M.E. (2012): Ein Brief von Michel-Edmond Baron de Selys Longchamps (1813 - 1900) an Friedrich Förster (1864 - 1918). *International Dragonfly Fund - Report* 51: 1-8. (in German, with English and French summaries) ["In the odonatological reprint collection of the Natural History Museum Senckenberg (Frankfurt a.M., Germany) an original letter of Michel-Edmond Baron de Selys Long-champs (Liège, Belgium) to the German odonatologist Friedrich Förster (Schopfheim), dated 15 February 1896, was found. The document is not only proof of a contact between two scientists but gives also an idea of how Selys planned and prepared the publication of his research. The facsimile of the letter as well as a typographic transcript and a German translation are provided." (Authors)] Address: Schneider, W., Entomologie II, Forschungsinstitut und Naturkundemuseum Senckenberg, Senckenberganlage 25, 60325 Frankfurt a.M., Germany. E-mail: Fri.Wol@t-online.de

**12076.** Selvakumar, R.; Karthikeyan, K.; Radhakrishnan, P. (2012): Analysis on surface nanostructures present in hindwing of dragon fly (*Sympetrum vulgatum*) using atomic force microscopy. *Micron* 43(12): 1299-1303. (in English) ["The present study involves the analysis of surface nanostructures and its variation present in the hind wing of *S. vulgatum* using atomic force microscopy (AFM). The hindwing was dissected into 4 parts (D1-D4) and each dissected section was analyzed using AFM in tapping mode at different locations. The AFM analysis revealed the presence of irregular

shaped nanostructures on the surface of the wing membrane with size varying between  $83.25 \pm 1.79$  nm to  $195.08 \pm 10.25$  nm. The size and shape of the nanostructure varied from tip (pterostigma) to the costa part. The membrane surface of the wing showed stacked arrangement leading to increase in size of the nanostructure. Such arrangement of the nanostructures has led to the formation of nanometer sized valleys of different depth and length on the membrane surface giving them ripple wave morphology. The average roughness of the surface nanostructures varied from  $18.58 \pm 3.12$  nm to  $24.25 \pm 8.33$  nm. Surfaces of the wings had positive skewness in D1, D2 and D4 regions and negative skewness in D3 region. These surface nanostructures may contribute asymmetric resistance under mechanical loading during the flight by increasing the bending and torsional resistance of the wing. Highlights: \*The atomic force microscopy of dragon fly wings (*Sympetrum vulgatum*) indicates the presence of distinct multilayers in the wing membrane with irregular shaped nanostructure with size varying from  $89.91 \pm 0.0195$  nm to  $345.36 \pm 0.0471$  nm. \*The size of the nanostructure differed from the tip (pterostigma) to the costa part of wing attached to the abdomen. \*The arrangement of the nanostructure resembled ripple wave morphology. \*At present, the modelings of dragon fly wing are carried out considering only the venation and not the sub-micron to nano sized structures present in the wing. \*This study clearly indicates that since the distribution and arrangement of nanostructure within the wing varies, its influence in flight mechanism should not be neglected during designing/modeling of wings." (Authors)] Address: Selvakumar, R., Nanobiotechnology Laboratory, Nanotech Research Facility, PSG Institute of Advanced Studies, Coimbatore 641 004, India. E-mail: selvabiotech@gmail.com

**12077.** Senzota, R. (2012): Wildlife mortality on foot paths of the University of Dar es Salaam, Tanzania. *Tropical Ecology* 53(1): 81-92. (in English) ["Human population on the University of Dar es Salaam, Mlimani Campus, has increased substantially in recent years. It is expected that the number of small animals trampled and killed by pedestrians is correspondingly increasing but no baseline study has hitherto been conducted. Between May 2007 and August 2008, over 1,000 animals trampled by humans walking along foot paths at the main Campus of the University of Dar es Salaam, Tanzania, were identified and enumerated. Human presence along foot paths was also recorded as well as animals killed by vehicles on roads of the campus and surrounding areas. Variations between foot paths, months, seasons and level of human abundance were examined. Invertebrates were the most common animal kills on foot paths while most vertebrate kills were along roads. Foot path deaths peaked during semester periods when pedestrian numbers increased. Types and numbers of animals killed differed between foot paths, apparently in relation to adjacent habitat. Tunnels placed at various sections of the paths would facilitate small animals crossings and reduce mortality. Despite having the highest concentration of pedestrians, a bridge path (path C) scored one of the lowest death tolls." (Author) Six out of eight studied foot paths contained no killed Odonata specimens. Each of the the other two paths had Odonata species which were approximately 1% of the total number of dead insect taxa established for for them.] Address: Senzota, R., Department of Zoology and Wildlife Conservation, University of Dar es Salaam, P.O. Box

35064, Dar es Salaam, Tanzania. E-mail: senzota@udsm.ac.tz

**12078.** Shanker, C.; Katti, G.; Padmavathi, C. (2012): Organic amendments and their impact on arthropod diversity in rice (*Oryza sativa* L.) fields of Hyderabad, India. *Journal of Tropical Agriculture* 50(1-2): 63-66. (in English) ["Organic manuring influences the diversity of arthropods and their functional significance in rice fields. Arthropod diversity under eight organic manure regimes consisting of farmyard manure (FYM), vermicompost (VC), poultry manure (PM), neem cake (NC), FYM + 50% recommended fertilizer dose (50%RFD), VC+50% RFD, RFD, and unfertilized control (UC) was assessed in a randomized block design experiment. The doses of organic amendments were adjusted to give the recommended level of  $120 \text{ kg N ha}^{-1}$ . Arthropod sampling was carried out by sweep-nets, vacuum sampling, and straining. Higher abundance of arthropods was observed in plots treated with VC and NC with the spider *Tetragnatha* sp. being the dominant species. Simpson's index indicated that the maximum diversity was observed in PM treated plots (0.022) while the least was in RFD plots (0.183)." (Authors) *Agriocnemis femina*, *A. pygmaea* and *Orthetrum sabina* are among the predatory insects reported.] Address: Shanker, C., Directorate of Rice Research, Rajendranagar, Hyderabad 500030, India. E-mail: chitrashanker@gmail.com

**12079.** Sharma, I.; Dhanze, R. (2012): Evaluation of macrobenthic fauna in hill stream environment of Western Himalaya, India. *Journal of Threatened Taxa* 4(9): 2875-2882. (in English) ["The purpose of this study is to evaluate seasonal occurrence of macrobenthic fauna in the tributaries of river Beas. The seasonal diversity of macrobenthic fauna was calculated in relation with physico-chemical parameters which revealed that benthic diversity is largely controlled by temperature, water current and volume of water. The width and depth of the streams exhibited an inverse relation with benthic fauna. An inverse relation between temperature and benthos was recorded at the sites located at higher elevation whereas a direct relation was inferred at the lower elevation. The peak of benthic fauna was recorded during winter season at all sampling sites. The benthic fauna was mainly represented by eight groups out of which four are highly distributed at all the sites among which Ephemeroptera were most dominating taxa in the River. Simple correlations were applied for benthos and abiotic factors, which revealed that water temperature, dissolved oxygen, alkalinity, depth and width influenced the invertebrate's distribution and abundance. ...The Odonata were seen only at Tripal and Bathoo during winter season but their maximum population was reported from Tripal where it formed 0.16 to 40% of total benthos." (Authors)] Address: Sharma, I., Zoological Survey of India, High Altitude Regional Centre, Solan, Himachal Pradesh 173211, India. Email: induzsi@gmail.com

**12080.** Shull, D.R.; Chase, K.; Paulson, G.S. (2012): Phoretic relationship between *Hydra* sp. (Anthomedusae: Hydridae) and a damselfly nymph (Odonata: Calopterygidae). *Entomological News* 122(2): 154-156. (in English) [Verbatim: "During April 2007, we collected an immature *Calopteryx* sp. with a *Hydra* sp. attached to its dorsum in Burd Run, Shippensburg, Pennsylvania. This is the first record of phoretic behaviour by *Hydra* sp. ... *Hydra* sp. is attached by its basal disc near the base of the wing pads of the damselfly in a location that would probably not impede the mobility of the damselfly. The



permanence of this relationship is not determined. A moulting event could easily dislodge the Hydra sp. from the damselfly. However, the Hydra sp. is well located to switch to the newly emerged Calopteryx sp. The nature of the relationship between these two species is also unclear, but it is possible that the Hydra sp. may benefit from the relationship in a manner similar to that hypothesized by Dossdall and Parker (1998) for the phoretic association between *Nanocla dius branchicolus* (Diptera: Chironomidae) and *Argia moesta* (Odonata: Coenagrionidae). They suggested that the relationship benefited *N. branchicolus* by reducing interspecific competition for food, and reducing energy expenditure associated with relocation. Hydra spp. are relatively sedentary, typically found on rocks and vegetation. Lomnicki and Solbodkin (1966) describe an interesting mode of locomotion in response to overcrowding or lack of food where Hydra sp. produces a bubble and floats to the surface of the water to move short distances in relatively still waters. Much like the floating behaviour, Hydra sp. may utilize the damselfly nymph for dispersal over greater distances or perhaps forage in more prey-abundant areas on the back of a predatory insect." Address: Shull, D.R., Dept of Biology, Shippensburg University, 1871 Old Main Drive, Shippensburg, PA 172572299 USA. E-mail: dushull@pa.gov

**12081.** Simaika, J.P.; Samways, M.J. (2012): Using dragonflies to monitor and prioritize lotic systems: a South African perspective. *Organisms Diversity & Evolution* 12(3): 251-259. (in English) ["The ever-worsening condition of streams due to local, regional, and global demands on water has resulted in the development of increasingly streamlined, rapid assessment methods using macroinvertebrates. Biotic indices in particular are versatile and robust, although not always easy to use. For example, the family-level South African Scoring System is an effective water quality measure, but is time-consuming and requires high-level expert training. The index could be used alongside the species-level Dragonfly Biotic Index (DBI), originally developed for monitoring habitat integrity, with which it is significantly and strongly correlated. We review here the relevant biotic indices in stream biomonitoring and their advantages and disadvantages, and present a new extension of the DBI, the Habitat Condition Scale (HCS). The HCS enables comparison and ranking of sites in terms of their habitat condition. Indeed, the DBI is a very flexible index, having been used in site selection and prioritization for conservation, as well as the measurement of habitat recovery. The theoretical framework behind the index demonstrates the potential of the index to track biotic changes due to climate change. The index could also be easily adapted for use in other biogeographical regions, given that species distributions, threat levels and sensitivities are well-known, and that there is an adequate number of endemic species. However, like all benthic macroinvertebrate indices, the DBI cannot always identify exactly which in-water impacts have an effect and to what extent. The real power of the DBI lies in being able to quantify community response to known physical changes on the riverscape and across the region" (Authors)] Address: Simaika, J.P., Centre for Invasion Biology, Department of Conservation Ecology and Entomology, Stellenbosch University, P Bag X1, Matieland 7602, South Africa. E-mail: simaika@sun.ac.za

**12082.** Sivaperuman, C.; Kumar Shah, S.; Venkataraman, K. (2012): Diversity and distribution of odonates

in Ritchie's Archipelago, Andaman and Nicobar Islands. In: K. Venkataraman, Raghunathan, C. & C. Sivaperuman (eds.): *Ecology of faunal communities on the Andaman and Nicobar Islands*. Springer, Heidelberg: 209-218. (in English) ["The diversity and distribution of odonates were examined in Ritchie's Archipelago, Andaman and Nicobar Islands. This study was conducted during 2008–2011, and line transect method was used to assess the population of odonates. A total of 31 species of odonates that belong to eight families were recorded. The diversity and distribution of odonates in different islands in this archipelago have been discussed in this chapter." (Authors)] Address: Sivaperuman, C., Zool. Surv. India, Andaman & Nicobar Isis Centre, Port Blair-744 102, Andaman & Nicobar Isis, India. E-mail: csivaperuman@yahoo.co.in

**12083.** Śniegula, S.; Nilsson-Örtman, V.; Johansson, F. (2012): Growth pattern responses to photoperiod across latitudes in a northern damselfly. *PLoS ONE* 7(9): e46024. doi:10.1371/journal.pone.0046024: (in English) ["Background: Latitudinal clines in temperature and seasonality impose strong seasonal constraints on ectotherms. Studies of population differentiation in phenotypic plasticity of life history traits along latitudinal gradients are important for understanding how organisms have adapted to seasonal environments and predict how they respond to climate changes. Such studies have been scarce for species with a northern distribution. Methodology/Principle Finding: Larvae of the northern damselfly *Coenagrion johanssoni* originating from semi-voltine central, partivoltine northern, and partivoltine northernmost Swedish populations were reared in the laboratory. To investigate whether larvae use photoperiodic cues to induce compensatory growth along this latitudinal gradient, larvae were reared under two different photoperiods corresponding to a northern and southern latitude. In addition, field adult size was assessed to test the strength of possible compensatory growth mechanisms under natural conditions and hatchling size was measured to test for maternal effects. We hypothesized that populations originating from lower latitudes would be more time constrained than high-latitude populations because they have a shorter life cycle. The results showed that low-latitude populations had higher growth rates in summer/fall. In general northern photoperiods induced higher growth rates, but this plastic response to photoperiod was strongest in the southernmost populations and negligible in the northernmost population. During spring, central populations grew faster under the southern rather than the northern photoperiod. On the other hand, northern and northernmost populations did not differ between each other and grew faster in the northern rather than in the southern photoperiod. Field sampled adults did not differ in size across the studied regions. Conclusion/Significance: We found a significant differentiation in growth rate across latitudes and latitudinal difference in growth rate response to photoperiod. Importantly, growth responses measured at a single larval developmental stage in one season may not always generalize to other developmental stages or seasons." (Authors)] Address: Śniegula, S., Department of Ecosystem Conservation, Institute of Nature Conservation, Polish Academy of Sciences, Mickiewiczza Av. 33A, 31-120 Krakow Poland. E-mail: ssniegula81@gmail.com

**12084.** Söndgerath, D.; Rummland, J.; Suhling, F. (2012): Large spatial scale effects of rising temperatures: model-

ling a dragonfly's life cycle and range throughout Europe. *Insect Conservation and Diversity* 5(6): 461-469. (in English) ["(1.) Rising environmental temperature will likely affect life cycle and range of species. To forecast such effects in an odonate, we simulated the continent-wide life cycle distribution pattern and range of a dragonfly applying a dynamic population model. (2.) The model was used to investigate how much of the current voltinism patterns and distribution range of the species are correctly predicted by using temperature and day length as the only environmental factors. We forecasted the range and voltinism changes on a European extent for the year 2050 using one GCM (CSIRO) driven by one greenhouse gas emission scenario (b2a) according to the IPCC. (3.) The model run lead to 80% correctly predicted distribution range, with a sensitivity of 94% and a specificity of 55%, the latter because of high error in predicting absence in southern Europe. (4.) The projected voltinism ranged from 1 to 2 years per generation in southern latitudes to 5 years in the north. A comparison with field data indicated correct predictions in 50% of all cases, while the other 50% were slight over- or underestimates by half a year per generation. (5.) We conclude that the model led to sufficient predictions of range as well as of life cycle pattern in central and northern Europe. Wrong predictions of presence for southern Europe may be caused by factors not recognised in the model, likely competition by con generics, while incorrect voltinism was possibly because of habitat effects. (6.) Simulations with increased temperature scenarios implied a future northward shift of the fundamental niche and a decreased development duration towards the northern range." (Authors)] Address: Söndgerath, Dagmar, Institut für Geoökologie, Technische Universität Braunschweig, Langer Kamp 19c, 38106 Braunschweig, Germany. E-mail: d.soendgerath@tu-bs.de

**12085.** Steinhoff, P. (2012): Records of Odonata from Phong Nha-Ke Bang National Park and its Buffer Zone, Central Vietnam. *Entomologie heute* 24: 37-49. (in English, with German summary) ["From September 2010 until August 2011, the dragonfly fauna of several habitats in the Phong Nha-Ke Bang National Park and its buffer zone in Central Vietnam was investigated. It is the first time that research on dragonflies was undertaken in that area. The habitats surveyed in the buffer zone were rivers, water-filled bomb craters, paddy fields and forest streams, while the habitats where research on dragonflies was carried out inside the national park were forest rivers and forest streams. In total, 61 species were determined at 16 different sites, while the identification of 15 more species was possible just at genus level; an identification of the species requires further research. The species were identified either in the field, with the help of photographs or (when a specimen was collected) in the laboratory. The differences of the habitats surveyed and the species found at each location are discussed and compared with the knowledge of the dragonfly fauna of Vietnam. Furthermore, an outlook on further research in the future is given." (Authors)] Address: Steinhoff, P., Trelleborger Weg 1, 17493 Greifswald, Germany. E-Mail: philipsteinhoff@gmail.com

**12086.** Striniqi, A.; Oga, J. (2012): Contribution to the knowledge of some aquatic insect species in Shkodra Lake. *BALWOIS 2012 - Ohrid, Republic of Macedonia* - 28 May, 2 June 2012: 7 pp. [The Shkodra lake is a lake on the border of Montenegro with Albania, the largest lake in the Balkan Peninsula. 44 insect taxa only are

treated at the family level.] Address: Striniqi, A., Department of Bio-Chemistry, The University of Shkodra Luigj Gurakuqi, Shkodra, Albania

**12087.** Sultana, R.; Kala, D.S. (2012): Water body quality analysis by benthic macroinvertebrates. *Int. J. Pharm. Bio. Sci.* 2(1): 269-279. (in English) [The paper includes references to Odonata.] Address: Kala, D.S., University engineering College, Kakatiya university, Warangal, India. E-mail: dr.shashidsk@yahoo.com

**12088.** Svensson, E.I. (2012): Non-ecological speciation, niche conservatism and thermal adaptation: how are they connected? *Organisms diversity & evolution* 12(3): 229-240. (in English) ["During the last decade, the ecological theory of adaptive radiation, and its corollary "ecological speciation", has been a major research theme in evolutionary biology. Briefly, this theory states that speciation is mainly or largely the result of divergent selection, arising from niche differences between populations or incipient species. Reproductive isolation evolves either as a result of direct selection on mate preferences (e.g. reinforcement), or as a correlated response to divergent selection ("by-product speciation"). Although there are now many tentative examples of ecological speciation, I argue that ecology's role in speciation might have been overemphasised and that non-ecological and non-adaptive alternatives should be considered more seriously. Specifically, populations and species of many organisms often show strong evidence of niche conservatism, yet are often highly reproductively isolated from each other. This challenges niche-based ecological speciation and reveals partial decoupling between ecology and reproductive isolation. Furthermore, reproductive isolation might often evolve in allopatry before ecological differentiation between taxa or possibly through learning and antagonistic sexual interactions, either in allopatry or sympatry. Here I discuss recent theoretical and empirical work in this area, with some emphasis on odonates and suggest some future avenues of research. A main message from this paper is that the ecology of species differences is not the same as ecological speciation, just like the genetics of species differences does not equate to the genetics of speciation." (Authors)] Address: Svensson, E.I., Section for Animal Ecology, Ecology Building, Lund Univ., SE-223 62 Lund, Sweden. E-mail: erik.svensson@zoekol.lu.se

**12089.** Swaegers, J.; Mergeay, J.; Maes, G.E.; Van Houdt, J.K.J.; Larmuseau, M.H.D.; Stoks, R. (2012): Microsatellite marker development and putative SNP detection for a northward expanding damselfly species using next generation sequencing. *Conservation Genetics Resources* 4(4): 1079-1084. (in English) ["In this study we used Roche's 454 sequencing to develop genetic markers for *Coenagrion scitulum*, a Mediterranean damselfly currently expanding its range northward. With a modest amount of sequencing we detected 6,318 potential microsatellite markers and 832 putative single nucleotide polymorphisms (SNPs). From the potential microsatellite markers we developed thirteen novel microsatellite markers. Among other applications, these markers can be used to unravel the micro-evolutionary consequences of range expansion in this species." (Authors)] Address: Swaegers, J., Lab.Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: janne.Swaegers@bio.kuleuven.be

**12090.** Tachamo Shah, R.D.; Narayan Shah, D.; Domisch, S. (2012): Range shifts of a relict Himalayan dragonfly in the Hindu Kush Himalayan region under cli-

mate change scenarios. *International Journal of Odonatology* 15(3): 209-222. (in English) ["Although understanding of geographic range shifts of many species in response to global climate change is expanding steadily, little is known about the Himalayan fauna, which in particular is affected by relatively faster warming rates than other parts of the world. Anticipated increases in temperature and changes in hydrological regimes will have significant adverse impacts on the habitat suitability for many species. This threat will even be higher to endemic and already threatened species due to their restricted distribution and narrow climate tolerance ranges. We investigated the range shifts of a relict Himalayan dragonfly (*Epiophlebia laidlawi*), a species that is endemic to the Hindu Kush Himalayan region. Currently, the species is only known from few localities in Bhutan, India and Nepal. For conservation of the species, it is necessary to foresee potential suitable habitat areas and range shifts due to global climate change. Here, we first estimated the current potential geographic distribution by identifying the suitable habitat area in the region using bioclimatic envelope models, by means of consensus projections of six algorithms as implemented in the BIOMOD-package in the software program R. We then used the current distribution to render future projections under the A2a and B2a IPCC emission scenarios for the years 2050 and 2080. Models predict that the suitable habitat area of the species will shift on average 374 m and 599 m uphill under the extreme (A2a) climate warming scenario, and 294 m and 342 m uphill under the moderate (B2a) scenario by 2050 and 2080, respectively. Future suitable habitat areas are projected to remain only in the high mountains of eastern Nepal. The results will help conservationists to delineate priority habitats in the first step towards the species conservation in the region." (Authors)] Address: Ram Devi Tachamo Shaha, Hindu Kush Himalayan Benthological Society, P.O. Box 20791, Sundhara, Kathmandu, Nepal

**12091.** Takahashi, Y.; Morimoto, G.; Watanabe, M. (2012): Ontogenetic colour change in females as a function of antiharassment strategy. *Animal Behaviour* 84(3): 685-692. (in English) ["Mate choice by females is an important component of sexual selection in many species. Theoretically, female sexual traits may be influenced by selection acting on the females via male mate choice, while the evolutionary consequences of male mate preferences are largely unknown, especially in the context of sexual conflict. We tested whether male mate choice affects the evolution of female colour in the damselfly *Ischnura senegalensis* in which females exhibit dimorphism consisting of a gynomorph that experiences ontogenetic colour change and an andromorph that does not. We first quantitatively confirmed that only gynomorphs change their body colour in relation to sexual maturation. In field experiments, males were unwilling to mate with sexually immature gynomorphs, although they attempted to mate with immature andromorphs. This is because males changed their mating preference for female colour depending on previous copulation experiences with sexually mature females. As a result, immature andromorphs received more male harassment than sexually immature gynomorphs, and then showed decreased food intake. Immature-specific colour functioned to avoid costly male harassment during female prereproductive stages, suggesting that ontogenetic colour changes in females have evolved as an antiharassment strategy of females

via male mate choice. Highlights: \*Female damselfly experienced ontogenetic colour change. \*Females with immature-specific colour efficiently avoided male harassment. \*Avoiding harassment increased food intake in females. \*Male choice may lead to the evolution of antiharassment strategy in females." (Authors)] Address: Takahashi, Y., Division of Ecology & Evolutionary Biology, Graduate School of Life Sciences, Tohoku University, Miyagi, Japan. E-mail: takahashi.yum@gmail.com

**12092.** Tampus, A.D.; Tobias, E.G.; Amparado, R.F.; Bajo, L.; Sinco, A.L. (2012): Water quality assessment using macroinvertebrates and physico-chemical parameters in the riverine system of Iligan City, Philippines. *AES Bioflux* 4(2): 59-68. (in English) ["The water quality in the riverine systems (Mandulog and Iligan) of Iligan City decreases as it approaches the downstream. Canonical Correspondence Analysis (CCA) was used to determine which physico-chemical parameters would influence the assemblage of macroinvertebrates. Results revealed that Total Suspended Solids (TSS) affect the groups Plecoptera, Tricoptera, Diptera and Simuliidae while nitrate affects Plecoptera and Gomphidae. Principal Component Analysis (PCA) was used to determine which physico-chemical parameters describe the sampling sites. Out of the ten physico-chemical parameters that were determined, only the pH, silicate and nitrate showed significant correlation that describe the sampling sites. These results indicated that the sampling sites within the two rivers show similar chemical attributes." (Authors)] Address: Tampus, Annielyn D., Department of Biological Sciences, College of Science and Mathematics, Mindanao State University-Iligan Institute of Technology, Tibanga, Iligan 9200, Philippines. E-mail: nyleinna@yahoo.com

**12093.** Tennessen, K.J. (2012): The nymph of *Anisagrion Selys 1876*, based on the discovery of *A. inornatum* (Selys, 1876) in Ecuador (Odonata: Coenagrionidae). *Organisms diversity & evolution* 12(3): 297-300. (in English) ["The final instar nymph of *Anisagrion inornatum* is described and illustrated based on five specimens (one reared) from southern Ecuador. It is the first to be discovered for the genus. The nymph of *Anisagrion inornatum* differs from its closest relative, *Apanisagrion lais*, by: (1) antenna shorter in relation to head length (ratio 1.35 in *An. inornatum* vs 1.55 in *Ap. lais*); (2) fewer palpal and premental setae (5 palpal and 4 or 5 premental setae in *An. inornatum* vs 6-8 palpal and 5-8 premental setae in *Ap. lais*); (3) venter of S3-S8 with medial dark stripe. The nymphs were found in a slow shallow seep overgrown with emergent wetland plants." (Author)] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktensessen@centurytel.net

**12094.** Trapero-Quintana, A.; Novelo-Gutierrez, R. (2012): Description of the final stadium larva of *Erythrodiplax bromeliicola* Westfall 2000 (Odonata: Libellulidae) with notes on variation in adults from Cuba. *Zootaxa* 3545: 59-66. (in English, with Spanish summary) ["The final stadium larva of *E. bromeliicola* is formally described and illustrated. The light brown scape and pedicel and creamy pale flagellum of the antenna, plus the abundant short, reddish, spiniform setae on the integument of the body surface and epiproct, comprise an exclusive combination of characters in the larva of *E. bromeliicola*. Information on larval habitat and a key for the larvae of the five *Erythrodiplax* species occurring in Cuba are provided. Details on morphological variation



of an adult population from Cuba are also provided." (Authors)] Address: Trapero-Quintana, A., Universidad de Oriente. Patricio Lumumba s/n, Santiago de Cuba, 90500, Cuba. E-mail: atrapero@cnt.uo.edu.cu ;

**12095.** Tsui, M.T.K.; Blum, J.D.; Kwon, S.Y.; Finlay, J.C.; Balogh, S.J.; Nollet, Y.H. (2012): Sources and transfers of methylmercury in adjacent river and forest food webs. *Environ. Sci. Technol.* 46(20): 10957-10964. (in English) ["Nearly all ecosystems are contaminated with highly toxic methylmercury (MeHg), but the specific sources and pathways leading to the uptake of MeHg within and among food webs are not well understood. In this study, we report stable mercury (Hg) isotope compositions in food webs in a river and an adjacent forest in northern California and demonstrate the utility of Hg isotopes for studying MeHg sources and cross-habitat transfers. We observed large differences in both  $\delta^{202}\text{Hg}$  (mass-dependent fractionation) and  $\Delta^{199}\text{Hg}$  (mass-independent fractionation) within both food webs. The majority of isotopic variation within each food web could be accounted for by differing proportions of inorganic Hg [Hg(II)] and MeHg along food chains. We estimated mean isotope values of Hg(II) and MeHg in each habitat and found a large difference in  $\delta^{202}\text{Hg}$  between Hg(II) and MeHg (~2.7‰) in the forest but not in the river (~0.25‰). This is consistent with in situ Hg(II) methylation in the study river but suggests Hg(II) methylation may not be important in the forest. In fact, the similarity in  $\delta^{202}\text{Hg}$  between MeHg in forest food webs and Hg(II) in precipitation suggests that MeHg in forest food webs may be derived from atmospheric sources (e.g., rainfall, fog). Utilizing contrasting  $\delta^{202}\text{Hg}$  values between MeHg in river food webs (-1.0‰) and MeHg in forest food webs (+0.7‰), we estimate with a two-source mixing model that ~55% of MeHg in two riparian spiders is derived from riverine sources while ~45% of MeHg originates from terrestrial sources. Thus, stable Hg isotopes can provide new information on subtle differences in sources of MeHg and trace MeHg transfers within and among food webs in natural ecosystems. .... In the riparian zone, one of the two emerged aquatic insects (damselfly adults) displayed MeHg isotopic compositions similar to their river counterparts while another emerged aquatic insect (dragonfly adults) displayed much higher  $\delta^{202}\text{Hg}$ MeHg. This suggests that damselfly adults may retain aquatic MeHg and perhaps continue feeding on other emerged aquatic insects, but dragonfly adults appear to feed on terrestrial insects that are enriched with  $\delta^{202}\text{Hg}$ MeHg. This is possible because dragonflies are stronger fliers than damselflies (e.g., higher flying velocities43), and dragonflies may spend more time integrating prey in forests (i.e., away from river), whereas damselflies likely remain around the river to feed." (Authors)] Address: Tsui, M.T.K., Department of Earth and Environmental Sciences, University of Michigan, Ann Arbor, Michigan 48109, USA. E-mail: mtktsui@umich.edu.

**12096.** van Kleef, H.H.; van Duinena, G.-J.A.; Verberka, W.C.E.P.; Leuven, R.S.E.W.; van der Velde, G.; Esselink, H. (2012): Moorland pools as refugia for endangered species characteristic of raised bog gradients. *Journal for Nature Conservation* 20(5): 255-263. (in English) ["In intact raised bog landscapes transitions from ombrotrophic into minerotrophic conditions occur. These gradients are lost from many bogs due to peat harvesting and drainage, and are difficult to restore. To determine which endangered species are characteristic

of pristine raised bog gradients and their current status in degraded bogs, plants and macroinvertebrates were surveyed in Estonian intact raised bogs and Dutch degraded bog remnants. Dutch national distribution data were used to determine whether communities with these species occurred outside bog habitats. Water chemistry data were used to describe associated environmental conditions. Intact bog gradients were the preferred habitat for six plant species and fifteen macroinvertebrate species, all of which are endangered. In degraded bogs these species were scarce or not recorded. In intact bogs these species lived at sites where runoff from the bog massif came into contact with regional ground water resulting in a gradient in pH, alkalinity, Ca, Fe and ionic ratio. Analysis of Dutch national distribution data revealed aggregations of these endangered species in moorland pools. These pools contained water chemistry gradients similar to those found in pristine bogs, which occurred at sites where groundwater seepage and stream water came in contact. In the past, stream water has been used to increase pH and trophic status of moorland pools facilitating fisheries. Today, this practice offers a conservation strategy for the protection of endangered species for which no short-term alternatives are available." (Authors) The following Odonata species are included in the analysis: *Coenagrion hastulatum*, *Somatochlora arctica*, *S. flavomaculata*, *Aeshna subarctica*, *Leucorrhinia albifrons*, and *L. dubia*.] Address: van Klee, H.H., Bargerveen Foundation, Radboud University Nijmegen, P.O. Box 9010, 6500 GL Nijmegen, The Netherlands

**12097.** Verberk, W.C.E.P.; Calosi, P. (2012): Oxygen limits heat tolerance and drives heat hardening in the aquatic nymphs of the gill breathing damselfly *Calopteryx virgo* (Linnaeus, 1758). *Journal of Thermal Biology* 37(3): 224-229. (in English) ["Thermal limits in ectotherms may arise through a mismatch between  $\text{O}_2$  supply and demand. At higher temperatures, the ability of their cardiac and ventilatory activities to supply  $\text{O}_2$  becomes insufficient to meet their elevated  $\text{O}_2$  demand. Consequently, higher levels of  $\text{O}_2$  in the environment are predicted to enhance heat tolerance, while reductions in  $\text{O}_2$  are expected to reduce thermal limits. Here, we extend previous research on thermal limits and oxygen limitation in aquatic insect larvae and report critical upper temperatures in nymphs of *C. virgo* exposed to different levels of  $\text{O}_2$ . In addition, we explore the potential for a mechanistic link between  $\text{O}_2$  conditions and thermal plasticity by exposing nymphs to two consecutive extreme heat events, using different levels of  $\text{O}_2$  in the second exposure. As predicted, hypoxia severely lowered critical temperatures. However, thermal tolerance was not improved under hyperoxia. Damselfly nymphs may be precluded to take advantage of hyperoxia if  $\text{O}_2$  uptake and delivery is controlled locally near the caudal gills where most of the gas exchange occurs. The same asymmetrical effects of hypoxia and hyperoxia on heat tolerance in terrestrial insects could be similarly explained if tracheal opening and/or ventilation are not centrally regulated. Prior exposure to hypoxia enhanced critical thermal maxima in subsequent heat exposures and hyperoxia negated this hardening effect, indicating potential for oxygen-driven heat hardening in these aquatic insects. Our study provides broad confirmation for oxygen limitation as a key mechanism setting upper thermal limits, pointing to a vital role for heat shock proteins in reducing  $\text{O}_2$  requirements by slowing down rates of protein denaturation." (Au-

thors)] Address: Verberk, W.C.E.P., Department of Animal Ecology and Ecophysiology, Institute for Water and Wetland Research, Radboud University, Toernooiveld 1, 6525 ED Nijmegen, The Netherlands. E-mail: wilco@aquaticecology.nl

**12098.** Villanueva, R.J.T.; van Weerd, M.; Cahilog, H. (2012): Odonata recorded in February 2012 in Isabela and Aurora Provinces, Luzon Island and Polillo Island, Philippines. International Dragonfly Fund - Report 49: 1-42. (in English) ["In February 2012, Odonata were recorded and voucher specimens collected in Luzon, The Philippines. The focus of study was set on localities near Dinapigue and San Mariano (Isabela Province), sites in Casiguran (Aurora Province) and on Polillo Island (Quezon Province). 60 Odonata species were recorded. Three are new to science and have been formally to be described. Four species were recorded for the first time in Luzon. *Amphicnemis furcata* and *Diplacodes nebulosa* were rediscovered after several decades since they were last documented from Luzon." (Authors)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**12099.** Villanueva, R.J.T. (2012): Review of the Philippine taxa formerly assigned to the genus *Amphicnemis* Selys. Part I: Overview and descriptions of three new genera (Odonata: Coenagrionidae). Zool. Med. Leiden 86 (8): 579-604. (in English) ["The Philippine species formerly assigned to the genus *Amphicnemis* Selys are reviewed. Three new genera *Luzonobasis* gen. nov., *Pandanobasis* gen. nov. and *Sangabasis* gen. nov. are erected. *Amphicnemis isabela* is synonymised with *Amphicnemis glauca* and transferred to *Luzonobasis* gen. nov. *Amphicnemis cantuga* and *A. mcgregori* are transferred to *Pandanobasis* gen. nov. *Amphicnemis braulitae*, *A. circularis*, *A. dentifer* and *A. furcata* are transferred to *Sangabasis* gen. nov. The rest of the Philippine *Amphicnemis* species are transferred to the genus *Pericnemis* Hagen. Two new species are described: *Pandanobasis curacha* spec. nov. and *P. daku* spec. nov." (Author)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**12100.** Vivier, N. (2012): Nicole Caulier-Mathy et Nicole Haesenne-Peremans (éd.), Une vie au fil des jours. Journal d'un notable politicien et naturaliste, Michel Edmond de Selys Longchamps (1823-1900), Bruxelles, Académie royale de Belgique, Commission royale d'histoire, 2008, 2 vol., 1747 p. Histoire, économie & société 31: 124-125. (in English) [Book review of the publication with the diary of Michel Edmond de Selys Longchamps.] Address: not stated

**12101.** Wankhade, V.; Manwar, N.; Dahihande, A. (2012): Effect of water pollution on assemblage and community structure of dragonfly at three ecosystems of Pune (India). Golden Research Thoughts 2(3): 1-6. (in English) [Anisoptera at three water bodies: Pune University pond (seasonal and nonpolluted), Mula-Mutha sangam (lotic, perenneal and polluted) and Pashan Lake (lentic, perenneal and polluted) were studied.] Address: Wankhade, V., Department of Zoology University of Pune, MS India 07. E-mail- varsha2w@rediffmail.com

**12102.** Ware, J.; Karlsson, M.; Sahlen, G.; Koch, K. (2012): Evolution of reproductive strategies in libellulid dragonflies (Odonata: Anisoptera). Organisms Diversity & Evolution 12(3): 313-323. (in English) ["In Libellulidae,

oocyte production has been assumed to be continuous, with periods of egg-laying interspersed with periods of resting/eating; however, recent work suggests that two types of oocyte production are common: either (a) continuous or (b) step-wise. These are mirrored in the arrangement of the ovarioles in the ovaries. Likewise, two types of mate-guarding behaviour have been observed in Libellulidae: (1) non-contact guarding and (2) tandem guarding in which the male either hovers above the female or is physically attached to her during oviposition. Using molecular (mitochondrial and nuclear) data we explored the evolution of female reproductive traits, focusing on ovariole morphology, as well as guarding behaviour, in Libellulidae. Continuous egg production appears to have evolved more than once, as have tandem and non-contact guarding. We discuss how the evolution of different ovariole types and guarding behaviour may have been influenced by habitat instability, dispersal and crowded oviposition sites; thus, migratory behaviour or habitat availability may have been the driving force of ovariole evolution." (Authors)] Address: Ware, Jessica L., Rutgers, The State University of New Jersey, Cook College, 93 Lipman Drive, New Brunswick, New Jersey 08901, USA. E-mail: jware@amnh.org

**12103.** Wasscher, M.T. (2012): The mansion, diaries and watercolours of Selys. Notul. odonatol. 7(10): 92-95. (in English) ["Notes are given on the mansion and family tomb at Wareme (Belgium) and the discoveries of the published diaries and large collection of unpublished watercolours by Michel Edmond de Selys Longchamps (1813-1900)." (Author)] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: marcel.hilair@12move.nl

**12104.** Wildermuth, H. (2012): Libellenausstellung im Naturschutzzentrum Neeracherried (Neerach, ZH). Entomo Helvetica 5: 173-174. (in German) [The author introduces the didactical concept of an exhibition in the Neeracherried, Switzerland. Morphology, biology, physiology are exemplified using in most cases *Anax imperator*.] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**12105.** Wu, H. (2012): Huizhou Dragonflies. China Forestry Publishing House: 191 pp. (in bilingual in Chinese and English) ["Until relatively recent times, dragonflies were studied by only a few entomologists, but in this new century they are receiving ever increasing attention from nature lovers all over the world. Many now derive great pleasure from the hobby of observing and photographing dragonflies, in the way they have long watched and photographed birds. Numerous new books introducing dragonflies, enabling their identification and reporting their regional or local diversity are being published in many countries. The present book by Wu Hongdao is among the first of its kind from the mainland of China. The bilingual text is limited, but the superb colour photos provide an excellent introduction to the diverse and colourful world of south Chinese dragonflies. Although, the area of Huizhou City covers only 6% of the land area of Guangdong province and a tiny 0.11% of the whole of China, this area is home to at least 174 species of dragonflies -about 70% of species known from Guangdong and one quarter of the total Chinese dragonfly fauna. This is mainly because the area of Huizhou City includes several well preserved protected areas. The most famous is Nankunshan provincial reserve, which is especially rich in dragonfly species and has been particularly well studied. Within

Huizhou City there are also suitable wetland habitats outside protected areas, in both lowlands and mountain. The first book illustrating Chinese dragonflies was Edward Donovan's famous classic *AN Epitome of the Natural History of the Insects of China*, published in London in 1798. Two of its 50 fine hand-coloured copper-engraved plates illustrate six dragonfly species. All of these, including the beautiful *Neurobasis chinensis*, the first dragonfly from China and the whole of Asia to be scientifically named, are also to be founded in Wu's book. Since the time of Donovan the world has changed in many ways. However, the beauty and diversity of insects continues to fascinate us, and books showcasing their splendor are still being published." (from the preface of Matti Hämäläinen & publisher)]

**12106.** Xu, Q.-h. (2012): *Periaeschna yazhenae* sp. nov. from Fujian, China (Odonata: Anisoptera: Aeshnidae). *Zootaxa* 3526: 72-78. (in English) ["*P. yazhenae* sp. nov. is described, illustrated and diagnosed from its congeners. Description of the final stadium larva of the new species is also provided. The new species is closely similar to *P. zhangzhouensis* Xu 2007 due to the high similarity of anal appendages, but is easy to separate from that species by the following characters: distal 1/4 of cercus narrowest and with truncated apex; abdominal segments 1–9 with simpler and less developed dorsal markings and with more complicated and more developed ventrolateral and ventral markings; and wings tinted with brownish-black at extreme base." (Author)] Address: Xu, Q.-h., Dept of Biological & Environmental Engineering, Zhangzhou City Univ., Zhangzhou, Fujian 363000, China. E-mail: qihxan@yahoo.com.cn

**12107.** Yang, P.-s. (2012): A study of the geographical differentiation and conservation among *Psolodesmus mandarinus* populations (Calopterygidae: Odonata). Dissertation, Institute of Entomology, National Taiwan University: 115 pp. (in Chinese, with English summary) ["To investigate the phylogenetic relationship and geographical variation of wing colour among the *Psolodesmus mandarinus* three subspecies, a combination of molecular, morphological, and behavioural approaches was used to guide this research and develop the conservation strategies. Firstly, the molecular phylogenetic analysis of nuclear and mitochondrial genes revealed considerable divergence between Yaeyama's populations (subspecies *kuroiwa*) and Taiwanese populations (included subspecies *mandarinus* and *dorothea*). Furthermore, two mitochondrial lineages (east and west) existed in Taiwan. The eastern Taiwan lineage included these individuals belonging to *dorothea*, and the western Taiwan lineage included both *dorothea* and *mandarinus*. Because of the genetic diversity of mitochondrial gene was much lower in northwestern Taiwan region and two subspecies shared a common haplotype, it is probable the populations of *mandarinus* were derived from the northward expansion of *dorothea* populations. Secondly, Yaeyama's populations (*kuroiwa*) and Taiwanese populations (*mandarinus* and *dorothea*) could be exactly discriminated by the morphometrical analysis of wing pterostigma. Previous studies reported the wing colour differences between *mandarinus* and *dorothea*, our results illustrated that the wing colour traits gradually changed across the populations in northern Taiwan. It would be hard to discriminate two subspecies and determine the distribution limits. In contrast, the female wing size shifted dramatically at 24.19 degree (between central and northern Taiwan) which

was close to the current criteria (24.33 degree) for dividing two subspecies. Because of both the wing colour trait and female wing size changed across the populations of *mandarinus* in northern Taiwan, it is probable these traits may form co-adapted trait complexes and to cope with a different selection regime in northern Taiwan. Thirdly, the field observations of mating behaviour in *mandarinus* and *dorothea* populations demonstrated that two subspecies possessed the same kind of female preference for exaggerated male coloration. Thus, the differentiation of wing colour trait could not be interpreted only by using sexual selection. If the wing colour trait and life history trait formed co-adapted trait complexes in northern Taiwan, the fitness of female preference would be difference between *mandarinus* and *dorothea*. Because of the positive fitness effect in female preference for *mandarinus* populations, wing colour traits gradually changed across the northern Taiwan. On the contrary, the negative fitness effect in female preference for *dorothea* populations, the hyaline wing is maintained by a combination of sexual selection and natural selection. Finally, *Psolodesmus* is the only one endemic genus of damselflies in Taiwan and Yaeyama. The variety of wing colour provided an ideal explanation case for biodiversity education. It also could be used as a biological indicator for monitoring stream ecosystem and global warming. Above all, we suggested developing an educational and recreational program for pursuing the goals of research, conservation and sustainable utilization." (Author)] Address: not stated

**12108.** Zhang, H.; Hämäläinen, M. (2012): *Matrona annina* sp. n. from southern China (Odonata, Calopterygidae). *Tijdschrift voor Entomologie* 155 (2012) 285–290: 285-290. (in English) ["*Matrona annina* sp. n. from Guangdong and Guangxi (China) is described and illustrated for both sexes. The new species differs from its sympatric congener *M. basilaris* Selys, 1853 by its brown wings, reduced bluish-white reticulation at wing base and in details of the structure of the superior anal appendages. An NJ-tree derived from the ITS region (ITS1, 5.8S gene, and ITS2) of *M. annina* and *M. basilaris* specimens, collected from the same stream, is presented. A mean of 3.4% difference in the ITS sequences was found between the two species." (Authors)] Address: Zhang, H., Institute of Hydrobiology, Chinese Academy of Sciences, Donghuanlu Road, Wuchang, Wuhan City, Hubei province, China. E-mail: zhanghaomiao6988@gmail.com

**12109.** Zhu, G.; Chmura, A.; Zhang, L. (2012): Morphology, echolocation calls and diet of *Scotophilus kuhlii* (Chiroptera: Vespertilionidae) on Hainan Island, South China. *Acta Chiropterologica* 14(1): 175-181. (in English) ["*S. kuhlii* is distributed in many urban environments, yet the ecology of this species is poorly known. The morphology, echolocation call structure, diet, and foraging areas of *S. kuhlii* were studied on Hainan Island, south China from March to November 2006. ... call shape suggests that this species is adapted to forage in open environments. Data from mist-netting and acoustic detection indicated that *S. kuhlii* foraged mainly around the crown of trees and street lights. Nine insect orders were recorded in its diet, with Lepidoptera (97.46%, by frequency) and Coleoptera (64.72 ± 2.37%, by volume) constituting the main prey, together with Hemiptera (19.99 ± 1.25%) and Hymenoptera (9.43 ± 1.14%). There was significant seasonal variation in the diet of *S. kuhlii*: Coleoptera increased from



March to May, and then decreased to August, while Hemiptera and Hymenoptera showed the inverse trend." (Authors) Odonata were occasionally recorded in the faeces, but no details are given.] Address: Zhang, L., Guangdong Entomological Institute, 105 Xingang Xi Road, Haizhu District, Guangzhou, 510260, China. E-mail: zhanglb@gdei.gd.cn

### 2013

**12110.** Almeida, D.; Merino-Aguirre, R.; Angeler, D.G. (2013): Benthic invertebrate communities in regulated Mediterranean streams and least-impacted tributaries. *Limnologia* 43(1): 34-42. ["Flow regulation is generally perceived to negatively influence fluvial ecosystems through alterations of natural habitat conditions, particularly in highly variable Mediterranean streams. However, the detection of impact may depend on chosen metrics, requiring a multiple-lines-of-evidence approach for ecologically relevant impact assessment. In this study, we compare the community structure, the trophic function, the microhabitat influence and the body condition of benthic invertebrates between the regulated Bullaque River and unregulated tributaries (Guadiana River basin, central Spain). Invertebrates and physical microhabitats were studied seasonally in 2010. Total abundance, EPT abundance, Rheoindex and LIFE metrics were higher in the regulated river during summer, whereas Shannon diversity was lower. Rheoindex and LIFE were higher in the tributaries during winter. Filterers were very abundant in spring and summer in the tributaries and the regulated stream, respectively. Deposit feeders dominated during summer in the tributaries. Despite these differences, ANOSIM revealed similar community structure and feeding groups characteristics in both fluvial system types. In addition, body condition, measured as fluctuating asymmetry level, indicated that damming created favourable developmental conditions for several invertebrate species in the Bullaque River. This suggests that damming surprisingly buffered from the adverse environmental conditions inflicted by seasonal summer droughts, which occur recurrently in Mediterranean areas. Results also suggest that the application of fluctuating asymmetry could therefore be promising for revealing integral ecological responses to different and often combined forms of anthropogenic and natural disturbance. ... A total of 12 species were selected to determine body conditions (fluctuating asymmetry (FA) levels): *Baetis fuscatus* (L.), *B. rhodani* (Pictet), *Caenis luctuosa* (Burmeister), *Ecdyonurus angelieri* Thomas, *Serratella ignita* (Poda), *Leuctra geniculata* (Stephens), *Platycnemis latipes* Rambur, *Onychogomphus uncatatus* (Charp.), *Micronecta meridionalis* (Costa), *Hydropsyche exocellata* Dufour, *H. instabilis* (Curtis) and *Rhyacophila relicta* McLachlan." (Authors)] Address: Almeida, D., Department of Ecology, Complutense University of Madrid, 2 José Antonio Novais Street, E-28040 Madrid, Spain. E-mail: dalmeida@bio.ucm.es

**12111.** Barry, M.J.; Syal, S. (2013): Metabolic responses of tadpoles to chemical predation cues. *Hydrobiologia* 700: 267-276. (in English) ["Life-history theory predicts that predator-induced defences should incur fitness costs. In larval amphibians, the most frequently reported cost is reduced energy intake due to lower foraging rates; however, recent reports suggest that this trade-off may be uncoupled through morphological and physiological adaptations. Metabolism is a measure of

energy expenditure and plasticity in respiration may potentially offset other costs of predator-induction. The aim of this study was to measure the indirect effects of dragonfly larvae on the respiration rate of tadpoles of the Arabian toad (*Bufo arabicus*) over time and at different predator concentrations. We performed two experiments. In the first experiment (time-response), we exposed tadpoles either to the indirect presence of odonate larvae or predator-free conditions and measured respiration rates 3, 5, 8, 11, 13, 15, 19 and 26 days after the start of the experiment. In the second experiment (dose-response), we used three levels of predator chemicals, equivalent to 1 predator per 10, 100 or 1,000 l plus controls. The respiration rate of predator-exposed tadpoles varied initially, but was 56.3% of controls after 26 days. In the dose-response experiment, the respiration rate of all predator-exposed tadpole groups was reduced by between 19.1 and 27.2% after 21 days. The study demonstrates a mechanism by which tadpoles may be able to adjust their physiology to partially offset the costs of lower energy intake due to predator avoidance. ... Larval dragonflies were collected from a nearby wadi and maintained on a diet of tadpoles when not being used for experiments. In the time-response experiment, final instar Aeshnidae (*Anax* sp.) and final instar Libellulidae (*Trithemis* sp.) were used. In the dose-response experiment, only *Anax* sp. were utilised." (Authors) ] Address: Barry, M.J., Department of Biology, Sultan Qaboos University, Al Khoud, P.O. Box 36, Muscat 123, Sultanate of Oman. E-mail: mjbarry@squ.edu.om

**12112.** Cañedo-Argüelles, M.; Kefford, B.J.; Piscart, C.; Prat, N.; Schäfer, R.B.; Schulz, C.-J. (2013): Salinisation of rivers: An urgent ecological issue. *Environmental Pollution* 173: 157-167. (in English) ["Secondary salinisation of rivers and streams is a global and growing threat that might be amplified by climate change. It can have many different causes, like irrigation, mining activity or the use of salts as deicing agents for roads. Freshwater organisms only tolerate certain ranges of water salinity. Therefore secondary salinisation has an impact at the individual, population, community and ecosystem levels, which ultimately leads to a reduction in aquatic biodiversity and compromises the goods and services that rivers and streams provide. Management of secondary salinisation should be directed towards integrated catchment strategies (e.g. benefiting from the dilution capacity of the rivers) and identifying threshold salt concentrations to preserve the ecosystem integrity. Future research on the interaction of salinity with other stressors and the impact of salinisation on trophic interactions and ecosystem properties is needed and the implications of this issue for human society need to be seriously considered." (Authors) The paper includes a reference to Odonata.] Address: Cañedo-Argüelles, M., Freshwater Ecology and Management (F.E.M.) Research Group, Departament d'Ecologia, Universitat Barcelona, Diagonal 643, 08028 Barcelona, Catalonia, Spain. E-mail: mcanedo.fem@gmail.com

**12113.** Drinan, T.J.; Foster, G.N.; Nelson, B.H.; O'Halloran, J.; Harrison, S.S.C. (2013): Macroinvertebrate assemblages of peatland lakes: Assessment of conservation value with respect to anthropogenic land-cover change. *Biological Conservation* 158: 175-187. (in English) ["Small blanket bog lakes can contain many rare and threatened aquatic invertebrate species. Their conservation value, however, is threatened throughout Eu-

rope by peat extraction and particularly conifer afforestation, which can compromise the physico-chemical habitat quality of peatland lakes through excessive inputs of forestry-derived dissolved and particulate substances. To quantify the effect of conifer plantation forestry on the conservation value of these habitats, we compared the hydrochemistry and assemblages of aquatic Coleoptera, Heteroptera and Odonata of replicate lakes across three distinct catchment land uses: (i) unplanted blanket bog only present in the catchment, (ii) mature conifer plantation forests only present in the catchment and (iii) catchments containing mature conifer plantation forests with recently clearfelled areas. All three catchment land uses were replicated across regions of sedimentary and igneous geology. Lakes with afforested catchments, in both geologies, had elevated concentrations of plant nutrients, total dissolved organic carbon and heavy metals, the highest concentrations being recorded from the clearfell lakes. Coleoptera and Heteroptera assemblages responded strongly to forestry-mediated changes in water chemistry, whereas Odonata assemblages responded more to catchment geology – geology being confounded by altitudinal differences between lakes. The greatest species-quality scores (SQSs) and species richness were recorded from the clearfell lakes. Three of the four International Union for the Conservation of Nature (IUCN) nationally red-listed species recorded during this study were, however, absent from clearfell lakes. Our findings demonstrate that plantation forestry can have a profound impact on the aquatic macroinvertebrate assemblages and conservation value of small blanket bog lakes, primarily via eutrophication. Despite indices such as SQS scores and species richness appearing to reveal a beneficial response of blanket bog lake communities to habitat deterioration, they mask that certain 'emblematic' species are being severely negatively impacted by the disturbance caused by plantation forestry. Considering the need for fertiliser to produce economically viable plantation forest crops, coupled with the inefficiencies of peat soils in retaining applied nutrients, the degradation of peatland lakes is likely to become more prevalent as plantation forestry continues to expand worldwide." (Authors)] Address: Drinan, T.J., School of Biological, Earth & Environmental Sciences, University College Cork, Distillery Fields, North Mall, Cork, Ireland. E-mail: tom-drinan@gmail.com

**12114.** Herbst, D.B.; Medhurst, R.B.; Roberts, S.W.; Jellison, R. (2013): Substratum associations and depth distribution of benthic invertebrates in saline Walker Lake, Nevada, USA. *Hydrobiologia* 700: 61-72. (in English) ["Walker Lake, a terminal salt lake in western Nevada, is undergoing rapid changes because of falling lake level and rising salinity, affecting the potential habitat of benthic invertebrates that supply food to native fish and birds. Benthic invertebrate surveys were conducted within different substratum size classes and macrophyte beds in the nearshore littoral shallows (1 m) and in the deeper offshore littoral (2–10 m) and profundal ([10 m) zones of the lake. Samples were dominated by the chironomid midges *Cricotopus ornatus* and *Tanytus grodhausi*; the damselfly *Enallagma clausum*; and an oligochaete worm of the genus *Monopylephorus*. Midges showed distinct depth preferences, with *Cricotopus* found primarily in the shallow littoral, and *Tanytus* found in the lower littoral and profundal regions. *Enallagma* occurred throughout the littoral region but was reduced in abundance below 10 m. *Cri-*

*cotopus* and *Enallagma* were most abundant on cobble rock substratum and macrophytes. Sand and small gravel substrata supported few invertebrates except oligochaetes, which were most common in shallow littoral areas. The extent of *Ruppia* beds was determined using hydroacoustic sounding and showed that these beds were most well-developed in a zone from 1.25 to 5 m depth. The estimated area of productive shallow littoral zone habitat at different lake levels showed that coverage was lowest near the current surface elevation. Rising lake levels would result in expansion of suitable habitat area, and while falling levels could also expand nearshore habitat, this would likely occur on areas of poorer substratum quality and under high salinities that may inhibit growth." (Authors)] Address: Herbst, D.B., R. Jellison Sierra Nevada Aquatic Research Laboratory, Univ. of California, 1016 Mt. Morrison Road, Mammoth Lakes, CA 93546, USA. E-mail: herbst@lifesci.ucsb.edu

**12115.** Kosterin, O.E. (2013): Brief Odonata survey in North Ethiopia during heavy rainy season of 2012. *International Dragonfly Fund - Report 56: 1-54.* (in English) ["A survey of Odonata in North Ethiopia, on the route Debre Libanos – Bahir Dar – Woldia – Hayk – Mile – Awash – Debre Zeyit crossing the provinces of Oromia, Amhara and Afar, in July 29 - August 10, 2012 yielded 38 species, including two endemics of Ethiopia and five species not hitherto reliably reported for this country in the literature: *Pseudagrion commoniae*, *P. hamoni*, *P. salisburyense*, *Bradinopyga strachani* and *Ictinogomphus ferox*. The number of Odonata species recorded in Ethiopia thus reached 104. 17 main localities were visited, on average showing 4.9 species per locality. A small branch of Jara River, Amhara, was the richest one (15 species). Comments on specimens of *Pseudagrion spernatum* and *Nesciothemis farinosa* and notes on the country in general and particular habitats of Odonata are provided." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bio-net.nsc.ru

**12116.** Moller, A.P.; Nishiumi, I.; Suzuki, H.; Ueda, K.; Mousseau, T.A. (2013): Differences in effects of radiation on abundance of animals in Fukushima and Chernobyl. *Ecological Indicators* 24(1): 75-81. (in English) ["Radioactive contamination can negatively affect the abundance of living beings through the radiation and chemical toxic effects of radionuclides or the effects of mutation accumulation over time. If radiotoxic effects were the main determinant of the abundance of organisms, we should expect a reduction in abundance immediately following radioactive contamination, while we should expect a gradual increase in negative effects over time if mutation accumulation was the main determinant. In particular, we should expect the main effects at the recently contaminated site in Fukushima to mainly be due to radiotoxicity, while effects at Chernobyl which has been contaminated since 1986 should be a mixture of radiotoxic and mutation accumulation effects. We censused spiders, grasshoppers, dragonflies, butterflies, bumblebees, cicadas and birds at 1198 sites in Chernobyl and Fukushima-Daiichi, where major nuclear accidents happened 25 years and 6 months ago, respectively. The mean level of radiation was higher and less variable at Fukushima than at Chernobyl, implying that we should expect more negative effects on the abundance of animals at Fukushima if immediate ef-

fects of radiation were important. While all taxa showed significant declines in abundance with increasing level of background radiation in Chernobyl, only three out of seven taxa showed such an effect at Fukushima. The effect of radiation on abundance differed between the two areas for butterflies, dragonflies, grasshoppers and spiders, but not for birds or bumblebees. These findings are consistent with the main effects of radiation on the abundance of animals at Fukushima being due to radiotoxicity while those at Chernobyl may be due to a mixture of radiotoxicity and mutation accumulation, because chronic exposure have been present for many generations thereby allowing for accumulation of mutations." (Authors)] Address: Møller, A.P., Laboratoire d'Ecologie, Systématique et Evolution, CNRS UMR 8079, Université Paris-Sud, Bâtiment 362, F-91405 Orsay Cedex, France

**12117.** Nilsson-Örtman, V.; Stoks, R.; De Block, M.; Johansson, H.; Johansson, F. (2013): Latitudinally structured variation in the temperature dependence of damselfly growth rates. *Ecology Letters* 16(1): 64-71. (in English) ["The Metabolic Theory of Ecology predicts that the slope of the rate-temperature relationship, E, remains consistent across traits and organisms, acting as a major determinant of large-scale ecological patterns. Although E has recently been shown to vary systematically, we have a poor understanding of its ecological significance. To address this question, we conducted a common-garden experiment involving six damselfly species differing in distribution, estimating E at the level of full-sib families. Each species was sampled throughout its latitudinal range, allowing us to characterise variation in E along a latitudinal gradient spanning 3600 km. We show that E differs among populations and increases with latitude. E was right-skewness across species, but this was largely an artefact of the latitudinal trend. Increased seasonality towards higher latitude may contribute to the latitudinal trend in E. We conclude that E should be seen as a trait involved in local adaptation." (Authors) *Coenagrion mercuriale*, *C. scitulum*, *C. puella*, *C. pulchellum*, *C. armatum*, *C. johanssoni*] Address: Nilsson-Örtman, V., Department of Ecology and Environmental Science, Umeå University, Umeå, Sweden. E-mail: viktor.j.nilsson@gmail.com

**12118.** Raubenheimer, D.; Rothman, J.M. (2013): Nutritional ecology of entomophagy in humans and other primates. *Annu. Rev. Entomol.* 58: 141-160. (in English) ["Entomophagy is widespread among nonhuman primates and is common among many human communities. However, the extent and patterns of entomophagy vary substantially both in humans and nonhuman primates. Here we synthesize the literature to examine why humans and other primates eat insects and what accounts for the variation in the extent to which they do so. Variation in the availability of insects is clearly important, but less understood is the role of nutrients in entomophagy. We apply a multidimensional analytical approach, the right-angled mixture triangle, to published data on the macronutrient compositions of insects to address this. Results showed that insects eaten by humans spanned a wide range of protein-to-fat ratios but were generally nutrient dense, whereas insects with high protein-to-fat ratios were eaten by nonhuman primates. Although suggestive, our survey exposes a need for additional, standardized, data." (Authors) The paper includes a reference to Odonata] Address: Raubenheimer, D., Institute of Natural Sciences, Mas-

sey University, Auckland 0632, New Zealand. E-mail: d.raubenheimer@massey.ac.nz

**12119.** Schneider, W.; Nasher, A.K. (2013): Dragonflies from mainland Yemen and the Socotra-Archipelago - additional records and novelties 1-13. *International Dragonfly Fund - Report 57*: 1-13. (in English, with German Summary) ["The odonatological results of two field trips to mainland Yemen carried out mainly in summer 2005 and winter 2007, and to Socotra in winter 1999 are put on record. At 30 localities, 33 dragonfly species were collected, respectively observed (3). One species, *Azuragrion somalicum* is new for mainland Yemen, and a second, *Pseudagrion niloticum*, is new for mainland Yemen and the Arabian Peninsula. Three species, *Azuragrion somalicum*, *Orthetrum julia*, and *Sympetrum fonscolombii* are new records for Socotra." (Authors)] Address: Schneider, W., Entomology II, Research Institute & Natural History Museum Senckenberg, Senckenberganlage 25, 60325 Frankfurt a.M., Germany. E-mail: fri.wol@t-online.de; wolfgang.schneider@senckenberg.de

**12120.** Theischinger, G. (2013): A new species of *Austropetalia* Tillyard from north-eastern New South Wales, Australia (Anisoptera, Austropetaliidae). *International Dragonfly Fund - Report 58*: 1-8. (in English) ["A new species, *Austropetalia annaliese*, is described, illustrated and compared to its congeners. The female holotype (New South Wales, Barrington Tops, 12 December 1981) will be deposited in the Collection of the Australian Museum, Sydney, Australia." (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**12121.** Wasscher, M.T.; van't Bosch, J.G. (2013): The true identity of *Neoneura bilinearis* Selys, 1860, with the synonymy of *N. gaida* Rácenis, 1953, and the description of *N. confundens* sp. nov. (Odonata: Protoneuridae). *Zootaxa* 3599: 19-36. (in English) ["Study of rough notes and sketches made by D.C. Geijskes in 1972 and the recently found original drawings by E. de Selys Longchamps done in 1884 from the male syntype of *Neoneura bilinearis* Selys, 1860, shows the syntype male and female (now lost for several decades) of *N. bilinearis* refer to the same species later described as *Neoneura gaida* Rácenis, 1953. Therefore *N. gaida* is considered a junior synonym of *N. bilinearis* Selys, 1860. A neotype is chosen for the true *N. bilinearis* (neotype ♂, Suriname, Kabalebo, 15 viii 1965, in RMNH). *N. bilinearis* sensu Williamson (1917) is redescribed as *Neoneura confundens* sp. nov. (holotype ♂, Suriname, Jodensavanna, Koela-kreek, 13 ii 1946, in RMNH). *N. confundens* has a wide distribution in South America north of the Tropic of Capricorn, but it is lacking from the central and lower Amazon. It occurs in several colour morphs and also varies in male appendage, genital ligula, and female pronotum morphology." (Authors)] Address: Wasscher, M.T., Minstraat 15 bis, 3582 CA Utrecht, The Netherlands. E-mail: marcel.hilair@12move.nl

**Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for multiple help, and Geert de Knijf for contributing many papers to this issue.**



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105; E-mail: K.Reinhardt@sheffield.ac.uk

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

## 1997

**12122.** Fahrngruber, H.; Wenger, A. (1997): Nachweis von *Gomphus flavipes* (Charpentier, 1825) bei Krems / NÖ. *Lanius*, Krems 1996-1997: 73-75. (in German) [As a result of a road kill, *Stylurus flavipes* was found on 24-VII-1997 along the river Krems, near Senftenberg, Niederösterreich, Austria] Address: not stated

**12123.** Taylor, P.D. (1997): Empirical explorations of landscape connectivity. Proceeding of the sixth annual International Association for Landscape Ecology (UK Region) conference, 9th-11th September 1997. Eds: Cooper, A. and J. Power. *IALE* (UK): 11-18. (in English) ["Movement plays a fundamental role in the dynamics of populations, and is influenced by differences in the patterning of resources on the landscape. The interaction between the ability of an organism to move through different types of landscape and the relative size and positioning of resources in the landscape is termed landscape connectivity. Experimental manipulations have been made to measure landscape connectivity for two species of damselflies (*Calopteryx maculata* and *C. aequabilis*) in completely forested, completely open and mixed landscapes. Experimentally, individuals have been translocated between landscapes to measure aspects of how they move through the different types of landscapes. I present an overview of these experiments and results and then discuss their importance as methods for further exploring the important concept of connectivity." (Author)] Address: Taylor, P., Biology Department, Acadia University, Wolfville, Nova Scotia, Canada B4P 2R6. E-mail: ptaylor@resalliance.org

**12124.** Wenger, A. (1997): Die Libellenfauna eines Folienteiches. *Lanius*, Krems 1996-1997: 57-62. (in German) [In early 1996, a garden pond was created. The development of the colonisation by dragonflies in 1996 and 1997 is outlined. *Anax imperator* inspected the pond before it was filled with water.] Address: not stated

## 1999

**12125.** Hambrook, J.A.; Armitage, B.J.; Vis, M. (1999): Algal and macroinvertebrate assemblages of selected Ohio springs. *Ohio Biological Survey Notes* 2: 1-24. (in English) ["A qualitative study of the algal flora, macroinvertebrate fauna, and water quality of ten Ohio springs

was conducted during July-September 1996. The springs were primarily in central and northern Ohio on a variety of surficial geology settings including karst, till, and exposed bedrock. Water quality varied with the groundwater source and local environment (agriculture, woodland). The algal community varied greatly in diversity among sites. One woodland site (Styx River) had only three taxa. In contrast, Cedar Bog (an open alkaline fen) had a great diversity of diatoms (246 taxa) with a total of 258 taxa. At most locations, between 15 and 56 taxa were reported. Like the algal community, the diversity of the macroinvertebrate fauna differed considerably among sites, ranging from 2 to 40 identified taxa. This variation may have been due to the sitespecific differences in water chemistry and/or habitat. Computation of Jaccard similarity coefficients for both the algal and macroinvertebrate data resulted in low similarity values among sites. The data collected provide a basis for proposed sampling methods (spring biotic survey protocols) that could be used for the range of spring/seep types found in Ohio." (Authors) The following taxa are listed: *Anax junius*, *Cordulegaster* sp., *Libellula* sp., *Pachydiplax longipennis*, *Enallagma* sp., *Ischnura verticallis*, *Lestes rectangularis*.] Address: Vis, M., Dept of Environmental & Plant Biology, Ohio Univ., Athens, OH 45701, USA

## 2001

**12126.** Goddard, S. (2001): The Scarce Chaser (*Libellula fulva*) on the River Stour. *Trans. Suffolk Nat. Soc.* 37: 81-82. (in English) [Recent records between 1997 and 2000 along the River Stour, UK are brought on record.] Address: Goddard, S., 47 Colchester Road, Ipswich IP4 3BT, UK

**12127.** Sugimura, M.; Futahashi, R. (2001): Second record of an interspecific hybrid between *Sympetrum eroticum* (Selys, 1883) and *Sympetrum parvulum* (Bartenev, 1912) (Libellulidae). *Tombo* 43: 51-54. (in Japanese, with English summary) [Japan; a supposed interspecific hybrid between the two taxa, is reported.] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

## 2002

**12128.** Malavasi, D. (2002): Note sull'odonatofauna delle zone umide della Bassa Pianura modenese. *Natu-*

ra Modenese 6: 59-64. (in Italian, with English summary) ["Notes on dragonfly community of the Modena lowland wetlands: Notes on Odonata living in man-made wetlands, ponds and canals in Modena lowlands, are reported. The area is a typical intensive agriculture-based lowland,... The following list includes all the species observed: *Sympecma fusca*, *Lestes barbarus*, *Platycnemis pennipes* *Ischnura elegans*, *Enallagma cyathigerum*, *Erythromma lindeni*, *Coenagrion puella*, *Erythromma najas*, *Aeshna cyanea*, *A. mixta*, *A. affinis*, *Anax imperator*, *Hemianax ephippiger*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Libellula depressa*, *L. fulva*, *Orthetrum brunneum*, *O. albistylum*, *O. cancellatum*, *Crocothemis erythraea*, *Sympetrum striolatum*, *S. meridionale*, *S. sanguineum*." (Author)] Address: Malavasi, D., Studio Associato GECCO, Via San Faustino, 23, 41037 Mirandola, Italy. E-mail: davidemalavasi.eco@libero.it

**12129.** Matushkina, N.A.; Gorb, S.N. (2002): A checklist of substrates for endophytic oviposition of some European dragonflies (Insecta: Odonata). *J. Kharkov Ent. Soc.* 10: 108-118. (in Russian) ["Compiled from original and literature data, we have drawn up a list of endophytic oviposition substrates for some European dragonflies. This list can be used for ecological and faunistic studies in a variety of aquatic ecosystems. In some cases, the list can help predict the occurrence of a species in a given area." (Authors)] Address: Gorb, S.N., Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**12130.** Sherman, N. (2002): The discovery and observations of Small Red-eyed Damselfly (*Erythromma viridulum*) at a Suffolk site in 2001. *Trans. Suffolk Nat. Soc.* 38: 124-125, pl. (in English) [15-VIII-2001, without locality dates.] Address: Sherman, N., 98, Dover Road, Ipswich, Suffolk IP3 8JH

**12131.** Zhou, J.; Xie, J.-h.; Dai, Q.; Zeng, Y.-j.; Liu, J.-x.; Zhang, W.-g.; Zhang, S.-y. (2002): Feeding behavioral strategy of *Rhinolophus pearsoni* in summer. *Zoological Research* 2002(2): 120-128. (in Chinese, with English summary) [According to table 1, the diet of 32 specimens of *R. pearsoni* contained 912 specimens of Aeshnidae.] Address: Zhou, J., Institute of Zoology, the Chinese Academy of Sciences, Beijing 100080, China

### 2003

**12132.** Underwood, D.K. (2003): Occurrence of the Small Red-eyed damselfly *Erythromma viridulum* in west Suffolk during 2002. *Trans. Suffolk Nat. Soc.* 39 (2003): 60-62. (in English) [This paper reports on the first record of *E. viridulum* in Long Melford, UK on 4 August 2002. Several more specimens were seen later on until 1 September. The known data of *E. viridulum* in England are mapped.] Address: Underwood, D.K., 29 Cordell Road, Long Melford, Sudbury, Suffolk, CO10 9EH, UK; E-mail: darrenunderwood@clara.co.uk

### 2004

**12133.** Kelliher, E. (2004): Investigating fluctuating asymmetry of the larval damselfly, *Calopteryx maculata* (Odonata: Calopterygidae). *Undergraduate Review* 1(10). Available at: <http://vc.bridgew.edu/undergradrev/vol1>

/iss1/10: 29-40. (in English) ["Fluctuating asymmetry (FA), or subtle random deviations from perfect bilateral symmetry, has recently become a useful tool in allowing researchers to understand more about an organism's health, fitness, developmental stability and environmental stressors. Ultimately, FA studies can be used as an indirect measurement of the quality of an aquatic system over time. We measured and examined the femur segments of the larval damselfly, *C. maculata* from sites on the Town, Hockomock, and Salisbury Plain Rivers, of Plymouth County, Massachusetts to determine FA levels. After accounting for measurement error, preliminary results show that variations in symmetry are not correlated to individual trait size. Also, the Hockomock River site showed FA levels three times higher than the Salisbury Plain river, and twice that of the Town River. Finally, severe femur deformation of some individuals at all sites suggests that other, more serious developmental or environmental factors may be inhibiting normal development. Results from a simple two-way ANOVA of differences in right and left femur segments and a Kolmogorov Smirnov test for normality strongly suggest that the first femur of *C. maculata* is a useful trait for FA measurement." (Author)] Address: not stated

**12134.** Leeming, D.; Warrington, S. (2004): An aquatic invertebrate survey of Ickworth Park, Suffolk. *Trans. Suffolk Nat. Soc.* 40: 55-71. (in English) [At eight of the twelve studied ponds the following Odonata were recorded: *Calopteryx splendens*, *Coenagrion puella*, *Enallagma cyathigerum*, *Pyrrhosoma nymphula*, *Ischnura elegans*, *Aeshna cyanea*, *A. grandis*, *Libellula depressa*, *Sympetrum striolatum*, and *S. sanguineum*.] Address: Warrington, S., Regional Nature Conservation Advisor, East of England, The National Trust, The Dairy House, Ickworth, Bury St. Edmunds, IP29 5QE, UK. E-mail: stuart.warrington@nationaltrust.org.uk

### 2005

**12135.** Martinov, V.V.; Martinov, A.V. (2005): To the knowledge of dragonflies (Insecta: Odonata) of the Nature Reserve 'Medobory' and surrounding areas. *The Kharkov Entomological Society Gazette* 2004 (2005) 12(1-2): 23-24. (in Russian, with English summary) [The Nature Reserve 'Medobory' is located in Gusiatsinsky District of the Ternopol Region. Odonata of the reserve were collected during field studies in May and August, 2004. The total of twenty-five species represents 33.8 % of the Ukrainian Odonata fauna.] Address: Martynov V. V., Dept of Zoology, Biological Faculty, Donetsk National University, ul. Shchorsa 46, Donetsk, 83050, Ukraine. E-mail: martynov@dongu.donetsk.ua

**12136.** Mauersberger, R.; Buczyński, P. (2005): Materials to the knowledge of dragonflies (Odonata) of the Pomeranian Lakelands. *Wiad. entomol.* 24(4): 243-244. (in Polish) [Records of 26 Odonata species from 14 localities from northern Poland are documented.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**12137.** Smith, J. (2005): Complementarity between two metrics which use invertebrates to assess riparian conditions of rivers. M. S. Thesis. University of KwaZulu-Natal, Pietermaritzburg: 98 pp + app. (in English) ["Conservation of streams involves an understanding of their physical, chemical and biological entities. SASS5 is a

biomonitoring method developed to monitor the habitat quality of a water body. It is based on differential scores attributed to various macroinvertebrate families with varying degrees of sensitivity to anthropogenic impact. This method, however, does not assess impacts on particular species. Odonata are good candidates for study at the species level as they are well researched and males are easily identified. As adults, they are known to be sensitive indicators of both riparian and river conditions. Yet Odonata cannot be an umbrella taxon for all other taxa. Therefore, the main aim of this study is to determine the complementarity of the two metrics (Odonata assemblages and SASS5), establishing whether Odonata assemblages offer additional information on, or insight into, riverine habitat quality as portrayed by SASS5. To accomplish this, certain objectives were addressed. 1) The variation of SASS5 scores and 2) Odonata assemblages between river systems, structural habitat types (open or closed canopies) and compositional habitat types (indigenous or alien vegetation). 3) Whether SASS5 scores vary to the same extent, and, 4) on the same spatial scale (river system and point localities) as Odonata abundance and species richness. The relationship between these two metrics was determined along three rivers in the Pietermaritzburg basin. Sampling units (SUs) with extremes in vegetation structure (sunlight and shaded SUs) and vegetation composition (alien or indigenous) were selected. Using this range of environmental conditions placed environmental extremes on the macroinvertebrate populations at point localities and having three different river systems added the dimension of variation over a broader scale, thus stretching the two metrics to investigate whether both responded similarly or in different ways. Results indicated that both metrics provide a similar portrait of overall river conditions. At the smaller spatial scale, the Odonata assemblage, unlike SASS, was highly sensitive to the riparian vegetation. Odonata species were less sensitive to vegetation composition but differentially sensitive to vegetation structure. However, landscape context is also important, with point localities being affected by the neighbouring dominant habitat type. Larval Odonata alone did not provide this information. Overall, aquatic macroinvertebrates and adult Odonata provide a highly complementary pair of metrics that together provide large spatial scale (river system) and small spatial scale (point localities) information on the level of impact of stressors such as riparian invasive alien trees." (Author)] Address: Smith, Jenny, School of Botany and Zoology, University of KwaZulu-Natal, P/Bag X01, Pietermaritzburg, South Africa

## 2006

**12138.** Morris, K. (2006): Suffolk dragonflies 2005. *Trans. Suffolk Nat. Soc.* 42: 68. (in English) ["Not a great year for migrants but a few interesting records along the coast. More importantly at least five of our Odonates continued their territorial expansion in Suffolk. Both *Libellula fulva* and *Platycnemis pennipes* pushed further up the River Stour with the former well into Sudbury and the latter just short although another small colony has recently appeared north of Sudbury in the Glemsford area. *L. fulva* wasn't found on this river until the 1990s but is now abundant either side of Bures. *P. pennipes* seemed to disappear from Suffolk in the 1960s but was rediscovered by Arthur Watchman at Stratford St Mary in 1988. Two other hawkers are mak-

ing steady progress in establishing themselves in a wider area of our county. *Aeshna isosceles* can now be seen along the coast as far south as Aldeburgh with up to six hawkings on the RSPB North Warren reserve – it was also reported as locally abundant further north and even found in central Lowestoft. Our earliest dragonfly – *Brachytron pratense* – only used to be found near the coast in Suffolk. Now it appears to be turning up almost anywhere. However it should be remembered that the hawkers normally take at least two years to go through their aquatic maturation process and therefore may not yet emerge every year in their new territories. Last but not least the new (1998) damselfly to England – *Erythromma viridulum* – can now be seen in most parts of the county where there is suitable habitat and certainly seems to have the ability to colonise faster than its larger relative *E. najas*." (Author)] Address: Morris, K., Arisaig, Back Lane, Monks Eleigh, Suffolk, IP7 7BA, UK. E-mail: dragons@arisaig.net

**12139.** Perez-Gelabert, D.E. (2006): Arthropods of Hispaniola (Dominican Republic and Haiti). A checklist and bibliography of species. *Zootaxa* 1831: 1-530. (in English, with Spanish summary) [Odonata are checklisted on pages 285-287.] Address: Perez-Gelabert, D.E., Integrated Taxonomic Information System (ITIS) and Dept of Entomology, U. S. National Museum of Natural History, Smithsonian Institution, P. O. Box 37012, Washington, DC 20013-7012, USA. E-mail: perezd@si.edu

## 2007

**12140.** Camousseight, A.; Vera, A. (2007): Estado del conocimiento de los Odonata (Insecta) de Chile. *Boletín del Museo Nacional de Historia Natural, Chile* 56: 119-132. (in Spanish, with English summary) ["A total of 47 species distributed in 23 genera and 9 families are recognized; the endemism reaches 29.8% of the species." (Authors)] Address: Camousseight, A., Museo Nacional de Historia Natural, Casilla 787, Santiago, Chile. [acamousseight@mnhn.cl](mailto:acamousseight@mnhn.cl)

**12141.** Hagen, H. von (2007): Drachenfliegen und Wasserjungfern: Libellen. In: *Naturschutzgruppe Witten - Biologische Station e.V. (Hrsg.): Natur zwischen Ruhr und Ardey. Erleben, verstehen und schützen. Comedia.* Bochum: 77-83, 213. (in German) [This contribution on the regional natural history introduces into the dragonfly fauna. Appendix 2 lists the species known to occur near Witten, Nordrhein-Westfalen, Germany.] Address: von Hagen, H., Akazienweg 28, 58452 Witten, Germany. E-mail: [h.vonhagen@web.de](mailto:h.vonhagen@web.de)

**12142.** Ibrahim, H.; Dauti, E.; Gashi, A.; Trozic-Borovac, S.; Skrijelj, R.; Grapci-Kotori, L. (2007): The impact of sewage effluents in water quality and benthic macroinvertebrate diversity of the Prishtina river (Kosova). *Entomol. rom.* 12: 227-231. (in English) ["From December 2004 until November 2005 macrozoobenthos specimens were collected every month with Surber net in six selected stations of the Prishtina River. The Hilsenhoff Family Biotic Index (FBI) and Shannon Weaver Index of Diversity on family level were used to indicate organic and nutrient pollution. In total 7 947 specimens belonging to 56 families of macrozoobenthos groups were found, mainly consisting of aquatic insects. The FBI results during the one-year period show that station P3 has the lowest value (4.6) and thus the best quality of water, while the highest value of this index was regis-



tered in station P5 (8.1) where the impact from sewage input is huge and obvious. The lowest value of Shannon Weaver Diversity Index was registered in station P5 (0.33) while the highest value was found in station P3 (4.04). These results show that biodiversity of aquatic insects (and macrozoobenthos in general) is seriously threatened in the last three stations of Prishtina river because of the direct discharge of sewage waters." (Authors) Taxa (including Odonata) are treated at family level.] Address: Ibrahim, H., Faculty of Mathematical and Natural Sciences, University of Prishtina, Kosovo

**12143.** Rodrigues, R.C.; Teixeira, R.A.; Campos, L.A. (2007): Comunidade de insetos bentônicos em rio impactado por mineração de carvão em Treviso, Santa Catarina Community of benthic insects in a river impacted by coal mining in Treviso, Santa Catarina. *Tecnologia e Ambiente* 13: 14 pp-["The diversity of benthic insects under a pollution gradient by coal mining effluents was analyzed in the Mãe Luzia river, southern Santa Catarina (Brazil). Insects were collected biweekly from September 2004 to August 2005 at three sites presenting different contamination levels. Temperature, discharge, pH and conductivity were measured during field sampling. An entomological net (mesh of 1 mm) was used in transects of 20 m disturbing the substratum at each 1 m. The insects were identified to family level and for each site the diversity index of Shannon-Wiener and the equitability index of Pielou were calculated. Canonical Correspondence Analysis (CCA) was used to search for similarity patterns among the sites and the correlation between biotic and abiotic variables. A total of 14,025 specimens were registered belonging to 35 families of nine orders. Hydropsychidae (Trichoptera) was the most abundant family followed by Elmidae (Coleoptera) and Psephenidae (Coleoptera). Abundance and richness were inversely proportional to the pollution impact degree, whereas the highest values of diversity and equitability were found at the intermediary site. CCA indicated better correlation between the conductivity and the diversity of benthic insects. These analysis evidenced differences between the sample units of the two less disturbed sites, being useful to detect subtle variations in the lotic environment." (Authors) Taxa including Odonata are treated at family level.] Address: Rodrigues, R.C., Programa de Pós-Graduação em Ciências Ambientais, Universidade do Extremo Sul Catarinense, Av. Universitária 1105, Cx.P. 3167 CEP 88806-000 Criciúma, Santa Catarina, Brazil. E-mail: renatacrbio@yahoo.com.br

**12144.** Tamai, M.; Wang, Z.; Rajagopalan, G.; Hui, H.; He, G. (2007): Aerodynamic performance of a corrugated dragonfly airfoil compared with smooth airfoils at low Reynolds numbers. *Proceedings of the 45th AIAA Aerospace Sciences Meeting and Exhibit*, Reno, Nevada, 8-11 January 2007 (10.2514/6.2007-483): 12 pp. (in English) ["An experimental study was conducted to investigate the flow behaviour around a corrugated dragonfly airfoil compared with a traditional, streamlined airfoil and a flat plate. The experimental study was conducted at the chord Reynolds number of  $Re_C = 34,000$ , i.e., the regime where Micro-Air-Vehicles (MAV) usually operate, to explore the potential applications of such bio-inspired airfoils for MAV designs. The measurement results demonstrated clearly that the corrugated dragonfly airfoil has much better performance over the streamlined airfoil and the flat plate in preventing large-scale flow separation and airfoil stall at the test low Reynolds number

level. The detailed PIV measurements near the noses of the airfoils elucidated underlying physics about why the corrugated dragonfly airfoil could suppress flow separation and airfoil stall at low Reynolds numbers: Instead of having laminar separation, the protruding corners of the corrugated dragonfly airfoil were found to be acting as "turbulators" to generate unsteady vortices to promote the transition of the boundary layer from laminar to turbulent rapidly. The unsteady vortex structures trapped in the valleys of the corrugated cross section could pump high-speed fluid from outside to near wall regions to provide sufficient energy for the boundary layer to overcome the adverse pressure gradient, thus, discourage flow separations and airfoil stall." (Authors)] Address: Zu, H., Dept of Aerospace Engineering, and AIAA Senior Member, USA. E-mail: huhui@iastate.edu

**12145.** Wang, Z.-g. (2007): Catalogue of Chinese dragonflies. *Henan Science* 25(2): 1-20. (in Chinese) [The paper lists 659 Odonata species/subspecies belonging to 154 genera and 19 families.] Address: Wang Zhi-guo, Henan Academy of Science, Zhengzhou, Henan, 450002 China

## 2008

**12146.** Calle, P.; Beekers, B.; Wijnhoven, H.; Schaffers, J. (2008): De Fauna van de Gelderse Poort. Een overzicht van de interessante ontwikkelingen in de periode 2004-2007. Stichting Flora- en Faunawerkgroep Gelderse Poort. Met financiële ondersteuning van de Provincie Gelderland, Staatsbosbeheer & ARK: 46 pp. (in Dutch) [Netherlands; 45 Odonata species have been recorded, 19 of them are mapped in detail.] Address: Calle, P., Begijnenstraat 36, 6511 WP Nijmegen, The Netherlands. E-mail: pepijnecalle@yahoo.com

**12147.** Chaput-Bardy, A. (2008): Structure des populations sur un réseau hydrographique dendritique. These de doctorat. Université d'Angers: VII + 139 pp. (in French, with English summary) ["River networks are characterised by a hierarchical branching structure and spatio-temporal heterogeneity. Indeed, longitudinal (physico-chemical parameters, water flow), lateral (connectivity between the main course and secondary channels) and time dimensions (seasonal variations) influence habitat heterogeneity. These variations in environmental parameters are gradual along branches (physico-chemical gradients) or discrete between branches (habitat heterogeneity) of the river network. Then landscape structure influences distribution, dispersal and gene flow of freshwater organisms. This work aimed to test (i) the effect of river network geometry on dispersal and gene flow, and (ii) the effect of environmental variations on distribution and phenotypic traits related to dispersal. We used empirical and theoretical approaches by studying a damselfly species, *Calopteryx splendens* across the River Loire and fitting an individual based-model to simulate gene flow in synthetic river networks. Then we showed a discontinuous distribution of individuals along watercourses and a morphological cline across the Loire River. This cline was due to physico-chemical characteristics of water. Morphological variations did not influence dispersal abilities but affected survival. Survival and densities were the main factors influencing dispersal in *C. splendens*. Genetical analyses showed an isolation by distance pattern and a strong genetic structure, but no genetic groups were defined in the catchment. These results can be ex-

plained by overland gene flow between watercourses and a metapopulation structure at the catchment scale. This is the first study performed in a large river network in environmental conditions. Furthermore we realised the Gene-Net software to test the effects of the river network on population genetic structure of freshwater organisms." (Author)] Address: Chaput-Bardy, Audrey, Laboratoire Paysages et Biodiversité, UFR Sciences, 2 bd Lavoisier, 49045 ANGERS Cedex, France.

**12148.** Coles, J.O. (2008): An integrated assessment of heavy metal contamination of sediments in the Halls Mill Creek watershed in Mobile, Alabama. MSc. thesis, University of South Alabama: 93 pp. (in English) ["Halls Mill Creek and its tributaries, Milkhouse and Second Creeks, are part of the Dog River Watershed that drains most of metropolitan Mobile, AL. Suburban development in West Mobile has created a large non-point source of the metal contaminants of lead, copper, cadmium and chromium. As part of an integrated assessment of sediment quality in the Halls Mill Creek Watershed sediment physicochemical properties including metal concentrations, percent organic content, and particle size distributions were analyzed. A whole sediment contact toxicity bioassay with the freshwater amphipod *Hyalella azteca* (*Hyalellidae*; *Amphipoda*) was conducted and *Progomphus obscuris* larvae were examined as bioindicators of heavy metal contamination of sediments. Field collected sediments contained concentrations of lead, copper, cadmium and chromium below toxic effects threshold levels and did not result in reduced survival and growth in *H. azteca*. *P. obscuris* larvae accumulated metals to detectable levels however relationships between sediment and tissue concentrations were not seen."(Author) <http://www.docin.com/p-226807678.html>] Address: not stated

**12149.** Dyatlova, E.S. (2008): Zoogeographic analysis of dragonfly fauna (Insecta: Odonata) of south-western Ukraine. The Kharkov Entomological Society Gazette 2007 (2008) 15(1–2): 21-27. (in Russian, with English summary) ["An analysis of the dragonfly fauna of south-western Ukraine was carried out, based on established odonatological zoogeographical classification. The odonate fauna of SW Ukraine was compared with other European countries. It was established that the fauna of the study area has the greatest similarity with certain Balkan countries (Serbia, Bulgaria, Bosnia and Herzegovina, Montenegro, Romania), south-eastern Ukraine and Hungary (82–75 %) and the least similarity with certain Baltic countries (Latvia, Sweden, Estonia and Finland) (58–49 %). As a result of zoogeographic analysis it was established that genera of the boreal faunistic complex dominate (72.4 %), genera of Sonore (42.6 %) and European-Siberian (21.3 %) groups predominating. Amongst the boreal species complex, 68.09 % belong to the European-Siberian group and 29.79 % to the Mediterranean group." (Author)] Address: Dyatlova, Elena, Inst. Zool., Fac. Biol., I.I. Mechnikov Univ. Odesa, Odessa, Ukraine. E-mail: [lena.dyatlova@gmail.com](mailto:lena.dyatlova@gmail.com)

**12150.** Harter, N. (2008): Note sur la présence de l'Orthétrum à stylets blancs (*Orthetrum albistylum*) pour le département de la Marne (51). *Naturelle* 2: 32-33. (in French) [17-VII-2007, Réserve Naturelle du Mesnil-sur-Oger, France] Address: Harter, N., 6 rue haute 08090 Fagnon, France. E-mail: [harter.chiro@mail.com](mailto:harter.chiro@mail.com)

**12151.** Martin, M.; Luig, J.; Ruusmaa, J.; Heidema, M. (2008): Distribution maps of Estonian insects. 3. Odo-

nata. Maps 166-219. *Eesti Loodusfoto*. Tartu: 64 pp. (in Bilingual in Estonian and English) ["According to insect collections and publications, 54 species of Odonata are recorded from Estonia. For each species, a distribution map based on 10 x 10 km international UTM grid is provided. Records from before 1950 and 1950 onwards verified by the authors, as well as records from published or unpublished sources not verified by the authors are denoted with different symbols." (Authors)] Address: not stated

**12152.** Ternois, V.; Druart, D. (2008): Nouvelles observations d'Orthétrum à stylets blancs *Orthetrum albistylum* (Selys, 1848) dans le département de la Haute-Marne (Odonata, Anisoptera, Libellulidae). *Bull. Soc. Sc. Nat. et Arch. de la Haute-Marne*, 7 (nouvelle série): 14-17. [Seven new records from the 2007 season in northern France are presented as well as data on habitat and phenology of *O. albistylum*.] Address: Ternois, V., /c CPIE du Pays de Soulaines, Domaine de Saint-Victor, 10200 Soulaines-Dhuys, France. E-mail: [cpie.vincent.ternois@wanadoo.fr](mailto:cpie.vincent.ternois@wanadoo.fr)

**12153.** Ternois, V.; Druart, D.; Brouillard, Y.; Lambert, J.-L. (2008): Première mention de *Ceriatrum tenellum* (De Villers, 1789) dans le département de la Haute-Marne et état des connaissances pour l'Aube (Odonata, Zygoptera, Coenagrionidae). *Naturelle* 2: 26-31. (in French) [Bourbonne-les-Bains, France; 13-VI and 13-VII-2007; a graph with phenology and a distribution map of the species for the Champagne-Ardenne-region are presented in addition.] Address: Ternois, V., /c CPIE du Pays de Soulaines, Domaine de Saint-Victor, 10200 Soulaines-Dhuys, France. E-mail: [cpie.vincent.ternois@wanadoo.fr](mailto:cpie.vincent.ternois@wanadoo.fr)

**12154.** Thaler, B. (2008): Die Wirbellosenfauna des Völser Weiher (Schlerngebiet, Südtirol). *Gredleriana* 8: 519-536. (in German, with English summary) ["In the frame of the "Habitat Schlem" project, the invertebrate assemblages of the Völser Weiher, meio- and macrozoobenthos as well as Zooplankton, were analyzed. Altogether 120 taxa were found, 33 of which not yet recorded for South Tyrol. Zoobenthos was composed of 99 crustacean and macroinvertebrate taxa, the majority of which found in the eulittoral. Tire richest group was the one of the Diptera with mainly Chironomidae taxa, followed by Oligochaeta and Crustacea. In terms of abundance the Crustacea clearly dominated in the eulittoral, mostly represented by *Macrotyclops albidus* and *Alonarfifinis*. Among the macroinvertebrates the highest relative abundance was shown by the Oligochaeta with *Shilaria incustris* as the most frequent species, the Diptera (*Dicrotendipes tritonus*) and the Ephemeroptera (*Caenis horaria*). Tire zoobenthos of tire sublittoral zone was almost exclusively represented by Oligochaeta, Chironomidae and Crustacea. Tire Zooplankton was composed of 16 rotifer species, 10 cladoceran and 4 copepod species. Tire quantitatively most important species were *Keratella cochlearis* among rotifers, *Ceriodaphnia pulchella* among cladocerans and *Mesocyclops leuckarti* among copepods. Tire Zooplankton community was characterized by a high percentage of rotifers. Tire ecological status of Völser Weiher, according to the European Water Framework Directive (2000/60/EC), was found to be good both evaluating it with Zooplankton and with eulittoral zoobenthos." (Authors) The list of taxa includes *Coenagrion puella*-group, *Ischnura* sp., *Anax imperator*, *Cordulia aenea*, *Libellula depressa*, and several early unidentified larval

stadia of different Odonata taxa.] Address: Thaler, Bertha, Biologisches Labor, Unterbergstr. 2, 39055 Leifers (BZ), Italy. E-mail: Bertha.Thaler@provinz.bz.it

## 2009

**12155.** Covey, S. (2009): Views and Reviews: The Dragonflies of Lesbos by John Bowers. Friends of Green Lesbos, Lesbos, Greece, 2009. 91 pp., 25 colour plates. Sbk. ISBN 978-960-930703-1. £15.00. Atropos 38: 58-59. (in English) [Extensive book review.] Address: not stated

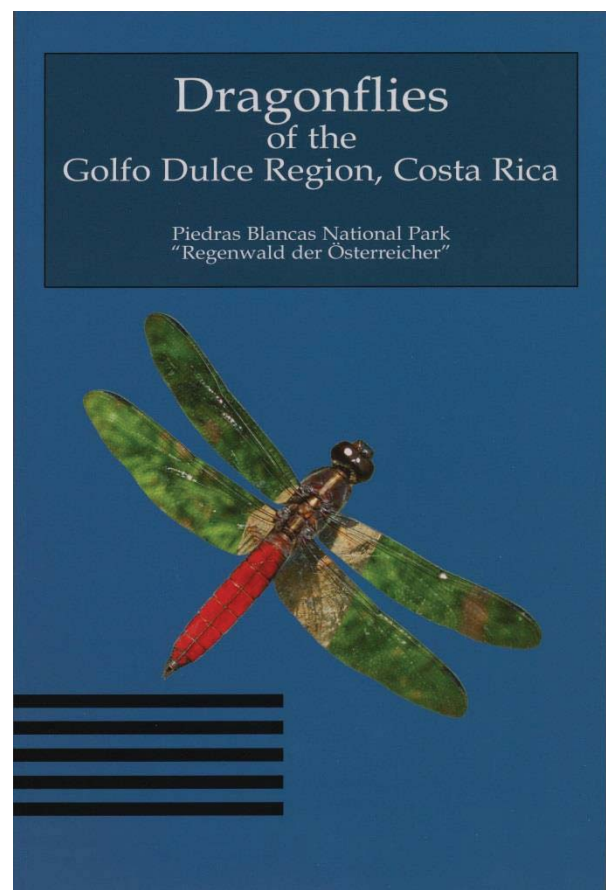
**12156.** Dunkley, J. (2009): Red-veined Darter *Symptetrum fonscolombii* in Northamptonshire. Atropos 38: 64-65. (in English) ["A significant local find of six *S. fonscolombii* was made at Upton on 27 June 2009 by local stalwarts Nick Roberts and Mark Piper; these were hawking over a recently constructed pond serving as a stormwater balancing vessel for adjacent new roadworks, illustrating how Odonata may opportunistically make use of any available water offering favourable habitat. I visited the site the next day, but the sky had clouded over and despite searching there was no further sign that afternoon. I returned on 29 June at 08.00 hrs. It was already very warm, but it took another hour or more for the target to appear, by which time Bob Bullock had arrived and we were soon watching up to six *S. fonscolombii*, including an ovipositing pair in tandem. Following Mark Tyrrell's prediction that confirmation of breeding should be looked for from mid-September onwards, visits by he and I on 19 and 22 September respectively produced not only teneral but also exuviae. The species remained present into October with estimated numbers running into double figures, providing much pleasure to local Odonata enthusiasts. As a bonus Mark Tyrrell found a 'wandering' male of *S. danae* at the same site on 19 September, following a male in Northampton on 10 September (Doug Goddard), which I was also lucky to see. These constitute the first records for the County." (Author)] Address: Dunkley, J., 10 Stonelea Road, Syweil, Northampton, NN6 OAZ, UK

**12157.** Garzon Sanabria, C.; Realpe, E. (2009): Diversidad de Odonata (Insecta) en la reserva natural Cabildo-Verde (Sabana de Torres-Santander, Colombia), Una aproximación hacia la conservación (Dragonfly diversity (Insecta) in the natural reserve Cabildo-Verde (Sabana de Torres-Santander, Colombia), an conservation approach). *Caldasia* 31(2): 459-470. (in Spanish, with English summary) ["We studied the diversity of Odonata in six sampling stations in the Sabana de Torres county, department of Santander, Colombia. Four stations were located within the Natural reserve Cabildo Verde, an area long the western hall slope of the Eastern cordillera, in the Magdalena's river mid valley. The remaining two were located outside of this reserve. The species composition was analyzed using an euclidian distance analysis. We found 245 adult individuals belonging to seven families, 22 genera and 39 species in the Sabana de Torres; 33 species, most of them in the suborder Zygoptera were found in the Natural Reserve Cabildo verde. The Shannon-Weaver value for the natural reserve was of  $H' = 2,972$  and outside of the reserve  $H' = 2,645$ , both relatively high in comparison to other studies. There was not significant differences in the number of species inside and outside of the reserve (Chi-squared,  $X^2 = 1,51$ ,  $Gl=1$ ,  $p > 0.05$ ); however, the composition of dragonflies within the re-

serve was given mainly by stenotopic species, especially those in the families Protoneuridae and Perilestidae. Such species are abundant in the studied area, occurring in streams with high vegetal coverage in primary and secondary forests." (Authors)] Address: Garzon Sanabria, Carolina, Laboratorio de Zoología y Ecología Acuática (LAZOE), Universidad de los Andes, Apartado 4976, Bogotá D.C., Colombia. lc.garzon88@uniandes.edu.co

**12158.** Glitz, D. (2009): Libellen: Das rheinland-pfälzische Naturerbe. Wir stellen Ihnen die Vielfalt der bedeutendsten Arten in Rheinland-Pfalz vor. *Naturschutz in Rheinland-Pfalz* 3/2009: 4-5. (in German) [The paper introduces *Oxygastra curtisii*, *Ophiogomphus cecilia* and an identification guide focussed on the regional Odonata species of Rheinland-Pfalz. In addition it reports on the conservation measures directed to Odonata.] Address: Glitz, D. c/o NABU Rheinland-Pfalz e.V., Frauenlobstr. 15-19, 55118 Mainz, Germany. E-mail: Kontakt@NABU-RLP.de

**12159.** Schneeweih, S.; Albert, R.; Huber, W.; Weisenhofer, A. (2009): Dragonflies of the Golfo Dulce Region, Costa Rica: Piedras Blancas National Park "Regenwald der Österreicher". Verein zur Förderung der Tropenstation La Gamba, Vienna. 56 pp. (in English) [This booklet about the dragonflies of the Piedras Blancas National Park, Costa Rica, features the majority of the species of the region. Species descriptions and many colour photographs enable the reader to identify dragonflies. The booklet also includes an introduction to dragonflies and to the region's natural history." (Publisher) Address: Fakultätszentrum für Biodiversität der Universität Wien, Tropenstation La Gamba, Rennweg 14, A-1030 Wien, Austria. E-mail: tropenstation.botanik@univie.ac.at





**12160.** Weber, G.; Boomers, J.; Cölln, K.; Jakubzik, A.; Ricono, K. (2009): Die Rückbesiedlung der ehemaligen Deponie Eskesberg durch Tiere und Pflanzen nach Abschluss der Sanierung - Vorstellung des begleitenden Biomonitorings. Jahresbericht des Naturwissenschaftlichen Vereins Wuppertal 61: 145-158. (in German, with English summary) [Nordrhein-Westfalen, Germany; 16 Odonata species have been recorded within the recolonisation period of five years. Only *Ischnura pumilio* and *Lestes sponsa* are presented in greater details.] Address: Weber, G., C/o NVW, Soldnerstr. 22, 44801 Bochum, Germany. E-mail: [nvwuppertal@online.de](mailto:nvwuppertal@online.de)

**12161.** Woodward, S. (2009): Mix up with a mixta. Leicestershire Entomological Society. Newsletter 41: 8. (in English) ["Dragonflies are generally reckoned to have good eyesight, but this male *Sympetrum sanguineum* is trying to couple with a male *Aeshna mixta*. The hawk was having none of it, so after about ten seconds of wingclattering and abdomen-waving, the darter was repelled. Eggleton Reserve, Rutland Water, SK881075, 30 Aug 2009." (Author)] Address: Woodward, S., Highfield Rd, Groby, Leicester LE6 0GU, UK. E-mail: [grobysteve@metronet.co.uk](mailto:grobysteve@metronet.co.uk)

## 2010

**12162.** Abbott, J.C. (2010): Dragonflies and Damselflies (Odonata) of Texas. Odonata Survey of Texas. Vol. 4. Austin, Texas: VI + 312 pp. (in English) [The book contains updated through 2009 references to the 234 species of odonates distributed throughout Texas, USA. Included in this volume are detailed species distribution and seasonality information arranged so that users can quickly and easily search by scientific name, county name, or flight season.] Address: Odonata Survey of Texas c/o John C. Abbott, Ph.D. Section of Integrative Biology1, University Station #L7000, The University of Texas at Austin, Austin, Texas 78712 USA. E-mail: [jcabbott@mail.utexas.edu](mailto:jcabbott@mail.utexas.edu)

**12163.** Bauer, S. (2010): Zielarterfassung. Naturschutz im Landkreis Ravensburg 5: 367 pp. (in German) [Baden-Württemberg, Germany; the author presents basic data on the regional umbrella species including regional distribution, habitat requirements and threats. Odonata are represented by *Coenagrion mercuriale*, *Orthetrum coerulescens*, *Cordulegaster bidentata*, *C. boltonii*, *Erythromma najas*, *Coenagrion pulchellum*, *Anax parthenope*, *Anaciaeschna isoceles*, *Epitheca bimaculata*, *Libellula fulva*, *Lestes barbarus*, *L. dryas*, *L. virens*, *Sympecma fusca*, *S. paedisca*, *Sympetrum flaveolum*, *Aeshna subarctica elisabethae*, *Somatochlora arctica*, *Leucorrhinia pectoralis*, *L. dubia*, and *L. rubicunda*.] Address: Bauer, S., Im Tobel, 88353 Immenried, Germany. E-mail: [Josef.Bauer@Landkreis-Ravensburg.de](mailto:Josef.Bauer@Landkreis-Ravensburg.de)

**12164.** El Haissoufi, M.; Bennis, N.; El Mohdi, O.; Millan, A. (2010): Analyse préliminaire de la vulnérabilité des odonates (Odonata) du Rif occidental (nord du Maroc). Boletín de la S.E.A. 46(1): 345-354. (in French, with Spanish and English summaries) ["The Odonata fauna of the Western Rif is well-known for its richness and diversity. In fact, 49 species out of the 61 which live in Morocco occur in this region alone. The analysis of the level of vulnerability shown by the species that occur in this region has shed light on those species most

vulnerable at the regional and national scale. *Hemianax ephippiger*, *Calopteryx exul*, *Oxygastra curtisii*, *Zygonyx torridus*, *Aeshna mixta* and *Orthetrum brunneum* are highly vulnerable at the regional scale and are therefore proposed for inclusion in the future red list of threatened species of the Western Rif. The degree of national vulnerability, studied here only for *C. exul* and *Gomphus simillimus maroccanus*, two Maghrebian and Moroccan endemics, respectively, revealed an average degree of vulnerability for both species. Protection measures should focus on these two species, especially because their natural habitats are being affected by different types and patterns of stress and disturbance." (Authors)] Address: El Haissoufi, M., Laboratoire Diversité & Conservation des Systèmes Biologiques. Département de Biologie, Université Abdelmalek Essaâdi, Tétouan, Maroc. E-mail: [elhaissoufism@yahoo.fr](mailto:elhaissoufism@yahoo.fr)

**12165.** Grand, D. (2010): *Leucorrhinia pectoralis* (Charpentier, 1825) dans la Dombes (département de l'Ain): éléments de biologie (Odonata, Anisoptera: Libellulidae). *Martinia* 26(3-4): 151-166. (in French, with English summary) ["The author first summarizes the biology, the ecology and the status of *Leucorrhinia pectoralis* in France and Europe. He brings then the results of a 3 years study of this species at the pond of Pizay, in the Dombes area, especially during emergence with attention to the metamorphosis substrates, exuviae location and sex-ratio. Some parameters influencing larval densities were examined as well as adults behaviours such maturation, territoriality, reproduction and displacements. The distribution of the species within Dombes area is finally considered together with its possible evolution regarding drought periods, agricultural practices and urban development." (Author)] Address: Grand, D., Impasse de la Voûte, F-69270 St. Romain-au-Mont d'or, France. E-mail: [danielgrand@yahoo.fr](mailto:danielgrand@yahoo.fr)

**12166.** Koch, L. (2010): Neu entstandene Kleingewässer entwickeln sich zu Libellen-Biotopen. Beiträge zur Heimatkunde der Stadt Schwelm und ihrer Umgebung N.F. 59: 19-38. (in German) [Nordrhein-Westfalen, Germany; 17, mostly widespread Odonata species are reported.] Address: Koch, L., Heinrich-Heine-Str. 5, 58256 Ennepetal, Germany. E-mail: [L-Koch@t-online.de](mailto:L-Koch@t-online.de)

**12167.** Lambret, P. (2010): Dynamique d'une population d'adultes de *Lestes macrostigma* (Eversmann, 1836) et implications pour son suivi: l'exemple de la Camargue (Odonata, Zygoptera: Lestidae). *Martinia* 26(1-2): 19-28. (in French, with English translation) ["The emergence curve, the flight period (phenology) and the number of adults which are detected along the day have been studied in *L. macrostigma* by the visual transect count method in a temporary pool of Camargue. Results are discussed in the light of other findings across the range of this threatened species. The consequences in term of survey and monitoring are highlighted." (Author)] Address: Lambret, P., Marais du Vigueirat, F-13104 Mas-Thibert, France. E-mail: [philambret@hotmail.com](mailto:philambret@hotmail.com)

**12168.** Lambret, P. (2010): Un mâle de *Lestes macrostigma* (Eversmann, 1836) prisonnier de *Juncus maritimus*. *Martinia* 26(1/2): 49-51. (in French, with English summary) [1-VII-2009, Marais du Vigueirat, Camargue, France; a male of *L. macrostigma* that has been 'captured' by *Juncus maritimus*: its right forewing was pierced by a stem of the plant.] Address: Lambret, P., Amis des Marais du Vigueirat, F-13104 Mas Thibert, France. E-mail: [philambret@hotmail.com](mailto:philambret@hotmail.com)

**12169.** Martire, D. (2010): Les Libellules et Ephemeres de la Reunion. BIOTOPE. Mèze: 72 pp. (in French) [The book covers 21 Odonata and 2 Ephemeroptera species found on the island of Reunion. These are attractively illustrated with colour photos. The book presents an identification key to Odonata, many colour photos and distribution maps of the species.] Address: Biotope, 22, boulevard Maréchal Foch, BO 58, 34140 Mèze, France

**12170.** Meyabeme Elono, A.L.; Liess, M.; Duquesne, S. (2010): Influence of competing and predatory invertebrate taxa on larval populations of mosquitoes in temporary ponds of wetland areas in Germany. *Journal of Vector Ecology* 35(2): 419-427. (in English) ["Abundances of mosquito larvae and associated invertebrate communities were assessed in 27 temporary ponds during the spring season in wetland areas of Germany. Four genera of mosquitoes were identified: *Aedes*, *Anopheles*, *Culex*, and *Culiseta*. We focused our analyses on *Aedes* spp. because this genus was the most abundant (92% of total abundance) and frequently encountered mosquito (present in 65% of investigated sites). The abundance of *Aedes* spp. was negatively associated with the abundance of competitors for food, and to a lesser extent with those of intraguild predators and strict predators. The influence of these natural antagonists on larvae of *Aedes* was stronger in ponds with higher levels of dissolved oxygen ( $53 \pm 4\%$ ) than in ponds with lower levels ( $16 \pm 1\%$ ). The overall abundance of antagonists explained 42% of the variation in abundance of *Aedes* spp. at sites with higher levels of dissolved oxygen. Of this explained variation, competitors accounted for 34.7%, whereas the abundance of intraguild predators and strict predators accounted for only 6.8 and 0.5%, respectively. Therefore, the promotion of competing species might be an appropriate ecological approach for the control of *Aedes* spp. in temporary ponds in these areas." (Authors) Samples including Odonata originate from Rosslau (Sachsen-Anhalt), Spreewald (Brandenburg) and Leipzig (Sachsen).] Address: Liess, M., UFZ – Helmholtz Centre for Environmental Research, Department of System Ecotoxicology, Permoserstr.15, 04318 Leipzig, Germany

**12171.** Molina, C.I.; Gibon, F.M.; Duprey J.L.; Dominguez E.; Guimarães, J.R.; Roulet, M. (2010): Transfer of mercury and methylmercury along macroinvertebrate food chains in a floodplain lake of the Beni River, Bolivian Amazonia. *Sci. Total. Environ.* 408(16): 3382-3391. (in English) ["We have evaluated the mercury and methylmercury transfers to and within the macroinvertebrate communities (including *Tremea* sp.) of a floodplain lake of the Beni River basin, Bolivia, during three hydrological seasons and in two habitats (open water and vegetation belt). Using the stable isotopes  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ , six trophic chains were identified during a previous study. Four are based on only one source: seston, organic matter from the bottom sediment, periphyton and macrophytes. Two are based on mixed sources (seston and periphyton in one case, periphyton and macrophytes in the other). During sampling, we found only one taxon that had surface sediment organic matter as food source and very few taxa whose trophic source was constituted by macrophytes. The periphyton was the most important source during all seasons; it produced the longest chain, with three trophic positions. Whatever the season and trophic source, all collected macroinvertebrates contained methyl mercury and the

latter was biomagnified in all trophic chains that we identified. The biomagnification of methylmercury through invertebrate trophic chains accurately reflected the existence and length of these chains. Biomagnification was virtually non-existent in the sediment-based chain, low and restricted to the dry season in the macrophyte-based chain. It was significant in the seston-based chain, but limited by the existence of only two trophic levels and restricted to the wet season. Finally, it was very effective in the periphyton-based chain, which offers the highest rate of contamination of the source but, above all, the largest number of trophic levels." (Authors)] Address: Molina, C.I., Instituto de Ecología, Unidad de Limnología, UMSA, Casilla postal #10077, La Paz, Bolivia. E-mail: camoar6088@gmail.com

**12172.** Specht, W. (2010): Zur Libellenfauna im Diabassteinbruch Wolfshagen, Landkreis Goslar (Niedersachsen) - ein Zwischenbericht (Odonata). *Mitteilungen des Naturwissenschaftlichen Vereins Goslar* 11: 81-164. (in German, with English summary) ["Dragonfly fauna of a quarry (Diabas-Steinbruch) near Wolfshagen, region Goslar (Lower Saxony, Germany) - an interim report (Odonata). During a number of studies in the quarry called "Diabas-Steinbruch" east of Wolfshagen in the time between 1992 and 2004, there was also carried out a survey of the occurrence of dragonflies within that quarry. On the basis of the results from those years, a total of 10 other species could be recorded in 2008 and 2009 raising the total number of species up to 33.18 out of these species are certainly indigenous to the place. This group includes the very rare *Leucorrhinia albifrons* and the Mediterranean species *Sympetrum fonscolombii* and *Crocothemis erythraea*. *Ischnura pumilio*, discovered in 2000 and 2004, was not found again. The rare dragonfly accounted to *Aeshna viridis* in 2004 could not be confirmed due to a mistake with identifying this specimen. The diversify and the large quantities of the dragonfly fauna in this protected biotope can possibly be explained with the presence of a micro-climate and a special water structure. The absence of fish and of human use are surely the most important reasons." (Author)] Address: Specht, W., Am Gemeindehof 6, 38690 Vienenburg, Germany. E-Mail: wolfgangspecht@web.de

**12173.** Thipaksorn, A.; Ruangsittichai, J. (2010): Diversity of rice Odonate insects in Lopburi Province, Thailand. *New Entomol.* 59(3,4): 37-42. ["From 2005 to 2008 in-season rice cropping period, 16 odonate insects were collected from pre-germinated direct seeded rice fields in Lopburi Province, an important rice field area of Central plain, Thailand. Within all rice odonate species, three predominant species, *Agriocnemis pygmaea*, *A. femina femina* and *Ischnura senegalensis*, had the highest numbers of individuals. The percentage of 3 species was 56.19% of the total collected. The sub-dominant species were *Diplacodes trivialis*, *I. aurora aurora*, *Crocothemis servilia servilia* and *Brachythemis contaminata*. The highest mean zygopteran species catch was founded from tillering to flowering rice growth stages and will decreasing of their number in milk grain to mature grain stages. On the other hand, the highest mean anisopteran species catch was founded from tillering to milk grain stages and rapidly decreasing of their number in dough grain stage. The number of species and individuals of rice odonates are increasing correlated to specific rice growth stages." (Authors)] Address: Thipaksorn, A., Department of Zoology, Faculty

of Science, Kasetsart University, Chatuchak, Bangkok 10900 Thailand. E-mail: athipaksorn@yahoo.com

**12174.** Trevor, D.; Caston, M.; Zwelabo, S. (2010): An assessment of the effect of industrial and sewage effluent on aquatic Invertebrates: A case study of a southern urban stream, Zimbabwe. *Journal of Sustainable Development* 3(2): 210-214. (in English) ["The impact of industrial effluent discharged in Mazai stream was assessed through physical-chemical parameters and also by bio-monitoring of benthic macro-invertebrates. Samples were collected at three sites, one before the effluent discharge point into the stream (site 3) and two sites which were located downstream after the discharge points (sites 1 and 2). High levels of chemical pollutants were recorded at sites 1 and 2 (ZINWA red category) whereas site 3 (reference site) consisted of relatively clean water (ZINWA blue category). This was confirmed by the biological evaluation process. The SASS4 scores at sites 1 and 2 indicated a deterioration of water quality while site 3 there was good water quality with high species diversity. Detrended correspondence analysis (DCA) showed that pollution sensitive taxa such as Hemiptera, Trichoptera, Coleoptera and Odonata were dominant at site 3 whilst the other sites were dominated by pollution tolerant species such as Chironomids. Continuous discharge of effluent could lead to extreme degradation of Mazai stream hence loss of biodiversity of macro-invertebrates." (Authors)] Address: Trevor, D., Dept Biol. Sci., Midlands State Univ., P. Bag 9055, Gweru, Zimbabwe. E-mail: tdube@msu.ac.zw

**12175.** van Swaay, C.A.M.; Groenendijk, D.; Termaat, T.; Plate, C.L. (2010): Vlinders en libellen geteld: jaarverslag 2009. Rapport VS2010.001, De Vlinderstichting, Wageningen: 36 pp. (in Dutch, with English summary) ["Butterflies and dragonflies are counted using a line-transect method. Butterfly transects are visited every week, dragonfly transects once every fortnight. The length of the transects is variable and depends on habitat quality and availability. In addition, single species transects are exclusively counted for a specific threatened butterfly or dragonfly. Indices were calculated using the computer program TRIM (Trends and Indices for Monitoring Schemes). This program was developed by CBS for the analysis of time series of counts with missing observations. The butterfly indices are calculated using a weighting procedure. The reference value of the year 2000 is set to 100. The dragonfly indices are not weighted yet and in most cases 2000 is used as the first year in the trend calculation and, therefore, set to a reference value of 100. Results of 2009: [...] Like in other years, in 2009 Odonata were counted every fortnight between May and September at 422 sites. The average number of dragonflies per transect was a little higher than in most previous years. Like in most other years *Enallagma cyathigerum* was the most common species (over 86,000 individuals). *Ischnura elegans*, with over 15,000 individuals, was the most widespread species. It was seen on about 81% of the plots. For most species indices are presented. As shown in previous years, an alarming decreasing trend was detected in 2009 again for *Aeshna viridis* and *Coenagrion hastulatum*. Other Red List species, like *Sympecma fusca*, *Lestes virens*, *Leucorrhinia dubia* and *Libellula fulva*, show a positive trend.(Authors)] Address: Termaat, T., De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: info@vlinderstichting.nl

**12176.** Woodward, S. (2010): Black Darter seen at Grace Dieu Wood. *Leicestershire Entomological Society. Newsletter* 43: 8. (in English) [Verbatim: The Black Darter *Sympetrum danae* is Britain's smallest dragonfly. As a health and moorland species, it is very thinly scattered in the lowlands and there are less than ten records for Leicestershire (Ian Merrill). On a recording excursion to Grace Dieu Wood, Thringstone, on 15 August, ... found one by some small pools that had formed in forestry machinery wheel ruts, SK433175. There was only one insect, a male, and it was not found on subsequent visits, however these pools have been productive for other dragonfly species this year and there are certainly many nymphs lurking in there...] Address: Woodward, S., Highfield Rd, Groby, Leicester LE6 0GU, UK. E-mail: grobysteve@metronet.co.uk

## 2011

**12177.** Bence, S.; Blanchon, Y.; Braud, Y.; Deliry, C.; Durand, E.; Lambret, P. (2011): Liste Rouge des Odonates de Provence-Alpes-Côte d'Azur. *Martinia* 27(2): 123-133. (in French, with English summary) [Basing on the results of a meeting of regional dragonfly experts on the 19th March, 2011 and applying the IUCN methods a regional Red List of endangered Odonata for Provence-Alpes-Côte d'Azur, France is published: "*Sympecma paedisca* is Regionally Extinct (RE). *Lestes macrostigma*, *Coenagrion caerulescens*, *Cordulegaster bidentata*, *Somatochlora m. meridionalis*, *Sympetrum depressiusculum* and *S. v. vulgatum* are Endangered (EN). *Coenagrion pulchellum*, *S. m. metallica*, *S. flavomaculata*, *S. alpestris*, *S. arctica* and *Leucorrhinia dubia* are Vulnerable (VU). *Lestes barbarus*, *L. dryas*, *L. virens vestalis*, *C. mercuriale*, *Brachytron pratense*, *Anax ephippiger*, *Gomphus vulgatissimus*, *G. simillimus*, *Onychogomphus uncutus*, *Cordulia aenea*, *Oxygastra curtisii*, *S. pedemontanum* and *Trithemis annulata* are Near Threatened (NT). Data are Deficient (DD) for *Aeshna grandis*, *G. flavipes* and *C. b. boltonii*. The IUCN methods were Not Applicable (NA) in the region for *C. hastulatum*, *Erythromma najas* and *G. graslinii*. Records of *Calopteryx v. virgo*, *Macromia splendens*, *Ophiogomphus cecilia*, *Epitheca bimaculata*, *L. albifrons* and *Pantala flavescens* are considered erroneous or unreliable. Other species which are present in the PACA region are classified Least Concern (LC). The main threats are habitat fragmentation and reduction of habitat quality. The current policies for biodiversity conservation should contribute to the reduction of the regional extinction risk. A new evaluation of this risk should be made in 2015." (Authors)] Address: Lambret, P., Coordinateur régional PACA du Plan d'Actions en faveur des Odonates, Amis des Marais du Vigueirat, F-13104 Mas Thibert, France. E-mail: p.lambret@espaces-naturels.fr

**12178.** Benken, T.; Komander, M. (2011): Die Senegal-Pechlibelle (*Ischnura senegalensis*) schlüpft in einem Aquarium bei Ulm. *Mercuriale* 11: 51-52. (in German, with English summary) ["We report on three specimens of *I. senegalensis* accidentally introduced to Germany in 2011. The odonates were encountered in the surroundings of Ulm (Baden-Württemberg) and we assumed the larvae were imported by exotic aquatic plants." (Authors)] Address: Benken, T., Nuitsstr. 19, D-76185 Karlsruhe, Germany. E-mail: Theodor@benken-online.net



**12179.** Benken, T.; Ehmman, H.; Miller, J.; Miller, E. (2011): Jäger als Gejagte - Libellenimagines als Nahrungsquelle. *Mercuriale* 11: 17-26. (in German) [Austria, France, Baden-Württemberg, Germany; Hornet attacks on *Epiheca bimaculata* and Aeshnidae as well as attacks of dragonflies, spiders and robberflies on Odonata are documented and discussed in detail.] Address: Benken, T., Nuitsstr. 19, D-76185 Karlsruhe, Germany. E-mail: Theodor@benken-online.net

**12180.** Chalar, G.; Arocena, R.; Pacheco, J.P.; Fabián, D. (2011): Trophic assessment of streams in Uruguay: A Trophic State Index for Benthic Invertebrates (TSI-BI). *Ecological Indicators* 11: 362-369. (in English) ["In this study we assessed the trophic status of 28 wadeable stream reaches of the Santa Lucía basin, an important economic region of Uruguay. We developed a Trophic State Index of Benthic Invertebrates (TSI-BI), the first of its kind for South American lotic systems. The methodological approach consisted of determining the ambient trophic gradient via canonical correspondence analysis based on the benthic invertebrate abundance matrix and an environmental variable matrix. The rescaled site scores served as environmental variables in the weighted averaging model (WA), to weight the benthic abundances and then find the optimum and tolerance of each of the sampled genus. These data were used to estimate the TSI-BI scores. These scores, in conjunction with the total phosphorus concentrations (TP), were used to group the study reaches when running a cluster analysis. The basic statistical parameters of the defined groups serve as an input to identify the threshold values of TP and TSI-BI corresponding with the different trophic states. The boundaries of TSI-BI and TP demarcating mesotrophic and eutrophic states were 8 and 71 g/l, respectively, and can be considered the limits between impaired and less altered reaches. The results also indicated that the trophic status of the reaches is related to land use intensity. A change in land use management seems to be critical for the preservation of one of the most important water supply systems in Uruguay." (Authors) 15 Odonata genera are integrated into the index.] Address: Guillermo Chalar, G., Section of Limnology, Department of Ecology, Faculty of Science, University of the Republic, Iguá 4225, Piso 9, Montevideo CP: 11400, Uruguay. E-mail: gchalar@fcien.edu.uy

**12181.** Contreras-Garduño, J.; Córdoba-Aguilar, A.; Azpilicueta-Amorín, M.; Cordero-Rivera, A. (2011): Juvenile hormone favors sexually-selected traits but impairs fat reserves and abdomen mass in males and females. *Evolutionary Ecology* 25(4): 845-856. (in English) ["The physiological mechanism underlying resource allocation in sexual selection studies has been little studied. One candidate is hormones as these favour resource allocation to reproductive traits but impair survival due to a resource over-expenditure directed to the former traits. We have investigated whether a juvenile hormone analog (JHa, methoprene) administered topically is involved in the resource allocation to wing pigmentation (an ornamental trait), fat reserves and flight muscle mass in both sexes of *Calopteryx haemorrhoidalis* and *C. virgo*. We also investigated the possible negative effect of such implementation on abdomen mass (an indirect measure of egg production) and field-based survival in adult males of *C. haemorrhoidalis* and *C. splendens*. We found that males and females treated with JHa, against a control group, developed higher wing pigmentation and showed reduced fat reserves

but had no change in muscle mass. In females, JHa decreased abdominal weight (an indicator of fecundity) and in males, survival was impaired only in *C. splendens*. These results support the idea that JH induces resource allocation to wing pigmentation, a sexually selected trait in both sexes. Thus, this study suggests that the action of JH could be a mechanistic link between ornaments and physiological condition in both males and females." (Authors)] Address: Córdoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**12182.** Grand, D.; David, G.; Diebolt, L. (2011): Réapparition de *Gomphus simillimus* Selys, 1840 dans le Grand Lyon (Odonata, Anisoptera: Gomphidae). *Martinia* 27(1): 61. (in French, with English summary) [Saint-Priest (Rhône), France, 30-VI-2010] Address: Grand, D., Impasse de la Voûte, F-69270 Saint-Romain-au-Mont-d'Or, France. E-mail: danieljgrand@yahoo.fr

**12183.** Grand, D.; Pont, B.; Krieg-Jacquier, R.; Barlot, R.; Feuvrier, B.; Bazin, N.; Biot, C.; Deliry, C.; Gaget, V.; Michelot, J.-L.; Michelot, L. (2011): *Gomphus flavipes* (Charpentier, 1825) redécouvert dans le bassin hydrographique du Rhône (Odonata, Anisoptera: Gomphidae). *Martinia* 27(1): 9-26. (in French, with English summary) ["After a short statement about the larval habitats of *Gomphus flavipes* and its European and French conservation status, places where this species was recently discovered or rediscovered in the Rhône River basin are noted, among which two are described. The hypothesis of a coming back from the Loire and Rhine watersheds against the maintenance of overlooked local populations throughout the 20th century is discussed. The report ends with an assessment of the conservation status of *G. flavipes* populations in the Rhône River basin." (Authors)] Address: Grand, D., Impasse de la Voûte, F-69270 Saint-Romain-au-Mont-d'Or, France. E-mail: danieljgrand@yahoo.fr

**12184.** Grand, D.; Garnier, G. (2011): Rencontre avec *Hemianax ephippiger* (Burmeister, 1839) dans le bas Bugéy (Ain) (Odonata, Anisoptera: Aeshnidae). *Martinia* 27(1): 31-32. (in French) [France, lacs de Conzieu, 22-VIII-2009] Address: Garnier, Géraldine, CREN Rhône-Alpes, Antenne de l'Ain, château Messimy, F-01800 Charnoz-sur-Ain, France

**12185.** Greven, H. (2011): Johann Leonhard Frisch (1666-1743) - ein wenig bekannter Pionier entomologischer Forschung. *Entomologie heute* 23: 145-206. (in German, with English summary) ["Johann Leonhard Frisch, pedagogue, linguist and entomologist, was born in 1666 in Sulzbach (Bavaria). He was a universal scholar of the Early Enlightenment. Among others he wrote aside from his job the "Description of various insects of Germany" („Beschreibung von allerley Insecten in Teutschland“), which was issued between 1721 and 1738 in 13 parts. Certainly, he was physico-theologically motivated, but this motivation is far less insistently expressed as by his contemporaries or subsequent "entomologists". The text often impresses with thorough descriptions of 300 "insects", in many cases including their developmental stages. Approximately 260 specimen are Hexapoda, from which many can be determined to the species level. The remaining "insects" belong to various "worms" such as arachnids, millipeds, molluscs, with careful observations of their living and

with ingenious and often amazing conclusions. In addition, he included 41 copper plates with 296 figures (tables; some with more than one figure) of different quality, which were engraved by his sons Philipp Jacob and Ferdinand Helfrich. Surely, meaningfulness of these plates (in combination with the text) is underestimated until now. Also noticeable are the short summaries, occasionally with critical annotations, of the entomological works of some famous naturalists of the Renaissance and the Early Enlightenment, among others Aldrovandi, Mofett, and Swammerdam. At the beginning of the 20th century Bodenheimer has thoroughly acknowledged Frisch, but later appreciations are either totally missing, are short, or focus on Frisch's main interest in parasites and store pests. Contrary to these approaches, I show exemplarily by some less spectacular details (e.g., striking legs of water scorpions, breathing of dragonfly-nymphs, parturition of aphids etc.), how precisely Frisch has observed his objects and how acutely he has commented his finding." (Author) The paper includes many figures and references to Odonata.] Address: Greven, H., Zoologie II, Heinrich-Heine-Universität, Universitätsstr. 1., 40225 Düsseldorf, Germany. E-mail: grevenh@uni-duesseldorf.de

**12186.** Hubregtse, V. (2011): Ovipositing Odonata: Dragonflies and damselflies at a flood-retarding basin. The Victorian Naturalist 128(4): 138-143. (in English) [A personal narrative is presented which explains the author's experience of watching the reproduction process of Odonata. The afternoon of 9 February 2011 was pleasantly warm, calm and sunny, so I decided to go for a walk around the flood-retarding basin in the north-east section of Monash University's Clayton campus, in suburban Melbourne. The basin, some 200m long and approximately 80m across at its widest point, is always interesting to visit, and this time I was about to see something special.] Address: unknown

**12187.** Klausnitzer, H. (2011): Bericht über die 11. Zentrale Tagung der Entomofaunistischen Gesellschaft und die 97. Tagung der Thüringer Entomologen. Entomologische Nachrichten und Berichte 55(1): 89-92. (in German) [The report on the meeting of the two German entomological societies includes pictures of Joachim Müller and Wolfgang Zimmermann, well known odonatologists. W. Zimmermann was rewarded for his great contributions to knowledge of Odonata and Ephemeroptera. The laudatio was held by J. Müller.] Address: Klausnitzer, Hertha, PF 202731, 01193 Dresden, Germany

**12188.** Middlemis-Maher, J.; Werner, E.E.; Denver, R.J. (2011): Stress hormones mediate predator-induced phenotypic plasticity in amphibian tadpoles. Front. Endocrinol. Conference Abstract: ISAREN 2011: 7th International Symposium on Amphibian and Reptilian Endocrinology and Neurobiology. doi: 10.3389/conf.fendo.2011.03.00031: (in English) ["Amphibian tadpoles mount behavioural, physiological and morphological responses to predation. Tadpoles rapidly reduce activity level when exposed to chemical cues of predation; with chronic exposure, tadpoles develop relatively smaller bodies and larger tails. The larger tail may serve as a lure to distract predator strikes from the more vulnerable body, or may confer enhanced burst locomotion for escape. In many vertebrates, exposure to predators also influences the activity of the hypothalamo-pituitary-adrenal (interrenal; HPI) axis. Here we investigated the effects of predator cues on activity of the tadpole HPI

axis and the relation to predator-induced responses in tadpole behaviour and tail morphology. We exposed wood frog tadpoles (*Rana sylvatica*) to the nonlethal presence of a predator (dragonfly larvae fed conspecific tadpoles) in outdoor mesocosms, and measured whole body CORT content by radioimmunoassay. Exposure to predator cue reduced CORT by ~30% compared with controls at 4 hours, but increased CORT by ~2 fold after 4 or 8 days. In a laboratory experiment, exposure either to predator cue or to CORT for 3 days (130 nM added to the aquarium water), caused tadpoles to develop a larger tail relative to their body. Importantly, the effect of predator cue on tail morphology was blocked by treatment with the corticosteroid synthesis inhibitor metyrapone (110 µM). Short term treatment with CORT (1-3 hours) increased tadpole activity, and lead to higher mortality than controls in the presence of an unrestrained predator. By contrast, chronic exposure to CORT (8 days) showed a trend towards increased survivorship of tadpoles with free predators. Our results support the hypothesis that tadpoles mount a dual physiological and phenotypic response to predation, suppressing behaviour and CORT in the short term, but increasing CORT with longer exposure which induces changes in tail and body morphology." (Authors)] Address: Denver, R.J., University of Michigan, Molecular, Cellular and Developmental Biology, Ann Arbor, USA. E-mail: Rdenver@umich.edu

**12189.** Naraoka, H. (2011): Reproductive behavior of *Coenagrion terue* (Asahina, 1949) (Zygoptera, Coenagrionidae), with special reference to repeated interruptions of the copulation and a long pre-ovipositional tandem linkage. Tombo 53: 101-109. (in Japanese, with English summary) ["The reproductive behaviour and prolonged pre-oviposition tandem in *C. terue* are described based on observations in northern Japan, in 2003-2007. The number of females was much smaller than that of males at the oviposition site. Tandem formation was observed at the roosting site in early morning and at the oviposition site in late morning, between 6:00-15:00h. However, males rarely succeeded in holding females, because most females avoided males by doing "face to face hovering". When a rejective female was seized by a male, she did a peculiar "abdominal oscillation", and consequently tandem was shortly dissolved. Copulation was observed from 6:10-14:30h. Oviposition started after 9:00h. When pairs were created early in the morning, they did not necessarily start to copulate soon, but did copulate at various time between 6:00-12:00h with a peak of 9:00-11:00h. The duration of copulation, observed in field and cage, before 9:00h (mean 41.7 ± 22.3 min), was longer than that after that time (mean 33.0 ± 12.1 min), but the difference was not significant. Mean copulation duration was 38.1 ± 19 min (n=34). Copulation was divided into 3 stages; I: 35.4 ± 19.1 min, II: 77.8 ± 32.7 sec, and III: 110.7 ± 43.4 sec. In copulations continuing over 24 min, "breaks" of 1-3 times were observed. Tandem pairs created before 9:00 h rested at 0.5-3 hours in some points of pre, mid and post-copulation, the same after 9:00 h did rarely rest until copulation and oviposition. Pre-oviposition rest was negatively and significantly correlated with tandem formation time during the day. Long tandem duration before oviposition can be regarded as pre-oviposition guarding." (Author)] Address: Naraoka, H., Motoizumi 36-71, Fukunoda, Itayanagi, Kitatsugaru-gun, Aomori 038-3661, Japan. E-mail: sbnkq127@ybb.ne.jp

**12190.** Parr, A. (2011): Migrant Dragonflies in 2010. Including recent decisions and comments by the Odonata Records Committee. *Atropos* 42: 23-28. (in English) [Observation details are presented on *Calopteryx splendens*, *Lestes barbarus*, *L. viridis*, *Coenagrion scitulum*, *Ischnura elegans*, *Erythromma viridulum*, *Aeshna affinis*, *A. grandis*, *A. mixta*, *Anax ephippiger*, *A. parthenope*, *Sympetrum danae*, *S. flaveolum*, *S. fonscolombii* and *S. striolatum*. *Ischnura senegalensis* and *Crocothemis servilia* were recorded in Britain as obvious accidental introductions.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**12191.** Pfau, H.K. (2011): Functional morphology and evolution of the male secondary copulatory apparatus of the Anisoptera (Insecta: Odonata). *Zoologica* 156: 103 pp. (in English) ["In this study, the functions and mechanical interactions of different parts of the secondary copulatory apparatus of Anisoptera are reconstructed in detail and possible evolutionary pathways are described. Whereas in Zygoptera and Anisozygoptera the vesica spermalis of the third abdominal segment is a single segmented intermediate sperm-storage, this organ is subdivided into four segments in the Anisoptera. The evolutionary consequences of acquiring new functions as secondary (in reality tertiary) "penis" and sperm-syringe are one focus of this study. The secondary copulatory apparatus of male dragonflies (Odonata), located at the second and third abdominal segment, consists of a number of sequentially arranged devices. These serve (1) as support of the female ovipositor, (2) for carrying out preparatory actions for filling an intermediate sperm-storage, (3) for levering and inserting a secondary "penis" (in the primitive case the ligula) and (4) as transmitter of sperm to the female vagina. Each subtask affords a sequence of actions of the corresponding sclerites and muscles of this apparatus. An impressive variety of different solutions to perform and secure the filling of the sperm-reservoir of the vesica spermalis in the Anisoptera is described. In the primitive case a laborious and time-consuming procedure - which probably depends on interrelated functions of the ligula and female ovipositor - is carried out. Reduction of the ovipositor in different lines of the Anisoptera apparently initiated evolutionary modifications, which finally led to more sophisticated modes of preparing filling and protection. Another focus are the auxiliary devices and techniques in the Anisoptera for emptying the sperm-reservoir of the vesica spermalis. For instance, two different types of sperm-pumps are incorporated in its distal segment ("glans"). These pumps - which extend the function of a hydraulically working gland-structure, the erectile organ - show an opposite co-ordination of sperm-suction and -ejection in connection with compression and decompression movements. It was tried to reconstruct a transitional system to close a serious gap in the phylogenetic interpretation. A comparative investigation of different "glans" led to the discovery of different "ways" of combining the emptying-mechanism of the sperm-reservoir with an intensification of the sperm-jet and a "washing out" of sperm of the male predecessor (sperm displacement). The different stages of evolution of the glans, which reflect phylogenetic splittings, are outlined and discussed. This study is of great interest to biologists interested in the functional morphology of the Odonata. It does not merely rely on painstaking comparisons of morphological details, but integrates func-

tional points of view to use the heuristic power of hypothetical approach." (Publisher)] Address: Pfau, H.K., Rathenastr. 14, D-65326 Aarbergen, Germany. E-mail: clauspfau@web.de

**12192.** Prys Witt, K.-P. (2011): Die Asiatische Keiljungfer (*Gomphus flavipes*) in der Leine bei Neustadt am Rübenberge. Beiträge zur Naturkunde Niedersachsens 64(4): 96-98. (in German) [25./26-VII-2006, River Leine, Neustadt a. Rbge., Niedersachsen, Germany] Address: Prys Witt, K.-P., Lessingstr. 2, 31535 Neustadt a.Rbge., Germany

**12193.** Raescu, C.-S.; Dumbrava-Dodoaca, M.; Petrovici, M. (2011): Macrozoobenthic community structure and dynamics in Cerna River (western Romania). *Aquaculture, Aquarium, Conservation & Legislation* 4(1): 79-87. (in English, with Romanian and Hungarian summaries) ["In order to determine water quality in Cerna River, researchers carried out analyses into the structure and dynamics of benthic macroinvertebrates communities as well as into the physical-chemical factors. 12 Groups of macroinvertebrates were identified. Density, abundance and frequency values recorded for benthic communities varied according to the physical-chemical conditions specific to each sample collecting station. Researchers noticed a direct influence of Baile Herculane town and dam upon the community submitted to study, the maximum density and percentage numerical abundance being established for Oligochaeta and Diptera, benthic groups tolerant to changes in aquatic ecosystems qualitative parameters. The community of organisms including Ephemeroptera, Trichoptera, Plecoptera, Odonata and Coleoptera was characterized by a decrease in density and abundance values upstream - downstream as water quality is more and more degraded. This deterioration is also emphasized by the biotic index EPT/Ch values." (Authors)] Address: Dumbrava-Dodoaca, Malina, West Univ. of Timisoara, Faculty of Chemistry, Biology & Geography, Timisoara, Romania. E-mail: malinadumbrava@yahoo.com

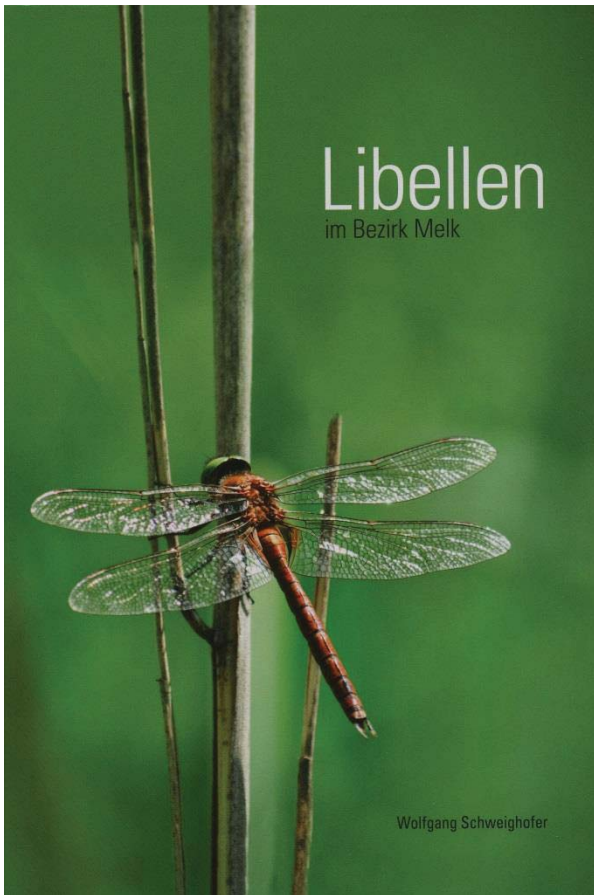
**12194.** Ren, G.-d.; Ning, J. (2011): Differentiation and phylogeny of metathoracic pleural sclerites in selected pterygote insects. *Entomotaxonomia* 33: 81-93. (in Chinese, with English summary) ["Sixteen representative species of Pterygota are selected to analyse the development of morphological characteristics of metathoracic pleural sclerites in different taxa. A well-resolved cladogram of preliminary evolutionary relationships is produced with the topology: [Ephemeroptera + (Odonata + Neoptera)]+ [Plecoptera+(Megaloptera+Neuroptera+(Orthoptera+(Hemiptera+(Coleoptera+(Mecoptera+Lepidoptera+(Hymenoptera+Diptera)))))]. This analysis indicates that Palaeoptera and Neoptera are clearly separated. Ephemeroptera is more distantly related to Neoptera while Odonata has a closer relationship. The taxonomic status and evolutionary relationships of Neoptera are discussed and some arguments are made that are in conflict with the current classification system." (Authors)] Address: Ren, G.-d., College of Life Sciences, Hebei Univ., Baoding, Hebei 071002, China

**12195.** Runze, K.; Baier, H. (2011): Biotop- und Artenmonitoring in Mecklenburg-Vorpommern heute -auf einem schmalen Pfad zwischen Verpflichtungen und Ressourcen. *Artenschutzreport* 27: 26-40. (in German) [The paper outlines history and present status of monitoring activities in Mecklenburg-Vorpommern, Germany. Odonata are represented by *Aeshna viridis*, *Leucorrhin-*



ia albifrons, L. caudalis, L. pectoralis, Stylurus flavipes, and Sympecma paedisca. Records of these species are plotted in map 8.] Address: Runze, Katrin, Landesamt für Umwelt, Naturschutz und Geologie Mecklenburg-Vorpommern, Goldbergerstr. 12, 18273 Güstrow, Germany. E-mail: katrin.runze@lung.mv-regierung.de

**12196.** Schweighofer, W. (2011): Libellen im Bezirk Melk. Beiträge zur Bezirkskunde Melk 9. 207 pp. (in German) [Austria; detailed account on the regional dragonfly fauna including distribution maps] Herausgeber: Kuratorium zur Herausgabe einer Bezirkskunde für den Bezirk Melk, Abt Karl-Str. 25a, 3390 Melk, Austria. Address of author: Schweighofer, W., Ötscherblick 10, 3661 Artstetten, Austria. E-mail: wolfgang.schweighofer@schule.at



**12197.** Semwal, N.; Akolkar, P. (2011): Suitability of irrigation water quality of canals in NCR Delhi. International Journal of Basic and Applied Chemical Sciences 1(1): 60-69. (in English) ["Within the acceptable range of pH in water quality, deficiency and excess of various levels of critical pollutants such as, Total Dissolved Salts (TDS), Electrical Conductivity, Sodium Adsorption Ratio (SAR) and Boron determined the suitability of water for irrigation, in four major canals of Delhi. Canal waters were deficient in minimum SAR levels of 0.046 to 2.33. Average Boron levels of 0.639 to 0.807 mg/l were good enough for irrigation to sensitive group of crops, 0.639 mg/l to 0.807 mg/l levels were excellent for irrigation to semi tolerant group of crops and 1.22 to 1.966 mg/l of Boron levels were good for irrigation to tolerant group of crops. Excellent to good irrigation water was indicated by clean to slight pollution in biological water quality of Gang Canal and Western Yamuna Canal and medium to high salinity hazards supported moderate to

heavy pollution in biological water quality of Agra Canal and Hindon Canal." (Authors) Odonata are treated at family level.] Address: Semwal, N., Central Pollution Control Board (Ministry of Environment & Forests, Govt of India), Parivesh Bhawan, East Arjun Nagar, Delhi 110 032, India. E-mail: nripsemwal@yahoo.co.in

**12198.** Ternois, V.; Lambret, J.-L. (coord.) (2011): Oxygastra curtisii (Dale, 1834) en Champagne-Ardenne: bilan du programme régional 2007-2009 (Odonata, Anisoptera: Corduliidae). Martinia 27(1): 45-60. (in French, with English summary) ["Little attention has been paid to O. curtisii in the Champagne-Ardenne region, France. Until the beginning of the years 2000, the species was considered rare and observations were spread all over the region. In 2005, many individuals were observed in gravel pits in the Aube department. This supposed this kind of habitat to be attractive for the species. In this context, the CPIE (Permanent Center for Environmental Initiatives) of the Pays of Soulaines and the Onema (National Office of Waters and Aquatic Habitats) led some investigations over several alluvial valleys in the region. The present paper gives both the results gathered from 2007 to 2009 and the regional status of O. curtisii. It provides also a new distribution map of the species for the Champagne-Ardenne region." (Authors)] Address: Ternois, V., CPIE du Pays de Soulaines, Domaine de Saint-Victor F-10200 Soulaines-Dhuys, France. E-mail: cpie.vincent.ternois@wanadoo.fr

**12199.** Ulmer, A. (2011): Sympetrum pedemontanum (Allioni, 1766) nouveau pour les départements de la Loire et de la Haute-Loire, et sites majeurs pour S. depressiusculum (Selys, 1841) dans ces deux départements. Martinia 27(2): 95-100. (in French, with English summary) ["This paper deals with the discovery of Sympetrum pedemontanum, which is new to the Loire and the Haute-Loire departments. Numbers of S. depressiusculum were also present. Some observations indicate that the breeding of both species is highly probable. The importance of these findings at a local scale is discussed." (Author)] Address: Ulmer, A., Le Colombier, F-42140 - Chazelles-sur-Lyon, France. E-mail: andre.ulmer@free.fr

**12200.** Vieira, V.; Teixeira, T.; Teixeira, M.; Oliveira, L. (2011): Novos Dados sobre Lepidópteros, Odonatos e Himenópteros (Insecta) da Ilha de São Jorge, Açores. XV Expedição Científica do Departamento de Biologia - São Jorge 2011 - Rel. Com. Dep. Biol. 40: 107-116. (in Portuguese, with English summary) [São Jorge island (Azores, Portugal), July 25-31, 2011, Ischnura hastata, I. pumilio, Anax imperator, Sympetrum fonscolombii] Address: Vieira, V., Universidade dos Açores, Departamento de Biologia e Grupo de Biodiversidade dos Açores (CITA-A), Apartado 1422, PT-9501-801 Ponta Delgada, Açores, Portugal

## 2012

**12201.** Abraham, L. (2012): "On the other hand, what is this Eastern aeschnoides?" (Morton 1926) – an undescribed Palpares species from the Eastern Mediterranean (Neuroptera: Myrmeleontidae). Natura Somoysiensis 22: 65-102. (in English) ["This paper summarizes the history of Palpares libelloides (Linnaeus, 1764) and related taxa described from the Mediterranean in the neuropterological literature. Based on these

results *Palpares assyriorum* sp. n. from Syria, Jordan, Turkey and Israel is described. *Libellula turcica* Petiver & Empson, 1767 is a new homonym of *Libellula* Linnaeus 1758 (Odonata) (hom. n.) and a new synonym of *Palpares libelloides* (Linnaeus, 1764) (syn. n.). *Palpares aeshnoides* is a nomen nudum, only a collection name. *Palpares chrysopterus* Navás, 1910 is a valid taxon and *Palpares turcicus* Koçak, 1976 (syn. n.) is a new junior synonym of *Palpares chrysopterus* Navás, 1910." (Author)] Address: Ábrahám, L., Somogy County Museum, Natural History Department, H-7400 Kaposvár, P.O. Box 70, Hungary E-mail: labraham@smmi.hu

**12202.** Acatrini, C.-M.; Ghibusi, E.-A.; Petrovici, M.; Pirvu, M. (2012): Macrozoobenthic communities structure characteristic of certain tributaries of the Siret river from Harghita, Maramures and Vrancea Mountains and Moldovei Plateau. *Annals of West University of Timisoara, ser. Biology* 15: 141-148. (in Romanian, with English summary) [Romania; "35 qualitative macrozoobenthic samples were collected in 2011 from many Siret river tributaries coming from the Harghita Mountains (5 stations), Maramures Mountains (14 stations), Moldavian Plateau (4 stations) and Vrancea Mountains (12 stations). Laboratory analysis of samples revealed the existence of the following 15 groups of benthic invertebrates: Ephemeroptera, Plecoptera, Trichoptera, Oligochaeta, Diptera (Chironomidae, Simuliidae, Ceratopogonidae, Limoniidae), Gastropoda, Bivalva, Coleoptera, Acarina, Odonata, Hirudinea, Isopoda, Heteroptera, Turbellariata and Collembola). Groups that have the highest frequencies were mayflies and dipterans (each with a frequency of 97.1%), followed by caddisflies (80%), amphipods (68.6%), oligochaetes (57.1%) and stoneflies (54.3%). Presence of sensitive groups to water quality degradation (Ephemeroptera, Trichoptera and Plecoptera) with high frequency shows good quality water at most stations investigated." (Authors)] Address: Acatrini, Cristina-Mariana, West University of Timisoara, Faculty of Chemistry-Biology-Geography, Department of Biology and Chemistry, Pestalozzi, 16, 300115, Romania. E-mail: milcapetrovici@yahoo.com

**12203.** Andrew, R.J.; Thakkar, N.; Verma, P. (2012): Ectoparasitism of anisopteran dragonflies (Insecta: Odonata) by water mite larvae of *Arrenurus* spp. (Arachnida: Hydrachnida: Arrenuridae) in central India. *Acarina* 20(2): 194-198. (in English) ["There is no report on the frequency, species selection and site specificity of water mites' ectoparasitism within and among dragonfly species of India. Here, we present a field survey of the species selection and site specificity of ectoparasite larval arrenurid mites on anisopteran adults at Nagpur city of central India. Since the female odonates returns to water to oviposit, it would be of some advantage for the mite to show a female-biased parasitism in order to return to water easily and continue the remaining aquatic part of their life cycle. A total of 204 specimens of anisopteran odonates belonging to 11 species were examined for the presence of larval *Arrenurus* spp. as ectoparasites during the post-monsoon (August–September 2010) and summer (March–April 2011) months from a large pond in central India. Only 14 dragonfly specimens of six species (*Acisoma panorpoides*, *Brachythemis contaminata*, *Crocothemis servilia*, *Diplacodes trivialis*, *Neurothemis t. tullia*, and *Trithemis pallidinervis*) were found to be parasitized (overall prevalence of 6.86%). The prevalence for *C. servilia* was 28.6%, followed by *T. pallidinervis* and *A. panorpoi-*

*des* at 21.4%. The total number of parasites recorded was 465 at an average of 33.26 per specimen. The parasite load per host species was the highest in *T. pallidinervis* (92.6) followed by *C. servilia* (24). In *C. servilia*, *A. panorpoides* and *D. trivialis* the mites were attached ventrally to the thorax and were mostly arranged in a 'v' or triangular shape, while in *B. contaminata* and *T. pallidinervis* the mites were found all over the ventral abdomen. In one *T. pallidinervis* male and one *C. servilia* female, mites were found both on the thorax as well as the abdomen. The maximum number of mites found on an individual dragonfly was on the female abdomen of *T. pallidinervis* (114), while only one mite was found on the thorax of a male *C. servilia*. Mite infestation was sex-biased — 71.0% and 85.7% of infested odonates were females in August–September and March–April, respectively." (Authors)] Address: Andrew, R.J., Post Graduate Department of Zoology, Hislop College, Nagpur, 440 001, India. E-mail: rajuandrew@yahoo.com

**12204.** Aslan, B.; Karaca, I. (2012): Insect fauna of Kovada Lake National Park Basin (Isparta, Turkey). *Türk. entomol. derg.* 36(4): 473-489. (in English, with Turkish summary) ["The study was conducted to determine insect fauna of Kovada Lake National Park Basin in Isparta province of Turkey between April 2007 and October 2008. In the study, various collecting methods, including pitfall trap, sweeping, air-sweepnet, drop sheet and light trap were used in nine different habitats selected from the region. The insect specimens were collected by weekly samplings. A total of 240 insect species and subspecies belonging to 75 families and 11 orders were recorded from the national park basin." (Authors) The following Odonata species are listed: *Aeshna mixta*, *Cercion lindenii lindenii*, *Coenagrion ornatum*, *C. puella puella*, *Onychogomphus forcipatus*, *Crocothemis erythraea*, *Orthetrum brunneum*, *O. cancellatum cancellatum*, *Libellula depressa*.] Address: Aslan, B., Department of Medical and Aromatic Plants, Tefenni Vocational School of Higher Education, Mehmet Akif Ersoy University, 15600, Tefenni, Burdur, Turkey. E-mail: aslanb@mehmetakif.edu.tr

**12205.** Balter, M.; Zinman, A. (2012): The design, construction, and application of a 3D flying prey simulator to aid in the investigation of neuronal control in dragonflies. *Proceedings of The National Conference, On Undergraduate Research (NCUR) 2012, Weber State University, Ogden Utah, March 29 – 31, 2012: 61-68.* (in English) ["The goal of this interdisciplinary research project is to investigate the neuronal control of flying prey interception in dragonflies by designing, constructing, and programming an apparatus to simulate the complex motions of a flying insect. Our three-dimensional motion device is capable of mimicking a flying insect by moving a small glass bead accurately up to speeds of 1 m/s. Dragonflies are highly efficient aerial predators that have the remarkable capability of intercepting and capturing small insects in flight. This complex process generally occurs in less than 300 ms, with success rates as high as 97%1. Prey capture behaviour requires both rapid visual processing and information transmission, resulting in the evolution of large neurons in the control pathway. Eight pairs of large neurons, called Target-Selective Descending Neurons (TSDNs), are implicated in steering the interception flight. These neurons descend from the brain of the dragonfly to the wing motor regions of the thorax, transmitting visual information about prey movement. Our stimulus device will be used

to determine the way in which the TSDN's encode information about object movement in three dimensions. To date, visual neuron studies have been mostly restricted to two dimensions, the x-direction (left - right) and the y-direction (up - down), recording responses to images displayed on a flat projection screen. However, Dr. Olberg of the Biology Department at Union College hypothesized that the z-dimension (front - back) movement is vital to understanding the exact roles of these neurons in prey interception. An understanding of visually guided prey interception by dragonflies, could lead to the development of effective guidance mechanisms for military or civilian use. The device consists of 80/20 extruded aluminum parts, timing belts and pulleys, ball bearings, metal axles, and DC brushed motors with encoders. The device is computer controlled by Simulink and Real Time Windows Target, which are components of MATLAB." (Authors)] Address: Balter, M., Mechanical Engineering and Biology Departments, Union College, 807 Union Street, Schenectady, NY 12308 USA

**12206.** Balter, M. (2012): The design, construction, and application of a 3D flying prey simulator. Thesis. Rutgers University: (in English) ["The goal of this research project is to investigate the neuronal control of flying prey interception in dragonflies by designing, constructing, and programming an apparatus to simulate the complex motions of a flying insect. Our three-dimensional motion device is capable of mimicking a flying insect by moving a small bead accurately up to speeds of 1 m/s in any direction. Dragonflies are efficient aerial predators that can intercept and capture small insects in flight. Our stimulus device will be used to determine the way in which dragonfly neurons encode information about object movement in three dimensions. Sinusoidal position tracking experiments using multiple input frequencies were conducted using the apparatus. The results indicate that the machine operates smoothly with little variability between trials. Preliminary dragonfly testing with the apparatus showed favourable results, indicating proof of concept.... This machine is programmed to move an analogue of a small flying insect (bead) in front of a dragonfly causing the dragonfly to react as if it were prey. Assists the research of Dr. Robert Olberg. Work has been presented and published at the 2012 National Conference on Undergraduate Research, while lead to an invitation into the Union College Chapter of Sigma Xi. Has currently been submitted for publication to the 2012 ASME Dynamic Systems and Controls Conference." (Author)] Address: Balter, M., Mechanical Engineering & Biology Depts, Union College, 807 Union Str., Schenectady, NY 12308 USA

**12207.** Bechly, G. (2012): An interesting new fossil relict damselfly (Odonata: Zygoptera: Coenagrionoidea) from Eocene Baltic amber. *Palaeodiversity* 5: 51-55. (in English, with German summary) ["A new fossil genus and species of damselfly, *Balticoagrion paulyi* n. gen., n. sp. (Odonata: Zygoptera: Coenagrionoidea: Familia incertae sedis) is described from Eocene Baltic amber. This fossil taxon does not fit into any known fossil or Recent family-group taxon and is here tentatively considered as relict taxon and potential stem group representative of Coenagrionoidea. The same piece of amber also contains a piece of skin from a small reptile as syninclusion." (Author)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail: guenter.bechly@smns-bw.de

**12208.** Benchalel, W.; Samraoui, B. (2012): Caractérisation écologique et biologique de l'odonatofaune de deux cours d'eau méditerranéens: l'oued El-Kébir et l'oued Bouaroug (Nord-Est de l'Algérie). *Méditerranée* 118: 19-27. (in French, with English summary) [Algeria; "A total of 13 species were identified in Oued El-Kébir, and 11 in Oued Bouaroug. Reproduction was proved for 5 species in Oued El-Kébir and 8 species in Oued Bouaroug. In both sites of study, the flight period of the species extends from the beginning of spring to the end of autumn. The follow-up of the larval development of some species has proved the univoltinism of *Boyeria irene*, *Calopteryx haemorrhoidalis*, *Coenagrion puella*, *Lestes viridis*, *Orthetrum chrysostigma*, *Pseudagrion subdilatata*. Other species such as *Orthetrum anceps* *Onychogomphus costae* *Paragomphus genei* are probably univoltine. But we lack data that confirms their univoltinism because of the sampling problem. As for *Gomphus lucasi* and *Onychogomphus uncutus*, these species are probably not univoltines. A morphometric characterization of the different larval stages (metric and numerical characters) has also been established for every species which the reproduction has been proved. Given the intense anthropic pressure in the sampled areas especially in Oued El-Kébir, the regression of the species' total number seems to be unfortunately irreversible. These hydrographical basins need to be immediately and effectively protected in order to keep this natural heritage." (Authors)] Address: Benchalel, W., Université Badji Mokhtar -Annaba, B.P. 12, 23000 Algeria. E-mail: wafachalel@yahoo.fr

**12209.** Benson, D. H.; Baird, I. R. C. (2012): Vegetation, fauna and groundwater interrelations in low nutrient temperate montane peat swamps in the upper Blue Mountains, New South Wales. *Cunninghamia* 12(4): 267-307. (in English) ["Newnes Plateau Shrub Swamps are a series of low nutrient temperate montane peat swamps around 1100 m elevation in the upper Blue Mountains, west of Sydney (lat 33° 23' S; long 150° 13'E). Transect-based vegetation studies show a closely related group of swamps with expanses of permanently moist, gently sloping peatlands. Vegetation patterns are related to surface hydrology and subsurface topography, which determine local peat depth. While there is evidence that a group of the highest elevation swamps on the western side of the Plateau are more dependent on rainwater, the majority of swamps, particularly those in the Carne Creek catchment, and east and south of it, may be considered primarily groundwater dependent with a permanently high watertable maintained by groundwater aquifers. An integral part of the swamps are a number of threatened groundwater dependent biota (plants-*Boronia deanei* subsp. *deanei*, *Dillwynia stipulifera*, dragonfly- *Petalura gigantea*, lizard- *Eulamprus leuraensis*), which are obligate swamp dwellers. This association of dependence leaves the entire swamp ecosystem highly susceptible to threats from any loss of groundwater, the current major one being the impact of damage to the confining aquicludes, aquitards, aquifers and peat substrates as a result of subsidence associated with longwall mining. Impacts on the swamps may also result from changes to hydrology through damming of creeks, mine waste water discharge, increased moisture competition from pine plantations, recreational motorbike and off-road vehicle tracks and climate change. If these groundwater dependent ecosystems do not receive protection from activities such as longwall mining subsidence, significant ecolog-



ical damage is unlikely to be avoided or able to be mitigated even where provisions of the Commonwealth Environment Protection and Biodiversity Conservation and NSW Threatened Species Conservation Acts apply to groundwater dependent swamps and biota. The importance of the highest elevation part of the Plateau for a number of restricted (some endemic) plant species is also discussed. This paper includes a synthesis of results of a study (by IRCB) of larval burrow morphology and groundwater dependence in *P. gigantea*" (Authors) Available from <http://www.rbgsyd.nsw.gov.au/science/Scientificpublications/cunninghamia/contentsbyvolume/volume12#twelve%20four>] Address: Baird, I., 3 Waimea St, Katoomba NSW 2780, Australia. E-mail: [ianbaird@mountains.net.au](mailto:ianbaird@mountains.net.au)

**12210.** Benzer, S.; Gül, A.; Yılma, M. (2012): Feeding properties of pike (*Esox lucius* L., 1758) living in Kapulukaya Dam Lake (Türkiye). *GEFAD / GUJGEF* 32(3): 697-714. (in Turkish, with English summary) [Among 328 pikes caught between November 2001 and October 2002, 58.82% had filled and 41.8% had empty digestive tracts. Odonata contributed significantly to the diet of pikes.] Address: Benzer, S., Gazi Üniversitesi, Gazi Eğitim Fakültesi, İktisadi İdari Bilimler Bölümü, Fen Bilgisi Öğretmenliği Anabilim Dalı, Ankara, Turkey. E-mail: [sbenzer@gazi.edu.tr](mailto:sbenzer@gazi.edu.tr)

**12211.** Bland, L.M.; Collen, B.; Orme, C.D.L.; Bielby, J. (2012): Data uncertainty and the selectivity of extinction risk in freshwater invertebrates. *Diversity and Distributions* 18(12): 1211-1220. (in English) ["Aim: To investigate the impact of different treatments of the IUCN Data Deficient (DD) category on taxonomic and geographical patterns of extinction risk in crayfish, freshwater crabs and dragonflies. Location: Global. Methods: We used contingency tables to evaluate taxonomic and geographical selectivity of data deficiency and extinction risk for three invertebrate taxonomic groups (crayfish, Odonata, and freshwater crabs) based on their IUCN Red List status. We investigated differences in patterns of data deficiency and extinction risk among taxonomic families, geographical realms and taxonomic families within geographical realms for each of the three groups. At each level, we evaluated the impact of uncertainty conferred by the conservation status of DD species on extinction risk patterns exhibited by that group. We evaluated three scenarios: excluding DD species, treating all DD species as non-threatened and treating all DD species as threatened. Results: At the global scale, DD species were taxonomically non-randomly distributed in freshwater crabs and dragonflies, and geographically non-randomly distributed in all three taxonomic groups. Although the presence of under- or over-threatened families and biogeographical realms was generally unchanging across scenarios, the strength of taxonomic and geographical selectivity of extinction risk varied. There was little consistent evidence for taxonomic selectivity of extinction risk at sub-global scales in freshwater crabs and dragonflies, either among biogeographical realms or among scenarios. Main conclusions: Global patterns of taxonomic selectivity and geographical selectivity were generally consistent with one another and robust to different treatments of DD species. However, sub-global scale conservation prioritization from these types of data sets will require increased investment to make accurate decisions. Given the current levels of data uncertainty, the relative importance of biological characteristics and threatening processes

in driving extinctions in freshwater invertebrates cannot be easily determined. We recommend that DD species should be given high research priority to determine their true status." (Authors)] Address: Bland, Lucie, Institute of Zoology, Zoological Society of London, Regent's Park, London, NW1 4RY, UK. E-mail: [Lucie.bland@ioz.ac.uk](mailto:Lucie.bland@ioz.ac.uk)

**12212.** Blanke, A.; Greve, C.; Wipfler, B.; Beutel, R.; Holland, B.; Misof, B. (2012): The identification of concerted convergence in insect heads corroborates Palaeoptera. *Systematic Biology* 62(2): 250-263. (in English) ["The relationships of the three major clades of winged insects - Ephemeroptera, Odonata and Neoptera - are still unclear. Many morphologists favor a clade Metapterygota (Odonata+Neoptera), but Chiasatomyaria (Ephemeroptera+Neoptera) or Palaeoptera (Ephemeroptera+Odonata) have also been supported in some older and more recent studies. A possible explanation for the difficulties in resolving these relationships is concerted convergence - the convergent evolution of entire character complexes under the same or similar selective pressures. In this study we analyse possible instances of this phenomenon in the context of head structures of Ephemeroptera, Odonata and Neoptera. We apply a recently introduced formal approach to detect the occurrence of concerted convergence. We found that characters of the tentorium and mandibles in particular, but also some other head structures, have apparently not evolved independently, and thus can cause artefacts in tree reconstruction. Our subsequent analyses, which exclude character sets that may be affected by concerted convergence, corroborate the Palaeoptera concept. We show that the analysis of homoplasy and its influence on tree inference can be formally improved with important consequences for the identification of incompatibilities between datasets. Our results suggest that modified weighting (or exclusion of characters) in cases of formally identified correlated cliques of characters may improve morphology based tree reconstruction." (Authors)] Address: Blanke, A., Zoologisches Forschungsmuseum Alexander Koenig, Zentrum für molekulare Biodiversität, Adenauerallee 160, 53113 Bonn, Germany

**12213.** Bo, T.; Fenoglio, S.; López-Rodríguez, M.J.; Tierno de Figueroa, J.M. (2012): Trophic behaviour of the dragonfly *Cordulegaster boltoni* (Insecta: Odonata) in small creeks in NW Italy. *Entomologica Fennica* 22: 255-261. (in English) ["*C. boltonii* is a widespread Odonata in Europe, which usually inhabits small lotic systems. In this study we analysed the gut contents of *C. boltoni* immature stages, collected in the Rocchetta Tanaro Natural Park (Italy, Piemonte). Two hundred and eleven individuals were collected, and their diet analyzed by dissection or clearing. Larvae appeared to be opportunistic predators, feeding on a variety of prey. Aquatic insects dominated their diet, while crustaceans, annelids, molluscs and terrestrial invertebrates were sporadically observed in the gut contents. An ontogenetic shift in the diet was detected, as small larvae consumed different prey than large ones. Our study suggests that *C. boltonii* is one of the dominant predators in the benthic communities of lowland small order streams of Piemonte, which, because of their environmental characteristics, are devoid of fish and stoneflies." (Authors)] Address: Fenoglio, S., University of Piemonte Orientale "Amedeo Avogadro", Via T. Michel, 11- 15121 - Alessandria - Italy. E-mail: [fenoglio@unipmn.it](mailto:fenoglio@unipmn.it)

**12214.** Boscardin, J.; Corrêa Costa, E.; Garlet, J.; Cunha Bolzan, L.; Nascimento Machado, D.; Pedron, L. (2012): Índices faunísticos para a entomofauna coletada em plantios de *Eucalyptus* spp. VII Congresso de Medio Ambiente de la AUGM: 14 pp. (in Portuguese, with English summary) ["The genus *Eucalyptus* has become important for the economy of Brazil. However with the increase in areas with *Eucalyptus* sp. entomological problems tend to increase in the same proportions, as crops with this kind provide conditions for adaptation of pests, thereby requiring constant monitoring through surveys of insect populations. The objective of this study is the population survey of entomofauna by using light traps in *Eucalyptus* spp. The study was conducted in three *Eucalyptus* stands, belonging to the species: *E. dunni*, *E. grandis* and *E. grandis* x *E. urophylla* (clone hybrid), with three years of age. located on the Taquari farm, in São Francisco de Assis, Rio Grande do Sul To collect entomofauna light traps were used, one in every species tested, with samples taken monthly from August 2008 to July 2009. The insects collected were analyzed using indices of frequency, abundance, diversity and constancy. During the survey, we collected 3054 individuals in eight orders (Blatodea. Coleoptera. Dermaptera, Hemiptera, Hymenoptera, Lepidoptera. and Odonata [Libellulidae], Mantodea) and 34 families. The orders with the highest number of insects were collected: Coleoptera. Lepidoptera and Hemiptera with 61.18 and 12% of the total sample respectively. The orders Coleoptera and Lepidoptera. presented the families with the most significant indices, especially the families Elateridae, Ptilodactylidae and Staphylinidae, Scarabeidae order Coleoptera and Arctiidae and Noctuidae of the Lepidoptera order. Considering the results obtained in this survey, it is concluded that the area presents major groups, some with potential to become pests, and others considered as a tool in integrated pest management of insect pests in *Eucalyptus*. contributing to reduced use of chemicals in your control." (Authors)] Address: Boscardin, J., Univ. Federal de Santa Maria (UFSM), Centro de Ciencias Rurais, Campus Universitario, Bairro Camobi, Prédio 42, sala 3223, CEP 97105-900, Santa Maria, RS, Brasil. E-mail: boscardinj@gmail.com

**12215.** Brockhaus, T. (2012): Vorwort: Bibliografie der für Deutschland publizierten Libellenliteratur (Odonata). *Libellula*, Supplement 11: 3. (in German) [Introduction to the bibliographie of odonatological literature referring to Germany.] Address: Brockhaus, T., An der Morgensonne 5, 09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**12216.** Buczyński, P.; Tończyk, G.; Buczyńska, E. (2012): Materials to the knowledge of some aquatic insects (Plecoptera, Odonata, Heteroptera, Trichoptera, Coleoptera) of the Gorce Mountains. *Teka Kom. Ochr. Kszt. Środ. Przyr. - OL PAN* 9: 16-27. (in English, with Polish summary) [In spring 2006, *Thecagaster bidentata* was the only odonate species recorded in Gorce Mountains and the Gorceński National Park, Poland.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**12217.** Buczyński, P.; Bielak-Bielecki, P. (2012): *Crocothemis servilia* (Drury, 1773) (Odonata: Libellulidae) introduced with aquarium plants to Lublin (Poland). *Annales Universitatis Mariae-Curie Skłodowska Lubin - Polonia* 67(2) (Sectio C): 21-26. (in English, with Polish

summary) ["A larva of the Oriental dragonfly *Crocothemis servilia* was found in June 2012 in a pet shop in Lublin and brought up to the imago. This is the first record of this kind in Poland. There is evidence that the species was introduced with aquarium plants." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**12218.** Cano-Villegas, F.J.; (2012): Notas sobre la situación de *Cordulegaster bidentata* Selys, 1843 (Odonata: Cordulegasteridae) en el Pirineo de Lerida (noreste de España). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)* 51: 337-339. (in Spanish, with English summary) [Data on the reproduction in the Iberian Peninsula of the European endemic species *C. bidentata* is presented for the first time. Additionally, information about the composition of one of its larval colonies in Lerida is provided, pointing out that it shares its habitat with *C. boltonii*. This could be a sign of the deterioration of its colonies in the area." (Authors)] Address: Cano Villegas, F.J., C/Montemayor, 4 1º-2; 14003-Córdoba, Spain. E-mail: ficanovi2@hotmail.com

**12219.** Chae, J.S.; Park, M.K.; Kim, H.-C.; Jung, J.-Y.; Son, H.Y.; Ryu, S.-Y.; Shin, H.-J.; Sim, C.; Park, B.-K. (2012): Infection status of metacercaria in adult dragonflies from Republic of Korea. *International Journal of Veterinary Science* 1(2): 55-58. (in English) ["The dragonfly serves as a second intermediate host of some trematodes. Seven species of dragonflies, *Sympetrum darwinianum*, *Orthetrum albistylum*, *Lyriothemis pachygastra*, *Sympetrum eroticum*, *Crocothemis servilia*, *Pantala flavescens* and *Sympetrum pedemontanum* were surveyed. The most abundant species among these dragonflies were *S. darwinianum*, *S. eroticum* and *C. servilia* (2,118 and 620 and 334 individuals, respectively). And, the least abundant dragonflies were *S. pedemontanum*, *L. pachygastra* and *O. albistylum* (25, 57 and 62 individuals, respectively). Among these intermediate hosts, *S. eroticum* had the highest infestation rate of metacercaria per individual (11.71%). The infestation rates of two dragonflies, *S. darwinianum* and *S. pedemontanum* (8.58% and 4.56%, respectively) also were higher than those of the other four species. In artificial infection studies using animal hosts, we could identify the infections of adult *P. muris* and *P. japonicus* from only mouse, in which the infestation rates of *P. muris* and *P. japonicus* were 90% and 95% among 20-tested individuals, respectively. Interestingly, adult *L. liberum* was detected from only frog, *R. nigromaculata* and the rates of the infestation in frogs were 97.5% among 50-tested frogs. These results suggest that the population size of dragonfly is an important factor to carry high burden of metacercaria. Moreover, we discussed their epidemiological implications for human and animal infections." (Authors)] Address: Sim, Cheolho, Department of Biology, Baylor University, Waco, Texas 76798, USA. E-mail: cheolhosim@baylor.edu

**12220.** Chandana, E.P.S.; Rajapaksha, A.C.D.; Samarasekera W.G.K.H. (2012): A survey of odonate assemblages associated with selected wetland localities in southern Sri Lanka. *Asian Journal of Conservation Biology* 1(2): 67-73. (in English) [28 Odonate species were recorded at five different study sites. Ceylon endemics or rare species are *Pseudagrion rubriceps*, *Euphaea splendens*, *Onychothemis tonkinensis*, *Pseudagrion malabaricum* and *Indothemis limbata*.] Address: Chandana E.P.S., Department of Zoology, Faculty of Sci-

ence, University of Ruhuna, Matara, Sri Lanka. E-mail: epschandana@zoo.ruh.ac.lk

**12221.** Chelmick, D. (2012): Views and Reviews: Fotografien Larvenhuidjes van Libellen [Photo Guide to Dragonfly Exuviae] by C. Brochard, D. Groenendijk, E van der Ploeg, & T. Termaat. KNNV Uitgeverij, 2012. 320 pp., colour images throughout, Sbk, 175x245mm. ISBN 9789050114097. €49.95. *Atropos* 47: 65-66. (in English) [book review.] Address: Chelmick, D.G., 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK. E-mail: dgc@david.chelmick.com

**12222.** Choong, C.Y.; Ng, Y.F.; Dow, R.A. (2012): Odonata (Insecta) from three forests of central Terengganu, Malaysia. *The Malayan Nature Journal* 64(2): 95-104. (in English) ["Records of Odonata collected at sites in central Terengganu, Peninsular Malaysia, in August 2011 are presented. A total of 90 species from 13 families were collected. Of these, 49 named species are the first confirmed records for Terengganu and another three species to which no definite name can be assigned at this time are also new records for the state. The collection included a new species of *Drepanosticta*, yet to be named. *Protosticta curiosa* was recorded for the first time in Malaysia. These records are combined with existing records of Odonata from Terengganu in the literature to produce a full list of the Odonata known from the state. At present 107 species from 13 families are known from Terengganu." (Authors)] Address: Choong, C.Y., School of Environmental and Natural Resource Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: rocoto98@yahoo.com

**12223.** Chun-Ying Gao, C.-Y.; Meng, G.-X.; Li, X.; Wu, M.; Liu, Y.; Li, X.-Y.; Zhao, X.; Lee, I.; Feng, X. (2012): Wettability of dragonfly wings: the structure detection and theoretical modeling. *Surface and Interface Analysis* 45(2): 650-655. (in English) ["Hydrophobic surfaces have gained extensive attention in recent decades for their potential applications. The hydrophobic properties of dragonfly's (*Pantala flavescens*) wings were measured, and the water contact angles (WCAs) of the distal and basal part of a dragonfly's wing were 134.9° and 125.8°, respectively. Images obtained by optical microscopy and scanning electron microscopy showed the microstructures and nanostructures on the wing surface. Microstructures appeared as cell block patterns, and the size of the blocks decreased from the basal to distal part. However, no significant differences of chemical composition between the two parts were detected by X-ray photoelectron spectroscopy. To understand the correlation between the structures and WCA, a double roughness structure model was built theoretically with simplified lattice patterns, and the theoretical model was well fitted with empirical wettability of the dragonfly's wing." (Authors)] Address: Feng, X., State Key Laboratory of Medicinal Chemical Biology, College of Life Science, Nankai University, Tianjin, 300071, China. E-mail: xzfeng@nankai.edu.cn

**12224.** Dehghani, R.; Zarghi, I.; Aboutalebi, M.; Barzegari, Z.; Ghanbari, M. (2012): Fauna and habitat diversity of aquatic arthropods city of Kashan in 2010. *Journal of North Khorasan University of Medical Sciences* 4(4): 603-610. (in Farsi, with English summary) [Iran; 61 out of 1724 insect samples belong to Odonata, but the results are not detailed.] Address: Zarghi, I.,

School of Health, Mashhad, University of Medical Sciences, Mashhad, Iran. E-mail: i.zarghi@gmail.com

**12225.** Dow, R.A.; Orr, A.G. (2012): The type repository of *Drepanosticta simuni* spec. nov. (Zygoptera: Platystictidae). *Odonatologica* 41(4): 347-348. (in English) [To ensure that the name *D. simuni*, described (2012) in *Odonatologica* 41: 283-291, is available, the type repository, omitted from the original description, is stated along with a diagnosis of the species. The type is deposited in Naturalis Biodiversity Centre, Leiden (RMNH).] Address: Orr, A.G., Griffith School of the Environment, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@bigpond.com

**12226.** Endersby, I. (2012): The naming of Victoria's dragonflies (Insecta: Odonata). *Proceedings of the Royal Society of Victoria* 123(3): 155-178. (in English) ["The chronology of the naming of Victoria's 76 species of Odonata is given, with short biographical notes on the authors. From a study of the original descriptions, the etymology of the 76 species and 44 genera known from the State is elucidated or inferred." (Author)] Address: Endersby, I., 56 Looker Road, Montmorency, Vic. 3094, Australia. E-mail: endersby@mira.net

**12227.** Festi, A. (2012): *Leucorrhinia pectoralis* (Charpentier, 1825) (Odonata: Libellulidae) presso il Lago di Monticolo – importante segnalazione per l'Alto Adige e l'Italia. *Gredleriana* 12: 201-208. (in Italian, with English summary) [11.05.2012, Lago Grande di Monticolo (WGS 84 46,420652 11, 285273), Province of Bolzano (Italy). Information is given about habitat, distribution in Italy and the conservation status.] Address: Festi, A., Via Penegal 7, I-39100 Bolzano, Italy. E-mail: alex.festi@rol-mail.net

**12228.** Foto, M.S.; Koji, E.; Ajeagah, G.; Bilong Bilong, C.; Njiné T. (2012): Impact of dam construction on the diversity of benthic macroinvertebrates community in a periurban stream in Cameroon. *International Journal of Biosciences* 2(11): 137-145. (in English) ["In the aim of evaluating the impact of a dam construction on the biodiversity of aquatic organisms, physicochemical variables coupled to benthic macroinvertebrates communities were analysed at the upstream and downstream of the Mefou stream dam from September 2009 to March 2010. Physicochemical results revealed a slightly acidic and well oxygenated water of the Mefou stream, being appropriated for the development of benthic macroinvertebrates organisms. Significant differences were observed for temperature and oxygen between the stations ( $P < 0.05$ ). Of the 1801 individuals collected (4 phyla, 6 classes, 13 orders, and 47 families) arthropods (99.25%) dominated, while Annelids, Nematelminths and Mollusca were less represented (2 %). The Correspondence Canonic analysis (CCA) distinguished two sections on the stream: a superior section at the upstream of the dam which is characterised by much oxygenation and abundance of Atyidea (excellent bioindicators of good quality water) ( $r = 0.04$ ;  $P < 0.05$ ); an inferior section at the downstream of the dam, dominated by rheophil organisms (odonates). The relative abundance of odonates correlated with the values of water flow rates of each station ( $r = 0.94$ ;  $P < 0.01$ ). The presence of polluo-tolerant organisms (Chironomidae and Haplotaenidae) at station 3 could reflect anthropic action at the downstream of the dam. Shannon and Weaver ( $H = 4.1 \pm 0.5$  bits) and Pielou index ( $J = 0.8 \pm 0.1$  bits) revealed favourable conditions for the coexistence of



benthic macroinvertebrates. These results could provide viable information used in evaluating the water quality of lotic systems subjected to dam construction in Cameroon." (Authors)] Address: Foto, M.S., Dept of Animal Biology and Physiology, Faculty of Science, University of Douala, P.O Box 24157, Douala, Cameroon. E-mail: sfotomen@yahoo.fr

**12229.** Franzén, M.; Molander, M. (2012): Changes in the insect fauna in Padjelanta National Park. *Entomologisk Tidskrift* 132(2): 81-112. (in Swedish, with English summary) ["Arctic ecosystems and the trophic levels structuring them have recently been severely perturbed, although a relatively large proportion of the Arctic environment is protected. Temperatures have increased two to three times more rapidly in the Arctic compared to other regions, mammal populations have declined and the tree line has shifted to higher altitudes. However, knowledge of possible changes of the insect fauna in Arctic habitats is strikingly poor. In this study we compiled data from historical and recent surveys of six major insect taxa (Lepidoptera, Coleoptera, Hymenoptera (Aculeata), Odonata, Orthoptera and Diptera (Syrphidae) recorded in Padjelanta, the largest (1984 km<sup>2</sup>) National Park in Sweden. Padjelanta is situated in the Western part of the province Lule Lappmark and is dominated by alpine vegetation, with an average altitude of 800 m.a.s.l. (range: 550-1800 m.a.s.l.). Insects in Padjelanta have been studied occasionally since the beginning of the 1940s. We carried out a follow up study of the taxa listed above between 1998 and 2008 to study possible changes in the insect fauna. A total of 398 species belonging to the studied groups have been recorded in the park. Especially species rich groups are the bumblebees and butterflies, of which 16 and 26 species have been recorded. Red Listed species were represented by eight butterflies, but several other interesting and rare species were found, including the first records of the weevil *Dorytomus tortrix* and the chrysidid wasp *Chrysis angustula* in the province Lule lappmark. Only small changes in the fauna were detected; some species of Lepidoptera, Coleoptera and Aculeate wasps seem to have colonized the area over the last 65 years, but the overall rate of colonization has been low. We discuss changes in the alpine fauna, the Red List status of alpine insect species and threats to the environment. It is concluded that the alpine insect fauna warrants further attention and should be carefully monitored since environmental changes are expected to occur at an increased rate in the future." (Authors) *Aeshna caerulea*, *Somatochlora alpestris* and *S. arctica* are listed from the National Park.] Address: Franzén, M., UFZ Centre for Environmental Research, Dept of Community Ecology, Theodor-Lieser-Str. 4, 06120 Halle, Germany. E-post: markus.franzen@ufz.de

**12230.** Futahashi, R.; Yamamaka, T.; Uemura, Y.; Hisamatsu, M. (2012): Collection and photographic data on dragonflies and damselflies from Ibaraki prefecture. *Bulletin of Ibaraki Nature Museum* 15: 13-38. (in Japanese, with English summary) ["39 odonate species have so far been reported in Ibaraki Prefecture. Here we give a comprehensive list of Odonata collected from Ibaraki Prefecture based on the collections of Ibaraki Nature Museum and the authors' private collections, which consist of 87 species and one hybrid species. We also mention the following four species which are not included in these collections: *Stylurus oculatus*, *Sympetrum uniforme*, *Libellula angelina*, and *Tholymis tillar-*

*ga*. The former three species may have become extinct in Ibaraki Prefecture, and the last species seems to be a species migrating from a southern area." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8566, Japan

**12231.** Gaffin-Cahn, E. (2012): Neural responses to looming objects in the dragonfly. Thesis, Bachelor of Science in Neuroscience, University of Rochester: (in English) ["Dragonflies have high visual acuity, which, when combined with a remarkably fast visual response, allows them to hunt small insects with a high success rate. Rather than aiming at the prey's current location, the dragonfly predicts the prey's future location and intercepts the insect mid-flight. Eight bilateral pairs of large Target-Selective Descending Neurons (TSDNs) of the dragonfly ventral nerve cord respond to small, contrasting objects, which presumably represent potential prey. These interneurons are part of the neuronal circuitry that triggers small changes in wing angle and position to control flight during prey interception. In flight, dragonflies extend their legs out to catch the prey about 20 ms before contact. The current research investigates the role of the TSDNs in prey contact. Spiking traces from the nerve cord were recorded during the presentation of expanding black circles projected on a screen, which simulate approaching prey. Several loom sizes and speeds were used to cover a range of realistic and unrealistic rates of expansion. I hypothesized that the interneurons predict the time to contact (Tc) of the simulated looming stimuli. Looming-sensitive TSDNs fired at a consistent time before Tc, supporting the hypothesis." (Author)] Address: Elon Gaffin-Cahn, E. E-mail: egaffinc@caoslab.rochester.edu

**12232.** Herrera-Grao, T.; Núria Bonada, N.; Blanco-Garrido, O.G. (2012): First record of *Trithemis kirbyi* Selys, 1891 in Catalonia (Odonata, Libellulidae). *Boln. Asoc. esp. Ent.* 36(3-4): 457-459.[Spain, Arnes (Tarragona), in early August 2012]

**12233.** Hobbelen, P.H.F.; Samuel, M.D.; Foote, D.; Tango, L.; LaPoint, D.A. (2012): Modeling the impacts of global warming on predation and biotic resistance: mosquitoes, damselflies and avian malaria in Hawaii. *Theoretical Ecology* 6(1): 31-44. (in English) ["Biotic resistance from native predators can play an important role in regulating or limiting exotic prey. We investigate how global warming potentially alters the strength and spatial extent of these predator-prey interactions in aquatic insect ecosystems. As a simple model system, we use rock pools in streams of rainforests of Hawaii, which contain *Megalagrion calliphya* as predator and the invasive southern house mosquito *Culex quinquefasciatus* as prey. This abundant mosquito is the major vector of avian malaria transmission to native forest birds. We use mathematical modelling to evaluate the potential impacts of damselfly predation and temperature on mosquito population dynamics. We model this predator-prey system along an elevational gradient (749-1952 m elevation) and assess the effect of 1°C and 2°C climate warming scenarios as well as the effects of El Niño and La Niña oscillations, on predator-prey dynamics. Our results indicate that the strength of biotic resistance of native predators on invasive prey may decrease with increasing temperature because demographic rates of predator and prey are differentially affected by temperature. Future warming could therefore increase the abundance of invasive species by re-

leasing them from predation pressure. If the invasive species is a disease vector, these shifts could increase the impact of disease on both humans and wildlife." (Authors)] Address: Hobbelen, P.H.F., Rothamsted Research, Harpenden AL5 2JQ, UK. E-mail: peter.hobbelen@rothamsted.ac.uk

**12234.** Hobson, K.A.; Anderson, R.C.; Soto, D.X.; Wassenaar, L.I. (2012): Isotopic evidence that dragonflies (*Pantala flavescens*) migrating through the Maldives come from the northern Indian subcontinent. *PLoS ONE* 7(12): e52594. doi:10.1371/journal.pone.0052594: 4 pp. (in English) ["Large numbers of *P. flavescens* appear in the Maldives every October–December. Since they cannot breed on these largely waterless islands, it has recently been suggested that they are "falling out" during a trans-oceanic flight from India to East Africa. In addition, it has been suggested that this trans-oceanic crossing is just one leg of a multi-generational migratory circuit covering about 14,000–18,000 km. The dragonflies are presumed to accomplish this remarkable feat by riding high-altitude winds associated with the Inter-tropical Convergence Zone (ITCZ). While there is considerable evidence for this migratory circuit, much of that evidence is circumstantial. Recent developments in the application of stable isotope analyses to track migratory dragonflies include the establishment of direct associations between dragonfly wing chitin  $\delta^2\text{H}$  values with those derived from long-term  $\delta^2\text{H}$  precipitation isoscapes. We applied this approach by measuring wing chitin  $\delta^2\text{H}$  values in 49 individual *P. flavescens* from the November–December migration through the Maldives. Using a previously established spatial calibration algorithm for dragonflies, the mean wing  $\delta^2\text{H}$  value of  $-117\pm 16\text{‰}$  corresponded to a predicted mean natal ambient water source of  $-81\text{‰}$ , which resulted in a probabilistic origin of northern India, and possibly further north and east. This strongly suggests that the migratory circuit of this species in this region is longer than previously suspected, and could possibly involve a remarkable trans-Himalayan high-altitude traverse." (Authors)] Address: Hobson, K.A., Environment Canada, Saskatoon, Saskatchewan, Canada. E-mail: Keith.Hobson@ec.gc.ca

**12235.** Hoffmann, J. (2013): Anmerkungen zur Beobachtung "Rotfußfalke auf nächtlicher Libellenjagd" von Martin Löschau (in *Otis* 18: 115). *Otis* 19 (2011): 135–138 (in German, with English summary) ["Our knowledge on nocturnal activities both of dragonflies as well as falcons is very fragmentary. The observed dragonflies are probably Migrant Hawkers (*Aeshna mixta*). Presumably, the observed Red-footed Falcon (*Falco vespertinus*) has joined to the migrating dragonfly swarm, which also came from eastern direction, and used this for a longer time as a food resource. Small falcons hiking with dragonfly swarms are also known from other regions. Preconditions for such nocturnal antipredation are abiotic factors such as UV-visibility." (Author) Address: Hoffmann, J., alauda, Liebigstr. 2-20, 22113 Hamburg; E-Mail: hoffmann@alauda.de

**12236.** Holuša, O.; Holušova, K. (2012): The first findings of larvae of *Cordulegaster insignis* (Odonata: Cordulegasteridae) in Macedonia. *Acta Musei Beskidensis* 4: 143–149. (in English, with Czech summary) ["Ten larvae of *C. insignis* were found on 6–VII-2012 at Novacani village near Veles town in central Macedonia. The finding of larvae of several instars shows the permanent occurrence of the species in Macedonia." (Authors)] Address:

Holuša, O., Faculty of Forestry and Wood Technology, Mendel University in Brno, Zemeědělská 3, CZ-613 00 Brno, Czech Republic. E-mail: holusao@email.cz

**12237.** Holuša, O.; Krivan, V (2012): A population of *Cordulegaster insignis* (Schneider, 1845) in Macedonia (Odonata: Cordulegasteridae). *Acta Musei Moraviae, Scientiae biologicae* (Brno) 97(2): 1–5. (in English) ["Males of the species were found at 23-V-2010 and 19-VI-2011 at Novaeani village near the town of Veles (41°45' N 21°4'56'E) in central Macedonia. The occurrence of a population and other *Cordulegaster* species in Macedonia is discussed." (Authors)] Address: Holuša, O., Faculty of Forestry and Wood Technology, Mendel University in Brno, Zemeědělská 3, CZ-613 00 Brno, Czech Republic. E-mail: holusao@email.cz

**12238.** Horne, J. (2012): Emergence, maturation time and oviposition in the Common Darter *Sympetrum striolatum* (Charpentier). *J. Br. Dragonfly Society* 28(2): 66–74. (in English) ["The most successful period of oviposition in 2005 occurred during the last half of September. However, 9% of the emergences in 2006 occurred from a pond exposed from mid-October through November 2005, indicating a second, smaller, peak of oviposition. Over the period 1990–2011 the average date for the first sighting of individuals was 17 June and the average date when first seen patrolling was 14 July. The mean time between emergence and patrolling was 28 days." (Author)] Address: Horne, J., 78 Spring Lane, Bishopstoke, Eastleigh, Hants, S050 6BB, UK

**12239.** Hull, R.; Katete, R.; Ntwasa, M. (2012): Therapeutic potential of antimicrobial peptides from insects. *Biotechnology and Molecular Biology Review* 7(2): 31–47. (in English) ["The first antimicrobial peptides were isolated from the cecropia moth *Hyalophora cecropia* in 1980. Since then a plethora of antimicrobial peptides have been isolated from other arthropods, invertebrates and chordates. With the emergence of antibiotic resistant bacterial pathogens and the promising activity of these peptides, attempts are being made to use these peptides as new antimicrobial agents. Other researchers are interested in using these peptides to improve the resistance of crops and livestock to infections, while another line of research is interested in using these peptides to control vector borne diseases. Despite the promising antibacterial, antiviral, anti-protozoan and anti-tumor activity of these peptides, relatively few peptides have made it to clinical trials. Problems associated with the development of these peptides into effective antimicrobial agents include their higher cost, proteolysis or decreased activity in physiological environments and mass production. This review (including a reference to *Aeshna cyanea*) will focus specifically on the development of insect antimicrobial peptides into useful chemotherapeutic agents." (Authors)] Address: Ntwasa, M., School of Molecular and Cell Biology, University of the Witwatersrand, Wits, 2050, South Africa. E-mail: monde@biology.wits.ac.za

**12240.** Jeziorski, P.; Holuša, O. (2012): An updated checklist of the dragonflies (Odonata) of the Czech Republic. *Acta Musei Beskidensis* 4: 143–149. (in English, with Czech summary) [26 genera of Odonata with 73 species have been recorded in the territory of the Czech Republic, 71 species from Bohemia and 69 species from Moravia.] Address: Jeziorski, P., Na Bělidle 1, CZ-735 64 Havířov-Suchá, Czech Republic. E-mail: jezirko@post.cz

- 12241.** Jia, C.Y.; Wei, C.Y. (2012): Radio tracking of large Odonata species in forest fragments in Singapore. Project Report. Submitted to Nature Society (Singapore), Junior College Category, 2012; <http://www.nss.org.sg/documents/LGD%202012%20%20Radio%20Trackin%20Odonata%20NUS%20High%20Hwa%20Chong%20Inst.pdf>: 11 pp. (in English) ["Recent advances in technology allow radio tracking to be done for larger insects. Such studies have been done on Odonata, in the open fields of the UK. However, behaviour of larger Odonates in the tropical forests of the SE Asian region is not well known, especially when away from water bodies. Difficulty arises in following these large individuals through the dense forest undergrowth as the individuals fly or perch in the canopy foliage. This study thus aims to be a pilot study in the uses of radio tracking in collecting information on the spatial and temporal behaviour of large Singaporean Odonates, in particular the *Macrogomphus quadratus*. Radio tracking is done on foot and individuals are followed for as long as a signal is detected (an average of seven days). The *M. quadratus* is likely to be a percher in terms of its feeding behaviour as can be deduced from the signals received on the tracking receiver and also from visual observations of untagged individuals. As a pioneer work in the field of radio tracking in SE Asia, we hope that future work will be aided by our findings." (Authors)] Address: Jia, C.Y., NUS High School, Hwa Chong Inst., Little Green Dot Student Research Grant, 20 Clementi Avenue 1, Singapore 129957
- 12242.** Joest, R.; Vierhaus, H.; Wrede, J. (2012): Erstnachweis des Kleinen Blaupfeils *Orthetrum coerulescens* im Arnsberger Wald. *ABU info* 33-35: 38-39. (in German) [Landkreis Soest, Nordrhein-Westfalen, Germany; records from 2010 and 2011 are documented.] Address: Joest, R., Hellweg 41, 59505 Bad Sassendorf-Lohne, Germany
- 12243.** Kang, S.-R.; King, S.L. (2012): Influence of salinity and prey presence on the survival of aquatic macroinvertebrates of a freshwater marsh. *Aquatic ecology* 46(4): 411-420. (in English) ["Salinization of coastal freshwater environments is a global issue. Increased salinity from sea level rise, storm surges, or other mechanisms is common in coastal freshwater marshes of Louisiana, USA. The effects of salinity increases on aquatic macroinvertebrates in these systems have received little attention, despite the importance of aquatic macroinvertebrates for nutrient cycling, biodiversity, and as a food source for vertebrate species. We used microcosm experiments to evaluate the effects of salinity, duration of exposure, and prey availability on the relative survival of dominant aquatic macroinvertebrates (i.e., *Procambarus clarkii*, *Cambarellus puer*, Libellulidae, Dytiscidae cybister) in a freshwater marsh of southwestern Louisiana. We hypothesized that increased salinity, absence of prey, and increased duration of exposure would decrease survival of aquatic macroinvertebrates and that crustaceans would have higher survival than aquatic insect taxon. Our first hypothesis was only partially supported as only salinity increases combined with prolonged exposure duration affected aquatic macroinvertebrate survival. Furthermore, crustaceans had higher survival than aquatic insects. Salinity stress may cause mortality when acting together with other stressful conditions." (Authors)] Address: Kang, S.R., School of Renewable Natural Resources, Louisiana State Univ. AgCenter, Rm. 307, RNR Building, Baton Rouge, LA, 70803, USA. E-mail:
- 12244.** Karube, H. (2012): Vietnamese Odonata collected in 1992-2003 surveys (3) Cordulegastridae, genus *Anotogaster* with note on its systematic grouping. *Tombo* 54: 55-69. (in English) ["Here I report the following five species of the genus *Anotogaster* from Vietnam with full descriptions; *A. sakaii* Zhou, 1988, *A. chaoi* Zhou, 1998, *A. sapaensis* sp. nov., *A. gigantea* Fraser, 1924 and *A. klossi* Fraser, 1919. Among them, *A. sapaensis* is new to science, and related for *A. nipalensis*. *A. sakaii*, *A. chaoi* and *A. gigantea* are new records for Vietnam. The female of *A. chaoi* and the male of *A. klossi* are described for the first time. In northern Vietnam, I recorded 4 species from the same mountain, such a high species diversity is a unique characteristics of Indochina region. In addition, the key for grouping of this genus is discussed." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp
- 12245.** Kim, M.; Yoo, J.-c. (2012): Diet of yellow bitterns (*Ixobrychus sinensis*) during the breeding season in South Korea. *Journal of Ecology and Field Biology* 35(1): 9-14. (in English) ["Yellow bitterns (*Ixobrychus sinensis*) are a small wetland bird common to Asian countries including South Korea, Japan, and China. The aim of this study is to describe diet of yellow bitterns during the breeding season in artificial wetland of northeastern South Korea between May to August 1999-2001. For the purposes of this paper, we observe the frequency of nest visiting by parents during the chick rearing period. A total of 98 boluses regurgitated by 52 chicks aged 1 day to 11 days after hatching form the sample and are shown to contain 323 food items. A bolus contained mean 3.8 items and weighs 0.2 g to 7.7 g. The most regularly occurring food items recorded are fish (63%) and insets (33%). In terms of fish, top mouth minnows (*Pseudorasbora parva*) and crucian carps (*Carassius auratus*) are frequently observed. In terms of insects, there are mosquitoes (Diptera), instars of dragonfly (Libellulidae), damselflies Coenagrionidae) and water bugs (*Diplonychus japonicus*). Yellow bitterns were also shown to feed on bull frogs (*Rana catesbeiana*), shrimp (Palaemonidae), and spiders (Araneae). The size of fish in a bolus ranged from 15.56 mm to 93.73 mm (mean, 37.08 mm). The amount of food can be observed to increase with the age of chicks ( $r = 0.279$ ,  $P = 0.025$ ,  $N = 64$ ) but parents did not provide larger fish as chicks grew. Parent birds visited nests more frequently when they have a larger brood ( $F_{1,21} = 14.529$ ,  $P = 0.001$ ). Our results suggest that fish is the most important prey during the breeding season and that age of chicks is related to amount of diet in yellow bitterns." (Authors)] Address: Yoo, J.-c., Korean Institute of Ornithology and Dept of Biology, Kyung Hee Univ., Seoul 130-701, Korea. E-mail: jcyoo@khu.ac.kr
- 12246.** Kipping, J.; Martens, A.; Suhling, F. (2012): Africa's smallest damselfly: a new *Agriocnemis* from Namibia (Odonata: Coenagrionidae). *Organisms Diversity and Evolution* 12(3): 301-306. (in English) [*Agriocnemis bumhilli* sp. n., a new damselfly from the Kwando River in northeastern Namibia is described. The new species is similar to *Agriocnemis angolensis* but characterized by unique male appendages, swollen abdominal segments 9 and 10, the complete absence of antehumeral stripes, and smaller size. The species is illustrated and



a photograph is provided. For comparison, an illustrated key to the other members of *Agriocnemis* within south-central Africa is provided." (Authors)] Address: Kipping, J., BioCart - Ökologische Gutachten & Studien, Albrecht-Dürer-Weg 8, D-04425 Taucha, Germany. E-mail: BioCartKipping@web.de

**12247.** Kipping, J. (2012): Zur aktuellen Verbreitung der in Fließgewässer siedelnden Libellenarten in der Umgebung von Altenburg mit besonderer Berücksichtigung von Pleiße und deren Nebengewässern (Insecta: Odonata). *Mauritiana* 23: 148-174. (in German, with English summary) ["The recent distribution of lotic dragonfly species in the surrounding of Altenburg with special account on the Pleiße River and its tributaries (Insecta: Odonata). Along the Pleiße River and its tributaries in the Altenburger Land district and adjacent areas all members of the Odonata families Gomphidae and Calopterygidae were not known to occur or extinct since the 1960th. Pollution with industrial and urban waste water was probably the main reason for decline and extinction of these species. With the regional collapse of water polluting industry in the river catchment and increasing efforts in water purification after 1990 the situation turned to the better and from this time onwards some of the species resettled formerly abandoned river stretches. The paper presented here gives an up to date overview about the recent distribution of *Gomphus pulchellus*, *G. vulgatissimus*, *Ophiogomphus cecilia* and *Calopteryx splendens* and *C. virgo* in the region. Some of the mentioned species are nowadays widely distributed and locally common. In Germany the lentic *G. pulchellus* has its easternmost occurrence near Altenburg." (Author)] Address: Kipping, J., BioCart - Ökologische Gutachten & Studien, Albrecht-Dürer-Weg 8, D-04425 Taucha, Germany. E-mail: BioCartKipping@web.de

**12248.** Klaus, D. (2012): Die Besiedlung künstlich geschaffener Kleingewässer in der Pleißeau durch Wasserinsekten und Amphibien. *Mauritiana* 23: 54-77. (in German, with English summary) ["The colonisation of artificially created ponds in the Pleiße-Floodplain by aquatic insects and amphibians. The newly created small bodies of water on the meadows of the Pleiße between Windischleuba and Remsa in 2009 were examined for their colonization by dragonflies, water bugs, water beetles and amphibians. As a result 14 species of dragonflies, 8 taxa of water bugs and 27 representatives of aquatic beetles were detected. So far only three amphibian species were found in these ponds. The insects were predominantly eurytopic and widespread species in Thuringia. But with the Scarce Blue-tailed Damselfly (*Ischnura pumilio*) - Red List of TH 3 (= "Vulnerable"), the diving beetle *Laccophilus poecilus* - RL TH: R (= "Rare"), and the green toad (*Bufo viridis*) - RL TH 1 (= "Critically endangered"), these bodies of water also presented a habitat to three species endangered in Thuringia." (Author)] Address: Klaus, D., Naturkundliches Museum Mauritium Altenburg, Parkstr. 1, 04600 Altenburg, Germany. E-mail: klaus@mauritianum.de

**12249.** Koike, S. Morimoto, H.; Goto, Y.; Kozakai, C.; Yamazaki, K. (2012): Insectivory by five sympatric carnivores in cool-temperate deciduous forests. *Mammal Study* 37(2): 73-83. (in English) ["We studied insectivory by five carnivores—the Asiatic black bear (*Ursus thibetanus*), Japanese marten (*Martes melampus*), Japanese badger (*Meles meles*), red fox (*Vulpes vulpes*), and raccoon dog (*Nyctereutes procyonoides*)—in a cool-temperate deciduous forest in Japan. From May

2003 to April 2005, we assayed 373 fecal samples (91 from bear, 158 from marten, 43 from badger, 36 from fox, and 45 from raccoon dog) for insects. Each carnivore species consumed a variety of insect species, some preferentially. Bears preferred colonial insects like ants and wasps; martens ate a variety of forest insects, such as ground beetles and arboreal insects; badgers preferred forest ground beetles; foxes ate ground beetles and grassland insects; and raccoon dogs ate a variety of species. Dietary preferences may reflect the feeding strategy, behaviour, or habitat preference of each carnivore species. Based on the habitat preferences of the insects, we could assign carnivores to particular microhabitats: bears and martens used forest in three dimensions, badgers inhabited forest in two dimensions, foxes used grassland and forest in two dimensions, and raccoon dogs inhabited grassland and forest in three dimensions. Identification of insects in feces may provide information on the dietary and habitat preferences of these carnivores.... Foxes foraged only on Coleoptera, Hemiptera, Orthoptera, and Odonata. Only foxes ate Odonata (grassland insects)." (Authors)] Address: Koike, S., Tokyo University of Agriculture and Technology, 3-5-8 Saiwai, Fuchu, Tokyo 183-8509, Japan. E-mail: koikes@cc.tuat.ac.jp

**12250.** Koleček, J. (2012): A new record of the Yellow-spotted Whiteface (*Leucorrhinia pectoralis*, Odonata: Libellulidae) in the district Vsetín (Eastern Moravia, the Czech Republic). *Acta Carpathica occidentalis* 3: 117-18. (in Czech, with English summary) [3-4 mature males were observed at the abandoned gravel pit near the Choryně village on 15.vi.2012 at altitude 270 m a.s.l.] Address: Koleček, J., Katedra zoologie, Přírodovědecká fakulta Univerzity Palackého, 17. listopadu 50, CZ-771 46 Olomouc, Czech Republic. E-mail: j.kolecek@email.cz

**12251.** Koren, T.; Trkov, D.; Vukotic, K.; Crne, M. (2012): New records of the rare dragonfly, Black Pennant – *Selysiothemis nigra* (Vander Linden, 1825) (Insecta: Odonata) in Bosnia and Herzegovina. *Natura Sloveniae* 14(2): 65-69. (in English, with Slovenian summary) [Records of the species in summer 2012 from two localities in Bosnia and Herzegovina and three in Croatia all located in the Neretva River alluvium are documented and discussed.] Address: Koren, T., University of Primorska, Science and Research Centre, Institute for Biodiversity Studies, SI-6310 Izola, Giordana Bruna 6, Slovenia. E-mail: koren.toni1@gmail.com

**12252.** Kosterin, O.E.; Chartier, G.; Holden, J.; Mey, F.S. (2012): New records of Odonata from Cambodia, based mostly on photographs. *Cambodian Journal of Natural History* 2012(2): 150-163. (in English, with Cambodian summary) ["Nine species of Odonata – *Euphaea ochracea*, *Lestes nodalis*, *Gynacantha phaeomeria*, *Gynacantha demeter*, *Microgomphus chelifer*, *Amphithemis curvistyla*, *Orthetrum triangulare*, *Rhyothemis plutonia* and *Tetrathemis platyptera* – are reported for the first time for Cambodia, raising the number of named Odonata species recorded in this country to 135. All of the new records are based on photographs taken in nature apart from *E. ochracea*, which is supported by a voucher specimen. Also based on photographs, new distributional records for 93 Odonata species are provided for a number of localities in the Cardamom Mountains: the environs of Tatoi Village in Koh Kong Province, and the environs of Ou Saom and Pramoui villages, including parts of Phnom Samkos

Wildlife Sanctuary, in Pursat Province. Ectoparasitic midges in the genus *Forcipomyia* (Pterobosca) were recorded on one species in the family Coenagrionidae and 11 species in the family Libellulidae." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**12253.** Kulijer, D.; Baker, R.A.; Zawal, A. (2012): A preliminary report on parasitism of Odonata by water mites from Bosnia and Herzegovina. *J. Br. Dragonfly Society* 28(2): 92-10. (in English) ["The following Odonata, infested with mites, have been collected from a number of sites in Bosnia and Herzegovina - *Aeshna isosceles*, *Sympetrum flaveolum*, *Coenagrion pulchellum*, *Coenagrion puella*, *Coenagrion scitulum*, *Enallagma cyathigerum*, *Erythromma najas*, *Ischnura elegans*, *Ischnura pumilio*, *Lestes dryas*, *Platycnemis pennipes*, and *Pyrrosoma nymphula*. The preferred site of mite attachment on the body is the posterior ventral surface of the thorax, behind the third pair of legs. In all but one of the species of zygopteran, mites were also found between the first and second pair and/or the second and third pair of legs and, in several species, on the abdomen. Mite loads varied for different species but preliminary results suggest that the larger anisopterans can carry more mites (in *S. flaveolum* mean 42, range 1-91) than the zygopterans, the highest recorded in the latter being in *C. pulchellum* (mean 37, range 1-68) and the lowest in *L. dryas* (mean 4, range 1-11). More mites were found on female damselflies than on males. Three distinct sizes of larval mite have been noted, indicating stages in their engorgement on the host." (Authors)] Address: Kulijer, D., National Museum of Bosnia and Herzegovina, Zmaja od Bosne 3, 71000 Sarajevo

**12254.** Kulijer, D.; Vinko, D.; Billquist, M.; Mekkes, J.J. (2012): Contribution to the knowledge of the Odonata fauna of Bosnia and Herzegovina – Results of the ECOO 2012. *Natura Sloveniae* 14(2): 23-38. (in English, with Slovenian summary) ["As a part of the 2nd European Congress on Odonatology (ECOO 2012), which was held in the beginning of July 2012 in Belgrade (Serbia), a post congress excursion to Bosnia and Herzegovina was organized. Between 6 and 12 August 2012, altogether 36 localities in three biogeographical regions throughout Bosnia and Herzegovina were surveyed, and 52 dragonfly species were found. This represents 83% of the hitherto recorded dragonfly species for the country. The most significant results are the second record and a new locality of *Somatochlora metallica*, second record of *Coenagrion hastulatum*, and first observation of the strong population of *Lindenia tetraphylla* for the country. New records of rare and/or threatened species, i.e. *Coenagrion ornatum*, *Ceriagrion tenellum*, *Caliaeschna microstigma*, *Cordulegaster heros* and *Selysiothemis nigra*, are also reported. The records of the most interesting species are briefly discussed from the aspects of biogeography and nature conservation." (Authors)] Address: Vinko, D., Slovenska 14, SI-1234 Mengeš, Slovenia; E-mail: damjan.vinko@gmail.com

**12255.** Laister, G. (2012): Ortstreue und Ortswechsel von *Cordulia aenea* an Fortpflanzungsgewässern (Odonata: Corduliidae). *Libellula* 31(3/4): 155-178. (in German, with English summary) ["In a five-year study, data on site fidelity and change of location in *C. aenea* during the pre-reproductive and reproductive period was

collected using capture mark-recapture method. Five ponds, which were preferentially investigated in pairs in different years, were included in the study. Teneral individuals of *C. aenea* were marked at the pond that harboured the largest population. Immigration, unequal probability of individuals to gain a territory and mortality during pre-reproductive period presumably had the widest influence on the recapture rate of males marked as tenerals. Emigration was proved only to a lesser degree towards nearby ponds. In summary, it can be concluded that in spite of low recapture rates of teneral marked males we cannot assume that emigration plays a major part in the composition of a large population. In adult males site fidelity including an exchange of individuals between closely neighbouring ponds was found." (Author)] Address: Laister, G., Stadtgärten Linz, Abteilung Botanischer Garten und Naturkundliche Station, Roseggerstr. 20-22, A-4020 Linz, Austria. E-mail: Gerold.Laister@mag.linz.at

**12256.** Laister, G. (2012): Ortstreue und Gewässerwechsel von *Cordulegaster boltonii* (Odonata: Cordulegastriidae). *Libellula* 31(3/4): 113-130. (in German, with English summary) ["Site fidelity and movement to other brooks in *Cordulegaster boltonii* (Odonata: Cordulegastriidae) – In the year 2000, at three brooks in the area of Linz, Austria, site fidelity and movement to other brooks has been investigated. The brooks have been of different width and because of their characteristics of different suitability for *Cordulegaster boltonii*. It has been shown that site fidelity and movement to other brooks depends on how much a habitat meets the ecological needs of the species. Site fidelity was highest for males at the apparently favoured habitat. Ratio of males moving to other brooks was highest at brooks which represented less typical habitats. Some males have been found more frequently and for a longer time at the brook than other males." (Author)] Address: Laister, G., Stadtgärten Linz, Abteilung Botanischer Garten und Naturkundliche Station, Roseggerstr. 20-22, A-4020 Linz, Austria. E-mail: Gerold.Laister@mag.linz.at

**12257.** Lambert, J.L.; Neveu, G.; Millard, R.; Genin, C. (2012): Première preuve de l'indigénat d'*Ophiogomphus cecilia* (Fourcroy, 1785) dans le Jura Franc-Comtois (Odonata, Anisoptera : Gomphidae). *Martinia* 28(1): 41-48. (in French, with English summary) ["*O. cecilia* is reported from the Hérisson River, a major tributary of the Ain River, Jura mountains, eastern France, 2011. This is the first evidence of the reproduction in the Jura mountains, as previously only a dead imago was known from the mouth of the Loue River in the Doubs River." (Authors)] Address: Lambert, J.L., Onema, Service départemental de la Marne, F- 51520 La Veuve ; <jean-luc.lambert@onema.fr

**12258.** Lankika, M.D.H.; Karunaratne, M.M.S.C.; Conniff, K. (2012): Species composition of Odonate fauna in Meegahawatta, a wetland Aaea in Hanwella, Sri Lanka. *Journal of Tropical Forestry and Environment* 2(2): 37-42. (in English) ["Approximately 120 species of Odonata have been recorded in Sri Lanka to date. There are many gaps in our knowledge of Odonata taxonomy and distribution. The present study, therefore, was carried out to investigate adult Odonata species present in Meegahawatta area (1000m<sup>2</sup>) in Hanwella. The study was carried out using two fixed quadrats (20m x 10m) randomly established in two selected sites. Total number of individuals belonging to each species was counted fortnightly by using binoculars. A total of 27 species,

11 Zygoptera and 16 Anisoptera representing eight families were recorded. This comprised of three endemic Zygopteran species (*Libellago adami*, *Pseudagrion rubriceps ceylonicum* and *Prodiasineura sita*) and three endemic anisopteran species (*Epophthalmia vittata cyanocephala*, *Cyclogomphus gynostylus* and *Macrogomphus lankanensis*). Among those identified was one recently discovered and yet un-described Archibasis species. Of the three endemic Anisopteran species recorded, *C. gynostylus* and *M. lankanensis* are listed as vulnerable species in the IUCN Redlist of 2010. Although the Zygopterans showed higher Diversity Index and Evenness Index ( $H' = 1.99$ ,  $E = 0.83$ ) than the Anisopterans ( $H' = 1.96$ ,  $E = 0.32$ ), their Richness Index ( $R = 1.67$ ) was less than that of the Anisopterans ( $R = 2.49$ ). The most common Zygopteran species recorded was *Pseudagrion malabaricum* whereas *Neurothemis tulia tulia* was the most common anisopteran species." (Authors)] Address: Lankika, M.D.H., Department of Zoology, University of Sri Jayewardenepura, Nugegoda, Sri Lanka. E-mail: harshi87@hotmail.com

**12259.** Maag, N.; Gehrler, L.; Woodhams, D.C. (2012): Sink or swim: a test of tadpole behavioral responses to predator cues and potential alarm pheromones from skin secretions. *J. Comp. Physiol. A Neuroethol. Sens. Neural Behav. Physiol.* 198(11): 841-846. (in English) ["Chemical signalling is a vital mode of communication for most organisms, including larval amphibians. However, few studies have determined the identity or source of chemical compounds signalling amphibian defensive behaviours, in particular, whether alarm pheromones can be actively secreted from tadpoles signalling danger to conspecifics. Here we exposed tadpoles of the common toad *Bufo bufo* and common frog *Rana temporaria* to known cues signalling predation risk and to potential alarm pheromones. In both species, an immediate reduction in swimming activity extending over an hour was caused by chemical cues from the predator *Aeshna cyanea* (dragonfly larvae) that had been feeding on conspecific tadpoles. However, *B. bufo* tadpoles did not detectably alter their behaviour upon exposure to potential alarm pheromones, neither to their own skin secretions, nor to the abundant predator-defence peptide bradykinin. Thus, chemicals signalling active predation had a stronger effect than general alarm secretions of other common toad tadpoles. This species may invest in a defensive strategy alternative to communication by alarm pheromones, given that Bufonidae are toxic to some predators and not known to produce defensive skin peptides. Comparative behavioural physiology of amphibian alarm responses may elucidate functional trade-offs in pheromone production and the evolution of chemical communication." (Authors)] Address: Maag, N., Institute of Evolutionary Biology & Environmental Studies, University of Zürich, Winterthurerstr. 190, 8057 Zürich, Switzerland. E-mail: nino.maag@gmx.ch

**12260.** Machado, A.B.M. (2012): A new species of *Ischnura* (Odonata: Coenagrionidae) from high altitude eastern Andes, of Colombia. *Zoologia* 29(6): 598-600. (in English) ["*Ischnura mahechai* sp. nov. is described and illustrated based on specimens collected at the Eastern Andean mountain range of Colombia. The species is close to *Ischnura cruzi* De Marmels, 1987 but differs from it by the structure of male anal appendages and female hind prothoracic lobe. The specimens were collected on a small Andean lake at 3,600 m, the 4th alti-

tudinal record for a resident odonate." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Instituto de Ciências Biológicas, Univ. Federal de Minas Gerais. Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brasil. E-mail: angelo@icb.ufmg.br

**12261.** Mäkinen, J. (2012): Eteläntytökorento (*Coenagrion puella*) Suomessa [Coenagrion puella in Finland]. *Crenata* 5: 4-7. (in Finnish) [In Finland *C. puella* was a very rare and local species for many decades. It was first recorded in 1958 in Vehkalahti, where a population was found in a small river. The next two populations were also discovered in small streams in south-eastern Finland. *C. puella* was classified as endangered in the Finnish Red List between the years 1986 and 2001. In 2002 it began to expand its range rapidly. Within one decade it has become a common species in the Helsinki area. At present the northern border of the range (excluding the old population in Mäntyharju, still the northernmost in Finland) is 70-80 km north from the southern coast. The average speed of the expansion is estimated to have been 5-6 km per year during the past 11 years. (Asmus Schöter)] Address: makisenjussi@gmail

**12262.** Mäkinen, J., M. Friman, S. Karjalainen & J. (2012): Rahkonen (2012) Sudenkorentokatsaus 2011 [Report of dragonfly records made in Finland in 2011]. *Crenata* 5: 8-28. (in Finnish) [This article presents the most interesting Odonata records from Finland in 2011. Two new additions to the Finnish fauna were found: *Lestes virens* and *Sympetrum fonscolombii*. *L. virens* was recorded in Vantaa (27-28 August, by Miikka Friman) and *S. fonscolombii* in Helsinki (9 October, by Timo Päivinen). Only one individual of both species was observed. During 2011 seven new provincial records were made. These include the second observation of *Sympetrum pedemontanum* in Finland (Liperi, 27 July, by Kari Manner). A total of 59 dragonfly species have been recorded in the country by the end of 2011. (Asmus Schöter)] Address: makisenjussi@gmail

**12263.** Marinov, M. (2012): Description of female *Hemicordulia hilaris* Lieftinck, 1975 (Anisoptera: Corduliidae) with brief notes on the biogeography of the genus. *Rec. Auckland Mus.* 48: 97-105. (in English) ["Three *Hemicordulia* specimens in the Auckland Museum, collected from the Cook Islands and Fiji, were compared with recently sampled material from Fiji, Tonga and New Caledonia. They were determined to be conspecific with *H. hilaris*, originally described from New Caledonia and confirmed for other parts of the Pacific – Fiji, Samoa and Tonga. The female of *H. hilaris* is described here for the first time and morphological features that separate the species from other congeners are discussed." (Author)] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

**12264.** Martens, A.; Schiel, F.J. (2012): Erste Ansiedlung der Quagga-Muschel *Dreissena rostriformis bugensis* (Andrusov) an einem isolierten See in Mitteleuropa (Bivalvia: Dreissenidae). *Lauterbornia* 75: 109-111. (in German, with English summary) ["On 27-05-2012 a specimen of *Dreissena rostriformis bugensis* attached on a dragonfly exuvia was recorded at a gravel-pit lake near Dettenheim north of Karlsruhe, Germany. In autumn 2012, the mussel was recorded at the underside of angler's boats and on aquatic vegetation in big numbers. The lake had no water exchange with the



River Rhine, and was used for gravel dredging, swimming, fishing with boats and sailing. This is the first record of *D. rostriformis bugensis* from an isolated lake in Central Europe." (Authors)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**12265.** Martens, A.; Zinecker, A. (2012): Springbrunnen – ein städtisches Extremhabitat als Entwicklungsgewässer von *Sympetrum fonscolombii* (Odonata: Libellulidae). *Libellula* 31(3/4): 211-221. (in German, with English summary) ["Waterspout fountains: an extreme urban habitat as breeding site of *Sympetrum fonscolombii* in Central Europe (Odonata: Libellulidae) – In September 2012, exuviae and fullgrown larvae of *S. fonscolombii* were found at fountains in the palace gardens of Karlsruhe, Bruchsal, Schwetzingen and Ludwigsburg, Baden-Württemberg, Germany. In Bruchsal the species emerged until 24-x-2012. Waterspout fountains are artificial urban habitats and form an extreme: They are filled with water between April and October and they are extremely poor in structures, microhabitats and species. So far, there were no reports of breeding odonates in that special type of urban waters. Having a rapid egg and larval development, *S. fonscolombii* prefers temporal ponds and is well-adapted to use these waters for successfully breeding; therefore, it profits from this urban habitat." (Authors)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, 76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**12266.** Martens, A. (2012): *Lestes macrostigma* (Eversmann, 1836) (Odonata, Zygoptera: Lestidae) en tant qu'hôte de *Forcipomyia paludis* (Macfie, 1936) (Diptera: Ceratopogonidae). *Martinia* 28(2): 107-108. (in French, with English summary) ["On 25 May 2010 in the National Natural Reserve of the Marais du Vigueirat (Carnegie, Southern France), photographs of several pre-reproductive *L. macrostigma* were taken having ceratopogonids –or biting-midges– on their wings." (Author)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**12267.** Masunaga, K. (2012): The dragonfly and damselfly faunas of Lake Biwa and their long-term changes. In Kawanabe, H., M Nishino & M. Maehata (eds.): *Lake Biwa: Interactions Between Nature and People*. Springer: 117-118. (in English) [The Odonata fauna in Lake Biwa is summarized. "Ninety-nine species were recorded in 2000 from Shiga Prefecture, which surrounds the lake. Five species are treated as endangered, six as vulnerable species, and five as near threatened species in the 2005 edition of the Red Data Book Shiga. Ongoing threats to these insects, particularly their aquatic young, include deteriorating water quality, loss of aquatic habitats, and predation by nonnative species of fish." (Author)] Address: Masunaga, K., Lake Biwa Museum, 1091 Oroshimo-cho. Kusatsu. Shiga 523-0001, Japan. E-mail: moai@lbm.go.jp

**12268.** Matushkina, N.A.; Buy, D.D.; Borysenko, N.N. (2012): Current status of the dragonfly (Insecta, Odonata) fauna of the Kanive Nature reserve and vicinities. *Nature Reserves in Ukraine* 18(1-2): 87-91. (in English, with Ukrainian and Russian summaries) ["Forty dragonfly species are recorded from the Kanev Natural Reserve and vicinities, three of which (*Erythromma viridulum*,

*Somatochlora flavomaculata*, and *Stylurus flavipes*) were reported for the first time. Notes on biogeographic affinities, ecology and behaviour were added for these species. Current findings of some dragonfly species (*Sympecma fusca*, *Aeshna affinis*, *Brachytron pratense*, *Somatochlora metallica*, *Crocothemis erythraea*, and *Orthetrum albistylum*), rare or locally distributed in the Reserve, are added. Current status of the odonata fauna of the Reserve is discussed from the position of environment changes." (Authors)] Address: Matushkina, Natalia A., Department of Zoology, Biological Faculty, National Taras Shevchenko University of Kyiv, vul. Volodymyrs'ka, 64, Kyiv UA-01033, Ukraine. E-mail: odonataly@gmail.com

**12269.** McTavish, E.J.; Smith, G.K.; Guerrero, R.F.; Gering, E.J. (2012): Flight morphology variation in a damselfly with female-limited polymorphism. *Evolutionary Ecology Research* 14: 325-341. (in English) ["Background: Female-limited colour polymorphisms occur in many species of Odonata. Often one female morph appears male-like in coloration (androchromes) whereas one or more others are distinct from males (gynochromes). These androchromes are hypothesized to be male-mimics, thereby avoiding the harassment of excessive male mating attempts. Organism: *Ischnura ramburii*, Rambur's fork-tail, is a widespread New World species with androchrome and gynochrome females. It was introduced to the Hawaiian Islands in the mid-1970s and females were thought to be exclusively gynochromatic there. Questions: How do males and females differ in their flight apparatus? Do females with different colour morphologies also differ in flight morphology? Hypothesis: Because male-like coloration is sometimes associated with male-like flight behaviours, androchrome females should have more male-like wings than gynochrome females. Methods: We caught individuals of *I. ramburii* in the field from seven populations on three of the Hawaiian Islands and three populations in Texas (part of its native range). Using digitized wing and body images, we compared body size, wing size, and wing shape between sexes, between female morphs, and among geographic regions. Results: Male *I. ramburii* are smaller than females and have smaller, more slender wings. Although androchromes are absent from the Big Island of Hawaii, both androchrome and gynochrome females are common on Oahu and Kauai. Androchrome females are indistinguishable from gynochrome females in all aspects of their flight apparatus except for forewing size, which is smaller than that of gynochromes and thus more-male like. Wing shape and size vary geographically. Body- and wing-size differences between males and females are consistent across regions, although the degree and direction of sexual dimorphism in wing shape are not." (Authors)] Address: Guerrero, R.F., Univ. of Texas at Austin, Section of Integrative Biology, One University Station, C0930, Austin, TX 78712, USA. E-mail: r.guerrero@utexas.edu

**12270.** Mezquita-Aranburu, I.; Ocharan, F.J. (2012): Odonates from Gipuzkoa. *Munibe (Ciencias Naturales-Natur Zientziak)* 60: 51-75. (in Spanish, with English and Euskarian summaries) ["We present data on 42 species of Odonata found in Gipuzkoa (Basque Country, Spain) during a study conducted between 2006 and 2011, and also we do a literature review. Overall, 43 species have been detected, 21 Zygoptera (9 of them first seen in Gipuzkoa) and 22 Anisoptera (13 of them

first seen in Gipuzkoa). Particularly interesting are *Coenagrion mercuriale*, *C. scitulum*, *Oxygastra curtisii* and *Orthetrum albistylum*." (Authors)] Address: Mezquita-Aranburu, I., Sociedad de Ciencias Aranzadi / Aranzadi Zientzia Elkarte, Departamento de Entomología / Entomologia Departamentua, Zorroagagaina 11 • 20014 Donostia / San Sebastián, Spain. E-mail: mezquitaaranburu@gmail.com

**12271.** Mielewicz, M.; Liebisch, F.; Walter, A.; Greven, H. (2012): Infrarot (NIR)-Reflexion bei Insekten — phänetische Untersuchungen an 181 Arten. *Entomologie heute* 24: 183-216. (in German, with English summary) ["We tested a camera system which allows to roughly estimate the amount of reflectance properties in the near infrared (NIR; ca. 700-1000 nm). The effectiveness of the system was studied by taking photos of 165 insect species including some subspecies from museum collections (105 Coleoptera, 11 Hemiptera (Pentatomidae), 12 Hymenoptera, 10 Lepidoptera, 9 Mantodea, 4 Odonata, 13 Orthoptera, 1 Phasmatodea) and 16 living insect species (1 Lepidoptera, 3 Mantodea, 4 Orthoptera, 8 Phasmatodea), from which four are exemplarily pictured herein. The system is based on a modified standard consumer DSLR camera (Canon Rebel XSi), which was altered for two-channel colour infrared photography. The camera is especially sensitive in the spectral range of 700-800 nm, which is well-suited to visualize small scale spectral differences in the steep of increase in reflectance in this range, as it could be seen in some species. Several of the investigated species show at least a partial infrared reflectance. NIR-reflectance is especially pronounced in specimens of an overall white, red, orange and yellow colouration, but was also found in numerous green insects (e.g. the leaf katydids *Ancylecha fenestrata* and *Stipnochlora coulouiana* and the walking leaf *Phyllium celebicum*). In contrast, other green wings, as for example the metallic green wings of the butterfly *Troides priamus* or the metallic green elytra of several jewel beetles such as *Chrysaspis aurovittata*, do not reflect NIR-radiation... 3.2.5. Odonata (museum specimen): In contrast to the yellow spots on the abdomen of a female *Libellula depressa*, the dark body parts of Odonata species did not show any NIR-reflectance. Whitish transparent exuviae of various unclassified species generally showed a high reflectance (data not shown)." (Authors)] Address: Mielewicz, M., ETH Zürich, Institute of Agricultural Sciences, Universitätstr. 2, CH-8092 Zürich, Switzerland. E-Mail: michaemi@ethz.ch

**12272.** Moenickes, S.; Frassl, M.; Schlieff, J.; Kupisch, M.; Mutz, M.; Suhling, F.; Richter, O. (2012): Temporal patterns of populations in a warming world: a modelling framework. *Marine Biology* 159(11): 2605-2620. (in English) ["In this paper, we present an approach for describing the environmentally induced temporal pattern of structured populations by partial integro-differential equations. Populations are structured according to size or stage. Growth, energy allocation and stage transitions are affected by environmental conditions of which temperature, photoperiod, water depth and food supply were taken into account. The resulting modelling framework was applied to describe, analyse and predict alterations in populations with continuous development, populations with distinct state structures and interacting populations. Our exemplary applications consider populations of freshwater Amphipoda, Isopoda and Odonata. The model was capable of simulating life cycle altera-

tions in dependence on temperature in interaction with other environmental factors: (1) population dynamics, (2) seasonal regulation, (3) water depth-dependent dispersal, (4) intraguild predation and (5) consumer-resource dynamics." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**12273.** Mohamed, Z. Y.A.; Osman, K.S.M.; Mohamed, I.E.E.; Bakry, S.M. (2012): Impact of water-pH values on the consumption capacity of certain aquatic insects preying on different medical snails. *Journal of Evolutionary Biology Research* 4(3): 39-51. (in English) ["The main aim of this work was to determine the consumption capacity of five aquatic insects (as predators) on four species of medical snails (as preys) tested under four values of pH at a constant and controlling temperature in the laboratory. The predators were represented by adults of two hemipterous species (*Limnogeton fieberi* Mayr, *Sphaerodema urinator* Duf.) and three larval odonatus species (*Anax imperator*, *Crocothemis erythraea* and *Ischnura pumilio*). Moreover, the four water-pH values were 5, 7, 9, and 11 at 30°C. On the other hand, the four prey of the medical snails were *Bulinus truncatus* Audouin, *Biomphalaria alexandrina* Ehrenb, *Cleopatra bulimoides* Olivier and *Melanoides tuberculata* Muller. All of individual fauna were collected from the River Nile in Qena. The acidic media were adjusted as a mixture of three acids phosphoric acid acetic acid boric acid. In contrast, the alkaline solution was prepared by sodium hydroxide. The results illustrate that, the maximum predation occurred under 7 pH and 9 pH at 30°C regardless of the laboratory conditions. It appeared that *Bulinus truncatus* was highly preferable snail species to these predators. *Biomphalaria alexandrina* which is the intermediate host of *Schistosoma mansoni* Bilharz, may be the lastly preferable snail species to these predators. The belostomatids (*Limnogeton fieberi* and *Sphaerodema urinator*), and the odonats (*A. imperator*, *C. erythraea* and *I. pumilio*), could be the highest successful predators on the harmful snails (*Bulinus truncatus*, *Melanoides tuberculata*, *Biomphalaria alexandrina* and *Cleopatra bulimoides*). Therefore, its use should be encouraged to be reared in large numbers and then released in the natural places of snails under 7 to 9 range values of water pH." (Authors)] Address: Mohamed, Z. Y., Zoology and Entomology Dept, Faculty of Science in Qena, South Valley University Egypt

**12274.** Moreno Pallares, M.I.; Guillot Monroy, G.H., (2012): Distribución espacial y temporal de náyades de odonatos en los humedales La Vaca y Santa María del Lago, Bogotá, Colombia. *Acta biol. Colomb.* 17(2): 281-294. (in Spanish, with English summary) ["We evaluated the spatial and temporal variation in communities of dragonfly's naiads and their association to the habitat rehabilitation status in LaVaca and Santa María del Lagowetlands. Four samplings were carried out in several sites of each during a year. Macroinvertebrates were collected at the entry and exit flow, and in open waters of the wetlands using standard techniques. We found a gradient in the distribution of the abundance of nymphs in both wetlands, where naiads community had the highest number of individuals in the places located farther from the dumping sites. Comparing the community composition between wetlands La Vaca and Santa María del Lago through the beta diversity, heterogeneity was found in both ecosystems. The gradient in the

distribution of the abundance of naiads observed in both wetlands fits with to a response of the species in terms of tolerance to the environmental variables." (Authors)] Address: Moreno Pallares, Maria, Universidad Nacional de Colombia, Sede Bogotá, carrera 30 # 45-03, Bogotá-Colombia, Edificio 421, oficina 205, extensión 11319. E-mail: mimorenop@unal.edu.co

**12275.** Murashige, T. (2012): The record of an aberrant dark form of male *Ischnura senegalensis* (Rambur). Tombo 54: 70. (in Japanese, with English summary) ["An aberrant dark form of the male of *Ischnura senegalensis* was recorded from Kishiwada city, Osaka prefecture, Japan. This specimen has a uniformly black coloration on the whole head, synthorax, legs, basal abdomen and its dorsum, with only faintly bluish parts on the 8th and 9th segments. The green colour of typical specimens is totally absent and replaced by black." (Author)] Address: not stated

**12276.** Nilsson, V. (2012): Thermal adaptation along a latitudinal gradient in damselflies. Doctoral thesis. Umeå University, Faculty of Science and Technology, Department of Ecology and Environmental Sciences: XII + 35 pp. (in English) ["Understanding how temperature affects biological systems is a central question in ecology and evolutionary biology. Anthropogenic climate change adds urgency to this topic, as the demise or success of species under climate change is expected to depend on how temperature affects important aspects of organismal performance, such as growth, development, survival and reproduction. Rates of biological processes generally increase with increasing temperature up to some maximal temperature. Variation in the slope of the initial, rising phase has attracted considerable interest and forms the focus of this thesis. I explore variation in growth rate-temperature relationships over several levels of biological organization, both between and within species, over individuals' lifetime, depending on the ecological context and in relation to important life history characteristics such as generation length and winter dormancy. Specifically, I examine how a clade of temperate damselflies have adapted to their thermal environment along a 3,600 km long latitudinal transect spanning from southern Spain to northern Sweden. For each of six species, I sampled populations from close to the northern and southern range margin, as well from the centre of the latitudinal range. I reared larvae in the laboratory at several temperatures in order to measure individual growth rates. Very few studies of thermal adaptation have employed such an extensive sampling approach, and my finding reveal variation in temperature responses at several levels of organization." (Author)] Address: Nilsson, V., Dept of Ecology & Environ. Sci., Animal Ecology Group, Umeå Univ., 90187 Umea, Sweden. E-mail: viktor.nilsson@emg.umu.se

**12277.** Nishadh, K.A.; Das, K.S.A. (2012): Metazoan community composition in tree hole aquatic habitats of Silent Valley National Park and New Amarambalam Reserve Forest of the Western Ghats, India. Journal of Threatened Taxa 4(14): 3312-3318. (in English) ["In a study of the metazoan community composition in tree hole aquatic habitat of a tropical rainforest, Silent Valley National Park, and the adjacent moist deciduous forest, New Amarambalam Reserve Forest, of the Western Ghats, 28 different species were recorded from 150 tree hole aquatic habitats with an average of 3-5 species per tree hole. Most of the recorded organisms (96.8%) belong to Odonata (no details on more detailed

taxonomic units), Heteroptera, Diptera, Coleoptera and Trichoptera. The study reports the first record of toe-winged beetle larvae (Ptilodactylidae) in a tree hole aquatic habitat. The most significant observation is the prolific occurrence of trichopteran larvae as the second most abundant taxa in tree holes of Silent Valley National Park, and this stands as the first comprehensive record of the entire order in the habitat studied. The study upholds the importance of less explored microhabitats in the Western Ghats region in terms of sustaining unique community composition in the most delicate and extreme habitat conditions. It also puts forward important ecological research questions on biodiversity ecosystem functionality which could impart important lessons for managing and conserving the diminishing tropical evergreen forests which are significant for these unique habitats." (Authors)] Address: Das, K.S.A., Centre for Conservation Ecology, Department of Zoology, M.E.S. Mampad College, Malappuram, Kerala 676542, India. E-mail: dasksa@gmail.com

**12278.** Nössing, T.B.; Festi, A.; Winkler, F.; Haller, R.; Lösch, B. (2012): Die Libellen (Odonata) der Etschtalsole zwischen Meran und Salurn (Südtirol, Italien). Gredleriana 12: 185-200. (in German, with English summary) ["The dragonfly fauna of the Adige valley in a total of 41 locations between Merano and Salorno (South Tyrol, Italy) was analyzed in the period 2009 -2011. The current species composition was compared with historical data. 40 species in the area could be identified, 33 of which can be classified as certainly or probably autochthonous for the area. As expected the wetland complexes of the biotopes Kalterer See and Castelfeder are the most species-rich sites. On the other hand the channels and the small wet biotopes showed a relatively poor dragonfly community. Compared to the historical data, the typically riverine species and the species of periodically flooded habitats have disappeared or result very rare in the present dragonfly fauna. The decline of these species may be associated with changes in the landscape and the changing of farming methods in the Adige valley." (Authors)] Address: Nössing, Tanja, Nicolodistr. 47, I-39100 Bozen, Italy. E-mail: tanja.noessing@rolmail.net

**12279.** Norgret, J.-Y.; Vitzthum, S. (2012): Insectes remarquables de Lorraine & d'Alsace. Édition serpenoise: 247 pp. (in French) [The book briefly introduces into habitats and Odonata species of northeastern France] Address: Édition serpenoise, BP 70090, 57004 Metz Cedex I

**12280.** Novak, C.W.; Goater, T.M. (2012): Introduced bullfrogs and their parasites: *Haematoloechus longiplexus* (Trematoda) exploits diverse damselfly intermediate hosts on Vancouver Island. Journal of Parasitology 99(1): 59-63. (in English) ["The lung fluke, *Haematoloechus longiplexus*, is the most prevalent and abundant parasite of introduced bullfrogs on Vancouver Island, British Columbia, Canada. The ecological success of this trematode in invasive bullfrogs is related to the fluke's ability to utilize native intermediate hosts for transmission. The purpose of this study was to identify the odonate species involved in the transmission of *H. longiplexus* to the introduced bullfrog. The prevalences and mean intensities of 21 species of odonates (nymphs and adults) were examined for metacercariae infections. *Haematoloechus longiplexus* is a second intermediate host specialist, being found only in damselflies. Six damselfly species exhibiting the 'climber' ecological



habit were identified as second intermediate hosts of *H. longiplexus*. *Enallagma carunculatum* (prevalence = 75.0%, mean intensity =  $17.2 \pm 10.8$ ), *Ischnura cervula* (65.2%,  $8.9 \pm 4.3$ ), *Ischnura perparva* (45.5%,  $15.4 \pm 10.3$ ), and *Enallagma boreale* (40.7%,  $4.8 \pm 7.8$ ) were the most commonly infected damselfly species. Metacercariae were absent in damselflies collected from sites lacking bullfrogs. *Haematoloechus longiplexus* was likely introduced along with the bullfrog, and subsequently adapted to the physid snail and diverse damselfly intermediate hosts present in ponds on Vancouver Island." (Authors) Address: Novak, C.W., Biology Dept, Vancouver Island University, Nanaimo, British Columbia, Canada V9R 5S5. E-mail: colin.novak@viu.ca

**12281.** Ogawa, H.; Nosaka, M.; Hashii, N.; Yokoyama, M.; Tsurusaki, N. (2012): Records of faunal survey of insects of Tottori Sand Dunes in 2011 with comments to the fauna of "Sakyu Oasis". *Natural History Research of San'in* 7: 31-40. (in Japanese, with English summary) ["On the basis of faunal surveys of Tottori Sand Dunes in 2010, a total of 83 species of insects are recorded. The number includes 21 insect species that were previously unknown from the sand dune area. Some remarks are made for the aquatic communities and orthopteran fauna in and around a pool called "Oasis", which is formed all year round except for the hottest season from mid July to September at the depression just below a ridge called "Umanose"."] (Authors) Three Odonata species were recorded: *Ischnura senegalensis*, *Pantala flavescens*, *Sympetrum risi*.] Address: Tsurusaki, N., Laboratory of Biology, Faculty of Regional Sciences, Tottori University, Koyama-Minami 4-101, Tottori, 680-8551 Japan. E-mail: E-mail: ntsuru@rstu.jp

**12282.** Olberg, S.; Lønnve, O.J. (2012): *Ischnura pumilio* (Charpentier, 1825) (Odonata, Coenagrionidae) in Norway. *Norwegian Journal of Entomology* 59: 229-233. ["A male of *I. pumilio* was captured near a pond at the bottom of a sandpit at Bergsdalen in Nittedal, north of Oslo, on 30 May 2012. The following month, several imagines were spotted and nymphs were caught in the pond. The species is new to the Norwegian fauna."] (Authors) The paper also provides a recent distribution map of the species covering Sweden and Norway.] Address: Olberg, S., BioFokus, Gaustadalléen 21, NO-0349 Oslo, Norway. E-mail: stefan@biofokus.no

**12283.** Olthoff, M.; Ikemeyer, D. (2012): Dragonflies of a peat bog in northwestern Turkey (Odonata: Anisoptera, Zygoptera). *Zoology in the Middle East* 57: 142-146. (in English) [37 Odonata species were recorded in 2011 in the peat bog around Yenicaga lake, province Bolu, northwest Turkey ( $40^{\circ}47'N$ ,  $32^{\circ}1'E$ ). *Ischnura elegans*, *Coenagrion puella*, *Erythromma viridulum* and *Sympetrum sanguineum* were the most abundant species. *Leucorrhinia pectoralis*, *Cordulia aenea*, *Coenagrion pulchellum*, *C. scitulum*, *Pyrrhosoma nymphula*, *Lestes sponsa*, *L. dryas* and *Libellula quadrimaculata* are remarkable due their regional rarity or arealgeographic position in Turkey.] Address: Olthoff, M., Biologische Station Zwillbrock e.V., Zwillbrock 10, 48691 Vreden, Germany. E-mail: matthias.olthoff@gmx.de

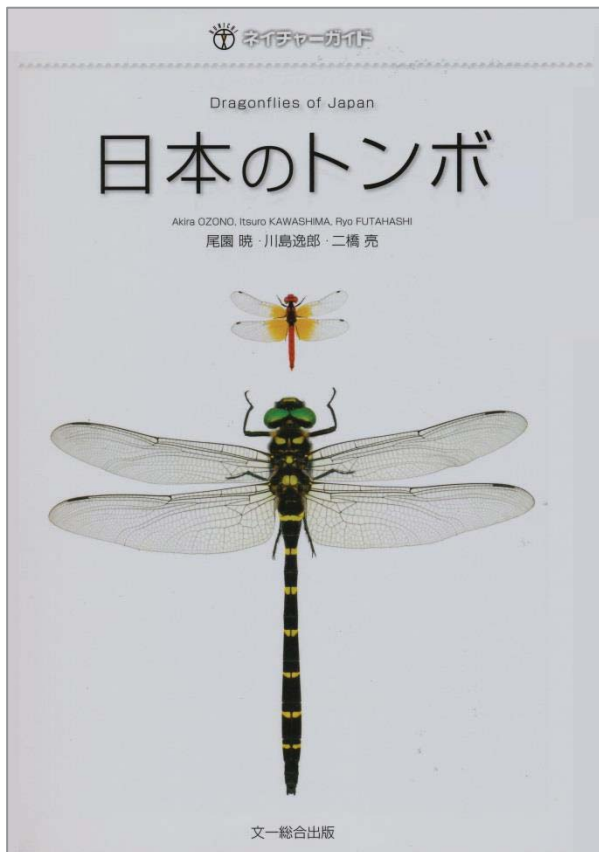
**12284.** Omopariola, C.A. (2012): Survey of Aquatic Insects of Ogun River Nigeria and Its Physico-Chemical Properties. Undergraduate These, Biological Sciences, Federal University of Agriculture, Abeokuta: (in English) [Nigeria; "This study was carried out to determine the abundance, composition, distribution of aquatic insects

and physico - chemical factors of Ogun River. The aquatic insects were collected using sweep and pond net (0.5mm) from two study sites during February and middle April 2012. The water samples and insects were collected once in a week. Insects were sampled using standard entomological methods, while water samples was analysed using standard winkler's titrimetric and APHA methods to determine the chemical properties. Water analyses were conducted in the laboratory of Ogun State Water Corporation, Abeokuta, Ogun State. While insects identifications were done in the laboratory in the Department of Agricultural - Biology, University Of Ibadan. Results show that five orders and thirteen families were found with the highest number of aquatic insects from the order Odonata. The most abundant family were Coenagrionidae and Libellulidae respectively. Physico - chemical values, water temperature, pH, DO, Conductivity and Nutrient were measured. Only conductivity had the greater value among the water quality parameters. Bar chart were used to compare the physico - chemical parameters." (Author) Address: not stated

**12285.** Ortega, A.J.J.; Ramos-Elorduy, J.; Pino Moreno, J.M. (2012): Insectos comestibles en algunas localidades en la región centro del Estado de México: técnicas de recolección, venta y preparación. *Dugesiana* 19(2): 123-133. (in Spanish, with English summary) ["Edible insects in some locations in Central Region of Mexico State: Collection, techniques, sale and preparation: The goal of this research is to know the actual condition of some edible insect species inside a framework in some municipalities of Toluca, Almoloya de Juárez, Temoaya and Lerma at Mexico State. For this study we utilize the ethnographic method, doing a tracking and gathering of species. Tianguis and markets were also visited. We found various Lepidoptera larvae as those of agave plant, those of "capulín" tree, the "sacamiches" of the grass and some Coleoptera larvae as those of different kind of trees alive and many of death trees, as well as nymphs of dragonflies. We also analyzed, different aspects related with their common and ethnic names, as well as the diverse ways to prepare them and how they are sold." (Authors)] Address: Ramos-Elorduy, Julieta, Instituto de Biología UNAM, Departamento de Zoología Laboratorio de Entomología. E-mail: relorduy@ibiologia.unam.mx

**12286.** Ott, J. (2012): Die Speer-Azurjungfer, ein seltener Bewohner von Moorgewässern. *Heimatjahrbuch des Landkreises Kaiserslautern* 2011: 91-93. (in German) [General account on *Coenagrion hastulatum* with focus on the Pälzerwald-region, Rhineland-Palatinate, Germany.] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**12287.** Ozono, A.; Kawashima, I.; Futahashi, R. (2012): Dragonflies of Japan. Bunichi-Sogo Syuppan., Co. Ltd. 532 pp (in Japanese, with English summary) [This fully illustrated field guide covers the total of the 203 Odonata species of Japan. Every species is generously illustrated with fully-coloured photographs, colour distribution maps, and detailed line drawings to aid species identification. Key features for identification, distribution, seasons of occurrence, habitats, similar species, and current taxonomic status based on molecular phylogeny is described for every species.]



**12288.** Paunović, M.; Janović, J.; Kovačević, S.; Zorić, K.; Žganec, K.; Simić, V.; Atanacković, A.; Marković, V.; Kračun, M.; Hudrina, S.; Lajtner, J.; Gosstein, S.; Lucić, A. (2012): Macroinvertebrates of the natural substrate of the Sava River – Preliminary results. *Water Research and Management* 2(4): 33-39. (in English) [Croatia; "The objective of this study is to present the comparable data on macroinvertebrate communities from the natural bottom substrate along the middle and lower stretch of the Sava River. The study was carried out in September 2011 at eight sites of the sector between Zagreb - Martinska Ves and Belgrade – at the confluence into the Danube. The data presented could be used as baseline information for any future management of the main course of the Sava River." (Authors) Odonata are represented by *Calopteryx splendens*, *Erythromma lindenii*, *Coenagrion mercuriale* [sic], *Gomphus vulgatissimus*, *Pyrrhosoma nymphula*, and *Platycnemis pennipes*.] Address: Paunovic, M., University of Belgrade, Institute for Biological Research "Sinisa Stankovic", 142 Despota Stefana Boulevard, Belgrade, Serbia, E-mail: mpaunovi@ibiss.bg.ac.rs

**12289.** Perez Gutierrez, L.A. (2012): *Archilestes choconus* spec. nov., a new damselfly from Colombia (Odonata: Lestidae). *Odonatologica* 41(4): 349-354. (in English) ["The new species is described and illustrated from the adults of both sexes. Holotype (male: Colombia, Choco dept., Salero alt. 129 m a.s.l., 10-VIII-2005. *A. choconus* sp. n. shows the following character combination: cercus with well developed medial tooth in basal third, distal portion of cercus elongate, curved inward and sharply pointed, paraproct vestigial, and colour pattern of pterothorax close similar to *A. neblina* Garrison, except for metepisternum, metepimeron and metasternum largely yellow. The new species is closely related to *A. guayaraca* De Marmels, *A. latialatus* Don-

nelly and *A. tuberalatus* (Williamson)."] (Author)] Address: Pérez Gutiérrez, L.A., Grupo de investigación en Biodiversidad del Caribe colombiano, Departamento de Biología, Universidad del Atlántico, km 7 antigua via Puerto Colombia, Barranquilla, Colombia. E-mail: leonperez@mail.uniatlantico.edu.co

**12290.** Pickess, B.P. (2012): Mixed pairings: are male Emerald Damselfly *Lestes sponsa* short-sighted or desperate? *Atropos* 47: 76-77. (in English) [Mixed pairings are documented: (1) Male *Lestes sponsa* coupled with a female *Pyrrhosoma nymphula*. Arne, Dorset, UK 17 July 2012 and (2) Male *Lestes sponsa* coupled with a male *Enallagma cyathigerum*. Squirrel Cottage Lake, near East Holme, Dorset, UK 13 September 2012.] Address: Pickess, B.P., 8 Shaw Drive, Sandford, Wareham, Dorset, BH20 7BT, UK

**12291.** Plotnikova, S.I.; Svidersky, V.L.; Gorelkin, V. S. (2012): Peculiarities of structural-functional organization of the motor neuropil in the dragonfly thoracic ganglia. *Journal of evolutionary biochemistry and physiology* 48(5-6): 568-573. ["The study considers structural-functional relations in motor neuropil of the thoracic ganglia in dragonflies-insects capable of performing very complex and fast maneuvering in flight. The motor neuropil in dragonflies was shown to be more differentiated than in less mobile insects, while its motor nuclei are more outlined and approached to each other. There were revealed dendrites of the leg muscle motoneurons (intermediate nucleus), running to the anterior and posterior nuclei that contain dendrites of the wing muscle motoneurons. A possible role of such a dendrite approaching is discussed for close functional cooperation of wing and leg muscles essential for dragonflies to catch a large prey in flight by using their legs. Peculiarities of structural organization of the wing muscle motoneurons in dragonflies and locusts are considered to suggest the greater functional capabilities of motoneurons in the dragonfly motor apparatus." (Authors)] Address: Svidersky, V.L., Sechenov Institute of Evolutionary Physiology and Biochemistry, Russian Academy of Sciences, St. Petersburg, Russia. E-mail: vlsvider@iephb.ru

**12292.** Postler, E.; Postler, W.; Schiel, F.-J.; Martens, A. (2012): Die Quagga-Muschel *Dreissena rostriformis bugensis* als neuer Aufsitzer von Libellenlarven (Bivalvia: Dreissenidae; Odonata: Gomphidae, Libellulidae). *Libellula* 31(3/4): 237-241. (in German, with English summary) ["The quagga mussel *Dreissena rostriformis bugensis* as a new epizoon of odonate larvae (Bivalvia: Dreissenidae; Odonata: Gomphidae, Libellulidae) – Individuals of *Dreissena rostriformis bugensis*, an invasive species rapidly spreading in navigable inland waters of Central Europe, were reported from two exuviae of *Gomphus vulgatissimus* collected at the Dattel-Hamm-Kanal near Bergkamen, Germany, on 03-v-2012 and from an exuvia of *Orthetrum cancellatum* collected at a gravel-pit lake on 27-v-2012 next to the Upper Rhine River near Dettenheim north of Karlsruhe, Germany. These seem to be the first records of *D. r. bugensis* epizoic on odonate larvae; so far all reports from North America and from Western and Central Europe deal with the zebra mussel *Dreissena polymorpha*. Further findings of *D. rostriformis* settling epizoically on odonate larvae are expected." (Authors)] Address: Postler, W., Hammer Str. 39, D-59174 Kamen, Germany. E-mail: w.postler@t-online.de

**12293.** Prpic, N.-M. (2012): Nomenclatural note on the identity of *Agrion viridis* Vander Linden, 1820: a plea for the selection of a neotype (Odonata: Zygoptera, Libellulidae). *Nachrichtenblatt der Bayerischen Entomologen* 61(3/4): 76-79. (in German, with English summary) ["It has been recognized previously that the name for the Western Willow Spreadwing, *Lestes viridis*, in its original combination *Agrion viridis* Vander Linden, 1825, is a junior homonym of *Agrion viridis* Vander Linden, 1820, which is regarded as a junior synonym of *Lestes barbara*. The junior homonym normally must be replaced by its junior synonym *Agrion leucopsallis* De Charpentier, 1825, which would remove a well established and widely used name from the Odonata. Here I show that *Agrion viridis* Vander Linden, 1820, is no synonym of *Lestes barbara*, but has been based on a heterogeneous type series that also contained several other *Lestes* species. Since no types are extant, it is suggested that a topotypic neotype should be selected to establish the identity of *Agrion viridis* Vander Linden, 1820, with the species currently called *Lestes viridis*. This action would conform to the regulations of the International Code of Zoological Nomenclature and preserve the usage of *Lestes viridis*." (Author)] Address: Prpic, N.-M., Georg-August-Universität Göttingen, Johann-Friedrich-Blumenbach-Institut für Zoologie und Anthropologie, Abteilung für Entwicklungsbiologie, GZMB Ernst-Caspari-Haus, Justus-von-Liebig-Weg 11, 37077 Göttingen, Germany. E-Mail: nprpic@uni-goettingen.de

**12294.** Prysitt, K.-P. (2012): Ein Vorkommen von der Pokaljungfer (*Erythromma lindenii*) bei Neustadt - Poggenhagen. *Mitteilungen der Arbeitsgemeinschaft Zoologische Heimatforschung Niedersachsen* 17/18: 10-11. (in German) [6-VIII-2006, gravel pit near Wunstorf, Niedersachsen, Germany] Address: Prysitt, K.-P., Lesingstr. 2, 31535 Neustadt a.Rbge., Germany

**12295.** Pugh, A.R. (2012): Effects of restoration on the waterways in the Styx River catchment. *The Weta* 44: 28-41. (in English) ["Riparian restoration of waterways is important in restoring, preserving, and enhancing their ecological and aesthetic values, particularly in lowland Canterbury where most waterways are severely degraded due to anthropogenic changes to the landscape. In order to assess the effects of riparian restoration in the Styx River catchment, aquatic macroinvertebrates were sampled at eight sites, seven within the Styx River catchment and a control site (there with *Xanthocnemis*). Comparisons were made between sites using the SQMCI biotic index, taxon richness and diversity, percentage EPT taxa, and by analysing macroinvertebrate community composition dissimilarity. The Styx River catchment is in relatively good condition compared to other lowland urban waterways in Canterbury; riparian restoration appears to be beneficial for the waterway macroinvertebrate communities, but currently unrestored sites require more than restoration of the riparian zone." (Author)] Address: Pugh, A.R., Dept of Ecology, Lincoln University, New Zealand. E-mail: Andrew.Pugh@lincolnuni.ac.nz

**12296.** Rebor, M.; Salerno, G.; Piersanti, S.; Dell'Otto, A.; Gaino, E. (2012): Olfaction in dragonflies: Electrophysiological evidence. *Journal of Insect Physiology* 58(2): 270-277. (in English) ["The problem of olfaction in Paleoptera (Odonata, Ephemeroptera) cannot be considered fully elucidated until now. These insects have been traditionally considered anosmic, because their brain lacks glomerular antennal lobes, typically in-

involved in Neoptera odor perception. In order to understand if the presumed coeloconic olfactory receptors described on the antennal flagellum of adult Odonata are really functioning, we performed an electrophysiological investigation with electroantennogram (EAG) and single cell recordings (SCR), using *Libellula depressa* as a model species. Odors representing different chemical classes such as (Z)-3-hexenyl acetate (acetate ester), (E)-2-hexenal, octanal (aldehydes), (Z)-3-hexen-1-ol (alcohol), propionic acid, butyric acid (carboxylic acids), and 1,4-diaminobutane (amine) were tested. Most of the tested chemicals elicited depolarizing EAG responses in both male and female antennae; SCR show unambiguously for the first time the presence of olfactory neurons in the antennae of *L. depressa* and strongly support the olfactory function of the coeloconic sensilla located on the antennal flagellum of this species. Electrophysiological activity may not necessarily indicate behavioural activity, and the biological role of olfactory responses in Odonata must be determined in behavioural bioassays. This study represents a starting point for further behavioural, electrophysiological, neuroanatomical and molecular investigation on Odonata olfaction, a research field particularly interesting owing to the basal position of Paleoptera, also for tracing evolutionary trends in insect olfaction. Olfaction in Paleoptera (Odonata/Ephemeroptera) is still an open question. *Libellula depressa* bears presumed olfactory sensilla on its antennae. We performed an electrophysiological investigation (EAG, SCR) on these antennae. Depolarizing EAG and SCR responses to chemicals were recorded in males and females. This is the first clear identification of olfactory receptor neurons in Odonata." (Authors)] Address: Rebor, Manuela, Dipartimento di Biologia Cellulare e Ambientale, Via Elce di Sotto, 06123 Perugia, Italy. E-mail: rebor@unipg.it

**12297.** Rosario, K.; Dayaram, A.; Marinov, M.; Ware, J.; Kraberger, S.; Stainton, D.; Breitbart, M.; Varsani, A. (2012): Diverse circular single-stranded DNA viruses discovered in dragonflies (Odonata: Epiprocta). *Journal of General Virology* 93: 2668-2681. (in English) ["Viruses with circular single-stranded DNA (ssDNA) genomes that encode a replication initiator protein (Rep) are among the smallest viruses known to infect both eukaryotic and prokaryotic organisms. In the past few years an overwhelming diversity of novel circular Rep-encoding ssDNA (CRESS-DNA) viruses has been unearthed from various hosts and environmental sources. Since there is limited information regarding CRESS-DNA viruses in invertebrates, this study explored the diversity of CRESS-DNA viruses circulating among insect populations by targeting dragonflies (Epiprocta), top insect predators that accumulate viruses from their insect prey over space and time. Using degenerate PCR and rolling circle amplification coupled with restriction digestion, 17 CRESS-DNA viral genomes were recovered from eight different dragonfly species collected in tropical and temperate regions. Nine of the genomes are similar to cycloviruses and represent five species within this genus, suggesting that cycloviruses are commonly associated with insects. Three of the CRESS-DNA viruses share conserved genomic features with recently described viruses similar to the mycovirus *Sclerotinia sclerotiorum* hypovirulence-associated DNA virus 1, leading to the proposal of the Gemycircularvirus genus. The remaining viruses are divergent species representing four novel CRESS-DNA viral genera including a gokushovirus-like prokaryotic virus (microphage) and



three eukaryotic viruses with Repts similar to circoviruses. The novelty of CRESS-DNA viruses identified in dragonflies using simple molecular techniques indicates that there is an unprecedented diversity of ssDNA viruses among insect populations." (Authors)] Address: Ware, Jessica L., Rutgers, The State Univ. of New Jersey, Cook College, 93 Lipman Drive, New Brunswick, New Jersey 08901, USA. E-mail: jware@amnh.org

**12298.** Rosset, V.; Simaika, J.P.; Arthaud, F.; Bornette, G.; Samways, M.J.; Oertli, B.; Vallod, D. (2012): Comparative assessment of scoring methods of the conservation value of biodiversity in ponds and small lakes. *Aquatic Conservation: Marine and Freshwater Ecosystems* 23: 23-36. (in English) ["Fresh waters are among the most endangered ecosystems in the world. Practical tools to measure their biodiversity value are needed for their effective conservation. Besides species richness, other aspects of biodiversity, including the threat level of species also need to be considered. Currently, existing scoring methods for assessing the conservation value of freshwater fauna and flora assemblages are varied, and guidelines to select an appropriate method are lacking. In this paper, it is hypothesized that scores to assess the conservation value of assemblages can vary markedly according to the type of method used. To test this, four types of scoring methods were applied differing in the weight given to Red List categories and in the expression of the score, i.e. either using mean per species or the assemblage as a whole, on sets of dragonfly and macrophyte data collected from varied types of small lakes and ponds in three different countries (France, Switzerland and South Africa). The comparison of the different types of methods showed that the type of method used had a marked impact on the assessment of the conservation value of a water body: the expression per species or per assemblage as the weight given to Red List categories changed the value of a given water body. Overall, results also confirmed that the different types of methods could be applicable in different geographical areas and types of standing water bodies, independently of the original area where the method was developed. Results illustrated that, besides the species richness assessment commonly used, calculating conservation value as a mean per species is useful because it provides additional information. Overall, using methods expressed as a mean per species and coupling the Red List with other criteria gave the best performance." (Authors) The analysis includes Odonata identified at the order level.] Address: Rosset, Véronique, University of Applied Sciences Western Switzerland, hepia Geneva technology, architecture and landscape, 1254 Jussy-Geneva, Switzerland. E-mail: veronique@rosset.org

**12299.** Rudolph, R. (2012): Die Libellen der Germanengöttin Frigga. *Odonatologica* 41(3): 251-266. (in English) ["In 1919, the German author Hermann Löns published 'Wasserjungfern. Von Sommerboten und Sonnenkundern' (Voigtländer-Verlag, Leipzig), a collection of thirteen dragonfly stories written in a particular emotional style. Here Löns stated that in paganian Germanic times dragonflies had been consecrated to the goddess Frigga and that, therefore, early missionaries had damned dragonflies as diabolic, imposing on them the names 'Satansbolzen' and 'Teufelsnadel'. The 'Wasserjungfern' were reprinted many times up to today and these statements have become widespread popular belief in Germany. Their diction being close to Nazi-terminology,

Löns's statements as to Frigga and the damnation of dragonflies were amended from the first edition following WW II but appeared again in all later editions. Here it is shown, by analyzing mythological and earliest clerical as well as ethnographic and old entomological literature, that dragonflies never have been consecrated to a Germanic goddess and that no clerical damnation ever took place." (Author)] Address: Rudolph, R., Kloosterweg 25, NL-5853 EE Siebengewald, The Netherlands

**12300.** Sabagh, L.T.; Carvalho-e-Silva, A.M.P.T.; Rocha, C.F.D. (2012): Biota Neotropica 12(4). Diet of the toad *Rhinella icterica* (Anura: Bufonidae) from Atlantic Forest highlands of southeastern Brazil: 258-262. (in English, with Portuguese summary) ["In this study, we present some information of the regarding trophic niche from the anuran toad *R. icterica* living in high altitudes above 2000 m a.s.l. from a habitat of the Atlantic Forest Biome – the Altitude Fields in the Itatiaia National Park. We found 150 prey items in toad stomachs, belonging to five prey types, as well as skin remains and some remains of plant material. The index of relative importance indicated that most important prey types were beetles and ants, these last composing 70% of the diet numerically and the trophic niche breadth (B) was 1.81. The relatively low diversity of prey types we recorded in the diet of *R. icterica* of Itatiaia and numerically dominated by ants suggests some preference for this item. We do not found significant relationship between the toad measurements with the preys' measurements. We concluded that *R. icterica* toads at the highlands of Itatiaia feeds on arthropods, mainly ants and coleopterans and that the high consumption of preys with relatively small and similar size as ants in the diet prevents an expected relationship among frog body or mouth size and prey volume and size." (Authors) Odonata contributed with 1.3% (n=2) to the diet of 17 toad specimens.] Address: Sabagh, L.T., Laboratório de Ecologia de Vertebrados, Depto de Ecologia, Univ. do Estado do Rio de Janeiro – UERJ, Rua São Francisco Xavier, 524, Maracanã, CEP 20550-019, Rio de Janeiro, RJ, Brasil. E-mail: leandro.sabagh@gmail.com

**12301.** Sánchez, A.B. (2012): Confirmación de la presencia actual de *Lestes macrostigma* (Eversmann, 1832) (Odonata: Lestidae) en la provincia de Cádiz (sudeste de la Península Ibérica). *Boletín de la S.E.A.* 50(1): 565-566. (in Spanish, with English summary) ["Presence of populations of *L. macrostigma* in Cadiz province is confirmed, after more than 15 years without observations of this species, indicating the importance of these populations to guarantee the possible genetic flow between the populations of Doñana (Huelva and Seville) and the Natural Reservation Laguna de Fuente de Piedra (Malaga)." (Author)] Address: Sánchez, A.B., C/ Juan Ramón Jiménez 28. 11160 – Barbate (Cádiz, España) Arturo.libelula@gmail.com

**12302.** Santos Loureiro, N.; Pontes, L. (2012): The *Trithemis nigra* (Odonata: Libellulidae) of Príncipe Island, Gulf of Guinea. *African Journal of Ecology* 51: 180-183. (in English) ["Príncipe is a 114 km<sup>2</sup> volcanic island (1°36'N; 7°24'E) in the Gulf of Guinea, Africa. *T. nigra* was firstly described by Longfield (1936) as a subspecies of *Trithemis donaldsoni* (Calvert, 1899), after having examined two males collected by W.H.T. Tams in December 1932 and January 1933, at Príncipe Island, a former Portuguese colony in the Gulf of Guinea.... It seems that following the expedition of Tams, nobody re-

turned to Príncipe Island to add new field data concerning *T. nigra*... In this note, we present the results of a new survey carried out in March and August 2011. The occurrence of the species was confirmed and threats were evaluated. Fifteen localities were investigated in the August 2011 survey, and the species was found in five out of them... According to our observations, the habitat preference of *T. nigra* is for permanent lotic systems with abundant flowing freshwater and a mix of direct solar light and shades provided by the forest trees and shrubs. The 'Critically Endangered' category assigned in 1996 is maintained, the species was recognized as an endemism for Príncipe." (Authors)] Address: Santos Loureiro, N., Centre for Environmental Biology – ADC, Faculdade de Ciências da Universidade de Lisboa - Campo Grande Ed. C2, 1749-016 Lisboa, Portugal. E-mail: [odonata@nsloureiro.pt](mailto:odonata@nsloureiro.pt)

**12303.** Schneider, T.; Schneider, J. (2012): Sommerbeobachtungen von Libellen am unteren Nil in Ägypten (Odonata). *Libellula* 31(3/4): 257-266. (in German, with English summary) ["Summer observations of Odonata on the Lower Nile in Egypt – In June 2012, a total of 13 species was recorded on the River Nile south of Cairo. Of special interest was the first record of *Acisoma panorpoides* on the Nile in Egypt. This shows that the Nile can be used as a corridor by this species to reach the Mediterranean coast from tropical Africa. *Mesocnemis robusta*, a species which is classified as «critical relict» or «critically endangered» for North Africa, was found to be one of the most abundant dragonflies on the Nile. Some observations from the Nile Delta are added." (Authors)] Address: Schneider, T., Arnold-Knoblauch-Ring 76, 14109 Berlin/Wannsee, Germany. E-mail: [thomas.rs@gmx.de](mailto:thomas.rs@gmx.de)

**12304.** Schorr, M.; Wolf, J. (2012): Bibliografie der für Deutschland publizierten Libellenliteratur (Odonata). *Libellula*, Supplement 11: 5-420. (in German, with English summary) ["This bibliography is a summary of over 6,400 titles about the Odonata of Germany. It starts with a quotation of 6,018 titles with relevance to Germany, including titles that originated in academic institutions. Besides individual studies, these were researched from about 1,000 periodicals from several countries. To ease the research on species, faunistic, biological, ecological, and geographical facts, all titles are tagged to approximately 1,000 words or phrases. Thanks to many parts also being in English, the contents of the quoted literature are also open to foreign users. The next chapter reviews around 400 quotations of unpublished titles about Odonata. Because of the nature of "grey literature" this chapter surely can only be a selection of an unknown amount of expertise and other unpublished literature." (Authors)] Address: Schorr, M., Schulstr. 7B, 54314 Zerf, Germany. E-mail: [bierschorr@online.de](mailto:bierschorr@online.de)

**12305.** Schröter, A.; Borisov, S.N. (2012): *Coenagrion scitulum* in Central Asia: a biogeographical analysis and rectification (Odonata: Coenagrionidae). *Libellula* 31(3/4): 267-283. (in English, with German summary) ["This study provides information on the occurrence of *Coenagrion scitulum* in Central Asia, in English for the first time. Based on critical evaluation of published and previously unpublished data, a schedule of records and an up-to-date distribution map is presented. With reference to occurrence of *C. scitulum* in Europe, specific chorological and ecological characteristics of Central Asian *C. scitulum* are discussed and by means of the example of a Kyrgyz population a regional habitat of *C. scitulum* is

described. *C. scitulum* is among those dragonfly species being widely distributed in Europe and whose eastern limit of distribution runs through Central Asia. Due to language barriers and insufficient communication, a considerable lack of knowledge of the proper distribution range of such species amongst European odonatologists seems to persist. This article addresses the knowledge gap and aims to rectify erroneous statements and establish the correct eastern limit of distribution of *C. scitulum* in European non-Russian-language odonatological literature." (Authors)] Address: Schröter, A., Rasenweg 10, 37130 Gleichen, Germany. E-mail: [AsmusTim@gmx.de](mailto:AsmusTim@gmx.de)

**12306.** Selva Kumar, C.; Nair, R.R.; Sivaramakrishnan, K.G.; Ganesh, D.; Janarthanan, S.; Arunachalam, M.; Sivaruban, T. (2012): Influence of certain forces on evolution of synonymous codon usage bias in certain species of three basal orders of aquatic insects. *Mitochondrial DNA* 23(6): 447-460. (in English) ["Forces that influence the evolution of synonymous codon usage bias are analyzed in six species of three basal orders of aquatic insects. The rationale behind choosing six species of aquatic insects (three from Ephemeroptera, one from Plecoptera, and two from Odonata) for the present analysis is based on phylogenetic position at the basal clades of the Order Insecta facilitating the understanding of the evolution of codon bias and of factors shaping codon usage patterns in primitive clades of insect lineages and their subtle differences in some of their ecological and environmental requirements in terms of habitat-microhabitat requirements, altitudinal preferences, temperature tolerance ranges, and consequent responses to climate change impacts. The present analysis focuses on open reading frames of the 13 protein-coding genes in the mitochondrial genome of six carefully chosen insect species to get a comprehensive picture of the evolutionary intricacies of codon bias. In all the six species, A and T contents are observed to be significantly higher than G and C, and are used roughly equally. Since transcription hypothesis on codon usage demands A richness and T poorness, it is quite likely that mutation pressure may be the key factor associated with synonymous codon usage (SCU) variations in these species because the mutation hypothesis predicts AT richness and GC poorness in the mitochondrial DNA. Thus, AT-biased mutation pressure seems to be an important factor in framing the SCU variation in all the selected species of aquatic insects, which in turn explains the predominance of A and T ending codons in these species. This study does not find any association between microhabitats and codon usage variations in the mitochondria of selected aquatic insects. However, this study has identified major forces, such as compositional constraints and mutation pressure, which shape patterns of codon usage in mitochondrial genes in the primitive clades of insect lineages." (Authors)] Address: Selva Kumar, C. Department of Zoology, University of Madras, Chennai 600 025, Tamil Nadu, India

**12307.** Sharma, R.K.; Agrawal, N. (2012): Faunal diversity of aquatic insects in Surha Tal of District - Ballia (U. P.), India. *Journal of Applied and Natural Science* 4(1): 60-6. (in English) [The regional diversity of aquatic insect fauna was studied during 2006-08. Twenty nine species of aquatic insect were collected including *Mesogomphus lineatus*, *Potamarcha obscura*, *Ischnura aurora aurora*, *I. senegalensis* and *Agriocnemis pygmaea*.] Address: Sharma, R.K., Department of Zoology,

University of Lucknow, Lucknow-226007, India. E-mail: rajnish.enviro.80@gmail.com

**12308.** Sheikh, E.M.; Douglas, M. (2012): Biodiversity, phenology, and thermoregulatory strategies of odonates at Pierce Cedar Creek Institute. Undergraduate Research Grants for the Environment Report, Grand Rapids Community College: 24 pp. (in English) ["Forty-three species of dragonflies from five families and sixteen species of damselflies from three families were identified at Pierce Cedar Creek Institute in Hastings, Michigan (latitude 42.6459 and longitude -85.2908) between May 7 and August 10, 2012. Our study showed that Pierce Cedar Creek Institute provides habitat to a greater number and variety of odonates than expected. The diurnal phenology of the odonates varied by species, with smaller and medium dragonflies generally out earlier in the day and active into the afternoon, and large dragonflies are more active near dusk. We found that dragonflies and damselflies use a variety of active and passive thermoregulatory strategies. We found that the mean  $\Delta T$  (the difference between ambient and thoracic temperature) as well as the heating / cooling curves and preferred flight temperatures, are positively correlated with increasing thoracic size of the odonate. In addition, we found that the flow of haemolymph from the wings to the thorax does not function to significantly regulate thoracic temperature." (Authors)] Address: Sheikh, Elaine M.

**12309.** St. Clair, C. (2012): Effects of atrazine exposure on immune function and cannibalistic behavior of dragonfly larvae. M.S. thesis, Murray State University: 74 pp. (in English) ["Chapter 1: Agricultural runoff containing herbicide is known to have adverse effects on freshwater organisms. Aquatic insects are particularly susceptible, and herbicide runoff has the potential to affect immunity in this group. I examined the effect of atrazine, an herbicide commonly used in the United States, on immune function in larvae of *Plathemis lydia* during a long-term exposure at ecologically relevant concentrations. Larvae were exposed to concentrations of 0, 1, 5 and 10 ppb atrazine for three or six weeks. Haemocyte counts, haemolymph phenoloxidase (PO) activity, cuticular and gut PO, encapsulation ability and post-encapsulation PO were measured at the end of each trial period as indicators of immune system strength. Atrazine concentration had a significant effect on haemocyte counts after controlling for the effect of larva size. There was a significant interaction between time and concentration for haemolymph PO, cuticular PO, and a marginal interaction for gut PO. Therefore, atrazine affects both haemocyte numbers and phenoloxidase activity over time in *P. lydia*. The exact impact of the changes is unclear. However, the changed immune function demonstrated in this study is likely to modify susceptibility to pathogens, alter wound healing and may decrease available energy for growth and metamorphosis. Chapter 2: Agricultural runoff containing herbicide is known to have adverse effects on freshwater organisms. Aquatic insects are particularly susceptible, and herbicide runoff has the potential to affect behaviour in this group. Here I examine the effects of short-term exposure to the herbicide atrazine on cannibalistic behaviour in larvae of *Libellula luctuosa*. Large focal larvae (> 12 mm length) were exposed to 0, 1, 10, or 100 ppb atrazine for 96 hours. A smaller (< 8 mm) conspecific was then placed with the focal larva, and its behaviour observed for 30 minutes. Time until

initiation of stalking and time until strike were noted. After the initial 30 minutes, each pair was checked at 2, 4, 6, 24 and 48 hours. Time of consumption and amount consumed were noted. The number of larvae that engaged in cannibalistic activity within the initial 30-minute observation period was significantly higher for controls compared to all experimental treatments. When stalking, striking and consumption times were examined together (a measure of overall response time) concentration had a significant effect, with the 10 ppb group taking significantly longer to cannibalize than the control group." (Author)] Address: not stated

**12310.** Stavenga, D.G.; Leertouwer, H.L.; Hariyama, T.; De Raedt, H.A.; Wilts, B.D. (2012): Sexual dichromatism of the damselfly *Calopteryx japonica* caused by a melanin-chitin multilayer in the male wing veins. PLoS ONE 7(11): e49743. doi:10.1371/journal.pone.0049743: 7 pp. (in English) ["Mature male *C. japonica* damselflies have dark-blue wings, due to darkly coloured wing membranes and blue reflecting veins. The membranes contain a high melanin concentration and the veins have a multilayer of melanin and chitin. Female and immature *C. japonica* damselflies have brown wings. We have determined the refractive index of melanin by comparing the differently pigmented wing membranes and applying Jamin-Lebedeff interference microscopy. Together with the previously measured refractive index of chitin the blue, structural colour of the male wing veins could be quantitatively explained by an optical multilayer model. The obtained melanin refractive index data will be useful in optical studies on melanized tissues, especially where melanin is concentrated in layers, thus causing iridescence." (Authors)] Address: Stavenga, D.G., Computational Physics, Zernike Institute for Advanced Materials, University of Groningen, Groningen, The Netherlands, E-mail: D.G.Stavenga@rug.nl

**12311.** Stewart, S.S. (2012): Variation in fluctuating asymmetry among nine damselfly species. M.S. thesis. Dept. of Biology. Baylor University: (in English) ["Fluctuating asymmetry (FA), measured as random deviations from bilateral symmetry, likely results from developmental disturbances by internal or environmental stresses. However, comparisons of FA in single damselfly species from stressed environments have often been inconclusive. We measured levels of FA among multiple species of damselflies from the same environment to determine the relative roles of environmental stress and species specific developmental instability. Damselflies of nine species were collected from a central Texas wetland. Calculations of their FA were based on cell counts of four venation patterns in fore and hind wings. Significant FA of venation occurred in both sexes, both wing positions, and in each of four venation patterns of all nine species. Levels of FA were not significantly different between sexes or between wing positions for any of the nine species. However, FA varied significantly among the four venation patterns. Patterns with lowest mean cell counts had significantly higher FA than the other patterns, despite scaling to remove size bias. More broadly, a three-fold difference in overall FA occurred among the nine species and was not correlated with species mean weight or abdomen length. The wide range of FA levels among multiple species in the same environment casts doubt on the effective use of FA of a single species to indicate of environmental stress. Future research must examine the relative roles of species-specific predispositions for FA from internal genetic



stresses as well as external stressors." (Author) For a published version of the thesis see: Stewart, S.S.; Vodopich, D.S. (2013): Variation in fluctuating asymmetry among nine damselfly species. *International Journal of Odonatology* 16(1): 67-77.] Address: Stewart, Sherry, Department of Biology, Baylor University, Waco, TX, 76798-7388, USA

**12312.** Stobbe, H. (2012): Besondere Libellenfunde auf Kreta im Oktober 2011 (Odonata). *Libellula* 31(3/4): 251-256. (in German, with English summary) ["18 Odonata species were spotted in the Greek island of Crete during October 2011. A visual observation of a female *Calopteryx virgo festiva* on the Megalou Potamos documented the first re-sighting of this species after more than 150 years. Several males of *Trithemis arteriosa* flew on a reservoir near Skourvoula. This species is not only new for Crete but for the whole European continent. It is argued that both spp. most probably originated from the east, and came via southwestern Turkey and the Dodecanese Islands. Sightings of *Boyeria cretensis* in October confirm a long flying season until autumn. The check-list of Crete comprises 35 Odonata species so far." (Author)] Address: Stobbe, H., Wulksfelder Weg 9A, D-22889 Tangstedt, Germany. E-mail: Hartwig.Stobbe@t-online.de

**12313.** Suhonen, J.; Suutari, E.; Kaunisto, K.M.; Krams, I. (2012): Patch area of macrophyte *Stratiotes aloides* as a critical resource for declining dragonfly *Aeshna viridis*. *Journal of Insect Conservation* 17(2): 393-398. (in English) ["Currently, many rare and endangered species occur in fragmented habitats. Habitat patch size is often used as an easily measured surrogate of habitat quality and local population size. We investigated whether habitat patch size affects the presence and density of larvae of the endangered dragonfly *Aeshna viridis*, which for a large part of their life history depend on the macrophyte *Stratiotes aloides* rosette. The study was performed in four populations, two from Finland and two from Latvia. Our main result was that density of *A. viridis* and patch occupation increased with area of *S. aloides* patch. The results may be due to larvae actively avoiding enemies (higher survival) and/or to the possibility that females laid higher number of eggs in the large *S. aloides* patches. Our results indicate that local abundance and persistence of *A. viridis* population may depend on the few, large *S. aloides* patches rather than several small patches of equal total area." (Authors)] Address: Suhonen, J., Section of Ecology, Dept of Biology, University of Turku, 20014 Turku, Finland. E-mail: juksuh@utu.fi

**12314.** Taylor, D.J.; Titus-Mcquillan, J.; Bauer, A.M. (2012): Diet of *Chalcides ocellatus* (Squamata: Scincidae) from southern Egypt. *Bulletin of the Peabody Museum of Natural History* 53(2): 383-388. (in English) ["We studied the diet of the skink *C. ocellatus* (Forskål, 1775) from southern Egypt using stomach contents from a large series of specimens collected during the Yale University Prehistoric Expedition to Nubia. Only 2.5% of specimens contained identifiable prey items. Insect larvae, coleopterans and orthopterans were the most important prey items. The first two of these prey categories are typically among the most important in the diet of this species in other areas of its broad distribution. Males and females differed somewhat in their diets and had a dietary overlap of 0.607. Males had relatively larger head widths than females, but this is likely to be related to sexual selection rather than dietary segrega-

tion." (Authors) One female had preyed on an Odonata specimen.] Address: Taylor, D.J., Department of Biology, Villanova University, 800 Lancaster Avenue, Villanova PA 19085 USA. E-mail: dylan.taylor@villanova.edu

**12315.** Termaat, T.; Kalkman, V.J. (2012): De nieuwe Rode Lijst Libellen. *Vlinders* 2 2012: 4-7. (in Dutch, with English summary) ["The new Red List for dragonflies: Red Lists have to be updated every ten years, and as the previous Red List for dragonflies of the Netherlands was written in 1997, a new one was finally made in 2011. As the current method for evaluating species differs, the 1997 data had to be re-evaluated to make comparison of the lists possible. During the last fourteen years, the status of Dutch dragonflies has improved. Three nationally extinct species reappeared. Eight species have increased, now considered to be of least concern. Six more species have become less threatened. The downside is that two species which used to be of least concern are now vulnerable and one other species shifted from endangered to critically endangered. Environmental and nature conservation measures have mediated the positive picture for most dragonflies, but the improvements are not large enough for some of the most critical species. Climate change also plays a positive role for many species, but might be a risk for others. Dragonfly data collected by voluntary observers are crucial to be able to make Red Lists, now and in the future." (Authors)] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands. E-mail: tim.termaat@vlinderstichting.nl

**12316.** Theischinger, G.; Richards, S.J. (2012): *Gynacantha heros* spec. nov., a large crepuscular species from Papua New Guinea (Anisoptera: Aeshnidae). *Odonatologica* 41(4): 355-359. (in English) ["The new species is described. Holotype male: Papua New Guinea, Sepik Basin, 31-V-2010, at light; deposited in the Museum & Art Gallery of the Northern Territory (NTM), Darwin, Australia. It is the 6th and the largest member of the genus recorded from the island of New Guinea. Characters of the adult male are illustrated and the affinities of the new species are discussed." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**12317.** Theischinger, G.; Richards, S.J. (2012): *Akrothemis*, a new libellulid genus from Papua New Guinea (Anisoptera: Libellulidae). *Odonatologica* 41(4): 337-345. (in English) ["The new genus is established for *O. risi* Champion, 1915. Photos of the holotype of *O. risi* are presented, and the supposed female of this species is described for the first time. A second species, *Akrothemis bimaculata* sp. n., from Papua New Guinea is described as new. Holotype female: Papua New Guinea, Kaugumi Camp, E Sepik Prov., alt 60 m a.s.l., 4-X-2010 (NTM 1008589). *Akrothemis* appears to belong in *Tetrathemistinae* and may be most closely related to a group of genera around *Tetrathemis* Brauer, 1868." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**12318.** Thipaksorn, A.; Apiwathnasorn, C.; Ruangsittichai, J. (2012): Modified molecular techniques for detecting rice odonate insects in Thailand. *Munis Entomology & Zoology* 7(2): 852-856. (in English) ["Rice odonates are beneficial predators that can help control insect pests in rice, so playing a valuable role in the rice eco-

system. Morphological classification is not reliable at the taxonomic level for some species. Thus, molecular techniques may be used to resolve species more accurately. Normally, genetic DNA sequence amplification is used in molecular identification. This study modified and developed one stage of the DNA extraction process to permit DNA extraction from a single insect leg. After cytochrome oxidase subunit 1 (COI) amplification, nucleotide banding was conducted to determine the efficiency of the extracted DNA. The results showed that this modification to DNA extraction could yield sufficient DNA to amplify the COI gene, and thus be a practical tool for detecting odonates using molecular techniques." (Authors) *Agriocnemis pygmaea*, *Ischnura a. aurora*, *Ischnura senegalensis*, *Brachythemis contaminata*, *Diplacodes trivialis*] Address: Apiwathnasorn, C., Dept of Medical Entomology, Faculty of Tropical Medicine, Mahidol Univ., Ratchawithi Road, Ratchathewi, Bangkok 10400, Thailand. E-mail: tmjrs@mahidol.ac.th

**12319.** Tiple, A.D. (2012): Odonata fauna with their status of Achanakmar-Amarkantak Biosphere Reserve, Madhya Pradesh and Chhattisgarh. *International Journal of Biotechnology and Bio Sciences* 2(1): 97-101. (in English) ["The paper reports detailed entomological survey on the Odonata diversity in Achanakmar-Amarkantak Biosphere Reserve. During the course of study 70 species of Odonata belonging to 12 families is provided. The highest number of Odonate were recorded belonging to the Libellulidae (31 species), followed by Coenagrionidae (15), Gomphidae, (5), Protoneuridae (3) and Lestidae (3), Aeshnidae (4 species), Platynemididae (2 species), Calopterygidae and Chlorocyphidae (2 species) and Euphaeidae, Corduliidae and Macromiidae (one species). Of the total 67 species 23 were very common, 21 were common, 18 rare and 5 very rarely in occurrence. The observations support the high value of this Achanakmar-Amarkantak Biosphere Reserve for conservation of Odonata and research on their biology." (Authors)] Address: Tiple A. D., Department of Zoology, Vidyabharti College Seloo, Wardha, Maharashtra, India and Forest Entomology Division, Tropical Forest Research Institute, Jabalpur 482021, India. E-mail: ashishdtiple@yahoo.co.in

**12320.** Tyrrell, M. (2012): The impact of spring temperature on emergence patterns in five 'spring' species. *J. Br. Dragonfly Society* 28(2): 102-107. (in English) ["The first emergence dates for five 'spring' species were monitored at a single site over a seven season period. During this time, average spring temperature was also monitored and the two related to determine the impact of average air temperature on the first emergence of each species. It was noted that during warm springs, for example 2007 and 2011, the five species emerged significantly earlier than in an average spring, for example 2010. During a cold spring, for example 2012, first emergence coincided with the dates for average springs. This implies that, for these species, spring air temperature is only a critical factor determining emergence if it is high, in which case day length is not a trigger but sun intensity may be. Cooler temperatures in spring have little or no impact on first emergence compared to an average spring, in which case day length may then be the critical factor determining emergence." (Author)] Address: Tyrrell, M., 8 Warwick Close, Raunds, Northants, NN9 6JH, UK

**12321.** van der Poorten, N.; Conniff, K. (2012): The taxonomy and conservation status of the dragonfly fau-

na (Insecta: Odonata) of Sri Lanka. In: *The National Red List 2012 of Sri Lanka; Conservation Status of the Fauna and Flora*. Weerakoon, D.K. & S. Wijesundara Eds., Ministry of Environment, Colombo, Sri Lanka: 1-10. (in English) ["The current list for Sri Lanka includes 118 species in 12 families with a high degree of endemism: there are 47 endemic species and an additional 8 endemic subspecies. Three new endemic species are in the process of description. Since the last IUCN Red List publication (2007), five new endemic species have been described: *Drepanosticta bine*, *D. anamia*, *D. moja* (Bedjanic, M., 2010), *Lyriothemis defonsekai* (van der Poorten, 2009a) and *Libellago corbeti* (van der Poorten, 2009b)." (Authors)] Address: Conniff, Karen, C/O ICIMOD, Khumaltar, Lalitpur, G.P.O Box 3226, Kathmandu, Nepal

**12322.** Vercken, E.; Wellenreuther, M.; Svensson, E. I.; Mauroy, B. (2012): When asymmetrical fitness costs select for suboptimal traits: the cliff-edge hypothesis revisited. *PLoS ONE* 7(4): e34889. doi:10.1371/journal.pone.0034889: 9 pp. (in English) ["The cliff-edge hypothesis introduces the counterintuitive idea that the trait value associated with the maximum of an asymmetrical fitness function is not necessarily the value that is selected for if the trait shows variability in its phenotypic expression. We develop a model of population dynamics to show that, in such a system, the evolutionary stable strategy depends on both the shape of the fitness function around its maximum and the amount of phenotypic variance. The model provides quantitative predictions of the expected trait value distribution and provides an alternative quantity that should be maximized ("genotype fitness") instead of the classical fitness function ("phenotype fitness"). We test the model's predictions on three examples: (1) litter size in guinea pigs, (2) sexual selection in damselflies, and (3) the geometry of the human lung. In all three cases, the model's predictions give a closer match to empirical data than traditional optimization theory models. Our model can be extended to most ecological situations, and the evolutionary conditions for its application are expected to be common in nature.... Our second example deals with a secondary sexual trait in *Calopteryx splendens*, using survival and mate choice data obtained in the field ([30], M. Wellenreuther, E. Vercken and E. Svensson, unpublished data)." (Authors)] Address: Vercken, Elodie, Institut Sophia Agrobiotech, UMR 1355 ISA, Institut National de la Recherche Agronomique, Sophia-Antipolis, France. E-mail: elodie.vercken@sophia.inra.fr

**12323.** Villanueva, R.J.T.; Cahilog, H. (2012): Notes on a small Odonata collection from Tawi-Tawi, Sanga-Sanga and Jolo islands, Philippines. *International Dragonfly Fund - Report* 55: 1-32. (in English) ["Sulu region is among the least explored faunal region in the Philippine archipelago. Odonatologically, this region is poorly studied until recently. Presently a survey conducted in July 1 – 14, 2011 revealed ten new records in Tawi-Tawi raising the total number of Odonata to 54. Three new species records were made for Sanga-Sanga raising the known number in that island to 34. Three species were recorded for the first time in Jolo raising the total number to 18. One new species of damselfly was found and several questionable and possible new species of dragonflies were documented." (Authors)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

- 12324.** Waldhauser, M. (2012): Dragonflies from the Western High Atlas, Morocco, with the first records of *Pyrrhosoma nymphula* in the High Atlas (Odonata: Coenagrionidae). *Libellula* 31(3/4): 243-250. (in English, with German summary) ["Fifteen species of Odonata were recorded during a short trip to the central part of the Moroccan Western High Atlas in May/June 2012. *Pyrrhosoma nymphula* was recorded in the High Atlas for the first time. *Cordulegaster princeps* was found in series of localities, west of pass Tizi-n-Test for the first time." (Author)] Address: Waldhauser, M., Petrovice 136, Jablonné v Podještědí, CZ-471 25, Czech Republic. E-mail: martinw@seznam.cz
- 12325.** Walter, S. (2012): Wiederfund der Zwerglibelle *Nehalennia speciosa* (Charpentier, 1840) in Sachsen (Odonata). *Entomologische Nachrichten und Berichte* 56(3-4): 252. (in German) [Sachsen, Germany, Muskauer Heide, 9-VI-2012] Address: Walter, Sabine, c/o Landschaftsplanung Dr. Böhnert & Dr. Reichhoff GmbH Freital, Dresdner Str. 77, 01705 Freital, Germany
- 12326.** Wildermuth, H. (2012): Extensiv genutztes Grünland als Reifungs-, Jagd- und Paarungshabitat von *Coenagrion puella* und *Enallagma cyathigerum* (Odonata: Coenagrionidae). *Libellula* 31(3/4): 223-235. (in German, with English summary) ["Extensively used meadows as habitat for maturation, forage and copulation of *C. puella* and *E. cyathigerum* (Odonata: Coenagrionidae) – The heterogeneously structured environment of an isolated pond in the Swiss Central Alps at 1,475 m a.s.l. was surveyed for maturing, foraging and copulating imagines of *C. puella* and *E. cyathigerum*. The individuals were distributed patchily and concentrated on extensively used grassland, grassy rock vegetation and shrubbery up to 780 m distant from the pond (max. abundance 30 individuals/10 m<sup>2</sup> 100-200 m distant from pond) while intensively exploited rich meadows that had been cut shortly before the start of the study were largely avoided (max. abundance 0.06 individuals/10 m<sup>2</sup> 100-200 m distant from pond). The extensively used grassland that was neither cut nor grazed during the survey not only served for maturation and foraging, but also as rendezvous and copulation site in 68 documented cases during a three days' study. The importance of extensively used grassland as terrestrial habitat in the life history of the two Zygoptera species is discussed." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wilder-muth.ch
- 12327.** Yakovlev, V.A.; Yakovleva, A.V.; Ilyasova, A.R. (2012): Insects in the invertebrate communities of the upper reaches of the Kuybyshev Reservoir, Russia. *Proceedings of the University of Kazan* 154(4): 188-198. (in Russian, with English summary) ["Based on the study of zoobenthos in the upper reaches (Volga, Kama, Volga-Kama, and Tetyushi) of the Kuybyshev Reservoir carried out in 1999–2008, about 150 taxons of insects of different ranks were revealed including 119 taxons with rank below genus. Insects made up from 41.5% (shallow shores) up to 55.0% (deep water areas) of the total taxon composition of benthal invertebrates. From the six orders (Ephemeroptera, Odonata, Hemiptera, Coleoptera, Trichoptera, Diptera), dipterans (67.2% of all insects) were characterized by the greatest diversity, basically due to chironomid larvae. Generally, the contribution of insects to the total abundance and biomass of zoobenthos is not significant; they considerably concede to homotopic invertebrates, especially molluscs, consisting mostly of invaders that have widely settled the Reservoir in the last two decades." (Authors)] The following taxa are listed: *Coenagrion armatum*, *C. puella*, *C. pulchellum*, *Coenagrion* sp., *Ischnura elegans*, *I. pumilio*, *Anax parthenope*, *Gomphus vulgatissimus* and *Orthetrum* sp.] Address: not stated
- 12328.** Yang, G.; Xu, J.; Yang, Z.; Mao, B. (2012): A summary of resource of Odonata in Yunnan province. *Journal of Dali University* 11(10): 59-65. (in Chinese, with English summary) [China; 210 Odonata species are checklisted.] Address: Yang, G., College of Agriculture and Biology Science, Dali University, Dali, Yunnan 671003, China
- 12329.** Zabłocki, P.; Wolny, M. (2012): The first locality of the Northern Emerald *Somatochlora arctica* (Zetterstedt, 1840) (Odonata: Corduliidae) in the Opole region (Southwest Poland) with commentary to the list of dragonflies of Opole voivodeship. *Park i nar. Rez. Przyr.* 31: 87-96. (in Polish, with English summary) [Kamieniec Nature Reserve, Opole vovodship, Upper Silesia, Poland, 8-IX-2012] Address: Wolny, M., Dział Przyrody Muzeum Śląska Opolskiego, ul. Leśnicka 28, 47-154 Góra Św. Anny, Poland. E-mail: m.wolny@poczta.onet.pl
- 12330.** Zabłocki, P.; Wolny, M. (2012): Materials to the knowledge of some protected, rare and interesting species of dragonflies (Insecta: Odonata) of Silesia (southwest Poland). *Opolski rocznik muzealny* 14: 9-48. (in Polish, with English summary) [Records of 31 Odonata species from Silesia are documented. A total of 314 specimens was collected from 101 localities located in 46 different UTM grid squares dating from years 2002, 2007-2012. 80% of the examined sites are located in the Opole voivodeship, 15% in the Lower Silesian voivodeship, and 5% in the Silesian voivodeship. All specimens are deposited in the collection of Nature Department of Opole Silesia Museum. The most significant findings for the Opole voivodeship are: *Sympetrum fonscolombii*, *S. pedemontanum*, *S. depressiusculum*, *Epithea bimaculata* and *Leucorrhinia caudalis*.] Address: Wolny, M., Dział Przyrody Muzeum Śląska Opolskiego, ul. Leśnicka 28, 47-154 Góra Św. Anny, Poland. E-mail: m.wolny@poczta.onet.pl
- 12331.** Zawal, A.; Szlauer-Łukaszewska, A. (2012): Water mite parasites (Hydrachnidia) of odonates from the Nature Reserve "Jezioro Szare", northwestern Poland. *Odonatologica* 41(3): 267-275. (in English) ["The relationships between larvae of *Arrenurus* s. str. and their Odonata hosts from Lake Szare are described. A total of 173 water mite larvae of *Arrenurus affinis/neumanilvietsi*, *A. bicuspidator*, *A. cuspidator*, *A. cuspidifer*, *A. tricuspator*, *A. robustus* and *Piona longipalpis* was collected. Of these, 151 were found on adult Odonata, 9 on odonate larvae and 13 on exuviae. Parasitic mite larvae were found on odonate adults but only phoretic mite larvae were found on the larvae and exuviae. The occurrence of parasites was most frequently and most numerous recorded on the thoracic segments of their hosts." (Authors)] Address: Zawal, A., Department of Invertebrate Zoology and Limnology, University of Szczecin, Wąska 13, PL-71-415 Szczecin, Poland
- 12332.** Zhuravchak, R.O.; Shidlovsky, L.V. (2012): The fauna of the projected Novelsky National Park. *Nature Reserves in Ukraine* 18(1-2): 42-50. (in Ukrainian, with English and Russian summaries) [*Enallagma cyathigerum*, *Sympetrum danae*, *S. sanguineum* and *S. vul-*



gatum are the only Odonata species so far known from the territory of the proposed National Park.] Address: not stated

**12333.** Zimmermann, F. (2012): Vielfalt gesichert? Ein Überblick zur aktuellen Gefährdungssituation von Arten und Lebensräumen in Brandenburg. *Naturschutz und Landschaftspflege in Brandenburg* 21(3): 96-110. (in German) [Populations of Mediterranean species and species of running waters have developed positively, while that of bogs decreased.] Address: Zimmermann, F., Landesamt für Umwelt, Gesundheit und Verbraucherschutz des Landes Brandenburg, Seeburger Chaussee 2, 14476 Potsdam, Germany

## 2013

**12334.** Abbasi, F.; (2013): Comparative analyses of the diet of the Spirlin (*Alburnoides eichwaldii*) in the Tilabad, Shirabad and Kaboodval Streams Golestan Province, Iran. *World Journal of Fish and Marine Sciences* 5(1): 79-83. (in English) [Odonata are preyed more accidentally and not at all studied localities.] Address: Abbasi, Fatemeh, Dept Fisheries, Gorgan University of Agriculture and Natural Resources, Gorgan, Iran

**12335.** Aden, C.; Kastner, F.; Loesbrock, J.; Krohn-Grimberghe, S. (2013): Neue Ansätze digitaler Artenerfassung für den ehrenamtlichen Naturschutz Ergebnisse der Entwicklung mobiler Lösungen in Niedersachsen. *Naturschutz und Landschaftsplanung* 45(4): 101-107. (in German, with English summary) ["The collection of data on flora and fauna by honorary nature conservation has been subject of changes in terms of techniques in the field and the flow of data. During the last years web portals have been established supported by open source software including free usable maps and forms for the recording of the observations as well as identification keys, species profiles and internet platforms. The portals are hosted by NGOs and public authorities. The method of Citizen Science seems to be very effective for data collection in a broad geographical range. Voluntary data collection has been additionally facilitated by the use of mobile devices such as smartphones, simplifying data flow from the field to the NGOs or nature conservation authorities. The paper summarises the current developments of voluntary data collection. It illustrates software developments such as the DragonflyApp (LibellenApp) and the web-based GIS portal eMapper. As an additional example the paper explains the standardized digital flow of data from the field up to the Lower Saxony Water Management, Coastal Defense and Nature Conservation Agency (NLWKN) which has also been implemented within the joint research project ARDINI. The apps have been developed to run on both operating systems (iOS/ Android). The application of modern techniques of the IT sector may encourage young people to participate in honorary nature conservation." (Authors)] Address: Kastner, Friederike, Carl von Ossietzky Universität Oldenburg, Institut für Biologie und Umweltwissenschaften, Ammerländer Heerstr. 114-118, 26129 Oldenburg, Germany. E-Mail: [friederike.kastner@uni-oldenburg.de](mailto:friederike.kastner@uni-oldenburg.de);

**12336.** Anderson, C.N.; Grether, G.F. (2013): Characterization of novel microsatellite loci for *Hetaerina americana* damselflies, and cross-amplification in other species. *Conservation Genetics Resources* 5(1): 149-151. (in English) ["*Hetaerina* damselflies are distributed

throughout the Neotropics. We developed eleven microsatellite loci for the damselfly *Hetaerina americana*. Microsatellites were tested for polymorphism on a panel of 24 individuals. The number of alleles ranged from 2 to 6, observed heterozygosity from 0.080 to 0.701, and the fixation index from -0.266 to 1.000. Cross-amplification was tested in 7 different species in the genus *Hetaerina* from the United States and Mexico. These microsatellite loci will be useful for studies of population structure and gene flow in *H. americana*." (Authors)] Address: Grether, G.F., Dept of Ecology and Evolutionary Biology, University of California, 621 Charles E Young Drive South, Los Angeles, CA, 90095. USA. E-mail: [ggrether@obee.ucla.edu](mailto:ggrether@obee.ucla.edu)

**12337.** Andrew, R.J. (2013): Andromorphic female of the dragonfly *Neurothemis tullia tullia* (Drury) (Odonata: Libellulidae), central India. *Journal of Threatened Taxa* 5(1): 3571-3573. (in English) ["On 02 November 2010, we were observing the dragonflies of Telenkhedi Pond (west end) when we noticed a typical "male" of *Neurothemis t. tullia* behaving in an unusual manner. It was hovering above the shallow shore and flying low at regular intervals so as to dip the terminal abdominal segment in water, which is a typical female ovipositing behaviour of this species." (Authors)] Address: Andrew, R.J., Post Graduate Department of Zoology, Hislop College, Nagpur, Maharashtra 440001, India. E-mail: [rajuandrew@yahoo.com](mailto:rajuandrew@yahoo.com)

**12338.** Arle, J.; Wagner, F. (2013): Effects of anthropogenic salinisation on the ecological status of macroinvertebrate assemblages in the Werra River (Thuringia, Germany). *Hydrobiologia* 701: 129-148. (in English) ["For more than 100 years, the Werra River has been severely affected by intensive salinisation caused by potash fertilizer industries. We show considerable differences in macroinvertebrate assemblages between reaches without salinisation impact and downstream reaches with intense anthropogenic salinisation in the Werra. This is true for almost all biological metrics relevant for ecological status classification under the EU-Water Framework Directive (EU-WFD) (European Community, Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, No. L 327/1, of 22 December 2000) and diversity measures (taxon richness, evenness). Macroinvertebrate assemblages at salinisation sites were completely dominated by three halophile neobiotic macroinvertebrate species (*Gammarus tigrinus*, *Corophium lacustre* and *Potamopyrgus antipodarum*). We compared anthropogenically salinised sites from the Werra with disturbed but non-salinised sites from the Werra and other German rivers. We used biological metrics developed for classifying the ecological status according to the EU-WFD. This comparison indicated a severe degradation at salinisation sites on the Werra and these fell into the worst ecological status class 'bad' according to the EU-WFD. Multivariate statistical analyses revealed anthropogenic salinisation as a key factor causing the differences in composition of macroinvertebrate assemblages in the Werra between salinisation and reference sites. Analyses of the long-term presence-absence data of macroinvertebrate assemblages indicated no marked improvement in the ecological status in the past 20 years." (Authors) The assessment also includes the Odonata-EPTCBO (Eph., Ple., Tri., Col., Bivalv., Odo.) index.] Address: Wagner, F.,

Institut für Gewässerökologie und Fischereibiologie Jena (IGF), Sandweg 3, 07745 Jena, Germany. E-mail: falko.wagner@igf-jena.de

**12339.** Arnold, A. (2013): Kleb-Labkraut als Falle für eine Prachtlibelle. *Mitteilungen Sächsischer Entomologen* 32: 12. (in German) [Altscherbitzer Park, north of Leipzig, Sachsen, Germany. A male *Calopteryx splendens* was caught by catchweed (*Galium aparine*). *G. aparine* is a scrambler, whose epidermis is barbed.] Address: Arnold, A., Zur schönen Aussicht 25, 04435 Schkeuditz, Germany

**12340.** Babu, R.; Subramanian, K.A.; Andrew, R.J. (2013): Obituary: Tridib Ran Jan Mitra. *Odonatologica* 42(1): 67-72. (in English) ["A brief biography and appreciation of the work of Dr T.R. Mitra (19 Feb. 1942-3 July 2012), the doyen of Indian odonatology, are followed by his odonatalogical bibliography (1967-2013). He described six new taxa from India and his works on the Indian odonate fauna will remain important references for a long time to come." (Authors)] Address: Subramanian, K.A., Zoological Survey of India, M-Block, New Alipore, Kolkata, West Bengal 700053, India. E-mail: subbu.ka.zsi@gmail.com

**12341.** Baird, R.C. (2013): Larval habitat and behaviour of *Phenes raptor* (Odonata: Petaluridae): a review of current knowledge, with new observations. *International Journal of Odonatology* 16(1): 79-91. (in English) ["*Phenes raptor* is one of only two petalurid dragonflies with a documented non-fossorial larval lifestyle. There have been few reported observations of larvae and their habitat, and the behaviour and ecology of this unique South American species remain largely unknown. This paper provides a review of previously published and unpublished information, and new observations on the habitat and behaviour of larvae and imagines. Larval habitat ranges from fens or seepages to moist terrestrial forest floor litter habitats. Better understanding the ecology and behaviour of the species will require observation of mating locations, additional observations of larvae in habitat and of oviposition and emergence sites across the species' broad geographic and bioclimatic range." (Author)] Address: Baird, R.C., 3 Waimea St, Katoomba NSW 2780, Australia

**12342.** Baker, K.S.; McIntyre, N.E. (2013): Associations between size and fitness of adult females in the model odonate: *Enallagma civile* (Odonata: Coenagrionidae). *The Southwestern Naturalist* 58(1): 91-96. (in English, with Spanish summary) ["During June 2009–June 2010, we collected 561 actively mating female familiar bluets *Enallagma civile*. Although only ca. 25% of these subsequently laid eggs in the laboratory, size of clutch averaged 250 eggs (range, 1–1,047). Overall, there was a high average rate of hatching success (75.8%). Size of females, in terms of width of head capsule, a non-labile trait in adults, was not significantly associated with metrics of fitness. Hatching success was associated positively with length of eggs (indicating that size of eggs may be an indicator of quality of eggs) and negatively related to duration of hatching." (Authors)] Address: McIntyre, Nancy, Dept of Biological Sciences, Texas Tech University, Lubbock, TX 79409-3131, USA. E-mail: nancy.mcintyre@ttu.edu

**12343.** Beatty, S.J.; Morgan, D.L.; Keleher, J.; Allen, M.G.; Sarre, G.A. (2013): The tropical South American cichlid, *Geophagus brasiliensis* in Mediterranean climatic south-western Australia. *Aquatic Invasions* 8: 21-36.

(in English) ["The highly endemic (82%) freshwater fishes of south-western Australia are imperiled due to severe habitat and water quality declines and impacts of introduced species. As a case study of the recent tropical aquarium fish introductions, the biology and ecology of the pearl cichlid *Geophagus brasiliensis* was determined in the Swan River catchment south-western Australia. Unlike endemic freshwater fish species of this Mediterranean climatic region, *Geophagus brasiliensis* underwent a protracted spawning period during the warmer period from December to May. It appeared that recruitment only occurred in lentic habitats; however the species also persists in downstream lotic habitats. Growth rate and maximum size (245 mm TL) of the species exceed all but one of the region's native freshwater fishes. Whilst minimum water temperature may help limit its establishment in many aquatic ecosystems, its salinity tolerance and omnivorous diet would facilitate its colonisation in this region, including freshwaters and estuaries. Past and future habitat and climatic change is predicted to continue to favour species from sub-tropical and tropical regions." (Author) Odonata larvae are preyed upon.] Address: Beatty, S.J., Freshwater Fish Group and Fish Health Unit, Murdoch University, South St, Murdoch, Western Australia, Australia 6150 E-mail: s.beatty@murdoch.edu.au

**12344.** Bechly, G.; Kin, A. (2013): First record of the fossil dragonfly family Eumorbaeschnidae from the Upper Jurassic of Poland. *Acta Palaeontologica Polonica* 58(1): 121-124. (in English) ["*Eumorbaeschna adriankini* sp. nov. is described as first fossil insect from the Upper Jurassic of Central Poland (Owadów-Brzezinki quarry, Tomaszów Mazowiecki area), and as first record of the family Eumorbaeschnidae (Odonata: Anisoptera: Aeshnoptera) outside the Solnhofen lithographic limestone." (Authors)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail: guenter.bechly@smns-bw.de

**12345.** Bedjanic, M. (2013): *Paragomphus campestris* spec. nov., a new endemic dragonfly from Sri Lanka (Anisoptera: Gomphidae). *Odonatologica* 42(1): 45-53. (in English) ["The new species is described and illustrated. Holotype male: Mawanella, Hingula Oya; Kegalle distr., Sabaragamuwa prov.; 22-IV-1976; deposited in State Collection of Zoology, Munich. The currently known information on its distribution, phenology and ecology is provided and discussed." (Author)] Address: Bedjanic, M., Rakovlje 42/A, SI-3314 Braslovce, Slovenia. E-mail: matjazbedjanic@yahoo.com

**12346.** Bernard, R.; Buczyński, P.; Tończyk, G. (2013): A distribution atlas of dragonflies (Odonata) in Poland – correction. *Odonatrix* 9(1): 31-32. (in Polish, with English summary) ["Due to an error in the database an incorrect UTM-square has been included and/ or a correct UTM-square has been lacking on the distribution maps for nine species in the "Atlas". For three further species, this error has resulted in incorrect colour of the circle, which reflects a period of data collecting, in one or two squares. The corrections for particular species both on maps and in the numbers of occupied squares recorded in the historical period are presented in the table." (Authors)] Address: Bernard, R., 1 Zakład Zoologii Ogólnej, Uniwersytet im. Adama Mickiewicza, ul. Umultowska 89, 61-614 Poznań, Poland. E-mail: rbernard@amu.edu.pl

**12347.** Bertoluci, J.; da Rocha, P.L.B.; Trefaut, R.M. (2013): Field evidence of coupled cycles of arthropod predator-tadpole prey abundance in six aquatic systems of an Atlantic Rainforest site in Brazil. The Herpetological Journal 23(1): 63-66 (in English) ["We evaluated the patterns of abundance association between tadpoles and their aquatic arthropod predators (including *Anax amazili*, *Aeshna punctata*, *Libellula herculea*) in natural communities of Atlantic Forest in south-eastern Brazil. We distributed 10 traps in each one of six aquatic systems and counted the numbers of tadpoles and of predators captured monthly for 13 months. For each system, we quantified the temporal association between tadpoles and predator abundances and measured its strength (using Spearman's rho coefficient) for time-lags ranging from -6 to +6 months, followed by testing the hypothesis that the strength of the association differs among time-lag values. The associations were always stronger in streams than in ponds, and strongest ( $r^2 > 0.42$ ) and always significant ( $p < 0.016$ ) when time-lag was zero months, resulting in significant differences of mean values of  $r^2$  across time-lags ( $p < 0.001$ ). A time-lag shorter than one month agrees with predictions from the model of predator-prey coupled cycles. The results also suggest that the importance of secondary factors driving abundance values in streams is stronger than in ponds, where conditions tend to be more unstable. To our knowledge, this is the first evidence of coupled cycles of predator-prey abundance with delayed dependence demonstrated with tadpoles and insects in aquatic forest systems." (Authors)] Address: Bertoluci, J, Endereço profissional Universidade de São Paulo, Escola Superior de Agricultura Luiz de Queiroz. Av. Pádua Dias, 11 Pavilhão da Horticultura 2 andar sala 18, Vila Independência 13418-900 – Piracicaba, SP - Brasil - Caixa-Postal: 9. E-mail: jaime.bertoluci@usp.br

**12348.** Bhandarkar, S.V.; Bhandarkar, W.R. (2013): A study on species diversity of benthic macro invertebrates in freshwater lotic ecosystems in Gadchiroli district Maharashtra. Int. J. of Life Sciences 1(1): 22-31. (in English) ["A study was conducted to evaluate the potential of benthic macro-invertebrates community assemblages in predicting the water quality status. Three sampling stations with various environmental quality gradients were selected at the Wainganga, Gadhavi and Khobragadhi River in Gadchiroli district in order to determine differences or changes in the benthos community associated with variability in water quality. The diversity indices like Shannon-Wiener index, Evenness or Shannon equitability index and Margalef's index were calculated. According to Shannon-Wiener index of species diversity, all the selected sampling sites fall under moderate pollution. The Shannon equitability index values showed a greater equitability in the apportionment of individuals among the species in all the sites while Margalef's index of species richness reveals that the site-I had more healthy body and have higher species diversity among all sampling sites. The species diversity of site-II is greater than site-III. The site-III had poorer in species diversity and nutrient material." (Authors) The taxa list includes "Aphylla nymph (Aeshnidae)", Gomphidae and Libellulidae.] Address: Bhandarkar, S.V., Department of Zoology, M. B. Patel College, Deori. Dist. Gondia. 441 901. MS. India. E-mail: sudhirsense@rediffmail.com

**12349.** Bin, L.; Mao, S. (2013): Aerodynamic interactions between wing and body of a model insect in forward

flight and maneuvers. Journal of Bionic Engineering 10(1): 19-27. (in English) ["The aerodynamic interactions between the body and the wings of a model insect in forward flight and maneuvers are studied using the method of numerically solving the Navier-Stokes equations over moving overset grids. Three cases are considered, including a complete insect, wing pair only and body only. By comparing the results of these cases, the interaction effect between the body and the wing pair can be identified. The changes in the force and moment coefficients of the wing pair due to the presence of the body are less than 4.5% of the mean vertical force coefficient of the model insect; the changes in the aerodynamic force coefficients of the body due to the presence of the wings are less than 5.0% of the mean vertical force coefficient of the model insect. The results of this paper indicate that in studying the aerodynamics and flight dynamics of a flapping insect in forward flight or manoeuvre, separately computing (or measuring) the aerodynamic forces and moments on the wing pair and on the body could be a good approximation." (Authors) The paper includes a reference to dragonflies.] Address: Bin, L., Ministry-of-Education Key Laboratory of Fluid Mechanics, Beihang University, Beijing 100191, P. R. China

**12350.** Bischof, M.M.; Hanson, M.A.; Fulton, M.R.; Kolka, R.K.; Sebestyen, S.D.; Butler, M.G. (2013): Invertebrate community patterns in seasonal ponds in Minnesota, USA: Response to hydrologic and environmental variability. Wetlands 33(2): 245-256. (in English) ["Seasonal ponds are common throughout forested regions of the north central United States. These wetlands typically flood due to snow-melt and spring precipitation, then dry by mid-summer. Periodic drying produces unique fishless habitats with robust populations of aquatic invertebrates. A basin's physical/chemical features, the absence of vertebrate predation, and especially the duration of seasonal flooding, have long been viewed as the major structuring influences on these communities, but previous studies have shown only limited effects of environmental variables on pond invertebrates. Applying ordination methods to data from weekly collections of invertebrates during 2008–2009, we tested influences of site-level environmental gradients on the presence and relative abundance of aquatic invertebrate communities in 16 seasonal ponds in a forested region of north central Minnesota, USA. We assessed invertebrate (including Odonata) community patterns in relation to pond size and depth, soil nutrients, canopy closure, hydroperiod, and predominant groundwater function (recharge, discharge, or flow-through). Patterns in pond invertebrate community composition were consistently related to pond depth, overhead canopy closure, and hydroperiod. Site-level hydrologic function showed weak relationships to seasonal patterns of invertebrate abundance. Although physical features of ponds had only modest influence on presence and abundance of invertebrates, weekly sampling improved models relating environmental variables to pond invertebrates." (Authors) Address: Hanson, M.A., Minnesota Department of Natural Resources, Wetland Wildlife Populations and Research Group, Bemidji, MN, 56601, USA. E-mail: mark.alan.hanson@state.mn.us

**12351.** Blanke, A.; Beckmann, F.; Misof, B. (2013): The head anatomy of *Epiophlebia superstes* (Odonata: Epiophlebiidae). Organisms Diversity & Evolution 13(1): 55-66. (in English) ["The relic dragonfly family Epiophlebi-



idae is recovered as sistergroup of Anisoptera (= Eiprocta) by most molecular and morphological analyses. However, in a recent study it was placed within Anisoptera as sister group of Cordulegastridae. In another study, several affinities to Zygoptera in the morphology of the ovipositor and the egg-laying behaviour were pointed out. Here, we present a detailed study of the outer, as well as the inner, head morphology of *Epiophlebia superstes*. Compared with the last detailed literature account, three additional mandibular muscles were discovered, as well as additional buccal and pharyngeal muscles. The results are compared with the anatomic features of Zygoptera and Anisoptera. A formal character evaluation focused on head characters confirms the sistergroup relationship of Epiophlebiidae and Anisoptera." (Authors)] Address: Blanke, A., Zentrum für molekulare Biodiversität, Zoologisches Forschungsmuseum Alexander Koenig, Adenauerallee 160, 53113, Bonn, Germany. E-mail: [blanke@uni-bonn.de](mailto:blanke@uni-bonn.de)

**12352.** Bochumer Botanischer Verein (2013): GEO-Tag der Artenvielfalt am 16. und 17. Juni 2012 auf der Halde Hoheward in Herten. Jahrbuch des Bochumer Botanischen Vereins 4: 117-134. (in German) [Herten, Nordrhein-Westfalen, Germany; 11 Odonata species including *Erythromma najas* were recorded.] Address: Goertzen, Diana, Dornröschenweg 27, D-44339 Dortmund, Germany. E-mail: [diana.goertzen@rub.de](mailto:diana.goertzen@rub.de)

**12353.** Bomfleur, B.; Decombeix, A.-L.; Escapa, I.H.; Schwendemann, A.B.; Axsmith, B. (2013): Whole-plant concept and environment reconstruction of a *Telemachus* conifer (Voltziales) from the Triassic of Antarctica. *International Journal of Plant Sciences* 174(3): 425-444. (in English) ["We present a whole-plant concept for a genus of voltzialean conifers on the basis of compression/impression and permineralized material from the Triassic of Antarctica. The reconstruction of the individual organs is based on a combination of organic connections, structural correspondences, similarities in cuticles and epidermal morphologies, co-occurrence data, and ex situ palynology. The affiliated genera of organs include trunks, branches, and roots (Notophytum); strap-shaped leaves with parallel venation (*Heidiphyllum* compressions and permineralized *Notophytum* leaves); seed cones (*Telemachus* and *Parasciadopitys*); pollen cones (*Switzianthus*); and bisaccate pollen of *Alisporites* type. Structural similarities lead us to suggest that *Parasciadopitys* is the permineralized state of a *Telemachus* cone and should be treated as a junior synonym. Biotic interactions involving the reconstructed conifer genus include plant-insect interactions (oviposition by Odonata) and not less than five different types of plant-fungal interactions, including two distinct endomycorrhizal associations, two probable seed parasites, and epiphyllous fungi. A representative whole plant is reconstructed as a 10–15-m-tall, seasonally deciduous forest tree with a vertical, narrow-conical crown shape. We interpret these *Telemachus* trees as the dominant components of peat-forming conifer swamps, forest bogs, and immature bottomland vegetation in the Triassic high-latitude river basins of southern Gondwana. In architecture, growth habit, and many ecological characteristics, the *Telemachus* conifers appear to be comparable to extant larch (*Larix*). Owing to the large amount and often exquisite preservation of the material, this conceptual whole-plant genus represents one of the most completely reconstructed ancient conifer taxa to date." (Authors)] Address: Bomfleur, B., Dept of Ecology & Evolu-

tionary Biology, University of Kansas, Lawrence, Kansas 66045, U.S.A., and Natural History Museum and Biodiversity Institute, University of Kansas, Lawrence, Kansas 66045, USA

**12354.** Bose, A.P.H.; Robinson, B.W. (2013): Invertebrate predation predicts variation in an autotomy-related trait in larval damselfly. *Evolutionary Ecology* 27(1): 27-38. (in English) ["Autotomy, the discarding of a prey appendage grasped by a predator, may evolve when the benefits of immediate survival outweigh the costs of appendage loss. In larval damselflies, joints connecting lamellae to the abdomen vary in size and shape within and among taxa suggesting that they may evolve under selection by invertebrate predators, such as dragonfly larvae. Assuming that joint width is proportional to the force required for autotomy, we tested if invertebrate predation favours smaller lamellar joints for autotomy or larger joints for structural support of lamellae for swimming. We compared the maximum joint widths of larval *Lestes* and *Enallagma* among ponds that varied in risk of invertebrate predation. Relative predation risk estimated as the frequency of regenerated lamellae within ponds was weakly and positively related to the relative abundance of larval dragonflies. The allometry of lamellar joint size decreased with increasing risk of invertebrate predation across ponds after controlling for variation in body size in *Lestes* congener but not in *Enallagma* species. Both species of *Lestes* had larger joint sizes than the five species of *Enallagma*, suggesting that the ancestral divergence of lamellar joints between these genera may influence contemporary responses to invertebrate predation." (Authors)] Address: Bose, Aneesh, Department of Integrative Biology, University of Guelph, 50 Stone Road East, Guelph, ON, N1G-2W1, Canada. E-mail: [abose@uoguelph.ca](mailto:abose@uoguelph.ca)

**12355.** Brandon, A. (2013): Odonata news and events from across the vice counties of Anglesey, Merionethshire, Caernarvonshire, Denbighshire and Flintshire. *Y Fursen - North Wales Dragonfly Newsletter* 70: 3 pp. (in English) [The author reports from the British Dragonfly Society Recorders Conference at CEH, Wallingford, UK in March 2013, and presents a brief report on the recent trends in UK species ranges: "The records show that since 1970 they are doing much better as a group than, say, butterflies. There are more species actually increasing their range than those in decline - 14% are increasing and 5% decreasing. The winners, i.e. those species that have expanded their ranges or are colonising new sites are: *Aeshna mixta*, *A. cyanea*, *Anax imperator*, *Brachytron pratense*, *Calopteryx splendens*, *Erythromma viridulum*, *Libellula fulva*, *L. quadrimaculata*, *Orthetrum cancellatum*, *Platynemis pennipes*, *Sympetrum sanguineum*. Distinct losers are: *Aeshna grandis*, *Coenagrion puella*, *C. pulchellum*, *Enallagma cyathigerum*, *Ischnura elegans* – this includes three of our most common damselflies!" Details on the current distribution of *C. pulchellum* in North Wales, UK are presented. The journal also advises to Odonata larva videos.] Address: Brandon, A., North Wales Dragonfly Recorder, Bryn Heilyn, Rowen, Conwy LL32 8YT., UK. E-mail: [allanrowenconwy@antispam.sky.com](mailto:allanrowenconwy@antispam.sky.com)

**12356.** Büsse, S.; Genet, C.; Hörschemeyer, T. (2013): Homologization of the flight musculature of Zygoptera (Insecta: Odonata) and Neoptera (Insecta). *PLoS ONE* 8(2): e55787. doi:10.1371/journal.pone.0055787: 16 pp, suppl. (in English) ["Among the winged insects (Pterygota) the Dragonflies and Damselflies (Odonata) are

unique for several reasons. Behaviourally they are aerial predators that hunt and catch their prey in flight, only. Morphologically the flight apparatus of Odonata is significantly different from what is found in the remaining Pterygota. However, to understand the phylogenetic relationships of winged insects and the origin and evolution of insect flight in general, it is essential to know how the elements of the odonatan flight apparatus relate to those of the other Pterygota. Here we present a comprehensive, comparative morphological investigation of the thoracic flight musculature of damselflies (Zygoptera). Based on our new data we propose a homologization scheme for the thoracic musculature throughout Pterygota. The new homology hypotheses will allow for future comparative work and especially for phylogenetic analyses using characters of the thoracic musculature throughout all winged insects. This will contribute to understand the early evolution of pterygote insects and their basal phylogenetic relationship." (Authors)] Address: Büsse, S., Georg-August-Universität Göttingen, Johann-Friedrich-Blumenbach-Institut für Zoologie & Anthropologie, Abteilung Morphologie, Systematik & Evolutionsbiologie mit Zoologischem Museum, Berliner Str. 28, 37073 Göttingen, Germany. E-Mail: sebastian.buesse@biologie.uni-goettingen.de

**12357.** Bußmann, M. (2013): Nachweise der Gestreiften Quelljungfer *Cordulegaster bidentata* Selys, 1843 (Odonata: Cordulegastriidae) in Quellbächen des Unteren Lennetales (Märkischer Kreis, NRW). *Natur und Heimat* 73(1): 1-10. (in German) [Märkischer Kreis, Nordrhein-Westfalen, Germany; *C. bidentata* was recorded in the crenal of ten from 33 studied running water bodies.] Address: Bußmann, M., Märkischer Kreis, Untere Landschaftsbehörde, Heedfelder Str. 45, 58509 Lüdenscheid, Germany

**12358.** Butcher, G. (coord.) (2013): The Mysterious Migratory Dragonfly. *Flylines Spring 2013*: 7-8. (in English) [Verbatim: For centuries, people around the world have reported seeing large swarms of dragonflies, migrating mostly in early fall. In the United States, up to 16 different species have been spotted in these autumnal flights. In spite of these numerous sightings and the fascination with dragonflies, these flights still remain a mystery. The US Forest Service and its partners, however, are working to increase our knowledge of this remarkable phenomenon. They are working together to delve deeper into the mystery of dragonfly migration, their biology and their breeding patterns. One partner organization, the Xerces Society, has convened a group of experts to form the Migratory Dragonfly Partnership. One of the first products of the partnership is a scientific review paper by Michael L. May: "A critical overview of progress in studies of migration of dragonflies (Odonata: Anisoptera), with emphasis on North America," in the *Journal of Insect Conservation* ([www.migratorydragonflypartnership.org](http://www.migratorydragonflypartnership.org)). In his review, the author discusses the task of greatly increasing our understanding of this phenomenon. Citizen science is another way in which we are gaining more than a glimpse into the world of dragonflies. Celeste Mazzacano, dragonfly partnership coordinator, is organizing a project, Pond Watch ([www.migratorydragonflypartnership.org](http://www.migratorydragonflypartnership.org)), which encourages the public to visit local dragonfly ponds often to determine which species are present and at which life-cycle stage. The project focuses on five major migratory species: *Anax junius*, *Tramea lacerata*, *Pantala flavescens*, *P. hymenaea*, and *Sympetrum corruptum*; however, the

study's techniques can be used on any dragonfly species of interest. Another project, Migration Monitoring Project ([www.migratorydragonflypartnership.org](http://www.migratorydragonflypartnership.org)) encourages people to report sightings during fall migration. Many observations of their flight have occurred at well-known sites for observing raptor migration, so it may be possible to combine efforts to monitor hawks, eagles, kites, and dragonflies from the same sites. Migratory Dragonfly Partnership researchers are taking the lead on a third major project that uses latitudinal differences in stable isotopes to determine the geographic origin of adult dragonflies. The scientists study emerging adults and exuviae (the "skin" that the emerging adults discard) to create an isotopic map of North America. Then they can compare the isotopes of migrating adults to determine their geographic origin. If all of this makes you want to get involved, be sure to visit the web site and start contributing your data. In addition, visit the web site to see if there will be a Migratory Dragonfly Short Course taught in your area. These short courses are a great way to learn how to participate firsthand.] Address: For more information on the Wings Across the Americas, visit <http://www.fs.fed.us/global/wings>

**12359.** Carlson, B.E.; Langkilde, T. (2013): A common marking technique affects tadpole behavior and risk of predation. *Ethology* 119(2): 167-177. (in English) ["In many studies, it is necessary for researchers to mark individual animals for later identification. It is often assumed in the interpretation of these studies that marks have no effects on the biology of the animals. This assumption is insufficiently tested, and, when it is, coarse assessments of negative effects are often used, such as survival and growth under simplified laboratory conditions. We examined the consequences of a common larval amphibian marking technique (staining with methylene blue) for wood frog tadpole behaviour and survival in an ecologically realistic scenario (predation). We measured a number of tadpole behavioural variables, under baseline conditions and in the presence of olfactory cues of a predator, for marked and unmarked tadpoles. We then exposed pairs of tadpoles (one marked and one unmarked) to one of two predators and tested for the effects of marking on the susceptibility of tadpoles to predation. We found that marking suppressed the increase in movement rate that typically occurred in (unmarked) tadpoles in the presence of predator cues. Marked tadpoles were significantly more likely to be captured by predators, an effect that could not be attributed to this difference in movement rate. These results raise concern about the use of this staining method and highlight the need for studies involving marked animals to thoroughly address any relevant effects the marks may have on the biology of the subjects." (Authors) Dragonfly predators were predominantly larvae of *Anax junius*.] Address: Carlson, B.E., Dept of Biology, The Pennsylvania State University, 208 Mueller Laboratory, University Park, PA 16802, USA. E-mail: bec169@psu.edu

**12360.** Chambers, D.L.; Wojdak, J.M.; Du, P.; Belden, L.K. (2013): Pond acidification may explain differences in corticosterone among salamander populations. *Physiological and Biochemical Zoology* 86(2): 224-232. (in English) ["Physiological tolerances play a key role in determining species distributions and abundance across a landscape, and understanding these tolerances can therefore be useful in predicting future changes in species distributions that might occur. Vertebrates possess

several highly conserved physiological mechanisms for coping with environmental stressors, including the hormonal stress response that involves an endocrine cascade resulting in the increased production of glucocorticoids. We examined the function of this endocrine axis by assessing both baseline and acute stress-induced concentrations of corticosterone in larvae from eight natural breeding populations of Jefferson's salamander *Ambystoma jeffersonianum*. We surveyed individuals from each pond and also examined a variety of environmental pond parameters. We found that baseline and stress-induced corticosterone concentrations differed significantly among ponds. Population-level baseline corticosterone concentrations were negatively related to pH and positively related to nitrate, and stress-induced concentrations were again negatively related to pH, positively related to nitrate, and positively related to temperature. We followed the field survey with an outdoor mesocosm experiment in which we manipulated pH and again examined baseline and acute stress-induced corticosterone in *A. jeffersonianum* larvae. As in the field survey, we observed an increase in the baseline corticosterone concentration of individuals exposed to the lowest pH treatment (pH 5–5.8). Examining physiological indices using a combined approach of field surveys and experiments can be a powerful tool for trying to unravel the complexities of environmental impacts on species distributions. [...] After 24 h, tadpoles from high-latitude populations, compared with those from low-latitude populations, had increased baseline corticosterone levels when reared with a nonlethal dragonfly predator, but this difference disappeared after 15 d of cohousing with a predator." (Authors)] Address: Belden, Lisa, 4092C Derring Hall, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0406, USA. E-mail: belden@vt.edu

**12361.** Chen, Y.H.; Skote, M.; Zhao, Y.; Huang, W.M. (2013): Stiffness evaluation of the leading edge of the dragonfly wing via laservibrometer. *Materials Letters* 97: 166-168. (in English) ["The material property of the leading edge vein (LEV) of the dragonfly wing is investigated. A new vibration method is developed using a laser vibrometer and mini-shaker. The natural frequency of a cantilevered LEV is determined via lateral oscillation. As a result, the elastic modulus of a LEV sample from a dragonfly wing is found to be in the range of the elastic hydrocarbon polymer, while a dead dragonfly is similar to low density polyethylene. The loss of water contents in the veins increases the stiffness of the LEV by approximately 20times. Highlights: \*Material property of the costa of the dragonfly hindwing is investigated. \*New vibration method is developed to obtain the elastic modulus of the costa. \*Elastic modulus is 20 times lower for a fresh costa than a dead sample. \*Material for an artificial model should be an elastic hydrocarbon polymer." (Authors)] Address: Skote, M., School of Mechanical and Aerospace Engineering, Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798. E-mail: mskote@ntu.edu.sg

**12362.** Choong, C.Y.; Cheah, D.S.L. (2013): Odonata of Ayer Hitam Forest Reserve, Johor, Peninsular Malaysia. *Faunistic Studies in South-East Asian and Pacific Island Odonata* 2: 1-11. (in English, with Malay summary) ["Odonata records from Ayer Hitam Forest Reserve and the surrounding area in Johor, Peninsular Malaysia are presented. A total of 44 Odonata species from eight families were collected in the area in October

2012. All of these records are new to Ayer Hitam Forest Reserve. *Indothemis carnitica* is a new record for Malaysia." (Authors)] Address: Choong, C.Y., School of Environ. & Natural Resource Sciences, Fac. of Sci. & Tech., Univ. i Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: rocoto98@yahoo.com

**12363.** Chowdhary, S.; Sharma, K.K. (2013): Evaluation of macrobenthic invertebrates in the longitudinal profile of a river (Tawi), originating from Shivalik hills. *Journal of Global Biosciences* 2(1): 31-39. (in English) [Identification of Nearctic(!) Odonata taxa was done at the genus level.] Address: Chowdhary, Samita, Dept of Zoology, Univ. of Jammu-180006, Jammu and Kashmir, India

**12364.** Daraż, B. (2013): Some dragonflies (Odonata) of Chingombe, Zambia, and some other localities in Zambia and Botswana. *Odonatrix* 9(1): 13-20. (in English, with Polish summary) ["During occasional observations at ten southern African localities in 2011, mainly in Zambia and additionally in Botswana, 24 dragonfly species were recorded. Sixteen species were recorded in Chingombe, central Zambia." (Author)] Address: Daraż, B., Kościelna Str. 41, 35-505 Rzeszów, Poland. E-mail: bdaraz@poczta.onet.pl

**12365.** Das, A.; Gupta, S.K. (2013): An initial survey on insect associated mites of South Bengal. *IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS)* 5(1): 7-8. (in English) ["A preliminary study related to mites associated in the insects is given in this article. Ten species of mites under nine families collected from six orders of insects from South Bengal are reported here giving collection data and biological information." (Authors) *Arrenurus* sp. is listed from an Odonata sampled at the Science City area.] Address: Das, A., PG Department of Zoology, Vidyasagar College, Kolkata, India

**12366.** De Block, M.; Pauwels, K.; Van Den Broeck, M.; De Meester, L.; Stoks, R. (2013): Local genetic adaptation generates latitude-specific effects of warming on predator-prey interactions. *Global Change Biology* 19(3): 689-696. (in English) ["Temperature effects on predator-prey interactions are fundamental to better understand the effects of global warming. Previous studies never considered local adaptation of both predators and prey at different latitudes, and ignored the novel population combinations of the same predator-prey species system that may arise because of northward dispersal. We set up a common garden warming experiment to study predator-prey interactions between *Ischnura elegans* damselfly predators and *Daphnia magna* zooplankton prey from three source latitudes spanning >1500 km. Damselfly foraging rates showed thermal plasticity and strong latitudinal differences consistent with adaptation to local time constraints. Relative survival was higher at 24 °C than at 20 °C in southern *Daphnia* and higher at 20 °C than at 24 °C, in northern *Daphnia* indicating local thermal adaptation of the *Daphnia* prey. Yet, this thermal advantage disappeared when they were confronted with the damselfly predators of the same latitude, reflecting also a signal of local thermal adaptation in the damselfly predators. Our results further suggest the invasion success of northward moving predators as well as prey to be latitude-specific. We advocate the novel common garden experimental approach using predators and prey obtained from natural temperature gradients spanning the predicted temperature increase in the northern popula-



tions as a powerful approach to gain mechanistic insights into how community modules will be affected by global warming. It can be used as a space-for-time substitution to inform how predator-prey interaction may gradually evolve to long-term warming." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robbystoks@bio.kuleuven.ac.be

**12367.** De Knijf, G.; Vanappelghem, C.; Demolder, H. (2013): Odonata from Montenegro, with notes on taxonomy, regional diversity and conservation. *Odonatologica* 42(1): 1-29. (in English) ["The Odonata fauna of Montenegro was investigated during 2 field trips in 2009 and in 2011. In all, 105 localities were visited resulting in 50 observed species (52 taxa). Important populations of *Lindenia tetraphylla* and *Selysiothemis nigra* were found, that of the former is probably the most important one in Europe. The presence of *Lestes parvidens*, *Caliaeschna microstigma*, *Cordulegaster heros* and *C. bidentata* is confirmed. *C. heros* individuals show clear variation from the nominal type and are of an intermediate form with the ssp. *pelionensis*. Several populations of *Gomphus schneiderii*, which differ in thoracic and abdominal markings from typical *schneiderii*, were detected and criteria are given for the differentiation with *G. vulgatissimus*. *Epiptera bimaculata* is a new species for Montenegro and represents the southernmost observation in its European range. The first populations of *Trithemis annulata* were discovered. A major emphasis was on the survey and diversity of the Mediterranean region. This region has a greater diversity than the Alpine region and several species of the Balkans are confined to it. Skadar lake has the greatest diversity of dragonflies and is home to several threatened and European protected species. Many populations of rare species in the coastal area are threatened by an increasing demand for water consumption by tourists and for agriculture use." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**12368.** Degefu, F.; Lakew, A.; Tigabu, Y.; Teshome, K. (2013): The water quality degradation of upper Awash River, Ethiopia. *Ethiopian Journal of Environmental Studies and Management* 6(1): 58-66. (in English) ["Benthic macroinvertebrate based assessment of water quality in the upper Awash River, along the river course of about 500 kms was conducted on quarterly bases between September 2009 and August 2010. This paper reports the complete identification of macroinvertebrates together with measurements of physico-chemical parameters and heavy metal concentrations which were considered as a tool for assessing the water quality status of upper Awash river, Ethiopia. Benthic animals and water samples were collected from three different sampling sites located in the upper Awash River, and analyzed to evaluate stressor sources and the general stream water quality. The percentage abundance of families of various macroinvertebrates taxonomic groups was identified from all sites. Accordingly, Koka bridge site of the upper Awash River had low water quality status which is likely to be due to poor farming, untreated effluents from factories and poor provision of sanitation facilities to the riparian communities. Apparently, the concentrations of the selected nutrients and heavy metals did not differ significantly among the sampling sites (ANOVA,  $P > 0.05$ ), presumably due to pollution of the whole stream reach by the catchment nutrient

sources. Ten orders of benthic macroinvertebrates consisting of 36 families were identified. The highest family richness was observed in Ginchi, slightly impacted site (1) whilst the least faunal diversity was observed in Koka Bridge (7 families) indicating the effect of water quality class differences among the sampling sites." (Authors) Taxa include Odonata and are treated at family level.] Address: Degefu, F., EIAR-National Fisheries and Aquaculture Research Center, P.O.Box 64, Sebeta, Ethiopia. E-mail: fasildeg2000@yahoo.com

**12369.** Demayo, C.G.; Rico, M.J.; Torres, M.A.J. (2013): Relative warp analysis of variations in the fore- and hindwings of selected populations of male *Neurothemis terminata terminata* (Ris, 1911). *Sci. Int. (Lahore)* 25(2): 277-284. (in English) ["Relative warp analysis of variations in the shape of the fore- and hind wings of male *N. terminata* was done on selected populations. To illustrate variations in wing shape, landmark data was subjected to relative warp analysis and the resulting scores were subjected to Multivariate Analysis of Variance (MANOVA) and Canonical Variate Analysis (CVA). The results display significant variations between populations on the wings of the male *N. terminata*. The results suggest that each population represents discrete panmictic units which could be due to the territorial behaviour of male dragonflies." (Authors)] Address: Demayo, C.G., Dept of Biological Sciences. College of Science and Mathematics, MSU-Iligan Institute of Technology, Iligan City, Philippines. E-mail: cgdemayo@gmail.com

**12370.** Domisch, S.; Araújo, M.B.; Bonada, N.; Pauls, S.U.; Jähnig, S.J.; Haase, P. (2013): Modelling distribution in European stream macroinvertebrates under future climates. *Global Change Biology* 19(3): 752-762. (in English) ["Climate change is predicted to have profound effects on freshwater organisms due to rising temperatures and altered precipitation regimes. Using an ensemble of bioclimatic envelope models (BEMs), we modelled the climatic suitability of 191 stream macroinvertebrate species from 12 orders across Europe under two climate change scenarios for 2080 on a spatial resolution of 5 arc minutes. Analyses included assessments of relative changes in species' climatically suitable areas as well as their potential shifts in latitude and longitude with respect to species' thermal preferences. Climate-change effects were also analysed regarding species' ecological and biological groupings, namely (1) endemicity and (2) rarity within European ecoregions, (3) life cycle, (4) stream zonation preference and (5) current preference. The BEMs projected that suitable climate conditions would persist in Europe in the year 2080 for nearly 99% of the modelled species regardless of the climate scenario. Nevertheless, a decrease in the amount of climatically suitable areas was projected for 57-59% of the species. Depending on the scenario, losses could be of 38-44% on average. The suitable areas for species were projected to shift, on average, 4.7-6.6° north and 3.9-5.4° east. Cold-adapted species were projected to lose climatically suitable areas, while gains were expected for warm-adapted species. When projections were analysed for different species groupings, only endemics stood out as a particular group. That is, endemics were projected to lose significantly larger amounts of suitable climatic areas than nonendemic species. Despite the uncertainties involved in modelling exercises such as this, the extent of projected distributional changes reveals further the vulnerability of freshwater organisms to climate change and implies a need

to understand the consequences for ecological function and biodiversity conservation." (Authors) The analysis includes *Calopteryx haemorrhoidalis*, *C. splendens*, *Gomphus pulchellus* and *Onychogomphus uncatatus*.] Address: Domisch, S., Senckenberg Research Institute and Natural History Museum Frankfurt, Department of River Ecology and Conservation, Gelnhausen, Germany. E-mail: sami.domisch@senckenberg.de

**12371.** Dow, R.A.; Reels, G.T. (2013): Previously unpublished Odonata records from Sarawak, Borneo. Part I. Kuching Division excluding Kubah National Park, and Samarahan Division. *Faunistic Studies in South-East Asian and Pacific Island Odonata* 3: 1-25. (in English) ["Records of Odonata from Kuching and Samarahan, the western administrative divisions of Sarawak in Malaysian Borneo, are presented. Forty-two species are listed from Bako National Park, and eighty-nine species are listed from various other locations. Notable records, not yet published in detail elsewhere, include *Aciagrion fasciculare*, *Bornargiolestes* species, *Pericnemis* species of *triangularis*, *Coelliccia* new species and *Tetrathemis flavescens*." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**12372.** El-Hawagry, M.S.; Khalil, M.W.; Sharaf, M.R.; Fadl, H.H.; Aldawood, A.S. (2013): A preliminary study on the insect fauna of Al-Baha Province, Saudi Arabia, with descriptions of two new species. *ZooKeys* 274: 1-88. (in English) [A total of 582 species and subspecies (few identified only to genus level) belonging to 129 families and representing 17 orders, have been recorded from Al-Baha Province. The list of taxa includes two Odonata species: *Anax parthenope* and *Trithemis artemesia*.] Address: El-Hawagry, M.S., Basic Sciences Department, Community College, Al-Baha University, Al-Baha, Saudi Arabia, PO Box 1598, Project: Survey and Classification of Agricultural and Medical Insects in Al-Baha Province, Kingdom of Saudi Arabia. E-mail: el-hawagry@gmail.com

**12373.** Engel, M.S.; Kristensen, N.P. (2013): A history of entomological classification. *Annual Review of Entomology* 58: 585-607. (in English) ["The classification of insects has attempted to most effectively communicate information about this hyperdiverse lineage of life and, not surprisingly, has had a considerably rich historical development. This history can be coarsely segregated into four periods: the Pre-Linnean era, the first century spanning Linnaeus's *Systema Naturae* to Darwin's *On the Origin of Species*, the Darwinian era up to the Cladistic Revolution, and the Hennigian era leading to today. The major events of each of these episodes are briefly summarized and some of the more notable researchers highlighted, along with their influence on our current understanding of insect relationships and how this is reflected in the current classification of the Hexapoda." (Authors) The paper contains many references to Odonata.] Address: Engel, M.S., Division of Entomology, Natural History Museum, and Dept of Ecology & Evolutionary Biology, University of Kansas, Lawrence, Kansas 66045, USA. E-mail: msengel@ku.edu

**12374.** Favretto, M.A.; Bortolon dos Santos, E.; Geuster, C.J. (2013): Entomofauna do Oeste do Estado de Santa Catarina, Sul do Brasil. *EntomoBrasilis* 6(1): 42-63. (in Portuguese, with English summary) ["In this study is presented a list of 1328 insect species observed in west of Santa Catarina State, Brazil, in the

last eight decades. The species richness found corresponds 1.47 % of the total of species registered in Brazil. The data set was compiled from collection records performed by F. Plaumann, in addition to the records from literature and personal observations. Here, we recorded a total of 17 orders of insects." (Authors) 58 Odonata taxa, mostly identified at the genus level, are listed.] Address: Favretto, M.A., Prefeitura Municipal de Campos Novos, Secretaria Municipal de Saude, Brazil. E-mail: marioarthur.favretto@hotmail.com

**12375.** Ferreira, G.A.; Nakano-Oliveira, E.; Genaro, G.; Lacerda-Chaves, A.K. (2013): Diet of the coati *Nasua nasua* (Carnivora: Procyonidae) in an area of woodland inserted in an urban environment in Brazil. *Revista Chilena de Historia Natural* 86: 95-102. (in English, with Spanish summary) ["Coatis are omnivores whose diet consists of small vertebrates, invertebrates, and fruit. In urban areas, they may ingest food waste that has been discarded in deposits near their habitat, or they may consume food offered by humans. The present work investigates the diet of coatis through analysis of 56 fecal samples collected from Morro Imperador, a fragment of woodland inserted into an urban center in the municipality of Juiz de Fora, State of Minas Gerais, Brazil. The results point to a diet with niche breadth of 0.4 in which the percentage of occurrence of insects (34.9 %) and fruit (19.9 %) comprise the main dietary items. The presence of food due to human action (direct or indirect) is also constant throughout the year (14.1 %), thereby demonstrating the ability of these animals to adapt to modified environments." (Authors) Frequency of occurrence and percentage of occurrence in Odonata: Aeshnidae FO:1.8, PO: 0.4.] Address: Ferreira, G.A., Programa de Pós Graduação em Biologia e Comportamento Animal, Universidade Federal de Juiz de Fora, Campus Universitário/sn, Juiz de Fora, MG, 36036-900, Brasil. E-mail: ferreira.g.a@hotmail.com

**12376.** Ferry, E.E.; Hopkins, G.R.; Stokes, A.N.; Mohammadi, S.; Brodie, E.D.; Gall, B.G. (2013): Do all portable cases constructed by caddisfly larvae function in defense? *Journal of Insect Science*: Vol. 13 | Article 5: 9 pp. (in English) ["The portable cases constructed by caddisfly larvae have been assumed to act as a mechanical defense against predatory attacks. However, previous studies have compared the survival of caddisflies with different cases, thereby precluding an analysis of the survival benefits of "weaker" case materials. The level of protection offered by caddisfly cases constructed with rock, stick, or leaf material, as well as a no-case control, was investigated against predatory nymphs of *Anax junius*. A valid supposition is that the cases made of stronger material are more effective at deterring predators. Yet, observations revealed that there was no difference in survival between the case types. All caddisflies with a case experienced high survival in comparison to caddisflies removed from their case. In addition, larvae with stick-cases experienced fewer attacks and captures by dragonflies. These results showed that the presence of a case, regardless of the material used in its construction, offers survival benefits when faced with predatory dragonfly nymphs." (Authors)] Address: Ferry, Emily, Dept of Biology, Utah State Univ., 5305 Old Main HL, Logan UT 84322, USA.

**12377.** Fleck, G.; El Adouzi, M. (2013): The larva of the genus *Palaeosynthemis* Förster, 1903 (Odonata: Anisoptera: Synthemistidae) and a generic key to the larvae of non-New Caledonian Synthemistidae. *Zootaxa* 3619

(5): 589-594. (in English) ["The larva of *Palaeosynthemis Förster*, 1903, based on *P. cyrene* (Liefinck, 1953), is described and illustrated for the first time. A diagnosis of the genus is given. A larval generic key to all known non-New Caledonian genera of Synthemistidae is provided." (Author)] Address: Fleck, G., CBGP (Centre de Biologie et de Gestion des Populations), Campus international de Baillarguet, CS 30016, 34988 Monferrier-sur-Lez cedex, France. E-mail: fleckgunther@gmail.com

**12378.** Friebe, J.G. (2013): Libellen am Wassergarten im Dornbirner Stadtpark (Vorarlberg / Österreich) (Insecta: Odonata). *inatura - Forschung online*, Nr. 3: 8 pp. (in German, with English summary) ["During the years 2010 to 2012 a total of 23 dragonfly and damselfly species (Odonata) have been observed in the vicinity of the «water garden» near the natural history museum «inatura» in Dornbirn (Vorarlberg / Austria). 22 species have been documented at species level. Solely some rare *Demoiselle* specimens (*Calopteryx* sp.) eluded photographic documentation thus inhibiting exact determination. Common species are typically ubiquitous without special demands regarding their habitat. Despite strong anthropogenic influence and «care» of the water garden they reproduce successfully. Remarkable, however, is the occurrence of some rare species (*Sympetrum depressiusculum*, *Sympetma paedisca*) well within the settlement area of Dornbirn. The documentation of Odonata will be continued. All observational data are documented in the biodiversity database (BioOffice 2.0) of the museum. They are also available online via the Biodiversity Portal GBIF (<http://www.gbif.at/>)." (Author)] Address: Friebe, G., Jahngasse 9, A-6850 Dornbirn, Austria. E-Mail: georg.friebe@inatura.at

**12379.** Frye, M.A. (2013): Visual attention: A cell that focuses on one object at a time. *Current Biology* 23(2): R61-R63. (in English) ["A new study has identified a remarkable neuron in the dragonfly brain that chooses and faithfully follows one and only one prey-like visual target, completely ignoring another, thereby demonstrating a form of competitive selection required for visual attention." (Author)] Address: Frye, M.A., Howard Hughes Medical Institute, Department of Integrative Biology and Physiology, Univ. of California, Los Angeles, CA 90095, USA. Electronic address: frye@ucla.edu.

**12380.** Fuller, C.A.; Gilmore, A.F. (2013): The combined effects of Atrazine and predation on the larval dragonfly *Ladona deplanata*. Kentucky Water Resources, Annual Symposium, March 18, 2013, Marriott's Griffin Gate Resort, Lexington, Kentucky: 57-58. (in English) [Verbatim: Agricultural pesticide contamination is ubiquitous in freshwater habitats and predicting the fate of these chemicals in natural communities is an important goal for ecologists. Atrazine is a common herbicide found in freshwater habitats worldwide with numerous negative effects on aquatic wildlife. Typical concentrations are relatively low (~100 ppb), yet have the ability to impair wildlife behaviour, physiology, and fitness traits. Recent research indicates that these effects are often magnified in the context of other community interactions. Because invertebrates are a keystone species in aquatic habitats we sought to determine how sublethal concentrations of atrazine (80 ppb) and predator cues (*Anax junius*) affect larval dragonflies (*Ladona deplanata*) throughout development. We used a split-plot experimental design with aquatic mesocosms to test the interaction of these stressors over a six-week period. We

examined the effects of both stressors on immune parameters, growth, and fat storage, phenotypically plastic traits that have fitness implications for adult dragonflies. Preliminary analyses using two-way ANOVAs indicate that both treatment effects on larvae were evident after two weeks of exposure with predator cues affecting growth and immune parameters over the entire six weeks. After two weeks of exposure, there was a significant treatment interaction on immune parameters, however by the end of the six-week period, treatment effects depended on the specific immune response measured. The effect of predator presence on hemocyte numbers persisted throughout the experiment, as did the effect of atrazine on phenoloxidase (PO) activity. The results of our study indicate that sublethal atrazine exposure affects immune function in larval dragonflies with implications for parasite resistance and the potential for tradeoffs between growth and immune investment. In the context of a natural community, sublethal herbicide exposure may be intensifying the effects of predators with implications for survival to metamorphosis and adult fitness. This study highlights the importance of conducting long-term exposure experiments of multiple stressors, in detecting differences in the sublethal effects of contaminants on aquatic invertebrates.] Address: Fuller, Claire, A., Department of Biology, Murray State University, Murray, KY 42071, USA. E-mail: claire.fuller@murraystate.edu

**12381.** Genoud, D. (2013): Présence de *Lestes virens vestalis* (Rambur, 1845) et *Lestes barbarus* (Fabricius, 1798) en Plaine de l'Ain (département de l'Ain) à proximité du Rhône. Discussion sur leur statut. *Sympetrum* 16: 22-23. (in French) [Records of the regionally rare *L. virens vestalis* and *L. barbarus* between 1995-1997 are documented. Gain and loss in the 2000th of the local populations are presented.] Address: Genoud, D., 2 domaine de Bellevue - 11290 Arzens, France

**12382.** Genoud, D. (2013): Présence de *Platycnemis acutipennis* (Selys, 1841) en Plaine de l'Ain (département de l'Ain) à proximité du Rhône. *Sympetrum* 16: 18-20. (in French) [France; records of *P. acutipennis* from 29.VII-1995, 29-VII-1996 as well as 6 and 23-VIII-2007 are presented.] Address: Genoud, D., 2 domaine de Bellevue - 11290 Arzens, France

**12383.** Genoud, D. (2013): Observation de *Boyeria irene* (Fonscolombe, 1838) en Plaine de l'Ain (département de l'Ain) à proximité du Rhône. *Sympetrum* 16: 24-25. (in French) [23-VIII-1997, Saint-Maurice-de-Reymen, France.] Address: Genoud, D., 2 domaine de Bellevue - 11290 Arzens, France

**12384.** Goertzen, D.; Suhling, F. (2013): Promoting dragonfly diversity in cities: major determinants and implications for urban pond design. *Journal of Insect Conservation* 17(2): 399-409. (in English) ["Urbanisation is increasing and it is essential to integrate biodiversity into the spatial planning of urban areas. This requires deeper understanding of biodiversity patterns in cities. We investigated which habitat variables are major determinants of dragonfly diversity and species assemblage structure in the municipal area of Dortmund (Germany). We sampled dragonfly larvae in 33 ponds situated in city parks, commercial, residential and agricultural areas. We recorded 30 autochthonous dragonfly species with species richness ranging from zero to 17. Additionally, we surveyed a set of environmental variables including habitat size, water level, pond structures



and vegetation as well as surrounding landscape and potential disturbances like waterfowl and fish. Multivariate methods were used to identify the major determinants of dragonfly diversity, abundance and assemblage structure. Analysis indicated that diversity of aquatic and terrestrial vegetation affected dragonfly diversity positively. City park ponds had low diversity, but *Ischnura elegans* was obviously promoted by the specific park pond conditions, including high waterfowl density. We found five assemblages mostly determined by generalistic species which were related to different pond types. Moderately disturbed ruderal and pioneer ponds in residential and agricultural areas also contained increased numbers of rare species. Our results indicate that urban ponds may have a great value for maintaining biodiversity, but various disturbances have negative impact. To promote urban biodiversity we suggest a natural design of well-vegetated ponds as well as a high diversity of different pond types and particularly a more-natural redesign of city park ponds." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, 38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**12385.** Gonzalez-Bellido, P.T.; Peng, H.; Yang, J.; Georgopoulos, A.P.; Olberg, R.M. (2013): Eight pairs of descending visual neurons in the dragonfly give wing motor centers accurate population vector of prey direction. *Proceedings of the National Academy of Sciences* 110(2): 696-701. (in English) ["Intercepting a moving object requires prediction of its future location. This complex task has been solved by dragonflies, who intercept their prey in midair with a 95% success rate. In this study, we show that a group of 16 neurons, called target-selective descending neurons (TSDNs), code a population vector that reflects the direction of the target with high accuracy and reliability across 360°. The TSDN spatial (receptive field) and temporal (latency) properties matched the area of the retina where the prey is focused and the reaction time, respectively, during predatory flights. The directional tuning curves and morphological traits (3D tracings) for each TSDN type were consistent among animals, but spike rates were not. Our results emphasize that a successful neural circuit for target tracking and interception can be achieved with few neurons and that in dragonflies this information is relayed from the brain to the wing motor centers in population vector form." (Author) *Libellula luctuosa* was studied; additional results were obtained by using specimens of *L. lydia* and *L. pulchella*.] Address: Gonzalez-Bellido, Paloma, Allen Institute for Brain Science, Seattle, WA 98103, USA. E-mail: paloma@mbl.edu.

**12386.** Harabiš, F.; Tichanek, F.; Tropek, R. (2013): Dragonflies of freshwater pools in lignite spoil heaps: Restoration management, habitat structure and conservation value. *Ecological Engineering* 55: 51-61. (in English) ["Although numerous studies of several terrestrial groups have revealed high conservation potential of post-industrial sites, freshwater habitats in post-mining sites still remain little explored. Here we present a study of Odonata colonizing 61 freshwater pools newly established at 9 lignite spoil heaps in the north-western Czech Republic, Central Europe. We aimed mainly on effects of the three prevailing pool restoration methods (spontaneously inundated depressions at non-reclaimed sites, at reclaimed sites; and novel technically constructed ponds) along with several factors of the local habitat and surrounding landscape on species richness,

conservation values, and species composition of the dragonfly communities. By recording of 32 species of lentic dragonflies (including 8 threatened ones) and 2 additional threatened lotic species, we documented the conservation value of post-industrial habitats also for aquatic arthropods. None of the three restoration methods supported dragonfly communities of distinctly higher conservation value than did the two others, each method generated habitats for different threatened species. Similar patterns were revealed also for vegetation heterogeneity, bottom substrate, water shading, and surrounding terrestrial habitats. We thus conclude that a mosaic-like combination of the restoration methods and creating of heterogeneous water pools will be most effective for restoring of freshwater biodiversity in highly degraded sites." (Authors)] Address: Harabiš, F., Dept of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, CZ-165 21 Prague 6, Czech Republic. E-mail: harabis.f@gmail.com

**12387.** Heino, J. (2013): Environmental heterogeneity, dispersal mode, and co-occurrence in stream macroinvertebrates. *Ecology and Evolution*: 12 pp. (in English) ["Both environmental heterogeneity and mode of dispersal may affect species co-occurrence in metacommunities. Aquatic invertebrates (including Odonata; all taxa are treated at order level) were sampled in 20–30 streams in each of three drainage basins, differing considerably in environmental heterogeneity. Each drainage basin was further divided into two equally sized sets of sites, again differing profoundly in environmental heterogeneity. Benthic invertebrate data were divided into three groups of taxa based on overland dispersal modes: passive dispersers with aquatic adults, passive dispersers with terrestrial winged adults, and active dispersers with terrestrial winged adults. The co-occurrence of taxa in each dispersal mode group, drainage basin, and heterogeneity site subset was measured using the C-score and its standardized effect size. The probability of finding high levels of species segregation tended to increase with environmental heterogeneity across the drainage basins. These patterns were, however, contingent on both dispersal mode and drainage basin. It thus appears that environmental heterogeneity and dispersal mode interact in affecting co-occurrence in metacommunities, with passive dispersers with aquatic adults showing random patterns irrespective of environmental heterogeneity, and active dispersers with terrestrial winged adults showing increasing segregation with increasing environmental heterogeneity." (Author)] Address: Heino, J., Finnish Environment Institute, Natural Environment Centre, Ecosystem Change Unit, P.O. Box 413, FI-90014, Oulu, Finland. E-mail: jani.heino@environment.fi

**12388.** Hunt, P. (2013): Favourite days: A summer holiday provided Peter Hunt with one of his favourite days spotting some of the dragonfly species of a Greek island. *Dragonfly News* 63: 20-21 (in English) [Thassos, Greece; records are documented with focus on *Sympetrum fonscolombii* and *Crocothemis erythraea*.] Address: not stated

**12389.** Ishaq, F.; Khan, A. (2013): Aquatic biodiversity as an ecological indicators for water quality criteria of River Yamuna in Doon Valley, Uttarakhand, India. *World Journal of Fish and Marine Sciences* 5(3): 322-334. (in English) [The taxa list includes *Agriion* and *Matrona*.] Address: Khan, A., Department of Biotechnology and Biochemistry, Division of Life Science, Sardar Bhagwan

Singh Post Graduate Institute of Biomedical Sciences and Research, Balawala, 248161, Dehradun, UK, India

**12390.** Jancowski, K.; Orchard, S.A. (2013): Stomach contents from invasive American bullfrogs *Rana catesbeiana* (= *Lithobates catesbeianus*) on southern Vancouver Island, British Columbia, Canada. *NeoBiota* 16: 17-37. (in English) ["Invasive alien American bullfrog populations are commonly identified as a pernicious influence on the survival of native species due to their adaptability, proliferation and consequent ecological impacts through competition and predation. However, it has been difficult to determine conclusively their destructive influence due to the fragmentary and geographically dispersed nature of the historical database. An expanding meta-population of invasive American bullfrogs, became established on southern Vancouver Island, in the mid- to late 1980s. An on-going bullfrog control program begun in 2006 offered a unique opportunity to examine the stomach contents removed from 5,075 adult and juvenile bullfrogs collected from 60 sites throughout the active season (April to October). Of 15 classes of organisms identified in the diet, insects were numerically dominant, particularly social wasps and odonates. Seasonality and site-specific habitat characteristics influenced prey occurrence and abundance. Native vertebrates in the diet included fish, frogs, salamanders, snakes, lizards, turtles, birds, and mammals, including some of conservation concern. Certain predators of bullfrog tadpoles and juveniles are commonly preyed upon by adult bullfrogs, thereby suppressing their effectiveness as biological checks to bullfrog population growth. Prey species with antipredator defences, such as wasps and sticklebacks, were sometimes eaten in abundance. Many prey species have some type of anti-predator defence, such as wasp stingers or stickleback spines, but there was no indication of conditioned avoidance to any of these. Results from this study reinforce the conclusion that, as an invasive alien, the American bullfrog is an opportunistic and seemingly unspecialized predator that has a uniquely large and complex ecological footprint both above and below the water surface." (Authors)] Address: Jancowski, K., Bullfrog-Control.com Inc., 69A Burnside Road West, Victoria, British Columbia, Canada, V9A 1B6. E-mail: bullfrog-control@shaw.ca

**12391.** Janssens, L.; Stoks, R. (2013): Exposure to a widespread non-pathogenic bacterium magnifies sublethal pesticide effects in the damselfly *Enallagma cyathigerum*: From the suborganismal level to fitness-related traits. *Environmental Pollution* 177: 143-149. (in English) ["While there is increasing concern that pesticide stress can interact with stress imposed by antagonistic species including pathogens, it is unknown whether this also holds for non-pathogenic bacteria. We exposed *Enallagma cyathigerum* damselfly larvae to the pesticide chlorpyrifos and a non-pathogenic *Escherichia coli* strain. Both exposure to chlorpyrifos and *E. coli* reduced growth rate and fat storage, probably due to the observed energetically costly increases in physiological defence (glutathione-S-transferase and Hsp70) and, for *E. coli*, immune defence (phenoloxidase). Moreover, these stressors interacted for both fitness-related traits. Most importantly, another fitness-related trait, bacterial load, increased drastically with chlorpyrifos concentration. A possible explanation is that the upregulation of phenoloxidase in the presence of *E. coli* changed into a downregulation when combined with chlorpyrifos. We

argue that the observed interactive, partly synergistic effects between pesticides and widespread non-pathogenic bacteria may be common and deserves further attention to improve ecological risk assessment of pesticides. Highlights: \*Non-pathogens such as the bacterium *E. coli* are ignored in ecotoxicology. \*Both *E. coli* and chlorpyrifos impaired fitness-related traits in damselfly larvae. \**E. coli* modulated and magnified effects of chlorpyrifos on physiology and fitness. \*Bacterial load was magnified >10× in the presence of chlorpyrifos. \*Risk assessment of pesticides should consider synergisms with non-pathogens." (Authors)] Address: Janssens, Lizanne, Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Charles Deberiotstraat 32, B-3000 Leuven, Belgium. E-mail: lizanne.janssens@bio.kuleuven.be

**12392.** Janssens, L.; Stoks, R. (2013): Synergistic effects between pesticide stress and predator cues: conflicting results from life history and physiology in the damselfly *Enallagma cyathigerum*. *Aquatic Toxicology* 132–133: 92-99. (in English) ["There is increasing awareness that the negative effects of anthropogenic stressors may be magnified in the presence of natural stressors. Very few of these studies have included physiology, yet including physiological studies may help learning about the mechanistic base of such synergisms at the life history level and identify synergistic interactions not translated in life history traits. We studied in *Enallagma cyathigerum* damselfly larvae potential synergistic effects between exposure to the pesticide glyphosate and predator cues on a key life history trait, growth rate, its associated behavioral trait, food intake, and three types of physiological traits known to be affected by both stressors in isolation: the stress protein Hsp70, energy storage and variables related to oxidative stress and damage. The pesticide and predator cues reduced growth rate in an additive way. Food intake increased under pesticide exposure and was not affected by the predator cues, indicating physiological mediation of the growth reduction. One potential physiological mechanism was that both stressors additively increased Hsp70 levels, this may also have contributed to the reduced levels of total carbohydrates when exposed to predator cues. Chronic exposure to predator cues reduced oxygen consumption, possibly to avoid too high costs of an increased metabolic rate. This reduction did not occur in the presence of the pesticide, reflecting the need for energetically expensive defence mechanisms (such as Hsp70 upregulation). When both stressors were combined, there was a reduction of the antioxidant enzyme superoxide dismutase activity (SOD) and an associated increase of oxidative damage in lipids. While synergistic interactions were not present for growth rate and food intake, they were identified for antioxidant defence and oxidative damage. This novel type of "hidden" synergistic interaction may have profound fitness implications, and when ignored will lead to underestimations of the impact of pollutants in natural populations where predators are omnipresent. Highlights: \*Interactions between natural stressors and pesticides remain poorly understood. \*Predation risk and glyphosate additively affected life history and behaviour. \*We showed a novel type of synergistic interaction in terms of oxidative damage. \*This hidden synergism can have severe fitness consequences and may be widespread." (Authors)] Address: Janssens, Lizanne, Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Charles

Deberiotstr. 32, B-3000 Leuven, Belgium. E-mail: lizanne.janssens@bio.kuleuven.be

**12393.** Jinguji, H.; Quoc Thuyet, D.; Uéda, T.; Watanabe, H. (2013): Effect of imidacloprid and fipronil pesticide application on *Sympetrum infuscatum* (Libellulidae: Odonata) larvae and adults. Paddy and Water Environment 11: 277-284. (in English) ["The effect of imidacloprid and fipronil on *S. infuscatum* larvae and adults during the rice cultivation period was monitored using an experimental micro-paddy lysimeter (MPL) system. Twenty-two hatched larvae were laid on the soil surface of each MPL. MPLs were treated with imidacloprid, fipronil, and the control MPL was left untreated. The pesticide concentration, *S. infuscatum* larval and adult populations, and larval emergence time were monitored in each MPL. The maximum imidacloprid and fipronil concentration in paddy water was 52.8 µg/l at 1 day, and 1.3 µg/l at 6 h, respectively, after the pesticide application. Both pesticides dissipated quickly in paddy water, with half-lives of 8.8 and 5.4 days for imidacloprid and fipronil, respectively. The absence of *S. infuscatum* larvae and exuviae in the fipronil-treated MPL was remarkable. The larval survival decreased to 63.6 ± 18.2, 15.2 ± 2.6, and 0% in the control, imidacloprid-treated, and fipronil-treated MPLs, respectively, by 9 days after pesticide application. Emergence in the imidacloprid-treated MPL was also significantly lower than that in the control MPL. The observed decrease in the abundances of *S. infuscatum* larvae and adults in MPLs seems to be both directly and indirectly associated with nursery-box application of fipronil and imidacloprid." (Authors)] Address: Jinguji, H., School of Food, Agricultural and Environmental Sciences, Miyagi University, 2-2-1 Hatatate, Taihaku-ku, Sendai, Miyagi, 982-0215, Japan. E-mail: jinguji@myu.ac.jp

**12394.** Johansson, F.; Nilsson-Örtman, V. (2013): Predation and the relative importance of larval colour polymorphisms and colour polyphenism in a damselfly. Evolutionary Ecology 27(3): 579-591. (in English) ["Intraspecific body colour variation is common in many animal species. Predation could be a key selective agent giving rise to variation in body colour, and such variation could be due to genetics (polymorphisms) or phenotypic plasticity (polyphenisms). In this study we examined the degree of colour polymorphism and polyphenism in background colour matching in larvae of *Coenagrion armatum*. In addition, we tested if predation risk is reduced when larvae are exposed to a matching compared to a non-matching background. By raising families of larvae at three different background colours we showed that polymorphism explained about 20 % of the total variation and polyphenism about 35 %. In a predation experiment with fish, we showed that larvae with a body colour matching the background had a higher survival success compared to larvae with a non-matching background colour. We suggest that the background matching is adaptive in terms of survival from predation and that colour diversity is maintained because of spatial and temporal variation in the background experienced by damselfly larvae under field conditions." (Authors)] Address: Johansson, F., Department of Ecology and Genetics, Uppsala University, Uppsala, Sweden. E-mail: frank.johansson@ebc.uu.se

**12395.** Johnson, L.; Mantle, B.L.; Gardner, J.L.; Backwell, P.R.Y. (2013): Morphometric measurements of dragonfly wings: the accuracy of pinned, scanned and detached measurement methods. ZooKeys 276: 77-84. (in

English) ["Large-scale digitization of museum specimens, particularly of insect collections, is becoming commonplace. Imaging increases the accessibility of collections and decreases the need to handle individual, often fragile, specimens. Another potential advantage of digitization is to make it easier to conduct morphometric analyses, but the accuracy of such methods needs to be tested. Here we compare morphometric measurements of scanned images of dragonfly wings to those obtained using other, more traditional, methods. We assume that the destructive method of removing and slide-mounting wings provides the most accurate method of measurement because it eliminates error due to wing curvature. We show that, for dragonfly wings, hand measurements of pinned specimens and digital measurements of scanned images are equally accurate relative to slide-mounted hand measurements. Since destructive slide-mounting is unsuitable for museum collections, and there is a risk of damage when hand measuring fragile pinned specimens, we suggest that the use of scanned images may also be an appropriate method to collect morphometric data from other collected insect species." (Authors)] Address: Backwell, Patricia, Research School of Biology, The Australian National University, 116 Daley Road, Canberra, ACT 0200, Australia. E-mail: pat.backwell@anu.edu.au

**12396.** Jones, G. (2013): Sensory biology: Listening in the dark for echoes from silent and stationary prey. Current Biology 23(6): R249-R251. (in English) ["New research shows how bats use echolocation unexpectedly to detect silent and stationary prey in darkness. Bats may use acoustic search images to identify potential prey when prey-generated noises, visual and olfactory cues are absent.... Perhaps the bats possess an acoustic image of a dragonfly, and base their decision of whether or not to attack according to how close the acoustic image they receive is to their neural template of a prey item — in this case a dragonfly..." (Authors)] Address: Jones, G.; School of Biological Sciences, University of Bristol, Woodland Road, Bristol BS8 1UG, UK. E-mail: Gareth.Jones@bristol.ac.uk

**12397.** Joshi, S. (2013): Response to "Talmale, S.S. & A.D. Tiple (2013). New records of damselfly *Lestes thoracicus* Laidlaw, 1920 (Odonata: Zygoptera: Lestidae) from Maharashtra and Madhya Pradesh states, central India" with a note on identification of *Lestes concinnus* Hagen in Selys, 1862 and *L. umbrinus* (Selys, 1891). Journal of Threatened Taxa 5(7): 4125-4126. (in English) [The author discusses the taxonomic status of *L. thoracicus* in detail and concludes that the specimens collected by Talmale & Tiple (2013) are of *L. concinnus*.] Address: Joshi, S., Department of Zoology, St. Xavier's College- Autonomous, Mumbai, Maharashtra 400001, India. E-mail: shantanuvanellus@gmail.com

**12398.** Kabouche, B. (2013): Note sur les odonates de la région d'Oran (Algérie), compte-rendu de prospections (septembre 2011). Poiretia 5: 1-5. (in French, with English summary) ["A series of surveys carried out in September 2011 in the vicinity of Oran and Tlemcen permit to observe nine species of Odonata in six different locations. The presence of a Saharan species, *Trithemis kirbyi*, and a rare species in the Oran area, *Orthetrum trinacria*, is highlighted." (Author)] Address: Kabouche, B. LPO PACA (Ligue de Protection des Oiseaux, région Provence Alpes Côte d'Azur): 6, avenue Jean Jaurès, 83400 Hyères-les-Palmiers (France). E-mail: benjamin.kabouche@lpo.fr





**12399.** Karjalainen, S.; Hämäläinen, M. (2013): Demoiselle damselflies. Winged jewels of silvery streams. Publisher: Caloptera, [www.caloptera.com](http://www.caloptera.com). ISBN 978-952-93-1045-6. 224 pp (bilingual in Finnish and English) ["The demoiselle damselflies are among the most beautiful of all insects. They typically inhabit clear pristine streams, where they cavort jewel-like in the sun over the waters. The superb photographs in this book and an informative text introduce us to their fascinating world. Besides the familiar European species, the book also includes representatives of all Demoiselle genera from around the world, as well as their nearest relatives. This book is the product of a fruitful collaboration between an exceptionally gifted nature photographer and a well known scientific authority on these insects."] (Publisher) You can order the book from the publisher (Caloptera Publishing, Neidonpuistontie 6 D 8, FI-02400 Kirkkonummi, Finland) and pay with Paypal. Price of €36 includes worldwide economy postage. Economy shipping to most of the countries takes 8 to 15 business days. Email address for ordering: [info@caloptera.com](mailto:info@caloptera.com).

**12400.** Kaunisto, K.M.; Suhonen, J. (2013): Parasite burden and the insect immune response: interpopulation comparison. *Parasitology* 140(1): 87-94. (in English) ["The immune response affects host's survival and reproductive success. Insurmountable immune function has not evolved because it is costly and there is a trade-off between other life-history traits. In previous studies several factors such as diet and temperature have been proposed to cause interpopulation differences in immune response. Moreover, the insect immune system may be functionally more protective upon secondary exposure, thus infection history may associate with the immune response. Here we measured how geographical location and Parasite burden is related to variation in immune response between populations. We included 13 populations of *Coenagrion hastulatum* in Finland over a latitudinal range of 880 km to this study. We found that water mites associated strongly with the

immune response at interpopulation level: the more the mites, the higher the immune response. Also, in an alternative model based on AIC, latitude and individual size associated with the immune response. In turn, endoparasitic gregarines did not affect the immune response. To conclude, a positive interpopulation association between the immune response and the rate of water mite infection may indicate (i) local adaptation to chronic Parasite stress, (ii) effective 'induced' immune response against Parasites, or (iii) a combined effect of both of these." (Authors)] Address: Suhonen, J., Department of Biology, Section of Ecology, University of Turku, FI-20014 Turku, Finland. E-mail: [juksuh@utu.fi](mailto:juksuh@utu.fi)

**12401.** Keränen, I.; Kahilainen, A.; Knott, E.; Kotiaho, J.S.; Kuitunen, K. (2013): High maternal species density mediates unidirectional heterospecific matings in *Calopteryx* damselflies. *Biological Journal of the Linnean Society* 108(3): 534-545. (in English) ["Hybridization is a well-known phenomenon, but there are still relatively few studies addressing the question of reproductive isolation between related sympatric animal species with largely overlapping ranges. Population density, relative abundance, and operational sex ratio (OSR) are among the factors known to have an influence on the frequency of heterospecific matings in sympatric populations. Here we had two aims. First, we used microsatellite markers and field observations to study the frequency of hybrids, and backcrosses, and the rate of heterospecific matings between two sympatric damselfly species *Calopteryx splendens* and *C. virgo*. Second, we investigated the role of population densities, relative abundances, and OSRs on conspecific and heterospecific mating rates. Altogether we genotyped 2104 individuals from both species and found four hybrids (0.19%), one of which was a backcross. Of all the 272 matings observed, 17 (6%) were between heterospecifics, and all of these were between a *C. splendens* male and a *C. virgo* female. In addition, all of the hybrids contained mitochondrial DNA (mtDNA) of *C. virgo*. We show that the population density of *C. virgo*, which was the maternal species of all the heterospecific matings and hybrid individuals, was the only significant factor covarying with the rate of the heterospecific matings. The OSRs did not correlate with the rate of con- or heterospecific matings. Studies on interspecific interactions in sympatric species can give information about the maintenance of reproductive isolation, and thus speciation." (Authors)] Address: Keränen, I., Department of Biological and Environmental Science, University of Jyväskylä, Jyväskylä, Finland. E-mail: [inka.m.keranen@jyu.fi](mailto:inka.m.keranen@jyu.fi)

**12402.** Khadijah, A.R.; Azidah, A.A.; Meor, S.R. (2013): Diversity and abundance of insect species at Kota Damansara Community Forest Reserve, Selangor. *Scientific Research and Essays* 8(9): 359-374. (in English) ["A study was conducted on the diversity and abundance of insect species at Kota Damansara Community Forest Reserve in order to determine the richness of the forest insect fauna. A total of 774 insects from 13 Orders and 79 Families were recorded. This study shows that Coleoptera (42.63%), Hymenoptera (17.96%), Diptera (10.08%) and Orthoptera (10.85%) were the most dominant Orders in the Forest Reserve. The highest insect diversity was observed in Diptera (Shannon's,  $H' = 2.67$ ), while Dermaptera, Isoptera, Mantodea and Phasmatodea (Shannon's,  $H' = 0.00$ ) were the lowest. However, the highest insect evenness was observed in Blattodea (Evenness,  $E = 0.36$ ). This study also found that

the abundance of insects in Kemit zone was the highest (Margalef index, = 8.51) compared to other zone sites." (Authors) Odonata are poorly represented within the samples.] Address: Azidah, A.A., Institute of Biological Sciences, Fac. of Science, Univ. of Malaya, 50603 Kuala Lumpur, Malaysia. E-mail: azie@um.edu.my. T

**12403.** Khairiyah, M.H.S.; Izzati, M.R.N.; Faezah, P. (2013): Species richness and temporal variation in the dragonfly and damselfly fauna at National Botanical Garden Shah Alam. Humanities, Science and Engineering (CHUSER), 2012 IEEE Colloquium on 3-4 Dec. 2012: 442-447. (in English) ["A study on the species richness and temporal variation of insect under order Odonata was conducted at National Botanical Garden Shah Alam (NBGSA), Selangor. Samplings were conducted for three months from January 2012 to March 2012 using sweep net. Two trails were chosen at two different lakes and two different sessions which were morning session and evening session. Trail one was located at the innermost part of the forest that far human activities while trail two was located at middle of the forest with open area and near to human activities. A total of 420 odonates were successfully collected consist of four families and 23 morphospecies. The families identified were Lestidae, Libellulidae, Coenagrionidae and Gomphidae. The most abundant family was the Libellulidae with 341 individuals followed by Lestidae, Coenagrionidae and Gomphidae with 54, 16, and 9 individuals respectively. Trail one recorded the highest number of individuals collected with 250 individuals while trail two with 170 individuals had the lowest number of individual collected. Morning session was identified as the most active time for Odonata with 236 individuals collected rather than evening session with only 184 individuals. From the data analysis, Shannon-Weiner Diversity Index showed that there was no significant different ( $p > 0.05$ ) between both trails and sessions. Overall study had shown area with high vegetation and located far away from human activities had the highest diversity of Odonata." (Authors)] Address: Khairiyah, M.H.S., Faculty of Applied Sciences, Universiti Teknologi MARA, 40450, Shah Alam, Selangor, Malaysia

**12404.** Kim, Y.H.; Lee, S.H. (2013): Which acetylcholinesterase functions as the main catalytic enzyme in the class Insecta? *Insect Biochemistry and Molecular Biology* 43(1): 47-53. (in English) ["Most insects possess two different acetylcholinesterases (AChEs) (i.e., AChE1 and AChE2; encoded by *ace1* and *ace2* genes, respectively). Among the two AChEs, AChE1 has been proposed as a major catalytic enzyme based on its higher expression level and frequently observed point mutations associated with insecticide resistance. To investigate the evolutionary distribution of AChE1 and AChE2, we determined which AChE had a central catalytic function in several insect species across 18 orders. The main catalytic activity in heads was determined by native polyacrylamide gel electrophoresis in conjunction with Western blotting using AChE1- and AChE2-specific antibodies. Of the 100 insect species examined, 67 species showed higher AChE1 activity; thus, AChE1 was considered as the main catalytic enzyme. In the remaining 33 species, ranging from Palaeoptera to Hymenoptera, however, AChE2 was predominantly expressed as the main catalytic enzyme. These findings challenge the common notion that AChE1 is the only main catalytic enzyme in insects with the exception of

Cyclorrhapha, and further demonstrate that the specialization of AChE2 as the main enzyme or the replacement of AChE1 function with AChE2 were rather common events, having multiple independent origins during insect evolution. It was hypothesized that the generation of multiple AChE2 isoforms by alternative splicing allowed the loss of *ace1* during the process of functional replacement of AChE1 with AChE2 in Cyclorrhapha. However, the presence of AChE2 as the main catalytic enzyme in higher social Hymenoptera provides a case for the functional replacement of AChE1 with AChE2 without the loss of *ace1*. The current study will provide valuable insights into the evolution of AChE: which AChE has been specialized as the main catalytic enzyme and to become the main target for insecticides in different insect species." (Authors) The study includes *Calopteryx atrata* and *Sympetrum pedemontanum*.] Address: Lee, S.H., Dept of Agricultural Biotechnology, Seoul National Univ., 599 Gwanakno, Gwanakgu, Seoul 151-742, Republic of Korea. E-mail: shlee22@snu.ac.kr

**12405.** Kin, A.; Gruszczynski, M.; Martill, D.; Marshall, J.D.; Błażejowski, B. (2013): Palaeoenvironment and taphonomy of a Late Jurassic (Late Tithonian) Lagerstätte from central Poland. *Lethaia* 46(1): 71-81. (in English) ["A rich assemblage of exceptionally preserved marine and terrestrial fossils occurs in finegrained limestones in the upper part of the Late Tithonian (Middle Volgian) shallowing upward carbonate sequence in Central Poland. The richest horizon, a deposit known locally as the Corbulomima horizon, is named after the shallow burrowing suspension feeding bivalve *Corbulomima obscura*, moulds of which occur in densities of up to 500 per square metre on some bedding planes. The fauna in this bed also includes organic and phosphatic remains of a wide range of other creatures including the exuviae of limulids and decapods, disarticulated fish skeletons and rare isolated pterosaur bones and teeth. There are also perfectly preserved dragonfly wings and beetle exoskeletons. The average stable carbon and oxygen isotope values for ostracod shells and fine-grained sediment from this horizon suggest precipitation of the calcium carbonate from warm seawater of normal marine salinity. The carbonate sediments overlying the fossiliferous horizon have been interpreted as nearshore to shoreface facies. These pass abruptly into coarse reworked intraclastic sediments interpreted as possible tsunami or storm surge over-wash deposits. The clasts in this deposit have more positive oxygen isotope values than those in the underlying limestone, which may indicate that they were lithified in a slightly more evaporative, perhaps intertidal, setting. The succession terminates with silicified fine-grained limestones likely to have formed in extremely shallow lagoonal environments. In contrast with the Solnhofen limestones of Lower Tithonian age in south-central Germany the Corbulomima horizon is interpreted as a transitional deposit formed in a shallow marine setting by rapid burial with elements of both Konservat- and Konzentrat-Lagerstätte preservation." (Authors) For the odonatological details see: Bechly, G.; Kin, A. (2013): First record of the fossil dragonfly family Eumorbaeschnidae from the Upper Jurassic of Poland. *Acta Palaeontologica Polonica* 58(1): 121-124.] Address: Martill, D., School of Earth & Environmental Sciences, University of Portsmouth, Burnaby Building, Burnaby Road, Portsmouth, PO1 3QL Portsmouth, UK. E-mail: david.martill@port.ac.uk

- 12406.** Koshelev, V.N.; Kolobov, V.Yu. (2013): Feeding of juvenile Kaluga and Amur sturgeon in the Amur river estuary. *Bulletin of Astrakhan State Technical University. Series: Fishing Industry* 2013(1): 20-28. (in Russian, with English summary) ["Data on feeding of juvenile kaluga and Amur sturgeon in the Amur river estuary are presented for the first time. It is established that kaluga main food consists of fishes (98.4 %), as mollusks are dominant in Amur sturgeon food composition (63.0 %). Kaluga main food components are fishes of Cyprinidae (43.1 %), Bagridae (24.5 %) and Osmeridae (19.1 %), Amur sturgeon dominant prey are mollusks of *Amuropaludina chloantha* (39.6 %) and *Corbicula* sp. (17.4 %). Dynamics of food composition in the period from May to October is described [including data on Odonata at the order level]. It is defined that there is no competitive activity between juvenile kaluga and Amur sturgeon in the Amur river estuary part." (Authors)] Address: Kolobov, V.Yu., Khabarovsk branch of the Pacific Research Fisheries Center; Junior Scientific Researcher of the Amur River Bioresources Laboratory, Russia. E-mail: kolobovv78@mail.ru
- 12407.** Kulijer, D.; Boudot, J.-P. (2013): First evidence of the occurrence of *Cordulegaster insignis* Schneider, 1845 in Serbia. *Odonatologica* 42(1): 55-62. (in English) ["Two *C. insignis* specimens from Serbia were found in the collection of the National Museum of Bosnia and Herzegovina. These constitute both the first record of the species in Serbia and its north-westernmost record worldwide. The distribution of the species in Europe and the taxonomic characters of the specimens are presented and discussed."(Authors)] Address: Kulijer, D., National Museum of Bosnia and Herzegovina, Zraja od Bosne 3, BA-71000 Sarajevo, Bosnia and Herzegovina. E-mail: dejan.kulijer@gmail.com
- 12408.** Kulkarni, A.S.; Subramanian, K.A. (2013): Habitat and seasonal distribution of Odonata (Insecta) of Mula and Mutha river basins, Maharashtra, India. *Journal of Threatened Taxa* 5(7): 4084-4095. (in English, with Marathian summary) ["Catchment landscape degradation and habitat modifications of freshwater ecosystems are a primary cause of biodiversity loss in riverine ecosystems all over the world. Many elements of the flora and fauna of freshwater ecosystems are sensitive to the changes in catchment land use and habitat modification. These sensitive taxa are also reliable indicators of freshwater ecosystem health. In the current study we investigate the seasonal and habitat distribution of Odonata across riparian land use types in Mula and Mutha river basins, northern Western Ghats, Maharashtra. There was a difference in the species composition across land use types and across seasons with highest diversity and abundance during the post monsoon period. The highest Odonata diversity was observed in urban areas followed by forest and agriculture fields. There was a loss of 31% of the odonate fauna in the study area over 50 years which could be due to rapid industrialization and urbanization of the region and consequent degradation of freshwater ecosystems. The significance of catchment land use on Odonata diversity and its value in landscape monitoring is discussed." (Authors)] Address: Kulkarni, A.S., Agharkar Research Institute, Gopal Ganesh Agarkar Road, Pune, Maharashtra 411004, India. E-mail: aboli.kulkarni5@gmail.com
- 12409.** Li, Y.; Béthoux, O.; Pang, H.; Ren, D. (2013): Early Pennsylvanian Odonatoptera from the Xiaheyan locality (Ningxia, China): new material, taxa, and perspectives. *Fossil Record* 16(1): 117-139. (in English) ["Data on Odonatoptera species from the Xiaheyan locality (Ningxia, China; Early Pennsylvanian) described so far are complemented based on abundant new material. Several taxonomic and nomenclatural adjustments are proposed. The species *Tupus readi* Carpenter, 1933 is transferred to the genus *Shenzhousia* Zhang & Hong, 2006 in Zhang et al. (2006), and therefore should be referred to as *Shenzhousia readi* (Carpenter, 1933) n. comb. The monotypic genus *Sinomeganeura* Ren et al., 2008 is synonymized with *Oligotypus* Carpenter, 1931. As a consequence the type species of the former must be referred to as *Oligotypus huangheensis* (Ren et al., 2008) n. comb. The monotypic genus *Paragilsonia* Zhang, Hong & Su, 2012 in Su et al. (2012) is synonymized with *Tupus* Sellards, 1906. As a consequence the type-species of the former is to be referred to as *Tupus orientalis* (Zhang, Hong & Su, 2012 in Su et al. (2012)) n. comb. The monotypic genus *Sinierasiptera* Zhang, Hong & Su, 2012 in Su et al. (2012) is synonymized with *Erasipterella* Brauckmann, 1983. As a consequence the type-species of the former is to be referred to as *Erasipterella jini* (Zhang, Hong & Su, 2012 in Su et al. (2012)) n. comb. In addition *Aseripterella sinensis* n. gen. et sp. and *Sylphalula laliquei* n. gen. et sp. are described. The 'strong oblique distal' cross-vein, located in the area between RA and RP is found to occur more extensively than previously expected. It is believed to be a structure distinct from the subnodal cross-vein, and therefore deserves to be referred to by a distinct name (viz. 'postsubnodal cross-vein'). Odonatoptera from the Xiaheyan locality cover a broad range of sizes. Factors that could have promoted the evolution of large-sized Odonatoptera are briefly reviewed. The permissive conditions prevailing during the Pennsylvanian, and the existence of an elaborated food web, are emphasized as putative positive factors. The new taxonomic treatment suggests that genera documented in the Lower Permian, such as *Shenzhousia* and *Oligotypus*, stem from the early Pennsylvanian, and implies a high resilience of these taxa when facing the Pennsylvanian-Permian environmental perturbations." (Authors)] Address: Li, Y., College of Life Science, Capital Normal University, 105 Xisanhuanbeilu, Haidian District, Beijing 100048, China. E-mail: liyongjunsysu@126.com
- 12410.** Li, Y.; Nel, A.; Shih, C.; Ren, D.; Pang, H. (2013): The first euthemistid damselfly from the Middle Jurassic of China (Odonata, Epiproctophora, Isophlebiptera). *ZooKeys* 261: 41-50. (in English) ["*Sinoeuthemis daohugouensis* gen. et sp. n. is the first record of the isophlebipteran family Euthemistidae from Middle Jurassic of northeast China, while previously this family was restricted to the early Late Jurassic Kazakhstan. This new finding allows us to emend the family diagnosis with hindwing characters. This new species shows a mixture of characters alternatively present in different genera of the two families Euthemistidae and Sphenophlebiidae." (Authors)] Address: Ren, D., State Key Laboratory of Biocontrol and Institute of Entomology / Key Laboratory of Biodiversity Dynamics and Conservation of Guangdong Higher Education Institutes Sun Yat-Sen University, Guangzhou, China. E-mail: rendong@mail.cnu.edu.cn
- 12411.** Locke, S.A.; Bulté, G.; Forbes, M.R.; Marcolli, D.J. (2013): Estimating diet in individual pumpkinseed sunfish *Lepomis gibbosus* using stomach contents, stable isotopes and parasites. *Journal of Fish Bi-*



ology 82(2): 522-537. (in English) ["The diets (including Odonata) of 99 pumpkinseed sunfish *Lepomis gibbosus* from a pair of small, adjacent lakes in Ontario, Canada, were estimated from their stomach contents, trophically transmitted parasites and stable isotopes of carbon and nitrogen in fish tissue. The three methods provided virtually unrelated information. There was no significant correlation in the importance of any prey item across all three methods. Fish with similar diets according to one method of estimating diet showed no tendency to be similar according to other methods. Although there was limited variation in fish size and the spatial scale of the study was small, both fish size and spatial origin showed comparatively strong associations with diet data obtained with all three methods. These results suggest that a multidisciplinary approach that accounts for fish size and spatial origins is necessary to accurately characterize diets of individual fish." (Authors)] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**12412.** Lopes Junior, R.S.; Peixoto, P.E.C. (2013): Males of the dragonfly *Diastatops obscura* fight according to predictions from game theory models. *Animal Behaviour* 85(3): 663-669. (in English) ["Agonistic interactions between males for the ownership of mating territories are common among animal species. There are at least three theoretical models aimed to clarify the rules used by rivals to decide the contest winner: war of attrition model (WOA), sequential assessment model (SAM) and cumulative assessment model (CAM). However, few empirical investigations have simultaneously tested predictions from these three models, reducing our ability to infer each model's explanatory power. In this study, we used males of *D. obscura* to identify traits that affect individual fighting ability (resource-holding potential, RHP) and to test predictions derived from WOA, SAM and CAM models. For this, we identified morphological and physiological male traits related to chances of victory, timed contests between males and evaluated the relationship between male traits, contest duration and performance of costly behaviours. Individual body mass represented the main trait affecting RHP. Contest duration decreased with increasing winner body mass and increased with increasing loser body mass, rejecting the WOA model. The probability of physical contact increased with decreasing mass differences between rivals. Additionally, when considering pairs of rivals that showed similar mass differences, contest duration was unrelated to loser body mass. Since fights can lead to physical contact, body mass may affect the capacity to inflict costs on the rivals. Also, the relationships between contest duration and RHP and between the probability of physical contact and RHP difference between rivals indicate that males perform mutual assessment of fighting ability, as presumed by SAM. Highlights: \*We identified male traits in *Diastatops obscura* that determine fighting ability. \*We tested predictions from three game theory models regarding rules used by rivals. \*Males previously present in territories were more likely to win. \*Greater body mass was related to greater chances of victory in contests. \*Males seem to perform mutual evaluation of fighting ability during the contest." (Authors)] Address: Peixoto, P.E.C., Departamento de Ciências Biológicas, Universidade Estadual de Feira de Santana, Feira de Santana CEP 44031-460, Bahia, Brazil. E-mail: pauloerique@gmail.com

**12413.** Lou, M. (2013): Improving specimen identification: Informative DNA using a statistical Bayesian method. Open Access Dissertations and Theses. Paper 7637. <http://digitalcommons.mcmaster.ca/opedissertations/7637>: XI + 99 pp. (in English) ["This work investigates the assignment of unknown sequences to their species of origin. In particular, I examine four questions: Is existing (GenBank) data reliable for accurate species identification? Does a segregating sites algorithm make accurate species identifications and how does it compare to another Bayesian method? Does broad sampling of reference species improve the information content of reference data? And does an extended model (of the theory of segregating sites) describe the genetic variation in a set of sequences (of a species or population) better? Though we did not find unusually similar between-species sequences in GenBank, there was evidence of unusually divergent within-species sequences, suggesting that caution and a firm understanding of GenBank species should be exercised before utilizing GenBank data. To address challenging identifications resulting from an overlap between within- and between species variation, we introduced a Bayesian treeless statistical assignment method that makes use of segregating sites. Assignments with simulated and *Drosophila* (fruit fly) sequences show that this method can provide fast, high probability assignments for recently diverged species. To address reference sequences with low information content, the addition of even one broadly sampled reference sequence can increase the number of correct assignments. Finally, an extended theory of segregating sites generates more realistic probability estimates of the genetic variability of a set of sequences. Species are dynamic entities and this work will highlight ideas and methods to address dynamic genetic patterns in species." (Author) The paper includes a few references to Odonata.] Address: Lou, Melanie, McMaster University, 1280 Main St W Hamilton, ON L8S 4L8, Canada. E-mail: melanie.jj.lou@gmail.com

**12414.** Lozano, F. (2013): Description of three females of the genus *Acanthagrion* (Odonata: Coenagrionidae) with a key to the females of Argentina. *Zootaxa* 3646 (1): 23-38. (in English, with Spanish summary) ["The neotropical genus *Acanthagrion* Selys is composed of 44 species, of which the females of 31 species are currently known. In this contribution the females of *A. aepilum* and *A. minutum* are described and that of *A. ascendens* is redescribed. Distribution maps and new records are provided for all three species. Finally, a key to females of the genus *Acanthagrion* from Argentina is provided.] Address: Lozano, F., Centro Regional de Estudios Genómicos (UNLP) Av. Calchaquí km 23.4, 1888, Florencio Varela, Buenos Aires, Argentina. E-mail: federicolozano82@gmail.com

**12415.** Lupi, D.; Rocco, A.; Rossaro, B. (2013): Benthic macroinvertebrates in Italian rice fields. *J. Limnol.* 72(1): 184-200. (in English) ["Rice fields can be considered man-managed temporary wetlands. Five rice fields handled with different management strategies, their adjacent channels, and a spring were analysed by their benthic macroinvertebrate community to i) evaluate the role of rice agroecosystem in biodiversity conservation; ii) find indicator species which can be used to compare the ecological status of natural wetlands with rice agroecosystems; and iii) find the influence of environmental variables on biodiversity. Different methods of data analysis with increasing degree of complexity – from diver-

sity index up to sophisticated multivariate analysis – were used. The investigation provided a picture of benthic macroinvertebrates inhabiting rice agroecosystems where 173 taxa were identified, 89 of which detected in rice paddies. Among them, 4 phyla (Mollusca, Annelida, Nematomorpha, and Arthropoda), 8 classes (Bivalvia, Gastropoda, Oligochaeta, Hirudinea, Gordioida, Insecta, Branchiopoda, and Malacostraca), 24 orders, 68 families, 127 genera and 159 species have been found. Ten threatened and 3 invasive species were detected in the habitats examined. The information obtained by the different methods of data analysis allowed a more comprehensive view on the value of the components of rice agroecosystems. Data analyses highlighted significant differences between habitats (feeding channel and rice field), with higher diversity observed in channels, and emphasised the role of the water chemical-physical parameters. The period of water permanence in rice fields resulted to be only one of the factors influencing the community of benthic macroinvertebrates. The presence of rare/endangered species allowed characterising some stations, but it was less informative about management strategies in rice paddies because most of these species were absent in rice fields." (Authors) The list of taxa includes 15 Odonata species.] Address: Lupi, Daniela, Univ. of Milan, Dept of Food, Environmental and Nutritional Sciences (DeFENS), Via Celoria 2, 20133 Milano, Italy. E-mail: daniela.lupi@unimi.it

**12416.** MacNeil, C.; Beets, P.; Lock, K.; Goethals, P.L.M. (2013): Potential effects of the invasive 'killer shrimp' (*Dikerogammarus villosus*) on macroinvertebrate assemblages and biomonitoring indices. *Freshwater Biology* 58(1): 171-182. (in English) ["(1.) Water quality monitoring data from 10 watercourses and laboratory mesocosm studies were used to assess the potential impacts of the crustacean amphipod invader *D. villosus* on resident macroinvertebrate assemblage structure in Central European fresh waters. (2.) The presence of *D. villosus* was associated with a decline in the prevalence of many native species, pollution sensitive as well as pollution tolerant, and changes in biotic indices, despite the trends of improved water quality coinciding with the invasion period. A general increase in the prevalence of other invaders was also noted. The potential impacts of *D. villosus* were substratum dependent, differing between stone, concrete and sand-dominated sites. (3.) Mean Multimetric Macroinvertebrate Index Flanders (MMIF) values were marginally lower when *D. villosus* was present ( $P < 0.06$ ), as opposed to when other amphipod species or no amphipods were present, despite the improved water quality. Mesocosm studies showed that several macroinvertebrate taxa were completely eliminated in treatments with *D. villosus*, oligochaete worms, Caenidae mayfly, chironomids and tipulids being particularly vulnerable to *D. villosus* predation. Biological Monitoring Working Party (BMWP) scores were lower in mesocosms with *D. villosus* as opposed to the native *Gammarus pulex* or no amphipods at all. (4.) We predict that resident macroinvertebrate assemblages in both Central Europe and Britain will come under increasing pressure as *D. villosus* invasions progress. Consequently, macroinvertebrate biotic indices, such as the MMIF or BMWP, may need to be revised to account for changes in taxa sensitivities to water quality as well as increased predation and competition." (Authors) Larvae of *Ischnura elegans* were used for the experiments. They were preyed less frequently by *D. villosus* and only very rarely by *G. pulex*, opposite to worms, chirono-

mids and tipulids which were predated in all amphipod replicates. In field samples based on the samples from 1990 to 2009, Platycnemididae were effected negatively by invasive *D. villosus* especially in rivers with concrete substratum or stone substratum.] Address: MacNeil, C., Department of Environment, Food and Agriculture, The Isle of Man Government, Thie Slieau Whallian, Foxdale Road, St. Johns IM4 3AS, Isle of Man. E-mail: calummanx@hotmail.com

**12417.** Majumder, J.; Das, R.K.; Majumder, P.; Ghosh, D.; Agarwala, B.K. (2013): Aquatic insect fauna and diversity in urban fresh water lakes of Tripura, Northeast India. *Middle-East Journal of Scientific Research* 13(1): 25-32. (in English) ["Freshwater lakes are integral part of urban ecosystem and provide numerous benefits to human beings directly or indirectly. An inventory was carried out to study the aquatic entomofauna, their diversity and distribution in three urban freshwater lakes of Tripura, northeast India during January to May, 2012. A total of 2159 individuals representing 31 species belonging to 23 genera, 15 families and 4 orders were recorded. Maximum of 30 species and 1191 individuals of aquatic insects were recorded in vegetation rich Maharaja Bir Bikram College Lake and minimum of 11 species and 215 individuals were recorded in vegetation poor Laxminarayan Bari Lake. Insects belonging to the orders Hemiptera (32.26%) and Odonata (32.25%) showed higher species richness followed by those belonging to Coleoptera (25.81%) and Diptera (9.68%), respectively. Maximum diversity ( $H_s = 3.03$ ) and least dominance ( $D_s = 0.06$ ) and minimum diversity ( $H_s = 1.50$ ) and maximum dominance ( $D_s = 0.06$ ) of aquatic insects was recorded in Maharaja Bir Bikram College Lake and Laxminarayan Bari Lake, respectively. Richness estimators Chao 1 and Chao 2 provided the best predicted value of species richness. Three species are reported here for the first time from the state. Dominance of hemipteran and coleopteran insects suggested that urban lakes of Tripura are relatively less polluted." (Authors)] Address: Agarwala, B.K., Department of Zoology, Ecology and Biodiversity Laboratories, Tripura University, Suryamaninagar, Tripura 799 022, India

**12418.** Marinov, M.; Donnelly, N. (2013): *Teinobasis fatakula* sp. nov. (Zygoptera: Coenagrionidae), found on 'Eua Island, Kingdom of Tonga. *Zootaxa* 3609(6): 589-592. (in English) ["A recent study of the 'Eua Island in the Kingdom of Tonga has yielded a small Odonata fauna including the new species *Teinobasis fatakula* (Holotype male: Kingdom of Tonga, 'Eua Island, 21.3781° S, 174.9346° W, elevation 175 m; 14 July 2012, M. Marinov leg.). Because 'Eua has aquatic habitats unique within the Kingdom of Tonga, the new species is very likely endemic to that island and represents an extension of the verified range of the genus of at least 2800 km." (Authors)] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

**12419.** May, M.L. (2013): A critical overview of progress in studies of migration of dragonflies (Odonata: Anisoptera), with emphasis on North America. *J. Insect Conserv.* 17(1): 1-15. (in English) ["Migration by Odonata has been recorded sporadically for several centuries, but only recently have new technologies and a new wave of interest in these ancient insects sparked a concerted effort to understand the extent, behavioural mechanisms, adaptive significance, and ecological consequences of this phenomenon. Here I review our cur-

rent knowledge of these sometimes spectacular flights, focusing on the few species in North America that are known to migrate more or less annually. One of these, *Anax junius*, has been shown to traverse hundreds to thousands of kilometers from north to south during fall migration. *Pantala flavescens* is plausibly inferred to make an overseas flight from India to East Africa with the Northeast Monsoon, although its migrations in North America are less well understood. Large scale movements of these and other species raises questions about population connectivity, ecosystem impacts, the nature and evolution of cues that initiate migration, and effects of climate change on these phenomena." (Author)] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu

**12420.** Mchenga, I.S.S.; Ali, A.I. (2013): Macro-fauna communities in a tropical mangrove forest of Zanzibar Island, Tanzania. *Global Journal of Bio-Science and Biotechnology* 2(1): 260-266. (in English) [Odonata are treated at family level.] Address: Mchenga, I.S.S., Society for Environmental Research and Conservation, P.O. Box 2477, Zanzibar, Tanzania. E-mail: islamsalum@yahoo.co.uk

**12421.** Meyer-Rochow, B. (2013): Ethno-entomological observations from North Korea (officially known as the "Democratic People's Republic of Korea"). *Journal of Ethnobiology and Ethnomedicine* 2013, 9:7 doi:10.1186/1746-4269-9-7: 12 pp. (in English) ["In terms of scientific activities generally and ethnobiological pursuits in particular, North Korea, officially known as the Democratic People's Republic of Korea, is an almost blank entity on the quilt of global research. During a sabbatical semester at Pyongyang University of Science and Technology the author used this opportunity to gather some information on the uses of insect and other terrestrial arthropods as human food and components of traditional healing methods in that country. Despite the widely publicised shortcomings in the supply of food stuffs to the population of North Korea, insects are not generally seen as a source of food worthy of exploitation. However, the therapeutic use of insects, centipedes and scorpions to treat illnesses as diverse as the common cold, skin rashes, constipation, dysentery, nervous prostration, whooping cough, osteomyelitis, tetanus, and various forms of cancer is apparently still popular. The arthropods used therapeutically are credited with antiinflammatory, immunological and other health-promoting effects, because they are said to contain hormones, steroids, lipids and plant-derived alkaloids, all of which capable of exerting their effects on the human body." (Author) "Aeshnidae, Libellulidae, Crocothemis servilia" are used both as food and for therapeutic reasons. Regrettably no details are presented.] Address: Meyer-Rochow, B., School of Engineering and Science, Jacobs University Bremen, Research II (Rm.37), Bremen D-28759, Germany. E-mail: dence: b.meyer-rochow@jacobs-university.de

**12422.** Mitra, T.R.; Babu, R.; Subramanian, K.A. (2013): *Anax panybeus* Hagen, 1867: an addition to the Odonata (Aeshnidae) of India. *Journal of Threatened Taxa* 5(2): 3682-3683. (in English) ["Materials examined: 4868/H13, 1♂, 01.viii.1984, 27km on NS Road, Swarup Nullah, Great Nicobar Island; 4869/H13, 1♂, 01.viii.1984, 35km on NS Road, Shashtri Nagar, Great Nicobar Island, coll. S.S. Saha. The Specimens were deposited in

National Zoological Collection, Zoological Survey of India, Kolkata." (Authors)] Address: Subramanian, K.A., Zoological Survey of India, M-Block, New Alipore, Kolkata, West Bengal 700053, India. E-mail: subbuka.zsi@gmail.com

**12423.** Moon, D.C.; Silva, D. (2013): Environmental heterogeneity mediates a cross-ecosystem trophic cascade. *Ecological Entomology* 38: 23-30. (in English) ["(1.) The flow of energy and nutrients across ecosystem boundaries can have significant community-wide effects, but the role of productivity of the recipient habitat in mediating these effects remains unclear. This is especially true when organisms moving across ecosystem boundaries serve simultaneously as predators and prey. (2.) In this study, the effects of odonates, primarily *Enallagma civile*, on a salt marsh system were examined. Cages were used to exclude odonate predators, but not other arthropods, from experimental plots of the sea oxeye daisy, *Borrchia frutescens* (L.) in high and low productivity areas. The effects were assessed on the in situ arthropod community and the host plant. (3.) There were strong direct effects of predation on the herbivores *Pissonotus quadripustulatus* Van Duzee and *Asphondylia borrichiae* Rossi and Strong, with higher densities where damselflies were excluded. Damselflies also served as prey for web-building spiders. This resulted in lower spider densities inside cages, and a positive indirect effect on grasshopper densities. (4.) Direct and indirect effects of odonates were greater in the high productivity area, resulting in a trophic cascade, with greater damage and reduced flowering and density of the host plant inside cages. (5.) The results of this study support the subsidy hypothesis and show that theoretical models of trophic dynamics, which were developed to explain exchanges within ecosystems, may have predictive and explanatory value for exchanges across ecosystems as well." (Authors)] Address: Moon, D.C., Dept of Biology, University of North Florida, Jacksonville, Florida, USA. E-mail: dmoon@unf.edu

**12424.** Murphy, J.F.; Davy-Bowker, J.; McFarland, B.; Ormerod, S.J. (2013): A diagnostic biotic index for assessing acidity in sensitive streams in Britain. *Ecological Indicators* 24(1): 562-572. (in English) ["Despite the history of freshwater biomonitoring, there is still a dearth of proven indices that allow accurate status assessment while simultaneously diagnosing the cause of impairment, particularly when stressors are multiple. Here, we present an approach to developing diagnostic indices where the sensitivity of biota (including *Cordulegaster boltonii*) is quantified using multivariate ordination. We applied the approach to the development of an index to detect acidity in British streams. Using a 197-site calibration dataset, we quantified variation in macroinvertebrate assemblages and determined which environmental variables best described the pattern. We then ranked taxa along an acid-base gradient, having first considered the merits of factoring out confounding variation from natural environmental factors. The response of the new species-level Acid Water Indicator Community (AWICsp) index to variation in base-flow and storm-flow pH and acid neutralising capacity (ANC) was quantified using independent data. Performance was also compared with existing family-level and species-level indices. AWICsp was consistently the species-level diagnostic index most clearly related to base-flow pH, storm-flow pH and ANC, accounting for 38–56% of the variation in acid conditions among the 76



test sites. Given the need to develop bio-diagnostic indicators, these data illustrate how organisms can indicate causes of stream impairment using robust and objective procedures, and when applied to strong environmental gradients such as acid-base status. We suggest that given the necessary calibration data, this approach could be applied successfully to other widespread stressors with equally strong biological effects such as organic pollution and fine sediment deposition, particularly if used in combination with RIVPACS-type predictive bioassessment models." (Authors)] Address: Murphy, J.F., River Communities Group, School of Biological and Chemical Sciences, Queen Mary University of London, c/o FBA River Laboratory, East Stoke, Wareham, Dorset BH20 6BB, UK.

**12425.** Nautiyal, P.; Shivam Mishra, A. (2013): Variations in benthic macroinvertebrate fauna as indicator of land use in the Ken River, central India. *Journal of Threatened Taxa* 5(7): 4096-4105. (in English, with Marathian summary) ["Examination of benthic macroinvertebrates in semi-natural, urban and agricultural land use along the highland Ken River in central India reveals a significantly higher density in semi-natural compared with other two landuse. Insects dominate the fauna at seminatural (90%) and urban locations (93%) compared to agriculture sites (48%) where annelid share increases to 32%. The seminatural location characterized by rocky substrate support high relative abundance of Caenidae and Neoephemeridae. Their abundance decreases at urban locations. Brachycentridae, Chironomidae, Glossocolecidae, Nephthyidae, Thiariidae and Corbiculidae increased at urban and agriculture locations characterized by small-sized sediments, suggesting important role for substrate also. Ordination shows that the Caenidae and Heptageniidae are characteristic at semi-natural location, Leptophlebiidae, Hydroptychidae, Glossosomatidae at urban while Thiariidae and Chironomidae at agricultural locations. Functionally, the collectors dominate the fauna, as all three landuse, especially large tracts of agriculture, are a continuous source of particulate organic matter (POM) in the river." (Authors) The study includes Gomphidae.] Address: Shivam Mishra, A. Aquatic Biodiversity Unit, Department of Zoology & Biotechnology, H. N. B. Garhwal (Central) University, Srinagar, Garhwal, Uttarakhand 246174, India. E-mail: shivama2000@yahoo.co.in

**12426.** Nixon, M.R.; Orr, A.G.; Vukusic, P. (2013): Subtle design changes control the difference in colour reflection from the dorsal and ventral wing-membrane surfaces of the damselfly *Matronoides cyaneipennis*. *Optics Express* 21(2): 1479-1488. (in English) ["The hind wings of males of *M. cyaneipennis* exhibit iridescence that is blue dorsally and green ventrally. These structures are used semiotically in agonistic and courtship display. Transmission electron microscopy reveals these colours are due to two near-identical 5-layer distributed Bragg reflectors, one placed either side of the wing membrane. Interestingly the thicknesses of corresponding layers in each distributed Bragg reflector are very similar for all but the second layer from each outer surface. This one key difference creates the significant disparity between the reflected spectra from the distributed Bragg reflectors and the observed colours of either side of the wing. Modelling indicates that modifications to the thickness of this layer alone create a greater change in the peak reflected wavelength than is observed for similar modifications to the thickness of any

other layer. This results in an optimised and highly effective pair of semiotic reflector systems, based on extremely comparable design parameters, with relatively low material and biomechanical costs." (Authors)] Address: Nixon, M.R., School of Physics, University of Exeter, EX4 4QL, UK. E-mail: M.R.Nixon@exeter.ac.uk

**12427.** Nomura, F.; De Marco, P.; Carvalho, A.F.A.; Rossa-Feres, D.C. (2013): Does background colouration affect the behaviour of tadpoles? An experimental approach with an odonate predator. *Ethology Ecology & Evolution* 25(2): 185-198. (in English) ["Predation is a primary driver of tadpole assemblages, and the activity rate is a good predictor of the tadpoles' tolerance for predation risk. The conflicting demands between activity and exposure to predation can generate suboptimal behaviours. Because morphological components, such as body colouration, may affect the activity of tadpoles, we predict that environmental features that enhance or match the tadpole colouration should affect their survival or activity rate in the presence of a predator. We tested this prediction experimentally by assessing the mortality rate of tadpoles of *Rhinella schneideri* and *Eupemphix nattereri* and the active time on two artificial background types: one bright-coloured and one black-coloured. We found no difference in tadpole mortality due to the background type. However, *R. schneideri* tadpoles were more active than *E. nattereri* tadpoles, and the activity of *R. schneideri* was reduced less in the presence of the predator than that of *E. nattereri*. Although the background colouration did not affect the tadpole mortality rate, it was a stimulus that elicited behavioural responses in the tadpoles, leading them to adjust their activity rate to the type of background colour." (Authors)] Address: Nomura, F., Departamento de Ecologia, ICB, Universidade Federal de Goiás (UFG), CP 131, CEP 74001-970, Goiânia, Goiás, Brazil

**12428.** Novello-Gutierrez, R.; Che Salmah, M.R. (2013): Two interesting larvae of *Onychogomphus* from Malaysia (Anisoptera: Gomphidae). *Odonatologica* 42(1): 31-38. (in English) ["The larvae of *O. thienemani* and *Onychogomphus* sp. are described and illustrated. Both species are clearly separated from each other principally by the shape of post-clypeus, pronotum, size of ligula, and dorsal protuberance on abdominal segment 2. The most distinctive feature of these 2 larvae is the shape and position of the 3rd antennomere in a manner of a protecting shield in front of the head." (Authors)] Address: Che Salmah, M.R., Universiti Sains Malaysia, School of Biological Sciences, 11800 Pulau Pinang, Malaysia. E-mail: csalmah@usm.my

**12429.** Nunes, A.L.; Richter-Boix, A.; Laurila, A.; Rebelo, R. (2013): Do anuran larvae respond behaviourally to chemical cues from an invasive crayfish predator? A community-wide study. *Oecologia* 171(1): 115-127. (in English) ["Antipredator behaviour is an important fitness component in most animals. A co-evolutionary history between predator and prey is important for prey to respond adaptively to predation threats. When non-native predator species invade new areas, native prey may not recognise them or may lack effective antipredator defences. However, responses to novel predators can be facilitated by chemical cues from the predators' diet. The red swamp crayfish *Procambarus clarkii* is a widespread invasive predator in the Southwest of the Iberian Peninsula, where it preys upon native anuran tadpoles. In a laboratory experiment we studied behavioural antipredator defences (alterations in activity level and spa-

tial avoidance of predator) of nine anurans in response to *P. clarkii* chemical cues, and compared them with the defences towards a native predator, the larval dragonfly *Aeshna* sp. To investigate how chemical cues from consumed conspecifics shape the responses, we raised tadpoles with either a tadpole-fed or starved crayfish, or dragonfly larva, or in the absence of a predator. Five species significantly altered their behaviour in the presence of crayfish, and this was largely mediated by chemical cues from consumed conspecifics. In the presence of dragonflies, most species exhibited behavioural defences and often these did not require the presence of cues from predation events. Responding to cues from consumed conspecifics seems to be a critical factor in facilitating certain behavioural responses to novel exotic predators. This finding can be useful for predicting antipredator responses to invasive predators and help directing conservation efforts to the species at highest risk." (Authors)] Address: Nunes, Ana, Departamento de Biologia Animal, Centro de Biologia Ambiental, Faculdade de Ciências da Universidade de Lisboa, Bloco C2, Piso 5, Campo Grande, 1749-016, Lisbon, Portugal. E-mail: alnunes@fc.ul.pt

**12430.** Obasi, K.O.; Ijere, N.D.; Okechukwu, R.I. (2013): Species diversity and equitability indices of some fresh water species in Aba River and Azumini Blue River, Abia state Nigeria. *International Journal of Science and Technology* 2(3): 238-241. (in English) [The taxa list includes larvae of Aeshnidae.] Address: Obasi, K.O., Department of Biological Science, School of Science; Fed. Univ. of Tech. Owerri, Imo State, Nigeria

**12431.** Oliveira Junior, J.M.B.; Ramos Cabette, H.S.; Silva Pinto, N.; Juen, L. (2013): As variações na comunidade de Odonata (Insecta) em córregos podem ser explicadas pelo Paradoxo do Plâncton? Explicando a riqueza de espécies pela variabilidade ambiental. *Entomobrasiliis* 6(1): 1-8. (in Portuguese, with English summary) ["Variations in Odonata (Insecta) community in streams may be predicted by the plankton paradox? Explaining species richness by environmental variability: The theory of Plankton Paradox postulates that environments that exhibit regular temporal fluctuations would present a high diversity of species, since such fluctuations would prevent the occurrence of competitive exclusion. This work aimed evaluate variations in adult Odonata community in catchment of River Suiá-Miçú, testing the hypothesis that sites with environmental variables with the largest amplitude of variation would present the highest species richness. Were sampled 11 water bodies in an area of transition Cerrado-Amazon Forest in east-central Mato Grosso state, Brazil. Environmental variables evaluated were: environmental integrity (HII) and range of variation of pH, conductivity, air temperature, water temperature, dissolved oxygen, ammonia, phosphorus and Mg<sup>+</sup>. Were collected 2.144 specimens, distributed in eight families, 41 genera and 78 species. Our hypothesis was not confirmed, since the multiple regression analysis performed between the estimated kind of richness Anisoptera and Zygoptera with range of variation of physical-chemical was not significant for any of the eight variables, as well as for HII. Our results suggest that variations in the community of Odonata in streams cannot be explained by Plankton Paradox. We believe that this result may have occurred due mainly to the low variations in environmental conditions discussed, action of other local processes such as competition and predation or differ-

ences ecophysiological result of body size variation and capacity of thermoregulation in the order of the adults studied." (Authors)] Address: Juen, L. Universidade Federal do Para, Brasil. E-mail: leandrojuen@ufpa.br

**12432.** Ott, J. (2013): Eine europaweit geschützte Libelle: die Große Moosjungfer hat sich im Raum Kaiserslautern angesiedelt. *Heimatjahrbuch Kaiserslautern* 2013: 90-92. (in German) [Rheinland-Pfalz, Germany. The authors outlines biology and habitat requirements of *Leucorrhinia pectoralis* in the district of Kaiserslautern and discusses the possible origin of the recently established local populations.] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**12433.** Parr, A.J. (2013): The Large White-faced Darter *Leucorrhinia pectoralis* (Charp.) in Britain during 2012. *J. Br. Dragonfly Society* 29(1): 40-45. (in English) ["*L. pectoralis* was noted in England on two occasions in 2012, these constituting only the second- and third-ever confirmed UK records of the species. This is discussed in the light of the migratory capabilities of *Leucorrhinia* species and the possibility that some earlier unexpected sightings from eastern England originally ascribed to White-faced Darter *L. dubia* may have been either *L. pectoralis* or *L. rubicunda*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**12434.** Petrulevicius, J.F.; Nel, A. (2013): A new Frenguelliidae (Insecta: Odonata) from the early Eocene of Laguna del Hunco, Patagonia, Argentina. *Zootaxa* 3616 (6): 597-600. (in English) ["The discovery of a new specimen of Frenguelliidae, attributed to the new species *Frenguella iglesiasi*, in Patagonia, Argentina, is noteworthy for the knowledge of the diversity within this little-known family." (Authors)] Address: Petrulevicius, J.F., Museo de La Plata - UNLP - CONICET, División Paleozoología Invertebrados, Paseo del Bosque s/n, 1900 La Plata, Argentina. E-mail: levicius@museo.fcnym.unlp.edu.ar

**12435.** Pinguet, D. (2013): On the trail of the Orange-spotted Emerald. *Dragonfly News* 63: 22-24 (in English) [northern Portugal without locality dates, *Oxygastra curtisii*, *Macromia splendens*, *Gomphus graslinii*.] Address: not stated

**12436.** Ramírez, A.; Gutiérrez-Fonseca, P.E. (2013): The larvae of *Heteragrion majus* Selys and *H. atrolineatum* Donnelly, with a key to known species from Costa Rica (Odonata: Megapodagrionidae). *Zootaxa* 3609(1): 96-100. (in English, with Spanish summary) ["The final larval stadium of *Heteragrion majus* Selys, 1886 and *H. atrolineatum* Donnelly, 1992 are described and illustrated for the first time, using reared material from Costa Rica, and compared with other species of the genus known from the country. All species were very similar as larvae, but they can be separated by the presence and distribution of antennal setae, spines on the posterior margin of the abdominal segments, and size. A key to separate all five species known for Costa Rica is provided." (Authors)] Address: Ramírez, A., Department of Environmental Sciences, University of Puerto Rico, P.O. Box 190341, San Juan, Puerto Rico 00919. E-mail: aramirez@ramirezlab.net

**12437.** Ramirez-Gonzalez, R.; Yu, D.W.; Bruce, C.; Heavens, D.; Caccamo, M.; Emerson, B.C. (2013): PyroClean: Denoising pyrosequences from protein-coding

amplicons for the recovery of interspecific and intraspecific genetic variation. *PLoS ONE* 8(3): e57615. doi:10.1371/journal.pone.0057615: 11 pp. (in English) ["High-throughput parallel sequencing is a powerful tool for the quantification of microbial diversity through the amplification of nuclear ribosomal gene regions. Recent work has extended this approach to the quantification of diversity within otherwise difficult-to-study metazoan groups. However, nuclear ribosomal genes present both analytical challenges and practical limitations that are a consequence of the mutational properties of nuclear ribosomal genes. Here we exploit useful properties of protein-coding genes for cross-species amplification and denoising of 454 flowgrams. We first use experimental mixtures of species from the class Collembola to amplify and pyrosequence the 5' region of the COI barcode, and we implement a new algorithm called PyroClean for the denoising of Roche GS FLX pyrosequences. Using parameter values from the analysis of experimental mixtures, we then analyse two communities sampled from field sites on the island of Tenerife. Cross-species amplification success of target mitochondrial sequences in experimental species mixtures is high; however, there is little relationship between template DNA concentrations and pyrosequencing read abundance. Homopolymer error correction and filtering against a consensus reference sequence reduced the volume of unique sequences to approximately 5% of the original unique raw reads. Filtering of remaining non-target sequences attributed to PCR error, sequencing error, or numts further reduced unique sequence volume to 0.8% of the original raw reads. PyroClean reduces or eliminates the need for an additional, time-consuming step to cluster reads into Operational Taxonomic Units, which facilitates the detection of intraspecific DNA sequence variation. PyroCleaned sequence data from field sites in Tenerife demonstrate the utility of our approach for quantifying evolutionary diversity and its spatial structure. Comparison of our sequence data to public databases reveals that we are able to successfully recover both interspecific and intraspecific sequence diversity." (Author) The study includes Odonata ("Ophiogomphus"), a taxon not known from Teneriffa.] Address: Emerson, B.C., Island Ecology and Evolution Research Group, Instituto de Productos Naturales y Agrobiología (Consejo Superior de Investigaciones Científicas), La Laguna, Tenerife, Canary Islands, Spain. E-mail: bemerson@ipna.csic.es

**12438.** Rathod, P.P.; Manwar, N.A.; Pawar, S.S.; Raja, I.A. (2013): Diversity and abundance of dragonflies and damselflies (Order - Odonata) in agro ecosystems around the Amravati City (M.S.), India in monsoon season. *International Journal of Agriculture Innovations and Research* 1.5: 174-182. (in English) [Between July 2012 and October 2012, 31 Odonata species were reported. The authors calculated the Species diversity (H) and Evenness (E) as 3.012 and 0.877 respectively.] Address: Raja, I.A., Dept of Zoology, Shri Shivaji College of Arts, Commerce and Science, Akola - 444001. India. E-mail: medrraja@gmail.com

**12439.** Ren, H.; Wang, X.; Li, X.; Chen, Y. (2013): Effects of dragonfly wing structure on the dynamic performances. *Journal of Bionic Engineering* 10(1): 28-38. (in English) ["The configurations of dragonfly wings, including the corrugations of the chordwise cross-section, the microstructure of the longitudinal veins and membrane, were comprehensively investigated using the

Environmental Scanning Electron Microscopy (ESEM). Based on the experimental results reported previously, the multi-scale and multi-dimensional models with different structural features of dragonfly wing were created, and the biological dynamic behaviours of wing models were discussed through the Finite Element Method (FEM). The results demonstrate that the effects of different structural features on dynamic behaviours of dragonfly wing such as natural frequency/modal, bending/torsional deformation, reaction force/torque are very significant. The corrugations of dragonfly wing along the chordwise can observably improve the flapping frequency because of the greater structural stiffness of wings. In updated model, the novel sandwich microstructure of the longitudinal veins remarkably improves the torsional deformation of dragonfly wing while it has a little effect on the flapping frequency and bending deformation. These integrated structural features can adjust the deformation of wing oneself, therefore the flow field around the wings can be controlled adaptively. The fact is that the flights of dragonfly wing with sandwich microstructure of longitudinal veins are more efficient and intelligent." (Authors)] Address: Wang, X., Dept of Engineering Mechanics, AML, Tsinghua Univ., Beijing 100084, P. R. China. E-mail: xshwang@tsinghua.edu.cn

**12440.** Ren, L.-q.; Li, X.-j. (2013): Functional characteristics of dragonfly wings and its bionic investigation progress. *Science China Technological Sciences* 56(4): 884-897. (in English) ["Dragonfly is one of the most excellent nature flyers, and its wings exhibit excellent functional characteristics through the coupling and synergy of morphology, configuration, structure and material. The functional characteristics presented by dragonfly wings provide a biological inspiration for the investigation and development of aerospace vehicles and bionics flapping aircraft flapping-wing micro air vehicles. In recent years, some progresses have been achieved in the researches on the wings' geometric structure, material characteristics, flying mechanism and the controlling mode. In this paper, the functional characteristics of the dragonfly wings including flying, self-cleaning, anti-fatigue, vibration elimination and noise reduction are introduced and the effects of their morphology, configuration, structure and material on the functional characteristics are described. Moreover, the current state of the bionic study on the functional characteristics of dragonfly wings is analyzed and its application prospect is depicted." (Authors)] Address: Ren, L.-q., Key Laboratory of Bionic Engineering (Ministry of Education, China), Jilin University, Changchun, 130025, China. E-mail: lqren@jlu.edu.cn

**12441.** Renner, S.; Périco, E.; Sahlén, G. (2013): Dragonflies (Odonata) in Subtropical Atlantic Forest fragments in Rio Grande do Sul, Brazil: seasonal diversity and composition. *Scientia Plena* 9(1): 1-8. (in English, with Portuguese summary) ["One of the most endangered ecosystems in America is the Atlantic Forest, which demands emergency actions to protect its remnants as well its biodiversity. In this situation the species inventory can develop a management role for the future, determining specific areas that should be preserved as well the species composition and richness can be used as an indicator of a healthy ecosystem. The use of dragonfly species composition has proven its potential indication of quality habitats. The Odonata species actually still poorly known in the Neotropical region and has never been used as a tool to analyze the



actual conditions of aquatic environments particularly in the Subtropical Atlantic Forest, which occurs in south of Brazil. A systematic survey was carried out in aquatic systems located at remnants of forest from March 2011 to February 2012. A total of 565 specimens belonging to 34 species, distributed in 5 families were sampled. Libellulidae was dominant, with 14 species, followed by Coenagrionidae, Gomphidae, Lestidae and Aeshnidae. Through inventory survey we deepen the Odonata composition knowledge and performed a statistic analysis." (Authors)] Address: Ecologia e Sensoriamento Remoto, Centro Universitário Univates, 95900-000, Lajeado-RS, Brasil. E-mail: samuelrenner@hotmail.com

**12442.** Rizo-Patron, F.; Kumar, A.; McCoy Colton, M.B.; Springer, M.; Trama, F.A. (2013): Macroinvertebrate communities as bioindicators of water quality in conventional and organic irrigated rice fields in Guanacaste, Costa Rica. *Ecological Indicators* 29: 68-78. (in English) ["The purpose of this study was to compare how aquatic macroinvertebrates are affected by certain management practices and agrochemicals in organic and conventional rice cultivations (treatments) in northwestern of Costa Rica. We sampled macroinvertebrates in both treatments, at the water entrances (irrigation) and exits (drainage) during two cycles (8 months total) of rice field cultivation. We employed a water quality index using macroinvertebrates (BMWP/CR) as bioindicators in both management treatments. Insect family mean ( $P = 0.0019$ ) and species mean richness ( $P = 0.0340$ ) were greater in the organic vs. the conventional treatments as well as at the entrances rather than their exits. Both macroinvertebrates mean abundance ( $P = 0.0281$ ) and insects mean abundances ( $P = 0.0065$ ) were greater at the organic vs. the conventional treatments. The water quality index (BMWP/CR) was greater in the organic treatment at the entrance (124) comparing with the exit (72), and also at the conventional entrance (92) vs. the exit (66), thus showing that the management practices affected the macroinvertebrate community. The organic treatment showed the settlement of a greater number of families and species of macroinvertebrates both in general and in those considered sensitive to pollution than in the conventional treatment. This sensitive group of macroinvertebrates (Baetis sp., Fallceon sp., Leptohyphes sp., Tricorythodes sp., Farrowodes sp., Phyllogomphoides sp., Hydroptila sp., Mayatrichia sp., Neotrichia sp., Oxyethira sp., Nectopsyche sp.1, Nectopsyche sp.2, Oecetis sp.) can be used as a bioindicators of water quality in these agroecosystems. On the contrary, more macroinvertebrates resistant to pollution were found in the conventional compared to the organic treatment, showing that aquatic macroinvertebrates respond to the type of management/products that are applied to the rice field." (Authors)] Address: Rizo-Patrón, F., Organization for Tropical Studies, Palo Verde Biological Station, Guanacaste, Costa Rica. E-mail: frizopatron@ibcperu.org

**12443.** Rosario, K.; Padilla-Rodriguez, M.; Kraberger, S.; Stainton, D.; Martin, D.P.; Breitbart, M.; Varsani, A. (2013): Discovery of a novel mastrevirus and alphasatellite-like circular DNA in dragonflies (Eiprocta) from Puerto Rico. *Virus Research* 171: 231-237. (in English) ["Geminiviruses have emerged as serious agricultural pathogens. Despite all the species that have been already catalogued, new molecular techniques continue to expand the diversity and geographical ranges of these single-stranded DNA viruses and their associated

satellite molecules. Since all geminiviruses are insect-transmitted, examination of insect vector populations through vector-enabled metagenomics (VEM) has been recently used to investigate the diversity of geminiviruses transmitted by a specific vector in a given region. Here we used a more comprehensive adaptation of the VEM approach by surveying small circular DNA viruses found within top insect predators, specifically dragonflies (Eiprocta). This 'predator-enabled' approach is not limited to viral groups transmitted by specific vectors since dragonflies can accumulate the wide range of viruses transmitted by their diverse insect prey. Analysis of six dragonflies collected from an agricultural field in Puerto Rico culminated in the discovery of the first mastrevirus (Dragonfly-associated mastrevirus; DfasMV) and alphasatellite molecule (Dragonfly-associated alphasatellite; Dfas-alphasatellite) from the Caribbean. Since DfasMV and Dfas-alphasatellite are divergent from the limited number of sequences that have been reported from the Americas, this study unequivocally demonstrates that there have been at least two independent past introductions of both mastreviruses and alphasatellites to the New World. Overall, the use of predacious insects as sampling tools can profoundly alter our views of natural plant virus diversity and biogeography by allowing the discovery of novel geminiviruses and associated satellite molecules without a priori knowledge of the types of viruses or insect vectors in a given area." (Authors)] Address: Varsani, A., School Biol. Sci., Univ. Canterbury, Private Bag 4800, Christchurch 8140, New Zealand. E-mail: arvind.varsani@canterbury.ac.nz

**12444.** Ruhi, A.; Boix, D.; Gascon, S.; Sala, J.; Quintana, X.D. (2013): Nestedness and successional trajectories of macroinvertebrate assemblages in man-made wetlands. *Oecologia* 171(2): 545-556 (in English) ["Current successional models, primarily those based on floral succession, propose several distinct trajectories based on the integration of two key hypotheses from succession theory: convergence versus divergence in species composition among successional sites, and progression towards versus deviation from a desired reference state. We applied this framework to faunal succession, including differential colonization between active and passive dispersers, and the nested patterns generated as a consequence of this peculiarity. Nine man-made wetlands located in three different areas, from 0–3 years from wetland creation, were assessed. In addition, 91 wetlands distributed throughout the region were used as references for natural macroinvertebrate communities. We predicted the following: (1) highly nested structures in pioneering assemblages will decrease to lower mid-term values due to a shift from active pioneering taxa to passive disperser ones; (2) passive idiosyncratic taxa will elicit divergent successional trajectories among areas; (3) the divergent trajectories will provoke lower local and higher regional diversity values in the mid-term assemblages than in pioneer assemblages. Our results were largely congruent with hypotheses (1) and (2), diverging from the anticipated patterns only in the case of the temporary wetlands area. However, overall diversity trends based on hypothesis (3) did not follow the expected pattern. The divergent successional trajectories did not compensate for regional biodiversity losses that occurred as a consequence of pioneering colonizer decline over time. Consequently, we suggest reconsidering wetland construction for mitigation purposes within mid-term time frames

(B3 years). Wetlands may not offset, within this temporal scenario, regional biodiversity loss because the ecosystem may not support idiosyncratic taxa from natural wetlands." (Authors) Supplementary data provide information at the species level, while the main paper analyses the taxa (including Odonata) at family level.] Address: Ruhí, A., Catalan Institute for Water Research (ICRA), Scientific and Technological Park of the University of Girona, H2O Building, Emili Grahit 101, 17003 Girona, Catalonia, Spain. E-mail: aruhi@icra.cat

**12445.** Rychła, A. (2013): New sites of the Golden-ringed Dragonfly *Cordulegaster boltonii* (Donovan, 1807) (Odonata: Cordulegasteridae) in the mid-western Poland. *Odonatrix* 9(1): 21-28. (in Polish, with English summary) ["*C. boltonii* has been known from 133 sites in Poland so far. Currently, the largest metapopulations are present in the Pomarenian's Lake District, Lubusz Land, Upper Silesia and Lesser Poland. However, the knowledge about the distribution of *C. boltonii* is still incomplete and any information is required since it has been vulnerable and consequently protected species in Poland. Therefore, new records of *C. boltonii* from mid-western Poland (southern Lubusz Land) are presented in this paper. The investigated area is situated on territories of communes Brody, Gubin, Lubsko and Tuplice in the Lubuskie District. In brief, it is lowland locally with varied relief structure of numerous morainic hills (altitudes to 120 a.s.l.) and depressions (altitudes to 50 a.s.l.), particularly covered by pine cultures with small participation of leaf forests. The main running waters like Pstrąg, Tymnica, Golec and Welnica represent the type of lowland rivers dominated by sandy channel substrates and receive flows from numerous small tributaries in the area. The investigation was carried out from April to October 2011 in selected sections (length of 100–500 m) of all running waters. The occurrence of larvae, exuviae and imagines, as well as the general hydromorphological features of each habitat were noted. For larvae, 15 to 20 samples were taken with a hydrobiological scoop at each site. As result, *C. boltonii* was observed at 16 sites in 11 running waters (small rivers and streams). Larvae were found at 12 sites localized in 7 running waters, providing a breeding success of *C. boltonii* in these habitats. The highest number of larvae was found in small forest streams at sites 6 and 9, with 21 and 22 larvae respectively. The habitats of *C. boltonii* are small-mid lowland streams, rivers, and rarely ditches with the width range of 0,5–3,5 m and depth range of 10–100 cm; with swift current, sandy and sand-gravelled bottom partially covered with fine and grob detritus deposits. The flowing water is clear, but at the most sites brown coloured probably as a result of large iron content. Currently, the surface waters in the investigated are only under slight anthropogenic pressure, manifesting in low risk of dispersed nutrients inflows from the drainage basin and in temporary changing hydrological regime and water quality by fish ponds. Locally, the hydrological regime of some running waters is changed by beaver's dam constructions, which slow down the current. In fact, only imagines could be found at some sites downstream from the fish ponds (No. 2 and 7), suggesting that the larvae might avoid habitats localized directly beyond fish ponds. (sites No. However, with increasing distance from ponds, larvae could be observed again (sites No. 4a, 4b, 4c). Additionally, the significant hydromorphological changes occurred only locally (sites No. 3, 4a, 8 and 10) as a result of beaver's activity (several meters

above the dams). The larvae of *C. boltonii* weren't observed only the still water bodies. It indicates, that the beavers might have a negative influence only on short sections of habitats used by *C. boltonii* in this area. To conclude, the data indicate that the southern part of Lubusz Land is currently an important area for the development and protection of an intact population of *C. boltonii* in Poland." (Author)] Address: Rychła, Anna, ul. Osiedlowa 12, Ploty, 66-016 Czerwieńsk, Poland. E-mail: rychlan@op.pl

**12446.** Sacchi, R.; Hardersen, S. (2013): Wing length allometry in Odonata: differences between families in relation to migratory behaviour. *Zoomorphology* 132(1): 23-32. (in English) ["In insects, wing shape and body size are correlated with several aspects of behaviour, and the optimal morphology of wings is a trade-off between a number of functional demands in relation to behaviour (e.g. foraging, migration and sexual display). Dragonflies are spectacularly skilful flyers and present a range of different wing shapes, but to date, no detailed studies have been conducted in this group on wing length allometry in relation to body size. In this paper, we use published data on body length and wing length in all European and North American dragonflies to investigate differences in wing length allometries among Odonata taxa (suborders and families) and to relate these to behavioural patterns. We found different wing allometries between Zygoptera and Anisoptera, which are probably related to the flight mode and wing form of the two suborders. Among the Anisoptera, the Libellulidae showed a distinct wing length allometry from all other anisopteran families and migrants differed from non-migrant species. The first dichotomy is likely to reflect the adaptation of wing morphology of Libellulidae to sit-and-wait behaviour and to brief foraging flights (most species of this family are perchers) with respect to all other families, members of which are typically flyers. The second dichotomy reflects the trend of migrating species to have relatively longer wings than non-migrating members of the same family. Finally, wing length allometry differed among all the zygopteran families analysed, and this pattern suggested that each family evolved a particular wing morphology in response to peculiarities in behaviour, habitat and flight mode." (Authors)] Address: Hardersen, S., Centro Nazionale per lo Studio e la Conservazione della Biodiversità Forestale, Corpo Forestale dello Stato, Strada Mantova, 29, 46045 Marmirolo (MN), Italy. E-mail: s.hardersen@gmail.com

**12447.** Sánchez-Guillén, R.A.; Martínez-Zamilpa, S.M.J.; Jiménez-Cortés, J.G.; Forbes, M.R.L.; Córdoba-Aguilar, A. (2013): Maintenance of polymorphic females: do parasites play a role? *Oecologia* 171(1): 105-113. (in English) ["The role of parasites in explaining maintenance of polymorphism is an unexplored research avenue. In odonates, female-limited colour polymorphism (one female morph mimicking the conspecific male and one or more gynochromatic morphs) is widespread. Here we investigated whether parasitism contributes to colour polymorphism maintenance by studying six species of female dimorphic damselflies using large databases of field-collected animals. We predicted that androchrome females (male mimics) would be more intensively parasitized than gynochrome females which is, according to previous studies, counterbalanced by the advantages of the former when evading male harassment compared to gynochrome females. Here we show that in *Ischnura denticollis* and *Enallagma no-*

vahispaniae, androchrome females suffer from a higher degree of parasitism than gynochromatic females, and contrary to prediction, than males. Thus, our study has detected a correlation between colour polymorphism and parasitic burden in odonates. This leads us to hypothesize that natural selection, via parasite pressure, can explain in part how androchrome and gynochrome female colour morphs can be maintained. Both morphs may cope with parasites in a different way: given that androchrome females are more heavily parasitized, they may pay a higher fecundity costs, in comparison to gynochrome females." (Authors)] Address: Sánchez-Guillén, Rosa, Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Ciudad, Universitaria, Apdo. Postal 70-275, México. E-mail: rguillen@uvigo.es

**12448.** Savard, M. (2013): Inventaire automnal des odonates au Saguenay–Lac-Saint-Jean: découverte d'une population du sympétrum tardif. *Le Naturaliste Canadien* 137(1): 25-32. (in French) [Between 18-IX and 12-X-2011, *Sympetrum vicinum* was found inhabiting the beaver ponds north of Lac Saint-Jean in the National Park Pointe-Taillon, Québec, Canada. This is the northernmost of the known distribution boundary of *S. vicinum*.] Address: Savard, M.; E-mail: michel.savard@ssss.gouv.qc.ca

**12449.** Sciberras, A.; Sammut, M. (2013): The occurrence of the Copper Emerald *Calopteryx haemorrhoidalis* (Vander Linden, 1825), records of rare species, changing population trends of some hitherto common species and recent colonisers in the Maltese Islands. *J. Br. Dragonfly Society* 28(1): 1-9. (in English) ["The first record of *C. haemorrhoidalis* from the Maltese Islands is reported. Historical and modern records for the Maltese Islands of the rare species, *C. virgo*, *Aeshna mixta* and *Selysiothemis nigra*, are discussed; also the changing population trends of hitherto common species such as *Orthetrum coerulescens anceps*, *Sympetrum fonscolombii* and *Sympetrum striolatum*." (Authors)] Address: Sciberras, A., 1133 'Arnest', Arcade Str, Paola, Malta. E-mail: bioislets@gmail.com

**12450.** Sesterhenn, T.M.; Reardon, E.E.; Chapman, L.J. (2013): Hypoxia and lost gills: respiratory ecology of a temperate larval damselfly. *Journal of Insect Physiology* 59(1): 19-25. (in English) ["Damselfly larvae, important predators and prey in many freshwater communities, may be particularly sensitive to hypoxia because their caudal lamellae (external gills) are frequently lost. In this study, we address how lost lamellae interact with low oxygen to affect respiration and behaviour of the widespread North American damselfly *Ischnura posita*. Results showed no effect of lost lamellae on resting metabolic rate or critical oxygen tension. Ventilation behaviours increased only when dissolved oxygen (DO) was at or below 25% saturation, and these behaviours were not affected by the number of lamellae. Use of the oxygen-rich surface layer occurred almost exclusively at the lowest dissolved oxygen level tested (10% saturation, 2.0 kPa). Damselflies that were missing lamellae spent more time at the surface than individuals with intact lamellae. The negative relationship between body size and time at the surface, and the negative relationship between body mass and critical oxygen tension suggest that larger *I. posita* may be more hypoxia tolerant than smaller individuals. Overall, *I. posita* was minimally affected by missing lamellae and seems well adapted to low DO habitats. Average critical oxygen

tension was very low (0.48 kPa, 2.4% saturation), suggesting that individuals can maintain their metabolic rate across a broad range of DO, and behaviours changed only at DO levels below the hypoxia tolerance thresholds of many other aquatic organisms." (Authors)] Address: Sesterhenn, T.M., Dept of Biology, Univ. of Kentucky, 101 Morgan Building, Lexington, KY 40506-0225, USA. E-mail: tsesterh@purdue.edu

**12451.** Siepielski, A.M.; McPeck, M.A. (2013): Niche versus neutrality in structuring the beta diversity of damselfly assemblages. *Freshwater Biology* 58(4): 758-768. (in English) ["(1.) Differences among communities in taxonomic composition – beta diversity – are frequently expected to result from taxon-specific responses to spatial variation in ecological conditions, through niche partitioning. Such process-derived patterns are in sharp contrast to arguments from neutral theory, where taxa are ecologically equivalent and beta diversity results primarily from dispersal limitation. (2.) Here, we compared beta diversity among assemblages of Zygoptera, for which previous experiments have shown that niche differences maintain genera within a community, but patterns of relative abundance for species within each genus are shaped primarily by neutral dynamics. (3.) Using null-model and ordination-based methods, we find that both genera and (in contrast to neutral theory) species assemblage composition vary across the landscape in a deterministic fashion, shaped by environmental and spatial factors. (4.) While the observed patterns in species composition conflict with theory, we suggest that this is a result of weak ecological filters acting to produce spatial variation in assemblages of ecologically similar species undergoing ecological drift within communities. Such patterns are especially likely in systems of relatively weak dispersers like damselflies." (Authors) The study includes the following taxa: *Enallagma divagans*, *E. ebrium/hageni*, *E. exulans*, *E. geminatum*, *E. minusculum*, *E. pictum*, *E. signatum*, *E. traveatum*, *E. vernale*, *E. vesperum*, *Argia*, *Ischnura*, *Lestes*, and *Nehalennia*.] Address: Siepielski, A.M., Department of Biology, University of San Diego, San Diego, CA 92110, USA. E-mail: adamsiepielski@sandiego.edu

**12452.** Sim, L.L.; Davis, J.A.; Strehlow, K.; McGuire, M.; Traylor, K.M.; Wild, S.; Papas, P.J.; O'Connor, J. (2013): The influence of changing hydroregime on the invertebrate communities of temporary seasonal wetlands. *Freshwater Science* 32(1): 328-342. (in English) ["Community dynamics in temporary waters are constrained by the hydroregime (depth, timing, duration, frequency, and predictability of water in an aquatic habitat), which in turn is influenced by climatic patterns and anthropogenic use of water in the landscape. Declining rainfall in regions with a Mediterranean climate, such as southwestern Australia, has decreased the depth and duration of water in temporary wetlands, potentially altering the composition of invertebrate communities. We used a long-term data set (6–25 y) to examine temporal changes in hydroregimes and aquatic invertebrate diversity (based on species presence/absence) at 9 seasonal wetlands. The study wetlands maintained distinctly seasonal hydroregimes, despite declining rainfall and the contraction of wetland hydroperiods. Distance-based redundancy analysis (dbRDA) indicated that conductivity, NO<sub>3</sub>-+NO<sub>2</sub>-, and turbidity were the most important factors explaining the changes in invertebrate community composition over time. Allocation of species into 4 trait-based groups based on their resilience to or



resistance of drought and their mode of recolonization of a water body upon rewetting revealed that the fauna is dominated by active dispersers. This result suggests that the proximity of source wetlands from which mobile invertebrate species and vertebrate vectors, such as waterbirds, can recolonize seasonal wetlands is an important factor influencing the invertebrate community response to rewetting. Despite the decline in water availability, we found little evidence of a shift to a more arid-adapted fauna. We suggest that the maintenance of a mosaic of wetlands of varying hydroregimes at the whole-landscape scale will be critical to the future persistence of aquatic invertebrate communities in Mediterranean regions where the frequency and intensity of droughts is predicted to increase... Group-3 taxa (colonists that do not need water for egg laying) were relatively rare. Those recorded included damselflies (Lestidae), mosquitoes (Culicidae), and dragonflies (Libellulidae)." (Authors)] Address: Davis, Jenny, Australian Centre for Biodiversity, School of Biological Sciences, Monash University, Wellington Road, Clayton, Victoria 3800, Australia. E-mail: jenny.davis@monash.edu

**12453.** Simaika, J.P.; Samways, M.J.; Kipping, J.; Suhling, F.; Dijkstra, K.-D.B.; Clausnitzer, V.; Boudot, J.-P.; Domisch, S. (2013): Continental-scale conservation prioritization of African dragonflies. *Biological Conservation* 157: 245-254. (in English) ["Indicators on the state of global biodiversity illustrate continued decline, while pressure on biodiversity keeps rising. This necessitates revisiting site prioritization and species protection for conservation. Patterns of richness and threat of four well-studied aquatic taxa, the fishes, crabs, molluscs and dragonflies largely coincide at the continental scale, at least in Africa. For this study, we focus on dragonflies, for which there is a point locality database, as a surrogate taxon, modelling the species at the fine-scale, using species distribution modelling. With this approach, we built a protected areas network using spatial planning software. Priority areas for dragonfly conservation largely coincided with analyses of global biodiversity hotspots. The Zambian swamps and woodlands, as well as the rainforests of the Lower Guinea and Congo Basin are emphasized as hotspots of dragonfly diversity. Among globally threatened species, 72% were recorded at least once in a protected area. Although the current reserve network covers 10.7% of the landscape, the proportional representation of species geographic distributions in reserves is only 1.2%. The reserve network is therefore inefficient concerning freshwater species, and many areas of conservation priority that are not formally protected remain. The advantage of operating at the fine scale, while covering a large geographic area is that it shifts the focus from the large-scale hotspots to smaller priority areas within and beyond hotspots. Also, by operating at the fine-scale for a large geographical area, the potential exists for local conservation managers to consider campaigning for the inclusion of the priority areas that are not formally protected, while adjacent to the existing reserve networks. Where this is not possible, we recommend monitoring these areas to detect future threats to the habitats that these might face." (Authors)] Address: Simaika, J.P., Dept of Conservation Ecology and Entomology, Stellenbosch University, P Bag X1, Matieland 7602, South Africa. E-mail: john.simaika@senckenberg.de

**12454.** Simon, S.; Narechania, A.; DeSalle, R.; Hadrys, H. (2013): Insect phylogenomics: Exploring the source

of incongruence using new transcriptomic data. *Genome Biol Evol.* 4(12): 1295-1309. (in English) ["The evolution of the diverse insect lineages is one of the most fascinating issues in evolutionary biology. Despite extensive research in this area, the resolution of insect phylogeny especially of inter-ordinal relationships has turned out to be still a great challenge. One of the challenges for insect systematics is the radiation of the polyneopteran lineages with several contradictory and/or unresolved relationships. Here, we provide the first transcriptomic data for three enigmatic polyneopteran orders (Dermaptera, Plecoptera and Zoraptera) to clarify on of the most debated issues among higher insect systematics. We applied different approaches to generate three data sets comprising 78 species and 1,579 clusters of orthologous genes. Using these three matrices we explored several key mechanistic problems of phylogenetic reconstruction including missing data, matrix selection, gene and taxa number/choice and the biological function of the genes. Based on the first phylogenomic approach including these three ambiguous polyneopteran orders we provide here conclusive support for monophyletic Polyneoptera, contesting the hypothesis of Zoraptera+Paraneoptera and Plecoptera+remaining Neoptera. In addition, we employ various approaches to evaluate data quality and highlight problematic nodes within the Insect Tree that still exist despite our phylogenomic approach. We further show how the support for these nodes or alternative hypotheses might depend on the taxon- and/or gene-sampling." (Authors) The analysis includes *Ischnura elegans*.] Address: Simon, Sabrina, ITZ, Ecology & Evolution, Stiftung Tierärztliche Hochschule Hannover, 30559 Hannover, Germany. E-mail: ssimon@amnh.org

**12455.** Smith, M.S. (2013): Another mixed damselfly pairing. *Atropos* 48: 85-86 (in English) [Mixed pairing of *Lestes barbarus* and *L. sponsa*. Winterton, Norfolk, 8 – IX-2012] Address: Smith, M.S., 15 St Edmund's Road, Lingwood, Norfolk, NR13 4LU, UK

**12456.** Smith, E.L.; Coté, D.; Colbo, M.H. (2013): An impoverished benthic community shows regional distinctions. *Northeastern Naturalist* 20(1): 91-102 (in English) ["Monitoring programs using benthic macroinvertebrates are well-used and expanding to areas where communities are species-poor. The sensitivity of these depauperate communities to environmental conditions, however, is not well known. In this study, impoverished benthic invertebrate communities were compared from three climatically and geologically distinct regions of Newfoundland. Differences in community structure were evident among regions at both the genus and family level. These results indicate that widely dispersing and depauperate macroinvertebrate communities can be sufficiently diverse to respond to regional variation in environmental conditions and therefore remain promising for detecting anthropogenic-induced changes... For example, species of Ephemeroptera number 35 in Newfoundland (106,000 km<sup>2</sup>) versus 160 species in Maine (91,650 km<sup>2</sup>) while Odonata number 38 species in Newfoundland and 128 species in the Canadian ..." (Authors)] Address: Smith, Erica, Box One, Portage la Prairie, MB, Canada R1N 3P1. E-mail: SmithEricaL@gmail.com

**12457.** Stewart, S.S.; Vodopich, D.S. (2013): Variation in fluctuating asymmetry among nine damselfly species. *International Journal of Odonatology* 16(1): 67-77. (in English) ["Fluctuating asymmetry (FA), measured as

random deviations from bilateral symmetry, likely results from developmental disturbances by internal or environmental stresses. However, comparisons of FA in single damselfly species (Odonata: suborder Zygoptera) from stressed environments have often been inconclusive. We measured levels of FA among multiple species of damselflies from the same environment to determine the relative roles of environmental stress and species-specific developmental instability. Damselflies of nine species (*Argia sedulum*, *A. nahuana*, *A. immundum*, *Ischnura ramburii*, *I. hastata*, *I. posita*, *Enallagma civile*, *E. basidens*, *Telebasis salva*) were collected from a central Texas wetland. Calculations of their FA were based on cell counts of four clearly defined areas (venation patterns) in fore and hind wings. Significant FA of venation occurred in both sexes, both wing positions, and in each of four venation patterns of all nine species. Levels of FA were not significantly different between sexes or between wing positions for any of the nine species. However, FA varied significantly among the four venation patterns. Patterns with lowest mean cell counts had significantly higher FA than the other patterns, despite scaling to remove size bias. More broadly, a three-fold difference in overall FA occurred among the nine species and was not correlated with species mean weight or abdomen length. The wide range of FA levels among multiple species in the same environment calls for caution in designing studies that select a single species expected to be sensitive to environmental stress. Future research must examine the relative roles of species-specific predispositions for FA from internal genetic stresses as well as external stressors." (Authors)] Address: Stewart, Sherry, Department of Biology, Baylor University, Waco, TX, 76798-7388, USA

**12458.** Suhling, I.; Suhling, F. (2013): Thermal adaptation affects interactions between a range-expanding and a native odonate species. *Freshwater Biology* 58(4): 705-714. (in English) ["(1.) Increasing temperature and invading species may interact in their effects on communities. In this study, we investigated how rising temperatures alter larval interactions between a naturally range-expanding dragonfly, *Crocothemis erythraea*, and a native northern European species, *Leucorrhinia dubia*. Initial studies revealed that *C. erythraea* grow up to 3.5 times faster than *L. dubia* at temperatures above 16 C. As a result, we hypothesised that divergent temperature responses would lead to rapid size differences between coexisting larvae and, consequently, to asymmetric intraguild predation at higher ambient temperatures. (2.) Mortality and growth rates were measured in interaction treatments (with both species present) and non-interaction controls (one species present) at four different temperature regimes: at an ambient temperature representative of central Germany, where both species overlap in distribution, and at temperatures increased by 2, 4 and 6 C. (3.) The mortality of *C. erythraea* did not differ between treatment and control. In contrast, mortality of *L. dubia* remained similar over all temperatures in the controls, but increased with temperature in the presence of the other species and was significantly higher there than in the controls. We concluded that *L. dubia* suffered asymmetric intraguild predation, particularly at increased temperature. Reduced growth rate of *L. dubia* in the interaction treatment at higher temperatures also suggested asymmetric competition for prey in the first phase of the experiment. (4.) The results imply that the range expansion of *C. erythraea* may cause reduction in population size of

syntopic *L. dubia* when temperature rises by more than 2°C. The consequences for future range patterns, as well as other factors that may influence the interaction in nature, are discussed." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**12459.** Sundermann, A.; Gerhardt, M.; Kappes, H.; Haase, P. (2013): Stressor prioritisation in riverine ecosystems: Which environmental factors shape benthic invertebrate assemblage metrics? *Ecological Indicators* 27: 83-96. (in English) ["Aquatic ecosystems are amongst the most heavily altered ecosystems and exhibit a disproportional loss of biodiversity. Numerous stressors, such as nutrient enrichment, contaminant pollution, sedimentation and alterations in stream hydrology and habitat structure, account for these losses. Understanding these forces is of utmost importance to prevent riverine ecosystems from further deterioration and to provide helpful insights for restoration practices. In the present study, we analyse the response of biological indicators to a large number of environmental factors. For this, benthic invertebrate assemblages (including Odonata at the order level) from 83 sites in Germany were described based on 25 metrics from four different metric types. The condition of the sites was described using 27 environmental factors: 13 for water quality, 4 for land use in the catchment and 10 for local scale habitat structure. The relative importance of single environmental predictors or predictor combinations for benthic invertebrate assemblages was analysed with single and multiple linear regression models. The results for the latter models were statistically supported via a bootstrap approach. The models revealed the importance of water quality and catchment-scale land use in explaining benthic invertebrate assemblages; in particular, chloride, oxygen, total organic carbon and the amounts of artificial surfaces and arable land were the most important predictors. Models including solely structural variables such as plan form, bank structures and substrate diversity had lower goodness of fit values than those for other variables. Regarding the four different assemblage metric types, functional metrics had on average lower goodness of fit values than composition/abundance, richness/diversity and sensitivity/tolerance metrics. Among the richness/diversity metrics, however, the model results for the Shannon–Wiener and Simpson diversity indices and evenness were poor. Our results show that catchment-related factors and water quality were of overriding importance in shaping biodiversity patterns and causing species loss. In contrast, structural degradation at a local scale was not the most significant stressor. This finding might explain why structural restoration at a reach scale often yields a low benefit–cost ratio and may be considered to represent inappropriate investment prioritisation." (Authors)] Address: Sundermann, Andrea, Senckenberg Research Institute and Natural History Museum Frankfurt, Department of River Ecology and Conservation, Clameystr. 12, 63571 Gelnhausen, Germany. E-mail: Andrea.Sundermann@senckenberg.de

**12460.** Takahara, T.; Doi, H.; Kohmatsu, Y.; Yamaoka, R. (2013): Different chemical cues originating from a shared predator induce common defense responses in two prey species. *Animal Cognition* 16(1): 147-153. (in English) ["In freshwater ecosystems, inducible defenses that involve behavioural or morphological changes in

response to chemical cue detection are key phenomena in prey–predator interactions. Many species with different phylogenetic and ecological traits (e.g., general activity patterns and microhabitats) use chemical cues to avoid predators. We hypothesized that prey species with a shared predator, but having different ecological traits, would be adapted to detect different chemical cues from the predator. However, the proximate mechanisms by which prey use chemical cues to avoid predation remain little known. Here, we tested our hypothesis by using fractionated chemical components from predatory dragonfly nymphs (*Anax parthenope julius*) to trigger anti-predator behavioural responses in two anuran tadpoles, the wrinkled frog *Glandirana* (*Rana*) *rugosa* and the Japanese tree frog *Hyla japonica*. *Glandiranarugosa* detected chemical cues that had either high or low hydrophobic properties, but *H. japonica* responded only to chemical cues with hydrophilic properties. During the normal behaviours of these tadpole species, *G. rugosa* remains immobile in benthic habitats, whereas *H. japonica* exhibits active swimming at the surface or in the middle of the water column. As we had hypothesized, these tadpole species, which have different general activity levels and microhabitats, detected different chemical cues that were exuded by their shared predator and responded by changing their activities to avoid predation. The specific chemical cues detected by each tadpole species are likely to have characteristics that optimize effective predator detection and encounter avoidance of the shared dragonfly predator." (Authors)] Address: Takahara, T., Graduate School of Science and Technology, Kyoto Institute of Technology, Sakyo-ku, Kyoto, 606-8585, Japan. E-mail: takahara@hiroshima-u.ac.jp

**12461.** Takahashi, Y.; Watanabe, M. (2013): Time constraints related to sexual maturation and prolonged copulation in the female-dimorphic damselfly *Ischnura senegalensis*. *Entomological Science* 16(1): 34-39. (in English) ["Time constraints are critical for reproductive success. To understand the spatiotemporal dynamics of morph frequency in the female-dimorphic damselfly *Ischnura senegalensis*, we compared two different morphs for two important time constraints on female reproductive output, i.e. post-emergence sexual maturation and prolonged copulation. The females of both morphs achieved sexual maturation 4–5 days after emergence, suggesting that the rate of sexual maturation does not result in morph-specific fitness. The copulation durations declined with the time of onset of copulation in both morphs. Consequently, all copulations terminated at approximately 12:00 hours. Because females show foraging and oviposition activity only after copulation, the copulation duration does not result in morph-specific time constraints. These two important time constraints do not account for morph-specific reproductive success and do not affect the evolutionary equilibrium of morph frequency in *I. senegalensis*." (Author)] Address: Takahashi, Y., Graduate School of Life Sciences, Tohoku University, 6-3, Aoba, Aramaki, Aoba, Sendai, Miyagi 980-8578, Japan. Email: takahashi.yum@gmail.com

**12462.** Talmale, S.S.; Tiple, A.D. (2013): New records of damselfly *Lestes thoracicus* Laidlaw, 1920 (Odonata: Zygoptera: Lestidae) from Maharashtra and Madhya Pradesh states, central India. *Journal of Threatened Taxa* 5(1): 3552-3555. (in English) ["05.xii.2010, two males and one female from Sukad River, Singhori Wildlife Sanctuary, District Raisen, Madhya Pradesh (23°14.68'N &

78°11.01'E) (ZSI,CZRC A/16755); 09.xii.2010, one male and one female from Bhagdehi, Singhori Wildlife Sanctuary, District Raisen, Madhya Pradesh (23°06.59'N & 78°15.22'E) (ZSI,CZRC A/16756); 20.vii.2011, one male from Danital Lake, Rani Durgavati Wildlife Sanctuary, District Damoh, Madhya Pradesh (23°32.86'N & 79°43.70'E) (ZSI,CZRC, A/16757); 03.vii.2010, one male and one female were collected from Futala Lake Nagpur, Maharashtra (20°9'N & 79°9'E) (ZSI, CZRC, A/16987)." (Authors)] Address: Talmale, S.S., Zoological Survey of India, Central Zone Regional Centre, Jabalpur, Madhya Pradesh 482002, India. E-mail: stalmale@yahoo.co.in

**12463.** Taylor, P. (2013): A change in status of the Willow Emerald Damselfly *Lestes viridis* (Vander Linden) in the United Kingdom. *J. Br. Dragonfly Society* 29(1): 65-68 (in English) ["The revised list of Odonata in the United Kingdom produced by Taylor et al. (2009) contained 42 species in Category A, a further 12 species in Category B and three species in Category C (former breeding species not recorded since 1970). This list was subsequently revised again (Taylor & Smallshire, 2010) following the discovery of *Coenagrion scitulum* in Kent during June and July 2010 - this discovery necessitating a move for the species from Category C to Category B (vagrant species). The sustained colonisation of *Lestes viridis* since 2009 now requires this species be moved from Category B to Category A (resident and/or migrant species recorded since 1970)." (Author)] Address: Taylor, Pam, Decoy Farm, Decoy Rd, Potter Heigham, Norfolk, NR29 5LX, UK

**12464.** Theischinger, G.; Tang, C. (2013): Diagnostic characters of the larvae of *Austropetalia* Tillyard (Anisoptera Austropetaliidae), including some mainly pictorial history. *Agrion* 17(1): 4-7. (in English) ["The two Australian species of *Austropetaliidae*, *Austropetalia patricia* (Waterfall Redspot) and *Austropetalia tonyana* (Alpine Redspot), were hitherto generally identified by their geographic distribution. Recently planned listing as VULNERABLE species necessitated a closer look at the larvae. As a result, it became possible to identify the available larval material of the two species on the basis of size and direction of the lateral abdominal lobes on segments 5-8 and to present diagnostic photos in the present article (Figs 1-10)." (Authors)] Address: Tang, Cheryl, Water Science, Office of Environment & Heritage, Department of Premier & Cabinet, PO Box 29, Lidcombe NSW 1825, Australia

**12465.** Theischinger, G.; Richards, S.J. (2013): *Palaeosynthemis elegans* spec. nov., a new dragonfly from Papua New Guinea (Anisoptera: Synthemistidae). *Odonatologica* 42(1): 63-66. (in English) ["The new species is described from the upper Sepik Basin in northern Papua New Guinea. Holotype ♂: PNG, West Sepic prov., Temporary Camp in upper Sepic Basin, alt. 290 m asl, during Feb. 2010; deposited in Mus. & Art Gallery, Darwin, Australia. Characters of the adult male are illustrated and the affinities of the new species are discussed." (Authors)] Address: Theischinger, G., NSW Dept of Premier & Cabinet, Office of Environment & Heritage, PO Box 29, Lidcombe, NSW 1825, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

**12466.** Thomas, J.A.; Trueman, J.W.H.; Rambaut A.; Welch, J.J. (2013): Relaxed phylogenetics and the palaeoptera problem: Resolving deep ancestral splits in the insect phylogeny. *Systematic Biology* 62(2): 285 - 297. (in English) ["The order in which the three groups



of winged insects (the Pterygota) diverged from their common ancestor has important implications for understanding the origin of insect flight. But despite this importance, the split between the Odonata (dragonflies and damselflies), Ephemeroptera (mayflies) and Neoptera (the other winged orders) remains very much unresolved. Indeed, previous studies have obtained strong apparent support for each of the three possible branching patterns. Here, we present a systematic reinvestigation of the basal pterygote split. Our results suggest that outgroup choice and limited taxon sampling have been major sources of systematic error, even for datasets with a large number of characters (e.g., in phylogenomic datasets). In particular, a dataset of 113 taxa provides consistent support for the Palaeoptera hypothesis (the grouping of Odonata with Ephemeroptera), while results from datasets with fewer taxa give inconsistent results, and are highly sensitive to minor changes in data and methods. We also focus on recent methods that exploit temporal information using fossil calibrations, combined with additional assumptions about the evolutionary process, and so reduce the influence of outgroup choice. These methods are shown to provide more consistent results, for example, supporting Palaeoptera, even for datasets that previously supported other hypotheses. Together, these results have implications for understanding insect origins and for resolving other problematic splits in the tree of life." (Authors)] Address: Thomas, Jessica, Dept of Biology, Univ. of York, York, YO10 5DD, UK. E-mail: jessicaathomas@gmail.com

**12467.** Tiitsaar, A.; Kaasik, A.; Teder, T. (2013): The effects of seasonally variable dragonfly predation on butterfly assemblages. *Ecology* 94(1): 200-207. (in English) ["Where predation is seasonally variable, the potential impact of a predator on individual prey species will critically depend on phenological synchrony of the predator with the prey. Here we explored the effects of seasonally variable predation in multispecies assemblages of short-lived prey. The study was conducted in a landscape in which we had previously demonstrated generally high, but spatially and seasonally variable dragonfly-induced mortality in adult butterflies. In this system, we show that patterns of patch occupancy in butterfly species flying during periods of peak dragonfly (in >90% *Orthetrum cancellatum*) abundance are more strongly associated with spatial variation in dragonfly abundance than patch occupancy of species flying when dragonfly density was low. We provide evidence indicating that this differential sensitivity of different butterfly species to between-habitat differences in dragonfly abundance is causally tied to seasonal variation in the intensity of dragonfly predation. The effect of dragonfly predation could also be measured at the level of whole local butterfly assemblages. With dragonfly density increasing, butterfly species richness decreased, and butterfly species composition tended to show a shift towards a greater proportion of species flying during periods of off-peak dragonfly abundance." (Authors)] Address: Tiitsaar, A., Dept of Zoology, Institute of Ecology and Earth Sciences, University of Tartu, Vanemuise 46, 51014 Tartu, Estonia. E-mail: anu.tiitsaar@ut.ee

**12468.** Tiple, A.; Chandra, K. (2013): Dragonflies and damselflies (Insecta, Odonata) of Madhya Pradesh and Chhattisgarh states, Central India. *Journal Care4Nature* 1(1): 3-11. (in English) [106 Odonata species from Madhya Pradesh and Chhattisgarh are listed and briefly discussed.] Address: Tiple, A., Forest Entomology Divi-

sion, Tropical Forest Research Institute, Jabalpur-482021, Madhya Pradesh, India. E-mail: ashishdtiple@yahoo.co.in

**12469.** Touchon, J.C.; McCoy, M.W.; Vonesh, J.R.; Warkentin, K.M. (2013): Effects of plastic hatching timing carry over through metamorphosis in red-eyed treefrogs. *Ecology* 94: 850-860. (in English) ["Environmentally cued plasticity in hatching timing is widespread in animals. As with later life-history switch points, plasticity in hatching timing may have carryover effects that affect subsequent interactions with predators and competitors. Moreover, the strength of such effects of hatching plasticity may be context dependent. We used red-eyed treefrogs, *Agalychnis callidryas*, to test for lasting effects of hatching timing (four or six days post-oviposition) under factorial combinations of resource levels (high or low) and predation risk (none, caged, or lethal *Pantala flavescens* dragonfly naiads). Tadpoles were raised in 400-L mesocosms in Gamboa, Panama, from hatching until all animals had metamorphosed or died, allowing assessment of effects across a nearly six-month period of metamorphosis. Hatching early reduced survival to metamorphosis, increased larval growth, and had context-dependent effects on metamorph phenotypes. Early during the period of metamorph emergence, early-hatched animals were larger than late-hatched ones, but this effect attenuated over time. Early-hatched animals also left the water with relatively longer tails. Lethal predators dramatically reduced survival to metamorphosis, with most mortality occurring early in the larval period. Predator effects on the timing of metamorphosis and metamorph size and tail length depended upon resources. For example, lethal predators reduced larval periods, and this effect was stronger with low resources. Predators affected metamorph size early in the period of metamorphosis, whereas resource levels were a stronger determinant of phenotype for animals that metamorphosed later. Effects of hatching timing were detectable on top of strong effects of larval predators and resources, across two subsequent life stages, and some were as strong as or stronger than effects of resources. Plasticity in hatching timing is ecologically important and currently underappreciated. Effects on metamorph numbers and phenotypes may impact subsequent interactions with predators, competitors, and mates, with potentially cascading effects on recruitment and fitness." (Authors)] Address: Touchon, J.C., Smithsonian Tropical Research Institute, Apartado Postal 0843-03092, Balboa, República de Panamá. E-mail: TouchonJC@si.edu

**12470.** Tweedy, B.; Drenner, R.W.; Murray Chumchal, M.; Kennedy, J.H. (2013): Effects of fish on emergent insect-mediated flux of methyl mercury across a gradient of contamination. *Environ. Sci. Technol.* 47: 1614-1619. (in English) [Texas, USA; "We examined the effects of fish predation on emergent insect-mediated methyl mercury (MeHg) flux across a gradient of MeHg contamination in experimental ponds. Emergent insects were collected from ponds with (n=5) and without fish (n=5) over a six-week period using floating emergence traps. We found that the potential for MeHg flux increased with Hg contamination levels of the ponds, but that the realized MeHg flux of individual insect taxa was determined by fish presence. Fish acted as size-selective predators and reduced MeHg flux by suppressing emergence of large insect taxa (Odonata) but not small insect taxa (chironomids and micro-caddis-

flies). MeHg flux by small insect taxa was correlated with concentrations of MeHg in terrestrial spiders along the shorelines of the study ponds, demonstrating for the first time the cross-system transport of MeHg by emergent insects to a terrestrial spider." (Authors)] Address: Tweedy, B., Dept of Biology, Texas Christian University, Winton Scott Room 401, 2800 South University Drive, Fort Worth, Texas 76129, USA

**12471.** van Strien, A.J.; Termaat, T.; Kalkman, V.; Prins, M.; De Knijf, G.; Gourmand, A.-L.; Xavier Houard, X.; Nelson, B.; Plate, C.; Prentice, S.; Regan, E.; Smallshire, D.; Vanappelghem, C.; Vanreusel, W. (2013): Occupancy modelling as a new approach to assess supranational trends using opportunistic data: a pilot study for the damselfly *Calopteryx splendens*. *Biodivers. Conserv.* 22(3): 673-686. (in English) ["There is limited information available on changes in biodiversity at the European scale, because there is a lack of data from standardised monitoring for most species groups. However, a great number of observations made without a standardised field protocol is available in many countries for many species. Such opportunistic data offer an alternative source of information, but unfortunately such data suffer from non-standardised observation effort and geographical bias. Here we describe a new approach to compiling supranational trends using opportunistic data which adjusts for these two major imperfections. The non-standardised observation effort is dealt with by occupancy modelling, and the unequal geographical distribution of sites by a weighting procedure. *C. splendens* was chosen as our test species. The data were collected from five countries (Ireland, Great Britain, the Netherlands, Belgium and France), covering the period 1990–2008. We used occupancy models to estimate the annual number of occupied 1 x 1 km sites per country. Occupancy models use presence-absence data, account for imperfect detection of species, and thereby correct for between-year variability in observation effort. The occupancy models were run per country in a Bayesian mode of inference using JAGS. The occupancy estimates per country were then aggregated to assess the supranational trend in the number of occupied 1 x 1 km<sup>2</sup>. To adjust for the unequal geographical distribution of surveyed sites, we weighted the countries according to the number of sites surveyed and the range of the species per country. The distribution of *C. splendens* has increased significantly in the combined five countries. Our trial demonstrated that a supranational trend in distribution can be derived from opportunistic data, while adjusting for observation effort and geographical bias. This opens new perspectives for international monitoring of biodiversity." (Authors)] Address: van Strien, A.J., Statistics Netherlands, P.O. Box 24500, 2490 HA The Hague, The Netherlands. E-mail: asin@cbs.nl

**12472.** van Swaay, C.; Veling, K.; Termaat, T.; Huskens, K.; Plate, C. (2013): Vlinders en libellen geteld. Jaarverslag 2012. Rapport VS2013.003, De Vlinderstichting, Wageningen: 37 pp. (in Dutch, with English summary) ["The number of dragonfly transects has stabilized around 330 sites. About 40% of these transects are counted for one target species only. In 2012, 21 transects had more than 20 species. The most speciose transects had 27 species (2 transects, both in eastern Overijssel). The number of counted dragonflies per transect was below the long-term average, but a little higher than the previous two years. Like previous years, *Coenagrion*

*puella* was the most abundant species, *Ischnura elegans* was the most widespread species. Population indices are presented for most species in chapter 8. 22 species show a significant increase, 6 species are stable and 18 others are declining. For the first time significant trends are presented for three very rare species: *Coenagrion armatum*, *Leucorrhinia albifrons* and *L. caudalis* (all declining). *L. albifrons* was not observed in 2012. The coming field season will indicate if this species still exists in the Netherlands or not." (Authors)] Address: De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands

**12473.** Vargas Salgado, L.G.; Carvalho, A.; Pinto A.P. (2013): Larval taxonomy of *Macrothemis* Hagen, 1868 (Odonata: Libellulidae), with descriptions of four larvae and a key to the fourteen known species. *Zootaxa* 3599 (3): 229-245. (in English) ["The ultimate larval stadia of *Macrothemis declivata*, *M. hemichlora*, *M. imitans imitans* and *M. tenuis* are described and illustrated for the first time, based on material from Brazil. Six of the most used keys to larvae of libellulid genera of the New World are evaluated with respect to the correct identification of the 27 known larvae of *Macrothemis*, *Brechmorhoga*, *Gynothemis* and *Scapanea*. *Macrothemis* species were wrongly identified in more than 50% of the trials, being keyed as *Brechmorhoga*, *Gynothemis* and even *Dythemis*. The genus *Macrothemis* and its relatives need to be reevaluated and adequately diagnosed based on larvae. A key to the 14 known larvae of species currently included in *Macrothemis* is presented." (Authors)] Address: Pinto A.P., Depto de Entomologia, Museu Nacional, Univ. Federal do Rio de Janeiro (UFRJ); Caixa Postal 68044, 21944-970, Cidade Universitária, Rio de Janeiro, RJ, Brazil. E-mail: odonata-angelo@hotmail.com

**12474.** Villanueva, R.J.T.; Cahilog, H. (2013): Small Odonata collection from Talaingod, Davao del Norte, Mindanao Island, Philippines. *International Dragonfly Fund - Report 59*: 1-26. (in English) ["Odonata survey was conducted in Talaingod, Davao del Norte, Mindanao Island. Four major sites were explored in Barangay Santo Niño from December 26 - 30, 2012. Thirty five species under eleven families including one new species were found re-presenting the first odonatological record in the province of Davao del Norte. Three species need further study while *Orthetrum glaucum* represents a new record for the island of Mindanao. *Coeliccia exoleta* population, a vulnerable species in the IUCN Red List of Threatened Species, was found." (Authors)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**12475.** Villanueva, R.J.T.; Medina, M.N.D.; Jumawan, K.M. (2013): *Pericnemis melansonii* sp. nov., a new damselfly (Odonata: Coenagrionidae) from Compostela Valley Province, Mindanao Island, Philippines. *Journal of Threatened Taxa* 5(7): 4110-4112. (in English) ["During a short biodiversity survey in Cabalian Creek, Nabunturan, Compostela Valley Province conducted by the second and third authors, specimens of *Pericnemis* were collected. Voucher specimens were given to the first author who confirmed they represented a species new to science. Due to the urgency of establishing the known habitat of the present species as a protected area, it is described here in advance of a complete treatment of the Philippine *Pericnemis*. Holotype: Male, ACN-2012-hol-1, 22.xi.2012, Cabalian Creek, Nabunturan, Com-

postela Valley Province, Mindanao Island, Philippines, K. Jumawan leg." (Authors)] Address: Villanueva, R., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**12476.** Wang, C.; Zhou, H.; Zhang, Z.; Zhao, Y.; Cong, D.; Menga, C.; Zhang, P.; Ren, L.b (2013): Mechanical property of a low carbon steel with biomimetic units in different shapes. *Optics & Laser Technology* 47: 114-120. (in English) ["Inspired by the superior biomechanical properties of some biological compositions, an attempt to improve the mechanical property of low carbon steel with biomimetic units was made by using a laser remelting process. Three kinds of shapes including 'striation', 'spot' and 'gridding', were chosen for forming the biomimetic units. Microstructure and microhardness examinations demonstrated that desirable microstructural changes and regular hardness distribution were acquired in the units. The results of tensile tests indicated that the biomimetic specimens had an improvement in the strength and ductility simultaneously. The beneficial influence of laser processed biomimetic units on tensile behaviour can be attributed to the combined effects of the microstructural characteristics within the unit zone and the stress redistribution derived from the efficient stress transfer. By investigating the variation of plastic deformation in different regions of the specimens, the effect of unit shapes on tensile property was also compared and discussed. Highlights: \*Low carbon steel with biomimetic units in different shapes was processed by laser. \*Good combination of strength and ductility was obtained in biomimetic samples. \*Mechanical property improvement was analyzed on basis of microstructural changes and stress transfer. \*Effect of unit shapes on tensile property was compared and discussed.... Typical structural shapes of constriction units in biological compositions: (a) striation-shaped units in the tree leaf; (b) spot-shaped units in the elytrum of ground beetle; (c) gridding-shaped units in the dragonfly wing; (d) gridding-shaped units in the scale of butterfly wing." (Authors)] Address: Wang, C., The Key Lab of Automobile Materials, The Ministry of Education, Jilin University, No. 5988 Renmin Street, Changchun, Jilin 130025, PR China

**12477.** Wang, Y.; Engel, M.S.; Rafael, J.A.; Dang, K.; Wu, H.; Wang, Y.; Xie, Q.; Bu, W. (2013): A unique box in 28S rRNA is shared by the enigmatic insect order Zoraptera and Dictyoptera.. *PLoS ONE* 8(1): e53679. doi:10.1371/journal.pone.0053679: 13 pp. (in English) ["The position of the Zoraptera remains one of the most challenging and uncertain concerns in ordinal-level phylogenies of the insects. Zoraptera have been viewed as having a close relationship with five different groups of Polyneoptera, or as being allied to the Paraneoptera or even Holometabola. Although rDNAs have been widely used in phylogenetic studies of insects, the application of the complete 28S rDNA are still scattered in only a few orders. In this study, a secondary structure model of the complete 28S rRNAs of insects was reconstructed based on all orders of Insecta. It was found that one length-variable region, D3-4, is particularly distinctive. The length and/or sequence of D3-4 is conservative within each order of Polyneoptera, but it can be divided into two types between the different orders of the supercohort, of which the enigmatic order Zoraptera and Dictyoptera share one type, while the remaining orders of Polyneoptera share the other. Additionally, independent evidence from phylogenetic results support

the clade (Zoraptera+Dictyoptera) as well. Thus, the similarity of D3-4 between Zoraptera and Dictyoptera can serve as potentially valuable autapomorphy or synapomorphy in phylogeny reconstruction. The clades of (Plecoptera+Dermaptera) and ((Grylloblattodea+Mantophasmatodea)+(Embiodea+Phasmatodea)) were also recovered in the phylogenetic study. In addition, considering the other studies based on rDNAs, this study reached the highest congruence with previous phylogenetic studies of Holometabola based on nuclear protein coding genes or morphology characters. Future comparative studies of secondary structures across deep divergences and additional taxa are likely to reveal conserved patterns, structures and motifs that can provide support for major phylogenetic lineages." (Authors)] Address: Xie, Q., Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, China. E-mail: qiangxie@nankai.edu.cn (QX)

**12478.** Watanabe, K.; Yamazaki, S.; Shoji, K.; Nagashima, Y.; Sato, K. (2013): Dragonfly fauna in Dainohara Forest Park. *Bulletin of Sendai Science Museum* 22: 82-83. (in Japanese) [17 species of dragonflies found in the Dainohara forest park (Miyagi Prefecture, Japan) from 2011 to 2012 are listed together with collection data.] Address: not transliterated

**12479.** Wellenreuther, M.; Sánchez-Guillén, R.A.; Cordero-Rivera, A.; Svensson, E.I.; Hansson, B. (2013): Male-biased recombination in odonates: insights from a linkage map of the damselfly *Ischnura elegans*. *Journal of Genetics* 92(1): 5 pp. (in English) ["Results: The two-point analyses detected that 13 of the 19 markers were linked to at least one other in our *I. elegans* mapping data set. These markers built up four linkage groups with two to five markers (figure 1). No markers were linked to more than one linkage group, and thus no conflicting assignments occurred. The parsimonious sex-average autosomal linkage map spanned 211.5 cM. A moderate degree of heterochiasmy was found, with a female map of 179.2 cM and a male map of 331.7 cM (paired t-test on log<sub>10</sub> map distances at the four linkage groups:  $t = 3.295$ ,  $df = 3$ ,  $P = 0.046$ ). The female-to-male map ratio was 0.54, i.e. -0.27 on a log<sub>10</sub>-scale. To compare the pattern of recombination in insects, we compiled data of sex-specific recombination, either from linkage mapping studies or recombination nodule counts, for 30 insect species (including *I. elegans*) (figure 2; details and references are given in table 2 in electronic supplementary material). Comparison of recombination rates within the class of Insecta showed that most species have higher recombination in females, contrasting the pattern found for *I. elegans*, and that achiasmatic recombination is widespread across multiple orders." (Authors)] Address: Wellenreuther, Maren, Section for Animal Ecology, Ecology Building, Lund University, Sölvegatan 37, SE-223 62 Lund, Sweden. E-mail: maren.wellenreuther@zoekol.lu.se

**12480.** Wheat, C.W.; Wahlberg, N. (2013): Explosion, the colonization of land and the evolution of flight in arthropoda. *Systematic Biology* 62(1): 93-109. (in English) ["The timing of the origin of arthropods in relation to the Cambrian explosion is still controversial, as are the timing of other arthropod macroevolutionary events such as the colonization of land and the evolution of flight. Here we assess the power of a phylogenomic approach to shed light on these major events in the evolutionary history of life on earth. Analyzing a large phylogenomic dataset (122 taxa, 62 genes) with a



Bayesian-relaxed molecular clock, we simultaneously reconstructed the phylogenetic relationships and the absolute times of divergences among the arthropods. Simulations were used to test whether our analysis could distinguish between alternative Cambrian explosion scenarios with increasing levels of autocorrelated rate variation. Our analyses support previous phylogenomic hypotheses and simulations indicate a Precambrian origin of the arthropods. Our results provide insights into the 3 independent colonizations of land by arthropods and suggest that evolution of insect wings happened much earlier than the fossil record indicates, with flight evolving during a period of increasing oxygen levels and impressively large forests. These and other findings provide a foundation for macroevolutionary and comparative genomic study of Arthropoda." (Authors) The paper includes references to dragonflies.] Address: Wheat, C.W., Dept of Biosciences, PL 65, Viikinkaari 1, 00014 University of Helsinki, Finland. E-mail: chris@christopherwheat.net

**12481.** Wildermuth, H. (2013): Libellengewässer, die kommen und gehen. Mskr. 8 pp. (in German, with English summary) ["Rise and fall of small dragonfly ponds (Odonata): The dragonfly fauna of two freshly created shallow ponds in open meadows country in the Swiss Plateau was monitored during summer 2012. Altogether 24 and 28 species were recorded, respectively, 17 and 15 of them certainly or most probably indigenous. The water bodies proved to be suitable for pioneer and regionally rare species such as *Ischnura pumilio*, *Orthetrum albistylum*, *O. brunneum*, *Sympetrum depressiusculum* und *S. fonscolombii*. The importance of shallow ponds as breeding habitats for dragonflies, the problems of rapid overgrowth and the possible maintenance measures for conservation of an optimal succession state are discussed." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**12482.** Wildermuth, H. (2013): Die Libelle auf der Wäscheleine. *Mercuriale* 12(2012): 53-56. (in German, with English summary) ["An adult female *Sympetrum vulgatum* was observed in a garden using a washing line as perch from where it started irregularly to feeding flights for nearly seven hours during a warm and sunny day. The body was mostly held horizontally and probably cooled by a slight wind. Obelisk posture was only adopted at windless moments. On the same day at the same locality only a few metres apart a female *S. fonscolombii* used the tip of a slender inflorescence of *Lythrum salicaria* as starting point for hunting flights. The results are discussed relating to the percher mode for feeding and thermoregulation in *Sympetrum* spp." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**12483.** Willet, J. (2013): Species Review 7: The Azure Hawker *Aeshna caerulea* (Ström). *J. Br. Dragonfly Society* 29(1): 1-19 (in English) ["In the British Isles *A. caerulea* is restricted to Scotland, where it is classified as Vulnerable and appears to be undergoing a decline, although it remains under-recorded. The characteristics of the larva and adult are described and its habitat, behaviour and distribution are discussed." (Author)] Address: Willet, J., 7 Muirden Rd, Maryburgh, IV7 8EJ, UK

**12484.** Winterbourn, M.J.; Pohe, S.R. (2013): Life histories of four dragonfly species (Odonata: Anisoptera) in northern New Zealand. *New Zealand Entomologist*

36(1): 8-14. (in English) ["Life histories of four dragonfly species were investigated in the littoral zone of Lake Heather, a shallow sand dune lake near Kaitiaki in the far north of New Zealand. All four species are self-introduced to New Zealand. Collections of larvae made in seven months from February 2011 to February 2012 were used to infer larval development. *Aeshna brevistyla*, the most abundant species, was semivoltine, *Tramea loewii* and *Hemicordulia australiae* were univoltine and, although difficult to interpret, our data suggest *Diplacodes bipunctata* was bivoltine with autumn and winter-spring generations. Adults of all four species were seen in December and February, *T. loewii* was also on the wing in late March, *A. brevistyla* in October and *D. bipunctata* in November." (Authors)] Address: Winterbourn, M.J., School of Biological Sciences, University of Canterbury, Private Bag 4800, Christchurch 8140, New Zealand. E-mail: michael.winterbourn@canterbury.ac.nz

**12485.** Wong-Muñoz, J.; Anderson, C.N.; Munguía-Steyer, R.; Córdoba-Aguilar, A. (2013): Body size and morph as drivers of copulation duration in a male dimorphic damselfly. *Ethology* 119(5): 407-416. (in English) ["Copulation duration is often highly variable within and among species. Here, we explore the roles of body size, male morph, morph frequency, and alternative reproductive tactics to explain copulation duration in the damselfly *Paraphlebia zoe*. *P. zoe* has two male morphs (pigmented or hyaline wings) which differ in reproductive tactics (territorial or non-territorial behaviours). We also analyze the effects of season as the frequencies of both morphs tend to vary along the reproductive season. In the first non-experimental year, we found that the relationship between body size and copulation duration depended on the time of year. Early in the season, body size positively correlated with copulation duration, while late in the year, body size negatively correlated with copulation duration. In the second experimental year (when we reversed the frequency of male morphs in the middle of the season: making pigmented males less frequent than hyaline males), size influenced copulation duration as well as morph – body size positively correlated with copulation duration, and hyaline males mated for longer than pigmented males. Contrary to our prediction, changes to the relative abundances of morphs did not influence copulation duration. Hyaline males may be under selection for longer copulation durations to compensate for their reduced access to females, as long copulations potentially lead to more rival sperm to be removed from the female sperm storage organs and/or increased mate guarding. We do not discard, however, other explanations that drive variation in copulation duration such as cryptic female choice and/or predation." (Authors)] Address: Córdoba-Aguilar, A., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México D.F., México. E-mail: acordoba@ecologia.unam.mx

**12486.** Yang, J.; Gonzalez-Bellido, P.T.; Peng, H. (2013): A distance-field based automatic neuron tracing method. *BMC Bioinformatics* 2013, 14:93 (in English) ["Background: Automatic 3D digital reconstruction (tracing) of neurons embedded in noisy microscopic images is challenging, especially when the cell morphology is complex. Results: We have developed a novel approach, named DF-Tracing, to tackle this challenge. This method first extracts the neurite signal (foreground) from a noisy image by using anisotropic filtering and automat-

ed thresholding. Then, DF-Tracing executes a coupled distance-field (DF) algorithm on the extracted foreground neurite signal and reconstructs the neuron morphology automatically. Two distance-transform based "force" fields are used: one for "pressure", which is the distance transform field of foreground pixels (voxels) to the background, and another for "thrust", which is the distance transform field of the foreground pixels to an automatically determined seed point. The coupling of these two force fields can "push" a "rolling ball" quickly along the skeleton of a neuron, reconstructing the 3D cell morphology. Conclusion: We have used DF-Tracing to reconstruct the intricate neuron structures found in noisy image stacks, obtained with 3D laser microscopy, of dragonfly thoracic ganglia. Compared to several previous methods, DF-Tracing produces better reconstructions." (Authors)] Address: Yang, J., Key Laboratory of Medical Image Computing, Ministry of Education, Northeastern University, Shenyang, China. E-mail: yangjin-zhu@neusoft.com

**12487.** Yang, Y.; Wang, L.; Wei, S.; Song, G.; Kenoyer, J.M.; Xiao, T.; Zhu, J.; Wang, C. (2013): Nondestructive analysis of dragonfly eye beads from the Warring States Period, excavated from a Chu tomb at the Shenmingpu Site, Henan Province, China. *Microscopy and microanalysis* 19(2): 335-343. (in English) ["Dragonfly eye beads are considered to be the earliest types of glass objects in China, and in the past have been considered as evidence of culture interaction or trade between West and East Asia. In this article, synchrotron radiation microcomputed tomography and  $\mu$ -probe energy dispersive X-ray fluorescence were used to determine the chemical composition, microstructure, and manufacturing technology of four dragonfly eye beads, excavated from a Chu tomb at the Shenmingpu site, Henan Province, China, dated stylistically to the Middle and Late Warring State Period (475 bc-221 bc). First, a nondestructive method was used to differentiate the material types including faience (glazed quartz), frit, glazed pottery (clay ceramic), and glass. Three beads were identified as faience and one bead as glazed pottery. The glaze recipe includes quartz, saltpeter, plant ash, and various copper, and is classified as belonging to the K2O-CaO-SiO2 glass system, which indicates that these beads were not imported from the West. Based on computed tomography slices, the manufacturing technology of the faience eye beads appears to include the use of an inner core, molding technology, and the direct application glazing method. These manufacturing features are consistent with the techniques used in China during this same time period for bronze mold-casting, proto-porcelain, and glass." (Authors)] Address: Wang, C., Laboratory of Human Evolution, IVPP, Beijing, China. E-mail: cswang@ucas.ac.cn

**12488.** Yong, H.S.; Lim, P.-E.; Tan, J.; Eamsobhana, P. (2013): Genetically determined colour polymorphism in larvae of *Ceriagrion chaoi* (Insecta: Odonata: Coenagrionidae). *The Raffles Bulletin of Zoology* 61(1): 47-51. (in English) ["Although genetically determined colour polymorphism is quite common in adult odonates, there is no report on this phenomenon in the larvae of any odonate species up to now. This paper reports, for the first time, the occurrence of two colour morphs (dark and brown) in both the male and female larvae of *C. chaoi*. The species identity of these colour morphs was confirmed by the partial sequences of 16S rRNA gene as well as observation on emergence. Only a single in-

variant haplotype was observed, which differed from a congeneric species *Ceriagrion cerinorubellum* (Brauer) by 39 base pairs. The partial sequences of 16S rRNA gene constitute the first report for these damselflies. Available data indicate that environment/habitat does not seem to play a role in the determination of the colouration in the larvae of *C. chaoi*. The inheritance and significance of the colour polymorphism however remain to be verified." (Authors)] Address: Yong, H.S., Inst. of Biological Sciences, Univ. of Malaya, 50603 Kuala Lumpur, Malaysia. Email: yong@um.edu.my

**12489.** Youngman, R. (2013): Altitude limits for the occurrence and breeding of some British dragonflies. *J. Br. Dragonfly Society* 29(1): 20-22 (in English) ["The altitude at which some species of dragonfly occur and/or breed has been determined at two locations in Inverness-shire, in the Central Highlands of Scotland The importance of aspects of temperature, rather than altitude itself, and of the role of the microclimate are discussed." (Author)] Address: Youngman, R., Blairchroisk Farm Cottage, Ballinluig, Perthshire, PH9 ONE, UK. E-mail: blairchroisk@btinternet.com

**12490.** Zhang, H.-J. (2013): *Cephalaeschna xiangensis* spec. nov., a new dragonfly from Shaanxi, China, with a key to the adults of the Chinese members of the genus (Anisoptera: Aeshnidae). *Odonatologica* 42(1): 39-43. (in English) ["The new species is described and illustrated. Holotype  $\sigma$ : Maliu village (107°32' E, 32°43'N, altitude 1200m), Xixiangco., Shaanxi prov., China; deposited in the Shaanxi Bioresource Key Lab., Hanzhong, China. A key to the adults of the Chinese *Cephalaeschna* species is provided." (Author)] Address: Zhang, H., Department of Entomology, College of Natural Resources and Environment, South China Agricultural University, Guangzhou 510642, China. E-mail: zhanghaomiao6988@gmail.com

**12491.** Zhang, H.-m.; Tong, X.-o. (2013): Descriptions of the final instar larvae of seven Chinese Chlorogomphidae species, with taxonomic notes on adults (Odonata: Anisoptera). *Zootaxa* 3620 (2): 223-244. (in English) ["The larvae of seven species of Chlorogomphidae from South China are described based on reared larvae, i.e. *Chlorogomphus kitawakii* Karube, *C. nasutus* Needham, *C. papilio* Ris, *C. shanicus* Wilson, *C. usudai* Ishida, *C. yokoi* Karube and *Chloropetalia soarer* Wilson. The adult female of *C. kitawakii* is first described. Biological information on Chlorogomphidae is provided and a diagnosis of the family proposed." (Authors)] Address: Tong, X.-o., Department of Entomology, College of Natural Resources and Environment, South China Agricultural University, Guangzhou, 510642, Guangdong Province, P. R. of China. E-mail: xtong@scau.edu.cn

**12492.** Żurawlew, P.; Piecuch, T. (2013): Site of *Sympetrum pedemontanum* (O.F. Muller in Allioni, 1766) in the Wysoczyzna Kaliska (Southern Wielkopolska). *Odonatrix* 9(1): 29-30. (in Polish, with English summary) [Obra Canal near Talary (UTM: XT45) in southern Wielkopolska, Poland. 17.07.2009, 2.08.2012.] Address: Żurawlew, P., Kwień 67a, 63-313 Chocz, Poland. E-mail: grusleon@gmail.com

**Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for multiple help, and Cédric Vanappelghem, Geert de Knijf, Asmus Schröter and Bernd Kunz for contributing many papers to this issue.**

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105; E-mail: K.Reinhardt@sheffield.ac.uk

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

---

## 1997

**12493.** Garrison, R.W. (1997): Odonata. Nomina Insecta Nearctica 4: 551-579. (in English) [This list includes all described Odonata of North America north of the Mexican border. Species occurring in the Antilles and Bahamas are considered to be Neotropical and are not included. Species misidentifications are not included.] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Dept of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**12494.** Honsig-Erenburg, W.; Konar, M.; Huber, T.; Gutleb, B.; Wieser, G.; Friedl, T.; Mildner, P. (1997): Zoologische Exkursion des Naturwissenschaftlichen Vereines zur Kolpa (Slowenien). Carinthia II 187/107: 139-152. (in German, with English and Slovenian summaries) [An excursion of the "Naturwissenschaftlicher Verein für Kärnten", departement of zoology, was performed between August 12th to 14th 1996 to the Kolpa river in the region of Dol (frontier Slovenia - Croatia). The macrozoobenthic samples include Calopteryx virgo, Gomphus vulgatissimus and Onychogomphus forcipatus.] Address: not stated

## 1998

**12495.** Schweighofer, W. (1998): Zur Libellenfauna (Odonata) des unteren Melktales (Niederösterreich). Lanius, Krems 1996-1997: 17-32. (in German) [In a quartz sand pit, in 1996/97, 31 Odonata species were recorded; the list of species included Lestes virens and Orthetrum albistylum. Along the river Melk, 1997, 14 species were recorded in 1997; the list of species included Gomphus vulgatissimus, Onychogomphus forcipatus and Ophiogomphus cecilia.] Address: Schweighofer, W., Ötscherblick 10, A-3661 Artstetten, Austria. E-mail: wolfgang.schweighofer@schule.at

**12496.** Tuxhorn, C.; McShaffrey, D. (1998): Flight velocities of Odonata measured using video techniques. Bull.

North American benthological society 15(1): 152. [Verbatim: We determined the flight velocity, based on over 2,800 flight segments of individuals of 4 spp. near Marietta, Ohio. A Panasonic Palmsight PV-1557 16x Optical Zoom camcorder was used to record flight of individuals at a pond on 3 dates in 1997. Recording was done between 1-4 pm. Distances on the monitor were determined by reference to mean lengths of individuals caught at the time of filming. The distance a specimen flew between frames was calculated by measuring the on-screen distance and dividing by the magnification factor. This distance was then multiplied by the time between video frames (0.03 sec) to determine velocity. Average flight velocity for all flight segments of the 4 spp. was 1.9 m/s (n=2844, sigma=0.59). Mean velocities were: Libellula luctuosa 1.7 m/s (n=737, sigma=0.48), L. lydia 2.0 m/s (n=1963, sigma=0.49), Pachydiplax longipennis 1.5 m/s (n=59, sigma=0.53), Tramea lacerata 2.5 m/s (n=85, sigma=0.85). Significant differences (t-test, alpha=0.05) were found between the flight velocities of all 4 spp. A positive correlation exists between the length of the species and average flight velocity. Address: not stated.

## 2000

**12497.** Santos Lopes, F.; De Marco, P. (2000): Comportamento territorial em insetos: aspectos conceituais e estudos de casos. Oecologia Brasiliensis 8: 193-222. (in Portuguese, with English summary) ["Our objective in this review, about insect territorial behaviour, isn't to provide an exhaustive discussion on this issue, but to establish the major theoretical aspects on this theme, for anyone that initiate their studies on it. The paper includes: a) a review about the concept of territoriality, based on the former ideas developed from vertebrate studies and its applicability to insects; b) the major problems in the use these concepts, in special mistakes with other terms related to the spatial distribution of individuals or other behaviours, associated to competition for resources; c) theoretical considerations on territoriality and, d) case studies in Odonata, as examples on those



issues." (Authors)] Address: De Marco, P., Laboratório de Ecologia Teórica e Síntese, Depto de Ecologia, Universidade Federal de Goiás, BR-74.001-970 Goiânia, Goiás, Brazil. E-mail: pdemarco@icb.ufg.br

**12498.** Tóth; S. (2000): Data to the dragonfly (Odonata) fauna of the Villány Hills, South Hungary. *Dunántúli Dolgozatok Term. Tud.* 10: 139-146. (in Hungarian, with English summary) [In 1999 and 2000, 39 Odonata species were recorded.] Address: Tóth, S., Széchenyi u. 2, H-8420 Zirc, Hungaria. E-mail: flycatcher@freemail.hu

## 2001

**12499.** Gapud, V.P.; Recuenco-Adorada, J.D. (2001): Contribution to the taxonomy of Philippine Megapodagrionidae (Odonata: Zygoptera). *Philippine Entomology* 15(2): 115-124. (in English) [*Argiolestes baltazarae* sp. nov., is described from the Northern Sierra Madre Natural Park, Philippines. *A. realensis* Gapud & Recuenco 1993 is redescribed, and the male of *Rhinagrion philippinum* is described. Illustrations and a key to Philippine species of Megapodagrionidae are provided.] Address: Gapud, V.P., Department of Entomology, College of Agriculture, Univ. of the Philippines Los Banos, College, Laguna 4031, Philippines. E-mail: vicgap@laguna.net

**12500.** Karube, H. (2001): New species of the genus *Chlorogomphus* from Yunnan, China (Chorolegidae: Chlorogomphinae). *Tombo* 43: 9-11. ["A new chlorogomphid dragonfly from Yunnan, SW China, is described under the name of *Chlorogomphus daviesi* sp. nov. This species belongs to the *Chlorogomphus auratus* group, but is easily distinguished from other members mainly by the structures of male caudal appendages and penile organs. The Chinese chlorogomphid dragonflies have not been well studied so far. Thirteen (including five Taiwanese) species were recorded prior to 1994. Karube (1995) described *Chlorogomphus kitawakii* from Guangxi, Ishida (1996) described *C. usudai* from Hainan I., and Chao (1999) reviewed Chinese chlorogomphid dragonflies with descriptions of two new species." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**12501.** Malikova, E.I.; Seidenbusch, R. (2001): Description of a female *Macromia manchurica* Asahina, 1964 (Macromiidae). *Tombo* 43: 21-22. (in English) [Southern Primorje, Oktyabrsky region, v. Novo-Georgievka, Russia, 6. VIII. 1989, S. Kulchitsky leg; the female of this rare Far Eastern species was unknown until present. "One female specimen of this species identified as *M. sibirica* Djakonov, 1926 (= *M. amphigena fraenata* Martin, 1905) was mentioned and depicted by Dr. S. Gorb (1991) and then sent to one of us (R. S.) together with a male specimen of true *M. amphigena fraenata*....The species can be easily distinguished from co-occurring *M. amphigena* by more developed yellow body mark-

ings : the yellow rings on the tergites IV-VII are not interrupted ; by a pale brown or chestnut labium, and the labrum with a pair of yellow spots; and by the shape of the genital plate. Asahina (1964) supposed that the larvae of *Macromia* sp. from the River Sintuhe (now R. Komissarovka) near village Ijinka, Primorje Territory, described by Popova (1953), were in fact *M. manchurica*. The finding of imago from a neighbouring locality confirmed this supposition." (Authors)] Address: Malikova, E.I., Dept of Zoology, Blagoveshchensk State Pedagogical University, Lenin Street, 104, Blagoveshchensk, 675000, Russia

**12502.** Matsuki, K. (2001): Description of the last instar larva of *Euphaea ochracea* Selys, 1859 from Thailand (Euphaeidae). *Tombo* 43: 23-24. (in English) [7-V-1985, Huey Kaeo, N. Thailand, K. Matsuki, leg.; the female exuvia is figured.] Address: Matsuki, K., 3-1575-14 Hasama-cho, Funabashi, Chiba, 274-0822, Japan

**12503.** Sasamoto, A. (2001): Description of a new subspecies of *Stylogomphus lawrenceae* Yang et Davies, 1996 from the Malay Peninsula (Anisoptera: Gomphidae). *Tombo* 43: 14-18. (in English) ["The adult and larva of *Stylogomphus lawrenceae malayanus* ssp. n. are described and illustrated (holotype: male, allotype: female, Tapah to Tana Rata, 19 miles point, Perak, Malaysia; 31. III. 1999, captured at larval stage and reared in room until emergence, and deposited in the National Science Museum, Tokyo). This is the first record of the genus *Stylogomphus* from the Malay Peninsula. This subspecies is almost identical with nominotypical subspecies in the shapes of male anal appendages, female valvula vulvae and occiput, although discriminated in the shapes of hamulus anterior and posterior, and thoracic markings. The genus *Stylogomphus* was established by Fraser in 1922 and contains 10 species, 2 of which have one subspecies each (Tsuda, 2000). *Stylogomphus* species hitherto have been known from E. Asia, N. India, Bangladesh, Nepal, continental China, Taiwan, N. Vietnam, and Japan, as well as one species from N. America. From N. Thailand only unidentified exuviae were reported by Matsuki (1988). In spring of 1999 in Cameron Highland, the Malay Peninsula, the larvae supposed as *Stylogomphus* were caught from a clean stream in tropical jungle, and then, reared in room until adult emergence. This species is not only a new record from the Malay Peninsula, but is also believed to be a new subspecies." (Author)] Address: Sasamoto, A., 190-4 Yakuoji, Tawaramoto-chô, Shiki-gun, Nara, 636-0341, Japan. E-mail: akssmt@sea.plala.or.jp

## 2002

**12504.** Lynch, R.J.; Bunn, S.E.; Catterall, C.P. (2002): Adult aquatic insects: Potential contributors to riparian food webs in Australia's wet-dry tropics. *Austral Ecology* 27(5): 515-526. (in English) ["Changes in the abundance and biomass of aquatic and terrestrial aerial in-

sects with distance (mid-stream, 0, 10–15 and 160 m) from lowland streams were examined across the dry season landscape in Kakadu National Park, northern Australia. Malaise traps and sticky intercept traps were used to sample the insects at four streams, spaced over an area of 1650 km<sup>2</sup>. Malaise and intercept catches were dominated by Diptera (flies and midges), both numerically and by biomass. Chironomid midges were the most abundant taxon, making up 43.4 and 51.0% of the malaise and intercept trap catches, respectively. However, most chironomids were small (less than 3 mm body length), contributing 34.9% to intercept trap biomass, but only 5.2% in malaise traps. Ceratopogonid midges and caddisflies (Trichoptera) accounted for most of the remaining adult aquatic insects. Major terrestrial components were Diptera and Hymenoptera in malaise traps and Coleoptera and Diptera in intercept traps. The total abundance and biomass of insects were much greater over streams and along the water's edge than in riparian (10–15 m) and savanna (160 m) habitats primarily because of the presence of large numbers of adult aquatic insects. The abundance and biomass of terrestrial insects in malaise traps showed no relationship with distance, but intercept trap catches suggested slightly greater abundances over the water and at the water's edge. The great abundance of aquatic insects relative to terrestrial insects close to streams suggests that they have the potential to be an important component of the diets of riparian insectivores, and predation may be an important pathway by which aquatic nutrients and energy are moved into terrestrial food webs." (Authors) The aquatic classification included those insects with at least one fully aquatic life stage: Odonata, Ephemeroptera, Trichoptera, Diptera (Chironomidae, Culicidae, Simuliidae), Neuroptera (Sisyridae) and Hemiptera (Veliidae, Corixidae). ... 523 odonates were caught in malaise traps.] Address: Bunn, S.E., Faculty of Environmental Sciences, Griffith University, Nathan, Queensland 4111, Australia. E-mail: s.bunn@mailbox.gu.edu.au

### 2003

**12505.** DuBois, R.B. (2003): Development of a citizen-based Odonata survey in northwestern Wisconsin. Wisconsin Department of Natural Resources, Final Report. 24 Oct. 2003: 8 pp. (in English) ["The objective of this project was to develop a network of citizen volunteers capable of assisting with surveys of Odonates in northwestern Wisconsin. As a part of this process determining effective methods of citizen contact, training, and reporting of records were established. The knowledge gained from this study was then used as a prelude to constructing a future statewide survey." (Author)] Address: DuBois, R., Wisconsin Dept of Natural Resources, 1401 Tower Ave., Superior, WI 54880, USA. E-mail: robert.dubois@Wisconsin.gov

**12506.** Tennessen, K.J. (2003): Odonata (Dragonflies, Damselflies). In: Resh, V.H. & R.T. Cardé (eds): Ency-

clopedia of insects. University of California, Berkeley. Academic Press. 1266 pp: 814-823. (in English) [Odonata are treated at pages 814-823. In general, many chapters contain references to Odonata.] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

### 2004

**12507.** DuBois, R.B.; Pleski, J.M.; Smith, W.A.; Epstein, E.J.; Mead, K. (2004): First records for *Aeshna sitchensis* (Odonata: Aeshnidae) and *Enallagma clausum* (Odonata: Coenagrionidae) and a northwestern record for the state endangered *Somatochlora incurvata* (Odonata: Corduliidae) in Wisconsin. The Great Lakes Entomologist 37(3 & 4): 126-130. (in English) ["While surveying for Odonata in coastal peatlands and associated shoreline areas adjacent to Lake Superior in Wisconsin, two new state record species, *A. sitchensis* and *E. clausum* populations were documented. Also located was a robust population of the state-endangered *S. incurvata* at the northwestern edge of the known range of this species." (Authors)] Address: DuBois, R., Wisconsin Dept of Natural Resources, 1401 Tower Ave., Superior, WI 54880, USA. E-mail: robert.dubois@Wisconsin.gov

**12508.** Meurgey, F. (2004): Première observation d'*Anax junius* (Drury, 1773) en France (Odonata, Aeshnidae). Bulletin de la Société des Sciences naturelles de l'Ouest de la France 26(3): 176-177. (in French, with English summary) [14-IX-2003, Pointe St Gildas, France. During a study of spatial movements of some *Sympetrum* sp. along the coast of the Loire-Atlantique department, western France, a male *Anax junius* has been seen in flight on the beach. This specimen has been captured and it is actually stored in the Natural History Museum of Nantes.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**12509.** Zhu, H. (2004): Odonata. In: Yang, X. (ed): Insects of the Great Yarlung Zangbo Canyon of Xizang, China. China Science and Technology University Press: 18-19. (in Chinese, with English summary) [In November 1998, the following taxa from Motuo/Medôg in eastern Tibet Autonomous Region, China are documented: *Palpopleura sexmaculata*, *Sympetrum hypomelas*, *Calicnemia* sp., *Aristocypha cuneata*, *Anotogaster kuchenbeiseri*, *Acisoma panorpoides*, *Crocothemis servilia*, *Orthetrum triangulare melania* (Selys, 1883) and *O. prunosum neglectum* (Rambur, 1842).] Address: Yang, X.-K., Key Lab. Zool. Syst. & Evolution, Chinese Academy of Sciences, 1 Beichen West Road, Chaoyang District, Beijing 100101, P.R. China. E-mail: yangxk@ioz.ac.cn

### 2005

**12510.** Brunelle, P.M.; deMaynadier, P. (2005): The Maine Damselfly and Dragonfly Survey: A Final Report. No-

vember 1 2005. Edition 2 (Revised). Prepared for: Maine Department of Inland Fisheries and Wildlife (MDIFW), 650 State Street, Bangor, Maine, USA 04401: 31 pp. (in English) ["MDDS Final Results: The goals of the MDDS project were two-fold: (1) To raise public awareness and concern for damselflies and dragonflies specifically, and invertebrate conservation generally, and, (2) To improve the Maine Department of Inland Fisheries and Wildlife's ability to protect those odonate species of greatest conservation concern. Underlying the achievement of both goals was the need for an improved understanding of the distribution and status of Odonata in Maine. The balance of this report provides a graphical and tabular summary of MDDS's final results. In summary, the project exceeded initial expectations for public participation and scientific contributions, as evidenced by the following summary statistics: Outreach Contributions: Volunteer participation statewide: >200; Volunteers trained in MDDS seminars: 95; Newsletters published (Mainensis): 4; Major press articles covering the project: 5; Website hits (<http://mdds.umf.maine.edu/~odonata/>): >16,000; Scientific Contributions: Total records submitted (% increase on 1999 baseline): 17,264 (229%); New Rare, Threatened, and Endangered species records: 297; New state species records: 10; New U.S. species records (Québec Emerald and Canada Whiteface): 2; Scientific publications completed or in progress (4 articles; 1 book): 5." (Authors) For details see: <http://mdds.umf.maine.edu/MDDS%20Final%20Report.pdf> Address: Brunelle, P.M., 6044-1 Compton Avenue, Halifax, Nova Scotia, Canada, B3K 1E7

**12511.** Feige, K.-D.; Jueg, U.; Zessin, W. (2005): Beitrag zur Fauna des Treptow-Sees (Landkreis Parchim) – Vögel, Weichtiere, Egel und Libellen. *Mitteilungen der Naturforschenden Gesellschaft West-Mecklenburg* 5(1): 54-63. (in German) [Mecklenburg-Vorpommern, Germany; 10 in most cases common Odonata species were observed at 3.7.04 and 21.8.04: *Lestes sponsa*, *Coenagrion puella*, *Pyrrhosoma nymphula*, *Ischnura elegans*, *Enallagma cyathigerum*, *Aeshna mixta*, *Libellula quadrimaculata*, *Orthetrum cancellatum*, *Sympetrum flaveolum*, *S. vulgatum*.] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**12512.** Labandeira, C.C. (2005): The fossil record of insect extinction. *New approaches and future directions. American Entomologist* • Spring 2005: 14-29. (in English) ["The fossil record of insect extinction at the family level is characterized by two basic modes: background extinction, which represents an ambient level of taxa extirpation, and mass extinctions, which are occasional severe events in which taxa are eliminated significantly above background levels. The most significant mass extinction, at the end-Permian (Permian-Triassic; P-T), divides the history of insects into two major evolutionary faunas: an earlier Paleozoic Evolutionary Fauna of apterygotes, paleopterans, and basal clades of or-

thopteroids and hemipteroids; and a subsequent Modern Evolutionary Fauna of more derived clades of orthopteroids and hemipteroids and especially holometabolous insects. In addition to the P-T event, four other extinctions are documented by multipletypes of data: Late Pennsylvanian, Late Jurassic, later Early Cretaceous; and the end-Cretaceous (Cretaceous-Paleocene; K-P). There also is an analogous record of insect origination that is characterized by major, above-background events. Four methods are used to detect insect extinction in the fossil record. The taxic approach is widely used, whereby the temporal durations of fossil taxa are tallied for each geologic unit of interest and analyzed in a manner analogous to demography used in ecology. By contrast, the phylogenetic approach uses clades as the basic units of interest. A recent approach uses proxy data such as quantification of plant-insect associations across major boundaries in lieu of an insect body-fossil record. Last, the clustering of times of origin from modern coevolved plant-insect associations provides data for likely interruptions from major paleoenvironmental perturbations. Pluralism, emphasizing multiple approaches to determine the ecological dynamics of insects during an extinction, is the best strategy to evaluate insect demise or survival in the fossil record." (Author) The paper includes several references to dragonflies.] Address: Labandeira, C., Dep Paleobiology, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560-0121, USA. E-mail: labandec@si.edu

## 2006

**12513.** DuBois, R.B.; Smith, W.; Tennessen, K.; Berg, M.; Remsburg, A. (2006): GLOM 2006 Informs Beginners and Showcases Rare Clubtails. *Argia* 18(3): 3-4. (in English) ["This report describes the events, presentations, and Odonata species recorded at the 6th Annual Great Lakes Odonata Meeting (GLOM) held July 22-25, 2006." (Authors)] Address: DuBois, R., Wisconsin Department of Natural Resources, 1401 Tower Ave., Superior, WI 54880, USA. E-mail: robert.dubois@Wisconsin.gov

**12514.** Jocqué, M.; Martens, K.; Riddoch, B.; Brendonck, L. (2006): Faunistics of ephemeral rock pools in southeastern Botswana. *Arch. Hydrobiol.* 165(3): 415-431. (in English) ["Rock pools on granite outcrops occur worldwide and are poorly studied, despite their intrinsic biological interest. In semi-arid Botswana, such habitats occur mainly on the granite outcrops in the southwestern Hardveld zone. To date, studies on these systems have focused mainly on individual species or particular interactions. By means of frequent sampling (every other day) during an entire wet phase (hydrocycle), we attempted to get a time integrated overview of invertebrate species composition in a set of 18 rock pools from two clusters (meta-communities). A faunal list (including *Pantala flavescens*) is presented and described. Rock



pool species were separated in permanent and ephemeral inhabitants, based on their strategy to survive or escape the frequent dry phases of their habitat, respectively. A new chydorid species, four new turbellarian taxa and two new ostracod species were discovered. All new taxa were permanent inhabitants, illustrating the need for more intense and time-integrated studies of these ephemeral systems and especially the permanent residents with specific adaptations to the vagaries of their variable habitat. The best sampling strategy to assess species richness in these rock pool systems is to randomly sample three to four pools in a cluster, each in the final phase of their hydrocycle." (Authors)] Address: Jocqué, M., K. U. Leuven, Laboratory of Aquatic Ecology, De Bériotstraat 32, 3000 Leuven, Belgium.

**12515.** Wang, B.; Huang, F (2006): Xizang insect differentiation. Henan Science and Technology Publishing House, Zhengzhou: 540 pp. (in Chinese with English abstract and Latin names) [Xizang (Tibet, China), 11 Odonata species are checklisted.] Address: not stated

## 2007

**12516.** DuBois, R.B. (2007): GLOM 2007 Visits Northeastern Illinois. *Argia* 19(4): 17-18. (in English) ["This report is a summary of the 7th Annual Great Lakes Odonata meeting (GLOM) held at the Volo Bog State Natural Area in Lake County, IL. The educational focus of this meeting was on the federally endangered *Somatochlora hineana* since the meeting was held close to some known Hine's Emerald habitat. Areas sampled for Odonata were not far from the Wisconsin state line, and habitats and species recorded were similar to those found in many areas in southern Wisconsin." (Author)] Address: DuBois, R., Wisconsin Department of Natural Resources, 1401 Tower Ave., Superior, WI 54880, USA. E-mail: robert.dubois@Wisconsin.gov

**12517.** DuBois, R.B. (2007): *Gomphus spicatus* (Odonata: Gomphidae) rediscovered in Illinois and *Libellula semifasciata* (Odonata: Libellulidae) recorded near Wisconsin DNR. *The Great Lakes Entomologist* 40(1&2): 99-100. (in English) ["A single adult female *L. semifasciata* was collected on a hiking trail along the Dead River (in Illinois, USA) on 10 June 2007. The finding of this dragonfly ... is noteworthy because that species has not been found in Wisconsin since Muttkowski (1908) reported it from Milwaukee County in 1903 (Smith et al. 2003; Wisconsin Odonata Survey 2008). Populations of *L. semifasciata* may persist, and should be looked for, in the southern tier of counties of Wisconsin, especially in Kenosha County near Lake Michigan." (Author)] Address: DuBois, R., Wisconsin Dept of Natural Resources, 1401 Tower Ave., Superior, WI 54880, USA. E-mail: robert.dubois@Wisconsin.gov

**12518.** DuBois, R.B.; Tennessen, K.J.; Berg, M. (2007): Efficacy of morphological characters for distinguishing

nymphs of *Epitheca cynosura* and *Epitheca spinigera* (Odonata: Corduliidae) in Wisconsin. *The Great Lakes Entomologist* 40(3&4): 129-139. (in English) ["Attempts to distinguish exuviae and last-instar nymphs of *E. cynosura* and *E. spinigera* using lateral spine characters have proven to be unreliable, and recent use of setae counts on only one side of the prementum or one labial palp have led to confusion because these structures often hold unequal numbers of setae on the two sides of the same specimen. Based on exuviae of 67 reared *E. cynosura* and 55 reared *E. spinigera* from lakes throughout Wisconsin, this study tested the efficacy of previously used character states for distinguishing these species and searched for new characters to improve the reliability of regional keys." (Authors)] Address: DuBois, R., Wisconsin Department of Natural Resources, 1401 Tower Ave., Superior, WI 54880, USA. E-mail: robert.dubois@Wisconsin.gov

**12519.** Fields, S.E.; Speer, H.; Castleberry, J.S.; Hook, M.W.; Hunsucker, R.; Lambert, D.M (2007): A listing of flora and fauna of Saint Helena Island, South Carolina with emphasis on historic Penn center. *Journal of the South Carolina Academy of Science* 4(1): 33-47. (in English) [USA; "We present baseline occurrence data for at least 306 taxa of plants and animals in the vicinity of Historic Penn Center on St. Helena Island, South Carolina. It is hoped that this list will be appended by future surveyors and can serve as an aid in the conservation of species and the preservation of the natural, as well as the cultural history of the site." (Authors) The list contains the following Odonata taxa: *Epiaeschna heros*, *Enallagma* spp., *Erythemis simplicicollis*, *Libellula axilena*, *L. semifasciata*, *Pachydiplax longipennis*] Address: Fields, S, School of the Environment, University of South Carolina, 702G Byrnes Bldg., Columbia, SC 29208, USA. E-mail: stevefields@chmuseums.org

**12520.** Goncalves, F.B. (2007): Análise comparativa de índices bióticos de avaliação de qualidade de água, utilizando macroinvertebrados, em um rio litorâneo do Estado do Paraná. Dissertação apresentada ao Programa de Pós-Graduação em Ecologia e Conservação, Setor de Ciências Biológicas Universidade Federal do Paraná, como requisito parcial para obtenção do grau de Mestre em Ecologia e Conservação: IX + 43 pp. [Brazil; this work aimed to compare four different biotic indices of water quality using benthic macroinvertebrate, in order to verify if there is one better to be applied in the coastal streams in the Paraná state; describe its communities and analyse its environmental condition through the functional feeding groups. Five biotic indices were chosen to it: 1- EPT INDEX (Percent of Ephemeroptera, Plecoptera and Trichoptera); 2- BMWP' (Biological Monitoring Work Party System); 3- BMWP'-ASPT (Average Score Per Taxon) and 4-HFBI (Hilsenhoff Family Biotic Index). They were applied in two different sites in a coastal stream in the Paraná state. The "do Pinto" stream headwaters' are placed in a protected area.

There are many input materials from headwaters to the mouth as organic house material, craps and funny activities. Five samples were taken between April of 2005 and April of 2006. It was observed the HFBI index does not represent the real conditions of the stream. This way, no one of the indices can be suggested as a better one, since everyone presented many differences among their scores and the structure of community. The functional feeding groups protocol suggested the stream as a not structured one, mainly in the inferior site that has an human influence." (Author) Odonata are treated at the family level.] Address: not stated

**12521.** Smolis, A.; Malkiewicz, A.; Stelmaszczyk, R.; Kadej, M. (2007): Nowe stanowiska trzepli zielonej *Ophiogomphus cecilia* (Geoffroy in Fourcroy, 1785) w województwie dolnośląskim. *Przyroda Sudetów* 10: 85-88. (in Polish, with German and Czech summaries) [Records of *O. cecilia* from eleven localities, in most cases situated in the Odra valley (area of the Lower Silesian Voivodeship, Poland) are documented.] Address: Stelmaszczyk, R., Muzeum Przyrodnicze, Uniwersytet Wrocławski, ul. Sienkiewicza 21, 50-335 Wrocław, Poland. E-mail: stelma@biol.uni.wroc.pl

**12522.** Torralba Burrial, A.; Ocharan, F.J. (2007): Comparación del muestreo de macroinvertebrados bentónicos fluviales con muestreador surber y con red manual en ríos de Aragón (NE Península Ibérica). *Limnetica* 26(1): 13-24. (in Spanish, with English summary) ["Comparison between Surber and hand net sampling methods to survey benthic macroinvertebrates in rivers of Aragon (NE Iberian Peninsula) When monitoring the ecological state of rivers and other surface waters, the Water Framework Directive (Directive 2000/60/CE) establishes that the methods used should guarantee that the information given be of an equivalent scientific quality and comparability; for rivers and communities of benthic macroinvertebrates in shallow waters, it remits to the standards for the biological sampling with Surber and hand net. These sampling methods were compared in 15 sites located in the fluvial network of Aragon (NE Spain), including the different types of rivers and ecological states existent in it. Both methods provided similar results when employed with the same community, showing high correlation coefficients and slopes near 1, for number of taxa captured, number of EPT groups (Ephemeroptera, Plecoptera and Trichoptera), number of taxa included in the index IBMWP (formerly known as BMWP'), value of this index and of the IASPT. In spite of this high correlation, the Surber sampler presented a higher average efficiency in the total number of taxa captured than the hand net, capturing a slightly greater number of taxa, taxa included in the IBMWP among them (increasing the value of the index a little). Other advantages of Surber versus hand net are commented, especially that of allowing quantitative samplings." (Authors) Samples include Coenagrionidae, Calopterygidae, Aeshnidae, and Gomphidae (all at the family lev-

el).] Address: Torralba Burrial, A., Depto de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

**12523.** Torralba Burrial, A.; Ocharan, F.J. (2007): Presencia de *Hemianax ephippiger* (Burmeister, 1839) (Odonata: Aeshnidae) en la provincia de Huesca (NE España). *Boletín de la Sociedad Entomológica Aragonesa* 40: 426. (in Spanish) [18-VIII-2003, river Asabón, Salinas de Huesca (30TXM821980; alt. 604 m a.s.l.), Spain] Address: Torralba Burrial, A., Depto de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

## 2008

**12524.** Johansson, F.; Crowley, P.H. (2008): Larval cannibalism and population dynamics of dragonflies. In: Lancaster, J. & R.A. Briers (eds): *CAB International 2008. Aquatic insects: Challenges to populations. Proceedings of the Royal Entomological Society's 24th symposium*: 36-54. (in English) ["Cannibalism, the process of killing and eating conspecifics, is common among odonate larvae and is believed to influence odonate population dynamics. Here we attempt to summarize and consider interactions among key factors linked to cannibalism at both the individual and population levels. Through cannibalism, odonate larvae receive energy directly from the consumption of the conspecific, and indirectly from reduced exploitation competition because the per capita food supply may increase. Cannibalism might, however, also incur costs such as risk of death and pathogen infections. Alternative food availability, population density and size structure of the cannibalistic population, and habitat structure are environmental factors that affect cannibalism rate in odonate larvae on a short-term basis. Theoretical models predict that cannibalism reduces size variation under most cannibalism intensities and life histories. The models also show that cannibalism can – but will not always – stabilize population dynamics. Unfortunately few long-term studies examining the population dynamics on dragonfly larvae have been performed, and we urge more such studies." (Authors)] Address: Johansson, F., Dept of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

## 2009

**12525.** Bingham, S.N. (2009): Aquatic macroinvertebrate use of rootmat habitat created by eight woody riparian species. M.Sc. thesis, Graduate School of The Ohio State University: XII + 61 pp. (in English) [oas 38;"Rootmats are an instream habitat type created by fine roots of riparian vegetation that are exposed through natural erosion at the stream bank. Previous research indicated that rootmats may be important habitats for aquatic invertebrates and may have a distinct inverte-

brate composition compared to other instream habitat types. The objective of this study was to examine the invertebrate communities inhabiting rootmats of eight common woody riparian species in Cuyahoga Valley National Park, Ohio (CVNP). I collected 47 rootmat samples from pools across 10 CVNP streams. Coarse particulate organic matter, root morphology, and physicochemical variables were measured to characterize the local habitat at each location. Invertebrate community indices, multivariate techniques and univariate techniques were used to investigate the role of rootmats as habitat and determine whether any associations existed between invertebrate communities and eight woody riparian species. Additionally, invertebrate communities of rootmats were compared to adjacent riffles for eight sites. A total of 138 taxa were collected from rootmats across all woody species. Most (59%) of the taxa were gathering collectors and this suggests that fine particulate organic matter may be a dominant food source within or near rootmats. Additionally, 15% of the captures were predators, while scrapers, shredders and filtering collectors were present in similar proportions (8-9% each). *Paratanytarsus dissimilis* was the most abundant organism across the samples at nearly 250 organisms m<sup>2</sup>. Other abundant taxa were Chironomidae *Calopteryx maculata*, *Caecidotea communis* (isopod), *Stenelmis* sp. and *Dubiraphia bivittata* (riffle beetles). Invertebrate diversity, species composition and functional feeding guilds differed among certain tree species. Specifically, rootmats of two willow species (*Salix interior* and *S. nigra*) were consistently similar to each other, and different from rootmats of *Carpinus caroliniana*, *Fraxinus pennsylvanica*, and *Acer saccharum*. Additionally, invertebrate species composition was different in adjacent rootmat and riffle habitats, but the habitats were similar in terms of diversity and abundance." (Author)] Address: not stated

**12526.** Bolzon, D.M.; Nordström, K.; O'Carroll, D.C. (2009): Local and large-range inhibition in feature detection. *Journal of Neuroscience* 9(45): 14143-14150. (in English) ["Lateral inhibition is perhaps the most ubiquitous of neuronal mechanisms, having been demonstrated in early stages of processing in many different sensory pathways of both mammals and invertebrates. Recent work challenges the long-standing view that assumes that similar mechanisms operate to tune neuronal responses to higher order properties. Scant evidence for lateral inhibition exists beyond the level of the most peripheral stages of visual processing, leading to suggestions that many features of the tuning of higher order visual neurons can be accounted for by the receptive field and other intrinsic coding properties of visual neurons. Using insect target neurons as a model, we present unequivocal evidence that feature tuning is shaped not by intrinsic properties but by potent spatial lateral inhibition operating well beyond the first stages of visual processing. In addition, we present evidence for a second form of higher-order spatial inhibition—a

long-range interocular transfer of information that we argue serves a role in establishing interocular rivalry and thus potentially a neural substrate for directing attention to single targets in the presence of distracters. In so doing, we demonstrate not just one, but two levels of spatial inhibition acting beyond the level of peripheral processing." (Authors) *Hemicordulia tau*] Address: O'Carroll, D., Discipline of Physiology, School of Medical Sciences, University of Adelaide, Adelaide SA 5005, Australia

**12527.** Donohue, I.; Donohue, L.A.; Ní Ainín, B.; Irvine, K. (2009): Assessment of eutrophication pressure on lakes using littoral invertebrates. *Hydrobiologia* 633(1): 105-122. (in English) ["Until the E.U. Water Framework Directive listed benthic invertebrates as a biotic element to be used for ecological classification of lakes, techniques for the assessment of the response of littoral invertebrates to anthropogenic pressures were extremely limited compared with those of rivers and lake profundal zones. We describe here the development of an ecological classification model based on changes of littoral invertebrate assemblages across a gradient of eutrophication, which is the most widespread anthropogenic pressure on lakes across Europe. The model comprises three derived parameters, two of which were developed from taxon-specific optima along a total phosphorus gradient calculated using canonical correspondence analysis, and the third based on invertebrate abundance. Combining the parameter metrics, we can estimate the ecological quality ratio (EQR), relative to those from paleolimnologically-confirmed reference lakes. The model was tested using independent samples collected from both hard and soft substrata and across two seasons from 45 lakes, comprising three alkalinity groups (n = 15 in each), and across gradients in water column total phosphorus concentrations. For hard substrata, EQRs were related consistently and highly significantly to water column concentrations of total phosphorus, accounting for the majority of the variance in every alkalinity group. For samples taken from soft substrata, a significant relationship was found only for high alkalinity lakes, accounting for a moderate proportion of the variability in water column total phosphorus concentrations. Our results compare highly favourably with those from other aquatic ecological assessment methods, irrespective of the faunal or floral group upon which they are based, demonstrating that littoral invertebrate assemblages can provide a statistically robust prediction of nutrient status when samples are collected from hard substrata. While the method was developed specifically to assess nutrient pressures on littoral invertebrates, many lakes are subject to multiple pressures. The development of classification models that incorporate multiple pressures presents a particularly significant challenge for the implementation of the Water Framework Directive, requiring both reliable identification of minimally-impacted reference states and incorporation of pressures that are unlikely to interact in predictable



ways." (Authors) Taxa classified as 'sensitive' to total phosphorus used in the calculation of the %Sensitive to TP Metric include *Brachytron pratense*, *Coenagrionidae*, *Libellulidae*, *Orthetrum cancellatum*, and *O. coerulescens*.] Address: Donohue, I., School of Natural Sciences, Dept of Zoology, Trinity College Dublin, Dublin 2, Ireland. E-mail: [ian.donohue@tcd.ie](mailto:ian.donohue@tcd.ie)

**12528.** Drake, M. (2009): A survey of the aquatic invertebrates of RSPB Otmoor Reserve, Oxfordshire. Royal Society for the Protection of Birds: 22 pp. (in English) [UK; Aquatic invertebrates were sampled at 25 waterbodies at Greenaways field at RSPB's Otmoor Reserve on 24 – 25 July 2009. *Brachytron pratense* (scarce), *Anax imperator*, *Ischnura elegans*, *Pyrrhosoma nymphula*, *Coenagrionidae*, *Libellula depressa*, *Libellula quadrimaculata*, and *Sympetrum* sp. (all common) are listed.] Address: Drake, C.M., Orchid House, Burrigge, Axminster, Devon EX13 7DF, UK

**12529.** DuBois, R.B.; Pleski, J.M.; Smith, W.A.; Epstein, E.J. (2009): Odonata of coastal peatland habitats adjacent to Lake Superior in Wisconsin. *Great Lakes Entomologist* 42(3/4): 158-172. (in English) ["We sampled adults and exuviae of Odonata in eleven coastal fens and poor fens near Lake Superior in Douglas, Bayfield, and Ashland counties in Wisconsin to determine species that were breeding in these areas, and gain knowledge about their relative abundances, flight periods, and nymphal habitats. The flora in these fens was characterized by mats of *Sphagnum* mosses, a variety of ericaceous shrubs, and a number of sedges, among which *Carex lasiocarpa* was most dominant. We averaged seven visits per site from early June through September, 2004, to cover the flight periods of most species of Odonata at this latitude. Fifty species of Odonata were identified at the sites, 33 of which exhibited evidence of breeding. Species commonly breeding in the fens included *Lestes disjunctus*, *Coenagrion resolutum*, *Enallagma hageni*, *Nehalennia irene*, *Aeshna canadensis*, *Williamsonia fletcheri*, *Leucorrhinia frigida*, *L. glacialis*, *L. hudsonica*, *Libellula quadrimaculata*, *Sympetrum obtrusum*, and *S. vicinum*. Eight uncommon species were found to breed in at least one of the fens, including *L. eurinus*, *A. sitchensis*, *A. tuberculifera*, *A. verticalis*, *Somatochlora incurvata*, *W. fletcheri*, *Nannothemis bella*, and *S. danae*. *W. fletcheri* and *S. danae* were found to be more common in these habitats than previously thought, causing their rarity status with the Natural Heritage Inventory of the Wisconsin Dept of Natural Resources to be relaxed, and they will no longer be actively tracked. Emergence and flight periods of Odonata in coastal peatlands began at least a week later than in similar inland peatlands in these counties." (Authors)] Address: DuBois, R., Wisconsin Dept Natural Resources, 1401 Tower Ave., Superior, WI 54880, USA. E-mail: [robert.dubois@Wisconsin.gov](mailto:robert.dubois@Wisconsin.gov)

**12530.** DuBois, R.B. (2009): GLOM 2009 Visits Indiana Dunes National Lakeshore. *Argia* 2184): 4-5. (in Eng-

lish) ["The 9th annual Great Lakes Odonata Meeting (GLOM) was held during 10-12 July in Indiana Dunes National Lakeshore (IDNL). The IDNL has not previously received much attention from odonatologists. Surveys were done in the area from 1993-1997 and over 60 species of Odonata were recorded. At the 2009 meeting surveys were done and 42 species were recorded, including eight not found in the previous 1993-1997 survey." (Author)] Address: DuBois, R., Wisconsin Dept of Natural Resources, 1401 Tower Ave., Superior, WI 54880, USA. E-mail: [robert.dubois@Wisconsin.gov](mailto:robert.dubois@Wisconsin.gov)

**12531.** Fiorenza, T.; Pecile, I. (2009): The Pygmy damselfly *Nehalennia speciosa* is still part of the Odonata fauna of Italy (Insecta, Odonata, Coenagrionidae). *Boll. Mus. civ. St. nat. Venezia* 60: 17-27. (in English, with Italian summary) ["Authors make a short synthesis on the presence and distribution of *N. speciosa* in Friuli, along with the results of the researches conducted in the Friuli-Venezia Giulia region. The confirmation of the Friulian presence, which was already known in the past, and its discovery in three unknown locations, testify that the species is still present in Italy." (Authors)] Address: Fiorenza, T., Via Morosina, 17/c, 33100 Udine. Italy. E-mail: [Tizianofiorenza@libero.it](mailto:Tizianofiorenza@libero.it)

**12532.** Fulan, J.A. (2009): Metodologias de amostragem em macrófitas e seu efeito na abundância de odonata. A comparison of two sampling techniques in the study of the macrophytes and their effects on abundance of odonata. *Estud Biol.* 31(73/74/75): 67-73. (in Portuguese, with English summary) ["The aim of this work was assess the distribution of the abundance of Odonata on macrophytes utilizing distinct methods sampling insect net of 0,25 mm mesh size and square method. The samplings were realized in two lakes in its mouth zone into the Jurumirim Reservoir, São Paulo State, Brazil. Three stands of *E. azurea* and three of *S. auriculata* were assessed. In each sampling station were measured surface temperature, dissolved oxygen, pH and conductivity. It was realized two statistical analysis: the Student test to compare the abundances of Odonate with insect net and square and correlation between the abundances of Odonata and abiotic factors. The results showed that the abundances of Odonata did not differ significantly between insect net and square, however, insect net exhibited higher abundance in every one sites of sampling. Insect net also was efficient in the caught of small nymphs as *Telebasis* sp., *Tauriphila* sp. and *Erythemis* sp." (Author)] Address: Fulan, J.A., Doutorado (andamento), Depto de Zoologia, Instituto de Biociências, Univ. Estadual de São Paulo (UNESP), Botucatu, SP - Brazil. E-mail: [joaofulan@ig.com.br](mailto:joaofulan@ig.com.br)

**12533.** Mohi-Ud-Din, I.; Singh, M.; Borana, K. (2009): Statistical approach to monthly variations of physico-chemical factors at Lower lake of Bhopal in relation to insect fauna. *Current World Environment* 4(1): 195-198.

(in English) [The monthly variations of insects was studied in Lower lake of Bhopal (India), during June 2002 to May 2004. The density of total population of insects ranged between 201 org/m<sup>2</sup> to 450 org/m<sup>2</sup> and dominated by Coleoptera during most of the study period. Taxa are treated at genus level and include Nearctic Odonata species.] Address: Mohi-Ud-Din, I., Sadhu Vaswani College, Bairagarh, Dept of Applied Aquaculture, Barkatullah University, Bhopal - 462 016, India

**12534.** O'Carroll, D.C.; Shoemaker, P.A. (2009): Mechanisms for visual detection of small targets in insects. AOARD-09-4058 / FA2386-09-1-4058. Final Performance Report, December 1, 2009: 26 pp. (in English) ["The grantee investigated insect visual detection of small targets against a cluttered, moving background. The work focused on deducing neural mechanisms that underlie this ability, to an understanding of the computational principles. Electrophysiology examined the complex function of small-target sensitive neurons (of dragonflies). Experiments explored the receptive field properties and underlying mechanisms involved in target detection, suggested the form of computational models, and focused anatomical investigations. Conceptual models were translated into numerical models that can be evaluated in simulations under a variety of conditions and compared with biological systems." (Authors)] Address: O'Carroll, D., Discipline of Physiology, School of Medical Sciences, University of Adelaide, Adelaide SA 5005, Australia

**12535.** Sutton, P.G. (2009): A checklist of the dragonflies (Odonata) of Corfu (Kérkira) including a new record for the Ionian Islands, the Black Pennant *Selysiotemis nigra* (Vander Linden, 1825). Bulletin of the Amateur Entomologists' Society 68(485): 136-144. (in English) [Greece; the checklist for the Odonata of Corfu now includes *S. nigra*, bringing the total number of species recorded from the island to 40, and the current total for the Ionian Islands to 41. The list also includes the very rare and threatened species *Pyrrhosoma elisabethae* and *Ceriagrion geogrifyi*.] Address: Sutton, P.G., 2 Fir Tree Close, Flitwick, Beds. MK45 1NZ, UK. E-mail: petersutton@freeuk.com

**12536.** Torralba-Burrial, A.; Alonso-Naveiro, M. (2009): Las comunidades de libélulas (Odonata) del Parque Natural de Sierra de Cebollera (La Rioja, N España). Zulia 27: 7-52. (in Spanish, with English summary) ["Odonata communities were sampled in 22 locations in Natural Park Sierra de Cebollera (La Rioja). 21 species were found; eleven have been not recorded before from La Rioja. Records of threatened dragonflies *Coenagrion caerulescens* and *Sympetrum flaveolum* are very interesting. The last species has great populations in Sierra de Cebollera. Dragonfly communities are analysed showed differences between running and stagnant waters. Biogeographical analysis shows a low percentage of Ethiopic elements and high percentage of West-

Mediterranean elements. A provisional checklist of La Rioja odonates is included." (Authors)] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

**12537.** Walia, G.K. (2009): The impact of industrial effluent on moulting and emergence in the damselfly *Ceriagrion coromandelianum* (Fabricius) (Odonata: Zygoptera: Coenagrionidae). National journal of Life Sciences 6(1): 99-102. (in English) ["The antipenultimate and penultimate larval instars of *C. coromandelianum* were reared in effluent free medium. The antipenultimate larvae required 32 days to become adult and penultimate larvae needed 9 days to become final instars. In sub lethal concentration of industrial effluent the moulting is arrested and all the antipenultimate larvae died in 25-32 days, while in case of penultimate larvae, all of them died within 15 days. However, few of them exhibited incomplete moulting but died without eclosion on the same day. Rate of oxygen consumption and various biochemical constituents in the tissues were decreased significantly in the effluent treated larvae. These could be the probable cause for the mortality of larvae under the toxicity of industrial effluent. As industrial effluent inhibits moulting thus juvenomimetic action could be attributed to it." (Author)] Address: Walia, Gurinder Kaur, Dept of Zoology & Environmental Sciences, Punjabi University, Patiala-147002, Punjab, India. E-mail: gurinderkaurwalia@yahoo.co.in

## 2010

**12538.** Henderson, C.L; Adams, S. (il.). (2010): Butterflies, moths, and other invertebrates of Costa Rica: a field guide. Mariposas, polillas y otros invertebrados de Costa Rica: una guía de campo. Editorial Austin, TX, University of Texas Press, US: 173 pp. (in English) ["At the biological crossroads of the Americas, Costa Rica hosts an astonishing array of plants and animals-over half a million species! Ecotourists, birders, and biologists come from around the world, drawn by the likelihood of seeing more than three or four hundred species of birds and other animals during even a short stay. To help all these visitors, as well as local residents, identify and enjoy the wildlife of Costa Rica, Carrol Henderson published Field Guide to the Wildlife of Costa Rica in 2002, and it instantly became the indispensable guide. Now Henderson has created a dedicated field guide to more than one hundred tropical butterflies, moths, and other invertebrates that travelers are most likely to see while exploring the wild lands of Costa Rica. He includes fascinating information on their natural history, ecology, identification, and behaviour gleaned from his forty years of travels and wildlife viewing, as well as details on where to see these remarkable and beautiful creatures. The butterflies, moths, and other invertebrates are illustrated by over 180 stunning and colourful photographs, most of which were taken in the wild by Hen-

person. A detailed and invaluable appendix that identifies many of Costa Rica's best wildlife-watching destinations, lodges, and contact information for trip-planning purposes completes the volume." (Publisher) The book includes a brief chapter on Pseudostigmatidae.] Address: not stated

**12539.** Indermuehle, N.; Angélibert, S.; Rosset, V.; Oertli, B. (2010): The pond biodiversity index "IBEM", a new tool for the rapid assessment of biodiversity in ponds from Switzerland. Part 2. Method description and examples of application. *Limnetica* 29(1): 105-119. (in English, with Spanish summary) ["Ponds are now widely recognized to contribute significantly to regional freshwater biodiversity. Therefore, tools to easily and rapidly assess biological quality specifically for these aquatic habitats have been increasingly requested by conservation planners and nature managers. In close association with practitioners, we developed such a method for Switzerland; the pond biodiversity index "IBEM". The IBEM-Index is based on the assessment of the taxonomic richness of 5 groups: aquatic vegetation, Gastropoda, Coleoptera, adult Odonata and Amphibia. No abundance data are necessary and genus level identification is required for all groups except Amphibia (species level). The sampling methodology is a stratified random strategy and allows the use of richness estimators to transform the observed taxonomic richness (Sobs) into true taxonomic richness (Strue). As the IBEM assessment follows the methodology presented in the Water Framework Directive, it is based on the calculation of the ratio of true taxonomic richness (Strue) to reference-based predicted richness (Sref). Each of the five taxonomic groups is assessed separately and the overall biological quality of any given pond (i.e. the IBEM-Index) is the average of the five ratios. This score is later converted into one of five quality classes for each pond: bad (0 to 0.2), poor (> 0.2 to 0.4), moderate (> 0.4 to 0.6), good (> 0.6 to 0.8), and high (> 0.8 to 1). In this paper, the implementation of the IBEM-Index is described in detail. The sampling methodologies are developed (for the biodiversity and the environmental variables) as well as the assessment methodology. Finally, two examples are presented in detail, for a "good" quality pond and for a "bad" quality pond. The method implementation also includes a website (<http://campus.hesge.ch/ibem>) which allows the online calculation of the index, and provides support for both sampling and assessment methodologies to users. The IBEM-Index is a rapid assessment method which gives an overall value of pond biodiversity in terms of taxa richness and can be used, for example, in regional screenings or site monitoring in Switzerland. Moreover, as biodiversity is generally recognized as a good indicator of global ecological quality, the IBEM-Index can also be used to investigate ecosystem quality.] Address: Oertli, B., HEPiA Geneva, Univ. of Applied Sciences Western Switzerland, technology, architecture and landscape. 1254 Jussy-Geneva, Switzerland. E-mail: [beat.oertli@hesge.ch](mailto:beat.oertli@hesge.ch)

**12540.** Ramirez, A. (2010): Macroinvertebrados de agua dulce de Costa Rica I, Capítulo 5. Odonata. *Rev. Biol. Trop.* 58 (Suppl. 4): 97-136. [The chapter introduces into the morphology of Odonata and gives detailed keys at the genus level to identify the regional Odonata fauna (imagos, larvae)] Address: Ramírez, A., Inst. para Estudios de Ecosistemas Tropicales, Univ. de Puerto Rico, Puerto Rico. E-mail: [alonso.ites@gmail.com](mailto:alonso.ites@gmail.com)

**12541.** Scott, R.W. (2010): The diversity and composition of benthic macroinvertebrate assemblages in streams in the Mackenzie River System, Northwest Territories. M.Sc. thesis, University of Waterloo, Ontario, Canada: X + 138 pp. (in English) [Impending natural resources development and concern about the effects of climate change have spurred increased efforts to study and monitor aquatic habitats in the Mackenzie River system. As part of Environment Canada's attempt to survey the system in advance of the construction of the Mackenzie Gas Pipeline, benthic macroinvertebrates were sampled at 50 streams spanning the geographical range of the Mackenzie system in the Northwest Territories, Canada, to assess spatial patterns in diversity and assemblage structure and the environmental factors driving them. Replicated, quantitative D-net samples were collected during the late summer of 2005 through 2008, mostly at crossings of the proposed pipeline route. 373 macroinvertebrate taxa were recorded, mainly aquatic insects, which were identified to the genus or species levels; other groups were identified to higher taxonomic levels. Ephemeroptera and Plecoptera diversity declined along a latitudinal gradient, while Trichoptera diversity declined in the middle of the latitudinal range and rose towards the far north. Chironomidae (Diptera) increased in diversity and abundance towards the far north, becoming dominant in the northern subarctic forest and lowland tundra of the Mackenzie Delta. Diversity, measured as the average generic richness per stream, correlated with a composite environmental variable representing stream size, but not much else; spatial trends in local generic richness were only apparent in the far north of the study area. Regional diversity was assessed using rarefaction curves and showed a clear decrease from south to north across the study area for most taxa; the major exception was the chironomid subfamilies Orthocladiinae and Chironomini, the former being diverse throughout the study area and the latter increasing in diversity on the tundra. Odonata, Hemiptera and Coleoptera were well-represented in the south of the study area, but decreased sharply in diversity and abundance in the north; another common order, Megaloptera, was entirely absent from the study area, as were crayfish. Community composition varied along a latitudinal gradient, with some species restricted to northern latitudes and many more species restricted to the southern areas. Composition varied by region, as did the environmental factors that control it. Streams in the north of the system are connected to hundreds of small lakes and tend to freeze in the winter,



which increases habitat stability; assemblages in this region were characterized by relatively large chironomids that are usually associated with lentic habitats and by a lack of taxa that are intolerant to freezing. Substrate was the main factor explaining differences in assemblage composition in this region. Just to the south, alluvial streams are more common and permafrost is continuous with very shallow active layers, which likely results in intense discharge peaks and ice scour in the spring and flashy summer hydrographs. Invertebrates in this region were mainly short-lived, small sized orthoclads, baetids and chloroperlids; the annual disturbance regime seems likely to be an important factor shaping community composition in this region. Many streams in this region received input from saline springs, resulting in perennial flow, and these streams harboured several taxa that were absent or rare in other streams at similar latitudes, including several stoneflies (e.g. *Pteronarcys*, *Sweltsa*); the presence of flow during the winter was found to be a major factor affecting community composition in this region, which surrounded the town of Norman Wells, NT. Nutrient dynamics appeared to be important in structuring benthic assemblages in the southern portion of the study region, with high-nutrient streams supporting a diverse fauna which included many taxa that were absent in the north, while communities in low-nutrient streams were more similar to the northern alluvial stream fauna. There was no spatial distinction between low- and high-nutrient streams in the southern region, and the difference may be due to the local conditions of permafrost, which is patchy and discontinuous in the region. Evidence that winter ice and permafrost conditions are important drivers of benthic invertebrate diversity and community composition in the Mackenzie system, along with the latitudinal gradients which are consistent with a temperature/climate gradient, raises the possibility that benthic assemblages may be useful as indicators of effects of global climate change on freshwater habitats in the Canadian north. More immediately, construction of the Mackenzie Gas Pipeline may affect stream habitat due to sedimentation, and plans for the operation of the pipeline have raised concerns about potential effects on permafrost conditions. Implications for development of a biomonitoring program utilizing benthic invertebrates and their potential as indicators of climate change are discussed." (Author) Mainly in table 10, the following Odonata taxa are listed: *Aeshna* sp., *Somatochlora minor*, *Epitheca canis*, *Amphiagrion* sp., *Coenagrion/Enallagma* sp., *Lestes unguiculatus*, *Ophiogomphus severus*.] Address: not stated

**12542.** Sy, T.; Schulze, M. (2010): *Leucorrhinia pectoralis* (Charpentier, 1825) – Große Moosjungfer. Berichte des Landesamtes für Umweltschutz Sachsen-Anhalt Halle, Sonderheft 2/2010: 77-93. (in German) [The paper compiles the regional knowledge on ecology and distribution of *L. pectoralis* and assesses the current local status within the Natura 2000 network of protected areas in Sachsen-Anhalt, Germany.] Address: Sy, T.,

RANA - Büro für Ökologie und Naturschutz, Frank Meyer, Mühlweg 39, D-06114 Halle(Saale), Germany. E-mail: thoralf.sy@rana-halle.de

**12543.** Sy, T.; Schulze, M. (2010): *Ophiogomphus cecilia* (Fourcroy, 1785) – Grüne Keiljungfer. Berichte des Landesamtes für Umweltschutz Sachsen-Anhalt Halle, Sonderheft 2/2010: 96-112. (in German) [The paper compiles the regional knowledge on ecology and distribution of *O. cecilia* and assesses the current local status within the Natura 2000 network of protected areas in Sachsen-Anhalt, Germany.] Address: Sy, T., RANA - Büro für Ökologie und Naturschutz, Frank Meyer, Mühlweg 39, D-06114 Halle(Saale), Germany. E-mail: thoralf.sy@rana-halle.de

**12544.** Sy, T.; Schulze, M. (2010): *Coenagrion mercuriale* Charpentier, 1840 – Helm-Azurjungfer. Berichte des Landesamtes für Umweltschutz Sachsen-Anhalt Halle, Sonderheft 2/2010: 63-76. (in German) [The paper compiles the regional knowledge on ecology and distribution of *C. mercuriale* and assesses the current local status within the Natura 2000 network of protected areas in Sachsen-Anhalt, Germany.] Address: Sy, T., RANA - Büro für Ökologie und Naturschutz, Frank Meyer, Mühlweg 39, D-06114 Halle(Saale), Germany. E-mail: thoralf.sy@rana-halle.de

**12545.** Torralba-Burrial, A.; Ocharan, F.J. (2010): Presencia de *Ischnura elegans* (Vander Linden, 1829) (Odonata: Coenagrionidae) en 1980 en Louro (Galicia, noroeste de España). Boletín de la Sociedad Entomológica Aragonesa 46(1): 466. (in Spanish, with English summary) ["The study of *Ischnura* material collected in 1980 in Louro shows that colonization of this coastal lagoon by *Ischnura elegans* occurred earlier than indicated by the scientific literature. This fact should be taken into account when evaluating the replacement processes of the Iberian-Maghrebian endemic *Ischnura graellsii* by its vicarious cogenetic *I. elegans*." (Authors)] Address: Torralba Burrial, A., Depto de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**12546.** Torralba-Burrial, A.; Ocharan, F.J. (2010): Primera cita de *Anax parthenope* (Selys, 1839) (Odonata: Aeshnidae) de La Rioja (España). Boletín de la Sociedad Entomológica Aragonesa 46(1): 418. (in Spanish, with English summary) [El Villar de Arnedo (La Rioja, Spain), 12-VIII-1994 Leg. María José Bañuelos. 30TWM78, 400 m a.s.l.] Address: Torralba Burrial, A., Depto de Biología de Organismos y Sistemas, Univ. de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**12547.** Torralba-Burrial, A.; Mezquita, I. (2010): De Monstruos y Prodigios (30): Teratologías alares en *Symptetrum Newman*, 1833 (Odonata: Libellulidae). Boletín de la S.E.A. 47: 463-466. (in Spanish, with English summary) ["Wing teratologies, possibly caused by extension

problems during emergence, are reported in three individuals of *Sympetrum fonscolombii*, one of *S. meridionale* and one of *S. striolatum*." (Authors)] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**12548.** Walther, G.-R.; Nagy, L.; Heikkinen, R.K.; Penuelas, J.; Ott, J.; Pauli, H.; Pöyry, J.; Berger, S.; Hickler, T. (2010): Observed climate-biodiversity relationships. In: Settele, J., L. Penev, T. Georgiev, R. Grabbaum, V. Grobelnik, V. Hammen, S. Klotz, M. Kotarac & I. Kuehn (Eds): Atlas of Biodiversity Risk. Pensoft Publishers, Sofia: 74-75. (in English) [The range expansion of *Crocothemis erythraea* in Germany in the course of the last decades of the twentieth century is presented in more details. Additional odonatan range extensions or extractions are briefly outlined.] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: L.U.P.O. GmbH@t-online.de

**12549.** Zhao, H.X.; Yin, Y.J.; Zhong, Z. (2010): Nano fibrous multilayered composites in pterostigma of dragonfly. Chinese Science Bulletin 55(18): 1856-1858. (in Chinese) ["The sections of the pterostigma of *Crocothemis servilla* are observed through FEG-ESEM, and interesting nano fibrous multilayered structures are discovered. The sleeve-like pterostigma has a center layer with the thickness of 2~3 µm. The center layer is composed of more than twenty ultra-thin nano layers with the thickness of 90~150 nm. Every ultra-thin nano layer is formed by parallel nano fibers adhered one-by-one. The marvelous nano fibrous multilayered structure provides reference for mankind to understand better the function of the pterostigma and to improve better the bionics manufactures." (Authors)] Address: Zhong, Z., School of Aerospace Engineering and Applied Mechanics, Tongji University, Shanghai 200092, China. E-mail: zhongk@tongji.edu.cn

**12550.** Rao, D.V.; Chandra, K.; Devi, K. (2010 (?)): Endemic fauna of Andaman and Nicobar Islands, Bay of Bengal. Zoological Survey of India. Kolkata: 290 pp. (in English) [On page 14, eleven Odonata taxa are checked and discussed in more details on pages 147-149.] Address: Rao, D.V., Freshwater Biology Regional Centre, Zoological Survey of India, Hyderabad-500048

## 2011

**12551.** Babu, R. (2011): New distributional record of coenagrionids (Odonata: Zygoptera: Coenagrionidae) from Himachal Pradesh, India. Rec. zool. Surv. India 111(4): 73-77. (in English) ["A list of ten species under six genera of family Coenagrionidae (Zygoptera) constituting the first record from Himachal Pradesh State, along with necessary collection data and their distribution, has been provided. The distribution of three genera *Aciagrion* Selys, *Mortonagrion* Fraser and *Rhod-*

*ischnura* Laidlaw are new records to Himachal Pradesh. Three species *Aciagrion approximans*, *A. azureum*, and *Mortonagrion aborense* are reported for first time from the outside of Eastern India. *Agriocnemis splendissima*, *Pseudagrion hypermelas*, and *P. microcephalum* have been recorded for the first time from the Western Himalaya Region." (Authors)] Address: Babu, R., Zoological Survey of India, "M"-Block, New Alipore, Kolkata-700 053

**12552.** Bagworth, T. (2011): Reports from Coastal Stations—2010: Gibraltar Point NNR, Lincolnshire. *Atropos* 42: 66. (in English) [UK, *Erythromma najas*, *E. viridulum*, *Brachytron pratense*, *Sympetrum flaveolum*, *S. fonscolombii*] Address: not stated

**12553.** Benken T.; Kommander, M. (2011): Die Senegal-Pechlibelle (*Ischnura senegalensis*) schlüpft in einem Aquarium bei Ulm. *Mercuriale* 11: 51-52. (in German, with English summary) [Baden-Württemberg, Germany; "We report on three specimens of *I. senegalensis* accidentally introduced to Germany in 2011. The odonates were encountered in the surroundings of Ulm and we assumed the larvae were imported by exotic aquatic plants." (Authors)] Address: Benken, T. Nuitsstr. 19, 76185 Karlsruhe, Germany. E-mail: theodor@benken-online.net

**12554.** Bowman, N. (2011): Reports from Coastal Stations—2010: Eccles-on-Sea, Norfolk. *Atropos* 42: 65-66. (in English) [UK, 19-VII-2010, influx of 50+ specimens of *Erythromma viridulum*] Address: not stated

**12555.** Burwell, C.J.; McDougall, A.; Nakamura, A.; Lambkin, C.L. (2011): New butterfly, hawkmoth (Lepidoptera) and dragonfly (Odonata) records from vegetated coral cays in the southern Great Barrier Reef, Queensland. *Australian Entomologist* 38(2): 75-88. (in English) [Cays, including the first data from Lady Elliot and North Reef Islands, are presented and previously published records summarised. ... Not surprisingly, the Odonata fauna of the Capricornia Cays is depauperate, with only 10 species recorded from our survey. Most are strong-flying species and/or species that are known to disperse or be blown long distances from their larval breeding sites. Seven are distributed throughout most or all of Australia with the other three occurring in northern and eastern Australia: *Diplacodes trivialis* occurring as far south as southern NSW, *Orthetrum sabina* as far south as south-eastern Queensland and *O. serapia* as far south as Rockhampton, central Queensland (Theischinger & Endersby 2009). Odonata are probably regular visitors to islands of the Capricornia Cays, but the absence of permanent water bodies means that they are unable to establish resident populations. However, on Lady Elliot Island there is a sizable depression which fills with rainfall and might provide temporary larval habitat for some dragonflies and damselflies. All 10 odonate species we collected from Lady

Elliot Island are known to breed in temporary water bodies (Watson et al 1991, Theisinger and Hawking 2006). We recorded only two dragonfly species from other islands: *Ischnura aurora* from Lady Musgrave and North Reef Islands and *Pantala flavescens* from North Reef Island." (Authors) ] Address: Burwell, C.J., Biodiversity Program, Queensland Museum, PO Box 3300, South Brisbane, Qld 4101, Australia

**12556.** Clancy, S.P. (2011): Reports from Coastal Stations—2010: Dungeness area, Kent Sean. *Atropos* 42: 55-57. (in English) [UK, *Anax parthenope*, *Erythromma viridulum*] Address: not stated

**12557.** Deans, M.J. (2011): Reports from Coastal Stations—2010: Bawdsey Peninsula, Suffolk. *Atropos* 42: 62-63. (in English) [UK, *Chalcolestes viridis*, *Erythromma viridulum*] Address: not stated

**12558.** Dewick, S., (2011): Reports from Coastal Stations—2010: Curry Farm, Bradwell-on-Sea, Essex. *Atropos* 42: 61. (in English) [UK; *Calopteryx splendens*; *Sympetrum striolatum* at light trap] Address: Dewick, S.; Curry Farm, Bradwell-on-Sea, Southminster, Essex, CM0 7NL, UK

**12559.** DuBois, R.B. (2011): Comparison of field- and classroom-based forms of environmental education to motivate adult learner involvement in Citizen-Based Monitoring of Odonata. Master of Science in Education, University of Wisconsin – Superior: VII + 74 pp. (in English) ["Environmental education has been one of the primary means used to recruit volunteers for citizen-based monitoring partnerships. However, little research has been done to investigate the forms of environmental education that are most effective in promoting these partnerships or how to effectively motivate adult learners who will become meaningfully involved in them. This study sought to determine the relative effectiveness of two forms of short-term environmental education in motivating adult learners to become involved in a citizen-based monitoring activity related to dragonflies and damselflies (Odonata), called the Wisconsin Odonata Survey (WOS). The two forms of environmental education examined were 1) a classroom-based interactive lecture form in which PowerPoint presentations of learning content and accompanying question and answer periods were used in conjunction with exploration of display items and live specimens, and 2) a field-based guided discovery form in which learning content was delivered orally and with illustration poster boards, after which students observed odonate behaviour in the wild, captured and handled live specimens, and practiced making field identifications. Three replications of each form of education were examined during summer of 2010, and student intent to become involved with WOS was measured using survey questionnaires given to willing volunteers immediately after each education event and again through the mail after six weeks. Re-

sults were largely equivocal, but suggested the possibility of a weak advantage with the use of field-based guided-discovery learning over classroom-based interactive lecturing when recruiting citizen volunteers for WOS. Both forms of education had value in other areas including building a greater understanding of the need to protect odonates and their habitats, increasing interest in odonates, and prompting participants to learn more about them." (Author)] Address: DuBois, R., Wisconsin Dept of Natural Resources, 1401 Tower Ave., Superior, WI 54880, USA. E-mail: robert.dubois@Wisconsin.gov

**12560.** Ficsor, M.; Szabo, A. (2011): Contribution to the aquatic macroinvertebrate fauna of Szinva and its tributaries, NE Hungary. *Acta Biol. Debr. Oecol. Hung.* 26: 75-88. (in English, with Hungarian summary) [The list of taxa includes *Calopteryx splendens*, *Platycnemis pennipes*, *Coenagrion puella*, *Ischnura pumilio*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Orthetrum brunneum*, *O. cancellatum*, and *O. coerulescens*.] Address: Ficsor, M., North Hungarian Regional Environmental, Nature Conservation and Water Management Inspectorate, Laboratory, 4. Mindszent tér, H-3530, Miskolc, Hungary. E-mail: ficsor.mark@emikofe.kvvm.hu

**12561.** Fiedler, W. (2011): Kleines Drama im Teich. *Mindori* 22(Sommer 2011): 40-44. (in German) [Pictures of an *Aeshna* larva demonstrate preying of a newt larva and a mollusc.] Address: not stated

**12562.** Gnanasekaran, S.; Paulraj, M.G.; Sivasankaran, K.; Ignacimuthu, S. (2011): Diversity of Odonata (insecta) in the areas of Poondi reservoir (Tiruvallur district) in Tamil Nadu. *Hexapoda* 18(1): 19-24. (in English) ["The Odonata diversity and species composition in the surrounding areas of Poondi reservoir in Tiruvallur district of Tamil Nadu were studied from January 2009 to November 2010. The specimens were collected from agricultural crops, grasses, herbs and shrubs by sweeping net. Eighteen different species of Odonates belonging to 15 genera and four families were recorded during the study period. Family Libellulidae was predominant in this area with 11 species. Family Coenagrionidae was represented by five species. Other families viz., Lestidae and Gomphidae were represented by only one species each. The Shannon's and Simpson's diversity indices were maximum during Sep-Nov. 2009 with 2.381 and 0.8817 scores respectively. Maximum evenness of 0.6306 was recorded during Jun-Aug. 2010." (Authors)] Address: Ignacimuthu, S., Entomology Research Institute, Loyola College, Chennai – 600 034. Tamil Nadu, India. E-mail:entolc@hotmail.com

**12563.** Harvey, R.; Higgott, J. (2011): Reports from Coastal Stations—2010: Minsmere RSPB, Suffolk. *Atropos* 42: 63-64. (in English) [UK, *Anaciaeschna isosceles*] Address: not stated



- 12564.** Hodgson, K.I.; Howe, P. (2011): Reports from Coastal Stations—2010: Sandwich Bay Bird Observatory, Kent. *Atropos* 42: 59. (in English) [UK; *Lestes barbarus*, *Libellula fulva*, *L. quadrimaculata*, *Sympetrum fonscolombii*] Address: not stated
- 12565.** Hunter, I. Hunter, S. (2011): Reports from Coastal Stations—2010: Elms Farm, Icklesham, East Sussex. *Atropos* 42: 54-55. (in English) [UK, 27-VII-2010, maximum peak of 160+ specimens of *Erythroma viridulum*] Address: not stated
- 12566.** Ikemeyer, D.; Olthoff, M. (2011): Dragonfly survey in the peat bog of Yenicağa lake, province Bolu, Turkey. Report. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Eschborn. September 2011: 22 pp. (in English) ["A dragonfly investigation was carried out in the peat bog around Yenicağa lake in June and August 2011. During this investigation, 37 dragonfly species could be recorded. The peat bog is a valuable habitat for many dragonfly species. Highlights include *Leucorrhinia pectoralis* and *Cordulia aenea*, which were mainly found at peat cuttings. Further species like *Coenagrion pulchellum* or *Pyrrhosoma nymphula* tend to be confined to this habitat, too. Open bog habitats with shallow ponds and seasonally flooded depressions were important habitats for species like *Lestes dryas*, *Ischnura pumilio* or *Sympetrum flaveolum*. The banks of Yenicağa lake are characterized by high densities of *Sympetrum*-species among others. Furthermore, some running waters were investigated." (Authors)] Address: Ikemeyer, D., Biologische Station Zwillbrock e.V., Zwillbrock 10, 48691 Vreden, Germany. E-mail: info@bs-zwillbrock.de
- 12567.** Kawano, M.; Iwakiri, J.; Tachiyama, R.; Yamada, S. (2011): Estimation of water quality at Sakatani and Hiroto Rivers based on zoobenthos. Annual Report of the Miyazaki Prefectural Institute for Public Health and Environment 23: 112-118. (in Japanese, with English summary) ["The estimation of water quality based on ASPT (Average Score Per Taxon) is used a lot as an investigation indicating the river conditions. And the biological indicator by the zoobenthos is very important to make up for the chemical properties. Therefore, we have examined the water quality and biota of rivers flowing through Miyazaki prefecture since 1993. We investigated 3 points downward along the stream of Sakatani and Hiroto Rivers situated in the south part of the prefecture. In order to evaluate the river environment based on zoobenthos, we used ASPT and DI. Compared to the research in 1994, BOD (Biochemical Oxygen Demand) was significantly reduced. More species of zoobenthos were found, ASPT value was higher than 7.0 at all points except Obi. The result indicated that both rivers have generally maintained the water quality, biological condition and biodiversity at a good level." (Authors) The list of species includes *Sieboldius albarda*, *Sinogomphus flavolimbatus*, and *Onychogomphus viridicostus*.] Address: Kawano, M., Environmental Science Division, Miyazaki Prefectural Museum of Nature and History, 2-4-4 Jingu, Miyazaki, Miyazaki Prefecture 880-0053, Japan
- 12568.** Knill-Jones, S. (2011): Reports from Coastal Stations—2010: Isle of Wight. *Atropos* 42: 50-52. (in English) [UK, Brading Marsh, River Yar, *Libellula fulva*] Address: Knill-Jones, S.A., 2 School Green Road, Freshwater, Isle of Wight, PO40 9AL, UK
- 12569.** Kovács, K.; Csányi, B.; Deák, C.; Kálmán, Z.; Kovács, T.; Szekeres, J. (2011): Results of the Rába survey 2009 on aquatic macroinvertebrates 1. Faunistic results. *Acta Biol. Debr. Oecol. Hung.* 26: 135-151. (in Hungarian, with English summary) [In a joint Austrian-Hungarian study of the river Raab/Rába-system, in June 2009 eight Odonata species were collected: *Calopteryx splendens*, *C. virgo*, *Platycnemis pennipes*, *Ischnura elegans pontica*, *Stylurus flavipes*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, and *Onychogomphus forcipatus*.] Address: Kovács, K., North Transdanubian Regional Environmental, Nature Conservation and Water Management Inspectorate, Laboratory, Török Ignác u. 68., H-9028 Győr, Hungary. E-mail: krik@freemail.hu
- 12570.** Lejfelt-Sahlén, A. (2011): *Sympetrum pedemontanum* – ny trollslända i Sverige. *fauna & flora* 106(3): 40-41. (in Swedish) [*S. pedemontanum* was recorded at 4-IX-2011, along the river Husqvarna at Ramsjöholm about 15 km NE Stockholm, Sweden. This is a new species for Sweden.] Address: Anna Lejfelt-Sahlén c/o Sahlén, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, S-752 36 Uppsala, Sweden. E-mail: goran.sahlen@set.hh.se
- 12571.** Marquez Rodriguez, J. (2011): *Trithemis kirbyi ardens* (Gerstaecker, 1891) (Odonata: Libellulidae); datos de campo sobre su ecología en el Sur de España y primeros registros para la provincia de Sevilla (España). *Métodos en Ecología y Sistemática* 6(1-2): 10-20. (in Spanish, with English summary) ["In areas of the countryside of Seville (southern Spain) with a high burden and cattle farm, the number of odonates is reduced to a few species adapted to live in environments where there is a strongly marked by seasonal high temperatures and low rainfall in summer. The loss of natural habitats by human action or phenomena such as desertification, diffuse pollution of water by the subscriber of farmland, and the evidence of warming and climate change in countries like Spain, promote migration Odonata of African origin to Europe via the Mediterranean Sea. The observation of several adult specimens of *Trithemis kirbyi* at various locations near Corbones and Guadaira river valleys, to certify the first records of the species for the province of Seville and its colonization eroded by media exploitation of the earth, where most competitors are African species, ensuring suc-

successful expansion toward the north. (Author)] Address: Márquez Rodríguez, J., Departamento de Sistemas Físicos, Químicos y Naturales (Zoología). Universidad Pablo de Olavide, A-376 km 1, 41013 Sevilla, Spain. E-mail: jmarrod1@admon.upo.es

**12572.** Mezquita Aranburu, I.M.; Torralba Burrial, A. (2011): Primera cita de *Trithemis annulata* (Palisot de Beauvois, 1805) (Odonata, Libellulidae) para Navarra (norte de España). Boletín de la SEA 49: 360. (in Spanish, with English summary) [20-VIII-2010, male near Balsa del Pulguer (30TXM0690456752, 322 m asl), Cascante (Navarra), Spain] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

**12573.** Odin, N. (2011): Reports from Coastal Stations—2010: Landguard Bird Observatory, Suffolk. *Atropos* 42: 62. (in English) [UK, *Chalcolestes viridis*, *Anax imperator*, *Libellula depressa*] Address: not stated

**12574.** Premachandran, S.; Giacobello, M. (2011): The effect of wing corrugations on the aerodynamic performance of low-Reynolds number flapping flight. 17th Australasian Fluid Mechanics Conference, Auckland, New Zealand, 5-9 December 2010: 4 pp. (in English) ["The effect of wing corrugations on the aerodynamic performance of low Reynolds number hovering flight is investigated using two-dimensional Computational Fluid Dynamics. Corrugated sections with peaks that follow the contours of NACA sections are compared with the corresponding NACA airfoils, a flat plate of the same wall thickness as the corrugated sections, and a 1:4 ellipse. Simplified kinematics comprising combined heaving and pitching motions were simulated, and it was found that the thinner airfoil-type sections produced more lift than the thicker sections. The corrugated sections were found to perform similarly regardless of the size of the corrugated peaks and the orientation of the leading edge. The net vertical force in all of the corrugated cases was approximately the same as for the flat plate, indicating that wing corrugations produce no direct benefit in the generation of net vertical force for wings operating with hovering kinematics." (Authors) The paper includes references to dragonflies.] Address: Premachandran, S., Air Vehicles Division, Defence Science and Technology Organisation, 506 Lorimer St, Fishermans Bend VIC 3207, Australia

**12575.** Rai, K.R.K. (2011): Comparative studies on lentic environment of Mai pokhari, Ilam and Kechana jheel wetland ecosystems, Jhapa, Nepal (With reference to bottom dwelling fauna). *Nepalese Journal of Biosciences* 1: 32-36. (in English) ["Mai Pokhari is a mountain lake situated in midland at an altitude of 2150 m from sea level whereas Kechana jheel is situated in lowland (Tarai) at an altitude of 63 m from the sea level respectively. The lentic environments of the both lakes vary in

the composition of bottomdwelling fauna and limnetic fauna respectively. The comparative studies were carried out in two different years by sampling the macroinvertebrates periodically. The bottom-fauna at Mai pokhari was found higher than Kechana jheel. Mai pokhari is still in natural condition but Kechana jheel is losing its native entity because of aquaculture. Mainly, the abundance of Chironomids showed the stratification in Mai pokhari but abundance of Trichoptera and Coleoptera in Kechana jheel indicate unstable bottom condition because continuous application of manure for pre-conditioning it as a fish pond." (Author) Odonata abundance is less than 1% of total abundance of macrozoobenthos.] Address: Kalu Ram Khambu Rai, Dept Zoology, Mechi Campus, Tribhuvan University, Bhadrapur-5, Jhapa. E-mail: draikr@ntc.net.np

**12576.** Rojas-Riano, N.C. (2011): Sistemática del género *Polythore* Calvert, 1917 (Odonata: Polythoridae). Maestría thesis, Biología, línea Sistemática, Universidad Nacional de Colombia: 118 pp. (in English, with Spanish summary) ["The Neotropical damselfly genus *Polythore* is mainly distributed in western South America, in the foothills of the eastern slope of the Andes between Bolivia and Venezuela and in the Amazon region. In the present study, the 19 species of *Polythore* are revised based on morphological adult male characters from wing venation, wing pattern coloration, and genital ligula. Only general characters of females are included due to their polymorphism and to the limited availability of specimens in collections. Presence of supplementary sectors between RP2 and IR2 proximal to the pterostigma was found as a character that taxonomically defines the genus. Based on this character the new combination *P. chiribiquete* is proposed. The status of the populations proposed in the literature for species of the *picta* group is assessed by morphometric and multivariate analyses. Clear differentiation was found in populations of *P. procera* and *P. gigantea*. Populations of the remaining species differ only by characters proposed in the literature but not by other characters studied. Descriptions, illustrations, and an identification key to adult males are provided. A phylogenetic analysis of 49 species, including all the species of *Polythore* plus 29 out-group species, was performed based on wing venation, wing pattern coloration of male and female, and male genital ligula. Character coding and managing was conducted through DELTA package. Heuristic search tree was developed under the Ratchet method using NONA of the WinClada package. Partitioned analysis using male and female characters were designed and were compared with a total evidence analysis. Also, the relationship between morphological intraspecific variability and phylogenetic signal was studied using the species of *Polythore* as a model, through lineal and geometric morphometrics approach in two body regions: wings and genitalia. Total evidence analysis had the lowest percentage of strict homologies (22%), being near the percentage of partitioned analysis of female

characters (32%), while partitioned analysis of male characters had the highest percentage of strict homologies with 37%. The statistical support for individual clades was assessed with Bootstrap and Bremer values. A strict homology as support of the monophyly of Polythore was found. Of the six species groups proposed in the literature, only three were found to be natural groups. The sister group of Polythore is Euthore. Polythore williamsoni is registered for the first time for Colombia" (Author)] Address: Rojas-Riano, Nancy, Biologist. Graduate student M.Sc., Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Sede Bogotá. Carrera 30 no. 45-03 AA. 7495. Bogotá D.C., Colombia. E-mail: ncrojasr@unal.edu.co

**12577.** Scott, D.A. (2011): Reports from Coastal Stations—2010: Dursey Island, Co. Cork. *Atropos* 42: 71. (in English) [Ireland, *Aeshna juncea*, *Sympetrum striolatum*] Address: not stated

**12578.** Silveira, M.R.; Bemvenuti, M.; Moresco, A. (2011): Hábito alimentar de *Oligosarcus robustus* Menezes, 1969 e de *Oligosarcus jenynsii* (Günther, 1864), no sul do estado do Rio Grande do Sul. *Atlântica*, Rio Grande 33(1): 73-86. (in Portuguese, with English summary) ["The characiform fishes *O. robustus* and *O. jenynsii* inhabit the coastal lagoons of the extreme southern Brazil. They "were characterized according to their morphologic variation and feeding structures as well as to their feeding habit. Specimens were collected in two periods (July and December 2001) in the Flores, Nicola, Jacaré and Mangueira lagoons. The food range was determined using the frequency of occurrence (FO%) and gravimetric methods (G%). A total of 164 specimens were analyzed, 67 of which had empty stomachs. The most frequent food items for *O. robustus* were insects FO=58,6%, fish FO=46,3% and crustaceans FO=12,2%. For *O. jenynsii* insects were dominant FO=83,9%, followed by crustaceans FO=35,7% and fish FO=26,8%. Insects were more frequent during summer for both species, Ephemeroptera and Odonata were the dominant groups. Fish were the main item in the diet of *O. robustus* during winter while *O. jenynsii* maintained the preference for the same group of insects during the cold season. The feeding strategy determined by the Amundsen graphic method showed that *O. jenynsii* is generalist preferring insects throughout the year while *O. robustus* is generalist opportunistic choosing insects during summer and fish in the wintertime." (Authors)] Address: Silveira, Marta Rahal, Unive Federal do Rio Grande – Inst. de Oceanografia, Caixa Postal 474 - Rio Grande, RS, Brasil. 96.201-900. E-mail: martarahal@bol.com.br

**12579.** Simaika, J.P. (2011): Practical conservation planning from local to continental scales using freshwater invertebrates. Dissertation presented for the degree of Doctor of Philosophy in Conservation Ecology at the University of Stellenbosch: XVI + 123 pp. (in English)

["Dragonflies are a valuable tool for assessing aquatic systems and have been used as indicators of ecological health, ecological integrity, and environmental change, including climatic change. In four separate studies I explored the usefulness of dragonflies as surrogates in biomonitoring, site prioritization and indication of global climate change. In the use of dragonflies for biomonitoring, I field-tested a freshwater ecological integrity index, the Dragonfly Biotic Index (DBI), based on dragonfly assemblages at the local scale, and compared the DBI to a standard freshwater benthic macroinvertebrate-based freshwater health index. Overall, dragonflies were more sensitive to changes in river condition than were macroinvertebrates, and the DBI site value and macroinvertebrate scores were highly significantly correlated. I conclude that dragonfly assemblages in the form of a DBI are an excellent tool for environmental assessment and monitoring freshwater biodiversity, with the potential to replace benthic macroinvertebrate-based freshwater quality assessments. In the second study, I used the DBI to prioritize sites for conservation action in South Africa. Using a selected set of top prioritized sites, I compared the DBI's performance to that of a rarity-complementarity algorithm. Site prioritization using the DBI reveals that CFR sites protect Red Listed taxa rather well. The rarity-complementarity algorithm represents all species, but without greater emphasis on the rare and threatened species. I conclude that the DBI is of great value in selecting biodiversity hotspots, while the algorithm is useful for selecting complementarity hotspots. The third study was made possible by the recent completion of a continental assessment of freshwater biodiversity, which revealed that patterns of richness and threat of four well-studied aquatic taxa largely coincide at the continental scale. Using only dragonflies, I built a protected areas network for Africa using spatial planning software. I then compared the performance of the existing African reserve network and that of known global biodiversity hotspots against the model, and identified sites of conservation concern. Although the current reserve network covers 10.7% of the landscape, the proportional representation of species geographic distributions in reserves is only 1.1%. The reserve network is therefore inefficient, and many areas of conservation priority that are not formally protected remain. The advantage of operating at the fine scale, while covering a large geographic area is that it shifts the focus from the large-scale hotspots to smaller priority areas within and beyond hotspots. In the fourth study, I created species distribution models of dragonflies in an El Niño-prone biodiversity hotspot in South Africa, and predicted the changes in species richness, geographic range and habitat suitability, forty and eighty years from now. According to the model results of two different emissions scenarios, at least three species will be lost from the area by 2050, and four by 2080. The remaining species are predicted to persist with reduced geographical ranges, at generally higher elevations. Most species presented here thrive quite well in artificial



environments, that is, engineered ponds or dams. It is therefore unlikely that loss in connectivity will play a role for these species." (Author)] Address: Simaika, J.P., Department of Conservation Ecology and Entomology, Stellenbosch University, P Bag X1, Matieland 7602, South Africa. E-mail: john.simaika@senckenberg.de

**12580.** Siregar, A.Z.; Rawi, C.S.M.; Nasution, Z. (2011): Population density of damselfly *Agriocnemis femina* (Odonata: Coenagrionidae) in Manik Rambung ricefield, Simalungun-Sumatera Utara. *Jurnal Ilmu Pertanian KULTIVAR* 5(1): 23-31. (in English) [Indonesia; "The objective of this research was to study effect and correlation of physics-chemistries with density of *A. femina*. The method using Mark Release Recapture with 8 stations in Manik Rambung Village, Simalungun District. The result showed 2351 individuals of *A. femina*, consist of male 1345 individuals and female 1006 individuals. Recapture rates of males and females were 87% and 13%, while score of Lincoln's indices highest calculated in twelve sampling were 451 individuals. The result of analysis correlation showed humidity given effects on population of density *A. femina* recapture were 0.432." (Authors)] Address: Siregar, Ameilia, Postgraduate Student in School of Biological Sciences-University Science Malaysia, Malaysia. E-mail: zuli-yanti@yahoo.com

**12581.** Sivtseva, L.V. (2011): New data for distribution of rare species of dragonflies and damselflies (Odonata) in Yakutia . *Proceedings of the Russian Entomological Society* 82: 13-16. (in Russian, with English summary) ["A new data on the distribution of rare species of dragonflies and damselflies *Aeshna grandis*, *A. subarctica*, *Somatochlora arctica* and *S. sahlbergi* in Yakutia are given. *A. subarctica* is recorded for the first time for the Central Yakutia, and *S. arctica* is a new species for the Southern Yakutia." (Author)] Address: Sivtseva, L.V., Institute for Biological Problems of Cryolithozone SB RAS, Lenin av., 41, Yakutsk 677980, Russia. E-mail: sivtseval@mail.ru

**12582.** Solly, F.; Milton, P.; Sawyer, D. (2011): Reports from Coastal Stations—2010: Isle of Thanet, Kent. *Atropos* 42: 60-61. (in English) [UK, *Orthetrum cancellatum*, *Sympetrum fonscolombii*] Address: not stated

**12583.** Spence, B. (2011): Reports from Coastal Stations—2010: Spurn Point, East Yorkshire. *Atropos* 42: 67-68. (in English) [UK, *Calopteryx splendens* flow north-west along the seashore] Address: not stated

**12584.** Subramanian, K.A.; Kakkassery, F.; Nair, M.V. (2011): Chapter 5 "The status and distribution of dragonflies and damselflies (Odonata) of the Western Ghats. In: Molur, S., Smith, K.G., Daniel, B.A. and Darwall, W.R.T. (Compilers). 2011. *The Status and Distribution of Freshwater Biodiversity in the Western Ghats, India*. Cambridge, UK and Gland, Switzerland: IUCN, and Co-

imbatore, India: Zoo Outreach Organisation: 63-72. (in English) ["Conclusions and conservation recommendations: The river basins and associated freshwater ecosystems of the Western Ghats are global hotspots for odonates with high levels of endemism. Even though only 3.2% (four species) of the species are known threatened, over a quarter of the odonates in the region (46 species) have been assessed as DD. Many of these species are likely to be threatened as they are only known from historical records, often just the type specimens, and urgently need more survey work to identify their current ranges, populations and threats. Research is also required in those large areas where there is insufficient information on odonate diversity and distributions such as those south and north of the southern Karnataka–northern Kerala habitats and eastwards into the Deccan plateau. Many of the endemic odonates such as *Disparoneura apicalis* (VU) (Protoneuridae), *Platysticta deccanensis* (VU) (Platystictidae), *Melanoneura bilineata* (NT) (Protoneuridae) or *Idionyx* spp. (Cordulidae) are very narrowly distributed within the Western Ghats. The destruction of riverine habitats by hydro-electric and irrigation projects threatens the survival of these odonates, which depend on fast flowing torrential streams or stream associated habitats such as *Myristica* swamps. Destruction or alteration of a small catchment means likely extinction of these species. The protection of key habitats (fast flowing streams) for these species is an immediate priority. This is particularly urgent for species such as *Disparoneura apicalis*, *Calocypha laidlawi* and *Melanoneura bilineata*. Long term conservation of the odonate fauna of the region depends upon: (1) conservation of riparian forest cover, (2) prevention of flow modifications in streams and rivers, (3) conservation of *Myristica* swamps and high altitude peat bogs, and (4) prevention of use of pesticides and other agrochemicals in upper catchments of rivers." (Authors)] Address: Subramanian, K.A., Zoological Survey of India, M-Block, New Alipore, Kolkata, West Bengal 700053, India. subbuka.zsi@gmail.com

**12585.** Tabugo, S.R.M.; Torres, M.A.J.; Demayo, C.G. (2011): Determination of developmental modules and conservatism in the fore- and hind-wings of two species of dragonflies, *Orthetrum sabina* and *Neurothemis ramburii*. *International journal of agriculture & biology* 13: 541-546. (in English) ["The wings of dragonflies are highly compartmentalized as shown by the major and minor veins separating the different compartments or modules. There is a long term hypothesis that compartments of the wings as bounded by the veins may correspond to units of "gene regulation". Are the different compartments 'units of gene regulation' and is there genetic conservatism on the wings of the dragonfly? This study was therefore, conducted to evaluate whether there is a number and pattern of developmental modules in dragonfly wings and determine whether there exists genetic conservatism based on intra and inter-modular variations in the wings. The study was con-

ducted in two cosmopolitan species of Libellulid dragonflies. Different hypotheses were formulated and tested as to the possible spatial boundaries based on major wing venations. A priori models applying the tools of geometric morphometrics were constructed and statistically tested for the goodness of fit test (GoF) statistic by comparing the observed and expected covariance matrices. Jackknife support values for each variational model were also computed using  $Y^*$  as the GoF statistic. Results showed fair consistency in the observed number and patterns of hypothesized developmental modules implying that the wings of these species of dragonflies are highly conserved. It is concluded that there is genetic conservatism in the morphological spaces in the wings of the two species." (Authors)] Address: Demayo, C.G., Dept of Biol. Sciences, College of Science and Mathematics, MSU-Iligan, Institute of Technology, Iligan City, Philippines. E-mail: cgdemayo@gmail.com

**12586.** Torralba Burrial, A.; García Pérez, J.A.; García García, I. (2011): Primera cita de Gomphus pulchellus Selys, 1840 (Odonata: Gomphidae) para Asturias (Norte de España). Boletín de la SEA 49: 294. (in Spanish, with English summary) [28-V-2011, near Pesoz (29TPH7477296071, 255 m a.s.l.), Spain] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**12587.** Tunmore, M. (2011): Reports from Coastal Stations—2010: Lizard Peninsula. Atropos 42: 47-48. (in English) [UK; 10-X-2010; Sympetrum fonscolombii] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: atropos@atroposed.freesevice.co.uk

**12588.** Zhao, H.X.; Yin, Y.J.; Zhong, Z. (2011): Assembly modes of dragonfly wings. Microscopy Research and Technique 74(12): 1134-1138. (in English) ["The assembly modes of dragonfly wings are observed through FEG-ESEM. Different from airplane wings, dragonfly wings are found to be assembled through smooth transition mode and global package mode. First, at the vein/membrane conjunctive site, the membrane is divided into upper and lower portions from the center layer and transitioned smoothly to the vein. Then the two portions pack the vein around and form the outer surface of the vein. Second, at the vein/spike conjunctive site, the vein and spike are connected smoothly into a triplet. Last, at the vein/membrane/spike conjunctive site, the membrane (i.e., the outer layer of the vein) transitioned smoothly to the spike, packs it around, and forms its outer layer. In short, the membrane looks like a closed coat packing the wing as a whole. The smooth transition mode and the global package mode are universal assembly modes in dragonfly wings. They provide us the references for better understanding of the functions of dragonfly wings and the bionic manufactures of the

wings of flights with mini sizes." (Authors)] Address: Zhong, Z., School of Aerospace Engineering and Applied Mechanics, Tongji University, Shanghai 200092, China. E-mail: zhongk@tongji.edu.cn

## 2012

**12589.** Abdelsalam, K.M. (2012): Benthic macro- and meso-invertebrates of a sandy riverbed in a mountain stream, central Japan. Limnology 13(1): 171-179. (in English) ["Quantitative samples of benthic invertebrates were collected from a sandy riverbed of a mountainous stream (Kozu site of Takami-gawa stream, Nara Prefecture), central Japan by core samplers in five sampling occasions through the years 2008–2009. A total of 120 taxa (including 'Davidius') were identified, representing 55 families and 97 genera. Insects formed about 92% of the total recorded taxa and 88% of individuals' abundance. A total of 111 taxa of aquatic insects, belonging to 49 families and 92 genera, were identified and represented by ten orders. Oligochaeta and Acari were dominant non-insect invertebrates. Diptera was the most diverse insect group, followed by Trichoptera and Ephemeroptera. Dominant taxa were mesoinvertebrates, younger stages of macroinvertebrates, both of which predominantly inhabit the interstitial zone of a sandy riverbed. Both taxon richness and invertebrate abundance were higher in February 2009 and lower in April and August 2008. A few major invertebrate taxa demonstrated distinct seasonal trends; i.e. Nymphomyia alba, Rheosmittia, and Corynoneura were abundant in February 2009. Newly hatched larvae of Larcasia akagiae were abundant in May 2008. This study also demonstrated the effectiveness of core samplers to collect small-sized benthic fauna that inhabit the interstitial or hyporheic zone of the sandy riverbed." (Author)] Address: Abdelsalam, K.M., Marine Biota Taxonomy Laboratory, National Institute of Oceanography and Fisheries (NIOF), Qayet Bay, Alexandria, Egypt. E-mail: kh.abdelsalam@gmail.com

**12590.** Álvarez Gándara, J.; Estévez Rodríguez, R. (2012): Primeros registros de Orthetrum brunneum (Fonscolombe, 1837) para la provincia de Lugo (Galicia, N.W. Península Ibérica) (Odonata, Libellulidae). Archivos entomológicos 7: 161. (in Spanish, with English summary) [12-VIII-2012; province of Lugo (Galicia, Spain), Vilalpape-Bóveda, 375 m.a.s.l., UTM10x10 29TPH21.] Address: Álvarez Gándara, J., Barrio do Souto, 10 B. E-36740 San Salvador de Tebra, Tomiño, Spain. E-mail: lcgandara@yahoo.es

**12591.** Ángeles Álvarez, M.; Torralba Burrial, A. (2012): Primera cita de Sympetrum meridionale (Selys, 1841) (Odonata: Libellulidae) para Asturias (norte de la Península Ibérica). Boletín de la SEA 51: 346. (in English) [07-X-2012, Llodero (WGS84: 30TTP6447430218; 0 m a.s.l.; Zeluán, Gozón), Asturias (Spain).] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

mos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**12592.** Ángeles Álvarez, M.; Martínez Rubio, A.; Bueno, J.; Noval, I.; Cimadevilla Suárez, C.; Torralba Burrial, A. (2012): Primeras citas de *Aeshna affinis* Vander Linden, 1820 (Odonata: Aeshnidae) para Asturias (norte de la Península Ibérica). *Boletín de la SEA* 51: 357-358. (in Spanish, with English summary) [Records of *A. affinis* from Asturias (Spain) are reported.] Address: Torralba Burrial, A., Depto de Biología de Organismos y Sistemas, Univ. de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**12593.** Balachandran, C.; Anbalagan, S.; Dinakaran, S. (2012): Influence of environmental parameters on the aquatic insect assemblages in Meghamalai hills, South India. *Life sciences Leaflets* 9: 72-81. (in English) ["In order to develop discreet management practices for lotic ecosystems, it is inevitable to gather subsequent information on their ecological status which involves monitoring the environmental parameters and biodiversity attributes. The distribution and composition of aquatic insect communities in streams at a local scale are considered to be primarily determined by environmental factors and interactive relationships within the system. The current study was carried out to investigate the effects of environmental variables on the assemblages of aquatic insects in the streams of Meghamalai hills. Six different streams in Meghamalai hills were selected as sampling sites and were examined for the water quality and aquatic insect assemblages. A total of 2139 individuals of aquatic insects, belonging to 10 orders, 28 families and 30 genera (including *Heliogomphus*), were collected from six streams. The collectors occupied a predominant group amongst all the functional feeding groups of insects followed by scrapers, predators and shredders. Higher diversity of aquatic insects was found at the middle order streams. The BMWP scores revealed that among the six sites studied, Site VI had the best water quality while Site III had the least water quality. Among the 12 environmental variables taken into account for the study, riparian vegetation, pH, conductivity, atmospheric temperature and stream order were found to be influencing the distribution of aquatic insects." (Authors)] Address: Balachandran, C., Energy & Wetlands Research Group, Centre for Ecological Sciences, Indian Inst. of Science, Bangalore, India. E-mail: bchandruji@gmail.com

**12594.** Bernard, R.; Buczyński, P. (2012): Wazki – Odonata. In: C. Błaszak, [Ed.], *Zoologia*, Vol. 2, Pt 1, Wydawnictwo Naukowe PWN, Warszawa: 131-144. (in Polish) [Odonata chapter in the Polish standard zoology handbook] Address: Bernard, R., Dept of General Zoology, Adam Mickiewicz University, Umultowska 89, PL-61-702 Poznań, Poland; E-mail: bernard@amu.edu.pl

**12595.** Bogan, M.T.; Boersma, K.S. (2012): Aerial dispersal of aquatic invertebrates along and away from arid-land streams. *Freshwater Science* 31(4): 1131-1144. (in English) [Arizona, USA; "Dispersal is an essential process in metapopulation and metacommunity dynamics. Most studies of aquatic invertebrate dispersal in streams have focused on in-stream drift of larvae. However, understanding aerial dispersal is important for predicting community assembly in isolated habitats after disturbance or stream restoration. We used artificial pools placed at 3 distances (5, 75, and 250 m) from 1 perennial and 1 ephemeral arid-land stream to examine aerial-dispersal dynamics of aquatic invertebrates over a 6-wk period in summer 2009. We also conducted a 2-wk experiment to examine the relationship between daily rainfall and disperser abundance at the perennial site. Sixty-six aquatic invertebrate taxa colonized the artificial pools. They represented 1/3 of taxa documented from neighbouring perennial streams. Abundance and species richness declined with distance away from both streams. This result suggests that ephemeral stream channels may serve as important aerial dispersal corridors for aquatic invertebrates even when no surface water is present. Mean species richness tripled after 58 mm of rain during the 4th wk of the experiment. Data from the 2-wk experiment highlighted the role of rainfall as a dispersal cue in this system. Amount of daily rainfall explained 48 to 77% of the variation in disperser abundance at 5, 75, and 250 m from the perennial site. We used spatiotemporal dispersal patterns observed in our study to identify 5 modes of aerial dispersal among 56 taxa: 1) widespread common, 2) widespread hapazard, 3) range-restricted, 4) cue-limited, and 5) infrequent. Classification of specific aerial-dispersal modes provides a conceptual framework for modelling spatially explicit community responses to disturbance, stream restoration, and climate-change-induced habitat contraction or expansion." (Authors) Odonata nymphs (unidentified Libellulidae) appeared in week 5.] Address: Bogan, M.T., Zoology Department, 3029 Cordley Hall, Oregon State University, Corvallis, Oregon 97331 USA. E-mail: boganmi@science.oregonstate.edu

**12596.** Brotons Padilla, M.; Ocharan, F.J.; Outomuro, D.; Torralba-Burrial, A. (2012): Odonatos del Parque Nacional de Cabañeros (Ciudad Real, España Central) (Insecta: Odonata). *Boletín de la Sociedad Entomológica Aragonesa* 50: 341-344. (in Spanish, with English summary) ["A total of 37 species of Odonata from Cabañeros National Park (central Spain) have been recorded, eight of which are also new to the province of Ciudad Real."] Address: Brotons Padilla, M., c/ Caldereros 14 1o b. 13300 Valdepenas, Spain. E-mail: brotonspadilla@gmail.com

**12597.** Caixero, A.P. (2012): Características espermáticas de quatro espécies de Odonata (Insecta). Tese apresentada á Universidade Federal de Viosa, como parte das exigências do Programa de Pós-Graduagão



em *Biología Celular e Estructural*, para obtenção do título de *Doctor Scientiae*: x + 61 pp. (in Spanish, with English summary) ["... The ultrastructural features of the sperm has shown promise for phylogenetic analyzes in many insect groups, but such studies are still lacking for Odonata. Thus, this study aimed to describe the structure and ultrastructure of spermatozoa of species of Odonata suborders: Zygoptera and Anisoptera, searching for information that would assist in understanding the systematics of this group of insects. For this, sperm from seminal vesicles and testes of adult males of the *Ischnura fluviatilis*, *Pantala flavescens*, *Tramea abdominalis* and *Micrathyrja hesperis* were prepared for light and transmission electron microscopy. The sperm of these species have some characteristics similar to those presented by the sperm of most Pterygota. However, some differential characteristics stand out: lack of perforatorium in the acrosome and of paracrystalline material in the mitochondrial derivatives; flagellum very short, possibly immobile with small mitochondrial derivatives inspecies of Libellulidae; and lack of accessories bodies and microtubule arrangement 9+9+0 in species of the Trameinae subfamily. The analysis of the ultrastructure of spermatozoa enabled the differentiation of the two suborders of Odonata, as well as, the species of two Libellulidae subfamilies studied." (Author)] Address: not stated

**12598.** Chelmick, D. (2012): Observations of the Willow Emerald damselfly *Lestes viridis* (Vander Linden) in Britain. *Atropos* 46: 38-42. (in English) [History and distribution of *L. viridis* in UK; identification of imago; life history] Address: Chelmick, D.G., 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK. E-mail: dgc@david.chelmick.com

**12599.** Chovanec, A.; Wimmer, R.; Rubey, W.; Schindler, M.; Waringer, J. (2012): Hydromorphologische Leitbilder als Grundlage für die Ableitung gewässertyp-spezifischer Libellengemeinschaften (Insecta: Odonata), dargestellt am Beispiel der Bewertung der restrukturierten Weidenbach-Mündungsstrecke (Marchfeld, Niederösterreich). *Wiss. Mitt. Niederösterreich. Landesmuseum* 23: 83-112. (in German, with English summary) ["Hydromorphological reference conditions as basis for deriving river-type-specific dragonfly communities (Insecta: Odonata): a case study at the rehabilitated downstream stretch of the Weidenbach (Lower Austria): The ecological status of the rehabilitated downstream stretch of the Weidenbach in the lowland areas of Lower Austria was assessed by dragonfly surveys at three sections. Key element of the assessment procedure, which is in compliance with the EU Water Framework Directive (WFD), is a comparison between the current situation and river-type-specific reference conditions. Hydromorphological references served as basis for deriving the reference dragonfly community. The section with the smallest deviation from the hydromorphological reference was colonised by a near river-type-specific dragonfly

community. Species composition, the Odonata Habitat Index, species-specific habitat values and flow preferences were considered in the assessment. A total of 27 species were recorded, 19 species of them were classified as autochthonous. All four species of the genus *Orthemtrum* occurring in Central Europe were found. The river stretch was ranked as class II ("good ecological status"), which represents the second best class and the quality target in the 5-tiered WFD classification scheme." (Authors)] Address: Chovanec, A., Krottenbachgasse 68, A-2345 Brunn am Gebirge, Austria. E-mail: a.chovanec@kabsi.at

**12600.** Cordero Rivera, A.; Torralba-Burrial, A.; Ocharan, F.J.; Cano, F.J.; Outomuro, D.; Azpilicueta Amorin, M. (2012): *Macromia splendens*. En: VV.AA., Bases ecológicas preliminares para la conservación de las especies de interés comunitario en España: Invertebrados. Ministerio de Agricultura, Alimentación y Medio Ambiente. Madrid: 67 pp. (in Spanish) [Odonata species protected under the European Community law are treated according the legal definitions of the Fauna, Flora, Habitat Directive. Information on identification, general distribution, ecology and habitat, 'favourable conservation status' on different geographic scales, conservation measures, and regional bibliography are given. This manual refers to the situation of *M. splendens* in Spain.] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**12601.** Csányi, B.; Szekeres, J.; György, Á.I.; Szalóky, Z. (2012): Macrozoobenthon investigations along the Lower Danube between Calarasi and Braila, Romania. *Acta Biol. Debr. Oecol. Hung.* 28: 47-59. (in English, with Hungarian summary) [In the framework of the improving the navigability of the Lower Romanian Danube between Calarasi and Braila (375 fkm – 175 fkm) a detailed survey program of aquatic macroinvertebrates and fish was performed. On-site sampling of macroinvertebrates was carried out in early summer of 2011 between 31 May and 4 June. Altogether 16 Kick and Sweep multi-habitat samples in the littoral zone and 18 dredged samples in the deep water zone were collected. A motor boat was used in 11 sites of the main arm. Mussel populations were estimated along the banks with free diving method. There were Cnidaria (1), Annelida and leeches (7), snails (10), mussels (9), Malacostraca (18), Ephemeroptera (4) Odonata (2), Heteroptera (6), Trichoptera (4), Coleoptera (3) and Diptera (3) taxa detected. Results illustrate that in deep zones characterized by uniform moving sand fraction only has very scarce community with low taxon numbers. The littoral zone of the low discharge conditions that has low bed erosion and not significant sediment deposition contains very rich macroinvertebrate communities, especially at those sections that are having rocky habitats, as well. Interesting faunistic results were the detection

of the leech (*Batracobdelloides moogi*), a snail (*Theodoxus transversalis*), a very rare mussel (*Unio crassus*) and a brackish water invader Crustacea species (*Pseudocuma longicorne ponticum*) on this Danube section." (Authors) *Stylurus flavipes*] Address: Csányi, B., Environmental & Water Management Research Institute Non-profit Ltd., Nonprofit Kft., H-1095 Budapest, Kvaszay Jenő út 1, Hungary. E-mail: bela.csanyi@gmail.com

**12602.** Fukumoto, M.; Eda, S. (2012): New record of *Aciagrion migratum* Selys from the Saku area in Nagano prefecture. *Tombo* 54: 142. (in Japanese, with English summary) ["*A. migratum* has rapidly advanced northward in Japan recently, probably due to a warm change of climate. This species has been very rare in Nagano prefecture except in the southern district. In this paper, we reported it for the first time from Saku district, in the eastern area of Nagano prefecture." (Authors)] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**12603.** Futahashi, R.; Sasamoto, A. (2012): Revision of the Japanese species of the genus *Rhipidolestes* (Megapodagrionidae) based on nuclear and mitochondrial gene genealogies, with a special reference of Kyushu-Yakushima population and Taiwan-Yaeyama population. *Tombo* 54: 107-122. (in English, with Japanese summary) ["Here we report a revision of Japanese *Rhipidolestes* (Megapodagrionidae) species based on nuclear and mitochondrial gene genealogies, along with morphological findings. In Japan, six *Rhipidolestes* species (*R. aculeatus* Ris, 1912, *R. okinawanus* Asahina, 1951, *R. hiraoui* Yamamoto, 1955, *R. asatoi* Asahina, 1994, *R. shozoi* Ishida, 2005, and *R. amamiensis* Ishida, 2005) and two subspecies (*R. aculeatus yakusimensis* Asahina, 1951, and *R. amamiensis tokunoshimensis* Ishida, 2005) have been described so far. Because the differences in morphological characteristics between each species/subspecies are subtle, it has been difficult to determine the phylogenetic classification of these groups. Based on the results of our molecular phylogenetic analyses using nuclear DNA (1TS1 and ITS2 regions) and mitochondrial DNA (16S ribosomal RNA and COI regions) sequences, we newly show that Kyushu-Yakushima and Taiwan-Yaeyama Islands populations apparently belong to different clades, *R. yakusimensis* stat. nov. and *R. aculeatus* (sensu stricto), respectively. We confirmed that *R. shozoi* and *R. okinawanus* in the Okinawajima Island can be clearly distinguished, whereas the differences between nominotypical *R. amamiensis* and *R. amamiensis tokunoshimensis* were rather obscure. We also recognized genetic differences between Kyushu and Yakushima populations of *R. yakusimensis*, between Yaeyama and Taiwan populations of *R. aculeatus*, and between middle Okinawajima and Tokashikijima populations of *R. okinawanus*, though we do not discuss them in detail at present. Overall, the results of molecular phylogeny in Japanese *Rhipidolestes* group coincided with the closeness of geographic distribution rather than the similarity of genital

morphology." (Authors)] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**12604.** Gashaw, H.; Mengistu, S. (2012): Ecological assessment of lake Hora, Ethiopia, using benthic and weed-bed fauna. *Momona - Ethiopian Journal of Science* 4(2): 3-15. (in English) ["Urbanization and human settlement in close proximity to the Ethiopian lakes are among the potential causes of changes in water quality and quantity. The drastic changes occurred into one of the Bishoftu crater lakes (Kilole) best exemplify this phenomenon. The purpose of this study was ecological assessment of Lake Hora using benthic and weed-bed fauna. Samples of benthic and weed-bed were collected monthly from September 2009 to March 2010 at 3 sampling stations (A, B, C), with a standard Ekman grab. Station A is in front of Ras Hotel, Station B is place of Irecha and station C was to the south crater of the lake. The benthic and weed-bed fauna of Lake Hora included a total of 6958 individuals within 27 taxa belonging principally to Copepod (2812) and Chironomidae (1460) and Ecdyonuridae (735). A high number of organisms were observed mainly at stations B and A (3198 and 2342 respectively). The correlation result indicates that oxygen showed strong relation to benthic and weed bed fauna distribution and abundance. There were high number of individuals, taxa diversity, evenness and grate number of rare taxa of benthic and weed-bed fauna at stations A and B, but these stations were affected by the community around the lake area for different reasons (for example washing clothes, boat parking and others). However low density and abundance of macroinvertebrates at station C could be due to: low organic matter load at station C which was free of human interactions; steeply slope geographical setting of the profoundly and its catchment and low vegetation cover. The Family Biotic Index result for all the sampling stations was 7.55, according to Hilsenhoff Family Biotic Index this value is indicating likely severe organic pollution and very poor water quality in all sampling sites. As this research finding indicates Lake Hora needs protection management strategies to maintain its sustainable use." (Authors) Taxa including Coenagrionidae and Lestidae are treated at family level.] Address: Gashaw, H., Dept of Biology, Addis Ababa University, Addis Ababa, Ethiopia. E-mail: habibag2@gmail.com

**12605.** Germann, A. (2012): Die fliegenden Edelsteine der Saarpfalz. *Libellen - pfeilschnell und farbenprächtig. Saarpfalz-Jahrbuch 2013*: 161-167. (in German) [Saarland, Gerany; this is a general account on Odonata with many biological information and a brief introduction in the regional fauna of the Saar-Pfalz county.] Address: not stated

**12606.** Goffart, P.; Motte, G.; Vandevyvre, X. (2012): Un afflux exceptionnel de *Leucorrhinia* à gros thorax (*Leucorrhinia pectoralis*) en Wallonie en 2012. *Les Nat-*

uralistes belges 93(4): 85-94. (in French, with English summary) ["*L. pectoralis* is a rare species in Wallonia (South Belgium). However, during the 2012 season, this species has been encountered, sometimes numerous, on 24 sites scattered in diverse regions of the territory, while it has been noticed only very sporadically during the ten preceding years. The influx has been sudden, concentrated from the 24th to the 30th of May in each concerned part of the territory. It corresponded to a period of fine weather under the influence of continental currents with east winds. Dragonflies have been seen there again until mid-June in the Ardenne and Lorraine and early July in the Hainaut. Egg-layings were recorded at several sites. The possible origin, local and/or distant, of these white-faced darters is discussed in the light of available observations. The hypothesis of an influx from the eastern regions of Europe is privileged." (Authors)] Address: Goffart, P., Département de l'Etude du Milieu naturel et agricole (DEMna), Service Public Wallon (SPW) - DGARNE - Direction de la Nature et de l'Eau, Avenue Maréchal Juin, 23 - 5030 Gemnloux Belgium. E-mail : Philippe.GOFFART@spw.wallonie.be

**12607.** Hacet, N.; Çokkuvvetli, K.T. (2012): Records of Odonata from rice fields in the Edirne province in Turkish Thrace. *Notul. odonatol.* 7(10): 89-92. (in English) ["During the 2001 and 2009 surveys, 20 species were recorded. The most common of these were *Ischnura elegans*, *Crocothemis erythraea*, *Orthetrum albistylum* and *Sympetrum fonscolombii*, whereas *Gomphus flavipes*, *Ophiogomphus cecilia* and *Orthetrum cancellatum* occurred at a single locality each. *O. cecilia* represents the second record from Turkish Thrace. The role of Odonata in the bio-control of the pests in rice fields is discussed." (Authors)] Address: Hacet, N., Dept of Biology, Faculty of Science, Trakya University, 22030 Edirne, Turkey. E-mail: nhacet@hotmail.com

**12608.** Henderson, B.L.; Chumchal, M.M.; Drenner, R.W.; Deng, Y.; Diaz, P.; Nowlin, W.H. (2012): Effects of fish on mercury contamination of macroinvertebrate communities of grassland ponds. *Environmental Toxicology and Chemistry* 31(8): 870-876. (in English) ["Mercury is an environmental contaminant that negatively affects the health of vertebrate consumers such as fish, birds, and mammals. Although aquatic macroinvertebrates are a key link in the trophic transfer of Hg to vertebrate consumers, Hg contamination in macroinvertebrate communities has not been well studied. The purpose of the present study was to examine how Hg in macroinvertebrate communities is affected by the presence of fish. We sampled macroinvertebrates from five ponds with fish and five ponds without fish, at the Lyndon B. Johnson National Grassland in north Texas, USA. Ponds without fish contained a higher biomass of macroinvertebrates and taxa with higher concentrations of Hg, which led to a higher Hg pool in the macroinvertebrate community. A total of 73% of the macroinvertebrate biomass from ponds without fish was composed

of taxa with the potential to emerge and transport Hg out of ponds into terrestrial food webs. The results of the present study suggest that small ponds, the numerically dominant aquatic ecosystems in the United States, may be more at risk for containing organisms with elevated Hg concentrations than has been appreciated." (Authors) Taxa include Odonata and are treated at the genus level.] Address: Henderson, B.L., Institute for Environmental Studies & School of Geology, Energy, & the Environment, Texas Christian Univ., Fort Worth, Texas, USA.

**12609.** Hippke, M. (2012): Die Feuerlibelle *Crocothemis erythraea*, eine neue Libellenart für das LSG „Schlosspark Ludwigslust“. *Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 15(1): 98. (in German) [Mecklenburg-Vorpommern, Germany; 30.06.2012] Address: Hippke, M., Wiesenring 29, 19370 Parchim, Germany. E-mail: mathias-hippke@web.de

**12610.** Horvai, V.; Czirok, A.; Lökkös, A.; Borza, P.; Bödis, E.; Deák, C. (2012): New faunistic data from the riparian zone of the Hungarian-Croatian reach of Drava River. *Acta Biol. Debr. Oecol. Hung.* 28: 109-120. (in Hungarian, with English summary) ["Samples were taken at four locations on Hungarian-Croatian reach of river Drava between 2008 and 2011. Among the 131 taxa that were identified, there were invasive ones, and also rare, sensitive ones indicating good water quality." (Authors) The following Odonata species are listed: *Calopteryx splendens*, *Coenagrion puella*, *Stylurus flavipes*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, and *Platycnemis pennipes*.] Address: Horvai, V., Carpathes Nature Conservation Foundation, Radnóti Miklós ltp. 5., H-7700 Mohács, Hungary. E-mail: horvaivaler@gmail.com

**12611.** Jacquemin, J.; Vein, D. (2012): The aquatic insects of a standard small plain river in NE France, with emphasis on remarkable species. *Aquatic Insects* 34 (Suppl): 11-22. (in English) ["A five-year macroinvertebrate study was conducted on a 55 km river (le Rupt-de-Mad, Lorraine region, north-eastern France), a standard for the region. A list of 300 species was drawn up, and remarkable species were listed for some better known orders: Ephemeroptera, Plecoptera, Trichoptera and Odonata (31 species). Some faunistic results are emphasised: about 42% of the identified species were more or less ubiquitous, 26% were meso- to polysaprobic species of potamon, present only in the main course of the river, while 31% were rather stenoecious species restricted to certain tributaries. 51 remarkable species were listed, taking into account their regional status, according to IUCN categories: more than three quarters were hosted in the small tributaries, and 55% found exclusively in these latter (versus 23.5% only present in the main course of the river). Calcareous lotic tributaries were hosting particularly original communities with many remarkable species. Ephemeroptera, Plecoptera



and Trichoptera were pertinent groups to assess the global faunistic interest of lotic habitats, but lentic habitats are probably better evaluated using other groups, e.g. Odonata and Coleoptera; the latter unfortunately poorly known from an ecological point of view." (Authors) 1. *Calopteryx splendens*; 2. *C. virgo*; 3. *Lestes sponsa*; 4. *Chalcolestes viridis*; 5. *Platycnemis pennipes*; 6. *Cercion lindenii*; 7. *Coenagrion mercuriale*; 8. *C. puella*; 9. *C. pulchellum*; 10. *Enallagma cyathigerum*; 11. *Ischnura elegans*; 12. *Pyrrhosoma nymphula*; 13. *Gomphus vulgatissimus*; 14. *Onychogomphus forcipatus*; 15. *Aeshna cyanea*; 16. *A. grandis*; 17. *A. isoceles*; 18. *A. mixta*; 19. *Anax imperator*; 20. *Brachytron pratense*; 21. *Cordulegaster bidentata*; 22. *Cordulia aenea*; 23. *Somatochlora metallica*; 24. *Leucorrhinia pectoralis*; 25. *Libellula depressa*; 26. *L. fulva*; 27. *L. quadrimaculata*; 28. *Orthetrum cancellatum*; 29. *Sympetrum sanguineum*; 30. *S. striolatum*; 31. *S. vulgatum*] Address: Jacquemin, G., Biologie des Insectes, Université H. Poincaré, Nancy 1, BP 239, F-54506 Vandoeuvre-lès-Nancy, France

**12612.** Jeziorski, P., Holuša, O. (2012): An updated checklist of the dragonflies (Odonata) of the Czech Republic. *Acta Mus. Beskid. 4*: 143-149. (in English, with Czech summary) ["The presented actualized checklist is a first critical list of the Odonata from the Czech Republic. The checklist summarizes all relevant data and all species are listed in the checklist on the basis of voucher specimens. The results are based on the revisions of collections, authors' faunistic research and literary data. So far 26 genera of Odonata with 73 species have been recorded in the territory of the Czech Republic, 71 species from Bohemia and 69 species from Moravia." (Authors)] Address: Jeziorski, P., Na Belidle 1, CZ-735 64 Havírov-Suchá, Czech Republic. E-mail: jezirko@post.cz

**12613.** Jumawan, K.M.; Medina, M.N.D.; Villanueva, R.J.T. (2012): Annotated list of Odonata from Mainit Hot Spring Protected Landscape, Compostela valley, Mindanao Island, Philippines. *Philippine Journal of Systematic Biology 6*: 14-27. (in English) ["Within the framework of the 'Rapid Biodiversity Survey of Mainit Hot Spring Protected Landscape' conducted by the Research and Development Centre of Assumption College of Nabunturan, an annotated list of Odonata was compiled, representing 41 species in 25 genera and 12 families from seven sites surveyed from December 2011 to February 2012. These records represent the baseline data for Mainit Hot Spring Protected Landscape and even for Compostela Valley Province. One species is potentially new to science; more than half of the records are forest dwelling endemics." (Authors)] Address: Medina, M.N.D., Research and Development Centre, Assumption College of Nabunturan, Nabunturan, Compostela Valley Province, 8801 Philippines. E-mail: miltonsept19@yahoo.com

**12614.** Jung, K.-S.; Park, D.-H.; Lee, J.-E. (2012): A study of the arrangements of wing and thoracic muscu-

lar structures on flight behavior of Odonata, with a note on backward flight of Zygoptera. *Tombo 54*: 133-138. (in English, with Japanese summary) ["The two suborders of Odonata, Zygoptera and Anisoptera, show different modes of flight behaviours, e.g. capturing their prey. In suborder Anisoptera, most species fly dynamically and are good at capturing preys in flight by grasping them in their legs. On the contrary, in suborder Zygoptera, species usually fly delicately and often use their mandibles to capture their prey. In addition, we observed that zygopteran species were sometimes flying backwards when they cannot advance forward in small space. Such backward flight is observed rarer in Anisoptera. For purpose to reveal the differences of these flight modes between two suborders, we compared the arrangement of wing and pterothorax with measuring the angles between dorsal carina to costal margin of wing or posterior thorax, and dissected pterothoracic muscular structures of both Zygoptera and Anisoptera. From our results, both suborders have six muscles are attached to each wing, however, differed in the attachment to wing and thorax, and distinct in thoracic proportion as angles of wing to pterothorax. Each arrangement is supposed to be suitable for the flight behaviour in each suborder, especially Zygoptera is better at delicate turning in flying including backward flight." (Authors)] Address: Jung, K.-S., Department of Biological Science, Andong National University, Andong 760-749, Korea. E-mail: tootootoo@korea.com

**12615.** Karube, H. (2012): *Onychogomphus viridicostus* (Oguma, 1926) (Odonata, Gomphidae). *Tombo 54*: 123-126. (in English, with Japanese summary) ["*Onychogomphus viridicostus* (Oguma, 1926) is transferred to the genus *Melligomphus* Chao, 1990 based on adult external morphology." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**12616.** Karube, H.; Takizawa, H. (2012): A record of interfamilial tandem formation by a male of *Orthetrum glaucum* (Libellulidae) and a female of *Procordulia fusiformis* (Corduliidae) on Borneo island. *Tombo 54*: 151-152. (in Japanese, with English summary) ["An interfamilial tandem formation by *Orthetrum glaucum* male (Libellulidae) and *Procordulia fusiformis* female (Corduliidae) was observed on a road in a mountain area of Sabah, Borneo Island, Malaysia. *P. fusiformis* is an endemic species to the Bornean mountain area and was abundant in the observation site. The two species are of similar size, with the body colorations distinctively different from each other. The present case of the interfamilial tandem formation is consistent with the generalization by Corbet (1999) that the body size difference is important for a male in discriminating their mates from heterospecific ones." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**12617.** Keller, D. (2012): Insect dispersal in fragmented agricultural landscapes. Diss. ETH No. 20663. A dissertation submitted to ETH Zürich: 142 pp. (in English) ["Preserving biodiversity and enhancing connectivity are two major goals of current conservation strategies in fragmented agricultural landscapes. Therefore, many European countries have implemented agri-environment schemes in order to foster biodiversity and connectivity. The expected positive effects on biodiversity could, however, not consistently be detected, and for many agricultural species, it remains unknown whether populations are functionally connected. As functional connectivity is sustained by dispersal and gene flow, connectivity measures should be based on knowledge of species-specific dispersal potential, dispersal habitats and landscape elements that impede or facilitate gene flow. However, such information is not available for most species, and especially so for many insect species. In this thesis, I wanted to gain knowledge on insect dispersal in intensively managed and fragmented agricultural landscapes, where diverse connectivity measures had been implemented. The main goals were to assess the reproductive habitats, dispersal abilities, dispersal habitats and landscape effects on gene flow of five insect species inhabiting an agricultural landscape in the Oberaargau region on the Swiss plateau. In chapter 1, I analysed dispersal ability and dispersal habitats of the threatened damselfly *Coenagrion mercuriale*, which inhabits streams and ditches flowing through agricultural land. With a mark-resight study, I detected frequently occurring dispersal over short distances (= 500 m). This short-distance dispersal was restricted to streams, i.e. the reproductive habitat of *C. mercuriale*. In a landscape genetic analysis, I also detected long-distance dispersal showing that populations were functionally connected by individuals moving over larger distances. While short-distance dispersal was confined to streams, this long-distance dispersal seemed to be more directed and seemingly followed more or less straight lines across agricultural land. Functional connectivity of populations of *C. mercuriale* as well as the effects of several landscape elements on gene flow were further analysed in chapter 2, where I applied spatial genetic clustering methods combined with interpolation by kriging and landscape genetic corridor analysis (= transect analysis). The analysed populations were divided into a northern and a southern genetic cluster, separated by a hill ridge intersecting the study area. Similarly, landscape corridor analysis identified elevation change, but also Euclidian distance, patches of forest and flowing water bodies as barriers to gene flow. Only open agricultural land seemed to enhance dispersal in *C. mercuriale*. This again 2 showed that dispersal was not restricted to the reproductive habitat of *C. mercuriale* and that populations separated by open agricultural land were well connected. To analyse how landscape elements affect dispersal and gene flow in another specialised insect species, I developed ten polymorphic microsatellite markers for the wetland grasshopper *Stethophyma grossum*, using the 454 next generation sequencing technol-

ogy (chapter 3). These newly developed markers were then applied to identify dispersal habitats of *S. grossum* and to assess the effects of population network topology and spatial scale (geographical distance thresholds) on landscape genetic analysis in chapter 4. Both spatial scale and population network topology proved to be important factors in landscape genetic analysis and all three approaches applied (i.e. isolation by distance patterns, population network topology, least-cost transect analysis) identified a scale threshold of 3-4 km, up to which landscape composition and configuration greatly influenced dispersal and gene flow. For dispersal among neighbouring populations (defined by a Gabriel graph) that were within its maximum dispersal distance (0-3 km), *S. grossum* preferred its reproductive habitat as dispersal habitat. In contrast, no clear most likely dispersal habitat could be identified when population network topology and spatial scale were not considered. [...] In conclusion, this thesis presented several approaches to assess landscape effects on dispersal and gene flow in agricultural insects. Moreover, it detected various aspects of insect dispersal in intensively managed fragmented agricultural landscapes, which should be considered in future studies. The analyses of five insect species showed that landscape effects on dispersal and gene flow mainly depend on species-specific dispersal ability, reproductive habitat specialisation and spatial population configuration. The latter phenomenon has, however, hardly been used in landscape genetic studies. Furthermore, I found that populations of all analysed species were functionally connected, even in the fragmented landscape of the study area. The species were well able to cross intensively managed open agricultural land and dispersal was not restricted to their reproductive habitats. For both specialised study species (i.e. *C. mercuriale* and *S. grossum*), dispersal habitats changed at different thresholds of spatial scale. Moreover, the consideration of population network topology as applied in the analysis of *S. grossum* (i.e. restricting the dataset to neighbouring populations within maximum dispersal distance) further improved results. For future landscape genetic analyses, these studies suggest a more thorough consideration of spatial scale, by differentiating between short- and long-distance dispersal, as well as by incorporating population network topology. All these findings, i.e. the identification of species-specific reproductive habitats, dispersal habitats, dispersal ability and the detection of landscape elements hindering or facilitating gene flow, will help planning future connectivity measures for the study species and can also give general guidelines for the conservation of insects in fragmented agricultural landscapes." (Authors)] Address: Keller, Daniela, WSL Swiss Federal Research Institute, Zürcherstr. 111, CH-8903 Birmensdorf, Switzerland. E-mail: [mailto:daniela.keller@wsl.ch](mailto:mailto:daniela.keller@wsl.ch)

**12618.** Kisasa Kafutshi, R. (2012): Le régime alimentaire du Martin-pêcheur huppé *Alcedo cristata* pendant la période de reproduction dans la région de Kinshasa (R.D. Congo). *Malimbus* 34: 17-28. (in English) ["The

diet of the Malachite Kingfisher was investigated by study of 182 regurgitated pellets collected from 65 broods during the nesting period in the rainy seasons from 2004 to 2009, in two sites in the Kinshasa area. In total, 2619 undigested remains were identified in the pellets, revealing 1100 prey. The Malachite Kingfisher's diet is rich and diverse. The prey identified were 92.7 % fishes (*Oreochromis niloticus*, *Gambusia affinis* and *Hemichromis elongatus*), 5.9 % insects (Odonata and Orthoptera) and 0.5 % frogs." (Author)] Address: Kisasa Kafutshi, R., Université de Kinshasa, Faculté des sciences, Département de Biologie, B.P. 190 Kinshasa XI, R.D. Congo. E-mail: bobkisasa@yahoo.fr

**12619.** Kiyoshi, T.; Hosoya, T.; Konagaya, T.; Kuramitsu, K. (2012): A record of *Gynacanta japonica* Barteneff from Suwanose-jima Island. *Tombo* 54: 143-144. (in Japanese, with English summary) ["*G. japonica* was recorded for the first time from Suwanose-jima Island, Tokara Group, Kagoshima Prefecture, Japan in 2010. The environment of the island was mostly destroyed due to volcanism, and there are few regions with good forests for the species. Although this species has been recorded previously from the Tokara Group, only from Nakano-shima Is., our subsequent surveys (2008-2011) have failed to rediscover the species there." (Authors)] Address: Kiyoshi, T., Kyoto Univ, Grad. Sch. Sci, Dept Zool., Kyoto 6068502, Japan. E-mail: kiyoshi@zoo.zool.kyoto-u.ac.jp

**12620.** Klass, K.-D.; Matushkina, N.A.; Kaidel, J. (2012): The gonangulum: A reassessment of its morphology, homology, and phylogenetic significance. *Arthropod Structure & Development* 41(4): 373-394. (in English) ["The gonangulum is a sclerite in the female genitalic region of insects. Its presence or full development has long been considered an apomorphy supporting Zygentoma + Pterygota. Recent studies of female genitalia in several insect orders (K.-D. Klass and co-workers) revealed many new data on the gonangulum and homologous sclerotisations (laterocoxa LC9). Herein the gonangulum area is described (including articulations, muscle attachments, sulci) and compared among Archaeognatha, Zygentoma, Odonata, Dermaptera, Dictyoptera, and Notoptera. A wider perspective is provided to the topic by addressing some novel issues: identification of LC9 sclerotisations in non-insect taxa and in insects that secondarily lack an ovipositor; occurrence of homonomous sclerotisations in other abdominal segments of both sexes; morphological interpretation of LC9; and the role of paedomorphosis in LC9 evolution. As a result, there is currently no support for any insect lineage from this character system. For gonangulum-related characters both a significant intra-ordinal variation and frequent homoplasy are demonstrated using various Odonata, Dermaptera, and Dictyoptera as examples. Divergent fates of LC9 in simplified genitalia are shown using a dermapteran and an odonatan. We view all this as a showcase of how a renewed and more

detailed examination of a character system can dramatically change the phylogenetic evidence drawn from it." (Authors)] Address: Matushkina, Natalia, Department of Zoology, Biological Faculty, Kyiv National University, vul. Volodymirs'ka 64, Kyiv, 01033, Ukraine. E-mail: odonataly@gmail.com

**12621.** Korsun, O.V., Akulova G.A., Gordeev S.Yu., Gordeeva T.V., Budaeva A.A. (2012): Insects of the Onon-Balj National Park (Mongolia). *Amurian zoological journal* 4(1): 18-25. (in Russian, with English summary) ["The list of insects recorded from the Onon-Balj National Park and its vicinities (Khentii Aimag, Mongolia) is given. This is the first faunistic list of insects for the territory of the National Park. 1125 specimens of 336 species and 10 orders were collected and identified." (Author) The list of species collected between 26.07 and 03.08.2007 includes nine Odonata species, among them *Ophiogomphus obscurus*.] Address: Korsun, O.V., Zabaikalsky State Humanitarian Pedagogical University named after N. Chernishevsky, Department of Biology. Babushkina st. 129, Chita, 672007, Russia. E-mail: olegkorsun@mail.ru

**12622.** Kraemer, L.D.; Evans, D. (2012): Uranium bioaccumulation in a freshwater ecosystem: Impact of feeding ecology. *Aquatic Toxicology* 124-125: 163-170. (in English) ["The objectives of our study were: 1) to determine if there was significant uranium (U) bioaccumulation in a lake that had been historically affected by a U mine and 2) to use a combined approach of gut content examination and stable nitrogen and carbon isotope analysis to determine if U bioaccumulation in fish was linked to foodweb ecology. We collected three species of fish: smallmouth bass (*Micropterus dolomieu*), yellow perch (*Perca flavescens*) and bluegill (*Lepomis macrochirus*), in addition to several invertebrate species including freshwater bivalves (family: Sphaeriidae), dragonfly nymphs and snails (class: Gastropoda) and zooplankton (family: Daphniidae). Results showed significant U bioaccumulation in the lake impacted by historical mining activities. Uranium accumulation was 2-3 orders of magnitude higher in invertebrates than in the fish species. Within fish, U was measured in operculum (bone), liver and muscle tissue and accumulation followed the order: operculum > liver > muscle. There was a negative relationship between stable nitrogen ratios ( $^{15}\text{N}/^{14}\text{N}$ ) and U bioaccumulation, suggesting U biodilution in the foodweb. Uranium bioaccumulation in all three tissues (bone, liver, muscle) varied among fish species in a consistent manner and followed the order: bluegill > yellow perch > smallmouth bass. Collectively, gut content and stable isotope analysis suggests that invertebrate-consuming fish species (i.e. bluegill) have the highest U levels, while fish species that were mainly piscivores (i.e. smallmouth bass) has the lowest U levels. Our study highlights the importance of understanding the feeding ecology of fish when trying to predict U accumulation. Highlights: \*Significant U accumulation in



Bow Lake biota \*U accumulation was higher in invertebrates than in fish \*U biodilution occurred in the food-web \*In fish U bioaccumulation: bluegill > yellow perch > smallmouth bass \*U accumulation in fish is linked to feeding ecology." (Authors)] Address: Kraemer, Lisa, Trent University, 1600 West Bank Drive, Peterborough, ON, Canada, K9J 7B8. E-mail: lisakraemer@trentu.ca

**12623.** Lara, M.B.; Gallego, O.F.; Vaz Tassi, L. (2012): Mesozoic coleopteran faunas from Argentina: geological context, diversity, taphonomic observations, and comparison with other fossil insect records. *Psyche* Volume 2012, Article ID 242563: 14 pp. (in English) on bibliographical and unpublished materials (86 described species, 526 collected specimens). The material came from different geological units from the late Middle Triassic to the Late Triassic (Bermejo, Cuyo, and Malargüe basins) to the Middle-Late Jurassic and Early Cretaceous (Deseado Massif, Canadón Asfalto, and San Luis Basin). The coleopteran record is composed of 29 described species with 262 collected specimens (isolated elytra) mainly represented by Triassic species and only four specimens recorded in Jurassic units, all of them currently unpublished. These fossil coleopterans provide fundamental information about the evolution of insects in the Southern Hemisphere and confirm the Triassic Argentinean insect deposits to be among the most important in the world." (Authors) The paper contains many references to Odonata.] Address: Gallego, O.F., Micropaleontología, Depto de Biología, Facultad de Ciencias Exactas y Naturales y Agrimensura, Universidad Nacional del Nordeste and Área Paleontología, Centro de Ecología Aplicada del Litoral (CONICET), Casilla de Correo 128, 3400 Corrientes, Argentina. E-mail: ofgallego@live.com.ar

**12624.** Machado, A.B.M. (2012): The apicale species group of *Acanthagrion*, with description of four new species and a hook-moving apparatus (Zygoptera: Coenagrionidae). *Odonatologica* 41(3): 201-223. (in English) ["The 8 species of the group are studied and keyed. The lectotype of *A. apicale* is designated, redescribed and illustrated. From Brazil, *A. chicomendesi*, sp. n. (holotype male: Mato Grosso), *A. flaviae*, sp. n. (holotype male: Amazonas), *A. kaori* sp. n. (holotype male: Amazonas) and *A. triangulare* sp. n. (holotype male: Acre) are described. *A. apicale descendens* Fraser, 1946 is revalidated as species. A study of the penis lobes was performed, demonstrating that the median lobe is inflatable and mainly responsible for the lateral movement of the sclerotized hook, whose importance in copulation is discussed." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil. E-mail: angelo@icb.ufmg.br

**12625.** Mahabal, A.; Rane, P.D. (2012): Large-scale night congregation of Yellow-tailed Ashy Skimmers Po-

tamarcha congener (Rambur) at Gaganbawada, Maharashtra State: with notes on their camouflage and roosting behaviour. *Bugs R All* 19: 16-17. (in English) [Verbatim: "During the faunistic survey of Maharashtra State, we had camped at Gaganbawada (16°32'48"N 73°50'06"E) PWD Rest House, Kolhapur district, from 7-9 January, 2007. Gaganbawada is a small town situated in the Northern Western Ghats at a height of 614 meters asl, with an average rainfall of 2500 to 3000 mm. Surrounding this town a mixture of agricultural cropland, hilly areas with dry deciduous – mixed forest, medium and large - sized ponds and streams were noticed. Along these ponds and streams there was dense vegetation that included shrubs, trees and aquatic plants with some marshy areas. On the first evening (7/1/2007) we came across a large congregation of *P.* congener, on cultivated, medium sized 'Australian Pine' *Casuarina equisetifolia* Linnaeus (Casuarinaceae). On close observation it was noticed that these skimmers had chosen only the dry branches of the tree. Further, it was also observed that the resting position of the skimmers was the same as the branching pattern of needle-shaped green leaves. From a distance the colony of skimmers was totally camouflaged and this behaviour could be related to avoid predation of the colony at night time. The congregation of skimmers was also noticed on two other near-by *Casuarina* trees. We counted the number of dry branches occupied by these *P.* congener on all the trees as well as number of individuals resting on such branches. Roughly we then estimated the congregation to be of about 4000 skimmers. On this first day, the skimmers roosted in these trees overnight and next morning around 9 am they vacated the roost in swarms of 50 to 200 individuals. On second day (8/1/2007) in the evening they came back and roosted again on the same trees in similar fashion. During this night, with the help of torch light we collected few samples of these skimmers using insect net for confirming their identity. The roost was disturbed and some of them dispersed and got attracted to the light at verandah of the rest house. In general here we noticed that the females were much more than the males in such congregations (in the ratio of 7:3 approx.). On 9/1/2007 we moved to the next camp. We then contacted the caretaker of the Gaganbawada rest house and enquired about these skimmers and he informed us that the insects were still roosting on the trees on 9th January. *P.* congener are medium sized dragonflies with bluish black thorax and yellow tail with black markings. Their large colonies are often found within patches of forest or scrub associated with weedy ponds and marshes. These insects breed in marshes but their flight season is not known (Fraser, 1936; Subramanian, 2009). It is uncertain whether such large-scale congregation and overnight roosting of these skimmers is temporary or permanent or a local winter migratory behaviour. However, it can be inferred that because of agricultural crops and marshy places, plenty of food and breeding areas might be available to them along with

proper trees for safe roosting in this area of Gaganbawda." (Authors)] Address: Rane, P.D., Zoological Survey of India, W.R.C, Akurdi, Pune 411044, India

**12626.** Matsuda, I.; Umesaki, H. (2012): Records of the migrating species *Anax guttatus* caught in SaKai City and Taism-cho, Osaka Prefecture in 2004 and 2011. Tombo 54: 145-146. (in Japanese, with English summary) ["One of the authors, Matsuda, caught by "buri" (thread and stones for catching flying dragonflies) 3 males in 2004 and 3 males in 2011 (one male each on June 11, July 3 and 9) of *Anax guttatus* in Oizumi Park, Sakai City, Osaka Prefecture. Umesaki netted a male of the same species in Taishi-cho, Osaka Prefecture on July 9, 2011. This species is considered to be an immigrant from the south, and the first typhoon visited mainland Japan on July 12 in 2011. Thus, it seems noteworthy that 4 males were recorded before the typhoon visited." (Authors)] Address: Matsuda, I., 583 -087, 6 -11 Osaka Habikino Momoyamada 1-chome, Japan

**12627.** Mayon, N.; Terweduwe, S. (2012): Différents patterns d'émergence chez deux libellules rhéophiles: effet station ou mécanisme pour limiter la compétition? Les Naturalistes belges 93(4): 45-64. (in French, with English summary) ["We have compared the emergence patterns of *Gomphus vulgatissimus* and *Onychogomphus forcipatus* in different sites along a downstream gradient in the Sûre River (southern Belgium). Results confirm that *G. vulgatissimus* reacts as a spring species while *O. forcipatus* shows emergence characteristics of a summer species. In *G. vulgatissimus*, results suggest cohort splitting to take place at different levels in the various study sites. We discuss such differences with special focus on non-biotic (mainly temperature) and biotic (competition) parameters. In sites where both species are present, results show that the emergence cycles can be either contiguous or separated, suggesting an effect of interspecific competition. This work shows that emergence patterns in dragonflies are under the combined influence of numerous parameters. Therefore, they can be rather different even at a very local scale (i.e. a stream section)." (Authors)] Address: Mayon, N., Parc Naturel Haute-Sûre et Forêt d'Anlier. Chemin du Moulin 2, B-6630 Martelange, Belgium. E-mail: nicolas@parcnaturel.be

**12628.** McLamb, S. (2012): Not a total washout! The red-veined darter *Sympetrum fonscolombii* Selys, 1840 in Shropshire. Shropshire entomology 6: 9-10. (in English) [Recent records of *S. fonscolombii* in Shropshire, UK are compiled and briefly discussed. Though it is too early to summarise the field season with respect to dragonflies and damselflies I felt it important to point out that despite a largely soggy summer not all was lost and whilst the May monsoons briefly abated Red-veined darters *Sympetrum fonscolombii* Selys 1840, were spotted by Jim Almond at Venus Pool (SJ5406). Days later I was lucky enough to see them accompa-

nied by the experienced eyes of Bob Kemp who confirmed the identification. The darters stubbornly remained some distance out from the main bird hide though with the aid of a telescope the single pale stripe on the side of the thorax was clearly visible. This is illustrated here in Jim's photographs and one can also make out Shropshire Entomology – October 2012 (No.6): 10 the blue coloration in the lower half of the eye. The darters were clearly ovipositing and though this species is regarded as a scarce migrant there has been an increase in the number of breeding records in recent years (Smallshire & Swash, 2010). *S. fonscolombii* has been recorded in a number of locations this year including Staffordshire where interestingly it has been recorded for the last few years suggesting possible successful breeding as opposed to an influx of new migrants (British Wildlife, 2012). This is definitely a species to look out for and thanks to Jim is a great record for Shropshire. The only previous record was an anonymous sighting made at Whixall Moss in 1940.] Address: not stated

**12629.** Mediani, M.; Boudot, J.-P.; Benazzouz, B.; El Bella, T. (2012): Two dragonfly species (Insecta: Odonata) migrating at Dakhla (region of Oued Ad-Dahab Lagouira, Morocco). International Journal of Odonatology 15(4): 293-298. (in English) ["Large numbers of migrating imagos of *Anax ephippiger* were observed from the end of January to March 2012 at Dakhla Bay, Southern Morocco, in an area where long-lasting fresh and brackish waters are lacking, and thus which is unfavourable for the reproduction of Odonata. This supports well the classical scheme of northward mass migration of the species along the Atlantic coast of Africa, induced by autumnal mass emergences in the Sahel as a result of the summer African monsoon. Small numbers of *Sympetrum fonscolombii* were previously temporarily recorded from the same area in July 2011. They were probably nomadic individuals of which the origin could not be verified, but which could have been involved in long distance vagrancy, typical of the species, due to the scarcity of fresh and brackish water in the area." (Authors)] Address: Mediani, M., Laboratoire de Diversité et Conservation des Systèmes Biologiques, Faculté des Sciences, Département de Biologie, Université Abdelmalek Essaâdi-Tétouan, Morocco

**12630.** Mezquita Aranburu, I.; Ocharan, F.J. (2012): Odonatos de Gipuzkoa. Munibe (Ciencias Naturales-Natur Zientziak) 60: 25 pp. (in Spanish, with English and Euskarian summaries) ["We present data on 42 species of Odonata found in Gipuzkoa (Basque Country, Spain) during a study conducted between 2006 and 2011, and also we do a literature review. Overall, 43 species have been detected, 21 Zygoptera (9 of them first seen in Gipuzkoa) and 22 Anisoptera (13 of them first seen in Gipuzkoa). Particularly interesting are *Coenagrion mercuriale*, *C. scitulum*, *Oxygastra curtisii* and *Orthetrum albistylum*." (Authors)] Address: Mez-

quita Aranburu, I., Sociedad de Ciencias Aranzadi / Aranzadi Zientzia Elkarte, Depto de Entomología / Entomologia Departamentua, Zorroagaina 11 • 20014 Donostia / San Sebastián, Spain. E-mail: mezquitaaranburu@gmail.com

**12631.** Michalski, J. (2012): A Manual for the Identification of the Dragonflies and Damselflies of New Guinea, Maluku, & the Solomon Islands. Khanduanum Books: 561 pp. (in English) ["First comprehensive guide to all 620 species of dragonflies of New Guinea and the neighbouring islands, which is home to ten percent of the world's dragonfly fauna. Nearly half of the species are found nowhere else on Earth. Includes 1,275 illustrations and eight pages of colour plates showing representative species and habitats. Includes introductory sections on structure, habitat, history, collection and photography, as well as appendices discussing taxonomic questions and a full bibliography. Illustrated keys to all taxa, and illustrations of larval forms where known. Over the past ten years there has been a growing interest in the dragonflies of this remarkable part of the world. This manual brings together all of the published research on this fauna from its origins in the 1800s to the present." (Author)] Address: Michalski, J., 1223 Mount Kemble Avenue, Morristown New Jersey 07960, USA. E-mail: huonia@aol.com

**12632.** Motte, G., Vadevyvre, X.; Dufrene, M. (2012): Evolution des populations d'odonates des mares de Ben-Ahin 20 ans après la création de la Réserve Naturelle. *Les Naturalistes belges* 93(4): 65-84. (in French, with English summary) ["Twenty years after the establishment of Ben-Ahin Nature Reserve (1993), we followed the evolution of the dragonfly fauna between 1993 and 2011. A comparison of the data collected before and after 2003 shows that the species richness of the site remained stable. Four species were no longer observed (*Erythromma lindenii*, *E. viridulum*, *Lestes sponsa*, *Sympetrum vulgatum*) but this is attributed to sampling bias. And two new species have recently been recorded (*A. isosceles*, *O. brunneum*) but these observations were only of erratic individuals. No obvious changes in species phenology could be documented in relation to global warming. Recommendations for site management are also proposed at the end of this paper." (Authors)] Address: Dufrière, M., Service Public Wallon (SPW) - Direction Générale Opérationnelle (DG03) - Département de l'Etude du Milieu naturel et agricole (DEMna), Av. Maréchal Juin, 23, B-5030 Gembloux, Belgium. E-mail: Marc.Dufrene@spw.wallonie.be

**12633.** Naraoka, H. (2012): Discovery of *Platycnemis echigoana* Asahina (*Platycnemididae*) in Aomori Prefecture. *Tombo* 54: 139-141. (in Japanese, with English summary) ["The Japanese endemic species *Platycnemis echigoana* Asahina was previously recorded from only 4 prefectures; Niigata, Yamagata, Fukushima and Nagano. Here I report records of this species from Rok-

kasho village, Aomori Prefecture, more than 280 km away from the known habitats. On June 25, 2011, I discovered one immature male and one immature female of this species in a forest at Rokkasho village. I also found many mature adults during July and August, 2011 and observed reproductive behaviours. After September, I could not find any adult specimens." (Author)] Address: Naraoka, H., Motoizumi 36-71, Fukunoda, Itayanagi, Kitatsugaru-gun, Aomori 038-3661, Japan. E-mail: sbnkq127@ybb.ne.jp

**12634.** Nordström, K.; Bolzon, D.; O'Carroll, D. (2012): Underlying neuro-physiological mechanisms. *Front. Behav. Neurosci. Conference Abstract: Tenth International Congress of Neuroethology*. doi: 10.3389/conf.fnbeh.2012.27.00234: (in English) [Verbatim: As an animal moves through the world, its own movement generates widefield optic flow across the visual field that it can use for several behavioural tasks, such as maintaining a straight trajectory or avoiding obstacles. Behavioural evidence shows that many animals can also disambiguate the motion of discrete objects that move independently of the remaining visual surround from such self-generated optic flow. In the insect optic ganglia, we find neurons specialized for detecting these two types of motion: Some respond optimally to widefield optic flow whereas others are specifically tuned to the relative motion of discrete figures (Olberg, 1981). In the dragonfly lobula there are two types of neurons tuned to the relative motion of discrete figures: Small target motion detectors (STMDs) and bar cells (O'Carroll, 1993). Whereas STMDs are tuned to small figures (Nordström, 2012), the bar cell response increases with bar height, but there is no response to the type of widefield stimuli generated during ego-motion (O'Carroll et al., 2012). Bar cells thus respond specifically to the motion of elongated, discrete figures. We here investigate the neurophysiological mechanisms that underlie this tuning. In the vertebrate visual cortex bar sensitivity is generated by aligning output from rows of neurons with small receptive fields (simple cells). Vertebrate simple cells share several physiological properties with elementary STMDs (ESTDMs), the input elements to STMDs (Wiederman et al., 2008). To investigate whether dragonfly bar cells generate their specific sensitivity to elongated features by spatially pooling the input from a row of elementary small target tuned motion detectors, we quantify responses to key parameters involved in ESTMD tuning (Wiederman et al., 2008). We show that whereas the velocity tuning and the high gain to sub-pixel targets suggest that bar cells share input mechanisms with STMDs, other responses point to a different type of input. For example, as opposed to STMDs, bar cell responses are often contrast polarity invariant, and they respond equally well to a bar and to a single edge moving across the visual field. The neurons also show a surprisingly strong spatial summation. Early anatomical studies of the fly optic lobes showed that the column underlying each facet is represented by



up to 100 unique interneurons, leading to the suggestion that visual input is processed in many parallel streams (e.g. Fischbach & Dittrich, 1989). In support of this notion, local motion is computed differently in the inputs to SMTDs (Wiederman et al., 2008) and to the neurons coding for widefield optic flow (Hassenstein & Reichardt, 1956). Our findings that bar cells generate their specific sensitivity to discrete, elongated figures by using different visual input from the STMDs provide further evidence for the notion of parallel visual input pathways.] Address: Nordström, Karin, Uppsala University, Department of Neuroscience, Uppsala, 75124, Sweden. E-mail: Karin.Nordstrom@neuro.uu.se

**12635.** Ocharan, F.J.; Torralba-Burrial, A.; Outomuro, D.; Azpilicueta Amorín, M.; Cordero Rivera, A. (2012): *Leucorrhinia pectoralis*. En: VV.AA., Bases ecológicas preliminares para la conservación de las especies de interés comunitario en España: Invertebrados. Ministerio de Agricultura, Alimentación y Medio Ambiente. Madrid: 50 pp. (in Spanish) [Odonata species protected under the European Community law are treated according the legal definitions of the Fauna, Flora, Habitat Directive. Information on identification, general distribution, ecology and habitat, 'favourable conservation status' on different geographic scales, conservation measures, and regional bibliography are given. This manual refers to the situation of *L. pectoralis* in Spain.] Address: Ocharan, F.J., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain: E-mail: focharan@oonreo.uniovi.es

**12636.** Ocharan, F.J., Torralba-Burrial, A., Outomuro, D., Azpilicueta Amorín, M. y Cordero Rivera, A. (2012): *Lindenia tetraphylla*. En: VV.AA., Bases ecológicas preliminares para la conservación de las especies de interés comunitario en España: Invertebrados. Ministerio de Agricultura, Alimentación y Medio Ambiente. Madrid: 49 pp. (in Spanish) [Odonata species protected under the European Community law are treated according the legal definitions of the Fauna, Flora, Habitat Directive. Information on identification, general distribution, ecology and habitat, 'favourable conservation status' on different geographic scales, conservation measures, and regional bibliography are given. This manual refers to the situation of *L. tetraphylla* in Spain.] Address: Ocharan, F.J., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain: E-mail: focharan@oonreo.uniovi.es

**12637.** Özyurt, C.E.; Mavruk, S.; Kiyaga, V.B. (2012): Effects of predator size and gonad maturation on food preference and feeding intensity of Sander *Lucioperca* (Linnaeus, 1758). *Turkish Journal of Fisheries and Aquatic Sciences* 12: 1-8. (in English) [Seyhan Dam Lake, Turkey; a total of 3,921 dietary items belonging to 15 different taxonomic groups were identified in the 345 (57.3%) non-empty stomachs of Sander *Lucioperca*. Only one specimen of Odonata was found.] Address:

Özyurt, C.E., Department of Fishing and Fish Processing Technology, Faculty of Fisheries, Cukurova University, Adana, Turkey. E-mail: cozyurt@cu.edu.tr

**12638.** Ottburg, F.G.W.A.; Henkens, R.J.H.G. (2012): *Combinatie van vaarrecreatie en beek gebonden natuur in Noord-Brabant. Kennis over ecologische effecten van kano's en fluisterboten, kwetsbaarheid van flora en fauna en handelingsperspectieven voor beheerder en gebruiker.* alterra-rapport no. 2375: 113 pp. (in Dutch) ["Combining water recreation and stream-related nature in Noord-Brabant. Knowledge of the ecological effects of canoes and whisper-boats, sensitivity of flora and fauna and management prospects for manager and end user: Two small river systems (R5 and R6) in this Dutch province are suitable for canoes and whisper-boats. These streams also include several Habitat 2000 areas and are important for Red List species. A literature study was made of the ecological effects of this type of water recreation on habitats, vegetation, fish populations, waterfowl, and Odonata. Several species of water birds and Odonata were very susceptible to disturbance by boats. Two case studies, the Dommel and Bovenmark, were used in a local workshop to apply this knowledge to a local stream management plan. Supportive measurements included fixed stopping points for boats, zoning of streams for recreative use, and more education for users and staff." (Authors) For details see: <http://content.alterra.wur.nl/Webdocs/PDFFiles/Alterraraapporten/AlterraRapport2375.pdf>] Address: not stated

**12639.** Parr, A.J. (2012): Migrant and dispersive dragonflies in Britain during 2011. *J. Br. Dragonfly Society* 28(2): 56-65. (in English) ["The year 2011 was noteworthy for the large, indeed unprecedented, numbers of Vagrant Emperor *Anax ephippiger* noted throughout the year. There were at least three immigration waves - a slow trickle of sightings during the late winter of 2010/11, a surge of records during April and early May, and then a final run of records during October and November. Both the spring and autumn influxes were associated with spells of unseasonably hot weather with winds from the far south. Arrivals of *Sympetrum fonscolombii* were also noted during these periods. Although the summer weather was, by contrast, less spectacular, there were still significant immigrations of *Anax parthenope*, as well as of further *S. fonscolombii*. Three sightings of *Aeshna isosceles* were also made well away from the species' current UK stronghold. Many of the other key events of the year related to the consequences of immigrations seen not in 2011 but in the preceding few years, where new local breeding populations of a number of species might potentially have become established. The recently-identified colony of *Coenagrion scitulum* in Kent appeared to remain stable and there was to be proof of successful breeding by *Aeshna affinis* following the 2010 invasion, when small numbers of exuvia were discovered at Hadleigh Country Park, Essex, during June. Numbers of mature adults

seen later in the year were, however, low and give some concern as to the long-term viability of this colony. Numbers of *Lestes barbarus* seen at Cliffe, Kent, following breeding attempts also noted during 2010 were, however, higher and hopefully a stable colony may develop here." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**12640.** Paulson, D.R.; Dunkle, S.W. (2012): A checklist of North American Odonata. Including English name, etymology, type locality, and distribution. 2012 edition. Originally published as Occasional Paper No. 56, Slater Museum of Natural History, University of Puget Sound, June 1999; completely revised March 2009; updated February 2011 and February 2012. Copyright © 2012 Dennis R. Paulson and Sidney W. Dunkle 2009, 2011, and 2012 editions published by Jim Johnson: 86 pp. (in English) ["The checklist includes all 462 species of North American Odonata considered valid at this time. For each species the original citation, English name, type locality, etymology of both scientific and English names, and approximate distribution are given. Literature citations for original descriptions of all species are given in the appended list of references." (Authors)] Address: Dunkle, S.W., 8030 Lakeside Parkway, Apt. 8208, Tucson, AZ 85730, USA

**12641.** Pfaff, M. (2012): Die Dinos der Lüfte. *Kraut & Rüben* 5/2012: 42-45. (in German) [General account of dragonflies in a German garden journal.] Address: not stated

**12642.** Pinto, A.P.; Carvalho, A.C. (2012): Taxonomic and distributional notes on *Telebasis Selys*, 1865, with a redescription of *T. pallida* Machado, 2010, and an evaluation of the *T. racenisi* Bick & Bick, 1995 "complex" of species (Odonata, Coenagrionidae). *Deutsche Entomologische Zeitschrift* 59(2): 189-200. (in English) ["A full checklist of the species of *Telebasis Selys*, 1865, housed in the Brazilian collections Coleção Entomológica "Prof. José Alfredo Pinheiro Dutra", Departamento de Zoologia, Instituto de Biologia, Universidade Federal do Rio de Janeiro (DZRJ), and Museu de Zoologia, Universidade de São Paulo (MZSP) is presented. A total of 325 specimens representing 19 species were studied. Ten new records for Brazilian States were found for *T. carmesina* Calvert, 1909 (Rio de Janeiro and Rio Grande do Sul), *T. corallina* (Selys, 1876) (Pernambuco), *T. demarara* (Williamson, 1917) (Maranhão), *T. filiola* (Perty, 1834) (Paraíba and Santa Catarina), *T. gigantea* Daigle, 2002 (São Paulo), *T. inalata* (Calvert, 1961) (Mato Grosso do Sul), *T. pallida* Machado, 2010 (Goiás) and *T. obsoleta* (Selys, 1876) (Mato Grosso do Sul), as well as a new record of *T. carminita* Calvert, 1909 for Suriname. *Telebasis pallida* Machado, 2010 is redescribed and diagnosed based on 14 males collected near the type locality, and its genital ligula is described and illustrated for the first time. Furthermore, the status of the three species of the *Telebasis*

*racenisi* Bick & Bick, 1995 "complex" is evaluated. Of these, *Telebasis pareci* Machado, 2010 syn. n. is proposed as junior subjective synonym of *Telebasis lenkoi* Machado, 2010, and a possible synonymy among the three species is discussed under *T. racenisi*." (Authors)] Address: Pinto, A.P., Programa de Pós-graduação em Ciências Biológicas (Zoologia), IB – USP, Universidade de São Paulo, SP, Brazil; Museu de Zoologia, Univde de São Paulo, Av. Nazaré 481, Ipiranga 04263-000, São Paulo, SP, Brazil. E-mail: odonataangelo@hotmail.com

**12643.** Raposeiro, P.M.; Cruz, A.M.; Hughes, S.J.; Costa, A.C. (2012): Azorean freshwater invertebrates: Status, threats and biogeographic notes. *Limnetica* 31(1): 13-22. (in English, with Spanish summary) ["This paper presents an updated catalogue of the freshwater invertebrates (including Odonata) of the Azores archipelago and reviews the published records to account for the current taxonomic status and changes in the nomenclature of the listed taxa. The number of freshwater invertebrate species that has been recorded in the Azores has risen sharply throughout the 20th century to 241 species based on field collections and the identification by several generations of local and foreign researchers. The freshwater fauna has been described as the following: (i) being "disharmonic", i.e., lacking taxa commonly found in continental freshwater systems such as the Plecoptera, and (ii) possessing a relatively high degree of endemism in selected groups. As expected, most recorded invertebrates are primarily of Palaearctic origin. However, endemic species make up 11 % of the freshwater invertebrate fauna, which emphasises the unique character of Azorean freshwater habitats, the importance of conservation measures and the need to continue the study of these systems." (Authors)] Address: Raposeiro, P.M., Research Centre in Biodiversity and Genetic Resources (CIBIO)-Açores and the Biology Department, University of Azores, Rua Mae de Deus 13A, 9501-855 Ponta Delgada, Açores, Portugal. E-mail: raposeiro@uac.pt

**12644.** Regan, E. (2012): Northern Emerald *Somatochlora arctica*. *Atropos* 45: 88. (in English) ["A male was discovered on Garinish Island, Co. Cork, Ireland, on 29 June (Regan, 2012). The island offers no suitable breeding habitat for the species, and this individual was presumably a wanderer. The nearest known site for this Irish rarity is some 24km away in County Kerry, though closer sites may yet be discovered. (A. Parr)"] Address: Regan, E., National Biodiversity Data Centre, WIT west campus, Waterford, Ireland

**12645.** Roberts, D. (2012): Responses of three species of mosquito larvae to the presence of predatory dragonfly and damselfly larvae. *Entomologia Experimentalis et Applicata* 145(1): 23-29. (in English) ["Although predators have been extensively used in the biological control of mosquito larvae, their efficacy will be reduced if the larvae are able to detect and respond to their presence.

This ability to detect and respond to the unseen presence of dragonfly or damselfly larvae was investigated for the larvae of three mosquito species (all Diptera: Culicidae) to see whether they either altered their rate of development or their feeding behaviour. The development of *Culex quinquefasciatus* Say and *Culiseta longiareolata* Macquart larvae was not affected by exudates from either predator, but *Culex sinaiticus* Kirkpatrick developed significantly slower when reared in the presence of a caged dragonfly larva and produced adults that were significantly smaller, indicating that they probably reduced feeding activity to make themselves less detectable to the predator. This only occurred when the dragonflies were fed in situ (in the presence of the mosquito larva) and not when removed for feeding, so that although this removed predator kairomones, other cues such as vibrations caused by movement of the predator may also be involved. In addition, the mosquito larvae responded to dragonfly larvae, but not to damselfly larvae. The depth of the water in which the mosquito larvae were reared had no effect on their response to the dragonfly. All three mosquito species significantly increased surface filter-feeding, when a predator was present in the water (compared with controls where no predator was present), at the expense of bottom scraping. In *Cx. sinaiticus* (but not the other two species), surface filter-feeding was greater when a dragonfly was present, compared with a damselfly. In the experimental conditions of one predator per 250 ml water, all three mosquito species were thus able to detect dragonfly and damselfly larvae (and distinguish between the two), but their response varied among species." (Author)] Address: Roberts, Derek, Department of Biology, Sultan Qaboos University, Al-Khod, Oman. E-mail: derekmr@squ.edu.om

**12646.** Rodríguez Martínez, S.; Torralba Burrial, A. (2012): Teratología en el paraprocto derecho de una exuvia de *Aeshna cyanea* (Müller, 1764) (Odonata: Aeshnidae). *Boletín de la SEA* 51: 321-322. (in Spanish, with English summary) [Pena, 29TPJ770195, 415 m a.s.l., El Franco, Asturias, Spain; description of a teratology in the caudal appendages of exuviae belonging to a female of *A. cyanea*.] Address: Rodríguez Martínez, S., Depto de Biología de Organismos y Sistemas, Universidad de Oviedo, c/ Catedrático Rodrigo Uria s/n, E-33071 Oviedo, Spain. E-mail: saul.riguez@gmail.com

**12647.** Röller, O. (2012): Aktuelle Meldungen der Grünen Keiljungfer (*Ophiogomphus cecilia*) in der Pfalz. *POLLICHIA-Kurier* 28/4: 29-30. (in German) [Rheinland-Pfalz, Germany; 2011 data from a citizen science-project are presented.] Address: Röller, O., Gottlieb-Wenz-Straße 19, 67454 Haßloch, Germany. E-Mail: roeller@pollichia.de

**12648.** Sasamoto, A.; Watanabe, Y.; Kawashima, I. (2012): First instar larvae of the two subspecies of *Zygonyx iris*, *malayana* and *errans*, (Libellulidae) from Vi-

etnam and Borneo. *Tombo* 54: 127-132. (in English, with Japanese summary) ["In the genus *Zygonyx*, unique characteristics have been reported for adult morphology, behaviour, and final instar larval morphology. In this paper, we report the first description of first instar larvae from the genus *Zygonyx*, which also have unique morphology. The first instar larvae of *Z. iris malayana* and *Z. i. errans* had conspicuous fan-shaped setae on the back from head to abdomen while final instar larvae did not have these setae. This structure has not been reported in other libellulid species, which implies a unique taxonomic position for this genus." (Authors)] Address: Sasamoto, A., 190-4 Yakuoji Tawaramoto, Shiki-gun, Nara prefecture, 636-0341, Japan. E-mail: aksmt@sea.plala.or.jp

**12649.** Schmidt, E.G. (2012): Sicherung der Karpfenzucht im Teichgut Hausdülmen. *Naturschutzobjekt Karpfenstreckteiche*. *Naturzeit im Münsterland* 9(18): 14-15. (in German) [Nordrhein-Westfalen, Germany; the author introduces into the biodiversity of habitats depending on anthropogenic resp. agricultural use and details the positive effects with the example of carp breeding techniques and *Sympetrum depressiusculum*.] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**12650.** Shirasawa, R. (2012): Twelve cases of abnormal connections of dragonflies observed in 2011. *Tombo* 54: 147-150. (in Japanese, with English summary) ["In 2011, twelve cases of abnormal connection of dragonflies were observed chiefly in Nagano and partly in Tsugata prefectures. The five cases are heterospecific heterosexual connection in the same genus such as *Lestes*, *Aeshna* and *Sympetrum*, however, one case consists of different genera, *Orthetrum* and *Sympetrum*. The five cases of homosexual conspecific connection were in *Lestes* and *Sympetrum*. Only one case of homosexual heterospecific connection was observed in *Lestes*." (Authors)] Address: Shirasawa, R., 398-0002, Nagano Prefecture Omachi God Sakae-cho, 6305 - 3

**12651.** Simoes, M.H.; Souza-Silva, M.; Lopes Ferreira, R.L. (2012): Species richness and conservation of caves in the Urucuia River sub-basin, a tributary of the San Francisco River: a case study in caves of Arinos, Minas Gerais, Brazil. *Revista Brasileira de Espeleologia* 2(2): 1-17. (in English) [Brazil; "Inadequate land use and the overexploitation of natural resources are causing serious impacts on cave environments and therefore the proposal of conservation actions become necessary. The objective of the present study was to gather information on the invertebrate fauna of seven caves in the region of Arinos, in the northwest of Minas Gerais state, proposing priorities and conservation measures. A total of 374 species were registered, seven with troglomorphic traits. The expansion of agricultural practices and the pollution of water bodies are the most worrisome threats. The recovery of the cave surround-



ings and the awareness of nearby landowners are priority actions to be developed. The creation of reserves and corridors make up alternatives for the conservation of this important heritage." (Authors) The list of taxa includes "Coenagrionidae (1), Libellulidae (1), Protoneuridae (1)".] Address: Simões, M.H., Universidade Federal de Lavras – UFLA, Laboratório de Ecologia Subterrânea, Setor de Zoologia/Departamento de Biologia, Brazil. E-mail: matsimoes@hotmail.com.

**12652.** Sinclair, K.A.; Xie, Q.; Mitchell, C.P.J. (2012): Methylmercury in water, sediment, and invertebrates in created wetlands of Rouge Park, Toronto, Canada. *Environmental Pollution* 171: 207-215. (in English) ["Thousands of hectares of wetlands are created annually because wetlands provide beneficial ecosystem services. Wetlands are also key sites for production of the bioaccumulative neurotoxin methylmercury (MeHg), but little is known about MeHg production in created systems. Here, we studied methylmercury in sediment, water, and invertebrates in created wetlands of various ages. Sediment MeHg reached 8 ng g<sup>-1</sup> in the newest wetland, which was significantly greater than in natural, control wetlands. This trend was mirrored in several invertebrate taxa, whose concentrations reached as high as 1.6 µg g<sup>-1</sup> in the newest wetland, above levels thought to affect reproduction in birds. The MeHg concentrations in created wetland invertebrate taxa generally decreased with increasing wetland age, possibly due to a combination of deeper anoxia and less organic matter accumulation in younger wetlands. A short-term management intervention and/or improved engineering design may be necessary to reduce the mercury-associated risk in newly created wetlands." (Authors) Most Odonata taxa in the newest constructed wetland had concentrations in excess of 1 µg g<sup>-1</sup>, which is twice the current fish warning level for human consumption.] Address: Mitchell, C., Department of Physical and Environmental Science, University of Toronto Scarborough, 1265 Military Trail, Toronto, ON, Canada M1C 1A4. E-mail: carl.mitchell@utoronto.ca

**12653.** Stoks, R.; Swillen, I.; De Block, M. (2012): Behaviour and physiology shape the growth accelerations associated with predation risk, high temperatures and southern latitudes in *Ischnura damselfly* larvae. *Journal of Animal Ecology* 81(5): 1034-1040. (in English) ["(1) To better predict effects of climate change and predation risk on prey animals and ecosystems, we need studies documenting not only latitudinal patterns in growth rate but also growth plasticity to temperature and predation risk and the underlying proximate mechanisms: behaviour (food intake) and digestive physiology (growth efficiency). The mechanistic underpinnings of predator-induced growth increases remain especially poorly understood. (2) We reared larvae from replicated northern and southern populations of *Ischnura elegans* in a common garden experiment manipulating temperature and predation risk and quantified growth rate, food

intake and growth efficiency. (3) The predator-induced and temperature-induced growth accelerations were the same at both latitudes, despite considerably faster growth rates in the southern populations. While the higher growth rates in the southern populations and the high rearing temperature were driven by both an increased food intake and a higher growth efficiency, the higher growth rates under predation risk were completely driven by a higher growth efficiency, despite a lowered food intake. (4) The emerging pattern that higher growth rates associated with latitude, temperature and predation risk were all (partly or completely) mediated by a higher growth efficiency has two major implications. First, it indicates that energy allocation trade-offs and the associated physiological costs play a major role both in shaping large-scale geographic variation in growth rates and in shaping the extent and direction of growth rate plasticity. Secondly, it suggests that the efficiency of energy transfer in aquatic food chains, where damselfly larvae are important intermediate predators, will be higher in southern populations, at higher temperatures and under predation risk. This may eventually contribute to the lengthening of food chains under these conditions and highlights that the prey identity may determine the influence of predation risk on food chain length." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**12654.** Sutton, P.G. (2012): Key identification features for the Red-veined Darter *Sympetrum fonscolombii* (Selys, 1840) and other Odonata in Corfu (Kérkira). *Bulletin of the Amateur Entomologists' Society* 71(501): 45-49. (in English) [Records of *S. fonscolombii*, *Lestes barbarus*, *Coenagrion pulchellum*, and *Ischnura elegans* are documented and discussed] Address: Sutton, P.G., 2 Fir Tree Close, Flitwick, Beds. MK45 1NZ, UK. E-mail: petersutton@freeuk.com

**12655.** Sviderskii, V.L.; Plotnikova, S.I.; Gorelkin, V.S.; Severina, I.; Isavnina, I.L. (2012): Functional role of dragonfly legs before and after hatching: reorganization of coordinating interactions. *Rossiiskii fiziologicheskii zhurnal imeni I.M. Sechenova* 98(11): 1432-1440. (in Russian, with English summary) ["The characteristics of a structure-functional organization of leg apparatus were examined in the dragonfly *Aeshna grandis*: larvae of the final stadium, which legs perform a locomotion function and adults (imago) rising on a wing, which legs lose a locomotion function and are used mainly for catching a prey in the air. It has been demonstrated that legs of the imago practically do not differ from those of the larva either in shape or in proportion of segments of the leg and all changes in the functional role of legs of the imago are implemented due to modifications of mechanisms of limb muscle control and an appropriate reorganization or coordinating interactions. As it is proved by the obtained data, this reorganization concerns

mechanisms of the generation of motor commands as well as close coordination of the activity of wing and leg apparatus and some others. The above mentioned mechanisms are discussed." (Authors)] Address: Svidersky, V.L., Sechenov Institute of Evolutionary Physiology and Biochemistry, Russian Academy of Sciences, St. Petersburg, Russia. E-mail: office@iephb.ru

**12656.** Tellez, D.; Chapelin-Viscardi J.-D. (2012): Une nouvelle station à *Leucorrhinia caudalis* (Charpentier, 1840) dans le département du Loiret (Odonata Anisoptera Libellulidae). *L'Entomologiste* 68(3): 191. (in French) [Arboretum, Grandes Bruyères (Ingrannes), France: 1 ind. in 2011, 3 ind. in 2012] Address: Laboratoire d'Eco-Entomologie, 5 rue Antoine Mariotte, 45000 Orléans, France

**12657.** Tijare, R.V.; Patil, K.G. (2012): Diversity of Odonata in and around Gorewada National Park, Nagpur, M.S. (India). *Bionano Frontier - Eco Revolution 2012 Colombo - Srilanka*: 182-183. (in English) ["The survey of odonates carried out from wetlands present in and nearby region of the Gorewada National park during the months July 2010 to June 2011. Total 29 species were observed in and around Gorewada national park, Nagpur belonging to 24 genera and 6 families. Odonate species *Orthetrum sabina*, *Neurothemis tullia*, *Diplacodes trivialis*, *Crocothemis servilia*, *Trithemis aurora*, *Bradinopyga geminata*, *Pantala flavescens*, *Acisoma panarpoides*, *Anax guttatus*, *Ceriagrion coromandelianum* were observed almost throughout the year. *Gynacantha bayadera* is crepuscular species observed breed in swamps and marshy area of forest and *Ischnura senegalensis* was pollution tolerant species found near the variety of stagnant and flowing water." (Authors)] Address: Govt. Institute of Science, Nagpur, 440 001, India. E-mail: rvtijare@rediffmail.com

**12658.** Tiple, A.D. (2012): Odonata (damselflies and dragonflies) fauna of Tadoba National Park and surroundings, Chandrapur, Maharashtra (Central India). *Bionano Frontier* 5: 149-152. ["A survey of fresh water body sites such as ponds, streams, fields grassland, and forests areas of Tadoba National Park, Chandrapur district area of 623 sq. km. from 2008 to 2010 to collect and record the Odonate faunal diversity and their status. A total of 64 species of Odonata belonging to 41 genera and 9 families viz. Gomphidae, Aeshnidae, Cordulidae, Libellulidae, Coenagrionidae, Platycenemididae, Protoneuridae, Chlorocyphidae and Lestidae were recorded. The checklist adds 24 new records for Tadoba National Park. The Odonates belong to the Libellulidae (33 species), followed by Coenagrionidae (14 species), Aeshnidae (5 species), Gomphidae, (3 species), Platycenemididae and Lestidae (3 species each), Protoneuridae (2), Macromiidae (1 species) and Chlorocyphidae (1 species). Of the total 64 species, 23 were abundant or very common, 24 were common, 12 rare and 5 very rarely in occurrence. The observations support the val-

ue of the National park (reserve forest) area in providing valuable resources for Odonata." (Author)] Address: Tiple, A.D., Dept of Zoology, Vidyabharti College, Seloo, Wardha 442104, Maharashtra, India. E-mail: ashishdtiple@yahoo.co.in

**12659.** Torralba Burrial, A.; Hernández Toledo, E. (2012): Confirmación de la presencia actual de *Onychogomphus costae* Sélys, 1885 (Odonata: Gomphidae) en Madrid (centro de la Península Ibérica). *Boletín de la SEA* 51: 347-348. (in English, with Spanish summary) [The current presence of *O. costae* in Madrid province (Spain) is reported. Only one previous record from this region existed, published in the early 20th century. The new locality is: Fuentiduena de Tajo, rio Tajo, 30TVK8699638899 (datum WGS84), 541 m a.s.l., 16/08/2012, 1 male, 1 female.] Address: Torralba Burrial, A., Depto de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

**12660.** Torralba-Burrial, A.; Ocharan, F.J.; Outomuro, D.; Azpilicueta Amorín, M.; Cordero Rivera, A. (2012): *Ophiogomphus cecilia*. En: VV.AA., Bases ecológicas preliminares para la conservación de las especies de interés comunitario en España: Invertebrados. Ministerio de Agricultura, Alimentación y Medio Ambiente. Madrid: 50 pp. (in Spanish) [Odonata species protected under the European Community law are treated according the legal definitions of the Fauna, Flora, Habitat Directive. Information on identification, general distribution, ecology and habitat, 'favourable conservation status' on different geographic scales, conservation measures, and regional bibliography are given. This manual refers to the situation of *O. cecilia* in Spain.] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

**12661.** Torralba-Burrial, A.; Ocharan, F.J.; Outomuro, D.; Azpilicueta, M.; Cordero, A. (2012): *Gomphus graslinii*. En: VV.AA., Bases ecológicas preliminares para la conservación de las especies de interés comunitario en España: Invertebrados. Ministerio de Agricultura, Alimentación y Medio Ambiente. Madrid: 81 pp. (in Spanish) [Odonata species protected under the European Community law are treated according the legal definitions of the Fauna, Flora, Habitat Directive. Information on identification, general distribution, ecology and habitat, 'favourable conservation status' on different geographic scales, conservation measures, and regional bibliography are given. This manual refers to the situation of *G. graslinii* in Spain.] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

**12662.** Torralba-Burrial, A.; Ocharan, F.J.; Outomuro, D.; Azpilicueta Amorín, M.; Cordero Rivera, A. (2012): *Coenagrion mercuriale*. En: VV.AA., Bases eco-

lógicas preliminares para la conservación de las especies de interés comunitario en España: Invertebrados. Ministerio de Agricultura, Alimentación y Medio Ambiente. Madrid: 98 pp. (in Spanish) [Odonata species protected under the European Community law are treated according the legal definitions of the Fauna, Flora, Habitat Directive. Information on identification, general distribution, ecology and habitat, 'favourable conservation status' on different geographic scales, conservation measures, and regional bibliography are given. This manual refers to the situation of *C. mercuriale* in Spain.] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**12663.** Torralba-Burrial, A.; Ocharan, F.J.; Outomuro, D.; Azpilicuta Amorín, M.; Cordero-Rivera, A. (2012): *Oxygastra curtisii*. En: VV.AA., Bases ecológicas preliminares para la conservación de las especies de interés comunitario en España: Invertebrados. Ministerio de Agricultura, Alimentación y Medio Ambiente. Madrid: 97 pp. (in Spanish) [Odonata species protected under the European Community law are treated according the legal definitions of the Fauna, Flora, Habitat Directive. Information on identification, general distribution, ecology and habitat, 'favourable conservation status' on different geographic scales, conservation measures, and regional bibliography are given. This manual refers to the situation of *O. curtisii* in Spain.] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**12664.** Van Ryswyk, B. (2012): 2012 Hamilton Odonata Count Summary. *The Wood Duck* 66(2): 38-41. (in English) [Ontario, Canada, June 30 2012; "Our species count for the day was above average at 59 species, and we even managed to add one new species (*Basiaeschna janata*) to the list! Our cumulative species list (all species ever seen on the Count) is now at a whopping 90 species!" (Author)] Address: not stated

**12665.** Van Ryswyk, B. (2012): 2009 Hamilton Odonata Count Summary. *The Wood Duck* 66(2): 30-31. (in English) [Ontario, Canada; "The sixth annual Hamilton Odonata Count was held on July 4, 2009, and was quite successful considering the wet, cool spring that we had. We observed a total of 57 species on Count day (and an additional four species from count week). .... Location: The Hamilton Odonate Count uses a circle 15 miles in diameter, centred on the village of Kirkwall in Flamborough. Highlights of the 2009 count included four new species to the Count list, two on Count day and two during the Count week. New Count records were: *Epi-aeschna heros*, *Cordulegaster maculate*, *C. obliqua*, and *Somatochlora walshii*." (Author)] Address: not stated

**12666.** Vega-Sánchez, Y.M.; Camacho-Morales, E.; Chassin-Noria, O.; MendozaCuenca, L. (2012): Efecto

del tipo de hábitat, genética y selección sexual sobre la morfología alar en *Hetaerina* (Odonata: Calopterygidae). *Biológicas* 14(1): 53-60. (in Spanish, with English summary) ["Odonates exhibit distinctive behaviour among insects, particularly flight types associated with mating systems and therefore have been widely used as ecological and evolutionary models. As in other flying insects, the wing shape is under strong selective pressures because it determines not only flight efficiency but also their reproductive success. We evaluated the factors that shape the evolution of wing shape in three species of *Hetaerina*: *H. americana*, *H. cruentata* and *H. titia*, which have a wide geographical distribution in Mexico and can settle in different habitat types. These species also converge in a territorial lek mating system, where males gather in exhibition arenas where they perform ritualized flights, long-lasting and energy-demanding. We apply geometric morphometric techniques to independently evaluate the shape and size of individuals. Also genetic relationship analysis was made between populations of the three species using nuclear DNA sequences (ITS1, 5.8S and ITS2). Our results suggest that although there is convergence in the mating system and a genetic similarity within populations, the evolution of the forms of the wings in these three species is determined by the pressures associated to habitat similarity. Analysis of deformation show that the structural complexity and levels of competition for resources and sexual partners that are characteristic of tropical rain forests favour the evolution of wing designs that increase the maneuverability of individuals." (Authors)] Address: Mendoza Cuenca, L., Laboratorio de Ecología y Evolución de la Conducta, Fac. de Biología. Univ. Michoacana de San Nicolás de Hidalgo. Edificio "R", Ciudad Universitaria, Av. Francisco J. Múgica s/n. Col. Felicitas del Río, C.P. 58030. Morelia, Michoacán, México

**12667.** von Ellenrieder, N. (2012): The levis group of *Orthemis* revisited: a synopsis including a synonymy and description of six new species of *Orthemis* from South America (Odonata: Libellulidae). *International Journal of Odonatology* 15(3): 115-207. (in English) ["The levis and ferruginea groups of *Orthemis* are redefined. Six new species of *Orthemis* are described: *O. aciculata* sp. nov. (male holotype: Surinam, Para Dist., road near forest, Zanderij I (5°32' N, 55°10' W), 17 January 1957, leg. J. Belle [RMNH]), *O. celata* sp. nov. (male holotype: Brazil, Pará State, Rio Gurupí, Canindé (0°30'57' ' S, 51°14'00' ' W), 27-28 February 1966, leg. B. Malkin [RMNH]), *O. faaseni* sp. nov. (male holotype: Brazil, Rondônia State, Porto Velho (8°46' S, 63°54' W), 28 February 1922, leg. J.H. Williamson & J.W. Strohm [UMMZ]), *O. garrisoni* sp. nov. (male holotype: Panama, Panamá Prov., 7 km NW of Gamboa, Pipeline Road, trail near palm forest, 30 July 1979, leg. RWG & J.A. Garrison [FSCA]), *O. paulsoni* sp. nov. (male holotype: Ecuador, Sucumbios Prov., forest trail ca. 3 km W of Shushufindi (0°09'59' ' N, 76°41'30' ' W), 14 October 2009, leg. K.J. Tennessen [FSCA]), and



*O. teres* sp. nov. (male holotype: Bolivia, Cochabamba Dept., Chapare, Cristal Mayo (17°00'57' ' N, 65°38'09' ' W), October/November 1994, leg. R. Andreas [FSCA]). *Orthemis plaumanni* Buchholz is found to be a junior synonym of *O. ambinigra* Calvert. A lectotype is designated for *O. concolor* Ris. All species of the *levis* group and the new species of the *ferruginea* group described here are diagnosed, illustrated, mapped, and keyed." (Author)] Address: Ellenrieder, Natalia von, California State Collection of Arthropods, CDFA, 3294 Meadowview Road, Sacramento, CA 95832. Email: natalia.ellenrieder@gmail.com

**12668.** Ware, J.L.; LaPolla, J.S. (2012): A tribute to Michael L. May. *Organisms diversity & evolution* 12(3): 205-207. (in English) [The editors dedicate this special issue of 'Organisms Diversity and Evolution' to Mike May. "We have titled it "Of Dragons and Damsels," because he has spent much of his career, as mentioned above, working on dragonflies and damselflies, but one of the features that we all admire in Mike is that he is such a polymath of entomological knowledge. The breadth of his knowledge has always been a source of admiration among his students. We have tried to include a breadth of papers to reflect Mike's own varied interests. We hope this serves as tribute to a man we all admire and respect, and someone from whom we expect still more great science to come." (Authors)] Address: Ware, Jessica, Rutgers, the State Univ. of New Jersey, Boyden Hall, room 406, 195 University Ave, Newark, NJ 07102, USA. E-mail: jware42@andromeda.rutgers.edu

**12669.** Weissinger, R.H.; Perkins, D.W.; Dinger, E.C. (2012): Biodiversity, water chemistry, physical characteristics, and anthropogenic disturbance gradients of sandstone springs on the Colorado plateau. *Western North American Naturalist* 72(3): 393-406. (in English, with Spanish summary) ["Springs located on the Colorado Plateau are highly threatened and represent a small percentage of the landscape; yet they are disproportionately important to diverse native flora and fauna. The relationships between anthropogenic disturbance, aquatic macroinvertebrate species composition, and environmental variables at these springs have received little study. We selectively visited 40 sandstone springs in southeastern Utah and southwestern Colorado to span a range of impacts. We classified the springs into impact categories based on a spring impact score, and we measured biodiversity (aquatic macroinvertebrates), water chemistry (nutrients, dissolved O<sub>2</sub>, pH, specific conductivity, temperature, turbidity, coliform bacteria [*Escherichia coli*]), physical characters (solar radiation, substrate, vegetation cover, bank stability, discharge), and presence of anthropogenic disturbance. *Escherichia coli* abundance was higher in high impact categories, and turbidity increased with increasing disturbance. No differences in total N, total P, specific conductivity, flow, dissolved O<sub>2</sub>, pH, or substrate were found among the

impact categories. Vegetation cover was higher in low impact categories than in moderate and high impact categories, while potential annual and growing-season solar radiation was lower in low impact categories than in high impact categories. Global and subsequent multiple response permutation procedure (MRPP) comparisons suggested strong differences in aquatic macroinvertebrates between low and high impact springs and no difference at moderate impact springs. Mean taxa richness ( $\alpha$ -diversity), total taxa richness ( $\gamma$ -diversity), and percent of taxa richness composed of shredders peaked at moderate disturbance levels. The percentage of non-insect taxa richness was reduced in high impact categories, and Odonata were higher in low impact categories than in high impact categories. All high impact springs had both livestock use and vehicle use (roads or off-highway vehicles), and our data suggest that disturbances caused by one or both of these uses alter the aquatic macroinvertebrate assemblage. We suggest that disturbance may increase macroinvertebrate richness, where a mix of tolerant and intolerant species co-occur, until macroinvertebrate richness reaches a threshold; after surpassing this threshold, macroinvertebrate diversity decreases." (Authors)] Address: Perkins, D.W., Northern Colorado Plateau Inventory & Monitoring Network, National Park Service, Western State College, Environmental Studies Dept, Gunnison, CO 81231, USA. E-mail: dustinwperkins@nps.gov

**12670.** Yapó, M.L.; Atse, B.C.; Kouassi, P. (2012): Inventaire des insectes aquatiques des étangs de piscicultures au sud de la Côte d'Ivoire. *Journal of Applied Biosciences* 58: 4208-4222. (in French, with English summary) ["Objective: The main objective of this study was to determine the diversity of aquatic insect species in five fish farms ponds in the Southern Ivory Coast. It contributes to our knowledge of this ecosystem, which is not well known. Methods and Results: The samples were taken using a hand net and a Van veen grab. Specimens were identified to the lowest possible taxonomic level, by use of systematic and classification keys (Dejoux et al., 1981; Tachet et al., 2003; de Moor et al., 2003 a; 2003 b). Seventy-nine taxa belonging to 8 orders and 35 families were identified. Hemiptera and Coleoptera were the major insect taxa collected (with 21 taxa each). They were followed by Diptera (15 taxa), Odonata (11 taxa), Ephemeroptera (5 taxa) and by Trichoptera (4 taxa). Megaloptera and Lepidoptera (1 taxon each) were the less diversified. Conclusion and application: Eight new taxa for the Ivory Coast were harvested. Most of these taxa are cosmopolitan. They were found in most of the stations. This is a contribution to the list of aquatic insects for the scientific community." (Authors)] Address: Yapó, M.L., 1 Laboratoire de Zoologie- Biologie Animale, Université de Cocody, U.F.R Biosciences, 22 BP582 Abidjan 22 Côte d'Ivoire

**12671.** Zeybek, M.; Kalyoncu, H.; Ertan, Ö.O.; Çiçek, N.L. (2012): Benthic invertebrate fauna of Köprüçay

stream (Antalya). Süleyman Demirel Üniversitesi, Fen Bilimleri Enstitüsü Dergisi 16(2): 146-153. (in Turkish, with English summary) [Köprüçay Stream, Turkey; samples were collected at 7 stations between February 2008 – January 2009. The taxa listed are Gomphus sp., Octogomphus sp., Aeshna sp., Plathemis sp., Epallage fatime, Calopteryx splendens, Anax sp., and Anax longipes. The Nearctic taxa of course are misidentified.] Address: Zeybek, M., Süleyman Demirel Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü / ISPARTA, Turkey

**12672.** Zhang, Z.; Song, X.; Wang, Q.; Lu, X. (2012): Mercury Bioaccumulation and Prediction in Terrestrial Insects from Soil in Huludao City, Northeast China. Bull. Environ. Contam. Toxicol. 89(1): 107-112. (in English) ["Mercury accumulation was investigated by constructing and testing empirical equations based on mercury in soil ( $C_s$ ) and in 10 terrestrial insects ( $C_i$ ).  $C_s$  ranged from 0.13 to 41.01 mg/kg.  $C_i$  differed with species and the highest was found in dragonfly.  $C_s$  and  $C_i$  showed a good linear fit, and a simple equation was used in predicting  $C_i$  when insects were classified into one Insecta group ( $r = 0.3399$ ,  $p = 0.0037$ ). The taxonomy can affect validities of empirical equations, which fit field data well when insects were grouped by feeding habits, and when grouped by species, empirical equations were suitable only for certain insects." (Authors)] Address: Lu, X., Key laboratory of Wetland Ecology and Environment, Institute of Northeast Geography and Agroecology, Chinese Academy of Sciences, Changchun, 130012, China. E-mail: luxg@neigae.ac.cn

### 2013

**12673.** Abbott, J. (2013): Morph-specific and sex-specific temperature effects on morphology colour polymorphic damselfly *Ichnura elegans*. Animal Biology 63(2): 149-167. (in English) ["Colour polymorphic species with extensive ranges often exhibit large-scale geographic patterns of morph frequency variation. Because colour polymorphism is associated with correlated differences in multiple traits, such as thermal performance, a likely proximate explanation for such patterns is morph-specific responses to temperature variation. The colour polymorphic *Ichnura elegans* exhibits large-scale geographic variation in morph frequencies, but the possibility that temperature is a proximate explanation for the latitudinal cline in morph frequencies has only ever been tested within a single developmental stage (egg survival and hatching time), where no difference between the morphs was found. I therefore carried out a temperature manipulation on larvae of *I. elegans* which I raised to maturity in the laboratory. I found that individuals exhibited incomplete compensatory growth after being exposed to cold temperatures, and that individuals which did not emerge successfully and those that experienced cold temperatures had more juvenile morphology in the last instar. In addition, there were sex-specific and morph-specific effects of temper-

ature on adult morphology, such that sexual size dimorphism was increased when individuals experienced warm temperatures throughout the larval stage, and that cold temperatures tended to result in larger size of androchromes and their offspring compared to the other morphs. These results are generally consistent with the large-scale geographic variation in morph frequencies found in this species." (Author)] Address: Abbott, Jessica, 1. Section for Evolutionary Ecology, Department of Biology, Lund University, Sölvegatan 37 9 223 62 Lund, Sweden. Email: jessica.abbott@biol.lu.se

**12674.** Abed, R.M.M.; Barry, M.J.; Al Kindi, S.; Golubic, S. (2013): Structure and cyanobacterial species composition of microbial mats in an Arabian Desert stream. African Journal of Microbiology Research 7(15): 1434-1442. (in English) ["Microbial mats are often the dominant benthic biotype in desert streams, however information on such mats is very scarce. We investigated the gross morphology of microbial mats and their cyanobacterial species composition in a perennially flowing wadi in Northern Oman, in relation to current flow and other biotic and abiotic variables. Physical and chemical parameters at the six sites were generally similar with low concentrations of soluble phosphorus and nitrogen; however, flow rates varied greatly with the highest velocity being 50 cm/s. The mats varied greatly in their gross morphology with the four sites with the highest current velocities forming low laminated structures attached to cobbles, and the two sites with minimal or no flow forming complex three-dimensional structures or free floating balls 1 to 3 cm in diameter. The concentration of chlorophyll a varied between 2.6 ( $\pm 0.02$ ) and 1.4 ( $\pm 0.11$ ) mg chlorophyll a g<sup>-1</sup> mat fresh weight, with the highest concentration detected in the free floating balls. 21 cyanobacterial morphotypes belonging to 14 genera ... were identified with *Calothrix* and *Leptolyngbya* spp. as the most abundant. Cluster analysis of the cyanobacterial species composition showed that mats could have very different morphologies despite similar species compositions suggesting a high degree of plasticity of mat form. We conclude that microbial mats are important elements in Wadi ecosystems and have great variety of structure and community composition." (Authors) Odonata are treated as morphospecies.] Address: Abed, R.M.M., Biology Dept, College of Science, Sultan Qaboos Univ., P.O. Box: 36, postal code 123, Al Khoud, Sultanate of Oman. E-mail: rabad@mpi-bremen.de

**12675.** Al-Shami, S.; Heino, J.; Che Salmah, M.R.; Hassan, A.A.; Suhaila, A.H.; Madrus, M.R. (2013): Drivers of beta diversity of macroinvertebrate communities in tropical forest streams. Freshwater Biology 58(6): 1126-1137. (in English) ["(1.) There has recently been increasing interest in patterns of beta diversity but we still lack a comprehensive understanding of these patterns in various regions (e.g. the tropics), ecosystems (e.g. streams) and organism groups (e.g. invertebrates). (2.) Our aim was to investigate the patterns of beta diversity of stream ma-

croinvertebrates in relation to key environmental (i.e. stream size, pH and habitat degradation) and geographical variables (i.e. latitude, longitude, altitude) in a tropical region. We surveyed a total of 8–10 riffle sites in each of 34 streams (altogether 337 riffle sites were sampled) in Peninsular Malaysia to examine variation in macroinvertebrate community composition at within-stream and among-stream scales. (3.) Based on test of homogeneity of dispersion, we found that the streams studied differed significantly in within-stream variation in community composition (i.e. among-site variation of within stream beta diversity). The patterns were similar based on Bray–Curtis coefficient on abundance data, Sorensen coefficient on presence–absence data and Simpson coefficient on presence–absence data. We also found that within-stream beta diversity was significantly related to stream size, pH and latitude, with each of these variables individually accounting for around 20% of the variation in beta diversity in simple regressions, while the total variation explained by the three significant variables amounted to around 50% in multiple regressions. By contrast, habitat degradation, longitude and altitude were not significantly related to beta diversity. We also found that the factor drainage basin accounted for much of the variation in beta diversity in general linear models, suppressing the effects of environmental variables. (4.) We concluded that within-stream beta diversity is mainly related to a combination of the identity of a drainage basin and stream environmental factors. Our findings provide important background for stream environmental assessment and conservation planning by emphasising that (i) macroinvertebrate communities within streams are not homogeneous, but show considerable beta diversity, (ii) streams differ in their degree of within-stream beta diversity, (iii) stream size and water pH should be considered in applied contexts related to within-stream beta diversity and (iv) historical effects may be different in different drainage basins and may affect present-day patterns of within-stream beta diversity. ... However, dragonflies, fish and frogs showed negative responses to latitude, whereas caddisflies and salamanders showed no relationships with latitudinal gradients. ..." (Authors)] Address: Al-Shami, S.A., School of Biol. Sc., Univ. Sains Malaysia (USM), 11800 Penang, Malaysia. E-mail: alshami200@gmail.com

**12676.** Alvarez, H.A.; Serrano-Meneses, M.A.; Reyes-Márquez, I.; Jiménez-Cortés, J.G.; Córdoba-Aguilar, A. (2013): Allometry of a sexual trait in relation to diet experience and alternative mating tactics in two rubyspot damselflies (Calopterygidae: Hetaerina). *Biological Journal of the Linnean Society* 108(3): 521-533. (in English) ["Several arguments have been put forward to explain how sexual selection drives the evolution of sexual trait allometry, especially hyperallometry. The 'positive allometry theory' suggests that hyperallometry is a rule in all-secondary sexual traits, whereas the 'display hypothesis' suggests that only males in good condition will exhibit hyperallometric sexual display traits. In the present study, we investigated: (1) the condition-dependence nature (by

using two diet treatments that varied in the amount of food provided to the larvae) of a sexually selected trait (wing pigmentation; WP) in recently-emerged adults of *Hetaerina americana*, and (2) the scaling relationship between WP and body size (wing and body length) in *H. americana* and *H. vulnerata*, according to alternative reproductive tactics (ARTs; territorial and nonterritorial males). First, we found support that indicated that diet positively affected WP length, although there was no significant WP allometric pattern in relation to diet regimes. Second, WP was hyperallometric in both *Hetaerina* species. WP size was similar between ARTs and, in *H. americana* (but not *H. vulnerata*), nonterritorial males showed steeper slopes than territorial males when wing length was used. The results obtained support the notion that sexual traits are hyperallometric, although there is no clear pattern in relation to ARTs." (Authors)] Address: Serrano-Meneses, M.A., Laboratorio de Biología Evolutiva, Centro Tlaxcala de Biología de la Conducta, Universidad Autónoma de Tlaxcala, Tlaxcala, México. E-mail: serrano.meneses@gmail.com

**12677.** Álvarez Gándara, J.; Ferreiro Garrido, J.; Vilas Souto, J. (2013): *Orthetrum brunneum* (Fonscolombe, 1837), nueva cita para la provincia de Pontevedra (Galicia, NO Península Ibérica) (Odonata - Libellulidae). *Archivos Entomológicos* 8: 287-288. (in Spanish, with English summary) [After a period of more than 95 years, *O. brunneum* is recorded once again in the province of Pontevedra (Galicia, NW Iberian Peninsula): 04-X-2012, Salvaterra de Miño.] Address: Ferreiro Garrido, J., Barrio do Souto, 10B. E-36740 San Salvador de Tebra, Tomiño (Pontevedra), Spain. E-mail: meisok@gmail.com

**12678.** Anbalagan, V.; Paulraj, M.G.; Ignacimuthu, S. (2013): Odonata diversity (Insecta: Arthropoda) in rice and vegetable fields in a north-eastern district of Tamil Nadu, India. *Journal of Research in Biology* 3(4): 977-983. (in English) ["Odonata diversity in vegetable fields (brinjal and okra) and rice fields was studied from January 2005 to December 2008 in Tiruvallur district of Tamil Nadu. Totally 23 species of Anisoptera and 12 species of Zygoptera were recorded and all these species were grouped into eight families. In vegetable fields 31 species of Odonata were recorded under 22 genera. In rice fields the species richness (21 species) and total genera (16) were less than vegetable fields during the entire study period. Libellulidae was the large family in both vegetable and rice fields which comprised maximum number of species. *Pantala flavescens*, a migratory species, was the most dominant in numbers throughout the year. Diversity indices clearly showed that Odonata diversity was higher in vegetable fields than in rice fields." (Authors)] Address: Ignacimuthu, S., Entomology Research Institute, Loyola College, Chennai-34, India. E-mail: entolc@hotmail.com

**12679.** Anonymus (2013): Keynsham landmark appears on new book cover. *The Week in Bitton*, Corston,



Downend, Emersons Green, Hanham, Keynsham, Kingswood, Longwell Green, Mangotsfield, Oldland Common, Pucklechurch, Salford, Staple Hill, Stockwood, Warmley, Whitchurch, Wick & Willsbridge • Thursday 8 August 2013: 29. (in English) [Verbatim: "Keynsham landmark appears on new book cover The chimney of Cadbury's former power house appears in a painting on the front cover of a new book published by the Bristol Regional Environmental Records Centre (BRERC). Called Dragonflies and Damselflies of the Bristol Region, it is the fourth in a series of books that document local wildlife. Why put Keynsham on the front cover? The stretch of the River Avon along with the River Chew and other water-courses are particularly good sites for Odonata (an order of carnivorous insects that includes dragonflies and damselflies). Specialist species include the Scarce Chaser, that is often seen now but was not discovered in the Bristol area until 1986, and the delicate White-legged Damselfly that needs good, clean water to complete its life cycle. John Aldridge, from Keynsham and a volunteer for the BRERC, said: "A key message that should be taken forward is that the redevelopment at the former Cadbury site must be sympathetic to dragonflies and damselflies; this should not be too difficult as the flood plain is impossible to build on anyway. However, steps should be taken to ensure that the habitat is not damaged when work takes place." The hardback book contains many photographs, maps and text describing each species. It costs £19.50 and is available from BRERC. For more information call 0117 934 9833 or visit [www.brerc.org.uk](http://www.brerc.org.uk)] Address: <http://theweekin.co.uk/wp-content/uploads/2013/08/Issue0281.pdf>

**12680.** Anonymus (2013): Beauties from the above skies. Journal - Parc National du Mont-Orford 2013-2014: 4 (in English) [Verbatim: The parc national du Mont-Orford team is very pleased with new discoveries made over time in the park that allow the team to pursue the mission of conservation, protection and development of our heritage. During the 2012 summer season, based on an exploratory survey of Odonata, a preliminary list of 26 species was drawn up in 3 field visits in the Lac-Stukely sector. This first summary-inventory showed a species not yet mentioned in the Estrie region: *Somatochlora tenebrosa*, a dragonfly rarely observed in Quebec. Another wonderful discovery was *Perithemis tenera*. This latter species was mentioned for the first time in Quebec in 2007. This is the second mention of this species for the Estrie region. ...] Address: <http://www.sepaq.com/dotAsset/35697.pdf>

**12681.** Bagworth, T. (2013): Reports from coastal stations - 2012: Gibraltar Point NNR, Lincolnshire. *Atropos* 48: 67-68. (in English) [UK, *Sympetrum fonscolombii*, *Calopteryx splendens*, *Aeshna grandis*] Address: not stated

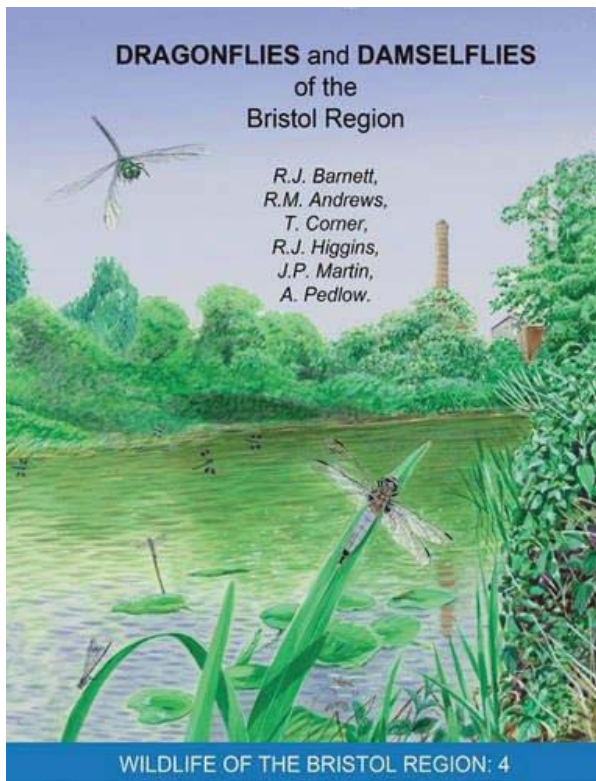
**12682.** Baker, R.A. (2013): Cynthia Evelyn Longfield (1896-1991) - the Irish connection and collections. *J. Br.*

*Dragonfly Society* 29(1): 23-39. (in English) ["Cynthia E. Longfield (1896-1991), traveller, explorer and dragonfly expert, was a remarkable woman in many ways. Internationally known as an odonatologist, she travelled throughout the five continents, most importantly sailing with other scientists to the South Pacific on the St. George expedition in 1924. She taught herself natural history at home and had wide interests including ornithology and botany. She always regarded herself as Irish, with her family estate in County Cork, to which she was to return on 'retirement' in 1957. She deposited her library and scientific papers at the Royal Irish Academy and a collection of her Odonata was donated to the Natural History Museum in Dublin. She worked for many years at the Natural History Museum in London as a volunteer, where she eventually specialized on African species of dragonflies and was made an Honorary Associate in 1948. Author or co-author of several books on dragonflies, she was elected the first Honorary member of the British Dragonfly Society and is remembered with affection and high regard by those who knew her." (Author)] Address: Baker, R.A., The Bungalow, St Johns Park, Menston, Ilkley, LS29 6ES, UK.

**12683.** Baker, R.A. (2013): Malcolm Burr (1878-1954) and Robert McLachlan (1837-1904), British workers on the Balkan fauna in 1898, with notes on the Odonata collected and identified. *Notul. odonatol.* 8(1): 1-3. (in English) ["2 British naturalists, a young student from Oxford University and an older expert on Odonata, collaborated on material from SE Europe in 1898. The first of these, M. Burr, collected the material while on a tour of the Balkans, Romania and Hungary in that year and R. McLachlan identified the specimens and published the work in the same year. The species list provides some of the earliest information on the Odon. from this part of the world, and is updated with additional notes." (Authors)] Address: Baker, R.A., Faculty of Biological Sciences, University of Leeds, Leeds, LS2 9JT, UK. E-mail: [R.A.Baker@leeds.ac.uk](mailto:R.A.Baker@leeds.ac.uk)

**12684.** Barnett, R.; Andrews, R.; Corner, T.; Higgins, R.J.; Martin, J.P.; Pedlow, A. (2013): Dragonflies and Damselflies of the Bristol Region. Bristol Regional Environmental Records Centre (BRERC): 214 pp. (in English) ["This book presents the culmination of thousands of sightings by both professional ecologists, biologists and amateur naturalists, brought together by BRERC to enable the status of our species in the region to be assessed. Wonderful colour photographs accompany the distribution maps which reveal where the different species occur around Bristol, Bath and the surrounding countryside. Expert authors analyse the threats and opportunities to the dragonfly populations; they have been subject to great changes over the last two hundred years, and will no doubt continue to change into the future. For example, the restoration of boating on the Kennet & Avon Canal has reduced the numbers of dragonflies, but at the same time, new species such as

Erythromma viridulum are colonising our area." (Publisher, <http://www.brerc.org.uk/services/publications.htm>) Address: BRERC: Bristol Central Library, College Green, Bristol, BS1 5TL, UK



**12685.** Bashar, K.; Reza, M.S. (2013): Dragonflies & damselflies in Bangladesh. Faunistic study of Odonata. Lambert Academic Publishing AG & Co. KG: 128 pp. (in English) [inv, "A faunistic study of Odonata was carried out in Bangladesh. A total of forty eight (48) species of Odonates belonging to thirty one genera, eight families and two sub-orders were recorded from the sampling areas. Among them, twenty five (25) species of Dragonflies under three families and twenty three (23) species of Damselflies under five families were recorded. The highest and lowest numbers of Odonata species were observed in Jahangirnagar university campus (31 species) and Bandarban (23 species) respectively. The diversity of Odonata species was peak during the post-monsoon season (45 species). Highest numbers of species were identified in Libellulidae family whereas lowest numbers were observed in Gomphidae, Lestidae, Calopterygidae and Protoneuridae family. Rhyothemis variegata was the dominant species (13.03%) of dragonfly but in damselfly, Agriocnemis pygmaea was the abundant species (13.97%) among all collected Odonata." (Authors)]

**12686.** Batty, P.M. (2013): The Brilliant Emerald Somatochlora metallica (Vander Linden) in Scotland, with particular reference to the Argyll sites and to larval habitat. J. Br. Dragonfly Society 29(1): 55-64. (in English) ["Since 2000, new S. metallica sites have been found in the Loch a' Chrion-doire area in Argyll. The sites are de-

scribed. The apparent range expansion is likely to be the result of increased recording in the area. Larvae were first found in Scotland in 2000. Their habitat is discussed. They are found in water 20-40 cm deep, underneath heather or sphagnum banks amongst sparse fibrous detritus. The banks are at water level and overhanging or undercut for between 30 and 150 cm. Larvae have also been found under stones in Slovenia." (Author)] Address: Batty, Pat M., Kirnan Farm, Kilmichael Gien, Lochgilphead, Argyll PA31 8QL, UK

**12687.** Bazin, N. (2013): Gomphus flavipes (Charpentier, 1825) redécouvert sur la Vallée du Rhône. Symptetrum 16: 30. (in French) [After 150 years of absence, G. stylurus was discovered at 27-VII-2007 in the region Rhône-Alpes, France.] Address: Bazin, N., Chemin d'Aurelle, le village, 07700 Bidon, France

**12688.** Bechly, G.; Poinar, G. (2013): Burmaphlebia reifi gen. et sp. nov., the first anisozygopteran damsel-dragonfly (Odonata: Epiophlebioptera: Burmaphlebiidae fam. nov.) from Early Cretaceous Burmese amber. Historical Biology: An International Journal of Paleobiology 25(2): 233-237. (in English) ["A new family, genus and species of damselfly, Burmaphlebia reifi gen. et sp. nov. (Burmaphlebiidae fam. nov.), is described as the second fossil odonate from Early Cretaceous Burmese amber. Its phylogenetic position is discussed and the fossil is attributed to a new family at the base of the anisozygopteran grade, probably closely related to the Recent relict group Epiophlebiidae. It is the first record of the 'anisozygopteran' grade from amber and the smallest known representative of this group." (Authors)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, D-70191 Stuttgart, Germany. E-mail: guenter.bechly@smns-bw.de

**12689.** Blanke, A.; Greve, C.; Mokso, R.; Beckmann, F.; Misof, B. (2013): An updated phylogeny of Anisoptera including formal convergence analysis of morphological characters. Systematic Entomology 38(3): 474-490. (in English) ["Family interrelationships among Anisoptera (dragonflies) are unresolved. Molecular markers applied thus far have not been particularly useful for resolving relationships at the family level. Previous morphological studies have depended heavily on characters of wing venation and articulation which are believed to display considerable degrees of homoplasy due to adaptations to different flight modes. Here, we present a comprehensive anatomical dataset of the head morphology of Anisoptera focusing on muscle organization and endoskeletal features covering nearly all families. The characters are illustrated in detail and incorporated into an updated morphological character matrix covering all parts of the dragonfly body. Phylogenetic analysis recovers all families as monophyletic clades except Corduliidae, Gomphidae as sister group to all remaining Anisoptera, and Austropetaliidae as sister group to Aeshnidae (=Aeshnoidea). The position of Petaluridae and

Aeshnoidea to each other could not be resolved. Libelluloidea is monophyletic with Neopetalia and Cordulegastridae as first splits. Chlorogomphidae is sister to monophyletic [Synthemistidae + ('Corduliidae + Libellulidae)]. In addition, we applied a recently published formal approach to detect concerted convergence in morphological data matrices and uncover possible homoplasies. Analyses show that especially head and thorax characters may harbour homoplasies. After exclusion of possible homoplastic characters, Gomphidae is corroborated as sister group to all remaining Anisoptera." (Authors)] Address: Blanke, A., Zentrum für molekulare Biodiversität, Zoologisches Forschungsmuseum Alexander Koenig, Adenauerallee 160, 53113, Bonn, Germany. E-mail: blanke@uni-bonn.de

**12690.** Blinova, I.V. (2013): A brief review of studies of insects and spiders in Murmansk region since 1900. Herald of the Kola Science Centre of the Russian Academy of Sciences 2013(1): 58-65. (in Russian, with English summary) ["Faunistic studies of insects and spiders on the Kola Peninsula have always been sporadic and were mostly conducted by visiting scientists. These studies were begun mostly by Finnish workers and were pursued actively between 1840 and 1934. Since 1930, arthropod exploration has been undertaken by some scientists at the Kola Science Centre, at regional Nature Reserves and by visiting zoologists as well. The number of arachnid and insect species in the region is c.4000, which is only a half of the corresponding number in Karelia. At least 400 species can be described as rare ones. The regional distribution of all arthropods is insufficiently known. The better explored areas include the Barents and White Sea coasts and the Khibiny Mountains. Soil invertebrates and amphibiotic & aquatic insects are among the most thoroughly studied. Invertebrate-plant interactions in the region's ecosystems, including life cycles and consortia, require for further study." (Author) The extensive list (n = 144) of regional publication also includes odonatological titles.] Address: Blinova, Ilona V., Head. Lab. population biology of plants. E-mail: ilbli@yahoo.com

**12691.** Booth, A.J.; Kadye, W.T.; Vu, T.; Wright, M. (2013): Rapid colonisation of artificial substrates by macroinvertebrates in a South African lentic environment. African Journal of Aquatic Science 38(2): 175-183. (in English) ["Macroinvertebrate colonisation patterns on artificial substrates were investigated in a small reservoir in the Eastern Cape, South Africa. Semi-closed 1 000 cm<sup>3</sup> polythene netting cages filled with either brick, gravel, shredded plastic, or equal proportions of these three materials, were suspended above the benthic substrate. Gravel was preferred by caenid mayflies and chironomids, plastic by odonates, and brick by potamonautid crabs. Colonisation rates were rapid, with half the substrate-specific asymptotic diversity and richness being attained within a week. Overall, taxon richness on the substrates was similar to that in samples

collected with a sweep net, but diversity was almost half. Taxon richness was found to be highest on the gravel and brick substrates, and lowest on plastic. By contrast, macroinvertebrate communities on the plastic and mixed substrates were the most diverse and the most even. All substrates, with the exception of gravel, showed that the number of odonates was significantly positively correlated with the number of potential prey that included chironomid midges, caenid mayflies and caddisfly larvae. It is recommended that plastic be used to construct artificial substrates if a high macroinvertebrate diversity is required for monitoring purposes within lentic environments." (Authors)] Address: Booth, A.J., Department of Ichthyology and Fisheries Science, Rhodes University, PO Box 94, Grahamstown, 6140, South Africa

**12692.** Borisova, P.; Varadinova, E.; Uzunov, Y. (2013): Contemporary state of the bottom invertebrate communities of the Tundzha river basin (South-East Bulgaria). Acta zool. bulg. 65(1): 75-87. (in English) ["This paper presents the results of species content and structure of the macroinvertebrate communities alongside Tundzha River (South-East Bulgaria) and some of its tributaries for two periods of investigations: 1987 and 2009. The changes of macrozoobenthos community in Tundzha River are not just related with appearance or disappearance of the species but also with the restructuring of the quantitative and qualitative parameters. The dynamics of the benthos community is related with the improving of the water quality in the last two decades." (Authors)] Address: Uzunov, Y., Dept of Aquatic Ecosystems, Institute of Biodiversity & Ecosystem Research, Bulgarian Academy of Sciences, 1113 Sofia, 2 Gagarin Street, Sofia, Bulgaria. E-mail: uzunov@ecolab.bas.bg

**12693.** Bowman, N. (2013): Reports from coastal stations - 2012: Eccles-on-Sea, Norfolk. Atropos 48: 66-67. (in English) [UK, Sympetrum fonscolombii, Calopteryx splendens, Ischnura pumilio] Address: not stated

**12694.** Brandon, A. (2013): Odonata news and events from across the vice counties of Anglesey, Merionethshire, Caernarvonshire, Denbighshire and Flintshire. Y Fursen. North Wales Dragonfly Newsletter 71: 4 pp. (in English) [Documentation of emergence of Pyrrhosoma nymphula at 6th May 2013 in North Wales.] Address: Brandon, A., North Wales Dragonfly Recorder Bryn Heilyn, Rowen, Conwy LL32 8YT, UK. E-mail: allanrowenconwy@antispamsky.com

**12695.** Brochard, C.; van der Ploeg, E. (2013): Searching for exuviae of endemic Odonata species in Greece. Brachytron 15(2): 83-101. (in English, with Dutch summary) ["During two field trips to Greece in 2012, the first to Corfu in May 2012 and the second to Crete in June 2012, 37 species of dragonflies were observed. On Corfu, many larvae and exuviae of Pyrrhosoma elisabethae were found, both unknown to science. On Crete



a fair number of exuviae of *Coenagrion intermedium* and *Boyeria cretensis* were collected. *C. scitulum* and *Erythromma lindenii* are reported for the first time for Corfu and *Lindenia tetraphylla* was a new species of the dragonfly fauna of Crete. Also on Crete, *C. scitulum* is rediscovered at two localities after an apparent absence of more than 100 years. The identification of *Gomphus schneiderii* and the use of searching for exuviae are discussed near the larval habitat." (Authors)] Address: Brochard, C., Marsstraat 77, 9742EL Groningen, The Netherlands. E-mail: info@cbrochard.com

**12696.** Brochard, C.; van der Ploeg, E. (2013): A first acquaintance with the larvae of *Ceriagrion georgifreyi* and *Pyrrhosoma elisabethae*. *Brachytron* 15(2): 133-139. (in Dutch, with English summary) ["The larva of *Ceriagrion georgifreyi* was found for the first time during a field trip in South West Turkey (May 2011), while searching for exuviae for the project of creating a photographic guide of exuviae of European dragonflies. Also larvae of *Pyrrhosoma elisabethae* were found for the first time during a field trip on the island Corfu, Greece, for the same project in May 2012. Both species are very rare in Europe and both have a more common look-alike: *Ceriagrion tenellum* and *Pyrrhosoma nymphula*. The larvae of *Ceriagrion georgifreyi* and *Pyrrhosoma elisabethae* have been captured, photographed in an aquarium and then released again into their habitat. The habitat that the larvae use is described succinctly. Comparison for each species with its common look-alike shows that they have a very similar morphology. To identify them, many measurements of the exuviae collected during the field trips will be made. The results will be published in the key of the photographic guide of the exuviae of European dragonflies." (Authors)] Address: Brochard, C., Marsstraat 77, 9742EL Groningen, The Netherlands. E-mail: info@cbrochard.com

**12697.** Brown, A. (2013): Variation in the flexibility of potential anti-predator behaviours among larval damselflies. MSc thesis, Department of Integrative Biology, The University of Guelph, Ontario, Canada: VII + 53 pp. (in English) ["Heterogeneous environments play an important role in the evolution of traits when selection is diversifying between different conditions. One response is the capacity of individuals to beneficially adjust their phenotype to local conditions, such as different predators. In larval *Enallagma* damselflies, diversifying selection from predatory dragonfly larvae or predatory fish favours opposing traits, respectively high or low levels of activity, and so appears to drive the adaptive divergence of anti-predator specialists. However, little work has addressed: i) if anti-predator generalist species exist; ii) if anti-predator generalist species express adaptive flexible behaviour; iii) if adaptive flexible behaviour is influenced by prior experience with predators. I compared individual larval behaviour in the presence of fish, dragonfly larvae, or no predators, in four *Enallagma* species groups from ponds with and without fish preda-

tors. Ecological distributions suggest variation in degree of anti-predator generalization, and this was associated with increased responsiveness to predator treatment in the most likely ecological generalist. Responses to predators varied across different behaviours and sometimes were shaped by prior predation experience. Thus, a variety of adaptive strategies may have evolved to cope with heterogeneity in predation risk in larval damselflies." (Author)] Address: not stated

**12698.** Buczyński, P.; Ciechanowski, M.; Karasek, T. (2013): A peat bog in Martenki (the East-Pomeranian Lake District) – an interesting refugium of aquatic insect fauna. *Chrońmy Przyr. Ojcz.* 69(4): 315-321. (in Polish, with English summary) ["The peat bog in Martenki (the East-Pomeranian Lake District, northern Poland, 54°25'N, 18°20'E) is located at the bottom of the glacial drainage channel. It covers 2.29 ha. Transition mires and quaking bogs with *Sphagnum* spp., *Vaccinium oxycoccus*, *Drosera rotundifolia*, *Typha latifolia* and *Menyanthes trifoliata* are dominant vegetation. About half of the bog is covered with post-excavation peat pits filled with dystrophic waters, overgrown by *Potamogeton natans*. The site is a refugium for an interesting assemblage of aquatic insects, rich in tyrphobionts and tyrphophiles, thus requires legal protection. During preliminary hydrobiological studies, 24 species were recorded, belonging to Odonata (7), Heteroptera (5), Coleoptera (10), Trichoptera (1) and Lepidoptera (1)." (Authors) Odonata species are: *Coenagrion hastulatum*, *C. pulchellum*, *Erythromma najas*, *Aeshna grandis*, *A. subarctica*, *Leucorhinia pectoralis*, *L. rubicunda*.] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**12699.** Buczyński, P.; Brożonowicz, A.; Czerniawska-Kusza, I. (2013): A disjunctive site of *Sympecma paedisca* (Brau.) (Odonata: Lestidae) in Opole Silesia (south-western Poland). *Cas. Sleż. Muz. Opava* (A) 62: 45-50. ["The occurrence of *S. paedisca* in a small water body in the Limestone Quarry "Górażdże" was recorded in 2010. This site is interesting because of the anthropogenic nature of ecosystem and its location 50 km west of the known range of the species." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**12700.** Bush, A.; Theischinger, G.; Nipperess, D.; Turak, E.; Hughes, L. (2013): Dragonflies: climate canaries for river management. *Diversity and Distributions* 19(1): 86-97. (in English) ["Aim: Freshwater ecosystems are highly vulnerable to the effects of climate change. Where long-term datasets are available, shifts in species phenology, species distributions and community structure consistent with a climate change signal have already been observed. Identifying trends across the wider landscape, to guide management in response to

this threat, is limited by the resolution of sampling. Standard biomonitoring of macroinvertebrates for water-quality purposes is currently not well suited to the detection of climate change effects, and there are risks that substantial changes will occur before a management response can be made. This study investigated whether dragonflies, frequently recommended as general indicators of ecological health, are also suitable as indicators of climate change. Location: Data were analysed from standard bio-assessment monitoring at over 850 sites spanning a 9° latitudinal gradient in eastern Australia. Methods: Using variation partitioning, we analysed the proportion of assemblage turnover in dragonflies and other macroinvertebrate assemblages that can be explained by climate and other environmental drivers. We also tested whether the utility of dragonflies as indicators improved at higher taxonomic resolution and whether the turnover of dragonfly assemblages was congruent with that of other groups. Results: Climate explained three times as much variation in turnover of dragonfly species than dragonfly and other macroinvertebrate assemblages at family level. The dissimilarity of dragonflies and varying turnover in each macroinvertebrate assemblage meant surrogacy amongst groups were low. Main conclusions: On the basis of the influence of climate on turnover of macroinvertebrate assemblages, dragonfly species distribution appears highly sensitive to climatic factors, making this taxon a potential useful indicator of climate change responses. However, the low surrogacy amongst assemblages also suggests that a shift in the focus of conservation management from specific taxa to the functional composition of assemblages across a diverse range of habitats is needed." (Authors)] Address: Bush, A., Dept of Biol. Sciences, Macquarie University, North Ryde, Sydney, NSW 2109, Australia. E-mail: alex.bush@mq.edu.au

**12701.** Butler, S.G.; Kohler, H.-U. (2013): A preliminary list of Odonata from Langkawi Island, Straits of Malacca. *Notul. odonatol.* 8(1): 4-8. (in English) ["A list of 77 species hitherto discovered from the island is presented. Totals of genera are noted and a list of sites is included. The seasonality of Kedawi is briefly discussed, together with the so far observed effects this may have on the life cycles of certain species. Further areas for exploration are mentioned." (Author)] Address: Kohler, H.-U., Tulpenweg 107, CH-3098 Koeniz, Switzerland

**12702.** Cade, M. (2013): Reports from coastal stations - 2012: Portland, Dorset. *Atropos* 48: 47-49. (in English) [UK, *Aeshna cyanea*, *Pyrrhosoma nymphula*, *Symptetrum striolatum*] Address: not stated

**12703.** Calvao, L.B.; Vital, M.V.C.; Juen, L.; Lima Filho, G.F.; Oliveira-Junior, J.M.B.; Pinto, N.S.; De Marco, P. (2013): Thermoregulation and microhabitat choice in *Erythrodiplax latimaculata* Ris males (Anisoptera: Libellulidae). *Odonatologica* 42(2): 97-108. (in English) ["It was assessed whether solar incidence affects the spa-

tial distribution, microhabitat choice, territorial defense, time spent in behavioural categories, activity patterns, and abundance of *E. latimaculata*. The study was conducted in a semi-lotic area in the Cerrado in Aparecida de Goiânia, Goiás, Brazil, using the scan procedure with a fixed area, sampling 3 environments, viz. shade, partial shade, and an area with constant solar incidence. There was a higher abundance and activity concentration of this species. in areas with higher solar incidence than in other areas ( $H = 19.180$ ;  $P < 0.001$ ). This can be explained by the ecophysiological requirements of *E. latimaculata*, in which individuals need to be exposed to solar radiation to warm their bodies, allowing the beginning of their activities. Diurnal variation did not affect the behavioural pattern, indicating that individuals are ectothermic and need direct solar incidence on their bodies ( $H = 12.193$ ;  $P = 0.160$ ). They spend most of the time perching with wings dropped ( $41.448 \pm 21.781$ ; mean  $\pm$  SD) and displaying a territorial behaviour, making defense flights around the perch. In lentic water bodies females seem only to mate and oviposit (exophytic, directly into the water)." (Authors)] Address: De Marco, P., Laboratorio de Ecologia Teórica e Síntese, Departamento de Ecologia, Universidade Federal de Goiás, BR-74.001-970 Goiânia, Goiás, Brazil. E-mail: pdemarco@icb.ufg.br

**12704.** Campos, F.; Velasco, T.; Sánchez, G.; Santos, E. (2013): Odonatos de la cuenca alta del río Águeda (Salamanca, oeste de España) (*Insecta: Odonata*). *Boletín de la Sociedad Entomológica Aragonesa* 52: 234-238. (in Spanish, with English summary) [The dragonfly fauna was sampled in the high Águeda river basin (W of the Salamanca province, Spain). 39 species were recorded, 20 Zygoptera and 19 Anisoptera. Ten species occur only in ponds, 13 occur only in rivers and 16 species in both habitats. Three species are included into the Spanish Invertebrate Red List: *Macromia splendens* (CR), *Coenagrion mercuriale* (VU) and *Coenagrion scitulum* (VU). Furthermore, *Brachythemis impartita* is recorded for the first time in Castilla-León. Biogeographically, 64.1% of species are Mediterranean, 23.1% Ethiopian and/or Pontic-Eastern, and 12.8% are Eurosiberian and/or Holarctic." (Authors)] Address: Campos, F. Universidad Europea Miguel de Cervantes, Calle Padre Julio Chevalier 2, 47012 Valladolid, Spain. E-mail: fcampos@uemc.es

**12705.** Cayasan, R.D.; Limitares, D.E.; Gomid, J.V.S.; Nuñeza, O.M.; Villanueva, R.J.T. (2013): Species richness of Odonata in selected freshwater systems in Zamboanga del Sur, Philippines. *Aquaculture, Aquarium, Conservation & Legislation. International Journal of the Bioflux Society* 6(4): 378-393. (in English) ["In this study, the species richness and relative abundance of Odonata were determined in 12 sampling sites in Zamboanga del Sur. Field work was conducted in August-December, 2012 using the random sampling method. Thirty-six species belonging to 10 families were docu-

mented of which 16 (44%) species are Philippine endemic. High species richness was recorded in Cabilinan Stream which is considered to be the most undisturbed site in the 12 sampling sites. Species richness was also considerably high in eight sampling sites despite habitat modification and water pollution from agricultural run-offs. The presence of Oriental species which are indicators of degraded environments suggests that the streams are disturbed. However, the presence of some endemic species indicates that these endemic fauna can thrive in disturbed habitats." (Authors)] Address: Cayasan, Roxanne, Dept of Biological Sciences, Mindanao State Univ. - Iligan Institute of Technology, Iligan City, Philippines

**12706.** Chahl, J; Dorrington, G.; Mizutani, A. (2013): The dragonfly flight envelope and its application to micro UAV research and development. 15th Australian International Aerospace Congress. Melbourne, Vic.: Australian International Aerospace Congress, 2013: 278-287. (in English) ["In this paper we present quantitative analysis of three dimensional trajectories of dragonflies under free flight conditions. The trajectories were captured while male insects were engaged in their normal behaviour of combat to protect oviposition sites along a stream. For the first time we have unambiguous measurements of speed, acceleration and turn rate of large dragonflies and the means by which comparative studies can be done against other species and in different environments. Using physical scaling laws we propose means by which this data set can be used to provide a comparison for larger flapping wing UAV concepts. Our ultimate goal is to provide a robust standard against which flapping wing aircraft performance can be compared so that appropriate evolutionary pressure can also be applied to technological developments, thus freeing resources for the truly viable designs." (Authors) *Hemianax papuensis* was studied, and peak speeds of 6.0 m/s (21.6 km/h) are observed.] Address: Chahl, J., Defence and Systems Institute, University of South Australia, Mawson Lakes, South Australia, 5095, Australia. E-mail: javaan.chahl@unisa.edu.au

**12707.** Chiyoda, S.; Sekiguchi, S. (2013): Insect fauna of Yato Kitano. Furusato Fund natural environment research report 10: 19-26. (in Japanese) [Saitama Prefecture, Japan. The following Odonata species are listed: *Ischnura asiatica*; *Lestes temporalis*; *Anotogaster sieboldii*; *Anax nigrofasciatus*; *Orthetrum albistylum speciosum*; *O. melania*; *Sympetrum frequens*; *S. parvulum*.] Address: Haicheng junior high school biology section.

**12708.** Cho, J.-Y.; Kim, G.; Kim, S.; Lee, H. (2013): Replication of surface nano-structure of the wing of dragonfly (*Pantala flavescens*) using nano-molding and UV nanoimprint lithography. *Electronic Materials Letters* 9(4): 523-526. (in English) ["The hydrophobicity of a dragonfly's wing originates from the naturally occurring nano-structure on its surface. The nano-structure on a dragonfly's wing consists of an array of nano-sized pil-

lars, 100 nm in diameter. We re-create this hydrophobicity on various substrates, such as Si, glass, curved acrylic polymer, and flexible PET film, by replicating the nano-structure using UV curable nano-imprint lithography (NIL) and PDMS molding. The success of the nano-structure duplication was confirmed using scanning electron microscopy (SEM). The hydrophobicity was measured by water-based contact angle measurements. The water contact angle of the replica made of UV cured polymer was  $135^\circ \pm 2^\circ$ , which was slightly lower than that of the original dragonfly's wing ( $145^\circ \pm 2^\circ$ ), but much higher than that of the UV cured polymer surface without any nano-sized pillars ( $80^\circ$ ). The hydrophobicity was further improved by applying a coating of Teflon-like material." (Authors)] Address: Lee, H., Department of Materials Science and Engineering, Korea University, Seoul, 136-713, Korea. E-mail: heonlee@korea.ac.kr

**12709.** Clancy, S.P. (2013): Reports from coastal stations - 2012: Dungeness and Surrounding Area, Kent. *Atropos* 48: 53-55. (in English) [UK; *Anax parthenope*, *Erythromma viridulum*] Address: not stated

**12710.** Conesa García, M.A.; Sanchez, A.B. (2013): Algunos odonatos en la Reserva Natural Del Complejo Lagunar de Villafranca de los Caballeros (Toledo), España. *Zygonyx* 1: 9-10. (in Spain) [4-VII-2011, Nature Reserve of Villafranca de los Caballeros (Toledo), Spain: *Lestes barbarus*, *Lestes virens*, *Ischnura graellsii*, *Ischnura elegans*, *Enallagma cyathigerum*, *Anax imperator*, *Libellula depressa*, *Orthetrum cancellatum*, *Sympetrum meridionale*, *S. striolatum*, *Trithemis annulata*, and *Selysiothemis nigra*] Address: Conesa García, M.A. E-mail: mconesa@libelulas.org

**12711.** Conesa García, M.A. (2013): Algunos odonatos en la turbera del Área de Reserva "el Padul" (Granada), España. *Zygonyx* 1: 5-6. (in Spanish) [*Ischnura graellsii*, *Orthetrum cancellatum*, *Sympetrum fonscolombii*, *S. striolatum*, *Crocothemis erythraea*, *Trithemis annulata*, *Aeshna mixta*, and *Anax imperator* are documented for bog Reserve Area "Padul" (Granada), Spain.] Address: Conesa García, M.A. E-mail: mconesa@libelulas.org

**12712.** Conesa García, M.A.; Sanchez, A.B. (2013): Sobre la larva de *Gomphus vulgatissimus* (Linnaeus, 1758). *Zygonyx* 1: 7-8. (in Spain) [13-III-2012; larvae of *G. vulgatissimus* are documented in the river Cea at its junction with the river Esla (30T UN32, León, Spain)] Address: Conesa García, M.A.; E-mail: mconesa@libelulas.org

**12713.** Conesa García, M.A.; Cano Villegas, F. (2013): Claves para la identificación de las exuvias del género *Trithemis* Brauer 1868 (Odonata: Libellulidae) en la península ibérica. *Boln. Asoc. esp. Ent.* 37(1-2): 49-59. (in Spanish, with English summary) [Authors present detailed morphological and biometric data founding on Iberian Peninsula material to separate *Trithemis kirbyi* from *T. annulata*.] Address: Conesa García, M.A., Aso-



ciación Odonatológica de Andalucía. Laboratorio de Biología. UNED. Málaga, Spain. E-mail: mconesa@malaga.uned.es

**12714.** Craves, J.A.; O'Brien, D.S. (2013): The Odonata of Wayne county, MI: Inspiration for renewed monitoring of urban areas. *Northeastern Naturalist* 20(2): 341-362. (in English) ["Ninety species of Odonata are now verified by specimens for Wayne County, MI, a highly urbanized county in the southeastern corner of the state. This total represents 54% of the total number recorded in the state of Michigan. Thirty-three species not previously reported from Wayne County have been collected since 2000, despite a long history of collecting in the area and relatively little remaining appropriate habitat. These results suggest previous workers may have neglected to do much serious collecting here, and emphasize the need for collecting and monitoring Odonata in urban areas." (Authors)] Address: Craves, Julie, 1 Rouge River Bird Observatory, Environmental Interpretive Center, University of Michigan-Dearborn, Dearborn, MI 48128, USA. E-mail: jcraves@umd.umich.edu.

**12715.** Das, S.K.; Sahoo, P.K.; Dash, N.; Marathe, S.; Mahato, S.; Dashahare, A.; Mishra, P.S.; Prasad, A.; Rana, R. (2013): Odonates of three selected tiger reserves of Madhya Pradesh, Central India. *Check List* 9(3): 528-532. (in English) ["Odonates were recorded from three Tiger Reserves of Madhya Pradesh, Central India, including Kanha, Pench and Bandhavgarh, where 47 species were recorded within 7 families and 31 genera. We recorded 44 species from Kanha, 41 species from Pench and 37 species from Bandhabgarh Tiger Reserve. Thirty-five species were recorded in all three tiger reserves. ... In summer survey *Orthetrum sabina* was the most abundant species, while in winter the most abundant was *Agriocnemis pygmaea*." (Authors)] Address: Das, S.K., Wildlife Institute of India, P.O. Box-18, Chandrabani- 248001, Dehradun, India. Email: sunit.das219@gmail.com

**12716.** Dayaram, A.; Potter, K.A.; Moline, A.B.; Rosenstein, D.; Marinov, M.; Thomas, J.E Rosario, K.; Breitbart, M.; Argüello-Astorga, G.R.; Varsani, A. (2013): High global diversity of cycloviruses amongst dragonflies. *Journal of general virology* 94(8): 1827-1840. (in English) ["Members of the *Circoviridae* family, specifically the *Circovirus* genus, were thought to infect only vertebrates; however, members of a sister group under the same family, the proposed *Cyclovirus* genus, have been detected recently in insects. In an effort to explore the diversity of cycloviruses and better understand the evolution of these novel single stranded DNA (ssDNA) viruses, here we present five cycloviruses isolated from three dragonfly species (*Orthetrum sabina*, *Xanthocnemis zealandica* and *Rhionaeschna multicolour*) collected in Australia, New Zealand and the United States of America. The genomes of these five viruses share similar genome structure to other cycloviruses, with a circu-

lar ~1.7 kb genome and two major bidirectionally transcribed open reading frames (ORFs). The genomic sequence data gathered during this study were combined with all cyclovirus genomes available in public databases to identify conserved motifs and regulatory elements in the intergenic regions, as well as determine diversity and recombinant regions within their genomes. The genomes reported here represent four different cyclovirus species, three of which are novel. Our results confirm that cycloviruses circulate widely in winged insect populations; in eight different cyclovirus species identified in dragonflies to date, some of these exhibit a broad geographical distribution. Recombination analysis revealed both intra- and inter-species recombination events among cycloviruses, including genomes recovered from disparate sources (e.g., goat meat and human faeces). Similar to other well-characterised circular ssDNA viruses, recombination may play an important role in cyclovirus evolution." (Authors)] Address: Varsani, A., School of Biological Sciences, University of Canterbury, Private Bag 4800, Christchurch 8140, New Zealand. E-mail: arvind.varsani@canterbury.ac.nz

**12717.** Deans, M.J. (2013): Reports from coastal stations - 2012: Bawdsey Peninsula, Suffolk. *Atropos* 48: 62-64. (in English) [*Aeshna cyanea* and *Sympetrum striolatum* were recorded at artificial light.] Address: not stated

**12718.** Dewick, S. (2013): Reports from coastal stations - 2012: Curry Farm, Bradwell-on-Sea, Essex. *Atropos* 48: 59-60. (in English) [UK, *Chalcolestes viridis*; *Sympetrum sanguineum* and *S. striolatum* were caught at artificial light.] Address: Dewick, S.; Curry Farm, Bradwell-on-Sea, Southminster, Essex, CM0 7NL, UK

**12719.** Dolný, A.; Mižicová, H.; Harabiš, F. (2013): Natal philopatry in four European species of dragonflies (Odonata: *Sympetrinae*) and possible implications for conservation management. *J. Insect Conserv.* 17(4): 821-829. (in English) ["In Europe, the species *Sympetrum depressiusculum* is classified as vulnerable with a high risk of extinction in the wild. It is a habitat specialist, the presumed main reason for its vulnerability is the destruction of its natural habitats. Other causes of its general extinction are unknown. Published information regarding dispersal rate and philopatry is not available, although these are evolutionary strategies that can play key roles in susceptibility to environmental change. We compared the rate of philopatry in *S. depressiusculum* and three other related, abundant but not endangered species of the same genus (*S. sanguineum*, *S. striolatum*, *S. vulgatum*). We collected data in a very isolated site in the Czech Republic, more than 100 km distant from another known population of the species. Using exuviae collection (total of 6,157 exuviae) and capture-mark-recapture (total of 2,188 adults marked) methods, we acquired data allowing us to compare the numbers of emerged individuals and adults returning to the ma-

ternal site. We found a difference of nearly an order of magnitude between the philopatry of *S. depressiusculum* and the three other species. While in *S. depressiusculum* philopatry was almost 100 %, in the other species it was 10 %. We suggest the high rate of philopatry can influence the vulnerability of *S. depressiusculum* in landscape altered by humans. Strict protection of the natal sites is very important for preserving species having this evolutionary strategy, and reintroductions and translocations should also be undertaken to reduce the extinction risk of this endangered species." (Authors)] Address: Dolný, A., Department of Biology and Ecology, Faculty of Science, Institute of Environmental Technologies, University of Ostrava, 710 00 Ostrava, Czech Republic. E-mail: ales.dolny@osu.cz

**12720.** Dompreeh, K.A.; Eghan, M.J.; Kotsedi, L.; Maa-za, M. (2013): Comprehensive optical study of the dragonfly *Aeshna cyanea* transparent wing. *Optics Communications* 297: 176-181. (in English) ["The optical properties of the transparent wings of *A. cyanea* were studied using a comprehensive set of optical measurements, experimental analysis and theoretical modelling which involves the use of a high level programming language to simulate the optical effects seen. With these, the relative refractive index of the Odonatan wing, the pruinosity associated with the microstructure and the chemical composition of the wings were studied. The Nystrom matrix techniques were applied to solve the surface currents JZ and HZ of the scattered fields for different incident angles from grazing and used to explain the pruinosity associated with the wings microstructure. The wing was found to be an Electro-Optic Material (EOM) associated with a number of Nonlinear Optical (NLO) responses having high frequency absorption for extreme UV and also, leaky multi-channeling wave guide." (Authors)] Address: Dompreeh, K.A., Nanosciences African Network (NANOAFNET), iThemba LABS-National Research Foundation, 1 Old Faure road, Somerset West 7129, P.O. Box 722, Somerset West, Western Cape Province, South Africa. E-mail: dompreeh@tlabs.ac.za

**12721.** Dow, R.A.; Reels, G.T.; Butler, S.G. (2013): Odonata of the Dulit range in Sarawak, Malaysian Borneo. *Notul. odonatol.* 8(1): 8-14. (in English) [Odonata records from the Dulit Range are presented. 111 species are now known from the Dulit Range. Notes on species of particular interest are included.] Address: Dow, R.A., Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**12722.** Dow, R.A.; Ngiam, R.W.J. (2013): *Prodasineura yulan* (Odonata: Zygoptera: Platycnemididae), a new species from Sarawak. *Zootaxa* 3670(1): 87-90. (in English) ["*Prodasineura yulan* is described from a male from Maludam National Park, Betong Division, Sarawak, Malaysian Borneo, small stream in disturbed peat swamp forest, 9-vii-2012, leg. R.W.J. Ngiam. To be deposited in

ZRC. It is allied to *Prodasineura interrupta*." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**12723.** Earley, C.G. (2013): *Dragonflies: Hunting – Identifying - How and where they live.* Publisher Firefly Books Ltd: 32 pp. (in English) [This is an introductory North-American perspective on anisopteran Odonata for beginners.] Address: Firefly Books Ltd., 50 Staples Avenue, Unit 1, Richmond Hill, ON, Canada L4B 0A7

**12724.** Emiliyamma, K.G.; Jafer Palot, M.; Radhakrishnan, C.; Balakrishnan, V.C. (2013): *Lyriothemis acigastra*: a new addition to the Odonata fauna of Peninsular India. *Taprobanica* 5(1): 73-74. (in English) [Aravanchal and Madayipara areas in Kannur District of North Kerala, India during July to September, 2010.] Address: Emiliyamma, K.G., Zoological Survey of India (Western Ghats Regional Center) Kozhikode 673006, Kerala, India. E-mail: kgemily@gmail.com

**12725.** Fuentes-Rodroquez, F.; Juan, M.; Gallego, I.; Lusi, M.; Fenoy, E.; Leon, D.; Penalver, P.; Toja, J.; Casas, J.J. (2013): Diversity in Mediterranean farm ponds: trade-offs and synergies between irrigation modernisation and biodiversity conservation. *Freshwater Biology* 58(1): 63-78. (in English) ["(1.) Agricultural intensification has caused dramatic biodiversity loss in many agricultural landscapes over the last century. Here, we investigated whether new types of farm ponds (made of artificial substrata) in intensive systems and natural-substratum ponds in traditional farming systems differ in their value for aquatic biodiversity conservation. (2.) We analysed the main patterns of environmental variation, compared  $\alpha$ -,  $\beta$ - and  $\gamma$ -diversity of macroinvertebrates (calculated at the order level and including Odonata) between ponds types and evaluated the role of submerged aquatic vegetation (SAV). Generalised additive models (GAM) were used to analyse the relationships of  $\alpha$ - and  $\beta$ -diversity with environmental predictors, and variation partitioning to separate the effect of environmental and spatial characteristics on the variation in macroinvertebrate assemblages. Moran's eigenvector maps (MEMs) were used to define spatial variables. (3.) A principal coordinate analysis (PCoA) detected a primary environmental gradient that separated nutrient-rich ponds from those dominated by SAV; a secondary morphometric gradient distinguished natural-substratum ponds, with large surface area and structural complexity, from artificial-substratum ponds with steeper slopes. Natural-substratum ponds had almost twice the  $\alpha$ - and  $\gamma$ -diversity of artificial-substratum ponds, and diversity significantly increased when SAV was present, particularly in artificial-substratum ponds. Total phosphorus (TP) strongly contributed to explain the patterns in diversity, while SAV was a significant predictor of assemblage composition and diversity. GAMs revealed optima of both  $\alpha$ -diversity at intermediate SAV covers and  $\beta$ -diversity at intermediate-high TP concentrations. (4.) These findings have im-

portant implications for conservation planning. Adaptation of artificial substratum ponds by adding natural substratum and smoothing the gradient of pond margins would improve their conservation value. Development of SAV with occasional harvests and certain cautionary measures to control nutrient levels may also improve both the agronomical and environmental function of ponds." (Authors)] Address: Fuentes-Rodroquez, Francisca, Departamento de Biología Vegetal y Ecología, Facultad de Ciencias, Universidad de Almería, Almería, Spain E-mail: ffuentes@ual.es

**12726.** Garrison, R.W. (2013): Reviewed: Pfau Hans Klaus. 2011. Functional Morphology and Evolution of the Male Secondary Copulatory Apparatus of the Anisoptera (Insecta: Odonata). *Zoologica*, 156: 103 pages, 65 figures ISBN 978-3-510-55043-2 Paperback. 118.00 J (US\$147.57). Available from: Schweizerbart Science Publishers (Nägele u. Obermiller), Johannesstr. 3 A, 70176 Stuttgart, Germany; Tel. +49 (0) 711/351456-0, Fax +49 (0) 711/ 351456-99; mail@schweizerbart.de, www.schweizerbart.de. *Pan-Pacific Entomologist* 89(2): 122-123. (in English) [review] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**12727.** Garwood, J.M.; Knapp, R.A.; Pope, K.L.; Grasso, R.L.; Magnuson, M.L.; Maurer, J.R. (2013): Use of historically fishless high-mountain lakes and streams by Nearctic River otters (*Lontra canadensis*) in California. *Northwestern Naturalist* 94(1): 51-66. (in English) ["In California, River Otters are most commonly associated with food-rich lowland aquatic habitats where they forage primarily on fish and crustaceans. Their distribution in high-elevation montane regions of the state, areas in which fish and crayfish were absent historically, is largely unknown. We compiled occurrence records of River Otters in California from elevations >1100 m, and evaluated them using evidentiary standards. Based on 126 records, we report the widespread presence of River Otters in the Klamath, southern Cascades, and Sierra Nevada mountain ranges, including at elevations exceeding 3000 m. Sixty-three percent of the records met our definition as "verified", and the remaining 37% were considered "unverified". The distribution of observations through time and habitats in which observations were made were similar between verified and unverified records. River Otter records spanned the period from 1900 to 2010, with 50% occurring between 1991 and 2010. Ninety-three percent of the water bodies with records of River Otters contained nonnative prey (fish and crayfish). Those lacking nonnative prey all supported native prey, including amphibians and reptiles. Based on records that contained River Otter foraging observations, nonnative fishes and crayfish were represented in 89% of the total accounts, and native frogs and invertebrates were represented in

22%. It remains unclear whether River Otters occurred in California's high-elevation water bodies prior to the introduction of fish and crayfish, and additional research is needed to understand the possible influence of nonnative prey in allowing River Otters to expand their distribution in these habitats. ... Two scats from different lakes contained the remains of large-bodied aquatic insects, including *Aeshna* spp. larvae, adult *Lethocerus* spp. (Hemiptera), and adult *Notonecta* spp. (Hemiptera)." (Authors)] Address: Garwood, J.M., California Department of Fish and Wildlife, 5341 Ericson Way, Arcata, CA 95521, USA. E-mail: justin.garwood@wildlife.ca.gov

**12728.** Gecheva, G.; Yurukova, I.; Cheshmedjiev, S.; Varadinova, E.; Belkinova, D. (2013): Integrated assessment of the ecological status of Bulgarian lowland and semi-mountain natural lakes. *Journal of Environmental Protection* 4: 29-37. (in English) ["This work focuses on an integrated approach for lake ecological status assessment, elaborated according to the requirements of the European Water Framework Directive (WFD). Data from five lowland and semi-mountain lakes in Bulgaria collected from two years (2011-2012) form the basis for an integrated assessment and the definition of reference conditions. Several metrics were applied in combination, to classify lakes into five ecological status classes. Assemblages of aquatic organisms: phytoplankton, macrophytes and benthic macroinvertebrates, together with 11 supporting physico-chemical parameters were studied. The assessed unique conditions suggested that reference conditions of Bulgarian lakes have natural variability. This first baseline study illustrated specific cases within the lake types that should be assessed in details before providing standardized classification systems in compliance with the requirements of WFD." (Authors) *Enallagma cyathigerum*] Address: Yurukova, Lilyana, Faculty of Biology, Plovdiv University "P. Hilendarski", Plovdiv, Bulgaria. E-mail: yur7lild@bio.bas.bg

**12729.** Geipel, I.; Kalko, E.K.V.; Wallmeyer, K.; Knörnschild, M. (2013): Postweaning maternal food provisioning in a bat with a complex hunting strategy. *Animal Behaviour* 85(6): 1435-1441. (in English) ["Highlights: • We studied postweaning maternal food provisioning in a free-living Neotropical bat. • Mothers provided their pups with prey items for 5 successive months after weaning. • Food provisioning presumably provides pups with two informational benefits. • Provisioned pups may acquire prey-handling skills and learn acoustic images of prey. • Social learning can facilitate the acquisition of the bats' complex hunting strategy. Adult animals of many taxa exhibit extended parental care by transferring food to inexperienced offspring, thus allocating nutritional and sometimes even informational benefits such as the acquisition of adult dietary preferences and foraging skills. In bats, postweaning food provisioning is severely understudied, despite the taxon's diverse and complex foraging strategies. The Neotropical common



big-eared bat, *Micronycteris microtis*, preys on relatively large insects gleaned from vegetation, finding its silent and motionless prey by echolocation. The demands of this cognitively challenging hunting strategy make *M. microtis* a likely candidate for maternal postweaning food provisioning. We studied five free-living mother–pup pairs in their night roost using infrared video recordings. Each mother exclusively fed her own pup and mother–pup recognition was mutual. Provisioned pups were volant and had started their own hunting attempts. Weaned pups were provisioned for 5 subsequent months with a variety of insects, reflecting the adult diet. Mothers transferred over 50% of their prey to pups. Maternal prey transfers declined as pups matured, whereas the pups' own prey captures increased. During prey transfers, aggressive behaviour between mothers and pups was rare. We argue that postweaning maternal food provisioning might yield two informational benefits for *M. microtis* pups. First, learning how to handle large and well-defended prey is mandatory for inexperienced pups and could be practised with prey items provided by their mothers. Second, acoustically characteristic echo images of prey items could be gained during mother–pup prey transfers, probably facilitating the successful acquisition of *M. microtis*'s complex hunting strategy." (Authors) The illustration shows the transfer of a large libellulid from mother to her pup.] Address: Geipel, Inga, Institute of Experimental Ecology, Faculty of Natural Sciences, University of Ulm, Ulm, Germany. E-mail: inga.geipel@uni-ulm.de

**12730.** Gibbons, M.E.; George, M.P. (2013): Clutch identity and predator-induced hatching affect behavior and development in a leaf-breeding treefrog. *Oecologia* 171(4): 831-843. (in English) ["For species with complex life cycles, transitions between life stages result in niche shifts that are often associated with evolutionary trade-offs. When conditions across life stages are unpredictable, plasticity in niche shift timing may be adaptive; however, factors associated with clutch identity (e.g., genetic or maternal) may influence the effects of such plasticity. The red-eyed treefrog (*Agalychnis callidryas*) is an ideal organism for investigating the effects of genetics and life stage switch point timing because embryos exhibit adaptive phenotypic plasticity in hatching time. In this study, we evaluated the effects of experimentally manipulated hatching time and clutch identity on antipredator behaviour of tadpoles and on developmental traits of metamorphs, including larval period, mass, SVL, and jumping ability. We found that in the presence of dragonfly nymph predator cues at 21 days post-oviposition, tadpoles reduced both their activity level and height in the water column. Furthermore, early-hatched tadpoles were less active than late-hatched tadpoles of the same age. This difference in behaviour patterns of early- and late-hatched tadpoles may represent an adaptive response due to a longer period of susceptibility to odonate predators for early-hatched tadpoles, or it may be a carry-over effect mediated by

early exposure to an environmental stressor (i.e., induction of early hatching). We also found that hatching time affected both behavioural traits and developmental traits, but its effect on developmental traits varied significantly among clutches. This study shows that a single early-life event may influence a suite of factors during subsequent life stages and that some of these effects appear to be dependent on clutch identity. This interaction may represent an evolutionary response to a complex life cycle and unpredictable environments, regardless of whether the clutch differences are due to additive genetic variance or maternal effects." (Authors)] Address: Gibbons, M.E., Department of Biology, Birmingham-Southern College, Birmingham, AL, 35254, USA, mgibbons@bsc.edu.

**12731.** Gobbi, M.; Riservato, E.; Bragalanti, N.; Lencioni, V. (2013): Dalle collezioni museali alla prima lista di specie prioritarie di invertebrati per il Trentino. *Museologia scientifica memorie* 9: 157-161. (in Italian, with English summary) ["From the museum collections to the first list of priority invertebrate species of Trentino: In this paper the first list of priority invertebrate species for the Trentino Province is presented. The list was drawn up starting from a list of 229 species in collaboration with a local network of entomologists and by using the expert based approach. Seventy species of conservation interest (including *Leucorrhinia pectoralis*, *Ophiogomphus cecilia*, *Sympecma paedisca*) were selected according to 10 objective criteria, and a database with 771 geo-referenced records was created. The database was integrated with spatial data from the Italian CKmap and from museums and private collections not included in the CKmap. For 42 species was possible to link the habitat typology (nat2000 and not), therefore to create a database specie-site and specie-habitat, and realize maps on the actual and potential distribution. Such list of species is an helpful tool to support stakeholder decisions regarding the designation of new protected areas or the extension of those already existing." (Authors)] Address: Gobbi, M., Sezione di Zoologia degli Invertebrati e Idrobiologia, Museo delle Scienze, Via Calepina, 14. I-38122 Trento, Italy. E-mail: mauro.gobbi@muse.it

**12732.** Gomides, S.C.; Ribeiro, L.B.; Peters, V.M.; Sousa, B.M. (2013): Feeding and reproduction ecology of the lizard *Tropidurus torquatus* (Squamata: Tropiduridae) in a rock outcrop area in southeastern Brazil. *Revista Chilena de Historia Natural* 86: 137-151. (in English, with Spanish summary) ['Zona da Mata mineira', state of Minas Gerais in southeastern Brazil (21°48'27.5"S; 43°35'31.7"W, altitude: 697 m).; "This work evaluates the diet and the reproductive cycle of *T. torquatus* in relation to seasonality in a rock outcrop formations in a remaining area of Atlantic Rainforest. The data indicate that the lizards feed mainly on arthropods and plant material. The female reproductive activity varies between seasons, while males contain sper-

matozoids throughout the year. The minimum body size at maturity of the individuals was larger when compared to other population of the same species studied by other authors. The data obtained in the present study confirm previous observations about the different patterns in diet composition and reproductive cycles of each population of this species in different latitude and occurrence areas, and provide the first study about this theme for *T. torquatus* in rock outcrops in Atlantic Forest of Minas Gerais state." (Authors) Odonata contributed with less than 1% of prey items of the diet of 55 lizard specimens, and only during the dry season.] Address: Gomes, S.C., Universidade Federal de Juiz de Fora, Instituto de Ciências Biológicas, Depto de Zoologia, Campus Universitário Martelos, 36036-900, Juiz de Fora, MG, Brazil. E-mail: samuelbio@hotmail.com

**12733.** González-Tokman, D.; González-Santoyo, I.; Córdoba-Aguilar, A. (2013): Mating success and energetic condition effects driven by terminal investment in territorial males of a short-lived invertebrate. *Functional Ecology* 27(3): 739-747. (in English) ["The terminal investment hypothesis has two predictions: in the face of an infection (i) mature males will increase investment to traits that increase mating success, while such investments will occur to a less extent in young males; and (ii) physiological costs of resource reallocation will be more severe for infected mature males than for infected young males. Although these predictions have been tested in long-lived vertebrates, prior studies have not examined actual resource allocation conflicts. Here, we have tested the above predictions and have investigated the energetic costs of increased mating by old males, using a short-lived invertebrate, the damselfly *Hetaerina americana*. Males of this species defend territories as the main way to obtain access to females. Using groups of infected vs. noninfected males of two different ages, we found that compared to young infected males, mature infected males defended territories for longer, had higher mating success and directed agonistic behaviour to conspecific males more frequently. Despite similar immune responses by mature and young males, infected mature males ended up with less fat reserves compared to infected young males. This suggests that resource allocation conflicts are more severe for mature than for young males. In general, these results suggest that the terminal investment hypothesis applies in males of short-lived invertebrates and that a cause of increased mating success for males of advanced ages is reduced energetic stores." (Authors)] Address: Córdoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**12734.** Grewe, Y.; Hof, C.; Dehling, M.; Brandl, R.; Brändle, M. (2013): Recent range shifts of European dragonflies provide support for an inverse relationship between habitat predictability and dispersal. *Global Eco-*

*logy and Biogeography* 22(4): 403-409. (in English) ["Aim: We compared the effects of recent shifts of northern range boundaries of odonates adapted to either lentic (standing water) or lotic (running water) habitats in Europe. Lentic species are thought to have a higher dispersal propensity than lotic species because of the lower spatial and temporal persistence of lentic habitats on average. Hence, we expected shifts in the range boundaries particularly of lentic species. Location: Europe. Methods: Our analyses are based on odonate distribution maps from two field guides that present the European ranges of dragonflies and damselflies in 1988 and 2006. We categorized species according to their preference for lentic or lotic habitats, and then assigned each species to a southern or a northern group according to the centre of its distribution. Shifts in northern range boundaries were calculated as the average distance between the 10 northernmost grid cells in 1988 and 2006. Range boundary shifts were also analysed with regard to prevalence, phenology, body size and wing size. Results: Lentic species of the southern group expanded their range boundaries on average 115 km northwards per decade, whereas lotic species of the southern group on average did not change their range boundaries. Northern lentic and lotic species showed no consistent trends in their changes in range boundaries. These results did not qualitatively change when we considered the effects of phylogeny, phenology, body size and wing size. Main conclusions: Our results support the hypothesis that species adapted to lentic habitats, which are assumed to be less persistent in time and space, disperse better than lotic species." (Authors)] Address: Brändle, M., Dept of Ecology – Animal Ecology, Fac. Biology, Philipps-Universität Marburg, Karl-von-Frisch Strasse 8, 35032 Marburg, Germany. E-mail: braendle@staff.uni-marburg.de

**12735.** Groselj, N. (2013): Facsimile and translation of two occasional dragonfly poems written by prominent Slovenian men of letters. *Notul. odonatol.* 8(1): 15-16. (in English) ["Two handwritten Slovenian texts by I. Geister and K. Gantar are facsimile reproduced and followed by English translations. Brief biographic notes on the 2 authors are included and a technical comment on the translations is added." (Author)] Address: Groselj, N., Ilirska 15, SI-1000 Ljubljana, Slovenia. E-mail: sestertia@hotmail.com

**12736.** Guillermo-Ferreira, R.; Silva Vilela, D. (2013): New records of *Forcipomyia* (*Pterobosca*) *incubans* (Diptera: Ceratopogonidae) parasitizing wings of Odonata in Brazil. *Biota Neotrop.* 13(1): 360-362. (in English, with Portuguese summary) ["*F. incubans* Macfie (1937) is recorded here for the first time for Brazil. Females were collected in the Brazilian Neotropical Savanna parasitizing the wings of *Erythrodiplax juliana* Ris (1911), *Erythrodiplax* aff. *anomala* Brauer (1865) and *Erythemis credula* Hagen (1861). A map of potential distribution of this species in the New World is also provided. The results suggest that its distribution may range from southern South

America to Mexico, with higher densities in the Brazilian and Colombian Tropical Rain Forests." (Authors)] Address: Guillermo-Ferreira, R., Departamento de Biología, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Universidade de São Paulo – USP, CEP 14040-901, Ribeirão Preto, SP, Brazil. E-mail: rhainerguillermo@yahoo.com.br

**12737.** Guillermo-Ferreira, R.; Del-Claro, K. (2013): Mate recognition in *Acanthagrion truncatum* (Odonata: Coenagrionidae). *Acta Scientiarum. Biological Sciences* Maringá 35(3): 451-453. (in English, with Spanish summary) ["Sexual and species recognition, along with sexual colour dimorphism, play an important role in the reproduction of many animal species. In this article, it was investigated if males of the dimorphic Neotropical damselfly *Acanthagrion truncatum* are able to recognize mates and differentiate them between co-specific males and hetero-specific females of sympatric species. The results showed misguided mating attempts from males towards other males and *Homeoura chelifera* females. They also seem able to recognize *A. lancea* and *Telebasis carmesina* females as hetero-specifics. This study support the hypothesis that male-male interactions are misdirected sexual behaviour and that sympatric morphologically similar species may represent visual interference for mate searching males." (Author)] Address: Guillermo-Ferreira, R., Departamento de Biología, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Universidade de São Paulo, Av. Bandeirantes, 3900, 14040-901, Ribeirão Preto, São Paulo, Brazil. E-mail: rhainerguillermo@yahoo.com.br

**12738.** Gupta, S.; Narzary, R. (2013): Aquatic insect community of lake, Phulbari anua in Cachar, Assam. *Journal of Environmental Biology* 34: 591-597. (in English) [The list of taxa includes the Nearctic 'Tramea' and 'Argia'.] Address: Gupta, Susmita, Department of Ecology & Environmental Science, Assam University, Silchar-788 011, India. E-mail: susmita.au@gmail.com

**12739.** Gvoždík, L.; Černická, E.; Van Damme, R. (2013): Predator-prey interactions shape thermal patch use in a newt larvae-dragonfly nymph model. *PLoS ONE* 8(6): e65079. doi:10.1371/journal.pone.0065079: 6 pp. (in English) ["Thermal quality and predation risk are considered important factors influencing habitat patch use in ectothermic prey. However, how the predator's food requirement and the prey's necessity to avoid predation interact with their respective thermoregulatory strategies remains poorly understood. The recently developed 'thermal game model' predicts that in the face of imminent predation, prey should divide their time equally among a range of thermal patches. In contrast, predators should concentrate their hunting activities towards warmer patches. In this study, we test these predictions in a laboratory setup and an artificial environment that mimics more natural conditions. In both cases, we scored thermal patch use of newt larvae (prey)

and free-ranging dragonfly nymphs (predators; *Aeshna cyanea*). Similar effects were seen in both settings. The newt larvae spent less time in the warm patch if dragonfly nymphs were present. The patch use of the dragonfly nymphs did not change as a function of prey availability, even when the nymphs were starved prior to the experiment. Our behavioural observations partially corroborate predictions of the thermal game model. In line with asymmetric fitness pay-offs in predator-prey interactions (the 'life-dinner' principle), the prey's thermal strategy is more sensitive to the presence of predators than vice versa." (Authors)] Address: Gvoždík, L., Institute of Vertebrate Biology AS CR, Brno, Czech Republic. E-mail: gvozdik@brno.cas.cz

**12740.** Hämäläinen, M.; Karube, H. (2013): Description of *Anisopleura bipugio* sp. nov. from southern Vietnam (Odonata: Euphaeidae). *Tombo* 55: 51-55. (in English) ["*Anisopleura bipugio* sp. nov. (holotype male from Bidoup-Nui Ba in Lam Dong province, southern Vietnam) is described and illustrated for the male sex. It differs from all known *Anisopleura* species by having long horns in the posterior lobe of the prothorax. Records of the two other *Anisopleura* species collected from Vietnam are listed." (Authors)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: libellago@gmail.com

**12741.** Hämäläinen, M. (2013): Description of *Bayadera kinnara* sp. nov. from Burma, with taxonomic notes on its congeners (Odonata: Euphaeidae). *Tombo* 55: 45-49. (in English) ["A new species *Bayadera kinnara* (holotype male from Northern Burma, Kachin State, South-Kumon Range, Zhan-Phut) is described for the male sex. The new species is compared with *Bayadera serrata* Davies & Yang, 1996 described from Yunnan, China. A new record of *B. serrata* from Vietnam is presented. *Bayadera chittaranjani* Lahiri, 2003 is transferred to the genus *Schmidtiphaea* Asahina, 1978. The mutual taxonomic status of *Schmidtiphaea chittaranjani* and *S. schmidi* Asahina, 1978 is preliminarily discussed." (Author)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: libellago@gmail.com

**12742.** Harvey, R.; Higgott, J. (2013): Reports from coastal stations - 2012: Minsmere RSPB, Suffolk. 64: 65. (in English) [UK, *Leucorrhinia pectoralis* in June 2012, *Chalcolestes viridis*, *Anaciaeschna isoceles*] Address: not stated

**12743.** Hassall, C. (2013): Time stress and temperature explain continental variation in damselfly body size. *Ecography* 36(8): 894-903. (in English) ["Body size is among the most important biological variables but despite much measurement of this trait, the factors driving its variation are not fully understood. Here, I describe variation in body size in *Calopteryx maculata* to estab-



lish whether variations in growth and development observed in response to experimental manipulation of temperature and time stress in the laboratory can be scaled-up to variation among natural populations. Nine hundred and seven specimens of *C. maculata* males were collected from 34 sites across the species' entire range in North America during the summer of 2010. A general measure of body size was derived from a series of wing and leg measurements. I compare the fit of models based on latitude (Bergmann's rule), temperature (the temperature–size rule) and seasonal effects (a combination of temperature and time stress) using Akaike's information criterion (AIC). The U-shaped relationship between size and latitude was best explained by a seasonality model containing both photoperiod and temperature. The presence of both these terms suggests that time stress dominates in the southern part of the range, reducing body size by accelerating development. However, the temperature–size rule dominates in the northern part of the range, increasing body size closer to the northern range margin. The best-fit model of geographic variation in size is in accordance with previous laboratory studies of temperature and photoperiod in damselflies and theoretical work, indicating that the findings from such studies can be applied to natural populations. These findings are likely applicable to any species with complex life histories inhabiting seasonal environments." (Author)] Address: Hassall, C., School of Biology, Univ. of Leeds, Woodhouse Road, LS2, 3JT, UK. E-mail: c.hassall@leeds.ac.uk

**12744.** Haywood, B.; Richter, R. (2013): The ancient greenling 'Hemiphlebia mirabilis' (Odonata: Hemiphlebiidae) in South Australia. *South Australian Naturalist* 87(1): 42-47. (in English) ["On the 13 December 2009 the first observation of *H. mirabilis* occurred for South Australia from the Piccaninnie Ponds Conservation Park in the far lower south-east of the state. This tiny damselfly was flying in a Twig-rush *Baumea arthrophylla* swamp fringed with tea-tree (*Melaleuca squarrosa* and *Leptospermum continentale*) and was quite abundant. Subsequent observations have occurred in 2010 to 2013 at sites up to 60 km further north-west along the coast and as far-inland as the Mount Burr Range expanding our previous knowledge on distribution. Information is provided about habitat preference, fire history and flight period for South Australia." (Authors)] Address: Haywood, B., Conservation Planner, ForestrySA, PO Box 162, Mt Gambier, SA, 5290, Australia

**12745.** Heino, J. (2013): Does dispersal ability affect the relative importance of environmental control and spatial structuring of littoral macroinvertebrate communities? *Oecologia* 171(4): 971-980. (in English) ["Both spatial processes and environmental control may structure metacommunities, but their relative importance may be contingent on the dispersal ability of organisms. I examined the roles of spatial and environmental factors for the structuring of littoral macroinvertebrate communities

across a set of lakes in a boreal drainage basin. I hypothesized that dispersal ability would affect the relative importance of spatial processes and environmental control, and thus the biological data were divided into four groups of species differing in dispersal ability. In general, the group of the strongest aerial dispersers showed greatest relative pure environmental control and least pure spatial structuring of community structure and species richness, while spatial processes seemed to be more important for the other three dispersal ability groups. However, these results were contingent on the indirect measure of spatial processes, with the spatial variables and connectivity variables providing slightly different insights into the spatial processes and environmental control of metacommunity structuring. It appears, however, that dispersal ability has effects on the spatial processes and environmental control important in metacommunity organization, with strong dispersers being more under environmental control and less affected by spatial processes compared to weak dispersers." (Author) The paper includes references to *Aeshna grandis*.] Address: Heino, J., Ecosystem Change Unit, Finnish Environment Institute, P.O. Box 413, 90014, Oulu, Finland. E-mail: jani.heino@ymparisto.fi.

**12746.** Hilfert-Rüppell, D.; Rüppell, G. (2013): Do coloured-winged damselflies and dragonflies have flight kinematics different from those with clear wings? *International Journal of Odonatology* 16(2): 119-134. (in English) ["The flights of male odonates encountering conspecifics at their reproduction sites were investigated by means of slow-motion films. We recorded large and generally consistent differences between species with clear wings (SCLW) and species with coloured wings (SCOW). SCLW mostly fought having physical contact and moved their wings without pauses in wing beats (hereafter designated wing pauses), attacking the other males. During encounters, SCOW males showed pauses of all wings or of the fore or the hind wings only. The wing beat frequencies of SCOW therefore showed much greater variation than in SCLW. In Zygoptera SCOW, parallel flapping of both wing pairs was frequent. The two investigated species of Calopterygidae showed several special flight patterns when encountering other males. Male Anisoptera with coloured wings also used wing pauses, and often displayed their wing patterns by gliding and banking to the other male or by flying in an upright posture. Thus, we found that most odonate males with coloured wings, in the presence of rivals, exhibited special flight styles, implying signalling functions. We interpret wing pauses as an adaptive characteristic that allows rival males to evaluate the quality of their opponent by assessment of the coloured wings. Sexual selection is suggested as a possible cause for the evolution of these flights." (Authors)] Address: Hilfert-Rüppell, Dagmar, Institut für Fachdidaktik der Naturwissenschaften, Technische Universität, Braunschweig, Germany. E-mail: d.hilfert-rupeppell@tu-bs.de

**12747.** Hodgson, I.; Beugg, J. (2013): Reports from coastal stations - 2012: Sandwich Bay Bird Observatory, Kent. *Atropos* 48: 57-58. (in English) [UK; *Sympetrum fonscolombii*, *Libellula fulva*, *L. quadrimaculata*] Address: not stated

**12748.** Hunter, I.; Hunter, S. (2013): Reports from coastal stations - 2012: Elms Farm, Icklesham, East Sussex. *Atropos* 48: 52-53. (in English) [UK; *Erythromma viridulum*, *Sympetrum fonscolombii*] Address: not stated

**12749.** Iserbyt, A.; Bots, J.; van Gossum, H.; Sherratt, T.N. (2013): Negative frequency-dependent selection or alternative reproductive tactics: maintenance of female polymorphism in natural populations. *BMC Evolutionary Biology* 2013, 13:139: 10 pp. (in English) ["Background: Sex-limited polymorphisms have long intrigued evolutionary biologists and have been the subject of long-standing debates. The coexistence of multiple male and /or female morphs is widely believed to be maintained through negative frequency-dependent selection imposed by social interactions. However, remarkably few empirical studies have evaluated how social interactions, morph frequencies and fitness parameters relate to one another under natural conditions. Here, we test two hypotheses proposed to explain the maintenance of a female polymorphism in a species with extreme geographical variation in morph frequencies (*Nehalennia irene*). We first elucidate how fecundity traits of the morphs vary in relation to the frequencies and densities of males and female morphs in multiple sites over multiple years. Second, we evaluate whether the two female morphs differ in resource allocation among fecundity traits, indicating alternative tactics to maximize reproductive output. Results: We present some of the first empirical evidence collected under natural conditions that egg number and clutch mass was higher in the rarer female morph. This morph-specific fecundity advantage gradually switched with the population morph frequency. Our results further indicate that all investigated fecundity traits are negatively affected by relative male density (i.e. operational sex ratio), which confirms male harassment as selective agent. Finally, we show a clear trade-off between qualitative (egg mass) and quantitative (egg number) fecundity traits. This trade-off, however, is not morph-specific. Conclusion: Our reported frequency- and density-dependent fecundity patterns are consistent with the hypothesis that the polymorphism is driven by a conflict between sexes over optimal mating rate, with costly male sexual harassment driving negative frequency-dependent selection on morph fecundity." (Authors)] Address: Iserbyt, A., Dept of Biology, Evolutionary Ecology Group, Groenenborgerlaan 171, Antwerp BE-2020, Belgium. E-mail: arne.iserbyt@ua.ac.be

**12750.** Johansson, H.; Stoks, R.; Nilsson-Örtman, V.; Ingvarsson, P.K.; Johansson, F. (2013): Large-scale patterns in genetic variation, gene flow and differentiation in five species of European Coenagrionid damselfly

provide mixed support for the central-marginal hypothesis. *Ecography* 36(6): 744-755. (in English) ["Recently, an increased effort has been directed towards understanding the distribution of genetic variation within and between populations, particularly at central and marginal areas of a species' distribution. Much of this research is centred on the central-marginal hypothesis, which posits that populations at range margins are sparse, small and genetically diminished compared to those at the centre of a species' distribution range. We tested predictions derived from the central-marginal hypothesis for the distribution of genetic variation and population differentiation in five European Coenagrionid damselfly species (*Coenagrion armatum*, *C. johanssoni*, *C. puella*, *C. pulchellum*, *C. mercuriale*). We screened genetic variation (microsatellites) in populations sampled in the centre and margins of the species' latitudinal ranges, assessed genetic diversity (HS) in the populations and the distribution of this genetic diversity between populations (FST). We further assessed genetic substructure and migration with Bayesian assignment methods, and tested for significant associations between genetic substructure and bioclimatic and spatial (altitude and latitude) variables, using general linearized models. We found no general adherence to the central-marginal hypothesis; instead we found that other factors such as historical or current ecological factors often better explain the patterns uncovered. This was illustrated in *C. mercuriale* whose colonisation history and behaviour most likely led to the observation of a high genetic diversity in the south and lower genetic diversity with increasing latitude, and in *C. armatum* and *C. pulchellum* whose patterns of low genetic diversity coupled with the weakest genetic differentiation at one of their range margins suggested, respectively, possible range shifts and recent, strong selection pressure." (Authors)] Address: Johansson, Helena, Centre of Excellence in Biological Interactions, Dept of Biosciences, Helsinki Univ., PO Box 65, FI-00014 Helsinki, Finland. E-mail: helena.z.johansson@helsinki.fi

**12751.** Johnston, P.R.; Rolff, J. (2013): Immune- and wound-dependent differential gene expression in an ancient insect. *Developmental & Comparative Immunology* 40(3-4): 320-324. (in English) ["Two of the main functions of the immune system are to control infections and to contribute to wound closure. Here we present the results of an RNAseq study of immune- and wound-response gene expression in *Coenagrion puella*, a representative of the odonates, the oldest taxon of winged insects. De novo assembly of RNAseq data revealed a rich repertoire of canonical immune pathways, as known from model insects, including recognition, transduction and effector gene expression. A shared set of immune and wound repair genes were differentially expressed in both wounded and immune-challenged larvae. Moreover three-fold more immune genes were overexpressed only in the immune-challenged treatment. This is consistent with the notion that the immune-system reads a balance

of signals related to wounding and infection and that the response is tailored accordingly. Highlights: \*Infection transcriptome of an odonate, oldest group of pterygote insects. \*Wounding and immune challenge lead to over-expression of immune genes. \*More genes are overexpressed in immune-challenged vs. wounded individuals. \*Odonates have a repertoire of immune transcripts comparable to more derived taxa." (Authors)] Address: Rolff, J., Evolutionary Biology, Inst. for Biology, Free University Berlin, Königin Luise Str. 1-3, 14195 Berlin, Germany. E-mail: jens.rolff@fu-berlin.de

**12752.** Kalkman, V.J.; Orr, A.G. (2013): Field Guide to the damselflies of New Guinea. *Brachytron* 16, Suppl.: 3-120. (in English, with Bahasa Indonesian) ["With this book in hand the reader can identify all genera and most species of damselflies occurring in New Guinea. It will doubtless stimulate people to explore their local streams and standing waters of New Guinea and to appreciate the wonderful diversity of damselflies and dragonflies to be found there. Over 500 copies are being donated to universities throughout New Guinea. As well as introducing students and researchers to the beauty of damselflies, the guide provides a basis to study them and use them in biodiversity studies supporting the conservation of freshwater habitats. The guide contains nearly 300 colour drawings and over 250 line drawings by Albert Orr and twenty-two colour photographs taken in the field by Stephen Richards. Many genera and most species included have never been depicted in colour before."] Approximately 60% of the known zygopteran taxa is figured and described. [Vincent Kalkman has had an interest in the damselflies and dragonflies of New Guinea since 2005. In 2006 and 2008 he conducted fieldwork with the Kelempok Entomologi Papua in the Indonesian part of the island and in 2009 he joined the expedition by Conservation International to Muller Range in Papua New Guinea. Albert Orr's interest in the insect fauna of New Guinea dates back to undergraduate days when he made two lengthy excursions in 1971 and 1973/4, collecting butterflies and dragonflies. He has authored and illustrated several identification guides to Asian dragonflies and damselflies [2003, 2005 and 2007), and the butterflies of Australia (2010). ... This field guide was made possible by grants from: Van Tienhoven Foundation, Van der Hucht De Beukelaar Stichting, the International Dragonfly Fund, Nederlandse Vereniging voor Libellenstudie, Theo Benken, Klaus-Jürgen Conze, Andre Günther, Holger Hunger, Dietmar Ikemeyer, Lutz & Ursel Koch, Martin Lemke, Ludwig Quandt, Richard Seidenbusch, Klaus-Peter & Mechtild Seiler, Wolfgang Schneider, Anke & Michael Tydecks-Jürging and Isolde Wiesmath." (Publisher)] Address: Kalkman, V.J., p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**12753.** Katayama, M. (2013): Differential survival rates of damselfly larvae in the presence of newt and dragon-

fly predators. *International Journal of Odonatology* 16(2): 177-182. (in English) ["The damselfly species *Paracercion melanotum* has been found to be the most abundant species in damselfly larval communities on Okinawa-zima Island in southwest Japan. To clarify differential susceptibility to predation, a possible factor affecting relative population densities in larval communities, between *Paracercion melanotum* and a less common damselfly species, *Ischnura senegalensis*, laboratory experiments were conducted using three abundant predator species: the sword-tailed newt (*Cynops ensicauda popei*), anisopteran larvae (*Crocothemis servilia servilia*), and a planktivorous fish (*Poecilia reticulata*). *Paracercion melanotum* survived predation by the newt and the dragonfly well compared to *I. senegalensis*. Fishes consumed approximately equal numbers of the two damselfly species. From these results, the newt and the dragonfly were suggested as the most probable predators regulating damselfly larval communities on Okinawa-zima Island. Predators could be a crucial factor determining relative abundance in damselfly larval communities." (Authors)] Address: Katayama, M., Graduate School of Human and Environment Studies, Kyoto University, Yosida-Nihonmatsu, Sakyo ku, Kyoto, 6068501, Japan. Email: motok.k.ryuk@gmail.com

**12754.** Kaunisto, K.M.; Suhonen, J. (2013): Parasite burden and the insect immune response: interpopulation comparison. *Parasitology* 140(1): 87-94. (in English) ["The immune response affects host's survival and reproductive success. Insurmountable immune function has not evolved because it is costly and there is a trade-off between other life-history traits. In previous studies several factors such as diet and temperature have been proposed to cause interpopulation differences in immune response. Moreover, the insect immune system may be functionally more protective upon secondary exposure, thus infection history may associate with the immune response. Here we measured how geographical location and parasite burden is related to variation in immune response between populations. We included 13 populations of *Coenagrion hastulatum* in Finland over a latitudinal range of 880 km to this study. We found that water mites associated strongly with the immune response at interpopulation level: the more the mites, the higher the immune response. Also, in an alternative model based on AIC, latitude and individual size associated with the immune response. In turn, endoparasitic gregarines did not affect the immune response. To conclude, a positive interpopulation association between the immune response and the rate of water mite infection may indicate (i) local adaptation to chronic parasite stress, (ii) effective 'induced' immune response against parasites, or (iii) a combined effect of both of these." (Authors)] Address: Kaunisto, K.M., Section of Ecology, Dept of Biol., 20014 University of Turku, Finland. E-mail: kkauni@utu.fi

**12755.** Keller, D.; Seidl, I.; Forrer, C.; Home, R.; Holdegger, R. (2013): Schutz der Helm-Azurjungfer *Coen-*



agrion mercuriale (Odonata: Coenagrionidae) am Beispiel des Smaragd-Gebiets Oberaargau. Entomo Helvetica 6: 87-99. (in German, with English and French summaries) ["C. mercuriale is a critically endangered damselfly in Switzerland and is also a target species in the Emerald and Natura 2000 network of European protected areas. One of the most important sites of C. mercuriale in Switzerland is located in the Emerald area Oberaargau. Here, this damselfly species inhabits streams and ditches flowing through agricultural meadows. Within a larger research project, several studies have been performed on C. mercuriale in the Oberaargau region. (1) Conservation measures and their costs were assessed, (2) the effectiveness of the Emerald information campaigns were surveyed and analysed with a questionnaire, and (3) the connectivity of annually monitored populations was studied in a mark-recapture study and genetic analyses. Overall, these studies showed positive results. The calculations of conservation costs revealed a moderate amount of expenses for conservation measures of C. mercuriale. The survey indicated that local people were well informed about the protection of C. mercuriale because of the information campaigns. Furthermore, population monitoring indicated a positive development of local damselfly populations. Connectivity between populations located within the same stream system was ensured by frequent dispersal along the water courses across distances up to 0.5 km. However, dispersal across distances larger than 0.5 km occurred less often, but across open agricultural land. Such long-distance dispersal events are important for the interconnectivity of distant populations." (Authors)] Address: Keller, Daniela, WSL Swiss Federal Research Institute, Zürcherstr. 111, 8903 Birmensdorf, Switzerland. E-mail: daniela.keller@wsl.ch

**12756.** Knill-Jones, S. (2013): Reports from coastal stations - 2012: Isle of Wight. 49: 50. (in English) [UK; immature *Anax parthenope* at 25-VII-2012] Address: Knill-Jones, S.A., 2 School Green Road, Freshwater, Isle of Wight, PO40 9AL, UK

**12757.** Kulijer, D.; De Knijf, G.; Frankovic, M. (2013): Review of the Odonata of Bosnia and Herzegovina. Odonatologica 42(2): 109-123. (in English) ["The current knowledge on the Odonata fauna of Bosnia and Herzegovina is summarized based on museum and private collections, literature and new unpublished data of the authors. In all, 63 species are known, including first reports of *Platycnemis pennipes nitidula*, *Anax parthenope*, *Gomphus flavipes*, *G. schneiderii*, *Cordulegaster heros* and *Selysiothemis nigra* for the country. *Callaeschna microstigma* is rediscovered after more than 100 yr. The first reliable data on the occurrence of *Somatochlora metallica* is reported. More than 1,400 new records were collected and a national odonatological database has been created. Annotations to the new species and to some other faunistically interesting species are given. Possible future additions to the fauna of Bosnia and

Herzegovina are discussed." (Authors)] Address: Frankovic, M., Oboj V. odvojak 10/1, HR-10000 Zagreb, Croatia. E-mail: svanimir@yahoo.com

**12758.** Lopez van Oosterom, M.V.; Ocón, C.S.; Brancolini, F.; Maroñas, M.E.; Sendra, E.D.; Rodrigues Capitulo, A. (2013): Trophic relationships between macroinvertebrates and fish in a pampean lowland stream (Argentina). Iheringia 103(1): 57-65. (in English, with Spanish summary) ["The diet and trophic relationships between the macroinvertebrates Phyllogomphoides joaquina Rodrigues Capitulo, 1992 and Coenagrionidae, Chironomidae (Diptera), *Diplodon delodontus* (Lamarck, 1919) (Bivalvia: Hyriidae), and *Pomacea canaliculata* (Lamarck, 1822) (Gastropoda: Ampulariidae) and the fishes *Pimelodella laticeps* Eigenmann, 1917 (Heppteraidae) and *Bryconamericus iheringii* (Boulenger, 1887) (Characidae) in a temperate lowland lotic system in Argentina were assessed on the basis of gut contents and stable-isotope analyses. The feeding strategies were analyzed by the Amundsen method. Relative food items contribution for the taxa studied indicated a generalist-type trophic strategy. In macroinvertebrates, in general, the values of stable isotope confirmed the result of the analysis of gut contents. With the fish, stable-isotope analysis demonstrated that both species are predators, although *B. iheringii* exhibited a more omnivorous behaviour. These feeding studies allowed us to determine the trophic relationships among taxa studied. Detritus and diatoms were a principal source of food for all the macroinvertebrates studied. In La Chozas stream the particulate organic matter is a major no limited food resource, has a significant influence upon the community." (Authors)] Address: López van Oosterom, María V., Instituto de Limnología "Dr. Raúl A. Ringuelet", CCT - La Plata - CONICET, Universidad Nacional de La Plata (UNLP), Boulevard 120 y 62 s/n, (1900) La Plata, Buenos Aires, Argentina. E-mail: vanesa@ilpla.edu.ar

**12759.** Mäkinen, J. (2013): Toukkanahkojen etsintää Helsingin Uutelassa [In search of exuviae at Uutela (Helsinki)]. Crenata 6: 4-7. (in Finnish, with English summary) ["In the summer of 2012 the author spent several days searching for exuviae of *Aeshna* species in Uutela, a nature reserve area located in southeast Helsinki. A total of 1001 exuviae were found at two adjacent ponds. The most common species were *Aeshna serrata* (808 exuviae) and *Aeshna mixta* (188 exuviae). This was the second occurrence of confirmed reproduction of *A. mixta* in Finland, previously only one exuvia has been found. The size of *A. serrata* population was found to be much bigger than supposed." (Authors)] Address: Mäkinen, J. E-mail: makisenjussi@gmail.com

**12760.** Mahbob, M.A.E.; Mahmoud, H.H. (2013): The first report of preliminary list of the insect fauna of the Elkharaga city, New Valley, Egypt. Journal of Ecology and the Natural Environment 5(7): 125-132. (in English) [*Ischnura evansi* and *I. senegalensis* are documented.]

Address: Mahbob, M., Department of Mathematics and Science, Faculty of Education in the New Valley, Assiut University, Egypt.

**12761.** Mapi-ot, E.F.; Taotao, A.U.; Nuñeza, O.M.; Villanueva, R.J.T. (2013): Species diversity of adult Odonata in selected areas from Misamis Occidental Province, Philippines. *AAFL Bioflux* 6(4): 421-432. (in English) ["Odonata is considered an environmental indicator group of freshwater habitats. Thus there is a need to have a good baseline data to use it for monitoring fluvial habitats. However, species composition of Odonata in Misamis Occidental is poorly known. This study was conducted to determine the species diversity of Odonata in the municipality of Sinacaban and in the cities of Oroquieta and Ozamiz, Misamis Occidental, Philippines. Opportunistic sampling method using sweep nets was employed. There were 266 Odonata individuals collected comprising 22 species. Seven species (31.82%) are Philippine endemic. Low species diversity was recorded in all the sampling sites with more or less even distribution of species. Results indicate that the sampled areas are already disturbed." (Authors)] Address: Mapi-ot, Emmarie, Department Biological Sciences, Mindanao State University - Iligan Institute of Technology, Iligan City, Philippines; 2 D3C Gahol Apartment, Lopez Jaena St., Davao City, Philippines. E-mail: efmapiot@yahoo.com

**12762.** Marinov, M.; Richards, S. (2013): Notes on the female colour forms of *Synthemis miranda* Selys, 1871 (Odonata: Synthemistidae) in New Caledonia. *Australian Entomologist* 40(2): 57-64. (in English) ["Two female *Synthemis miranda* Selys specimens with strikingly different morphological features (mainly wing colouration) were collected in sympatry in Province Nord, New Caledonia. Both appear to be mature adults. Specimens with these two colour patterns have previously been reported in the literature but this paper presents the first record of their co-existence. We formally recognise the two forms based on colour pattern and note other morphological features that may also distinguish them. The validity of these additional characters requires confirmation through examination of further material." (Authors)] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

**12763.** Marinov, M.; Richards, S.; Theuerkauf, J. (2013): Damselflies and Dragonflies (Insecta: Odonata) of the Mt. Panié and Roches de la Ouaième region, New Caledonia. *A Rapid Biological Assessment of the Mt. Panié and Roches de la Ouaième region, province Nord, New Caledonia*: 113-130. (in English, with French summary) ["We surveyed odonates at 46 sites in north-eastern New Caledonia, including 38 primary sites in three catchments on and around Mt. Panié. A total of 23 species were recorded during this survey, which comprises 41% of the 56 species known for the country. The lowest number of species was documented within the La

Guen river catchment, where less species were found than in the Dané Yém river catchment despite only limited sampling (half a day) at this latter site. Localities within the La Guen catchment also appeared to suffer from higher disturbance compared to those in the We-wec river catchment where species richness was high. They had lower water pH, higher amounts of filamentous algae and an apparently low abundance of primary consumers (macroinvertebrates). Anthropogenic impacts, including bushfires and introduced mammals, may these differences. Our results suggest that odonates are useful bioindicators within the Mt. Panié area. This survey has provided baseline data on species occurrence and abundance at a range of sites, and identified several questions regarding disturbance to aquatic ecosystems that require further investigation." (Authors)] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

**12764.** Mathieu, M. (2013): Présence d'*Oxygastra curtisii* (Dale, 1834) confirmée en Isère. *Sympetrum* 16: 32-33. (in French) [23-VI-2003, Département Isère, France.] Address: Mathieu, Marylin. E-mail: marilyn.mathieu@espaces-naturels.fr

**12765.** McGoff, E.; Solimini, A.G.; Pusch, M.T.; Jurca, T.; Sandin, L. (2013): Does lake habitat alteration and land-use pressure homogenize European littoral macroinvertebrate communities? *Journal of Applied Ecology* 50(4): 1010-1018. (in English) ["Beta diversity is the compositional heterogeneity of biotic assemblages among sites, and biotic homogenization is the decrease in beta diversity, facilitated by an increase in similarity of biotic communities over time. Environmental harshness decreases the importance of stochastic processes in structuring assemblages, resulting in a homogenization of the biota. We investigated if increasing nutrient enrichment, land-use pressure, and within-lake habitat alteration would decrease the beta diversity of macroinvertebrates in 46 lakes across Europe. Beta diversity was calculated using global multivariate dispersion. We utilized a structural equation modelling approach to account for hierarchical interdependence between potential impacts, that is the direct effects and correlations among the different impacts. We found clear indications that European macroinvertebrate communities are being homogenized by ongoing lake shore development. Increasing land-use pressure in the form of residential and commercial development had a direct negative effect on beta diversity (standardized coefficient = -0.40), as did roadways, albeit indirectly through an increase in engineering structures (standardized coefficient = -0.31). Increasing within-lake silt levels also homogenized macroinvertebrate communities (standardized coefficient = -0.18), independent of near shore land use. Our results indicate the negative effect of both the near shore land-use pressure and the within-lake habitat alteration on macroinvertebrate beta diversity, with significant inter-

actions between these pressures. Habitat protection should take a more holistic approach to assessing lake development pressure, over a range of scales, as a solely site specific approach is not always biologically meaningful. Thus, future management plans should carefully control and mitigate ongoing development pressure if lake ecosystem health and resilience is to be maintained. Synthesis and applications. This study is the first of its kind to demonstrate European-wide homogenization of littoral macroinvertebrate lake communities with increasing habitat alteration and land-use pressure. Significant interactions occur between different habitat scales, with no one scale entirely accounting for the homogenization effect. To avoid further biotic homogenization, development pressure must be carefully managed at multiple scales, and where possible, minimized. This presents a challenge, as globally there is an increasing expansion of the human population and a consequent increase in anthropogenic pressure across all habitats." (Authors) Mean, median and standard error (SE) of the number of animals per order per lake in decreasing order: Odonata: 48.1, 13.0, 18.5] Address: McGoff, Elaine, Department of Aquatic Sciences & Assessment, Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden. E-mail: mcgoffe@tcd.ie

**12766.** Monteiro, C.; Couceiro, S.R.M.; Hamada, N.; Juen, L. (2013): Effect of vegetation removal for road building on richness and composition of Odonata communities in Amazonia, Brazil. *International Journal of Odonatology* 16(2): 135-144. (in English, with Spanish summary) ["This study showed that the main impact on Odonata species of removal of riparian vegetation for road building was on community composition, since species richness remained unaltered. This result, most evident in damselflies, was probably driven by the entry of generalist species that replaced specialist species after the impact. We collected adult odonates in forested and deforested streams in the surroundings of Manaus, Amazonas, northern Brazil. We collected 380 specimens belonging to 32 odonate species. *Erythrodiplax fusca* and *Argia* sp. 1 could be used in biomonitoring programs, since they were significantly associated with deforested streams. Using odonate community composition and key species appears to be more efficient in biomonitoring programs than simply using species richness." (Authors)] Address: Monteiro, C., Univ. Federal do Para, Laboratorio de Ecologia e Zoologia de Invertebrados, Instituto de Ciencias Biologicas, Rua Augusto Correia, N. 1 Bairro Guama, CEP 66.075-110, Belem, Para, Brazil. Email: claudiomonteiro80@hotmail.com

**12767.** Moore, C.; Deans, M.J. (2013): Reports from coastal stations - 2012: Dunwich Heath National Trust, Suffolk. *Atropos* 48: 65-66. (in English) [UK, *Leucorrhinia pectoralis* in June 2012] Address: not stated

**12768.** Nasasagare, R.P.; Ntakimazi, G.; Libois, R. (2013): Diet composition of young and adult Northern

Grey-headed Sparrow *Passer griseus* and adult Southern Red Bishop *Euplectes orix* in Burundi. *Malimbus* 35: 1-10. (in English, with French summary) ["We studied the diet composition of Northern Grey-headed Sparrow and Southern Red Bishop in four localities of the Rusizi Plain, northwest Burundi. We analyzed crop contents of 100 adults from each of the two species and the composition of food brought by parents to nestlings of the sparrow at ten nests. In all four sites, the sparrow's diet consisted primarily of rice. The bishop also fed mostly on rice grains but also ate Lepidoptera caterpillars, some other insects and wild grass seeds such as *Panicum* sp. and *Brachiaria* sp. For adults of both bird species, there was no significant variation in diet throughout the year. However, the diet of young sparrows was much more diverse and changed from the day of hatching until fledging. On the day of hatching, chicks ate mainly caterpillars but by the tenth day, food items comprised one third caterpillars, one third Orthoptera and the rest of other insects including Odonata, Dictyoptera, Isoptera and adult Lepidoptera. After this and until fledging, the chicks were fed increasingly on rice seeds. Simultaneously, the proportion of caterpillars taken gradually decreased until none was fed to the nestlings at the end of the nestling period. The items brought by parents also varied with time of day, with caterpillars and grasshoppers in higher proportions in the morning, decreasing around mid-day and then increasing in the evening." (Authors)] Address: Nasasagare, Régine Pacis, Zoogeographic Research Unit, Dept of Sciences "Biology, Ecology, Evolution", Univ. of Liège, Boulevard du Rectorat 27, 4000 Liège, Belgium. E-mail: rpnas@yahoo.fr

**12769.** Natsume, H. (2013): Two cases of unusual flight of male Odonata nearby the shiny surface of a parked car. *Tombo* 55: 88-90. (in Japanese, with English summary) ["A few mature males of *Zygomma petiolatum* were observed to fly over the surface of a metallic dark-green coloured car at Deep Water Bay in Hong Kong on July 11, 1993. Another observation was made at Kutchan town in Hokkaido, Japan, on August 8, 1998. A male *Aeshna juncea juncea* flew over a black vehicle for several minutes. In both cases their behaviours looked like patrol flight of territorial males at the water. The causes of these behaviours are briefly discussed." (Author)] Address: E-mail: romluna@y4.dion.ne.jp

**12770.** Natuhara, Y. (2013): Ecosystem services by paddy fields as substitutes of natural wetlands in Japan. *Ecological Engineering* 56: 97-106. (in English) ["This paper reviews research on the ecosystem services or multifunctionality of paddy rice cultivation in Japan, focusing on biodiversity as a basis for ecosystem services, with the aim of describing the current status and impact of the subject and exploring options for sustainable practices. Ecosystem services provided by paddy fields include; groundwater recharge, production of non-rice foods, flood control, soil erosion and landslide prevention, climate-change mitigation, water purification, culture and



landscape, and support of ecosystems and biodiversity. Among these services, the value of services that regulate ecosystem functions was estimated to be US\$ 72.8 billion in Japan. More than 5000 species have been recorded in paddy fields and the surrounding environment. Because paddy fields are artificially disturbed by water level management, plowing, and harvest, most species move between paddy fields and the surrounding environment. The linkage between paddy fields and the associated environment plays an important role in biodiversity. Two changes that have affected the ecosystem of paddy fields are modernization and abandonment of farming. Satoyama, a traditional socio-ecological production landscape, which provided a functional linkage between paddy fields and the associated environment has lost its functions. Biodiversity-conscious rice farming has been promoted by collaborations among farmers, consumers and governments. Biodiversity certification programs are successful examples of biodiversity-conscious framing. In these programs incentives include direct payments and/or premium prices paid by consumers, as well as farmers willingness to improve the safety of food and environment." (Author) The paper includes references to *Sympetrum frequens*.] Address: Natuhara, Y., Graduate School of Environmental Studies, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 468-8601, Japan. E-mail:natuhara@nagoya-u.jp

**12771.** Nguyen, S.H.T.; Webb, H.K.; Hasan, J.; Tobin, M.J.; Crawford, R.J.; Ivanova, E.P. (2013): Dual role of outer epicuticular lipids in determining the wettability of dragonfly wings. *Colloids and Surfaces B: Biointerfaces* 106: 126-134. (in English) ["Numerous natural surfaces possess superhydrophobicity and self-cleaning properties that would be extremely beneficial when applied in industry. Dragonfly wings are one example of such surfaces, and while their general surface structure is known, their precise chemical composition is not. Here, the epicuticular lipids of dragonfly wing membranes were characterized to investigate their significance in contributing to self-cleaning and superhydrophobic properties. After just 10 seconds of lipid extraction using chloroform, the water contact angles exhibited by the wings decreased below the accepted threshold for superhydrophobicity (150°). Infrared spectra collected at the Australian Synchrotron contained characteristic absorption bands of amide, ester and aliphatic hydrocarbons moieties on the wing surfaces, the latter of which was decreased post-extraction with chloroform. GCMS data analysis revealed that the epicuticular wax components were dominated by n-alkanes with even-numbered carbons, especially n-hexacosane, and palmitic acid. SEM and AFM data analysis conducted on the untreated and chloroform-extracted wing surfaces demonstrated that surface topography changed after extraction; the surface nanostructure was progressively lost with extended extraction times. The data presented here indicate that epicuticular lipids contribute not only to self-cleaning and superhydrophobic properties through

their inherent hydrophobic nature, but also by forming the physical structure of the wing surface. This knowledge will be extremely valuable for reconstruction of dragonfly wing structures as a biomimetic template." (Authors)] Address: Ivanova, Elena, Faculty of Life and Social Sciences, Swinburne University of Technology, PO Box 218, Hawthorn, VIC 3122, Australia. E-mail: eivanova@swin.edu.au

**12772.** Obolewski, K.T.; Strzelczak, A.; Astel, A.M.; Sawczyn, J. (2013): Short-term effects of stream restoration and management on macroinvertebrate communities in lowland streams. *International Journal of Engineering Research and Development* 6(4): 122-131. (in English) ["As a result of hydrotechnical treatments, a 2.5 km long reach of the lowland Kwacza River (Poland) was elongated to 3.5 km. Restoration triggered off short-term changes in the river ecosystem, which were studied through habitat and invertebrate analysis. Sampling was conducted at 10 sections before and after restoration. Invertebrates quickly colonized various habitats and thus improved biological diversity of the Kwacza River. The only taxon that increased its ecological importance was Gammaridae. In turn, Ephemeroptera concentrated at places with better oxygen conditions. The neural network model revealed that variables directly connected with restoration were not as important as primarily hypothesised." (Authors) Taxa (including Odonata) are treated at family level.] Address: Obolewski, K.T., Dept of Ecology, Pomeranian Univ. in Slupsk, Arciszewskiego 22b, 76-200 Slupsk, Poland

**12773.** Odin, N. (2013): Reports from coastal stations - 2012: Landguard Bird Observatory, Suffolk. *Atropos* 48: 61-62. (in English) [UK, *Leucorrhinia pectoralis* at 27-V-2012; *Chalcolestes viridis*, *Libellula quadrimaculata*] Address: not stated

**12774.** Okamoto, K.W.; Grether, G.F. (2013): The evolution of species recognition in competitive and mating contexts: the relative efficacy of alternative mechanisms of character displacement. *Ecology Letters* 16(5): 670-678. (in English) ["Sympatric divergence in traits affecting species recognition can result from selection against cross-species mating (reproductive character displacement, RCD) or interspecific aggression (agonistic character displacement, ACD). When the same traits are used for species recognition in both contexts, empirically disentangling the relative contributions of RCD and ACD to observed character shifts may be impossible. Here, we develop a theoretical framework for partitioning the effects of these processes. We show that when both mate and competitor recognition depend on the same trait, RCD sets the pace of character shifts. Moreover, RCD can cause divergence in competitor recognition, but ACD cannot cause divergence in mate recognition. This asymmetry arises because males with divergent recognition traits may avoid needless interspecific conflicts, but suffer reduced attractiveness to conspecific

ic females. Therefore, the key empirical issue is whether the same or different traits are used for mate recognition and competitor recognition." (Authors) Model organism is *Hetaerina*.] Address: Okamoto, K.W., Dept of Ecology & Evolutionary Biology, 621 Charles E. Young Drive South, University of California, Los Angeles, CA, USA. E-mail: kenichiokamoto@ncsu.edu

**12775.** Okuyama, H.; Samejima, Y.; Tsubaki, Y. (2013): Habitat segregation of sympatric *Mnais* damselflies (Odonata: Calopterygidae): microhabitat insolation preferences and competition for territorial space. *International Journal of Odonatology* 16(2): 109-117. (in English) ["Distribution and abundance of sympatric *Mnais costalis* and *M. pruinosa* damselflies were studied in a low mountain stream in Shiga, Japan, from 2008 through 2012. The reproductive seasons of the two species overlapped almost entirely: both species emerged in early May and disappeared in late June each year. Males of both species hold territories within the same stretch of the river; however, *M. costalis* was more abundant on the lower stream, while *M. pruinosa* was more abundant on the upper stream. Canopy openness varied at territorial sites. Results of these observations suggest that habitat segregation of the two species is due to different preference for light/shade conditions. Morisita's  $R_d$  index suggests that interspecific exclusion (or avoidance) contributes to the habitat segregation of the two species." (Authors)] Address: Tsubaki, Y., Center for Ecological Research, Kyoto Univ., 2-509-3 Hirano, Otsu, Shiga, Japan. Email: g0980134@yahoo.co.jp

**12776.** Onishi, Y.; Genkai-Kato, M. (2013): Benthic invertebrates and attached algae in the upstream region of the Kagami River, Kochi Prefecture. *Kuroshio Science* 6(2): 208-216. (in Japanese, with English summary) ["In lotic ecosystems, the downstream environments are affected by the upstream environments. Surveys were conducted for water chemistry, attached algae and benthic invertebrates in five headwater streams of the Kagami River, Kochi Prefecture, western Japan. The discharge rate among the streams ranged between 0.24 and 2.46 m<sup>3</sup> /s, but there was no correlation between the discharge rate and attached algae or benthic invertebrates. Attached algae were dominated by diatoms, and the density of chlorophyll *a* varied between 4.8 and 30.5 mg/m<sup>2</sup> depending on the streams. The invertebrate communities in the streams were dominated by mayflies, caddisflies and freshwater crabs. Streams with abundant freshwater crabs tended to have fewer aquatic insects and lower biodiversity, and vice versa. This indicates that the invertebrate community structure in the upstream region of the Kagami River is strongly affected by the abundance of freshwater crabs." (Authors) The list of taxa includes Odonata *Calopteryx cornelia* and 'Gomphidae'.] Address: Onishi, Yukiko, Department of Biology, Faculty of Science, Kochi University, 2-5-1 Akebono-cho, Kochi 780-8520, Japan

**12777.** Outomuro, D.; Adams, D.C.; Johansson, F. (2013): The evolution of wing shape in ornamented-winged damselflies (Calopterygidae, Odonata). *Evolutionary Biology* 40(2): 300-309. (in English) ["Flight has conferred an extraordinary advantage to some groups of animals. Wing shape is directly related to flight performance and evolves in response to multiple selective pressures. In some species, wings have ornaments such as pigmented patches that are sexually selected. Since organisms with pigmented wings need to display the ornament while flying in an optimal way, we might expect a correlative evolution between the wing ornament and wing shape. We examined males from 36 taxa of calopterygid damselflies that differ in wing pigmentation, which is used in sexual displays. We used geometric morphometrics and phylogenetic comparative approaches to analyse whether wing shape and wing pigmentation show correlated evolution. We found that wing pigmentation is associated with certain wing shapes that probably increase the quality of the signal: wings being broader where the pigmentation is located. Our results also showed correlated evolution between wing pigmentation and wing shape in hind wings, but not in front wings, probably because hind wings are more involved in signalling than front wings. The results imply that the evolution of diversity in wing pigmentations and behavioural sexual displays might be an important driver of speciation due to important pre-copulatory selective pressures." (Authors) *Archineura incarnata*, *Atrocalopteryx atrata*, *Caliphaea confusa*, *Calopteryx aequabilis*, *C. amata*, *C. cornelia*, *C. exul*, *C. haemorrhoidalis*, *C. maculata*, *C. splendens splendens*, *C. virgo meridionalis*, *C. virgo virgo*, *C. xanthostoma*, *Echo modesta*, *Hetaerina americana*, *H. titia*, *Matrona basilaris*, *Matronoides cyanipennis*, *Mnais andersoni*, *M. costalis*, *M. mneme*, *M. pruinosa*, *M. tenuis*, *Neurobasis chinensis*, *Phaon camerunensis*, *P. iridipennis*, *Phaon* sp. from Madagascar, *Psolodesmus mandarinus dorothea*, *Sapho bicolor*, *S. ciliata*, *S.o gloriosa*, *Umma longistigma*, *U. saphirina*, *Vestalis amoena*, *V. gracilis*, *V. lugens*] Address: Outomuro, D., Department of Ecology and Genetics, Evolutionary Biology, Centre, Uppsala University, Norbyvägen 18D, 752 36 Uppsala, Sweden. E-mail: outomuro.david@gmail.com

**12778.** Outomuro, D.; Ocharan, F.J.; Torralba-Burrial, A. (2013): Teratologías en adultos de *Calopteryx* Leach, 1815 (Odonata: Calopterygidae). *Boletín de la Sociedad Entomológica Aragonesa* 52: 265-268. (in Spanish, with English summary) ["Several teratologies are described in adult specimens of *Calopteryx virgo meridionalis*, *C. xanthostoma* and *C. haemorrhoidalis*. These teratologies are mainly associated with the wing pigmentation but also with the abdomen." (Authors)] Address: Ocharan, F.J., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain: E-mail: focharan@oonreo.uniovi.es

**12779.** Outomuro, D.; Adams, D.C.; Johansson, F. (2013): Wing shape allometry and aerodynamics in ca-

lopterygid damselflies: a comparative approach. *BMC Evolutionary Biology* 2013, 13:118 doi:10.1186/1471-2148-13-118: 11 pp. (in English) ["Background: Wing size and shape have important aerodynamic implications on flight performance. We explored how wing size was related to wing shape in territorial males of 37 taxa of the damselfly family Calopterygidae. Wing coloration was also included in the analyses because it is sexually and naturally selected and has been shown to be related to wing shape. We studied wing shape using both the non-dimensional radius of the second moment of wing area (RSM) and geometric morphometrics. Lower values of the RSM result in less energetically demanding flight and wider ranges of flight speed. We also re-analyzed previously published data on other damselflies and dragonflies. Results: The RSM showed a hump-shaped relationship with wing size. However, after correcting for phylogeny using independent contrast, this pattern changed to a negative linear relationship. The basal genus of the study family, Hetaerina, was mainly driving that change. The obtained patterns were specific for the study family and differed from other damselflies and dragonflies. The relationship between the RSM and wing shape measured by geometric morphometrics was linear, but relatively small changes along the RSM axis can result in large changes in wing shape. Our results also showed that wing coloration may have some effect on RSM. Conclusions: We found that RSM showed a complex relationship with size in calopterygid damselflies, probably as a result of other selection pressures besides wing size per se. Wing coloration and specific behaviour (e.g. courtship) are potential candidates for explaining the complexity. Univariate measures of wing shape such as RSM are more intuitive but lack the high resolution of other multivariate techniques such as geometric morphometrics. We suggest that the relationship between wing shape and size are taxa-specific and differ among closely related insect groups." (Authors) *Archineura incarnata*, *Atrocalopteryx atrata*, *Caliphaea confusa*, *Calopteryx aequalis*, *C. amata*, *C. cornelia*, *C. exul*, *C. haemorrhoidalis*, *C. maculata*, *C. splendens splendens*, *C. virgo meridionalis*, *C. virgo virgo*, *C. xanthostoma*, *Echo modesta*, *Hetaerina americana*, *H. titia*, *Matrona basilaris*, *Matronoides cyanipennis*, *Mnais andersoni*, *M. costalis*, *M. mneme*, *M. pruinosa*, *M.s tenuis*, *Neurobasis chinensis*, *Phaon camerunensis*, *P. iridipennis*, *Phaon sp.* from Madagascar, *Psolodesmus mandarinus dorothea*, *Sapho bicolor*, *S. ciliata*, *S. gloriosa*, *Umma longistigma*, *U. saphirina*, *Vestalis amoena*, *V. gracilis*, *V. lugens*] Address: Outomuro, D., Population and Conservation Biology, Dept of Ecology & Genetics, Evolutionary Biology Centre, Uppsala Univ., Norbyvägen 18D, 75236 Uppsala, Sweden. E-mail: outomuro.david@gmail.com

**12780.** Päivinen, T. (2013): Erikoisia havaintoja: isoukonkorento munii ja kuolee pian sen jälkeen [Remarkable observation: Siberian Hawker (*Aeshna crenata*) dies shortly after oviposition]. *Crenata* 6: 11. (in Finnish) ["A photo series of six pictures taken on 25-viii-2009 at

Nuoksio nationalpark (Espoo) impressively shows the process of dying of a Siberian Hawker immediately after oviposition. The documentation is subtitled: Isoukonkorentonaaraan kuolemantanssi heti munitaan [Dance of death of a female Siberian Hawker immediately after oviposition] (Asmus Schröter)] Address: not stated

**12781.** Päivinen T. (2013): Retkellä rajavyöhykkeellä Kiteenjoella [Excursion at the Finnish-Russian border area along Kiteenjoki river]. *Crenata* 6: 36-38. (in Finnish) [The author presents dragonfly observations made during two excursions in 2011 and 2012 along the border river Kiteenjoki in North Karelia region in Eastern Finland. The precise location of the 2,5km long river section is shown on a map and observation data are listed in a table. A total of 18 species has been recorded, most notably *Libellula fulva*, which is rare in Finland and which has one of its Finnish strongholds in the region described. (Asmus Schröter)] Address: not stated

**12782.** Paul, S.; Kakkassery, F.K. (2013): Taxonomic and diversity studies on Odonate nymphs by using their exuviae. *Journal of Entomology and Zoology Studies* 1(4): 47-53. (in English) [*Paragomphus lineatus*, *Anax guttatus*, *A. immaculifrons*, *Pantala flavescens*, and *Trithemis aurora* were identified by comparing the larval characters present on exuviae, collected from a temporary pond at Ammadam, Thrissur district, Kerala state, India.] Address: Kakkassery, F.K., Department of Zoology, St. Thomas' College, Thrissur Kerala 680001, India. E-Mail: kakkassery@yahoo.com

**12783.** Pérez Bilbao, A.; Benetti, C.J.; Garrido, J. (2013): Estudio de la calidad del agua del río Furnia (NO. España) mediante el uso de macroinvertebrados acuáticos. *Nova Acta Científica Compostelana (Biología)* 20: 1-9. (in Spanish, with English summary) ["In this work, the results of the study of the water quality of the Furnia River (Pontevedra, NW Spain) using the aquatic macroinvertebrate (including Odonata) assemblages are presented. Semi-quantitative surveys were carried out in autumn of 2007 and spring of 2008, and different indices based on these assemblages (abundance, richness, EPT, IASPT, Shannon-Wiener, IBMWP and % of feeding groups) were calculated. Several environmental variables that complemented the biological data were also measured. Although the indices decreased slightly along the water course, the results indicate a very good water quality of the Furnia River and a very diverse community of aquatic macroinvertebrates that must be conserved." (Authors) Taxa are treated at family level.] Address: Pérez Bilbao, Amaia, Depto de Ecología y Biología Animal, Campus Universitario As Lagoas- Marcosende Facultad de Biología, Univ. de Vigo, 36310 Vigo, Spain. E-mail: amaia@uvigo.es

**12784.** Peters, J.; Hettiarachichi, R. (2013): Visual motif patterns in separation spaces. *Theory and Applications of Mathematics & Computer Science* 3(2): 36-58. (in



English) ["This article introduces descriptive separation spaces useful in the discovery of what are known as motif patterns. The proposed approach presents the separation axioms in terms of descriptive proximities. Asymmetries arise naturally in the form of the separation of neighbourhoods of descriptively distinct points in what are known as Leader uniform topological spaces. A practical application of the proposed approach is given in terms of visual motif patterns, identification of nearness structures and pattern stability analysis in digital images." (Authors) On pages 45-47, *Aeshna* sp. is used to demonstrate the mathematical processing of image analysis.] Address: Peters, J., Computational Intelligence Lab., Univ. of Manitoba, Winnipeg, Manitoba R3T 5V6 Canada. E-mail: james.peters3@ad.umanitoba.ca

**12785.** Petrulevicius, J.F. (2013): Palaeoenvironmental and palaeoecological implications from body fossils and ovipositions of Odonata from the Eocene of Patagonia, Argentina. *Terrestrial Arthropod Reviews* 6(1-2): 53-60. (in English) ["Odonata are beginning to be well recorded in the Eocene of Patagonia, Argentina. They are represented by body fossils and traces in three localities. Oviposition scars are recorded in Río Pichileufú (Lutetian: 47.7 Ma; Río Negro province) and Laguna del Hunco (Ypresian: 52.2 Ma; Chubut province), nymphs in Confluencia (Ypresian; Río Negro), and adults (wings) in Laguna del Hunco. The absence of different stages in given localities could depend on different factors, such as as environmental, taphonomical and/or sampling bias. Laguna del Hunco is well sampled and the absence of nymphs seems to depend on taphonomical factors since there are other preimaginal aquatic inhabitants of the lake, such as Trichoptera nymph cases. Confluencia has not been well sampled and adults could be absent due to a sampling bias. The nymphs of Confluencia indicate a water body with low energy flux. Ovipositions in Laguna del Hunco and Río Pichileufú are made on terrestrial leaves of bushes and trees and have three different morphologies. Leaves are interpreted to be alive when oviposition was done as they show tissue reactions associated to the injuries. Wrinkled wings at Laguna del Hunco are interpreted to be signals of predation probably by birds or mammals." (Author)] Address: Petrulevicius, J.F., División Paleozoología Invertebrados, Museo de La Plata-UNLP-CONICET Paseo del Bosque s/n, La Plata (1900), Buenos Aires, Argentina, e-mail: levicius@fcnym.unlp.edu.ar

**12786.** Pouilly, M.; Rejas, D.; Perez, T.; Duprey, J.-L.; Molina, C.; Hubas, C.; Guimaraes, J.R.D. (2013): Trophic structure and mercury biomagnification in tropical fish assemblages, Iténez River, Bolivia. *PLoS ONE* 8(5): e65054. doi:10.1371/journal.pone.0065054: 9 pp. (in English) ["We examined mercury concentrations in three fish assemblages to estimate biomagnification rates in the Iténez main river, affected by anthropogenic activities, and two unperturbed rivers from the Iténez

basin, Bolivian Amazon. Rivers presented low to moderate water mercury concentrations (from 1.25 ng L<sup>-1</sup> to 2.96 ng L<sup>-1</sup>) and natural differences in terms of sediment load. Mercury biomagnification rates were confronted to trophic structure depicted by carbon and nitrogen stable isotopes composition ( $\delta^{15}\text{N}$ ;  $\delta^{13}\text{C}$ ) of primary trophic sources, invertebrates and fishes. Results showed a slight fish contamination in the Iténez River compared to the unperturbed rivers, with higher mercury concentrations in piscivore species (0.15  $\mu\text{g g}^{-1}$  vs. 0.11  $\mu\text{g g}^{-1}$  in the unperturbed rivers) and a higher biomagnification rate. Trophic structure analysis showed that the higher biomagnification rate in the Iténez River could not be attributed to a longer food chain. Nevertheless, it revealed for the Iténez River a higher contribution of periphyton to the diet of the primary consumers fish species; and more negative  $\delta^{13}\text{C}$  values for primary trophic sources, invertebrates and fishes that could indicate a higher contribution of methanotrophic bacteria. These two factors may enhance methylation and methyl mercury transfer in the food web and thus, alternatively or complementarily to the impact of the anthropogenic activities, may explain mercury differences observed in fishes from the Iténez River in comparison to the two other rivers." (Authors)] Address: Pouilly, M., Institut de Recherche pour le Développement - UMR Borea- Biologie des Organismes et des Ecosystèmes Aquatiques (MNHN, CNRS, IRD, UPMC), Paris, France. E-mail: pouilly@ird.fr

**12787.** Preston, D.L.; Orlofske, S.A.; Lambden, J.P.; Johnson, P.T.J. (2013): Biomass and productivity of trematode parasites in pond ecosystems. *Journal of Animal Ecology* 82(3): 509-517. (in English) ["Ecologists often measure the biomass and productivity of organisms to understand the importance of populations and communities in the flow of energy through ecosystems. Despite the central role of such studies in the advancement of freshwater ecology, there has been little effort to incorporate parasites into studies of freshwater energy flow. This omission is particularly important considering the roles that parasites sometimes play in shaping community structure and ecosystem processes. Using quantitative surveys and dissections of over 1600 aquatic invertebrate and amphibian hosts, we calculated the ecosystem-level biomass and productivity of trematode parasites alongside the biomass of free-living aquatic organisms in three freshwater ponds in California, USA. Snails and amphibian larvae, which are both important intermediate trematode hosts, dominated the dry biomass of free-living organisms across ponds (snails = 3.2 g m<sup>-2</sup>; amphibians = 3.1 g m<sup>-2</sup>). An average of 33.5% of mature snails were infected with one of six trematode taxa, amounting to a density of 13 infected snails m<sup>-2</sup> of pond substrate. Between 18% and 33% of the combined host and parasite biomass within each infected snail consisted of larval trematode tissue, which collectively accounted for 87% of the total trematode biomass within the three ponds. Mid-summer

trematode dry biomass averaged 0.10 g m<sup>2</sup>, which was equal to or greater than that of the most abundant insect orders (Coleoptera = 0.10 g m<sup>2</sup>, Odonata = 0.08 g m<sup>2</sup>, Hemiptera = 0.07 g m<sup>2</sup> and Ephemeroptera = 0.03 g m<sup>2</sup>). On average, each trematode taxon produced between 14 and 1660 free-swimming larvae (cercariae) infected snail-1 24 h<sup>-1</sup> in mid-summer. Given that infected snails release cercariae for 3–4 months a year, the pond trematode communities produced an average of 153 mg m<sup>2</sup> yr<sup>-1</sup> of dry cercarial biomass (range = 70–220 mg m<sup>2</sup> yr<sup>-1</sup>). Our results suggest that a significant amount of energy moves through trematode parasites in freshwater pond ecosystems, and that their contributions to ecosystem energetics may exceed those of many free-living taxa known to play key roles in structuring aquatic communities." (Authors)] Address: Preston, D.L., Department of Ecology and Evolutionary Biology, University of Colorado, Boulder, Colorado, USA. E-mail: daniel.preston@colorado.edu

**12788.** Pukhnarevich, D.A. (2013): Zoobenthos in the lower reaches of the Oka river. *Bulletin of the Lobachevsky State University of Nizhny Novgorod* 1(1): 128-135. (in Russian, with English summary) [oas 38;The bottom dwelling benthos of River Oka, the largest right tributary of the Volga (European part of Russia), includes *Chalcolestes viridis* and *Aeshna* sp.] Address: Pukhnarevich, D.A. E-mail: ecotox@mail.ru

**12789.** Qin, C.; Zhang, Y.; Yu, H.; Wang, B. (2013): Concordance among different aquatic insect assemblages and the relative role of spatial and environmental variables. *Biodiversity Science* 21(3): 326-333. (in Chinese, with English summary) ["Indicator groups are often used for biodiversity monitoring and conservation, however, the effectiveness of these groups in representing biodiversity is rarely tested. To explore community congruence among different aquatic insect groups and how this may be affected by spatial factors and environmental variables, we carried out an investigation on aquatic insects in April 2010 in 21 headwater streams within the Dongtiaoxi Basin, China. In total, we recorded 130 species from 92 genera, 44 families and 7 orders. We divided the stream insects into three groups, Coleoptera (C), Ephemeroptera + Plecoptera + Trichoptera (EPT), and Diptera + Megaloptera + Odonata (DMO). In Mantel tests, three aquatic insect groups showed significant cross-taxon concordance, C versus EPT ( $r = 0.65$ ,  $P < 0.001$ ), C versus DMO ( $r = 0.67$ ,  $P < 0.001$ ) and EPT versus DMO ( $r = 0.82$ ,  $P < 0.001$ ). According to variance partitioning procedures, environmental variables were the major determinants of aquatic insect community structures, while spatial factors were less important. Species composition in different taxon groups exhibited similar relationships to environmental gradients. Altitude, pH, mean velocity and concentration of oxygen were the most important drivers of aquatic insect assemblage patterns. Overall, our results indicated that, at least in the studied region, community

congruence among different aquatic insect groups was strong. We propose that one group, such as the EPT group, may be used as a biodiversity indicator in future cost-effective surveys." (Authors)] Address: Wang, B., Laboratory of Aquatic Insects and Stream Ecology, Dept of Entomology, Nanjing Agricultural Univ., Nanjing 210095, China. E-mail: wangbeixin@njau.edu.cn

**12790.** Ragaie, M.; Sabry, A.H. (2013): Insect wings as a solar cell system. *International Journal of Open Scientific Research* 1(3): 10-26. (in English) ["This work demonstrated that most flying insect species use their wings pigment to absorb light and reemits this light as fluorescence. *Orthetrum brunneum* [the species figured in the paper is *Anax ephippiger*]; seven-spotted lady beetle, *Coccinella septempunctata*; *Pentodon bispinosus* (Coleoptera) and sphingid moth, *Acherontia styx* were studied. The results showed that the yellow and black pigments which in the lady beetle adults wings have many elements such as carbon, nitrogen, oxygen, potassium, phosphor, sulphur, chloride and calcium. Magnesium, phosphor, sulphur and calcium not found in the posterior wings (which known that a membrane). The dragon fly adult also has a yellow pigment in all anterior and posterior wings. The results showed that the yellow pigment has silicon in yellow pigment except in central veins of wings. Carbon, nitrogen, oxygen, potassium, sodium and chloride were found in white grub adult wings. The adult of sphingid moth (which have yellow and black pigment in anterior and posterior wings) has silicon, aluminum and chloride which known as the main component in solar cell system. These elements were found in the yellow pigment in the anterior wings. Silicon and chloride not found in the black pigment in the adult wings. Data cleared that the flying insects use the colour in their wings as a solar system to generate the power. This mechanism can be used as an alternative source of energy in nature." (Authors)] Address: Ragaie, M., Pests and Plant Protection Department, National Research Center, Dokki, Giza, Egypt. E-mail: kazafyhassan@yahoo.com

**12791.** Rajabi, H.; Darvizeh, A. (2013): Experimental investigations of dragonfly wings functional morphology. *Chinese Phys. B* 22(8) 088702: 8 pp. (in English) ["Nowadays, the importance of identifying the dragonfly flight mechanism, as an inspiration for designing flapping wing vehicles, is well known. Experimental approach to understanding the complexities of the insect wings, as organs of flight, could provide significant outcomes for designing purposes. In this paper, a comprehensive investigation is carried out on the morphological and microstructural features of dragonfly wings. Scanning electron microscopy (SEM) and tensile testing are used to experimentally verify the functional roles of different parts of the wings. A number of SEM images of the wing elements such as nodus, leading edge, trailing edge, and vein sections, which play dominant roles in strengthening the whole structure, are presented. The

results from the tensile tests indicate that the nodus might be the critical region of the wings subjected to high tensile stresses. Considering the patterns of the longitudinal corrugations of the wings obtained in this paper, it can be supposed that they increase the load-bearing capacity, giving the wings an ability to tolerate dynamic loading conditions. In addition, it may be suggested that the longitudinal veins, leading, and trailing edges are structural mechanisms to further improve fatigue resistance by providing higher fracture toughness, preventing crack propagation, and allowing the wings to sustain a significant amount of damage without loss of strength." (Authors)] Address: Rajabi, H., Dept of Mechanical Engineering, Faculty of Engineering, The University of Guilan, Rasht, Iran. E-mail: harajabi@ahr.ac.ir

**12792.** Rákósy, L.; Heiser, M.; Mancu, C.-O.; Schmitt, T. (2013): Strong divergences in regional distributions in Romania: recent ecological constraints in dragonflies (Odonata) versus ancient biogeographical patterns in butterflies (Lepidoptera: Rhopalocera). *Insect Conservation and Diversity* 6(2): 145-154. (in English) ["(1.) While the biogeographical structuring of Europe as a whole is already relatively well understood, patterns at the more regional scale are still poorly explored. Especially the influence of differing ecological demands among species groups on regional distribution patterns is mostly unresolved. Therefore, we compare the distributions of strictly terrestrial butterflies with those of semi-aquatic dragonflies. (2.) We analysed a regionalised distribution of the 196 butterfly and 68 dragonfly taxa of Romania with cluster analyses and principal component analyses, and worked out the different faunal regions and faunal elements for this country. (3.) We obtained a clear regional structuring for the butterflies (e.g. Transylvanian Basin, Carpathians, SE Romania, W/SW Romania), but only a vertical structuring in the dragonflies from the Danube lowlands to the elevations of the Carpathians. (4.) This structure implies a recent distribution trigger based on ecological and climatic constraints in dragonflies with water and energy availability being of high importance. (5.) The more ancient biogeographical pattern in butterflies reflects the different biogeographical elements of Europe and the connections of the Carpathian regions to the Balkan Peninsula and the Eastern European steppes, with energy being of considerably higher importance for butterfly occurrences than water availability." (Authors)] Address: Schmitt, T., Biogeographie, Fachbereich VI, Gebäude N, Raum 303, Universität Trier, D-54286 Trier, Germany. E-mail: thsh@uni-trier.de

**12793.** Riva-Murray, K.; Bradley, P.M.; Chasar, L.C.; Button, D.T.; Brigham, M.E.; Scudder Eikenberry, B.C.; Journey, C.A.; Lutz, M.A. (2013): Influence of dietary carbon on mercury bioaccumulation in streams of the Adirondack Mountains of New York and the Coastal Plain of South Carolina, USA. *Ecotoxicology* 22: 60-71. (in English) ["We studied lower food webs in streams of

two mercury-sensitive regions to determine whether variations in consumer foraging strategy and resultant dietary carbon signatures accounted for observed within-site and amongsite variations in consumer mercury concentration. We collected macroinvertebrates (primary consumers and predators [including Aeshnidae and Libellulidae]) and selected forage fishes from three sites in the Adirondack Mountains of New York, and three sites in the Coastal Plain of South Carolina, for analysis of mercury (Hg) and stable isotopes of carbon ( $\delta^{13}\text{C}$ ) and nitrogen ( $\delta^{15}\text{N}$ ). Among primary consumers, scrapers and filterers had higher MeHg and more depleted  $\delta^{13}\text{C}$  than shredders from the same site. Variation in  $\delta^{13}\text{C}$  accounted for up to 34 % of within-site variation in MeHg among primary consumers, beyond that explained by  $\delta^{15}\text{N}$ , an indicator of trophic position. Consumer  $\delta^{13}\text{C}$  accounted for 10 % of the variation in Hg among predatory macroinvertebrates and forage fishes across these six sites, after accounting for environmental aqueous methylmercury (MeHg, 5 % of variation) and base-N adjusted consumer trophic position ( $\text{D}\delta^{15}\text{N}$ , 22 % of variation). The  $\delta^{13}\text{C}$  spatial pattern within consumer taxa groups corresponded to differences in benthic habitat shading among sites. Consumers from relatively more-shaded sites had more enriched  $\delta^{13}\text{C}$  that was more similar to typical detrital  $\delta^{13}\text{C}$ , while those from the relatively more-open sites had more depleted  $\delta^{13}\text{C}$ . Although we could not clearly attribute these differences strictly to differences in assimilation of carbon from terrestrial or inchannel sources, greater potential for benthic primary production at more open sites might play a role. We found significant variation among consumers within and among sites in carbon source; this may be related to within-site differences in diet and foraging habitat, and to among-site differences in environmental conditions that influence primary production. These observations suggest that different foraging strategies and habitats influence MeHg bioaccumulation in streams, even at relatively small spatial scales. Such influence must be considered when selecting lower trophic level consumers as sentinels of MeHg bioaccumulation for comparison within and among sites." (Authors)] Address: Riva-Murray, Karen, U.S. Geological Survey, 425 Jordan Road, Troy, NY 12180, USA. E-mail: krmurray@usgs.gov

**12794.** Roland, H.-J.; Stübing, S.; Holtzmann, J.; von Blanckenhagen, B.; Hill, B.T.; Seehausen, M. (2013): Aktuelle Verbreitungskarten auf Grundlage von Daten der Jahre 2007 bis 2012. Libellen in Hessen - Supplement 1: 74 pp. (in German) [Hessen, Germany; on the base of 48,391 data sets, distribution maps for the 60 regional Odonata species are compiled.] Address: Roland, H.-J., Im Mühlahl 35, 61203 Reichelsheim, Germany. E-mail: Hjuergenroland@aol.com

**12795.** Rosça, I.; Gherghel, I.; Strugariu, A.; Zamfirescu, S.R. (2013): Feeding ecology of two newt species (*Triturus cristatus* and *Lissotriton vulgaris*) during the repro-



duction season. Knowledge and Management of Aquatic Ecosystems (2013) 408, 05: 5 pp. (in English, with French summary) ["The aim of this study was to provide an in-depth survey of feeding ecology and trophic interactions of two syntopic newt species (*Triturus cristatus* and *Lissotriton vulgaris*) inhabiting aquatic breeding habitats from the eastern Romanian Carpathian Mountains. We sampled 736 individuals from both species. The trophic spectrum was based mostly on Asselidae (>30%). Our results show that both species may be considered generalists because their niche breadth is higher than 0.5, with largely overlapping trophic niches (>70%), which may indicate food competition." (Authors) Only in 1999, 1.05% of 186 analysed stomachs of *Lissotriton vulgaris* contained Coenagrionidae.] Address: Gherghel, I., Dept of Zoology, Oklahoma State University, 501 Life Sciences West, 74078 Stillwater, Oklahoma, USA. E-mail: iulian.gherghel@okstate.edu

**12796.** Rudolf, V.H.W.; Rasmussen, N.L. (2013): Ontogenetic functional diversity: Size-structure of a keystone predator drives functioning of a complex ecosystem. Ecology 94(5): 1046-1056. (in English) ["A central challenge in community ecology is to understand the connection between biodiversity and the functioning of ecosystems. While traditional approaches have largely focused on species-level diversity, increasing evidence indicates that there exists substantial ecological diversity among individuals within species. By far, the largest source of this intraspecific diversity stems from variation among individuals in ontogenetic stage and size. Although such ontogenetic shifts are ubiquitous in natural communities, whether and how they scale up to influence the structure and functioning of complex ecosystems is largely unknown. Here we take an experimental approach to examine the consequences of ontogenetic niche shifts for the structure of communities and ecosystem processes. In particular we experimentally manipulated the stage-structure in a keystone predator, larvae of the dragonfly *Anax junius*, in complex experimental pond communities to test whether changes in the population stage/size-structure of a keystone species scale up to alter community structure and ecosystem processes, and how functional differences scale with relative differences in size among stages. We found that the functional role of *A. junius* was stage specific. Altering what stages were present in a pond lead to concurrent changes in community structure, primary producer biomass (periphyton and phytoplankton), and ultimately altered ecosystem processes (respiration and net primary productivity), indicating a strong, but stage-specific trophic cascade. Interestingly the stage-specific effects did not simply scale with size or biomass of the predator, but instead indicated clear ontogenetic niche shifts in ecological interactions. Thus, functional differences among stages within a keystone species scaled up to alter the functioning of entire ecosystems. Therefore, our results indicate that the classical approach of assuming an average functional role of

a species can be misleading because functional roles are dynamic and will change with shifts in the stage-structure of the species. In general this emphasizes the importance of accounting for functional diversity below the species level to predict how natural and anthropogenic changes alter the functioning of natural ecosystems." (Authors)] Address: Rudolf, V., Rice University, Department of Ecology & Evolutionary Biology. E-mail: volker.rudolf@rice.edu

**12797.** Sanchez, A.B. (2013): Odonatological conference at Natural park "Los Alcornocales", Cádiz, España. Zygonyx 1: 14-15. (in Spanish) [UTM-grid 30STF60; 9-VI-2012; checklist of 18 species observed.] Address: Bernal Sánchez, A. E-mail: arturolibelula@gmail.com

**12798.** Sánchez-Guillén, R.A.; Hammers, M.; Hansson, B.; Van Gossum, H.; Cordero-Rivera, A.; Galicia Mendoza, D.I.; Wellenreuther, M. (2013): Ontogenetic shifts in male mating preference and morph-specific polyandry in a female colour polymorphic insect. BMC Evolutionary Biology 2013, 13:116 doi:10.1186/1471-2148-13-116: 11 pp. (in English) ["Background: Sexual conflict over mating rates may favour the origin and maintenance of phenotypes with contrasting reproductive strategies. The damselfly *Ischnura elegans* is characterised by a female colour polymorphism that consists of one androchrome and two gynochrome female morphs. Previous studies have shown that the polymorphism is genetic and to a high extent maintained by negative frequency-dependent mating success that varies temporally and spatially. However, the role of learning in male mating preferences has received little attention. We used molecular markers to investigate differences in polyandry between female morphs. In addition, we experimentally investigated innate male mating preferences and experience-dependent shifts in male mating preferences for female morphs. Results: Field and molecular data show that androchrome females were less polyandrous than gynochrome females. Interestingly, we found that naïve males showed significantly higher sexual preferences to androchrome than to gynochrome females in experimental trials. In contrast, experienced males showed no preference for androchrome females. Conclusions: The ontogenetic change in male mate preferences occurs most likely because of learned mate recognition after experience with females, which in this case does not result in a preference for one of the morphs, but rather in the loss of an innate preference for androchrome females." (Authors)] Address: Sánchez-Guillén, Rosa Ana, Departamento de Ecología e Biología animal, Grupo de Ecología Evolutiva e da Conservación, Universidade de Vigo EUET Forestal, Campus de Pontevedra, Pontevedra 36005, Spain. E-mail: rguillen@uvigo.es

**12799.** Sanford, M.R.; Ramsay, S.; Cornel, A.J.; Marsden, C.D.; Norris, L.C.; Patchoke, S.; Fondjo, E.; Lanzaro, G.C.; Lee, Y. (2013): A preliminary investigation of

the relationship between water quality and *Anopheles gambiae* larval habitats in western Cameroon. *Malaria Journal* 2013, 12:225: 8 pp. (in English) ["Background: Water quality and anopheline habitat have received increasing attention due to the possibility that challenges during larval life may translate into adult susceptibility to malaria parasite infection and/or insecticide resistance. Methods: A preliminary study of *Anopheles gambiae* s.s. larval habitats in the north-west and south-west regions of Cameroon was conducted in order to detect associations between *An. gambiae* s.s. molecular form and 2La inversion distributions with basic water quality parameters. Water quality was measured by temperature, pH, conductivity, total dissolved solids (TDS) at seven sites in Cameroon and one site in Selinkenyi, Mali. Results: Principal components and correlation analyses indicated a complex relationship between 2La polymorphism, temperature, conductivity and TDS. Cooler water sites at more inland locations yielded more S form larvae with higher 2La inversion polymorphism while warmer water sites yielded more M form larvae with rare observations of the 2La inversion. Discussion: More detailed studies that take into account the population genetics but also multiple life stages, environmental data relative to these life stages and interactions with both humans and the malaria parasite may help us to understand more about how and why this successful mosquito is able to adapt and diverge, and how it can be successfully managed. ... There were no known predatory insects observed in the pools the mosquitoes were collected from at the time of collections. No beetles, dragonfly nymphs or aquatic hemipterans were observed. However, it is possible that predatory mosquito larvae may have been present as they would have been impossible to differentiate by sight. However, no predatory mosquito larvae were collected in the reared and preserved samples. The correlation between the larval sex ratio and temperature was not statistically significant ( $\chi^2 = 11.433$ , d.f. = 6,  $P = 0.076$ )."] (Authors)] Address: Lee, Y., Vector Genetics Laboratory, School of Veterinary Medicine, Univ. of California, Davis, CA, USA. E-mail: yoslee@ucdavis.edu

**12800.** Santos, J.M.; Encina, L.; Oliveira, J.M.; Teixeira, A. (2013): Feeding ecology of the Ruivaco *Achondrostoma oligolepis*, a Portuguese endemic cyprinid fish. *Limnetica* 32(1): 27-38. (in English, with Spanish summary) ["This study assessed the feeding ecology of the *A. oligolepis*, a Portuguese endemic resident cyprinid fish whose dietary habits are virtually unknown. Samples were taken seasonally in three medium-sized rivers representing a gradient of temporality. The stomach contents of 97 individuals (42-126 mm total length, TL) were analysed. Although there was no significant overall variation in diet composition between rivers, differences were found among seasons. A broad range of food categories was identified, although a smaller subset of primarily detritus (77.6 %) and plant material (18.4 %) constituted the base diet. Of the animal prey,

Coleoptera and Diptera were the most prevalent, occurring in 13.2 % and 9.8 % of the fish, respectively, and were consumed mainly in the spring. Based on the observed diet composition and feeding strategy, *A. oligolepis* could be considered a generalist, foraging on the most abundant and available prey." (Authors) Gomphidae and Aeshnidae contributed to the food of *A. oligolepis*.] Address: Santos, J.M., Centro de Estudos Florestais, Instituto Superior de Agronomia, Universidade Técnica de Lisboa, 1349-017 Lisboa, Portugal. E-mail: jmsantos@isa.utl.pt

**12801.** Sasamoto, A.; Do, C.; Van, L.V. (2013): Discovery of a new species of the genus *Planaeschna* from Northern Vietnam, with a first description of male *P. tomokunii*. *Zootaxa* 3652(5): 587-594. (in English) ["A new species of *Planaeschna* McLachlan, *P. guentherpetersi* sp. nov. (holotype male and paratype female) from Phu Tho province, northern Vietnam, is described and illustrated. In addition, the male of *P. tomokunii* Asahina, 1996, which was known from only the holotype female, is described for the first time, based on newly collected material of both sexes, from the type locality, Tam Dao, Vinh Phuc province, northern Vietnam." (Authors)] Address: Sasamoto, A., 190-4 Yakuoji Tawaramoto, Shiki-gun, Nara prefecture, 636-0341, Japan. E-mail: akssmt@sea.plala.or.jp

**12802.** Schneider, T.; Schneider, J.; Seidenbusch, R. (2013): Odonata of North-Israel with a focus on the Upper Jordan Valley (Upper Galilee) - an update and a comparison between observations a quarter of a century (Odonata). *Entomologische Zeitschrift* 123(3): 129-134. (in English, with German summary) ["In May 1986, in August 1987, and in May 2010 a total of 36 species of Odonata were observed in North-Israel. This represents about 70 % of the known number of species of North-Israel. The last odonatological survey of this rapidly changing region dates from 1975, and the present status of the odonatological fauna of North-Israel is not known. Extensive water extraction and massive water pollution by sewage-waters from fish ponds, agricultural run-offs, and saline water from salt springs at the Lower Jordan River and fish farming and fish introduction are the main recent causes of the decline of several Odonata species in North-Israel. *Onychogomphus macrodon*, still found in 1986, seems now extinct from Israel and is currently restricted to the territory of Turkey, where it is also severely threatened. *Agriocnemis sania*, still present in 1986 in low numbers on the Lower Jordan, has also disappeared from North-Israel like *Brachythemis fuscopalliata* and the endemic subspecies *Rhythemis semihyalina syriaca* and *Urothemis edwardsi hulae*." (Authors)] Address: Thomas Schneider, T., Arnold-Knoblach-Ring 76, 14109 Berlin/Wannsee, Germany. E-Mail: thomas.rs@gmx.de

**12803.** Schneider, W. (2013): Obituary - Robert W. (Bob) Reimer. 18 December 1953 – 25 January 2012.

Agrion 17(1): 8-9. (in English) Address: Schneider, W., Entomology II, Research Institute and Natural History Museum Senckenberg, Senckenberganlage 25, 60325 Frankfurt a.M., Germany. Email: fri.wol@t-online.de

**12804.** Schulte, L.M.; Schulte, R.; Lötters, S. (2013): Avoiding predation: The importance of chemical and visual cues in poison frog reproductive behaviour. *Chemical Signals in Vertebrates* 12: 309-321. (in English) ["The detection of biological signals is especially important in -predator-prey systems. Anuran amphibians have evolved a remarkable diversity of defense strategies against predators, but the most risk-free is the prevention of a possible danger. This is valid for the protection of offspring as well. The Neotropical poison frog *Ranitomeya variabilis* deposits both eggs and tadpoles in phytotelmata. The -exploitation of these small pools is advantageous as it lowers the risk of offspring -predation compared to larger water bodies. Nonetheless, there are potential predators in these pools as well. We analysed how the parent frogs avoid conspecific -cannibalistic tadpoles and damselfly larvae of the species *Microstigma rotundatum*. We compared the use of chemical and visual cues and show that *R. variabilis* avoids conspecific tadpoles for the deposition of its offspring using chemical cues, while visual tadpole models alone were not avoided by the frogs. Damselfly larvae in contrast were avoided when present, but could not be detected by chemical cues alone. We suggest that the invertebrate predators mask their chemical cues, forcing the frogs to use other senses to detect them." (Authors)] Address: Schulte, Lisa, Department of Biogeography, Trier University, Universitätsring 15, 54286, Trier, Germany. E-mail: s6laschu@uni-trier.de

**12805.** Scott, M.A.; Scott, W.J. (2013): Reports from coastal stations - 2012: Longstone Centre, St Mary's, Isles of Scilly. *Atropos* 48: 43. (in English) [UK; 11-VIII-2012, *Sympetrum fonscolombii*] Address: not stated

**12806.** Sechler, D.R.; Phelps, Q.E.; Tripp, S.J.; Garvey, E.J.; Herzog, D.P.; Ostendorf, D.E.; Ridings, J.W.; Crites, J.W.; Hrabik, R.A. (2013): Effects of river stage height and water temperature on diet composition of year-0 sturgeon (*Scaphirhynchus* spp.): a multi-year study. *J. Appl. Ichthyol.* 29: 44-50. (in English) [Mississippi, USA; Odonata play a minor role in diet of year-0 *Scaphirhynchus* sturgeons.] Address: Sechler, D.R., Fisheries and Illinois Aquaculture Center, Dept of Zoology, Southern Illinois University, Carbondale, IL, USA

**12807.** Seymour, R.S.; Matthews, P.G.D. (2013): Physical gills in diving insects and spiders: theory and experiment. *J. Exp. Biol.* 216: 164-170. (in English) ["Insects and spiders rely on gas-filled airways for respiration in air. However, some diving species take a tiny air-store bubble from the surface that acts as a primary O<sub>2</sub> source and also as a physical gill to obtain dissolved O<sub>2</sub> from the water. After a long history of modelling, recent work with O<sub>2</sub>-

sensitive optodes has tested the models and extended our understanding of physical gill function. Models predict that compressible gas gills can extend dives up to more than eightfold, but this is never reached, because the animals surface long before the bubble is exhausted. Incompressible gas gills are theoretically permanent. However, neither compressible nor incompressible gas gills can support even resting metabolic rate unless the animal is very small, has a low metabolic rate or ventilates the bubble's surface, because the volume of gas required to produce an adequate surface area is too large to permit diving. Diving-bell spiders appear to be the only large aquatic arthropods that can have gas gill surface areas large enough to supply resting metabolic demands in stagnant, oxygenated water, because they suspend a large bubble in a submerged web." (Authors) The paper includes a passing reference to Odonata] Address: Seymour, R.S., Ecology & Evolutionary Biology, Univ. of Adelaide, Adelaide, SA 5005, Australia. E-mail: roger.seymour@adelaide.edu.au

**12808.** Shanku, A.G.; McPeck, M.A.; Kern, A.D. (2013): Functional annotation and comparative analysis of a zygopteran transcriptome. *G3 - Genes, Genomes, Genetics* 3: 763-770. (in English) ["In this paper we present a de novo assembly of the transcriptome of the damselfly, *Enallagma hageni*, through the use of 454 pyrosequencing. *E. hageni* is a member of the suborder Zygoptera within the order Odonata, and the Odonata are the basal lineage of the winged insects (Pterygota). To date, sequence data used in phylogenetic analysis of *Enallagma* species have been derived from either mtDNA or ribosomal nuclear DNA. This transcriptome contained 31,661 contigs that were assembled and translated into 14,813 individual open reading frames. Using these data, we constructed an extensive dataset of 634 orthologous nuclear protein-coding genes across 11 species of Arthropoda, and used Bayesian techniques to elucidate *Enallagma*'s place in the Arthropod phylogenetic tree. Additionally, we demonstrate that the *Enallagma* transcriptome contains 169 genes that are evolving at rates that differ relative to the rest of the transcriptome (29 accelerated and 140 decreased), and through multiple Gene Ontology searches and clustering methods, we present the first functional-annotation of any palaeopteran's transcriptome in the literature." (Authors)] Address: Shanku, A.G., Rutgers, The State University of New Jersey, Department of Genetics, Nelson Bio Labs-B416, 604 Allison Road, Piscataway, NJ 08854-8082. E-mail: alexander.shanku@rutgers.edu

**12809.** Shih, Y.T.; Ko, C.C.; Pan, K.T.; Lin, S.C.; Polaszek, A. (2013): *Hydrophylita* (*Lutzimicron*) *emporos* Shih & Polaszek (Hymenoptera: Trichogrammatidae) from Taiwan, parasitising eggs, and phoretic on adults, of the damselfly *Psolodesmus mandarinus mandarinus* (Zygoptera: Calopterygidae). *PLOS ONE* 8(7) e69331: 10 pp. (in English) ["*Hydrophylita emporos* n. sp. reared from eggs of *P. mandarinus* in Taiwan is described. This



is the first species of *Hydrophylita* to be described from the Old World, and the first record of phoresy in the genus. Adult females were observed aggregating at the base of the female damselfly's abdomen. When the damselfly begins ovipositing, females move to the tip of the abdomen, enter the water and quickly locate eggs for parasitising. The article contains links to video footage of this process." (Authors)] Address: Polaszek, A., Department of Life Sciences, Natural History Museum, London, UK. E-mail: ap@nhm.ac.uk

**12810.** Sidagyte, E.; Višinskiene, G.; Arbaciauskas, K. (2013): Macroinvertebrate metrics and their integration for assessing the ecological status and biocontamination of Lithuanian lakes. *Limnologica - Ecology and Management of Inland Waters* 43(4): 308-318. (in English) ["We present an assessment system for determining the ecological status (eutrophication and land use pressures) and non-indigenous macroinvertebrate species (NIMS) specific deviation from naturalness of Lithuanian lakes, using semi-quantitative sampling of littoral macroinvertebrates. This system includes two integrated indices, the multimetric Lithuanian Lake Macroinvertebrate Index (LLMI) and the Fauna Autochthony Index (FAI). The LLMI, developed for the assessment of ecological status, averages four metrics: the conventional Average Score Per Taxon (ASPT) and the first Hill's number (H1), as well as the newly validated number of Coleoptera, Ephemeroptera and Plecoptera taxa (#CEP) and the proportion of Coleoptera, Odonata and Plecoptera individuals (COP). Furthermore, the metrics of biocontamination were transformed into the WFD-compliant FAI for the NIMS-specific naturalness evaluation. The LLMI had significant correlations with total phosphorus, total nitrogen, chlorophyll a, biochemical oxygen demand, water transparency, the morphoindex and the combined trophomorphoindex. Relationships between the LLMI or its core metrics and biocontamination were not found; thus the LLMI and the FAI are not interdependent and have the advantage of separately accounting for pressures requiring different management techniques. Variation of the LLMI and the FAI did not differ between stony/pebbly and vegetated littoral mesohabitats suggesting that any of the mesohabitats or a multihabitat sampling technique can be suitable for a reliable evaluation of lake status. Aquatic beetles revealed themselves as good indicators of the trophic status, while caddisflies and conventional macroinvertebrate metrics ETO and EPT proved unworkable. The ineffectiveness of the latter metrics may be due to the relatively low trophic level in most of the studied lakes which resulted in an increment of caddisfly metrics with an increase of nutrient loads, as well as due to the susceptibility of caddisflies to the invasive species, the zebra mussel *Dreissena polymorpha* and amphipod *Pontogammarus robustoides*." (Authors)] Address: Šidagyte, E., Nature Research Centre, Akademijos St. 2, LT-08412 Vilnius, Lithuania. E-mail: e.sidagyte@gmail.com

**12811.** Singh, V.; Banyal, H.S. (2013): Odonate fauna of Khahhiar lake (Mini Switzerland) of Chamba district of Himachal Pradesh, India. *The Bioscan* 8(1): 281-287. (in English) [Between June 2008 and March 2012, 10 Odonata species were recorded.] Address: Singh, V., Dept of Biosciences, Himachal Pradesh Univ., Shimla - 171 005 (H.P.) India. E-mail: proliferate@yahoo.com

**12812.** Smetanin, A.N. (2013): On the insect fauna of the Kichiga river basin, northeastern Kamchatka. *Entomological Review* 93(2): 160-173. (in English) [189 species of insects from 55 families and 9 orders were found in the Kichiga River basin, northeastern Kamchatka Peninsula in 1987–1994. The list includes the following Odonata taxa: *Coenagrion johanssoni*, *Enallagma antiquum* (Belyshev, 1955; synonym of *Coenagrion hylas* or *johanssoni*?) *Aeshna juncea brachystigma* Sjöstedt, *A. coerulea*, *A. subarctica*, *Somatochlora arctica*, and *S. sahlbergi*.] Address: Smetanin, A.N., Russian State University of Tourism and Service, Kamchatka Branch, Petropavlovsk-Kamchatsky, Russia

**12813.** Smith-Patten, B.D.; Patten, M.A. (comp.) (2013): A checklist of Oklahoma Odonata (Dragonflies and Damselflies). Oklahoma Biological Survey, University of Oklahoma. leaflet: 2 pp. (in English) [State total: 161 species (14 June 2013); <http://www.biosurvey.ou.edu/patten/Oklahoma%20Odonata%20checklist%20revised%2014%-20June%202013.pdf>] Address: Smith-Patten, Brenda, Sam Noble Oklahoma Museum of Natural History, University of Oklahoma, Norman, Oklahoma 73072, USA. E-mail: argia@ou.edu

**12814.** Smolinský, R.; Gvoždík, L. (2013): Does developmental acclimatization reduce the susceptibility to predation in newt larvae? *Biological Journal of the Linnean Society* 108(1): 109-115. (in English) ["Many organisms respond to the heterogeneity of abiotic environmental conditions by plastic modifications of their phenotypes (acclimation or acclimatization). Despite considerable research efforts in this area, the beneficial (adaptive) effect of acclimation or acclimatization is still debated. We examined whether the development of newt larvae (*Ichthyosaura alpestris*) under different natural light and thermal conditions subsequently altered their susceptibility to predation in sun-exposed versus shaded tanks in nature. During predation trials in various light and temperature conditions, newt larvae that developed in sun-exposed warmer tanks consistently suffered from higher predation by dragonfly nymphs (*Aeshna cyanea*) compared to larvae from shaded or colder tanks. We conclude that higher sun exposure during embryonic and larval development negatively affects antipredator performance even in sun-exposed tanks: this result is inconsistent with the beneficial acclimation hypothesis." (Authors)] Address: Gvoždík, L., Department of Population Biology, Institute of Vertebrate Biology AS CR, Konešín, Czech Republic. E-mail: gvozdk@brno.cas.cz

**12815.** Spence, B. (2013): Reports from coastal stations - 2012: Spurn Point, East Yorkshire. *Atropos* 48: 68-69. (in English) [UK; *Lestes sponsa*, *Sympetrum fonscolombii*] Address: not stated

**12816.** Subramanian, K.A.; Rangnekar, P.; Naik, R. (2013): *Idionyx* (Odonata: Corduliidae) of the Western Ghats with a description of a new species. *Zootaxa* 3652(2): 277-288. (in English) ["The status and distribution of *Idionyx* Hagen, 1867, of the Western Ghats, India, is updated and a new species *Idionyx goman-takensis* is described and illustrated based on male and female specimens from Kulem (=Collem), Goa, India. This new species can be differentiated from other species of *Idionyx* by long and slender cerci and epiproct, absence of teeth in the basal half of the cerci, and a tuft of golden hairs at the end of the lateral lobes of the epiproct. A revised key to the species of the genus is provided, and its diversity and ecology in the Western Ghats is discussed." (Authors)] Address: Subramanian, K.A., Zoological Survey of India, Kolkata, India-700 053. E-mail [subbuka.zsi@gmail.com](mailto:subbuka.zsi@gmail.com)

**12817.** Subrero, E.; Poma, S.; Cucco, M. (2013): Gli Odonati come indicatori delle condizioni ambientali in aree di riqualificazione ambientale del Parco fluviale del Po. *Rivista piemontese di Storia naturale* 34: 127-146. (in Italian, with English summary) ["Odonata as bioindicators of restoration in the Po River Park.: Recently there has been an increase in environmental restoration activity aimed at restoring natural habitats in agricultural and/or degraded areas. Among the most threatened habitats the lowland wetlands show a particularly critical condition, due to human activities. In this study we used the Odonata (sampling the exuviae) as indicators of the effectiveness of environmental restoration. Our aim was to collect information about ecological succession of species in areas subject to management, and to assess the time necessary to reach the characteristics of natural wetlands. To this end, in the territory of the Po river Park (Piedmont, Italy), we compared 6 sites resulting from environmental remediation and 5 of natural origin. For each site, in May-September 2011, we collected quantitative sampling of Odonata exuviae (28 species found), qualitative surveys of prevalent aquatic plants (presence/absence), environmental physical-chemical parameters (pH, temperature, conductivity, dissolved oxygen), and we measured the cover of 16 land use categories near the sampling sites. The multivariate statistical analysis (Correspondence Analysis) showed that the Odonata population is related to the environmental condition in terms of land use and aquatic vegetation, while physical-chemical parameters were less important. The dragonfly species composition differed among sites resulting from environmental restoration, where the exuviae of *Ischnura elegans* and *Crocothemis erythraea* (pioneer species) were very abundant, and sites of natural origin, where the *C. erythraea* was absent and *I. elegans* was present in significantly small-

ler numbers, replaced by other more sensitive species. The site of Canale di Brema, characterized by lotic waters, is particularly relevant because exuviae belonging to the species *Gomphus flavipes* and *Ophiogomphus cecilia*, both included in the Habitats Directive 92/43/EEC lists, were found." (Authors)] Address: Subrero, Eerica, Università del Piemonte Orientale, DISIT, via T. Michel, 11 - 15121 Alessandria, Italy.

**12818.** Takahashi, Y.; Kawata, M. (2013): Alternative trait combinations and secondary resource partitioning in sexually selected color polymorphism. *Ecology and Evolution* 3(7): 2038-2046. (in English) ["Resource partitioning within a species, trophic polymorphism is hypothesized to evolve by disruptive selection when intra-specific competition for certain resources is severe. However, in this study, we reported the secondary partitioning of oviposition resources without resource competition in the damselfly *Ischnura senegalensis*. In this species, females show colour polymorphism that has been evolved as counteradaptation against sexual conflict. One of the female morphs is a blue-green (andromorph, male-like morph), whereas the other morph is brown (gynomorph). These female morphs showed alternative preferences for oviposition resources (plant tissues); andromorphs used fresh (greenish) plant tissues, whereas gynomorphs used decaying (brownish) plants tissues, suggesting that they chose oviposition resources on which they are more cryptic. In addition, the two-colour morphs had different egg morphologies. Andromorphs have smaller and more elongated eggs, which seemed to adapt to hard substrates compared with those of gynomorphs. The resource partitioning in this species is achieved by morphological and behavioural differences between the colour morphs that allow them to effectively exploit different resources. Resource partitioning in this system may be a by-product of phenotypic integration with body colour that has been sexually selected, suggesting an overlooked mechanism of the evolution of resource partitioning. Finally, we discuss the evolutionary and ecological consequences of such resource partitioning." (Authors)] Address: Takahashi, Yuma, Division of Ecology and Evolutionary Biology, Graduate School of Life Sciences, Tohoku University, Aoba, Sendai, Miyagi 980-8578, Japan. E-mail: [takahashi.yum@gmail.com](mailto:takahashi.yum@gmail.com)

**12819.** Takahashi, Y.; Kawata, M. (2013): A comprehensive test for negative frequency-dependent selection. *Population Ecology* 55(3): 499-509. (in English) ["Understanding the mechanisms that maintain genetic diversity within a population remains a primary challenge for evolutionary biology. Of the processes capable of maintaining variation, negative frequency-dependent selection (NFDS), under which rare phenotypes (or alleles) enjoy a high fitness advantage, is suggested to be the most powerful. However, few experimental studies have confirmed that this process operates in nature. Although a lot of suggestive evidence

has separately been provided in various polymorphic systems, these are not enough to prove the existence of NFDS in each system. Here we present a general review of NFDS and point out some problems with previous works to develop reasonable alternative research strategies for testing NFDS. In the second half of this paper, we focused on NFDS in *Ischnura senegalensis*, that shows female-limited genetic polymorphism. We show (1) the proximate causal mechanisms of the frequency-dependent process, (2) frequency-dependent inter-morph interaction, (3) rare morph advantage and (4) morph frequency oscillations in a natural population. These results provide unequivocal empirical support for NFDS in a natural system." (Authors)] Address: Takahashi, Y., Division of Ecology and Evolutionary Biology, Graduate School of Life Sciences, Tohoku University, 6-3 Aoba, Aramaki, Aoba, Sendai, Miyagi, 980-8578, Japan. E-mail: takahashi.yum@gmail.com

**12820.** Talucdher, R.; Shivakumar, K. (2013): Tensile properties of veins of damselfly wing. *Journal of Biomaterials and Nanobiotechnology* 4: 247-255. (in English) ["Microtension test of Costa and Radius veins of damselfly (*Lestes* sp.) wing was conducted to measure tensile strength and modulus. The specimens were classified into fresh and dry depending on when the samples were prepared and tested. Fresh samples tested immediately after extracting from the fly while the dry samples were tested one year after extraction and stored in a desiccator. Measured load-displacement response and fracture load were used to calculate modulus and strength. Field Emission Scanning Electron Microscope was used to measure the fracture morphology and cross-section of the vein. The results showed that the veins are brittle and fracture surface is flat. The average strength (232 - 285 MPa) and modulus (14 - 17 GPa) of the Costa and Radius veins were nearly same for both fresh and dry samples. The tensile modulus of the veins was 8% - 10% higher than the indentation (compressive) modulus and was nearly the same as that of human bones." (Authors)] Address: Shivakumar, K., Center for Composite Materials Research (CCMR), Department of Mechanical Engineering, North Carolina A & T State University (NC A & T SU), Greensboro, USA. E-mail: kunigal@ncat.edu

**12821.** Tang, H.-C.; Yeh, W.-C.; Chen, S.-L. (2013): Description of an endemic and endangered new *Sympetrum* species (Odonata: Libellulidae) from the subtropical area of Taiwan. *Zootaxa* 3693(3): 351-357. (in English) ["*Sympetrum nantouensis* sp. nov. collected from Nantou, Central Taiwan, is described and figured, with remarks on its ecology and oviposition behaviour. Judging from penile structure, it is considered to belong to the *infuscatum*-group, whose members are defined here by penile characters. In the *infuscatum*-group, *S. nantouensis* is most similar to *S. risi* Bartenev, but they are probably not very closely related to each other. *S. nantouensis* differs from *S. risi* mainly in having beak-

like cerci, well-lineated black and pale yellow pterothorax, and penile 4th segment with longer and apically upcurved cornua. This new species is distinct among its congeners in view of both biogeography and morphology because of its confined and peripheral existence and the odd shape of its cerci. All type specimens will be deposited at the Insect Collection of TFRI." (Authors)] Address: Tang, H.-C., Education Division, Taipei Zoo, Taipei, Taiwan. E-mail: tgx02@zoo.gov.tw

**12822.** Theischinger, G.; Richards, S.J. (2013): *Hylaeargia simplex* spec. nov., a third species of *Hylaeargia* Lieftinck from New Guinea (Zygoptera: Platycnemididae). *Odonatologica* 42(2): 157-161. (in English) ["The new species is described from the upper Sepik Basin. Holotype male: Papua New Guinea, West Sepik Prov., 30-XI-2009; deposited in the Museum & Art Gallery of the Northern Territory, Darwin, Australia. The adults of both sexes are illustrated, habitat conditions are given, and the affinities of the new species are discussed." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**12823.** Torralba-Burrial, A.; da Silva, G.; Rodríguez-Martínez, S.; Menéndez, D.; García-García, I.; Fernández-González, A.; Fernández-Menéndez, D. (2013): Las comunidades de libélulas de la cuenca media-alta del río Tâmega (NE Portugal) (Insecta: Odonata). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)* 52: 173-190. (in Spanish, with English and Portuguese summaries) ["The Odonata communities of the upper-middle basin of the Tâmega river (Portugal) were analysed by sampling of adults and exuviae in 2010 and 2011. Thirty-seven dragonfly species were found, which account for half of those known from the Iberian Peninsula and 60% of the Portuguese species. The most frequent species in the area were *Calopteryx virgo*, *Cordulegaster boltonii*, *Boyeria irene*, *Anax imperator*, *Pyrrhosoma nymphula*, *Platycnemis latipes*, *Onychogomphus uncatatus*, *Calopteryx xanthostoma* and *Orthetrum coerulescens*. Furthermore, large populations of *Macromia splendens*, *Oxygastra curtisii* and *Gomphus graslinii*, protected species included in Habitats Directive, were frequent in the area. *Coenagrion mercuriale*, another protected species, presented a more restricted distribution in the study area." (Authors)] Address: Torralba-Burrial, A., Cluster de Energía, Medioambiente y Cambio Climático, Campus de Excelencia Internacional, Universidad de Oviedo, Spain. E-mail: antonioib@gmail.com

**12824.** Torralba-Burrial, A.; Ocharan, F.J. (2013): Iberian Odonata distribution: data of the BOS Arthropod Collection (University of Oviedo, Spain). *ZooKeys* 306: 37-58. (in English) ["Odonata are represented from the Iberian Peninsula by 79 species. However, there exists a significant gap in accessible knowledge about these species, especially regarding their distribution. This data paper describes the specimen-based Odonata data



of the Arthropod Collection of the Department of Biología de Organismos y Sistemas (BOS), University of Oviedo, Spain. The specimens were mainly collected from the Iberian Peninsula (98.63% of the data records), especially the northern region. The earliest specimen deposited in the collection dates back to 1950, while the 1980's and 2000's are the best-represented time periods. Between 1950 and 2009, 16,604 Odonata specimens were deposited and are documented in the dataset. Approximately 20% of the specimens belong to the families Coenagrionidae and Calopterygidae. Specimens include the holotype and paratypes of the Iberian subspecies *Calopteryx haemorrhoidalis asturica* Ocharan, 1983 and *Sympetrum vulgatum ibericum* Ocharan, 1985. The complete dataset is also provided in Darwin Core Archive format." (Authors)] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonio@hotm.com

**12825.** Tunmore, M. (2013): Reports from coastal stations - 2012: Lizard Peninsula, Cornwall. *Atropos* 48: 44-45. (in English) [UK; *Sympetrum fonscolombii*] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: atropos@atroposed.freemove.co.uk

**12826.** Tyrrell, M. (2013): Notes & Observations. *Dragonfly News* 63: 18-19. (in English) [UK; photographs of an attack of *Anax imperator* on *Cordulegaster boltonii*, *Ischnura elegans* preying on *Enallagma cyathigerum*, and *C. boltonii* preying on *Pyrrhosoma nymphula*.] Address: not stated

**12827.** Ulmer, A. (2013): *Calopteryx haemorrhoidalis* (Vander Linden, 1825) dans les vallons rhodaniens, une nouvelle espèce pour le département de la Loire. *Sympetrum* 16: 26-28. (in French) [In summer 1999, a male of *C. haemorrhoidalis* was found along the river Valencize, Massif du Pilat (Loire), France; this is a first record for the Département Loire.] Address: Ulmer, A., Coordinateur du GRPLS dans la Loire, Rue Caderot, Le Colombier, 42140 Chazelles-sur-Lyon, France

**12828.** Van, K.D.; Janssens, L.; Debecker, S.; De Jong, M.; Lambret, P.; Nilsson-Örtman, V.; Bervoets, L.; Stoks, R. (2013): Susceptibility to a metal under global warming is shaped by thermal adaptation along a latitudinal gradient. *Global Change Biology* 19(9): 2625-2633. (in English) ["Global warming and contamination represent two major threats to biodiversity that have the potential to interact synergistically. There is the potential for gradual local thermal adaptation and dispersal to higher latitudes to mitigate the susceptibility of organisms to contaminants and global warming at high latitudes. Here, we applied a space-for-time substitution approach to study the thermal dependence of the susceptibility of *Ischnura elegans* damselfly larvae to zinc in a common garden warming experiment (20°C and 24°C) with replicated

populations from three latitudes spanning >1500 km in Europe. We observed a striking latitude-specific effect of temperature on the zinc-induced mortality pattern; local thermal adaptation along the latitudinal gradient made Swedish, but not French, damselfly larvae more susceptible to zinc at 24°C. Latitude- and temperature-specific differences in zinc susceptibility may be related to the amount of energy available to defend against and repair damage since Swedish larvae showed a much stronger zinc-induced reduction of food intake at 24°C. The pattern of local thermal adaptation indicates that the predicted temperature increase of 4°C by 2100 will strongly magnify the impact of a contaminant such as zinc at higher latitudes unless there is thermal evolution and/or migration of lower-latitude genotypes. Our results underscore the critical importance of studying the susceptibility to contaminants under realistic warming scenarios taking into account local thermal adaptation across natural temperature gradients." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**12829.** Vieira, V.; Cordero-Rivera, A. (2013): New data on the Odonata fauna from Graciosa Island (Azores). *Arquipélago. Life and Marine Sciences* 30: 78-81. (in English) ["Only two species of odonates, namely *Anax imperator* and *Sympetrum fonscolombii*, were found in Graciosa during June 07-15, 2004, and August 31-September 01, 2007. ... These species were common in ponds rich in *Potamogeton* and other macrophytes. No damselflies were found during the two surveys. Two *Ischnura* species are known from the Azores (*I. hastata*, *I. pumilio*). Lorenzo-Carballa et al. (2009) showed that in the Azores *I. hastata* is restricted to oligotrophic ponds, basing on studies in São Miguel and Pico. It was absent from all eutrophic ponds impacted by cattle grazing and by ponds subjected to water extraction by humans. This suggests that parthenogenetic populations of *I. hastata* are highly sensitive to eutrophication, which is different from the habitat preferences showed by sexual populations in the Americas." (Authors)] Address: Vieira, V.; Universidade dos Açores, Departamento de Biologia & Grupo da Biodiversidade dos Açores (CITA-A), Rua da Mãe de Deus, Apartado 1422, PT-9501-801 Ponta Delgada, Açores, Portugal. E-mail: vvieira@uac.pt

**12830.** Villanueva, R.J.T.; Cahilog, H. (2013): Odonata Fauna of Balabac Island, Philippines with descriptions of two new species. *International Dragonfly Fund - Report* 60: 1-34. (in English) ["The Odonata fauna of Balabac Island, Philippines was studied in March 2013. A total of 41 species under 33 genera were recorded. 28 species were recorded for the first time in the island. One genus - *Mortonagrion* was recorded for the first time in the Philippines. *Mortonagrion astamii* spec. nov. and *Prodasineura poncei* spec. nov. are new to science and are described. Three previously recorded species remained elusive and not seen during the survey." (Au-

thors)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**12831.** Wagler, R.; Wagler, A. (2013): Knowledge of arthropod carnivory and herbivory: Factors influencing preservice elementary teacher's attitudes and beliefs toward arthropods. *International Journal of Environmental & Science Education* 8(2): 303-318. (in English) ["Human negativity toward arthropods has been well documented but the factors that contribute to this negativity have been elusive. This study explored knowledge of arthropod carnivory (including *Hagenius brevistylus*) and herbivory as possible casual factors that contribute to the negative tendencies preservice elementary teachers have toward most arthropods. Specifically, this study investigated the effect knowledge of arthropod carnivory and herbivory had on United States kindergarten through sixth grade preservice elementary teacher attitude toward that arthropod and belief concerning the likelihood of incorporating information about that specific arthropod into their future science classroom. A cluster randomized design with a control group was used for the study. The treatment group consisted of 147 preservice elementary teachers and the control group consisted of 151. Unique to this study is the finding that arthropod carnivory and herbivory are causal factors that strongly affect preservice elementary teacher attitude and belief toward arthropods. When the participants of the study were made aware that an arthropod they thought was a herbivore was actually a carnivore, their attitude and likelihood of incorporation significantly declined. When the participants of the study were made aware that an arthropod they thought was a carnivore was actually a herbivore, their attitude and likelihood of incorporation significantly increased. Implications and future research are discussed." (Authors)] Address: Wagler, R., The University of Texas at El Paso, Department of Teacher Education, 500 West University Avenue, Education Building 601, El Paso, TX 79968, USA. E-mail: rrwagler2@utep.edu

**12832.** Walker, P.D.; Wijnhoven, S.; van der Velde, G. (2013): Macrophyte presence and growth form influence macroinvertebrate community structure. *Aquatic Botany* 104: 80-87. (in English) ["Multivariate analysis demonstrated that macroinvertebrate assemblages of macrophyte-dominated sub-habitats within a small eutrophic pond differed markedly from those of Bottom substrate and Open water habitats. Certain habitats (e.g. *Nymphaea* and *Phragmites*) appeared to be quite similar in their macroinvertebrate communities, whereas others appeared to be very distinct in terms of the species composition (e.g. Open water habitat). Analysis of functional feeding groups also revealed differences between habitats in terms of the community structure. Again, the Open water habitat exhibiting the most marked difference. Macrophyte growth form does not cause significant differences in macroinvertebrate species richness

and diversity but it has a significant effect on macroinvertebrate abundance. Habitats consisting of highly branched and dissected macrophyte growth forms provide more food resources and microhabitats supporting larger numbers of macroinvertebrates than macrophytes with firm undissected stalks and leaves. This study highlights the importance of maintaining the ecological quality of small freshwater habitats in order to promote macrophyte growth and thus maintain a high level of species richness within such ecosystems. Highlights: \*We investigated how macrophytes influence macroinvertebrate communities, which is useful for predicting overall biodiversity. \*The data presented show interesting results with respect to presence and growth form of the macrophytes within a single aquatic system. \*Previous studies often used artificial structures/plants in waters with different physico-chemical conditions making comparisons difficult. \*This study employed an alternative approach to minimise variation due to season, physico-chemical conditions and spatial variation." (Authors) The list of taxa includes *Ischnura elegans*, *Enallagma cyathigerum* and *Aeshna grandis*.] Address: Walker, P.D., Dept of Animal Ecology & Ecophysiology, Inst. for Water and Wetland Research, Faculty of Science, Radboud Univ. Nijmegen, Nijmegen, The Netherlands

**12833.** Wang, L.-J.; Cherng, J.-J.; Chang, Y.J.; Jiang, J.-L. (2013): Description of *Rhinocypha taiwana* sp. nov. from Taiwan, with a preliminary molecular phylogenetic analysis of the *Rhinocypha drusilla*-group (Odonata: Chlorocyphidae). *International Journal of Odonatology* 16(1): 93-107. (in English) ["*Rhinocypha taiwana* Wang & Chang, sp. nov. is described and illustrated for both sexes. The genetic distance of the cytochrome c oxidase I (COI) gene in *R. taiwana* and related species ranges from 4.2% to 10.4%. *R. taiwana* is shown to be a good species based on morphological and genetic criteria. It also is clearly retrieved as a distinct species based on COI phylogenetic analysis. The *R. drusilla* group is proposed and defined by a combination of characteristics which distinguish them from all other *Rhinocypha* species: male abdomen with reddish orange markings and S2 with a unique dorsal spade-shaped or similar marking. A key to the males of the six species of the *R. drusilla* group is provided. Two morphologically distinct continental species, *R. drusilla* and *R. arguta*, are shown to have a rather small genetic distance, only 1.2–1.7%. More material from the continental populations of this group is needed for further morphological and molecular studies." (Authors) *Rhinocypha arguta*, *R. drusilla*, *R. huai*, *R. ogasawarensis*, *R. taiwana*, *R. uenoii*] Address: Wang, L.-J., Division of Forest Protection, Taiwan Forestry Research Institute, Taipei, Taiwan, ROC. E-mail: ljwang23@ms17.hinet.net

**12834.** Watanabe, K.; Takechi, L.; Hisamatsu, S. (2013): A new record of *Aeshna crenata* Hagen, 1856 from Ehime Prefecture, Japan Kohei. *Tombo* 55: 55-56. (in Japanese, with English summary) ["We collected a

final instar larva and five exuviae of *A. crenata* from a pond in Kumakogen Town, Ehime Prefecture. This is the first propagating record of the species from Shikoku Island." (Authors)] Address: Hisamatsu, S., Louisiana State Arthropod Museum, Louisiana State University AgCenter, 404 Lire Sciences Building, Louisiana State University, Baton Rouge, LA 70803. USA. E-mail: sthisamatsu@gmail.com

**12835.** Waters, R.M.; Burghardt, G.M. (2013): Prey availability influences the ontogeny and timing of chemoreception-based prey shifting in the Striped Crayfish Snake, *Regina alleni*. *Journal of Comparative Psychology* 127(1): 49-55. (in English) ["Striped crayfish snakes (*Regina alleni*) undergo a dietary shift from dragonfly larvae to crayfish during ontogeny. Godley (1980) suggested that this shift is attributable to crayfish availability rather than an initial preference for dragonfly larvae. We experimentally tested this hypothesis by measuring the chemosensory response of newborn snakes to prey odors at 2 ages and also after they were fed on either dragonfly larvae or crayfish. The results show that *R. alleni* respond equally to dragonfly larvae, hard crayfish, and soft crayfish before feeding experience. We also show that the maintenance of this preference over fish and control stimuli is subsequently determined by the prey type encountered, through an unusual interaction. Snakes fed dragonfly larvae increased their chemosensory response to both dragonfly larvae and crayfish, whereas snakes fed crayfish increased their response only to crayfish. Our study demonstrates that innate chemosensory responses to prey can be modified by prey availability and that they do not necessarily result from maturation alone. Such plasticity has adaptive value to newborn animals that must fend for themselves from birth and respond to changing environmental conditions." (Authors)] Address: Burghardt, G.M., Dept of Psychology and Department of Ecology and Evolutionary Biology, University of Tennessee, USA

**12836.** Weihrauch, F. (2013): 2013 International Congress of Odonatology Freising, Bavaria, 17-21 June 2013. *Agrion* 17(1): 15. (in English) [Primarily introduction into the coming 13th International Congress of Odonatology in Freising, Germany.] Address: Weihrauch, F., Jägerstr. 21A, 85283 Wolnzach, Germany. E-mail: Florian.Weihrauch@t-online.de

**12837.** Weihrauch, F. (2013): ICO 2013 Congress Programme. As of: 05.06.2013. Freising, Upper Bavaria / Germany, 17th to 22st June 2013. *International Congress of Odonatology. Freising: 16 pp.* (in English) [Timetable of the International Congress of Odonatology in Freising, Germany, June 2013] Address: Weihrauch, F., Jaegerstr. 21A, 85283 Wolnzach, Germany

**12838.** Wiederman, S.D.; Shoemaker, P.A.; O'Carroll, D.C. (2013): Correlation between OFF and ON channels underlies dark target selectivity in an insect visual

system. *The Journal of Neuroscience* 33(32): 13225-13232. (in English) ["In both vertebrates and invertebrates, evidence supports separation of luminance increments and decrements (ON and OFF channels) in early stages of visual processing (Hartline, 1938; Joesch et al., 2010); however, less is known about how these parallel pathways are recombined to encode form and motion. In *Drosophila*, genetic knockdown of inputs to putative ON and OFF pathways and direct recording from downstream neurons in the wide-field motion pathway reveal that local elementary motion detectors exist in pairs that separately correlate contrast polarity channels, ON with ON and OFF with OFF (Joesch et al., 2013). However, behavioural responses to reverse-phi motion of discrete features reveal additional correlations of the opposite signs (Clark et al., 2011). We here present intracellular recordings from feature detecting neurons in the dragonfly that provide direct physiological evidence for the correlation of OFF and ON pathways. These neurons show clear polarity selectivity for feature contrast, responding strongly to targets that are darker than the background and only weakly to dark contrasting edges. These dark target responses are much stronger than the linear combination of responses to ON and OFF edges. We compare these data with output from elementary motion detector-based models (Eichner et al., 2011; Clark et al., 2011), with and without stages of strong center-surround antagonism. Our data support an alternative elementary small target motion detector model, which derives dark target selectivity from the correlation of a delayed OFF with an undelayed ON signal at each individual visual processing unit (Wiederman et al., 2008, 2009)." (Authors)] Address: Wiederman, S.D., Adelaide Centre for Neuroscience Research, School of Medical Sciences, The University of Adelaide, Adelaide, SA 5005, Australia

**12839.** Wiederman, S.D.; Shoemaker, P.A.; O'Carroll, D.C. (2013): Modeling selective attention in an insect visual neuron. 6th Australian Workshop on Computational Neuroscience The University of Melbourne 30-31 January 2013: 68. (in English) [Verbatim: Whether considering a lion focused on a single zebra within a panicked herd, or a dragonfly capturing flies amidst swarms of prey and conspecifics, each animal selects a single object amongst distracting stimuli. Little is known about the neuronal mechanisms that allow animals to accomplish this 'attentional' task. Diverse evidence from functional imaging and physiology to psychophysics, highlights the importance of 'competitive selection' in attention for vertebrates, artificial intelligence and even in fruitflies. Although direct neural correlates for such attention are scarce, we have recently demonstrated responses from an identified dragonfly visual neuron, the 'centrifugal small target motion detector' (CSTMD1), that perfectly match a model for competitive selection within the limits of neuronal variability ( $r^2=0.83$ ). Responses of CSTMD1 to individual moving targets differ in both magnitude and time course depending on loca-



tion of the target within the cell's receptive field. However, responses to two simultaneous targets almost always match those elicited by one of the two targets acting alone. Successive repetition of stimulus pairs over variable sizes, separation and contrasts all elicit responses equivalent to single targets, regardless of whether the 'winner' is the stronger stimulus if presented by itself. Here we examine winner-takes-all networks as putative components of the small target detection system, considering biologically plausible implementations and how they might contribute to the physiological responses of CSTMD1. By examining such competitive selection models we gain insight into how the pre-synaptic elements to CSTMD1 could be arranged to permit the 'absolute' encoding of a single target in a multiple target environment.] Address: Wiederman, S.D., Adelaide Centre for Neuroscience Research, School of Medical Sciences, The University of Adelaide, Adelaide, SA 5005, Australia

**12840.** Wiesenborn, W.D. (2013): Phosphorus contents in desert riparian spiders and insects vary among taxa and between flight capabilities. *Florida Entomologist* 96(2): 424-432. (in English) ["Phosphorus occurs in a variety of biological molecules including DNA and RNA, ATP and other adenine nucleotides, phosphorylated metabolites, and phospholipids. Variation in phosphorus content among spiders and insects would influence the element's uptake by insectivorous birds. I measured amounts of phosphorus in 3 families of spiders and 7 orders and 24 families of insects collected in riparian habitat next to the Colorado River in western Arizona. Relation between phosphorus mass and body dry-mass,  $P \mu\text{g} = 9.6$  (body mg), in spiders and insects was not allometric. Phosphorus concentration, as a mean percentage of body dry-mass, was higher in spiders (1.33%) than in insects (0.96%). Phosphorus contents varied most among families but also among orders and genera. Insect predators contained higher phosphorus concentrations (1.01%) than insect herbivores (0.90%). Strong-flying insects, Odonata, Neuroptera, Diptera, and Hymenoptera except Formicidae, also contained higher phosphorus concentrations (1.04%) than weak flying or wingless insects (0.89%), Orthoptera, Hemiptera, Coleoptera, and Formicidae. Larger flight-muscles with higher concentrations of phosphorylated metabolites likely increase phosphorus contents in strong-flying insects. Birds that eat aerial insects may benefit from higher phosphorus contents in their prey." (Author)] Address: Wiesenborn, W.D., U.S. Bureau of Reclamation, Lower Colorado Regional Office, P.O. Box 61470, Boulder City, Nevada 89006, USA. E-mail: wwiesenborn@fastmail.fm

**12841.** Wildermuth, H. (2013): Entwicklung der Libellenfauna (Odonata) am Husemersee (Kanton Zürich) im Verlauf der letzten 130 Jahre. *Entomo Helvetica* 6: 7-21. (in German, with English and French summaries) ["Between 1885 and 2012 a total of 55 dragonfly species have been recorded in the Husemersee region.

While 14 of them have definitely disappeared, 31 species are still present and 10 are new to the locality. The locally extinct species are typical moorland species that have lost their habitats by intense peat exploitation during World War I and II. It is assumed that many of the newcomers have profited from the climate change. The extant dragonfly fauna is discussed in the context of the current habitat supply and measures for habitat management to promote the odonate populations are suggested." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**12842.** Xu, M.X.; Wang, X.; Yan, X.J.; Lv, G.F.; Zheng, S.N.; Wang, H.B. (2013): Polarization imaging target detection method by imitating dragonfly compound eye LF-SF mechanism. *Applied Mechanics and Materials* 347-350: 3881-3884. (in English) ["Recently, water surface target detection and tracking for sea, lake, or river are challenging research topics. This paper presents a framework of target detection and tracing based on three-channel synchronization polarization imaging and imitation dragonfly compound eye LF-SF (large field-small field) mechanism. This framework can make full use of the advantages of polarization sensitivity of the compound eyes of a dragonfly, and be useful for effective water surface target detection and motion vector estimation." (Authors)] Address: Xu, M.X., Nanjing University of Science & Technology, Nanjing, China. E-mail: mengxi.xu@gmail.com

**12843.** Xu, Q.-h. (2013): *Idionyx pseudovictor* sp. nov. from Fujian, China (Odonata: Anisoptera: Corduliidae). *Zootaxa* 3683(1): 82-86. (in English) ["A new species of the genus *Idionyx* Hagen, *I. pseudovictor* sp. nov. from Fujian, China is described from the female, illustrated and diagnosed from its congeners. Description of the final stadium larva of the new species is also provided. The new species is closely similar to female *I. victor*. There are a series of relatively minor colour and pattern differences between these two female adults, as well as a series of obvious structural differences in larvae of these two species. The female adult of the new species can be separated from that of *I. victor* by the following characters: (1) labrum entirely yellow; (2) distal end of ventral synthorax entirely yellow; (3) abdominal S1-2 with complete middorsal yellow stripe; (4) valvula vulvae pointed triangularly, not projecting beyond apical border of 8th tergite. The larva of the new species can be separated from that of *I. victor* by the following characters: (1) body dark brown, covered with dense long hairs; (2) apical border of prementum with 10 spiniform setae on each side; (3) premental setae 5+3/5+3; (4) numerous fine bristles present on median lobe; (5) inner margin of palpal lobe with 6 large projections; and (6) movable hook long and acuminate." (Author)] Address: Xu, Q.-h., Dept of Biological and Environmental Engineering, Zhangzhou City University, Zhangzhou, Fujian 363000, China. E-mail: qhx363000@gmail.com

**12844.** Yakubovich, V.S. (2013): First record of the dragonfly *Orthetrum albistylum speciosum* (Uhler, 1858) (Odonata: Libellulidae) from Evreiskaya Avtonomnaya Oblast, Russian Far East. *Far Eastern Entomologist* 262: 7-8. (in English, with Russian summary) [Russia: Evreiskaya autonomnaya oblast, Oktyabrskii District, vicinity of Soyuznoe village, top of a hill near the Amur River, 6-9.VII 2012, 1 female (E.S. Koshkin leg.).] Address: Yakubovich, V.S., Dept of Biology, Far Eastern Medical University, Murav'ev-Amursky Street 35, Khabarovsk 680000, Russia. E-mail: Presid11@mail.ru

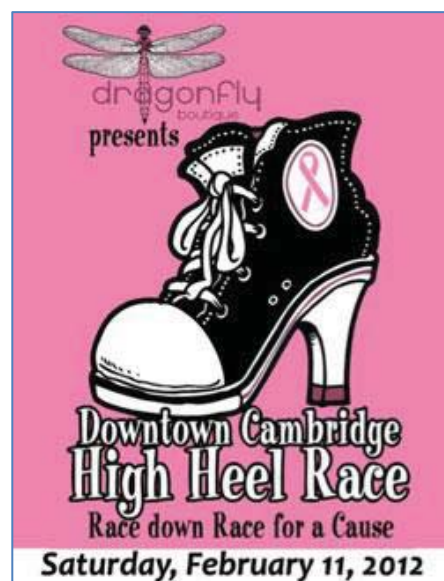
**12845.** Yu, X.; Chen, J. (2013): *Calicnemia soccifera* sp. nov. from Yunnan, China (Zygoptera: Platycnemididae). *International Journal of Odonatology* 16(2): 183-188. (in English) ["A new species, *Calicnemia soccifera* sp. nov. (holotype ♂: Jinping, Yunnan, China) is described and illustrated for both sexes. *C. miniata* is confirmed to occur in Xizang (Tibet), China, and preliminary taxonomic remarks on some Chinese species of *Calicnemia* are given." (Authors).] Address: Yu, X., Institute of Entomology, College of Life Sciences, Nankai Univ., Tianjin, 300071, PR China. E-mail: nkyuxin@yahoo.cn

**12846.** Zhang, H.-C.; Zheng, D.-R.; Wang, B.; Fang, Y.; Jarzembowski, E.A. (2013): The largest known odonate in China: *Hsiufua chaoi* Zhang et Wang, gen. et sp. nov. from the Middle Jurassic of Inner Mongolia. *Chinese Science Bulletin* 58(13): 1579-1584. (in English) ["A new genus and species, *Hsiufua chaoi* Zhang et Wang, is established based on a forewing from the Middle Jurassic Haifanggou Formation in Inner Mongolia, China and attributed to *Campteropteroidea*, *Isophlebioidea*, Odonata. It is the largest odonate known in China and the fourth in the world in terms of forewing length. The maximum size (based on forewing length) of Odonata is smaller in the Permian than in the Mesozoic which is probably due to competition for prey between Odonata and Protodonata in the Permian. The reason that the maximum size of Jurassic odonates is larger than that of their extant relatives is most probably less competition and lower predation pressure from contemporary aerial vertebrates." (Authors)] Address: Zhang, H.-C., State Key Laboratory of Palaeobiology & Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China. E-mail: hc Zhang@nigpas.ac.cn

**12847.** Zhao, H.; Yin, Y.; Zhong, Z. (2013): Arnold circulation and multi-optimal dynamic controlling mechanisms in dragonfly wings. *Acta Mechanica Sinica* 26(3): 237-244. (in English) ["This paper aims to reveal the multi-optimal mechanisms for dynamic control in dragonfly (*Pantala flavescens*, *Crocothemis servilia*) wings. By combining the Arnold circulation ("blood circulation") with such micro/nano structures as the hollow inside constructions of the pterostigma, veins and spikes, dragonfly wings can create variable mass, variable rotating inertia and variable natural frequency. This marvelous ability enables dragonflies to overcome the contradictory re-

quirements of both light-weight-wing and heavy-weight-wing, and displays the multi-optimal mechanisms for the excellent flying ability and dynamic control capacity of dragonflies. These results provide new perspectives for understanding the wings' functions and new inspirations for bionic manufactures." (Authors)] Address: Zhong, Z., School of Aerospace Engineering and Applied Mechanics, Tongji Univ., Shanghai 200092, China. E-mail: zhongk@tongji.edu.cn

**12848.** Zyla, D.; Wegierek, P.; Owocki, K.; Niedzwiedzki, G. (2013): Insects and crustaceans from the latest Early–early Middle Triassic of Poland. *Palaeogeography, Palaeoclimatology, Palaeoecology* 371: 136-144. (in English) ["Two stratigraphical horizons in the Palegi clay-pit, a new Triassic paleontological site within Buntsandstein deposits (latest Olenekian–early Anisian in age) in the Holy Cross Mountains (Poland), have yielded arthropod faunas comprising ca. 400 fossil specimens assigned to two subphyla: Crustacea (class Branchiopoda and Maxillopoda) and Hexapoda (class Insecta). The Palegi arthropod assemblage is similar to that described from the Middle Triassic of France and Germany but is dominated by remains of conchostracans and cockroaches. This new fauna expands our knowledge of the latest Early–early Middle Triassic diversity of insects and freshwater arthropods in the Germanic Basin. The newly discovered fauna represents one of the oldest Mesozoic records of insects described from the Buntsandstein facies of Europe, and provides important information to better appreciate the process of ecosystem recovery after the Permian–Triassic extinction. Highlights: \*We describe a noteworthy Triassic arthropods assemblage from Germanic Basin. \*Arthropod fossils occur in deposits interpreted as freshwater ponds. \*This is the oldest record of insects from the Buntsandstein of Germanic Basin." (Authors) The paper includes references to Odonata.] Address: Niedzwiedzki, G. Department of Paleobiology and Evolution, Faculty of Biology, Warsaw University, S. Banacha 2 Street, 02-097 Warszawa, Poland. E-mail: grzegorz.niedzwiedzki@ebc.uu.se



Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for multiple help, and Rainer Rudolph, Geert de Knijf, Asmus Schröter and Bernd Kunz for contributing many papers to this issue.

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105; E-mail: K.Reinhardt@sheffield.ac.uk

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

---

## 1997

**12849.** Jiu, O. (1997): Gomphidae in Heilongjiang Province. *Journal of Heilongjiang Nongken Normal College* 1997(03): 70-73. (in Chinese, with English summary) [10 species of Gomphidae from the Chinese Heilongjiang Province were keyed: *Stylurus flavipes*, *Shaogomphus postocularis epophthalmus*, *Anisogomphus maacki*, *Trigomphus citimus*, *Davidius lunatus*, *Nihonogomphus rutilus*, *Ophiogomphus obscurus*, *Sieboldius albardae*, *Sinictinogomphus clavatus*, *Gomphidia confluens*.] Address: not stated

## 1998

**12850.** Korsós, Z. & Mészáros, F. (1998): Diversity of the Hungarian fauna. *Természetvédelmi Közlemények* 7: 125-133. (in Hungarian, with English summary) [Hungarian Odonata diversity was quantified with 65 species.] Address: Korsós, Z. Természetvédelmi Múzeum, Áttattár 1088 Budapest, Baross u. 13, Hungary

**12851.** Yang, Z.; Ou, Y. (1998): The damselflies in the north of China. *Journal of Hanzhong Teachers College* 16: 57-61. (in Chinese, with English summary) [The paper refers to damselflies reported north of 38° northern latitude in China (Yinchuan, Yan'an, Taiyuan, Shijiazhuang, area north of Dalian latitude) (Liaoning, Hebei, Shanxi, Shaanxi, Ningxia. provinces). 37 species are keyed.] Address: Yang, Z., The Adults Educational College of Hanzhong Teachers College, Hanzhong, Shaanxi, 723000; Heilongjiang Nongken Teachers College, Acheng, 150301, China

## 1999

**12852.** Luo, G.; He, H. (1999): A primary study on dragonflies from Xunwu, Jiangxi Province. *Journal of Guangzhou Normal University (Natural Science)* 20(9): 85-86, 94. (in Chinese, with English summary) [In 1996 and 1997, 26 Odonata species were collected in Xunwu

area of Jiangxi Province, China.] Address: Luo, G., Dept. of Biology, Guangzhou Normal Univ. 510400, China

**12853.** Miyashita, M. (1999): Studies on conservation and restoration of the habitat of the damselfly *Mortonagrion hirosei*. *Proc. Envir. Syst. Res.* 27: 293-304. (in Japanese, with English summary) [Japan; "M. hirosei, was designated as an endangered species by the Environment Agency in 1991, because its habitat is vulnerable to the effects of land reclamation and river improvement. The low-flying insect lives in reed plains and measures about three centimeters long when fully grown. Relationships between the habitat of the damselfly, salinity, topography and vegetation were studied at 9 tidal rivers from Hinuma marsh in Ibaraki Prefecture to the Nagaitaura Bay in the Tsushima Islands. The larvae of the damselfly were collected only from the pool in a sunken place covered with dead leaves on the riverside. Salinity and the time required for the completion of the habitat of the damselfly were above 0.50.PERMIL. and about 4 years, respectively. The damselfly which lived on the riverside at Suigo-ohashi bridge across the Tonegawa River died out in 1998, because of reduced salinity of its habitat. It is supposed that the salinity of the habitat was the most important environmental element required for holding communities of the damselfly." (Author)]

**12854.** Orr, R. (1999): The dragonflies and damselflies of the Cove Point LNG Site, Calvert county, Maryland. <http://www.covepoint-trust.org/reports/orr-001.pdf>: 31 pp. (in English) ["The Cove Point Liquid Natural Gas Site (Cove Point Site) consists of 900 acres of undeveloped property in Calvert County, Maryland. The property is owned by the Cove Point LNG Limited Partnership and approximately 600 acres are subject to a conservation easement that was granted to the Maryland Environmental Trust and The Nature Conservancy to oversee. The Cove Point Site borders the western shore of the Chesapeake Bay, just south of Calvert Cliffs. A wide variety of pristine and managed aquatic water habitats oc-



cur at the Site including marshes, ponds, streams, and seeps. A survey was conducted for the Odonata of the Cove Point Site during 1998 and 1999 under a Cove Point Natural Heritage Trust Research Contract. Field data were collected on June 5, July 7, July 29, August 22, September 11, September 30, October 14 and December 2 in 1998. In 1999 field data were collected on January 3, March 31, April 23, April 30, May 21, June 6, July 8, September 3, and October 7. The survey was based mostly on adult odonates, but limited cast skins and larvae were also sampled. The species, date and habitat (along with any note-worthy behaviour or life-history observations) were recorded for 10,916 individual dragonflies and damselflies over the course of the survey. 53 species of Odonata were recorded at the Cove Point Site during the 1988-1999 season. 24 species were first records for Calvert County. *Gomphus rogersi*, is ranked as S1 in Maryland. *Cordulegaster bilineata* and *Somatochlora filosa* have tentative ranks of S2, *Archilestes grandis*, *Amphiagrion saucium*, *Anax longipes*, *Gomphaeschna furcillata*, *Celithemis fasciata*, and *Libellula axilena* have tentative ranks of S3. .... 34. *Erythemis simplicicollis* -- Eastern Pondhawk: *E. simplicicollis* hunts by staying on the ground and flying up to capture prey in the air. An interesting behavioural observation was noticed between the Eastern Pondhawk and one of its prey animals the tiger beetle *Cicindela hirticollis*, on the beach at Cove Point. The dragonfly would only take the tiger beetle when it was in flight which would occasionally happen when I disturbed the beetles while walking on the beach. If the beetle managed to land before being captured, the dragonfly would land next to it, often just a couple of inches away. I got the impression (but it does need to be further observed or tested) that the tiger beetle was behaviourally programmed to run and not fly away from the dragonfly -- thus avoiding capture. When I approached the tiger beetles they appeared to more readily take to the air than they did when a dragonfly was next to them. As a side note -- I have watched the Eastern Pondhawk hunt *Cicindela dorsalis* at Flag Ponds in the early 1990s but did not see any captured (only attempts). However, the Flag Ponds rangers informed me that they had seen them being taken. One thing that is for sure, is that at the beach at Cove Point, during the heat of the day, *E. simplicicollis* are an active predator of tiger beetles." (Author) For the complete study see: <http://www.cove-point-trust.org/studies.html>] Address: Orr, R., Columbia, Maryland 21044, USA

## 2000

**12855.** Liu, Z.-y.; Ling, Z.-q.; Liu, A.-y.; Yu, Z.-n. (2000): The SEM observation and analysis of pleomorphism of *Paecilomyces odonatae*. *Mycosystema* 19(1): 56-59. (in Chinese, with English summary) ["The SEM photographs showed clearly that *Paecilomyces odonatae* Liu, Liang & Liu possessed two sorts of conidiogenous structures, which were the *Paecilomyces*-type with ellipsoidal co-

nidia in chain and *Acremonium*-type producing cylindrical conidia in a slime head. The single spore strains obtained by single spore isolation were used in morphological observation and RAPD analysis. The results showed the cultural and morphological characteristics and the bands of DNA RAPD of the ellipsoidal single conidial strains were no much differences from those of cylindrical single conidial strains." (Authors).] Address: Liu, Z.-y., Lab. of Entomogenous Fungi, College of Biotechnology, Guizhou Univ., Guiyang, 550025, China

## 2001

**12856.** Ficsór, M.; Szabó, A. (2001): Contribution to the aquatic macroinvertebrate fauna of Szinva and its tributaries, NE Hungary. *Acta biol. debrecina Oecol. Hung.* 26: 75-88. (in English, with Hungarian summary) [Includes records of *Calopteryx splendens*, *Platycnemis pennipes*, *Coenagrion puella*, *Ischnura pumilio*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Orthetrum brunneum*, *O. cancelatum*, and *O. coerulescens*.] Address: Ficsór, M., North Hungarian Regional Environmental, Nature Conservation and Water Management Inspectorate, Laboratory, 4. Mindszent tér, H-3530, Miskolc, Hungary. E-mail: [ficsor.mark@emikofe.kvvm.hu](mailto:ficsor.mark@emikofe.kvvm.hu)

## 2003

**12857.** Roy, A.H.; Rosemond, A.D.; Leigh, D.S.; Paul, M.J.; Wallace, J.B. (2003): Habitat-specific responses of stream insects to land cover disturbance: biological consequences and monitoring implications. *J. N. Am. Benthol. Soc.* 22(2): 292-307. (in English) ["Changes in catchment land cover can impact stream ecosystems through altered hydrology and subsequent increases in sedimentation and nonpoint-source pollutants. These stressors can affect habitat suitability and water quality for aquatic invertebrates. We studied the impact of a range of physical and chemical stressors on aquatic insects, and tested whether the effects of these stressors differed in 3 habitat types: riffles, pools, and banks. Our study was conducted in Piedmont streams in Georgia (USA) where catchment development pressure and the potential for aquatic biodiversity loss are high. We sampled 3 replicates of riffle, pool, and bank habitats within a 100-m reach of 29 streams (11-126 km<sup>2</sup>) that varied in catchment land cover. Correlations between environmental variables and aquatic insects (both richness and density) within habitat types indicated that riffle habitats (vs pool and bank habitats) exhibited the strongest relations with environmental variables. Riffle assemblages were negatively affected by both physical (e.g., bed mobility) and chemical (e.g., specific conductance, nutrient concentrations) variables. The density of aquatic insects in pools was also correlated to physical and chemical variables, but there were few relationships with pool or bank richness or bank density. Because of greater relative impacts of disturbance in riffles versus

banks, we found greater differences between riffle and bank richness in streams with greater sediment disturbance. The proportion of bank richness (bank richness / bank + riffle richness) increased with finer bed sediment ( $r^2 = 0.43$ ) and increased bed mobility ( $r^2 = 0.35$ ). We compared richness of facultative taxa (found in multiple habitats) between sites we characterized as minimally impacted and sediment-impacted. In riffles, richness of facultative taxa was lower in sediment-impacted vs minimally impacted sites (11.0 vs 20.2,  $p = 0.002$ , t-test), but was similar for both disturbance groups in banks (20.1 vs 22.7,  $p > 0.05$ , t-test). Our results suggest that taxa richness may be retained in bank habitats when riffle quality is poor and banks may serve as a refuge in highly disturbed systems. Such shifts in the distribution of benthos may be an early warning indicator of biotic impairment and have implications for biomonitoring and maintenance of habitat." (Authors) Taxa included Odonata and were treated at genus level.] Address: Roy, A.H., Institute of Ecology, The University of Georgia, Athens, Georgia 30602 USA. E-mail: aroy@uga.edu

**12858.** Zhu, C.-j.; Muraoka, J.; Mizuno, H. (2003): CG simulation of dragonflies based on aerodynamics. Information Processing Society of Japan SIG Notes 2003(15): 31-36. (in Japanese, with English summary) ["A dragonfly is a kind of familiar insect by which the sense of season can be shown. The expression of a dragonfly by CG can be expected as an element which will improve the sense of season in landscape simulation, virtual reality, etc. In this paper, the flight model of a dragonfly, based on aerodynamics, is proposed. In this model, a dragonfly can be made to fly in real time considering the force caused by the flapping of the wings. Steep rise, sudden stop, hover and rapid turn, which are the flight characteristics of a dragonfly, can be performed. Furthermore, depending on the control-points placed in the space, the flight route of a dragonfly can be established easily." (Authors)] Address: Zhu, C.-j., Tohoku Institute of Technology, Japan

## 2004

**12859.** Bunnell, F.L.; Campbell, R.W.; Squires, K.A. (2004): Allocating scarce resources for conservation in a species-rich environment: Guidelines from history and science. In: T.D. Hooper, editor. Proceedings of the Species at Risk 2004 Pathways to Recovery Conference. March 2-6, 2004, Victoria, B.C. Species at Risk 2004 Pathways to Recovery Conference Organizing Committee, Victoria, B.C.: 1-20. (in English) ["British Columbia is one of the most species-rich areas in north temperate regions. Its size, location, and topography encourage small incursions of species that are more abundant elsewhere. Given this richness, the province faces formidable challenges in the allocation of limited resources to conservation. The importance of making wise decisions is revealed by recent reviews of North American recovery expenditures that suggest that about 50% of

efforts have failed. Fortunately, lessons from history and science can help formulate guidelines. Part of history's lesson is that we begin too late, and that more resources should be allocated to preemptive measures. We consider criteria to prioritize species and four classes of action appropriate to conditions in British Columbia that can be used to guide the allocation of resources in a cost-effective fashion. For example, about 93% of global bird extinctions since the 1600s have been island endemics. British Columbia hosts at least 90 endemic taxa, of which about 66% are island dwelling. Because centres of endemism are concentrated, preemptive monitoring plans based on a frequency that reflects natural history characteristics and known threats are possible. From a review of natural history characteristics, we have collated lists of species that are appropriate to specific conservation actions (summarized here) and provide a checklist that should precede development of a recovery plan for any specific taxon." (Authors) The paper included several references to Odonata.] Address: Bunnell, F.L., Forest Sciences Dept, University of British Columbia, 270 - 2357 Main Mall, Vancouver, BC, V6T 1Z4, Canada. E-mail fbunnell@interchange.ubc.ca

**12860.** Jiang, Y. (2004): *Sympetrum infuscatum* as a medicinal dragonfly species in Heilongjiang. Quarterly of Forest By-product and Speciality in China 4(GSNO. 71): 29-30. (in Chinese, with English summary) [China; *S. infuscatum* was analysed for nutrient contents (protein and fat content resulted in 56.22% and 22.93% resp.) and medical/pharmacological purposes in traditional Chinese medicine.] Address: Jiang, Yuxia, Dept of Biology, Mudangjiang Teachers College, Mudangjiang 157012, China

**12861.** Morrison, F.; McLain, D.; Sanders, L. (2004): Dragonfly abundance and emergence behavior before and after bank stabilization on the Connecticut River in Gill, Massachusetts. <http://www.odes.millersriver.net/Speakers/fredmorrison.htm>: (in English) [Verbatim: While stabilization has become an important tool for reducing excessive riverbank erosion, the impacts on emerging dragonflies are unknown. To investigate the effects of bank stabilization, we surveyed a 1200-ft. stretch of eroding bank on the Connecticut River in Gill, Massachusetts for emerging dragonfly species before (2001) and after (2002-2003) bank stabilization. The site was stabilized in fall 2001 by grading the slope, planting with native vegetation, and adding a rock footing at the average water line. We collected exuviae from the entire site at least weekly from early June to late July each year. We also observed the behaviour of nymphs in the process of emerging from the river. In 2003, we added 4 reference sites for comparison between stabilized and natural habitat. Several of the 15 species showed marked increases in abundance following stabilization. The most dramatic change was with *Gomphus vastus*, which increased from 357 in 2001 to 12,270 in 2003. *Gomphus abbreviatus*, *Stylurus spiniceps*, *S. amnicola*

and *Dromogomphus spinosus* were more abundant after stabilization, but declined in the third year of the study. *Neurocordulia yamaskanensis* and *Macromia illinoisensis* declined in the second year and were most abundant in the third year. *Gomphus ventricosus* was only common in the third year, while *G. fraternus* was absent following stabilization. The changes in abundance between years could not be differentiated between cause-and-effect and natural fluctuations. However, notable changes occurred in the behaviour of emerging nymphs. After stabilization, *G. abbreviatus*, *S. spiniceps*, *S. amnicola*, and *D. spinosus* eclosed close to the water line when the river level was low on the riprap. This behaviour made them susceptible to being splashed by boat waves and submerged by rapidly rising water level. These species were much more abundant at the natural reference sites than at the stabilized sites. Nymphs of *S. spiniceps* crawled a significantly ( $\alpha = 0.05$ ) shorter distance on the riprap (0.9 ft.) than on natural banks (11.2 ft.). Mortality of *G. abbreviatus* from boat waves and rising water was as high as 33% in 2002. While the impact of riprap on dragonfly populations is unknown, the observed mortality indicates that standard-sized riprap does not provide a favourable substrate for dragonfly emergence. Alternative stabilization methods should be explored that incorporate dragonfly conservation.] Address: Morrison, F., A Natural Focus, Montague Rd, Westhampton, MA 01027, USA. E-mail: [anaturalfocus@crocker.com](mailto:anaturalfocus@crocker.com)

**12862.** Xu, Q. (2004): A preliminary report of the investigation of dragonflies from Huboliao National Nature Reserve of Fujian. *Natural Enemies of Insects* 26(2): 81-85. (in Chinese, with English summary) [64 Odonata species were reported from Huboliao National Nature Reserve of Fujian, China including 10 species newly recorded in Fujian viz *Mnais andersoni*, *Rhinocypha perforata*, *Anisopleura furcata*, *Euphaea ornata*, *Pseudagrion rubriceps*, *P. spencei*, *Drepanosticta hongkongensis*, *Polycanthagyna erythromelas*, *Orthetrum triangulare*, and *Trithemis festiva*.] Address: Xu, Q., Zhangzhou Education College, Zhangzhou, Fujian 363000, China

**12863.** Yang, B.-s.; Ren, B.-z. (2004): Two new records of *Cordyceps* from northeastern China. *Journal of Jilin Agricultural University* 26(2): 148-150. (in Chinese, with English summary) ["*Cordyceps tricentri* Yasuda and *Cordyceps odonatae* Kobayasi were reported. The stroma of *Cordyceps tricentri* Yasuda, light yellow in colour, singly grew at the chest of host; its fertile part was clubbed or ellipsoidal; its pyrenocarp was under the skin of stroma, pitcher-shaped and its ostiole protruded a little; its ascospore was linear, and broke into secondary spores when mature. In China, they had only been reported in Zhejiang province, Hebei province, Yunnan province, Guangdong province, Guizhou province and Anhui province before. The stroma of *Cordyceps odonatae* Kobayasi, light yellow in colour, singly grew at the chest of host; its stalk curved; its fertile part

was long-ellipsoidal and with longitudinal grooves; its pyrenocarp was under the skin of stroma, pitcher-shaped and its ostiole was verrucous and protruded a little; its ascospore was linear, and broke into secondary columnar ascospore when mature. In China, it had only been reported in Guizhou province before." (Authors)] Address: Yang, B.-s., Institute of Mycology, Jilin Agricultural University, Changchun 130118, China

## 2005

**12864.** DuBois, R.B.; Smith, W.; Pleski, J.M.; Reese, M. (2005): Wisconsin Odonata Highlights in 2004. *Argia* 17(2): 4-6. (in English) [This report is a summary of research highlights pertaining to Odonata for Wisconsin in 2004. Records of *Aeshna sitchensis*, *Enallagma clausum*, *Somatochlora incurvata*, *Williamsonia fletcheri*, *W. lintneri*, *Coenagrion interrogatum*, and *Enallagma aspersum* were treated in detail.] Address: DuBois, R., Wisconsin Dept of Natural Resources, 1401 Tower Ave., Superior, WI 54880, USA. E-mail: [robert.dubois@Wisconsin.gov](mailto:robert.dubois@Wisconsin.gov)

**12865.** Fenoglio, S.; Bo, T.; Agosta, P.; Cucco, M. (2005): Mass loss and macroinvertebrate colonisation of fish carcasses in riffles and pools of a NW Italian stream. *Hydrobiologia* 532: 111-122. (in English) ["In this study, we analysed the decomposition of trout carcasses in a low-order Apennine stream, with the aim to investigate the mass loss rate in a Mediterranean lotic system, and to examine the influence of microhabitats on the invertebrates colonising fish carcasses. In May 2003, we put 56 dead rainbow trout (*Oncorhynchus mykiss*) in the stream, placing seven sets (four trout each) in both riffle and pool habitats. At four dates, we removed one trout per set to measure its dry mass and determine the associated macroinvertebrate assemblage. Fifty-eight macroinvertebrate taxa colonised the carcasses, with significant differences between the erosive and depositional microhabitats. Riffle trouts hosted richer and denser colonist communities than pool trouts. Chironomidae, *Serratella ignita*, *Habrophlebia* sp., *Dugesia* sp. and *Protonemura* sp. were the five most abundant taxa. Decomposition was initially very rapid in both environments and then tapered off over time. The mass loss rate was higher ( $k = 0.057 \text{ day}^{-1}$ ) than that found in other studies. Higher Mediterranean temperatures probably increase the process. Although we found no significant difference between riffles and pools, mass loss was more regular in erosive habitats, underlining the importance of local, small-scale conditions. In small, low-order, heterotrophic streams, fish carcasses represent an important resource and shelter for rich and diversified invertebrate assemblages." (Authors) *Calopteryx virgo*, *Onychogomphus* sp., *Boyeria irene*, and *Chalcolestes viridis* were found to have settled on the carcasses.] Address: Fenoglio, S., University of Eastern Piedmont, Di.S.A.V., Via Cavour 84, I-15100 Alessandria, Italy. E-mail: [fenoglio@unipmn.it](mailto:fenoglio@unipmn.it)



**12866.** Heckscher, C.M.; White, H.B. (2005): First Atlantic coastal plain occurrence of *Gomphus fraternus* Say (Odonata: Gomphidae). *Entomological News* 116(4): 271-272. (in English) [*G. fraternus*, 15-V-2002 and 13-V-2004, wooded north shore of Broad Creek, Sussex County, Delaware, USA at approximately 38°34'N, 75°38'W.] Address: Heckscher, C.M., Delaware Natural Heritage Program, Delaware Division of Fish and Wildlife, 4876 Hay Point Landing Road, Smyrna, Delaware 19977 USA. E-mail: christopher.Heckscher@state.de.us.

**12867.** Subramanian, K.A.; Sivaramakrishnan, K.G.; Gadgil, M. (2005): Impact of riparian land use on stream insects of Kudremukh National Park, Karnataka state, India. *Journal of Insect Science* 5:49: 10pp. (in English) ["The impact of riparian land use on the stream insect communities was studied at Kudremukh National Park located within Western Ghats, a tropical biodiversity hotspot in India. The diversity and community composition of stream insects varied across streams with different riparian land use types. The rarefied family and generic richness was highest in streams with natural semi evergreen forests as riparian vegetation. However, when the streams had human habitations and areca nut plantations as riparian land use type, the rarefied richness was higher than that of streams with natural evergreen forests and grasslands. The streams with scrub lands and iron ore mining as the riparian land use had the lowest rarefied richness. Within a landscape, the streams with the natural riparian vegetation had similar community composition. However, streams with natural grasslands as the riparian vegetation, had low diversity and the community composition was similar to those of paddy fields. We discuss how stream insect assemblages differ due to varied riparian land use patterns, reflecting fundamental alterations in the functioning of stream ecosystems. This understanding is vital to conserve, manage and restore tropical riverine ecosystems." (Authors) (Odonata) taxa were treated at the genus level.] Address: Subramanian, K.A., Centre for Ecological Sciences, Indian Institute of Science, Bangalore-560012, India. E-mail: subbu@ces.iisc.ernet.in

## 2006

**12868.** Holdt, E. von (2006): Die Libellen im Raum Hannover. Jubiläumsheft "125 Jahre HVV" (Hannoverscher Vogelschutzverein): 62-69. (in German) [The author introduced into the Odonata fauna of the town of Hannover, Niedersachsen, Germany and the region in the periphery of the settlement. Focus was set on rare species and species with recent range extensions or invasive behaviour.] Address: von Holdt, E., Offensteinstr. 13, 30451 Hannover, Germany. E-mail: ecvohe@t-online.de

**12869.** Karlsson, M. (2006): Relationship between mate-guarding strategies and the number of ovarioles in Libellulidae (Odonata). Master's thesis in Applied Ecol-

ogy at Halmstad University: 11 pp. ["In Libellulidae there are two types of egg-laying behaviour, non-contact guarding where the male accompany the female during oviposition and tandem guarding where the male is physically coupled with the female. These egg laying strategies also shows differences in egg size distribution and egg size. In species which perform non-contact guarding the egg size is inversely proportionate to the order of laying. In tandem species on the other hand, the egg size is more randomly distributed and the eggs are slightly larger than in non-contact species. To see if there is a difference in the female internal reproductive organs between the two guarding types, the ovariole number was counted. The result shows that in species which perform tandem guarding during oviposition have a fewer number of ovarioles compared to the non-contact species. This difference in ovariole number was also species specific. The impact on ecosystems is increasing and the survival of dragonflies or any other insects can no longer be taken for granted. Therefore this information can be valuable in conservation biology when new habitats are created for preservation of species." (Author) The following species were studied: (a) Non-contact guarders: *Trithemis kirbyi*, *Crocothemis erythraea*, *Leucorrhinia dubia*, *Libellula depressa* (b) Tandem guarders: *Sympetrum fonscolombii*, *Pantala flavescens*, *Philonomon luminans*, *Tramea basilare*, *Urothemis edwardsii*, *Diplacodes lefebvrii*, *S. vulgatum*, *S. danae*, *S. frequens*, *S. infuscatum*.] Address: not stated.

## 2007

**12870.** Campbell, W.B.; Novelo-Gutiérrez, R. (2007): Reduction in odonate phylogenetic diversity associated with dam impoundment is revealed using taxonomic distinctness. *Arch. Hydrobiol.* 168(1): 83-92. (in English) ["Taxonomic distinctness is a highly useful index combining species richness and taxonomic (phylogenetic) diversity to detect changes in the taxonomic structure of communities and assemblages. While analysis of an odonate assemblage before and after construction of a hydroelectric impoundment in the state of Hidalgo, Mexico, revealed no significant increase in average monthly species richness (although annual counts were slightly higher for the latter survey), taxonomic distinctness and its variation were reduced. The impoundment converted natural lotic conditions into lentic habitat with more littoral vegetation. Such conditions favoured plant-dependent species (mostly in the Zygoptera) with more species per genus and genera per family relative to those not dependent (mostly in the Anisoptera). High ratios reduce the average risk of losing higher taxonomic structure with loss of a species. Reduced taxonomic distinctness and its variation occurred at the expense of the Gomphidae and Corduliidae, and several genera in the Libellulidae having non-plant dependent species that favour inorganic substrate in flowing waters. The results contrast with the common assumption that higher odonate diversity occurs in lentic habitats. Seasonal pat-

terns of taxonomic distinctness appeared similar between surveys and may reflect reproductive and emergence cycles. The results support the use of taxonomic distinctness and its variation over species richness in ecological assessments and its application in further freshwater research. We encourage its use with aquatic insects, but recommend frequent sampling intervals to account for effects from emergence and reproductive behaviours. These results suggest new and added breadth to the value of taxonomic distinctness in ecological research regarding habitat change." (Authors)] Address: Novelo-Gutiérrez, R., Depto de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**12871.** Dombrovsky, K.O. (2007): Biotopic allocation and dynamics of the number of damselfly larvae (Insecta, Odonata) of the Kakhovskoye water reservoir. Questions of aquatic entomology of Russia and adjacent lands: Materials of the Third All-Russia Symposium on Amphibiotic and Aquatic Insects. Voronezh State University. ISBN 978-5-9273-1169-9: 96-100. (in Russian, with English summary) [Between 1990 and 2000, in the floodplain waterbodies of the Kakhovskoye water reservoir, Ukraine the following Odonata species had been recorded: *Platycnemis pennipes*, *Erythromma najas*, *Enallagma cyathigerum*, *Coenagrion puella*, *C. hastulatum*, *Calopteryx splendens*, *Sympetrum sanguineum*, *Sympetma paedisca*, *Aeshna affinis*, *Anax imperator*, *Libellula depressa*, *Libellula quadrimaculata*, *Leucorrhinia pectoralis*, *Orthetrum cancellatum*, *Gomphus vulgatissimus*, *Somatochlora* sp., and *Ischnura elegans*] Address: Dombrovsky, K.O., Zaporizhzhya National University, Zaporizhzhya, Ukraine

**12872.** Praveen, J.; Chitra, S. (2007): Odonata watching in south Kerala. *Malabar Trogon* 5(2): 2-5. (in English) [The authors present data on Odonata species observed in three localities in South Kerala, India. A total of 11 hours were spent in the field for over five days in two trips (one during 21-23rd July 2007 and another during 24-25 August 2007). 30 Odonata species were checklisted and annotated.] Address: Praveen, J., B303, Shriram Spurthi, ITPL Main Road, Brookefields, Bangalore, India. E-mail: paintedstork@gmail.com

**12873.** Raju, D.V. (2007): Odonates of the Kuttanad wetland ecosystem. *Malabar Trogon* 5(1): 12-13. (in English) ["Kuttanad is primarily a deltaic formation of five-river systems, namely, Meenachil, Pamba, Manimala, Muvattupuzha and Achencovil, located in fertile lowlying areas of around Vembanad Lake. It spreads over Alappuzha, Kottayam and Pathanamthitta districts of Kerala, South West India and forms an integral part of the Vembanad-Kol Ramsar site." (Author) 45 Odonata species were listed.] Address: Raju, D.V., Valiyaparambil, Kuzhimattom.P.O, Kottayam, Kerala, India. E-mail: davidraju2007@gmail.com

**12874.** Vascotto, S.; Friesen-Pankratz, B. (2007): Phase I Ecological assessment of the Bear Rock and The Smokes. Report prepared for Tulita Dene Band by Rescan Environmental Services Ltd: 99 pp. (in English) [Northwest Territories, Canada; the study area is entirely within the Taiga Plains Ecozone. The majority of this ecozone is located in the southwesterly corner of the Northwest Territories, northeastern British Columbia, and northern Alberta. The ecozone is dominated by the Mackenzie River and its tributaries and is bordered to the west by cordilleran mountain ranges, to the east by Great Slave and Great Bear Lakes, and to the north by the Mackenzie Delta. 41 species of odonates were listed. Odonata species occurring in the Taiga Plains Ecozone with Territorial, Federal, or Global Status are: *Somatochlora sahlbergi*, *S. franklini*, *Stylurus notatus*, *Coenagrion resolutum*, *C. angulatum*, *C. interrogatum*, *Enallagma cyathigerum*, *Cordulia shurtleffi*, *Lestes congener*, *L. disjunctus*, *L. dryas*, *Aeshna eremita*, *A. interrupta*, *A. juncea*, *A. septentrionalis*, *A. sitchensis*, *A. subarctica*, *Ophiogomphus colubrinus*] Address: not stated

**12875.** Yu, W.-y.; Li, Z.-h.; Huang, C. (2007): Faunal study on Odonata in Haihui, Jiangxi province. *Sichuan Journal of Zoology* 26(1): 103-107. (in Chinese, with English summary) [31 of the 52 species recorded in 2004 and 2005 were new records for the Jiangxi Province, China.] Address: Yu, W.-y., Dept of Life Science, Nanjing Xiaozhuang University, Nanjing 210017, China. E-mail: zjyem@sina.com.cn

## 2008

**12876.** Ansori, I. (2008): Keanekaragaman nimfa Odonata (Dragonflies) di Beberapa Persawahan Sekitar Bandung Jawa Barat. *Jurnal Exacta* 6(2): 42-50. (in Indonesian, with English summary) [West Java, Indonesia; research on Odonata diversity was conducted in Antapani, Cigadung, Dago Pakar and Dago Pojok paddy fields located in Bandung. *Orthetrum sabina*, *Crocothemis servilia*, and *Anaciaeschna jaspidea* were recorded; *C. servilia* and *O. sabina* were dominant.] Address: Ansori, I., Program Studi Pendidikan Biologi Jurusan PMIPA FKIP UNIB

**12877.** Finch, O.-D. (2008): Die Tierwelt der Hunte im Spiegel des Aquariums. In: FANSA, M.: Beiträge zum Schauaquarium - Die Hunte: Ein Fluss durch norddeutsche Landschaften (= Schriftenreihe des Landesmuseums für Natur u. Mensch Oldenburg 58): 40-58. (in German) [Niedersachsen, Germany; the author briefly introduced into the rheophilous Odonata fauna of the river Hunte and its tributaries. Ditches in the region were inhabited by *Coenagrion mercuriale* and *C. ornatum*, and eutrophic permanent water bodies by *Aeshna viridis*.] Address: Finch, O.-D., Carl-von-Ossietzky Universität Oldenburg, Inst. Biol., AG Terrestrische Ökologie, PF 2503, 26111 Oldenburg, Germany. E-mail: oliver.d.finch@uni-oldenburg.de

**12878.** Grand, D.; Grossi, J.-L. (2008): Le marais de Chavas dans le nord de l'Isère et son peuplement odonatologique: inventaire, gestion et menaces. Particularités de la saison 2007. *Martinia* 24(2): 47-63. (in French, with English summary) [France; "Calopteryx haemorrhoidalis, already recorded in south Isère, has recently colonized the Charvas brook, whereas Leucorrhinia pectoralis extends its distribution area to the west of the region. The Charvas marsh has been strongly disturbed in the 30 last years, and the actual marsh represents only 21 % of its initial surface. In spite of this, it has conserved a high fauna and flora diversity. Its odonatofauna is composed of 47 species. But the future of this marsh seems threatened because of the anthropogenic extension and the climate change." (Authors)] Address: Grossi, J.-L., AVE-NIR, 10 rue Raspail, 38000-Grenoble, France

**12879.** Grütter-Schneider, E. (2008): Libellen im Oberaargau. Ein Beitrag zur Kenntnis der regionalen Fauna. *Jahrbuch des Oberaargaus* 51: 109-148. (in German) [The Oberaargau region is situated in the northeastern part of the Kanton Bern, Switzerland. In the past 30 years, the authors recorded 43 autochthonous Odonata species. These were presented in photographs and with information on morphology and habitat. Some records were documented with greater detail.] Address: not stated

**12880.** Heidecke, F. (2008): Die Goitzsche-Wildnis und ihre Libellenfauna (Odonata). *Naturschutz im Land Sachsen-Anhalt* 45: 26-35. (in German) [In 2004 and 2005, the Odonata fauna of the Goitzsche-brown coal mining area, Sachsen-Anhalt and Sachsen, Germany was studied for their Odonata fauna. A total of 38 was recorded. The species were assessed according to their habitat preferences and ability to colonize early successions states of vegetation development.] Address: Heidecke, F., Sieverstorstr. 57, 39106 Magdeburg, Germany. E-mail: libellenforscher@web.de

**12881.** Kolshorn, P. (2008): Kleinvieh & Co. *Naturspiegel* 70: 26. (in German) [17-XI-2008, Sympecma fusca, NSG Hülser Bruch, Krefeld, Nordrhein-Westfalen, Germany] Address: c/o Redaktion Naturspiegel, Hustenfeld 32, D-41379 Brüggen

**12882.** Luque, P.; Serra, A. (2008): *Macromia splendens* i *Gomphus graslinii*, dues noves espècies d'odonats per a Catalunya. *Butlletí Institució Catalana d'Història Natural* 74(2006): 113-116. (in Catalan) [River Igars, near Arnes, 31TBF6826, 555 m. a.s.l. 15-VI-2007, 23-VI-2007 and 07-VII-2007.] Address: Serra, A., Dept de Biologia Animal, Facultat de Biologia, Univ. de Barcelona, Avda. Diagonal, 645, Spain. E-mail: aserra@ub.edu

**12883.** Wildlife Conservation Society - Galle (2008): The study of the faunal diversity in Galle district, southern Sri Lanka. Final Report. Wildlife Conservation Society - Galle, Hiyare, Galle, Sri Lanka: iii + 44 pp. (in English) ["Out of 120 species of dragonflies recorded in Sri

Lanka, 62 species belonging to 12 families were recorded during this survey. This represents about 52% of the island's dragonfly fauna. Out of 62 species recorded from Galle district, 54 of them found in Kottawa-Kombala (Hiyare) forest Reserve. There were eighteen endemic and two nationally threatened species among them (IUCN Sri Lanka, 2007). *Elatoneura caesia* and *Macrogomphus lankensis* are the only nationally threatened species found in this survey. Un-described damselfly species belongs to genus *Drepanosticta* was recorded at Kanneliya & Hiyare in this survey and further analysis are ongoing to conform this finding." (Authors) Odonata species collected at 11 localities are presented on pages 15-16] Address: Wildlife Conservation Society - Galle, Biodiversity Education and Research Centre, Hiyare Reservoir, Hiyare, Galle, Sri Lanka. E-mail: info@wildlife.lk

## 2009

**12884.** Dziock, F.; Wacowska, K.; Siegl, S.; Briesenick, T.; Ernst, R. (2009): Erfassung und Bewertung der Vorkommen der Asiatischen Keiljungfer und Grünen Flussjungfer an der Elbe bei Roßlau. *Naturschutz im Land Sachsen-Anhalt* 46 (Sonderheft): 169-175. (in German) [Exuviae of *Stylurus flavipes* and *Ophiogomphus cecilia* were quantitatively sampled in groynes along a stretch of river Elbe, Sachsen-Anhalt, Germany. The conservation status of the local populations was assessed and causes of threats (gravelling of the sandy habitats between goynes) were briefly discussed.] Address: not stated

**12885.** Landmann, A. (2009): Die Höhenverbreitung als Indikator der Gefährdung von Insekten im Alpenraum. *Contributions to Natural History* 12: 829-856. (in German, with English summary) ["Altitudinal distribution as an indicator of threat in insects: an analysis of red data books from the Alps and adjoining regions. — The Alps represent one of the most important biodiversity hot spots in Europe but at the same time are the most developed mountain system in the world. However, human impact is very uneven within alpine landscapes. Topographical conditions restrict the space available for agriculture, settlements, traffic systems and industrial development. Human activities therefore have a focus at valley bottoms and other suitable lowland areas. While large nearly pristine areas still can be found at higher elevations, high local population densities together with intensive tourism have led to an over-exploitation and strong fragmentation of natural habitats at lower altitudes. Specialised lowland species can thus be expected to be under disproportionately strong pressure and should show an unfavourable conservation status. By contrast, species (groups) with broader altitudinal distribution or with preferences for higher elevations should experience less threat and this pattern should be expressed in the red data books as well (percentage of endangered species, distribution over threat-



categories). This hypothesis was tested using data concerning altitudinal distribution and national as well as regional red data books from different areas within the Alps (Switzerland, Austria, Tyrol, Carinthia) and at its northern border (Lower Austria, Bavaria). Dragonflies and grasshoppers were used for analysis because good and recent data are available for both groups and most regions. Species were first grouped into two (Odonata) to three (Saltatoria) main classes regarding their regional altitudinal distribution patterns: "valley (lowland) species", "midmountain species", and "mountain species", and their threat status was compared (separately per region) thereafter. For Tyrol and Switzerland more detailed data about vertical distribution (e.g. the absolute stretch of vertical distribution; the number of altitudinal zones used) exist and were directly correlated with threat status (red data categories). Overall the percentage of species regarded as "safe" (LC = least concern species) in recent red data books was significantly higher in species (species groups) belonging to the "midmountain" and especially the "mountain" groups than in species of the "valley group". The groups (esp. "valley" vs. "mountain") also strongly differed in the overall patterns (dimensions) of threat, valley species exhibiting a much higher proportion of species within the highest categories (CR = critically endangered, EN = endangered). Differences between "valley" and "mountain" species were higher in central parts of the Alps but comparatively low at the northern edge of the Alps, in Lower Austria and Bavaria. This fits to differences in overall landscape settings because both latter regions offer more area and more suitable habitats for sensitive lowland species. Moreover, for dragonflies as well as for grasshoppers, there was a clear trend of decreasing threat with increasing number of altitudinal zones inhabited in the Tyrol and Switzerland. Altitudinal distribution patterns might therefore be a useful indirect indicator of conservation problems (threat status) for animal groups in the Alps and adjoining regions, especially when more direct measures (e.g. data about population trends) are not available. However, further analysis for more and different animal groups are needed and called for to test this hypothesis." (Author)] Address: Landmann, A., Institut für Zoologie der Universität Innsbruck, Technikerstr. 25 & Institut für Naturkunde & Ökologie Karl Kapfererstr. 3, 6020 Innsbruck, Austria. E-mail: Armin.Landmann@uibk.ac.at

**12886.** Maynou i Sene, X. (2009): A contribution to the study of the Odonata of the Sant Llorenç del Muut Massif and Obac Range. Bull. Inst. Cat. Hist. Nat. 75(2007-2009): 85-98. (in Catalan, with English and Spanish summaries) ["An updated list of 28 species of Odonata recorded in the Sant Llorenç del Munt Massif and Obac Range (Catalonia) in 2007 and 2008 is provided, with an estimation of the degree of presence of each species. The list of species is compared to existing records, old and recent. The species-diversity observed in this study is similar to that in other Catalan nature reserves,

although most of the species found here can be considered ecological generalists. In this survey, data regarding reproduction and phenology are also provided for every species, the most important dragonfly sites are identified and actions for the conservation and improvement of the Odonata community richness are suggested." (Authors) Species of regional interest were *Sympetrum sinaiticum*, *Coenagrion caerulescens*, *C. mercuriale*, *Trithemis annulata*.] Address: Maynou i Sené, X., C. del Dr. Salva, 23. 08224 Terrassa, Spain. E-mail: xavier.maynou@gmail.com

**12887.** Wildlife Conservation Society - Galle (2009): The study of the faunal diversity in Matara district – southern, Sri Lanka. Final report. Wildlife Conservation society – Galle, Hiyare, Galle, Sri Lanka: III + 43 pp. (in English) ["Out of 120 species of dragonflies recorded in Sri Lanka, 51 species belonging to 10 families were recorded during this survey. This represents about 42% of the island's dragonfly fauna. There were seventeen (17) endemic and two (2) nationally threatened species among them (IUCN Sri Lanka, 2007). *Elatoneura caesia* and *Macrogomphus lankensis* are the only nationally threatened species found in this survey. The first record of Damselfly *Elatoneura tenax* from the Dediyaigala rain forest reserve that is the lowest elevation of this species recorded in Sri Lanka." (Authors) Checklist of Odonata species recorded during the survey at 14 localities is presented as appendix on pages 14-15.] Address: Wildlife Conservation Society - Galle, Biodiversity Education and Research Centre, Hiyare Reservoir, Hiyare, Galle, Sri Lanka. E-mail: info@wildlife.lk

## 2010

**12888.** Aguzzi, S. (2010): Studio sulla comunità di Odonati del Lago Boscaccio. Natura Boscaccio: i Quaderni - n. 1: 77 pp. (in Italian) [20 Odonata species were recorded at lake Boscaccio (Milano province, Italy). *Stylurus flavipes* was for the first time reported from the province and *Gomphus vulgatissimus* represents the first provincial record since the 1960s. Additional species of regional interest were *Orthetrum albistylum*, *Sympetrum pedemontanum*, *S. depressiusculum*, and *S. meridionale*.] Address: Aguzzi, S. c/o Dipto Biol. Anim., Univ. Pavia, Pavia, Italy

**12889.** Archer, M.W. (2010): Retention, movement, and the biotic response to large woody debris in the channelized Missouri River. M.Sc. Thesis, Graduate College at the University of Nebraska, Lincoln, Nebraska: X + 116 pp. (in English) ["Large woody debris (LWD) is an important component of a healthy aquatic ecosystem. However, little is known about the dynamics of LWD in a large, channelized river such as the Missouri River. My objectives were to first, assess the abundance of LWD found along the channelized portion of the Missouri River. Second, I documented movement of LWD that entered the river. Lastly, using PRIMER software I ana-

lyzed what effect, if any, river segments, bend types, and LWD had on the community composition of the macroinvertebrate and fish that inhabit the river. Abundance of LWD was greater along bends that have flow diverted away from the bank compared to bends that had recent modifications to divert flow to the shore (major modification bends) and areas with little bank armouring, such as, side channel chutes ( $P < 0.05$ ). Recruitment of LWD into the river that could become available as aquatic habitat occurred mostly within 5 m of the bankfull width (BFW). Telemetry analysis of LWD showed that LWD located within the BFW of the river was often (63% of LWD) displaced downstream. Minimum distance of displaced LWD was 0.02 rkm, median distance was 146.50 rkm, and maximum distance was 1454.69 rkm. No differences were found in the community composition of macroinvertebrates between segments ( $P = 0.43$ ) or between bend types (0.074). Community composition did differ between LWD and non-LWD sites ( $P = 0.016$ ). Fish communities differed between the segments ( $P = 0.043$ ) therefore further analyses were split between the segments. Segment 8 fish communities did not differ between bend types ( $P = 0.35$ ) or between LWD and non-LWD sites ( $P = 0.55$ ). Results were similar in Segment 9 (bend types ( $P = 0.20$ ), LWD and non-LWD sites ( $P = 0.19$ )). Combining the macroinvertebrate communities and fish communities to test for differences in the combined biota community composition showed that differences did not exist between the segments ( $P = 0.59$ ) or bend types ( $p = 0.29$ ). However, the composition of the composite community was different between LWD and non-LWD sites ( $P = 0.011$ ). My results suggest that while retention of LWD is low it still has an effect on the composition of the composite communities that inhabit the Missouri River." (Author Taxa including Odonata are treated at the order level.] Address: Archer, M.W., University of Nebraska at Lincoln, USA. E-mail: michael.archer@huskers.unl.edu

**12890.** Cobb, M. (2010): The damselfly enigma: better bigger or smaller? Outside JEB doi: 10.1242/jeb.036665 September 1, 2010 J. Exp. Biol. 213: VI. (in English) [Verbatim: "Damselflies show abrupt, darting flight, which is the envy of aero-engineers. This amazing ability is used both to capture prey and, by males, to establish territories that can attract females. Insects are ectothermic, so maintaining this flying ability in the face of fluctuating environmental changes is a major challenge. Furthermore, body size has both a direct effect on manoeuvrability and an indirect effect, through its impact on heat retention. Two Japanese researchers from Kyoto University, Yuka Samejima and Yoshitaka Tsubaki, have studied how body size and temperature affect flight ability in this stunning insect. The damselfly they chose to study – *Mnais costalis* – lives by fast-flowing mountain streams and shows male polymorphism: orange-winged larger males tend to have territories while clear-winged smaller males do not. These morphs reflect different mating strategies, with smaller males

'sneaking' mating opportunities. The authors used an infrared thermographic camera to measure the surface temperature of males, which they manipulated in the laboratory by using a halogen lamp, and studied the flight performance of each male. They estimated maximum lifting force and size-corrected lifting force, which they measured by attaching weights to the insects' wings with fishing line. Size-corrected lifting force is an index of acceleration that is linked to the damselfly's superb aerial acrobatics. The authors found that both measures of flight performance were positively correlated with body temperature. This is not particularly surprising, as it is well known that insect flight muscle activity increases with temperature. However, although body size led to higher maximum lifting force, it was negatively correlated with size-corrected lifting force. Simply put, larger males were less agile. When the authors took their thermographic camera into the field, they discovered that the story was even more complex: larger, territorial, males showed substantial variation in body temperature, as their territory showed varying patches of light and shade. Smaller, non-territorial males, however, generally had higher body temperatures, as they tended to bask in sunlit areas, as part of their 'sneaky' mating strategy. This combination of behavioural ecology and physiology enriches our understanding of the maintenance of polymorphic mating strategies in this species. Due to their smaller body size and their more constant, higher body temperature, smaller males are apparently more agile, and therefore gain an advantage in terms of 'sneaky' mating and avoiding predation. However, their smaller size means that they are less able to lift females – essential during mating – or to combat larger males. The best strategy, it would appear, would be to be a large male with a perpetually sunlit territory. Indeed, the authors' unpublished data suggest that such males have higher reproductive success. However, such territories are rare and may be temporally or physically fragile; natural selection has led to the current polymorphism of alternative male strategies, with underlying alternative physiologies. Who would have thought that the beautiful flight of the damselfly concealed such complexity?" For the full paper see: Samejima, Y. and Tsubaki, Y. (2010). Body temperature and body size affect flight performance in a damselfly. *Behav. Ecol. Sociobiol.* 64, 685-692.] Address: Cobb, M., University of Manchester, UK. E-mail: cobb@manchester.ac.uk

**12891.** Cordero Rivera, A.; Córdoba-Aguilar, A. (2010): 15. Selective forces propelling genitalic evolution in Odonata. In: Edited by Janet Leonard and Alex Córdoba-Aguilar (eds.): *The Evolution of Primary Sexual Characters in Animals*. ISBN13: 9780195325553. 552 pp: 332-352. (in English) ["Conclusions and suggestions for future research: Although it seems that sexual selection, particularly sperm competition, is an important force shaping genital morphology and function, other selective forces cannot be disregarded. Other sexual selec-

tion forces are cryptic female choice and sexual conflict. A similar argument can be made for natural selection hypotheses, especially the lock and key hypothesis. Further investigations should test hypotheses from both sexual and natural selection. Our knowledge of genital functional morphology is still rather poor for many families of Anisoptera (but see Pfau 2005; for a comprehensive work see Siva-Jothy 1997), and this is especially true for females. Another research priority is tropical families, and also species-poor and primitive taxa, like the Hemiphlebiidae or Petaluridae. Furthermore, study of the genital morphology of highly diverse and localized taxa, like *Megalagrion* in Hawaii (Polhemus & Asquith 1996) or *Nesobasis* in Fiji (Donnelly 1990), both with more than 20 species, would be appropriate tests of hypotheses of genital evolution and speciation on islands. As we have mentioned above, there is limited evidence for mating frequency having negative effects on females, and we lack direct evidence for genital damage, two predictions derived from sexual conflict hypotheses, and therefore open to future studies. Finally, the lock-and-key and pleiotropy hypotheses are still not formally tested with odonates, a group that offers high rewards for future studies of genital diversity." (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: [acordero@uvigo.es](mailto:acordero@uvigo.es)

**12892.** Eichinger, E.; Reinhard, U. (2010): Libellenwochenende - elsässisch-baden-württembergisches Austauschtreffen am 23.- und 24. Juli, diesmal in Baden-Württemberg. *Mercuriale* 10: 53-55. (in German) [Report on a dragonfly weekend in the Lake Constance region.] Address: Eichinger, Eva-Maria, Galgenbergstr. 18, 72072 Tübingen, Germany

**12893.** Gourmand, A.-L.; Vanappelghem, C. (2010): Protocole de suivi des espèces prioritaires. *Martinia* 26(3-4): 186-187. (in French, with English summary) ["Minutes of the workshop about the French Dragonfly monitoring scheme are summarized. The bases of this project are laid in accordance to the experience of the Dutch Monitoring Scheme." (Authors)] Address: Vanappelghem, C., 14, rue Brûle Maison, F-59000 Lille, France. E-mail: [cedvana@free.fr](mailto:cedvana@free.fr)

**12894.** Hideto, K (2010): [Dragonfly charm]. *Japic News* 313: 8-9. (in Japanese) [Kita Hideto is the responsible director of the pharmaceutical company Novartis for public relations. In this paper, he gives a personal insight in his relationship to dragonflies and introduces into some culture historical aspects of dragonflies in Japan.] Address: not stated

**12895.** Houard, X. (2010): Le Plan national d'actions (PNA) en faveur des Odonates menacés en France métropolitaine. *Martinia* 26(3-4): 182-185. (in French, with English summary) ["The French action plan for

threatened Odonata. Facing threats to Odonata and aware of issues related to the conservation of those insects which are typical and emblematic of wetlands, the French government launched a national plan of specific actions for their conservation. This plan covers the 18 most endangered dragonfly species in the metropolitan territory (*Lestes macrostigma*, *Sympecma paedisca*, *Coenagrion caerulescens*, *C. lunulatum*, *C. mercuriale*, *C. ornatum*, *Nehalennia speciosa*, *Aeshna caerulea*, *Gomphus flavipes*, *G. graslinii*, *Lindenia telraphylla*, *Ophiogomphus cecilia*, *Oxygastra curtisii*, *Macromia splendens*, *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis*, *Sympetrum depressiusculum*). The main types of actions envisaged under this plan are summarized." (Author)] Address: Houard, X., Centre Entomologique de Ressources pour la Conservation, Office pour les insectes et leur environnement (Opie), BP 30, 78041 Guyancourt Cedex, France. E-mail: [xavier.houard@insectes.org](mailto:xavier.houard@insectes.org)

**12896.** Ineichen, S.; Ruckstuhl, M. (2010): Stadtfauna: 600 Tierarten der Stadt Zürich. Haupt Verlag, Bern: 446 pp. (in German) [The chapter on Odonata is written by André Rey. On pages 124-143, he introduces into 38 Odonata species. Each is represented by a photograph, condensed information on habitat and morphology and a map with records in the town of Zürich, Switzerland. The record of *Gomphus simillimus* far away from the next known reproduction habitat along river Rhine is of special interest.] Address: Rey, A. E-mail: [ar@andre-rey.ch](mailto:ar@andre-rey.ch)

**12897.** Krieg-Jacquier, R. (2010): *Epithea bimaculata* (Charpentier, 1825) dans le département de l'Ain (Odonata, Anisoptera, Corduliidae). *Martinia* 26(3-4): 83-97. (in French, with English summary) ["This paper deals with the distribution of *Epithea bimaculata* in the Ain department (Rhône-Alpes region, France). After the review of the 19 sites where the species occurs, the author points out its possible univoltinism within two of them." (Author)] Address: Krieg-Jacquier, R., 18 rue de la Maçonne, 73000 Barberaz, France. E-mail: [regis.krieg.jacquier@gmail.com](mailto:regis.krieg.jacquier@gmail.com)

**12898.** Kunz, B. (2010): Ein ungewöhnliches Zuhause: Brutfürsorge der Krabbenspinne *Xysticus cristatus* in einer Vierfleck-Exuvie (*Libellula quadrimaculata*). *Mercuriale* 10: 51-52. (in German) [19-VI-2010, Heimatsee, Schwäbisch-Hall, Baden-Württemberg, Germany; The exuvia of *L. quadrimaculata* is used by a spider for oviposition] Address: Kunz, B., Hauptstr. 111, 74595 Langenburg, Germany. E-mail: [libellen@berndkunz.de](mailto:libellen@berndkunz.de)

**12899.** Leclerc, D.; Angelibert, S.; Rosset, V. (2010): Les Libellules (Odonates) des étangs piscicoles de la Dombes. *Martinia* 26(3-4): 98-108. (in French, with English summary) [A total of 34 species were observed between 2007 and 2009 in 79 fish ponds of the Dombes region, France. Their distribution and abundance were compared with the illustrated atlas of Odonata



from Rhône-Alpes (Deliry, 2008). *Coenagrion pulchellum*, *Enallagma cyathigerum*, *Erythromma lindenii*, and *Libellula fulva* were new for the Dombes area. "Finally our observations confirm the strong implantation of *Leucorrhinia pectoralis* in the fish ponds of the Dombes region and provide more accurate information on the habitat used by the adults of this species, which possesses a strong heritage value." (Authors)] Address: Leclerc, D., Haute École du Paysage, d'ingénierie et de l'Architecture (HEPIA), 150 route de Lullier, 1254 Jussy-Genève, Switzerland

**12900.** Lockwood, M. (2010): Nuevas citas de *Cordulegaster bidentata* Selys, 1842 (Odonata: Cordulegasteridae) de los Pirineos catalanes. *Boletín de la S.E.A.* 46(1): 506-508. (in Spanish, with English summary) ["New records of *C. bidentata* from the Catalan Pyrenees: New records of *C. bidentata* from the Catalan Pyrenees are described. The situation of the species in the region is also discussed, along with its possible choice of habitat." (Author)] Address: Lockwood, M., Grupo Oxygastra, Institució Catalana d'Història Natural, Carrer del Carme, 47; 08001 Barcelona, Spain. E-mail: mike@walkingcatalonia.net

**12901.** Ott, J. (2010): Résumé de la communication orale: Alien Invasive Species (AIS) - a threat for European dragonflies? *Martinia* 26(3-4): 167. (in English) [Verbatim: After the negative effects of climatic changes presently a new threat becomes more and more important for European dragonflies: Alien Invasive Species (AIS). As a consequence of the globalisation, introductions by aquarists and fishermen many new species can be found in the waters. Some of them also do reproduce and are increasing their ranges, out of these species some are having negative - some even dramatic - effects on the biocoenosis. In particular some fish (e.g. *Ctenopharyngodon idella*) and crayfish species (e.g. *Orconectes limosus*, *Procambarus* sp., *P. clarkii*) could be identified as dangerous for the native dragonfly fauna, as they are altering the biotic conditions or the food chain (e.g. reduction of water plants - lack of substrate for oviposition) or as they are strong direct predators for the larvae. As these AIS often are favoured by higher temperatures, climatic changes and AIS now may have synergistic and cumulative effects. After a short review on recent developments and trends of the distribution and ecology of Odonata in Europe the possible consequences for nature conservation and the future for native dragonfly populations are outlined. In this context also the results of a current research on the effects of crayfish on dragonfly larvae and other water organisms will be presented.] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**12902.** Savart, J.-P. (2010): Contribution à l'étude des Odonates de Guadeloupe Observations sur trois sites à Pigeon (Commune de Bouillante, Côte-sous-le-Vent,

Basse-Terre). *Martinia* 26(3-4): 168-177. (in French, with English summary) ["The author studied three sites western from the mountains of Basse-Terre, in the vicinity of river Lostau, between its mouth and the central part of Guadeloupe National Parc. Fourteen species were recorded whom three are endemic to the island. With the aim to enhance the conservation of Odonata, especially transfer throughout the Lostau valley, the author emphasizes the role of artificial biotopes and proposes to create aquatic habitats and further, to favour education in order to involve as much people as possible not only in the improvement of knowledge of these insects but also in the conservation of their habitats." (Author)] Address: Savart, J.-P., Habitation Dumoulin, BP 2 Pigeon, 97125 Bouillante, Guadeloupe

**12903.** Schmitt, V. (2010): Inventaire des populations de *Coenagrion mercuriale* (Charpentier, 1840) dans le bassin de la Chiers (Odonata, Zygoptera: Coenagrionidae). *Martinia* 26(3-4): 123-131. (in French, with English summary) ["For the needs of the project Interreg IVa Big Region entitled "Preservation of the remarkable natural elements of the Chiers basin in the Belgian and French Lorraine", it was necessary to know better the localization of the populations of *C. mercuriale* in the Chiers watershed. The method used and the results are both described in this paper." (Author) 168 habitats were studied. 42 localities harboured local populations of *C. mercuriale*.] Address: Schmitt, V., Conservatoire des Sites Lorrains, 14 rue de l'Eglise, F-57930 Fénétrange, France

**12904.** Tabarroni, A. (2010): Odonata in the "Malmerendi" Collection, Faenza Civic Museum of Natural Sciences. (*Insecta Odonata*). *Quaderno di studi e notizie di storia naturale della Romagna* 31: 37-46. (in Italian) ["The dragonfly specimens preserved in the entomological collection of Domenico Malmerendi (1900-1980) have been identified. The whole collection is made up of approx. 81,000 specimens and is the principal component of the Civic Museum of Natural Sciences in Faenza (Ravenna, Italy). The Dragonfly section contains 80 specimens, belonging to 16 genera and 30 species. The peculiar interest of this collection is due to its confined geographic provenience and also to the period of time in which it was assembled." (Author)] Address: Tabarroni, A., via Domenico Zampieri, 24, 40129 Bologna, Italy. E-mail: altabar@tiscali.it

**12905.** Vanappelghem, C.; Hubert, B. (2010): Suivi de la population de *Coenagrion mercuriale* (Charpentier, 1840) dans la Réserve naturelle régionale des dunes et hauts de Dannes-Camiers (Pas-de-Calais) (Odonata, Zygoptera: Coenagrionidae). *Martinia* 26(3-4): 131-137. (in French, with English summary) ["A monitoring of *C. mercuriale* and of its habitat has been tested on a regional nature reserve in the Nord-Pas-de-Calais region, France. Species monitoring appeared to reflect real population trends, but the analysis of key habitat attrib-

utes monitoring could not clearly explain the observed population decline with changes in habitat. However an artificial seasonal variation of the water depth could be related with this decline." (Author)] Address: Vanappelghem, C., 14, rue Brûle Maison, F-59000 Lille, France. E-mail: cedvana@free.fr

**12906.** Wu, D.-h.; Wang J.-t.; Zhang, Y.; Wang, B.-x.; Li, Y.-q.; Shen, Y.f. (2010): River water bioassessment with benthic macroinvertebrate in Lianyungang, Jiangsu province. *The Administration and Technique of Environmental Monitoring* 22(1): 29-32. (in Chinese, with English summary) ["Benthic macroinvertebrates assemblages were collected from 7 sites of 5 Lianyungang rivers in May, 2008. A total of 67 macroinvertebrate taxa (no taxonomic details are given) were found including 18 genera in Diptera, 11 genera in Odonata, 24 species in Mollusca, 5 species and 4 genera in 4 families of Annelida. All sampling sites were plotted out 3 groups by CCA ordination analysis. The water quality was assessed by the Shannon-Wiener diversity index, Biotic Index and COD, the result of diversity index was quite different from those of BI and COD, while the results between BI and COD were similar. Based on above three indicators, the quality of Qianwei river was clean and other rivers were from slight to middle pollution. The Pearson's correlation analysis showed that BI corresponded strongly with TN ( $r=0.913$ ,  $p=0.004$ ) and Shannon-Wiener diversity index had no correlation with TN ( $r=0.257$ ,  $p=0.578$ )."] (Authors)] Address: Wu, D.-h., Lab of Aquatic Insects and Stream Ecology, Department of Entomology, Nanjing Agricultural University, Nanjing, Jiangsu 210095, China

## 2011

**12907.** Ayme-Southgate, A.; Philipp, R.A.; Southgate, R.J. (2011): Projectin PEVK domain, splicing variants and domain structure in basal and derived insects. *Insect Molecular Biology* 20(3): 347-356. (in English) ["The third elastic filament of striated muscles consists of giant proteins: titin (in vertebrates) and kettin/projectin (in insects). In all three proteins, elasticity is at least partly associated with the so-called PEVK domain. The projectin PEVK domains of diverse insects are highly divergent compared with an otherwise conserved protein organization. We present the characterization of the PEVK domain in two dragonflies (*Pachydiplax longipennis*, *Libellula pulchella*) and in human lice. A conserved segment at the end of the PEVK, the NH(2)-terminal conserved segment-1 (NTCS-1), may serve as an anchor point for projectin to either myosin or actin, providing a mechanical link. The analysis of alternative splicing variants identifies the shortest PEVK isoform as the predominant form in the flight muscles of several insects, possibly contributing to myofibrillar stiffness."] (Authors)] Address: Ayme-Southgate A., Department of Biology, College of Charleston, Charleston, SC, USA. E-mail: southgatea@cofc.edu

**12908.** Barnard, P. (2011): Royal Entomological Society Book of British Insects. John Wiley & Sons: 368 pp. (in English) ["This book is the only modern systematic account of all 558 families of British insects, covering not just the large and familiar groups that are included in popular books, but even the smallest and least known. It is beautifully illustrated throughout in full colour with photographs by experienced wildlife photographers to show the range of diversity, both morphological and behavioural, among the 24,000 species. All of the 6,000 genera of British insects are listed and indexed, along with all the family names and higher groups. There is a summary of the classification, biology and economic importance of each family together with further references for detailed identification. All species currently subject to legal protection in the United Kingdom are also listed. The Royal Entomological Society (RES) ... began its famous Handbooks for the Identification of British Insects in 1949, and new works in that series continue to be published. The RES Book of British Insects has been produced to demonstrate the on-going commitment of the RES to educate and encourage each generation to study these fascinating creatures. This is a key reference work for serious students of entomology and amateur entomologists, as well as for professionals who need a comprehensive source of information about the insect groups of the British Isles they may be less familiar with."] (Publisher) Chap. 8 treats Odonata.] Address: Royal Entomological Society, The Mansion House, Chiswell Green Lane, St Albans AL2 3NS, UK

**12909.** Blanchon, V.; Durand, E.; Lambret, P. (2011): Redécouverte de *Gomphus flavipes* (Charpentier, 1825) en Provence-Alpes-Côte d'Azur (Odonata, Anisoptera: Gomphidae). *Martinia* 27(2): 121-122. (in French) [In June and July 2011, exuviae of *Stylurus flavipes* were found at the shore of the Isle of Saxy, Rhône, north of Arles (43,70972° N / 4,618611° E), France.] Address: Blanchon, V., Chemin de la Mourgatte, F-26200 Montélimar, France. E-mail: yoann.blanchon@orange.fr

**12910.** Bogan, M.T.; Lytle, D.A. (2011): Severe drought drives novel community trajectories in desert stream pools. *Freshwater Biology* 56: 2070-2081. (in English) [Arizona, USA; "(1.) Ecological communities can be relatively stable for long periods of time, and then, often as a result of disturbance, transition rapidly to a novel state. When communities fail to recover to pre-disturbance configurations, they are said to have experienced a regime shift or to be in an alternative stable state. (2.) In this 8-year study, we quantified the effects of complete water loss and subsequent altered disturbance regime on aquatic insect communities inhabiting a formerly perennial desert stream. We monitored two study pools seasonally for 4 years before and 4 years after the transition from perennial to intermittent flow to evaluate pre-drying community dynamics and post-drying recovery trajectories. (3.) Mean species richness

was not affected by the transition to intermittent flow, though seasonal patterns of richness did change. Sample densities were much higher in postdrying samples. (4.) The stream pool communities underwent a catastrophic regime shift after transition to intermittent flow, moving to an alternative stable state with novel seasonal trajectories, and did not recover to pre-drying configurations after 4 years. Six invertebrate species were extirpated by the initial drying event, while other species were as much as 40 times more abundant in post-drying samples. In general, large-bodied top predators were extirpated from the system and replaced with high abundances of smaller-bodied mesopredators. (5.) Our results suggest that the loss of perennial flow caused by intensified droughts and water withdrawals could lead to significant changes in community structure and species composition at local and regional scales." (Authors) *Libellula saturata* was a significant pre-drying indicator.] Address: Bogan, M.T., Department of Zoology, Oregon State University, Corvallis, OR, USA. E-mail: boganmi@science.oregonstate.edu

**12911.** Courant, S.; Meme-Lafond, B. (2011): Écologie et gestion des populations de *Leucorrhinia albifrons* (Burmeister, 1839) et *L. caudalis* (Charpentier, 1840) (Odonata, Anisoptera: Libellulidae) sur un étang du Saumurois (département du Maine-et-Loire). *Martinia* 27(2): 81-94. (in French, with English summary) ["*Leucorrhinia albifrons* and *L. caudalis* were discovered at a forest pool in Gennes (Maine-et-Loire) during summer 2009, several hundred miles away from their nearest breeding sites. The first is a new species to the Pays de la Loire, whereas the second was regularly observed at a site more and more altered since 2006. Following this discovery, a survey is carried out to study both the ecology of these *Leucorrhinia* species and the crucial habitat parameters for their survival. The research based on both exuviae' and adults' surveys brought us phenological and ecological data on these species, and emphasized the role of dense aquatic vegetation which allows the survival of larvae over their entire development period. Water quality and structure of vegetation also play a vital role for *L. caudalis* and *L. albifrons* during reproduction. The management plan based on these data provides suitable suggestions to ensure the optimal conditions for these Whitefaces." (Authors)] Address: Courant, S., LPO Anjou, 10 rue de Port Boulet, 49080 Bouchemaine, France. E-mail: courantsylvain@yahoo.fr

**12912.** Doucet, G.; Duret, B. (2011): Contribution à la connaissance de *Somatochlora metallica meridionalis* Nielsen, 1935 en Corse (Odonata, Anisoptera: Corduliidae). *Martinia* 27(1): 33-38. (in French, with English summary) ["The records dealing with *S. meridionalis* in Corsica since its discovery in 2001 are summed up. The discovery of this taxon in the Haute-Corse department in June 2009 extends its range considerably to the North in the island. The habitats from which it is known and the odonatological assemblages associated

to this Corduliidae are detailed." (Authors)] Address: Doucet, G., 74 rue de la Colonie, 75013 Paris, France. E-mail: guillaume.doucet@yahoo.fr

**12913.** Duda, J.J.; Beirne, M.M.; Larsen, K.; Barry, D.; Stenberg, K.; McHenry, M.L. (2011): Aquatic ecology of the Elwha River estuary prior to dam removal. In: Duda, J.J., Warrick, J.A., and Magirl, C.S., eds., 2011, Coastal habitats of the Elwha River, Washington - Biological and physical patterns and processes prior to dam removal: U.S. Geological Survey Scientific Investigations Report 2011-5120, 264 pp: 175-223. (in English) ["The removal of two long-standing dams on the Elwha River in Washington State will initiate a suite of biological and physical changes to the estuary at the river mouth. Estuaries represent a transition between freshwater and saltwater, have unique assemblages of plants and animals, and are a critical habitat for some salmon species as they migrate to the ocean. This chapter summarizes a number of studies in the Elwha River estuary, and focuses on physical and biological aspects of the ecosystem that are expected to change following dam removal. Included are data sets that summarize (1) water chemistry samples collected over a 16 month period; (2) beach seining activities targeted toward describing the fish assemblage of the estuary and migratory patterns of juvenile salmon; (3) descriptions of the aquatic and terrestrial invertebrate communities in the estuary, which represent an important food source for juvenile fish and are important water quality indicators; and (4) the diet and growth patterns of juvenile Chinook salmon in the lower Elwha River and estuary. These data represent baseline conditions of the ecosystem after nearly a century of changes due to the dams and will be useful in monitoring the changes to the river and estuary following dam removal." (Authors) Taxa (including Odonata) were treated at order level.] Address: not available

**12914.** Fiorenza, T.; Del Bianco, C.; Chiandetti, I.; Uboni, C.; Zandigiacomo, P. (2011): Gli Odonati del Friuli Venezia Giulia: risultati di uno studio triennale. *Bollettino Soc. Naturalisti "Silvia Zenari", Pordenone* 35: 109-122. (in Italian with English summary) ["During the period 2009-2011, a survey was carried out on the occurrence and distribution of Odonata in the Friuli Venezia Giulia region (north-eastern Italy). The aim of this study is to provide a regional Atlas of the Odonata at the end of 2013. Fifty-one species of Odonata have been found. This number agrees with the previous checklists of Kiauta (1969; 52 species) and Pecile (1984; 55 species). The occurrence of the Zygopteran *Nehalennia speciosa*, a threatened species, and of the Anisopteran *Cordulegaster heros*, a species widespread in the Balkan area and included in the Annexes II and IV of the Habitat Directive (Dir. 92/43/CEE) is extremely important from a naturalistic point of view. Both species are present in Italy only in Friuli Venezia Giulia. Further survey is expected to be planned in the next years, that will lead to the detection in the region of



about ten new species." (Authors)] Address: Fiorenza, T., Via Morosina 17/c, 33100 Udine, Italy. E-mail: E-mail: tizianofiorenza@libero.it

**12915.** Grand, D.; David, G.; Hahn, J.; Hentz, J.-L.; Krieg-Jacquier, R.; Roncin, P. (2011): *Gomphus flavipes* (Charpentier, 1825) à Lyon (Rhône) et nouvelles localités rhônalpines (Odonata, Anisoptera: Gomphidae). *Martinia* 27(1): 27-30. (in French, with English summary) ["In a previous communication, GRAND et al. (2011) reported the rediscovery of *Gomphus flavipes* in the Rhone hydrographic system, where this species had been found in 33 localities on the Rhône, the Doubs and the Saône rivers. Additional surveys conducted in mid-June 2009 and during summer 2010, allowed us to add 25 new municipalities for this species, its presence being mainly demonstrated by the finding of exuviae. All localities were located in the Ain and Rhone departments and two exuviae were found in the city of Lyon, one on the Saône and the other on the Rhone rivers." (Authors)] Address: Roncin, P., 36 chemin de l'Étang Neuf, 01000 Saint-Denis-lès-Bourg, France

**12916.** Gu, W.; Ma, L.; Ding, X.H.; Zhang, J.; Han, Z.W. (2011): Insect diversity of different habitat types in Zhalong Wetland, northeast China. *Chinese Journal of Applied Ecology* 22(9): 2405-2412. (in Chinese) ["In order to approach the effects of different habitat types in wetland on insect diversity, an investigation was conducted on the insects in eight types of habitats in Zhalong Wetland. A total of 5822 insects were collected, belonging to 143 species, 58 families, and 11 orders, among which, Orthoptera, Diptera and Odonata ("Libellulidae, Platycnemididae") were the dominant taxa. The species diversity was the highest in grassland meadow, and the Shannon diversity index and evenness index were higher in lakeside but the lowest in wet meadow. Cluster analysis and principal component analysis showed that the similarity of the insect community in the habitats was related to the water source status and vegetation type, and the species and individual number of predatory taxa had important regulation effects on the insect community stability. Lakeside had the strongest insect community stability, while wet meadow had the weakest one, indicating that habitat water source status could affect insect survival, and further, affect the species composition and distribution pattern of insect community." (Authors) ] Address: Gu, W., School of Forestry, Northeast Forestry University, Harbin 150040, China. guwei20042109@yahoo.com.cn

**12917.** Houard, X.; Simon, A. (2011): Bilan à mi-parcours du projet d'atlas des Odonates de Normandie. *Martinia* 27(1): 1-6. (in French, with English summary) ["The Atlas Project of the Dragonflies of Normandy (France) was launched by the volunteer group CERCION in 2004. After the project has running on for six years the mid-term review which is proposed below marks the handover between the two coordinators of

the group. Several maps are presented demonstrating progress in regional mapping of Odonata fauna." (Authors)] Address: Houard, X., Groupe CERCION (Collectif d'Études Regional pour la Cartographie et l'Inventaire des Odonates de Normandie), E-mail: x.houard@gmail.com

**12918.** Juliand, P.; Guillon, B. (2011): In memoriam Renaud Bemhard. *Martinia* 27(2): 143-144. (in French) [Obituary.] Address: Juliand, P., Le serre F - 07110 Jannas, France. E-mail: christine.juliand@wanadoo.fr

**12919.** Kiran, C.G.; Raju, D.V. (2011): Checklist of Odonata of Kerala with their Malayalam names. *Malabar Trogon* 9(3): 31-35. (in English) [India; 147 Odonata species were listed.] Address: Raju, D.V., Valiyaparambil, Kuzhimattom.P.O, Kottayam, Kerala, India. E-mail: davidraju2007@gmail.com

**12920.** Labbaye, O. (2011): Les Odonates du marais de Larchant (département de la Seine-et-Marne). *Martinia* 27(2): 69-80. (in French, with English summary) [France; Odonata species of special interest for the Île-de-France region are *Anaciaeschna isosceles*, *Leucorhinia caudalis*, *L. pectoralis* and *Somatochlora metallica*.] Address: Labbaye, O., Office de Génie Ecologique-O.G.E. 5 boulevard de Créteil, 94100 Saint-Maur-des-Fossés, France. E-mail: o.labbaye@oge.fr

**12921.** Lambret, P. (2011): Cas d'un mâle d'*Anax parthenope* (Selys, 1839) se nourrissant au sol renversé sur le dos (Odonata, Anisoptera: Aeshnidae). *Martinia* 27(1): 66-67. (in French) [06-VI-2009, Marais Vigueirat, Camargue, France. *A. parthenope* preyed on a male of *Orthetrum cancellatum*. Landing on the ground, *O. cancellatum* clung to short grass stems, causing *A. parthenope* to turn to its back and to devour the prey in this position.] Address: Lambret, P., Cabane de Ligagneau, Marais du Vigueirat, F-13104 Mas-Thibert, France. E-mail: philambret@hotmail.com

**12922.** Lambret, P. (2011): Observation précoce d'un individu sénéscent de *Crocothemis erythraea* (Brullé, 1832) et discussion sur son origine (Odonata, Anisoptera: Libellulidae). *Martinia* 27(2): 135-137. (in French, with English summary) ["I observed in the beginning of May 2011 an old female of *C. erythraea* which had very damaged wings. This state indicates that this individual was old and could not have emerged in the area during the year of observation. It was rather an individual which succeeded in overwintering and/or which came from southern latitudes." (Author)] Address: Lambret, P., Cabane de Ligagneau, Route de l'Etoumeau 13104 Mas-Thibert, France. Email: philambret@hotmail.com

**12923.** Lambret, P. (2011): Rejet d'une proie capturée par un Zygoptère (Odonata) et implication en terme de chemioréception. *Martinia* 27(2): 141-142. (in French, with English summary) ["A female of *Lestes macrostigma*

ma which captured a Coleoptera Coccinellidae and abandoned it then has been photographed. It seems that the prey has been rejected because of distasteful reasons. This observation sustains the fact that Odonata have chemoreceptors which are dedicated to taste." (Author)] Address: Lambret, P., Cabane de Ligagneau, Route de l'Etoumeau 13104 Mas-Thibert, France. Email: philambret@hotmail.com

**12924.** Lin, B.; Hu, H.; Zhu, X. (2011): Preliminary investigation on the dragonfly resources in Jiangxi Jiulianshan National Nature Reserve. *Jiangxi Forestry Science and Technology* 2011(04): 41-43, 63. (in Chinese, with English summary) ["43 species of Odonata from Jiulianshan Nature Reserve including 8 families and 30 genera were reported in this paper. 5 species (*Vestalis gracilis*, *Ceriagrion latericum* ryukyuanum *Asahina*, 1967 [sic], *Gynacantha japonica*, *Idionyx claudia*, *Orthetrum luzonicum*) were new records of insect from Jiangxi province. Fauna analysis indicated that the dominant fauna in this region are Oriental. Of all these components in the fauna, there are 25 species of Oriental, 13 species of Palaear-oriental species, and 5 wide-spread species, which accounts for 58.14%, 30.23%, and 11.63% of all species, respectively. A few of them belong to Palaearctic species." (Authors)] Address: Lin, B., Jiulianshan National Natural Reserve Administration, Longnan Jiangxi 341700, China. Email: lbzh903@163.com

**12925.** Lindsay, M.K. (2011): Effects of a Freshwater Turtle (*Trachemys scripta elegans*) on Ecosystem Functioning in Experimental Ponds. Theses and Dissertations-Biology. Paper 38. Texas State University, San Marcos, Texas: XIII + 61 pp. (in English) [Man-made ponds located on Griffith League Ranch in Bastrop, Texas, USA. Turtles were found to have not significant influence on both taxa richness and individual abundance of Odonata.] Address: not stated.

**12926.** Luczak, C.; Godin, J.; Vanappelghem, C. (2011): Intérêt des listes d'espèces des Naturalistes du XIXe - XXe siècles: le cas du Nord - Pas-de-Calais, de l'ère Giard (XIXe siècle) à l'ère Kérautret (XXe siècle). In: Schmitt, F.G. (ed) *Observation des écosystèmes marins et terrestres de la Côte d'Opale: du naturalisme à l'écologie*. U.O.F., Paris. ISBN: 978-2951062528: 147-156. (in French, with English summary) ["Species list of Mammals, Birds, Dragonflies and Amphibians were compared at a century scale: end of the XIXth century versus end of the XXth century. Presence/absence data of breeding animals were used. The area covered was the Nord - Pas-de-Calais region, northern France (12 500 km<sup>2</sup>). Biases in data were identified and were taken into account in data selection and analysis (Sørensen index and McNemar test). Significant changes were detected for taxa with great dispersion ability: birds and dragonflies. When the results are viewed at a larger spatial scale in north-west Europe, species at their

southern distribution edge were still present in northern France, and species at their northern distribution edge were extending their range northward. These changes were supposed to be linked to climate changes." (Authors)] Address: Vanappelghem, C., 14, rue Brûle Maisson, F-59000 Lille, France. E-mail: cedvana@free.fr

**12927.** Meurgey, F.; Poiron, C. (2011): The true *Dythemis multipunctata* Kirby, 1894, from the West Indies and proposed new taxonomic status (Odonata: Anisoptera: Libellulidae). *Zootaxa* 3019: 51-62. (in English) ["The true *D. multipunctata* is illustrated and the female is described for the first time based on specimens from the type locality, St. Vincent (Lesser Antilles). The taxonomic status of the species is discussed, and notes on behaviour, habitat, and range distribution are provided. *D. multipunctata* is to be considered a subspecies of *D. sterilis* (Hagen), and mainland populations previously known as *multipunctata* are now to be called *D. nigra* Martin." (Authors)] Address: Poiron, Celine, Société d'Histoire Naturelle L'Herminier - Muséum d'Histoire Naturelle 12, rue Voltaire, 44000 Nantes, France. E-mail: celine-poiron@hotmail.fr

**12928.** Mitra, A.; Dow, R.; Subramanian, K.A.; Sharma, G. (2011): Chapter 5. The status and distribution of dragonflies and damselflies (Odonata) of the Eastern Himalaya. The status and distribution of freshwater biodiversity in the Eastern Himalaya: 54-66. (in English) ["5.5 Conclusions and conservation recommendations: Of the 367 species of Odonata considered present within the Eastern Himalayan assessment region, more than one third (135) are Data Deficient. This shows that there is lack of good quality research and recent data from the region. Lahiri (1989) has published a list of 78 Odonata species and subspecies that have not been reported from India since 1948 and 49 of these are part of present assessment. Thirty-eight of these 49 species are in the Data Deficient list of the present assessment. A further 13 of these 49 species were recorded from Nepal from the mid-1960s to late 1980s (Vick 1989), making the records around 30 years old, and records for many other species are of a similar age. Only 50 species of dragonflies have been reported from parts of eastern and southern Bhutan (Mitra 2008), much of Bhutan is still unexplored, a situation that is repeated across much of the assessment region, for example in Arunachal Pradesh in India, and in Myanmar. There is an urgent need for extensive, expert survey across the region. However fresh survey efforts are hampered by existing legislation in some regional countries which make it difficult to obtain permits for collection and loan of invertebrate specimens for scientific research; this is entirely counter productive for conservation efforts. Additional serious constraints include a lack of funding for fieldwork, and the need to train experts in taxonomy and field research methodologies. Moreover, large parts of the assessment region are affected by insurgency and political instability which has discouraged extensive

fieldwork in these areas; the mountainous and forested terrain in many parts of the region itself makes access difficult. Most species considered endemic to the region have been assessed as Data Deficient which raises doubts over their status as endemic to the region. Fieldwork in the unexplored areas within and outside the assessment region, and fresh fieldwork even in the relatively well known areas, might reveal that of some of these species are not actually endemic to the project region, but have wider ranges. Similarly, fieldwork is needed to determine the habitat requirements etc. for the Data Deficient species. Without extensive fieldwork the status of the Data Deficient species cannot change. Indeed, the lack of data can be considered to be a major threat to the Odonata of the region, as until this lack is remedied, proper conservation planning is not possible. The fundamental need is for extensive, good quality, fieldwork over the entire region. There is also a pressing need for high quality taxonomic work on the Odonata of the region. Revisions in many groups would likely result in the discovery that many of the currently Data Deficient species are in fact junior synonyms of better known species on the one hand, and in the discovery of new species in the region on the other. However such taxonomic work is made almost impossible by the lack of material for those groups where the taxonomical problems are most severe, by legislation that hampers international scientific collaboration in some countries, and by difficulties in locating and gaining access to type material for a number of species, as well as by poor maintenance of insect collections in many regional institutions. As far as the conservation of the Odonata fauna of the region is concerned, the only measures that are effective in protecting invertebrate populations are habitat protection measures, which need to be planned using the kind of data that we mostly lack for the region. Lahiri (1989) pointed out that most of the type localities of rare and endemic Odonata of eastern India concentrate in and around northern Bengal and Sikkim and Khasi Hills; however there has been insufficient sampling in other eastern Indian states such as Manipur, Arunachal Pradesh, and Nagaland. With their diverse ecosystems, these areas also sustain the majority of known Indian species. Identifying such pockets in other countries within the assessment region and giving at least parts of such pockets protected status would safeguard a high percentage of species and their habitats. For Odonata, if areas to be protected are chosen carefully, they do not have to be large, in practice more good might be done by protecting many small areas including examples of all habitat types in a particular region, than by protecting one or two large, but homogenous in terms of habitat, areas. To summarize, the following actions are recommended: (1). Funding should be made available for extensive expert sampling of Odonata across the project region, and for relevant training. (2). Priority should be given to taxonomic research. (3). Regional governments should review their existing legislation that affects scientific collection of in-

vertebrates, and loan and exchange of material with researchers in other countries, and remove or revise the ill-advised barriers to these activities that are currently in place. (4). When fresh data becomes available, and any taxonomic studies that are needed become available, Odonata experts should reassess the Odonata of the region currently placed in any category other than Least Concern, and, where necessary make recommendations on the protection of suitable habitat. 5. Standards of curation and storage of regional insect collections should be raised to prevent loss of type and other scientifically valuable material. The actions recommended above are mostly concerned with research, but until this research has taken place, actual conservation measures cannot be planned affectively." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**12929.** Nelson, S.J.; Chen, C.; Roebuck, H.; Zoellick, B. (2011): Sensible sentinels: preliminary mercury data for dragonfly nymphs (Odonata: Anisoptera) across northern New England corroborate expected spatial pattern. Poster presentation. The 10th International Conference on Mercury as a Global Pollutant (ICMGP), 24–29 Jul 2011; Halifax, Canada: (in English) [Verbatim: Mercury (Hg) is a potent neurotoxin that is delivered to ecosystems via deposition from a global atmospheric pool, and ultimately bioaccumulates in aquatic and terrestrial foodwebs. Around the Gulf of Maine, research sites in 'pristine' areas have fish and other biota that exceed thresholds considered safe for human consumption or wildlife protection. All Maine, Vermont, and New Hampshire surface waters are under fish consumption advisory and are considered impaired with respect to Hg because of these patterns and the difficulty in predicting which systems are most affected. Together with a team of citizen scientists, we are evaluating the utility of dragonfly nymphs (Odonata: Anisoptera) as indicators of Hg status in the Gulf of Maine region. We propose that dragonfly nymphs will be good sentinels because they are: (1) widespread and found in most surface waters in the region, (2) long-lived in aquatic systems (1-5 yr as nymphs), (3) exhibit site philopatry, (4) important prey species for fish that are consumed by humans, and (5) simple to capture, process, and analyze at meaningful Hg concentrations. Specifically, because dragonfly nymphs are themselves predators, Hg concentrations are high enough for laboratory and statistical analyses to be meaningful. The average Hg concentration in dragonfly nymphs sampled across Maine was 0.097 ppm (wet weight basis), greater than the proposed wildlife safety criterion (0.077 ppm). At sites across the region (ME, NH, VT, and MA), we used our data to address hypotheses regarding whether Hg varied with body size or by family; these characteristics were less important than a field site's landscape setting. Data from a survey of a variety of surface water sites in or near four National Park areas in ME (Acadia), MA (Boston Harbor Island and Saugus Ironworks), and VT



(Marsh Billings Rockefeller) confirmed that Hg in dragonfly nymphs was more variable among sites than within a site, suggesting that they are useful indicators for Hg. Further, three years of research by citizen scientists has confirmed correlation between Hg in dragonfly nymphs and DOC in five streams within Sunhaze National Wildlife Refuge. Hg in dragonfly nymphs were related to concentrations in other media at three long term monitoring sites within Acadia National Park where Hg in mature forests has been shown to be greater than early successional forests. More research on dragonfly larval life history will help to develop a mechanistic understanding of this spatial variability in Hg bioaccumulation.] Address: Nelson, Sarah, Senator George J Mitchell Center for Environmental and Watershed Research and Department of Plant, Soil, and Environmental Sciences, University of Maine, Orono, ME, USA. E-mail: sarah.nelson@umit.maine.edu

**12930.** Ruffoni, A. (2011): Nouvelles stations pour *Oxygastra curtisii* et *Cordulegaster bidentata*, Odonates rares en Bourgogne. Rev. sci. Bourgogne-Nature 13: 63-64. (in French) [France; three exuvies of *O. curtisii*, Cure à Voutenay-sur-Cure (89), 28-VI- 2008; nine exuvies of *O. curtisii*, Varenne Saint-Germain (71) 1-VII-2008; two individuals of *C. bidentata*, 10-VII-2008, Arleuf (58); one male of *C. bidentata*, Quarré-les-Tombes (89), 27-VI-2009.] Address: Ruffoni, A., Société d'histoire naturelle d'Autun - Maison du Parc - 58230 Saint-Brisson, France. E-mail: shna.ruffoni@orange.fr

**12931.** Sansault, E. (2011): Découverte du premier site de reproduction de *Leucorrhinia caudalis* (Charpentier, 1840) en Indre-et-Loire (Odonata, Anisoptera: Libellulidae). *Martinia* 27(2): 115-120. (in French, with English summary) ["A breeding site of *L. caudalis* has been discovered in a small forest pond, north-west of Indre-et-Loire, France, on May 2008. The particular circumstances of this discovery and the following sightings of the species in this area are detailed. Conservation issues linked to the discovery of this endangered species into a protected high nature value area are discussed." (Author)] Address: Sansault, E., A.N.E.P.E. Caudalis. 118, rue de l'Ermitage, F-37100 Tours, France. E-mail: anepe.caudalis@gmail.com

**12932.** Schmid, F. (2011): Massenschlupf und weite Wanderungen schlüpfbereiter Larven des Zweifelflecks (*Epitheca bimaculata*) an einem See im oberschwäbischen Alpenvorland. *Mercuriale* 11: 27-30. (in German) [Baden-Württemberg, Germany; a mass emergence of *E. bimaculata* at 600 m.a.s.l. in May 2011 is reported. Emerging larvae were found up to 50 m from shore line and up to a height of 5 m.] Address: Schmid, F, Graben 23, 7225 Münsingen, Germany. E-mail: fcschmid@t-online.de

**12933.** Shah, D.N.; Tachamo Shah, R.D.; Pradhan, B.K. (2011): Diversity and community assemblage of littoral zone benthic macroinvertebrates in Jagadishpur

Reservoir. *Nepal Journal of Science and Technology* 12: 211-219. (in English) ["Littoral benthic macroinvertebrates diversity and community assemblage of Jagadishpur Reservoir were studied during post-monsoon (2008) and pre-monsoon (2009) seasons. Altogether twelve sites in the littoral zone of the reservoir were sampled for benthic macroinvertebrates (including Odonata) ... At each site, benthic macroinvertebrate samples were taken from different possible substrate types. The environmental variables of each site were collected based on Lentic Ecosystem Field Protocol during sampling. Biological metrics were used to describe the diversity and composition of benthic macroinvertebrates. The relationship between benthic macroinvertebrates assemblage and substrate types were examined by using principal component analysis. Cluster analyses were performed to describe the similarity among samples. In total, 50 taxa, belonging to 15 orders were recorded for littoral zone of the reservoir. The recorded higher number of taxa (family level) belonged to order Heteroptera and Diptera, and class Mollusca. Mollusca for post-monsoon and Diptera (particularly Chironomidae) for pre-monsoon shared the highest proportion in the total density. Shannon diversity index ( $H'$ ) for post-monsoon was  $1.82 \pm 0.46$  and for pre-monsoon was  $1.38 \pm 0.53$  and was significantly different between seasons ( $p=0.01$ ). Principal component analysis revealed that increase in taxa numbers were positively correlated to soft substrates while negatively correlated to non-soft substrates in littoral zone of the reservoir. Cluster analyses discriminated the sites into two main groups for both seasons. The study concludes that benthic macroinvertebrates diversity is highly influenced by substrate types, water level fluctuation, and human accessibility to the reservoir. Therefore, in order to stabilize benthic macroinvertebrates diversity and their abundance, it is essential to maintain surface water level, stabilize bank substrate and minimize human pressure." (Authors)] Address: Shah, D.N., Hindu Kush Himalayan Benthological Society, Kathmandu, Nepal. E-mail: deepnarayanshah@hkhbenso.org

**12934.** Stryjecki, R. (2011): Invertebrate fauna of the Minina River, taking into account environmental factors. *Acta Biologica* 18: 37-48. (in English) [Poland; "A total of 5,613 macroinvertebrate specimens, belonging to 43 taxa (including "Anisoptera, Calopteryx sp., Zygoptera non det.") of varying systematic positions, were collected at four study sites in the Minina River. Dominant in the material collected were Gammarus sp. (33.9%), Chironomidae larvae (30.4%) and Ephemera sp. larvae (7.0%). More individuals (3,551) and taxa (39) were caught in the lentic zone than in the lotic zone (2,062 specimens and 30 taxa). The biological diversity index ranged from 1.57 to 3.14 within the sites and from 1.04 to 3.77 within habitats (zones of the river). The taxonomic composition and the abundance of the fauna were mainly influenced by biotic factors (e.g. amount of aquatic vegetation) and abiotic factors (e.g. water cur-

rent and type of bottom sediment), while human impact (presence of hydraulic structures, straightening of the river bed) did not significantly affect the fauna." (Author)] Address: Stryjecki, R., Dept of Zoology, University of Life Sciences in Lublin, ul. Akademicka 13, 20-950 Lublin, Poland. E-mail: robstry@wp.pl

**12935.** Turshak, L.G.; Mwansat, G.S. (2011): Insect diet of some Afrotropical insectivorous Passerines at the Jos Wildlife Park, Nigeria. *Science World Journal* 6 (4): 1-4. (in English) [Odonata contributed 2.29% to the diet of the studied birds. No details were given.] Address: Mwansat, G.S., Dept of Zoology, University of Jos, Nigeria. E-mail: georginamwansat@gmail.com

**12936.** Xu, H.-c.; Hao, X.-d.; Hung, J.-h.; Ye, T.-x.; Ye, L.-x. (2011): Insects diversity of Fengyanshan mountain in Zhejiang province. *Journal of the Zhejiang A&F University* 28(1): 1-6. (in Chinese, with English summary) [Taxa - including Odonata - are treated at the order level; no details are given.] Address: Xu, H.-c., Institute of Forest Protection, Zhejiang A&F University, Lin'an 311300, Zhejiang, China

**12937.** Xu, H.-x.; Xin, Z.-y.; Wang, X.-z.; Wang, H.-j. (2011): Investigation and study on insect and the fauna of Heihe Nature Reserve of Gansu province. *Journal of Gansu Forestry Science and Technology* 36(1): 19-24, 42. (in Chinese, with English summary) [In August and September 2008, the insect fauna of the Heihe Nature Reserve in Zhangye of Gansu, China was studied including *Crocothemis servilia*, *Pantala flavescens*, *Anax nigrofasciatus*, *Anax parthenope julius*, *Mnais gregoryi*; *Ophiogomphus spinicornis*, and *Libellula basilea*.] Address: Xu, H.-x., Forestry Sci-tech Extension Station of Gansu Province, Lanzhou 730046, China

## 2012

**12938.** Baeta, R.; Sansault, E.; Présent, J. (2012): Repartition et première estimation quantitative des populations de *Leucorrhinia caudalis* (Charpentier, 1840) en Indre-et-Loire (37), région Centre (Odonata, Anisoptera: Libellulidae). *Martinia* 28(2): 109-119. (in French, with English summary) ["Considered as threatened in France, *L. caudalis* is concerned by a National Action Plan. Following the discovery of a small population in 2008 in the Savigne basin (Indre-et-Loire - France), researches have been set up in 2011 and 2012 around the department of Indre-et-Loire. They led to the observation of 124 males, eight females, one larva and 30 exuviae in 10 localities, among which nine were unknown. The population size could therefore be estimated at several hundreds individuals in Indre-et-Loire. Three main areas have been identified: the Savigne basin (seven localities), the south Touraine (two localities) and the Champagne area (one locality). In France and Europe, several populations have been recently discovered, yet the only long term dataset available in Centre region (Brenne)

suggests a relatively negative trend. The Indre-et-Loire populations discovered recently are probably linked to the recent intensification of sampling efforts occurring in this department. In order to get a better understanding of the populations' distribution and functionality, useful field and genetic studies are proposed and detailed." (Authors)] Address: Sansault, E., Association Naturaliste d'Étude et de Protection des Écosystèmes (ANEPE) « Caudalis », 118 rue de l'Ermitage, 37100 Tours, France. E-mail: anepe.caudalis@gmail.com

**12939.** Bagworth, T. (2012): Reports from coastal stations - 2011: Gibraltar Point NNR, Lincolnshire. *Atropos* 45: 72. (in English) [Records of *Sympetrum fonscolombii*, *Aeshna cyanea*, *A. grandis* and *Calopteryx splendens* were documented.] Address: not stated

**12940.** Bamann, T.; Jebram, J. (2012): Nachweis der Grünen Flussjungfer (*Ophiogomphus cecilia*) an der nördlichen Ufer. *Mercuriale* 12: 11-14. (in German, with English summary) ["At 02-X-2012 seven adults – males and females – of *O. cecilia* were observed at the shoreline of the prealpine river Iller close to the City of Ulm (48°20'29" N, 10°00'33" O, 484 m a.s.l.) in the federal state of Baden-Württemberg, SW-Germany. The new records are presented and discussed." (Authors)] Address: Bamann, T., Altenhaustr. 2, 71111 Waldenbuch, Germany. E-mail: t.bamann@web.de

**12941.** Bedjanič, M. (2012): On the synonymy of three endemic dragonfly species from Sri Lanka (Zygoptera: Platystictidae, Protoneuridae). *Notul. odonatol.* 7(9): 77-80. (in English) ["Based on re-examination of museum collections and newly available material *Drepanosticta fraseri* Lieftinck, 1955 is synonymised with *Drepanosticta submontana* (Fraser, 1931), *Drepanosticta sinhalensis* Lieftinck, 1971 is synonymised with *Drepanosticta lankanensis* (Fraser, 1931), while *Disparoneura ramajana* Lieftinck, 1971 is a synonym of *Elatoneura leucostigma* (Fraser, 1933)." (Author)] Address: Bedjanič, M., Kolodvorska 21b, SI-2310 Slovenska Bistrica, Slovenia. E-mail: matjazbedjanic@yahoo.com

**12942.** Bernal Sánchez, A. (2012): Confirmación de la presencia actual de *Lestes macrostigma* (Eversmann, 1832) [sic] (Odonata: Lestidae) en la provincia de Cádiz (sudeste de la Península Ibérica). *Boletín de la Sociedad Entomológica Aragonesa* 50: 565-566. (in Spanish, with English summary) ["Presence of populations of *L. macrostigma* in Cadiz province is confirmed, after more than 15 years without observations of this species, indicating the importance of these populations to guarantee the possible genetic flow between the populations of Donana (Huelva and Seville) and the Natural Reservation Laguna de Fuente de Piedra (Malaga)." (Author)] Address: Bernal Sánchez, A., C/ Juan Ramón Jiménez 28. 11160 - Barbate (Cádiz. Esparta), Spain. E-mail: ArturoJibelula@gmail.com

- 12943.** Borkenstein, A. (2012): Buntspechte erbeuten frisch geschlüpfte *Libellula quadrimaculata*. *Mercuriale* 12: 59-60. (in German, with English summary) [Niedersachsen, Germany; "Great spotted woodpeckers (*Dendrocopos major*) repeatedly approached to birch trees near a forest bog in northwestern Germany and caught several immature individuals of *Libellula quadrimaculata*. The dragonflies were most probably fed to their offspring." (Author)] Address: Borkenstein, Angelika, Lebensborner Weg 5, 26419 Schortens, Germany. E-mail: AngelikaBorkenstein@t-online.de
- 12944.** Bowman, N. (2012): Reports from coastal stations - 2011: Eccles-on-Sea, Norfolk. *Atropos* 45: 71-72. (in English) [UK, *Erythromma viridulum*] Address: not stated
- 12945.** Brunken, H.; Hein, M.; Klugkist, H. (2012): Auswirkungen ökologischer Grabenräumung auf Fische und die Grüne Mosaikjungfer (*Aeshna viridis*) in Bremer Natura-2000-Gebieten. *Natur und Landschaft* 87(8): 370-375. (in German, with English summary) ["Natura 2000 sites in the Weser river lowlands around Bremen, Germany, are known as important secondary habitats for typical floodplain species (e. g. Mud Loach *Misgurnus fossilis*, Spined Loach *Cobitis taenia*, Green Hawker *Aeshna viridis*) listed in Annexes II and IV of the Habitats Directive. Different methods of ditch maintenance, evaluated in a research and development project focusing on Water Soldier populations (*Stratiotes aloides*), revealed no impairments of the above mentioned target species. Different maintenance schemes were found to be favourable for fish and for dragonflies respectively. Ditch maintenance approaches should be modelled on natural floodplain dynamics to provide a habitat mosaic in terms of water level, intensity and time of ditch cleaning, ensuring a connected drainage system composed of different succession levels." (Authors) The number of specimens was higher in ditches maintained in autumn compared with ditches maintained in (late) summer.] Address: Klugkist, H., Senator für Umwelt, Bau und Verkehr, Bremen, Ansgaritorstr. 2, 28195 Bremen, Germany. E-Mail: henrich.klugkist@umwelt.bremen.de
- 12946.** Bühler, W. & H. Hunger (2012): (2012): Neue Funde der Gabel-Azurjungfer (*Coenagrion scitulum*) in Südbaden bei Buggingen, Gottenheim und Riegel (Odonata: Coenagrionidae). *Mercuriale* 12: 27-32. (in German, with English summary) ["Following the rediscovery of *C. scitulum* for Baden-Württemberg in 2010 and the finding of the species at a second site in 2011, seven new sites were found in the southern Upper Rhine Valley in 2012. The distance as the crow flies between the southernmost occurrence near Buggingen and the northernmost south of Riegel is 32 km. The species has established itself successfully at several waters. So far, the immigration into Baden-Württemberg has obviously taken place exclusively from the south or southwest." (Authors)] Address: Bühler, W., Birkenweg 18, 79288 Gottenheim, Germany. E-mail: Willy.Buehler@gmx.de
- 12947.** Cade, M. (2012): Reports from coastal stations - 2011: Portland, Dorset. *Atropos* 45: 52-54. (in English) [Probable *Anax ephippiger* were recorded at 23 April (Groove) and 24 April 2011 (Ferrybridge), UK.] Address: not stated
- 12948.** Cho, K.-T.; Kim, H.-W.; Kim, H.-R.; Jeong, H.-M.; Lee, K.-M.; Kang, T.-G.; You, Y.-H. (2012): Landscape ecological characteristics of habitat of *Nannophya pygmaea* Rambur (Libellulidae, Odonata), an endangered species for conservation. *Korea Society of Wetland* 14(4): 667-674. (in Korean, with English summary) ["This study was conducted to understand landscape ecological characteristics on habitats of *N. pygmaea*, an endangered species in South Korea. The ecological characteristics of the habitats were investigated in abandoned paddy fields where *N. pygmaea* populations have been found in Chungcheongnam-do Kongju, Gyeonggi-do Kwangju and Gyeongsangbuk-do Mungyeong from 2009 to 2010. We surveyed the dominant vegetation, areas, water depth and temperature, and plant height and coverage to compare the wetlands living *N. pygmaea* and not living *N. pygmaea*. As a result, habitats of *N. pygmaea* in all regions were dominated by *Salix koreensis* community. There is no significant difference in the water temperature, plant height and coverage among wetlands of the three different sites, but depth was varied within 2.5~9.5cm. The water depth of habitat was deeper in Gongju than the others. Percentage of open water was 1.7~6% in the wetlands living *N. pygmaea*. but it did not appear in the wetlands not living *N. pygmaea*. Therefore, the ecological characteristics of wetlands as abandoned paddy fields should be taken into account for *N. pygmaea* habitat conservation and restoration." (Authors)] Address: not available
- 12949.** Clancy, S.P. (2012): Reports from coastal stations - 2011: Dungeness Area, Kent. *Atropos* 45: 60-62. (in English) [Verbatim: The most exciting Odonata records of the year involved a series of records of *Hemianax ephippiger*: three were present along Dengemarsh Sewer from 23-24 April with one remaining on 25th, and an additional adult present elsewhere on the RSPB reserve on 24th. *Sympetrum fonscolombii* occurred on just a single occasion, at the Long Pits on 24 July. In addition to three records of *Anax parthenope* on the Reserve on 14 & 26 July, and 1 August, there were 22 records of this species at the Long Pits between 5 July and 17 August, with oviposition noted on 28 July and 17 August.] Address: not stated
- 12950.** Corso, A.; Janni, O.; Pavesi, M.; Sammut, M.; Sciberras, A.; Vigano, M. (2012): Annotated checklist of the dragonflies (Insecta Odonata) of the islands of the Sicilian Channel, including the first records of *Sympetrum*



trum sinaiticum Dumont, 1977 and *Pantala flavescens* (Fabricius, 1798) for Italy. *Biodiversity Journal* 3(4): 459-478. (in English) ["In this paper we report data on the historical and recent status of all Odonata species recorded for the Sicilian Channel islands: the Pelagie islands and Pantelleria, politically belonging to Italy, and Maltese Archipelago islands. The number of species known for the former group of islands raises from 7 to 20. Of these, 2 are new for the Italian fauna, namely *Sympetrum sinaiticum*, noticed through likely sightings starting from 2010 on Lampedusa, and confirmed through voucher specimens collected in April 2012, and *Pantala flavescens*, first noticed in October 2012 on Lampedusa and Linosa; while *Calopteryx* sp. cf. *haemorrhoidalis*, *Ischnura genei*, *Aeshna mixta*, *Orthetrum nitidinerve*, *O. coerulescens anceps*, *Crocothemis erythraea*, *Sympetrum striolatum*, *S. meridionale*, *Brachythemis impartita*, *Trithemis annulata* and *T. kirbyi*, already known for Italy, are new for the Italian islands of the Sicilian channel. The Maltese fauna includes at present 18 recorded species; the previously reported *Trithemis arteriosa* is to be deleted from the list, since the concerned specimen upon reexamination proved to be *T. annulata*." (Authors)] Address: Corso, A., MISC - Via Camastra, 10 - 96100 Siracusa, Italy. E-mail: voloerrante@yahoo.it

**12951.** Crabtree, A.G. (2012): Modeling a small pond odonate population: Exploring the complex life history dynamics of *Pachydiplax longipennis* (Odonata: Libellulidae). Thesis, Northern Illinois University. Biological Sciences. Proquest, Umi Dissertation Publishing: 152 pp. (in English) ["Members of the insect order Odonata are excellent examples of organisms that demonstrate complex life histories. Both the larval and adult stages must be studied to understand the dynamics of such species, A population of *P. longipennis* was studied at a small fishless pond in north central Illinois in 2008 and 2009. Additionally, a dynamic population model of the species was developed using the graphical modelling software, STELLA, to further understand the life history dynamics of *P. longipennis*. The larval dragonfly community in the pond was composed of nine species, all of which were also present as adults. The adult dragonfly community contained an additional four species, for a total of 13. Although, the maximum larval density of *P. longipennis*, which occurred in the middle of the summer, was ~15 m<sup>2</sup> in 2008 and 2009, mean density was higher in 2009. Based on this maximum density, it was estimated the maximum larval population size for the pond was ~170,000. Head capsule width and total length of larvae were used to identify 14 larval instar classes for the species. Changes in head capsule width between adjacent instar classes generally conformed to Dyar's Ratio, with the exception of the changes between the first and last two instars. Skipping of instar classes was common among larvae reared in the lab. Mean maximum *P. longipennis* adult abundance occurred in July in both 2008 and 2009. It was higher in 2008 than that observed in 2009, ~12 per 10 m sector versus 8 per 10 m sector. The

estimated adult population size in 2009 based on mark-recapture data using Craig's estimation method was 2,000. Average clutch size, determined from six captured, mated females, was 1,238+/-431 eggs per clutch. Average clutch survivorship was 27.51%+/-16.38. A density-ceiling model generated a stable population of *P. longipennis* larvae and adults that cycled in 54 week intervals. Short term (2 years) results predicted an early instar larval population of ~175,000 individuals, a late instar larval population of ~40,000, and an adult population of ~4,000. Long term (20 years) results predict early instar larval population of ~300,000 individuals, a late instar larval population of ~75,000, and an adult population of ~6,000. Long term estimates were comparable to those predicted by larval and adult sampling. Sensitivity analysis of varying mortality rates found that changing early instar larval mortality rate had a significant impact on observed abundances in all modelled life stages, while changes in breeding adult mortality had little effect. Simulations of ten different survivorship scenarios of larval and adult mortality resulted in three specific categories of response in terms of larval and adult abundances: one or both reached carrying capacity, both went extinct, or either or both stabilized at an intermediate abundance. Scenario results also suggested a greater importance of larval stage mortality rates, similar to the results of the sensitivity analysis. A density-dependent model generated unrealistic results in both short term and long term simulations." (Author)] Address: not stated

**12952.** Deans, M.J. (2012): Reports from coastal stations - 2011: Bawdsey Peninsula, Suffolk. *Atropos* 45: 68-69. (in English) [*Chalcolestes viridis* and *Erythromma viridulum* at several sites on the peninsula.] Address: not stated

**12953.** Defontaine, P. (2012): Richesse odonatologique d'une mare artificielle. *Martinia* 28(2): 69-82. (in French, with English summary) ["The observations made since 1996 on a garden pond are dealt with. Among the 38 odonata species observed, 19 reproduce among which nine do every year. The odonatological diversity of the pond has increased parallel to the vegetation development. Moreover, several species considered to be rare or endangered in the "Région Centre" have been observed (namely *Lestes dryas*, *Coenagrion mercuriale*, *Oxygastra curtisii*, *Somatochlora metallica*, *Brachytron pratense*, *Libellula fulva* and *Sympetrum danae*). Some of them occasionally breed in the pond." (Author)] Address: Defontaine, P., place Adrien Rozier, 12000 Rodez, France. E-mail: pdefontaine12@yahoo.fr

**12954.** Doucet, G.; Jacquot, P. (2012): Éléments sur l'émergence et les exuvies de *Nehalennia speciosa* (Charpentier, 1840) en France (Odonata, Zygoptera: Coenagrionidae). *Martinia* 28(2): 83-88. (in French, with English summary) ["This work is an assessment of the prevalent emergence conditions in the single French population of *N. speciosa*, located in a peat bog in the

south of the Jura department. Most of exuviae were found at the central pool and were located in deep tufts of Sedges at less than 10 cm above the water level. With a size ranging from 10 to 11.5 mm, the exuvia of *N. speciosa* is the smallest of all the exuviae of the French Odonata fauna." (Authors)] Address: Doucet, G., 28A, rue de la Colombière, F-21000 Dijon, France. E-mail: guillaume.doucet@yahoo.fr

**12955.** Doucet, G.; Ruffoni, A. (2012): *Leucorrhinia caudalis* (Charpentier, 1840), nouvelle espèce pour la Côte-d'Or (21) (Odonata, Anisoptera: Libellulidae). *Martinia* 28(2): 127-130. (in French, with English summary) [13-V-2012; "L. caudalis has been discovered in the Bourgogne region since 2006. It breeds in old gravel pits into which abundant aquatic vegetation is now developed. The observation of this protected species in a new department brings us to increase our investigations in the frame of the regional atlas project." (Authors)] Address: Doucet, G., 28A, rue de la Colombière, F-21000 Dijon, France. E-mail: guillaume.doucet@yahoo.fr

**12956.** Doucet, G.; Bedrines, G.; Foutel, C. (2012): Premier cas d'émergence à *Hemianax ephippiger* (Burmeister, 1839) en Bourgogne (Odonata: Anisoptera: Aeshnidae). *Martinia* 28(2): 121-122. (in French) [A teneral female of *A. ephippiger* was photographed at 30-VII-2012 near Saint-Seine-Sur-Vingeanne (Côte d'Or, 21), France. At the same site an exuvia of *A. ephippiger* was found at 4-VIII-2012.] Address: Doucet, G., 128A, rue de la Colombière, F-21000 Dijon, France. E-mail: guillaume.doucet@yahoo.fr

**12957.** Duquef, M. (2012): Reproduction probable d'*Hemianax ephippiger* (Burmeister, 1839) en Guyane (Odonata, Anisoptera: Aeshnidae). *Martinia* 28(2): 126. (in French) [A teneral female of *A. ephippiger* was captured at 21-III-2012 near Sinnamary, French-Guyana.] Address: Duquef, M., 25, rue Paul Baroux, F-80440 Blangy-Tronville, France. E-mail: mauriceduquef@yahoo.fr

**12958.** Feldwieser, G. (2012): Ein weiterer Fund der Grünen Flussjungfer (*Ophiogomphus cecilia*) im Südosten Baden-Württembergs. *Mercuriale* 12: 15-16. (in German, with English summary) [The observation of a male of *O. cecilia* at a gravel pit (MTB 7922 NO, 48°04'43" N, 9°27'21" O, 544 m a.s.l.) was recorded and shortly discussed." (Author)] Address: Feldwieser, G., Gonningerstr. 27, 72793 Pfullingen, Germany

**12959.** Fiedler, J. (2012): Blässhuhn mit erbeutetem Tandem der Kleinen Königslibelle (*Anax parthenope*). *Mercuriale* 12: 63. (in German) [NSG Kohlplattenschlag, Landkreis Karlsruhe, Baden-Württemberg, Germany, 10 vi 2008; an Eurasian Coot (*Fulica atra*) preyed on a tandem of *Anax parthenope*.] Address: not stated

**12960.** FRHO (2012): In Liechtenstein geschützte Arten (Stand 13. Juni 2012). FRHO, Vaduz, 10. August 2012:

[According to the "Verordnung über besonders geschützte Pflanzen- und Tierarten" (Liechtensteinisches Landesgesetzblatt, LGBl. 1996/136; online: <http://www.gesetze.li/Seite1.jsp?LGBl=1996136.xml&Searchstring=arten&showLGBl=true>), the following Odonata species are protected in the state of Liechtenstein: *Enallagma cyathigerum*, *Aeshna cyanea*, *Sympetrum sanguineum*, *Coenagrion pulchellum*, *Pyrrhosoma nymphula*, *Sympetrum fonscolombeii*, *Sympetrum pedemontanum* [sic = pedemontanum], *Calopteryx splendens* [sic = splendens], *Sympetrum flaveolum*, *Somatochlora flavomaculata*, *Lestes sponsa* (sic = sponsa), *Sympetrum vulgatum*, *Cordulia aenea*, *Sympecma fusca*, *Cordulegaster bidentatus*, *Somatochlora metallica*, *Chalcolestes viridis*, *Lestes viridis* [sic], *Sympetrum striolatum*, *Anax imperator*, *Ischnura elegans*, *Aeshna grandis*, *Orthetrum cancellatum*, *Coenagrion mercuriale*, *Aeshna mixta*, *Coenagrion puella*, *Agrion puella* [sic], *Lestes virens*, *Leucorrhinia dubia*, *Ischnura pumilio*, *Orthetrum coerulescens* [sic = coerulescens], *Libellula depressa*, *Sympetrum danae*, *Orthetrum brunneum*, *Sympetrum depressiusculum*, *Aeshna juncea*, *Libellula quadrimaculata*, *Gomphus pulchellus*, and *Cordulegaster boltoni*. According to "Das Übereinkommen über die Erhaltung der europäischen wildlebenden Pflanzen und Tiere und ihrer natürlichen Lebensräume (Berner Konvention, LGBl. 1982/42)" *Coenagrion mercuriale* is protected.]

**12961.** Fulan, J.A.; Henry, R.; Davanso, R. (2012): Os efeitos da ação antrópica sobre a distribuição de macroinvertebrados no Rio Guareí, São Paulo - Anthropogenic action influence on macroinvertebrates distribution in Guareí River, São Paulo State - Brazil. *Estud Biol.* 34 (82): 51-56. (in Portuguese, with English summary) ["In this study, it was examined, during the period from March to December 2006, the effects of human disturbance on the macroinvertebrates that live near macrophytes in Guareí River, São Paulo State - Brazil. It was questioned if the high conductivity recorded in Guareí River affected the distribution of the macroinvertebrates and what were the most important variables that affect macroinvertebrates in a river with a strong nutrient concentration. The objective of this study was to investigate the effects of environmental variables on densities and composition of the macroinvertebrates. Three stands of aquatic plants were sampled with with 0.25 mm mesh net on a 0.07m<sup>2</sup> square metal frame. Air and water temperature, depth, pH, electrical conductivity, suspended solids, dissolved oxygen and macrophyte biomass were measured. A canonical correspondence analysis (CCA) was performed using the density of the macroinvertebrates and environmental variables. Chironomidae, Culicidae, Acanthagrion, *Coryphaeschna*, *Erythrodiplax*, *Miathyria marcella*, *Micrathyria*, *Gastropoda*, *Ostracoda* and *Hemiptera* were the only taxa that showed significant correlation with the axes. From the results, we can conclude that the high conductivity recorded in Guareí River due to the high amount of organic matter released during its course did not significantly affected the distri-

bution of the macroinvertebrates during the studied period. However, the ACC recorded that oxygen was the most significant environmental factor for the density variance of the macroinvertebrates, especially larval Odonata." (Authors)] Address: Fulan, J.A., Biólogo, Univ. Estadual Paulista Júlio de Mesquita Filho (Unesp), doutor, Universidade Federal do Amazonas (UFAM), Manaus, AM - Brasil. E-mail: joaofulan@ig.com.br

**12962.** Gabel, F.; Garcia, X.F.; Schnauder, I.; Püsch, M.T. (2012): Effects of ship-induced waves on littoral benthic invertebrates. *Freshwater Biology* 57: 2425-2435. (in English) ["(1.) Ship-induced waves can affect the physical characteristics of lake and river shorelines, and laboratory studies have shown effects on littoral invertebrates. Here, we explored whether these effects could be observed under field conditions along a natural lake shore affected by wave sequences (trains) produced by boats. (2.) Individuals of five invertebrate species (*Bithynia tentaculata*, *Calopteryx splendens*, *Dikergammarus villosus*, *Gammarus roeselii*, *Laccophilus hyalinus*) were exposed to waves with increasing shear stress in five habitats differing in structural complexity. (3.) Detachment of invertebrates increased with increasing shear stress and was best modelled using sigmoid response curves. Habitat structural complexity mitigated the effects of shear stress, and detachment rate was influenced more by habitat type than by species. A threshold (90% of the individual invertebrates unaffected) stress level of 0.64 N m<sup>2</sup> was found for a structurally complex reed habitat, compared to 0.37 N m<sup>2</sup> for a simple sand habitat. (4.) Shear stress associated with wave trains created by recreational boating at a distance of 35 m from the shore and at a speed of 11 km h<sup>-1</sup> resulted in 45% detachment of littoral invertebrates. Decreasing the boat-to-shore distance to 20 m increased wave shear stress by 30% and invertebrate detachments up to 75%. (5.) Disturbance of littoral habitats and invertebrate assemblages are widespread in inland waters used for recreational and/or commercial navigation. Our findings show that the integrity of littoral zones of navigable surface waters could be much improved by implementing management measures such as physically protecting complex habitats with dense reed belts and tree roots, and reducing boat speeds and increasing their minimum shoreline distance." (Authors)] Address: Gabel, Fredericke, Dept of Limnology of Shallow Lakes & Lowland Rivers, Leibniz-Institute of Freshwater Ecology & Inland Fisheries, Berlin, Germany

**12963.** Gabel, F. (2012): Impacts of ship-induced waves on benthic macroinvertebrates. Dissertation, Landwirtschaftlich-Gärtnerischen Fakultät, der Humboldt-Universität zu Berlin: 124 pp. (in English) ["Inland navigation constitutes a major human use of major rivers and lakes worldwide which is expected to increase in the future. Navigation does not only lead to river training and inputs of toxic compounds, but also significantly affects shore habitats by the ship-induced waves. In contrast to

the importance of such pressures, the effects of these hydrodynamic disturbances on benthic invertebrates in the littoral zones are poorly understood, even that invertebrates constitute a central element of littoral food webs. Hence, in this thesis I investigated i) the direct and immediate effects of ship-induced waves on benthic invertebrates (including *Calopteryx splendens*) in the littoral zone, ii) their subsequent effects on trophic interactions and iii) on the growth and fitness of invertebrates, and finally iv) the long-term effects on the community composition of benthic invertebrates in littoral zones. Both laboratory and field experiments showed increasing detachment of invertebrates with higher wave-induced shear stress, following a sigmoid response curve. Detachment was significantly mitigated by higher structural complexity of some habitats, as complex habitats dissipate wave energy and provide better fixing possibilities for invertebrates. Moreover dislodgement of invertebrates resulted in an elevated risk of being preyed upon by fusiform fish. In contrast, deep bodied fish reduced feeding under wave disturbance. Waves also reduced the growth and energy storage of native invertebrates via reduced feeding rate or increased energy expenditure, while non-native invertebrates were not affected. The cumulative impact of the demonstrated various mechanistic effects of ship-induced waves alters the community composition of benthic invertebrates. The abundance of native invertebrates and total species richness was shown to be lower at sites exposed to ship-waves, while non-native invertebrates increased in abundance. Thus, ship-induced waves affect benthic invertebrates on the individual, species, and community levels, as well as the interaction of trophic levels, and hence will alter the ecological structure and function of whole littoral zones. This knowledge on the pathways how ship-induced waves affect littoral zones may be also used to develop scientifically based and target-oriented management plans for surface waters used as inland waterways. Adverse effects of ship-induced waves may be mitigated by specifically protecting structural complex habitats such as tree roots and dense reed belts, and by minimizing wave generation by increasing minimum sailing distance to shore or by adjusting vessel speed." (Author)] Address: Gabel Friederike, Geographie Landschaftsökologie, Heisenbergstr. 2, 48149 Münster, Germany. E-Mail: gabel@igb-berlin.de

**12964.** Gäde, G.; Marco, H.G. (2012): The adipokinetic hormone (AKH) of one of the most basal orders of Pterygota: structure and function of Ephemeroptera AKH. *Journal of Insect Physiology* 58(11): 1390-1396. (in English) ["This is the first reported primary sequence of a bioactive peptide isolated from three Ephemeroptera families. Peptides of the adipokinetic hormone (AKH) family from the corpora cardiaca of nymphs of *Afronurus* spp. (Heptageniidae), *Siphonurus lacustris* (Siphonuridae) and *Ephemera danica* (Ephemeridae) were investigated functionally in homologous (hypertrehalosaemic activity



demonstrated in *E. danica* nymphs) and heterologous (active in cockroach and locust) bioassays, and structurally by liquid-chromatography coupled with ion trap electrospray ionisation mass spectrometry. All species investigated synthesise the octapeptide code-named Anaim-AKH (pGlu-Val-Asn-Phe-Ser-Pro-Ser-Trp amide). Confirmation of this peptide being present in corpora cardiaca of *E. danica* nymphs was obtained via reverse phase-high pressure liquid chromatography. Phylogenetically, the presence of only one AKH peptide may constitute a basal condition; all other lower insect orders, e.g. Odonata, Blattodea, Orthoptera, amongst others, have more than one AKH analogue. We propose that Anaim-AKH is the ancestral peptide which may support the Palaeoptera hypothesis that mayflies (Ephemeroptera) and dragonflies (Odonata) form the Palaeoptera clade, the sister group of Neoptera. The structural data cannot, however, shed any light on the phylogenetic scenarios within Ephemeroptera itself. Finally, this study demonstrates the successful use of larvae as an alternative biological source to study neuropeptides in ephemeral, elusive or difficult to obtain adult insects." (Authors)] Address: Gäde, G., Zoology Department, University of Cape Town, Rondebosch, ZA-7701, Republic of South Africa.

**12965.** Gheteu, D. (2012): Preliminary study on Odonata larvae (Insecta: Odonata) from "Elesteiele Jijiei Si Miletinului" (ROSPA0042): Population dynamics and conservation issues. *Analele Stiintifice ale Universita.ii „Alexandru Ioan Cuza” din Iasi, s. Biologie animala* 58: 13-21. (in English, with Romanian summary) ["Recent studies on Odonata diversity from farm ponds revealed that species assemblages were not correlated with pond use or to landscape variables and farm ponds made a positive contribution to the maintenance of aquatic biodiversity. Our study was made in Oct. 2010-Oct. 2011 in the fish ponds and rivers from "Elesteiele Jijiei Si Miletinului" (ROSPA0042) on Odonata larvae. Population dynamics and diversity of Odonata species lead us to consider their importance in the assessment of biotic integrity and conservation of the wetlands and ponds." (Author) Data referred to *Calopteryx splendens*, *Ischnura elegans*, *Enallagma cyathigerum*, *Platycnemis pennipes*, *Orthetrum albistylum*, *O. cancellatum*, *Anax imperator*, *Onychogomphus forcipatus*.] Address: Gheteu, Diana, Fac. Biol., Alexandru Ioan Cuza Univ. of Ia.i, B-dul Carol I, no. 20A, 700505 Ia.i, Romania. E-mail: dianaghetu@yahoo.com

**12966.** Gil, J.A.; Chanonoa, G.C.; Coutino Jose, M.A. (2012): Estudio del ámbar con inclusiones biológicas de la Colección Paleontológica de la Secretaría de Medio Ambiente e Historia Natural, Chiapas, México. *Lacandonia* 6(1): 23-29. (in Spanish, with English summary) ["Paleontological Collection of the Secretaría de Medio Ambiente e Historia Natural preserves 215 pieces with biological inclusions that contain a total of 569 organisms. The total of studied organism 73.64 % corresponding to animals and the 26.36 % corresponding to vegetables, bellowing biological groups Magnoliopsida, Lilio-

psida, Coniferopsida, Polypodiopsida, Hepaticopsida, Bryopsida, Insecta, Arachnida, Chilopoda, Diplopoda and Crustacea. The best study biological group is Insecta, being determined the orders Archaeognatha, Thysanoptera, Diptera, Hymenoptera, Coleoptera, Homoptera, Isoptera, Trichoptera, Ephemeroptera, Hemiptera, Orthoptera, Blattodea, Psocoptera, Lepidoptera and Odonata. The order with the greatest number of individuals is Diptera with 143, while Odonata is only represented by one specimen (No further details are given). Have been described six new species, *Swietenia miocenica*, *Hymenaea allendis*, *Episinus penneyi*, *Culopilla aguilerai*, *Plectropsyche alvarezii* and *Antillopsyche mexicana*. Additionally, with the pieces of the amber collection has participated in various cultural scientific events developments within and outside of the State." (Authors)] Address: Gil, J.A., Coordinación Técnica de Investigación, Secretaría de Medio Ambiente e Historia Natural y Facultad de Biología de la Universidad de Ciencias y Artes de Chiapas, Mexico.

**12967.** Gnanakumar, M.; Ansil, B.R.; Nameer, P.O.; Das, S. (2012): Checklist of Odonates of Chimmony Wildlife Sanctuary. *Malabar Trogon* 10(1&2): 3-6. (in English) [Chimmony Wildlife Sanctuary (10°26'N 10°26'N; 76°31'E 76°37'E) (Fig. 1) is situated in Thrissur District of Kerala, India. 55 odonate species including the Western Ghats endemic *Platysticta deccanensis* were recorded.] Address: Gnanakumar, M., Malabar Nat. Hist. Soc., Sushela Mandir, B. G. Road, Nadakavu Post, Calicut-673011, India. E-mail: kumargm33@gmail.com

**12968.** Hodgson, I.; Beugg, J. (2012): Reports from coastal stations - 2011: Sandwich Bay Bird Observatory, Kent. *Atropos* 45: 64-65. (in English) [UK; *Lestes barbarus*, *Sympetrum fonscolombii*, *Libellula fulva*, *L. quadrimaculata*, and *Anaciaeschna isoceles* were reported.] Address: not stated

**12969.** Huber, K. (2012): Die Bedeutung neuer Feuchtbiootope für Libellen. *Informativ. Ein Magazin des Naturschutzbundes Oberösterreich* 68: 9. (in German) [Machland, Oberösterreich, Austria. Shallow, well sunned ponds were created and observed for their colonisation by Odonata. The paper briefly outlines without details a few highlights, including the fact that all in Austria represented species of *Orthetrum* could be observed at one locality. *Coenagrion scitulum* could be observed for the first time in 2012 in this federal state.] Address: not stated

**12970.** Hunter, I.; Hunter, S. (2012): Reports from coastal stations - 2011: Elms Farm, Icklesham, East Sussex. *Atropos* 45: 58-59. (in English) [*Erythromma viridulum* peaked at 24-VIII-2011 to 366 individuals. *Anax ephippiger* was recorded at 13-IX-2011.] Address: not stated

**12971.** Iorio, E. (2012): Nouvelles observations de *Gomphus graslinii* Rambur, 1842 dans le Canal de la Vallée des Baux à Arles (Bouches-du-Rhône) (Odonata-

ta, Anisoptera: Gomphidae). *Martinia* 28(2): 103-106. (in French, with English summary) ["*G. graslinii* was again observed in the vicinity of the city of Arles (Bouches-du-Rhône department, France) along the Canal de la Vallée des Baux. This time, our observations have been done on the part of the Canal de la Vallée des Baux near the "Barbégat" Castel, of which one on the east of the road D 33. We totalize four contacts with four different specimens along the concerned canal. It suggests a regular presence of this species and supports its autochthony in this place." (Author)] Address: Iorio, E., ÉCO-MED (Écologie & Médiation), Pôle Entomologie, Tour Méditerranée, 65 av. Jules Cantini, F-13298 Marseille Cedex 20, France. E-mail: e.iorio@ecomed.fr

**12972.** Jensen, J.K.; Nielsen, O.F. (2012): The Vagrant Emperor Anax ephippiger (Burmeister, 1839) (Aeshnidae, Odonata) found on the Faroe Islands in 2011. *Ent. Meddr.* 80: 3-6. (in Danish, with English summary) ["In the spring of 2011 three specimens of *A. ephippiger* were found on the Faroe Islands. Two were recorded on 13th and one on the 15th of April 2011, all males. There were no other sightings of the species later in 2011. No dragonflies (Odonata) breed in the Faroe Islands and there was only one earlier finding of a dragonfly, an introduced *Calopteryx virgo*." (Authors)] Address: Nielsen, O.F., Tulstrupvej 112, DK 8680 Ry, Denmark. E-mail: ofn.orth@tdcspc.dk

**12973.** Johnson, A.; Phillips, J. (2012): Reports from coastal stations - 2011: Hayling Island, Hampshire. *Atropos* 45: 56-57. (in English) [30-VII-2011, Anax imperator at MV light.] Address: not stated

**12974.** Jung, K.S. (2012): Odonatological research society of Korea (Osok). *Notul. odonatol.* 7(9): 87-88. (in English) [Verbatim: The Society was founded on 13 May 2006. By September 2011, it had 36 members; the current President is the author of this note. The objective of the Society is the study of odonate systematics, faunistics and distribution in the Korean peninsula. The results are published in the biennial OSOK-Report, the 3rd volume of which is in preparation now. So far 123 species are known to occur in Korea; 102 of these were recorded from South Korea, including 29 Zygoptera (4 families, 13 genera) and 73 Anisoptera (6 families, 39 genera). Since the establishment of the Society, its members brought on record *Paracercion sieboldii*, *Sympetrum fonscolombii* (both in 2007) and *Brachidiplax chalybea flavovittata* (in 2010) for the first time from South Korea. In 2011, an undescribed *Boyeria* species was discovered. The response of the odonates to the recent climate change is receiving particular attention by the Society. As climate-sensitive biological indicator species in Korea were selected *Ceriagrion nipponicum*, *Ischnura elegans*, *Sympetrum speciosum* and *S. striolatum*. Since 2009, the status and habitats of these species are regularly monitored. So far, Nannophya

pygmaea has been the sole species on the Odonata Red List of Korea. Following the suggestion by the Society, *Macromia daimoji* and *Libellula angelina* were added in 2011. The publication of the monographic works, *Dragonflies and damselflies of Korea* (2012, Ill-gongyuska, Seoul) and *Odonata larvae of Korea* (2011, Nature & Ecology Academic Series, Seoul), both by the author of this note, facilitates the work on the Korean odonates.] Address: Jung, K.S., 6F, IBS Building, 1572-18 Seocho-Dong, Seocho-ku, Seoul 137-070, Korea

**12975.** Kadye, W.T.; Booth, A.J. (2012): Detecting impacts of invasive non-native sharptooth catfish, *Clarias gariepinus*, within invaded and non-invaded rivers. *Biology and Conservation* 21(8): 1997-2012. (in English) ["In aquatic ecosystems, impacts by invasive introduced fish can be likened to press disturbances that persistently influence communities. This study examined invasion disturbances by determining the relationship between non-native sharptooth catfish *Clarias gariepinus* and aquatic macroinvertebrates in the Eastern Cape, South Africa. A Multiple Before-After Control-Impact (MBACI) experimental design was used to examine macroinvertebrate communities within two rivers: one with catfish and another one without catfish. Within the invaded river, macroinvertebrates showed little response to catfish presence, whereas predator exclusion appeared to benefit community structure. This suggests that the macroinvertebrate community within the invaded river was adapted to predation impact because of the dominance of resilient taxa, such as Hirudinea, Oligochaeta and Chironomidae that were abundant in the Impact treatment relative to the Control treatment. High macroinvertebrate diversity and richness that was observed in the Control treatment, which excluded the predator, relative to the Impact treatment suggests predator avoidance behaviour within the invaded river. By comparison, within the uninvaded river, catfish introduction into the Impact treatment plots indicated negative effects on macroinvertebrate community that was reflected by decrease in diversity, richness and biomass. A community-level impact was also reflected in the multivariate analysis that indicated more variation in macroinvertebrate composition within the Impact treatment relative to the Control in the uninvaded river. Catfish impact within the uninvaded river suggests the dominance of vulnerable taxa, such as odonates that were less abundant in the Impact treatment plots after catfish introduction. From a disturbance perspective, this study revealed different macroinvertebrate responses to catfish impact, and suggests that within invaded habitats, macroinvertebrates were less responsive to catfish presence, whereas catfish introduction within uninvaded habitats demonstrated invasion impact that was shown by a decrease in the abundance of vulnerable taxa. The occurrence of non-native sharptooth catfish within many Eastern Cape rivers is a concern because of its predation impact and potential to influence trophic interrelationships, and efforts should be

taken to protect uninvaded rivers, and, where possible, eradicate the invader." (Authors) Taxa including Odonata were treated at family level.] Address: Booth, A.J., Dept Ichthyology & Fishery Science, Rhodes University, P.O. Box 94, Grahamstown, 6140 South Africa. E-mail: t.booth@ru.ac.za

**12976.** Keil, P.; Buch, C.; Kowallik, C.; Rautenberg, T.; Schlüpmann, M. & Unseld, K. (2012): Bericht für das Jahr 2011. Jahresberichte der Biologischen Station Westliches Ruhrgebiet, Oberhausen 9, 90 S. 2. korrigierte Ausgabe: 92 pp. (in German) [This report on the activities of the Biologische Station Westliches Ruhrgebiet, Oberhausen for 2011, includes several brief notes on odonatological studies and documented interesting records.] Address: Biologische Station Westliches Ruhrgebiet e. V., Ripshorster Str. 306, 46117 Oberhausen, Germany

**12977.** Khelifa, R. (2012): Flight period, apparent sex ratio and habitat preferences of the Maghribian endemic *Calopteryx exul* Selys, 1853 (Odonata: Zygoptera). *Revue d'écologie* 68(1): 37-45. (in French, with English summary) [*Calopteryx exul* is an endangered endemic Odonata species restricted to the Maghreb that shows an increasing concern about its conservation status, due to substantial habitat loss. A study dealing with its flight period, the apparent sex-ratio of imagoes and adult habitat preferences was carried out in the Seybouse basin, northeastern Algeria, during two years. The flight period of the species begun on early May and ended on late July, showing a peak around late May / early June. Either a small second generation or delayed emergences was responsible of the record of scarce teneral and immatures in early September. Additional larval investigations are needed to elucidate the origin of such late emergences. The maturation period was estimated to extend over 11-12 days. The apparent daily sex-ratio in the adult population present on site was mostly biased with 65 to 67% of females. Additional work addressing sex-ratio at emergence is needed to understand this disequilibrium. Multivariate analysis showed that adults of *C. exul* prefer relatively fast flowing shallow water when compared to its congeneric *C. haemorrhoidalis*, which was mainly observed at deeper, slower and very shaded running waters with dense banks vegetation. The population of *C. exul* dealt with in this study is currently the largest one reported so far in the Maghreb. Data on adult phenology and habitat preferences will allow future investigations about the present distribution of the species in Algeria and the whole Maghreb." (Author)] Address: Khelifa, R., Département d'écologie et du génie de l'environnement, Faculté des Sciences de la Nature et de la Vie et des Sciences de la Terre et de l'Univers, Université 08 Mai 1945, Guelma 24000, Algeria

**12978.** Kiel, E.; Kastner, F.; Lühken, R.; Schröder, M. (2012): Die Wirbellosenfauna in Gräben Norddeutsch-

lands. *Natur und Landschaft* 87(8): 347-350. (in German, with English summary) [Oldenburg, Niedersachsen, Germany; "This article reviews macroinvertebrate studies on ditches in Europe. It focuses on aspects of biodiversity and the role ditches can play in meeting nature conservation objectives. By means of new data on dragonfly fauna and fundamental ecological aspects of specific ditches in northern Germany, we discuss the value of ditch systems in terms of nature conservation practice in an intensively used environment. Examples are given in order to explain the dimension of their positive impact. These data reveal the important ecological value ditch systems can have for rare and endangered aquatic species and the terrestrial fauna even in distant areas." (Authors) Special emphasis was given to the densities of *Aeshna viridis* in meadow ditches.] Address: Kiel, Ellen, AG Gewässerökologie und Naturschutz, Institut für Biologie und Umweltwissenschaften, Carl von Ossietzky Universität Oldenburg, Ammerländer Heerstr. 114 –118, 26129 Oldenburg, Germany. E-mail: ellen.kiel@uni-oldenburg.de

**12979.** Knill-Jones, S. (2012): Reports from coastal stations - 2011: Isle of Wight. *Atropos* 45: 54-56. (in English) [*Anax parthenope*, *Sympetrum fonscolombii*, *S. vulgatum*] Address: Knill-Jones, S.A., 2 School Green Road, Freshwater, Isle of Wight, PO40 9AL, UK

**12980.** Li, H.-x.; Zhang, R.-q.; Wu, F.-c.; Guo, G.-h.; Feng, C.-l. (2012): Comparison of mercury species sensitivity distributions of freshwater biota in China and the United States. *Acta Scientiae Circumstantiae* 32(5): 1183-1191. (in Chinese, with English summary) ["Based on single-species freshwater acute toxicity data in China and the United States, species sensitivity distributions (SSDs) of vertebrates (including fish) and invertebrates (including arthropods and non-arthropod invertebrates) to mercury were constructed, and species sensitivity to mercury in these two countries were compared. The results of this study indicated that there was no significant difference between sensitivity distributions of the Chinese and American taxa. However, the hazardous concentration for 5% of the species (HC5) range of Chinese species to short-term mercury exposure was lower than that of the American species, especially for non-arthropod invertebrates. HC5 for American non-arthropod invertebrates to mercury was 7D times larger than that for the corresponding Chinese species. Under the 95% protection level and including all the species, the tested invertebrates were more sensitive to mercury than the vertebrates in both China and the United States. However, in the lower taxonomic classification level, the sensitivity decreased in the order of arthropod > non-arthropod invertebrates > fish in China, but the order was arthropods > fish > non-arthropod invertebrates in the United States. Therefore, in determining the water quality criteria based on the sensitivity of all the species, we should also consider the influence of SSD of individual groups. The water quality



criteria derived from the species sensitivity distribution of American species may make the aquatic species in China out of protection." (Authors) The paper includes a reference to Odonata.] Address: Wu, F.-c., State Key Laboratory of Environmental Criteria and Risk Assessment, Chinese Research Academy of Environment Sciences, Beijing 100012, China. E-mail: wufengchang@vip.skleg.cn

**12981.** Lu, C.-w.; Yang, R.-g.; Chen, Y.; Zhang, B.-l.; Huang J.-h.; Zhou, S.-y. (2012): A preliminary study of Odonata in Mao'er Mt. Nature Reserve of Guangxi, China. *Journal of Guangxi Normal University (Natural Science Edition)* 30(1): 95-104. (in Chinese, with English summary) [The Odonata collection of Insect Collections of Guangxi Normal University includes 57 species from Mao'er Mt. Nature Reserve of Guangxi. Among them, 19 species were newly recorded in Guangxi: *Orthetrum testaceum*, *O. lineostigma*, *Sympetrum ruptum*, *S. kunckeli*, *Lyriothemis flava*, *Zygonyx iris insignis*, *Idionyx victor*, *Somatochlora dido*, *Anotogaster kuchenbeiseri*, *Cephalaeschna acutifrons*, *Gynacantha bayadera*, *Planaeschna shanxiensis*, *Asiagomphus hainanensis*, *Asiagomphus pacificus*, *Lamelligomphus ringens*, *Amphigomphus hansonii*, *Gomphidia kelloggi*, *Mnais andersoni*, and *Coeliccia sexmaculata*.] Address: Lu, C.-w., College of Life Science, Guangxi Normal University, Guilin Guangxi 541004, China

**12982.** Marković, V.; Vasiljević, B.; Atanacković, A.; Tomović, J.; Zorić, K.; Tubić, B.; Paunović, M. (2012): Status assessment of the Lim River based on macroinvertebrate communities. *BALWOIS 2012 - Ohrid, Republic of Macedonia - 28 May, 2 June 2012*: 4 pp. (in English) ["Status assessment of the Lim River was carried out by using aquatic macroinvertebrates as the most commonly used biological quality element. Investigation was performed during July 2011, and comprised five sites. The saprobic index (Zelinka-Marvan), BMWP and ASPT were calculated to assess of the level of environmental stress i.e. organic pollution. Water quality status according to Zelinka-Marvan index varied from 1.90 to 2.35. Values of BMWP biotic index ranged from 31 to 113 and for ASPT index from 5.17 to 6.65. According to results of the investigation, the ecological status of the water body the Lim River can be evaluated as high to good considering SI and ASPT values and high to moderate status in accordance with BMWP index." (Authors) Only *Gomphus vulgatissimus* was observed in the Lim River.] Address: Marković, Vanja, Institute for Biological Research "Siniša Stanković", Belgrade, Serbia

**12983.** Miszta, A.; Przondziona, K. (2012): [Dragonflies in the Katowice Forest Park, 2: composition of the odonate fauna during 2002-2011]. *Przyroda Górnego Śląska* 70: 7-10. (in Polish) [Poland; the regional fauna comprises of 38 Odonata species.] Address: Miszta, A.,

Centrum Dziedzictwa Przyrody Górnego Śląska, Katowice, Poland

**12984.** Miszta, A.; Cuber, P.; Dolný, A.; Liberski, J. (2012): Yellow-spotted Whiteface *Leucorrhinia pectoralis* (Charpentier, 1825) (Odonata: Libellulidae) in the Silesian Province in the years 2002–2012. *Odonatrix* 8(2): 33-42. (in Polish, with English summary) [*L. pectoralis* was studied at 244 sites in the Silesian Province in 2002–2012, and was recorded at 34 sites. "The comparison of the present with historical data from the years 1958–1965 showed that *L. pectoralis* vanishes from peat bogs in this region. The reason for this situation is deteriorating condition of these habitats, mainly because of their desiccation and industrial pollution. It was noted however, that the species is present in a relatively high number on forest sinkhole ponds emerging over coal exploitation areas in the central, industrialized part of the province. Approximately 20% of investigated sinkholes presented conditions favourable for the reproduction and development of *L. pectoralis*. However, these habitats are unstable and do not sustain permanent presence of the species." (Authors)] Address: Miszta, Alicja, Centrum Dziedzictwa Przyrody Górnego Śląska, ul. Św. Huberta 35, 40–543 Katowice, Poland. E-mail: a.miszta@cdpgs.katowice.pl

**12985.** Norval, G.; Huang, S.-C.; Mao, J.-J.; Goldberg, S.R.; Slater, K. (2012): Additional notes on the diet of *Japalura swinhonis* (Agamidae) from southwestern Taiwan, with comments about its dietary overlap with the sympatric *Anolis sagrei* (Polychrotidae). *Basic and Applied Herpetology* 26: 87-97. (in English) ["*Japalura swinhonis* is an endemic agamid lizard in Taiwan, and although its diet has been examined in northern Taiwan and Orchid Island, it has not been investigated in other parts of its range. Investigating the diet of a species from different parts of its range is crucial due to temporal and spatial variations in it. This study examined the dietary items of 47 *J. swinhonis* from Santzepu and Yunlin, southwestern Taiwan. We also reviewed the diet of *J. swinhonis* and compared it with that of *A. sagrei* from Santzepu, where these species are sympatric in anthropogenically created habitats such as *Areca* catechu plantations and fruit orchards. The diet of *J. swinhonis* from Santzepu was dominated by hymenopterans, followed by coleopterans, lepidopterans and trichopterans, while that of the *J. swinhonis* from Yunlin was dominated by isopterans, followed by hymenopterans, lepidopterans and coleopterans. The diet of *A. sagrei* from Santzepu was mainly dominated by hymenopterans, lepidopterans, araneids, hemipterans, coleopterans, dipterans, isopterans and orthopterans, in that order of frequency. From the results of this study it is evident that in areas where *J. swinhonis* and *A. sagrei* are sympatric there is a substantial dietary niche overlap, and competition for prey is very likely." (Authors) The paper includes a few references to Odonata as prey of *Anolis sagrei*.] Address: Norval, G., Applied Behavioural Ecology & Ecosystem Research

Unit, Department of Environmental Sciences, University of South Africa, Republic of South Africa. E-mail: gnovral@gmail.com

**12986.** Nowak, M. (2012): Intrasexueller Kannibalismus bei *Ischnura elegans*. *Mercuriale* 12: 61-62. (in German, with English summary) ["In 2008, a case of intrasexual cannibalism was observed in southern France (Pont de Gau, Carmargue): A copulating female was feeding on a immature female of the variation *Ischnura elegans* f. *violacea*." (Author)] Address: Nowak, M., Fuchseckstr. 16/1, 73114 Schlat, Germany. E-mail: Nowak-Schlat@t-online.de

**12987.** Odin, N. (2012): Reports from coastal stations - 2011: Landguard Bird Observatory, Suffolk. *Atropos* 45: 67-68. (in English) [UK; *Chalcolestes viridis*, *Brachytron pratense*] Address: not stated

**12988.** Orr, R. (2012): 2011-2012 Survey of the dragonflies and damselflies (Odonata) of the Cove Point LNG property (Calvert county, Maryland). <http://www.covepoint-trust.org/studies.html>: 20 pp. (in English) [USA; "Full property surveys for Odonata were completed in 1998-1999 and again in 2011-2012. In addition, a limited survey was completed along the LNG pipeline right-of-way in 2005. To date, 62 Odonata species have been recorded from the Cove Point LNG property. Seven of the sixty-two species were added since the end of the 1998-1999 survey. Two State-listed Maryland Endangered dragonflies (*Gomphus rogersi* and *Somatochlora filosa*) complete their life cycle on the property. The known larval site of *G. rogersi* is a small stream along the pipeline right-of-way while the larval site of *S. filosa* is Cove Point Marsh. Between the times of the two full property surveys, the larval site of *S. filosa* (Cove Point Marsh) was impacted by storm breaches resulting in saltwater from the Chesapeake Bay mixing with the freshwater of the marsh. In addition, the larval site of *G. rogersi* (along the LNG pipeline right-of-way) had been intersected by the placement of an additional underground pipeline. Both sites have undergone extensive environmental restoration in the hopes of returning these wetlands to their original condition. Before the 2011-2012 survey the fate of the two State-listed species that were first reported during the 1998-1999 survey were unknown. *S. filosa* and *G. rogersi* were relocated during the 2011-2012 survey. Both species were found in reduced numbers in comparison with the 1998-1999 survey. The reduction in the number of individual *S. filosa* is likely due to a decrease in the size of the larval habitat that is now restricted just to the northern section of Cove Point Marsh. The reduction in the number of individual *G. rogersi* is the result of a beaver dam that flooded the small stream where the larvae previously existed. Human intervention has returned the *G. rogersi* habitat to its 1999 condition by removing the dam plus restoring the surrounding environment from the burying of the new pipeline. The restoration of Cove

Point Marsh is currently in progress and it is reasonable to assume that when (or if) the southern section of Cove Point Marsh returns to a healthy freshwater habitat that *S. filosa* will recover to its earlier numbers." (Author) For the complete study see: <http://www.covepoint-trust.org/studies.html>] Address: Orr, R., Mid-Atlantic Invertebrate Field Studies, [www.marylandinsects.com](http://www.marylandinsects.com), USA. E-mail: [odonata457@comcast.net](mailto:odonata457@comcast.net)

**12989.** Parr, A. (2012): Migrant dragonflies in 2011 including recent decisions and comments by the Odonata Records Committee. *Atropos* 45: 30-35. (in English) [Records of the following species are documented and discussed: *Lestes barbarus*, *Chalcolestes viridis*, *Coenagrion scitulum*, *Ischnura elegans*, *I. senegalensis*, *Erythromma viridulum*, *Aeshna affinis*, *A. mixta*, *Anaciaeschna isocetes*, *Anax ephippiger*, *A. imperator*, *A. parthenope*, *Somatochlora arctica*, *Sympetrum flaveolum*, *S. fonscolombii*, and *S. striolatum*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: [Adrian.parr@bbsrc.ac.uk](mailto:Adrian.parr@bbsrc.ac.uk)

**12990.** Pepa, B.; Papparisto, A.; Keçi, E. (2012): Preliminary data of water quality of Osumi, Devolli and Shkumbini River based on benthic macro invertebrates during summer of year 2011. *BALWOIS 2012 - Ohrid, Republic of Macedonia - 28 May, 2 June 2012*: 1-12. (in English) ["Recently, monitoring of water quality of Albanian River has a high interest. Based on instructions of Water Frame Directive (WFD) for the water body study an efficient element in monitoring and assessment of water quality are benthic macro-invertebrates. Our study was focused on Osumi, Devolli and Shkumbini River during summer 2011, and the purpose is to show relations between benthic macro-invertebrates and water quality. For each River was monitored respectively three stations. Where Osumi River show that, the total number of organisms is 509 that are related to 18 taxons, and in Devolli River are found 389 organisms that are related to 17 taxons. While in Shkumbini River are found 809 organisms which are related to 25 taxons. The result has shown that: EPT-Biotic Index represent different values in different stations. Osumi River: St 1 =4.32, St 2=3.99, St 3 =5.1; Devoll River: St 1 =3.90, St 2=3.93, St 3 =3.76; Shkumbini River: St 1 =3.86, St 2=4.37, St 3 =3.96. Based to these data the water quality of each river is Good (bioclassification 3.75-6.5). Also two others parameters (SWRC-Biotic Index, Family- Biotic Index) are in accordance with EPT- Biotic. Three Rivers have a good water quality with a slight impact." (Authors) Taxa including Odonata were treated at the family or suborder level.] Address: Pepa, B., Faculty of Natural Sciences, Tirana University, Albania. E-mail: [bledpepa@hotmail.com](mailto:bledpepa@hotmail.com)

**12991.** Pessacq, P.; Santos, T.C.; Costa, J.M. (2012): Checklist and updated distribution of Protoneuridae from Brazil. *International Journal of Odonatology* 15(2): 59-73. (in English) ["Protoneuridae are represented in

the Neotropics by 16 genera and 117 species, of which 64 species in 12 genera are known to occur in Brazil. Most of them are known only from the original descriptions or isolated records. During 2009 the Protoneuridae collection of MNRJ was revised; 2800 specimens were studied, belonging to 40 species in nine genera. As a result, the distribution of 25 species is extended, including 50 new records for several states and three new records for the country: *Epipleoneura lamina* Williamson, *Protoneura woytkowskii* Gloyd, and *Psaironeura remissa* (Calvert). The widest distributions are shown by *Neoneura sylvatica* Hagen in Selys, *Epipleoneura venezuelensis* Rácenis, and *Epipleoneura metallica* Rácenis, which are also recorded from the highest number of states: 11 and eight respectively. Additionally, the distribution of most species within previously recorded states is extended." (Authors)] Address: Pessacq, P., CONICET - Facultad de Ciencias Naturales, (LIESA), Universidad Nacional de la Patagonia San Juan Bosco, Sarmiento 849, 9200, Esquel, Chubut, Argentina. E-mail: pablopessacq@yahoo.com.ar

**12992.** Phiri, C.; Chakona, A.; Day, J.A. (2012): Body-size distribution, biomass estimates and life histories of common insect taxa associated with a submerged macrophyte *Lagarosiphon ilicifolius* in the Sanyati Basin, Lake Kariba, Zimbabwe. *African Journal of Aquatic Science* 37(3): 289-299. (in English) ["The body-size distributions and biomass estimates of *Caenis* (Ephemeroptera: Caenidae), *Cloeon* (Eph.: Baetidae), *Coenagrionidae* (Odonata), *Micronecta* (Hemiptera: Corixidae), *Chironominae* (Diptera: Chironomidae) and *Orthocladiinae* (Chironomidae), the most common and abundant insect taxa associated with a submerged macrophyte *Lagarosiphon ilicifolius* in Lake Kariba, are presented. *Caenis* has a univoltine life cycle, whilst *Cloeon*, *Coenagrionidae*, *Chironominae* and *Orthocladiinae* have multivoltine life cycles. Growth and reproduction of *Micronecta* occurred all year round. The *Coenagrionidae* had the highest mean biomass, which was significantly greater than those of the other taxa. *Caenis* and *Orthocladiinae* were sensitive to variations in water temperature and dissolved oxygen (DO) concentration, their highest biomasses occurring when temperatures were low and DO concentrations high. The biomasses of *Chironominae* and *Orthocladiinae* increased with rising water levels, but that of *Caenis* decreased. Total insect biomass was minimally affected by variations in water physico-chemical variables. The study suggests that water temperature, water level and DO concentration do have an effect on the biomasses of some insect taxa associated with *Lagarosiphon* in Lake Kariba. Mixing processes during de-stratification also affect the abundance and biomass of the insect taxa." (Authors)] Address: Phiri, C., University of Zimbabwe Lake Kariba Research Station, PO Box 48, Kariba, Zimbabwe

**12993.** Qiu, F.; Zhang, Q.; Li, C.-r.; Spatafora, J.; Fan, M.-z.; Li, Z.-z.; (2012): The genus *Cordyceps* and its al-

lies from Anhui. *Journal of Anhui Agricultural University* 39(5): 803-806. (in Chinese, with English summary) ["In this paper, 20 species of *Cordyceps* and its allies from some nature preserves in Anhui Province were reported as follows: *Cordyceps brongniartii* and its anamorph *Beauveria brongniartii*, *C. cylindrica* and its anamorph *Nomuraea atypicola*, *Metacordyceps guniujiangensis* and its anamorph *Metarhizium* aff. *cylindro-sporum*, *Ophiocordyceps heteropoda* var. *langyashanensis* and its anamorph *Hirsutella heteropoda*, *O. melolonthae*, *O. odonatae*, *O. gryllotalpae*, *C. kusanagiensis* and so on. Among them, *O. melolonthae* is a new record to China mainland and a minor error in original description of *O. odonatae* was revised. Specimens examined are deposited in Research Center on Entomogenous Fungi, Anhui Agricultural University (RCEFAAU)." (Authors)] Address: Qiu, F., Anhui Provincial Key Laboratory for Microbial Control, Hefei 230036, China. E-mail: chunruli@hotmail.com

**12994.** Rattu, A.; Atzeni, A.; Bzzato, E.; Cillo, D. (2012): 550 - *Selysiothemis nigra* (Van der Linden, 1825) (Odonata Libellulidae). *Boll. Soc. Entomol. Ital.* 144(3): 136. (in Italian) [A record from the isle of Sardegna, Italy is documented: prov. Cagliari, parco Naturale Regionale Molentargius - Saline, Quartu Sant'elena, Is Arenas, 7. & 13.VII.2010, A. Rattu & A. Atzeni leg., 3 specimens. (coll. Rattu); id., Stagno di Quartu S.e., 9.VII.2010, A. Rattu leg., 1 specimen. (coll. Rattu). *Aeshna mixta*, *Crocothemis erythraea*, *Brachythemis impartita* and *Orthetrum trinacria* were collected from the same habitat too.] Address: Rattu, A., via del pozzetto 2, 09130 Cagliari CA, Italy. E-mail: andrearattu@virgilio.it

**12995.** Sansault, E.; Baeta, R.; Présent, J. (2012): *Leucorrhinia pectoralis* (Charpentier, 1825), une nouvelle espèce pour l'Indre-et-Loire (37), région Centre (Odonata, Anisoptera: Libellulidae). *Martinia* 28(2): 123-125. (in French, with English summary) ["During various biodiversity surveys led by the non profit organization Caudalis in both May and June 2012, three sites hosting males of *L. pectoralis* were discovered in the basin of Savigné area, Indre-et-Loire, France. This discovery represents the first sightings of this species in Indre-et-Loire. One site in particular hosted a dozen of males showing territory behaviour. Even if autochthony can not be proved yet, all sites discovered perfectly match the species' ecological requirements." (Authors)] Address: Sansault, E., Association Naturaliste d'Étude et de Protection des Écosystèmes (ANEPE) « Caudalis », 118 rue de l'Ermitage, F-37100 Tours, France. E-mail: anepe.caudalis@g mail.com

**12996.** Schiel, F.-J.; Hunger, H. (2012): Vermehrtes Auftreten der Großen Moosjungfer (*Leucorrhinia pectoralis*) in der badischen Oberrheinebene 2012 (Odonata: Libellulidae). *Mercuriale* 12: 37-44. (in German, with English summary) ["In the German Federal State of Baden-Württemberg, the distribution of *L. pectoralis* is mainly



restricted to the southeastern prealpine region. In the Upper Rhine Valley, the species had so far only been recorded at 13 sites between 1959 and 2011; this included one site where the species has reproduced since 2008. In 2012, the species was surprisingly observed 13 times at eleven sites in the Upper Rhine Valley of Baden-Württemberg. Northernmost and southernmost site are about 135 km apart. In only one case a female was observed. All other observations referred to single or few males. The observations in the Upper Rhine Valley corresponded with an increased occurrence in large parts of central and western Europe. Therefore we conclude that there has been long distance dispersal from the northern parts of central Europe which has been favoured by northeasterly winds. It is very probable that this type of dispersal has also occurred to a extent in the past." (Authors)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, 77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**12997.** Schiel, F.-J. (2012): Nachtrag zur Verbreitung von Kleiner und Glänzender Binsenjungfer (*Lestes virens*, *L. dryas*) am Oberrhein (Odonata: Lestidae). *Mercuriale* 12: 23-26. (in German, with English summary) ["Three records of *L. virens* and one of *L. dryas*, documented by E. & K. Westermann from 1977 to 1981 and additionally recent findings of both species in 2012 are supplemented to the synopsis of Schiel (2011). Especially the records of E. & K. Westermann are important for our understanding of the distribution of these two species in the upper Rhine valley. In all *Lestes virens* was recorded at 26 sites in the upper Rhine valley of the German Land of Baden-Württemberg and *L. dryas* at 11 sites. Between 1958 and 1999 *L. virens* was recorded at 11 sites and between 2000 and 2012 at 18 sites. From 1922 to 1999 *L. dryas* was found at four sites in this part of the upper Rhine valley and from 2000 to 2012 at seven sites. New distribution maps are presented and the records are shortly discussed." (Author)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**12998.** Schmid, F. (2012): Fehlpaarungen von *Sympetma fusca* und *S. paedisca* (Odonata: Lestidae). *Mercuriale* 12: 33-36. (in German, with English summary) ["In 2011 and 2012, four heterospecific connections between *S. fusca* and *S. paedisca* were observed in the prealpine region of the German Land of Baden-Württemberg. One heterospecific copulation, observed at 04-V-2012, lead subsequently to an interspecific oviposition and was documented by photographs." (Author)] Address: Schmid, F., Graben 23, 72525 Münsingen, Germany. E-mail: fcschmid@t-online.de

**12999.** Schmid, F. (2012): Bemerkenswerte Schlupföhnen von Zweifleck (*Epithea bimaculata*) und Gemeiner Falkenlibelle (*Cordulia aenea*) an einem See im ober-schwäbischen Alpenvorland (Odonata: Corduliidae). *Mer-*

*curiale* 12: 57-58. (in German, with English summary) [Baden-Württemberg, Germany; "At a trunk of a *Larix decidua*-tree larvae of *Cordulia aenea* were proofed to climb up to 2.8 m and those of *Epithea bimaculata* up to 6.05 m above the ground." (Author)] Address: Schmid, F., Graben 23, 72525 Münsingen, Germany. E-mail: fcschmid@t-online.de

**13000.** Schmidt, B. (2012): Widerfund von *Leucorrhinia albifrons* (Burmeister, 1839) (Odonata: Libellulidae) in Baden-Württemberg. *Mercuriale* 12: 17-22. (in German, with English summary) ["On 09-VII-2012, two males of *L. albifrons* were observed at a shallow water shore with reed bed (*Schoenoplectus lacustris*) at lake Badsee, Allgäu (county of Ravensburg, prealpine region, southwest Germany). It's the third time this taxon has been recorded in Baden-Württemberg for the last 100 years. Locality, habitat and water body are described and the origin of the specimens is discussed." (Author)] Address: Schmidt, B.K., Alpenstr.27, 88045 Friedrichshafen, Germany. E-mail: Bertrand.Schmidt@gmx.de

**13001.** Scon; D.A. (2012): Reports from coastal stations - 2011: Dursey Island, Co. Cork. *Atropos* 45: 78-79. (in English) [UK; *Sympetrum fonscolombii*]

**13002.** Scott, M.A.; Scott, W.J. (2012): Reports from coastal stations - 2011: Longstone Centre, St Mary's, Isles of Scilly. *Atropos* 45: 44-45. (in English) [22 records of *Sympetrum fonscolombii* between 12 Oct. and 6 Nov 2011; *Anax ephippiger* on 15 Oct. 2011.] Address: not stated

**13003.** Shi, X.; Yu, H. (2012): Finite element analysis of dragonfly wing structural stiffness. *Nongye Jixie Xuebao* (Transactions of the Chinese Society of Agricultural Machinery) 43(1): 224-229. (in English) ["The dragonfly wings were taken as the study objects, CAD and finite element analysis software ANSYS were applied to establish the finite element model of dragonfly wings. Through static analysis, the main vein structure was determined as load-bearing structure in dragonfly wings, the main vein and secondary veins coordinating so as to make the overall structure more reasonable. According to the characteristics of dragonfly wings wrinkled structure, the mesh model of rectangular and staggered quadrilateral fold structure was established, different mechanical properties under load were analysed. The results showed that under the same uniform load, the greater the height of wrinkling was, the smaller structural deformation, and the greater structural stiffness would be. The analysis of quadrilateral mesh (no membrane) model in a different uniform deformation under load of the trend can be seen in the same wrinkle height, as the load increased, the deformation also increased, but as the wrinkle height increased, and with the smaller amount of deformation of the load increased, the quadrilateral mesh stiffness of the structure became slightly larger than staggered quadrilateral

mesh structure. Under the same load, the deformation of a membrane mesh structure was always less than no membrane mesh structure." (Authors)] Address: not stated

**13004.** Skalon, T.N.; Skalon, N.V. (2012): Some data on the fauna of Odonata in the Kuznetsk-Salair mountainous region and neighbouring areas of the west Siberian plain. *Bulletin of the Kemerovo State University - Journal of theoretical and applied research* 3(51): 17-21. (in Russian, with English summary) ["This article reports on the fauna of dragonflies from 12 regions of the Kuznetsk-Salair mountainous region and neighbouring region the West Siberian Plain: 1) Salair Ridge, 2) Yin basin (within Coos Netsuke steppe), 3) downstream river Tom, 4) middle course river Tom, 5) the upper reaches of Tom; 6) Shoria Mountain 7) western slope of Kuznetsk Alatau, 8) River basin of Yaya, 9) middle course Kiya; 10) upper reaches of river Kiya, 11) the eastern slope of the Kuznetsk Alatau (tributaries Chulyma - Uryup, Black Yus); 12) the eastern foothills of the Kuznetsk Alatau (Podzaplotskie bogs). 63 species of Odonata have been detected by now. New data on the distribution of these species within the investigated territory are provided." (Authors)] Address: not stated

**13005.** Smout, A.-M. (2012): Reports from coastal stations - 2011: *Anstruther, Fife. Atropos* 45: 75. (in English) [UK, Scotland; *Ischnura elegans*] Address: not stated

**13006.** Soontornprasit, K. (2012): Use of aquatic insects as bioindicators of water quality in Kwan Phayao, Phayao province. *Journal of Community Development Research* 5(1): 15-24. (in Thai, with English summary) ["This study measured the aquatic insect diversity and its application as a bioindicator to monitor water quality in Kwan phayao, Phayao Province, Thailand. Shannon-Wiener index were used to assess water quality. Physical, chemical and biological parameters were also measured to compare with the surface water quality standard of Thailand. Results indicated that 3,511 aquatic insect from 26 families in 6 orders (including Odonata, but without details) were identified. The most abundant family found during the year was Geridae in the Hemiptera order. Using aquatic insects as bioindicators, it can be concluded that all sampling sites were shown to standard for surface water quality CLASS 2, depending on land use and human activities. From the correlation analysis, biological indices were related to some physico-chemical properties of water quality. Diversity index were related to some parameters such as DO, alkalinity, temperature and conductivity ( $p < 0.05$ )."] (Author)] Address: Soontornprasit, K., Division of Fishery, Faculty of Agriculture and Natural Resources, University of Phayao, Phayao 56000, Thailand. E-mail: kanyanats@hotmail.com

**13007.** Spitzenberg, D. (2012): Dr. Joachim Müller zum 70. Geburtstag. *Naturschutz im Land Sachsen-Anhalt* 49: 80-82. (in German) [The author briefly outlines

some personal achievement in science and life of J. Müller, biologist and odonatologist with great reputation within Germany.] Address: Spitzenberg, D., Zur Tonkuhle 53 · 39444 Hecklingen, Germany. E-Mail: spitzenberg.dietmar@vodafone.de

**13008.** Stephan, U. (2012): Einfluss der Untersuchungsmethode auf die Erfassung von Cordulegaster Larven. *Mercuriale* 12: 45-52. (in German, with English summary) ["Two methods of sampling larval Cordulegaster were compared according to their efficiency: the "cullender method": the investigator use a sieve, e.g. a cullender, to remove substrate from the bottom of little streams or seepages and to sort out the larvae being contained in the substrate; the "tremor method": the investigator causes tremors by jumping up and down at the stream margin; some larvae react to the tremors by performing movements, e.g. rising their heads out of the substrate, and therefore reveal their positions. The tremor method was more efficient in collecting larvae, especially the larger ones (body length > 15 mm). However, small larvae (body length < 15 mm) could be more efficiently recorded by the cullender method. In addition, the suitability of the methods was affected by habitat structures: at dark, shady stretches and habitats with lots of leaf litter the cullender method should be used, whereas in stony reaches the tremor method is more suitable." (Author)] Address: Stephan, Ulrike, Im Westengarten 12, 79241 Ihringen, Germany. E-mail: stephan.ulrike@gmx.net

**13009.** Stephan, U.; Schiel, F.J. (2012): Nachruf auf Lothar Gilbert. *Mercuriale* 12: 65. (in German) [Obituary of L. Gilbert, a locally active member of the Schutzgemeinschaft Libellen in Baden-Württemberg.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**13010.** Su, Y.; Zhang, Z.; Hong, Y. (2012): Two new ancient griffenflies (Insecta Odonoptera) from the Namurian of Ningxia, China. *Insect Systematics & Evolution* 43: 1-10. (in English) ["Two new ancient griffenflies, members of the Qilianshan Entomofauna from the Namurian B-C (Upper Carboniferous) of Ningxia Hui Autonomous Region, are described. One species, *Sinierasiptera jini* Zhang, Hong & Su, sp.n., is placed in a new family *Sinierasipteridae* within Neodonoptera, and the other, *Paragilsonia orientalis* Zhang, Hong & Su, sp.n., in *Meganeuridae* (Tupinae). The phylogenetic position of the new family *Sinierasipteridae* is discussed." (Authors)] Address: Su, Y., School of the Earth Sciences and Resources, China University of Geosciences Beijing 100083, P. R. China

**13011.** Sullivan, S.M.P.; Rodewald, A.D. (2012): In a state of flux: The energetic pathways that move contaminants from aquatic to terrestrial environments. *Environmental Toxicology and Chemistry* 31(6): 1175-1183.

(in English) ["In this Focus article, we address ecological and societal issues related to the aquatic-to-terrestrial transport of aquatic contaminants, with the spotlight falling on flowing water ecosystems. We highlight the ways in which a new understanding of the aquatic-terrestrial interface has prompted an integrated view of cross-boundary contaminant flows within complex ecological networks. We pay particular attention to aquatic insects (including Odonata), which as an important source of energy for riparian consumers such as arthropods, birds, mammals, and reptiles, are especially likely to move contaminants into terrestrial ecosystems 4–6. The linkages among aquatic and terrestrial systems represent an emerging ecological and environmental issue. We believe that contextualizing contaminant fluxes within this framework will yield significant short- and long-term benefits to ecological health and human well-being." (Authors)] Address: Sullivan, S.M., School of Environment & Natural Resources, The Ohio State Univ., Columbus, Ohio, USA. E-mail: sullivan.191@osu.edu

**13012.** Tiple, A.D. (2012): Odonata (Damselflies and Dragonflies) fauna of Tadoba National Park and surroundings, Chandrapur, Maharashtra (Central India). *Bionano Frontier* 1: 149-152. (in English) ["A survey of fresh water body sites such as ponds, streams, fields grassland, and forests areas of Tadoba National Park, Chandrapur district area of 623 sq. km. from 2008 to 2010 to collect and record the odonate faunal diversity and their status. A total of 64 species of Odonata ... were recorded. The checklist adds 24 new records for Tadoba National Park. ... Of the total 64 species, 23 were abundant or very common, 24 were common, 12 rare and 5 very rarely in occurrence. The observations support the value of the National park (reserve forest) area in providing valuable resources for Odonata." (Author)] Address: Tiple A. D., Dept of Zoology, Vidyabharti College Seloo, Wardha, Maharashtra, India & Forest Entomology Division, Tropical Forest Research Inst., Jabalpur 482021, India. E-mail: ashishdtiple@yahoo.co.in

**13013.** Trautmann, S; Lötters, S; Ott, J; Buse, J; Filz, K; Rödder, D; Wagner, N; Jaeschke, A; Schulte, U; Veith, M; Griebeler, E-M; Böhning-Gaese, K. (2012): Auswirkungen auf geschützte und schutzwürdige Arten. In: Mosbrugger, V., Brasseur, G., Schaller, M. und Stribny, B. (Hrsg.) *Klimawandel und Biodiversität - Folgen für Deutschland*. WBG, Darmstadt, (2012), 260-289, ISBN 978-3534252350 (2012): 260-289. (in German) [On the basis of in most cases self-referring papers and mono-causal interpretation of records, the usual speculations of Odonata (chap. 10.4) as climate change indicators are outlined. The paper lacks in any critical discussion on the data base on climatic induced range extensions vs. habitat availability or discussion while species as *Sympetrum pedemontanum* and *Erythromma viridulum* - for long years considered as indicators of climate change - are recently very rare or have lost most of their ranges in the past years.] Address: Ott, J., Fried-

hofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**13014.** Tunmore, M. (2012): Reports from coastal stations - 2011: Lizard Peninsula, Cornwall. *Atropos* 45: 47-49. (in English) [Verbatim: It was a notable year for Odonata, which began early with a male *Anax ephippiger* ... at Kennack Sands on 19 February. This was the prelude to further occurrences during a period of exceptionally warm weather in April. Unidentified dragonflies seen near Goonhilly on 6 April and at Kynance on 19 April were almost certainly this species. More definite was a male present at Windmill Farm NR on 24 April, with two present on a different part of the reserve the next day and one present on 26th; two males were seen near Mullion on 24 April and an ovipositing pair was observed at a site near Predannack on 26th with at least one still present on 28th. A small arrival of *Sympetrum fonscolombii* also occurred at the same time with six present at Windmill Farm on 25 April and three near Mullion the same day. With exceptionally early emergences of resident Odonata also noted, some local observers were able to see nine species in the month of April. The summer brought a lull in Odonata immigration but small numbers of *S. fonscolombii* continued to be reported from Windmill Farm in early June and again in late July/August. An *Anax imperator* was present there between 28 July and 4 August, which was only the second record for the site. Signs of autumn migration included a *Sympetrum striolatum* in the moth-trap at Church Cove on 2 September and an *Aeshna mixta* in the trap at Cury Cross Lanes on 12 September. Two *S. fonscolombii* were at Cury Cross Lanes on 10 September, followed by one at Windmill Farm on 25 October, whilst a pair of *A. ephippiger* were seen ovipositing near Predannack on 28 October.] Address: Tunmore, M., 36 Tinker Lane, Meltham, Huddersfield, West Yorkshire HD7 3ES, UK. E-mail: Atropos@atroposed.freeserve.co.uk

**13015.** Velle, L. (2012): Inventaire des Odonates en forêts domaniales de Vierzon et de Vouzeron et première preuve de reproduction de *Leucorrhinia caudalis* (Charpentier, 1840) pour le département du Cher. *Martinia* 28(2): 89-102. (in French, with English summary) ["During an odonatological survey, 2009–2011, the author recorded 31 species of dragonflies from a dozen of forest ponds in the National Forest of Vierzon-Vouzeron, Cher department, Central France. This is more than half of the species known from this under prospected department. Two nationally protected species, which are also included in appendix II and/or IV of the "directive Habitats" have been discovered: *Leucorrhinia caudalis* and *L. pectoralis*. It is the first mention of the successful reproduction of *L. caudalis* in the Cher department. *Leucorrhinia pectoralis*, already known in this department, seems to be well present in the forested wetlands of this area." (Author)] Address: Velle, L., Office National des Forêts - Réseau entomologie Chemin



des Merlins, F-03340 Montbeugny, France. E-mail: laurent.velle@onf.fr

**13016.** Vircel, G. (2012): Nouvelle observation et nouvelle localité pour *Somatochlora metallica meridionalis* Nielsen, 1935 en Haute-Corse (2B) (Odonata, Anisoptera: Corduliidae). *Martinia* 28(2): 120. (in French) [*S. meridionalis* was recorded at 12-VII-2012 at the river Varagno near Poggio-di-Nazza, Haute-Corse, France (42°2'12,20"N, 9°19'18,58"E).] Address: Vircel, G., LPO PACA, Villa Saint-Jules, 6 avenue Jean Jaurès, F-83400 Hyères, France

**13017.** Vundtsettel, M.F.; Kuznetsova, N.V. (2012): Ecological characteristics of the river Yakhroma and its benthic fauna. *Vestnik of Astrakhan State Technical University. Series: Fishing Industry.* 2012(1) [ISSN 2073-5529]: 15-21. (in Russian, with English summary) [Yakhroma River, 55 kilometres north of Moscow; Dmitrovsky District of Moscow Oblast, Russia. 170 samples of zoobenthos between 2009-2011 resulted in 86 species from 16 orders. Odonata are represented by *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Calopteryx virgo*, *C. splendens*, *Chalcolestes viridis*, *Lestes sponsa*, *Orthetrum cancellatum*, *Platycnemis pennipes*, *Coenagrion armatum*, *Brachytron pratense*, *Aeshna grandis*, *Anax imperator*, and *Somatochlora metallica*.] Address: Vundtsettel, M.F., Astrakhan State Technical University, Dmitrov branch, Russia. E-mail: df-vmf@mail.ru

**13018.** Wildermuth, H. (2012): Libellengewässer, die kommen und gehen. *Mercuriale* 12: 1-10. (in German, with English summary) ["The dragonfly fauna of two freshly created shallow ponds in open meadows in the Swiss Plateau was monitored during summer 2012. Altogether 24 and 29 species were recorded, respectively, 16 and 15 of them certainly or most probably indigenous. The water bodies proved to be suitable for regionally rare species such as *Ischnura pumilio*, *Orthetrum albistylum*, *O. brunneum*, *Sympetrum depressiusculum* and *S. fonscolombii*. The importance of shallow ponds in open country as breeding habitats for dragonflies, especially during the early succession stages, the problems of rapid overgrowth or complete disappearance and the possible maintenance measures for conservation of an optimal succession state are discussed." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**13019.** Xu, J.; Wang, Q. (2012): Species diversity of flower-visiting insects at Huangjin Main Campus of Gannan Normal University. *Journal of Gannan Normal University* 3: 120-124. (in Chinese, with English summary) [*Crocothemis servilia*, *Orthetrum albistylum*, *Sympetrum croceolum*, *Agriocnemis femina*, *Ischnura senegalensis*, *Ceriatagrion melanurum*, and *Platycnemis foliacea* were among the insect species found using

flowers as perching substrate.] Address: Xu, J.s., School of Life and Environment Science, Gannan Normal University, Ganzhou 341000, China

**13020.** Ye, S.-s.; Wang, H.-q.; Chen, Y.; Fang, Y.; Li, K. (2012): Characterization of riparian insect communities in Lingang New Town of Shanghai. *Chinese Journal of Ecology* 31(5): 1207-1213. (in Chinese, with English summary) ["Lingang New Town is a rapidly developing coastal zone in Shanghai metropolitan region, China. To understand the characteristics of the riparian insect communities in the zone under effects of urbanization, an investigation was conducted in different habitats and seasons from October 2009 to September 2010. A total of 7755 insect individuals were collected, belonging to 199 species, 84 families, and 13 orders." (Authors) Odonata were represented by 2.3% of the specimens and only detailed as Libellulidae and Coenagrionidae.] Address: Li, K., Shanghai Key Laboratory for Ecology of Urbanization Process and Eco-Restoration, East China Normal University, Shanghai 200062, China. E-mail: kaili@bio.ecnu.edu.cn

**13021.** Yu, W.-y.; Li, Z.-h.; Luo, Q.-h.; Cai, Y.; Ren, Y.-h.; Zhao, L.; Chen, X.-r.; Zhou, S.-s. (2012): Study on fauna and diversity of Odonata in Maolan area of Guizhou. *Sichuan Journal of Zoology* 31(5): 828-833. (in Chinese, with English summary) [Transect counts in five localities (Maolan area, Guizhou province, China) in July, 2011 resulted in 65 Odonata species. The records were documented and analysed according to the known species biogeography.] Address: Yu, W.-y., Institute of Applied Ecology, Nanjing Xiaozhuang University, Nanjing 211171, China. E-mail: ywy138519@126.com

**13022.** Yu, X.; Bu, W.-j.; Zhu, L.; (2012): Research advances in eco-environment assessment using dragonfly as a bioindicator. *Chinese Journal of Ecology* 31(6): 1585-1590. (in Chinese, with English summary) [Odonata as bioindicators were discussed in terms of general environmental assessment, environment pollution degree assessment, environmental improvement assessment, climate change assessment, and large-scale environmental assessment.] Address: Zhu, L., College of Environmental Science and Engineering, Nankai University, Tianjin 300071, China. E-mail: zhulin@nankai.edu.cn

**13023.** Zoellick, B.; Nelson, S.J.; Schauffler, M. (2012): Participatory science and education: bringing both views into focus. *Front. Ecol. Environ.* 10(6): 310-313. (in English) ["Aligning the goals of scientists and participants becomes more challenging when citizen science moves into middle- and high-school classrooms. Here, we describe a logic model developed in association with the Acadia Learning Project, a collaboration among scientists, teachers, and students that successfully meets both research and educational needs. The logic model is intended to assist other classroom-based citi-

zen-science initiatives with project design and evaluation." (Authors) The paper includes references to Odonata.] Address: Nelson, Sarah, Senator George J Mitchell Center for Environmental and Watershed Research and Department of Plant, Soil, and Environmental Sciences, University of Maine, Orono, ME, USA. E-mail: sarah.nelson@umit.maine.edu

## 2013

**13024.** Abdelsalam, K.M.; Tanida, K. (2013): Diversity and spatio-temporal distribution of macro-invertebrates communities in spring flows of Tsuya Stream, Gifu Prefecture, central Japan. The Egyptian Journal of Aquatic Research 39(1): 39-50. (in Spatio-temporal; Macro-invertebrates; Diversity; Mother community; Springs) [Calopteryx atrata, Planaeschna milnei and Anotogaster sieboldii were listed from the stream.] Address: Abdelsalam, K.M., National Institute of Oceanography and Fisheries, Qayet Bey, El-Anfoushy, Alexandria, Egypt. E-mail: kh.abdelsalam@gmail.com

**13025.** Abhijna, U.G.; Ratheesh, R.; Biju Kumar, A. (2013): Distribution and diversity of aquatic insects of Vellayani lake in Kerala. Journal of Environmental Biology 34: 605-611. (in English) [The diversity of insect fauna of Vellayani lake in Kerala, India was represented by 60 insect species. Odonata count to 12.55% of the taxa.] Address: Kumar, B., Department of Aquatic Biology & Fisheries, University of Kerala, Thiruvananthapuram-695 581, India. E-mail: abiju@rediffmail.com

**13026.** Acquah - Lamptey, D.; Kyerematen, R.; Owusu, E.O. (2013): Using odonates as markers of the environmental health of water and its land related ecotone. International Journal of Biodiversity and Conservation 5(11): 761-769. (in English) ["The study of Odonata communities along wetlands requires the basic understanding of the abundance, distribution and number of species present. As habitat conditions change, they also exhibit changes in their diversity and distribution. Odonata assemblages were surveyed along the Densu River at Atewa Range Forest Reserve (ARFR) and Nsawam in the Eastern Region of Ghana and Weija in the Greater Accra Region of Ghana. Of the 177 species recorded for Ghana, 66 species (43 dragonfly and 23 damselfly species) were sampled along the Densu River. These belonged to eight families of which the Libellulidae dominated. The distribution of species was significantly different between the sites with the most diverse area being ARFR with 47 species. The various environmental variables along the river were recorded and their effects discussed." (Authors)] Address: Acquah - Lamptey, D., Department of Animal Biology and Conservation Science, P. O. Box LG67, University of Ghana, Legon, Ghana. E-mail: dalquino@gmail.com

**13027.** Adambukulam, S.P.; Kakkassery, F.K. (2013): Taxonomic studies of the last instar nymph of Lathre-

cista asiatica asiatica (Fabricius 1798) (Family: Libellulidae, Order: Odonata) by using its exuvia. Journal of Entomology and Zoology Studies 1(5): 103-109. (in English) ["L. a. asiatica is a monotypic cosmopolitan dragonfly species of the genus Lathrecista belonging to family Libellulidae, reported from peninsular India to Australia. No literature is available on the description of the nymph of this species, and the present paper describes the nymphal features of the last instar of Lathrecista asiatica asiatica by using its exuviae which was collected at the time of emergence of adult from a temporary pond in Ammadam, Thrissur district, Kerala, India." (Authors)] Address: Kakkassery, F.K., Department of Zoology, St. Thomas' College, Thrissur, India. E-mail: kakkassery@yahoo.com

**13028.** Afzal, G.; Mushtaq, S.; Rana, S.A.; Sheikh, M.A. (2013): Trophic niche breadth and niche overlap among different guilds of spider species in wheat agroecosystem. Pakistan Journal of Life and Social Sciences 11(2): 107-111. (in English) ["Trophic niche breadth and niche overlap of nine spiders including Pardosa timidula (Roewer, 1951), Hippasa olivacea (Thorell, 1887), Plexippus paykulli (Audouin, 1826), Oxyopes javanus (Thorell, 1887) (hunters), Leucauge decorata (Blackwall, 1864), Tetragnatha javana (Thorell, 1890), Neoscona mokerji (Tikader, 1980), Argiope aemula (Walckenaer, 1841) and Cyclosa spirefera (Simon, 1889) (web builders) inhabited in wheat fields of University of Agriculture, Faisalabad, Pakistan were verified. Study was planned to know how the most abundant spiders of wheat are coexisted in terms of habitat and food resources. Evidences of predation in fields were used to compute the coefficients of niche breadth and niche overlap. Diet breadth values were approximately 1 to 2 times greater than the minimum, which specifies substantial differing degree of feeding specialization. All overlap values were <1.00 (range, 0.05-0.92), which indicated that each species had its own feeding niche in the wheat ecosystem. It was concluded that separation of guild members in microhabitat, high plasticity in their foraging patterns may results in reduced competition and coexistence. Thus, such abundantly found spiders are highly responsible to enhance their biological control potential in wheat agroecosystems." (Authors) Odonata had been preyed by all spider species studied, but in most cases were rarely encountered in the spiders diet.] Address: Afzal, G., Department of Zoology & Fisheries, University of Agriculture, Faisalabad-38040, Pakistan

**13029.** Albrecht, M.P.; Reis, V.C.S.; Caramaschi, E.P. (2013): Resource use by the facultative lepidophage Roeboides affinis (Günther, 1868): a comparison of size classes, seasons and environment types related to impoundment. Neotropical Ichthyology 11(2): 387-394. (in English, with Portuguese summary) ["We report the consumption of scales and other food resources by the facultative lepidophage Roeboides affinis in the upper

Tocantins River where it was impounded by the Serra da Mesa Hydroelectric Dam. We compared the diet among size classes, between dry and wet seasons, and between sites with distinct water flow characteristics (lotic vs. lentic) related to the distance from the dam and phase of reservoir development. As transparency and fish abundance increased after impoundment, we expected a higher consumption of scales in lentic sites. Likewise, habitat contraction, higher transparency and decrease in terrestrial resources availability, would promote a higher consumption of scales. Scales were consumed by 92% of individuals and represented 26% of the total volume of resources ingested by *R. affinis*. Diet composition varied significantly among size classes, with larger individuals consuming more scales and larger items, especially odonates and ephemeropterans. Scale consumption was not significantly different between dry and wet seasons. *Roeboides affinis* incorporated some food items into the diet as a response to the impoundment, like other species. Scale consumption was higher in lotic sites, refuting our initial hypothesis, what suggests that the lepidophagous habit is related the rheophilic nature of *R. affinis*." (Authors)] Address: Albrecht, Miriam, Universidade Federal do Rio de Janeiro, Departamento de Ecologia, Av. Carlos Chagas Filho, 373, Cidade Universitária, 21941-902 Rio de Janeiro, RJ, Brazil. E-mail: albrechtmp@gmail.com

**13030.** Andrew, R.J. (2013): Odonates of Zilpi Lake of Nagpur (India) with a note on the emergence of the libellulid dragonfly, *Trithemis pallidinervis*. *Journal on New Biological Reports* 2(2): 177-187. (in English) ["Zilpi lake is a small water-body, formed by the construction of an earth fill dam in 1974 under the irrigation project of the Govt. of Maharashtra. The maximum live storage capacity of the dam is 1.51 MCM. It lies 25 km west of Nagpur city and is today a well known spot for scenic beauty and aquatic birds. A survey of dragonfly fauna of this lake was undertaken during the post monsoon period of 2012. A total of 34 odonate species belonging to the family- Coenagrionidae (7), Lestidae (1), Aeshnidae (3), Gomphidae (1) and Libellulidae (22) were found breeding in this lake. Except the *Diplacodes nebulosa* and *Rhodothemis rufa*, all other species are commonly found in the water bodies of central India. *Trithemis pallidinervis* abundantly breeds in this lake. Study of the emergence pattern of *T. pallidinervis* demonstrates that there is a direct correlation between choice of direction of the larva for emergence and the presence of emergent support and geographic condition of the water edge. 94% of the larvae of *T. pallidinervis* prefer the erect dried twigs of *Cassia tora* (Caesalpinaceae) to emerge. Maximum larvae (61%) preferred the west side of the lake for emergence because of the gradual sloping edge and large cluster of emergent support. The sex ratio is male biased (53.5% male, 46.5% female) and there was no correlation between the sex of the emerging larva and choice of direction." (Author)] Address: Andrew, R.J., Post Graduate Dept of Zoology,

Hislop College, Nagpur-440001, India. E-mail: rajuan-drew@yahoo.com

**13031.** Antoniazzi, C.E.; López, J.A.; Duré, M.; Falico, D.A. (2013): Alimentación de dos especies de anfibios (*Anura: Hylidae*) en la estación de bajas temperaturas y su relación con la acumulación de energía en Santa Fe, Argentina. *Rev. Biol. Trop. (Int. J. Trop. Biol.)* 61(2): 875-886. (in Spanish, with English summary) [The diet of *Hypsiboas pulchellus* includes a few Odonata.] Address: Antoniazzi, Carolina Elizabet, Universidad Nacional del Litoral, Facultad de Humanidades y Ciencias, Departamento de Ciencias Naturales, Ciudad Universitaria, Paraje el Pozo S/N (3000), Santa Fe, Argentina; caroantoniazzi@gmail.com

**13032.** Aspacio, K.T.; Yuto, C.M.; Nuñez, O.M.; Villanueva, R.J.T. (2013): Species diversity of Odonata in selected areas of Buru-un, Iligan City and Tubod, Lanao del Norte, Philippines. *ABAH BIOFLUX - Animal Biology & Animal Husbandry International Journal of the Bioflux Society* 5(2): 145-155. (in English) ["Odonata is known to be sensitive to structural habitat quality and is a valuable tool to evaluate landscape degradation. This study determined the species diversity of Odonata in Buru-un, Iligan City and Tubod, Lanao del Norte, Philippines. Eight sites were assessed on August 27 - 31, 2012 and on October 26 - 30, 2012 for a total of 98 man-hours. Sweep nets were used for collection. Twenty six species were identified from all sampling sites. Lake Babuyan (Site 4) and Kallangan Spring (Site 5) had the highest species richness. *Trithemis aurora*, an oriental species, was the most abundant species. Moderate species diversity was recorded with low endemism (35 %)."] (Authors)] Address: Nuñez, Olga, Department of Biological Sciences, Mindanao State University - Iligan Institute of Technology, Iligan City, Philippines. E-mail: olgamnuneza@yahoo.com

**13033.** Babu, R.; Subramanian, K.A.; Nandy, S. (2013): Endemic Odonates of India. Records of the Zoological Survey of India. Occasional Paper 347: 1-60. (in English) ["The paper deals with an updated list of 186 species /subspecies belonging to 67 genera of Odonates endemic to India have been compiled along with distribution of each taxon with respective citations. The distributions of more number of endemic species/subspecies are restricted in two biodiversity hotspots of India, Western Ghats and North east India." (Authors)] Address: Babu, R, Southern Regional Centre, Zoological Survey of India, Chennai - 600 028, India

**13034.** Bailowitz, R.; Danforth, D.; Upson, S. (2013): *Erpetogomphus molossus*, a new species from Sonora, Mexico (Odonata: Anisoptera: Gomphidae). *Zootaxa* 3734(5): 559-570. (in English) ["*E. molossus* is described from 3 male and 3 female specimens (holotype and allotype in collection of Instituto Biológico de la Universidad Nacional Autónoma de México) from the intermit-



tent pine-oak woodland of the Yécora municipio in east-central Sonora, Mexico. Diagnostic features of the new species include the seemingly bulbous tip (in lateral view) and prominent baso-ventral process of the male cerci and the notched and denticled posteromesal corners of the female subgenital plate." (Authors)] Address: Bailowitz, R., 15444 N. Indian Trail, Tucson, AZ 85750 USA. E-mail: raberg2@q.com

**13035.** Bajwa, Y.; Williams, V.; Ren, Y.; Dong, H. (2013): Investigation into the role of dragonfly wing flexibility during passive wing pitch reversal. *Bulletin of the American Physical Society* 58(18): o.p. (in English) ["Wing deformation is a characteristic part of flapping wing flight. In dragonflies, a torsion wave can be observed propagating from the tip to the root during stroke reversal. In this paper, we utilize high-speed photogrammetry and 3d surface reconstruction techniques to quantify wing deformation and kinematics of a dragonfly. We then use finite elements in the absolute nodal coordinate formulation to estimate strain energy in the wing during wing pitch reversal. We use this data to analyse the role of wing structure in facilitating wing rotation and bringing about the characteristic torsion wave. The influence of the elastic force in facilitating wing rotation is then compared with inertial and aerodynamic forces as well. A quantitative look into the variation of strain energy within the insect wing during wing rotation could lead to more efficient design of dynamic wing pitching mechanisms." (Authors)] Address: not stated

**13036.** Barry, M.J. (2013): Effects of fluoxetine on the swimming and behavioural responses of the Arabian killifish. *Ecotoxicology* 22(2): 425-432. (in English) ["The selective serotonin reuptake inhibitor fluoxetine has frequently been detected in surface waters around the world. Fluoxetine modulates levels of serotonin, a neurotransmitter that regulates several important physiological and behavioural processes including fear and anxiety, aggression, locomotion and feeding. In this study, groups of sub-adult Arabian killifish (*Aphanius dispar*) were exposed to either 0, 0.03, 0.3 or 3 µg/L fluoxetine hydrochloride for 7 days and their swimming behaviour and social interactions videotaped in a circular arena. The fish were subsequently exposed to a predator alarm chemical (from dragonfly larvae fed with *A. dispar*) and their short-term responses recorded. The video was analysed using the open-sourced software program Ctrax which objectively quantified swimming and social behaviours. Aggression (chasing behaviour was significantly reduced at 3.0 µg/L fluoxetine. After the addition of the predator alarm chemicals fish responded quickly, increasing the percentage of time spent drifting or motionless and reducing average swimming velocity. Controls and fish exposed to 0.03 or 3 µg/L fluoxetine reduced swimming speed by 20-30 % but returned to pre-exposure velocities within 6 min. Fish exposed to 0.3 µg/L fluoxetine reduced swimming speed by 38 % after addition of the predator alarm and did not return to

pre-exposure speeds during the recording period (19 min). Schooling behaviour was also affected by fluoxetine and predator alarm with fish exposed to 0.3 µg/L fluoxetine significantly reducing nearest neighbour distance and swimming speed relative to nearest neighbour the following addition of the predator alarm." (Author)] Address: Barry, M.J., Biology Department, Sultan Qaboos University, PO Box 36, Al Khoud, Muscat, 123, Sultanate of Oman. E-mail: mjbarry@squ.edu.om

**13037.** Barth, G.; Nel, A.; Franz, M. (2013): Two new odonate-like insect wings from the latest Norian of northern Germany. *Polish Journal of Entomology* 82(3): 127-142. (in English) ["Two new well preserved odonate (damselfly-dragonflies) insect wings from the latest Norian (Upper Triassic) of two different localities are described. Although the rather long distance of more than 250 km separates the localities, the holotypes occur in comparable lithologies and are thus described together. We describe an odonate forewing, *Italophebia baueri* sp. n., from an abandoned quarry at Langenberg near Seinstedt north of the Harz Mountains (Lower Saxony), which is the first occurrence of this genus outside Italy. The second wing, *Triassothemis gartzii* sp. n., was found in the cored well Gartz 1 (NE Germany). In both occurrences the insect wings were associated with abundant autochthonous as well as allochthonous faunal and floral remnants of shallow subaquatic environments." (Authors)] Address: Barth, G., TU Bergakademie Freiberg, Bernhard-von-Cotta-Straße 2, D-09599 Freiberg, Germany

**13038.** Baturina, M.A.; Loskutova, O.A. (2013): Fauna of amphibious and aquatic insects of small waterbodies in the environs of Syktyvkar CITY (Komi Republic, Russia). *Materials of the Fifth All-Russia Symposium on Amphibiotic and Aquatic Insects / Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences. – Yaroslavl: Filigran, 2013. – 254 pp: 21-25.* (in Russian, with English summary) ["The fauna of amphibious and aquatic insects has been studied in small rivers and small standing waterbodies in the environs of Syktyvkar. Occurrence frequency, abundance, biomass, and proportion of species in composition of zoobenthos are determined. A rare stonefly species, included in the Red Data Book of Komi Republic, is recorded." (Authors) The following taxa were listed: *Platycnemis pennipes*, *Coenagrion johanssoni*, *Coenagrion* sp., *Aeshna caerulea*, *Brachytron pratense*, *Gomphidae* sp., *Ischnura* sp., *Ophiogomphus* sp., *Epithea bimaculata*, and *Somatochlora metallica*.] Address: Baturina, M.A., Institute of Biology, Komi Scientific Centre, Ural Branch, Russian Academy of Sciences ul. Kommunisticheskaya 28, Syktyvkar, Komi Republic, 167982, Russia. E-mail: baturina@ib.komisc.ru

**13039.** Bedjanič, M.; van der Poorten, N. (2013): On the synonymy of two enigmatic endemic clubtails from Sri Lanka (Anisoptera: Gomphidae). *Agriion* 17(2): 44-47. (in English) ["Here, we report on an additional case of syn-

onymy recognized only recently while studying the type specimens and their photographs of two enigmatic Sri Lankan representatives of the family Gomphidae, namely *Heliogomphus ceylonicus* (Hagen in Selys, 1878) and *Anisogomphus solitaris* Lieftinck, 1971. ... Comparison of wing venation, thorax, prothorax and head colouration and markings revealed that both taxa are actually conspecific. Thus, *A. solitaris* and *H. ceylonicus* are synonymized, Hagen's senior species name having priority (ICZN, 1999). The systematic positioning of the species by Lieftinck (1971) in the genus *Anisogomphus* is retained until new material and data are available." (Authors)] Address: Bedjanič, M., Rakovlje 42a, SI-3314 Braslovče, Slovenia. E-mail: matjazbedjanic@yahoo.com

**13040.** Benoit, J.M.; Cato, D.A.; Denison, K.C.; Moreira, A.E. (2013): Seasonal mercury dynamics in a New England vernal pool. *Wetlands* 33(5): 887-894. (in English) ["Mercury fluxes into and transformations within a small vernal pool in Massachusetts were investigated over a wet-dry-wet cycle. We measured the deposition of total mercury (HgT) and methyl mercury (MeHg) via litterfall between October 6 and December 2, 2010. Litterfall fluxes were 10  $\mu\text{g m}^{-2}$  and 80 ng  $\text{m}^{-2}$ , respectively, over that time period. Average HgT concentration in litterfall was  $33 \pm 2$  ng  $\text{gdw}^{-1}$ ; 0.9 % was present as MeHg. The HgT content of the litter layer increased slightly throughout the year, reaching  $55 \pm 20$  ng  $\text{gdw}^{-1}$  inside and  $42 \pm 7$  ng  $\text{gdw}^{-1}$  outside the pool. Litter %MeHg increased only to 1.5 % on the forest floor, while it increased dramatically in the vernal pool after inundation in late November, reaching 9 % by early spring. Measurements in pool benthic invertebrates show that two types of shredders bioaccumulated MeHg 4–9-fold relative to the leaf litter substrate. Overall, our results indicate significant production and bioaccumulation of MeHg in this vernal pool. This de novo MeHg could impact resident amphibians or be exported to the surrounding forest." (Authors) The focus was set on Trichoptera, Diptera, Amphipoda, and Isopoda with only one passing reference to Odonata.] Address: Benoit, Janina, Chemistry Dept, Wheaton College, Norton, MA, 02766, USA. E-mail: jbenoit@wheatonma.edu

**13041.** Bernal Sánchez, A. (2013): Odonatological conference at Natural park "Los Alcornocales", Cádiz, España. *Zygonyx* 1: 14-15. (in English) ["On Saturday 9th June, 2012 we organized a visit in order to observe and take pictures of the emblematic species in the Natural Park "Los Alcornocales". It was a calm and profitable day in which we visited two specific areas in the grid 30STF60." 18 Odonata species are listed including *Macromia splendens*, *Gomphus graslinii*, and *Oxygastrea curtisii*.] Address: not stated

**13042.** Berquier, C. (2013): Première observation en France d'*Orthetrum trinacria* (Selys, 1841) sur l'île de Corse (Odonata, Anisoptera: Libellulidae). *Martinia* 29(1): 15-18. (in French, with English summary) ["For the first

time in France, *O. trinacria* was found on 14 June 2012 at a coastal wetland in the area of Bastia, Corsica island. This brings to 101 the number of taxa of the French metropolitan odonatological fauna. Considerations about the expansion of this species to the north as a consequence of global warming are dealt with." (Author)] Address: Berquier, C., Office de l'Environnement de la Corse - Observatoire Conservatoire des Insectes de Corse, F-20250 Corte, France. E-mail: cyril.berquier@oec.fr

**13043.** Bionda, R.; Mekkes, J.-J.; Pompilio, L.; Mosini, A. (2013): Gli Odonati del Parco Naturale delle Alpi Veglia e Devero e aree limitrofe. *Rivista piemontese di Storia naturale* 34: 115-126. (in Italian, with English summary) ["Dragonflies of the Alpi Veglia and Devero Natural Park and surroundings (Piedmont, northern Italy): We present the results of 4 years of dragonfly monitoring in the Alpi Veglia and Devero Natural Park and Alpc Devero Conservation Area, Western Alps, Italia, alongside with records from two neighbouring sites. Altogether we recorded 17 species. *Somatochlora arctica* and *Leucorrhinia dubia* are for the first time recorded for Piedmont." (Authors)] Address: Bionda, R., Ente di gestione delle Aree protette dell'Ossola, viale Pieri 27, 28868 Varzo VB, Italy. E-mail: rada.bionda@libero.it

**13044.** Blanchon, Y.; Ronne, C. (2013): Afflux d'*Hemianax ephippiger* (Burmeister, 1839) en région PACA en 2011 (Odonata, Anisoptera: Aeshnidae). *Martinia* Hors-série, *Hemianax ephippiger* - migration 2011, mai 2013: 61-64. (in French, with English summary) ["A large and unusual influx of *Hemianax ephippiger* has been observed in 2011 in the Provence-Alpes-Côte d'Azur région (southern France). The records distribution was bimodal between April and November. Abundance peaked in September. Most of observations occurred along the littoral fringe with groups including up to several thousands of individuals. Evidences of breeding were noted in the Camargue." (Authors)] Address: Ronne, Charlotte, 2 8, avenue des Alliés, 13360 Roquevaire, France. E-mail: charlotte.ronne@yahoo.fr

**13045.** Blanckaert, K.; Garcia, X.-F.; Ricardo, A.-M.; Chen, Q.; Pusch, M.T. (2013): The role of turbulence in the hydraulic environment of benthic invertebrates. *Ecology* 6(4): 700-712. (in English) ["The role of turbulence in the dislodgment of benthic stream invertebrates from the riverbed was investigated experimentally in a laboratory flume. For the first time, technological advances allowed measuring the spatio-temporal patterns of turbulent flow around two free-moving invertebrates (*Aeshna cyanea* and *Somatochlora flavomaculata*). A specific methodology was developed for the analysis of turbulence around benthic invertebrates. The results confirmed two hypotheses: (i) on the contrary to sediment particles, invertebrates are not only sensitive to the peak values of the turbulent flow forcing but also to the temporal fluctuations in this flow forcing; and (ii)

the dominant temporal fluctuations are not due to local turbulent structures of the size of the invertebrate, but to turbulent structures that scale with the flow depth and are inherited from upstream. In 15 of the 17 conducted tests, important turbulent events that scale with the flow depth accompanied by rapid temporal flow fluctuations occurred at the moment of dislodgement. The dominant forcing was consistently a threefold increase in shear stress, and was related to a sweep event in 12 of the 17 tests. Thereby, the increase in longitudinal velocity was typically about 40%, which led to a 100% increase in drag force in comparison with the time-averaged drag force. These results enable a new understanding of the detailed hydraulic conditions leading to passive drift of stream invertebrates. In addition, they open new perspectives to improve models predicting the distribution of benthic invertebrates based on hydrodynamics by accounting for turbulence." (Authors)] Address: Blanckaert, K., State Key Laboratory of Urban & Regional Ecology, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Shuangqing Road 18, 100085 Beijing, China. E-mail: koen.blanckaert@epfl.ch

**13046.** Boeglin, Y. (2013): Premières données d'*Hemianax ephippiger* (Burmeister, 1839) pour le département de la Loire (Odonata, Anisoptera: Aeshnidae). *Martinia Hors-série, Hemianax ephippiger - migration 2011, mai 2013*: 73-75. (in French) [France; five records from the Loire department were documented.] Address: Boeglin, Y., 7 rue Jacquemard, F-42110 Feurs, France. E-mail: yoann.boeglin@live.fr

**13047.** Bogan, M.T.; Boersma, K.S.; Lytle, D.A. (2013): Flow intermittency alters longitudinal patterns of invertebrate diversity and assemblage composition in an arid-land stream network. *Freshwater Biology* 58(5): 1016-1028. (in English) [Arizona, USA; "(1.) Temporary streams comprise a large proportion of the total length of most stream networks, and the great majority of arid-land stream networks, so it is important to understand their contribution to biotic diversity at both local and landscape scales. (2.) In late winter 2010, we sampled invertebrate assemblages in 12 reaches of a large arid-land stream network (including perennial and intermittent headwaters, intermittent middle reaches and perennial rivers) in south-east Arizona, U.S.A. Intermittent reaches had then been flowing for c. 60 days, following a dry period of more than 450 days. We sampled a subset of the perennial study reaches three more times between 2009 and 2011. Since intermittent reaches were dry during these additional sampling periods, we used assemblage data from two other intermittent streams in the study network (sampled in 2004–05 and 2010) to explore interannual variability in intermittent stream assemblage composition. (3.) Invertebrate richness was lowest in intermittent reaches, despite their often being connected to species-rich perennial reaches. The assemblages of these intermittent reaches were not simply a subset of the species in perennial

streams, but rather were dominated by a suite of stoneflies, blackflies and midges with adaptations to intermittency (e.g. egg and/or larval diapause). On average, 86% of individuals in these samples were specialists or exclusive to intermittent streams. Predators were 7–14 times more abundant in perennial than in intermittent reaches. (4.) Despite being separated by long distances (12–25 km) and having very different physical characteristics, the assemblages of perennial headwaters and rivers were more similar to one another than to intervening intermittent reaches, emphasising the prime importance of local hydrology in this system. (5.) The duration and recurrence intervals of dry periods, and the relative importance of dispersal from perennial refuges, probably influence the magnitude of biological differences between neighbouring perennial and temporary streams. Although perennial headwaters supported the highest diversity of invertebrates, intermittent reaches supported a number of unique or locally rare species and as such contribute to regional species diversity and should be included in conservation planning... We found invertebrate predators to be 7–14 times more abundant in perennial headwater and river reaches than in intervening intermittent reaches. While we did not estimate predator biomass, the dominant predators in intermittent reaches (Dytiscidae) were of a similar size to those in perennial reaches (Odonata and Dytiscidae). This suggests that intermittent reaches of arid-land streams may provide a significant refuge from invertebrate predation pressure." (Authors)] Address: Bogan, M.T., Department of Zoology, Oregon State University, 3029 Cordley Hall, Corvallis, OR 97331, USA. E-mail: boganmi@science.oregonstate.edu

**13048.** Bosch, J.G. van't (2013): Rare dragonflies In the Netherlands in 2006-2009, CWNO-reports 5. *Brachytron* 15(2): 112-122. (in Dutch, with English summary) ["This is the fifth report of the Dutch Committee for records of rare odonates (CWNO). In this report, records from the period 2006-2009 are reviewed. Acceptability is judged independently by each of the committee members, based on the documentation available (e.g. descriptions, drawings, pictures or collected material). Only accepted records are reviewed. Of each accepted record the Province, nearby city and/or municipality, location, date, number, gender and names of the observers are given. If photographs are available, this is also mentioned. In most cases only the first record is given. Subsequent records of the same individual or population are accepted on the basis of the first record and are not reviewed. For these first observation the locations are marked with an asterisk \*. These locations are regarded as a 'known location'. New records from a known location will not be reviewed in the future. 2006 - A male and a female *Leucorrhinia caudalis* were observed near Maastricht (Limburg). This was the first record of this species since 1970. Unfortunately the species was not found there in subsequent years. Reproduction of *Anax parthenope* was proven for the first time, at one



location in Gelderland and one location in Limburg. In 2006, a very large influx of *Sympetrum meridionale* took place with observations of at least 30 individuals accepted. There were only four previous records of this species. 2007 - The first population of *Coenagrion scitulum* was discovered at Cadzand-Bad (Zeeuws-Vlaanderen). The fifth ever observation of *Anax ephippiger* was near Zeist (Utrecht). The first known reproduction of *Sympetrum meridionale* took place at Westvoorne (Zuid-Holland). A maximum of 15 individuals was seen. Numbers of this species in other parts of the country were also high. At least three males of *Somatochlora flavomaculata* were found near Wassenaar (Zuid-Holland). 2008 - A male *Leucorrhinio caudalis* was seen at Ottema Wiersma reserve (Friesland). Two new populations of *Somatochlora arctica* were discovered in Overijssel. A female *Sympetrum depressiusculum* was found at Hoge Veluwe (Gelderland), far from the few known reproduction locations. Exceptional wanderers of *Somatochlora flavomaculata* were found at Eemshaven (Groningen) and on the Wadden Sea island Schiermonnikoog (Friesland). 2009 - A male *Leucorrhinia caudalis* was photographed in De Weerribben (Overijssel) by a group of Belgian observers. A male *Ophiogomphus cecilia* was photographed at Groote Peel (Limburg), away from the two rivers where populations are known. One of the highlights of 2009 was the observation of at least six males and one female *Onychogomphus forcipatus* along the river Grensmaas near Meers (Limburg). *Coenagrion scitulum* was found at four new locations in Zeeuws-Vlaanderen." (Author)] Address: van't Bosch, J., Newtonplein 62, 2562 JX Den Haag, The Netherlands. E-mail: johanvantbosch@yahoo.co.uk

**13049.** Bota-Sierra, C.A.; Wolff Echeverri, M.I. (2013): Taxonomic revision of *Mesamphiagrion* Kennedy, 1920 from Colombia (Odonata: Coenagrionidae), with the description of four new species. *Zootaxa* 3718(5): 401-440. (in English, with Spanish summary) ["The genus *Mesamphiagrion* Kennedy, 1920, occurs in the Pante-pui region and northern Andes in South America and is most speciose in Colombia where the genus is less known. In this work, we record 10 species of *Mesamphiagrion* from Colombia, including four new species (*Mesamphiagrion gaudiimontanum* Bota-Sierra sp. nov., *M. nataliae* Bota-Sierra sp. nov., *M. rosleri* Bota-Sierra sp. nov., and *M. santainense* Bota-Sierra sp. nov.). We also re-describe the male of *M. risi* (De Marmels 1997) and describe the females of *M. risi*, *M. ovigerum* (Calvert, 1909), and *M. occultum* (Ris, 1918), which were previously unknown. Descriptions, photographs, illustrations, distribution maps, natural history notes, and a diagnostic key for males and females of *Mesamphiagrion* from Colombia are provided." (Authors)] Address: Bota-Sierra, C.A., Grupo de Entomología Universidad de Antioquia (GEUA), Medellín-Colombia. AA 1226, Colombia. E-mail: corneliobota@gmail.com

**13050.** Boudot, J.-P. (2013): *Hemianax* versus *Anax ephippiger* (Burmeister, 1839) (Odonata: Anisoptera: Aeshnidae). *Martinia Hors-série, Hemianax ephippiger - migration 2011, mai 2013*: 3-11. (in French, with English summary) ["Since its description under the name *Aeschna ephippigera* by Burmeister (1839), the Vagrant Emperor has changed of genus name several times. During a long time, it was included in the genus *Hemianax*, then transferred in the genus *Anax*, basing mostly on wings venation parameters. However modern cladistic studies use much more structural and/or genetic criteria. Waiting for more information in this field, the SFO prefers to maintain the Vagrant Emperor in the genus *Hemianax*." (Author)] Address: Boudot, J.-P., Limos - UMR 7137 CNRS / Université de Lorraine, Faculté des sciences, BP 70239, F-54506 - Vandoeuvre-lès-Nancy cedex, France. E-mail: jean.pierre.boudot@numericable.fr

**13051.** Bouton, F.M. (2013): Observation d'*Hemianax ephippiger* (Burmeister, 1839) en Sarthe au printemps 2011 (Odonata, Anisoptera: Aeshnidae). *Martinia Hors-série, Hemianax ephippiger - migration 2011, mai 2013*: 65-68. (in French, with English summary) [In 2011, *H. ephippiger* has been recorded for the first time in the Sarthe department, France. During the spring, a few individuals and breeding behaviour were observed in two alluvial gravel pits.] Address: Bouton, F.M., 18, rue Saint Pavin de la Cité, 72000 Le Mans, France. E-mail: fmb72@yahoo.fr

**13052.** Brossman, K. (2013): Tails and toxins: Exploring life history traits and predator-induced defenses in Eastern Red-spotted newts (*Notophthalmus viridescens viridescens*). M.Sc. thesis, The Graduate School, The Huck Institute of Life Sciences, The Pennsylvania State University: 68 pp. (in English) [Pennsylvania, USA; Chapter 2. *N. v. viridescens* larvae alter morphological but not chemical defences in response to predator cues focus on tadpole-dragonfly (*Anax junius*, *Aeschna sitchensis*, *Gomphaeschna antilope*, and *Aeschna juncea*) interactions: "Prey traits are often modified in response to exposure to predators, a phenomenon known as predator-induced phenotypic plasticity. Morphological plasticity in response to predator cues is well documented in amphibians; however, predator-induced chemical defences have received relatively little attention. *N. v. viridescens*, which possesses tetrodotoxin – a toxin for chemical defence, is most vulnerable to predation during its larval stage. I assessed whether exposing Eastern Red-spotted Newt larvae to predator scent cues (from dragonfly larvae) would elicit change in their morphological and chemical defences. Newt larvae exposed to scent cues of predatory dragonfly larvae exhibited significantly deeper tail depths, which should enhance predator escape ability by allowing them to swim faster, but did not differ in mass, snout-vent length or tail length. Newt larvae toxin concentrations were not significantly affected by exposure to these predator cues. Larval toxicity may be maternally-derived and in-

flexible, or induced toxicity may only be detectable later in development. Predator-induced phenotypic plasticity, especially of chemical defences, warrants greater attention, as potentially important outcomes of species interactions remain unclear." (Author)] Address: Brossman, Kelly, The Pennsylvania State University, The Graduate School, The Huck Institute of Life Sciences

**13053.** Buczyński, P.; Zawal, A.; Dąbkowski, P.; Szlauer-Lukaszewska, A. (2013): Dragonflies (Odonata) of the nature reserve "Świdwie". *Parki Narodowe i Rezerваты Przyrody* 32(2): 3-13. (in Polish, with English summary) ["32 odonate species were recorded in the year 2010 in the nature reserve "Świdwie" (NW Poland). Ecological, zoogeographical and conservation aspects of the fauna were analysed." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**13054.** Buczyński, P. (2013): Polish and dedicated to Poland odonatological papers. 11. The year 2012. *Odonatrix* 9(2): 72-76. (in Polish, with English summary) [The author presents a list of Polish and dedicated to Poland odonatological papers that were published in the year 2012. In the reported time period, 47 papers of various kind were published. One paper published in the year 2011 is given too." (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**13055.** Buczyński, P.; Tończyk, G. (2013): Dragonflies (Odonata) of Tuchola forests (northern Poland). 1. *Wdzydzki Landscape Park. Annales UMCS, Biologia* 68(1): 75-103. (in English, with Polish summary) ["The Wdzydzki Landscape Park lies in the Tuchola Forests which are among the areas of key importance for conservation of dragonflies in Poland. In the years 2002-2009, 55 dragonfly species were recorded in the park and its buffer zone. Lakes and Sphagnum bogs housed the highest species richness. Among the recorded species, one is included in the IUCN Red List of Threatened Species, two in the European Red List, two in the Polish Red List, ten species legally protected in Poland and ten "umbrella species". Peatbog lakes and Sphagnum bogs were most important for conservational issues. Dragonfly fauna of the studied area is among the species-richest in Poland. Its conservation value is high due to occurrence of stenotopic species, its importance for the conservation of rare and endangered species as well as for maintenance of odonatocoenoses typical of a range of natural waters. It results mostly from the forest coverage and high richness, variety and good ecological state of the surface waters. Interesting from the zoogeographical point of view was development of some thermophilic species in the lake littoral. It may be an indication of changes in thermal regime of surface waters, related to climate warming." (Authors)] Address:

Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**13056.** Büsse, S.; Hörschemeyer, T. (2013): The thorax musculature of Anisoptera (Insecta: Odonata) nymphs and its evolutionary relevance. *BMC Evolutionary Biology* 2013, 13:237 doi:10.1186/1471-2148-13-237: 13 pp. (in English) ["Background: Among the winged insects (Pterygota) the Odonata (dragon- and damselflies) are special for several reasons. They are strictly aerial predators showing remarkable flight abilities and their thorax morphology differs significantly from that of other Pterygota in terms of the arrangement and number of muscles. Even within one individual the musculature is significantly different between the nymphal and adult stage. Results: Here we present a comparative morphological investigation of the thoracic musculature of dragonfly (Anisoptera) nymphs. We investigated representatives of the Libellulidae, Aeshnidae and Cordulegasteridae and found 71 muscles: 19 muscles in the prothorax, 26 in the mesothorax and 27 in the metathorax. Nine of these muscles were previously unknown in Odonata, and for seven muscles no homologous muscles could be identified in the neopteran thorax. Conclusion: Our results support and extend the homology hypotheses for the thoracic musculatures of Odonata and Neoptera, thus supplementing our understanding of the evolution of Pterygota and providing additional characters for phylogenetic analyses comprising all subgroups of Pterygota." (Authors)] Address: Büsse, S., Abteilung Morphologie, Systematik & Evolutionsbiologie, JFB-Institut für Zoologie & Anthropologie der Georg-August-Universität Göttingen, Germany. E-mail: sebastian.buesse@biologie.uni-goettingen.de

**13057.** Büsse, S.; Hörschemeyer, T. (2013): The thorax musculature of Anisoptera nymphs (Odonata). 6th Dresden Meeting on Insect Phylogeny, Dresden, September 27–29, 2013. Abstracts — Poster Presentations: 40-41. (in English) [Verbatim: Among the winged insects (Pterygota) the Odonata are special for several reasons. Their thorax morphology differs significantly from that of other Pterygota by a reduced number of muscles (e.g. Asahina 1954; Maloeuf 1935). Even within one individual, between the nymph and adult stage, the musculature is significantly different (e.g. Maloeuf 1935). Here we present a comparative morphological investigation of the thoracic musculature of Anisoptera nymphs. For representatives of the Libellulidae, Aeshnidae and Cordulegasteridae we describe 71 muscles, 19 muscles of the prothorax, 26 muscles of the mesothorax and 27 muscles of the metathorax. This includes nine muscles that were so far unknown in Odonata, as well as seven muscles for which no homologous muscles could be identified in the neopteran thorax. Our results support and extend the homology hypotheses for the thoracic musculature of Odonata and Neoptera (Büsse et al. 2013) thus supplementing our understand-

ing of the evolution of Pterygota and providing additional characters for phylogenetic analyses comprising all subgroups of Pterygota. References: Asahina S. 1954: A morphological study of a relic dragonfly *Epiophlebia superstes* Selys (Odonata, Anisozygoptera). Tokyo: The Japan Society for the Promotion of Science 153 pp. — Büsse S., Genet C., Hörnschemeyer T. 2013: Homologization of the flight musculature of Zygoptera (Insecta: Odonata) and Neoptera (Insecta). PLoS ONE 8(2): e55787. doi:10.1371/journal.pone.0055787 — Maloeuf N.S.R. 1935: The postembryonic history of the somatic musculature of the dragonfly thorax. *Journal of Morphology* 58: 87–115.] Address: Büsse, S., Abteilung Morphologie, Systematik & Evolutionsbiologie, JFB-Institut für Zoologie & Anthropologie der Georg-August Universität Göttingen, Germany

**13058.** Büsse, S. (2013): The Thorax of Odonata (Insecta) including remarks on evolution and phylogeny. Dissertation. Georg-August-Universität Göttingen: 211 pp., app.-I. ["The aim of my dissertation was to study the morphology and evolution of the thorax of damselflies and dragonflies (Odonata). One focus was the morphology of the thorax musculature and the homology between Odonata and a generalized Neoptera thorax as well as ground pattern of Pterygota (all winged insects). Furthermore, wing base skeletal element morphology was studied to extend and underscore the recent homology hypotheses. Beyond that, I examined the morphology, genetics and biogeography, and relating phylogeny of a very rare and enigmatic group of Odonata, *Epiophlebia*. *Epiophlebia* present a unique position within the Odonata. The group of *Epiophlebia* is closely related to all dragonflies but represents the only group of Odonata not belonging to dragonflies (Anisoptera) or damselflies (Zygoptera). The four known species of *Epiophlebia* are adapted to an extreme habitat in Asian mountain regions. They prefer cold and swiftflowing mountain streams at an altitude ranging from 1000 to 3500 meters above sea level (stenoecious lifestyle). The habitats of the *Epiophlebia* species are highly separated from each other on the Asian continent. Their respective range shows no overlap areas today, which typifies speciation via spatial isolation (separation). Results of genetic investigation of three of the four species' DNA segments (sequences) show surprising, extreme homogeneity. These results lead to a biogeographical scenario, which assumes a shared habitat of *Epiophlebia* during the Würm ice age (approximately 20,000 years ago). When the warming phase started, *Epiophlebia*-populations were separated into distinct populations each located in a different glacial refuge (simplified, cold withdraw areas). This short time frame could explain the genetic homogeneity observed. Nevertheless, the question of the species status of *Epiophlebia* remains: Is there only one species – *Epiophlebia superstes* – in four different populations or are there four different species? During a subsequent morphological study the species status at least of *Epiophlebia*

*laidlawi* Tillyard, 1921 could also be confirmed. Another study that draws directly on the genetic investigation of *Epiophlebia*, comprises a genetic sequence (S4-region of the 28s rRNA gene), which is suitable as a universal species identification tool for insects. Most insect specimens from all insect groups were successfully identified to species level with this tool. The investigation comprised 85 samples of 65 insect species, with at least one species per major clade of which the former represented a genus. We were able to demonstrate that our analysis system – which provides universal applicability and extended functionality – has advantages over the existing one (e.g. COI). The S4-method is applicable for degraded DNA that has, for example, been caused by aging, weathering or chemical influences. Investigation of the Odonata thorax comprised three studies. Two of the musculature and sclerites of adult Zygoptera flight apparatus and one of the entire nymphal Anisoptera thorax musculature. The aim was to understand and highlight peculiarities of the odonatan thorax. To obtain the data and reach the best overall result possible, traditional morphological methods – such as dissecting and hand drawing – were combined with one of the latest morphological methods, which included computer tomography (SR!CT) aided by 3D reconstruction. By doing this, we discovered a total of 11 new, previously unknown muscles for Odonata. These morphological data were used to present the first complete homologization scheme of Odonata and neopterous insect thorax musculature. Furthermore, the homologies of the skeletal elements of the flight apparatus were confirmed and distinctly enhanced. This study also mark the first time muscle attachment points were discussed as important homology criteria. As a whole, these homology assessments allow unprecedented direct comparison between Odonata, which have a highly derived flight apparatus, and all other insects. Insights into the evolution and ground pattern of Odonata, even of all winged insects (Pterygota), were consequently gained. The homologies enable comparison and provide a complete new set of characters for subsequent analysis of the relationship (phylogenetic analysis) of Pterygota. A key, wing base sclerites' characteristic – the subalare –, points to the phylogenetic hypothesis of Paleoptera [Odonata+Ephemeroptera (mayflies)]. A generalized Odonata thorax that includes all recently known muscles will allow simplified work and access to the complex structure for future studies and will aid in furthering knowledge. This generalized thorax might be the initial point for a hypothetical ground pattern of pterygote insects and will allow insights into the development and evolution of the insect flight apparatus." (Author)] Address: Büsse, S., Abteilung Morphologie, Systematik & Evolutionsbiologie, JFB-Institut für Zoologie & Anthropologie der Georg-August Universität Göttingen, Germany

**13059.** Büsse, S. (2013): Generalized Odonata thorax. 6th Dresden Meeting on Insect Phylogeny, Dresden,



September 27–29, 2013. Abstracts — Poster Presentations: 41. (in English) [Verbatim: The odonatan thorax is a highly specialized and therefore a highly derived character system (e.g. Asahina 1954; Büsse et al. 2013). The generalized odonatan thorax shows all the muscles that have been found in Odonata to date. It compiles all the results of Büsse et al. (2013) and Büsse & Hörnschemeyer (subm.) and is completed by four muscles located independently by both Asahina (1954) and Maloeuf (1935), only. For simplicity's sake, for comparison to Neoptera in particular, the generalized odonatan thorax is shaped like a nymphal thorax, which resembles the neopteran thorax. In order to present an overview, all structures, attachment points and directions have been simplified. It includes all muscles found homologous to Neoptera (Büsse et al. 2013; Büsse & Hörnschemeyer subm.) and the newly described Odonata muscles with no homologies to neopteran thorax (Büsse & Hörnschemeyer subm.). The aim of the generalized odonatan thorax is to gain clear understanding of Odonata's muscle setup. It also represents an initial attempt to develop a hypothetical odonatan ground pattern of a stem-group representative. References: Asahina S. 1954: A morphological study of a relic dragonfly *Epiophlebia superstes* Selys (Odonata, Anisozygoptera). Tokyo: The Japan Society for the Promotion of Science 153 pp. — Büsse S., Genet C., Hörnschemeyer T. 2013: Homologization of the flight musculature of Zygoptera (Insecta: Odonata) and Neoptera (Insecta). PLoS ONE 8(2):e55787. doi:10.1371/journal.pone.0055787 — Büsse S., Hörnschemeyer T. submitted: The nymphal thorax musculature of Anisoptera (Insecta: Odonata) and its evolutionary relevance. BMC Evolutionary Biology. — Maloeuf N.S.R. 1935: The postembryonic history of the somatic musculature of the dragonfly thorax. Journal of Morphology 58: 87–115.] Address: Büsse, S., Abteilung Morphologie, Systematik & Evolutionsbiologie, JFB-Institut für Zoologie & Anthropologie der Georg-August Universität Göttingen, Germany

**13060.** Butler, S.G.; Orr, A.G. (2013): The larva of *Heliaeschna simplicia* Karsch, 1891 (Anisoptera: Aeshnidae). *Odonatologica* 42(2): 151-156. (in English) ["The female larva is figured and described for the first time, based on exuviae from a reared specimen and an F larva collected from runnels in peat swamp forest in Sarawak, Malaysia. The larva is compared with those of *Heliaeschna filostyla* Martin, 1906 and *H. uninervulata* Martin, 1909, the only other species of the genus so far described, as well as certain other aeshnid genera. Notes on habitat and behaviour are included." (Author)] Address: Butler S.G., Red Willow, All Stretton, Shropshire SY6 GHN, UK. E-mail: sgbutler15@btopenworld.com

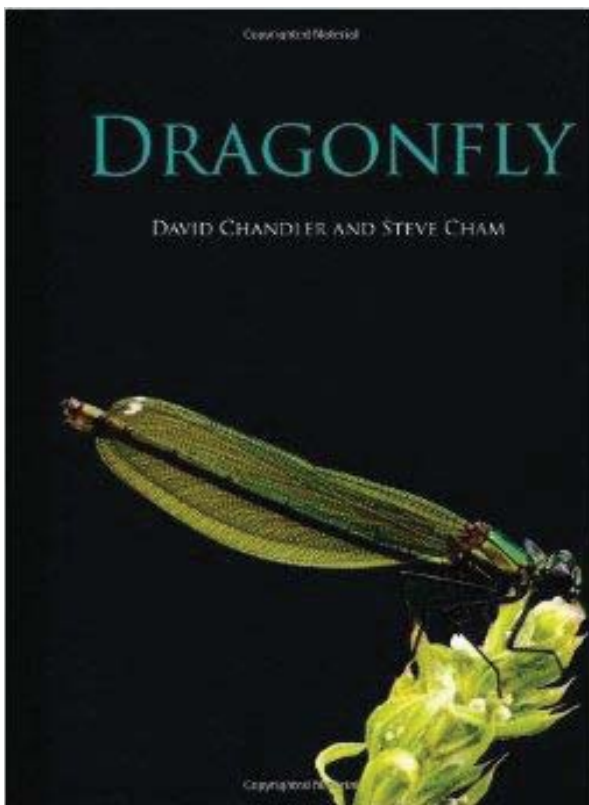
**13061.** Carle, F.L.; May, M.L.; Kjer, K.M. (2013): A supermatrix approach to the phylogeny of Odonata. 6th Dresden Meeting on Insect Phylogeny, Dresden, September 27–29, 2013. Abstracts — Oral Presentations: 21. (in

English) [Verbatim: Over the past decade, a number of research teams have explored the phylogeny of Odonata with molecular data. Each has targeted their own set of genes, and their own taxa, and little effort has been made to coordinate efforts, or consolidate data from multiple sources. Here we construct a supermatrix from 4 independent genes (28S, 18S; 12S, 16S, COI, COII; EF1a and H3) and over 500 species, representing all families of Odonata. Our phylogenetic results are largely congruent with those we reported in Carle et al. 2008, with monophyletic suborders (Anisoptera and Zygoptera). We find coenagrionoids and calopterygoids together with lepidoptera relatively basal. We find *Epiophlebia* as sister to Anisoptera, with aeshnoids at the base of the Anisoptera. We discuss our strategies for alignment, data exclusion, combining taxa, discovering contaminants and reducing missing data. References: Carle F.L., Kjer K.M., May M.L. 2008: Evolution of Odonata, with special reference to Zygoptera. *Arthropod Systematics & Phylogeny* 66: 37–44.] Address: Frank L. Carle (Rutgers University, Dept of Entomology, 93 Lipman Dr., New Brunswick, NJ 08901, USA

**13062.** Carvalho, F.G.; Pinto, N.S.; Oliveira Júnior, J.M.B.; Juen, L. (2013): Effects of marginal vegetation removal on Odonata communities. *Acta Limnologica Brasiliensia* 25(1): 10-18. (in English, with Portuguese summary) ["Aim: Here we assess the effects of habitat degradation on individuals of the two suborders of Odonata community of Borecaia river sub-basin. More specifically, we tested the hypothesis that Anisoptera richness would be positively affected by removal of vegetation; on the other hand, Zygoptera richness would be adversely affected by virtue of their ecophysiological requirements; Methods: We selected 10 streams of similar orders, six preserved and four degraded. Streams characterized as preserved had values of Index of Habitat Integrity (IHI) above 0.70 ( $0.77 \pm 0.07$ , mean  $\pm$  SD) and continuous forest on both sides with a minimum width of 70 meters. Each site was sampled three times on different days. The effect of vegetation removal on richness was assessed using richness estimated by first order Jackknife; Results: Decreased physical integrity (measured with IHI) of streams had no significant effect on the estimated richness to Odonata in general. However, the estimated richness of Anisoptera showed an inverse relationship with the integrity ( $r^2 = 0.485$ ,  $P = 0.025$ ), i.e., there was a reduction in their species richness with increasing integrity; Discussion: As a general pattern, Anisoptera presents higher richness in an altered site; on the other hand, Zygoptera presents higher richness in a preserved one. This pattern suggests that Odonata needs to be considered at the sub-order level to access the effects of habitat degradation on these insects. Because of its restrictions ecophysiological Odonata varied widely in their composition and species richness between the two types of environments, it reinforces the potential of the order of studies and environmental monitoring also shows that Zygoptera be more affected by changes in

habitat. However, further studies including more samples and different streams are need to confirm this pattern, being an interesting line of research for future works." (Authors)] Address: Carvalho, F.G., Curso de Especialização em Perícia Ambiental, Pontífica Universidade Católica de Goiás – PUC Goiás, Av. Universitária, 1069, Área 4, Bloco A, Campus I, Setor Universitário, CEP 74605-010, Goiânia, GO, Brazil. E-mail: nandocarvalhog@hotmail.com

**13063.** Catil, J.-M. (2013): Gomphus simillimus Selys, 1840 au menu des hirondelles de fenêtre (Delichon urbica) (Odonata, Anisoptera: Gomphidae). Martinia 29(1): 42. (in French) [9 vi 2011, Mauvezin (Gers [32], France); in the nest of a house martin (Delichon urbica), two teneral specimens of G. simillimus were found. Obviously they had not been consumed by the young. The author proposed that the gomphids had been too large to be devoured by the nestlings.] Address: Catil, J.-M., CPIE Pays Gersois, Au Château, F-32300 L'Isle de Noé, France. E-mail: jmcatil@yahoo.fr



**13064.** Chandler, D.; Cham, S. (2013): Dragonfly. New Holland's Natural History Monographs 4. 128 pp (in English). ["Supremely colourful, among the most voracious predators of the insect world and on the wing for more than 300 million years, dragonflies and damselflies capture the imagination in so many ways. Yet many aspects of their fascinating lives are little-known to humans. Dragonfly provides an insight into a hidden world through engaging text and stunning close-up photography. Dragonfly combines insightful writing with rarely seen images of the life and behaviour of the

world's dragonfly and damselfly species. There are chapters on subjects such as hunting, courtship and the emergence of the nymphs and their subsequent transformation into adult dragonflies. These insects are further brought to life through the personal experiences of the author and photographers, and these are woven into the text." (Publishers)]

**13065.** Chen, J.; Yu, X. (2013): Odonata diversity of the middle and lower reaches of the Red River basin, Yunnan, China. Journal of Insect Biodiversity 1(9): 1-11. (in English) ["Eighty six species of Odonata are recorded from the middle and lower reaches of the Red River basin. Archineura hetaerinoidea is recorded from China for the first time. Five genera and five species are new to Yunnan Province. Among the six types of odonate habitats, forest streams have the highest species diversity whereas ponds have the most species shared with other habitats. Both of these two habitats are important in biodiversity conservation and need urgent protection." (Authors)] Address: Yu, X., Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, 300071, China. E-mail: lannysummer@163.com

**13066.** Chen, Y.H.; Skote, M.; Zhao, Y.; Huang, W.M. (2013): Dragonfly (Sympetrum flaveolum) flight: kinematic measurement and modelling. Journal of Fluids and Structures 40: 115-126. (in English) ["Highlights: • The kinematics of the wing is studied thoroughly using high-speed videography. • The costa is shown to be two parts hinged with physical constraint of forty degrees. • Two flapping patterns are revealed: simple figure-eight and a double figure-eight. • Kinematic modelling is established. • Previous misunderstandings regarding the wing rotation during pronation are clarified. The kinematics of the flapping hindwing of S. flaveolum is investigated. Several tracking points along the leading edge and trailing edge of the hindwing are recorded and studied using high-speed videography. By applying more tracking points along the leading edge around the nodus, it is shown that the leading edge is not one rigid piece, but two pieces hinged at the nodus with physical constraint of forty degrees. Such arrangement also eases the difficulties in rotating the wing during pronation by bending the leading edge forward and flattening the wing. From the kinematic experiments, two flapping patterns of the dragonfly wing are revealed as a simple figure-eight and a double figure-eight flapping pattern. Kinematic modelling of the two flapping patterns is then established by transforming the flapping motions into angular rotations about the pivoting wing root in a local body-fixed spherical coordinate system." (Authors)] Address: Skote, M., School of Mechanical & Aerospace Engineering, Nanyang Technological Univ., 50 Nanyang Av., Singapore 639798, Republic of Singapore. E-mail: mskote@ntu.edu.sg

**13067.** Cheng, S.; Cheng, L.; Zhang, C.; Wushu, Y.; Yuanrong, B.; Mao, Y. (2013): Observations on diet of Cab-

ot's Tragopan at Huanggangshan in Jiangxi Province, China. Chinese Journal of Zoology 48(1): 36-42. (in Chinese, with English summary) ["Food composition and behaviour of Tragopan caboti were studied with methods of field observation and captive observation simulated natural environment from May, 2004 to June, 2012 in Jiangxi Wuyishan National Nature Reserve. 78 species (categories) were recorded for food intake by T. caboti during the study period. Among of these foods, 74 species belong to higher plants in 39 families and 65 genera] ... including Odonata (without any taxonomic details) [respectively. Research results show that T. caboti is phytophagous and trophic broad with strong ability of ingestion learning and environment suitability. But the feeding habits of T. caboti are significant different in different environment condition." (Authors)] Address: Cheng, S., Jiangxi Wuyishan National Nature Reserve Yanshan 334500 China. E-mail: songlin513@126.com

**13068.** Cherevichko, A.V.; Mikhailov, A.E. (2013): Amphibiotic insects (Ephemeroptera, Odonata, Plecoptera, Trichoptera) in the benthos of intensely polluted small rivers in Pskov Oblast. Materials of the Fifth All-Russia Symposium on Amphibiotic and Aquatic Insects / Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences. – Yaroslavl: Filigran, 2013. – 254 pp: 233-236. (in Russian, with English summary) ["The composition of macrozoobenthos of some small rivers in Pskov Oblast has been studied in areas with intensely polluted with undertreated wastewaters of enterprises or populated areas. Considerably decreased species richness and abundance of amphibiotic insects have been revealed in areas of wastewater discharge, compared to background values of these parameters." (Authors) The following Odonata species were listed: Calopteryx splendens, C. virgo, Cordulia aenea, Gomphus vulgatissimus, Ischnura elegans, Leucorrhinia rubicunda, Libellula fulva, Lestes viridis, Platycnemis pennipes, and Sympetrum vulgatum.] Address: Cherevichko, A.V., Pskov Branch, State Res. Inst. of Lake & River Fisheries ul. Gorkogo 13, Pskov, 180007, Russia. E-mail: acherevichko@mail.ru

**13069.** Clausnitzer, H.-J.; Clausnitzer, C.; Hengst, R. (2013): Veränderung der Libellenfauna in 43 Jahren im NSG Breites Moor bei Celle, Niedersachsen (Odonata). Libellula 32(1/2): 31-44. (in German, with English summary) [Germany; "In total, 49 dragonfly species were observed. In the years 1970-2001, the species composition remained almost constant. In the years 2002-2012, however, the species number increased. Those species with a Mediterranean origin especially immigrated for the first time and became successfully established. On the other hand, two species reproduced no longer in the nature reserve. Climate change and habitat succession are discussed as causes for this development." (Authors)] Address: Clausnitzer, H.-J., Eichenstr. 11, 29348 Eschede, Germany. E-mail: H.-J.Clausnitzer@t-online.de

**13070.** Conniff, K.; Bedjanic, M. (2013): Two new endemic representatives of the genus Archibasis from Sri Lanka (Zygoptera: Coenagrionidae). Odonatologica 42(3): 189-202. (in English) ["A. lieftincki sp. n. (holotype male: Gin Ganga river at Deniyaya; Matara distr.; Southern prov.; N 6.34°, E 80.56°; 02-V-2003; to be deposited at Sri Lanka National Museum, Colombo) and A. oscillans hamvellanensis subsp. n. (holotype male: Hanwella; Colombo distr.; Western prov.; N 6.90°, E 80.09°; 06-11-2011; to be deposited at Sri Lanka National Museum, Colombo) are described as new to science. Distribution, habitat requirements and threat status of these two endemic taxa are briefly commented." (Authors)] Address: Conniff, Karen, do ICIMOD, GPO Box 3226 Kumalhar, Kathmandu, Nepal. E-mail: karoconniff@gmail.com

**13071.** Dayaram, A.; Potter, K.A.; Moline, A.B.; Rosenstein, D.D.; Marinov, M.; Thomas, J.E.; Breitbart, M.; Rosario, K.; Argüllo-Astorga, G.R.; Varsani, A. (2013): High global diversity of cycloviruses amongst dragonflies. Journal of General Virology 94: 1827-1840 (in English) ["Members of the family Circoviridae, specifically the genus Circovirus, were thought to infect only vertebrates; however, members of a sister group under the same family, the proposed genus Cyclovirus, have been detected recently in insects. In an effort to explore the diversity of cycloviruses and better understand the evolution of these novel ssDNA viruses, here we present five cycloviruses isolated from three dragonfly species (Orthemum sabina, Xanthocnemis zealandica and Rhionaeschna multicolor) collected in Australia, New Zealand and the USA, respectively. The genomes of these five viruses share similar genome structure to other cycloviruses, with a circular ~1.7 kb genome and two major bidirectionally transcribed ORFs. The genomic sequence data gathered during this study were combined with all cyclovirus genomes available in public databases to identify conserved motifs and regulatory elements in the intergenic regions, as well as determine diversity and recombinant regions within their genomes. The genomes reported here represent four different cyclovirus species, three of which are novel. Our results confirm that cycloviruses circulate widely in winged-insect populations; in eight different cyclovirus species identified in dragonflies to date, some of these exhibit a broad geographical distribution. Recombination analysis revealed both intra- and inter-species recombination events amongst cycloviruses, including genomes recovered from disparate sources (e.g. goat meat and human faeces). Similar to other well-characterized circular ssDNA viruses, recombination may play an important role in cyclovirus evolution." (Authors)] Address: Varsani, A., School of Biological Sciences, University of Canterbury, Christchurch 8140, New Zealand. E-mail: arvind.varsani@canterbury.ac.nz

**13072.** Davenport, J.M.; Chalcraft, D.R. (2013): Non-consumptive effects in a multiple predator system reduce the foraging efficiency of a keystone predator. Ecology and Evolution 3(9): 3063-3072. (in English) [



"Many studies have demonstrated that the nonconsumptive effect (NCE) of predators (*Anax* sp.) on prey traits can alter prey demographics in ways that are just as strong as the consumptive effect (CE) of predators. Less well studied, however, is how the CE and NCE of multiple predator species can interact to influence the combined effect of multiple predators on prey mortality. We examined the extent to which the NCE of one predator altered the CE of another predator on a shared prey and evaluated whether we can better predict the combined impact of multiple predators on prey when accounting for this influence. We conducted a set of experiments with larval dragonflies, adult newts (a known keystone predator), and their tadpole prey. We quantified the CE and NCE of each predator, the extent to which NCEs from one predator alters the CE of the second predator, and the combined effect of both predators on prey mortality. We then compared the combined effect of both predators on prey mortality to four predictive models. Dragonflies caused more tadpoles to hide under leaf litter (a NCE), where newts spend less time foraging, which reduced the foraging success (CE) of newts. Newts altered tadpole behaviour but not in a way that altered the foraging success of dragonflies. Our study suggests that we can better predict the combined effect of multiple predators on prey when we incorporate the influence of interactions between the CE and NCE of multiple predators into a predictive model. In our case, the threat of predation to prey by one predator reduced the foraging efficiency of a keystone predator. Consequently, the ability of a predator to fill a keystone role could be compromised by the presence of other predators." (Authors)] Address: Davenport, J.M., Divi. Biol. Sciences, Univ. of Montana, Missoula, Montana 59812, USA. E-mail: jon.davenport@mso.umt.edu

**13073.** De Knijf, G.; Adriaens, D.; Van Elegem, B.; Paelinckx, D. (2013): Natura 2000 habitats – more than floral Criteria and use of typical fauna species when assessing the conservation status of a Natura 2000 habitat. *Natuur.focus* 11(3): 109-120. (in Dutch, with English summary) ["The European Habitats Directive dictates that the assessment of the conservation status of a habitat type takes, amongst others, into account the conservation status of its typical fauna species. Therefore, a list of typical species for each habitat type is required, together with a description of the method used to assess their conservation status. When choosing typical fauna species the following considerations should be taken into account: 1) typical species should be good indicators for a favourable habitat quality, 2) it should be possible to detect typical species by non-destructive and inexpensive means and 3) the list of typical species should ideally remain stable over the mid- to long-term. Here we present a list of 153 typical fauna species for the different habitat types present in Flanders. Only species reproducing in a specific habitat type were selected. Distinction is made between species exclusively (type E) present in the habitat type, characteristic species (type K) having half of their popula-

tion reproducing in it, and species which are consistently present (type Ca and Cab), but not restricted to it. Assessment of the status of typical species can be based on best expert opinion, general national surveys, site-based sampling or Red List information. A typical species which is likely to become extinct within the next ten years will automatically lead to an overall unfavourable conservation status of that habitat type. Otherwise assessment will be based on the expected decline of a certain percentage of all typical species for a certain habitat type." (Authors) Odonata were prominently represented as indicator species for freshwater habitats: *Aeshna isocetes*, *A. juncea*, *Brachytron pratense*, *Calopteryx splendens*, *Coenagrion hastulatum*, *C. lunulatum*, *C. pulchellum*, *Cordulegaster boltonii*, *Gomphus vulgatissimus*, *Leucorhinia dubia*, *L. pectoralis*, *L. rubicunda*, *Libellula fulva*, *Somatochlora arctica*, *S. flavomaculata*, and *Sympetrum depressiusculum*.] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**13074.** De Knijf, G.; Demolder, H. (2013): Early spring observations of Odonata from Cyprus. *Libellula* 32(1/2): 59-74. (in English, with German summary) ["During a two-week visit to the island of Cyprus in April 2012, 17 species of dragonfly were observed. In particular, the discovery of a large population of *Lestes macrostigma* is worth mentioning, as this species has not been reported in Cyprus for over 60 years. Concerning the flight period, very early records in the season for the eastern Mediterranean were noted for *Epallage fatime*, *Onychogomphus forcipatus albotibialis*, *Orthetrum taeniolatum* and *Selysiothemis nigra*. For the latter, this is the earliest observation date ever reported. Furthermore, several very old individuals of *Sympetrum meridionale* and *S. striolatum* were seen in early April, providing strong evidence for these species to be able to overwinter in small numbers as adults. These are the first worldwide records of overwintering for *S. meridionale* in the adult stage." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**13075.** De Marmels, J.; Gaspar Neiss, U. (2013): Description of the larva of *Neuraeschna claviforcipata* Martin, 1909 (Insecta: Odonata: Aeshnidae). *Zootaxa* 3721 (1): 97-100. (in English) ["The ultimate stadium larva of *N. claviforcipata* is described and illustrated based on an F-0 exuvia of a reared female from northern Amazonas State, Brazil. This larva differs from the other two known larvae of the genus in lacking the spiny lateral prominence of the mandible, and in having only a short spine each side of the median cleft of the prementum; labium is shorter and cercus longer. Noteworthy is the presence of a hair brush on each occipital lobe behind mesal angle of compound eye. The larva was found in a small blackwater pool with abundant leaf litter in an open, "campina"-type habitat, with sandy soil and low, bushy vegetation." (Authors)] Address: De Marmels, J., Museo

del Instituto de Zoología Agrícola "Francisco Fernández Yépez" (MIZA), Facultad de Agronomía, Universidad Central de Venezuela, Apartado 4579, Maracay 2101-A, Venezuela. E-mail: demarmjc@gmail.com

**13076.** Dijkstra, K.-D.B.; Bechly, G.; Bybee, S.M.; Dow, R.A.; Dumont, H.J.; Fleck, G.; Garrison, R.W.; Hämäläinen, M.; Kalkman, V.J.; Karube, H.; May, M.L.; Orr, A.G.; Paulson, D.; Rehn, A.C.; Theischinger, G.; Trueman, J.W.H.; van Tol, J.; von Ellenrieder, N.; Ware, J. (2013): The classification and diversity of dragonflies and damselflies (Odonata). In: Zhang, Z.-Q. (Editor). Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa* 3703 (1): 36-45. (in English) ["An updated classification and numbers of described genera and species (until 2010) are provided up to family level. We argue for conserving the family-group names Chlorocyphidae, Euphaeidae and Dicterididae, as well as retaining Epiophlebiidae in the sub-order Anisozygoptera. Pseudostigmatidae and New World Protoneuridae are sunk in Coenagrionidae and Old World Protoneuridae in Platycnemididae. The families Amphipterygidae and Megapodagrionidae as traditionally recognized are not monophyletic, as may be the superfamily Calopterygoidea. The proposal to separate Chlorogomphidae, Cordulegastridae and Neopetaliidae from Libelluloidea in their own superfamily Cordulegastroidea is adopted. Macromiidae, Libellulidae and Synthemitidae and a restricted Corduliidae are accepted as families, but many genera of Libelluloidea are retained as incertae sedis at present. 5952 extant species in 652 genera have been described up to 2010. These are placed here in 30 families; recent proposals to separate additional families from Amphipterygidae and Megapodagrionidae have not yet been incorporated." (Authors)] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: [dijkstra@nlnm.nl](mailto:dijkstra@nlnm.nl)

**13077.** Din, A.U.; Zia, A.; Bhatti, A.R.; Khan, M.N. (2013): Odonata naiads of Potohar Plateau, Punjab, Pakistan. *Pakistan J. Zool.* 45(3): 695-700. (in English) ["A series of collection surveys conducted during two consecutive years (2011-12) to explore Odonata naiads of Potohar plateau revealed 34 species under 6 families and 21 genera. Specimens were collected from different aquatic habitats that include almost all sort of waters including static, flowing, acidic, alkaline, brackish or saline. Details showing valid names, collection localities, ecological observations, number of individual male/female collected are provided for each species." (Authors) In any case, the identification of the Westmediterranean *Boyeria irene* should be revalidated.] Address: Zia, S.A., National Insect Museum, National Agriculture Research Centre, Islamabad – Pakistan. E-mail: [saiyedahmed@yahoo.com](mailto:saiyedahmed@yahoo.com)

**13078.** Dow, R.A.; Reels, G.T.; Butler, S.G. (2013): Previously unpublished Odonata records from Sarawak,

Borneo. Part II. Kubah National Park. Faunistic Studies in South-East Asian and Pacific Island Odonata 6: 1-27. (in English, with Bahasa Melayu summary) [Malaysia; "Records of Odonata from Kubah National Park, near Kuching in west Sarawak, are presented. Eighty-five species are known from the national park. Notable records include *Drepanosticta drusilla*, *Rhinocypha* species of spinifer, *Bornagriolestes* species, *Anaciaeschna* species and *Macromidia genialis erratica*." (Authors)] Address: Dow, R.A., Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: [rory.dow230@yahoo.co.uk](mailto:rory.dow230@yahoo.co.uk)

**13079.** Dow, R.A. (2013): *Drepanosticta burbachi* spec. nov. from Sarawak, Borneo, a new species allied to *D. dulitensis* Kimmins, with notes on related species (Zygoptera: Platystictidae). *Odonatologica* 42(3): 203-210. (in English) ["The new species is described and compared with its closest congener, *D. dulitensis*. Holotype male: Malaysia Sarawak, Kuching Division, Gunung Penrissen, Borneo Highlands Resort trail system, steep boulder stream, 24-VII-2012; deposited in RMNH, Leiden. New records for *D. dulitensis* are documented and the species is discussed." (Author)] Address: Dow, R.A., Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: [rory.dow230@yahoo.co.uk](mailto:rory.dow230@yahoo.co.uk)

**13080.** Drissner, J.; Steigmüller, M.L.; Hille, K. (2013): Environmental education outside school: effects of a half-day teaching programme. *Education Journal* 2(6): 231-235. (in English) ["The "Green Classroom" in the Botanical Garden of the University of Ulm is a learning forum outdoor school that is used by about 2,500 school students annually. Its educational concept is based on experiential learning and is geared towards expanding students' biological knowledge and awareness of small animals such as invertebrates and insects. In the first study, 66 students (grade 4) were asked to draw a picture of a pond as a habitat. 33 of these students had previously visited the "Green Classroom" (intervention group). Students of the intervention group drew more of the smaller types of animals in their pictures and furthermore a bigger variety of species of animals and plants than the control group. In the second study, the same students (66, grade 4) were given a list of animal species, and were asked to tick those which are typical to a pond. Students who had visited the "Green Classroom" ticked more animals off correctly than their peers in the control group." (Authors) The pictures also represent dragonflies.] Address: Drissner, J., Botanical Garden, University of Ulm, D - 89081 Ulm, Germany. E-mail: [juergen.drissner@uni-ulm.de](mailto:juergen.drissner@uni-ulm.de)

**13081.** Dubois, P. (2013): Observation d'un cas de coloration atypique chez *Orthetrum coerulescens* (Fabricius, 1798) (Odonata, Anisoptera: Libellulidae). *Martinia* 29(1): 9-14. (in French, with English summary) ["During July 2010, I made a picture of a male of *O. coerulescens*

which had transversal black strips on the abdomen (Alex, Drome region, France). Due to the publication of this observation on an Internet odonatist forum and thanks to further discussion, possible reasons for this uncommon pattern are proposed and similar observations are reported." (Author)] Address: Dubois, P., Goely, les Fougères, 42520 Macias, France. E-mail: pdubois@online.fr

**13082.** Dunbier, J.R.; Wiederman, S.D.; O'Carroll, D.C. (2013): Mapping predictive facilitation in a dragonfly target neuron. *Front. Physiol. Conference Abstract: International Conference on Invertebrate Vision*. doi: 10.3389/conf.fphys.2013.25.00002: n.p. (in English) [Verbatim: Dragonflies are masters of aerial pursuit, executing prey capture flights with a 97% success rate. In perching Libellulids, such flights are brief (average 184ms, [1]), although target motion is also tracked from the perch prior to take-off. However many dragonflies also engage in longer duration territorial and courtship pursuits of conspecifics, that can last tens of seconds. These chase sequences include changes in velocity and direction, as well as the possibility of target occlusion by matched background texture. Recent work shows that responses of dragonfly small target motion detector (STMD) neurons may be facilitated over prolonged time courses (up to 500ms) of continuous motion [2,3]. We hypothesize that such facilitation may play a role in increasing robustness by predictively increasing the gain of detectors in the direction of future travel. We tested this in CSTMD1, a dragonfly neuron recently shown to express a form of selective attention for one target in the presence of a distractor [4]. We presented single target stimuli that moved along an initial 'priming' path for 500ms before undergoing spatial, temporal or combined discontinuities in their trajectories. We quantified the facilitation state by comparing the neuronal response (spike rate) in a 200ms window following the discontinuity with that for a naive control, tested at the same receptive field location. We found that facilitation is initially spatially localized: only the smallest spatial displacement tested in the direction of target travel (4°) gives significantly stronger responses than control. When larger spatial displacements were combined with a delay in reappearance, however, responses were significantly elevated, even for a 20° displacement with a 500ms delay in reappearance. Backward displacements (i.e. across previously traversed location) yield strongly inhibited responses. This suggests that facilitation is mediated by a process of local gain modulation that actively spreads from the last seen location of a stimulus and in the approximate direction of travel. Such predictive modulation of local target salience may be a key mechanism for selective attention during target tracking. Acknowledgements: We thank the manager of the Botanic Gardens of Adelaide for allowing insect collection. Funding was received from the US Air Force Office of Scientific Research (grants FA2386-10-1-4114 and FA9550-09-1-0116). References: [1] Olberg, R. M., Worthington, A. H., and Venator, K. R. (2000). Prey pursuit and interception in dragonflies. *J. Comp. Physiol.*

*A* 186, 155–162. [2] Nordström, K., Bolzon, D. M., and O'Carroll, D. C. (2011). Spatial facilitation by a high-performance dragonfly target-detecting neuron. *Biol. Lett.* 7, 588–592. [3] Dunbier, J.R., Wiederman, S.D., Shoemaker, P.A. and O'Carroll, D.C. (2012). Facilitation of dragonfly target-detecting neurons by slow moving features on continuous paths. *Front. Neural Circuits* 6:79. [4] Wiederman, S.D. and O'Carroll D.C. (2013) Selective attention in an insect visual neuron. *Curr. Biol.* 23, 156–161.] Address: Dunbier, J.R., The University of Adelaide, School of Medical Sciences, Adelaide, Australia. E-mail: james.dunbier@adelaide.edu.au

**13083.** Dunbier, J.R., Wiederman, S.D.; Shoemaker, P.A.; O'Carroll, D.C. (2013): Facilitation of dragonfly target-detecting neurons by slow moving features on continuous paths. *Frontiers in Neural Circuits* 6(79): 11 pp. (in English) ["Dragonflies detect and pursue targets such as other insects for feeding and conspecific interaction. They have a class of neurons highly specialized for this task in their lobula, the "small target motion detecting" (STMD) neurons. One such neuron, CSTMD1, reaches maximum response slowly over hundreds of milliseconds of target motion. Recording the intracellular response from CSTMD1 and a second neuron in this system, BSTMD1, we determined that for the neurons to reach maximum response levels, target motion must produce sequential local activation of elementary motion detecting elements. This facilitation effect is most pronounced when targets move at velocities slower than what was previously thought to be optimal. It is completely disrupted if targets are instantaneously displaced a few degrees from their current location. Additionally, we utilize a simple computational model to discount the parsimonious hypothesis that CSTMD1's slow build-up to maximum response is due to it incorporating a sluggish neural delay filter. Whilst the observed facilitation may be too slow to play a role in prey pursuit flights, which are typically rapidly resolved, we hypothesize that it helps maintain elevated sensitivity during prolonged, aerobically intricate conspecific pursuits. Since the effect seems to be localized, it most likely enhances the relative salience of the most recently "seen" locations during such pursuit flights." (Authors)] Address: Dunbier, J.R., The University of Adelaide, School of Medical Sciences, Adelaide, SA 5005, Australia. E-mail: ames.dunbier@adelaide.edu.au

**13084.** Fate, C.; Lapeyrie, J.; Nel, A. (2013): A new Permagoniidae from the Middle Permian of the South of France (Odonatoptera: Protozgyoptera). *Zootaxa* 3702(4): 397-400. (in English) ["The new permagoniid protozgyopteran genus and species *Salagoulestes wesleyi* is described from the Middle Permian of Lodève Basin, Salagou Formation. It seems to be more closely related to the two genera *Scytolestes* and *Permagonia* than to any other Permagoniidae. It increases the diversity of the odonatopteran fauna in the Salagou Formation to 14 different species." (Authors)] Address:



Fate, Caitin, 1225 Sequoia Drive, San Anselmo, CA 94960, California, USA. E-mail: caitinfate@gmail.com

**13085.** Ferrand, M.; Dommanget, J.-L. (2013): *Hemianax ephippiger* (Burmeister, 1839) en Île-de-France en avril et mai 2011 (Odonata, Anisoptera: Aeshnidae). *Martinia* Hors-série, *Hemianax ephippiger* - migration 2011, mai 2013: 55-60. (in French, with English summary) ["The discovery of *H. ephippiger* in the région Ile-de-France is presented and discussed. The species was observed in two areas separated by a gap of ca. 40 km in the Yvelines department. The first is an open and vegetated settling tank. In April 2011, ten individuals were observed patrolling or hunting. The second site is a wet depression in which seven individuals were observed either in tandem or laying. The eggs were inserted into various substrates, namely stems, moss, plant debris, etc. No larval development could be observed. The authors suppose that other sites in the Paris basin were also invested by the great migratory." (Authors)] Address: Ferrand, M., SFO, 7 rue Lamartine, F-78390 Bois-d'Arcy, France

**13086.** Fleck, G.; Li, J.; Schorr, M.; Nel, A.; Zhang, X.; Lin, L.; Gao, M. (2013): *Epiophlebia sinensis* Li & Nel 2011 in Li et al. (2012) (Odonata) newly recorded in North Korea. *International Dragonfly Fund - Report* 61: 1-4. (in English) [A male of *E. sinensis* was collected in June 2012 in North Korea. The record was briefly documented and discussed.] Address: Li, J., P.O. Box 22, Vientiane, Laos. E-mail: lucanus123@163.com

**13087.** Frackiel, K.; Henel, A.; Taylor, J.R.E. (2013): Distribution and habitat selection of *Nehalennia speciosa* (Charpentier, 1840) (Odonata: Coenagrionidae) in Biebrza valley. *Odonatrix* 9(2): 55-64. (in Polish, with English summary) ["Eight new localities of *N. speciosa* were found in the Biebrza river valley, NE Poland, six of them in the Biebrza National Park (Figs 1, 2). The Biebrza river valley is famous as the largest complex of marshes in Poland and in Central Europe. *N. speciosa* has never been recorded there before. Six out of eight localities were found in the southern basin of the river that is best preserved, with vast areas of fen mires. The locality "Osowiec-Twierdza" (Fig. 1) represents small dystrophic water bodies with the *Sphagnum* moss mat; *N. speciosa* is present in the nearby *Carex rostrata* swamp. Habitats of the other seven localities (fen mires) are different from those most typical of the species in Poland as they do not contain *Sphagnum*. Additionally, these fen mires are floristically rich in comparison with many other habitats of *N. speciosa* in Poland. Locality "Bagno Ławki" is especially untypical as the plant community there is dominated by *Equisetum fluviatile* that is known from only very few other localities of *N. speciosa* in Poland. Special feature of five out of six localities in the lower basin of the Biebrza valley is the dominance of *Carex rostrata* that is a common characteristic of the localities in eastern Poland. The presence of *N. speciosa*, recorded in vast are-

as of fen mires of the Biebrza valley may suggest that other localities of the species are to be discovered there." (Authors)] Address: Frackiel, K., Biebrzański Park Narodowy, Osowiec-Twierdza 8, 19-110 Goniądz, Poland. E-mail: kfrackiel@biebrza.org.pl

**13088.** Frauendorf, T.C.; Colón-Gaud, C.; Whiles, M.R.; Barnum, T.R.; Lips, K.R.; Pringle, C.M.; Kilham, S.S. (2013): Energy flow and the trophic basis of macroinvertebrate and amphibian production in a neotropical stream food web. *Freshwater Biology* 58(7): 1340-1352. (in English) ["Despite the typically high taxonomic and functional diversity of tropical habitats, little is known about the roles of individual consumers in their ecosystem structure and function. We studied the trophic basis of production in a tropical headwater stream by identifying major sources of energy, measuring energy flow through consumers and characterising interactions among trophic levels and functional groups. We examined gut contents of 18 dominant macroinvertebrate (including *Heteragrion* and *Neurocordulia*) and two tadpole taxa and used these data, along with previously published estimates of secondary production, to quantify food-web structure and energy flow pathways. We also examined the prevalence of omnivory and patterns of resource consumption across seasons and habitats. Non-algal biofilm, a heterogeneous polysaccharidic matrix, was the most utilised food resource in the stream. Contrary to some studies of Old World tropical stream food webs, detrital energy sources were consumed at relatively high rates and contributed significantly to overall energy flow, although much of this was attributable to a single shredder taxon. Algal consumption rates were similar to values reported for temperate streams and were highest during the dry season. Omnivory was prevalent across all functional groups, particularly predators, suggesting traditional functional and trophic assignments based on temperate regions may not be appropriate for tropical systems. Seasonal patterns of resource consumption appeared linked to hydrological disturbance. This is the first study to provide quantitative estimates of energy flow through a neotropical stream food web. Extirpation and extinction rates in tropical freshwater habitats are high; our study provides baseline information for conservation and management of remaining systems, and for quantifying the consequences of further losses of biodiversity such as ongoing amphibian declines." (Authors)] Address: Frauendorf, Therese, Institute of Pacific Island Forestry, 60 Nowelo St., Hilo, HI 96720, USA. E-mail: tfrauend@hawaii.edu

**13089.** Fulan, J.A.; Davanso, R.C.S.; Henry, R. (2013): A profundidade como fator determinante na variação anual da densidade dos macroinvertebrados associados à *Salvinia auriculata* Aublet. *Revista Brasileira de Biociências* 9(2): 214-219. (in Portuguese, with English summary) ["The depth as a factor in determining annual change density of macroinvertebrates associated with *Salvinia auriculata*: The aim of this work was to study

the effects of water annual variation of Paranapanema River and others variables on macroinvertebrates that lives in macrophytes roots, from March 2006 to February 2007. The sampled was realized with a hand-net ... We measured air and water temperature, depth, dissolved oxygen, pH, K25 and suspended matter. The normality was tested and a Canonical Correspondence Analysis (CCA) was realized. Telebasis showed high density in period studied. There was a high variation in depth: 6.07 m in April 2006 to 1.83 m in November 2007. The CCA showed that Culicidae, Ephemeroptera, Ostracoda, Calopterygidae, Coryphaeschna and Cyanallagma were significative correlated with the depth. We concluded that the effect of the depth on larvae Odonata can not have been direct, but indirect by the effect in substrates as aquatic plants." (Authors)] Address: Fulan, J.A., Univ. Fed. Amazonas (UFAM). CEP: 69800-000, Humaitá, AM, Brasil. E-mail: joaofulan@ig.com.br

**13090.** Garcia-Trejo, F.; Hurtado-Gonzalez, S.L.; Soto-Zarazúa, G.; Alatorre-Jacome, O.; Gutiérrez-Yurrita, E. R.P.J. (2013): Ecophysiological responses to the effect of annual management on an endemic viviparous fish in central plateau of México. *Neotropical Ichthyology* 11(1): 117-123. (in English, with Spanish summary) ["Studies on the biological aspects of fish typically focus on species that currently have commercial value, causing species that lack such market value to be ignored. This is the case of several freshwater fish, specifically of several members of the Goodeidae family. In the State of Querétaro there are several species of this family characterized for being viviparous and having distinctive sexual dimorphism that may have commercial potential. The subject of this study is *Girardinichthys multiradiatus*, a viviparous fish endemic to the upper-half of the Lerma River basin. The lack of knowledge regarding its biology and ecology has prevented the development of guidelines to manage its habitat and to preserve its population. The objective was to determine the ecophysiological responses of *G. multiradiatus* to its environmental management. From the sampling (24 hours every two months) population structure and dynamics were analyzed throughout a hydrological cycle using meristic data (standard length). Trophic and ecophysiological responses to fluctuations in environmental factors were also identified. Although the mexcalpique is a polytrophic species, results show that it prefers feeding on Diptera or Cladocera, while detritus is the third substance frequently found in their stomachs. Environmentally, the water regime is responsible for fluctuations in the population dynamics of the species, while temperature changes are the most influence its energy balance. These results can guide efforts to conserve this species and its habitat." (Authors) Odonata contributed up to ca 3% to the diet items *G. multiradiatus*.] Address: Garcia-Trejo, F., División de Investigación y Posgrado, Fac. de Ingeniería, Univ. Autón. de Querétaro, Centro Universitario, Cerro de las Campanas S/N, C.P. 76010, Querétaro, Qro., México. E-mail: fernando.garcia@uaq.mx

**13091.** Garrison, R.W.; von Ellenrieder, N. (2013): A contribution to the study of the biodiversity of Odonata in Costa Rica with an emphasis on the genus *Argia* (Insecta: Odonata: Coenagrionidae). *International Dragonfly Fund - Report 62*: 1-23. (in English) ["A two week trip to Costa Rica was conducted between 26 May and 8 June 2013, sampling odonates in several provinces along the centre to the pacific southern portion of the country. A total of 86 species in 34 genera were found, including 16 species of the genus *Argia*. Lists of all species by locality, photographs of live specimens, and illustrations and notes of described species of *Argia* are presented to facilitate identification to other collectors." (Authors) Drawings of caudal appendages of *Argia adamsi*, *A. chelata*, *A. rogersi*, *A. terira*, *A. underwoodi* and *A. pulla* are presented.] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**13092.** Gaspar Neiss, U.; Fleck, G.; Alta Feitoza, L.A.; Hamada, N. (2013): Description of the adult male of *Aeschnosoma auripennis* Geijskes, 1970 (Odonata: Corduliidae s.s.). *Zootaxa* 3718(6): 596-599. ["The male of *A. auripennis* is described for the first time, based on a specimen reared from a larva collected in the Reserva Biológica do Uatumã, Amazonas State, Brazil. The species is newly reported from the Roraima State, Brazil." (Authors)] Address: Gaspar Neiss, U., Inst. Nacional de Pesquisas da Amazônia (INPA), Coordenação de Biodiversidade (CBio), Avenida André Araújo, n 2936, Caixa Postal 478, CEP 69067-375, Manaus, Amazonas, Brazil

**13093.** Gayet, P.; Ruffoni, A. (2013): *Afflux d'Hemianax ephippiger* (Burmeister, 1839) en Bourgogne au printemps 2011 (Odonata, Anisoptera: Aeshnidae). *Martinia Hors-série, Hemianax ephippiger - migration 2011*, mai 2013: 47-50. (in French, with English summary) ["In the frame of its massive migration during 2011, *H. ephippiger* has been observed several times in the Bourgogne region. The species is new for the Yonne department but was already recorded in the past from the three other departments of the region. The authors present the 2011 observations and their characteristics." (Authors)] Address: Gayet, P., 3, route de Perrigny, 71620 Guerfand, France. E-mail: gayet-philippe@orange.fr

**13094.** Gerlach, J. (ed.) (2013): Odonata, Hemiptera, Hymenoptera and other insects of the Seychelles islands. *Siri Scientific Press*: 400 pp. (in English) ["The Seychelles islands are biogeographically interesting, with ancient affinities to Africa and Asia, recent colonizing species from the Indo-Pacific and modern introductions. Until recently, relatively little was known about the biodiversity of the islands. This has changed through the publication of a series of monographs on the Seychelles fauna, presenting the latest information on all the terrestrial and freshwater animals of the is-

lands. In this current volume on the Odonata, Hemiptera, Hymenoptera and other insects of the Seychelles islands, 15 expert scientists from nine different countries have provided contributions that cover all 954 species of these insect orders and other orders not covered in previous volumes (e.g. Protura, Collembola, Diplura, Microcoryphia, Zygentoma, Thysanoptera, Psocodea, Neuroptera, Siphonaptera and Trichoptera) recorded from the islands. The volume includes taxonomic keys, diagnostic illustrations and descriptions for many species, in addition to distribution records and assessments of species conservation status as defined by the International Union for the Conservation of Nature (IUCN)."(Publisher)]

**13095.** Gliwa, B. (2013): Die Libellen der Moorgebiete "Praviršulio tyrelis" und "Didysis Tyrulis" in Litauen. Build and Conserve a Livable Environment in the Countryside. ISBN 978-609-95323-1-8: 164-198. (in German, with English and Lithuanian summary) ["Odonata of two nature reserve boglands in Lithuania: Praviršulis and Didysis Tyrulis. While Didysis Tyrulis has been largely destroyed due to peat cutting, Praviršulis remained healthy, however, with disorders of natural hydrological conditions in a large part. As a result Praviršulis contains still two natural lakes and plenty of raised bog and fen. By contrast, at Didysis Tyrulis one finds no natural water bodies at all but lots of secondary „lakes“ in the digged pools together with a dense set of ditches. Praviršulis is well researched in terms of dragonflies, 45 species have been recorded. Among them some species strongly specialized in bogland, e.g. Nehalennia speciosa, Somatochlora arctica. Due to still started research, only 27 species have been recorded at Didysis Tyrulis, among them rare species as Coenagrion armatum and Coenagrion lunulatum. As a surprise, a large of population of N. speciosa could be observed as well. This is the first report of this species in a renaturating habitat. Really large populations were recorded for Leucorrhinia rubicunda and L. pectoralis in 2012." (Author)] Address: Gliwa, B., Sargeliu bendruomenes centras, Sargeliai, Raseiniu r., LT-60443, Lithuania. E-mail: info@sargeliai.org

**13096.** Gonzalez-Bellido, P.T.; Peng, H.; Yang, J.; Georgopoulos, A.P.; Olberg, R.M. (2013): In dragonflies, descending visual neurons code prey direction in population vector form. Front. Physiol. Conference Abstract: International Conference on Invertebrate Vision. doi: 10.3389/conf.fphys.2013.25.00058: n.p. (in English) [Verbatim: The population vector is the weighted vectorial sum activity of an ensemble of neurons and it was first shown to predict the direction of an upcoming arm movement in monkeys (Georgopoulos et al. 1983, 1986). In this study we show that in the dragonfly Libellula luctuosa, the population vector algorithm also decodes the target direction information relayed from the brain to the wing motor centers by a group of 16 neurons. Moreover, these 16 neurons (named Target Selective De-

scending Neurons or TSDNs; Olberg 1986), perform such directional information coding with high accuracy across 360°. This is significant because the monkey motor cortex requires upwards of 200 neurons to achieve the same performance (Georgopoulos et al. 1988). To obtain the TSDNs directional tuning curves, we impaled a total of 51 TSDNs from 38 animals with sharp electrodes and recorded their responses to a battery of 3497 target trajectories. The target had a constant speed and size, but random location and direction. To confirm cell ID, Lucifer yellow was injected into 32 of the recorded cells. Although the preferred direction, receptive field and morphological traits (3D tracings) for each TSDN type were consistent among animals, spike rates were not. Importantly, the TSDN spatial (receptive field) and temporal (latency) properties matched the area of the retina where the prey is focused and the reaction time, respectively, during predatory flights. The findings of this study are published in Gonzalez-Bellido et al. 2013. References: Georgopoulos AP, Caminiti R, Kalaska JF, Massey JT. 1983. Spatial coding of movement: a hypothesis concerning the coding of movement direction by motorcortical populations. Experimental Brain Research Supplement 327-336; Georgopoulos AP, Kettner RE, Schwartz AB. 1988. Primate motor cortex and free arm movements to visual targets in three-dimensional space. II. Coding of the direction of movement by a neuronal population. Journal of Neuroscience 8: 2928-2937; Georgopoulos AP, Schwartz AB, Kettner RE. 1986. Neuronal population coding of movement direction. Science 233: 1416-19; Gonzalez-Bellido PT, Peng H, Yang J, Georgopoulos AP, Olberg RM. 2013. Eight pairs of descending visual neurons in the dragonfly give wing motor centers accurate population vector of prey direction. Proceedings of the National Academy of Sciences 110: 696-701.; Olberg RM. 1986. Identified target-selective visual interneurons descending from the dragonfly brain. Journal of Comparative Physiology. A, Sensory, Neural, and Behavioral Physiology 159: 827-840.] Address: Gonzalez-Bellido, Paloma, Marine Biological Laboratory, Marine Resources Center, Woods Hole, MA, 02543, USA. E-mail: pgonzalez@mbl.edu

**13097.** Grand, D. (2013): Les libellules du rio Cabriel, provinces d'Albacete, Cuenca et Valencia (Espagne) (Odonata): distribution et observations biologiques. Martinia 29(1): 1-8. (in French, with English summary) ["The part of the rio Cabriel which has been studied is located to the centre east of Spain, at the confines of the provinces of Albacete, Cuenca and Valencia. I investigated it along more than 120 km in July 2000, and then from late May to late September for six years (2006-2011). I observed 31 Odonata species of which Onychogomphus costae is cited for the first time from the province of Valencia. Brachythemis impartita was seen far from the maritime border of the province of Valencia, where it is usually know. Orthetrum chrysostigma and Trithemis annulata were found in few places of the rio



Cabriel. *Onychogomphus costae* and *Zygonyx torridus* are respectively considered as Endangered and Vulnerable by the IUCN European Red List. A monitoring of the main populations of both species will therefore be settled next years." (Author)] Address: deceased

**13098.** Gremyachikh, V.A.; Komov, V.T.; Trankvilevsky, D.V.; Shapovalov, M.I.; Motorin, A.A. (2013): Levels of mercury in water and amphibiotic insects from different waterbodies and watercourses of European Russia. Materials of the Fifth All-Russia Symposium on Amphibiotic and Aquatic Insects / Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences. – Yaroslavl: Filigran, 2013. – 254 pp: 46-51. (in Russian, with English summary) ["Data are provided on the levels of mercury in members of abundant species of amphibious insects of the orders Plecoptera, Coleoptera, Heteroptera, Trichoptera and Odonata collected in waterbodies and watercourses of Vologda, Voronezh, Novgorod and Yaroslavl Oblasts and the Republic of Adygea." (Authors) *Coenagrion* sp., *Aeschna* sp., *Anax imperator*, *Gomphus vulgatissimus*, *Calopteryx splendens*, *Somatochlora metallica*.] Address: Komov, V.T., Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences Borok, Nekouzsky District, Yaroslavl Oblast, 152742, Russia. E-mail: vkomov@ibiw.yaroslavl.ru

**13099.** Halupka, K.J.; Wiederman, S.D.; Cazzolato, B.S.; O'Carroll, D.C. (2013): Local facilitation improves success in closed loop simulations of insect small target pursuit. Front. Physiol. Conference Abstract: International Conference on Invertebrate Vision. doi: 10.3389/conf.fphys.2013.25.00001: (in English) ["Detecting and intercepting a small target is a computationally challenging task, but one solved elegantly by the small brain of flying insects, which have evolved several strategies for pursuit of either prey or conspecifics [1, 2]. Male houseflies track other flies, constantly updating their heading towards the target, based on an error angle between target and pursuer [3, 4], thus mimicking movements of the target on a spiralling flight path that ends in capture. By contrast, predatory dragonflies use an interception strategy, steering to minimise movement of the prey's image on the retina, resulting in a collision course [5]. To evaluate these two strategies for target pursuit against visual clutter, we developed a closed-loop model inspired by insect STMD (Small Target Motion Detector) neurons and pursuit behaviour, set in natural scenery. This allows quantification of the merits of alternative pursuit strategies and of key stages of visual processing that cannot yet be obtained from in-vivo analysis. We found that the velocity tuning of STMD neurons [6, 7] imposed a lower bound on the discriminable velocity of targets. However the intercept method enabled successful pursuits even when the target was moving significantly faster than pursuer. The preliminary stage of the detection algorithm is readily distracted by false positives generated by complex backgrounds. However, addition of a facilitation mecha-

nism, inspired directly by recent physiological analysis of dragonfly STMD neurons [8, 9] prevents such breakthrough responses by amplifying the weak signal of tiny targets moving on long trajectories. With this additional 2nd order salience-enhancing algorithm, we saw a significant improvement in successful target interception, from just over 50% to almost 80% (Chi square=5.87, p=0.015, n=44, Fig. 1). Acknowledgements: This work was supported by the US Air Force Office of Scientific Research (FA2386-10-1-4114) and the Australian Research Council (DP130104572). References: [1] RM Olberg. Visual control of prey-capture flight in dragonflies. *Curr Opin Neurol*, 22:267–271, 2012. [2] TS Collett and MF Land. Visual control of flight behaviour in the hoverfly. *J Comp Physiol., A*, 99(1):1-66, 1975. [3] MF Land and TS Collett. Chasing Behaviour of Houseflies (*Fannia Canicularis*). *J Comp Physiol A*, vol. 89, pp. 331-357, 1974. [4] C Wehrhahn, T Poggio, and L Bult-hoff. Tracking and chasing in houseflies. *Biol Cybern*, 45(2):123-130, 1982. [5] RM Olberg, A Worthington, and K Venator. Prey pursuit and interception in dragonflies. *J Comp Physiol., A*, 186(2):1-9, 2000. [6] SD Wiederman, PA Shoemaker, and DC O'Carroll. A model for the detection of moving targets in visual clutter inspired by insect physiology. *PLoS ONE*, 3(7):1-11, 2008. [7] KJ Halupka, SD Wiederman, BS Cazzolato, and DC O'Carroll. Discrete implementation of biologically inspired image processing for target detection. *Proc. ISSNIP*, 143-148, 2011. [8] K Nordström, DM Bolzon, and DC O'Carroll. Spatial Facilitation by a High-Performance Dragonfly Target-Detecting Neuron. *Biol Lett*, 2:588-592, 2011. [9] JR Dunbar, SD Wiederman, PA Shoemaker, and DC O'Carroll. Facilitation of Dragonfly Target-Detecting Neurons by Slow Moving Features on Continuous Paths. *Front Neural Circuits*, 6:1-11, 2012." (Authors)] Address: Halupka, Kerry, The University of Adelaide, School of Medical Sciences, Australia. E-mail: kerry.halupka@gmail.com

**13100.** Hamamoto, M.; Ohta, Y.; Hara, K.; Hisada, T. (2013): Three-dimensional free-flight analysis of the rapid turning of a dragonfly using fluid-structure interaction analysis. *Journal of Computational Science and Technology* 7(1): 75-88. (in English) ["Recent studies of the flapping flight of insects have succeeded in solving the unsteady aerodynamics of hovering and contributed to realizing bio-inspired micro aerial vehicles (MAVs). However, the effect of wing deformation on the aerodynamics has not been investigated because of a lack of appropriate analysis methods. As an initial step to creating a "total" simulator for flapping flight, we developed a free-flight simulator by combining fluid-structure interaction finite element analysis based on the arbitrary Lagrangian-Eulerian method, which can quantitatively treat the strong interaction between the wing deformation and its surrounding airflow, and a rigid body dynamics analytical solver. With biologically-inspired flapping motion, which mimicked the changes in the stroke motion of the wing, the numerical model of the dragonfly per-

formed rapid turning over 1200°/s of yaw angular velocity. Although the flapping motion for the left wing on the trigger flapping and the right wing on the resumed flapping (or its inversed combination) are identical, a considerable difference in the deformation of the wing during this identical flapping between the former and latter halves of the turn was observed. Thus, while these actuations were identical, the directions of the aerodynamic forces were largely controlled by passive deformations of the wings. These results meant that the effect of wing deformation on its aerodynamics should be taken into account and thus fluid-structure interaction analysis is required to effectively design the actuation of the wing on an artificial MAV." (Authors) Symptetrum] Address: Hamamoto, M., Advanced Technology Research Laboratories, Corporate Research and Development Group, Sharp Corporation, 2613-1 Ichinomoto-cho, Tenri, Nara 632-8567, Japan. E-mail: hamamoto.masaki@sharp.co.jp

**13101.** Hansen, G.J.A.; Hein, C.L.; Roth, B.M.; Vander Zanden, M.J.; Gaeta, J.W.; Latzka, A.W.; Carpenter, S.R. (2013): Food web consequences of long-term invasive crayfish control. *Canadian Journal of Fisheries and Aquatic Sciences* 70(7): 1109-1122. (in English) ["Controlling invasive species can restore ecosystems while also quantifying species interaction strengths. We experimentally removed invasive rusty crayfish (*Orconectes rusticus*) from a Wisconsin lake. Rusty crayfish abundance declined by 99% in eight years, did not significantly increase four years post-harvest, and no compensatory recruitment response was observed. Native crayfish (*O. virilis*) and sunfish (*Lepomis* spp.) abundances increased by two orders of magnitude as rusty crayfish abundance declined, and macrophyte cover increased significantly in 2-4 m waters. We expected benthic macroinvertebrate densities to increase as rusty crayfish were removed; however, fish consumption of invertebrates increased as rusty crayfish density declined, and macroinvertebrate responses varied among families and habitats. Total Gastropoda density increased 300-fold in cobble, while the density of one gastropod family declined in macrophytes. Ephemeroptera, Odonata, and Amphipoda densities also declined in certain habitats as rusty crayfish were removed, suggesting that they are indirectly facilitated by rusty crayfish. This study highlights the importance of considering indirect effects when assessing the impacts of invasive species, and demonstrates that these impacts may be reversed over relatively short timescales" (Authors)] Address: Hansen, Gretchen, Center for Limnology, University of Wisconsin-Madison, 680 N. Park Street, Madison, WI 53706, USA. E-mail: ghansen2@wisc.edu

**13102.** Hanun, S.O.; Dahelmi, S.S. (2013): Dragonflies species in Kandi Wildlife Park Area, Sawahlunto City, West Sumatra. *Jurnal Biologi Universitas Andalas* 2(1): 71-76. (in Indonesian, with English summary) [15 Odonata species were documented from the Kandi

Wildlife Park Area, Sawahlunto City, West Sumatra.] Address: Hanun, Silvy Olivia, Laboratorium Taksonomi Hewan, Jurusan Biologi, FMIPA Universitas Andalas, Kampus UNAND Limau Manis Padang – 25163, Indonesia. E-mail: oliviahhanum@gmail.com

**13103.** Heckmann, S.; Hörschemeyer, T.; Büsse, S. (2013): The thorax musculature of Zygoptera nymphs (Odonata). 6th Dresden Meeting on Insect Phylogeny, Dresden, September 27–29, 2013. Abstracts — Poster Presentations: 39. (in English) [Verbatim: Odonata are arguably the insect group with the most impressive flight skills (e.g. Corbet 1999). Each wing pair can be controlled independently and some species are even able to fly backwards (Hatch 1966). The muscles responsible for the wing movement are connected directly to the wings (Tannert 1958). This exclusively direct mechanism of wing movement distinctly sets Odonata apart from all other winged insects; where the wing beat is done mainly through a system of indirect muscles, many of which are highly reduced or missing in the Odonata (e.g. Snodgrass 1935). Here we present a comparative morphological investigation of the thoracic flight musculature of Zygoptera. The results for *Nehalennia speciosa* and *Ischnura elegans* allow first insights into our comprehensive study. Nymphs are aquatic predators, which feed on other Arthropods, whereas adults are arial predators (e.g. Corbet 1999). The amount and kind of muscles therefore significantly differ between nymphal and adult Odonata, which are adapted to their respective habitat (e.g. Asahina 1954; Maloeuf 1935). We used synchrotron radiation micro computed tomography (S<sub>μ</sub>CT), aided by 3-D reconstruction to study the thorax of Zygoptera. The muscles were identified following the nomenclature introduced by Friedrich and Beutel (2008) as well as the homology hypothesis of Büsse et al. (2013) and Büsse & Hörschemeyer (subm.). References: Asahina S. 1954: A morphological study of a relic dragonfly *Epiophlebia superstes* Selys (Odonata, Anisozygoptera). Tokyo: The Japan Society for the Promotion of Science 153 pp. — Büsse S., Genet C., Hörschemeyer T. 2013: Homologization of the flight musculature of Zygoptera (Insecta: Odonata) and Neoptera (Insecta). *PLoS ONE* 8(2): e55787. doi:10.1371/journal.pone.0055787 — Büsse S., Hörschemeyer T. submitted: The nymphal thorax musculature of Anisoptera (Insecta: Odonata) and its evolutionary relevance. *BMC Evolutionary Biology*. — Corbet P.S. 1999: *Dragonflies: Behavior and Ecology of Odonata*. New York: Cornell Univ. Press. — Friedrich F., Beutel R. 2008: The thorax of *Zorotypus* (Hexapoda, Zoraptera) and a new nomenclature for the musculature of Neoptera. *Arthropod Structure & Development* 37: 29–54. — Maloeuf N.S.R. 1935: The postembryonic history of the somatic musculature of the dragonfly thorax. *Journal of Morphology* 58: 87–115. — Snodgrass R.E. 1935: *Principles of Insect Morphology*. New York: Mc Graw-Hill Book Company. — Tannert W. 1958: Die Flügelgelenkung bei Odonaten. *Deutsche Entomologische*

Zeitschrift 5: 394–455.] Address: Heckmann, Saskia, Abteilung Morphologie, Systematik & Evolutionsbiologie, JFB-Institut für Zoologie & Anthropologie der Georg-August Universität Göttingen, Germany

**13104.** Heger, P.; George, R.; Wiehe, T. (2013): Successive gain of insulator proteins in arthropod evolution. *Evolution* 67(10): 2945-2956. (in English) ["Alteration of regulatory DNA elements or their binding proteins may have drastic consequences for morphological evolution. Chromatin insulators are one example of such proteins and play a fundamental role in organizing gene expression. While a single insulator protein, CTCF (CCCTC-binding factor), is known in vertebrates, *Drosophila melanogaster* utilizes six additional factors. We studied the evolution of these proteins and show here that—in contrast to the bilaterian-wide distribution of CTCF—all other *D. melanogaster* insulators are restricted to arthropods. The full set is present exclusively in the genus *Drosophila* whereas only two insulators, Su(Hw) and CTCF, existed at the base of the arthropod clade and all additional factors have been acquired successively at later stages. Secondary loss of factors in some lineages further led to the presence of different insulator subsets in arthropods. Thus, the evolution of insulator proteins within arthropods is an ongoing and dynamic process that reshapes and supplements the ancient CTCF-based system common to bilaterians. Expansion of insulator systems may therefore be a general strategy to increase an organism's gene regulatory repertoire and its potential for morphological plasticity." (Authors) Several clades/orders were omitted for clarity. Ephemeroptera and Odonata are combined in Palaeoptera.] Address: Heger, P., Cologne Biocenter, Institute for Genetics, University of Cologne, Zùlpicher Str. 47a, 50674 Köln, Germany. E-mail: peter.heger@uni-koeln.de

**13105.** Heintzman, L. (2013): Examination of Polycyclic Aromatic Hydrocarbons in an urban stormwater system and bioaccumulation in Odonata. M.Sc. thesis, Biology, Texas Tech University: 94 pp. (in English) ["Polycyclic aromatic hydrocarbons (PAHs) are toxic organic pollutants produced from combustion processes. Associated with urban runoff they have been detected worldwide in urban wetlands. PAH contaminations in wetlands are known to be influenced by hydrology and environmental factors. Because PAHs and their associated metabolites are carcinogenic, mutagenic, and teratogenic, they pose significant risks to wetland-dependent organisms. Provided meager scientific data on PAHs in playa wetlands, I investigated the occurrence of 16 PAHs within playa surface water samples and tissues of amphibious organisms (Odonata, a flagship group of predatory wetland insects) from seven urban playas along a runoff gradient in Lubbock, Texas. PAH detections from surface water samples were highly variable across sites and dates, with naphthalene and pyrene occurring most often in water samples. Adult Odonata PAH detections were also variable but significantly different from corre-

sponding surface water samples (suggesting bioaccumulation rather than passive chemical exposure), with naphthalene and fluoranthene occurring most often. The number of specific PAH compound detections was significantly associated with percent impervious surface within 300 m of a playa, but not with gradient position or number of inflows. Therefore, results indicate that for urban playas of Lubbock, land-use factors are more important in determining PAH contamination than hydrologic factors." (Author)] Address: not stated

**13106.** Heiser, M.; Schmitt, T. (2013): Tracking the boundary between the Palaearctic and the Oriental region: new insights from dragonflies and damselflies (Odonata). *Journal of Biogeography* 40(11): 2047-2058. (in English) ["Aim: We aim to define the hotspots, faunal regions and faunal elements of Odonata in Eurasia. We describe the location and the extent of the transition zone between the Palaearctic and Oriental realms. Location: Eurasia. Methods: Odonata are suitable for this study because the number of species in the group is sufficient for the required analyses, their distributions are mostly known, and they are split into the highly dispersive Anisoptera and the weakly dispersive Zygoptera. For our analyses, Eurasia was classified into 63 regions, within which we determined the presence or absence of each of the 1765 Odonata species. We calculated species richness maps and performed cluster analysis and principal components analysis to extract faunal regions and elements. Results: Occurrence records of Eurasian Odonata were partitioned among three major biogeographical entities: (1) Europe, North Africa and North Asia; (2) India, Indochina and southern China; and (3) northern China, Korea and Japan. Each of these entities has further notable substructures and faunal elements, especially in Southeast Asia. The tropical rain forest region of Southeast Asia is the species diversity hotspot of odonates and has the highest number of (often localized) faunal elements. The northern border of the Oriental region reaches southernmost China and the southern slopes of the Himalayas, but the transitional zone between the Oriental and the Palaearctic region extends much farther north, and includes northern China, Japan and Manchuria. The lower dispersal ability of Zygoptera compared with that of Anisoptera is mirrored in various biogeographical patterns: (1) the Western Palaearctic influence on the Eastern Palaearctic is stronger in Anisoptera than in Zygoptera; (2) Zygoptera have more faunal elements on islands than do Anisoptera; and (3) Zygoptera are isolated by the Strait of Gibraltar, but do not show a finer-grained structure of their faunal elements on the mainland. Main conclusions: The less severe impact of the ice ages in Southeast Asia resulted in the evolution and survival of Odonata species in many regional refugia. These faunal elements have had a greater impact on the post-glacial colonization than previously thought and strongly influence the composition of Odonata in East Asia." (Authors)] Address: Schmitt, T., Biogeographie, Fachbereich



VI, Gebäude N, Raum 303, Universität Trier, 54286 Trier, Germany. E-mail: thsh@uni-trier.de

**13107.** Helmker, B.; Hörnschemeyer, T.; Büsse, S. (2013): The thorax musculature of *Epiophlebia* nymphs (Odonata). 6th Dresden Meeting on Insect Phylogeny, Dresden, September 27–29, 2013. Abstracts — Poster Presentations: 39–40. (in English) [Verbatim: *Epiophlebia* is the single taxon inside the recent Odonata, which combines characters of the Anisoptera and the Zygoptera. The four known species of *Epiophlebia* differ in only a few morphological features (e.g. Asahina 1961; Li et al.2011; Carle 2012). Recent publications (Büsse et al. 2012) show that the genetics of three of these species varies very little. This study investigates the thoracic musculature of different nymphal instars of *Epiophlebia laidlawi* and *E. superstes* in order to further reveal the relationship of the two species. Based on Maloeuf's (1935) nomenclature for the thoracic musculature of the Odonata and Asahina's (1954) studies on *E. superstes*, the nymphs were examined via Synchrotron radiation micro computer tomography (S $\mu$ CT). Furthermore the identified muscles were homologized with the ones found in the Zygoptera (Büsse et al. 2013) and Anisoptera (Büsse & Hörnschemeyer subm.), based on the nomenclature established by Friedrich & Beutel (2008). The thoracic musculature of *E. laidlawi* and *E. superstes* is highly similar. Every muscle described by Maloeuf (1935) and Asahina (1954) could be confirmed in both species. Five muscles differ from the description of both authors. In addition, thirteen new muscles could be identified, of which one might be unique to the Eiprocta. References: Asahina S. 1954: A morphological study of a relic dragonfly *Epiophlebia superstes* Selys (Odonata, Anisozygoptera). Tokyo: The Japan Society for the Promotion of Science 153 pp. — Asahina A. 1961: Is *Epiophlebia laidlawi* Tillyard (Odonata, Anisozygoptera) a good species? *International Revue der Gesellschaft für Hydrobiologie* 46: 441–446. — Büsse S., von Grumbkow P., Hummel S., Shah D.N., Tachamo Shah R.D., et al. 2012: Phylogeographic Analysis Elucidates the Influence of the Ice Ages on the Disjunct Distribution of Relict Dragonflies in Asia. *PLoS ONE* 7(5): e38132. doi:10.1371/journal.pone.0038132 — Büsse S., Genet C., Hörnschemeyer T. 2013: Homologization of the flight musculature of Zygoptera (Insecta: Odonata) and Neoptera (Insecta). *PLoS ONE* 8(2):e55787. doi:10.1371/ journal.pone. 0055787 — Büsse S., Hörnschemeyer T. submitted: The nymphal thorax musculature of Anisoptera (Insecta: Odonata) and its evolutionary relevance. *BMC Evolutionary Biology*. — Carle F.L. 2012: A new *Epiophlebia* (Odonata: Epiophlebioidea) from China with a review of epiophlebian taxonomy, life history, and biogeography. *Arthropod Systematics & Phylogeny* 70(2): 75–83. — Friedrich F., Beutel R. 2008: The thorax of *Zorotypus* (Hexapoda, Zoraptera) and a new nomenclature for the musculature of Neoptera. *Arthropod Structure & Development* 37: 29–54. — Li J.-K., Nel A., Zhang X.-P.,

Fleck G., Gao M.-X., et al. 2011: A third species of the relict family Epiophlebiidae discovered in China (Odonata: Eiproctophora). *Systematic Entomology* 37(2): 408–412. doi: 10.1111/j.1365–3113.2011.00610.x. — Maloeuf N.S.R. 1935: The postembryonic history of the somatic musculature of the dragonfly thorax. *Journal of Morphology* 58: 87–115] Address: Helmker, B., Abteilung Morphologie, Systematik & Evolutionsbiologie, JFB-Institut für Zoologie & Anthropologie der Georg-August Universität Göttingen, Germany

**13108.** Höpstein, G. (2013): Eine Kiesgrube im Saaletal bei Etzelbach als „Naturerbe“ der NABU-Stiftung. *Landchaftspflege und Naturschutz in Thüringen* 50(2): 70–74. (in German, with English summary) [“The conservation of a gravel pit as a wetland near Etzelbach is described in the article. The effects of the development in the last five years after acquisition are illustrated. The focus of the research stands on dragonflies, grasshopper, fishes, amphibians, and reptiles. The gravel pit near Etzelbach is an important area for the development of dragonflies in the middle Saale valley. Typical representatives and characteristic species are *Erythromma viridulum*, *Orthetrum cancellatum*, and *Anax imperator*. Remarkable records are *Erythromma lindenii*, *Gomphus pulchellus* and *Anax parthenope*.” (Author)] Address: Höpstein, G., Flecke 17, 07422 Bad Blankenburg, Germany

**13109.** Hykel, M. (2013): The occurrence and bionomy of *Cordulegaster bidentata* at selected localities in the Western Carpathians Mts. Bachelor's thesis, Department of Ecology and Environmental Sciences, Faculty of Science, Palacky University in Olomouc: VII + 29 + III pp. (in Czech, with English summary) [Czech Republic, Western Carpathians Mts., Palkovice hills, Šostýn hills. “Habitat of larvae were small streams and spring areas – width of watercourse 40–180 cm, depth of water column 4–45 cm, volume flow 25–80 cm<sup>3</sup>s<sup>-1</sup>, shading 40–80% and riparian vegetation coverage 0–60%. Diurnal activity was observed on selected spring area in Palkovice hills. ... During the 8 days was found 41 males and 17 females. Reappearance was 29 males and 5 females. Diurnal activity of males was recorded from 8:30 until 17:44. Egg-laying was recorded between 8:27 to 17:29. The highest abundance was between 9:00–12:00 and between 16:00–16:30. The average interval visit of imagoes was 13 minutes.” (Author)] Address: not stated

**13110.** Ikemeyer, D.; Olthoff, M. (2013): First record of *Onychogomphus assimilis* (Schneider, 1845) in north-western Turkey. *Libellula* 32(1/2): 91–94. (in English, with German summary) [“In 2011 a male *O. assimilis* was recorded at the river Devrek in the province of Zonguldak in northwestern Turkey. Previously, the species in Turkey had only been found in rivers close to the Mediterranean Sea and some eastern provinces. The finding of *O. assimilis* indicates a population in the river systems of the Pontic Mountains in northern Turkey.” (Au-

thors)] Address: Ikemeyer, D., Billerbecker Str. 6, 48329 Havixbeck, Germany. E-mail: dkjikemeyer@t-online.de

**13111.** Iorio, E. (2013): Nouveau record d'altitude en France pour *Aeshna affinis* Vander Linden, 1820 (Odonata, Anisoptera: Aeshnidae). *Martinia* 29(1): 19-22. (in French, with English summary) ["*Aeshna affinis* has been discovered at an altitude-record of 1325 m in a pond in the Hautes-Alpes department. Behaviour suggesting autochthony of this species in this pond have been observed." (Author)] Address: Iorio, E., ECO-MED (Ecologie & Mediation), Pole Entomologie, TourMediterranee, 65 av. Jules Cantini, 13298 Marseille Cedex 20, France. E-mail: e.iorio@ecomedit.fr

**13112.** Johansson, N. (2013): The genetic effects (mtDNA COI) of the invasive *Anax imperator* on the native *Aeshna grandis* from populations in southern Sweden. B.Sc. thesis. Halmstad University: (in English) ["Climate change will increase the range of some species, including *A. imperator* which first was observed in Sweden in the year 2000 and are now observed annually in the region of Scania (Skåne) and other parts of southern Sweden. *A. grandis* is a common dragonfly from south to north of Sweden and at some places they now share the habitat with *A. imperator*. The changing climate will benefit *A. imperator* and the species will spread north in Sweden. How this will affect the native *A. grandis* is not yet known however this study may reveal some light on the subject. By extracting mtDNA from larvae of *A. grandis* from 16 different sites; 8 sites with observations of *A. imperator* and 8 without, it is possible to reveal if there is a genetic difference between locals within the invasive species range and outside it. This study have used the COI region in mtDNA in *A. grandis* larvae to reveal if the haplotypes in populations that inhabits same habitats as *A. imperator* are negatively affected or, contrary to different sources, they are able to co-exist. The mtDNA were sequenced, MEGA version 5 was used to construct phylogenetic trees and the program TCS was used to estimate the gene genealogies. In this study there was no correlation between habitats within *A. imperator* range and outside of its range, however it is interesting that the tree constructed in MEGA divides the larvae in two groups and the graph in TCS also divides the larvae into two groups. This could still be an effect of climate change; it could be the result of *A. grandis* from Europe immigrating to Sweden. Another hypothesis is two kinds of larvae: one fast-growing larvae which has already adapted to the rising temperatures and have a shorter larva-stage and one slower growing, not yet adapted to temperatures. It could also be a result of an ongoing sympatric speciation however further studies are required to investigate the two types and more importantly, the cause of the two types of larvae." (Authors)] Address: Johansson, Nathalie, Halmstad University, School of Business and Engineering (SET)

**13113.** Jolley, J.C.; Albin, E.S.; Kaemingk, M.A.; Willis, D.W. (2013): A survey of aquatic invertebrate communities in Nebraska Sandhill lakes reveals potential alternative ecosystem states. *Journal of Fish and Wildlife Management* 4(1): 151-162. (in English) ["Aquatic invertebrate communities are important to shallow lake ecosystem form and function, providing vital components to the food web that link primary producers to consumers and thereby important to lake management goals of maximizing food resources for birds, fish and mammals. We characterized lake invertebrate communities and physicochemical variables in six Nebraska Sandhill lakes and examined these characteristics within an alternative stable state framework. Surveys were conducted during 2005 within each of these six Nebraska Sandhill lakes by sampling aquatic macroinvertebrate abundance, zooplankton abundance and biomass, phytoplankton biomass, and physicochemical variables. When placed within an alternative stable state framework, the response variables exhibited a gradient of different ecosystem states. Two lakes appeared congruent with the clear water state (dense submergent vegetation, high invertebrate abundance and diversity, and low phytoplankton), two were congruent with the turbid water state (high phytoplankton, low vegetation coverage, low invertebrate abundance and diversity), while two lakes were intermediate, likely in a state of hysteresis. Principal component groupings further supported these findings by following similar lake-specific patterns with attributes of a clear water state (high secchi depth, abundant benthic macroinvertebrates) or turbid water state (total dissolved solids, biomass of small-bodied zooplankters) grouping meaningfully according to multiple lake states. . The lakes studied contained varied fish communities, which may have influenced the diversity, density, and biomass of invertebrate and zooplankton communities. Generally lakes dominated by piscivorous fish displayed the clear water state while those with abundant planktivores displayed the turbid water state. Shallow lakes containing dense invertebrate communities likely provide a rich food base to important fauna (migratory waterfowl) that aid in reaching desired management objectives for these systems. Multiple small lakes, in close proximity, displaying divergent ecosystem states invites the opportunity for more in-depth analyses of driving mechanisms that will undoubtedly add to our ability to effectively manage these systems in the future." (Authors) Taxa included Odonata and were treated at the family level.] Address: Jolley, J.C., United States Fish and Wildlife Service, Columbia River Fisheries Program Office, 1211 SE, USA. E-mail: jeffreyjolley@fws.gov

**13114.** Jones, R.W.; Obregon-Zuniga, A.; Guzman-Rodriguez, S. (2013): Preliminary assessment of biogeographic affinities of selected insect taxa of the state of Sonora, Mexico. In: Gottfried, Gerald J.; Ffolliott, Peter F.; Gebow, Brooke S.; Eskew, Lane G.; Collins, Loa C. Merging science and management in a rapidly chang-

ing world: Biodiversity and management of the Madrean Archipelago III and 7th Conference on Research and Resource Management in the Southwestern Deserts; 2012 May 1-5; Tucson, AZ. Proceedings. RMRS-P-67. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 133-137. (in English) ["The biogeographic affinities of butterflies (Lepidoptera: Papilionoidea and Hesperidae), Odonata, and ants (Hymenoptera: Formicidae) reported from the State of Sonora, Mexico were analysed using published species lists. The combined distribution of these taxa was proportionally greater (47.4%) for those species within the Mega-Mexico3 biogeographic category (Southwestern United States south to northern Central America). Formicidae was the most highly restricted taxon with greater proportions of Sonoran desert endemics. Butterflies had a greater proportion of tropical species (82.8%), whereas Odonata from Sonora were most widely distributed either north or south of Mega-Mexico. Differences in the biogeographic affinities of the three insect taxa are attributed to specificity of immature host plants and the distribution and persistence of species habitats." (Authors)] Address: Jones, R.W., Facultad de Ciencias Naturales, Universidad Autónoma de Querétaro, Querétaro, Qro., México

**13115.** Juslen, A.; Hyvärinen, E.; Virtanen, L.K. (2013): Application of the Red-List Index at a national level for multiple species groups. *Conservation Biology* 27(2): 398-406. (in English) ["The International Union for Conservation of Nature (IUCN) Red List Index (RLI) is recognized as one of the key indicators of trends in the status of species. The red-list assessment done by Finnish authorities of species in Finland is taxonomically one of the most extensive national assessments. We used the Finnish Red Lists from 2000 and 2010 to calculate for the first time the national RLIs for 11 taxonomic groups (including Odonata) at different trophic levels and with different life cycles. The red-list index is calculated on the basis of changes in red-list categories and indicates trends in the status of biological diversity of sets of species. The RLI value ranges from 0 to 1. The lower the value the faster the set of species is heading toward extinction. If the value is 1, all species in the set are least concern and if the value is 0, all species are (regionally) extinct. The overall RLI of Finnish species decreased. This means that, in Finland, these taxonomic groups were heading toward extinction faster in 2010 than in 2000. Of the analysed groups of organisms, RLIs of 5 decreased and RLIs of 6 increased. At the national level, the RLIs and status trends varied markedly between species groups. Thus, we concluded that generalizations on the basis of RLIs of a few taxa only may yield a biased view of ongoing trends in the status of biological diversity at the species level. In addition, one overall RLI that includes many different species groups may also be misleading if variation in RLI among species groups is not considered and if RLI values are not presented separately for each

group." (Authors)] Address: Juslén, A., Finnish Museum of Natural History, Zoology, FI-00014 University of Helsinki, Finland. E-mail: aino.juslen@helsinki.fi

**13116.** Karle-Fendt, A.; Stadelmann, H. (2013): Entwicklung der Libellenfauna eines regenerierenden Hochmoores nach Renaturierungsmaßnahmen (Odonata). *Libellula* 32(1/2): 1-30. (in German, with English summary) ["The Bavarian Felmer Moos (47°33'N, 10°15'E), a highly fragmented and disturbed bog, was regenerated stepwise since 1986. Starting in 2000, intensive monitoring of the odonate fauna was carried out in order to investigate possible relationships between the technical measures and the dynamics of the dragonfly species typical for moorland habitats and their populations. In total, 47 species of Odonata were recorded as imagines. By quantitative sampling of Anisoptera exuviae between 2001 and 2012 we tried to find a relation between selected species and different types of water bodies and their succession stages respectively. The results showed that the populations were strongly augmented by the increase of the number and size of water bodies as well as by the rising number of various succession stages. In years with unusually warm springs we observed conspicuous decline of the populations. From the results conclusions were drawn for the regeneration concept." (Authors)] Address: Karle-Fendt, A., Hofenerstr. 49, 87527 Sonthofen, Germany. E-mail: karle-fendt@t-online.de

**13117.** Kaunisto, K.M.; Viitaniemi, H.M.; Leder, E.H.; Suhonen, J. (2013): Association between host's genetic diversity and parasite burden in damselflies. *Journal of Evolutionary Biology* 26(8): 1784-1789. (in English) ["Recent research indicates that low genetic variation in individuals can increase susceptibility to parasite infection, yet evidence from natural invertebrate populations remains scarce. Here, we studied the relationship between genetic heterozygosity, measured as AFLP-based inbreeding coefficient  $f_{AFLP}$ , and gregarine parasite burden from eleven *Calopteryx splendens* populations. We found that in the studied populations, 5–92% of males were parasitized by endoparasitic gregarines (Apicomplexa: Actinocephalidae). Number of parasites ranged from none to 47 parasites per male, and parasites were highly aggregated in a few hosts. Mean individual  $f_{AFLP}$  did not differ between populations. Moreover, we found a positive association between individual's inbreeding coefficient and parasite burden. In other words, the more homozygous the individual, the more parasites it harbours. Thus, parasites are likely to pose strong selection pressure against inbreeding and homozygosity. Our results support the heterozygosity-fitness correlation hypothesis, which suggests the importance of heterozygosity for an individual's pathogen resistance." (Authors)] Address: Kaunisto, K.M., Section of Ecology, Department of Biology, University of Turku, FI-20014 Turku, Finland. E-mail: kkauni@utu.fi



**13118.** Kempster, C. (2013): The Abundance and biodiversity of arthropods in biofuel crops: Insects and arachnids in corn, switchgrass and native mixed grass prairie fields. M.Sc. thesis, Environmental Science at Rochester Institute of Technology, Rochester, New York 14623-5603: V + 80 pp. (in English) [Michigan, USA. "Concerns about fossil fuel prices and harmful effects have prompted research and investment in biofuel development. Biofuels have the potential to provide a stable fuel source that reduces carbon emissions. However, the ecological impacts of different crop choices should be examined. Arthropod communities in corn and switchgrass monocultures and mixed grass prairie polycultures were examined to determine the impact of the crop choice on the arthropod communities. Results show that, when compared to corn and switchgrass fields, mixed grass prairie fields had higher values for arthropod biomass, number, size, the number of orders present, the number of individuals in each order, and the overall arthropod diversity. Corn fields were dominated by Diptera (61.83%) and contained very low abundance of the other orders found in this study. Mixed grass prairie fields also showed Diptera as the most prevalent order (43.47%), followed by Hemiptera (17.89%) and Homoptera (13.65%), Hymenoptera (6.12%), Coleoptera (5.61%), with the others each less than 2.5%, Thysanoptera, Acari, Araneae, Lepidoptera, Orthoptera and Odonata. Switchgrass fields showed arthropod communities with diversity levels between that of corn and mixed grass prairies, with Diptera (39.33%), Coleoptera (17.91%) and Hemiptera (16.33%) dominating the community. Hymenoptera 5.53% and Lepidoptera, Odonata, Orthoptera, Thysanoptera, Acari and Araneae total 17%. Average arthropod abundance was 49.33 individuals and 98 milligrams in mixed grass prairie fields, 35.59 individuals and 49 milligrams in switchgrass fields, and only 23.93 individuals and 23 milligrams in corn fields. The average number of orders found was also correlated to field type, with 4.17 in corn fields, 5.53 in switchgrass fields, and 7.08 in mixed grass prairie fields. It is concluded that transitioning from planting fields with corn to growing mixed grass prairie, or switchgrass, for cellulosic ethanol and biodiesel production would increase the overall abundance and biodiversity of the arthropod community." (Author)] Address: Kempster, Caitlin. not stated

**13119.** Kerry, L. (2013): On the relationship between the Small Red Damselfly *Ceriatagrion tenellum* and the terrestrial mite *Leptus killingtoni*. J. Br. Dragonfly Society 29(2): 69-83. (in English) ["Larvae of the terrestrial mite, *Leptus killingtoni* were identified on a population of *Ceriatagrion tenellum* on the East Devon Pebblebed Heaths in 2011. An investigation was undertaken on the interaction between these species during the flight period in 2012. In total 567 individuals (382 males and 185 females) were caught and marked and the location of a total of 808 mites were noted (498 on first capture and a further 310 on recaptures). The highest numbers of *L.*

*killingtoni* were seen in the middle and driest period at the end of July. Only 19% of immature *C. tenellum* were found to have mites, whereas 36% of male and 49% of female mature damselflies had mites. Paired females were more likely to be infested than unpaired females and males (whether paired or not). Mites were recorded most often from areas more difficult to groom, with 26.6% recorded on the ventral surface of the thorax (and especially between the legs), 20.9% on the abdomen and 17.3% on the femur. Female melanogastrium were recaptured nearly twice as often as *typica*, despite similar numbers being marked." (Author)] Address: Kerry, L., Mount Pleasant, Stoneyford, Colaton Raleigh, Sidmouth, Devon. EX10 OHZ, UK

**13120.** Khelifa, R. (2013): Book review: Karjalainen S. & Hämäläinen M. 2013: *Demoiselle damselflies: Winged jewels of silvery streams*. Caloptera, Helsinki, 223 pp. (bilingual, Finnish and English). ISBN 978-952-93-1045-6. Price EUR 36.00 (hardcover). Eur. J. Entomol. 110(4): 703. (in English) [Book review.] Address: Khelifa, R., Faculty of Biological and Agricultural Sciences, Biology Department, University of Tizi Ouzou, Tizi Ouzou 15000, Algeria. E-mail: rassimkhalifa@gmail.com

**13121.** Kholmogorova, N.V. (2013): Amphibiotic insects of the Izh River. Materials of the Fifth All-Russia Symposium on Amphibiotic and Aquatic Insects / Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences. – Yaroslavl: Filigran, 2013. – 254 pp: 223-227. (in Russian, with English summary) ["Amphibiotic insects of the Izh River and the Izhevsk Reservoir have been studied. A significant reduction in the number of amphibionts in the regulated part of the river (the Izhevsk Reservoir, Russia), compared to the upper reaches of the river, and gradual recovery of their biodiversity with distance downstream from the dam has been revealed. A total of 183 species and higher taxa of amphibiotic insects have been recorded, including representatives of the following orders: Trichoptera, 35 species; Ephemeroptera, 24; Plecoptera, 1; Odonata, 16; Coleoptera, 51; Heteroptera, 18; Sialidae, 2; and Lepidoptera, 3." (Author) Only *Coenagrion hastulatum*, *Libellula depressa*, *Calopteryx splendens*, *Platycnemis pennipes*, and *Leucorrhinia pectoralis* were briefly mentioned in the text.] Address: Kholmogorova, N.V., Udmurt State University ul. Universitetskaya 1, Izhevsk, Udmurt Republic, 426034, Russia. E-mail: nadja-holm@mail.ru

**13122.** Kiauta, B. (2013): Obituary: Gordon Pritchard. *Odonatologica* 42(3): 257-261. (in English) ["A brief appreciation of the odonatological work of Dr G. Pritchard (1939-2012), Professor Emeritus of the University of Calgary (Canada), is followed by his odonatological bibliography (1963-2008). Among his main interests were, e.g., odonate prey capture and the structure and operation of the organs involved, the biology of *Argia vivida* in the Alberta (Canada) thermal springs, and various as-

pects of life history and behaviour. Other studies of importance include his work on the ecological classification of odonate mating systems, larval identification by means of cellulase acetate electrophoresis and egg development." (Author)] Address: Kiauta, B., P.O. Box 124, NL-5854 ZJ Bergen/LB, The Netherlands

**13123.** Kim, D.E.; Kim, J.M. (2013): Insect fauna of Ungok wetland in Gochang, Jeonbuk, Korea, designated as a wetland protection area at Ramsar Convention. *Journal of Environmental Science International* 22(9): 1141-1152. (in Korean, with English summary) [In 2011, a total of 149 species belonging to 11 orders and 57 families were recorded. Odonata were represented by 10.1% of the species (15 species): *Ceriagrion melanurum*, *Atrocalopteryx atrata*, *Calopteryx japonica*, *Orthetrum albistylum*, *O. japonicum*, *O. melania*, *Lyriothemis pachygastra*, *Crocothemis servilia mariannae*, *Sympetrum darwinianum*, *S. frequens*, *S. eroticum*, *S. infuscatum*, *S. kunckeli*, *S. parvulum*, and *Rhyothemis fuliginosa*.] Address: Kim, D.E., Ecosystem Assessment Division, National Institute of Environmental Research, Incheon 404-708, Korea. E-mail: un19781978@naver.com

**13124.** Kim, Y.H.; Kwona, D.H.; Lee, S.H. (2013): Biochemical characterization of two distinct acetylcholinesterases possessing almost identical catalytic activity in the damselfly *Vestalis gracilis*. *Journal of Asia-Pacific Entomology* 16(4): 465-471. (in English) ["Highlights: • Two acetylcholinesterases were identified in *Vestalis gracilis*. • Both VgAChE1 and VgAChE2 were almost equally active in *V. gracilis*. • Both VgAChE1 and VgAChE2 probably have similar neuronal functions. • VgAChEs were primarily associated with the membrane via the GPI anchor. • VgAChEs exhibited different sensitivities to insecticides. Most insects possess two different acetylcholinesterases (AChEs) (i.e., AChE1 and AChE2). It has been recently reported that only one AChE (either AChE1 or AChE2) has been selected for as the main synaptic enzyme and it varies with different insect lineages (Kim et al., 2012 and Kim and Lee, 2013). Interestingly, however, both AChE1 and AChE2 are almost equally active in a damselfly species, providing a unique example of the incomplete specialization of one AChE function after duplication, where, consequently, both AChE1 and AChE2 likely play a similar role in synaptic transmission. In this study, therefore, we investigated the tissue distribution patterns and the molecular and inhibitory properties of two AChEs (i.e., VgAChE1 and VgAChE2) from *V. gracilis* as a model species possessing two AChEs that are equally active. VgAChEs exhibited almost identical catalytic activity and were expressed in the central nervous system (CNS). The most predominant molecular form of both VgAChEs was a disulfide-bridged dimer, which is associated with the cell membrane via a glycosylphosphatidylinositol anchor. In an inhibition assay, however, VgAChE1 and VgAChE2 exhibited different sensitivities to organophosphate and carbamate insecticides de-

pending on the structure of the inhibitors. These findings suggest that both VgAChEs have neuronal functions. In addition, soluble monomeric and cleaved molecular forms were detected in both the CNS and peripheral nervous system tissues by an AChE2-specific antibody, implying that VgAChE2 probably shares both neuronal and non-neuronal physiological functions in *V. gracilis*. Our results support the notion that both VgAChEs, paralogous of each other, are involved in synaptic transmission, with VgAChE2 being in the early stage of acquiring non-neuronal functions." (Authors)] Address: Lee, S.H., Research Institute for Agriculture and Life Sciences, Seoul National University, 151-921, Republic of Korea. E-mail: shlee22@snu.ac.kr

**13125.** Koch, K.; Schneider, J.; Birkmann, L.; Weis, J.; Kotulla, A. (2013): Ein Vergleich zweier Großlibellenpopulationen (Odonata: Anisoptera) in Mainz. *Mainzer naturwissenschaftliches Archiv* 50: 321-331. (in German, with English summary) ["Over a period of two months we compared two populations of Anisoptera in the city of Mainz (Rhineland-Palatinate, Germany) by applying three methods: exuviae sampling, adult screening and mark-recapture. The areas under investigation comprised parts of the nature reserve Laubenheimer-Bodenheimer Ried as well as an assemblage of artificial ponds on the campus of the University of Mainz. The two habitats differed in size and structure. Nevertheless, partly the differences between the two populations in number of species and number of specimen, in sex ration, recapture rate, species diversity and the evenness were smaller than expected or even contrary to our expectations (species diversity of the exuviae). The cause of this observation might be that we worked less intensively on the larger area of Laubenheimer. However, we interpret our observation as a hint that even small artificial ponds can offer an adequate habitat for various Anisoptera." (Authors)] Address: Koch, Kamilla, Abteilung Ökologie, Institut für Zoologie, Johannes-Gutenberg-Universität Mainz, Johann-Joachim-Becherweg 13, 55128 Mainz, Germany. E-Mail: kochka@uni-mainz.de

**13126.** Krieg-Jacquier, R. (2013): In memoriam Daniel Grand. *Martinia* 29(1): 75-76. (in French) [France, personal obituary for one of the most expressed and productive French odonatologists of the past decades.] Address: Krieg-Jacquier, R., 18 rue de la Maconne, 73000 Barbezaz, France. E-mail: regis.krieg.jacquier@gmail.com

**13127.** Kulijer, D.; Zawal, A.; Baker, R.A. (2013): Further studies on the Odonata from Bosnia & Herzegovina and their mite parasites. *J. Br. Dragonfly Society* 29(2): 97-106. (in English) ["A brief review of the present knowledge of the Odonata from Bosnia and Herzegovina is followed by further work on their mite parasites; in particular their identification, distribution and host records. A total of 301 mites were mounted, counted and identified, most of them to species. *Arrenurus bicuspikator*, *A. bruzelii*, *A. cuspidator*, *A. cuspidifer*, *A. maculator* and *A.*

papillator were identified on 13 odonate host species, including three Anisoptera: *Aeshna isosceles*, *Sympetrum flaveolum* and *Anax imperator*. The Zygoptera were *Ischnura pumilio*, *I. elegans*, *Coenagrion puella*, *C. pulchellum*, *C. scitulum*, *Pyrrhosoma nymphula*, *Enallagma cyathigerum*, *Erythromma najas*, *Lestes dryas* and *Platycnemis pennipes*. Size measurements indicate that larval mites of the same species are much larger on anisopterans than on zygopterans and reasons for this are discussed." (Authors)] Address: Kulijer, D., National Museum of Bosnia and Herzegovina, Zmaj od Bosne 3, 71000 Sarajevo, Bosnia & Herzegovina

**13128.** La Porta, G.; Dell'Otto, A.; Speziale, A.; Goretti, E.; Rebori, M.; Piersanti, S.; Gaino, E. (2013): Odonata biodiversity in some protected areas of Umbria, central Italy. *Odonatologica* 42(2): 125-137. (in English) ["Odonate assemblages of 4 wetlands included in the Biotopes Inventory of Italy (Natura 2000 project) have been investigated. A total of 36 species has been recorded and no species-area relationship was found. The richness observed is about 60-90% of the potential richness of the biotopes. The occurrence of *Trithemis annulata*, previously unknown from the Umbria region, and new findings for the biotopes are reported. The odonate flight period spanned from early April to the end of November. Diversity and evenness profiles have shown more diverse communities at sites with a greater habitat heterogeneity and multivariate dispersion analysis has revealed higher homogeneity for Zygoptera than for Anisoptera." (Authors)] Address: La Porta, G., Dipartimento di Biologia Cellulare e Ambientale, Sezione di Biologia Animale e Ecologia, Università degli Studi di Perugia, 06123 Perugia, Italy. E-mail: gianandrea.laporta@unipg.it

**13129.** Lambret, P.; Boudot, J.-P. (2013): *Hemianax ephippiger* (Burmeister, 1839) (Odonata, Anisoptera: Aeshnidae): présentation générale. *Martinia* Hors-série, *Hemianax ephippiger* - migration 2011, mai 2013: 13-27. (in French, with English summary) ["The life history and behaviour of *H. ephippiger* are summarized in order to better understand the recent migratory activity of the species observed in Europe. The key criteria for a fast identification of the adults are given. *H. ephippiger* ranges from the South of Africa to the North of Europe and to India. It is autochthonous in the tropical zone and the Mediterranean where the larvae grow rapidly and preferentially in shallow waters, either permanent or temporary. The species is an obligate migrant which leaves early its native habitat, at the post-teneral stage. Following mass emergences, mass migrations bring the species to the north and the west and the latter has been observed as far as Iceland, Central Asia, French Guyana and the West-Indies. Such long-distance migrations are accompanied by successful local breeding and appear to be mostly passive, being allowed for by strong winds blowing into the same direction for several days. In Africa, migrations are initiated mostly from September to November, taking advantage of the mass

emergences launched by the rainfalls of the summer monsoon. Migrations occur first during the winter along the Atlantic African coast and are accompanied by local breeding and production of a new generation. They continue in Western Europe until the spring. More to the east, inland swarms fail to cross the Atlas range during the winter and accumulate in the Sahara before being able to start again northwards in spring. These two Coastal and inland migration pathways are accompanied by successful breeding in suitable habitats in the north of Africa, Mediterranean Europe and sometimes Central Europe. Similar migrations with successful local breeding are also known from the Arabian Peninsula, both along the coasts and inland. They seem to reach Anatolia and Central and Eastern Europe. Central Asian records could result from Indo-Iranian migrations. The secondary generations appearing north of the Saharan/Arabian belt may lead to new mass migrations in summer and autumn in Southern Europe. Due to the obligate migratory behaviour of the species, the European individuals leave their native habitats for unknown destinations; a return to Africa can be advocated but remains highly hypothetical. Egg laying in Europe in autumn is therefore very rare and in this case the European winter conditions make a larval development highly improbable, except in its southernmost parts of the continent. Other noteworthy behaviours of the species are reminded." (Authors)] Address: Lambret, P., Le Trident B2 n°55, rue de la Sansouïre, F-13310 St-Martin-de-Crau, France. E-mail: philambret@hotmail.com

**13130.** Lambret, P. (2013): De l'émergence et de la coloration chez *Lestes macrostigma* (Eversmann, 1836) (Odonata, Anisoptera: Lestidae). *Martinia* 29(1): 53-64. (in French, with English summary) ["Both the emergence and the colour pattern all along the imaginal life of *L. macrostigma* were studied from 2009 to 2013 in the national natural reserve of the Marais du Vigueirat. Between the break of the larval skin and the moment when the abdomen reaches its final length, the emergence lasted about two hours. Emergences mainly took place in early morning and the exuviae were found around 30 cm above the water table. The sex-ratio at emergence was close to 1 and both sexes emerged synchronously. The coloration of the imagines changed rapidly during the first days. That of the day of the emergence and/or the day after was unique, depending both on the time of emergence as well as the weather, so that it is possible to know if an individual has emerged the day or the day before its observation. The pruinosity seems to cover a maximal surface during the mating period and then decreases, whereas the abdominal tergites darken. The record of tenerals appears to be sufficient to show the autochthony of a population. Coloration patterns can help to identify local populations and their breeding localities." (Author)] Address: Lambret, P., Le Trident B2 n°55, rue de la Sansouïre, F-13310 Saint-Martin-de-Crau, France. E-mail: philambret@hotmail.com



**13131.** Lambret, P.; Gully, F. (2013): Nouveau cas d'aile de Zygoptère transpercée par une plante: *Ceriagrion tenellum* (Villers, 1789) (Odonata, Zygoptera: Coenagrionidae). *Martinia* 29(1): 46. (in French) [*C. tenellum* was trapped at the spine of a leave of *Cirsium arvense* at 27 juin 2007, lake Roud ar Roc'h (Lannion, Department of Côtes-d'Armor, France).] Address: Lambret, P., Cabane de Ligagneau, Route de l'Etoumeau 13104 Mas-Thibert, France. Email: philambret@hotmail.com

**13132.** Lambret, P.; Deschamps, C. (2013): Bilan de la migration d'*Hemianax ephippiger* (Burmeister, 1839) en France en 2011 (Odonata, Anisoptera: Aeshnidae). *Martinia* Hors-série, *Hemianax ephippiger* - migration 2011, mai 2013: 29-46-appendix: 76-96. (in French, with English summary) ["The migration waves of *H. ephippiger* observed in Western Europe in 2011 was so huge that it remains unparalleled in human mind in the region. Basing on a large network of 177 volunteers, we gathered 560 data in France, distributed in 57 departments and covering 18 regions. Most of data were recorded from April to June, corresponding to a first immigration wave. A second wave ranged from July to November, with locally swarms of thousands individuals coming from the south. Immature imagoes were encountered throughout the presence of the species in the country, but some individuals were already very old during the spring immigration. Given the general lack of known significant winter larval development in Europe, spring adults originated most likely from Africa. They bred in France in various standing waters (ponds, gravel pits with well-developed vegetation, lakes...). Imagoes recorded in summer and autumn were in part the offspring of the spring breeders and in part new southern incomers. A wide coastal Atlantic pathway was especially used for this 2011 migration, although the Rhône river axis was more usual in previous migrations. For this reason, and because of its dramatic abundance, *H. ephippiger* is new to 31 French departments. The affinity of *H. ephippiger* for lowlands is obvious: 83.6 % of the observations referred to localities ranging from 0 to 200 m a.s.l. However, *H. ephippiger* was seen at 1428 m a.s.l and bred successfully still at 640 m a.s.l, the latter elevation being to our knowledge the highest known for the species in Europe. Few other noteworthy records about the behaviour of the individuals observed are given." (Authors)] Address: Lambret, P., Cabane de Ligagneau, Route de l'Etoumeau 13104 Mas-Thibert, France. Email: philambret@hotmail.com

**13133.** Li, Y.-J.; Nel, A.; Ren, D.; Pang, H. (2013): A new damselfly dragonfly from the Mesozoic of China with a hook-like male anal angle (Odonata: Isophlebioptera: Campteroptelebiidae). *Journal of Natural History* 47(29-30): 1953-1958. (in English) ["A new genus and species of campteroptelebiid dragonfly, *Angustiphlebia mirabilis* gen. nov. et sp. nov., is described from the Jiulongshan Formation in China. It has some remarkable venational structures, i.e. a hypertrophy of the male hind wing anal

angle, a quite long gaff, and a secondary branch of the anal anterior near subdiscoidal cell in hind wing, supporting the hypothesis of a sister-group relationship with the genus *Oreophlebia*. These new data will help to solve the phylogenetic relationships within the Campteroptelebiidae." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**13134.** Lim, P.-E.; Tan, J.; Eamsobhana, P.; Yong, H.S. (2013): Distinct genetic clades of Malaysian Copera damselflies and the phylogeny of platycnemine subfamilies. *Scientific Reports* 3, Article number: 2977: 7 pp. (in English) ["The phylogenetic relationships of some taxa in the Platycnemidinae at the species and generic levels have been investigated. Phylogenetic trees were generated from both individual mitochondrial encoded COI, COII, 16S rDNA and nuclear encoded 28S rDNA and also combined sequences; these data indicate that the component taxa of the genus *Copera* belong to two distinct genetic clades – the marginipes group and the annulata group. There was no distinct genetic difference between the red-legged and yellow-legged morphs of *C. vittata*. Molecular data showed that the annulata group is considered a member of the genus *Platycnemis*, as originally proposed. The genus *Coeliccia*, a member of the subfamily Calicnemiinae (Platycnemididae), is not grouped with the Platycnemidinae. The Disparoneurinae of the 'Protoneturidae' showed a closer relationship to the Platycnemidinae than the Calicnemiinae. The dataset supports the placement of the Disparoneurinae as a subfamily of the Platycnemididae. This resolves the monophyly of Platycnemididae." (Authors)] Address: Lim, P.-E., Institute of Biological Sciences, University of Malaya, 50603 Kuala Lumpur, Malaysia [2] Institute of Ocean and Earth Sciences, University of Malaya, 50603 Kuala Lumpur, Malaysia.

**13135.** Liu, G.; Li, C.; Dong, H. (2013): Does dragonfly's abdomen flexion help with fast turning maneuvers? *Bulletin of the American Physical Society* 58(18): o.p. (in English) ["Dragonflies are able to achieve fast turning maneuvers during take-off flights. Both asymmetric wing flapping and abdomen flexion have been observed during the fast turning. It's widely thought that the asymmetric wing beats are responsible of producing the aerodynamic moment needed for the body rotation. However, the dynamic effect of the abdomen flexion is not clear yet. In this study, an integrated experimental and computational approach is used to study the underlying dynamic effect of dragonfly abdomen flexion. It's found that dragonfly abdomen tended to bend towards the same side as the body reorienting to. Quantitative analysis have shown that during take-off turning maneuver the abdomen flexion can modulate the arm of force by changing the position of the centre of mass relative to the thorax. As a result, roll and yaw moments produced by the wing flapping can be enhanced." (Au-

thors)] Address: Liu, G., Dept. of Mechanical and Aerospace Engineering, University of Virginia, USA

**13136.** Louboutin, B.; Jaulin, S.; Houard, X. (2013): Premières mentions pour *Leucorrhinia dubia* (Vander Linden, 1825) et *Coenagrion hastulatum* (Charpentier, 1825) dans l'Aude et observation d'une femelle andromorphe de *L. dubia* (Odonata: Libellulidae, Coenagrionidae). *Martinia* 29(1): 65-74. (in French, with English summary) ["A new breeding locality for *L. dubia* and *C. hastulatum* was discovered during an entomological survey conducted for the Office national des forêts (ONF) by the Office pour les insectes et leur environnement (Opie), at a small peaty pond in the La Fajolle forest (Aude department, France). The station is located in a mountainous area under continental bioclimatic influences. Although this area has been poorly prospected in the past, it appears potentially very rich and original from an entomological point of view. Detailed information is given on the habitat and the local Odonatological assemblage, and conservation prospects are mentioned. Finally, the capture of an andromorphic female of *L. dubia* at the site is emphasized." (Authors)] Address: Louboutin, B., Office pour les insectes et leur environnement (Opie), antenne du Languedoc-Roussillon, CBGP Campus de Baillargat - 34988 Monferrier-sur-Lez Cedex, France. E-mail: bastien.louboutin@insectes.org

**13137.** Manger, R.; Martens, A. (2013): First records of *Forcipomyia paludis* (Diptera: Ceratopogonidae), an ectoparasite of dragonfly adults, in The Netherlands. *Entomologische Berichten* 73(5): 182-184. (in English, with Dutch summary) ["On June 7th 2008, *Leucorrhinia pectoralis* individuals having the biting midge *Forcipomyia* (*Pterobosca*) *paludis* on their wings were photographed in National Park Weerribben-Wieden (The Netherlands). This ceratopogonid or biting midge is a temporary ectoparasite of dragonfly adults and the only ceratopogonid species known to specifically feed on this insect group in Europe. The photographs are the first evidence of the presence of *F. paludis* in The Netherlands, but reference material still has to be collected and stored. *Forcipomyia paludis* is already known from Ireland, England, France, Germany, Switzerland, Austria, Sweden, Poland, Italy and Croatia." (Authors) Five biting midges on a female *Crocothemis erythraea*, 05.vii.2008, National Park Weerribben-Wieden were documented.] Address: Manger, R., MangerEco, Stoepveldsingel 55, 9403 SM Assen, The Netherlands. E-mail: rene@mangereco.nl

**13138.** Manger, R. (2013): De Libellen von Kefalonia. Privately published. [www.mangereco.nl](http://www.mangereco.nl): 5 pp. (in Dutch) [In endApril/May 2013, five localities on the island Kefalonia (Greece) were studied for their Odonata fauna. A total of 16 species including *Coenagrion pulchellum* and *C. scitulum* found were recorded.] Address: Manger, R., MangerEco, Stoepveldsingel 55, 9403 SM Assen, The Netherlands. E-mail: rene@mangereco.nl

**13139.** Marinov, M.; Chinn, W.; Edwards, E.; Patrick, B.; Patrick, H. (2013): A revised and updated Odonata checklist of Samoa (Insecta: Odonata). *Faunistic Studies in South-East Asian and Pacific Island Odonata* 5: 1-21. (in English) ["Odonata records of the Samoan Archipelago are updated and an updated checklist provided. It is part of an ongoing assessment of the fauna, taxonomy and distribution of the Pacific island dragonflies. The checklist follows recent reviews published/prepared about the Solomon Islands, New Caledonia, Fiji and Kingdom of Tonga. This study draws on recent dragonfly records following general insect surveys spanning 2008-2012 funded by Critical Ecosystem Partnership Fund (CEPF) via Conservation International (CI) to the authors and to Secretariat Pacific Regional Environment Program (SPREP) and also by funding from Japan International Cooperation Agency (JICA). Other unpublished data from Samoan Archipelago and Niue are included as well. All, but one, of the newly collected Odonata species are widespread within the Pacific region. *Hemicordulia cupricolor* is the only species from the recent collections which is endemic to Samoa, previously reported for Savai'i and Upolu Islands. It has never been confirmed since its original description in 1927. The new study shows the species as an inhabitant of high altitude zones of Savai'i. It is recommended inland areas of Savai'i and other islands within the Samoan Archipelago should be targeted in further field studies." (Authors) The study also discusses the knowledge on the taxonomic status between *Anaciaeschna jaspidea* and *A. melanostoma*.] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@mpi.govt.nz

**13140.** Maxwell, J. (2013): Parametric investigations into fluid-structure interactions in hovering flapping flight. M.Sc. Thesis, Department of Mechanical Engineering, University of Maryland, College Park: XI + 128 pp. (in English) ["A parametric investigation into flapping flight is presented. For a Reynolds number of 75, harmonically forced flapping dynamics is studied. A wing section is modelled as two rigid links connected by a hinge with a torsion spring-damper combination. This section is wrapped in a smooth aerodynamic surface for immersion in the fluid domain. An immersed boundary method is employed on a two-dimensional structured Cartesian grid to solve the incompressible form of the Navier-Stokes equations for low Reynolds numbers by using a finite difference method. Fully coupled fluidstructure interactions are considered. Performance metrics, which include cycle-averaged lift, drag, power, and their ratios, are used to characterize the effects of different parameters and kinematics. Principal components of flow-field structures are quantified, and the system's response is correlated to performance. The thesis findings can serve as a basis to understand and identify flapping frequencies that provide high performance." (Author) Figure 3.3 presents a Principal component analysis of a dragonfly picture (*Anax junius*).] Address: not stated

**13141.** McLamb, S. (2013): Shropshire (VC40) Dragonfly Newsletter. Shropshire (VC40) Dragonfly Newsletter. Spring 2013: 7 pp. (in English) [Content: Flight Season 2012; First and Last Recorded Sightings 2012; Species: A total of 27 species were recorded in 2012 comprising 16 dragonfly and 11 damselfly species; New / Rediscovered Populations: *Sympetrum fonscolombii*, *Ischnura pumilio*; Missing In Action...: The most notable 'missing species' of 2012 was the Keeled Skimmer (*Orthetrum coerulescens*); Coming Soon to a Pond Near You?: *Erythromma viridulum*; BDS National Atlas; Shropshire Dragonflies- the next project!] Address: McLamb, Sue, mclamb1@btinternet.com.

**13142.** Medvedev, A.F.; Kosterin, O.E.; Malikova, E.I.; Schneider, W. (2013): Descriptions of *Somatochlora exuberata* Bartenev, *Leucorrhinia intermedia* Bartenev and *Sympetrum vulgatum grandis* Bartenev, the fate of A.N. Bartenev's type specimens and designation of the lectotype of *L. intermedia* (Anisoptera: Corduliidae, Libellulidae). *Odonatologica* 42(3): 211-228. (in English) ["Descriptions of *S. exuberata*, *L. intermedia* and *S. vulgatum grandis* were published simultaneously but 4 times in 2 languages and in 3 years, 1910, 1911 and 1912. One of the 1910 publications was fragmented and published in 4 subsequent journal issues, involving confusion with the order of parts and the paper title, but it is this publication which has priority. The date of publication of the above mentioned names is Oct. 1, 1910. Hence *Somatochlora exuberata* Bartenev, 1910 has priority over *Somatochlora japonica* Matsumura, 1911. Syntypes in Bartenev's own collections were most probably lost, as were most of his types, but some may remain in European collections as received by foreign odonatologists from Bartenev in exchange. A male syntype of *L. intermedia* from Ris' collection, kept in Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt/Main, Germany (FMS), is designated as the lectotype of this taxon." (Authors)] Address: Medvedev, A.F., Department of Hydrobiology, Faculty of Biology, Moscow State University, Leninskie Gory 1-12, Moscow, 119991, Russia

**13143.** Mikolajewski, D.J.; Wohlfahrt, B.; Joop, G.; Beckerman, A.P. (2013): Sexual size dimorphism and the integration of phenotypically plastic traits. *Ecological Entomology* 38(4): 418-428. (in English) ["Sexual size dimorphism (SSD) reflects adaptive differences in male and female reproductive roles. Understanding the mechanisms generating SSD is of broad ecological and evolutionary interest, because body size is closely linked to fitness. Sex-specific phenotypic plasticity in growth as a response to environmental conditions represents one of the major sources mediating variation in SSD. We investigated phenotypic plasticity associated with predation and seasonal time constraints in development as a source of SSD in *Coenagrion puella*. We complemented this with an analysis of trait correlations (integration) of body size with behavioural, physiological

and life-history traits to investigate how dimorphism manifests. Our results reveal that: (i) plasticity in SSD is mediated by environmental variation; and (ii) environment-dependent, sex-specific changes in the association of body size with growth rate and fat storage mediated changes in the offset of SSD. Our results highlight sex-specific trait responses to the environment channel manifestation of SSD. These findings may be crucial to understanding large parts of the widely documented intraspecific variation of SSD." (Authors)] Address: Mikolajewski, D.J., Laboratory of Aquatic Ecology and Evolutionary Biology, Katholieke Universiteit Leuven, Charles Debériotstraat 32, 3000 Leuven, Belgium. E-mail: d.j.mikolajewski@sheffield.ac.uk

**13144.** Miłaczewska, E. (2013): 10th National Symposium of the Odonatological Section of Polish Entomological Society – Izabelin, June 28–30, 2013] 77. *Odonatrix* 9(2): 77-80. (in Polish, with English summary) [The author discusses the symposium organized in June 2013 in the Kampinoski National Park (central Poland). One scientific session and a several field sessions took place. During the field sessions, at 16 sites 34 dragonfly species were found with one regional new species (*Erythromma viridulum*) which makes together 53 species known in this area. Moreover, the recently discovered population of *Nehalennia speciosa* at the transitional peat bog Długie Bagno was studied with respect to its numbers (at least several thousands of specimens) and the characteristic of its habitat." (Author)] Address: Miłaczewska, Ewa, ul. Cichociemnych 3 m. 13, 03-984 Warszawa, Poland. E-mail: ewa.milaczewska@gmail.com

**13145.** Mitra, A. (2013): Cinderella's new shoes – how and why insects remodel their bodies between life stages. *Current Science* 104(8): 1-9. (in English) ["Metamorphosis in insects is a remarkable phenomenon where the larva undergoes a striking morphological reorganization to give rise to the adult. Over the years, various physiological factors and pathways that govern metamorphosis have been discovered, and at the same time, some understanding about the origins of this phenomenon has also emerged. This review summarizes the current state of knowledge of both the mechanisms underlying metamorphosis, as well as the theories put forward to explain its evolution." (Author) The paper includes references to Odonata.] Address: Mitra, A., Department of Biology, Washington University in St Louis, Monsanto 411, Campus Box 1137, One Brookings Drive, St. Louis, MO 63130-4899, USA. E-mail: mitra.aniruddha@gmail.com

**13146.** Mittmann, K. (2013): Interessante Libellen am Silbersee in Bobenheim-Roxheim. *Pollichia Kurier* 29(4): 32. (in German) [Rheinland-Pfalz, Germany; the focus of the anecdotal observations was set on *Anax parthenope* and *Crocothemis erythraea*] Address: not stated



- 13147.** Monster, L. (2013): Vleugels van libel zijn natuurraadsel. Kunst- en vliegwerk. *Landleven* 18(5): 54-57. (in Dutch) [This is a popular account on dragonflies in a Dutch journal for garden lovers.] Address: Landleven, Postbus 4, 7000 BA Doetinchen, The Netherlands. E-mail: redactie@redactielandleven.nl
- 13148.** Moreno-Benítez, J.M.; Ripoll Rodríguez, J.; Toro, F.; Winter, P. (2013): Contribución al conocimiento de los odonatos (Odonata) de la provincia de Málaga (España). *Boletín de la Red de Observadores de Libélulas en Andalucía* 3: 77-107. (in Spanish, with English summary) ["Dragonflies (Odonata) records from the province of Malaga, Spain, during the period 2005-2012, are reported. The available literature is reviewed and the provincial catalogue is updated. Currently 56 species are known within Malaga." (Authors)] Address: E-mail: lorquini@gmail.com
- 13149.** Ndueze, O.U.; Noutcha, M.A.E.; Umeozor, O.C.; Okiwelu, S.N. (2013): Arthropods associated with wildlife carcasses in Lowland Rainforest, Rivers State, Nigeria. *European Journal of Experimental Biology* 3(5): 111-114. (in English) [Odonata belong to the arthropods associated with the carcass of the Mona monkey, *Cercopithecus mona*. "Odonata were probably transients, with no discernible impact on the decomposition process." (Authors)] Address: Ndueze, O.U., Entomology & Pest Management Unit, Department of Animal and Environmental Biology, University of Port Harcourt, Nigeria
- 13150.** Negi, R.K.; Mangain, S. (2013): Seasonal variation of benthic macro invertebrates from Tons River of Garhwal Himalaya Uttarakhand. *Pakistan Journal of Biological Sciences* 16: 1510-1516. (in English) ["Present investigation was carried out to assess the seasonal variation of benthic macro-invertebrates from the Tons river, a tributary of Yamuna River in Garhwal Himalaya, Uttarakhand during December, 2007 to November, 2009. The seasonal benthic diversity was correlated with various physico-chemical parameters which documented that the macrobenthic diversity is mostly regulated by the dissolved oxygen in the water while temperature and free CO<sub>2</sub> were found to be inversely correlated with the benthic fauna. Maximum diversity of benthos was reported at the upstream site ('H' 0.204) during the winter season while it was recorded minimum during the rainy season at all the sites. Maximum diversity is reported during the winter season at all the sites. The benthic fauna is represented by three phylum, 4 classes and 10 orders with Insecta emerging as the most dominant class. Maximum genera were reported from mid-stream site as it acts as ecotone between upstream and downstream." (Authors) The list of taxa includes Odonata at the genus level. Some of them were probably misidentified.] Address: Negi, R.K., Dept of Zoology and Environmental Sciences, Gurukula Kangri University, Haridwar UK-249404, India
- 13151.** Nel, A.; Krzeminski, W.; Szewo, J. (2013): *Elektroephaea* gen.n., the oldest representative of the modern Epallaginae from Eocene Baltic amber (Odonata: Zygoptera: Epallagidae). *Insect Systematics & Evolution* 44(2): 129-140. (in English) ["*Elektroephaea flecki* gen.n. sp.n., the oldest representative of the modern damselfly subfamily Epallaginae, is described from the Middle Eocene Baltic amber. This study confirms a Palaeocene age (or older) for the Epallagidae, previously supported by the presence of representatives of Eodichrominae from the Palaeocene-Eocene Mo-clay Formation of Denmark and from Baltic amber." (Autors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr
- 13152.** Netz, H. (2013): Paarung in der Libellen-Disco. Neuer Lebensraum für die Grüne Keiljungfer. *Naturschutz heute* 3/13: 14-15. (in German) [The paper reports on current attempts to improve habitats of *Ophiogomphus cecilia* in the region Fränkisches Becken, Bayern, Germany. The project is EU founded. For more details see: <http://www.lbv.de/unsere-arbeit/life-naturprojekte/life-projekt-keiljungfer/tagebuch.html>] Address: not stated
- 13153.** Nordström, K. (2013): Robust prey detection in a small nervous system. *PNAS* 110(2): 389-390. (in English) ["Vision plays a huge role for us humans, as well as for many other animals. If you have ever tried to walk in a straight line with your eyes closed, you know how important self-generated optic flow is for maintaining a straight trajectory. Besides such widefield optic flow cues, we can also visualize the motion of objects that move independently of the remaining visual surround. Such targets may represent the motion of a ball during a game of cricket, tennis, or baseball (take your pick, depending on your cultural heritage and location in the world). Despite the fact that you are moving, and thereby generating optic flow across your visual field, you can still visualize and identify the independent trajectory of the ball. Motion vision is not only important for human sports stars (1), but also for insects who use these cues for tasks such as maintaining a straight flight trajectory (2), avoiding colliding with approaching tree trunks, and, importantly, identifying targets such as potential prey (3), the subject of a paper published in PNAS (4). Studying the neurophysiology underlying target detection in human subjects, and other vertebrates, quickly becomes quite complicated. Besides the relative inaccessibility of the vertebrate visual cortex, there is the additional inconvenient complication of the eyes being able to move independently of the head (5). In insects, however, the eyes are fixed to the head's exoskeleton, which means we know what the insect looks at if we know what direction the head is facing. Intriguingly, however, despite vertebrates and insects being separated by huge evolutionary distances (6), and being equipped with completely different eyes (7), mo-

tion vision is coded in remarkably similar ways in the vertebrate visual cortex and the insect brain (8). We can therefore, somewhat surprisingly, use the insect visual system to understand ... Dragonflies have compound eyes, which limit the spatial resolution severely compared with the single lens eyes of vertebrates (7). In a compound eye, the maximum resolution is given by the spacing of the individual lenses. Dragonflies, and many other insects that depend on successful target detection, have therefore evolved areas in the compound eye with increased spatial resolution, called acute zones (16). The dragonfly's acute zone is located in the dorso-frontal visual field, in the same area as Gonzalez-Bellido et al. describe the peak TSDN sensitivity (4). This is also the part of the visual field where STMD receptive fields tend to cluster (17), and where dragonflies position their prey during target pursuit (3, 9). Taken together, this highlights the coevolution of optics, neural machinery and behaviour for optimizing successful target pursuit despite the limited hardware—in the form of poor and a small brain—provided." (Author)] Address: Nordström, Karin, Department of Neuroscience, Uppsala University, SE-751 24 Uppsala, Sweden. E-mail: karin.nordstrom@neuro.uu.se.

**13154.** Noskovič, J.; Rakovská, A.; Porhajašová, J.; Babošová, M.; Čeryová, T. (2013): Biological evaluation of the water quality in the water flow in the southwestern part of the Slovak Republic. *Research Journal of Agricultural Science* 45(2): 171-181. (in English) ["Assessment of the surface water quality in the whole Europe affected the Directive 2000/60/EC of the waters, according to which is the evaluation method of surface waters based on the the evaluation of the ecological and chemical status of the surface water bodies. For environmental assessment are key information on the qualitative and quantitative composition of communities aquatic organisms. On this basis, we collected 28 samples of water flow at 7 sites Caradice brook during year 2009, in the southwestern part of the Slovak Republic. In the water flow Ěaradice stream, which spring in the mountain of Pohronský Inovec and is righthand tributary of the Hron River, thus we obtained 30 776 individuals macrozoobenthos. By determining the mentioned number of the individuals, we found the presence of 146 kinds that were included into 16 systematic groups: Turbellaria, Oligochaeta, Hirudinea, Gastropoda, Bivalvia, Isopoda, Amphipoda, Ephemeroptera, Plecoptera, Odonata, Heteroptera, Megaloptera, Coleoptera, Trichoptera, Diptera, Chironomidae. From these systematic groups the largest number of representatives of the systematic group Amphipoda had regularly occurred at all sampling sites. Most widespread type of this systematic group and also the most numerous of all species of macroinvertebrate found in the waters of the Caradice stream was *Gammarus fossarum*, which we regard to its mass occurrence (28%) identified as eu-dominant species. The smallest numerous individuals were represented systematic group Megaloptera that

monitored the water flow occurred infrequently, so we included them to subprecedent species. The greatest constancy, i.e. stability of in the community had species *Eiseniella tetraedra*, *Gammarus fossarum*, *Pisidium obtusale*, which we evaluated as the species always present. The species of *Cloeon dipterum*, *Erpobdella octocolata*, *Hydropsyche angustipennis* was species the almost always present. The greatest frequency had family Chironomidae (100%). The Saprobic indices in the reporting period ranged from 1.7151 to 2.2399 on the basis of what we categorized the water from Caradice stream to the level of beta - mesosaprobity. The average annual value of the saprobic index of benthic invertebrates of Caradice brook (SAS=2,00) does not meet the requirements of the indicator of water quality - Part E "biological and microbiological parameters, which are set out in Government Regulation No. 269/2010 Coll. (SAS = 1,3)." (Authors)] Address: Noskovič, J., Dept of Environmental Sciences and Zoology, Slovak University of Agriculture in Nitra, Tr. A. Hlinku 2, 949 76 Nitra – Slovakia. E-mail: Jaroslav.Noskovic@uniag.sk

**13155.** Obasi, K.O.; Okechukwu, R.I.; Nwokocha, N.J. (2013): Species diversity and evenness of some organisms in Usumani and Imo Rivers, Abia State, Nigeria. *International Journal of Science and Technology* 2(9): 690-695. (in English) ["Shannon Weiner's diversity index (H), and Pileos's evenness index (J) or Equitability, were adopted in establishing the diversity and evenness of the species respectively. Results of the study show that the highest diversity index of 2.0312 and equitability (evenness) index of 0.8471 were recorded at Usumani river. At Imo river Uzuaku, diversity index of 0.6560 and equitability of 0.4076 were recorded. In addition, Imo river Owerrinta had diversity index of 0.7407 and equitability of 0.4134." (Authors) The material includes "Aeshna sp. dragonfly larvae".] Address: Obasi, K.O., Department of Biological Science, School of Science Federal University of Technology; Owerri, Nigeria.

**13156.** Obregon-Romero, R.; Cano-Villegas, J.; Tamañon-Gomez, R.; Lopez Tirado, J. (2013): Primeras citas de *Trithemis kirbyi* Selys, 1891 (Odonata, Libellulidae) en las provincias de Ciudad Real y Huelva, y nuevas aportaciones para la provincia de Badajoz (España). *Boletín de la SAE* 22: 88-93. (in Spanish, with English summary) [T kirbyi was recorded, for the first time, from Ciudad Real (first record from Castilla La Mancha) and Huelva (Andalusia). The presence in the province of Badajoz (Extremadura) was also confirmed. These records document the range extension of the species towards inland habitats and the Atlantic coast.] Address: Obregón-Romero, R., Dpto. Botánica, Ecología y Fisiología Vegetal. Área de Ecología. Campus de Rabanales. Universidad de Córdoba, Spain. E-mail: ra-faobregonr@gmail.com

**13157.** Olomukoro, J.O.; Osamuyiamen, I.M.; Dirisu, A.-R. (2013): Ecological survey of macrobenthic inver-

tebrates of selected ponds in Agbede flood plain, southern Nigeria. *Journal of Biology, Agriculture and Healthcare* 3(1): 23-29. (in English) ["Ecological study on three selected ponds of Agbede flood plain was fortnightly carried out between January and June, 2007 to assess and document the macrobenthic fauna composition, abundance and distribution, as well as the physicochemical status of some parameters in water which were collected and analyzed monthly. Benthos was sampled for using the Ekman Grab operated by hand in shallow waters together with the Kick sampling method. Among the eight physicochemical characteristics investigated, pH fluctuated from slightly acidic to slightly alkaline with range of values (5.90 – 7.35) at the studied stations. Significant difference ( $P < 0.05$ ) was observed for biological oxygen demand (BOD5) and dissolved oxygen (DO). A total of ten (10) groups comprising macroinvertebrates taxa with one thousand and thirty one (1,031) individuals were recorded in this study. Most dominant groups were represented by Coleopterans (35.79% and 374 individuals), Hemiptera (20.19% and 211 individuals) and Dipterans (18.47% and 193 individuals). Evenness was highest in pond 1 (0.4973). The highest number of macroinvertebrates were collected from pond 2 (416) where no human activities occurred and however implied that human activities can rapidly alter any previously stable communities of aquatic environments." (Authors) Identification of taxa is obscure because the checklist includes Palaearctic and Nearctic taxa.] Address: Olumukoro, J.O., Department Of Animal And Environmental Biology, Faculty Of Life Sciences, University Of Benin, Benin City, P.M.B. 1154, Nigeria. E-mail: olomsjo@yahoo.com

**13158.** Orwa, P.O.; Raburu, P.O.; Kipkemboi, J.; Rongoei, P.; Owuor, O. (2013): Use of macroinvertebrate assemblage to assess the ecological integrity of Nyando Wetlands, Kenya. *Journal of Ecology and the Natural Environment* 587: 152-164. (in English) ["This study aimed to investigate changes in macroinvertebrate assemblage within Nyando wetlands and developed an index of biotic integrity for monitoring human disturbances. Triplicate macroinvertebrate samples were collected monthly for seven months using a scoop net. They were sorted live, counted and identified to genus level. Water samples for nutrients were collected and analyzed using standard methods. Physico-chemical parameters were taken in situ using electronic meters. Macroinvertebrates were analyzed for richness, diversity, dominance and abundance. Abundance was correlated with physico-chemical parameters. Kruskal-Wallis test was used to test spatial differences in macroinvertebrate community. Metrics for index of biotic integrity were chosen, tested, and a 5, 3, 1 scoring criteria was used. A total of 45 genera (including four Odonata genera) were identified and Kruskal-Wallis test analysis revealed significant spatial differences in macroinvertebrate abundance. Repeated measures ANOVA showed significant spatio-temporal differences. Tolerant ma-

croinvertebrates were abundant at the disturbed sites whereas intolerant taxa showed a strong negative correlation with nutrient levels. Sites with higher disturbance recorded a total index score far below the reference site score. The results indicated that macroinvertebrates in Nyando wetlands can be used to monitor its ecological integrity. The IBI developed should be used to protect the lake from eutrophication." (Authors)] Address: Orwa, P.O., Department of Fisheries and Aquatic Sciences, University of Eldoret, P.O. Box 1125, Eldoret, Kenya

**13159.** Outomuro, D.; Dijkstra, K.-D.B.; Johansson, F. (2013): Habitat variation and wing coloration affects wing shape evolution in dragonflies. *Journal of Evolutionary Biology* 26(9): 1866-1874. (in English) ["Habitats are spatially and temporally variable, and organisms must be able to track these changes. One potential mechanism for this is dispersal by flight. Therefore, we would expect flying animals to show adaptations in wing shape related to habitat variation. In this work, we explored variation in wing shape in relation to preferred water body (flowing water or standing water with tolerance for temporary conditions) and landscape (forested to open) using 32 species of dragonflies of the genus *Trithemis* (80% of the known species) (*Trithemis aconita*, *T. adelpha*, *T. aenea*, *T. aequalis*, *T. africana*, *T. annulata*, *T. arteriosa*, *T. aurora*, *T. basitincta*, *T. bifida*, *T. bredoi*, *T. dejouxi*, *T. dichroa*, *T. donaldsoni*, *T. dorsalis*, *T. ellenbeckii*, *T. festiva*, *T. furva*, *T. grouti*, *T. hartwigi*, *T. hecate*, *T. imitata*, *T. kalula*, *T. kirbyi*, *T. monardi*, *T. nuptialis*, *T. pluvialis*, *T. pruinata*, *T. selika*, *T. stictica*, *T. tropicana*, *T. wernerii*). We included a potential source of variation linked to sexual selection: the extent of wing coloration on hindwings. We used geometric morphometric methods for studying wing shape. We also explored the phenotypic correlation of wing shape between the sexes. We found that wing shape showed a phylogenetic structure and therefore also ran phylogenetic independent contrasts. After correcting for the phylogenetic effects, we found (i) no significant effect of water body on wing shape; (ii) male forewings and female hindwings differed with regard to landscape, being progressively broader from forested to open habitats; (iii) hindwings showed a wider base in wings with more coloration, especially in males; and (iv) evidence for phenotypic correlation of wing shape between the sexes across species. Hence, our results suggest that natural and sexual selection are acting partially independently on fore- and hindwings and with differences between the sexes, despite evidence for phenotypic correlation of wing shape between males and females." (Authors)] Address: Outomuro, D., Dept of Ecology and Genetics, Population Biology and Conservation Biology, Norbyvägen 18 D, 752 36 Uppsala, Sweden. E-mail: david.outomuro@ebc.uu.se

**13160.** Pacini, N.; Donabaum, K.; De Villeneuve, P.H.; Konecny, R.; Pineschi, G.; Pochon, Y.; Salerno, F.;



Schwaiger, K.; Tartari, G.; Wolfram, G.; Zieritz, I. (2013): Water quality management in a vulnerable large river: the Nile in Egypt 11(2). *International Journal of River Basin Management*: 205-219. (in English) ["We review the severe water management problems of the Nile Basin, where physical water scarcity is associated with high demographic growth, leading to a sharply-rising demand for competing water uses such as hydropower and large-scale irrigation. Rapid economic growth is perceived as the means to emerge from the poverty trap that afflicts livelihoods in the Upper Basin and vital wetland ecosystem services such as fish biomass, freshwater biodiversity, groundwater recharge, flow regulation and local climate moderation are threatened by the water development schemes and pollution that follow from this policy. Their cumulative impacts remain unaddressed. The High Aswan Dam's impacts on freshwater biodiversity are incompletely understood; a significant number of species may have become threatened as a result of its construction. Today the reservoir water quality is high, it is thought to support 47 fish species, its local human activities are restricted by central government regulations and recent estimates indicate that eutrophication threats are unlikely. Sediment and nutrient inputs coming into it from upstream will, however, continue to decrease in the near future as a result of newly built and planned dams in the upper basin. The dams will also reduce discharge and cause further loss of connectivity between the river and its floodplain; exacerbated by the possible completion of the Jonglei Canal bypassing the Sudd swamps. These impacts will affect the Nile's vulnerable aquatic biodiversity and regulatory services that are likely to affect local climate conditions. Under the current geopolitical scenario, management decisions that could favour participatory and sustainable options are over-ruled by high-level political trade-offs between the numerous riparian states. The financing of major hydropower developments by vested interests creates a scenario that is unlikely to favour sustainable resource management and conflict resolution.... Below Aswan, the whole river can be described as a potamon dominated by Odonata, Coleoptera, Corixidae and Chironomidae." (Authors)] Address: Pacinia, N., Dept of Environmental & Chemical Engineering, Univ. of Calabria, Arcavacata di Rende, Italy

**13161.** Panigalli, G.; Tessmann Soligo, K. (2013): Diversidade de insecta (Arthropoda) associada à carcaça de *Sus scrofa* L. em um fragmento de Mata Atlântica de Xanxerê Santa Catarina. *Unoesc & Ciência - ACBS, Joaçaba* 4(1): 15-26. (in Portuguese, with English summary) ["The lack of information about the insect fauna associated with decaying corpse of vertebrates in tropical motivated this study lifting Insecta (Arthropoda) carcass of *Sus scrofa* (Linnaeus 1758) in a fragment of Atlantic Forest in the town of Xanxerê, SC. The animal-bait was exposed in an environment characterized by rural mosaic of forest remnants and area of agricultural activity and observed until its skeletonization, the specimens being collected daily from Insecta associated with hous-

ing. We used metal cage, modified Shannon trap, pitfall traps, insect nets and bait-casting of the animal. We collected a total of 3,226 arthropods analyzed and classified into 44 species. The order Diptera was the most frequent, followed by Coleoptera, Lepidoptera, Hymenoptera, Hemiptera/Heteroptera, Orthoptera, Mantodea and Odonata." (Authors) A single Odonata-specimen was recorded; it was considered without any functional relationship to the carcass of *S. scrofa*.] Address: Panigalli, Gerusa, Mestre em Ciências Biológicas; Professora do Curso de Ciências Biológicas na Universidade do Oeste de Santa Catarina; Rua Dirceu Giordani, 696, Bairro Jardim Tarumã, 89820-000, Xanxerê, SC, Brasil. E-mail: gerusa.panigalli@unoesc.edu.br

**13162.** Panov, E.N.; Opaev, A.S. (2013): Behavior of males in a reproductive aggregation of the banded damselfly *Calopteryx splendens* (Insecta, Odonata). *Entomological Review* 93(7): 805-813. (in English) ["The view according to which damselfly males practice two alternative reproductive tactics of access to females is critically discussed. It is widely accepted that some males ("territorial" ones) have priority as potential female partners, while others ("sneakers" or "wanderers") are incapable of retaining an individual territory. They have a chance of mating only by intruding briefly into the area defended by a "territorial" male when a female is present there. Thus, the tactics of a "territorial" male consists in waiting for a female in its territory and copulating with it "by agreement," whereas non-territorial males resort to forced copulations. By observation of individually marked males (48 out of 118) it was shown that every male could be regarded as "territorial" during a certain period and as a "wanderer" before and after it. Thus, no correlation between the modes of space use by a male (residence/mobility) and the characters of its external morphology and/or signal behaviour appears to be possible in principle. According to the data obtained, a more plausible explanation is that the female chooses not the male but the best area for oviposition. In addition, it was ascertained that adherence to forced copulations cannot constitute successful "tactics" since they rarely result in insemination, neither by "territorial" nor "non-territorial" males. In other words, we are dealing not with certain alternative tactics (i.e., specialized adaptive mechanisms that have evolved in the species) but simply with the results of different sets of circumstances at a given moment." (Authors) Original Russian Text © E.N. Panov, A.S. Opaev, 2013, published in *Zoologicheskii Zhurnal*, 2013, Vol. 92, No. 1, pp. 24–33.] Address: Panov, E.N., Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Moscow, 119071, Russia. E-mail: panoven@mail.ru

**13163.** Payton, G. (2013): The effects of predator chemical cues on the behavior of spotted salamander larvae (*Ambystoma maculatum*). *BIOS 35502: Practicum in Field Biology, Advisor: Shayna Sura: 15 pp.* (in English) [Wisconsin, Michigan, USA "The detection of kair-

omones, or chemical cues released by hunting predators, is an important ability of prey that allows them to exhibit anti-predator behaviour, thus increasing their chance of survival and fitness. This study aims to elucidate the effect of the kairomones of two native predators, diving water beetle larvae and dragonfly larvae (Libellulidae), on the behaviour of spotted salamander larvae. Observational laboratory trials were conducted to determine the effect that the addition of kairomone-containing water had on the larvae's preference for depth and cover in their environment. I predicted that the larvae would prefer to live in a shallow environment when treated with dragonfly larvae chemical cues, a deep environment if exposed to diving water beetle chemical cues, and an even split between the two depths when exposed to the kairomones of both predators, based on the predators' different hunting methods. I also hypothesized that the salamander larvae would prefer to inhabit areas with foliage to areas with no foliage when treated with the kairomones of dragonfly larvae and/or diving water beetles. However, it was found that there was no significant difference in mean time spent in each quadrant between each of the treatments. Perhaps the effect of chemical cues is a learned trait for the salamander larvae, and thus the predator naïve larvae used in this experiment had no knowledge of the predators' effects or hunting techniques." (Author) For details see: <http://www3.nd.edu/~underc/east/education/documents/George2013.pdf> Address: not stated

**13164.** Pinto, H.A.; Melo, A.L. (2013): Metacercariae of Eumegacetes medioximus (Digenea: Eumegacetidae) in larvae of Odonata from Brazil. *Biota Neotropica* 13(2): 351-354. (in English, with Portuguese summary) ["During studies on the participation of larval Odonata in the life cycle of trematodes carried out at the Pampulha reservoir, Belo Horizonte, State of Minas Gerais, Brazil, between May and September 2011, larvae of *Orthemis discolor* and *Perithemis mooma* were found harbouring metacercariae identified as *Eumegacetes medioximus* Braun, 1901. This is the first report and morphological description of metacercariae of *E. medioximus* in the Neotropical region." (Authors)] Address: Pinto, H.A., Laboratório de Taxonomia e Biologia de Invertebrados, Departamento de Parasitologia, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais – UFMG, CP 486, CEP 30123-970, Belo Horizonte, MG, Brasil

**13165.** Prasad, K.K.; Ramakrishna, B.; Srinivasulu, C.; Srinivasulu, B. (2013): Odonate diversity of Manjeera Wildlife Sanctuary with notes on female polymorphism of *Neurothemis tullia* (Drury, 1773) (Odonata: Libellulidae) and some species hitherto unreported from Andhra Pradesh, India. *Journal of Entomology and Zoology Studies* 1(4): 99-104. (in English) [28 Odonata species were recorded from the Manjeera Wildlife Sanctuary between December 2010 to October 2012. *Anaciaeschna jaspidea*, *Coenagrion dyeri*, *Pseudagrion decorum*, and *Rhodischnura nursei* were reported for the

first time from Andhra Pradesh. Female polymorphism of *Neurothemis tullia* from the Manjeera Wildlife Sanctuary, Medak District, Andhra Pradesh was documented and discussed in detail.] Address: Prasad, K.K., Wildlife Biology and Taxonomy Lab, Department of Zoology, Osmania University, Hyderabad – 500 007, India. E-Mail: [kpmanjeera@gmail.com](mailto:kpmanjeera@gmail.com)

**13166.** Prorochuk, V. (2013): Rare insect species of the NNP "Gutsul'shchina": [Current status and future conservation]. *Visnyk of the Lviv University. Series Biology* 61: 110-118. (in Ukrainian) [*Calopteryx virgo*, *Anax imperator*, *Cordulegaster bidentata*, and *Sympetrum pedemontanum* were among the 38 insect species introduced in the National park of "Hutsul'shchyna" and considered as rare inhabitants of the Park.] Address: Prorochuk, V., Natsional'nyy pryrodnyy park «Hutsul'shchyna» vul. Druzhby, 84, Kosiv, Ivano-Frankivs'ka obl. 78600, Ukraine. E-mail: [gutsulpark@rambler.ru](mailto:gutsulpark@rambler.ru)

**13167.** Prunier, F.; Ripoll Rodríguez, J.; Schorr, M. (2013): Citas bibliográficas de odonatos en Andalucía. *Boletín de la Red de Observadores de Libélulas en Andalucía* 3: 43-76. (in Spanish, with English summary) ["Bibliographical data on Andalusian, Spain dragonflies are abstracted and ordered by province and 10x10 kilometers squares. Doubtful records as well as species to be confirmed in the region are discussed. The Andalusian catalogue of dragonflies is updated." (Authors)] Address: Prunier, Florent, C/ Maestro Priego López, 7, 2D, 14004 Cordoba, Spain. E-mail: [florent.prunier@yahoo.fr](mailto:florent.prunier@yahoo.fr)

**13168.** Prunier, F.; Ripoll Rodríguez, J.; Chelmick, D. (2013): Segundo Atlas de odonatos en Andalucía: incorporando 25 años de investigación. *Boletín de la Red de Observadores de Libélulas en Andalucía* 3: 5-41. (in Spanish, with English summary) [Spain; "The second Andalusian atlas of dragonflies is presented, updating the publication of the first in 1984. This work is based on the subsequent literature review and data of ROLA's recording scheme. For each species, a map represents the last period in which its presence has been detected (prior to 1984, 1984-2000, after 2000)." (Authors)] Address: Prunier, Florent, C/ Maestro Priego López, 7, 2D, 14004 Cordoba, Spain. E-mail: [florent.prunier@yahoo.fr](mailto:florent.prunier@yahoo.fr)

**13169.** Quina, C.L.; Pelli, A.; Costa Martins, A.G. (2013): Succession of benthic macroinvertebrates on rat carcasses in Uberaba river - MG. *SaBios-Revista de Saúde e Biologia* 8(2): 73-80. (in Portuguese, with English summary) ["There are patterns of ecological succession in different stages of decomposition in the rat carcasses. According to the stages of decomposition, the succession happens in stages characterized by defined groups and species. The aim of this research was to evaluate the ecological succession in animal carcasses in lotic environments. Five neonates rats previously sacrificed in cold anesthesia were evaluated. Within a bag of shade, the material was deposited in lotic environments and re-

moved in intervals of 1 to 4 days. The analysis was performed in the laboratory after sieving the sample solution and preserved in alcohol 75%. The material was sorted and identified under a stereoscopic microscope. Insecta was the dominant group. Trichoptera and Diptera were dominant with three families, followed by two Ephemeroptera families and one family of Coleoptera and Odonata ("Libellulidae") orders. Two orders of Crustacea, the phyla Annelida and Sarcodina were also observed. There was a succession of organisms related to functional or morphological behaviour. There was a tendency of increase in density and species richness and that the pattern of succession in artificial substrate - carcasses - reflects the environmental conditions." (Authors)] Address: Pelli, A., Universidade Federal do Triângulo Mineiro Departamento de Patologia, Genética e Evolução, Disciplina de Ecologia & Evolução Av. Frei Paulino, 30. Uberaba/MG - CEP 38025-180, Brazil. E-mail: apelli.oikos@icbn.uftm.edu.br

**13170.** Ramaker, A.J. (2013): First population of *Coenagrion scitulum* in Dutch Limburg. *Brachytron* 15(2): 123-127. (in Dutch, with English summary) ["In 2010 the second population of *C. scitulum* in the Netherlands was found in province of Limburg. The other population in the Province of Zeeland, was discovered in 2007. The discovery and the reproduction location are discussed, as well as the expansion in the north-west of Europe. Females of the population in Limburg are almost all of the multicoloured morph, which appears to be rarer in the populations in Zeeland and western Belgium." (Author)] Address: E-mail: dolf@goyatlah.nl

**13171.** Rebora, M.; Piersanti, S.; Gaino, E. (2013): The mechanoreceptors on the endophytic ovipositor of the dragonfly *Aeshna cyanea* (Odonata, Aeshnidae). *Arthropod Structure & Development* 42(5): 369-378. (in English) ["This study investigates the mechanoreceptors located on the cutting valvulae of the ovipositor of *A. cyanea*, using both SEM and TEM, with the aim of providing an overview of the sensory equipment of an odonatan endophytic ovipositor. Four kinds of sensilla have been described. Notwithstanding their different external and internal morphology, they show features typical of mechanoreceptors. Three of them are evident along the external surface of the two cutting valvulae in the form of sub-spherical pegs, pit organs type 1 (holes) and pit organs type 2 (depressions), these last similar to amphinematic scolopidia, while the fourth type is represented by subintegumental mononematic scolopidia having no direct relationship with the cuticle. In spite of their structural differences, the morphology of the described mechanoreceptors is consistent with performing a main role in allowing the perception of compression/ stretching of the thick cuticle of the valvulae and their bending due to the pressure acting on the distal end of the ovipositor during substrate penetration. Such an organization is coherent with the need of endophytic Odonata to be able to evaluate the stiffness of the plant where to lay eggs." (Authors)]

Address: Rebora, Manuela, Dipartimento di Biologia Cellulare e Ambientale, Università di Perugia, 06123 Perugia, Italy. E-mail: rebora@unipg.it

**13172.** Reeve, B.C.; Crespi, E.J.; Whipps, C.M.; Brunner, J.L. (2013): Natural stressors and ranavirus susceptibility in larval Wood Frogs (*Rana sylvatica*). *EcoHealth* 10(2): 190-200. (in English) ["Chronic exposure to stressors has been shown to suppress immune function in vertebrates, making them more susceptible to pathogens. It is less clear, however, whether many natural stressors are immunosuppressive. Moreover, whether stressors make disease more likely or more severe in populations is unclear because animals respond to stressors both behaviourally and physiologically. We tested whether chronic exposure to three natural stressors of wood frog tadpoles—high-densities, predator-cues, and low-food conditions—influence their susceptibility to a lethal ranavirus both individually in laboratory experiments, and collectively in outdoor mesocosms. Prior to virus exposure, we observed elevated corticosterone only in low-food treatments, although other treatments altered rates of growth and development as well as tadpole behaviour. None of the treatments, however, increased susceptibility to ranavirus as measured by the proportion of tadpoles that became infected or died, or the time to death compared to controls. In fact, mortality in the mesocosms was actually lower in the high-density treatment even though most individuals became infected, largely because of increased rates of metamorphosis. Overall we find no support for the hypothesis that chronic exposure to common, ecologically relevant challenges necessarily elevates corticosterone levels in a population or leads to more severe ranaviral disease or epidemics. Conditions may, however, conspire to make ranavirus infection more common in metamorphosing amphibians ... Predator cues were generated by feeding wood frog tadpoles to a dytiscid beetle larvae (Dytiscidae) or dragonfly larvae (families Libellulidae, Aeshnidae, and Corduliidae), each in 400 mL of water." (Authors)] Address: Brunner, J.L., School of Biol. Sciences, Washington State Univ., P.O. Box 644236, Pullman, WA, 99164, USA. E-mail: jesse.brunner@wsu.edu

**13173.** Renoult, J.P. (2013): Arrivée de la Libellule purpurine *Trithemis annulata* (De Palisot de Beauvois, 1805) dans la vallée du Rhône. *Sympetrum* 17: 81-82. (in French) [19-X-2008, camping 'La Brise' (GPS-43.4579/4.4396), Saintes-Maries de la Mer (Bouches-du-Rhône), France; one mature male and immature male and female.] Address: E-mail: jujurenoult@hotmail.com

**13174.** Röller, O.; Schotthöfer, A. (2013): Großes Ochsenauge und Großer Blaupfeil - zwei hierzulande gegenwärtig häufige Arten, die ebenso wie viele andere Arten unsere vermehrte Aufmerksamkeit verdienen. *Pollichia Kurier* 29(4): 32-35. (in German) [Rheinland-Pfalz, Germany. The phenology of *Orthetrum cancellatum* and *Libellula fulva* in the River Rhine alluvium was outlined on



the basis of citizen science data.] Address: Röller, O., c/o Pollichia, Bismarckstr. 33, 67433 Neustadt, Germany

**13175.** Roh, C.; Saxton-Fox, T.; Gharib, M. (2013): Characterization of ventilatory modes in dragonfly nymph. *Bulletin of the American Physical Society* 58(18): n.p. (in English) ["A dragonfly nymph's highly modified hindgut has multiple ventilatory modes: hyperventilation (i.e. jet propulsion), gulping ventilation (extended expiratory phase) and normal ventilation. Each mode involves dynamic manipulation of the exit diameter and pressure. To study the different fluid dynamics associated with the three modes, Anisopteran larvae of the family Aeshnidae were tethered onto a rod for flow visualization. The result showed distinct flow structures. The hyperventilation showed a highly turbulent and powerful jet that occurred at high frequency. The gulping ventilation produced a single vortex at a moderate frequency. The normal ventilation showed two distinct vortices, a low-Reynolds number vortex, followed by a high-Reynolds number vortex. Furthermore, a correlation of the formation of the vortices with the movement of the sternum showed that the dragonfly is actively controlling the timing and the speed of the vortices to have them at equal distance from the jet exit at the onset of inspiration. This behaviour prevents inspiration of the oxygen deficient expired water, resulting in the maximization of the oxygen intake." (Authors)] Address: not stated

**13176.** Ronne, C.; Blanchon, Y. (2013): Redécouverte de *Brachytron pratense* (Müller, 1764) dans le département du Var (Odonata, Anisoptera: Aeshnidae). *Martinia* 29(1): 43-45. (in French, with English summary) ["*B. pratense* has been found for the last time in the Var department at Hyeres in 1921. An exuvia of the species was found again on 29 April 2012 in Tourves. This data is the first proof of successful breeding in the department." (Authors)] Address: Ronne, Charlotte, 8, avenue des Allies, F-13360 Roquevaire, France. E-mail: charlotte.ronne@yahoo.fr

**13177.** Ruffoni, A.; Varanguin, N.; Millard, R. (2013): L'enquête *Coenagrion ornatum* (Selys in Selys et Hagen, 1850) en Bourgogne (Odonata, Zygoptera: Coenagrionidae): protocole et premiers résultats. *Martinia* 29(1): 23-41. (in French, with English summary) ["*C. ornatum* is a damselfly which is widespread in Central Europe, the Balkans and Asia Minor. The species shows a small disjunct area in Burgundy, France, from where it extends very rarely to the neighbouring departments of the Loire (Rhône-Alpes Region), Allier (Auvergne Region) and Cher (Centre Region). It turned extinct in northern Alsace, where population(s) were connected to the German ones and constituted the western limit of the continuous species range, shortly after its discovery. Its occurrence in the French northern Alps and the Jura Plateau had been claimed but remained never documented. First data from Burgundy available in 2002 remained scattered and the rarity of this species was underlined. In

2009, the new Burgundy Odonatological Group (GOB) decided to bring an important effort dealing with the distribution and the status of this species in Burgundy. This paper described the field protocol used as well as the first results." (Authors)] Address: Ruffoni, A., Société d'histoire naturelle d'Autun, Maison du Parc, F-58230 Saint-Brisson, France. E-mail: shna.ruffoni@orange.fr

**13178.** Rumpold, B.A.; Schlüter, O.K. (2013): Nutritional composition and safety aspects of edible insects. *Molecular Nutrition & Food Research* 57(5): 802-823. (in English) ["Insects, a traditional food in many parts of the world, are highly nutritious and especially rich in proteins and thus represent a potential food and protein source. A compilation of 236 nutrient compositions in addition to amino acid spectra and fatty acid compositions as well as mineral and vitamin contents of various edible insects as derived from literature is given and the risks and benefits of entomophagy are discussed. Although the data were subject to a large variation, it could be concluded that many edible insects provide satisfactorily with energy and protein, meet amino acid requirements for humans, are high in MUFA and/or PUFA, and rich in several micronutrients such as copper, iron, magnesium, manganese, phosphorous, selenium, and zinc as well as riboflavin, pantothenic acid, biotin, and in some cases folic acid. Liabilities of entomophagy include the possible content of allergenic and toxic substances as well as antinutrients and the presence of pathogens. More data are required for a thorough assessment of the nutritional potential of edible insects and proper processing and decontamination methods have to be developed to ensure food safety." (Authors) The analysis includes references to Odonata.] Address: Schlüter, O.K., Leibniz Institute for Agricultural Engineering Potsdam-Bornim, Max-Eyth-Allee 100, 14469 Potsdam, Germany. E-mail: oschlueter@atb-potsdam.de

**13179.** Ryazanova, G.I. (2013): Populational variability of wing venation in the dragonfly *Ischnura elegans* (Vander Linden, 1820). *Materials of the Fifth All-Russia Symposium on Amphibiotic and Aquatic Insects / Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences. – Yaroslavl: Filigran, 2013. – 254 pp: 156-160.* (in Russian, with English summary) ["The number of wing cells was studied in four populations of *I. elegans* in 2010–2012. It is revealed that this characteristic has significant variability both within a season and between seasons in each population. Individuals emerging early in the season have a significantly greater number of cells in the wings than those emerging at the end of the season. Interseasonal changes in the number of cells in the wings in different populations are independent in direction and degree, indicating high phenotypic mobility. The lack of stable interpopulation differences in the studied characteristic does makes it impossible to use it for assessing the degree of isolation for populations." (Author)] Address: Ryazanova, G.I.,

Biological Faculty, Moscow Lomonosov State Univ., Moscow, 119992, Russia. E-mail: ryazanovagi@mail.ru

**13180.** Sansault, E.; Baeta, R.; Présent, J. (2013): Synthèse des observations d'*Hemianax ephippiger* (Burmeister, 1839) réalisées en 2011 en région Centre (Odonata, Anisoptera: Aeshnidae). *Martinia* Hors-série, *Hemianax ephippiger* - migration 2011, mai 2013: 69-72. (in French, with English summary) [Records (imagos, exuviae) from the departments Indre-et-Loire and Indre are documented.] Address: Sansault, E., A.N.E.P.E. Caudalis, 118, rue de l'Ermitage, 37100 Tours, France. E-mail: anepe.caudalis@gmail.com

**13181.** Sato, S.; Masuma, Y.; Hasegawa, Y.; Choi, M.-K.; Kassai, H. (2013): Fundamental study on ecosystem support canal using porous concrete. *Int. J. of Geomate* 4(2): 580-584. (in English) ["This research aimed to enhance the compressive strength of porous concrete as well as to develop the porous concrete that can support and improve the ecosystem preservation by itself. Several porous concrete specimens were prepared for the measurement of mechanical properties. As a result, it was confirmed that the radius of coarse aggregate affected significantly to mechanical properties of porous concrete under the same unit weight of cement. It was also revealed that strengths at age 28 days were stable despite of different sizes of coarse aggregate. The bio-adhesive ability of porous concrete specimen was evaluated against water bugs and adhesive algae. Every porous concrete specimen was soaked in same environmental condition at the bottom of actual concrete canal. From this experiment, it was confirmed that preference environment for some specific species of water bugs are possible to be supplied when the porosity and the size of coarse aggregate would be adjusted." (Authors) Calopterygidae, Gomphidae] Address: Shushi Sato, S., Faculty of Agriculture, Kochi University, Japan

**13182.** Schmidt Furieri, K.; Santos, J.S. dos (2013): As libélulas (Odonata: Insecta) da Reserva Natural Vale. XI Congresso de Ecologia do Brasil, Setembro 2013, Porto Seguro - BA: 3 pp. (in Portuguese) [Brasil; the Odonata collection of the reserve also included *Mecistogaster amalia* and *Leptagrion dispar*.] Address: Schmidt Furieri, Karina, Universidade Federal do Espírito Santo - UFES / Instituto de Pesquisas da Mata Atlântica - IPEMA, Brail. E-mail: kfurieri@gmail.com

**13183.** Schut, D.; de Vos, M.; Rademaker, J. (2013): *Calopteryx virgo* near Winterswijk: Did a rare damselfly of streams profit from restoration measures? *Brachytron* 15(2): 102-111. (in Dutch, with English summary) ["This article describes the population trends of *C. virgo* in several streams in the Winterswijk area (Gelderland), in the Eastern part of the Netherlands. From the mid 1970s a strong decline of the species was observed. The decrease can be attributed to decreasing water quality. Since the mid 1990s the species has recovered

and has recolonised its historic distribution area. The increase can be attributed to several restoration measures, improving the ecological quality of the streams. These measures focused both on water quality and stream morphology." (Authors)] Address: Schut, D., Pieter Postplein 20, 6543 LV Nijmegen, The Netherlands. E-mail: verhipsel@gmail.com

**13184.** Seehausen, M.; Schardt, L. (2013): Die exotischen Libellen des Naturhistorischen Museums Mainz / Landessammlung für Naturkunde Rheinland-Pfalz (Insecta: Odonata). *Mainzer naturwissenschaftliches Archiv* 50: 333-342. (in German, with English summary) [The exotic Odonata in the collection of the Mainz Museum of Natural History / State Collection of Natural History of Rhineland-Palatinate were identified and revised. The records originate from Rwanda, Peru, Cuba and the Dominican Republic. *Atoconeura pseudodoxia* from Rwanda represents the first documented proof for the so far unknown easternmost distribution of this species.] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65183 Wiesbaden, Germany. E-Mail: malte.seehausen@museum-wiesbaden.de

**13185.** Sharkey, C.R.; Roberts, N.W.; Partridge, J.C. (2013): Dragonfly larval polarization sensitivity as a contrast enhancer in turbid water. *Front. Physiol. Conference Abstract: International Conference on Invertebrate Vision.* doi: 10.3389/conf.fphys.2013.25.00078: n.p. (in English) [Verbatim: A challenge faced by visual systems underwater is the presence of scattered light haze, or 'veiling light', that reduces the contrast of the scene. Light scattered underwater by sub-wavelength particles is polarized, forming a light field that is maximally polarized in a band orthogonal to the direction of the sun (Waterman, 2006). An animal able to filter out this scattered, polarized light would benefit from a greater perceived contrast, enhancing the detection of objects in an underwater scene (Rowe et al., 1995; Schechner et al., 2003). If this mechanism were present, it could potentially benefit an aquatic predator by enhancing prey detection. We compared the responses of three larval instars of dragonfly, *Anax imperator*, to moving gratings with a range of spatial frequencies, seen by the insects through turbid water under different illumination conditions. Animals were placed in an optomotor drum, with a surrounding circular tank filled with diluted milk; the grating to be tested being placed on the outside of the drum. The milky solution was illuminated from above through linear Polaroid filters with transmission axes aligned either radially or tangentially with respect to the drum, thereby creating either a weakly (10%) vertically polarized or a more strongly (30%) horizontally polarized light field, respectively. The head angles of animals, during the experiment, were measured and 'gain', the rotational velocity (degrees per second) of the animal's head was expressed as a fraction of that of the drum, used as a measure of their response. Data were

log transformed and analysed by fitting Linear Mixed Models. For all three larval instars, responses to the moving gratings were significantly stronger overall when the light field was polarized horizontally (?deviance=5.945, d.f.=1, p=0.015; Fig.1, bars represent SE) particularly at 0.09 cycles/degree. Animals responded differently to different spatial frequencies, exhibiting reduced responses at the highest and lowest frequencies tested. Responses to different spatial frequencies were dependent on instar, with response peaking at a lower frequency for earlier instars (?deviance=13.56, d.f.=6, p=0.035). The increase in response, observed when animals are in a horizontally polarized light field, may be due to a contrast-enhancing effect of polarization sensitivity, a suggestion supported by preliminary data, derived from on-going behavioural experiments. This contrast enhancing effect could increase the chance of a successful strike during hunting and increase the distance at which both predators and prey can be detected. References: Rowe, M. P., Pugh, E. N., Tyo, J. S., & Engheta, N. (1995). Polarization-difference imaging: a biologically inspired technique for observation through scattering media. *Optics letters*, 20(6), 608–610.; Schechner, Y. Y., Narasimhan, S. G., and Nayar, S. K. (2003). Polarization-based vision through haze. *Applied optics* 42, 511–525.; Waterman, T. H. (2006). Reviving a neglected celestial underwater polarization compass for aquatic animals. *Biological reviews of the Cambridge Philosophical Society* 81, 111–115.] Address: Sharkey, Camilla, The University of Bristol, Ecology of Vision Group, Bristol, BS8 1UG, United Kingdom. E-mail: cs7750@bristol.ac.uk

**13186.** Shep, H.; Konan, M.K.; Doumbia, L.; Ouattara, M.; Boussou, C.K.; Ouattara, A.; Gourène, G. (2013): Feeding relationships among *Tilapia zillii* (Gervais, 1848), *Tilapia guineensis* (Bleeker, 1862) and their hybrid in Ayamé man-made lake, Côte d'Ivoire. *Pakistan J. Zool.* 45(5): 1405-1414. (in English) ["The stomach contents of 122 specimens of *Tilapia zillii*, 121 of *Tilapia guineensis* and 227 of their hybrid were studied in Ayamé man-made lake during two years between August 1995 and September 1997 in order to analyze their diet composition and interspecific diet overlap. ... Diptera and macrophytes were the most important item in the diet of these species." (Authors) Odonata were of minor importance as food.] Address: Shep, H., Laboratoire d'Environnement et de Biologie Aquatique, Université Nangui Abrogoua, 02 BP 801 Abidjan 02, Ivory Coast

**13187.** Silina, A.E. (2013): Amphibiotic insects (Insecta) of Reservoirs of the Rovensky Nature Park. Materials of the Fifth All-Russia Symposium on Amphibiotic and Aquatic Insects / Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences. – Yaroslavl: Filigran, 2013. – 254 pp: 166-178. (in Russian, with English summary) ["Checklist and data on abundance of amphibiotic insects (Insecta), excluding Chironomidae, of the Rovensky Nature Park in Belgorod Oblast are

given. Two streams, two small rivers, the upper reaches of the Aydar River and two standing reservoirs are surveyed. A total of 169 species of amphibiotic insects from orders of Collembola, Plecoptera, Ephemeroptera, Odonata, Coleoptera, Trichoptera, Lepidoptera, Hymenoptera, Megaloptera and Diptera are recorded. Abundant and rare species are identified, and distribution of insects in the studied waterbodies is determined." (Author) The following Odonata species/taxa were listed: *Calopteryx splendens*, *C. virgo*, *Sympetma paedisca*, *Lestes dryas*, *Coenagrion hastulatum*, *C. pulchellum*, *Ischnura elegans*, *I. pumilio*, *Ischnura* sp., *Platycnemis pennipes*, *Aeshna grandis*, *A. caerulea*, *Aeshna* sp., *Anax parthenope*, *Gomphus vulgatissimus*, *Libellula fulva*, *Epitoca bimaculata*, *Sympetrum danae*, *S. striolatum*, *S. meridionale*, *S. sanguineum*, and *S. flaveolum*.] Address: Silina, A.E., Belogorye State Nature Reserve per. Monastyrsky 3, Borisovka, Belgorod Oblast, 309342, Russia. E-mail: allasilina@list.ru

**13188.** Silva-Méndez, G.; Lorenzo-Carballa, M.O.; Cordero-Rivera, A.; Watts, P.C. (2013): Microsatellite loci for two threatened dragonfly (Odonata: Anisoptera) species: *Oxygastra curtisii* (Dale, 1834) and *Macromia splendens* (Pictet, 1843). *Conservation Genetics Resources* 5(4): 1171-1174 (in English) ["Twenty one polymorphic microsatellite loci were isolated from *Macromia splendens* (n = 8 loci) and *Oxygastra curtisii* (n = 13 loci). Both species have their main distribution areas in southwestern Europe, with records in the north of Africa in the case of *O. curtisii*. *M. splendens* is listed as vulnerable by IUCN, while *O. curtisii* is regarded as near threatened. Genetic diversity was assessed in samples from the Iberian Peninsula representing two populations for each species. Number of alleles per locus ranged from 5 to 11 (*O. curtisii*) and between 4 and 16 (*M. splendens*), while mean expected heterozygosity varied between 0.118–0.745 (*O. curtisii*) and 0.130–0.849 (*M. splendens*). Five loci (four for *O. curtisii* and one for *M. splendens*) showed significant deviations ( $P < 0.05$ ) from expected Hardy–Weinberg equilibrium conditions, with the locus from *M. splendens* experiencing null alleles. These loci are currently being used to assess spatial genetic structure in these protected species." (Authors)] Address: Silva-Ménde, G. da, Evolutionary Ecology and Conservation Group, Department of Ecology and Animal Biology, Universidad de Vigo, EUE Forestal, Campus Universitario A Xunqueira s/n, 36005, Pontevedra, Spain. E-mail: genarodasilva@uvigo.es

**13189.** Simon, S.; Brugler, M.R.; DeSalle, R.; Hadrys, H. (2013): First insights in the embryonic development of the damselfly *Ischnura elegans*. 6th Dresden Meeting on Insect Phylogeny, Dresden, September 27–29, 2013. Abstracts — Oral Presentations: 21-22. (in English) [Verbatim: The new sequencing technologies have massively increased the amount of data available for comparative transcriptomics which can be used to infer insect relationships but also to study the transcriptional



signatures and dynamics of developmental processes. In addition, for *Drosophila* species it has been shown that expression divergence correlate with sequence divergence among putative orthologous genes, making comparative gene expression analyses to a useful tool in molecular phylogenetics (Zhang et al. 2007; Kalinka et al. 2010). However, transcriptomic data across developmental stages are mainly available for derived holometabolous insects, especially drosophilid dipteran species. Here, we fill in an important gap for future comparative gene expression analyses by analyzing and comparing transcriptomic data across the embryonic development of *I. elegans*. Roche 454-multiplexed transcriptomic data was generated for four time-periods (day 1–3, 4–5, 6–7, 8–9) spanning the entire embryonic lifespan. The assembled 454 reads and comparative analyses between the different embryonic stages will provide the first insights in the temporal gene expression changes during early damselfly development. In addition, highquality ds cDNA libraries for each embryonic developmental stage (day) were generated for further in-depth gene expression analyses using quantitative RT-PCR. The long-term goal of this ongoing research project is to systematically search for expression divergence between distantly related insect species, their correlation to sequence divergence (known phylogenetic relationships) and to study their role in morphological changes. References: Kalinka A.T., Varga K.M., Gerrard D.T., Preibisch S., Corcoran D.L., Jarrells J., Ohler U., Bergman C.M., Tomancak P. 2010: Gene expression divergence recapitulates the developmental hourglass model. *Nature* 468: 811–814. — Zhang Y., Sturgill D., Parisi M., Kumar S., Oliver B. 2007: Constraint and turnover in sex-biased gene expression in the genus *Drosophila*. *Nature* 450: 233–237.] Address: Simon, Sabrina, Sackler Institute for Comparative Genomics, American Museum of Natural History, New York, NY 10024, USA

**13190.** Singh, K.M.; Singh, M.P.; Kumawat, M.M.; Riba, T. (2013): Entomophagy by the tribal communities of North East India. *Indian Journal of Entomology* 75(2): 132-136. (in English) ["A survey was conducted to document the edible insects available at East Siang District, Arunachal Pradesh and Bishnupur District, Manipur, northeast India. East Siang district is predominated by the Adi tribe and Bishnupur district by the Meitei community. The two ethnic groups, viz. Adi and Meitei accept insects as their food. Most of the edible insects belong to the order Hymenoptera, Hemiptera, Orthoptera, Odonata and Coleoptera. *Philosamia ricini* is a commercialized insect species as food in Arunachal Pradesh. Based on their resources, Adis of East Siang accepted more terrestrial insects compared to Meiteis of Bishnupur. Meitei community of Bishnupur consumed more aquatic insects. One or the other species of insects are available in all the seasons, however, more species are available in the warm season. Most of the insects are consumed after processing. Some points to

be considered for encouraging these edible insects as human food are also discussed." (Authors)] Address: Singh, K.M., College of Horticulture and Forestry, Central Agricultural University, Pasighat, Arunachal Pradesh, India. E-mail: mamoento@gmail.com

**13191.** Sluvko, A.A. (2013): On the changes introduced in the Red Data Book of Astrakhan oblast: Order Odonata (Dragonflies and damselflies). Materials of the Fifth All-Russia Symposium on Amphibiotic and Aquatic Insects / Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences. — Yaroslavl: Filigran, 2013. — 254 pp: 182-186. (in Russian, with English summary) [Russia; "The Red Data Book of the Astrakhan region is the official register of the state of rare and endangered species of the flora and fauna of Astrakhan Oblast. The first edition of the Red Data Book of Astrakhan Oblast was published in 2004. The second edition is currently in preparation. Work on the inventory of the dragonfly fauna and subsequent assessment of this fauna resulted in improvements of the checklist of species. Analysis of the data allowed to petition the commission on rare and endangered species of animals, wild plants and fungi of Astrakhan Oblast for including four dragonfly species with local distribution in Astrakhan Oblast into the Red Data Book of Astrakhan Oblast." (Author) *Onychogomphus forcipatus*, *Erythromma najas*, *Sympetrum pedemontanum*, and *S. danae* were detailed.] Address: Sluvko, A.A., Federal Service for Veterinary and Phytosanitary Surveillance (Astrakhan Oblast Department) ul. Admiralteyskaya 51, Astrakhan, 414040, Russia. E-mail: asluvko@mail.ru

**13192.** Smirnova, D.A.; Sklyarova, O.N.; Epova, Y.V. (2013): The amphibiotic insect fauna of the Tengiz-Korgalzhyn lake system (Kazakhstan) in 2012. Materials of the Fifth All-Russia Symposium on Amphibiotic and Aquatic Insects / Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences. — Yaroslavl: Filigran, 2013. — 254 pp: 187-189. (in Russian, with English summary) ["The amphibiotic insect fauna of the Tengiz-Korgalzhyn lake system (n = 10 lakes studied) was represented in 2012 by 56 species and taxa not identified to species. Chironomids were the most diverse group. It is noted that amphibiotic insect diversity depended on water salinity." (Authors) The single Odonata species listed was *Sympecma paedisca* from lake Bozaral.] Address: Smirnova, D.A., Kazakhstan Agency of Applied Ecology ul. Zvereva 47, Almaty, 050010, Kazakhstan. E-mail: d.smirnova@kape.kz

**13193.** Soboleva, V.A.; Golub, V.B. (2013): On the dragonfly and damselfly diversity (Insecta: Odonata) of the Tellerman Forest in Voronezh Oblast. Materials of the Fifth All-Russia Symposium on Amphibiotic and Aquatic Insects / Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences. — Yaroslavl: Filigran, 2013. — 254 pp: 189-195. (in Russian, with English summary) [Russia "A total of 18 species of 15 genera

and eight families of dragonflies are recorded from materials collected in August 2011 and May and June 2012 in the Tellerman upland oak forest (Voronezh Oblast). *Aeshna mixta* (Aeshnidae) is reported from Voronezh Oblast for the first time. *Sympetma paedisca* and *Stylurus flavipes*, species on the European Red List, and *Anax imperator* and *Calopteryx virgo*, included in the Red Data Book of Voronezh Oblast, are recorded in the forest. The basis of the zoogeographical structure of the dragonfly fauna of extreme eastern Central Russian Forest-Steppe is formed by species that have trans-Palaeartic and western Palearctic ranges occupying temperate latitudes." (Authors)] Address: Soboleva, V.A., Voronezh State University Universitetskaya pl. 1, Voronezh, 394006, Russia. E-mail: strekozavr@bk.ru

**13194.** Speh, E.; Lamy, A.-M. (2013): Découverte de *Gomphus graslinii* Rambur, 1842 dans le département du Cher, France (Odonata, Anisoptera, Gomphidae). *Martinia* 29(1): 47-48. (in French) [29 vi 2012, a female *G. graslinii*, was observed app 3.5 km away from the river Amon, Saint-Hilaire-en-Lignières, département Cher, France.] Address: Speh, Emmanuelle, Conservatoire d'espaces naturels de la région Centre, Antenne Cher/Indre, 16 rue du Bas-de-Grange, F-18100, Vierzon, France. E-mail: emmanuelle.speh@cen-centre.org

**13195.** Stanford, B.; Albertani, R.; Lacore, D.; Parker, G. (2013): Proper orthogonal decomposition of flexible clap and fling elastic motions via high-speed deformation measurements. *Experimental Mechanics* 53(7): 1127-1141. (in English) ["Many complex unsteady mechanisms are thought to facilitate the high efficiency and agility commonly observed in small biological flyers. One of these, the flexible clap and fling maneuver, has not been extensively studied; an experimental characterization is the focus of this work. The clap-fling mechanism is approximated with a single flexible membrane flapping wing, replacing the symmetry plane between two wings with a splitter plate simulating the pair wing. This produces a complex vibro-impact aeroelastic problem, the deformation resulting from which is measured with a high-speed visual image correlation system. A low-dimensional representation of the ensuing large data set is obtained with proper orthogonal decomposition. The POD modes, and the relative importance of each, can help elucidate crucial mechanisms and relationships within the flapping system, and are computed for various membrane wing structures and flapping frequencies, with or without the presence of the splitter plate." (Authors) The paper includes references to Odonata] Address: Albertani, R., U.S. Air Force Research Lab., Wright-Patterson AFB, OH, 45433, USA. E-mail: roberto.albertani@oregonstate.edu

**13196.** Sumanapala, A.P.; Bedjanic, M. (2013): Rediscovery of a long lost endemic damselfly *Sinhalestes orientalis* (Hagen in Selys, 1862) from Peak Wilderness Sanctuary, Sri Lanka (Zygoptera: Lestidae). *Asian Journal of Conservation Biology* 2(1): 44-47. (in English) ["S.

*orientalis* the only representative of its genus, is an endemic and globally critically endangered damselfly in Sri Lanka. It was first collected from Rambodde, Sri Lanka in 1858 and after that no new information on this species has been available. Here, we report on the re-discovery of *S. orientalis* from the Peak Wilderness Sanctuary, Sri Lanka after 154 years from its last and only record." (Authors)] Address: Sumanapala, A.P., Young Biologists' Association, Institute of Biology, 120/10, Vidya Mawatha, Colombo 7, Sri Lanka. E-mail: apsumanapala@gmail.com

**13197.** Tennessen, K.J.; Valley, S.A. (2013): New records for *Gomphus lynnae* Paulson (Odonata: Gomphidae), with a description of the nymph. *Proc. Ent. Soc. Washington* 115(4): 333-341. (in English) ["*Gomphus* (*Gomphurus*) *lynnae* Paulson, known from only a few localities in the states of Washington and Oregon, U.S.A., is reported from 10 localities in a 260 km stretch of the John Day River in Gilliam, Grant, Sherman, and Wheeler counties and a 59 km stretch of the Owyhee River in Malheur County, Oregon, all within the Columbia River watershed. We collected adults, nymphs and exuviae from several localities and two nymphs were associated with adults. Nymphs of this rare species have not been fully characterized. The nymph is described and illustrated; its closest congener is *G. externus* Hagen, from which it is distinguished by the lack of a distinct posterolateral spine on abdominal segment 6, shorter posterolateral spine on abdominal segment 9, and the presence of only two or three denticles, sometimes lacking, on the lateral margins of abdominal segment 8. Nymphs of *G. lynnae* occupy substrates of mixed sand and silt in riffle/run areas of large, slow flowing rivers." (Authors)] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**13198.** Tennessen, K.J.; Krotzer, R.S. (2013): Description of the last stadium nymph of *Leptobasis lucifer* (Odonata: Coenagrionidae). *Proc. Ent. Soc. Washington* 115 (2): 182-188. (in English) ["Nymphs of *L. lucifer* were collected in shallow water in a cypress (*Taxodium distichum* (Linnaeus) Richard (Taxodiaceae)) dome in southern Florida. They differ from *L. vacillans*, the only *Leptobasis* species previously described, by ratio of length of antennomere 2 to antennomere 1 (1.6 in *L. lucifer*, 1.4 in *L. vacillans*), cercus length (0.13–0.17 mm in *L. lucifer*, 0.08–0.13 mm in *L. vacillans*), and length—width ratio of caudal lamellae (> 4.0 in *L. lucifer*, < 4.0 in *L. vacillans*). *Leptobasis* is most similar to *Ischnura* Charpentier and *Enallagma* Charpentier; a combination of characters, including head width and the arrangement of setal bases on the lateral carinae of the abdominal segments, is necessary to separate these genera." (Authors)] Address: Krotzer, R.S., 2238 Haysop Church Road, Centreville, Alabama 35042, USA. E-mail: rskrotze@southernco.com

**13199.** Ternois, V. (2013): Premières mentions d'*Hemianax ephippiger* (Burmeister, 1839) pour la Champag-

ne-Ardenne (Odonata, Anisoptera: Aeshnidae). *Martinia Hors-série*, *Hemianax ephippiger* - migration 2011, mai 2013: 51-54. (in French, with English summary) ["*H. ephippiger* has been observed for the first time in the Champagne-Ardenne région during its mass migration in 2011. All data recorded in the region (n = 8) are dealt with." (Authors)] Address: Ternois, V., Société française d'Odonatologie (Champagne-Ardenne) s/c CPIE du Pays de Soulaïnes, Domaine de Saint-Victor, 10200 Soulaïnes-Dhuys, France. E-mail: cpie.vincent.temois@wanadoo.fr

**13200.** Thuyet, D.Q.; Watanabe, H.; Motobayashi, T.; Ok, J. (2013): Behavior of nursery-box-applied fipronil and its sulfone metabolite in rice paddy fields. *Agriculture, Ecosystems & Environment* 179(1): 69-77. (in English) ["Highlights: • Behaviour of insecticide fipronil in paddy environment was examined. • Fipronil concentrations in paddy water were different depending on the treatment. • Fipronil indicated half-lives less than 3.1 days in water and 26.4 days in soil. • Concentrations in root zone were about 10 times higher than in the inter-row zone. • Toxic metabolite fipronil sulfone was found in every water and soil samples. The granular insecticide fipronil has been widely applied in rice nursery boxes, both before transplanting (BT) and during at-sowing (AS) treatments to control insect pests at the early stages of rice cultivation in Japan. Although a potential effect of fipronil on paddy ecosystems and downstream aquatic environments has been observed, the environmental effect of this substance in paddy fields remains unsought. Here we investigate the environmental behaviour of nursery-box-applied granular fipronil and its sulfone metabolite in paddy water and paddy soils during BT and AS treatments performed in a paddy field in Japan. Although the fipronil concentrations in the paddy water in the AS treatment were significantly lower than those measured in the BT treatment, no significant differences were observed in the paddy soil between the two treatments. Fipronil was mainly found in the 0- to 5-cm surface soil layer of the rice-root zone, where its concentrations were approximately ten times higher than those in the soil of the inter-row zone. The insecticide concentration in the 0- to 1-cm layer of the inter-row zone in the surface soil was approximately 2.5 times higher than that in the 0- to 5-cm layer. The maximum concentrations of fipronil in the 0- to 1-cm surface soil layer ranged from 65.8 to 92.1 µg/kg on the first day after rice transplanting (DAT), and the corresponding values in the paddy water ranged from 0.9 to 2.5 µg/L. The dissipation of fipronil from the paddy water and paddy soil was described by first-order kinetics. The compound's half-life (DT50) was 0.9–3.1 days in paddy water and 12.3–26.4 days in paddy soil. Compared to the BT treatment, the AS treatment may pose a smaller risk to the paddy water and the adjacent environment. Fipronil sulfone was found in every water and soil sample, with the maximum concentrations ranging from 0.4 to 0.9 µg/L in the paddy water and from 9.7 to

59.2 µg/kg in the paddy soil on the third DAT. These values gradually decreased over time. Ecotoxicological risk assessments of fipronil products in rice paddies should not only consider the toxicity of fipronil itself but also that of fipronil sulfone because of its relatively high concentrations in paddy water and paddy soil. ...The studies of the environmental impact of fipronil on paddy fields suggest that the dragonfly (*Sympetrum* species) population has rapidly decreased since 1989, and that the observed reduction was positively correlated with the increased use of nursery-box-applied fipronil ..."] (Authors)] Address: Motobayashi, T., Tokyo University of Agriculture and Technology, 3-5-8, Saiwaicho, Fuchu, Tokyo 183-8509, Japan. E-mail: pochi@cc.tuat.ac.jp

**13201.** Touron-Poncet, H.; Bernadet, C.; Compin, A.; Bargier, N.; Céréghino, R. (2013): River classification as the basis for freshwater biological assessment in overseas Europe: Issues raised from Guadeloupe (French Lesser Antilles). *International Review of Hydrobiology* 98: 34-43. (in English) ["Over the past decade, Europe's Water Framework Directive (WFD) has prompted a large amount of ecological research aiming at establishing river typologies and ecological indicators in member States. Yet, the lack of robust bioindicators in Europe's overseas regions arguably reflects minimal knowledge of the distribution patterns of aquatic species in the Community's outermost areas. Specifically, there has been no published classification of rivers for any European overseas region. 51 sites were sampled for benthic invertebrates and environmental variables (land-cover, physical habitat, and water chemistry) in Guadeloupe, French Lesser Antilles. Redundancy analysis and k-means clustering were used to bring out spatial patterns in species composition in relation to environmental conditions. Our results highlighted the importance of land cover and geomorphology in delineating three ecological sub-regions (clusters) for freshwater invertebrates. Deviation from predictable community structure only occurred when river sites were subjected to harsh water chemistry alterations (urban runoff, wastewaters). Changes in species richness did not detect environmental stress efficiently within a given sub-region, probably because most sites are naturally species-poor due to the insular context and/or because disturbance is often weak. However, differences existed between clusters in terms of species identity and numerical dominance. Our a posteriori typology of sites was compared to local a priori expert opinion of river health, in an attempt to better characterize the network of survey sites, and to target sites for reference conditions." (Authors) Odonata in this study were represented by *Argia concinna*, *Enallagma coecum*, *Ischnura ramburii*, *Libellulidae* *Brechmorhoga*, *Macrothemis celeno*, and unidentified taxa.] Address: Céréghino, R., UPS EcoLab Univ. Toulouse, 118 Route de Narbonne, 31062 Toulouse Cedex 9, France. E-mail: regis.cereghino@univ-tlse3.fr

**13202.** Tummylovich, O.A. (2013): Interannual dynamics of the species composition and relative abundance of dra-



gonflies in one of the ponds of Kaliningrad. Materials of the Fifth All-Russia Symposium on Amphibiotic and Aquatic Insects / Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences. – Yaroslavl: Filigran, 2013. – 254 pp: 214-218. (in Russian, with English summary) ["Dragonfly larvae and changes in anthropogenic pressure on the ecosystem were monitored for 4 years (2005–2007) in one of the ponds of Kaliningrad. In 2004, the pond had virtually no anthropogenic pressure, and it was inhabited by seven species of dragonflies (*Libellula quadrimaculata*, *L. depressa* Enallagma cyathigerum, *Coenagrion hastulatum*, *C. pulchellum*, *Ischnura elegans*, and *Aeshna grandis*). Anthropogenic influence increased during the period of study, leading to degradation of aquatic vegetation, soil pollution, and disruption of the shoreline due to the increased recreational pressure. This was accompanied by a decrease in the occurrence frequency of all dragonfly species and average number of larvae per sample (from 2.71 to 0.31 individuals), and the gradual disappearance of six species. In 2007, only *L. quadrimaculata* remained in the pond, the most widespread and abundant species, not only in Kaliningrad Oblast, but throughout Russia and Europe." (Author)] Address: Tummylovich, O.A., Kaliningrad State Technical University Sovetsky prosp. 2, Kaliningrad, 236000, Russia. E-mail: levente@rambler.ru

**13203.** Valk, van der, R. (2013): Calculation of the maturation period of the Black Darter (*Sympetrum danae*). *Brachytron* 15(2): 128-132. (in Dutch, with English summary) ["The maturation period of *S. danae* was studied over a period of three years and calculated using the statistical model that Underhill & Zuchinni (1986) used to describe primary moult in birds. The development of the pterostigma colour was used as a measure for maturation. During the maturation period the pterostigma colour changes from white to intense black. To visualize this process the stages of the maturation were estimated in the field as follows: • stage "fresh": the colour of the pterostigma is practically white and the body is more or less pale; • stage "immature": the colour of the pterostigma is not white anymore but also not completely dark; • stage "mature": the colour of the pterostigma is black. In this manner the number of dragonflies in each stage is counted. As a result of this model the duration  $t$  in days of the maturation period (stage "immature") can be calculated. In addition two other parameters are calculated i.e. the mean starting date  $\mu$  and the standard deviation  $\sigma$  of the starting dates. In this model it is assumed that the starting dates have a Gaussian distribution  $N[\mu, \sigma]$ . These parameters were calculated using a computer programme. The duration of the maturation period in the year 2007 stands out with respect to the year 2006. 2005 appeared to be a more average year. The duration of the maturation period of *S. danae* appears to depend strongly on weather conditions (Table 2). In 2005 the duration of the maturation period was seventeen days, which is in ac-

cordance with the duration mentioned in Nederlandse Vereniging voor Libellenstudie (2002). In years with more extreme weather conditions the duration of the maturation period may differ by as much as a factor three." (Author)] Address: Valk, van der, R., J. Buiskoolweg 10A, 9695 TT Bellingwolde, The Netherlands. E-mail: valk0078@kpnmail.nl

**13204.** Vassilenko, D.V. (2013): Dragonflies of the family Kennedyidae Tillyard, 1925 (Insecta: Odonata) in Permian odonatofaunas. Materials of the Fifth All-Russia Symposium on Amphibiotic and Aquatic Insects / Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences. – Yaroslavl: Filigran, 2013. – 254 pp: 32-35. (in Russian, with English summary) ["Kennedyid dragonflies are a group of protozopterans specialized on living among dense vegetation. The fossil record of Kennedyidae is extremely incomplete. Members of this family are invariably scant and rather uniform in Permian deposits, which is explained by their mode of life and low probability of their fossilization under typical sedimentation conditions. Owing to the fossil site Isady, which gives an idea of the fauna of a small waterbody and its environs, it has been shown that Kennedyids played a very important role in such biotopes. The actual taxonomic diversity of the family was considerably higher than documented, not only because of the incompleteness of the fossil record, but also because of wing venation reduction, which results in low variation of venation even at the level of genera, and thus in underestimations of the number of identifiable species." (Author)] Address: Vassilenko, D.V., Borisiak Palaeontological Institute. Russian Academy of Sciences ul. Profsoyuznaya 123, Moscow, 117997, Russia. E-mail: lab@palaeoentomolog.ru

**13205.** Venkatesh, A.; Tyagi, B.K. (2013): Predatory potential of *Bradinopyga geminata* and *Ceragrion coromandelianum* larvae on dengue vector *Aedes aegypti* under controlled conditions (Anisoptera: Libellulidae; Zygoptera: Coenagrionidae; Diptera: Culicidae). *Odonatologica* 42(2): 139-149. (in English) ["The predatory potential of *B. geminata* and *C. coromandelianum* larvae on *Aedes aegypti* larvae was investigated under laboratory condition with a view to screening these predators for use in the control of *Ae. aegypti* breeding in dengue prone areas. The feeding rate of 8th instar *B. geminata* on *Ae. aegypti* showed maximum predation on 1st instar larvae (86%), followed by 2nd, 3rd and 4th instars (72%, 66% and 48%), respectively. In the first hour, the consumption rate was maximal for all instars and a low intake (about 5%) was observed in subsequent hours. In 12th instar *B. geminata* larvae maximum predation was observed for the 1st and 2nd instar larvae (98%) of *Ae. aegypti*, followed by 3rd and 4th instars (92% and 78%), respectively. The feeding rate of 12th instar *C. coromandelianum* larvae on *Ae. aegypti* larvae showed that the maximum predation was of the 1st instar larvae (82%), followed by 2nd, 3rd and 4th in-

stars (51%, 35% and 24%) respectively. The first hour consumption rate was maximum for all instars and no significant intake was seen in the following hours. The predation of *Aedes* larvae by the 2 spp. of odonate larvae was compared for the 4 mosquito larval instars by using one way ANOVA. No significant difference was found between them for 1st instar larvae of *Ae. aegypti* but there was a significant difference ( $P < 0.05$ ) in predation on the other 3 instars, with *B. geminata* consuming more mosquito larvae. A single anisopteran larva is sufficient for eliminating the huge mass of larval mosquitoes breeding in a cement tank or a cement cistern. Therefore, this biological control agent could be released to control *Aedes* larval production in areas of dengue epidemics." (Authors)] Address: Tyagi, B.K., Centre for Research in Medical Entomology, Indian Council of Medical Research, 4 Sarojini Street, Chinna Chokkikulam, Madurai-625 002, Tamil Nadu, India. E-mail: bktyagi@sify.com

**13206.** Walker, B. (2013): Some observations on the effect of temperature on dragonfly recording. *J. Br. Dragonfly Society* 29(2): 84-96. (in English) ["The British Trust for Ornithology added odonates to the species that contributors are asked to record from 2011. Records for the first two years of dragonfly records from this scheme have been analysed and indicate a marked difference in observations in the spring between 2011 and 2012. Spring 2011 was warmer than the recent average and noticeably warmer than in 2012 and dragonflies were recorded earlier in numbers in 2011 than in 2012. Based on a comparison of the records and the average weekly temperatures a correction factor is proposed to account for reduced dragonfly activity when temperatures are lower and it is suggested that this can explain some fluctuations in the raw data. It is also noted that the reduction in records from their peak can be described by a daily survival rate approach." (Author)] Address: Walker, B., 49 Roman Way, Wantage, Oxon OX12 9YF, UK

**13207.** Wang, C.-x.; Yu, W.-Y.; Li, Z.-h.; Cai, Y.; Ren, Y.-h.; Liu, Y. (2013): Study on fauna and diversity of Odonata in Yuntai mountain, Jiangsu Province. *Hubei Agricultural Sciences* 52(8): 1821-1832. (in Chinese, with English summary) [41 species were recorded between 2000 and 2010. The records were analysed according biogeographical regions.] Address: Wang, C.-x., Biochemical and Environmental Engineering college, Nanjing Xiaozhuang University, Nanjing 211171, China

**13208.** Warren, J.M.B. (2013): An assessment of benthic macroinvertebrate communities from three wadeable streams in central Texas. *Water Quality Technical Series Publication WQTS-2013-01. PWD PWD RP V3400-1784.* Texas Parks and Wildlife Department, Austin, TX: V + 16 pp. (in English) ["Benthic macroinvertebrates were collected and identified from three streams in the middle Brazos River Basin as a vehicle

for a biologist to gain experience in study design and working with an unfamiliar taxonomic group. The three streams selected for the study were among the few streams that continued to flow in the middle Brazos River Basin during an extreme drought in 2011. The sample sites were the Leon River at FM 1829, Salado Creek at Pace Park in Salado and Tehuacana Creek upstream of FM 2491. All three streams shared similar substrate and cover at the sample sites. Benthic macroinvertebrates were collected from riffles dominated by cobble, algae and leaf debris. Flow varied among the three streams, ranging from 1.0 ft<sup>3</sup>/s at Tehuacana Creek to 6.6 ft<sup>3</sup>/s at Salado Creek. Instantaneous physicochemical data varied among the three streams as well. Benthic macroinvertebrate taxa were most numerous at Salado Creek with 29 collected. Tehuacana Creek and Leon River taxa were 19 and 15, respectively. Numbers and types of individuals collected from each creek translated into an aquatic life use (ALU) scores that are the sum of 12 individual metrics. Salado Creek's ALU ranked high (score = 37), the Leon River scored intermediate (26), and Tehuacana Creek scored intermediate (28). Data results agreed with field observations and instantaneous physico-chemical data, and the study challenged the novice benthic macroinvertebrate taxonomist." (Authors) The list of taxa includes *Argia*, *Enallagma*, *Erpetogomphus*, and *Libellula*.] Address: Bronson Warren, Jennifer M., Water Resources Branch, Texas Parks and Wildlife Department, 4200 Smith School Road, Austin, Texas 78744, USA

**13209.** Wasserberg, G.; White, L.; Bullard, A.; King, J.; Maxwell, R. (2013): Oviposition site selection in *Aedes albopictus* (Diptera: Culicidae): Are the effects of predation risk and food level independent? *Journal of Medical Entomology* 50(5): 1159-1164. (in English) ["For organisms lacking parental care and where larval dispersal is limited, oviposition site selection decisions are critical fitness-enhancing choices. However, studies usually do not consider the interdependence of the two. In this study, we evaluated the effect of food level on the oviposition behaviour of *Aedes albopictus* (Skuse) in the presence or the absence of a nonlethal predator (caged dragonfly nymph). We also attempted to quantify the perceived cost of predation to ovipositioning mosquitoes. Mosquitoes were presented with oviposition cups containing four levels of larval food (fermented leaf infusion) with or without a caged libellulid nymph. By titrating larval food, we estimated the amount of food needed to attract the female mosquito to oviposit in the riskier habitat. As expected, oviposition rate increased with food level and decreased in the presence of a predator. However, the effect of food level did not differ between predator treatments. By calculating the difference in the amount of food for points of equal oviposition rate in the predator-present and predator-absent regression lines, we estimated the cost of predation risk to be 1950 colony-forming-units per millilitre. Our study demonstrated the importance of considering the possi-

ble interdependence of predation risk and food abundance for oviposition-site-seeking insects. This study also quantified the perceived cost of predation and found it to be relatively low, a fact with positive implications for biological control." (Authors)] Address: not available

**13210.** Weihrauch, F.; Erfurth, L. (2013): He who is too slow is punished by life: *Calopteryx virgo* (L.) entangled by the tendril of a vetch during emergence (Zygoptera: Calopterygidae). *Odonatologica* 42(3): 253-256. (in English) ["At a rivulet in the western fringe area of Munich, Germany, an immature male was photographed with its right forewing tightly entwined around by the tendril of a vetch. Obviously the tendril had entangled the not yet unfolded wing briefly after emergence. The living insect was unable to escape from its bonds. This is only the third published case of a biotic interaction of this type." (Authors)] Address: Weihrauch, F., Jägerstr. 21A, 85283 Wolnzach, Germany. E-mail: Florian.Weihrauch@t-online.de

**13211.** Więcek, M.; Martin, P.; Gąbka, M. (2013): Distribution patterns and environmental correlates of water mites (Hydrachnidia, Acari) in peatland microhabitats. *Exp. Appl. Acarol.* 61: 147-160. (in English) ["In Europe peatlands are wetlands of postglacial origin. Because of climatic changes and agricultural activities (i.e. drainage and peat extraction), they are one of the most endangered ecosystems worldwide. Water mites are well known as indicators of changing environments in other ecosystems such as springs and lakes. For our study we selected seven peatlands located in North-Western Poland and focused on water mite distribution and associated habitat and water quality variables. We described water mite fauna in various microhabitats (aquatic and semiaquatic) along the mineral-richness gradient to test whether this gradient is reflected in the composition of water mite assemblages. We selected conductivity, pH and vegetation as variables reflecting the poor-rich gradient. Additionally, we measured water depth, temperature and dissolved oxygen, which are often important parameters for water mites. We also noted presence of prey and host taxa of particular water mite species. Based on physicochemical parameters we identified three types of habitats harbouring three distinctive species groups of water mites. We were able to distinguish species that appear to be typical of spring fens (e.g. *Hygrobates norvegicus*, *Lebertia separata*), connected with acidic, nutrient poor pools (e.g. *Arrenurus neumani*, *A. pustulator*) and species seemingly typical of temporary habitats dominated by *Sphagnum* mosses (e.g. *Piersigia intermedia*, *Zschokkea oblonga*, *A. stecki*). The poor-rich gradient is strongly reflected in the composition of water mite assemblages. We also found strong correlations between the water mite fauna and both conductivity and pH gradient. Our results show that water conductivity is the most important of the examined factors, driving mite-species distribution in peat-

lands." (Authors) The paper includes many references to Odonata.] Address: Więcek, M., Dept of Animal Morphology, Faculty of Biology, Adam Mickiewicz University, Umultowska 89, 61-614 Poznań, Poland. E-mail: roztoc@wp.pl

**13212.** Wildermuth, H. (2013): Buchbesprechungen: Karjalainen S. & M. Hämäläinen 2013. *Demoiselle Damselflies – Winged Jewels of Silvery Streams*. *Entomo Helvetica* 6: 198. (in German) [The review introduces into the wonderful book on the Calopterygoidea.] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**13213.** Wildermuth, H. (2013): SAGLS-Exkursion 2012 im Ronfeld am Baldeggersee. *Entomo Helvetica* 6: 190-191. (in German) [The 'Schweizerische Arbeitsgemeinschaft für Libellenschutz' (SAGLS) realised an excursion to the Baldeggersee region, Kanton Luzern, Switzerland. Most interesting species recorded were *Orthetrum albistylum*, *Sympetrum depressiusculum*, and *Anax parthenope*. For more details on the region see: <http://www.pronatura-lu.ch/ronfeld.php>.] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**13214.** Wildermuth, H. (2013): Natur- und Fotoreise zu den Heuschrecken Südfrankreichs. *Entomo Helvetica* 6: 192-195. (in German) [This extensive orthopterological report on a journey to southern France, includes some odonatological notes: records of Odonata from the Canal de Vergière, Crau, and Marais du Vigueirat, Camargue, Département Bouches-du-Rhône, as well as the river Hérault.] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**13215.** Wu, X.; Li, F.; Cong, R.; Chu, B. (2013): Preliminary Analysis on Feeding Habits of *Megalurus pryeri* in Nanji Wetland, Jiangxi. *Sichuan Journal of Zoology*: 438-441. (in Chinese, with English summary) ["The feeding habits and food composition of marsh grassbird *Megalurus pryeri* in Nanji Wetland National Nature Reserve (Jiangxi province) were investigated during breeding season (April, 2011) and non-breeding season (November, 2011). The brood behaviour of parent birds was observed by using binoculars and cameras in breeding season, and the stomach contents of 7 dead individuals collected from bird banding in non-breeding season were examined also. The results showed that the marsh grassbird mainly eat arthropods including dragonfly insects, spiders, imago or larva of *Grillotapidae* (mole crickets) and *Lepidoptera* insects in breeding season. While the diet was made up of both arthropods (70.24%) and vegetation (29.76%) such as *Orthoptera*, *Coleoptera*, *Odonata*, *Lepidoptera* insects, spiders and seeds, foliage in non-breeding season. In conclusion, the feeding habits of mash grassbird are different in breeding and non-breeding season, and this difference is due to seasonal changing of food composition in the



habitats and that the nestlings need higher protein nutrition food." (Authors) Odonata contributed with 8.36% to the diet.] Address: Li, F., College of Wildlife Resources, Northeast Forestry University, Harbin 150040, China. E-mail: lifeng604@163.com

**13216.** Xu, Q.-h. (2013): Descriptions of the final stadium larva and female adult of *Coeliccia mingxiensis* Xu (Odonata: Zygoptera: Platycnemididae). *Zootaxa* 3721 (1): 92-96. (in English) ["The final stadium larva of *C. mingxiensis* is described and illustrated. The female adult is also described for the first time. The larva can be easily separated from all known *Coeliccia* larvae by the following distinct morphological characters: (1) prementum longest in all known *Coeliccia* larvae; median lobe with 4 pairs of premental setae and palpal lobe with 6 palpal setae; (2) caudal gills shortest of all known *Coeliccia* larvae when compared with body length; median gill rounded at apex and lateral gill with a small median projection at apex. The female is similar to the male in many respects, differing chiefly in several respects as follows: the transverse yellow band on vertex of head broader and straighter than in male; antehumeral stripe on mesepisternum somewhat incurved basally, not forming a strong hook, which is present in male; distal abdomen with obviously different colour pattern; anal appendages brownish-black, shorter than S10; vulvar scales robust, brownish-yellow, projecting well beyond end of abdomen." (Author)] Address: Xu, Q.-h., Department of Garden and Horticulture, Zhangzhou City University, Zhangzhou, Fujian 363000, China. E-mail: qhx363000@gmail.com

**13217.** Yapo, L.M.; Atsé, C.B.; Kouassi, P. (2013): Composition, abundance and diversity of aquatic insects in fishponds of southern Ivory Coast, West Africa. *Entomologie Faunistique – Faunistic Entomology* 66: 123-133. (in English, with French summary) ["Abundance, density, biomass, and diversity of aquatic insects collected in water column from fishponds in southern Ivory Coast were studied. Monthly samplings have been conducted from December 2007 to November 2008. A total of 27,381 individuals belonging to 64 taxa, 25 families and 6 orders (Ephemeroptera, Odonata, Hemiptera, Lepidoptera, Coleoptera, and Diptera) were collected. Among these six orders, Hemipterans dominated quantitatively and qualitatively aquatic insect's community structure. The most abundant species were *Anisops sardea* Kirkaldy 1904 (64.17%), *Plea pullula* Stål 1855 (5.87%), *Eurymetra* sp. (3.87%), *Amphiops* sp. (3.79%), *Mesovelgia* sp. (3.41%) and *Cloeon bellum* Navas 1931 (2.21%). A spatiotemporal variation was observed for the different recorded parameters (density, biomass, and diversity). The maximum abundance, density, and biomass were recorded during the rainy season in the station of Layo. The Shannon-Weaver index indicated that the highest diversity of aquatic insects was obtained during the rainy season in the stations of Banco, Anyama I and Anyama II. In contrast, evenness reached

maximum values during the dry season in the stations of Layo, and Banco. Local environmental conditions (i.e. temperature, dissolved oxygen, pH, transparency, conductivity, ammonium, nitrite and phosphorus) accounted for 91.70% of variation in aquatic insect assemblages using canonical correspondence analysis (CCA). Seasonal trends in aquatic insect community composition were also related to changes in environmental characteristics of the fishponds." (Authors)] Address: Atsé, C.B., Département Aquaculture, Centre de Recherches Océanologiques (CRO), BPV 18 Abidjan, Côte d'Ivoire. E-mail: atsebouacelestin@hotmail.com

**13218.** Youprom, P.; Panich-Pat, T.; Prommi, T.-O. (2013): Aquatic insect communities and water quality in wetland, northern Thailand. *Journal of Applied Sciences in Environmental Sanitation* 8(3): 161-169. (in English) [Nong Leng Sai wetland is situated in the north of the town of Phayao, Mae Chai District, Phayao Province. Aquatic insects were monthly collected from January to August 2009. The Hemiptera had the highest abundance with 43.34% of the total specimens, followed by Odonata (19.66%). Taxa are treated at the family level.] Address: Youprom, P., Faculty of Liberal Arts and Science, Kasetsart University, Kamphaeng Saen Campus, Nakhon Pathom, Thailand. E-mail: faastop@ku.ac.th

**13219.** Zhang, H.; Cai, Q.; Liao, M. (2013): Three new *Cephalaeschna* species from central China with descriptions of the hitherto unknown sex of related species (Odonata: Aeshnidae). *International Journal of Odonatology* 16(2): 157-176. (in English) ["Three new *Cephalaeschna* species, *C. discolor* sp. nov. (holotype male; Shennongjia National Nature Reserve, Shennongjia City, Hubei province, China, 16 August 2012), *C. mattii* sp. nov. (holotype male; Lujiahe River, Zigui County, Hubei province, China, 18 September 2012) and *C. solitaria* sp. nov. (holotype male; Dalongtan in Shennongjia National Nature Reserve, Shennongjia City, Hubei province, China, 19 July 2012) are described, illustrated in colour and compared with the known Chinese *Cephalaeschna*. All the holotypes are deposited in the Collection of Aquatic Animals, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan City, Hubei Province, China. The hitherto unknown male of *C. obversa* and female of *C. patrum* are also described and illustrated. Brief notes on biology of each species are also provided." (Authors)] Address: Zhang, H., Department of Entomology, College of Natural Resources and Environment, South China Agricultural University, Guangzhou 510642, China. E-mail: zhanghaomiao6988@gmail.com

**13220.** Zhu, R.; Ayodeji Bode-Oke, A.; Yan Ren, Y.; Dong, H. (2013): Analysis of dragonfly take-off mechanism: Initial impulse generated by aerodynamic forces. *Bulletin of the American Physical Society* 58(18): o.p. ["Take-off is a critical part of insect flight due to not only that every single flight initiates from take-off, but also that the take-off period, despite its short duration, ac-

counts for a relatively large fraction of the total energy consumption. Thus, studying the mechanism of insect take-off will help to improve the design of Micro Air Vehicles (MAVs) in two major properties, the success rate and the energy efficiency of take-off. In this work, we study 20 cases in which dragonflies (species including *Pachydiplax longipennis*, *Epitheca cynosura*, *E. princeps* etc.) take off from designed platform. By high-speed photogrammetry, 3-d reconstruction and numerical simulation, we explore how dragonflies coordinate different body parts to help take-off. We evaluate how aerodynamic forces generated by wing flapping create the initial impulse, and how these forces help save energy consumption." (Authors)] Address: not stated

**13221.** Živić, I.; Živić, M.; Milošević, D.; Bjelanović, K.; Stanojlović, S.; Daljević, R.; Marković, Z. (2013): The effects of geothermal water inflow on longitudinal changes in benthic macroinvertebrate community composition of a temperate stream. *Journal of Thermal Biology* 38(5): 255-263. (in English) ["Highlights: • We monitored effects of water temperature increase on macrozoobenthos communities. • Water temperature increase severely decreased macrozoobenthos diversity. • Warm waters were dominated (98.9%) by Chironomidae, Mollusca and Oligochaeta. • Plecoptera, Coleoptera, Gammaridae, and Odonata completely disappeared in warm waters. • Significant warm waters annual temperature variations had profound influence too. Studies of macroinvertebrate communities in thermal streams are highly geographically localized and mostly faunistical, making the efforts to understand in situ water thermal regime effects on those biocoenoses barely achievable. We examined the effects of geothermal water inflow on benthic macroinvertebrate community composition in a temperate stream. Environmental data analysis has shown that water temperature is a major factor determining the faunistical composition, especially downstream of the geothermal water inflow situated some 20 m upstream of locality V3. The increase in mean annual water temperature from  $11.5 \pm 4.1$  °C at locality V2 to  $22.0 \pm 5.0$  °C at locality V3 induced an enormous shift in community composition from a diverse one, composed mainly of Gammaridae, Simuliidae, Chironomidae, Trichoptera and Ephemeroptera, and to a lesser extent of Plecoptera, Coleoptera, other Diptera, Hirudinea, Odonata, Mollusca and Oligochaeta, to a uniform one strongly dominated by Chironomidae, Mollusca and Oligochaeta, comprising  $98.9 \pm 0.5\%$  of collected individuals. While the disappearance of Plecoptera and Ephemeroptera and the increase in representation of Mollusca and Oligochaeta at locality V3 might be solely explained by water temperature increase, in the case of Chironomidae the increase in water discharge and relatively high annual water temperature variation at locality V3 had additional positive effects. However, the latter factor induced disappearance of Gammaridae at locality V3. In addition to the increase in water temperature, increase of water velocity significantly determined the

longitudinal dynamics of Coleoptera." (Authors)] Address: Živić, Ivana, University of Belgrade, Faculty of Biology, Studentski trg 16, 11000 Belgrade, Serbia

**13222.** Zinman, A.R.; Balter, M.L.; Olberg, R.; Ramasubramanian, A.; Hodgson, D.A. Design, construction, and testing of a flying prey simulator. ASME 2012 5th Annual Dynamic Systems and Control Conference joint with the JSME 2012 11th Motion and Vibration Conference Volume 3: Renewable Energy Systems; Robotics; Robust Control; Single Track Vehicle Dynamics and Control; Stochastic Models, Control and Algorithms in Robotics; Structure Dynamics and Smart Structures; Fort Lauderdale, Florida, USA, October 17–19, 2012: 59-65. (in English) ["The goal of this research project is to investigate the neuronal control of flying prey interception in dragonflies by designing, constructing, and testing an apparatus to simulate the complex motions of a flying insect. Our three-dimensional motion device is capable of mimicking a flying insect by moving a small bead accurately up to speeds of 1 m/s in any direction. Dragonflies are efficient aerial predators that can intercept and capture small insects in flight. Our stimulus device will be used to determine the way in which dragonfly neurons encode information about object movement in three dimensions. Sinusoidal position tracking experiments using multiple input frequencies were conducted using the apparatus. The results indicate that the machine operates with good repeatability with little variability between trials. Preliminary dragonfly testing with the apparatus showed favourable results, indicating proof of concept." (Authors)] Address: Balter, M., Mechanical Engineering and Biology Departments, Union College, 807 Union Street, Schenectady, NY 12308 USA

**Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for multiple help, and Rainier Rudolph, Geert de Knijff, Cédric Vanappelgem and Bernd Kunz for contributing many papers to this issue.**



<http://www.henry4school.fr/oct13P1.htm>

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105; E-mail: K.Reinhardt@sheffield.ac.uk

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

## 1997

**13223.** Han, F.-y. (1997): The dragonflies from Taiyuan city. *Journal of Shanxi University (Nat. Sci. Ed.)* 20(1): 96-98. (in Chinese, with English summary) [18 species had been collected in Taiyuan City, China. *Pseudothemis zonata*, *Sympetrum hypomelas*, *Enallagma cyathigerum*, *Lestes barbarus*, and *Lestes sponsa* are first records for Shanxi Province.] Address: Han F.y., Department of Life Science, Shanxi University, Taiyuan 030006, China

**13224.** Martens, A. (1997): Erfolgreiche Entwicklung der Eier von *Lestes viridis* (Vander Linden) nach Ablage in Koniferen (Zygoptera: Lestidae). *Libellula* 16(1/2): 65-68. (in German, with English summary) ["In October 1995, tandems oviposited in the bark of two-year-old twigs of *Pinus silvestris* at a bog lake near Gilliom (Lower Saxony, Germany). Other trees at this lake as well as at two other localities showed the typical markings of deposited eggs. In May 1996, hatched prolarvae and first larval instars were recorded from water filled traps hanging in *Pinus* trees." (Author)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, 76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**13225.** Rintelen, T. von (1997): Eine Vogelreuse als Libellenfalle: Beobachtungen in der Vogelwarte Pape, Lettland. *Libellula* 16(1/2): 61-64. (in German, with English summary) ["A birdtrap as a collecting device for dragonflies: observations at the Bird Observatory of Pape, Latvia - From the middle of August to the middle of September 1995 the birdtrap was observed to be full with dragonflies, approx. 500-1000 specimens, at least 90% were alive. Most of the dragonflies belonged to the genus *Aeshna*, the remaining consisted of several libellulids and two *Somatochlora* species. The occurrence of four immature *Anax ephippiger* (Burmeister) specimens was of special interest and suggests an actual breeding in the area. This record of *A. ephippiger* seems to be the first for Latvia." (Author)] Address: von Rintelen, T., Museum für Naturkunde der Humboldt-Universität zu Berlin, Institut

für Systematische Zoologie, Invalidenstr.e 43, 10115 Berlin, Germany

## 1998

**13226.** Jödicke, R. (1998): Herbstphänologie mitteleuropäischer Odonaten. 2. Beobachtungen am Niederrhein, Deutschland. *Opuscula zoologica Fluminensia* 159: 1-20. (in German) ["In a systematical investigation during several years, 12 species were recorded from mid October onwards. *Lestes virens vestalis* (20-XI), *L. viridis* (28-XI), *Aeshna cyanea* (23-XI), and *Sympetrum striolatum* (3-XII) were the last on wings. Additionally, autumnal records of all central European species are compiled from the literature and unpublished sources, and compared with the Lower Rhine situation. The results are discussed in terms of individual age, reproductive ability, and causes of mortality." (Author)] Address: Jödicke, R., Großenging 14, D-49699 Lindern, Germany

**13227.** Thorp, J.H.; DeLong, M.D.; Greenwood, K.S.; Casper, A.F. (1998): Isotopic analysis of three food web theories in constricted. *Oecologia* 117(4): 551-563. (in English) ["Analyses of stable isotope ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ) and C:N ratios of food webs within a floodplain and a constricted-channel region of the Ohio River during October 1993 and July 1994 indicate that the increasingly influential flood pulse concept (FPC) does not, for either location, adequately address food web structure for this very large river. Furthermore, results of this study suggest that the riverine productivity model (RPM) is more appropriate than the widely known river continuum concept (RCC) for the constricted region of this river. These conclusions are based on stable isotope analyses of potential sources of organic matter (riparian C3 trees, riparian C4 grasses and agricultural crops, submerged macrophytes, benthic filamentous algae, benthic particulate organic matter, and transported organic matter containing detritus and phytoplankton) and various functional feeding groups of invertebrate and fish consumers. The FPC, which stresses the key contribution of organic matter,



particularly terrestrial organic matter, originating from the floodplain to riverine food webs, was judged inappropriate for the floodplain region of the Ohio River for hydrodynamic and biotic reasons. The rising limb and peak period of discharge typically occur in November through March when temperatures are low (generally much less than 10°C) and greater than bank-full conditions are relatively unpredictable and short-lived. The major food potentially available to riverine organisms migrating into the floodplain would be decaying vegetation because autotrophic production is temperature and light limited and terrestrial insect production is minimal at that time. It is clear from our data that terrestrial C4 plants contribute little, if anything, to the consumer food web (based on  $\delta^{13}\text{C}$  values), and  $\delta^{15}\text{N}$  values for C3 plants, coarse benthic organic matter, and fine benthic organic matter were too depleted (~7–12‰ lower than most invertebrate consumer values) for this organic matter to be supporting the food web. The RPM, which emphasizes the primary role of autotrophic production in large rivers, is the most viable of the remaining two ecosystem models for the constricted-channel region of the Ohio based on stable isotope linkage between sources and consumers of organic matter in the food web. The most important form of food web organic matter is apparently transported (suspended) fine (FTOM) and ultra-fine particulate organic matter. We propose that phytoplankton and detritus of an autochthonous origin in the seston would represent a more usable energy source for benthic (bivalve molluscs, hydropterygids, caddisflies) and planktonic (microcrustaceans) suspension feeders than the more refractory allochthonous materials derived from upstream processing of terrestrial organic matter. Benthic grazers depend heavily on nonfilamentous benthic algae (based on gut analysis from a separate study), but filamentous benthic algae have no apparent connection to invertebrate consumers (based on  $\delta^{13}\text{C}$  values). Amphipod and crayfish show a strong relationship to aquatic macrophytes (possibly through detrital organic matter rather than living plant tissue). These observations contrast with the prediction of the RCC that food webs in large rivers are based principally on refractory FTOM and dissolved organic matter from upstream inefficiencies in organic-matter processing and the bacteria growing upon these suspended or dissolved detrital compounds. The conclusions drawn here for the Ohio River cannot yet be extended to other floodplain and constricted-channel rivers in temperate and tropical latitudes until more comparable data are available on relatively pristine and moderately regulated rivers." (Authors) *Argia*, *Enallagma*, *Neurocordulia*] Address: Thorp, J.H., Department of Biology, University of Louisville, Louisville, KY 40292, USA

#### 1999

**13228.** Juhász, P.; Kiss, B.; Olajos, P.; Grigorszky, I. (1999): Faunistical research on the 'sanctuary' oxbows of River Körös. *Crisicum* 2: 99-110. (in Hungarian, with English summary) [Hungaria; in 1998 at 12 localities 28

Odonata species were recorded. The list of species includes *Coenagrion pulchellum*, *Stylurus flavipes*, *Epitheca bimaculata*, *Anaciaeschna isosceles*, and *Anax parthenope*.] Address: Juhász, P., VITUKI Rt., H-1095 Budapest, Kvassay út 1., Hungaria

**13229.** Malavasi, D.; Tralongo, S. (1999): Osservazioni sulle comunità di Lepidotteri Ropaloceri e Odonati presenti nel Parco regionale dello Stirone. *Pianura* 11: 133-145. (in Italian, with English summary) [21 Odonata species were observed in the regional Park of the River Stirone, Italy. The list of species includes *Coenagrion mercuriale*.] Address: Malavasi, D., Studio Associato GECO, Via San Faustino, 23, 41037 Mirandola, Italy. E-mail: davidemalavasi.eco@libero.it

**13230.** Mitra, T.R. (1999): Geographical distribution and zoogeography of Odonata of Meghalaya, India. *Rec. zool. survey India, Occ. pap.* 170: 63 pp. (in English) [The state Meghalaya is situated in the North-eastern part of India. It was created in 1972; previous to this it was within Assam along with Arunachal Pradesh, Mizoram, Manipur, Nagaland. Its physiography is based on three hills - Garo, Khasi and Jaintia. The paper compiles 148 species and their known regional localities.] Address: deceased

#### 2000

**13231.** Sivaramkrishnan, K.J.; Venkataraman, K.; Moorthy, R.K.; Subramaniam, K.A.; Utkarsh, G. (2000): Aquatic insect diversity and ubiquity of the Western Ghats, India. *Journal of the Indian Institute of Science* 80(6): 537-552. (in English) ["We studied the distribution of 4533 individuals of aquatic insects belonging to 72 genera, 45 families and 10 orders, collected from headwater stream riffles from 17 localities in the hills of southwestern India. The southern, wetter sites with lower human impacts favour specialised sensitive taxa. The ecological attributes are correlated across the taxonomic gradient, viz. family, genus and species levels, which would permit an efficient and participatory inventory as well as monitoring even at the family level." (Authors) Taxa include Odonata and are treated at family level.] Address: Utkarsh, G., RANWA. C-2611, Ketan Heights, Kothrud, Pune 411 029, India

#### 2001

**13232.** Catling, P.M. (2001): Morphological evidence for the hybrid *Enallagma ebrium* x *hageni* (Zygoptera: Coenagrionidae) from Ontario. *Proceedings of the Entomological Society of Ontario* 132: 99-101. (in English) ["On 18-VI-2000, four species of Zygoptera including *Enallagma civile*, *E. cyathigerum*, *E. ebrium*, and *E. hageni*. were collected from Bumside gravel pit pond, 45.2272° N, 75.7780° W, 5 km NE of Richmond, Ottawa, Ontario. This extensive gravel pit pond had been created 10 years earlier. Subsequent examination of the material revealed a single male specimen of a probable hybrid of *E. ebrium* and *E. hageni*. ... The putative *Enallagma ebrium* x *hageni*

specimen has been placed with *E. ebrium* in the Canadian National Collection of Insects, Arachnids, and Nematodes (CNCI, Agriculture and AgriFood Canada, Ottawa)." (Author)] Address: Catling, P.M., 2326 Scrivens Drive, R.R. 3, Metcalfe, Ontario K0A 2P0, Canada. E-mail: brownell@achilles.net

## 2002

**13233.** Scholl, C. (2002): Report of the dragonflies at Store Mosse National Park, 2001. County Administration, Jönköping, Meddelande 02: 28: 20 pp. (in English) [16 spp., recorded in the Park (N of Värnamo, Sweden) during July-Aug. 2001, are listed, their local abundance is stated and habitat requirements are outlined. For the full paper see: <http://projektwebbar.lansstyrelsen.se/store-mosse/SiteCollectionDocuments/sv/Publikationer/200228-Report%20of%20The%20Dragonflies%20at%20Store%20Mosse%20National%20Park%202001.pdf>] Address: Scholl, Christiane c/o J. Rova, Länsstyrelsen i Jönköpings län, S-551 86 Jönköping, Sweden

## 2003

**13234.** Beatty, C.D. (2003): Habitat associations and life histories of Odonata in riverine wetlands of the Willamette Valley, Oregon. M.Sc. thesis, Oregon State University: 92 pp. (in English) ["This thesis explored the distributions and life histories of Odonata of the riverine wetlands of the Willamette Valley in western Oregon, USA. Odonate species distributions were characterized over two seasons in the autumn of 2000 and the spring of 2001-at twenty-seven wetlands located throughout the valley. Distributions of nymphs and adults were compared with wetland habitat conditions that may affect odonate diversity. Odonate nymph and adult distributions were analyzed through Hierarchical Agglomerative cluster analysis (HA). HA identified discrete clusters of sites based on the distributions of species in the genera *Aeshna*, *Erythemis*, *Lestes*, *Libellula*, *Pachydiplax*, *Sympetrum* and *Tamea*. To identify habitat associations with odonate species, nymph and adult data were analyzed by Non-metric Multidimensional Scaling (NMS). NMS revealed that odonate distributions are associated with site hydrology, water depth and temperature, the presence of large emergent plants (e.g. *Typha latifolia*), the presence of fish, and surrounding landcover. These data will provide guidance for wetland managers in the use of odonates as indicators of wetland health. To further examine the relationship between odonate species and their wetland habitats, quantitative life history data for the 27 odonate species were analyzed to determine functional associations between species attributes and the environments in which they are found. Oviposition location, presence of a resting egg, over-wintering life stage, nymphal foraging strategy and adult flight season were subjected to NMS, to determine biological similarities between species occupying particular locations. Life history patterns correlated strongly with hydrology. Analysis of sites by odonate species richness

found a relationship between richness and site hydrology, but failed to explain the distribution of several species associated with wetlands that dry during part of the year. We conclude from our results that species-level life history data are essential for explaining odonate distributions. We determined that the presence of odonate species in a wetland is indicative of habitat condition, that analysis of odonate distributions at the species level is necessary to understand habitat associations, and that analysis of life-history attributes provides a functional understanding of odonate distributions that measurements of species richness or the distributions of genera or families alone cannot explain." (Author)] Address: Beatty, C., Dept Biology, Santa Clara Univ., 500 El Camino Real, Santa Clara, California 95053-0268, USA. E-mail: cbeatty@scu.edu

**13235.** Englund, R.A.; Arakaki, K.; Preston, D.J.; Evenhuis, N.L.; McShane, M.K.K. (2003): Systematic inventory of rare and alien aquatic species in selected O'ahu, Maui, and Hawai'i Island streams. Contribution No. 2003-017 to the Hawaii Biological Survey: II + 14 pp. (in English) ["The Hawaii Biological Survey (HBS) of the Bishop Museum collected and identified aquatic insects and other stream invertebrates in selected Hawaiian streams as part of an inventory of rare native and new alien aquatic species. Three remote streams on each island (O'ahu, Maui, Hawai'i) were assessed during this study. The purpose of these surveys was to provide a systematic inventory in selected streams of rare native aquatic species and invasive alien species in remote and difficult to access portions of the Hawaiian archipelago. The results of this study also provided an indication of aquatic ecosystem health and native biodiversity in areas not normally accessible because of geographic constraints such as steep waterfalls and dense vegetation. These surveys provided a baseline inventory of aquatic insect species present in each stream assessed and also ensured museum specimens and related databases will be available for future researchers. Stream reaches examined during this study had little to no impacts from urbanization or irrigation diversions, with the Maui and Hawai'i Island streams found to be particularly pristine. A representative cross-section of pristine stream reaches was examined on each island surveyed. The aquatic insect fauna found during these surveys contained a remarkably high percentage of native species in streams surveyed among O'ahu, Maui, and Hawai'i Islands. Only the lowest surveyed elevations of Punalu'u Stream, O'ahu at 100-200 ft elevation (50-56%) and Kawainui Stream, O'ahu (57%) contained lower proportions of native aquatic insect species than the other streams assessed during these surveys. Punalu'u Stream was the only stream where a longitudinal transect was conducted from a low to high elevation (100- 900 ft), and the percent native species increased greatly as elevation increased. Hawai'i Island streams surveyed during this study yielded several range extensions and a rich assortment of aquatic insects that are either indicators of high water quality, or also can be considered uncommon. East Maui streams such as West

Wailua Iki and Kopiliula were also found to contain aquatic insects that are now extremely rare and sensitive to disturbance. The most significant finding of this study was the discovery of eight previously uncollected species of endemic Hawaiian aquatic insects; six new species were found on Maui and one each from O'ahu and Hawai'i Islands. All eight new species are Diptera that are the most diverse group of native aquatic insects in the Hawaiian archipelago. Aquatic Diptera are important in the diet of native Hawaiian stream fish; healthy and diverse populations will ensure an abundant year-round food supply for native fish such as *Lentipes concolor*. Additionally, at least five undescribed species of the aquatic moth *Hypomocoma* were collected during these surveys. Additionally, efforts at aquatic insect collections have been high between 1990-2003, and the collection of eight new species during this study greatly exceeds the rate found in the previous 13 years of intensive collections. This also illustrates how little basic information is known on the numbers and types of aquatic insects for Hawaiian inland waters, let alone their basic ecological, evolutionary, and life history parameters." (Authors) The following species had been found: *Anax junius*, *A. strenuus*, *Crocothemis servilia*, *Orthemis ferruginea*, *Pantala flavescens*, *Tramea abdominalis*, *Enallagma civile*, *Ischnura ramburii*, *I. posita*, *Megalagrion blackburni*, *M. calliphya*, *M. hawaiiense*, *M. n. nigrohamatum*, and *M. n. nigrolineatum*.] Address: Hawaii Dept of Land & Natural Resources, 1151 Punchbowl Street, Room 330, Honolulu, Hawai'i 96813, USA

#### 2004

**13236.** Cieřta, M. (2004): Dragonflies (Odonata) and artificial garden ponds. *Vážký 2004. Sborník referátů VII. celostátního semináře odonatologů v Krušných horách. ZO ČSOP Vlařim, 2004: 89-90.* (in Czech, with English summary) [Czech Republic; "The list of observed Odonata in three new artificially constructed garden pools (locality Haviřov, mapping square 6276, 265 m a.s.l.; area of pools: 10 x 10 m, 15 x 15 m and 1,5 x 3 m) is given in this article. During 2002-2004 the following species were found: • autochthonous species with successful breeding (18 species totally): *Aeshna affinis*, *A. cyanea*, *Anax imperator*, *Coenagrion puella*, *Enallagma cyathigerum*, *Erythromma najas*, *Ischnura elegans*, *Lestes barbarus*, *L. sponsa*, *L. viridis*, *Libellula depressa*, *Orthetrum cancellatum*, *Pyrrhosoma nymphula*, *Somatochlora flavomaculata*, *Sympetrum flaveolum*, *S. sanguineum*, *S. striolatum* and *S. vulgatum*. • allochthonous species (sporadic occurrence of imago, no larvae were found), 11 species totally: *Calopteryx splendens*, *C. virgo*, *Cordulia aenea*, *Crocothemis erythraea*, *Ischnura pumilio*, *Lestes virens*, *Libellula quadrimaculata*, *Orthetrum albistylum*, *Sympecma fusca*, *Sympetrum danae* and *S. meridionale*." (Author)] Address: Cieřta, M., Haviřov-Město, Na Důlňáku 1376/8A, Czech Republic

**13237.** De Knijf, G.; Tailly, M. (2004): Oviposition from *Aeshna cyanea*: some remarkable observations. *Gom-*

*phus* 20(1): 21-26. (in Dutch, with English summary) ["Three remarkable observations of oviposition by *Aeshna cyanea* are described. 1) on rocks forming a dam in full sunshine, at an at the time of observation dry pond, 2) in dead wood and bark of an elder (*Sambucus nigra*) at more than 4 m from the waterside and 3) in moss (*Amblystegium varium*) at 0,20 m above the water in mosses at 0,30 m above and 0,40 m from the waterside. Thus *A. cyanea* seems not to be linked strictly to water for its oviposition, but shows a predilection for moist, shadowed substrats like mosses, dead plants, branches, wood, mud and soil. The water level at the moment of hatching (shortly after the winter) is generally higher, so the prolarvae are at that time already in the water or have only a short distance to go; probably they are capable of jumping or creeping some meters to reach the water if necessary." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, 1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

#### 2005

**13238.** Hillwalker, W.E. (2005): Selenium and trace metal accumulation in detrital-benthic food webs of lotic and lentic wetlands, Utah, USA. Ph.D. thesis, Oregon State University: 105 pp. (in English) ["Concentrations of selenium (Se), manganese (Mn), zinc (Zn), cadmium (Cd), lead (Pb) and arsenic (As) were measured in the water column, sediment and biota, in conjunction with selected physicochemical data, from representative wetland types at a mining site within Salt Lake County, Utah, USA. The selected field sites included Oolitic Pond (lentic) and Lee Creek (lotic), which are moderately contaminated brackish, alkaline aquatic wetlands managed by a copper mining industry. These fishless wetlands are located in a geographic region that poses risk to migratory shorebird populations from dietary Se. A spatial sampling study demonstrated the extent of variation in total Se concentration within the wetlands. With the exception of the sediment compartment, Se concentration did not differ significantly along the 2-mile length of Lee Creek or within the Pond. The differences in sediment total Se concentrations between the Creek East and West segments characterize lower Lee Creek as having two segments distinguished by unique processes that influence the sediment Se accumulation profiles. Se accumulation trends were observed temporally over 3-years (2000 to 2002) and over two seasons (spring and autumn). Total Se body burden in benthic invertebrates was more clearly associated with sediment/detritus Se concentrations than with surface water concentrations. Three invertebrate groups dominated the aquatic invertebrates assemblage in the lotic and lentic benthos; primary consumers (Chironomidae, Diptera), generalist feeders (Hemiptera) and predators (Odonata). The chironomid larvae accumulated 1.3 to 39 times the trace metal concentrations of the Hemiptera or odonate taxa, independent of trace metal type (essential or non-essential) or wetland occupation. Organism-specific factors, such as habitat selection and



preferential feeding habits, were proposed to influence benthic invertebrate accumulation profiles by modifying trace metal exposure. Mixed diets, trophic omnivory and the complexity of wetland biogeochemistry limit the power of stable nitrogen fractionation signatures to define benthic food web relationships. Wetland site-specific processes impacted Se accumulating efficiency, with trace metal concentrations from 4 to 7 times greater within the lentic benthic system than the lotic. The fractionation of the natural abundant stable carbon isotopes revealed the importance of sedimentary and detrital organic carbon as dietary sources for the benthic food web. Sediment organic content was not significantly associated with sediment, or invertebrate, Se accumulation profiles. Ecological risk assessments based on sound understanding of metal chemistry and the interactions between the sediment matrix and benthic organisms are necessary to provide tools for environmental management." (Author)] Address: Hillwalker, Wendy; E-mail: whillwalker@exponent.com

**13239.** Paez, A.K.; Stotz, D.F.; Shopland, J.M. (2005): Cuba: Peninsula de Zapata. Rapid Biological Inventories Report 07: 150 pp. (in bilinugual Spanish and/or English) [Odonata recorded during the rapid biological inventory of the Zapata Peninsula, 8-15 September 2002, by Jorge Luis Fontenla are listed in Appendix 4. 18 Odonata species - exclusively Aeshnidae and Libellulidae - are listed. For details see: <http://fm2.fieldmuseum.org/rbi/pdfs/cuba07/cub07entireesp.pdf>] Address: The Field Museum, Environmental and Conservation Programs, 1400 South Lake Shore Drive, Chicago Illinois 60605-2496, USA

**13240.** The Field Museum (2005): Cuba: Parque Nacional La Bayamesa. Rapid Biological Inventories 13: 243 pp. (in English) [The following Odonata species are listed: *Triacanthagyna* sp., *Enallagma coecum*, *Scapanea frontalis*, *Hypolestes trinitatis*, *Neoneura maria*, and *Protoneura capillaris*] Address: The Field Museum, Environmental & Conservation Programs, 1400 South Lake Shore Drive, Chicago, Illinois 60605-2496, USA

## 2006

**13241.** Bo, T.; Cucco, M.; Fenoglio, S.; Malacarne, G. (2006): Colonisation patterns and vertical movements of stream invertebrates in the interstitial zone: a case study in the Apennines, NW Italy. *Hydrobiologia* 568: 67-78. (in English) ["We examined vertical migration and colonisation patterns of stream macroinvertebrates within the substratum of an Apennine creek in NW Italy. Macroinvertebrates was sampled at three depths in the streambed (0-5, 5-10, 10-15 cm) by means of artificial baskets filled with natural substratum. We placed 42 traps (5 5 15 cm), i.e. 21 top-opened (T-traps) and 21 bottom-opened (B-traps), each composed of three overlapping baskets (high-H, medium-M and low-L), to evaluate differences in the vertical movements. We also collected Surber samples to compare interstitial assemblages with streambed communities. The multilevel traps yielded 42 taxa, compared

with 60 taxa in the natural riverbed. Interstitial traps were rapidly colonised; both taxa richness and organism number increased during the 42-day study period. We found active migration in both vertical directions, but there were more invertebrates in the top-opened traps than in the bottom-opened traps. In the T-traps the most colonised baskets were those placed at the H level, while in the B-traps the L level baskets were more rapidly colonised. The interstitial assemblages differed markedly from the streambed communities in both composition and functional organisation, with more collector-gatherers and predators in the interstitial zone and more filterers and scrapers in the natural riverbed. In Apennine lotic systems, the interstitial zone is an important habitat for stream macrobenthos, although it may not be used by all species." (Authors) *Onychogomphus* sp., *Orthetrum* sp., *Calopteryx* sp.] Address: Bo, T., University of Piemonte Orientale, Di.S.A.V., Via Bellini 25, I-15100, Alessandria, Italy. E-mail: fenoglio@unipmn.it

**13242.** Fenoglio, S.; Bo, T.; Cucco, M.; Malacarne, G. (2006): Leaf breakdown patterns in a NW Italian stream: Effect of leaf type, environmental conditions and patch size. *Biologia, Bratislava* 61/5: 555-563. (in English) ["We studied the decomposition process and macroinvertebrate colonisation of leaf packs to determine to what extent leaf consumption and invertebrate abundance depend on the pollution level, season, leaf type and patch size. We exposed 400 leaf packs made of two leaf types, alder and chestnut, at two sites of the Erro River (NW Italy) with different environmental alteration levels. Leaf packs were set out as three patch sizes (alone, or in groups of 6 or 12). A first experiment was carried out in winter and a second in summer. Leaf packs were retrieved after 15, 30, 45 and 60 days of submersion to determine the leaf mass loss and to quantify the associated macroinvertebrates. Natural riverbed invertebrates were collected in the same areas. Patch size, season, leaf type and pollution level significantly affected mass loss. The breakdown process was faster for alder leaves, during summer, at the unpolluted site, and in smaller patches. Leaf type and patch size did not affect macroinvertebrate density and richness, but the highest taxon richness was found in winter and at the unpolluted site. There were more shredders and predators than in the natural riverbed. Our study supports two recent ideas regarding leaf processing in streams: that patch size influences the leaf breakdown rate and that the breakdown rate can be used to evaluate water quality and environmental health." (Authors) The data set includes Odonata.] Address: Fenoglio, S., University of Piemonte Orientale, Di.S.A.V., Via Bellini 25, I-15100 Alessandria, Italy. E-mail: fenoglio@unipmn.it

**13243.** Mekong River Commission; Burnhill, T. (2006): Identification of Freshwater Invertebrates of the Mekong River and Its Tributaries. Mekong River Commission. ISBN 9295061004, 9789295061002: 274 pp. (in English) ["The freshwater fauna of the Mekong River and its tribu-

teries ranks second in the world in terms of species richness. While a few of these species, such as the Mekong giant catfish and the Irrawady dolphin, are iconic symbols of the river that are known worldwide, the bulk of the faunal diversity comprises innumerable types of worms, snails, beetles, crabs, spiders and other bugs, which biologists group collectively as invertebrates. Although less charismatic, these animals are not only important elements of the wildlife of the river, they also play a vital role in the welfare of the millions of people who live off the natural resources of the Mekong River." (Eds.) Chapter 16 deals with Odonata larvae. For details see: [zoo.sci.ku.ac.th/Research/boonsatean/Reboonsoong4.pdf](http://zoo.sci.ku.ac.th/Research/boonsatean/Reboonsoong4.pdf) Address: not available

**13244.** Torralba Burrial, A.; Ocharan, F.J. (2006): De Monstruos & Prodigios: Deformidad abdominal en *Pyrhosoma nymphula* (Sulzer, 1776) (Odonata: Coenagrionidae). *Boletín de la Sociedad Entomológica Aragonesa* 39: 437-438. (in Spanish) [Spain; abdomen and wing deformations in *P. nymphula* are documented.] Address: Torralba Burrial, A., Dept de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: [antoniotb@hotmail.com](mailto:antoniotb@hotmail.com)

**13245.** Wei, I.; Zhou, S.-y.; (2006): Characteristics of echolocation calls and summer diet of three sympatric insectivorous bats species. *Zoological Research* 27(3): 335-341. (in Chinese, with English summary) [The diet of *Taphozous melanopogon* includes Odonata.] Address: Zhang, Shu-yi, Inst. Zool., Chinese Acad. Sci., Beijing 100080, China. E-mail: [zhangsy@ioz.ac.cn](mailto:zhangsy@ioz.ac.cn)

## 2007

**13246.** Bo, T.; Fenoglio, S.; Malacarne, G.; Pessino, M.; Sgariboldi, F. (2007): Effects of clogging on stream macroinvertebrates: An experimental approach. *Limnologica* 37: 186-192. (in English) ["The influence of streambed sediment clogging on macroinvertebrate communities was investigated in the Lemme creek (NW Italy). To assess how fine sediment accumulation can influence the colonisation process and community composition of macroinvertebrates, we placed 48 traps in the riverbed. The traps consisted of boxes built with metal net (mesh 1 cm, height 15 cm, sides 5 cm) covered with nylon net except for the apex, allowing access exclusively from the top. We created four trap types filled with 100% gravel, 30% sand and 70% gravel, 70% sand and 30% gravel and 100% sand. After 20 and 40 days, we removed 6 traps / type. Macroinvertebrates rapidly colonised the traps, as we found no significant community differences between the two removal dates. Among the four trap types, we found significant differences in taxa number and abundance, which both decreased with increasing clogging. Thus, our study supports the hypothesis that clogging and the accumulation of fine substratum elements strongly affects benthic stream communities." (Authors) The study includes data on *Calopteryx virgo*, *Onycho-*

*gomphus forcipatus*, and *Boyeria irene*.] Address: Fenoglio, S., Univ. Piemonte Orientale, Di.S.A.V., Via Bellini n. 25, 15100 Alessandria, Italy. E-mail: [fenoglio@unipmn.it](mailto:fenoglio@unipmn.it)

**13247.** Couteyen, S.; Papazian, M. (2007): Contribution à la connaissance des Odonates de l'île de la Réunion 8. Description de la larve de *Hemianax ephippiger* (Burmeister, 1839), une espèce nouvelle pour l'île (Odonata, Aeschnidae). *L'Entomologiste* 63(4): 187-189. (in French, with English summary) [A female of *Anax ephippiger* emerged near the village of Tampon.] Address: Couteyen, S., Association réunionnaise d'Écologie, 188 Chemin Nid Joli, F-97430 Le Tampon (la Réunion), France. E-mail: [scouteyen@ecologie.re](mailto:scouteyen@ecologie.re)

**13248.** Green, D.; Moore, A.; Bell-Cross, S.; Lechmere-Oertel, H. (2007): Identifying an unusual insect form in San rock paintings of the southern Drakensberg, South Africa. *Southern African Humanities* 19: 69-81. (in English) ["Identifying images in San rock art is an essential prerequisite for analysis and interpretation. At site M4 in the southern Drakensberg, there are San rock paintings of some 600 insects depicted as though flying over and around a snake. To identify these flying insects we examine their morphology and depicted behaviour and compare these to a number of formally similar insect taxa—bees, locusts and grasshoppers, dragonflies, ant lions, flying ants, and flying termites. We conclude that the painted insects at M4 most closely resemble flying termites. This study has implications for the analysis and interpretation of certain insect terminology in Xam ethnography, and for gaining some understanding of the social and ritual symbolism of these flying insects in the rock art." (Authors)] Address: Green, Dawn, Dept Anthropology & Archaeology, Univ. of South Africa, PO Box 392, UNISA, 0003 South Africa. E-mail: [dawn@yezinyanya.co.za](mailto:dawn@yezinyanya.co.za)

**13249.** Karube, H. (2007): On the scientific name of Japanese name "Kiuro - harabiro - tombo". *Tombo* 50: 71-72. (in Japanese, with English title) [The confusing taxonomy of the species is settled as follows: *Lyriothemis flava* Oguma, 1915: *Lyriothemis tricolor* Ris, 1919 > *Syn Lyriothemis tricolor* Ris, 1916 *Syn Lyriothemis flava* Oguma, 1922 > *Lyriothemis flava* Oguma, 1915] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: [paruki@nh-kanagawa-museum.jp](mailto:paruki@nh-kanagawa-museum.jp)

**13250.** Quiroz-Martinez, H.; Rodriguez-Castro, V.A. (2007): Aquatic insects as predators of mosquito larvae. *Journal of the American Mosquito Control Association* 23(sp2): 110-117. (in English) ["Mosquitoes are serious biting pests and obligate vectors of many vertebrate pathogens. Their immature larval and pupal life stages are a common feature in most tropical and many temperate water bodies and often form a significant proportion of the biomass. Control strategies rely primarily on the use of larvicides and environmental modification to

reduce recruitment and adulticides during periods of disease transmission. Larvicides are usually chemical but can involve biological toxins, agents or organisms. The use of insect predators in mosquito control has been exploited in a limited fashion and there is much room for further investigation and implementation. Insects that are recognized as having predatorial capacity with regard to mosquito prey have been identified in the Orders Odonata, Coleoptera, Diptera (primarily aquatic predators), and Hemiptera (primarily surface predators). Although their capacity is affected by certain biological and physical factors, they could play a major role in mosquito control. Furthermore, better understanding for the mosquitoes-predators relationship(s) could probably lead to satisfactory reduction of mosquito-borne diseases by utilizing either these predators in control programs, for instance biological and/or integrated control, or their kairomones as mosquitoes' oviposition repellents. This review covers the predation of different insect species on mosquito larvae, predator-prey-habitat relationships, co-habitation developmental issues, survival and abundance, oviposition avoidance, predatorial capacity and integrated vector control." (Authors)] Address: Rodríguez-Castro, Adriana, 2 Apartado Postal 105 – F, Ciudad Universitaria, San Nicolás de los Garza, Nuevo León, CP 66450, México

**13251.** Soldati, P. (2007): Les études entomologiques dans la réserve naturelle nationale de la Fort d'Orient (Aube): bilans quantitatifs et qualitatifs. *Cour. scient. PnrFO* 31: 67-76. (in French) [The Regional Park Fort d'Orient is situated in the French department Aube in the region Champagne-Ardenne. A list with a total of 963 insect species is compiled among them several Odonata species as the legally protected *Coenagrion mercuriale*, *Oxygastra curtisii* and *Leucorrhinia caudalis*. Also included are in the rare for France species such as *Sympetma fusca*, *Coenagrion scitulum*, *Gomphus simillinus*, *Onychogomphus forcipatus*, *Epitheca bimaculata* and *Somatochlora flavomaculata*.] Address: Soldati, P., c/o Association Champenoise de Sciences Naturelles, 7 rue du Maréchal Leclerc, 10600 La Chapelle St Luc, France

**13252.** Torralba Burrial, A.; Melero, Melero, Y.X.; Ocharan, F.J. (2007): Utilización de exuvias de *Orthetrum brunneum* (Fonscolombe, 1837) (Odonata: Libellulidae) como lugar de cría por *Sibianor aurocinctus* (Ohlert, 1865) (Araneae: Salticidae). *Boletín de la Sociedad Entomológica Aragonesa* 41: 344. (in Spanish) [Exuviae of *O. brunneum* are used for reproduction of the spider *Sibianor aurocinctus* (Ohlert, 1865) (Araneae: Salticidae). 27-VII-2004, Monegros (Huesca) (UTM 30T 733720, 4625127), Spain.] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antioib@hotmail.com

**13253.** Zhu, X. (2007): An utilization study of ornamental insect resource in Hunan province. *Journal of Hunan First Normal College* 7(4): 170-172. (in Chinese, with

English summary) [China; The following Odonata species are documented having an ornamental importance: *Anax parthenope julius*, *Sinictinogomphus clavatus*, *Gomphidia confluens*, *Epophthalmia elegans*, *Epitheca marginata*, *Crocothemis servilia*, *Orthetrum albistylum*, *O. japonicum internum*; *O. triangulara melania*, *Pantala flavescens*, *Pseudothemis zonata*, *Rhyothemis fuliginosa*, *Sympetrum eroticum ardens*, *S. darwinianum*, *Calopteryx atratum*, *Matrona basilaris basilaris*, *Copera annulata*.] Address: Zhu, X., Hunan Environmental and Biological Polytechnic, Hengyang, Hunan 421005, China

## 2008

**13254.** Anitha Rani, A.; Mahalingam, V. (2008): Record of a new gregarine parasite (*Xiphocephalus* sp.) of the dragonfly, *Diplacodes trivialis* (Rambur). *Entomon* 33(4): 285-288. (in English) ["A new species of the gregarine protozoan belonging to the genus *Xiphocephalus* was recorded parasitizing the adults of *D. trivialis* collected from the scrub jungle ecosystem. The uniqueness of the species is with the epimerite that is in the form of an elongated deltoid process with a bulbous terminal end." (Authors)] Address: Anitha Rani, A., G. S. Gill Research Institute, Guru Nanak College, Chennai-600 042, India

**13255.** Chan, T.-W.; Wong, K.-C. (2008): Taxonomic study of the larval stage of Aeshnidae (Odonata) in Taiwan. The 29 Annual Meeting of Taiwan Entomological Society - Abstract Booklet: 37. (in Chinese and English) [Verbatim: The Aeshnidae is the second largest family of Odonata in Taiwan, with some 23 species now assigned to 9 genera. Seventeen species of larval aeshnids from 8 genera collected in Taiwan were taxonomically studied. Based on literature records and examination of an extensive collection, a redescription of the larva of *Periaeschna magdalena* Martin, 1909, *Planaeschna risi risi* Asahina, 1964, *Planaeschna taiwana* Asahina, 1951, *Aeshna petalura taiyal* Asahina, 1938, *Polycanthagyna erythromelas* (McLachlan, 1896), *P. melanictera* (Selys, 1883), *Anaciaeschna jaspidea* (Burmeister, 1839), *A. martini* Selys, 1897, *Anax nigrofasciatus nigrofasciatus* Oguma, 1915, *A. panybeus* Hagen, 1867, *A. parthenope julius* Brauer, 1865, *Gynacantha japonica* Barteneff, 1909, *G. ryukyuensis* Asahina, 1962 is provided. Morphological characteristics of the larva of *Sarasaeschna pyanan* (Asahina, 1951), *Sarasaeschna lieni* (Yeh & Chen, 2000), *Planaeschna ishigakiana flavostria* Yeh, 1996, *Polycanthagyna ornithocephala* (McLachlan, 1896) is described and illustrated for the first time. In addition, all 17 larval aeshnids are keyed for reference in future research. For some more details see: <http://ndltd.ncl.edu.tw/cgi-bin/gs32/gsweb.cgi/login?o=dnclcdr&s=id=%22097NHLT5404004%22.&searchmode=basic>] Address: Chan, T.-W., Graduate Institute of Biological Resources and Technology, National Dong Hwa University, Taiwan

**13256.** Chang, C.-T.; Tsai, F.-Y.; Shih, M.-C.; Chi, K.-J. (2008): The role of pterostigma in wing mechanics of



dragonflies (Odonata, Libellulidae). The 29 Annual Meeting of Taiwan Entomological Society - Abstract Booklet: 72. (in Chinese and English) [Verbatim: Pterostigma is a thickened and darkened region on an insect wing, located distally from the wing base and near the leading edge. Because of interspecific variation in its size, morphology, and related position, pterostigma is often used as a trait for classification. To date, the only study that examined its mechanical function indicates that, in dragonflies, the pterostigma changes the distribution of wing mass, which may change the vibration characteristics of wings and consequently the flight performance. However, no direct empirical evidence has been reported to explain how it works. In this study, we aimed to examine how pterostigma affects the dynamic characteristics of wings in *Pantala flavescens*, a species commonly found in Taiwan. Scanning electron micrographs were taken in order to compare the thickness of pterostigma and wing cell. Direct measurements of pterostigma showed that it accounted for only 0.5% of the wing area, yet more than 2.5% of the wing mass. That is, the pterostigma is five times heavier than the rest of the wing. To examine the effects of pterostigma, we compared the vibration characteristics of complete wings with those without this structure. To this end, each wing sample was cut off from the thorax and glued onto an oscillator that provided different frequencies to vibrate the wing. High-speed videocamera was used to record the behaviour of the vibrating wing, from which we could quantify its deformation. Preliminary results reveal that the existence of pterostigma changes the wave amplitudes and shapes of a flapping wing, which implies a functional consequence in dragonfly flight.] Address: Chang, C.-T., Institute of Biophysics, National Chung Hsing University, Taiwan

**13257.** Fogarty, F.A.; Bybee, S.M.; Ingley, S.J.; Branham, M.A. (2008): Phylogenies of the Flatwing Damselflies: Molecular and morphological evidence (Odonata: Megapodagrionidae). <http://esa.confex.com/esa/2008/webprogram/Paper37035.html>: (in English) ["A phylogenetic analysis was carried out on the Neotropical flatwing damselflies (Odonata: Megapodagrionidae), using both morphological and molecular data. Megapodagrionidae has a worldwide distribution, yet its monophyly is questionable, as are the major groupings within the family (Bybee et al., 2008). Neotropical lineages were shown to be especially problematic. All 13 Neotropical genera were examined; in addition to 20 outgroup taxa (e.g., old world megapodagrionids: *Austroargiolestes*, *Caledopteryx*, *Pseudolestes* and *Rhipidolestes*; coenagrionoids; calopterygoids and *Thaumatoneura*. Analyses were rooted to *Lestes disjunctus*. 52 Morphological characters were coded for each taxon in the analysis. Molecular data was analyzed for six genes: 12s, 16s, 28s, COii, ND1 and h3 (~4800bp). Molecular data was combined with morphological data under Bayesian (MrBayes) and Parsimony (TNT) methods for tree reconstruction. Megapodagrionidae is not supported as monophyletic but the taxon sampling for old world groups is not exhaustive. Trees do not

reconstruct the Neotropical Megapodagrionidae as a monophyletic clade. Neotropical genera are distributed across several clades that include old world megapodagrionids (e.g., *Teinopodagrion* and *Allopodagrion*). Interestingly, *Thaumatoneura* (Central American) appears to be sister to *Paraphlebia* supporting this monospecific genus as a megapodagrionid, a relationship suggested by Calvert in 1902, but currently not supported by other phylogenetic studies. Though Megapodagrionidae is not monophyletic the most primitive lineage representing the group has its origins in the Neotropics. The larger monophyletic clade representing "Megapodagrionidae" has no clear pattern of distribution or correlation with geography among genera." (Authors)] Address: Bybee, S., Graduate Research Assistant: Branham Laboratory, Dept Entomology & Nematology, University of Florida. Natural Area Drive, P.O. Box 110620, Gainesville, FL 32611-0620, USA. E-mail: seth.bybee@gmail.com

**13258.** Lin, S.-C.; Chen, Y.-F.; Yang, P.-S. (2008): Taxonomy of the Sauter's clubtail (*Leptogomphus sauteri*) (Odonata: Gomphidae). The 29 Annual Meeting of Taiwan Entomological Society - Abstract Booklet: 34. (in Chinese and English) [Verbatim: *L. sauteri* is endemic to Taiwan and it includes two geographical subspecies (*L. s. sauteri* Ris and *L. s. formosanus* Matsumura). In order to compare both morphological and molecular difference between two subspecies, we collected the specimens around the Taiwan Island. The preliminary results indicate that there were relatively morphological variations in the body color and male genitalia. The diagnostic characters of these two subspecies can not easily be defined. Furthermore, the mitochondrial cytochrome oxidase I gene (mtCOI) was amplified using universal primers for these two subspecies. The other clubtail species from Taiwan and the Himaehosoi clubtail (*L. yayeyamensis* Matsumura) from Yaeyama Islands, Japan, were also amplified. Then, these molecular data were combined for analysis. The phylogenetic trees among mtDNA sequences were constructed using neighbour-joining methods and maximum parsimony methods. The results suggest that Sauter's clubtail would be divided into the Southern Taiwan group and the Central-Northern-Eastern Taiwan group. The geographical distributional limit of these two groups is relatively fit for the previous specimen records, but we still need more specimens to assess the diagnostic characters.] Address: Lin, Sue-Cheng, Dept of Entomology, National Taiwan Univ., Taiwan

**13259.** Mäkinen, J. (2008): Idänkirsikorento *Sympecma paedisca* Lappeenrannassa [*Sympecma paedisca* recorded in Lappeenranta, SE Finland]. *Crenata* 1: 38-39. (in Finnish) [Just emerged specimens of *S. paedisca* were found in Lappeenranta on 10-13 August 2007 by Jouko and Jere Rantanen. This is the first confirmed case of this species breeding in Finland. Earlier only migrant specimens were known from the coastal areas of the Gulf of Finland. A few other records of this species are listed. (Matti Hämäläinen / Asmus Schröter)] Address:

Mäkinen, J., Metsänhoitajankatu 12 B 16, FI-00790 Helsinki, Finland

**13260.** Subramanian, K.A.; Ali, S.; Ramachandra, T.V. (2008): Odonata as indicators of riparian ecosystem health a case study from south western Karnataka, India. *Fraseria* (N.S.) 7: 83-95. (in English) ["The influence of riparian land use on the diversity and distribution were investigated by sampling 113 localities covering 4 districts in south-western Karnataka. A total of 55 species in 12 families were recorded. Streams, rivers and lakes had higher diversity than marshes and sea coast. However, lakes had low endemism than streams and rivers. Streams flowing through evergreen forests had higher diversity and endemism. Human impacted riparian zones such as paddy fields had relatively lower species richness. However, streams flowing through forestry plantations had higher diversity than other natural riparian zones such as dry deciduous, moist deciduous and semi evergreen forests. Myristica swamps - a relict evergreen forest marsh had low diversity and high endemism. Odonate communities of lentic ecosystems, and human impacted streams and rivers were characterized by widespread generalist species. Endemics and habitat specialists were. restricted to streams and rivers with undisturbed riparian zone. The study documents possible odonate community change due to human impact: The influence of riparian landuse change on odonate community is also discussed." (Authors)] Address: Subramanian, K.A., Zoological Survey of India, Western Regional Station, PUNE, Maharashtra-410044, India. E-mail: subbuka.zsi@gmail.com

**13261.** Torralba Burrial, A.; Outomuro, D.; Ocharan, F.J. (2008): De Monstruos & Prodigios (19): Dos ejemplares teratológicos de *Coenagrion puella* (Linnaeus, 1758) (Odonata: Coenagrionidae). *Boletín de la Sociedad Entomológica Aragonesa* 42(1): 352. (in Spanish) [Asturias, Spain; two cases of teratologies are demonstrated.] Address: Outomuro, D., Dept de Biología de Organismos y Sistemas, Universidad de Oviedo. 33071 Oviedo, Spain. E-mail: outomuro.david@gmail.com

## 2009

**13262.** Bouchard, R. W. (2009): Chapter 5. Odonata (Dragonflies & Damselflies). *Guide to Aquatic Invertebrate Families of Mongolia* | 2009: 63-74. (in English) ["The guide to Mongolian aquatic invertebrate families is modified from a guide developed for the Upper Midwest of North America. Most of the illustrations in both guides are from species that occur in North America and in many cases are not known from Mongolia. In addition, the keys were also originally developed with North American taxa in mind. Despite this, many of the families and even genera occur in both North America and Mongolia and most illustrations and characters used in keys should be appropriate. I have added families known from Mongolia that were not included in the guide to invertebrates in the

Upper Midwest of North America. However, corrections and additions may still be needed to make the guide complete and accurate for use in Mongolia." (Author) Drafts for all chapters are now available, see: <http://www.entomology.umn.edu/midge/Projects/Biodiversity/Mongolia/Mongoliaguide.htm>] Address: Bouchard, R.W., Univ. Minnesota, Dept Entomology, 219 Hodson Hall, 1980 Folwell Ave., St. Paul, MN 55108, USA

**13263.** Cupsa, D.; Birkas, M.; Telcean, I. (2009): Studies upon the structure and dynamics of the benthic macroinvertebrate communities from two habitats of The Ier River's Channel (Bihor county, Romania). *Bihorean Biologist* 3(1): 59-70. (in English) ["The aim of the present study was to describe the structure and dynamics of the macrozoobenthic communities on a sandy and muddy substrate from Ier Channel, in order to show the importance of the composition of the substratum in the macrozoobenthic community settlement. During the study period (May-October 2006) we identified 43 species and 884 individuals of benthic organisms, especially Gastropoda and insect larvae. The number of species and individuals exhibited high variability on the sandy substrate. Groups with high density were Gastropoda, Trichoptera and Chironomidae larvae. The most frequent groups were Hirudinea, Gastropoda, Bivalvia and Chironomidae larvae. The most abundant species were found to be tolerant to water pollution and the sensitive groups were missing. The diversity indices showed a more diverse community on the muddy substrate and the value of the IBGN index revealed a poor water quality. ...The Odonata species have low densities and excepting *Ischnura elegans* they were found accidentally." (Authors) Additional species recorded are *Coenagrion pulchellum*, *Lestes sponsa*, *Libellula quadrimaculata*, *L. depressa*, and *Sympetrum sanguineum*.] Address: Cupsa, Diana, Univ. of Oradea, Faculty of Sciences, Dept of Biology, 1 Universitatii str., 410087, Oradea, Romania. E-mail: dcupsa@uoradea.ro

**13264.** Mayer, W.; Turk, J. (2009): Kommentierte Artenliste der Libellen (Odonata) im NSG Kühkopf-Knoblochsaue und Umgebung. *Collurio* 27: 43-60, 63-68. (in German) [The local list includes 46 species of the Odonata fauna known from Hessen, Germany. Each species is briefly characterised and commented upon.] Address: not known

**13265.** Mitra, A. (2009): Dragonfly fauna of Bhutan – An annotated and updated Check-list with ten new records. *Fraseria* (N.S.) 7(1/2): 205-109. (in English) ["In eastern Bhutan, 18 species and subspecies of dragonflies were collected from the Kuruchu Reservoir area at Mongar, eight from Samdrup Jongkhar, one from Kanglung and one from Yongphula. From southern Bhutan, six species and subspecies were collected from Sarpang, five from Gelephu and eight from Tsirang. Ten species and subspecies of these are new to Bhutan and include *Pseudagrion rubriceps*, *Drepanosticta carmichaeli*, *Lestes dorothea*, *Neurobasis* ch. *chinensis*, *Scalmogomphus* bis-

trigatus, *Diplacodes nebulosa*, *D. lefebvrei*, *Trithemis pallidinervis*, *Tramea virginia* and *Urothemis signata signata*. *Aeshna p. petalura* was encountered for the first time although Tsuda reported its presence in 1991. Specimens are deposited at the museum maintained by the Department of Zoology, Sherubtse College, Kanglung, Bhutan. An up-to date check-list of 50 species and subspecies of dragonflies known from Bhutan is also provided." (Author)] Address: deceased

**13266.** Parr, M.J. (2009): Tribute to Professor Stephen Corbet (21 May 1929 -13 Feb. 2008) given following the opening ceremony at the 6th WDA International Congress of Odonatology, Xalapa, Mexico, 13 June 2009. *Agrion* 13(2): 88-89. (in English) [Obituary.] Address: Parr, M.J., Hele Barton, 9c St James's St., South Petherton, Somerset, TA13 5BS, UK. E-mail: mima37@tiscali.co.uk

**13267.** Rafi, M.A., Khan, M.R.; Zia, A.; Shehzad, A. (2009): Diversity of Odonata in District Poonch and Sudhnoti of Kashmir Valley - Pakistan, with a new record for the country. *Halteres* 1(1): 28-35. (in English) ["Detailed surveys were carried out from two districts viz. Poonch and Sudhnoti of Kashmir Valley during summer seasons of 2007 and 2008 to make an updated record of inhabiting Odonata. Ten localities were selected on the basis of variables keeping in view the habitat requirements of Odonata. The present study provides a record of 16 Anisopterous species spreading to 9 genera and 29 Zygopterous species spreading to 14 genera. Among these *Lestes patricia* is a new record for the country. The distribution, synonymy, richness and abundance of the species are discussed in this paper. The Kashmir Valley is rich in insect biodiversity, the odonate fauna of this valley needs to be further explored." (Authors)] Address: Rafi, M.A., National Insect Museum, National Agriculture Research Centre, Islamabad - Pakistan. E-mail: arafiam@yahoo.com

**13268.** Rahman, M.H.; Miah, M.J.U.; Ali, H.; Alam, M.S.; Islam, M.A. (2009): Effect of fertilizer on the qualitative and quantitative abundance of benthic fauna in ponds. *J. Agrofor. Environ.* 3(1): 25-28. (in English) ["The present research was conducted to assess the effects of added fertilizers on the qualitative and quantitative abundance of benthic fauna in ponds for a period of six months from August, 2008 to January, 2009 in the Bangladesh Agricultural University, Mymensingh, Bangladesh. All the experimental ponds were rectangular in shape, each with surface area of 44 m<sup>2</sup> and the average depth of water was 1m. Three treatments such as GM [Goat manure + Urea: 3000+50 kg/ha], SM (Sheep manure + Urea: 3000+50 kg/ha) and C (control) were run in duplicates. Fertilizers were used fortnightly and benthos samples were collected randomly from the ponds at monthly intervals. Seven groups of benthic fauna viz. Oligochaeta, Chironomidae, Ceratopogonidae, Mollusca, Ephemeroptera, Odonata and Hirudinea were recorded throughout

the experimental period. The total average number in the abundance of benthic fauna was recorded as (2196.09 ± 216.35/m<sup>2</sup>, 2108.49 ± 211.50/m<sup>2</sup> and 1397.36 ± 233.04/m<sup>2</sup>) in the treatments GM, SM and C respectively. The abundance of Oligochaeta and Chironomidae were found dominant with the treatments GM and SM in all the months during the whole study period. The maximum numbers of benthic fauna (2743.90 ± 457.32/m<sup>2</sup>, 2515.24 ± 228.66/m<sup>2</sup> and 1905.50 ± 228.66/m<sup>2</sup>) were found with the treatments GM, SM, and C respectively in August, 2008 and minimum (1676.84 ± 304.88/m<sup>2</sup>, 1600.62 ± 228.66/m<sup>2</sup> and 1219.52 ± 152.44/m<sup>2</sup>) were found with the treatments GM, SM and C respectively in January, 2009. The mean values of temperature (°C) [23.52 ± 1.78, 23.48 ± 1.82 and 23.70 ± 1.81], transparency (cm) [33.53 ± 0.90, 33.02 ± 0.89 and 33.08 ± 1.09], pH (8.03 ± 0.20, 8.18 ± 0.18 and 8.20 ± 0.19) and dissolved Oxygen (mg/l) [5.37 ± 0.35, 5.37 ± 0.37 and 5.67 ± 0.33] were found in the treatments GM, SM and C respectively. The fluctuations in abundance of benthic fauna were found to be more or less related with the pH, temperature, dissolved oxygen as well as transparency." (Authors)] Address: Rahman, M.H., Dept of Aquaculture, Dept of Fisheries Management, Bangladesh Agricultural University, Mymensingh

**13269.** Sánchez, A.; Pérez, J.; Jiménez, E. & Tovar, C. (2009): Los Odonatos de Extremadura. Clase insecta Orden Odonata. Junta de Extremadura, Consejería de Industria, Energía y Medio Ambiente (ed). Colección Medio Ambiente. ISBN: 978-84-606-4804-8: 339 pp. (in Spanish) [55 Odonata species have been recorded in the Spanish region Extremadura. In a monographic style, all species are presented together with data on morphology, phenology, legal protection status, biology and ecology of the species, habitat and regional distribution map. Addition chapters are directed to a general morphology and biology of the Odonata, including detailed figures and photographs and different aspects. A voluminous chapter approaches the conservation of dragonflies. In total, this is a sound handbook on the regional dragonfly fauna. A pdf of the book can be accessed at <http://extremambiente.gobex.es/files/bibliotecadigital/atlasodonatos.pdf>

## 2010

**13270.** Bellingan, T.A. (2010): The diversity of aquatic insects in the Tsitsikamma region, with implications for aquatic ecosystem conservation. MSc. thesis, Rhodes University, Grahamstown: XVI + 187 pp. (in English) ["As a result of research carried out within the last decade to assess the diversity of macroinvertebrates of the Salt River in the Western Cape Province, South Africa, surveys of macroinvertebrates of 20 sites on 11 selected rivers from the same mountain range source were undertaken. This was done to make a preliminary assessment of the conservation status of the rivers of this region. Aquatic insects from the orders Ephemeroptera, Odonata, Plecoptera, Megaloptera, Trichoptera and the dipteran family Simuliidae were collected using techniques to



maximize the number of taxa found. The insects collected were identified to species level where possible. Water physicochemical parameters were recorded at all sites for each sampling trip to characterize these rivers and to establish a set of baseline data for future comparisons. These parameters included measurements made on site and analysis of the concentrations of all the major ions in water samples in the laboratory. .. A total of 31 species were collected from 20 genera, from nine families. The most common species collected were *Orthetrum julia capicola* and *Allocnemis leucosticta*, both occurring at 17 sites, followed by *Pseudagrion furcigerum*, occurring at 14 sites. Three species of Synlestidae were the next most common species, *Chlorolestes conspicuus*, *Chlorolestes umbratus* and *Ecchlorolestes nylephtha* occurred at 12 sites each. Unique or uncommon species are difficult to distinguish as 14 of the species were collected at two sites or fewer, making nearly half of the total number of species collected "rare" with respect to this study. "] Address: Bellingan, T.A., Rhodes University, P.O. Box 94, Grahamstown 6140, South Africa

**13271.** Boudot, J.-P. (2010): Spécificités du peuplement en Odonates du nord de l'Afrique et observations récentes d'espèces remarquables (Insecta: Odonata). *Martinia* 26(3-4): 109-122. (in French, with English summary) ["The author summarizes the main distinctive features of the Odonata fauna in Africa North of the 17th parallel and comments the most noteworthy recent discoveries. An overall predominance of European and European-derived species is recognized, except in Egypt where the Palearctic component is strongly depressed and the Afro-tropical component enhanced thanks to the so-called "Nile corridor effect". Among the recently discovered or confirmed species, *Orthetrum machadoi* is new for the whole Palearctic realm, *O. ransonnetii* is new to the Northern Maghreb, *Sympetrum sinaiticum* is new to Morocco and the African part of Egypt, *Selysiothemis nigra* is new to Morocco, and *Agriocnemis sania* is new to the African part of Egypt." (Author)] Address: Boudot, J.-P., LIMOS, UMR CNRS 7137, Universités de Nancy, Faculté des Sciences, B.P. 239, F-54506 - Vandoeuvre-lès-Nancy Cedex, France. E-mail: jean-pierre.boudot@limos.uhp-nancy.fr

**13272.** Briggs, N.; Schneider, E.G.; Sones, J.; Puryear, K. (2010): Inventory of Odonata (Dragonflies and Damselflies) at Fire Island National Seashore. Natural Resources Technical Report NPS/NCBN/NRTR—2010/295. National Park Service. Fort Collins, CO: 78 pp. (in English) ["In order to expand knowledge of odonate biodiversity and to make recommendations for management, we conducted a comprehensive baseline inventory of Odonata at Fire Island National Seashore (FIIS), Suffolk County, New York. During 2004 and 2005 we conducted a checklist inventory at sites where odonates could potentially breed, as well as at potential migratory and foraging. Checklist walks are unrestricted, complete searches that provide an efficient means for initial determination of

species presence. During the combined 2004 and 2005 field seasons, 27 species of odonates were documented across 18 of the 34 sites surveyed. Two New York state listed species were observed, *Ischnura ramburii* and *Libellula needhamii*. Of the 847 individuals sighted during 2004 and 2005, 92 were collected as voucher specimens, representing 25 of the 27 species recorded. The most widely distributed species included *Anax junius*, *Erythrodiplax berenice*, *Libellula semifasciata*, and *Pantala hymenaea*. Of all sites surveyed during 2004 and 2005, Kismet Pond showed the greatest abundance ( $n = 481$  individuals) and species richness (0.85) of odonates. Migration events were not observed during odonate surveys; however, a migration event was documented by one researcher at Bellport Beach at the Otis Pike Wilderness Area during 2004. Overall, FIIS contains few habitats that are appropriate for odonate reproduction; however, several sites offer good foraging and migration habitat." (Authors)] Address: Briggs, Nina, Rhode Island Natural History Survey, P.O. Box 1858, Kingston, RI 02881, USA

**13273.** Buczyński, P.; Cichocki, W.; Rozwałka, R. (2010): Rediscovery of *Somatochlora alpestris* (Selys, 1840) and new locality of *S. arctica* (Zetterstedt, 1840) in the Orawa - Nowy Targ Basin (Odonata: Corduliidae). *Odonatrix* 6(2): 42-46. (in Polish, with English summary) ["During studies on spiders of high peat bogs in Orawa - Nowy Targ Basin (southern Poland), a few larvae of two *Somatochlora* species were caught in Barber's traps. Larvae were found in traps situated by the edges of peat bogs, in places without isolated water bodies, in patches of damp Sphagnum. *Somatochlora alpestris* was caught in Puścizna Wielka (49°27'N, 19°46'E, UTM: DV17) and Baligówka (49°28'N, 19°50'E, DV18) peat bogs. Both localities are situated at the height of ca. 650 m a.s.l. New data confirm the occurrence of the species in peat bogs in the Orawa - Nowy Targ Basin: the last record from 78 years ago was given by Fudakowski (1932). Taking into consideration small effectiveness of Barber's traps in collecting dragonflies, even so scarce material shows that *S. alpestris* can be present in the area numerously and in many sites, however, this needs to be verified on the field. This species does not react on climatic changes as *Aeshna caerulea* whose range of occurrence moved from 840 to ca. 1400 m a.s.l. Together with data about good condition of mountain populations of this species it proves the validity of shifting *S. alpestris* in the Red list of Dragonflies of Poland from EN category to NT. New locality of *Somatochlora arctica* is a nature reserve „Bór na Czerwonem" (49°27'N, 20°02'E, DV37). This site is important for the protection of this species for its acreage has become even more fragmented in Poland." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**13274.** Campos, F.; Santamaría, T.; Santos, E.; Velasco, T. (2010): Presencia de *Anax parthenope* (Selys, 1839)

(Odonata: Aeshnidae) en la provincia de Valladolid (España). Boletín de la S.E.A. 47: 382. (in Spanish) [15-VII-2010, Monasterio de Vega, province Valladolid, Spain (42°14'N 05°12'W, 768 m a.s.l., Fig. 1)] Address: Campos, A., Universidad Europea Miguel de Cervantes, Calle Padre Julio Chevalier, 2, E-47012 Valladolid, Spain. E-mail: campos@uemc.es

**13275.** Cuber, P. (2010): Lestids (Odonata: Zygoptera: Lestidae) rarely observed in Silesian Province. *Odonatrix* 6(2): 37-41. (in Polish, with English summary) [Poland; records of *Sympecma paedisca*, *Lestes dryas* and *Lestes barbarus* are documented. *S. paedisca* regularly occurs in the small reserve „Żabie Doły”; new localities were detected. Contrary to that, *Lestes dryas* and *L. barbarus* were recorded in smaller number and in fewer localities than it was in the past. The paper also documents an interspecific pairing between *S. paedisca* and *S. fusca*.] Address: Cuber, P., Śląski Uniwersytet Medyczny w Katowicach, Wydział Farmaceutyczny z Oddziałem Medycyny Laboratoryjnej w Sosnowcu, Zakład Parazytologii, ul. Jedności 8, 41-200 Sosnowiec, Poland. E-mail: piotrc10@op.pl

**13276.** Dejean, A.; Leroy, C.; Corbara, B.; Roux, O.; Céréghino, R.; Orivel, J.; Boulay, R. (2010): Arboreal ants use the "Velcro® principle" to capture very large prey. *PLoS ONE* 5 (6): 7 pp. (in English) ["Plant-ants live in a mutualistic association with host plants known as "myrmecophytes" that provide them with a nesting place and sometimes with extra-floral nectar (EFN) and/or food bodies (FBs); the ants can also attend sap-sucking Hemiptera for their honeydew. In return, plant-ants, like most other arboreal ants, protect their host plants from defoliators. To satisfy their nitrogen requirements, however, some have optimized their ability to capture prey in the restricted environment represented by the crowns of trees by using elaborate hunting techniques. In this study, we investigated the predatory behaviour of the ant *Azteca andreae* which is associated with the myrmecophyte *Cecropia obtusa*. We noted that up to 8350 ant workers per tree hide side-by-side beneath the leaf margins of their host plant with their mandibles open, waiting for insects to alight. The latter are immediately seized by their extremities, and then spread-eagled; nestmates are recruited to help stretch, carve up and transport prey. This group ambush hunting technique is particularly effective when the underside of the leaves is downy, as is the case for *C. obtusa*. In this case, the hook-shaped claws of the *A. andreae* workers and the velvet-like structure of the underside of the leaves combine to act like natural Velcro® that is reinforced by the group ambush strategy of the workers, allowing them to capture prey of up to 13,350 times the mean weight of a single worker." (Authors) The prey also includes a 10 cm large unidentified dragonfly.] Address: Dejean, A., Centre National de la Recherche Scientifique, Écologie des Forêts de Guyane (UMR-CNRS 8172), Campus Agronomique, Kourou, France, E-mail: alain.dejean@wanadoo.fr

**13277.** Duquef, Y.; Delasalle, J.-F.; Duquef, M. (2010): Le marais de Blangy-Tronville (Somme): 30 ans d'inventaires odonatologiques Synthèse et bilan 2010. *Martinia* 26(3-4): 71-80. (in French, with English summary) ["In the Picardie area (Somme department), the Blangy-Tronville marsh is located in the Somme valley. It includes a number of water bodies resulting from former peat extraction and shows a great floristic and faunistic value. The Odonatological surveys initiated in 1982 produced 38 species, among which *Oxygastra curtisii*. Records are shown according to chronology. Next studies will address the précisé status of the recorded species and will focus on the possible effects of climate global change." (Authors)] Address: Duquef, Y., 25 rue Paul Baroux, F-80440 Blangy-Tronville, France. E-mail: yannduquef@yahoo.fr

**13278.** Grand, D. (2010): Résumé du poster: Les Libellules endémiques de la Nouvelle-Calédonie. *Martinia* 26(3-4): 187. (in French) [This poster presentation deals on Odonata diversity of New Caledonia, an archipelago with a highly endemic odonate fauna.] Address: deceased

**13279.** Langford, T.; Jones, J.; Broadmeadow, S.; Armitage, P.; Shaw, P.; Davy-Bowker, J. (2010): 15 Biological diversity in New Forest streams. In: A. Newton eds. *Biodiversity in the New Forest*. Newbury, Berkshire, Pisces Publications. 248 pp: 157-171. (in English) [UK; the list of Odonata considers the following taxa: *Pyrrhosoma nymphula*, *Coenagrion puella* group (*C. puella*, *C. pulchellum*), *Calopteryx splendens*, *C. virgo*, *Cordulegaster boltonii*, *Aeshna mixta* group (*A. mixta*, *A. cyanea*), *Aeshna cyanea*, and *Orthetrum coerulescens*.] Address: Langford, T., Centre for Environmental Sciences, School of Civil Engineering and the Environment, Univ. of Southampton, Highfield, Southampton, Hampshire SO17 1BJ, UK

**13280.** Lohr, M. (2010): Libellen zweier europäischer Flusslandschaften. Besiedlungsdynamik und Habitatnutzung von Libellengemeinschaften am Unteren Allier (Frankreich) und an der Oberweser (Deutschland). *Arbeiten aus dem Institut für Landschaftsökologie Münster* 17: 183 pp. (in German, with French and English summaries) ["The odonates of two European fluvial landscapes - dynamics of colonisation and habitat selection by dragonfly assemblages in the alluvial floodplains of the Lower Allier (France) and the Upper Weser (Germany). The main aim of the present thesis is the description of the colonisation by dragonflies in alluvial floodplains of semi-natural and regulated rivers by the examples of the lower course of the place Allier (placecountry-region France) and the upper course of the place Weser (placecountry-region Germany). Therefore, spatio-temporal dynamics of the dragonfly assemblages is analysed. From the results recommendations for measures to regenerate alluvial floodplains are derived. The place Allier, where the study area is situated on its lower course («UR Allier»), is regarded as one of the last natural-like rivers of Central and place Western Europe due to a nearly unchanged morphological and hydrological dynamics. In

contrast, the place Upper Weser, where the study area «UR Weser" is situated, has been subject to deep anthropogenic changes since the Middle Ages. Beside river engineering measures, these changes also include water pollution by salts. Descriptions of the place Upper Weser from the 19th century permit the conclusion that the place Weser possessed comparable structures and was subject to a similar morphological dynamics as actually shown in the place Lower Allier. A total of 56 odonate species was recorded, 50 of them having been observed in the UR Allier and 43 in the UR Weser. Although the study areas show some climatic differences and the distance between them amounts to approximately 700 km, the proportion of species being present in both areas is high and currently comes up to 37 species. Three species found in the UR Allier appear in the appendix 2 of the FFH directive - *Coenagrion mercuriale*, *Oxygastra curtisii* and *Ophiogomphus cecilia*. The populations of *O. cecilia* observed in the UR Allier are probably the largest ones in Central and place Western Europe. In 1997, for the first time the species has been found in the UR Weser in the lower course of the river Diemel. Now it is probably autochthonous there. For 32 species the seasonal dynamics of emergence and flight periods in the UR Weser are characterised by phenograms. Therefore, the species are classified into six groups according to different types of life cycles. For *Ischnura elegans* and *Crocothemis erythraea*, evidences for a bivoltine development in at least some years were found. Observations of exceptionally early emergence of *Cordulegaster bidentata* point at a regulation of the emergence date by day length. Based on more than 10 000 data sets from the period of 1989-2005 the trends in occurrence of Odonata species are calculated and analysed for the UR Weser. A significant increase of occurrence can be stated for nine species, five species show a significant decline. A strong expansion of *Crocothemis erythraea* between 2000 and 2005 in the floodplain of the place Upper Weser is evident. This trend is part of an expansion of its distribution area in many parts of place Central Europe whereas the increase in occurrence of *Erythromma viridulum*, *Aeshna affinis* and *Gomphus pulchellus* is due to a regional outspread of these species. These positive trends must be regarded in context with the observed climate change, but should also have been advanced by an anthropogenic increase of habitat availability. Due to meteorological conditions *Sympetrum flaveolum* shows strong fluctuations. The negative trend in occurrence of *Lestes dryas* is a result of drought-effects on reproduction habitats due to lack of precipitation in some years. Founding on indicator and differential species eight different Odonata coenoses are described for the UR Allier on the basis of 61 sampling sites. The Odonata assemblages of 152 sampling sites in the UR Weser are classified to 16 coenoses. The coenosis of the main course of the place Allier is remarkable. Due to quasi-natural morphodynamical conditions it shows an exceptionally high species diversity of 19 species. Among others, six species of gomphids (*Gomphidae*) live in these habitats.

Considered as specialists of various sediments they can often be found side by side, although each species prefer habitats of different grain sizes. This is a consequence of the micro-spatial distribution of different sediments, which is typical of natural rivers. In contrast, the coenosis of the main course of the place Upper Weser has a very low diversity. Many species were probably only able to reproduce here since salt pollution had been reduced in the 1990s. For some species of gomphids settling in the place Allier, actually a positive trend in occurrence even in .strongly regulated rivers in place Central Europe is observed where current velocity is secondarily reduced between groynes. In the future, some of them could also appear in the place Upper Weser if salt pollution will decrease. Permanent waters of former secondary channels have a high species diversity in both study areas. In the UR Allier the coenosis of these waters can be differentiated according to the influence of cattle grazing. Alluvial ponds situated in pasture areas are colonized by thermophilous species like *Orthetrum albistylum* and *Coenagrion scitulum* due to a poor shading of their habitats. Besides, species preferring ponds with a low cover of vegetation like *Orthetrum brunneum* and *Ischnura pumilio* are found here. Ponds lacking influence of cattle grazing show both higher vegetation density and shading. Here, *Aeshna affinis*, *Lestes dryas* and *L. barbarus* are breeding. In the UR Weser, alluvial ponds of former secondary channels are subject to strong water level fluctuations. Permanent waters as well as shallow zones drying up temporarily are present. According to these conditions the coenosis has a high species diversity including 31 species. Here, species of permanent waters live beside several species with tolerance of habitat drying like *Aeshna affinis*, *Lestes dryas* and *Sympetrum flaveolum*. In these waters species with different habitat preferences can be found jointly due to high hydrological dynamics being typical of alluvial ponds. Exclusively in the UR Weser gravel pits were studied. Their coenoses can be differentiated by vegetation development and shading. Only waters with intermediate stages of succession show a high species richness due to vegetation diversity. In the UR Weser, *Crocothemis erythraea* and *Gomphus pulchellus* are exclusively found here. Because of very important water depths and steep banks, these features not being typical for alluvial water bodies, gravel pits are only exceptionally colonized by species characterising alluvial floodplains. The development of dragonfly assemblages in three re-deepened ponds in a former secondary channel of the UR Weser shows that even in regulated alluvial landscapes dynamic processes can 'be reactivated with low expenditure. Only a few years later structure diversity had been promoted by these restoration measures, the ponds were colonized by diverse dragonfly assemblages being typical of alluvial waters. The proximity of different waters is very important. Hereby, the species can select those ponds offering their preferred habitat conditions according to the actual meteorological situation. Recommendations for the development and the restoration of alluvial floodplains



can be derived from the results of the study and the analysis. The main aim of floodplain restoration is the re-activation of hydrological and morphological processes. Therefore, regeneration measures are proposed, these having to be adjusted to the individual conditions of the alluvial landscape." (Author)] Address: Lohr, M., Fachgebiet Landschaftsökologie und Naturschutz, An der Wilhelmshöhe 44, 37671 Hötter, Germany. E-mail: Mathias.Lohr@hs-owl.de

**13281.** Lorenzo-Carballa, M.O.; Beatty, C.D.; Cordero-Rivera, A. (2010): Parthenogenesis in islands insects: The case study of *Ischnura hastata* Say (Odonata, Coenagrionidae) in the Azores. In: Artur R. M. Serrano, Paulo A. V. Borges, Mário Boeiro and Pedro Oromí (eds.): Terrestrial arthropods of Macaronesia - Biodiversity, ecology and evolution. Sociedade Portuguesa de Entomologia: 199-230. (in English) ["Conclusions: Despite the a priori advantages that islands represent for parthenogenetic reproduction, such as isolation from sexual competitors and lower "biological accommodation", the evidence of parthenogenetic forms of otherwise sexually reproducing species found inhabiting islands is still anecdotal (but see Aguin-Pombo et al., 2006). The case of *I. hastata* however, represents a clear classical example of geographic parthenogenesis, with sexual populations widely distributed in the continent and all-female populations found at the Azores islands. Cuellar (1994) has pointed out the importance of differences in vagility between sexual and asexual forms as a possible reason why asexuals can establish. In his review, the evolution of flightlessness in sexuals is offered as an example of a way that parthenogens could outcompete sexual populations through rapid colonisation of an area that sexuals, while reproductively more competitive, cannot invade as quickly. Odonates are extremely vagile animals and some species, such as *Pantala flavescens*, are almost cosmopolitan. In the American continent. *I. hastata* acts as a colonizer and shows a widespread distribution. Genetic data support these observations and indicate that populations probably interchange migrants. These features could have prevented purely parthenogenetic populations for becoming established in the original species' distribution area. Furthermore. *I. hastata* has been found in the Galápagos Islands, where both males and females have been reported (Peck, 1992). Thus the Azorean *I. hastata* is the first and unique case where parthenogenetic forms of this species have established. The great distance between the Azores archipelago and the American continent may have prevented sexual *I. hastata* to arrive and outcompete parthenogenetic populations. Also, the habitat of the Azores islands contains few competitors and predation rates are low, as is the incidence of parasitism by water mites (Lorenzo-Carballa et al., 2011), which would benefit parthenogenetic populations in the long term. Parthenogenesis in *I. hastata* has probably evolved spontaneously from sexual reproduction, which raises the possibility of finding spontaneous/facultative parthenogenesis in sexual populations in other locations. An important goal

for future work is to study and quantify the tytoparthenogenetic capacities of otherwise sexual *I. hastata* females; which will permit us to determine the biotic and abiotic conditions under which parthenogenesis will prevail over sexual reproduction. Finally, it is important to note that chance has probably played a major role in the establishment of the parthenogenetic *I. hastata* populations in the Azores, which makes them a unique case within the order Odonata and stresses the importance of conserving these populations." (Authors)] Address: Lorenzo-Carballa, Olalla, Departamento de Ecología e Biología Animal, Grupo de Ecología Evolutiva e da Conservación, Universidade de Vigo, EUET Forestal, Campus Universitario, Pontevedra, España 36005, Spain. E-mail: olalla.lorenzo@uvigo.es

**13282.** Mazzoni, R.; Nery, L.L.; Iglesias-Rios, R. (2010): Ecologia e ontogenia da alimentação de *Astyanax janeiroensis* (Osteichthyes, Characidae) de um riacho costeiro do Sudeste do Brasil. *Biota Neotrop.* 10(3): 53-60. (in English, with Portuguese summary) ["In the present work we aimed to describe the spatio-temporal and ontogenetic variations of *Astyanax janeiroensis* diet in Ubatiba stream, a coastal fluvial system from Serra do Mar. We analyzed 540 specimens collected monthly during twelve months in six sites differing in the degree of vegetal cover (opened and closed sites). We verified that *A. janeiroensis* is an omnivorous species whose diet is largely based on autochthonous items. The estimated intestinal coefficient was 0.74 (+ 1.2), being compatible with an omnivorous behaviour. We did not register differences in the diet from dry and rainy seasons. Nonetheless, we found differences in the diet from opened and closed sites. We registered quite absolute predominance of autochthonous items in the diet from the closed sites, whereas, in the opened ones we found similar ingestion of allo- and autochthonous items. Concerning juveniles and adult specimens, we found differences in the consumption of animal and vegetal items with a relative reduction of animal ingestion among adult specimens. The intestinal coefficient of adult specimens was higher than that of juveniles, corroborating the diet results." (Authors) Diet includes regularly Odonata.] Address: Mazzoni, Rosana, Dept de Ecologia, Instituto de Biologia, Universidade Federal do Rio de Janeiro – UFRJ, CP 68020, Rio de Janeiro, RJ, Brasil. E-mail: mazzoni@uerj.br

**13283.** Santi, E.; Mari, E.; Piazzini, S.; Renzi, M.; Bacaro, G.; Maccherini, S. (2010): Dependence of animal diversity on plant diversity and environmental factors in farmland ponds. *Community Ecology* 11(2): 232-241. (in English) ["Farmland ponds represent habitats with a high conservation value that make a significant contribution to regional biodiversity. Understanding the influence of plant species composition and environmental variables in driving variations in animal species composition in ponds is an important issue in the fields of ecological research and conservation biology. Using variance partitioning techniques to quantify independent effects, we examined

how plant species composition, local-landscape configuration and physicochemical variables interact in influencing aquatic insect and amphibian community composition. The ponds investigated in this study were located in the Site of Community Importance — Special Protected Area (Natura 2000 Network) "Monte Labbro — Alta Valle dell'Albegna" (Tuscany, central Italy). Our results showed that: (i) plant community composition (such as *Carex hirta*, *Glyceria fluitans*, *Potamogeton natans*, *Typha latifolia*) is a good predictor for amphibian but not for aquatic insect species composition; (ii) aquatic insect species composition was more strongly affected by the landscape context, whereas for amphibians the local characteristics of the ponds were determining; (iii) the physicochemical context is a poor predictor for these animal taxa; (iv) lastly, and notably, the explanatory variables explained a high proportion of the total variation in amphibian and aquatic insect species composition. Our results have important implications with respect to the creation of new ponds, which should preferentially take place close to semi-natural grasslands and other wetlands, in order to maintain greater connectivity, and away from urban areas. Moreover, larger ponds are preferable for the preservation of pond biodiversity. The management and conservation of ponds is necessary to ensure the protection of habitats, the survival of individual species and overall pond biodiversity.... *Pyrrhosoma nymphula* and *Anax imperator* were positively correlated with the pond area, whereas *Orthetrum brunneum* and *Notonecta glauca* were negatively correlated with this factor. ...In contrast, *Ilyocoris cimicoides*, *Libellula depressa*, *Anax parthenope* and *Hyphydrus aubei* mainly occurred on sites situated at lower altitudes with a low cover of pastures. Ponds with higher frequencies of *Cloeon dipterum*, *Acilius sulcatus* and *Libellula quadrimaculata* were positively correlated with the presence of torrents (refuges). Finally, most of the aquatic insect species appear to be negatively correlated with high trampling intensity and high altitude." (Authors)] Address: Santi, Elisa, University of Siena BICONNET, Biodiversity and Conservation Network, Department of Environmental Science "G.Sarfatti" Via P.A. Mattioli 4 53100 Siena Italy. E-mail: elisa.santi @unisi.it

**13284.** Tończyk, G. (2010): Area of Poland as locus typicus for some dragonfly species. *Odonatrix* 6(1): 4-6. (in Polish, with English summary) ["In the year 1825 and 1840 Toussaint de Charpentier published two very important for European odonatology works describing new species of dragonflies. For 10 of them Śląsk (Silesia) was established as locus typicus, thus typical materials being the basis of species description came from the areas of Poland. Charpentier lived and worked in Brzeg, in the vicinities of Opole. Charpentier 1825: *Aeschna flavipes* = *Gomphus flavipes* (Charpentier, 1825); *Aeschna serpentina* = *Ophiogomphus cecilia* (Fourcroy, 1785); *Libellula bimaculata* = *Epithea bimaculata* (Charpentier, 1825); *Libellula pectoralis* = *Leucorrhinia pectoralis* (Charpentier, 1825); *Agrion hastulatum* = *Coenagrion hastulatum* (Charpentier, 1825). Charpentier 1840: *Agrion cyathigerum*

= *Enallagma cyathigerum* (Charpentier, 1840); *Agrion lunulatum* = *Coenagrion lunulatum* (Charpentier, 1840); *Agrion viridulum* = *Erythromma viridulum* (Charpentier, 1840); *Libellula striolata* = *Sympetrum striolatum* (Charpentier, 1840); *Libellula caudalis* = *Leucorrhinia caudalis* (Charpentier, 1840)." (Author)] Address: Tończyk, G., Katedra Zoologii Bezkręgowców i Hydrobiologii, Uniwersytet Łódzki, Banacha 12/16, 90-237 Łódź, Poland. E-mail: tonczyk.grzegorz@gmail.com

**13285.** Wildermuth, H. (2010): Weiterbildungsexkursion der Schweizerischen Arbeitsgemeinschaft für Libellenschutz SAGLS. *Entomo Helvetica* 3: 217-218. (in German) [20 odonatologists met at 20-VI-2009 to inform on habitat measures to promote Odonata in the Natur Sanctuary "Drumlinlandschaft Zürcher Oberland" between Wetzikon und Hinwil, Switzerland. The focus of measures is set on *Orthetrum coerulescens* and *Leucorrhinia pectoralis*.] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**13286.** Zandigiacomo, P.; Buian, F.M. (2010): Reperti di *Selysiothemis nigra* (Odonata, Libellulidae) lungo il litorale Alto-Adriatico. *Boll. Soc. Naturalisti "Silvia Zenari"*, Pordenone 34: 77-84. (in Italian, with English summary) ["In the period 2004-2010, adults of *S. nigra* were observed in four littoral sites of the Veneto and Friuli Venezia Giulia regions (north-eastern Italy). All these records indicate that *S. nigra* is recently naturalized in more zones of the High-Adriatic littoral permanently, confirming the trend of the species to expand its distribution area towards North. This new phenomenon could be associated to the modification of the behaviour of several Odonata species owing to the so-called 'climate change'." (Authors)] Address: Zandigiacomo, P., Dipt di Biologia e Protezione delle Piante, Università degli Studi di Udine, Italy. E-mail: pietro.zandigiacomo@uniud.it

## 2011

**13287.** Ameilia, Z.S (2011): The use of Odonata as bio-indicator in environmental systems. *Universitas Sumatera Utara*; <http://repository.usu.ac.id/handle/123456789/28385>: 9 pp. (in English, with Indonesian summary) [Sumatra, Indonesia; Petani Streams, Sibolangit: *Heliogomphus retroflexus*, *Pantala flavescens*. Manik Rambung rice fields: *Pseudagrion microcephalum*, *Ischnura senegalensis*, *Agriocnemis femina*, *A. pygmaea*, *Ictinogomphus acutus*, *Gomphidia abbotti*, *Potamarcha congener*, *Orthetrum sabina*, *Diplacodes trivialis*, *Crocothemis servilia*, *N. terminata*, *N. ramburii*, *Tholymis tillarga*, and *Pantala flavescens*.] Address: Ameilia, Z.S., Lecturer Dept. Pest and Disease, Faculty of Agriculture USU, Medan 20155, Malaysia

**13288.** Brotóns Padilla, M.; Ocharan Larrondo, F.J. (2011): Catálogo odonológico crítico de la provincia de Ciudad Real (centro de España) (Insecta: Odonata). *Boletín de la SEA* 49: 351-353. (in Spanish, with English

summary) ["Odonatological records from the province of Ciudad Real (central Spain) are very scarce. They are limited to the records of L. Navas from Pozuelo de Calatrava and three other localities, as well as some scattered records from other authors in 14 papers published later. This lack of data can be extrapolated to the entire Southern Plateau with the exception of Extremadura, i.e. the Castilla-La Mancha administrative region. The main aim of the present paper is to establish a critical catalogue of Odonata for this province as a basis for further work on this insect group." (Authors)] Address: Ocharan, F.J., Dept Biología de Organismos y Sistemas. Univ. de Oviedo. 33071 Oviedo, Spain. E-mail: focharan@uniovij

**13289.** Campos, F.; Velasco, T.; Sanchez, S.; Sanz, G.; Garcia, V. (2011): Primera cita de *Anax ephippiger* (Burmeister, 1839) (Odonata: Aeshnidae) en las provincias de Valladolid y Zamora, España. *Boletín de la S.E.A.* 48(1): 461-462. (in Spanish, with English summary) [2011; three new localities of *A. ephippiger* are documented. Habitat data include water quality readings.] Address: Campos, A., Universidad Europea Miguel de Cervantes, Calle Padre Julio Chevalier, 2, E-47012 Valladolid. E-mail: fcampos@uemc.es

**13290.** Cao, L.-z. (2011): Investigations on Libelluloidea for [sic] Odonata in Guizhou province. *Journal of Anhui Agricultural Sciences* 39(31): 19033-19035, 19056. (in Chinese, with English summary) [The list of libellulid dragonflies comprises of 39 species. The publication provides a key for the 16 genera, and detailed keys to Orthetrum and Sympetrum species. Common Chinese names for libellulid genera and Orthetrum and Sympetrum species are proposed.] Address: Cao, L.-z., Jiangxi Normal University, Nanchang, Jiangxi 330022, China

**13291.** Carr, J.; Climate Change Unit - IUCN Global Species Programme (2011): A synthesis of existing species data of the West Africa region. UNEP-WCMC technical report: 25 pp. (in English) [Available data for the African countries Chad, Niger, Nigeria, Benin, Togo, Ghana, Ivory Coast, Liberia, Sierra Leone, Guinea, Guinea Bissau, Gambia, Senegal, Mauritania, Mali, and Burkina Faso are condensed in maps with the following contents: Species richness (297 Odonata species), density map of threatened species (18 Odonata species), density map of regionally endemic species (36 Odonata species), and density map of nationally endemic species (10 Odonata species). No species details are given.] Address: UNEP World Conservation Monitoring Centre (UNEP-WCMC), 219 Huntingdon Road, Cambridge CB3 0DL, UK. E-mail: protectedareas@unep-wcmc.org

**13292.** Cochet, A. (2011): Androchromie partielle chez une femelle de *Trithemis annulata* (Palisot de Beauvois, 1807) (Odonata, Anisoptera: Libellulidae). *Martinia* 27(2): 138. (in French) [A female of *T. annulata* with male characters of the face was photographed near Mont de Marsan, Département Landes, France at 23-IX-2011.] Ad-

dress: Cochet, A., 27 rue Louis Saint Sevin, 40000 Mont de Marsan, France. E-mail: alain.cochet7@orange.fr

**13293.** Dow, R.A.; Reels, G.T. (2011): Odonata from a remnant patch of disturbed peat swamp forest on the outskirts of Kuching, west Sarawak. *Agrion* 15(2): 50-51. (in English) [Verbatim: Before large-scale human alterations began, much of the surroundings of what is now Kuching, the state capital of Sarawak, consisted of various types of swamp forest, including much peat swamp forest. Later, rubber was planted in parts of this swamp forest. MA Lieftinck (1953: 236), under the description of *Podolestes harrissoni*, gave an incomplete list of species collected in "an old rubber garden" on the Matang Road outside of Kuching, on September 22, 1950. This list included a number of apparently very scarce species (eg *Amphicnemis madelenae*, *Nannophyopsis chalcosoma* and *Pseudagrion optera diotoma*). Since Lieftinck's day Kuching has expanded considerably and there has been extensive development along the Matang Road, so that most of the peat swamp/old rubber habitat has gone. However, one patch remains, although probably not for much longer. Indeed, it may already have been bulldozed; we last passed the site in July 2010, when building work was occurring immediately adjacent to it. We first visited this site in January 2006, and made return visits in 2008 and 2010. The site is small, consisting of disturbed peat swamp with many old rubber trees that are still being tapped (on his last visit, RAD was ordered out of the site by machete-wielding rubber tappers). This site is at least near to Lieftinck's site, but remarkably we have collected a number of species not found by Lieftinck, illustrating the biodiversity of this kind of habitat in west Sarawak, and the extreme localisation of some species. Most notable of our discoveries at the Matang road was *Pachycypha* sp. cf. *aurea*. *P. aurea*, a tiny chlorocyphid, was described from the south of Kalimantan, and remains the only named species in the genus, which has not been recorded outside of Kalimantan until now. Despite the small size of the Matang Road site, it was not until May 2010 that we found this minute taxon, along one short section of a tiny stream. Both sexes descended from the canopy only in full sunlight, typically perching high. They were at low densities, and no interactions were observed between the sexes. They typically returned to the canopy almost immediately after the sun became obscured by clouds. A full list of the 26 species we have collected at the site is given below. Most of them were not listed by Lieftinck, but probably a number of these were actually collected by him; six species (at least) collected by Lieftinck were not collected by us. At least two of the species listed here are as yet unnamed; descriptions of both are being prepared by RAD.] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**13294.** Englund, R.A. (2011): Guam and Palau aquatic insect surveys. Contribution No. 2011-007 to the Pacific Biological Survey. Final Report. Prepared for: Southeast-



ern Ecological Science Center, U.S. Geological Survey, Gainesville, Florida: 21pp. (in English) ["From 15 to 26 March, 2010, collections of aquatic insects were made from freshwater habitats on the island Guam and the Republic of Palau. These surveys were part of a developing a regional biosecurity plan, and personnel from the Pacific Biological Survey of the Bishop Museum assisted scientists from the United States Geological Survey Southeast Ecological Science Center (USGS–SESC) based in Gainesville, Florida in obtaining data required for this plan. The results from these surveys will be used in conjunction with the USGS–SESC project entitled "Risk Analysis of Freshwater Nuisance Species Associated with Department of Defense Operations in Micronesia" that obtained critical baseline information regarding native and non–native freshwater invertebrates. The objective of these aquatic insect surveys was to provide a systematic inventory in selected streams on the islands Guam and in the Republic of Palau. Streams on both Guam and Palau were sampled for one week each. A total of 35 aquatic insect species were collected during surveys on Guam from 15–19 March, and 28 species were found on Palau from 21–26 March, 2010 (Tables 3–5). In the Republic of Palau, the vast majority of freshwater habitats are located on Babeldaob Island, so efforts were concentrated here. These results should be considered preliminary as this was a biological reconnaissance due to limited sampling time and effort for each site. However, this study does provide baseline information regarding particularly rich areas of biodiversity. Although reservoir habitats were assessed on Guam and Palau, lotic habitats were by far the most species-rich habitats. These surveys provided a baseline inventory of aquatic insect species present in each stream assessed and also ensured museum specimens will be available for future researchers. During the course of this study no obvious invasive aquatic invertebrates were observed in the streams sampled on Guam and Palau. All taxa identified to the species level were ascertained to be native species, and at least three species of aquatic Heteroptera on Guam were island endemics (*Limnogonus lundbladi*, *Microvelia mariannarum*, and *Saldula guamensis*). For Palau, a conservative estimate of finding at least 4 island endemics was made, including the three endemic damselflies (*Drepanosticta palauensis*, *Pseudagrion palauense*, and *Teinobasis palauensis*) and the gyrrinid (whirlygig) beetle. The identity of an *Ischnura* found in lentic habitats on Palau remains a mystery, but as it is not a widespread species such as *Ischnura aurora* or *Agriocnemis femina femina* it is likely that it at least is indigenous if not possibly endemic to Palau. The majority of endemism found during the present study was in relatively undisturbed forested watersheds that appeared to have little to no water diversions. Sampling areas around rifles/cascade areas were found to be particularly species rich. Streams above Fena Reservoir in the Naval Magazine such as the diverse Maulap River are currently strictly protected from development and human impacts, but uncontrolled feral animals such as water buffalo and

pigs could disturb the watershed to such an extent to impede water quality. Although feral animals did not appear to be a problem on Babeldaob, logging, increased agricultural development and water withdrawals are all potential future threats to maintaining a highly diverse and unique freshwater aquatic ecosystem on Palau." (Author) March 2010 Guam surveys: *Anax guttatus*, *Hemicordulia mindana*, *Diplacodes bipunctata*, *Orthetrum sabina*, *Pantala flavescens*, *Rhyothemis phyllis*, *Tholymis tillarga*, *Tramea transmarina*, *Agriocnemis* sp. undet., *Agriocnemis femina femina*, *Ischnura aurora*. Aquatic insect taxa observed and collected on Babeldaob Island during March 2010 Palau surveys: *Agriocnemis femina femina*, *Drepanosticta palauensis*, *Ischnura* sp. 1 undet., *Pseudagrion palauense*, *Teinobasis palauensis*, *Anax guttatus*, *Hemicordulia lulico*, *Diplacodes bipunctata*, *Neurothemis terminata*, *Orthetrum sabina*, *Pantala flavescens*, *Rhyothemis phyllis*, *Tholymis tillarga*, *Tramea transmarina*. Aquatic insect taxa observed and collected on Koror and Malakal Islands during March 2010 Palau surveys: *Agriocnemis femina femina*, *Teinobasis palauensis*, *Ischnura* sp. 1 undet., *Anax guttatus*, *Hemicordulia mindana*, *Diplacodes bipunctata*, *Neurothemis terminata*, *Orthetrum sabina*, *Pantala flavescens*, *Rhyothemis phyllis*, *Tholymis tillarga*, *Tramea transmarina*.] Address: Englund, R.A., J. Linsley Gressitt Center for Entomological Research, Bishop Museum, 1525 Bernice Street, Honolulu, Hawaii 96817, USA. E-mail: englund@bishopmuseum.org

**13295.** Futahashi, R. (2011): A revisional study of Japanese dragonflies based on DNA analysis (1). Tombo 53: 67-74. (in Japanese, with English summary) ["Phylogenetic analyses using DNA sequences of dragonflies have been increasing recently. Here I review the recent findings of phylogenetic relationships between each family of Odonata based on DNA analyses by foreign research groups, and introduce the classification of Japanese dragonflies based on my ongoing DNA analyses. Several studies reported that Zygoptera and Anisoptera (including Epiphlebiidae) are monophyletic, and Chlorogomphidae and Macromiidae are accepted at the family level. Corduliidae is confirmed as non-monophyletic clade, and among Japanese Corduliidae species, *Macromidia ishidaei* Asahina, 1964 belongs to a different family. Coenagrionidae is divided into two well-supported subdivisions. The first includes a group of coenagrionids mostly characterized by having an angulate frons (including *Ceriagrion* and *Nehalennia*), and the second division includes typical Coenagrionidae. From my nuclear DNA analysis of all Japanese species, *Rhipidolestes aculeatus* Ris 1912 and *Anotogaster sieboldii* (Selys 1854) were recovered as strongly diphyletic, suggesting that *R. a. yakusimensis* Asahina, 1951 should be accepted at species level, and the Yaeyama group of *A. sieboldii* should be regarded as the distinct species *A. flaveola* Lohmann, 1997. Within subspecies, *Orthetrum japonicum japonicum* (Uhler, 1858) and *O. j. internum* McLachlan, 1894 were recovered as deeply separated lineages. Together with differences in their larval characteristics, these two subspecies are better recog-

nized as distinct species as in Ishida (1996). In contrast, only a few differences were found between the following two combinations of allopatric species; *Planaeschna milnei* (Selys, 1883) and *Planaeschna naica* Ishida, 1994, *Somatochlora japonica* Matsumura, 1911 and *Somatochlora exuberata* Bartenev, 1912, and no differences were found between the allopatric species *Aeshna nigroflava* Martin, 1908 and *Aeshna crenata* Hagen, 1856, suggesting that the two species of each combination should be recognized as the same species. The advantage, points of caution, and usage of DNA analysis are also discussed." (Author)] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**13296.** Gathman, J.P.; Burton, T.M. (2011): A Great Lakes coastal wetland invertebrate community gradient: Relative influence of flooding regime and vegetation zonation. *Wetlands* 31(2): 329-341. (in English) ["Wetland invertebrate community composition is affected by habitat conditions associated with flooding regimes and vegetation characteristics, yet distinguishing among these influential factors is difficult because they tend to co-vary spatially. We studied a Great Lakes coastal wetland invertebrate community along an elevation gradient as Lake Huron water level rose and fell over a three-year period. This hydrologic variation caused changes in the gradient of flooding conditions, while plant zonation remained relatively unchanged. Multivariate analysis indicated that the invertebrate community varied continuously along the elevation gradient, and that it changed substantially within vegetation zones as water level changed. Variation across the gradient decreased because the high-elevation wet meadow community became more similar to lower-elevation communities as a result of upslope expansion in distributions of many taxa, and substantial increases in dominance of a subset of taxa. Invertebrate density increased dramatically with high-water conditions, and diversity decreased in general. Results suggested that invertebrate community composition was influenced by flooding conditions more than vegetation. These results may have important implications for conservation of high-elevation wetland zones as high-water refuges for wet-meadow invertebrates, and for coastal wetland monitoring schemes based on vegetation zones as habitat for particular invertebrate assemblages. ... Libellulidae (and, to a lesser extent, Aeshnidae) dragonfly nymphs became conspicuously abundant in the Year 3 wet meadow (and June hummock zone; see Table 3), even though water levels were dropping (Gathman 2000). Many of these nymphs were found dead in shallow, warm pools of water in depressions on the recently exposed wet meadow substrate. Stranded aquatic invertebrates are easy prey for birds and terrestrial animals, and may nutritionally supplement terrestrial communities" (Authors)] Address: Gathman, J.P., Dept of Biology, University of Wisconsin River Falls, River Falls, WI 54022, USA. E-mail: joseph.gathman@uwrf.edu

**13297.** Gniadkowski, J. (2011): Dragonfly (Odonata) in the nearby of Czestochowa. Part V. *Biuletyn Czestochowskiego Koła Entomologicznego* 10/11: 22-25. (in Polish, with English summary) [Poland; 25 Odonata species are documented. The list of records includes *Coenagrion hastulatum* and *Ophiogomphus cecilia*.] Address: Gniadkowski, J., ul. Oskara Lange 7/97, Czestochowa, Poland

**13298.** Harrison, J.F.; Kaiser, A.; Vanden Brooks, J.M. (2011): Atmospheric oxygen level and the evolution of insect body size. *Proceedings of the Royal Society B* 277(1690): 1937-1946. (in English) ["Insects are small relative to vertebrates, possibly owing to limitations or costs associated with their blind-ended tracheal respiratory system. The giant insects of the late Palaeozoic occurred when atmospheric PO<sub>2</sub> (aPO<sub>2</sub>) was hyperoxic, supporting a role for oxygen in the evolution of insect body size. The paucity of the insect fossil record and the complex interactions between atmospheric oxygen level, organisms and their communities makes it impossible to definitively accept or reject the historical oxygen-size link, and multiple alternative hypotheses exist. However, a variety of recent empirical findings support a link between oxygen and insect size, including: (i) most insects develop smaller body sizes in hypoxia, and some develop and evolve larger sizes in hyperoxia; (ii) insects developmentally and evolutionarily reduce their proportional investment in the tracheal system when living in higher aPO<sub>2</sub>, suggesting that there are significant costs associated with tracheal system structure and function; and (iii) larger insects invest more of their body in the tracheal system, potentially leading to greater effects of aPO<sub>2</sub> on larger insects. Together, these provide a wealth of plausible mechanisms by which tracheal oxygen delivery may be centrally involved in setting the relatively small size of insects and for hyperoxia-enabled Palaeozoic gigantism." (Authors) References to dragonflies are made.] Address: Harrison, J.F., School Life Sci., Arizona State Univ., Tempe, AZ 85287-4501, USA. E-mail: j.harrison@asu.edu

**13299.** Hochebner, T. (2011): Buchbesprechung: Libellen im Bezirk Melk. Wolfgang Schweighofer. Herausgegeben vom „Kuratorium zur Herausgabe einer Bezirkskunde für den Bezirk Melk“, Melk, 2011, 207 Seiten. *LANIUS-Information* 20(1/2): 18-19. (in German) [Review of the book. Publisher: Forschungsgemeinschaft LANIUS, Schlossgasse 3, 3620 Spitz an der Donau, Austria. E-mail: office@lanius.at] Address: not stated

**13300.** Hugo, C.D. (2011): The influence of fire and plantation management on wetlands on the Tsitsikamma plateau. MSc thesis, Nelson Mandela Metropolitan University: X + 81 pp + 2 app. (in English) [South Africa; "Conclusion: Dragonfly abundance of wetlands on the Tsitsikamma Plateau was low but considering the absence of surface water, species richness was still fairly high. Dragonfly abundance is expected to increase when the drought ends, but the pattern of the results are expected to remain the same in wetter conditions. Fire indirectly influences dragonfly species composition and abundance

by altering vegetation structure. Generally, in this study dragonfly abundance and species richness was higher in palustrine wetlands with old vegetation, which had not burnt for at least nine years. Thus, it is important that structural vegetation succession of wetlands can take place. This study found female dragonflies frequented the palustrine wetlands more than males, which suggests the importance of palustrine wetlands as a refuge habitat for female dragonflies, and thus highlights the need for their conservation and further research. The wetland habitats on the plateau likely play a vital role as refuge habitats for female dragonflies, aiding in population dynamics by serving as gene flow corridors and dispersal grounds." (Author)] Address: Hugo, Christine Denise, Botany Dept, Nelson Mandela Metropolitan Univ., P.O. Box 77000, Port Elizabeth 6031, South Africa. E-mail: cd.hugo@gmx.net

**13301.** Huon, F.; Dieu, E. (2011): Observations de *Coenagrion mercuriale* (Charpentier, 1840) et de *Cordulegaster boltonii* (Donovan, 1807) à Fontenay-le-Fleury (Département des Yvelines). *Martinia* 27(2): 139-140. (in French) [France; records of *C. mercuriale* and *C. boltonii* (30-VI-2010) are documented.] Address: Huon, Florent, 50, avenue de Villepreux, F-78340 Les-Clayes-Sous-Bois, France. E-mail: florent.huon@gmail.com

**13302.** Labinger, Z.; Gorney, E. (2011): Drawing Inspiration from the Hula Valley. Publisher: Artists for Nature Foundation & Society for the Protection of Nature in Israel: 192 pp. (in Trilingual essays and captions in English, Hebrew, and Arabic) ["The artwork in this book forms a unique portrait of the Hula Valley, an important agricultural region in northern Israel. This area is located at the crossroads of Eurasia and Africa and is situated along the Great Rift Valley. It is an area rich in wetlands, woodlands, open fields and mountains, and is a critical stopover, breeding, and wintering site for more than 300 bird species, 20 of which are globally threatened. An estimated 500 million birds pass through here while migrating, which is why the Hula Valley is currently being proposed as the largest UNESCO World Heritage Transnational Serial Nomination. The Israel Ornithological Center of the Society for the Protection of Nature in Israel (SPNI) teamed up with the International Artists for Nature Foundation (ANF) to produce this book. They brought together 34 artists from around the world to participate in two festivals held during the winter of 2008 and the spring of 2009. The reproductions of their works shows us the Hula Valley in all its splendour." (Publisher) The book includes three water colour pictures from Barry van Dusen and Bruce Pearson.] Address: <http://www.artistsfornature.com>

**13303.** Martín, R. (2011): *Coenagrion pulchellum* (Van der Linden, 1825) (Insecta, Odonata, Coenagrionidae) en la Península Ibérica. *Boletín de la S.E.A.* 48(1): 493-495. (in Spanish, with English summary) ["A number of damselflies resembling *Coenagrion pulchellum* were

found during a revision of the Odonata collection belonging to the Barcelona Museum of Natural History and after detailed study this initial impression was confirmed. The fact that this species resembles *Coenagrion puella*, and has probably been confused on numerous occasions, is discussed." (Author)] Address: Ricardo Martín, R., Grupo Oxygastra, Institució Catalana d'Història Natural, Carrer del Carme, 47, 08001 Barcelona, Spain. E-mail: info@oxygastra.org

**13304.** Rannap, R.; Kaart, T.; Briggs, L.; de Vries, W. (2011): Habitat requirements of *Pelobates fuscus* and *Leucorrhinia pectoralis*. Project report "Securing *Leucorrhinia pectoralis* and *Pelobates fuscus* in the northern distribution area in Estonia and Denmark" LIFE08NAT/EE/000257. Tallinn 2011: 23 pp. (in English) ["Discussion and conclusions - *Leucorrhinia pectoralis*: To determine habitat requirements of *L. pectoralis* only data from Estonia was used, because in Denmark just three sites with *L. pectoralis*' larvae were found during the inventory in 2010. This dragonfly species has declined sharply in the westernmost parts of its range and its present distribution is very patchy (Sahlén et al., 2004). Thus, knowledge on habitat demands of *L. pectoralis*, gained from Estonia, would be very useful for active habitat management planning in Denmark and in other Western and Central European countries (e.g. Germany, France, the Netherlands, Belgium, etc.) as well. In Estonia *L. pectoralis* preferred larger natural lakes with extensive shallow littoral zones and large swampy edges of moor vegetation for breeding. At the same time artificial man made ponds with generally small size and steep banks were avoided as reproduction sites for *L. pectoralis*. In many areas in Europe natural lakes surrounded by bogs and swamps have completely vanished or their number has decreased rapidly. If such sites still exist, it would be important to preserve those in a state as close to natural as possible. In the other hand, while planning actions of habitat management for *L. pectoralis* creation of large wetlands and restoration of large permanent depressions with depth variation and extensive littoral zones should be considered. In addition, tense network of natural water bodies (lakes, bogs, beaver floods, river flood plains etc) is essential to harbour a vital population of *L. pectoralis*. Therefore aquatic habitats should be created and restored in clusters. *Leucorrhinia pectoralis* favoured to reproduce in water bodies with peaty sediment and avoided water bodies with mud. The sediment type turned out essential for the species probably due to its influence to the water chemistry and macrophytes' community. Sediment type also indicates the species' preference to natural clean water bodies and avoidance of eutrophicated waters. Thus, when restoring or creating breeding sites for this species, sediment type should be taken into account and agricultural pollution as well as nutrient influx should be prevented. In accordance to earlier studies, breeding site selection of *L. pectoralis* was strongly associated with presence of macrophytes in the water body (Schindler et al. 2003, Sahlén et al., 2004). Less than 1



m tall vegetation cover, as well as presence of 20 Sphagnopsida and Bryopsida mosses associated positively with larval abundance of *L. pectoralis*. Water vegetation has various important functions for adults and larvae, which include concealment from predators (Askew 1982), substrate for egg deposition, larval habitat, as well as for mating and feeding perches (Buchwald 1992, Schindler et al. 2003). Presence of forest and bogs in the close vicinity of breeding site was essential for *L. pectoralis* and the shorter distance to the forest was favoured. Forest provides shelter for the adults. At the same time open areas and buildings had significantly negative influence on breeding site selection. As demonstrated by Chin and Taylor (2009) the dispersal ability in the genus *Leucorrhinia* was limited by open areas, particularly in short distances, whereas forest shelters acted as dispersal routes for the adults. Thus, breeding sites should be created near the woodlands and large open areas as well as urban areas should be avoided." (Authors) <http://www.keskkonnaamet.ee/public/galleries/dragonlife/HabitatrequirementsP.fuscusandL.pectoralis.pdf> Address: Not stated

**13305.** Rochlin, I.; Dempsey, M.E.; Iwanejko, T.; Ninivaggi, D.V. (2011): Aquatic insects of New York salt marsh associated with mosquito larval habitat and their potential utility as bioindicators. *Journal of Insect Science* 11(172): 1-17. (in English) ["The aquatic insect fauna of salt marshes is poorly characterized, with the possible exception of biting Diptera. Aquatic insects play a vital role in salt marsh ecology, and have great potential importance as biological indicators for assessing marsh health. In addition, they may be impacted by measures to control mosquitoes such as changes to the marsh habitat, altered hydrology, or the application of pesticides. Given these concerns, the goals of this study were to conduct the first taxonomic survey of salt marsh aquatic insects on Long Island, New York, USA and to evaluate their utility for non-target pesticide impacts and environmental biomonitoring. A total of 18 species from 11 families and five orders were collected repeatedly during the five month study period. Diptera was the most diverse order with nine species from four families, followed by Coleoptera with four species from two families, Heteroptera with three species from three families, then Odonata and the hexapod Collembola with one species each. Water boatmen, *Trichocorixa verticalis* Fieber (Heteroptera: Corixidae) and a shore fly, *Ephydra subopaca* Loew (Diptera: Ephydriidae), were the two most commonly encountered species. An additional six species; *Anurida maritime* Guérin-Méneville (Collembola: Neanuridae), *Mesovelina mulsanti* White (Heteroptera: Mesovelidae), *Enochrus hamiltoni* Horn (Coleoptera: Hydrophilidae), *Tropisternus quadristriatus* Horn (Coleoptera: Hydrophilidae), *Dasyhelea pseudocincta* Waugh & Wirth (Diptera: Ceratopogonidae), and *Brachydeutera argentata* Walker (Diptera: Ephydriidae), were found regularly. Together with the less common *Erythrodiplax berenice* Drury (Odonata: Libellulidae), these nine species were identified as the most

suitable candidates for pesticide and environmental impact monitoring due to abundance, position in the food chain, and extended seasonal occurrence. This study represents a first step towards developing an insect-based index of biological integrity for salt marsh health assessment." (Authors)] Address: Rochlin, I., Division of Vector Control, Suffolk County Dept of Public Works, 335 Yaphank Avenue, Yaphank, NY 11980-9744, USA. E-mail: [ilia.rochlin@suffolkcountynyny.gov](mailto:ilia.rochlin@suffolkcountynyny.gov)

**13306.** Sadeghi, S. (2011): A preliminary study of larval stage of Odonata in Fars province, description of full grown larva of genus *Anax* (Leach, 1815) and an identification key for the larvae. *Iranian Journal of Biology* 23(3): 468-477. (in Farsi, with English summary) ["Faunal study of Odonata of Fars province began for the first time in Iran at the department of biology, Shiraz University in 2002 (1380). According to the accessible references, no study on larval stage of Odonata of Iran was found till the time of this research. A total of 332 larvae, 229 of the Anisoptera and 103 of Zygoptera were collected in a year sampling. All these collected larvae are 14 genera, 9 belong to Anisoptera and 5 to Zygoptera which identified for the first time in Iran. Description of the full-grown larva of a species from genus *Anax* and a provisional key to the families and the last larval instar of the known 14 genera is given." (Author)] Address: Sadeghi S., Biol. Dept., Fac. of Science, Shiraz University, Shiraz, I.R. of Iran

**13307.** Sadeghi, S. (2011): An introduction to faunal study and checklist improvement of Fars province Odonata. *Journal of taxonomy and biosystematics* 2(5): 49-60. (in Farsi, with English summary) ["Faunal study of Odonata in Fars province began, in 1380 (2002) for the first time at the department of biology, Shiraz University, This article presents a part of the results of this study, which is related to their adult stage. According to accessible references, there was no other detailed study on this group of insects until this project started. In addition to some specimens which had been collected and kept at the Insect Collection of biology department, Shiraz Univ. (CBSU), during the past few years, several new collections of Odonata were also added to this study from different habitats of the province. A total of 650 adults, 264 of the suborder Anisoptera and 386 of the suborder Zygoptera were collected and identified during one-year sampling. Among 22 identified species, 15 species belonged to Anisoptera and 7 to Zygoptera. Nine species were reported from Fars province for the first time. Line drawings, photos and distribution maps of the species were prepared separately, some of them are presented in here as a sample." (Author)] Address: Sadeghi S., Biology Dept., Faculty of Science, Shiraz University, Shiraz, I.R. of Iran. E-mail: [ssadeghi@shirazu.ac.ir](mailto:ssadeghi@shirazu.ac.ir)

**13308.** van der Poorten, N. (2011): *Palpopleura s. sexmaculata* (Fabricius, 1787) deleted from the list of Odonates of Sri Lanka (Libellulidae). *Agrion* 15(2): 52-53. (in English) [The status of *P. sexmaculata* in Sri Lanka is

discussed in detail. As a consequence, it is deleted from the national checklist of Odonata.] Address: van der Poorten, Nancy, 17 Monkton Avenue, Toronto, Ontario, M8Z 4M9, Canada. E-mail: nmgvdp@gmail.com

**13309.** Van Ryswy, B. (2011): 2010 Hamilton Odonata Count. *The Wood Duck* 64(8): 172-174. (in English) [The seventh annual Hamilton Odonata Count was held on July 3, 2010; the study area comprises a circle of 15 miles in diameter, centred on the village of Kirkwall in Flamborough, Ontario, Canada. A total of 63 species were recorded bringing the local list to 84 Odonata species. New species for the count were: *Enallagma basidens*, *Boyeria vinosa*, *Gomphus graslinellus* and *Libellula incesta*.] Address: not stated

## 2012

**13310.** Bange, A. (2012): Kartierung der Libellenfauna an ausgewählten Gewässern der Insel Wangerooge. *Natur- und Umweltschutz (Zeitschrift Mellumrat)* 11(2): 53-57. (in German, with English summary) [Niedersachsen, Germany; "With a great diversity of small waters Wangerooge has ideal habitats going for relatively many species of dragonflies. During the monitoring at selected waters and random sightings of dragonflies in 2011 a total of 22 species could get confirmed. Of that 18 species are rated as indigenous. Probably because of the bad temporary weather conditions in late summer some of the for-coming dragonfly species might be underrepresented. All in all, 36 species are recorded for Wangerooge up to now together with the first records of *Sympetrum fonscolombii* and *Erythromma viridulum*." (Author)] Address: Bange, A., Lange Str. 16, 59505 Bad Sassendorf, Germany. E-mail: andreas-b.@web.de

**13311.** Belmar, O.; Velasco, J.; Gutiérrez-Cánovas, C.; Mellado-Díaz, A.; Millán, A.; Wood, P.J. (2012): The influence of natural flow regimes on macroinvertebrate assemblages in a semiarid Mediterranean basin. *Ecology* 6(3): 363-379. (in English) ["The investigation of flow-ecology relationships constitutes the basis for the development of environmental flow criteria. The need to understand hydrology-ecology linkages in natural systems has increased owing to the prospect of climate change and flow regime management, especially in water-scarce areas such as Mediterranean basins. Our research quantified the macroinvertebrate community response at family, genus and species level to natural flow regime dynamics in freshwater streams of a Mediterranean semiarid basin (Segura River, SE Spain) and identified the flow components that influence the composition and richness of biotic assemblages. Flow stability and minimum flows were the principal hydrological drivers of macroinvertebrate assemblages, whereas the magnitude of average and maximum flows had a limited effect. Perennial stable streams were characterized by flow sensitive lotic taxa (Ephemeroptera, Plecoptera and Trichoptera) and intermittent streams by predominately lentic

taxa (Odonata, Coleoptera, Heteroptera and Diptera). Relatively minor biological changes were recorded for intermediate flow regime classes along a gradient of flow stability. Seasonal variation and minimum flows are key hydrological components that need to be considered for river management and environmental flows in the Segura River basin and other Mediterranean basins. The anthropogenic modification of these parameters, due to both human activities and climate change, would probably lead to significant changes in the structure and composition of communities in perennial stable streams. This would be characterized by a reduction of flow sensitive Ephemeroptera, Plecoptera and Trichoptera taxa and an increase in more resilient Odonata, Coleoptera, Heteroptera and Diptera taxa." (Authors) Odonata are treated at genus level: *Anax*, *Boyeria*, *Calopteryx*, *Cercion*, *Ischnura*, *Pyrrhosoma*, *Cordulegaster*, *Gomphus*, *Onychogomphus*, *Libellula*, *Orthetrum*, *Sympetrum*, *Platycnemis*.] Address: Belmar, O., Department of Ecology and Hydrology, University of Murcia, Espinardo Campus, 30100 Murcia, Spain. E-mail: oscarbd@um.es

**13312.** Belvin, W.K.; Zander, M.E.; David W. Sleight, D.W.; Connell, J.; Holloway, N.; Palmieri, F. (2012): Materials, structures and manufacturing: An integrated approach to develop expandable structures. *American Institute of Aeronautics and Astronautics Paper 2012-1951, NF1676L-13247*: 14 pp. (in English) ["Membrane dominated space structures are lightweight and package efficiently for launch; however, they must be expanded (deployed) in-orbit to achieve the desired geometry. These expandable structural systems include solar sails, solar power arrays, antennas, and numerous other large aperture devices that are used to collect, reflect and/or transmit electromagnetic radiation. In this work, an integrated approach to development of thin-film damage tolerant membranes is explored using advanced manufacturing. Bioinspired hierarchical structures were printed on films using additive manufacturing to achieve improved tear resistance and to facilitate membrane deployment. High precision, robust expandable structures can be realized using materials that are both space durable and processable using additive manufacturing. Test results show this initial work produced higher tear resistance than neat film of equivalent mass. Future research and development opportunities for expandable structural systems designed using an integrated approach to structural design, manufacturing, and materials selection are discussed." (Authors) The paper includes many references to Odonata.] Address: Zander, M.E., Aerospace Engineer, Technische Universität Braunschweig & DLR German Aerospace Center, Institute of Composite Structures, Lilienthalplatz 7, 38108 Braunschweig, Germany

**13313.** Blackburn, M. (2012): Using aquatic macroinvertebrates as indicators of streamflow duration. *StreamflowdurationindicatorsIDWA2012Final06072012*: 17 pp. (in English) [USA, "The current paper identifies family-level aquatic macroinvertebrate communities that re-

spond to variations in streamflow duration in Idaho and Washington streams. The recommended taxa list will serve to compliment a multimetric assessment method designed to allow field practitioners to classify perennial, intermittent, and ephemeral stream habitats." (Authors) Larvae of Odonata are assessed as indicators as follows: 'Perennial': Gomphidae, Cordulegastridae, Calopterygidae; 'Intermittent': Lestidae; 'Ephemeral': none.] Address: U.S. Environmental Protection Agency, Oregon Operations Office, 805 SW Broadway, Suite 500, Portland, OR 97205, USA.

**13314.** Bruno, C.G.G. (2012): Assessment of heavy metal contamination in Brazilian savanna's streams using Odonata larvae as bioindicators. MSc. thesis. Federal University of Uberlandia. Uberlandia-MG. 92 pp. (in Portuguese, with English summary) ["The aquatic ecosystems are the main receptors of pollutants and contaminants from industrial and agricultural activities and of the discharge of sewage. Among the various substances potentially harmful, heavy metals are a threat to the aquatic ecosystems and the biota. This research aimed to evaluate the contamination of Cerrado's streams by heavy metals using Odonata's larvae as bioindicators, by analyzing biological parameters and evaluating the concentration of metals in the sediments and in the larvae. Samples were collected between October 2010 and August 2011. For the fauna, the abundance of individuals, richness of taxa and the diversity index of Shannon-Wiener (H') and Pielou's equity index (J) were calculated. The presence of metals in the sediment and in the larvae was measured by atomic absorption spectrometry and atomic emission spectrometry with inductively coupled plasma, respectively. Cluster analysis was performed for the set of streams for the concentrations of Cu, Zn, Ni, Fe and Mn in sediments, and concentrations of Cu, Zn and Ni in the sediment were compared with a table of guide values. Canonical Redundancy Analysis (RDA) was performed to discriminate metals that contributed most to the variance of the biological parameters. Significance of heavy metals on the fauna of Odonata was evaluated by Canonical Correspondence Analysis (CCA). A Principal Component Analysis (PCA) was performed to determine the most important patterns in the concentrations of Cu, Zn, Fe and Mn in the larvae and in the sediments and the bioaccumulation factor (BAF) was calculated to assess the potential for bioaccumulation of metals by the larvae. The Cluster analysis promoted the formation of groups of streams due to the greater or lesser concentration of heavy metals in the sediment which may have been influenced by the presence or absence of riparian vegetation and agricultural activities in the surrounding areas of the streams. The comparison with the table of guide values indicated that the streams which showed the highest concentrations of metals in the sediment were also those who had values above the limits given for at least one of the metals evaluated. The CCA indicated that most taxa of Odonata presented opposite distribution in relation to the vectors of heavy metals, while the family Libellulidae

was abundant in streams subject to greater anthropogenic influence. There was low similarity between the distribution patterns of the PCA diagrams for the sediment and larvae, which indicates the importance of assessments not only in the sediment, but also in the organisms for the achievement of results more efficient about heavy metal contamination. The BAF showed a tendency to bioaccumulation of Zn and Mn by the Gomphidae larvae, indicating that these metals are able to concentrate on its bodies, reflecting the environmental conditions where these organisms live and thus serving as important tools in biomonitoring studies. The results of this study emphasize the potential of the order Odonata for environmental studies, because they demonstrated to be able to reflect the conditions of their environment with respect to the concentration of heavy metals." (Author)] Address: Bruno, Cynthia; no stated

**13315.** Das, H.; Dutta, A. (2012): Effects of industrial effluents on ecology of a wetland of Nalbari district, Assam with special reference to ichthyofauna. The Ecoscan, Special issue 1: 147-153. (in English) ["Industrial effluents discharge into the water bodies is a major threat to the aquatic life. The wetland near District Industries and Commerce Centre (DIC) of Nalbari district provides a typical example of aquatic pollution due to industrial discharge. A study was undertaken during 2010-2011 to examine selected physico-chemical parameters of this wetland that receives effluents from different categories of small scale industries like aluminum utensil manufacturing industry, flour industry and mustered oil industry located at DIC. The water quality parameters that observed to estimate pollution level were temperature (18-25°C), colour (dark brown to blackish), odour (H<sub>2</sub>S like), DO (3.9-4.7 mg/L), FCO<sub>2</sub> (3.6-5.1 mg/L), pH (8.5-9.2), alkalinity (349-410 mg/L), total hardness (69-147 mg/L), chloride (58-67 mg/L). Among these water quality parameters certain parameters like temperature and total hardness were within the acceptable limit. However, others exceeded the acceptable range of sustainable fish growth. Effects of pollutants were studied on certain hardy fishes like *Channa gachua*, *Clarias batrachus* and *Anabas testudineus*. Industrial effluents affect the integument, gills and several organs of such fishes especially liver. Plankton and aquatic insects were also studied to throw some light on the indicator species." (Authors) *Urothemis signata*, *Dysphaea ethela*] Address: Das, H., Dept Zoology, Gauhati Univ., Guwahati - 781 014, India. E-mail: Hiteshdas11@gmail.com

**13316.** Day, L.; Farrell, D.; Gibert, E.; Günther, A.; Hämläinen, M.; Klimsa, E.; Korshunov, A.; Kosterin, O.; Noppadon, M.N.; Pelegrin, A.; Röder, U.; Ruangrong, R.; Vikhrev, N. (2012): New provincial records of Odonata from Thailand mostly based on photographs. *Agrion* 16(1): 16-25. (in English) [Records from 76 localities are documented.] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru



**13317.** Del Arco, A.I.; Ferreira, V.; Graça, M.A.S. (2012): The performance of biological indicators in assessing the ecological state of streams with varying catchment urbanisation levels in Coimbra, Portugal. *Limnetica* 31(1): 141-154. (in English) ["The performance of biological indicators in assessing the ecological state of streams with varying catchment urbanisation levels in Coimbra, Portugal The growth of human populations has resulted in the expansion of metropolitan areas and changes in land use, both of which affect watersheds and streams. The ecological integrity of streams is likely to be negatively affected by urbanisation, compromising freshwater ecosystem services. The aim of this study was to assess how efficient structural and functional indicators are in evaluating the ecological conditions of water in urban stream ecosystems. Two urban streams crossing the city and one stream crossing a suburban area of Coimbra, Portugal were selected. Total impervious area (TIA) was used as an indicator of urbanisation. Physical and chemical parameters of water were measured and analysed within the Water Framework Directive (WFD/2000/60/EC). Benthic macroinvertebrates were used as structural indicators, and the IBMWP biotic index (modified) and the Portuguese IPTIS index were calculated. The decomposition rates of oak (*Quercus robur*) and alder (*Alnus glutinosa*) leaves were used as indicators of functional quality. Biotic indices and litter decomposition rates indicated poor ecological conditions in the urban streams compared to the suburban stream, consistent with the degree of urbanisation. The decrease in ecological quality in urban streams most likely reflected decreases in dissolved oxygen and increases in water temperature and conductivity. We emphasise (a) the need to combine physical and chemical data with biological data and (b) the high performance of a novel functional indicator based on litter breakdown rate as an accurate, efficient and integrative measure of ecological integrity in urban streams." (Authors) The analysis also considers 'Cordulegaster' and 'Onychogomphus'.] Address: Del Arco, Ana Isabel, IMAR-CMA, Dept of Life Sciences, University of Coimbra, P.O. Box 3046, 3001-401Coimbra, Portugal. E-mail: aarco@ujaen.es

**13318.** Dunbier, J.R.; Wiederman, S.D.; O'Carroll, D.C. (2012): Predictive response facilitation to moving targets in an insect neuron. *Front. Behav. Neurosci.* Conference Abstract: Tenth International Congress of Neuroethology, College Park. Maryland USA, USA, 5 Aug - 10 Aug, 2012. doi: 10.3389/conf.fnbeh.2012.27.00234: (in English) ["Hemicordulia tau, is an efficient aerial insect predator. Much of their airborne behaviour is related to the pursuit of other flying insects, both conspecifics and prey. The dragonflies identify these target animals at distance against visually cluttered, dynamic backgrounds. Additionally this must all be separated from the motion signals generated by the dragonflies' movement through the world. The visual system of the dragonflies possesses numerous specialisations to facilitate these essential behaviors. Small target motion detecting (STMD) neurons have been identified in the lobula of several insect spe-

cies that engage in visual chase behaviors. This class of neurons respond robustly to small, discrete targets moving within a region of the visual field even in the presence of other non-target based motion [Nordström and O'Carroll 2009]. How do STMDs generate robust responses to target motion despite motion of other background features? Previous work from our lab shows that despite STMDs having a short absolute latency of response, response to the continuous motion of a discrete target increases to its maximum over several hundreds of milliseconds [Nordstrom et al 2011]. The dragonfly centrifugal small target motion detector, CSTMD1 is ideal for investigating the mechanisms underlying this response facilitation. We recently showed that disruption of the path into discontinuous paths abolishes facilitation in a manner predicted poorly by parsimonious physiological explanations for such a slow response, leading to the conclusion that facilitation must involve a higher order mechanism that is locally circumscribed [Dunbier et al 2011]. To test this hypothesis we presented CSTMD1 with controlled spatial, temporal and spatio-temporal discontinuities in target trajectories. Spatial displacements reveal the instantaneous extent of facilitatory spread to be limited to less than 21 degrees from the current target location. Temporal discontinuities revealed that the local response remains primed in that region for at least 500msec, longer in some cases. Most interesting of all we found that for a velocity matched spatio-temporal discontinuity (the equivalent of a target disappearing behind an obstruction), facilitation spreads away from the disappearance location to a greater degree than in the purely spatial discontinuities. i.e. responses at more distant locations that were not initially facilitated, become more so after a delay matching the predicted target speed. While our experiments reveal a fascinating, predictive mechanism for boosting the target response at expected future locations, it is not yet clear whether this subserves a boost in local target detectability amidst complex clutter, or a higher order mechanism of attention to a feature of interest (or both). ... References: Dunbier, Wiederman, Shoemaker & O'Carroll "Modelling the temporal response properties of an insect small target motion detector" *ISSNIP*. p.125. 2011. Geurten, Nordström, Sprayberry, Bolzon & O'Carroll. "Neural mechanisms underlying target detection in a dragonfly centrifugal neuron," *J. Exp. Biol.* 210, 3277–3284. 2007. Nordström & O'Carroll. "Feature detection and the hypercomplex property in insects" *Trends Neurosci.* 32, 383–391. 2009. Nordström, Bolzon & O'Carroll. "Spatial facilitation by a high-performance dragonfly target-detecting neuron," *Biol. Lett.* 7, 588-592. 2011. Conference: Tenth International Congress of Neuroethology, College Park. Maryland USA, USA, 5 Aug - 10 Aug, 2012.] Address: Dunbier, J.R., Univ. of Adelaide, School of Medical Sciences, Adelaide, SA 5005, Australia. E-mail: ames.dunbier@adelaide.edu.au

**13319.** Falico, D.A.; Lopez, J.A.; Antoniazzi, C.E. (2012): Opportunistic predation upon dragonflies by *Pseudis limellum* and *Pseudis paradoxa* (Anura: Hylidae) in the Gran

Chaco region, Argentina. *Herpetology Notes* 5: 215-217. (in English) ["On January the 7th, 2010 we manually captured 19 postmetamorphic *P. paradoxa* individuals (mean snout-vent length= 46.12 ± 2.46 mm) and 14 *P. limellum* individuals (mean snout-vent length = 18.06 ± 1.54 mm). All individuals were euthanized in situ and subsequently deposited in the herpetological reference collection of the National Institute of Limnology (INALI: CONICET-UNL). After dissection, the entire content of the gastrointestinal tract of each individual was analyzed under a microscope. To describe the diet, we calculated the hierarchic index of relative prey importance (IRI%), that combines prey numerosity (N), volume (V) and frequency of occurrence (FO) to obtain a general expression of the importance of each prey item (George and Hadley, 1979): Eighty-nine percent of the *P. paradoxa* (hereafter Pp) individuals and 79% of the *P. limellum* (hereafter Pl) individuals contained dietary remains. We identified 78 prey items (Pp = 41, Pl = 37) classified in 17 categories (Table 1). Odonata was the most important prey in both species. Diet similarity between species was high (Pjk=75.98%). However, post-hoc analysis revealed that odonates consumed by *P. paradoxa* were significantly larger than those consumed by *P. limellum* (Odonata length: unpaired t test, t13 = 5.12, p = 0.0002; Odonata width: unpaired t test, t13 = 10.284, p < 0.0001; Odonata volume: unpaired t test with Welch correction, Welch's approximate t7 = 7.471, p = 0.0001). ..... The high dietary overlap found in our study could potentially be attributed to a high temporary abundance of odonates during the sampling date (authors pers. obs.). Odonates are vulnerable to predation by anurans during oviposition, when reproducing individuals are in direct contact with the water surface, and during emergence, when larvae shed their skin (exuvia) as part of their metamorphosis to the adult stage (Rehfeldt, 1992; Worthen, 2010). The possibility of *P. limellum* and *P. paradoxa* to co-occur with an elevated diet overlap could therefore be facilitated by the temporary abundance of this food resource (i.e. summer dragonfly oviposition and emergence), variation in mean prey item size (larger frogs consumed larger dragonflies, probably a larger proportion of Anisoptera versus Zygoptera), and the high productivity of these wetlands (Seib and Lajmanovich, 2003-2004). For this reason, we proposed that, as *P. paradoxa* and *P. limellum* are generalist predators, they tend to opportunistically exploit temporary abundant prey - such as dragonflies during oviposition or emergence - which causes a temporary rise in 'taxonomic' diet overlap but likely results in minor food competition." (Authors)] Address: Falico, D.A., Instituto Nacional de Limnología (CONICET-UNL). Ciudad Univ., Paraje El Pozo, (3000) Santa Fe, Argentina. E-mail: jalopez@inali.unl.edu.ar

**13320.** Ferreira, R.B.; Schineider, J.A.P.; Teixeira, R.L. (2012): Diet, fecundity, and use of bromeliads by *Phyllodytes luteolus* (Anura: Hylidae) in southeastern Brazil. *Jour. Herpetology* 46(1): 19-24. (in English) ["This study explores the feeding ecology, habitat use, and fecundity of *Phyllodytes luteolus* inside bromeliads in the restinga

of Regência (sandy coastal plain), Espírito Santo state, southeastern Brazil. Because bromeliads are harvested for commercial use, and frogs may be collected accidentally, the ecology of this frog is of particular interest. We collected 363 individuals of *P. luteolus* (103 tadpoles, 74 juveniles, 64 males, and 122 females) from three species of bromeliads in a 4-km<sup>2</sup> area bimonthly from February to December of 1998. Ants and termites were the dominant food items in terms of number and mass over time. The percentage of prey items and the size of prey eaten by juveniles differed significantly from those of adults. Dominant prey items were relatively similar across the sampled bromeliad species and locations. *Phyllodytes luteolus* preferred *Vriesea procera*, the most-complex bromeliad in our study site. Half of the individuals were found in bromeliads located in transitional zones. Female *P. luteolus* were slightly larger than the males, which may have determined the strong sex ratio bias toward females. We found females with developed oocytes (range 11–15) in every sampled month, indicating a protracted spawning period. This frog can be considered an active forager and specialist, feeding preferentially on colonial insects. *Phyllodytes luteolus* uses several species of harvested bromeliads and possesses several attributes that could facilitate its success as an invasive species." (Authors) Odonata larvae were found in low numbers.] Address: Ferreira, R.B., Dept Wildland Res.s & Ecol. Center, Utah State Univ., Logan, Utah 84322–5230, USA. E-mail: rodrigoecologia@yahoo.com.br

**13321.** Fiorenza, T.; Chiandetti, I.; Del Bianco, C.; Maiorano, I.; Nadalon, G.; Uboni, C.; Zandigiacomo, P. (2012): Gli Odonati del Friuli Venezia Giulia: aggiornamento della checklist. *Bollettino Soc. Naturalisti "Silvia Zenari"*, Pordenone 36: 117-131. (in Italian, with English summary) ["The Odonata of the Friuli Venezia Giulia region: an updated checklist. During surveys carried out in 2012 in the context of the Project "Atlas of the Odonata of Friuli Venezia Giulia" (north-eastern Italy) the regional Odonatofauna list has been enriched with seven new species mainly found in mountain and hilly areas. Up to now, the new checklist includes 57 species. The new observed species are *Coenagrion hastulatum* and *Somatochlora arctica*, *S. meridionalis*, *Sympetrum meridionale*, *S. vulgatum*, *S. danae* and *Leucorrhinia dubia*. Notably, no specimens of *Nehalennia speciosa* were found in the Palude di Cima Corso biotope, therefore this species is present in the region (and in Italy) only in the Torbiera di Lazzacco biotope. All collected data will be useful in the development of projects in order to protect important biotopes for the conservation of threatened species." (Authors)] Address: Fiorenza, T., Via Morosina, 17/c, 33100 Udine, Italy. E-mail: tizianofiorenza@libero.it

**13322.** Gurumayum Shantabala, D.; Goswami, U.C. (2012): Spatial and seasonal distribution of macrobenthic fauna of three rivers of Manipur. *Indian journal of fisheries* 59(1): 37-42. (in English) ["Benthic fauna of three important rivers of Manipur state viz., Khuga, Thoubal and

Imphal were studied during 1999 - 2000. Macroinvertebrate zoobenthos population was low in all the rivers and was found between 85-1,255  $\mu\text{m}^{-2}$ . In Khuga (129-1,255  $\mu\text{m}^{-2}$ ) and Thoubal (173-1,100  $\mu\text{m}^{-2}$ ) rivers macroinvertebrate benthos population were poor to medium where as in the Imphal River all the three stretches studied showed lowered macroinvertebrate population (85-390  $\mu\text{m}^{-2}$ ). During pre-monsoon period there was maximum benthos density in both the stretches in Thoubal, Khuga and Imphal rivers, whereas in the middle stretches of Imphal River, maximum population was observed in post-monsoon. Upper stretch showed richer benthos population both in terms of density and species composition in Khuga and Thoubal rivers. In the Imphal River distinct spatial variation of macroinvertebrate benthos population was lacking, but species composition was richer in lower stretch. Altogether nine macrozoobenthic groups (including Odonata, without any details) were observed during the study and the details are presented in this paper." (Authors)] Address: Goswami, U.C, Department of Zoology, Gauhati University, Guwahati, Assam, India. E-mail : santaguru@rediffmail.com

**13323.** Hämäläinen, M. (2012): Vanha 1700-luvun sudenkorentohavainto Turusta. [An old dragonfly record from Turku made in 1700's]. *Crenata* 5: 38. (in Finnish) [A record of '*Libellula forcipata*' (probably referring to *Gomphus vulgatissimus*), observed in Turku on 12 June 1781 and 10 June 1782, was published in *Specimen calendarii florum et faunae Aboensis* by C.N. Hellenius and J.G. Justander in 1786. This is the second oldest dragonfly record published from Finland. (Matti Hämäläinen/Asmus Schröter)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: libellago@gmail.com

**13324.** Haslett, J.R. (2012): Development and future of conservation policy initiatives for insects and other invertebrates in Europe. In: New, R.T. (Ed.): *Insect Conservation: Past, Present and Prospects*. Springer Netherlands, Part 4: 317-337. (in English) ["The insect fauna of Europe and indeed the entire invertebrate fauna of the region has been subjected to an immense variety of severe changes of environmental conditions, habitat suitability and other threats to their existence. Most of these animals also remain at the bottom of the league in public profile and conservation status in modern European society and environmental policy." (Author) The paper includes references to Odonata.] Address: not stated

**13325.** Hazarika, H.; Goswami, M.M. (2012): Feeding behavior of *Diplonychus rusticus* Fabricius (Hemiptera, Belostomatidae) on fish and fish food. 2012 International Conference on Biological and Life Sciences 40: 136-140. (in English) [Gauhati University, Kamrup (Metro), Assam, India; "D. rusticus is one of the common aquatic insects inhabiting the freshwater habitats of Assam, India. An experimental approach has been used to study the predatory efficiency and feeding behaviour of this aquatic bug

in relation to individual density of 7 prey individuals of different size, namely fish species- *Catla catla* and *Puntius* sp., mosquito larvae- *Culex quinquefasciatus* (Diptera), Chironomid larvae- *Tendipes* sp. (Diptera), mayfly- *Baetis* sp. (Ephemeroptera), small aquatic beetle- *Amhiops pedestris* Sharp (Coleoptera) and Damselfly nymph- *Ischnura* sp. (Odonata) by separate feeding in aquaria in laboratory condition. The mean rank of consumption is calculated against each of the prey organism. Of the small size class the most consumed taxa is recorded as living spawn of *Catla catla* followed by the *Baetis* sp. Within the medium size class the most used taxa is the living forms of mosquito larvae which is closely followed by the living spawn of *Catla catla*. The results of the present laboratory experiments indicate the possible use of the aquatic bug as a biological control agent of mosquito vector under agro-climatic conditions of Assam, India. On the other hand, it shows significant negative role in the nurseries and rearing ponds of fish aquaculture system." (Authors)] Address: Hazarika, H., Darrang College, Tezpur, Assam, India. E-mail: hazarika.rabindra@gmail.com

**13326.** Horvath, J.; Ferenczi, M.; Móra, A.; Vad, C.F.; Ambrus, A.; Forró, L.; Szövényi, G.; Andrikovics, S. (2012): Invertebrate food sources for waterbirds provided by the reconstructed wetland of Nyirkai-Hany, northwestern Hungary. *Hydrobiologia* 697: 59-72. (in English) ["The Nyirkai-Hany wetland reconstruction area in northwestern Hungary is now designated as a Ramsar and a Natura 2000 site. It was created in 2001–2002 by the Fertő-Hanság National Park Directorate to restore a part of the formerly drained large wetland called Hanság and to offer waterbirds a suitable habitat for feeding and breeding. We focused on this aim of the restoration project and studied the temporal and spatial variation in abundance of birds and their invertebrate prey in this newly created wetland. From April 2007 until May 2008, we sampled plankton, nekton and benthos of different habitats monthly and monitored waterbirds weekly on the three different areas of the Nyirkai-Hany. During our investigations, 135 invertebrate and 53 waterbird species were recorded. Benthos and macrophyte decomposition accelerating guilds were the most abundant waterbird guilds—besides the dominant grazing importer material transporter guild, represented primarily by geese—in the Nyirkai-Hany. Zooplankton assemblages primarily consisted of small species not easily used as a food by planktivorous waterbirds. The low density of zoobenthic biomass and the small extent of shallow water mudflats probably accounted for the scarcity of the bioturbating guild group of birds. Nektonic biomass varied greatly among locations having different vegetation types, was greatest in the shallow water areas dominated by *Typha*, *Carex* and *Phragmites* species and lowest at offshore vegetation-free sites. Chironomids, mayflies and odonates were especially abundant and their biomass significantly correlated with several waterbird species, mainly belonging to the macrophyte decomposition accelerating guild (e.g. *Anas platyrhynchos*, *Fulica atra*). This guild itself, which has increa-



sed in abundance in recent years, showed an exceptionally strong correlation with odonate abundance. These results indicate the growing importance of the Nyirkai-Hany wetland area as a foraging site for waterbirds." (Authors) Odonata listed are: *Aeshna mixta*, *Anax* sp., *Brachytron pratense*, *Coenagrion puella*, *C. pulchellum*, *Ischnura elegans*, *Lestidae* sp., *Sympetma fusca*, and *Sympetrum vulgatum*.] Address: Horváth, Z., Department of Systematic Zoology and Ecology, Eötvös Loránd University, Pázmány Péter sétány 1/C, 1117 Budapest, Hungary. E-mail: hhzsofia@gmail.com

**13327.** Jones, O.M. (2012): The effects of SPINOSAD on *Culex quinquefasciatus* (Diptera: Culicidae) and non-target insect species. MSc thesis. Agricultural and Mechanical College, Department of Entomology, Graduate Faculty of the Louisiana State University: VI + 36. (in English) [USA "Spinosaad is a relatively new insecticide with a unique mode of action that is being valued for control of larval mosquitoes. Whereas a number of toxicological studies have measured effects of spinosaad on various mammals, fish, birds, and terrestrial arthropods, fewer studies have been conducted on the effects of spinosaad on non-target aquatic insect species. Such studies are important as these species might be found in the same environments as mosquito larvae targeted for control. A neighbourhood pond was surveyed to find a representative species of mosquito as well as other common aquatic insects with which to examine susceptibility to spinosaad and non-target effects. The mosquito species chosen was *Culex quinquefasciatus* and the most common non-target taxa were immature stages of a mayfly (*Caenis* spp., Ephemeroptera: Caenidae), a damselfly (*Ischnura* spp., Odonata: Coenagrionidae) and a dragonfly (*Pachydiplax longipennis*, Odonata: Libellulidae). Bioassays of mosquitoes from a reference susceptible strain (Sebring-S) and field-collections of *C. quinquefasciatus* were used to determine susceptibility to spinosaad. In addition, susceptibility was examined in nontarget taxa using spinosaad concentrations corresponding to the LC50 of a field-collected mosquitoes (0.031 ppm) and the labeled rate (1.6 ppm) of Natular®, an EC formulation of spinosaad. Susceptibility to spinosaad did not differ between Sebring-S and field-collected mosquitoes. However, there was a marked difference in susceptibility among non-target taxa. Susceptibility was greatest in *Caenis* spp., followed by *Ischnura* spp., then *P. longipennis*. Results from this study will allow better future management strategies for the use of spinosaad as a mosquito larvicidal agent." (Author)] Address: James Ottea, J., Dept of Entomology, Louisiana State University Agricultural Center, Baton Rouge, LA 70803, USA

**13328.** Kalninš, M. (2012): The dragonflies (Odonata) species composition changes, spatial distribution and their determining factors in Latvia. PhD thesis. Larvijas Universitate, Riga: 84 pp. (in bilingual in Latvian and English) ["Conclusions: (1.) In line with the latest investigations, there are 59 dragonfly species in Latvia. The

changes in Latvian dragonfly fauna in the last 20 years are related to the extension of southern species areas in the northern direction. In future 5 new dragonfly species may be identified in Latvia – *Lestes viridis*, *Erythromma viridulum*, *Aeshna affinis*, *Orthetrum coerulescens* and *Sympetma fusca*, while the total number of new species in a larger period of time might reach 12 species. The foreseen changes in the dragonfly fauna are related to the distribution of southern species in the northern direction. (2.) The distribution of separate dragonfly species in Latvia is very irregular, as Latvia lays in the periphery of the species' area (*Coenagrion johanssoni*) and due to disjunctive distribution of species habitat (*Gomphus flavipes*, *Aeshna subarctica*) and climate changes (*Anax parthenope*, *Sympetrum fonscolombii*, *Sympetrum pedemontanum*). (3.) The variety of dragonfly species found in raised bogs is increased by the presence of water pools in open landscape (less common are pools in pine groves). Low variety of species is found in wooded mire (wooded [pine groves] mire landscape with mounds and depressions) and open mire (open mire landscape with mounds and depressions, but with no water bodies or woods) habitats. For dragonflies, the most important structures are open water and *Ledum palustre*, *Vaccinium uliginosum*, *Calluna vulgaris* and *Andromeda polifolia* vegetation structures. (4.) In the research of river dragonflies Gomphidae it was found that *Gomphus vulgatissimus* is an ecologically flexible species and the highest density of population can be found in micro habitats with sand and mud (and lower speed of the stream). *Onychogomphus forcipatus*, on the other hand, is less flexible and the highest density of larvae population is found in micro habitats with gravel, pebbles and cobbles (and higher speed of the stream). For *Ophiogomphus cecilia* the density of larvae population is relatively low, but no specific micro habitats were identified in Latvia. (5.) In Latvia, contrary to other European countries, *Nehalennia speciosa* may populate both small and large water bodies, if the vegetation is appropriate for the species. The distribution of the species in Latvia is most likely determined by the climate – the level of moisture and continentality of the climate. Fundamental differences regarding the vegetation populated by the species and the size of populations were not established. (6.) *Aeshna subarctica* in Latvia populates raised bogs with water pools and lakes and lakes with fen and poor fen banks, but, unlike in other European countries, it is not found in peat quarries. The distribution of the species in Latvia is most likely determined by the climate – the level of moisture and continentality of the climate. Fundamental differences regarding the size of the populated water bodies and populations were not established. (7.) *Ophiogomphus cecilia* in Latvia populates similar river habitats as in other places in the species area. Unlike in case of the part of the species area on the south from Latvia, in Latvia the distribution of the species is more determined by the climate – the level of moisture and continentality of the climate. (8.) The population of *Leucorrhinia* family dragonflies in Latvia, in comparison with the population of this species

in other places in Europe, is quite small. *L. albifrons* are more often found in dystrophic (acidic) lakes and also habitats of anthropogenic origin; *L. caudalis* comparatively often can be found in oxbow lakes, which is more characteristic to the periphery of the species area; the number of new localities of *L. pectoralis* has grown considerably, despite the downward tendency in Europe. The habitats suitable for these species are characterized more by the vegetation of the habitat rather than its origin (naturalism)." (Author)] Address: Kalninš, M., Nature Conservation Agency, Baznicas iela 7, LV-2150, Sigulda, Siguldas novads, Latvia. E-mail: [martins.kalnins@biology.lv](mailto:martins.kalnins@biology.lv)

**13329.** Kalninš, M. (2012): The ecology and conservation of the Bog Hawker *Aeshna subarctica* Walker, 1908 (Odonata: Aeshnidae) in Latvia. *Latvijas Entomologs* 51: 40-57. (in English) ["*A. subarctica* is a declining and already regionally extinct species in some areas in Europe. Published and all known unpublished data have been used to present and analyse its distribution, population size, habitat selection, and conservation status. The distribution of *A. subarctica* has been mapped using a basic grid of 5x5 km squares in the Baltic grid system. In total, *A. subarctica* has been recorded from 21 squares and 21 localities occurring sparsely or in small concentrations over a large part of the country apart from its western territories. The majority of the recent localities are situated in northern and southern Latvia. The known pattern of the species' distribution partly results from the abundance and density of appropriate habitats and possibly a climatic influence. However, this also may be a consequence of an insufficient and uneven odonatological exploration of the country. *A. subarctica* has mostly been recorded in primary habitats in Latvia, such as raised bogs with bog pools, lakes and lakes within fens and bogs. The flight season of the *A. subarctica* in Latvia ranges mainly from August to September. The conservation measures are suggested." (Authors)] Address: Kalninš, M., Nature Conservation Agency, Baznicas iela 7, LV-2150, Sigulda, Siguldas novads, Latvia. E-mail: [martins.kalnins@biology.lv](mailto:martins.kalnins@biology.lv)

**13330.** Karube, H.; Futahashi, R.; Sasamoto, A.; Kawashima, I. (2012): Taxonomic revision of Japanese odonate species, based on nuclear and mitochondrial gene genealogies and morphological comparison with allied species. Part I. *Tombo* 54: 75-106. (in English, with Japanese summary) ["Current taxonomy of Japanese Odonata has been mainly based on the morphological differences in wing venation, male terminalia, and penis (secondary genital organ). We performed nuclear and mitochondrial DNA analyses of all Japanese Odonata species and subspecies, and found that the molecular phylogeny of some taxonomic groups did not agree with the traditional taxonomy. Here we discuss the taxonomy of several Japanese Odonata based on nuclear and mitochondrial DNA analyses including foreign material from neighboring areas along with morphological findings. We propose to revise the following six taxa. (1) *Boninagrion*

should be regarded as synonymous with *Ischnura*, (2) *Planaeschna naica* Ishida, 1994 should be downgraded to a subspecies of *P. milnei* (Selys, 1883), (3) *Aeshna nigroflava* Martin, 1908 should be a junior synonym of *A. crenata* Hagen, 1856, (4) *Anotogaster* "Yaeyama population" should be regarded as *A. klossi* Fraser, 1919, (5) *Somatochlora japonica* Matsumura, 1911 should be downgraded to a subspecies of *S. exuberata* Barteneff, 1910, and (6) *Orthetrum japonicum internum* McLachlan, 1894 should be regarded as a genuine species." (Authors)] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**13331.** Kuc, R.; Kuc, V. (2012): Bat wing air pressures may deflect prey structures to provide echo cues for detecting prey in clutter. *J. Acoust. Soc. Am.* 132(3): 1776-1779. (in English) ["Bats have remarkable echolocation capabilities to detect prey in darkness. While it is clear how bats do this for prey that is isolated, moving, or noisy, their ability to find still and quiet prey within clutter has remained a mystery. A video published by the ChiRoPing group shows the gleaning bat *Micronycteris microtis* capturing a still dragonfly specimen sitting on a leaf surface. While hovering over the dragonfly, the bat's wings exert air forces that cause the dragonfly wings to deflect in synchrony with the bat's wing beats. This paper illustrates that echoes from such deflecting wings vary in both amplitude and time-of-flight, producing robust echo cues that permit prey detection, even when the prey is embedded within clutter. Experiments with a dragonfly specimen mounted on a leaf driven by periodic air puffs produced wing deflections that were sensed with sonar pulses. Results demonstrate that echo variations synchronized with periodic air puffs are easily distinguishable from surrounding clutter, even when clutter produces the first echoes. These results suggest a strategy that bats can employ to detect still and silent prey embedded within cluttered environments." (Authors)] Address: Kuc, R., Dept of Electrical Engineering, Yale Univ., 15 Prospect Street, New Haven, Connecticut 06520-8284, USA. E-mail: [roman.kuc@yale.edu](mailto:roman.kuc@yale.edu)

**13332.** Lin, R.; Buijse, L.; Dimitrov, M.R.; Dohmen, P.; Kosol, S.; Maltby, L.; Roessink, I.; Sinkeldam, J.A.; Smidt, H.; Van Wijngaarden, R.P.A.; Brock, T.C.M. (2012): Effects of the fungicide metiram in outdoor freshwater microcosms: responses of invertebrates, primary producers and microbes. *Ecotoxicology* 21: 1550-1569. (in English) ["The ecological impact of the dithiocarbamate fungicide metiram was studied in outdoor freshwater microcosms, consisting of 14 enclosures placed in an experimental ditch. The microcosms were treated three times (interval 7 days) with the formulated product BAS 222 28F (Poliram). Intended metiram concentrations in the overlying water were 0, 4, 12, 36, 108 and 324 lg a.i./L. Responses of zooplankton, macroinvertebrates, phytoplankton, macrophytes, microbes and community metabolism endpoints were investigated. Dissipation half-life (DT50) of metiram was approximately 1–6 h in the water column of

the microcosm test system and the metabolites formed were not persistent. Multivariate analysis indicated treatment-related effects on the zooplankton (NOECcommunity = 36 lg a.i./L). Consistent treatment-related effects on the phytoplankton and macroinvertebrate communities and on the sediment microbial community could not be demonstrated or were minor. There was no evidence that metiram affected the biomass, abundance or functioning of aquatic hyphomycetes on decomposing alder leaves. The most sensitive populations in the microcosms comprised representatives of Rotifera with a NOEC of 12 lg a.i./L on isolated sampling days and a NOEC of 36 lg a.i./L on consecutive samplings. At the highest treatment-level populations of Copepoda (zooplankton) and the blue-green alga *Anabaena* (phytoplankton) also showed a short-term decline on consecutive sampling days (NOEC = 108 lg a.i./L). Indirect effects in the form of short-term increases in the abundance of a few macroinvertebrate and several phytoplankton taxa were also observed. The overall community and population level no-observed-effect concentration (NOECmicrocosm) was 12–36 lg a.i./L. At higher treatment levels, including the test systems that received the highest dose, ecological recovery of affected measurement endpoints was fast (effect period 8 weeks)." (Authors) Anisoptera, Zygoptera] Address: Lin, R., Alterra, Wageningen University and Research Centre, PO Box 47, 6700 AA, Wageningen, The Netherlands. E-mail: theo.brock@wur.nl

**13333.** Lobón-Cerviá, J.; Rezende, C.F.; Castellanos, C. (2012): High species diversity and low density typify drift and benthos composition in Neotropical streams. *Fundamental and Applied Limnology* 181(2): 129-142. (in English) [oas 40;" We hypothesized that Neotropical streams might exhibit higher drift and benthos densities than their Palearctic counterparts in order to sustain the high diversity of drift-and benthos-feeding fish species that typify this vast region. We assessed drift and benthos composition in two pristine streams deemed to represent the two less documented Neotropical regions: Rio Amazonas (i.e., Yahuaraca) and Coastal Serra do Mar (i.e., Mato Grosso). Four monthly benthos and drift samples were collected over diel cycles in the rainy and dry seasons. Although the two streams showed remarkably low drift and benthos densities, in Mato Grosso benthos density was markedly higher. The same aquatic families predominate in the drift and benthos of the two streams. High taxonomic richness, low drift density, consistent diel cycles with a peak just after dusk, higher density during the night and temporal changes unrelated to seasonality typify drift composition of the two streams. Although drift densities were lower in Yahuaraca, the dominant families did exhibit drift behaviour, with two drift peaks at night. In Mato Grosso only Baetidae showed such behavioural drift with density peaks at night; other families demonstrated passive drift. Overall, these results refute our hypothesis that Neotropical streams should exhibit higher drift and benthos densities. Actually these pristine streams show among the lowest drift and benthos densi-

ty values worldwide." (Authors) Drifted specimens also contained a few Odonata specimens from several different families.] Address: Lobón-Cerviá, J., Museo Nac. de Ciencias Naturales (CSIC), C/ José Gutiérrez Abascal, 2. Madrid 28006 Spain. E-mail: MCNL178@mncn.csic.es

**13334.** Maradova, M.; Soldán, T. (2012): Effect of meander restoration on macroinvertebrate biodiversity: the case of the Borová stream (Blanský Les, Czech Republic). *Silva Gabreta* 18(1): 1-21. (in English) ["This study brings a view on the effects of restoration of a formerly channelized small submontane stream situated in the Blanský Les Protected Landscape Area (South Bohemia, Czech Republic) on macroinvertebrate assemblages as an indicator group. The restoration project was carried out during two stages (1998 and 2000). It consisted of excavating a new channel to restore the historic meandering pattern. The evaluation of this project is primarily based on the comparison of composition between pre-restoration (1995) and post-restoration (2000–2003) macroinvertebrate samples focusing on species richness, species composition, and representation of rare Ephemeroptera and Plecoptera species. The analyses showed a substantial increase in species richness that was especially prominent shortly after the restoration intervention. This increase was not only due to the creation of lentic habitats, but was even observed at every single sampling site of the stream. The DCA ordination of species composition of the pre- and post-restoration sites indicated a considerable increase in the between-site diversity. This was apparently caused mainly by the establishing of lentic habitats, whereas diversity of lotic sites showed only a slight increase, which was most prominent during the last year of the sampling period. The shift in the species composition was profound for lotic sites as well. Although the restoration intervention considerably increased species richness and markedly changed species composition, there was no detectable increase of rare or vulnerable Ephemeroptera and Plecoptera species." (Authors) The restoration resulted in a complete loss of all dragonfly species.] Address: Maradova, Monika, Anglo-Czech High School, Trebízského 1010, 37006 České Budejovice, Czech Republic. E-mail: m.maradova@seznam.cz

**13335.** Marinov, M.; Theischinger, G. (2012): Description of two new aeshnids from Solomon Islands (Anisoptera: Aeshnidae). *International Dragonfly Fund - Report 53*: 1-8. (in English) ["Two new species, *Agyrtacantha browni* and *Gynacantha amphora*, are described, illustrated and compared to closely related congeners. The male holotypes (Kongulae Village, Guadalcanal Island, Solomon Islands, 26 April 2012) are deposited at the Nationaal Natuurhistorische Museum, Leiden, The Netherlands." (Authors)] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@mpi.govt.nz

**13336.** Maynou i Señé, X. (2012): L'Odonatofauna (Insecta: Odonata) de la conca del riu Flamisell (Pirineus



centrals). *Arxius - Butlletí de la Institució Catalana d'Història Natural* 76: 105-121. (in Catalanian, with Spanish and English summaries) [Spain; "The basin of the Flamisell river, a tributary of the Noguera Pallaresa river, was surveyed and a preliminary list of the dragonfly species present and of the main types of habitats where they reproduce was obtained. In this study, a total of 37 species were recorded. In the alpine and subalpine glacial lakes area no dragonflies were detected except in some small shallow lakes and ponds, where holarctic species *Enallagma cyathigerum* and *Aeshna juncea* were found. In the lotic habitats, the species related with high fluvial ecological status *Calopteryx virgo meridionalis*, *Boyeria irene*, *Onychogomphus uncatulus* and *Cordulegaster boltonii* were found to be widely distributed. The marginal marshy habitats of the Montcortès carstic lake were identified as a biodiversity hotspot for dragonflies in Catalonia since they support a rich assembly of 25 species. Finally, a monitoring scheme of the dragonfly communities in their characteristic habitats is proposed in order to detect possible impacts of the growing resort and real state development in the Flamisell river basin." (Author)] Address: Maynou i Señé, X., C. del Dr. Salvà, 23. 08224 Terrassa. A/e, Spain. E-mail: xavier.maynou@gmail.com

**13337.** Mochon, A. (2012): Découverte de la libellule pachydiplax au Québec durant l'inventaire de l'odonatofaune du ruisseau Castagne en Montérégie. *Le Naturaliste canadien* 136(3): 49-59. (in French) [In July and August 2011, *Pachydiplax longipennis* was recorded as the 140th Québec-Odonata species near Saint-Joachim-de-Sheffield, Montérégie, Canada.] Address: Mochon, A. E-mail: mochon.alain@sepaq.com

**13338.** Morante, T.; Garcia-Arberas, L.; Anton, A.; Rallo, A. (2012): Macroinvertebrate biomass estimates in Cantabrian streams and relationship with brown trout (*Salmo trutta*) populations. *Limnetica* 31(1): 85-94. (in English) ["Macroinvertebrate biomass estimates in Cantabrian streams and relationship with brown trout (*Salmo trutta*) populations In this work, the average biomass of 80 relatively common families of benthic macroinvertebrates in the streams of the Biscay region (Basque Country, northern Iberian Peninsula) was estimated. The macroinvertebrates were collected using a kick net and preserved alive in cool aerated stream water. The fresh weight, dry weight, and ash-free dry weight (AFDW) were obtained for each family. The biomass values obtained were applied to more than a hundred macroinvertebrate samples collected from 1997 to 2006 in 17 stretches of 14 rivers inhabited by brown trout. The total and partial biomass of each sample was estimated. Significant differences in the density ( $F = 2.91$ ;  $df = 16, 100$ ;  $P < 0.001$ ) and biomass ( $F = 6.52$ ;  $df = 16, 100$ ;  $P < 0.001$ ) of the macroinvertebrates occurred among the stations, with up to a 11-fold and 17-fold range, respectively. The brown trout population size was positively correlated to both the macroinvertebrate abundance and biomass. By age classes, this relationship was significant for only the 1+ and 2+ trout.

The AFDW metric is recommended because it represents the real organic biomass value that joins the trophic food chain, avoiding an overestimation of the energy contribution of taxa with shells or cases. The Gammaridae had higher values of AFDW than expected, due to their high content of organic matter. A positive selection of gammarids by the trout was also observed in some cases." (Authors) The analysis includes Odonata without further details.] Address: Morante, T., Dept Zoology and Animal Cell Biology. Faculty of Science and Technology. University of the Basque Country. P.O. BOX 644 4808 Bilbao, Spain. E-mail: morante.tamara@gmail.com

**13339.** Ocharan, R.; Ocharan, F.J.; Torralba-Burial, A. (2012): Primeras citas de *Anax parthenope* (Selys, 1839) (Odonata: Aeshnidae) en Asturias (N España). *Boln. Asoc. esp. Ent.* 36 (3-4): 465-467. (in Spanish, with English title) [First records of *Anax parthenope* in Asturias (N Spain). A male was recorded near the reservoir of La Furta (Nubledo, Corvera de Asturias, 30TTP6723, 40 m s.n.m.) at 22-VII-1994 (leg. R. Ocharan). A female was recorded near Avilés (30TTP62) at 16-VIII-2006 (leg. A. Vivas).] Address: Ocharan, F.J., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain: E-mail: focharan@uniovi.es

**13340.** Parr, A. (2012): Odonata recording in Suffolk during 2011. *Trans. Suffolk Nat. Soc.* 48: 102-103. (in English) [Records of *Chalcolestes viridis*, *Libellula fulva*, *Platycnemis pennipes*, *Brachytron pratense*, *Coenagrion pulchellum*, *Anax ephippiger*, and *Sympetrum fonscolombii* are discussed.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**13341.** Peck, S.B. (2012): CDF Checklist of Galapagos Dragonflies and Damselflies - FCD Lista de especies de Libélulas, caballitos del diablo de Galápagos. In: Bunggartz, F., Herrera, H., Jaramillo, P., Tirado, N., Jiménez-Uzcátegui, G., Ruiz, D., Guézou, A. Ziemmeck, F. (eds.). Charles Darwin Foundation Galapagos Species Checklist - Lista de Especies de Galápagos de la Fundación Charles Darwin. Charles Darwin Foundation / Fundación Charles Darwin, Puerto Ayora, Galapagos: <http://checklists.datazone.darwinfoundation.org/terrestrial-invertebrates/odonata/> Last updated 03 Jul 2012.: 2 pp. (in English) [Considering published data until 2001, a total of ten Odonata species from Galapagos archipelago is documented.] Address: not stated

**13342.** Richman, D.B.; O'Keefe, W. (2012): Life on a high isolated mountain: the arthropod fauna of Mt. Taylor, Cibola county, New Mexico. *Zoological Studies* 51(6): 793-803. (in English) ["The arthropod fauna of Mt. Taylor, New Mexico at 2874-3445 m (9424-11,300 ft) was examined by pitfall trapping, and to a lesser extent by pan trapping and hand collection between 1997 and 2008, with continuous pitfall trapping in 1997-2000. This fauna was characteristically Canadian in nature (as might be

expected as the area covers Canadian and Hudsonian life zones with a tiny area of Arctic-Alpine at the top of the peak's north face; see Price 1997), but also contained unique elements such as a then-undescribed species of trapdoor spider (Araneae: Cyrtacheniidae) from the pitfall traps (described as *Neoapachella rothi* Bond and Opell in 2002) and a still-undescribed jumping spider of the genus *Habronattus* (Araneae: Salticidae). At least 237 species in a minimum of 75 families were collected over the course of the study. As our methods were somewhat limited, we expect many more species to be found in the area covered. Pitfall traps were maintained near the summit until 2000. Dominant arthropods included *Carabus* (*Oreocarabus*) *taedatus agassii* LeConte (Coleoptera: Carabidae), *Anystis* sp. (Acari: Anystidae), and *Pardosa concinna* (Thorell) (Araneae: Lycosidae), among others. The Canadian and Rocky Mountain tiger beetle *Cicindela longilabris* Say (Coleoptera: Carabidae), the alpine dragonfly *Oplonaeschna armata* (Hagen) (Odonata: Aeshnidae), and the short-winged grasshoppers *Chorthippus curtipennis* (Harris) and *Melanoplus magdalenae* Hebard were examples of less-common hand-collected or pan-trapped high-elevation species." (Authors)] Address: Richman, D.B., Department of Entomology, Plant Pathology, and Weed Science, New Mexico State University, Las Cruces, New Mexico 88003, USA. E-mail: rdavid@nmsu.edu

**13343.** Rolls, R.J.; Boulton, A.J.; Gowns, I.O.; Maxwell, S.E.; Ryder, D.S.; Westhorpe, D.P. (2012): Effects of an experimental environmental flow release on the diet of fish in a regulated coastal Australian river. *Hydrobiologia* 686: 195-212. (in English) ["Environmental flow rules are developed to provide a flow regime necessary to maintain healthy river and floodplain ecosystems in rivers regulated for human uses. However, few studies have experimentally assessed potential ecological mechanisms causing declines in the health and productivity of freshwater fish assemblages in regulated rivers to inform the development of appropriate environmental flows. We tested whether an experimental flow release in a regulated tributary of the Hunter River, Australia, altered the diet of two widely distributed fish species (Australian smelt *Retropinna semoni* and Cox's gudgeon *Gobiomorphus coxii*) compared with data from unregulated reference and regulated control tributaries. Neither species had significant differences in the number of prey taxa ingested, gut fullness or composition of gut contents due to the environmental flow release (EFR). The diet of *R. semoni* did not differ significantly between regulated and unregulated tributaries in either catchment. However, the diet of *G. coxii* differed in only one of the two pairs of rivers consistently across all sample times. Assuming the EFR was sufficient to alter the composition of prey available for consumption by the fish species studied, our findings imply that functional indicators, such as the diet of generalist higher-order consumers, may be more suitable indicators of long-term flow regime change rather than short-term flow events." (Authors) The diet includes specimens

of *Nannophlebia*.] Address: Rolls, R.J., Australian Rivers Institute, Griffith University, Nathan, QLD, 4111, Australia. E-mail: r.rolls@griffith.edu.au

**13344.** Rybak, J.; Niedzielska, K. (2012): The biological water quality assessment of the Rudna River situated near the post-flotation tailing pond "Żelazny Most" on the basis of communities of benthic invertebrates. *Inżynieria Ekologiczna* 29: 119-129. (in Polish, with English summary) ["As a result of copper ore extraction lots of fine-grained mineral waste, constituting over 90% of extracted ore, appear. It contains traces of heavy metals, biosurfactants and foams applied in the process of extraction and copper enrichment. Waste rock with technological water is delivered and deposited in post-flotation tailing ponds. Such sites are harmful to the environment as dust containing toxic heavy metals is blown away causing water and soil contamination. The influence of such sediments on macroinvertebrates inhabiting the neighbouring river Rudna seems significant, since they are regarded as almost perfect bioindicators and constitute the majority of systems of water quality control. A four study sites of different distance from "Żelazny Most" tailing pond have been selected in order to assess a water quality. A set of different biotic indices based on zoobenthos was applied for the assessment. The water quality was evaluated with following indices: BMWP-PL, ASPT-PL, FBI, EPT, BBI, TBI and CBS which were compared with each other in order to check their usefulness. The water biodiversity was also assessed in the studied area. We calculated a dominance and frequency of families, as well as Hurlbert and Margalef indices. The obtained results suggest the significant influence of the tailing pond on river biocoenosis in the closest areas to "Żelazny Most".(Authors) The analysis includes 'Calopterygidae' and 'Gomphidae'.] Address: Rybak, Justyna, Zakład Biologii i Ekologii, Wydział Inżynierii i Ochrony Środowiska, Politechnika Wroclawska, ul. Wybrzeże Wyspiańskiego 27, 50-370 Wrocław, Poland. E-mail: justyna.rybak@pwr.wroc.pl

**13345.** Samways, M.J.; Hamer, M.; Veldtman, R. (2012): Development and Future of Insect Conservation in South Africa. In New, T.R. (Ed.): *Insect Conservation: Past, Present and Prospects*, Part 3. Springer Netherlands: 245-278. (in English) ["When considering the history of insect conservation activities in South Africa, it is important to consider its biodiversity value in a global context. The country has been rated as the third most biologically diverse in the world after Indonesia and Brazil. It also has within its borders three or the world's 34 biodiversity hotspots (Mittermeier et al. 2004). In discussions of South Africa's biodiversity, it is mostly the country's flora that is recognized as being of enormous conservation value, followed by the variety of large mammals and rich bird fauna that form the basis of a large ecotourism industry. The contribution of the insect fauna to the country's biodiversity, in terms of both richness and functioning, is less well known among the public, decision makers and even some conservation scientists. Insect con-

ervation can be considered a relatively new and possibly also a neglected discipline in South Africa, but there has certainly been some progress through various activities, at both landscape and species levels. The future of insect conservation in South Africa faces both challenges and opportunities, most of which are shared with other parts of the world with high and irreplaceable biodiversity." (Authors) The paper includes references to Odonata.] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**13346.** Silver, C.A.; Vamosi, S.M. (2012): Macroinvertebrate community composition of temporary Prairie wetlands: A preliminary test of the effect of rotational grazing. *Wetlands* 32: 185-197. (in English) ["Over half the temporary wetlands in the prairie pothole region of North America (PPR) have been drained for agricultural purposes and nearly all those remaining have agriculturally impacted margins. Cattle grazing is a common practice in the PPR. Rotational grazing utilizes several pastures, with cattle grazing one pasture while the others are rested. The success of this practice in increasing the suitability of rested wetlands for macroinvertebrates has not been evaluated for temporary wetlands. We repeatedly sampled macroinvertebrate communities in 13 rotationally grazed temporary wetlands. Seven wetlands were in an early grazed pasture (i.e., grazed when wetlands were wet), and six wetlands were in an adjacent late grazed pasture (i.e., grazed when wetlands were dry). The communities were examined from two perspectives, traditional taxonomy and an emerging functional traits perspective. Late grazed wetlands contained more abundant and diverse macroinvertebrate communities than early grazed wetlands. Chironomidae were significantly more abundant in late grazed wetlands. Scrapers were more common in the early grazed wetlands, whereas late grazed wetlands contained more gatherers. Our results suggest that rotational grazing may have a positive influence on macroinvertebrate diversity by allowing some wetlands to escape grazing pressure during the wet season. ... Chironominae dominated late grazed wetlands, whereas early grazed wetlands contained more other dipterans and predaceous Odonata larvae." (Authors)] Address: Silver, Carly, Dept Biol. Sci., Univ. Calgary, T2N 1N4, Calgary, Alberta, Canada. E-mail: carlysilver8@gmail.com

**13347.** Sims, G.G. (2012): A distribution of dragonflies and damselflies of the State of Wyoming. Last Updated: August 12, 2012: 36 pp. (in English) ["This compilation is an attempt to bring together odonate collection and distribution information from a variety of sources, and present it in a clear and easily-accessible form. The report actually contains neither any new data nor new collection records, but is an effort to consolidate information from various available sources into a concise and useful form." (Author)] Address: Sims, G.G., Route 2, Box 237-3, Mansfield, Missouri 65704-9564, USA. E-mail: georgesims@hotmail.com

**13348.** Smolinský, R.; Gvoždík, L. (2012): Interactive influence of biotic and abiotic cues on the plasticity of preferred body temperatures in a predator-prey system. *Oecologia* 170(1): 47-55. (in English) ["The ability to modify phenotypes in response to heterogeneity of the thermal environment represents an important component of an ectotherm's non-genetic adaptive capacity. Despite considerable attention being dedicated to the study of thermally-induced developmental plasticity, whether or not interspecific interactions shape the plastic response in both a predator and its prey remains unknown. We tested several predictions about the joint influence of predator/prey scents and thermal conditions on the plasticity of preferred body temperatures ( $T_p$ ) in both actors of this interaction, using a dragonfly nymphs-newt larvae system. Dragonfly nymphs (*Aeshna cyanea*) and newt eggs (*Ichthyosaura alpestris*) were subjected to fluctuating cold and warm thermal regimes (7–12 and 12–22°C, respectively) and the presence/absence of a predator or prey chemical cues. Preferred body temperatures were measured in an aquatic thermal gradient (5–33°C) over a 24-h period. Newt  $T_p$  increased with developmental temperature irrespective of the presence/absence of predator cues. In dragonflies, thermal reaction norms for  $T_p$  were affected by the interaction between temperature and prey cues. Specifically, the presence of newt scents in cold regime lowered dragonfly  $T_p$ . We concluded that predator-prey interactions influenced thermally-induced plasticity of  $T_p$  but not in a reciprocal fashion. The occurrence of frequency-dependent thermal plasticity may have broad implications for predator-prey population dynamics, the evolution of thermal biology traits, and the consequences of sustaining climate change within ecological communities." (Authors) *Aeshna cyanea*] Address: Smolinský, R., Department of Population Biology, Institute of Vertebrate Biology AS CR, Studenec 122, 67502, Konešín, Czech Republic.

**13349.** Terzani, F.; Rocchi, S.; Cianfa-Nelli, S.; Cianferoni, F.; Fabiano, F.; Mazza, F.; Zinetti, F. (2012): Invertebrati della Riserva naturale biogenetica di Camaldoli. In: A. Bottacci, [Ed.], *La Riserva naturale biogenetica di Camaldoli*, CFS/UTB, Prato: 285-316. (in Italian) [*Calopteryx splendens ancilla*, *Coenagrion puella*, *Enallagma cyathigerum*, *Ischnura elegans*, *Ischnura pumilio*, *Pyrrhosoma nymphula*, *Aeshna cyanea*, *Anax imperator*, and *Libellula depressa* are listed from the Reserve, Tuscany, central Italy.] Address: Terzani, F., Mus. Zool. "La Specola", Univ. Firenze, Via Romana 17, I-50125 Firenze, Italy

**13350.** Torralba-Burrial, A.; Dominguez Robledo, J.M.; Luque, P. (2012): Primera cita de *Brachytron pratense* (Müller, 1764) (Odonata: Aeshnidae) en Cantabria (N península ibérica). *Boln. Asoc. esp. Ent.* 36 (3-4): 479-482. (in Spanish, with English title) [*B. pratense* was recorded in the marshes of Alday (Camargo, Spain). 30TVP3108, 0-3 m s.n.m.: 23/04/2011, 1 male, 02/05/2011, 2 males.] Address: Torralba Burrial, A., Departa-



mento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoni-otb@hotmail.com

**13351.** Trockur, B.; Lemke, M.; Germann, A.; Didion, A. (2012): Suche nach der Gemeinen Winterlibelle *Sympetma fusca* (Vander Linden, 1820) abseits der Gewässer – Zwischenbericht 2012 (Odonata: Lestidae). Abhandlungen der Delattinia 38: 307-312. (in German, with English and French summaries) [Saarland, Germany, 2012; 150 records of *S. fusca* from terrestrial habitats are documented.] Address: Trockur, B., Brückenstr. 25, 66636 Tholey-Hasborn, Germany. E-mail: BerndTrockur@gmx.de

**13352.** Trockur, B. (2012): Sandgrube Piesbach – Anmerkungen zur Libellenfauna mit besonderer Berücksichtigung des Kleinen Blaupfeiles *Orthetrum coerulescens* (Fabricius, 1798) (Odonata, Libellulidae). Abhandlungen der Delattinia 38: 307-312. (in German, with English and French summaries) ["The dragonfly community of a sand pit near Piesbach (community of Nalbach, Saarland, Germany) has been examined since a few years. There is one of only a few autochthonous localities in the Saarland of *Orthetrum coerulescens* with about 100 exuviae in a small fountain area of 7 m<sup>2</sup>." (Author)] Address: Trockur, B., Brückenstr. 25, 66636 Tholey-Hasborn, Germany. E-mail: BerndTrockur@gmx.de

**13353.** Trockur, B. (2012): Erstnachweis der Großen Moosjungfer *Leucorrhinia pectoralis* (Charpentier, 1825) im Saarland (Odonata: Libellulidae). Abhandlungen der Delattinia 38: 255-265. (in German, with English and French summaries) ["In June 2012 *L. pectoralis* was found for the first time in the Saarland, Germany. In a water body with different parts and with strongly fluctuant water-levels near Neunkirchen-Dechen some males were found in five different parts (first 06/08/12). Two males were found nearby the water body in the terrestrial field, one egg-laying female could be observed, and in autumn some larvae could be caught. The records are presumably in relation with other findings in the southwest of Germany, as in the south of Rhineland-Palatinate, and could be due to an approach and expansion in spring of 2012 because of special weather conditions. The locality is suitable for the species, autochthonism is not surely established but possible." (Author)] Address: Trockur, B., Brückenstr. 25, 66636 Tholey-Hasborn, Germany. E-mail: BerndTrockur@gmx.de

**13354.** Tyrrell, M. (2012): The Impact of spring temperature on emergence patterns in five 'spring' species. *J. Br. Dragonfly Society* 28(2): 102-107. (in English) ["The first emergence dates for five 'spring' species were monitored at a single site over a seven season period. During this time, average spring temperature was also monitored and the two related to determine the impact of average air temperature on the first emergence of each species. It was noted that during warm springs, for example 2007

and 2011, the five species emerged significantly earlier than in an average spring, for example 2010. During a cold spring, for example 2012, first emergence coincided with the dates for average springs. This implies that, for these species, spring air temperature is only a critical factor determining emergence if it is high, in which case day length is not a trigger but sun intensity may be. Cooler temperatures in spring have little or no impact on first emergence compared to an average spring, in which case day length may then be the critical factor determining emergence." (Author)] Address: Tyrrell, M., 8 Warwick Close, Raunds, Northants, NN9 6JH, UK

**13355.** Van den Broeck, M. (2012): De Interactie tussen Predator en Prooi in een Opwarmend Klimaat: een Ongelijke Strijd? Proefschrift, Master in de Biologie Faculteit Wetenschappen, Departement Biologie, Laboratorium voor Aquatische Ecologie en Evolutiebiologie, K.U.Leuven: 43 pp. (in Dutch, with English summary) ["The effects of global change and consequently changes in temperature, have different impacts on ecosystems around the world, mainly in and between aquatic systems. These consequences are diverse, ranging from changes in life-history traits of populations, to species migrations, including effects in Odonata. This order of insects functions as intermediate predator in aquatic systems where they can reduce the number of zooplankton populations. Both can affect the primary producers (phytoplankton) and consumers in the trophic cascade, whereby influences of global change on these species and their interactions can cause large effects in such aquatic systems, with drastic effects on humans, nature and environment. Using a predator-prey model (the damselfly *Ischnura elegans* as predator and *Daphnia magna* as prey), possible scenarios resulting from climate change were simulated whereat animals from three latitudes, under two temperature conditions were confronted with their predator or prey. Depending on the relative effect of temperature and/or latitude on predator and prey, the ability to find, capture and digest a prey by a predator decreases, increases or remains stable. Also the efficiency of a prey can vary depending on these factors. The predation experiments were always performed with two damselflies and 60 *Daphnia*, 20 individuals of each latitude. The surviving *Daphnia* were screened with allozymes to perform a percentage comparison between the different conditions." (Author)] Address: not stated

**13356.** Vanappelghem, C.; Haubreux, D.; Hubert, B.; Cheyrezy, T.; Janczak, A.; Lemaire, B.; Pratte, O.; Derolez, B.; Blondel, B. (2012): Liste rouge, rareté, tendances d'évolution et espèces patrimoniales des Odonates du Nord - Pas-de-Calais. *Le Héron* 45(1): 43-58. (in French, with English summary) ["A new IUCN assessment of the regional Odonata is proposed, leading to their classification in IUCN red list categories. This assessment is completed by regional evolution trends and rarity indices for each species. Finally, a list of the heritage species at a regional level is proposed." (Authors)] Address: Vanap-

pelghem, C., 34, rue de bailleul, 62580 Thelus, France.  
E-mail: cedvana@free.fr

**13357.** Xin, Y.; Bu, W.j.; Zhu, L. (2012): Research advances in eco-environment assessment using dragonfly as a bioindicator. *Chinese Journal of Ecology* 31(6): 1585-1590. (in Chinese, with English summary) ["Dragonfly, due to its wide distribution, indepth research and easy to sample, is an ideal bioindicator for eco-environment assessment. In recent decades, more and more related researches are using dragonfly to assess eco-environment. In this review, the related researches were generalized into five types, i. e., general environmental assessment, environment pollution degree assessment, environmental improvement assessment, climate change assessment, and large-scale environmental assessment, and a brief introduction for each type of the researches was given. The current status and deficiency of the researches in China were discussed, and the broad prospects of using dragonfly as a bioindicator for eco-environment assessment were analyzed through the comparison of the superiority of this bioindicator than the others. It was point out that to build up a thoroughly sourced database of dragonfly diversity in China and to develop specific assessment methods could be the most important things to make progress. Using dragonfly as a bioindicator to assess ecological environment would be low-cost, high-efficient, and environmentally friendly, not only important but also necessary to the needs of China today's economic development." (Authors)] Address: Xin, Y., College of Life Sciences, Nankai University, Tianjin 300071, China

**13358.** Zhang, H.-j. (2012): Investigating Odonata from Damingshan of Guangxi. *Sichuan Journal of Zoology* 31(4): 611-613. (in Chinese, with English summary) [China; 46 Odonata species have been recorded in August 2011; the list also includes *Calopteryx melli*, *Zygonyx takasago*, and *Lamelligomphus tutulus*.] Address: Zhang, Hong-jie, Shaanxi Key Laboratory of Bio-resource Shaanxi University of Technology Hanzhong Shaanxi Province 723000 China

## 2013

**13359.** Ábelová, M.; David, S. (2013): The morphometry of male adults of Southern Hawker (*Aeshna cyanea*) (Müller, 1764) Odonata: Aeshnidae) from the Slovak Republic. *MENDELNET 2013* (Proceedings of International PhD Students Conference Mendel University in Brno, Czech Republic, November 20th and 21st, 2013): 686-690. (in English) ["The study elaborates the morphometric analysis of 112 male imago specimens of *A. cyanea* from 8 localities of Slovakia. 12 morphometric signs for imago specimens of Southern Hawker are measured by calliper. The research has confirmed several distortions of normality of data, partly caused by measurement error, e. g. in mm wingspan ( $WS = \text{average} \pm SE: 96.66 \pm 3.93$ ), body length ( $BL = \text{average} \pm SE: 64.86 \pm 2.18$ ). This

morphometric structure is the most problematic to measure, because of curvature caused by placement in test-tubes with alcohol (97%). We researched there exist correlation between morphometric signs wingspan and the length of body. In addition it has been proved that the correlation of signs is not often linearly correlated. The results are also important, because morphometric signs are used in many determination keys of Odonates. In fact Odonata species are bioindicators of pollution and global warming; measured morphometric structures could be used such as means for monitoring of changing environmental variables in future. We have processed so far the largest data set of morphometric data for Slovakia." (Authors)] Address: Ábelová, Monika, Dept Ecology & Environmental Sciences, Fac. of Natural Sciences, Constantine the Philosopher Univ. in Nitra, Tr. A. Hlinku 1, 949 74 Nitra, Slovak Republic. E-mail: monika.abelova@ukf.sk

**13360.** Akira, T. (2013): Records of aquatic insects Kahokugata, Ishikawa Prefecture in 2012. *Kahokugata Lake Scienc* 16: 1-6. (in Japanese, with English translation of title) [11 common Odonata species are documented.] Address: Akira, T., 923-0911 Ishikawa Komatsu Okawacho 3-71, Japan

**13361.** Álvarez, M.; Nova, N. (2013): Detección de potenciales poblaciones de *Sympetrum meridionale* (Selys, 1841) en Asturias (norte de la Península Ibérica) (Odonata: Libellulidae). *Fotografía y Biodiversidad*. *BVnews* 31: 100-105. (in Spanish, with English summary) [Records from two localities in Asturias, Spain are presented: (1) 22-IX-2013, in the dunes of Playa de Xagó (Gozón, Asturias, [Latitud: 43.599; Longitud: -5.922]); (2) 29-IX-2013, Cabo de Peñas ([Latitud: 43.653; Longitud: -5.852]) Address: Álvarez, Marián, Experto del Grupo de Odonata de Biodiversidad Virtual – Oviedo (Asturias, España), E-mail: madamcoolpix@gmail.com

**13362.** Amr, Z.S.; Al Azzam, L.S.; Katbeh-Bader, A.; Eid, E.K. (2013): Odonata of Wadi Al Mujib catchment with notes on the impact of Wadi Al Mujib dam, Jordan (Insecta: Odonata). *Jordan Journal of Biological Sciences* 6(4): 292-299. (in English) ["A total of 14 species pertaining to five families (Platycnemididae, Coenagrionidae, Gomphidae, Aeshnidae and Libellulidae) were identified along eight sites in the Wadi Al Mujib catchment. Collected species varied along the eight sampling sites, ranging from a single species from Al Mujib dam to a maximum of seven species in the waterfalls to the bridge site. In the present study, eight species are considered as new records to the Odonata of the Wadi Al Mujib catchment (*Ischnura elegans*, *I. evansi*, *I. fontaineae*, *I. senegalensis*, *Anax parthenope*, *Orthetrum sabina*, *Sympetrum fonscolombii* and *Zygonyx torridus*). Such changes over the past 35 years reflect the dynamics of dragonflies' spatial movement within their distribution range. Results shown in this study strongly indicates the negative impact of the Wadi Al Mujib dam on the dragonfly fauna, as a single species was recovered from the dam proper. This is mainly due

to the sharp cliffs and water level fluctuation and the limited breeding areas. Few flat areas with scarce vegetation were identified around the dam. Water level fluctuation does not allow steady vegetation growth around the edges of the dam, yet, the abrupt water depth is not suitable for development of the larval stages of dragonflies. Sharp edges are not suitable for breeding and perching of these insects." (Authors)] Address: Amr, Z.S., Dept Biology, Jordan University of Science and Technology, P. O. Box 3030, Irbid, Jordan. E-mail: amrz@just.edu.jo

**13363.** Anjos-Santos, D.; Pessacq, P. (2013): *Peristicta guarellae* sp. nov. from Brazil (Odonata: Protoneuridae). *International Journal of Odonatology* 16(4): 293-299. (in English, with Spanish summary) ["*Peristicta guarellae* sp. nov. (holotype: Brazil, Paraná State, Exc. 399/col. 3, stream in km 50 of Curitiba-Ponta Grossa route [BR 376], about 25°20'08" S, 49°51'15" W, 21-XI-1971, N. D. Santos leg., deposited in the Collection of "Museu Nacional, Universidade Federal do Rio de Janeiro", Rio de Janeiro, Brazil) is described and illustrated. An identification key for males of *Peristicta* (excluding *P. lizeria* Navás), comparisons and comments on other species of the genus are presented." (Authors)] Address: Anjos-Santos, Danielle, Lab. Investigaciones en Sistemática y Ecología Animal (LIESA), Sarmiento 849, 9200, Esquel, Chubut, Argentina. E-mail: danielleanjos2@yahoo.com.br

**13364.** Anwer, S.F.; Ashraf, I.; Mehdi, H.; Ahmad, A.; Grafi, H. (2013): On the aerodynamic performance of dragonfly wing section in gliding mode. *Advances in Aerospace Science and Applications* 3(3): 227-234. (in English) ["A comprehensive numerical of fluid dynamic study of a pleated wing section based on the wing of *Aeshna cyanea* has been performed at ultra low Reynolds numbers (RN) corresponding to the gliding flight of these dragonflies. The simulations employ an unstructured triangular mesh based on finite volume discretization. A critical assessment of the computed results was performed. In this work, we investigate the aerodynamic characteristics and spatio-temporal dynamics of a cut section of *Aeshna cyanea*'s wing. Numerical simulations were performed at ultra low RN (100 to 1000) at different angle of attacks ranging from 0° to 15°. The results give a satisfactory measure of confidence in the fidelity of the simulation. The effect of the RN on the gliding ratio is that at Re 1000 and at angle of attack (here after, AOA) 15°. The largest gliding ratios are obtained. Flow invariably for all RN, minimum Drag coefficient is obtained at AOA 15°." (Authors)] Address: Grafi, H., Dept Mechanical Engg, Taibah Univ., P.O. Box. 344, Al Madina Al Munawara, Kingdom of Saudi Arabia

**13365.** Aristova, D.S.; Bashkuev, A.S.; Golubev, V.K.; Gorochov, A.V.; Karasev, E.V.; Kopylov, D.S.; Ponomarenko, A.G.; Rasnitsyn, A.P.; Rasnitsyn, D.A.; Sinitshenkova, N.D.; Sukatsheva, I.D.; Vassilenko, D.V. (2013): Fossil Insects of the Middle and Upper Permian of European Russia. *Paleontological Journal* 47(7): 641-832.

["Fossil insects (including Odonata) of European Russia from the Urzhumian to Vyatkian stages are reviewed, new taxa are described, and dynamics of insect taxonomic diversity around the Permian–Triassic boundary in light of the Paleozoic–Mesozoic boundary global extinction problem is analyzed. Traces of interactions between arthropods and plants are analyzed. Insectbearing deposits of the Late Paleozoic found in the northern and eastern areas of the East European Platform are unique on the global scale in their completeness and continuity, allowing us to trace especially comprehensively the biotic processes that occurred around the boundary described as the time of the greatest biotic catastrophe of the Phanerozoic. A total of 28 genera and 111 species are newly described. Within the range from the Urzhumian to the Permo–Triassic boundary, 15 representative successive assemblages, including 112 families, are recognized (seven in the area in question and eight in other regions of Asia, Australia, and Africa). New tools are developed for the analysis of the dynamics of diversity. These tools show an approximately equilibrium (slightly positive) dynamics in the Urzhumian and Severodvianian and a drop in diversity during the Vyatkian Age. It is shown that Permian insect assemblages acquired a substantially postPaleozoic pattern much earlier than the end of the Paleozoic. The character of changes that took place in the Induan and Olenekian remains uncertain, but a largescale extinction event did not occur here: most families that have not been recorded at the beginning of the Triassic are recorded again in the Middle and Upper Triassic. Nevertheless, a biotic crisis probably actually took place, but was reduced to reorganization of the biota's structure, which provided enormous growth of biodiversity over subsequent hundreds of millions of years, rather than resulted in catastrophic extinction. This study is intended for entomologists, stratigraphers, and all readers interested in the biotic events that took place around the Permian–Triassic boundary." (Authors)] Address: Vassilenko, D.V., Borissiak Paleontological Institute, Russian Academy of Sciences, Profsoyuznaya ul. 123, Moscow, 117997 Russia

**13366.** Arnold, A. (2013): Fotobelege von Missbildungen an Imagines von Libellen (Odonata) und Ameisenjungfern (Planipennia, Myrmeleonidae). *Mitteilungen Sächsischer Entomologen* 32: 44-45. (in German) [Sachsen, Germany; the authors documents teratological anomalies in wings of *Calopteryx splendens* from the Elbe River near Pölbitz collected in 2011 and from the Mulde River near Laußig from 30.06.2012.] Address: Arnold, A., Zur schönen Aussicht 25, 04435 Schkeuditz, Germany

**13367.** Babu, R. (2013): New Zygoptera records from Jharkhand state, India. *Notulae Odonatologicae* 8(2): 18-21. (in English) ["The 12 species brought on record are all new for the state. Likewise, the occurrence of the Chlorocyphidae (*Libellago*) and of the genera *Mortonagrion*, *Onychargia*, *Rhodischnura*, and *Prodasineura* is documented here for the first time from the state of Jhar-



khand, which was previously part of Bihar." (Author)] Address: Babu, R., Southern Regional Centre, Zoological Survey of India, 130, Santhome High Road, Chennai-600 028, India. E-mail: baburzsi@gmail.com

**13368.** Baird, I.R.C. (2013): Emergence behaviour in *Petalura gigantea* (Odonata: Petaluridae): confirmation of upright emergence. *International Journal of Odonatology* 16(3): 213-218. (in English) ["Two distinct emergence styles have been reported in odonates, with both the upright and hanging back emergence reported in the Petaluridae, between and within individual species, including *Petalura gigantea*. This paper reports three additional observations of upright emergence in *P. gigantea*, providing further evidence that this emergence style is the norm for the species." (Author)] Address: Baird, I.R.C., College of Health and Science, University of Western Sydney, Locked Bag 1797, Penrith South, NSW, 1797, Australia

**13369.** Baliteau, L.; Denise, C.; Dommange, G. (2013): Contribution à l'inventaire des Odonates du département de l'Aveyron. *Martinia* 29(2): 89-102. (in French, with English summary) ["Odonata survey in the Aveyron department, southern France. This paper deals with the 1022 records of Odonata gathered by the authors in the Aveyron department during their participation to the French Invod and CIUF programs, 2001-2012. 47 species are summarized according to the different natural regions of this department. Wetlands regularly host 34 species on the Causses and 27 species in the Saint-Affricain districts. Six species are very common: *Aeshna cyanea*, *Calopteryx virgo meridionalis*, *Pyrrhosoma nymphula*, *Cordulegaster h. boltonii*, *Libellula depressa* and *Sympetrum striolatum*. Further information about the status and distribution of selected species is included." (Authors)] Address: Baliteau, L., Les Gardies, F-12620 Saint-Beauzély, France. E-mail: baliteaul@yahoo.fr

**13370.** Behr, H. (2013): Neue Arten auf der Libellen-Checkliste des Stadtgebietes Schwerin, Mecklenburg (Odonata). *Virgo* 16(1): 65-66. (in German) [Mecklenburg-Vorpommern, *Gomphus vulgatissimus*, *Anaciaeschna isoceles*, *Leucorrhinia pectoralis*, *Sympetrum fonscolombii*, *Ischnura pumilio*.] Address: Behr, H., Herrengrabenweg 57, 19061 Schwerin, Germany. E-mail: hauke-behr@web.de

**13371.** Bernal, A. (2013): Primeras observaciones y aproximación a la distribución de *Trithemis kirbyi* Sélys 1891 para la provincia de Cádiz. *Rev. Soc. Gad. Hist. Nat.* 7: 25-27. (in Spanish, with English summary) [*T. kirbyi* was recorded for the first time in the Cádiz province (Spain) at 7-VI-2009: river of Hozgarganta near Jimena de la frontera (UTM 30S 278931 4035716, 74 m a.s.l.).] Address: Arturo Bernal, C/Juan Ramón Jiménez 28. 11160 - Barbate (Cádiz)

**13372.** Bárta, D.; Dolný, A. (2013): Dragonflies of Sungai Wain. *Ecological Field Guide to the Odonata of Lowland*

Mixed Dipterocarp Forest of Southeastern Kalimantan. Taita Publishers. 168pp. (In English, Czech and Indonesian) ["Dragonflies of Sungai Wain is clearly a labour of love by the authors, and a successful labour: it is a beautiful book that represents a valuable contribution to our knowledge of the dragonflies of Borneo. Not much is known about the dragonfly fauna of south-eastern Kalimantan and this book will help both visitors to Borneo and local researchers and enthusiasts to identify many of the species that can be found in the lowlands. The reader is given not only information and images of the species themselves, but an insight into how dragonflies are entwined with the habitat in which they are found, and how changes to that habitat affect them, and how they in turn reflect those changes. It is to be hoped that the book will encourage people to visit Sungai Wain, and other locations in Kalimantan, to look for dragonflies, and, most importantly, that it will stimulate local interest in these insects and their role as bio-indicators. 223 colour scans of 82 species, 24 habitat photos, 46 photos of living species." (Publisher)] Address: <http://www.taitapublishers.cz/dragonflies-of-sungai-wain/?id=25>



**13373.** Böhm, K.; Raab, B.; Grimmer, F.; Müller, K.; Albrecht, H. (2013): Habitatansprüche der Imagines von *Ophiogomphus cecilia* an mittelfränkischen Gewässern (Odonata: Gomphidae). *Libellula* 32(3/4): 97-114. (in German, with English summary) ["Habitat preferences of

perching males of *O. cecilia* in Middle Franconia (Odonata: Gomphidae) – *O. cecilia* is considered to be threatened throughout Europe. Therefore, the species is listed in Annex II and IV of the Habitats Directive of the EU. The objective of this study was to identify the environmental factors which primarily determine the suitability of different river sections as habitats for perching males of *O. cecilia*. The study was carried out at 68 sections of the three rivers Aurach, Bibert and Zenn on a total length of 12 km, which all cross the sandstone basin of Middle Franconia from west to east. Sixty variables, which also include attributes used to monitor *O. cecilia* for Habitats Directive reporting, were sampled and correlated to the abundance of perching imagines. The numbers of males showed significant correlations to shading, structure and dynamics of the water surface and to the land use in the surrounding area. Recommendations for the habitat management of *O. cecilia* are given." (Authors)] Address: Albrecht, H., Lehrstuhl für Renaturierungsökologie, Technische Universität München, Emil-Ramann-Str. 6, 85354 Freising, Germany. E-mail: albrecht@wzw.tum.de

**13374.** Börzsöny, L. (2013): *Polythore koepcke* spec. nov. from the Sira Mountains in Peru with remarks on related species (Odonata, Zygoptera, Polythoridae). *Spixiana* 36(2): 265-268. (in English, with Spanish summary) ["*Polythore koepcke* spec. nov. is described from the mountains of Cerros del Sira, Huanuco Department, Peru and compared to its nearest relatives. It differs from *Polythore spaeteri* Burmeister & Börzsöny, 2003 in penis structure and in having brownish apical spots not only in forewings, but also in hindwings. Although the type localities of the two species are only some fifty kilometres away from each other, they occur at different elevations, *P. spaeteri* is known from lowland locations at 250-350 m above sea level, but *P. koepcke* from levels at 800 m and above." (Author)] Address: Börzsöny, L., Cserényhegyi u. 30, 8233 Balatonszölös, Hungary. E-mail: borzsony@gmx.de

**13375.** Braun, K. (2013): Swaziland's Odonata. Damsel-flies and Dragonflies. Swaziland National Trust Commission. [www.sntc.org.sz](http://www.sntc.org.sz): 83 pp. (in English) [This checklist includes a total of 79 species. Compiled by Kate Braun, July 2013. For details see: <http://www.thekingdomofswaziland.com/downloads/birds/Dragonflies.pdf>.] Address: not stated

**13376.** Brochard, C.; van der Ploeg, E. (2013): Description of the exuvia and larva of *Pyrhosoma elisabethae* (Odonata: Coenagrionidae). *Libellula* 32(3/4): 159-174. (in English, with German summary) ["During a field trip to the Greek island of Corfu which took place between 6 to 13 May 2012, a total of 348 exuviae and six larvae of *P. elisabethae* were collected for the first time. This quantity of *P. elisabethae* exuviae allows an accurate description of the species. The exuviae of *P. elisabethae* are very similar to the exuviae of *P. nymphula*, the principal differences being in the shape of their labial palps." (Authors)]

Address: Brochard, C., Marsstraat 77, 9742 EL Groningen, the Netherlands. E-mail: info@cbrochard.com

**13377.** Brockhaus, T. (2013): Odonata records from the polar Ural and the Petchoro-Ilycheski Zapovednik, Komi-Republic, Russian Federation. *Notulae Odonatologicae* 8(2): 21-23. (in English) ["In total, 16 species were observed in summer 2012. *Somatochlora sahlbergi* was encountered in the shrub tundra around Worku-ta. *S. graeseri* and *S. pedemontanum* are new for the Komi-Republic." (Author)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**13378.** Brockhaus, T. (2013): Die Libellenfauna der Geverschen Platte im Erzgebirge (Insecta: Odonata). *Veröff. Museum für Naturkunde Chemnitz* 36: 5-22. (in German, with English summary) ["The "Geversche Platte" is a forested landscape in the "Erzgebirge" Mountains (Saxony). It covers about 65 km<sup>2</sup>. Dragonfly habitats comprise bogs, rivers and anthropogenic ponds and water reservoirs, especially due to mining. During the past 20 years, 34 dragonfly species have been observed. Important parts of the dragonfly fauna are species which live in bogs, such as *Coenagrion hastulatum*, *Aeshna juncea* and *Somatochlora arctica*, which occur in stable populations. Other remarkable species are *Leucorrhinia pectoralis*, and the rheophile species *Calopteryx virgo* and *Cordulegaster boltonii*. The species communities of several areas, in particular those of protected areas, are described." (Author)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**13379.** Brunner, H., Holzinger, W.E.; Komposch, B. (2013): Die Östliche Weidenjungfer (*Lestes parvidens*) neu für Kärnten, mit Ergänzungen und Korrekturen zu den »Libellen Kärntens«. *Carinthia II* 203/123: 343-348. (in German, with English summary) ["*Lestes parvidens* is reported from Carinthia (Austria) for the first time. In addition, interesting new records of *Lestes virens* and *Aeshna affinis* are presented, and corrections to the monograph of the Odonata of Carinthia (Holzinger & Komposch 2012) are made." (Authors)] Address: Brunner, Helwig, ÖKOTEAM – Institut für Tierökologie und Naturreinplanung, Bergmannsgasse 22, A-8010 Graz, Austria. E-Mail: brunner@oekoteam.at

**13380.** Buczyński, P.; Zawal, A.; Stępień, E.; Pešić, V. (2013): *Gomphus pulchellus* Selys recorded on the eastern edge of its distribution area in Montenegro (Anisoptera: Gomphidae). *Odonatologica* 42(4): 293-300. (in English) ["A larva from the Zeta River (Danilovgrad, 12-X-2010) is brought on record, figured and its habitat is described. This is the first record of *G. pulchellus* larva from the Balkans. The eastern records of the species are reviewed and mapped, and the eastern range of *G. pulchellus* is discussed." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka

19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**13381.** Campos, A.; Perez, D.; Sanz, G.; Velasco, T.; Santos, E. (2013): Nuevas localidades de *Anax parthenope* (Sélys, 1839) (Odonata, Aeshnidae) en la mitad norte de España. Boln. Asoc. esp. Ent. 37(1-2): 95-98. (in Spanish, with English translation of title) [Six new localities of *A. parthenope* are documented and a map of the current knowledge of distribution in NW-Spain is given.] Address: Campos, A., Universidad Europea Miguel de Cervantes, Calle Padre Julio Chevalier, 2, E-47012 Valladolid, Spain. E-mail: fcampos@uemc.es

**13382.** Chasle, P. (2013): *Coenagrion caerulescens* sur le ruisseau La Canette en Haute-Garonne (Odonata: Coenagrionidae): enjeux patrimoniaux. Martinia 29(2): 105-117. (in French, with English summary) ["*C. caerulescens* on the stream La Canette, Haute-Garonne department: conservation issues. *C. caerulescens* has been observed for the first time in the Haute-Garonne department north of Toulouse, in an artificialized area. A one-day survey does not allow us to conclude towards a native population beyond the western limit of its known distribution in France, but indicates an important odonatological diversity. This emphasizes the need of a local monitoring and to determine the ecological interest of the site, and, if appropriate, to initiate conservation measures in this area submitted to a high anthropogenic pressure." (Author)] Address: Chasle, P., 15, rue d'Aubuisson, F-31000 Toulouse, France. E-mail: pierrick.chasle@gmail.com

**13383.** Chaudhry, M.T.; Ul Mohsin, A.; Bhatti, M.I.; Javed, R.A.; Abbas, G. (2013): First record of *Anaciaeschna jaspidea* and *Epophthalmia vittata vittata* (Odonata: Anisoptera) from Pakistan. Iranian Journal of Science & Technology 37A4: 445-448. (in English) [*Anaciaeschna jaspidea* was collected from Gujjo, District Thatta (Sindh) in August 2008. *Epophthalmia vittata* was collected from Java Dam, Rawalpindi and Dhok Tallian Dam near Chakwal. "Individuals of this genus were found maneuvering near the peripheries of small dams. Some taxonomic notes of the said species are provided." (Authors)] Address: Chaudhry, M.T., Agricultural Training Institute Karor Lal Easan, District Layyah, Punjab, Pakistan. E-mail: dtrariq273@yahoo.com

**13384.** Chen, S.-L.; Yeh, W.-C. (2013): Description of a new species of the genus *Sarasaeschna* Karube & Yeh, with a key to the species of Taiwan (Odonata: Anisoptera: Aeshnidae). Zootaxa 3764(1): 92-100. (in English) ["*Sarasaeschna Chiangchilii* sp. nov. collected from Daxi, Taoyuan County in northern Taiwan is described and diagnosed. Judging from male penile structure, this species is considered to belong to the *pryeri*-group of its genus. It is easily distinguished from all known congeners in having peculiar sickle-shaped cerci in male. The habitats of *S. Chiangchilii* are mainly shaded brooks in lowland areas, which are exceptional for its Taiwanese relatives.

Distributional maps and a key are also provided for the four species of Taiwanese *Sarasaeschna*." (Authors)] Address: Yeh, W.-C., Conservation and Research Center, Taipei Zoo, Taipei, Taiwan. E-mail: dwx24@zoo.gov.tw

**13385.** Córdoba-Aguilar, A.; Munguía-Steyer, R. (2013): The sicker sex: Understanding male biases in parasitic infection, resource allocation and fitness. PLoS ONE 8(10): e76246. doi:10.1371/journal.pone.0076246: 15 pp. (in English) ["The "sicker sex" idea summarizes our knowledge of sex biases in parasite burden and immune ability whereby males fare worse than females. The theoretical basis of this is that because males invest more on mating effort than females, the former pay the costs by having a weaker immune system and thus being more susceptible to parasites. Females, conversely, have a greater parental investment. Here we tested the following: a) whether both sexes differ in their ability to defend against parasites using a natural host-parasite system; b) the differences in resource allocation conflict between mating effort and parental investment traits between sexes; and, c) effect of parasitism on survival for both sexes. We used a number of insect damselfly species as study subjects. For (a), we quantified gregarine and mite parasites, and experimentally manipulated gregarine levels in both sexes during adult ontogeny. For (b), first, we manipulated food during adult ontogeny and recorded thoracic fat gain (a proxy of mating effort) and abdominal weight (a proxy of parental investment) in both sexes. Secondly for (b), we manipulated food and gregarine levels in both sexes when adults were about to become sexually mature, and recorded gregarine number. For (c), we infected male and female adults of different ages and measured their survival. Males consistently showed more parasites than females apparently due to an increased resource allocation to fat production in males. Conversely, females invested more on abdominal weight. These differences were independent of how much food/infecting parasites were provided. The cost of this was that males had more parasites and reduced survival than females. Our results provide a resource allocation mechanism for understanding sexual differences in parasite defense as well as survival consequences for each sex." (Authors)] Address: Córdoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**13386.** Costa, Z.J.; Vonesh, J.R. (2013): Prey subsidy or predator cue? Direct and indirect effects of caged predators on aquatic consumers and resources. Oecologia 173(4): 1481-1490. (in English) ["The non-consumptive effects of predators on prey can affect prey phenotypes, potentially having important consequences for communities due to trait-mediated indirect interactions. Predicting non-consumptive effects and their impacts on communities can be difficult because predators can affect resources directly through nutrient cycling and indirectly by altering prey resource use, which can lead to complex in-



teractions among resources and consumers. In this study we examined the effects of caged dragonfly predators on aquatic resources in the presence and absence of two focal herbivores, the tadpoles of Neotropical tree frogs *Agalychnis callidryas* and *Dendropsophus ebraccatus*. We crossed the presence/absence of caged dragonflies with four tadpole treatments: no tadpoles, each tadpole species alone, and both species together to examine interactions among tadpole composition, predator presence, and time on tadpole growth, resources, and zooplankton abundances. Predator effects on growth changed through ontogeny and was species-dependent. Predators initially reduced then dramatically increased *A. callidryas* growth, but had no effect on *D. ebraccatus*. Predators also increased the abundances of both periphyton and phytoplankton. However, there was no evidence of a trait-mediated trophic cascade (i.e., tadpole by predator interaction). Instead, nutrients from prey carcass subsidies likely played an increasingly important role in facilitating resources, and shaping tadpole growth, competitive interactions, and zooplankton abundances through time. In nutrient-poor aquatic systems the release of nutrients via the consumption of terrestrially derived prey items by aquatic predators may have important impacts on food webs by facilitating resources independent of the role of trait-mediated trophic cascades." (Authors)] Address: Costa, Zacharia, Dept of Biology, Virginia Commonwealth University, 1000 W. Cary St., Richmond, VA, 23284-2012, USA. E-mail: zachariacosta@gmail.com

**13387.** Das, K.S.A.; Subramanian, K.A.; Emiliyamma, K.G.; Palot, M.J.; Nishadh, K.A. (2013): Range extension and larval habitat of *Lyriothemis tricolor* Ris, 1919 (Odonata: Anisoptera: Libellulidae) from southern Western Ghats, India. *Journal of Threatened Taxa* 5(17): 5237-5246. (in English) ["Worldwide many species of odonates are known to use phytotelmata as a breeding habitat. Hitherto, no species are known to breed in phytotelmata in India. However, field studies conducted in the southern Western Ghats revealed that *L. tricolor* uses tree holes as a larval habitat. Here we report the range extension of *L. tricolor* to southern Western Ghats and describe morphology of the larva, exuvia, and adult female. Based on the present study, we describe the larval habitat of *L. tricolor* in the southern Western Ghats. Our findings reveal that *L. tricolor* breeds in the tree holes of evergreen and semi-evergreen forests in the southern Western Ghats." (Authors)] Address: Das, K.S, Centre for Conserv. Ecology, Dept Zoology, M.E.S. Mampad Coll., Malappuram, Kerala 676542, India. E-mail: dasksa@gmail.com

**13388.** Dau, A.-C.; Martin, P. (2013): Die Salzquellen von Bad Oldesloe- Struktur und Fauna eines Extremlebensraumes. *Deutsche Gesellschaft für Limnologie (DGL). Erweiterte Zusammenfassungen der Jahrestagung 2012 (Koblenz), Hardeggen 2013: 86-90.* (in German) [Schleswig-Holstein, Germany; the species list of the brackwater habitats includes Odonata (*Anax* sp. and *Aeshna* sp.); for more details see Dau 2013: <http://nlbif.eti.uva.nl/ccw/do->

[cuments/Dau,2013.pdf](http://nlbif.eti.uva.nl/ccw/do-)] Address: Dau, Ann-Christin, Christian-Albrechts-Univ. Kiel, Am Botanischen Garten 1-9, 24118 Kiel, Germany. E-mail: ann.christindau@yahoo.de

**13389.** Daumal, T. (2013): *Hemianax ephippiger*, nouveau pour la Picardie (Odonata: Aeshnidae). *Martinia* 29(2): 119-122. (in French, with English summary) ["The first observation of *H. ephippiger* for the Picardie region (France) has been made on 20-X-2013, in Authie's estuary, Fort Mahon city, Somme department. This data is probably linked with southern winds that have blown for a week over south-western Europe prior to the observation. This is the 61th Odonata species observed in the region." (Author)] Address: Daumal, T., 3 rue de la Clarté, F-60300 Senlis, France. E-mail: thibauddaumal99@yahoo.com

**13390.** de Souza, M.M.; Souza, B.; de Aguiar Pereira, M.C.S.; Machado, A.B.M. (2013): List of Odonates from Mata do Baú, Barroso, Minas Gerais, Brazil. *Check List* 9(6): 1367-1370. (in English) ["A survey of odonatofauna was carried out in Mata do Baú, a predominantly forested area in Barroso, Minas Gerais, regarded as a priority area for conservation and scientific investigation, as published by Biodiversitas, a Brazilian nongovernmental institution. Sample collection was conducted over twenty-six days from November 2009 to February 2011. Fifty-seven species of Odonata were collected and grouped into 30 genera and nine families. The dominant families were Libellulidae (46.5%), Coenagrionidae (20.6%), and Megapodagrionidae (10.3%). A specimen of *Heteragrion obsoletum* (Selys, 1886) was collected, which to-date is known by a single specimen collected in 1880 and red-listed as endangered. Special attention was given to the presence of five species of the genus *Heteragrion*, strictly limited to lotic forest streams, with two new species'. This genus is especially sensitive to environmental deterioration, indicating that the forest stream's environmental conditions are beneficial to the area and create a baseline for future monitoring of similar environments." (Authors)] Address: de Souza, M.M., Instituto Federal de Educação e Tecnologia do Sul de Minas, Campus Inconfidentes. CEP 37576-000. Inconfidentes, MG, Brazil. E-mail: magalhaescajubi@bol.com.br

**13391.** De Vocht, A.; Pasmans, R.; Cox, P.; Vanbrabant, B.; Dupont, A.; Hendig, P.; Carlens, H. (2013): Ongewerve- lden en vissen in de taplopen van het Kanaal naar Beverlo. *ANTenne* 7(4): 10 -20. (in Dutch) [*Calopteryx splendens*, *Gomphus pulchellus*, *G. vulgatissimus*, *Orthetrum coerulescens*, and *Sympetrum depressiusculum* are reported from a canal situated near Beverlo, Belgium.] Address: De Vocht, A., PXL-BIO Research, PXL, Agoralaan gebouw H, 3590 Diepenbeek, Belgium. E-mail: alain.devocht@pxl.be

**13392.** Dijkstra, K.-D.B.; Kalkman, V.J.; Dow, R.A.; Stokvis, F.R.; van Tol, J. (2013): Redefining the damselfly families: a comprehensive molecular phylogeny of Zygoptera (Odonata). *Systematic Entomology* 39: 68-96. (in English)

["An extensive molecular phylogenetic reconstruction of the suborder Zygoptera of the Odonata is presented, based on mitochondrial (16S, COI) and nuclear (28S) data of 59% of the 310 genera recognized and all (suspected) families except the monotypic Hemiphlebiidae. A partial reclassification is proposed, incorporating morphological characters. Many traditional families are recovered as monophyletic, but reorganization of the superfamily Coenagrionoidea into three families is proposed: Isostictidae, Platycnemididae and Coenagrionidae. Archboldargia Lieftinck, Hylaeargia Lieftinck, Palaiargia Förster, Papuargia Lieftinck and Onychargia Selys are transferred from Coenagrionidae to Platycnemididae, and Leptocnemis Selys, Oreocnemis Pinhey and Thaumagrion Lieftinck from Platycnemididae to Coenagrionidae. Each geographically well-defined clade of Platycnemididae is recognized as a subfamily, and thus Disparoneurinae (i.e. Old World 'Protoneuridae') is incorporated, Calicnemiinae is restricted, and Allocnemidinae (type genus: Allocnemis Selys) subfam. n., Idiocnemidinae (type genus: Idiocnemis Selys) subfam. n. and Onychargiinae (type genus: Onychargia Selys) subfam. n. and Coperini trib. n. (type genus: Copera Kirby) are described. Half of Coenagrionidae belongs to a well-supported clade incorporating Coenagrion Kirby and the potential subfamilies Agriocnemidinae, Ischnurinae and Pseudagrioninae. The remainder is less well defined, but includes the Pseudostigmatidae and New World Protoneuridae that, with Argiinae and Teinobasinae, may prove valid subfamilies with further evidence. Ninety-two per cent of the genera formerly included in the polyphyletic Amphipterygidae and Megapodagrionidae were studied. Pentaplebiidae, Rimanellidae and Devadattidae fam. n. (type genus: Devadatta Kirby) are separated from Amphipterygidae, and Argiolestidae, Heteragrionidae, Hypolestidae, Philogeniidae, Philosinidae and Thaumtoneuridae from Megapodagrionidae. Eight further groups formerly placed in the latter are identified, but are retained as incertae sedis; the validity of Lestoideidae, Philogangidae and Pseudolestidae is confirmed. For some families (e.g. Calopterygidae, Chlorocyphidae) a further subdivision is possible; Protostictinae subfam. n. (type genus: Protosticta Selys) is introduced in Platystictidae. Numerous new combinations are proposed in the Supporting Information. Many long-established families lack strong morphological apomorphies. In particular, venation is incongruent with molecular results, stressing the need to review fossil Odonata taxonomy: once defined by the reduction of the anal vein, Protoneuridae dissolves completely into six clades from five families." (Authors)] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: dijkstra@nrm.nl

**13393.** Division of Wildlife (2013): Dragonflies and damselflies of Ohio - Field guide. Division of Wildlife Publication 5320 (R812): 76 pp. (in English) ["Ohio is a great state for dragonfly and damselfly diversity. To date, 164 species have been recorded, and like vagrant birds, out-of-range dragonflies can appear far from their normal

haunts. The newest addition to Ohio's Odonata (the order of insects that includes dragonflies and damselflies) were several striped saddlebags, *Tramea calverti*, which were found in late summer of 2006 at Magee Marsh Wildlife Area on western Lake Erie – far from their normal range in the extreme southern U.S. With 7,000 miles of streams and scores of lakes, ponds, and wetlands, Ohio has plenty of good places to look for dragonflies and damselflies. Some of the best spots are listed beginning on page 9. Until recently, learning about dragonflies and damselflies has been difficult for the casual naturalist. The only books available were out-of-date technical manuals. This booklet is one of several new publications that provide an introduction to dragonflies and damselflies. There has been an enormous increase in interest in the Odonata; not surprising, given their beautiful appearance and incredible flying abilities. The Odonata are also excellent indicators of water quality and thus serve as barometers of the health of our streams, lakes, and wetlands." (Editors)] Address: Division of Wildlife, 2045 Morse Rd Service Road, Columbus, OH 43229, USA

**13394.** Dolný, A. (2013): Population size estimation of *Aeshna caerulea* (Odonata: Aeshnidae) in the Czech part of Úpské rašeliniště bog (Giant Mountains). *Casopis Slezského Zemského Muzea - serie A - vedy přírodní* 62(1): 83-89. (in English) ["*A. caerulea* is present as a post-glacial relict in central European mountains. This species is listed as critically endangered in the Czech Republic (very restricted distribution occurring in two isolated populations) and the European population trend of this species is decreasing. The main objective of the study was to estimate the population size of *A. caerulea* in the Úpa bog National Nature Reserve (Czech Republic) using capture-mark-recapture data. Population estimates of adults using the Schnabel method was 425 (the 95% confidence limits: 248.1 / 992.3), and using the Schumacher-Eschmeyer method was 416 (the 95% confidence limits: 326.8 / 570.4). Imago activity became apparent at the beginning of July. This study has suggested that the possible future threats for the *A. caerulea* in the Czech Republic are drying up, air nitrogen depositions, eutrophication, pollution of water by external sources, and terrestriation, mainly as a result of global warming." (Author)] Address: Dolný, A., Dept of Biology and Ecology/Institute of Environmental Technologies, Faculty of Science, University of Ostrava, Chittussiho 10, CZ-710 00 Ostrava, Czech Republic. E-mail: ales.dolny@osu.cz

**13395.** Edwards, P.G.; Gaines, K.F.; Bryan, A.L.; Novak, J.M.; Blas, S.A. (2013): Trophic dynamics of U, Ni, Hg and other contaminants of potential concern on the Department of Energy's Savannah River Site. *Environmental Monitoring and Assessment* 186: 481-500. (in English) ["The Department of Energy's Savannah River Site is a former nuclear weapon material production and current research facility located in South Carolina, USA. Wastewater discharges from a fuel and nuclear reactor target manufacturing facility released depleted and natural U,

as well as other metals into the Tims Branch-Steed Pond water system. We investigated the current dynamics of this system for the purposes of environmental monitoring and assessment by examining metal concentrations, bioavailability, and trophic transfer of contaminants in seven ponds. Biofilm, detritus, and Anuran and Anisopteran larvae were collected and analyzed for stable isotopes ( $\delta^{15}\text{N}$ ,  $\delta^{13}\text{C}$ ) and contaminants of potential concern (COPC) with a focus on Ni, U, and Hg, to examine metal mobility. Highest levels of Ni and U were found in biofilms U (147 and 332 mg kg<sup>-1</sup> DW, respectively), while highest Hg levels were found in tadpoles (1.1 mg kg<sup>-1</sup> DW). We found intraspecific biomagnification of COPCs as expressed through stable isotope analysis. Biofilms were the best indicators for contamination and Anuran larvae with the digestive tract removed were the best indicators of the specific bioavailability of the focal metals. Monitoring data showed that baseline  $\delta^{15}\text{N}$  values differed between ponds, but within a pond, values were stable throughout tadpole Gosner stage, strengthening the case to use this species for monitoring purposes. It is likely that there still is risk to ecosystem integrity as COPC metals are being assimilated into lower trophic organisms and even low levels of this mixture has shown to produce deleterious effects to some wildlife species." (Authors)] Address: Gaines, Karen, Department of Biological Sciences, Eastern Illinois University, 600 Lincoln Ave, Charleston, IL, 61920, USA. E-mail: kfgaines@eiu.edu

**13396.** Ellenrieder, N. von (2013): A revision of *Metaleptobasis* Calvert (Odonata: Coenagrionidae) with seven synonymies and the description of eighteen new species from South America. *Zootaxa* 3738(1): 1-155. (in English, with Spanish summary) ["Examination of over 1,400 specimens of the neotropical genus *Metaleptobasis* Calvert, 1907, including primary types or paratypes of 18 of the 20 currently available species names and large series of specimens including pairs in tandem and copula, allowed me to unequivocally associate older names with species, distinguish between specific and intraspecific variability, associate both sexes for each species, and recognize the existence of female polymorphism. As a result, seven names are found to be junior synonyms: *Metaleptobasis mauritia* Williamson, 1915 junior synonym of *M. bicornis* (Selys, 1877), *M. manicaria* Williamson, 1915 and *M. fernandezi* Rácenis, 1955 junior synonyms of *M. diceras* (Selys, 1877), *M. westfalli* Cumming, 1954 junior synonym of *M. foreli* Ris, 1915, and *M. tetragena* Calvert, 1947, *M. weibezahni* Rácenis, 1955, and *M. incisula* De Marmels, 1989 junior synonyms of *M. brysonima* Williamson, 1915. Lectotypes are designated for *M. amazonica* and *Leptobasis diceras*. Eighteen new species of *Metaleptobasis* are described: *M. brevicauda* (Holotype male, Peru, Huánuco Dep., Shapajilla, jungle, 11 v 1939, F. Woytkowski leg., in UMMZ); *M. falcifera* (Holotype male, Peru, Madre De Dios Dep., Pakitza, Reserved Zone, Manu National Park, T2 to R2 to T1 to base camp, 11°55'48"S, 71°15'18"W, 250 m, 17 ix 1989, J.A. Louton leg., in USNM); *M. furcifera* (Holotype male, Peru, Loreto Dep.,

Iquitos, iii 1936, G.G. Klug leg., in BMNH); *M. gabrielae* (Holotype male, Peru, Loreto Dep., Tamshiyacu-Tahuayo Reserve, forest interior (4°23'40"S, 73°14'56"W), 27 vii 2009, T. Faasen leg., in RMNH); *M. guillermoi* (Holotype male, Peru, Loreto Dep., Yarinacocha, temporary forest stream (8°17'S, 74°37'W, 145 m), 2 vi 1972, D.L. Pearson leg., in FSCA); *M. inermis* (Holotype male, Brazil, Pará State, Jacareacanga, vii 1969, F.R. Barbosa leg., in UMMZ); *M. leniloba* (Holotype male, Peru, Loreto Dep., Pacaya-Samiria National Reserve, Santa Luisa trail (5°15'S, 74°40'W), 10 vi 2008, C. Beatty, A. Cordero & J. Hoffmann leg., in FSCA); *M. longicauda* (Holotype male, Brazil, Mato Grosso State, C. Teles Pires, Alto Tapajos, 1-31 viii 1956, Sick leg., in MNRJ); *M. orthogonia* (Holotype male, Peru, Loreto Dep., San Juan, Río Amazonas, near Iquitos, viii 1939, J. Schunke leg., in FSCA); *M. paludicola* (Holotype male, Peru, Loreto Dep., Tamshiyacu-Tahuayo Reserve, swamp, 4°23'49"S, 73°14'57"W, 27 ii 2009, T. Faasen leg., in RMNH); *M. panguanae* (Holotype male, Peru, Huánuco Dep., Biological Station Panguana, E side Río Yuyapichis, 9°37'S, 74°57'W, 6-17 iv 2003, H.J. & E.-G. Burmeister leg., in ZSM); *M. peltata* (Holotype male, Peru Loreto Dep., Tamshiyacu-Tahuayo Reserve, 4°21'22"S, 73°11'0"W, 19 ii 2010, T. Faasen leg., in RMNH); *M. prostrata* (Holotype male, Peru, Junín Dep., Satipo, v 1945, P. Paprzycki leg., in UMMZ); *M. silvicola* (Holotype male, Peru, Madre de Dios Dep., Explorer's Inn on Río Tambopata, 30 km SW Puerto Maldonado, main trail, 1 viii 1979, M. Perkins & P. Donahue leg., in FSCA); *M. spatulata* (Holotype male, Peru, Huánuco Dep., 10 km N of Cucharas, confluence of Huallaga and Pacay rivers, viii 1954, F. Woytkowski leg., in UMMZ); *M. tridentigera* (Holotype male, Brazil, Rondônia State, Porto Velho, Area Abunan, T11 Aleatorio, 8°46'S, 63°54'W, 86 m, 16 v 2010, Nogueira & Mendes leg., in MZUSP); *M. truncata* (Holotype male, Brazil, Pará State, Jacareacanga, xi 1969, F.R. Barbosa leg., in UMMZ); and *M. turbinata* (Holotype male, Peru, Loreto Dep., Tamshiyacu-Tahuayo Reserve, forest swamp (4°24'18"S, 73°14'38"W), 25 ii 2010, T. Fassen leg., in RMNH). Illustrations, keys, diagnoses, and distribution maps for all 31 currently known species are provided. Phylogenetic relationships within the genus *Metaleptobasis* are analyzed based on 33 adult morphological characters, including the 31 currently described species of *Metaleptobasis* and eleven outgroup taxa of other Coenagrionidae of the subfamily Teinobasinae. The cladistic analysis recovered *Metaleptobasis* as monophyletic, and as sister group of *Aceratobasis* Kennedy, a teinobasine genus some of the species of which possess an articulated spur on base of male cercus. Hypothesized relationships among its species are discussed." (Author)] Address: Ellenrieder, Natalia von, Plant Pest Diagnostic Center, California Dept Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832, USA. E-mail: natalia.ellenrieder@gmail.com

**13397.** Endersby, I. (2013): Additional distribution records for Victorian dragonflies (Insecta: Odonata). Continued. *Victorian Entomologist* 43(4): 120-125. (in English) [Aus-



tralia, distribution maps of *Coenagrion lyelli*, *Cordulephya pygmaea*, and *Austrothermis nigrescens* are presented.] Address: Endersby, I., 56 Looker Road, Montmorency, Vic. 3094, Australia. E-mail: endersby@mira.net

**13398.** Endersby, I. (2013): Additional distribution records for Victorian dragonflies (Insecta: Odonata). *Victorian Entomologist* 43(4): 99-105. (in English) ["Distribution maps using point data were published for all of the known species of Odonata from Victoria from all available Museum label data that had been digitised at the time (Endersby 2010). The maps were restricted to specimen data as the identification of species can be checked. Some literature references were included if the specimen data were very sparse. Since then additional collection data have become available and numerous photographs have been published on the internet where identification of the species is unequivocal. Maps incorporating new data have been prepared for 19 species for which the original coverage was sparse and are presented here. Photographs on which some of the new records were based are provided. It is likely that this new information is due to increased search activity over the last few flight seasons rather than showing range extensions. Victoria does not have a strong history of focussed dragonfly sampling. Discussion of distribution extralimital to Victoria is based on the dot point maps in Theischinger & Endersby (2009)."] (Author) *Austrocnemis splendida*, *Austrolestes aridus*, *Austrolestes io*] Address: Endersby, I., 56 Looker Road, Montmorency, Vic. 3094, Australia. E-mail: endersby@mira.net

**13399.** Eremina, E.E.; Haritonov, A.Yu. (2013): First record of *Sympetrum v. vulgatum* (Linnaeus, 1758) dragonfly imaginal hibernation (Odonata, Libellulidae) in the South Urals, Russia. *Eurasian Entomological Journal* 12(3): 224-226. (in Russian, with English summary) ["In early April 2012 an active adult male *Sympetrum v. vulgatum* was captured in Chelyabinsk city, the Southern Urals, Russia. This is first record of imaginal hibernation of a dragonfly not of genus *Sympecma* in the temperate latitudes of Russia."] (Authors)]

**13400.** Farkas, A.; Jakab, T.; Müller, O.; Móra, A.; Lajter, I.; Dévai, G. (2013): Sex ratio in Gomphidae (Odonata) at emergence: is there a relationship with water temperature? *International Journal of Odonatology* 16(4): 279-287. (in English) ["Although the sex ratio of Odonata at emergence has received much attention, we are still far from understanding the exact causes of its variability and imbalance. In this paper we studied the sex ratios at emergence in natural populations of two Gomphus species based on samples of exuviae taken from two European lowland rivers. We hypothesized a possible relationship between the water temperature during larval development and the sex ratio at emergence. Sex ratio records exhibited no consistent bias towards one sex but varied between habitats and years in both species. We found correlations between sex ratio and water temperature in the year preceding emergence. Furthermore, the

correlation between sex ratios and water temperature was in opposite directions in the two congeneric species, which may be attributed to differences in their voltinisms. We conclude that the effect of water temperature can be mediated through cohort-splitting; temperature-dependent development of minor cohorts, including unequal proportions of males and females due to the faster development of male larvae, affects the sex ratio at emergence. The supposed effect does not cause a long-term consistent bias, but may explain the year-to-year variations."] (Authors)] Address: Farkas, Anna, Dept Hydrobiology, Centre of Arts, Humanities & Sciences, Fac. Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary. E-mail: flavipes@gmail.com

**13401.** Ferrand, M.; Duclose, M. (2013): Première mention d'*Orthetrum albistylum* dans le département de la Seine-Saint-Denis (Odonata: Libellulidae). *Martinia* 29(2): 123-124. (in French) [A male of *O. albistylum* was observed at 2-VII-2012 in the "parc Georges-Valbon" NW of Seine-Saint-Denis, France.] Address: Ferrand, M., Office pour les insectes et leur environnement, BP 30, F-78041 Guyancourt Cedex, France. E-mail: maxime.ferrand@irisectes.org

**13402.** Ferreras-Romero, M., (2013): Comparative analysis of the conservation state of southern Iberian streams using Odonata as indicators of environmental quality. *Métodos en Ecología y Sistemática* 7(3): 20-36. (in English, with Spanish summary) ["Global ecological conditions existing in streams of the southern Iberian Peninsula are very unequal. A new approach to assess aspects of the ecological integrity of Mediterranean streams by analysing dragonfly communities is presented. The Iberian Stream Odonatological Index (ISOI) operates at the species level. Taxonomic diversity and voltinism are two elements to take consideration to design this index. The results of a first application of this approach are presented in the paper as well. ISOI scores are compared with results obtained by application of a biological index based on whole macro-invertebrates communities (IBMW)."] (Author)] Address: Ferreras-Romero, M., Dept Sistemas Físicos, Químicos y Naturales, Univ. Pablo de Olavide, A-376 km 1, 41013 Sevilla, Spain. E-mail: mferrom@upo.es

**13403.** Figueiredo, N.; Pires, M.M.; Davanzo, R.C.S.; Kotzian, C.B. (2013): Diversidade de larvas de Odonata (Insecta) da Bacia do Rio Ibicuí, Rio Grande do Sul, Brasil. *Ciência e Natura* 35(2): 84-94. (in Portuguese, with English summary) ["An inventory of larval odonates in lotic systems from two courses (slope and lowland) in the Ibicuí River basin, Rio Grande do Sul, Brazil, was carried out in 2009 and 2010. In total, 964 specimens were sampled and classified in 34 genera and seven families. Libellulidae was the richest family with 14 genera and Gomphidae was the most abundant. Three new genera (*Agriogomphus*, *Cacoides* and *Mnesarete*) are new records for Rio Grande do Sul State. The dominant and more

frequent genera were *Progomphus*, *Hetaerina* and *Argia*. There was no significant difference in genus richness between the two courses, but a difference in frequency of occurrence of some genera was recorded. This difference is due to the distinguishing characteristics of the substrate between sections, which promoted a predominance of the genera of the gomphid family, especially in the sandy stretch from the lowland course." (Authors)] Address: Figueiredo, N., Universidade Federal de Santa Maria, UFSM, Santa Maria, RS, Brazil

**13404.** Fitzgerald, T. (2013): Nonlinear fluid-structure interactions in flapping wing systems. PhD thesis, Faculty of the Graduate School of the University of Maryland, College Park: X + 178 pp. (in English) ["This work relates to fluid-structure interactions in the context of flapping wing systems. System models of flapping flight are explored by using a coupling scheme to provide communication between a fluid model and a structural model describing a flexible wing. The constructed computational models serve as a tool for investigating complex fluid-structure interactions and characterizing them. Primary goals of this work are construction of models to understand nonlinear phenomena associated with the flexible flapping wing systems, and explore means and methods to enhance their performance characteristics. Several system analysis tools are employed to characterize the coupled fluid-structure system dynamics, including proper orthogonal decomposition, dimension calculations, time histories, and frequency spectra. Results obtained from two-dimensional simulations conducted for a combination of a two-link structural system and a fluid system are presented and discussed. Comparisons are made between the use of direct numerical simulation and the unsteady vortex lattice method as the fluid model in this coupled dynamical system. To enable three-dimensional studies, a novel solid model is formulated from continuum mechanics for geometrically exact finite elements. A new partitioned fluid-structure interaction algorithm based on the Generalized- method is formulated and implemented in a large scale fluids solver inside the FLASH framework. Consistent boundary conditions are also formulated by using Lagrangian particles. Several examples demonstrating the effectiveness of the methods and implementation are shown, in particular, for flapping flight at low Reynolds numbers. Unique experiments have also been undertaken to determine the first few natural frequencies and mode shapes associated with hawkmoth wings. The computational framework developed in this dissertation and the research findings can be used as a basis to understand the role of flexibility in flapping wing systems, further explore the complex dynamics of flapping wing systems, and also develop design schemes that might make use of nonlinear phenomena for performance enhancement."(Author)] Address: not stated

**13405.** Fleck, G.; Legrand, J. (2013): Notes on the genus *Libellulosoma* Martin, 1906, and related genera (Odonata: Anisoptera: Corduliidae). *Zootaxa* 3745(5): 579-586. (in English) ["The holotype of *Libellulosoma minuta*, until

now regarded as the unique specimen of this monotypic genus and considered lost for half a century, was found again in the dragonfly collection of the Muséum National d'Histoire Naturelle in Paris. A second specimen, also from Madagascar (probably East Madagascar) was found in the collection René Martin together with the holotype. A redescription, including the structure of the secondary copulatory apparatus, is provided. The genus *Libellulosoma* is closely related to the genera *Pentathemis* and *Aeschnosoma*, and its membership in the clade *Aeschnosomata* is well supported. Evidence from biogeography, the fossil record, and phylogeny indicates that this group, possible sister group of remaining *Corduliidae* s.s., was probably already present in the Early Cretaceous." (Authors)] Address: Legrand, J., Muséum national d'Histoire naturelle, 45 rue Buffon, 75005 Paris, France

**13406.** Fronzek, S. (2013): Climate change and the future distribution of *palsa mires*: ensemble modelling, probabilities and uncertainties. *Monographs of the Boreal Environment Research* 44: 35 pp. (in English) ["The heterogeneous environments of *palsa mires* offer distinct ecosystem services that are characterised by a rich species diversity (CAFF 2001). *Palsas* are preferred breeding grounds for bird species and offer resting places for migrating birds (Järvinen and Väisänen 1976, Järvinen 1979). Furthermore, the European distribution of the dragonfly *Somatochlora sahlbergi* is believed to be totally restricted to *palsa mires* (Schröter 2011). Consequently, the value of *palsa mires* for nature conservation has been recognised and they have been listed as one of 65 priority natural habitat types in Annex I of the "Habitats" Directive of the European Union." (Author) For the complete paper see: <https://helda.helsinki.fi/bitstream/handle/10-138/40109/fronzekdissertation.pdf?sequence=1>] Address: Fronzek, S., Univ. of Helsinki, Fac. Biological & Environmental Sci., Dept of Environmental Sciences

**13407.** Fulan, J.A.; Henry, R. (2013): A comparative study of Odonata (Insecta) in aquatic ecosystems with distinct characteristics. *Ambiência Guarapuava* (PR) 9(3): 589-604. (in English with Portuguese summary) ["The objective of this study was to compare the richness and density of Odonata larvae in four distinct environments: lotic with large pollutant loads, lotic with small pollutant loads, lentic disconnected from a river and lentic connected to a river, as well as to record the physical and chemical parameters of the water in the four environments. We identified (with one exception at the genus level) a total of 1,302 Odonata larvae in the four habitats. The environmental variables measured were: dissolved oxygen, pH, conductivity, suspended matter, air and water temperature, precipitation, depth, and the biomass of the macrophytes. The lentic habitats exhibited a greater Odonata larvae density in relation to the lotic habitats, except during April and December of 2006. The Guareí River, however, presented an elevated conductivity, possibly because of a greater quantity of pollutants it received during the period between June and September of 2006, and it

showed a higher density of Odonata larvae in comparison to the Paranapanema River. The temperature and the dissolved oxygen on the water surface were, respectively, greater and smaller in the lakes in comparison to the rivers. In spite of the Odonata density being higher in the lentic ecosystems in comparison to the lotic, the richness was not altered during the period studied. Nevertheless, the genera composition was distinct, showing that some taxa show a certain preference for certain types of ecosystems like Calopterygidae and Neogomphus, which were shown exclusively in the Paranapanema River." (Authors)] Address: Fulan, J.A., Universidade Federal do Amazonas (UFAM). CEP: 69800-000, Humaitá, AM, Brasil. E-mail: joaofulan@ig.com.br

**13408.** Gainzarain, J.A.; Ocharan, F.J.; Mezquita, I. (2013): Catalogo de los odonatos (Insecta: Odonata) de Álava (norte de España). Boletín de la Sociedad Entomológica Aragonesa (S.E.A.) 53: 173-185. (in Spanish, with English summary) ["This paper provides new information about the dragonflies recorded in Álava (northern Spain) mainly between the years 2008 and 2012, including the biogeographical characterization and an updated checklist of the order for this province. Data regarding the status of each species are provided. Calopteryx haemorrhoidalis and Gomphus simillimus are reported for the first time from Álava." (Authors)] Address: Ocharan, F.J., Dept Biología de Organismos y Sistemas, Univ. de Oviedo, E-33071 Oviedo, Spain: E-mail: focharan@uniovi.es

**13409.** Gliwa, B. (2013): First record of Orthetrum albistylum (Odonata: Libellulidae) in Lithuania. Naujos ir retos Lietuvos vabzdziu rusys 25: 5-6. (in English, with Lithuanian summary) ["Jurbarkas district Bank of the river Nemunas 55°05'01.7"N, 22°49'46.4"E. A single male has been observed in the valley of the river Nemunas at a river groyne near Rotuliai, 08 07 2013." (Author)] Address: Gliwa, B., Lithuanian Entomological Society, Akademijos 2, LT-08412 Vilnius, Lithuania. E-mail: gliwa@sargeliai.org

**13410.** Gołąb, M.J.; Śniegula, S.; Drobnia, S.M.; Zajac, T. Serrano-Meneses, M.A. (2013): Where do floaters settle? An experimental approach in odonates. Animal Behaviour 86: 1069-1075. (in English) ["Highlights: •We investigated the effect of habitat quality on the settlement of floaters. •Habitat disturbances affect mostly the nonterritorial part of a population. •Vacated high-quality territories are always taken over by new residents. •Nearly half of vacated low-quality territories are not taken over. •Floaters settle in the vicinity of high-quality sites. According to classic ecological models, nonterritorial males should settle in low-quality habitats as a result of losing competition over reproductive sites ('defeated male' hypothesis). Alternatively, according to evolutionary game theory models, nonterritorial males should settle in the vicinity of high-quality sites and 'choose' to delay breeding until these habitats are vacant for them ('male player' hypothesis). However, nonterritorial male spatial distribu-

tion has not been experimentally tested. If the defeated male hypothesis is true (1) deterioration of high-quality sites should increase the number of nonterritorial males in a population and (2) vacated low-quality territories should be taken over by new territorial males. If the male player hypothesis is true, a similar manipulation should (1) decrease the number of nonterritorial males and (2) vacated low-quality territories should not be taken over. We performed two types of field experiment to test these hypotheses: male removal and patch quality manipulation. Our study species was the territorial damselfly Calopteryx splendens; males of this species exhibit both territorial and nonterritorial behaviour. Our results suggest that deterioration of high-quality habitats significantly reduced the number of nonterritorial males. The proportion of take-overs of the high-quality territories was significantly higher than that of low-quality territories. Our study supports the assumptions of the male player hypothesis and indicates that nonterritorial damselflies are more sensitive to habitat quality changes than territorial ones. Because nonterritorial individuals exist in most populations of territorial taxa, a better understanding of their settlement rules may be relevant for population dynamics and modelling." (Authors)] Address: Gołąb, Maria, Institute of Nature Conservation, Polish Academy of Sciences, Kraków, Poland. E-mail: marysiagolab@gmail.com

**13411.** Gomez-Anaya, J.A.; Novelo-Gutierrez, R.; Ramirez, A. (2013): Temporal variation in Odonata larval assemblage diversity in a lowland stream in western Mexico. Odonatologica 42(4): 309-323. (in English) ["There is limited information on the structure and seasonality of Mexican Odon., in particular for lowland regions. Here, the structure and seasonal changes in the diversity of larval Odon. at El Ticuiz stream (10m asl) are described by conducting seven surveys over the yr. The study reach was impacted by dredging that resulted in the occurrence of lotic and lentic-like environments that promoted the abundant growth of aquatic macrophytes. Overall, Odonata diversity was high and a total of 13 species of Zygoptera and 23 of Anisoptera were recorded. The dominant species were Argia pulla and Telebasis salva, both dominating assemblages during the entire period of study. Two peaks in species richness, spring and autumn, were found suggesting that most spp. have at least 2 generations per year. Potential causes for the high diversity found include the low elevation, low flow, the effects of dredging in habitat availability, and the presence of water hyacinths and Potamogeton sp. Changes in species richness and composition appear to be mostly related to seasonality." (Authors)] Address: Gomez-Anaya, J.A., Instituto de Ecología, A.C., Apartado Postal 63, 91070, Xalapa, Veracruz, Mexico. E-mail: antonio.gomez@inecol.edu.mx

**13412.** Gonzalez-Tokman, D.M.; Gonzalez-Santoyo, I.; Munguía-Steyer, R.; Cordoba-Aguilar, A. (2013): Effect of juvenile hormone on senescence in males with terminal investment. J. Evol. Biol. 26: 2458-2466. (in English) ["Senescence, a decline in survival and reproductive prospects



with age, iscontrolled by hormones. In insects, juvenile hormone (JH) is involved in senescence with captive individuals, but its effect under natural conditions is unknown. We have addressed this gap by increasing JH levels in young and old wild males of the damselfly *Hetaerina americana*. We assessed survival in males that were treated with a JH analogue (methoprene), which is known to promote sexual activity, and an immune challenge, which is known to promote terminal investment in reproduction in the studied species. We replicated the same procedure in captivity (to control for environmental variation), where males were deprived of any activity or food. We expected old males to show the lowest survival after being treated with JH and immune-challenged, because the effect of terminal investment on senescence would be exacerbated by JH. However, this should be the case for wild animals, but not for captive animals, as the effects of JH and immune challenge should lead to an increase in high energetic-demanding activities only occurring in the wild. Old animals died sooner compared with young animals in both the wild and captivity, confirming that males are subject to senescence. In wild but not captive animals, JH decreased survival in young males and increased it in old males, confirming that JH is sensitive to the environment when shaping animal senescence. Immune challenge had no effect on survival, suggesting no effect of terminal investment on senescence. Additionally, contrary to the expected effects of terminal investment, with an immune challenge, recapture rates increased in young males and decreased in old males. Our results show that male senescence in the wild is mediated by JH and that terminal investment does not cause senescence. One explanation is that animals undergoing senescence and terminal investment modify their feeding behaviour to compensate for their physiological state." (Authors)] Address: Córdoba-Aguilar, A., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: [acordoba@ecologia.unam.mx](mailto:acordoba@ecologia.unam.mx)

**13413.** Grgic, M. (2013): Faunistical and ecological characteristics of dragonflies (Odonata) in different habitat types in the alluvial lowland forest Spacva. MS thesis. Department of Biology, University Josip Juraj Strossmayer in Osijek. 62 pp. (in Croatian, with English summary) [A total of 22 Odonata species were recorded at ten localities in the alluvial lowland forest in the area of Spacva, Croatia, between May and October in 2012. Most abundant species were *Erythromma viridulum*, *Orthetrum albistylum*, *Sympetrum sanguineum* and *Crocothemis erythraea*. The list also includes *Chalcolestes parvidens*, *Epithea bimaculata* and *Somatochlora meridionalis*.] Address: Grgic, Marina, Department of Biology, University Josip Juraj Strossmayer in Osijek, Croatia

**13414.** Gros, P. (2013): Der Violette Sonnenzeiger *Trithemis annulata* (Beauvois, 1805): Eine sich in Südeuropa ausbreitende afrotropische Libellenart. Salzburger Entomologische Arbeitsgemeinschaft. Haus der Natur. News-

letter 1/2013: 1-3. (in German) [The author reports from a trip (without dates) into the valley of Cavu near Lecci on the island of Corsica, France. Several Odonata species are noted including *Ischnura genei* and *Trithemis annulata*. The later is briefly introduced as a species with current range extension.] Address: Gros, P., Haus der Natur, Museumsplatz 5, A-5020 Salzburg, Austria. E-Mail: [patrick.gros@hausdernatur.at](mailto:patrick.gros@hausdernatur.at)

**13415.** Guillermo-Ferreira, R.; Bispo, P.C. (2013): Description of the larva of *Telebasis griffinii* (Martin, 1896) (Zygoptera: Coenagrionidae). *Odonatologica* 42(4): 403-407. (in English) ["A description and illustrations of the final instar larva are provided based on reared specimens collected in São Paulo State, Brazil. *T. griffinii* can be distinguished from other *Telebasis* species by the 6 palpal setae, 1 premental seta, no setae on antennae, and the shape of the foliaceous and lanceolate caudal lamellae." (Authors)] Address: Guillermo-Ferreira, R., LABIA, Laboratório de Biologia Aquática, Departamento de Ciências Biológicas, Faculdade de Ciências e Letras de Assis, Universidade Estadual Paulista, Av. Dom Antonio 2100, BR-19.806-900 Assis, SP, Brazil

**13416.** Gustafsson, S.; Österling, M.; Skurdal, J.; Schneider, L.D.; Calles, O. (2013): Macroinvertebrate colonization of a nature-like fishway: The effects of adding habitat heterogeneity. *Ecological Engineering* 61, Part A: 345-353. (in English) ["Nature-like fishways are designed to imitate the characteristics of natural streams, thereby providing both fish passage and habitat for a variety of aquatic organisms. To date, however, the potential for habitat rehabilitation of nature-like fishways has not been fully realized. To develop the concept of how to design a nature-like fishway, a 500-m long nature-like fishway, termed the biocanal, was constructed at the Eldforsen hydroelectric facility, Sweden. It included four habitat types: riffle, pool, floodplain and braided (i.e. with islands), each replicated three times. The riffle sections were considered controls for typical Swedish nature-like fishways. Thus the biocanal had a more varied in-stream environment than those of conventional fishways. To test the prediction that the biocanal had a positive effect on biodiversity, we compared the physical habitat and benthic fauna composition of the more diverse habitat types in the biocanal to the riffle habitats. We also made comparisons between the biocanal and six natural reference streams in the area. After two years, 63% of the benthic fauna families found in the reference streams had colonized the biocanal. Families present in the reference streams, but not in the biocanal, were predominantly slow colonizers or taxa linked to riparian vegetation, which was scarce and in an early successional stage along the biocanal. In the biocanal, pool and floodplain habitats contained the highest number of families, the highest family diversity (Shannon–Weaver) and the highest densities of Ephemeroptera, Plecoptera and Trichoptera. Since these habitats contained more families and had higher diversities than the riffle habitats which are typical of conventional nature-like fishways, we suggest that the construction of bio-

canals indeed possesses the potential for high biodiversity... The Odonata were among the slowest colonizers, and only one out of the seven Odonata families found in the reference streams was found in the biocanal at the end of the study. (Aeshnidae, Calopterygidae, Cordulegastridae, Corduliidae, Gomphidae, Platycnemididae)". (Authors)] Address: Gustafsson, Stina, Department of Biology, Karlstad University, S-651 88 Karlstad, Sweden. E-mail: stina.gustafsson@kau.se

**13417.** Ha, N.S.; Goo, N.S. (2013): Flapping frequency and resonant frequency of insect wings. 10th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), Oct. 30 2013-Nov. 2 2013: 29-31. (in English) ["In this study, we experimentally studied the relationship between wingbeat frequency and resonant frequency of 30 individuals of eight insect species from five families: Odonata (*Sympetrum flaveolum*), Lepidoptera (*Pieris rapae*, *Plusia gamma* and *Ochlodes*), Hymenoptera (*Xylocopa pubescens* and *Bombus rupestris*), Hemiptera (*Tibicen linnei*) and Coleoptera (*Allomyrina dichotoma*). We found that wingbeat frequency does not have a strong relation with resonance frequency: in other words, insects have not been evolved sufficiently to flap at their wings' structural resonant frequency. This contradicts the general conclusion of other reports—that insects flap at their wings' resonant frequency to take advantage of passive deformation to save energy." (Authors)] Address: not available.

**13418.** Hacet, N.; Özkan, N. (2013): Odonata larvae from Kapıdağ Peninsula and Marmara Island in Turkey (Anisoptera: Aeshnidae, Gomphidae, Cordulegastridae, Libellulidae). *Notulae Odonatologicae* 8(2): 23-25. (in English) ["The larvae of 8 species, collected in 2010, are brought on record. Six of them occurred in both places, whereas *Gomphus schneiderii* and *Onychogomphus forcipatus albotibialis* were restricted to the peninsula. The Marmara records are the first odonate records from the island." (Authors)] Address: Hacet, Nurten, Department of Biology, Faculty of Science, Trakya University, TR-22030 Edirne, Turkey. E-mail: nhacet@hotmail.com

**13419.** Hämäläinen, M. (2013): Synonymic notes on some oriental species of Calopterygidae, Euphaeidae and Chlorocyphidae. *Notulae Odonatologicae* 8(2): 25-29. (in English) ["The following new synonymies are presented: *Echo margarita tripartita* Selys, 1879 (Calopterygidae) is synonym of *E. margarita* Selys, 1853; *Heterophaea ruficollis* (Ris, 1930) (Euphaeidae) is a junior synonym of *H. barbata* (Martin, 1902); *Rhinocypha cognata* Kimmins, 1936 (Chlorocyphidae) is a junior synonym of *R. stygia* Förster, 1897. The lectotype of *E. margarita tripartita* is designated." (Author)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: Libellago@gmail.com

**13420.** Haritonov, A.Yu.; Borisov, S.N. (2013): Distribution and habitat characteristics of *Sympetrum haritonovi*

Borisov, 1983 (Odonata, Libellulidae) in Central Asia mountains Tien-Shan, Pamir-Alai and Kopetdagh. *Eurasian Entomological Journal* 12(3): 213-216. (in Russian, with English summary) ["The locality list of little-known species *Sympetrum haritonovi* in Tien-Shan, Pamir-Alai and Kopetdagh is presented. The species is firstly recorded for Turkmenistan and Kazakhstan. It is ranged in mountain absolute altitudes 800–3550 m with optimum near 1600–2200 m. Habitats for larvae served wetlands drainable with ground water and mountain springs. Large number of adults of the species was recorded in 3360 and 3550 m altitudes of East Pamir on floods of two thermal sources. Five dragonfly species were recorded together with *S. haritonovi*: *Ischnura forcipata*, *I. pumilio*, *Orthetrum anceps*, *O. brunneum* and *Sympetrum flaveolum*." (Authors)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**13421.** Haro, R.J.; Bailey, S.W.; Northwick, R.M.; Rolfhus, K.R.; Sandheinrich, M.; Weiner, J. (2013): Burrowing dragonfly larvae as biosentinels of Methylmercury in freshwater food webs. *Environmental Science & Technology* 47(15): 8148-8156. (in English) ["We assessed the utility of larval burrowing dragonflies (*Arigomphus cornutus*, *Dromogomphus spinosus*, *Gomphus adelphus*, *Gomphus exilis*, *Gomphus graslinellus*, *Gomphus lividus*, *Gomphus spicatus*, *Hagenius brevistylus*, *Ophiogomphus colubrinus*, *Progomphus obscurus*) as biosentinels of methylmercury (MeHg) contamination. Gomphids were the most abundant family of dragonflies sampled during 2008-2010 from 17 lakes in four national parks of the northwestern Laurentian Great Lakes region. Ten species of burrowing gomphids were sampled; 13 lakes contained 3 or more species, and 2 species of *Gomphus* co-occurred in 12 lakes. Most of the total Hg (THg) in whole, late-instar larvae was MeHg, with mean percent MeHg exceeding 60% in 16 lakes. Mean MeHg in larvae of a given species varied greatly among lakes, ranging from 4 to 109 ng g<sup>-1</sup> dry weight. Methylmercury levels in larvae, however, were much less variable within a given lake and species. The mean concentration of MeHg in burrowing gomphids was positively correlated with mean MeHg concentration in unfiltered lake water. Mean concentrations of THg and MeHg in multispecies assemblages of *Gomphus* were also positively correlated with mean THg in coexisting prey fish and game fishes. We recommend—and provide guidance on—the application of burrowing gomphids as biosentinels of MeHg contamination, which can extend the bioassessment of MeHg to fishless fresh waters." (Authors)] Address: Haro, R.J., River Studies Center, University of Wisconsin-La Crosse, La Crosse, Wisconsin 54601, USA

**13422.** Herder, J.E.; van Delft, J., Bellemain, E.; Valentini, A. (2013): The use of environmental DNA (eDNA) to monitor biodiversity. *De Levende Natuur* 114(3): 108-113. (in Dutch, with English) ["Analyses of Environmental DNA

is a new approach for monitoring biodiversity. The method is based on the limited persistence of the DNA left behind by species in their environment. This environmental DNA (eDNA) can be detected in water samples, thereby indicating or confirming a species' presence. In this article we present an overview of the various habitats where eDNA has been successfully used for species detection. We show the results of pilot studies carried out in the Netherlands on the freshwater fish *Misgurnus fossilis*, dragonflies *Aeshna viridis* and *Leucorrhinia pectoralis* and the mammals *Neomys fodiens* and *Microtus oeconomus*. We focus on case studies in which eDNA has been used to monitor endangered species. Furthermore, we describe DNA metabarcoding by which a list of species is generated from an environmental sample. Finally, we take a look into the future by suggesting areas where more research is needed. We think that this new tool can give an enormous boost to data collection both in monitoring and biodiversity studies, thereby contributing to the conservation of species." (Authors)] Address: Herder, J.E., Stichting RAVON, Postbus 1413, 6501 BK Nijmegen, The Netherlands. E-mail: j.herder@ravon.nl

**13423.** Herzog, J.; Martens, A. (2013): Larve von *Aeshna* spec. (Odonata: Aeshnidae) als Beute des Südlichen Wasserschlauchs *Utricularia australis*. *Libellula* 32(3/4): 181-185. (in German, with English summary) ["A second stadium larva of *Aeshna* cf. *cyanea* was recorded in a bladder of *U. australis* sampled from a garden pond in Karlsruhe, Germany, on 16-V-2013. The larva was still alive, parts of the abdomen protruded from the bladder. Furthermore two larvae of Zygoptera were found. This is the first record of an anisopteran larva as prey of a carnivorous aquatic plant." (Authors)] Address: Herzog, Juliana, Pädagogische Hochschule Karlsruhe, Institut für Biologie und Schulgartenentwicklung, Bismarckstr. 10, 76133 Karlsruhe, Germany. E-mail: Juliana.Herzog@gmx.de

**13424.** Hippke, M. (2013): Einige bemerkenswerte faunistische Beobachtungen 2013 aus West-Mecklenburg (Odonata, Lepidoptera, Heteroptera, Orthoptera). *Virgo* 16(1): 63-65. (in German) [Mecklenburg-Vorpommern, Germany; records of the following Odonata species are documented: *Anax parthenope*, *Aeshna affinis*, *Crocothemis erythraea*, *Leucorrhinia caudalis*, *L. pectoralis*, *Lestes barbarus*, *Erythromma viridulum*.] Address: Hippke, M., Wiesenring 29, 19370 Parchim, Germany. E-mail: Mathias-Hippke@web.de

**13425.** Inoue, K.; Sasamoto, A.; Futahashi, R. (2013): The true status of *Somatochlora taiwana* Inoue & Yokota: A genuine species or a synonym of *S. dido* Needham? (Anisoptera: Corduliidae). *Odonatologica* 42(4): 325-334. (in English) ["The taxonomic status of *S. taiwana*, described from Taiwan, is controversial. It may be a genuine species or a synonym under *S. dido*, a species that occurs in mainland China. Based on morphological and DNA analyses, it is proposed here that *S. taiwana* should be treated as a genuine species." (Authors)] Address:

Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**13426.** Ivanova, E.P.; Hasan, J.; Webb, H.K.; Gervinskis, G.; Juodkazis, S.; Truong, V.K.; Wu, A.H.F.; Lamb, R.N.; Baulin, V.A.; Watson, G.S.; Watson, J.A.; Mainwaring, D.E.; Crawford, R.J. (2013): Bactericidal activity of black silicon. *Nature Communications* 4:2838. DOI: 10.1038/ncomms3838: 7 pp. (in English) ["Black silicon is a synthetic nanomaterial that contains high aspect ratio nanoprotusions on its surface, produced through a simple reactive ion etching technique for use in photovoltaic applications. Surfaces with high aspect-ratio nanofeatures are also common in the natural world, for example, the wings of the dragonfly *Diplacodes bipunctata*. Here we show that the nanoprotusions on the surfaces of both black silicon and *D. bipunctata* wings form hierarchical structures through the formation of clusters of adjacent nanoprotusions. These structures generate a mechanical bactericidal effect, independent of chemical composition. Both surfaces are highly bactericidal against all tested Gram-negative and Gram-positive bacteria, and endospores, and exhibit estimated average killing rates of up to  $4.5 \times 10^5$  cells  $\text{min}^{-1} \text{cm}^{-2}$ . This represents the first reported physical bactericidal activity of black silicon or indeed for any hydrophilic surface. This biomimetic analogue represents an excellent prospect for the development of a new generation of mechano-responsive, antibacterial nanomaterials." (Authors)] Address: Ivanova, Elena, Faculty of Life and Social Sciences, Swinburne University of Technology, Hawthorn, Victoria 3122, Australia. E-mail: eivanova@swin.edu.au

**13427.** Jaeschke, A.; Bittner, T.; Reineking, B.; Beierkuhnlein, C. (2013): Can they keep up with climate change? – Integrating specific dispersal abilities of protected Odonata in species distribution modelling. *Insect Conservation and Diversity* 6: 93-103. (in English) ["(1.) The effects of climate change on the distribution of species are typically inferred using bioclimatic envelope models, assuming either no or unrestricted dispersal abilities. Information on species-specific dispersal abilities, especially of animals, is rarely incorporated. (2.) We analysed European records of two damselflies and four dragonflies protected by the Habitats Directive of the European Union. In addition to no or unrestricted dispersal scenarios, we considered species-specific dispersal distances based on literature information to improve realism in assessing conservation implications of climate change. The climate model HadCM3 and the emission scenario A2 were applied to project potential changes in occurrence probabilities up to 2035. As modelling algorithms, generalised linear models (GLM) and boosted regression trees (BRT) were used. (3.) The species *Coenagrion ornatum*, *Coenagrion mercuriale* and *Ophiogomphus cecilia* are projected to lose range (up to -68%) when incorporating specific dispersal distances, while they are projected to extend their range (up to +23%) in the unre-



stricted dispersal scenario. Furthermore, suitable climatic conditions tend to decline for *Leucorrhinia albifrons* and *Leucorrhinia caudalis* (up to -73%), whereas *Leucorrhinia pectoralis* is projected to gain distribution area (up to +37%) assuming either species-specific or unrestricted dispersal and subsequently successful breeding. Cross-validated model performance (AUC values) ranges between 0.77 and 0.92. (4.) 4. The integration of species-specific knowledge about dispersal distances in species distribution models promises to improve estimates of potential range changes and their implications for conservation management. Contrasting model results under different dispersal scenarios highlight the importance of research on species' ecology including dispersal distances." (Authors)] Address: Jaeschke, Anja, University of Bayreuth, Universitätsstr. 30, D-95447 Bayreuth, Germany. E-mail: anja.jaeschke@uni-bayreuth.de

**13428.** Jimenez-Cortes, J.G.; Cordoba-Aguilar, A. (2013): Condition dependence and trade-offs of sexual versus non-sexual traits in an insect. *Journal of ethology* 31(83): 275-284. (in English) ["Sexual traits often communicate male condition and so are known to be highly condition-dependent. Thus, it is expected that, under restricted environments, sexual traits will be more heavily impacted than non-sexual traits, and so a negative covariation will be expected between sexual traits and non-sexual traits as only high-quality males will sustain the costs of producing both trait types. Such covariation will not necessarily appear in non-restricted environments. We tested these predictions using males of the American rubyspot, *Hetaerina americana*. First, fully mature males from different seasons were collected and their sexual [a wing red spot and body size (this corrected for body mass using residuals)], and condition-indicating, non-sexual (phenoloxidase and protein concentration) traits were measured. Second, larvae were reared under different food quantities and the same traits plus another non-sexual trait [pro-phenoloxidase (proPO)], were measured in recently emerged males. Contrary to expected, non-sexual traits showed larger expression variance than sexual traits. We found a significant covariation between body size and proPO for experimental males. Both rich and poor diet groups showed a negative slope for body size and proPO. This supposes a resource allocation trade-off between these two traits for recently emerged animals. On the other hand, the presumed signaling function between sexual traits, such as spot size, and physiological indicators of condition in this species, is not supported." (Authors)] Address: Jimenez-Cortes, J.G., Departamento de Ecología Evolutiva, Instituto de Ecología, Univ. Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510 México, D. F., Mexico

**13429.** Jones, N.E. (2013): Patterns of benthic invertebrate richness and diversity in the regulated Magpie River and neighbouring natural rivers. *River Research and Applications* 29(9): 1090-1099. (in English) ["Fluctuating flows common in hydropeaking operations present biota with contrasting and challenging environments. Taxa that

require a narrow range of water velocity or are not adapted to withstand sudden changes in discharge will likely be eliminated or competitively disadvantaged under such circumstances, perhaps leading to reduced biodiversity. I investigated the whole river, longitudinal and lateral patterns of benthic invertebrate abundance, Shannon–Wiener diversity, and rarefied taxa density and richness in the hydropeaking Magpie River and 16 neighbouring natural rivers. The Magpie River had greater abundances of benthic invertebrates than natural rivers, particularly near the dam. General differences in benthic community characteristics were largely based on the near absence of Odonata and Plecoptera and an abundance of snails and worms in the Magpie River. Family density, richness and diversity were greater in the regulated Magpie River and unregulated upper Magpie River than found in natural rivers. Longitudinally, family density, diversity and particularly richness increased downstream in the Magpie River. Laterally, diversity did not show any trends with increasing depth along transects, except at near the dam where it decreased sharply with depth, velocity, and an abundance of filter feeding invertebrates. Taxa density did not show any lateral trends in natural rivers, whereas in the Magpie River, it increased with water velocity and depth. The results of this study are contradictory to the general findings of others implying reduced biodiversity below hydropower facilities. Possible explanations are examined and contrasted with other examinations of benthic invertebrate response below hydropeaking dams. General differences in benthic community characteristics were largely based on the near absence of Odonata and Plecoptera and an abundance of snails and worms in the Magpie River. ... Axis 2 eigenvalues were heavily weighted by Odonata, worms and snails. ..." (Author)] Address: Jones, N.E., River and Stream Ecology Lab, Ontario Ministry of Natural Resources, Trent University, 2140 East Bank Drive, Peterborough, Ontario, Canada K9J 7B8. E-mail: nicholas.jones@Ontario.ca

**13430.** Jones, O.M.; Ottea, J. (2013): The effects of Spinosad on *Culex quinquefasciatus* and three nontarget insect species. *Journal of the American Mosquito Control Association* 29(4): 346-351. (in English) ["Spinosad is a relatively new insecticide with a unique mode of action that is being evaluated for control of larval mosquitoes. Whereas a number of toxicological studies have measured effects of spinosad on various animals, few have been conducted on the effects of spinosad on nontarget, aquatic insect species. Such studies are important as these species might be found in the same environments as mosquito larvae targeted for control. A neighborhood pond was surveyed to find a representative species of mosquito as well as other common aquatic insects with which to examine susceptibility to spinosad and nontarget effects. The mosquito species chosen was *Culex quinquefasciatus* and the most common nontarget taxa were immature stages of a mayfly (*Caenis* sp., Ephemeroptera: Caenidae), a damselfly (*Ischnura* sp., Odonata: Coenagrionidae), and a dragonfly (*Pachydiplax longipennis*).

nis, Odonata: Libellulidae). Bioassays of mosquitoes from a reference susceptible strain (Sebring-S) and field collections of *Cx. quinquefasciatus* were used to determine susceptibility to spinosad. In addition, susceptibility was examined in nontarget taxa using spinosad concentrations corresponding to the LC50 of field-collected mosquitoes (0.031 ppm) and the maximum label rate (1.6 ppm) of spinosad (Natular®EC). Susceptibility to spinosad did not differ between Sebring-S and field-collected mosquitoes. However, there was a marked difference in susceptibility among nontarget taxa. Susceptibility was greatest in *Caenis* sp., followed by *Ischnura* sp., and then *P. longipennis*. (Authors)] Address: James Ottea, J., Dept of Entomology, Louisiana State University Agricultural Center, Baton Rouge, LA 70803, USA

**13431.** Jovic, M. (2013): A proposal of Serbian names for dragonfly species (Insecta: Odonata) of the Balkan Peninsula, with the checklist of Odonata of Serbia. *Acta entomologica serbica* 18(1/2): 1-10. ["This work presents suggestions for Serbian nomenclature for 92 Odonata species which can be found in the states of the Balkan Peninsula and adjacent territories of Hungary and Romania. Sixty-seven species are chosen in particular because of written notes about their discovery on the territory of Serbia. Comments on the names suggested are made with the previously existing Serbian vernacular names for this group of insects in mind." (Author) ] Address: Jovic, M., Natural History Museum in Belgrade, Njegoševa 51, 11000 Belgrade, Serbia. E-mail: milos.jovic@nhmbeo.rs

**13432.** Juhászová, J. (2013): From symbol to latency (Two forms of spiritual discourse in contemporary Slovak poetry). *Zeitschrift für Slawistik* 58(4): 444-461. (in English) ["Spiritual themes in the 20th century Slovak poetry were influenced first of all by the aesthetic code of symbolism with a small exception in the 1930s when it was influenced by H.Bremond's conception of pure poetry. Only in contemporary spiritual poetry the power of the symbolist code is weakening, and aesthetic impulses of avantguards and poststructuralist tendencies become a more distinctive source of inspiration. Against the background of the interpretation of two poetic texts - M. Rúfus: *Vlastnoručný podpis*, zb. *Vážka*, 1998 [The Handwritten Signature, coll. The Dragonfly], and Erik Jakub Groch: *Sa*, zb. *Druhá naivita*, 2005 [Self, coll. The Second Naïveté], the study focuses on important developmental impulses in literary thought, observing how in a certain period the power of one aesthetic code begins to weaken and leaves a space for a new one to succeed." (Author)] Address: Juhászová, Jana, Department of Slovak Language and Literature, Faculty of Arts and Letters, Catholic University, Hrabovská cesta 1, 03401 Ružomberok, Slovakia

**13433.** Juhász, P.; Kiss, B.; Olajos, P.; Grigorszky, I. (2013): Cercetările faunistice a nevertebratelor macroscopice acvatice pe teritoriul administrat de către Körös–Maros Nemzeti Park. *Crisicum* 3: 139-154. (in Hungari-

an) [32 localities in the Körös–Maros Nemzeti Park (Hungaria) have been studied for their fauna. The list of 36 Odonata species includes *Lestes dryas*, *L. macrostigma*, *Coenagrion pulchellum interruptum*, *C. scitulum*, *Stylurus flavipes*, *Ophiogomphus cecilia*, and *Leucorrhinia pectoralis*.] Address: Juhász, P., VITUKI Rt., H-1095 Budapest, Kvassay út 1. Hungaria

**13434.** Kalkman, V.J.; Richards, S.J.; Polhemus, D.A. (2013): Two new species of *Pyrrhargiolestes*, with a key to the males (Odonata: Argiolestidae). *International Journal of Odonatology* 16(1): 53-65. (in English) ["Two new species belonging to the endemic New Guinea genus *Pyrrhargiolestes* are described from Papua New Guinea: *P. lamington* sp. nov. (holotype: Mount Lamington, Oro Province, dep. in RMNH) and *P. yela* sp. nov. (holotype: Rossel Island, Milne Bay Province, dep. in USNM). The presumed male of *P. alicus* is described for the first time. New records and remarks are provided for *P. angulatus*, *P. kula*, *P. sidonia* and *P. tenuispinus*. A key to the males of all species of *Pyrrhargiolestes*, information on habitat and a map of the known distributions are given." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**13435.** Kang, S.R.; King, S.L. (2013): Seasonal comparison of aquatic macroinvertebrate assemblages in a flooded coastal freshwater marsh. *Open Journal of Ecology* 3: 94-101. (in English) [White Lake Wetlands Conservation Area (WLWCA, 29°52'N, 92°31'W) in the Chenier Plain of southwestern Louisiana, USA; "Marsh flooding and drying may be important factors affecting aquatic macroinvertebrate density and distribution in coastal freshwater marshes. Limited availability of water as a result of drying in emergent marsh may decrease density, taxonomic diversity, and taxa richness. The principal objectives of this study are to characterize the seasonal aquatic macroinvertebrate assemblage in a freshwater emergent marsh and compare aquatic macroinvertebrate species composition, density, and taxonomic diversity to that of freshwater marsh ponds. We hypothesize that 1) freshwater emergent marsh has lower seasonal density and taxonomic diversity compared to that of freshwater marsh ponds; and 2) freshwater emergent marsh has lower taxa richness than freshwater marsh ponds. Seasonal aquatic macroinvertebrate density in freshwater emergent marsh ranged from 0 organisms/m<sup>2</sup> (summer 2009) to 91.1 ± 20.53 organisms/m<sup>2</sup> (mean ± SE; spring 2009). Density in spring was higher than in all other seasons. Taxonomic diversity did not differ and there were no unique species in the freshwater emergent marsh. Our data only partially support our first hypothesis as aquatic macroinvertebrate density and taxonomic diversity between freshwater emergent marsh and ponds did not differ in spring, fall, and winter but ponds supported higher macroinvertebrate densities than freshwater emergent marsh during summer. However, our data did not support our second

hypothesis as taxa richness between freshwater emergent marsh and ponds did not statistically differ." (Authors) Data on the mean density (ind-m<sup>2</sup>) in freshwater emergent marsh by season are presented at the genus level for *Coryphaeschna*, *Enallagma*, *Ischnura*, *Erythemis*, and *Pachydiplax*] Address: Kang, S.R., School of Renewable Natural Resources, LSU AgCenter, Baton Rouge, Louisiana 70803-4301, USA. E-mail: skang1@tigers.lsu.edu

**13436.** Karube, H.; Suda, S., Umeda, T.; Hayashi, H. (2013): Odonata fauna of Izu Archipelago, Japan. Tombo 55: 99-114. (in Japanese, with English summary) ["Izu archipelago, situated south of Tokyo, consists of 9 main islands. Here we recorded 23 odonate species in total. Some of the species (*Anaciaeschna martini*, *Anax nigrofasciatus nigrofasciatus*, and *Crocothemis servilia marianae*) were recorded for the first time from the archipelago. All the islands are of volcanic origin, thus fresh water bodies are very limited, and the islands have relatively short geological histories. Therefore the archipelago has a poor odonate fauna without endemic species/subspecies. We confirmed many alien species: some of them are invasive and we consider their predation as the main cause of the extinction of *Deielia phaon*." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**13437.** Kawade, S.T. (2013): Diversity and abundance of damselflies of Saikheda Water Reservoir of Yavatmal district, Maharashtra (India). Science Park Research Journal 1(20): 1-5. (in English) ["Saikheda water reservoir of Yavatmal district, Maharashtra (India) were studied for rainy season from June 2013 to September 2013 of two station of Saikheda dam. A total of 10 species belonging to three families of zygoptera were identified." (Author)] Address: Kawade, Sarita, Department of Zoology, S. M. College Pandharkawada, Dt., Yavatmal (M.S), India

**13438.** Keller, D.; Holderegger, R. (2013): Damselflies use different movement strategies for short- and long-distance dispersal. Insect Conservation and Diversity 6(5): 590-597. (in English) ["Dispersal is an important process for any organism, but especially for endangered species in fragmented landscapes. To enhance the dispersal of a certain species, connectivity measures are implemented, which require knowledge on the species' dispersal behaviour and habitat. It is often assumed, that the preferred reproductive habitat of a species is also used as the main dispersal habitat. Although this assumption has often been confirmed, there are also cases where it has been disproved. With a combination of a mark-resight study and genetic analysis conducted in a fragmented agricultural landscape in Switzerland, the dispersal habitats of the threatened damselfly *Coenagrion mercuriale* were analysed for different distance classes. In addition, maximum dispersal distances were estimated. The mark-resight study detected movement over short distances (=500 m) mainly within the reproductive habitat of *C.*

*mercuriale* (i.e. streams). In contrast, the genetic study detected both short- and long-distance dispersal. Short-distance dispersal occurred along streams, and discontinuity of streams hindered dispersal. Long-distance dispersal was suggested to happen along more or less straight lines and crossing agricultural land. Genetic analysis also showed that populations were well connected and that few individuals dispersed over larger distances (=4500 m). Our study showed that connected reproductive habitat enhanced short-distance dispersal in *C. mercuriale*. Although short-distance dispersal occurred frequently, long-distance dispersal was rare, but important to connect more isolated populations. Therefore, it would be relevant to differentiate between these two dispersal types when planning connectivity measures." (Authors)] Address: Keller, Daniela, WSL Swiss Federal Research Institute, Zürcherstr., 111, 8903 Birmensdorf, Switzerland. E-mail: daniela.keller@wsl.ch

**13439.** Khelifa, R.; Zebba, R.; Moussaoui, A.; Kahalerras, A.; Bensouilah, S.; Mahdjoub, H. (2013): Niche partitioning in three sympatric congeneric species of dragonfly, *Orthetrum chrysostigma*, *O. coerulescens anceps*, and *O. nitidinerve*: The importance of microhabitat. Journal of Insect Science 13(71): 1-17. (in English) ["Habitat heterogeneity has been shown to promote co-existence of closely related species. Based on this concept, a field study was conducted on the niche partitioning of three territorial congeneric species of skimmers (Anisoptera: Libellulidae) in Northeast Algeria during the breeding season of 2011. According to their size, there is a descending hierarchy between *O. nitidinerve*, *O. chrysostigma*, and *O. coerulescens anceps*. After being marked and surveyed, the two latter species had the same breeding behaviour sequence. Knowing that they had almost the same size, such species could not co-occur in the same habitat according to the competitive exclusion principle. The spatial distribution of the three species was investigated at two different microhabitats, and it was found that these two species were actually isolated at this scale. *O. chrysostigma* and *O. nitidinerve* preferred open areas, while *O. c. anceps* occurred in highly vegetated waters. This study highlights the role of microhabitat in community structure as an important niche axis that maintains closely related species in the same habitat." (Authors)] Address: Khelifa, R., Département d'écologie et du génie de l'environnement, Université 08 Mai 1945, Guelma 24000, Algeria. E-mail: rassimkhalifa@gmail.com

**13440.** Khelifa, R.; Zebba, R.; Kahalerras, A.; Laouar, A.; Mahdjoub, H.; Houhamdi, M. (2013): Description of the final instar exuvia of *Urothemis edwardsii* with reference to its emergence site selection (Odonata: Libellulidae). Entomologia Generalis 34(4): 303-312. (in English) ["The last instar exuviae of the critically endangered *U. edwardsii* is described and illustrated based on exuviae collected from Lake Bleu, Numidia (Northeast Algeria). The species is readily distinguishable from other local libellulids by its large size, coloration pattern, and long dorsal



spines. The presence of spiniform setae on dorsal spines 6–8 seems to be a key trait to identify the species. The dragonfly usually emerged on water lilies (*Nymphaea alba*) at about 10 cm above the water surface at water depths ranging from 50–200 cm with a marked preference to stratum between 100 and 150 cm." (Authors)] Address: Khelifa, R., Dépt de Biologie, Faculté des Sci. Biologiques et Agronomiques, Univ. de Tizi Ouzou, Tizi Ouzou 15000, Algeria. E-mail: rassimkhelifa@gmail.com

**13441.** Kopecký, O. (2013): Predation-induced injuries in wild populations of Alpine Newt. *Pakistan J. Zool.* 45(2): 417-422. (in English) ["Animal species not at the top of the food pyramid, including most amphibians, are exposed to predation. To date, the frequency and types of injuries observed in European newts have not been analyzed. This article presents a study of this phenomenon conducted during 2007–2009 at three localities in the Czech Republic. Of 549 captured individuals, 9.3% had been injured. Wounds were found primarily to the tail (78.4% of injured newts) and to extremities in the form of missing toes (19.6%). Other types of wounds or their combinations occurred only exceptionally. The presence of injuries differed among localities, but was not affected by body length or sex. The complex life cycle and regenerative abilities of newts complicate drawing conclusions as to the ecological background of injury frequency. Therefore, future studies focused on this topic should utilize experimental approaches." (Author) Larvae of the genera *Libellula* and *Aeshna* are discussed in the framework of potential predator of newts.] Address: Kopecký, O., Department of Zoology and Fisheries, Faculty of Agrobiological, Food and Natural Resources, Czech University of Life Sciences Prague, Kamýcká 957, Prague 6 – Suchbátka 165 21, Czech Republic

**13442.** Korkeamäki, E. (2013): Elinympäristön perustaminen täplälampikorennolle (*Leucorrhinia pectoralis*) [Establishing habitats for Yellow-spotted Whiteface (*Leucorrhinia pectoralis*)]. *Crenata* 6: 22-25. (in Finnish, with English summary) ["This article examines the factors that effect the colonisation of Odonata in new habitats, especially newly formed wetland pools. Wetland pools were dug in Lintulahdet Life project to the shore areas to provide a suitable living environment for dragonflies. The special target species was *Leucorrhinia pectoralis*. The persistence of Odonata populations was studied by monitoring of larvae, exuviae and adults. The monitoring showed that *L. pectoralis* and many other dragonfly species inhabited the newly formed pools. By controlling the shadowing reed beds it was possible to increase the breeding success of Odonata populations." (Author)] Address: Korkeamäki, E., Karkunkatu 18 a 4 b, FIN-48600 Karhula, Finland

**13443.** Korkeamäki, E. (2013): Siberian Hawker (*Aeshna crenata*) in the Salpausselkä Ridge area. *Kymijoen vesi ja ympäristö ry:n tutkimusraportti no 217/2013*: 11 pp, app.. (in Finnish, with English summary) ["*A. crenata*,

is an impressive, but rare, localized and poorly known species in Europe. A total of 44 small ponds and lakes, situated within the Salpausselkä Ridge, north of Kouvola city in south-eastern Finland, were surveyed for populations of *A. crenata* during the summer period 2011-2012. Adults and exuviae were searched for in sunny weather. Altogether, 29 odonate species recorded in these 44 ponds. *Aeshna crenata* was found in 21 ponds and it seems to have rather specialized habitat requirements in the study area. It occurs mainly in small, circular and oligotrophic ponds with slightly swampy shoreline. These ponds – ‘suppa pits’ – are typical glacial age formations in the Salpausselkä Ridge and influenced by clear groundwater. Sex ratio is also checked with *Aeshna* –exuviae and the majority members were females. Potential threats by the human activity to the populations of *A. crenata* is also discussed." (Author)] Address: Korkeamäki, E., Karkunkatu 18 a 4 b, FIN-48600 Karhula, Finland

**13444.** Korte, T.; Eberhard, T. (2013): Was lebt im Lämpkes Mühlenbach? Die Entwicklung der wirbellosen Kleintiere (Makrozoobenthos) nach der naturnahen Umgestaltung des Lämpkes Mühlenbaches. *Jahresberichte der Biologischen Station Westliches Ruhrgebiet e. V.* 10 (2013): 29-32. (in German) [Nordrhein-Westfalen, Germany; only *Aeshna cyanea* is listed. In spite the fact the renaturation of the book is assessed as successful, even 17 year after the measurements, no rheophilous Odonata have colonised the brook.] Address: Korte, T., Emschergenossenschaft/Lippeverband, Geschäftsbereich Technische Services, Kooperationslabor mit dem Ruhrverband, Kronprinzenstraße 37, 45128 Essen, Germany. E-Mail: korte.thomas@eglv.de

**13445.** Kosterin, O.E. (2013): *Somatochlora arctica* (Zett.) Seems to migrate to escape from wildfires (Anisoptera: Corduliidae). *Notulae Odonatologicae* 8(2): 35-36. (in English) ["*S. arctica* is known from the Novosibirsk province, Russia, only by scarce records from small forest lakes in the districts of Bolotnoe and Moshkovo, situated N of Novosibirsk (KOSTERIN et al., 2001, *Sympetrum*, Hyogo 7/8: 24-49). In the Bakchar district (Tomsk prov.), some 200 km N of Novosibirsk, it appears as one of the most abundant dragonfly species (BERNARD & KOSTERIN, 2010, *Odonatologica* 39: 1-28): during 12-22 July 2006 the foraging swarms were found above any dry open area, although the abundance of these drastically decreased after the 14th of July. The breeding sites were not found, they are probably located in the inaccessible mesotrophic fens, overgrown with sedge amidst vast *Sphagnum* bogs. In 2012, five dead *S. arctica* specimens were collected in Novosibirsk Academy Town, ca 30 km S of downtown Novosibirsk (and ca 50 km S of the Moshkovo district border), obviously crashed by traffic while foraging along and above the asphalt-paved roads. In four specimens the wings were clear and in one male moderately smoked (they are frequently smoked in specimens from Tomsk province). During some 30 years of more or less regular observations in Academy Town, the

species has never been encountered there. The environmental conditions prevailing at the time the above specimens were found were exceptional: July had been very hot and smog of various intensities occurred in the province of Novosibirsk almost every day, with the hot air poorly transparent, smelling smoke. The sun could be watched by naked eye: as a red spot with sharp margins against a white sky. This was due to the forest fires, occupying vast areas of Siberia, in particular that part of Tomsk province, situated N of Novosibirsk province, which seemed to be a *S. arctica* paradise (see above). "The summer of 2012 has proved to be the most severe wildfire season Russia has faced in a decade. [...] More than 17,000 wildfires had burnt more than 30 million hectares (74 million acres) through August 2012, according to researchers at the Sukachev Institute of Forest in Russian Academy of Sciences." (<http://www.nasa.gov/misionpages/fires/main/world/20120913-siberia.html>). We assume, *S. arctica* escaped the fires in its native area by long migration. An alternative option would be a mass propagation, triggering the individuals to expand by plain diffusion, resulting in their noticeable numbers far from that area. This seems less likely as it would imply two independent anomalies: fires and mass propagation. High temperatures could favour the propagation, but they could have no effect if taking place after the emergence of the adults, as was the case in the summer of 2012." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**13446.** Kulić, L.; Erić, K.; Gajić, M. (2013): *Cordulegaster insignis* Schneider, 1845 (Odonata: Cordulegastridae) the first record from Serbia over a century later. *Bulletin of the Natural History Museum* 6: 65-69. (in English, with Serbian summary) [middle course of the Sokobanjska Moravica, 5-VI-2011, female] Address: Kulić, Lena, Društvo odonatologa Srbije, 11000 Belgrade, Serbia. E-mail: lekilecko@gmail.com

**13447.** Kulijer, D.; Topić, G. (2013): First record of a Balkan population of *Ceriatrigon tenellum* outside the influence of the Mediterranean climate (Odonata: Coenagrionidae). *Libellula* 32(3/4): 193-204. (in English, with German summary) ["*C. tenellum* is rare in the Balkan Peninsula and has hitherto been known as restricted only to the areas under the influence of the Mediterranean climate. On 21 July 2011 and on 3 June 2012 the species was found at the small Dol Lake in the valley of Pliva River, central Bosnia and Herzegovina. Altogether 14 dragonfly species could be observed at the site. This is the first finding of a population of *C. tenellum* in the Danube catchment and in the area outside the Mediterranean region of the Balkans. All known records from the eastern Adriatic were gathered and the distribution of the species in the Adriatic region is outlined. In Bosnia and Herzegovina *C. tenellum* is found at seven localities. The species prefers habitats with rich and diverse water

vegetation and the presence of flowing water. This finding is discussed in relation to the distribution and the habitats of the species in the East Adriatic and Europe. A short discussion on the threats and the conservation status in the Balkan region is appended." (Authors)] Address: Kulijer, D., National Museum of Bosnia and Herzegovina, Zmaja od Bosne 3, 71000 Sarajevo, Bosnia and Herzegovina. E-mail: dejan.kulijer@gmail.com

**13448.** Kumon, Y.; Otsuka, M. (2013): Development of Sirocco fan featuring dragonfly wing. *Transactions of The Japan Institute of Electronics Packaging* 6(1): 24-31. (in English) ["We have developed high-performance electric fans by applying features of the wings of living creatures. This paper proposes an air purifier sirocco fan blade that mimics the wings of a dragonfly. Air quality has increasingly attracted attention in Japanese homes, and one or more air purifiers are installed in almost 40% of all houses in the country. The purpose of an air purifier is to maintain air cleanness, and it is operated overnight. There is, however, the problem of the loud noise created by the fan, which also makes overnight operation inconvenient. To solve this problem, we adopted the shape of the dragonfly wing in the sirocco fan blade of an air purifier. As a result, a maximum reduction of 2.5 dB was achieved." (Authors)] Address: Kumon, Yui, Development Dept., Health & Environmental Systems Group, Sharp Corporation, 3-1-72, Kitakamei-Cho, Yao-Shi, Osaka 581-8585, Japan

**13449.** Liang, Z. (2013): Computational analysis of vortex structures in flapping flight. PhD thesis, Wright State University: XVIII + 210 pp. ["Vortex structures and vortical formation in flapping flight are directly related to the force production. To analyze the connection between vortex structures and aerodynamic performance of flapping flight, we have developed highly efficient algorithms for large-scale flow simulations with moving and deforming bodies. To further understand the underlying mechanisms of force generation caused by the coherent structures of the vortex formation, a new analysis method has been developed to measure the influence of Proper Orthogonal Decomposition (POD) modes on aerodynamic forces. It is challenging to finish three-dimensional Direct Numerical Simulations (DNS) of insect flight in a limited amount of time. In the current work, the Modified Strongly Implicit Procedure (MSIP) has been implemented into an existing Computational Fluid Dynamics (CFD) solver, as a smoother for the multigrid method to solve the pressure equation and an iterative method to solve the momentum equation. The new solver is capable of performing a 17-million-mesh simulation within 10 days on a single core of an Intel i5-3570 chip at 3.4GHz, nearly 10 times faster than the traditional Line-SOR solver. Based on this numerical tool, the free flight of a dragonfly for eight-and-a-half wing beats is studied in detail. The results show that the dragonfly has experienced two flight stages during the flight. In a maneuver stage, wing-wake interaction generated by the fore- and hindwings attenuates the total force by 8% (peak value). In contrast, in an escape

stage, the fore- and hindwings collaborate to generate force which is 8% larger than when they flap separately. Especially, the peak force on the forewing is significantly increased by 42% in a downstroke and this enhancement is known to associate with a distorted trailing edge vortex, as demonstrated by a theoretical model based on wake survey methods. The movement of the trailing edge vortex is a response to the motion of the hindwing. When the fore- and hindwings flap closely with only a short distance existing between them, the hindwing exerts a wall effect to the trailing edge vortex. Vortex formation of flapping flight and force generation are considered to be closely linked; however, it is difficult to accurately determine the influence of an individual vortex on the overall aerodynamic performance. Here, as an alternative, we examine the influence of coherent structures, which are thought as special types of vortices in terms of kinetic energy. First, wake structures are decomposed by the POD method and the most energetic vortices are extracted. Then, a pressure corrected POD Reduced-Order Models (ROM) method is used to verify that the POD modes can capture the dynamics of the flows. Finally, the force of POD modes is quantified by a new method, termed the POD mode Force Survey Method (POD-FSM). The process is applied to investigate the flow field generated by a two- or three-dimensional plate undergoing a pitching-plunging motion. Superposition of force of the POD modes shows a good agreement with the DNS result. In addition, it is found that some POD modes have zero lift, and some have zero thrust. These force behaviours are related to symmetry of POD mode. According to the symmetry or antisymmetry about the streamwise line (or the crossflow plane in three-dimension), the POD modes can be qualitatively grouped into two sets. Combining POD modes in the same set can help to decompose the flow into thrust- and lift-producing flows. It is found that the force acting on the plate is a linear combination of the force of the thrust- and lift-producing flows and their interactions. Because two flows have different frequency spectrum, it is possible to perform flow control with respect to frequency to achieve the desired aerodynamic performance." (Author)] Address: not stated.

**13450.** Lingenfelder, U. (2013): Die Libellen der Queichniederung (Insecta: Odonata). Fauna Flora Rheinland-Pfalz 12(3): 921-998. (in German, with English and French summaries) ["The article gives an overview of the dragonfly fauna of Queichniederung and summarizes the results of the mapping of dragonflies in 2006 within the Natura 2000 sites „Bellheimer Wald mit Queichtal“ and „Offenbacher Wald, Bellheimer Wald und Queichwiesen“ including supplementary examinations. In the alluvium of the river Queich, a total of 51 dragonfly species could be detected between the years 1954 to 2012. During the field-mapping in 2006, the occurrence of species was documented in permanently water-bearing streaming waters, temporary water-bearing irrigation ditches, flood meadows and some standing waters. The focus of the investigation was on the systematic mapping of the dis-

tribution of the Habitats Directive species *Coenagrion mercuriale* and *Ophiogomphus cecilia*. Together with complementary acquisitions from previous years (1999, 2004, 2005) and from the year 2010 there were 33 species detected at 32 studied watersites with a total of 109 sample sites." (Author)] Address: Lingenfelder, U., Seeburgstr. 1, 67716 Heltersberg, Germany. E-Mail: u.lingenfelder@vr-web.de

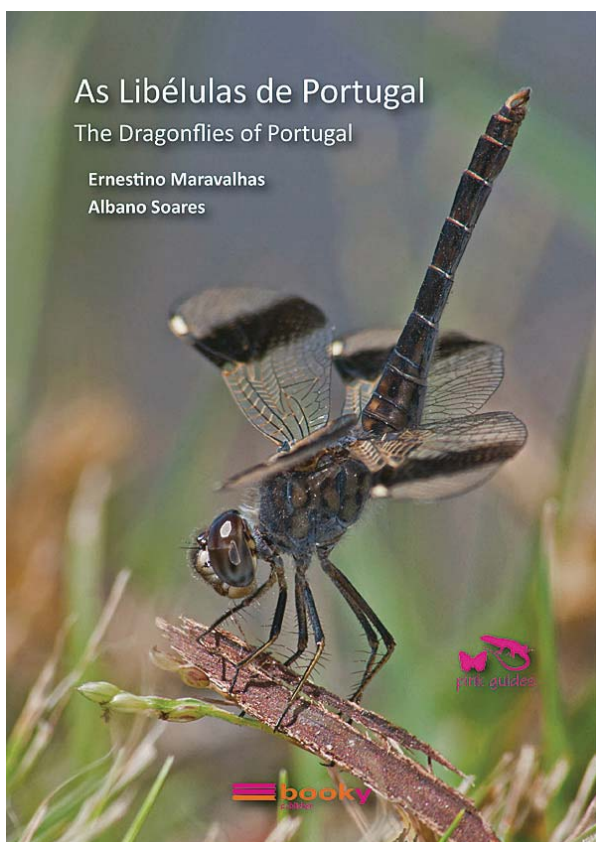
**13451.** Lökkös A.; Kondorosy, E.; Cser, B.; Szivák, I. (2013): Contributions to the aquatic macroinvertebrate fauna of the Koppány stream. *Natura Somogyiensis* 23: 153-158. (in Hungarian, with English summary) [The Koppány stream is a lowland stream in southwestern Hungary. The aquatic macroinvertebrate fauna of the Koppány stream is poorly known. During the collections in 2010 71 aquatic macroinvertebrate species were collected. The list of Odonata includes *Platycnemis pennipes*, *Ischnura elegans pontica*, *Calopteryx splendens*, *Anax imperator*, *Sympetrum striolatum*, and *S. vulgatum*.] Address: Lökkös A, Balaton-felvidéki Nemzeti Park Igazgatóság, H-8903 Zalaegerszeg, Pf. 37, Hungary. E-mail: a.lokkos@gmail.com

**13452.** Loomis, D. (2013): Reproductive success and foraging ecology of the rusty blackbird on the Copper River Delta, Alaska. M.Sc. thesis, Oregon State University: 84 pp. (in English) ["The Rusty Blackbird (*Euphagus carolinus*) has suffered significant population declines across its entire geographic range and the mechanisms associated with this decline are poorly understood. Although much of the Rusty Blackbird breeding habitat in Alaska has remained relatively unaltered by anthropogenic activities, this species continues to decline by an estimated 5% annually. As part of a collaborative effort to obtain data on the reproductive ecology, breeding success, and habitat requirements of this species throughout their range, a total of 42 nests were found and monitored for two consecutive breeding seasons (2009 – 2010) on the Copper River Delta in south-central Alaska. Nests were monitored every 2-4 days to calculate nest success, survival rates, clutch initiation date, clutch size, egg viability, and fledging rates. In 2010, chick provisioning rates, chick diet, and aquatic invertebrate availability in Rusty Blackbird foraging habitats were also investigated. Mean clutch size ranged from 5 to 7 eggs both years (2009 =  $5.41 \pm 0.15$ , 2010 =  $5.67 \pm 0.13$ ). Daily nest survival rate averaged over both seasons was high, at  $0.9913 \pm 0.0043$  (95% CI 0.9772-0.9967) and most eggs were viable (N = 31 nests), with  $0.8922 \pm 0.0275$  of eggs over both seasons hatching. Approximately 85% of clutches were initiated within a two week period for both years of the study. Clutch-initiation date (CID) was significantly different between years ( $p$ -value < 0.0001), with mean CID of 10 May ( $\bar{x} = 10.476 \pm 0.95$ ) in 2010 and May 18 ( $\bar{x} = 18.421 \pm 1.13$ ) in 2009. The mean provisioning rate was 0.84 ( $\pm 0.06$ ; 95% CI: 0.72 to 0.95) invertebrate food items per chick per hour. Large odonate nymphs, specifically dragonflies, made up the bulk



(97.2%) of the observed food items provisioned to chicks. Weekly pond sampling revealed four taxonomic groups of invertebrates that were of the size observed provisioned to chicks (Coleoptera, Hirudinea, Zygoptera, Anisoptera) and Anisoptera were among the rarest collected (16.2%) of this size. Although the least common large invertebrate collected, Anisoptera nymphs were present in all weekly samples. The week with the most abundant Anisoptera collection coincided with the week of peak hatching during 2010 of the study. Thus, availability of dragonfly nymphs appear to be important to Rusty Blackbird reproductive success on the Copper River Delta and may have contributed to the high nest success observed in this study." (Author)] Address: not stated

**13453.** Machado, A.B.M. (2013): *Philogenia nemesioi*, a new damselfly from Peru (Odonata, Megapodagrionidae). *Revista Brasileira de Entomologia* 57(4): 365-366. ["*Philogenia nemesioi* sp. nov. is described and illustrated based on one male specimen collected on forests of the eastern slope of the Peruvian Andes at 900 m. It belongs to the cristalina group, but differs from other species of the group by the structure of the anal appendage." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Caixa Postal 486, Belo Horizonte-MG, Brasil. [angelo@icb.ufmg.br](mailto:angelo@icb.ufmg.br)



**13454.** Maravalhas, E.; Soares, A. (2013): *As Libélulas de Portugal - The Dragonflies of Portugal*. Booky Publisher, 04.2013: 329 pp. (in bilingual in Portuguese and English) ["This is the first book to cover the dragonflies of

Portugal. It provides a comprehensive identification guide to the 67 recorded species. For each species there is a concise text, a map and photos of living specimens in their natural environment as well as numerous photos of details to aid identification. Illustrated throughout in colour with over 600 high quality photographs. Distribution maps to all species." (Publisher)] Address: not stated

**13455.** Marinov, M.; Pikacha, P. (2013): On a dragonfly collection from the Solomon Islands with overview of fauna from this Pacific archipelago (Insecta: Odonata). *Faunistic Studies in South-East Asian and Pacific Island Odonata* 4: 1-48. (in English, with Toksave summary) ["Odonata fauna of the Solomon Islands (considered in its political rather than geographical borders) is revised following a recent collecting trip to Guadalcanal Island in April 2012. Some important taxonomic considerations are discussed and a complete literature review is provided for the country with an updated checklist of 64 species that is in accordance with the latest taxonomic studies on the group from that part of the world. The collection reported here was carried out on two and a half effective field days and resulted in a total of 30 taxa. Two of them (*Agyrtacantha browni* and *Gynacantha amphora*) are new to science and already described elsewhere and three others (*Lestes concinnus*, *Lathrecista asiatica festa* and *Rhyothemis resplendens*) are new to the country. A female of *Pseudagrion incisurum* is described for the first time and another female (*Rhinocypha liberata*) will be described later." (Authors)] Address: Pikacha, P., Solomon Islands Community Conservation Partnership, P.O. Box 2378, Honiara, Solomon Islands. E-mail: [patrick.pikacha@gmail.com](mailto:patrick.pikacha@gmail.com)

**13456.** Márquez-Rodríguez, J.; Ferreras-Romero, M. (2013): Primera cita de *Coenagrion caerulescens* (Fonscolombe, 1838) (Odonata, Coenagrionidae) en la provincia de Sevilla (España). *Boletín de la Asociación española de Entomología* 37(3-4): 359-361. (in Spanish) [First record of *C. caerulescens* in the Seville province (Spain): 20-VII-2013, a las 15:30 h (13:30 GMT), river Salado near the town of Osuna (37°13'N, 05°04'W; 260 m a.s.l.)] Address: Márquez-Rodríguez, J., Departamento de Sistemas Físicos, Químicos y Naturales, Universidad Pablo de Olavide, A-376, km 1, ES-41013 Sevilla, Spain. E-mail: [jmarrod1@admon.upo.es](mailto:jmarrod1@admon.upo.es)

**13457.** Márquez-Rodríguez, J.; Ferreras-Romero, M. (2013): *Orthetrum nitidinerve* in the southern Iberian Peninsula: Two breeding populations in the Seville Province (Odonata: Libellulidae). *Libellula* 32(3/4): 141-149. (in English, with Spanish and German summaries) ["In late June and early September 2013, more than 170 years after the first record of *O. nitidinerve* in the Iberian Peninsula, the reproduction of this species in Spain was confirmed for the first time by the capture of teneral individuals. The records were taken at two small streams in the Seville province. Phenology observations and reproductive behaviour are commented upon." (Authors)] Ad-

dress: Joaquín Márquez-Rodríguez, J., Departamento de Sistemas Físicos, Químicos y Naturales, Universidad Pablo de Olavide, A-376, km 1, ES-41013 Sevilla. E-mail: jmarrod1@admon.upo.es

**13458.** Márquez-Rodríguez, J. (2013): Seguimiento en el comportamiento y proceso de colonización atlántica de *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) en la Península Ibérica. *Revista gaditana de Entomología* 4(1): 159-167. (in Spanish, with English summary) ["Since the first observation of the African species *T. kirbyi* in southern Iberian Peninsula, the new records were mainly concentrated in different Spanish provinces of East, due to its rapid expansion through the Mediterranean coast. The biology, behaviour and dispersal capacity in mainland Europe, were almost unknown since its detection in 2007. From spring 2012 through autumn 2013, we have visited several locations in the southwest of Spain and southeastern Portugal, recording their Odonata fauna. Among them, Corumbel (La Palma del Condado - Huelva) was visited in late spring and early autumn, confirming its presence in reservoirs. The existence of favourable environmental characteristics vital to the development of this thermophilic species, and the monitoring of a stable population located in the province of Seville, confirm a flight period of eight months (from mid-April to end of November)."] (Author)] Address: Márquez-Rodríguez, J., Dept de Sistemas Físicos, Químicos y Naturales (Zoología), Universidad Pablo de Olavide, A-376 km 1, 41013 Sevilla, Spain. E-mail: jmarrod1@admon.upo.es

**13459.** Mary, R. (2013): Ecology and predatory efficiency of aquatic (Odonate) insect over the developmental stages of mosquitoes (Diptera: Culicidae). *Journal of Academia and Industrial Research* 2(7): 429-436. (in English) ["Mosquitoes of the genera *Aedes*, *Anopheles* and *Culex* are considered relatively dangerous among the individuals of family Culicidae, because they cause significant public health threat all over the world. Predatory efficiency of the confirmed predators (Odonata: Aeshnidae) by in vitro experiments on the developmental stages of the mosquitoes namely, *Aedes aegypti*, *Anopheles stephensi* and *Culex quinquefasciatus* with reference to the duration of the prey availability, changes in the relative preference or selectivity of predators over the mosquito larvae at different stages (I, II, III and IV instars larvae and pupae) of development, changes in the relative consumption rate of the predators with reference to the species of mosquitoes, attack rate and success rate of the predators on the larval mosquitoes were investigated. Seasonal (month-wise) dynamics of each of the selected predators in some familiar freshwater bodies in Coimbatore, for two consecutive years i.e. from January 2009 to December 2011, relationship (correlation), if any, between physico-chemical parameters of the water and the abundance of the predators in the water bodies and the range of co-efficient of association, between and among the different species of the predators were also investigated. Relative incidence of larval mosquitoes of genera

*Aedes*, *Anopheles* and *Culex* in the selected water bodies and the range of co-efficient of association between the predator and prey were also investigated. The results of the predatory capacity of *Anax* nymph on the larvae and pupae of the mosquitoes for 24 h and 1 h of dragonfly showed the highest predation rate against I instar larvae of the mosquito compared to that of the capacity of other predators tested in the present study. Total consumption rate of 7 predatory individuals towards I instar of *C. quinquefasciatus* was 50 out of 700 i.e. 72% was fed in 24 h." (Author)] Address: Mary, Rosaline, Dept. of Zoology, Nirmala College for Women (Autonomous), Coimbatore, India. E-mail: elangorosi@yahoo.in

**13460.** McCauley, S.J. (2013): Relationship between morphology, dispersal and habitat distribution in three species of *Libellula* (Odonata: Anisoptera). *Aquatic Insects* 34(3-4): 195-204. (in English) ["Morphology is an important determinant of flight performance and can shape species' dispersal behaviour. This study contrasted the morphology of flight-related structures in dragonfly species with different dispersal behaviours to gain insights into the relationship between morphology and dispersal behaviour. Specifically, wing size, wing shape and thorax size were compared in three co-occurring species from different clades within the genus *Libellula* to assess how these morphological traits are related to differences in dispersal behaviour and to how broadly their larvae occur across a habitat gradient. Two species had broad larval habitat distributions as well as high rates and distances of dispersal. These two species had relatively larger wings and thoraces than the third species, which was found only in permanent lakes and had limited dispersal. The hind-wings of more dispersive species also had lower aspect ratios and a relatively wider basal portion of the wing than the less dispersive species. Broad hind-wings may facilitate the use of gliding flight and reduce the energetic costs of dispersal. Determining the morphological traits associated with alternative dispersal behaviours may be a useful tool to assess the differential dispersal capacities of species or populations."] (Author)] Address: McCauley, S.J., Department of Biology, University of Toronto Mississauga, 3359 Mississauga Rd, Mississauga, ON L5L 1C6, Canada

**13461.** Mediani, M.; Boudot, J.P.; Benazzouz, B.; El Bella, T. (2013): Two dragonfly species (Insecta: Odonata) migrating at Dakhla (region of Oued Ad-Dahab Lagouira, Morocco). *International Journal of Odonatology* 15(4): 293-298. (in English) ["Large numbers of migrating imagoes of *Anax ephippiger* were observed from the end of January to March 2012 at Dakhla Bay, Southern Morocco, in an area where long-lasting fresh and brackish waters are lacking, and thus which is unfavourable for the reproduction of Odonata. This supports well the classical scheme of northward mass migration of the species along the Atlantic coast of Africa, induced by autumnal mass emergences in the Sahel as a result of the summer African monsoon. Small numbers of *Sympetrum fonsco-*

lombii were previously temporarily recorded from the same area in July 2011. They were probably nomadic individuals of which the origin could not be verified, but which could have been involved in long distance vagrancy, typical of the species, due to the scarcity of fresh and brackish water in the area." (Authors)] Address: Mediani, M., Laboratoire de Diversité et Conservation des Systèmes Biologiques, Faculté des Sciences, Département de Biologie, Université Abdelmalek Essaâdi-Tétouan, Morocco. E-mail: mediamed05@yahoo.fr

**13462.** Molineri, C.; Rodríguez, J.S. (2013): Description of the larva of *Argia jujuya* Ris (Coenagrionidae) with a key to species from the Argentinean Yungas cloud forest. *International Journal of Odonatology* 16(4): 301-307. (in English) ["The previously unknown larva of *Argia jujuya* Ris, 1913 is described, diagnosed and illustrated. Among other characters, the following combination is important to distinguish it from other species in the genus: antennae with six concolorous segments, ligula projected only slightly, row of small premental setae present, abdominal sternum 8 almost entirely covered with spiniform setae, gonapophyses with pointed apices slightly diverging distally, cercus triangular, caudal lamellae subequal in length and triquetral along entire length, with fringe of stout setae along entire dorsal and ventral margins. Larvae were collected in very small and thickly vegetated streams, with low water current. A key for the three species known as larvae in NW Argentina is presented." (Authors)] Address: Molineri, C., Instituto de Biodiversidad Neotropical, CONICET (Argentine Council of Scientific Research), Facultad de Ciencias Naturales e IML, Universidad Nacional de Tucuman, M. Lillo 205, 4000, San Miguel de Tucuman, Argentina. E-mail: carlosmolineri@gmail.com

**13463.** Moroz, M.D. (2013): Aquatic insects of cross-border water currents between Belarus and Ukraine. *Entomological Review* 93(7): 874-886. (in English) ["224 species of aquatic insects from 9 orders were found in cross-border water currents between Belarus and Ukraine: Collembola—4, Plecoptera—3, Ephemeroptera—25, Odonata—33, Trichoptera—47, Megaloptera—1, Heteroptera—19, Coleoptera—88, Lepidoptera—4 species. The fauna of aquatic insects is rich and includes a number of species rare in Belarus and Europe." (Author) Original Russian Text © M.D. Moroz, 2013, published in *Entomologicheskoe Obozrenie*, 2013, Vol. 92, No. 2, pp. 303–318. *Calopteryx splendens*] Address: Moroz, M.D., Scientific and Practical Center for Biore-sources, Academy of Sciences of Belarus, Minsk, Republic of Belarus. E-mail: mdmoroz@bk.ru

**13464.** Naraoka, H. (2013): Diurnal activity and reproductive behavior of *Indolestes peregrinus* (Ris, 1916) (Lestidae: Odonata). *Tombo* 55: 91-98. (in Japanese, with English summary) ["The diurnal activity and the reproductive behaviour of *I. peregrinus* are described based on observations at Aomori prefecture, northern Japan, in

2008-2012 and briefly compared with those of other zygopteran species. In their diurnal activity, males were found at a rice field, pond and barrage of the reproductive site between 8:00 am and 5:00 pm above 17-18°C air temperature. They were active in the morning, but in contrast spent most time inactively perched after 11:00 am. They rested on trees at the night. On the other hand, single females, except when in tandem with males, were rarely seen at the reproductive site. Copulation and oviposition were observed between 8:00 am and 6:00 pm on warmers day but was suppressed on cloudy and cooler days. When a pair did not complete oviposition before night fall, they again started to oviposit the next day as the same couple, after resting for the night. The duration of intra-male sperm translocation was significantly and negatively correlated with air temperature. The duration of copulation was significantly and negatively correlated with the time of copulation onset. Copulation was divided into 3 stages. Stage I was characterized by the pumping movement of the male's abdomen with several breaks in copulation. Stage II was, shorter than the other stages, with a few quick pumping. Stage III was divided into two substages III-A and III-B, the former of which are almost inactive, but the latter showed active pumping. The female oviposited on the aerial stems or leaves of emergent plants, but never into the water. She usually did so in tandem linkage with the male, rarely singly." (Author)] Address: Naraoka, H., 36-71 Motoizumi, Fukunoda, Itayanagi-machi, Kita-gun, Aomori, 038-3661, Japan

**13465.** Neveu, G.; Hubert, A. (2013): Sites d'émergence d'*Oxygastra curtisii* dans le département de la Somme (Odonata: Corduliidae). *Martinia* 29(2): 79-85. (in French, with English summary) ["*O. curtisii* is a species of Western Europe and northern Africa, which is not present in the French departments bordering the northern Channel and the North Sea. In the Somme department, the species was recorded for the first time in 1997 and seems to be permanently established and to extend increasingly in the Somme valley since that time. The first exuviae were observed in 2005 and were discovered around a standing water habitat. Although already known, this is quite atypical but new observations have been made regularly since then. The species does not yet extend to neighbouring departments. However, a first data was reported in the Pas-de-Calais department in 2012." (Author)] Address: Neveu, G., 22 rue de Sailly le sec, F-80800 Sailly Laurette, France. E-mail: gilles.neveu@orange.fr

**13466.** Ngiam, R.W.N.; Dow, R.A. (2013): The larva of *Leptogomphus risi* Laidlaw from Singapore with a comparison to *Leptogomphus williamsoni* Laidlaw from Sarawak and congeners (Odonata: Anisoptera: Gomphidae). *Nature in Singapore* 6: 307-312. (in English) ["The final instar larva of *Leptogomphus risi* Laidlaw is described and illustrated for the first time based on an exuvia collected from Singapore. A comparison of this larva with known larvae of congeners is discussed, including a first description of the larva of *Leptogomphus williamsoni*



Laidlaw from Sarawak." (Authors)] Address: Ngiam, R.W.N, National Biodiversity Centre, National Parks Board 1 Cluny Road, Singapore 259569, Republic of Singapore. E-mail: ngiamwenjiang@nparks.gov.sg

**13467.** Novelli, I.A.; Gomides, S.C.; Singer Brugiolo, S.S.; de Sousa, B.A.1 (2013): Alimentary habits of *Hydromedusa maximiliani* (Mikan, 1820) (Testudines, Chelidae) and its relation to prey availability in the environment. *Herpetology Notes* 6: 503-511. (in English) ["*Hydromedusa maximiliani* is endemic to mountainous regions, with distribution in the Atlantic Forest region along mountain ranges in Southeastern and part of northeastern Brazil. This work aimed at studying the feeding habits of a *H. maximiliani* population from Minas Gerais state, Southeastern Brazil. Specimens were captured, marked, measured and submitted to stomach washing. Pitfall traps were used to capture prey in terrestrial environments, and nets were used to collect macroinvertebrates in the aquatic environment. We captured and recaptured a total of 33 individuals. From 16 samples of stomach content, we recorded aquatic insect larvae, crabs, and terrestrial invertebrates. In total, 16 categories of prey items were identified. These belonged to 16 orders and 70 families of Insecta (including Odonata), 3 families of Diplopoda, 2 families of Crustacea, and 13 families of Arachnida. Lepidoptera, Baetidae and Diplopoda reached maximum electivity. The most representative group in the diet was Insecta, especially those with aquatic larval phase. The information obtained in this study about the diet of *H. maximiliani* indicates this vertebrate as a potential predator for regulating the density of benthic macroinvertebrates, and our data corroborate other studies which also showed the importance of *H. maximiliani* as a predator essential to aquatic food web dynamics. These data will be useful in future studies dealing with the bio-monitoring of *H. maximiliani*, and contributing to its preservation as well as to the preservation of habitats where this species lives." (Authors)] Address: Novelli, Iara, Programa de Pós-graduação em Comportamento e Biologia Animal, Dept de Zoologia – ICB, Univ. Federal de Juiz de Fora, Rua José Lourenço Kelmer, s/n - Campus Universitário, Bairro São Pedro - CEP: 36036-900 - Juiz de Fora, Minas Gerais, Brazil. E-mail: iaranovelli27@gmail.com

**13468.** Novelo-Gutiérrez, R. (2013): Description of the larva of *Argia chelata* Calvert, 1902 (Odonata: Coenagrionidae). *Zootaxa* 3745(4): 479-485. (in English, with Spanish summary) ["The larva of *A. chelata* is described and figured. It falls into the group of *Argia* larvae with a moderately prominent ligula and two palpal seta, but it differs from its closest relatives by having labial palp with 2 setae plus one basal setella; the length of the ligula is 30% of its maximum width; basal tergites (1–5) lacking long, fine setae, mainly on midline; S8–10 mostly dark brown; paraprocts with spiniform setae on basal 0.25 and 0.55 of dorsal and ventral borders, respectively. Larvae were found in 2nd to 4th order shallow streams in cloud forest, crawling among debris, fine sand and mud where the wa-

ter flow is slow or still, close to the shoreline. The larva is compared with *A. lacrimans* (Hagen), *A. pima* Garrison, and *A. tonto* Calvert, species apparently closely related." (Author)] Address: Novelo-Gutiérrez, R., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec # 351, El Haya, 91070 Xalapa, Veracruz, México. E-mail: rodolfo.novelo@inecol.mx

**13469.** Novelo-Gutiérrez, R.; Gomez-Anaya, J.A. (2013): Listado preliminar de los odonatos (Insecta: Odonata) del estado de Guanajuato, México. *Dugesiana* 20(2): 85-88. (in Spanish) [Preliminary checklist of Odonata from Guanajuato, México] Address: Novelo-Gutiérrez, R., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec # 351, El Haya, 91070 Xalapa, Veracruz, México. E-mail: rodolfo.novelo@inecol.mx

**13470.** Obolewski, K. (2013): Use of macrozoobenthos for biological assessment of water quality in oxbow lakes of varying hydrological connectivity to the main river channel in the example of Łyna River valley. *Ochrona Środowiska* 35(2): 19-26. (in Polish, with English summary) ["This study presents influence of hydrological connectivity between oxbow lakes and the river on water quality determined based on the structure of aquatic invertebrate communities in oxbow lakes. Five oxbow lakes of the Łyna River were investigated, i.e. two lotic, two semilotic and one lentic ecosystem. It was shown that Chaoboridae (Diptera), Oligochaeta and Hydrobiidae (Gastropoda) were the most abundant groups of invertebrates, often accompanied by Chironomidae larvae (Diptera). Ephemeroptera and Trichoptera were the only invertebrate bioindicators observed in the studied water bodies. The EPT% index, determined based on their abundance, as well as EPT:C, determined based on their proportion to Chironomidae, indicated that groups of these organisms sensitive to environmental conditions occurred at low abundance in all hydrological types of oxbow lakes. Family Biotic Index (FBI), Biological Monitoring Working Party index (BMWP-PL) and Average Score per Taxon (ASPT), both adapted to the Polish conditions, revealed low water quality regardless of the degree of hydrological connectivity. This study shows that the structure of invertebrate communities inhabiting oxbow lakes can be a source of valuable monitoring data. BMWP-PL seems to be the most objective among the biotic indices. Hence, it can be applied in biomonitoring research of many types of aquatic ecosystems." (Authors) The list of taxa includes 'Lestidae' and 'Corduliidae'.] Address: Obolewski, K., Akademia Pomorska w Słupsku, Wydział Matematyczno-Przyrodniczy, Zakład Ekologii, ul. Krzysztofa Arciszewskiego 22b, 76-200 Słupsk, Poland. E-mail: obolewsk@apsl.edu.pl

**13471.** Orlofske, J.M.; Baird, D.J. (2013): The tiny mayfly in the room: implications of size-dependent invertebrate taxonomic identification for biomonitoring data properties. *Aquatic Ecology* 47(4): 481-494. (in English) ["The appropriate level of taxonomic identification, taxonomic suf-

iciency, for biomonitoring purposes continues to be controversial. Taxonomic sufficiency, however, fails to address the bias created by size-dependent taxonomic identification, which can result in coarse-resolution identification for immature specimens lacking distinguishing characteristics. Our study provides a direct test for this potential systematic bias in biomonitoring data by examining two morphological traits: body size and shape of key organisms (Ephemeroptera, Plecoptera, Trichoptera and Odonata) collected from standard aquatic biomonitoring samples. Direct measurement of body size and a geometric morphometric description of body shape provide consistent, quantitative variables to describe the composition of specimens identified at different levels of taxonomic resolution (genus or family). Corroborating our expectations, we observed evidence of systematic size bias in family-level identifications. Specimens that could only reliably be identified to the family level were significantly smaller than specimens identified to the genus level. Qualitative comparisons of shape variation between specimens demonstrated a high degree of variation in specimens identified only at the family level and support the conclusion that specimens identified at the family level possess multiple constituent taxa (genera or species). Thus, size-dependent taxonomy can have negative consequences for the accurate determination of biodiversity and may invalidate common biomonitoring metrics. Improvements to biomonitoring protocols through technological advances, including DNA-based taxonomy to augment specimen identification, should effectively remove the size-bias problem in the long term. In the short-term, recognizing instances of size bias, the degree to which it may impact bioassessment and exploring methods for remediation, including traits-based assessments, can enhance data quality and inferences derived from biomonitoring studies." (Authors)] Address: Orlofske, Jessica M., Canadian Rivers Institute & Dept of Biology, University of New Brunswick, PO Box 4400, 10 Bailey Drive, Fredericton, NB E3B 5A3, Canada. E-mail: j.orlofske@unb.ca

**13472.** Orr, A.G.; Hämäläinen, M. (2013): Two new species of *Pericnemis* from Borneo with comparative notes on related species (Zygoptera: Coenagrionidae). *Odonatologica* 42(4): 335-345. (in English) ["*Pericnemis triangularis* Laidlaw was described on the basis of a single female from Bettotan in NE Borneo. Specimens from Brunei and neighbouring Sarawak previously referred to this species are reappraised with reference to the type and described as *Pericnemis dowi* sp. n. *P. kiautarum* sp. n. from Sabah, N. Borneo is described and figured based on a single male specimen. The new species are also compared and discussed in relation to *P. stictica*, the other Sundaland species of the genus. Both are distinguished by their male caudal appendages and by the form of a well developed horn on the hindlobe of the pronotum. The form of the appendages suggests a closer relationship between *P. dowi* and *P. kiautarum* than *P. stictica*. Both *P. dowi* and *P. stictica* breed in phytotelmata and it is conjectured that *P. kiautarum* probably does likewise. The potential hazards of describing species

from the female sex only are discussed." (Authors)] Address: Orr, A.G., Griffith School of the Environment, Griffith Univ., Nathan, Q-4111, Australia. E-mail: agorr@bigpond.com

**13473.** Osozawa, S.; Su, Z.-H.; Oba, Y.; Yagi, T.; Watanabe, Y.; Wakabayashi, J. (2013): Vicariant speciation due to 1.55 Ma isolation of the Ryukyu islands, Japan, based on geological and GenBank data. *Entomological Science* 16(3): 267-277. (in English) ["The Ryukyu island arc, originally a continental margin arc, separated from the Chinese continent by the rifting of the Okinawa trough, a process which began at 1.55 million years ago (Ma) and continues to the present. In addition, the Ryukyu arc was simultaneously divided into the northern Amami-Okinawa and southern Yaeyama islands by the Kerama rift valley, and consequently formed two isolated island units. The Kuroshio warm current began to flow into the Okinawa trough from the Yonaguni Strait, and flow out through the Tsushima and Tokara straits also at 1.55 Ma, and these seaways effectively acted as barriers between the Ryukyu islands and Taiwan, China and Japan. Through this geological process, vicariant speciation generated Ryukyu endemic animal species. We support this hypothesis by drawing linearized maximum likelihood (ML) phylogenetic trees of the species in four endemic insect groups (peacock butterfly, Chinese windmill butterfly, golden-ringed dragonfly - *Anotogaster sieboldii*, window firefly) using GenBank sequence data. We determined the precise branching ages for these phylogenetic trees, and show simultaneous speciation at 1.55 Ma for Amami-Okinawa and Yaeyama units. The Taiwan and Tsushima straits, barriers between Taiwan and China, and Japan and Korea, respectively, did not form sufficient barriers to migration during glacial low stands, and species were intermingled. A marine embayment may have posed as a migration barrier between northern and southern China in the Quaternary or a little earlier. From our study we also estimate the precise molecular evolution rate and justify the molecular clock." (Authors)] Address: Osozawa, S., Department of Earth Sciences, Graduate School of Science, Tohoku University, Sendai 980-8578, Japan. E-mail: osozawa@m.tohoku.ac.jp

**13474.** Ott, J. (2013): Erstnachweis der Östlichen Moosjungfer – *Leucorrhinia albifrons* (Burmeister, 1839) – in Rheinland-Pfalz (Insecta: Odonata). *Fauna Flora Rheinland-Pfalz* 12(3): 1075-1086. (in German, with English summary) ["*L. albifrons* was discovered for the first time in Rhineland-Palatinate, Germany in the year 2013. A single male was observed over a period of about two hours at an acid water near Kaiserslautern and also pictures for documentation were taken. The total number of dragonfly species for the federal state rises now to 68." (Author)] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**13475.** Ott, J. (2013): Erfassung der Gestreiften Quelljungfer (*Cordulegaster bidentata*) Selys, 1843 im Natur-

park und Biosphärenreservat Pfälzerwald (Insecta: Odonata). Fauna Flora Rheinland-Pfalz 12(3): 1039-1074. (in German, with English summary) ["During a field-study in the nature parc and biosphere reserve (BSR) "Pfälzerwald" taking place in fall 2012 *C. bidentata* was researched in 44 springs and spring brooks. This study is part of a monitoring project of the Forstliche Forschungsanstalt für Waldökologie und Forstwirtschaft (FAWF a forestry research institute) of springs and 30 sites were given from this general project, whereas another 14 were added in order to look in particular for the target species. Between the end of October and beginning of November over ten days the study was carried out in good weather conditions and at eight sites larvae *C. bidentata* were found; also at eight sites larvae of the sister species *C. boltonii* were found, whereas in three sites larvae of both species were present. In four more sites out of these 44, which were presently not occupied by *Cordulegaster* spp., in recent years *C. bidentata* was found and during various investigations in the BSR in six other sites larvae of the species were registered, as well as one adult in another locality. Finally 19 springs or spring brooks settled by this typical forest species – until today believed as very rare in the BSR – are now known and it seems to have a much wider distribution, underlining the value of the BSR for biodiversity protection. It was remarkable, that the larvae of *C. bidentata* occurred also in pretty acid conditions, partly also under a pH of 5, where the species, as well as *C. boltonii*, normally should not be present. Some more populations of *C. bidentata* recently were found in areas bordering north and west of the BSR in Rhineland-Palatinate and consequently the species should be taken from the national red list (listed as "endangered") and also the federal red list ("endangered by extinction"). Nevertheless the species, for which Germany and Rhineland-Palatinate have a high responsibility, faces many threats which certainly impact the populations in a negative way. Here in particular the dense conifer plantations neighbouring their habitats endanger their survival, as well as other impacts from intensive forestry management in the vicinity (e.g. deposition of old branches etc. in the springs, new infrastructures near the springs). In addition, the technical extension of the springs and spring brooks has a negative impact on the species, as well as the high density of wild boars, destroying the habitats and feeding on the larvae. In the medium and long term also climatic changes might be of more importance, in particular longer hot and dry periods in the summer, even if the larvae are somewhat tolerant to dry conditions. Several measurements to protect *C. bidentata* can be proposed, which also will improve the habitat conditions of *C. boltonii*: conversion of the coniferous forest into deciduous forests in the neighborhood of the springs, creation of diverse forest glades with flowering plants as maturation and feeding habitats, strict protection of the springs (no obstructions in the water cycle, no trampling damage etc.)." (Author)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**13476.** Ott, J. (2013): Die Östliche Moosjungfer – eine für Rheinland-Pfalz neue Libellenart wurde erstmals im Kreis Kaiserslautern gefunden. Heimatjahrbuch 2014: 76-78. (in German) [16-VII-2013, "Oberer Erleentalweiher", near Kaiserslautern, Rheinland-Pfalz, Germany] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**13477.** Palacino-Rodríguez, F. (2013): Five new records of dragonflies (Odonata: Anisoptera) from Putumayo Department (Colombia). Boletín del Museo de Entomología de la Universidad del Valle 14(2): 16-21. (in English, with Spanish summary) [Records in April 2013 of *Erythemis vesiculosa*, *Erythrodiplax basalis*, *E. unimaculata*, *E. fusca*, and *E. umbrata* are documented.] Address: Palacino-Rodríguez, F., Grupo de Investigación en Odonatos de Colombia. Laboratorio de Artrópodos, Grupo de Biotecnología, Centro Internacional de Física, Universidad Nacional de Colombia. Departamento de Biología, Facultad de Ciencias, Universidad El Bosque, Bogotá, Colombia. E-mail: odonata17@hotmail.com

**13478.** Patten, M.A.; Smith-Patten, B.D. (2013): Two new species, *Lestes eurinus* Say and *L. forcipatus* Rambur, for Oklahoma, with comments on other vagrant *Lestes* recorded in the state (Zygoptera: Lestidae). Notulae Odonatologica 8(2): 29-32. (in English) ["Details are provided for the first records of the two species for the state of Oklahoma in central United States. The knowledge is also summarized of other vagrant Lestidae that have been recorded in the state, and *L. congener* is removed from the list of spp. known from Oklahoma." (Authors)] Address: Patten, M.A., Oklahoma Biological Survey, University of Oklahoma, Norman, OK 73019, USA. E-mail: mpatten@ou.edu

**13479.** Pedrono, M.; Smith, I.I. (2013): Overview of the natural history of Madagascar's endemic tortoises and freshwater turtles: Essential components for effective conservation. Chelonian Research Monographs 6: 59-66. ["Madagascar had seven endemic chelonian species, including six tortoises and one aquatic turtle. The now extinct tortoises species, *Aldabrachelys grandidieri* and *Aldabrachelys abrupta*, as well as the extant species, *Astrochelys yniphora*, *Astrochelys radiata*, *Pyxis planicauda*, and *Pyxis arachnoides*, all occurred in the arid bush and in the mosaic of dry forests and wooded savannahs from south to northwestern regions of the island. The aquatic Madagascar Big-headed Turtle, *Erymnochelys madagascariensis*, occurs in rivers and large lakes in western Madagascar. These species all have delayed maturity offset by a prolonged reproductive lifespan. They also have a moderate annual reproductive output that includes multiple small clutches of eggs within a season, thus their intrinsic population growth rates are low. The last two decades have brought an increased understanding of the demographic vulnerability of Madagascan chelonians to overexploitation. Particularly significant are the drivers of population dynamics relating to adult mortality



and fecundity. The maximum level of harvest that their populations can sustain is low and is already greatly exceeded in most locations. This is the point at which the design of sound conservation strategies is crucial; increased integration of the natural history of Madagascan chelonians in conservation strategies could significantly improve their effectiveness. ... Juvenile *Erymnochelys madagascariensis* have a diet of aquatic or terrestrial invertebrates that have fallen into the water (e.g., molluscs, Coleoptera, Trichoptera larvae, Odonata, and Ephemeroptera)." (Authors)] Address: Pedrono, M., CIRAD, UPR AGIRs, B.P. 853, Antananarivo 101, Madagascar. E-mail: miguel.pedrono@cirad.fr

**13480.** Petrovičová, K.; David, S. (2013): Ecology and habitat preferences of *Onychogomphus forcipatus* (Linnaeus, 1758) Odonata: Gomphidae) from the Slovak Republic. MENDELNET 2013 (Proceedings of International PhD Students Conference Mendel University in Brno, Czech Republic, November 20th and 21st, 2013): 769-773. (in English) ["*O. forcipatus* is a conspicuous and ecologically interesting dragonfly species with low population density, occurring in lowland and foothill watercourses. In Slovakia, the species is known from 32 localities and 11 orthographic units with a total number of 106 specimens (51 males 3 females 14 Ex 38 L). *O. forcipatus* has a double-peak hypsometric distribution of localities with a height of 100-200 m and 400-500 m.a.s.l.. We assume that the atypical occurrence is linked to the preference of a river bed substrate: lithal (from pebbles to fine gravel) part of the watercourse hyporhithral and psammal/psammopelal (sandy-loamy-alumina substrate) part of the stream epipotamal. *O. forcipatus* occurs in the localities along with 36 dragonfly species with a positive correlation to rheophilous species *Platycnemis pennipes*, *Calopteryx splendens*, *C. virgo*, *Ophiogomphus cecilia* and *Gomphus vulgatissimus*. The significance of substrate, longitudinal zonation of the watercourse, and altitude were tested using Monte Carlo permutation test. After removal of the correlation of factors (inflation factor), the test showed statistically significant correlations for substrate types psammal (positive correlation,  $p = 0,002$ ) and pleisopotamal (negative correlation,  $p = 0,001$ ). Our results are consistent with published data." (Authors)] Address: Petrovičová, Kornelia, Dept of Zoology & Anthropology, Fac. Natural Sciences, Constantine the Philosopher Univ. in Nitra, Tr. A. Hlinku 1, 949 74 Nitra, Slovak Republic. E-mail: kornelia.petrovicova@gmail.com

**13481.** Pino, P. L., Torralba-Burrial, A.; Martínez Martínez, D.; Serra Sorribes, A. (2013): Primera cita de *Gomphus graslinii* (Rambur, 1844) y confirmación de la reproducción de *Macromia splendens* (Pictet, 1843) (Odonata: Gomphidae, Corduliidae) en Aragón (España). Boletín de la Sociedad Entomológica Aragonesa 53: 327-328. (in Spanish, with English summary) [The first record of *G. graslinii* and new records confirming the reproduction of *Macromia splendens* in Teruel province (new also to Aragon) are reported. A male of *G. graslinii* was found at La Pesquera del Ulldemó (Beceite, Teruel; UTM 31T 265261 4523851, da-

tum ETRS89, 570 m a.s.l.). At the same locality, also three exuviae of *Macromia splendens* were found.] Address: Pino, P.L., Museu de les Terres de l'Ebre, Gran Capità, 34, 43870 Amposta (Tarragona), Spain. E-mail: odonats@yahoo.es

**13482.** Pires, M.M.; Kotzian, C.B.; Spies, M.R.; Neri, D.B. (2013): Diversity of Odonata (Insecta) larvae in streams and farm ponds of a montane region in southern Brazil. *Biota Neotropica* 13(3): 259-267. (in English, with Portuguese summary) ["This study presents an inventory of the genera of Odonata found in streams and artificial farm ponds in a montane region, with temperate climate, in southern Brazil. Differences in richness of lotic and lentic environments were also investigated. The diversity of odonate families and genera in southernmost Brazil is lower than in warmer, either tropical or subtropical, regions of the country. Nine genera are new records for the region and six genera had their geographical ranges extended to regions with temperate climate of the Neotropics. The overall richness and especially the overall abundance recorded in the studied area are possibly determined by the occurrence of numerous farm ponds because natural standing waters are scarce in the region. The presence of macrophytes in these artificial ponds allowed the establishment of a diversified odonatofauna, typical of lentic environments." (Authors)] Address: Pires, M.M., Programa de Pós-graduação em Biologia, Universidade do Vale do Rio dos Sinos – UNISINOS, 93022-000, São Leopoldo, RS, Brasil, Programa de Pós-graduação em Biologia, Universidade do Vale do Rio dos Sinos – UNISINOS, Av. Unisinos, 950, CEP 93022-000, São Leopoldo, RS, Brasil

**13483.** Plaksa, S.A.; Yarovenko, Yu.A.; Gadzhiev, A.A. (2013): Status evaluation of corsac fox (*Canidae*, *Vulpes corsac*) population in Dagestan. *Arid Ecosystems* 3(2): 85-91. (in English) [Corsac foxes are feeding on every diet available including Odonata. No details are given.] Address: Plaksa, S.A., Caspian Institute of Biological Resources, Dagestan Research Center, Russian Academy of Sciences, ul. M. Gadzhieva 45, Makhachkala, 367000, Russia. E-mail: splaksa@list.ru

**13484.** Puchmertlová, M (2013): *Vážky* (Odonata) soustavy Boleveckých rybníků v Plzni [Dragonflies of Bolevec ponds system at Plzen]. BSc thesis, Fakulta Pedagogická, Katedra Biologie, Západočeská Univerzita v Plzni: V + 73 pp. (in Czech, with English summary) [Bolevec ponds, Plzen, Czech Republic. In 2012, at three localities (Strženska, Nováček and Kamenný ponds), 24 Odonata species were found. The list of species includes *Coenagrion hastulatum* and *Lestes dryas*.] Address: not stated

**13485.** Rache, L.; Acero, A.; Alfonso, S.; Rincón Silva, J.D. (2013): First record of the genera *Diaphlebia* Selys 1854, *Argyrothemis* Ris 1909 and *Fylgia* Kirby 1889 from Colombia (Odonata: Gomphidae, Libellulidae). Entomo-

tropica 28(2): 95-97. (in Spanish, with English summary) ["The genera *Argyrothemis*, *Diaphlebia* and *Fylgia*, are reported for the first time from Colombia. These genera were collected in the Natural Reserve El Caduceo at San Martín (Meta Dept.). The specimens were collected in floodplain area inside and outside of a primary forest. Thereby the known distribution for this genera is now broader and the number of taxa reported for Colombian odonates." (Authors) *Diaphlebia angustipennis* Selys, 1854: 1 female, COLOMBIA. Departamento del Meta. San Martín. Vereda San Francisco. 03° 40' 168" N 073° 39' 564" W. 370 m; *Argyrothemis argentea* Ris, 1909: 1 female, COLOMBIA. Departamento del Meta. San Martín. Vereda San Francisco. 03° 40' 168" N 073° 39' 56" W. 370 m.a.s.l.; *Fylgia amazonica lychnitina* De Marmels, 1989: 2 males, COLOMBIA. Departamento del Meta. San Martín. Vereda San Francisco. 03° 40' 091" N 073° 39' 277" W. 353 m.a.s.l.] Address: Rache, L., Universidad Nacional de Colombia, Sede Bogotá. Carrera 30 no. 45-03 AA. 7495. Colombia. E-mail: leonardorache@hotmail.com

**13486.** Rebora, M.; Piersanti, S.; Dell'Otto, A.; Gaino, E. (2013): The gustatory sensilla on the endophytic ovipositor of Odonata. *Arthropod Structure & Development* 42(2): 127-134. (in English) ["The present paper aims at describing the fine structure of coeloconic sensilla located on the cutting valves of the endophytic ovipositor of two Odonata species, *Aeshna cyanea* and *Ischnura elegans*, by carrying out parallel investigations under SEM and TEM. In both species these coeloconic sensilla are innervated by four unbranched neurons forming four outer dendritic segments enveloped by the dendrite sheath. One dendrite terminates at the base of the peg forming a well developed tubular body, while the other three enter the peg after interruption of the dendrite sheath. The cuticle of the peg shows an apical pore and a joint membrane. This last feature, together with the tubular body and the suspension fibers, represent the mechanosensory components of the sensillum while the pore and the dendrites entering the peg allow chemoreception. The ultrastructural organization of these coeloconic sensilla is in agreement with the one reported for insect gustatory sensilla. Our investigation describes for the first time typical insect gustatory sensilla in Odonata. Electrophysiological and behavioral studies are needed to verify the role that these structures can perform in sensing the egg-laying substrata. Highlights: \*The presence of chemoreceptors on ovipositor of endophytic Odonata was hypothesized. \*No data on these sensilla are available at TEM level. \*We investigate coeloconic sensilla on ovipositor of endophytic Odonata under SEM/TEM. \*Sensilla show a pore and one of the outer dendritic segments forms a tubular body. \*This is the typical morphology of insect gustatory sensilla." (Authors)] Address: Rebora, Manuela, Dipartimento di Biologia Cellulare e Ambientale Università di Perugia, Via Elce di sotto 06121 Perugia, Italy. E-mail: rebora@unipg.it

**13487.** Redin, A.; Sjöberg, G. (2013): Effects of beaver dams on invertebrate drift in forest streams. *Šumarski list*

11-12: 597-607. (in English, with Bosnian summary) ["We aimed to assess the effects of beaver dams on the invertebrate drift fauna in five central Swedish boreal forest streams. Each stream was sampled once during the autumn, with drift traps placed upstream and downstream of the beaver dams. Drift densities (numbers/100 m<sup>3</sup> water) were calculated. The invertebrates were determined, dried and weighed. No significant differences were noted in total drift densities or in the drift densities of pelagic species. The drift densities of benthic species were higher upstream of the dam, mainly because Ephemeroptera were more abundant in the upstream part. No significant difference was observed in diversity or dry weight. The functional feeding group ratio: filtering collectors / gathering collectors was significantly higher downstream of the dam." (Authors) Upstream-number of Odonata was very low. No drifting specimens were observed.] Address: Redin, A., Department of Wildlife, Fish, and Environmental Studies, SLU, SE-90183 Umea, Sweden. E-mail: Andreas.Redin@home.se

**13488.** Reinhardt, K. (2013): Drei seltene Insekten am südlichen Salzhaff: *Lestes barbarus* (Odonata, Lestidae), *Conocephalus fuscus* (Orthoptera, Tettigoniidae) und *Boloria dia* (Lepidoptera, Nymphalidae). *Entomologische Nachrichten und Berichte* 57(4): 273-274. (in German) [Mecklenburg-Vorpommern, Germany, eastern edge of Boisdorfer Werder; 15.08.2013; *Lestes barbarus*] Address: Reinhardt, K., Evolutionsökologie der Tiere, Universität Tübingen, Auf der Morgenstelle 28, 72076 Tübingen, Germany. E-Mail: k.reinhardt@sheffield.ac.uk

**13489.** Reinhardt, K. (2013): The Entomological Institute of the Waffen-SS: evidence for offensive biological warfare research in the third Reich. *Endeavour* 37(4): 220-227. (in English) ["In January 1942, Heinrich Himmler, head of the Schutzstaffel (SS) and police in Nazi Germany, ordered the creation of an entomological institute to study the physiology and control of insects that inflict harm to humans. Founded in the grounds of the concentration camp at Dachau, it has been the focus of previous research, notably into the question of whether it was involved in biological warfare research. This article examines research protocols by the appointed leader Eduard May, presented here for the first time, which confirm the existence of an offensive biological warfare research programme in Nazi Germany." (Author) E. May also used Odonata to build his career.] Address: Reinhardt, K., University of Tuebingen, Animal Evolutionary Ecology, Auf der Morgenstelle 28, 72076 Tübingen, Germany. E-mail: k.reinhardt@uni-tuebingen.de

**13490.** Rodrigues, M.E.; Carriço, C.; Pinto, Z.T.; Mendonça, P.M. & Queiroz, M.M.C. (2013): First record of acari *Arrenurus Dugès*, 1834 as a parasite of Odonata species in Brazil. *Biota Neotropica* 13(4): 365-367. (in English, with Portuguese summary) ["Water mites are common and widespread parasites of some aquatic insects in freshwater habitats. This is the first record of acari *Arrenurus Dugès*, 1834, as a parasite of Odonata in

Brazil. Water mites were sampled from *Miathyria marcella* and *Ischnura fluviatilis*." (Authors)] Address: Rodrigues, M.E., Programa de Pós-graduação em Entomologia e Conservação da Biodiversidade, Universidade Federal da Grande Dourados – UFGD, CEP 79804-970, Dourados, MS, Brasil. E-mail: rodrigues.mbio@gmail.com

**13491.** Roland, H.-J.; Martens, A. (2013): Transport einer Ameise durch eine Libelle (Hymenoptera: Formicidae; Odonata: Lestidae). *Libellula* 32(3/4): 175-179. (in German, with English summary) ["A series of digital photographs, taken on 25-iv-2013 at a fish pond near Echzell north of Frankfurt am Main, Germany, documented the aerial transport of a worker of *Lasius cf. flavus* by the male of a tandem of *Sympecma fusca*. The ant was fixed to the left hind tibia by its mandibles and traveled a minimum distance of 3 m." (Authors)] Address: Roland, H.-J., Im Mühlahl 35, 61203 Reichelsheim, Germany. E-mail: hjroland@gmx.de

**13492.** Rüppell, G.; Hilfert-Rüppell, D. (2013): Biting in dragonfly fights. *International Journal of Odonatology* 16(3): 229-229. (in English) ["Slow motion films of fight behaviour of five different species of Odonata were analysed. In all cases biting played a major role. The biting duration depended on the duration of a stable connection between the two opponents. Sitting odonates showed much longer biting than those that were flying. In fights of *Anax junius* and *Calopteryx splendens* long biting between males led to serious injuries and death. Two males of *Anax imperator* bit each other by very short strikes during looping flights together, better described as hack-biting. This hack-biting was seen in two other fights: a female of *Libellula quadrimaculata* bit a harassing male on the head, immobilizing him, and during a male–male fight in *C. splendens* flying nearly on the spot. Loops, very brief but relatively stable flight positions, were used for biting in three cases. The significance of biting in inter- and intrasexual competition in Odonata is discussed." (Authors)] Address: Hilfert-Rüppell D., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: d.hilfert@tu-bs.de

**13493.** Ruiz-Guzmán, G.; Canales-Lazcano, J.; Jiménez-Cortés, J.G.; Contreras-Garduño, J. (2013): Sexual dimorphism in immune response: Testing the hypothesis in an insect species with two male morphs. *Insect Science* 20(5): 620-628. (in English) ["It has been proposed that given that males should invest in sexual traits at the expense of their investment in immune response, females are better immunocompetent than males. Typically, this idea has been tested in monomorphic species, but rarely has been evaluated in polymorphic male species. We used *Paraphlebia zoe*, a damselfly with two male morphs: the black wing (Black-W) morph develop black spots as sexual traits and the hyaline wing morph (Hyaline-W) resembles a female in size and wings colour. We predicted that Black-W should have a lower immune response than Hyaline-W, but that the latter males should not differ from females in this respect. Nitric oxide (NO)

and phenoloxidase (PO) production, as well as haemolymph protein content, were used as immune markers. Body size (wing length) was used as an indicator of the male condition. The results show that, as we predicted, females and Hyaline-W had higher values of NO than Black-W, corresponding to differences in size. However, the opposite was found in relation to PO production. Females had the highest levels of haemolymph protein content, whereas no differences were found between Black-W and Hyaline-W. These results partially support the sexual selection hypothesis and are discussed in the context of the life history of this species. Black-W, Hyaline-W and females could express the immune markers that are prioritized by their particular condition, and probably neither of them could express all immune markers in an elevated manner, as this would result in an excessive accumulation of free radicals." (Authors)] Address: Contreras-Garduño J., Departamento de Biología, División de Ciencias Naturales y Exactas, Universidad de Guanajuato, campus Guanajuato. Noria Alta s/n, Noria Alta, 36050. Guanajuato, Guanajuato, México. E-mail: jcont@ecologia.unam.mx

**13494.** Rychła, A. (2013): Vorkommen der Arktischen Smaragdlibelle *Somatochlora arctica* (Zetterstedt, 1840) in Hochmooren der polnischen Ostseeküste und in Pommern. *International Dragonfly Fund - Report* 63: 1-31. (in German, with English and Polish summaries) ["The distribution of *S. arctica*, a rare Odonata species in Poland, is insufficiently known. Therefore, in June 2013 seventeen localities in the northwestern potential range of the species in Poland were surveyed for their dragonfly fauna, with special emphasis on (raised) bog habitats and *S. arctica*. A total of 36 Odonata species was recorded including most of the Polish legally protected species. Only three localities (two Sphagnum-covered ditches and one shallow Sphagnum-hollow) resulted in records of *S. arctica*, both larvae and imago. These habitats harboured small larval populations. Most of the imagines were recorded hunting along the edges of clear pine and downy birch woods. LIFE - Natura 2000 measures to consolidate water tables of the studied raised bogs were not specified to conserve the habitats of *S. arctica*. But in general, this will help to save a favourable status of the raised bogs as a total." (Author)] Address: Rychła, Anna, ul. Osiedlowa 12, Płoty, 66-016 Czerwieńsk, Poland. E-mail: rychlan@op.pl

**13495.** Sanchez Crespo, A.; Torralba-Burrial, A.; (2013): Detección de la libélula amenazada *Oxygastra curtisii* (Dale, 1834) (Odonata: Corduliidae) en la sierra de Guadarrama (Madrid, centro de España). *Boletín de la Asociación española de Entomología* 37(1/2): 89-93. (in Spanish, with English summary) [*O. curtisii* was found at Guadarrama Mountains (Madrid, Central Spain), 30TVL41, 841 m a.s.l., river Guadalix, in June 2012] Address: Sanchez Crespo, A.. E-mail: angel.scespo@telefonica.net

**13496.** Sánchez-Guillén, R.A.; Muñoz, J.; Rodríguez-Tapia, G.; Feria Arroyo, T.P.; Córdoba-Aguilar, A. (2013):



Climate-induced range shifts and possible hybridisation consequences in insects. *PLoS ONE* 8(11): e80531. doi:10.1371/journal.pone.0080531: 10 pp. (in English) ["Many ectotherms have altered their geographic ranges in response to rising global temperatures. Current range shifts will likely increase the sympatry and hybridisation between recently diverged species. Here we predict future sympatric distributions and risk of hybridisation in seven Mediterranean ischnurid damselfly species (*I. elegans*, *I. fontaineae*, *I. genei*, *I. graellsii*, *I. pumilio*, *I. saharensis* and *I. senegalensis*). We used a maximum entropy modelling technique to predict future potential distribution under four different Global Circulation Models and a realistic emissions scenario of climate change. We carried out a comprehensive data compilation of reproductive isolation (habitat, temporal, sexual, mechanical and gametic) between the seven studied species. Combining the potential distribution and data of reproductive isolation at different instances (habitat, temporal, sexual, mechanical and gametic), we infer the risk of hybridisation in these insects. Our findings showed that all but *I. graellsii* will decrease in distributional extent and all species except *I. senegalensis* are predicted to have northern range shifts. Models of potential distribution predicted an increase of the likely overlapping ranges for 12 species combinations, out of a total of 42 combinations, 10 of which currently overlap. Moreover, the lack of complete reproductive isolation and the patterns of hybridisation detected between closely related ischnurids, could lead to local extinctions of native species if the hybrids or the introgressed colonising species become more successful." (Authors)] Address: Sánchez-Guillén, Rosa, Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, México D.F., Mexico. E-mail: rguillenuvigo@hotmail.com

**13497.** Sasamoto, A.; Futahashi, R. (2013): Taxonomic revision of the status of *Orthetrum triangulare* and *melania* group (Anisoptera: Libellulidae) based on molecular phylogenetic analyses and morphological comparisons, with a description of three new subspecies of *melania*. *Tombo* 55: 57-82. (in English) ["The taxonomic status of the libellulid dragonflies *Orthetrum triangulare* (Selys, 1878) and allied taxon *O. [triangulare] melania* (Selys, 1883) has been inconclusively resolved until present. In addition, the *melania* group has conspicuous geographical variations in morphology, which have not yet been discussed in detail. We present a taxonomic revision based on the molecular phylogenetic analyses using nuclear ITS1, ITS2, and mitochondrial 16SrRNA and COI genes, as well as external morphology. We confirm that *triangulare* and *melania* are well separated by the both nuclear and mitochondrial gene molecular phylogenies. The external morphologies of these two groups are conspicuously different, indicating that *O. melania* should be regarded as a genuine species. Although the genetic differences between *O. triangulare malaccense* and *O. t. triangulare* were subtle, the morphological differences between these two subspecies could be recognized. Furthermore,

based on molecular phylogenetic analyses and external morphological comparisons, *O. melania* could be separated into four subgroups: (1) mainland Japan (Hokkaido to Kyushu) and northern Ryukyu, (2) continental China, Taiwan, Korean Peninsula, (3) middle Ryukyu (from Tokara Islands to Kumejima Island), and (4) southern Ryukyu (Yaeyama Islands). Therefore we recognize the following four subspecies: *nominotypical melania*, m. *continentale* ssp. nov. (holotype female: Linfan, Zhejiang prov., R. P. china), m. *ryukyense* ssp. nov. (holotype female: Mt. Nago, Nago city, Okinawajima Island, Japan), and m. *yaeyamense* ssp. nov. (holotype female: Otomipass, Taketomi-cho, Iriomotejima Island, Yaeyama Isis., Japan)." (Authors)] Address: Sasamoto, A., 190-4 Yakuoji Tawaramoto, Shiki-gun, Nara prefecture, 636-0341, Japan. E-mail: akssmt@sea.plala.or.jp

**13498.** Schneider, T. (2013): Frühsommer-Beobachtungen an *Cordulegaster helladica buchholzi* und anderen Libellen auf Naxos, Griechenland (Odonata: Cordulegastriidae). *Libellula* 32(3/4): 151-158. (in German, with English summary) ["Early summer observations of *Cordulegaster helladica buchholzi* and other dragonflies on Naxos (Greece) - In June 2013 during a two day trip 17 dragonfly species were recorded from Naxos. *Cordulegaster helladica buchholzi* was found in great numbers exclusively in the upper part of a single river system. This subspecies might be threatened by further water extraction from the brook and by the cutting of the forests along the water courses. *Aeshna affinis* and *Trithemis annulata* are new for the island, increasing the number of known taxa from 19 to 21. *Sympetma fusca* was rediscovered since the report of K.F. Buchholz more than 50 years ago." (Author)] Address: Schneider, T., Arnold-Knoblach-Ring 76, 14109 Berlin/Wannsee, Germany. E-mail: thomas.rs@gmx.de

**13499.** Seehausen, M. (2013): Die Libellen (Odonata) der Sammlung Gerning. *Libellula* 32(1/2): 45-58. (in German, with English abstract) ["The Odonata of the collection Gerning – The Gerning collection of the Wiesbaden Museum is partly over 250 years old and one of the most important collections of the 18th century. Beside butterflies, beetles and other insects it contains also Odonata. These were revised and catalogued. Altogether 92 individuals in 44 species could be assigned to the collection. Furthermore, there are 25 specimens in 13 species from Java collected by Ernst Albert Fritze, two *Sympetrum vulgatum* from an unknown collector (abbreviation "K") and one unidentified *Aeshnidae* larvae without label in this collection by mistake. In comparison to the 1830 committed catalogue (Gerning n.y.) there are 41 specimens of the Coll. Gerning missing. Two males of *Uracis imbuta* (Burmeister, 1839) from Buenos Aires were certified according to the citation of Rambur (1842). Problems when dealing with historical references and collections are mentioned." (Author)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**13500.** Seehausen, M. (2013): New to the fauna of Hong Kong: *Matrona basilaris* Selys, 1853 (Odonata: Calopterygidae). International Dragonfly Fund - Report 65: 3-5. (in English) ["*Matrona basilaris* was collected between 1878 and 1907 in Hong Kong. The specimens had been deposited in the Übersee-Museum Bremen (Germany)."] (Author)] Address: Seehausen, M., Museum Wiesbaden, Friedrich-Ebert-Allee 2, 65183 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**13501.** Shende, V.A.; Patil, K.G. (2013): Diversity of dragonflies (Anisoptera) in Gorewada International Bio-Park, Nagpur, Central India. *Arthropods* 2(4): 200-207. (in English) [34 anisopteran species were recorded. 26 of them are assessed as "common" and 8 as "occasional".] Address: Shende, V.A., Department of Zoology, Institute of Science, R. T. Marg, Nagpur (M.S.), India. E-mail: vi-rushende@gmail.com

**13502.** Silveira Coimbra, H.S.; Damé Schuch, L.F.; Muller, G.; Lambrech Gonçalves, C.; Zambrano, C.; Bastos Oyarzabal, M.E.; Prestes, L.; Araujo Meireles, M.C. (2013): Research of trematodes digenetics from *Heleobia* spp. (Mollusca: Hydrobiidae) in area of occurrence of equine monocytic ehrlichiosis, in Rio Grande do Sul, Brazil. *Arq. Inst. Biol.*, São Paulo 80(3): 266-272. (in Portuguese, with English summary) ["The equine monocytic ehrlichiosis in the region South of the Rio Grande do Sul has demonstrated to be important in the creations of Crioulo horses. It has been reported as cause of diarrhea in equine not surround and as cause of losses with treatments and death of the animals, being pointed as a limited factor in the range breeding in some regions. The way of transmission for the oral way, intermediated for trematodes in aquatic environments, has been supported. Freshwater snails are involved as intermediate hosts of trematodes and harbor of the *Neorickettsia risticii*. A total of 16,846 *Heleobia* snails had been collected in the cities of Arroio Grande, Rio Grande, Palmares do Sul and Santa Vitoria do Palmar, 92.2% of which had been found in the roots of aquatic plants (*Eichornea* spp.). The frequency of trematodes present in the snails varied of 2.3 to 12.8% in the collected regions. Three types of cercariae were found, morphology type 1, morphology type 2 and morphology type 3, and two morphologic type of metacercariae of the snails. A total of 357 insects of the Odonata order were collected, stages of metacercariae had been found in the tissues of suborder Anisoptera with 5.3% of frequency. More studies are necessary for identification of the joined larval phases, as well as knowing the host definitive and identifying the adult parasite and the relation of its cycle of life with the occurrence of equine monocytic ehrlichiosis." (Authors)] Address: Coimbra, Helen, Faculdade de Veterinária; Universidade Federal de Pelotas (UFPEL) - Pelotas (RS), Brasil. E-mail: coimbrahs@gmail.com

**13503.** Singh, V.; Banyal, H.S. (2013): Insect fauna of Khajjiar Lake of Chamba district, Himachal Pradesh, In-

dia. *Pakistan J. Zool.* 45(4): 1053-1061. (in English) [The following Odonata species are listed: *Anotogaster basal*, *Anax immaculifrons*, *Orthetrum s. sabina*, *Orthetrum t. triangulare*, *Orthetrum pruinosum neglectum*, *Palpopleuras sexmaculata*, *Crocothemis servilia*, *Trithemis festiva*, *Pseudagrionii* sp., and *Neurobasis c. chinesis*.] Address: Singh, V., Department of Biosciences, Himachal Pradesh University, Shimla-171 005 (HP), India

**13504.** Smith-Gomez, (2013): Primeros registros de tres especies de Zygoptera (Insecta: Odonata) para el estado de Jalisco, México. *Dugesiana* 20(2): 83-84. (in Spanish) [First records of *Hetaerina vulnerata*, *Apanisagrion lais*, and *Argia plana* from Jalisco, México are presented.] Address: Smith-Gómez, S.A., Lab. de Ento., Centro de Estudios en Zoología, Depto. De Botánica y Zoología, CUCBA, Univ. de Guadalajara, Apdo. Postal 134, CP 45100, Zapopan, Jalisco, México. E-mail: smity456@hotmail.com

**13505.** Steinhoff, P.O.M.; Do, M.C. (2013): Notes on some *Coelliccia* species from Vietnam (Zygoptera: Platycnemiidae). *Odonatologica* 42(4): 347-357. (in English) ["The original descriptions of *C. acco* Asahina, 1997, *C. kazukoae* Asahina, 1984, *C. montana* Fraser, 1933 and *C. yamasakii* Asahina, 1984 are supplemented and enhanced, and new illustrations of these species are provided. A teneral form of *C. yamasakii* is described and figured. *C. kazukoae* is recorded for the first time from Vietnam." (Authors)] Address: Steinhoff, P., Trelleborger Weg 1, 17493 Greifswald, Germany. E-mail: philipsteinhoff@gmail.com

**13506.** Stewart, B.A.; Close, P.G.; Cook, P.A.; Davies, P.M. (2013): Upper thermal tolerances of key taxonomic groups of stream invertebrates. *Hydrobiologia* 718: 131-140. (in English) ["Southwestern Australia has already undergone significant climatic warming and drying and water temperatures are increasing particularly in small streams where riparian vegetation has been cleared. The ability to predict how freshwater fauna may respond to these changes requires understanding of their thermal tolerances. A review of relevant literature and laboratory testing of four aquatic species from southwestern Australia were used to compare upper thermal tolerance (UTT) among key taxonomic groups. UTT for selected species determined by LT50 tests were similar to that of species tested elsewhere. Mean UTT, based on relevant literature and LT50 experiments, ranged from 22.3°C for Ephemeroptera to 43.4°C for Coleoptera. Mean UTT for both Coleoptera and Odonata (41.9°C) were significantly higher than those for all the other groups (22.3–31.5°C) with the exception of Planaria. The mean UTT value of 22.3°C for Ephemeroptera was significantly lower than for Decapoda (29.6°C), Trichoptera (30.1°C) and Mollusca (31.5°C). For three insect orders tested, eurytherms had significantly higher UTT values than stenotherms. The variation in UTT among taxa suggests that additional thermal shifts, caused by riparian disturbance and/or climate change, are likely to create novel assemblages due to the replacement of temperature-sensitive taxa by more tolerant taxa. This has im-

plications for the sustainability of regionally important endemic cool water species." (Authors)] Address: Stewart, Barbara, Centre of Excellence in Natural Resource Management, Univ. of Western Australia, Albany, WA 6330, Australia. E-mail: barbara.cook@uwa.edu.au

**13507.** Striniqi, A.; Misja, K. (2013): An overview of threatened and risked entomofauna of northern Albania. *Journal of environmental research and development* 8(1): 40-49. (in English) [The paper lists three Odonata species together with locality data: *Coenagrion ornatum* (Kukes), *Lestes dryas* (Kukes, Shkoder, Lezhe), and *Gomphus vulgatissimus* (Shkoder, Lezhe).] Address: Striniqi, Ariana, Faculty of Natural Sciences, University of Shkodra "Luigj Gurakuqi"

**13508.** Svensson, E.I.; Waller, J.T. (2013): Ecology and sexual selection: Evolution of wing pigmentation in calopterygid damselflies in relation to latitude, sexual dimorphism, and speciation. *The American Naturalist* 182(5): E174-E195. (in English) ["Our knowledge about how the environment influences sexual selection regimes and how ecology and sexual selection interact is still limited. We performed an integrative study of wing pigmentation in calopterygid damselflies, combining phylogenetic comparative analyses, field observations and experiments. We investigated the evolutionary consequences of wing pigmentation for sexual dimorphism, speciation, and extinction and addressed the possible thermoregulatory benefits of pigmentation. First, we reconstructed ancestral states of male and female phenotypes and traced the evolutionary change of wing pigmentation. Clear wings are the ancestral state and that pigmentation dimorphism is derived, suggesting that sexual selection results in sexual dimorphism. We further demonstrate that pigmentation elevates speciation and extinction rates. We also document a significant biogeographic association with pigmented species primarily occupying northern temperate regions with cooler climates. Field observations and experiments on two temperate sympatric species suggest a link between pigmentation, thermoregulation, and sexual selection, although body temperature is also affected by other phenotypic traits such as body mass, microhabitat selection, and thermoregulatory behaviors. Taken together, our results suggest an important role for wing pigmentation in sexual selection in males and in speciation. Wing pigmentation might not increase ecological adaptation and species longevity, and its primary function is in sexual signaling and species recognition." (Authors)] Address: Svensson, E.I., Evol. Ecol. Unit, Dept of Biology, Lund Univ., 223 62 Lund, Sweden. E-mail: erik.svensson@biol.lu.se

**13509.** Swaegers, J.; Mergeay, J.; Therry, L.; Bonte, D.; Larmuseau, M.H.D.; Stoks, R. (2013): Rapid range expansion increases genetic differentiation while causing limited reduction in genetic diversity in a damselfly. *Heredity* 115(4): 422-429. (in English) ["Many ectothermic species are currently expanding their geographic range due to global warming. This can modify the population genetic di-

versity and structure of these species because of genetic drift during the colonization of new areas. Although the genetic signatures of historical range expansions have been investigated in an array of species, the genetic consequences of natural, contemporary range expansions have received little attention, with the only studies available focusing on range expansions along a narrow front. We investigate the genetic consequences of a natural range expansion in the Mediterranean damselfly *Coenagrion scitulum*, which is currently rapidly expanding along a broad front in different directions. We assessed genetic diversity and genetic structure using 12 microsatellite markers in five centrally located populations and five recently established populations at the edge of the geographic distribution. Our results suggest that, although a marginal significant decrease in the allelic richness was found in the edge populations, genetic diversity has been preserved during the range expansion of this species. Nevertheless, edge populations were genetically more differentiated compared with core populations, suggesting genetic drift during the range expansion. The smaller effective population sizes of the edge populations compared with central populations also suggest a contribution of genetic drift after colonization. We argue and document that range expansion along multiple axes of a broad expansion front generates little reduction in genetic diversity, yet stronger differentiation of the edge populations." (Authors)] Address: Swaegers, J., Laboratory of Aquatic Ecology, Evolution and Conservation, Department of Biology, University of Leuven, Leuven, Belgium. E-mail: Janne.Swaegers@bio.kuleuven.be

**13510.** Tatarinov, A.G.; Kulakova, O.I.; Loskutova, O.A. (2013): Odonata (Dragonflies and damselflies) of the Polar and Subpolar region. *Materials of the Fifth All-Russia Symposium on Amphibiotic and Aquatic Insects / Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences.* – Yaroslavl: Filigran, 2013. – 254 pp: 206-210. (in Russian, with English summary) ["A total of 36 species of Odonata of seven families have been recorded in the Polar and Subpolar Ural Mountains. Three families make up the bulk of taxonomic diversity: *Coenagrionidae* (11 species, 30.5%), *Corduliidae* (seven species, 19.4%), *Libellulidae* (seven species, 19.4%). The families *Calopterygidae*, *Lestidae*, represented by one and two species, respectively, were the least abundant. Species widespread in the study area are indicated; the average timing of the emergence of adults is specified; three types of water bodies inhabited by larvae are recognized; habitat preferences of larvae are analyzed." (Authors)] Address: Tatarinov, A.G., Institute of Biology, Komi Scientific Centre, Ural Branch, Russian Academy of Sciences, ul. Kommunisticheskaya 28, Syktyvkar, Komi Republic, 167982, Russia. E-mail: andreitatarinov@mail.ru

**13511.** Tatarkiewicz, D. (2013): Analysis of the emergence of the Scarce Chaser *Libellula fulva* O.F. Müller, 1764 (Odonata: Libellulidae). *Aquatic Insects* 34(3-4), (2012): 173-193. (in English) ["*L. fulva* is widespread in Europe and in many regions is relatively common. It is also



abundant in the lake districts of western and northern Poland. Although the species frequently occurs in large numbers its biology is poorly known. Emergence of *L. fulva* was investigated in this study as a contribution to the life history of the species. Studies were carried out in the vicinity of Chojno (52°41' N, 16°12' E) on the edge of the Notecka Forest in 2003 and 2004. The stem habitat of the population is a stream with the adjacent swamps. *L. fulva* belongs to the spring species sensu Corbet (1999). The emergence of the studied population lasted 19 days (between 18 May and 5 June) and 31 days (between 13 May and 12 June) in 2003 and 2004, respectively. It was characterized by synchronous and, especially in the first phase, mass emergence. The high synchronisation is reflected in the fact that 50% of the population had emerged by the seventh (in 2003) and the fifth (in 2004) days of the process. This is vital to the imagines, which mature and return to the water body as soon as possible to reproduce. Timing of the end of emergence depends on atmospheric conditions during its duration and the conditions preceding the start of emergence on a given day. In the daily course there is a tendency for emergence to finish as soon as possible. Extension of the emergence is synonymous with increased mortality in the dragonfly population caused by predators." (Authors)] Address: Tatarkiewicz, D., Dept of Biology and Environmental Protection, University School of Physical Education, Królowej Jadwigi St. 27/39, 61-871 Poznań, Poland. E-mail: dawid.tatarkiewicz@poczta.fm

**13512.** Theischinger, G.; Richards, S.J. (2013): Three new species of *Teinobasis* Kirby from Papua New Guinea (Zygoptera: Coenagrionidae). *Odonatologica* 42(4): 359-367. (in English) ["*T. chrysea* sp. n. Holotype male: (NTM 1008871), *T. lutea* sp. n. (Holotype male: (NTM 1008876) and *T. macroglossa* sp. n. (Holotype male: (NTM 1008877) are described from temporary bush camps, without permanent place-names, in the Sepik Basin. Characters of the available adults are illustrated, habitat conditions are given and their affinities are discussed." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**13513.** Theischinger, G.; Richards, S.J. (2013): Two new species of *Hylaeargia* Lieftinck from New Guinea (Zygoptera: Platynemididae). *International Dragonfly Fund - Report* 64: 1-11. (in English) ["Two species, *Hylaeargia vanmastrigti* sp. n. (holotype male from Star Mountains, Papua Province, Indonesian New Guinea) and *H. lisae* sp. n. (holotype male from Hindenburg Range, Papua New Guinea), are described as new. An illustrated key to the known species of *Hylaeargia* Lieftinck is presented." (Authors)] Address: Theischinger, G., NSW Department of Premier and Cabinet, Office of Environment and Heritage, PO Box 29, Lidcombe NSW 1825 Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

**13514.** Trapero-Quintana, A.; Lafuente, Y.R. (2013): Diversidad y emergencia de odonatos en los Cantiles, Pro-

vincia Granma, Cuba. *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)* 53: 217-222. (in Spanish, with English summary) ["In this study we show the temporal variation of thirteen odonate species in a lotic habitat at Los Cantiles, Jiguani, Granma province, Cuba. The survey was conducted between August 2010 and June 2011 by means of recollecting exuviae. *Neonuera maria* was the most dominant species while the most diverse family was Libellulidae. There was a heterogeneous distribution of relative abundance in both seasons, mainly characterized by accidental species." (Authors)] Address: Trapero Quintana, A., Departamento de Biología de la Universidad de Oriente, Patricio s/n, Santiago, Cuba, CP 90500, Cuba. E-mail: atrapero@cnt.uo.edu.cu

**13515.** Tripon, C.; Cupsa, D. (2013): Data on the Odonata fauna of the Natura 2000 site "Lunca Inferioara a Crisului Repede" (ROSCI-0104), Bihor County, NW Romania. *Bihorean Biologist* 7(2): 99-103. (in English) [12 Odonata species have been recorded.] Address: Cupsa, Diana, University of Oradea, Faculty of Sciences, Department of Biology, Universitatii str. 1, 410087 - Oradea, Romania. E-mail: dcupsa@uoradea.ro

**13516.** Tsai, F.-Y.; Chi, K.-j. (2013): Wing deformation of dragonfly: Aerodynamic effects and flapping. MSc.thesis, Faculty of Science> Institute of Biological Physics, Chung Hsing University, Institute of Biophysics: (in Chinese, with English summary) ["Pterostigma is a darken region at the leading edge of the wings of many insects. It is bilayer in structure, and is thicker and heavier than the other cells of the wing. Previous study shows that a dragonfly wing with pterostigma would increase wing's bending deformation at same vibration frequency and amplitude. In this study, I further examined the mechanical characteristics and consequences of pterostigma of dragonfly wings. Firstly, I controlled the vibration amplitudes of the wing base to explore how they affect wing's bending deformation. Secondly, I applied flow visualization technology to examine the effects of pterostigma, and hence difference in bending deformation, on the flow behaviours around the flapping wings. Because of the limits of our experimental setup, I used lower vibration frequency for wings in lower wind speed to meet similarity of Strouhal number. The results show that, whether the wing had pterostigma, the wing's bending deformation was greater when the amplitude increased; however, the effect is more pronounced in wings with pterostigma. Furthermore, the Y-position of pterostigma (i.e. the amplitude of pterostigma) increased with the amplitude of wing base, indirectly implying that a flapping wing with greater bending deformation would also have higher pterostigma position. Results from the wind tunnel experiments show that removal of pterostigma would change the range and angles of wing's angle of attack. However, the effects of pterostigma on the behaviours of vortices are not conclusive." (Authors)] Address: not stated

**13517.** Ueda, T.; Hiroshi, J. (2013): The ecological impact of the insecticides fipronil and Imidacloprid on Sym-

petrum frequens in Japan. Tombo 55: 1-12. (in Japanese, with English summary) ["Recently the dramatic decline in population numbers of *Sympetrum frequens* has been manifest and was repeatedly reported on by many mass media in Japan. Here we reviewed the studies related to the problem. It appears that the sharp decline began in the late 1990's and numbers dropped to 1 % or less of previous population size, with regional differences. The major factor in the decline would be the application of insecticides fipronil and imidacloprid to seedling in the nursery box, and the subsequent transplanting of these into paddies. Several laboratory tests and field experiments have revealed that these new type insecticides directly and/or indirectly caused extremely high mortality in larvae of the dragonfly. A simple simulation model that reflects larval mortality caused only by these insecticides predicted well the decline pattern in some districts in Japan. The decrease of planted rice acreage since 1970 and agricultural improvement since 1963 may have caused a long-term decline in the population numbers of *S. frequens*." (Authors)] Address: Ueda, T., Ishikawa Agricultural College, Suematsu, Nonoichi, Ishikawa Pref., 921, Japan. E-mail: ueda@ishikawa-c.ac.jp

**13518.** Vanappelghem, C.; Houard, X.; Jolivet, S. (2013): Observations de *Chalcolestes parvidens* en Corse (Odonata: Lestidae). *Martinia* 29(2): 139-146. (in French, with English summary) ["Two surveys carried out in Corsica in June 2011 and June/July 2013 have revealed two new localities of *C. parvidens*. Localities where the genus *Chalcolestes* was observed are described. Both the criteria to identify of the females and the habitats of *C. parvidens* are discussed." (Authors)] Address: Vanappelghem, C., Conservatoire d'espaces naturels du Nord et du Pas-de-Calais, 152 boulevard de Paris. F-62190 Lillers, France. E-mail: cedric.vanappelghem@espaces-naturels.fr

**13519.** Vanappelghem, C.; Quevillart, R. (2013): Emergence d'*Epitheca bimaculata* sur les étangs de la Forge à Glageon (Nord) (Odonata: Corduliidae). *Martinia* 29(2): 125-138. (in French, With English summary) ["The ponds « étangs de la Forge » host the most important population of *Epitheca bimaculata* in the Nord-Pas-de-Calais region (Northern France). Some scheduled works on these ponds have led us to study the population, particularly in comparing the two ponds of the site. The emergence pattern and supports were described in 20 plots where 580 exuviae were collected. The emergences began in early May and ended on 20 May. The EM50, the cumulative emergence median, lasted seven days. We estimated that the emerging population size in 2009 was about 3000 individuals, one of the ponds being more favorable for the species. Over 66 % of the 580 collected exuviae were located more than 5 m from the water. Nearly 90 % of exuviae were found below 50 cm high. The results show that *E. bimaculata* emerges preferentially in the herbaceous layer. Finally, proposals for the conservation of the species on the site and in the area are made, including the treatment of the riparian and the

surrounding vegetation." (Authors)] Address: Vanappelghem, C., Conservatoire d'espaces naturels du Nord et du Pas-de-Calais, 152 boulevard de Paris. F-62190 Lillers, France. E-mail: cedric.vanappelghem@espaces-naturels.fr

**13520.** Wagh, P.; Kurhade, S. (2013): Odonata of Nandur Madhmeshwar wetland, a proposed RAMSAR site in Maharashtra, India. *Notulae Odonatologicae* 8(2): 32-35. (in English) ["In total, 21 common and widespread species are listed and their local status of abundance is marked. The documented odonate diversity is high as compared to the Ujani and Nathsagar wetlands of Maharashtra. Since the wetland fulfills some important IBA criteria, it is a prime candidate for a Ramsar site in Maharashtra." (Authors)] Address: Wagh, P., Department of Environmental Science, New Arts, Commerce and Science College, Ahmed-nagar-414001, Maharashtra, India. E-mail: prashantsinnarkar@gmail.com

**13521.** Wasscher, M.T.; Dumont, H.J. (2013): Life and work of Michel Edmond de Selys Longchamps (1813-1900), the founder of Odonatology. *Odonatologica* 42(4): 369-402. (in English) ["The life and times of the great Belgian odonatologist are outlined. The main sources of biographic information are his diaries (1823-1900). In addition to a sketch of his rich life, the information on his family, the castles he lived in, his travels in Europe, his immense natural history collections, on his disciples and on his contacts with contemporary odonatologists is given therein. Selys was a liberal politician, and devoted much of his time and energy to local, provincial and national political levels, as a senator and President of the Belgian Senate. He had a broad interest in natural history that far transcended the study of dragonflies. In odonatology, his work is of a particular importance: he did not only pioneer the field by describing over 700 valid species, but he consequently used wing venation as the backbone of the taxonomical system of the order. In his Last Will, Selys earmarked a large sum of money in order to stimulate the work of various specialists on the description of his large zoological collections." (Authors)] Address: Wasscher, M.T., Minstraat 15 bis, NL-3582 CA Utrecht, The Netherlands. E-mail: marcel.hilair@12move.nl

**13522.** Watanabe, K.; Kawashima, I.; Sasamoto, A. (2013): Notes on the larva of *Neurothemis ramburii* ramburii (Kaup in Brauer, 1866) obtained from Iriomote-jima Island, Yaeyama Islands, southern Ryukyus, Japan (Anisoptera: Libellulidae). *Tombo* 55: 83-87. (in English) ["The external morphology of the last instar larva of *N. r. ramburii* from Iriomote-jima Island, Yaeyama Islands, southern Ryukyus is described and illustrated based on the exuviae. The external characters are compared with those of the known larvae of *Neurothemis*. In addition, the ecology of the species in southern Ryukyus is briefly noted." (Authors)] Address: Sasamoto, A., 190-4 Yakuoji Tawaramoto, Shiki-gun, Nara prefecture, 636-0341, Japan. E-mail: akssmt@sea.plala.or.jp

**13523.** White, M.R.; Switzer, P.V. (2013): Examining the causes of rarity for the Odonata of Illinois. Transactions of the Illinois State Academy of Science 106: 13-14. (in English) ["Odonata play an important role in habitat management and conservation, but our understanding of the causes of commonness versus rarity in this group is limited. In this study we examined the causes of rarity for the Odonata of Illinois. Using S-ratings for conservation status and published habitat classifications for Illinois odonates, we investigated whether habitat type (lotic versus lentic) or habitat specificity (whether they were limited to a specific type of aquatic habitat) was related to commonness. We found that lotic species and habitat specialists were more likely to be rare than lentic and generalist species. More information, however, is needed on the distributions and natural histories of Illinois odonates if we are to more fully understand the causes of rarity in this important group." (Authors)] Address: White, Miranda, Dept of Biological Sciences, Eastern Illinois University, Charleston, IL 61920, USA

**13524.** Willis, C.; Samways, M.; Tarboton, W. (2013): Whistle-blowers on wetland quality. Veld & Flora December 2013: 194-196. (in English) ["Dragonflies are charismatic insects whose presence serves as an important indicator of the quality and health of South Africa's freshwater ecosystems." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**13525.** Witt, J.W.; Forkner, R.E.; Kraus, R.T. (2013): Habitat heterogeneity and intraguild interactions modify distribution and injury rates in two coexisting genera of damselflies. Freshwater Biology 58(11): 2380-2388. (in English) ["(1) Sublethal effects of predation can affect both population and community structure. Despite this, little is known about how the frequency of injury varies in relation to habitat, aquatic community characteristics or between trophically similar, coexisting taxa. (2) In a tidal freshwater ecosystem, we first examined injuries (lamellar autotomy) of Enallagma and Ischnura damselfly larvae, which have unique behaviours and susceptibilities to predation, as a function of habitat type, body size and overall odonate density. We also examined relative abundance of these genera and potential anisopteran predators as a function of habitat type. (3) The frequency of injury to Enallagma was high when larvae were small and overall odonate density was high. For Ischnura, however, the frequency of injury depended on habitat and was high for small larvae in less disturbed habitats low on the shore. Ischnura were most frequently found in more disturbed habitats high on the shore, whereas Enallagma were more frequently found in less disturbed habitats low on the shore. (4) The relative importance of factors hypothesised to structure odonate communities varied between coexisting Enallagma and Ischnura. Distinctive distributions and patterns of injury for each genus provided new insights on the potential for intraguild inter-

actions to modify habitat associations in tidal freshwater ecosystems." (Authors)] Address: Witt, J.W., U.S. Environmental Protection Agency, Global Change Research Program, U.S. EPA – ORD, Mail Code: 8601P 1200 Pennsylvania Avenue, NW, Washington, DC 20460, USA. E-mail: witt.jonathan@epa.gov

**13526.** Wünsch, H.-W.; Gospodinova, H.; Heydrich, W. (2013): Beobachtungen zum Fortpflanzungsverhalten von *Sympecma fusca* (Odonata: Lestidae). Libellula 32(3/4): 187-192. (in German, with English summary) ["In the first days of spring 2012, between 23 March and 27 March, we observed some reproductive behavior of approximately 100 individuals of *Sympecma fusca* at different ponds in North Rhine-Westphalia, Germany. A lot of males competing for females impeded many copulations. An example of female refusal behaviour was documented by photos." (Authors)] Address: Wünsch, H.-W., Am Burgberg 11, 50126 Bergheim, Germany. E-mail: willi@waldschrat-online.de

**13527.** Yoosefi Lafooraki, E.Y.; Rasekhi, F.; Shayanmehr, M. (2013): Introduction of some Odonata species (Insecta) from northern Iran. Taxonomy and biosystematics 5(17): 3-12. (in Persian, with English summary) [Mazandaran province, Iran; \**Anax parthenope*, \**Calopteryx splendens* intermedia, *Calopteryx splendens orientalis*, \**Coenagrion vanbrinckae*, *Crocothemis erythraea*, \**Epallage fatime*, \**Ischnura pumilio*, \**Lestes virens*, \**Libellula depressa*, \**Orthetrum albistylum*, *Orthetrum sabina*, \**Platycnemis dealbata*, *Sympetrum fonscolombei* and *S. striolatum*. Species marked by asterisk were recorded for the first time for Mazandaran fauna] Address: Shayanmehr, M., Dept of Plant Protection, Faculty of Crop Sciences, Sari University of Agricultural Sciences and Natural Resources, Sari, Iran. E-mail: m.shayanmehr@sanru.ac.ir

**13528.** Zawal, A.; Buczyński, P. (2013): Parasitism of Odonata by *Arrenurus* (Acari: Hydrachnidia) larvae in the Lake Świdwie, nature reserve (NW Poland). Acta Parasitologica 58(4): 486-495. (in English) ["Larvae of a vast majority of water mite species are parasites of aquatic insects. Owing to this, they migrate to new localities, and are able to survive unfavourable environmental conditions. This also concerns species from subgenus *Arrenurus* s. str., parasites of dragonflies. The detailed analysis of this phenomenon, however, has only been possible in the last several years, since the key to the identification of larvae from genus *Arrenurus* Dug. was published. In 2010, the parasitism of *Arrenurus* s. str. larvae on dragonflies in the Lake Świdwie reserve (NW Poland) was analysed. Larvae of 9 species of water mites were recorded on 107 imagines of dragonflies from 8 species. The following were identified as hosts of water mites for the first time: *Anax imperator*, *Libellula quadrimaculata*, and *Leucorrhinia caudalis*. The highest prevalence occurred in the case of: *Erythromma najas* and *Lestes dryas* (100%), *Coenagrion pulchellum* (96.5%), and *C. puella* (80.0%). *Coenagrion pulchellum* was in-



fested by 9 species of parasites, *C. puella* by 6, and *Erythromma najas* and *Lestes dryas* by three species. The highest number of host species occurred in the case of *Arrenurus maculator* (5); followed by *A. cuspidator*, *A. batillifer* cf., *A. bicuspidator*, and *A. tetracyphus* (3 each); *A. papillator*, *A. tricuspikator*, and *A. bruzelii* (2 each), and *A. claviger* (1). Differentiation of preferences of particular parasites towards various parts of the host body was observed, probably related to the coevolution of parasites and hosts, and competition between the host species. The body sizes of the parasites suggest that approximately 50% of body size growth of water mites from subgenus *Arrenurus* s. str. occurs at the stage of parasitic larva." (Authors)] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Wąska 13, PL-71-415 Szczecin, Poland. E-mail: [zawal@univ.szczecin.pl](mailto:zawal@univ.szczecin.pl)

**13529.** Zhang, H.-m.; Cai, Q.-h. (2013): Discovery of four new species of the genus *Planaeschna* from Southwestern China (Odonata: Anisoptera: Aeshnidae). *Zootaxa* 3741(2): 254-264. (in English) ["Four new species of the genus *Planaeschna*, *P. robusta* sp. nov. (holotype male; Mt. Emeishan, Emeishan City, Sichuan Province, China, 16. VIII. 2007), *P. maculifrons* sp. nov. (holotype male; Mt. Emeishan, Emeishan City, Sichuan Province, China, 20. VIII. 2007), *P. caudispina* sp. nov. (holotype male; Mt. Qingchengshan, Dujiangyan City, Sichuan Province, China, 30. VIII. 2007) and *P. monticola* sp. nov. (holotype male; Sanjiacun Stream, Fengyi Town, Dali City, Yunnan Province, China, 19. XI. 2012) are described and illustrated and diagnosed from their congeners. All the holotypes have been deposited in the Collection of Aquatic Animals, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan City, Hubei Province, China. Brief notes on the biology of each species are also provided." (Authors)] Address: Cai, Q.-h., State Key Laboratory of Freshwater Ecology and Biotechnology, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan 430072, China. E-mail: [qhcai@ihb.ac.cn](mailto:qhcai@ihb.ac.cn)

## 2014

**13530.** Boonsoong, B.; Chainthong, D. (2014): Description of the final-instar larva of *Heliogomphus selysi* Fraser (Odonata: Gomphidae). *Zootaxa* 3764(4): 482-488. (in English) ["The final instar larva of *H. selysi* Fraser, 1925, is described and illustrated for the first time based on specimens collected in Ratchaburi province, Thailand. Antennae, legs and paraprocts are similar morphologically to *H. kelantanensis* and *H. scorpio* but with a unique combination of dorsal hooks and lateral spines." (Authors)] Address: Boonsoong, B., Animal Systematics and Ecology Speciality Research Unit (ASESRU), Dept of Zoology, Faculty of Science, Kasetsart University, Bangkok, Thailand 10900. E-mail: [fscibtb@ku.ac.th](mailto:fscibtb@ku.ac.th)

**13531.** De Marco Jr., P.; Nogueira, D.S.; Costa Correa, C.; Vieira, T.B.; Dias Silva, K.; Pinto, N.S.; Bichsel, D.; Hi-

rota, A.S.V.; Vieira, R.R.S.; Carneiro, F.M.; Bispo de Oliveira, A.A.; Carvalho, P.; Bastos, R.P.; Ilg, C.; Oertli, B. (2014): Patterns in the organization of Cerrado pond biodiversity in Brazilian pasture landscapes. *Hydrobiologia* 723: 87-101. (in English) ["There is a worldwide concern on the loss of pond biodiversity in human dominated landscapes. Nevertheless, agricultural activities appear to increase pond number in the Brazilian Cerrado through damming streams for cattle raising. These man-made ponds may represent important landscape features, but their importance to regional biodiversity has not yet been studied. Here, we evaluated differences in alpha and beta diversity under a multi-taxonomic approach, as well as tested pond size as the main driver of local species richness. We also assessed the importance of environmental heterogeneity through the analysis of the regional species accumulation curves (SAC). The overall result suggests that species turnover was the major component of regional biodiversity for all groups. Major physical and chemical water conditions had no effects on algae, macrophytes, water bugs, and birds species richness. Pond size had a significant effect on Odonata and fish species richness, while water beetles and amphibians were influenced by trophic conditions. Results from regional SAC show variations among different taxonomic groups regarding landscape heterogeneity: only algae, fish, and birds do not reached to an asymptote and had higher z-values. Our results highlight the importance of ponds for biodiversity conservation in increasingly agricultural landscapes in central Brazil." (Authors)] Address: De Marco, P., Laboratório Ecologia Teórica e Síntese, Departamento de Biologia Geral, Universidade Federal de Goiás, BR-74001-970, Goiânia, GO, Brazil. E-mail: [pdemarco@icb.ufg.br](mailto:pdemarco@icb.ufg.br)

**13532.** Degabriele, G. (2014): An overview of the dragonflies and damselflies of the Maltese Islands (Central Mediterranean) (Odonata). *Bulletin of the Entomological Society of Malta* 6 (2013): 5-127. (in English) ["17 species of odonates have been recorded on the Maltese Islands of which *Pantala flavescens* represents a new record. Diagnostic features of the adult and larval stages of these species are described in this work. The work also combines findings from previous literature on Maltese Odonata with information gathered from fieldwork data in order to give an insight on the current situation of the Odonata of the Maltese Islands and serves as an identification guide to both adults and larvae of these insects. The anatomy and physiology of the larval and adult forms of these insects, which are discussed in this work, are adapted to the predatory lifestyle which they lead. The fact that odonate larvae frequent different habitats from adults helps to reduce competition for resources. Adult odonates can be found in a number of local habitats, mostly near freshwater but also brackish water bodies since freshwater is a scarce natural resource on the Maltese Islands. Global warming is affecting the distribution range of odonates in the Mediterranean - while some species may be on the decline, others which can thrive in

hot dry environments are progressively being recorded in the Mediterranean and southern Europe, including the Maltese Islands. Relatively little work on the Odonata of the Maltese Islands has been done previous to the present work. Most of this involves listing of locally recorded species; very little research investigates odonate behaviour and distribution. No information exists as to why species such as *Sympetrum striolatum*, and *Orthetrum cancellatum* have become progressively uncommon in recent years, and therefore more research is required on the matter. Because of limiting water resources, freshwater habitats on the Maltese Islands are quickly drained of water, which may be used for agricultural purposes. This may tend to reduce species richness of local odonates. Biologists are now considering dragonflies as biological indicators of a healthy environment and make recommendations in order to preserve the habitats frequented by these insects." (Author)] Address: Degabriele, G., Dept of Biology, Junior College, Univ. of Malta, Msida MSD 1252, Malta. E-mail: godwin.degabriele@um.edu.mt

**13533.** Dijkstra, K.-D.B.; Monaghan, M.T.; Pauls, S.U. (2014): Freshwater biodiversity and aquatic insect diversification. *Annual Review of Entomology* 59: 143-163. (in English) ["Inland waters cover less than 1% of Earth's surface but harbor more than 6% of all insect species: Nearly 100,000 species from 12 orders spend one or more life stages in freshwater. Little is known about how this remarkable diversity arose, although allopatric speciation and ecological adaptation are thought to be primary mechanisms. Freshwater habitats are highly susceptible to environmental change and exhibit marked ecological gradients. Standing waters appear to harbor more dispersive species than running waters, but there is little understanding of how this fundamental ecological difference has affected diversification. In contrast to the lack of evolutionary studies, the ecology and habitat preferences of aquatic insects have been intensively studied, in part because of their widespread use as bioindicators. The combination of phylogenetics with the extensive ecological data provides a promising avenue for future research, making aquatic insects highly suitable models for the study of ecological diversification." (Authors) The study includes data on Odonata.] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: dijkstra@nbn.nl

**13534.** Dohrmann, M. (2014): The influence of ignoring secondary structure on divergence time estimates from ribosomal RNA genes. *Molecular Phylogenetics and Evolution* 71: 214-223. (in English) ["Highlights: •Model choice can have an influence on molecular divergence time estimates. •For rDNA paired regions this has only been investigated once. •reinvestigate this issue using empirical data. •Ignoring structure biases age estimates but this is negligible in a Bayesian setting. •The bias is not randomly distributed across nodes. Genes coding for ribosomal RNA molecules (rDNA) are among the most popular markers in molecular phylogenetics and evolu-

tion. However, coevolution of sites that code for pairing regions (stems) in the RNA secondary structure can make it challenging to obtain accurate results from such loci. While the influence of ignoring secondary structure on multiple sequence alignment and tree topology has been investigated in numerous studies, its effect on molecular divergence time estimates is still poorly known. Here, I investigate this issue in Bayesian Markov Chain Monte Carlo (BMCMC) and penalized likelihood (PL) frameworks, using empirical datasets from dragonflies (Odonata: Anisoptera) and glass sponges (Porifera: Hexactinellida). My results indicate that highly biased inferences under substitution models that ignore secondary structure only occur if maximum-likelihood estimates of branch lengths are used as input to PL dating, whereas in a BMCMC framework and in PL dating based on Bayesian consensus branch lengths, the effect is far less severe. I conclude that accounting for coevolution of paired sites in molecular dating studies is not as important as previously suggested, as long as the estimates are based on Bayesian consensus branch lengths instead of ML point estimates. This finding is especially relevant for studies where computational limitations do not allow the use of secondary-structure specific substitution models, or where accurate consensus structures cannot be predicted. I also found that the magnitude and direction (over- vs. underestimating node ages) of bias in age estimates when secondary structure is ignored was not distributed randomly across the nodes of the phylogenies, a phenomenon that requires further investigation." (Author)] Address: Dohrmann, M., Ludwig-Maximilians-Univ. Munich, Dep.t of Earth & Environmental Sciences, Palaeontology & Geobiology, Molecular Geo- & Palaeobiology Lab, Richard-Wagner-Str. 10, 80333 Munich, Germany. E-mail: m.dohrmann@lrz.uni-muenchen.de

**13535.** Dow, R.A.; Silviu, M.J. (2014): Results of an Odonata survey carried out in the peatlands of Central Kalimantan, Indonesia, in 2012. *Faunistic Studies in South-East Asian and Pacific Island Odonata* 7: 1-37. (in English) ["The results of a survey of Odonata (dragonflies and damselflies) in the peatlands of Central Kalimantan, Indonesia, in 2012 are presented. Fifty four species of Odonata found in the area in June-July 2012 are listed, along with brief notes and the locations in which they were found. Of the species found, twelve had not been recorded in Central Kalimantan previously, and of these at least four are completely new to science. Six species, originally described from Central Kalimantan and not recorded any-where since 1953, were rediscovered. At least sixteen of the species found during the survey are considered to be of conservation concern. The discovery of at least four new species to science in a relatively short survey indicates a high probability of occurrence of many more species that are awaiting discovery, and that many undiscovered species may be lost or highly threatened because of the rapid demise of peat swamp forest habitats. A checklist of the Odonata known from Central Kalimantan is provided in an appendix." (Authors)] Ad-

dress: Dow, R.A., Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**13536.** Faithpraise, F.; Chatwin, C.; Obu, J.; Olawale, B.; Young, R.; Birch, P. (2014): Sustainable control of *Anopheles* mosquito population. *Environment, Ecology & Management*, Vol 2014, Article ID 3: 19 pp. (in English) ["Despite the widespread use of insecticides, community engagement programmes and preventive measures mosquito borne diseases are growing and new tools to prevent the spread of disease are urgently needed. An alternative control measure for the eradication of *Anopheles* mosquitoes is suggested by the use of a Sustainable Control Model, which demonstrates the capability of Odonata, a natural beneficial predator, to exercise control over *Anopheles* mosquitoes in less than 140 days." (Authors)] Address: Faithpraise, Fina, Department of Zoology & Environmental Biology, University of Calabar, Nigeria

**13537.** Froufe, E.; Ferreira, S.; Boudot, J.-P.; Alves, P.C.; Harris, D.J. (2014): Molecular phylogeny of the Western Palaearctic *Cordulegaster* taxa (Odonata: Anisoptera: Cordulegasteridae). *Biological Journal of the Linnean Society* 111(1): 49-57. (in English) ["In the present study, we report the first molecular phylogeny for the Western Palaearctic *Cordulegaster* genus. We sequenced fragments of both mitochondrial and nuclear genes [cytochrome c oxidase I (COI) and Internal Transcribed Spacer-1 (ITS-1)] from eight species and 13 subspecies, from western, southern and central Europe, Turkey, and Morocco. Our data support the existence of two major groups corresponding to the traditional *boltonii*- and *bidentata*-groups. Both groups are monophyletic based on COI sequences and the distinctiveness of *Cordulegaster princeps*, *Cordulegaster trinacriae*, *Cordulegaster picta* and *Cordulegaster heros* relative to *Cordulegaster boltonii*, and *Cordulegaster helladica* and *Cordulegaster insignis* relative to *Cordulegaster bidentata*, is confirmed. All species are also monophyletic for ITS-1, with the exception of *Cordulegaster helladica buchholzi*, which shares the haplotype with *C. insignis*. Although moderate levels of genetic diversity were found within *C. boltonii*, there was no clear separation among the four subspecies, with the exception of the populations of *Cordulegaster boltonii algerica* from North Africa. Similarly, no genetic differentiation was found between the two subspecies of *C. bidentata*, *Cordulegaster bidentata bidentata* and *Cordulegaster bidentata sicilica*." (Authors)] Address: Froufe, Elsa, CIIMAR, Centro Interdisciplinar de Investigação Marinha e Ambiental, Rua dos Bragas, 289, 4050-123 Porto, Portugal. E-mail: elsafroufe@gmail.com

**13538.** Grant, M.; Robinson, A.; Fincke, O.M. (2014): Use of stable isotopes to assess the intraspecific foraging niche of males and female colour morphs of the damselfly *Enallagma hageni*. *Ecological Entomology* 39(1): 109-117. (in English) ["(1) For the first time, diet and isotopic niche overlap among males and two female-specific colour

morphs of a damselfly were quantified to test whether sexual conflict could cause intra-sexual diet variation. (2) Relative to the green female morph, blue females, similar in coloration to the blue males, may be more likely overlooked by mate-searching males. If so, blue females should be more likely to forage unmolested at lake shores, where the density of males and prey is high. The blue morph's isotopic niche space should therefore differ from that of green females and be more similar to that of males. (3) Stable isotope analyses of two Michigan populations failed to support these predictions. Despite population differences in  $\delta^{13}\text{C}$  and diet, within sites isotopic niches overlapped among males and females, with little difference between the two female colour morphs. (4) Males exhibited the broadest isotopic niche area, which increased across years, whereas that of blue females became more restricted, possibly due to greater sexual harassment in forest feeding sites. (5) There was an unexpectedly high shift in  $\delta^{13}\text{C}$  from prey to predator. Future work is merited to determine whether such trophic shifts are characteristic of Odonata, a group of important aquatic and terrestrial predators." (Authors)] Address: Fincke, Ola M., Ecology and Evolutionary Biology Program, Department of Biology, University of Oklahoma, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**13539.** Groner, M.L.; Rollins-Smith, L.A.; Reinert, L.K.; Hempel, J.; Bier, M.E.; Relyea, R.A. (2014): Interactive effects of competition and predator cues on immune responses of leopard frogs at metamorphosis. *The Journal of Experimental Biology* 217: 351-358. (in English) ["Recent hypotheses suggest that immunosuppression, resulting from altered environmental conditions, may contribute to increased incidence of amphibian disease around the world. Antimicrobial peptides (AMPs) in amphibian skin are an important innate immune defense against fungal, viral and bacterial pathogens. Their release is tightly coupled with release of the stress hormone, norepinephrine. During metamorphosis, AMPs may constitute the primary immune response in the skin of some species because acquired immune functions are temporarily suppressed in order to prevent autoimmunity against new adult antigens. Suppression of AMPs during this transitional stage may impact disease rates. We exposed leopard frog tadpoles (*Lithobates pipiens*) to a factorial combination of competitor (including *Anax junius*) and caged-predator environments and measured their development, growth, and production of hydrophobic skin peptides after metamorphosis. In the absence of predator cues, or if the exposure to predator cues was late in ontogeny, competition caused more than a 250% increase in mass-standardized hydrophobic skin peptides. Predator cues caused a decrease in mass-standardized hydrophobic skin peptides when the exposure was late in ontogeny under low competition, but otherwise had no effect. Liquid chromatography mass spectrometry/mass spectrometry of the skin peptides showed that they may include three previously uncharacterized AMPs in the brevinin and temporin families. Both of these peptide



families have previously been shown to inhibit harmful microbes including *Batrachochytrium dendrobatidis*, the fungal pathogen associated with global amphibian declines. Our study shows that amphibians may be able to adjust their skin peptide defenses in response to stressors that are experienced early in ontogeny and that these effects extend through an important life history transition." (Authors)] Address: Groner, Maya, Univ. of Prince Edward Island, Canada. E-mail: mgroner@upepei.ca

**13540.** Huang, S.c.; Chiou, T.-h.; Marshall, J.; Reinhard, J. (2014): Spectral sensitivities and color signals in a polymorphic damselfly. *PLoS ONE* 9(1): e87972. doi: 10.1371/journal.pone.0087972: 8 pp. (in English) ["Animal communication relies on conspicuous signals and compatible signal perception abilities. Good signal perception abilities are particularly important for polymorphic animals where mate choice can be a challenge. Behavioral studies suggest that polymorphic damselflies use their varying body colorations and/or color patterns as communication signal for mate choice and to control mating frequencies. However, solid evidence for this hypothesis combining physiological with spectral and behavioral data is scarce. We investigated this question in the Australian common blue tail damselfly, *Ischnura heterosticta*, which has pronounced female-limited polymorphism: andromorphs have a male-like blue coloration and gynomorphs display green/grey colors. We measured body color reflectance and investigated the visual capacities of each morph, showing that *I. heterosticta* have at least three types of photoreceptors sensitive to UV, blue, and green wavelength, and that this visual perception ability enables them to detect the spectral properties of the color signals emitted from the various color morphs in both males and females. We further demonstrate that different color morphs can be discriminated against each other and the vegetation based on color contrast. Finally, these findings were supported by field observations of natural mating pairs showing that mating partners are indeed chosen based on their body coloration. Our study provides the first comprehensive evidence for the function of body coloration on mate choice in polymorphic damselflies." (Authors)] Address: Huang, S.c., Queensland Brain Institute, Univ. Queensland, St Lucia, Queensland, Australia. E-mail: shaochang.huang@uqconnect.edu.au

**13541.** Ilg, C.; Oertli, B. (2014): How can we conserve cold stenotherm communities in warming Alpine ponds?. *Hydrobiologia* 723: 53-62. (in English) ["Freshwater biodiversity has shown to be highly vulnerable to climate warming, alpine cold stenotherm populations being especially at risk of getting extinct. This paper aims at identifying the environmental factors favouring cold stenotherm species in alpine ponds. This information is required to provide management recommendations for habitats restoration or creation, needed for the mitigation of the effects of climate warming on alpine freshwater biodiversity. Cold stenotherm species richness as well as total (i.e. stenotherm and eurytherm) richness were ana-

lyzed for aquatic plants, Coleoptera and Odonata in 26 subalpine and alpine ponds from Switzerland and were related to environmental factors ecologically relevant for pond biodiversity. Our results confirmed that the set of environmental variables governing pond biodiversity in alpine or subalpine ponds is specific to altitude. Altitude and macrophyte presence were important drivers of cold stenotherm and total species richness, whereas connectivity did not show any significant relation. Therefore, the management of pond biodiversity has to be 'altitude-specific'. Nevertheless, cold stenotherm species from the investigated alpine ponds do not show some specific requirements if compared to the other species inhabiting these ponds. Therefore, both total and cold stenotherm species richness could be favoured by the same management measures." (Authors)] Address: Ilg, Christiane, hepia Geneva Technology, Architecture and Landscape, University of Applied Sciences Western Switzerland, 150 route de Presinge, 1254, Jussy, Geneva, Switzerland. E-mail: christiane.ilg@hesge.ch

**13542.** Iyengar, V.K.; Castle, T.; Mullen, S.P. (2014): Sympatric sexual signal divergence among North American Calopteryx damselflies is correlated with increased intra- and interspecific male-male aggression. *Behavioral Ecology and Sociobiology* 68(2): 275-282. (in English) ["Divergence of sexual signals in sympatry can arise as a consequence of (1) interspecific competition for resources, (2) selection against maladaptive hybridization, or (3) as a result of selection to reduce the cost of interspecific aggression; termed agonistic character displacement (ACD). Calopterygid damselflies have emerged as a model system for studying the evolution of divergent sexual signals due to the repeated evolution of sympatric species pairs with fully and partially melanized wings. Damselfly wing patterns function during both courtship and territory defense. However, the relative contributions of natural and sexual selection to phenotypic divergence and enhanced isolation in sympatry remain unclear in many cases. Here, we investigated the hypothesis that interference competition, in the form of increased interspecific male-male aggression, drives the evolution of character displacement in sympatry between two species of North American damselflies, *Calopteryx aequabilis* and *C. maculata*, that show no evidence of ecological divergence or ongoing hybridization. In paired behavioral trials, we found that interspecific male aggression related to territory defense varied between site, species, and as a function of the relative abundance of con- vs. hetero-specific males. Specifically, we found that large-spotted *C. aequabilis* males received increased intra- and interspecific aggression but that aggression against large-spotted males declined during the middle of the flight season when both species were equally abundant. Based on these results, we suggest that ACD leads to enhanced species recognition, and may be a common outcome of the antagonism between interspecific male-male competition and the countervailing force of intra-specific sexual selection favoring increased wing melani-

zation among territorial damselfly species." (Authors)] Address: Mullen, S.P., Dept of Biology, Boston University, 5 Cummington Mall, Boston, MA, 02215, USA. E-mail: smullen@bu.edu

**13543.** Janssens, L.; Stoks, R. (2014): Non-pathogenic aquatic bacteria activate the immune system and increase predation risk in damselfly larvae. *Freshwater Biology* 59(2): 417-426. (in English) [(1) Pathogens can increase vulnerability to predation through their harmful effects on hosts. Recently, it was shown that the mere activation of the immune system by pathogens may increase the host's risk of predation. Here, we test whether exposure to non-pathogenic bacteria also activates the immune system and thereby increases vulnerability to predation. (2) We exposed *Enallagma cyathigerum* damselfly larvae to a non-pathogenic strain of the bacterium *Escherichia coli* and measured immune defence, anti-predator behaviour and survival times in the presence of larval dragonfly predators. To evaluate whether non-pathogenic bacteria also generated energy-based trade-offs leading to other fitness costs, we also quantified growth rate and survival in the absence of predators. (3) Exposure to the non-pathogenic bacterium did not affect survival in the absence of the predator but increased growth rate, possibly a response to reduce exposure time to the bacterium. Larvae exposed to the bacterium activated their immune response as shown by an increase in the activity of phenoloxidase and the number of haemocytes. The bacterium affected anti-predator traits involved in avoiding detection by predators as well as traits involved in escape after detection. Pre-exposed larvae showed higher activity levels and further increased the number of feeding strikes in the presence of predation risk, possibly driven by energetic constraints. Pre-exposed larvae swam less often when attacked, but faster. This impaired anti-predator response came at the ecological cost of increased vulnerability to predation. (4) Our study demonstrated that exposure to non-pathogenic bacteria increases vulnerability to predation, which is a novel type of antagonistic interaction. This highlights the unexplored possibility that non-pathogens may play a role in maintaining variation in immune defence through insidious effects on predator-prey interactions. Since non-pathogenic bacteria can be very abundant, this unexplored ecological cost of immune system activation in terms of increased predation may have major consequences in natural systems and may provide an unexplored new force underlying variation in immune defence." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**13544.** Kalita, G.J.; Boruah, B.; Das, G.N. (2014): An observation on odonata (damselflies and dragonflies) fauna of Manchabandha reserve forest, Baripada, Odisha. *Advances in Applied Science Research* 5(1): 77-83. (in English) [India; the area is located at 21°54'21.23"N &

86°45'10.35" E. 48 Odonata species were recorded between September 2012 and October 2013, covering all 3 seasons viz. summer (March to June), monsoon (July to October) and winter (November to February).] Address: Kalita, G.J., Department of Wildlife & Biodiversity Conservation, North Orissa University, India

**13545.** Kaur Kohli, M.; Schneider, T.; Müller, O.; Ware, J.L. (2014): Counting the spots: a molecular and morphological phylogeny of the spotted darner *Boyeria* (Odonata: Anisoptera: Aeshnidae) with an emphasis on European taxa. *Systematic Entomology* 39: 190-195. (in English) ["*Boyeria irene* and *B. cretensis* are species of spotted dragonflies belonging to the 'darner' family, Aeshnidae. In 1991, Peters classified *Boyeria* from Crete as *B. cretensis*, based on adult morphological characters. In this study, we used molecular evidence to determine if indeed *B. irene* and *B. cretensis* are different species. DNA was sequenced from samples of *B. irene* (from France, Switzerland, Tunisia, Spain and Italy) and *B. cretensis* (from Crete). These species were recovered as two different clades with strong support. We conclude that *B. irene* and *B. cretensis* are different species, with evidence based on molecular and morphological differences. In addition, we present the first phylogenetic hypothesis for *Boyeria* for which we have sequenced all but three species. Lastly, we discuss different scenarios that may have led to the present-day distribution and speciation patterns of Mediterranean *Boyeria*." (Authors)] Address: Kaur Kohli, Manpreet, 195 University Ave, Boyden Hall 431, Rutgers University, Newark, NJ 07102, USA. E-mail: mkk24@njit.edu

**13546.** Kissling, W.D.; Pattemore, D.E.; Hagen, M. (2014): Challenges and prospects in the telemetry of insects. *Biological Reviews*: (in English) ["Radio telemetry has been widely used to study the space use and movement behaviour of vertebrates, but transmitter sizes have only recently become small enough to allow tracking of insects under natural field conditions. Here, we review the available literature on insect telemetry using active (battery-powered) radio transmitters and compare this technology to harmonic radar and radio frequency identification (RFID) which use passive tags (i.e. without a battery). The first radio telemetry studies with insects were published in the late 1980s, and subsequent studies have addressed aspects of insect ecology, behaviour and evolution. Most insect telemetry studies have focused on habitat use and movement, including quantification of movement paths, home range sizes, habitat selection, and movement distances. Fewer studies have addressed foraging behaviour, activity patterns, migratory strategies, or evolutionary aspects. The majority of radio telemetry studies have been conducted outside the tropics, usually with beetles (Coleoptera) and crickets (Orthoptera), but bees (Hymenoptera), dobsonflies (Megaloptera), and dragonflies (Odonata) have also been radio-tracked. In contrast to the active transmitters used in radio telemetry, the much lower weight of harmonic radar

and RFID tags allows them to be used with a broader range of insect taxa. However, the fixed detection zone of a stationary radar unit (<1 km diameter) and the restricted detection distance of RFID tags (usually <1–5 m) constitute major constraints of these technologies compared to radio telemetry. Most of the active transmitters in radio telemetry have been applied to insects with a body mass exceeding 1g, but smaller species in the range 0.2–0.5 g (e.g. bumblebees and orchid bees) have now also been tracked. Current challenges of radio-tracking insects in the field are related to the constraints of a small transmitter, including short battery life (7–21 days), limited tracking range on the ground (100–500 m), and a transmitter weight that sometimes approaches the weight of a given insect (the ratio of tag mass to body mass varies from 2 to 100%). The attachment of radio transmitters may constrain insect behaviour and incur significant energetic costs, but few studies have addressed this in detail. Future radio telemetry studies should address (i) a larger number of species from different insect families and functional groups, (ii) a better coverage of tropical regions, (iii) intraspecific variability between sexes, ages, castes, and individuals, and (iv) a larger tracking range via aerial surveys with helicopters and aeroplanes equipped with external antennae. Furthermore, field and laboratory studies, including observational and experimental approaches as well as theoretical modelling, could help to clarify the behavioural and energetic consequences of transmitter attachment. Finally, the development of commercially available systems for automated tracking and potential future options of insect telemetry from space will provide exciting new avenues for quantifying movement and space use of insects from local to global spatial scales." (Authors)] Address: Kissling, W.D., Ecoinformatics & Biodiversity, Department of Bioscience, Aarhus University, Aarhus C, Denmark. E-mail: danilkissling@web.de

**13547.** Koch, K.; Wagner, C.; Sahlén, G. (2014): Farmland versus forest: comparing changes in Odonata species composition in western and eastern Sweden. *Insect Conservation and Diversity* 7(1): 22-31. (in English) ["Despite the loss of natural ecosystems in the developed world during the past millennia, anthropogenic landscapes still sustain much biodiversity. Our question was, whether ten year changes in regional Odonata faunas are comparable between farmland and forested areas, or if the species pool of farmland areas respond in other ways than that of forest. We used data of dragonfly larvae collected from 16 lakes in a farmland area in south-western Sweden in the years 2002 and 2011/12, and compared these to data from 34 lakes in a forest area in south-eastern Sweden in the years 1996 and 2006. The species-richness in the agricultural region increased by 17% but decreased by 13% in the forested region. The changes in occurrence and regional distribution were similar in both areas, affecting 71% and 69% of the species pool. Average extinction rates were comparable between the agricultural and the forested region (38% and

43%) while colonisation rates differed greatly (64% and 114%). The species composition differed between the regions; the forest lakes harboured a 29% larger species pool. It is possible that in the forested region, the regional species pool in areas surrounding the study sites could stabilise the extinction and have a positive effect on changes in species composition. We assume that the different habitat structures of the waters in the agricultural and the forest regions and changes in temperature are the main driving forces behind the shifts. The mean seasonal air temperature has increased by circa 0.5 °C in both regions, when comparing ten-year periods before each sampling year." (Authors)] Address: Koch, Kamilla, Department of Ecology, Johannes Gutenberg-University of Mainz, Becherweg 13, 55128 Mainz, Germany. E-mail: kochka@uni-mainz.de

**13548.** Kosterin, O.E. (2014): Corrigenda to Cambodian Odonata reports published by O.E. Kosterin between 2010 and 2012. *International Dragonfly Fund - Report* 67: 95-96. (in English) [The correction includes a paragraph missing in Kosterin, O.E. 2012a. Odonata of the Cambodian coastal regions in late rainy season of 2011. *International Dragonfly Fund Report* 45: 1-102, Geographical coordinates for some localities, earlier incorrectly inferred from GoogleEarth, were now verified by GPS, and a misspelling.] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia; Novosibirsk State University, Pirogova str. 2, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

**13549.** Kosterin, O.E. (2014): Odonata of the south-west and north-east of Cambodia as studied in early rainy season of 2013. *International Dragonfly Fund - Report* 67: 1-94. (in English) ["Results of an odonatological survey of the coastal SW regions and continental NE regions of Cambodia in May 22 - June 8, 2013 are presented. All Odonata recorded are listed by localities. Of 107 Odonata species encountered, 104 were identified to species level, of which 15 are reported for the first time for Cambodia, namely *Macromidia genialis shanensis* Fraser, 1927 in Koh Kong Province, *Chalibeothemis fluviatilis* Lieftinck, 1933 in Kampong Saom Province and *Ceriagrion azureum* (Selys, 1891), *Prodasineura coerulea* Fraser, 1932, *Protosticta caroli* van Tol, 2008; *Gomphidia abbotti* Williamson, 1907, *Lamelligomphus castor* (Lieftinck, 1941), *Macrogomphus kerri* Fraser, 1922, *Nychogomphus duaricus* (Fraser, 1924), *Orientogomphus minor* (Laidlaw, 1931), *Macromia aculeata* Fraser, 1927, *Macromia chaiyaphumensis* Hämäläinen, 1985, *Macromia cincta* (Rambur, 1842), *Nesoxenia lineata* (Selys, 1879) and *Palpopleura sexmaculata* (Fabricius, 1787) in Ratanakiri Province. Besides, *Ceriagrion indochinense* Asahina, 1967 is confirmed for Cambodia. Cambodian specimens of *Hemicordulia* sp. are reidentified as *Hemicordulia tenera* ssp. The country list now reaches 152 named species. Of them, most interesting are 5 species with generally Malay ranges: *Archibasis viola*, *Aethriamanta gracilis*, *M. cincta*, *C. fluviatilis* and



*Nesoxenia lineata*. Characters and/or taxonomy are also discussed of *Vestalis gracilis* (Rambur, 1842), *Euphaea masoni* Selys, 1859, *Rhinagrion viridatum* Fraser, 1938, *Aciagrion* spp., *Archibasis* spp., *P. caroli*, *Gynacantha sub-interrupta* Rambur, 1842, *Idionyx thailandica* Hämäläinen, 1985, *Neurothemis fluctuans* (Fabricius, 1793) and *P. sexmaculata*. Notes on habitats and habits of some species are provided. General notes on the areas and their Odonata as well as field impressions are briefly outlined and illustrated by photos." (Author)] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia; Novosibirsk State Univ., Pirogova str. 2, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

**13550.** Kutcher, T.E.; Bried, J.T. (2014): Adult Odonata conservatism as an indicator of freshwater wetland condition. *Ecological Indicators* 38(1): 31-39. (in English) ["Highlights: • Coefficients of conservatism can be empirically estimated for adult Odonata. • Adult Odonata conservatism can be used to evaluate freshwater wetland condition. • Adult Odonata respond predictably to both in-wetland and buffer disturbances. • Odonata conservatism did not vary with sampling effort, unit size, or wetland class. There is a growing need to identify effective and efficient biological indicators for wetland assessment, and adult Odonata possess several attributes that make them attractive for this application. We introduce a general indicator of freshwater wetland condition based on objectively estimated adult Odonata species conservatism, or sensitivity to human disturbances. We used an extensive opportunistic survey dataset from Rhode Island (USA) to empirically assign a coefficient of conservatism (CoC) to each of 135 Odonata species, based on their exclusivity to categories of degradation among 510 wetlands; the mean CoC of species observed in the adult stage was applied as an index of wetland integrity. An independent sample of 51 wetlands was also drawn from the opportunistic survey to test the performance of the index relative to human disturbance, as measured by multimetric rapid assessment and surrounding impervious surface area. The index was well predicted by both disturbance measures and showed no evidence of dependence on sampling effort, wetland size, or geomorphic class. Our findings suggest that conservatism of adult Odonata averaged across species may provide a robust indicator of freshwater wetland condition. And because adult Odonata are generally easy to identify, especially relative to larval Odonata, the index could be particularly useful for wetland assessment. Our straightforward empirical approach to CoC estimation could be applied to other existing spatially referenced Odonata datasets or to other species assemblages." (Authors)] Address: Bried, J., Dept of Zoology, Oklahoma State Univ., 501 Life Sciences West, Stillwater, OK 74078, USA

**13551.** Lee, M. (2014): Dragonfly wings: Special structures for aerial acrobatics. In: Lee, M. (ed): Remarkable natural material surfaces and their engineering potential.

Springer: 65-77. (in English) ["Over history, dragonflies have been found across the globe, allowing a rich multitude of culture and symbolism to be developed around these four-winged creatures. For example, in Native American history, dragonflies were symbols of activity and swiftness and were often associated with horses. In Japanese history, these insects were considered to serve as winged mounts for the Hotoke-Sama, or August Spirits of the Ancestors. Among Buddhists, the Hotoke-Sama were thought to return on August 15th, riding dragonflies into their old homes to be reunited with their families (Mitchell and Lasswell, *A dazzle of dragonflies*. Texas A&M University Press, College Station, 2005). Though such folklore may have diffused over time as scientific research dedicated to dragonflies began, fascination with their flying and maneuvering capabilities has not, perhaps even increasing in recent years. One look at the dragonfly's impressive flying abilities can convince that this attention is well afforded: they can fly sideways, forwards and backwards, hover in midair and reverse directions instantaneously, accelerate rapidly, and fly as fast as 50 km/h (Rajabi et al., *J Bionic Eng* 8:165–173, 2011). Although dragonfly wings account for less than 2 % of the total body mass, they are the main enablers of such diverse flight behavior. The membrane of dragonfly wings is thin, transparent, and film-like, supported by a framework of veins (Sun and Bhushan, *CR Mecanique* 340:3–17, 2012). It is also layered and superhydrophobic (Song et al., *Mat Sci Eng A* 457(1–2):254–260, 2007). Wing corrugation increases strength and stiffness and its ability to absorb stress against bending in the spanwise direction (Sun and Bhushan, *CR Mecanique* 340:3–17, 2012). Wing vein structure is hierarchical, consisting of a sandwich structure on the primary level and a multilayered chitinous shell and protein fibril structure on the secondary level (Chen et al., *J Bionic Eng* 9:185–191, 2012). Finally, micro- and nano-scale ripple morphologies reduce pressure drag during flight (Shelton, *Probing question: how do dimples make golf balls travel farther?* <http://news.psu.edu/story/141235/2007/06/18/research/probing-question-how-do-dimples-make-golf-balls-travel-farther>, 2007), while vein-joints contribute to wing flexibility (Donoughe et al., *J Morphol* 272(12):1409–1421, 2011). All of these properties make dragonfly wings an optimal source of bioinspiration for micro-air-vehicles (MAVs) compared to other animals such as hummingbirds and butterflies. Novel designs of MAVs have already been developed based on research of the dragonfly (Ratti & Vachtsevanos, *J Intell Robot Syst* 65:437–455, 2012)." (Author)] Address: Lee, Michelle, Mechanical Engineering, McCormick School of Engineering at Northwestern University, Evanston, IL, 60208, USA. E-mail: MichelleLee2013@u.northwestern.edu

**13552.** LeGrand, H.E.; Howard, T.E. (2014): The dragonflies and damselflies of North Carolina. Fifth approximation. <http://ncparks.gov/odes/5th.pdf>: 204 pp. (in English) ["This material is a Fifth Approximation account of the species of dragonflies and damselflies of North Carolina.

It is not considered to be a "publication". It is intended to be a guide or "handbook" for odonate enthusiasts, as there is, as yet, no published book on this group of insects of North Carolina. The bulk of the information is based on data for each species that has been compiled over a several decade period by the late Duncan Cuyler; most of these data are based on specimens. (Cuyler's entire specimen collection is housed at the Florida State Collection of Arthropods/International Odonata Research Institute in Gainesville, FL.) In 2009, the second author (Tom Howard) created the Dragonflies and Damselflies of North Carolina website -- <http://www.dpr.ncparks.gov/odes/a/accounts.php> -- which has an input function that allows biologists to enter their own observational data." (Authors)] Address: LeGrand, H.E., NC Natural Heritage Program 1601 MSC Raleigh, NC 27699-1601, USA. E-mail: [harry.legrand@ncdenr.gov](mailto:harry.legrand@ncdenr.gov)

**13553.** Lian, Y.; Broering, T.; Hord, K.; Prater, R. (2014): The characterization of tandem and corrugated wings. *Progress in Aerospace Sciences* 65(1): 41-69. (in English) ["Dragonfly wings have two distinct features: a tandem configuration and wing corrugation. Both features have been extensively studied with the aim to understand the superior flight performance of dragonflies. In this paper we review recent development of tandem and corrugated wing aerodynamics. With regards to the tandem configuration, this review will focus on wing/wing and wing/vortex interactions at different flapping modes and wing spacing. In addition, the aerodynamics of tandem wings under gusty conditions will be reviewed and compared with isolated wings to demonstrate the gust resistance characteristics of flapping wings. Regarding corrugated wings, we review their structural and aerodynamic characteristics." (Authors)] Address: Lian, Y., Mechanical Engineering Dept, Univ. of Louisville, Louisville, KY 40292, USA. E-mail: [yongshenglian@gmail.com](mailto:yongshenglian@gmail.com)

**13554.** Marquez-Rodríguez, J. (2014): Primera cita de *Orthetrum nitidinerve* (Selys, 1841) (Odonata: Libellulidae) en el Algarve (sur de Portugal). *Arquivos Entomoloxicos* 10: 65-68. (in Spanish, with English summary) ["The first record of *O. nitidinerve* for the Algarve (Southern Portugal) and some considerations of its biology are provided. The species was found in a small river with ecological characteristics similar to the localities where the first breeding populations have been recently detected in Spain." (Author)] Address: Márquez-Rodríguez, J., Departamento de Sistemas Físicos, Químicos y Naturales. Universidad Pablo de Olavide. A-376, km 1. E-41013 Sevilla, Spain. E-mail: [jmarrod1@admon.upo.es](mailto:jmarrod1@admon.upo.es)

**13555.** Marquez-Rodríguez, J. (2014): Primera cita de *Sympetrum striolatum* (Charpentier, 1840) (Odonata: Libellulidae) en la isla de Capri (Italia). *Arquivos Entomoloxicos* 10: 17-19. (in Spanish, with English summary) [*S. striolatum* is documented on 2-IX-2011 from the island of Capri (Italy). Some considerations of its biology are provided. The species was found in a forest area of

the cliff (33 T 436948 4489077).] Address: Joaquín Márquez-Rodríguez Dept de Sistemas Físicos, Químicos y Naturales. Universidad Pablo de Olavide. A-376, km 1. 41013 Sevilla, Spain. E-mail: [jmarrod1@admon.upo.es](mailto:jmarrod1@admon.upo.es)

**13556.** Martens, A.; de Santos Loureiro, N.; Hazevoet, C.J. (2014): Dragonflies (Insecta, Odonata) collected in the Cape Verde Islands, 1960-1989, including records of two taxa new to the archipelago. *Zoologia Caboverdiana* 4: 1-7. (in English, with Portuguese summary) ["Dragonflies from the Cape Verde Islands, collected between 1960 and 1989 and kept in institutes in Portugal and Cape Verde, were studied. The Cape Verde collection at the Centro de Zoologia, Instituto de Investigação Científica Tropical, Lisbon, Portugal, includes eight species of dragonflies represented by 279 specimens collected in 1960-61 and 1969-72. The entomological collection at the Instituto Nacional de Investigação e Desenvolvimento Agrário (INIDA), São Jorge dos Orgãos, Republic of Cape Verde, includes four odonate species, represented by 27 specimens, collected in the years 1987 and 1989. *Anax tristis* Hagen and *A. rutherfordi* McLachlan, single male specimens of which were collected in Santo Antão, 27 October 1972, are new taxa for the archipelago. Both are tropical migrants of which the nearest known occurrence in continental Africa is more than 1,000 and 1,500 km, respectively, from the Cape Verde Islands. The two collections contain several specimens from new localities within the archipelago, particularly from the islands of Maio and Fogo. Current knowledge of flight season and island distribution are summarized and updated." (Authors)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: [andreas.martens@ph-karlsruhe.de](mailto:andreas.martens@ph-karlsruhe.de)

**13557.** Martínez-Sanz, C.; Puente-García, S.M.; Rebolledo, E.R.; Jiménez-Prado, P. (2014): Macroinvertebrate richness importance in coastal tropical streams of Esmeraldas (Ecuador) and its use and implications in environmental management procedures. *International Journal of Ecology* Volume 2014, Article ID 253134: 11 pp. (in English) ["This study was aimed at determining the performance of some indices and community attributes frequently used to assess river quality and test the role of macroinvertebrate taxa richness as element of bioindication in several coastal tropical streams of western Esmeraldas (Ecuador). In addition, a macroinvertebrate taxon list of this region was provided for the first time. Thirteen sampled points distributed across nine streams were selected for this study and nineteen parameters and attributes of bioindication were tested. The differences between nonimpact and impact places were evaluated mainly using one-way analysis of variance. Jackknife 2 and Clench were used to estimate the regional richness and the quality of the inventory, respectively. Seventy taxa (principally genus and family) of the main groups of macroinvertebrates were collected. Measured richness and family richness were the best metric followed by BiologicalMonitoringWorking Par-

ty/Colombia (BMWP/Col), Odonata richness, Shannon-Weiner, and EPT richness (Ephemeroptera + Plecoptera + Trichoptera) indices. Only a slight right trend (Ephemeroptera, Trichoptera, and Chironomidae attributes) or incorrect performances (Average Score Per Taxon (ASPT) and % EPT) were showed by frequently used metrics. Finally, several recommendations were made about taxonomic level used, the ranks of quality of taxa richness, and the effort-results relationship in the field of bioindication." (Authors)] Address: Martínez-Sanz, C., Faculty of Environmental Science, Pontifical University Catholic of Ecuador in Esmeraldas (PUCESE), C/ Espejo y Santa Cruz S/N, 080150 Esmeraldas, Ecuador. E-mail: cmars@unileon.es

**13558.** Matlaga, T.H.; Phillips, C.A.; Soucek, D.J. (2014): Insensitivity to road salt: an advantage for the American bullfrog? *Hydrobiologia* 721: 1-8. (in English) ["The health of freshwater ecosystems is negatively affected by a multitude of pollutants. In northern latitudes, road deicing agents enter nearby ponds and waterways elevating chloride concentrations in winter and spring. Few studies have examined how amphibians respond to road salt contamination and no study has focused on the response of an invasive amphibian. We examined the effects of NaCl, the most commonly used deicing agent, on the embryos and tadpoles of the American bullfrog, *Lithobates catesbeianus*, a species that is invasive in many regions around the world. In the first experiment, we exposed *L. catesbeianus* embryos to ecologically relevant levels of chloride for 60 days. The second experiment examined the indirect consequences of chloride contamination by exposing *L. catesbeianus* tadpoles to dragonfly larvae. *Lithobates catesbeianus* did not experience reduced survival, growth, or ability to evade predation in elevated chloride concentrations compared to controls. The lack of a response by *L. catesbeianus* suggests that its population growth will not be negatively impacted by road salt contamination. This result may be good news for *L. catesbeianus*, but raises concern for sympatric amphibians that have to contend with negative impacts of both chloride contamination and non-native *L. catesbeianus*." (Authors)] Address: Matlaga, Tanya, Illinois Natural History Survey, Prairie Res. Inst., Univ. of Illinois, Champaign, IL, 61820, USA. E-mail: matlagat@susqu.edu

**13559.** Mlynarek, J.J.; Knee, W.; Forbes, M.R. (2014): Explaining susceptibility and resistance to a multi-host parasite. *Evolutionary Biology* 41(1): 115-122. (in English) ["Closely related host species are known to show variation in the level of resistance towards the same or similar parasite species, but this phenomenon is understudied. Such studies are important for understanding the ecological factors that might promote susceptibility or resistance to parasites: in particular, whether one host species is a larger target of selection for the parasite by virtue of being more abundant locally or more regionally widespread than another host species. In this study, we examined the expression of resistance by two closely related species of

damselflies (*Nehalennia irene* and *Nehalennia gracilis*) against an *Arrenurus* water mite species. We show that the host species at each of two isolated sphagnum bogs have statistically indistinguishable levels of prevalence and intensity of infection by mite larvae. Despite having similar measures of parasitism, the regionally less represented species (*N. gracilis*) showed total resistance, whereas the regionally well-represented species (*N. irene*) was completely susceptible. Moreover, the form of resistance expressed by *N. gracilis* was unique, in that the oral glands of the mite were melanised. Also, this mite species was not found outside of isolated bog habitats. These results suggest that there might have been strong historical selection from this mite on the bog specialist, *N. gracilis*, and that this selection may have resulted in resistance evolving to fixation in a series of isolated populations." (Authors)] Address: Mlynarek, Julia, Department of Biology, Carleton University, Nesbitt Building, 1125 Colonel By Drive, Ottawa, ON, K1S 5B6, Canada. E-mail: Juliamlynarek@carleton.ca

**13560.** Moraes, M.; Ferreira Rezende, C.; Mazzoni, R. (2014): Feeding ecology of stream-dwelling Characidae (Osteichthyes: Characiformes) from the upper Tocantins River, Brazil. *Zoologia* 30(6): 645-651. (in English, with Portuguese summary) ["In this contribution we studied the trophic ecology of four Characidae species from the Cavalo Stream, upper Tocantins River, considering diet overlap and trophic niche breadth. The diet of the four species was composed of adult and immature insects, both autochthonous and allochthonous in origin. Autochthonous items dominated the diet of *Moenkhausia dichroua* (Kner, 1858), *Bryconamericus* sp., and *Creagrutus atrisignum* Myers, 1917. By contrast, allochthonous items were dominant in the diet of *Astyanax bimaculatus* (Linnaeus, 1758). Trophic niche breadth varied among species, with the highest value recorded for *M. dichroua* (0.48), followed by *Bryconamericus* sp. (0.39), *A. bimaculatus* (0.33) and *C. atrisignum* (0.29). Similarity analysis revealed two groups with different patterns of food preference. The first group was composed of insectivorous and the second by omnivorous species. The overlap in food items consumed by the four species studied was high. We suggest that resources are not limited in this stream and that competition might not be regulating these populations. This is one more case corroborating the general pattern registered for Tropical environments, where resource partitioning and specialization are responsible by the organization of fish communities." (Authors) App. 5% of the diet of *Moenkhausia dichroua* are Odonata larvae. In the rest of studied fish species, Odonata play a minor role as prey.] Address: Mazzoni, Rosana, Departamento de Ecologia, Instituto de Biologia Roberto Alcântara Gomes, Universidade do Estado do Rio de Janeiro, Rua São Francisco Xavier 524, 20550-013 Rio de Janeiro, RJ, Brazil. E-mail: mazzoni@uerj.br

**13561.** Nel, A.; Azar, D.; Huang, D.-y. (2014): A new Middle Jurassic Chinese fossil clarifies the systematic compo-



sition of the Heterophlebioptera (Odonata: Trigonoptera). *Alcheringa* 38(1): 130-134. (in English) ["Juraheterophlebia sinica, a new species of damselfly, is described from the Middle Jurassic of China. Its fore- and hind wings in connection to the body allows comparison of the type genera of the families Erichschmidtidae and Juraheterophlebiidae, respectively based on a forewing and a hind wing. Juraheterophlebiidae is a junior synonym of the Erichschmidtidae. The new fossil confirms the previous attributions of Erichschmidtia and Juraheterophlebia to the clade Heterophlebioptera." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**13562.** Quin, Y.-H.; Wu, H.-Y.; Ji, X.-Y.; Yu, W.-W.; Du, Y.-Z. (2014): Mitochondrial genome of the stonefly *Kamimuria wangi* (Plecoptera: Perlidae) and phylogenetic position of Plecoptera based on mitogenomes. *PLoS ONE* 9(1): e86328. doi:10.1371/journal.pone.0086328: 9 pp. (in English) ["This study determined the mitochondrial genome sequence of the stonefly, *Kamimuria wangi*. In order to investigate the relatedness of stonefly to other members of Neoptera, a phylogenetic analysis was undertaken based on 13 protein-coding genes of mitochondrial genomes in 13 representative insects. The mitochondrial genome of the stonefly is a circular molecule consisting of 16,179 nucleotides and contains the 37 genes typically found in other insects.... Phylogenetic analysis using maximum likelihood and Bayesian inference of 13 protein-coding genes supported a novel relationship between the Plecoptera and Ephemeroptera. The results contradict the existence of a monophyletic Plecoptera and Plecoptera as sister taxa to Embiidina, and thus requires further analyses with additional mitogenome sampling at the base of the Neoptera." (Authors) *Euphaea formosa* was included as an outgroup.] Address: Quin, Y.-H., School of Horticulture & Plant Protection and Institute of Applied Entomology, Yangzhou University, Yangzhou, Jiangsu, China

**13563.** Robin, J.; Wezel, A.; Bornette, G.; Arthaud, F.; Angélibert, S.; Rosset, V.; Oertli, B. (2014): Biodiversity in eutrophicated shallow lakes: determination of tipping points and tools for monitoring. *Hydrobiologia* 723: 63-75. (in English) ["Nutrient-rich freshwater ecosystems are generally considered as having low ecological quality and low associated biodiversity. In such systems we analysed the effects of water quality on biodiversity of several species groups, to determine tipping points and tools for monitoring. We investigated the water quality of 99 eutrophic and hypertrophic shallow lakes with extensive fish culture during a 3-year study, through the measures of physico-chemical parameters, phytoplankton biomass and structure. In a second step, we related the water quality with richness of aquatic plants, macroinvertebrates and dragonflies. With concentrations of chlorophyll-a above 30 or 70 µg l<sup>-1</sup>, shallow lakes are normally classified, respectively, in a poor or bad ecological state. However, our results show that chlorophyll-a concentra-

tions up to 78 µg l<sup>-1</sup> could be found together with relatively high species or family richness of aquatic plants, invertebrates and dragonflies. We identified most tipping points with 50–60 µg l<sup>-1</sup> of chlorophyll-a, values above which a significant decrease of species diversity was found. For monitoring of these shallow lakes we propose to use chlorophyll-a concentrations in combination with water transparency during spring. These parameters are easily applicable and cheap and they yield a good forecast of the biodiversity for the species groups studied." (Authors)] Address: Robin, J., Lab. Ecol. of Fluvial Hydrosystems, UMR 5023 LEHNA, CNRS Univ. of Lyon, ENTPE, ISARA, Lyon, France. E-mail: jrobin@isara.fr

**13564.** Sanchez-Guillen, R.A.; Córdoba-Aguilar, A.; Cordero-Rivera, A.; Wellenreuther, M. (2014): Genetic divergence predicts reproductive isolation in damselflies. *Journal of Evolutionary Biology* 27: 76-87. (in English) ["Reproductive isolation is the defining characteristic of a biological species, and a common, but often untested prediction is a positive correlation between reproductive isolation and genetic divergence. Here, we test for this correlation in odonates, an order characterized by strong sexual selection. First, we measure reproductive isolation and genetic divergence in eight damselfly genera (30 species pairs) and test for a positive correlation. Second, we estimate the genetic threshold preventing hybrid formation and empirically test this threshold using wild populations of species within the *Ischnura* genus. Our results indicate a positive and strong correlation between reproductive isolation and genetic distance using both mitochondrial and nuclear genes cytochrome oxidase II (COII:  $r = 0.781$  and 18S–28S:  $r = 0.658$ ). Hybridization thresholds range from -0.43 to 1.78% for COII and -0.052–0.71% for 18S–28S, and both F1-hybrids and backcrosses were detected in wild populations of two pairs of *Ischnura* species with overlapping thresholds. Our study suggests that threshold values are suitable to identify species prone to hybridization and that positive isolation–divergence relationships are taxonomically widespread." (Authors)] Address: Sánchez-Guillén, Rosa, Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510 México D.F., Mexico. E-mails: rguillen@uvigo.es

**13565.** Savard, M. (2014): L'anax précoce au Québec: une libellule migratrice. *Le Naturaliste canadien* 138(1): 20-31. (in French, with English summary) ["The northern limits for Québec of the dispersion and breeding ranges of *Anax junius* were updated during work for the Migratory Dragonfly Partnership. The new limits presented are based on scientific literature and previously unpublished data from the Québec Dragonfly Atlas Initiative. Each year, the first adults arriving from the United States of America are reported from the lowlands of the Outaouais and St. Lawrence rivers in May, and exceptionally in late April. The species is also occasionally reported from the Laurentian and Appalachian foothills, and from inhabited

areas along the shores of the Estuary and the Gulf of the St. Lawrence River between the 47th and 50th parallels north. In the extreme southern part of Québec, the emergence of overwintering populations is occasionally observed in June or early July. In the temperate deciduous region of the province, the emergence of summer populations regularly occurs from mid-August to early October. In the temperate mixed region found in the Témiscouata area, emergences may occur and this might also be the case in the Saguenay–Lac-Saint-Jean area. According to the climate model proposed by Gérardin and McKenney (2001), the northern limit of the breeding range of the common green damer could reach the 49th parallel, following the 15.7°C isotherm for the warmest three summer months. Therefore, it seems unlikely that this species is able to complete its life cycle in boreal regions, such as on Anticosti Island. Climate change could be marked by an earlier arrival of immigrant adults in the spring, and by an increase in the frequency of the emergence of overwintering and summer populations of naiads." (Author)] Address: Michel Savard. E-mail: michel.savard@ssss.gouv.qc.ca

**13566.** Shantibala, T.; Lokeshwari, R.K.; Debaraj, H. (2014): Nutritional and antinutritional composition of the five species of aquatic edible insects consumed in Manipur, India. *Journal of Insect Science* 14(14): 10 pp. (in English) ["The people living in Manipur have a distinct identity, culture, and food habits. They have a prototype culture of eating insects. In our study, the nutritive contents of five potentially-edible aquatic insects, *Lethocerus indicus* (Lepeletier and Serville) (Hemiptera: Belostomatidae), *Laccotrephes maculatus* (F.), *Hydrophilus olivaceus* (F.) (Coleoptera: Dytiscidae), *Cybister tripunctatus* (Olivier), and *Crocothemis servilia* (Drury) (Odonata: Libellulidae), were analyzed to inform consumers about the nutritional quality of the insects and the suggested quantity of their intake. A good amount of protein content and high gross energy was recorded among the insects. The results showed high levels of sodium, calcium, and magnesium present in the insects, indicating that they are a good source of minerals. Antinutritional properties of these insects were below 0.52%, which is a non-toxic level. Aquatic insects, such as *C. tripunctatus*, also possesses strong antioxidant activity (110 ig/mL). Therefore, these insects can play a major role in food security, health, and environment management. It is essential to cultivate edible insects to maintain their population sustainability." (Authors)] Address: Shantibala, T., Institute of Bioresources and Sustainable Development, Dept of Biotechnology, Government of India, Takyelpat-795001, Manipur, India. E-mail: shantibro@yahoo.co.in

**13567.** Smith-Herron, A.J.; Cook, T.J. (2014): *Setasedecim fursus* n. gen., n. sp. (Apicomplexa: Actinocephalidae: Acanthosporinae) from *Ischnura ramburii* (Odonata: Zygoptera) in Imperial County, California, U.S.A. *Comparative Parasitology* 81(1): 79-84. (in English) ["*Argia sedula*, *Ischnura ramburii*, *Enallagma basidens*, *E. civile*, and *E. carcunculatum*, were collected from Imperial and San Di-

ego counties in California, U.S.A., and were found to collectively host 4 species of actinocephalid gregarines. *Setasedecim fursus* n. gen., n. sp. (Apicomplexa: Actinocephalidae: Acanthosporinae) is described from the adults of *Ischnura ramburii* from Sunbeam Lake, Imperial County. This genus is distinguished from the existing genera within Acanthosporinae by oocysts bearing a total of 16 spines: 8 equatorial, 2 at each equatorial vertex, terminal spines inserted at each pole, and 1 at each vertex created by polar truncations. The gregarines recovered are referable to the family Actinocephalidae but are taxonomically distinct from its constituent genera. We describe the new taxon and provide new host and locality records for known actinocephalid gregarines." (Authors)] Address: Smith-Herron, Autumn, Institute for the Study of Invasive Species, Sam Houston State University, Huntsville, Texas 77341, USA. E-mail: ajs029@shsu.edu

**13568.** Smolinský, R.; Gvoždík, L. (2014): Effect of temperature extremes on the spatial dynamics of predator-prey interactions: a case study with dragonfly nymphs and newt larvae. *Journal of Thermal Biology* 39(1): 12-16. (in English) ["Highlights: • We examine predator-prey interactions under extreme temperatures. • Predator activity increases with rising temperature, but prey activity does not. • The co-occurrence of predator and prey increases at high temperatures, but the probability of predation does not. • Diel thermal extremes negatively affect predators through the mismatch between space use and prey capture rate. Theory predicts that predators are more vulnerable to increasing temperature than prey. Despite huge variations in the magnitude and duration of thermally-extreme episodes in nature, most empirical studies on predator-prey interactions consider conditions induced by a climatic shift in mean temperature. We asked whether the increased vulnerability of predators holds under daily thermal extremes occurring during heat waves, using dragonfly nymphs and newt larvae as the predator-prey model system. Direct exposure of predator to prey in heated and non-heated aquaria under semi-natural conditions revealed that predator movements increased with rising temperature, whereas prey activity decreased. In contrast to the theory of predator-prey space use, the spatial co-occurrence of predator and prey individuals increased with temperature, while predation rates diminished. We conclude that daily thermal extremes affect trophic interactions in the same way, i.e. through the increased vulnerability of predators, as do long-term shifts in mean environmental temperature. Our results highlight the importance of behavioural studies for understanding mechanisms mediating the effect of extreme thermal events on species interactions." (Authors)] Address: Gvoždík, L., Institute of Vertebrate Biology AS CR, Kvetná 8, 60365 Brno, Czech Republic. E-mail: gvozdik@brno.cas.cz

**13569.** St. Clair, C.R.; Fuller, C.A. (2014): Atrazine exposure increases time until cannibalistic response in a dragonfly larva. *Canadian Journal of Zoology* 92(2): 113-117. (in English, with French summary) ["Agricultural

runoff containing herbicide is known to have adverse effects on freshwater organisms. Aquatic insects are particularly susceptible, and herbicide runoff has the potential to affect behaviour in this group. Here we examine the effects of short-term exposure to the herbicide atrazine on cannibalistic behaviour in larvae of *Libellula luctuosa*. Large larvae (> 12 mm length) were exposed to concentrations of 0, 1, 10, or 100 µg/L atrazine for 96 hours. A smaller (< 8 mm) conspecific was then placed with the large larva, and the behavior of the large larvae was observed for 30 minutes. Time until initiation of stalking and time until strike were determined. After the initial 30 minutes, each pair was checked at 2, 4, 6, 24 and 48 hours. Time of consumption and amount consumed were determined. The number of larvae that engaged in cannibalistic activity within the initial 30-minute observation period was significantly higher for controls compared to all experimental treatments. When stalking, striking and consumption times were examined together (a measure of overall response time) concentration had a significant effect, with the 10 µg/L group taking significantly longer to cannibalize than the control group. Cannibalism is a particularly important behaviour in dragonfly larvae populations, and this study confirms that this interaction is altered by exposure to atrazine, with the potential to affect ecological relationships." (Authors)] Address: St. Clair, Coy, Department of Biological Sciences, Murray State University, 2112 Biology Building, Murray KY 42071, USA. E-mail: coyray03@gmail.com

**13570.** Stoks, R.; Geerts, A.N.; De Meester, L. (2014): Evolutionary and plastic responses of freshwater invertebrates to climate change: realized patterns and future potential. *Evolutionary Applications* 7(1): 42-55. (in English) ["We integrated the evidence for evolutionary and plastic trait changes in situ in response to climate change in freshwater invertebrates (aquatic insects and zooplankton). The synthesis on the trait changes in response to the expected reductions in hydroperiod and increases in salinity indicated little evidence for adaptive, plastic, and genetic trait changes and for local adaptation. With respect to responses to temperature, there are many studies on temporal trait changes in phenology and body size in the wild that are believed to be driven by temperature increases, but there is a general lack of rigorous demonstration whether these trait changes are genetically based, adaptive, and causally driven by climate change. Current proof for genetic trait changes under climate change in freshwater invertebrates stems from a limited set of common garden experiments replicated in time. Experimental thermal evolution experiments and common garden warming experiments associated with space-for-time substitutions along latitudinal gradients indicate that besides genetic changes, also phenotypic plasticity and evolution of plasticity are likely to contribute to the observed phenotypic changes under climate change in aquatic invertebrates. Apart from plastic and genetic thermal adjustments, also genetic photoperiod adjustments are widespread and may even dominate the

observed phenological shifts." (Authors) The publication includes references to Odonata.] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**13571.** Therry, L.; Nilsson-Örtman, V.; Bonte, D.; Stoks, R. (2014): Rapid evolution of larval life history, adult immune function and flight muscles in a poleward-moving damselfly. *Journal of Evolutionary Biology* 27: 141-152. (in English) ["Although a growing number of studies have documented the evolution of adult dispersal-related traits at the range edge of poleward-expanding species, we know little about evolutionary changes in immune function or traits expressed by nondispersing larvae. We investigated differentiation in larval (growth and development) and adult traits (immune function and flight-related traits) between replicated core and edge populations of the poleward-moving damselfly *Coenagrion scitulum*. These traits were measured on individuals reared in a common garden experiment at two different food levels, as allocation trade-offs may be easier to detect under energy shortage. Edge individuals had a faster larval life history (growth and development rates), a higher adult immune function and a nearly significant higher relative flight muscle mass. Most of the differentiation between core and edge populations remained and edge populations had a higher relative flight muscle mass when corrected for latitude-specific thermal regimes, and hence could likely be attributed to the range expansion process per se. We here for the first time document a higher immune function in individuals at the expansion front of a poleward-expanding species and documented the rarely investigated evolution of faster life histories during range expansion. The rapid multivariate evolution in these ecological relevant traits between edge and core populations is expected to translate into changed ecological interactions and therefore has the potential to generate novel eco-evolutionary dynamics at the expansion front." (Authors)] Address: Therry, Laboratory of Aquatic Ecology, Evolution and Conservation, KU Leuven, Leuven, Belgium. E-mail: Lieven.therry@bio.kuleuven.be

**13572.** Van Praeta, N.; De Jonge, M.; Blust, R.; Stoks, R.; Bervoets, L. (2014): Behavioural, physiological and biochemical markers in damselfly larvae (*Ischnura elegans*) to assess effects of accumulated metal mixtures. *Science of The Total Environment* 470-471: 208-215. (in English) ["Highlights: •At which organismal level effects of metal mixtures in nature can best be detected? •Differences in metal accumulation were observed between populations of *Ischnura elegans*. •Relations between the metal load index and both biochemical (GST) and physiological endpoints (energy storage) were observed. •No sublethal endpoint could be used to detect the observed variation among populations. Currently it is not known at which organismal level effects of metal mixtures in nature can best be detected, which is relevant to develop accurate monitoring schemes and quality stand-



ards. The present study investigated relationships between accumulated metals with different levels of biological organisation in the aquatic larval stage of *Ischnura elegans*. Larvae were collected in seven Flemish ponds differing in metal load. In each field-collected larva we quantified concentrations of accumulated metals and a set of biochemical markers (acetylcholinesterase (AChE) and glutathione-S-transferase (GST)), physiological endpoints (energy storage), and behavioural responses (locomotory activity and the feeding rate). Accumulated metal levels and the measured endpoints significantly differed among ponds, however, a large variation in metal load index was observed within individuals of the same population. Only GST and energy availability could be partly predicted by the observed variation in metal load index on individual damselfly level. However, no single endpoint could be used to detect the observed variation in metal load index among populations. In conclusion, the sublethal endpoints cannot be used as reliable biomarkers to monitor the toxicity of accumulated metal mixtures in natural populations of *I. elegans*." (Authors)] Address: Van Praeta, N., Department of Biology, Systemic Physiological and Ecotoxicological Research Group (SPHERE), University of Antwerp, Groenenborgerlaan 171, 2020 Antwerp, Belgium. E-mail: nander.vanpraet@ua.ac.be

**13573.** Villanueva, R.J.T. (2014): The type repository of *Drepanosticta sugbo* spec. nov. and *Mortonagrion astamii* spec. nov. (Odonata: Zygoptera). International Dragonfly Fund - Report 65: 1-2. (in English) ["*Drepanosticta sugbo* and *Mortonagrion astamii* were described in Philippine Scientist 49: 1-16 and International Dragonfly Fund Report 60: 1-34, respectively. The type repositories which were omitted from the original descriptions, are stated here along with a diagnosis of the species." (Author)] Address: Villanueva, R.J.T., Forestal Healing Homes and Therapeutic Milieu, Forestal Road, Cabantian, Davao City, 8000 Philippines Email: rjtvillanueva@gmail.com

**13574.** Whatley, M.H.; van Loon, E.E.; van Dam, H.; Vonk, J.A.; van der Geest, H.G.; Admiraal, W. (2014): Macrophyte loss drives decadal change in benthic invertebrates in peatland drainage ditches. *Freshwater Biology* 59(1): 114-126. (in English) ["Agricultural peatlands and their associated drainage systems are often highly managed and exposed to anthropogenic pressures, such as eutrophication and stable water tables, maintained via drainage during periods of high rainfall and inlet of, alkaline-rich, waters during dry periods. These pressures promote peat degradation, resulting in the accumulation of fine-degraded peat particles that dramatically alter aquatic habitats by smothering surfaces and decreasing water quality. Consequential effects on benthic communities are expected but have not been investigated so far. We hypothesised that peat degradation can lead to the decline in submerged macrophytes, which are of critical importance to sustaining biodiversity of benthic invertebrate communities. To investigate this, we analysed de-

cadal (1985–2007) changes in benthic species richness in 29 peat ditches in the Netherlands and, to determine patterns of macroinvertebrate habitat occupancy, carried out a complementary field experiment with submerged artificial macrophytes, natural sediments and emergent bank vegetation. Results from long-term monitoring indicate that chemical conditions in agricultural peat ditches have improved slightly over the last decades; however, there has been a simultaneous decline in benthic invertebrate species richness and densities corresponding to a decline in the numbers of submerged macrophytes. The apparent dependence of macroinvertebrates on macrophytes was reinforced by our field experiment which revealed that invertebrate density was highest in submerged artificial plants, while invertebrate species richness was highest in natural emergent vegetation. Conversely, degraded peat sediments supported extremely few invertebrates. Our results clearly illustrate the strong influence of submerged macrophyte loss on macroinvertebrate assemblages in peatland waters. Furthermore, this suggests that improvements in water quality alone will not benefit invertebrates in the absence of suitable vegetative habitats." (Authors) The study includes *Ischnura elegans*.] Address: Whatley, M.H., Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, P.O. Box 94248, 1090 GE, Amsterdam, The Netherlands. E-mail: m.h.whatley@uva.nl



[http://i.dailymail.co.uk/i/pix/2011/02/07/article-1354392-0D1046F0000005DC-613\\_634x494.jpg](http://i.dailymail.co.uk/i/pix/2011/02/07/article-1354392-0D1046F0000005DC-613_634x494.jpg)

Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for multiple help, and Geert de Knijf, Cédric Vanappelgem, Bernd Kunz and Jürgen Ott for contributing many papers to this issue.

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Dr. Klaus Reinhardt, Dept Animal and Plant Sciences, University of Sheffield, Sheffield S10 2TN, UK. Tel. ++44 114 222 0105; E-mail: K.Reinhardt@sheffield.ac.uk

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

## 1997

**13575.** Jiang, Y.h.; Chen, Xi.p. (1997): General situation on the study of Odonata in Jiangsu province. *Journal of Jiangsu Forestry Science & Technology* 24(4): 48-53. (in Chinese, with English summary) [The authors in a chronological style compile published data on the Odonata fauna of Jiangsu, China. The list of odonate species totals to 72.] Address: Jiang, Y, Lianyungang City Yuntaixiang Diversified Management Office, Jiangsu 222064 PRC

## 1998

**13576.** Zhu, H.; Shi, F.; Zhou, S. (1998): An investigation of dragonflies (Odonata) from Huaping, Guangxi. *Guangxi Sciences* 5(2): 142. (in Chinese, with English summary) [14 odonate species are reported from Huaping Natural Reserve, Guangxi Zhuang Autonomous Region, China. *Bayadera melanopteryx*, *Sympetrum baccha*, *S. depressiusculum* and *S. infuscatum* are assessed as new additions to the Odonata fauna of Guanxi. The examined specimens are deposited in the Department of Biology, Shanxi University and the Department of Biology, Guangxi Normal University.] Address: Zhu, H.q. Dept of Biology, Shanxi University, Wuchenglu, Taiyuan, Shanxi, 030006, China

## 2000

**13577.** Brunelle, P.M. (2000): Distribution of Damselflies and Dragonflies (Odonata) of Cape Breton Island, Nova Scotia, Canada. *Canadian Heritage, Parks Canada ISBN 0-662-28573-5*: 52 pp. (in English) ["Knowledge of the Odonata on Cape Breton Island (CBI) as of 1999 has been assessed, yielding a list of 85 species, 24 (28% of the island list) of which are additions to the previously published CBI list. Separate lists for the Lowlands, Highlands and countries are presented." (Publisher)] Address: Brunelle, P.-M., 2460 John Street, Halifax, Nova Scotia, B3K 4K7, Canada

**13578.** Miyashita, M. (2000): Studies on the method for assessment of the habitat of the damselfly, *Mortonagrion Hirosei*. *Proceedings of the Japan Society of Civil Engineers*: 65-73. (in Japanese, with English summary) ["The habitat of *M. Hirosei*, which was designated species by the Environment Agency in 1991, was studied at the site of the Tone Kamome Ohashi bridge project spanning the Tonegawa river. Changes of the water level and the salinity of the habitat of this species were measured with actual survey. The larvae of the damselfly were collected only from pool in a sunken place covered with dead leaves of reeds on the riverside. It was concluded that the mesh figure of a distribution of the damselfly can be used as an excellent tool for environmental impact assessment method." (Author)] Address: not stated

**13579.** Raab, R. (2000): Die Libellenfauna in den Maßnahmenbereichen Untere Lobau und Orth. Gutachten im Auftrag von Nationalpark Donauauen GmbH, Deutsch-Wagram: 74 pp. (in German) [Austria; a total of 41 species were found. Species conservation measures for *Leucorrhinia pectoralis* and *Ophiogomphus cecilia* are prepared and documented. For more details see: <http://www.donauauen.at/dateien/42428LibellenfaunaimBereichOrthu.U.Lobau.pdf>.] Address: Raab, R., Technisches Büro für Biologie, Anton Brucknergasse 2, 2232 Deutsch-Wagram, Austria. E-mail: E-mail: Rainer.Raab@usa.net

## 2001

**13580.** Chen, Z.y.; Liang, G.q.; Jia, F.l.; Zie, W.c.; Chen, Z.m.; Deng, S.f.; Tang, C.g.; Chen, J.l.; Yang, Q.y. (2001): Catalogue of insects from Dadongshan (Mt.) of Guangdong Nanling National Nature Reserve (I). *Ecologic Science* 20(1-2): 109-114. (in Chinese, with English summary) [74 odonate species are listed from the Dadongshan (Mt.) Management station of Guangdong Nanling National Nature Reserve, China (114°41'E, 24°50'N). The list of species is based on 10 recording trips between 1992 and 1998.] Address: Chen, Z.y., Institute of Entomology and

## 2002

**13581.** Miyashita, M.; Someya, T. (2002): Post-assessment of the habitat of the damselfly, *Mortonagrion Hirosei*, at the site of the Tone Kamome Ohashi Bridge. *Environmental Systems Research* 30: 419-428. (in Japanese, with English summary) ["*M. Hirosei*, was designated as an endangered species by the Environment Agency in 1991, because its habitat is vulnerable to the effects of land reclamation and river improvement. Pre- and post-assessments of the habitat of the damselfly were taken at the site of the Tone Kamome Ohashi Bridge project spanning the Tonegawa River, which marks the border between Hasakimachi, Ibaraki Prefecture, and Choshi, Chiba Prefecture. Before the project, the larvae of the damselfly were found abundantly in the reed-covered area of this bridge on the Ibaraki side of the river in October 1998. However, there were no larvae found on this side after the project in December 2001. Also, the adults of the damselfly were not observed in July 2002. The larvae of the damselfly were collected only from the puddle of the depressed ground covered with dead leaves of reed plants. However, the puddles were filled with the alluvial deposits. The level of the habitats of the damselfly after the project was higher than before the project from 20 to 100mm. Because the water supply from the watercourses and springs was decreased remarkably, the habitats of the damselfly were dried and the salinity of the habitats also became high. It was supported that the extinction of the damselfly on the Ibaraki side of the Tone Kamome Ohashi Bridge was caused by the reconstruction of the watercourse, which was extended and changed into boarded." (Author)] Address: Someya, T., 2-4313-9, Ishikavva-cho, Mito City, 310-0904, Japan

## 2003

**13582.** Gerson, U.; Smiley, R.L.; Ochoa, R. (2003): Mites (Acari) for pest control. Blackwell Science Ltd: XV + 539 pp. (in English) [Chapter 7 on Arrenuridae includes several references to Odonata.] Address: Gerson, U., Department of Entomology, Faculty of Agricultural, Food and Environmental Sciences, Hebrew University, Rehovot, Israel

**13583.** Golubeva, O.G. Stephenson, S.L. (2003): Zoospore fungi from subantarctic Campbell Island. *New Zealand Journal of Botany* 41: 319-324. (in English) [Campbell Island (52°33'S, 169°09'E), oceanic island about 700 km south-east of the New Zealand mainland. *Chytrium hyalinus* Karling, *Amer. J. Bot.* 32, 363 (1945) was found on an unidentified dragonfly exoskeleton and wings.] Address: Golubeva, Olga, Komarov Botanical Institute, 2 Prof. Popov St., St. Petersburg 197376 Russia

**13584.** Wüst-Graf, R. (2003): Erstmaliger Entwicklungsnachweis einer zweiten Generation der Kleinen Königsli-

belle, *Anax parthenope* SELYS, 1839, in der Schweiz nördlich der Alpen (Odonata: Aeshnidae). *Entomologische Nachrichten*, Luzern 50(1): 19-24. ["In 2 in Jan. 2003 constructed ponds, Mauensee, canton Luzern, Switzerland, 44 *A. parthenope* exuviae were found in Aug. This is the first evidence of a second generation of this species in Switzerland N of the Alps. It is probably due to an early immigration from S Europe and to the exceptionally hot weather during May-Aug. The 2 ponds do not have an identical structure; both of them deviate from the usual *A. parthenope* breeding habitat." (Author)] Address: Wüst-Graf, R., Christoph-Schnyderstr. 10, CH-6210 Sursee, Switzerland

## 2004

**13585.** Liu, J.; Ren, D.; Dao, C.; Cheng, X.; Li, N.; Liu, Z. (2004): Discovery of hemeroscopid dragonfly from Jiufotang Formation in western Liaoning and its geological implications. *Global Geology* 23(3): 209-212. (in English) ["A new hemeroscopid dragonfly fossil, *Abrohemeroscopus mengi* Ren, Liu et Chen, 2003, found from the upper part of the Jiufotang Formation, Liaoning Province, northeastern China, is similar to the *Hemeroscopus baissicus* Pritykina, 1977, and more primitive phylogenetically than *H. baissicus* in the following characters: \*hindwing anal loop is smaller, with only 6-7 cells (plesiomorphy); \*Rspl is absent (plesiomorphy); \*the hindwing vein CuAa is curved and has five distinct posterior branches (plesiomorphy); \*the forewing MP shortened, reaches the posterior wing margin slightly beyond the level of the nodus (plesiomorphy); \*pterostigmata more distinctly braced (plesiomorphy); \*the hindwing area between MP and CuAa is narrow, with only one row of cells near the discoidal triangle (plesiomorphy). These facts demonstrate that the upper part of the Jiufotang Formation should be early Early Cretaceous in age." (Authors)] Address: Ren, D., College of Life Science, Capital Normal Univ., 105 Xisanhuanbeilu, Haidian District, Beijing 100048 China. E-mail: rendong@mail.cnu.edu.cn

## 2005

**13586.** Foote, D. (2005): Inventory of Anchialine Pools in Hawai'i's National Parks. U.S. Department of the Interior. U.S. Geological Survey. USGS FS 2005-3129: 2 pp. (in English) [Verbatim: Surveys Detect Endangered Damselflies: Another candidate endangered species found in anchialine pools is the orange-black damselfly (*Megalagrion xanthomelas*) or pinao'ula (Fig. 4). These damselflies feed on both native and exotic flies, including mosquitoes, which breed in the pools. Pinao'ula breed in both fresh and brackish pools along coastal areas, which are commonly threatened by development. Very few of these habitats are protected; in Hawai'i, only three National Historical Parks contain suitable breeding habitat for pinao'ula, and all three parks are located on the west coast of Hawai'i Island.] Address: Email: davidfoote@usgs.gov



**13587.** Ueda, K.; Kim, T.; Aoki, T. (2005): A new record of Early Cretaceous fossil dragonfly from Korea. *Bull. Kitakyushu Mus. Nat. Hist. Hum. Hist., Ser. A.* 3: 145-152. (in English) ["Early Cretaceous fossil dragonfly *Hemeroscopus baissicus* Pritykina was discovered from Korea. This is the first record of this species from this area and the description of wings is given." (Authors)] Address: Ueda, K., Kitakyushu Museum of Natural History & Human History, 2-4-1 Higashida, Yahatahigashiku, Kitakyushu 805-0021 Japan

## 2006

**13588.** Cailles, C.R. (2006): Phenotypic and genetic effects of Chernobyl-derived radionuclide contamination on the red-eyed damselfly *Erythromma najas* (Odonata, Coenagrionidae). Ph.D. thesis, Faculty of Science and Technology, University of Plymouth: 15 + 307 pp. (in English) ["The 1986 Chernobyl accident released large amounts of radioactive contamination into the surrounding environment. As a result, the Chernobyl region provides a suitable site for investigations into the effects of ionising radiation on non-human biota. Studies of this type are important in order to establish whether or not current anthropocentric radiation protection guidelines are appropriate for the protection of the wider environment. Despite the presence of many freshwater habitats in the region, there have been few studies investigating the effects of radiation on aquatic invertebrates. In the present study, the effects of Chernobyl-derived radionuclide contamination on *E. najas* were investigated. This large scale study involved analysis of 720 *E. najas* specimens obtained from eight lakes in the Chernobyl region ranging in <sup>137</sup>Cs contamination levels from 37000 kBq m<sup>2</sup> to 100 kBq m<sup>2</sup>. Estimated external dose rates of ionising radiation ranged from 24 µGyhr<sup>-1</sup> to 0.066 µGyhr<sup>-1</sup>. Fitness of *E. najas* populations was assessed both phenotypically (by the use of fluctuating asymmetry (FA) techniques) and genetically (by the use of inter simple sequence repeat (ISSR) markers and mitochondrial (mt) DNA sequencing techniques). FA was assessed by the analysis of eight bilateral traits and no relationship between FA and dose rates of ionising radiation was found. Analysis of 61 ISSR bands revealed no evidence of elevated mutation rates in contaminated lakes. This finding was supported by the results of the mtDNA sequencing study which involved sequencing of the COI and COII regions of 80 *E. najas* specimens. The sequencing study revealed high levels of gene flow between the Chernobyl lakes and no evidence of either an increased mutation rate in contaminated lakes or a population bottleneck. In summary, these studies have revealed no adverse effects of Chernobyl-derived ionising radiation on *E. najas* populations." (Author)] Address: not stated

**13589.** Fochetti, R.; Argano, R. (2006): Patterns of benthic invertebrate assemblages in rivers of Central Italy. *Italian Journal of Zoology* 73(2): 145-151. (in English)

["The present paper aims to analyse and compare the benthic composition (including Odonata) of several rivers of Northern, Central Apenninic and Southern Italy. We considered faunistic data from seven Italian streams (Adige, Mignone, Arrone, Fiora, Aniene, Amaseno and Simeto rivers). In particular, we wanted to compare how, using detailed taxonomic data, every single river or stretch of river would conform or differentiate from other rivers (or stretches of river) in respect to their faunistic and structural aspects. We used presence-absence data of taxonomic groups, identified mainly at species level. Similarity indexes, Principal Component Analysis and divisive analysis (DIVA) gave almost overlapping results. Aggregative, ordination and divisive algorithms, in fact, group each of the studied rivers as single independent units, isolated and differentiated from the others. We discuss the results with respect to the main longitudinal zonation theories on running waters." (Authors)] Address: Fochetti, R., Dipartimento di Scienze Ambientali, Univ. della Tuscia, Largo dell'Università snc, 01100 Viterbo, Italy. E-mail: fochetti@unitus.it

## 2007

**13590.** Bailowitz, R. (2007): Evening Skimmer (*Tholymis citrina* Hagen) in Arizona. *Argia* 19(3): 28. (in English) [12-VI-2007, Gila River, Duncan, Greenlee County, Arizona, USA] Address: Bailowitz, R., 15444 N. Indian Trail, Tucson, AZ 85750 USA. E-mail: raberg2@q.com

**13591.** Behrstock, R. A.; Dobbs, M.; Dunkle, S.; Overton, M. (2007): Additional records of Odonata from Tamaulipas, San Luis Potosi, Hidalgo, and Queretaro States, Mexico. *Argia* 19(3): 30-33. (in English) [Records of 24 odonate species (new state records) registered between November 2006 and April 2007 are documented in detail.] Address: Behrstock, R.A., 10359 S. Thicket Pl., Hereford, AZ 85615, USA. E-mail: rbehrstock@cox.net

**13592.** Chelmick, D. (2007): From a desert across the pond. *Argia* 19(3): 10-11. (in English) [Bristol (UK) is characterised as a dragonfly desert. The author compares observations of dragonflies from Europe (France, UK) with observations in Florida (USA), an oasis of dragonflies.] Address: Chelmick, D.G., 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK. E-mail: dgc@david.chelmick.com

**13593.** Couteyen, S.; Papazian, M. (2007): Présence d'un *Gynacantha* sur l'île Rodrigues (Odonata, Aeshnidae). *L'Entomologiste* 63(4): 223. (in French) [Mauritius; two larvae of *Gynacantha bispina* cf. were collected at (1) "Cascade Mourouck", 11-III-2004 and (2) "Forêt de la Solitude", 15-III-2004.] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France. E-mail: mpapazian@ecologie.re

**13594.** Danforth, D.; Bailowitz, R. (2007): *Macrothemis pseudimitans* (White-tailed Sylph), new species for the

U.S. *Argia* 19(3): 29. (in English) [14-IX-2007, stream Black Draw, San Bernardino National Wildlife Refuge, 14 miles east of Douglas, Arizona, USA.] Address: Danforth, D., P.O. Box 232, Bisbee, Az., 85603, USA. E-mail: Dougofbis@yahoo.com

**13595.** Fenoglio, S.; Bo, T.; Cucco, M.; Malacarne, G. (2007): Response of benthic invertebrate assemblages to varying drought conditions in the Po river (NW Italy). *Italian Journal of Zoology* 74(2): 191-201. (in English) ["In the rivers of northern Italy, the presence of water is typically continuous all year long, although in the last five decades there has been a conspicuous increase in drought periods, mainly caused by human impacts and climate change. The aim of this study was to assess the impact of the length of the drought periods on macroinvertebrate assemblages. We collected invertebrates in four reaches of the Po river, characterised by different periods of absence of surface water. We found significant differences among the stations in invertebrate abundance and taxa richness, with a decrease in the more drought affected stream reaches. Collector-gatherers significantly increased as the drought period lengthened, while the opposite occurred for scrapers and shredders. The areas with a discontinuous presence of water were mainly colonised by small, fastgrowing, plurivoltine organisms. A main result of our study is that only a few taxa appear to be able to survive in reaches with intermittent flow, underlining the great ecological difference between perennial and naturally intermittent streams. Our results suggest that the recent increase of droughts will likely cause an impoverishment of benthic communities in prealpine rivers." (Authors) The list of taxa includes 'Coenagrionidae' and 'Cordulidae'.] Address: Fenoglio, S., University of Piemonte Orientale, Di.S.A.V., Via Bellini 25, I-15100 Alessandria, Italy. E-mail: fenoglio@unipmn.it

**13596.** Gallucci, T. (2007): Observations on the behavior of *Macrothemis inequiunguis* (Jade-striped Sylph). *Argia* 19(3): 14-17. (in English) [Extensive report on behaviour of *M. inequiunguis* near the Big Springs Ranch, north of Leakey, Real County, Texas, UAA, one of the very few localities of this species.] Address: Gallucci, T., Gulf Coast Laboratory for Wildlife Research and Milk River Milm; P.O. Box 6, Camp Verde, Texas 78010-5006, USA. E-mail: milkrivermusic@hotmail.com

**13597.** Harding, R.W. (2007): *Lanthus vernalis* (Southern Pygmy Clubtail) finally found in Canada. *Argia* 19(3): 27. (in English) [7-VII-2007, Kings County, New Brunswick, Canada] Address: Harding, R.W., PR#3 Montague, Summerville, PE, C0A 1R0, Canada

**13598.** Keppner, E.; Keppner, L.; Daigle, J.J. (2007): Note on the occurrence of *Nehalennia pallidula* Calvert (Everglades Sprite) in Bay County, Florida. *Argia* 19(3): 28-29. (in English) [Between April and August 2007, several specimens of the rare *N. pallidula* have record-

ed in the northwestern part of Florida, USA.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**13599.** Meurgey, F. (2007): 2007 Collecting trip in Guadeloupe - Where have all the seasons gone? *Argia* 19(3): 11-13. (in English) [Extensive report on a dragonfly trip to Guadeloupe in June 2007.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**13600.** Meurgey, F. (2007): The *Argia concinna* Rambur type locality mystery: Can it be solved? *Argia* 19(3): 13-14. (in English) [The type locality of the species is assumed to be Capesterre, Guadeloupe.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**13601.** Paulson, D. (2007): Recent decisions of the DSA Checklist Committee. *Argia* 19(3): 8-9. (in English) [*Enallagma cardenium* - Purple Bluet; *Enallagma coecum* - Antillean Bluet; *Enallagma eiseni* - Baja Bluet; *Macrothemis pseudimitans* - White-tailed Sylph; *Sympetrum semicinctum* - Band-winged Meadowhawk.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@pugetsound.edu

**13602.** Paulson, D. (2007): Book Review: Dragonflies of the Yungas (Odonata) / Libelulas des las Yungas (Odonata) by Natalia von Ellenrieder and Rosser W. Garrison. *Argia* 19(3): 34. (in English) [Review of the "Field Guide to the Species from Argentina. Libelulas de las Yungas (Odonata) Una guía de campo para las especies de Argentina. Pensoft Series Faunistica 67, ISSN 13120174, Pensoft Publishers, Sofia-Moscow. 168 pp."] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@ups.edu

**13603.** Scalici, M.; Gibertini, G. (2007): Feeding habits of the crayfish *Austropotamobius pallipes* (Decapoda, Astacidae) in a brook in Latium (central Italy). *Italian Journal of Zoology* 74(2): 157-168. (in English) ["The several studies regarding the feeding habits of freshwater decapods have provided a few detailed descriptions of their natural diets and have seldom analysed variations in their feeding habits due to season, size, age, and changes in their physiological state. This situation led us to analyse the stomach content of different age classes of the crayfish *A. pallipes*, in order to increase the knowledge available on this species' diet. Ingestion index, vacuity frequency, and occurrence frequency were calculated; then, a graphical representation was carried out only for the animal component (mainly insect larvae) observed within the stomach. The results show *A. pallipes* to be an omnivorous and opportunistic

animal. Its diet includes the exploitation of more easily accessible vegetal and detritus resources, which are the main sources of energy and proteins in freshwater ecosystems. Invertebrates are very important for the crayfish diet; in fact, the animal component, and in particular Trichoptera, Diptera, and shellfish, plays a very important role for juveniles and adult females. Feeding strategies might reduce competition between sexes, satisfying their energetic and nutritional needs. The acquired knowledge of the crayfish trophic niche may be used, for example, to improve the diet of animals kept in captivity." (Authors) Odonata were represented in the diet of crayfishes from all sampling sites.] Address: Scalici, M., Dipartimento di Biologia, Università degli Studi "Roma Tre", v.le G. Marconi 446, I-00146 Roma, Italy. Email: scalici@uniroma3.it

**13604.** Worthen, W.B.; Jones, C.M (2007): Odonata survey of Blue Wall Nature Preserve and Bunched Arrowhead Heritage Trust Preserve, Greenville, County, South Carolina. *Argia* 19(3): 24-25. (in English) [42 odonate species were collected between March 2005 - August 2007 at Bunched Arrowhead Heritage Trust Preserve and 38 species at Bunched Arrowhead Heritage Trust Preserve.] Address: Worthen, W.B., Dept of Biology, Furman University, Greenville, SC29613 USA. E-mail: worthen@furman.edu

## 2008

**13605.** Aguillard, D. (2008): The Modoc experience: CalOdes/DSA Blitz IV. *Argia* 20(3): 9. (in English) [8-9-VIII-2008, Modoc County, California, USA. The rare *Ophiogomphus severus* was found at Sand Creek. A total of 47 odonate species were recorded] Address: Aguillard, D., San Diego, California, USA. E-mail: doug@basiclink.com

**13606.** Babson, J.D. (2008): An interesting record of bird predation on a damner. *Argia* 20(3): 12. (in English) [8-VIII-2007, Cochise County, Arizona, USA. An only double sized Sulphur-bellied Flycatcher (*Myiodynastes luteiventris*) preyed on a four inches long aeshnid dragonfly] Address: Babson, J.D., Vail, Arizona, USA. E-mail: jeff@skylandtours.com

**13607.** Bailowitz, R.; Danforth, D. (2008): *Libellula pulchella* (Twelve-spotted Skimmer) without black wingtips. *Argia* 20(4): 10-11. (in English) [23-IX-2008, Esterito Marsh, San Carlos, Sonora, Mexico; a specimen of *L. pulchella* resembling *Libellula forensis* was closely studied and compared with *L. forensis*. Special attention must be given to specimens with wingtips without black marking of *L. pulchella* to avoid confusion with *L. forensis*.] Address: Bailowitz, R., 15444 N. Indian Trail, Tucson, AZ 85750 USA. E-mail: raberg2@q.com

**13608.** Beaton, G.; Dobbs, M. (2008): 2007 summary of odonate research in Georgia. *Argia* 20(1): 28-29.

[New records are: *Calopteryx aequabilis*, *Lestes congener*, *Stenogomphurus consanguis*, *Gomphus cavillaris*, *Ophiogomphus incurvatus*, *O. edmundo*, *O. mainensis*, *Progomphus adaptatus*, *Neurocordulia virginienensis*, *Macrodiplax balteata*, *Sympetrum corruptum*, Notable records are *Aphylla williamsoni*, *Gomphus apomyius*, *Cordulegaster obliqua*, *Somatochlora tenebrosa*.]

**13609.** Beckemeyer, R. (2008): Sedgwick County, Kansas record of *Miathyria marcella* (Hyacinth Glider). *Argia* 20(4): 22. (in English) [26-IX-2008; the tropical species (northwestern record in USA) was found "just a couple of weeks after hurricane Ike's traverse of the central USA".] Address: Beckemeyer, R.J., 957 Perry Ave., Wichita, KS 67203-3141, USA. E-mail: royb@southwind.net

**13610.** Behrstock, R.A. (2008): First Arizona record of Narrow-striped Forceptail (*Aphylla protracta*). *Argia* 20(3): 21. (in English) [16-VII-2008, Twin Ponds, San Bernardino, NWR, Cochise Co., Arizona, USA] Address: Behrstock, R.A., 10359 S. Thicket Pl., Hereford, AZ 85615, USA. E-mail: rbehrstock@cox.net

**13611.** Biggs, K. (2008): Book Review: Gossamer Wings, Mysterious Dragonflies. *Argia* 20(3): 29. (in English) [Review of Hilfert-Rüppell, D. & Rüppell, G. (2007): *Juwelenschwingen / Geheimnisvolle Libellen - Gossamer Wings / Mysterious Dragonflies*. Splendens-Verlag, Cremlingen. 168 pp.] Address: Biggs, Kathy, 308 Bloomfield Road, Sebastopol CA, 95472, USA. E-mail: bigsnest@sonic.net

**13612.** Bridgehouse, D.W. (2008): *Tramea lacerata* (Black Saddlebags) — Found in Nova Scotia. *Argia* 20(4): 19. (in English) [28-VII-2008, Halifax County, Nova Scotia, Canada.] Address: Bridgehouse, D.W., 24 Kiel Court, Eastern Passage, NS BSG 1R3, Canada. E-mail: d.bridgehouse@ns.sympatico.ca

**13613.** Catling, P. (2008): A new northern limit for Citrine Forktail (*Ischnura hastata*), possibly due to climate warming. *Argia* 20(4): 12-17. (in English) [IX-2008, Altmonte, Lanark County, Ontario, Canada] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**13614.** Catling, P.M.; Kostiuk, B. (2008): Lake Darners and Variable Darners swarming over a herd of Wood Bison and feeding on Horse flies. *Argia* 20(1): 12-14. (in English) [On 28-VII-2007, near Fort Providence (Northwest Territories, Canada) app. 1000 *Aeshna interrupta lineata* and *A. eremita* were observed preying on Tabanidae (Diptera) swarming above a herd of 20 bison. The impact of dragonflies on these Tabanidae and reducing the bites for bison are discussed] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca



- 13615.** Chadwick, W. (2008): Back in the Bronx for 2008. *Argia* 20(4): 17-18. (in English) [New York city, USA; 15 species from 5 localities are listed. The list also includes the migrant *Tramea carolina* and brackish-water dwelling *Erythrodiplax berenice*.] Address: Chadwick, W., Bronxville, New York, USA. E-mail: mrcnaturally@optonline.net
- 13616.** Collins, S. (2008): *Triacanthagyna caribbea* (Caribbean Darner) in Texas: Another U.S. record. *Argia* 20(3): 21. (in English) [13-XI-2007, Santa Ana National Wildlife Refuge, Lower Rio Grande valley, Texas, USA] Address: Collins, S., 7505 Knollwood Rd, Towson, MD 21286, USA. E-mail: dcollins@ufl.edu
- 13617.** Daigle, J.J. (2008): Key West and South Florida survey. *Argia* 20(1): 20-21. (in English) [Report on a survey on Odonata done in the Florida Keys and southern Florida, with localities, but without any dates (probably October 2007)] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com
- 13618.** Daigle, J.J. (2008): Corkscrew crystals!. *Argia* 20(3): 25. (in English) [*Chrysobasis lucifer*, Audunbon Corkscrew Swampy Sanctuary near Immokalee, Florida, USA] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com
- 13619.** Danforth, D.; Bailowitz, R. (2008): Straight-tipped Ringtail (*Erpetogomphus elaps*) found in Arizona. *Argia* 20(4): 22-23. (in English) [17-IX-2008, lower Parker Canyon, Santa Cruz County, Arizona, USA] Address: Danforth, D., P.O. Box 232, Bisbee, Az., 85603, USA. E-mail: Dougofbis@yahoo.com
- 13620.** de Lacour, F. (2008): *Tauriphila argo* (Arch-tipped Glider) — New species for the United States. *Argia* 20(3): 26-27. (in English) [11-VI-2008, Bentsen State Park, Texas, USA] Address: de Lacour. E-mail: thoreyi@warwick.net
- 13621.** De Marmels, J. (2008): Have a look in your kitchen first: A short christmas story from Venezuela. *Argia* 20(1): 23. (in English) [*Protoneura paucinervis* was caught at 23-XII-2007. All published records from this species "are from the Amazon region of Ecuador, Peru and Brazil. This one is the first from Venezuela (El Limón, 430 m a.s.l., Maracay, Aragua State)."] (Author)] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univers. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com
- 13622.** Donnelly, T.W. (2008): Book Review: Field Guide to the Dragonflies and Damselflies of Algonquin Provincial Park and the Surrounding Area. *Argia* 20(4): 25. (in English) [Review of: Jones, C.D.; Kingsley, A.; Burke, P.; Holder, M. (2008): Field Guide to The Dragonflies and Damselflies of Algonquin Provincial Park and the Surrounding Area. The Friends of Algonquin Park. Algonquin Park Field Guide Series 1. 263 pp] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 13623.** Donnelly, T.W. (2008): A hybrid complex in *Enallagma*. *Argia* 20(3): 10-11. (in English) [Hybrids of *Enallagma anna* and *E. civile* as well as *E. carunculatum* and *E. civile* are documented.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 13624.** Dragonfly Society of the Americas (2008): *Argia* 20(1). *Argia* 20(1): 34 pp. (in English) [The following administrative or organisatoric items are issued: In This Issue: 1; 2008 DSA Annual Meeting in Bend, Oregon, 1–3 August Johnson: 6; Plans Underway for the Northeast Regional Meeting of the DSA, in the Northern Adirondacks and St. Lawrence Valley of New York, 26–29 June 2008: 7; Report on NymphFest 2008: 8; Request for Odonata records from the Delmarva Peninsula: 29; Dragonfly "job" announcement: 30; Recent articles and books: 30.] Address: Dragonfly Society of the Americas c/o Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com
- 13625.** Dragonfly Society of the Americas (2008): *Argia* 20(3). *Argia* 20(3): 34 pp. (in English) [The following administrative or organisational issues are reported: In This Issue: 1; The 2008 DSA Annual Meeting: 2; Minutes of the 2008 Annual Meeting of the Dragonfly Society of the Americas: 5; BAO Reminder: 6; Report on the Northeastern DSA Meeting: 7; Recent articles and books: 29; Photo supplement 35.] Address: Dragonfly Society of the Americas c/o Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com
- 13626.** Dragonfly Society of the Americas (2008): *Argia* 20(4). *Argia* 20(4): 30 pp. (in English) [Administrative and organisational issues are: Calendar of Events:1; In This Issue: 1; 2009 DSA Annual Meeting to be Held in Sullivan, Missouri, 19–21 June 2009: 2; Nick and Ailsa Donnelly Fellowship for 2009: 3; 2009 DSA SE Regional Meeting in Galax, Virginia: 4; 2008 Treasurer's Final Report: 4; Renewal reminder: 26; Recent articles and books: 26; Dues renewal form: 28.] Address: Dragonfly Society of the Americas c/o Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com
- 13627.** DuBois, B.; Tennesen, K. (2008): Nymphal habitat of *Somatochlora ensigera* Martin (Plains Emerald). *Argia* 20(1): 9-11. (in English) [16-V-2007, the larval habitat of *S. ensigera* in the Turtle River, near Arvilla, Grand Forks County, North Dakota, USA is described] Address: DuBois, R., Wisconsin Department of Natural

Resources, 1401 Tower Ave., Superior, WI 54880, USA.  
E-mail: robert.dubois@Wisconsin.gov

**13628.** Dunkle, S. (2008): Veracruz, Mexico, Dragonfly migration. *Argia* 20(1): 14. (in English) [19-X-2007, migrating ahead of an approaching cold front, providing a strong tailwind towards the south, thousands of fast speed *Tramea* sp cf. *onusta* were observed flying an attitude of app. 50 m.] Address: Dunkle, S.W.; Biology Dept, Collin County Community College, Spring Creek Campus, Plano, Texas, USA 75074. E-mail: sdunkle@ccc.edu

**13629.** Dunkle, S.; Tennessen, K.; Donnelly, T.W. (2008): Some tributes to Philip. *Argia* 20(1): 4-5. (in English) [Three tributes following the message of Philip Corbet's passing away on 13th February 2008] Address: Dunkle, S.W.; Biology Dept, Collin County Community College, Spring Creek Campus, Plano, Texas, USA 75074. E-mail: sdunkle@ccc.edu

**13630.** Ellenrieder, N. von (2008): A natural sticky-trap for Odonates. *Argia* 20(4): 10. (in English) [Argentina, El Rey National Park, end of October 2006; numerous Odonata (in most cases *Telebasis willinki* and *Erythrodiplax media*) were trapped on the surface of foam nests of the Rufous Four-eyed frog (*Pleurodema borellii*).] Address: Ellenrieder, Natalia von, California State Collection of Arthropods, CDFA, 3294 Meadowview Rd, Sacramento, CA 95832. Email: natalia.ellenrieder@gmail.com

**13631.** Garrison, R.W. (2008): 100 years of the Biologia Centrali-Americana, Neuroptera. *Argia* 20(4): 5-8. (in English) [This reminiscence and sound introduction in a monumental work highlights the pioneer character of Calvert's work] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**13632.** Gomez Anaya, M. (2008): Ecología de los ensamblajes de larvas de odonatos (insecta) y su uso potencial como indicadores de calidad ecológica en la Sierra de Coalcomán, Michoacán, México. Tesis, Universidad autónoma del estado de Hidalgo, Instituto de ciencias básicas e ingeniería, área académica de biología, doctorado en recursos bióticos: XXV + 306 pp. (in Spanish, with English summary) [Five Odonata larvae assemblages from Coalcomán Range, Michoacán, México were described and compared: Pinolapa (RP), Chichihua (CH), Ticuiz (TZ), Colorín (CL) and Estanzuela (EZ). The objectives of the study were describe and compare the assemblages and to relate them with some environmental variables judging their utility as conservation indicators. Two sampling trips for each year station were carried out, generally to beginning and final of each station. Simultaneously, the physio-

chemical variables pH, temperature, dissolved oxygen and conductivity were measured. Other variables of the streams like width, depth, current speed and gradient were measured in some additional trips. The streams were sampled in longitudinal sections of approximately 500 m using D-net and Hess sampler. We used a stratified sampling design (shores, rapids and eddies) and inside each stratum sampling was aleatory. The fauna was conserved in alcohol 96% with a replacement before 24 hours. All the larvae were identified to the species level regardless of their development stadium. As descriptive of each assemblage (alpha diversity) different diversity indexes were calculated (Shannon-Weaver H', Berger Parker, Williams's alpha), richness (Margalef), dominance (Simpson D), equitativity (Pielou). To compare and order the diversity of the water bodies the Renyi's index was used. The Bray-curtis' similarity index was used to evaluate the replacement rate (beta diversity) space and temporarily. An estimation of the theoretical richness using non parametric methods (presence/absence: Chao2, Jack2, Bootstrap and Mao Tau; abundance: ACE and Chaol) and parametric methods (Clench and von Bertalanffy) was carried out. Abundance of species was adjusted to the four classic models (stick broken, normal log, log series and geometric); additionally, each assemblage was separated in two groups, core and occasional species, according to Magurran & Henderson (2002). We used Canonical Correlation (CC) and Correspondences Analysis (AC) to explore the possible relationship between the physiochemical and environmental variables with species abundance. Discriminante Analysis (AD) was used to corroborate if the assemblages of Zygoptera, Anisoptera and *Argia* was able to segregate well the streams, the year stations and the strata. Among the results, the water bodies showed important physiochemical differences creating a temporal and geographical mosaic of variation. A total of 75 Odonata species (gamma diversity) were registered of a total of 380 samples. Number of species was higher at Ticuiz (36) and smaller at Colorín (18). These water bodies represented the ends in diversity and conservation in Coalcomán Range. Additionally, Ticuiz represents a mixed environment (lotic - lentic) with a moderate degree of stress being this fact the possible reason of its highest diversity and corroborating the intermediate-disturbance hipótesis. On the other hand, Colorín represents the water body more conserved with a characteristic Odonata assemblage of mountain streams of cloudest forest. According to the richness estimators, the five lists of species are still incomplete, being the most complete those of Estanzuela and Colorín. CC showed that some physiochemical variables could be responsible for the abundance of some species, while the AC indicated that a possible association can exist between the species and the strata, being the shores that support the highest diversity and abundance. AD evidenced that the assemblages of Zygoptera, Anisoptera and *Argia* can segregate well among the water bodies, year stations and strata. Final-

ly, we considered convenient to looking for indicator species of conservation among the *Argia* genus." (Author)] Address: Gomez Anaya, J.A., Instituto de Ecología, A.C. Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: antonio.gomez@inecol.edu.mx

**13633.** Gregoire, S.; Gregoire, J. (2008): Update on *Celithemis elisa* (Calico Pennant) emergence in New York State. *Argia* 20(1): 14-15. (in English) [USA; in 2007, 6,497 specimens emerged from a 35x40 m study pond. Influence of weather on behaviour and emergence is discussed.] Address: Gregoire, J., Kestrel Haven Avian Migration Observatory, Burdett, NY 14818, USA. E-mail: khmo@empacc.net

**13634.** Groover, R.S. (2008): Eastern Amberwings (*Perithemis tenera*) non-existent at eutrophic covered ponds? *Argia* 20(1): 15-16. (in English) [Virginia, USA; author discusses the observation that ponds completely covered with *Lemna minor* are not occupied by *P. tenera*] Address: Groover, R.S., Biology, J. Sageant Reynolds Community College, Richmond, VA, USA. E-mail: rgroover@reynolds.edu

**13635.** Harp, G.L. (2008): New records for Tamaulipas and Colima states in Mexico. *Argia* 20(1): 27-28. (in English) [Previously unrecorded regional records are: *Epitheca princeps*, *Celithemis eponina*, *Enallagma signatum*, *Tamea calverti*, *Ischnura posita*, *Hetaerina cruentata*.] Address: Harp, G., Department of Biological Sciences, Arkansas State University, State University, AR 72467, USA. E-mail: glharp@astate.edu

**13636.** Harp, G.L. (2008): New records for Idaho and Wyoming. *Argia* 20(4): 19-20. (in English) [Several new county records are documented. *Rhionaeschna multicolor* is new to Idaho, USA.] Address: Harp, G., Dept of Biological Sciences, Arkansas State University, State University, AR 72467, USA. E-mail: glharp@astate.edu

**13637.** Johnson, J. (2008): Beware the spotless *Leucorrhinia hudsonica* (Hudsonian Whiteface). *Argia* 20(4): 9-10. (in English) [Colour variation of *L. hudsonica* (lack of red spots on abdomen) is discussed. The paper also refers to a note on a new state record of *L. proxima* in Oregon, USA.] Address: Johnson, J., 3003 Unander Ave, Vancouver, WA 98660, USA. E-mail: jtjohnson@comcast.net

**13638.** Manolis, T. (2008): A windy February in Florida. *Argia* 20(1): 21-23. (in English) [Report from a trip between 10-23 February 2008; Florida, USA.] Address: Manolis, T., 808 El Encino Way, Sacramento, CA, 95864, USA

**13639.** Mauffray, B. (2008): *Dythemis velox* (Swift Setwing) in Indiana. *Argia* 20(3): 26. (in English) [10-VIII-2008, Greene-Sullivan State Forest, Green County, Indiana, USA] Address: Mauffray, B., 4525 N.W.

53rd Lane., Gainesville, FL 32653, USA. E-mail: iori@afn.org

**13640.** Mead, K. (2008): Book review: Dazzling Dragonflies: A Life Cycle Story (Linda Glaser's Classic Creatures). Millbrook Press. ISBN 978-0-8225-675-30. Paperback, 32 pp. \$22.60. *Argia* 20(1): 31-[The book is directed to children, and Kurt Mead highlights the quality of content and presentation of facts.]

**13641.** Meurgey, F. (2008): Another case of westward dispersal of African odonates to the West Indies: *Tamea basilaris* Palisot de Beauvois found in Martinique (FWI). *Argia* 20(4): 20-21. (in English) [Records of an obscure *Tamea* sp. on Martinique, finally proved to be *Tamea basilaris*. The origin of this windborne species should be the Afrotropical regions. In October 2008, also several females of *T. basilaris* were observed ovipositing a basin with brackish water.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**13642.** Meurgey, F. (2008): Migration of *Pantala hymenaea* (Spot-winged Glider) in the French West Indies. *Argia* 20(4): 12. (in English) [08-IX-2008, Le Moule, E Grand-Terre, Guadeloupe; followed by several records more on Guadeloupe and Martinique. The influx is explained (partly) by the tropical storm Omar originating in the Caribbean, and crossing the West Indies in October 2008 while following a SW-NNE direction.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**13643.** Myrup, A. (2008): *Somatochlora hudsonica* (Hudsonian Emerald) from the Uinta Mountains of northeastern Utah. *Argia* 20(1): 24-26. (in English) [Two records of *S. hudsonica* are documented from July 2004 and 2007; further noteworthy species are *Somatochlora semicircularis*, *Cordulia shurtleffii*, *Leucorrhinia borealis*, *L. hudsonica*, *L. proxima*, *Aeshna juncea*, and *Coenagrion resolutum*.] Address: Myrup, A., 914 South 1635 West, Orem, Utah 84058, USA. E-mail: alanm@provo.edu

**13644.** Parr, M. (2008): Philip Corbet, specialist on the ecology of dragonflies and mosquitoes, and earnest advocate of a human population policy. *Argia* 20(1): 2-5. (in English) [This is an authoritative obituary written by a companion and friend of Philip Corbet (21.5.1929 - 13.2.2008).] Address: Parr, M.J., Hele Barton, 9c St James's St., South Pethcrton, Somerset, TA13 5BS, UK. E-mail: mima37@tiscali.co.uk

**13645.** Paulson, D.R. (2008): Lucifer Damsel (*Chrysobasis lucifer*) rediscovered during southern Florida expedition. *Argia* 20(1): 17-20. (in English) [9-15-XII-2007, southern Florida, USA. 37 species were recorded, among them *Chrysobasis lucifer*. The latter is briefly



compared to specimens from Costa Rica, and the meaning of the name "lucifer" is explained. This 2007-midwinter fauna is compared to dates from January 2000.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@pugetsound.edu

**13646.** Rutherford, R.; O'Brien, M. (2008): A significant new Hine's Emerald (*Somatochlora hineana*) record for Michigan. *Argia* 20(3): 28. (in English) [4-VIII-2008, Hayward Lake, Menominee County, Michigan, USA] Address: O'Brien, M., Insect Division, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA. E-mail: mfobrien@umich.edu

**13647.** Stanley, S.; Pehek, E. (2008): Odonata of a rare habitat in New York City. *Argia* 20(1): 11-12. (in English) [Public Ocean Breeze Park, New York city, USA; 24 odonate species were recorded in 2007. These are discussed against the background of threat by urbanisation of habitats.] Address: Stanley, Susan, New York City Department of Parks & Recreation, Natural Resources Group, New York, NY, USA

**13648.** Strausfeld, N.J.; Seyfarth, E.-A. (2008): Johann Flögel (1834–1918) and the birth of comparative insect neuroanatomy and brain nomenclature. *Arthropod Structure & Development* 37: 434-441. (in English) ["Johann H.L. Flögel (1834–1918) was an amateur scientist and self-taught microscopist in Germany who 130 years ago pioneered comparative arthropod neuroanatomy. He was fascinated by innovations in optical instrumentation, and his meticulous studies of the insect supraoesophageal ganglia were the first to use serial sections and photomicrographs to characterize the architecture of circumscribed regions of brain tissue. Flögel recognized the interpretative power resulting from observations across various species, and his comparative study of 1878, in particular, provided a baseline for subsequent workers to evolve a secure nomenclature of insect brain structures. His contributions stand out from contemporary accounts by virtue of their disciplined descriptions and emphasis on identifying comparable elements in different taxa. Here we give a biographical sketch of his life and summarize his remarkable achievements." (Authors) The publication includes a photograph of the brain structure of *Aeshna mixta* from Flögel's original publication from 1878: Flögel, J.H.L., 1878. Ueber den einheitlichen Bau des Gehirns in den verschiedenen Insecten-Ordnungen. *Zeitschrift für wissenschaftliche Zoologie* 30, 556–592.] Address: Strausfeld, N.J., Arizona Research Laboratories, Division of Neurobiology, 611 Gould-Simpson, University of Arizona, Tucson, AZ 85721, USA. E-mail: fly-brain@neurobio.arizona.edu

**13649.** Tennessen, K. (2008): A tip for pointing out perched Odonates in the field. *Argia* 20(4): 11. (in English) [To ease communication within a group of odon-

tologists in field, a laser pointer is introduced to help pointing out a position of a hidden dragonfly specimen.] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**13650.** Tennessen, K. (2008): Dragonfly Poetry. *Argia* 20(4): 26-27. (in English) [Seven poems on dragonflies written by a group of Wisconsin poets are presented.] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**13651.** Trapero-Quintana, A.D. (2008): Anomalous tandem registered in *Telebasis dominicanum* (Selys, 1857) (Zygoptera: Coenagrionidae). *Argia* 20(1): 16. (in English) [8-x11-2007, 5,5km down the main road near North Santiago de Cuba, Cuba. Two males of *T. dominicanum* formed a tandem.] Address: Trapero Quintana, A., Departamento de Biología de la Universidad de Oriente, Patricio s/n, Santiago, Cuba, CP 90500, Cuba. E-mail: atrapero@cnt.uo.edu.cu

## 2009

**13652.** Bend, Y.I.; Cong, Q.; Wang, X.j. (2009): Mechanism of hydrophobicity of dragonfly wing surface. *Transactions of the Chinese Society for Agricultural Machinery* 40(9): 205-208. (in Chinese, with English summary) ["By means of scanning electron microscope (SEM), Fourier transform infrared spectroscopy (FT-IR) and optical contact angle measuring instruments, the microstructure, ingredient and hydrophobicity of dragonfly wing surface was investigated. Results show that dragonfly wing surface is covered with large number of papilla, leading to the composite contact between liquid droplet and dragonfly wing surface, which enhances the hydrophobicity of dragonfly wing surface. The waxy layer increases the hydrophobic capacity of dragonfly wing surface. Moreover, the hydrophobic equation of dragonfly wing surface was established through the Cassie model, and the multivariate coupling mechanism of dragonfly wing surface was analyzed. It is the conclusion that the hydrophobicity ascribes to co-coupling of the microstructure and ingredient of dragonfly wing surface." (Authors)] Address: Wan, Yanling, Key Laboratory for Bionic Engineering, Ministry of Education, Jilin University, Changchun 130025, China

**13653.** Maynou i Señé, X. (2009): Aportació al coneixement de la fauna odonològica del massís de Sant Llorenç del Munt i la serra de l'Obac. *Butlletí de la Institució Catalana d'Historia Natural* 75: 85-98. ["An updated list of 28 species of Odonata recorded in the Sant Llorenç del Munt Massif and Obac Range (Catalonia, Spain) in 2007 and 2008 is provided, with an estimation of the degree of presence of each species. The list of species is compared to existing records, old and recent. The species diversity observed in this study is similar to that in other Catalan nature reserves, although most of the species found here can be considered ecological

generalists. In this survey, data regarding reproduction and phenology are also provided for every species, the most important dragonfly sites are identified and actions for the conservation and improvement of the Odonata community richness are suggested." (Author)] Address: Xavier.maynon@gmail.com

**13654.** Winkel, S.; Kuprian, M.; Weber, R.; Weber, E.; Mathias, T. (2009): Das NABU-Schutzgebiet „Amphibienparadies Steinau-Marborn“. Erste faunistische Ergebnisse einer Erfolgskontrolle. MKK-Mitteilungsblatt. Zentrum für Regionalgeschichte 34: 9-12. (in German) [Hessen, Germany. 20 odonate species are listed between 2007 and 2009; the list includes *Erythromma najas*, *E. viridulum* and *Sympetrum vulgatum*.] Address: Winkel, Sibylle, Pommernstr. 7, 63069 Offenbach, Germany. E-mail: Si-winkel@t-online.de

## 2010

**13655.** Nel, A.; Nel, P.; Petrulevicius, J.F.; Perrichot, V.; Prokop, J.; Azar, D. (2010): The Wagner Parsimony using morphological characters: a new method for palaeosynecological studies. *Ann. soc. entomol. Fr.* (n.s.) 46(1–2): 276-292. (in English, with French summary) ["The limits and difficulties related to the tools currently in use for palaeosynecological comparisons of faunas or floras of different geological periods are discussed. The new method of the Wagner parsimony Applied to Palaeosynecology Using Morphology (WAPUM method), is defined and tested on morphological characters gathered from two insect groups Odonoptera and Thripida. The difficulties related to the monophyly of the taxonomic groups used in the more traditional approaches are no longer a problem when using the WAPUM method. In the WAPUM a character is 'presence versus absence of species bearing a morphological structure'. The results obtained from use of the WAPUM minimize the number of changes among character states. Application of the WAPUM could reveal signals to confirm or object the currently available scenarios for the global changes in the evolution of past diversity and disparity of organisms (major changes or global crises of diversity)." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**13656.** Poinar, G. (2010): Palaeoecological perspectives in Dominican amber. *Ann. soc. entomol. Fr.* (n.s.) 46(1–2): 23-52. (in English, with French summary) ["Palaeoecological and palaeobiogeographical aspects of Dominican amber are discussed based on the known insect fauna. Topics covered are examples of speciation, extinctions, longevity as well as associations between insects and plants, insects and vertebrates and various arthropod groups. Examples of camouflage, oviposition and predator-prey associations are presented. Ecological and medical implications from recently discovered vector-parasite associations (malaria, trypan-

nosomiasis and leishmaniasis) are discussed. Paleosymbiotic associations, with examples of phoresis, mutualism, parasitism and pathogens, are examined. Insects in Dominican amber, together with their cohabitants, can assist in determining specific habitats and reconstructing ancient landscapes." (Author) Figure 8 demonstrates *Diceratobasis worki* (Zygoptera: Coenagrionidae) probably bred in tank bromeliads.] Address: Poinar, G. Jr., Dept of Zoology, Oregon State Univ., Corvallis, OR 97331, USA: E-mail: poinarg@science.oregonstate.edu

**13657.** Rowe, R.J. (2010): *Ischnura aurora* (Brauer 1865) (Zygoptera: Coenagrionidae), an Australo-Pacific species. *New Zealand Journal of Zoology* 37(2): 189-192. (in English) ["There is some confusion over the identity of small forms of *Ischnura* occurring in South and East Asia and the Australo-Pacific region. Here, characters are given that separate *Ischnura aurora* (Brauer 1865) of the Australo-Pacific region from animals from the Asian mainland and nearby islands. Difficulties in attaching a name, or names, to Asian forms are considered. ... As work to progress this problem needs to be done with fresh, and possibly with living, material, this is a problem which can only be solved by persons resident in the area. The name, or names, to be associated with these Asian forms will require examination of the types of *rubilio*, *amelia* and *bhimtalensis*, together perhaps with a sensitive choice of a lectotype for *delicata*." (Author)] Address: Rowe, R.J., School of Marine and Tropical Biology, James Cook University, Townsville, Australia. E-mail: richard.rowe@jcu.edu.au

**13658.** Schmitt, V. (2010): Inventaire des populations de *Coenagrion mercuriale* (Charpentier, 1840) dans le bassin de la Chiers (Odonata, Zygoptera: Coenagrionidae). *Martinia* 26(3/4): 123-130. (in French, with English summary) ["For the needs of the project Interreg IVa Big Region entitled "Preservation of the remarkable natural elements of the Chiers basin in the Belgian and French Lorraine", it was necessary to know better the localization of the populations of *C. mercuriale* in the Chiers watershed. The method used and the results are both described in this paper." (Author)] Address: Schmitt, Virginie, Conservatoire des Sites Lorrains, 14 rue de l'Eglise, F-57930 Fénétrange, France

**13659.** Zhang, H.-j.; et al. (not stated) (2010): Distribution and species key of genus *Sympetrum* from China. *Journal of Anhui Agri. Sci.* 38(14): 7386-7388. (in Chinese, with English summary) [28 species of the genus *Sympetrum* are keyed.] Address: Zhang, H.-j., Shaanxi Bioresource Key Laboratory, Shaanxi University of Technology, Hanzhong-723000, Shaanxi, China. E-mail: hjzhang663@sohu.com

## 2011

**13660.** Bo, T.; Fenoglio, S. (2011): Impacts of a micro-sewage effluent on the biota of a small Apennine creek.

Journal of Freshwater Ecology 26(4): 537-545. (in English) ["Organic pollution of domestic origin represents the most important cause of water quality deterioration in rural and mountainous areas of the northern Apennines. In this study, the ecological consequences of a small sewage dump in the Caramagna Creek (north-western Italy) were analyzed. The addition of organic matter and nutrients led to a dramatic change in the taxonomic richness and density of the macrobenthic community. Also functional, biological, and ecological composition of the invertebrate assemblages changed downstream of the effluent. Interestingly, benthic chlorophyll a showed only a weak increase in the downstream section, despite the increased levels of nutrients. This work emphasizes the importance of better management of sewage treatment also in remote areas." (Authors) The samplings include *Cordulegaster boltonii* and *Boyeria irene*.] Address: Fenoglio, S., University of Piemonte Orientale, Di.S.A.V., Via Bellini 25, I-15100 Alessandria, Italy. E-mail: fenoglio@unipmn.it

**13661.** Dow, R.A.; Reels, G.T. (2011): Odonata from a remnant patch of disturbed peat swamp forest on the outskirts of Kuching, west Sarawak. *Agrion* 15(2): 50-51. (in English) ["Before large-scale human alterations began, much of the surroundings of what is now Kuching, the state capital of Sarawak, consisted of various types of swamp forest, including much peat swamp forest. Later, rubber was planted in parts of this swamp forest. M.A. Lieftinck (1953: 236), under the description of *Podolestes harrissoni*, gave an incomplete list of species collected in "an old rubber garden" on the Matang Road outside of Kuching, on September 22, 1950. This list included a number of apparently very scarce species (e.g. *Amphicnemis madelenae*, *Nannophyopsis chalcosoma* and *Pseudagrionoptera diotoma*). Since Lieftinck's day Kuching has expanded considerably and there has been extensive development along the Matang Road, so that most of the peat swamp/old rubber habitat has gone. However, one patch remains, although probably not for much longer. Indeed, it may already have been bulldozed; we last passed the site in July 2010, when building work was occurring immediately adjacent to it. We first visited this site in January 2006, and made return visits in 2008 and 2010. The site is small, consisting of disturbed peat swamp with many old rubber trees that are still being tapped (on his last visit, RAD was ordered out of the site by machete-wielding rubber tappers). This site is at least near to Lieftinck's site, but remarkably we have collected a number of species not found by Lieftinck, illustrating the biodiversity of this kind of habitat in west Sarawak, and the extreme localisation of some species. Most notable of our discoveries at the Matang road was *Pachycypha* sp cf *aurea*. *P. aurea*, a tiny chlorocyphid, was described from the south of Kalimantan, and remains the only named species in the genus, which has not been recorded outside of Kalimantan until now. Despite the small size of the Matang Road site, it was not until May

2010 that we found this minute taxon, along one short section of a tiny stream. Both sexes descended from the canopy only in full sunlight, typically perching high. They were at low densities, and no interactions were observed between the sexes. They typically returned to the canopy almost immediately after the sun became obscured by clouds. A full list of the 26 species we have collected at the site is given below. Most of them were not listed by Lieftinck, but probably a number of these were actually collected by him; six species (at least) collected by Lieftinck were not collected by us. At least two of the species listed here are as yet unnamed; descriptions of both are being prepared by RAD." (Authors)] Address: Dow, R.A., NCB Naturalis, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**13662.** Engelmann, A. (2011): Analyse von Exkrementen gefangener Waschbären (*Procyon lotor* L., 1758) aus dem Müritz-Nationalpark (Mecklenburg-Vorpommern) unter Berücksichtigung individueller Parameter. Diplomarbeit. Ernst-Moritz-Arndt-Universität Greifswald: 109 pp. (in German, with English summary) ["In the current study the diet behaviour of the raccoon (*Procyon lotor* L., 1758) has been investigated in a semi-natural habitat of the North-Eastern Lowland (Müritz National Park, Mecklenburg-West Pomerania) by means of 220 faeces samples collected between 2006 and 2009. Each of the samples could be associated to a day with a single individual raccoon. Thus, it was possible to relate the results of the fecal analysis to other known parameters (sex, age, habitat use). The raccoon's diet, being dominated by invertebrates (biomass = 43,7 %) and plants (biomass = 41,3 %), mainly consisted of earthworms, molluscs, insects, fruit, and nuts. Furthermore, the diet depended on the season of the year and the age, sex and habitat use of the individual." (Author) 26 of the faeces included Odonata.] Address: Engelmann, Anett, Projekt Waschbär, Goldenbaum 38, 17237 Carpin, Germany

**13663.** Fabbri, R. (2011): Two species of Odonata new to Emilia-Romagna Region, and one confirmed. (*Insecta Odonata*). *Quaderno di studi e notizie di storia naturale della Romagna* 34: 47-50. (in Italian, with English summary) ["*Oxygastra curtisii* and *Trithemis annulata* are reported as new for the dragonfly fauna of Emilia-Romagna. *Coenagrion mercuriale castellanii* is confirmed as present in Romagna in four new localities." (Author)] Address: Fabbri, R., Museo Civico, Sezione Naturalistica, via Vittorio Veneto, 1/a, 48012 Bagnacavallo (RA), Italy. E-mail: eco.fabbri@gmail.com

**13664.** Hatami, R.; Soofiani, N.M.; Ebrahimi, E.; Hemami, M.R. (2011): Evaluating the aquaculture effluent impact on macroinvertebrate community and water quality using BMWP index. *Journal of Environmental Studies* 37(3): 13-15. (in Farsi) ["We investigated the environmental impact of trout farm discharge on Za-



yandeh-Rud River. Three farms with different production capacities; 250, 25 and 70 tones were assigned to this study. Five sampling sites were designated to each farm. Benthic macroinvertebrates were collected in autumn, winter, and spring using the quantitative techniques. A total of 11 classes, 16 orders and 53 families' of macroinvertebrates were identified. Information on macroinvertebrates of each site was used to calculate the biological monitoring working party (BMWP). BMWP index was significantly ( $p < 0.01$ ) low at farm effluents especially when the production capacity was high. At these locations, abundance of tolerant taxa (e.g. Chironomidae, Simuliidae, Oligochaeta families) increased, but sensitive taxa (Ephemeroptera and Trichoptera) declined in number. The BMWP index values were closely related to production rate and the lowest values ( $6.03 \pm 1.17$ ) was recorded at the farm with the highest production. Although, BMWP index at site 50 m after the outfall showed low or no recovery of water quality and community structure, however, at site 1 km after the outfall BMWP values exhibited a partial downstream spatial recovery of community structure so that no significant difference with upstream site was observed. We concluded that self-purification capacity and the high water flow of the river dilutes effluents so that biotic index showed no alarming condition at the farthest downstream station." (Authors) Gomphidae, Calopterygidae] Address: Hatami, R.; E-mail: rezvan.hatamiut@yahoo.com

**13665.** Henheik, H. (2011): Zum Vorkommen der Quelljungfer-Arten (*Cordulegaster bidentata*, *C. boltonii*) im näheren Umkreis von Tübingen. *Mercuriale* 11: 1-10. (in German, with English summary) ["In 2001, 100 small brooks in the surroundings of the city of Tübingen (Federal state of Baden-Württemberg, Southwest-Germany) were surveyed for the two *Cordulegaster* species by larval search. While 243 larvae of *C. bidentata* were found in 26 small brooks, only 19 larvae of *C. boltonii* were found in one brook. Larvae of *C. bidentata* were found in altitudes of 320 – 410 m a s l. and in distances of 8 to 1,225 m from the sources." (Author)] Address: Henheik, H., In Angeräcker 1, 72829 Engstingen, Germany. E-mail: hhenheik@googlemail.com

**13666.** Hunt, P.D. (2011): Odonata of the Lamprey River, NH. <http://www.lampreyriver.org/UploadedFiles/Files/odonatareport2011.pdf>: 18 pp. (in English) [New Hampshire, USA "Extensive surveys for Odonata were conducted along the Lamprey River from Northwood to Durham in 2011 and supplemented with data collected in previous years. A total of 74 species has been reported along the river, 29 of which can be considered specialists of rivers and streams. Overall, the percentage and total number of such species at a site increased from the headwaters (mean of 6.5 river species) through the lower portions (e.g., Lee and Durham, mean of 23 river species). This increase in species richness likely results from the increased size and habi-

tat diversity at downstream sites, since only a few species were restricted to upstream areas. No river species of statewide conservation concern were detected along the Lamprey, probably because these species are more typical of larger rivers like the Connecticut and Merrimack. One common river group – the snaketails in the genus *Ophiogomphus* – seemed relatively rare compared to other rivers in New Hampshire. Given available data, the local rarity of *Ophiogomphus* might be related to in-stream conditions or to a general rarity in coastal plain streams. Issues known to affect the Lamprey, and thus potentially its odonate fauna, include sedimentation, temperature, and extremely high or low flows, but more detailed study would be needed to determine if any of these is affecting local species distributions. Overall, the odonate fauna of the Lamprey appears diverse and healthy and is likely to persist in the absence of large-scale perturbations such as extensive losses of riparian buffers, increased pollution, or excessive alteration of substrate conditions." (Authors)] Address: Hunt, Pamela, NH Audubon, Lamprey River, 203 Wadleigh Falls Road, Lee, NH 03861, USA

**13667.** Kastner, F.; Mückenwarf, M.; Buchwald, R. (2011): Zum Vorkommen der FFH-Libellenart *Aeshna viridis* Eversmann, 1836 (Odonata: Aeshnidae) in Krebscherengraben der Hunte- und Wesermarsch, Niedersachsen. *Drosera* 2010: 103-108. (in German, with English summary) ["On the occurrence of *A. viridis*, species of the European Habitat Directive, in ditches with Water Soldier in the Hunte and Weser river marshes, Lower Saxony, Germany. *A. viridis* is strongly linked to standing waters with dense stands of the Water Soldier (*Stratiotes aloides*), that serves the dragonfly as the only oviposition plant species for the dragonfly. In north-western Germany, *A. viridis* predominantly occurs in the river plains of Aller, Elbe, Weser, and Ems. For this study, we analysed all available inventories (expert reports, student research projects) on the distribution and present habitats of *Aeshna viridis* in the Hunte and Weser river marshes between Oldenburg and Bremen. In 2010, we recorded the occurrence of the endangered dragonfly species in the following locations with marsh ditches: NSG Bornhorster Huntewiesen, Iprump, Huntebrück, Warfleth, and Sandhausen. We consider its presence in these habitats to be autochthonous." (Authors)] Address: Friederike Kastner, Friederike, AG Vegetationskunde und Naturschutz, IBU, Carl von Ossietzky Universität Oldenburg, 26111 Oldenburg, Germany. E-Mail: Friederike.Kastner@uni-oldenburg.de

**13668.** Lienenbecker, H. (2011): Libellen im Raum Bielefeld-Gütersloh - Zufallsbeobachtungen eines Botanikers. *Ber. Naturwiss. Verein für Bielefeld u. Umgegend* 50: 160-166. (in German) [Nordrhein-Westfalen, Germany; 10 localities were studied resulting in 30 Odonata species. Of regional interest are *Lestes dryas*, *L. virens*, *Ischnura pumilio*, *Coenagrion pulchellum*, *Erythromma najas*, *E. viridulum*, *Gomphus vulgatissi-*

mus, *G. pulchellus*, *Sympetrum danae*, *S. flaveolum*, *S. vulgatum*, *Crocothemis erythraea*, and *Leucorrhinia dubia*] Address: Lienenbecker, H., Traubenstr. 6b, 33803 Steinhagen, Germany

**13669.** Mezquita Aranburu, I.; Ocharan, F.J.; Torralba-Burrial, A. (2011): Primera cita de *Orthetrum albistylum* (Sélys, 1848) (Odonata: Libellulidae) para la Península Ibérica. Boln. Asoc. esp. Ent. 35(3-4): 519-523. (in Spanish) [16-VII-2011, male of *O. albistylum* observed at Plaiaundi Ecological Park (Guipúzcoa), Bahía de Txingudi (30TWP978004, 6 m a.s.l, Irún, Guipúzcoa).] Address: Mezquita Aranburu, I., Depto de Entomología de la Sociedad de Ciencias Aranzadi, Paseo de Zorroaga, 11, 20004 Donostia-San Sebastián (Spain). E-mail: mezquitaaranburu@gmail.com

**13670.** Sänger, H.; Köhler, M. (2011): Natur- und Artenschutz auf Folgeflächen des Uranerzbergbaus. Proceedings des Internationalen Bergbausymposium WIS-SYM2011: 11 pp. (in German) [Halde Beerwalde, Thüringen, Germany; "Mining and extraction of natural resources are related with infringements on nature and landscape. After finalization of mining activities long-term remediation is necessary. Within the law to reclamation activities of the mining areas it is also necessary to take account of the demands of nature conservancy and species protection. The paper offers insights to the manifold possibilities to create significative seminatural biotopes within the Remediation." (Authors) The following Odonata species are listed: *A. cyanea*, *A. grandis*, *A. mixta*, *Anax imperator*, *Coenagrion puella*, *Enallagma cyathigerum*, *Libellula quadrimaculata*, *Sympecma fusca*, *S. danae*, *S. sanguineum*, and *S. vulgatum*.] Address: Sänger, H., BIOS-Büro für Umweltgutachten, Berggasse 6, 08451 Crimmitschau, Deutschland

**13671.** Schiphouwer, M.E. (2011): What do Ponto-Caspian Gobiidae eat in the Dutch Rhine river system? Reports Environmental Science nr. 372: 35 pp. (in English) ["This research was executed during the first research internship period of the Master of Environmental Science, with the Nature and Water Management specialisation. The internship was supervised by Rob Leuven of the Department of Environmental Sciences at the Radboud University in Nijmegen and Frank Spikmans of the RAVON Foundation in Nijmegen. During this internship I had the opportunity to work with fish, which are of personal interest to me. Introduction of exotic fish can have adverse effects on the native ecosystems in the Netherlands. Because there was not much information available concerning the recently arrived Gobiidae a research subject was born. The research concerns a preliminary investigation on feeding habits of four Gobiidae species in the Dutch Rhine river system, based on stomach contents analysis." (Author) The diet of *Proterorhinus semilunaris* includes Zygoptera.] Address: Schiphouwer, M.E., Department of Environmental Science, Faculty of Science, Radboud University

Nijmegen, Heyendaalseweg 135, 6525 AJ Nijmegen, the Netherlands

**13672.** Terzani, F. & Fabbri, R. (2011): Odonata from the National Park of Casentine forests, Mount Falterona and Campigna, in Northern Apennines. (Insecta Odonata). Quaderno di studi e notizie di storia naturale della Romagna 34: 21-46. (in Italian) ["19 taxa of Odonata were reported so far by literature from the Casentine Forests National Park. The field researches carried out by the authors in the National Park and close surroundings, with some additional data from other collections, increase the number to 33 taxa, by addition of 14 taxa. 324 records with collection data are listed: 67 are reported from literature and 257 are unpublished records." (Authors)] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**13673.** Wildermuth, H. (2011): Ein unbeabsichtigt entstandenes Gewässer im intensiv genutzten Landwirtschaftsland als Libellenhabitat. Mercuriale 11: 43-46. (in German, with English summary) ["The odonate fauna of an ephemeral pond arisen from heavy rainfall in a meadow depression, comprising seven species with *Ischnura pumilio* constituting the most abundant, was compared with a recently created, structurally similar pond that was frequented by 15 species of which *I. pumilio*, *I. elegans* and *Enallagma cyathigerum* were the most common. The importance of accidentally originated temporary pools for the existence of pioneer species such as the regionally rare *I. pumilio* is discussed." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**13674.** Zhang, H. (2011): Karst Forest Odonata from Southern Guizhou, China. International Dragonfly Fund - Report 37: 1-35. (in English) ["The paper compiles records from four excursions to study the Odonata fauna of southern Guizhou, China. Between 2007 and 2010 in Xiaoqikong Park and Maolan National Nature Reserve, 104 taxa have been recorded. Some interesting species are discussed, compared with sibling taxa, and information on habitats and habits is given." (Author)] Address: Zhang, H., Department of Entomology, College of Natural Resources and Environment, South China Agricultural University, Guangzhou 510642, China. E-mail: zhanghaomiao6988@gmail.com

## 2012

**13675.** Amaya-Perilla, C.; Palacino-Rodriguez, F. (2012): An Updated list of the dragonflies (Odonata) of Meta department, Colombia, with forty-six new department records. Bulletin of American odonatology 11(2): 29-38. (in English, with Spanish summary) ["As a result of several years of sampling in Meta Department, Colombia, an updated list of dragonflies species is provided, of

which 46 are new department records. A total of 12 families, 60 genera, and 144 species are reported, which represents 85% of the families, 68% of the genera, and 44% of the species recorded from Colombia." (Authors)] Address: Amaya-Perilla, Catalina, School of Biological Sciences, University of Auckland, 3A Symonds Street, Thomas Building 110, Auckland, Grafton 1010, New Zealand. E-mail: c.amaya@ auckland.ac.nz.

**13676.** Beukema, J.J.; Manger, R. (2012): Threats of drought for dragonflies in dune areas. *Levende Nat.* 113(6): 288-291. (in Dutch, with English summary) ["In dune areas, Odonata mostly depend on small and shallow ponds and pools. For over 10 years, numbers of dragonflies were monitored at ponds in the dunes of the northern part of Holland. At all pools, their abundances were strongly reduced at low water levels after periods of drought. Such declines were more substantial at shallow than at deeper ponds. In ponds that had run dry completely, recovery of numbers took 2 or 3 years in Zygoptera, whereas the larger Anisoptera immigrated more rapidly and reached the usual numbers within the first year. Deepening of shallow pools or digging of new pools resulted in higher abundances, again much faster in Anisoptera than in Zygoptera. To keep dune areas well populated by dragonflies, we advise to maintain sufficient pond depths." (Authors)] Address: Beukema, J.J., Linieweg 19, NL-1783BA Den Helder, The Netherlands

**13677.** Buczyński, P.; Łabędzki, A. (2012): Landscape park of "Janowskie Forests" as a hotspot of dragonfly (Odonata) Species diversity in Poland. In: Dyguś, K.H. (ed.): *The natural human environment. Dangers, protection, management, education.* Wyższa Szkoła Ekologii i Zarządzania, Warszawa: 151-174. (in English, with Polish summary) ["The "Janowskie Forests" Landscape Park protects a major part of the Janowskie Forests – one of the most environmentally valuable, compact forest complexes in Poland. It constitutes a key fragment of one of hotspots of diversity of dragonflies in Poland. The authors discuss results of long-term studies on the area (1988-1990, 1993-1998). In a relatively small area (approximately 40 000 ha) 58 species of dragonflies were recorded here (79.4% of the national fauna). Such rich species diversity results from a fortunate coincidence. In spite of regular conducting of forest economy measures, natural waters were destroyed to little extent. Particularly peatbogs, streams, and rivers survived in a good state. This is why populations of majority of stenotopes were preserved, as reflected by identification of 10 protected species, two species from the Polish red list of dragonflies, and one species from the European red list of dragonflies. Human economy contributed to increased differentiation of the landscape, and development of numerous anthropogenic waters, particularly fish ponds and sand pits, inhabited by rich communities of dragonflies. The character of the catchment, constituting an efficient forest "biological filter", often determines the habitat features of ponds, similar to

those of dystrophic lakes, or at most moderately eutrophic lakes. The study area can be treated as an object of an unintentional experiment which contributed to enriching the dragonfly fauna, and did not lead to loss of majority of the most valuable primary elements. It provides valuable guidelines for management of other protected areas, and particularly for implementation of active protection measures." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**13678.** Deplon, G. (2012): Contribution à l'inventaire des Odonates du Tarn. OPIE Midi-Pyrénées. Rapport de Stage. Août 2012: 42 pp. (in French) [Department Tarn, France. The report focus on the results of mapping activities in July 2012 and presents data on *Macromia splendens*, *Oxygastra curtisii*, *Gomphus graslinii*, *Coenagrion mercuriale* and *C. caerulescens*. In addition, records of *Trithemis annulata*, *Somatochlora metallica*, and *Lestes dryas* are documented.] Address: not stated

**13679.** He, Q.-j.; Yi, C.-h.; Yang, Y.-m.; Li, X.; Wang, L. (2012): Review on aquatic insect in Yunnan plateau. *Southwest China Journal of Agricultural Sciences* 25(1): 314-317. (in Chinese, with English summary) [The article reviews some regional studies without going into the details. only *Asiagomphus gongshanensis* is mentioned.] Address: He, Q.-j., Yunnan Academy of Forestry, Yunnan Kunming 650204, China. E-mail: heqiuju@163.com

**13680.** He, Q.-j.; Yi, C.-h.; Yang, Y.-m.; Li, X.; Wang, L. (2012): Faunal analysis of Odonata in Cangshan Erhai National Nature Reserve. *Journal of Northwest Forestry University* 27(3): 131-136. (in Chinese, with English summary) [Based on literature and field data, 65 odonate species were recorded for the nature reserve. The species are listed and classified according to their zoogeographic distribution.] Address: Yi, Chuan-hui, Yunnan Academy of Forestry, Kunming, Yunnan 650201, China. E-mail: ynkcx2007@163.com

**13681.** Johnson, J.; Valley, S. (2012): Update of The Odonata of Oregon. *Bulletin of American odonatology* 11(2): 39-47. (in English) ["92 species are currently recorded in Oregon. Additional and updated records since Johnson & Valley (2005) are summarized for 28 species and one hybrid with some range maps updated. The current county records and early/late flight dates for all known species in Oregon are presented." (Authors)] Address: Johnson, J., 3003 Unander Ave, Vancouver, WA 98660, USA. E-mail: jtjohnson@comcast.net

**13682.** Keppner, E.J. (2012): Odonata records from Bay and Washington counties and the St Andrew Bay drainage basin, Florida. *Bulletin of American odonatology* 11(2): 49-67. (in English) ["An annotated list of the



Odonata occurring in Bay and Washington counties and the St. Andrew Bay drainage basin, Florida, is presented based on collections of adults and nymphs from 2003-2012. This survey, combined with reports from the literature, resulted in 114 species of Odonata (36 Zygoptera and 78 Anisoptera) being reported from the survey area with 94 species of odonates reported for Bay County (31 Zygoptera and 63 Anisoptera), 92 for Washington County (28 Zygoptera and 64 Anisoptera), and 99 for the St. Andrew Bay drainage basin (31 Zygoptera and 68 Anisoptera). The Florida Natural Areas Inventory lists 20 of the species reported from the survey area as imperiled and the Florida Fish and Wildlife Conservation Commission lists 13 of those species as Species of Greatest Conservation Need." (Author)] Address: Keppner, E.J., 4406 Garrison Road, Panama City, FL 32404, USA. E-mail: ekeppner@bellsouth.net

**13683.** Orr, A.G.; Kalkman, V.J.; Richards, S.J. (2012): A review of the New Guinean genus *Paramecocnemis* Lieftinck (Odonata: Platycnemididae), with the description of three new species. *The Australian Entomologist* 39(3): 161-177. (in English) ["The genus *Paramecocnemis* Lieftinck, previously known from two species from northern New Guinea, is redefined on the basis of new material recently collected in the Sepik Basin and Western Province of Papua New Guinea. Three new species are described: *P. spinosus* sp. n. and *P. similis* sp. n. are quite close to the generic type species, *P. erythrostigma* Lieftinck, while *P. eos* sp. n. is more distantly related to known species and probably of basal stock." (Authors)] Address: Orr, B., 26 Currimundi Rd, Caloundra, Q4551, Australia. E-mail: agorr@bigpond.com

**13684.** Renker, C.; Schleich, S.; Buse, J.; Caspari, A.; Caspari, S.; Fluck, W.; Fritsch, R.; Hauptlorenz, H.; Heller, G.; Hinsberger, R.; Idelberger, S.; Jungmann, C.; Ludewig, H.-H.; Marx, M.; Reder, G.; Roth, N.; Schlotmann, F.; Schmolz, M.; Schwab, G.; Simon, H.; Simon, L.; Wagner, T.; Wedel, J.; Wedel, S.; Weitmann, G.; Weitz, W.; Weitzel, M.; Werle, H.-J.; Werno, A.; Weyrauch, G.; Willigalla, C.; Zühlke, J. (2012): Eine Momentaufnahme aus der Flora und Fauna im Landkreis Birkenfeld - Ergebnisse des 13. GEO-Tags der Artenvielfalt am 04.06.2011. *Mainzer Naturwissenschaftliches Archiv* 49: 165-236. (in German, with English summary) ["In the frame of the 13th "Geo day of biodiversity" on June 4th 2011 the authors explored the fauna and flora of several areas in the rural district of Birkenfeld (Upper Nahe Mts., Rhineland-Palatinate, Germany). The main focus was on the nature reserve "Clay pits Birkenfeld" west of the city of Birkenfeld, the floodplain of the river Nahe next to the airfield Hoppstädten-Weiersbach and the nature reserve "Alter Nahearm", an oxbow lake of the river Nahe southwest of Hoppstädten-Weiersbach. Altogether the authors detected 1,491 animal and plant species within 24 hours. Among them were 450 plant species, 920 invertebrates and 111 vertebrate species. Some of the species were first records within the investigated areas." (Authors) 21

Odonata species were recorded.] Address: Schlotmann, F., Weserstr. 11, D-55296 Harxheim, Germany. Email: frank.schlotmann@gmx.net

**13685.** Rennie-Lis, C. (2012): The microhabitat preferences of an isolated colony of *Coenagrion mercuriale* in Oxfordshire. M.Sc., Conservation Ecology, School of Life Sciences. Oxford Brookes University: 85 pp. (in English) ["*C. mercuriale* is a rare Odonata species that is only found in the UK in a selection of specialised habitats in the south. It has a declining population and is listed as endangered on the IUCN red list. It is the only species of Odonata currently given Biodiversity Action Plan (BAP) priority status in the UK, due to its limited distribution, both nationally and on a global scale. This project aimed to investigate the ecological requirements for an isolated colony of *C. mercuriale* that was mysteriously discovered in Oxfordshire in the 1990s, so that suitable habitat management activities could be developed. Mark-release-recapture surveys were conducted to enable an accurate population size to be estimated at 280 adult individuals across two sub-sites. Detailed mobility information was also gathered, which showed that dispersal distances were limited to an average of around 28m for the colony, meaning that range expansion is unlikely. Furthermore, behavioural observations uncovered some unusual breeding activity at one of the sub-sites, where there has also been a population decline trend in recent years. This warrants concerns about the viability of this population into the future. Hence, habitat management modifications have been recommended with the aim of preventing further decline." (Author)] Address: not stated

**13686.** Taylor, J. (2012): Bali jewel-damselfly display. *Agrion* 16(2): 47. (in English) [Verbatim: In 2004, I witnessed the display of a male damselfly around a female which was laying eggs. He circled facing her with his white legs outstretched and smoky wings flashing iridescent colours in the sunlight. It was so attractive I thought it would be good if I could capture it on video. On a visit last December I had the opportunity to do just this. The damselfly, *Rhinocypha fenestrata cornellii*, breeds in fast-flowing water and I found a site on an irrigation conduit near Ubud where there were many males and females active. I noticed that some of the females were laying eggs in objects near the flowing water and, seeing this, I moved a chunk of rotten wood to a place suitable for photography. Females soon arrived to lay eggs in it, and a male saw his chance and began defending the wood against other males. He displayed around the females laying eggs or settling nearby and I saw him fly off with one of them to mate on a fern leaf. In the video the display is shown in real time and slow motion. The video can be seen on YouTube ([http://www.youtube.com/watch?feature=player\\_detailpage&v=h18vryX4Jul](http://www.youtube.com/watch?feature=player_detailpage&v=h18vryX4Jul)) or search for key words: *Rhinocypha*, Bali, & Damselflies.] Address: Jan Taylor [jmtay5@bigpond.net.au]

**13687.** Ternois, V.; Fradin, E.; Gajdos, A.; Lambert, K.-L. (coord.) (2012): Pré-atlas des Odonates de Champagne-Ardenne. Bilan cartographique des programmes INVOD et CILIF (Synthèse 2011). Société française d'Odonatologie (Champagne-Ardenne): 26 pp. (in French) [France; the Champagne-Ardenne region, four Departments; distribution maps of 65 species are provided. The data are arranged according records prior to 2001 and 2001-2011. A total of 29 178 records from 946 localities are mapped: - Ardennes: 222 loc. / 8 406 records / 61 species; - Aube: 252 loc.s / 9 079 records / 58 species; - Marne : 287 loc. / 8 943 records / 60 species; - Haute-Marne : 185 loc. / 2 750 records / 56 species] Address: Ternois, V., /c CPIE du Pays de Soulaines, Domaine de Saint-Victor, 10200 Soulaines-Dhuys, France. E-mail: cpie.vincent.ternois@wanadoo.fr

**13688.** Tu, X.-y.; Chen, Y.-s.; Liu, N.; Zhang, Y. (2012): Investigation on diversity of Odonata insect inside and outside an university in Jiangxi. *Guangdong Agricultural Sciences*: 151-153. (in Chinese, with English summary) [Anax parthenope julius; Ictinogomphus rapax; Brachythemis contaminata; Acisoma panorpoides panorpoides; Pseudothemis zonata; Agriocnemis femina; Ceragrion auranticum; Ischnura senegalensis; Cercion calamorum dyeri are listed.] Address: Tu, X.-y., College of Life Sciences, Jiangxi Normal University, Nanchang 330022, China. E-mail: txy1036@163.com

**13689.** Wang, X.J.; Song, W.; Li, Z.S.; Cong, Q. (2012): Fabrication of superhydrophobic AAO-Ag multilayer mimicking dragonfly wings. *Chin. Sci. Bull.* 57: 4635-4640. (in English) ["Inspired by the co-coupling of the non-smooth structure and the waxy layer inducing the hydrophobicity of dragonfly wing surface, we developed a simple and versatile method to fabricate a superhydrophobic surface with the dragonfly wing structures. In this work, Ag nanorods grew on highly ordered anodic aluminum oxide (AAO) surface via a galvanic reduction approach. Then the AAO-Ag multilayer was fabricated. Furthermore, the surface free energy of AAO-Ag multilayer was reduced by modifying with perfluorodecanethiol. The modified AAO-Ag multilayer was superhydrophobic and the static contact angle reached as high as 168°. X-ray photoelectron spectra (XPS) were used to characterize the chemical structure of the obtained products. The morphologies of AAO-Ag multilayer was similar to microstructure of dragonfly wing surface and presented hierarchical rough structure. The results showed that the co-coupling of the rough structure and low surface free energy induced the superhydrophobic performance of the AAO-Ag multilayer surface." (Authors)] Address: Wang, X., Key Lab. for Bionic Engineering of Ministry of Education, Jilin Uni., Changchun 130025, China

### 2013

**13690.** Alexander, A.C.; Luis, A.T.; Culp, J.M.; Baird, D.J.; Cessna, A.J. (2013): Can nutrients mask commu-

nity responses to insecticide mixtures?. *Ecotoxicology* 22: 1085-1100. (in English) ["The ecological effect of simultaneous exposure to two nutrient gradients, three insecticides and different predator intensities was investigated over a 3-week period in 80 outdoor, artificial streams using field-collected benthic invertebrates. The experimental design consisted of a 2 × 5 factorial structure with two nutrient levels (oligotrophic or mesotrophic) and five concentrations of the ternary insecticide mixture consisting of the insecticides (chlorpyrifos, dimethoate and imidacloprid). Equivalent toxic unit doses were summed to create a ternary insecticide dose (e.g., 0.1 + 0.1 + 0.1 = 0.3 TU) resulting in a range of ternary insecticide mixture toxicity (i.e., control groundwater, 0.3, 0.6, 0.9 and 1.2 TU). Two genera of insect predators, Gomphus spp. (Odonata) and Agnetina spp. (Plecoptera) were also added into each replicate stream, at densities and sizes comparable to those found at our collection site, to evaluate how the contribution of predators may change in nutrient limited (oligotrophic) versus amended (mesotrophic) systems. We describe a causal mechanism whereby the combined action of nutrients and insecticides reshaped aquatic community structure by interacting through multiple pathways. Specifically, mesotrophic conditions reduced the toxic effects of ternary insecticide mixtures for aquatic insects which, in some cases, appeared to increase abundance of aquatic insects. However, higher levels of insecticides in mesotrophic streams negated this effect and were even more toxic; for example, to aquatic insect grazers than the same insecticide doses in oligotrophic treatment levels. Effects of predators were only significant in oligotrophic streams. Evidence is provided as to how nutrient and contaminant interactions can greatly complicate the assessment of community level responses to insecticide mixtures due to direct and indirect effects of the resulting changes in the density of different genera and functional feeding groups within a community." (Authors)] Address: Alexander, Alexa, Department of Biology at the University of New Brunswick, #10 Bailey Drive, P.O. Box 4400, Fredericton, NB, E3B 5A3, Canada. E-mail: alexa.alexander@unb.ca

**13691.** Amhaeva, L.S.; Kozminov, S.G.; Ketenchiev, H.A. (2013): Preimaginal stages of *Coenagrion puella* L. 1758 (Odonata). *Ecology of animals - The South of Russia: ecology, development* 4: 40-45. (in Russian, with English summary) ["Aim. Ages and stages of *C. puella* with a wide area of distribution throughout Russia were determined in the laboratory. Morphological and morphometric characteristics of larvae instars are described. Location. Zoological laboratory of Kabardino-Balkarian State University (Russia). Methods. Common methods of entomological research were used. In experimental conditions, the development stage (F) of 260 ex. of *C. puella* were studied. Eggs of *C. puella* were taken from natural reservoirs and incubated at 22-24 °C. Larvae were fed once a day by Cladocera,

Copepoda, Ostracoda, Chironomidae, Oligochaeta. Results and conclusions. Larvae of *C. puella* are hatched from eggs after 24–26 days at the temperature 22–24 °C. Time diapason between exuviations is increased with age of larvae: 1–5 stages exuviate by 3–4 days, 6–7 stages by 5–6 days, 8–9 by 6–18 days, 10th by 9–12 days. Morphometric parameters of the larvae are changed with each molting. Main morphological changes indicate a stages of development and are due with change of mask (including its distal margin), lateral lobe, external lamellae (gill plates), antennae and tarsi. The results can be used in ecological monitoring, micropopulation studies. These data can help to determine the variability of dragonflies in mountain ecosystems." (Authors)] Address: Amhaeva, L.Sh., Chechen State University, Sheripov str., 32, Grozny 364907 Russia

**13692.** Ananian, V.Yu.; Tailly, M. (2013): Additions to the dragonfly (Odonata) fauna of Armenia, with new records of rare or uncommon species. *Russian entomological journal* 22(4): 249-254. (in Russian, with English summary) ["This review presents the results of the second phase of recent surveys of the dragonfly fauna and its distribution in Armenia, covering the period 2004-2012. Four species *Coenagrion armatum*, *Cordulegaster vanbrinkae*, *Crocothemis servilia* and *Selysiotthemis nigra* were recorded for the first time in Armenia. Other annotated records deal with rare or uncommon species with sporadic finds in the country, and with rarities rediscovered since their last accounts half a century ago — *Lestes macrostigma*, *Gomphus schneiderii*, *Onychogomphus assimilis* and *Libellula pontica*. A few scarcely recorded commoner species are discussed as well." (Authors)] Address: Ananian, V.Yu., 179 Bashinjaghian Str., apt. 23, Yerevan 0078, Armenia. E-mail: gomphus@gmx.com

**13693.** Batty, P. (2013): Site condition monitoring for dragonflies (Odonata) at Claish Moss SSSI. Scottish Natural Heritage Commissioned Report No. 707: IV + 7 pp. (in English) ["Background: Site Condition Monitoring is a six year rolling programme of assessment of the state of notified features on Sites of Special Scientific Interest (SSSI). Two visits were made in 2013 (25 June and 5 August) to assess the condition of dragonflies and damselflies at Claish Moss SSSI, which has a notable assemblage (nine species) of Odonata. Main findings: Ten species of dragonflies were found breeding and a cast skin of the rare *Somatochlora artica* was seen. There was suitable habitat for *Aeshna caerulea*, although this species was not recorded. The site was found to be in favourable condition for Odonata, and the current management should be maintained. It will be helpful to contact surrounding landowners to ensure that some sheltered feeding areas for the northern emerald remain in future management plans for the surrounding forestry plantations." (Author)] Address: Batty, Patricia, Kirnan Farm, Kilmichael Glen, Lochgilphead, Argyll, PA31 8QL, UK

**13694.** Batzer, D.P.; Ruhí, A. (2013): Is there a core set of organisms that structure macroinvertebrate assemblages in freshwater wetlands? *Freshwater Biology* 58(8): 1647-1659. (in English) ["We analysed taxa lists from 447 individual wetlands from several ecoregions across the world using nestedness and similarity-based multivariate analyses. We examined how similar wetland assemblages are across regions, whether variation in assemblages is ordered (nested) or unpredictable (idiosyncratic), whether individual taxa occur predictably or unpredictably across wetland habitats, and if any of these patterns differed between temporary- and permanent water habitats. We found that macroinvertebrate assemblages were highly nested ( $N = 0.947$ ), but unexpectedly 37 of the 40 most widespread taxa (>10% occurrence) were idiosyncratic. Of the 447 wetlands, we identified 277 that shared more than 40% similarities in assemblages, were mostly nested, and clustered together in ordination space, and thus could be considered a core set of wetlands in terms of assemblage structure. Assemblages in the 170 wetlands outside this core (mostly idiosyncratic) tended to be depauperate sites in arid or high elevation areas, or alternatively taxonomically rich sites supporting numerous lotic or lacustrine organisms. The 'Core' itself split into two main parts, one comprised of wetlands from semi-arid or mild climate areas dominated by strong flying insects, and the second comprised of wetlands from wetter, more northerly areas where non-insects with passive dispersal were very prevalent. Climate and geology appear to be major controls on macroinvertebrate distributions across the set of 447 wetlands. Hydrology (temporary versus permanent) of wetlands was a lesser control on assemblage structure over the set of 447 wetlands. That wetlands are dominated by about 40 widely-occurring macroinvertebrate taxa, and those taxa tend to occur idiosyncratically, suggests that overall assemblages across wetlands may share many similarities, but some of widespread taxa may still be missing from many individual wetlands. Why these otherwise fairly ubiquitous taxa do not occur in specific wetlands may shed important light on how those wetlands are controlled ecologically; in other words, do sites lack specific factors required by these taxa?" (Authors) The analysis of taxa is conducted at family level and includes Libellulidae, Coenagrionidae and Lestidae.] Address: Batzer, D.P., Department of Entomology, University of Georgia, Athens, GA, 30602, USA. E-mail: dbatzer@uga.edu

**13695.** Bennett, A.M.; Pereira, D.; Murray, D.L. (2013): Investment into defensive traits by anuran prey (*Lithobates pipiens*) is mediated by the starvation-predation risk trade-off. *PLoS ONE* 8(12): e82344. doi:10.1371/journal.pone.0082344: 9 pp. (in English) ["Prey can invest in a variety of defensive traits when balancing risk of predation against that of starvation. What remains unknown is the relative costs of different defensive traits and how prey reconcile investment into these traits when energetically limited. We tested the simple alloca-



tion model of prey defense, which predicts an additive effect of increasing predation risk and resource availability, resulting in the full deployment of defensive traits under conditions of high risk and resource saturation. We collected morphometric, developmental, and behavioural data in an experiment using dragonfly larvae (predator, *Aeshna* sp.) and Northern leopard frog tadpoles (prey) subject to variable levels of food availability and predation risk. Larvae exposed to food restriction showed limited response to predation risk; larvae at food saturation altered behaviour, development, and growth in response to predation risk. Responses to risk varied through time, suggesting ontogeny may affect the deployment of particular defensive traits. The observed negative correlation between body size and activity level for food-restricted prey – and the absence of a similar response among adequately-fed prey – suggests that a trade-off exists between behavioural and growth responses when energy budgets are limited. Our research is the first to demonstrate how investment into these defensive traits is mediated along gradients of both predation risk and resource availability over time. The interactions we demonstrate between resource availability and risk level on deployment of inducible defenses provide evidence that both internal condition and extrinsic risk factors play a critical role in the production of inducible defenses over time." (Authors)] Address: Amanda M. Bennett, Amanda, Environmental & Life Sciences, Trent Univ., Peterborough, Ontario, Canada. E-mail: amandabennett2@trentu.ca

**13696.** Breithaupt, N. (2013): Zur Häufigkeit der Farbformen von Weibchen der Zarten Rubinjungfer (*Ceragrion tenellum*) im Naturschutzgebiet Mindelsee (Odonata: Coenagrionidae). *Mercuriale* 13: 7-10. (in German, with English summary) [Baden-Württemberg, Germany; "At a calcareous peat bog in the northern borderline of Lake Mindelsee the frequency of the female colour morphs of *C. tenellum* was determined at two dates in August 2011. With a frequency of 64 % *f. typicum* dominated, followed by 34 % of *f. erythrogastrium*. With a frequency of 2 % females of *f. melanogastrium* were rarest at the study site. The results are compared with those in other parts of Germany and shortly discussed." (Author)] Address: Breithaupt, Ninja. E-mail: ninja-b@gmx.de

**13697.** Brookshire, B.A. (2013): Comparison of Odonata populations in natural and constructed emergent wetlands in the bluegrass region of Kentucky. Eastern Kentucky University Encompass. Honors Theses. Paper 124: III, 33 pp. (in English) ["With the degradation and destruction of many natural wetlands in Kentucky, there are high incentives to look at the remaining natural wetlands and the new artificial wetlands that are beginning to become prevalent among biologists. Wetlands are important to dragonfly populations just as dragonflies are vital to wetland function. In my study I looked at the fluctuation in Odonata populations at ten artificial wet-

lands and ten natural wetlands in the Inner Bluegrass region of Kentucky. In my study the dragonfly populations were monitored based on Shannon and Simpson's diversity, Species richness, and number of individual and species numbers. The wetlands were also compared on a season to season basis and the health of the wetlands were considered using a rapid assessment method. My research found that the artificial wetlands, though they scored low on the rapid assessment method, scored high in all categories except for species richness in the fall season of data collection. This study can be important in discovering the differences between natural and artificial wetlands, since Odonates are such an important biological indicator of wetland health and function. This could be vital in increasing the health of remaining natural wetlands and new artificial wetlands that are being created to supplement the lack of many of Kentucky's natural wetlands." (Author)] Address: Brookshire, Brittany Ann, Eastern Kentucky University, USA. E-mail: BrittanyBrookshi@eku.edu

**13698.** Bunker, B.; Janovy, J.; Tracey, E.; Barnes, A.; Duba, A.; Shuman, M.; Logan, J.D. (2013): Macroparasite population dynamics among geographical localities and host life cycle stages: Gregarines in *Ischnura verticalis*. *Journal of Parasitology* 99(3): 403-409. (in English) ["Populations of several species of gregarine parasites within a single host species, the damselfly *Ischnura verticalis*, were examined over the course of 1 season at 4 geographic localities separated by a maximum distance of 9.7 km. Gregarines, having a life cycle with both exogenous and endogenous stages, are subject to a wide variety of selective pressures that may drive adaptation. Gregarine species showed some specificity for host life cycle stage; *Steganorhynchus dunwoodyi* and *Hoplorhynchus acanthatholius* were most prevalent in larval hosts, while *Steganorhynchus dunwoodyi*, *Actinocephalus carrillynae* and *Nubenocephalus nebraskensis* were most prevalent in adult hosts. Species prevalence and abundance differed by geographic locality. Gregarine prevalence was significantly higher in adult female damselflies than males at 2 localities; sex differences in prevalence were insignificant for larval damselflies at all 4 localities. In larval hosts, gregarine abundance was independent of age (size). The present study therefore shows that pond characteristics, host life cycle stage, and adult host sex are the main factors that influence the prevalence and abundance of gregarine populations." (Authors)] Address: Logan, J.D., Dept of Mathematics, Univ. of Nebraska Lincoln, Lincoln, NE 68588-0130, USA. E-mail: dlogan@math.unl.edu

**13699.** Butler, S.G. (2013): Description of the last instar larva of *Orchithemis pulcherrima* Brauer from Sarawak, Malaysia (Anisoptera: Libellulidae). *Odonatologica* 42(3): 247-251. (in English) ["A male larva is described and illustrated. The labium, with its lack of large mental setae, frontal margin and palpal shape, is similar to that

in some *Orthetrum* species. So are also the small eyes, but the rounded shape of the head is not." (Author)] Address: Butler S.G., Red Willow, All Stretton, Shropshire SY6 GHN, UK. E-mail: sgbutler15@btopenworld.com

**13700.** Claerebout, S. (2013): Première mention en Belgique de *Forcipomyia* (*Pterobosca*) *paludis* (Macfie, 1936), ectoparasite des odonates adultes (Diptera: Ceratopogonidae). Bulletin de la Société royale belge d'Entomologie/Bulletin van de Koninklijke Belgische Vereniging voor Entomologie 149: 201-204. (in French, with English and Dutch summaries) ["On May 29th 2010, *Coenagrion pulchellum* with the ceratopogonid *Forcipomyia* (*Pterobosca*) *paludis* (Macfie, 1936) on its wings was photographed in the old brickyard of Ploegsteert (Comines-Warneton, prov. Hainaut, Belgium). This minute fly is a temporary and exclusive ectoparasite of Odonata imagines. Although no individual has been collected so far, the photographic document is the first evidence of the presence of *F. paludis* in Belgium. The species is already known from thirteen European countries." (Author)] Address: Claerebout, S., Centre Marie-Victorin, Centre de Recherche et d'Éducation pour la Conservation de la Nature, rue des Écoles 21, B-5670 Vierves-sur-Viroin, Belgium. E-mail: stephaneclaerebout@yahoo.fr

**13701.** Clarke, T. (2013): Mixed pairing between Emerald Damselfly *Lestes sponsa* and Azure Damselfly *Coenagrion puella*. *Atropos* 50: 84-85. (in English) [Verbatim: The image published here was taken on 21 August 2013, just before noon, at Pleasley Pit Nature Reserve, North Derbyshire, during a warm and sunny day. I spotted this mixed pairing between a male *Lestes sponsa* and a male *Coenagrion puella* approximately two metres from the bankside, on dead reed protruding from the water. I have no idea how long the pair had been in tandem and they split up within minutes of my spotting them. Just time for the one photograph!] Address: Clarke, T., 5 Nottingham Drive, Wingerworth, Chesterfield, Derbyshire, S42 6ND, UK

**13702.** Contreras-Martinez, E. (2013): Diversidad de Entomofauna acuática en tres ríos de la Ecoregión Darién, Choco biogeográfico (Colombia). *Dugesiana* 20(2): 243-250. (in Spanish, with English summary) ["There are few studies on insect diversity from rivers and streams of coastal areas, particularly within the Chocó biogeographic area. In this study we conducted a spatially explicit inventory of insects from three freshwater bodies in the Darien Ecoregion (located in the Colombian Caribbean). To establish the aquatic insect spatial patterns of richness, multiple habitats were sampled at seven stations from three streams located between the flat and mountainous parts. Also some physicochemical parameters were measured and each sampling station was characterized according to the quality of riparian cover and habitat heterogeneity following rapid assessment protocols such as Quality Index of Riparian

forest (QBR) and Fluvial Habitat Index (IHF), respectively. To describe the macroinvertebrate assemblage, Shannon Diversity and Pielou Equity indices, and Jaccard similarity were calculated and a non Parametric Multidimensional Scaling (NMDS) performed; the number of groups used in the clusters and the dendrogram were determined by the k -means partition method (k -Means Partitioning). Clustering patterns were interpreted based on the riparian cover condition and the physicochemical variables. A total of 3399 individuals were collected and identified to family level, most abundant insect families were Leptophlebiidae, Chironomidae and Hydropsychidae. Differences between sampling stations were found where Carolina Middle and High Capurganá sections had the higher richness values with 31 and 30 families respectively. The most diverse station was the medium reach El Regalo and less diverse was the high reach La Carolina, which separated from the other stations by the similarity analysis. The clustering pattern found could partially respond to similarities in riparian coverage, habitat heterogeneity and the particular characteristics provided by these parameters, since they have an indirect effect on other variables such as temperature which has a strong influence on the presence and / or establishment of the insect population. The effect of temperature was related to the function of vegetation cover and the drought period experienced by the region at the time of sampling." (Authors) Taxa are treated at family level and include 'Libellulidae, Megapodagrionidae, Calopterygidae, Coenagrionidae, Gomphidae, and Platystictidae'.] Address: Contreras-Martínez, Eliana, Instituto de Biología; Universidad de Antioquia; Medellín; Colombia. contreras.eliana5@gmail.com

**13703.** Cook, T.; Smith-Heeron, A.J. (2013): Gregarines infecting *Ischnura* spp. in Texas U.S.A. including description of *Septemlatuspora rasberryi* n. gen. n. sp. (Apicomplexa: Actinocephalidae: Acanthosporinae) and revision of *Steganorhynchus dunwoodyi* (Apicomplexa: Actinocephalidae: Menosporinae). *Journal of Parasitology* 100(1): 99-105. (in English) [*Septemlatuspora rasberryi* is described from adults of *Ischnura ramburii*.] Address: Cook, T., Sam Houston State University, Biological Sciences, Sam Houston State University, USA

**13704.** Copatti, C.E.; Fagundes, L.S.; Quaini, J.B.; Copatti, B.R. (2013): Diversity of aquatic arthropods on *Eichhornia crassipes* (Mart.) Solms roots before and after removal of substrate in a reservoir in southern Brazil. *Pan-American Journal of Aquatic Sciences* 8(4): 265-275. (in English, with Portuguese summary) ["The objective of this study was to determine the influence of substrate removal on the diversity, composition and trophic structure of aquatic arthropods found on *Eichhornia crassipes* roots. Because many arthropods are intimately associated with their substrate, its removal might result in increased richness and diversity for the aquatic arthropods on *E. crassipes* roots. The study

was performed in the Lajeado da Cruz River in Cruz Alta-RS, where the identification of the aquatic arthropods captured during eight samplings between August 2008 and May 2011 was performed. Four samples were collected prior to removal of the substrate and four were collected afterward. A total of 8,894 exemplars and 55 families of aquatic arthropods were sampled. The families Palaemonidae and Chironomidae were the most abundant. The diversity indices indicated increases in both diversity and richness after substrate removal. Values of the water quality parameters of turbidity, colour, iron and aluminum were found to be outside the norms, which indicated a need for caution with regard to water quality. The removal of the substrate triggered changes in the community and its trophic structure as well as an increase in the diversity of arthropods on the water hyacinth roots. ... In this study, Odonata and Ephemeroptera were more abundant than Coleoptera and Hemiptera (Table I), indicating that the study area was not in an early stage of succession and that the patterns found had been influenced by the existence or removal of water hyacinths in the substrate." (Authors)] Address: Copatti, C.E., Universidade Federal da Bahia, Depto de Zoologia, Instituto de Biologia, 40170-290, Salvador, BA, Brasil. E-mail: carloseduardocopatti@yahoo.com.br

**13705.** Day, R.S. (2013): Odonata survey of various sites of the Missouri Prairie Foundation Barton, Dade, Polk, St. Clair, and Vernon Counties in Missouri. Missouri Prairie Foundation. <http://www.moprairie.org/wp-content/uploads/2014/05/Odonate-Survey-Report.pdf>: 68 pp. (in English) ["I recorded a total of 35 species of dragonflies and damselflies between June 3 and August 12, 2013. A complete checklist can be found on page 9 of this report. A total of 76 specimens were deposited at the Enns Entomology Museum at the University of Missouri. No Missouri Species of Conservation Concern were found during this survey. I conducted surveys on June 2-4, July 8-11, and August 10-12, 2013. I visited all sites (n=7) on the contract three times, with the exception of Marmaton Wet Prairie. I was unable to survey Marmaton on two occasions (June and August) due to flood conditions. The Marmaton site was very difficult to access because there are no paths or fire breaks to access areas, and the grass was so tall and thick that it made navigating the prairie very difficult. I did, however, document 15 species when I was there in July. I'm confident that had I been able to survey Marmaton the other two times that I would have found more species. During the June survey, I observed an abundance of teneral dragonflies (newly emerged) on most sites. In July, I saw more species flying overall than in June. By August, there were still many dragonflies, but I noticed a decline in numbers from July. The Penn-Sylvania site always had the most activity and abundance. When I was there on July 9, I witnessed a large flock of swallows swooping over the pond and feeding on the dragonflies. Most of the species observed throughout the

entire survey were in the Libellulidae family, a very common pond dragonfly family. The greatest abundance and Odonata activity was near water sources such as the ponds located on the sites. I found nothing that could be considered out of the ordinary. The drainages in the prairies produced very little Odonata activity. It is my opinion based on the plant communities and habitat present, that large shallow water wetlands would produce more activity and abundance, but most species would still be in the Libellulidae family." (Author)] Address: Day, R.S., Daybreak Imagery, 6382 Charleston Road, Alma, IL 62807, 618-547-3522, USA. E-mail: richard@daybreakimagery.com

**13706.** Dommaget, J.-L. (2013): In memoriam Alain Manach. 1949-2012. *Martinia* 29(2): 77-78. (in French) [obituary] Address: Dommaget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**13707.** Duman, M.; Mutlu, C.; Büyük, M.; Karaca, V. (2013): Beneficial insects, spider and polinater species determined in the Karacadag paddy growing areas. *Türk. biyo. мүc. derg.* 4(1): 53-64. (in Turkish, with English summary) [Turkey, provinces of Diyarbakir and Sanliurfa, 2010-2011; only *Coenagrion* sp. is listed.] Address: Büyük, M., Dicle Üniversitesi, Meslek Yüksek Okulu Mühendislik Mimarlık Fakültesi, Diyarbakir Sorumlu yazar, Turkey. E-mail: tulin@ksu.edu.tr

**13708.** Ebrahimi, A.; Mohammadian, H.; Madjdzadeh, S.M. (2013): The dragonflies of family Libellulidae (Odonata: Anisoptera) of the Khabr National Park (Kerman Province, south-east Iran). *Far Eastern Entomologist* 270: 7-11. (in English, with Russian summary) ["The list of 12 species in five genera of family Libellulidae firstly collected in the Khabr National park in spring and summer is given. The majority of these species are common in Iran and other parts of Kerman province." (Authors) This paper is identical to the manuscript that was - as we know now - simultaneously sent to several journals, and which was published after intensive editing as IDF-Report 69. May be that all data were published in the *Caspian Journal of Environmental Sciences* 7(2) too; some of the data could be fake in the sense that collecting dates resulted from different years but same days and in general are too similar as they could have been collected by chance. (ms)] Address: Ebrahimi, A., Department of Biology, Faculty of Sciences, Shahid Bahonar University, Kerman, Iran. E-mail: krm-brhm5@gmail.com

**13709.** Eggs, W.; Stephan, U. (2013): In Schächten endende Bäche als Falle für Larven bzw. schlüpfende Imagines von *Cordulegaster boltonii* und *C. bidentata* (Odonata: Cordulegastridae). *Mercuriale* 13: 1-6. (in German, with English summary) [Baden-Württemberg, Germany; "During spring-time in 2012, in the vicinity of Waldsee, a quarter of the city of Freiburg i. Br., gully holes and a shaft were checked in order to release trapped amphibi-



ans. The shaft was fed by a subterranean artificial stream, a branch of a spring brook originating in the Black Forest. In three holes, on an area of 0.5 m, a total of 131 Cordulegaster larvae could be recorded. Both, the risk for larvae being trapped in the subterranean artificial stream and the difficulties for emerged adults to pass the gully grids for the maiden flight are discussed." (Authors)] Address: Eggs, Waltraud, Riesenweg 35, 79110 Freiburg, Germany. E-mail: bwp.eggs@web.de

**13710.** Environment Canada (2013): Management plan for the Pygmy Snaketail (*Ophiogomphus howei*) in Canada. Species at Risk Act Management Plan Series. Environment Canada, Ottawa: iii + 13 pp. (in English) ["*O. howei* is one of the smallest dragonflies in North America. Adults are black, with brown stripes and yellow markings on their abdomen, green on the thorax, and a transparent yellow-orange tint on the basal side of the wings. Aspects of the Pygmy Snaketail life cycle requirements are poorly understood and habitat requirements for the species are complex. Larvae take up to two years to develop to the adult stage, drifting downstream from where eggs are laid; the majority of their adult life is then spent in the upper canopy of riparian areas. *O. howei*, in Canada, is known from 11 sites in New Brunswick and 1 site in Ontario. Little is known of the species' distribution, abundance, and habitat needs in Canada. There are several knowledge gaps with regards to characterizing threats to this species. Dam construction is a threat of high concern in Ontario. All other threats, in both New Brunswick and Ontario, are either of low concern or the impact is unknown and include; dam construction, pollution, invasive species, residential development, forest harvesting and agriculture land use, wakes from boats, and vehicle traffic on roads. The species was assessed as Special Concern by COSEWIC in 2008, and was listed as Special Concern under Schedule 1 of the Species at Risk Act in 2011. In New Brunswick the species is not listed under provincial legislation. In Ontario it is listed as Endangered under the provincial Endangered Species Act, 2007. The management objective for the Pygmy Snaketail is to maintain the presence of existing populations at all sites where they are currently known to occur and conserve new occurrences that are identified. This will be achieved by implementing conservation measures that are organized under the following three broad strategies: (1.) Population monitoring and surveys of suitable habitat (2.) Maintenance of aquatic habitat quality and quantity (3.) Outreach, education, and stewardship to promote conservation " (Authors)]

**13711.** Farris, S.M. (2013): Evolution of complex higher brain centers and behaviors: Behavioral correlates of mushroom body elaboration in insects. *Brain, Behavior and Evolution* 82: 9-18. (in English) ["Large, complex higher brain centers have evolved many times independently within the vertebrates, but the selective pressures driving these acquisitions have been difficult to

pinpoint. It is well established that sensory brain centers become larger and more structurally complex to accommodate processing of a particularly important sensory modality. When higher brain centers such as the cerebral cortex become greatly expanded in a particular lineage, it is likely to support the coordination and execution of more complex behaviors, such as those that require flexibility, learning, and social interaction, in response to selective pressures that made these new behaviours advantageous. Vertebrate studies have established a link between complex behaviors, particularly those associated with sociality, and evolutionary expansions of telencephalic higher brain centers. Enlarged higher brain centers have convergently evolved in groups such as the insects, in which multimodal integration and learning and memory centers called the mushroom bodies have become greatly elaborated in at least four independent lineages. Is it possible that similar selective pressures acting on equivalent behavioural outputs drove the evolution of large higher brain centers in all bilaterians? Sociality has greatly impacted brain evolution in vertebrates such as primates, but it has not been a major driver of higher brain center enlargement in insects. However, feeding behaviours requiring flexibility and learning are associated with large higher brain centers in both phyla. Selection for the ability to support behavioral flexibility appears to be a common thread underlying the evolution of large higher brain centers, but the precise nature of these computations and behaviors may vary." (Author) The function of mushroom bodies in Odonata is discussed. Regrettably the studies on sensory systems in Odonata of the Italian working group lead by Elda Gaino and Manuela Reborá are not considered. (Martin Schorr)] Address: Farris, Sarah, 53 Campus Drive, 3139 Life Sciences Building, Morgantown, WV 26506, USA. E-mail: Sarah.Farris@mail.wvu.edu

**13712.** Festi, A. (2013): Nuova segnalazione di un sito riproduttivo di *Leucorrhinia pectoralis* Charpentier, 1825 (Odonata: Libellulidae) per l'Alto Adige e l'Italia. *Gredleriana* 13: 129-132. (in Italian) [Documentation of records of *L. pectoralis*: 09.-23.06.2013, Bigleidermoos - Torbiera Bigleider near Aldeno, (Prov. Aut. di Bolzano, Italy; WGS 46,37095511,341261).] Address: Festi, A., Via Penegal 7, I-39100 Bolzano, Italy. E-mail: alex.festi@rolmail.net

**13713.** Fiebig, I.; Lohr, M. (2013): Libellengemeinschaften oligotroph-saurer Sekundärgewässer im Solling, Süd-Niedersachsen (Odonata). *Libellula* 32(3/4): 115-139. (in German, with English summary) ["Odonata communities of oligotrophic-acidic pools in the Solling, Southern Lower Saxony, Germany (Odonata) – In 2011 the Odonata communities of 15 oligotrophic-acidic and two meso- to eutrophic water bodies in the Rutenbruch, Solling, southern part of Lower Saxony were studied by collecting exuviae and recording imagines. The investigated pools were created between 1982 and 2008 in

windthrow areas of spruce forests on former fens. These areas were partly cattle-grazed by Exmoor Ponies since 2010. In total 28 odonate species were found, for 21 of them breeding was confirmed. Many species are characteristic of oligotrophic-acidic waters of moors and bogs or possess their main habitat in these pools within the region, among them *Coenagrion hastulatum*, *Aeshna juncea*, *Leucorrhinia dubia* and *L. rubicunda*. The occurrence of these and further species like *Leucorrhinia pectoralis* is discussed regarding ecological and conservational aspects. Some of the pools were already colonized by typical species of moors and bogs like *Leucorrhinia dubia* and *L. rubicunda* only a few years after their creation. The effects of cattle-grazing on the Odonata must be regarded differently for different life cycle stages. Whereas the habitats of the adults were more suitable, the impact of trampling on the larval habitat of some typical species of bogs and mosses and their populations was adverse. Recommendations on the future grazing-management are given. The pools with the largest populations of species important for conservation should not be grazed simultaneously, but rotational grazing of pastures with intervals of three to five years is suggested." (Authors)] Address: Fiebig, Isabel, Fachgebiet Landschaftsökologie und Naturschutz, An der Wilhelmshöhe 44, 37671 Hötter, Germany. E-mail: isabel.fiebig@hs-owl.de

**13714.** Fijewski, Z. (2013): The first site of the Pygmy damselfly *Nehalennia speciosa* (Charpentier, 1840) (Odonata: Coenagrionidae) in the Świętokrzyskie mountains. *Kulon* 18: 153-155. (in Polish, with English summary) [June, 2010, transition mire in the Czarna River valley near Sielpia, Poland (51°06'N, 20°21'E)] Address: Fijewski, Z., ul. Brzozowa 1a/36, 26-200 Końskie, Poland

**13715.** Funk, A.; Gschöpf, C.; Blaschke, A.P.; Weigelhofer, G.; Reckendorfer, W. (2013): Ecological niche models for the evaluation of management options in an urban floodplain—conservation vs. restoration purposes. *Environmental Science & Policy* 34: 79-91. (in English) ["Highlights: \*We analysed potential management options for a floodplain of the Danube. \*The aim was to integrate restoration and conservation objectives into management. \*Therefore the habitat availability for endangered and flagship species was calculated. \*The results represent the actual and potential future community of the system. The Lobau, a former dynamic floodplain area of the Danube River situated close to Vienna (Austria), was strongly affected by the river regulation in 1875. The reduced hydrological connectivity changed the conditions in the system which is nowadays groundwater-fed, back-flooded, and characterized by sedimentation and terrestrialisation processes. On one hand, the artificially created habitat types have a high conservation potential; they harbour a rich community whose habitat range has been reduced due to degradation in the cultural landscape. On the other hand, resto-

ration efforts aim to reverse the anthropogenic impact due to damming and to restore the natural status of the wetland with its dynamic hydrological regime and its associated rheophilic community as far as possible. The challenge for floodplain managers is now to develop a compromise solution that integrates restoration and conservation efforts. The potential options range from the conservation of the present status to the restoration of the floodplain towards pristine conditions. We used a logistic regression approach to predict the potential habitat availability for indicator species including highly endangered and flagship species which are used for attracting public support for the conservation/restoration measures. The results represent the actual and potential future community of the system for the management options. Based on the results we make recommendations for the selection of a best compromise for the management of the floodplain with special regard to the legal objectives." (Authors) *Leucorrhinia pectoralis* is assessed as "common" in the Lobau.] Address: Funk, Andrea, WasserCluster Lunz, Dr Carl Kupelwieser Promenade 5, A-3293 Lunz/See, Austria

**13716.** Gai, K. (2013): Wing damage effect on dragonfly's aerodynamic performance during takeoff. Master of Science in Engineering (MSEgr), Wright State University, Mechanical Engineering: VIII + 56 pp. (in English) ["Insect wing damage resulted from living environment or predation commonly happens in nature. This usually results in deterioration of insect's flight performance and as a consequence, the insect needs adjustment of flapping wings to compensate the effect from the wing loss. In this study, *Erythemis simpliciolis* with and without wing loss is chosen to study the change of aerodynamic performance of flapping wings. Three cases including flight with intact wings (IW), flight with one-sided forewing damage (OFD), and flight with double-side forewing damage (DFD) are determined. An integrated study using high-speed photogrammetry, three-dimensional surface reconstruction, and direct numerical simulation (DNS) are used to quantify wing kinematics and aerodynamics performance. Results have shown that in general, during downstroke of forewings, forewing area loss could reduce insect's lift production; The lift force generated by the outer wings is larger than or equal to that produced by the inner wings during downstroke, but the outer wings' lift production becomes smaller than the inner wings' during upstroke; Span-wise forewing area removal reduces forewing tip vorticity, and it leads to the detachment of the tip vortex ring during upstroke." (Author)] Address: Gai, Kuo, c/o Wright State University, Mechanical Engineering, 3640 Colonel Glenn Hwy, Dayton, OH 45435, USA

**13717.** Girod, T.E. (2013): Bullfrog (*Lithobates catesbeianus*) diet composition, life history, and time period for larval development in California's north coast. M.Sc. thesis, Biology, Humboldt State University : XI + 94pp. (in English) ["*Lithobates catesbeianus* (American bull-

frogs) are not native to states west of the Rocky Mountains. Since their introduction to California, they have been implicated in the decline of amphibian species. On California's north coast, bullfrogs may be causing local declines of native amphibians through predation, competition, or disease. Knowledge of the diet of introduced bullfrogs can help determine if bullfrogs are directly preying on these amphibians and therefore directly causing decline. Moreover, Humboldt County's coastal areas have a climate that is cooler on average than the American bullfrogs' native climate. Cool, yet stable year-round temperatures may affect larval phenology, knowledge of which is important for timing the larval culling used to manage the species. Bullfrogs and their larvae were captured from five coastal sites in Humboldt County, CA. Sites varied from 2 m to 1400 m in elevation, and from 0.18 km to 27.25 km in straight-line distance from the coast. Frogs were measured for snout-vent length, gender was determined and stomach contents were categorized. For larvae, total length and stage of development (Gosner stage) were recorded. Results showed diet was greatly affected by body size and site location. Native herptiles made up a very small percentage (7%) of overall bullfrog diet by count, but a larger percentage (32% in adult females to 65% in juveniles) of diet by volume. Most larvae that were captured were large and young tadpoles (i.e., low Gosner stage) were rare. A late stage larva was captured in early spring, suggesting a multi-year development period. This study provides evidence that bullfrogs are directly preying on native herptiles, and suggests that larval management efforts would best be carried out in late summer, prior to tadpoles metamorphosing or overwintering." (Author) Diet includes Odonata.] Address: not stated

**13718.** Grönroos, M.; Heino, J.; Siqueira, T.; Landeiro, V.L.; Kotanen, J.; Bini, L.M. (2013): Metacommunity structuring in stream networks: roles of dispersal mode, distance type, and regional environmental context. *Ecology and Evolution* 3(13): 4473-4487. (in English) ["Within a metacommunity, both environmental and spatial processes regulate variation in local community structure. The strength of these processes may vary depending on species traits (e.g., dispersal mode) or the characteristics of the regions studied (e.g., spatial extent, environmental heterogeneity). We studied the metacommunity structuring of three groups of stream macroinvertebrates differing in their overland dispersal mode (passive dispersers with aquatic adults; passive dispersers with terrestrial adults; active dispersers with terrestrial adults). We predicted that environmental structuring should be more important for active dispersers, because of their better ability to track environmental variability, and that spatial structuring should be more important for species with aquatic adults, because of stronger dispersal limitation. We sampled a total of 70 stream riffle sites in three drainage basins. Environmental heterogeneity was unrelated to spatial extent among our study regions, allowing us to examine the effects of these two factors on meta-

community structuring. We used partial redundancy analysis and Moran's eigenvector maps based on overland and watercourse distances to study the relative importance of environmental control and spatial structuring. We found that, compared with environmental control, spatial structuring was generally negligible, and it did not vary according to our predictions. In general, active dispersers with terrestrial adults showed stronger environmental control than the two passively dispersing groups, suggesting that the species dispersing actively are better able to track environmental variability. There were no clear differences in the results based on watercourse and overland distances. The variability in metacommunity structuring among basins was not related to the differences in the environmental heterogeneity and spatial extent. Our study emphasized that (1) environmental control is prevailing in stream metacommunities, (2) dispersal mode may have an important effect on metacommunity structuring, and (3) some factors other than spatial extent or environmental heterogeneity contributed to the differences among the basins." (Authors) The list of taxa only includes a single Odonata species, *Somatochlora metallica*.] Address: Grönroos, Mira, Ecosystem Change Unit, Finnish Environment Institute, Oulu, Finland. E-mail: mira.gronroos@environment.fi

**13719.** Gutiérrez-Fonseca, P.E.; Rosas, K.G.; Ramírez, A. (2013): Aquatic insects of Puerto Rico: a list of families. *Dugesiana* 20(2): 215-219. (in English, with Spanish summary) ["Studies on aquatic insects in Puerto Rico began early last century. Most taxa have been well documented; however, we lack information on some taxa and there is no single document containing all the scattered information. These are major obstacles for the study of insects on the island. Here we reviewed data collected in published articles, graduate theses, university courses, environmental impact studies and reviewed material deposited in the Museum of Zoology at the University of Puerto Rico. The objective was to compile the first list of aquatic insect families of Puerto Rico. Overall, 61 families belonging to seven insect orders were found. The best known orders were Ephemeroptera, Trichoptera and Odonata. The most diverse orders were Diptera, followed by Coleoptera and Hemiptera. Despite its small size, Puerto Rico is a diverse island compared to the remaining Greater Antilles. This study is the first attempt to develop a list with all information available and contribute to advance our knowledge of aquatic insects. In addition, we hope to aid decision makers and encourage ecological and biogeographical studies on aquatic ecosystems in Puerto Rico." (Authors)] Address: Gutiérrez-Fonseca, P.E., Dept Biol., Univ. of Puerto Rico Rio Piedras, P.O. Box 190341, San Juan, Puerto Rico 00919. E-mail: gutifp@gmail.com

**13720.** Hamerlík, L.; Svitok, M.; Novikmec, M.; Očadlík, M.; Bitušík, P. (2013): Local, among-site, and regional diversity patterns of benthic macroinvertebrates in high altitude waterbodies: do ponds differ from lakes?. *Hy-*



drobiologia 723: 41-52. (in English) ["In this study we aimed at comparing invertebrate diversity of high altitude lakes and ponds along hierarchical spatial scales. We compared local, among-site, and regional diversity of benthic macroinvertebrates in 25 ponds and 34 lakes in the Tatra Mountains, central Europe. The ponds showed significantly lower local diversity, higher among-site diversity and similar regional diversity than the lakes. The species–area relationships (SAR), habitat heterogeneity, and environmental harshness are assumed as drivers for the local diversity patterns. An ecological threshold separating pond and lake systems emerged at an area of 2 ha, where the SAR pattern changed significantly. Differences in species turnover between these systems were likely driven by greater environmental variability and isolation of the ponds. High altitude ponds neither significantly support greater regional diversity nor higher number of unique taxa than lakes. The higher among-site diversity of ponds relative to lakes highlights the relevance of ponds for regional diversity in mountain areas. ... Except for Plecoptera (7 taxa) and Odonata (*Aeshna cyanea*, *Aeshna juncea*, *Somatochlora* sp.), the rest of higher taxonomic groups recorded were represented by 1–2 species/taxa. Odonata and Chaoboridae (Diptera) only occurred in ponds ..."] (Authors)] Address: Hamerlík, L., Faculty of Science, Matthias Belius University, Tajovského 40, SK–97 401 Banská Bystrica, Slovakia. E-mail: ladislav.hamerlik@umb.sk

**13721.** Hanlon, S.H.; Re Iyea, R. (2013): Sublethal effects of pesticides on predator–prey interactions in amphibians. *Copeia* 2013(4): 691-698. (in English) ["Increasing evidence suggests that contaminants in the environment can have important consequences on organismal interactions. While we have a good understanding of the lethal effects of contaminants on organisms, we have a weak understanding of how contaminants can affect organisms by altering the interactions that they have with other species in the community. Using tadpoles of two anuran species (Bullfrogs, *Lithobates* [*Rana*] *catesbeianus*; Green Frogs, *L. clamitans*), we investigated the effects of low nominal concentrations (1 and 10 ppb) of two pesticides (malathion and endosulfan) on tadpole activity and survival when exposed to four predator treatments (no predators; water bugs, *Belostoma flumineum*; newts, *Notophthalmus viridescens*; and dragonfly larvae, *Anax junius*). In both anuran species, adding predators reduced tadpole activity and survival, with increasing rates of mortality occurring with water bugs, newts, and dragonflies, respectively. Additionally, the highest concentration of endosulfan caused tadpole mortality after 48 hrs. Most significant, tadpole species also experienced interactive effects of predators and pesticides on survival after 48 hrs. In Bullfrog treatments, all predators reduced the amount of tadpole mortality when exposed to endosulfan. In Green Frogs, additive negative effects occurred, except that newts increased the tadpole mortality when

exposed to endosulfan. Our findings illustrate that pesticide effects on predator–prey interactions are often complex and have the potential to alter aquatic community composition." (Authors)] Address: Hanlon, Shane, Dept Biological Sciences, Univ. of Memphis, Memphis, Tennessee 38152; E-mail: hanloc2107@gmail.com.

**13722.** Harabiš, F.; Šigut, M.; Dolný, A. (2013): Density-distribution patterns of egg parasitoids in freshwater habitats. *Časopis Slezského zemského muzea - serie A - vědy přírodní* 62(1): 65-72. (in Harabiš, F., Department of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, CZ-165 21 Prague 6, Czech Republic. E-mail: harabis.f@gmail.com) ["Similar in effect to predators, egg parasitoids could have a significant effect on the distribution of host and its' population dynamics. However, knowledge about the biology and ecology of aquatic parasitoids and their effects on the host are very limited. The aim of this study was to determine whether the density of parasitoids is affected by several environmental determinants and if there is a temporal change of density during the season, particularly in relation to the host population dynamics (from order Odonata in this study). In total, 266 individuals of parasitoid wasps (from four families utilizing damselflies as hosts) were identified. The density of parasitoids did not change significantly during the season regardless of the population dynamics of model host *L. sponsa* and other odonates, while there was a significant effect of habitat type on the density of parasitoids. This indicates that eggs of Odonata represent only one of several host taxa. This indicates that egg parasitoids of aquatic invertebrates are host generalists preferring open over afforested habitats." (Authors)] Adress: Harabiš, F., Dept of Ecology, Czech Univ. of Life Sciences Prague, Kamycka 129, 165 21 Praha 6 – Suchbát, Czech Republic. E-mail: harabis.f@gmail.com

**13723.** Hassall, C.; Keat, S.; Thompson, D.J.; Watts, P.C. (2013): Bergmann's rule is maintained during range expansion in a damselfly. *Global Change Biology* 20(2): 475-482. (in English) ["Climate-induced range shifts result in the movement of a sample of genotypes from source populations to new regions. The phenotypic consequences of those shifts depend upon the sample characteristics of the dispersive genotypes, which may act to either constrain or promote phenotypic divergence, and the degree to which plasticity influences the genotype-environment interaction. We sampled populations of *Erythromma viridulum* from Northern Europe to quantify the phenotypic (latitude-body size relationship based on seven morphological traits) and genetic (variation at microsatellite loci) patterns that occur during a range expansion itself. We find a weak spatial genetic structure that is indicative of high gene flow during a rapid range expansion. Despite the potentially homogenising effect of high gene flow, however, there is extensive phenotypic variation among samples along the invasion route that manifests as a strong, positive

correlation between latitude and body size consistent with Bergmann's rule. This positive correlation cannot be explained by variation in the length of larval development (voltinism). While the adaptive significance of latitudinal variation in body size remains obscure, geographical patterns in body size in odonates are apparently underpinned by phenotypic plasticity and this permits a response to one or more environmental correlates of latitude during a range expansion." (Authors)] Address: Watts, P., Institute of Integrative Biology, Univ. of Liverpool, Liverpool, UK. E-mail: phill@liv.ac.uk

**13724.** Hayasaka, D.; Suzuki, K.; Korenaga, T.; Saito-Morooka, F.; Nomura, T.; Fukasawa, K.; Sánchez-Bayo, F.; Goka, K. (2013): Effects of two successive annual treatments of two systemic insecticides, imidacloprid and fipronil, on dragonfly nymph communities in experimental paddies. *Journal of the Pesticide Science Society of Japan* 38(2): 101-107. (in Japanese, with English summary) ["The effects of two successive annual treatments of imidacloprid and fipronil on dragonfly nymph communities, which are one of the best-known bioindicators in Japanese agroecosystems, were monitored in experimental paddies. The abundance of dragonfly nymphs was lower in both insecticides-treated fields than it was in the controls, particularly following fipronil treatments. Residues of both insecticides were found in the soil throughout the two years, and imidacloprid persisted in water up to three months following each treatment. A Principal Response Curve analysis (PRC) showed that the second annual treatments caused greater structural changes in dragonfly nymph communities than the initial treatments caused, particularly for fipronil. The community structures continued to change even after the insecticides dissipated from the water. This suggests that ecological impacts, and therefore risks, of imidacloprid and fipronil on dragonfly nymph communities depend more on soil residues than they do on waterborne residues. As expected, susceptibility of dragonfly nymphs to these two insecticides differed among species." (Authors)] Address: Hayasaka, D., National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba, Ibaraki 305-8506, Japan. E-mail: hayasaka@nara.kindai.ac.jp

**13725.** Heier, L.S.; Nyheim, M.; Skipperud, L.; Meland, S. (2013): Mobility and uptake of antimony, cadmium and cobalt in dragonfly larvae (Odonata, Anisoptera) as a function of road salt concentrations — a tracer experiment. *Urban Environment, Proceedings of the 11th Urban Environment Symposium (UES), held in Karlsruhe, Germany, 16-19 September 2012, ISBN 978-94-007-7755-2: 507-516.* (in English) [Oslo, Norway; "Road runoff typically contains a variety of contaminants such as metals and road salt. Odonata larvae are important members in a variety of freshwater ecosystems which may receive road runoff. The objective of the present work was to investigate the uptake and excretion kinetics of cadmium (Cd), cobalt (Co) and antimony (Sb) in

Odonata larvae using radioactive tracer technique, and secondly how addition of road salt would affect the uptake. Larvae were individually exposed in beakers containing sediment spiked with <sup>109</sup>Cd, <sup>60</sup>Co and <sup>125</sup>Sb and water with different concentrations of road salt. The results showed that at higher salt concentrations more <sup>109</sup>Cd and <sup>60</sup>Co were mobilized from the sediments, however, the uptake in the larvae decreased. Antimony-125 was strongly bound in the sediment, and addition of salt did not affect the accumulation in the larvae significantly." (Authors)] Address: Heier, Lene, Department of Plant and Environmental Sciences, Norwegian University of Life Sciences, PO Box 5003, 1432, Ås, Norway. E-mail: lene.sorlie.heier@umb.no

**13726.** Hinojosa-Garro, D.; Arceo-Gómez, J.; Zambano, L.; Escalera-Vázquez, L.H. (2013): Fish diet composition in permanent and semi-permanent pools in tropical wetlands of the Yucatan Peninsula. *Neotropical Ichthyology* 11(4): 881-890. (in English, with Spanish summary) [Petenes Biosphere Reserve (PBR), Campeche, southern Mexico; "We compared fish diet composition between permanent (P) and semi-permanent (SP) pools in Petenes Biosphere Reserve (PBR), Campeche. A total of 445 gut contents were examined to determine stomach relative fullness (RF), fish diet as index of niche breadth (INB) and diet overlap. In SP pools, species showed a RF of 1.66 (57.20 % empty stomachs) whereas in P pools, the RF was 2.91 (31.16%). We classified fish diet into six trophic groups: detritivorous, herbivorous-detritivorous, insectivorous, piscivorous, omnivorous and malacophagous. Species in P pools were found to be specialist. Conversely, species present in both habitats shifted to generalist patterns. There was a 54.0% dissimilarity in fish diet composition between pools. From all items identified, detritus (21.33% of the total dissimilarity), aquatic and terrestrial invertebrates (12.31%), fish remains (10.29%), plant remains (7.37%), and crustaceans (2.74%) distinguished diets between pools. Significant diet overlaps (>0.6) and low INB values (<0.3) were observed in P pools, whereas in SP pools, intermediate-low diet overlaps (<0.4) and higher INB values (>0.5) were observed. In SP pools seasonality had a strong effect on fish diet, increasing the frequency of food items such as terrestrial insects, amphipods and arachnids, during the rainy season while P pools showed lower variation. Thus, fish trophic habits appear to be regulated by pools hydrology." (Authors) Odonata had significant higher frequencies in fish of P pools compared to SP pools.] Address: Hinojosa-Garro, D., Laboratorio en Manejo de Vida Silvestre y Colecciones Científicas, Área de Ecología Acuática, CEDESU, Universidad Autónoma de Campeche, San Francisco de Campeche, Campeche, México. E-mail: dhinojos@uacam.mx

**13727.** Hoess, R. (2013): Fliegender Knäuel aus *Erythromma viridulum* und *Enallagma cyathigerum*. *Mercuriale* 13: 25-28. (in German, with English summary)

[Switzerland; "E. viridulum and E. cyathigerum were observed forming a flying aggregation made of several dozens of specimens close to the water surface. Tandem pairs of E. viridulum probably tried to access the submerged oviposition substrate by using sitting individuals." (Author)] Address: Hoess, R., Normannenstr. 35, CH-3018 Bern, Switzerland. E-mail: r.hoess@1st.ch

**13728.** Jomoc, D.J.G.; Flores, R.R.C.; Nuñez, O.M.; Villanueva, R.J.T. (2013): Species richness of Odonata in selected wetland areas of Cagayan de Oro and Bukidnon, Philippines. *AACL Bioflux* 6(6): 560-570. (in English) ["Monitoring the environment through indicator species such as Odonata which has an aquatic larval stage and a terrestrial adult stage allows fast and easy means of evaluating habitat quality. This study aims to examine the species richness of Odonata in nine wetland areas of Bukidnon and Cagayan de Oro City. A survey using random sampling method was conducted from October to December 2012. Thirty-eight species were recorded under 28 genera and 12 families. Nineteen species are endemic. Species richness of the Odonata in relatively undisturbed areas ranges from 17-20 species. A lower species richness of 6-12 species was recorded in urbanized and disturbed areas. A relatively rare taxa, *Rhinagrion reinhardi* was recorded in one of the pristine areas. Further surveys in poorly studied and undisturbed areas may result in a higher species richness of Odonata." (Authors)] Address: Nuneza, Olga, Department of Biological Sciences, Mindanao State University - Iligan Institute of Technology, Iligan City, Philippines; 2 D3C Gahol Apartement, Davao City, Philippines. E-mail: olgamnuneza@yahoo.com

**13729.** Kadye, W.T.; Chakona, A.; Marufu, L.T.; Samukange, T. (2013): The impact of non-native rainbow trout within Afro-montane streams in eastern Zimbabwe. *Hydrobiologia* 720: 75-88. (in English) ["Non-native trout species have been associated with many negative effects in receiving ecosystems. The first aim of this study was to determine the impact of non-native rainbow trout *Oncorhynchus mykiss* on distribution and abundance of native mountain catfish *Amphilius uranoscopus* within Afro-montane streams in Nyanga Mountains, eastern Zimbabwe. The second aim was to compare macroinvertebrate community responses to the presence of the trout and the catfish. We examined trout impact on catfish's habitat associations, whereas macro-invertebrate composition was compared using open fish and fish enclosure experiments in habitats with and without trout. Trout influenced both the distribution and abundance of the catfish that occupied shallow reaches possibly to avoid predation from trout that occurred in the deeper habitats. Within trout invaded reaches, most macro-invertebrate taxa were more abundant in enclosure than open treatments. By contrast, within trout-free reaches, most macro-invertebrates either did not differ between treatments or were generally more abundant in open than enclosure treat-

ments. This suggests that the macro-invertebrate communities responded differently within invaded and non-invaded reaches. By influencing distribution and abundance of native biota, non-native rainbow trout may have wider ecological effects, such as influencing trophic interrelationships within invaded habitats. ... In general, large-bodied Odonate taxa *Atoconeura* sp. and *Aeshna* sp. were more abundant in Mare River that had no trout compared to Pungwe River that had trout." (Authors)] Address: Kadye, W.T., Department of Ichthyology and Fisheries Science, Rhodes University, PO Box 94, Grahamstown 6140, South Africa. E-mail: kadyew@yahoo.com

**13730.** Kappes, E.; Kappes, W. (2013): Ein Schlafplatz von Männchen der Großen Pechlibelle *Ischnura elegans* in Mecklenburg-Vorpommern. *Mercuriale* 13: 43-44. (in German, with English summary) [Adult males of *I. elegans* were observed in high density at 11-VII-2009 at a nocturnal resting site in Mecklenburg-Western Pomerania (Germany). On a small area of 4 m<sup>2</sup> the authors estimated at least 1,000 specimens.] Address: Kappes, E., Eichenweg 27, 22395 Hamburg, Germany. E-mail: eva.wulf.kappes@t-online.de

**13731.** Karjalainen, S.; Mäkinen, J. (2013): Sudenkontokatsaus 2012 [Dragonfly review 2012]. *Crenata* 6: 8-10. (in Finnish, with English summary) ["This article presents the most interesting dragonfly (Odonata) records from Finland in 2012. No new additions to the Finnish fauna were found but five new provincial records were made: *Ischnura pumilio* (Varsinais-Suomi), *Coenagrion puella* (Ahvenanmaa), *Libellula depressa* (Keski-Pohjanmaa), *Ophiogomphus cecilia* (Kainuu), *Aeshna viridis* (Ahvenanmaa)." (Authors)] Address: Mäkinen, J., Metsänhoitajankatu 12 B 16, FI-00790 Helsinki, Finland. E-mail: makisenjussi@gmail.com

**13732.** Karjalainen, S.; Mäkinen, J. (2013): Sudenkonton toisten sudenkontojen saaliina: havainnot Suomesta [Dragonflies preying on other dragonflies: records from Finland]. *Crenata* 6: 12-16. (in Finnish, with English summary) ["This article compiles all known Finnish records of adult dragonflies feeding on other dragonflies. The results show that *Aeshna serrata* is the most active predator of other dragonflies. A total of 14 records of *A. serrata* feeding on other dragonflies are known. *A. serrata* is a rare species in Finland but the number of predation records is much higher than in other species. Three cases of cannibalism have been recorded: *Ischnura elegans*, *Aeshna grandis* and *Aeshna serrata*." (Authors)] Address: Mäkinen, J., Metsänhoitajankatu 12 B 16, FI-00790 Helsinki, Finland. E-mail: makisenjussi@gmail.com

**13733.** Karjalainen, S. (2013): Sudenkontolajien väli-set parittelut: havainnot Suomesta [Heterospecific copulae: records from Finland]. *Crenata* 6: 20-21. (in Finnish, with English summary) ["This paper lists all known



Finnish records of heterospecific copulation. A total of 14 records are known, twelve of them concern *Calopteryx* species. In addition, a copula between *Aeshna juncea* male and *A. cyanea* female and a copula between *Leucorrhinia albifrons* male and *Sympetrum flavolum* female are described." (Authors)] Address: Karjalainen, S., Tyrskykuja 3 B 15, FIN-02320 Espoo, Finland. E-mail:sk@korento.net

**13734.** Kerry, L. (2013): On the relationship between the Small Red Damselfly *Ceriagrion tenellum* and the terrestrial mite *Leptus killingtoni*. *J. Br. Dragonfly Society* 29(2): 69-83. (in English) ["Larvae of the terrestrial mite, *Leptus killingtoni* were identified on a population of *Ceriagrion tenellum* on the East Devon Pebblebed Heaths in 2011. An investigation was undertaken on the interaction between these species during the flight period in 2012. In total 567 individuals (382 males and 185 females) were caught and marked and the location of a total of 808 mites were noted (498 on first capture and a further 310 on recaptures). The highest numbers of *L. killingtoni* were seen in the middle and driest period at the end of July. Only 19% of immature *C. tenellum* were found to have mites, whereas 36% of male and 49% of female mature damselflies had mites. Paired females were more likely to be infested than unpaired females and males (whether paired or not). Mites were recorded most often from areas more difficult to groom, with 26.6% recorded on the ventral surface of the thorax (and especially between the legs), 20.9% on the abdomen and 17.3% on the femur. Female melanogastrium were recaptured nearly twice as often as *typica*, despite similar numbers being marked." (Author)] Address: Kerry, L., Mount Pleasant, Stoneyford, Colaton Raleigh, Sidmouth, Devon. EX10 OHZ, UK

**13735.** Khelifa, R.; Mahdjoub, H.; Zebba, R.; Kahalerras, A.; Guebailia, A.; Amari, H.; Houhamdi, M. (2013): Aspects of reproductive biology and behaviour of the regional critically endangered *Urothemis edwardsii* (Odonata: Libellulidae) on Lake Bleu (Algeria). *Zoology and Ecology* 23(4): 282-285. (in English, with Lituianian summary) ["A study on the reproductive biology and behaviour of the regional critically endangered *Urothemis edwardsii* Selys was conducted in the relict sub-population of Lake Bleu (North-east Algeria) during the reproductive season of 2012. The reproductive behaviour was described from the pair formation to the end of oviposition. Copulation duration was  $98.55 \pm 16.48$  s, and the whole oviposition episode lasted  $220.89 \pm 32.08$  s with usually three bouts interrupted by three rest periods. The species displayed a particular oviposition behaviour characterized by an alternation of contact (during the first bout) and non-contact guarding. The induced clutch size was  $646.33 \pm 173.10$  eggs. In the laboratory, eggs showed direct embryonic development and synchronous egg hatching within the modal period of 10 days ranging between nine and 24 days. The overall hatching success was 85.39%, the main

causes of mortality being infertility and unhatchability." (Authors)] Address: Khelifa, R., Faculty of Biological and Agricultural Sciences, Biology Department, University of Tizi Ouzou, Tizi Ouzou 15000, Algeria. E-mail: rassimkhelifa@gmail.com

**13736.** Knight, K. (2013): Damselfly larvae select quick release lamellae for survival. *J. Exp. Biol.* 217: 159. (in English) ["Adult damselflies are a spectacular vision of summer, streaking through the air above pond surfaces. Yet survival through their earlier aquatic life stages is extremely precarious. Equipped with leaf-like lamellae hinged at the end of the abdomen for propulsion, the structures provide the perfect appendages for passing predators to grab onto. But the larval insects have a self-preservation mechanism that helps them to escape hungry predators: they self amputate – autotomize – trapped lamellae. Jennifer Gleason, Douglas Fudge and Beren Robinson from the University of Guelph, Canada, explain that the ability of a larva to shed its lamellae with ease improves its chances of survival, which might lead larvae that inhabit heavily predated waters to develop relatively fragile lamellar joints to increase their chances of survival (p. 185). To test the theory, the Canadians measured the force required to break damselfly larvae lamellar joints, as well as the size and cuticle thickness of the joint. They discovered that the joints of damselfly larvae from fishless ponds – where carnivorous dragonfly larvae flourish – were much more fragile than the joints of larvae from ponds where there were few dragonfly larvae. 'This suggests that autotomy may evolve in larval damselflies under selection from small grasping predators like larval dragonflies by favouring smaller joint size or reduced cuticle area of lamellae joints', says the team." (Author)] Address: Kathryn Knight. E-mail: kathryn@biologists.com

**13737.** Knillmann, S.; Stampfli, N.C.; Noskov, Y.A.; Becketov, M.A.; Liess, M. (2013): Elevated temperature prolongs long-term effects of a pesticide on *Daphnia* spp. due to altered competition in zooplankton communities. *Global Change Biology* 19(5): 1598-1609. (in English) [Fifty-five outdoor microcosms were installed at the UFZ-Helmholtz Centre for Environmental Research, Germany (51°21'13N, 12°25'55E). "Considerable research efforts have been made to predict the influences of climate change on species composition in biological communities. However, little is known about how changing environmental conditions and anthropogenic pollution can affect aquatic communities in combination. We investigated the influence of short warming periods on the response of a zooplankton community to the insecticide esfenvalerate at a range of environmentally realistic concentrations (0.03, 0.3 and 3 µg L<sup>-1</sup>) in 55 outdoor pond microcosms. Warming periods increased the cumulative water temperature, but did not exceed the maximum temperature measured under ambient conditions. Under warming conditions alone the abundance of some zooplankton taxa increased selectively

compared to ambient conditions. This resulted in a shift in the community composition that had not recovered by the end of the experiment, 8 weeks after the last warming period. Regarding the pesticide exposure, short-term effects of esfenvalerate on the community structure and the sensitive taxa *Daphnia* spp. did not differ between the two temperature regimes. In contrast, long-term effects of esfenvalerate on *Daphnia* spp., a taxon that did not benefit from elevated temperatures, were observed twice as long under warming than under ambient conditions. This resulted in long-term effects on *Daphnia* spp. until 4 months after contamination at 3 µg L<sup>-1</sup> esfenvalerate. Under both temperature regimes, we identified strength of interspecific competition as the mechanism determining the time until recovery. However, enhanced interspecific competition under warming conditions was prolonged and explained the delayed recovery of *Daphnia* spp. from esfenvalerate. These results show that, for realistic prediction of the combined effects of changing environmental factors and toxicants on sensitive taxa, the impacts of stressors on the biotic interactions within the community need to be considered." (Authors) Odonata are considered at the order level.] Address: Knillmann, Saskia, Department of System Ecotoxicology, UFZ - Helmholtz Centre for Environmental Research, Permoserstr. 15, 04318 Leipzig, Germany. E-mail: saskia.knillmann@ufz.de

**13738.** Knorp, N. (2013): Limitations on macroinvertebrate populations in South Florida wetlands. MSc. thesis, Florida Atlantic university: 69 pp. (in English) ["It can be difficult to disentangle the factors that determine population success in freshwater systems, particularly for organisms with disturbance-resistant life stages like aquatic invertebrates. Nevertheless, the effects of environmental variation and habitat structure on animal population success in wetlands are important for understanding both trophic interactions and biodiversity. I performed two experiments to determine the factors limiting crayfish (*Procambarus fallax*) and dragonfly (Family: Libellulidae) populations in wetland environments. A simulation of a dry-disturbance and subsequent sunfish (Family: Centrarchidae) re-colonization revealed that crayfish populations are sensitive to sunfish, while dragonfly naiads seemed to be limited by other drying-related factors. A second manipulation revealed that small-bodied fishes and habitat structure (submerged vegetation) shaped dragonfly communities primarily through postcolonization processes." (Author)] Address: Knorp, Natalie. not available

**13739.** Kovacs, T.; Murányi, D. (2013): Larval data of *Caliaeschna microstigma* (Schneider, 1845) from the Balkan Peninsula, with contributions to its biology (Odonata: Aeshnidae). *Folia historico naturalia musei Matraensis* 37: 21-28. (in English) ["Based on larvae or exuviae, we present 59 new localities of *C. microstigma* from Albania (17), Bulgaria (6), Croatia (1), Greece (18), Macedonia (2), Montenegro (11), and from the Eu-

ropean part of Turkey (4). Collecting sites are depicted on a map. Summary on the habitat and biology of the species is given, and morphological characters of the larvae are shown on several figures. Due to the different larval cohorts collected, we conclude that the species has semivoltine life cycle." (Authors)] Address: Murányi, D., Hungarian Natural History Museum, Baross u. 13, H-1088 Budapest, Hungary. E-mail: muranyi@zol.nhmus.hu

**13740.** Krieg-Jacquier, R. (2013): Daniel nous a quittés. *Sympetrum* 17: 3. (in French) [Obituary Daniel Grand.] Address: Krieg-Jacquier, R., 18 rue de la Maçonne F-73000 Barberaz, France. E-mail: regis.krieg.jacquier@gmail.com

**13741.** Kulijer, D.; Zawal, A.; Baker, R.A. (2013): Further studies on the Odonata from Bosnia & Herzegovina and their mite parasites. *J. Br. Dragonfly Society* 29(2): 97-106. (in English) ["A brief review of the present knowledge of the Odonata from Bosnia and Herzegovina is followed by further work on their mite parasites; in particular their identification, distribution and host records. A total of 301 mites were mounted, counted and identified, most of them to species. *Arrenurus bicuspidator*, *A. bruzelii*, *A. cuspidator*, *A. cuspidifer*, *A. maculator* and *A. papillator* were identified on 13 odonate host species, including three Anisoptera: *Aeshna isosceles*, *Sympetrum flaveolum*, and *Anax imperator*. The Zygoptera were *Ischnura pumilio*, *I. elegans*, *Coenagrion puella*, *C. pulchellum*, *C. scitulum*, *Pyrrhosoma nymphula*, *Enallagma cyathigerum*, *Erythromma najas*, *Lestes dryas* and *Platycnemis pennipes*. Size measurements indicate that larval mites of the same species are much larger on anisopterans than on zygopterans and reasons for this are discussed." (Authors)] Address: Zawal, A., Uniwersytet Szczeciński, Wydział Nauk Przyrodniczych, Katedra Zoologii Bezkręgowców i Limnologii, ul. Wąska 13, PL-71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**13742.** Kumar, M. (2013): Image performance characteristics of bio-inspired image sensor. MSc. thesis, The Graduate Faculty of The University of Akron: XIII + 111 pp. (in English) ["Bio-Inspired imaging has the prospective to enhance machine vision and image performance characteristics. The rationale of this study is to explore the image formation by different insect eyes that will benefit the digital imaging with high resolution while maintaining wide field-of-view, for defense and military applications. In this study, three architectures of different compound eyes, namely, the apposition, the superposition and the neural superposition, were studied. Human eye is polarization insensitive and without usage of an artificial polarization filter, it cannot employ the polarization of light. In contrast, insect vision holds numerous advantages, as their compound eyes provides wide viewing angle, good tracking abilities due to large amount of photoreceptor units and foremost im-

portant can detect the polarized light. It is well known, that polarization of light provides enhanced structural and geometrical information, such as high contrast visualization of the surface contours, curvature of objects, surface structures, and locations of different materials. The five insect species that were considered for this study are *Hemicordulia tau*, *Anoplognathus pallidicollis*, *Heteronympha merope*, *Melanitis leda* and *Phalaenoides tristifica*. In this study, several insect eyes architecture, were studied. Then, the imaging design parameters by varying the physical, geometrical, optical parameters of the eye architectures were simulated. Specifically, several physical, optical, geometrical, and imaging design parameters considered for this study, namely, the angular spacing of receptors, the diameter of the photoreceptors, the optical field-of-view, flying speed; the modulation transfer function (MTF), optical-blur filters, image contrast, angular sensitivity, spatial and angular resolution, degree of blurring, signal-to-noise ratio, and motion artifacts, were simulated at varying of those parameters. The outcome of this study is to explore the phenomenology of the image formation by diverse insect eye architectures which may benefit the areas of defense and security, surveillance and navigation, healthcare, and others." (Author)] Address: Kumar, M. c/o The Graduate Faculty of The University of Akron, 302 E Buchtel Ave, Akron, Ohio 44325, USA

**13743.** Lamond, B. (2013): A Great Blue Skimmer (*Libellula vibrans*) in Flamborough (Hamilton) and a summary of Ontario records. *The Wood Duck* 67(3)2: 38-39. (in English) [6 August 2012 - 8th Concession West, Flamborough, 400m west of Spencer Creek, Hamilton, Ontario, Canada.] Address: Lamond, B. E-mail: bill-lamond@hotmail.com

**13744.** Lamond, B. (2013): Rapids Clubtail (*Gomphus quadricolor*) in the Hamilton Area. *The Wood Duck* 67(1): 9-10;-15. (in English) [30 May 2010 - Grand River at Hardy Road, Brantford, Hamilton, Ontario, Canada.] Address: Lamond, B. E-mail: bill-lamond@hotmail.com

**13745.** Lissak, W. (2013): Erfolgreiches Artenhilfsprojekt für den Kleinen Blaupfeil *Orthetrum coerulescens* im Rahmen des Aktionsplans „Biologische Vielfalt Baden-Württemberg 111 Arten-Korb“. *Mercuriale* 13: 29-36. (in German, with English summary) ["To secure an occurrence of *O. coerulescens* at Eislingen/Fils (Northern Württemberg) a species conservation program was started. The aim of the cooperation between different partners is the coordination and implementation of protection measures. Because *O. coerulescens* is a target species in the so-called "111- species-basket" under the "Action Plan Biodiversity in the German Land of Baden-Württemberg", the project was presented as part of this campaign. Although the habitat of the population is protected and no use or regular water maintenance happens, the population was threatened by shrubs and trees planted at the shoreline of the creek. By clearing

trees and shrubs along the creek and by removing parts of the dense stands of *Typha latifolia* the shadowing of the watercourse channel was reduced and thus the habitat quality could be improved for *O. coerulescens*. A monitoring between 2008 and 2013 showed an increase of the local population of *O. coerulescens*, which was discovered in 2008. Thus the management actions succeeded the measures were accompanied by intensive public relations. It was financed by public funds and by a sponsorship." (Author)] Address: Lissak, W., Schubartstr. 12, 73092 Heiningen, Germany. E-mail: Wolfgang.Lissak @t-online.de

**13746.** Lösch, B.; Winkler, F.; Haller, R.; Festi, A.; Nösing, T.B. (2013): Libellen (Odonata) im Naturpark Texelgruppe (Südtirol, Italien). *Gredleriana* 13: 99-110. (in German, with English summary) ["Dragonflies were collected in and around the Nature Park Texelgruppe during summer 2011. In 28 investigated habitats a total of 15 species was found (10 species in the Nature park). In the habitats in the Nature park the species assemblage was relatively small and contained mainly mountain species, which was to be expected considering the altitude of the habitats. Most frequent species were *Aeshna juncea* and *Somatochlora alpestris*. The Fagelsee and the moors on the Adelsböden in the Nature park as well as the Kehlthalbach retention basin outside the Nature park proved to be of particular interest." (Authors)] Address: Lösch, Birgit, Gampenstr. 22, I-39011 Lana, Italy. birgit.loesch@hotmail.de

**13747.** Manenti, R.; Siesa, M.E.; Ficetola, G.F. (2013): Odonata occurrence in caves: active or accidentals? A new case study. *Journal of Cave and Karst Studies* 75(3): 205-209. (in English) ["Caves are environments that host unique faunas and may be important for organisms not exclusively dependent on caves. The occurrence of epigeal taxa in caves is often considered accidental, but their study can provide useful information on cave colonization. Records of Odonata underground are extremely scarce. We have identified larvae of *Cordulegaster bidentata* in two caves, one natural and one artificial, from Lombardy in northwestern Italy. They occurred in pools near the cave entrance that have 84 lux of maximum illuminance, reached in early spring. In both caves we found a high density of larvae, and some of them were at very advanced instars. They had an important role in the cave's trophic web, exerting a high predation pressure on larvae of the salamander *Salamandra salamandra*. The plasticity of some Odonata species may allow them to take advantage of underground springs." (Author)] Address: Manenti, R., Dipartimento di Bioscienze, Università degli Studi di Milano, Via Celoria, 26 20133 Milano, Italy. E-mail: raoul.manenti@unimi.it

**13748.** Massaro, F.C.; Negreiros, N.F.; Rocha, O. (2013): A search for predators and food selectivity of two native species of *Hydra* (Cnidaria: Hydrozoa) from



Brazil. *Biota Neotropica* 13(2): 35-40. (in English, with Portuguese summary) ["The Hydra is the most common representative of freshwater cnidarians. In general, it is found in freshwaters on every continent, with the exception of Antarctica. The aim of the present study is to gather biological and ecological data on aspects of two species of Hydra native to Brazil: *Hydra viridissima* and *Hydra salmacidis*. Predation and food selectivity experiments were performed to assess the possible predators and the prey preferences, respectively, of the two species. The results indicate that the two species of Hydra were not consumed by any of the predators that were tested, which are typical predators of invertebrates in freshwater: nymphs of Odonata Anisoptera and the phantom midge larvae of *Chaoborus* sp. (Insecta), adults of Copepoda Cyclopoida (Crustacea) and the small fish *Poecilia reticulata*. It was observed that the smaller Hydra, *H. viridissima*, positively selected the nauplii and copepodites of calanoid copepods and small cladocerans and rejected large prey, such as the adults of calanoid copepods and ostracods. The larger *H. salmacidis*, besides the nauplii and copepodites of the calanoid copepods and small cladocerans, also positively selected the large adults of the calanoid copepods. It can be concluded that both *H. viridissima* and *H. salmacidis* are most likely preyed on little or not preyed on at all in many freshwater bodies, as they are top predators in the food chain. At the same time, they are efficient predators, and a positive relationship was observed between the prey size and the Hydra species size. Food selectivity was related to prey size as well as other prey characteristics, such as carapace thickness and swimming efficiency. ... Thus, it can be concluded that Odonata Anisoptera, the phantom midge *Chaoborus* sp., the adults of Copepoda Cyclopoida and the fish *P. reticulata*, which were tested as predators in the present study, do not consume hydras in freshwater." (Authors)] Address: Massaro, Fernanda Cristina, Post Graduate Program in Environmental Engineering Science, São Carlos School of Engineering, University of São Paulo – USP, Av. Trabalhador São-carlense, 400, CP 292, CEP 13560-970, São Carlos, SP, Brazil. E-mail: femassaro@gmail.com

**13749.** Maxwell, J. (2013): Mixed pairing between Blue-tailed Damselfly *Ischnura elegans* and Emerald Damselfly *Lestes sponsa*. *Atropos* 50: 85-86. (in English) [Verbatim: Loch Bran, halfway along Loch Ness and just south-east of Foyers, is one of the best places in Scotland to find *Somatochlora metallica*. It's a beautiful, small, lily-covered loch set within the forest and accessed along a short path from a handy lay-by. I visited there on 21 July 2013, in search of this new species for me. The weather was perfect and I soon saw several Brilliant Emerald—iridescent beauties dancing along the edge of the sphagnum moss edge of the loch. However, there were many other attractions with various damselflies and darters mating amongst the emergent stalks and *Libellula quadrimaculata* and *Aeshna*

*juncea* all dominating their territories. Having watched Willow Emerald Damselfly *Lestes viridis* in Suffolk earlier in the year, I was taking a special interest in the pairs of Emerald Damselfly *L. sponsa* mating and was surprised to observe a mixed pairing between a male Blue-tailed Damselfly *Ischnura elegans* and a female Emerald Damselfly. As I remember the pair flew off together before any mating occurred.] Address: Maxwell, J., 7 Lilac Hill, Hamilton, Lanarkshire, ML3 7HG, UK

**13750.** Meurgey, F. (2013): A catalogue of the West Indian dragonflies (Insecta: Odonata). *Annales de la Société entomologique de France* (N.S.) 49(3): 298-334. (in English, with French summary) ["Compilation and analysis of the existing literature together with the results of our research carried out since 2000 makes possible an updated catalogue of the West Indian Odonata. Such a catalogue has not previously been available, and dispersed and multilingual literature did not facilitate odonatological studies. The odonate fauna of the Caribbean is currently composed of 108 valid species, of which 36 (32%) are endemic to one or a few islands. The most species-rich families are Libellulidae and Coenagrionidae, together comprising 65% of the total fauna." (Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**13751.** Moore, C. (2013): Three unusual dragonfly sightings in West Cornwall during 2013. *Atropos* 50: 93-94. (in English) [UK; *Anax parthenope* (female). Drift Reservoir, Cornwall, 14 July 2013; *Libellula fulva* (female). Marazion Marsh, Cornwall, 17 July 2013; *Anax ephippiger* (female). Godolphin Woods, 12 August 2013] Address: Moore, Christine, Sallyport House, Church Street, Newlyn, Penzance, Cornwall, TR18 5JY, UK. E-mail: caemoore@aol.com

**13752.** Moroz, M.D. (2013): [Aquatic insects of Richianka River]. *Herald BSU. Ser. 2*(1): 53-57. (in Russian, with English summary) [Belarus; 17 Odonata taxa are listed including *Brachytron pratense*, *Stylurus flavipes*, and *Gomphus vulgatissimus*. *Calopteryx splendens*, *Calopteryx virgo*, *Lestes sponsa*, *Coenagrion puella*, *Coenagrion pulchellum*, *Ischnura elegans*, *Platycnemis pennipes*, *Gomphus vulgatissimus*, *Strylarus flavipes*, *Brachytron pratense*, *Aeshna grandis*, *Aeshna mixta*, *Cordulia aenea*, *Somatochlora metallica*, *Libellula fulva*] Address: Moroz, M.D., Scientific & Practical Center for Bioresources, Academy of Sciences of Belarus, Minsk, the Republic of Belarus. E-mail: mdmoroz@bk.ru

**13753.** Moroz, M.D.; Semenchenko, V.P.; Razlutski, V.I. (2013): Aquatic insects (Insecta) of the Gomel region rivers. *Proceedings of the National Academy of Sciences of Belarus, Biological series* 2013(2): 91-97. (in Russian, with English summary) [Belarus; the checklist of taxa includes the following Odonata species: *Calop-*

teryx splendens, *C. virgo*, *Platycnemis pennipes*, *Coenagrion puella*, *C. pulchellum*, *Erythromma najas*, *Gomphus vulgatissimus*, and *Somatochlora metallica*.] Address: Moroz, M.D., Scientific and Practical Center for Bioresources, Academy of Sciences of Belarus, Minsk, the Republic of Belarus. E-mail: mdmoroz@bk.ru

**13754.** Muranyi, D.; Kovacs, T. (2013): Contribution to the Odonata fauna of Albania and Montenegro. *Folia historico naturalia musei Matraensis* 37: 29-41. (in English) ["Faunistical data of 37 Odonata species collected in Albania since 2007, and 20 species collected in Montenegro during the past ten years are enumerated. *Selysiothemis nigra* is new to the fauna of Albania. Notes and figures are given concerning the taxonomy, distribution, and ecology of 15 taxa." (Authors)] Address: Murányi, D., Hungarian Natural History Museum, Baross u. 13, H-1088 Budapest, Hungary. E-mail: muranyi@zool.nhmus.hu

**13755.** Nattress, B. (2013): Mixed pairing by Emerald Damselfly *Lestes sponsa*. *Atropos* 50: 83. (in English) [Verbatim: I was interested to read the note in *Atropos* 47 (Pickess, 2012) about pairing by a male Emerald Damselfly *Lestes sponsa* with a female Large Red Damselfly *Pyrrosoma nymphula*. This observation reminded me of a similar incident that I had witnessed back in 2011. On the afternoon of 27 July 2011, whilst on holiday in Dumfries and Galloway, I visited Balloch Wood Ponds, near Creetown. I was strolling around watching the dragonflies and damselflies, when I noticed a male Emerald Damselfly paired with a female Large Red Damselfly. I took a quick photograph for the record. I watched the pair for not much more than a minute before they moved away.] Address: Nattress, B., 25 West Lea Dive, Tingley, Wakefield, West Yorkshire, WF3 1DH, UK

**13756.** Nava-Bolaños, A.; Sánchez-Guillén, R.A.; Munguía-Steyer, R.; Córdoba-Aguilar, A. (2013): Isometric patterns for male genital allometry in four damselfly species. *Acta ethologica* 17(1): 47-52. (in English) ["Recent studies have found that insect genitalic traits show negative allometry, i.e., are relatively small in relation to body size. One interpretation of this is that males use their genitalia to stimulate females. Thus, given the nature of damselfly copulation in which males physically reach the rival sperm that females have stored from previous matings, male genitalic traits are not expected to show negative allometry. To test this idea, we assessed (a) the rival sperm displacement function by the mating male and (b) allometry of aedeagal length of four damselfly species (*Argia anceps*, *Argia tezpi*, *Argia extranea*, and *Enallagma praevarum*). Sperm displacement was assessed by inspecting whether the aedeagus reached the rival sperm during copulation in mating pairs for the four species. To have a standard for comparing allometric patterns, allometry of aedeagal was compared to that of two non-genital traits, tibial,

and fourth abdominal segment length. In all cases, the aedeagus was found to reach the rival sperm which supports the idea that stimulation is not the mechanism for sperm displacement but physical displacement. Aedeagal length was isometric, and its slope was lower in general compared to that of tibial length and fourth abdominal segment. Given that this isometric pattern is not common for other odonate species, our interpretation of these varying aedeagal scaling patterns in this insect order is that males' and females' sexual interests are in conflict (males are evolving an elongated aedeagus to reach rival sperm while females are evolving unreachable sperm storage organs to prevent displacement of stored sperm). This sexual conflict scenario would favor varying scaling patterns for aedeagal length in odonates. A final interpretation is that the risk of interspecific matings in damselflies, may also explain different species-specific, aedeagal allometries." (Authors)] Address: Córdoba-Aguilar, A., Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Apdo. P. 69-1, Plaza Juárez, Pachuca, Hidalgo 42001, Mexico E-mail: acordoba@uaeh.reduaeh.mx

**13757.** Nelson, S. (2013): Sampling guide for the collection of dragonfly larvae and water samples from National Parks for mercury analysis. University of Maine (UMaine)/Mitchell Center & School of Forest Resources Acadia Learning/Schoodic Education Research Center (SERC) Institute National Park Service (NPS) – Air Resources Division (ARD): 16 pp. (in English) ["Scope and Application: Mercury threatens natural resources the National Park Service is charged with protecting. This citizen science project encourages students and visitors in national parks to collect dragonfly larvae for mercury analyses. The study connects people to parks, advances the educational mission, fosters biodiversity discovery opportunities, and provides baseline data to better understand the spatial distribution of mercury contamination in national parks. Mercury (Hg) is a globally distributed contaminant that can harm human and wildlife health. In its toxic methylated form, mercury bioaccumulates (builds-up) in aquatic and terrestrial foodwebs. Effects include reproductive and neurological impairment. Due in part to emissions from coal-burning power plants, even remote national park environments receive mercury deposition from the atmosphere. (See <http://www.nature.nps.gov/air/AQBasics/mercury.cfm> for background on mercury in national parks.) Dragonfly larvae (Odonata: Anisoptera) could serve as indicators of ecosystem health by characterizing the risk and potential toxic effects of mercury. These aquatic macroinvertebrates are long-lived (up to 5 year as larvae) before emerging as adult dragonflies, widespread across the U.S., predatory (i.e., prone to higher concentrations of mercury), important prey for fish species, and they reflect the mercury sensitivity of a specific watershed. Moreover, they are relatively easy to collect! This citizen science project (<http://www.nature.nps.gov/air/Studies/>

airtoxics/dragonfly/index.cfm) expands the geographic scope of research previously conducted by scientists and citizen scientists, and provides data that can be compared across parks. Early data are being used to develop hypotheses regarding whether mercury varies with odonate larval body size or by family; or whether a site's landscape setting drives variability in mercury in odonate larvae. Educational content and lesson plans for use by interpreters, resource managers, or research learning center staff are also available. Ultimately, this project also helps raise awareness about mercury impacts. The citizen science effort to collect dragonfly larvae from national parks for mercury analysis expanded in 2012 to include a total of approximately 14 parks across the following NPS regions: Northeast, Southeast, Midwest, Intermountain, Pacific West, and Alaska. Citizen scientists involved include students ranging from elementary-aged to college, park visitors, and BioBlitz participants. In addition to collecting dragonfly larvae, all parks are collecting a water sample for mercury-relevant water chemistry (i.e., dissolved organic carbon (DOC), pH, sulfate) and a water sample for total mercury. Most parks will sample once per year but a few parks will sample twice per year to help determine if there is seasonal variability. Data results will be available in 2013/2014. The optimal study design is 2.3 sites per park that represent a gradient in mercury-relevant chemistry (as defined above); or a gradient in landscape condition, such as a high and low elevation, amount of wetlands adjacent to or upstream from the site, or forested versus urban landcover. Consider scoping the sampling locations in advance of collecting samples. Does the proposed sampling location retain a healthy population of dragonflies? (A sample size of 15 dragonfly larvae per site is preferred.) Will nearby riparian flora and fauna get trampled? Is the site spacious enough for a group? Safety of the participants involved is extremely important. Riparian edges can be very slippery, as are stream and lake bottoms. High water levels and turbulent flows may cause an individual to lose balance in the water. Be attentive of the possible risks. A park research permit will be needed to conduct this project; the dragonfly and water samples collected for this project will be destroyed through analysis, or discarded after analysis. In addition, in some cases, a state permit may be needed to collect dragonfly larvae. Example text for the permit application can be found in Appendix A of this sampling protocol. The project's fact sheet and other materials will provide further assistance. (See NPS Dragonfly Larvae web page as above and additional documents on Sharepoint <http://sharenr/ard/DragonflyMercuryProject/Forms/AllItems.aspx>.)" (Author)] Address: Nelson, Sarah, Email: [sarah.j.nelson@maine.edu](mailto:sarah.j.nelson@maine.edu)

**13758.** Nowack, M. (2013): Blauegrüne Mosaikjungfer *Aeshna cyanea* auf systematischer Jagd nach Tandems der Weidenjungfer *Lestes viridis*. *Mercuriale* 13: 41-42. (in German, with English summary) ["A systematic hunt of one male of *A. cyanea* after tandems of *Lestes viridis* was observed five times at 18.10.2013 in southwest

Germany. Two of five observed attacks during 30 minutes were successful, but at the end in all cases the prey escaped." (Author)] Address: Nowak, M., Fuchseckstr. 16/1, 73114 Schlat, Germany. E-mail: [Nowak-Schlat@t-online.de](mailto:Nowak-Schlat@t-online.de)

**13759.** Nowack, M. (2013): Kleine Einblicke zum Verhalten der Großen Moosjungfer *Leucorrhinia pectoralis*. *Mercuriale* 13: 37-40. (in German, with English summary) ["In 2012 the behaviour of *L. pectoralis* was studied during 22 visits at one waterbody in the eastern part of the German Land of Baden-Württemberg. One male was observed 11 times in a time span of three weeks. The activity patterns of two males being present simultaneously at the study site differed significantly. One male showed rhythmic movements with its abdomen, which was in a concave position similar to that of some damselflies. When the sun was hidden behind clouds the observed specimens perched at light stems and open soil, where they sometimes got in touch with their wings to the ground. The only female observed, was ovipositing unguarded by a male over the open water surface in a two minutes timespan. All specimens, which were observed reaching or leaving the breeding water, either came from neighbouring trees or left the water towards the trees. The results are shortly discussed." (Author)] Address: Nowak, M., Fuchseckstr. 16/1, 73114 Schlat, Germany. E-mail: [Nowak-Schlat@t-online.de](mailto:Nowak-Schlat@t-online.de)

**13760.** Orr, A.G.; Kalkman, V.J.; Richards, S.J. (2013): Four new species of *Palaiargia* Förster, 1903 (Odonata: Platynemididae) from New Guinea with revised distribution records for the genus. *International Journal of Odonatology* 16(4): 309-325. (in English) ["Four new species of *Palaiargia* from New Guinea, *P. benkeni*, *P. clarillii*, *P. quandt* and *P. tydecksjuerging*, are described and figured. Maps are provided of the known distributions of all species of the genus which occurs in the Moluccas and on the main island of New Guinea. Previous unpublished records are provided for *P. carnifex*, *P. c. ceix*, *P. charmosyna*, *P. ernstmayri*, *P. humida* and *P. stellata*." (Authors)] Address: Orr, A.G., Griffith School of the Environment, Griffith University, Nathan, Q4111, Australia. E-mail: [agorr@bigpond.com](mailto:agorr@bigpond.com)

**13761.** Orr, A.G.; Ngiam, R.W.J.; Dow, R.A. (2013): A description of the larva of *Heliaeschna idae* Brauer from Borneo, with a supplementary note on the larva of *H. univervulata* Martin (Odonata: Aeshnidae). *International Journal of Odonatology* 16(3): 231-238. (in English) ["The final instar larva of *H. idae* is described and figured for the first time based on the exuvia from an advanced female larva collected in Sarawak, Borneo (East Malaysia). It is compared with the known larvae of the genus and is concluded to be most closely allied to *H. simplicia* Karsch, with which it shares a unique structure on the anterior margin of the prementum of the labium, along with several other distinctive characters.



The dorsal structure of the head of *H. uninervulata* is re-examined and illustrated. It is shown to bear a prominent convexity and tuft of long setae on the vertex which is similar to a structure previously recorded only in *H. simplicia*, and which is only weakly developed in *H. idae*. The taxonomic implications of these partly conflicting observations are discussed and it is concluded the Oriental members of the genus *Heliaeschna* might be separated into two or three separate genera, which are as yet unnamed." (Authors)] Address: Orr, A.G., Griffith, School of the Environment, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@bigpond.com

**13762.** Panomwan, Y.; Thanawan, P.-P.; Promm, T.-o, (2013): Aquatic insect communities and water quality in wetland, northern Thailand. *Journal of Applied Sciences in Environmental Sanitation* 8(3): 161-169. (in English) ["Nong Leng Sai wetland is located in Phayao Province, northern Thailand. Agriculture in contiguous lands has caused sedimentation and eutrophication, affecting not only its hydrology but its capacity to sustain a high diversity of aquatic life. The aims of this study were to assess the physicochemical (pH: air and water temperature, dissolved oxygen, conductivity and total dissolved solids) and biological characteristics (aquatic insects) of five sampling sites in the wetland during January to August 2009. Three replicates of samplings by aquatic D-net were used at the sampling sites. A total of 3,724 individuals belonging to seven orders and 26 families were recorded in this study. The hemipterans were the most abundant groups in wetland (8 families) followed by the coleopterans (6 families), the dipterans (3 families), the odonates (3 families), ephemeropterans (3 families), the trichopterans (2 families) and the lepidopteran was least abundant (1 family). The results from CCA indicated that low diversity was probably due to higher conductivity in the month of the dry season." (Authors) Libellulidae, Coenagrionidae, Gomphidae] Address: Promm, Taeng-On, Faculty of Liberal Arts and Science, Kasetsart University, Kamphaeng Saen Campus, Nakhon Pathom 73140, Thailand. E-mail: faastop@ku.ac.th

**13763.** Peterson, M. (2013): Note on the first record of *Pseudagrion microcephalum* (Rambur) (Odonata: Coenagrionidae) from Victoria, Australia. *Calodema* 285: 1-2. ["*P. microcephalum* was first recorded from Victoria, Australia by René Martin in 1901, based on a specimen collected by Farncombe Lovett Billingham (1859–1937) at Alexandra. The literature is reviewed." (Author) This note is correcting an internet publication: Richter, R. (2013). Discovery of *Pseudagrion microcephalum* (Blue Riverdamsel) in Victoria. Publicly available PDF, privately published electronically on 16 March 2013. 2pp.] Address: Peterson, M., Unit 5/33 Point Walter Road, Bicton, Perth, WA 6157 Australia

**13764.** Pinto, N.S.; Neto, J.H.; Ribeiro, V.; Rodrigues, A.R.; Brandao, B.R.; Rocha, C.O. (2013): Efeito da Presença de Vizinhos sobre o Comportamento Territo-

rial de *Perithemis mooma* (Kirby) (Anisoptera: Libellulidae). *EntomoBrasilis* 6(2): 104-107. (in Portuguese, with English summary) ["Effect of the presence of neighbours on the behaviour of territorial *Perithemis mooma*: Some territorial species present less aggressive responses in relation to the entering of neighbours than non-neighbours in their territory. This differentiation in responses is known as "Dear Enemy Effect". The objective of this study was evaluate the interaction of *P. mooma* with its neighbours and invaders, testing the occurrence of the "Dear Enemy Effect". This study was conducted in the Campus Samambaia of the Universidade Federal de Goiás (UFG). The intraspecific agonistic interactions of *P. mooma* were observed in 30 individuals, totalling 300 minutes of observation. We verified that the individuals spend more time in fights with invaders. This information corroborates the hypothesis that individuals recognize the neighbours; consequently spend less time the agonistic interactions with them. For the analysis about time and proportion of fight with neighbours more or less distant, we verified that the individuals spend more time in interactions with closer neighbour than further neighbours. Occurred more proportion of fight with invaders from the side of the lesser distant than from the centre (Tukey test;  $p = 0.034$ ). We observed that in *P. mooma* there is a significant effect indicating that males who recognizes themselves as neighbours interact with lesser aggressively than when interact with invaders. Thus, it is possible suggest that there is an effect dear enemy in males *P. mooma*, since there was a significant difference in time, as well as in the intensity of the interaction with neighbours and with invaders." (Authors)] Address: Pinto, N.S., Lab de Ecologia Teórica e Síntese, Depto de Biologia Geral, Univ Federal de Goiás, Goiânia, GO, Brasil

**13765.** Popova, O.N.; Barkalov, A.V.; Borisov, S.N.; VV Foolov, VV. (2013): Memory of Anatolii Yurievich Haritonov (21.09.1949–04.04.2013). *Eurasian Entomological Journal* 12(3): 205-212. (in Russian) [Obituary with bibliography of A.Yu. Haritonov.] Address: Popova, O.N., Institut Sistematiki i Zkologii Zhivotnykh, 630091 Novosibirsk, Ul. Frunse 11, Russia. E-mail: popova.olga.nik@gmail.com

**13766.** Popova, O.N.; Kharitonov, A.Yu. (2013): [Mass reproductive migrations of dragonflies genus *Sympetrum* (Odonata, Libellulidae)]. *Zoologicheskii zhurnal* 92: 893-900. ["The results of observing mass flights of some dragonflies of the genus *Sympetrum* forming tandems are presented. These tandems always fly against the wind, some of them landing for oviposition and then joining the flight again. This variant of migration behaviour has been unexplained until now. A hypothesis is proposed according to which synchronous mass flights of dragonfly tandems facilitate the most uniform oviposition in all the suitable biotopes. The general direction of the flight depends on the wind. As the wind direction changes, the flight course of the tandems changes ac-

cordingly, so that the dragonflies cross the same territory several times, which leads to a denser and more uniform distribution of eggs. It is proposed to refer to this variant of flight as reproductive wanderings. Such a dispersal strategy can maintain the most uniform population density and a more stable abundance of some dragonfly species in the territories with unstable humidity." (Authors)] Address: Popova, Olga, Institut Sistematiiki i Zkologii Zhivotnykh, 630091 Novosibirsk, Ul. Frunse 11, Russia. E-mail: popova.olga.nik@gmail.com

**13767.** Popova, O.N.; Haritonov, A.Yu. (2013): Odonata of the East Vasyugan, West Siberia, Russia. *Eurasian Entomological Journal* 12(3): 217-223. (in Russian, with English summary) ["Results of the studies of abundance of odonate, carried out in July 2012 in the odonatologically weakly explored east part of Vasyugan Plain, are presented. 27 localities are briefly described and the list of 40 species with data on their abundance, occurrence and population density are given. The list was increased to 43 species after including the data of 2006 [Bernard, Kosterin, 2010]." (Authors)] Address: Popova, O.N., Institut Sistematiiki i Zkologii Zhivotnykh, 630091 Novosibirsk, Ul. Frunse 11, Russia. E-mail: popova.olga.nik@gmail.com

**13768.** Rebora, M.; Dell'Otto, A.; Rybak, J.; Piersanti, S.; Gaino, E.; Hansson, B. (2013): The antennal lobe of *Libellula depressa* (Odonata, Libellulidae). *Zoology* 116 (4): 205-214. (in English) ["Here we describe the antennal lobe of *L. depressa*, identified on the basis of the projections of the afferent sensory neurons stemming from the antennal flagellum sensilla. Immunohistochemical neuropil staining as well as antennal backfills revealed sensory neuron terminal arborizations covering a large portion of the antennal lobe. No clear glomerular structure was identified, thus suggesting an agglomerular antennal lobe condition as previously reported in Palaeoptera. The terminal arbors of backfilled sensory neurons do, however, form spherical knots, probably representing the connections between the few afferent neurons and the antennal lobe interneurons. The reconstruction revealed that the proximal part of the antennal nerve is divided into two branches that innervate two spatially separated areas of the antennal lobe, an anterioventral lobe and a larger posteriodorsal lobe. Our data are consistent with the hypothesis that one tract of the antennal nerve of *L. depressa* contains olfactory sensory neurons projecting into one of the sublobes, while the other tract contains thermo-hygroreceptive neurons projecting into the other sublobe." (Authors)] Address: Rebora, Manuela, Dipartimento di Biologia Cellulare e Ambientale, Università di Perugia, 06123 Perugia, Italy. E-mail: rebora@unipg.it

**13769.** Roa-Fuentes, C.A.; Prada-Pedrerros, S.; Álvarez-Zamora, R.; Rivera Rondón, C.A.; Maldonado-Ocampo, J.A. (2013): Abundancia relativa y dieta de *Grundulus bogotensis* (Characiformes: Characidae) en

el altiplano Cundiboyacense, Colombia. *Universitas Scientiarum* 18(1): 73-82. (in Spanish, with English and Portuguese summaries) ["Relative abundance and diet of *G. bogotensis* in the Cundiboyacense plateau, Colombia. Abstract. To compare the relative abundance of *G. bogotensis* in two river basins and the diet of the populations of three basins in the Cundiboyacense plateau, we sampled 10 localities using electrofishing equipment between March and June 2006. The relative abundance in each locality was expressed as the number of fish caught per hour on a 100m stretch; any significant differences in relative abundance among basins were identified via a Kruskal-Wallis test. To quantify the diet, we used the volumetric method. Similarities between the basins were determined using three multivariate analyzes: nonmetric multidimensional scaling, analysis of similarity and similarity percentages. In the end, we collected a total of 675 individuals during 600 minutes of capture effort. The abundance of this species in the Bogotá river basin was significantly lower compared to that of the Suárez basin. The dietary composition, of autochthonous origin, primarily immature insects (including 'Aeshnidae') and microcrustaceans and the volume of items proved similar between the basins. In conclusion, the dietary analysis indicated a similarity exceeding 60% in the feed resource use for the three basins. The relative abundance of populations of *G. bogotensis* in the Bogotá river basin was lower than in the Suárez river basin, the latter having, possibly, the greatest abundance of this species throughout its range. The data suggests the most favourable conditions for the survival of the species in Lake Tota." (Authors)] Address: Roa-Fuentes, C.A., Laboratorio de Ictiología, Unidad de Ecología y Sistemática -UNESIS-, Departamento de Biología, Facultad de Ciencias, Pontificia Universidad Javeriana, Carrera 7 N° 40-62, Bogotá D.C., Colombia. E-mail: camilo.roa@gmail.com

**13770.** Robinson, J. (2013): Observations on the predation of *Gyrinus* by *Aeshna grandis* (Odonata: Aeshnidae) and *Triturus cristatus* (Amphibia: Salamandriidae). *Latissimus* 34: 20-21. (in English) [Verbatim: Whilst collecting invertebrate samples from a pond and ditch complex in Lancashire (UK) this summer (12 July 2013) I observed some invertebrate and vertebrate behaviour which I had never seen before. I was taking a break and when I heard distinctly audible splashes in the ditch adjacent to my resting spot. Peeking over the bridge parapet I watched a large brown dragonfly repeatedly diving onto the surface of the ditch causing audible and visible splashes. The action was far too violent to be ovipositing, so I grabbed a pair of binoculars and watched. The dragonfly turned out to be a male *Aeshna grandis* (instantly discounting the ovipositing idea). The dragonfly was actively hunting gyrrinids. I watched for a good half hour and the dragonfly took six gyrrinids in that time period and "missed" a similar number. It deliberately took individuals that were separate from the main raft. All the texts I've read have suggested that the

volatile chemicals produced by the pygidial glands rendered gyrinids either unpalatable or toxic to predators, however, the Aeshna had not apparently read this. It was definitely eating them, not just catching and dropping, if they are that unpalatable and/or toxic, it would have stopped after the first one surely? There were plenty of other prey types available for the Aeshna (ciclicids and tabanids were very abundant and not perturbed by any insect repellent my assistant and I cared to apply) I wonder if, on the day in question air temp was ca 30°C, that the volatiles were simply evaporating before they became "effective"? The same ditch had a significant population of Great Crested Newts and later that day I observed an individual taking gyrinids from below, it would rest on a piece of submerged masonry (approx. 200mm) below the surface) until the raft of gyrinids was directly overhead then shoot up, grab one and sink slowly back onto the masonry. The newt showed no sign that the Gyrinids were either unpalatable or toxic as it caught at least nine in the time period that I watched. The only gyrinids I recorded from that ditch were *G. substriatus* Stephens and I have to admit that both the Aeshna and GCN caught more than I did! Address: not stated

**13771.** Rudolf, V.H.W.; Rasmussen, N.L. (2013): Population structure determines functional differences among species and ecosystem processes. *Nature Communications* 4, Article number: 2318 doi:10.1038/ncomms3318: 7 pp. (in English) ["Linking the structure of communities to ecosystem functioning has been a perennial challenge in ecology. Studies on ecosystem function are traditionally focused on changes in species composition. However, this species-centric approach neglects the often dramatic changes in the ecology of organisms during their development, thereby limiting our ability to link the structure of populations and communities to the functioning of natural ecosystems. Here we experimentally demonstrate that the impact of organisms on community structure and ecosystem processes often differ more among developmental stages within a species than between species, contrary to current assumptions. Importantly, we show that functional differences between species vary depending on the specific demographic structure of predators. One important implication is that changes in the demography of populations can strongly alter the functional composition of communities and change ecosystem processes long before any species are extirpated from communities." (Authors) *Anax junius* and *Cybister fimbriolatus* are used as model organisms in mesocosms.] Address: Rudolf, V.H.W., Dept of Ecology and Evolutionary Biology, Rice University, 6100 Main Street-MS 170, Houston, Texas 77005, USA. E-mail: Volker.rudolf@rice.edu

**13772.** Ryazanova, G.I.; Polygalov, A.S. (2013): Fluctuating asymmetry of wing venation in damselflies *Ischnura elegans* (V.d. Lind.) (Odonata, Coenagrionidae) and prospects of its use as a biological indica-

tor of ecological quality of fresh-water reservoirs. *Moscow University Biological Sciences Bulletin* 68(4): 195-199. (in English) ["Fluctuating asymmetry (FA) of wing venation has been studied in five populations of *I. elegans* for bioindication of the environment in 2010 and 2011. The seasonal and sexual features of FA have been assessed. Different characteristics of FA in the damselfly wings have been found not to correlate with each other. In order to explain differently directed changes in FA of damselflies from the populations studied, which were influenced by temperature-oxygen stress of 2010, the hypothesis of differentiated death of specimens with shaky stability of development has been suggested. Possible use of FA as an instrument of biomonitoring of the ecological quality of water reservoirs has been put into question. Original Russian Text © G.I. Ryazanova, A.S. Polygalov, 2013, published in *Vestnik Moskovskogo Universiteta. Biologiya*, 2013, No. 3, pp. 27-32." (Authors)] Address: Ryazanova, G.I., Biological Faculty, Moscow Lomonosov State University, Moscow, 119992, Russia. E-mail: ryazanovagi@mail.ru

**13773.** Sánchez-Guillén, R.A.; Córdoba-Aguilar, A.; Cordero-Rivera, A. (2013): An examination of competitive gametic isolation mechanisms between the damselflies *Ischnura graellsii* and *I. elegans*. *International Journal of Odonatology* 16(3): 259-267. (in English) ["Recent findings suggest that postmating prezygotic isolation (i.e. gametic barriers) could be an important factor preventing hybrid formation. Competitive gametic barriers emerge when a female is inseminated by a conspecific and a heterospecific male. We examined whether sperm proportions after double matings and copulation duration impede hybrid formation. For this, we used females of *Ischnura graellsii* that mated with one conspecific and one heterospecific (*I. elegans*) male and vice versa, and calculated paternity of the second male by using RFLPs. Values of paternity (although preliminary because of a small sample size) suggest no bias in paternity towards conspecific males. However, proportion of sperm stored in the bursa and spermatheca of the female was biased towards the conspecific male when the heterospecific male was the first male, while copulation duration did not differ between conspecific and heterospecific males. Our results suggest that the relative sperm volumes may play a role as a gametic barrier in this species. However, cryptic female choice mediated by the preferential use of the conspecific sperm, although not detected, could not be discarded owing to small sample sizes in some cases." (Authors)] Address: Sánchez-Guillén, Rosa, E-mail: rguillenuvigo@hotmail.com

**13774.** Schiel, F.-J.; Hunger, H. (2013): Weitere Ausbreitung von *Coenagrion scitulum* in der baden-württembergischen Oberrheinebene (Odonata: Coenagrionidae). *Mercuriale* 13: 21-24. (in German, with English summary) ["Two observations of single males of *C. sci-*



tulum in the central part of the eastern upper Rhine valley in the federal state of Baden-Württemberg are recorded. The new sites are situated 56 km resp. 100 km north of the hitherto known closest recording site of the species in Baden-Württemberg. Habitats are described and possible dispersal routes are discussed shortly. Most likely, colonization took place from sites in Alsace or southeastern Palatine where occurrences of the species are known in distances of only 16 to 22 km from the two new sites described in this paper." (Authors)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, 77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**13775.** Schilthuizen, M. (2013): Something gone awry: unsolved mysteries in the evolution of asymmetric animal genitalia. *Animal Biology* 63: 1-20. (in English) ["The great diversity in genital shape and function across and within the animal phyla hamper the identification of specific evolutionary trends that stretch beyond the limits of the group under study. Asymmetry might be a trait in genital morphology that could play a unifying role in the evolutionary biology of genitalia. Here, I review the current knowledge on the taxonomic distribution, phylogenetic patterns, genetics, development, and ecology of asymmetric (chiral) genitalia. Asymmetric genitalia (male as well as female) have evolved from bilaterally symmetric ones (and sometimes vice versa), innumerable times in most animal taxa with internal fertilisation, and especially in Platyhelminthes, Arthropoda, Nematoda, and Chordata. In groups with asymmetric genitalia, chiral reversal (where species carry genitalia that are the mirror image of those in other, congeneric, species) is common, but antisymmetry (both mirror images present within a species) is rare. Although indications exist that, at least in insects, asymmetry evolves as a compensatory response to the evolution of male-dominant mating positions, many mysteries remain. Main questions are: (i) is genital asymmetry developmentally linked with other (visceral, external) asymmetries? (ii) is genital asymmetry usually correlated with a change in mating position? (iii) is asymmetry more likely to evolve in response to cryptic female choice or sexually-antagonistic coevolution? (iv) why is antisymmetry so rare and how does chiral reversal evolve? Based on an overview of the taxonomic patterns, I advocate a research program that makes use of the simple, binary nature of left-right asymmetry to test hypotheses for its evolution with experimental and comparative methods. I also provide tables with full or summarised data on (a) genital asymmetry across all animal phyla with internal fertilisation; (b) genera with dextral as well as sinistral species; (c) species with dextral as well as sinistral individuals; (d) genera with symmetric as well as asymmetric species; (e) species with symmetric as well as asymmetric individuals." (Author) The analysis considers Córdoba-Aguilar, A. (2003): A description of male and female genitalia and a reconstruction of copulatory and fertilisation events in

*Calopteryx haemorrhoidalis* (Vander Linden). *Odonatologica*, 32, 205-214.] Address: Schilthuizen, M., Naturalis Biodiversity Center, Darwinweg 2, 2333 CR Leiden, The Netherlands. E-mail: menno.schilthuizen@naturalis.nl

**13776.** Schultz, T.D.; Fincke, O.M. (2013): Lost in the crowd or hidden in the grass: signal apparency of female polymorphic damselflies in alternative habitats. *Animal Behaviour* 86(5): 923-931. (in English) ["Highlights: • We quantified apparency of polymorphic female damselflies as mates and prey. • Females matched either the colour of conspecific males or the colour of the visual background. • Cryptic heteromorphs were nearly undetectable to conspecific males or predators in vegetation. • Male-mimicking andromorphs were highly detectable to conspecific males and predators on shore. • We propose that disruptive selection on female colour is driven by sexual conflict and predation. Animals must locate prey and mates in noisy sensory environments. Species that rely on visual cues, and which are prey of visual predators, consequently face trade-offs. Additionally, within species, sexual conflict over mating may impose pressures to avoid both predators and mates. Many studies have attempted to explain female-specific polymorphisms in damselflies, but without considering their actual conspicuousness under natural conditions. Using models of colour perception for damselflies and birds, we assessed the detectability of female coloration to conspecific males and potential predators. Alternative colour morphs reduce female apparency either through signal similarity with conspecific males (i.e. mimicry) or by matching the noise of the visual background. The colours of male-mimicking andromorphs that reduce their apparency among groups of males at breeding sites render them highly detectable to males as well as visual predators in offshore vegetation, where females occur when not reproducing. By presenting tethered female damselflies to free-flying males amidst vegetation, we demonstrated that, among flying females, males were able to detect andromorphs more easily than the more cryptic heteromorphs. Thus, when male density is low, cryptic heteromorphs may experience less harassment than andromorphs, suggesting a scenario of disruptive selection on female coloration driven by males as well as predators. Greater attention is warranted not only to the predation risks of female signals, but also to the effect of variation in the visual environments on encounters between males and unreceptive females." (Authors)] Address: Schultz, T.D., Department of Biology, Denison University, Granville, OH 43023, USA. E-mail: schultz@denison.edu

**13777.** Seehausen, M. (2013): Libellen in unserer Region - Aufruf zur Mitarbeit. *Ornithologischer Jahresbericht 2012 - Hessische Gesellschaft für Ornithologie und Naturschutz e.V., Arbeitskreis Wiesbaden-Rheingau-Taunus*: 5-7. (in German) [Few information on odonate fauna of the Taunus-Middle rang mountain-region and

the capital of Hessen, Wiesbaden, Germany are known. The author introduces into the regional fauna to foster intensified regional recording of Odonata.] Address: Seehausen, M., Museum Wiesbaden Hessisches Landesmuseum für Kunst und Natur, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**13778.** Sharma, I.; Dhanze, R. (2013): Ecology of River Spiti, Lahaul-Spiti (Himachal Pradesh), India. *International Journal of Fisheries and Aquaculture Sciences* 3(2): 131-141. (in English) ["The present study is conducted in view to appraise the ecology of Spiti River in the high altitude cold desert of Spiti valley, which is one of the fragile Himalayan Ecosystem. The diversity of planktonic, macrobenthic fauna along with physico-chemical parameters has been worked out. During monsoon season maximum density, diversity of planktons and diversity of benthic fauna was recorded. The maxima of wealth of biological parameters during monsoon in spiti valley are disparate from the low and mid-hills, where highest is noticed during the winter or summer. Simpson's diversity index was applied for calculation of species richness and species diversity." (Authors) The list of taxa includes "Odonata" found to be more frequent in post-monsoon season compared with pre- and monsoon seasons.] Address: Sharma, I., Zoological Survey of India, High Altitude Regional Centre, Solan, Himachal Pradesh 173211, India. Email: induzsi@gmail.com

**13779.** Šiliņš, R.; Druvietis, I.; Poppels, A. (2013): Seasonal dynamics of benthic and planktonic communities in shallow lagoon bird lake Engure, Latvia. *Acta Biologica Universitatis Daugavpilis* 13(1): 129-141. (in English) [The list of taxa includes the following Odonata species: *Coenagrion armatum*, *C. hastulatum*, *C. pulchellum*, *Lestes virens*, *L. sponsa*, *Ischnura elegans*, *Aeshna grandis*, *Cordulia aenea*, *Sympetrum danae*.] Address: Druvietis, I., University of Latvia, Faculty of Biology, Chair of Hydrobiology, Kronvalda blvd.4, Riga, Latvia, LV-1586. E-mail: ivarsdru@latnet.lv

**13780.** Spencer, T. (2013): A further mixed pairing. *Atropos* 50: 83-84. (in English) [Verbatim: On 12 July 2010 at about 13.00hrs, I was taking photographs around a pool in a small field at Pensthorpe, Norfolk, when I noticed a male Emerald Damselfly *Lestes sponsa* coupled with a female Common Blue Damselfly *Enallagma cyathigerum*. Both were clasping the tip of a reed by the water's edge, but while the male's abdomen was curved into one half of the mating 'wheel', that of the female was kept straight. At around the same time that day I also saw and photographed a pairing of two male Emerald Damselfly at the same pool. The upper male's abdomen was semi-arched while that of the lower one was straight, as described for the previous pairing. The notion that male Emerald Damselfly are desperate to mate is perhaps borne out by these observa-

tions: if no females can be found, then anything will do apparently!] Address: Spencer, T., Orchard Cottage, Wood Norton Road, Stibbard, Fakenham, Norfolk, NR21 OEX

**13781.** Stalder, G. (2013): Aktivitäten der Gemeinen und der Sibirischen Winterlibelle (*Sympecma fusca* und *Sympecma paedisca*) im Spätherbst und Winter in ihrem Winterhabitat 2010-2013. *Mercuriale* 13: 11-20. (in German, with English summary) ["In late autumns 2012 and 2013 as well as in winters 2010/2011 and 2012/2013 the activity patterns of *Sympecma fusca* and in winter 2010/2011 those of *S. paedisca* were observed in the 'Pro Natura' nature protection area at Lengwil near Lake Constance, northeastern Switzerland. During a period of overall six months the hibernation habitats were controlled 39 times and more than 40 specimens were recorded. On cold winter days without closed snow cover specimens of *S. fusca* were observed clinging to upright stems in heights up to few decimetres above the ground as well as clinging to stems lying on the bottom. During upcoming snowfall in midwinter both *S. fusca* and *S. paedisca* moved downwards along the stems resulting in being snowed in. However, this behaviour changed in late March, as several individuals of *S. fusca* could be recorded above a closed snow cover." (Author)] Address: Stalder, G., Hueb 6, CH-8580 Sommeri, Switzerland. E-mail: gesta@gmx.ch

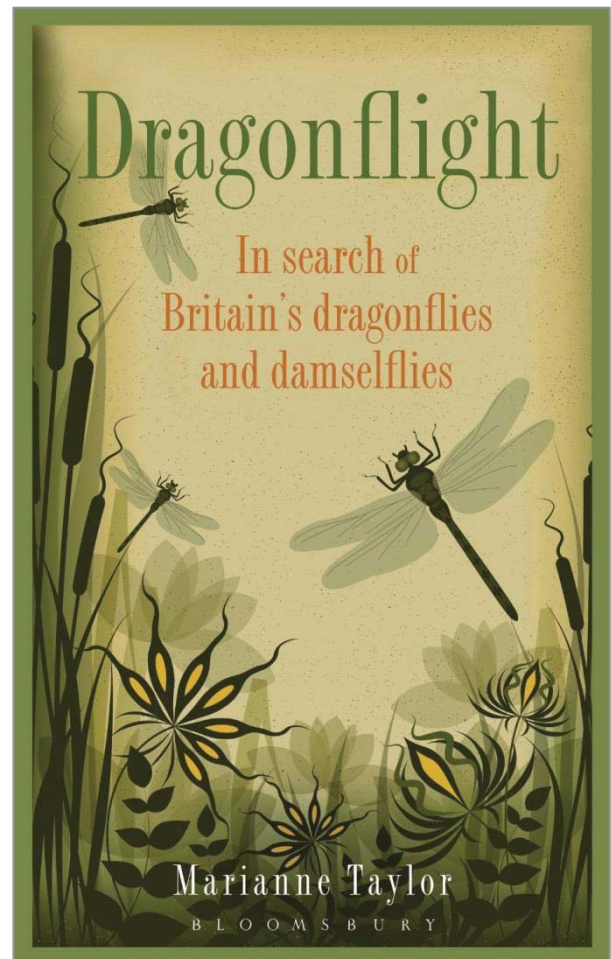
**13782.** Sumanapala, A.P. (2013): Diversity of Odonata in the Peak Wilderness Sanctuary, Sri Lanka. *Proceedings of International Forestry and Environment Symposium, Sri Lanka*. Published by Department of Forestry and Environmental Science, University of Sri Jayewardenepura 18: 143. (in English) [Verbatim: A preliminary study on the diversity of Odonata was carried out for the first time to assess the diversity of Odonata in the Peak Wilderness Sanctuary (PWS), Sri Lanka. It is a biologically rich area surrounding the Adam's Peak which is located at 6° 48' 33.357" N and 80° 29'58.3182" E. Total area of the sanctuary is about 24,000 ha and the altitude ranges from 50 m to 2238 m. The study was conducted from August 2012 to August 2013. Visual encounter survey method was used for the sampling and it was carried out along the existing paths and streams in the sanctuary covering many different habitats types. Sampling was done in the day time from 0800 h to 1700 h as odonates are most active during the day. 34 species of odonates representing 11 families were recorded during the study while 30 of them were identified to the species level. This represents 28.1% (from 121 species) of the Sri Lankan odonate fauna. 19 of the recorded species (55.9%) belong to Suborder Zygoptera while there remaining 15 (44.1%) belongs to the Suborder Anisoptera. Seven of the identified species are endemic to the country while 13 species are considered to be threatened with extinction at the national level. 10 of the threatened species are known to be Vulnerable while three species are endangered. The

nationally data deficient and globally critically endangered damselfly *Sinhalestes orientalis* (Hagen in Selys, 1862) which has not been recorded for 154 years was also observed during this study. The high species richness of Odonata and the presence of many threatened species and data deficient species indicate that the PWS is an important area for the Odonata thus more comprehensive studies and suitable conservation actions should be made.] Address: Sumanapala, A.P., Young Biologists' Association, Institute of Biology, 120/10, Vidya Mawatha, Colombo 7, Sri Lanka. E-mail: apsumanapala@gmail.com

**13783.** Tajima, Y.; Watanabe, M. (2013): Male secondary genitalia mimic the female egg during oviposition for sperm displacement in the non-territorial damselfly *Ischnura asiatica* (Brauer) (Zygoptera: Coenagrionidae). *Odonatologica* 42(3): 229-236. (in English) ["The male sperm storage organs of *I. asiatica* include the bursa copulatrix and the spermatheca. The spermatheca is joined to the base of the bursa copulatrix by a spermathecal duct. At the tip of the male's secondary genitalia, there is a pair of horns which might be used to remove sperm from the female sperm storage organs. Since each horn of the male genitalia is shorter than the spermathecal duct, the spermatheca might be inaccessible to males. However, sperm reduction occurs both in the bursa copulatrix and in the spermatheca during copulation. This suggests an alternative mechanism by which the 8 can cause a decline in the spermathecal sperm. In order to investigate the mechanism of sperm reduction, an interrupted copulation experiment was conducted in the field. The extent of sperm reduction in the spermatheca was related to the width of the head of the secondary genitalia of the mated male. Females have mechano-receptive sensilla which communicate the presence of an egg to the muscles surrounding the sperm storage organs for fertilization. Therefore, the head of the secondary genitalia might mimic the movement of the egg that stimulates the sensilla to induce spermathecal sperm ejection by the female." (Authors)] Address: Tajima, Y., Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan. E-mail: tj@ies.life.tsukuba.ac.jp

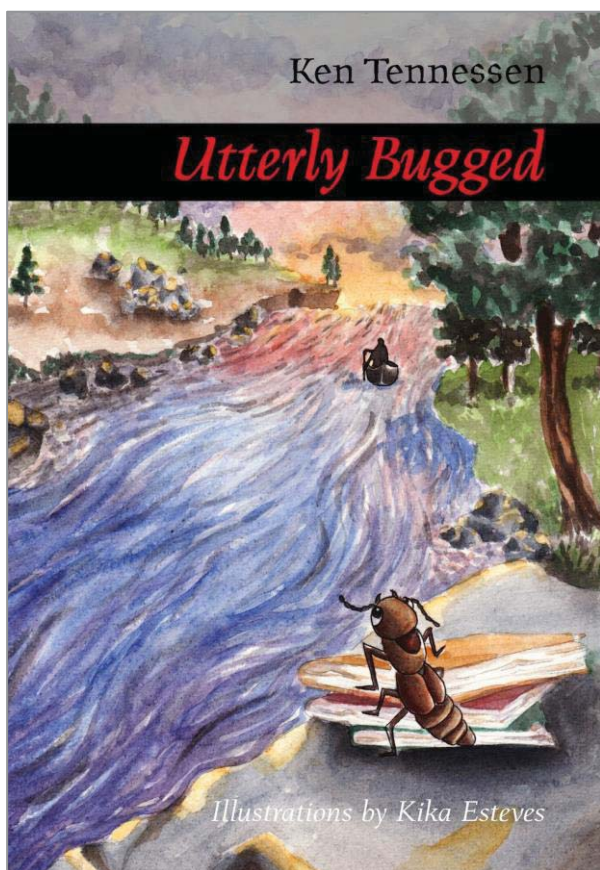
**13784.** Taylor, M. (2013): *Dragonflight: In Search of Britain's Dragonflies and Damselflies*. A&C Black Publishers: 256 pp. (in English) ["This book is an account of two years spent getting to know Britain's most dazzling and enigmatic insects - the dragonflies and damselflies. The quest to find, photograph, watch and learn about dragons and damsels took the author on a tour of diverse and lovely wetlands up and down Britain, from the rugged wild peat bogs of north-west Scotland to the languid meanders of the Oxfordshire Thames. The account describes close encounters with the dragons and damsels themselves, set against backdrops of rich and vital habitats teeming with a range of other wildlife. It is

also packed with background detail on dragonfly and damselfly natural history, and wetland ecology in general. The text is enlivened with line drawings and a section of colour photographs." (Publisher)] Address: not stated



**13785.** Tennesen, K. (2013): *Utterly Bugged*. Red Dragonfly Press. ISBN: 978-1-937693-31-2; 180 pp. (in English) ["Unaware that he has been transported back in time, retired entomologist Amos Garruty lands in a biological world unknown to him. Early on he sees peculiar dragonflies cure an injured snake, a superstition long debunked. Things soon take a turn for the worse when he sees a large bony-toothed bird streak through a clearing in the rainforest. He is aware that these flightless giants went extinct millions of years ago. He soon realizes he is alone. During his frantic struggle to return to the present, he is bitten by mosquitoes and unknowingly contracts a bygone virus. His ensuing travels in the United States unleash a hellish trail of infection. As people along his route get sick, it dawns on him that he might be a carrier. He tries to avoid contact, but is unsure what is really happening. Suspecting that authorities are hunting him, he flees to South America. His obsession with the enigmatic origins of insects continues to escalate, leading to a supernatural encounter that shakes him to his core."] Publisher.





**13786.** Tiple, A.D.; Andrew, R.J.; Subramanian, K.A.; Talmale, S.S. (2013): Odonata of Vidarbha region, Maharashtra state, Central India. *Odonatologica* 42(3): 237-245. (in English) ["A survey of water bodies of the Vidarbha region of central India was conducted during 2006-2012. A total of 82 species were recorded. The study adds 13 new species for the Vidarbha region and 6 species for Maharashtra state. Of the total, 23 species were abundant or very common, 26 were common, 24 rare and 9 very rare. The study shows that ecological disturbances in Vidarbha due to industrial and human activities are a threat to the odonate fauna. *Mortonagrion varralli* and *Copera ciliata*, which were recorded by earlier workers in this region, were not found during this survey. However, protected small and big water bodies used for agriculture and domestic usage provide valuable habitat for Odonata." (Authors)] Address: Talmale, S.S., Zoological Survey of India, Jabalpur-482 002, (MP), India

**13787.** Trindade, M.E.; Peressin, A.; Cetra, M.; Jucá-Chagas, R. (2013): Variation in the diet of a small characin according to the riparian zone coverage in an Atlantic Forest stream, northeastern Brazil. *Acta Limnologica Brasiliensia* 25(1): 34-41. (in English, with Portuguese summary) ["The diet of *Astyanax vermillion* at forested reach was quite varied when compared to the diet at deforested reach with items such as Hymenoptera (wasp), Ephemeroptera (larvae), Lepidoptera (larvae), Trichoptera (larvae), Araneae, Nematoda, Odonata and Coleoptera, that only occurred at forested

reach." (Authors)] Address: Trindade, Márcia Emília de Jesus, Instituto de Desenvolvimento Sustentável Mamirauá – IDSM, Estrada do Bexiga, 2584, Fonte Boa, CEP 69470-000, Tefé, AM, Brazil. E-mail: mejtrindade@hotmail.com

**13788.** Trockur, B. (2013): Zum Vorkommen der Gefleckten Smaragdlibelle *Somatochlora flavomaculata* (Vander Linden, 1825) in der Bistau - ein gutes Beispiel für die Bedeutung der grenzüberschreitenden Zusammenarbeit der Libellenkundler und Freilandökologen (Odonata: Corduliidae). *Abhandlungen der DELATTINIA* 39: 217-226. (in German, with English and French summaries) ["*S. flavomaculata* joins to the dragonfly species with low knowledge and data in the Saarland (Germany) region. Some new records in the valley of the little river „Bist“ (EC Habitats Directive area „Eulenmühle“) gave reason to further examination in July 2013. The species could be recorded as adults (also with copulae) in many parts of the FFIH-area. Reproduction still isn't proved but could be expected. The attention for the species and the region first was called up through contacts and interchange of data by the work to the dragonfly atlas for the SLL+-region (Grande Region) and through a big population some hundreds of meters behind the frontier in Lorraine." (Authors)] Address: Trockur, B., Brückenstr. 25, 66636 Tholey-Hasborn, Germany. E-mail: BerndTrockur@gmx.de

**13789.** Trockur, B. (2013): Bemerkenswertes und aktuelle Ergänzungen zur Libellenfauna des Saarlandes aus den Jahren 2002 bis 2011 (Insecta: Odonata). *Abhandlungen der DELATTINIA* 39: 79-154. (in German, with English and French summaries) ["In order to have a look over the dragonfly news of the years 2002 - 2011, the database for the Saarland (Germany) has been updated for the fifth time. The knowledge about localities and distribution has highly improved in these 10 years. Some species are new, some have increased in population size or in the amount of localities. Selected species are presented in maps, graphics or detailed text. The listing of the "best" dragonfly localities is updated and enlarged, and dragonfly-hotspots are described. Some localities are described precisely. The migration of the database to the Recorder software is mentioned and the way of data-recording and updating in the last years is described. The features and problems concerning the homogeneity of the database as well as positive and negative trends of some species during the last years are being discussed." (Author)] Address: Trockur, B., Brückenstr. 25, 66636 Tholey-Hasborn, Germany. E-mail: BerndTrockur@gmx.de

**13790.** Truscott, L. (2013): Mixed pairings: Emerald Damselfly *Lestes sponsa* and Common Darter *Sympetrum striolatum*. *Atropos* 50: 84. (in English) [Verbatim: The notes in *Atropos* 47 (Pickess, 2012) and 48 (Smith, 2013) about mixed pairings of damselflies, especially involving Emerald Damselfly *Lestes sponsa*,

reminded me of an incident observed during a Cornwall Dragonfly Group field meeting at Breney Common, Cornwall, on 12 August 1990. A male Emerald Damselfly was holding a Common Darter *Sympetrum striolatum* (assumed to be a female at the time, but subsequently identified as an immature male) in the tandem position, the latter clinging to emergent vegetation. The pair remained in this position for at least 15 minutes and were left in situ after a few photographs were taken. Although I have since observed mixed pairings of damselfly species, this is the only occasion I have ever seen a damselfly/ dragonfly pairing.] Address: Truscott, L., 59 Cremyll Road, Torpoint, Cornwall, PLU 2DZ

**13791.** Tyrrell, M. (2013): A review of contact sensing during endophytic oviposition in Odonata. *J. Br. Dragonfly Society* 29(2): 107-113. (in English) ["This paper reviews the morphology and use of the endophytic ovipositor, with particular reference to the styli and their function in aiding the positioning of eggs. Differences in the structure of the styli between anisopteran and zygopteran odonates and between different species of aeshnid are reviewed. It is hypothesised that differences in the structure of the styli are related to differences in the complexity of the preferred oviposition substrate." (Author)] Address: Tyrrell, M., 8 Warwick Close, Raunds, Northants, NN9 6JH, UK

**13792.** Verberk, W.C.E.P.; Bilton, D.T. (2013): Respiratory control in aquatic insects dictates their vulnerability to global warming. *Biol. Lett.* 9(5): 5 pp. (in English) ["Forecasting species responses to climatic warming requires knowledge of how temperature impacts may be exacerbated by other environmental stressors, hypoxia being a principal example in aquatic systems. Both stressors could interact directly as temperature affects both oxygen bioavailability and ectotherm oxygen demand. Insufficient oxygen has been shown to limit thermal tolerance in several aquatic ectotherms, although, the generality of this mechanism has been challenged for tracheated arthropods. Comparing species pairs spanning four different insect orders, we demonstrate that oxygen can indeed limit thermal tolerance in tracheates. Species that were poor at regulating oxygen uptake were consistently more vulnerable to the synergistic effects of warming and hypoxia, demonstrating the importance of respiratory control in setting thermal tolerance limits." (Authors) The study includes *Cordulegaster boltonii* and *Calopteryx virgo*.] Address: Verberk, W.C.E.P., Dept of Animal Ecology and Ecophysiology, Institute for Water and Wetland Research, Radboud University, Toernooiveld 1, 6525 ED Nijmegen, The Netherlands. E-mail: wilco@aquaticcecolgy.nl

**13793.** Walker, B. (2013): Some observations on the effect of temperature on dragonfly recording. *J. Br. Dragonfly Society* 29(2): 84-96. (in English) ["The British Trust for Ornithology added odonates to the species that contributors are asked to record from 2011. Rec-

ords for the first two years of dragonfly records from this scheme have been analysed and indicate a marked difference in observations in the spring between 2011 and 2012. Spring 2011 was warmer than the recent average and noticeably warmer than in 2012 and dragonflies were recorded earlier in numbers in 2011 than in 2012. Based on a comparison of the records and the average weekly temperatures a correction factor is proposed to account for reduced dragonfly activity when temperatures are lower and it is suggested that this can explain some fluctuations in the raw data. It is also noted that the reduction in records from their peak can be described by a daily survival rate approach." (Author) *Modell-organisms are *Pyrrhosoma nymphula*, *Ischnura elegans*, *Libellula depressa*, and *Aeshna cyanea*.*] Address: Walker, B., 49 Roman Way, Wantage, Oxon OX12 9YF, UK

**13794.** Wiederman, S.D.; Dunbier, J.R.; O'Carroll, D.C. (2013): Selective attention in the dragonfly. *Front. Physiol. Conference Abstract: International Conference on Invertebrate Vision.* doi: 10.3389/conf.fphys.2013.25.00003: (in English) [Verbatim: A dragonfly that captures flies amidst swarms of prey and conspecifics must competitively select a single object amongst distracting stimuli. Even though many animals can accomplish this 'attentional' task, little is known about the neuronal mechanisms that permit the selection of one moving feature from competing alternatives [1], which are often moving against complex, textured backgrounds. We recently demonstrated that responses from an identified dragonfly visual neuron, the 'centrifugal small target motion detector' (CSTMD1), perfectly match a model for competitive selection within the limits of neuronal variability ( $r^2=0.83$ ) [2]. Responses to individual targets presented at different locations of the receptive field differ in both magnitude and time course. However, responses to two simultaneous targets exclusively track those for one target alone. In response to a single target, CSTMD1 activity builds slowly over several hundred milliseconds [3,4]. This facilitation could represent a state of 'arousal' (enhanced responses) or the development of a locus of attention in a defined region of space and time (with suppression outside of this locus). In order to test this, we mapped a receptive field by presenting short (100ms) target trajectories on a stimulus monitor. Randomly interspersed with this stimulus, we mapped a 'primed' receptive field, with the same short trajectories following a longer duration priming target. We show that that there is a difference between the control and the primed version, with enhanced activity in an area in front of the current target trajectory. Thus the receptive field is not stationary and must be considered within the context of past stimulation.] Address: Wiederman, S.D.; The University of Adelaide, Adelaide Centre for Neuroscience Research, Adelaide, SA, 5005, Australia, steven.wiederman@adelaide.edu.au

**13795.** Winter, P. (2013): A mixed pairing between Emerald Damselfly *Lestes sponsa* and Large Red Damselfly *Pyrrhosoma nymphula*. *Atropos* 50: 85. (in English)

[Verbatim: On 8 July 2013 I visited the pond on Furzley Common, Hampshire. Along the southern edge of the pond the central, well vegetated, bog island is only two to three metres away. As I scanned through the damselflies along the vegetation edge I came across an unusual tripling where a male *Lestes sponsa* had attached itself to the male of a coupled pair of *Pyrrhosoma nymphula*. I watched them for a couple of minutes and managed to obtain a few record shots. While I was trying to get in a more parallel plane to photograph the insects the male *L. sponsa* detached itself. I noticed that the posterior abdominal segments were 'kinked', presumably arising from the coupling.] Address: Winter, P., 4 Rosebank Close, Rownhams, Southampton, S016 8AU, UK

**13796.** Wisconsin Dragonfly Society (2013): The Wisconsin Odonata News. February, 2013. The Wisconsin Odonata News 1(1): 12 pp. (in English) [The table of contents of this issue: Officers: 1; A Word from the President: 1; Mission Statement: 2; Note from the Editor: 2; Odonata Record Numbers by Year Chart: 2; Summary of WDS Board Meeting: 3; Eastern Forktail Picture: 3; Spring Meeting, 2013 Information: 4; Wisconsin Dragonfly and Damselfly Field Checklist: 4-6; Map of Odonata Records Submitted 2012 by Cty: 7; Map of Odonata Species by County as of 2012: 8; Great Lakes Odonata Meeting Notes: 9; List of Resources: 9; "On Hold," a poem by Ken Tennesen, 2009: 10; WDS Facebook Group Page: 11; Information on Dragonfly Society of the Americas: 11; Membership form for Wisconsin Dragonfly Society: 11.] Address: DuBois, R., Wisconsin Dept of Natural Resources, 1401 Tower Ave., Superior, WI 54880, USA. E-mail: robert.dubois@Wisconsin.gov

**13797.** Xiao, L.; Fu, S.; Xue, F.-s. (2013): Characters of insect diapause stage and photoperiod sensitive stage. *Biological Disaster Science* 36(1): 1-8. (in Chinese, with English summary) ["Insects are poikilothermal animal, in order to tide over serious environmental conditions, many insect use diapause characteristics to adapt to environment changes, throughout describing diapause and photoperiod sensitive stage, in order to let people understand clearly about biology characteristics of insect diapause stage and photoperiod sensitive stage." (Authors) The paper includes a reference to Waringer J. (1983): A study on embryonic development and larval growth of *Sympetrum danae* at two artificial ponds in lower Austria (Anisoptera: Libellulidae). *Odonatologica* 12(4): 331-343.] Address: Institute of Entomology, Jiangxi Agriculture University, Nanchang 330045, China. E-mail: xuefangsen@hotmail.com

**13798.** Zinchenko, T.D.; Golovatyuk, L.V. (2013): Salinity tolerance of macroinvertebrates in stream waters (review). *Arid Ecosystems* 3(3): 113-121. (in English) ["The review of the salinity tolerance of various macrozoobenthos taxa is based on the published data and the results

of our studies. Significant differences in the tolerance of hydrobionts to water salinity in rivers of different arid regions are shown. Leeches, bivalved molluscs, larvae of stoneflies, caddis flies, and mayflies are the most stenohaline species. The taxonomical structure of macrozoobenthos in saline rivers of Lake Elton basin in the arid zone of Russian South is presented." (Authors) *Aeshna* sp. and *Sympetrum sanguinum* are reported from Lake Elton, a salt lake in Volgograd Oblast, Russia, near the border with Kazakhstan. On page 116 a general review on literature data on impact of salinity on Odonata is given.] Address: Zinchenko, T.D., Institute of Ecology of Volga River Basin, Russian Academy of Sciences, ul. Komzina, 10, Togliatti, 445003, Russia. E-mail: tdz@mail333.com

**13799.** Zuniga, M.; Chara, J.; Giraldo, L.P.; Chara-Serna, A.-M.; Pedraza, G.X. (2013): Composición de la comunidad de macroinvertebrados acuáticos en pequeñas quebradas de la región andina colombiana, con énfasis en la entomofauna. *Dugesiana* 20(2): 263-277. (in Spanish, with English summary) ["The Colombian Andes are irrigated by an extensive network of small streams that originate the most important rivers of the country and contribute fundamental ecosystem services to local rural communities. Despite the importance of these stream ecosystems, little is known about their biological diversity and function. This work evaluated benthic macroinvertebrate composition in 28 first and second order streams located in La Vieja River Basin (Colombia's central Andes). Results evidenced the high abundance and diversity of the regional macroinvertebrate community. A total of 32,319 individuals, distributed in four phyla, eight classes, 18 orders, 73 families and 91 genera, were collected. Arthropoda and Mollusca were the best represented phyla, whereas Insecta, Gastropoda and Bivalvia, were the most important classes. Chironomidae was the dominant taxa in the studied streams. Odonata was also abundant, contrasting with the typical low abundance of this group in higher order systems. The most common genera were Smicridea, Heterelmis, Atrichopogon, Farrodes, Argia and Limnocoris, which also presented distribution patterns different than those found in larger streams. Within the Ephemeroptera, the genus *Zelus* (Baetidae) is highlighted as a new distribution record for the Andean region of the Valle del Cauca. Results demonstrate that even though the studied systems are small and immersed in agricultural landscapes, they harbour an important component of the regional and local diversity." (Authors) *Aeshnidae*, *Gomphidae* (*Progomphus*), *Libellulidae* (*Brechmorhoga*, *Cannaphila*, *Dythemis*, *Libellula*, *Macrothemis*, *Micrathyria*, *Orthemis*, *Perithemis*), *Calopterygidae* (*Hetaerina*), *Coenagrionidae* (*Argia*, *Nehalennia*), *Megapodagrionidae*, *Polythoridae*] Address: Zúñiga, María del Carmen, Centro para la Investigación en Sistemas Sostenibles de Producción Agropecuaria – CIPAV, Carrera 25 No. 6-62, Cali, Colombia. E-mail: maczuniga@gmail.com



**13800.** Adu, B.W.; Ogunjobi, J. A. (2014): Assessment of dragonflies and damselflies of Owena Forest south-western Nigeria. *International Journal of AgriScience* 4(3): 153-159. (in English) ["The odonate species of Owena forest was surveyed once a month for a period of two years (May, 2008 to April, 2010). Six hours were spent at the forest on every fieldwork. Three study sites were identified at the forest: River Owena at the Dam (ROD), River Owena in Forest (ROF), and Cocoa Research Institute of Nigeria (CRIN) substation along Ondo-Akure road Owena. Only adult dragonflies and damselflies specimens were collected at the study sites. A total of 2016 specimens of Odonata were collected at the forest. *Ceriatagrion glabrum* was found to be widespread at the three study sites. *Palpopleura portia* and *P. lucia* were found to be abundant at ROD and CRIN, while *Mesocnemis singularis* and *Congothemis dubia* were dominant species at ROD and ROF. Data collected from the study sites were subjected to Descriptive statistics, Soerensen's Quotient index (SQ) and Diversity indices (Margalef index, Simpson's dominance index, Shannon Wiener index and Evenness). Based on the diversity indices used, ROF was the richest study site (H': 4.48, Simpson dominance (c): 0.99 and Manglef index (d) 13.53). In terms of species distribution, the study revealed that species of Odonata was well distributed at ROF and ROD. ROF and CRIN are the most similar study sites with SQ of 0.75 followed by ROD and CRIN (SQ: 0.60) while the least similar paired sites are ROF and ROD. All the diversity indices used established that ROF was the richest study site. The results also revealed that Owena forest was rich in Odonata fauna; despite the fact that it is a secondary re-growth forest undergoing some anthropogenic activities." (Authors)] Address: Adu, B.W., Biological Science Department, Ondo State University of Science and Technology, Okitipupa, Nigeria. E-mail: williamsadubabs@yahoo.com

**13801.** Akhtar, N. (2014): Dragonflies of Manglawar Swat Khyber Pakhtoonkhwa Pakistan. *European Academic Research* 2(1): 172-178. (in English) ["Current study was conducted to explore the dragonflies of Manglawar Swat. This study was conducted in the period from August to December 2013. The collection was made in the timing of 10 AM to 4 PM. In current study 11 species in 5 genera were identified belonging to family libellulidae. These species were *Crocothemis erythraea*, *C. servilia*, *Libellula fulva*, *Trithemis aurora*, *T. festiva*, *T. kirbyi*, *T. pallidinervis*, *Acisoma panorpoides*, *Orthetrum chrysis*, *O. sabina* and *O. taeniolatum*." (Author)] Address: Akhtar, N., Department of Zoology, Abdul Wali Khan University Mardan (Buner Campus) Pakistan

**13802.** Allen, K.A.; Thompson, D.J. (2014): Population size and survival estimates for the rare damselflies, *Coenagrion mercuriale* and *Ischnura pumilio*. *Insect*

*Conservation and Diversity* 7(3): 241-251. (in English) ["(1) *C. mercuriale* is rare in the UK and is threatened across Europe. *I. pumilio* is also threatened in the UK. Both species have suffered population declines in recent years and are vulnerable to habitat fragmentation and loss. Yet, reliable population size and survival estimates are scarce in odonate species. This study provides mark-release-recapture estimates of these parameters for UK stronghold populations of both species. (2) Surveys were performed at four locations in southern England between 2001 and 2006. A total of 12 071 adult individuals were marked across nine populations. Mark-release-recapture modelling techniques were used to provide survival and recapture probabilities and population size estimates. (3) This study presents the first Horvitz-Thompson estimates of population size in odonates, which are among the highest reported for damselflies. Maximum estimates for a single site were  $63\ 662 \pm 4997$  for *C. mercuriale* and  $7453 \pm 382$  for *I. pumilio*. More males than females were captured at all sites, but calculated estimates indicated a female-biased sex ratio in adult *I. pumilio* at one location. (4) Daily survival probability is among the highest published for damselflies. Male and female survival was equal or very similar in all populations. Further effects of maturity, age, site, and time on survival were identified. (5) Estimated population sizes are much greater than previously thought, suggesting that where habitat is maintained, populations of threatened odonates can be very large. Furthermore, greater proportions of females have been estimated where wider searching techniques were employed. This has implications for future study design if estimates are to be reliably used for conservation management." (Authors)] Address: Allen, Katherine, School of Environmental Sciences, University of Liverpool, Liverpool L69 3GP, UK. E-mail: kaallen@liv.ac.uk

**13803.** Almeida, M.V.O.; Pinto, A.P.; Carvalho, A.; Takiya, D.M. (2014): When rare is just a matter of sampling: Unexpected dominance of clubtail dragonflies (Odonata, Gomphidae) through different collecting methods at Parque Nacional da Serra do Cipó, Minas Gerais State, Brazil. *Revista Brasileira de Entomologia* 57(4): 417-423. (in English) ["Capture of dragonfly adults during two short expeditions to Parque Nacional da Serra do Cipó, Minas Gerais State, using three distinct collecting methods: aerial nets, Malaise and light sheet traps reported. The results are outstanding due the high number of species of Gomphidae (7 out of 26 Odonata species), including a new species of *Cyanogomphus* Selys, 1873, obtained by two non-traditional collecting methods. Because active collecting with aerial nets is the standard approach for dragonfly inventories, we discuss some aspects of the use of traps, comparing our results with those in the literature, suggesting they should be used as complementary methods in faunistic studies. Furthermore, *Zonophora campanulata annulata* Belle, 1983 is recorded for the first time from Minas Gerais State and taxonomic notes

about *Phyllogomphoides regularis* (Selys, 1873) and *Progomphus complicatus* Selys, 1854 are also given." (Authors)] Address: Oliveira De Almeida, M.V., Laboratório de Biologia e Sistemática de Odonata (LABIOSIS), Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista s/n, São Cristóvão 20940-040 Rio de Janeiro-RJ, Brazil. E-mail: mvoalmeida@gmail.com

**13804.** Bajwa, Y.; Bode-Oke, A.; Williams, V.; Zhu, R. (2014): Phase relationship as a flight control mechanism in dragonflies. *The Spectra* 2014: 32-40. (in English) ["Dragonflies can be observed utilizing a wide variety of wing kinematics to elegantly control their bodies in flight, due to their four-winged nature. Odonata have the ability to manipulate the phase difference between their fore and hind wings. Scientists in the field postulate that the relationship between relatively in-phase flapping flight results in enhanced lift and thrust. Such flight can be observed during power-intensive maneuvers such as high-speed turns and take-off. Observations and data reveal that the preferred flying mode for dragonflies employs out-of-phase flight. Such a phase relationship may improve aerodynamic efficiency through the minimization of wing-wake interaction for the hind wing. In this paper, we utilized high speed photogrammetry and 3D surface reconstruction techniques to both capture and digitize dragonfly free flight. We attempted to explore the relation of phase difference with force production by damaging the dragonfly wings. The procedure was to perform chord-wise cuts on individual wings to limit the ability of the dragonfly to produce lift. Our observations showed that when damaged, Odonata compensated for lost force production by manipulating phase difference in a manner that increased lift production." (Authors)] Address: Bajwa, Y., School of Engineering and Applied Science, Dept of Mechanical and Aerospace Engineering, University of Virginia, USA

**13805.** Batty, P. (2014 ): Species Review 8: *Somatochlora arctica* (Zetterstedt, 1840) (The Northern Emerald). *J. Br. Dragonfly Society* 30(1): 32-53. (in English) ["In the British Isles it is only found in Scotland, where it is widely distributed in the west, and in a very small number of localities in the south of Ireland. The species and its life cycle are described and its conservation is discussed in the light of potential threats and the possible effects of climate change." (Author)] Address: Batty, Patricia, Kirnan Farm, Kilmichael Glen, Lochgilphead, Argyll, PA31 8QL, UK

**13806.** Bell, N.; Dylmer, E.; Olsen, K. (2014): Status of *Aeshna serrata* in Denmark. *Brachytron* 16(1/2): 38-42. (in English, with Dutch summary) ["*A. serrata* (Hagen, 1856) is known from a relatively wide geographical range, though in Europe it is mainly confined to the Baltic coastal area in Estonia, Finland and Sweden. *A. serrata* is typically found in mesotrophic and eutrophic freshwater or brackish habitats with dense *Phragmites*

and bulrush (Cyperaceae) beds. *A. serrata* was first found in Denmark in 2006 in a typical habitat for *A. serrata* and has since then been found repeatedly at the same locality. There are also single records from other localities in the same region from 2010-2012. The species is rare in Denmark but very likely overlooked. A search for new *A. serrata* habitats in Denmark will without doubt result in new records and a more accurate knowledge of its national distribution." (Author)] Address: Bell, N., Istedgade 6.1, 8700 Horsens, Denmark. E-mail: njohnbell@gmail.com

**13807.** Blyth, C. (2014): Colonisation of a new pond: new habitat for *Coenagrion hastulatum* (Charpentier) (the Northern Damselfly) and other odonate species at a site in Aberdeenshire. *J. Br. Dragonfly Society* 30(1): 1-8. (in English) ["A new pond was constructed in 2011 for the purpose of providing nearby Odonata populations with a new habitat in which to live. This provided the opportunity to begin a long-term colonisation study, part-funded by a British Dragonfly Society Philip Corbet award. The results of the first survey, in summer 2012, indicate quick colonisation by five of the ten known local species, i.e. *Lestes sponsa*, *Pyrrhosoma nymphula*, *Ischnura elegans*, *Sympetrum danae* and *S. striolatum*. The reasons for this are discussed." (Author)] Address: Blyth, Colette, 17 Sythrum Crescent, Glenrothes, Fife, KY7 5DG, UK

**13808.** Bomark, E. (2014): The antihistamine hydroxyzine and Odonata. Bioaccumulation and effects on predator-prey interactions between dragonfly and damselfly larvae. B.C. Thesis in Biology 15 ECTS, Dept. of Ecology and Environmental Science (EMG), S-901 87 Umeå, Sweden : 13 pp. (in English) ["Through wastewater entering aquatic environments, aquatic insects are continuously exposed to pharmaceuticals including neurologically active antihistamines. The antihistamine hydroxyzine has previously been found to lower activity in damselflies and to reach 2000 times the concentration of surrounding water in damselfly tissue. The purpose of this short-term exposure study was to investigate if hydroxyzine also bioaccumulates in dragonflies and if dilute hydroxyzine ( $362 \pm 50$ , mean ng/l  $\pm$  SD) have effects on predator-prey interactions between dragonfly *Aeshna grandis* and damselfly *Coenagrion hastulatum* larvae, i.e. number of attacks and predation success. Predators and prey were captured and exposed during one, three or five days (with controls) before taking part in predation experiments; Dragonflies were put in separate containers with six damselflies, they were video recorded and attacks and predated damselflies noted during four hours. Tissue concentrations of hydroxyzine were analyzed from all dragonflies and a subsample of the damselflies showing a mean bioconcentration factor (BCF) of 27 and 7 respectively, surprisingly much lower than previous research. There was no difference in attack rate or predation efficiency between controls and exposed dragonflies. However, dragonflies exposed for

five days were found to attack more and capture more prey than dragonflies exposed for one day, a change that was not seen in the controls. This confounding factor motivates further studies to clarify if hydroxyzine after a period of exposure can have a sublethal effect altering foraging and/or predator avoidance traits with the net result of increased predation success for dragonflies in the predator-prey interaction between dragonflies and damselflies." (Authors)] Address: Bomark, Elinor, Dept. of Ecology and Environmental Science (EMG), S-901 87 Umeå, Sweden

**13809.** Boonsoong, B.; Chainthong, D. (2014): Description of the last stadium larva and female of *Microgomphus thailandica* Asahina, 1981 (Odonata: Gomphidae). *Zootaxa* 3811(2): 271-279. (in English) ["The last stadium larva of *M. thailandica* is described, illustrated and compared with the larvae of congeneric species based on reared specimens collected from the Phachi headwater stream, Ratchaburi province, Thailand. The female adult of this species is described for the first time from a reared specimen from the same locality." (Authors)] Address: Boonsoong, B., Animal Systematics and Ecology Speciality Research Unit (ASESRU), Dept of Zoology, Faculty of Science, Kasetsart University, Bangkok, Thailand 10900. E-mail: fscibtb@ku.ac.th

**13810.** Bouwman, J.H. (2014): *Somatochlora arctica* rediscovered on Veluwe after 75 years. *Brachytron* 16(1/2): 48-50. (in Dutch, with English summary) ["On 4 September 2012 two males *S. arctica* were observed near Nunspeet, northern Veluwe, Gelderland. Only one observation on the Veluwe was known, at Deelensche Wasch, Hoge Veluwe, in 1939. Despite searches, no additional observations have been done and exuviae were found. The habitat at this location has been the same for a long time. Because of this it seems likely that a population is present. On the Veluwe only a small number of suitable peat areas are present. Therefore the chances of populations of *S. arctica* being present appear to be limited." (Author)] Address: Bouwman, J.H., Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: jaap.bouwman@vlinderstichting.nl

**13811.** Brekelmans, F. (2014): *Ophiogomphus cecilia* on the river Dommel. *Brachytron* 16(1/2): 18-28. (in Dutch, with English summary) ["Between 27 July and 5 August 2012 *O. cecilia* was observed for the first time at the river Dommel, near Valkenswaard and Waalre, Noord-Brabant. With the exception of an observation in 1935, these were the first observations of *O. cecilia* in Noord-Brabant. At least two males and two females were found. One female was observed during oviposition. Larvae and exuviae have not been found, but larvae of this species are hard to find and a thorough search for exuvia has not been performed. It is not clear if a population exists in the river Dommel. The nearest known populations of *O. cecilia* are in Noord-Limburg,

at the rivers Roer and Swalm. It is likely that one of these populations is the origin of the individuals observed in Noord-Brabant. The river Dommel appears to hold suitable habitat for *O. cecilia*. The same applies to the rivers Keersop and Tongelreep in the same region of Noord-Brabant. Water quality in the river Dommel is poor, but this does not appear to be an obstacle for establishment of the species, as has been shown in other populations." (Author)] Address: Brekelmans, F., c/o Bureau Waardenburg, Verenigingstraat 32, 3515 GJ Utrecht, The Netherlands. E-mail: Florisbrekelmans@gmail.com

**13812.** Brocchieri, D.; Castelluccio, P.; Crucitti, P. (2014): Gli Odonati della Riserva Naturale "Macchia di Gattaceca e Macchia del Barco" (Lazio) (Odonata). *Bollettino della Società Entomologica Italiana* 146(1): 31-40. (in Italian, with English summary) [An annotated checklist of Odonata of the "Macchia di Gattaceca and Macchia del Barco" Regional park within the "mentanese - cornicolano archipelago", north east of Rome city area (Central Latium, Italy), collected during the period 2009-2013, is presented. Twenty six species are reported, out of 57 species known for Latium. For each species phenological data together with interesting aspects of species biology are highlighted.] Address: Brocchieri, D., paolo Castelluccio, pierangelo Crucitti, Società Romana di Scienze Naturali, via Fratelli Maristi 43, 00137 Roma, Italia. E-mail: info@srsn.it

**13813.** Brochard, C.; van der Ploeg, E. (2014): *Boyeria*: the darker the better. Ovipositing behaviour of two European *Boyeria* species. *Brachytron* 16(1/2): 51-56. (in Dutch, with English summary) ["Oviposition of *B. irene* and *B. cretensis* was observed while looking for exuviae in France and Germany and Crete, Greece respectively. For both the oviposition behaviour and habitat preferences for oviposition were found to comply with descriptions in literature. *Boyeria cretensis* was observed while trying to oviposit in the dark shoes of the observers." (Authors)] Address: Brochard, C., Marsstraat 77, 9742EL Groningen, The Netherlands. E-mail: info@cbrochard.com

**13814.** Brossman, K.; Carlson, B.; Stokes, A.; Langkilde, T.T.L. (2014): Eastern newt (*Notophthalmus viridescens*) larvae alter morphological but not chemical defenses in response to predator cues. *Canadian Journal of Zoology* 92(4): 279-283. (in English) ["Prey traits are often modified in response to exposure to predators, a phenomenon known as predator-induced phenotypic plasticity. Morphological plasticity in response to predator cues is well documented in amphibians; however, predator-induced chemical defenses have received relatively little attention. The Eastern newt, which possesses tetrodotoxin – a toxin for chemical defense, is most vulnerable to predation during its larval stage. We assessed whether exposing Eastern newt larvae to predator scent cues (from dragonfly larvae) would elicit



change in their morphological and chemical defenses. Newt larvae exposed to scent cues of predatory dragonfly larvae exhibited significantly greater tail depths, which should increase survival of attempted predation by allowing them to swim faster, but did not differ in mass, snout-vent length, or tail length. Newt larvae toxin concentrations were not significantly affected by exposure to these predator cues. Larval toxicity may be maternally- or environmentally-derived and inflexible, or induced toxicity may only be detectable later in development. Predator-induced phenotypic plasticity, especially of chemical defenses, warrants greater attention, as potentially important outcomes of species interactions remain unclear." (Authors)] Address: Brossman, Kelly, Dept Biol., Intercollege Graduate Program in Ecology, & Center for Brain, Behavior and Cognition, Pennsylvania State Univ., 208 Mueller Laboratory, University Park, PA 16802, USA. E-mail: khb5021@psu.edu

**13815.** Brown, D.J.; Nowlin, W.H.; Ozel, E.; Mali, I.; Episcopo, D.; Jones, M.C.; Forstner, M.R.J. (2014): Comparison of short term low, moderate, and high severity fire impacts to aquatic and terrestrial ecosystem components of a southern USA mixed pine/hardwood forest. *Forest Ecology and Management* 312: 179-192. (in English) [Bastrop County, Texas, USA; "Highlights. •Magnitude of fire effects on water quality increased with increasing fire severity. •Most forest structure variables were only significantly impacted by high severity fire. •Terrestrial arthropods were only significantly impacted by high severity fire. Historically fire was an important natural disturbance shaping the structure and composition of pine-dominated forests in the southern United States. Longstanding fire suppression policies have resulted in structural and compositional changes, notably accumulation of heavy fuel loads and reduction in vegetation species diversity. Primary goals of forest management through prescribed burning include fuel load reduction and mimicking ecosystem impacts of historically natural wildfires. In addition to the influences of fire frequency and season, the influence of fire severity on ecosystem responses is currently of interest. In this study we sought to quantify the impacts of low, moderate, and high severity fires, and their interaction with prior forest management practices, to several aquatic and terrestrial ecosystem components of a southern U.S. mixed pine/hardwood forest using a before–after, control-impact (BACI) approach. The ecosystem components we assessed were water quality, community composition of aquatic arthropods (wildfire impacts only), forest structure characteristics, community composition of understory vegetation, and community composition of ground-dwelling arthropods. We found that increasing fire severity increased aquatic nutrient levels and productivity, but the magnitude of effects increased with severity. Low and moderate severity fires had weak effects on forest structure characteristics, community composition of understory vegetation, and community composition of ground-dwelling arthropods in the initial

years following burns. In contrast, high severity fires dramatically reduced fine and large fuel loads, increased diversity of understory vegetation, and influenced community composition of ground-dwelling arthropods. Further, wildfire severity was reduced in areas with a prior moderate severity prescribed burn, but not in areas with a prior low severity prescribed burn. Our results provide quantitative evidence for the role of fire severity as a primary factor influencing responses of ecosystems to fire, and indicate that forest management practices influence the impact of high severity fires on ecosystems. ... Unfortunately, sampling of aquatic arthropods in ponds was initiated after the LOWRX and MODRX fires and most of the sampled ponds were not part of those fire treatments. Thus, we were only able to assess impacts of the HIGHWILD fire on the composition of pond arthropods. We sampled aquatic arthropods seasonally, collecting 7 samples at 8 ponds between August 2010 and January 2013 .... We identified insects to family, with the exception of Ephemeroptera (mayflies) and Odonata (dragonflies and damselflies), which we identified to order, and we identified other arthropods to class or order ... We did not detect a HIGHWILD fire impact on total number of captured individuals of aquatic arthropods ( $F_{1,52} = 0.71$ ,  $P = 0.404$ ). Likewise, the RDA analysis indicated the HIGHWILD fire had no impact on community composition of aquatic arthropods ( $P = 0.949$ ), with 3.2% of the variation explained by the model. In addition, the RDA biplot confirmed the statistical test, with all aquatic arthropod groups located either near the origin or nearly orthogonal to the treatment burn status predictor." (Authors)] Address: Brown, D.J., Dept of Biology, Texas State University, 601 University Drive, San Marcos, TX 78666, USA. E-mail: djb.ecology@gmail.com

**13816.** Bush, A.A.; Nipperess, D.A.; Duursma, D.E.; Theischinger, G.; Turak, E.; Hughes, L. (2014): Continental-scale assessment of risk to the Australian Odonata from climate change. *PLoS ONE* 9(2): e88958. doi:10.1371/journal.pone.0088958: 12 pp. (in English) ["Climate change is expected to have substantial impacts on the composition of freshwater communities, and many species are threatened by the loss of climatically suitable habitat. In this study we identify Australian Odonata vulnerable to the effects of climate change on the basis of exposure, sensitivity and pressure to disperse in the future. We used an ensemble of species distribution models to predict the distribution of 270 (85%) species of Australian Odonata, continent-wide at the subcatchment scale, and for both current and future climates using two emissions scenarios each for 2055 and 2085. Exposure was scored according to the departure of temperature, precipitation and hydrology from current conditions. Sensitivity accounted for change in the area and suitability of projected climatic habitat, and pressure to disperse combined measurements of average habitat shifts and the loss experienced with lower dispersal rates. Streams and rivers

important to future conservation efforts were identified based on the sensitivity-weighted sum of habitat suitability for the most vulnerable species. The overall extent of suitable habitat declined for 56–69% of the species modelled by 2085 depending on emissions scenario. The proportion of species at risk across all components (exposure, sensitivity, pressure to disperse) varied between 7 and 17% from 2055 to 2085 and a further 3–17% of species were also projected to be at high risk due to declines that did not require range shifts. If dispersal to Tasmania was limited, many south-eastern species are at significantly increased risk. Conservation efforts will need to focus on creating and preserving freshwater refugia as part of a broader conservation strategy that improves connectivity and promotes adaptive range shifts. The significant predicted shifts in suitable habitat could potentially exceed the dispersal capacity of Odonata and highlights the challenge faced by other freshwater species." (Authors) Figure 4. Predicted suitable habitat in south-eastern Australia under current climate and 2055 and 2085 using emissions scenario RCP8.5 for *Notoaeschna sagittata*, *Coenagrion lyelli* and *Petalura gigantea*.] Address: Bush, A.A., Dept. Biological Sciences, Macquarie Univ., Sydney, New South Wales, Australia. E-mail: alexalbush@gmailcom

**13817.** Cardoso-Leite, R.; Vilardi, G.C.; Guillermo-Ferreira, R.; Bispo, P.C. (2014): The effect of conspecific density on emergence of *Lestes bipupillatus* Calvert, 1909 (Odonata: Lestidae). *Psyche* Volume 2014, Article ID 650427: 3 pp. (in English) ["Conspecific density may influence on adult recruitment and consequently on population dynamics. Several studies have shown the density dependence of larvae growth rates in Odonata. However, few studies evidenced how conspecific density influence final instar larvae emergence date decisions. Considering that larvae may choose date of emergence, the present study investigated if density affects larvae choice. For this, we reared eight final instar larvae in individual aquaria and other 24 larvae in aquaria with three larvae each. This way, we simulated environments with low and high larval density. We then noted the days that larvae took to emerge and compared between low and high density groups. The results showed that larvae seem to emerge earlier when in high densities (Mann-Whitney,  $U=10.000$ ,  $p=0.03$ ). These results support the hypothesis that damselfly last instar larvae may postpone or hasten emergence in response to the social environment and related constraints." (Authors)] Address: Cardoso-Leite, R., Departamento de Ciências Biológicas, Faculdade de Ciências e Letras de Assis, Universidade Estadual Paulista, Av. Dom Antônio, 2100, 19806-900, Assis, SP, Brazil

**13818.** Chahl, J.; Mizutani, A. (2014): Dragonfly hover is primarily mediated by vision. *Proc. SPIE 9055, Bioinspiration, Biomimetics, and Bioreplication 2014*, 905516 (March 8, 2014), San Diego, California, USA doi:10.1117/12.2045029; <http://dx.doi.org/10.1117/12.2045029>

(in English) ["The sensory means by which hover is achieved could be inertial, visual or an unexplained sensory modality. Dragonflies in their natural habitat were shown not to maintain a stationary position in wind. Their position fluctuated significantly while returning to the original position. The movement of the dragonfly is correlated with the movement of vertically standing vegetation. This response would be non-causal with wind for an inertial or putative pressure based internal sensory system. It is postulated that with a substrate of moving water, sensitivity to movement on the visual horizon for controlling hover is a robust strategy." (Authors)] Address: Mizutani, Akiko, Odonatrix Pty. Ltd., One Tree Hill SA 5114, Australia

**13819.** Chen, S.-L.; Yeh, W.-C. (2014): Description of a new species of the genus *Sarasaeschna* Karube & Yeh, with a key to the species of Taiwan (Odonata: Anisoptera: Aeshnidae). *Zootaxa* 3764(1): 92-100. (in English) ["*Sarasaeschna Chiangchilii* sp. nov. collected from Daxi, Taoyuan County in northern Taiwan is described and diagnosed. Judging from male penile structure, this species is considered to belong to the pryeri-group of its genus. It is easily distinguished from all known congeners in having peculiar sickle-shaped cerci in male. The habitats of *S. Chiangchilii* are mainly shaded brooks in lowland areas, which are exceptional for its Taiwanese relatives. Distributional maps and a key are also provided for the four species of Taiwanese *Sarasaeschna*." (Authors)] Address: Chen, S.-L., Conservation and Research Center, Taipei Zoo, Taipei, Taiwan. E-mail: [dwx24@zoo.gov.tw](mailto:dwx24@zoo.gov.tw)

**13820.** Clayden, M.G.; Kidd, K.A.; Chételat, J.; Hall, B.D.; Garcia, E. (2014): Environmental, geographic and trophic influences on methylmercury concentrations in macroinvertebrates from lakes and wetlands across Canada. *Ecotoxicology* 23(2): 273-284. (in English) ["Macroinvertebrates are a key vector in the transfer of methylmercury (MeHg) to fish. However, the factors that affect MeHg concentrations and bioaccumulation in these organisms are not as well understood as for fish, and studies on a broad geographic scale are lacking. In this study, we gathered published and unpublished MeHg and carbon ( $\delta^{13}C$ ) and nitrogen ( $\delta^{15}N$ ) stable isotope data for freshwater macroinvertebrates from 119 lakes and wetlands across seven Canadian provinces, along with selected physical, chemical and biological characteristics of these systems. Overall, water pH was the most important determinant of MeHg concentrations in both predatory and non-predatory invertebrates [ $R^2_{adj} = 0.32$ ,  $p < 0.001$ ; multivariate canonical redundancy analysis (RDA)]. The location of lakes explained additional variation in invertebrate MeHg (partial  $R^2 = 0.08$  and  $0.06$  for latitude and longitude, respectively; RDA), with higher concentrations in more easterly and southerly regions. Both invertebrate foraging behaviour and trophic position (indicated by functional feeding groups and  $\delta^{15}N$  values, respectively)

also predicted MeHg concentrations in the organisms. Collectively, results indicate that in addition to their feeding ecology, invertebrates accumulate more MeHg in acidic systems where the supply of MeHg to the food web is typically high. MeHg concentrations in macroinvertebrates may also be influenced by larger-scale geographic differences in atmospheric mercury deposition among regions." (Authors) The supplementary material details the taxa, but in Odonata in most cases only at the order level.] Address: Kidd, Karen, Biology Department, Canadian Rivers Institute, University of New Brunswick, 100 Tucker Park Road, Saint John, NB, E2L 4L5, Canada. E-mail: kiddk@unb.ca

**13821.** Dayaram, A.; Galatowitsch, M.; Harding, J.S.; Argüello-Astorga, G.R.; Varsani, A. (2014): Novel circular DNA viruses identified in *Procordulia grayi* and *Xanthocnemis zealandica* larvae using metagenomic approaches. *Infection, Genetics and Evolution* 22: 134-141. (in English) ["Highlights: •Identification of 13 novel ssDNA viruses in *P. grayi* and *X. zealandica*. •The 13 novel viral genomes (1628 - 2668 nt) have NAG-TATTAC nonanucleotide motif. •The novel ssDNA viruses have 2 ORFs that are bidirectional or unidirectional. •Reps of novel ssDNA viruses have conserved the RCR & helicase motifs. Recent advances in sequencing and metagenomics have enabled the discovery of many novel single stranded DNA (ssDNA) viruses from various environments. We have previously demonstrated that adult dragonflies, as predatory insects, are useful indicators of ssDNA viruses in terrestrial ecosystems. Here we recover and characterise 13 viral genomes which represent 10 novel and diverse circular replication associated protein (Rep) -encoding single stranded (CRESS) DNA viruses (1628 - 2668 nt) from *P. grayi* and *X. zealandica* dragonfly larvae collected from four high-country lakes in the South Island of New Zealand. The dragonfly larvae associated CRESS DNA viruses have different genome architectures, however, they all encode two major open reading frames (ORFs) which either have bidirectional or unidirectional arrangement. The 13 viral genomes have a conserved NAGTATTAC-nonanucleotide motif and in their predicted Rep proteins we identified the rolling circle replication (RCR) motif 1, 2 and 3, as well as superfamily 3 (SF3) helicase motifs. Maximum likelihood phylogenetic and pairwise identity analysis of the Rep amino acid sequences reveal that the dragonfly larvae novel CRESS DNA viruses share <63% pairwise amino acid identity to the Reps of other CRESS DNA viruses whose complete genomes have been determined and available in public databases and that these viruses are novel. CRESS DNA viruses are circulating in larval dragonfly populations; however, we are unable to ascertain whether these viruses are infecting the larvae directly or are transient within dragonflies via their diet." (Authors)] Address: Varsania, A., School of Biological Sciences, University of Canterbury, Christchurch, 8140, New Zealand. E-mail: arvind.varsani@canterbury.ac.nz

**13822.** De Knijf, G.; Adriaens, T.; Vermeylen, R.; Van der Schoot, P. (2014): Discovery of a population of *Gomphus flavipes* on the Albert Canal (Belgium), one of the busiest channels in Europe, with an overview of its status in Western and Central-Europe. *Brachytron* 16(1/2): 3-17.["*Gomphus flavipes*, a typical river species, disappeared in many parts of western and central Europe as a result of deterioration of the water quality. Since the beginning of the 1990s *G. flavipes* has been rediscovered in several rivers, first in the Netherlands and Germany. The first observation of *G. flavipes* from Belgium dates from 2000 and originates from the river Meuse, where it forms the border between Belgium and the Netherlands. Several observations were made there, but exuviae have never been found. Although the species has been observed several times since 2002 in the province of Antwerp, these observations were all considered to refer to vagrant individuals from the river Meuse the Netherlands or the river Rhine in Germany. In July 2012 a population of *G. flavipes* was discovered along the Albert Canal in the province of Antwerp, Flanders, Belgium. A freshly emerged individual was found on 28 July 2012 and the following days along the Albert Canal in Broechem. The first exuvium was found on 6 August. The subsequent search (6-12 August 2012) resulted in the discovery of 70 exuviae, all found along the Albert Canal between the sluices of Wijnegem and the bridge over the canal in Grobbendonk, over a distance of 9.5 km. The average density of exuviae found per trajectory with larval skins present was 1.2 (minimum 0.1, maximum 3.3) per 100 meter. Sex-ratio was 1:0.6 in favour of females, which is reported normal in gomphid populations but can also be explained by the late sampling date, as in dragonflies males are mostly the first to emerge. Emergence substratum was highly artificial. Most exuviae were found on the concrete sheet piling of the bank, to a lesser extent also on poles or vertical walls. Based on long-term research in other parts in Europe, we estimated the population along the Albert canal at a minimum of 200 individuals. This discovery of a population of *G. flavipes* in one of the busiest channels in Europe is unique and sheds new light on the potential range of the species in Flanders and suitable habitat in large parts of Europe. *G. flavipes* is also known to reproduce in small irrigation canals (< 5m wide) between the rice paddies in northern Italy, but although also artificial these cannot be compared with the Albert Canal. This local shift in habitat preference from rivers towards canals with concrete banks, is probably a result of the recent range expansion of *G. flavipes* in western Europe." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussels, Belgium. E-mail: geert.deknijf@inbo.be

**13823.** Denny, E.G.; Gerst, K.L.; Miller-Rushing, A.J.; Tierney, G.L.; Crimmins, T.M.; Enquist, C.A.F.; Guertin, P.; Rosemartin, A.H.; Schwartz, M.D.; Thomas, K.A.; Weltzin, J.F. (2014): Standardized phenology monitoring methods to track plant and animal activity for science and resource management applications. Interna-



tional Journal of Biometeorology 58: 591-601. (in English) ["Phenology offers critical insights into the responses of species to climate change; shifts in species' phenologies can result in disruptions to the ecosystem processes and services upon which human livelihood depends. To better detect such shifts, scientists need long-term phenological records covering many taxa and across a broad geographic distribution. To date, phenological observation efforts across the USA have been geographically limited and have used different methods, making comparisons across sites and species difficult. To facilitate coordinated cross-site, cross-species, and geographically extensive phenological monitoring across the nation, the USA National Phenology Network has developed in situ monitoring protocols standardized across taxonomic groups and ecosystem types for terrestrial, freshwater, and marine plant and animal taxa. The protocols include elements that allow enhanced detection and description of phenological responses, including assessment of phenological "status", or the ability to track presence-absence of a particular phenophase, as well as standards for documenting the degree to which phenological activity is expressed in terms of intensity or abundance. Data collected by this method can be integrated with historical phenology data sets, enabling the development of databases for spatial and temporal assessment of changes in status and trends of disparate organisms. To build a common, spatially, and temporally extensive multi-taxa phenological data set available for a variety of research and science applications, we encourage scientists, resources managers, and others conducting ecological monitoring or research to consider utilization of these standardized protocols for tracking the seasonal activity of plants and animals." (Authors) Phenophases to be observed in Odonata are: Active adults, Adults feeding, Migrating adults, Mating, Egg laying, Dead adults, Individuals in a net] Address: Denny, Ellen, National Coordinating Office, USA National Phenology Network, 1955 East Sixth Street, Tucson, AZ 85721, USA. E-mail: ellen@usanpn.org

**13824.** Dow, R.A. (2014): *Telosticta iban* sp. nov. from Sarawak (Odonata: Zygoptera: Platystictidae). *Zootaxa* 3784(1): 74-78. (in English) ["*T. iban* sp. nov. is described from the Lanjak Entimau Wildlife Sanctuary in Sarawak, Malaysian Borneo. Both sexes can be distinguished from all other species of *Telosticta* by the form of the antehumeral markings." (Author)] Address: Dow, R.A., Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**13825.** Emerson, Y.S.; Alaban, J. (2014): *Hemidactylus platyurus* (Flat-tailed House Gecko). Predation. *Herpetological Review* 45(1): 129. (in English) [Verbatim: *Hemidactylus platyurus* is a moderate-sized (43–58 mm SVL) gecko with a widespread distribution in Southeast Asia and in the Philippines (Brown and Alcalá 1978.

Philippine Lizards of the family Gekkonidae. Silliman University Press. Dumaguete, Philippines. 146 pp.). This note reports the observed predation of *H. platyurus* by a dragonfly, *Anax* cf. *panybeus* (Odonata: Aeshnidae). At 1330 h on 8 September 2013, JA observed a female *Anax* cf. *panybeus* (60 mm right hindwing length), clutching a still struggling *Hemidactylus platyurus*, land on a branch of a tamarind tree (*Tamarindus indica*) in Pueblo de Panay, Barangay Dinginan, Roxas City, Capiz Province, Panay Island, Philippines (11.548572°N, 122.727822°E, WGS84; elev. 112 m). The dragonfly utilized its anterior legs to hold on to its prey while simultaneously chewing the left eye of the gecko for ca. four minutes. To our knowledge, this is the first recorded incident of a dragonfly preying on a lizard in the Philippines. Photographic vouchers were deposited at the Raffles Museum of Biodiversity Research, National University of Singapore (ZRC[IMG] 2.183a–c). We thank R. J. Villanueva for identification of the dragonfly, Kelvin K. P. Lim for ZRC voucher numbers, and Cameron Siler for comments on this note.] Address: Emerson, Y.S., Philippine Center for Terrestrial and Aquatic Research, 1198 Benavidez St., Unit 1202, Tondo, Manila, Philippines. E-mail: emersonsy@gmail.com

**13826.** Endersby, I. (2014): Additional distribution records for Victorian dragonflies (Insecta: Odonata). *Victorian Entomologist* 44(2): 34-37. (in English) [Australia; *Nannophya australis*; *Notoaeschna sagittata*] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@pacific.net.au

**13827.** Endersby, I. (2014): Additional distribution records for Victorian dragonflies (Insecta: Odonata). Continued. *Victorian Entomologist* 44(3): 58-64. (in English) [Australia; *Orthetrum villosovittatum*, *Pantala flavescens*, *Parasynthemis regina*, *Pseudagrion aureofrons*.] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@pacific.net.au

**13828.** Escoto-Moreno, J.; González-Soriano, E.; Escoto-Rocha, J.; Márquez, J. (2014): Riqueza y distribución de la familia Aeshnidae (Odonata: Anisoptera) en el estado de Aguascalientes, México. *Revista Mexicana de Biodiversidad* 85: 209-217. (in Spanish, with English summary) ["The species richness and geographic distribution of the family Aeshnidae in the state of Aguascalientes is presented. A total of 168 adult individuals from 55 localities were collected during a 12 months period between August 2006 and July 2007. They belong to four genera and seven species (*Aeshna persephone*, *Anax junius*, *Anax walsinghami*, *Remartinia luteipennis*, *Rhionaeschna dugesi*, *Rhionaeschna multicolor*, *Rhionaeschna psilus*). ... Specific richness of the family Aeshnidae in the state of Aguascalientes corresponds to the 11.9% of all Odonata species recorded for the state and 23.3% of the species recorded of this family for México. The species accumulation curve is stabilized, but according to Chao 2, Jackknife 1 and

Jackknife 2 non-parametric estimators, the sampling effort performed estimates between 80.3% and 97.5% of the species of this family that theoretically exist in the state of Aguascalientes. The localities that showed a higher species richness were La Rinconada, stream at Malpaso and Puente La Labor, all belonging to the municipality of Calvillo, and the Estación Biológica Agua Zarca (EBAZ) in the municipality of San José de Gracia. The distribution of the species reflects three regional patterns: Altiplano Mexicano, Sierra Madre Occidental and Neotropical." (Authors)] Address: Escoto-Moreno, J., Laboratorio de Sistemática Animal, Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo. Km 4.5 carretera Pachuca-Tulancingo s/n, Ciudad Universitaria, Col. Carboneras, 42184 Mineral de la Reforma, Hidalgo, México. E-mail: jerjaem2002@yahoo.es

**13829.** Faithpraise, F.O.; Idung, J.; Usibe, B.; Chatwin, C.R.; Young, R.; Birch, P. (2014): Natural control of the mosquito population via Odonata and Toxorhynchites. *International Journal of Innovative Research in Science* 3(5): 12898-12911. (in English) ["The main impact of mosquito pests is the transmission of many dangerous diseases and death. Hence, the reduction of their population by the use of a natural control method is a primary objective of this research. This mosquito reduction method utilises different species of predators (Odonata) and (Toxorhynchites) to substantially improve the environment. The frequency of capturing the pest mosquitoes by the predators is determined using a Pascal distribution, whilst insect mortality is modelled using a Weibull distribution. The results from the model show that by using insect predators, a significant reduction of the mosquito population is possible in less than eighty days." (Authors)] Address: Faithpraise, Fina, Engineering & Design, (Biomedical Engineering) School of Engineering and Informatics, University of Sussex, Brighton, UK

**13830.** Feindt, W.; Hadrys, H. (2014): Still a one species genus? Strong genetic diversification in the world's largest living odonate, the Neotropical damselfly *Megaloprepus caerulatus*. *Conserv. Genet.* 15: 469-481. (in English) ["Mesoamerican biodiversity is increasingly threatened by anthropogenic destruction of natural land cover. Habitat degradation and climate change are primary threats to specialized forest odonate species that are important model organisms for forest health and defining conservation units. The extreme niche specialization of *M. caerulatus*, the world's largest extant odonate, makes it well suited as an indicator for changing environmental conditions. *Megaloprepus*, which is considered to be a monospecific genus, is highly dependent on old growth forests whose water filled tree holes are limiting reproductive resources for this species. Here, we focus on the question how historical and recent fragmentation events, strong niche conservatism and ecological conditions have affected population dynamics, viability and the species status in this evolu-

tionarily old genus. Two mitochondrial sequence markers (ND1 and 16S rRNA) and a set of microsatellites were used to analyze population structure and genetic diversity of *M. caerulatus* in the northern part of its distributional range. Results suggested an absence of gene flow and no shared haplotypes among the study populations. Statistical parsimony indicated high substructuring among populations with sequence diversity similar to levels found at the species level compared to other odonates. In sum, the genetic data suggest that *Megaloprepus* may actually consist of more than one species. The taxonomic status of the group should be revised in light of the three distinct genetic clusters found in different forest regions. The results may also allow insights into the impact of recent and historical habitat fragmentation on a strong Neotropical forest restricted insect species." (Authors)] Address: Feindt, Wiebke, ITZ, Ecology & Evolution, University of Veterinary Medicine Hannover, Bünteweg 17d, 30559 Hannover, Germany. E-mail: wiebke.feindt@ecolevol.de

**13831.** Forbes, M.R.; Mlynarek, J.J. (2014): A hypothesis to explain host species differences in resistance to multi-host parasites. *Ideas in Ecology and Evolution* 7: 17-24. (in English) ["Here, we offer a novel hypothesis to explain why some host species evolve resistance, whereas other related species remain susceptible to a shared parasite species. We first describe instances of single water mite species that are ectoparasitic on different species of host dragonflies, where the mites are killed by resistance mechanisms and have little to no fitness on some host species. This begs the question of why some host species are susceptible, whereas other host species are (nearly) completely resistant. Earlier logic based on parasites exploiting abundant host species at the cost of exploiting rare host species does not explain such instances well. Rather, a hypothesis based on closed populations of some host species being able to evolve parasite recognition is invoked. Parasite recognition is not expected to evolve in host species from more open populations with considerable gene flow across sites, only some sites of which have the parasite species present. The logic of this hypothesis can be explored with simulation models, whereas empirical tests could involve combined approaches using molecular genetics, population genetics, experimental infections and transplantation experiments." (Authors)] Several experiments on Odonata were tested during the present survey] Address: Forbes, M.R., Dept of Biology, Carleton University, 587 Tory Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**13832.** Gallardo, B.; Dolédec, S.; Paillex, A.; Arscott, D.B.; Sheldon, F.; Zilli, F.; Mérigoux, S.; Castella, E.; Comín, F.A. (2014): Response of benthic macroinvertebrates to gradients in hydrological connectivity: a comparison of temperate, subtropical, Mediterranean and semiarid river floodplains. *Freshwater Biology* 59(3):

630-648. (in English) ["(1) Despite a general recognition that benthic macroinvertebrates respond to changes in hydrological connectivity within floodplain ecosystems, no consensus about patterns in community structure and ecosystem processes across large scales and different climates has yet been established. Such knowledge is necessary since anthropogenic activities continue to alter the natural hydrogeomorphology of large floodplains, with most consequences for aquatic communities remaining unknown. (2) Using information from six large rivers located in four different climate regions (humid subtropical, maritime temperate, Mediterranean and dry semi-arid), we compared benthic macroinvertebrate responses along lateral gradients of hydrological connectivity. We tested hypotheses related to differences among climate regions and to similar hydrological constraints within any one climate. The large geographical scale covered by this study provides the first comprehensive comparison of aquatic community patterns across hydrological gradients under different climatic settings. (3) Multivariate ordinations demonstrated a higher overlap of trait community composition (50% variance explained by the first two axes) than taxonomic composition (15%) among floodplains, displaying high interclimate trait stability. The taxonomy-based ordination separated the subtropical floodplain, with an average 86% of non-insect taxa, from the insect-dominated temperate, Mediterranean and semi-arid floodplains (with >50% insect abundance). In the trait-based ordination, large body size (60% of organisms >4 cm) and long lifespan duration (80% of organisms) discriminated the subtropical from the other five studied floodplains. (4) Across a gradient of lateral connectivity, linear mixed effect (LME) models supported seven of 15 hypotheses, which suggests remarkably consistent macroinvertebrate patterns in floodplains regardless of the climate regime. Taxon and trait richness were positively related and peaked at sites of intermediate hydrological connectivity. Our predictions about the feeding guilds of macroinvertebrates (e.g. that shredders and scrapers would be more abundant in connected channels, and predators and deposit feeders at isolated sites) were more strongly supported by the data than those about life history (e.g. plurivoltinism and short lifespan would be better represented in connected channels). This difference was related to the influence of extended periods of hydrological disconnection as disturbance in addition to flooding. (5) Trait stability across hydrological connectivity provides a meaningful ecological context for the comparison of the macroinvertebrate benthos among climatic zones, where taxonomic composition differs strongly. In addition, trait similarities and dissimilarities found in this study suggest that large-scale biogeographical filters do operate on communities, resulting in different trait combinations in temperate and Mediterranean floodplains when compared to semi-arid and subtropical environments. The extent to which global macroecological factors (i.e. climate, dispersal history) and local biotic and abiotic fac-

tors (i.e. drought frequency, habitat structure, water chemistry) contribute to this difference requires further investigation." (Authors) The list of taxa includes Odonata identified at the genus level.] Address: Gallardo, Belinda, Applied and Restoration Ecology Group, Pyrenean Institute of Ecology (IPE-CSIC), Avda. Montanana 1005, 50192 Zaragoza, Spain. E-mail: belinda@ipe.csic.es

**13833.** Galliani, C.; Scherini, R.; Piglia, A.; Merlini, D. (2014): *Odonati d'Italia. Guida al riconoscimento e allo studio di libellule e damigelle.* linnea.it / linnea's eBooks. 201 pp (in Italian)



**13834.** Garrison, R.W. (2014): Review of *Oxystigma Selys* with the synonymy of *Oxystigma williamsoni* Geijskes (Odonata: Heteragrionidae). *Zootaxa* 3780(2): 347-364. (in English) ["*Oxystigma williamsoni* Geijskes, 1976 is synonymized with *Oxystigma petiolatum* (Selys, 1862), based on a reexamination of an extensive series of both taxa identified by D. Geijskes in the RMNH. Illustrations of the variability for both taxa and illustrations, maps, and keys for all species are provided." (Authors)] Address: Garrison, R.W., Plant Pest Diagnostic Branch, California Department of Food and Agriculture, Sacramento, USA. E-mail: rgarrison@cdfa.ca.gov

**13835.** Gleason, J. E.; Fudge, D.S.; Robinson, B.W. (2014): Eco-mechanics of lamellar autotomy in larval damselflies. *J. Exp. Biol.* 217(2): 185-191. (in English) ["In larval damselflies, the self-amputation (autotomy) of the caudal lamellae permits escape from predatory larval dragonflies. Lamellar joint size declines among populations with increasing risk of dragonfly predation,



but the breaking force required for autotomy and the biomechanical factors that influence breaking force are unknown. If autotomy enhances survival in larval damselflies, then predation by larval dragonflies should select for joints that require less force to break. We test this adaptive hypothesis by evaluating whether breaking force is negatively related to local predation risk from larval dragonflies. We also test a cuticle structure hypothesis, which predicts that breaking force is positively related to joint size and to joint cuticle thickness because of a structural support relationship between joint and lamella. The peak force necessary for lamellar autotomy was assessed on individual larval *Enallagma* damselflies collected from populations that varied in risk of predation. Easier lamellar autotomy occurred in larvae from sites with higher predation risk because damselflies from fishless ponds (where predatory larval dragonflies are likely more abundant) had lower breaking forces than those from ponds with fish (where larval dragonfly predation is likely reduced). Furthermore, breaking force was a positive function of joint size and also of total cuticle cross-sectional area after controlling for joint size. This suggests that autotomy may evolve in larval damselflies under selection from small grasping predators such as larval dragonflies by favouring smaller joint size or reduced cuticle area of lamellar joints." (Authors)] Address: Gleason, J. E., Dept of Integrative Biology, University of Guelph, Guelph, ON, Canada, N1G 2W1. E-mail: jgleason@uoguelph.ca

**13836.** Gómez-Anaya, J.A.; Novelo-Gutiérrez, R.; Ramírez, A.; Arce-Pérez, R. (2014): Using empirical field data of aquatic insects to infer a cut-off slope value in asymptotic models to assess inventories completeness. *Revista Mexicana de Biodiversidad* 85: 218-227. (in English, with Spanish summary) ["The selection of the most appropriate model is essential to predict the potential species richness of a site or landscape. Species accumulation curves have been used as a basic tool for comparing richness when different sampling protocols have been applied. Among the parameters generated by these models the slope has been cited as an indicator of completeness without regard to a defined cut-off value. In this work, we fit 12 field data sets of aquatic Coleoptera (Hidalgo) and Odonata larvae (Michoacán) to 2 asymptotic models (Clench and Linear Dependence) in order to calculate the slopes at the maximum effort and relate them with efficiency. Then, the theoretical effort needed to achieve the 95% of the lists was calculated for each data set in order to get the theoretical slopes. The average slope value found was 0.01 with a variance of <0.001, so we propose this value as indicative of a list reaching 95% of completeness for data obtained from similar sampling protocols. Additionally, we propose the use of number of rare species as an additional criterion to evaluate the inventories completeness. The effect of different sampling intensity on fitted models and estimation of parameters and the importance of a cut-off slope value in asymptotic mod-

els as a criterion to evaluate completeness of biological inventories are discussed." (Authors)] Address: Novelo-Gutiérrez, R., Department of Environmental Sciences, University of Puerto Rico, P.O. Box 190341, 00919 San Juan, Puerto Rico. E-mail: rodolfo.novelo@inecol.mx

**13837.** Gonzalez-Santoyo, I.; Gonzalez-Tokman, D.M.; Munguia-Steyer, R.E.; Cordoba-Aguilar, A. (2014): A mismatch between the perceived fighting signal and fighting ability reveals survival and physiological costs for bearers. *PLoS ONE* 9(1): e84571. doi:10.1371/journal.pone.0084571: 12 pp. (in English) ["Signals of fighting indicate an animal's intention to attack and so they serve to prevent costly aggressive encounters. However, according to theory, a signal that is different in design (i.e. a novel signal) but that fails to inform fighting intentions will result in negative fitness consequences for the bearer. In the present study we used males of the territorial damselfly *Hetaerina americana*, which have a red wing spot during territory defense that has evolved as a signal of fighting ability. By producing a novel signal (covering the red spot with blue ink) in territory owners, we investigated: a) the behavioral responses by conspecific males; b) survival cost and c) three physiological mediators of impaired survival: muscular fat reserves, muscle mass and immune ability. We predicted that males with the novel signal would be attacked more often by conspecifics as the former would fail to convey fighting ability and intentions adequately. This will result in lower survival and physiological condition for the novel signal bearers. We found that, compared to control males (males whose red spot was not changed), experimental males had reduced survival, were less able to hold a territory, and had a reduced muscle mass. It seems that spot modified males were not able to effectively communicate their territory tenancy, which may explain why they lost their defended sites. Our results provide support for theoretical models that a novel signal that fails to inform fighting ability may lead to a fitness cost for bearers." (Authors)] Address: Córdoba-Aguilar, A., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

**13838.** Gopal, P.K.; Abaji, S.V.; Bhimrao, U.S. (2014): Diversity of damselflies (Zygoptera) in Gorewada International Bio-Park, Nagpur, Central India. *Arthropods* 3(1): 80-87. (in English) ["Gorewada International Bio-Park consists of a lake as a major water source, marshy shore and heterogeneity in vegetation. Its geographical location is 21°11'N 79°2'E. Observations are made through walking line transects along the lake border to determine the diversity of damselfly. Total 21 species of damselflies belonging to nine genera (*Aciagrion*, *Agriocnemis*, *Ceriagrion*, *Enallagma*, *Ischnura*, *Pseudagrion*, *Rhodischnura*, *Copera* and *Lestes*) and three families (*Coenagrionidae*, *Lestidae* and *Platycne-*

mididae) have been recorded. Out of total damselflies examined, 52.38% are common, 19.05% are occasional and 28.57% are rare species. The present study encourages the conservation of a wide range of indigenous damselfly species in this area." (Authors)] Address: Gopal, P.K., Department of Zoology, Institute of Science, R. T. Marg, Nagpur (M.S.) India. E-mail: virushende@gmail.com

**13839.** Günther, A.; Hilfert-Rüppell, D.; Rüppell, G. (2014): Reproductive behaviour and the system of signalling in *Neurobasis chinensis* (Odonata, Calopterygidae) – a kinematic analysis. *International Journal of Odonatology* 17(1): 31-52. (in English) ["The reproductive behaviour of the damselfly *N. chinensis* was filmed at 300 and 600 frames per second in Thailand in spring 2009. This was subsequently viewed in slow motion for detailed analysis. Altogether we observed 26 matings at two different sites. Besides visual observations of behaviour of male–female encounters at the reproductive sites, we analysed their flight cinematographically by measuring velocity, wing beat frequency, phase relationships of fore- and hind wings, and described the flight paths of different flight manoeuvres. Wing clapping by the perched insects was analysed in detail. Also filmed were alternative reproductive behaviour and avoidance behaviour when attacked by a hunting spider. By analysing the video footage in slow motion, details of male flight with hind wings held motionless, a typical flight-style for this genus, were revealed. The significance of this behaviour in interactions with conspecifics is discussed." (Authors)] Address: Günther, A., TU Bergakademie Freiberg, Institut für Biowissenschaften, Leipziger Str. 29, D-09599 Freiberg, Germany

**13840.** Guillermo-Ferreira, R.; Therézio, E.M.; Gehlen, M.H.; Bispo, P.C.; Marletta, A. (2014): The role of wing pigmentation, UV and fluorescence as signals in a Neotropical damselfly. *Journal of Insect Behavior* 27(1): 67-80. (in English) ["Pigmentation patterns, ultraviolet reflection and fluorescent emission are often involved in mate recognition and mate quality functions in many animal taxa. We investigated the role of wing ultra-violet reflection, fluorescence emission, and pigmentation on age and sexual signals in the damselfly *Mnesarete pudica*. In this species, wings are sexually dimorphic in colour and exhibit age dependency: males and females show a smoky black colouration when young, turning red in mature males while it turns brown in females. First, we investigated wing UV patterns through reflectance and emission spectra. Second, behavioural experiments were undertaken to show male and female responses to manipulated wing pigmentation and experimentally reduced UV (UV-). Reflectance spectra of the wings of juvenile and mature males and females were used to show the differences between controls and individuals with manipulated colouration used in the behavioural experiment. UV-reduced, females with wings painted red, and control males and females were

tethered and presented to conspecific males and females, and their behavioral responses were recorded. The male red wing pigmentation and females with red wings elicited an aggressive response in territorial males and a sexual response in females. Both males and females showed neutral responses towards individuals with reduced UV. Wing signals of juvenile individuals also provoked neutral responses. These results suggest that UV, together with pigmentation, plays a role during mate recognition in males and females. Other than butterflies and spiders, it seems that fluorescence signals and UV reflectance can also be part of communication in odonates." (Authors)] Address: Guillermo-Ferreira, R., Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, SP, Brazil. E-mail: rhainerguillermo@yahoo.com.br

**13841.** Guimaraes Souto, R.; Corbi, J.J.; Buzá Jacobucci, G. (2014): Environmental diagnosis of organochlorine compounds in sediment and benthic invertebrates of Triangulo Mineiro Watersheds, Minas Gerais, Brazil. *Revista Brasileira de Recursos Hídricos* 19(1): 143-153. (in Portuguese, with English summary) ["This study aimed to assess the levels of organochlorine compounds in sediments of 35 watercourses belonging to the Uberabinha, Araguari and Tijuco watersheds. Samples of benthic invertebrates collected in streams that showed higher concentrations of organochlorines were analyzed. Among the nineteen compounds analyzed, ten were detected in watercourses. The bioaccumulation of organochlorines was not evident in the fauna. However, this does not exclude other possible impacts of these compounds on the fauna. Monitoring measures must be encouraged since sediment is one of the most important compartments in the context of the cycling of matter and energy flow." (Authors) Taxa are treated at family level. Gomphidae are eu-dominant.] Address: Guimarães Souto, R., Ecologia e Conservação de Recursos Naturais — UFU, Campus Umuarama, Uberlândia — MG, Brazil. E-mail: rebioguimaraes@yahoo.com.br

**13842.** Hämäläinen, M.; Subramanian, K.A. (2014): *Anisopleura lieftincki* Prasad & Ghosh, 1984 – a junior synonym of *A. subplatystyla* Fraser, 1927 (Odonata: Euphaeidae). *Notulae odonatologicae* 8(3): 37-40. (in English) ["*Anisopleura lieftincki* Prasad & Ghosh, 1984 is synonymised with *A. subplatystyla* Fraser, 1927. Distinguishing characters to separate *A. subplatystyla* and *A. comes* Hagen, 1880 are presented." (Authors)]

**13843.** Hämäläinen, M. (2014): *Atrocalopteryx auco* spec. nov. from Vietnam, with taxonomic notes on its congeners (Odonata: Calopterygidae). *Zootaxa* 3793(5): 561-572. (in English) ["*Atrocalopteryx auco* Hämäläinen, spec. nov. (holotype male, from Vietnam, Lang Son province, Huu Lien, Tan Lai, alt. 260 m, 9 June 2008, deposited at RMNH, Leiden, The Netherlands) is de-

scribed and illustrated for both sexes and compared with other species in the genus. The new combination *Atrocalopteryx laosica* (Fraser, 1933), comb. nov. is made. An annotated list of *Atrocalopteryx* species and keys to both sexes are presented. Male of *A. auco* differs from the other two completely opaque-winged species (*A. atrata* and *A. atrocyana*) by having yellowish crossveins on the under surface of the wings and by having the underside of abdominal segments 8.10 strikingly yellowish. The female of *A. auco* can be easily separated from *A. atrata* and *A. atrocyana* by the presence of whitish pseudopterostigma in both wings. Problems in the definition of the genus *Atrocalopteryx* are discussed." (Author)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: libellago@gmail.com

**13844.** Hahn, A.T.; Rosa, C.A.; Bager, A.; Krause, L. (2014): Dietary variation and overlap in D'Orbigny's slider turtles *Trachemys dorbigni* (Duméril and Bibron 1835) (Testudines: Emydidae). *Journal of Natural History* 48(11-12): 721-728. (in English) ["Although *T. dorbigni* is the most abundant freshwater chelonian species in southern Brazil, little is known about its feeding habits. Our goal was therefore to evaluate this species' dietary composition and niche variation there. For this, we collected road-killed animals ( $n = 73$ ) on a federal highway (BR 392) between 2002 and 2003, and analysed their gut contents. We identified 26 different dietary items, and our results indicated that D'Orbigny's slider is omnivorous in this area. Total food volume, as well as the degree of herbivory and carnivory, were similar between males and females. However dietary composition of plants was different: although both males and females fed on underwater plant matter, only females consumed surface macrophytes. This finding suggested differential microhabitat usage between males and females throughout the swamps." (Authors) Odonata poorly contributed to the diet of the turtles.] Address: Hahn, A.T., aLaboratório de Herpetologia, Departamento de Zoologia, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil. E-mail: anehahn@gmail.com

**13845.** Hart, L.A.; Bowker M.B.; Tarboton W.; Downs C.T. (2014): Species composition, distribution and habitat types of Odonata in the iSimangaliso Wetland Park, KwaZulu-Natal, South Africa and the associated conservation implications. *PLoS ONE* 9(3): e92588. doi: 10.1371/journal.pone.0092588: 11 pp. (in English) ["Maputaland–Pondoland–Albany, South Africa has been identified as a biodiversity hotspot and centre for endemism. Odonata make good indicators of freshwater ecosystem health. Consequently we compiled a list of Odonata species recorded to date in the iSimangaliso Wetland Park. We then detailed important species in terms of endemism, conservation status, and potential as indicator species. Finally, we compared Odonata assemblages of different sites sampled within the park to

illustrate habitat importance. Species identified during two formal surveys and incidental observations made during the study period were combined with an existing database to compile an accurate and up to date species list for the iSimangaliso Wetland Park. Data from this study were then analyzed to determine which water bodies had the most similar species composition. The Dragonfly Biotic Index (DBI) value of each study area was also determined. We recorded 68 odonate species in the iSimangaliso Wetland Park, adding 13 species to the Ezemvelo KwaZulu-Natal Wildlife database for the area. This brings the total number of Odonata species for the iSimangaliso Wetland Park to 86. Eight species are red-listed, 12 are restricted in South Africa to the coastal plains of northern KwaZulu-Natal, and the remainder occurs widely across the southern African savanna. Analyses indicate that species odonate assemblages were most similar in water bodies with comparable habitats. iSimangaliso Wetland Park is identified as an important area for Odonata diversity and endemism, a trend also reflected by the DBI values. Shifts in the existing species assemblages would indicate changes within the ecosystem and thus this species account provides necessary baseline data for the area. Species Conservation efforts should thus target water bodies of varying habitat types to protect greater species diversity." (Authors)] Address: Downs C.T., School of Life Sciences, University of KwaZulu-Natal, Pietermaritzburg, South Africa. E-mail: Downs @ukzn.ac.za

**13846.** Hassall, C. (2014): The ecology and biodiversity of urban ponds. *Wiley Interdisciplinary Reviews: Water* 1(2): 187-206. (in English) ["Recent research has demonstrated that ponds contribute a great deal to biodiversity at a regional level as networks of habitat patches that also act as 'stepping stones' to facilitate the movement of species through the landscape. Similarly, a great deal of biodiversity persists in urban environments where synanthropic communities are supplemented by species that thrive in disturbed environments. Aquatic urban biodiversity appears to persist despite anthropogenic stressors: an array of anthropogenic pollutants (road salt and heavy metals), invasive species, and active mismanagement—particularly the removal of riparian vegetation. Optimizing urban ponds for different ecosystem services results in conflicting priorities over hydrological, geochemical, ecological, aesthetic, and cultural functions. The socio-ecosystem approach to environmental management opens a path to greater incorporation of biodiversity into town planning and sustainability, while accounting for cultural attitudes to urban ecosystems. I identify a range of research needs: (1) the roles of design and location of urban ponds in influencing biodiversity, (2) the function of urban wetlands for stormwater and pollution management, and (3) public perceptions of urban ecosystems and how those perceptions are influenced by interactions with natural systems. Urban wetlands offer an important opportunity to educate the general public on natural systems and science in general using a resource that is lo-



cated on their doorstep. In the face of increasing pressures on natural systems and increasing extent and intensity of urbanization, a more comprehensive appreciation of the challenges and opportunities provided by urban ponds could play a substantial role in driving sustainable urban development." (Author) The paper only includes a few references to Odonata.] Address: Hassall, C., School of Biology, University of Leeds, Leeds, UK. E-mail: c.hassall@leeds.ac.uk

**13847.** Ihara, S. (2014): Food habits of the adult Japanese newt *Cynops pyrrhogaster* (Amphibia: Salamandridae) in the sub-alpine Yachidaira High Moor, East—Central Honshu, Japan. *Current Herpetology* 33(1): 38-45. (in English) ["The diet of the adult *Cynops pyrrhogaster* was studied at a small pond on the Yachidaira high moor (1500 m asl) from 2002 to 2004. In total, 160 individuals examined by stomach flushing yielded 1518 prey items, of which most (95.7% of the total numerically) were small arthropods inhabiting the pond or surrounding land. Of these, chironomid larvae and Cladocera numerically represented 34.3% and 34.7%, respectively. By mass, *Rhacophorus arboreus* tadpoles, Odonata adults, Brachycera adults, and conspecific newt eggs comprised 13.7%, 11.5%, 10.7%, and 9.8% of all prey, respectively. The composition of prey items varied seasonally and annually. These results suggest that the food habits of adult *C. pyrrhogaster* in the alpine high moor areas are influenced by yearly and seasonal changes in various small animals in and around the ponds." (Authors)] Address: Ihara, S., Department of Biology, Ohu University, 31-1 Misumido, Tomita, Koriyama, Fukushima 963-8611, Japan. E-mail address: s-ihara@den.ohu-u.ac.jp

**13848.** Janssens, L.; Van, K.D., Debecker, S.; Bervoets, L.; Stoks, R. (2014): Local adaptation and the potential effects of a contaminant on predator avoidance and antipredator responses under global warming: a space-for-time substitution approach. *Evolutionary Applications* 7(3): 421-430. (in English) ["The ability to deal with temperature-induced changes in interactions with contaminants and predators under global warming is one of the outstanding, applied evolutionary questions. For this, it is crucial to understand how contaminants will affect activity levels, predator avoidance and antipredator responses under global warming and to what extent gradual thermal evolution may mitigate these effects. Using a space-for-time substitution approach, we assessed the potential for gradual thermal evolution shaping activity (mobility and foraging), predator avoidance and antipredator responses when *Ischnura elegans* damselfly larvae were exposed to zinc in a common-garden warming experiment at the mean summer water temperatures of shallow water bodies at southern and northern latitudes (24 and 20°C, respectively). Zinc reduced mobility and foraging, predator avoidance and escape swimming speed. Importantly, high-latitude populations showed stronger zinc-induced reductions in escape swimming speed at both temperatures, and in

activity levels at the high temperature. The latter indicates that local thermal adaptation may strongly change the ecological impact of contaminants under global warming. Our study underscores the critical importance of considering local adaptation along natural gradients when integrating biotic interactions in ecological risk assessment, and the potential of gradual thermal evolution mitigating the effects of warming on the vulnerability to contaminants." (Authors)] Address: Khuong Dinh Van, Institute of Aquaculture, Nha Trang University, Nha Trang, Vietnam. E-mail: khuongaquatic@gmail.com

**13849.** Janssens, L.; Van, K.D.; Stoks, R. (2014): Extreme temperatures in the adult stage shape delayed effects of larval pesticide stress: a comparison between latitudes. *Aquatic Toxicology* 148: 74-82. (in English) ["Highlights: •Global warming and pesticides are major threats to aquatic biodiversity. •Larval pesticide and adult heat stress reduced fitness traits in a damselfly. •High-latitude damselflies were more sensitive to the pesticide and heat stress. •Both stressors interacted across metamorphosis; similarly across latitudes. •Risk assessment should consider temperature extremes shaping pesticide effects. Global warming and pesticide pollution are major threats for aquatic biodiversity. Yet, how pesticide effects are influenced by the increased frequency of extreme temperatures under global warming and how local thermal adaptation may mitigate these effects is unknown. We therefore investigated the combined impact of larval chlorpyrifos exposure, larval food stress and adult heat exposure on a set of fitness-related traits in replicated low- and high-latitude populations of the damselfly *Ischnura elegans*. Larval pesticide exposure resulted in lighter adults with a higher water content, lower fat content, higher Hsp70 levels and a lower immune function (PO activity). Heat exposure reduced water content, mass, fat content and flying ability. Importantly, both stressors interacted across metamorphosis: adult heat exposure lowered the reduction of fat content, and generated a stronger decrease in PO activity in pesticide-exposed animals. Larval pesticide exposure and larval food stress also reduced the defense response to the adult heat stress in terms of increased Hsp70 levels. In line with strong life history differences in the unstressed control situation, high-latitude animals were less sensitive to food stress (body mass and water content), but more sensitive to pesticide stress (development time and PO activity) and heat exposure (PO activity and Hsp70 levels). While low-latitude adults could better withstand the extreme temperature as suggested by the weaker increase in Hsp70, heat exposure similarly affected the delayed effects of larval pesticide exposure at both latitudes. Our study highlighted two key findings relevant for ecological risk assessment under global warming. Firstly, the delayed effects of larval pesticide exposure on adult damselflies depended upon subsequent adult heat exposure, indicating that larval pesticide stress and adult heat stress interacted across metamorphosis. Secondly,

low- and high-latitude animals responded differently to the imposed stressors, highlighting that intraspecific evolution along natural thermal gradients may shape sensitivity to pesticides." (Authors)] Address: Janssens, Lizanne, Lab.Aquatic Ecology, Evolution and Conservation Sint-Michielsstraat 6 - box 2439, 3000 Leuven, Belgium. E-mail: lizanne.janssens@bio.kuleuven.be

**13850.** Juen, L.; Oliveira-Junior, M.B.; Shimano, Y.; Mendes, T.P.; Cabette, H.S.R. (2014): Composition and richness of Odonata (Insecta) in streams with different levels of conservation in a Cerrado-Amazonian Forest ecotone. *Acta Amazonica* 44(2): 223-234. (in Portuguese, with English summary) ["The removal or substitution of riparian vegetation causes disturbance in physical environment, seasonal water flow and water chemical quality. These modifications can cause decrease in species richness by local extinctions. The aim of this study was to examine the effect of disturbance in the physical environment on the richness and species composition of Odonata adults in streams with different levels of conservation in the river Suiá-Missu basin, Mato Grosso, Brazil. Modifications in the aquatic systems affected the Odonata community, probably because their ecophysiological and behavioral requirements of adults and larvae. Anisoptera species, which require sunny environments because of their body size, had higher species richness in environments with low plant cover. On the other hand, Zygoptera species, which generally inhabit streams with dense vegetation, presented a decrease in richness in disturbed environments, as a result high sunlight radiation and/or variations in temperature. Hence, in both suborders, environmental perturbations do not need to be severe to change species composition, indicating that ecosystem services could be lost, even with only partial alterations in physical environment." (Authors)] Address: Juen, L., Universidade Federal do Pará-UFPA. Laboratório de Ecologia Aquática, Instituto de Ciências Biológicas. Rua Augusto Correia, nº 1, Bairro Guamá, CEP: 66075-110. Belém, Pará, Brasil. E-mail: leandrojuen@ufpa.br

**13851.** Karjalainen, S. (2014): Luonnonmaatieteellisistä maakunista mahdollisesti hävinneet sudenkorennot [Dragonfly species possibly vanished from biogeographical provinces]. *Crenata* 7: 4-9. (in Finnish) [Based on a reference from 1986 listing Finnish dragonfly species not recorded in Finnish biogeographical provinces after 1960, this article presents in tabular form 18 instances referring to 15 species not recorded in respective Finnish biogeographical provinces for at least 55 years. As state of odonatological research varies widely between the provinces and provinces best explored haven't lost any species yet, it remains unclear if species became rarer or only have been overlooked since (Asmus Schröter).] Address: Karjalainen, S., Tyrskykuja 3 B 15, FIN-02320 Espoo, Finland. E-mail: sk@korento.net

**13852.** Karjalainen, S. (2014): Sudenkorentokesän 2013 kohokohdat [Odonatological Highlights of summer 2013].

*Crenata* 7: 10-13. (in Finnish, with English summary) ["The article presents the most interesting dragonfly (Odonata) records from Finland in 2013. *Anax parthenope* was recorded for the first time in Finland on 16th July 2013 in Inkoo. A patrolling male was photographed by Jan Tvrdy. Several records of *Sympetrum fonscolombii* were made between May and September. Before this, only one record has been made in Finland (2011)."] (Author)] Address: Karjalainen, S., Tyrskykuja 3 B 15, FIN-02320 Espoo, Finland. E-mail: sk@korento.net

**13853.** Karjalainen, S. (2014): Isotyönkorenonn erikoinen muninta [Extraordinary oviposition of *Erythromma najas*]. *Crenata* 7: 43. (in Finnish) [A photo series of 13 pictures shows oviposition of a female *Erythromma najas* which was infested and probably weakened by aquatic mites. During ovipositing the female was aggressively disturbed by a male of *Enallagma cyathigerum*. The attack finally exhausted all of the female's power and it floated away on the water's surface (Asmus Schröter).] Address: Karjalainen, S., Tyrskykuja 3 B 15, FIN-02320 Espoo, Finland. E-mail: sk@korento.net

**13854.** Karthika, P.; Krishnaveni, N. (2014): Impact assessment of dragonfly diversity in different wetland ecosystems in Coimbatore with special reference to abiotic factors. *International Journal of Advanced Research* 2(2): 639-648. (in English) ["Coimbatore district possess many wetlands, amongst them Singanallur, Suler, Kumarasamy and Narasampathy were selected for the present study. Physico-chemical parameters of the waters for four selected wetlands were carried out and it revealed that Singanallur and Suler wetlands were highly polluted as it possessed the ranges beyond the permissible limits of WHO. Since dragonflies are the indicator and flagship species of the wetland ecosystem the diversity of dragonflies were analyzed with special reference to water quality parameters of the selected wetlands. According to the survey, totally 11 species of dragonfly, belonging to two families (Libellulidae and Aeshnidae) were identified. Among the selected four wetlands the diversity of dragonflies was high in Suler and Singanallur where the pollution level was also high. The present study clearly indicated that the diversity of dragonflies was not dependent upon the water characters but vegetation (aquatic and marginal) could have influenced their abundance in these wetlands." (Authors)] Address: Pushparaj, Pushparaj, Department of Zoology, Avinashilingam Institute for home science and higher education for women, Coimbatore, India

**13855.** Kim, M.J.; Jung, K.S.; Park, N.S.; Wan, X.; Kim, K.-G.; Jun, J.; Yoon, T.J.; Bae, Y.B.; Lee, S.M.; Kim, I. (2014): Molecular phylogeny of the higher taxa of Odonata (Insecta) inferred from COI, 16S rRNA, 28S rRNA, and EF1-a sequences. *Entomological Research* 44(2): 65-79. (in English) ["In this study, we sequenced both two mitochondrial genes (COI and 16S rRNA) and nuclear genes (28S rRNA and elongation factor-1a) from

71 species of Odonata that represent 7 superfamilies in 3 suborders. Phylogenetic testing for each two concatenated gene sequences based on function (ribosomal vs protein-coding genes) and origin (mitochondrial vs nuclear genes) proved limited resolution. Thus, four concatenated sequences were utilized to test the previous phylogenetic hypotheses of higher taxa of Odonata via Bayesian inference (BI) and maximum likelihood (ML) algorithms, along with the data partition by the BI method. As a result, three slightly different topologies were obtained, but the BI tree without partition was slightly better supported by the topological test. This topology supported the suborders Anisoptera and Zygoptera each being a monophyly, and the close relationship of Anisozygoptera to Anisoptera. All the families represented by multiple taxa in both Anisoptera and Zygoptera were consistently revealed to each be a monophyly with the highest nodal support. Unlike consistent and robust familial relationships in Zygoptera those of Anisoptera were partially unresolved, presenting the following relationships: (((Libellulidae + Corduliidae) + Macromiidae) + Gomphidae + Aeshnidae) + Anisozygoptera) + (((Coenagrionidae + Platycnemididae) + Calopterygidae) + Lestidae). The subfamily Sympetrinae, represented by three genera in the anisopteran family Libellulidae, was not monophyletic, dividing *Crocothemis* and *Deielia* in one group together with other subfamilies and *Sympetrum* in another independent group." (Authors)] Address: Kim, I., Dept Appl. Biol., College of Agriculture & Life Sciences, Chonnam National Univ., Gwangju 500-757, Korea. Email: ikkim81@chonnam.ac.kr

**13856.** Kittel, R.N.; Engels, W. (2014): Diversity of damselflies (Odonata: Zygoptera) of the state Rio Grande do Sul, Brazil, with four new records for the state. *Notulae odonatologicae* 8(3): 49-55. (in English) ["During a survey of damselflies in the summer 2004/2005 at the Araucaria forest reserve Pró-Mata in the Serra Geral mountain range, Rio Grande do Sul, Brazil, four species of Zygoptera new to the state were recorded. These are *Heteragrion consors*, *Lestes auritus*, *Mecistogaster ornata*, and *Mnesarete borchgravi*. These records increase the number of damselflies known from Rio Grande do Sul to 49 species." (Authors)] Address: Kittel, Rebecca, Australian Centre for Evolutionary Biology and Biodiversity, and School of Earth and Environmental Sciences, The University of Adelaide, SA 5005, Australia. E-mail: rebecca.kittel@adelaide.edu.au

**13857.** Koch, K. (2014): Hand feeding: a method to increase the survival rate of *Orthetrum coerulescens* (Odonata: Libellulidae) in outdoor enclosures. *International Journal of Odonatology* 17(1): 1-6. (in English) ["Food intake rate and diet composition have a high impact on all organisms and affect individual fitness, fecundity and mortality. Specimens in enclosures have to be fed in an adequate way and with minimum stress for the specimens. Adult dragonflies are flying hunters. In enclosures, they are usually fed by adding different

kinds of adult dipterans. In this study, I additionally fed specimens of *Orthetrum coerulescens* by hand. Each specimen received one house fly or up to six fruit flies per day. This was less than an adult dragonfly would normally consume; however, this additional hand feeding was enough to significantly increase the survival rate of individuals, especially within the first 12 days of adult life. The maximum life span (subadult and adult) observed was about 60 days, for both hand-fed adults and those that were not hand fed." (Author)] Address: Koch, Kamilla, Department of Ecology, Johannes Gutenberg-University of Mainz, Becherweg 13, 55128 Mainz, Germany

**13858.** Kohara, Y.; Nishimata, M.; Mori, H.; Yoshimoto, S.; Matsuda, S.; Kuroki, I.; Nakamura, K. (2014): Discovery of *Ceriagrion nipponicum* from Okayama Prefecture, Japan. *Naturalistae* 18: 43-45. (in Japanese, with English summary) ["*C. nipponicum*, was found in Okayama Prefecture, Japan where the species had not been recorded. The damselfly is designated as an endangered species nationwide all over Japan. Two adult males and a female were observed around an artificial pond in Tamano City. A male-female pair laid eggs into plant body of waterweeds. It is considered that *C. nipponicum* has established in the habitat where we observed." (Authors)] Address: Kohara, Y., Dept of Biosphere-Geosphere System Science, Faculty of Informatics, Okayama University of Science, 1-1 Ridai-cho, Kita-ku, Okayama-shi, Okayama-ken 700-0005, Japan.

**13859.** Kok, J.M.; Chahl, J. (2014): Resonance versus aerodynamics for energy savings in agile natural flyers. *Proc. SPIE 9055, Bioinspiration, Biomimetics, and Bioreplication 2014*, 905504 (March 8, 2014), San Diego, California, USA; doi:10.1117/12.2045030. Conference Volume 9055 (in English) ["Insects are the most diverse natural flyers in nature, being able to hover and perform agile manoeuvres. Dragonflies in particular are aggressive flyers, attaining accelerations of up to 4g. Flight in all insects requires demanding aerodynamic and inertial loads be overcome. It has been proposed that resonance is a primary mechanism for reducing energy costs associated with flapping flight, by storing energy in an elastic thorax and releasing it on the following half-stroke. Certainly in insect flight motors dominated by inertial loads, such a mechanism would be extremely beneficial. However in highly manoeuvrable, aerodynamically dominated flyers, such as the dragonfly, the use of elastic storage members requires further investigation. We show that employing resonant mechanisms in a real world configuration produces minimal energy savings that are further reduced by 50 to 133% across the operational flapping frequency band of the dragonfly. Using a simple harmonic oscillator analysis to represent the dynamics of a dragonfly, we further demonstrate a reduction in manoeuvring limits of ~1.5 times for a system employing elastic mechanisms. This is in contrast to the potential power reductions of  $\sqrt{2}$  from



regulating aerodynamics via active wing articulation. Aerodynamic means of energy storage provides flexibility between an energy efficient hover state and a manoeuvrable state capable of large accelerations. We conclude that active wing articulation is preferable to resonance for aerodynamically dominated natural flyers." (Authors)] Address: Chahl, J., School of Engineering, Univ. South Australia, Mawson Lakes Campus W2-44, Australia. E-mail: [Javaan.Chahl@unisa.edu.au](mailto:Javaan.Chahl@unisa.edu.au)

**13860.** Kolaríkova, K.; Horecký, J.; Liška, M.; Jíchová, M.; Tátosová, J.; Lapšanská, N.; Horická, Z.; Chvojka, P.; Beran, L.; Košel, V.; Matina, J.; Ciamporová-Taoviová, Z.; Krno, I.; Bulánková, E.; Šporka, F.; Kment, P.; Stuchlík, E. (2014): Benthic macroinvertebrates along the Czech part of the Labe and lower section of the Vltava rivers from 1996–2005, with a particular focus on rare and alien species. *Biologia* 69/4: 508-521. (in English) ["In the Czech part of the Labe River and the lower part of the Vltava River, we examined if the benthic macroinvertebrate composition changed from 1996 to 2005 due to expected improvements in water quality resulting from socioeconomic changes in the Czech Republic since the 1990s. Special attention was given to rare and alien species. The four biological metrics used (Number of taxa, BMWP, Number of sensitive taxa, and Number of EPT taxa) demonstrated that there was indeed an improvement in water quality as well as a slight improvement of the Labe microhabitats during the investigated period. An increasing Number of taxa over time was observed at most sites. Two main concurrent ecological processes are recently in progress in the Labe: a recovery of native species and an expansion of alien species, some of which are considered invasive. The caddisfly *Setodes punctatus* and the beetle *Pomatinus substriatus*, considered as regionally extinct in the Czech Republic until 2005, were rediscovered during our investigations. Findings of the crustacean *Hemimysis anomala* (invasive) and the chironomids *Stenochironomus* sp. and *Lipiniella* sp. were the first records of these taxa in the Czech Republic." (Authors)] A total of 17 Odonata species are reported including *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, and *Ophiogomphus cecilia*.] Address: Kolaríkova, Kateřina, Institute for Environmental Studies, Faculty of Science, Charles University in Prague, Benátská 2, CZ-12843 Praha 2, Czech Republic. E-mail: [katerina.kolarikova@natur.cuni.cz](mailto:katerina.kolarikova@natur.cuni.cz)

**13861.** Koskinen, J. (2014): Sudenkorentoaineiston tilastollinen testaaminen [Statistical testing of odonotological data]. *Crenata* 7: 40-41. (in Finnish, with English summary) ["The philosophy and basics of statistical testing are explained. Fischer's exact test and FDR adjustment are explained, and the error sources are discussed." (Author)] Address: not stated

**13862.** Koskinen, J.; Eronen, R.; Latja, P. (2014): Viherukonkorennon *Aeshna viridis* iltaparveilu Polvijär-

vellä heinäkuussa 2013 [Crepuscular swarming behaviour of *Aeshna viridis* at Polvijärvi in July 2013]. *Crenata* 7: 44-45. (in Finnish, with English summary) ["The swarming behaviour of *A. viridis* was observed on 30-vii-2013 from 22.15-23.00 at lake Solanlampi in Polvijärvi municipality (62° 45 N, 29° 20 E) in Northern Karelia region. The sunset was at 22.30. At 22.15 hawkers started to appear on the lake. At 22.30 the lake was crowded with at least hundreds, maybe even thousands of hawkers. All identified individuals were *Aeshna viridis*, the rest showed viridis-like jizz and behaviour. The intense swarming started with individuals widely scattered along lake margins but the dragonflies quickly concentrated at a few open spots with less floating vegetation. No aggressive or mating behaviour was observed, the flight style suggested feeding behaviour. The swarming ended abruptly at 22.55 and at 23.00 the lake was practically empty, the dragonflies having left. The weather was calm, half-cloudy, from +22°C (20.00h) to +17°C (23.00h). A video of the swarming behaviour (recorded by Risto Eronen) has been uploaded to YouTube service under the name „Viherukonkorennon (*Aeshna viridis*) iltaparveilu“ <http://www.youtube.com/watch?v=ZrGYQJPw-Jc> (Authors)] Address: not stated

**13863.** Kosterin, O.E. (2014): Notes on intraspecific variation of some Gomphidae (Odonata) species in Cambodia. *International Dragonfly Fund - Report* 68: 1-16. (in English) ["Specimens of *Burmagomphus asahinai* Kosterin, Makbun and Dawwrueng, 2012 and *Burmagomphus divaricatus* Lieftinck, 1964 from SW and NE Cambodia show differences in the development of the light pattern. One male of the latter species has unusual posterior spinules on posterior hamuli. Two males of *Orientogomphus minor* (Laidlaw, 1931) from the same locality in NE Cambodia have substantial differences in the thoracic and abdominal pattern. NE Cambodian specimens of *Gomphidia abbotti* Williamson, 1907 and *Lamelligomphus castor* (Lieftinck, 1941) have minor differences from data on these species from literature. Caution is necessary when composing and using keys for identification of the mentioned genera of gomphids." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: [kosterin@bionet.nsc.ru](mailto:kosterin@bionet.nsc.ru)

**13864.** Lamond, B. (2014): Comet Darners in Ontario in 2012-2013 with a focus on Brantford records. *The Wood Duck* 67(6): 129-131. (in English) [*Anax longipes*, Hamilton, Ontario, Canada.] Address: Lamond, B. E-mail: [bill-lamond@hotmail.com](mailto:bill-lamond@hotmail.com)

**13865.** Larson, K. (2014): A survey that established a baseline population data set for Odonata species in Jay Cooke State Park, Carlton County, Minnesota. *Duluth Journal of Undergraduate Research in Science* 2014: 13-16. (in English) ["In an effort to create a baseline population data set of Odonata in Jay Cooke State Park

a survey was conducted from May 29, 2013 to September 26, 2013 by using hand-netting techniques, in the field identification on live specimens, as well as proper treatment, storage and documentation of caught specimens. The purpose of this survey was to create an online accessible data set that can be used in the future for research on topics such as climate change, watershed health and other ecological issues being that Odonata are bioindicators of ecosystem health due to their obligate aquatic nymph forms. Only 3 adult males were collected of each species found to ensure no damage to future populations. Contrasted to population data previously reported there were 11 species added from the 2013 survey to the list of documented species found in Carlton County. These newly documented 11 species were part of the 35 different species caught from a total of 67 specimens collected." (Author)] Address: Larson, Kendra, Swenson College of Science and Engineering, University of Minnesota Duluth, USA. E-mail: Lars4094@d.umn.edu

**13866.** Letsch, H.; Gottsberger, B.; Ware, J. (2014): Ancient biogeography and evolution of dragonflies (Odonata: Anisoptera). *BioDivEvo2014 - Joint conference — 15th Annual Meeting of the Society of Biological Systematics (GfBS), 22nd International Symposium of the German Botanical Society (DBG), "Biodiversity and Evolutionary Biology"* — Dresden · March 24 – 27, 2014, Technische Universität Dresden, Germany. This meeting is funded by the German Research Foundation. Publisher: Senckenberg Naturhistorische Sammlungen Dresden, Königsbrücker Landstraße 159 · 01109 Dresden · Germany; Editor-in-Chief: Uwe Fritz (Zoology) on behalf of the German Society for Biological Systematics (GfBS), Christoph Neinhuis (Botany) on behalf of Section „Biodiversity and Evolutionary Biology“, the German Botanical Society (DBG); Distributor: Senckenberg Naturhistorische Sammlungen Dresden, Königsbrücker Landstraße 159 · 01109 Dresden · Germany. ISBN 978-3-910006-49-2: 105. (in English) [Verbatim: From Early Triassic to Middle Jurassic, earth land masses were united in the supercontinent Pangaea. The Late Jurassic break-up of Pangaea into Laurasia (later giving rise to North America, Europe, and Asia), and Gondwana, (later South America, Africa, India, Antarctica, and Australia) led to increased diversification and the contemporary vicariant distribution of plants and animals. While the congruence of tetrapod evolution and continental fragmentation has been documented by recent phylogenetic and biogeographical studies, no work has been conducted until now to explicitly reconstruct the phylogenetic relationships and biogeography of insect groups in the context of ancient continental drift in the Mesozoic. In the present study, we want to explore the potential pangaeian appearance of dragonfly families (Odonata: Anisoptera) and their subsequent diversification in concordance to continental schisms. We compiled a comprehensive molecular data set, based on eight ribosomal RNA and protein

coding genes, representing all major dragonfly groups. Based on this data, tree reconstruction was conducted and divergence times of the anisopteran families were estimated. We additionally reconstructed ancestral areas to retrace their historical biogeography. Our phylogenetic reconstruction proposes Aeshnoidea as the first branch in Anisoptera and Petaluroidea as sister group to Cavilabiata, the latter being subdivided into Cordulegastroidea and Libelluloidea. Divergence time estimation clearly shows a pangaeian appearance and early radiation of all anisopteran superfamilies. The reconstruction of ancestral areas suggests North America as the cradle of all Anisoptera and hot spot for the early radiation of Gomphoidea and Petaluroidea. Libelluloidea probably emerged and primary radiated in Eurasia, with subsequent independent dispersal events to the southern continents. Our results suggest a persistent yet tenuous dispersal route between Eurasia and Africa in the Lower Cretaceous.] Address: Ware, Jessica, Department of Biological Sciences, Rutgers University, Newark, NJ, 07102, USA

**13867.** Li, F.; Kwon, Y.-S.; Bae, M.-J.; Chung, N.; Kwon, T.S.; Park, Y.-S. (2014): Potential impacts of global warming on the diversity and distribution of stream insects in South Korea. *Conservation Biology* 28(2): 498-508. (in English, with Spanish summary) ["Globally, the East Asian monsoon region is one of the richest environments in terms of biodiversity. The region is undergoing rapid human development, yet its river ecosystems have not been well studied. Global warming represents a major challenge to the survival of species in this region and makes it necessary to assess and reduce the potential consequences of warming on species of conservation concern. We projected the effects of global warming on stream insect (Ephemeroptera, Odonata, Plecoptera, and Trichoptera [EOPT]) diversity and predicted the changes of geographical ranges for 121 species throughout South Korea. Plecoptera was the most sensitive (decrease of 71.4% in number of species from the 2000s through the 2080s) order, whereas Odonata benefited (increase of 66.7% in number of species from the 2000s through the 2080s) from the effects of global warming. The impact of global warming on stream insects was predicted to be minimal prior to the 2060s; however, by the 2080s, species extirpation of up to 20% in the highland areas and 2% in the lowland areas were predicted. The projected responses of stream insects under global warming indicated that species occupying specific habitats could undergo major reductions in habitat. Nevertheless, habitat of 33% of EOPT (including two-thirds of Odonata and one-third of Ephemeroptera, Plecoptera, and Trichoptera) was predicted to increase due to global warming. The community compositions predicted by generalized additive models varied over this century, and a large difference in community structure in the highland areas was predicted between the 2000s and the 2080s. However, stream insect communities, espe-

cially Odonata, Plecoptera, and Trichoptera, were predicted to become more homogenous under global warming." (Authors)] Address: Park, Y.-S., Department of Biology, Kyung Hee University, Seoul, Republic of Korea. E-mail: parkys@khu.ac.kr

**13868.** Li, X.j.; Zhang, Z.-h.; Liang, Y.-h.; Ren, L.-q.; Jie, M.; Yang, Z.-g. (2014): Antifatigue properties of dragonfly *Pantala flavescens* wings. *Microscopy Research and Technique* 77(5): 356-362. (in English) ["The wing of a dragonfly is thin and light, but can bear high frequent alternating stress and present excellent antifatigue properties. The surface morphology and microstructure of the wings of *P. flavescens* were observed using SEM in this study. Based on the biological analysis method, the configuration, morphology, and structure of the vein were studied, and the antifatigue properties of the wings were investigated. The analytical results indicated that the longitudinal veins, cross veins, and membrane of dragonfly wing form a optimized network morphology and spacially truss-like structure which can restrain the formation and propagation of the fatigue cracks. The veins with multilayer structure present high strength, flexibility, and toughness, which are beneficial to bear alternating load during the flight of dragonfly. Through tensile-tensile fatigue failure tests, the results were verified and indicate that the wings of dragonfly *P. flavescens* have excellent antifatigue properties which are the results of the biological coupling and synergistic effect of morphological and structural factors." (Authors)] Address: Zhang, Z.-h., Key Laboratory of Bionic Engineering (Ministry of Education, China), Jilin University, 5988 Renming Street, Changchun 130025, People's Republic of China. E-mail: zhzh@jlu.edu.cn

**13869.** Liang, B.; Sun, M. (2014): Dynamic flight stability of a hovering model dragonfly. *Journal of Theoretical Biology* 348: 100-112. (in English) ["•Hovering flight of the model dragonfly is inherently unstable. •The instability is caused by the horizontal-velocity/pitch-moment derivative. •Damping force and moment derivatives weaken the instability considerably. •Forewing/hindwing interaction has little effect on the stability properties. •High stroke-plane angles affect how stability derivatives are produced. The longitudinal dynamic flight stability of a model dragonfly at hovering flight is studied, using the method of computational fluid dynamics to compute the stability derivatives and the techniques of eigenvalue and eigenvector analysis for solving the equations of motion. Three natural modes of motion are identified for the hovering flight: one unstable oscillatory mode, one stable fast subsidence mode and one stable slow subsidence mode. The flight is dynamically unstable owing to the unstable oscillatory mode. The instability is caused by a pitch-moment derivative with respect to horizontal velocity. The damping force and moment derivatives (with respect to horizontal and vertical velocities and pitch-rotational velocity, respectively) weaken the instability considerably. The aerodynamic inter-

action between the forewing and the hindwing does not have significant effect on the stability properties. The dragonfly has similar stability derivatives, hence stability properties, to that of a one-wing-pair insect at normal hovering, but there are differences in how the derivatives are produced because of the highly inclined stroke plane of the dragonfly." (Authors)] Address: Sun, M., Ministry-of-Education Key Laboratory of Fluid Mechanics, Beijing University of Aeronautics & Astronautics, Beijing, China. E-mail: m.sun@buaa.edu.cn

**13870.** Lonkar, S.S.; Kedar, G.T. (2014): Macrozoobenthic diversity of three urban lakes of Nagpur, central India. *International Journal of Advanced Research* 2(4): 1082-1090. (in English) ["The present study was carried at three urban lakes of Nagpur City in Central India from September 2010 to August 2012 confirmed macrozoobenthic diversity of 30 species belonging to 4 different phylum, viz Platyhelminths, Annelida, Arthropoda, Mollusca. The most abundant species are observed in Phylum Arthropoda, Class Insecta as larvae, nymph and naids of the aquatic insects. The presence of species belonging to Phylum Mollusca are also more in number with the occurrence of Gastropoda and Pelecypoda. The occurrence of Phylum Annelida is prominent with class Oligochaeta and Hirudinea. The species belonging to Phylum Platyhelminths of class Turbellaria are least in study. The study suggests that the rich benthic fauna is due to the organic rich habitat in the three urban lakes of city." (Authors) Unspecified dragonfly zygopteran and anisopteran larvae are listed.] Address: Lonkar, S.S., Dept. of Zoology, Institute of Science, Nagpur-10, India

**13871.** Loureiro, N. (2014): Dragonflies and damselflies (Insecta: Odonata) collected during the Lindberg expedition to the Cape Verde Islands, 1953-54. *Zoologia Caboverdiana* 4(2) (2013): 43-48. (in English, with Portuguese summary) ["In this paper, 47 specimens of Odonata collected by H. Lindberg and his assistant S. Panelius in the Cape Verde Islands in 1953-1954 and identified by K.J. Valle and K.F. Buchholz, are presented. *Agriocnemis exilis*, collected in Boa Vista Island in February 1954, is added to the list of Odonata known from the archipelago. The collection also includes specimens from *Ischnura senegalensis* which was previously recorded in Cape Verde on only two occasions, in 1898 and 2000." (Author)] Address: Loureiro, N., Centre for Environmental Biology – ACD, Lisboa, and Universidade do Algarve, FCT, Campus de Gambelas, 8005-139 Faro, Portugal, E-mail: odonata@nsloureiro.pt

**13872.** Macias, S.; Dinning, J. (2014 ): Possible range expansion of *Coenagrion puella* (Azure Damselfly) in North-East Scotland. *J. Br. Dragonfly Society* 30(1): 9-16. (in English) ["The clear fell of a coniferous plantation near the Ley Pond at Crathes Castle, Aberdeenshire, in the winter of 2011/12 was followed by a survey of the Odonata populations at the pond, with the purpose of



understanding the progress of these populations after a significant change to an adjacent habitat. In the second year of the survey, individuals of *C. puella* were found for the first time and this is discussed in terms of range expansion of this species." (Authors)] Address: Macias, Sara, 1 Rangers Office, Crathes Castle, Banchory, AB31 5QJ 243 Gairn Terrace, Aberdeen, AB10 6AY, UK

**13873.** Mäkinen, J. (2014): Hämeen Sudenkorennot [The dragonflies of Häme]. *Crenata* 7: 14-39. (in Finnish, with English summary) ["Distribution maps are presented for all 51 dragonfly species observed in the provinces of Kanta-Häme and Pajät-Häme (together known as Häme) in South Finland. Records made before 1980 and after that are shown with different map symbols. Contrary to many other areas in Finland the dragonfly fauna of Häme has been intensively studied during the past decades, offering the opportunity to analyse data for possible changes in species abundance. Statistical analyses performed by Janne Koskinen revealed a statistically significant decline of four species whereas seven species show a positive trend. The declining species are *Lestes dryas*, *Coenagrion armatum*, *Gomphus vulgatissimus* and *Leucorrhinia dubia*. Increasing species are *Calopteryx splendens*, *Coenagrion pulchellum*, *Brachytron pratense*, *Epithea bimaculata*, *Somatochlora flavomaculata*, *Libellula depressa* and *Leucorrhinia pectoralis*. Reasons for decline remain unclear. Although *Coenagrion armatum* has declined in many European countries it is still classified as „least concern species“ in Finland. The majority of the increasing species are considered to be „southern species“ and their increase might be a result of a northward shift of their distribution due to climate change. Since 1979 not less than eight species have been found in Häme for the first time, most of which already breed in the area, at least occasionally." (Author)] Address: Mäkinen, J., Metsänhoitajankatu 12 B 16, FI-00790 Helsinki, Finland. E-mail: makisenjussi@gmail.com

**13874.** Malkmus, R. (2014): Zur Verbreitung von Amphibien, Reptilien und Libellen in den Ostalpen (5. Nachtrag).. *Nachrichten des Naturwissenschaftlichen Museums der Stadt Aschaffenburg* 110: 71-78. (in German, with English summary) [During 14 excursions (2006 - 2013) to eight alpine mountain ranges (Karwendel, Rofan, Dachstein Schladminger Tauern, Wölzer Tauern, Kitzbühler-, Tuxer- und Zillertaler Alpen) in the eastern Austrian Alps data on distribution and biology of amphibians, reptiles and dragonflies were registered. Dragonfly species recorded are: *Aeshna juncea*, *A. cyanea*, *A. caerulea*, *Enallagma cyathigerum*, *Coenagrion puella*, *Enallagma cyathigerum*, *Libellula quadrimaculata*, *Pyrhosoma nymphula*] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany

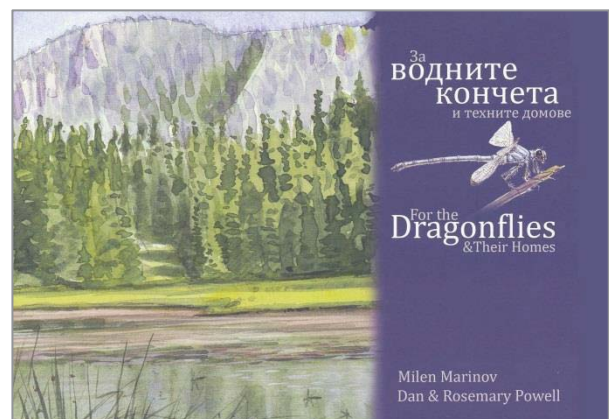
**13875.** Malkmus, R. (2014): Erstnachweis von *Cordulegaster bidentata* für den Odenwald. *Nachrichten des Naturwissenschaftlichen Museums der Stadt Aschaf-*

*fenburg* 110: 65-66. (in German, with English summary) [The occurrence of *C. bidentata* in the Odenwald mountains (Bayern, Germany) was registered for the first time: 26-V-2012, Dörnbachs s Breitenbuch (400 m a.s.l.)] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany

**13876.** Malkmus, R. (2014): Verbreitung der Gestreiften Quelljungfer (*Cordulegaster bidentata* Selys 1843) im Spessart. *Nachrichten des Naturwissenschaftlichen Museums der Stadt Aschaffenburg* 110: 57-64. (in German, with English summary) [Bayern, Germany. "The occurrence of *Cordulegaster bidentata* in the Spessart mountains was registered for the first time. The 56 sites were found in little spring brooks on a specific geological formation (diorite, gneiss, quartzite, micashist, "Bröckelschiefer") restricted to the northwestern part of the investigated area. Remarkable is the dominance of *C. bidentata* in this region over *C. boltonii* in this region – a species which is very common along brooks in the sandstone area." (Author)] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany

**13877.** Malkmus, R. (2014): Die Verbreitung der Zweigestreiften Quelljungfer *Cordulegaster boltonii* (Donovan, 1807) im Spessart. *Jahresberichte der Wetterauischen Gesellschaft für die gesamte Naturkunde* 163–164: 1-7. (in German, with English summary) ["The distribution of *C. boltonii* in the Spessart mountains (north western Bavaria) was researched between 2009 and 2012. 680 brooks were investigated, 309 larvae sites of the dragonfly could be registered in permanent Wowing brooks on different geological formations (sandstone, metamorphic rocks, basalt, eolian sand), except of shell-limestone. Except of some brook systems in the western and northern part, *C. boltonii* is not endangered in the investigated area." (Author)] Address: Malkmus, R., Schulstr. 4, D-98759 Wiesthal, Germany

**13878.** Marinov, M.; Powell, D.; Powell, R. (2014): For the Dragonflies and their homes. Bulgarian Biodiversity Foundation, ISBN: 978-954-9959-62-8 (Bilingual in Bulgarian and English)



**13879.** McLennan, M.R. (2014): Chimpanzee insectivory in the northern half of Uganda's Rift Valley: do Bulindi chimpanzees conform to a regional pattern?. *Primates* 55: 173-178. (in English) ["Insects are a nutritious food source for many primates. In chimpanzees, insectivory is most prevalent among communities that manufacture tools to harvest social insects, particularly ants and termites. In contrast to other long-term study sites, chimpanzees (*Pan troglodytes schweinfurthii*) in Budongo Forest and Kibale National Park, Uganda, rarely eat insects and have small foraging tool kits, supporting speculation that infrequent insectivory—technically aided or otherwise—characterises chimpanzees in this part of Uganda's Rift Valley. To expand the dataset for this region, insect foraging was investigated at Bulindi (25 km from Budongo) over 19 months during two studies in 2007–2008 and 2012–2013. Systematic faecal analysis demonstrated that insectivory is a habitual foraging activity at this site. Overall levels of insect consumption varied considerably across months but were not predicted by monthly changes in rainfall or fruit intake. Unlike their Budongo and Kibale counterparts, Bulindi chimpanzees often consume ants (principally weaver ants, *Oecophylla longinoda*) and use sticks to dig out stingless bee (*Meliponini*) ground nests. In other respects, however, insectivory at Bulindi conforms to the pattern observed elsewhere in this region: they do not manufacture 'fishing' or 'dipping' tools to harvest termites and aggressive or hard-to-access ants (e.g., army ants, *Dorylus* spp.), despite availability of suitable prey. The Bulindi data lend support to the supposition that chimpanzees in this part of the Rift Valley rarely exploit termites and *Dorylus* ants, apparently lacking the 'cultural knowledge' that would enable them to do so most efficiently (i.e., tool use). The study's findings contribute to current debates about the relative influence of genetics, environment and culture in shaping regional and local variability in *Pan* foraging ecology." (Author) The diet also includes a few Odonata.] Address: McLennan, M.R., Faculty of Humanities and Social Sciences, Anthropology Centre for Conservation, Environment and Development, Oxford Brookes University, Gipsy Lane Campus, Oxford OX3 0BP, UK. E-mail: mmclennan@brookes.ac.uk

**13880.** Mehdi, H.; Kumar Lakhera, B.; Kamboj, A. (2014): Numerical analysis of steady and unsteady flow for dragonfly wing section in gliding mode. *International Journal of Advanced Mechanical Engineering* 4(4): 365-370. (in English) ["A comprehensive numerical Analysis of Steady and Unsteady flow on the wing of Dragon fly *Aeshna cyanea* has been performed at ultra low Reynolds numbers 100, 200, 500 ,and 1000 with angle of attack 0°,5°,10°,12.5°,15° corresponding to the gliding flight of these dragon flies. The simulations employ an unstructured triangular mesh based on finite volume discretization. A critical assessment of the computed results was performed. The results give a satisfactory measure of confidence in the fidelity of the simulation."

(Authors)] Address: Mehdi, H., Department of Mechanical Engineering, MIT, Meerut, (U.P) 250002, India

**13881.** Mitra, A.; Dem, C.; Gyeltshen, K.; Dorji, L.; Kumar Puri, N.; Tshering, P.; Wangdi, P.; Acharya, P.; Namgyel, R.; Dorji,S.; Phuntsho, S.; Lhaden (2014): Odonata survey in Central and Western Bhutan covering eight Dzongkhags (Districts): An annotated species list with nine new records. *Journal of Entomology and Zoology Studies* 2(2): 11-15. (in English) ["122 specimens have been collected spreading to 46 species under 32 genera and 11 families from different parts of central and western Bhutan during August 13 to 23, 2013. *Agriocnemis clauseni*, *Ceriagrion* sp., *Himalagrion exclamationis*, *Platylestes praemorsus*, *Perisogomphus stenseni*, *Anax indicus*, *Brachydiplax sobrina*, *Neurothemis intermedia atalanta*, *Tramea basilaris* are the new records for Bhutan. Geographical position and collection details are provided for each species which are supplemented by abdominal length, hind wing length and some other identifying characters for the new records. After the present study a total of 84 species and subspecies of Odonata are known to occur in Bhutan." (Authors)] Address: Mitra, A., School of Life Sciences, Sherubtse College, Kanglung, Bhutan. E-mail: amitonodona@yahoo.com

**13882.** Monteiro-Júniora, C.S.; Juen, L.; Hamada, N. (2014): Effects of urbanization on stream habitats and associated adult dragonfly and damselfly communities in central Brazilian Amazonia. *Landscape and Urban Planning* 127: 28-40. (in English) ["Highlights: •In Amazonia, most damselfly species appear to favor preserved environments. •Urbanization affects Zygoptera more than Anisoptera. •Even sites with only a little riparian vegetation harbour their own Odonata fauna. •The community of adult dragonflies and damselflies can provide a good measure to classify environments. •Maintaining riparian vegetation is important for conserving aquatic biota. Abstract: Thirty streams, located in Manaus in the central part of Brazilian Amazonia, were examined to evaluate the correlations between environmental integrity and the local communities of adult dragonflies and damselflies. The presence of damselflies would have a positive correlation with environmental integrity, and dragonflies a negative one due to their contrasting ecophysiological requirements. The environmental integrity of each site was estimated based on the Habitat integrity index (HII), which was modified for this study in an urban area. The hypothesis that would be differences in assemblage composition between streams in differently urbanized areas was supported, possibly because most damselfly species are considered to be specialists that are found in pristine habitats, whereas dragonflies seem to be generalists and are likely to be found in disturbed environments. The ordination indicated systematic differences in community composition based on the degree of conservation of the environment, with the communities

found in well-preserved habitats being distinct from those found in intermediate and degraded ones. Differences in the composition of odonate communities reflect differences in the integrity of the environment, but they can also provide a measure of the intensity of impacts, thus contributing to the development of effective conservation strategies. In addition, the HII, which is applied rapidly and easily, provides environmental managers with an objective measure of the degree of alteration of aquatic habitats. Maintenance of forest cover along watercourses is clearly essential for the conservation of hydrological resources and the aquatic organisms that depend on these environments." (Authors)] Address: Monteiro-Júnior, C.S., Laboratório de Ecologia e Conservação, Universidade Federal do Pará, Instituto de Ciências Biológicas, Rua Augusto Correia, No. 1 Bairro Guama, CEP 66.075-110 Belém, Pará, Brazil. E-mail: csmonteirojr@gmail.com

**13883.** Müller, J. (2014): Rosmarie Steglich - herzliche Glückwünsche zur Vollendung des 70. Lebensjahres. *Entomologische Mitteilungen Sachsen-Anhalt* 22(1): 63-65. (in German) [Sachsen-Anhalt; Germany; the note includes biographic data and an updated list of publications starting 2003.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**13884.** Muzon, J.; del Palacio, A.; Ramos, L. (2014): *Ischnura ultima* Ris, 1908 (Odonata: Coenagrionidae): New records from southern South America. *Check List* 10(1): 187-188. (in English) ["*Ischnura ultima* Ris, 1908 is recorded for the first time from Buenos Aires Province, Argentina, 750 km southeast from the southernmost previous known localities (Córdoba Province). This finding supports a stronger biogeographical relationship between the southern hills of Buenos Aires (surrounded by the Pampas lowlands) and the Monte province. In addition, this record supports the odonate endemic areas scheme previously proposed for Argentina." (Authors)] Address: Muzón, J., Instituto de Limnología "Dr. R.A. Ringuelet" (CONICET-CCT La Plata), C.C. 712. 1900. La Plata, Argentina. E-mail: muzon@ilpla.edu.ar

**13885.** Na, Y.; Sun, C.; Li, T.; Li, Y. (2014): The Insect Oviposition Firstly Discovered on the Middle Jurassic Ginkgoales Leaf from Inner Mongolia, China. *Acta Geologica Sinica - English Edition* 88(1): 18-28. (in English) ["Although the evidence of insect oviposition on plant organs has been reported from the late Paleozoic to the Miocene, record from the middle Jurassic is still blank. This paper reports a significant evidence of insect oviposition on plant leaf from the middle Jurassic for the first time. The ovipositional scar is distributed on the abaxial surface of Sphenobaiera leaf (Ginkgoales) from the middle Jurassic Daohugou Formation of Inner Mongolia, China. A new ichnospecies *Paleoovoidus venustus* sp. nov. is described. The scar is elliptic to oval, ar-

ranged in longitudinal rows between leaf veins with almost regular distance, with its long axis paralleling to the leaf venation. This discovery adds new information to the morphology of insect endophytic oviposition probably produced by Odonata existed in a terrestrial ecosystem ~165 Ma ago. The new materials also provide important data for the study of insect reproductive biology, plant-insect interaction and coevolution, as well as understanding the paleoclimate and palaeoenvironment during that time in northeast China." (Authors)] Address: Sun, C., The Key Laboratory for Evolution of Past Life and Environment in Northeast Asia, Ministry of Education, Jilin University, Jilin, China. E-mail: cls5788@qq.com

**13886.** Nava-Bolaños, A.; Sánchez-Guillén, R.A.; Munguía-Steyer, R.; Córdoba-Aguilar, A. (2014): Isometric patterns for male genital allometry in four damselfly species. *Acta ethol.* 17: 47-52. (in English) ["Studies have found that insect genitalic traits show negative allometry, i.e., are relatively small in relation to body size. One interpretation of this is that males use their genitalia to stimulate females. Thus, given the nature of damselfly copulation in which males physically reach the rival sperm that females have stored from previous matings, male genitalic traits are not expected to show negative allometry. To test this idea, we assessed (a) the rival sperm displacement function by the mating male and (b) allometry of aedeagal length of four damselfly species (*Argia anceps*, *Argia tezpi*, *Argia extranea*, and *Enallagma praevarum*). Sperm displacement was assessed by inspecting whether the aedeagus reached the rival sperm during copulation in mating pairs for the four species. To have a standard for comparing allometric patterns, allometry of aedeagal was compared to that of two non-genital traits, tibial, and fourth abdominal segment length. In all cases, the aedeagus was found to reach the rival sperm which supports the idea that stimulation is not the mechanism for sperm displacement but physical displacement. Aedeagal length was isometric, and its slope was lower in general compared to that of tibial length and fourth abdominal segment. Given that this isometric pattern is not common for other odonate species, our interpretation of these varying aedeagal scaling patterns in this insect order is that males' and females' sexual interests are in conflict (males are evolving an elongated aedeagus to reach rival sperm while females are evolving unreachable sperm storage organs to prevent displacement of stored sperm). This sexual conflict scenario would favour varying scaling patterns for aedeagal length in odonates. A final interpretation is that the risk of interspecific matings in damselflies, may also explain different species-specific, aedeagal allometries." (Authors)] Address: Córdoba-Aguilar, A., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx



**13887.** Nel, A.; Azar, D.; Huang, D.-Y. (2014): A new Middle Jurassic Chinese fossil clarifies the systematic composition of the Heterophlebioptera (Odonata: Trigonoptera). *Alcheringa* 38(1): 130-134. (in English) ["Juraheterophlebia sinica, a new species of damselfly, is described from the Middle Jurassic of China. Its fore- and hind wings in connection to the body allows comparison of the type genera of the families Erichschmidtidae and Juraheterophlebiidae, respectively based on a forewing and a hind wing. Juraheterophlebiidae is a junior synonym of the Erichschmidtidae. The new fossil confirms the previous attributions of Erichschmidtia and Juraheterophlebia to the clade Heterophlebioptera." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**13888.** Nkalubo, W.; Chapman, L.; Muyodi, F. (2014): Feeding ecology of the intensively fished Nile Perch, *Lates niloticus*, in Lake Victoria, Uganda. *Aquatic Ecosystem Health & Management* 17(1): 62-69. (in English) ["The diet of Nile Perch (8.0–121.0 cm total length [TL]) from the Ugandan waters of Lake Victoria was quantified through stomach content analysis of specimens collected from experimental catches and fish factory samples. A total of 7824 stomachs (5602 from experimental fishing and 2222 from factory samples) were examined, of which 34.8% contained food. Fish from the experimental catches were smaller (8.0–41.6 cm TL) and had a higher diversity of prey dominated by unidentifiable fish prey, haplochromine cichlids, *Rastrineobola argentea*, Odonata and *Caridina nilotica*, while larger fish (30.0–121.0 cm TL) from the factory samples had a predominance of fish remains and haplochromine cichlids. Nile Perch that had a high proportion of fish prey (versus invertebrates) in their stomachs showed a larger size for a given age, and were in a better condition ( $K = 1.24$ ) than those that had primarily invertebrates ( $K = 1.10$ ) in their stomachs. Nile Perch exhibited a much smaller size (15 cm versus 30 cm TL) at shift to piscivory in comparison to Nile Perch examined in earlier studies, when haplochromines were rare in Lake Victoria. The recovery of haplochromine cichlids coincident with declining Nile Perch densities illustrates the importance of developing sustainable management options that can define a proper balance between fishing mortality and Nile Perch predation." (Authors)] Address: Nkalubo, Winnie, National Fisheries Resources Research Institute, P.O. Box 343, Jinja, Uganda

**13889.** Outomuro, D.; Rodríguez-Martínez, S.; Karlsson, A.; Johansson, F. (2014): Male wing shape differs between condition-dependent alternative reproductive tactics in territorial damselflies. *Animal Behaviour* 91: 1-7. (in English) ["Highlights: •We explored the role of wing morphology in territory-holding potential. •We studied three species of *Calopteryx* damselflies in natural populations. •Wing shape differed between territorial and nonterritorial tactics. •The pattern of variation was

similar in hindwings, but not in forewings. Territorial contests between males without weaponry are based on costly displays and can result in condition-dependent alternative reproductive tactics that maximize male fitness. Physiological and morphological traits such as fat content, body size or the expression of secondary sexual traits have been shown to contribute to male territory-holding potential. When territorial contests are based on flight displays, wing morphology is expected to contribute to the territory-holding potential of a male through its effects on flight performance. We explored whether wing shape contributed to the territory-holding potential of males of three species of *Calopteryx* damselflies. Males of these species show two distinct, condition-dependent behavioural tactics: territorial and nonterritorial. Previous studies have shown that territorial males have higher fitness than nonterritorial males. We used mark-recapture to determine male tactics within the populations and compared wing shape, size and wing coloured spot size (a secondary sexual trait) between tactics. Territorial males of all three species had shorter and slightly broader hindwings than nonterritorial males. In two species, forewings of territorial males were longer and broader than forewings of nonterritorial males. Wing size and wing spot size did not differ between tactics. We suggest that the wing shape of territorial males might confer better flight manoeuvrability, which would be advantageous for territorial contests. Therefore, wing shape is likely to be an important trait contributing to territory-holding potential in condition-dependent alternative reproductive tactics based on flight displays." (Authors)] Address: Outomuro, D., Department of Ecology and Genetics, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, 75236 Uppsala, Sweden. E-mail: outomuro.david@gmail.com

**13890.** Perveen, F.; Khan, A.; Rauf, S.A. (2014): Check list of first recorded dragonfly (Odonata: Anisoptera) fauna of District Lower Dir, Khyber Pakhtunkhwa, Pakistan. *Arthropods* 3(2): 120-126. (in English) [A collection of 318 dragonflies was made during May-July 2011 from district Lower Dir, Khyber Pakhtunkhwa, Pakistan including 11 species: *Cordulegaster brevistigma brevistigma*, *Onychogomphus bistrigatus*, *Rhodothemis rufa*; *Orthetrum cancellatum*; *O. pruinatum neglectum*; *O. triangulare*; *O. sabina*; *Diplacodes lefebvrei*; *D. trivialis*; *Sympetrum decoloratum*; *Pantala flavescens*.] Address: Perveen, Farzana, Dept of Zoology, Shaheed Benazir Bhutto Univ. (SBBU), Main Campus, Sheringal, Khyber Pakhtunkhwa, Pakistan. E-mail: farzanasan@hotmail.com

**13891.** Piersanti, S.; Frati, F.; Conti, E.; Gaino, E.; Rebori, M.; Salerno, G. (2014): First evidence of the use of olfaction in Odonata behaviour. *Journal of Insect Physiology* 62(1): 26-31. (in English) ["Highlights: •We tested the attractiveness of prey odour in *Ischnura elegans* by behavioural assays. •We recorded responses to prey odour from single olfactory neurons in *I. elegans*. •The adults of *I. elegans* were attracted by olfac-

tory cues emitted by prey. •Antennal olfactory sensilla of *I. elegans* showed excitatory responses to prey odour. •Antennal olfactory sensilla are involved in Odonata predation. Dragonflies and damselflies are among the most ancient winged insects. Adults belonging to this order are visually oriented and are considered anosmic on the basis of neuroanatomical investigations. As a consequence, the chemical ecology of these predatory insects has long been neglected. Morphological and electrophysiological data demonstrated that dragonfly antennae possess olfactory sensilla. Additionally, a neuroanatomical study revealed the presence of spherical knots in the aglomerular antennal lobe that could allow for the perception of odour. However, the biological role of the antennal olfactory sensilla remains unknown, and no bioassay showing the use of olfaction in Odonata has been performed thus far. Here, we demonstrate through behavioural assays that adults of *Ischnura elegans* are attracted by olfactory cues emitted by prey; furthermore, using electrophysiological single-cell recordings, we prove that the antennal olfactory sensilla of *I. elegans* respond to prey odour. Our results clearly demonstrate the involvement of antennal olfactory sensilla in Odonata predation, thus showing, for the first time, the use of olfaction in Odonata biology. This finding indicates that the nervous system of Odonata is able to receive and process olfactory information, suggesting that the simple organisation of the antennal lobe does not prevent the use of olfaction in insects." (Authors)] Address: Rebora, Manuela, Dipto di Chimica, Biologia e Biotecnologie, Univ. of Perugia, Via Elce di Sotto, 06123 Perugia, Italy. E-mail: rebora@unipg.it

**13892.** Popova, O.N.; Haritonov, A.Yu (2014): Mass reproductive wanderings of dragonflies of the genus *Sympetrum* (Odonata, Libellulidae). *Entomological Review* 94(1): 21-28. (in English) ["The results of observing mass flights of some dragonflies of the genus *Sympetrum* forming tandems are presented. These tandems always fly against the wind, some of them landing for oviposition and then joining the flight again. This variant of migration behaviour has been unexplained until now. A hypothesis is proposed according to which synchronous mass flights of dragonfly tandems facilitate the most uniform oviposition in all the suitable biotopes. The general direction of the flight depends on the wind. As the wind direction changes, the flight course of the tandems changes accordingly, so that the dragonflies cross the same territory several times, which leads to a denser and more uniform distribution of eggs. It is proposed to refer to this variant of flight as reproductive wanderings. Such a dispersal strategy can maintain the most uniform population density and a more stable abundance of some dragonfly species in the territories with unstable humidity." (Authors)] Address: Popova, Olga, Institute of Systematics and Ecology of Animals, Siberian Branch, Russian Academy of Sciences, Novosibirsk, 630091 Russia. E-mail: popova.olga.nik@gmail.com

**13893.** Powney, G.D.; Brooks, S.J.; Barwell, L.J.; Bowles, P.; Fitt, R.N.L.; Pavitt, A.; Spriggs, R.A.; Isaac, N.J. (2014): Morphological and geographical traits of the British Odonata. *Biodiversity Data Journal* 2: e1041: 12 pp. (in English) ["Trait data are fundamental for many aspects of ecological research, particularly for modeling species response to environmental change. We synthesised information from the literature (mainly field guides) and direct measurements from museum specimens, providing a comprehensive dataset of 26 attributes, covering the 43 resident species of Odonata in Britain. Traits included in this database range from morphological traits (e.g. body length) to attributes based on the distribution of the species (e.g. climatic restriction). We measured 11 morphometric traits from five adult males and five adult females per species. Using digital callipers, these measurements were taken from dry museum specimens, all of which were wild caught individuals. Repeated measures were also taken to estimate measurement error. The trait data are stored in an online repository (<https://github.com/BiologicalRecordsCentre/Odonatatraits>), alongside R code designed to give an overview of the morphometric data, and to combine the morphometric data to the single value per trait per species data." (Author)] Address: Powney, G.D., Centre for Ecology & Hydrology, Wallingford, UK. E-mail: gary.powney@ceh.ac.uk

**13894.** Rada, B.; Šantic, M. (2014): Community structure of aquatic insects in the karstic Jadro River in Croatia. *Journal of Insect Science*: Vol. 14 | Article 54 : 10 pp. (in English) ["This study focused on the aquatic insect community in the longitudinal gradient and temporal scales of the Jadro River. The river was sampled for a period of ten years (2000– 2010), four times per year through the various seasons, along the river course. Sampling stations were selected in the upper, middle, and downstream parts of the river. A total of 21,852 specimens of aquatic insects belonging to six orders were obtained. The species determination confirmed 27 different species in the river. The data were analyzed by the multivariate methodologies of correspondence analysis and cluster analysis (unweighted pair group method with arithmetic mean) using the similarity index of Morosita for all ten years. Canonical correspondence analysis was applied to the data to check which of the measured physicochemical variables significantly explained community variation. According to those data, significant variables for the upper station were water temperature and dissolved oxygen, and chlorides was the significant variable for the lower stations." (Authors) *Calopteryx virgo*, *Cordulegaster boltonii*] Address: Rada, B., University of Split, Faculty of Science, Department of Biology, Teslina 12/III, 21000 Split, Croatia, E-mail: radja@pmfst.hr

**13895.** Rangnekar, P.; Naik, R. (2014): Further additions to the Odonata (Insecta) fauna of Goa, India. *Journal of Threatened Taxa* 6(3): 5585-5589. (in Eng-

lish) [The authors surveyed various habitats (n=41), especially in forested areas, from August 2011 to July 2012 to document the odonate diversity. A total of 74 species were so far known from the State. In the present communication, an additional 13 species are documented: *Gynacantha dravida*, *Gomphidia kodaguensis*, *Merogomphus longistigma*, *Megalogomphus hanynngtoni*, *Onychothemis testacea*, *Urothemis signata*, *Zygonyx iris malabarica*, *Epopthalmia vittata*, *Archibasis oscillans*, *Ceriagrion rubiae*, *Pseudagrion rubriceps*, *Protosticta sanguinostigma*, *Caconeura ramburi*.] Address: Rangnekar, P., Building 4, S-3, Technopark, Chogm Road, Alto-Porvorim, Goa 403001, India. E-mail: paragrangnekar@yahoo.com

**13896.** Reboredo-Fernández, A.; Prado-Merini, O.; García-Bernadal, T.; Gómez-Couso, H.; Ares-Mazás, E. (2014): Benthic macroinvertebrate communities as aquatic bioindicators of contamination by *Giardia* and *Cryptosporidium*. *Parasitology Research* 113(5): 1625-1628. (in English) ["Benthic macroinvertebrates (community composed mostly by aquatic forms of insects, such as stonefly nymphs, dragonfly nymphs, water bugs or beetle larvae) are often used in biological monitoring programmes to evaluate the ecological status of rivers and thus to indicate the repercussions of anthropogenic activities. The aim of the present study was to evaluate the use of this indicator community to detect human enteroprotzoan parasites that are transmitted via water. In total, 32 samples of macroinvertebrates were collected, with the aid of surber nets of mesh size 500 µm, from nine rivers in Galicia (NW Spain), on different occasions between 2005 and 2009. The samples were homogenised (0.04 M phosphate buffered saline, pH 7.2), sieved (150 and 45 µm mesh), and concentrated (by a diphasic method). Aliquots of the sediments were then analysed by a direct immunofluorescence technique with monoclonal antibodies against *Giardia* and *Cryptosporidium*. *Giardia* cysts were detected in one (3.1 %) of the samples and *Cryptosporidium* oocysts were detected in four (12.5 %) of the samples. This work is the first study carried out to investigate the presence of *Giardia* and *Cryptosporidium* in this benthic community. The results demonstrate that benthic invertebrates could be used as bioindicators of contamination by these waterborne protozoans. Moreover, as this aquatic organisms act as intermittent accumulators and its monitoring enables chronological analysis of perturbations, in both the short- and mid-term, this may represent a suitable alternative or complementary method to the usual techniques of detecting human and animal enteropathogens in water samples." (Authors)] Address: Gómez-Couso, H., Lab. of Parasitology, Dept of Microbiology and Parasitology, Fac. Pharmacy, Univ. of Santiago de Compostela, Campus Vida, 15782, Santiago de Compostela, A Coruña, Spain. E-mail: hipolito.gomez@usc.es

**13897.** Renner, S.; Perico, E.; Sahlen, G. (2014): Dragonflies (Odonata) in Subtropical Atlantic Forest frag-

ments in Rio Grande do Sul, Brazil. *Scientia Plena* 9(1): 1-8. (in English, with Spanish summary) ["One of the most endangered ecosystems in America is the Atlantic Forest, which demands emergency actions to protect its remnants as well its biodiversity. In this situation the species inventory can develop a management role for the future, determining specific areas that should be preserved as well the species composition and richness can be used as an indicator of a healthy ecosystem. The use of dragonfly species composition has proven its potential indication of quality habitats. The Odonata species actually still poorly known in the Neotropical region and has never been used as a tool to analyze the actual conditions of aquatic environments particularly in the Subtropical Atlantic Forest, which occurs in south of Brazil. A systematic survey was carried out in aquatic systems located at remnants of forest from March 2011 to February 2012. A total of 565 specimens belonging to 34 species, distributed in 5 families were sampled. Libellulidae was dominant, with 14 species, followed by Coenagrionidae, Gomphidae, Lestidae and Aeshnidae. Through inventory survey we deepen the Odonata composition knowledge and performed a statistic analysis." (Authors)] Address: Renner, S., Ecologia e Sensoriamento Remoto, Centro Universitário Univates, 95900-000, Lajeado-RS, Brasil. E-mail: samuelrenner@hotmail.com

**13898.** Richter, R. (2014): Discovery of the damselfly *Austroagrion cyane* in Victoria. *Victorian Entomologist* 44(2): 38-40. (in English) ["*Austroagrion Tillyard, 1913* is a genus of small damselflies with four species known from Australia (Theischinger & Hawking 2006). *A. watsoni* Lieftinck, 1982 is the most widespread and abundant of these and well known from Victoria. *A. cyane* (Selys, 1876) is fairly common in south-west Western Australia with a few records from south-east South Australia. This article describes the range extension of *A. cyane* further east into south-west Victoria." (Author) 26 – 27 December, 2013, Long Swamp, Bay Coastal Park.] Address: Reiner Richter <http://rnr.id.au>

**13899.** Roberts, D. (2014): Mosquito larvae change their feeding behavior in response to kairomones from some predators. *Journal of Medical Entomology* 51(2): 368-374. (in English) ["The efficacy of using predators for the biological control of mosquito disease vectors will be reduced if mosquito larvae respond to predator presence. The larvae of two mosquito species were investigated to study whether they responded to predator kairomones by increasing surface filter-feeding, which is a less active and thus less risky feeding strategy than bottom feeding. *Culex quinquefasciatus* Say is normally found in highly polluted water, where it will have little contact with predators. Except for some third instars, its larvae showed no response to four different types of predators. *Culiseta longiareolata* Macquart, living in rain-filled rock pools, is frequently attacked by a range of predators. All instars tested (second, third, and fourth



instars) strongly responded to chemicals from dragonfly nymphs (*Crocothemis erythraea*), damselfly nymphs (*Ischnura evansi*), and the fish *Aphanius dispar* Ruppel. However, they did not respond to final-instar water scorpions (*Nepa cinerea* L.), which would not feed on the mosquito larvae. Second- and third-instar *Cs. longiareolata* produced the same response to chopped up mosquito larvae as they did to dragonfly nymphs, but fourth instars produced a significantly stronger response to dragonfly nymphs—both those unfed and those fed in situ. Thus, *Cs. longiareolata* not only identified different predators and responded accordingly, but also responded to conspecific alarm pheromones. *Cx quinquefasciatus* showed little response to predators or to alarm pheromones from damaged conspecific larvae." (Author)] Address: Roberts, D., Department of Biology, Sultan Qaboos University, PO Box 36, Al-Khod 123, Oman. E-mail: derekmr@squ.edu.om

**13900.** Rotvit, L.; Jacobsen, D. (2014): Egg development of Plecoptera, Ephemeroptera and Odonata along latitudinal gradients. *Ecological Entomology* 39: 177-185. (in English) [(1) Interest in the effect of temperature on ecophysiological processes is growing. Using published data, a meta-analysis was carried out on the influence of temperature on duration of egg development of the aquatic insect orders Plecoptera, Ephemeroptera and Odonata in relation to latitudinal compensation. The aim was to test the hypotheses on thermal adaptation and countergradient variation. (2) The orders showed considerable differences in the response to temperatures along latitudinal gradients. Duration of egg development in Ephemeroptera and Plecoptera was negatively related to latitude at 15, 20 and 25 °C, and 5, 15, and 20 °C, respectively. This is interpreted as compensation for short summer seasons at high latitudes, a result that is in line with the countergradient variation hypothesis. (3) In contrast, the results for Odonata supported neither the thermal adaptation nor the countergradient variation hypothesis. Odonate eggs from higher latitudes developed more slowly than those from lower latitudes at 20 and 25 °C. It is likely that the high-latitude odonates have more time for eggs to develop, despite the shorter season, because the potential time constraint that lies in producing more generations per year at lower latitudes may override the effect of seasonal constraints at higher latitudes.] Address: Jacobsen, D., Freshwater Biological Laboratory, Dept of Biology, Univ- of Copenhagen, Universitetsparken 4, 2100 Copenhagen, Denmark. E-mail: djacobsen@bio.ku.dk

**13901.** Schriever, T.A.; Cadotte, M.W.; Williams, D.D. (2014): How hydroperiod and species richness affect the balance of resource flows across aquatic-terrestrial habitats. *Aquatic Science* 76(1): 131-143. (in English) [Queen's Biological Station north of Kingston, Ontario, Canada (44.565977 N, -76.324223 W). "Ecosystem functioning is influenced by the flow of nutrients, detri-

tus, and organisms. Variation in these flows, like that found in temporary ecosystems, affects temporal and spatial patterns of community diversity and secondary production. We evaluated the influence of hydroperiod and ecosystem size on the bi-directional flow of subsidies from intermittent ponds and surrounding forests by quantifying litter deposition and the abundance and biomass of emerging insects and amphibians. In addition, we assessed whether amphibian and insect diversity influenced the magnitude of cross-habitat resource flux. We found substantial spatial and temporal variation in the magnitude, composition, and timing of cross-habitat resource subsidies. Overall, deposition into ponds far exceeded biomass exported via insect and amphibian emergence. We found a negative association between resource flux and the diversity of amphibians and insects. Different species groups contributed to flux patterns unequally, with insects having higher diversity but lower flux compared to amphibians. Organismal flux varied among ponds with amphibians having the highest flux in the shortest hydroperiod pond and insect flux was highest from an intermediate hydroperiod pond. This work reveals how variation in pond size and permanence affects species diversity and ecosystem flows. Species composition played a major role in flux differences across ponds. Further, given the general lack of research and conservation prioritization of temporary ponds, uncovering how these ponds contribute to cross-habitat linkages is necessary to develop fully integrated management strategies." (Authors) Taxa are specified at the family level and include Coenagrionidae, Lestidae, and Libellulidae] Address: Schriever, Tiffany, Department of Zoology, Cordley Hall 3029, Oregon State University, Corvallis, OR 97331-2914, USA. E-mail: tiffany.schriever@gmail.com

**13902.** Seehausen, M.; Hämäläinen, M.; Wasscher, M.T. (2014): Edmond de Selys Longchamps' odonatological swansong – »Xanthagrion« species from Chatham Island and other notes on Odonata specimens from Hawaii and New Zealand in the Übersee-Museum in Bremen. *Notulae odonatologicae* 8(3): 41-49. (in English) ["A small Odonata collection from Hawaii and New Zealand in the Übersee-Museum Bremen is discussed. This collection is of historical interest, since it includes the last specimens identified by Edmond de Selys Longchamps. On 25 November 1900, just two weeks before his death, Selys produced watercolour drawings of an undescribed »Xanthagrion « species from Chatham Island based on this material." (Authors)]

**13903.** Skvortsov, V.E.; Snegovaya, N. Yu. (2014): Additions to the knowledge of the Odonata fauna of Azerbaijan, with six new records. *Notulae odonatologicae* 8(3): 67-76. (in English) ["Thirty-two species collected during 2012 from Azerbaijan are listed, three further species were identified from photographs taken in 2008. Of the resulting 35 species, six species were new for the country, the record of *Cordulegaster vanbrinkae*

being the third locality in the world." (Authors)] Address: Snegovaya, Nataly, Zoological Institute NAS of Azerbaijan, proezd 1128, kvartal 504, Baku, AZ 1073, Azerbaijan. E-mail: snegovaya@yahoo.com

**13904.** Śniegula, S.; Drobniak, S.M.; Gołab, M.J.; Johansson, F. (2014): Photoperiod and variation in life history traits in core and peripheral. *Ecological Entomology* 39: 137-148. (in English) ["(1) In order to predict evolutionary responses to environmental changes one needs to identify the evolutionary potential in terms of genetic variation of traits and of the traits' plasticity. We studied genetic variance in life history traits and their reaction norms in response to manipulated photoperiods in central, northern, and northernmost peripheral populations of *L. sponsa*. After the central-marginal hypothesis, it is predicted that central populations will express the highest genetic variance. (2) Northern and northernmost populations showed the highest development and growth rates. All populations expressed shorter development and accelerated growth when raised in a northern compared with a central latitude photoperiod. The slopes of reaction norms differed between regions resulting in a region-by-photoperiod interaction. (3) There was genetic variation in development time; however, it did not differ across regions. There was no genetic variation in growth rate or in the plasticity of development time and growth rate to photoperiod. (4) Results did not support the central-marginal hypothesis. However, evidence was found that the development time has the potential to evolve at similar rates across study regions. In contrast, the growth rate seems to be genetically constrained for further evolution, probably because of a strong past directional selection on this trait. The presence of low genetic variation in the slope of the reaction norms could be a result of stabilising selection imposed by seasonality." (Authors)] Address: Śniegula, S., Institute of Nature Conservation, Polish Academy of Sciences, al. Mickiewicza 33, 31-120 Kraków, Poland. E-mail: szymon.sniegula@gmail.com

**13905.** Suhling, F.; Müller, O.; Martens, A. (2014): The dragonfly larvae of Namibia (Odonata). *Libellula Supplement* 13: 5-106. (in English, with German summary) ["We present an illustrated key to the exuviae and final stadium larvae of the dragonflies of Namibia. We have also included some taxa from neighbouring areas, which have not been recorded in Namibia yet. The key is therefore applicable also in southern Angola, most of Botswana and the Northern Cape province of South Africa. It includes identification characters of taxa hitherto undescribed, viz. *Lestes pallidus*, *Pseudagrion deningi*, *P. rufostigma*, *Ictinogomphus dundoensis*, *Crenigomphus cornutus*, *C. kavangoensis*, *C. hartmanni*, *Paragomphus cataractae*, *P. elpidius*, *P. sabcicus*, *Mastigomphus dissimilis*, *Anax bangweuluensis*, and *Phyl-lomacromia overlaeti*, and for the first time keys for some widespread African species pairs, such as *Tramea basilaris* and *T. limbata*, and *Zygonyx torridus* and

*Z. natalensis*. However, the larvae of many species and even four out of 50 genera occurring in Namibia are still unknown. Therefore, this key remains preliminary." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**13906.** Suhling, F.; Martens, A. (2014): Distribution maps and checklist of Namibian Odonata. *Libellula Supplement* 13: 107-175. (in English, with German summary) ["This paper presents a checklist of the Odonata of Namibia and provides up-to-date distribution maps of 130 species. Compared with the checklist from 2007, five species have been added to the list, four of them were new for science. Two species were omitted." (Authors)] Address: Suhling, F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**13907.** Suhonen, J.; Korkeamäki, E.; Salmela, J.; Kuitunen, M. (2014): Risk of local extinction of Odonata freshwater habitat generalists and specialists. *Conservation Biology* 28(3): 783-789. (in English) ["Understanding the risk of a local extinction in a single population relative to the habitat requirements of a species is important in both theoretical and applied ecology. Local extinction risk depends on several factors, such as habitat requirements, range size of species, and habitat quality. We studied the local extinctions among 31 dragonfly and damselfly species from 1930 to 1975 and from 1995 to 2003 in Central Finland. We tested whether habitat specialists had a higher local extinction rate than generalist species. Approximately 30% of the local dragonfly and damselfly populations were extirpated during the 2 study periods. The size of the geographical range of the species was negatively related to extinction rate of the local populations. In contrast to our prediction, the specialist species had lower local extinction rates than the generalist species, probably because generalist species occurred in both low- and high-quality habitat. Our results are consistent with source-sink theory." (Authors)] Address: Suhonen, J., Section of Ecology, Department of Biology, University of Turku, FI-20014, Turku, Finland. E-mail juksuh@utu.fi

**13908.** Sushko, G.G. (2014): The zoogeographic composition of the insect fauna (Odonata, Coleoptera, Macrolepidoptera) in the raised bogs of the Belarusian Lakeland. *Entomological Review* 94(1): 40-48. (in English) ["The zoogeographic composition of insects in the raised bogs of the Belarusian Lakeland was investigated. The boundaries of this region coincide with those of the last glaciation and the distribution of raised bogs on the East European Plain. By the example of three model groups (Odonata, Coleoptera, and Macrolepidoptera) it was found that the insect fauna complexes in the bogs of the Belarusian Lakeland had a typical boreal pattern with prevalence of species with Euro-Siberian ranges, and also included large fractions of species

with Circumboreal and Circum-Arctoboreal ranges. The environmental conditions of bogs in the temperate zone of Europe facilitate the southward expansion of many cold-adapted species." (Authors) Original Russian Text © G.G. Sushko, 2013, published in *Entomologicheskoe Obozrenie*, 2013, Vol. 92, No. 3, pp. 493–504.] Address: Sushko, G.G., Vitebsk State University named after P.M. Masherov, Vitebsk, Republic of Belarus. E-mail: gennadis@rambler.ru

**13909.** Swaegers, J.; Mergeay, J.; Therry, L.; Bonte, D.; Larmuseau, M.H.D.; Stoks, R. (2014): Unravelling the effects of contemporary and historical range expansion on the distribution of genetic diversity in the damselfly *Coenagrion scitulum*. *Journal of evolutionary biology* 27(4): 748-759. (in English) ["Although genetic diversity provides the basic substrate for evolution, there are a limited number of studies that assess the impact of recent climate change on intraspecific genetic variation. This study aims to unravel the degree to which historical and contemporary factors shape genetic diversity and structure across a large part of the range of the range-expanding *C. scitulum*. A total of 525 individuals from 31 populations were genotyped at nine microsatellites, and a subset was sequenced at two mitochondrial genes. We inferred the importance of geography, environmental factors, and recent range expansion on genetic diversity and structure. Genetic diversity decreased going westwards, suggesting a signature of historical post-glacial expansion from east to west and the presence of eastern refugia. Although genetic differentiation decreased going northwards, it increased in the northern edge populations, suggesting a role of contemporary range expansion on the genetic make-up of populations. The phylogeographical context was proven to be essential in understanding and identifying the genetic signatures of local contemporary processes. Within this framework, our results highlight that recent range expansion of a good disperser can decrease genetic diversity and increase genetic differentiation which should be considered when devising suitable conservation strategies." (Authors) Address: Swaegers, J., Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Deberiotstraat 32, 3000 Leuven, Belgium. E-mail: Janne.Swaegers@bio.kuleuven.be

**13910.** Tabugo, S.R.M.; Torres, M.A.J.; Gorospe, J.G.; Amparado, R.F.; Demayo, C.G. (2014): Integrative approach in describing *Neurothemis* species using correlation analysis based on distances. *European Journal of Zoological Research* 3(1): 19-31. (in English) ["Describing species variation and delineation are fundamental to biology and much debate exists surrounding on what applied approach is appropriate. Species delineation now used separate elaborate datasets to quantify independently and test species criteria. However, the complexity of the speciation process has ushered the need to infuse studies with new tools and techniques capable of aiding in species delineation. Herewith, an integrative

approach using Correlation Analysis based on Distances was used to circumvent the traditional morphological analysis and provide a novel means of describing closely related complex species (sibling species) diversity using the genus *Neurothemis* as a case study. Correlation Analysis based on distances proved to be useful by looking into the relative contribution of each trait considered to species/group divergence and distinctiveness. Results demonstrate noted differences between female and male morphs. On one hand, females exhibited female-limited polymorphism which was suggested to have possibly evolved throughout sexual selection. On the other hand, polymorphism being limited to males mostly plays a role in male-male competition for access to females. Differences were attributed mainly by external morphological wing characters such as the fore-wing triangle, hind wing triangle, the radial planate, fore-wing subtriangle, number of anal loop 'sole cells', hind wing supertriangle, number of cross veins in the cubital space of the hind wing (behind the median space), wing pigmentation, shape of synthorax, shape of epiproct and shape of left and right cerci. Here, the utilization of a number of characters for species delineation proved to be effective in understanding variation and the nature of the *Neurothemis* species found in Iligan City." (Authors)] Address: Tabugo, Sharon Rose M., Department of Biological Sciences, College of Science and Mathematics, MSU-Iligan Institute of Technology, Iligan City, Philippines

**13911.** Takahashi, Y.; Nagata, N.; Kawata, M. (2014): Antagonistic selection factors induce a continuous population divergence in a polymorphism. *Heredity* 112(4): 391-398. (in English) ["Understanding the relative importance of selection and stochastic factors in population divergence of adaptive traits is a classical topic in evolutionary biology. However, it is difficult to separate these factors and detect the effects of selection when two or more contrasting selective factors are simultaneously acting on a single locus. In *I. senegalensis*, females exhibit colour dimorphism and morph frequencies change geographically. We here evaluated the role of selection and stochastic factors in population divergence of morph frequencies by comparing the divergences in colour locus and neutral loci. Comparisons between population pairwise  $F_{ST}$  for neutral loci and for the colour locus did not detect any stochastic factors affecting colour locus. Although comparison between population divergence in colour and neutral loci using all populations detected only divergent selection, we detected two antagonistic selective factors acting on the colour locus, that is, balancing and divergent selection, when considering geographical distance between populations. Our results suggest that a combination of two antagonistic selective factors, rather than stochastic factors, establishes the geographic cline in morph frequency in this system." (Authors)] Address: Takahashi, Yuma, Division of Ecology and Evolutionary Biology, Graduate School of Life Sciences, Tohoku University,



Aoba, Sendai, Miyagi 890–8578, Japan. E-mail: takahashi.yum@gmail.com

**13912.** Therry, L.; Lefevre, E.; Bonte, D.; Stoks, R. (2014): Increased activity and growth rate in the non-dispersive aquatic larval stage of a damselfly at an expanding range edge. *Freshwater Biology*: 1266-1277. (in English) ["While evolutionary changes in adult traits during range expansion have been recorded in many species, similar changes in the non-dispersive larval stage have only rarely been documented. Increased activity in the non-dispersive larval stage is an important ecologically relevant trait in aquatic communities that may be expected to evolve in the edge populations (i) as a result of the combination of spatial sorting in dispersal-related adult activity and a coupling between adult and larval behaviour and (ii) to meet higher energy demands to allow higher growth rates and a higher investment in costly dispersal-related traits. We specifically address whether activity is higher in the larval non-dispersive aquatic stage at an expanding range front by comparing larvae of replicated core and edge populations of the *Coenagrion scitulum* in three common garden experiments where larvae were reared from the egg stage. As expected, activity in the non-dispersive larval stage was consistently higher in the edge populations. Although changes in larval activity probably have consequences for ecological interactions, the higher activity was not associated with increased predation rates by dragonfly larvae, potentially because of associated compensatory changes in other antipredator mechanisms. We documented one of the few cases of a positive coupling of activity in the larval and adult stages. Yet, contrary to larval activity, adult activity did not differ between core and edge populations. This indicates that the higher larval activity we documented is not shaped by a coupling with adult activity. Instead, our results are consistent with the hypothesis that a higher energy need in edge populations shaped the higher larval activity. Edge larvae showed a higher growth rate which is expected to evolve at the initial low population densities in newly founded edge populations. Moreover, higher growth rate showed the expected positive covariation with larval activity. Increases in activity in the non-dispersive stage in edge populations at an expansion front should be included in the ongoing debate whether evolutionary changes at invasion fronts are driven by adaptive versus non-adaptive evolution. Moreover, they may have the potential to affect ecological interactions at expanding range fronts" (Authors).] Address: Therry, L., Laboratory of Aquatic Ecology, Evolution and Conservation, K.U. Leuven, Charles Deberiotstraat 32, B-3000 Leuven, Belgium. E-mail: Lieven.Therry@bio.ku-leuven.be

**13913.** Tsuchiya, K.; Hayashi, F. (2014): Left-handed sperm removal by male *Calopteryx damselflies* (Odonata). *SpringerPlus* 2014, 3:144 doi:10.1186/2193-1801-3-144: 12 pp. (in English) ["Male genitalia in several in-

sect species are asymmetry in right and left shape. However, the function of such asymmetric male genitalia is still unclear. We found that the male genitalia of *Calopteryx cornelia* are morphologically symmetric just after emergence but asymmetric after reproductive maturation. Males remove rival sperm stored in the female bursa copulatrix (single spherical sac) and the following spermatheca (Y-shaped tubular sac) prior to their own ejaculation to prevent sperm competition. Males possess the aedeagus with a recurved head to remove bursal sperm and a pair of spiny lateral processes to remove spermathecal sperm. The right lateral process is less developed than the left, and sperm stored in the right spermathecal tube are rarely removed. Experiments involving surgical cutting of each lateral process demonstrated that only the left process functions in spermathecal sperm removal. Thus, males of *C. cornelia* are left-handed in their sperm removal behaviour at copulation." (Authors)] Address: Tsuchiya, K., Department of Biology, Tokyo Metropolitan University, Minamiosawa 1-1, Hachioji, Tokyo 192-0397, Japan. E-mail: tsuchiya.suzuki.kaori@gmail.com

**13914.** Tuomisto, H.; Karjalainen, S. (2014): Suojelus-*Etelä-Pohjanmaalle Suomen sudenkorentoseuran tuella* [Implementation of a bog reserve in Southern Ostrobothnia province]. *Crenata* 7: 42. (in Finnish) [In 2010 the Finnish Dragonfly Society started a fund raising project to buy up a bog to establish a nature reserve especially for dragonflies (see Mäkinen 2010 in OAS 30). In cooperation with The Finnish Association for Nature Conservation (FANC) (Suomen luonnonsuojeluliitto) and a foundation for nature conservation (Luonnonperintösäätiö) in 2014 the project has been implemented successfully and 37 hectares of a bog in Alajärvi municipality are now protected (Asmus Schröter).] Address: Karjalainen, S., Tyrskykuja 3 B 15, FIN-02320 Espoo, Finland. E-mail: sk@korento.net

**13915.** Vašek, M.; Všetíčková, L.; Roche, K.; Jurajda, P. (2014): Diet of two invading gobiid species (*Proterorhinus semilunaris* and *Neogobius melanostomus*) during the breeding and hatching season: No field evidence of extensive predation on fish eggs and fry. *Limnologica - Ecology and Management of Inland Waters* 46: 31-36. (in English) ["One of the potential impacts of invasive gobies on native fish fauna is predation on eggs and fry. Therefore, the diet composition of two invading gobiid species, the tubenose goby *Proterorhinus semilunaris* and round goby *Neogobius melanostomus*, was examined in the Dyje river system (Danube basin, Central Europe, near Breclav, Czech Republic) during the 2011 reproductive season to ascertain the extent of gobiid predation on heterospecific and conspecific eggs and juveniles. Consumption of fish eggs and juveniles by invading gobies was very low. The diets of both species consisted largely of benthic macroinvertebrates, and particularly insect larvae. These results indicate that invading gobies in the Dyje river system are likely

to impact native fish fauna more through competitive effects than through direct predation on eggs and juveniles." (Authors) Odonata larvae are given as prey item of gobiid species. No quantitative estimates on the preyed larvae were provided] Address: Vašek, M., Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, v.v.i., Na Sádkách 7, 370 05 České Budějovice, Czech Republic. E-mail: [mojmir.vasek@seznam.cz](mailto:mojmir.vasek@seznam.cz)

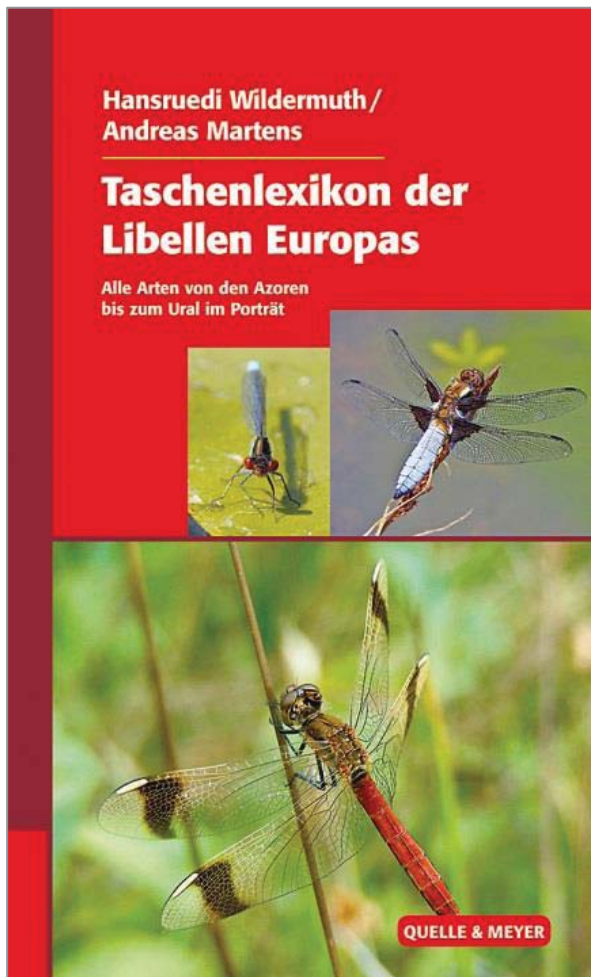
**13916.** Vivas Santelíz, J.J. (2014): Primer registro de *Rhionaeschna psilus* (Calvert, 1947) (Odonata: Aeshnidae) para el Estado Zulia, Venezuela. *Entomotropica* 29(1): 49-51. (in Spanish, with English summary) ["*R. psilus* is recorded for the first time from Zulia State. The specimens were captured in one of the tributaries of Negro river (500 m) close before to the village of Shirimi, and at the Kunana Lagoon (1110 m a.s.l.) in the Sierra de Perijá National Park. A short description of the external morphology, and data on biological and ethological aspects, as well as a note on general distribution are given." (Author)] Address: Vivas-Santelíz, J.J., Laboratorio de Zoología de Invertebrados, Universidad del Zulia, Facultad Experimental de Ciencias, Departamento de Biología, Venezuela. E-mail: [Jonjvs1@gmail.com](mailto:Jonjvs1@gmail.com)

**13917.** Wang, L.; Zhong, Z. (2014): Dynamics of the dragonfly wings raised by blood circulation. *Acta Mechanica* 225(4-5): 1471-1485. (in English) ["We investigate how the blood flow in the veins in the flapping wings of a dragonfly affects their dynamic response. An idealized model of an elastic tube conveying fluid and rotating around a fixed axis is adopted in this study, based on which governing partial differential equations of motion are obtained by invoking the extended Hamilton's principle. Separation of variables techniques and assumed modes method are employed to solve the resulting equations, and the stabilization analysis is performed to assess the stability of the system. In particular, the coupling effects of tube rotation, deformation, and the movement of the fluid inside are evaluated under different flow rates and rotation speeds. This demonstrates that if the blood in the dragonfly wings flows from humeral angle distally to the wing apex, a stabilization effect can be obtained, and the higher the blood flow rate is, the faster the system will be stabilized. Contrary cases are also studied for further validation of the model." (Authors)] Address: Zhong, Z., School of Aerospace Engineering and Applied Mechanics, Tongji University, Shanghai, 200092, People's Republic of China. E-mail: [zhongk@tongji.edu.cn](mailto:zhongk@tongji.edu.cn)

**13918.** Warren, R.W.; Hall, D.B.; Greger, P.D. (2014): Radionuclides in bats using a contaminated pond on the Nevada National Security Site, USA. *Journal of Environmental Radioactivity* 129: 86-93. (in English) [Nevada, USA; "Highlights: •Bats uptake radionuclides from a contaminated pond. •Tritium had highest concentrations but <sup>137</sup>Cs gave highest dose. •Tritium concentra-

tions in bats are approximately one-twentieth of that in the pond. •Population level effects are not expected based on RESRAD-Biota dose estimates. • It may be more appropriate to model the bats as riparian animals in RESRAD-Biota. Perched groundwater percolating through radionuclide contamination in the E Tunnel Complex on the Nevada National Security Site, formerly the Nevada Test Site, emerges and is stored in a series of ponds making it available to wildlife, including bats. Since many bat species using the ponds are considered sensitive or protected/regulated and little information is available on dose to bats from radioactive water sources, bats were sampled to determine if the dose they were receiving exceeded the United States Department of Energy dose limit of 1.0E-3 Gy/day. Radionuclide concentrations in water, sediment, and flying insects were also measured as input parameters to the dose rate model and to examine trophic level relationships. The RESRAD-Biota model was used to calculate dose rates to bats using different screening levels. Efficacy of RESRAD-Biota and suggested improvements are discussed. Dose to bats foraging and drinking at these ponds is well below the dose limit set to protect terrestrial biota populations." (Authors) Seven insect orders were sampled at or near a pond where bats were supposed to hunt for insects. Odonata were represented and obviously contaminated with anthropogen created radionuclides. However, there was not a direct evidence for bats preying on dragonflies, but only the assumption that Odonata may count to the diet of bats. Contamination of the aggregate "flying insects" with <sup>137</sup>Cs, <sup>239/240</sup>Pu, and <sup>241</sup>Am is documented in table 5: "it is plausible that the insects are the dominant source of americium in bats. Early life stages of certain sampled insects (e.g. of the orders Odonata, Diptera, and Neuroptera) are aquatic with potential to have a high amount of contact with pond sediment. The level of contact with sediment has been shown to be an important factor determining the relative concentrations of actinides in aquatic and emergent insects."] Address: Warren, R.W., National Security Technologies, LLC, 2621 Losee Rd., North Las Vegas, NV 89030-4129, USA. E-mail: [warrenrw@nv.doe.gov](mailto:warrenrw@nv.doe.gov)

**13919.** Wildermuth, H.; Martens, A. (2014): Taschenlexikon der Libellen Europas. Alle Arten von den Azoren bis zum Ural. Quelle & Meyer Verlag Wiebelsheim. 824 pp. (in German) ["The Taschenlexikon der Libellen Europas contains brilliant and informative photos of dragonfly species both native to Europe and the sporadic invasive species, and portrays their biology in detail. In addition to the explanation of names, the current state of knowledge is summarized for each type in a compact form in this portable book. This pocket guide is aimed at experts that have been observing dragonflies for a longer time and wish to have more information on all species occurring in Europe and their way of life than is available in current identification guides." (Publisher)]



**13920.** Wildermuth, H. (2014): Perching behaviour in *Lindenia tetraphylla* – a distinctive feature among European Clubtails (Odonata: Gomphidae). *Notulae odontologicae* 8(3): 56-66. (in English) ["Based on photographic documents and compared to the corresponding behavioural elements in all remaining European Gomphidae, the perching behaviour of individuals and copulating pairs of *L. tetraphylla* was studied. *L. tetraphylla* perches preferentially on thin, exposed plant parts using only the middle and hind legs to fix the body. This is in contrast to all other members of the European gomphids, which use all six legs in these situations. The horizontal position and the compact wheel form of the copulating pair constitute a further peculiarity of *L. tetraphylla*. These specific behavioural elements are discussed in respect to their functional and phylogenetic relevance." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**13921.** Williamson, J. (2014): Proposed determination: *Austropetalia tonyana* - Alpine Redspot Dragonfly as a vulnerable species. Fisheries Scientific Committee Ref. No. PD57, File No. FSC14/01: 5 pp. (in English) ["The Fisheries Scientific Committee, established under Part 7A of the Fisheries Management Act 1994 (the Act), is proposing to list *Austropetalia tonyana* - the Alpine Redspot Dragonfly, as a VULNERABLE SPECIES in

Part 1 of Schedule 5 of the Act. The listing of Vulnerable Species is provided for by Part 7A, Division 2 of the Act." (Author)] Address: Williamson, Jane, NSW Dept of Primary Industries – PO Box 1305 CROWS NEST NSW 1585, Australia. Email: fsc@dpi.nsw.gov.au

**13922.** Worthen, W.B.; Phillips, C.C. (2014): Are community patterns in flight height driven by antagonistic interactions? *International Journal of Odonatology* 17(1): 7-16. (in English) ["Large libellulid dragonflies often fly higher than smaller libellulids. We hypothesized that this size-related pattern in flight height might be caused by aggressive displacement. We tested this hypothesis by using a 30 m "dragonfly zip-line" to reel dead dragonfly decoys of four species of different sizes (*Erythemis simplicicollis*, *Libellula incesta*, *Pachydiplax longipennis*, and *Perithemis tenera*) along a shoreline at four different heights (20, 60, 100, and 140 cm), counting the number of investigations made by large patrolling *Libellula incesta* and *Libellula luctuosa* males. We hypothesized that decoys of smaller species would be investigated and attacked at higher frequency when they were reeled high, in the *Libellula* flight zone, than when they were reeled at their natural low height. This hypothesis was falsified; both *L. incesta* and *L. luctuosa* investigated high-flying decoys significantly less frequently than low-flying decoys. *Perithemis tenera* decoys were investigated less frequently than other decoys by both species, but *L. incesta* investigated *E. simplicicollis*, *P. longipennis*, and *L. luctuosa* decoys with increasing frequency whereas *L. luctuosa* investigated these three species at equal rates. These patterns correlate with the degree of morphological similarity between patrolling species and decoys, consistent with likely patterns of "mistaken identity" by patrolling *L. incesta* and *L. luctuosa* males. We suggest that patrolling males may preferentially investigate other low-flying males in the hopes of finding a mate-guarded female." (Authors)] Address: Worthen, W.B., Dept of Biology, Furman Univ., Greenville, SC 29613, USA. E-mail: wade.worthen@furman.edu

**13923.** Wouda, H. (2014): Fifteen years of monitoring odonata in the Leemputten and Verbrande bos areas. *Brachytron* 16(1/2): 29-37. (in Dutch, with English summary) ["De Leemputten (Ermelo) and Verbrande bos (Geldersch Landschap & Kasteelen Foundation) together form a single ecological unit. The area is considered one of the most valuable nature conservation areas in the Dutch province of Gelderland in a botanical and faunistic sense. It has a broad diversity of water habitats, offering a home to many species of Odonata. In fifteen years of monitoring, 40 different species were observed. Dragonflies are used as water quality indicator species for the area." (Author)] Address: Wouda, H., Lange Haeg 133, 3853 EG Ermelo, The Netherlands. E-mail: h.wouda5@chello.nl

**13924.** Xu, Q.; Zhang, H. (2014): Description of the final stadium larva of *Periaeschna zhangzhouensis* Xu,



with discussion of taxonomic characters of the larvae of the genus *Periaeschna* Martin (Odonata: Aeshnidae). International Journal of Odonatology 17: 53-58. (in English) ["The final stadium larva of *P. zhangzhouensis* is described and illustrated for the first time. The taxonomic characters of the larvae of the genus *Periaeschna* Martin are discussed and summarized." (Authors)] Address: Xu, Q., State Key Laboratory of Freshwater Ecology and Biotechnology, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan 430072, PR China. E-mail: qhx-363000@gmail.com

**13925.** Yue, X.D.; Miao, D.Q.; Cao, L.B.; Wu, Q.; Chen, Y.F. (2014): An efficient color quantization based on generic roughness measure. Pattern Recognition 47(4): 1777-1789. (in English) ["Author-Highlights: • Propose an efficient two-stage color quantization framework. • Applies the quantization in a precisely compressed colour space. • Propose the generic roughness measure for precise colour space compression. • Propose the algorithms of roughness thresholding and weighted Rough K-means. • Experimental results validate the high efficiency of the proposed method. Colour quantization is a process to compress image colour space while minimizing visual distortion. The quantization based on preclustering has low computational complexity but cannot guarantee quantization precision. The quantization based on postclustering can produce high quality quantization results. However, it has to traverse image pixels iteratively and suffers heavy computational burden. Its computational complexity was not reduced although the revised versions have improved the precision. In the work of colour quantization, balancing quantization quality and quantization complexity is always a challenging point. In this paper, a two-stage quantization framework is proposed to achieve this balance. In the first stage, high-resolution colour space is initially compressed to a condensed colour space by thresholding roughness indexes. Instead of linear compression, we propose generic roughness measure to generate the delicate segmentation of image colour. In this way, it causes less distortion to image. In the second stage, the initially compressed colours are further clustered to a palette using Weighted Rough K-means to obtain final quantization results. Our objective is to design a post-clustering quantization strategy at colour space level rather than pixel level. Applying the quantization in the precisely compressed colour space, the computational cost is greatly reduced; meanwhile, the quantization quality is maintained. The substantial experimental results validate the high efficiency of the proposed quantization method, which produces high quality colour quantization while possessing low computational complexity." (Authors) A picture of *Calopteryx* sp. is used to demonstrate the procedure of measuring.] Address: Yue, X.D., School of Computer Engineering and Science, Shanghai University, Shanghai, 200444, China. E-mail: yswantfly@gmail.com

**13926.** Zeuss, D.; Brandl, R.; Brändle, M.; Rahbek, C.; Brunzel, S. (2014): Global warming favours light-coloured insects in Europe. Nature Communications 5:3874 | DOI: 10.1038/ncomms4874 | www.nature.com/naturecommunications: 9 pp, Suppl. (in English) ["Associations between biological traits of animals and climate are well documented by physiological and local-scale studies. However, whether an ecophysiological phenomenon can affect large-scale biogeographical patterns of insects is largely unknown. Insects absorb energy from the sun to become mobile, and their colouration varies depending on the prevailing climate where they live. Here we show, using data of 473 European butterfly and dragonfly species, that dark-coloured insect species are favoured in cooler climates and light-coloured species in warmer climates. By comparing distribution maps of dragonflies from 1988 and 2006, we provide support for a mechanistic link between climate, functional traits and species that affects geographical distributions even at continental scales. Our results constitute a foundation for better forecasting the effect of climate change on many insect groups." (Authors)] Address: Zeuss, D., Department of Ecology — Animal Ecology, Faculty of Biology, Philipps-Universität Marburg, Karl-von-Frisch-Str. 8, 35043 Marburg, Germany. E-mail: dirk.zeuss@biologie.uni-marburg.de

**13927.** Zhang, H.-m.; Cai, Q.-h. (2014): Description of *Chlorogomphus auripennis* spec. nov. from Guangdong Province, with new records of Chlorogomphidae from Yunnan Province, China (Odonata: Chlorogomphidae). Zootaxa 3790(3): 477-486. (in English) ["A new chlorogomphid, *Chlorogomphus* (*Orogomphus*) *auripennis* spec. nov. (holotype male; Mt Nankunshan, Longmen County, Guangdong Province, China, 20. V. 2008) is described and illustrated. It is the first species belonging to the subgenus *Orogomphus* recorded from mainland China. The holotype will be deposited in the Collection of Aquatic Animals, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan City, Hubei Province, China. *C. auratus* Martin, 1910 and *Chloropetalia selysi* (Fraser, 1929) are recoded from Chinese territory for the first time. The total number of Chlorogomphidae in China reaches 20. Description of the hitherto unknown female of *C. yokoi* Karube, 1995 is provided." (Authors)] Address: Zhang, H., Dept of Entomology, College of Natural Resources and Environment, South China Agricultural University, Guangzhou 510642, China. E-mail: zhanghaomiao6988@gmail.com

**Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for multiple help, and Geert de Knijf, Asmus Schröter, Bernd Kunz and Jürgen Ott for contributing papers to this issue.**

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

## 1997

**13928.** Pither, J. (1997): Responses in the habitat occupancy, movement behaviour, and wing morphology of two species of calopterygid damselflies to landscape structure. M.Sc. thesis, Acadia University, Wolfville: 177 pp. (in English) ["I examine the responses of *Calopteryx maculata* and *Calopteryx aequabilis*, to differences in landscape structure. I performed surveys to determine patterns of stream occupancy in relation to habitat characteristics measured at small spatial scales, and the medium-scale characteristic of distance to forest. I show that the relative importance of these habitat characteristics differs among species and between survey years. The changes over time are consistent with weather patterns. I then examine the relative abilities of these two species to move through forest and pasture landscapes. Previous work had suggested that *C. maculata* uses forest as a resource more consistently than *C. aequabilis*. Results from manipulative experiments show that the connectivity of pasture landscapes is higher than forest landscapes for *C. maculata*. There was no detectable difference in connectivities for *C. aequabilis*. These results have implications regarding the relative propensities of individuals to disperse within the structurally different landscapes. I examine the wing morphologies of *C. maculata* and *C. aequabilis* individuals collected from landscapes of differing structure. I show that the fore and hindwings of *C. maculata* individuals are consistent in their asymmetric distributions (left - right) across landscapes. The forewings of *C. aequabilis* individuals inhabiting a highly fragmented landscape exhibited a significantly higher degree of asymmetry, and were significantly shorter overall, than those inhabiting a moderately fragmented landscape. Forewings of female *C. maculata* individuals collected from high connectivity (pasture) landscapes were slightly longer than those from low connectivity (forest) landscapes." (Author)] Address: not stated

## 1990

**13929.** Hernández, J.M.R. (1999): Lista preliminar de los odonatos Insecta, Odonata de los cayos Caguanes y

Palma, provincia de Sancti Spiritus. Cocuyo 8: 2-3. (in Spanish) [24 odonate species are listed. They represent app. 30% of the Odonata fauna of Cuba.] Address: Hernández, J.M.R., Apartado Postal 2004, Sancti-Spiritus, Cuba CP 60100

## 2000

**13930.** Aranha, J.M.R.; Gomes, J.H.C.; Fogaça, F.N.O. (2000): Feeding of two sympatric species of Characidiinae, *C. lanei* and *C. pterostictum* (Characidiinae) in a coastal stream of Atlantic Forest (Southern Brazil). Brazilian Archives of Biology and Technology 43(5): 527-531. (in English) [The diet of *Characidium lanei* includes Odonata.] Address: Aranha, J.M.R., Depto de Zoologia, SCB, Universidade Federal do Paraná, CP 19020, CEP 81531-990, Curitiba - PR, Brazil

## 2001

**13931.** Hernández, J.M.R.; de Armas, L.F. (2001): Distribución geográfica de *Remartinia secreta* y *Crocotemis servilia* en Cuba (Odonata: Aeshnidae, Libellulidae). Cocuyo 10: 12-13. (in Spanish) [New records of *R. secreta* and *C. servilia* for Cuba are presented. The morphology of *C. servilia* is briefly compared with *Erythrodiplax* species.] Address: Hernández, J.M.R., Apartado Postal 2004, Sancti-Spiritus, Cuba CP 60100

**13932.** Reeves, D.M. (2001): Survey for the Giant Dragonflies, *Petalura gigantea* and *Petalura litorea* and the Swordgrass Brown Butterfly, *Tisiphone abeona morrissi*. Tugon Bypass emir. Impact Statement tech. Pap. 12: 1-9. (in English) ["*P. gigantea* was recorded from a potential breeding site in Queensland in the Stewart Road to Boyd Street section, south-west of the John Flynn Hospital and Medical Centre. This is possibly the first record of this species from the Gold Coast area for nearly 60 years. A specimen in the Queensland Museum was collected at Burleigh Heads in 1933 (Theischinger 1999) (p. 160) and there is a record of another Burleigh Heads specimen collected in 1942 (NSW National Parks and Wildlife Ser-

vice 1999, p. 5). No other sightings were made of *P. litorea*. However, potential breeding sites occur in NSW (Site 2), in Queensland (Sites 1 and 3) and in Commonwealth land (Site 4)." (Author)] Address: Reeves, D.M., 30 Bramston Terrace, Herston, Qld 4006, Australia

## 2002

**13933.** Mitra, A. (2002): Dragonfly (Odonata: Insecta) fauna of Trashigang Dzongkhag, eastern Bhutan. In: T. Gyeltshen & [?] Sadruddin, [Eds], Environment and life support systems of the Bhutan Himalaya, Vol. 1, Sherubtse Coll., Kang-lung, Bhutan: 40-70. (in English) ["23 species and sub-species of dragonflies have been recorded for the first time from Trashigang Dzongkhag (district) of which 18 species are new records for the whole of Bhutan. However, a checklist of eight Zygopterans and 15 Anisopterans belonging to ten families along with the field data and identification key has been given. The habitat ecological study reveals that certain species have specific habitat preferences, viz. fast flowing streams, slow-running marshy streams, side pools, irrigation channels and stagnant water-bodies like monsoon ponds. The coloured photographs of some of the species in their natural habitats have been given for their easy field identification." (Author)] Address: Mitra, A., School of Life Sciences, Sherubtse College, Kanglung, Bhutan. E-mail: amitonata@yahoo.com

## 2004

**13934.** Rolfes, W. (2004): Flugakrobaten aus der Urzeit. *Ärztliches Journal Reise & Medizin* 38(8): 34-39. (in German) [General account on dragonflies in a medical journal.] Address: not stated

**13935.** Slotton, D.G.; Ayers, S.M.; Suchanek, T.H.; Weyand, R.D. Liston, A.M. (2004): Mercury bioaccumulation and trophic transfer in the Cache Creek Watershed of California, in relation to diverse aqueous mercury exposure conditions. A component (Component 5B) of the multi-institution Directed Action research project: Assessment of Ecological and Human Health Impacts of Mercury in the San Francisco Bay-Delta Watershed. A CALFED Bay-Delta Program Project. October 1999 – September 2003. Final Report: January 25, 2004: 74 pp. (in English) [USA; "Water and biota were sampled throughout the Cache Creek watershed during a 20 month period between January 2000 and August 2001. A range of mercury (Hg) exposure conditions were investigated in relation to several mining and natural Hg point sources in the watershed. The study was conducted to provide foundational information and baseline monitoring data for future point source remediation efforts and TMDL regulation. Seasonal aqueous sampling was conducted in conjunction with Hg loading studies. Mercury was characterized in adult game fishes and native fishes throughout the watershed. Bioaccumulation of methylmercury

(MeHg) in several taxa of aquatic insect and small fish bioindicators was compared to diverse aqueous Hg exposure conditions and to corresponding fillet muscle Hg in the larger fishes. The Turkey Run/Abbott complex of Hg mines and the Sulfur Creek complex of Hg mines and geothermal springs were confirmed to be dominant point sources of elevated total Hg (THg), MeHg, and MeHg bioaccumulation in the watershed. In the main stem of Cache Creek, fish Hg increased by over 100% downstream of inflows from the primary remedial targets. Fish Hg reached concentrations to over 6.00 ppm in portions of the watershed. Aqueous Hg parameters varied spatially by over three orders of magnitude between control sites and tributaries near point sources. Seasonal order of magnitude shifts were seen, greater for raw THg. Partly due to the large range of concentrations, general correlations were found between the different aqueous Hg parameters. On a same-site basis, strongest correlations were found between raw and filtered fractions of both THg and MeHg and between TSS and THg. While aqueous MeHg was broadly associated with general spatial patterns in aqueous THg (re loading), variable processes of methylation were indicated to play an important role in some MeHg concentrations. On a whole watershed basis, including all individual paired seasonal samplings, aqueous raw and filtered THg and MeHg all showed substantial apparent correlations with aquatic insect and small fish MeHg bioaccumulation. However, the system-wide apparent correlations were found to be driven largely by clusters of high Hg vs low Hg site data. On an individual site basis, most of the apparent correlations broke down, with recent, seasonally averaged aqueous raw MeHg concentration remaining as by far the best predictor of aquatic insect and small fish MeHg. However, the form of the relationship with raw aqueous MeHg, as well as aqueous: biotic bioaccumulation factors (BAFs), varied between main stem and tributary sites. Study results strongly support the development of site-specific relationships for any predictive applications. Aqueous, invertebrate, and small fish MeHg were found to be seasonally dynamic, with different patterns at different sets of sites. This complicated linkages to large fish MeHg, which required the temporal pooling, by site, of aqueous and lower trophic data. Among similar sites, pooled data provided general linkages directly between unfiltered aqueous MeHg and large fish muscle Hg. Wider-ranging linkages were exhibited between MeHg in bioindicator organisms and large fish muscle. Results of this study indicate that the most useful environmental samples for regulatory and remediation monitoring for Hg include unfiltered aqueous MeHg and short-lived, relatively easily obtainable, low trophic level biota, in addition to larger fish of human health concern." (Authors) The analysis includes at family level Calopterygidae, Coenagrionidae, Gomphidae, and Libellulidae. For details see: Coenagrionidae, ] Address: Slotton, D.G., University of California at Davis, Dept. of Environmental Science and Policy, One Shields Avenue, Davis, CA 95616. USA. E-mail: dgslopton@ucdavis.edu



**13936.** Smith, W.A.; Vogt, T.E.; Gaines, K.H. (2004): Checklist of Wisconsin Dragonflies. Updated November 2004. Wisconsin Entomological Society Miscellaneous Publications No. 2 June 1993 (2004): 14 pp. (in English) ["This checklist provides a summary of the 111 dragonfly species found in Wisconsin with an indication of population and legal status, breeding habitat, and estimates of range and flight period based on records maintained by the Natural Heritage Inventory Program of the Wisconsin Department of Natural Resources. Five species reported from Wisconsin, but never substantiated as part of the state's fauna, are listed in addition. In 1975, William Hilsenhoff summarized dragonfly species (Odonata: Anisoptera) known from Wisconsin. There were reports of 90 species at that time, but one was found to be reported in error leaving the state's fauna at 89. To date of the report (2003), an additional 22 species have been reliably reported from the state." (Authors)] Address: Smith, W., Wisconsin Department of Natural Resources, ER-6 101 S Webster Street, Madison, WI 53703, USA. E-mail: WilliamA.Smith@Wisconsin.gov

## 2006

- 13937.** Bailowitz, R. (2006): *Tramea insularis* in Arizona. *Argia* 18(1): 9. (in English) [Records of *T. insularis* from 2005 in Arizona, USA are compiled; the origin of the specimens may be the result of the hurricane season in the gulf of Mexico during 2005.] Address: Bailowitz, R., 15444 N. Indian Trail, Tucson, AZ 85750 USA. E-mail: raberg2@q.com
- 13938.** Bailowitz, R. (2006): Thornbush Dasher (*Micrathya hagenii*) new for Arizona. *Argia* 18(3): 14. (in English) [19-IX-2005, Carpenter Tank, Buenos Aires National Wildlife Refuge, Pima Co., Arizona, USA] Address: Bailowitz, R., 15444 N. Indian Trail, Tucson, AZ 85750 USA. E-mail: raberg2@q.com
- 13939.** Beaton, G.; Stevenson, D. (2006): Breeding habitat for *Somatochlora filosa* (Fine-Lined Emerald). *Argia* 18(3): 19-20. (in English) [13-VIII-2006, Ft. Stewart, Long County, Georgia, USA] Address: Beaton, G., 320 Willow Glen Drive, Marietta, GA 30068, USA. E-mail: giffbeaton@mindspring.com
- 13940.** Behrstock, R.A (2006): Five new records of Odonata for the State of Tamaulipas, Mexico, including the correction of a previously published *Brechmorhoga*. *Argia* 18(1): 17-19. (in English) [Records of *Apanisagrion lais*, *Erpetogomphus designates*, *Phyllocycla breviphylla*, *Cannaphila insularis* are documented. *Brechmorhoga vivax* turned out to be *B. tepeaca*. Thus, *B. tepeaca* should be added to the Tamaulipas list and *B. vivax* dropped from it.] Address: Behrstock, R.A., 10359 S. Thicket Pl., Hereford, AZ 85615, USA. E-mail: rbehrstock@cox.net
- 13941.** Cashatt, E.D.; Day, R.; Esker, T.L. (2006): A new Anisoptera record for Illinois: *Libellula auripennis* Burmeister. *Argia* 18(3): 12. (in English) [Ballard Nature Center, Effingham Co., Illinois, USA, 7-VI-2006] Address: Cashatt, E.D., Zoology Section, Illinois State Museum Research and Collection Center, 1011 East Ash, Springfield, IL 62703, USA. E-mail: cashatt@museum.state.il.us
- 13942.** Dobbs, M.M. (2006): A new spreadwing for Georgia. *Argia* 18(1): 10. (in English) [Records of *Lestes forcipatus* from August 2005 in Walker County, Georgia, USA are documented.] Address: Dobbs, Marion, pond\_damsel@comcast.net
- 13943.** Donnelly, N. (2006): Still looking for warthogs. *Argia* 18(1): 23-25. (in English) [Extensive report on an odonatological trip in early 2006 to South Africa.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 13944.** Donnelly, N. (2006): Another note on *Stylurus scudderii* oviposition. *Argia* 18(3): 19. (in English) [Nature Reserve La Verendrye, N Ottawa, Canada, 1992; "... *Stylurus scudderii* males were patrolling the stream in their characteristic deliberate manner. I suddenly saw a female (my first!) patrolling near the edge. It was the fattest-bodied gomphid that I think I have ever seen. Think of a flying cigarette, black with bright yellow markings. I followed the female as she flew into a culvert about 50 feet away. I ran up to the road and crossed it to watch the female appear on the other side. Except she did not appear. Baffled, I went back to see if she made a U-turn and headed out the entrance. I still didn't see her. Then I saw her. She was ovipositing near the mid-point of the culvert and continued to do so for a minute or so. The culvert was about 5 feet in diameter (I should have measured it) and the water was about 6 inches deep. I wonder how many dragonflies oviposit in culverts?" (Author)] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu
- 13945.** Godwin, J.; Krotzer, S. (2006): "Cave dragonfly" found in Alabama. *Argia* 18(3): 20. (in English) [ISA. Verbatim: On 19 August 2006, while exiting the Keel Sinks entrance to the Tony Sinks cave system located within the Sharp-Bingham Mountain Preserve in Jackson County in extreme northeastern Alabama, one of us (JG) encountered a dragonfly perched on a wall of the entrance pit to the cave system. The phenomenon of odonates utilizing caves as roosts, ostensibly as thermal refugia, has been reported in the literature (for example see Corbet, 1999), but it is apparently a fairly rarely documented event. ... The dragonfly was discovered at about 1600 h, perched on the wall of the pit ca. 5 m below the lip, on the cooler portion of the pit wall, well below the thermocline. Light conditions at the time were subdued but far from approaching darkness. Lethargic and easily captured by hand, the specimen was sent to SK, who identified it as a female *Somatochlora tenebrosa*. This largely crepuscular species would seem to be a likely candidate

to seek out a thermal refuge during the long, hot days of an Alabama summer!] Address: Krotzer, S., 2238 Haysop Church Road, Centreville, AL 35042, USA. E-mail: rskrotze@southernco.com

**13946.** Gregoire, J.; Gregoire, S. (2006): Breeding population of *Anax longipes* discovered in the Finger Lakes highlands of New York. *Argia* 18(1): 12-13. (in English) [Exuviae of *A. longipes* were found in July and August 2005. *Somatochlora* sp. was caught in a mist net.] Address: Gregoire, J., Kestrel Haven Avian Migration Observatory, Burdett, NY 14818, USA. E-mail: khmo@empacc.net

**13947.** Gregoire, S.; Gregoire, J. (2006): Update on mass emergence of *Lestes unguiculatus* in central New York. *Argia* 18(1): 14. (in English) [After drying of a pond with app. 75,000 individuals of *L. unguiculatus* in 2004 and emigration of the adult population, in 2005 only one specimen could be seen.] Address: Gregoire, J., Kestrel Haven Avian Migration Observatory, Burdett, NY 14818, USA. E-mail: khmo@empacc.net

**13948.** Honcu, M.; Roztocil, O. (2006): Important species of dragonflies (Odonata) in the region of česká Lípa (Northern Bohemia, Czech Republic) in 2003-2005. *Vážky 2005: sborník referátu VIII. celostátního semináře odonatologu ve Žďárských vrších : seminár usporádaly ve dnech 23.-26.6.2005 Správa CHKO Žďárské vrchy, ZO CSOP Vlašim a Vlastivedné muzeum a galerie v České Lípe / editor sborníku Lubomír Hanel. -- Vyd. 1. -- Vlašim: ZO CSOP Vlašim, 2006. ISBN 80-86327-52-3: 49-63. (in Czech, with English summary) ["Faunistic records of dragonflies made during the excursions of the VIII. allstate meeting of odonatologists in June 2005 in the Žďárské vrchy – hills. In the course of several field trips detected in the visited five faunistic squares No. 6261, 6360, 6361, 6362, 6461 a collection of 26 species of dragonflies, a number which represents about 32,5 % of all the dragonfly species known in the whole Czech Republic. Common species prevail, noteworthy is the detection of following species: *Leucorrhinia pectoralis*, listed in "Natura", found in two places, *Somatochlora arctica*, *Orthetrum albistylum*, *Cordulegaster boltonii*, *Leucorrhinia rubicunda*, *Leucorrhinia dubia*, *Coenagrion hastulatum* a *Lestes dryas*. The date of the meeting was chosen to facilitate the finding of representants of the family *Leucorrhinia* and also of the family *Aeshna* but, unfortunately, the representants of this second family did not appear. In addition to the excursions organised in the course of the meeting Mr. Hesoun detected one exuvium of *Symptetrum fonscolombii* at the borders of the faunistic squares No. 6260 and 6261; the correctness of the determination had been approved by Dr. A. Dolný. The list of detected species is as follows: *Calopteryx virgo*, *Lestes viridis*, *L. sponsa*, *L. dryas*, *Platycnemis pennipes*, *Pyrrhosoma nymphula*, *Erythromma najas*, *Coenagrion hastulatum*, *C. puella*, *Enallagma cyathigerum*, *Ischnura elegans*, *Anax imperator*, *Cordulegaster boltonii*, *Cordulia aenea*, *Soma-**

*tochlora metallica*, *S. arctica*, *Libellula quadrimaculata*, *L. depressa*, *Orthetrum cancellatum*, *O. albistylum*, *Symptetrum vulgatum*, *S. flaveolum*, *S. danae*, *Leucorrhinia dubia*, *L. rubicunda*, and *L. pectoralis*." (Authors)] Address: Honcu, M., Vlastivedné muzeum v České Lípe, náměstí Osvobození 297, 470 01 Česká Lípa, Czech Republic. E-mail: honcu@muzeum.clnet.cz

**13949.** Kappes, E.; Kappes, W. (2006): First record of *Enallagma eiseni* from the USA. *Argia* 18(3): 7. (in English) [28-VI-1992 Quitobaquito Springs, Organ Pipe Cactus National Monument, Pima Co., Arizona, USA] Address: Kappes, W., Eichenweg 27, 22395 Hamburg, Germany

**13950.** Krotzer, S. (2006): *Stylurus potulentus*, new for Alabama. *Argia* 18(2): 12. (in English) [26-VI-2006, Majors Creek, Baldwin County, Alabama, USA] Address: Krotzer, S., 2238 Haysop Church Road, Centreville, AL 35042, USA. E-mail: rskrotze@southernco.com

**13951.** Manolis, T. (2006): A hybrid gomphid (*Ophiogomphus bison* x *morrisoni*) from California. *Argia* 18(3): 9-10. (in English) [Susan River, Susanville, Lassen Co., California, USA, 31-V-2002, male] Address: Manolis, T., 808 El Encino Way, Sacramento, CA, 95864, USA

**13952.** Manolis, T.; Bruun, R. (2006): A hybrid *Libellula* (*forensis* x *luctuosa*) from northern California. *Argia* 18(3): 8-9. (in English) [Battle Creek Wildlife Area, Shasta Co., California, USA; 29-IV - 1-V-2006.] Address: Manolis, T., 808 El Encino Way, Sacramento, CA, 95864, USA

**13953.** Manolis, T.; Iliff, M. J.; Erickson, R. A. (2006): First records of *Enallagma eiseni* and *Telebasis incolumis* from northern Baja California. *Argia* 18(3): 4-6. (in English) [*Enallagma eiseni* & *Telebasis incolumis*: 24-VII-2006, Arroyo Santo Domingo, Mexico.] Address: Manolis, T., 808 El Encino Way, Sacramento, CA, 95864, USA

**13954.** Manolis, T. (2006): *Cordulegaster dorsalis* in southwestern New Mexico: A long-buried first state record. *Argia* 18(3): 13. (in English) [W. Fork Gila River, Catron Co., New Mexico, USA, 14/15-IX-1973] Address: Manolis, T., 808 El Encino Way, Sacramento, CA, 95864, USA

**13955.** McKenzie, P. M.; Gillespie, R.; Kelley, S. (2006): *Arigomphus maxwelli* Ferguson, 1950 (Bayou Clubtail), a new gomphid for Missouri. *Argia* 18(1): 10-11. (in English) [Three records of *A. maxwelli* from Dunklin, Boone (2005) and Mississippi (2003) counties, Missouri, USA are documented and discussed in detail.] Address: McKenzie, P., U.S. Fish and Wildlife Service, 101 Park DeVille Dr., Suite A, Columbia, MO, 65203-0057, USA. E-mail: paul\_mckenzie@fws.gov

**13956.** Meurgey, F. (2006): *Anax ephippiger* (Burmeister, 1839), a new species for the West Indies. *Argia* 18(1): 21-22. (in English) [A female *A. ephippiger* was caught on

26-I-2006 near Anse-Bertrand (North-West of Grande-Terre, Guadeloupe. The climatic/wind situation is discussed to explain the arrival of this essentially African species in the Caribbean region)] Address: Meurgey, F., Mus. d'Hist. nat. Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**13957.** Meurgey, F. (2006): Collecting trip in Guadeloupe, French West Indies. *Argia* 18(1): 19-21. (in English) [Extensive report on a three week trip to Guadeloupe between 24 January and 14 February 2006.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**13958.** Mitra, A.; Phuntsho, P. (2006): A report on the Odonata diversity of Bumdeling Wildlife Sanctuary, Trashigang, Eastern Bhutan. Ministry of Agriculture, Thimphu: 58 pp. (in English) ["Conclusion: The present study reflects the rich entomological diversity of the conservation areas in Bhutan in respect of Odonata. With the nine new records during the present study, 40 species and subspecies of dragonflies are known from Bhutan till date (see checklist). Two of them have been found new to world.. It's a clear indication for the government to start with this type of projects in the field of invertebrates that constitute the lion's share of the living species on earth, With the on going trends of modernization, it's time now for Bhutan to know its actual strength of biodiversity, 10 explore, and to document it for making effective plans to conserve them in situ, before it is too late to start. Nature Conservation Division, should as early as possible set up a museum to preserve the type specimens produced from this kind of studies. However, as far as the Odonata fauna of Bhutan is concerned, the study remains fairly incomplete as the middle and west Bhutan are still unexplored." (Authors) Regrettably, the "grey paper" also includes the detailed descriptions of two new damselfly taxa: *Anisopleura bella* Mitra & Phuntsho 2006 and *Acia-grion olympicum bumdelingsis* Mitra & Phuntsho 2006. It is questionable if these descriptions formally can be accepted as they are not made in any publication available to any taxonomist.] Address: Mitra, A., Department of Zoology, Sherubtse College, KANGLUNG, Bhutan. E-mail: amitodonata@yahoo.com

**13959.** Mourek, J. (2006): A challenge to the participation on the monitoring of insect species (Insecta) of community interest. *Vážky 2005: sborník referátu VIII. celostátního semináře odonatologu ve Žďárských vrších : seminář uspořádaly ve dnech 23.-26.6.2005 Správa CHKO Žďárské vrchy, ZO CSOP Vlašim a Vlastivedné muzeum a galerie v České Lípě / editor sborníku Lubomír Hanel. -- Vyd. 1. -- Vlašim: ZO CSOP Vlašim, 2006. ISBN 80-86327-52-3: 154-161. (in Czech, with English summary) ["The long term monitoring of species and habitats according to the EU Council Directive 92/43/EEC (On the conservation of natural habitats and of wild fauna and flora) is organized by the Agency for*

Nature Conservation and Landscape Protection of the Czech Republic. This contribution informs about the aims and the system of monitoring of insect species and summarizes the methods of monitoring for particular species. It is also intended as a challenge for the professional as well as non-professional entomologists to participate in the monitoring." (Author)] Address: Mourek, J., Agentura ochrany přírody a krajiny ČR, Kališnická 4-6, 130 23 Praha 3, Czech Republic. E-mail: jan\_mourek@nature.cz

**13960.** Paulson, D. (2006): New common names for three North American odonates. *Argia* 18(3): 23. (in English) [*Epithea costalis* - Slender Baskettail; *Somatochlora elongata* - Ski-tipped Emerald; *Celithemis ornata* - Ornate Pennant] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@pugetsound.edu

**13961.** Proctor, N.S. (2006): Some Connecticut observations. *Argia* 18(1): 17. (in English) [Observations of Green Heron's preying on *Libellula vibrans* are documented. An additional observation is given on a migratory Solitary Sandpiper (*Tringa solitaria*) who repeatedly plucked out odonate larvae from the muddy edges of a pool. During a ten minute feeding period it consumed 15 larvae.] Address: Proctor, Noble, 43 Church St. Branford, CT 06405, USA

**13962.** Trybula, J. (2006): *Arigomphus cornutus*, a state record for New York. *Argia* 18(3): 11-12. (in English) [21-VI-2006, Indian Creek Nature Center, Upper & Lower Lakes Wildlife Management Area, Canton, Saint Lawrence Co., New York, USA] Address: Trybula, J., Dept Biology, State Univ. New York at Potsdam, 44 Pierrepont Ave., Potsdam, NY 13676, USA. E-mail: trybulj@potsdam.edu

**13963.** Tveekrem, J. (2006): *Somatochlora brevicincta* from Minnesota. *Argia* 18(1): 19. (in English) [Lake County, Minnesota, USA, 11-VII-2005] Address: not stated

**13964.** White, H. (2006): *Enallagma anna* in Pennsylvania. *Argia* 18(2): 13. (in English) [Huntingdon Co, Pennsylvania, USA, no dates] Address: White, III, H.B., Dept of Chemistry and Biochemistry, University of Delaware, Newark, Delaware 19716, USA

**13965.** White, H. (2006): *Gynacantha nervosa* from Delaware!. *Argia* 18(2): 13. (in English) [27-IX-1975, Newark, New Castle Co., Delaware, USA] Address: White, III, H.B., Dept of Chemistry and Biochemistry, University of Delaware, Newark, Delaware 19716, USA

## 2007

**13966.** Abbott, J.C. (2007): Book Review: *Dragonflies & Damselflies of Georgia and the Southeast*. *Argia* 19(1): 21-22. (in English) [Review of: Beaton, G. (2007): *Drag-*



onflies and Damselflies of Georgia and the Southeast. Wormsloe Foundation Nature Book. University of Georgia Press. ISBN-13: 978-0820327952. 355 pp] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabott@mail.utexas.edu

**13967.** Connors, R. (2007): *Somatochlora elongata* (Skipped Emerald) and *Enallagma durum* (Big Bluet): Two new species for Tennessee. *Argia* 19(1): 18-19. (in English) [*Somatochlora elongata*: 19-VII-2006, Carter County, Tennessee, USA. *Enallagma durum*: 3-X-2006, Paris Landing State Park, Henry County, Tennessee, USA.] Address: Connors, R., Nashville, Tennessee, USA. E-mail: Rconnorsphoto@aol.com

**13968.** Cuppen, J.G.M.; Drost, B. (2007): Entomological fauna of the Kempen, Noord-Brabant – report of the 161st summer meeting at Baarschot. *Entomologische Berichten* 67(4): 122-144. (in Dutch, with English summary) ["The 161st summer meeting of the Netherlands Entomological Society took place on 9-11 June 2006. A total of 1408 taxa of eighteen arthropod orders were recorded." The following odonate species are listed: *Calopteryx splendens*, *C. virgo*, *Lestes dryas*, *L. sponsa*, *L. virens*, *L. viridis*, *Ischnura elegans*, *Pyrrhosoma nymphula*, *Enallagma cyathigerum*, *Coenagrion puella*, *Aeshna cyanea*, *Anax imperator*, *Cordulia aenea*, *Somatochlora metallica*, *Libellula depressa*, *L. quadrimaculata*, *Sympetrum danae*, and *Leucorrhinia dubia*.] Address: Cuppen, J.G.M., Buurtmeesterweg 16, 6711 HM Ede, The Netherlands. E-mail: jan.cuppen@wur.nl

**13969.** Headon, C.M.; Hall, R.J. (2007): A multivariate analysis of factors affecting mercury availability in dragonfly nymphs (Order: Odonata) inhabiting wetland ecosystems. <https://ia601509.us.archive.org/5/items/AMultivariateAnalysisOfFactorsAffectingMercuryAvailabilityInDragonfly/MercuryInDragonflyNymphs.pdf>; 42 pp. (in English) ["Fifteen wetlands were examined to determine the influence of sediment and water chemical parameters on mercury bioavailability in dragonfly nymphs (Order: Odonata; suborder: Anisoptera; Genus: *Cordulia*). Wetland types included mineral poor fens, circumneutral minerotrophic fens and marshes. Mercury concentrations in dragonfly nymphs ranged from 0.041 to 0.402 ug.g<sup>-1</sup> dry mass and were significantly ( $p < 0.001$ ) different among the 15 wetlands. Multivariate statistical procedures showed that sediment total sulfur (S) concentration explained the greatest amount of the among wetland variation in Hg concentrations in anisopteran nymphs. With increasing concentrations of total S in the sediments there was a decrease in nymph Hg concentrations. Surface water chemistry appeared not to have a direct effect on Hg bioavailability." (Authors)] Address: not stated

**13970.** Larsen, R.R. (2007): Notes on the Plateau Spreadwing (*Lestes alacer*) in eastern New Mexico. *Argia* 19(3): 17-18. (in English) [Notes are given on phenol-

ogy, oviposition, feeding of adults (including gleaning of ants), dormitories and regional habitats of larval and imaginal *L. alacer*.] Address: Larsen R.R., Roswell, New Mexico, USA. E-mail: roblrsn@yahoo.com

**13971.** Lubchansky, J. (2007): First record of *Enallagma basidens* (Double-striped Bluet) in Nevada. *Argia* 19(1): 19. (in English) [19-VI-2006, Floyd Lamb State Park, Clark County, Nevada, USA] Address: Lubchansky, J. E-mail: thelube@verizon.net

**13972.** Manger, R.; Rocks, J.; Rocks, A.; Knecht, T. (2007): Early or late emerged Ruby whiteface *Leucorrhinia rubicunda* in October? *Brachytron* 10(2): 219-221. (in Dutch, with English summary) [Netherlands; "On October 26, 2006 a young female *L. rubicunda* was found in the Bargerveen peat bog. The observation of a female in autumn is very exceptional as this is a typical spring species and the earliest *Leucorrhinia* in temperate lowlands. A possible explanation could be the extreme hot summer and spring causing an exceptionally high water temperature, resulting in higher food availability and probably faster larval growth. The exceptionally high temperatures in October may have prevented this female to diapause." (Authors)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rmanger@planet.nl

**13973.** Misof, B.; Niehuis, O.; Bischoff, I.; Rickert, A.; Erpenbeck, D.; Staniczek, A. (2007): Towards an 18S phylogeny of hexapods: Accounting for group-specific character covariance in optimized mixed nucleotide/doublet models. *Zoology* 110: 409-429. (in English) ["The phylogenetic diversification of Hexapoda is still not fully understood. Morphological and molecular analyses have resulted in partly contradicting hypotheses. In molecular analyses, 18S sequences are the most frequently employed, but it appears that 18S sequences do not contain enough phylogenetic signals to resolve basal relationships of hexapod lineages. Until recently, character interdependence in these data has never been treated seriously, though possibly accounting for the occurrence of biased results. However, software packages are readily available which can incorporate information on character interdependence within a Bayesian approach. Accounting for character covariation derived from a hexapod consensus secondary structure model and applying mixed DNA/RNA substitution models, our Bayesian analysis of 321 hexapod sequences yielded a partly robust tree that depicts many hexapod relationships congruent with morphological considerations. It appears that the application of mixed DNA/RNA models removes many of the anomalies seen in previous studies. We focus on basal hexapod relationships for which unambiguous results are missing. In particular, the strong support for a "Chiasmomyaria" clade (Ephemeroptera+Neoptera) obtained in Kjer's [2004. Aligned 18S and insect phylogeny. *Syst. Biol.* 53, 1–9] study of 18S sequences could not be confirmed by our analysis. The hexapod tree can be rooted

with monophyletic Entognatha but not with a clade Ellipura (Collembola+Protura). Compared to previously published contributions, accounting for character interdependence in analyses of rRNA data presents an improvement of phylogenetic resolution. We suggest that an integration of explicit clade-specific rRNA structural refinements is not only possible but an important step in the optimization of substitution models dealing with rRNA data." (Authors) The list of species studied includes 42 Odonata species/samples.] Address: Misof, B., Abt. Ent., Zool. Forschungsmus. A. Koenig, Adenauerallee 160, 53113 Bonn, Germany. E-mail: b.misof.zfmk@uni-bonn.de

**13974.** Muddeman, J. (2007): A new species for the Galapagos Islands: Great Pondhawk (*Erythemis vesiculosa*). *Argia* 19(1): 17-18. (in English) [13-VII-2004 and 24-X-2006, Punta Moreno, W Isabela Island, Ecuador] Address: Muddeman, J. E-mail: john@iberianwildlife.com

**13975.** Myrup, A.R. (2007): Interesting new state and county Odonata records for Utah. *Argia* 19(1): 14-16. (in English) [Records of the following species are documented in detail: *Perithemis intensa*, *Libellula luctuosa*, *Macromia magnifica*, *Aeshna persephone*, *Telebasis salva*, and *Argia hinei*] Address: Myrup, A., 914 South 1635 West, Orem, Utah 84058, USA. E-mail: alanm@provo.edu

**13976.** Nichols, W.J.; McAdoo, J.R. (2007): Summer of fun: Odonates on the Oswegatchie River in New York. *Argia* 19(3): 26. (in English) [Note on the Odonata fauna (n = 39) in summer 2007; St. Lawrence County, New York, USA] Address: Nichols, W.J., Northern Illinois University, Dept of Biological Sciences Dekalb, IL 60115, USA. E-mail: wnicols@niu.edu

**13977.** Sibley, F.C. (2007): Unusual three species pairing. *Argia* 19(4): 19. (in English) [03-IX-2004, Keuka Lake, New York, USA; string of three males composing of *Sympetrum internum*, *S. semicinctus* and *Perithemis tenera*.] Address: Sibley, F.C., The Conservation Agency, 6 Swinburne St. Jamestown, RI 02835, USA. E-mail: fcsibley@empacc.net

**13978.** Strickland, G.; Strickland, J. (2007): Two new species records for Louisiana. *Argia* 19(4): 18-19. (in English) [Lestes forficula: 8-IX-2007, Barney Farm near the town of Washington in St. Landry Parish, Louisiana, USA; *Erythemis vesiculosa*, 27-X-2007, Cameron Parish, Louisiana, USA.] Address: Strickland, J., 1354 Brookhollow Drive, Baton Rouge, LA 70810, USA. E-mail: gstrick3@cox.net

## 2008

**13979.** Dauphin, D.T. (2008): New U.S. Dragonfly - *Planiplax* sp. (probably *Planiplax sanguiventris*). *Argia* 20(2): 19. (in English) [2-VI-2008, Mission, Hidalgo County, Texas, USA] Address: Dauphin, D., Mission, Texas, USA. E-mail: dauphin@sbcglobal.net

**13980.** Hämäläinen, M. (2008): Ukonkorennot crenata ja maxima – hieman historiaa [The Mosaic Hawk crenata and maxima – a brief history]. *Crenata* 1: 35-37. (in Finnish) [On the occasion of the publication of the first issue of the new magazine of the Finnish Dragonfly Society the history of knowledge of *Aeshna crenata* (which was eponymous for the magazine) is outlined and illustrated. *Aeshna maxima*, described by Hisinger in 1861 based on a specimen from Lohja (S-Finland) later on turned out to be a synonym of *Aeshna crenata* described by Hagen (1856) on Siberian material. (Asmus Schröter)] Address: Hämäläinen M., Dept Applied Zool., P.O. Box 27, FIN-00014 University of Helsinki, Finland; E-mail: matti.hamalainen@helsinki.fi

**13981.** Koskinen, J.; Pynnönen, P. (2008): Etelänukonkorento *Aeshna mixta* ensi kertaa lisääntyvänä Suomessa [First confirmed breeding record of the Migrant Hawker *Aeshna mixta* in Finland]. *Crenata* 1: 34. (in Finnish) [The discovery of a freshly emerged female and an exuvia at Laukanlahti (Perniö) in coastal southwest Finland on 11-viii-2008 representing the first reproduction record of *A. mixta* Finland is briefly described and illustrated. (Asmus Schröter)] Address: not stated

**13982.** Manolis, T.; Klett, S. (2008): *Pachydiplax longipennis* (Blue Dasher) flying with exuvia attached. *Argia* 20(3): 18. (in English) [14-VI-2008, Sonoma State University's Fairfield Osborn Preserve, Sonoma County, California, USA] Address: Manolis, T., 808 El Encino Way, Sacramento, CA, 95864, USA

**13983.** Meurgey, F.; Gwenael, D.; Thiebaut, B. (2008): 2008 collecting trip in Martinique (French West Indies). *Argia* 20(2): 14-16. (in English) [Detailed report on an odonatological trip from 23 March to 13 April 2008.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**13984.** Nirschl, R. (2008): *Brechmorhoga praecox* (Slender Clubskimmer) — A new species for the United States. *Argia* 20(2): 17. (in English) [28-II-2008, Mission, Hidalgo County, Texas, USA] Address: Nirschl, R. E-mail: ricknir@hotmail.com.

**13985.** Parkko, P.; Metsälä, P. (2008): Täplälampikorennon *Leucorrhinia pectoralis* esiintyminen Kymenlaaksoissa [Occurrence of *Leucorrhinia pectoralis* in Kymenlaakso, SE Finland.]. *Crenata* 1: 30-33. (in Finnish) [Up to 2000 only 20 sites for *L. pectoralis* were known in Kymenlaakso province in south-east Finland. By the end of 2007 already 40 sites were known. The increase is partly due to increased observing activity, but undoubtedly this species is also invading new sites in Kymenlaakso. [Note by abstracter: The same is true also elsewhere in southern Finland. (Asmus Schröter)] Address: Parkko, P., Hirveläntie 49, FI-45910 Voikkaa, Finland

**13986.** Abu Hassan, A.; Dieng, H.; Satho, T.; Boots, M.; Al Sariy, J.S.L. (2010): Breeding patterns of the JE vector *Culex gelidus* and its insect predators in rice cultivation areas of northern peninsular Malaysia. *Tropical Biomedicine* 27(3): 404-416. (in English) ["Japanese encephalitis (JE) virus activity is an important cause of viral encephalitis in Southeast Asia. In Malaysia, JEV activity has been first detected in *Culex gelidus* in 1976. Since then, no study has fully addressed the seasonal dynamics of this mosquito. As irrigated rice production expands, the incidence of JEV vectors, particularly *Cx. gelidus* is expected to increase. We surveyed Penang Island to determine the breeding patterns of *Cx. gelidus* and their potential insect predators, in relation to habitat/niche and rice growing period. Six rice fields proper (RFP) and related drainage canals (DC) were visited through three cultivation cycles (CCs) over 17 months. Weekly visits were performed to each of the 36 sites and mosquito larvae and aquatic insects were sampled from RFP and DCs using dippers. *Culex gelidus* was abundant in RFP and almost absent in DCs. Its densities usually were high during the first and 3rd CC and when the RFs were in Fp, Pp and Gp. In DCs, the mosquito was abundant during Mp, e.g., 2nd CC. Predators, especially those belonging to the families Corixidae, Coenagrionidae and Dytiscidae, were more present in RFP. Predator numbers usually were high during the first CC; in some cases predator abundance peaked during other CCs, e.g., corixids and dytiscids. In RFP, neither corixids nor coenagrionids showed any positive correlation with densities of *Cx. gelidus*. However, dytiscids' population peaked when the mosquito densities were on the rise. These observations suggest that *Cx. gelidus* is active during the period of rice cultivation. Operational vector control through bio-control or with insecticides near the end of the rice cultivation season in RFP may prove beneficial in reducing the density of *Cx. gelidus*, but also the amount of bio-agent or insecticide applied on riceland." (Authors)] Address: Abu Hassan, A., School of Biological Sciences, Universiti Sains Malaysia, Penang, Malöaysia. E-mail: aahassan@usm.my

**13987.** Girgin, S.; Kazancy, N.; Dügel, M. (2010): Relationship between aquatic insects and heavy metals in an urban stream using multivariate techniques. *Int. J. Environ. Sci. Tech.* 7(4): 653-664. (in English) ["In the study, the relationship between some aquatic insect species (Ephemeroptera, Plecoptera, Trichoptera and Odonata) and some heavy metals (cadmium, lead, copper, zinc, nickel, iron and manganese) and boron were assessed using data obtained from the Ankara Stream, which flows through Ankara, the capital city of Turkey and receives high organic and industrial wastes. Sampling was carried out monthly along the Ankara Stream in 1991. Environmental data were used to explain biological variation using multivariate techniques provided by the program canonical correspondence analysis ordination. The ordination method canonical correspondence analysis was ap-

plied to evaluate the relationships between environmental variables and distribution of aquatic insect larvae. Data sets were classified by two way indicator species analysis. In this study, aquatic insecta communities have been shown by canonical correspondence analysis ordination as related to total hardness, pH, cadmium, lead, copper, zinc, nickel, iron, manganese and boron. Cadmium, lead, copper and boron exceeded limits of the United States Environmental Protection Agency criteria for aquatic life. Trichopteran, *Dinarthrum iranicum* was an indicator of two way indicator species analysis and was placed close to the arrow representing copper. Odonate, *Aeshna juncea* was an indicator of two way indicator species analysis in site 10 and was placed close to the arrows representing manganese, lead, and nickel. Trichopteran, *Cheumatopsyche lepida* and odonate, *Platycnemis pennipes* were indicators of two way indicator species analysis for sites 6, 7, 11, 14, 15, 18 and were placed close to the arrows representing cadmium, boron, iron and total hardness." (Author) As *A. juncea* is no stream-dwelling species, the identification of this species and some more from the taxa list in table 2 is questionable. (Martin Schorr)] Address: Girgin, S., Biology Department, Gazi Education Faculty, Gazi University, Teknikokullar, Ankara, Turkey. Email: sonmez.girgin@gmail.com

**13988.** Grand, D. (2010): *Zygonyx torridus* (Kirby, 1889) sur le rio Cabriel, provinces de Albacete, Cuenca et Valencia (Espagne): distribution et observations biologiques (Odonata, Anisoptera, Libellulidae). *Martinia* 36 (3/4): 78-90. (in French, with English summary) ["Some investigations were conducted from the end of May to the end of September between 2006 and 2010, on a section of 122 km along the rio Cabriel (provinces of Albacete, Cuenca and Valencia). Recently evaluated as « Vulnerable » in Europe, *Z. torridus* is an Afrotropical species with a discontinuous distribution area around the Mediterraneans. Big larval and adult populations are encountered along rio Cabriel. This paper deals with some aspects of its poorly known biology such as emergences, behaviour, distribution and sex-ratio." (Author)] Address: deseased

**13989.** Ishizawa, N. (2010): Effect of the environmental conditions at rice paddies on the emergence and the oviposition in *Sympetrum frequens* (Selys). *New Entomol.* 59(3/4): 48-52. (in Japanese, with English summary) ["It was cleared that emergence from the rice paddies was affected by the temperature of the water. The number of emergence from the rice paddy at the north side, of which water temperature was higher than that at the south side and being shone by the sun earliest in the morning, counted 232 and outnumbered that of the south (76) and the emergence was skewed to the paddy that was shone earlier by the sun in the morning (the difference was significant,  $p < 0.001$ ). After rice-planting the number of emergence at the rice plant was more than that at other plants near the ridge of rice paddies. The average height of emergence was ca. 8 cm, and that at rice plant was just a little higher than that at other plants



near the ridge, however, the difference was not significant. Also, in the reproductive season the temperatures of the standing water at rice paddies were inclined to be higher at the north side than at the south side, and the number of oviposition pairs was 61, significantly more than that at the south ( $p < 0.001$ ). Oviposition tended to be skewed to the early sunlit rice paddies in the morning. *S. frequens* has a propensity to prefer sunlit paddies at the seasons of emergence and reproduction." (Author)] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozawa City, Saitama Pref., Japan. E-mail: greffect708@jcom.home.ne.jp

**13990.** Wesner, J.S. (2010): Seasonal variation in the trophic structure of a spatial prey subsidy linking aquatic and terrestrial food webs: adult aquatic insects. *Oikos* 119: 170-178. (in English) ["Research over the past decade has established spatial resource subsidies as important determinants of food web dynamics. However, most empirical studies have considered the role of subsidies only in terms of magnitude, ignoring an important property of subsidies that may affect their impact in recipient food webs: the trophic structure of the subsidy relative to in situ resources. This may be especially important when subsidies are composed of organisms, as opposed to nutrient subsidies, because the trophic position of subsidy organisms may differ from in situ prey. I explored the relative magnitude and trophic structure of a cross-habitat prey subsidy, adult aquatic insects (including Odonata), in terrestrial habitats along three streams in the south central United States. Overall, adult aquatic insects contributed more than one-third of potential insect prey abundance and biomass to the terrestrial habitat. This contribution peaked along a permanent spring stream, reaching as high as 94% of abundance and 86% of biomass in winter. Trophic structure of adult aquatic and terrestrial insects differed. Nearly all adult aquatic insects were non-consumers as adults, whereas all but one taxon of terrestrial insects were consumers. Such a difference created a strong relationship between the relative contribution of the prey subsidy and the trophic structure of the prey assemblage: as the proportion of adult aquatic insects increased, the proportion of consumers in the prey assemblage declined. Specific effects varied seasonally and with distance from the stream as the taxonomic composition of the subsidy changed, but general patterns were consistent. These findings show that adult aquatic insect subsidies to riparian food webs not only elevate prey availability, but also alter the trophic structure of the entire winged insect prey assemblage." (Author)] Address: Wesner, J.S., Biol. Station & Dept of Zool. Univ. of Oklahoma, Norman, Oklahoma 73019 USA

## 2011

**13991.** Brix, K.V.; DeForest, D.K.; Adams, W.J. (2011): The sensitivity of aquatic insects to divalent metals: A comparative analysis of laboratory and field data. *Science of the Total Environment* 409: 4187-4197. (in English) ["Laboratory studies have traditionally indicated that aquatic insects are relatively insensitive to metals while field studies have suggested them to be among the most sensitive aquatic invertebrate taxa. We reviewed and synthesized available studies in the literature to critically assess why this discrepancy exists. Despite the intense effort to study the effects of metals on aquatic biota over the past several decades, we found studies specific to insects to still be relatively limited. In general, the discrepancy between laboratory and field studies continues with few efforts having been made to elucidate the ecological and physiological mechanisms that underlie the relative sensitivity (or insensitivity) of aquatic insects to metals. However, given the limited data available, it appears that aquatic insects are indeed relatively insensitive to acute metal exposures. In contrast, we suggest that some aquatic insect taxa may be quite sensitive to chronic metal exposure and in some cases may not be protected by existing water quality criteria for metals. The discrepancy between laboratory and field studies with respect to chronic sensitivity appears to largely be driven by the relatively short exposure periods in laboratory studies as compared to field studies. It also appears that, in some cases, the sensitivity of aquatic insects in field studies may be the result of direct effects on primary producers, which lead to indirect effects via the food chain on aquatic insects. Finally, available evidence suggests that diet is an important source of metal accumulation in insects, but to date there have been no conclusive studies evaluating whether dietary metal accumulation causes toxicity. There is a clear need for developing a more mechanistic understanding of aquatic insect sensitivity to metals in long-term laboratory and field studies." (Authors) The review includes references to Odonata.] Address: Brix, K.V. c/o EcoTox 575 Crandon Blvd., #703 Key Biscayne, Florida 33149, USA. E-mail: kbrix@rsmas.miami.edu

**13992.** Cheicante, R. (2011): *Somatochlora georgiana* (Coppery Emerald) discovered and observed in Maryland. *Argia* 23(2): 12-13. (in English) [First record of *S. georgiana* at 12-VI-2010, Idylwild WMA, near Federalsburg, Maryland, USA. Two additional records from the same year are also documented.] Address: Cheicante, R., Bel Air, Maryland, USA. E-mail: rickcheicante@yahoo.com

**13993.** Duran, M.; Akyildiz, G.K. (2011): Evaluating benthic macroinvertebrate fauna and water quality of Suleymanli Lake (Buldan-Denizli) in Turkey. *Acta zool. bulg.* 63(2): 169-178. (in English) ["Benthic macroinvertebrate samples were taken seasonally from October 2006 to April 2008 except winter seasons with the aim of evaluate macroinvertebrate fauna and water quality of Suleymanli Lake. In total, 61 benthic macroinvertebrate taxa were found and 40 of them are new records for the lake. Chandler Score and Shannon-Weiner Diversity Index provided more compatible data than Revised Biological

Monitoring Working Party, Extended Trent Biotic Index and Belgian Biotic Index with physical-chemical results. Also, Principle Component Analysis was carried out to establish associations between benthic macroinvertebrates and environment variables. In our study, the lake water quality was determined as moderately polluted. Obtained environmental variables from water samples showed that the temperature, dissolved oxygen, pH, total dissolved solids and electrical conductivity are the most important parameters in explaining the macroinvertebrate community variation in the lake." (Authors) The following Odonata taxa are listed: Gomphus sp., Anax imperator, Cordulia sp., Libellula depressa, Calopteryx sp., Coenagrion ornatum, C. pulchellum, Ischnura elegans, Pyrrhosoma nymphula, and Enallagma cyathigerum.] Address: Duran, M., Pamukkale Univ., Faculty of Arts and Sciences, Dept of Biology, Kinikli, 20070, Denizli, Turkey

**13994.** Gregoire, S.; Gregoire, J. (2011): Some unusual sightings in the Northeast. *Argia* 23(2): 6. (in English) [USA, New York, Massachusetts; 2010 records of (migratory) *Tamea carolina* and *Anax longipes* are documented.] Address: Gregoire, J., Kestrel Haven Avian Migration Observatory, Burdett, NY 14818, USA. E-mail: khmo@empacc.net

**13995.** Hummel, S. (2011): *Ischnura perparva* (Western Forktail), new to Iowa. *Argia* 23(2): 7. (in English) [28-VII-2009, Odebolt Creek, Odebolt, Sac Co., Iowa, USA] Address: Hummel, S., P.O. Box 121, Lake View, IA, 51450, USA. E-mail: mshummel@netins.net

**13996.** Jaun, A. (2011): An Fluss und See: Natur erleben - beobachten - verstehen. Haupt: 232 pp. (in German) [On pages 96-105, dragonflies are introduced.] Address: Haupt Verlag AG, Falkenplatz 14, 3012 Bern, Switzerland

**13997.** Kazanci, N. (2011): Species records of order Odonata (Insecta) and their habitat quality from Turkey. *Review of Hydrobiology* 4(1): 47-58. (in English, with Turkish summary) [Records of the following taxa are documented: *Calopteryx splendens amasina*, *Epallage fatime*, *Coenagrion puella*, *C. pulchellum*, *Platycnemis pennipes*, *Aeshna affinis*, *Caliaeschna microstigma*, *Onychogomphus forcipatus albotibialis*, *Cordulegaster picta*, *Somatochlora flavomaculata*] Address: Kazanci, Nilgün, Hacettepe University, Science Faculty, Biology Department, Hydrobiology Section, Beytepe, Ankara, Turkey. E-mail: nilgunkazanci@gmail.com]

**13998.** Kourim, M.L.; Doumandji-Mitiche, B.; Doumandji, S.; Reggani, A. (2011): Biodiversité entomologique dans le parc national de l'Ahaggar (Tamanrasset, Sahara). *Entomologie faunistique – Faunistic Entomology* 2011 (2010) 63(3): 149-155. (in French) [Algeria; the list of species only includes *Orthetrum chrysostigma* and *Trithemis arteriosa*.] Address: Kourim, M.L., Département de Zoologie agricole et forestière, Ecole Nationale Supérieure Agronomique, El-Harrach, Alger, Algeria

**13999.** McHugh, M. (2011): Two northern range extensions along the eastern border of Kansas. *Argia* 23(2): 15. (in English) [USA, 2010; *Didymops transversa*, *Libellula deplanata*] Address: McHugh, M., Kansas City, USA. E-mail: Emchugh2@kc.rr.com

**14000.** Naraoka, H. (2011): Diurnal changes of the copulation duration and the ovipositing female number of *Ischnura asiatica* Brauer (Odonata: Coenagrionidae). *Journal of the natural history of Aomori* 16: 1-4. (in Japanese) ["The copulation duration and the oviposition hour were studied in natural population of *I. asiatica* at Aomori-ken northern Japan. The copulation was observed between ca. 5:00h and 16:00h. The total duration of copulation was  $192m38s \pm 74m35s$  ( $n=59$ ) in mean and divided into three stages (I:  $188m34s \pm 70m41s$ , II:  $1m35s \pm 39s$ , III:  $16m05s \pm 4m28s$ ,  $n=47$ ). The oviposition was observed between ca. 11:00h and 16:30h with a peak from 12:30h to 16:00h. The copulation duration was negatively correlated ( $P < 0.001$ ) with the time of day, stage I being shorter towards the end of the day. The shortening of copulation duration before the oviposition hour is thought as "copulation guarding". But, the shortening after the onset of oviposition may be based on the number of mature eggs of the female and the remaining oviposition hour in the day at the time of copulation." (Author)] Address: Naraoka, H., 36-71, Aza-Motoizumi, Fukunoda, Itayanagicho, Kita-gun, Aomori Prefecture, 038-3661, Japan

**14001.** Nyheim, M.T. (2011): Biotilgjengelighet og opptak av antimon, kadmium, kobolt og sink i øyenstikkernymfer (Odonata, Anisoptera) som funksjon av økende veisaltkonsentrasjoner - et tracerekserperiment. MSc. thesis, Norwegian University of Life Sciences: 73 pp, XII . (in Norwegian, with English summary) ["Because of the long winters in Norway, the amount of road salt needed to keep the roads ice-free is high. A large part of this road salt ends up in ponds close to the roads. High concentration of salt may increase the mobilization of heavy metals in sediments and effect biota living in the ponds. This thesis investigates how road salt in the aqueous phase affects the mobility of Co, Cd, Sb and Zn in sediment and how this affects the accumulation of these metals in nymphs of Odonata. This was done using  $^{60}\text{Co}$ ,  $^{109}\text{Cd}$ ,  $^{125}\text{Sb}$  and  $^{65}\text{Zn}$  and tracer technique in a laboratory experiment. Nymphs of dragonflies (Anisoptera) was exposed to moderate contaminated sediment and water with different salt concentrations (0, 500, 5000 og 10 000 mg NaCl/L). Sequential extraction was used on the sediments to investigate the mobility and bindings of the metals. For  $^{60}\text{Co}$  og  $^{109}\text{Cd}$  a positive correlation was identified between the salt concentration and activity in the aqueous phase, and between the salt concentration and the fractions that is assumed to be bioavailable in sequential extraction.  $^{125}\text{Sb}$  seemed to be tightly bound to the sediment and were not mobilized by road salt in the aqueous phase. Due to low activity of  $^{65}\text{Zn}$  in the sediment it was hard to draw any conclusions for this metal. The nymphs accumulated  $^{109}\text{Cd}$ ,  $^{60}\text{Co}$  and

125Sb, while 65Zn showed none accumulation. Based on values of the bioaccumulation factor (BAF), the ranking of the accumulation of the different metals appeared to be as follows: 60Co > 109Cd ~ 125Sb > 65Zn. An increase in salt concentration in the aqueous phase did not lead to an increase in the accumulation of 60Co and 109Cd in the nymphs, rather the opposite trend was observed for these metals. This was not true for 125Sb which had the lowest accumulation in the control group with no added road salt. For 65Zn the activity in the aqueous phase and in the nymphs was so low that it was hard to draw any conclusions from the results. Autoradiography and measurements of nymphs that changed their exo-skeleton showed that the accumulation of either 60Co or 109Cd, or both of these metals, was in both internal organs and tissues and exo-skeleton." (Author)] Address: Nyheim, Mari

**14002.** Revenga, J.E.; Campbell, L.M.; Kyser, K.; Klanssen, K.; Arribère, M.A.; Ribeiro Guevara, S. (2011): Trophodynamics and distribution of silver in a Patagonia Mountain lake. *Chemosphere* 83: 265-270. (in English) ["Silver (Ag) ions are among the most toxic metallic ions to aquatic biota. In southern Argentina, fish from Patagonian lakes have liver Ag concentrations [Ag] among the highest ever reported globally. Silver concentration in phytoplankton from Lake Moreno ( $1.82 \pm 3.00 \mu\text{g g}^{-1}$  dry weight, DW) was found to be significantly higher than [Ag] in zooplankton ( $0.25 \pm 0.13 \mu\text{g g}^{-1}$ ). Values in snails and decapods ( $0.60 \pm 0.28 \mu\text{g g}^{-1}$  and  $0.47 \pm 0.03 \mu\text{g g}^{-1}$  respectively), were higher than in insect larvae ( $0.28 \pm 0.39 \mu\text{g g}^{-1}$  for Trichoptera). We examined trophic transfer of Ag in the biota using stable nitrogen and carbon isotopes ratios ( $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  respectively). Silver concentrations in the biota of Lake Moreno were not associated with any particular C source, as assessed by  $\delta^{13}\text{C}$ . Hepatic [Ag] significantly increased with trophic position, as measured by  $\delta^{15}\text{N}$ , within the brook trout sample set. Biodilution of Ag was observed between primary producers and small forage fish when whole body [Ag] was analyzed. Nevertheless, when considering whole food web biomagnification and hepatic [Ag] of top predator fish, a significant positive regression was found between [Ag] and trophic position, as measured by  $\delta^{15}\text{N}$ . The importance of species-specific and tissue-specific considerations to obtain more information on Ag trophodynamics than that usually presented in the literature is shown. To the best of our knowledge, this is the first study in assessing Ag trophodynamics and tissue-specific biomagnification in a whole freshwater food web." (Authors) Only two specimens "Odonata" were analysed containing 0,03 and 0,1  $\mu\text{g g}^{-1}$  Ag concentrations. ] Address: Revenga, J.E., Centro Regional Universitario Bariloche (CRUB), Universidad Nacional del Comahue, Quintral 1250, 8400 Bariloche, Argentina. E-mail: jrevenga@bariloche.com.ar

**14003.** Rueda, J.; Molina, C.; Rueda, Y. (2011): Fallo no crítico en la emergencia de un ejemplar de *Orthetrum trinacria* (Sélys, 1841) (Odonata: Libellulidae). *Boletín de la*

*S.E.A.* 48(1): 374. (in Spanish, with English summary) ["We report on the sighting of a flying specimen of *O. trinacria* with a non critical failure experienced during wing emergence. It was observed during an attack on a dip-teran which ended on a reed." (Authors)]

**14004.** Tourenq, C.; Brook, M.; Knuteson, S.; Shuriqi, M.K.; Sawaf, M.; Perry, L. (2011): Hydrogeology of Wadi Wurayah, United Arab Emirates, and its importance for biodiversity and local communities. *Hydrological Sciences Journal* 56(8): 1407-1422. (in English, with French summary) ["Wadi Wurayah, in the Emirate of Fujairah, United Arab Emirates, lies within the Hajar Mountain range by the Gulf of Oman. The climate of the area is influenced by climatic events originating in Africa, Eastern Europe-Siberia, and the Indian and Pacific oceans. Rainfall provides  $18.7\text{hm}^3$  water annually, with an average of  $2.24 \text{hm}^3$  as runoff. Recharge from rainfall to the mountain ophiolite complex creates a unique hydrogeological system with permanent freshwater habitats that support a biodiversity unique in the country and the world. The freshwater habitats host, amongst others, two species of amphibians, one fish species and aquatic insect species new to science. Spring waters classified as magnesium bicarbonate, slightly alkaline, with temperatures from 22 to 28°C and an average pH of 8.3, meet physico-chemical standards for drinking and bottled water, but do not meet the bacteriological standards near places frequented by tourists. An active management of the human pressure on the whole wadi ecosystem is urgently needed. ... To date, nine species of Odonata have been observed in Wadi Wurayah, the waterfall pool has one of the only three records of *Tamea basilaris* and the only record of *Crocothemis sanguinolenta* for the whole UAE (Reimer personal comm., Feulner et al. 2007)." (Authors)] Address: Tourenq, C., Emirates Wildlife Society - World Wide Fund for Nature, PO Box 45333, Abu Dhabi, United Arab Emirates. E-mail: ctourenq@ewswwf.ae

**14005.** Villanueva, R.J.T.; Gapud, V.P.; Lin, C.-P. (2011): *Drepanosticta leonardi* n. sp., (Odonata: Platystictidae), a new damselfly species from Leyte Island, Philippines. *Philipp. Ent.* 25(2): 111-115. (in English) ["One new species of damselfly, *Drepanosticta leonardi* n. sp., is described and illustrated based on specimens from Mt. Pangasugan, in the central part of Leyte Island, Philippines. It belongs to *Drepanosticta belyshevi* group and differs from its congeners based on the combination of characters on its posterior lobe of prothorax and cerci." (Authors)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

## 2012

**14006.** Andrew, R.J.; Verma, P.; Thaokar, N. (2012): Seasonal variation and mite infestation in the anisopteran dragonflies of Gorewada lake of Nagpur City, India.



Vidyabharati International Interdisciplinary Research Journal 1(1): 1-10. (in English) ["A field study throughout the year (2010-2011) was undertaken at Gorewada lake of Nagpur city (which supplies water to the city) to study the seasonal activity pattern of anisopteran dragonflies. Although a total of 33 anisopterans were detected, we could study the following three parameters- flight period, reproductive behaviour, breeding habitats and mite parasitism of twenty species. The result indicates a distinct variation in the breeding site and flight period of the species observed. Such variation in the choice of breeding habitat allows the species to avoid competitive pressure for breeding and larval microhabitats. Only six species (*Acisoma panorpoides*, *Brachythemis contaminata*, *Crocothemis servilia*, *Diplacodes trivialis*, *Neurothemis t. tulia* and *Trithemis pallidinervis*) were found to be parasitized with mite *Arrenurus* spp. mostly on the ventral region of the thorax and abdomen." (Authors)] Address: Andrew, R.J., Post Graduate Dept of Zoology, Hislop College, Nagpur (M.S.), India

**14007.** Bates, L.M. (2012): Investigating the bioaccumulation of methylmercury in invertebrates from Saskatchewan prairie pothole wetlands. Ph thesis. The University of Regina, Canada, 3737 Wascana Parkway, Regina, SK S4S 0A2: 113 pp-["Deposition of atmospheric mercury (Hg(II)) to remote areas is an environmental health concern. Mercury is transferred to aquatic habitats from the atmosphere through fallout and precipitation and from surrounding land surfaces in runoff. Once present in a wetland, Hg(II) can be converted by microbial activity to methylmercury (MeHg), which is a harmful neurotoxin that bioaccumulates in foodwebs. Wetlands are important sites of methylation and MeHg concentrations in the water of prairie wetland habitats can be elevated compared to other systems. Within these habitats, invertebrates are an important food resource for many waterfowl species and may act as an indicator for the level of contamination within higher trophic levels. In 2007 and 2008, invertebrates were collected from wetlands on three land use types: agricultural lands, grasslands and organic agricultural lands. Organisms were identified to order (Gastropoda, Corixidae, Odonata, and Dytiscidae / Notonectidae) and categorized into functional feeding groups (FFGs; scraper, omnivore or predator). Samples were analyzed for total Hg, MeHg and stable isotopes of nitrogen ( $\delta^{15}N$ ) and compared among invertebrate taxa and land use types. MeHg concentrations generally increased with trophic level. Gastropoda were significantly lower in MeHg concentrations than the other taxa. The  $\delta^{15}N$  values did not correlate well with MeHg levels seen in invertebrate taxa, but did confirm invertebrate trophic levels. In general, MeHg concentrations were higher in invertebrate taxa from organic ponds than those from grassland ponds and lowest in invertebrates from ponds on traditional agricultural lands. Differences in MeHg concentrations with land use effects were apparent for all invertebrate groups collected, with significant differences observed in Corixidae. Changes in MeHg

concentrations in invertebrates in response to land management practices may be used to identify wetland habitats that may favour Hg methylation and may allow for prediction of contamination levels in biota of the prairie pothole region." (Author)] Address: Bates, Lara Michelle

**14008.** Bühler, W. (2012): Ein zweiter aktueller Fund der Gabel-Azurjungfer (*Coenagrion scitulum*) in Baden-Württemberg. *Mercuriale* 11(2011): 47-48. (in German) [Second record of *C. scitulum* in Baden-Württemberg, Germany; Gottenheim am Tuniberg (Landkreis Breisgau-Hochschwarzwald) 16-VI-2011.] Address: Bühler, W., Birkenweg 18, 79288 Gottenheim, Germany. E-mail: willy.buehler@gmx.de

**14009.** Craves, J.A. (2012): A preliminary list of the Odonata of Wayne Co.. *Michigan Birds and Natural History* 9(1): 7-16. (in English) ["Wayne Co. is located in southeastern Michigan at ~ lat 42°15'N, long 83°20'W. It covers 622 sq mi (1611 km). Encompassing Detroit and its immediate suburbs, it is heavily urbanized. There are 3 large rivers in county. The Rouge River drains into the Detroit River, which itself forms the eastern boundary of the county. The Huron River drains into Lake Erie near the mouth of the Detroit River. Unfortunately, 84% of historic wetlands in the county have been lost (Wooley 1998), and less than 3% of the original coastal wetlands remain along the Detroit River (Manny et al. 1988). This Odonata list is compiled from the Michigan Odonata Survey (MOS) database at the University of Michigan Museum of Zoology (UMMZ), a literature search, and my own records obtained during summer 2001. The list contains 75 species; 29 Zygoptera (damselflies) and 46 Anisoptera (dragonflies). Specimens are required by the MOS for official placement on the state or a county list. Of the 75 listed species, 19 are represented only by literature or sight records. I've noted these unvouchered species, and they can be considered "unofficial" until a voucher is received by MOS. If my record was the first for Wayne Co. (18 species), it will be noted as a new county record. For 5 of these new records, I did not obtain a voucher specimen. Two published records are not included. *Gompheshna furcillata* (Hagen) was reported by Hagen (1875). With the only confirmed records in the state from the Upper Peninsula and northern Lower Peninsula, this record is probably in error. *Arigomphus submedianus* (Williamson) was reported by Hagen (1885) as *G. submedianus* (*pallidus*). This is the only record for the state and considered questionable (O'Brien 1998). Following the main list are 48 species that have been found in 1 or more of the neighbouring counties which might be expected in Wayne Co. Approximate flight dates for adults have been provided. Depending on the number of specimen records, dates given are for southeast Michigan (Wayne, Monroe, Washtenaw, Oakland, and/or Macomb counties), statewide (Michigan data from O'Brien 2001), or from Ohio (OOS 2000). I provide dates from my own records from Wayne Co. if they represent dates outside others given. The flight date ranges are approximate.

Bear in mind that dragonfly collections are still limited, and many collectors focus their field work in mid-summer; early and late dates for some species are probably not accurately represented. The Ohio Odonata Survey web site (OOS 2000) provides excellent graphs, useful for seeing not only date ranges, but also peak flight dates of adults in that state." (Author)] Address: Craves, Julie A., Rouge River Bird Observatory, Natural Areas Dept., University of Michigan-Dearborn, Dearborn, MI 48128, USA

**14010.** Dragonfly Society of the Americas (2012): *Argia* 24(2). *Argia* 24(2): 26 pp. (in English) [The following administrative and organisational issues are published: Calendar of Events: 1; DSA 2012 Annual Meeting in South Carolina a Great Success!: 1; DSA 2012 Post-Meeting Trip: 2; Call for Papers for BAO: 4; DSA is on Facebook: 15; MDP has gone digital!: 21; Photos Needed: 22; Annual Meeting 2012 group photo: 22.] Address: Dragonfly Society of the Americas c/o Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**14011.** Feulner, G. (2012): Cross Dressing Damsels. *Gazelle* 27(12): 4-5. (in English) ["The landscaped grounds at Emirates Towers have never been a hotbed of biodiversity. The mostly exotic landscape plants and the active grounds crew see to that. But the pond on the Sheikh Zayed Road side supports a population of dozens of Evans' Bluetail damselfly *Ischnura evansi* (*Cyperus alternifolius*, the umbrella sedge), especially at the southern end. When I visited in mid-November, the population had a somewhat peculiar look. In the first place, many of the damsels present were rather pale or had slightly odd colours instead of the customary pale green eyes and thorax. This was probably because they were recently molted from the larval stage, consistent with the large number of small exuviae (the shed larval skins) found on the lower stems of the sedges; I collected some for reference. But in addition, almost all of the individuals had a pale blue band near the end of the abdomen (the "tail"). This is normally characteristic of males, but closer inspection showed that many of these blue-banded individuals were in fact females, and some of them could be found copulating with blue-banded males. Within the genus *Ischnura* (Bluetails), females of many species are known to have several different colour morphs. One of those is a so-called 'androchrome' morph, which mimics male colouration, including the blue band. In *I. evansi* this is apparently not infrequent. The androchrome morph was previously encountered in *I. evansi* at Ruwayyah, among more conventional females (see 'Damsel in Disguise' in the March 2011 *Gazelle*). More recently I found an androchrome female at a 'wild' site, in a small population at a well-vegetated waterfall pool along the mountain front near Juweif, in northern Oman. But why it should predominate in the Emirates Towers population is unknown. In more than an hour of observation I saw only a single drab female and a single orange one – normally

two of the more common colour morphs. The androchrome females also seemed to adopt male-like behaviour by perching in prominent places at the pool for extended periods, even when they were not feeding or ovipositing." (Author)] Address: Feulner, G.R., P.O. Box 31045, Dubai, United Arab Emirates. E-mail: grfeulner@gmail.com

**14012.** Fröhlich, A.; Hauswirth, L.; Joest, R. (2012): Natur aus zweiter Hand - Steinbruch Lohner Klei. Erfassung der Flora, Libellen, Heuschrecken und Tagfalter im Naturschutzgebiet „Steinbruch Lohner Klei“ 2009 - 2011. *ABU info* 33-35: 21-25. (in German) [Nordrhein-Westfalen, Germany. 13 common Odonata species are checked.] Address: Hauswirth, Luise, Reiterwinkel 11, 59557 Lippstadt, Germany

**14013.** Kelliher, J.S. (2012): The distribution of heavy metals in known and potential Hine's emerald dragonfly (*Somatochlora hineana*) habitat near the Viburnum Trend mining district of southeast Missouri, USA. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Missouri Lead Mining District, Natural Resource Damage Assessment and Restoration: 22 pp. (in English) ["The Viburnum Trend mining district in southeast Missouri, USA is one of the largest producers of lead in the world. Previous biological surveys in the district have found evidence demonstrating metal exposure of birds, insects, fish and crayfish. This study examined heavy metal concentrations in the sediment and water of freshwater wetlands known to be or potentially occupied by the federally endangered *S. hineana*. Sediment samples were collected from thirteen sites to assess the potential exposure of the dragonfly to mining-derived metals. Water samples were also collected at the sampling sites when sufficient surface water was available for collection. Concentrations of metals (lead, zinc, cadmium, nickel, et al) were analyzed in the surface water and sediment. Mean concentrations of lead in sediments were significantly greater ( $P < 0.01$ ) at sites potentially impacted by mining compared to reference sites. Sediment concentrations of lead exceeded consensus-based threshold effects concentrations at eight of ten sites potentially impacted by mining. Concentrations of dissolved metals in surface water samples did not exceed Aquatic Life Criteria established by the State of Missouri. These findings suggest that metals associated with mining activities in the Viburnum Trend may have the potential to negatively impact Hine's Emerald Dragonfly populations in and around the district." (Author)] Address: Kelliher, J.S. c/o U.S. Department of the Interior, Fish and Wildlife Service, Southeast Missouri Lead Mining District, Natural Resource Damage Assessment and Restoration, 5600 American Blvd. West, Suite 990, Bloomington, MN 55437-1458, USA

**14014.** King, S.; Flint, O.S. (2012): *Sympetrum ambiguum* (Odonata: Libellulidae) to be removed from the Minnesota list of Odonata. *Argia* 24(1): 2-3. (in English) [R.P. Currie had corrected the identification to a female *Sym-*

petrum obtrusum.] Address: Flint, O.S., Dept of Ent. MRC-169, National Museum of Natural History, Washington, DC, 20013-7012, USA. E-mail: flinto@si.edu

**14015.** Kohler, N.S. (2012): *Archilestes grandis* (Great Spreadwing) and *Sympetrum rubicundulum* (Ruby Meadowhawk), two new records for Montana. *Argia* 24(1): 15-16. (in English) [USA; *Archilestes grandis*: Little Bighorn River, Big Horn Co., 2-IX-2011; *Sympetrum rubicundulum*: Sallow reservoir north of Forsyth, Rosebud Co., 26-VII-2011] Address: Kohler, N.S. E-mail: nskohler@bresnan.net

**14016.** Langenbach, A.; Joest, R. (2012): Gläserne Schwingen an der renaturierten Lippe. *ABU info* 33-35: 69. (in German) [Brief report on activities to map the odonate fauna at two localities in the Lippe alluvium in Nordrhein-Westfalen, Germany. A brief focus is set on the representation of *Ophiogomphus cecilia* along the River Lippe between Lippstadt and Lippborg.] Address: Langenbach, Anke, Kölner Grenzweg 23, 59558 Lippstadt, Germany

**14017.** Leivas, P.T.; Leivas, F.W.T.; Moura, M.O. (2012): Diet and trophic niche of *Lithobates catesbeianus* (Amphibia: Anura). *Zoologia* 29(5): 405-412. (in English) ["*L. catesbeianus* is an invasive anuran introduced in Brazil that is associated with the displacement and the decline of populations of native species worldwide. There is evidence that biological invasions are facilitated by certain attributes of the invading species, for instance niche breadth, and that invasive species have a broader ecological niche with respect to native ones. We designed a study to ascertain the temporal, ontogenetic, and sex differences in the niche dynamics of the American bullfrog. We sampled monthly from June 2008 to May 2009 in the state of Paraná, southern Brazil. For each individual, we gathered biometric and stomach content data. We then estimated the niche breadth of the juveniles and adults, and compared it between the sexes. A total of 104 females and 77 males were sampled. *L. catesbeianus* has a generalist diet, preying upon invertebrates and vertebrates. Even though the diet of the studied population varied seasonally, it did not differ between the sexes nor did it respond to biometric variables. Niche breadth was more restricted in the winter than in the autumn. The trophic niche of juveniles and adults did not overlap much when compared with the trophic niche overlap between males and females. Adult males and females had a considerable niche overlap, but females had a broader trophic niche than males in the winter and in the spring. These niche characteristics point to an opportunistic predation strategy that may have facilitated the process of invasion and establishment of this species in the study area." (Authors) 131 of the 181 stomachs include insects, of which 24 contained Odonata. Obviously, in most cases this must be imagoes while only in one case larvae were involved.] Address: Leivas, P.T., Programa de Pós-Graduação em Ecologia e Conservação, Universidade Federal do Paraná. Caixa postal 19020, 81531-980 Curitiba, Paraná, Brazil. E-mail: ptleivas@yahoo.com.br

**14018.** Mitra, A.; Choden, K.; Dorji, Y.; Penjor, T.; Dorji, R.; Subedi, K.; Dorji, P. (2012): Odonata of Samdrup Choling Dungkhag in Samdrup Jongkhar, Bhutan. *Bhutan journal of research & development* Autumn 2012: 125-141. (in English) ["Several field visits were undertaken between February and June, 2012, at different Odonata habitats in and around Samdrup Choling Dungkhag under Samdrup Jongkhar Dzongkhag, mainly at Pemathang, Phuntshothang, Martshala and Dewathang. A total of 83 specimens of Odonata were collected comprising of 40 species and subspecies including 19 new records for Bhutan, thereby extending the list of Odonata known from Bhutan to 75. One of the *Coelliccia* species seemed to be new to science and will be confirmed after further study. The present study recorded four species namely, *Coelliccia svihleri*, *Protosticta himalaica*, *Rhinocypha cuneata* and *Chlorogomphus mortoni*, which were designated as 'Data Deficient' during the recent most red list assessment in eastern Himalaya carried out by IUCN. However, the study on the seasonal diversity of Odonata in Samdrup Choling Dungkhag remained incomplete being limited to only five months. 56 of the 75 species and subspecies of Odonata known from Bhutan arc recorded only from Eastern and South-eastern parts. A major portion of Bhutan remains odonatologically unexplored." (Authors)] Address: Mitra, A., Dept Zool., Sherubtse Coll., Kanglung, Bhutan. E-mail: amitodonata@yahoo.com

**14019.** Myrup, A.R. (2012): A survey of the Odonata fauna of Zion National Park. *Argia* 24(2): 5-10. (in English) [Utah, USA. "During the summer of 2011, 25 species of Odonata were documented from Zion National Park, belonging to seven families and 17 genera. Thirteen of these were previously unrecorded from Zion NP. This brings the Zion National Park list of Odonata to 37 species belonging to seven different families and 23 genera. ... No new additions were added to the Utah State Odonata Checklist. Although many streams in Zion NP were not surveyed, a better understanding of the distribution and habitat preferences of odonates in Taylor Creek, North Creek, Pine Creek, Weeping Rock Stream and the East Fork Virgin River was obtained from this study in Zion National Park. Several of the odonates found in Zion NP have narrow habitat requirements, and it is comforting to know that, at least here, these habitats and the precious water they contain are protected. Due to their natural state and inaccessibility, many of the streams in the Virgin River drainage (165.5 river miles) have been designated as "Wild and Scenic Rivers" by the Omnibus Public Lands Management Act of 2009." (Author)] Address: Myrup, A., 914 South 1635 West, Orem, Utah 84058, USA. E-mail: alanm@provo.edu

**14020.** Nottage, L.; Nottage, R. (2012): Canada Tips and nearby quarry pools, Blaenavon. *Gwent - Glamorgan Recorders' Newsletter* 7: 7. (in English) [Wales, UK; on 23-VII-2012, the following Odonata were seen: *Cordulegaster boltonii*, *Anax imperator*, *Aeshna juncea*, *Libellula quadrimaculata*, *Sympetrum striolatum*, *S. danae*,



*Ischnura pumilio*, *Enallagma cyathigerum*, *Pyrrhosoma nymphula* and *Lestes sponsa*.] Address: not stated

**14021.** Oke, O.A.; Gbadebo, A.M. (2012): Survey and collection of insect species associated with Water Hyacinth on Ogun River, Nigeria. *International Journal of Agriculture and Forestry* 2(2): 6-9. (in English) [Odonata were represented by *Acisoma panorpoides*.] Address: Oke, O.A., Department of Biological Sciences, University of Agriculture, Abeokuta, P. M. B. 2240 Nigeria

**14022.** Okulewicz, A.; Sitko, J. (2012): Parasitic helminths – probable cause of death of birds. *Helminthologia* 49(4): 241-246. (in English) ["Parasitic helminths were the probable cause of death of 41 passeriform birds (29 adults and 12 juveniles in their first year of life) caught in the net during the spring and autumn ringing (1986 – 2010). The birds (1 Chaffinch *Fringilla coelebs*, 1 House Martin *Delichon urbica*, 2 Blue Tit *Cyanistes caeruleus*, 9 Great Tit *Parus major*, 3 Willow Tit *Poecile palustris*, 1 Great Reed *Acrocephalus arundinaceus*, 1 Chiffchaff *Phylloscopus collybita*, 3 Blackcap *Sylvia atricapilla*, 2 Dunnock *Prunella modularis*, 1 Magpie *Pica pica*, 5 Robin *Erithacus rubecula*, 9 Common Blackbird *Turdus merula* and 3 Song Thrush *T. philomelos*) were caught in the environs of Přešov (Czech Republic). The helminths: trematodes, tapeworms, nematodes and hook worms, were located in the intestine, glandular and muscular stomach, cloaca, rectum, gall bladder, liver, pulmonary cavity, air sac, nasal and orbital cavity and subcutaneous tissue of the hosts. The intensity of invasion with different species of parasites was up to 734 per host. Some parasites *Brachydistomum ventricosum*, *Mosesia sittae*, *Aprocta cylindrica*, *Diplotrina tridens* were acquired at the wintering grounds. All the helminths were heteroxenous, with development cycle involving intermediate hosts (invertebrates) which are part of the birds' diet. ... Trematode *Collyriclum faba* is a parasite of subcutaneous tissue of Passeriformes, its intermediate hosts are snails and water insects (Odonata, Plecoptera, Ephemeroptera, Trichoptera)."] (Authors)] Address: Okulewicz, Anna, Dept of Parasit., Inst. of Genetics & Microbiol., Wrocław Univ., Przybyszewskiego 63/77, 51-148 Wrocław, Poland, E- mail: [anna.okulewicz@microb.uni.wroc.pl](mailto:anna.okulewicz@microb.uni.wroc.pl)

**14023.** Pavlova, M.; Pehlivanov, L.; Kazakov, S.; Varadinova, E.; Vidinova, Y.; Tyufekchieva, V.; Uzunov, Y. (2012): Changes in the aquatic communities in the Rhodopes mountain landslide lakes (South Bulgaria) for the last 40 years. I. Taxonomic composition of macrozoobenthos, zooplankton and fish communities. *Acta zool. bulg.*, Suppl. 4: 187-195. (in English) ["The biodiversity of aquatic communities (macrozoobenthos, zooplankton and fish) in 5 of Smolyanski and 2 of Chairski landslide lakes was studied in spring and summer of 2010. A total of 19 taxa of different taxonomic level of macrozoobenthos and zooplankton were reported for the first time in the studied lakes. The enriched list included 4 new planktonic species (of Rotifera type) and 15 new macrozoobenthic taxa (4 species of Oligochaeta, 2 species of Bivalvia, one ge-

nus of Ephemeroptera, one species of Plecoptera, 4 species, 1 genera and 2 families of the Trichoptera groups). Five fish species were registered belonging to two families in the composition of the ichthyofauna of the studied lakes. The similarities in the species composition of the macrozoobenthos and zooplankton among the lakes and in comparison with previous investigations were assessed. The statistically significant differences found for the macrozoobenthos composition in comparison with the published in 1975 revealed two completely different communities. Moreover, this applied also to the zooplankton community which fundamentally differed from that found in 1975. The large number of taxa reported for the first time was probably due to the long period of time since the last studies (more than 40 years) and the changes in the ecological conditions in the lakes. A more refined examination of the ecosystem functioning could provide more comprehensive data about the processes in these lakes of high conservation value." (Authors) *Pyrrhosoma nymphula* and *Coenagrion pulchellum* are listed in table 3.] Address: Pavlova, Milena, Inst. of Biodiversity & Ecosystem Research, Bulgarian Academy of Sciences, 2 Yurii Gagarin str., 1113 Sofia, Bulgaria. E-mail: [mnp.iber@gmail.com](mailto:mnp.iber@gmail.com)

**14024.** Porst, G.; Naughton, O.; Gill, L.; Johnston, P.; Irvine, K. (2012): Adaptation, phenology and disturbance of macroinvertebrates in temporary water bodies. *Hydrobiologia* 696: 47-62. (in English) ["The temporal transition of species dominance following disturbances is strongly influenced by taxon life histories. In temporary water bodies, seasonal progression can be rapid. The community response of aquatic littoral invertebrate communities to disturbance was measured across four temporary water bodies (turloughs) representing a hydroperiod gradient in the karst landscape of western Ireland. Three distinct turlough wet-phases were identified based on macroinvertebrate taxon richness and community composition: filling, aquatic and drying phase. Invertebrates able to recolonise the turlough environment quickly upon flooding from refugia (e.g. sink-holes or little puddles) or resting stages within the turlough basin demonstrated highest proportion in abundances during the initial filling phase. Over time, the number of actively dispersing invertebrates, generally occupying turloughs only for a part of their life-cycle, increased. Hydroperiod had a significant effect on macroinvertebrate taxon richness, with short hydroperiods supporting low faunal diversity. Influence of hydrological disturbance generally decreased with progression of the annual wet phase, indicated by a decrease in taxon richness variation and an increase of biodiversity with time. Our study highlights the importance of life-cycle strategies of species for the occurrence of fairly predictable and periodically occurring seasonal patterns, and emphasizes the importance of ecological disturbances for colonisation cycles." (Authors) The list of taxa includes *Lestes* sp.] Address: Porst, Gwendolin, Zool. Dept, School of Natural Sciences, Trinity College Dublin, Dublin 2, Ireland. E-mail: [porst@igb-berlin.de](mailto:porst@igb-berlin.de)

- 14025.** Prieto-Lillo, E.; Sanchis, M.J.; Rueda, J.; Molina, C.; Tomero, J.A.; Herrero-Borgoñón, J.J.; Teruel, S. (2012): Primeras citas de *Trithemis kirbyi* (Sélys, 1891) (Odonata: Libellulidae) en la Comunidad Valenciana: confirmación de su rápida expansión hacia el NE de la Península Ibérica. *Boletín de la Sociedad Entomológica Aragonesa* 51: 363-364. (in Spanish, with English summary) ["The presence of *T. kirbyi* in the Valencian Community is reported on the present paper. Its presence is considered associated with the warm fronts series registered in the summer of 2012, a phenomenon that contributes to facilitate its dispersion and enables its current presence in the northern half of the peninsula." (Authors) 11-VIII- 2012, Castellón, UTM: (ETRS89) 30 S 714065; 4422455); 11-IX-2012, Bolbaite (UTM: (ETRS89) 30S 700200, 4326965)] Address: Prieto-Lillo, E., C/ Vall d'Albaida No 44, Puerto de Sagunto, 46520 Valencia, Spain. E-mail: Ezequiel.Prieto@uv.es
- 14026.** Puliafico, K.P.; Jensen, A.M. (2012): 5. Entomology. Qatar Islamic Archaeology and Heritage Project. End of Season Report. *Environmental Studies*. 2011-2012: 31-45. (in English) [*Anax parthenope* is the single odonate species collected from the proposed UNESCO Exclusion and Buffer Zone, Al Zubarah Archaeological Site, Qatar, in March 2012.] Address: Puliafico, K., Entomology Dept, Zoological Museum, The Natural History Museum of Denmark. E-mail: puliafico@gmail.com
- 14027.** Ramos Hernandez, J.M. (2012): The Dragonflies (Insecta: Odonata) of Sierra Las Damas, Sancti Spiritus Province, Cuba. *Argia* 24(2): 18. (in English) [26 odonate species recorded in 2011 are checklisted.] Address: Ramos Hernandez, J.M., C # 9 e/ Algerdo Ferrer y Agramonte, Cabaiguán, Sancti-Spiritus, Cuba 62400
- 14028.** Revenga, J.E.; Campbell, L.M.; Arribére, M.A.; Ribeiro Guevara, S. (2012): Arsenic, cobalt and chromium food web biodilution in a Patagonia mountain lake. *Ecotoxicology and Environmental Safety* 81: 1-10. (in English) ["Mussels, *Diplon chilensis*, from Lake Moreno, a double-basined mountain lake in southern Argentina, is known to have elevated concentrations of chromium (Cr, >25  $\mu\text{g g}^{-1}$  dry weight DW) and arsenic (As, 35  $\mu\text{g g}^{-1}$  DW), attributed to untreated sewage. To further understand the trophodynamics of Cr, As and cobalt (Co), we investigated concentrations and transfer throughout the food web in each basin of Lake Moreno. Each basin differs in morphology in that the gently-sloping Lake Moreno West has more littoral habitat than deeper Lake Moreno East with its higher proportion of pelagic habitat. Despite the morphological differences, both basins share similar water quality parameters and species assemblages. As a result, Lake Moreno provides an exceptional opportunity to compare trophodynamics of elements that enable us to hypothesize pelagic-littoral habitat coupling in response to lake morphology as the underlying factor influencing both Cr pathway and Co and As trophodynamic modelling. Using stable isotopes of nitrogen ( $\delta^{15}\text{N}$ ) and carbon ( $\delta^{13}\text{C}$ ) to characterize metals trophodynamics in each basin, biodilution of As, Cr and Co were indicated by negative regressions. This is confirmed by elevated As, Co and Cr concentrations in phytoplankton (11.3 $\pm$ 5.7, 7.4 $\pm$ 4.9, 44.5 $\pm$ 40.7  $\mu\text{g g}^{-1}$  DW respectively), while zooplankton and biofilm had the next elevated concentrations. Those elevated concentrations are in contrast with lower concentrations in sport fish such as rainbow trout (0.5 $\pm$ 0.5, 0.2 $\pm$ 0.3, 1.8 $\pm$ 1.2  $\mu\text{g g}^{-1}$  DW). Higher concentrations of Cr in fish were associated with higher proportion of benthic/littoral prey items in western basin, and were confirmed by significant correlation with  $\delta^{13}\text{C}$  values. Arsenic, Co and Cr concentrations in fish, while elevated, do not pose health risks to human or wildlife consumers. Highlights: \*Biodilution of As, Cr and Co is shown in the biota of both basins of Lake Moreno. \*Cr pathways differed between basins. \*Different proportions of benthic/littoral preys in fish diet explained Cr pathways. \*Higher trophic level in the biota from 1 basin obscured metals transfer modeling. \*Lake morphology explained differences in both metal pathways and modeling." (Authors) Odonata are treated at the order level.] Address: Revenga, J.E., Centro Regional Universitario Bariloche (CRUB), Universidad Nacional del Comahue, Quintral 1250, 8400 Bariloche, Argentina
- 14029.** Richardson, T.W.; Smith, Z. (2012): Intergeneric copulation between *Sympetrum obtrusum* and *Leucorrhinia hudsonica*. *Argia* 24(1): 16-18. (in English) [6-XIII-2011, Grass Lake, El Dorado County, California, USA; male *Sympetrum obtrusum* and female *Leucorrhinia hudsonica*] Address: Richardson, T.W., Tahoe Institute for Natural Science, P.O. 4289 Truckee, CA 96160, USA. E-mail: will@tinsweb.org
- 14030.** Romero Porrino, R. (2012): Odonatos de Sierra Morena: Algunas citas de interés en el periodo 2010-2011. *Boletín Rola - Boletín de la Red de Observadores de Libélulas en Andalucía* 1: 22-29. (in Spanish, with English summary) [Records of adult dragonflies observed in Sierra Morena (Huelva, Sevilla, Córdoba and Jaén) in 2010-2011 are presented: *Calopteryx xanthostoma*, *Coenagrion scitulum*, *Pyrrhosoma nymphula*, *Aeshna cyanea*, *A. mixta*, *Onychogomphus uncatus*, *Oxygastra curtisii*, *Libellula depressa*, *Trithemis kirbyi*, *Brachythemis impartita*, and *Diplacodes lefebvrei*.] Address: E-mail: dendrominor@yahoo.es
- 14031.** Roobas, B.; Feulner, G. (2012): A Red November Visitor. *Gazelle* 27(12): 5-6. (in English) ["The only dragonfly observed during November's Dubai-Abu Dhabi desert field trip proved to be an interesting one. The two dragonfly species most commonly seen over desert sands in the UAE are the widespread *Pantala flavescens*, a strong flier that has a worldwide distribution, and *Anax ephippiger*, which in our area has an annual swarming period centered on January. Both of these species patrol relatively high above the ground and seldom perch. The dragonfly seen near Endurance Village was, however, a

female *Sympetrum fonscolombii*, a Palaearctic (northern) species, and it was perched on a clump of Desert Knot-grass (*Pennisetum divisum*). The earliest reports of this insect in the UAE and northern Oman were of scattered individuals, all seen in November, suggesting a possible seasonal phenomenon, but later reports by European visitors included spring occurrences as well. Additional local attention confirmed a major influx in November 2009, evidently a migration of sorts, reported in The National newspaper, when hundreds of these insects were reported by numerous observers across the UAE, from Abu Dhabi, Al Ain and Dubai to Kalba on the East Coast. Potential observers should note, however, that *S. fonscolombii* is just one of seven 'red' dragonflies that can all be found in the UAE. All of the others are resident and all but one are much more common – *Pantala flavescens*, *Crocothemis erythraea*, *Trithemis annulata*, *T. arteriosa*, *T. kirbyi* and *C. sanguinolenta*. In most of these species, it is only the male that is red; the female is normally a less conspicuous colour." (Authors)] Address: Feulner, G.R., P.O. Box 31045, Dubai, United Arab Emirates. E-mail: grfeulner@gmail.com

**14032.** Seehausen, M. (2012): Die Libellen (Insecta: Odonata) der Sammlung KIRSCHBAUM – Revision und kommentierter Katalog. Jahrbücher des Nassauischen Vereins für Naturkunde 133: 25-46. (in German, with English summary) [The Odonata of the Collection KIRSCHBAUM that is stored at the Museum Wiesbaden (Germany) has been revised and catalogued. "Due to the unfortunately common lack of a precise information about the place of collection, an analysis of historical literature had to be conducted. Altogether 479 individuals in 45 species were assigned to the collection." (Author) The collection also includes a specimen of *Cordulegaster (Sonjagaster) helladica* from Mount Taygetes, Greece.] Address: Seehausen, M., Museum Wiesbaden Hessisches Landesmuseum für Kunst und Natur, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**14033.** Smith-Patten, B.D.; Patten, M.A. (2012): *Stylurus intricatus* (Brimstone Clubtail), a new old record for Oklahoma. *Argia* 24(3): 10. (in English) [24-26-VIII-1932, Dunlap, Harper County, Oklahoma, USA] Address: Patten, M.A., Oklahoma Biological Survey, University of Oklahoma, Norman, OK 73019, USA. E-mail: mpatten@ou.edu

**14034.** Stoyanova, T.; Traykov, I.; Yaneva, I.; Bogoev, V. (2012): Accumulation of heavy metals in the macrozoobenthos of the Luda River, Bulgaria. *Biotechnology & Biotechnological Equipment* 26(3): 2981-2986. (in English) ["Heavy metals are among the most common environmental pollutants. Their long-term environmental chronic stress leads to negative impacts on the diversity and abundance of benthic invertebrates. The Luda River, a left tributary to the Struma River, flows through the north-western slopes of Pirin Mountain. An abandoned uranium mine is located in the upper parts of the water-

shed. The aim of this study was to assess the accumulation of heavy metals in the macrozoobenthos of the river. Four sites were sampled for river state assessment and from two of them additional macrozoobenthic samples were collected for heavy metal analysis in October 2011. In the lower reaches, the reduction of potential habitats, due to sand deposition, and the diversion of river waters showed stronger effect on the benthic communities than the abandoned mine. The benthic invertebrates below the mine were characterized with increased contents of Cr, Ni, Co, Zn, Cd, Pb and Cu. The results suggested that the metals accumulated in benthic organisms originate mostly from the water, whereas the accumulated Cd, Cu, Zn and Ni originate from the sediments. Supposedly, there is also biomagnification in the food web." (Authors) The analysis includes data on *Gomphus* sp. and *Aeshna* sp.] Address: Stoyanova, Teodora, Sofia University "St. Kliment Ohridski", Faculty of Biology, Sofia, Bulgaria. E-mail: stoyanova.t.l@gmail.com

**14035.** Sørensen, U.G.; Bruun Pedersen, H.J. (2012): Eastern Finland. Large carnivores - and all the rest. Privately published: 20 pp. (in English) [In 2012, the authors made a trip to eastern Finland. The following odonate records are documented: 1. *Coenagrion hastulatum*. 29/6 + Lake Ala-Kitka, 3/7 + Siikalahti (Parikalla). 2. *Coenagrion armatum*. 3/7 2 (♂&♀) Siikalahti (Parikalla), .... 3. *Enallagma cyathigerum*. 3/7 + Siikalahti (Parikalla). 4. *Somatochlora metallica*. 2/7 3 Astuvansalmi (Riistina). 5. *S. flavomaculata*. 3/7 1 Siikalahti (Parikalla). 6. *Libellula quadrimaculata*. 29/6 5 Lake Ala-Kitka, 3/7 1 Tantala. 7. *Leucorrhinia caudalis*. 3/7 2 Siikalahti (Parikalla), .... 8. *L. rubicunda*. 29/6 4 Lake Ala-Kitka, 3/7 3 Siikalahti (Parikalla).] Address: Sørensen, U.G., UG Sørensen Consult, Overgaden Oven Vandet 68, 2, DK-1415 Copenhagen K, Denmark. E-mail: contact@ugsorensen.dk. Web-site: www.ugsorensen.dk.

**14036.** Tamm, J. (2012): *Cordulegaster bidentata* in Hessen mit besonderer Berücksichtigung ihrer Bindung an den geologischen Untergrund (Odonata: Cordulegastriidae). *Libellula* 31(3/4): 131-154. (in German, with English summary) ["*C. bidentata* in Hesse, Germany, with emphasis on its dependence on geology (Odonata: Cordulegastriidae) – Distribution of *C. bidentata* in various areas of Hesse has been mapped from 2006 to 2011. The species has only been found on hill slopes in large mainly deciduous forests, where it is widely distributed and locally common. It is strictly bound to forest springs and their uppermost outflows. Its presence was found to be clearly correlated with the geological conditions. Palaeozoic sediments (greywacke, argillite slates) are well colonized in general. Bunter sandstone is partly colonized, partly not. Basalt areas are not colonized at all. The occurrence of the species seems to depend mainly on a sufficient quantity of sandy sediments in the springs and upper forest streams, where the larvae exclusively live. These sediments are a result of weathering of the original stone substratum and of water erosion, which al-



so means an effect of slope incline. That makes it understandable that *C. bidentata* settles well on Middle, but not on Lower and Upper Bunter sandstone. Acid water and soil conditions are suspected to exclude this odonate species mainly from larger coniferous forests. *C. bidentata* could be mapped efficiently in both larval and adult stages, but in the latter only, if mapping was exclusively concentrated on this species. It could be found quite easily not only at the springs, but also at the maturation sites, which are situated close to the springs. All these ways of finding the species allow mapping it in large areas quite quickly." (Author)] Address: Tamm, J., Elgershäuser Straße 12, D-34131 Kassel, Germany. E-mail: jochen.tamm@t-online.de

**14037.** Tennessen, K. (2012): Deformed antenna on *Ophiogomphus carolus* (Riffle Snaketail) nymph. *Argia* 24(2): 17-18. (in English) [North Fork Jump River, Price County, Wisconsin, USA. Deformation in Gomphidae are assessed very rare, and the few available information are discussed.] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**14038.** Terneus, E.; Hernández, K.; Racines, M.J. (2012): Evaluación ecológica del río Lliquino Través de macroinvertebrados acuáticos, Pastaza, Ecuador. *Revista de Ciencias (Facultad de Ciencias Naturales y Exactas Universidad del Valle)* 16: 31-45. (in Spanish, with English summary) ["Over the last 10 years, the Lliquino river, an affluent of the Pastaza river from the Ecuadorian Amazon basin, has been subjected to anthropological impacts due to colonization and mineral extraction activities. This study sought to measure this aquatic eco-system's ecological health by monitoring its waters using macroinvertebrates as bioindicators of environmental quality for five consecutive years (2008 – 2012). During this period, it was possible to determine that the river's ecological health remains in good condition, despite removal of petroleum material in the zone, which shows that apparently this activity is not as aggressive compared to extraction of minerals or heavy metals. The presence and dominance of some taxa indicators of good environmental conditions such as: Ephemeroptera (*Mayobaetis* sp., *Farrodus* sp., *Leptohyphes* sp.), Trichoptera (*Smicridea* sp., *Chimarra* sp.), Plecoptera (*Anacroneturia* sp.), and Megaloptera (*Corydalus* sp.). It is noteworthy that some of the taxa recorded in this study are not common in the macroinvertebrate assemble. For this reason, it is necessary to promote the creation of monitoring programs aimed at assessing the ecologic health conditions of these important populations needed to maintain the aquatic life ecosystem." (Authors) The following Odonata taxa are listed: *Limnocois*, *Macrothemis*, *Dythemis*, *Progomphus*, *Agriogomphus*, *Phyllogomphoides*, and *Acanthagrion*.] Address: Terneus, E., Universidad Internacional del Ecuador

**14039.** von Tschirnhaus, J.; Schulz, U. (2012): The male dimorphic damselfly *Paraphlebia zoe* (Odonata: Megapodagrionidae) in a Mexican cloud forest: site fidelity and

related behavioural aspects. *Mitteilungen der Deutschen Gesellschaft fuer Allgemeine und Angewandte Entomologie* 18: 301. (in German, with English title) ["Odonates have a wide and complex repertoire of territorial and reproductive behaviour. The males of some species even show evidence of correlated dimorphism in their morphology and behaviour. This has been proven for the Neotropical *Paraphlebia quinta* for example, and more recently for *P. zoe*, too. *P. zoe* is endemic to Mexico and occupies specialized habitats such as seepages located in mountain cloud forests. The dimorphic males of *P. zoe* are black-winged (BW) or hyaline-winged (HW). On a small stream within a cloud forest in the Mexican state of Puebla, 410 *P. zoe* adult males (BW and HW) and females were individually marked. The duration for which individuals remained at a given site was determined over a 66-day period and the dispersal distances and directions of marked males leaving the sites of initial observation were studied. Territorial behaviour of the different male phenotypes was observed during surveys. BW males were found to have high site fidelity, holding small territories for at least 66 days. HW males occupied larger areas and were present within these for shorter periods. Females were not found to have site fidelity. Site changes among BW males occurred infrequently and distances were mostly short. BW males generally perched close to the ground and behaved aggressively towards BW males and towards HW males, whereas HW males perched in higher vegetation and only behaved aggressively towards individuals of their own phenotype." (Authors)] Address: Schulz, U., Hochschule für nachhaltige Entwicklung (FH) Eberswalde, FB 2, Fr. Ebert Str. 28, 16225 Eberswalde, Germany

**14040.** Weissinger, R.H.; Perkins, D.W.; Dinger, E.C. (2012): Biodiversity, water chemistry, physical characteristics, and anthropogenic disturbance gradients of sandstone springs on the Colorado Plateau. *Western North American Naturalist* 72(3): 393-406. (in English, with Spanish summary) [USA; "Springs located on the Colorado Plateau are highly threatened and represent a small percentage of the landscape; yet they are disproportionately important to diverse native flora and fauna. The relationships between anthropogenic disturbance, aquatic macroinvertebrate species composition, and environmental variables at these springs have received little study. We selectively visited 40 sandstone springs in southeastern Utah and southwestern Colorado to span a range of impacts. We classified the springs into impact categories based on a spring impact score, and we measured biodiversity (aquatic macroinvertebrates), water chemistry (nutrients, dissolved O<sub>2</sub>, pH, specific conductivity, temperature, turbidity, coliform bacteria [*Escherichia coli*]), physical characters (solar radiation, substrate, vegetation cover, bank stability, discharge), and presence of anthropogenic disturbance. *Escherichia coli* abundance was higher in high impact categories, and turbidity increased with increasing disturbance. No differences in total N, total P, specific conductivity, flow, dissolved O<sub>2</sub>, pH, or substrate

were found among the impact categories. Vegetation cover was higher in low impact categories than in moderate and high impact categories, while potential annual and growing-season solar radiation was lower in low impact categories than in high impact categories. Global and subsequent multiple response permutation procedure (MRPP) comparisons suggested strong differences in aquatic macroinvertebrates between low and high impact springs and no difference at moderate impact springs. Mean taxa richness (alpha-diversity), total taxa richness (beta-diversity), and percent of taxa richness composed of shredders peaked at moderate disturbance levels. The percentage of non-insect taxa richness was reduced in high impact categories, and Odonata were higher in low impact categories than in high impact categories. All high impact springs had both livestock use and vehicle use (roads or off-highway vehicles), and our data suggest that disturbances caused by one or both of these uses alter the aquatic macroinvertebrate assemblage. We suggest that disturbance may increase macroinvertebrate richness, where a mix of tolerant and intolerant species co-occur, until macroinvertebrate richness reaches a threshold; after surpassing this threshold, macroinvertebrate diversity decreases." (Authors)] Address: Perkins, D.W., Northern Colorado Plateau Inventory & Monitoring Network, National Park Service, Western State College, Environmental Studies Dept, Gunnison, CO 81231, USA. E-mail: dustin\_w\_perkins@nps.gov

**14041.** Wesner, J.; Billman, E.J.; Belk, M.C. (2012): Multiple predators indirectly alter community assembly across ecological boundaries. *Ecology* 93(7): 1674-1682. (in English) ["Models of habitat selection often assume that organisms choose habitats based on their intrinsic quality, regardless of the position of these habitats relative to low-quality habitats in the landscape. We created a habitat matrix in which high-quality (predator-free) aquatic habitat patches were positioned adjacent to (predator-associated) or isolated from (control) patches with single or two species of caged predators. After 16 days of colonization, larval insect abundance was reduced by 50% on average in both the predator and predator associated treatments relative to isolated controls. Effects were largely similar among predator treatments despite variation in number of predator species, predator biomass, and whether predators were native or nonnative. Importantly, the strength of effects did not depend on whether predators were physically present. These results demonstrate that predator cues can cascade with equal strength across ecological boundaries, indirectly altering community assembly via habitat selection in intrinsically high-quality habitats. ... Nonnative brown trout (*Salmo trutta*) and a native dragonfly (*Ophiogomphus severus*) were the predators in this experiment." (Authors)] Address: Wesner, J., Dept Biology, 401 WIDB, Brigham Young Univ., Provo, Utah 84602 USA. E-mail: jeffwesner@gmail.com

**14042.** Wiles, W.; Bolek, M.G. (2012): Damselflies (Odonata: Zygoptera) as paratenic hosts of *Serpinema* cf. *trispinosum* (Leidy, 1852) (Nematoda: Camallanidae). Pos-

ter: <http://www.matthewbolek.com/Students/Wiles%20and%20Bolek%20RMCP%202012.pdf>: (in English) ["Third-stage juveniles of the nematode *Serpinema* cf. *trispinosum* (Leidy, 1852) were collected from the mid-gut of four species of adult damselflies from Teal Ridge, a non-irrigated restored semi-permanent wetland located in Stillwater, Oklahoma. This is the first record of *Serpinema* juveniles from damselflies. *Serpinema trispinosum*, adults have been reported from 15 species of North and Central American freshwater turtles, whereas microcrustaceans such as copepods serve as intermediate hosts in this nematode's life cycle. Our review of the literature indicates that this nematode has also been reported from a single species of aquatic snail in Canada, a single species of cichlid fish from Mexico and five species of amphibians from North and South America suggesting that a wide range of invertebrates and vertebrates may serve as paratenic hosts in the life cycle of this nematode. Dietary studies of the 15 species of freshwater turtles reported as definitive hosts for *S. trispinosum* indicate that aquatic insects including damselflies are more commonly reported in turtle diet studies than are fish or amphibians. Since larval damselflies predominantly feed on microcrustaceans our discovery of *S. cf. trispinosum* in damselflies may reflect the importance of damselflies as paratenic hosts of turtle parasites in this genus." (Authors)]

**14043.** Zia, A.; Awan, Z.J.; Astori, Z.H. (2012): Boreal Odonata of Pakistan. Lambert Academic Publishing: 69 pp. (in English) ["In order to study diversity of boreal Odonata in Pakistan two separate studies were carried out during the years 1994 - 1997 & 2006 - 2008. Among these, first study carries data for whole of northern areas, however second study was conducted only in two districts of northern areas with following localities, District Gilgit (Danyore, Sultanabad) and Astor (Yougham, Boomroy, Kharbay, Pakora, Moorgulum, Gorikot). In both of these studies there is a gap of almost a decade. Results of these two independent studies are merged together to study population fluctuation in common collected species (of both studies) with respect to time. As a whole thirty one species were collected from Gilgit-Baltistan. Among these *Orthetrum sabina*, *Pantala flavescens*, *Aeshna juncea* and *Megalestes major* (recorded in both studies) were collected in large numbers in the first study but they were appeared to decrease in next one. This shows a decreasing trend in their population that might be a result of (a) Increased deforestation and urbanization resulting in destruction of their breeding places. (b) A ravaging earthquake was faced in country during the year 2005 that resulted in disappearance of many of the springs and other freshwater spots of the area. Besides this, each study added some new records for the country's Odonata fauna. It highlights the scope to explore more species from the area by undertaking hectic surveys in future. Conservation measures are also needed to conserve some endangered species of the area." (Authors)] Address: Zia, S.A., National Insect Museum, National Agriculture Research Centre, Islamabad – Pakistan. E-mail: saiyedahmed@yahoo.com

**14044.** Adriaens, T.; Devisscher, S.; Louette, G. (2013): Risk analysis of American bullfrog *Lithobates catesbeianus* (Shaw). Risk analysis report of non-native organisms in Belgium. Rapporten van het Instituut voor Natuur- en Bosonderzoek 2013 (INBO.R.2013.41). Instituut voor Natuur- en Bosonderzoek, Brussel: 57 pp. (in English, with Dutch and French summaries) [The paper includes references to the mutual relationship between larvae of Odonata and bullfrogs.] Address: Adriaens, T., INBO Brussel, Kliniekstr. 25, 1070 Brussel, Belgium. E-mail: tim.adriaens@inbo.be

**14045.** Afzan Azmi, W.; Jennings, J. (2013): The impact of management practices of exotic willows (*Salix* spp.) on aquatic invertebrate communities in south Australian freshwater streams. *Journal of Sustainability Science and Management* 8(1): 43-52. (in English) ["The impact of willows, their removal and subsequent revegetation on aquatic invertebrate communities were examined in two freshwater streams in the Mount Lofty Ranges, South Australia. We hypothesized that lower abundance, species diversity and changes in functional feeding groups would occur where willows were present and have been removed. Unexpectedly, invertebrate abundance was significantly higher when willows were present in both streams. The introduced hydrobiid snail (*Potamopyrgus antipodarum*) was the most dominant taxon overall and was significantly more abundant under willows in both streams. More than half of total abundance under willows was contributed by scrapers (mostly *P. antipodarum*) as willow roots are presumed to provide a more stable habitat from high currents and have increased food availability compared with other vegetation. Where willows were removed and not revegetated, there were lower invertebrate species numbers and diversity in both streams. The removal of willows influenced not only loss of habitat, but also an increase in light intensity, decline in water quality and food availability. Our findings conclude that the presence of willows also reduces species numbers and diversity. Large scale willows removal may need special management considerations in order to reduce the impact on aquatic invertebrate communities. .... Similar trends in total abundance were observed in both streams for Trichoptera, Ephemeroptera and Coleoptera. However, fewer Odonata and Hemiptera were recorded in Sixth Creek than Deep Creek, but slightly more bivalves were found in Sixth Creek (1.2%) than in Deep Creek (0.8%)."] (Authors)] Address: Afzan Azmi, Wahizatul, Dept of Biol. Sciences, Faculty of Science and Technology, Universiti Malaysia Terengganu, 21030 Kuala Terengganu, Terengganu, Malaysia. E-mail: wahizatul@umt.edu.my

**14046.** Alvial, I.E.; Tapia, D.H.; Castro, M.J.; Duran, B.C.; Verdugo, C.A. (2013): Analysis of benthic macroinvertebrates and biotic indices to evaluate water quality in rivers impacted by mining activities in northern Chile. *Knowledge and Management of Aquatic Ecosystems*

(2012) 407, 01: 16 pp. (in English, with French summary) ["Catchments in the semiarid regions are especially susceptible to environmental perturbation associated with water scarcity, hydrological variations and overuse by anthropogenic activities. Using multivariate analysis to relate environmental and biological data, and diversity and biotic indices (ChBMWP, ChIBF), we analyzed the macroinvertebrate composition of 12 rivers of the semiarid region of northern Chile. A non-metric multidimensional scaling for macroinvertebrate taxa and a principal component analysis for environmental variables strongly separated upstream sites (e.g. Vacas Heladas and Malo Rivers), which presented low pH and high dissolved metal concentrations, from other sites. Effectively, CCA showed that metals and low pH, associated with the altitudinal gradient, determined the distributional patterns of macroinvertebrates in the Elqui catchment. The causes of these particular conditions could be related to geological processes and human impact. The biotic indices applied to the sampling sites corroborated and reflected these characteristics, with La Laguna and Turbio Rivers showing a diverse macroinvertebrate community and moderate to good water quality, and the Claro River showing favourable conditions for the development of aquatic biota, indicating its better quality relative to other stations. To the middle and low part of the basin, a change in the composition of the community was observed, with species that suggest an impact by an increase in organic matter, due to agricultural activities and urban settlements concentrated in this area. Our results suggest that macroinvertebrate taxa in northern Chile may be exceptional species, adapted to unfavourable geochemical conditions, and emphasize the need for protection of the semiarid basins of the region." (Authors) Taxa are treated at the family level. Rare Gomphidae and Aeshnidae were sampled at only one site with alkaline waters and low metal concentrations.] Address: E-mail: ingrid.alvial@ceaza.cl

**14047.** Andrew N.R.; Hill, S.J.; Binns, M.; Bahar, M.H.; Ridley, E.V.; Jung, M.-p.; Fyfe, C.; Yates, M.; Khusro, M. (2013): Assessing insect responses to climate change: What are we testing for? Where should we be heading? *PeerJ* 1:e11; DOI 10.7717/peerj.11: 19 pp. (in English) ["To understand how researchers are tackling globally important issues, it is crucial to identify whether current research is comprehensive enough to make substantive predictions about general responses. We examined how research on climate change affecting insects is being assessed, what factors are being tested and the localities of studies, from 1703 papers published between 1985 and August 2012. Most published research (64%) is generated from Europe and North America and being dedicated to core data analysis, with 29% of the studies analysed dedicated to Lepidoptera and 22% Diptera: which are well above their contribution to the currently identified insect species richness (estimated at 13% and 17% respectively). Research publications on Coleoptera fall well short of their proportional contribution (19% of publica-



tions but 39% of insect species identified), and to a lesser extent so do Hemiptera, and Hymenoptera. Species specific responses to changes in temperature by assessing distribution/range shifts or changes in abundance were the most commonly used methods of assessing the impact of climate change on insects. Research on insects and climate change to date is dominated by manuscripts assessing butterflies in Europe, insects of economic and/or environmental concern in forestry, agriculture, and model organisms. The research on understanding how insects will respond to a rapidly changing climate is still in its infancy, but the current trends of publications give a good basis for how we are attempting to assess insect responses. In particular, there is a crucial need for broader studies of ecological, behavioural, physiological and life history responses to be addressed across a greater range of geographic locations, particularly Asia, Africa and Australasia, and in areas of high human population growth and habitat modification. It is still too early in our understanding of taxa responses to climate change to know if charismatic taxa, such as butterflies, or disease vectors, including Diptera, can be used as key-stone taxa to generalise other insect responses to climate change. This is critical as the basic biology of most species is still poorly known, and dominant, well studied taxa may show variable responses to climate change across their distribution due to regional biotic and abiotic influences. Indeed identifying if insect responses to climate change can be generalised using phylogeny, functional traits, or functional groups, or will populations and species exhibit idiosyncratic responses, should be a key priority for future research. ... When the number of studies were compared to the identified species richness within each Order, Lepidoptera, Diptera, Orthoptera, Colembola, and Odonata have a proportionally higher percentage of papers assessing their responses to climate change relative to number of species identified, whilst Coleoptera, Hymenoptera, and Hemiptera have a proportionally lower percentage of papers assessing their responses to climate change relative to number of species identified." (Authors)] Address: Andrew, N.R., Centre for Behavioural and Physiological Ecology, Zoology, University of New England, Armidale, Australia. E-mail: nigel.andrew@une.edu.au

**14048.** Bagheri, Z.; Wiederman, S.D.; Cazzolato, B.S.; Grainger, S.; O'Carroll, D.C. (2013): A biologically inspired facilitation mechanism enhances the detection and pursuit of targets of varying contrast. 4th joint international conference on swarm, evolutionary and memetic computing (SEMCCO) & fuzzy and neural computing (FANCCO), Chennai, India, 19 - 21 December: 9 pp. (in English) ["Many species of flying insects detect and chase prey or conspecifics within a visually cluttered surround, e.g. for predation, territorial or mating behaviour. We modelled such detection and pursuit for small moving targets, and tested it within a closed-loop, virtual reality flight arena. Our model (dragonfly) is inspired directly by electrophysiological recordings from 'small target motion

detector' (STMD) neurons in the insect brain that are likely to underlie this behavioural task. The front-end uses a variant of a biologically inspired 'elementary' small target motion detector (ESTMD), elaborated to detect targets in natural scenes of both contrast polarities (i.e. both dark and light targets). We also include an additional model for the recently identified physiological 'facilitation' mechanism believed to form the basis for selective attention in insect STMDs, and quantify the improvement this provides for pursuit success and target discriminability over a range of target contrasts." (Authors)] Address: Bagheri, Zahra, Adelaide Centre for Neuroscience Research, The University of Adelaide, Australia. E-mail: zahra.bagheri@adelaide.edu.au

**14049.** Belluco, S.; Losasso, C.; Maggioletti, M.; Alonzi, C.C.; Paoletti, M.G.; Ricci, A. (2013): Edible insects in a food safety and nutritional perspective: A critical review. *Comprehensive Reviews in Food Science and Food Safety* 12: 296-313. (in English) ["Increasing world population worsens the serious problem of food security in developing countries. On the other hand in industrialized countries, where the problem of food security is of minor concern, health problems related to food refer to 2 main factors: food safety and environmental sustainability of food production. For these reasons, new ways must be found to increase yields while preserving food quality, natural habitats, and biodiversity. Insects could be of great interest as a possible solution due to their capability to satisfy 2 different requirements: (i) they are an important source of protein and other nutrients; (ii) their use as food has ecological advantages over conventional meat and, in the long run, economic benefits. However, little is known on the food safety side and this can be of critical importance to meet society's approval, especially if people are not accustomed to eating insects. This paper aims to collect information in order to evaluate how insects could be safely used as food and to discuss nutritional data to justify why insect food sources can no longer be neglected. Legislative issues will also be discussed. ... Parasitological hazards: Parasites represent another potential hazard in relation to insect consumption. Their presence has been well documented in a recent review about foodborne intestinal flukes in southeast Asia (Chai and others 2009). The great importance of this work is linked to the geographical area investigated, where there is a long, widespread tradition of insect consumption. Six out of 65 species of intestinal flukes considered in the paper were isolated from insect samples. Among these is *Phanerocephalus bonnei* (Lecithodendriid), 1st described at a human autopsy in 1951 in Jakarta, Indonesia and later found in monkeys in Malaysia and India in 1962. This fluke was then reported in 15 human autopsies in Udornthani Provincial Hospital in northeast Thailand. Subsequently, the same fluke infection was found to have a high prevalence in other countries. Metacercariae were discovered in naiads and adult dragon and damselflies, insects which are commonly eaten in these parts of the world. The same insect can harbor the

fluke, *Prosthodendrium molenkampii* (Lecithodendriid), which characteristically has 12 to 30 vitelline follicles on each anterolateral side. First isolated from 2 human autopsies by Lie Kian Joe in 1951 in Jakarta, Indonesia, this fluke was then found in 14 human autopsies in Udomthani Provincial Hospital, Thailand. Later, high prevalence was reported in different areas of northeast Thailand. In Laos PDR, a total of 8899 adult specimens were recovered from 52 infected people residing along the Mekong riverside areas of Vientian Municipality, and Savannakhet, Khammoune, and Saravane Provinces. Metacercariae were discovered in naiads and adult Odonata in Thailand. Another member of this genus, *Phaneropsolus spinicirrus*, was described in 1991 as a new species from a human infection case in northeast Thailand." (Authors)] Address: Paoletti, M.G, Biol. Dept., via Bassi 58 b, Padova Univ. 35100-Padova, Italy. E-mail: paoletti@bio.unipd.it

**14050.** Bergmann, T.; Rach, J.; Damm, S.; DeSalle, R.; Schierwater, B.; Hadrys, H. (2013): The potential of distance-based thresholds and character-based DNA barcoding for defining problematic taxonomic entities by CO1 and ND1. *Molecular Ecology Resources* 13(6): 1069 -1081. (in English) ["The mitochondrial CO1 gene (cytochrome c oxidase I) is a widely accepted metazoan barcode region. In insects, the mitochondrial NADH dehydrogenase subunit 1 (ND1) gene region has proved to be another suitable marker especially for the identification of lower level taxonomic entities such as populations and sister species. To evaluate the potential of distance-based thresholds and character-based DNA barcoding for the identification of problematic species-rich taxa, both markers, CO1 and ND1, were used as test parameters in odonates. We sequenced and compared gene fragments of CO1 and ND1 for 271 odonate individuals representing 51 species, 22 genera and eight families. Our data suggests that (i) the combination of the CO1 and ND1 fragment forms a better identifier than a single region alone; and (ii) the character-based approach provides higher resolution than the distance-based method in Odonata especially in closely related taxonomic entities." (Authors) *Aeshna cyanea*, *A. grandis*, *A. mixta*, *A. rileyi*, *Anaciaeschna triangulifera*, *Anax ephippiger*, *A. imperator*, *A. speratus*, *Brachytron pratense*, *Gynacantha usambarica*, *G. villosa*, *Paragomphus geneii*, *Crocothemis erythraea*, *C. sanguinolenta*, *Nesciothemis farinosum*, *Orthetrum brachiale*, *O. chrysostigma*, *O. coerulescens*, *O. julia falsum*, *O. trinacria*, *Sympetrum sanguineum*, *Trithemis annulata*, *T. arteriosa*, *T. donaldsoni*, *T. furva*, *T. grouti*, *T. hecate*, *T. kirbyi*, *T. morrisoni*, *T. nuptialis*, *T. palustris*, *T. stictica*, *Calopteryx haemorrhoidales*, *C. splendens*, *Platycypha auripes*, *P. caligata*, *Ceriagrion tenellum*, *Enallagma cyathigerum*, *Ischnura graellsii*, *I. senegalensis*, *Leptagrion elongatum*, *Pseudagrion acaciae*, *P. bicoeruleans*, *P. kersteni*, *P. massaicum*, *P. niloticum*, *Teinobasis alluaudi*, *Chlorocnemis abbotti*, *Coryphagrion grandis*, *Mecistogaster asticta*, and *M. martinezi*] Address: Hadrys, Heike, ITZ Ecology & Evolution, TiHo Hannover, Hannover, Germany. E-mail: heike.hadrys@ecolevol.de

**14051.** Bönsel, A.; Frank, M. (2013): Verbreitungsatlas der Libellen Mecklenburg-Vorpommerns. Natur+Text, Rangsdorf: 256 pp. (in German) [Germany. 63 odonate species are monographically treated. <http://www.naturundtext.de/shop/flora-fauna/verbreitungsatlas-der-libellen-mecklenburg-vorpommerns.html>.] Address: Natur+Text GmbH, Friedensallee 21, 15834 Rangsdorf, Germany. E-mail: shop@naturundtext.de



**14052.** Bogdan, H. V.; Covaciu-Marcov, S.-D.; Gaceu, O.; Cicort-Lucaciu, A.-S.; Ferenti, S.; Sas-Kovács, I. (2013): How do we share food? Feeding of four amphibian species from an aquatic habitat in south-western Romania. *Animal Biodiversity and Conservation* 36.1: 89-99. (in English, with Spanish summary) [The study area was located near Maru village, in the Tarcu Mountains, in south-western Romania (45° 27' 26.21" N/22° 26' 42.13" E). "The feeding of four amphibian species (*Triturus cristatus*, *Lissotriton vulgaris*, *Bombina variegata*, *Pelophylax ridibundus*) was studied in 2011, in south-western Romania. The diet of the newts was uniform and mostly composed of aquatic preys. The diet of the anurans was more diversified, comprising more prey taxa, mostly terrestrial. The trophic niches of the two newt species overlapped highly but differed from those of the anurans. The trophic niches of the anurans differed from one another. The differences among the four species' diets were determined by the use of different trophic resources, originating from different environments, and by their different sizes. The newts' diet was less diversified because the

aquatic habitat was small and poor in trophic availability. The anurans used the aquatic habitat as a base from where they captured terrestrial preys in the surrounding terrestrial environment." (Authors) The list of prey also includes unspecified Odonata.] Address: Covaciu Marcov, S.-D., Dept. of Biology, Fac. of Sciences, Univ. of Oradea, Universitatii str. 1, Oradea 410087, Romania. E-mail: severcovaciu1@gmail.com

**14053.** Brinesh, R.; Janardanan, K.P. (2013): The life history of *Pleurogenoides malampuzhensis* sp. nov. (Digenea: Pleurogenidae) from amphibious and aquatic hosts in Kerala, India. *Journal of Helminthology* 88(2): 230-236. (in English) ["The life-cycle stages of *Pleurogenoides malampuzhensis* sp. nov. infecting the Indian bullfrog *Hoplobatrachus tigerinus* (Daudin) and the skipper frog *Euphlyctis cyanophlyctis* (Schneider) occurring in irrigation canals and paddy fields in Malampuzha, which forms part of the district of Palakkad, Kerala, are described. The species is described, its systematic position discussed and compared with the related species, *P. gastroporus* (Luhe, 1901) and *P. orientalis* (Srivastava, 1934). The life-cycle stages, from cercaria to egg-producing adult, were successfully established in the laboratory. Virgulate xiphidiocercariae emerged from the snail *Digoniostoma pulchella* (Benson). Metacercariae are found in muscle tissues of dragonfly nymphs and become infective to the frogs within 22 days. The pre-patent period is 20 days. Growth and development of both metacercariae and adults are described." (Authors)] Address: Brinesh, R., Parasitology laboratory, Dept of Zoology, University of Calicut, Kerala, India

**14054.** Buczyński, P.; Zawal, A.; Stępień, E., Buczyńska, E.; Pešić, V. (2013): Contribution to the knowledge of dragonflies (Odonata) of Montenegro, with the first record of *Ophiogomphus cecilia* (Fourcroy, 1785). *Annales Universitatis Mariae Curie-Skłodowska (Sectio C)* 63(2): 57-71. (in English, with Polish summary) ["Authors discuss the collection of larvae and imagines of Odonata which was collected during hydrobiological and acarological studies conducted in Montenegro in 2010 and 2012. The material encompasses 28 dragonfly species of which *Ophiogomphus cecilia* has been recorded obolevn this country for the first time. The updated checklist of the dragonflies of Montenegro was also provided." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**14055.** Chiandetti, I.; Fiorenza, T.; Zandigiacomo, P. (2013): *Nehalennia speciosa* (Charpentier): una specie a rischio di estinzione sul territorio italiano (Odonata, Coenagrionidae). *Bollettino Soc. Naturalisti "Silvia Zenari", Pordenone* 37/2013: 113-121. (in Italian, with English summary) ["*Nehalennia speciosa*: a species at risk of extinction on the Italian territory. *N. speciosa* is a rare species considered threatened in several European countries. In 2009 in Italy, the species was detected only in four peat bogs of the Tlaveninum morainal amphitheatre

and in one swamp in the Carnic area in the Friuli Venezia Giulia region, while the populations of two sites in the Lombardia region are considered extinct. In the period 2010-2013, as part of the Project "Odonata Atlas of Friuli Venezia Giulia", periodic samplings were conducted in the five Friulian sites, where the species had already been found. In the morainal area, adults and exuviae of *N. speciosa* were observed only in the peat bog of Lazzacco (Pagnacco municipality, UD). In the nearby peat bogs of Brazzacco and Chialcinat (Moruzzo municipality, UD), individuals of the species were not detected, while a single adult male was found in 2012 in the peat bog of Modoletto (Pagnacco municipality, UD). In the Carnic area, adults were never detected in the swamp of Cima Corso (Ampezzo municipality, UD). Possible causes for the decline of the species are the progressive burial of some peat bogs, almost completely overgrown with marsh vegetation, and the occurrence of non-native fish fauna. The situation of *N. speciosa* in Italy is very critical, since a viable population is only present in the peat bog of Lazzacco, characterized by a very small area. Therefore, it is urgent to start an environmental restoration program to create or recreate suitable habitats for the reproduction of *N. speciosa*." (Authors)] Address: Chiandetti, I., Via Braide Podé, 8, 33010 Colloredo di Monte Albano (UD), Italy. E-mail: chiandet@gmail.com

**14056.** Choe, L.-J.; Han, M.-S.; Kim, M.; Choe, K.-J.; Kang, K.-K.; Na, Y.-E., Kim, M.-H. (2013): Characteristics communities structure of benthic macroinvertebrates at irrigation ponds, within paddy field. *Korean Journal of Environmental Agriculture* 32(4): 304-314. (in Korean, with English summary) ["Ecological functions of irrigation ponds were well known fact that important for biodiversity conservation in agricultural ecosystems. However, many irrigation ponds were destructed with changes of agricultural environment. The objective of this study is to appreciate the importance of ecological functions of irrigation pond. Furthermore, it presented to useful information for restorations of irrigation pond from analyses of correlations between benthic macroinvertebrate communities and locational factors of irrigation ponds. Benthic macroinvertebrate sampling was conducted from 2010 to 2012 at 15 study ponds. Comparisons of benthic macroinvertebrates diversity approached species richness and density, and statistical analyses were performed using independent t-test. A total of 131 species / 137,118 individuals of benthic macroinvertebrates were recorded during study period. Dominant taxa of benthic macroinvertebrates included Coleoptera, Hemiptera, and Odonata. Generally, benthic macroinvertebrate diversity in mountain region and existing ponds were showed higher than open field and created ponds, respectively. DCA ordination showed that benthic macroinvertebrate community was most correlated with locational characteristics of irrigation pond, and it correlated with bank type and age of pond. In conclusions, in order to restore ecological irrigation pond, it is necessary to consider environmental factors such as locational characteristics and bank types."



(Authors)] Address: Choe, L.-J., Climate Change & Agroecology Division, Nat. Acad. Agricultural Science, RD A, Suwon, 441-707, Korea. E-mail: wildflower72@korea.kr

**14057.** Curry, C. (2013): The role of habitat and dispersal in shaping the biodiversity of riverine insect assemblages. Dissertation, University of New Brunswick, Faculty of Science, Department of Biology: XI + 217 pp, app.. (in English) [New Brunswick, Canada. "Given limited resources, biomonitoring programs are touted as a source of biodiversity information for conservation planning in riverine ecosystems. However, the degree to which patterns revealed by biomonitoring are reflected in unsampled mesohabitats and undersampled taxonomic groups has not been fully addressed. Differences in dispersal capacity among taxonomic groups, in particular, may result in divergent patterns of biodiversity at landscape and regional scales. I sought to address the suitability of biological monitoring data in freshwater biodiversity assessment, and to test the prediction that the degree of spatial structuring in aquatic insect assemblages is inversely related to their dispersal capacity. My thesis comprises four articles. The first addresses whether macroinvertebrate biodiversity patterns in riffles, the target mesohabitat of Canada's national aquatic biomonitoring program, are reflective of those in riverine wetlands. The second addresses whether biodiversity in a group of insects that is abundant in biomonitoring samples (Trichoptera) reflects that of an underrepresented group (Odonata). The third tests the above prediction by comparing the degree of spatial structuring in the weakly dispersing Trichoptera and the stronger dispersing Odonata. The final article investigates regional and national aquatic insect biodiversity patterns utilizing the national biomonitoring dataset, and seeks to evaluate the influence of scale on the observation of spatial structuring aquatic insect assemblages. Several key findings emerged from this work: 1) Patterns of invertebrate taxon richness and beta diversity in riffles poorly reflect those in riverine wetlands. 2) Odonata and Trichoptera biodiversity were not always congruent, however, differences in abundance among groups may account for weak correlations. 3) Both Odonata and Trichoptera assemblages demonstrate relatively weak spatial structuring at a landscape (i.e. 5th order catchment) scale. The weak explanatory ability of spatial variables was also apparent at a regional scale, as just one of the Water Survey of Canada sub drainages within the Pacific drainage demonstrated a significant spatial component in aquatic insect assemblage variation. These findings suggest caution in the application of biomonitoring data to conservation planning. Although landscape and regional scale structuring of aquatic insect communities may be weak, it does not preclude the existence of smaller scale spatial structuring driven by local dispersal processes." (Author)] Address: not stated

**14058.** Davenport, J.M.; Chalcraft, D.R. (2013): Increasing conspecific density weakens the ability of intermediate predators to develop induced morphological defences

es to top predators. *Freshwater Biology* 59(1): 87-99. (in English) ["(1) Intraguild predation is common in nature, but it is unclear how species that both compete and eat each other can persist together. One possibility is that intermediate predators possess inducible morphological defences that protect them from top predators while not compromising their ability to compete with top predators. (2) The ability of intermediate predators to develop morphological defences may be compromised in environments with a high density of conspecifics because of reduced resource availability and predation risk due to the saturating functional response of top predators. Furthermore, since morphological defences take time to develop, the type and extent of morphological defences may vary during development. (3) We conducted an experiment to measure the phenotypic responses of an intermediate predator (larvae of the salamander *Ambystoma opacum*) to the presence of a caged top predator (larvae of *Anax* spp.) throughout ontological development in environments that differed in the density of conspecifics present. We also assessed how intermediate predators, reared in the different environments, differed in their vulnerability to top predators and ability to deplete their food resources. (4) We found that *Anax* induced morphological defences in *A. opacum*, but the extent of morphological change declined with the density of conspecifics. Moreover, some morphological traits disappeared, while others appeared just prior to *A. opacum* metamorphosis. The change in *A. opacum* phenotype in response to *Anax* made *A. opacum* less vulnerable to predation by *Anax* but had no significant effect on the foraging ability of *A. opacum*. (5) Our study demonstrates that top predators can induce phenotypes in intermediate predators that reduce their vulnerability to top predators while not compromising their ability to feed on a common prey. An increase in intermediate predator density, however, could diminish the ability of intermediate predators to develop the full suite of morphological defences. The inability to develop the full suite of morphological defences may reduce the probability of persistence with top predators." (Authors)] Address: Davenport, J.M., Division of Biological Sciences, University of Montana, Missoula, Montana 59812, USA. E-mail: jon.davenport@mso.umt.edu

**14059.** Diedericks, G.; Simaika, J.; Roux, F. (2013): A survey of adult Odonata along the Crocodile-Inkomati River main stem from source to ocean. A pilot project to determine the application of the Dragonfly Biotic Index (DBI) as an indicator of river health. Draft: 56 pp. (in English) ["Results: A total of 80 species were recorded along the 29 sampling points on the Crocodile-Inkomati River from an elevation of 2,100 to 20 m a.s.l. This represents 49.4% of all species known to occur in South Africa. Of the 118 species expected to occur, 32.2% were not encountered. A table with the sites visited, the total DBI score ( $\Sigma$  DBI), number of species, and average DBI 17 score per site (ADBI) are included below (Table 3) and the results illustrated graphically (Figure 4). A species accumulation chart, indicating species that were ex-

pected per site compared to those observed are shown in Figure 17. In general, adult Odonata species diversity was low at the headwaters, increasing longitudinally downstream, with several 'spikes', which tend to indicate increases in species diversity. Very low total DBI scores were recorded at the Sterkstroom (660 – 680 m a.s.l.), Kamagugu (560 – 580 m a.s.l.), Tenbosch Weir (120 – 140 m a.s.l.) and Moamba (60 – 80 m a.s.l.) sites. High diversity was recorded at the Montrose (780 – 800 m a.s.l.), Botanical Gardens (600 – 620 m a.s.l.), Crocodile Gorge (380 – 400 m a.s.l.) and Malelane (280 – 300 m a.s.l.) sites. The highest ADBI was recorded at headwater sites Verlorenvlei (2,080 – 2,100 m a.s.l.), Elandshoek (2,020 – 2,040 m a.s.l.) and Valyspruit (1,840 – 1,860 m a.s.l.). Threatened species were recorded in the Crocodile Gorge, Malelane, Crocodile Bridge and the Inkomati River below Lake Chuali." (Authors) For the complete text see [http://inkomaticma.co.za/images/Ecstatus\\_of\\_the\\_Crocodile\\_River\\_2013\\_-\\_Appendix\\_A.pdf](http://inkomaticma.co.za/images/Ecstatus_of_the_Crocodile_River_2013_-_Appendix_A.pdf) Address: Diedericks, G., Postnet Suite 225, Private Bag X9910, White River, 1240, South Africa. E-mail: gerhardd@mweb.co.za

**14060.** Dumont, H.J. (2013): Phylogeny of the genus *Ischnura* with emphasis on the old world taxa (Zygoptera: Coenagrionidae). *Odonatologica* 42(4): 301-308. (in English) ["COI and ITS DNA fragments were used to gain insight into the phylogenetic relationships within *Ischnura*. The genus is recovered as monophyletic, and the 24 species-level taxa considered (about one third of the total) suggest the existence of 2 main clades, here called the *I. elegans* and *I. pumilio* groups. Each group has a core number of about 4-5 species, while the placement of most others is not well resolved and will require further study. However, for a number of taxa, their relationship within the species group is clarified. This is true of formerly enigmatic species like *I. aralensis*, but also of *I. fontaineae*, *I. evansi*, and others. *I. aurora* is found to be only distantly related to *I. rubilio* and both certainly deserve full species status and occupy disjunct geographic ranges. *Ischnura nursei* is confirmed as a true *Ischnura*. *I. graellsii* and *I. saharensis*, although closely related to *I. elegans*, appear to be good species." (Author)] Address: Dumont, H.J., Dept of Ecology and Hydrobiology, Jinan University, Guangzhou-510632, China. E-mail: Henri.Dumont@ugent.be

**14061.** Fontanarrosa, M.S.; Collantes, M.B.; Bachmann, A.O. (2013): Aquatic insect assemblages of man-made permanent ponds, Buenos Aires City, Argentina. *Neotropical Entomology* 42(1): 22-31. (in English) ["Freshwater habitats are important elements within urban green space and they are endangered by various types of human activity. With the aim to increase the knowledge about species biodiversity in urban ecosystems, we characterised the assemblages of aquatic insects in four permanent man-made ponds in Buenos Aires city (Argentina) during a 1-year period. We recorded 32 species with *Sigara* spp. (Hemiptera) as the most abundant. The removal of aquatic vegetation from the studied ponds may have affected both the establishment and perma-

nence of the insect community. Swimmers were the dominant group in the studied sites, followed by burrowers and sprawlers, and only a few strictly climbers were collected. Therefore, all sampled ponds were dominated by collectors (principally gatherers), secondarily by predators and only few shredders were detected, which was much affected by the removal of macrophytes. Non-parametric abundance indexes estimated a number of species very close to the observed number in each site. Conversely, the incidence indexes estimated more species because there were many more taxa present only in one sample than those represented by few individual in a sample. Our data provides some insights on the community of man-made ponds that can improve the management of these aquatic urban habitats. Considering that macrophytes affect animal assemblages due to their role as physical structures that increase the complexity or heterogeneity of habitats, they should not be removed by authorities in order to promote biodiversity." (Authors) Odonata are listed at family level: Libellulidae, Coenagrionidae.] Address: Fontanarrosa, M.S., Lab Limnología, Depto Ecología, Genética y Evolución, FCEN, UBA CONICET, Ciudad Universitaria Pab II, 4° piso, C1428EHA, Buenos Aires, Argentina. E-mail: fontanarrosa@ege.fcen.uba.ar

**14062.** Fuisz, T.I.; Vas, Z.; Túri, K.; Körösi, A. (2013): Photographic survey of the prey-choice of European Bee-eaters (*Merops apiaster* Linnaeus, 1758) in Hungary at three colonies. *Ornis Hungarica* 21(2): 38-46. (in English, with Hungarian summary) ["Prey choice of European Bee-eaters was monitored via taking pictures of parent birds carrying prey items to their perches in front of the nests between 2011 and 2013 at three colonies in Hungary: at Pócsmegyer, Nagykarácsony and Albertirsa. All the colonies were studied in the breeding season, and prey items were identified from the digital images taken of adults carrying food for their chicks. During the three years 25 days were spent with collecting photographic data, and from the thousands of pictures taken 805 were suitable for analysis. On 775 photographs the prey item was identified at least to order level. Combining data from all the colonies hymenopterans were by far the most often consumed insects (50%), followed by dragonflies (17%), while beetles, orthopterans, lepidopterans and dipterans each contributed approximately 7-9% of the consumed prey. Prey composition showed marked differences between the individual colonies, although the ratio of hymenopterans was everywhere high. Bee-eaters at Pócsmegyer, probably due to the abundance of aquatic habitats nearby on the Danube shore, consumed almost as much dragonflies as hymenopterans, and ate very few orthopterans. While at the Albertirsa colony, surrounded by agricultural fields and meadows in a more arid environment, hymenopterans dominated the prey, and orthopterans were almost as often consumed as dragonflies. Lepidopterans constituted approximately 8% of Bee-eaters' diet in all colonies. From an insect ecological viewpoint, our study provides valuable data on the spe-

cies pool that might be at risk of predation by Bee-eaters, and enables us to roughly estimate the predation pressure on some taxa, and in certain cases even on species by these birds." (Authors)] Address: Fuisz, T.I., Dept Zool., Hungarian Natural History Museum, Budapest, Baross utca 13, 1088 Hungary. E-mail: tiber.i.fuisz@gmail.com

**14063.** Gándara, J.A.; Garrido, J.F.; Souta, J.V. (2013): *Orthetrum brunneum* (Fonscolombe, 1837), nueva cita para la provincia de Pontevedra (Galicia, NO Península Ibérica) (Odonata - Libellulidae). *Arquivos Entomoloxicos* 8: 287-288. (in Spanish, with English summary) ["After a period of more than 95 years, *O. brunneum* is recorded once again in the province of Pontevedra." (Authors)] Address: Gándara, J.A., Barrio do Souto, 10 B. E-36740 San Salvador de Tebra, Tomino (Pontevedra), Spain. E-mail: lcgandara@yahoo.es

**14064.** Greenwalt, D.; Labandeira, C. (2013): The amazing fossil insects of the Eocene Kishenehn Formation in northwestern Montana. *Rocks & Minerals* 88(5): 434-441. (in English) [USA "Approximately 46 million years ago, shortly after the green and red mudstones that now form the mountains of Glacier National Park completed their slow slide eastward from Canada, a series of strong earthquakes created a long north-south rift valley along what is now the western border of the park. As the valley filled with run-off from adjacent mountains, Lake Kishenehn, a 100-mile-long lake, was formed. Today, the North and Middle forks of the Flathead River erode their way through the mile-thick sediments of that ancient lake and expose carbon-rich oil shale and siltstone that comprise the steep cliffs on either side of the river. It is within these shales of the Kishenehn Formation that scientists from the Smithsonian Institution are collecting what are arguably some of the most exceptional insect fossils in the world. ... Seven orders of insects (including Odonata [dragonflies], Lepidoptera [butterflies and moths], Dermaptera [earwigs], Isoptera [termites], Collembola [springtails], Psocoptera [bark lice], and Neuroptera [lacewings and others]) account for less than 0.2 percent of all the Kishenehn fossil insects. Several factors may have contributed to this distribution of insect types. Members of the families Lepidoptera, Dermaptera, Isoptera, Psocoptera, and Collembola are not aquatic insects, and their near absence from the sediments of Lake Kishenehn is not unexpected. Perhaps the most important factor involved in the selective preservation of Kishenehn insects is their size. ... Large insects, such as grasshoppers and dragonflies, are too big to be buried by a single layer of sediment and are therefore exposed to predation and other processes that destroy the insect before it can be entombed. The only fossils of dragonflies in the Kishenehn Formation are wing fragments, structures that are very flat and thin that can be embedded within a single layer." (Authors)] Address: Labandeira, C., Curator Paleontomology, Smithsonian Institution, PO Box 37012, MRC 121, Washington, DC 20013-7012, USA. E-mail: labandec@si.edu

**14065.** Guan, Z.; Dumont, H.J.; Yu, X.; Han, B.-P.; Vierstraete, A. (2013): *Pyrrhosoma* and its relatives: a phylo-

genetic study (Odonata: Zygoptera). *International Journal of Odonatology* 16(3): 247-257. (in English) ["The placement and relationships of the red-and-black zygopteran *Pyrrhosoma*, currently considered to be part of the *Teinobasinae*, has long been uncertain. DNA fragments (COI and ITS) reveal that *Pyrrhosoma* s.s. is restricted to the West Palaearctic, with two morphologically distinct name-bearing clades (*nymphula*, *elisabethae*), and with a morphologically indistinct third clade in the Middle Atlas, Morocco, that might be close to the common ancestor of all three. *Chromagrion*, the closest relative of *Pyrrhosoma*, is found in North America, not in South Asia. Two isolated Chinese taxa (*tinctipenne* and *latiloba*) are morphologically similar to *Pyrrhosoma*, but their molecular distance is so large that a new genus, *Huosoma*, is required to accommodate them. Past climate change is suggested as the driver of the biogeography and evolution of this group of zygopterans. The origin of the Moroccan isolate and of *elisabethae* might predate the glaciations, and be of Pliocene age. The much wider disjunction between the American and South Asian groups and the western group suggests an older, perhaps Miocene age." (Authors)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@ugent.be

**14066.** Gutiérrez-Fonseca, P.E.; Ramírez, A.; Umaña, G.; Springer, M. (2013): *Macroinvertebrados dulceacuícolas de la Isla del Coco, Costa Rica: especies y comparación con otras islas del Pacífico Tropical Oriental*. *Rev. Biol. Trop. (Int. J. Trop. Biol.)* 61(2): 657-668. (in Spanish, with English summary) ["Freshwater macroinvertebrates from Cocos Island, Costa Rica: species and comparison with other islands of the Eastern Tropical Pacific. Cocos Island is an oceanic island in the Eastern Pacific, at 496km from Cabo Blanco, Costa Rica. This 24km<sup>2</sup> island is surrounded by a protected marine area of 9640km<sup>2</sup>. It was declared National Park in 1978 and a World Heritage by UNESCO in 1997. Freshwater macroinvertebrate fauna was collected in 20 sites covering three rivers (Genio, Chatam and Sucio) and two creeks (Minuto and an unnamed creek behind the park rangers' house). Tank bromeliads or phytotelmata were also examined for aquatic macroinvertebrates. Physicochemical parameters were determined in 13 study sites. Additionally, a comparison with other islands in the Eastern Tropical Pacific was conducted to determine the most important factors controlling the diversity in Tropical Pacific islands. A total of 455 individuals were collected belonging to 20 taxa (mostly identified to genus level) from 15 families of aquatic insects. Other macroinvertebrates such as Palaemonid shrimps, Hidrachnida and Oligochaeta were also collected. The family Staphylinidae (Coleoptera) was the most abundant, followed by Chironomidae (Diptera). Diptera was the order of insects with the highest taxonomic richness. A relationship between distance and the number of families was observed supporting the premises of the Theory of island Biogeography. This relationship was improved by correcting area by island elevation, indicating that mountainous islands had the rich-



est faunas, potentially due to high cloud interception that feeds freshwater environments favouring the establishment of aquatic fauna. Physicochemical variables were similar in all sites, possibly due to the geology and the absence of significant sources of pollution on the island." (Authors) The following Odonata taxa are listed: *Argia*, *Coenagrionidae*: genus 1 and genus 2, *Tramea calverti*, and *Triacanthagyna caribbea*] Address: Gutiérrez-Fonseca, P.E., Depto Biol., Univ. de Puerto Rico-Río Piedras, San Juan, Puerto Rico, 00931-3360. E-mail: gutifp@gmail.com

**14067.** Hoving, C.L.; Lee, Y.M.; Badra, P.J.; Klatt, B.J. (2013): Changing climate, changing wildlife a vulnerability assessment of 400 species of greatest conservation need and game species in Michigan. Michigan Department of Natural Resources. Wildlife Division Report No. 3564: 82 pp. (in English) ["Michigan's climate has been warming, and the warming trend is accelerating. The best available science indicates the acceleration is likely to continue, and warming in the next 40 years will be roughly 10 times as fast as the warming over the past 100 years in Michigan. Michigan wildlife face myriad conservation challenges, including land use change and habitat loss, habitat fragmentation, competition from invasive exotic species, altered ecological processes, and a rapidly changing climate. This report focuses on the effect of a rapidly changing climate. In 2010, the Michigan Natural Features Inventory (MNFI) received funding from the Michigan Department of Environmental Quality Coastal Management Program to assess vulnerability of 180 animal and plant species in the coastal zone using the Climate Change Vulnerability Index (CCVI) developed by NatureServe. MNFI assessed a total of 198 species including 131 animal species and 67 plant species. The Michigan Department of Natural Resources (DNR) Wildlife Division used State Wildlife Grants and Pittman-Robertson funds to assess vulnerability of 281 animal species using the same methods. Twelve animal species were assessed by both MNFI and the Michigan DNR. All resident terrestrial game species and all Species of Greatest Conservation Need (SGCN) (with enough life history data) were assessed. Vulnerable species are those expected to experience reductions in range extent or abundance by 2050 due to climate change. The CCVI analysis suggests that 17% of terrestrial game species and 61% of terrestrial and aquatic Species of Greatest Conservation Need (SGCN) are vulnerable. Other conservation threats or programs aside, these species will likely experience range or population reductions due to climate change. Vulnerable species included important game species, such as moose (*Alces americanus*), .... Vulnerable SGCN include conservation icons, such as the Karner blue butterfly (*Lycaeides melissa samuelis*) and common loon (*Gavia immer*). The full list of species' vulnerabilities is in the Appendices. Other vulnerability analyses suggest that ecological communities in Michigan will change dramatically as species respond individually. Some characteristic northern species, such as spruce, fir, and birch may fade from the landscape. Quak-

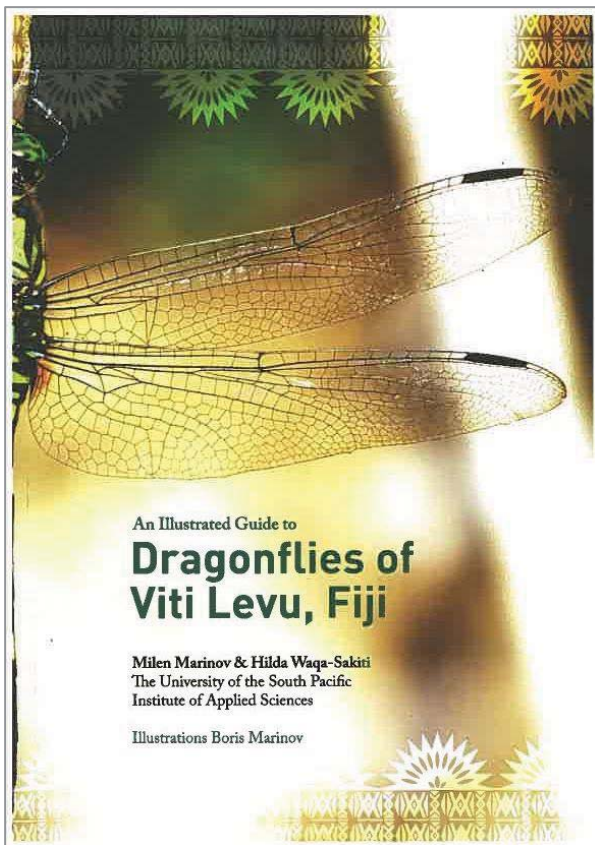
ing aspen (*Populus tremuloides*) is predicted not to regenerate and compete with the same health and vigor in a warmer and drier Michigan. Other species, such as red maple (*Acer rubrum*) and some oaks (*Quercus* spp.) and hickories (*Carya* spp.), are expected to do better in a warming climate. This analysis focuses on vulnerabilities of individual species, independent of changes in habitat or competitive interactions. The CCVI predicts the strength and direction of the influence of a changing climate. Management action (or inaction) can offset or reinforce the climate influence. The CCVI is a useful first step in climate adaptation, but it is only one tool to use to develop climate adaptive management plans for species or habitats. Initial suggestions of management actions are provided to help managers begin thinking about how these adaptive plans can be formulated. However, adaptation (e.g., climate-smart management) will need to be context specific; it will depend on existing management goals, priorities, funds, and local site conditions." (Authors) CCVI tool for these climate vulnerable species included the caveat that the "Species may expand range in assessment area." Populations of these species may decrease globally, but increase in Michigan if their populations shift northward. The only Odonata listed is *Somatochlora hineana*, and it is assessed as "EV – Extremely Vulnerable".] Address: Hoving, C.L., Michigan Dept of Natural Resources, Wildlife Division

**14068.** Katayama, M. (2013): Differential survival rates of damselfly larvae in the presence of newt and dragonfly predators. *International Journal of Odonatology* 16(2): 177-182. (in English) ["*Paracercion melanotum* has been found to be the most abundant species in damselfly larval communities on Okinawa-zima Island in southwest Japan. To clarify differential susceptibility to predation, a possible factor affecting relative population densities in larval communities, between *P. melanotum* and a less common damselfly species, *Ischnura senegalensis*, laboratory experiments were conducted using three abundant predator species: the sword-tailed newt (*Cynops ensicauda popei*), anisopteran larvae (*Crocothemis servilia servilia*), and a planktivorous fish (*Poecilia reticulata*). *P. melanotum* survived predation by the newt and the dragonfly well compared to *I. senegalensis*. Fishes consumed approximately equal numbers of the two damselfly species. From these results, the newt and the dragonfly were suggested as the most probable predators regulating damselfly larval communities on Okinawa-zima Island. Predators could be a crucial factor determining relative abundance in damselfly larval communities." (Author)] Address: Katayama, M., Dept of Ecology and Environmental Science, Graduate School of Agriculture, University of the Ryukyus, Nishihara, Okinawa, 9030213, Japan. E-mail: motok.k.ryuk@gmail.com

**14069.** Kriska, G. (2013): Freshwater invertebrates in Central Europe: A field guide. Springer Vienna: 400 pp. (in English) ["This up-to-date guidebook on freshwater invertebrates of the central European region is a richly il-

illustrated work, providing an excellent source of systematic information on freshwater macroinvertebrates. Numerous colour photos and additional vector graphic figures allow readers to identify specific species at a higher taxonomic level (family). The book is supplemented by electronic material including pictures and short video sequences." (Publisher) Odonata are treated on pages 194-209.] Address: Kriska, G., Group for Methodology of Biology Teaching, Biological Institute, Eötvös University, Pázmány sétány 1, Budapest 1117, Hungary

**14070.** Marinov, M.; Waqa-Sakiti, H. (2013): An Illustrated Guide to Dragonflies of Viti Levu. Fiji. USP Press. 144 pp. (in English) ["An Illustrated Guide to Dragonflies of Viti Levu, Fiji provides a detailed analysis of these fascinating insects, as well as a wonderful introduction to the techniques of identifying them in their natural state." (Publisher) Illustrations from Boris Marinov.] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@mpi.govt.nz; [http://uspbookcentre.com/store/merchant.mv?Screen=PROD&Store\\_Code=UBC&Product\\_Code=9789820109056&Category\\_Code=SN](http://uspbookcentre.com/store/merchant.mv?Screen=PROD&Store_Code=UBC&Product_Code=9789820109056&Category_Code=SN)



**14071.** Mellone, U.; López-López P; Limiñana, R.; Urios, V. (2013): Summer pre-breeding movements of Eleonora's Falcon *Falco eleonora* revealed by satellite telemetry: implications for conservation. *Bird Conservation International* 23(4): 487-494. (in English) ["Recent advances in bird tracking technologies are revealing that migratory birds use temporal staging sites other than breeding and wintering areas, and these areas deserve conservation ef-

orts. *F. eleonora* is a long-distance migratory raptor that breeds colonially on islands and is considered a priority species for conservation. Anecdotal observations indicate that during the pre-breeding period, Eleonora's Falcons stay in inland areas far away from the colonies, but, to date there are no detailed data concerning the connectivity between these areas and breeding colonies. Using satellite telemetry, we analysed data from four summering events belonging to three individuals breeding in two colonies in the Western Mediterranean (Spain). All of them made inland movements in areas up to c.400 km distant from the respective breeding colonies, visiting several habitats, from forests to arable lands, probably taking advantage of high densities of insects. Perturbations occurring in these areas could threaten Eleonora's Falcons with serious consequences at the population level. We suggest that conservation measures implemented at breeding and wintering grounds may not suffice and that temporary staging areas should be identified at a larger scale and deserve protection as well. ... It is remarkable that the peak of insect abundance, particularly Coleoptera as well as Odonata, occurs in the inland areas visited by Eleonora's Falcons just during the pre-breeding period (Cano 2001, Belenguer et al. 2004), providing an adequate food supply until the beginning of the autumn migration of passerines that form their main resource during breeding (Walter 1979). It has been reported that Eleonora's Falcons prey particularly upon the Common Cockchafer *Melolontha melolontha* (Cano 2001, Belenguer et al. 2004), an abundant insect that shows demographic explosions in June in some years." (Authors)] Address: Vertebrates Zoology Research Group, CIBIO, University of Alicante, Edificio Ciencias III, Campus San Vicente del Raspeig s/n, Apdo. 99, E-03080, Alicante, Spain

**14072.** Meyer-Rochow, V.B.; Chakravorty, J. (2013): Notes on entomophagy and entomotherapy generally and information on the situation in India in particular. *Applied Entomology and Zoology* 48(2): 105-112. (in English) ["Indian tribals use insects in a variety of ways. Species containing valuable protein, easily digestible fats, and considerable amounts of vitamins and minerals are consumed; others serve as raw material for folk remedies. Such uses need to be documented, because tribal communities are increasingly discarding their age-old practices. Research into this field can benefit India and the rest of the world in several ways. Traditional communities need to be shown to appreciate the value of their customs and that to look after their environment (lest many of the useful insects will disappear) is not a luxury, but a necessity. Moreover, studying food insects and therapeutically important species can lead to economic spin-offs and would allow countries like India to develop ways to sustainably use this abundant natural resource." (Authors) The publication includes some references to Odonata.] Address: Meyer-Rochow, V.B., School of Engineering and Science, Jacobs University, Research II (Rm. 37), 28759, Bremen, Germany. E-mail: [b.meyer-rochow@jacobs-university.de](mailto:b.meyer-rochow@jacobs-university.de)

**14073.** Mitra, A. (2013): On a small collection of dragonflies from Bhutan with four new records: Range extension of *Pyrrhosoma tinctipenne* (McLachlan, 1894). *Advances in Environment Science*, Oxford Book Company, Jaipur: 8-19. (in English) [*Pyrrhosoma tinctipenne*, *Periaeschna magdalena*, *Polycanthagyna erythomelas* and *Anisogomphus bivittatus* are recorded for the first time from Bhutan which extends the list of Odonata in Bhutan to 56. Though there is a general relationship between the Himalayan and Japanese fauna (Asahina, 1960), the present findings of *Pyrrhosoma tinctipenne* in Himalayas disproves McLachlan's (1894) deduction about the Chinese fauna that "in several respects the affinities are with Japan rather than with the Himalayas, notwithstanding the nearer proximity of the later". The Himalayan fauna, particularly the Odonata, due to high altitude, insurgency, political instability and lack of funds for research is still partially unexplored (Mitra et al., 2010)."] (Author)] Address: Mitra, A., School of Life Sciences, Sherubtse Coll., Kanglung, Bhutan. E-mail: amitonodona@yahoo.com

**14074.** Mole, B. (2013): Matter & energy: Material inspired by dragonfly wings bursts bacteria: Prickly synthetic surface could serve as antimicrobial coating on medical implants. *Science News* 184(13): 11. (in English) [Verbatim: Tiny spikes on a silicon surface can stab and kill any bacteria that make contact, researchers report November 26 in *Nature Communications*. Scientists could foil infectious bacteria by using the new surface architecture as a coating on medical devices and food-processing equipment. Microbiologist Elena Ivanova of Swinburne University of Technology in Hawthorn, Australia, and colleagues designed the nanoarchitecture by taking cues from bacteria-free surfaces in nature such as insect wings. Using scanning electron microscopy, the team discovered that dragonfly wings have protrusions, just 240 nanometers tall, which appeared to pop bacterial cells that tried to attach to the wing. By etching light-absorbing black silicon, Ivanova and her team created similar spikes, 500 nanometers tall and just 20 to 80 nanometers thick. When the researchers exposed bacteria or bacterial spores to the silicon surface, they found that it killed microbes quickly. On average, each square centimeter of silicon destroyed around half a million bacterial cells every minute. Black silicon, which engineers typically use in solar panels and light sensors, is cheap and easy to manipulate, Ivanova says. Creating the nanostructured surface takes just five minutes, she says. The researchers believe that nanostructured silicon could coat items such as medical implants to prevent infectious bacteria from hitchhiking into patients. The coating process "seems pretty straightforward and versatile," says nanchemist Thomas Webster of Northeastern University in Boston. Though Webster would like to see more data on the physical forces that actually cause the bacteria to pop, he says modelling the new material from insect wings is a novel approach for finding ways to kill harmful bacteria. "There's a lot of promise for nanoscale features to reduce bacterial growth without antibiotics," he adds.] Address: not stated

**14075.** Moroz, M.D. (2013): Fauna of aquatic insects of the projected «Vileity» Reserve. *Journal of BSU. Ser. 2.* 2013. No.2: 43-46. (in Russian, with English summary) [In the framework of establishing a transboundary conservation areas, including "Vileity-Adutiskis" (Belarus - Lithuania), 11 Odonata species were recorded: *Calopteryx virgo*, *Lestes dryas*, *L. sponsa*, *Ischnura elegans*, *Aeshna cyanea*, *Cordulia aenea*, *Somatochlora flavomaculata*, *Sympetrum danae*, *S. flaveolum*, *S. sanguineum*, and *S. vulgatum*.] Address: Moroz, M.D., Scientific and Practical Center for Bioresources, Academy of Sciences of Belarus, Minsk, the Republic of Belarus. E-mail: mdmoroz@bk.ru

**14076.** Müller, J.; Büttstedt, L.; Bock, H.; Steglich, H. (2013): Vorläufige Kurzmitteilung zur Libellenfauna (Odonata) im Projektgebiet südöstlicher Unterharz (MTB 4433 Wippra). *Entomologische Mitteilungen Sachsen-Anhalt* 21(1/2): 54-57. (in German) [Wippra, Sangerhausen, Landkreis Mansfeld-Südharz, Sachsen-Anhalt, Germany. 28 odonate species were found in 1994, 1996-1999 and 2011-2012.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**14077.** Negi, R.K.; Rajput, A. (2013): Impact of pulp and paper mill effluents on the diversity of benthic macroinvertebrate fauna of Ganga river at Bijnor, UP, India. *International Journal of Applied and Natural Sciences* 2(5): 91-96. (in English) ["Impact of pulp and paper mill effluents on the diversity of benthic macroinvertebrate in Ganga river at Bijnor, UP, India was investigated from four selected sites July, 2007 to June, 2009. A total of 13 genera of benthic fauna belonging to 6 orders viz. Ephemeroptera (4 genera, 30.7%), Plecoptera (2 genera, 15.3%), Diptera (3 genera, 23%), Odonata (2 genera [*Lestes*, *Macromia*], 15.3%), Leptostraca (1 genus, 7.6%) and Decapoda (1 genus, 7.6%) were recorded where Ephemeroptera was reported as the most abundant order at all the sites. It has been observed that as the site-II is the discharge point of the effluents, minimum diversity was recorded, while site-III has the maximum generic diversity which was 500 mts away from the discharge point which is clearly documenting the harmful effects of industrial effluents on the benthic fauna. Diversity index was also recorded maximum at site-IV with value of  $H'$  as 0.557 while it was found to be minimum at site-II as 0.248. Benthic density was reported to be higher during winter months."] (Authors)] Address: Negi, R.K., Dept Zool. & Environ. Sciences, Gurukula Kangri Univ., Haridwar (UK) India 249404. E-Mail: negi\_gkv@rediffmail.com

**14078.** Nummi, P.; Paasivaara, A.; Suhonen, S.; Pöysy, H. (2013): Wetland use by brood-rearing female ducks in a boreal forest landscape: the importance of food and habitat. *Ibis* 155: 68-79. (in English) ["Habitat use by birds may be related to single or interacting effects of habitat characteristics, food resources and predators, but little is known about factors affecting habitat use by wetland species in boreal ecosystems. We surveyed brood-



rearing females and ducklings of four common boreal duck species to assess the effects of habitat structure and food resources on the use of wetlands by brood-rearing ducks. Although wetland use by duck broods was related to habitat structure and food abundance, their relative importance varied among duck species. For the Common Goldeneye *Bucephala clangula*, a diving duck, aquatic invertebrates and large emerging insects were the most important factors associated with wetland use. Common Teal *Anas crecca* broods were observed more often on wetlands with greater Dipteran emergence, whereas in Mallard *Anas platyrhynchos* both habitat structure and large emerging insects were important. The occurrence of Eurasian Wigeon *Anas penelope* broods was related to emerging Diptera and habitat structure but the associations were not strong. The varying habitat and food requirements of common duck species could influence the success of wetland management programmes, and consideration of these factors may be particularly important for initiatives aimed at harvested species or species of conservation concern." (Authors) The paper includes references to Odonata.] Address: Nummi, P., Dept of Forest Sciences, Univ. Helsinki, PO Box 27, Helsinki, FI-00014, Finland. E-mail: petri.nummi@helsinki.fi

**14079.** Obolewski, K.T.; Strzelczak, A.; Astel, A.M.; Sawczyn, J. (2013): Short-term effects of stream restoration and management on macroinvertebrate communities in lowland streams. *International Journal of Engineering Research and Development* 6(4): 122-131. (in English) ["As a result of hydrotechnical treatments, a 2.5 km long reach of the lowland Kwacza River was elongated to 3.5 km. Restoration triggered off short-term changes in the river ecosystem, which were studied through habitat and invertebrate analysis. Sampling was conducted at 10 sections before and after restoration. Invertebrates quickly colonized various habitats and thus improved biological diversity of the Kwacza River. The only taxon that increased its ecological importance was Gammaridae. In turn, Ephemerellidae concentrated at places with better oxygen conditions. The neural network model revealed that variables directly connected with restoration were not as important as primarily hypothesised." (Authors) taxa are treated at order level. No effect on Odonata could be detected.] Address: K.T. Obolewski, K.T., Dept Ecology, Pomeranian Univ. in Słupsk, Arciszewskiego 22b, 76-200 Słupsk, Poland. E-mail: obolewsk@apsl.edu.pl

**14080.** Orr, A. (2013): Predation on butterflies and other insects by breeding rainbowbirds ('*Merops ornatus*': Meropidae) in South-East Queensland. *The Australian Entomologist* 40(3): 119-130. (in English) ["The diet of a family of Rainbowbirds ('*Merops ornatus*' Latham) nesting in the Currimundi Environmental Park, southern Queensland, was investigated over approximately four months. Three birds were involved, a breeding pair and a helper male. Insect prey was monitored photographically with 836 items being recorded. The recorded diet of the adults before hatching and that brought to the nestlings

differed considerably, with Hymenoptera being the most important adult prey class for adults, both numerically and in terms of biomass. However, few honeybees ('*Apis mellifera*' Linnaeus) were eaten by adults. Conversely, the most important components of the nestling diet in terms of biomass were cicadas, dragonflies (Anisoptera) and various Diptera. Large numbers of honeybees were also brought to the nestlings during their later development, particularly by the female bird and these comprised almost all the Hymenoptera fed to the nestlings. Lepidoptera, chiefly butterflies of all families, formed a minor but conspicuous part of the diet, particularly of the adults. Relatively fewer were fed to the nestlings, possibly because of the abundance of cicadas and dragonflies in the foraging territory." (Author)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology & Management, Environmental Sciences, Griffith Univ., Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**14081.** Röller, O. (2013): Ungewöhnlicher Paarungsversuch zwischen zwei Binsenjungfer-Arten. *Pollichia-Kurier* 29(3): 20-21. (in German) [21-VII-2013, Hanhofen, Rhein-Pfalz-Kreis, Rheinland-Pfalz, Germany; triple connection between a pair of *Lestes barbarus* and *L. dryas*.] Address: Röller, O., POLLICHIA, Bismarckstr. 33, 67433 Neustadt, Germany. E-Mail: roeller@pollichia.de

**14082.** Saha, N.; Aditya, G.; Saha, G.K. (2013): Prey preferences of aquatic insects: potential implications for the regulation of wetland mosquitoes. *Medical and Veterinary Entomology* 28(1): 1-9. (in English) ["Wetlands are potential sites for mosquito breeding and are thus important in the context of public health. The use of chemical and microbial controls is constrained in wetlands in view of their potential impact on the diverse biota. Biological control using generalist aquatic insects can be effective, provided a preference for mosquito larvae is exhibited. The mosquito prey preferences of water bugs and larvae of odonate species were evaluated using chironomid larvae, fish fingerlings and tadpoles as alternative prey. Manly's selectivity ( $a_i$ ) values with 95% confidence intervals (CIs) were estimated to judge prey preference patterns. Multivariate analysis of variance (manova) and standardized canonical coefficients were used to test the effects of density on prey selectivity. The  $a_i$  values indicated a significant preference ( $P < 0.05$ ) in all of the insect predators tested for mosquito larvae over the alternative prey as a density-dependent function. On a comparative scale, chironomid larvae had the highest impact as alternative prey. In a multiple-prey experiment, predators showed a similar pattern of preference for mosquito larvae over alternative prey, reflecting a significant ( $P < 0.05$ ) niche overlap. The results suggest that, in a laboratory setting, these insect predators can effectively reduce mosquito density in the presence of multiple alternative prey." (Authors)] Address: Saha, Nabaneeta, Department of Zoology, University of Calcutta, 35 Ballygunge Circular Road, Kolkata 700019, India. E-mail: nabaneetasaha@gmail.com

- 14083.** Saputri, D.; Dahelmi, D.; Safitri, E. (2013): Jenis-Jenis Capung (Odonata) di Persawahan Masyarakat Rimbo Tarok Kelurahan Gunung Sarik Kecamatan Kuranji Padang [Types of dragonflies (Odonata) in Rice Field Village Society Tarok Rimbo Sarik Mount Padang Subdistrict Kuranji]. *Jurnal Mahasiswa Pendidikan Biologi Genap 2013-2014* 2(2) [Journal of Biological Education Students Genap 2013-2014]: 6 pp. (in Indonesian, with English summary) [*Orthetrum sabina*, *Crocothemis servilia*, *Pantala flavescens*, and *Agriocnemis femina* were found in the paddy fields of Rimbo Tarok of Gunung Sarik Village of Kuranji District, Padang, Indonesia] Address: not stated
- 14084.** Savchuk, V.; Karolinsky, E.A. (2013): [New records of rare species of dragonflies (Insecta, Odonata) Ukraine [New Records of rare Dragonflies (Insecta, Odonata) in Ukraine]]. *Vestnik zoologii* 47(6): 506. (in Russian) [Ukraine; records of *Chalcolestes viridis*, *Lestes macrostigma*, *Erythromma lindenii*, *Libellula quadrimaculata*, and *Selysiothemis nigra* are documented.] Address: not stated
- 14085.** Talucdher, A.R.A. (2013): Morphological, mechanical and structural characterization of damselfly wing. Dissertation, North Carolina Agricultural and Technical State University, Greensboro, North Carolina: 115 pp. (in English) ["The damselfly belongs to the same insect family as the dragonfly that inspired the development of Micro Air Vehicles (MAVs). Understanding the morphological, mechanical and structural properties of wings, veins and membranes of fly would provide guidelines to develop efficient MAVs. Lack of test methodologies inhibited the progress. The objective of this research was to develop the above methodologies and then measure the properties of veins, membranes and wings of damselflies. The research yielded four test methodologies: fluorescence spectroscopic analysis to map the morphology of vein; axial nanoindentation test to measure indentation properties; micro tension test to measure tensile properties of microscopic components; and a unique vibration test of wings to measure natural frequency, stiffness and air damping factor. Axial indentation test contrasts the transverse indentation used in the past, whose results were corrupted by surface roughness and flexibility of veins. Veins were found to be made of two layered, elliptical tubular members. The thickness of inner and outer layers was about 8 and 5  $\mu\text{m}$ , respectively and corresponding indentation moduli were 8.42 and 16.00 GPa. The modulus of veins agreed with those of human bones. The tensile modulus and strength of veins ranged from 14 to 17 GPa and 232 to 285 MPa, respectively. The damselfly wing was found to vibrate under bending and torsional deformations, the natural frequency (in air) ranged from 130 to 178 Hz, the wing stiffness ranged from 0.18 to 0.30 N/m with the air damping ratio from 0.67 to 0.79. Pathway to develop a material of matching properties is also presented." (Author)]
- 14086.** Termaat, T.; Kalkman, V. (2013): Verspreidingsonderzoek bijzondere libellen- en vlindersoorten. *Euro-pean invertebrate survey Nederland - nieuwsbrief* 52: 13. (in Dutch) [The authors announce a new internet portal where records for 19 rare Dutch Odonata species can be inserted and displayed. Aim of the portal is to update and to take updated records from these species and the localities where they occur: <http://www.vlinderstichting.nl/steunDVS.php?id=537>] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands. E-mail: [tim.termaat@vlinderstichting.nl](mailto:tim.termaat@vlinderstichting.nl)
- 14087.** Tierno de Figueroa, J.M.; Lopez-Rodríguez; Fenoglio, S.; Sanchez-Castillo, P.; Fochetti, R. (2013): Freshwater biodiversity in the rivers of the Mediterranean Basin. *Hydrobiologia* 719: 137-186. (in English) ["We review the diversity of freshwater organisms in the Mediterranean Basin (hereafter Med), particularly from streams and rivers. We present available information on the richness, endemism, and distribution of each freshwater organism group within the Med, and make a comparison with Palearctic diversity. Approximately 35% of known Palearctic freshwater species and more than 6% of the World's freshwater species are present in the Med. A high degree of endemism is found in the Med freshwater biota. These data, together with the degree to which many freshwater species are threatened, support the inclusion of the Med among World biodiversity hotspots. Nevertheless, knowledge of Med biodiversity is still incomplete, particularly for some taxa. Regarding to the spatial distribution of species within the Med, the richest area is the North, although patterns differ among groups. A comparison of the ecological and biological traits of endemic and non-endemic species of three riverine groups (Ephemeroptera, Plecoptera, and Trichoptera) revealed that endemic species have several strategies and mechanisms to face typical mediterranean-climate conditions, such as drought, when compared to non-endemic species. We briefly analyse the conservation status of the region's biodiversity. Finally, we present some future challenges regarding the knowledge and protection of Med freshwater biodiversity." (Authors) Odonata are treated at pages 156-158.] Address: Tierno de Figueroa, J.M., Departamento de Zoología, Facultad de Ciencias, Universidad de Granada, 18071 Granada, Spain. E-mail: [jmtdef@ugr.es](mailto:jmtdef@ugr.es)
- 14088.** Torralba-Burrial, A. (2013): Las libélulas de Aragón. *Naturaleza Aragonesa* 30: 35-43. (in Spanish) [The paper introduces the regional odonate fauna of the autonomous republic in northeastern Spain.] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: [antoniotb@hotmail.com](mailto:antoniotb@hotmail.com)
- 14089.** Umar, D.M.; Harding, J.S.; Winterbourn, M.J. (2013): Freshwater invertebrates of the Mambilla Plateau, Nigeria. Gombe State University, Nigerian Montane Forest Project, University of Canterbury: 86 pp. (in English) ["In this book we present an illustrated guide to the most common benthic stream invertebrates found in trop-

ical highland streams on the Mambilla Plateau in Nigeria. They include Crustacea and insects in the orders Ephemeroptera, Plecoptera, Trichoptera, Odonata, Coleoptera, Hemiptera and Diptera. This photographic guide book is an attempt to assist students and researchers in the field to identify some of the common freshwater benthic invertebrates of Mambilla Plateau. It is not a comprehensive guide to all the animals you might collect. Due to the lack of any existing guide for freshwater invertebrates on the Plateau we anticipate that this will become an essential field tool for students and researchers." (Authors) see: <http://www.biol.canterbury.ac.nz/invertebrates/Freshwater-Invertebrates-of-Mambilla.pdf> Address: School of Biological Sciences, University of Canterbury, Private Bag 4800, Christchurch 8140, New Zealand. [www.biol.canterbury.ac.nz](http://www.biol.canterbury.ac.nz)

**14090.** Van der Sijde, G. (2013): Urban Dragonflies. *Natura* 110(3): 5. (in Dutch) [Netherlands; on 25 May 2013, the polder gardens beside the residential Rokkeveen Zoetermeer officially were named Dragonfly Capital Reserve.] Address: not stated

**14091.** Van Dijk, T.C.; Van Staalduinen, M.A.; Van der Sluijs, J.P. (2013): Macro-invertebrate decline in surface water polluted with Imidacloprid. *PLoS ONE* 8(5): e62374. doi:10.1371/journal.pone.0062374: 10 pp. (in English) ["Imidacloprid is one of the most widely used insecticides in the world. Its concentration in surface water exceeds the water quality norms in many parts of the Netherlands. Several studies have demonstrated harmful effects of this neonicotinoid to a wide range of non-target species. Therefore we expected that surface water pollution with imidacloprid would negatively impact aquatic ecosystems. Availability of extensive monitoring data on the abundance of aquatic macro-invertebrate species, and on imidacloprid concentrations in surface water in the Netherlands enabled us to test this hypothesis. Our regression analysis showed a significant negative relationship ( $P < 0.001$ ) between macro-invertebrate abundance and imidacloprid concentration for all species pooled. A significant negative relationship was also found for the orders Amphipoda, Basommatophora, Diptera, Ephemeroptera and Isopoda, and for several species separately. The order Odonata (represented by *Ischnura elegans*, *Erythromma najas* and *E. viridulum*) had a negative relationship very close to the significance threshold of 0.05 ( $P = 0.051$ ). However, in accordance with previous research, a positive relationship was found for the order Actiniedida. We used the monitoring field data to test whether the existing three water quality norms for imidacloprid in the Netherlands are protective in real conditions. Our data show that macrofauna abundance drops sharply between 13 and 67 ng l<sup>-1</sup>. For aquatic ecosystem protection, two of the norms are not protective at all while the strictest norm of 13 ng l<sup>-1</sup> (MTR) seems somewhat protective. In addition to the existing experimental evidence on the negative effects of imidacloprid on invertebrate life, our study, based on data from large-

scale field monitoring during multiple years, shows that serious concern about the far-reaching consequences of the abundant use of imidacloprid for aquatic ecosystems is justified." (Authors)] Address: Van Dijk, T.C., Environmental Sciences, Utrecht University, Utrecht, The Netherlands. E-mail: [j.p.vandersluijs@uu.nl](mailto:j.p.vandersluijs@uu.nl)

**14092.** Vanschoenwinkel, B.; Buschke, F.; Brendonck, L. (2013): Disturbance regime alters the impact of dispersal on alpha and beta diversity in a natural metacommunity. *Ecology* 94(11): 2547-2557. (in English) ["Disturbance and dispersal are two fundamental ecological processes that shape diversity patterns, yet their interaction and the underlying mechanisms are still poorly understood and evidence from natural systems is particularly lacking. Using an invertebrate rock pool metacommunity as a natural model system, we studied potential interactive effects of disturbance regime and patch isolation on diversity patterns of species with contrasting dispersal modes (passive vs. active dispersal). Isolation and disturbance regime had negative synergistic effects on alpha diversity; both directly, by excluding late successional species from isolated patches; and indirectly, by modulating establishment success of generalist predators in well connected patches. Unimodal relationships between isolation and alpha diversity, as predicted by mass effects, were only detected for passive dispersers in frequently disturbed patches and not in active dispersers. For passive dispersers, indications for a positive effect of isolation and a negative effect of disturbance on beta diversity were found, presumably due to differences in deterministic succession and stochastic colonization-extinction dynamics among different patch types. Our findings illustrate that interactions between dispersal rates and disturbance regime are important when explaining species diversity patterns in metacommunities and support the idea that diversity in frequently disturbed habitats is more sensitive to effects of dispersal-based processes." (Authors) The list of taxa includes larvae of Libellulidae.] Address: Vanschoenwinkel, B., KU Leuven, Lab. of Aquatic Ecology, Evolution and Conservation, Belgium. E-mail: [bram.vanschoenwinkel@bio.kuleuven.be](mailto:bram.vanschoenwinkel@bio.kuleuven.be)

**14093.** Vidal-Abarca, M.R.; Sánchez-Montoya, M.M.; Guerrero, C.; Gómez, R.; Arce, M.I.; García-García, V.; Suárez, M.L. (2013): Effects of intermittent stream flow on macroinvertebrate community composition and biological traits in a naturally saline Mediterranean stream. *Journal of Arid Environments* 99: 28-40. (in English) ["Highlights: •We studied the effect of flow intermittence on macroinvertebrate community in a naturally saline stream. •Flow intermittence promoted loss of drought-intolerant macroinvertebrate taxa and led to an increase in flier taxa richness at the intermittent site. •Macroinvertebrate community at the intermittent site was a subset of the community found in perennial sites. •Flow intermittence has important consequences to assess ecological quality. As saline streams are geographically widespread in arid and semiarid regions, flow intermittence frequently occurs as another stressor factor apart from salinity.



Rambla Salada is a temporary naturally saline stream with an intermittent reach upstream. This stream is an ideal scenario to study the effects of intermittent stream flow on macroinvertebrate community composition and biological traits in a naturally saline Mediterranean stream. This study analysed three sites with different hydrological regimes (one intermittent and two perennials). Flow intermittence exerted low pressure on the macroinvertebrate composition and biological traits which led to the loss of drought-intolerant species and taxa rather than acting as a selective force to promote desiccation-resistant taxa. Macroinvertebrate community at the intermittent site was a subset of the community found in perennial sites, and the presence of flier taxa at this site helped avoid flow cessation. These minor changes have consequences to assess the ecological quality of these saline temporary streams in the context of the Water Framework Directive, given the major differences revealed by some indices between the intermittent and perennial sites as the former obtained lower values due to the presence of few desiccation-intolerant species, which significantly increased the value of those biological indices. ... In this sense, Heteroptera, Coleoptera and Diptera are the most diverse groups inhabiting saline streams and on the contrary Ephemeroptera, Trichoptera, Odonata, Crustaceans, Hydrachnidia and Mollusca taxa are scarce (Mellado-Díaz et al., 2008 and Millán et al., 2011)." (Authors)] Address: Vidal-Abarca, Maria, Department of Ecology and Hydrology, Regional Campus of International Excellence "Campus Mare Nostrum", University of Murcia, Campus of Espinardo, 30100 Murcia, Spain. E-mail: charyvag@um.es

**14094.** Wei, H.H.; New, T.H. (2013): CFD analysis of bio-inspired corrugated aerofoils. Proceedings of ICFD11: Eleventh International Conference of Fluid Dynamics December 19-21, 2013, Alexandria, Egypt : 6 pp. (in English) ["Adapting aerospace solutions engineered by nature to improve technologically advanced products has become increasing popular as researchers attempt to come up with implementations that are simple and robust. Dragonfly wings have corrugated cross-section profiles which instead of hindering flight, actually exhibits superior flight performance by reducing the flow separation bubble even under static flight conditions. A computational fluid dynamics study was conducted to investigate this phenomenon at a Reynolds number of 14 000 by comparing a corrugated aerofoil with the NACA010 aerofoil. The results show a clear reduction of the separation bubble and increased lift for the corrugated aerofoil." (Authors)] Address: Wei, H.H., University of South Africa, Department of Mechanical and Industrial Engineering, Private Bag X6, Florida 1710, South Africa. E-mail: howh@unisa.ac.za

**14095.** Wiles, C.M. (2013): Parasite community structure in 5 species of damselflies (Odonata: Zygoptera) from Teal ridge, Stillwater Oklahoma. M.Sc. thesis, Oklahoma State University: 114 pp. (in English) ["Few ecological

studies exist on parasite community structure in insects and compared to other invertebrate and vertebrate groups, insects have been largely ignored in studies on parasite community structure. This is surprising because some insects, such as odonates, have become model systems for studies on host parasite interactions, and there is a desperate need for descriptive studies on their parasite community structure. In this study I examined 530 individual damselflies of five species (*Argia apicalis*, *Enallagma civile*, *Ischnura hastata*, *Ischnura verticalis*, and *Lestes disjunctus australis*) for their parasites and report parasite community structure parameters for these hosts. All damselflies were collected from Teal Ridge a semi-permanent wetland located in Stillwater, Oklahoma during the summer and fall of 2010-2012. I report the first record of juvenile *Serpinema cf. trispinosum* nematodes, along with new host records and geographical distribution information for gregarine parasites from Oklahoma damselflies. The parasite compound community of this odonate assemblage consisted of a total of 549 individual parasites, comprised of seven taxa including; five species of gregarines, two species of helminths, and one species of mite. None of the individual parasite species were host specific to a single damselfly species and all parasite species infected at least two species of damselflies. Average parasite species richness was low among the four species of damselflies ranging from a low of  $0.2 + 0.4$  (0-2) for *I. hastata* to a high of  $0.3 + 0.6$  (0-2) for *E. civile*. There was no relationship in damselfly size and parasite abundance, intensity, or species richness among any of the damselfly species examined. This study indicates that the parasite community structure of damselflies was most similar to Mariluan, 2012 study on the parasite communities of benthic aquatic insects and drastically differed in terms of standard measures of parasite community structure in vertebrate hosts which are much higher in terms of parasite prevalence, mean abundance, mean intensity and species richness." (Author)] Address: Wiles, Crystal Marie

**14096.** Woodford, D.J.; Barber-James, H.M.; Bellingan, T.A.; Day, J.A.; de Moor, F.C.; Gouws, J.; Weyl, O.L.F. (2013): Immediate impact of piscicide operations on a Cape Floristic Region aquatic insect assemblage: a lesser of two evils? *Journal of Insect Conservation* 17(5): 959-973. (in English) ["The piscicide rotenone is used as a conservation tool to remove alien fishes from rivers, though there is controversy over its effects on aquatic insects. An alien fish removal operation in the Rondegat River, Cape Floristic Region, South Africa, allowed the immediate impact of rotenone on an aquatic insect community in a region with high conservation values to be quantified. The insect community within the treated river was sampled in February 2011 (1 year before rotenone operations), February 2012 (1 week before) and March 2012 (1 week after). Insects were collected using kick sampling across multiple biotopes, together with samples from individual stones. We considered rotenone-precipitated losses to be those taxa captured a week before

treatment but absent after, and assessed the endemism of lost species to determine the conservation impact of the rotenone. Species richness decreased significantly following treatment, even though many rare taxa were not recorded immediately prior to treatment. Of the 85 taxa identified, 18 were lost including five endemic to the mountain range which the river drains. Ephemeroptera were most severely affected, with a significant loss of density on stones post-rotenone and six out of 20 species missing. Since half the missing taxa were recorded upstream of the treatment area, recovery of diversity is likely to be relatively rapid. Given that alien invasive fish negatively affect both fish and aquatic insect communities in South Africa, the long-term positive conservation impact of removing these fish is likely to outweigh the short-term negative effects of the piscicide. ... Odonata, Trichoptera, Coleoptera and Diptera appeared largely unaffected by the rotenone operations." (Authors)] Address: Woodford, D.J., South African Institute for Aquatic Biodiversity, Private Bag 1015, Grahamstown, 6140, South Africa. E-mail: d.woodford@saiab.ac.za

**14097.** Zschille, J.; Stier, N.; Roth, M.; Mayer, R. (2013): Feeding habits of invasive American mink (*Neovison vison*) in northern Germany — potential implications for fishery and waterfowl. *Acta Theriologica* 59(1): 25-34. (in English) [lowland area "Lewitz", located about 20 km southeast of the city of Schwerin (Mecklenburg-Western Pomerania, northern Germany, 53°26' N, 11°36' E). "In order to collect ecological data of invasive American mink (*Neovison vison*) at a fishpond area in northeastern Germany, we conducted a telemetry study in which 14 mink were radio-tracked. During this project, 2,502 scats from radio-tracked individuals were collected in the period from October 2003 to October 2005. Investigated mink principally prey on fish, small mammals and birds (eggs inclusive), whereas amphibians, reptiles and invertebrates were caught infrequently. Analysing mink scats of different seasons, we found significant seasonal variations of diet composition. In spring, fish, mammals and birds were hunted in similar amounts. During summer, birds made up the main part of the diet followed by mammals. In autumn, the proportion of birds in the mink diet decreased, whereas fish gained in importance. This trend continued during the winter period, when mink preyed almost exclusively on fish. Amphibians, crustaceans, insects, molluscs and reptiles were found only occasionally in scat samples. Among birds, the mink preyed mainly on the Eurasian Coot (*Fulica atra*) followed by the Mallard (*Anas platyrhynchos*). Mammalian prey was clearly dominated by the water vole (*Arvicola terrestris*) and among fish, mink hunted especially perch (*Perca fluviatilis*), roach (*Rutilus rutilus*) and carp (*Cyprinus carpio*). Results clearly demonstrate that mink is an opportunistic predator, which hunts its prey according to availability and vulnerability, respectively. Despite the high portions of fish in their autumn and winter diet, the economic damage caused by mink seems to be negligible. However, high predation rates on birds during the breeding sea-

son indicate a potential negative impact of mink on waterfowl." (Authors) Also larvae of Odonata very scarcely found in the diet of the mink.] Address: Zschille, Jana, Forest Zoology, Institute of Forest Botany and Forest Zoology, Dresden University of Technology, Pienner Str. 7, 01737, Tharandt, Germany. E-mail: zschille@forst.tu-dresden.de

## 2014

**14098.** Abere, S.A.; Ukoima, H.N. (2014): Checklist of urban wildlife species in rivers state: A case study of Obio/Akpor, Port Harcourt and Eleme Local Government Areas of Rivers State. *Caribbean Journal of Science and Technology* 2: 603-610. (in English) [Nigeria; "Trithemis furva, Trithemis kirbyi, Cordulegaster dorsalis, Austroaeschna tasmarica" are listed; a nice set of representatives from three continents in one African region ... ] Address: Abere, S.A, Department of Forestry and Environment, Faculty of Agriculture, Rivers State University of Science and Technology, Nkpolu-Oroworukwo, Port Harcourt, Nigeria

**14099.** Adarsh, C.K.; Aneesh, K.S., Nameer, P.O. (2014): A preliminary checklist of odonates in Kerala Agricultural University (KAU) campus, Thrissur District, Kerala, southern India. *Journal of Threatened Taxa* 6(8): 6127-6137. (in English) [52 odonate species are checked.] Address: Nameer, P.O., Centre for Wildlife Sciences, Coll. Forestry, Kerala Agricultural Univ., Thrissur, Kerala 680656, India. E-mail: nameer.po@kau.in

**14100.** Al-Shami, S.A.; Siti Nurhanani, H.; Che Salmah, M. R.; Salman, A.; Nur Huda, A.; Abu Hassan, A. (2014): Developmental instability in Odonata larvae in relation to water quality of Serdang River, Kedah, Malaysia. *Life Science Journal* 11(7): 152-159 (in English) ["We examined the fluctuating asymmetry (FA) in larvae of two Odonata genera; *Pseudagrion* sp. and *Onychothemis* sp. living in a relatively polluted river as a tool for water quality assessment. Larval and water samples were collected monthly from January to June 2008. Various water parameters including pH, temperature, velocity, nitrate, phosphate, biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solid (TSS), and ammonium-N content were recorded. Composite effect of selected water parameters expressed as Water Quality Index (WQI) was also calculated. FA indices [(FA), absolute asymmetry (AbsFA), composite fluctuating asymmetry (CFA)] of the first and second antennal segments of *Onychothemis* sp. and last tarsal segment of *Pseudagrion* sp. hind legs were calculated. We found that high FA levels in the selected traits for the two Odonata species were associated with deterioration in the water quality (WQI). BOD and pH were positively correlated with high FA indices in the antennal segments of *Onychothemis* sp. The FA levels calculated as FA indices of last tarsal segment of *Pseudagrion* sp. hind legs were positively correlated with ammonium-N, phosphate, and COD. We concluded that selected traits of the odonate

taxa are useful bioindicators as the incidence of fluctuating asymmetry in their larvae was strongly associated with deterioration in the water quality of the river." (Authors)] Address: Al-Shami, S.A., School of Biological Sciences, Universiti Sains Malaysia, Penang 11800, Malaysia. E-mail: alshami200@gmail.com

**14101.** Amaya-Perilla, C.; Marinov, M.; Holwell, G.; Varsani, A.; Stainton, D.; Kraberger, S.; Dayaram, A.; Curtis, N.; Cruickshank, R.; Paterson, A. (2014): Comparative study of the Chatham Islands Odonata, II: Morphometric and molecular comparison between *Xanthocnemis tuanuii* Rowe, 1981 and *X. zealandica* (McLachlan, 1873) with notes on the taxonomic position of *Xanthocnemis sinclairi* Rowe, 1987 (Zygoptera: Coenagrionidae). International Dragonfly Fund - Report 75: 1-27. (in English) ["We compared Chatham Island endemic species *Xanthocnemis tuanuii* to its congeners from the New Zealand South Island: *X. zealandica* (newly collected specimens) and *X. sinclairi* (type specimens plus newly collected material). Two independent tests were performed - geometric morphometrics and molecular. Both analyses were consistent in supporting the status of *X. tuanuii* as a good species. Species differed statistically in the following morphological traits: head (dorsal view), male appendages (dorsal, lateral, posterior and ventral views), thorax (dorsal view), and penis (dorsal and lateral view). In addition to the original diagnostic features (mainly shape of the male superior appendages), a new morphological character is suggested here which reliably distinguishes the species based on the shape of the inferior appendages. There was no statistical support for the species status of *X. sinclairi*. The only feature reported as diagnostic (lower lobe of male superior appendages) was found to be variable and insufficient to warrant the previously proposed taxonomic rank for *X. sinclairi*. Molecular analysis of specimens showing identical appendages to the *X. sinclairi* holotype grouped them with *X. zealandica* specimens. Therefore *X. sinclairi* is synonymised with *X. zealandica*." (Authors)] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@mpi.govt.nz

**14102.** Andersen, A.N.; Humphrey, C.; Braby, M.F. (2014): Threatened invertebrates in Kakadu National Park. In: Winderlich S & Woinarski J (eds) 2014. Kakadu National Park Landscape Symposia Series. Symposium 7: Conservation of threatened species, 26–27 March 2013, Bowali Visitor Centre, Kakadu National Park. Internal Report 623, June, Supervising Scientist, Darwin: 48-57. (in English) [Kakadu National Park, 171 km E Darwin, Northern Territory, Australia. A total of 78 Odonata species is known from the National Park. *Antipodogomphus dentosus*, *Eurysticta coomalie*, *Hemigomphus magela*, and *Lithosticta macra* are briefly highlighted.] Address: Braby, M.F., Department of Land Resource Management, P.O. Box 496, Palmerston, NT 0831, Australia

**14103.** Appel, E.; Gorb, S.N. (2014): Comparative func-

tional morphology of vein joints in Odonata. *Zoologica* (Schweizerbart) 159: 104 pp. (in English) ["The authors present a thorough study on the distribution of resilin-bearing wing vein joints in wings of Odonata. 22 species of 20 different families of dragonflies and damselflies, showing various wing morphologies and flight kinematics, are examined and reveal interesting evolutionary trends. Dragonflies and damselflies show an exceptional high lift production and are some of the most maneuverable flying insects. The important role of their corrugated wing profile in increasing lift production has been shown in various studies. As odonate wings lack internal muscles, their aerodynamic performance relies on passive deformations, such as pleat angle widening and camber formation. The rubber-like protein resilin has been shown to play a crucial role in wing joint flexibility. Thus, it may be assumed that the specific distribution of either stiff or flexible, resilin-bearing vein joints may influence the overall wing deformation during flight. Using fluorescence light microscopy and scanning electron microscopy, the dorsal and ventral wing sides of different species are compared with respect to the distribution patterns of four types of vein joints, five types of resilin patches, and joint-associated spines. The results reveal a significant difference between dragonflies and damselflies. Variations of the distribution patterns suggest a classification into five different pattern groups. Their occurrence within the two suborders shows some evolutionary trends and gives insight into the wing functionality. In particular, we discussed how the combination of joint morphology, kinematics, and wing morphology may allow different passive wing deformations during flight. This study, generously illustrated with 53 mostly coloured figures is of great interest to biologists studying insect flight, functional morphology, and evolution of Odonata. Furthermore, the described distribution patterns of different vein joints in combination with wing shape and flight kinematics may possibly inspire their biomimetic imitation in micro air vehicles (MAV)." (Publisher)] Address: Gorb, S.N., Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**14104.** Arbeiter, S.; Schnepel, H.; Uhlenhaut, K.; Bloege, Y.; Schulze, M.; Hahn, S. (2014): Seasonal shift in the diet composition of European Bee-Eaters *Merops apiaster* at the northern edge of distribution. *Ardeola* 61(1): 161-170. (in English, with Spanish summary) ["*M. apiaster* forage almost exclusively on airborne insects caught on the wing. The availability of this food might be temporally limited due to adverse weather conditions, especially at climatically sub-optimal breeding sites. We determined seasonal variation in the diet composition in adult and nestling bee-eaters at the species' northernmost breeding colonies by analysing food remains from pellets and by direct observation. Adult bee-eaters preyed on a wide range of insect species with more than 97% belonging to the taxonomic orders Hymenoptera, Odonata and Coleoptera. We observed consistent seasonal changes in adult



diet composition from the pre-incubation to the late chick rearing period. The dry mass proportion of dragonflies decreased remarkably in the adult diet as chick rearing started, whereas the consumption of small Hymenoptera increased by the end of the chick provisioning period. Additionally, we found differences in the diet composition of adults and nestlings. The higher amount of bumblebees and dragonflies in the nestling diet was temporally associated with a decrease of these components in the adult diet, indicating that breeding birds preferentially feed larger prey items to their offspring than those that they consume themselves." (Authors)] Address: Arbeiter, Susanne, Zool. Institute & Museum, Univ. of Greifswald, Johann-Sebastian-Bach-Str.11/12, 17489 Greifswald, Germany. E-mail: susanne.arbeiter@uni-greifswald.de

**14105.** Atwood, T.B.; Hammill, E.; Srivastava, D.S.; Richardson, J.S. (2014): Competitive displacement alters top-down effects on carbon dioxide concentrations in a freshwater ecosystem. *Oecologia* 175(1): 353-361. (in English) ["Climate change and invasive species have the potential to alter species diversity, creating novel species interactions. Interspecific competition and facilitation between predators may either enhance or dampen trophic cascades, ultimately influencing total predator effects on communities and biogeochemical cycling of ecosystems. However, previous studies have only investigated the effects of a single predator species on CO<sub>2</sub> flux of aquatic ecosystems. In this study, we measured and compared the individual and joint effects of predatory damselfly larvae (*Mecistogaster modesta*) and diving beetles on total prey biomass, leaf litter processing, and dissolved CO<sub>2</sub> concentrations of experimental bromeliad ecosystems. Damselfly larvae created strong trophic cascades that reduced CO<sub>2</sub> concentrations by ~46 % relative to no-predator treatments. Conversely, the effects of diving beetles on prey biomass, leaf litter processing, and dissolved CO<sub>2</sub> were not statistically different to no-predator treatments. Relative to multiplicative null models, the presence of damselfly larvae and diving beetles together resulted in antagonistic relations that eliminated trophic cascades and top-down influences on CO<sub>2</sub> concentrations. Furthermore, we showed that the antagonistic interactions between predators occurred due to a tactile response that culminated in competitive displacement of damselfly larvae. Our results demonstrate that predator identity and predator–predator interactions can influence CO<sub>2</sub> concentrations of an aquatic ecosystem. We suggest that predator effects on CO<sub>2</sub> fluxes may depend on the particular predator species removed or added to the ecosystem and their interactions with other predators." (Authors)] Address: Atwood, Trisha, Department of Forest and Conservation Sciences, University of British Columbia, Vancouver, BC, V6T 1Z4, Canada. E-mail: tatwood16@gmail.com

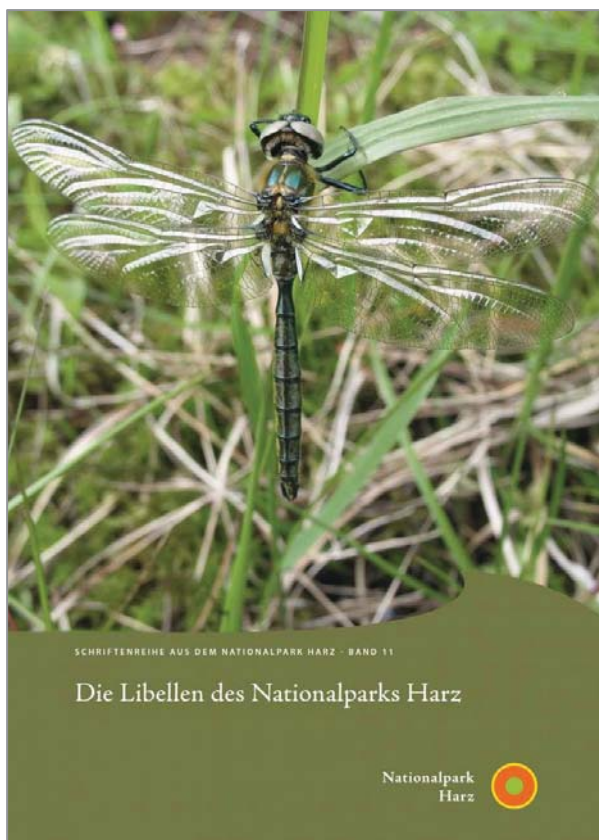
**14106.** Ball, L. (2014): An investigation of Odonate communities within Wadi Sayq, Dhofar province, Oman (Insecta: Odonata). *Check List* 10(4): 857-863. (in Eng-

lish) ["Two research expeditions surveyed Odonata communities within Wadi Sayq, a coastal wadi system 20 km in length, situated in the southwest Jabal Qamar mountain range, Dhofar Province of Oman. Sample collection was undertaken from 2 to 29 February 2012, and from 6 February to 7 March 2013. 897 individuals were recorded belonging to 20 species and *Tholymis tillarga* is new for the Arabian Peninsula. A single record of *Rhyothemis semihyalina* increases significantly the known distribution range of this species in Arabia to the West. Reasons for the observed temporal and spatial variation in community composition are explored and notes on species habitat preferences are included." (Author) *Trithemis arteriosa*; *Orthetrum chrysostigma*; *Ischnura senegalensis*; *Ceriagrion glabrum*; *T. annulata*; *Crocothemis erythraea*; *Pantala flavescens*; *Orthetrum ransonnetii*; *Macrodiplax cora*; *Azuragrion nigridorsum*; *Anax ephippiger*; *Tholymis tillarga*; *Nesciothemis farinosa*; *Agriocnemis pygmaea*] Address: Ball, L., University of Exeter, College of Life and Environmental Sciences, Penryn Campus, Treliever Road, Penryn, Cornwall TR10 9FE, UK. E-mail: lawrence.ball1@gmx.com

**14107.** Ball-Damerow, J.E.; M'Gonigle, L.K.; Resh, V.H. (2014): Changes in occurrence, richness, and biological traits of dragonflies and damselflies (Odonata) in California and Nevada over the past century. *Biodiversity and Conservation* 23(8): 2107-2126. (in English) ["Increases in water demand, urbanization, and severity of drought threaten freshwater ecosystems of the arid western United States. Historical assessments of change in assemblages over time can help determine the effects of these stressors but, to date, are rare. In the present study, we resurveyed 45 sites originally sampled in 1914–1915 for Odonata adults throughout central California and northwestern Nevada, USA. We examined changes in species occurrence rates, taxonomic richness, and biological trait composition in relation to climate changes and human population increases. While species richness at individual sites did not change significantly, we found that odonate assemblages have become more similar across sites. Homogenization is a result of the expansion of highly mobile habitat generalists, and the decline of both habitat specialists and species with an overwintering diapause stage. Using a multi-species mixed-effects model, we found that overall occurrences of Odonata increased with higher minimum temperatures. Habitat specialists and species with a diapause stage, however, occurred less often in warmer regions and more often in areas with higher precipitation. Habitat specialists occurred less often in highly populated sites. Life history traits of Odonata, such as dispersal ability, habitat specialization, and diapause, are useful predictors of species-specific responses to urbanization and climate change in this region." (Authors)] Address: Ball-Damerow, Joan, Dept of Environmental Science, Policy & Management, University of California, Berkeley, 130 Mulford Hall #3114, Berkeley, CA 94720-3114, USA. E-mail: joandamerow@gmail.com

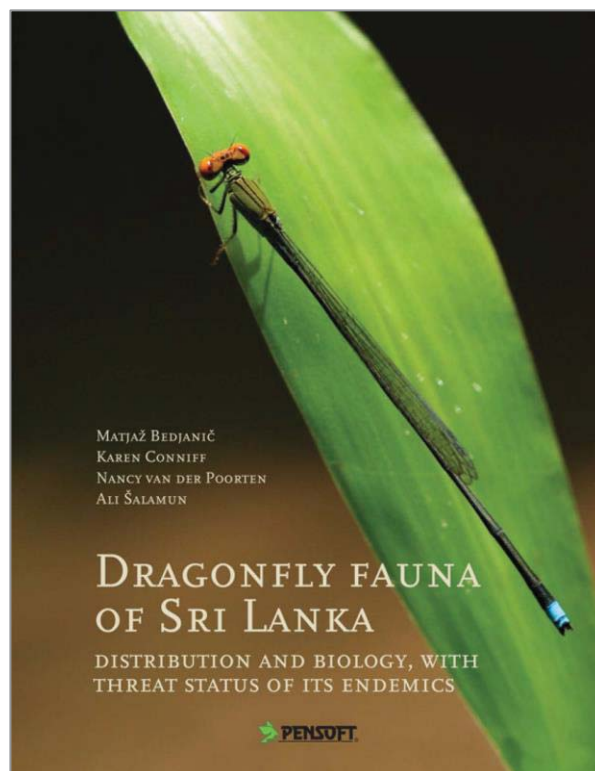
**14108.** Barry, M.J.; Roberts, D.M. (2014): Indirect interactions limit the efficiency of Odonata as natural control agents for mosquito larvae. *Journal of Insect Behavior* 27(5): 626-638. (in English) ["Odonate nymphs are voracious predators and may be useful natural control agents. However, odonates are normally found in complex guilds with a high degree of conspecific and interspecific predation that may reduce their overall predation efficiency. The present study investigates whether indirect interactions, mediated via chemical predation signals, inhibit the consumption of mosquito larvae by two common odonates: *Crocothemis erythraea* and *Ischnura evansi*. Our results show that the predation rate of *C. erythraea* is reduced by chemical cues from *Anax imperator*, but the response of *I. evansi* to *C. erythraea* was statistically non-significant. This study shows that intra-guild interactions may limit the effectiveness of odonates as predators of mosquitoes." (Authors)] Address: Barry, M.J., Author Affiliations1. Biology Department, Sultan Qaboos University, PO Box 36 AL Khoud, Muscat, 123, Oman. E-mail: mjbarry@squ.edu.om

**14109.** Baumann, K.; Müller, J. (2014): Die Libellen des Nationalparks Harz. Schriftenreihe aus dem Nationalpark Harz 11. 212 pp. (in German). Herausgeber: Nationalparkverwaltung Harz, Lindenallee 35, 38855 Wernigerode, Germany. [www.nationalpark-harz.de](http://www.nationalpark-harz.de)



**14110.** Bedjanic, M.; Conniff, K.; van der Poorten, N.; Šalamun, A. (2014): Dragonfly fauna of Sri Lanka: distribution and biology, with threat status of its endemics. Pensoft Publishers. 321 pp. (in English) ["Dragonflies are

strikingly beautiful insects and small colourful pearls of Sri Lanka's remarkable biodiversity. At present, 124 species are known from the island, of which almost half are endemic. Such an extraordinary level of endemism makes Sri Lankan dragonflies an exceptionally interesting group for studies in biodiversity, zoogeography, phylogeny and ecology. The book "Dragonfly fauna of Sri Lanka: distribution and biology, with threat status of its endemics" is the result of almost 20 years of the authors' work on the subject. With detailed texts and hundreds of colour photographs, maps and charts, it summarizes all the available knowledge on the distribution, taxonomy, biology and disturbing threat status of the dragonflies of Sri Lanka. It aims to raise awareness and promote interest in odonatology among a widespread and diverse community of researchers, nature conservationists and students in Sri Lanka and abroad." (Publisher)] [http:// www.pensoft.net/book/12977/dragonfly-fauna-of-sri-lanka-distribution-and-biology-with-threat-status-of-its-endemics](http://www.pensoft.net/book/12977/dragonfly-fauna-of-sri-lanka-distribution-and-biology-with-threat-status-of-its-endemics)



**14111.** Bharamal, D.L.; Koli, Y.J.; Korgaonkar, D.S.; Bhawane, G.P. (2014): Odonata fauna of Sindhudurg district, Maharashtra, India. *International Journal of Current Microbiology and Applied Sciences* 3(9): 98-104. (in English) [Records of 23 species are documented.] Address: Bharamal, D.L., Department of Zoology, Shri Panchamkhemraj Mahavidyalaya Savantvadi, MS, India

**14112.** Bharathi, A.; Roopan, S.M.; Rahuman, A.A.; Rajakumar, G. (2014): Solvatochromic behaviour and larvicidal activity of acridine-3-carboxylates. *Journal of Photochemistry and Photobiology B: Biology* 140: 359-364. (in English) ["Highlights: •Synthesis of acridine-3-carboxylate achieved. •Solvatochromic study was evaluated.

•Larvicidal activity against *A. stephensi* and *H. maculata* were done. A new series of substituted ethyl 10-chloro-4-(3,4-dimethoxyphenyl)-2-hydroxy-12-phenyl-1,4,5,6-tetrahydrobenzo[*a*]acridine-3-carboxylates, 3a–e have been synthesized through NaOH base mediated cyclocondensation of (E)-7-chloro-2-(3,4-dimethoxybenzylidene)-9-phenyl-3,4-dihydroacridin-1(2H)-ones, 1a–e with ethyl acetoacetate. Structures of these synthesized molecules were studied by FT-IR, <sup>1</sup>H NMR, <sup>13</sup>C NMR and EI-MS. And all the synthesized compounds were evaluated for their UV-absorption studies with various metal solutions. Acridine-3-carboxylate derivatives were tested against fourth instar larvae of *Anopheles stephensi* and *Hippobosca maculata*. Among those compounds, 3b and 3e have good larvicidal activities against both *A. stephensi* and *H. maculata*. Toxicity of compounds, 3b and 3e compounds were evaluated with the reference non-target aquatic species like, *Sphaerodema annulatum* Fabricius (Heteroptera: Belostomatidae) and *Zygomma petiolatum* Rambur (Odonata: Libellulidae) results very low LC50 values reveals that, the synthetic compounds are non toxic." (Authors)] Address: Roopan, S.M., Chemistry Research Laboratory, Organic Chemistry Division, School of Advanced Sciences, VIT University, Vellore 632 014, Tamil Nadu, India. -ail: mohanaroopan.s@gmail.com

**14113.** Bhatti, A.R.; Zia, A.; Mastoi, M.I.; Amad-ud-Din; Ashfaq, M.; Zahid, R.A.; Ali, M.A. (2014): Fenland naids of Odonata collected from Tehsil Shakargarh, Punjab, Pakistan. *Pakistan Entomologist* 36(1): 35-38. (in English) ["Naiads of Odonata were collected from various marshlands of Tehsil Shakargarh, Punjab. Aquatic spots including seasonal streams, rice fields, temporary ponds, water filled holes of uprooted trees and muddy margins of rivers etc. were visited in five selected localities." (Authors) The following species are documented: *Crocothemis servilia*; *Pantala flavescens*; *Orthetrum glaucum*; *O. sabina*; *Trithemis aurora*; *Ischnura aurora*; *Agriocnemis splendidissima*; *Ceriagrion coromandelianum*; *Rhodischnura nursei*] Address: Bhatti, A.R., National Insect Museum, NARC Islamabad, Pakistan. E-mail: bhatti.nim@gmail.com

**14114.** Bhuyan, B. (2014): Monsoon prediction: the use of traditional knowledge. *Sai Om Journal of Science, Engineering & Technology* 1(7): 1-6. (in English) ["India is traditionally an agrarian country wherein, the farm sector accounts for 14 percent of the country's nearly \$2 trillion economy, with two-third of it's 1.2 billion populace living in rural areas. Indian agriculture is highly dependent on rain wherein, half of the country lacks irrigation facility. At the same time, almost 75% of the rain in India arrives during the four rainy months of monsoon season. Thus highly dependent on rain, the people in different part of the country from time immemorial have developed various traditional means and ways for the prediction of monsoon rain over the country. These knowledge of monsoon prediction are based on various tacit knowledge such as direction of winds and temperature, shape and type of clouds, various

bio indicators such as flowering of some particular plants, typical behaviour of birds, animals and insects, position of celestial bodies, almanac etc. This particular study has been done to look into many such traditional knowledge of prediction of monsoon based on literature available from different sources. The study reveals that many such indigenous practices prevails in almost every part of the country and people especially, the farmers, rely on these information to large extent and adjust their agricultural activity accordingly. Thus, it is felt that if this indigenous knowledge is combined with the latest space and information technology, the prediction of the various weather and climate related phenomena will be more accurate and efficient. This will in turn help mitigating various climate induced disaster such as flood, drought, famine etc to great extent. .... Dragonfly flying in a group at three to four meters from the ground level indicates rain in the evening." (Author)] Address: Bhuyan, B., Senior Research Scholar, CSRD / SSS / JNU, New Delhi, India. Email: bibekbhuyan@yahoo.com

**14115.** Bianchi, R.; Calixto Campos, R.; Xavier-Filho, N.L.; Olifiers, N.; Gompper, M.E.; Mourão, G. (2014): Intraspecific, interspecific, and seasonal differences in the diet of three mid-sized carnivores in a large Neotropical wetland. *Acta Theriologica* 59(1): 13-23. (in English) ["The diet and partitioning of food resources among mid-sized mammalian carnivores is poorly known, especially in the tropics. We evaluated the resource partitioning between *Leopardus pardalis* (ocelot), *Cerdocyon thous* (crab-eating fox), and *Nasua nasua* (brown-nosed coati) in the Pantanal of Brazil. Between December 2005 and February 2008, we collected data necessary to better understand interspecific, intraspecific, and seasonal variability in diet. Food habits were assessed by analysis of feces (n = 293) collected from known individuals (n = 128), and differences in dietary composition were evaluated through nonmetric dimensional scaling using the Jaccard similarity index. The main diet differences were observed between the specialist ocelot and the more generalist crab-eating fox and brown-nosed coati. Crab-eating foxes and brown-nosed coatis preyed on arthropods, fruits, and vertebrates whereas ocelots preyed almost entirely on vertebrates, mainly rodents and snakes. Ocelots' consumption of snakes was the highest ever recorded, as was the extent of carnivory by brown-nosed coatis. For the crab-eating fox and the brown-nosed coati, there were large differences between the use of fruits and animal foods in the wet and dry season. Yet for both species there were no significant differences in the diets of males and females. Despite the conspicuous sexual dimorphism and spatial segregation that are typical of brown-nosed coatis, the results do not support the hypothesis that size dimorphism is primarily an adaptation to reduce intersexual competition for food. Rather, dimorphisms and patterns of space use may be more related to competition among males for access to females." (Authors) The diet of the crab-eating fox also includes some Odonata.] Address: de Cassia Bianchi, Rita, Depto de Biologia Aplicada à Agropecuária, Univde Estadual



Paulista "Júlio de Mesquita Filho", Jaboticabal, 14884-900, SP, Brazil. E-mail: rc\_bianchi@yahoo.com.br

**14116.** Blakely, T.J.; Eikaas, H.S.; Harding, J.S. (2014): The SingScore: a macroinvertebrate biotic index for assessing the health of Singapore's streams and canals. *Raffles Bulletin of Zoology* 62: 540-548. (in English) ["Worldwide, lotic ecosystems have been greatly modified by urbanisation, which has resulted in the impairment of physico-chemical conditions and the degradation of benthic communities. Singapore represents one of the most densely populated and urbanised nations globally, with more than 7,000 people per km<sup>2</sup>. Despite this high degree of urbanisation, relatively large forested areas remain in the Central Catchment Nature Reserve (CCNR) in the centre of the country. Thus, Singapore's lotic systems range from highly-impacted concreted canals in residential and commercial areas, to mildly-impacted, sand-dominated and forested streams within the CCNR. Although the use of macroinvertebrate biotic indices has a long history in freshwater ecology and they are now widely established in monitoring regimes around the world, few biotic indices have been developed for the tropics. This is particularly the case for Southeast Asia. We present the SingScore, a new biotic index developed for measuring the health of Singapore's lotic ecosystems using stream macroinvertebrates. We conducted extensive surveys of the macroinvertebrate communities inhabiting 47 study sites within streams, rivers and canals throughout Singapore's mainland, and measured a suite of physical and chemical parameters at all sites. We collected 59,116 macroinvertebrates, belonging to 74 different taxonomic groups (68 families and 6 higher taxa). Using multivariate ordination techniques and weighted averaging, we assigned tolerance scores (ranging from 1: pollution tolerant; to 10: pollution sensitive) to each of the 74 macroinvertebrate taxa. The SingScore was then calculated by summing the tolerance scores of all taxa present at a site and dividing by the number of taxa present at that site. The SingScore was multiplied by a constant of 20 to give SingScores between 0 and 200. We propose four likely water quality categories for running waters in Singapore: Poor (SingScore < 80), Fair (80–99), Good (100–119) and Excellent (120+). We envisage that the SingScore will enable more accurate monitoring of the health of Singapore's streams, rivers and canals." (Authors) The list of taxa includes Odonata, all at family level.] Address: Blakely, Tanja, Boffa Miskell, PO Box 110, Christchurch 8053, New Zealand

**14117.** Bode-Oke, A.; Zeyghami, S.; Dong, H. (2014): Effect of shape on wing kinematics control in dragonfly maneuvering flight (Abstract: L6.00007). *Bulletin of the American Physical Society*, 67th Annual Meeting of the APS Division of Fluid Dynamics, Volume 59, Number 18, Sunday–Tuesday, November 23–25, 2014; San Francisco, California: (in English) [Verbatim: Flying insects execute aerial maneuvers through fine modulations in their wing kinematics. It's yet not known that to what extend

the wing kinematics can be controlled and altered by the insect. To investigate the question, we recorded a yaw turn maneuver of a dragonfly in free flight. Our measurements show that this flight consists of two kinematically and dynamically distinct phases; acceleration and deceleration. In a systematic study, we first clipped the left forewing and then the right forewing of the same dragonfly and recorded its yaw turn maneuver. The signatures (in kinematics and dynamics) of the two identified phases stay unchanged by wing damage but the duration of both phases extends. The rotational velocity of the body drops dramatically by wing damage which implies the dragonfly is incapable of controlling the wing kinematics to achieve similar performance as in the intact wing. Our results suggest that the wing kinematics control is tightly influenced by the wing shapes and the aerodynamics of flapping flight.] Address: not stated

**14118.** Bos, F.; Wasscher, M.; Reinboud, W. (2014): *Veldgids libellen – Europa compleet voor Noordwest-Europa - veldkenmerken - met extra foto's*. KNNV. 260 pp. (in Dutch).



**14119.** Boshkovikj, V.; Webb, H.K.; Pham, V.T.; Fluke, C.J.; Crawford, R.J.; Ivanova, E.P. (2014): Three-dimensional reconstruction of surface nanoarchitecture from two-dimensional datasets. *AMB Express* 2014, 4:3

doi:10.1186/2191-0855-4-3: 9 pp. (in English) ["The design of biomaterial surfaces relies heavily on the ability to accurately measure and visualize the three-dimensional surface nanoarchitecture of substrata. Here, we present a technique for producing three-dimensional surface models using displacement maps that are based on the data obtained from two-dimensional analyses. This technique is particularly useful when applied to scanning electron micrographs that have been calibrated using atomic force microscopy (AFM) roughness data. The evaluation of four different surface types, including thin titanium films, silicon wafers, polystyrene cell culture dishes and dragonfly wings confirmed that this technique is particularly effective for the visualization of conductive surfaces such as metallic titanium. The technique is particularly useful for visualizing surfaces that cannot be easily analyzed using AFM. The speed and ease with which electron micrographs can be recorded, combined with a relatively simple process for generating displacement maps, make this technique useful for the assessment of the surface topography of biomaterials." (Authors)] Address: Boshkovikj, V., Faculty of Life and Social Sciences, Swinburne University of Technology, PO Box 218, Hawthorn, Victoria 3122, Australia. E-mail: vboshkovikj@swin.edu.au

**14120.** Bota-Sierra, C.A. (2014): A brief look at the Odonata from the Páramo ecosystems in Colombia, with the descriptions of *Oxyallagma colombianum* sp. nov. and *Rhionaeschna caligo* sp. nov. (Odonata: Coenagrionidae, Aeshnidae, Libellulidae). *Zootaxa* 3856(2): 192-210. (in English, with Spanish summary) ["Here I present the results of field work and collections of Odonata made in several páramos of Colombia between 2007 and 2014. Two undescribed species, in the genera *Oxyallagma* Kennedy, 1920, and *Rhionaeschna* Förster, 1909, respectively, were found, as well as two species not previously recorded from Colombia: *Rhionaeschna peralta* (Ris, 1918) and *Oxyallagma dissidens* (Selys, 1876). Descriptions and diagnoses of the new species, photographs, maps, illustrations, natural history notes, and comments on morphological plasticity are presented." (Author)] Address: Bota-Sierra, C.A., Grupo de Entomología Universidad de Antioquia (GEUA), Medellín - Colombia. AA 1226. E-mail: cornelio-bota@gmail.com

**14121.** Boulaaba, S.; Zrelli, S.; Boumaiza, M.; Rossaro, B. (2014): Relationships between physical and chemical factors and aquatic macroinvertebrates in perennial streams in the arid northern mountain basin El Batinah, Oman. *Journal of Entomological and Acarological Research* 46: 50-58. (in Arabia, Oman, arid zone, wadi, macroinvertebrates.) ["The relationships between physical properties, water chemistry and aquatic macroinvertebrates were investigated in riffles of four perennial streams in the arid northern Oman. Samples were collected monthly in autumn, winter and spring with a Surber net. Thirty two invertebrate taxa were recorded, most species are widely distributed, but few species with

very restricted distribution were also captured. Diptera followed by Pulmonata, Coleoptera and Odonata were the most represented taxa, Trichoptera and Heteroptera were a significant component only in one station (the Fezeh), where the lowest mean water temperature (23°C) was recorded. In the dry months from May to October, aquatic macroinvertebrates were completely absent. In order to summarise the community response some biotic indices were calculated. The highest diversity was observed in the Fezeh station. A seasonal gradient was also observed, with the highest diversity values in January, April, and December. The low faunal diversity was attributed to the high air and water temperature and the hydrological regime instability. A between station and a between month coinertia analysis was carried out, to analyse the response to spatial and seasonal factors. The first coinertia axis was correlated with altitude and substrate composition, while the second axis was correlated with air and water temperature. The present research emphasizes the urgency for preserving the less disturbed wadis in arid zones, because, despite their species poorness, their uniqueness in faunal composition requires special attention. The presence of few endemic species with very restricted distribution highlights the topicality and the value in investigating these areas, allowing the increase of our knowledge on biodiversity, ecology and biogeography about the benthic macroinvertebrates living in these extreme habitats." (Authors) The list of Odonata comprises of *Anax imperator*, *A. parthenope*, *A. ephippiger*, *Boyeria irene*, *Paragomphus genei*, *Orthetrum sabina*, *Sympetrum fonscolombii*, *Trithemis kirbyi*, and *Macromia splendens*. *B. irene* and *M. splendens* have definitely been misidentified.] Address: Rossaro, B., DeFENS, Dipartimento di Scienze per gli Alimenti, la Nutrizione e l'Ambiente, Università di Milano, Italy. E-mail: bruno.rossaro@unimi.it

**14122.** Brookshire, B. (2014): Comparison of Odonata populations in natural and constructed emergent wetlands in the Bluegrass region of Kentucky. Poster presentation, Scholarship week. Eastern Kentucky University, April, 14-18 2014: 1 p. (in English) ["Wetlands provide valuable hydrological functions and provide valuable niches for many small species of animals, including dragonflies (Biebighauser 2011). Without wetlands serving as reproductive habitat the dragonfly population would decrease exponentially. Research has shown that in the past forty years Kentucky has lost up to 80% of its own natural wetlands (Brown & Richter 2012). Wetlands provide: •Niches for small mammals, insects, amphibians and birds •Hydrology and flood prevention for surrounding areas •Habitat and resting areas for Migratory Waterfowl. Odonates could be important to discovering many of the variations between natural and artificial wetlands. Dragonflies and Damselflies are sensitive to environmental conditions, therefore they can act as biological indicators. My objective in this research is to measure the Odonata populations at various natural and artificial emergent wetlands and to compare these populations to

biotic and abiotic variables such as hydrology, vegetation types and wetland condition. I believe that if the wetlands being studied prove to be healthy then the dragonfly and damselfly populations at the individual wetlands will be high in species richness and diversity, while the wetlands that are less healthy will have a low species richness and diversity." (Author) For details see: <http://encompass-eku.edu/context/swps/article/1026/type/native/viewcontent>] Address: Brookshire, Brittany, Department of Biological Sciences, Eastern Kentucky University, 521 Lancaster Ave, Richmond, KY 40475, USA

**14123.** Brown, C. A.; Anang, Y.; Okorie P. N. (2014): Role of the construction industry In promoting mosquito breeding in and around the Accra metropolis, Ghana. *International journal of scientific & technology research* 3(7): 94-100. (in English) ["A wide range of water-holding containers are exploited by mosquito vector as sites for oviposition of eggs and larvae development. The study was aimed at determining the role of the construction industry in promoting mosquito breeding in and around the Accra metropolis, Ghana. A two-month larval survey was carried out at selected construction sites in and around the Accra metropolis. Routine daily larval sampling was done from mosquito breeding sites at the construction sites using the dipper method. Larvae samples were collected from sites such as small pools of water collection and concrete water containers. The larval population was estimated for each breeding site and the physical and chemical characteristics of the breeding sites were recorded. The presence of other aquatic fauna and flora were also noted and recorded. Water samples for a total of 30 different construction sites were sampled. Seventy percent (21/30) of the breeding sites sampled were positive for mosquito larvae. A total of 1475 mosquito larvae comprising of the three main genera: *Culex*, *Aedes* and *Anopheles* were collected. *Culex* species occurred in all the breeding sites and made up 54.1% of the overall sample collection, followed by *Aedes* species (28.1%) and *Anopheles* species (17.8%). A number of other fauna and flora, non-target organisms, were observed both at the sites and in the collected samples. These included Odonata nymphs, Notonectidae, water snail (*Bulinus* species), tadpoles and algae. The results of this study indicate that residential development sites should be strongly considered for inclusion in the local mosquito surveillance and control programs in order to reduce the public health risk related to the construction industry." (Authors).] Address: Brown, C.A., Dept of Medical Lab. Sciences, School of Allied Health Sciences, P. O. Box KB 143, Accra, Ghana. E-mail: [cabrown@chs.edu.gh](mailto:cabrown@chs.edu.gh)

**14124.** Brule, S.; Touroult, J.; Poirier, E.; Dalens, P.-H. (2014): Etude entomologique 2010-2012 – Montagne Pelée (Saül) / Rapport SEAG. Rapport de la Société entomologique Antilles-Guyane (Société entomologique Antilles-Guyane, Parc Amazonien de Guyane): 144 pp.+ appendices. (in French) [The total of 38 odonate species includes two *Argia* nov. spec. (Garrison in prep.) and two

additions to the odonate fauna of French Guiana: *Macromthemis imitans imitans* and *Epipleoneura fernandezi*. The list of taxa is documented on pages 223-224 of the study.] Address: Société entomologique Antilles-Guyane, 18 Lotissement Amaryllis, 97354 Remire-Montjoly, France. E-mail: [stephanebrule973@hotmail.fr](mailto:stephanebrule973@hotmail.fr)

**14125.** Buczyński, P.; Shapoval, A.P.; Buczyńska, E. (2014): *Pantala flavescens* at the coast of the Baltic Sea (Odonata: Libellulidae). *Odonatologica* 43(1/2): 3-11. (in English) ["A male *P. flavescens* was recorded in a bird net trap on the Courish Spit, Kaliningrad Oblast, western Russia (55°05'N, 20°44'E) on 29-v-2013. This is the northernmost record of this species in Europe and in the whole northern hemisphere. The record is discussed against the background of European records of *P. flavescens*." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: [pawbucz@gmail.com](mailto:pawbucz@gmail.com)

**14126.** Calvao, L.B.; De Marco Júnior, P.; Batista, J.D. (2014): Odonata (Insecta) from Nova Xavantina, Mato Grosso, Central Brazil: Information on species distribution and new records. *Check List* 10(2): 299-307. (in English) ["Currently about 800 odonate species are known to Brazil, but only 29% of the Brazil territory have been surveyed for this group. Here we provide a species list with information on distribution and new records for Odonata in nine streams in Nova Xavantina, Mato Grosso, Central Brazil. We used the scan procedure with a fixed area for three days in each stream between 10:00 and 14:00h. We collected 1038 dragonfly specimens belonging to 67 species, which represents 8% of the known Brazil odonate fauna. Additionally, five new records for the study area are presented." (Authors) *Gynothemis pumila*, *Acanthagrion abunae*, *Oxyagrion sulmatogrossense*, *Telebasis gigantea*, and *Tuberculobasis inversa*.] Address: Calvão, Lenize, Universidade do Estado de Mato Grosso, Programa de Pós Graduação em Ecologia e Conservação. Cx. P. 08. CEP 78690-000. Nova Xavantina, MT, Brazil. E-mail: [lenizecalvao@hotmail.com](mailto:lenizecalvao@hotmail.com)

Cham, S.; Nelson, B.; Parr, A.; Prentice, S.; Smallshire, D.; Taylor, P. (2014): Atlas of Dragonflies in Britain and Ireland. Field Studies Council for the Biological Records Centre, Centre for Ecology & Hydrology (eds.), with the British Dragonfly Society. 280 pp. (in English) [Produced in partnership with the British Dragonfly Society and DragonflyIreland, this full colour hardback book (approx. 290 pages) represents five years work by volunteers and partner organisations to map the distribution of damselflies and dragonflies throughout Britain and Ireland. As well as summarising the distribution of over 1 million dragonfly records, the Atlas includes: •Species accounts, including maps, for all 56 resident and immigrant species recorded in Britain and Ireland. •Four pages devoted to each resident species. •Sections on habitats, conservation, distribution changes and phenology. •High quality colour photographs of all species and their habitats.





**14127.** Charest, P.; Savard, M. (2014): Découverte de l'épithète de Brunelle au Québec, une libellule secrète. *Le Naturaliste canadien* 138(2): 16-25. (in French, with English summary) ["The collection of dragonfly exuviae along the Batiscan and Trenche Rivers in the Mauricie region of Québec in 2012 and 2013, lead to the first record of *Neurocordulia michaeli* for the province. This species, which was recently described by Brunelle (2000), has a more northern distribution than *Neurocordulia yamasakanensis*. Both these shadowdragons are more frequent in the temperate zone than the Québec records suggest. The lack of observations is due largely to the secretive and crepuscular nature of the adults, which means that they are less likely to be encountered during standard dragonfly surveys. The results of this study show that the larvae of both species can co-occur along the same stretches of river in the Laurentian foothills. An illustrated species identification key based on the characteristics of their exuviae is provided." (Authors)] Address: Charest, Pierrette. [chapie1@globetrotter.net](mailto:chapie1@globetrotter.net)

**14128.** Chiavacci, S.J.; Bednarz, J.C.; Benson, T.J. (2014): Does flooding influence the types and proportions of prey delivered to nestling Mississippi Kites? *The Condor* 116(2): 215-225. (in English, with Spanish summary) ["Mississippi Kites (*Ictinia mississippiensis*) nesting in the Mississippi Alluvial Valley, USA, have consistently exhibited poor reproductive success, reduced average clutch

sizes, and evidence of food stress during brood-rearing, raising concerns about population viability. Unlike populations elsewhere, kites nesting in the bottomland forests of this region face dynamic, anthropogenically altered hydrologic conditions that may be affecting the availability of important prey. Therefore, we quantified nestling diets and examined factors thought to be directly influencing the types and proportions of prey delivered to kite nestlings. Specifically, we sought to identify variables affecting the delivery of annual cicadas, the dominant prey item fed to kite chicks in numerous systems, as cicada emergence from subterranean burrows is known to be delayed by flooding. Using time-lapse video, we documented nestling diets and evaluated predictors of diet variability in east-central Arkansas, USA. We found that the delivery of cicadas increased with day of year, and was greatest during the driest of 4 study years. In contrast, the delivery of dragonflies, the numerically dominant prey item, declined with day of year, but increased with water level, and was lowest during the driest year. Although water level was not a strong predictor of the delivery of cicadas, interannual variation in the pattern of cicada deliveries suggests that flooding reduced the availability of this prey item to kites. Also, despite diverse nestling diets, the provisioning of dragonflies and a variety of other arthropods suggests that kites responded functionally to an absence of cicadas. The temporal patterns in prey deliveries that we detected imply that kite nestling diets in bottomland forests of the Mississippi Alluvial Valley may be influenced by water-level impacts on arthropod phenology and abundance. ... Nestling diet data recorded in 2004 and 2005 included 7 nests and 2,849 prey deliveries, the majority of which were cicadas (52.1%) and dragonflies (26.1%)." (Authors)] Address: Chiavacci, S.J. Department of Biological Sciences, Arkansas State University, Jonesboro, Arkansas, USA. E-mail: [schiavacci@gmail.com](mailto:schiavacci@gmail.com)

**14129.** Christudhas, A.; Mathai, M.T. (2014): Genetic variation of a migratory dragonfly characterized with random DNA markers. *Journal of Entomology and Zoology Studies* 2(2): 182-184. (in English) ["Polymorphism among individuals of dragonflies belonging to same genus and species was studied using molecular technique RAPD-PCR analysis. The RAPD banding pattern reflected the genetic diversity among *Pantala flavescens*. Reproducible and distinct polymorphic bands ranging approximately 200 bp to 2500 bp were generated with 5 RAPD primers. Operon c series primers OPC 7 and OPC 10 yielded unique bands of 1000 bp, 650 bp and 1100 bp which can be utilized for developing molecular markers for species identification specific for locations. The scoring pattern generated was utilized to construct the distance matrix using POPGENE 32 v1.31." (Authors)] Address: Christudhas, A. Department of Zoology, Madras Christian College, Tambaram-600059, Chennai, India

**14130.** Cigognini, R.; Gallesi, M.M.; Mobili, S.; Hardersen, S.; Sacchi, R. (2014): Does character displacement

demonstrate density dependent expression in females? A test on the wing shape of two species of European damselflies. *Evol. Ecol.* 28: 941-956. (in English) ["Character displacement (CD) is the evolutionary process which leads to the divergence in trait expression of closely related species in regions where species co-occur, compared to allopatric populations. In Europe CD has been investigated in males of *Calopteryx splendens* and *C. virgo* and has been related to species recognition. If species recognition is relevant for males, also females should benefit from CD. The most obvious differences between females of these two species are wing profile and colour. We sampled females from allopatric and from sympatric populations with different relative abundances of these species. Wing shape and pigmentation were evaluated for each damselfly. CD was found in wing profile but not in wing transparency. The relative abundance of species significantly affected CD, but with a different pattern in each species. The prediction that wing shape become more different from the allopatric state when the species was relatively rare, but more similar to the allopatric state when the species was common was evident only for *C. splendens*. Wing shape changes might increase differences in flying patterns making males more effective to discriminate between heterospecific females. So, CD we observed may be the result of a selection directed to reduce interspecific reproductive interference." (Authors)] Address: Sacchi, R., Dipartimento di Scienze della Terra e dell'Ambiente, Università degli Studi di Pavia, Via Taramelli 24, 27100 Pavia, Italy. E-mail: roberto.sacchi@unipv.it

**14131.** Clausnitzer, V. (2014): Report of the IUCN SSC Specialist Groups, Task Forces, Red List Authorities: Dragonfly Specialist Group. *Species 55*: 51-52. (in English) [Verbatim: Our aim is to foster the conservation of dragonflies (Odonata) and their habitats globally; by assessing their threat status according to The IUCN Red List; education of non-specialists (field guides, workshops, publications etc.) and using dragonflies as a flagship species for monitoring water quality. The group currently consists of 44 members from 28 countries. Currently, 2,752 dragonflies are listed on The IUCN Red List, which is nearly half of all known species. In 2013, over 150 new or updated dragonfly assessments were published, while 21 species are flagged as 'out-dated'. Most Australian and North American dragonflies are not on The IUCN Red List, but a comprehensive database and all information for assessing the global threat status is available. We are currently searching for ways to transfer the information without too much doubling up of work. A meeting of the Dragonfly Specialist Group was held in June in parallel with the World Wide Dragonfly Symposium in Germany. The focus was on South America, where we lack assessments and information; hence a sub-group has formed, chaired by Joachim Hoffmann, which is involved in regional assessments. A meeting with a focus on African odonatology was held in November 2013 in Stellenbosch, South Africa, where we discussed all nec-

essary changes, new assessments and updates for the African dragonflies (to be entered in the SIS in 2014). In February 2013, a project on *Amanipodagrion gilliesi* assessed as Critically Endangered on The IUCN Red List, was started in collaboration with the Tanzanian Forest Conservation Group and the Amani Nature Reserve, and funded by the Mohamed bin Zayed Species Conservation Fund. The project aims to raise awareness of the rarity of the dragonfly and on the connection of biodiversity, environmental quality and human well being. Another project funded by the Mohamed bin Zayed Species Conservation Fund, focused on *Xanthocnemis sobrina*, which is endemic to the New Zealand North Island. It is the only representative of its group in the country, assessed as Data Deficient on The IUCN Red List. The project aims to clarify some uncertainties around the taxonomy of the species and to assess its current conservation status. We are aiming to have all dragonflies on The IUCN Red List by 2016. This requires a lot of work, and involves many meetings (especially with regards to the assessment of South America's dragonflies), this will become difficult without external funding. The Powder Blue Damselfly (*Arabicnemis caerulea*) was featured as an Amazing Species on The IUCN Red List website, and *Amanipodagrion gilliesi* will be featured in 'No More Endlings: saving species one story at a time' by Allison Hegan. In South Africa, the recently established Dragonfly Biotic Index (DBI) is becoming popular for environmental impact assessments and habitat monitoring. (Viola Clausnitzer, Chair, Dragonfly Specialist Group)] Address: Clausnitzer, Viola, Heinzstr. 3, 02826 Görlitz, Germany. E-mail: violacl@t-online.de

**14132.** Coccia, C.; Boyero, L.; Green, A.J. (2014): Can differential predation of native and alien corixids explain the success of *Trichocorixa verticalis verticalis* (Hemiptera, Corixidae) in the Iberian Peninsula? *Hydrobiologia* 734: 115-123. (in English) ["Invasive species represent an increasing fraction of aquatic biota. However, studies on the role and consequences of facilitative interactions among aliens remain scarce. Here, we investigated whether the spread of the alien water boatman *Trichocorixa verticalis verticalis* in the Iberian Peninsula is related to reduced mortality from predation compared with native Corixidae, especially since *Trichocorixa* co-occurs with the invasive fishes *Gambusia holbrooki* and *Fundulus heteroclitus*. All three invaders have a common native range in North America and are widespread in and around Doñana in SW Spain. Using laboratory experiments, we compared the predation rates by the two exotic fish and native Odonata larvae (*Orthetrum*, *Sympetrum*, *Crocothemis*, *Aeshna*) on *Trichocorixa* and the native *Sigara lateralis*. We found no evidence to suggest that *Trichocorixa* suffers lower predation rates. However, when both corixids were mixed together, predation of *Trichocorixa* by Odonata larvae was higher. Odonata larvae were size-limited predators and the proportion of corixids ingested was positively correlated with mask length. Since *Trichocorixa* is smaller than its native com-

petitors, this may explain their higher susceptibility to predation by Odonata. This may be one of various factors explaining why *Trichocorixa* is particularly dominant in saline habitats where Odonata are rare, while it is still scarce in fresh waters." (Authors)] Address: Coccia, Cristina, Wetland Ecology Dept, Estación Biológica de Doñana-CSIC, Seville, Spain. E-mail: coccia@ebd.csic.es

**14133.** Cockburn, J.J.; Khumalo-Seegelken, B.; Villet, M.H. (2014): IziNambuzane: IsiZulu names for insects. *S. Afr. J. Sci.* 110(9/10), Art. #2013-0292: 13 pp. (in English) ["We provide a tool for communicating about insects in isiZulu to facilitate research and knowledge sharing in the fields of indigenous knowledge, cultural entomology, environmental education and community extension involving isiZulu speakers. A total of 213 different names for 64 insect specimens were encountered among a sample of 67 respondents in 11 communities distributed across the province of KwaZulu-Natal, South Africa. This list includes 93 names that can be considered core isiZulu vocabulary and which are widely used to identify insects that are agriculturally, medically, domestically, culturally or ecologically common or significant. Substantial variation was found regarding the names for particular insects, especially between regions, suggesting dialectal differences between isiZulu speakers. Grammatical and social variation in names was also recorded. This study highlights interdisciplinary teamwork in the field of indigenous knowledge research and the influences affecting the standardisation of South African languages for technical and scientific work. ... In areas north and northeast of the Thukela River and northeast of the Phongolo River, isiZulu speakers call dragonflies (Odonata) *ibhebhamanzi* or *amabhebhamanzi*, but these terms were not reported to the interviewers, apparently because they are considered impolite. ... For example, dragonflies (Odonata: Anisoptera) are most commonly indicated by the stem *-jekamanzi*, but the prefix (and therefore the noun class) of this varies depending on the geographical region in focus. ... It appears that isiZulu names do not go beyond the taxonomic resolution of family-level identification, and are more easily comparable to names accorded the Linnean taxonomic rank of 'order'. For example, *ujekamanzi* corresponds to the order Odonata, *ibhungane / ibhungezi / ibhungayezi* to the Coleoptera (beetles *sensu stricto*), depending on which region the speaker is in, and *umnyovu / umuvi* to the Hymenoptera (wasps, but excluding ants and bees). ... Crane flies, robber flies and antlions were all referred to as *ujekamanzi*, although the reference to water (*-manzi*) in that name clearly aligns it with the biology of the dragonflies and damselflies that it also denotes. However, all of these specimens were large, with elongated abdomens and clear wings, so *ujekamanzi* may be understood to designate a physical form rather than a specific taxon, in analogy to the terms 'pest' and 'bug' and 'germ' in English folk taxonomy, *inunu* in isiZulu or *gogga* in Afrikaans." (Authors)] Address: Villet, M.H., Dept of Zoology and Entomology, Rhodes University, Grahamstown, South Africa. E-mail: M.Villet@ru.ac.za

**14134.** Cooper, J.A. (2014): A catalogue of the type, figured and cited specimens in the geological collections of the Booth Museum of Natural History, Brighton. <http://www.brighton-hove-rpml.org.uk/SiteCollectionDocuments/Published%20Type%20CatalogueupdatedApril2014.pdf>: 169 pp. (in English) [Odonata are treated on pages 63-70. For the complete paper see: [http://www.brighton-hove-rpml.org.uk/SiteCollectionDocuments/Published%20Type%20Catalogue\\_updatedApril2014.pdf](http://www.brighton-hove-rpml.org.uk/SiteCollectionDocuments/Published%20Type%20Catalogue_updatedApril2014.pdf)] Address: Cooper, J.A., Booth Museum of Natural History Royal Pavilion & Museums, Brighton & Hove, UK

**14135.** Couto-Mendoza, M.T.; Servia, M.J.; Cobo, F. (2014): Regeneration interferes with fluctuating asymmetry analysis in odonate larvae. *Limnetica* 33(1): 107-120. (in English, with Spanish summary) ["When an odonate larva loses a leg, it has the ability to regenerate it in the next moult. In this study, our goal was to test whether this ability affects fluctuating asymmetry analyses (FA) using *Calopteryx virgo* larvae. We observed that asymmetries in the femur and tibia caused by regeneration in field samples are not always detected as outliers, and therefore they are not automatically eliminated by statistical tests. However, they increased the value of the composite index of asymmetry by approximately 30 % with respect to the sample where all of the cases of regeneration were eliminated. Next, we wanted to test whether costs associated with leg regeneration had an effect on the development of other structures by increasing the level of fluctuating asymmetry in this species. The results confirmed that the value of the composite index of asymmetry calculated using antennal and mask measures was significantly higher for individuals that had a regenerating leg. Thus, prior knowledge of the biology and the physiology of the traits of the species under study should be an essential topic in fluctuating asymmetry studies to guarantee reliable results, as regeneration ability clearly interferes in fluctuating asymmetry analysis in odonate larvae." (Authors)] Address: Couto-Mendoza, Maria, Depto de Zooloxía e Antropoloxía Física, Universidade de Santiago de Compostela. Campus Sur s/n, 15782 Santiago de Compostela, Spain. E-mail: mteresa.couto@usc.es

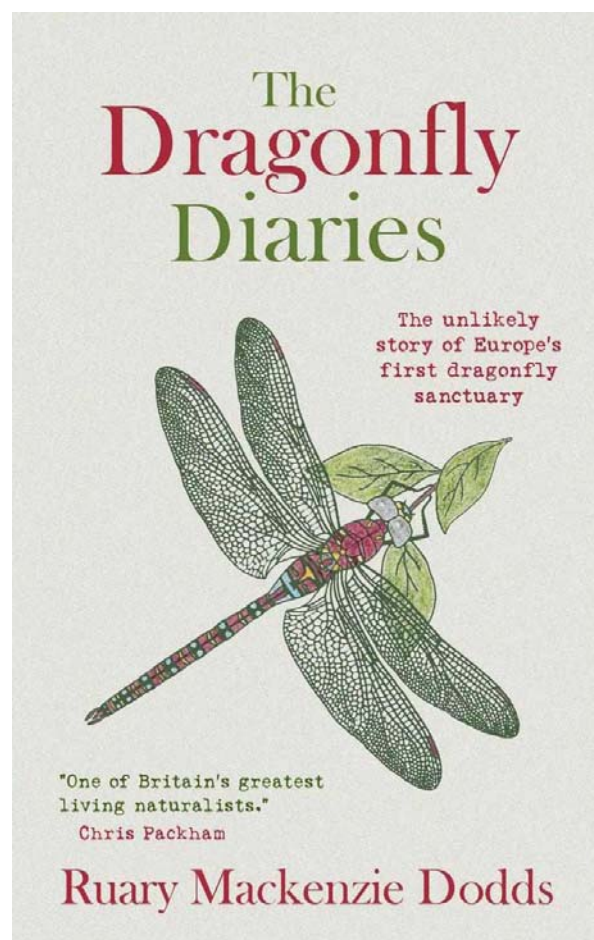
**14136.** Dawn, P. (2014): Taxonomic study of Odonata [Insecta] in Kolkata and surroundings, West Bengal, India. *Journal of Entomology and Zoology Studies* 2(3): 147-152. (in English) ["The present study was conducted to study species richness of Odonata (Insecta) in Kolkata and Howrah, West Bengal. Results document eighty Odonate species including four new records viz., *Rhodthemis rufa*, *Trithemis festiva*, *Agriocnemis femina* and *Lestes malabarica*. One species under genus *Agriocnemis* does not fit the records and is awaiting description. The paper also discusses habitat wise species distribution of Odonata within the study area." (Author)] Address: Dawn, P., Zoological Survey of India, M- Block, New Alipore, Kolkata – 700 053, West Bengal, India



**14137.** Dinh Van, K.; Janssens, L.; Debecker, S.; Stoks, R. (2014): Temperature and latitude-specific individual growth rates shape the vulnerability of damselfly larvae to a widespread pesticide. *Journal of Applied Ecology* 51(4): 919-928. (in English) ["(1) Freshwater ecosystems are especially vulnerable to climate change and pollution. One key challenge for aquatic toxicology is to determine and manage the combined effects of temperature increase and contaminants across species' ranges. (2) We tested how thermal adaptation and life-history evolution along a natural temperature gradient influence the vulnerability of an aquatic insect to a pesticide under global warming. We applied a space-for-time substitution approach to study the effect of warming on the vulnerability of *Ischnura elegans* damselfly larvae to the pesticide chlorpyrifos in a common garden warming experiment (20 and 24°C) with replicated populations from three latitudes spanning >1500 km in Europe. (3) Chlorpyrifos was more toxic to damselfly larvae at the higher temperature: mortality only occurred at 24°C and the reductions in growth rate were stronger at 24°C. This could partly be explained by parallel reductions in food intake but not by the activities of two widespread enzymatic biomarkers, glutathione S-transferase (GST) and acetylcholinesterase (AChE). (4) There was some evidence that the increased toxicity of the high chlorpyrifos concentration at 24°C was stronger in terms of growth reduction in the faster-growing larvae from the low-latitude populations. This is consistent with energy allocation trade-offs between growth rate and pesticide tolerance, but suggests that local thermal adaptation does not play a role in coping with pesticide stress. (5) Synthesis and applications. Damselfly larvae from populations in lower latitudes were more vulnerable to a common pesticide at higher temperatures and pesticide concentrations, whereas evidence for the influence of local thermal adaptation on the vulnerability of larvae was weak. These results emphasize the need for spatially explicit bioassessment and conservation tools. Management practices aimed at mitigating pesticide run-off into aquatic ecosystems are particularly important in agricultural areas at low latitudes." (Authors)] Address: Dinh Van, K., Lab. of Aquatic Ecology, Evolution & Conservation, Univ. of Leuven, Leuven, Belgium. E-mail: Khuong.DinhVan@bio.kuleuven.be

**14138.** Dodds, R.M. (2014): *The Dragonfly Diaries: The unlikely story of Europe's first dragonfly sanctuary*. Saraband. ISBN-10: 1908643552: 304 pp. (in English) ["Britain is home to some 40 species of dragonfly, and public interest in their plight is high right now thanks to their primeval beauty, aerobic grace and a growing realisation of their importance for water ecosystems. In *The Dragonfly Diaries*, Dodds shares his quirky fascination for these remarkable creatures over the 25 years he has been photographing and working with them. Combining fascinating description of the lives of dragonflies, with a diary chronicling the ups and downs of establishing Britain's first public dragonfly sanctuary, *The Dragonfly Diaries* is a must for nature buffs and for anyone who wants

to be inspired by the resolve and dedication of a man on a mission to save these critically important insects." (Publisher)] Address: not stated



**14139.** Dolný, A.; Harabiš, F.; Bárta, D.; Lhota, S.; Drozd, P. (2014): Aquatic insects indicate terrestrial habitat degradation: changes in taxonomical structure and functional diversity of dragonflies in tropical rainforest of East Kalimantan. *Tropical Zoology* 25(3): 141-157. (in English) ["Odonata are commonly used as ecological indicators of freshwater ecosystems. Despite earlier studies suggesting that adult odonates may be good indicators for complex changes in a landscape, the utility of odonates as suitable indicators to indicate health of non-aquatic (forest) habitats remains poorly understood. This study analyses the adult dragonfly assemblage pattern against spatial and temporal disturbance characteristics in Indonesia's Sungai Wain Protection Forest. The core of this reserve comprises one of the few remaining fragments of primary rain forest along the East Kalimantan coast, whereas the rest of the reserve is covered by secondary forest, scrub, grassland, and farmland. Adult dragonfly assemblages at individual sampling sites were analysed in relation to (1) their intensity, (2) frequency of human-caused disturbances, and (3) the time since the last such disturbance, while controlling random variables (type of aquatic and terrestrial habitat) were removed. This study tests the effect of these factors on (1) species richness, (2) proportion of Zygoptera, (3) proportion of

forest specialists, and (4) proportion of Borneo's endemics. The human-induced disturbances in the rain forest resulted in pronounced changes in the taxonomical composition and functional diversity of the odonate fauna. Results reported here demonstrate that gradual changes in the odonate assemblages correspond to the degree of anthropogenic influences on forest environments. Adult odonates comprise an appropriately sensitive and versatile indicator group for identifying changes in terrestrial forest environments as well as in freshwater habitats." (Authors)] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic. E-mail: Alnes.Dolny@osu.cz

**14140.** Dolný, A.; Harabiš, F.; Mizicova, H. (2014): Home range, movement, and distribution patterns of the threatened dragonfly *Sympetrum depressiusculum* (Odonata: Libellulidae): A thousand times greater territory to protect? *PLoS ONE* 9(7): e100408. doi:10.1371/journal.pone.0100408: 10 pp. (in English) ["Dragonflies are good indicators of environmental health and biodiversity. Most studies addressing dragonfly ecology have focused on the importance of aquatic habitats, while the value of surrounding terrestrial habitats has often been overlooked. However, species associated with temporary aquatic habitats must persist in terrestrial environments for long periods. Little is known about the importance of terrestrial habitat patches for dragonflies, or about other factors that initiate or influence dispersal behaviour. The aim of this study was to reveal the relationship between population dynamics of the threatened dragonfly species *Sympetrum depressiusculum* at its natal site and its dispersal behaviour or routine movements within its terrestrial home range. We used a mark–release–recapture method (marking 2,881 adults) and exuviae collection with the Jolly–Seber model and generalized linear models to analyse seasonal and spatial patterns of routine movement in a heterogeneous Central European landscape. Our results show that utilisation of terrestrial habitat patches by adult dragonflies is not random and may be relatively long term (approximately 3 mo). Adult dragonflies were present only in areas with dense vegetation that provided sufficient resources; the insects were absent from active agricultural patches ( $p = 0.019$ ). These findings demonstrate that even a species tightly linked to its natal site utilises an area that is several orders of magnitude larger than the natal site. Therefore, negative trends in the occurrence of various dragonfly species may be associated not only with disturbances to their aquatic habitats, but also with changes in the surrounding terrestrial landscape." (Authors)] Address: Dolný, A., Dept of Biology and Ecology/Institute of Environmental Technologies, Faculty of Science, University of Ostrava, Ostrava, Czech Republic. E-mail: ales.dolny@osu.cz

**14141.** Dorji, T. (2014): New records of dragonflies (Odonata) from Toebirongchhu sub-watershed in Punakha District, Western Bhutan. *Journal of Entomology and*

*Zoology Studies* 2(4): 51-57. (in English) ["Opportunistic survey of dragonfly diversity and distribution was done in Toebirongchhu sub-watershed within Punakha Dzongkhag, Western Bhutan to give updated list of species within the study area and the Dzongkhag, and update the species list for Bhutan. Total of 24 species belonging to 19 genera and 11 families were recorded of which 22 species are new record for the study area, 20 species for the Punakha Dzongkhag and 1 for Bhutan. The updated list of species for Punakha Dzongkhag is 28 species and for Bhutan is 85 species. Important records are *Anisogomphus caudalis* a Data Deficient species and a new record for Bhutan, *Aristocypha* (*Rhinocypha*) *cuneata*, another Data Deficient species, *Epiophlebia laidlawi* a Near Threatened species and *Anisopleura bella* a recently described species currently recorded only from Bhutan." (Author)] Address: Dorji, T., Department of Forestry, College of Natural Resources, Royal University of Bhutan, Lobesa, Bhutan

**14142.** Dow, R.A. (2014): *Onychogomphus marijanmatoki*, a new species from Sarawak, Borneo (Odonata: Anisoptera: Gomphidae). *Zootaxa* 3795(2): 181-186. (in English) ["*O. marijanmatoki* is described from a male from Gunung Mulu National Park, Miri Division, Sarawak, Malaysian Borneo. One of only two onychogomphine species known from Borneo, it differs from all others of the group in characters of the genital ligula and terminal appendages." (Author)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**14143.** Dow, R.A. (2014): *Amphicnemis triplex* sp. nov. from Central Kalimantan, Indonesia (Odonata: Coenagrionidae). *Odonatologica* 43(1/2): 67-77. (in English) ["*Amphicnemis triplex* sp. nov. is described from locations in Central Kalimantan in Indonesian Borneo. Holotype male, Indonesia, Kalimantan, Kalimantan Tengah, between Buntok and Ampah, black water stream in shallow peat over sand, 29-vi-2012; to be deposited in RMNH. The related species *A. erminea* is discussed." (Author)] Address: Dow, R.A., Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**14144.** Dow, R.A.; Zia, A.; Naeen, M.; Rafi, M.A. (2014): *Calicnemia fortis* sp. nov. from Pakistan (Odonata: Zygoptera: Platynemididae). *Zootaxa* 3869(3): 338-342. (in English) ["*Calicnemia fortis* sp. nov. is described from Azad Jammu and Kashmir in Pakistan and compared with other group 2 species of *Calicnemia*." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**14145.** Dreyer, J.; Gratton, C. (2014): Habitat linkages in conservation biological control: lessons from the land-water interface. *Biological Control* 75: 68-76. (in English) ["Highlights: • Aquatic-terrestrial and crop-noncrop linkages are conceptually similar. • Exchanges in agroeco-

systems are governed by natural enemy production and dispersal. • Donor habitats on the landscape determine the coverage of dispersal. • Land-cover/use and climate change will impact habitats, natural enemy exchange. Terrestrial landscapes, including those with embedded agroecosystems, are a mosaic of cover types varying in size. Creating or maintaining habitats that support natural enemy populations to combat agricultural pests is the primary method of conservation biological control. Non-crop habitats can be managed in an attempt to maximize the exchange of natural enemies with adjacent agroecosystems with the expectation that they will suppress damaging pest outbreaks. Despite this goal, current habitat management relying on natural enemy spillover into crops has been unreliably effective at reducing pest abundance or increasing crop yield. Furthermore, the expansion and intensification of agriculture and changes in global climate patterns threaten the foundations of conservation biological control in future agroecosystems. However, the aquatic-terrestrial interface offers a natural boundary similar to the one between agroecosystems and their neighbouring non-crop habitats that can provide useful insights to the challenges facing growers. Research of the exchanges between water and land suggests general biological and physical processes that govern the movement of organisms between disparate habitats. We propose that like aquatic insects moving from water to land, natural enemy dispersal from non-crop donor habitats into recipient crop patches on the landscape is a function of (1) the production of natural enemies in the source habitat which establishes the abundance of organisms that can disperse, (2) how and why mobile natural enemies disperse themselves into neighbouring recipient habitats, and (3) the configuration of donor and recipient habitats on the landscape. We suggest that conservation biological control practitioners can focus on these main components of natural enemy production and dispersal to predict the effectiveness of conservation biological control measures and guide their adaptation to future global change." (Authors) The publication includes several references to Odonata.] Address: Dreyer, J., Dept Ent., Univ. of Wisconsin-Madison 444 Russell Laboratories 1630 Linden Drive Madison, WI 53705, USA. E-mail: jamin.dreyer@gmail.com

**14146.** Egea-Serrano, A.; Hangartner, S.; Laurila, A.; Räsänen, K. (2014): Multifarious selection through environmental change: acidity and predator-mediated adaptive divergence in the moor frog (*Rana arvalis*). *Proc. R. Soc. B* 2014 281, 20133266, published 19 February 2014: 10 pp. (in English) ["Environmental change can simultaneously cause abiotic stress and alter biological communities, yet adaptation of natural populations to co-changing environmental factors is poorly understood. We studied adaptation to acid and predator stress in six moor frog populations along an acidification gradient, where abundance of invertebrate predators increases with increasing acidity of *R. arvalis* breeding ponds. First, we quantified divergence among the populations in anti-

predator traits (behaviour and morphology) at different rearing conditions in the laboratory (factorial combinations of acid or neutral pH and the presence or the absence of a caged predator: *Aeshna* dragonfly larva)). Second, we evaluated relative fitness (survival) of the populations by exposing tadpoles from the different rearing conditions to predation by free-ranging dragonfly larvae. We found that morphological defences (relative tail depth) as well as survival of tadpoles under predation increased with increasing pond acidity (under most experimental conditions). Tail depth and larval size mediated survival differences among populations, but the contribution of trait divergence to survival was strongly dependent on prior rearing conditions. Our results indicate that *R. arvalis* populations are adapted to the elevated predator pressure in acidified ponds and emphasize the importance of multifarious selection via both direct (here: pH) and indirect (here: predators) environmental changes." (Authors)] Address: Räsänen, Katja, Department of Genetics, University of Melbourne, Parkville, Victoria 3010, Australia. E-mail: katja.rasanen@eawag.ch

**14147.** Ellenrieder, N. von (2014): A synopsis of the Neotropical genus *Nephepeltia* (Odonata: Libellulidae), including description of a new species, synonymies, and a key to males. *Zootaxa* 3796(1): 121-146. (in English, with Spanish summary) ["*Nephepeltia flavipennis* (Holotype: Brazil, Rondônia, Governador Jorge Teixeira Municipality, Fazenda Rancho Grande, 10°31'48" S, 62°48'0"W, 165 m, J. Wiseman leg., in MNRJ) is described from the Amazon region of W Brazil, Ecuador, and N Peru. A lectotype is designated for *N. aequisetis* Calvert, 1909. *Nephepeltia chalconota* is considered to be a junior subjective synonym of *N. flavifrons* Karsch, 1889, and the subdivision of *N. phryne* into two subspecies is found to be unjustifiable. Diagnoses, illustrations, a key to males, and an updated map for all known members of the genus are provided." (Author)] Address: Ellenrieder, Natalia von, California State Collection of Arthropods, CDFA, 3294 Meadowview Road, Sacramento, CA 95832. Email: natalia.ellenrieder@gmail.com

**14148.** Emeljanov, A.F. (2014): The evolutionary role and fate of the primary ovipositor in insects. *Entomological Review* 94(3): 367-396. (in English) ["The development of a piercing-sawing ovipositor for introducing eggs into living plant tissues has made its owners independent of the soil characteristics and increased egg protection. This was the most important prerequisite for the appearance of wings and flight which provided the winged insects with tremendous opportunities for finding new niches and led to unparalleled adaptive radiation. The ovipositor has passed several stages of improvement and differentiation. The four principal types of the primary ovipositor are considered: those of Odonata, Diaphanopteroidea (only extinct forms), Cicadina (including Paraneoptera and Hymenoptera), and Orthoptera. A new hypothesis of the gonangulum homologies is put forward, interpreting it as half of sternite IX lateral of the midline



plus the paratergite of the same segment. The constructions of the valvae and different homologies of the third valvae in Polyneoptera and Eumetabola are discussed. The primary ovipositor has been repeatedly (i.e., in many lineages) reduced in the evolution of Pterygota. The main circumstances of these reductions are: (1) subterranean (fossorial) life in narrow cavities; (2) aquatic life of the larvae, mostly linked with submerged oviposition; (3) development and perfection of flight to which the heavy and protruding ovipositor was a hindrance. All the holometabolous insects except Hymenoptera lack the primary ovipositor." (Author)] Address: Emeljanov, A.F., Zoological Institute of the Russian Academy of Sciences, St. Petersburg, 199034 Russia. E-mail: hemipt@zin.ru

**14149.** Endersby, I. (2014): Additional distribution records for Victorian dragonflies (Insecta: Odonata). Final instalment. *Victorian Entomologist* 44(4): 80-84. (in English) [Australia; *Rhadinosticta simplex*; *Spinaeschna tripunctata*; *Tremea loewii*] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: Endersby@pacific.net.au

**14150.** Eyidozehi, K.; Narouyi, Y.; Mehraban, A.; Vazirimehr, M.R.; Rigi, K. (2014): Evaluation of aquatic insect fauna such as Heteroptera, Ephemeroptera, Diptera, Trichoptera, Coleoptera, Odonata and so on in east of Golestan province. *Journal of Biodiversity and Environmental Sciences* 5(1): 508-513. (in English) [In 2011 and 2012, several water bodies in cities of the Golestan province, Iran (Khan Bobin, Dalande, Ramiyan, Azadshahr, Nodehkhandoz, Gonbad, Kalale, Minodasht Galikash) were studied. The list of taxa - at family level - includes Libellulidae, Aeshnidae, and Gomphidae.] Address: Rigi, K., Dept of Agronomy, Islamic Azad University, Zahedan Branch, Zahedan, Iran. E-mail: krigi66@yahoo.com

**14151.** Fauziyah, S.; Alam, C.; Soesilohadi, R.C.H.; Retnoaji, B.; Alam, P. (2014): Morphological and mechanical characterisation of the hindwing nodus from the Libellulidae family of dragonfly (Indonesia). *Arthropod Structure & Development* 43(2): 415-422. (in English) ["Highlights: •We study functional morphology and structure of wing nodi from seven Indonesian Libellulidae species. •Nodal resilin morphology is species dependent. •Dorsal face resilin is inherently smaller than ventral face resilin. •Mechanical properties of resilin in nodus is related to its elongation shape factor. •We propose useful clues in advanced biomimetic jointing technology. In this communication, the morphologies and mechanical characteristics of nodi from the hindwings of seven Indonesian Libellulidae dragonfly species are identified. Geometrical analyses reveal that in all species, the shape of dorsal face resilin is relatively long and thin while ventral face resilin covers a greater surface area than dorsal face resilin, and is shaped like a hook. Finite element analyses reveal that the magnitude of strain energy may differ considerably between species, even though the locations of highest strain energy are usually the same.

Importantly, a correlation is found to exist between the mechanical forces that build up in the resilin, the face under investigation (dorsal or ventral) and the elongational shape factor of the resilin." (Authors)] Address: Alam, P., Laboratory of Paper Coating and Converting, Centre for Functional Materials, Abo Akademi University, Port-haninkatu 3, Turku 20500, Finland. E-mail: parvez.alam@abo.fi

**14152.** Favretto, M.A.; Orlandin, E.; dos Santos, E.; Piovesan, M. (2014): Insetos aquáticos em um lago artificial no sul do Brasil. *Biota Amazônia* 4(2): 113-116. (in Portuguese, with English summary) ["This study aimed to perform a survey of the aquatic insect in a artificial lake near to urban area at the municipality of Joaçaba, Santa Catarina State, Southern Brazil. Collections were performed in the morning in August, October, November and December, with entomological net. In total 300 specimens divided in five orders were collected. Odonata (n = 99 specimens) was the most abundant order, represented by Coenagrionidae, Lestidae and Aeshnidae. Followed by Hemiptera, represented by Notonectidae, Belostomatidae, Nepidae, Gerridae, Mesovellidae and Corixidae and the Ephemeroptera, with Baetidae. Regarding the functional trophic groups, 85% of the species were predators, 10% were shredders/collectors and 5% were collectors." (Authors)] Address: Orlandin, E., Academico do Curso de Ciências Biológicas, Universidade do Oeste de Santa Catarina, Brasil. E-mail: orlandin@unioeste.com

**14153.** Ferreira, S.; Velo-Antón, G.; Brochard, C.; Vieira, C.; Alves, P.C.; Thompson, D.J.; Watts, P.C.; Brito, J.C. (2014): A Critically Endangered new dragonfly species from Morocco: *Onychogomphus boudoti* sp. nov. (Odonata: Gomphidae). *Zootaxa* 3856(3): 349-365. (in English, with French summary) ["Both sexes of *Onychogomphus boudoti* sp. nov. Ferreira (Odonata: Anisoptera: Gomphidae) and exuviae are described and illustrated from a single locality in Morocco. This newly discovered species differs markedly from other *Onychogomphus* species by the morphology of the male epiproct and the female vulvar scale. It is genetically distinct in the mitochondrial DNA and the nuclear PRMT gene from all other Western Palaearctic *Onychogomphus* species. The known distribution of the new species is confined to a small stream with unusual habitat characteristics in the vicinity of Khenifra, in the Middle Atlas, where it experiences low population size and limited genetic diversity. We suggest listing this species both locally and globally as "Critically Endangered" [CR (B1, B2 + abiii)] following the IUCN Red List Categories and Criteria." (Authors)] Address: Ferreira, Sónia, CIBIO – Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado, Universidade do Porto, Campus Agrário de Vairão, R. Padre Armando Quintas, 4485-661 Vairão, Portugal. E-mail: hiporame@gmail.com

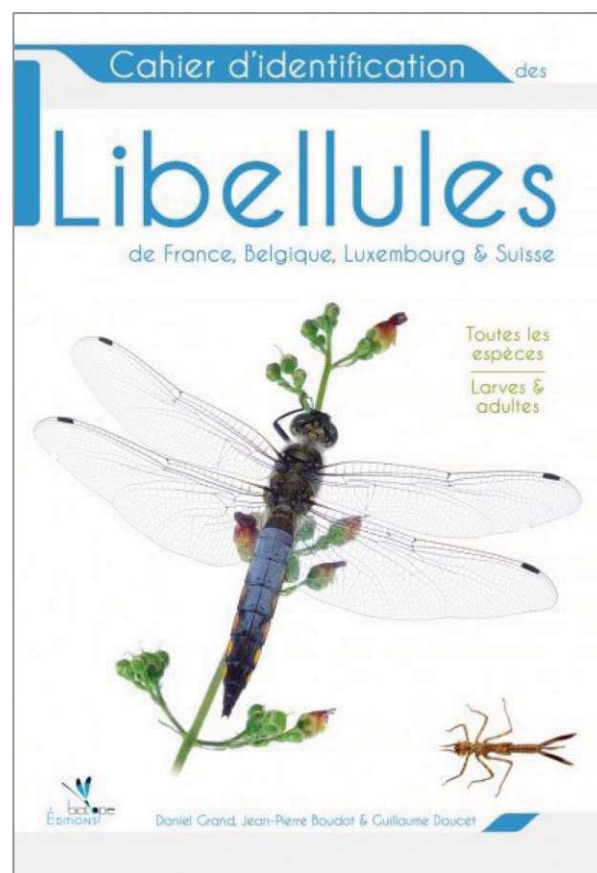
**14154.** Gaissert, N.; Mugrauer, R.; Mugrauer, G.; Jebens, A.; Jebens, K.; Knubben, E.M. (2014): Inventing a Micro

Aerial Vehicle inspired by the mechanics of dragonfly flight. Towards Autonomous Robotic Systems Lecture Notes in Computer Science 2014: 90-100. (in English) ["Dragonfly flight is unique: Dragonflies can manoeuvre in all directions, glide without having to beat their wings and hover in the air. Their ability to move each of their four wings independently enables them to slow down and turn abruptly, to accelerate swiftly and even to fly backwards. We looked into the mechanics of the dragonfly flight and managed to transfer its flight dynamics into an ultralight flying object: the BionicOpter. With a wingspan of 63 cm and a body length of 44 cm, the model dragonfly weighs just 175 g. A brushless motor actuates the four wings and is used to alter the flapping frequency. Eight servo motors allow the amplitude and the twisting angle of each wing to be changed independently making the BionicOpter almost as agile and fast as its natural role model. Here we present how dragonfly flight dynamics can inspire future design of MAVs." (Authors)] Address: Gaissert, Nina, Bionic Learning Network, Festo AG & Co. KG, Ruitter Str. 82, 73734, Esslingen, Germany. E-mail: niga@de.festo.com

**14155.** Gerlach, J.; Samways, M.J.; Hochkirch, A.; Seddon, M.; Cardoso, P.; Clausnitzer, V.; Cumberlidge, N.; Daniel, B.A.; Black, S.H.; Ott, J.; Williams, P.H. (2014): Prioritizing non-marine invertebrate taxa for Red Listing. *Journal of Insect Conservation* 18(4): 573-586. (in English) ["The IUCN Red List of threatened species is biased towards vertebrate animals, a major limitation on its utility for overall biodiversity assessment. There is a need to increase the representation of invertebrates (currently 21 % of species assessed on the List; <1 % of all invertebrates). A prioritisation system of terrestrial and freshwater groups is presented here, categorising taxa by species richness, assessment practicality, value for human land use and bioindication, and potential to act as conservation flagships. 25 major taxonomic groupings were identified as priorities, including the Annelida, Arthropoda, Mollusca, and Onychophora. Of these, the high-level taxa that emerge as highest priorities are Odonata, Araneae (spiders), Mantophasmatodea (heelwalkers), Plecoptera (stoneflies), non-marine Mollusca (Bivalvia and Gastropoda), Trichoptera (caddisflies), Coleoptera (beetles), Lepidoptera (moths and butterflies), Oligochaetes (earthworms), Orthoptera (grasshoppers and crickets), Decapoda (crayfish, crabs, shrimps) and Diptera (flies). Of these Red Listing is well advanced for Decapoda, freshwater Mollusca and Odonata. This leaves eight higher taxa with currently a minimum or patchy Red List assessment coverage. We recommend that Red List assessments in future focus on these groups, as well as completion of assessments for terrestrial Molluscs and Odonata. However, we also recommend realism, and as some of groups are very large, it will be necessary to focus on subsets such as certain functionally important or charismatic taxa or on a sampled subset which is representative of a larger taxon." (Authors)] Address: Gerlach, J., Coordinator – Terrestrial and Freshwater Invertebrate

Red List Authority, 133 Cherry Hinton Road, Cambridge, CB1 7BX, UK. E-mail: gerlachs@btinternet.com

**14156.** Grand, D.; Boudot, J.-P. (2014): Cahier d'identification des Libellules de France, Belgique, Luxembourg et Suisse. éditions Biotope. 176 pp (in French) ["This guide includes everything that is needed to identify dragonflies in the field. All 103 species dragonflies (subspecies included) are illustrated with photographs of males and females, by drawings and a concise distribution map providing an indication of abundance. The habitat is described and possible confusion between very similar species are reported. Flight periods are indicated. The guide includes an identification key to all identifiable larvae in the field. General chapters on the life cycle of dragonflies, their habitats and their anatomy are included to help you find and identify dragonflies in the field. The authors have updated the nomenclature, added three new species for France (*Brachythemis impartita*, *Orthetrum trinacria*, *Lindenia tetraphylla*), and updated the distribution maps." (<http://www.nhbs.com/title/view/199496>)] Adresse: Boudot, J.-P., LIMOS, UMR CNRS 7137, Univ. de Nancy, Faculté des Sciences, B.P. 239, 54506 - Vandoeuvre-lès-Nancy Cedex, France. E-mail: jean-pierre.boudot@limos.uhp-nancy.fr



**14157.** Gyulavári, H.A.; Therry, L.; Dévai, G.; Stoks, R. (2014): Sexual selection on flight endurance, flight-related morphology and physiology in a scrambling damselfly. *Evolutionary Ecology* 28(4): 639-654. (in English) ["We have limited knowledge on the mechanistic base of

sexual selection, especially in scrambling species. This asks for a functional approach that explores the link between each component of the phenotype-performance-fitness axis and that includes both morphological and physiological traits. We explored the phenotype-performance-fitness axis in the scrambling damselfly *Coenagrion puella* by studying the links between a set of physiological and morphological traits, flight performance (flight speed and flight endurance), and short-term mating success. As expected for scrambling competition, there was sexual selection for increased flight endurance rather than for increased flight speed. For fat content, we could demonstrate the full phenotype-performance-fitness axis, where selection for a higher fat content could be explained by the sexual selection for a higher flight endurance and the positive covariation between fat content and flight endurance. For three other traits (size, relative flight muscle mass and wing loading), however, we detected selection that could not be explained via their effect on flight performance, generating novel testable hypotheses about how the covariation between these traits and mating success is generated. This also urges caution when using morphological traits as proxies for flight speed and flight endurance in phenotypic selection studies." (Authors)] Address: Gyulavári, Hajnalka Anna, Lab. of Aquatic Ecology, Evolution and Conservation, KU Leuven, Univ. of Leuven, Charles Deberiotstraat 32 Bus 2439, 3000, Louvain, Belgium. E-mail: hgyulavari@gmail.com

**14158.** Hämäläinen, M. (2014): *Indocypha neglecta* sp. nov. from northern Vietnam (Odonata: Chlorocyphidae). *Odonatologica* 43(1/2): 79-90. (in English) ["*Indocypha neglecta* sp. nov. is described and illustrated from both sexes and compared with its congeners. The holotype male was collected at »Tonkin, Montagnes du Haut Song-Chaï« in northern Vietnam in 1895 and is deposited at MNHN, Paris." (Authors)] Address: Hämäläinen, M., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: matti.hamalainen@helsinki.fi

**14159.** Harms, T.M.; Kinkead, K.E.; Dinsmore, S.J. (2014): Evaluating the effects of landscape configuration on site occupancy and movement dynamics of odonates in Iowa. *J. Insect. Conserv.* 18: 307-315. (in English) ["Odonates contribute highly to global biodiversity and are considered good indicators of environmental quality, but they are under-studied and quantitative information on their habitat associations is lacking. Our objective was to examine the effects of landscape configuration on site occupancy and movement dynamics of four odonate species in Iowa: *Tramea onusta*, *Epithea princeps*, *Pantala flavescens*, and *Calopteryx maculata*. We conducted standardized visual encounter surveys for odonates at 233 public properties in Iowa from 2007 to 2011 and computed landscape variables within a 200, 600 m, and 1 km radius of each surveyed site. Using a robust design occupancy model in Program MARK, we estimated detection probability and site occupancy, site extinction, and site colonization probabilities for each species. We found

few significant effects of landscape variables on site occupancy, extinction, or colonization, although landscape variables at 600 m were included in the best model for all species. Detection probability (SE) ranged from 0.30 (0.04) for *Pantala flavescens* to 0.49 (0.04) for *Calopteryx maculata*. Our study provides information to aid habitat restoration and management efforts on sites having suitable characteristics in the surrounding landscape and ultimately help conserve odonates." (Authors)] Address: Harms, T.M., Center for Survey Statistics & Methodology, Iowa State University, 208 Office and Laboratory Building, Ames, IA 50011, USA. E-mail: harmsy@iastate.edu

**14160.** Hecomovich, D. (2014): Species watch: Damselflies & Dragonflies. *Boggs Quarterly* 10(2): 5. (in English) [California, USA; this is a brief note to motivate people to watch the regional Odonata fauna. See: <http://boggs-mountain.net/wp-content/uploads/2014/08/FOBMQuarterly714.pdf>] Address: not stated

**14161.** Heiser, M.; Dapporto, L.; Schmitt, T. (2014): Coupling impoverishment analysis and partitioning of beta diversity allows a comprehensive description of Odonata biogeography in the Western Mediterranean. *Organisms Diversity & Evolution* 14: 203-214. (in English) ["Islands host a subset of organisms occurring at their sources, and these assemblages are usually dominated by the most generalistic and dispersive species. In this study, we aim to identify which species are missing on islands and which ecological traits are responsible for differential occurrence. Then, we apply this information to beta diversity analyses. As a study group and area, we selected the Odonata in the Western Mediterranean. Based on the presence/absence of 109 species, we applied a series of analyses at both community and individual species level. The islands of the Balearics, Corsica, Sardinia and Malta are highly impoverished, but Sicily is not. Non-parametric multivariate adaptive regression splines predicted the occurrence of individual species on each island. Principal component analysis recognised differences between Zygoptera and Anisoptera, but members of the two suborders have similar occurrences on islands, and island occurrence is determined mostly by species' frequencies at source and by their degree of generalism. Island species predicted correctly to occur on islands showed opposite characteristics to species unpredicted to occur and being present. The similarity pattern highlighted by turnover (Simpson index) is clearer than that obtained by non-partitioned beta diversity (Sørensen index). In fact, indicator value analyses revealed more indicator species for the Simpson compared to Sørensen index, and indicator species from islands where unpredicted to occur by impoverishment analysis. This suggests that island species predicted absent determine most of an island's turnover pattern, thus encompassing fundamental biogeographic information. Due to their absence on nearest sources, they are also at higher risk of extinction, and deserving of special conservation effort." (Authors)] Address: Dapporto, L., Centre for Ecology, En-



vironment and Conservation, Dept of Biological and Medical Sciences, Oxford Brookes University, Headington, Oxford, OX3 0BP, UK. E-mail: leondap@gmail.com

**14162.** Holuša, O.; Holušová, K. (2014): Could an active public recreation have an impact to populations of some insects in forest ecosystem - case of forest dragonflies. In: Fialová, J. & Pernicová, D. [eds.]. Public recreation and landscape protection – with man hand in hand? Conference proceeding. 5th – 6th May 2014, Křtiny. Department of Landscape Management FFWT, Mendel University in Brno: 75-79. (in English, with Czech summary) ["Among the ways of modern public recreation include horse-riding in the forests or stream climbing in mountain streams and gorges. Both of these activities are often operated outside the marked trails in the forests, trough forest springs or watercourses respectively. There are described cases of this type of recreation in forests in the Moravskoslezské Beskydy Mts. in relation to populations of forest species of dragonflies. Among the right forest species of dragonflies in Central Europe include species of the genus *Cordulegaster*. *C. bidentata* is the most abundant species in the forests of central Europe in the hills and mountains, which inhabits forest springs and streams. In some cases, the paths (trails) routed through these habitats. The case, horse-riding in forests with direct impact to larvae of *C.r bidentata*, has been recorded in the study of bionomics rheobiont dragonfly species. A one-time passage of horses is not destructive, but repeated ride on the same path is dangerous. Repeated passage of horses causes physical destruction of habitat i.e. trampling of sediments in shallow pools, where larvae are concentrated, but also direct trampling of larvae. Negative impact is also the chemical pollution of water excrement that is left in large quantities in the habitats. Threat increases during the emergency of larvae i.e. from May to June, when larvae dwell in bank parts and are sensitive to any interference with the habitat or contact. Repeated recreation outside the marked paths, still on the same trails, is becoming an important negative factor in the threat of forest habitats springs and insect populations." (Authors)] Address: Holuša, O., Mendel University in Brno, Faculty of Forestry and Wood Technology, Department of Forest Protection and Wildlife Management, Zem..d..lská 3, 613 00 Brno, Czech Republic. E-mail: holusao@email.cz

**14163.** Hudu, F. (2014): What is the phonological word in Dagbani? A positional faithfulness account. *Ghana Journal of Linguistics* 3.1: 1-44. (in Dagbani, nasal place assimilation, vowel harmony, underspecification, positional faithfulness) ["This paper offers a phonological diagnostic for defining the word in Dagbani, a Gur language of Ghana. It shows that a morphological unit that constitutes a complete word blocks contrast-neutralising phonological processes from target segments within its boundaries when triggered across its boundary. In sub-word units, these processes (e.g. nasal place assimilation, vowel harmony, segmental deletion) apply to target sounds

without restrictions. The result is the maintenance of contrast in words and neutralisation of contrast in sub-words. The paper further argues that the asymmetrical application of these rules is an indication of a morphological strength distinction between the word as a strong position where segments are fully specified for phonological features, and the sub-word domain as a non-privileged position where segments may be underspecified for features. A formal analysis of the asymmetry is presented using the theory of positional faithfulness within the framework of Optimality Theory. ... Another such example is the word *sá-á pá?-á* which literally means 'rain's wife' but actually means 'dragonfly'. The point of these comparisons is that, while compounds sometimes convey such non-compositional meanings, complex words are compositional in meaning." (Author)] Address: Hudu, F., Department of Linguistics, School of Languages, University of Ghana, Legon, Accra, Ghana

**14164.** Ikomi, R.B.; Arimoro, F.O. (2014): Effects of recreational activities on the littoral macroinvertebrates of Ethiopie River, Niger Delta, Nigeria. *Journal of Aquatic Sciences* 29(1): 155-170. (in English) ["Littoral macroinvertebrate assemblages at four stations in Ethiopie River, Nigeria corresponding to different catchment land uses and recreational activities were sampled from October 2011 to May 2012 using kick sampling technique along with physico-chemical water parameters. The waters of Ethiopie River were in general, transparent, acidic with low pH values ranging from 4.6 to 6.4, reasonably well oxygenated (4.4-6.8 mg/L), of low conductivity (<38.0  $\mu\text{Scm}^{-1}$ ) except in Station 2 where conductivity reached up to 47.2  $\mu\text{Scm}^{-1}$  Ephemeroptera, Plecoptera and Trichoptera dominated the headwater stations, whereas Coleoptera, Oligochaeta and Chironomidae dominated recreational sites. Significant relationships were recorded between physico-chemical parameters: conductivity, BOD, temperature, and nutrients and occurrence of specific taxa, mainly *Neoperla*, *Caenis*, *Baetis*, *Enallagma*, *Gyrinus*, *Leptonema*, *Rhematobates* and *Chironomus*. Distribution of organic matter, macrophyte cover, substratum texture, recreational activities and current velocity accounted for variations in species composition, taxonomic richness and total abundance at four stations sampled. Significant changes in macroinvertebrate assemblages were primarily due to changes in water quality. Littoral macroinvertebrate communities proved to be good indicators of water quality and should be used as bioindicators in long-term monitoring of this river." (Authors)] Address: Arimoro, F.O., Applied Hydrobiology Unit, Department of Biological Sciences, Federal University of Technology, P.M.B. 65, Minna, Nigeria. E-mail: fran-sarimoro@yahoo.com

**14165.** Ishida, S.; Kadoya, T.; Takamura, N. (2014): An integrated indicator of biodiversity in agricultural ponds: Definition and validation. Integrative observations and assessments. *Ecological Research Monographs* 2014: 295-310. (in English) ["One of the promising approaches

to monitoring biodiversity is assessing the status of pressures driving the biodiversity state. To achieve this, we need to identify the principal pressures that cause simultaneous biodiversity loss across taxonomic groups and clarify how multiple pressures act synergistically or at least simultaneously to decrease biodiversity in the focal ecosystem. Here, we introduce a framework for an integrated biodiversity indicator that takes into consideration the estimated relative importance of multiple pressures. The indicator is defined as a function of the pressure(s) and is parameterized to explain a number of individual states of biodiversity. We showed that the framework can be successfully applied to a real ecosystem, a series of 64 agricultural ponds. We focused on macrophytes, Odonata, and benthic macroinvertebrates as the individual states of biodiversity of the ponds and on three types of pressure: eutrophication, habitat destruction, and invasive alien species. We then evaluated the relationships among pressures with direct effects and the individual states of biodiversity and used a hierarchical Bayesian approach to calculate the integrated biodiversity indicator. We found that the integrated indicator could explain the behaviors of several individual states of biodiversity. To demonstrate the applicability of our approach, we adapted the integrated indicator to another dataset of 35 different agricultural ponds in which the integrated indicator was calculated using the relative importance of multiple pressures estimated from the previous 64-pond study. We found that we could successfully extrapolate the integrated indicator to the 35 agricultural ponds. These results demonstrate the advantages of the framework in providing a more practical method for assessing biodiversity in freshwater lentic environments and in quantifying the relative importance of the major threats to biodiversity to prioritize strategies in conservation planning and policy making." (Authors)] Address: Kadoya, T., 4. Center for Environmental Biology and Ecosystem Studies, National Institute for Environmental Studies, Ibaraki, Japan. E-mail: kadoya@nies.go.jp

**14166.** Ishiyama, N.; Akasaka, T.; Nakamura, F. (2014): Mobility-dependent response of aquatic animal species richness to a wetland network in an agricultural landscape. *Aquatic Sciences* 76: 437-449. (in English) ["Management of wetland connectivity is important for biodiversity conservation. In the modern agricultural landscape, the natural connections between floodplain wetlands have been greatly altered. Agricultural ditches and channelized streams are widely distributed in floodplains, which may contribute to the maintenance of wetland connectivity and biodiversity. To determine how these watercourse networks affect wetland biodiversity, we examined the relationship between the species richness of aquatic animals and wetland connectivity, with a special focus on species mobility. From July to August 2011, fish and aquatic insects were collected from 24 wetlands in northern Japan. To determine the degree of wetland connectivity, we assessed the relative importance of individual wetlands in maintaining the entire wetland network using two connectivity indi-

ces: hydrologic connectivity via watercourses and spatial connectivity defined as Euclidian distances between wetlands using graph theory. We found that only high mobility groups of both taxa could enhance species richness in either a hydrologic (fish) or spatial (insect) wetland network. The species richness of insects with high-flying ability was found to increase as spatial connectivity increased. Furthermore, the species richness of fish with high-swimming ability was positively influenced by hydrologic connectivity, most likely because highly mobile species were able to reach suitable habitats and migrate from source populations in a wetland network owing to their good mobility. Our findings indicate that hydrologic network is important for maintaining biodiversity as well as spatial connectivity. It is important to focus conservation efforts on key wetlands with high hydrologic and spatial connectivity in future wetland management." (Authors) The following odonate species were assessed according to their mobility: *Sympetma paedisca*, *Lestes sponsa*, *Copera annulata*, *Coenagrion ecomutum*, *C. lanceolatum*, *Enallagma boreale circumlatum*, *Erythromma humerale*, *Paracerion hieroglyphicum*, *Somatochlora japonica*, *S. viridiaenea*, *S. alpestris*, *Cordulia amurensis*, *Epithea bimaculata sibirica*, *Libellula quadrimaculata asahinai*, *Orthetrum albistylum speciosum*, *Sympetrum croceolum*, *S. eroticum eroticum*, *S. frequens*, *S. infuscatum*, *Aeshna nigroflava*, *Anax parthenope*, and *Trigomphus melampus*.] Address: Ishiyama, N., Department of Forest Science, Graduate School of Agriculture, Hokkaido University, Kita 9 Nishi 9, Kita-ku, Sapporo 060-8589, Japan. E-mail: night7mare@gmail.com

**14167.** Jacquemin, S.J.; Pyron, M.; Allen, M.; Etchison, L. (2014): Wabash River Freshwater Drum (*Aplodinotus grunniens*) diet: Effects of body size, sex, and river gradient. *Journal of Fish and Wildlife Management* 5(1): 133-140. (in English) ["The objectives of this study were to describe the diet of freshwater drum (*Aplodinotus grunniens*) in the Wabash River, USA with tests for diet variation with body size, sex, and longitudinal river gradient. We used a multivariate ordination approach (nonmetric multidimensional scaling) to describe drum diet combined with a generalized linear model to test for covariation of diet with body size, sex, and river gradient. Hydroptychidae (Trichoptera, caddisfly larvae), Pleuroceridae (Gastropoda), and Heptageniidae (Ephemeroptera, mayfly larvae) were the most consumed prey items (~75% of overall diet). Among all freshwater drum, Hydroptychidae, Pleuroceridae, and Heptageniidae were present in 69%, 23%, and 38% of stomachs, respectively. Freshwater drum diets were similar along an upstream-downstream river gradient spanning 350 river km, but varied with body size and sex. Small- and medium-sized fish tended to consume more Diptera and annelids compared to the largest individuals which fed on molluscs and crayfish. With control for body size, the diets of male individuals were composed of more Diptera (Chironomidae) and annelid prey items compared with female individuals whose diet included more molluscs and crayfish. Overall, we interpret the lack of dietary turnover in freshwater

drum with Wabash River longitudinal gradient as evidence of diet specialization. Alternatively, we propose that a potential dietary - river gradient signal may be diluted as a function of increased freshwater drum longitudinal movements." (Authors) 0.66 % of the diet are Gomphidae, and a few Aeshnidae and Zygoptera.] Address: Jacquemin, S., Dept of Biological Sciences, Wright State University – Lake Campus, Celina, Ohio 45822, USA. E-mail: stephen.jacquemin@wright.edu

**14168.** Janssens, L.; Stoks, R. (2014): Chronic predation risk reduces escape speed by increasing oxidative damage: A deadly cost of an adaptive antipredator response. *PLoS ONE* 9(6): e101273. doi:10.1371/journal.pone.01-01273: 6 pp. (in English) ["Prey organisms evolved a multitude of plastic responses to avoid being eaten by predators. Besides the evolution of plastic morphological responses to escape predation, prey also evolved a set of physiological stress responses to avoid dying because of chronic predator stress per se due to disruption of cellular homeostasis. As physiological stress theory predicts increased energy consumption and the inhibition of essential nonemergency body functions, we tested whether chronic predation risk may increase oxidative damage thereby generating negative effects on escape performance. Specifically, we evaluated whether predation risk reduces escape swimming speed in damselfly larvae (*Coenagrion puella*) and whether this operates through stress-associated increases in oxidative damage. Counterintuitively and in contrast with many empirical studies, chronic predation risk decreased escape performance. This is however entirely consistent with the expectation of it being a long-term cost of responding to predation risk (e.g. by increasing respiration or upregulating the stress protein levels). The decreased swimming speed could be explained by an increased oxidative damage to proteins, thereby providing one of the poorly studied ecological links between oxidative damage and whole-animal performance. This likely widespread, understudied cost of chronic predation risk may provide an important pathway of non-consumptive predator effects on prey population dynamics. Moreover, it could play an evolutionary role by acting as a selective force causing prey organisms to adjust the magnitude of the physiological stress response and should be considered when evaluating life history trade-offs thought to be mediated by oxidative damage." (Authors)] Address: Janssens, Lizanne, Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Leuven, Belgium. E-mail: lizanne.janssens@bio.kuleuven.be

**14169.** Jara, F.G. (2014): Trophic ontogenetic shifts of the dragonfly *Rhionaeschna variegata*: the role of larvae as predators and prey in Andean wetland communities. *Annales de Limnologie* 50(2): 173-184. (in English) ["Body size strongly influences the type and strength of species interactions. Animals with complex life cycles, such as dragonflies, usually go through different stages that include a variation in body size and may involve shifts in

their trophic position in the food web. This investigation analyzes the position of the dragonfly *Rhionaeschna variegata*, in the food web according to its body size, in Andean wetland communities of Northwestern Patagonia (Argentina). The phenology of *R. variegata* larvae and their potential intraguild predators were studied in wetlands with different hydroperiods. Under controlled experimental conditions, feeding trials were performed to assess the effect of *R. variegata* on the survivorship of different types of prey. The effects of cannibalism and intraguild predation (IGP) on the survivorship of the small larvae of *R. variegata* were investigated with and without alternative prey as well as different sympatric predators. The phenology of *R. variegata* and intraguild predators differed among wetlands. The feeding trials showed that *R. variegata* has a significant effect on the survivorship of invertebrate and vertebrate prey. Cannibalism increased with body size in odonate larvae. The survivorship of small- and medium-sized larvae was mainly affected by the presence of larger predators such as belostmatids. The field and experimental data show that the effect of IGP and cannibalism is affected by the cohort dynamics of *R. variegata*. Body size in *R. variegata* determines the strength of its interaction with other components of the community." (Author)] Address: Jara, F.G., Laboratorio de Fotobiología, Instituto de Investigaciones en Biodiversidad y Medioambiente (INIBIOM-CONICET), Quintral 1250, San Carlos de Bariloche 8400, Río Negro, Argentina. E-mail: fjara77@hotmail.com

**14170.** Jocque, M.; Argueta, I. (2014): A new species in the genus *Amphipteryx* Selys, 1853 (Odonata, Amphipterygidae) from Pico Bonito National Park, Honduras. *ZooKeys* 408: 71-80. (in English, with Spanish summary) ["The Mesoamerican damselfly genus *Amphipteryx* includes four species: *A. agrioides* (Mexico), *A. chiapensis* (Mexico), *A. meridionalis* (Honduras) and *A. nataliae* (Verapaz, Guatemala). We describe a fifth species, *Amphipteryx jaroli*, from the cloud forest in Pico Bonito National park, Honduras. Additionally we include an up to date key of all species in the genus for both sexes." (Authors)] Address: Jocque, M., Jessica Ware Lab, Rutgers, the State University of New Jersey, 195 University Ave, Newark, NJ, 07102, USA. E-mail: merlijn.jocque@gmail.com

**14171.** Jonsson, M.; Fick, J.; Klaminder, J.; Brodin, T. (2014): Antihistamines and aquatic insects: Bioconcentration and impacts on behavior in damselfly larvae (Zygoptera). *Science of the Total Environment* 472: 108-111. (in English) ["Highlights: •Exposure to dilute concentrations of antihistamines altered damselfly behaviour. •Damselfly larvae showed substantial bioconcentration of antihistamines. •Our results highlight the need to study pharmaceutical effects on aquatic insects. •Behavioural assays can be useful for studying non-lethal effects of pharmaceuticals. Because aquatic insects use histamines as neurotransmitters, adverse impacts on aquatic insects living in aquatic environments that receive antihistamines with wastewater effluent are plausible. In this study, we



exposed damselfly larvae to low concentrations of two commonly used antihistamines (Hydroxyzine and Fexofenadine,  $360 \pm 42$  and  $2200 \pm 43$  ng l<sup>-1</sup>, respectively), and recorded damselfly larvae behaviour before and after exposure. Further, after the second set of behavioural assays was performed, we quantified bioconcentration of the antihistamines in the damselfly bodies. Our results showed significant changes in damselfly behaviour following antihistamine exposure. After Hydroxyzine exposure, the damselfly larvae became less active, and they showed reduced fleeing response (i.e. increased boldness) after being exposed to Fexofenadine, the latter also being significantly different from the non-exposed (control) individuals. Further, we found high levels of bioconcentration in the damselflies; Hydroxyzine showed an average bioconcentration factor (BCF) of 2000. As such, our results indicate that low concentrations of antihistamines can have sub-lethal effects on aquatic insects manifested as behavioural changes, and that bioconcentration of these substances can be high. Therefore, the need to investigate the impact of emergent aquatic contaminants also on aquatic insects, and on behaviours that are of ecological importance, is further highlighted." (Authors)] Address: Jonsson, M., Department of Ecology and Environmental Science, Umeå University, SE 90187, Umeå, Sweden, E-mail: [micael.jonsson@emg.umu.se](mailto:micael.jonsson@emg.umu.se)

**14172.** Kalniņš, M. (2014): *Argiolestes zane* sp. nov. from New Guinea (Odonata: Argiolestidae). *Telnov D.* (ed.) 2014: Biodiversity, Biogeography and Nature Conservation in Wallacea and New Guinea, volume II: 221-224, plates 32-34. (in English) ["*Argiolestes zane* sp. nov. (type locality: Indonesia, West Papua, S Bird's Neck, east from Kaimana, Triton bay, Lobo village environment, deposited LINC) is described. Ecological notes on habitat (forest brooks) of holotype and paratypes localities are given." (Author)] Address: Kalniņš, M., The Entomological Society of Latvia, Dzervenu iela 9-12, Siguldas novads, LV-2150, Sigulda, Latvia. E-mail: [martins.kalnins@biology.lv](mailto:martins.kalnins@biology.lv)

**14173.** Karube, H. (2014): Vietnamese Odonata collected in 1992-2003 surveys. V. Gomphidae. *Tombo* 56: 77-90. (in English, with Japanese summary) ["Twenty nine species of gomphid dragonflies were recorded from Vietnam during our survey. *Leptogomphus tamdaoensis* sp. nov., *Leptogomphus inouei* sp. nov., *Ophiogomphus* (*Ophiionurus*) *longijhamulus* sp. nov., *Ophiogomphus* (*Ophiionurus*) *minimus* sp. nov. are described and figured. *Stylurus clathratus* (Needham, 1930), *Leptogomphus perforatus* Ris, 1912, *L. elegans* Lieftinck, 1948, *Burmagomphus arboreus* Lieftinck, 1940, *B. divaricatus* Lieftinck, 1964, *Lamelligomphus formosanus* (Matsumura in Oguma, 1926), *L. castor* (Lieftinck, 1941), *Gomphidictinus perakensis* (Laidlaw, 1902) are all recorded from Vietnam for the first time." (Author)] Address: Karube, H., Kanagawa Prefectural Museum of Natural History, 499 Iryuda, Odawara, Kanagawa, 250-0031 Japan. E-mail: [paruki@nh.kanagawa-museum.jp](mailto:paruki@nh.kanagawa-museum.jp)

**14174.** Karube, H. (2014): Vietnamese Odonata collected in 1992-2003 surveys. IV. Synlestidae. *Tombo* 56: 73-76. (in English, with Japanese summary) ["Three species of the genus *Megalestes* were recorded from Vietnam. These are *M. micans* Needham, 1930, *M. hui* Wilson & Reels, 2003 and *M. australis* sp. nov., which is described and illustrated. The last species is related to *M. kurahashii* Asahina, 1985." (Author)] Address: Karube, H., Kanagawa Prefectural Museum of Natural History, 499 Iryuda, Odawara, Kanagawa, 250-0031 Japan. E-mail: [paruki@nh.kanagawa-museum.jp](mailto:paruki@nh.kanagawa-museum.jp)

**14175.** Karube, H.; Sasamoto, A. (2014): *Borneogomphus teramotoi*, a new genus and species of Gomphid dragonfly from Borneo (Odonata: Gomphidae: Onychogomphinae). *Tombo* 56: 65-72. (in English, with Japanese summary) ["*Borneogomphus teramotoi* gen. and sp. nov. (holotype male: E. Malaysia [Borneo Island], Bundu tuhan, Mt. Kinabalu, Sabah) is described and illustrated base on adults of both sexes and the larval exuvia. This new genus seems to be endemic to Borneo. Based on morphology and DNA analysis, *Borneogomphus* is most closely related to the continental *Phaenandrogomphus*, but it is easily distinguished by several characteristics, especially peculiar male genital structures, wing venation, and well developed valvula vulvae in female. The holotype is deposited in the Kanagawa Prefectural Museum of Natural History." (Authors)] Address: Karube, H., Kanagawa Prefectural Museum of Natural History, 499 Iryuda, Odawara, Kanagawa, 250-0031 Japan. E-mail: [paruki@nh.kanagawa-museum.jp](mailto:paruki@nh.kanagawa-museum.jp)

**14176.** Kaunisto, K. (2014): Host parasite interactions in damselflies. From individuals to populations. Doctoral dissertation (monograph). Department of Biology, Zoological Museum. *Annales Universitatis Turkuensis A II* 291: 24 pp. (in English) ["The main goal of this thesis is to increase understanding on evolutionary and ecological factors that have contributed to differences in parasite numbers in insects. Furthermore, the thesis addresses the effects of parasites on their hosts. The most important findings were: *Coenagrion hastulatum* immune response to artificial pathogen increased with increasing parasite numbers (Article I). Marginal, more isolated *C. hastulatum* populations on the edge of distribution have fewer parasites when compared to distribution's core populations (Article II). *Calopteryx splendens* individuals with higher homozygosity have more parasites, however, the rate of homozygosity did not differ between populations (Article III). Parasite prevalence was affected by whether the host species occurred in allopatric or sympatric population: sympatric *C. splendens* populations with sister species *Calopteryx virgo* harbored more parasites (Article IV). Parasites were associated with the wing spot size, an ornament under sexual selection, and thus may play an important role in character displacement, i.e. the size of the wing spot (Article V). To conclude with, this thesis brings about new information on the parasite infection patterns in insects, proposing several factors to con-

tribute to these patterns, as well as it addresses the effects of parasites on their hosts, from individual to population level." (Author)] Address: Kaunisto, K.M., Section of Ecology, Department of Biology, University of Turku, FI-20014 Turku, Finland. E-mail: kkauni@utu.fi

**14177.** Khanfsi, T. (2014): Caractérisation des Mantodea dans différents biotopes de la région de Timimoun. Mémoires Ingénieur, Faculté des Sciences de la Nature et de la Vie, Département des Sciences Agronomiques, Université Kasdi Merbah Ouargla UKMO: 80 pp. (in French, with English and Arabian summaries) ["The diversity of Mantis in two natural and cultivated habitats in Timimoun is studied. Four species (*Blepharopsis mendica*, *Sphodromantis viridis*, *Iris oratoria*, *Iris deserti*) are inventoried in the herbaceous layer mainly after 12 months of exploration. The palmgrove has 3 species and Estivo - autumn period is the most conducive to catch. The Sex-ratio indicates a predominance of males, although the medium is moderately diversified (Simpson index  $D = 0.65$ ). Morphological characterization and genitalia is made through a description and measurements. Diet of *Iris oratoria* contains Orthoptera (26.7%), Coleoptera and Odonata with (3.33 % each). *Iris deserti* consumes especially Diptera (33.33 %) and the same percentage of ants, Aranea, Dermaptera, Homoptera and with Collembola (16.6 %). The regime is moderately diversified (2.62 bits in the menu *Iris oratoria*, *Iris deserti* at 1.5 bits and 3.37 bits for *Blepharopsis mendica*). Prey size ranges from 2 to 20 mm. Trophic regime of 3 Mantids is insectivorous and generalist." (Author)] Address: not stated

**14178.** Kim, D.G.; Kang, H.J.; Baek, M.J.; Lee, C.Y.; Kim, J.G.; Bae, Y.J. (2014): Analyses of benthic macroinvertebrate colonization during the early successional phases of created wetlands in temperate Asia. *Fundamental and Applied Limnology / Archiv für Hydrobiologie* 184(1): 35-49. (in English) ["We quantified the colonization rate and pattern of benthic macroinvertebrate communities in 2 created small-sized wetlands (non-planted and planted) and a nearby older man-made wetland in Korea. We sampled benthic macroinvertebrates at monthly intervals and surveyed the vegetation dynamics every 2 months from May 2009 to October 2010. We determined the colonization rate using the newly adopted colonization index (CI), and evaluated the colonization pattern using multivariate analyses, including nonmetric multidimensional scaling (NMS) and indicator species analysis (ISPAN). As predicted, the species richness and diversity of benthic macroinvertebrates increased markedly in early successional phases in the 2 created wetlands, and initial planting accelerated colonization of benthic macroinvertebrate communities; in comparison, the older man-made wetland showed a more gradual increase. The CI (range 100–0) decreased over time in the created wetlands; this decrease was more rapid in the planted wetland than in the non-planted wetland. After 400 Julian days, the benthic macroinvertebrate community in the planted wetland showed 90 % similarity with

that in the older man-made wetland. The NMS results revealed that the colonization pattern of benthic macroinvertebrates differed significantly according to vegetation (non-planted versus planted [ $p = 0.000$ ]), season ( $p = 0.001$ ), and year ( $p = 0.014$ ). The ISPAN results showed that the indicator species in the non-planted and planted wetlands were the burrowing mayfly (*Ephemera orientalis*) and *Ischnura asiatica*, respectively. Our findings demonstrate the validity of using the CI to quantify the colonization rate of benthic macroinvertebrate communities in typical small-sized temperate wetlands." (Authors)] Address: Bae, Y.J., College of Life Sciences & Biotechnology, Korea Univ., 145 Anam-ro, Seongbuk-gu, Seoul 136-713, Korea. E-mail: yjbae@korea.ac.kr

**14179.** Knorp, N.E.; Dorn, N.J. (2014): Dissimilar numerical responses of macroinvertebrates to disturbance from drying and predatory sunfish. *Freshwater Biology* 59(7): 1378-1388. (in English) ["(1) Disturbances caused by drying can eliminate fully aquatic organisms and alter wetland communities. However, the net effects of pulsed drying followed by re-wetting on populations of benthic macroinvertebrates with greater tolerance to drying have been poorly studied. (2) We quantified the population responses of two large macroinvertebrates, dragonflies (*Libellulidae*) and a crayfish (*Procambarus fallax*), to variable drying history and predatory sunfish (Family: Centrarchidae) in experimental subtropical wetlands. To simulate naturally occurring combinations of drying and sunfish presence, the experimental treatments included a drying and re-wetting sequence that either eliminated sunfish or did not, with a third treatment of continuously flooded conditions with sunfish present. (3) The activity of adult dragonflies was similar over all experimental wetlands, but larval density after 6 months was highest in continuously flooded wetlands (with sunfish) and some species (*Erythemis simplicicollis*, *Celithemis eponina*) were absent from wetlands that experienced drying. There was no evidence that sunfish limited larval density. (4) After 6 months, overall crayfish biomass was greatest in wetlands that had dried and lacked sunfish. Crayfish density was similar in all wetlands, but individual crayfish body mass (g) was greatest in wetlands that lacked sunfish. Because of sunfish predation, few crayfish survived to full juvenile size. In the presence of sunfish, drying did not affect crayfish biomass or individual body mass. (5) The abundance of libellulid dragonfly larvae was indirectly reduced by the drying. In wetlands where submerged vegetation was reduced by drying, we suggest that libellulid populations were limited by a small-bodied fish (*Gambusia holbrooki*). In contrast, survival of juvenile crayfish was directly limited by sunfish, and therefore, crayfish (but not libellulid) populations could be temporarily enhanced by drying events when and where sunfish populations are reduced." (Authors)] Address: Knorp, Natalie, Department of Biological Sciences, Florida Atlantic University, 3200 College Ave., Davie, FL 33314, USA. E-mail: nekknorp42@students.tnitech.edu

- 14180.** Kobayashi, J. (2014): *Neurothemis ramburii* (Kaup in Brauer, 1866) (Libellulidae) with an unusual wing-maculation. Tombo 56: 96. (in Japanese, with English summary) [Japan. "A male of *N. ramburii* with unusual wing-maculation was captured at Iriomote-jima Island, Yaeyama Islands, SW Ryukyus. In each wing, the pigmented area is expanded, so that the hyaline part is narrowed and reduced, and the boundary with the coloured area becomes indistinct." (Author)] Address: not stated
- 14181.** Korbaa, M.; Ferreras-Romero, M.; Bejaoui, M.; Boumaiza, M. (2014): Two species of Odonata newly recorded from Tunisia. *African Entomology* 22(2): 291-296. (in English) ["*Pyrrhosoma nymphula* and *Aeshna cyanea*, whose presence in Tunisia was unknown, have recently been recorded in Khroumirian streams, in the northwest of the country. A new population of *Onychogomphus uncatulus*, a relatively rare species in North Africa (except Morocco), is also reported. Characteristics of their habitat are given." (Authors)] Address: Ferreras-Romero, M., Departamento de Biología Animal (Zoología), Facultad de Ciencias, Universidad de Córdoba, Avda. San Alberto Magno s/n, E-14004 Córdoba, Spain. E-mail: ferreras@teleline.es
- 14182.** Kosterin, O.; Chartier, G. (2014): Two more Odonata species recorded for Cambodia. *Cambodian Journal of Natural History* 2014(1): 8-11. (in English) ["*Heliaeschna simplicia* (Karsch, 1891): A male was found dead inside a house at Rainbow Lodge (11.580°N, 103.127°E) on 12 March 2013, seemingly after being attracted by light. *Epopthalmia vittigera* (Rambur, 1842) ssp. *bellicosa* Lieftinck, 1948: A female was photographed at Rainbow Lodge (11.580 N, 103.127 E) on 14 June 2013 and a male on 18 June 2013. Another female was found dead inside a house at Rainbow Lodge on 23 June 2013. More males were observed at the same place every day until at least 30 June 2013." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru
- 14183.** Kosterin, O.E. (2014): Odonata briefly observed on the islands of Bali and Lombok, Lesser Sundas, Indonesia, in the late February 2014. *International Dragonfly Fund Report* 74: 1-48. (in English) ["In the second half of February 2014, Odonata were searched for nine days on Bali and four days on Lombok, the western Lesser Sundas, Indonesia. One species, *Orthetrum chrysis* has been for the first time recorded for Bali and six species, *Nososticta emphylla*, *Idionyx murcia*, *Brachydiplax chalybea*, *Agrionoptera insignis*, *Neurothemis ramburii*, *Rhyothemis phyllis* have been for the first time recorded for Lombok. The previous literature concerning the two islands is analysed. To the moment, 55 Odonata species (3 unidentified) are known for Bali and 39 for Lombok, although the actual faunas of both islands are supposed to be equally rich, and further studies on Lombok are necessary. Odonata faunas of Bali and Lombok mirror each other in respect of high shares, 29 and 23%, of Odonata species ranging to the west and east of the two islands, respectively. Efficiency of Lombok Strait as a biogeographical boundary was estimated as high as 0.6, so Wallace Line is of importance for Odonata. Some diagnostic characters of *N. emphylla*, *N. ramburii*, *R. phyllis* *phyllis* and *Procordulia sambawana* and a taxonomical situation around *Prodasineura autumnalis* and *P. humeralis*, which is not justified biogeographically, are discussed. Short notes on habitats and assemblages of Odonata are added." (Author)] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia; Novosibirsk State University, Pirogova str. 2, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru
- 14184.** Kulijer, D. (2014): Odonata fauna of karst streams and rivers of South Herzegovina (Bosnia and Herzegovina, West Balkan). *International Dragonfly Fund - Report* 72: 1-50. (in English) ["Results of the odonatological survey in the Neretva River Basin in South Herzegovina karst region of Bosnia and Herzegovina conducted from April to August 2013 are presented. The area had been pre-assessed as insufficiently known in term of its Odonata fauna, but believed to be important habitat for several species of conservation concern, particularly *Coenagrion ornatum*, *Ceriatagrion tenellum*, *Calliaeschna microstigma*, *Lindenia tetraphylla* and *Cordulegaster heros*. Moreover, freshwater habitats of the region are increasingly threatened due to climate change and the habitat destruction due to infrastructure and hydroenergy production projects. The focus of the study was set on the streams and rivers in Neretva, Trebižat, Trebišnjica and Bregava river valleys, Hutovo blato wetland, Mostarsko blato, Dabarsko and Fatnicko polje. The survey resulted in 482 Odonata records of 49 species from 52 surveyed localities. Notable results include new distribution data on species of conservation concern, particularly six new localities of *C. ornatum*, nine of *C. microstigma* and five of *C. heros*. Comments on species of conservation concern and brief description of habitats at all surveyed localities are provided. New data on species of conservation concern are important for better conservation planning of dragonfly species and habitats in Bosnia and Herzegovina." (Author)] Address: Kulijer, D., National Museum of Bosnia and Herzegovina, Zmaja od Bosne 3, 71000 Sarajevo, Bosnia and Herzegovina. Email: dejan.kulijer@gmail.com
- 14185.** Kutcher, T.E. (2014): Biological indicators for assessing freshwater wetland condition in Rhode Island. *Dissertations and Master's Theses (Campus Access)*. Paper AAI1555662. <http://digitalcommons.uri.edu/dissertations/AAI1555662>: 98 pp. (in English) ["There is a growing need to identify assessment methods that can provide managers and researchers with a relative indication of wetland condition. Biological indicators (bioindicators) are considered to be the most effective and precise indicators of environmental condition. This study focuses on the develop-



ment of bioindicators based on the concept of species conservatism, or intolerance to human disturbance. In theory, the aggregate conservatism of a species assemblage should indicate the environmental quality of a natural area. In the first part of this study, I applied the conservatism concept to adult Odonata composition to create a novel bioindicator for open-canopy wetland systems. I used an extensive existing Odonata dataset to develop a conservatism-based Odonata index of wetland integrity and test it against rapid assessment and landscape-scale reference measures. The Odonata index was well predicted by both reference measures and showed no evidence of dependence on sampling effort, wetland size, or geomorphic class. My findings suggest that conservatism of adult Odonata averaged across species may provide a robust indicator of freshwater wetland integrity that is practical for wetland assessment. The conservatism concept is more typically applied to Floristic Quality Assessment (FQA), using vascular plant species. FQA index variants incorporating species richness, nativeness, and abundance have been empirically tested as indicators of freshwater wetland integrity, but less attention has been given to clarifying the mechanisms controlling FQA functionality; consequently, disagreement remains in identifying the most effective variant. In the second part of this study, I tested commonly-used FQA variants against landscape, rapid, and biological reference measures in open canopy wetlands. FQA variants incorporating species richness did not correlate with any reference measures and were influenced by wetland size and hydrogeomorphic class. In contrast, FQA variants disregarding species richness showed strong, monotonic relationships with all three reference measures, independent of wetland size and class. Incorporating non-native species improved performance over using only native species, and incorporating relative species abundance improved performance further. Non-richness variants responded linearly to individual and aggregate stresses, suggesting broad response to cumulative degradation, or decreasing integrity. These findings support the following recognized theories: aggregate plant species conservatism declines with increased disturbance; plant species richness increases with intermediate disturbance and increasing unit area; non-native species are favoured by human disturbances; and the proportional abundance of species is an important functional component of ecosystem health. This suggests that an abundance-weighted FQA variant incorporating non-native species and disregarding species richness should provide the most highly-relevant and effective FQA measure of ecological integrity for open-canopy vegetated wetlands." (Author)] Address: Kutcher, T.E., Rhode Island Natural History Survey, University of Rhode Island, 200 Ranger Hall, Kingston, RI 02881, USA. E-mail: tomkutcher@my.uri.edu

**14186.** Laister, G.; Lehmann, G.; Martens, A. (2014): Exotic Odonata in Europe. *Odonatologica* 43(1/2): 125-135. (in English) ["Between 1991 and 2011, more than 1,000 adults of exotic odonate species were recorded from glasshouses of a wholesaler dealer of aquarium

plants near Wels, Austria. Twenty-three species could be identified to species level. All species were accidentally introduced as eggs or larvae. The majority are widely distributed and common southeastern Asian species. About 17 taxa are first recorded from Europe bringing the list of exotic Odonata in Europe to 41 taxa. These odonates are mainly introduced via aquarist trade and many species have emerged from home aquaria and glasshouses. Currently, tropical plants for aquarists are mainly imported to Europe from Singapore, Indonesia and Thailand, which suggests that the exotic Odonata originated in those countries. So far, the introduction of exotic Odonata species into Europe is not ecologically relevant because none of the introduced species have become established in the wild. However, this study will improve understanding of the significance of trading connections in establishing exotic species which could become invasive." (Authors)] Address: Laister, G., Hans-Hofmann-Ring 3, 4470 Enns, Austria. E-mail: glaister@aon.at

**14187.** Lee, S.-D.; Miller-Rushing, A.J. (2014): Degradation, urbanization, and restoration: A review of the challenges and future of conservation on the Korean Peninsula. *Biological Conservation* 176: 262-276. (in English) ["Highlights: •We review the current state of conservation challenges on the Korean Peninsula. •The peninsula hosts many endemic species and is critical for bird migrations. •Conservation challenges include development, pollution, and deforestation. •Biodiversity on the peninsula is poorly documented. Documentation is improving. •Conservation solutions include habitat restoration and conservation planning. Human history on the Korean Peninsula has left natural resource managers with a number of serious challenges regarding the preservation of biodiversity and ecosystem functions. The Korean Peninsula covers 222,403 km<sup>2</sup> and contains a mountainous interior, many islands, and biodiversity-rich coastal and marine areas. Biodiversity on the peninsula is not well documented, especially in North Korea, but the peninsula is estimated to host at least 100,000 species, and perhaps manyfold more. Roughly 6% of species identified to date are endemic, and among vertebrate species in South Korea, 29% of mammals, 14% of birds, 23% of freshwater fishes, 48% of reptiles, and 60% of amphibians are estimated to be at risk of extinction or have been extirpated from the peninsula. The situation is likely worse in North Korea. Species still occurring on the Korean Peninsula have survived near total deforestation of the landscape, heavy fishing, pollution, and, in South Korea, a period of rapid urbanization since the end of the Korean War in 1953. Conservation challenges are particularly dire in North Korea, where environmental degradation has impaired the country's ability to sustain agriculture, clean air and water, and other fundamental ecosystem services. Conservation faces significant challenges in South Korea, too, given the country's goal to continue to develop one of the world's most advanced and urbanized economies. Natural resource managers in both North and South Korea are pursuing large-scale restoration of forests, wetlands,

lakes and rivers, and coastlines as a primary conservation strategy. In addition, South Korea is aggressively developing a "green economy" and is hosting international environmental meetings, attempting to take a leadership role as a convener of innovative thinking in conservation. North and South Korea are also implementing more common land protection techniques, such as the creation of national parks and other protected areas. These protected areas include the exceptional case of the 100,000-ha (250 km × 4 km) Demilitarized Zone (DMZ) that forms the border between North and South Korea. The DMZ was not created for conservation reasons, but has provided an important refuge for many species. Other well-known protected areas include Jeju Island and Baekdu Daegan Mountain, both of which host many species important for conservation. Together, these conservation actions show promise and may allow the Korean Peninsula to preserve its biodiversity and regain some of its important ecosystem services. South Korea, in particular, provides an example for attempting to balance economic development and conservation in an area with a long history of human exploitation. North Korea is much farther behind in its conservation efforts, but is now beginning planning for large-scale restoration projects, which if implemented may help reverse its long trend of environmental degradation." (Authors) *Libellula angelina* was selected to demonstrate the situation of a species Critically Endangered globally. It was detected at just 18 localities in 2000, and is threatened by habitat destruction and degradation and predation by non-native species. A second dragonfly listed by IUCN is *Nehalennia speciosa*.] Address: Lee, S.-D., Department of Environmental Science and Engineering, GT5 Research Program, College of Engineering, Ewha Womans University, Seoul 120-750, Republic of Korea. E-mail: lsd@ewha.ac.kr

**14188.** Manger, R. (2014): *Aeshna serrata* in Denmark. *Brachytron* 16(1/2): 43-47. (in Dutch, with English summary) ["In 2006 the first population of *Aeshna serrata* was discovered in Denmark. This paper describes some observations during a visit to the Danish site at Han Vejle on 29 August 2012. Some behaviour and the location are described. A female *Aeshna serrata* was observed trying to oviposit on a wooden bridge. Other observed species during this visit were *Aeshna grandis*, *Aeshna mixta*, *Sympetrum vulgatum* and *Enallagma cyathigerum*." (Author)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rmanger@planet.nl

**14189.** Marino, J.A.; Holland, M.P.; Maher, J.M. (2014): Predators and trematode parasites jointly affect larval anuran functional traits and corticosterone levels. *Oikos* 123(4): 451-460. (in English) ["Non-consumptive predator effects may have dramatic consequences for host-parasite interactions by influencing the ability of prey items to avoid, resist, or tolerate infection. Both predators and parasites can affect host traits, such as growth rates and behaviour, and these effects may in part be mediated through shared physiological pathways (e.g. the glu-

cocorticoid stress hormone, corticosterone [CORT]). Here, we examined the effects of trematode parasites (*Digena*: *Echinostomatidae*) and predator (larval odonate; *Anax* spp.) exposure on larvae of two amphibian species (*Rana sylvatica* and *R. clamitans*) in laboratory experiments. First, we measured behaviour and CORT responses of tadpoles exposed to predator chemical cue in combination with parasite cue or under direct exposure to parasites. We then measured the combined effects of predator cue and parasite infection on survival and traits. Evidence for effects of parasite cue in our study was equivocal, but we found novel interactive effects of parasites and predators on larval frogs. Parasites and predators had antagonistic effects on CORT, behaviour, and morphology, and negative synergistic effects on development. In addition, parasite infection and predator cues additively reduced activity levels of both species and growth in wood frogs. Negative effects of parasite infection on survival and traits were dose-dependent for both species, although wood frogs generally experienced stronger effects of infection than green frogs. Our results emphasize the importance of considering effects of parasites as well as predators, since both can have strong effects on survival and the combination can have both additive and non-additive effects on key traits. These effects likely have important implications for amphibian population dynamics, community structure, and conservation." (Authors)] Address: Marino, J.A. Jr., Dept of Ecology and Evolutionary Biology, Univ. of Michigan, Ann Arbor, MI 48103, USA. E-mail: jamarino@umich.edu

**14190.** Marinov, M. (2014): An undescribed colour variation of female *Antipodochlora braueri* (Odonata: Corduliidae). *Odonatologica* 43(1/2): 105-114. (in English) ["Four *Antipodochlora braueri* (Selys, 1871) specimens (2 males, 2 females) were collected in the North Island of New Zealand. One female from the Taranaki region had a wing colouration previously unknown. The new colour variation is described here and is compared to what had been so far reported of female *A. braueri*. Important diagnostic features, such as appendages and vulvar scales, are illustrated. The colour variant female is also compared to the female of *Procordulia smithii* because of the similarity of the wing pattern, which had caused confusion in the past. A male collected together with the female had wings more tinged with yellow than other known males." (Author)] Address: Marinov, M., Plant Health & Environment Laboratory, Investigation and Diagnostic Centres and Response, Ministry for Primary Industries, 14 Sir William Pickering Drive, Burnside, PO Box 14018, Christchurch, New Zealand. E-mail: milen.marinov@mpi.govt.nz

**14191.** McCauley, S.J.; Davis, C.J.; Werner, E.E.; Roberson, M.S. (2014): Dispersal, niche breadth, and population extinction/colonization ratios predict range size in North American dragonflies. *Journal of Animal Ecology* 83: 858-865. (in English) ["(1) Species' range sizes are shaped by fundamental differences in species' ecological

and evolutionary characteristics, and understanding the mechanisms determining range size can shed light on the factors responsible for generating and structuring biological diversity. Moreover, because geographic range size is associated with a species' risk of extinction and their ability to respond to global changes in climate and land use, understanding these mechanisms has important conservation implications. (2) Despite hypotheses that dispersal behaviour is a strong determinant of species range areas, few data are available to directly compare the relationship between dispersal behaviour and range size. Here, we overcome this limitation by combining data from a multi-species dispersal experiment with additional species-level trait data that are commonly hypothesized to affect range size (e.g. niche-breadth, local abundance, and body size, etc.). This enables us to examine the relationship between these species-level traits and range size across North America for fifteen dragonfly species. (3) Ten models based on a priori predictions about the relationship between species traits and range size were evaluated and two models were identified as good predictors of species range size. These models indicated that only two species' level traits, dispersal behaviour and niche breadth were strongly related to range size. The evidence from these two models indicated that dragonfly species that disperse more often and further had larger North American ranges. (4) Extinction and colonization dynamics are expected to be a key linkage between dispersal behaviour and range size in dragonflies. To evaluate how extinction and colonization dynamics among dragonflies were related to range size we used an independent data set of extinction and colonization rates for eleven dragonfly species and assessed the relationship between these populations rates and North American range areas for these species. (5) We found a negative relationship between North American range size and species' extinction to colonization ratios. Our results indicate that metapopulation dynamics act to shape the extent of species' continental distributions. These population dynamics are likely to interact with dispersal behaviour, particularly at species range margins, to determine range limits and ultimately species range sizes." (Authors)] Address: McCauley, S.J., Dept of Biology, University of Toronto Mississauga, 3359 Mississauga Road North, Mississauga, ON L5L, Canada. E-mail: shannon.mccauley@utoronto.ca

**14192.** McCormack, S.; Regan, E. (2014): *Insects of Ireland: An illustrated introduction to Ireland's common insect groups.* The Collins Press: 154 pp. (in English) ["Over 11,000 species of insects occur in Ireland but most are very small and escape notice. Identifying them accurately can be difficult or impossible. This comprehensive compact guide to over 120 of Ireland's most popular insects includes all Irish species of butterflies, bumblebees, dragonflies, ladybirds, grasshoppers and shield bugs. All are illustrated in colour with clear descriptions enabling accurate identification." (Publisher)] Address: not stated

**14193.** Melfi, J.; Leonardo, A.; Wang, Z.J. (2014): Roll dynamics in a free flying dragonfly (Abstract: F1.00015). *Bulletin of the American Physical Society, 67th Annual Meeting of the APS Division of Fluid Dynamics, Volume 59, Number 18, Sunday–Tuesday, November 23–25, 2014; San Francisco, California: (in English) [Verbatim: Dragonflies are capable of executing fast turning maneuvers. A typical free-flight maneuver includes rotations in all three degrees of freedom; yaw, pitch, and roll. This makes it difficult to identify the key changes to wing kinematics responsible for controlling each degree of freedom. Therefore we focus on a single motion; roll about the body longitudinal axis in a combined experimental and computational study. To induce rolling, a dragonfly is released from a magnetic tether while inverted. Both wing and body kinematics are recorded using multiple high speed cameras. The kinematics are replayed in a computer simulation of the flight, with forces and torques based on quasi-steady aerodynamics. By examining the effect of each kinematic change individually, we determine the key changes a dragonfly uses to both instigate, maintain, and end a rolling motion.]* Address: not stated

**14194.** Merkel-Wallner, G. (2014): *Insekten im Rainer Wald. Beiträge zur bayerischen Entomofaunistik 13: 1-65.* (in German, with English summary) [This is an overview of the known insects from the "Rainer Wald", a 250-acre hardwood floodplain forest in Danube valley near Straubing, Bavaria, Germany. On pages 8-10, 25 local Odonata species are listed and briefly discussed.] Address: Merkel-Wallner, Gisela, Bühläcker 3, 93444 Bad Krotzing, Germany

**14195.** Monroe, E.M.; Britten, H.B. (2014): Conservation in Hine's sight: the conservation genetics of the federally endangered Hine's emerald dragonfly, *Somatochlora hineana*. *Journal of Insect Conservation* 18: 353-363. (in English) ["*S. hineana* is distributed in discrete fen and wet meadow habitats over its range from Ontario, Canada, to Missouri, USA. Habitat destruction in the vicinity of Chicago, IL, and other areas lead to its designation as an US federal endangered species in 1995. Our main goal was to delineate the population genetic structure of the species within the northern recovery unit centered on the Door Peninsula in Wisconsin and the southern recovery unit in the Des Plaines River Valley near Chicago, IL. Sites on the Door Peninsula, WI, are in a matrix of agricultural development and second-growth forest and were used as a best available approximation of a pristine system for the dragonfly. We nondestructively sampled 557 adults and larvae from 16 sites in Illinois, Michigan, and Wisconsin from 2008 through 2011 and used ten microsatellite markers to estimate levels of genetic variability, and genetic structure. Mean allelic richness across all sites and years was 5.03 ( $\pm 0.64$ ) and expected heterozygosity was 0.52 ( $\pm 0.032$ ). Northern and southern recovery units as designated in the original recovery plan were genetically distinct. We delineated two genetic populations in the northern unit and three within the southern



including two disjunct sites." (Authors)] Address: Monroe, Emy, Department of Biology, University of South Dakota, 414 E. Clark St., Vermillion, SD, 57069, USA. E-mail: emymonroe@gmail.com

**14196.** Mourão, M.A.N.; Peixoto, P.E.C. (2014): Do morphological and physiological characteristics of males of the dragonfly *Macrothemis imitans* determine the winner of territorial contests? *Journal of Insect Science* 14(89): 10 pp. (in English) ["Males of many animal species show intraspecific disputes for mating territories that range from displays without physical contact to physical fights with risk of injury. This variation motivated the proposition of different models that suggest possible rules used by rivals to decide the contest winner. To evaluate those models, it is necessary to identify how males behave during the fight and the individual attributes that determine their fighting ability (resource holding potential). For this, males of *M. imitans* were used to evaluate two hypotheses conditioned on the occurrence of physical contact during the fight: if the contests occur with physical contact, features related to size should determine male resource holding potential, and if males do not exhibit physical contact during the contests, features that confer greater endurance should determine resource holding potential. To assess these hypotheses, we collected males that had ownership of territories (resident males) and males that occupied the territory after we removed the resident males (substitute males). After the capture, the resident and substitute males were transferred to the laboratory for measurements of wing area, dry weight, thoracic muscle mass, and fat content. The results showed that resident males do not differ in any measured trait from substitutes. Because the fights occur with physical contact, it is intriguing that resident males do not possess higher fighting capacity than intruders. Perhaps physical contact does not incur high costs during the fight, and other asymmetries, such as motivation associated with prior residency of the disputed territory, determine the contest winner." (Authors)] Address: Mourao, M.A.N., Programa de Pós-Graduação em Ecologia e Recursos Naturais, Univde Federal do Ceará, Ceará, Brazil. E-mail: marcoantoniomourao@yahoo.com.br

**14197.** Na, Y.; Sun, C.; Li, T.; Li, Y. (2014): The insect oviposition firstly discovered on the Middle Jurassic Ginkgoales leaf from Inner Mongolia, China. *Acta Geologica Sinica (English Edition)* 88(1): 18-28. (in Chinese, with English summary) ["Although the evidence of insect oviposition on plant organs has been reported from the late Paleozoic to the Miocene, record from the middle Jurassic is still blank. This paper reports a significant evidence of insect oviposition on plant leaf from the middle Jurassic for the first time. The ovipositional scar is distributed on the abaxial surface of *Sphenobaiera* leaf (Ginkgoales) from the middle Jurassic Daohugou Formation of Inner Mongolia, China. A new ichnospecies *Paleoovoidus venustus* sp. nov. is described. The scar is elliptic to oval, arranged in longitudinal rows between leaf veins with al-

most regular distance, with its long axis paralleling to the leaf venation. This discovery adds new information to the morphology of insect endophytic oviposition probably produced by Odonata existed in a terrestrial ecosystem ~165 Ma ago. The new materials also provide important data for the study of insect reproductive biology, plant-insect interaction and coevolution, as well as understanding the paleoclimate and palaeoenvironment during that time in northeast China." (Authors)] Address: Na, Y., Research Center of Paleontology & Stratigraphy of Jilin Univ., 6, Ximinzhong Street, Changchun 130026, China. E-mail: 19591-2281@qq.com

**14198.** Nai, Y.-S.; Sua, P.-Y.; Hsua, Y.-H.; Chiang, C.-H.; Kim, J.S.; Chen, Y.-W.; Wang, C.-H. (2014): A new spiroplasma isolate from the field cricket (*Gryllus bimaculatus*) in Taiwan. *J. Invertebr. Pathol.* 120: 4-8. (in English) ["We briefly described the morphology and transmission pathway of a *Spiroplasma* sp. isolated from the field cricket, *Gryllus bimaculatus* in Taiwan, followed by the phylogenetic analysis based on the 16S rRNA gene sequence. The cricket spiroplasma infected the hemolymph, gut, muscle tissues and tracheal cells; therefore we suggest that the pathogen invaded tissues and organs from the hemolymph through the tracheal system and the endoplasmic reticular system. Based on 16S rRNA gene sequences and the phylogeny, this spiroplasma was most closely related to *Spiroplasma platyhelix* (Identity= 95%) isolated from the dragonfly *Pachydiplax longipennis* and belongs to the *Ixodetis* clade." (Authors)] Address: Wang, C.-H., Institute of Zoology, College of Life Science, National Taiwan University, No. 1, Sec. 4, Roosevelt Road, Taipei 10617, Taiwan, ROC. E-mail: wangch@ntu.edu.tw

**14199.** Naidu, V.; Young, J.; Lai, J. (2014): Effect of wing flexibility on phasing of tandem wings in forward flight (Abstract: G30.00006). *Bulletin of the American Physical Society, 67th Annual Meeting of the APS Division of Fluid Dynamics, Volume 59, Number 18, Sunday–Tuesday, November 23–25, 2014; San Francisco, California:* (in English) [Verbatim: The dragonfly with two pairs of wings in tandem uses different phases between the wing pairs to suit the needs of the flight. Previous studies to understand the effect of phasing in forward flight are based on rigid wings. This is in contrast to the highly flexible dragonfly wings, with varying spanwise and chordwise flexibility. Here, we study flexible flapping wing simulations using Fluid Structure Interaction (FSI) in forward flight, at an advance ratio of 0.3 and Reynolds number of approximately 1300. The FSI simulations are carried out for phase 90° (hindwing leading), 0° (in-phase) and 180° (anti-phase). The performance of flexible wings will be compared with that of the rigid wings and the effect of flexibility will be discussed." (Authors)] Address: not stated

**14200.** Nair, P. (2014): Odonata (Insecta) fauna of Varadour, Kannur, Kerala, Southern India Vinayan. *Bugs R All*, No. 21: 6-10. (in English) ["The study reveals the presence of 44 species of odonates belonging to 31

genera and 7 families. A detailed systematic list is given in Table 1. ... *Merogomphus longistigma* is a rare species found in Western Ghats and the females are not common. It has been recorded from Chinnar, Vythiri Ghat (Wyanad), Travancore and Malabar (Emiliyamma et al., 2007). The present record is the first record from Kannur. *Pseudagrion malabaricum* and *Gynacantha bayadera* are recorded for the first time from Kannur. *G. bayadera* in this study is the second record from Kerala. *Ceriagrion olivaceum*, *Anax guttatus*, *Brachydiplax chalybea* and *Hydrobasileus croceus* has not been recorded from Kannur as per Emiliyamma et al. (2007). So they are new records from Kannur." (Author)] Address: Nair, P., Division of Agriculture, Tagore Vidyaniketan GVHSS, Rabeendrapuram Taliparamba P.O, Kannur, Kerala 670141, India. Email: vinayanpnair@yahoo.co.in

**14201.** Needham, J.G.; Westfall, M.J.; May, M.L. (2014): Dragonflies of North America: The Odonata (Anisoptera) Fauna of Canada, the Continental United States, Northern Mexico and the Greater Antilles. 3rd edition. Scientific Publishers: xiv, 648 pp. (in English) ["A manual for the identification of all the species of dragonflies (Odonata: Anisoptera) known from the United States and Canada, and from the Greater Antilles and the Mexican states bordering the United States, a total of 365 species. Includes keys to adults of both sexes and to last instar larvae, as far as the latter are known. Also includes illustrations of wing venation and larval habitus for all genera, caudal appendages of adult males and subgenital plates of females for most species, and numerous other details of morphology where these are important for identification. Geographic range is indicated, usually at the level of states and provinces. General introduction to morphology and biology." (Publisher)] Address: May, M.L., Dept Entom., New Jersey Agricultural Experiment Station, Cook College, Rutgers Univ., New Brunswick, NJ 08901-8524, USA. E-mail: may@aesop.rutgers.edu

**14202.** Nel, A.; Fleck, G. (2014): Dragonflies and damselflies (Insecta: Odonata) from the Late Eocene of the Isle of Wight. *Earth and Environmental Science Transactions of the Royal Society of Edinburgh* 104(3-4): 283 - 306. (in English) ["The odonatan fauna of the Late Eocene of the Isle of Wight is revised. The following taxa are revised or described: the gomphaeschnids *Oligoaeschna? anglica* Cockerell & Andrews, 1916 and *Anglogomphaeschna eocenica* gen. et sp. nov.; the aeshnids '*Oplonaeschna*' *vectensis* Cockerell & Andrews, 1916, *Aeschnophlebia andreasi* Nel et al., 2005, *Oligoaeschna wedmanni* sp. nov., and a '*Gynacanthinae*' species; *Neophya legrandi* sp. nov., first fossil representative of the Cordulephyidae; three undescribed '*Corduliidae*'; *Eomacrodiplex incompleta* gen. et sp. nov., first fossil representative of the Urothemistidae; the second representative of the Palaeogene family Bolcathoridae; a Thaumatonneuridae *Dysagrionini* species A; the megapodagrionid *Oligoargiolestes oligocenum* Kennedy, 1925; the two hypolestids *Anglohypolestes fasciata* gen. et sp.

nov. and *Eohypolestes hooleyi* gen. et sp. nov.; the coenagrionid '*Enallagma*' *oligocena* Cockerell & Andrews, 1916, and three other undescribed species; *Angloprotoneura emilielacroixi* gen. et sp. nov., first fossil European representative of the damselfly family Protoneuridae; and the lestid *Lestes* aff. *regina* Théobald, 1937. This fauna has strong similarities with the Recent Afrotropical and Indo-Malayan Odonata, suggesting a warm palaeoclimate for the Late Eocene of the Isle of Wight. '*Megalestes*' *anglicus* Cockerell, 1915 is a Zygoptera Lestiformia or Coenagrionomorpha of uncertain affinities." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1-mnhn.fr

**14203.** Nilsson-Örtman, V.; Stoks, R.; Johansson, F. (2014): Competitive interactions modify the temperature dependence of damselfly growth rates. *Ecology* 95: 1394 -1406. (in English) ["Individual growth rates and survival are major determinants of individual fitness, population size structure and community dynamics. The relationships between growth rate, survival and temperature may thus be important for predicting biological responses to climate change. Although it is well known that growth rates and survival are affected by competition and predation in addition to temperature, the combined effect of these factors on growth rates, survival and size structure has rarely been investigated simultaneously in the same ecological system. To address this question, we conducted experiments on the larvae of two species of damselflies and determined the temperature-dependence of growth rates and survival and the resulting cohort size structure under three scenarios of increasing ecological complexity: no competition, intraspecific competition and interspecific competition. In one species, the relationship between growth rate and temperature became steeper in the presence of competitors whereas that of survival remained unchanged. In the other species, the relationship between growth rate and temperature was unaffected by competitive interactions but survival was greatly reduced at high temperatures in the presence of interspecific competitors. We also found that the combined effect of competitive interactions and temperature on cohort size structure differed from the effects of these factors in isolation. Together, these findings suggest that it will be challenging to scale up information from traditional, single-species laboratory studies to the population and community level." (Authors)] Address: Nilsson-Örtman, V., Dept Ecology & Environmental Sci., Umea Univ., 90187 Umea, Sweden. E-mail: viktor.j.nilsson@gmail.com

**14204.** Norma-Rashid, Y.; Saleeza, S.N.R. (2014): Ecofriendly control of three common mosquito larvae species by Odonata nymphs. *Basic and Applied Aspects of Biopesticides 2014*: 235-243. (in English) ["This chapter revealed the efficacy of three predominant dragonfly species found in a natural population where the survey of mosquito population was conducted. Nymphs of dragonflies belonging to family Libellulidae, *Neurothemis fluctu-*

ans, *Orthetrum sabina*, and *Orthetrum chrysis*, were used as predators on the IV instar of mosquito larvae, *Aedes albopictus*, *Aedes aegypti*, and *Culex quinquefasciatus*. The daily feeding rates varied among predators and mosquito species. The mean numbers of mosquito larvae consumed by the predators were different between the mosquito species. *Aedes aegypti* was the most preferred prey for *Orthetrum sabina* and *Neurothemis fluctuans*. However, *Orthetrum chrysis* consumed more of *Culex quinquefasciatus* in contrast to other prey species. Feeding activities peaked during light-on in contrast to light-off. The results of variation factors that influenced the predation activities were significant and further discussed in this chapter. The factors that were assessed in the experiments included the water volume, predator species, predator density, and prey density and species. This chapter lends support to the potential use of Odonata species as an eco-friendly method of mosquito population eradication." (Authors)] Address: Y. Norma-Rashid, Y., Institute of Biological Sciences, Faculty of Science, University Malaya, 50603, Kuala Lumpur, Malaysia. E-mail: ynorma@um.edu.my

**14205.** Novelo-Gutiérrez, R. (2014): Primer registro de *Aphylla tenuis* Selys, 1859 para México, y primer registro del género para el estado de Chiapas (Odonata: Gomphidae) - First record of *Aphylla tenuis* Selys, 1859 for Mexico, and first record of the genus for Chiapas State (Odonata: Gomphidae). *Dugesiana* 21(1): 75. (in Spanish) [México: Chiapas; Municipio Tuxtla Chico, km 20 carretera Tapachula-Cacahoatan, Finca San Jose La Victoria, 14°59'12.49N; 9°9'14.64S; 49 masl, 15-III-1982, R. Novelo Col., 1 male, R. Novelo det. 2005.] Address: Novelo-Gutiérrez, R., Instituto de Ecología, A.C., Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec # 351, El Haya, 91070 Xalapa, Veracruz, México. E-mail: rodolfo.novelo@inecol.mx

**14206.** Novelo-Gutierrez, R.; Sites, R.W.; Vitheepradit, A. (2014): New province record of *Rhinagrion* for Thailand and description of the larva of *R. mima* (Odonata: Zygoptera: Philosinidae). *Zootaxa* 3852(5): 562-568. (in English, with Thai summary) ["The Oriental damselfly genus *Rhinagrion* includes 10 known species, but the larva of only *R. philippinum* has been described in any detail, while the larva of *R. viridatum* has been well-illustrated and features summarized. The larvae of the other eight species were unknown. Here, the larva of *Rhinagrion mima* is described and illustrated by supposition, based upon an F0 larva collected in Phetchabun Province in Thailand. It is compared with the larvae of *R. philippinum* and *R. viridatum*. This represents the first record of the genus for Phetchabun Province." (Authors)] Address: Novelo-Gutierrez, R., Red de Biodiversidad y Sistemática, Instituto de Ecología, A.C., Carretera antigua a Coatepec 351, El Haya, Xalapa, Veracruz, México. E-mail: rodolfo.novelo@inecol.mx

**14207.** Nuss, C. (2014): Erste Nachweise der libellenparasitischen Gnitze *Forcipomyia* (*Pterobosca*) *paludis*

(Macfie, 1936) in Rheinland-Pfalz. *Libellen in Hessen* 7: 51-54. (in German) [Rheinland-Pfalz, Germany, NSG „Laubenheimer Ried“ near Mainz (MTB) 6015), 2013. Three Odonata species have been observed infested from *Forcipomyia* (*Pterobosca*) *paludis* (Macfie, 1936): *Sympetrum sanguineum*: 4 Ind. (2.7.), 5 Ind. (4.7.), 1 Ind. (11.7.), 1 Ind. (1.8.), *Aeshna isoceles*: 2 Ind. (2.7.), *Platycnemis pennipes*: 7 Ind. (11.7.)] Address: Nuß, C., 65510 Idstein, Germany. E-mail: christian.nuss@gmx.de

**14208.** Nyffeler, M.; Pusey, B.J. (2014): Fish predation by semi-aquatic spiders: A global pattern. *PLoS ONE* 9(6): e99459. doi:10.1371/journal.pone.0099459: 21pp. (in English) ["More than 80 incidences of fish predation by semi-aquatic spiders – observed at the fringes of shallow freshwater streams, rivers, lakes, ponds, swamps, and fens – are reviewed. We provide evidence that fish predation by semi-aquatic spiders is geographically widespread, occurring on all continents except Antarctica. Fish predation by spiders appears to be more common in warmer areas between 40°S and 40°N. The fish captured by spiders, usually ranging from 2–6 cm in length, are among the most common fish taxa occurring in their respective geographic area (e.g., mosquitofish [*Gambusia* spp.] in the southeastern USA, fish of the order Characiformes in the Neotropics, killifish [*Aphyosemion* spp.] in Central and West Africa, as well as Australian native fish of the genera *Galaxias*, *Melanotaenia*, and *Pseudomugil*). Naturally occurring fish predation has been witnessed in more than a dozen spider species from the superfamily Lycosoidea (families Pisauridae, Trechaleidae, and Lycosidae), in two species of the superfamily Ctenoidea (family Ctenidae), and in one species of the superfamily Corinnoidea (family Liocranidae). The majority of reports on fish predation by spiders referred to pisaurid spiders of the genera *Dolomedes* and *Nilus* (>75% of observed incidences). There is laboratory evidence that spiders from several more families (e.g., the water spider *Argyroneta aquatica* [Cybaeidae], the intertidal spider *Desis marina* [Desidae], and the 'swimming' huntsman spider *Heteropoda natans* [Sparassidae]) predate fish as well. Our finding of such a large diversity of spider families being engaged in fish predation is novel. Semi-aquatic spiders captured fish whose body length exceeded the spiders' body length (the captured fish being, on average, 2.2 times as long as the spiders). Evidence suggests that fish prey might be an occasional prey item of substantial nutritional importance." (Authors)] The publication includes a small compilation of studies with information on estimated fresh weight (g/prey item) and caloric value (kJ/g dry weight) of Odonata used by semi-aquatic spiders: Fresh weight: 0.1–1.5; Caloric value: 21–22.] Address: Nyffeler, M., Section of Conservation Biology, Dept of Environmental Sci., Univ. Basel, Basel, Switzerland. E-mail: martin.nyffeler@unibas.ch

**14209.** Obata, A.; Shinohara, S.; Akimoto, K.; Suzuki, K.; Seki, M. (2014): Aerodynamic bio-mimetics of gliding dragonflies for Ultra-Light Flying robot. *Robotics* 3(2):



163-180. (in English) ["A detailed investigation including a low-speed flow study is presented on the development of ultra-light dragonfly mimetic flying robots with a focus on the dragonfly's remarkable gliding capability. It is revealed that the dragonfly's corrugated wing structure and cruciform configuration provide superior flying characteristics for fixed wing robots in low Reynolds number flight. It was also found that the dragonfly configuration has additional merit in its compatibility with propellers or high lift devices. This combination with such classic aero-engineering makes possible robots with broader flight envelope than conventional fixed-wing flying robots." (Authors)] Address: Obata, A., Micro Flying Robot Laboratory, Nippon Bunri University, 1727 Itigi Oita City 870-0397, Japan. E-Mail: obata@nbu.ac.jp

**14210.** O'Connor, J.H. (2014): Manipulation of larval and winter habitat reveals potential effects of urbanization and climate change on Wood Frogs in Connecticut. Master's Theses, University of Connecticut: 69 pp. (in English) ["Runoff from urban development and agricultural activity increases sediment input and water turbidity in many aquatic systems. These factors are known to affect fish and invertebrate communities but effects on amphibians are poorly understood. Runoff can transport nitrogenous compounds, heavy metals, pesticides, and other pollutants in addition to sediment. Our goal was to isolate the effect of sediment input from these other potential aquatic stressors. We manipulated silt addition in mesocosms to determine if sediment input affected survival, growth, or development of larval wood frogs (*Lithobates sylvaticus*). We also crossed our silt addition treatment with a predator (*Libellula cyanea*) presence treatment to assess interactive effects of multiple stressors. We found no effect of silt addition or predator presence on survival. Furthermore, addition of a large amount of silt during the early larval period resulted in earlier metamorphosis ( $F_{1,30} = 5.111$ ,  $p = 0.031$ ) at a larger size ( $F_{1,30} = 36.244$ ,  $p < 0.001$ ), traits generally viewed as positive for population dynamics. Non-lethal predator presence did not affect either mass at or time to metamorphosis. Results suggest that suspended sediment by itself is not directly harmful to wood frogs and potentially may serve as an additional food resource. Manipulating turbidity in mesocosms has advantages over studying turbidity in natural systems because treatments can be controlled and replicated sufficiently. Future research should investigate the relationship between sediment organic content and tadpole growth and survival and the interaction between water turbidity and other wetland stressors." (Author)] Address: O'Connor, J.H., Dept of Natural Resources and the Environment, University of Connecticut, Storrs, CT, USA. E-mail: jason.h.oconnor@uconn.edu

**14211.** Orlofske, S.A.; Jadin, R.C.; Hoverman, J.T.; Johnson, P.T.J. (2014): Predation and disease: understanding the effects of predators at several trophic levels on pathogen transmission. *Freshwater Biology* 59(5): 1064-1075. (in English) ["Predators can directly and indirectly

influence host-parasite interactions by consuming infected individuals, by removing infectious parasite stages and by changing host traits (e.g. behaviour). Because such effects can affect infection positively or negatively, understanding the net effects of predation on pathogen transmission under natural conditions is important. We conducted a mesocosm experiment to examine the effects of predators on interactions between tadpole hosts (*Pseudacris regilla*) and trematode parasites (*Ribeiroia ondatrae*). We manipulated the presence of (non-lethal, i.e., caged) predators of tadpoles (dragonfly larvae) and (potentially lethal) parasite predators (damselfly larvae) to evaluate their individual and combined effects on host infection. We expected that dragonflies would reduce tadpole activity and thereby increase parasite infection through a reduction in antiparasite behaviour. Because damselflies can consume parasites in the laboratory, we predicted that damselflies would lower infection by consuming parasites before they infected tadpoles. Our goal was to evaluate the net consequences of these predator-mediated effects for host/prey infection. The presence of caged dragonflies reduced tadpole activity, resulting in a ~50% increase in average infection load compared to treatments without predators. In contrast to our prediction that damselflies would reduce infection, damselflies elicited behavioural and morphological changes in hosts similar to dragonflies, with a comparable increase in parasite transmission. Thus, predator-mediated effects were evident predominantly through changes in host/prey behaviour, rather than through changes in the abundance of parasites. The lack of a direct effect of predators on infection (i.e. via consumption of parasites) could be the result of the presence of alternative prey (zooplankton) or a mismatch in timing between visual predators feeding during the day and parasites released from the first intermediate host and infecting amphibians at night. The presence of predators also stimulated morphological defences in their tadpole prey, including increased tail and body depth. Interestingly, we found that parasite infection also induced morphological changes in tadpole tail and body depth, similar to changes produced by (non-lethal) cues from predators. Parasites caused malformations in tadpoles, but there were no effects on tadpole growth or development from either parasites or predators. This research has key implications for linking predation and infectious disease in aquatic ecosystems. Our results emphasise the importance of indirect effects of predators on infection and highlight possible trade-offs in mitigating the concurrent risks of predation and disease. Parasites can also alter host morphology through trait-mediated effects similar to predators, supporting a broader inclusion of parasites in the study of the ecology of natural enemies." (Authors)] Address: Orlofske, Sarah, Dept Biol., Northeastern Illinois University, 5500 North St. Louis Ave., Chicago, IL 60625, USA. E-mail: s.a.orlofske@gmail.com

**14212.** Orr, A.G.; Richards, S.J. (2014): *Palaiargia trau-nae* sp. n. (Odonata: Platynemididae), a new Idiocnemidine damselfly from Papua New Guinea. *Australian En-*

tomologist 41(3): 153-159. (in English) ["Palaiargia traunae sp. n. from Trauna Gap near the Baiyer River Sanctuary in Western Highlands Province, Papua New Guinea, is described and its relationships discussed. It represents the 25th species of the genus, which is confined to the island of New Guinea, the Moluccas and some intervening islands." (Authors)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith Univ., Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**14213.** Pan, C.-X.; Qi, X.Y.; Zhao, G.; Guo, X.Z. (2014): The test and analysis of nanomechanical properties for dragonfly wing. *Applied Mechanics and Materials* 574: 271-274. (in English) ["Nanomechanical testing system in this paper has been applied to get elastic modulus and hardness of dragonfly wing, and showing their gradient changes along the wing, and also analyzing the mechanical properties in nanodimension. It is significant to make a further research for specific biological functions of dragonfly wing." (Authors)] Address: Pan, Chun-xiang, Flight Vehicle & Dynamic Department, Air Force Aviation Univ., Changchun, Jilin, China. E-mail: dexing789@163.com

**14214.** Pape-Lange, D. (2014): *Libellen Handbuch: Libellen sicher bestimmen* / Dirk. Verlag Schwarmstedt: Pape-Lange, Dirk. 260 pp. ISBN-10: 3000461752 (in German)



**14215.** Peng, H.; Tang, J.; Xiao, H.; Bria, A.; Zhou, J.; Butler, V.; Zhou, Z.; Gonzalez-Bellido, P.T.; Oh, S.W.; Chen, J.; Mitra, A.; Tsien, R.W.; Zeng, H.; Ascoli, G.A.; Iannello, G.; Hawrylycz, M.; Myers, E.; Long, F. (2014): Virtual finger boosts three-dimensional imaging and microsurgery as well as terabyte volume image visualization and analysis. *Nature Communications* 5, Article number: 4342 doi:10.1038/ncomms5342: 13 pp. (in English) ["Three-dimensional (3D) bioimaging, visualization and data analysis are in strong need of powerful 3D exploration techniques. We develop virtual finger (VF) to generate 3D curves, points and regions-of-interest in the 3D space of a volumetric image with a single finger operation, such as a computer mouse stroke, or click or zoom from the 2D-projection plane of an image as visualized with a computer. VF provides efficient methods for acquisition, visualization and analysis of 3D images for round-

worm, fruitfly, dragonfly, mouse, rat and human. Specifically, VF enables instant 3D optical zoom-in imaging, 3D free-form optical microsurgery, and 3D visualization and annotation of terabytes of whole-brain image volumes. VF also leads to orders of magnitude better efficiency of automated 3D reconstruction of neurons and similar biostructures over our previous systems. We use VF to generate from images of 1,107 *Drosophila* GAL4 lines a projectome of a *Drosophila* brain." (Authors) The article includes impressive images of a dragonfly thoracic ganglion neuron.] Address: Peng, H., Janelia Farm Research Campus, Howard Hughes Medical Inst., Ashburn, Virginia 20147, USA. E-mail: hanchuanp@alleninstitute.org

**14216.** Piersanti, S.; Frati, F.; Conti, E.; Rebora, M.; Salerno, G (2014): The sense of smell in Odonata: An electrophysiological screening. *J. Insect Physiol.* 70: 49-58. (in English) ["Volatile chemicals mediate a great range of intra- and interspecific signalling and information in insects. Olfaction has been widely investigated mostly in Neoptera while the knowledge of this sense in most basal insects such as Paleoptera (Odonata and Ephemeroptera) is still poor. In the present study we show the results of an electrophysiological screening on two model species, *Libellula depressa* and *Ischnura elegans*, representatives of the two Odonata suborders Anisoptera and Zygoptera, with the aim to deep the knowledge on the sense of smell of this insect order. The antennal olfactory sensory neurons (OSNs) of these two species responded to the same 22 compounds (out of 48 chemicals belonging to different functional groups) encompassing mostly amines, carboxylic acids or aldehydes and belonging to green leaf volatiles, vertebrate related volatiles and volatiles emitted by standing waters bacteria. The properties of Odonata OSNs are very similar to those of ionotropic receptors (IRs) expressing OSNs in other insects." (Authors)] Address: Rebora, Manuela, Dipto di Biologia Cellulare e Ambientale, Università di Perugia, 06123 Perugia, Italy. E-mail: rebora@unipg.it

**14217.** Quisil, J.C.; Nuñez, O.M.; Villanueva, R.T. (2014): Impact of mine tailings on the species diversity of Odonata fauna in Surigao del Sur, Philippines. *Journal of Biodiversity and Environmental Sciences* 5(1): 465-476. (in English) ["Odonata is very sensitive to changes in habitat, making it a reliable bio-indicator of environmental health. This study was conducted to assess the impact of mine tailings on the species diversity of Odonata in Surigao del Sur, Philippines. Eight sampling sites were surveyed comprising four sites with mine tailings and four sites without mine tailings. Opportunistic sampling using sweep nets was conducted on August 24-27, 2013 and October 26-29, 2013. Eighteen species were documented belonging to sixteen genera and six families. Over-all endemism was low at 22%. Seven species were recorded under sub-order Zygoptera, and eleven under sub-order Anisoptera. Species diversity and evenness were significantly different between areas with mine tailings and those without. Sites without mine tailings had higher

abundance, species richness, and endemism than sites with mine tailings. Results indicate that mine tailings adversely affect species diversity of Odonata." (Authors)] Address: Nuneza, Olga, Dept of Biological Sciences, Mindanao State Univ. - Iligan Institute of Technology, Iligan City, Philippines. E-mail: olgamnuneza@yahoo.com

**14218.** Raju, S.A. (2014): Diversity, distribution and abundance of damselfly (Zygoptera) of Dhimbe Lake Ambe-gaon tehsil, Pune, (Maharashtra: India). *Int. J. of Life Sciences* 2(2): 173-178. (in Odonata, Damselflies, Dhibhe, Abundance) ["Out of total 16 species/taxa *Pseudagrion rubriceps*, *Ceragrion coromandelianum*, were abundant or very common, *Ischnura senegalensis*, *Disparoneura quadrimaculata* were common, *Pseudagrion decorum* and *Pseudagrion microcephalum* rare and *Lestes umbrinus*, *Rhodischnura nursei* very rare in observation." (Author)] Address: Raju, S.A., Shri J.J.T. University, Vidyanagari, Churu-Bishau Road, Dist. Jhunjhunu, Rajasthan-333001, India. E-mail: amolsonawane7139@gmail.com

**14219.** Ramsey, A. (2014): Odonata to joy. *OneVoice* March 2014: 8. (in English) [Nevada, USA; Verbatim: Back in late September of last year, NNSS scientists guided visiting dragonfly specialists Neil McDonal and Bruce Lund on a one-day trip to the site to collect samples of the elaborately coloured insect. In total, the group visited sites in five regions of the NNSS. Bad weather, however, proved to be an obstacle. "Only four specimens were captured due to cold windy weather," said National Security Technolgtes biologist Paul Greger. "Fortunately, we were able to collect one new species for the site, the black fronted fork-tail. [*Ischnura denticollis*]" Working under the National Wildlife Refuge System, McDonal and Lund recently completed a regional study of Odonata - a division of carnivorous insect that includes the dragonfly and the smaller damselfly. They are seeking to build up on their research by sampling in areas that are farther north from their original southern Nevada study area. McDonal and Lund were able to identify nine Odonata species from an existing NNSS collection of Odonata archived in the 1990s. Additional field work is planned for 2014.] Address: not stated

**14220.** Ratna, O.P. (2014): Morphological characters and dietary diversity of Great Crested Canopy Lizard (*Bronchocela jubata* Dumeril & Bribon, 1837) along Opak riverside in Daerah Istimewa Yogyakarta. *Fakultas Biologo, Universitas Gadjah Mada, Yogyakarta*: 46 pp. (in Indonesian, with English summary) ["Java is one of the biggest island in Indonesia and divided into east, middle, and west regions. Each of them differ in landscapes, climates, and any other enviromental conditions. Those can lead to variation of animal characters on each regions. Biodiversity in Yogyakarta are very high. It is supported by various of ecosystems within the province. One of the riparian ecosystem in Yogyakarta is Opak River. It becomes a water source for animals live along the riverside, include for the herpetofauna *Bronchocela jubata*.

This insectivorous lizard has an important role in food chain within riparian ecosystem. This research was conducted to find out the morphological characters and dietary diversity of *B. jubata* at Opak riverside. VES (Visual Encounter Surveys) method was used for sampling. Then 60 morphological characters of each specimens were observed and measured. Specimens were identified based on Book of Identification and paratype specimens from Lembaga Ilmu Pengetahuan Indonesia (LIPI). All data were analyzed with NTSYSpc 2.1 to understand the similarity value of each individual. The ventriculus of each individual were preserved and then dissected. Food substances within ventriculus were observed using stereo microscope. The results showed that specimens of *B. jubata* at Opak riverside had more similarity with West Java specimens than with Sulawesi specimens. Similarity value of Opak specimens and paratype specimens from West Java was 62%. Whereas similarity of Opak specimens and paratype specimens from Sulawesi was just 54%. Specimens *B. jubata* at Opak riverside have observation of ventriculus contents showed that *B. jubata* mostly preyed on Insects from Order Hymenoptera, Lepidoptera, Odonata, Hemiptera, Orthoptera, and Coleoptera. Conclusion of this research, *B. jubata* at Opak riverside were similar with paratype specimens from West Java. *B. jubata*'s prey consist of 6 orders of insect, most of them were members of Order Odonata and Orthoptera." (Author)] Address: not stated

**14221.** Ratti, J.; Vachtsevanos, G.J. (2014): Inventing a biologically inspired, energy-efficient Micro Aerial Vehicle. In: Kimon P. Valavanis, & George J. Vachtsevanos (eds.): *Handbook of Unmanned Aerial Vehicles*. Springer: 1385-1413. (in English) ["In recent years, research efforts have focused on the design, development, and deployment of unmanned systems for a variety of applications ranging from intelligence and surveillance to border patrol, rescue operations, etc. Micro aerial vehicles are viewed as potential targets that can provide agility and accurate small area coverage while being costeffective and can be easily launched by a single operator. The small size of MAVs allows such flight operations within confined space but the control effectors must provide sufficient maneuverability, while maintaining stability, with only limited sensing capability onboard the platform. To meet these challenges, researchers have long been attracted by the amazing attributes of biological systems, such as those exhibited by birds and insects. Birds can fly in dense flocks, executing rapid maneuvers with g-loads far in excess of modern fighter aircrafts, and yet never collide with each other, despite the absence of air traffic controllers. This chapter introduces a novel framework for the design and control of a micro air vehicle. The vehicle's conceptual design is based on biologically inspired principles and emulates a dragonfly (Odonata-Anisoptera). A sophisticated multilayered hybrid and linear/non-linear controller to achieve extended flight times and improved agility compared to other rotary and flapping wing MAV designs. The chapter addresses the design and control fea-



tures of the proposed QV design and gives an overview on the developmental efforts towards the prototyping of the flyer. The potential applications for such a high-endurance vehicle are numerous, including airdeployable mass surveillance in cluster and swarm formations. The disposability of the vehicle would help in battlefield deployment as well, where such a, MAV would be made available to soldiers for proximity sensing and threat level assessment. Other applications would include search and rescue operations and civilian law enforcement." (Authors)] Address: Ratti, J., Robotics & Intelligent Machines, TechJect Inc., Atlanta, GA, USA. E-mail: jayantratti@gatech.edu

**14222.** Reborá, M.; Gaino, E.; Piersanti, S. (2014): The epipharyngeal sensilla of the damselfly *Ischnura elegans* (Odonata, Coenagrionidae). *Micron* 66: 31-36. (in English) ["Highlights: •No ultrastructural investigation has been performed so far on Odonata epipharynx. •We investigated the sensilla on the labrum of damselfly adults (*Ischnura elegans*). •On its ventral side the epipharynx shows sensilla (articulated hairs and small pegs). •The hairs, with a socket and a tubular body, have the structure of mechanoreceptors. •The pegs, with a tiny apical pore, have features typical of contact chemoreceptors. The knowledge on Odonata adult mouthparts sensilla is scanty and, notwithstanding the epipharynx in the labrum is considered an organ of taste, no ultrastructural investigation has been performed so far on this structure in Odonata. The labrum of the adult of *I. elegans* shows on its ventral side the epipharynx with sensilla represented by articulated hairs and by small pegs located at the apex of slightly raised domes. Under scanning and transmission electron microscope, the articulated hairs, with a well developed socket and tubular body, have the typical structure of bristles, the most common type of insect mechanoreceptors, usually responding to direct touch; the pegs, showing an apical pore together with a variable number of sensory neurons (from two to five), the outer dendritic segments of which show a dendrite sheath stopping along their length, have features typical of contact chemoreceptors." (Authors)] Address: Reborá, Manuela, Dipto Biol. Cellulare e Ambientale, Univ. Perugia, 06123 Perugia, Italy. E-mail: reborá@unipg.it

**14223.** Rodríguez, J.S.; Gómez, D.; Molineri, C. (2014): Nuevos registros de Odonata y Ephemeroptera para el noroeste de Argentina. *Revista de la Sociedad Entomológica* 73(1-2): 85-88. (in Spanish, with English summary) ["We provide new records for 14 species of Odonata and two species of Ephemeroptera including two new records for Argentina: *Nephepeltia leonardina* (Anisoptera: Libellulidae) and *Alloretochus peruanicus* (Ephemeroptera: Caenidae). The distributions of *Aphylla theodorina* and *Caenis tenella* (Caenidae) are extended to the Yungas (both previously known for the NE of Argentina). New records are also included for: *Neoneura confundens*, *Anax amazili*, *Brachymesia furcata*, *Erythemis plebeja*, *Erythrodiplax melanorubra*, *E. nigricans*, *Macrothemis imitans imitans*, *M. musiva*, *Miathyria marcella* and *Micrathyria hesperis*,

*Progomphus complicatus* and *P. joergenseni*." (Authors)] Address: Rodríguez, J.S., Instituto de Biodiversidad Neotropical CONICET-UNT, Horco Molle, s/n, (4107), San M. de Tucumán. E-mail: josephum@hotmail.com

**14224.** Roh, C.; Gharib, M. (2014): Modulation of a flow field by dragonfly nymph valve kinematics (Abstract: R7.00003). *Bulletin of the American Physical Society*, 67th Annual Meeting of the APS Division of Fluid Dynamics, Volume 59, Number 18, Sunday–Tuesday, November 23–25, 2014; San Francisco, California: (in English) [Verbatim: Previously, we visualized a respiratory jet and a propulsive jet of a dragonfly nymph using laser induced fluorescence. A more quantitative measurement of the dragonfly nymph's underwater breathing was investigated using digital particle image velocimetry. Simultaneously, dragonfly's anal valve kinematics were recorded using high-speed videography. The result shows an active usage of the valve during exhalation and inhalation to modulate the flow field. Calculating a Lagrangian particle path by time integration of the velocity field showed that the exhaled fluid is not inhaled back. This result suggests that the anal valve modulation of the flow field prevents the rebreathing of the exhaled jet.] Address: not stated

**14225.** Rong, L.; Latychevskaia, T.; Wang, D.; Zhou, X.; Huang, H.; Li, Z.; Wang, Y. (2014): Terahertz in-line digital holography of dragonfly hindwing: amplitude and phase reconstruction at enhanced resolution by extrapolation. *Optics Express* 22(14): 17236-17245. (in English) ["We report here on terahertz (THz) digital holography on a biological specimen. A continuous-wave (CW) THz in-line holographic setup was built based on a 2.52 THz CO<sub>2</sub> pumped THz laser and a pyroelectric array detector. We introduced novel statistical method of obtaining true intensity values for the pyroelectric array detector's pixels. Absorption and phase-shifting images of a dragonfly's hindwing were reconstructed simultaneously from single in-line hologram. Furthermore, we applied phase retrieval routines to eliminate twin image and enhanced the resolution of the reconstructions by hologram extrapolation beyond the detector area. The finest observed features are 35 μm width cross veins." (Authors)] Address: Latychevskaia, Tatiana, Physics Institute University of Zürich, Winterthurerstr. 190, 8057 Zürich, Switzerland. E-mail: tatiana@physik.uzh.ch

**14226.** Ruokonen, T.J.; Karjalainen, J.; Hämäläinen, H. (2014): Effects of an invasive crayfish on the littoral macroinvertebrates of large boreal lakes are habitat specific. *Freshwater Biology* 59(1): 12-25. (in English) ["(1) Invasive crayfish are widely acknowledged to have negative effects on benthic food webs in lakes, but few studies have investigated such effects at wider spatial scales and in varying habitats under natural conditions. (2) We examined the effects of introduced signal crayfish (*Pacifastacus leniusculus*) on the macroinvertebrate assemblages of different habitats in two large boreal lakes. We evaluated whether the density, taxon richness and

species composition are altered by the non-native crayfish and whether the responses are similar for stony and vegetated habitats and across a depth gradient. We also studied the influence of crayfish on periphyton biomass at stony sites, as a potential link to changes in macroinvertebrate communities. (3) In both lakes, macroinvertebrate density was similar between crayfish and non-crayfish sites across the habitats and depths studied. However, macroinvertebrate taxon richness was significantly lower, and community composition was altered in the presence of crayfish at stony sites. No similar pattern was detected at vegetated sites or in deeper sublittoral areas. The amount of periphyton was similar regardless of the presence of crayfish, and no clear direct or indirect crayfish–periphyton interaction was detected. (4) Our results suggest that introduced signal crayfish can have negative effects on the littoral macroinvertebrates of large boreal lakes, but that these effects are habitat specific. Our findings highlight how the evaluation of possible effects of invasive species needs to be carried out comprehensively across different habitats and spatial scales if conclusions are to be robust." (Authors) The paper includes references to *Somatochlora metallica* and *Corduliidae* sp.] Address: Ruokonen, T.J., Dept of Biological and Environmental Science, University of Jyväskylä, Survantie 9, P.O. Box 35, FI-40014 Jyväskylä, Finland. E-mail: timo.j.ruokonen@jyu.fi

**14227.** Šácha, D. (2014): Results of a survey of dragonflies (Insecta: Odonata) of Popradské rašelinisko fen. *Folia faunistica Slovaca* 19(1): 33-36. (in Slovak, with English summary) ["There were 19 species of dragonflies discovered during the research conducted at Popradské rašelinisko fen in 2013. Three species are protected (*Sympetma fusca*, *Anax imperator*, *Sympetrum pedemontanum*), 8 are listed in the national Red List (*S. fusca*, *Lestes virens*, *Ischnura pumilio*, *Aeshna juncea*, *Orthetrum brunneum*, *Crocothemis erythraea*, *S. danae* and *S. pedemontanum*). In the case of *S. fusca*, *Lestes dryas* and *L. virens* these are the first published records from this site. List of species is thus extended up to 23 species of dragonflies (plus 2 species with questionable data), which ranks the site among the most important wetlands in the region of Podtatranská kotlina valley. Occurrence of 8 previously published species was not observed. Among them *Coenagrion armatum*, which likely is only an irregular element of Slovak dragonfly fauna." (Author)] Address: Šácha, D., Podtatranského 31, SK – 031 01 Liptovský Mikuláš, Slovakia. E-mail: dusan.sacha@vazky.sk

**14228.** Šácha, D.; Racko, L. (2014): Results of the faunistic research of dragonflies at Šujské rašelinisko in 2013 (Insecta: Odonata). *Folia faunistica Slovaca* 19(1): 27-31. (in Slovak, with English summary) ["During an inventory of dragonflies of Šujské rašelinisko in 2013, 20 species were discovered. Occurrence of the species of the Community interest *Coenagrion ornatum* is confirmed, as well as four species of national importance (*Anax impera-*

*tor*, *Aeshna isocetes*, *Orthetrum coerulescens*, *Sympetrum pedemontanum*) and nine species included in the national Red List (*Ischnura pumilio*, *Coenagrion ornatum*, *A. isocetes*, *A. juncea*, *O. coerulescens*, *O. brunneum*, *S. pedemontanum*, *S. danae*, *Leucorrhinia rubicunda*). From a faunistic viewpoint, the most interesting are reports of *L. rubicunda* and *A. isocetes*, whereby the site is a new one for them in Slovakia." (Authors)] Address: Šácha, D., Podtatranského 31, SK – 031 01 Liptovský Mikuláš, Slovakia. E-mail: dusan.sacha@vazky.sk

**14229.** Sadeghi, S.; Dumont, H.J. (2014): Variation in the shape of the wings and taxonomy of Eurasian populations of the *Calopteryx splendens* complex (Odonata: Calopterygidae). *Eur. J. Entomol.* 111(4): 575-583. (in English) ["We used geometric morphometrics to determine variation in the morphology of the forewings of individuals in 20 populations of *Calopteryx splendens* s.l. in Eurasia and related these to the circum-specific taxonomy of this taxon. We found differences in shape, with the largest and smallest centroid size of the wings in adjacent northern (*orientalis*) and western (*intermedia*) populations in Iran, respectively, so isolation and relationship are not necessarily determined by distance, but often associated with the stream basin inhabited. The variation in wing shape, however, was much greater. with Populations at the eastern edge of the range (Tajikistan, Kyrgyzstan and East Kazakhstan) uniquely different. Oddly, no taxonomic name is associated with them, although they may be among the oldest representatives of the *splendens* complex. The European and Asian populations are in two separate clades. One of these includes insects with no to a medium-sized wing spot, which does not reach the tip of the wing (*waterstoni*-group), while the other includes insects with very broad wing spots, or, when short, it extends to the very tip of the wings and most females are androchrome (*ancilla* or *intermedia* group). Turkmenistan and northern Iranian population form a separate line inside this clade, which we equate with *Calopteryx orientalis*. South Albanian and Greek populations are in a separate branch corresponding to ssp. *balcanica*; two populations from Ireland and Italy form a branch that has no equivalent in traditional taxonomy, while *Calopteryx xanthostoma* was not identified by its wing shape. Understanding this multitude of phenotypes and the enormous amount of variation within certain populations but not in others becomes easy if one assumes there were two probable late Pleistocene waves of migration, the first of insects lacking spots that migrated east and westwards from the South Black Sea basin, the second, perhaps from the west Caspian, composed of heavily spotted insects with androchromic females. The hybridization between these two waves resulted in the current plethora of colour forms and accounts for why similar phenotypes may turn up independently in widely distant locations." (Authors)] Address: Sadeghi, S., Dept of Biology, Faculty of Sciences, Shiraz University, Shiraz, Iran. E-mail: ssadeghi@shirazu.ac.ir; hsbadersadeghi@gmail.com

**14230.** Salur, A.; Basgöz, N.; Telli, M.A. (2014): Faunistic study on Odonata (Insecta) of Gölbel Lake, Northern Turkey. *Munis Entomology & Zoology* 9(2): 950-951. (in English) [Gölbel Lake, Osmancik district, Çorum Province, Turkey, 41°06' 164" N 34° 55' 837" E, 1360 m a.s.l. 17 odonate species - all new for the district - were caught in June - August 2010 and in July 2011: *Lestes sponsa*, *L. barbarus*, *Sympecma fusca*, *Coenagrion puella*, *Enallagma cyathigerum*, *Ischnura elegans ebneri*, *Pyrrhosoma nymphula*, *Anax imperator*, *Cordulia aenea*, *Crocothemis erythraea*, *Leucorrhinia pectoralis*, *Libellula depressa*, *L. quadrimaculata*, *Orthetrum brunneum*, *O. albistylum*, *Sympetrum fonscolombii*, and *S. sanguineum*.] Address: Salur, A., Hitit University Arts and Sciences Faculty Dept of Biology, 19030, Corum, Turkey. E-mails: [alisalur@gmail.com](mailto:alisalur@gmail.com)

**14231.** Sánchez-Guillén, R.A.; Córdoba-Aguilar, A.; Cordero-Rivera, A.; Wellenreuther, M. (2014): Rapid evolution of prezygotic barriers in non-territorial damselflies. *Biological Journal of the Linnean Society* 113(2): 485-496. (in English) ["A central question in evolutionary biology concerns the accumulation of reproductive barriers during speciation. However, separating the reproductive barriers that have led to speciation from those that have secondarily accumulated (i.e. after initial divergence) is a widely recognized problem. Ideal candidate species for overcoming this problem are young species, where time for additional barriers to accrue has been limited. In the present study, we add to previous studies investigating the strength of reproductive barriers between the parapatric damselflies *Ischnura elegans* and *I. graellsii* by quantifying seven prezygotic barriers between the allopatric pairs of *I. elegans* and *I. genei*, as well as *I. graellsii* and *I. genei*. Specifically, we measured four premating (temporal, sexual, mechanical I, and mechanical II) and three postmating (oviposition success, fecundity, and fertility) barriers using experimental approaches and, for first time, we investigated the mechanisms causing mechanical isolation, which is the strongest reproductive barrier in ischnurans. The findings of the present study support the notion that premating barriers are generally strong and contribute significantly to total reproductive isolation in young lineages (65–98%), although they never solely lead to complete isolation. Asymmetry was generally stronger in premating than in postmating barriers, and was driven mostly through asymmetry in mechanical isolation, which is caused by morphological divergence of secondary sexual appendages. We found that barriers act multiplicatively in all species combinations tested, with the exception of sexual isolation, which was not detected. Our results are consistent with a recent allopatric speciation scenario driven by differences in male anal appendages, either impeding copulation or affecting female preferences. Taken together, the results from this and previous studies in diverse odonate genera suggest that premating barriers have evolved rapidly in ischnuran damselflies and, although reproductive isolation in ischnurans is more commonly the result of several barriers acting together, morphological divergence of second-

ary sexual appendages appears to be a common factor facilitating premating isolation in this group." (Authors)] Address: Sánchez-Guillén, Rosa, Depto de Ecología e Biología Animal, E. U. E. T. Forestal, Universidade de Vigo, Pontevedra, Spain. E-mail: [rguillen@uvigo.es](mailto:rguillen@uvigo.es)

**14232.** Sánchez-Guillén, R.A.; Muñoz, J.; Hafernik, J.; Tierney, M.; Rodríguez-Tapia, G.; Córdoba-Aguilar, A. (2014): Hybridization rate and climate change: are endangered species at risk? *Journal of Insect Conservation* 18: 295-305. (in English) ["Many species are altering their geographic range due to climate change creating new sympatric populations of otherwise allopatric populations. We investigated whether climate change will affect the distribution and thus the pattern of hybridization between two pairs of closely related damselfly species [*Ischnura damula* and *I. demorsa*, and *I. denticollis* and *I. gemina* (this, an endangered species)]. Thus, we estimated the strength of pre and postmating reproductive barriers between both pairs of species, and we predicted future potential distribution under four different Global Circulation Models and a realistic emissions scenario of climate change by using maximum entropy modelling technique. Our results showed that reproductive isolation (RI) is complete in *I. damula* × *I. demorsa* individuals: F1 (first generation) hybrids are produced but do not reach sexual maturation. However, RI in *I. denticollis* × *I. gemina* hybrids is high but incomplete and unidirectional: only *I. gemina* females produced F1 hybrids which mate with males and females of *I. denticollis* and between them producing BC1 (backcrosses) and F2 (second generation) viable hybrids. Maximum entropy models revealed a northern and westward shift and a general reduction of the potential geographic ranges. Based on the pattern of hybridization, for *I. damula* and *I. demorsa* there is a current threat as well as a rapid displacement and/or extinction of *I. gemina* by *I. denticollis*. However, the current pattern of extinction may not continue due to the contraction in ranges of the four species." (Authors)] Address: Sánchez-Guillén, Rosa, Departamento de Ecología e Biología Animal, E. U. E. T. Forestal, Universidade de Vigo, Pontevedra, Spain. E-mail: [rguillen@uvigo.es](mailto:rguillen@uvigo.es)

**14233.** Sanogo, S.; Kabre, J.; Ceccji, P. (2014): Spatial-temporal dynamics of population structure for macro invertebrates families in a continuum dam - effluent - river in irrigated system. Volta Basin (Burkina Faso). *International Journal of Agricultural Policy and Research* 2(5): 203-214. (in English) ["A monthly sampling of benthic macro invertebrates was carried out at the hydro-agricultural dam of Boura in the Volta watershed basin (Burkina) during the period of February through July 2012 in order to describe the structuring of insect succession along with changes occurring in habitats of this irrigated dam farming system. The samples of insects were collected from 6 stations located inside the littoral (Station I), the sublittoral (Station II), the sewage channel or effluent (Stations III, IV, V) and the Mouhoun River (Station VI). The sampling method employed is a conventional method by the European Union



named "Directive Cadre sur l'Eau (DCE)" recommended for the survey of benthic macro invertebrates. The survey reveals a community composed majorly of insects (more than 75%) variously distributed. On one hand at the shoreline and the coastal- adjoining zone in the dam, 23 families of macro invertebrates were identified; mostly belonging to the shoreline except for 10 families identified as endemic to the adjoining zone of the coastline. These two zones of the dam shelter the same malacological fauna consisting of the Unionidae, Lymneidae, Ampullariidae, Planorbidae, Valvatidae and Bulinidae families. The survey reveals otherwise that the differences between the Shannon biological diversity indices for these two zones were more pronounced during the month of July, the rainy period in the basin. On the other hand, concerning the dam-effluent-river continuum, a total of 35 families are sampled: 27 from dam water and stations near the irrigated zones; and 32 from the station of the sewage channel far from the irrigated zone and the river. The identification of individuals belonging to the family of the Baetidae and the Ephemerellidae (order of Ephemeroptera) in the river water highlights a subsequent reconstruction of the biodiversity in the river as the presence of both families is an indicator of fertile water. Further analysis on the spatial and temporal distribution involved 17 families out of the 35 sampled not common to all habitats. This lead to the conclusion that changes in natural habitats dictate the clustering patterns of macro invertebrates populations during the year long." (Authors) Taxa - including Gomphidae, Libellulidae and Coenagrionidae - are treated at family level.] Address: Kabre, A., Lab. de Recherche et de Formation en Peche et Faune (LaRFPF/ IDR), Université de Bobo-Dioulasso, BP. 1091 Bobo 01, Burkina Faso. E-mail: ankab226@yahoo.fr

**14234.** Sato, M.; Nishijima, S.; Miyashita, T. (2014): Differences in refuge function for prey and tolerance to crayfish among macrophyte species. *Limnology* 15: 27-35. ["The invasive crayfish *Procambarus clarkii* is an omnivore and an ecosystem engineer whose feeding mechanism has reduced the abundance of many native invertebrates and macrophytes. Since macrophytes provide refuges for aquatic insects, macrophyte depletion by crayfish might have indirect negative effects on animal prey in aquatic habitats. We postulated that the prey refuges provided by macrophytes and macrophyte tolerance to crayfish cutting and feeding vary among macrophyte species. We conducted two experiments to (1) investigate differences in macrophyte refuge function for dragonfly larvae against crayfish, and (2) test the tolerance to crayfish cutting and feeding among macrophyte species. *Elodea nuttallii* (submerged plant), *Potamogeton crispus* (submerged plant), and *Carex idzuroei* (emergent plant) had greater refuge effects than *Trapa japonica* (floating-leaved plant), an effect that might result from the larger total cover of *E. nuttallii*, *P. crispus*, and *C. idzuroei*, and the hardness of *C. idzuroei* leaves. Tolerance to crayfish cutting and feeding was greater in *C. idzuroei* than in the other species. As the macro-invertebrate as-

semblages in submerged vegetation are more abundant and species-rich than those in emergent and floating-leaf vegetation, conservation of *E. nuttallii* and *P. crispus* should be prioritized for restoring native aquatic animals in ecosystems invaded by the introduced crayfish. .... We examined four macrophyte treatments (*E. nuttallii*, *P. crispus*, *T. japonica*, and *C. idzuroei*) and a control (no macrophyte), and measured the predation rates of red swamp crayfish (*Procambarus clarkii*) on a native dragonfly (*Sympetrum baccha matutinum*) in each treatment. Crayfish were collected from Iwata, in Shizuoka Prefecture, while dragonfly larvae were collected from Kashiwa, in Chiba Prefecture. .... Results: Crayfish predation on dragonfly larvae: In the treatment without crayfish, 97 of 100 dragonfly larvae survived ( $n = 2$ , ten containers) the entire experiment: the *E. nuttallii*, *P. crispus*, and no macrophyte treatments each had one dead larva. Multiple regression analysis showed that the interaction between macrophyte treatment and day (day represents repeated measures), and day itself were significant for the number of dragonfly larvae, although the number of dragonfly larvae did not differ significantly among macrophyte treatments. This means that the time-related effect of crayfish on the number of dragonfly larvae differed among macrophyte treatments. The rate of decrease in dragonfly larvae was greater in the *T. japonica* and no macrophyte treatments than in the others. The *E. nuttallii* treatment had a greater rate of decrease in dragonflies compared to that of *C. idzuroei*. Logistic regression analysis demonstrated that the interaction between macrophyte species and mass, and mass itself were significant for the survival of dragonfly larvae, whereas macrophyte species was not significant. The significance of the interaction term indicates that the slopes of the relationship between dragonfly larvae survival and macrophyte mass differed among macrophyte species within the given range of macrophyte mass. Post hoc comparisons showed that the slope in the presence of *E. nuttallii*, *P. crispus*, and *C. idzuroei* was significantly greater than that in the presence of *T. japonica*. However, there were no other significant pairwise differences." (Authors)] Address: Miyashita, T., Laboratory of Biodiversity Science, School of Agriculture and Life Sciences, University of Tokyo, Yayoi, Tokyo 113-8656, Japan. E-mail: tmiya@es.a.u-tokyo.ac.jp

**14235.** Savard, M.; Mochon, A. (2014): L'aeschna majestueuse, une libellule en situation précaire au Québec. *Le Naturaliste canadien* Volume 138(2): 8-15. (in French, with English summary) ["According to historical data from entomological collections, the swamp damer (*Epiaeschna heros*) was more frequent in Québec in the past. The specimen caught on June 24, 2013 at Lac-Brome, in the Montérégie region, was the first individual of this species to be record in the province for 25 years. In Québec, human activity has resulted in the loss and perturbation of the forest-shaded temporary pools and fluvial swamps favoured by this species, which means that the swamp damer is now rare and potentially vulnerable in the province." (Authors)] Address: Mochon, A. mochon.alain@sepaq.com

**14236.** Schneider, T.; Schneider, E.; Schneider, J.; Müller, O. (2014): Rediscovery of *Cordulegaster vanbrinkae* in Iran (Odonata: Cordulegastridae). *Odonatologica* 43(1/2): 25-34. (in English) ["In July 2013, a total of 14 males of *C. vanbrinkae* was observed in the Hyrcanian Forest, Alborz Mountains, north-western Iran, not far from the type locality. This is only the second record of this poorly known species from Iran. Seven male specimens were collected. The variation of abdominal colour patterns and other morphological characters are shown. Notes on the biology of this species and a description of the biotope of a recently discovered population in Armenia are given." (Authors)] Address: Schneider, T., Arnold-Knoblauch-Ring 76, 14109 Berlin, Germany. E-mail: thomas.rs@gmx.de

**14237.** Seehausen, M. (2014): Forgotten duplicates from the Odonata collection of Edmond de Selys Longchamps rediscovered at the Übersee-Museum Bremen (Germany). *International Dragonfly Fund - Report 70*: 1-15. (in English) ["A selection of duplicates from the collection of Michel Edmond de Selys Longchamps was found at the Übersee-Museum Bremen/Germany (UMB). Selys determined a lot of Odonata in the UMB collection and sent 80 European and 76 exotic species to Bremen on 23 April, 1875. According to the labels 121 specimens could be assigned to this shipment and eleven specimens must have been sent to UMB in later years. This collection includes two paralectotypes (*Progomphus gracilis* Hagen in Selys, 1853; *Palaemnema nathalia* Selys, 1886) and seven syntypes (*Rhinocypha trifasciata* Selys, 1853; *Dysphaea dimidiata limbata* Selys, 1859; *Argia sordida* Hagen in Selys, 1865; *Oxyagrion dissidens* Selys, 1876; *Oxyagrion haematinum* Selys, 1876; *Oxyagrion pavidum* Hagen in Selys, 1876; *Telagrion longum* Selys, 1876). In addition, a male specimen of *Euphaea tricolor subcostalis* Selys, 1873 might also belong to the original syntype series. Altogether three specimens with labelled nomina nuda (*Diplax catharina* Selys, *Diplax fausta* Selys, *Dythemis bilineata* Hagen) and two labelled with manuscript names (*Diplax marcellina* Selys, *Perithemis ovata* Bates) are in this collection." (Author)] Address: Seehausen, M., Museum Wiesbaden, Natural History State Collection, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**14238.** Siesa, M.E.; Padoa-Schioppa, E.; Ott, J.; De Bernardi, F.; Ficetola, G.F. (2014): Assessing the consequences of biological invasions on species with complex life cycles: Impact of the alien crayfish *Procambarus clarkii* on Odonata. *Ecological Indicators* 46: 70-77. (in English) ["Highlights: •Invasive species can have complex consequences on species with complex life cycle. •We assessed the impact of *P. clarkii* on the richness of odonate life history stages. •The richness of adult odonates did not reveal any impact of the crayfish. •The richness of larvae and exuviae was negatively affected by the crayfish. •Aquatic life stages are better indicators of the crayfish impact, compared to adults. Abstract: The

temporal dimension is a key parameter when analysing the impact of invasive alien species. Studies on early invasion stages allow a better understanding of how ongoing processes modify native communities, helping to plan effective management actions. *P. clarkii* is an invasive crayfish influencing multiple features of invaded wetlands, but unravelling its impact on organisms with complex life cycles is difficult. We monitored 107 wetlands in Northern Italy, and evaluated the relationships between *P. clarkii* and the richness of three life history stages of odonates: adults, larvae and exuviae. We measured environmental features of each wetland and the natural vegetation in the surrounding landscape. We used an information-theoretic approach to relate species richness of the three life history stages of odonates to: wetland features, features of the surrounding landscape; crayfish presence. We used a spatially explicit technique (Moran Eigenvector Mapping) allowing the integration of spatial autocorrelation into analyses. Wetland and landscape features explained a significant amount of community richness. Wetland hydroperiod, canopy cover and stream velocity were the variables most strongly related to odonate richness. Furthermore, we observed significant relationships between *P. clarkii* and the richness of odonate communities, but the effect of the crayfish on the three odonate stages was different. Species richness measured using both larvae and exuviae was negatively related to the crayfish presence, while negative effects on adults were not evident. Furthermore, negative relationships were observed for Anisoptera but not for Zygoptera. A significant effect of eigenvectors representing spatial configuration suggests an important role of dispersal-related mechanisms in maintaining species richness in invaded wetlands, where fitness is likely lower. Larvae and exuviae may be more helpful for the assessment of the impact of invasive species at early stages of the invasions, while adults may better describe the long term consequences of the invasion at the landscape scale. Considering multiple life-history stages improves our understanding of the impact of biological invasions in freshwaters." (Authors)] Address: Ficetola, G.F., Dipartimento di Scienze dell'Ambiente e del Territorio, Università degli Studi di Milano-Bicocca, Piazza della Scienza 1, 20126 Milan, Italy. E-mail: francesco.ficetola@gmail.com

**14239.** Sindaco, R.; Grieco, C.; Riservato, E.; Rege, G. (2014): Le libellule (Insecta: Odonata) dell'Anfiteatro Morenico di Ivrea (Piemonte). *Rivista piemontese di Storia Naturale* 35: 109-138. (in Italian, with English summary) ["The dragonfly fauna of the moraine amphitheater of Ivrea (Piedmont, NW Italy), an area rich in lentic habitats, including some of the larger lakes of Piedmont, is described. With 48 species, this is one of the most important dragonfly areas of NW Italy. Among the most relevant species in regional scale, the occurrence of *Coenagrion pulchellum*, *Brachytron pratense*, *Onychogomphus uncatus*, *Cordulia aenea*, *Oxygastra curtisii* and *Sympetrum vulgatum* is highlighted. Three species previously recorded for the study area have not been

confirmed during the study (*Sympecma paedisca*, *Erythromma najas*, *Anax ephippiger*)." (Authors)] Address: Sindaco, R., c/o Museo Civico di Storia Naturale, via San Francesco di Sales 88, I-10022 Carmagnola, Italy

**14240.** Skoglund, L. (2014): Artsamhällen av trollsländor (Odonata) i norrländska tjärnar: identifiering av möjliga indikatorarter för artmångfald. Independent thesis Basic level (degree of Bachelor), Halmstad University, School of Business and Engineering (SET): 18 pp. (in Swedish, with English summary) ["A field study of dragonfly larvae was performed in 20 lakes situated in boreal forest in northern Sweden (in the southeast of Norrbotten county), accompanied by the study of several habitat variables within the locales; fish presence, composition of water vegetation, forestry and the distribution of Sphagnum moss. None of these variables had a proven effect on the species composition of Odonata. This may be due to the fact that species occurring in the north part of the country are generally more tolerant to environmental variables compared to species with a more southern focus of distribution. A shorter growth season implies prolonged life cycles and should in all probability bring about a greater need for habitat tolerance. When a species occurrence is not strictly random the species richness within a region increases/decreases as a result of the presence/absence of specific species which are sensitive to particular variables in their surroundings (deconstructive approach to species richness). Indicator species (indicating general species richness) were distinguished by implementing an analysis of nestedness and the result was compared to a similar study conducted for central Sweden (Sahlén & Ekstubbé, 2001). *E. najas* and *L. quadrimaculata* came forth as suitable indicator species for northern boreal freshwater habitats in this study. In the north they displayed specialist tendencies and were highly selective in their choice of habitats. The same species appears in a very different ecological context when localized to southern Sweden where they are considered trivial species. In addition, temporal follow-ups (repeated stocktakings) of the species composition of small freshwater habitats in this region, and the establishment of accompanying nestedness matrices will allow for the detection of ecological shifts within particular species. These would indicate ongoing restructuring of the Odonate communities and yield information about the impact of climate change." (Author)] Address: Skoglund, Linda c/o Sahlén, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, S-752 36 Uppsala, Sweden. E-mail: goran.sahlen@set.hh.se

**14241.** Śniegula, S.; Drobniak, S.M.; Gołą, M.J.; Johansson, F. (2014): Photoperiod and variation in life history traits in core and peripheral populations in the damselfly *Lestes sponsa*. *Ecological Entomology* 39: 137-148. (in English) ["(1.) In order to predict evolutionary responses to environmental changes one needs to identify the evolutionary potential in terms of genetic variation of traits and of the traits' plasticity. We studied genetic variance in life his-

tory traits and their reaction norms in response to manipulated photoperiods in central, northern, and northernmost peripheral populations of *Lestes sponsa*. After the central-marginal hypothesis, it is predicted that central populations will express the highest genetic variance. (2.) Northern and northernmost populations showed the highest development and growth rates. All populations expressed shorter development and accelerated growth when raised in a northern compared with a central latitude photoperiod. The slopes of reaction norms differed between regions resulting in a region-by-photoperiod interaction. (3.) There was genetic variation in development time; however, it did not differ across regions. There was no genetic variation in growth rate or in the plasticity of development time and growth rate to photoperiod. (4.) Results did not support the central-marginal hypothesis. However, evidence was found that the development time has the potential to evolve at similar rates across study regions. In contrast, the growth rate seems to be genetically constrained for further evolution, probably because of a strong past directional selection on this trait. The presence of low genetic variation in the slope of the reaction norms could be a result of stabilising selection imposed by seasonality." (Authors)] Address: Śniegula, S., Dept Ecosystem Conservation, Inst. of Nature Conservation, Polish Academy of Sci., Kraków, Poland. E-mail: szymon.sniegula@gmail.com

**14242.** Su, R.S.-C.; Kim, Y.; Liu, J.C. (2014): Resilin: Protein-based elastomeric biomaterials. *Acta Biomaterialia* 10: 1601-1611. (in English) ["Resilin is an elastomeric protein found in insect cuticles and is remarkable for its high strain, low stiffness, and high resilience. Since the first resilin sequence was identified in *Drosophila melanogaster* (fruit fly), researchers have utilized molecular cloning techniques to construct resilin-based proteins for a number of different applications. In addition to exhibiting the superior mechanical properties of resilin, resilin-based proteins are autofluorescent, display self-assembly properties, and undergo phase transitions in response to temperature. These properties have potential application in designing biosensors or environmentally responsive materials for use in tissue engineering or drug delivery. Furthermore, the capability of resilin-based biomaterials has been expanded by designing proteins that include both resilin-based sequences and bioactive domains such as cell-adhesion or matrix metalloproteinase sequences. These new materials maintain the superior mechanical and physical properties of resilin and also have the added benefit of controlling cell response. Because the mechanical and biological properties can be tuned through protein engineering, a wide range of properties can be achieved for tissue engineering applications including muscles, vocal folds, cardiovascular tissues, and cartilage." (Authors) The review includes references to Odonata.] Address: Liu, Julie, School of Chemical Engineering, Purdue University, West Lafayette, IN 47907-2100, USA. E-mail: julieliu@purdue.edu

**14243.** Sun, J.; Ling, M.; Pan, C.; Chen, D.; Tong, J.; Li, X. (2014): Biomimetic structure design of dragonfly wing



venation using topology optimization method. *Journal of Mechanics in Medicine and Biology* 14, 1450078, DOI: 10.1142/S021951941450078X: 17 pp. (in English) ["Scientists have carried out research for various biomimetic applications based on the dragonfly wings because of the superb flying skills and lightsome posture. The wings of dragonflies are mainly composed of veins and membranes, which give rise to the special characteristics of their wings that make dragonflies being supremely versatile, maneuverable fliers. Mimicking the dragonfly wing motion is of great technological interest from application's point of view. However, the major challenge is the biomimetic fabrication to replicate the wing motion due to the very complex nature of the wing venation of dragonfly wings. In this regard, the topology optimization method (TOM) is useful to simplify object's structure while retaining its mechanical properties. In this paper, TOM is employed to simplify and optimize the venation structure of *Pantala flavescens* wing that is captured by a 3D scanner and numerical reconfiguration. Combined with the material parameters obtained from nanoindentation testing, the quantitative models are established based on a finite element (FE) analysis and discussed in static range. The quantitative models are then compared with the square frame, staggered grid frame and hexagonal frame to examine the potentials of the biomimetic structure design for the fabrication of greenhouse roof." (Authors)] Address: Sun, J., Key Laboratory of Bionic Engineering (Ministry of Education, China), Jilin University, Changchun 130022, P. R. China

**14244.** Susheela, P.; Radha, R.; Ezhili, N. (2014): Diversity and distribution of aquatic insect population in Singanalur lake, Coimbatore, Tamil Nadu, India. *Journal of international academic research for multidisciplinary* 2(5): 141-147. (in Aquatic Insects, Biological Indicators, Environmental Assessment, Ecological Roles, Ecosystem) ["This study deals with diversity and distribution of aquatic insects from three stations in the Singanalur lake of Coimbatore district for a period of four months from December 2013 to March 2014 from the three sampling sites of the lake. The aquatic insects were sampled systematically and randomly in station-wise habitats, using standard protocols. The insects belonging to the orders Hemiptera, Coleoptera, Diptera, Odonata, Trichoptera, and Ephemeroptera were collected from December 2013 to March 2014 from the sampling sites. Hemiptera ranked first with the large population of individuals and percentage (1555 and 48.5%). The orders followed by Hemiptera were Coleoptera (631, 19.6%) Diptera (505, 15.7%), Odonata (333, 10.3%), Trichoptera (119, 3.7%), Ephemeroptera (61, 1.9 %)."] (Authors)] Address: Susheela, P., Dept. Zoology, PSGR Krishnammal College for Women, Coimbatore, Tamil Nadu, India

**14245.** Sviderskii, V.L.; Plotnikova, S.I.; Gorelkin, V.S.; Severina, I.Yu.; Isavnina, I.L. (2014): Functional role of dragonfly legs before and after wing formation: Rearrangement of coordinatory relationships. *Neuroscience and Behavioral Physiology* 44(7): 804-809. (in English)

["We report here our studies of the characteristics of the structural-functional organization of the leg apparatus of the dragonfly *Aeshna grandis*, in larvae of the final instar, whose legs have a locomotor function, and in adult winged individuals (imagoes), whose legs have lost their locomotor function and are used mainly as traps to catch prey in the air. Neither the shape nor the proportions of individual leg segments in imagoes were significantly different from those in larvae, and all changes in the functional role of the legs in imagoes occur as a result of changes in the mechanisms controlling the functioning of the leg muscles and the corresponding rearrangements in coordinatory relationships. These rearrangements, as evidenced by the data reported here, affect the mechanisms generating motor commands, the appearance of a tight correlation in the operation of the wing muscles and the leg apparatus, and various others. These mechanisms are discussed." (Authors) Address: Sviderskii, V.L., Sechenov Institute of Evolutionary Physiology and Biochemistry, Russian Academy of Sciences, 44 M. Torez Prospekt, 194223, St. Petersburg, Russia. E-mail: vlsvider@iephb.ru

**14246.** Tajima, Y.; Watanabe, M. (2014): Counteradaptation in response to sperm removal by stimulating the sensory system in female *Ischnura asiatica* (Odonata: Coenagrionidae). *Odonatologica* 43(1/2): 115-124. (in English) ["The male *Ischnura asiatica* (Brauer, 1865) has a pair of horns on its penis head. Because each horn is shorter than the spermathecal duct, the spermatheca is inaccessible to the male. Thus, males can not directly displace spermathecal sperm using the horns. Nevertheless during copulation displacement of sperm from the spermatheca does occur. By stimulating vaginal sensilla that communicate the presence of an egg to the muscles surrounding the sperm storage organs, sperm ejection can be induced as fertilization is anticipated by the female. Males with a large penis head might be better adapted to stimulate the sensilla and displace more sperm than those with a small penis head. From the viewpoint of females, on the other hand, there are costs if complete sperm displacement occurs. Decreasing the number of sensilla might make it difficult for the male's stimulation to displace spermathecal sperm, especially where a population includes males with a large penis head. To test this hypothesis, the width of the penis head and the number of sensilla were measured in several local populations, with different body sizes, distributed in mainland Japan. The number of sensilla decreased with the width of the penis head. Therefore, a low number of sensilla in the females might be a counteradaptation against the male sensory stimulation." (Authors)] Address: Watanabe, M., Graduate School of Life & Environ. Sci., Univ. Tsukuba, Tsukuba, Ibaraki 305-8572, Japan. E-mail: watanabe@kankyo.envr.tsukuba.ac.jp

**14247.** Takahashi, Y.; Kagawa, K.; Svensson, E.I.; Kawata, M. (2014): Evolution of increased phenotypic diversity enhances population performance by reducing sexual harassment in damselflies. *Nature communications* | 5: 4468 | DOI: 10.1038/ncomms5468: 7 pp. (in English)

["The effect of evolutionary changes in traits and phenotypic/genetic diversity on ecological dynamics has received much theoretical attention; however, the mechanisms and ecological consequences are usually unknown. Female-limited colour polymorphism in damselflies is a counter-adaptation to male mating harassment, and thus, is expected to alter population dynamics through relaxing sexual conflict. Here we show the side effect of the evolution of female morph diversity on population performance (for example, population productivity and sustainability) in damselflies. Our theoretical model incorporating key features of the sexual interaction predicts that the evolution of increased phenotypic diversity will reduce overall fitness costs to females from sexual conflict, which in turn will increase productivity, density and stability of a population. Field data and mesocosm experiments support these model predictions. Our study suggests that increased phenotypic diversity can enhance population performance that can potentially reduce extinction rates and thereby influence macroevolutionary processes." (Authors)] Address: Takahashi, Y., Frontier Research Institute for Interdisciplinary Sciences, Tohoku University, Sendai, Miyagi 980-8578, Japan. E-mail: takahashi.yum@gmail.com

**14248.** Takhelmayum, K.; Gupta, S. (2014): Odonata larvae of Keibul Lamjao National Park, Manipur, north-eastern India. *Journal of Threatened Taxa* 6(6): 5858-5863. (in English) [Larvae of 15 Odonata taxa were collected during 2009–2011. The list of taxa includes *Aeshna juncea* and *Leucorrhinia* sp., both taxa nearly impossible to occur in this region.] Address: Takhelmayum, Kiranbala, Dept Ecol. & Environ. Sci., Assam University, Silchar, Assam 788011, India. E-mail: kirantakhelmayum@yahoo.com

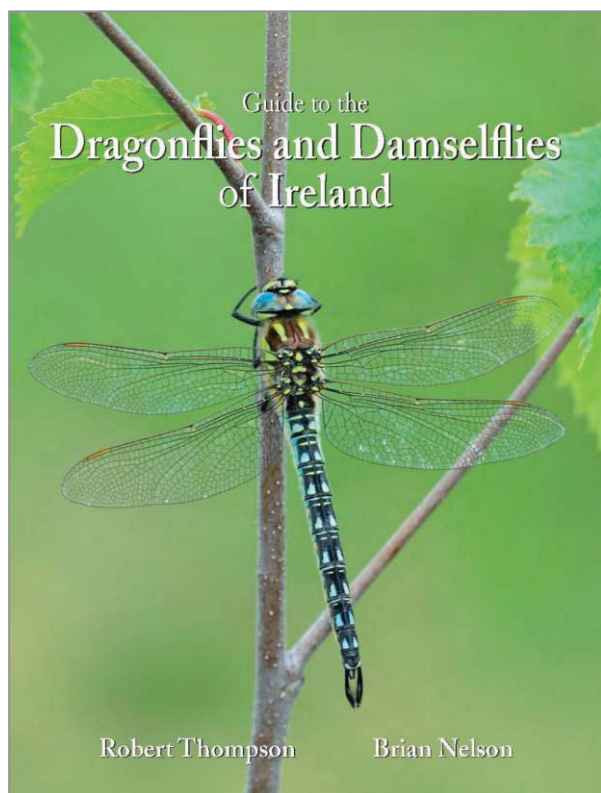
**14249.** Theischinger, G.; Richards, S.J. (2014): *Palaeosynthemis nigrostigma* sp. nov., a new dragonfly from Papua New Guinea (Anisoptera: Synthemistidae). *International Dragonfly Fund - Report 71*: 1-7. (in English) ["A new species of the synthemistid genus *Palaeosynthemis* is described from the Trauna River valley in Western Highlands Province, Papua New Guinea. The new species is most similar to *P. cyrene* from which it can be distinguished, among other characters, by the coloration of the pterostigma (jet-black in the new species vs brownish yellow in *P. cyrene*) and of the wing bases (not darkened vs strongly darkened). The new species also differs from *P. cyrene* in having a narrow, almost parallel-sided yellow lateral synthoracic stripe and a well-defined yellow marking along most of the ventral margin of the metepimeron. In *P. cyrene* the lateral synthoracic stripe is markedly wider and tapered, and the yellow element along the ventral margin of the metepimeron is absent. Characters of the adult male are illustrated and the affinities of the species are discussed." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**14250.** Theischinger, G.; Richards, S.J. (2014): *Drepanosticta elaphos* sp. nov. and *Drepanosticta pterophora* sp. nov. from Papua New Guinea (Odonata: Platystictidae). *Odonatologica* 43(1/2): 91-103. (in English) ["Two species of *Drepanosticta* Laidlaw from Papua New Guinea are described as new. They are: *Drepanosticta elaphos* sp. nov. (holotype male: Papua New Guinea) and *D. pterophora* sp. nov. (holotype male: Papua New Guinea), both from the upper Sepik Basin. Characters of the adults are illustrated, habitat notes are provided and their affinities are discussed." (Author)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**14251.** Theischinger G.; Richards, S.J. (2014): *Drepanosticta machadoi* spec. nov. from New Guinea (Odonata: Platystictidae). *Zootaxa* 3866(1): 145-150. (in English) ["*Drepanosticta machadoi* sp. nov. (Holotype male: Dablin Creek, Hindenburg Range) from Papua New Guinea is described. The new species is a predominantly black damselfly, the male with four pale/bright pattern elements on each side of the synthorax, dorsum of segments 9 and 10 largely bright blue, and a uniquely shaped posterior lobe of the pronotum which is a wide-angled fork with rather straight, narrow finger-like prongs. It is referred to the *Drepanosticta conica* group of species and a key to the males of the *D. conica* group is provided." (Authors)] Address: Theischinger G., Office of Environment and Heritage New South Wales, PO Box 29, Lidcombe, NSW 1825, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

**14252.** Therry, L.; Gyulavári, H.A.; Schillewaert, S.; Bonte, D.; Stoks, R. (2014): Integrating large-scale geographic patterns in flight morphology, flight characteristics and sexual selection in a range-expanding damselfly. *Ecography* 37: 1012-1021. (in English) ["While geographic trait variation along environmental clines is widespread, associated patterns in sexual selection remain largely unexplored. Geographic patterns in sexual selection may be expected if 1) phenotypes vary geographically and sexual selection is dependent on the local phenotypes in the population, and if 2) sexual selection is influenced by geographically structured environmental conditions. We quantified geographic variation in flight-related traits and flight performance in mated and unmated males and tested for geographic variation in sexual selection on these traits in the poleward range-expanding damselfly *Coenagrion scitulum* across a set of eleven core and edge populations ordered along thermal gradients in the larval and in the adult stage. We found little support for trait differentiation between core and edge populations, instead we found considerable geographic trait variation along the larval and adult thermal gradients. As expected under time constraints, body mass decreased with shorter larval growth seasons. Lower temperatures during the adult flight period were associated with a higher body mass, a higher flight speed and a higher fat content; these traits likely evolved to buffer flight ability at subop-

timal temperatures and to optimize starvation resistance. Across the large geographic scale, we found a consistent higher flight duration in mated males. Instead, sexual selection for higher fat content was stronger in populations with lower adult flight temperatures and sexual selection for lower body mass acted only in edge populations. Our results indicate sexual selection on flight performance to be consistent over a large geographic scale and this despite the clear geographic patterns in sexual selection on the underlying morphological traits. Our results highlight that to fully understand the fitness implications of geographically changing trait patterns, researchers should consider the entire phenotype–performance–fitness axis and incorporate effects of geographically structured life-stage specific environmental conditions on this axis." (Authors)] Address: Therry, L., Laboratory of Aquatic Ecology, Evolution and Conservation, KU Leuven, Leuven, Belgium. E-mail: lieven.therry@bio.kuleuven.be



**14253.** Thompson, R.; Nelson, B.; Lewington, R. (2014): Guide to the dragonflies and damselflies of Ireland. Blackstaff Press: 136 pp. ISBN: 9781909751149 (in English) ["Fully illustrated with lavish close-up photography and detailed artwork, this is a field guide to the Irish dragonflies and damselflies designed primarily for naturalists, photographers and others who want to improve their field identification skills. The aim is to provide the reader with a quick reference guide to the adults of all the resident and migrant species which have been recorded in Ireland since 1980. There are brief texts on aspects such as behaviour, ecology and distribution, and descriptions which highlight the key diagnostic features of each species and the average flight period. The artworks by

Richard Lewington on each species page illustrate mature males (occasionally teneral males) and females (not exactly to scale). The adult length and wingspan indicates the average size of the insect from the head to the tip of the abdomen and the typical wingspan." (Publisher)]

**14254.** Tiple, A.D.; Gathalkar, G.B.; Talma, S.S. (2014): New record of dragonfly *Ictinogomphus angulosus* (Selys, 1854) from state Maharashtra, India. *Ambient Science* 1(2): 3 pp. (in English) [6-X-2013, Futala Lake, of Nagpur city, Maharashtra, India. 21.15°45'75"N, 79.04°25'76"E] Address: Tiple, A.D., Dept of Zoology, Vidyabharti College, Seloo, Wardha 442104, Maharashtra, India. E-mail: ashishdtiple@yahoo.co.in

**14255.** Touchon, J.C.; Wojdak, J.M. (2014): Plastic hatching timing by Red-eyed treefrog Embryos Interacts with larval predator identity and sublethal predation to affect prey morphology but not performance. *PLoS ONE* 9(6): e100623. doi:10.1371/journal.pone.0100623: 9 pp. (in English) ["Many animals respond to predation risk by altering their morphology, behavior, or life-history. We know a great deal about the cues prey respond to and the changes to prey that can be induced by predation risk, but less is known about how plastic responses to predators may be affected by separate plastic responses occurring earlier in life, particularly during the embryonic period. Embryos of a broad array of taxa can respond to egg- or larval-stage risks by altering hatching timing, which may alter the way organisms respond to future predators. Using the red-eyed treefrog (*Agalychnis callidryas*), a model for understanding the effects of plasticity across life-stages, we assessed how the combined effects of induced variation in the timing of embryo hatching and variation in the larval predator community impacted tadpole morphology, pigmentation and swimming performance. We found that *A. callidryas* tadpoles developed deeper tail muscles and fins and darker pigmentation in response to fish predators, either when alone or in diverse community with other predators. Tadpoles altered morphology much less so to dragonfly naiads (*Pantala flavescens*) or water bugs. Interestingly, morphological responses to predators were also affected by induced differences in hatching age, with early and late-hatched tadpoles exhibiting different allometric relationships between tail height and body length in different predator environments. Beyond induced morphological changes, fish predators often damaged tadpoles' tails without killing them (i.e., sublethal predation), but these tadpoles swam equally quickly to those with fully intact tails. This was due to the fact that tadpoles with more damaged tails increased tail beats to achieve equal swimming speed. This study demonstrates that plastic phenotypic responses to predation risk can be influenced by a complex combination of responses to both the embryo and larval environments, but also that prey performance can be highly resilient to sublethal predation." (Authors)] Address: Wojdak, J.M., Department of Biology, Radford



University, P.O. Box 6931, Radford, VA, 24142, USA. E-mail: jmwojdak@radford.edu

**14256.** Umezu, S.; Tanabe, N.; Hashimoto, H. (2014): Fabrication of comb shape of leading edge wing of dragonfly. *Key Engineering Materials* 625: 182-186. (in English) ["Research on Micro air vehicle (MAV) has been carried out by many researchers to gather information in environmental monitoring, security and so on. When the earthquake, fire, smoke take place, it is difficult for human beings to investigate the detail because of dangerous condition. However, MAV has possibility to investigate the detail because MAV can fly freely around. Recently, dragonfly is highly focused by many researchers because dragonfly has high flight performances those are high efficiency flight, unintended acceleration, rapid turn and hovering. In general, these characteristics have root that wing is corrugation shape. We focus on microstructures on wing and its aerodynamic characteristics because there are many unique microstructures. We focused on micro spikes on dragonfly wing. Over three thousands of spikes exist on two sides of wing. The length and shape of spikes are 10 to 100 micron meters and oblique circular cone. It is important to clear the aerodynamic effect of the oblique circular cone. Artificial wing was fabricated by following processes. We fabricated micro spikes utilizing electro polishing. Fabricated micro spikes were set on plate utilizing micro spot bonding. We investigated the flow around the artificial wing and found that the flow around wing was controlled by micro spikes on wing. In this paper, we focused on comb shape of leading edge of wing. Comb shape is fabricated utilizing micro-EDM. We investigate flow characteristics of comb shape." (Authors)] Address: Umezu, S., 11-1-13, Okubo, Shinjuku, Tokyo 169-8555, Japan. E-mail: aumeshin@waseda.jp

**14257.** Van, K.D.; Janssens, L.; Debecker, S.; Stoks, R. (2014): Warming increases chlorpyrifos effects on predator but not anti-predator behaviours. *Aquatic Toxicology* 152: 215-221. (in English) ["Highlights: •Pesticide effects on predator and antipredator traits may depend on temperature. •We tested for temperature-sensitivity to chlorpyrifos in damselfly larvae. •Chlorpyrifos reduced key predator behaviours stronger at the higher temperature. •Chlorpyrifos reduced escape speed to the same extent at the high temperature. •Temperature dependence of the pesticide effects was similar at different latitudes. Abstract: Recent insights indicate that negative effects of pesticides on aquatic biota occur at concentrations that current legislation considers environmentally protective. We here address two, potentially interacting, mechanisms that may contribute to the underestimation of the impact of sublethal pesticide effects in single species tests at room temperature: the impairment of predator and antipredator behaviours and the stronger impact of organophosphate pesticides at higher temperatures. To address these issues we assessed the effects of chlorpyrifos on the predator and antipredator behaviours of larvae of the damselfly *Ischnura elegans*, important in-

termediate predators in aquatic food webs, in a common-garden warming experiment with replicated low- and high-latitude populations along the latitudinal gradient of this species in Europe. Chlorpyrifos reduced the levels of predator behavioural endpoints, and this reduction was stronger at the higher temperature for head orientations and feeding strikes. Chlorpyrifos also impaired two key antipredator behavioural endpoints, activity reductions in response to predator cues were smaller in the presence of chlorpyrifos, and chlorpyrifos caused a lower escape swimming speed; these effects were independent of temperature. This suggests chlorpyrifos may impact food web interactions by changing predator-prey interactions both with higher (predators) and lower trophic levels (food). Given that only the interaction with the lower trophic level was more impaired at higher temperatures, the overall pesticide-induced changes in food web dynamics may be strongly temperature-dependent. These findings were consistent in damselflies from low- and high-latitude populations, illustrating that thermal adaptation will not mitigate the increased toxicity of pesticides at higher temperatures. Our study not only underscores the relevance of including temperature and prey-predator interactions in ecological risk assessment but also their potential interplay and thereby highlights the complexity of contaminant effects on predator-prey interactions being differentially temperature-dependent pending on the trophic level." (Authors)] Address: Stoks, R., Lab. Aquatische Ecol., K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**14258.** Van Buskirk, J.; Krügel, A.; Kunz, J.; Miss, F.; Stamm, A. (2014): The rate of degradation of chemical cues indicating predation risk: An experiment and review. *Ethology* 120(9): 942-949. (in English) ["Many prey taxa use kairomones or alarm pheromones to assess the risk of predation in aquatic environments, and the rate at which these cues attenuate determines how precisely they indicate the local density of predators. We estimated the rate of degradation of chemical cues generated by *Aeshna* dragonfly larvae feeding on *Rana temporaria* tadpoles. The half-life of the cue was 35 h and was not influenced by whether it was aged in pond water or tap water or whether other tadpoles were present in the container in which cue-aging occurred. A review of other published estimates of predator cue half-life revealed values of 0.2–126 h, and variation among studies was unrelated to the type of aging water, the venue in which water was aged or prey behaviour observed (laboratory, field), or the type of behaviour that was recorded. We conclude that factors affecting the persistence of predator cues remain uncertain in spite of their importance for understanding the evolution of induced defenses." (Authors)] Address: Josh Van Buskirk, Inst. Evolutionary Biology & Environmental Studies, University of Zürich, 8057 Zürich, Switzerland. E-mail: josh.vanbuskirk@ieu.uzh.ch

**14259.** Van Praet, N.; De Bruyn, L.; De Jonge, M.; Vanhaecke, L.; Stoks, R.; Bervoets, L. (2014): Can dam-

selfly larvae (*Ischnura elegans*) be used as bioindicators of sublethal effects of environmental contamination?. *Aquatic Toxicology* 154: 270-277. (in English) ["The present study measured various pesticides and trace metals, together with sublethal effect biomarkers (lipid, protein and glycogen levels, acetylcholinesterase (AChE) and glutathione-S-transferase (GST) activities) in damselfly larvae (*Ischnura elegans*) at sixteen sampling sites in Flanders (Belgium). Four pesticides (chloridazon, dichlorvos, terbutylazine, metolachlor), some of them hardly measurable in surface water, and all trace metals were above the limit of quantification in damselfly tissue. A principal component analysis (PCA) on the accumulated pollutant concentrations returned five pollutant axes explaining 85.8% of the total variation. Based on these PCA-axes a hierarchical cluster analysis revealed that the 16 sampled ponds could be classified in 7 groups. Increasing dichlorvos levels in the animals resulted in a lower body mass. Body mass was negatively correlated with GST and AChE activities, lipid and glycogen levels. The present findings provide evidence of toxicity-induced sublethal stress of dichlorvos accumulation in natural populations of *I. elegans*." (Authors)] Address: De Jonge, M., Department of Biology, Systemic Physiological and Ecotoxicological Research (SPHERE), University of Antwerp, Groenenborgerlaan 171, 2020 Antwerp, Belgium. E-mail: maarten.dejonge@uantwerpen.be

**14260.** Varghese, A.P.; Nikesh, P.R.; Mathew, J. (2014): Odonata (Insecta) diversity of Salim Ali Bird Sanctuary and its adjacent areas in Thattekkad, Kerala, India. *Journal of Threatened Taxa* 6(6): 5887-5893. (in English) ["The study results in the identification of 82 species of Odonata out of which 51 species belong to dragonflies and 31 belong to damselflies. Twenty-one species are endemic to the Western Ghats (Images 1-21). The occurrence of IUCN categorized near threatened species like *Megalogomphus hanningtoni* (Fraser, 1923) and vulnerable species like *Platysticta deccanensis* Laidlaw, 1915 and *Protosticta sanguinostigma* Fraser, 1922 were remarkable. The area was found to be rich in odonate diversity. More studies are needed to understand the population dynamics and seasonal patterns of Odonata in this particular geographical area." (Authors)] Address: Varghese, A.P., Mar Athanasius College, Kothamangalam College P.O., Ernakulam, Kerala, 686666, India. E-mail: abypvarghese@yahoo.com

**14261.** Vassilenko, D.V. (2014): The first damselfly (Insecta: Odonata, Hemiphlebiidae) recorded from the Turonian of Israel. *Far Eastern Entomologist* 278: 1-7. (in English) ["The damselfly *Pantelusa krassilovi* Vassilenko, gen. et sp. n. of the family Hemiphlebiidae is described from the Turonian of Israel (Gerofit locality, Ora Formation) from a single fossil wing. It is the first odonate known from this locality. The new genus is considered close to Cretaceous representatives of the family, especially the genus *Electrohemiphlebia* Lak et al., 2009, known from the Albian amber of France. The possibility is discussed that

some endophytic ovipositions known from Gerofit belong to similar small damselflies." (Author)] Address: Vassilenko, D.V., A.A. Borissak Paleontological Institute, Russian Academy of Sciences, Profsoyuznaya str., 123, Moscow 117997, Russia. E-mail: lab@palaeoentomolog.ru

**14262.** Vezhnavets, V.V.; Baichorov, V.M.; Moroz, M.D. (2014): 7. Macrozoobenthos community. *Zoology and Ecology* 24(2): 128-134. (in English, with Lithuanian summary) ["Quantitative and qualitative parameters of the macrozoobenthos community in Lake Drukšiai were analyzed. We compared our data obtained in 2011–2012 with those of earlier investigations. The comparison of the current situation with the situations before the launch of the Ignalina Nuclear Power Plant (INPP) and during the initial period of its operation shows that stenothermic coldwater species of relict crustaceans and some species of chironomids have disappeared from the bottom fauna. In general, quantitative indices of zoobenthos development have increased in comparison with those recorded in the initial INPP operation period and are characterized by the dominance of oligochaetes in the profundal." (Authors) 11 Odonata taxa are listed but not further discussed.] Address: Vezhnavets, V.V., Laboratory of Hydrobiology, The Scientific and Practical Center for Biore-sources of National Academy of Sciences of Belarus, Akademicheskaya Street 27, BY-220072 Minsk

**14263.** Vilenica, M.; Dijkstra, K.D.B. (2014): The dragonfly (Insecta, Odonata) fauna of the Banovina region, Croatia. *Natura Croatica* 23(1): 45-66. (in English, with Croatian summary) ["In all, 32 dragonfly species were recorded between August 2010 and September 2011 at 21 localities in the Banovina region of Croatia, almost half of the total number known in Croatia. The most abundant species was *Platycnemis pennipes* while the rarest was *Coenagrion ornatum*. Ten of the recorded species are at a certain level of conservation concern and thus it is important to protect their habitats in region." (Authors)] Address: Vilenica, Marina, Faculty of Teacher Education, University of Zagreb, Department in Petrinja, Trg Matice hrvatske 12, 44250 Petrinja, Croatia

**14264.** Weerakkodi, W.G.I.S.; Amarasinghe, L.D. (2014): Rice field and marshland inhabiting mosquitoes and some physico-chemical and biological parameters affecting their abundance. *Proceedings of the 33th annual sessions of the institute of biology*, 27th September 2013. Abstract number 1-11: (in English) [Verbatim: Mosquito larval survey was carried out in rice fields and marshlands in Kelaniya area, Gampaha District, Sri Lanka from March to July 2012 to determine the variation of mosquito larval density and diversity. Further, the study investigated the physico-chemical and biological parameters associated with mosquito larval density in the two habitats. Larval sampling and recording of physico-chemical and biological parameters was carried out biweekly within the study period in five sampling sites per habitat within an extent of 20 km<sup>2</sup> in Kelaniya area. Larval samples

were identified up to the species level using keys in the laboratory using 4th instars and adult mosquitoes. Morphological identification of 1071 mosquito larvae collected from rice fields and 576 mosquito larvae collected from marshlands (150 scoops per habitat) revealed 08 species of mosquitoes of 04 genera in rice fields and 08 species of 03 genera from marshlands. Both habitats were dominated by Genus *Culex* (97.5% in rice fields and 95.4% in marshlands). *Culex tritaeniorhynchus* and *Culex gelidus* were represented the majority of samples. Mosquito larval density in rice field and marshland habitats in Kelaniya area was not significantly different ( $P > 0.05$ ). Rice fields are the most diverse habitats from two selected habitat types in Kelaniya area (Shannon wiener diversity index/  $H^1 = 1.35$  in rice fields and  $H^1 = 1.25$  in marshlands). However, they were mainly associated with high Total Dissolved Solid ( $>10.00$  mg/L), 6-8 pH level, low Dissolved Oxygen (5.0-6.0 mg/L),  $< 5.0$ mg/L nitrate and less than 1.0mg/L phosphate levels. They can tolerate a range of BOD levels in water. Further their habitats were positively associated with Chironomid larvae, phytoplanktons of Family Zygnemataceae, Clamydomonadeceae and Family Oscillatoriaceae and zooplanktons of Family Acanthocystis and Daphniidae, whereas negatively associated with larvae of Family Libellulidae of Order Odonata. Fourteen families of phytoplankton and 16 families of zooplankton were recorded associating mosquito larvae from rice fields and marshlands.] Address: Amarasinghe, L.D.D, Department of Zoology, University of Kelaniya, Sri Lanka. E-mail: deepika@kln.ac.lk

**14265.** Weihrauch, F. (2014): Editorial. *Odonatologica* 43(1/2). *Odonatologica* 43(1/2): 1. (in English) [Verbatim: Nothing in life is as certain as change. However *Odonatologica* has seemed to defy this rule, as it has persisted practically unchanged for an extraordinary 42 years under the editorship of Professor Bastiaan Kiauta. This remarkable feat of endurance must be ranked a signal success in the history of our science. I am not entirely sure why Bastiaan chose me to become his successor. I have to admit that I have been quite reluctant for almost two years to accede to his proposal because I was and still am well aware that the footprints he has left, highly visible in the recent past, are impossible to emulate no matter how hard I try. On the other hand, I have served with enthusiasm as editor of the German journal *Libellula* for almost a decade. As a passionate producer of dragonfly journals, this was an offer I simply could not refuse and I suppose Bastiaan knew that. However, in undertaking this task, I look back at Bastiaan's life's work with immense respect and admiration, and with some trepidation promise to do my best to repay his confidence in me. Too many names have been involved in the production of *Odonatologica* during the past 42 years to list them all here – they include associate editors and members of the editorial board, S.I.O. officers, peer reviewers, authors, and many, many more. An appraisal of most names can be found in Bastiaan's Editorial in *Odonatologica* 42 (4) and, because they established the foundation

on which I can build today, my sincere thanks go out to all of them. I would particularly like to single out two individuals from the S.I.O. board of trustees for special gratitude. They are Kiyoshi Inoue, President of the S.I.O, and Marianne Kiauta, the guardian angel of *Odonatologica*, who both in my eyes not only carry the banner of *Odonatologica*'s past success, but who have also welcomed me into my new role with a warmth and friendliness that was both irresistible and touching. I look forward to a fruitful collaboration with all members of the odonatological society in the near and more distant future, and hope to receive many manuscripts, so that *Odonatologica* may remain as it always has been – a seminal and attractive journal for everyone interested in dragonfly research."] Address: Weihrauch, F., Jägerstr. 21A, D-85283 Wolnzach, Germany. E-mail: Florian.Weihrauch@t-online.de

**14266.** Westermann, E. (2014): Erfolgreiche Entwicklung der Großen Heidelibelle (*Sympetrum striolatum*) im Oberen Hotzenwald (Hochschwarzwald) auf 900 m Meereshöhe. *Naturschutz am südlichen Oberrhein* 7: 226-227. (in German, with English summary) [Germany. "In 2012 at least 15 Common Darters emerged successfully at the Hierholzer Weiher (community of Dachsberg, district of Waldshut) at 900 m a.s.l. This species was probably not present at this location from 2003 to 2005 and in 2013. So far reproduction has not been recorded above 800 m in Baden-Württemberg." (Author)] Address: Westermann, Elisabeth, Buchenweg 2, 79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**14267.** Westermann, K.; Westermann, E. (2014): Die Libellenfauna des Klosterweihers im südlichen Hochschwarzwald. *Naturschutz am südlichen Oberrhein* 7: 228-234. (in German, with English summary) [Baden-Württemberg, Germany. "From 2000 to 2003 and in particular from 2011 to 2013 the dragonflies around the Klosterweiher (community of Dachsberg, district of Waldshut) were recorded over 34 days. In 1953 this pond, which is located at 944 m above sea level, was formed over moorland and currently has a size of almost three hectares. Over the last decades a wide siltation zone with reed and moor areas has developed which has been protected since 2005 by the „Friedrich-August-Grube“ nature reserve. The part open to the public is intensively used for bathing. On an easily accessible part, which is also very attractive for dragonflies, exuviae were collected and imagoes were recorded. From a total of 20 species recorded, at least 16, possibly 17, developed successfully almost every year. Outstanding species were the moor dragonflies *Coenagrion hastulatum*, *Aeshna juncea* and *Aeshna subarctica*. However, from the latter, only one exuvia has been found so far. The Klosterweiher was shown to be highest known emergence site in the Black Forest for *Lestes viridis* and *Platycnemis pennipes*. The habitats of the dragonflies in the siltation zone can only be secured in the medium term by regular management measurements." (Authors)] Address: Westermann, K., Buchenweg 2, 79365 Rheinhausen, Germany. E-mail: fosor@t-online.de



**14268.** Westermann, K.; Westermann, E. (2014): Zur Emergenz großer Populationen des Spitzenflecks (*Libellula fulva*) und des Frühen Schilfjägers (*Brachytron pratense*) im kühlen Frühjahr 2005 an einem kleinen Quellgewässer der Rheinniederung. *Naturschutz am südlichen Oberrhein* 7: 210-218. (in German, with English summary) [Baden-Württemberg, Germany. "During the cool and rainy spring of 2005 I investigated daily the emergence of huge populations of *L. fulva* and *B. pratense* in a small, largely reed-covered spring water body in the Rhine plain of the northern part of the district of Emmendingen. the emergence period lasted for approximately five weeks with a peak period of 12 and 14 days, respectively. A synchronization of the metamorphosis was not detectable in either species. Seven days after the first emergence of a *Brachytron* male the first territorial flight was observed. the corresponding time period in *L. fulva* was 20 days and therefore three times longer. the recordable losses were small in both species although the weather was unfavourable. At the same water body *Cordulia aenea* and *Somatochlora flavomaculata* also emerged in significant numbers. Among the four species significant differences in the selection of places for emergence were noted. *L. fulva* was by far the most frequent species with a minimum of 485 freshly emerged adults. For this species further data regarding selected substrate for emergence, weather impact, mechanisms for prevention of losses and inhomogeneity of the time course of emergence between the sexes were recorded." (Authors)] Address: Westermann, K., Buchenweg 2, 79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**14269.** Westermann, K.; Westermann, E. (2014): Eine autochthone Population der Speer-Azurjungfer (*Coenagrion hastulatum*) in Moorgewässern des Oberen Hotzenwalds – Erste Nachweise für den südlichen Hochschwarzwald. *Naturschutz am südlichen Oberrhein* 7: 219-225. (in German, with English summary) [Baden-Württemberg, Germany. "In 2012 and 2013 local populations of *C. hastulatum* were recorded for the first time in the upper Hotzenwald (district of Waldshut). Currently, autochthonous local populations exist in the siltation zone of the Klosterweiher (community of Dachsberg), and in the moor ponds of the Föhrenmoos (community of Ibach). Due to progressive siltation a population decrease is expected in both water bodies. Possible protection measures for the permanent conservation of a self-sustaining regional population are discussed." (Authors)] Address: Westermann, K., Buchenweg 2, 79365 Rheinhausen, Germany. E-mail: fosor@t-online.de

**14270.** Wlasichuk, C. (2014): The impacts of cattle grazing on stream ecosystems in Grasslands National Park of Canada, Saskatchewan. M.Sc. thesis, Department of Entomology, University of Manitoba, Winnipeg: XIII + 177 pp. (in English) ["Cattle are responsible for the deterioration of aquatic and riparian ecosystems throughout the North American prairies. Marked preference for riparian areas has resulted in vegetation loss, stream bank de-

stabilization, changes in sediment particle size, and increased nutrient loads in the streams. A grazing experiment in Grasslands National Park of Canada manipulated the density of cattle to represent a range of grazing intensities (from no grazing to very heavy grazing, 70% forage utilization). This experiment provided the opportunity to study how streams in the semi-arid mixed-grass prairie environment respond to a range of grazing pressure. Nine experimental pastures located on previously ungrazed land within the park boundary and four located within the adjacent community pastures were created, each subjected to a specified grazing treatment. Sampling occurred in the autumn from 2007 to 2009 and included the measurement of 33 physical, chemical, and biological habitat metrics and the characterization of the aquatic invertebrate community. Linear regressions were performed to determine if the habitat variables had a significant relationship to grazing intensity ( $P < 0.05$ ). Of the habitat variables, two sediment particle size categories were significantly related to grazing intensity: per cent of fine gravel (4-8 mm diameter) ( $P = 0.003$ ) and per cent of medium gravel (8-16 mm diameter) ( $P = 0.007$ ). The only other habitat variable with a significant linear relationship to grazing intensity was the concentration of suspended carbon in the stream water ( $P = 0.050$ ). Three invertebrate community metrics were focused on for their expected response to changes associated with cattle impacts: iii per cent Chironomidae (%Chiron), per cent Ephemeroptera, Odonata, and Trichoptera (%EOT), and taxa richness. There was a significant non-linear relationship between %Chiron ( $P = 0.005$ ) and grazing intensity, no linear or non-linear relationship between %EOT and grazing intensity, and a non-linear trend between richness and grazing intensity ( $P = 0.083$ ). A Reference Condition Approach was used to test for the effects of grazing on the invertebrate community. Multiple regression was used to create a model predicting the invertebrate community from habitat metrics. Of the three community metrics, only richness resulted in a model with acceptable predictive ability. The predicted richness values for each test site were calculated and their residuals were determined and compared to the distribution of residuals observed in the reference sites. Using this technique, I determined that 73.3% of the sites subjected to grazing deviated significantly for the reference condition and were therefore deemed to be impacted. There was no significant relationship between the test site residuals and grazing intensity. The macroinvertebrate community in this semi-arid environment is already under a lot of stress, the addition of cattle to the environment, even at low intensities, pushed the community beyond the reference condition." (Author)] Address: Wlasichuk, Cynthia. University of Manitoba, Canada

**14271.** Wojdak, J.M.; Touchon, J. C.; Hite, J.L.; Meyer, B.; Vonesh, J.R. (2014): Consequences of induced hatching plasticity depend on predator community. *Oecologia* 175(4): 1267-1276. (in English) ["Many prey species face trade-offs in the timing of life history switch points like

hatching and metamorphosis. Costs associated with transitioning early depend on the biotic and abiotic conditions found in the subsequent life stage. The red-eyed treefrog, *Agalychnis callidryas*, faces risks from predators in multiple, successive life stages, and can hatch early in response to mortality threats at the egg stage. Here we tested how the consequences of life history plasticity, specifically early hatching in response to terrestrial egg predators, depend on the assemblage of aquatic larval predators. We predicted that diverse predator assemblages would impose lower total predation pressure than the most effective single predator species and might thereby reduce the costs of hatching early. We then conducted a mesocosm experiment where we crossed hatchling phenotype (early vs. normal hatching) with five larval-predator environments (no predators, either waterbugs, dragonflies (*Pantala flavescens*), or mosquitofish singly, or all three predator species together). The consequences of hatching early varied across predator treatments, and tended to disappear through time in some predation treatments, notably the waterbug and diverse predator assemblages. We demonstrate that the fitness costs of life history plasticity in an early life stage depend critically on the predator community composition in the next stage." (Authors)] Address: Wojdak, J.M., Department of Biology, Radford University, P.O. Box 6931, Radford, VA, 24142, USA. E-mail: jmwjodak@radford.edu

**14272.** Xu, M.; Cerreta, A.L.; Schultz, T.D.; Fincke, O.M. (2014): Selective use of multiple cues by males reflects a decision rule for sex discrimination in a sexually mimetic damselfly. *Animal Behaviour* 92: 9-18. (in English) ["Discriminating between the sexes when one sex resembles the members of the other sex may be challenging. When sexual mimicry imposes costs on signal receivers, receivers can minimize confusion by using nonmimetic cues that differ between the models and the mimics. We tested this hypothesis in a female-specific polymorphic damselfly *Enallagma hageni*, whose blue coloration of andromorphic females resembles that of males, whereas the heteromorphic females have a distinctive green colour. Both female morphs share an abdominal pattern that differs from the males'. We predicted that males selectively use both colour (the mimetic cue) and pattern (the nonmimetic cue) in sex recognition: they use the nonmimetic cue only when the encountered individual has the mimetic colour. We modified the abdominal pattern of males, andromorphs and heteromorphs to resemble that of the opposite sex, and recorded males' reactions to pattern-altered and control individuals both in an arena and in the field. Our results supported our hypothesis. We then derived and tested potential male decision rules based on the two visual cues for sex recognition. We presented focal males with unnatural, orange females possessing either a male or female abdominal pattern, and recorded the reactions of mate-searching males to individuals with a novel pink-painted phenotype. Males reacted sexually to orange- and pink-painted individuals regardless of the abdominal pattern. Collectively, our re-

sults support a male discrimination rule of 'if not blue, then female', providing insights into the origin of phenotypic novelty in colour-polymorphic species." (Authors)] Address: Xu, Mingzi, Ecology and Evolutionary Biology Program, Department of Biology, University of Oklahoma, Norman, OK, USA. E-mail: xumingzi@ou.edu

**14273.** Yakubovich, V.S. (2014): The fauna of dragonflies (Odonata) of the lower reaches of Ussiri River, Khabarovskii Krai. A.I. Kurentsov's Annual Memorial Meetings 25: 41-48. (in Russian, with English summary) ["A list of 33 species of dragonflies in seven families collected in the lower reaches of Ussiri River in 2006-2007 is given. *Sympetrum kunckeli* is firstly recorded for Khabarovskii krai." (Authors)] Address: Yakubovich, V.S. , Far Eastern Medical University, Khabarovsk, Russia

**14274.** Yang, G.-h.; Hämäläinen, M.; Zhang, H.-m. (2014): Description of *Atrocalopteryx fasciata* spec. nov. from Yunnan, China (Odonata: Calopterygidae). *Zootaxa* 3779(3): 389-393. (in English) ["*Atrocalopteryx fasciata* Yang, Hämäläinen & Zhang, spec. nov. (holotype male, from China, Yunnan, Dehong, Yingjiang, deposited at Odonata Collection of College of Agriculture and Life Sciences, Dali University, Dali, Yunnan, China) is described and illustrated from the male sex. It is compared with *Atrocalopteryx laosica* (Fraser, 1933)." (Authors)] Address: Hämäläinen, M., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: matti.hamalainen@helsinki.fi

**14275.** Yong, H.S.; Lim, P.-E.; Tan, J.; Ng, Y.F.; Eamsobhana, P.; Suana, I.W. (2014): Molecular phylogeny of Orthetrum dragonflies reveals cryptic species of *Orthetrum prunosum*. *Scientific Reports* 4, Article number: 5553 doi:10.1038/srep05553: 9 pp, appendix. (in English) [The genus *Orthetrum* includes "species pairs whose members are not easily separated from each other by morphological characters. In the present study, the DNA nucleotide sequences of mitochondrial and nuclear genes were employed to elucidate the phylogeny and systematics of *Orthetrum* dragonflies. Phylogenetic analyses could not resolve the various subfamilies of the family Libellulidae unequivocally. The nuclear 28S rRNA gene is highly conserved and could not resolve congeneric species of *Orthetrum*. Individual mitochondrial genes (COI, COII, and 16S rRNA) and combination of these genes as well as the nuclear ITS1&2 genes clearly differentiate morphologically similar species, such as the reddish species pairs *O. chrysis* and *O. testaceum*, and the bluish-coloured species *O. glaucum* and *O. luzonicum*. This study also reveals distinct genetic lineages between *O. prunosum schneideri* (occurring in Malaysia) and *O. prunosum neglectum* (occurring north of Peninsular Malaysia from India to Japan), indicating these taxa are cryptic species." (Authors)] Address: Lim, P.-E., Institute of Ocean and Earth Sciences, University of Malaya, 50603 Kuala Lumpur, Malaysia. E-mail: phaikem@um.edu.my

**14276.** Yoshimura, M.; Akama, A. (2014): Radioactive contamination of aquatic insects in a stream impacted by the Fukushima nuclear power plant accident. *Hydrobiologia* 722: 19-30. (in English) ["The Fukushima Daiichi Nuclear Power Plant accident emitted radioactive substances into the environment, contaminating a diverse range of organisms. Stream algae, litter, sand substrate, aquatic insects and fishes are among the organisms that have been impacted. Radioactive Cs contaminations in the litter and sand substrate were elevated where the atmospheric dose rate in the air was high. Radioactive Cs contaminations in algae and aquatic insects varied irregularly; nevertheless, radioactive Cs contaminations in aquatic insects in pools were consistently higher than those in stream riffles. Contamination by the radioactive Cs differed by species, location and stream velocity. This study was undertaken in a limited number of samples and sites, with more extensive studies planned to fully determine the impact of radionuclides on aquatic ecosystems. ... Small sample sizes for the Perlidae, Heptageniidae, Stenopsychidae and Hydropsychidae in the pool and for the Chloroperlidae, Ephemeridae and Gomphidae (*Davidius nanus*) in the riffle made statistical analysis difficult, but there was trend toward lower radioactive Cs values in the riffle compared to those in the pool. The radioactive Cs values of the sand substrate in the riffle were  $30 \pm 4.12$  Bq/kg for  $^{134}\text{Cs}$  and  $58 \pm 12.9$  Bq/kg for  $^{137}\text{Cs}$ . The radioactive Cs values of the sand substrate in the pool were  $14 \pm 2.98$  Bq/kg for  $^{134}\text{Cs}$  and  $25 \pm 3.08$  Bq/kg for  $^{137}\text{Cs}$ ." (Authors)] Address: Yoshimura Mayumi, Kansai Research Center, Forestry and Forest Products Research Institute, Nagaikyutaro 68, Momoyama, Fushimi, Kyoto, 612-0855, Japan. E-mail: yoshi887@ffpri.affrc.go.jp

**14277.** Zhang, H.-m.; Hämäläinen, M.; Cai, Q.-h. (2014): *Anisopleura pelecypora* sp. nov. from south-western Yunnan, China (Odonata: Euphaeidae). *Odonatologica* 43(1/2): 43-50. (in English) ["*Anisopleura pelecypora* sp. nov. (holotype male from Ximeng Wa, Yunnan, China) is described and illustrated for the male sex. A comparison with its congeners is provided." (Authors)] Address: Zhang, H.-m., State Key Laboratory of Freshwater Ecology and Biotechnology, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan 430072, China. E-mail: zhanghaomiao6988@gmail.com

**14278.** Zhang, H.-m.; Cai, Q.-h. (2014): *Aeshna shennong* sp. nov., a new species from Hubei Province, China (Odonata: Anisoptera: Aeshnidae). *Zootaxa* 3795(4): 489-493. (in English) ["*Aeshna shennong* sp. nov. (holotype male: Dajihu national wetland park in Shennongjia National Nature Reserve, Shennongjia City, Hubei Province, China, 28. VIII. 2013) is described, illustrated and compared with its most similar congener, *A. petalura* Martin, 1908. The holotype will be deposited in the Collection of Aquatic Animals, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan City, Hubei Province, China. New distribution records of *A. petalura* from main-

land China are also provided." (Authors)] Address: Zhang, H., Dept of Entomology, College of Natural Resources and Environment, South China Agricultural University, Guangzhou 510642, China. E-mail: zhanghaomiao6988@gmail.com



Édouard Manet (1832-1883) (For more details see: <http://gallica.bnf.fr/ark:/12148/btv1b8610830q/f15.image> and <http://www.sothebys.com/en/auctions/ecatalogue/2010/rimbaud-verlaine-mallarm-and-their-friends-books-manuscripts-and-photographs-from-the-poetical-collection-of-eric-and-marie-hlne-b-pf1040/lot.14.html>)

**Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for multiple help, and Cédric Vanappelghem, Geert de Knijf, Asmus Schröter, Bernd Kunz and Andreas Martens for contributing papers to this issue.**



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

## 1997

**14279.** Herzig, A. (1997): Rote Liste gefährdeter Tiere und Pflanzen des Burgenlandes. Biologische Forschung Burgenland- Bericht 87: 3-33. (in German) [The regional Red List of threatened Odonata of the Federal State Burgenland (Austria) is presented at page 18.] Address: unknown

**14280.** May, M.L. (1997): The status of some species of *Enallagma* (Odonata: Zygoptera: Coenagrionidae). Ent. news. 108(2): 77-91. [I have investigated the identity and generic placement of five little known species of coenagrionid damselflies usually assigned to *Enallagma*. Of these, *E. camerunense* is shown not to belong to *Enallagma* but probably to be an aberrant *Pseudagrion*. *E. kauderni*, commonly regarded as a subspecies of *E. nigridorsum*, appears to be as well-differentiated from the latter as either is from *E. vansomereni*. so I consider *E. kauderni* to be a full species. Examination of the type of *E. melanotum* demonstrated it to be identical with *Agrion* (now *Cercion*) *sexlineatum*. *E. pseudelongatum* has been incorrectly placed as a synonym of *E. elongatum* in recent catalogs, probably owing to misinterpretation of Eraser's (1947) comparison of these distinct species. Finally, *E. strouhali* is apparently identical with the earlier described *E. risi*; I also discuss the possible relations of these taxa to *E. cyathigerum* and *E. boreale*." (Author)]

## 2000

**14281.** Eda, S. (2000): Two records of *Epiophlebia superstes* m Nagano Prefecture. Tombo 42: 42. (in Japanese, with English title and captions) [Japan; 01-7-19999, Misato (imago); 14-11-1999, Matsumoto (larva)] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**14282.** Eda, S. (2000): A hybrid male supposed between *Sympetrum e. eroticum* and *S. baccha matutinum*. Tombo 42: 30. (in Japanese, with English title and captions) [29-VIII-1999] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**14283.** Futahashi, R. (2000): Successive invasion and colonization of Odonate species into reclaimed land Koshino-kata, Shmminato City, Toyama Prefecture (Addition II). Tombo 42: 68. (in Japanese, with English summary) [Three Odonate species, *Polycanthagyna melamctera*, *Aeschnophlebia anisoptera* and *Sympetrum speciosum speciosum* were newly added to the fauna of the reclaimed land Koshino-kata, Shinminato City, Toyama Prefecture, Central Honshu, Japan. A total of 41 odonate species belonging to 6 families have been recorded from this land since 1988. ... *Anax nigrofasciatus nigrofasciatus* and *Epithea marginata* were recorded from the land for the first time." (Author)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14284.** Futahashi, R.; Araki, Y. (2000): Records of inter-specific hybrid between *Sympetrum kunckeli* and *S. e. eroticum*. Tombo 42: 67. (in Japanese, with English summary) [Two males (6-VIII-1998, 8- X-1998) of the supposed hybridisation between *Sympetrum kunckeli* and *Sympetrum eroticum eroticum* were captured from Toyama Prefecture.] Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**14285.** Matsuda, I. (2000): *Anax guttatus* collected again in Sakai City, Osaka Prefecture, in 1999. Tombo 42: 72. (in Japanese, with English summary) [Five mature males of *Anax guttatus* were captured by "Tombo-turi" (Catching dragonflies by threads and small stones) at Oizumi-Ryokuchi Park in Sakai City, Osaka Prefecture on July 11, August 7, 8, 13 and September 18, 1999. It is very interesting that this migrating species were caught both before and just after typhoon has come." (Author)] Address: Matsuda, I., 583 -087, 6 -11 Osaka Habikino Momoyamada 1-chome, Japan

**14286.** Matsuki, K.; Saito, Y. (2000): Description of the larva of *Mnais mneme* (Ris, 1916; (Calopterygidae) from Hong Kong. Tombo 42: 43-45. (in Japanese, with English summary) [The ultimate instar larva of *Mnais mneme* was

described based on the exuviae obtained from Hong Kong. It can be distinguished from the larvae of *M. pruinosa costalis* and *M. andersoni tenuis* in the following characteristics. The ratios of width to length of the median cleft of prementum are about 1 : 2.5 in *mnome*, about 1 : 3.4 in *andersoni tenuis* and about 1 : 5.8 in *pruinosa costalis*." (Author)] Address: Matsuki, K., 1575-14 Hasama-cho, Funabashi City, Chiba Pref., 274-0822, Japan

**14287.** Sasamoto, A. (2000): An endoparasite from *Psolodesmus kuroi* Oguma [sic]. Tombo 42: 48. (in Japanese, with English title) [*Psolodesmus mandarinus* McLachlan 1870 (syn: *Psolodesmus kuroi* Matsumura, 1913); Nematoda, Phasmidia.] Address: Sasamoto, A., 190-4 Yakuoji Tawaramoto, Shiki-gun, Nara prefecture, 636-0341, Japan. E-mail: akssmt@sea.plala.or.jp

**14288.** Wada, S. (2000): Observation on a Y-shaped triple connection of *Lestes temporalis* Selys. Tombo 42: 61-62. (in Japanese, with English summary) ["A Y-shaped triple connection, two males simultaneously in tandem with a female of *L. temporalis* was observed from its formation to separation at Sano-cho, Fukui-shi, Fukui Pref. on September 25, 1999 and some pictures of this unusual connection including pre-formation were taken during the observation. At that time, more than 30 tandems of the species were observed and there was no single female excepting one caught in a web, so a single male had no chance but to snatch a female in tandem. Moreover, the tandem interrupted by the single male was being caught in a tree and could not shake off the interrupting male easily. And the superior appendages of a male of the species is relatively longer than those of other species, and the period of the species in tandem is longer than other species, which seem to make it easier for the species to form this kind of unusual connection." (Author)] Address: Wada, S., 3-8-18 Nishikida, Fukui 918-8004, Japan

**14289.** Wada, S. (2000): New records of *Davidius moiwanus taruii* Asahina et Inoue from Fukui Prefecture. Tombo 42: 69-70. (in Japanese, with English summary) ["Some adults and larvae and exuviae of *Davidius moiwanus taruii* were collected at Shinjo, Mihama-cho, Fukui Pref. mainly in the spring of 1999. These are the first records of the species from Fukui Pref., Japan. Average lengths of the collected males' abdomen and hind wing are 31.68mm and 23.50mm respectively, and the females' are 27.86mm and 24.86mm respectively. These individuals seem to come close to those of the Hira Mountains rather than the Noto Peninsula judging from the size of them." (Author)] Address: Wada, S., 3-8-18 Nishikida, Fukui 918-8004, Japan

**14290.** Wada, S. (2000): A record of a teneral female of *Anax guttatus* in Fukui Prefecture. Tombo 42: 71. (in Japanese, with English summary) ["A female of *Anax guttatus* just after emergence was collected at Hananao-naka 2-chome, Fukui-shi, Fukui Pref., central Japan on October 22, 1999. In the last year 1998, exceedingly many adults

of the species were observed all over Fukui Pref., but in this year no adults observed except for the teneral female in the prefecture." (Author)] Address: Wada, S., 3-8-18 Nishikida, Fukui 918-8004, Japan

**14291.** Yokota, H.; Watanabe, Y. (2000): Larval breeding record of *Stylurus annulatus* (Djakonov). Tombo 42: 49-53. (in Japanese, with English summary) ["In September 1996, a female *S. annulatus* was caught at the shore of Lake Biwa, Shiga Prefecture. The eggs had brandy glass shaped process which adhere to settle, and the first instar larvae had two rows of spine like structures which disappear in the second instar. These features are common to the other two Japanese *Stylurus* species. The eggs hatched in two weeks and the larvae were bred in the laboratory. Rapid growing group hibernated in the fifth instar, and four males and four females emerged in July and August 1997. Slow growing group larvae hibernated in the third or fourth instar, and again in the final instar in the next winter. Four males and two females emerged in May and June, 1998 from the latter group." (Authors)] Address: Watanabe, Yoko, 4-14, Nishida-cho, Nishinomiya City, Hyogo Pref., 662-0034, Japan

**14292.** Yokoyama, T (2000): Larval growth of *Leucorhinia intermedia ijimai* Asahina. Tombo 42: 55-59. (in Japanese, with English summary) [Larval growth of *L. intermedia ijimai* is studied using outdoor samples and indoor breeding. There are 13 stages in their larval period and which is considered to be 2 to 3 years.] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

**14293.** Yokoyama, T (2000): A record of *Boyeria maclachlani* in Southern Hokkaido. Tombo 42: 59. (in Japanese, with English summary) [A male larvae of *B. maclachlani* discovered from Samegawa River, Oshima Peninsula, Southern Hokkaido, Japan, closes a gap in the known distribution of the species.] Address: Yokoyama, T., 1-15-303, Higashi 22chome, Kita 19jo, Higashi-ku, Sapporo City, 065, Japan

## 2002

**14294.** Futahashi, R.; Araki, Y. (2002): The Odonata fauna of Takamagahara High Moor, Oyama, Toyama Prefecture including the first record of *Sympetrum danae* from Toyama Prefecture. *Aeschna* 39: 19-24. (in Japanese, with English summary) ["*S. danae* was found at five places at Takamagahara High Moor, Oyama, Toyama Prefecture, central Honshu, Japan. This is the first record of the species from Toyama Prefecture and the habitat is situated at 2,130 meters above sea level, which is the highest record in Japan. Including this species, 16 species of 5 families have been recorded from this high moor. The following 4 species recorded here had rarely or never been known from such highland; *Lestes temporalis*, *Anotogaster sieboldii*, *Crocothemis servillia mariannae* and *Sympetrum parvulum*. And some noteworthy observations, including three patterns of unusual connections (male-male, triple

and triple males) of *Leucorrhinia dubia orientalis* and an infrequent behaviour of *Aeshna nigroflava* seemingly ovipositing in tandem, were described. (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14295.** Kita, H.; Futahashi, R. (2002): [The collecting records of *Anax nigrofasciatus nigrofasciatus* at Enshu-hama, Hamamatsu, Shizuoka Prefecture]. *Suruga no Konchu* 199: 5579. (in Japanese) [Records from 2000 and 2001 are briefly documented.] Address: Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan (probably not the actual address)

## 2004

**14296.** Futahashi, R.; Futahashi, H. (2004): Record of the type O triple-connection of *Anax nigrofasciatus nigrofasciatus* Oguma, 1915. *Aeschna* 41: 37-38. (in Japanese, with English summary) ["We observed the type O triple-connection of *Anax nigrofasciatus nigrofasciatus*. At first, a second male of *Anax nigrofasciatus nigrofasciatus* connected with a female copulating with the first male. They were flying a few minutes and fell on the ground, making a mass resulting in type O triple-connection. Then, the second male separated, leaving the female copulated with the first male only by his copulatory organs." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14297.** Futahashi R., Hayashi F. (2004): Distribution patterns of two damselfly species, *Mnais costalis* and *M. strigata*, in the Bôshô Peninsula, Chiba Prefecture. *Tombo* 47: 41-46. (in Japanese, with English summary) ["A total of 106 *Mnais* damselflies collected from the Bôshô Peninsula, Chiba Prefecture, central Japan, were classified into *M. strigata* Selys, 1853 (48 males, 9 females), *M. costalis* Selys, 1869 (40 males, 8 females), and their hybrid Fr1 (1 female) based on DNA sequences of a nuclear ribosomal internal transcribed spacer I (ITS I). The peculiar form *edai Asahina*, 1976 known from this peninsula was identified as one wing-colour form of *M. strigata*. The two species were distributed parapatrically with a narrow contact zone: i. e., *M. strigata* was restricted to the southern mountainous area of the Bôshô Peninsula, while *M. costalis* was distributed in the northern area of the Kanto plain. The two species were quite similar in their external morphology, excluding some different relationships between head width and forewing length and between pterostigma length and width. (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14298.** Hayashi, F.; Dobata, S.; Futahashi, R. (2004): A new approach to resolve the taxonomic and ecological problems of Japanese *Mnais* damselflies (Odonata: Calopterygidae) (1) General remarks. *Aeschna* 41: 1-14. (in

Japanese, with English summary) ["Several hypotheses coexist about taxonomy of Japanese *Mnais* damselflies (Odonata: Calopterygidae), having some discrepancies on their distributional ranges and ecological consideration. Recent phylogenetic studies based on sequences of the nuclear ribosomal DNA (ITS1 region) suggested that they consist of two closely related species, *M. costalis* and *M. strigata*, with sympatric distributions in a wide range of western Japan. These two species are usually distinguished by wing length:head width ratio and pterostigma length: width ratio of adult males, and also by the caudal gill shape of larvae (Havashi et al., 2004a, b). On the other hand, the sequences of the mitochondrial DNA (COI region) suggested that introgressive hybridization had occurred between the two species because of interspecific similarity (often identical) in mtDNA haplotypes at the same localities (Ilayashi et al., unpublished data). In the present paper, based on this new taxonomic hypothesis, were compared some other morphological characters between the two species, and reviewed their ecological knowledge from literature. The marking pattern on the metapoststemum, that had been used previously to distinguish some populations, varied individually. Both species included individuals with yellow-striped and unstriped metapoststemum, and therefore, this was not a species-specific character. Wing colour patterns also varied among individuals and were polymorphic. The pattern could be divided into three wing morphs; uncoloured (entirely hyaline), partially-coloured (coloured with orange to dark brown at about apical 3/4 area, but hyaline at the basal 1/4), and entirely-coloured (coloured with pale orange nearly all area). All morphs were found in male *M. costalis*, while the entirely-coloured wing morph was rarely found in male *M. strigata*. Females of *M. costalis* consisted, of the two wing morphs, uncoloured and entirely-coloured, but all females of *M. strigata* had uncoloured wings. Males with partially-colored wings are known to territorial fighters and those with uncoloured or entirely-coloured wings are non-territorial sneakers. Males with the latter two wing morphs may mimic females for sneaky copulation around the territorial males. Interspecific combinations of the wing colour morphs differed geographically. Two wing morphs, uncoloured and partially-coloured, were seen in males of both species when living allopatrically. In their sympatric ranges, however, males had completely reciprocal morphs (only partially-coloured wings in *M. costalis* and only uncoloured wings in *M. strigata*) in a part of western Japan, but all morphs coexisted in another part of western Japan. This pattern suggests that a reproductive character displacement occurs between the two species, as already pointed out by Suzuki (1984c). In general, the wing colour and its pattern may be important signals for damselflies to recognize mates by their large compound eyes. If hybrids are at a selective disadvantage, mating between the two species under speciation leads to wasted reproductive effort and, to avoid it, the character displacement is predicted to occur. If speciation goes further and they are completely isolated reproductively, coexistence of interspecifically similar morphs will be allowed. In the future, the mechanisms of



reproductive isolation and differences in the degree of isolation in local populations must be examined experimentally between these two closely related damselflies." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14299.** Tsuji, I.; Tosaka, H.; Suda, S.; Futahashi, R. (2004): Records of andromorphic type of *Anax nigrofasciatus nigrofasciatus* Oguma, 1915. *Aeschna* 41: 33-35. (in Japanese, with English summary) ["We found three females of andromorphic type of *Anax nigrofasciatus nigrofasciatus* in the Kanto District in 2003 and 2004. This type was recorded in Taiwan and Nepal but rarely recorded in Japan." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

## 2005

**14300.** Artemiadou, V.; Lazaridou, M. (2005): Evaluation score and interpretation index for the ecological quality of running waters in central and northern Hellas. *Environmental Monitoring and Assessment* 110(1-3): 1-40. (in English) ["The present study aims at creating an evaluation system for the quality of running waters, based on the analysis of benthic macroinvertebrate records from Hellenic rivers (473 samples from 8 river basins). The proposed evaluation system (Hellenic Evaluation Score and its Interpretation Index) may be used for waters sampled with the cost effective semi-quantitative sampling method of "3 min kick-sweep" and requires benthic macroinvertebrates to be identified to the taxonomic level of family. Though resulting from a modification of the Spanish score BMWP, it differs from it in the following characteristics: a) it includes the relative abundance of benthic macroinvertebrates and b) it takes into consideration the habitat diversity of the studied site, classifying it as "poor" or "rich", based on some parameters of the System B of the Water Framework Directive (2000/60/EU). Its interpretation is also based on a five-scaled classification system, consistent with the provisions of the same Directive." (Authors) Odonata are considered at the family level.] Address: Artemiadou, Vassilia, Laboratory of Zoology, Department of Zoology, School of Biology, Faculty of Science, Aristotle University of Thessaloniki, 54124, Thessaloniki, Greece. E-mail: luteus@bio.auth.gr

**14301.** Futahashi, R.; Futahashi, H. (2005): An observation of the egg-laying behavior of *Aeschnophlebia anisoptera* on the tree. *Aeschna* 42: 20. (in Japanese, with English summary) [11-VII-2002; "We observed the egg-laying behaviour of *Aeschnophlebia anisoptera* for a few minutes on the branches about 6 m above ground." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14302.** Futahashi, R.; Futahashi, H. (2005): The dragonflies and damselflies of Toyama Prefecture, Central Honshu, Japan in 2004. *Bull. Toyama Sci. Mus.* 28: 97-107. (in Japanese, with English summary) [We reported our collect and photograph data of odonate species from Toyama Prefecture in 2004. *Lyriothemis pachygastra* was newly recorded at eastern area Of Toyama Prefecture. The migratory species *Sympetrum fonscolombii* was recorded at three sites in Toyama Prefecture. Three hybrids were also recorded in this report.] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14303.** Hayashi, F.; Dobata, S.; Futahashi, R. (2005): A new approach to resolve the taxonomic and ecological problems of Japanese Mnais damselflies (Odonata: Calopterygidae) (2). References and examined specimens. *Aeschna* 42: 1-18. (in Japanese, with English summary) ["The present paper shows references of Japanese Mnais damselflies and the specimens of Mnais examined in our previous paper Hayashi et al. (2004c). *Mnais strigata* Selys, 1853 in Hayashi et al. (2004a, b, c) and Futahashi and Hayashi (2004) was changed to *M. pruinosa* Selys, 1853 by Hämäläinen and van Tol (2004); so that, we used the name *M. pruinosa* in this paper." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14304.** Landmann, A.; Lehmann, G.; Mungenast, F.; Sonntag, H. (2005): *Die Libellen Tirols*. Berenkamp. ISBN 3-85093-185-4: 324 pp. (in German) [For a detailed review (in German) see: [http://www.landesmuseum.at/pdf\\_fr-remote/BEF\\_6\\_0175-0176.pdf](http://www.landesmuseum.at/pdf_fr-remote/BEF_6_0175-0176.pdf)]

**14305.** Terzani, F.; Marconi, A.; Carletti, B. (2005): Odonati della Somalia raccolti dal 1971 al 1986 e depositati nel Museo Zoologico dell'Università di Firenze (Odonata). *Atti del Museo di Storia Naturale della Maremma* 21: 39-48. (in Italian, with English summary) ["A collection of 109 specimens of Odonata from Somaliland has been studied; twenty-nine species are listed; new for Somaliland result *Hemistigma albipuncta*, *Orthetrum guineense* and *Trithemis pluvialis*. An updated list of the dragonflies of Somaliland is provided." (Authors)] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

## 2006

**14306.** Aydin, G. (2006): Evaluation of insects as bio-indicators for sustainable land use in Çukurova delta. PhD thesis, Inst. Natural and Applied Sciences, Dept Plant Protection, University Çukurova: XXXVI + 269 pp. (in Turkish, with English summary) ["In this research was conducted to use insects as indicator for habitat description, environmental impacts and different human activities within the Çukurova Delta between 2003 and 2004. Hence sand

dune (Km), salt marsh (TB) and salt meadow (TÇ) , forest with *Pinus* sp. (Or), afforestation area with *Eucalyptus* sp. (A), aquatic (S) and beach (Ky) biotopes were evaluated in Çukurova Delta. Natural, semi-natural and unnatural habitats were chosen as 3 different human activity levels under each biotope and sampling methods were used in all sampling areas according to habitat properties. The data included 709 species and 86958 individuals of beetles collected during two years using pitfall trap, sweep, insect net and light trap sampling methods. Indicator species analysis produced to find indicator species for habitat description. In this respect some insect species *Platynemis dealbata*, *Trithemis arterosia*, *Ischnura elegans ebneri*, *Lestes barbarus*, *Trithemis annulata* and *Orthemis sabina* were most abundant in aquatic biotope, *Megacephala euphratica euphratica* was most abundant in salt marsh biotope, *Siagona europaea*, *Scarites planus*, *S. subcylindricus*, *Acinopus megacephalus* and *Idaea aversata* were most abundant in salt meadow biotope, *Pimelia bajula solieri* was most abundant in afforestation biotope, *Zophosis dilatata* was most abundant in sand dune biotope and *Lophyridia concolor* was most abundance in beach biotope showed a significant indicator level for habitat description. The analyses of Binomial (present-absent) and Guassian were used by generalized linear modelling produced to find indicator species for human activities. In this respect; 20 species from Coleoptera, 1 species from Hymenoptera, 5 species from Lepidoptera and 4 species from Odonata showed a significant indicator level for human activities such as cattle and sheep/goat grazing (Km, TB, TÇ, A), agriculture land (TB, TÇ, S), tourism (OR, A, Ky), garbage dump (TÇ), cutting and burning plant (Km)." (Author)] Address: Univerxity of Cukurova, Inst. Natural & Applied Scioences, dept Plant Protection, Turkey

**14307.** Futahashi, R.; Futahashi, H. (2006): The Odonate fauna of the Noto Peninsula, Hokuriku District, Honshu (2). *Tombo* 48: 18-20. (in Japanese, with English summary) ["Recent collections of the following three noteworthy species in the Noto Peninsula (Ishikawa Pref., Hokuriku District, Central Honshu, Japan) were reported: *Paracercion sexlineatum*, *Sympecma paedisca*, and *Sympetrum maculatum*. Two migratory species, *Sympetrum fonscolombii* and *Trapezostigma virginia*, and a supposed hybrid between *Anax nigrofasciatus nigrofasciatus* and, *Anax parthenope julius* are newly recorded from this peninsula." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14308.** Futahashi, R.; Futahashi, H. (2006): The Dragonflies and Damselflies of Toyama Prefecture, Central Honshu, Japan in 2005. *Bull. Toyama Sci. Mus.* 29: 137-145. (in Japanese, with English summary) ["We reported our collect and photograph data of odonate species from Toyama Prefecture in 2005. The following three species in this report were sharply decreased and not recorded in

2004; *Sympecma paedisca*, *Asiagomphus pryeri*, *Stylogomphus suzukii*. *Lyriothemis pachygastra* was newly distributed in this area in the last few years. Six migratory species, *Anax guttatus*, *Sympetrum cordulegaster*, *Sympetrum depressiusculum*, *Sympetrum fonscolombii*, *Sympetrum vulgatum imitans* and *Trapezostigma virginia*, and some males of hybrids between *Anax n. nigrofasciatus* and *Anax parthenope julius* were recorded in this report." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14309.** McKenzie, P.M. (2006): Using the National Wetland Inventory as a tool to locate fens and other rare Missouri wetland natural communities. *Missouriensis* 26 (2005): 36-40. (in English) ["In 1999, Linden Trial discovered the federally listed endangered Hine's emerald dragonfly (*Somatochlora hineana* Williamson) at Grasshopper Hollow in Reynolds County, Missouri. Since then, Missouri fens have received significant attention from odonatologists searching for this dragonfly. Subsequent surveys conducted for the Hine's emerald between 2001 and 2005 led to the discovery of 25 additional sites scattered across the Missouri Ozarks in 10 different counties." (Author)] Address: McKenzie, P.M., U.S. Fish and Wildlife Service, 101 Park DeVillie Dr.; Suite A, Columbia, MO 65203-0057, USA

**14310.** Torralba Burrial, A.; Ocharan, F.J. (2006): Confirmación de la presencia de *Coenagrion mercuriale* (Charpentier, 1825) e *Ischnura elegans* (Van der Linden, 1820) en la provincia de Zaragoza (NE España). *Boletín de la Sociedad Entomológica Aragonesa* 39: 284. (in Spanish, with English summary) ["Confirmation of *C.mercuriale* (Belmonte de Calatayud, Rio Perejiles, 07-VII-2002; Cetina, rio Jalon, 05-VII-2002; Codos, rio Grio, 07-VII-2002; Magallon, rio Huecha, 05-VII-2002) and *Ischnura elegans* (Fayon, embalse de Ribarroja, 21-VII-2004) presence in Zaragoza province (NE Spain).] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

## 2007

**14311.** Futahashi, R.; Futahashi, H. (2007): The dragonflies and damselflies of Toyama Prefecture, Central Honshu, Japan in 2006. *Bull. Toyama Sci. Mus.* 30: 127-137. (in Japanese, with English summary) ["We reported our collect and photograph data of odonate species from Toyama Prefecture in 2006. The following nine species in this report were sharply decreased and very rare in this area; *Paracercion melanotum*, *Sympecma paedisca*, *Gynacantha japonica*, *Aeschnophlebia anisoptera*, *Asiagomphus pryeri*, *Stylogomphus suzukii*, *Nihonogomphus viridis*, *Somatochlora clavata*. Three migratory species, *Sympetrum cordulegaster*, *Sympetrum depressiusculum*, *Sympetrum fonscolombii*, and *Trapezostigma virginia*, and some males of hybrids between *Anax n. nigrofasciatus*

and *Anax parthenope julius* were recorded in this report." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14312.** Levasseur, M. (2007): Odonates nouveaux pour l'île d'Anjouan, description d'une nouvelle sous-espèce de *Paragomphus genei* (Selys, 1841) (Archipel des Comores). *Martinia* 23(4): 115-126. (in French, with English summary) ["The author reports observations of 16 species essentially taken on a few day's trip on Anjouan island, including 12 not previously mentioned, 2 of them being new for the Comoros Archipelago. Illustrated description of *Paragomphus genei ndzuaniensis* ssp. nov. is provided. On the basis of texts and IRSN and MNHN specimen genitalia observation, the synonymy of two (*P. madegassus* and *P. z-viridum*) of the four Malgassian *Paragomphus* yet described, including *P. genei*, is proposed. An updated table is provided, listing the 41 species known from Comoro islands." (Author)] Address: Levasseur, M., 11 rue du Pont Colbert, F-78000 Versailles, France. E-mail: levasseur@magic.fr

**14313.** Terzani, F.; Cianferoni, F. (2007): Ricerche odonologiche in Toscana. X. Odonati del Mugello (Odonata). *Onychium* 5: 1-25. (in Italian, with English summary) ["Thirty species collected in the Sieve River basin (Mugello, sensu MASCAGNI et al., 1997) are listed and annotated. *Calopteryx virgo meridionalis*, *Pyrrhosoma nymphula*, *Coenagrion mercuriale castellani*, *Erythromma lindenii*, *Ischnura elegans*, *Aeshna cyanea*, *Anax imperator*, *Onychogomphus uncatus*, *Cordulegaster boltonii*, *Orthetrum cancellatum*, *Sympetrum fonscolombii* and *S. sanguineum* are cited for the first time in this geographic area. *Aeshna mixta* is confirmed." (Authors)] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**14314.** Zheng, J.-h.; Zhang, R.-j. (2007): Predation of Dragonfly, *Pantala flavescens* Fabricius, on the alates of the Red Imported Fire Ant, *Solenopsis invicta* Buren. *Acta Scientiarum Naturalium Universitatis Sunyatseni* 46(2): 120-122. (in Chinese, with English summary) ["The predation of *P. flavescens* on the alates of red imported fire ant, *Solenopsis invicta*, was studied in Zhuhai, Guangdong Province. A swarm of dragonflies hover over the mound of the fire ant when mating flight is taking place. The dragonflies capture the alates flying off the tip of the vegetation, eat the abdomen of alates, and throw away the left. About 85.66% of alates were killed by the dragonflies during mating flying at a height level about 5m from the ground. The predation of dragonfly is related with the weather, particularly with temperature and relative humidity of soil." (Authors)] Address: Zheng, Ji-huan, Inst. of Entomology, State Key Laboratory for Biocontrol, Sun Yat-sen Univ., Guangzhou 510275, China. E-mail: lsszry@sysu.edu.cn

**14315.** Alonso Naveiro, M.; Torralba Burrial, A. (2008): Confirmación de *Lestes sponsa* (Odonata: Lestidae) en la provincia de Teruel (España). *Boletín Sociedad Entomológica Aragonesa* 43: 424. (in Spanish, with English summary) [A reproductive population of *L. sponsa* is reported for first time in Teruel, Spain (29-VII-2008, Balsa del Cangrejero; 30TXL5842, 1148 m a.s.l.).] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniob@hotmail.com

**14316.** Futahashi, R.; Futahashi, H.; Wada, S. (2008): The dragonflies and damselflies of Toyama Prefecture, Central Honshu, Japan in 2007. *Bull. Toyama Sci. Mus.* 31: 141-156. (in Japanese, with English summary) ["We reported our collect and photograph data of odonate species from Toyama Prefecture in 2007. Eighty seven species from 11 families were recorded in Toyama Prefecture, and we found 77 species of them in 2007, except for the following 10 species (the last collection year in parenthesis) ; *Paracercion melanotum* (2006), *Anax guttatus* (2005), *Gomphus postocularis* (1972), *Nihonogomphus viridis* (2006), *Onychogomphus viridicostus* (1959), *Sympetrum danae* (2001), *Sympetrum fonscolombii* (2006), *Sympetrum striolatum imitoides* (2004), *Sympetrum vulgatum imitans* (2005), and *Trapezostigma virginia* (2006). The migratory species, *Tholymis tillarga* was first recorded in 2007, and two migratory species, *Sympetrum cordulegaster* and *Sympetrum depressiusculum* were also recorded in this report." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14317.** Shiha, M.S.; Ihsan, S.E.; Ramadan, A.M. (2008): A taxonomic study of the sub-order Zygoptera (Insecta: Odonata) on the Syrian coast « I ». *Tishreen University Journal for Research and Scientific Studies - Biological Sciences Series* 30(3): 189-209. [Based on 550 Zygoptera specimens collected from 22 locations on the Syrian coast during 2006 - 2007, the following taxa are discussed in detail: *Calopteryx splendens intermedia*, *C. hyalina*, *Epallage fatime*, *Sympecma fusca*, *Lestes viridis parvidens*, *Platycnemis dealbata*, *Ischnura elegans ebneri*, *Erythromma lindenii zernyi*, *Coenagrion scitulum*, *C. puella syriaca*, *Ceriagrion tenellum georgifreyi*, *Erythromma viridulum orientale*, *Enallagma cyathigerum* and *Pseudagrion syriacum*. Three species (*Lestes viridis parvidens*, *E. lindenii zernyi* and *C. scitulum*) are considered as first records in Syria.] Address: Ramadan, A.M., Plant Protection Department, Faculty of Agriculture, Tishreen University, Lattakia, Syria

**14318.** Torralba Burrial, A.; Alonso Naveiro, M. (2008): Primera cita de *Libellula quadrimaculata* (Odonata: Libellulidae) en la provincia de Teruel (España). *Boletín Sociedad Entomológica Aragonesa* 43: 420. (in Spanish, with



English summary) [First record to *L. quadrimaculata* for Teruel province, Spain, based only on one male, is given. 28-VII-2008, río Jiloca, Villafranca del Campo (30TXL39 0052, 972 m a.s.l., Teruel)] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniofb@hotmail.com

## 2009

**14319.** Baldi, A.; Hardersen, S. (2009): Gli odonati della Riserva naturale "Agoraie di Sopra e Moggetto" (Liguria, Genova) (Odonata). *Bollettino dell'Associazione Romana di Entomologia* 64: 59-67. (in Italian, with English summary) [Italy; "In the years 2001 and 2008 the dragonfly fauna of the Natural Reserve "Agoraie di Sopra e Moggetto" was investigated and a total of 15 species were recorded. The most important result of the survey was the discovery of a population of *Aeshna juncea*, new to the Liguria region and the southernmost known site of this species for Italy. Another species found for the first time in the Liguria region is *Libellula quadrimaculata*. The most numerous dragonfly species in the Reserve were *Lestes dryas* and *Sympetrum flaveolum*." (Authors)] Address: Baldi, A., MiPAAF, Corpo Forestale dello Stato, Comando Stazione Forestale S. Stefano d'Aveto, via degli Abeti, 3 I-16049 S. Stefano d'Aveto (Genova), Italy. E-mail: andrea-baldi70@gmail.com

**14320.** Chen, X.; Feng, Y.; Chen, Z. (2009): Common edible insects and their utilization in China. *Entomological Research* 39: 299-303. (in English) ["This paper reviews the common edible insects and their use in China. One-hundred and seventy-eight insect species from 96 genera, 53 families and 11 orders are commonly eaten in China. Preparation of edible insects includes frying, braising, stewing, stewing after frying, boiling and roasting. The insect forms eaten range from eggs to adults; however, in restaurants most are larvae and pupae. More than 50 species have been analyzed for their nutritive elements and nutritional value and these data are reviewed here. Insect health foods sold in the Chinese market are also briefly discussed. Six to seven species of dragonfly larvae of Odonata are edible. The common species are *Crocothemis servilia*, *Gomphus cuneatus* and *Lestes praemorsa*. The nutritive elements of three species have been analyzed (Feng et al. 2001b). Naiad is the common stage for eating." (Authors)] Address: Chen, X., The Research Institute of Resource Insects, Chinese Academy of Forestry, Kunming 650224, China. Email: cafcxm@tom.com

**14321.** Futahashi, R.; Futahashi, H. (2009): The dragonflies and damselflies of Toyama Prefecture, Central Honshu, Japan in 2008. *Bull. Toyama Sci. Mus.* 32: 143-154. (in Japanese, with English summary) ["We reported our collect and photograph data of odonate species from Toyama Prefecture in 2008. Eighty seven species from 11 families were recorded in Toyama Prefecture, and we found 75 species of them in 2008, except for the following

12 species (the last collection year in parenthesis); *Paracercion melanotum* (2006), *Anax guttatus* (2005), *Gomphus postocularis* (1972), *Nihonogomphus viridis* (2006), *Onychogomphus viridicostus* (1959), *Leucorrhinia dubia orientalis* (2007), *Sympetrum danae* (2001), *S. depressiusculum* (2007), *S. fonscolombii* (2006), *S. striolatum imitoides* (2004), *S. vulgatum imitans* (2005), and *Tholymis tillarga* (2007). The migratory species, *S. cordulegaster* (Selys, 1883), was also recorded in this report." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14322.** Futahashi, R.; Futahashi, H. (2009): The first record of *Sinogomphus flavolimbatus* (Matsumura in Oguma, 1926) from Toyama Prefecture, Honshu, Japan. *Tombo* 52: 14. (in Japanese, with English summary) [male, Suwara in Toyama-shi, Toyama Prefecture, Honshu, 19-VII-2009.] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14323.** Hecht, V.L. (2009): Libellenkartierung am Stiefelweiher (Brühl-Badorf). *Praktikumsbericht. Kölner Zoo and Bürgerinitiative 50tausendbaeume*: 22 pp. (in German) [Between 06.07.-14.08.2009, 18 odonate species have been recorded from Brühl, Nordrhein-Westfalen, Germany. For details see: [http://www.bi-50tausendbaeume.de/tl\\_files/media/pdf/Praktikumsbericht.pdf](http://www.bi-50tausendbaeume.de/tl_files/media/pdf/Praktikumsbericht.pdf)] Address: not stated

**14324.** Legakis, A.; Maragou, P. (eds) (2009): The Greek Red Data Book of Threatened Animals. Hellenic Zoological Society, Athens. 525 pp: 468-473. (in Greek with English summaries for the species) [Red List of Greek threatened animals includes *Somatochlora borisi*, *Pyrrhosoma elisabethae*, *Ceriagrion georgi-freyi*, *Boyeria cretensis*, and *Sonjagaster helladica*.] Address: not stated

**14325.** Pizzo, L. (2009): Contributo alla conoscenza degli odonati del Veneto: Le libellule del quartier del Piave (Treviso, Italia nord-orientale) (Odonata). *Boll. Mus. civ. St. nat. Venezia* 59 (2008): 31-43. (in Italian, with English summary) [21 odonate species were recorded between 2005-2007 at "Palù del Quartier del Piave" and "Fontane Bianche di Sernaglia" (Treviso). Regional important populations are that of *Calopteryx virgo virgo* and *Somatochlora flavomaculata*. *Onychogomphus forcipatus forcipatus* is new for Veneto; *Ischnura pumilio* and *Somatochlora metallica* are recorded for the first time in the province of Treviso; the presence of *Chalcolestes viridis* is confirmed.] Address: Pizzo, L., Via Righe 3, I-30010 Campolongo Maggiore (VE), Italia. E-mail: leonardo.pizzo@gmail.com

- 14326.** Bußmann, M. (2010): Ein neues Vorkommen der Gemeinen Winterlibelle (*Sympecma fusca* VANDER LINDEN, 1820) im mittleren Ruhrtal (Ennepe-Ruhr-Kreis, NRW). *Natur und Heimat* 70(1/2): 1-6. (in German) [Dumberger Au, river Ruhr near Hattingen, TK25 4508, Essen), Nordrhein-Westfalen, Germany] Address: Bußmann, M., Amselstr. 18, 58285 Gevelsberg, Germany. E-mail: m.bussmann@macrkischcr-krcis.de
- 14327.** Campbell, W.B.; Novelo-Gutiérrez, R.; Gómez-Anaya, J.A. (2010): Distributions of odonate richness and diversity with elevation depend on windward or leeward aspect: implications for research and conservation planning. *Insect Conservation and Diversity* 3(4): 302-312. (in English) ["(1.) Assessing species richness (SR) and diversity along environmental gradients is important to see whether abiotic differences alter patterns of species distribution and composition. (2.) We examined distributions of odonate SR, average taxonomic distinctness (ATD) and functional diversity (FD) (using the Shannon Index on proportions of plant-dependent and non-dependent species) with elevation and slope provided from an exploratory survey along a transect in the Sierra de Coalcomán Mountains, Michoacán State, Mexico. Adults were collected along both sides of a 500 m stream segment for 6 h day<sup>-1</sup> site<sup>-1</sup> in each of eight sites, and these species lists were complemented by collecting mature larvae. (3.) Species richness and FD declined with elevation among windward sites, while ATD increased. Among leeward sites, SR peaked at mid-elevation, and there was no trend for FD or ATD with elevation. Leeward sites were similar in species composition, whereas windward sites were dissimilar. Slope was correlated with elevation among windward sites, and influenced most variables, but not among leeward sites. FD was negatively correlated with ATD among sites along both aspects. Mean values of SR, ATD and FD between aspects were similar. (4.) The Energy-Richness Hypothesis best explained the species distributions along the windward aspect. Local abiotic influences appeared more important in community assembly among windward sites. Among leeward sites, the potential for Mid-Domain and Rapoport Effects suggest interspecies interactions control community assembly; providing greater potential for expansion of species elevational ranges, and an increase in range expansion of alien and non-endemic species along this aspect." (Authors)] Address: Campbell, B., c/o Silvia López Ortiz, Colegio de Postgraduados, Campus Veracruz, Apartado, Postal 421, Veracruz, Veracruz, Mexico, C.P. 91700. E-mail: bruce\_campbell3@hotmail.com
- 14328.** Chovanec, A.; Schindler, M.; Wimmer, R. (2010): Nachweise der Vogel-Azurjungfer (*Coenagrion ornatum* SELYS, 1850) im Weinviertel, Niederösterreich (Odonata: Coenagrionidae). *Beiträge zur Entomofaunistik* 11: 85-88. (in German) [Mai/June 2010, near Stützenhofen (16°36'37"O/48°44'30"N) and near Herrnbaumgarten (16°41'01"O/48°41'49"N), Niederösterreich, Austria] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-Mail: andreas.chovanec@umweltbundesamt.at
- 14329.** Futahashi, R.; Futahashi, H.; Shinbori, O. (2010): The dragonflies and damselflies of Toyama Prefecture, Central Honshu, Japan in 2009. *Bull. Toyama Sci. Mus.* 33: 129-145. (in Japanese, with English summary) ["Here we report our collection and photograph data of odonate species from Toyama Prefecture in 2009. In 2009, we found 76 species from 11 families, and a hybrid between *Anax nigrofasciatus nigrofasciatus* and *A. parthenope julius*. We newly found *Sinogomphus flavolimbatus* at Suwara, Toyama-shi in 2009, which is the first record from Toyama Prefecture. In total, eighty-eight species have been recorded in Toyama Prefecture. Among them, the following 12 species were not found in 2009 (the last collection year in parenthesis); *Paracercion melanotum* (2006), *Anax guttatus* (2005), *Aeschnophlebia anisoptera* (2008), *Gomphus postocularis* (1972), *Nihonogomphus viridis* (2006), *Onychogomphus viridicostus* (1959), *Sympetrum danae* (2001), *S. fonscolombii* (2006), *S. striolatum imitoides* (2004), *S. vulgatum imitans* (2005), *Trapezostigma virginia* (2008) and *Tholymis tillarga* (2007)." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp
- 14330.** Niesel, J. (2010): Invertebrate occurrence in relation to water permanence and fish in shallow wetlands at Öland, Sweden. MSc. thesis, Dept of Biology and Environmental Science, Senior Lecturer in Biology Univ. of Kalmar: 18 pp. (in English) ["Activity traps were used to study the effects of water permanence and fish predation on the ratio of invertebrate predator and prey species and overall invertebrate abundance in June 2002 in eight shallow calcareous lakes and two small ephemeral water bodies at Öland, southeastern Sweden. The invertebrate predator prey ratio was expected to decrease with decreasing water permanence since invertebrate predators are highly sensitive to drying. Fish was not expected to affect the ratio, since fish selectively feed on large prey species with no care taken to whether the prey is an invertebrate predator or not. The total abundance of invertebrates was expected to decrease both with decreasing water permanence and presence of fish because of drying mortality and selective predation by fish on large invertebrates. Parametric analyses of covariance (ANCOVA) on the lake data revealed no significant effect of fish or maximum depth (used as a measure of permanence) on the ratio of invertebrate predators and prey in the studied wetlands. Fish significantly negatively affected the invertebrate abundance and the mean abundance was twice as high in fishless wetlands as in wetlands with fish. The significant fish effect is however dependent on only one value and is therefore no longer significant when the interaction variable is excluded in the analysis. Maximum depth did

not significantly affect the abundance even if the relationship was close to significant. Since both maximum depth and the interaction variable were close to significant, increased replication of fishless wetlands might produce significant effects of these variables on the invertebrate abundance. Although tench (*Tinca tinca*) is an effective benthic forager, the overall invertebrate abundance was not more affected in the one local with tench than it was in the other wetlands with northern pike (*Esox lucius*). This indicates that one cause of the decrease in waterfowl density and diversity observed during the 20th century might be found in the benthic invertebrate community (e.g. chironomids and others)." (Author) The list of taxa includes Lestidae indet., Aeshnidae indet., and Libellulidae indet.] Address: not stated

**14331.** Popova, O.N. (2010): The dragonfly larvae population (Odonata) in a temporal water pond. Eurasian Entomological Journal 9(2): 239-248. (in Russian, with English summary) ["The structure and seasonal dynamics of the Odonata population of a temporary pond in Baraba forest-steppe (SW Siberia, Russia) are presented. Despite the extreme instability and poor conditions prevailing in the pond, the population is taxonomically rich (21 species), composed of a large number of individuals, resulting in high odonate biomass compared to that of the other aquatic insects. The adaptations for survival in temporary ponds for Odonata are discussed." (Author)] Address: Popova, O.N., Inst. Anim. Syst. & Ecol. Russ. Acad. Sei, Frunze 11, RUS-630091 Novosibirsk

**14332.** Qin, C.-H.; Yao, L.; Chen, C.; Zhang, C.-C.; Li, J.-H. (2010): Insect community structures and dynamics analysis in different aquatic vegetable areas in Wuhan. Chinese Bulletin of Entomology 47(1): 76-81. (in Chinese, with English summary) ["The insect community structure in different types of aquatic vegetables in Wuhan (Hubei province, China) were investigated with visual method and net method from May to October of 2008. The results showed that there were 9 169 individuals belonging to 11 orders, 48 families, 104 species. *Rhopalosiphum nymphaeae* (L.), *Prodenia litura* (Fabricius), *Saccharosyne procerus* (Matsumura), *Scirpophage praelata* (Scopoli) and *Galerucella birmanica* (Jacoby) were the main pests, and Odonata (*Agriocnemis femina*, *Crocothemis servilia*, *Ischnura senegalensis*, *Acisoma panorpoides*) and Coccinellidae were the primary natural enemies. The analyses on community structure indicated that the diversity index of insect community were remarkably different in different vegetations, which was the highest in water dropwort, and was the lowest in lotus. Insect community structure on water dropwort was the most stable, and water chestnut was at the second place. The diversity index of insect community in lotus was high in middle period, but low in early and late periods, whereas that in water bamboo was low in middle period, but high in early and late periods." (Authors)] Address: Qin, C.-H., College of Plant Science and Technology, Huazhong Agricultural University, Wuhan 430070, China

**14333.** Rowan, B. (2010): Nine years on: Revisiting the pond communities of the Lizard Peninsula, UK. The Plymouth Student Scientist 3(2): 40-59. (in English) ["Ponds contribute in various amounts to freshwater biodiversity and in some regions can be of considerably high biodiversity value compared to other freshwaters. The ecology of pond communities has been studied by numerous authors, yet many of these studies represent only a snapshot in time. This study explored the macroinvertebrate communities of a selection of ponds on the Lizard Peninsula, UK and revisited these ponds after a nine year period, examining changes in composition, environmental variables structuring the communities and their conservation value. Ponds in both years formed distinct groups, based on community similarities. In both years area was an important environmental variable structuring the communities and in the first year visited water chemistry and number of plant species also contributed. Between the two years the number of macroinvertebrate species remained similar, 72 in 2000 and 74 in 2009, but the identity of the species within the pond communities differed. The conservation value of the pond communities between the two years did not significantly differ. With regards to conserving these Lizard ponds, turnover in ponds has not affected their biodiversity value and management should allow for such processes to take place." (Author) *Lestes sponsa* is the single odonate species mentioned.] Address: Rowan, B., School of Marine Science & Engineering, University of Plymouth, Drake Circus, Plymouth, PL4 8AA, UK

**14334.** Ugai, S.; Futahashi, R.; Kimura, K. (2010): The first migrate record of *Tramea loewii* Kaup in Brauer, 1866 from Japan. Gekkan-Mushi 475: 32-33. (in Japanese) [23-VI-1999] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14335.** Wiedergrün, M. (2010): Kartierung der Amphibien und Libellen im Bereich des Kotzenbrühls. Seminararbeit. Bernhard-Strigel-Gymnasium Memmingen: 23 pp, Karte. (in German) [Baden-Württemberg, Germany. *Calopteryx splendens*, *Aeshna cyanea*, *Sympetrum vulgatum*, *Libellula quadrimaculata*, *Coenagrion puella*, *Pyrrhosoma nymphula*] Address: not stated

## 2011

**14336.** Angeles Alvarez, M.; Torralba-Burrial, A. (2011): Confirmación de la presencia de la libélula amenazada *Oxygastra curtisii* (Dale, 1834) (Odonata: Corduliidae) en Asturias (N España). Boln. Asoc. esp. Ent. 35(3-4): 483-486. (in Spanish) [Confirmation of the presence of the threatened dragonfly *Oxygastra curtisii* (Dale, 1834) (Odonata: Corduliidae) in Asturias (N Spain): 25-VI-2011: Nalón River, Oviedo, 30TTN702979, 143 m a.s.l. and Ribera de Arriba, 30TTN688982, 135 m a.s.l. A female was photographed at 19-VIII-2011 at Oviedo, 30TTP627018, 110 m a.s.l.] Address: Torralba Burrial, A., Depto de Biología de



Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

**14337.** Anonymus (2011): New North American dragonfly named. *Argia* 23 (3): 13. (in English) [Cordulegaster saracenia = Sarracenia Spiketail] Address: not stated

**14338.** Buckland-Nicks, A.H. (2011): Mercury bioaccumulation in dragonflies (Odonata: Anisoptera) from two lakes in Kejimikujik National Park Nova Scotia. Bachelor of Science thesis, Acadia University: xi, 105 pp. (in English) ["Mercury biomagnification is a concern due to neurotoxic effects in higher trophic organisms. Dragonflies (Odonata: Anisoptera) are vectors for MeHg in aquatic and terrestrial food chains. Dragonfly naiads, adults, and exuviae were collected from two lakes in Kejimikujik National Park, Nova Scotia. Samples were dried, digested, and analyzed for methylmercury (MeHg), divalent mercury (Hg(II)), and total mercury (THg) using gas chromatography-atomic fluorescence spectroscopy (AFS). Big Dam West lake dragonfly samples had greater MeHg, Hg(II), and THg than Big Dam East; reflecting higher water mercury concentrations and indicating potential as biomonitors. MeHg concentrations in naiads (n=64) ranged widely (mean:  $0.2337 \pm 0.1129 \mu\text{g g}^{-1}$ ) and %MeHg was high (mean:  $92\% \pm 4\%$ ). Adults (n=28) had similar dry weight MeHg but higher wet weight MeHg and THg, and lower %MeHg than naiads. Exuviae (n=32) had 50-fold lower MeHg than naiads and adults but nearly equal Hg(II). Emerging adults had similar MeHg to naiads and mature adults; however, they had between 1.5 and 3-fold higher Hg(II). Bioaccumulation patterns of Hg(II) in dragonfly life stages may provide information on MeHg detoxification. MeHg and THg increased with naiad age and weight, with a large increase in variation. Oldest and heaviest naiads had both the lowest and highest MeHg. Hg(II) had an opposite pattern to MeHg, with concentrations and variation decreasing with age and weight. Results indicate that dragonflies may have mechanisms of MeHg detoxification; however, they still have a high potential for transferring substantial amounts of MeHg to aquatic and terrestrial food chains." (Author)] Address: Buckland-Nicks, Amy, Department of Earth and Environmental Science, Acadia University, Wolfville, NS, USA. E-mail: a.bucklan@gmail.com

**14339.** Cardoso, P. (2011): Habitats Directive species lists: urgent need of revision. *Insect Conservation and Diversity* 5(2): 169-174. (in English) ["(1.) The European Habitats Directive is the main legislative work regarding Europe's nature conservation policy. It lists the protected habitats and species in the European Union. The species lists include 122 arthropods. (2.) The current lists of arthropods (Annexes II and IV) present, possibly among other, five obvious biases: taxonomic, geographic, range, size and aesthetic biases. Species of selected taxa (Lepidoptera, Coleoptera, Odonata and Orthoptera), from Northern or Central Europe, relatively widespread, of a large body size and attractive are favoured over species of other taxa,

from southern and Mediterranean Europe, endemic or relatively small or inconspicuous. Such biases are obstacles to the effective protection of the European fauna. (3.) Two main strategies should be followed to avoid these problems and therefore increase the effectiveness of conservation policies: (i) the adoption of objective and transparent criteria for the listing of protected species, and (ii) implement regular updates and amendments to the lists based on such criteria." (Author)] Address: Cardoso, P., Smithsonian Institution, National Museum of Natural History, Washington DC, USA

**14340.** Corso, A. (2011): Migrating dragonflies as a food source for breeding Eleonora's Falcons and migrating raptors. *British Birds* 104: 670-675. (in English) ["In July 2009, during the boat trip from Lampedusa to Lampione (Italy, Mediterranean Sea), we encountered many migrant dragonflies at sea, mostly *Anax ephippiger* and *Sympetrum fonscolombii*. As we approached Lampione we realised that several Eleonora's Falcons *Falco eleonora*, which breed on the island, were actively hunting the dragonflies, which they caught readily in flight. Similar behaviour has previously been documented at other Sicilian sites, including Lampedusa, the Eolie Archipelago and Pantelleria (Lo Cascio 1999; pers. obs.). Lampione is a small islet (700 m x 180 m) and, compared with larger islands, attracts relatively few passerines during migration. At times when avian prey is scarce or absent, it seems likely that migrating dragonflies constitute an important food source for Eleonora's Falcons during the breeding season." (Author)] Address: Corso, A., Via Camastra, 10 - 96100 Siracusa, Sicily, Italy. E-mail: voloerrante@yahoo.it

**14341.** Do, M.C.; Bui, H.M.; Nguyen, V.K. (2011): Dragonflies of Phu Quoc Island, South Vietnam. *Agrion* 15(2): 54-57. (in English) ["Conclusion: The research updated five species of dragonflies for the Phu Quoc fauna, three of which are new records for Vietnam (*Amphicnemis gracilis*, *Coeliccia yamasakii* and *Lestes elatus*). The species named as "*Coeliccia yamasakii*" and *Elattoneura* sp. in Bui (2008) are probably undescribed species. *Lestes elatus* is a new record for the Vietnam fauna and it is considered misidentified by Bui (2008) as *Platylestes heterostylus*. Further study of dragonflies on the island is needed to understand fully the fauna of the area." (Authors)] Address: Do, M.C., Hom thu so 16, Buu Dien 10210, 35 Thai Thinh, Hanoi, Vietnam. E-mail: docuong@gmail.com

**14342.** Farkas, A.; Jakab, T. (2011): Data on the dragonfly (Odonata) fauna of the floodplain area Borsodi-Tisza-hullámter (NE-Hungary). *Studia odonatol. hung.* 13: 89-96. (in Hungarian, with English summary) ["The paper presents faunistical data on dragonflies (larvae, exuviae and adults) (*Stylurus flavipes*, *Gomphus vulgatissimus*) collected along the impounded reach of the River Tisza in the floodplain area Borsodi-Tisza-hullámter (a geographical microregion inside the mesoregion Közép-Tisza-vidék, NE-Hungary). Firstly the authors present the methods em-

ployed in the collection of the specimens and in data processing, and introduce the literature considered in the identification of species and in reporting faunistic data. Thereafter they provide a detailed survey of the faunistic results from the sampling sites and finally summarize and evaluate the data on the dragonfly fauna. Collections were made in 1 year (2009), with the participation of 1 specialists on 31 days and 6 localities altogether, in 3 cells (DT 87, DT 88, DT 89) of the 10×10 km UTM grid map. In the report information on 3311 specimens (with undetermined sex) is given in detail (3289 exuviae; further 10 larvae and 12 adults collected as dead specimens), representing altogether 202 faunistic data (10 larvae, 180 exuviae, 12 adults). In this study 2 species (2 Anisoptera) were recorded in the area out of which 1 belongs to the less frequent and 1 to the rare class of country-wide occurrence frequency." (Authors)] Address: Farkas, Anna, Department of Hydrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary. E-mail: flavipes@gmail.com

**14343.** Farkas, A.; Jakab, T.; Devai, G. (2011): Emergence behaviour of riverine dragonfly (Odonata: Gomphidae) larvae along the Tisza river system based on exuviae surveys. *Acta Biol. Debr. Oecol. Hung.* 26: 53-66. (in Hungarian, with English summary) ["Emergence behaviour of riverine gomphid larvae, i.e. emergence distance, selection of emergence support and mortality during emergence are discussed. The study was based on the systematic collections of exuviae at reaches of the rivers Tisza and Szamos with different characteristics. Notes were made about the chosen emergence structure and the distance from the water line. In addition, mortality events were also recorded at the river reach at Tiszafüred characterized by the highest abundance of gomphids. Based on our results the larvae of the studied species differ significantly in their distance travelled from the water line to the emergence site. It was confirmed, that among the studied gomphid species the larvae of the earliest emerging *G. vulgatissimus* move away the farthest from the water line. According to our data, the distance crawled by the larvae to the emergence site correlates positively with the water level and negatively with the water temperature. At a given river reach the ratios of supports chosen by the larvae were similar in the different species, while in the same species it varied in higher degree between the studied river reaches. Thus, support-selection for emergence was primarily dependent on the frequency of structures and the distance crawled from the water line. At Tiszafüred bird predation on the abundant *G. flavipes* caused significant mortality. In contrast, in the case of *G. vulgatissimus*, emerging in small numbers, mortality was found to be negligible." (Authors)] Address: Farkas, Anna, Dept of Hydrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary. E-mail: flavipes@gmail.com

**14344.** Futahashi, R.; Futahashi, H.; Shinbori, O. (2011):

The dragonflies and damselflies of Toyama Prefecture, Central Honshu, Japan in 2010. *Bull. Toyama Sci. Mus.* 34: 159-175. (in Japanese, with English summary) ["Here we report our collection and photograph data of odonate species from Toyama Prefecture in 2010. In 2010, we found 75 species from 11 families, and hybrids between *Anax nigrofasciatus nigrofasciatus* and *A. parthenope julius*, and between *Sympetrum eroticum eroticum* and *Sympetrum kunckeli*. The following 13 species were not found in 2010 (the last collection year in parenthesis); *Paracerion melanotum* (2006), *Sympecma paedisca* (2009), *Anax guttatus* (2005), *Aeschnophlebia anisoptera* (2008), *Gomphus postocularis* (1972), *Nihonogomphus viridis* (2006), *Onychogomphus viridicostus* (1959), *Sympetrum danae* (2001), *S. depressiusculum* (2009), *S. fonscolombii* (2006), *S. striolatum imitoides* (2004), *S. vulgatum imitans* (2005), and *Tholymis tillarga* (2007)." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14345.** Khelifa, R.; Youcefi, A.; Kahlerras, A.; Alfarhan, A.; Al-Rasheid, K.A.S.; Samraoui, B. (2011): L'odonatofaune (Insecta: Odonata) du bassin de la Seybouse en Algérie: intérêt pour la biodiversité du Maghreb. *Revue d'écologie* 66(1): 55-66. (in French, with English summary) ["An odonatological survey of the wadi Seybouse watershed, Northeastern Algeria, was carried out over a period of two years. Thirty five species were recorded in this previously uncharted region, including *Calopteryx exul* and *Trithemis kirbyi*. The former species, a Maghrebian endemic, has been rediscovered in Algeria after more than a century of apparent absence and the species, classified as "Endangered" in the IUCN Mediterranean Red List, is represented in Algeria by only the Seybouse population. An efficient conservation plan is needed to prevent the extinction of this emblematic species. *T. kirbyi*, a desert species, has considerably extended its range northward. Anthropogenic impacts were noted for the majority of sampled stations and this pressure does not bode well for the conservation of the biodiversity of wadi Seybouse. The distribution and status of each recorded species were also discussed." (Authors)] Address: Khelifa, R., Dépt d'écologie et du génie de l'environnement, Faculté des Sciences de la Nature et de la Vie et des Sciences de la Terre et de l'Univers, Université 08 Mai 1945, Guelma 24000, Algeria

**14346.** Kitayama T.; Futahashi, R. (2011): The first record of an interspecific hybrid between *Anax nigrofasciatus nigrofasciatus* Oguma, 1915 and *Anax parthenope julius* Brauer, 1865 from Okayama Prefecture, Honshu, Japan. *Tombo* 53: 119-120. (in Japanese, with English summary) ["A male of interspecific hybrid between *Anax nigrofasciatus nigrofasciatus* Oguma, 1915 and *Anax parthenope julius* Brauer, 1865 was recorded at 2-VIII-2009 in Tomiliara. Kitaku. Okayama-shi, Okayama Prefecture. Honshu, Japan. This is the first record from Okayama Prefecture. This specimen has intermediate characteristics between *A. n. n.* and *A. p.j.* and mixed nuclear DNA sequences of these

two species. Notably, this specimen caught a female of *A. p.j.* but failed to mate." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14347.** Li, S.-y. (2011): Preliminary report on national edible insect resources in Pu'er Yunnan. *Southwest China Journal of Agricultural Sciences* 24(03): 1195-1202. (in Chinese, with English summary) [China; 152 insects have been selected as edible, among them *Crocothemis servilia*, *Pantala flavescens*, *Sinictinogomphus clavatus*, *Letes praemorsus*.] Address: Li, Sun-yang, Simao Teachers College, Yunnan Puer 665000, China

**14348.** Olberg, R.M. (2011): Visual control of prey-capture flight in dragonflies. *Current Opinion in Neurobiology* 22: 1-5. (in English) ["Interacting with a moving object poses a computational problem for an animal's nervous system. This problem has been elegantly solved by the dragonfly, a formidable visual predator on flying insects. The dragonfly computes an interception flight trajectory and steers to maintain it during its prey-pursuit flight. This review summarizes current knowledge about pursuit behavior and neurons thought to control interception in the dragonfly. When understood, this system has the potential for explaining how a small group of neurons can control complex interactions with moving objects." (Authors)] Address: Olberg, R.M., Dept of Biological Sciences, Union College, 807 Union Street, Schenectady, NY 12308, USA. E-mail: olbergr@union.edu

**14349.** Orłowski, G.; Karg, J. (2011): Diet of nestling Barn Swallows *Hirundo rustica* in rural areas of Poland. *Cent. Eur. J. Biol.* 6(6): 1023-1035. (in English) [In 3 of 3,152 cases *Calopteryx* sp. was prey of the Barn Swallows.] Address: Orłowski, G., Institute of Agricultural and Forest Environment, Polish Academy of Sciences, 60-809 Poznan, Poland. E-mail: orlog@poczta.onet.pl

**14350.** Pham, T.T. (2011): A real-time neural signal processing system for dragonflies. MSc. thesis, Dept Electrical & Computer Engineering, University of Arizona: 93 pp. (in English) ["This thesis focuses on hybrid bio-robotics (robots incorporating living animals as sensors) and visual electrophysiology in insects. The motivation of this study is solving a current problem of perception in neuromorphic systems. When imitating biological sensors, we have not completely understood the early processing of the input to reproduce artificially. Building hybrid systems with both artificial and real biological components is a promising solution. In hybrid bio-robots using a dragonfly as a living sensor, the early processing of visual information is performed fully in the brain of the dragonfly. The only significant remaining tasks are recording neural signals and processing, along with interpreting neural information in software and/or hardware for a robot platform. Based on existing works which focused on recording neural signals,

this thesis adds a software application of neural information processing to make a visual processing module for dragonfly hybrid bio-robots. After a neural signal is recorded in real-time, spikes of this signal can be detected either promptly by a hardware module using a simple threshold-based detection method or more accurately by a software module using an energy-based detection algorithm. Features of spikes are then extracted using a wavelet decomposition method. Finally, the system matches spikes with templates to find relevant neurons. The output of the whole visual processing module will be used to control other parts of a dragonfly hybrid bio-robot." (Authors)] Address: Pham, Thuy T., Dept of Electrical and Computer Engineering and Department of Neuroscience, University of Arizona, AZ USA 85716

**14351.** Szalay, P.E. (2011): Book review [BROOKS, S. (edit.) 2010: Field guide to the dragonflies and damselflies of Great Britain and Ireland. 4th revised edition. – British Wildlife Publishing, Gillingham, 160 pp. *Studia odonatol. hung.* 12: 93-95. (in Hungarian) [book review] Address: Szalay, P.E., Dept of Hydrobiology, Centre of Arts, Humanities & Sciences, Faculty of Science and Technology, Univ. of Debrecen, Egyetem tér 1, 4032 Debrecen, Hungary

**14352.** Szalay, P.É.; Gyulavári, H.A.; Szabó, L.J.; Miskolczi, M.; Cserhádi, C.S.; Dévai, G (2011): Comparative morphometric analysis of male adults of small red-eyed damselfly (*Erythromma viridulum* CHARPENTIER, 1840) collected from four North-East Hungarian populations. *Studia odonatol. hung.* 12: 5-32. (in Hungarian, with English summary) ["Our objective was to develop a reference baseline for this species of discussed taxonomical status relying on populations from the Pannonian Ecoregion, in order to provide a starting point for later comparisons. Specimens were collected at four NE-Hungarian water bodies representing different types. For each population 16 body marks and 9 wing marks in 15 male adults were analysed, respectively. The mean, minimum, maximum and deviation values; the difference between the minimum and maximum values relative to the mean, as well as the coefficients of variation were calculated. The position of the populations was described via principal component analysis and cluster analysis supported by KRUSKAL&WALLIS and MANN&WHITNEY tests. The strength of correlation between the marks was evaluated via linear regression analysis. Our results suggest that on the basis of all marks and wing marks the population from Kati-ér is the most distinct, whilst individuals from Bodzási-nyágyödrök or Tisza-hullámtér differ most considerably from the other three populations on the basis of body marks." (Authors)] Address: Szalay, P.E., Dept of Hydrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, Univ. of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary

**14353.** Terzani, F.; Fabbri, R. (2011): *Odonata del Parco Nazionale delle Foreste Casentinesi, Monte Falterona e Campigna (Appennino Settentrionale)*. *Quaderno di studi*



e notizie di storia naturale della Romagna 34: 21-46. (in Italian, with English summary) [Italy; "19 taxa of Odonata were reported so far by literature from the Casentine Forests National Park. The field researches carried out by the authors in the National Park and close surroundings, with some additional data from other collections, increase the number to 33 taxa, by addition of 14 taxa. 324 records with collection data are listed: 67 are reported from literature and 257 are unpublished records." (Authors)] Address: Terzani, F., Mus. Stor. Nat. "La Specola", Univ. Firenze, via Romana 17, I-50125 Firenze, Italy

**14354.** Trapero Quintana, A.D.; Reyes-Tur, B.; Cuellar Araújo, N. (2011): Esfuerzo de muestreo necesario para estimar la riqueza específica máxima en tres comunidades de Odonata en Cuba empleando exuvias. *Boletín de la SEA* 49: 285-290. (in Spanish, with English summary) ["Sampling effort needed to estimate maximum species richness of three Odonata communities in Cuba using exuviae. - Difficulty in recording all species in a given area is common in biodiversity inventories. The aim of this study is to estimate the minimum sampling effort needed to record the maximum richness of odonates in three freshwater habitats of Santiago de Cuba when only exuviae are sampled. Odonate exuviae were collected weekly in an 8 m<sup>2</sup> area in each locality during one year. With this methodology, for the three communities, 30 samples were needed to obtain maximum species richness, according to von Bertalanffy's model." (Authors)] Address: Trapero Quintana, A., Departamento de Biología de la Universidad de Oriente, Patricio s/n, Santiago, Cuba, CP 90500, Cuba. E-mail: atrapero@cnt.uo.edu.cu

**14355.** Vajda, C.; Szabó, L.J.; Miskolczi, M.; Devai, G. (2011): The morphometry of adult Southern Emerald Damselfly [*Lestes barbarus* (FABRICIUS, 1798)] based on the study of a population in North-East Hungary. *Studia odonotol. hung.* 13: 5-25. (in Hungarian, with English summary) ["There is very few data in the literature about the morphometry of dragonfly species including *Lestes barbarus*. Our work aimed at increasing the amount of data concerning this species, exploring the variation in the focal marks and comparing the sexes. The study is based on the body- and wing-marks of 15 male and 15 female adults from the marsh Fancsikai-mocsár, North-East Hungary. We measured the following parameters: total body length, total abdomen length, five marks on the head, two on the legs, 12 on the anal appendages of the males and seven on the abdominal tip of the females. We measured the area of the wings and the distance between eight selected points on them. The cross-veins in three rows of cells and the cells in eight rows of cells were counted as well. We used not only the mean, SD, maximum and minimum values to the comparison, but the coefficient of variation and the difference between the minimum and maximum values relative to the mean values. Furthermore we used SHAPIRO & WILK, Student-t and MANN & WHITNEY tests, principal component analysis, canonical discriminant analysis and linear regression between selected

marks. We found that total body length and total abdomen length of the males were significantly larger than the females', although females were significantly larger in the marks of head, legs and in wing-size. In case of the body-marks, variance was more significant in the abdominal tip. Considering the wings, larger differences were found in the number of cross-veins and cells. Principal component analysis showed a slight overlap in the convex hull of the body-marks and the wing-sizes of the two sexes, while discriminant analysis showed a full separation in both cases. Linear regression showed highly significant correlation for 20 mark-pairs but found no significant correlation in 68 cases. The total body length showed the maximal number of highly significant correlations, while the most numerous correlations with the different marks were at the head's marks." (Authors)] Address: Vajda, C.S., Department of Hydrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary

**14356.** Wutai, Y.; Peng, J.; Yang, X. (2011): A preliminary study of Hengshui Lake Odonata fauna and diversity. *Modern Rural Science and Technology* 2011(Section 04): 63-64. (in Chinese) [Hebei, China; the following odonate species had been recorded in summer 2010: *Anax parthenope*, *Pantala flavescens*, *Deiella phaon*, *Crocothemis servilia*, *Brachythemis contaminata*, *Rhyothemis fuliginosa*, *Sympetrum hypomelas*, *Orthetrum albistylum*, *O. melania*, *Ischnura elegans*, and *Copera annulata*.] Address: Wutai, Y., Hebei Hengshui College of Life Science, China

## 2012

**14357.** Anonymus (2012): Gayle Thomas Strickland — Obituary. *Argia* 24(4): 9. (in English) [6-X-1931 - 13-X-2012] Address: not stated

**14358.** Bot, S. (2012): Observation of *Gomphus vulgatissimus* along the Drentsch Aa in June 2011. *Brachytron* 15(1): 53-55. (in Dutch, with English summary) ["On 4 June, 2011, two individuals of *Gomphus vulgatissimus* were observed in National Park the Drentsche Aa (Drenthe). A male was captured and photographed. This observation constitutes the northernmost sighting in the Netherlands. There is one historical record of an earlier sighting at the same location. The species is expanding its range in the Netherlands, so the sighting was not unexpected. It remains unknown whether the individuals were casual vagrants, or whether they originated from a local population. As additional observations have been done in June 2012, it is to be expected that the Drenthse Aa area holds a population." (Author)] Address: Bot, S., Postbus 41139, 9701 CC Groningen, The Netherlands. E-mail: sanderbot@yahoo.co.uk

**14359.** Brees, A.; Johnson, A.; Drey, K. (2012): *Ophiogomphus westfalli* (Westfall's Snaketail), a new species for Iowa. *Argia* 24(4): 17-19. (in English) [16-VI-2010, Boone River, Boone Forks Wildlife Area, Hamilton County, Iowa,

USA] Address: Brees, A., 6759 NW 6th Drives, Des Moines, Iowa, 5023, USA. E-mail: abrees@hotmail.com

**14360.** Brochard, C.; van der Ploeg, E. (2012): Something completely different... Epallage fatime. *Brachytron* 15(1): 58-63. (in Dutch, with English summary) ["Epallage fatime can be found in south-eastern Europe, where it lives in rocky streams and rivers. The adult male is blue in coloration, the female black with blue dots and a black, yellow-striped thorax. The larvae are unique within the European dragonfly-fauna. Instead of leaf-like procts, it has balloon-shaped appendages. For respiration, the gills on the underside of the abdomen are more important than the procts, which occurs rarely in dragonflies around the world. The body of the larva is flattened. It lives underneath rocks in fast-flowing waters and is incredibly difficult to find." (Authors)] Address: Brochard, C., Marsstraat 77, 9742EL Groningen, The Netherlands. E-mail: info@cbrochard.com

**14361.** Broek, van den, T.G.Y. (2012): A design that did not make it: *Aeshna cyanea* on a banknote. *Brachytron* 15(1): 64-67. (in Dutch, with English summary) ["In the 1980s in preparation of the introduction of a new series of Dutch guilder banknotes, a design of a 100 guilder bill was made with a Southern Hawker (*Aeshna cyanea*) as its theme. *A. cyanea* at that time stood a chance of becoming the best-known dragonfly in the Netherlands. This design was not used but was displayed to the public for the first time in the Money Museum in Utrecht in 2009. The banknote was designed by Rob Schröder. It also shows a Northern Pike (*Esox Lucius*) and fragment of a poem by the Dutch poet Leo Vroman." (Author)] Address: van den Broek, T., Van Humboldtstraat 119, 3514 GN Utrecht, The Netherlands. E-mail: bombina@anajatim.demon.nl

**14362.** Buczynski, P. (2012): Dragonflies (Odonata) of the left-bank Bug River valley between Włodawa and Kodeń (middle-eastern Poland). *Zeszyty naukowe uniwersytetu Szczecińskiego NR 728 Acta Biologica* 19: 47-69. (in English, with Polish summary) ["The presented paper analyses the occurrence of dragonflies in the left-bank (Polish) part of the Bug River valley between Włodawa and Kodeń (65 km of the river course, 51°32'–51°55' N, 23°31'–23°38' E). In total, 40 species were recorded. The key sites for dragonflies were oxbow lakes, the Bug River and its tributaries. Species diversity was found to be relatively low due to a lack of peatlands and dystrophic waters, as well as strong astatism of small water bodies. The effects of strong water pollution in the Bug River were evident. The species composition of dragonflies was typical, but densities of Gomphidae (particularly *Ophiogomphus cecilia*) suggested an adverse state of the environment. This is caused by surface runoffs of agricultural wastewater in Poland, but also by strongly polluted rivers in the territory of Ukraine. The study includes a review of earlier research conducted in the upper course Bug River valley. Considering both the old and new data, 54 dragonfly species were recorded in the Middle Bug River valley between

Golêbie and Kodeń (246 km of the river course at the border of Poland with Ukraine and Belarus). It is an area of high importance for the protection of dragonflies in terms of species diversity and species assemblages." (Author)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**14363.** Dragonfly Society of the Americas (2012): *Argia* 24(4). *Argia* 24(4): 29 pp. (in English) [Second Notice 2013 DSA Annual Meeting: 1; Calendar of Events: 1; Don't Forget to Renew Your Membership! :3; 2013 Southeast DSA Regional Meeting: 3; Boreal or Bust—the 2012 Joint NE DSA and Great Lakes Odonata Meetings: 4; Request for Specimens: 5; The 2012 Annual Dragonfly Festival at Bitter Lake NWR: 6; Final 2012 Treasurer's Report: 7; Photos Needed for *Argia*: 9; DSA is on Facebook: 9; The Nick and Ailsa Donnelly Fellowship: 21; *Argia* is Going All-Digital!: 27; Some Possible Mis-Uses of GPS: 28; New Book Announcements: 28; Advice Column: 29.] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**14364.** Eggers, J.T. (2012): Effects of substrate on habitat selection by libellulid dragonflies. Ms. thesis, Northern Illinois University: 88 pp. (in English) ["Habitat selection is a complex process with both biotic and abiotic factors acting to influence the habitat a species occupies. Larvae of the odonate family Libellulidae are predominantly benthic, although some species are frequently associated with vegetation rooted in the sediments. The purpose of this study was to investigate how sediment type influences habitat selection in larvae of four libellulid species: *Pachydiplax longipennis*, *Libellula quadrimaculata*, *Tamea lacerata*, and *Libellula luctuosa*. Another aim was to investigate the influences of vegetation, prey availability, and predators on habitat selection. Both laboratory and field data were utilized in this study. The laboratory research consisted of eight experiments. Experiments 1–4 were designed to determine if sediment type was a factor in habitat selection in the presence and absence of different vegetation types. Experiment 5 and 6 examined the influence of prey availability and hunger with respect to sediment and vegetation. To determine if characteristics of a habitat alter the larva's response to a predator, Experiment 7 was designed to expose larvae to different combinations of sediment and vegetation with and without a predator present. Experiment 8 examined influences of sediment type in early instar larvae habitat selection. Field data was obtained via dragonfly larval sampling from May to October 2011. In laboratory experiments, libellulid larvae discriminated among sediment despite influences from other factors such as vegetative structure, prey availability, and predator presence. Whether the simulated vegetation was with screening or plants, larvae were found significantly more often with vegetation than bare soil with the exception of *L. quadrimaculata*. With the addition of a predator, all species of larvae were observed closer to the predator cage when on the previously established "preferred" soil

type than when on the other sediments. With the addition of prey, there was no difference in habitat selection between starved and fed individuals except in the case of *P. longipennis*. The most distinct similarity in the results for all four species was a significant avoidance of sand. Field data showed that the four species in this study demonstrated non-random association with substrate. The larvae species studied were found most often in natural sites that reflected the established "preferred" substrate from lab experiments, except in the case of *T. lacerata* larvae. For *T. lacerata*, substrate composition may be less important in habitat selection than other factors." (Author)] Address: Eggers, Jennifer Terese,

**14365.** Farkas, A.; Móra, A.; Devai, G. (2012): Mortality during emergence in *Gomphus flavipes* and *G. vulgatissimus* (Odonata: Gomphidae) along the Danube. *Acta Biol. Debr. Oecol. Hung.* 28: 65-82. (in Hungarian, with English summary) ["The mortality during emergence of the two closely related Hungarian Gomphus species was studied along the branches of the River Danube surrounding the island Szentendrei-sziget. Exuviae, dead and damaged specimens as well as dragonfly wings left behind by birds were collected daily to quantify the rates and the causes of mortality. The mortality rate remarkably differed between the species, such as the factors contributing to mortality. Total mortality during emergence proved to be relatively low in both species, but it was nearly two times higher (6.37%) in *G. flavipes* than in *G. vulgatissimus* (3.4%). In *G. vulgatissimus* mortality was mainly attributed to predation (1.36%) and natural physical factors (1.36%), particularly weather conditions. Whereas, in *G. flavipes* predation and artificial waves (generated by watercrafts) accounted for the major part of mortality (3.44% and 2.16% respectively). Our results suggest that the differences between the two species in mortality are in relation with the population size and the emergence strategy. Although the artificial waving influenced a small proportion of *G. flavipes* population, it should be considered as an important factor in point of view of nature protection." (Authors)] Address: Farkas, Anna, Dept of Hydrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary. E-mail: flavipes@gmail.com

**14366.** Fontana-Bria, L.; Frago, E.; Selfa, J. (2012): Nuevas citas de *Onychogomphus costae* Sélys, 1885 (Odonata: Gomphidae) del este de la Península Ibérica. *Boletín de la S.E.A.* 50(1): 573-574. (in Spanish, with English summary) ["New records of *O. costae* from València province (eastern Spain) are reported, which corroborate its presence in this region but warn of the need for its protection." (Authors)] Address: Frago, E., Laboratory of Entomology, Wageningen University, Droevendaalsesteeg 1, Building 107, 6708 PB Wageningen, The Netherlands. E-mail: enric.frago@wur.nl

**14367.** Futahashi, R.; Yamanaka, T.; Uemura, Y.; Hisamatsu, M. (2012): Collection and photographic data on

dragonflies and damselflies from Ibaraki Prefecture. *Bulletin of Ibaraki Nature Museum* 15: 13-38. (in Japanese, with English summary) ["Ninety-one odonate species have so far been reported in Ibaraki Prefecture. Here we give a comprehensive list of Odonata collected from Ibaraki Prefecture based on the collections of Ibaraki Nature Museum and the authors' private collections, which consist of 87 species and one hybrid species. We also mention the following four species which are not included in these collections: *Stylurus oculatus*, *Sympetrum uniforme*, *Libellula angelina*, and *Tholymis tillarga*. The former three species may have become extinct in Ibaraki Prefecture, and the last species seems to be a species migrating from a southern area." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14368.** Futahashi, R.; Futahashi, H.; Shinbori, O. Kawamura H. (2012): The dragonflies and damselflies of Toyama Prefecture, Central Honshu, Japan in 2011. *Bull. Toyama Sci. Mus.* 36: 27-53. (in Japanese, with English summary) ["Here we report our collection and photograph data of odonate species from Toyama Prefecture in 2011. In 2011, we found 76 species from 11 families, and hybrids between *Anax nigrofasciatus nigrofasciatus* and *A. parthenope julius*, and between *Sympetrum eroticum eroticum* and *Sympetrum kunckeli*. The following 12 species were not found in 2011 (the last collection year in parenthesis); *Paracercion melanotum* (2006), *Sympecma paedisca* (2009), *Anax guttatus* (2005), *Gomphus postocularis* (1972), *Sinogomphus flavolimbatus* (2010), *Nihonogomphus viridis* (2006), *Onychogomphus viridicostus* (1959), *S. danae* (2001), *S. fonscolombii* (2006), *S. striolatum imitoides* (2004), *S. vulgatum imitans* (2005), *Trapezostigma virginia* (2010) and *Tholymis tillarga* (2007). (Authors)] Address: Futahashi, R., Nat. Inst. of Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14369.** Futahashi, R. (2012): *Sympetrum fonscolombii* (Selys, 1840) and the interspecific hybrid between *Anax nigrofasciatus nigrofasciatus* Oguma, 1915 and *Anax parthenope julius* Brauer, 1865 taken in Tsukuba, Ibaraki Prefecture. *Aeschna* 48: 45-46. (in Japanese, with English summary) ["A male of *S. fonscolombii*, and a male of interspecific hybrid between *Anax nigrofasciatus nigrofasciatus* and *Anax parthenope julius* captured in Tsukuba, Ibaraki Prefecture, Japan is reported. This is the first record of *S. fonscolombii* in Ibaraki Prefecture. The hybrid specimen had intermediate characteristics between *A. n. n.* and *A. p. j.*, and was confirmed by nuclear DNA analysis." (Author)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14370.** Geraeds, R.; Muusse, T.O.V. (2012): The rediscovery of *Coenagrion mercuriale* in the Dutch province of



Limburg. *Brachytron* 15(1): 25-3. (in Dutch, with English summary) ["*C. mercuriale* has always been rare in the Netherlands. Only two reliable sightings are known: in 1903 and 1926. However, on the 1st of June 2011, four or five male Southern damselflies were found in the Beesels Broek in the Dutch province of Limburg. In the following days. Southern damselflies were seen almost daily up and until the 13th of June; after the 13th none were spotted. Only males were seen, maximally five animals at a time. All animals were seen along a small part of the Huilbeek brook and a small seepage stream. Both streams do not look wry suitable for the species. There is a lack of submerged vegetation that is suitable as larval habitat. Besides that, the Huilbeek brook is densely grown with *Phragmites australis*. Because of this, and the short 13-day period (early in the flight period that animals were seen), it is possible that there is no population present in this area of the Beesels Broek. It is most likely that the damselflies are vagrants from a nearby (undiscovered) population." (Authors)] Address: Geraeds, R.P.G., Bergstraat 70, NL-6131 AW Sittard, The Netherlands

**14371.** Geraeds, R. (2012): Habitat of larvae of *Gomphus vulgatissimus* in some streams in the Dutch province of Limburg. *Brachytron* 15(1): 3-15. (in Dutch, with English summary) ["The locations and timing of emergence of Gomphidae in the river Rur have been thoroughly investigated in recent years. It is assumed that gomphid dragonflies generally emerge close to their larval habitat. Since surveys of actual larval habitats in the Netherlands have been very rare, four transects of the Rur were checked for the presence of larvae of Common Clubtail (*Gomphus vulgatissimus*) during the years 2006-2009. The aim of this study was to discover what type of substrate the larvae prefer, and if the places where the dragonflies emerge are indeed situated close to the actual larval habitats. The larvae were caught with a hand brailer, which is normally used for fish and amphibian surveys. For each of the larvae caught, the type of substrate in which it was caught and its distance to the river bank were noted. Most of the 615 larvae were found within one metre distance of the river bank, and almost 50% even within 0,5 metre from the bank. The largest distance from the bank at which larvae were caught was 5 metres. Most larvae were found in mixed substrates, dominated by a combination of silt and detritus. Only a few larvae were found in substrates dominated only by silt, detritus, sand or gravel. Because the river Rur is too deep to investigate the whole streambed, it was not certain if the results were a good representation of the actual situation. Therefore, in 2009 and 2010 three smaller streams were investigated, using the same method as in 2006-2009. During this period, 51, 108 and 62 larvae were caught in the rivers Swalm, Vlootbeek and Worm respectively. These results were similar to the situation in the river Rur. In the three streams most larvae (53% to 63%) were caught within 0,5 metre from the bank as well. Same as in the Rur most larvae were found in mixed substrates, which were dominated by a combination of silt and detritus. In substrates that consisted of just

one type, almost no larvae were caught. Most likely, the preference for locations near the river banks is a result of the greater diversity in types of substrate. Further up the streambed, the streaming velocity is too high for sedimentation of silt and detritus. Therefore, the diversity of types of substrate is much higher along the banks. The majority of larvae of *Gomphus vulgatissimus* were found close to the banks, and it is most likely that they emerge near the larval habitat." (Author)] Address: Geraeds, R.P.G., Bergstraat 70, NL-6131 AW Sittard, The Netherlands

**14372.** Hatfield, J.K. (2012): New records for Taylor Co., Texas. *Argia* 24(4): 11. (in English) [19 species are added to the regional list from surveys on 17-IV-2012 and 31-VII-2012; most interesting are *Phyllogomphoides albrighti* and *Erythemis plebeja*.] Address: Hatfield, J.K., Lubbock, Texas, USA. E-mail: dragonflywatcher1029@yahoo.com

**14373.** Hatfield, J.K. (2012): Pale-faced Clubskimmer (*Brechmorhoga mendax*) in the Texas Panhandle. *Argia* 24(4): 11. (in English) [Spring 2012, Llano Estacado Audubon Society Trail off Buffalo Springs Lake, Lubbock Co., Texas, USA] Address: Hatfield, J.K., Lubbock, Texas, USA. E-mail: dragonflywatcher1029@yahoo.com

**14374.** Hoppenbrouwers, P. (2012): Observation of solitary oviposition by *Anax parthenope* in the Millingerwaard, The Netherlands. *Brachytron* 15(1): 31-35. (in Dutch, with English summary) ["Solitary oviposition of *Anax parthenope* was observed on 12th July 2006 in the Millingerwaard, near Millingen aan de Rijn in the province of Gelderland. This happened in a relatively small pond, circa 100 by 20m and with a maximum depth of 1,5m. This is the first documented observation of oviposition of *Anax parthenope* in the Netherlands. Oviposition and reproduction in The Netherlands are discussed, as well as identification, habitat preference and the occurrence of the species in Northwestern Europe." (Author)] Address: Hoppenbrouwers, P., Wijnbesstraat 69, 6543 TK Nijmegen, The Netherlands. E-mail: peter.hoppenbrouwers@planet.nl

**14375.** Joger, U.; Dujsebayaeva, T.; Belyalov, O.V.; Chikin, Y.; Guicking, D.; Grachev, Y.A.; Kadyrbekov, R.; Miaud, C. (2012): Fauna of the Aralkum. In: Breckle, S.W., W. Wucherer, L.A. Dimeyeva & N.P. Ogar (eds.): *Aralkum - a man-made desert. The desiccated floor of the Aral Sea (Central Asia)*. *Ecological Studies* 218: 199-269. (in English) ["The fauna of the Aralkum has been studied only partly. But the lists of mammals of the Kazakhstan part of the Aral Sea region, the migratory breeding bird species and rare winter visitors, the resident breeding bird species, passage visitors (birds), vagrant birds, reptiles collected around Aral Sea in 2002-2004, and taxonomical diversity of insect orders and other groups are documented. The ecological disaster of the Aral Sea reduced the faunistic diversity of the area in a selective manner. Aquatic and semiaquatic animal species such as fish-eating birds, waterfowl, Amphibia, water snakes and aquatic insects suffered dramatic reductions in numbers. Some freshwater

species and species of riverine forest died out or left the area completely. On the other hand, desert species and certain eurybionts were able to extend their ranges into the Aralkum. Further monitoring of the fauna of the Aralkum is strongly recommended to document the very active migrations to and invasions of the dynamic new ecosystems." (Author) In table 11.13 *Ischnura aralensis*, *Calopteryx virgo*, *Anax imperator*, *Orthetrum sabina*, and *Selysiothemis nigra* are classified as "Rare insect species of the Aral Sea".] Address: Joger, U., Staatliches Naturhistorisches Museum, Pockelsstr. 10, 38106 Braunschweig, Germany. E-mail: ulrich.joger@snhm.niedersachsen.de

**14376.** Kis, O.; Vajda, C.; K'zér, K.; Szabó, L.J.; Miskolczi, M.; Cserhatis, C.; Gyulavari, H.A.; Devai, G. (2012): Morphometric study of an adult Dark Emerald Damselfly [*Letes macrostigma* (Eversmann, 1836)] population from a Hungarian alkaline pond. *Studia odonotol. hung.* 14: 81-102. (in Hungarian, with English summary) ["Although exact information about different species are necessary for ecological and hydrobiological researches we found very few about the *L. macrostigma*. So our aim was to provide more information concerning this species. Furthermore we explored the variation of the examined body and wing traits and compared the sexes. The study is based on male and female adults collected from a Hungarian alkaline pond (Kelemen-szék) in the area between the rivers Danube and Tisa. Our results showed that males had larger body than females however this difference was not significant. Females nevertheless had significantly bigger head and wings. The multivariate analysis could not divide the sexes clearly based on body traits, but based on the wing measurements. Interestingly the traits of the head was correlated mostly with other traits." (Authors)] Address: Devai, G., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

**14377.** Konischuk, V.V.; Mosyakin, S.L.; Tsarenko, P.M.; Kondratyuk, S.J.; Borysova, O.; Virchenko, V.; Prydyuk, M.P.; Fitsaylo, T.; Havrys, G.G.; Tytar, V.M.; Shupova, T.V. (2012): [Red book of Kyiv region]. *Agroecological Magazine* • 3 • 2012: 46-58. (in Ukrainian) [The Red List considers *Coenagrion armatum*, *Sympecma paedisca*, *Aeshna viridis*, *Leucorrhinia caudalis*, *L. pectoralis*, *Anax parthenope*, *Stylurus flavipes*.] Address: Tytar, V.M., Institut Zoolo- gii II, Schmalhausen NAS of Ukraine, Kiev

**14378.** Konovalova, Y.; Buy, D.D. (2012): List of dragonfly species (Insecta: Odonata) from Pereyaslav-Khmel'nitsky District of Kyiv Region. *The Kharkov Entomol. Soc. Gaz.* 20(1): 15-22. (in Ukrainian, with Russian and English summaries) ["Updated list of dragonfly species from Pereyaslav-Khmel'nitsky District of Kiev Region (Ukraine) is compiled based on both the original and literature data. It includes 32 species. *Gomphus flavipes*, *Anax imperator*, *Aeshna viridis*, and *Leucorrhinia pectoralis* are currently recognized as threatened species. *Gomphus vulgatissimus* and *Crocothemis erythraea* are reported from the district for the first time." (Author)] Address: Buy, D.D., Kiev

National University, ul. Vladimirska, 64, Kiev, 01033, Ukraine. E-mail: -exploder\_@ukr.net

**14379.** Missouri Department of Natural Resources (2012): Biological Assessment Study Report: Logan Creek, Reynolds County. September 2011 – March 2012. Prepared for: Missouri Department of Natural Resources, Division of Environmental Quality, Water Protection Program, Water Pollution Control Branch. Prepared by: Missouri Department of Natural Resources, Field Services Division, Environmental Services Program, Water Quality Monitoring Section: 32 pp. (in English) ["Conclusions: Based on this study, there may be a conclusion drawn that Logan Creek is not biologically sustainable to benthic macroinvertebrates. The lack of fully supporting MSCI scores is most likely the result of metals impairment, particularly lead, from mine discharge." (Authors) Two samples at two stations resulted in the following Odonata taxa: Station #1: (1) *Argia*, *Basiaeschna janata*, *Enallagma*, *Gomphidae*, *Hagenius brevistylus*, *Macromia*, *Stylogomphus albistylus*; (2) *Argia*, *Calopteryx*, *Enallagma*, *Gomphidae*, *Hagenius brevistylus*, *Helocordulia*, *Libellula*, *Macromia*. Station #2: (1) *Argia*, *Calopteryx*, *Enallagma*, *Gomphidae*, *Hagenius brevistylus*, *Macromia*, *Stylogomphus albistylus*; (2) *Argia*, *Calopteryx*, *Enallagma*, *Gomphidae*, *Hagenius brevistylus*, *Hetaerina*, *Libellula*, *Macromia*] Address: Dept of Natural Resources, Field Services Division, Environ. Services Program, Water Quality Monitoring Section

**14380.** Padelford, L.; Padelford, B.; Schmid, R. (2012): First report of Black Meadowhawk (*Sympetrum danae*) from Nebraska. *Argia* 24(4): 13. (in English) [21-IX-2012, Fontenelle Forest, Bellvue, Sarpy County, Nebraska, Texa; 22-IX-2012, Heron Haven, Omaha, Douglas Co., Nebraska, USA.] Address: Padelford, Loren, 1405 Little John Rd, Bellevue, Nebraska, 68005, USA. E-mail: lpdfrd@cox.net

**14381.** Patten, M.A.; Smith-Patten, B.D. (2012): First record of the Atlantic Bluet (*Enallagma doubledayi*) for Oklahoma. *Argia* 24(4): 16-17. (in English) [2-IX-2012, McGee Creek Wildlife Management Area, Atoka Co., Oklahoma, USA] Address: Patten, M.A., Oklahoma Biological Survey, University of Oklahoma, Norman, OK 73019, USA. E-mail: mpatten@ou.edu

**14382.** Paulson, D.; Smallshire, D. (2012): Mass movement of Spot-winged Gliders (*Pantala hymenaea*) in Panama. *Argia* 24(4): 22-23. (in English) [01-IX-2012, Canal Area, Panama (9.08°N 79.65°W)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@pugetsound.edu

**14383.** Prieto-Lillo, E.; Selfa, J. (2012): Ejemplar teratológico de *Gomphus simillimus* (Sélys, 1840) (Odonata: Gomphidae). *Boletín de la S.E.A.* 50(1): 543-544. (in Spanish, with English summary) [Iberian Peninsula, Valencia, Spain; "A teratological specimen of *G. simillimus*, with a malformation in the apical area of the right hindwing and a

significant reduction in the left mesothoracic leg, is described." (Authors)] Address: Selfa, J., Lab. d'Investigació d'Entomologia, Dept. de Zoologia, Fac. de Ciències Biològiques, Univ. de València, c/ Dr. Moliner 50, 46100 Burjassot, València, Spain. E-mail: [jesus.selfa@uv.es](mailto:jesus.selfa@uv.es)

**14384.** Prieto-Lillo, E.; Selfa, J. (2012): Un caso de teratología abdominal en *Anax parthenope* (Sélys, 1839) (Odonata: Aeshnidae). *Boletín de la S.E.A.* 50(1): 539-540. (in Iberian Peninsula, Valencia) [Iberian Peninsula, Valencia, Spain; "A teratology involving the abdomen in a specimen of *A. parthenope*, with reproductive implications, is described." (Authors)] Address: Selfa, J., Lab. d'Investigació d'Entomologia, Dept. de Zoologia, Fac. de Ciències Biològiques, Univ. de València, c/ Dr. Moliner 50, 46100 Burjassot, València, Spain. E-mail: [jesus.selfa@uv.es](mailto:jesus.selfa@uv.es)

**14385.** Seidler, R. (2012): Striped Saddlebags (*Tramea calverti*) - First Louisiana record. *Argia* 24(4): 22. (in English) [8-X-2012, Red River National Wildlife refuge, Bayou Pierre Unit, Yates Tract, Louisiana, USA] Address: Seidler, Rosemary, Shreveport, Louisiana, USA: E-mail: [rseidler@centenary.edu](mailto:rseidler@centenary.edu)

**14386.** Torralba-Burrial, A.; Domínguez Robledo, J.M.; Luque, P. (2012): Primera cita de *Brachytron pratense* (Müller, 1764) (Odonata: Aeshnidae) en Cantabria (N península ibérica). *Boletín de la Asociación española de Entomología* 36: 479-482. (in Spanish, with English caption) [*B. pratense* was found at Marismas de Alday (Cantabria, Spain): 30TVP3108, 0-3m a.s.l.; 23/04/2011, 1 male, 02/05/2011, 2males.] Address: Torralba Burrial, A., Depto de Biología de Organismos y Sistemas, Univ. de Oviedo, E-33071 Oviedo, Spain. E-mail: [antoniotb@hotmail.com](mailto:antoniotb@hotmail.com)

**14387.** Van Wouwen, N. (2012): "Five undescribed species in ten days time" An interview with Dr. Rosser W. Garrison. *Brachytron* 15(1): 56-57. (in Dutch, with English summary) [On 9 July 2011, a WDA symposium was held in Leiden, the Netherlands, in lieu of the larger WDA symposium which had been planned for 2011 in Japan and which had been postponed because of the earthquake damage there. *Brachytron* grabbed the occasion and managed to secure an interview with Dr. Rosser W. Garrison, who with his wife Dr. Natalia von Ellenrieder are considered the authorities on the Odonata of Central and South America." (Author)] Address: Nick van Wouwen via [redactie@brachytron.nl](mailto:redactie@brachytron.nl)

## 2013

**14388.** Acquah-Lampsey, D.; Kyerematen, R.; Oduro Owusu, E. (2013): Dragonflies (Odonata: Anisoptera) as tools for habitat quality assessment and monitoring. *Journal of Agriculture and Biodiversity Research* 2(8): 178-182. (in English) ["Dragonflies have been recommended for habitat quality assessment and monitoring. The University of Ghana, Legon Campus dragonfly fauna was assessed and their conservation status evaluated. The water bodies present were assessed and found to serve as

breeding sites of the dragonflies. 26 dragonfly species belonging to three families were recorded making up 23.6% of the country's total dragonfly fauna. Based on these, management strategies were recommended for the area." (Authors)] Address: Acquah-Lampsey, D., Dept of Animal Biology & Conservation Sci., P.O. Box LG67, Univ. Ghana, Legon, Ghana. E-mail: [dacquahlampsey@gmail.com](mailto:dacquahlampsey@gmail.com);

**14389.** Adriaens, D.; Adriaens, T.; De Knijf, G.; Hendrickx, F.; Maes, D.; Van Landuyt, W.; Vermeersch, G.; Louette, G. (2013): Soorten en biotopen in Oost-Vlaanderen: prioriteit en symbolwaarde voor het natuurbeleid. *Rapporten van het Instituut voor Natuur- en Bosonderzoek 2013* (1040772). Instituut voor Natuur- en Bosonderzoek, Brussel: 387 pp. (in Dutch, with English summary) ["Many species and biotopes are struggling to survive in the Flemish region of Belgium, an area that is highly impacted by human presence. Nature policy tries to halt the current biodiversity crisis by implementing both area and species based conservation measures. Area based conservation measures aim to guarantee a minimum level of quality that serves a broad spectrum of species and biotopes. This is achieved by creating a broad network of areas and managing them in favour of biodiversity. However, for several nature values these area based measures do comply only partially or not at all with their ecological requirements. They also need habitat features that lie outside protected areas. In this case, additional and specific measures are needed to protect particular species and biotopes from disappearing. While the Flemish regional government mainly adopts an area based approach by setting apart nature reserves, the provincial governments (5 in Flemish region) rather focus on conserving biodiversity outside the network of nature reserves. For the latter, an extensive set of measures is required, tailored to the specific needs of species and biotopes. As they are applied outside protected areas, public support is a critical success factor. Indeed, not only provincial and local authorities have their role to play, but also individual citizens can contribute to the conservation of biodiversity. Both financial and logistic means to stop the biodiversity crisis are limited, however. Therefore, priorities have to be set: for which species and biotopes are conservation measures most urgent. It is obvious that provinces with a large share of the distribution or population of threatened nature values, bear a large responsibility for the conservation at the regional, national and even European level. With the finalisation of this report, each province in Flanders now has a list of species for which they contribute most to their conservation. These lists share a common methodology. Hence, they ensure that if the appropriate measures are applied, each province contributes to the maximal extent to the halt of biodiversity loss. In addition, and for the first time, this report also makes a prioritisation of the biotopes (in fact these are spatial units with specific environmental characteristics and a corresponding set of species) in the province of Eastern Flanders, based on area covering inventories in Flanders (Biological Valuation Map). The adopted methodology can easily be applied to make a list of the most



important biotopes in each of the other provinces of Flanders too. In this report, 155 species are listed as important biodiversity values for which the province of Eastern Flanders can further elaborate its biodiversity policy. Species were selected among 10 taxonomical groups. About one third of the species are present with more than a third of their Flemish distribution or population within the boundaries of the province of Eastern Flanders, or at least their share is higher as expected compared with the other provinces. Moreover, these species are among the most threatened in Flanders and are thus considered to take the most advantage of conservation measures. They are called priority species for the province. The other two thirds of the 155 species can be seen as symbol species for several other reasons. For example, they are explicitly protected by European legislation or are currently facing a steep decrease in numbers, extent or area of occupancy. Other species especially take advantage of the efforts to connect the actual nature reserves by creating stepping stones and corridors in the intervening landscape, a task for which the provincial government is qualified. Also species with most of their distribution or population size within the provincial territory are listed as symbol species. Analogously, about 20 biotopes with high importance within the province of Eastern Flanders were selected. They cover a broad spectrum: from mud flats and salt marshes, over creeks, wetlands, grasslands and tall herbs, to shrub and woodlands. Small landscape elements like rows of trees or shrub, embankments, fortresses and bunkers are considered as well. The choice of species and biotopes is consolidated by recent, objective and trustworthy data. The ecology, distribution, threats and conservation measures are described for each of the biodiversity values. The degree to which the distribution or population is spatially covered by nature reserves or areas with nature oriented management is determined too and can be used as an extra criterium to decide upon the sense of urgency for conservation action. The compilation of a list of species and biotopes of high conservation priority at the provincial level is an essential step in the design of a strategic policy that aims to spend the available funds as efficiently as possible for the conservation of biodiversity." (Authors) The following odonate species are treated in detail: *Cordulegaster boltonii*, *Coenagrion pulchellum*, *Aeshna isoceles*, *Libellula fulva*, *Leucorrhinia pectoralis*, *Calopteryx virgo*, and *Somatochlora flavomaculata*] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**14390.** Andrew, R.J.; Thaokar, N.; Verma, P. (2013): Odonate diversity at Wena Dam of Nagpur district (Ms), India. *International Journal of Scientific Research* 2(10): 1-3. (in English) [52 Odonata species were recorded at the Wena Dam of Nagpur district during the post monsoon period of 2012.] Address: Andrew, R., Post Graduate Dept of Zool., Hislop College, Nagpur-440001, India

**14391.** Baa-Poku, J.; Asante, F.; Amakye, J.S. (2013): Impact of urban effluents on the macroinvertebrates of a

creek in Accra, Ghana. *West African Journal of Applied Ecology* 21(1): 97-109. (in English) ["Five study stations were selected along the reaches of the creek. Water and benthic samples were collected and analyzed between September 2005 and February 2006. The study showed that the effluent discharges caused a significant increase in BOD, COD and NH<sub>3</sub> at the stations that received the effluents. The high levels of total and faecal coliforms at the midstream sections of the creek (626.0 x 10<sup>4</sup> cfu/100 ml and 75.30 x 10<sup>4</sup> cfu/100 ml, respectively) indicated increased pollution levels compared to the reference stations (446.0 x 10<sup>3</sup> cfu/100 ml and 133.0 x 10<sup>3</sup> cfu/100 ml). The Nima Creek showed characteristics of a disturbed urban creek. A total of 19 macroinvertebrate taxa, comprising a total of 11,613 individuals, were collected. Estimated Shannon-Weiner Diversity Index (H') was low at the midstream section of the creek, H'= 1.14, where the effluents were concentrated than at the upstream H'=1.44 or downstream H'= 1.38 sections of the creek. Chironomina and Physa were the most abundant taxa within the creek, dominated by the genus *Chironomus*, which is known to be tolerant to pollution, which confirmed the polluted state of the creek. Rigorous and regular assessment and monitoring of effluents from waste treatment plants and other sources that discharge into the creek, with the aim of complying with the Environmental Protection Agency (EPA) guidelines are some of the mitigative measures suggested to protect life in the creek." (Authors) Odonata are represented by "Libellulidae" and *Phaon iridipennis*.] Address: Baa-Poku, J., P.O. Box Os 943 Osu, Accra, Ghana. E-mail: baapoku@hotmail.com

**14392.** Baird, I.R.C.; Burgin, S. (2013): An emergence study of *Petalura gigantea* (Odonata: Petaluridae). *International Journal of Odonatology* 16(3): 193-211. (in English) ["Emergence studies in Odonata provide information on the behaviour, ecology and fundamental demographic parameters in population studies. This paper reports on a study of sex ratio at emergence, pattern and duration of the emergence season, and potential cohort splitting in *Petalura gigantea*. Sex ratio at emergence varied among years, habitat patches and swamp types. Across all collections, sex ratio varied significantly from a 1:1 ratio, with a bias towards females. The duration of the emergence season varied between sites and years, from at least 45 to at least 70 days, potentially commencing by late October and extending into early January and possibly beyond. Although some evidence suggested cohort splitting, it was not confirmed. Observations of spatially and temporally aggregated emergence clusters are consistent with observed oviposition patterns of individual females, suggesting cohort emergence. Observations of mortalities at emergence and of emergence location are provided; the latter should assist researchers and resource managers in identifying breeding sites in heterogeneous swamp vegetation." (Authors)] Address: Burgin, Shelly, Institute of Sustainable Development, Architecture, Bond University, Gold Coast, Queensland, 4229, Australia

**14393.** Brown, J.R.; Müller, T.; Kerby, J.L. (2013): The interactive effect of an emerging infectious disease and an emerging contaminant on Woodhouse's toad (*Anaxyrus woodhousii*) tadpoles. *Environmental Toxicology and Chemistry* 32(9): 2003-2008. (in English) ["Two factors influencing amphibian population declines are infectious diseases and exposure to anthropogenic contaminants. We examined an emerging fungal pathogen, *Batrachochytrium dendrobatidis* (Bd), and its interaction with an emerging contaminant, the antimicrobial triclosan. We first conducted, a two x two x four factorial study to examine the interactive impacts of dragonfly predator cues, Bd, and triclosan (0, 10, 100, 1000µg/L) on Woodhouse's toad tadpoles. We measured the lethal and sub-lethal impacts of these stressors on tadpoles over four weeks. All tadpoles in the 100 and 1000µg/L concentrations of triclosan died within 24h of exposure, but tadpoles in the low concentration (10µg/L) survived. Tadpoles exposed to only Bd (no triclosan) exhibited a low survival rate (67.5%) while those exposed to both 10µg/L triclosan and Bd exhibited a high survival rate (91.1%) implying that triclosan inhibits Bd on tadpoles. Bd and predator cue exposure individually increased the developmental rate of the surviving tadpoles but this effect was absent when these factors were combined with triclosan. In a follow-up study we found Bd growth in culture was significantly inhibited at 10µg/L concentration of triclosan and completely inhibited at 100µg/L. These findings suggest that interactions among multiple stressors can be complex and require examination in conjunction with one another to evaluate actual impacts to aquatic fauna."(Authors)] Address: Brown, Jennifer, Dept of Biology, University of South Dakota, Vermillion, SD, USA. E-mail: raejenn@gmail.com

**14394.** Combes, S.A.; Salcedo, M.K.; Iwasaki, J.M.; Pandit, M.M. (2013): Capture success and efficiency of dragonflies pursuing different types of prey. *Integrative and Comparative Biology* 56(5): 787-798. (in English) ["The dynamics of predator-prey interactions vary enormously, due both to the heterogeneity of natural environments and to wide variability in the sensorimotor systems of predator and prey. In addition, most predators pursue a range of different types of prey, and most organisms are preyed upon by a variety of predators. We do not yet know whether predators employ a general kinematic and behavioural strategy, or whether they tailor their pursuits to each type of prey; nor do we know how widely prey differ in their survival strategies and sensorimotor capabilities. To gain insight into these questions, we compared aerial predation in 4 species of libellid dragonflies pursuing 4 types of dipteran prey, spanning a range of sizes. We quantified the proportion of predation attempts that were successful (capture success), as well as the total time spent and the distance flown in pursuit of prey (capture efficiency). Our results show that dragonfly prey-capture success and efficiency both decrease with increasing size of prey, and that average prey velocity generally increases with size. However, it is not clear that the greater distances and times required for capturing larger prey are due solely to the

flight performance (e.g., speed or evasiveness) of the prey, as predicted. Dragonflies initiated pursuits of large prey when they were located farther away, on average, as compared to small prey, and the total distance flown in pursuit was correlated with initial distance to the prey. The greater initial distances observed during pursuits of larger prey may arise from constraints on dragonflies' visual perception; dragonflies typically pursued prey subtending a visual angle of 1°, and rarely pursued prey at visual angles greater than 3°. Thus, dragonflies may be unable to perceive large prey flying very close to their perch (subtending a visual angle greater than 3–4°) as a distinct target. In comparing the performance of different dragonfly species that co-occur in the same habitat, we found significant differences that are not explained by body size, suggesting that some dragonflies may be specialized for pursuing particular types of prey. Our results underscore the importance of performing comparative studies of predator-prey interactions with freely behaving subjects in natural settings, to provide insight into how the behaviour of both participants influences the dynamics of the interaction. In addition, it is clear that gaining a full understanding of predator-prey interactions requires detailed knowledge not only of locomotory mechanics and behaviour, but also of the sensory capabilities and constraints of both predator and prey." (Authors)] Address: Combes, Stacey, Dept of Organismic and Evolutionary Biology, Harvard University, Concord Field Station, 100 Old Causeway Road, Bedford, MA 01730, USA. E-mail: scombes@oeb.harvard.edu

**14395.** Courte, C. (2013): Vague migratoire exceptionnelle de *Leucorrhinia pectoralis* (Charpentier, 1825) [Odonata: Libellulidae] en 2012 dans le nord de la France. Point sur la Lorraine et mise à jour cartographique. *Bulletin société Lorraine d'entomologie* 14: 5-10. (in French) [Records between 2009 and 20012 of *L. pectoralis* in the northeastern départements of France are document and mapped.] Address: Courte, C., Chargé de mission scientifique 54/55, Conservatoire d'Espaces Naturels de Lorraine, 7 bis route de Pont-a-Mousson, 54 470 Thiaucourt, France. E-mail: c.courte@cren-lorraine.fr

**14396.** Cowan, E.M.; Cowan, P.J. (2013): The dragonflies and damselflies of a wadi pool near Nizwa, northern Oman. *Tribulus* 21: 14-23. (in English) ["10 Odonata species observed and photographed with evidence of breeding for one identified damselfly species and 5 dragonfly species. Another damselfly assumed to be *Ischnura evansi* also observed ovipositing. Photographs and notes on the behaviour of each species in the systematic list." (Authors) *Ischnura evansi*, *Pseudagrion decorum*, *Anax imperator*, *Paragomphus sinaiticus*, *Orthetrum chryso stigma*, *O. sabina*, *Crocothemis erythraea*, *Trithemis annulata*, *T. arteriosa*, *T. kirbyi*] Address: Cowan, P.J., Dept of Biological Sciences and Chemistry, Univ. of Nizwa, Sultanate of Oman. E-mail: desertmammal@yahoo.com

**14397.** Curry, B. (2013): More Citrine Forktails in the Hamilton Study Area. *The Wood Duck* 67(4): 82, 87. (in

English) [*Ischnura hastata*, Kerncliff Park quarry, Burlington, Ontario, Canada, 9 August 2013] Address: Curry, B. c/o Hamilton Naturalists' Club, P. O. Box 89052, Hamilton, Ontario, L8S 4R5, Canada. E-mail: info@hamiltonnature.org

**14398.** Degabriele, G. (2013): An overview of the dragonflies and damselflies of the Maltese Islands (Central Mediterranean) (Odonata). *Bulletin of the entomological society of Malta* 6: 5-127. (in English) ["Seventeen species of odonates have been recorded on the Maltese Islands of which *Pantala flavescens* represents a new record. Diagnostic features of the adult and larval stages of these species are described in this work. The work also combines findings from previous literature on Maltese Odonata with information gathered from fieldwork data in order to give an insight on the current situation of the Odonata of the Maltese Islands and serves as an identification guide to both adults and larvae of these insects. The anatomy and physiology of the larval and adult forms of these insects, which are discussed in this work, are adapted to the predatory lifestyle which they lead. The fact that odonate larvae frequent different habitats from adults helps to reduce competition for resources. Adult odonates can be found in a number of local habitats, mostly near freshwater but also brackish water bodies since freshwater is a scarce natural resource on the Maltese Islands. Global warming is affecting the distribution range of odonates in the Mediterranean - while some species may be on the decline, others which can thrive in hot dry environments are progressively being recorded in the Mediterranean and southern Europe, including the Maltese Islands. Relatively little work on the Odonata of the Maltese Islands has been done previous to the present work. Most of this involves listing of locally recorded species; very little research investigates odonate behaviour and distribution. No information exists as to why species such as *Sympetrum striolatum*, and *Orthetrum cancellatum* have become progressively uncommon in recent years, and therefore more research is required on the matter. Because of limiting water resources, freshwater habitats on the Maltese Islands are quickly drained of water, which may be used for agricultural purposes. This may tend to reduce species richness of local odonates. Biologists are now considering dragonflies as biological indicators of a healthy environment and make recommendations in order to preserve the habitats frequented by these insects." (Author)] Address: Degabriele, G., Dept of Biology, Junior College, Univ. of Malta, Msida MSD 1252, Malta. E-mail: godwin.degabriele@um.edu.mt

**14399.** Dijkstra, K.-D.B.; Kalkman, V.J. (2013): The "African" genus *Argiagrion* is a Brazilian *Leptagrion* species and the "Philippine" *Moroagrion* a European *Pyrrhosoma* (Odonata: Coenagrionidae). *International Journal of Odonatology* 16(2): 189-191. (in English) ["*Argiagrion leoninum*, known only from the female holotype alleged to be West African, is shown to be a junior synonym of the Brazilian species *Leptagrion macrurum*. *Moroagrion danielli*, known only from the male holotype thought to be from the

Philippines, is a junior synonym of the European *Pyrrhosoma nymphula*. *Argiagrion* and *Moroagrion* were both monotypic genera and become junior synonyms of *Leptagrion* and *Pyrrhosoma* respectively." (Authors)] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: dijkstra@nrm.nl

**14400.** Dorrington, G.E. (2013): On flying insect size and Phanerozoic atmospheric oxygen. *Proceedings of the National Academy of Sciences* 109(50): E3393-E3393. (in English) ["In a recent article in PNAS, Clapham & Karr (Clapham ME, Karr JA (2012) Environmental and biotic controls on the evolutionary history of insect body size. *Proc Natl Acad Sci USA* 109(27):10927-10930) related the maximum wing length (MWL) of different Odonoptera and Orthoptera species to Phanerozoic atmospheric oxygen partial pressure ( $pO_2$ ) as predicted by the GEOCARBSULF model (2). They argued that the MWL data assigned to 10-Myr periods is well correlated with elevated Paleozoic  $pO_2$  levels, but that the correlation weakens and is ultimately decoupled during the Mesozoic and Cenozoic. To explain the correlation, they assumed that maximum insect size is constrained by a tracheal oxygen supply limit. To explain the decoupling, they referred to the notion that insect size increase results in reduction of flight maneuverability and increased aerial predation by birds (among others), i.e., a selective pressure against size increase also operates. This convenient mixed hypothesis deserves scrutiny. ... Third, in the absence of aerial predation, the emergence of the gigantic Meganisoptera during the Carboniferous and Permian does not necessarily require elevated  $pO_2$  levels when it is assumed that these ancient Odonoptera were weak fliers with relatively low specific maximum power outputs compared with extant Anisoptera (Odonata). Fourth, extant Anisoptera are capable of lifting loads exceeding their own weight during hover (4), indicating substantial power reserves. Large extant aeshnids have also been recorded flying at more than 2,500 m altitude above sea level (5). Therefore, at low altitude, extant Anisoptera must have wide oxygen supply margins when operating in their usual aerobic flight modes. Following Clapham & Karr, the hypothetical removal of aerial predation would result in evolving size increase. However, at the present  $pO_2$  level, scale-up by one order of magnitude would be permissible before the tracheal surface area constrains maximum feasible size. Fifth, there is no evidence that the evasive maneuver capability of extant Anisoptera reduces as body size increases. Territorial dogfights among conspecific males tend to select larger individuals with good maneuverability and higher maximum flight speeds. Finally, the MWL history presented (Clapham & Karr) is reproduced in Fig. 1 with an important difference: two anisopteran species, *Petalura ingentissima* and *Tetracanthagyna plagiata*, have been included. There is no evidence that these large extant species evolved during any relaxation of aerial predation over the past 10 Myr. A more credible proposition is that the fossil record represented in Fig. 1 is incomplete.



The correlation reported by Clapham & Karr would then be premature." (Author)] Address: Dorrington, G.E., School of Aerospace, Mechanical and Manufacturing Engineering, RMIT University, Bundoora, VIC 3083, Australia. E-mail: graham.dorrington@rmit.edu.au

**14401.** Edia, E.O.; Bony, K.Y.; Konan, K.F.; Ouattara, A.; Gourène, G. (2013): Distribution of aquatic insects among four costal river habitats (Côte d'Ivoire, West-Africa). *Bulletin of Environment, Pharmacology and Life Sciences* 2(8): 68-77. (in English) ["We analysed aquatic insect distribution among four coastal river habitats of southeast Ivory Coast. In each river, two sites were sampled: one upstream and one downstream. In the eight sites, aquatic insects were randomly sampled eight times (i.e. four during the rainy season and four during the dry season) between July 2003 and March 2005. The basic criteria for classifying sampling sites by both the Principal Component Analysis and the hierarchical cluster analysis are mainly the nature of the waterbed substrate and the mineralization of the water. Overall, 115 taxa belonging to 51 families and ten orders were recorded. The richest taxon diversity was observed for Diptera and Ephemeroptera. The Indval method revealed that the most mineralized sites were characterised mostly by dipterans. However, the indicator taxa of weakly mineralized sites are mainly ephemeropterans. Taxa such as *Laccophilus* sp., *Ablabesmyia* sp., *Ceratopogon* sp., *Cryptochironomus* sp., *Labioabaetis gambiae*, *Procloeon sylvicola* and *Nanocladius* sp. were generalist in respect to the substrate nature. *Riolus* sp. *Perla* sp., *Choroterpes* sp., *Cloeon* sp. and *Ephoron* sp. were specialists of sandy substrate. *Compsoneria njalensis* was characteristic habitats whose bottom is muddy." (Authors) The checklist includes 15 Odonata species, among them *Phaon iridipennis*, *Lestinogomphus angustus* and *Phyllogomphus aethiops*.] Address: Edia O Edia, Lab. d'Environnement et de Biologie Aquatique, U.F.R.-S.G.E., Univ. Nangui Abrogoua, 02 BP, 801 Abidjan 02, Côte d'Ivoire. E-mail: square\_edia@ymail.com

**14402.** Farkas, A.; Polyák, L.; Móra, A.; Lengyel, S. (2013): The Odonata fauna of the Sajó river. *Acta Biol. Debr. Oecol. Hung.* 31: 27-39. (in Hungarian, with English summary) ["This paper presents the Odonata fauna of the Sajó River based on larval and exuvial data from literature as well as own collections. Up to date the occurrence of 10 dragonfly species have been reported from the river. During our investigations in 2011-2012 altogether nine species were found. Among these species the protected *Coenagrion ornatum* was collected from the river for the first time. The four riverine dragonfly species (*Gomphus flavipes*, *G. vulgatissimus*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*) and two Zygoptera species (*Calopteryx splendens*, *Platynemesis pennipes*) form stable populations along a great section of the river. The most important results are the new localities of the riverine dragonflies, all of which are threatened and protected in Hungary. It is most likely that their recent distribution in the river is attributed to the positive changes in water quality since

the 1990's." (Authors)] Address: Farkas, Anna, Dept Hydrobiology, Centre of Arts, Humanities and Sciences, Fac. of Science & Technology, Univ. of Debrecen, Egyetem tér 1, 4032 Debrecen, Hungary. E-mail: flavipes@gmail.com

**14403.** Feulner, G.R.; Judas, J. (2013): First UAE records of two Odonata: the dragonfly *Urothemis thomasi* and the damselfly *Ischnura nursei*. *Tribulus* 21: 4-13. (in English) ["*Urothemis thomasi* and *Ischnura nursei* (also known as *Rhodischnura nursei*) were recorded from the United Arab Emirates for the first time in June 2013. The nature of the sites and the observed behaviour of each species are briefly described. The two species were found in very different habitats and their main populations are centered in opposite directions from the East Coast of the UAE, the nearest records being more than 300 kilometres away. Alternative explanations for their newly discovered contemporaneous presence in the UAE are discussed, viz., gradual and previously unnoticed range expansion versus recent (and perhaps episodic) immigration in response to favourable conditions created by regional climatic phenomena." (Authors)] Address: Gary R. Feulner, G.R., c/o Chadbourne & Parke, PO Box 23927, Dubai, United Arab Emirates. E-mail: grfeulner@gmail.com

**14404.** Futahashi, R.; Futahashi, H.; Shinbori, O.; Kawamura, H. (2013): The dragonflies and damselflies of Toyama Prefecture, Central Honshu, Japan in 2012. *Bull. Toyama Sci. Mus.* 37: 127-147. (in Japanese, with English summary) ["Here we report our collection and photograph data of odonate species from Toyama Prefecture in 2012. In 2012, we found 75 species from 12 families, and a hybrid between *Anax parthenope* and *A. nigrofasciatus*. The following 13 species were not found in 2012 (the last collection year in parenthesis); *Paracercion melanotum* (2006), *Anax guttatus* (2005), *Melligomphus viridicostus* (1959), *Nihonogomphus viridis* (2006), *Sinogomphus flavolimbatus* (2010), *Shaogomphus postocularis* (1972), *Leucorrhinia dubia* (2011), *Sympetrum danae* (2001), *S. depressiusculum* (2011), *S. striolatum* (2004), *S. vulgatum* (2005), *Tramea virginia* (2010) and *Tholymis tillarga* (2007). (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14405.** Henn, M.J. (2013): Effects of artificial light on the drift on macroinvertebrates in urban central Texas streams. M.S. thesis. Texas State University San Marcos, Dept. of Biology: 28 pp. (in English) ["Since the majority of organisms operate on a circadian rhythm, light pollution in urban areas can possibly influence the aquatic community by affecting the drift of macroinvertebrates. The objective of this study is to examine if artificial night lights reduce drifting macroinvertebrates in the Edwards Plateau, by quantifying macroinvertebrate drift under ambient night light conditions and under extreme artificial lighting. This study was conducted in five streams (two large streams and three smaller streams) within urbanized areas of Central Texas.

Drifting macroinvertebrates were sampled using drift nets under two treatments: ambient lighting (control) and extreme artificial lighting. Among all streams, both taxon diversity and richness of drifting insects was similar between treatments, but average abundance of drifting insects was 37% less in artificial lighting treatment than under the control treatment. Treatment effects were more evident in larger streams than smaller streams. Average abundance of drifting insects was 40% less in artificial lighting treatment with larger streams with notable decreases in Simuliidae (58% less than the control), Baetidae (51% less), and Coenagrionidae (50% less). Reduced drift by artificial light conditions found in this study suggests the potential of artificial lighting disrupting dynamics of macroinvertebrate drift. Results of this experiment support a growing body of knowledge on how urbanized systems will influence stream communities and provide evidence to support various management strategies to minimize the effects of artificial lights on aquatic communities." (Author)] Address: Henn, Monika, Dept of Biology/Aquatic Station, Texas State University, San Marcos, TX, USA

**14406.** Ivanova, E.P.; Nguyen, S.H.; Webb, H.K.; Hasan, J.; Truong, V.K.; Lamb, R.N.; Duan, X.; Tobin, M.J.; Mahon, P.J.; Crawford, R.J. (2013): Molecular organization of the nanoscale surface structures of the dragonfly *Hemianax papuensis* wing epicuticle. PLoS ONE 8(7): e67893. doi:10.1371/journal.pone.0067893: 8 pp. (in English) ["The molecular organization of the epicuticle (the outermost layer) of insect wings is vital in the formation of the nanoscale surface patterns that are responsible for bestowing remarkable functional properties. Using a combination of spectroscopic and chromatographic techniques, including Synchrotron-sourced Fourier-transform infrared microspectroscopy (FTIR), x-ray photoelectron spectroscopy (XPS) depth profiling and gas chromatography-mass spectrometry (GCMS), we have identified the chemical components that constitute the nanoscale structures on the surface of the wings of *H. papuensis*. The major components were identified to be fatty acids, predominantly hexadecanoic acid and octadecanoic acid, and n-alkanes with even numbered carbon chains ranging from C14 to C30. The data obtained from XPS depth profiling, in conjunction with that obtained from GCMS analyses, enabled the location of particular classes of compounds to different regions within the epicuticle. Hexadecanoic acid was found to be a major component of the outer region of the epicuticle, which forms the surface nanostructures, and was also detected in deeper layers along with octadecanoic acid. Aliphatic compounds were detected throughout the epicuticle, and these appeared to form a third discrete layer that was separate from both the inner and outer epicuticles, which has never previously been reported." (Authors)] Address: Ivanova, Elena, Faculty of Life and Social Sciences, Swinburne University of Technology, Hawthorn, Victoria, Australia. E-mail: eivanova@swin.edu.au

**14407.** Janssens, L.; Stoks, R. (2013): Fitness effects of Chlorpyrifos in the damselfly *Enallagma cyathigerum*

strongly depend upon temperature and food level and can bridge metamorphosis. PLoS ONE 8(6): e68107. doi:10.1371/journal.pone.0068107: 7 pp. (in English) ["Interactions between pollutants and suboptimal environmental conditions can have severe consequences for the toxicity of pollutants, yet are still poorly understood. To identify patterns across environmental conditions and across fitness-related variables we exposed *Enallagma cyathigerum* damselfly larvae to the pesticide chlorpyrifos at two food levels or at two temperatures and quantified four fitness-related variables (larval survival, development time, mass at emergence and adult cold resistance). Food level and temperature did not affect survival in the absence of the pesticide, yet the pesticide reduced survival only at the high temperature. Animals reacted to the pesticide by accelerating their development but only at the high food level and at the low temperature; at the low food level, however, pesticide exposure resulted in a slower development. Chlorpyrifos exposure resulted in smaller adults except in animals reared at the high food level. Animals reared at the low food level and at the low temperature had a higher cold resistance which was not affected by the pesticide. In summary our study highlight that combined effects of exposure to chlorpyrifos and the two environmental conditions (i) were mostly interactive and sometimes even reversed in comparison with the effect of the environmental condition in isolation, (ii) strongly differed depending on the fitness-related variable under study, (iii) were not always predictable based on the effect of the environmental condition in isolation, and (iv) bridged metamorphosis depending on which environmental condition was combined with the pesticide thereby potentially carrying over from aquatic to terrestrial ecosystems. These findings are relevant when extrapolating results of laboratory tests done under ideal environmental conditions to natural communities." (Authors)] Address: Janssens, Lizanne, Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: lizanne.janssens@bio.kuleuven.be

**14408.** Jara, F.G.; Úbeda, C.A.; Perotti, M.G (2013): Predatory insects in lentic freshwater habitats from northwest Patagonia: richness and phenology. Journal of Natural History, 47(43-44): 2749-2768. (in English) ["The main purpose of this work was to study the richness, phenology and abundance of predatory insects throughout the hydroperiod and how they relate to the environmental parameters in lentic bodies of water in northwest Patagonia. Nineteen fishless wetlands and three wetlands with fish were studied, which are located in the surroundings of the Nahuel Huapi National Park. Biotic and abiotic variables were measured during the hydroperiod of each wetland. The dip-netting sampling technique was used to determine the richness of predatory insects and to study the phenology of the dominant species in four wetlands. Species richness in temporary wetlands ranged from one to nine species per wetland and does not differ from that observed in the permanent environments with or without fish predators. Maximum insect richness was recorded in late spring

and was associated with the maximum depth of the wetland and its structural complexity as well as with the duration of the hydroperiod." (Authors) *Cyanallagma interruptum*, *Rhionaeschna variegata*, *Erythrodiplax connata*, *Negomphus* sp., *Rialla villosa*] Address: Jara, F.G., Laboratorio de Fotobiología, INIBIOMA (CONICET-Universidad Nacional del Comahue), Bariloche, Argentina. E-mail: fjara77@hotmail.com

**14409.** Kastner, F.; Buchwald, R. (2013): Zum Vorkommen der FFH-Libellenarten *Coenagrion mercuriale* Charpentier, 1840 und *Coenagrion ornatum* Selys 1850 (Odonata: Coenagrionidae) im Kreis Minden-Lübbecke (Nordrhein-Westfalen). *Drosera* 2011(2013): 111-118. (in German, with English summary) ["On the occurrence of the dragonfly *Coenagrion mercuriale* Charpentier, 1840 and *Coenagrion ornatum* Selys 1850 (Odonata: Coenagrionidae), species of the European Habitat Directive, in the county Minden-Lübbecke (North Rhine-Westphalia). – *C. mercuriale* predominantly occurs in the river plains of Ems, Lippe, Hunte, and Weser in North Rhine-Westphalia. *C. ornatum* was only found in the river plains of Hunte and Weser in the county Minden-Lübbecke in North Rhine-Westphalia. The *C. mercuriale* and *C. ornatum* occur in sunny and warm, permanently flowing ditches with rich aquatic vegetation, usually with *Berula erecta*. For this study we accounted in 2011 the distribution of these two rare and endangered species in the county Minden-Lübbecke (NRW). We consider the presence of *C. mercuriale* in the three ditch systems Tiefenriede, Ilwede with Barlage and Mehner Bruch and of *C. ornatum* in the ditch systems Ilwede with Barlage and Mehner Bruch as autochthonous. *C. mercuriale* was mapped in 38 ditch sections with more than 1400 individuals and *C. ornatum* in seven ditch sections with eleven individuals." (Authors)] Address: Kastner, Friederike, AG Vegetationskunde und Naturschutz, IBU, Carl von Ossietzky Universität, 26111 Oldenburg, Germany. E-Mail: friederike.kastner@uni-oldenburg.de

**14410.** Khelifa, R.; Zebba, R.; Amari, H.; Mellal, M.K. (2013): Does wind affect emergence site selection in Odonata? *African Entomology* 21(2): 383-387. (in English) ["This study at *Erythromma lindenii* was undertaken in a 0.4 ha pond at 3 km northwest from El Fedjoudj province, Guelma, Algeria (36°31'54.30"N 7°22'48.08"E). There was a significant difference in exuvia height between males and females but no differences between sexes were noted in either their choice of support height or the density of the vegetation in which they emerged. Females climbed higher than males probably because females had significantly larger head width. This differential vertical stratification of exuviae between sexes has not been investigated in previous studies. However, it might also be related to differential maiden flight between sexes, i.e. females might climb higher to take a longer flight while males climb lower heights and fly shorter distance. This assumption requires an independent study that takes into account both the exuvia height and maiden flight distance

for each sex. Exuvia height, for both sexes, was highly positively correlated with support height. Mean and maximum wind speed were significantly negatively correlated to exuvia height and support height. However, mean and maximum wind speed were positively related to vegetation density where exuviae were found. That is, when wind speed was high larvae tended to choose lower heights, lower supports, and highly vegetated areas in order to emerge successfully without any damage. Another alternative explanation is that wind might not have behavioural effects in habitat choice but at higher wind speed the exuviae get blown off the plants if they are higher. Indeed, low vegetated sites and upper parts of emergent plants were subject to higher turbulences in windy conditions. In addition, mean and maximum wind speed were not significantly correlated to daily emerging population size. Neither the mean height of exuviae above water nor the mean height of the chosen support were significantly correlated with the daily emerging population size." (Author)] Address: Khelifa, R., Dépt de Biologie, Fac. des Sciences Biologiques et Agronomiques, Université de Tizi Ouzou, Tizi Ouzou 15000, Algeria. E-mail: rassimkhelifa@gmail.com

**14411.** Kis, O.; Vajda, C.S.; Gyulavári, H.A.; Szabó, L.J.; Miskolczi, M., Devai, G. (2013): Morphological characterisation of an adult population of Eastern Willow Spreading (*Chalcolestes parvidens*, Artobolevsky, 1929) from NE-Hungary. *Studia odonotol. hung.* 15: 49-72. (in Hungarian, with English summary) ["The taxonomical status of *C. parvidens* is widely controversial in Europe. The taxa *C. parvidens* were described as a subspecies of *Chalcolestes viridis*. Recently some authors consider it as a species by the results of phenotypic features and electrophoretic analysis. We found very few information on the taxa *C. parvidens*, so our aim was to provide a comprehensive morphometric characterization of the taxa based on a NE-Hungarian adult population. In this study we measured body, thorax side and wing traits. The data were processed by descriptive statistics and multivariate analysis. In case of selected traits we examined the correlation between them by linear regression analyses. Our results showed that males had significantly larger body than females. Females nevertheless had significantly wider head and longer wings. The multivariate analysis divided the sexes clearly based on the body and wing measurements. However in case of the thorax side measurements the sexes could not be separated clearly." (Authors)] Address: Kis, O., Dept of Hidrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, Univ. of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary

**14412.** Küry, D., Krieg, R. (2013): Aktionsplan Westliche Keiljungfer in der Region Basel (*Gomphus pulchellus* [Selys, 1840]). Im Auftrag: Kanton Basel-Stadt: 33 pp. (in German) [On the basis of local and regional studies on habitat selection, a species action plan for the conservation of *Gomphus pulchellus* in (NW-) Switzerland is presented.] Address: Küry, D., Life Science AG, Greifengasse 7, 4058 Basel, Switzerland



**14413.** Lencioni, F.A.A. (2013): Diagnoses and discussion of the group 1 and 2 Brazilian species of Heteragrion, with descriptions of four new species (Odonata: Megapodagrionidae). *Zootaxa* 3685(1): 1-80. (in English, with Spanish summary) ["Heteragrion is the most speciose and complex genus of Neotropical Megapodagrionidae, with 47 species and one subspecies, and many of them are poorly defined. To improve the knowledge of the Brazilian species of the genus, 179 specimens of 13 of the 17 described species were examined. Four new species are described in tribute to the 40th anniversary of the rock band Queen: *Heteragrion freddiemercuryi* (Holotype: Peruíbe (24° 22' 48" S & 47° 04' 40" W—10 m), São Paulo State—09-III-2000); *H. brianmayi* (Holotype and allotype: Parque Estadual da Serra do Mar—Núcleo Caraguatatuba, Caraguatatuba (23° 35' 36" S & 45° 25' 07" W—61 m), São Paulo State—05-II-2000 and 10-III-2002); *H. rogetaylori* (Holotype and allotype: Fazenda Trabiju, Pindamonhangaba (22° 50' 40" S & 45° 31' 01" W—651 m), São Paulo State—26-III-1999); and *H. johndeaconi* (Holotype and allotype: Alto Paraíso de Goiás (14° 10' 55" S & 47° 38' 36" W—1198 m), Goiás State—18-VI-2008 and 17-VI-2008), holotypes, allotypes and most paratypes deposited in FAAL. Diagnostic illustrations of all species studied are provided. Color photographs of live individuals of *H. brianmayi*, *H. aurantiacum*, *H. consors*, *H. mantiqueirae*, *H. tiradentense* and *H. triangulare* are also presented." (Author)] Address: Lencioni, R. Rua Anibal, 216 Jardim Coleginho, Vila Zeze, Jacafei Sao Paulo, Brazil. E-mail: [odonata@zygoptera.bio.br](mailto:odonata@zygoptera.bio.br)

**14414.** Loureiro, N.; Brochard, C.; Correia, A.; van der Ploeg, E. (2013): *Orthetrum trinacria exuviae* (Odonata: Libellulidae) from Santiago Island, Cape Verde: morphology, sexual size dimorphism and diagnostic features. *Boletín de la Sociedad Entomológica Aragonesa* 52: 281-284. (in English, with Spanish and Portuguese summaries) ["Successful breeding of *O. trinacria* was for the first time confirmed for Santiago Island, Republic of Cape Verde, based on exuviae found in eight localities visited during a field survey carried out in August and September 2012. The relevant diagnostic features listed in the literature for the *O. trinacria exuviae* were assessed. We concluded that one of the diagnostic features, the epiproct length to basal width ratio, was not fulfilled in 97.8% of the 46 exuviae collected by us. Besides that, studied *O. trinacria exuviae* had an average of 26.0 mm of total length and did not evidence sexual size dimorphism." (Authors)] Address: Centre for Environmental Biology - ACD. Lisboa, Portugal. E-mail: [odonata@nsloureiro.pt](mailto:odonata@nsloureiro.pt)

**14415.** Marinov, M. (2013): Contribution to the Odonata the Kingdom of Tonga. *Faunistic Studies in South-East Asian and Pacific Island Odonata* 1: 1-18. (in English) ["New data on the Odonata fauna of the Kingdom of Tonga is provided following research carried out on Tongatapu and 'Eua islands in July 2012. New localities for Tongatapu Island are put on record and previous studies are compared with new phenological data from a period during

which field surveys are rarely conducted on Pacific islands. Although Odonata have been collected before from 'Eua Island, the data presented here is the first published so far. 'Eua Island is assessed as a very important venue for further research on Odonata. Overall the Kingdom of Tonga is very depauperate in water resources with lotic biotopes very restricted in area and found on 'Eua Island, and possibly on Tofua and Late islands, which are both volcanic. This study on the Odonata of 'Eua resulted in records of eight taxa, including with *Teinobasis* sp. nov., which will be described elsewhere. Morphological variation in *Pseudagrion microcephalum stainbergerorum* and *Tramea transmarina* are discussed in the context of their subspecific affiliation. Diagnostic features for easier differentiation are proposed for the first of these taxa; the validation of commonly used diagnostic traits is discussed for the second." (Author)] Address: Marinov, M., Plant Health & Environment Lab., Investigation & Diagnostic Centres & Response, Ministry for Primary Industries, 14 Sir William Pickering Drive, Burnside, PO Box 14018, Christchurch, New Zealand. E-mail: [milen.marinov@mpi.govt.nz](mailto:milen.marinov@mpi.govt.nz)

**14416.** Ottonello, D.; Oneto, F. (2013): Libellule di Liguria (Odonata). *Annali del Museo Civico di Storia Naturale "G. Doria"* 105: 297-425. (in Italian, with English summary) ["Dragonflies from Liguria (Odonata). This paper updates the knowledge about dragonflies observed within the administrative boundaries of Liguria (North-west of Italy) to nearly seventy years since the last paper at regional scale (Capra 1945). The study was carried out through the collection of new data and through a revision of bibliography and museological collections. A geographic database was compiled with approximately 3,000 records, representing a relevant sampling effort with about one record every two square kilometers. Of these, 500 are published and 2,500 are unpublished data, the latter mainly collected in the last seven years (88%). A total of 57 species, 23 Zygoptera and 34 Anisoptera, are recorded for the study area, representing the 61% of the Italian odonofauna. Four species are recorded as new for Liguria: *Coenagrion pulchellum*, *Ophiogomphus cecilia*, *Libellula fulva* and *Trithemis annulata*. Conversely, five historically-recorded species were not found during the last years: *Coenagrion mercuriale*, *Erythromma najas*, *Sympetrum vulgatum*, *Somatochlora flavomaculata* and *S. meridionalis*. The Ligurian odonofauna is mainly composed by Palearctic species (84%), followed by Holarctic (7%), Afro-european (5%) and Afro-tropical (4%) species. Specimens were observed in flight from the sea level up to 1700 m a.s.l., with a higher number of species present at elevation of up to 1000 m, and only six species reaching the highest altitude. The flight season is mainly concentrated in the summer with the following number of species observed for each month: January (0), February (1), March (0), April (7), May (25), June (43), July (47), August (45), September (27), October (10), November (4), December (0). The most important areas, for biogeographical reasons or for highest number of species, are located in the "Genoese Apennine" (Aveto valley,

Roccagrande and Orba valley), in the Po valley encompassing the provinces of Genoa and Savona (Stura valley and Erro valley), in the Bormida valley and in the western area (River Centa basin, high Tanaro valley and Roja valley)." (Authors)] Address: Ottonello, D., Università Cà Foscari Venezia, Dipartimento di Scienze Ambientali, Informatica e Statistica, Dorsoduro 2137, 30123 Venezia, Italy. E-mail: [dario.ottonello@studionatura.net](mailto:dario.ottonello@studionatura.net)

**14417.** Post, M. (2013): Auch 2012: Veränderungen der Libellenfauna im Raum Neustadt. *Pollichia-Kurier* 29(1): 23-24. (in German) [The author briefly reports on records in 2012 from the southwestern region in Rheinland-Pfalz, Germany. Records of the following species are briefly discussed: *Leucorrhinia caudalis*, *L. pectoralis*, *L. rubicunda*, *Erythromma lindenii*, *Coenagrion scitulum*, *Sympetrum meridionale*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Aeshna cyanea*, and *Lestes virens*] Address: Post, M. E-mail: [libellen-nw@web.de](mailto:libellen-nw@web.de)

**14418.** Rivers-Moore, N.A.; Fowles, B.; Karssing, R.J. (2013): Impacts of trout on aquatic macroinvertebrates in three Drakensberg rivers in KwaZulu-Natal, South Africa. *African Journal of Aquatic Science* 38(1): 93-99. (in English) ["Global literature suggests that trout, when introduced as alien species into local streams, have had deleterious impacts on aquatic community structure and function. Prior to defining management actions regarding trout in the rivers of the Ukhahlamba-Drakensberg Park (UDP), data are required on their impacts on local aquatic communities. In February 2007, aquatic macroinvertebrate communities were sampled at three locations in streams in the UDP. Paired sites were separated by waterfalls, with no trout occurring upstream but occurring at low densities downstream. Differences in aquatic macroinvertebrate communities between upstream and downstream sites were apparent but, within the constraints of this study, such differences could not be directly attributed to trout predation. Further studies are recommended in order to provide additional information on seasonal variation in these patterns, as well as on density-dependent effects of trout on aquatic macroinvertebrate communities." (Authors) The list of taxa includes *Aeshna* sp.] Address: Rivers-Moore, N.A., Aquatic Ecologist (Pr. Sci. Nat.), P.O. Box 152, Hilton, 3245, South Africa. E-mail: [blackfly1@vodamail.co.za](mailto:blackfly1@vodamail.co.za)

**14419.** Sakamaki, Y. (2013): Chapter 23: A review of insect fauna reports for the Islands in Kagoshima Prefecture. In: Kawai, K., Terada, R. and Kuwahara, S. (eds): *The Islands of Kagoshima*. Kagoshima University Research Center for the Pacific Islands, 15 March 2013: 146-149. (in English) [Verbatim: 4. Characteristics of insect fauna in Amami Islands: Since Amami-Oshima Is. with Kakeromajima Is. has high mountains inland area and many mountain streams, they have diverse dragonfly faunas. *Asiagomphus amamiensis amamiensis* (Asahina), *Planaeschna ishigakiana nagaminei* Asahina, and *Coeliccia ryu-*

*kyuensis amamii* Asahina are known as endemic subspecies, and the islands are the northern limit of *Matrona basilaris japonica* Förster, and *Rhipidolestes amamiensis* Ishida.] Address: not stated

**14420.** Sanderson, H.; Compennolle, R. van; Dyer, S.D.; Price, B.B.; Nielsen, A.M.; Selby, M.; Ferrer, D.; Stanton, K. (2013): Occurrence and risk screening of alcohol ethoxylate surfactants in three U.S. river sediments associated with wastewater treatment plants. *Science of the Total Environment* 463–464: 600-610. (in English) ["Alcohol ethoxylates (AE) are high production volume (HPV) chemicals globally used in detergent and personal care products and are truly a work-horse for the household and personal care industries. Commercial AE generally consist of a mixture of several homologues of varying carbon chain length and degree of ethoxylation. Homologues that are not ethoxylated are also known as aliphatic alcohols or simply fatty alcohols (FA). This group of homologues represents a special interest in the context of environmental risk, as these are also abundant and ubiquitous naturally occurring compounds (e.g. animal fats and in human feces). Hence, in a risk assessment one needs to distinguish between the natural (background) concentrations and the added contribution from anthropogenic activities. We conducted a weight-of-evidence risk assessment in three streams, documenting the exposure and predicted risk, and compared these to the habitat and in situ biota. We found that the parameters (e.g., habitat quality and total perturbations hereunder total suspended solids (TSS) and other abiotic and biotic stressors) contributed to the abundance of biota rather than the predicted risk from AE and FA. Moreover, the documented natural *de novo* synthesis and rapid degradation of FA highlight the need to carefully consider the procedures for environmental risk assessment of naturally occurring compounds such as FA, e.g. in line with the added risk concept known from metal risk assessment. ... At the species level, twelve species were found only upstream, with a total abundance of 71 animals from all three locations. Of these 71 animals across all streams, only one species, *Boyeria vinosa* ... were found only to be present upstream in more than one stream. In the Bryan upstream location, twenty six *B. vinosa* were identified and one *B. vinosa* was identified in the Wilmington upstream location, suggesting that this was the most sensitive species overall on a qualitative basis." (Authors)] Address: Stanton, K., American Cleaning Institute, 1331 L Street, NW, Suite 650, Washington, District of Columbia 20005, USA. E-mail: [kstanton@cleaninginstitute.org](mailto:kstanton@cleaninginstitute.org)

**14421.** Schneider, T.; Schneider, E. (2013): Beobachtungen zur Gefährdung der Fließgewässer und ihrer Libellen in der türkischen Schwarzmeerregion (Odonata). *Libellula* 32(1/2) 2013: 75-90. (in German, with English summary) ["Observations on the threat to running waters and their Odonata fauna in the Turkish Black Sea Region – In August 2012 a total of 24 species were recorded from the Black Sea region east of Trabzon. New observations of

*Cordulegaster insignis mzymtae* are reported. The frequent occurrence of *Onychogomphus assimilis* on the little rivulet Kaçkal in the Artvin province not far from the Georgian border is described. Special threats to the regionally restricted populations of *Calopteryx splendens waterstoni* and other rheophilic species by excessive ongoing barrage construction are highlighted. A note on the altitudinal occurrence of *Coenagrion ponticum* and *C. puella* is made." (Authors)] Address: Schneider, T., Arnold-Knoblach-Ring 76, 14109 Berlin/Wannsee, Germany. E-mail: thomas.rs@gmx.de

**14422.** Sims, G. (2013): A distribution of dragonflies and damselflies (Odonata) of Louisiana. *Midsouth Entomologist* 6: 25-87. (in English) ["This compilation is an attempt to bring together Louisiana (USA) odonate collection and distribution information from a variety of sources, and present it in a clear and easily-accessible form. The report actually contains neither any new data nor new collection records, but is an effort to consolidate information from various available sources into a concise and useful form. Every care has been taken to insure the accuracy of the information, and any errors, omissions, or oversights are completely the fault of the author."(Author)] Address: Sims, G., Route 2, Box 237-3, Mansfield, Missouri 65704-9564, USA. E-mail: georgesims@hotmail.com

**14423.** Szalay, P.E.; Szeghalmy, S.Z.; Kis, O.; Miskolczi, M.; Szabo, L.; Fazekas, A.; Devai, G. (2013): Basic data to the morphologic analysis of an adult Banded Demoiselle [*Calopteryx splendens* (Harris, 1782)] population from Konyári Kálló (NE-Hungary). *Studia odonotol. hung.* 15: 9-26. (in Hungarian, with English summary) ["The Carpathian Basin is considered as a coincident zone from the point of view of the occurrence of various faunal elements. As a result, the classification of some dragonfly species or subspecies is sometimes questionable. Based on faunistic literature, the *Calopteryx splendens splendens* has been registered in the Hungarian dragonfly fauna up till now. In the course of our morphometric examinations however the subspecific taxonomical position of the Hungarian *C. splendens* has become doubtful. Our aim is to provide data for the taxonomical revision of the Hungarian *C. splendens* based on morphometric analyses. Our examinations of body and wing traits were performed on male and female adults from the small water course Konyári-Kálló near the settlement Hosszúpályi (NE-Hungary). In this paper the mean, minimum, maximum values, standard deviation and variation coefficients of our morphometric results are presented." (Authors)] Address: Szalay, P.E., Dept of Hydrobiology, Centre of Arts, Humanities and Sciences, Fac. of Science and Technology, Univ. of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary

**14424.** Terzani, F.; Cianferoni, F.; Rocchi, S. (2013): Aggiornamento e sintesi delle conoscenze odonologiche dell'Arcipelago Toscano (Insecta Odonata). *Quaderno di studi e notizie di storia naturale della Romagna* 37: 175-196. (in Italian, with English summary) ["An annotated

checklist of the Odonata of Tuscan Archipelago (Italy), reporting both data from literature and new, unpublished records. The updated Odonata fauna of Tuscan Archipelago currently comprises 25 species." (Authors)] Address: Terzani, F., Mus. Stor. Nat. "La Specola", Univ. Firenze, via Romana 17, 1-50125 Firenze, Italy

**14425.** Tomljanovic, T.; Piria, M.; Šprem, N.; Matulic, D.; Zanella, D. (2013): Finding of sterlet (*Accipenser ruthenus*) in the Sava river near Zagreb. VI International Conference "Water & Fish". Conference Proceedings, Faculty of Agriculture, Belgrade-Zemun, Serbia, June, 12 – 14. 2013: 326-330. (in English, with Croatian abstract) [Anisoptera contributed to the diet of sterlet.] Address: Tomljanovic, Tea, Univ. of Zagreb, Faculty of Agriculture, Dept of Fisheries, Beekeeping, Game Management and Special Zoology, Svetošimunska 25, 10 000 Zagreb, Croatia

**14426.** Vajda, C.S.; Szabo, L.; Miskolczi, M.; Cserhati, C.S.; Devai, G. (2013): The morphometry of north-east Hungarian adult population of the Emerald damselfly [*Letes sponsa* (Hansemann, 1823)]. *Studia odonotol. hung.* 15: 27-47. (in Hungarian, with English summary) ["Dragonflies are good indicators for many purposes however we found only few detailed information concerning their morphometrics. Our aim was to provide more information about *L. sponsa*, explore the variation of the examined traits and test them along with sex comparisons. We studied body and wing traits of male and female adults of *L. sponsa* collected in a population of Great Hungarian Plain (NE-Hungary). According to our results males had significantly larger body and abdomen than females. On the other hand females had significantly larger head, leg and wing than males. The variation was larger in traits of abdominal end and structural traits of wing than other body and wing traits. The PCA and DA confirmed a difference in sexes. The linear regression analyses showed the most correlations in case of the length of the body and the width of the head." (Authors)] Address: Vajda, C.S., Dept of Hydrobiology, Centre of Arts, Humanities and Sciences, Fac. of Science and Technology, Univ. of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary

**14427.** Van Ryswyk, B. (2013): 2013 Hamilton Odonata Count. *The Wood Duck* 67(3): 57-58;-63. (in English) [Hamilton, Ontario, Canada; the tenth annual Hamilton Odonata Count was held on July 6th 2013. Records of 54 odonate species are checklisted and commented.] Address: Van Ryswyk, Brenda c/o Hamilton Naturalists' Club, P. O. Box 89052, Hamilton, Ontario, L8S 4R5, Canada. E-mail: info@hamiltonnature.org

**14428.** Viski, V.B.; Jakab, T.; Miskolczi, M.; Vincze, A.; Grigorszky, I.; Szabo, L.J.; Devai, G. (2013): Data on the dragonfly (Odonata) fauna of the lowland water course Konyári-Kálló (Ne Hungaria). *Studia odonotol. hung.* 15: 121-135. (in Hungarian, with English summary) [34 Odonata species are documented from the small lowland water course Konyári-Kálló in the geographical macroregion



Tiszai-Alföld, over the administrative area of the county Szabolcs-Szatmár-Bereg and Hajdú-Bihar in NE-Hungary. Data were sampled in 2008-2009 and 2011-2012 at 8 localities.] Address: Viski, V.B., Dept of Hydrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary

**14429.** Wachowicz-Olszak, M.; Michonski, G. (2013): Dragonflies (Odonata) of the Staw Goslicki pond in the forest of Puszcza Wkrzanska (nw Poland). *Acta biologica* 20: 71-80. (in English, with Polish summary) ["Five research sites were established over the area of the studied water body, where both adults and larvae were collected. In total, 350 individuals were collected, which belonged to 17 dragonfly species; 297 adult specimens (45 females and 252 males) and 53 larvae were collected. The odonatofauna was mostly composed of eurytopic species. The most frequent species (75–100% frequency) included *Cordulia aenea*, *Coenagrion puella* and *Libellula quadrimaculata*. The following species belonged to the second frequency class (50–74%): *Enallagma cyathigerum*, *Erythromma najas*, *Ischnura elegans*, *Pyrrhosoma nymphula*, *Aeshna cyanea* and *Sympetrum sanguineum*. The third frequency class (25–49%) included *Coenagrion pulchellum*, *C. hastulatum*, *Lestes dyras* and *L. sponsa*." (Authors)] Address: Wachowicz-Olszak, M., Department of invertebrate Zoology & Limnology, University of Szczecin, Waska 13, 71-415, Szczecin, Poland. E-mail: gmichonski@gmail.com

**14430.** Wujek, D.E. (2013): Epizootic diatoms on the cerci of Ephemeroptera (Caenidae) naiads. *The Great Lakes Entomologist* 46(1-2): 116-119. (in English) ["Using scanning electron microscopy, epizootic diatoms were observed growing on the cerci of *Caenis amica* Hagen naiads (Ephemeroptera, Caenidae). *Meridion circulare* (Greville) C. Agardh was the most abundant, followed by *Synedra rumpens* Kützing, then *Cocconeis pediculus* Ehrenberg. Other diatom species observed from substrates in Cedar Creek, Isabella Co., Michigan were not observed on the cerci. No diatoms were observed on Ephemeroptera naiads. Epizootic algae are not infrequent on the surfaces of most active animals. The association between slugs and epizootic algae was one of the first to be described showing this unusual and interesting association since such relationships were described (Kuhn in Welcher 1864). Freshwater epizootic algae have been described from a variety of hosts. These include protists (Wiley et al. 1970, Pérez-Martinez et al. 2001); invertebrate animals such as Cladocera (Gaiser and Bachmann 1993, Barea-Arco et al. 2001), Rotifera (Wujek 2006); insects including Trichoptera (Bergey and Resh 1994, Sheath et al. 1995), Diptera (Sheath et al. 1996), and Odonata (Wujek pers. observ.); Crustacea together with Copepods (Russell and Norris 1971) and crayfish (Fuelling et al. 2010)."] (Author)] Address: Wujek, D.E., Dept Biol., Central Michigan Univ., Mt. Pleasant, MI 48859, USA. E-mail: wujek1de@cmich.edu

**14431.** Yoshida, K.; Hoshikawa, K.; Wada, T.; Yusa, Y.

(2013): Patterns of density dependence in growth, reproduction and survival in the invasive freshwater snail *Pomacea canaliculata* in Japanese rice fields. *Freshwater Biology* 58(10): 2065-2073. (in English) ["Patterns of density dependence in growth, reproduction and survival are important for predicting the population dynamics of a species. The patterns may change with environmental factors, such as the harshness of winter, but very little is known about such patterns and their mechanisms in unmanipulated natural populations of invasive animal species. We studied the extent of density dependence in the growth, reproduction and survival of an invasive freshwater snail, *Pomacea canaliculata*, in rice fields in Nara (cold district) and Kumamoto (warm district), Japan, over 2- and 1-year periods, respectively. In both areas, growth was negatively density dependent within the same generation, and the density of snails in the parental generation negatively affected the growth of offspring. The number of eggs per unit area was independent of adult density, suggesting eggs per adult female were few at high densities. Survival over the cold winter of 2005–2006 was independent of density in Nara. However, survival over the warm winter of 2006–2007 in both Nara and Kumamoto was negatively density dependent. Irrespective of the various negative density-dependent patterns, population density tended to show positive correlations with the density of the previous generation. This appears to reflect the substantial capacity of this snail to resist extremely low densities due to the various negative density-dependent patterns rather than indicating susceptibility to extinction at low densities... Few predators of the apple snail are found in Japanese rice fields (Yusa, Sugiura & Wada, 2006; Yamanishi et al., 2012), and we rarely observed predators of the snail in our study fields, with the exception of some dragonfly larvae (mainly *Pantala flavescens*) after the mid-term .."] (Authors)] Address: Yusa, Yoichi, Faculty of Science, Nara Women's University, Kitaouya-nishi, Nara 630-8506, Japan. E-mail: yusa@cc.nara-wu.ac.jp

**14432.** Zhang, P. (2013): Ecological photograph handbook of insects in Wulingshan. Northeast Forestry University Press. Harbin: 418 pp. (in Chinese, with Latin names) [Chongqing (national central city), China. The following species are pictured: *Orthetrum melania*, *O. albistylum*, *Sympetrum eroticum*, *Gomphidia confluens*, *Anax nigrofasciatus*, *Ischnura asiatica*, *Aciagrion olympicum*, *Platycnemis foliacea*, *Matrona basilaris nigripictus*] Address: not stated

**14433.** Zimmermann, P.; Hafner, A.; Zimmermann, A. (2013): Die Fang- und Heuschrecken der Naturschutzgebiete im Enzkreis und im Stadtkreis Pforzheim. *Naturschutz und Landschaftspflege Baden-Württemberg* 76: 41-72. (in German) [Baden-Württemberg, Germany. On page 43, a picture is shown of a larva of *Tettigonia viridissima* preying on *Crocothemis erythraea*.] Address: Zimmermann, P., Referat 56 – Naturschutz und Landschaftspflege des Regierungspräsidiums Karlsruhe, Germany. E-mail: peter.zimmermann@rpk.bwl.de

**14434.** Abelova, M.; David, S. (2014): Morphometry of *Aeshna cyanea* (Müller, 1764) (Odonata: Aeshnidae) exuviae from the territory of Slovakia. *Entomofauna carpathica* 26(1): 1-11. (in Slovakian, with English summary) ["The study elaborates the morphometric analysis of 87 exuviae specimens of *A. cyanea* from 6 localities of Slovakia. Measured and statistically evaluated are 6 morphometric signs for exuviae of *A. cyanea*. We confirmed several distortions of normality of data, partly caused by measurement error. The exuviae of females are larger in measured signs except the length of the thigh (femura) than males. It has been proved that the dependence of signs is often not linearly correlated. The results are also important, because morphometric signs are used in the designation keys and in the research of development stages of larvae and exuviae. We have processed so far the largest data set of morphometric data for Slovakia." (Authors)] Address: Ábelová, Monika, Dept Ecol. & Environ. Sci., Fac. Nat. Sci., Constantine the Philosopher Univ. in Nitra, Tr. A. Hlinku 1, 949 74 Nitra, Slovak Republic. E-mail: monika.abelova@ukf.sk

**14435.** Alikaj, M.; Hasani, L. (2014): Taxonomic data about Odonata order representatives in the habitats of Viroi lake in the region Gjirokastra. *AKTET. Journal of Institute Alb-Shkenca* 3(1): 64-67. (in Albanian, with English summary) [In summer 2005 and 2008, 10 odonate species have been recorded at Viroi Lake and Gjirokastra district, Albania.] Address: Alikaj, Marsela, Departamenti i Biologjisë, Universiteti "Eqrem Çabej", Gjirokastër, Shqipëri, Albania. E-mail: alikajmarsela@yahoo.com

**14436.** Altamiranda-Saavedra, M.; Palacino-Rodríguez, F.; Lobo-Hernández, M. (2014): Daily abundance at the breeding site and reproductive behavior of *Polythore gigantea* (Odonata: Polythoridae). *Odonatologica* 43(3/4): 169-182. (in English) ["Daily abundance at the breeding site and reproductive behavior of *P. gigantea* are described in different localities of Antioquia, Colombia. Observations were done between March and June 2009 from 08:00 to 16:00 h. The highest reproductive activity (i.e. maximal abundance of individuals at the breeding site) was observed between 11:06 and 12:12 h. Oviposition lasted 10 min on average. During courtship, the male exhibited rhythmical movements by opening and closing the wings rapidly, getting closer to the female and holding her in tandem. During oviposition, the female inserts the eggs inside wet trunks and little twigs in the surrounding vegetation under the close surveillance of the male. Males exhibit territorial behavior and conspecific aggression to defend the territory. Factors such as vegetation cover, might influence the time of the day in which oviposition occurs. This study provides, for the first time, information on the reproductive behavior of *P. gigantea*." (Authors)] Address: Altamiranda-Saavedra, M., Grupo Microbiología Molecular, Univ. de Antioquia, Apdo. Postal 1226, Calle 67 No. 53-108, off. 5-430, Medellín, Colombia. E-mail: maltamiranda2@gmamil.com

**14437.** Amri, N.; Jamili, S.; Abdolbaghian, S. (2014): Diversity of macrobenthos communities and their relationships with environmental factors in Jajroud River, Iran. *Resources and Environment* 4(2): 95-103. (in English) ["This paper evaluates the diversity of common groups of macrobenthos include: Diptera, Ephemeroptera, Odonata, Plecoptera, and Gastropoda and their relationships with environmental variables in the Jajroud river northeast of Tehran province (capital of Iran). The work has been extended out over a period of 12 months through three stations. Macrobenthos sampling has been carried out monthly with three replications in each station. Water temperature, dissolved oxygen, pH, BOD, phosphate and nitrate concentrations were within ranges usually capable of backing up a diverse biota. The other components such as water depth, water width, water flow and contamination were as well taken. The methodologies applied by a number of research groups were generally similar, making it possible to compare outcomes between different areas. Three metrics were utilized to show the diversity: Margalef richness, Shannon-Weaver's diversity index (.) and evenness index (E). From 108 Surber samples, 29 families, 39 genus and 92 species were identified (42% Ephemeroptera, 38% Diptera, 18% Plecoptera, 1.2% Gastropoda and 0.8% Odonata (*Argia adamsi*; *Aeshna affinis* [sic]) of the total fauna population). Chironomidae, Baetidae and Perlodidae were the most dominant families. The biodiversity of the community of the upper reaches of the river (ST1) was the highest that of the lower reaches (ST2) was the lowest that of (ST3) ranked in the middle. In this work, the presence of pollution-tolerant families in (ST3) indicates that this site is ecologically unhealthy. The diversity of Gastropoda and Chironomidae were significantly affected by pollution (positively) and water depth; whereas the diversity of Ephemeroptera by the dissolved oxygen and water temperature respectively. Besides the diversity of Odonata was affected by stream width. The outcome of a One-Way ANOVA for three metrics indicates the P - value and F-critical 3.1 and 5.1 respectively." (Authors) ] Address: Amri, Niusha, Science & Research Branch of Islamic Azad Univ., Tehran, Iran. E-mail: niushaamri@gmail.com

**14438.** Andersen, E. (2014): *Aeshna viridis* distribution and habitat choices in South and Central Sweden and the possibility to use a database as a tool in monitoring a threatened species. B.Sc. thesis, Halmstad University, School of Business and Engineering (SET), Biological and Environmental Systems (BLESS), Ecology and Environmental Science: 15 pp-["*Aeshna viridis*, a dragonfly generally considered to be a specialist as it in most cases chooses *Stratiotes aloides* as its habitat, have suffered badly from habitat loss and fragmentations throughout Europe under the last century as the human demand of land use have grown. It's thereby considered near threatened on EU red list and is included in the Habitat Directive. This means that it is protected by EU law as all EU Member States is committed to protect, monitor and report back to EU the status of the species. Several European countries

have designed protection plans for *S. aloides* to improve the preservation of *A. viridis*. My study in South and Central Sweden shows that the strong connection between *A. viridis* and *S. aloides* may not be consistent all over the distribution range of *A. viridis*, as my survey showed that larvae occur among other water plants when *S. aloides* is not present. Another aim in this study was to evaluate the possibility to use occurrence data on *A. viridis* and *S. aloides* from the Species Observations System to monitor *A. viridis* distribution and dispersal. My study implies uncertainties of how well the datasets reflects reality and more research is necessary before clarifying if datasets could be a possible tool in conservation management of *A. viridis*." (Author)] Address: Andersen, Emelie, Halmstad University, School of Business and Engineering (SET), Biological and Environmental Systems (BLESS), Ecology and Environmental Science), Sweden

**14439.** Ayme-Southgate, A.; Crowe, M.; Southgate, R. (2014): The NH2-terminal Ig domains of insect projectin could serve as elastic elements. *Proteomics and Genomics Research* 1(1): 21-33. (in English) ["The connecting C-filaments of insect indirect flight muscles have been proposed as one of the elements providing muscle elasticity for the asynchronous muscle physiology of derived insects. Two large modular proteins, kettin/Sallimus and projectin make up these filaments, and for both proteins the N-terminal sequences span the extensible I-band and are proposed as the elastic segments. The C-filaments have not been studied in insects, such as dragonflies (*Pachydiplax longipennis*), crickets, and Lepidoptera with muscles which are largely synchronous in physiology and display different levels of muscle stiffness. In this paper we focus our efforts on the projectin protein of several insects with synchronous flight muscles; namely dragonfly, cricket, and moth. We provide evidence for the localization of projectin over the sarcomere I-Z-I region that is consistent with the existence of C-filaments in synchronous flight muscles. Additionally, we determine the sequences for the NH2-terminal region of projectin in these insects and describe the presence of alternative splice variants. Using predictors of intrinsically disordered regions, we identify possible unfolded segments, especially around the short linker sequences found between the NH2 Ig domains. We propose a possible picture of projectin NH2-terminal region organized as different segments contributing elastic responses to stretch by either unfolding of highly disordered sequences (PEVK) or reorientation of domains by bending or twisting of disordered linkers between the Ig domains." (Authors)] Address: Ayme-Southgate, Agnes, Dept Biol., College of Charleston, Charleston SC, 29401, USA. E-mail: southgatea@cofc.edu

**14440.** Babu, R.; Nandy, S. (2014): Eight new records of dragonflies from Jharkhand State, India (Odonata: Aeshnidae, Gomphidae, Libellulidae). *Notulae odonatologicae* 8(4): 91-93. (in English) ["A field survey carried out in 2008–2010 and examination of the collection of the National Zoological Collection, Zoological Survey of India (ZSI),

Kolkata recorded eight Anisoptera species new for the state of Jharkhand. These are *Anaciaeschna jaspidea*, *Gynacantha dravida*, *Hemianax ephippiger*, *Orthetrum glaucum*, *O. luzonicum*., *Tramea limbata similata*, *T. virginea*, and a yet unidentified species of *Anisogomphus* Selys, 1858. These records increase the number of odonate taxa known from Jharkhand State to 73." (Authors)] Address: Babu, R. Southern Regional Centre, ZSI, Chennai-600 028, India. E-mail: baburzsi@gmail.com

**14441.** Baird, R.C. (2014): Larval burrow morphology and groundwater dependence in a mire-dwelling dragonfly, *Petalura gigantea* (Odonata: Petaluridae). *International Journal of Odonatology* 17(2/3): 101-121. (in English) ["Most species of petalurid dragonflies have a fossorial larval stage, which is unique in the Odonata. Larvae typically excavate burrows in soft peaty soils in mires, seepages or along stream margins, which are occupied by a single larva throughout the long larval stage. This paper reports on a study of burrow morphology in *Petalura gigantea*, with the objectives of describing their burrows, documenting any variability in burrow morphology across the hydrogeomorphic range of habitats used by the species, identifying factors contributing to any such variability, resolving questions in relation to the single previous illustration of a burrow system and identifying the level of groundwater dependence of larvae. The species was found to be an obligate, groundwater dependent, mire-dwelling species with well-maintained and sometimes complex burrows. Burrow complexity and morphological variation are inferred to be a response by larvae to the hydrogeomorphic characteristics of the habitat and substrate attributes. All burrows were occupied by a single larva, consistent with previous observations of other fossorial petalurids, but in contrast to the previous description of a *P. gigantea* burrow complex occupied by multiple larvae. The functional role of identified burrow features is discussed. Although the fossorial larval habit confers ecological benefits, the species' groundwater dependence and restriction to mire habitats places it at increased risk in the event of any reduction in groundwater availability, more intense fire regimes, and the potential compounding effects of rapid climate change." (Author)] Address: Baird, R.C., College of Health and Science, University of Western Sydney, Penrith South DC, NSW 1797, Australia

**14442.** Baird, R.C. (2014): Mate guarding and other aspects of reproductive behaviour in *Petalura gigantea* (Odonata: Petaluridae). *International Journal of Odonatology* 17(4): 223-236. (in English) ["Territorial behaviour and mate guarding are important components of mating systems in various insect groups, including the Odonata. This paper reports observations of male territorial behaviour associated with potential ovipositing sites, and postcopulatory, non-contact mate guarding in *Petalura gigantea*. This is the first unambiguous and detailed report of mate guarding in the Petaluridae. Additional observations of previously undocumented aspects of reproductive behaviour are also reported. These observations are compared



with other petalurids." (Authors)] Address: Baird, R.C., College of Health and Science, University of Western Sydney, Penrith South DC, NSW 1797, Australia

**14443.** Ball-Damerow, J.E.; M'Gonigle, L.K.; Resh, V.H. (2014): Local and regional factors influencing assemblages of dragonflies and damselflies (Odonata) in California and Nevada. *Journal of Insect Conservation* 18: 1027-1036. (in English) ["Studies of landscape effects on assemblages and distribution of insects are relatively uncommon, largely because of the lack of occurrence data that span broad spatial or temporal scales. Here, we provide a multi-species analysis using generalized linear mixed models to examine the effects of local and regional variables on richness and occurrence rates of Odonata species at 81 sites throughout central California and north-western Nevada, USA. These study sites were located across a range of ecoregions, including the Sierra Nevada Forests, California Mediterranean, Great Basin Shrub Steppe, and Northern Coastal California Forests. Dynamic regional variables in this study, degree-days and precipitation, influenced the richness of dragonflies, but not the less-mobile damselflies. In contrast, local habitat type influenced the richness of damselflies, but not dragonflies. Overall species occurrence was higher during site visits with higher degree-days, especially for highly mobile groups including dragonflies and migratory species. Dragonflies were also positively associated with total precipitation, but migratory species were not. Probability of presence across species was lower in highly urban sites, particularly for habitat specialists. Further, habitat specialists had lower rates of occurrence overall, suggesting that widespread generalist species may increasingly dominate Odonata assemblages. Our study indicates that Odonata in this semi-arid region are responsive to a combination of local and regional environmental variables." (Authors)] Address: Ball-Damerow, Joan, Dept of Environ. Sci., Policy & Management, Univ. of California, Berkeley, 130 Mulford Hall #3114, Berkeley, CA 94720-3114, USA. E-mail: joan-damerow@gmail.com

**14444.** Barry, M.J. (2014): Fluoxetine inhibits predator avoidance behavior in tadpoles. *Toxicological & Environmental Chemistry* 96(4): 641-649. (in English) ["Fluoxetine is a selective serotonin re-uptake inhibitor used to treat anxiety and depression in humans. It has been detected as a contaminant in the surface waters in many countries. The effects of fluoxetine (0, 0.03, 0.3, and 3 µg L<sup>-1</sup>) on the swimming and behavioural responses of *Bufo arabicus* tadpoles to alarm chemicals from predatory dragonfly larvae (*Anax imperator*) were measured. Fluoxetine significantly reduced swimming speed at 0.3 and 3 µg L<sup>-1</sup> in the absence of predator alarm chemicals but had no effect in their presence. Tadpoles exposed to predator alarm chemicals avoided open water and preferred to hide. Exposure to fluoxetine at 3 µg L<sup>-1</sup> completely eliminated this predator avoidance response, making the tadpoles more vulnerable to predation." (Author)] Address: Barry, M.J., Biology Dep.t, Sultan Qaboos University, Muscat, Oman

**14445.** Bashar, K.; Reza, M.S.; Razzak, M.A.; Rahman, K.M.Z.; Goda, P.; Howlader, A.J. (2014): Faunistic study of Odonata (dragonfly & damselfly) in some selected regions of Bangladesh. *Journal of Entomology and Zoology Studies* 2(4): 1-6. (in English) ["A study was conducted to investigate the species diversity of Odonata in five selected areas of Bangladesh viz. Dhaka, Moulvibazar, Bandarban, Chuadanga and Khulna during July' 2009 to June' 2010. A total of 3350 individuals belonging to 48 species under 8 families were observed during the study period. Among them 25 species were dragonflies under the families; Libellulidae (22), Aeshnidae (2) and Gomphidae (1), whereas the remaining 23 species were damselflies under five families; Coenagrionidae (16), Platycnemididae (4), Calopterygidae (1), Lestidae (1), Protoneuridae (1). The highest and lowest number of species was observed in Dhaka (31) and Bandarban (23), respectively. Libellulidae was the dominant family whereas few species were found under the family Gomphidae, Lestidae, Calopterygidae and Protoneuridae. Species composition was highest in the family Libellulidae (45.8%) followed by the family Coenagrionidae (33.3%). Post-monsoon represented by 45 species was the optimum season for Odonata. The present surveillance yielded one new species of Dragonfly, *Gynacantha dravida* and five Damselfly species: *Aciagrion pallidum*, *Ceriagrion praetermissum*, *Lestes elatus*, *Copea chantaburii* and *C. ciliata* in the perspective of Bangladesh. The above results indicate that study of Odonate species in other regions of the country would provide insight in updating the checklist of Odonate species in the country, and know their ecology, and their relative importance for the successful conservation strategy and impact of climate change on this group of insects." (Authors)] Address: Bashar, K., Department of Zoology, Jahangirnagar University, Savar, Dhaka-1342, Bangladesh

**14446.** Bistula-Prószyński, G. (2014): Dragonflies Odonata, of the Nature Reserve Siedleckie. In: Sposób cytowania: Górski P. 2014. Kleszcze rezerwatu Stawy Siedleckie. [W:] + M. Falkowski, K. Nowicka-Falkowska, M. Omelaniuk (red.). Bogactwo przyrodnicze rezerwatu Stawy Siedleckie. Monografia Przyrodnicza. s. 57, Siedlce: 73-76. (in Polish, with English summary) [Poland; 21 odonate species are checked. Records of *Orthetrum albistylum*, *Coenagrion lunulatum* and *Sympetma paedisca* are noteworthy.] Address: Bistula-Prószyński, G., Polskie Towarzystwo Entomologiczne; E-mail: grzegorz.bp@wp.pl

**14447.** Bogunski, G. (2014): Ergänzungen zur Checkliste der Libellen, Heuschrecken und Schmetterlinge im Gebiet „Kalksteinbrüche im Wildenfeser Zwischengebirge“ (EBG Nr. 35 sowie FFH Nr. 276) für den Zeitraum von 2009 bis 2013. *Mitteilungen Sächsischer Entomologen* 33(109): 130-135. (in German) [Sachsen, Germany (MTB 5341,2). A checklist of Odonata recorded between 2009 and 2013 totals to 26 species. *Sympetrum pedemontanum* and *Leucorrhinia dubia* only were observed prior this time period.] Address: Bogunski, G., Gartenstr. 10, D-08141 Reinsdorf, Germany

- 14448.** Bora, A.; Meitei, L.R. (2014): Odonates (Dragonflies and Damselflies) of Indian Council of Agricultural Research (ICAR), Research Complex for NEH Region Campus, Umiam, Meghalaya, India. *Journal of Entomology and Zoology Studies* 2(6): 16-21. (in English) ["A total of 33 species of Odonates were recorded from the study area from March to August, 2014. The family Libellulidae with 21 species was the most dominant among the Anisoptera followed by Gomphidae (2 sp.) and Aeshnidae (1 sp.). Among the Zygoptera, the 9 species recorded belong to the family Coenagrionidae. As the area houses 33 species of Odonates including 24 species of Anisoptera and 9 species of Zygoptera, it can be presumed to have a good diversity which may be attributed to the grasslands, shrubs and small water bodies inside the campus." (Authors)] Address: Bora, A., Research Scholar, Division of Animal Production, ICAR, RC for NEH Region Umiam-793003, Meghalaya, India
- 14449.** Borisov, S.N.; Kosterin, O.E.; (2014): Dragonflies and damselflies (Odonata) of north-eastern Kazakhstan. *Eurasian entomological journal* 13(4): 339-345. (in English, with Russian summary) ["Earlier north-eastern Kazakhstan was practically not studied with respect to Odonata. Here we report 39 species found in 14 localities, including such species rare in northern Kazakhstan as *Coenagrion johanssoni*, *Ischnura pumilio*, *Nehalennia speciosa*, *Anax imperator*, *Anax parthenope* and *Macromia amphigena fraenata*. The record of *Sympecma fusca* appeared the northernmost in Asia and that of *C. johanssoni* the southernmost in Kazakhstan. The known distribution of close species *Stylurus flavipes* and *S. ubadschii* in Kazakhstan and presence of *M. a. fraenata* in the Irtysh River basin are considered. The recorded individuals of *Anax parthenope* and *Sympetrum fonscolombii* probably arrived from the south. *N. speciosa* was found in rather an unusual habitat." (Authors)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru
- 14450.** Borisov, S.N. (2014): Dragonflies (Odonata) of thermal springs in Barguzinskaya depression of Baikalian rift zone, Russia. *Euroasian Entomological Journal* 13(2): 121-132. (in Russian, with English summary) ["At seven thermal springs and associated thermal water bodies of the Barguzin Depression (the North-East Baikal Region), 16 species of Odonata have been recorded: *Lestes dryas*, *L. sponsa*, *Sympecma paedisca*, *Coenagrion johanssoni*, *C. glaciale*, *Enallagma cyathigerum*, *Aeshna crenata*, *Ae. juncea*, *Somatochlora graeseri*, *Leucorrhinia dubia orientalis*, *Libellula quadrimaculata*, *Orthetrum albistylum*, *Sympetrum danae*, *S. flaveolum*, *S. pedemontanum*, *S. vulgatum*. The larvae of some of them were found in water with the temperature range of 25–34.5 °C. *Orthetrum albistylum* is known from 17 thermal springs of the Baikal Rift Zone, these localities are situated 1300 km apart of the main range." (Author)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru
- 14451.** Borisov, S.N. (2014): Distribution and ecology of *Ischnura forcipata* Morton, 1907 (Odonata, Coenagrionidae) in Tien-Shan and Pamir-Alai. *Eurasian Entomologische Nachrichten und Berichtsomologischer journal* 13(4): 323-328. (in Russian, with English summary) ["Distribution and ecology of *I. forcipata* in Tien-Shan and Pamir-Alai are studied. Normally, species development is bivoltine in foothill planes, and three generations possible in warm years." (Author)] Address: Borisov, S.N., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru
- 14452.** Borisov, S.N.; Kosterin, O.E.; Haritonov, A.Yu. (2014): On the fauna of Odonata of Chukotka and other northern regions of the Holarctic. *Eurasian entomological journal* 13(4): 315-320. (in English, with Russian summary) [Russia; "On the occasion of new data on Odonata from Chukotka (Chukotka Autonomous Okrug), the knowledge of Odonata fauna of this region is summarised. At present 17 species have been reported for Chukotka, of which *Aeshna caerulea*, *Cordulia aenea* and *Somatochlora exuberata* for the first time in this paper. The fauna of Odonata of Chukotka is compared to those of the territories of Yakutia, North America and Europe north of 62° N, and also to that of Kamchatka (containing 32, 34, 53, and 24 species, respectively). Species richness was found to strongly depend on climate mildness." (Authors)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru
- 14453.** Boudot, J.-P. (2014): A brief observation of egg laying in *Lindenia tetraphylla* (Odonata: Gomphidae) on Kriti (Crete), Greece. *Notulae odonatologicae* 8(4): 94-96. (in English) ["Brief sightings of an ovipositing *L. tetraphylla* above submerged mats of hydrophytes on a lake shore are reported." (Author)] Address: Boudot, J.P., Immeuble Orphée, Apt 703, Cidex 62, 78 rue de la Justice, Ludres, France. E-mail: jean-pierre.boudot@univ-lorraine.fr
- 14454.** Brockhaus, T. (2014): Mark-recapture studies on co-occurring *Sympecma fusca* (VANDER LINDEN, 1820) and *S. paedisca* (BRAUER, 1877) (Odonata: Zygoptera: Lestidae). *Polish Journal of Entomology* 83: 225-234. (in English) ["Maturation cohorts and reproductive cohorts of the two *Sympecma* species were studied in Chomutov (Czech Republic) from 2010 to 2013. During individual mark-recapture studies, a total of 705 winter damselflies were recorded, 473 of which were individually marked (375 *S. fusca*, 98 *S. paedisca*). The recapture rates in the maturation habitat and in the reproductive habitat were low. The population estimate using CHAPMAN's method for low recapture rates could not be carried out separately for the two species owing to the low recapture rate of *S.*

paedisca. The proportion of females was greater in the maturation habitat and significantly lower than that of males in the reproductive habitat. The reproductive habitat was predominantly inhabited by territorial males. All the females observed there were engaged in reproductive activities. There was a close correlation between the male density along the shoreline and reproductive activities. *S. paedisca* was less abundant than *S. fusca*. No differences between the two species were observed in reproductive behaviour. However, *S. paedisca* appeared to disperse continuously away from the maturation habitat. Perhaps this species prefers more open areas as maturation and wintering habitats. *S. fusca* was observed here until October." (Author)] Address: Brockhaus, T., An der Morgensonne 5, 09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**14455.** Brooks, S.; Cham, S.; Lewington, R. (2014): Field Guide to the Dragonflies and Damselflies of Great Britain and Ireland. British Wildlife Publishing. Revised 2014 edition: 192 pp. (in English) [xyxyxyxyxyxy] Address: British Wildlief Publishing, Lower Barn Rooks Farm, Rotherwick, Hook Hampshire RG27 9BG, UK. www.britishwildlife.com

**14456.** Buckland-Nicks, A.; Hillier, K.N.; Avery, T.S.; O'Driscoll, N.J. (2014): Mercury bioaccumulation in dragonflies (Odonata: Anisoptera): Examination of life stages and body regions. *Environmental Toxicology and Chemistry* 33(9): 2047-2054. (in English) ["Dragonflies (Odonata: Anisoptera) are an important component of both aquatic and terrestrial food webs and are vectors for methylmercury (MeHg) biomagnification. Variations in mercury content with life stage and body regions may affect the relative transfer of mercury to aquatic or terrestrial food webs; however, there has been little research on this subject. Also, little is known about mercury bioaccumulation in different body regions of dragonflies. To address these knowledge gaps, dragonfly naiads, adults, and exuviae were collected at 2 lakes in Kejimikujik National Park, Nova Scotia, Canada, and mercury concentrations in different life stages and body regions were quantified. Mean whole body concentrations of MeHg were substantial in naiads ( $232 \pm 112$  ng g<sup>-1</sup> dry wt, n = 66), emerging adults ( $236 \pm 50$  ng g<sup>-1</sup> dry wt, n = 10), and mature adults ( $231 \pm 74$  ng g<sup>-1</sup> dry wt, n = 20). Mean MeHg concentrations in exuviae ( $5.6 \pm 4.3$  ng g<sup>-1</sup>, n = 32) were 40-fold lower than in naiads and adults. Emerging adults had 2-fold to 2.5-fold higher Hg(II) concentrations than naiads, mature adults, and exuviae. In body regions of both naiads and adults, some abdomens contained significantly higher concentrations of Hg(II) than heads or thoraces, and this trend was consistent across families. Across families, Aeshnidae had significantly higher concentrations of MeHg and total Hg than Gomphidae and Libellulidae, but not higher than Corduliidae. The Hg(II) concentrations were lower in Aeshnidae and Libellulidae than in Gomphidae and Corduliidae. Shedding of exuviae presents a possible mechanism for mercury detoxification, but mercury concentrations and

burdens in exuviae are low in comparison with naiads and adults. Dragonfly adults retain a high potential for transferring substantial amounts of MeHg to their predators." (Authors)] Address: Buckland-Nicks, Amy, Dept of Earth and Environmental Science, Acadia University, Wolfville, NS, USA. E-mail: a.bucklan@gmail.com

**14457.** Bush, A.; Hermoso, V.; Linke, S.; Nipperess, D.; Turak, E.; Hughes, L. (2014): Freshwater conservation planning under climate change: demonstrating proactive approaches for Australian Odonata. *Journal of Applied Ecology* 51(5): 1273-1281. (in English) ["(1) Climate change represents a major challenge for conservation in the future and undermines protection within reserve boundaries. Freshwater biodiversity is still under-represented within reserves world-wide, and connectivity among reserves will become increasingly crucial if species are to persist under climate change. (2) We tested the likely benefits of including predicted species distributions in systematic reserve design for rivers under climate change and the impact of varying connectivity requirements on future representation. We used the modelled distribution of 126 east Australian Odonata to identify reserve networks using data for current or future (2055 and 2085) distributions either by filling gaps additively, or as separate targets in a single solution. We then assessed the potential improvements to species representation in the future using different types of connectivity penalties that emphasized either longitudinal riverine connections or connections to all neighbouring subcatchments. (3) Solutions that did not include future distributions in the planning stages were 16 to 30% less likely to protect the same species by 2055 and 2085, respectively. Inclusion of species' future distributions in the design phase leads to short-term increases in cost, but in the longer term fewer additional areas are required to meet targets and this strategy is likely to be significantly more efficient than implementing systematic design in stages. In addition, solely targeting riverine connectivity was significantly less likely to protect current species in the future than if cross-catchment connections were included. (4) Synthesis and applications. Where protected areas can be expanded to assist species adaptation to climate change, significant gains in efficiency are possible if longer term goals are considered when selecting sites. Furthermore, to improve the representation of species under future climates, reserve selection should consider inter-catchment connectivity, although the nature of optimal solutions will depend heavily on the range of taxa included, their dispersal capacity, and the availability of climatic refugia." (Authors)] Address: Bush, A., Dept of Biological Sciences, Macquarie Univ., Sydney, NSW, Australia. E-mail: alexalbush@gmail.com

**14458.** Bush, A.A.; Nipperess, D.A.; Theischinger, G.; Turak, E.; Hughes, L. (2014): Testing for taxonomic bias in the future diversity of Australian Odonata. *Diversity and Distributions* 20(9): 1016-1028. (in English) ["Aim: Invertebrates are often overlooked in assessments of climate change impacts. Odonata are a significant component of



freshwater macroinvertebrate diversity and are likely to be highly responsive to a changing climate. We investigate whether climate change could lead to significant alteration of continental patterns of diversity and whether vulnerable species are taxonomically clustered. Location: Australia. Methods: Habitat suitability of 270 odonate species was modelled, and a simplified phylogeny was developed based on taxonomic relationships and expert opinion. These maps were then combined to compare species richness, endemism, taxonomic diversity (TD) and taxonomic endemism (TE) under climate change scenarios, and estimate turnover in species composition. Based on the concentration of vulnerable species in regions associated with Gondwanan relicts, we tested the possibility that a focus on species loss would underestimate loss of evolutionary diversity. Results: Species richness of Australian Odonata is concentrated in the Wet Tropics, central-north Australia and south-east Queensland. Several additional regions support endemic assemblages, including the Victorian alpine region, the Pilbara and far south-western Australia. Major shifts in composition are expected across most of the east coast in response to climate change, and Tasmania has the potential to become a major refuge for mainland species. For many regions, the loss of TD is greater than expected based on the changes in species richness, and the loss of suitable habitat was unevenly distributed among families. However, the potential loss of evolutionary diversity among vulnerable species was not significantly different from random. Main conclusions: The major shifts in the distribution of Australian odonate diversity predicted to occur under climate change imply major challenges for conservation of freshwater biodiversity overall. Although major evolutionary losses may be avoided, climate change is still a serious threat to Australia's Odonata and poses an even greater threat to Australian freshwater biodiversity as a whole." (Authors)] Address: Bush, A., Dept. Biol. Sci., Macquarie Univ., Sydney, New South Wales, Australia. E-mail: alexalbush@gmailcom

**14459.** Campos, F., Velasco, T.; Santos, E.; Sanz, G.; Casanueva, P. (2014): Distribución de *Coenagrion mercuriale* (Charpentier, 1840) (Odonata, Coenagrionidae) en el norte de la provincia de Valladolid, España. Boln. Asoc. esp. Ent. 38 (3-4): 279-293. (in Spanish, with English summary) ["This paper analyzes the distribution of *C. mercuriale* in the northern half of the province of Valladolid and the variation of dorsal drawing design of the second abdominal segment (S2) among males of the nearby populations. The species was detected in 61 different locations, the streams being the most numerous (86.9 % of cases), followed by rivers (4.9%), ponds (3.3%), channels (1.6%), upwellings (1.6%) and wells (1.6%). Three designs of the dorsal drawing were found, one of them in 13.7% of males and the another two in 43.7% and 42.6% of males. Since in the study area there are large populations found in small streams that dry up in summer, a better management of the flow in these natural channels as a measure of conservation of the species is suggested." (Authors)] Address: Campos, A., Universidad Europea Miguel de Cervantes,

Calle Padre Julio Chevalier, 2, E-47012 Valladolid, Spain. E-mail: fcampos@uemc.es

**14460.** Chahl, J.; Mizutani, A. (2014): Dragonfly hover is primarily mediated by vision. Proc. SPIE 9055, Bioinspiration, Biomimetics, and Bioreplication 2014, 905516 (8 March 2014); doi: 10.1117/12.2045029: 5 pp. (in English) ["The sensory means by which hover is achieved could be inertial, visual or an unexplained sensory modality. Dragonflies in their natural habitat were shown not to maintain a stationary position in wind. Their position fluctuated significantly while returning to the original position. The movement of the dragonfly is correlated with the movement of vertically standing vegetation. This response would be non-causal with wind for an inertial or putative pressure based internal sensory system. It is postulated that with a substrate of moving water, sensitivity to movement on the visual horizon for controlling hover is a robust strategy." (Authors) *Hemianax papuensis*] Address: Chahl, J., Univ. South Australia, Defence Science and Technology Organisation, Australia. E-mail: javaan.chahl@unisa.edu.au,

**14461.** Chand, S. (2014): Pyrethroid pesticides induced impairments in midgut histo-architecture of naiad of *Trithemis aurora* (Burm.) dragonfly (Odonata: Libellulidae). Advances in BioResearch 5(2): 130-137. (in English) ["The midgut of last instar naiad of *T. aurora* was exposed to LC50 concentrations 2.69 x 10<sup>-5</sup> and 2.50 x 10<sup>-3</sup> ppm of cypermethrin and deltamethrin pesticides respectively for 40 hrs, exhibited positive histo-pathological derangements in various midgut tissues. High accumulation of cell contents was seen at apical ends of epithelial cells. The displacement of nuclei was observed and nuclear membrane was found damaged. The circular muscles become contracted and longitudinal muscle bundles remained damaged under cypermethrin constrain. The deltamethrin reacted with epithelial folds, separating their latero-apical ends for more pesticidal activity. The intercellular boundaries of epithelial cells were perfectly damaged at the basal portion of epithelial folds. The peritrophic membrane was damaged. The circular and longitudinal muscles were affected by the pesticide." (Author)] Address: Chand, S., P G Department of Zoology, R.P.G. College Jamuhai, Jaunpur - 222 002, India

**14462.** Chang, Y.-H.; Ku, C.-R.; Yeh, N. (2014): Solar powered artificial floating island for landscape ecology and water quality improvement. Ecological Engineering 69: 8-16. (in English) ["This study uses solar artificial floating islands (SAFI) for water purification and biological conservation. The site of experiment is set up on a lake shore on a university campus, where the eutrophic contents of lake and sewage from the student dormitory are used for result assessment. The study demonstrates that the SAFI is able to reduce the EC of the eutrophic contents by 30% and enhance dissolved oxygen (DO) by 2.8 times. The SAFI is also able to reduce electric conductivity of dormitory sewage by 34% and increase dissolved oxygen by 982 times. After the improvement, the oxidation–reduction property is

above +100 mV and the oxidation activities in samples are vigorous. The habitation of *Ischnura senegalensis*, *Leucauge magnifica* Yaginuma, and *Duttaphrynus melanostictus* can be observed in the SAFI enhanced water area, while the area without the influence of the SAFI lacks dissolved oxygen and water plants, which results in the common Culicidae, *Hirudo nipponica* Whitman, and Chironomida in rotten water. This research shows that the SAFI has determinant influence on the ecology and water quality improvement." (Authors)] Address: Chang, Y.-H., Department of Landscape and Architecture, MingDao University, Chanhua, No. 369, Wen-Hua Road, Peetow ChanHua 52345, Taiwan. E-mail: f89622050@ntu.edu.tw

**14463.** Chauhan, P.; Hansson, B.; Kraaijeveld, K.; de Knijff, P.; Svensson, E.I.; Wellenreuther, M. (2014): De novo transcriptome of *Ischnura elegans* provides insights into sensory biology, colour and vision genes. *BMC Genomics* 2014, 15:808 doi:10.1186/1471-2164-15-808: 14 pp. (in English) ["Background: There is growing interest in odonates as model organisms in ecology and evolutionary biology but the development of genomic resources has been slow. So far only one draft genome (*Ladona fulva*) and one transcriptome assembly (*Enallagma hageni*) have been published. Odonates have some of the most advanced visual systems among insects and several species are colour polymorphic, and genomic and transcriptomic data would allow studying the genomic architecture of these interesting traits and make detailed comparative studies between related species possible. Here, we present a comprehensive de novo transcriptome assembly for *I. elegans* built from short-read RNA-seq data. The transcriptome analysis in this paper provides a first step towards identifying genes and pathways underlying the visual and colour systems in this insect group. Results: Illumina RNA sequencing performed on tissues from the head, thorax and abdomen generated 428,744,100 paired-ends reads amounting to 110 Gb of sequence data, which was assembled de novo with Trinity. A transcriptome was produced after filtering and quality checking yielding a final set of 60,232 high quality transcripts for analysis. CEGMA software identified 247 out of 248 ultra-conserved core proteins as 'complete' in the transcriptome assembly, yielding a completeness of 99.6%. BLASTX and InterProScan annotated 55% of the assembled transcripts and showed that the three tissue types differed both qualitatively and quantitatively in *I. elegans*. Differential expression identified 8,625 transcripts to be differentially expressed in head, thorax and abdomen. Targeted analyses of vision and colour functional pathways identified the presence of four different opsin types and three pigmentation pathways. We also identified transcripts involved in temperature sensitivity, thermoregulation and olfaction. All these traits and their associated transcripts are of considerable ecological and evolutionary interest for this and other insect orders. Conclusions: Our work presents a comprehensive transcriptome resource for the ancient insect order Odonata and provides insight into their biology and physiology. The transcriptomic resource can

provide a foundation for future investigations into this diverse group, including the evolution of colour, vision, olfaction and thermal adaptation." (Authors)] Address: Chauhan, P., Dept of Biology, Lund University, Sölvegatan 37, SE-22362 Lund, Sweden. Email: pallavi.chauhan@biol.lu.se

**14464.** Collins, S.D. (2014): Fine-scale modeling of riverine Odonata distributions in the northerneast United States. Ph.D, Biology, Graduate Faculty of Texas Tech University: X + 207 pp. (in English) ["The distributions of riverine Odonata was modeled at the scale of individual river segments across the northeastern United States, a 784,982 km<sup>2</sup> region spanning from Ohio, West Virginia, and Virginia northeast to Maine. The species distribution modeling approach was reviewed with respect to Odonata, and several modeling techniques were compared. Species locality data assigned only to U.S. county is prevalent in invertebrate databases, and it was found that using these data for modeling tends to overpredict the geographic distributions of species. Several techniques to compensate for geographic sampling bias, which is also a characteristic of these largely opportunisticly collected databases, were compared, though the optimum method (thinning data, biased background sampling, or no treatment) depended on the dataset. Watersheds and riparian zones are ecologically relevant for riverine organisms, and models with catchment- and local-scale predictors outperformed models based only on climate. This fine-scale modeling approach is appropriate for the conservation of freshwater diversity, because individual river segments containing suitable species habitat can be identified and prioritized. Climate change is expected to reduce the available habitat for riverine Odonata within the northeastern U.S., though some rivers may serve as climatic refugia, and conservation of these rivers and their watersheds is essential." (Author)] Address: not stated

**14465.** Cooper, A. (2014): Dragonflies of the Colorado Front Range: A Photographic Guide Perfect Paperback. Boulder County Nature Association: 111 pp. (in English) ["Dragonflies -- they are dainty but deadly as they dart over ponds and clearings on the hunt for prey. How can they fail to catch the eye with such shimmering rainbow colours? Use this friendly photographic guide to identify and learn more about your striking and impressive insect neighbours. Showcasing 45 dragonflies and 28 damselflies, the guide covers the most common species found in the region, from the northern Colorado border south to Walsenburg. Accompanying more than 90 brilliant photographs are descriptions of habitat, appearance, length, behaviour, similar species, flight time and interesting facts for each species. Introductory material includes tips on watching, identifying and photographing these tiny jewels. This field guide is excellent for beginners and naturalists who would like to identify and enjoy dragonflies." (Publisher)] Address: Boulder County Nature Association, P.O. Box 493, Boulder, CO 80306, USA. <http://bcna.org/index.html>

**14466.** Corser, J.F.; White, E.L.; Schlesinger, M.D. (2014): Odonata origins, biogeography, and diversification in an Eastern North American hotspot: multiple pathways to high temperate forest insect diversity. *Insect Conservation and Diversity* 7(5): 393-404. (in English) ["We assessed the origins and historical biogeography of a rich regional odonate fauna in New York State (NYS), North-eastern United States. We computed North American (NA) range centres and NYS range margins and reviewed the taxonomic literature to provide a useful phylogenetic framework for the fauna. We analysed results from a newly completed Odonata atlas using generalised linear anova models to assess the effects of species' origins and zoogeographic affinities on relative frequency and extinction risk metrics. Phylogenetic reconstruction based on taxonomic nomenclature revealed different patterns of diversification. Zygoptera in NYS is mainly of Neotropical origin ~ 60 Ma displaying a pattern of tropical conservatism, but with a burst recent of Plio–Pleistocene speciation in certain groups. Alternatively, Anisoptera contains crown group endemic taxa and other very old lineages from the Mesozoic era before the breakup of Pangaea, highlighting the evolutionary significance of the Appalachian Mountains as an important global centre of temperate forest freshwater diversity. These high regional levels of odonate diversity have been brought about by at least three different mechanisms: dependence on forests, predominance of non-ecological speciation mechanisms, and niche conservatism across hundreds of millions of generations. NYS lies at a crossroads of both ancient and more recent Odonata evolution comprising separate boreal, temperate, and tropical faunas. Those species encountered less frequently and having higher overall extinction risk metrics generally tended to be the boreal species on the rear edge of their range, a widespread phenomenon for the insects of many regions generally attributed to ongoing climate change." (Authors)] Address: Corser, J.D., New York Natural Heritage Program, SUNY College of Environmental Science and Forestry, 625 Broadway, 5th Floor, Albany, NY 12233, USA. E-mail: jdcorser@gw.dec.state.ny.us

**14467.** Costa, R.N.; Nomura, F. (2014): Assessment risk and limited behavioral plasticity in tadpoles of *Rhinella ornata* (Anura, Bufonidae). *Iheringia* 104(2): 162-167. (in Portuguese, with English summary) ["Anuran tadpoles are important elements of trophic networks in aquatic environments, being food resource for many types of predators. Thus, the tadpoles exhibit a great variety of defense mechanisms that may be morphological, behavioral and/or physiological. The unpalatability, produced by the accumulation of toxic substances in the skin, is a common mechanism in many frog lineages. However, some predators are not affected by these toxic substances, which may favor the development of alternative mechanisms of defense against predation. In this context, our objective was evaluate if the unpalatable tadpoles of *R. ornata* (Spix, 1824) may present behavioral mechanisms of defense against predation in the presence of predators that are not

affected by toxic substances on its skin. To test our hypothesis, we used two kinds of predators: an aquatic Heteroptera of the genus *Belostoma* and a dragonfly larva of the genus *Aeshna*. The tadpoles were located in aquariums with visual and chemical clues of predators (direct risk experiment), only chemical clues (indirect risk experiment) and by the complete absence of predator signals (control). In both cases, the swimming behavior was observed for 5 minutes. During the experiments there was no alteration in swimming behavior of tadpoles." (Authors)] Address: Costa, R.N., Univ. Federal de Goiás (UFG), Depto Ecologia, Inst. de Ciências Biológicas, Lab. de Herpetologia e Comportamento Animal, Campus Samambaia (Campus II). Av. Esperança, Caixa Postal 131, 74001-970, Goiânia, Goiás, Brasil. E-mail: renan.nunes.costa@gmail.com

**14468.** Culler, L.E.; McPeck, M.A.; Ayres, M.P. (2014): Predation risk shapes thermal physiology of a predaceous damselfly. *Oecologia* 176(3): 653-660. (in English) ["Predation risk has strong effects on organismal physiology that can cascade to impact ecosystem structure and function. Physiological processes in general are sensitive to temperature. Thus, the temperature at which predators and prey interact may shape physiological response to predation risk. We measured and evaluated how temperature and predation risk affected growth rates of predaceous damselfly nymphs (*Enallagma vesperum*, Odonata: Coenagrionidae). First, we conducted growth trials at five temperatures crossed with two levels of predation risk (fish predator present versus absent) and measured growth rates, consumption rates, assimilation efficiencies, and production efficiencies of 107 individual damselflies. Second, we used a model to evaluate if and how component physiological responses to predation risk affected growth rates across temperatures. In the absence of mortality threat, growth rates of damselflies increased with warming until about 23.5 °C and then began to decline, a typical unimodal response to changes in temperature. Under predation risk, growth rates were lower and the shape of the thermal response was less apparent. Higher metabolic and survival costs induced by predation risk were only partially offset by changes in consumption rates and assimilation efficiencies and the magnitude of non-consumptive effects varied as a function of temperature. Furthermore, we documented that thermal physiology was mediated by predation risk, a known driver of organismal physiology that occurs in the context of species interactions. A general understanding of climatic impacts on ectothermic populations requires consideration of the community context of thermal physiology, including non-consumptive effects of predators." (Authors)] Address: Culler, Lauren, Department of Biological Sciences, Dartmouth College, 78 College Street, Hanover, NH, 03755-3563, USA. E-mail: le-culler@gmail.com

**14469.** da Silva-Mendez, D.; Lorenzo-Carballa, M.O.; Cordero-Rivera, A.; Watts, P.C. (2014): Microsatellite loci for two threatened dragonfly (Odonata: Anisoptera) spe-



cies: *Oxygastra curtisii* (Dale, 1834) and *Macromia splendens* (Pictet, 1843). *Conservation Genet. Resour.* 5(4): 1171-1174. (in English) ["Twenty one polymorphic microsatellite loci were isolated from two species of dragonfly (Odonata: Anisoptera), *Macromia splendens* (n = 8 loci) and *Oxygastra curtisii* (n = 13 loci). Both species have their main distribution areas in southwestern Europe, with records in the north of Africa in the case of *O. curtisii*. *M. splendens* is listed as vulnerable by IUCN, while *O. curtisii* is regarded as near threatened. Genetic diversity was assessed in samples from the Iberian Peninsula representing two populations for each species. Number of alleles per locus ranged from 5 to 11 (*O. curtisii*) and between 4 and 16 (*M. splendens*), while mean expected heterozygosity varied between 0.118–0.745 (*O. curtisii*) and 0.130–0.849 (*M. splendens*). Five loci (four for *O. curtisii* and one for *M. splendens*) showed significant deviations ( $P < 0.05$ ) from expected Hardy–Weinberg equilibrium conditions, with the locus from *M. splendens* experiencing null alleles. These loci are currently being used to assess spatial genetic structure in these protected species." (Authors)] Address: Silva-Méndez, G., Evolutionary Ecology and Conservation Group, Department of Ecology and Animal Biology, Universidad de Vigo, EUE Forestal, Campus Universitario A Xunqueira s/n, 36005 Pontevedra, Spain. E-mail: genarodasilva@uvigo.es

**14470.** Dawn, P.; Chandra, K. (2014): Dragonflies and damselflies (Insecta: Odonata) of Chhattisgarh, India. *Check List* 10(5): 1104-1109. (in English) ["The present study on the Odonata (Insecta) of Chhattisgarh, India, documents eighty-five species including thirteen new records to the state. *Cyclogomphus heterostylus*, *Macrogomphus seductus* and *Zygonyx iris iris* are recorded for the first time from central India. The paper discusses the geographical and habitat-wise distribution of Odonata of Chhattisgarh." (Authors) New regional records are also: *Anaciaeschna jaspidea*, *Cyclogomphus ypsilon*, *Microgomphus torquatus*, *Tramea limbata*, *Neurobasis chinensis*, *Vestalis apicalis*, *Rhinocypha bisignata*, *Ceragrion rubiae*, *Lestes praemorsus*, and *Copera vittata*.] Address: Dawn, P., Zoological Survey of India, Prani Vigyan Bhavan, M-Block, New Alipore, Kolkata, 700053, West Bengal, India. E-mail: prosenjit.dawn@gmail.com

**14471.** Dijkstra, K.-D.; Clausnitzer, V. (2014): The dragonflies and damselflies of eastern Africa: Handbook for all Odonata from Sudan to Zimbabwe. *Studies in Afrotropical Zoology* 298: 264 pp. (in English) ["Few animal groups can represent the greatest (insects) and most threatened (freshwater) biodiversity on earth as well as dragonflies, perhaps the best-known and most colourful of all aquatic insects. Fifteen years in development, *The Dragonflies and Damselflies of eastern Africa* is the first handbook of its extent and detail on tropical Odonata. Extending from Sudan and Somalia to Zambia and Mozambique, including the entire eastern half of the Congo Basin, the book covers a third of Africa, about ten million square kilometres, an area comparable to China or the United States,

but treats almost two-thirds of the continent's species. More than 500 species are illustrated with 1120 original drawings and over 360 colour photographs portraying 320 species. Identification keys to adult males of all species set a new standard for recognising 'the birdwatcher's insects' in Africa, detailed genus descriptions provide the most comprehensive account of their ecology and taxonomy so far, and all species have been furnished with a vernacular English name for the first time. Verified checklists are presented for Democratic Republic of Congo, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Somalia, South Sudan, Sudan, Tanzania, Uganda, Zambia and Zimbabwe." (Publisher)] Address: <http://www.africamuseum.be/research/publications/rmca/search/pubdetail?pubid=1737>; KMZA, Leuvensesteenweg 13, 3080 Teruren - Belgium

**14472.** Dolný, A.; Waldhauser, M.; Kvitá, L.; Kocourková, L. (2014): New records of lilypad whiteface *Leucorrhinia caudalis* (Odonata: Libellulidae) in the Czech Republic. *Acta Mus. Siles. Sci. Natur.* 63: 185-192. (in English) ["*L. caudalis* had been thought to be extinct in the Czech Republic for the last fifty years, until an accidental discovery of adult males in 2012. In 2014, larvae of *L. caudalis* were recorded from water reservoirs in the Ěeská Lípa region, northern Bohemia, for the first time. Thus, it is the first breeding site of *L. caudalis* in the Czech Republic. A male *L. caudalis* was also repeatedly recorded in Havířov-Dolní Suchá in the north-eastern Czech Republic." (Authors)] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic. E-mail: Alnes.Dolny@osu.cz

**14473.** Dong, C.X. (2014): Dragonflies of Nankunshan, China. China Forestry Publishing House: 195 pp. (in Chinese, English foreword, Latin names) [Nankunshan, Guangdong, China. 155 odonate species are introduced by app. 200 exquisite photographs.]

**14474.** Dow, R.A. (2014): A review of the genus *Bornargiolestes* Kimmins, 1936 (Odonata: Zygoptera) with a description of two new species from Sarawak, Malaysia. *Journal of Threatened Taxa* 6(5): 5700-5711. (in English, with Bahasa Melayu summary) ["The poorly known genus *Bornargiolestes* is reviewed and a fresh diagnosis is provided. Two new species, *Bornargiolestes fuscus* and *Bornargiolestes reelsi* are described. Illustrations, distribution maps and a key to the males of the genus are given." (Author)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**14475.** Dow, R.A.; Ngiam, R.W.J. (2014): Odonata from logged and unlogged forest in the Ulu Balui and Ulu Baleh, Kapit Division, Sarawak, in June and September 2013. *International Dragonfly Fund - Report* 73: 1-48. (in English) ["The results of two expeditions into the Ulu Baleh and Ulu Balui areas of the interior of Sarawak are presented, including data from forest that was pristine at the time of sampling but that was subsequently logged. A total of 74

species are recorded, notably including *Coeliccia campioni*, *Coeliccia* new species borneensis-group, *Pericnemis* spp., *Heliogomphus blandulus*, *Leptogomphus pendleburyi*, *Chlorogomphus ?manau* and *Procordulia ?new species*. A discussion of the results and potential differences in the odonate fauna of comparable logged and unlogged forest sites is given." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**14476.** Drake, D.L.; Anderson, T.L.; Smith, L.M.; Lohraff, K.M.; Semlitsch, R.D. (2014): Predation of eggs and recently hatched larvae of endemic Ringed Salamanders (*Ambystoma annulatum*) by native and introduced aquatic predators. *Herpetologica* 70(4): 378-387. (in English) ["Predation is a key determinant of pond community structure, yet not all predators are equally effective and not all life stages of potential prey are similarly susceptible. Understanding the effects of native and introduced species is essential to informing management strategies, especially for endemic and species of conservation concern. We examined the effects of five common predators (three native: Central Newts [*Notophthalmus viridescens louisianensis*], aeshnid dragonfly naiads [Aeshnidae], and Southern Leopard Frog tadpoles [*Lithobates sphenoccephalus*]; and two introduced: Fathead Minnows [*Pimephales promelas*] and Mosquitofish [*Gambusia affinis*] on survival of eggs and recently hatched larvae of Ringed Salamanders (*Ambystoma annulatum*). We also examined the effect of supplemental food or cover availability on survival at each stage. Predators primarily showed a binary response to eggs, consuming all or none of them. Supplemental food did not influence whether eggs or larvae were consumed. Larvae were consumed by all predator species although the effect varied. The presence of cover did not reduce the impacts of the other predators on larval survival. Overall, the two introduced fish species had a greater impact on survival of the early stages of Ringed Salamanders than did the native predators. Further inquiries into the susceptibility of different life stages and survival will improve conservation strategies for rare and endemic species such as Ringed Salamanders." (Authors)] Address: Drake, Dana, Division of Biological Sciences, University of Missouri, 105 Tucker Hall, Columbia, Missouri 65211, USA. E-mail, drake.dana.l@gmail.com

**14477.** Dumont, H.J. (2014): Odonata from the Tibesti Mountains and the Ounianga Lakes in Chad, with notes on *Hemianax ephippiger* accumulating in the desert. *Odonatologica* 43(1/2): 13-24. (in English) ["Fourteen species of Odonata were collected in Ounianga and Tibesti (Chad, Africa) in March 2014. Among them, only one zygopteran (*Ischnura saharensis*, with a Saharan distribution), one gomphid (the eremian *Paragomphus sinaiticus*), and two aeshnids (*Anax imperator* and *Hemianax ephippiger*) were present. The latter species was not only the most common dragonfly, but also the most abundant insect seen in the desert. It is likely that it was in a phase of accumulating individuals, possibly as a prelude to another

massive trans-Sahara and even trans-Mediterranean migration, for which the species is well-known. The 10 libellulids recorded were almost all Afrotropical species, but several expand to the Maghreb and even Mediterranean Europe. Only *Orthetrum* cf. *hintzi* is a tropical African species that had never been recorded from the desert before." (Author)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@ugent.be

**14478.** Dziekonska-Rynko, J.; Rokicki, J.; Mierzejewska, K. (2014): In vitro infection experiments with eggs of the nematode *Contraecaecum rudolphii* Hartwich, 1964 (sensu lato) targeting aquatic insect larvae (Odonata: Coenagrionidae and Libellulidae; Trichoptera: Integripalpia) as possible intermediate hosts. *Oceanological and Hydrobiological Studies* 43(2): 165-169. (in English) ["The availability of aquatic insects (Odonata: Coenagrionidae, Libellulidae and Trichoptera: Integripalpia) as potential intermediate hosts for the nematode *Contraecaecum rudolphii* Hartwich, 1964 sensu lato was studied under laboratory conditions. The infective material consisted of nematode eggs, newly hatched larvae, as well as in vitro infected cyclopoid copepods. High prevalence and intensity of infection associated with a low mortality of aquatic insect larvae suggests that they may serve as intermediate hosts for *C. rudolphii* and constitute a major reservoir of *C. rudolphii* larvae in aquatic habitats." (Authors)] Address: Jerzy Rokicki, J. Department of Zoology, Faculty of Biology and Biotechnology, University of Warmia and Mazury, ul. Oczapowskiego 5, 10-957, Olsztyn, Poland. E-mail: rokicki@univ.gda.pl

**14479.** Ebrahimi, A.; Mohammadian, H.; Madjzadeh, S. M. (2014): A note on libellulid dragonflies (Odonata: Libellulidae) of Khabr National Park (Kerman Province, South-East Iran). *International Dragonfly Fund - Report* 69: 1-9. (in English) ["In spring and summer 2008, the Odonata fauna of the Khabr National Park (Iran) was studied for the first time. Here, we present records of the representatives of family Libellulidae only. A total of twelve libellulid Odonata were found. Most of them are common species in Iran and other parts of Kerman province. Scarce Iranian species are *Trithemis arteriosa* and *Zygonyx torridus*." (Authors)] Address: Ebrahimi, A., Dept. of Biology, Faculty of Sciences, Shahid Bahonar University, Kerman, Iran. E-mail: krnbrhm5@gmail.com

**14480.** Eck, A.; Byrne, A.; Popescu, V.D.; Harper, E.B.; Patrick, D.A. (2014): Effects of water temperature on larval amphibian predator-prey dynamics. *Herpetological Conservation and Biology* 9(2): 302-308. (in English) ["Predation represents an important driver of species persistence and community structure. Climate change can influence predation through changes in the distribution and abundance of predatory species. Furthermore, predator-prey dynamics may be influenced by climate-induced shifts in the behaviour of predators and/or prey. Our research employed a model system consisting of larval amphibians

(*Lithobates clamitans*) as prey, and three species of predatory dragonfly larvae, *Ladona julia*, *Aeshna interrupta*, and *Didymops transversa*. Our goal was to assess whether simulated climate-induced changes in predator assemblages and abiotic conditions may influence predator-prey dynamics. The study was conducted in replicated aquatic microcosms, with water temperature manipulated across a range of temperatures. Predation studies involved a single dragonfly of a focal species and 10 larval *L. clamitans*. Our best-fitting model included dragonfly species, water temperature, and the interaction between the two factors. Survival of anuran larvae decreased for both *Aeshna interrupta* and *Didymops transversa*, but remained constant with increasing water temperature for *Ladona julia*. Our study demonstrates the potential for climate-induced changes in the composition of predator species to interact with altered abiotic conditions in shaping predator-prey dynamics." (Authors)] Address: Patrick, D.A., Paul Smith's College, School of Natural Resources, Management, and Ecology, Routes 86 & 30, Paul Smiths, New York 12945, USA. E-mail: dpatrick@paulsmiths.edu

**14481.** Edgehouse, M.; Brown, C.P. (2014): Predatory luring behavior of odonates. *J. Insect Sci.* 14(146): 3 pp. (in English) ["To date, there has been zero evidence that odonates employ luring as a means of prey acquisition. However, in this study, we show that *Aeshna palmata* larvae use abdominal movements to lure larval *Argia vivida*, subsequently consuming the lured organism. We also present findings of a similar behavior from larval *Ar. vivida* in an attempt to lure larval *A. palmata* within striking distance." (Authors)] Address: Edgehouse, M., Dept of Natural Sciences and Mathematics, Lewis-Clark State College, 500 8th Avenue, Lewiston, ID 83501, USA. E-mail: mjedgehouse@lsc.edu

**14482.** Escoto-Moreno, J.A.; Márquez, J.; Novelo-Gutiérrez, R. (2014): Los odonatos (Insecta: Odonata) del estado de Hidalgo, México: situación actual y perspectivas. *Revista Mexicana de Biodiversidad* 85: 1043-1053. (in Spanish, with English summary) ["The odonates (Insecta: Odonata) from Hidalgo state, Mexico: present situation and perspectives: An historical analysis on the number of odonate species recorded for Hidalgo State is made. Moreover, collections were made in 2011 year, in 8 localities with cloud forest, during the dry and rainy seasons, twice each, complemented with occasional collections in other 8 localities with other type of forests along 2012-2013 years. Twenty-two new records of species are provided, increasing the total number of odonates for Hidalgo to 129 species. A map of the historical collection sites, as well as those places with a high potential species richness, was generated using geographic information system (GIS), indicating also the areas with high potential for new records for future studies in the state. For Mexico, Hidalgo occupies the fifth place in odonate diversity per km<sup>2</sup> and the sixth one in odonate species richness, representing more than 1/3 of the species known for the country, and more than 1/2 and 3/4 of the genera and families recorded

for Mexico, respectively. Finally, comments are made on the high odonate diversity and its probable cause." (Authors)] Address: Novelo-Gutiérrez, R., Red de Biodiversidad y Sistemática, Instituto de Ecología, A. C. Carretera antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, México. E-mail: rodolfo.novelo@inecol.mx

**14483.** Faasen, T. (2014): *Phoenicagrion trilobum*, a new species of damselfly from Peru (Odonata: Coenagrionidae). *International Journal of Odonatology* 17(2-3): 63-72. (in English) ["Three species of *Phoenicagrion* are known from the north-eastern Amazonian part of Peru: *P. flammeum*, *P. paulsoni*, and a third undescribed species. In 2009 and 2010 several specimens of this third species were collected in Loreto, making it possible to describe this species, here named *Phoenicagrion trilobum* (holotype male: Peru, Loreto department, Tahuayo River, 18 km E of the Amazon River, 4°24'18" S, 73°14'38" W, in RMNH collection)." (Author)] Address: Faasen, T., Ecologica, Rondven 22, 6026PX Maarheeze, the Netherlands

**14484.** Farkas, A.; Danyik, T.; Mora, A. (2014): Contribution to the Odonata fauna of the rivers in the Körös-Maros National Park, Hungary, with special emphasis on Gomphidae. Part I. *Acta Biol. Debr. Oecol. Hung.* 32: 31-49. (in English, with Hungarian summary) ["In 2013 systematic collections of Gomphidae exuviae were carried out at 37 sampling sites along the Hungarian sections of the Fehér-Körös, Fekete-Körös, Kettos-Körös and Maros rivers. The sampling sites were visited four times, taking into account the phenology of gomphid species. Besides Gomphidae, exuviae of other species were also collected with faunistic aims. In addition, observational data on adult specimens were occasionally recorded. Collections resulted in the occurrence of 5640 exuviae (from which 5291 were exuviae of Gomphidae) and 112 adults were observed. Altogether 17 species were found, for which detailed records are given. The most important result is the co-occurrence of the four Hungarian gomphid species along all studied rivers. The distributional areas of *Onychogomphus forcipatus* and *Ophiogomphus cecilia* were remarkably expanded by our results. The composition of the Gomphidae assemblages varied widely among rivers and within a given river as well, according to habitat characteristics. In conclusion, stable and viable populations of Gomphidae exist along the studied rivers (Fehér-Körös may be an exception) with great significance in terms of nature conservation. Accordingly, either these populations or rivers deserve strict protection." (Authors)] Address: Farkas, Anna, Department of Hydrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary. E-mail: flavipes@gmail.com

**14485.** Farkas, A.; Méro, T.O.; Móra, A.; Dévai, G. (2014): Urban dragonflies: Data on the Odonata fauna of the Danube at Budapest. *Acta Biol. Debr. Oecol. Hung.* 32: 23-29. (in English, with Hungarian summary) ["Although the Danube is the largest river in Hungary, its Odonata fauna is



scarcely known, especially that of the river section in Budapest. In this paper new data on the Odonata fauna of the latter Danube section are presented. In 2013 the collections of exuviae and observations on adults were made at five sites along the Danube in Budapest. During this work 414 exuviae (including dead larvae found in early phases of emergence) were collected and 36 mature adults were observed. Altogether seven species were recorded, among them the rare and vulnerable *Ophiogomphus cecilia* and *Onychogomphus forcipatus*. Except for *Gomphus vulgatissimus*, all species found are new for the fauna of the main branch of the Danube in Budapest. The composition of Odonata assemblage may indicate the improving water quality state of the river." (Authors)] Address: Farkas, Anna, Department of Hydrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary. E-mail: flavipes@gmail.com

**14486.** Ferreira, S.; Lorenzo-Carballa, M.O.; Torres-Cambas, Y.; Cordero-Rivera, A.; Thompson, D.J.; Watts, P.C. (2014): New EPIC nuclear DNA sequence markers to improve the resolution of phylogeographic studies of coenagrionids and other odonates. *International Journal of Odonatology* 17(2-3): 135-147. (in English) ["While phylogeographic data provide valuable information to inform conservation plans, there are comparatively few Odonata phylogeographic studies. This lack of research is partially due to a lack of independent DNA markers with appropriate levels of polymorphism that PCR-amplify in a range of species. We followed an exon-primed, intron-crossing (EPIC) PCR strategy to develop five new, polymorphic nuclear DNA sequence loci (six distinct DNA fragments) for *Coenagrion mercuriale*. These markers were: cell division cycle 5 protein (CDC5), arginine methyltransferase (PRMT), acetylglucosaminyl-transferase (AgT), myosin light chain (MLC) and phosphoglucose isomerase (PGI). Between three and five of these new markers could be PCR-amplified in five other species from the genus *Coenagrion*; one locus (PRMT) can be used in 26 other species of odonates that we examined, including three species of Anisoptera belonging to the genus *Onychogomphus*. These new nuclear genetic markers will be useful for phylogeographic studies in a range of odonate species, but also for phylogenetic studies, providing a particularly useful complement to the existing mitochondrial and nuclear loci." (Authors)] Address: Ferreira, Sónia, CIBIO/UP - Centre de Investigate em Biodiversidade e Recursos Genéticos, Univ. do Porto, Campus Agrário de Vairao, P-4485-661 Vairão, Portugal. E-mail: hiporame@gmail.com

**14487.** Ferreras-Romero, M.; Marquez-Rodriguez, J. (2014): Odonatos asociados a cursos estacionales de Sierra Morena (sur de España). *Boln. Asoc. esp. Ent.* 38(1-2): 173-184. (in Spanish, with English summary) ["The Odonata fauna existing in two seasonal streams of the Sierra Morena Mountains (Spain) is shown and discussed. Two thirds of the 21 species recorded were anisopteran.

Presence in such watercourses of *Onychogomphus forcipatus*, *Oxygastra curtisii*, *Libellula depressa* and *Orthetrum brunneum* is noteworthy. Abundant exclusively autumnal reproductive activity of *Chalcolestes viridis*, *Aeshna mixta* and *Sympetrum striolatum* was recorded." (Author)] Address: Marquez-Rodriguez, J., Departamento de Sistemas Físicos, Químicos y Naturales. Universidad Pablo de Olavide. A-376 km 1. 41013 Sevilla, Spain. E-mail: jmarrod1@admon.upo.es

**14488.** Ferriz, R.A.; Iwaszkiw, J.M. (2014): Alimentación de *Gymnotus omarorum* (Gymnotiformes: Gymnotidae) en Laguna Blanca (Parque Nacional Río Pilcomayo), Formosa, Argentina. *Rev. Mus. Argentino Cienc. Nat.*, n.s. 16(2): 115-122. (in Spanish, with English summary) [La Laguna Blanca, Parque Nacional Río Pilcomayo, provincia de Formosa (25° 09' 56,80" S - 58° 14' 21,28" W), Argentina. "Diet of the electric knife-fishes, *G. omarorum*, is described in Laguna Blanca Río Pilcomayo National Park, Formosa province. Samples were collected monthly from September 2012 to July 2013. For the analysis of stomach contents, frequency methods, volume fraction, percentage and numerical abundance index (AI) were used. Preys ingested generally belong to invertebrates (including Odonata) and fish that live under the floating plants. The specimens of smaller sizes to 200 mm total length (TL) had a carnivorous diet with greater specialization, while in larger sizes from 201 mm TL, was carnivorous diet of the generalist type. Increased consumption of fish and decapods with increasing LT was observed. Insects in general and in particular Odonata nymphs, dominate in small and medium sizes. Significant differences were observed in the diet of this species throughout the period considered, correlating the same with changes in biomass of floating plants. The results allow characterizing the diet of *G. omarorum* as a generalist." (Authors)] Address: Ferriz, R.A., División Ictiología, Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" (MACN-CONICET), Av. ángel Gallardo 470, C1405DJH, Ciudad Autónoma de Buenos Aires, Argentina. E-mail: rferriz@macn.gov.ar

**14489.** Fuller, C. (2014): The effects of atrazine and predation risk on larval dragonflies *Ladona deplanata* (Odonata: Libellulidae). Thesis, Murray State University: 67 pp. (in English) ["Ecologists have recognized that the effects of anthropogenic stressors on organism life history may be magnified when combined with natural forms of stress. However, very few studies examine the effects on physiological traits in addition to traditional life history traits. Here, I review the usage, environmental concentrations and effects of atrazine, a common herbicide in aquatic systems. Then I present my study on the interactive effects of atrazine, and predation risk on growth, mass, immune function, and energy storage in the larval dragonfly *L. deplanata*. Using aquatic mesocosms to simulate natural conditions, I used a repeated measures design assessing sublethal atrazine exposure and non-consumptive predator stress on these traits over a 45-day period during the larval stage. I predicted that combining these stressors would

have additive negative effects on immunity and growth. I found that predation risk and atrazine caused significant changes to immunity over time, the strength of which was dependent on the specific immune parameter measured. Predation risk increased immune function, which was partially explained by mass gain but not skeletal growth, whereas sublethal atrazine caused little immunosuppression. The results of this study indicate that atrazine interacts with predation risk over time to cause significant changes to immune function but not growth and mass gain in *L. deplanata*. Together, these stressors may be altering the ability of larvae to survive to metamorphosis, which may profoundly affect population and community dynamics." (Author)] Address: Fuller, Claire, A., Dept of Biology, Murray State University, Murray, KY 42071, USA. E-mail: [claire.fuller@murraystate.edu](mailto:claire.fuller@murraystate.edu)

**14490.** Furness, A.N.; Soluk, D.A. (2014): Why shouldn't the dragonfly cross the road? Factors that influence dragonfly vulnerability to vehicular collisions. 99th ESA Annual Meeting (August 10 -- 15, 2014): (in English) [Verbatim: Roadway impacts on mammals, amphibians, and reptiles and how to mitigate for them has been widely examined; however, the impacts roadways have on insects has rarely been addressed. Roadways are known to act as barriers to wildlife movement either by eliciting behavioral avoidance or causing direct mortality. This is of special concern for endangered species such as the Hine's emerald dragonfly (*Somatochlora hineana*), large numbers of which die along roadways in some parts of its range. One of the simplest ways to reduce mortality is to reduce vehicle speed and likelihood of fatal collisions; however, virtually nothing is known about the relationship between vehicle speed and mortality in insects. We conducted a controlled experimental evaluation comparing the rates of dragonfly-vehicle collisions at 24 kph (15 mph), 40 kph (25 mph), 56 kph (35 mph), 72 kph (45 mph), and 88 kph (55 mph) on roadways in northern Door County, Wisconsin. Our study evaluated the influence of motor vehicle speed, flight height, and flight behavior on mortality rate of adult dragonflies in ten identified genera. Results/Conclusions: Our results indicate that vehicle speed was the most significant predictor ( $p < 0.0001$ ) of encounter result. There was a strong non-linear structure to the relationship between vehicle speed and mortality, suggesting that reducing vehicle speed is most important at higher speeds and would have fewer benefits at lower speeds. Flight height was not a strong predictor of encounter result ( $p = 0.72$ ); however, results show a significant difference ( $p < 0.0001$ ) between the encounter results of straight-flying dragonflies (e.g. *Somatochlora*, *Anax*) and all others, with straight fliers most vulnerable and agile fliers (e.g. *Pantala*, *Tramea*) least vulnerable. For dragonflies in general, decreasing the speed limit from 88 kph (55 mph) to 72 kph (45 mph) has the potential to reduce the probability of hit by 17%. For *S. hineana*, this speed reduction could decrease their probability of hit from 65% to 27%. Although many wetland insects have short-lived adults, some especially sensitive groups have adults that forage, reproduce, and disperse

over an extended period of time. Speed reduction in areas where these sensitive species interact with motor vehicles may be an essential tool in their conservation and may help reduce the overall impact of roadways on wetland ecosystems.] Address: Furness, Amber, Biology, University of South Dakota, Vermillion, SD, USA

**14491.** Futahashi, R. (2014): The adult flight season with the first and last appearance dates of Japanese dragonflies. *Aeschna* 50: 145-181. (in Japanese, with English summary) ["I summarize adult flight season of Japanese dragonflies based on literatures and personal communications. I also listed up the first and last appearance dates especially in the following well-investigated prefectures: Hokkaido, Aomori, Tochigi, Toyama, Shiga, Mie, Nara, Tokushima, Ehime, Kochi, and Oita." (Author)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: [ryo-futahashi@aist.go.jp](mailto:ryo-futahashi@aist.go.jp)

**14492.** Futahashi, R.; Futahashi, H.; Shinbori, O.; Kawamura, H. (2014): The Dragonflies and Damselflies of Toyama Prefecture, Central Honshu, Japan in 2013. *Bull. Toyama Sci. Mus.* 38: 143-163. (in Japanese, with English summary) ["Here we report our collection and photograph data of odonate species from Toyama Prefecture in 2013. In 2013, we found 76 species from 12 families. The following 12 species were not found in 2013 (the last collection year in parenthesis); *Sympecma paedisca* (2012), *Paracercion melanotum* (2006), *Aeschnophlebia anisoptera* (2011), *Anax guttatus* (2005), *Meligomphus viridicostus* (1959), *Nihonogomphus viridis* (2006), *Shaogomphus postocularis* (1972), *Sympetrum danae* (2001), *S. depressiusculum* (2011), *S. vulgatum* (2005), *Tramea virginia* (2010) and *Tholymis tillarga* (2007)." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: [ryo-futahashi@aist.go.jp](mailto:ryo-futahashi@aist.go.jp)

**14493.** Gambale, P.G.; Batista, V.G.; Oda, F.H.; Campos, R.M.; Takemoto, R.M.; Bastos, R.P. (2014): Anuran larvae as prey and hosts of invertebrates in Neotropical aquatic habitats. *Revista Chilena de Historia Natural* 87(31): 5 pp. (in English) ["Background: Biotic processes, such as predation and parasitism events, are crucial for answering questions in ecology and evolution. Here, we report predation and ectoparasitism events of invertebrates upon tadpoles in aquatic habitats of southern Brazil. Findings: Four lentic water bodies were sampled twice a month (December 2012 to March 2013). Those water bodies were located in the Diamante do Norte, County, state of Paraná, southern Brazil. The tadpoles, *Dendropsophus minutus*, *Hypsiboas raniceps*, *Scinax fuscovarius*, *Physalaemus cuvieri* and *Elachistocleis bicolor* were observed being predated by six different invertebrate predators. However, *Leptodactylus fuscus* and *Pseudis* sp. were also recorded on the same water bodies and were not observed being preyed or parasitized. The most abundant predator in our sampling areas was the diving beetle larvae. We observed

a static and escape behaviour of tadpoles when in close proximity to predators and constant movements in *E. bicolor* tadpoles, which can be advantageous for invertebrate predators. Parasitism events included *D. minutus*, *S. fuscovarius*, and *E. bicolor* tadpoles that were infected by a single leech. The ectoparasites anchor the posterior sucker on the host tadpole during the blood feeding. Conclusions: Even isolated reports of ecological interactions are important for understanding ecological communities and the impacts of parasites and predators on tadpoles' populations. Additionally, these interactions can help to understand the ecology behaviour of the organisms." (Authors) In one case *Coryphaeschna* sp. was found to prey on *Elachistocleis bicolor*.] Address: Gambale, Priscilla, Depto de Biol., Univ. Estadual de Maringá, Programa de Pós-Graduação em Ecologia de Ambientes Aquáticos Continentais, Nupélia - Núcleo de Pesquisas em Limnologia, Ictiologia e Aqüicultura - Bloco G-90, Av. Colombo, 5790, CEP 87020-900 Maringá, PR Brazil. Email: priscilagambale@gmail.com

**14494.** Garrison, R.W. (2014): Review: Pfau, Hans Klaus, 2011, Functional Morphology and Evolution of the Male Secondary Copulatory Apparatus of the Anisoptera (Insecta: Odonata). *Zoologica* 156: 103 pages, 65 figures; ISBN 978-3-510-55043-2. Paperback. Price: 118.00 € (US\$147.57). Available from: Schweizerbart Science Publishers (Nägele u. Obermiller), Johannesstr. 3 A, 70176 Stuttgart, Germany. www.schweizerbart.de. Pan-Pacific Entomologist 90(4): 32-33. (in English) [review] Address: Garrison, R.W., Plant Pest Diagnostics Branch, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA

**14495.** Graf, R. (2014): Rohrkolbenanbau - eine Chance für die Artenvielfalt?. *Orn. Beob.* 111(2): 93-106. (in German, with English summary) ["Cattail *Typha* sp. is a productive marsh plant which has been traditionally used for various purposes. Recently, additional usages of this plant have been developed, particularly regarding energy recovery. Therefore, a 1-hectare Cattail trial plot was established adjacent to a nature reserve in Central Switzerland (Wauwilermoos, Canton of Lucerne) in 2007. The plot is flooded every year to a height of 20-60 cm from April to the end of August and drained over winter. Since Cattail fields are morphologically very similar to natural marshes, a two-year monitoring programme was started to investigate how such fields were used by water and swamp-dwelling bird species. Supplementary data were drawn from the national wetland breeding bird census as well as the rare breeding and visiting bird census of the Swiss Ornithological Institute. It was shown that various bird species benefitted during migration time, primarily smaller herons, Common Teal, Garganey and rail species. Marked differences were observed in the species spectrum between the first and second year of the study, as Cattail had grown ample rapidly and the vegetation thus changed. The Cattail field was used by 11 marsh and water bird species, for eight of them (Mallard, Little Grebe, Spotted

Crake, Common Moorhen, Coot, Reed Warbler, Marsh Warbler and Reed Bunting) "Probable Breeding" was noted. Surveys on further organism groups revealed positive effects for dragonflies, water frogs and the Grass Snake. Cattail can be cultivated on sites which are prone to re-wetting (mostly former moorland) where it is an interesting crop to grow as it combines characteristics of high-quality biodiversity promoting areas with those of agricultural production." (Author) Also Odonata were monitored. 31 species were recorded between 2007 and 2008, including regionally rare species as *Anax ephippiger* and *Orthetrum albistylum*.] Address: Graf, R., Schweizerische Vogelwarte, Seerose 1, 6204 Sempach, Switzerland. E-Mail: roman.graf@vogelwarte.ch

**14496.** Grand, D.; Marinov, M.; Cook, C.; Jourdan, H.; Rouys, S.; Theuerkauf, J. (2014): Identification key to adult Odonata of New Caledonia and Wallis and Futuna. *Odonatologica* 43(3/4): 247-277. (in English) ["We present a dichotomous key to identify adults of all presently described Odonata of New Caledonia including the Loyalty Islands (Melanesia) and Wallis and Futuna (Western Polynesia). The key covers a total of 58 species of which approximately 50 % are regionally endemic, while others are more widespread species inhabiting neighbouring archipelagos such as Vanuatu and Fiji, and even more distant regions." (Authors)] Address: Marinov, M., Plant Health & Environment Laboratory, Investigation and Diagnostic Centres and Response, Ministry for Primary Industries, 14 Sir William Pickering Drive, Burnside, PO Box 14018, Christchurch, New Zealand. E-mail: milen.marinov@mpi.govt.nz

**14497.** Green, D.J. (2014): Dispersal, population genetics and taxonomy of selected aquatic macroinvertebrates in ephemeral river systems. M.Sc. thesis, School of Biological Sciences, Faculty of Science and Engineering, Flinders University, Adelaide, South Australia: 182 pp. (in English) ["One of the challenges to the study macroinvertebrates has always been identification. We looked at two morphologically very similar damselflies, *Ischnura heterosticta* and *Austroagrion watsoni* to investigate the benefit of genetic techniques in species identification (chapter 5). The mitochondrial sequence showed the rate of incorrect morphological identification at approximately 50%. This highlights both the need for accurate identification as well as the power of genetic techniques for identifying morphologically similar species." (Author)] Address: not stated

**14498.** Greenwalt, D.E.; Bechly, G. (2014): A re-description of the fossil damselfly *Eolestes syntheticus* Cockerell, 1940 (Odonata: Zygoptera: Eolestidae n. fam.) with description of new taxa from the Eocene of North America. *Zootaxa* 3887(2): 138-156. (in English) ["The enigmatic species *Eolestes syntheticus* Cockerell, 1940, from the Early Eocene of North America, previously attributed to the lestoid family Synlestidae, is re-examined in light of the discovery of new material from the Middle Eocene



Kishenehn Formation in northwestern Montana. E. syntheticus and a new species, *Eolestes ramosus* sp. n., are attributed to a new family Eolestidae fam. n. In addition, a new genus and species very closely related to Lestidae but assigned to family unknown, *Lutetialestes uniformis* sp. n., is described from the Kishenehn Formation." (Authors)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, 70191 Stuttgart, Germany. E-mail: guenter.bechly@smns-bw.de

**14499.** Guillermo-Ferreira, R.; Neiss, U.G.; Hamada, N.; Bispo, P.C. (2014): Behavior of the Amazonian damselfly *Chalcopteryx scintillans* McLachlan (Zygoptera: Polythoridae) and comments on its morphological distinction from *C. rutilans* (Rambur). *International Journal of Odonatology* 17(4): 251-258. (in English) ["Polythorid damselflies are Neotropical stream dwellers, whose behaviour has rarely been recorded. Here we describe the territorial and courtship behaviour of *Chalcopteryx scintillans* McLachlan, an Amazonian damselfly with shiny copper-coloured hind wings. Territorial behaviour consists of aerial contests, when males engage in threat displays and mutual pursuits in ascending and rocking flights. During courtship, males hold their copper hind wings still while hovering with their forewings, showing the hind wings to females, which hover in front of the male in response. After copulation, the male exhibits the courtship flight again by hovering over the oviposition resource (i.e. fallen tree trunk) on the stream. The females oviposit on the trunk while the males guard them by perching near and hovering around them constantly. We also present behavioural notes on reproductive and oviposition behaviour, and comments on the differentiation between *C. scintillans* and *C. rutilans* (Rambur)."] (Authors)] Address: Guillermo-Ferreira, R., Fac. de Ciências Biológicas e Ambientais, Univ. Federal da Grande Dourados/UFGD, Dourados, Mato Grosso do Sul, Brazil. E-mail: rhainerguillermo@gmail.com

**14500.** Hall, A.M.; McCauley, S.J.; Fortin, M.-J. (2014): Recreational boating, landscape configuration, and local habitat structure as drivers of odonate community composition in an island setting. *Insect Conservation and Diversity* 8(1): 31-42. (in English) ["1. Anthropogenic impacts to aquatic and terrestrial ecosystems are ubiquitous. Among these, local impacts to freshwater coastal wetlands from recreational boating are potentially severe. We determine the relative contribution of natural factors (local habitat structure and landscape configuration) and estimated impact from anthropogenic factors (i.e. pressure from recreational boating) to odonate community composition. 2. Odonate adults and exuviae were sampled from 17 islands within the 30 000 islands of the Georgian Bay Region of Lake Huron (Ontario, Canada). These islands experience a gradient of boating pressure from four marinas. The magnitude of impacts due to anthropogenic factors was estimated by marina dock space, proximity to marked boating channels, and proximity to a major highway. 3. Redundancy analyses and variance partitioning were utilised to quantify the relative influence of local habitat structure,

landscape configuration, and anthropogenic pressures on the distribution of 18 odonate species. 4. Our results show that local habitat structure, landscape configuration, and boating pressures influence odonate community composition. Overall variance in the species composition explained was 36.5% for adults (25.3% landscape configuration and habitat structure, 6.0% boating pressure, 5.2% shared) and 21.9% for exuviae (13.2% landscape configuration and habitat structure, 6.9% boating pressure, 1.8% shared). We found that communities of adults and larvae (sampled as exuviae) are influenced by different factors. 5. Overall, we find evidence that odonate community composition is affected by boating pressures. This stresses the need to consider not only global-scale human disturbances in conservation planning but also localised effects which differentially impact major life stages." (Authors)] Address: Hall, A.M., Dept of Ecology and Evolutionary Biology, University of Toronto, 25 Harbord St, Toronto, ON, Canada M5S3G5. E-mail: aarohall@gmail.com

**14501.** Henn, M.; Nichols, H.; Zhang, Y.; Bonner, T.H. (2014): Effect of artificial light on the drift of aquatic insects in urban central Texas streams. *Journal of Freshwater Ecology* 29(3): 307-318. (in English) ["Light pollution can reduce night time drift of larval aquatic insects in urban streams by disrupting their circadian rhythms. Previous studies on larval insect drift show that disruption in drift leads to changes in reproduction as well as intraspecific and interspecific interactions. The purpose of this study was to conduct a preliminary investigation into the effects of extreme artificial light on insect drift in urbanized, high clarity spring systems of the karst Edwards Plateau, TX. We quantified taxa richness, diversity, and abundance in aquatic insect night time drift under two treatments (ambient night time light and artificial light addition) and among five streams using a paired design. Richness and diversity of drifting aquatic insects were similar between treatments but abundance was 37% less in the light addition treatment than that of the control. Effects of light addition on mean abundance was more notable in large streams with a 58% decrease in Simuliidae (compared to that of the control) and 51% decrease in Baetidae. Reduced drift from light addition suggests the potential of artificial lighting disrupting insect drift and consequently community structure. Results of this experiment support a growing body of knowledge on how urbanized systems influence stream communities." (Authors) Coenagrionidae] Address: Henn, Monika, Dept of Biology/Aquatic Station, Texas State University, San Marcos, TX, USA

**14502.** Henry, J.R.; Harrison, J.F. (2014): Body size effects on the oxygen-sensitivity of dragonfly flight. *Journal of Experimental Biology* 217: 3447-3456. (in English) ["One hypothesis for the small size of insects relative to vertebrates, and the existence of giant fossil insects, is that atmospheric oxygen levels constrain insect body sizes because oxygen delivery is more challenging in larger insects. This study tested this hypothesis in dragonflies by measuring the oxygen sensitivity of flight metabolic

rates and behavior during hovering for 11 species of dragonflies (*Aeshna multicolor*, *Anax junius*, *Libellula comanche*, *L. luctuosa*, *L. saturata*, *Macrodiplax balteata*, *Pachydiplax longipennis*, *Pantala flavescens*, *P. hymenaea*, *Tramea lacerrata*, *T. onusta*) that ranged in mass by an order of magnitude. We measured flight times and flight metabolic rates in seven oxygen concentrations ranging from 30% to 2.5% to assess the sensitivity of their flight to atmospheric oxygen. We also assessed the oxygen sensitivity of flight in low-density air (nitrogen replaced with helium) in order to increase the metabolic demands of hovering flight. Lowered atmospheric densities did induce higher flight metabolic rates. Flight behavior was more sensitive to decreasing oxygen levels than flight metabolic rate. The oxygen sensitivity of flight metabolic rates and behaviors were not correlated with body size, indicating that larger insects are able to maintain an oxygen supply-to-demand balance even during flight." (Authors)] Address: Henry, Joanna, Arizona State Univ., PO Box 874701, Tempe, AZ 85287, USA. E-mail: joanna.henry@asu.edu

**14503.** Honcu, M. (2014): Records of the dragonfly *Leucorrhinia caudalis* (Charpentier, 1840), (Odonata, Libellulidae) of Česká Lípa Region (Czech Republik). *Bezdez* 23: 213-232. (in Czech, with English and German summaries) ["This paper discusses the records of *L. caudalis* in the water reservoirs at the airport near the former military training area Ralsko, Česká Lípa region. One male was detected on 20 May 2012 [...]. This record represents the fourth known locality in the Czech Republic and was made 50 years after the first detection of this species in Czech Republic. At present it represents the single recent locality in the Czech Republic because it repeatedly had not been detected in its historic localities. Therefore, in the Red list of Invertebrates of the Czech Republic by Farkac, Král & Škorpík (2005) it was considered as extinct. By further investigations it was proved that the population of *L. caudalis* in this locality is viable and evidently increases in number. The locality is endangered by old environmental burdens, succession, overgrowing and overshadowing, and, last not least, by different activities of sporting character which newly are spreading out in the surroundings of the former Hradcany airport. For the protection of this species and of the whole biocenosis the State Nature Protection Board is preparing a protection of the area with the water reservoirs by adding it to the already existing Nature Reserve Hradcanské rybníky (Ponds of Hradcany)." (Author)] Address: Honcu, M., Vlastivedné muzeum a galerie v České Lípě, náměstí Osvobození 297, 470 01 Česká Lípa; e-mail: honcu@muzeumcl.cz

**14504.** Hong, Z.-C. (2014): A fauna investigation of Odonata in the Jinpo mountains of Chongqing. *Journal of Southwest University (Natural Science Edition)* 36(7): 33-38. (in Chinese, with English summary) [Between 2009 and 2013, in Chongqing Jinpo National Nature Reserve (Nanchuan, Chongqing, China), 50 odonate species, belonging to 27 families have been recorded. Six species are new additions to the regional fauna. 40% (n=20) are

Palaearctic-Oriental, 34 % (n=17) species are Oriental, and 24% (N=13) are cosmopolitan distributed species.] Address: Hong, Z.-c., The Natural History Museum of Chongqing. Chongqing 400700, China

**14505.** Huang, S.-c. (2014): Colour vision of *Ischnura heterosticta* (Insecta: Odonata): Role in sexual selection, communication and visual plasticity. PhD Thesis, Queensland Brain Institute, University of Queensland. doi:10.142-64/uql.2014.469. 202 pp. (in English) ["Sensory systems are important for any life task of an animal. Vision, and colour vision in particular, is essential for visual-based insects, such as Odonata (damselflies and dragonflies), many of which display colour patterns on their bodies. Numerous behavioural studies suggest that the diverse colour patterns function as a means for intersexual, intrasexual, interspecific, or intraspecific recognition and play a role in sexual selection, particularly in ischnuran damselflies that have sex-limited polymorphism. However, to date there are no comprehensive studies linking behavioural to electrophysiological evidence to support the role of colour patterns and colour vision in mate choice in this group of insects. In my Ph.D. thesis, I investigated the function of body colouration and colour vision in sexual selection and communication of the Australian polymorphic damselfly, *Ischnura heterosticta*, and examined the mechanisms underlying its colour vision and colour discrimination ability. In an observational study (Chapter 2), I surveyed *I. heterosticta* reproductive behaviours and daily activity patterns in the field, providing the first detailed account of their colour morphs and behavioural biology. Andromorph females are blue like males, and gynomorph females have colour morphs in green, intermediate, and grey. Mating pairs, usually with gynomorphs, are formed after dawn and mating can last up to 3-4 hours. Oviposition occurs in the days after mating, and ovipositing females are subjected to aggressive male harassment, which varies with female colouration. These data provided the biological foundation regarding colour-based sexual selection in *I. heterosticta* investigated in the following chapters. In the next set of experiments (Chapter 3), I discovered a unique irreversible ontogenetic colour change in females of *I. heterosticta*: blue andromorphs are sexually immature individuals that emerge from nymphs. After 4 to 7 days, they turn into green-grey gynomorphs to signal their sexual maturity and advertise readiness to mate. Gynomorphs are the preferred mating partners, which suggests that blue andromorphs avoid unnecessary long mating during sexual immaturity through their male-mimicking colouration. This discovery provided the first indication that colour plays a key role in mate choice and that female polymorphism in *I. heterosticta* may be maintained via colour signals. In the next study (Chapter 4), I tested whether and how male mating preference was associated with colour cues by manipulating female body colours artificially. The outcomes strongly suggest that female body colouration is the key visual signal for mate choice in *I. heterosticta*. Males always preferred gynomorph females irrespective of female ratio or prior mating experience. Only under low

ambient light males of *I. heterosticta* occasionally misidentified blue andromorphs as mating partners, likely as consequence of the insufficient light. This finding provided the behavioural indication that ischnuran damselflies rely on colour vision for mate recognition. The next study (Chapter 5) examined the morphological structure of the compound eyes of *I. heterosticta* using histological approaches. The diameter of an ommatidium is about 10  $\mu\text{m}$ , and its length can be up to 400  $\mu\text{m}$  depending on the area of the retina. Several retinula cells were identified distributed along the ommatidium. This provided essential background information on the visual anatomy in this species, and the anatomical indication that *I. heterosticta* may have colour vision, which was investigated in the next chapter. I used electrophysiological approaches (Chapter 6) to investigate the spectral sensitivities of the visual system of *I. heterosticta*. The results showed that they have trichromatic vision, being able to detect UV, blue and green light. Contrast calculations confirmed that their colour discrimination ability enables them to distinguish the spectral differences of individual female morphs. These results were congruent with the behavioural findings from previous chapters, showing that *I. heterosticta* use colour signals for mate choice in context of sexual selection. The final study (Chapter 7) examined the molecular basis of colour vision in *I. heterosticta*, and investigated whether it is plastic and dependent on light experience. I identified three types of opsin genes in *I. heterosticta*, corresponding to three wavelengths of light (UV, blue and green), confirming that this species is trichromatic. I found that during development opsins are differentially expressed in nymphs (aquatic) and adults (terrestrial/aerial), and opsin expression also changes when individuals are reared or kept under different ambient light conditions. These findings were further supported by electrophysiological experiments, showing an equivalent change in response. This demonstrates that colour vision in *I. heterosticta* is plastic and that ambient light induces visual plasticity. This plasticity facilitates adaptation to the changing visual environments during development, and ensures that adults can detect the crucial colour cues that are key for mate choice and reproduction. This thesis is the first comprehensive study examining the functional role of colour vision and body colouration in a polymorphic ischnuran damselfly. This body of work also contributes important new insights into the mechanisms underlying sexual selection, evolution and maintenance of female-limited polymorphism in *I. heterosticta*." (Author)] Address: Huang; S.-C., Queensland Brain Institute, University of Queensland, Brisbane QLD 4072, Australia. E-mail: shaochang.huang@uqconnect.edu.au

**14506.** Hupaló, K.; Tończyk, G. (2014): New Data on the Range Extension of *Trithemis arteriosa* (Burmeister, 1839) (Odonata) in Turkey. *Acta zool. bulg.* 66(4): 581-582. (in English) ["*T. arteriosa* is one of the most widespread and abundant dragonfly species in Africa, which dominates in open and temporary freshwater habitats. This species is known for its migratory abilities and has expanded its

range to Madagascar and Eurasia, reaching to southern Anatolia. Since the first record of *T. arteriosa* in Turkey in 1988, the species has been recorded in other locations reaching as far as Gözcü in the west. This paper provides new data on the range extension of *T. arteriosa* in Belek area, which confirm its further expansion towards north-western part of the Mediterranean coast." (Authors)] Address: Hupaló, K., Department of Invertebrate Zoology and Hydrobiology, University of Lodz, 90-237, Banacha 12/16, 90-237 Lodz, Poland. E-mail: hrupeq@gazeta.pl

**14507.** Ichikawa, Y.; Watanabe, M. (2014): Changes in the number of eggs loaded in *Pantala flavescens* females with age from mass flights (Odonata: Libellulidae). *Zoological Science* 31(11): 721-724. (in English) ["The wandering glider dragonfly *Pantala flavescens* migrates to Japan every spring, where the population increases until autumn, in which mass flights often occur, followed by death in the winter. There have been no reports to date on the maturation process of this species throughout its lifespan in Japan. We collected females from mass flights when the flight height was low, and classified them into seven age stages by examining their wing condition. Very few females of the older stage were collected from the mass flights. The wing condition corresponded with the change in body color and with the egg production process in the ovaries. While pre-reproductive-stage females did not release eggs when treated with our artificial oviposition technique, each reproductive-stage female released about 640 eggs. Nearly all eggs released were fertilized. The ovaries developed with the stage, and reproductive-stage females had about 1100 ovarioles. The estimated maximum fecundity was about 29,000 eggs. The lifetime number of eggs laid of *P. flavescens* should be revealed by dissection." (Authors)] Address: Watanabe, M., College of Biol. Sci., Univ. of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan. E-mail: watanabe@kankyo.envr.tsukuba.ac.jp

**14508.** Inamuro, T.; Minami, K.; Suzuki, K. (2014): Free flight simulations of a dragonfly-like flapping wing-body model by the immersed boundary-lattice Boltzmann method (Abstract: L6.00010). *Bulletin of the American Physical Society*, 67th Annual Meeting of the APS Division of Fluid Dynamics, Volume 59, Number 18, Sunday–Tuesday, November 23–25, 2014; San Francisco, California: (in English) [Verbatim: Free flights of the dragonfly-like flapping wing-body model are numerically investigated by using the immersed boundary-lattice Boltzmann method (IB-LBM). First, we simulate free flights of the model without the pitching rotation for various values of the phase lag angle  $\phi$  between the forewing and the hindwing motions. We find that the wing-body model goes forward in spite of  $\phi$ , and the model with  $\phi = 0^\circ$  and  $90^\circ$  goes upward against gravity. The model with  $\phi = 180^\circ$  goes almost horizontally, and the model with  $\phi = 270^\circ$  goes downward. Secondly, we simulate free flights with the pitching rotation for various values of the phase lag angle  $\phi$ . It is found that in spite of  $\phi$  the wing-body model turns gradually in the nose-up direction and goes back and down as the pitching angle



Oc increases. That is, the wing-body model cannot make a stable forward flight without control. Finally, we show a way to control the pitching motion by changing the lead-lag angle  $\gamma(t)$ . We propose a simple proportional controller of  $\gamma(t)$  which makes stable flights within  $Oc = \pm 5^\circ$  and works well even for a large disturbance.] Address: not stated

**14509.** Jäckel, K.; Prinzhorn, S.; Falk, J., Deichmann, A.; Willigalla, C.; Koch, K. (2014): Nächtliche Ruheplätze der Odonata, insbesondere der Arten *Ischnura elegans* und *Coenagrion pulchellum* (Odonata). *Libellula* 33(1/2): 113-126. (in German, with English summary) ["Roosting habitats of Odonata, in particular of *Ischnura elegans* and *Coenagrion pulchellum* (Odonata) – Odonates use different habitats for maturing, mating, foraging, and roosting. There is not much knowledge about the odonates' choice of habitat for roosting at night. In our study we investigated two potential nocturnal roosting sites. We investigated whether individuals were clustering for roosting and whether there existed any preferences in the choice of the roosting site depending on the odonates' gender. Locations of our study were an assemblage of artificial ponds at the Johannes Gutenberg-University Mainz and a lake in the nature reserve "Eich-Gimbsheimer Altrhein", situated between Mainz and Worms. The investigation took place in June and July 2013. In the night, we found remarkably less species of Anisoptera and Zygoptera than during the day. Compared to Anisoptera, Zygoptera preferred to roost in lower positions. At both studied sites we mainly found a lot of individuals of *Ischnura elegans* and *Coenagrion pulchellum*. Both species favoured roosting on the top of the substratum at the waters' edge and on a marsh area next to the water. It seemed that male and female odonates did not choose the roosting position on the substratum in an obviously different way. 34-40 % of the odonate species found roosted in clusters. In both species the sex ratio within the roosting aggregations was biased towards males. Among separately roosting individuals of *C. pulchellum* we found a larger number of males, whereas for *I. elegans* the sex ratio was balanced." (Authors)] Address: Willigalla Ökologische Gutachten, Am Großen Sand 22, 55124 Mainz, Germany. E-mail: info@willigalla.de

**14510.** Janssens, L.; Stoks, R. (2014): Reinforcing effects of non-pathogenic bacteria and predation risk: from physiology to life history. *Oecologia* 176(2): 323-332. (in English) ["The important ecological role of predation risk in shaping populations, communities and ecosystems is becoming increasingly clear. In this context, synergistic effects between predation risk and other natural stressors on prey organisms are gaining attention. Although non-pathogenic bacteria can be widespread in aquatic ecosystems, their role in mediating effects of predation risk has been ignored. We here address the hypothesis that non-pathogenic bacteria may reinforce the negative effects of predation risk in larvae of the damselfly *Coenagrion puella*. We found synergistic effects for all three life history variables studied: mortality increased, growth reductions

were magnified and bacterial load was higher when both non-lethal stressors were combined. The combined exposure to the bacterium and predation risk considerably impaired the two key antipredator mechanisms of the damselfly larvae: they no longer reduced their food intake under predation risk and showed a synergistic reduction in escape swimming speed. The reinforcing negative effects on the fitness-related traits could be explained by the observed synergistic effects on food intake, swimming muscle mass, immune function and oxidative damage. These are likely widespread consequences of energetic constraints and increased metabolic rates associated with the fight-or-flight response. We therefore hypothesize that the here documented synergistic interactions with non-pathogenic bacteria may be widespread. Our results highlight the ignored ecological role of non-pathogenic bacteria in reinforcing the negative effects of predation risk on prey organisms." (Authors)] Address: Janssens, Lizanne, Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Charles Deberiotstraat 32, 3000, Louvain, Belgium. E-mail: lizanne.janssens@bio.kuleuven.be

**14511.** Jarzembowski, P.; Matraj, M. (2014): First records of the protected dragonfly (Odonata) – *Sympecma paedisca* (Brauer, 1877) in the Lower Silesia. *Wiad. entomol.* 33(1): 68-69. (in Odonata, *Sympecma paedisca*, faunistics, Lower Silesia, protected species) [Poland: 51°32'17" N 17°31'25"E, 6 VIII 2007, 51°31'09" N 17°06'58"E, 5 VIII 2007, 51°28'09" N, 17°08'20"E, 15 VIII 2007.] Address: not stated

**14512.** Kalkman, V.J.; Orr, A.G. (2014): Distribution and identification of *Rhodothemis* in the eastern part of the Indo-Australian Archipelago (Odonata: Libellulidae). *Faunistic Studies in South-East Asian and Pacific Island Odonata* 8: 1-9. (in English) ["The small libellulid genus *Rhodothemis* is restricted to Asia and Australia. Two of the four included species were described relatively recently by Lohmann (1984) but much previously documented material was never re-identified and the distribution of the species in the Indo-Australian Archipelago remained poorly known. All material available in the Naturalis Biodiversity Center (RMNH) from the eastern part of the Indo-Australian Archipelago was studied and is here brought on record. Key characters are illustrated and SEM images of the genital ligula are presented." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**14513.** Karolinskiy, E.A. (2014): Dragonflies (Insecta: Odonata) of the National Nature Park "Dvorichanskyi". *The Journal of V.N. Karazin Kharkiv National University. Series: biology* Issue 19, 11097, 2014: 26-29. (in Russian, with Ukrainian and English summaries) [23 odonate species were recorded at the National Nature Park "Dvorichanskyi" (Ukraine) during 2009–2013.] Address: Karolinskiy,

E.A., Kharkiv National University, VN Karazin, Kharkov, Ukraine. E-mail: kharkov.but@gmail.com

**14514.** Karube, H.; Sano, S.; Nagasaki, K.; Nagasaki, M.; Futahashi, R. (2014): Distributional expansion of alien species *Ceriagrion auranticum ryukyuanum* in southern Kanto region and trial of extermination. *Aeschna* 50: 139-143. (in Japanese, with English summary) ["*Ceriagrion auranticum ryukyuanum* is recently recorded in southern Kanto region and the distribution is expanded around Yokohama area. We reviewed recent record in Japan and judged by molecular study, some of Yokohama population doesn't belong to Japanese population. It suggested that the introduction of some of Yokohama population was accompanied by water plant from foreign countries. Trial of eradication program is effective in low density management of this alien species." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**14515.** Kawamura, Y.; Naka, H.; Sunami, Y.; Hashimoto, H. (2014): Effects of micro spike structure on flow around plate. The 3rd International Conference on Design Engineering and Science, ICDES 2014 Pilsen, Czech Republic, September 1-3, 2014: 96-100. (in English) ["In recent years, biomimetics has been attracting attention. Biomimetics is research method to apply function principle of organism. Surface microstructure plays an effective role also in either case. On the other hand, dragonfly which is kind of flight insect has some microstructure on their wings. It is thought that these microstructure effective in flight of dragonfly. Among them, surface micro spikes are very unique structure. Therefore, in this study experiment and CFD analysis was performed, with the aim to clarify the effect of this microstructure. And we compared the result of CFD analysis with the experimental result to examine mechanism of them. As a result, we confirmed that the drag coefficient was reduced because the generation of a vortex on the plate behind was suppressed by the microspikes." (Authors) The spines on dragonfly wings reduce the drag coefficient by reducing the effects of vortex.] Address: Sunami, Y., Dept of Mechanical Engineering, Tokai Univ., 4-1-1, Kitakaname, Hiratsuka City, Kanagawa Prefecture 259-1292, Japan. E-mail: sunami@tokai-u.jp

**14516.** Kiany, M.; Sadeghi, S. (2014): A preliminary study on Odonata fauna of Yazd province. The 17th National & 5th International Iranian Biology Conference, At Shahid Bahonar University of Kerman, Kerman, Iran. 2 pp. (in Farsi and English summaries) [*Platycnemis dealbata*, *Ischnura intermedia*, *Paragomphus lineatus* and *Onychogomphus lefebvrei*. *Crocothemis erythraea*, *Orthetrum chrysostigma* and *Trithemis festiva* are reported from Yazd, Mehriz and Taft regions in Yazd province (Iran). *Ischnura intermedia* is a new addition to the Iranian odonate fauna.] Address: Kiany, M., Biology Department, Shiraz University, Shiraz, Iran, E-mail: mohsen.kiany1@gmail.com

**14517.** Kijowski, A.M. (2014): Habitat use and movement patterns in larvae of the endangered Hine's emerald dragonfly (*Somatochlora hineana*, Williamson). M.Sc. thesis, University of South Dakota: 66 pp. (in English) ["Aquatic invertebrates living within wetlands must be able to respond to annual, seasonal, or even daily environmental fluctuations. In the spring, aquatic invertebrates may move to exploit available newly flooded areas. If such movement occurs, they must be able to follow the retreating water or have some other mechanism to avoid desiccation. The larvae of *Somatochlora hineana* live in flowing channels in seasonally flooded wetlands; however, it is unclear whether they use the wetland more extensively. To investigate the potential seasonal and yearly changes in *S. hineana* distribution and abundance in response to environmental variation, data from field studies from 2011-2012 were analyzed. There were 210 *S. hineana* larvae collected from the Mud Lake North Wildlife Refuge Area in Door County, Wisconsin from within and outside of crayfish burrows during the spring and summer. The mean densities of *S. hineana* larvae outside of burrows varied between May and June 2012, but did not vary across a habitat gradient. There were no significant changes in mean *S. hineana* densities in burrow and benthic samples between June 2011 and June 2012. In order to gain a better understanding of how *S. hineana* respond to environmental variation, their movement patterns in response to fluctuating water levels, position within the habitat, and increased habitat connectivity were also examined. Larvae were collected and tagged in a series of marking studies in 2011 and 2012 at the Mud Lake North Wildlife Refuge. The average total distance ( $\pm$ sd) moved by *S. hineana* larvae for both summers was  $1.15 \pm 2.20$  m/day with the longest net displacement being 11m/day. Larvae were observed moving between off-channel and within channel habitats, and were also caught in drift nets during periods of inundation, indicating increased habitat connectivity plays a role in the movement of these larvae." (Author)] Address: Kijowski, Ashley M. c/o Daniel Soluk, Professor, Biology, College of Arts & Sciences, UCL Churchill-Haines Labs 170C, USA. Email: Daniel.Soluk@usd.edu

**14518.** Kim, D.G.; Lee, C.Y.; Choi, L.J.; Kang, H.J.; Baek, M.J.; Kim, J.G.; Bae, Y.J. (2014): Drought effects on the colonization of benthic macroinvertebrate communities in the early successional phases in experimental mesocosm wetlands. *Journal of Freshwater Ecology* 29(4): 507-524. (in English) ["We investigated the drought effects on the colonization rate and pattern of benthic macroinvertebrate communities in newly created mesocosm wetlands in the central Korean Peninsula, from June 2011 to June 2013. The comparison was made between the initial colonization after mesocosm construction (pre-drought) and the recolonization after a drought event (post-drought) with a drought period of 50 days between them. In addition, we categorized communities according to their biological traits in relation to drought. Our results showed that aquatic vegetation abundance and covering degree were higher in post-

drought than in pre-drought, thereby influencing rapid colonization. Drought-resistant benthic macroinvertebrates colonized rapidly in post-drought; consequently, the colonization speed was 2.5-fold higher in post-drought than in pre-drought. We classified the benthic macroinvertebrate taxa into three groups: (1) a resistant group which generally emerged after the initial colonization period (e.g., Mollusca, Turbellaria, and Oligochaeta); (2) a sensitive group with diverse life history strategies and biological traits such as active migration or population decline after drought disturbance (e.g., Diptera: Chironominae, Odonata: Orthetrum, Coleoptera: Agabus and Rhantus); and (3) a seasonal group, which emerged only during certain periods and were not markedly influenced by drought (e.g., Ephemeroptera: Cloeon, Diptera: Culicidae, Odonata: Zygoptera and Pantala). Our findings elucidated the effects of drought on benthic macroinvertebrate communities in wetlands by using a mesocosm experiment." (Authors)] Address: Dept of Life Science, Graduate School, College of Life Sciences and Biotechnology, Korea Univ., Seoul 136-713, Korea

**14519.** Kiss, O.; Elek, Z.; Moskát, C. (2014): High breeding performance of European Rollers *Coracias garrulus* in heterogeneous farmland habitat in southern Hungary. *Bird Study* 61(4): 496-505. (in English) ["Capsule: Rollers showed slightly higher breeding performance in farmland mosaics than in natural grasslands in southern Hungary, where both habitats were supplied with nest-boxes. Aim: To establish which factors affect Rollers' breeding success in agricultural and their more traditional grassland habitats. Methods: Rollers' reproductive success in farmland mosaics and grassland habitats were compared. Laying date, clutch size, feeding rate, as well as prey abundance and diversity, as estimated by sweep netting and pitfall trapping, were evaluated. Their effects on breeding performance were analysed by generalized linear models. Results: In the agricultural habitat Rollers showed an even higher reproductive output than in their traditional habitat of natural grassland. Prey composition showed differences between the two habitats, with the lower abundance of orthopterans in farmland mosaics being substituted by the higher abundance of coleopterans and the diversity of arthropods (Orthoptera, Coleoptera, Heteroptera, Arachnida, Hymenoptera, Lepidoptera, Diptera, Homoptera, Mantidae, Myrmeleonidae and Odonata). Conclusion: Rollers can reproduce well where good quality resources are available, even outside of their typical habitat, where nest-box erection schemes may benefit this threatened species." (Authors)] Address: Kiss, O. Department of Ecology, Univ. of Szeged, Közép fasor 52., Szeged, Hungary

**14520.** Klonowska-Olejnik, M.; Buczynski, P. (2014): Disjunctive population of *Cordulegaster bidentata* SÉLYS, 1843 (Odonata: Cordulegastridae) in the Wisnickie Foot-hills (Southern Poland). *Wiad. entomol.* 33(1): 5-14. (in Polish, with English summary) ["The new site of *C. bidentata* in Kieblo Brzezinskie near Bochnia (49°56'N, 20°30'E, UTM: DA63) is given. In the years 2011-2012 numerous larvae were found and imagines were observed.

The site has a disjunctive character and is one of the lowest located autochthonic occurrence sites in Poland (260-270 m a.s.l.)." (Authors)] Address: Klonowska-Olejnik, Małgorzata, 1 Friedleina 33/19, 30-009 Kraków, Poland. E-mail: uxklonow@cyf-kr.edu.pl

**14521.** Koch, L.; Schuster, J. D.; Kordges, T.; Bußmann, M.; Kronshage, A. (2014): Vorkommen der beiden Quelljungfer-Arten *Cordulegaster bidentata* und *Cordulegaster boltonii* (Odonata: Cordulegastridae) im Ennepe-Ruhr-Kreis (NRW). *Jahresberichte des Naturwissenschaftlichen Vereins Wuppertal* 63: 145-182. (in German, with English summary) ["For the Ennepe-Ruhr district (North Rhine-Westphalia, Germany) the known habitats of *Cordulegaster bidentata* and *C. boltonii* are described. The observations are dated in the period from 1991 up to 2014. The occurrence in the surroundings of fourteen different brooks shows that the two species colonize the Ennepe-Ruhr area from the north (Herdecke) to the south (Ennepetal)." (Authors)] Address: Koch, L., Heinrich-Heine-Str. 5, 58256 Ennepetal, Germany. E-Mail: l-koch@t-online.de

**14522.** Kofler, I.M. (2014): Phenotypic plasticity of *Rana dalmatina* larvae: ontogenetic variation in anti-predator responses. MSc. thesis, Zoologie, Universität Wien: 37 pp. (in English, with German summary) ["Although anuran larvae are well studied model organisms for phenotypic plasticity in general, little is known about ontogenetic variation in predator induced plastic responses. To conduct an exploratory study on this topic, we performed an outdoor mesocosm experiment, confronting *Rana dalmatina* tadpoles with the presence of dragonfly predators (Aeshnidae) at five different times in their ontogenetic development. The tadpoles which experienced predator presence for the first time one week after the beginning of the experiment (approximately 9-10 days after hatching) showed the strongest plastic morphological responses, as well as retarded growth and delayed time of metamorphosis. The morphological responses were mainly deeper tail fins and a changed body-to-tail-length ratio. As the treatment which experienced predator contact in the second week of the experiment significantly differed from all other treatments and no linear relationship between time spent with predator and plastic responses was found, we can assume that developmental windows and developmental constraints are underlying our findings." (Author)] Address: not stated

**14523.** Koparde, P.; Mhaske, P.; Patwardhan, A. (2014): New records of dragonflies & damselflies (Insecta: Odonata) from Western Ghats of Maharashtra, India. *Journal of threatened taxa* 6(5): 5744-5754. (in English) ["Odonates were surveyed across 10 localities from Western Ghats of Maharashtra State, India during 2011-2013. We recorded 64 species belonging to 40 genera and 12 families. Seven species are new records for the region, and four out of them (*Heliogomphus promelas*, *Onychogomphus nilgiriensis*, *Protosticta hearseyi*, *Euphaea fraseri*) are new records for Maharashtra State. In this paper, we discuss these species records and their micro-habitats,



and update previous knowledge on distribution of odonates." (Authors)] Address: Koparde, P., Department of Biodiversity, MES's Abasaheb Garware College, Karve Road, Pune, Maharashtra 411004, India

**14524.** Kosterin, O.E. (2014): Odonata briefly observed on the islands of Bali and Lombok, Lesser Sundas, Indonesia, in the late February 2014. International Dragonfly Fund - Report 74: 1-48. (in English) ["In the second half of February 2014, Odonata were searched for nine days on Bali and four days on Lombok, the western Lesser Sundas, Indonesia. One species, *Orthetrum chrysis* has been for the first time recorded for Bali and six species, *Nososticta emphylla*, *Idionyx murcia*, *Brachydiplax chalybea*, *Agrionoptera insignis*, *Neurothemis ramburii*, *Rhyothemis phyllis* have been for the first time recorded for Lombok. The previous literature concerning the two islands is analysed. To the moment, 55 Odonata species (3 unidentified) are known for Bali and 39 for Lombok, although the actual faunas of both islands are supposed to be equally rich, and further studies on Lombok are necessary. Odonata faunas of Bali and Lombok mirror each other in respect of high shares, 29 and 23%, of Odonata species ranging to the west and east of the two islands, respectively. Efficiency of Lombok Strait as a biogeographical boundary was estimated as high as 0.6, so Wallace Line is of importance for Odonata. Some diagnostic characters of *N. emphylla*, *N. ramburii*, *R. phyllis phyllis* and *Procordulia sambawana* and a taxonomical situation around *Prodasi-neura autumnalis* and *P. humeralis*, which is not justified biogeographically, are discussed. Short notes on habitats and assemblages of Odonata are added." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**14525.** Kurita, T.; Aoyama, H.; Saitoh, S.; Shinzato, N.; Sawada, K.; Kuriwada, T.; Hironaka, K.; Inomata, N.; Yamahira, K.; Toda, M. (2014): Isolation and validation of eight microsatellite loci in *Ischnura senegalensis* by pyrosequencing a bead-enriched library. Applied Entomology and Zoology 49: 623-626. (in English) ["Eight microsatellite markers for the population genetics and evolutionary ecology of *I. senegalensis*, which shows body colour polymorphism in females, were developed using a streptavidin-bead enrichment library and pyrosequence by a next generation sequencer. The number of alleles per locus and effective number of alleles ranged from 3 to 11 and from 1.24 to 5.51, respectively. Observed and expected heterozygosities were 0.18–0.75 and 0.19–0.77, respectively. No linkage disequilibrium between loci was detected. One locus, *IsenAC75*, deviated significantly from the Hardy–Weinberg equilibrium, and the locus and additional two loci, *IsenAC40* and *IsenAC8*, were suspected for the presence of null alleles. Altogether, these eight microsatellite loci are considered to be useful for population genetic analyses because of the high polymorphic status and independency." (Authors)] Address: Kurita,

T., Natural History Museum and Institute, Chiba, 955-2 Aoba-cho, Chuo-ku, Chiba, 260-8682, Japan. E-mail: momofu\_monticola@hotmail.co.jp

**14526.** Laltanpuui; Kumar, N.S.; Mathai, M.T. (2014): Molecular and phylogenetic analysis of the genus *Orthetrum* (Odonata: Anisoptera: Libellulidae) using mitochondrial CO1 gene. Science Vision 14(3): 152-157. (in English) ["Molecular phylogenetic relationships among members of the genus *Orthetrum* were examined using 403 bp of mitochondrial COI. The support for monophyly of the *Orthetrum* was found in some studies with unresolved complexity. The *O. sabina*, *O. serapia* and *O. trinacria* formed a separate and distinct group from the morphological analysis. We analysed the COI sequences of 22 species of *Orthetrum* using MEGA6. The p-distance between the members and the rate of transitional and transversal substitution was generated. The analysis indicated that the *Orthetrum* are monophyletic and *O. sabina* and *O. trinacria* formed a distinct and a separate group." (Authors)] Four of the five data sets and allegedly obtained from German specimens (*O. trinacria*, *O. julia falsum*, *O. chryso-stigma*, *O. brachiale*; genbank association no.: KC912286, KC912281, KC912262, KC912258) refer to African species which never have been found in Germany.] Address: Laltanpuui, Dept Zool., Madras Christian Coll., Tambaram, Chennai 600 059, India. E-mail: laltetei@yahoo.co.in

**14527.** Lin, S.-c.; Chen, Y.-f.; Shieh, S.-h.; Yang, P.-s. (2014): A revision of the status of *Psolodesmus mandarinus* based on molecular and morphological evidence (Odonata: Calopterygidae). Odonatologica 43(1/2): 51-66. (in English) ["To investigate the relationships between the three recognized taxa in the genus *Psolodesmus*, traditionally ranked as subspecies of *Psolodesmus mandarinus*: *mandarinus*, *dorothea* and *kuroiwae*, the nuclear internal transcribed spacers and ribosomal 5.8S gene, mitochondrial cytochrome c oxidase subunit I gene, and wing pterostigma data were analyzed. Both molecular and morphological evidence suggest the presence of two distinct species, viz. *P. mandarinus* in Taiwan and *P. kuroiwae* in the Japanese Yaeyama Islands. Based on our results we continue the traditional practice of dividing the Taiwanese populations of *P. mandarinus* into two geographical subspecies, *P. m. mandarinus* in northern Taiwan and *P. m. dorothea* in central and southern Taiwan." (Authors)] Address: Yang, P.-s., Dept of Entomology, National Taiwan Univ., Taipei 106, Taiwan. E-mail: psyang@ntu.edu.tw

**14528.** Lorenzo-Carballa, M.O.; Thompson, D.J.; Cordeiro-Rivera, A.; Watts, P.C. (2014): Next generation sequencing yields the complete mitochondrial genome of the scarce blue-tailed damselfly, *Ischnura pumilio*. Mitochondrial DNA 25(4): 247-248. (in English) ["We report the entire mitochondrial genome of *I. pumilio*, using next-generation sequencing on genomic DNA. A de novo assembly provided a single contiguous sequence of 15,250 bp that contained the A+T-rich region and all standard coding regions; gene configuration is similar to other odonates and

comprises 13 protein-coding genes, two rRNA genes (12 S and 16 S rRNA) and 22 tRNA genes. We found a unique intergenic spacer in *I. pumilio* and confirm that the intergenic spacer s5 likely represents a synapomorphy between Anisoptera and Zygoptera. This is the first mitogenome sequence obtained for a member of the Coenagrionidae and demonstrates how next-generation sequencing technology can obtain mtDNA genome sequences without prior sample processing or primer design." (Authors)] Address: Watts, P.C., Dept of Evolution, Ecology and Behaviour, Institute of Integrative Biology, University of Liverpool, BioSciences Building, Crown Street, Liverpool L69 7ZB, UK. E-mail: phill@liv.ac.uk

**14529.** Lorenzo-Carballa, M.O.; Watts, P.C.; Cordero-Rivera, A. (2014): Hybridization between *Calopteryx splendens* and *C. haemorrhoidalis* confirmed by morphological and genetic analyses. *International Journal of Odonatology* 17(2-3): 149-160. (in English) ["Hybridization between *C. haemorrhoidalis* and any of its congeners has not been reported until now. We observed spontaneous matings between male *C. splendens* and female *C. haemorrhoidalis* at a locality in Central Italy, together with some putative hybrid individuals that had a mixed phenotype. Here, we report the morphological and molecular characterization of five suspected hybrids collected from this population during 2001 (n = 1), 2012 (n = 2) and 2013 (n = 2). A discriminant analysis based on 13 morphological variables correctly separated both parental species (with 100% assignment success) and classified the hybrid from 2001 as *splendens* phenotype and those from 2012 and 2013 as *haemorrhoidalis*. Genotype data (microsatellite loci) was used to confirm the hybrid origin of these specimens, although there were differences between the individual from 2001 and those from 2012 and 2013; the 2001 individual had alleles that were present in both parent species, suggesting it is an F1 hybrid, but the individuals collected in 2012 and 2013 had private alleles at eight (out of 12) loci and only a small portion of the genome in common with *C. splendens*, which suggests that introgression is occurring in this population. Similarities in mitochondrial DNA sequences indicate that the 2001 hybrid and the 2012–2013 hybrids have *splendens* and *haemorrhoidalis* maternal origins respectively, which, in contrast with behavioural observations, indicates that interspecific matings in both directions are possible. This is the first demonstration that *C. haemorrhoidalis* can hybridize with other congeners to produce viable offspring." (Authors)] Address: Lorenzo-Carballa, Olalla, Grupo de Ecología Evolutiva e da Conservación, Depto de Ecología e Biología Animal, Univ. de Vigo, EUE Forestal, Campus Universitario A Xunqueira s/n, 36005, Pontevedra, Spain.

**14530.** Machado, A.B.M.; de Souza, M.M. (2014): A remarkable new species of Heteragrion from Brazil (Odonata: Megapodagrionidae). *International Journal of Odonatology* 17(2/3): 95-99. (in English) ["A new species, *Heteragrion cyane* sp. nov., is described and illustrated based on one male collected in the State of Minas Gerais,

Brazil. The new species is remarkable for its blue color, a rare character within the species of group A Heteragrion." (Authors)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil. E-mail: angelo@icb.ufmg.br

**14531.** Mahdjoub, H.; Khelifa, R.; Zebbsa, R.; Mellal, M.K.; Bouslama, Z.; Houhamdi, M. (2014): Aspects of reproductive biology and ecology of *Coenagrion mercuriale* at its southern range margin. *International Journal of Odonatology* 17(4): 173-180. (in English) ["*Coenagrion mercuriale* is a threatened damselfly in most parts of its geographic distribution. It is listed as endangered in North Africa, where no data on its biology or ecology are available. This study aims to illustrate the reproductive behaviour and habitat preferences of adults in a population located in north-east Algeria, representing the southern limit of the species distribution. After emergence, adults spent 3 to 4 days away from the water to mature. Young mature individuals returned to the stream to mate, sometimes not far from their emergence site. The mean duration of copulation and oviposition were  $20.08 \pm 8.79$  min ( $\pm$  SD) and  $52.66 \pm 12.17$  min ( $\pm$  SD), respectively, separated by a short post-copulatory rest of  $4.60 \pm 2.02$  min ( $\pm$  SD). Copulation duration was positively correlated with male body length while resting duration was positively related to copulation duration. Single males and breeding pairs preferred the same habitats, characterized by relatively dense and high in-channel bank vegetation, and a quite large stream bed, with a substrate which mainly consisted of clay and silt. A comparison of the reproductive behaviour and habitat preferences with a population located in the northern limit of the distribution range is presented and discussed." (Authors)] Address: Mahdjoub, H., Laboratory of Ecology of Terrestrial and Aquatic Systems, Faculty of Sciences, Department of Biology, Badji Mokhtar University, Annaba 23000, Algeria

**14532.** Majumder, J.; Bhattacharjee, P.P.; Agarwala, B.K. (2014): Dragonflies and damselflies (Insecta: Odonata) of Tripura, northeastern India with a pictorial catalogue. *Journal of Threatened Taxa* 6(14): 6683-6702. (in English) ["A survey of Odonata was conducted in four reserve forests, three wildlife sanctuaries and three unclassified natural areas of Tripura, northeastern India from 2008 to 2012, from May to August. A total of 53 species belonging to 37 genera under nine families of Odonata were recorded in five years from 1370 points by direct search. This included 25 species, 16 genera and five families reported as new records for the state. A list of the species, number of specimens examined, their habitats, local and IUCN status, and worldwide distribution are provided. A pictorial catalogue of adults of the recorded species is also provided." (Authors)] Address: Agarwala, B.K., Ecology and Biodiversity Laboratories, Dept of Zoology, Tripura Univ., Suryamaninagar, Tripura 799022, India. E-mail: bagarwala00@gmail.com

**14533.** Malinowska, A.H.; van Strien, A.J.; Verboom, J.;

**14534.** Malinowska, A.H.; van Strien, A.J.; Verboom, J.; WallisdeVries, M.F.; Opdam, P. (2014): No evidence of the effect of extreme weather events on annual occurrence of four groups of ectothermic species. *PLoS ONE* 9(10): e110219. doi:10.1371/journal.pone.0110219: 10 pp. (in English) ["Weather extremes may have strong effects on biodiversity, as known from theoretical and modelling studies. Predicted negative effects of increased weather variation are found only for a few species, mostly plants and birds in empirical studies. Therefore, we investigated correlations between weather variability and patterns in occupancy, local colonisations and local extinctions (metapopulation metrics) across four groups of ectotherms: Odonata, Orthoptera, Lepidoptera, and Reptilia. We analysed data of 134 species on a 1×1 km-grid base, collected in the last 20 years from the Netherlands, combining standardised data and opportunistic data. We applied dynamic site-occupancy models and used the results as input for analyses of (i) trends in distribution patterns, (ii) the effect of temperature on colonisation and persistence probability, and (iii) the effect of years with extreme weather on all the three metapopulation metrics. All groups, except butterflies, showed more positive than negative trends in metapopulation metrics. We did not find evidence that the probability of colonisation or persistence increases with temperature nor that extreme weather events are reflected in higher extinction risks. We could not prove that weather extremes have visible and consistent negative effects on ectothermic species in temperate northern hemisphere. These findings do not confirm the general prediction that increased weather variability imperils biodiversity. We conclude that weather extremes might not be ecologically relevant for the majority of species. Populations might be buffered against weather variation (e.g. by habitat heterogeneity), or other factors might be masking the effects (e.g. availability and quality of habitat). Consequently, we postulate that weather extremes have less, or different, impact in real world metapopulations than theory and models suggest." (Authors)] Address: Malinowska, Agnieszka, Spatial Planning Group, Wageningen Univ., Wageningen, the Netherlands. E-mail: agnieszka.malinowska@wur.nl

**14535.** Manwar, N.A.; Rathod, P.P.; Raja, I.A. (2014): Diversity and abundance of dragonflies and damselflies of Chatri Lake region, in Pohara – Malkhed Reserve Forest, Amravati, Maharashtra (India). *PARIPEX - Indian Journal of Research* 3(6): 208-210. (in English) ["The present work is aimed to study diversity and abundance of Odonata of Pohara range in Pohara – Malkhed Reserve Forest, Maharashtra. This study has been carried out for one year from June 2012 to May 2013. ... Species richness (S), Relative abundance (P), Species diversity, and Evenness (E) were studied." (Authors) 37 species were observed.] Address: Manwar, N.A., Shri Shivaji College of Arts, Commerce and Science, Akola - 444001, India

**14536.** Márquez-Rodríguez, J. (2014): Contribución al conocimiento de la odonatofauna costera en la isla de Menorca. *Nova Acta Científica Compostelana (Biología)* 21:

7-10. (in Spanish) [Contribution to the knowledge of the coastal Odonata fauna from the island of Menorca (Spain): Records of the following odonate species are documented: *Ceriatrigon tenellum*, *Erythromma lindenii*, *Ischnura elegans*, *Aeshna isosceles*, *Anax parthenope*, *Orthetrum coerulescens*, *Crocothemis erythraea*, *Sympetrum meridionale*, and *S. striolatum*.] Address: Márquez-Rodríguez, J., Depto de Sistemas Físicos, Químicos y Naturales, Universidad Pablo de Olavide, de Sevilla. 41013, Sevilla, Spain. E-mail: jmarrod1@admon.upo.es

**14537.** Mediani, M.; Boudot, J.-P.; Chevalier, F.; Qninba, A.; Rodrigues, J.C. (2014): Nouvelles données sur les Odonates dans le Grand Sud marocain, avec *Ischnura saharensis*, *Anax parthenope*, *Crocothemis erythraea* et *Trithemis annulata* nouveaux pour le Sahara Atlantique (Odonata: Coenagrionidae, Aeshnidae, Libellulidae). *Martinia* 30(1): 11-22. (in French, with English summary) ["The Odonata fauna known from the Oued Ed Dahab-Lagouira administrative region is relatively poor compared to neighbouring regions. Apparently, species of this group are present all year round on some aquatic sites, which are however rare in the Moroccan Atlantic Sahara. To improve the knowledge of the Odonata fauna in this desert area, we visited most natural, semi-natural and artificial aquatic habitats present in the region. We will try first to characterize the migration of *Hemianax ephippiger* in January-February 2013 and 2014 and emphasize reproduction indices for this species in 2012 in some artificial habitats. The occurrence of *Sympetrum fonscolombii* at the Imlily Sebkhia and its breeding in market gardening farms are also emphasized. Four additional new species were added to the region, namely *Anax parthenope*, *Ischnura saharensis*, *Crocothemis erythraea* and *Trithemis annulata*." (Authors)] Address: Mediani, M., Dépt de Biologie, Laboratoire "Écologie, Biodiversité et Environnement", Faculté des Sciences, Université Abdelmalek Essaâdi, Tétouan, Maroc. E-mail: mediamed05@yahoo.fr

**14538.** Mehdi, H.; Anwer, S.F.; Ahmad, A. (2014): Vibration analysis of dragonfly wing section in gliding mode at low Reynolds numbers. *International journal of research in aeronautical and mechanical engineering* 2(12): 11-23. (in English) ["The dragonfly wings are highly corrugated, due to light in weight and good corrugation it increases the aerodynamic performance and strength of the wing. When the wings interact with the air, it is subjected to aerodynamic forces acting on the surface of the wing and the inertial force due to the acceleration or deceleration of the wing mass. The interaction between these inertial and aerodynamic forces resulted in wing deformation. We are interesting to calculate deformation and natural frequency of the dragon fly wing at different Reynolds number and different angle of attack. A dragonfly insect has been chosen because MAVs (Micro air Vehicles) and Dragonfly works almost same Reynolds Number i.e. Re- 102 to 104. In this work, Numerical study of Vibration Analysis for a Pleated Insect 2D Airfoil at Ultra Low Reynolds Numbers is carried out in gliding mode. The dynamics of a pleated insect wing



subjected to aerodynamic loading is studied for different Reynolds Number ranging from 100 to 1000 at different angle of attack ranging from 00 to 150 by using ANSYS-14 multi physics solver. The result from the CFD solver will be fed in the form of lift and drag forces are then fed into the ANSYS Workbench solver and vibration analysis is performed." (Authors)] Address: Mehdi, H., MED, Meerut Institute of Technology, Meerut (U.P), 250002/ INDIA

**14539.** Meng, L.-b.; Ang, H.-s.; Xiao, T.-h. (2014): Analysis of aerodynamic characteristics of flexible wing of dragonfly based on CFD/CSD method. *Journal of Aerospace Power* 29(9): 2063-2069. (in Chinese, with English summary) ["A methodology of fluid-structure bi-directional interaction based on computational fluid dynamics/computational structure dynamics (CFD/CSD) was presented. The donor-receptor relationship between two sets of grid system was identified by alternating digital tree (ADT). The local interpolation methods were used for data exchange between these two sets of grids. Flow with moving boundaries was dealt with by Delaunay graph mapping method. The code for nonlinear structural finite element and information transfer was developed and used to connect with the code of flow solver 3D2 MUFS developed in the Micro Air Vehicle Center of Nanjing University of Aeronautics and Astronautics (NUAA). It was applied to the aerodynamic computation of dragonfly flapping flight with flexible wing. Results show that the time-averaged vertical force coefficient of the dragonfly wing increases from 0.31 to 0.53, and the time-averaged thrust coefficient increases from 0.07 to 0.13 by flexible deformation. This confirms that the flexible deformation can improve the aerodynamic performance of flapping wing." (Authors)] Address: Meng, L.-b., College of Aerospace Engineering, Nanjing University of Aeronautics and Astronautics, China

**14540.** Muraviev, I.V.; Artemyeva, E.A. (2014): Some additions and comments to breeding biology of Blackheaded Wagtail *Motacilla feldegg* Michahhelles, 1830 (Passeriformes, Motacillidae, Motacillinae) in European Russia. *Advances in Bioscience and Bioengineering* 2(1): 1-15. (in English) [The stomach of a male specimen sampled at 09.06.2011 included 13.7% Coenagrionidae (no metric is given, probably relative relation of taxa in the diet.)] Address: Artemyeva, E.A., Ulyanovsk State Pedagogical Univ. of I.N. Ulyanov, the Centenary of V.I. Lenin's Birth sq., 4, Ulyanovsk, 432700, Russia

**14541.** Nagel, L.; Mlynarek, J.J.; Forbes, M.R. (2014): Comparing natural parasitism and resistance with proxies of host immune response in lepidopteran damselflies. *Ecological Parasitology and Immunology* 3 (2014), Article ID 235884, doi:10.4303/epi/235884: 7 pp. (in English) ["Commonly used proxies for measuring immune responses in invertebrates include the amount of melanin deposited on nylon inserts and assays of activity of the enzyme phenoloxidase (PO) in the haemolymph. We used these proxies to estimate immunity in unparasitized individuals from four Lepidopteran damselfly species (*L. disjunctus*, *L. congener*, *L.*

*rectangularis*, *L. forcipatus*) from populations with different levels of water mite parasitism. Levels of parasitism and resistance by hosts were population level estimates from published papers. These parasitism levels were not correlated positively with immune response measured by proxies in the current study. The species with the strongest melanization response to the inserts and the highest PO levels was the one that currently experienced no mite parasitism. The species with the weakest response to the inserts and the lowest PO levels had low current levels of parasitism. The two species that are heavily parasitized had an intermediate response. Natural resistance levels were also not correlated with the response measured by proxies, but the species with a strong response had high levels of resistance in the past. This finding is supported by earlier work done with Lepidoptera in which the most well-defended species currently experience no natural parasitism." (Authors)] Address: Nagel, Laura, Department of Biology, Queen's University, Kingston, ON, Canada K7L 3N6. E-mail: nagell@queensu.ca

**14542.** Naidu, V.; Young, J.; Lai, J. (2014): Effect of wing flexibility on dragonfly hover flight. 19th Australasian Fluid Mechanics Conference, Melbourne, Australia, 8-11 December 2014: 4 pp. (in English) ["The role of wing flexibility in tandem wings during the hover flight at phase 180. was investigated using Fluid Structure Interaction (FSI) simulations. The wing shapes were that of the dragonfly species *Aeshna juncea* and the flexible wing models displayed wing stiffnesses as found in the real wings. Wing flexibility enhanced the lift generated by both the tandem wings, with the forewing and the hindwing generating 10% and 17% more lift respectively, as compared to the rigid wings." (Authors)] Address: Naidu, V., School of Engineering and Information Technology, University of New South Wales, ADFA, ACT 2600, Australia

**14543.** Naka, H.; Sunami, Y.; Hashimoto, H. (2014): Development of the artificial wing suitable for flapping Micro Air Vehicle based on dragonfly wing. The 3rd International Conference on Design Engineering and Science, ICDES 2014 Pilsen, Czech Republic, September 1-3, 2014: 78-83. (in English) ["The dragonfly wing is passively deformed under flapping and has the strength to withstand high flapping frequency simultaneously. These characteristics of deformation and vibration of the wing is important for dragonfly flight. However, the effect of those on dragonfly flight has not been well understood. The purpose of this study is to develop an artificial wing suitable for flapping Micro Air Vehicle on the basis of the dragonfly wing. Therefore, natural frequency and deformation of the dragonfly wing are measured, and the artificial wing is fabricated on the basis of result of that. From the results of measurement, the dragonfly wing has the high natural frequency of 120 Hz. Although base-side of the wing is hardly deformed, the tip-side of the wing is greatly deformed because of the torsional deformation from the nodus of dragonfly wing. Then, the deformable artificial wing which can deform in the same manner of dragonfly wings was fabricated, and

aerodynamic force and power consumption under flapping was measured. As a result, the power efficiency of aerodynamic force using the deformable artificial wing is 5 times greater than the power efficiency using an undeformable wing." (Authors)] Address: Sunami, Y., Department of Mechanical Engineering, Tokai University, 4-1-1, Kitakaname, Hiratsuka City, Kanagawa Prefecture 259-1292, Japan. E-mail: sunami@tokai-u.jp

**14544.** Nasiruddin, M.; Azadi, M.A.; Reza, M.S. (2014): Abundance and diversity of aquatic insects in two water bodies of Chittagong university campus. *Bangladesh J. Zool.* 42(1): 19-33. (in English) ["Abundance and diversity of aquatic insects was studied in two water bodies, (a pond and a lake) of Chittagong University campus during October 2009 to September 2010. A total of 4406 insects belonging to 32 genera, under 20 families and 6 orders were recorded. In both the water bodies, the representatives of the orders Hemiptera and Odonata (identified using a North American key) were the most abundant groups. During the study period highest abundance of the total insects was recorded in November 2009 and the lowest in July 2010. Abundance of insects was comparatively higher in the pond habitat than in the lake. The Quotient of Similarity (QS) of the insects between the two water bodies was found to be the highest in October 2009 and lowest in July 2010. Species diversity, species richness and species evenness values of the lake were higher than that of the pond. *Hydrophilus* sp. and *Sphaerodema* sp. were the most dominant insects in the pond, while *Chironomus* sp. and *Gerris* sp. in the lake." (Authors)] Address: Nasiruddin, Munira, Dept of Zoology, University of Chittagong, Chittagong 4331, Bangladesh. E-mail: maazadi@yahoo.com

**14545.** Nelson, M. (2014): Surveying Odonata: are current monitoring methods up to the task? *J. Br. Dragonfly Society* 30(1): 17-31. (in English) ["Surveying odonates has focused historically on adult populations which are visible and amenable to standard types of surveying but recent work has suggested this may be giving a biased result, with consequent impact on conservation decision making and management. This study attempts to investigate whether there is a difference in results of larval and adult surveys and whether any difference found is specific to type of habitat or particular species." (Author)] Address: Nelson, M., 19 Sumner Street, Atherton, Greater Manchester, M46 0DJ, UK

**14546.** Nelson, S.J.; Chen, C.; Kahl, J.S.; Krabbenhoft, D.P. (2014): Validating landscape models for mercury in northeast lakes using dragonfly nymphs as mercury bio-sentinels. University of Maine Office of Research and Sponsored Programs: Grant Reports. Paper 52. <http://digitalcommons.library.umaine.edu/orspreports/52>: 32 pp. (in English) ["Mercury (Hg) is a toxic pollutant that is widespread in northeastern US ecosystems. Resource managers' efforts to develop fish consumption advisories for humans and to focus conservation efforts for fish-eating wildlife are hampered by significant variability in fish Hg

concentrations from site to site - often in neighbouring lakes. Watershed characteristics that vary across the Northeast such as forest type and wetlands are important predictors of methylation. Although data syntheses leading to hotspot maps (e.g., Evers et al. 2007) and sensitivity modelling have been conducted (Krabbenhoft et al. 2011), we still lack studies that use sentinel biota and have statistically rigorous sampling designs across the broad region. Fish Hg concentrations are most often used as biological indicators of Hg sensitivity in lakes; however, fish may move between waterbodies and interpretation can be confounded by size, species, diet, gender, and age. This project sampled lake water and a biosentinel, dragonfly larvae, in a statistical sample of 74 lakes that are part of US EPA long-term monitoring across the region to (1) test models for prediction of Hg and MeHg in water, and (2) determine the efficacy of this bio-sentinel in predicting sensitivity to Hg across the region. In the Upper Midwest, MeHg in dragonfly larvae was significantly, positively correlated with THg in perch (Knights et al. 2005) and researchers concluded that dragonfly larvae were promising bio-sentinels in that region (Haro et al. 2013). We hypothesized that dragonfly larvae are good indicators of Hg spatial patterns because they are widespread in fresh waters across this region, long-lived (1-5 years or more), exhibit site fidelity, are carnivorous, contain almost all of their Hg as MeHg, and have relatively high Hg concentrations. The project leveraged ongoing research at a statistical sample of 74 lakes across New England states and New York, sampled annually by cooperators in the US Environmental Protection Agency (EPA) Long-Term Monitoring (LTM) Network." (Authors)] Address: Nelson, Sarah, Senator George J. Mitchell Center for Sustainability Solutions, School of Forest Resources, Ecology & Environmental Sciences Program, and Maine RiSE (Research in Science Education) Center, USA. E-mail: sarah.j.nelson@maine.edu

**14547.** Neves, M.; Morais, C.S.; Garda, A.A. (2014): Sexual dimorphism and diet of *Pseudis tocantins* (Anura, Hylidae, Pseudidae). *South American Journal of Herpetology* 9(3): 177-182. (in English) ["The genus *Pseudis* (Hylidae) includes aquatic frogs distributed throughout South America east of the Andes. Few papers have been published on the ecology of these species, despite the great interest their gigantic larvae raise among herpetologists. *Pseudis tocantins* has a widespread distribution along the Tocantins-Araguaia hydrographic basin in Brazil and virtually nothing has been published about its natural history and ecology. The present work aimed to evaluate, based on 159 specimens from 13 populations, sexual dimorphism in size and shape and diet composition of *P. tocantins* along most of its known distribution. Females were significantly larger than males and body shape differed significantly between sexes, with tibia length and tympanum diameter as the variables contributing the most to this difference. We found 13 prey categories in frog's stomachs, with Araneae, Odonata, and Orthoptera being the most important items, respectively. Aquatic animals were also part of the species diet (even though less representative than

non-aquatic prey), showing that *P. tocantins* feeds on both above water and subaquatic prey." (Authors)] Address: Neves, M., Departamento de Biologia Animal, Universidade Federal de Viçosa. Avenida Peter Henry Rolfs s/n, CEP 36571 -000, Viçosa, MG, Brazil. E-mail: pseudis@gmail.com

**14548.** New, T.R.; Samways, M.J. (2014): Insect conservation in the southern temperate zones: an overview. *Australian Journal of Entomology* 53(1): 26-31. (in English) ["Insect conservation in the southern hemisphere lags substantially behind developments in parts of Europe and North America, where the relatively small faunas are better documented, and where a historical culture of natural history has enabled conservation needs to be assessed and addressed by many sympathetic supporters. We contrast this scenario with the much more embryonic knowledge and capability available in Australia, southern Africa, southern South America and New Zealand, all regions with large and incompletely documented insect faunas, but an equivalent array of threats to their survival. While a few individual 'flagship species' (mainly within Lepidoptera, Orthoptera and Coleoptera) have been critical in promoting wider interests, in general insects do not signify highly on regional conservation agendas. We offer a perspective of the major needs to counter this... Dragonflies are also relatively well studied. They have been surveyed comprehensively through the Odonata Database of Africa and the World Conservation Union's (IUCN) Species Survival Commission's Africa Freshwater Assessment (Clausnitzer et al. 2012). A comprehensive assessment of Argentinian dragonflies has begun, as part of an initiative to increase awareness of insect conservation in the country, discussed in detail at the 2012 meeting of the Entomological Society of Argentina." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**14549.** Nguyen, S.H.; Webb, H.K.; Hasan, J.; Tobin, M.J.; Mainwaring, D.E.; Mahon, P.J.; Marchant, R.; Crawford, R.J.; Ivanova, E.P. (2014): Wing wettability of Odonata species as a function of quantity of epicuticular waxes. *Vibrational Spectroscopy* 75: 173-177. (in English) ["Dragonflies have gained much attention due to their sophisticated wing surface structure, and their associated superhydrophobic, self-cleaning and bactericidal properties. In this work, we compared and contrasted the chemical composition and surface morphology of the wing membranes of four species of dragonfly and damselfly from the Odonata family collected in 1970s (*Diplacodes melanopsis* and *Xanthagrion erythroneurum*) and 2011 (*Diplacodes bipunctata*, and *Ischnura heterosticta*). .. Fourier-transform infrared spectroscopy data obtained from the Australian Synchrotron were used to classify the fundamental components of all four of the insect species' wings. The spectra of all species were dominated by C-H stretching, Amide I and Amide II and O-H stretch absorbance indicating similar membrane composition of chitin,

protein and wax in all four species. Although the samples were collected 40 years apart, there was no evidence of degradation during this time. Despite the overall similarities in spectral profile, species-specific differences were observed, most notably the intensity of the vCH<sub>2</sub> peaks, which in part reflect the amount of waxes present on the wings, appeared different between species. The surface topography also contained minor differences in their pillar diameter and spatial distribution. It is postulated that the differences in surface wettability of the wings could be attributed to these minor differences in surface chemistry and surface topography. For example, *X. erythroneurum* presented the highest water contact angle (WCA) of 160° whilst the *D. melanopsis* wings exhibited the lowest WCA (138°). And the wettability of their wings was found to directly correlate with the intensity of hydrocarbon peaks found in their respective IR spectrum." (Authors)] Address: Ivanova, Elena, Faculty of Science, Engineering, & Technology, Swinburne Univ. of Technology, PO Box 218, Hawthorn, VIC 3122, Australia. E-mail: eivanova@swin.edu.au

**14550.** Nielsen, E.R.; Manger, R.; Martens, A. (2014): First records of *Forcipomyia paludis* (Diptera: Ceratopogonidae), a midge parasitising dragonfly adults (Odonata: Libellulidae), for the Balearic Islands, Spain. *Notulae odonatologicae* 8(4): 83-85. (in English) ["Photographs of odonates parasitised by *Forcipomyia* (*Pterobosca*) *paludis* taken 2007 and 2014 in the Parc Natural de s'Albufera de Mallorca, Spain, document the first records of this ceratopogonid for the Balearic Islands." (Authors)] Address: Nielsen, E.R., Møllevvej 15B, Fovslet, 6580 Vamdrup, Denmark. E-mail: e\_refling@yahoo.com

**14551.** Nobre, C.E.; Carvalho, A.L. (2014): Odonata of Itatira, a Brazilian semi-arid area in the state of Ceará. *International Journal of Odonatology* 17(2-3): 73-80. (in English) ["The present study provides the first odonate survey for the Brazilian Caatinga, including species habitat information. Specimens were collected during five days in both dry and rainy seasons of 2011 in the municipality of Itatira, state of Ceará, located in the semi-arid region of northeastern Brazil. Adult individuals of 37 species were documented, the highest richness value thus far recorded for the region. Individuals of the majority of the species were recovered from small, temporary water bodies. In general, the local odonate community is composed of species with wide continental distributions, with the exception of *Macrothemis lutea*, *M. griseofrons* and *Erythrodiplax leticia*, which are restricted to northeastern Brazil. New occurrences and expanded distribution ranges of species are discussed." (Authors)] Address: Carvalho, A.L., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro (UFRJ), Caixa Postal 68044, BR-21944-970 Rio de Janeiro, RJ, Brazil. E-mail: alagoc@acd.ufrj.br

**14552.** Novelo-Gutiérrez, R. (2014): The larva of *Aphylla protracta* (Hagen, 1859), and a redescription of the larva of *A. angustifolia* Garrison, 1986 (Odonata: Gomphidae).



Zootaxa 3884(4): 387-393. (in English, with Spanish summary) ["The larva of *Aphylla protracta* is described and figured. It is characterized by 3rd antennomere subcylindrical, flattened on ventral surface, 4.2 times longer than its widest part. Abdomen with dorsal protuberances well developed on S2–4, reduced on S5, vestigial or absent on S6–9; lateral spines lacking entirely, tergites 5–8 with minute reddish setae, tergite 9 with abundant, small, reddish setae on most of its surface and the whole posterior margin; S10 cylindrical, very long, five times longer than its base, much longer than S6+7+8+9. Also, a redescription and figures of *A. angustifolia* are provided, and a comparison of both species is made. Mainly differences between both species were found in abdominal dorsal protuberances and the presence/absence of small setae on abdominal tergites." (Author)] Address: Novelo-Gutiérrez, R., Depto de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**14553.** Olberg, R.M ; Gonzalez-Bellido, P.; Wardill, T. (2014): The neuronal control of flying prey interception in dragonflies. Final rept. 15 May 2010-14 May 2014: 18 pp. (in English) ["Eight pairs of large descending visual neurons (TSDNs) control dragonfly prey interception flights. We investigated both the sensory inputs and the motor outputs of this group of neurons. A detailed map was obtained of the position and direction of target movement that excites each of the TSDNs. This study also revealed the anatomy of the TSDN output terminals, providing information about the likely pattern of connectivity from individual TSDNs to the neural circuitry controlling each of the wings. Angular speed is also encoded by the TSDNs. This speed sensitivity increases the gain of the system as the dragonfly approaches its prey. Distance appears not to be encoded by the TSDNs when the head is fixed. However binocular inputs are required for maximal responses. The functional implication of the binocular inputs is not yet known. Intracellular electrical stimulation of individual TSDNs confirmed their role in adjusting wing position and angle. TSDN activity rotates the head as well in the direction opposite the preferred target direction. Two TSDNs also move the legs and mouthparts." (Authors)] Address: Olberg, R.M., Department of Biological Sciences, Union College, 807 Union Street, Schenectady, NY 12308, USA. E-mail: olberg@union.edu

**14554.** Olomukoro, J.O.; Dirisu, A.-R. (2014): Status and the diversity of macrobenthos of Udu - Ghievwen wetlands in the Niger delta, Nigeria. Journal of natural science research 4(18): 6 pp. (in English) ["A survey on the status and diversity of benthic fauna community of Udu – Ughievwen wetlands was carried out for a period of six months. Benthic samples were collected using the Ekman Grab made by Hydrobios. Water Hyacinth (*Eichornia crassipes*) was also sampled for benthic organisms. A total of twelve taxonomic groups were recorded in this study and they include; Ephemeroptera (37.63%), Diptera (20.45%),

Decapoda (14.39%), Odonata (6.48%), Annelida (5.97%), Coleopterans (4.21%) and Trichoptera (3.87%). Others were; Mollusca (3.45%), Amphibian (2.85%), Hemiptera (2.27%) and Arachnida (0.42%). The highest number of individuals was collected from Ohwawha (171) and least at Ofri (60). Shannon – Weiner diversity (H) was highest at Ujevuu and least at Ofri sampling stations respectively. The suitability and diversity of the macrohabitats in the various study sites have favoured the abundance of benthic macroinvertebrates particularly the Decapoda, Ephemeroptera, and Diptera in these water bodies. The dominance of Ephemeroptera in most of the sites indicates a healthy nature or sound environmental quality of the entire Udu – Ughievwen wetlands. The study revealed that wetlands are populated by a rather different assortment of macroinvertebrates." (Authors) Taxa are detailed at genus level, but obviously were identified using a key from North America.] Address: Olomukoro, J.O., Dept of Animal & Environmental Biology, Faculty of Life Sciences, University of Benin, Benin City, P.M.B. 1154, Nigeria

**14555.** Ott, J. (2014): Der Kalikokrebs (*Orconectes immunis*) (Hagen, 1870) – ein noch wenig beachtetes Neozoon (AIS) mit erheblichem Gefährdungspotenzial für die aquatischen Lebensgemeinschaften der Rheinaue (Crustacea: Decapoda: Cambaridae. Fauna Flora in Rheinland-Pfalz 12(4): 1403-1416. (in German, with English summary) ["The author reports on a big population of the calico crayfish, an invasive species in Germany, in a secondary water body and gives some information on its negative effects on the aquatic biocoenosis (amphibians, dragonflies). As a consequence of its high dispersal potential this species will certainly increase the negative effects on the aquatic biocoenosis in the future. Furthermore the consequences for nature conservation and water management concepts are discussed." (Author) Passing notes on *Anax imperator* and *Ischnura elegans* are included.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**14556.** Ott, J. (2014): Zur Ansiedlung der Großen Moosjungfer – *Leucorrhinia pectoralis* (Charpentier, 1825) – in der Pfalz (Insecta: Odonata). Fauna Flora in Rheinland-Pfalz 12(4): 1417-1424. (in German, with English summary) ["The successful establishment of *L. pectoralis*, which after a long absence was found again in several waters in Rhineland-Palatinate in 2012, is reported. The species was found now autochthonous at least in one water in the Palatinate and also it occurred in several other bodies of water. This species, being listed on the annexes II and IV of the European habitats directive, has now to be monitored according to EC law." (Author)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**14557.** Outomuro, D.; Söderquist, L.; Rodríguez-Martínez, S.; Johansson, F. (2014): A preliminary study on female-limited colour polymorphism in *Lestes sponsa*. International Journal of Odonatology 17(2-3): 89-93. (in English)

["Female-limited colour polymorphisms are widespread in Odonata, usually showing an androchrome and one or more gynochromes. Androchromes have been hypothesized to function as male mimics with a consequent decrease of male harassment, although males may also learn to recognize the different female colour morphs. In the Eurasian damselfly *Lestes sponsa*, the occurrence of two female colour morphs (androchrome and gynochrome) has been known since the beginning of the twentieth century, although this has been generally overlooked. In this work, we studied a Swedish population of *L. sponsa* by counting the number of females of each morph during nine consecutive days, as well as the number of tandems. Androchromes showed blue pruinescence at similar body parts as males, although more limited at the tip of the abdomen. Moreover, androchromes also showed bright blue coloured eyes as males. We found no indication that androchromes might be a result of age changes in female coloration. The androchrome morph accounted for 19% of the female population. Androchromes did not form tandems at a lower frequency than expected in the population, given the frequency of presence of each morph. Therefore our results suggest that either androchromes in this species do not function as male mimics, or that the population has reached equilibrium with equal fitness for each morph. Other aspects of male harassment and learned mate-recognition, as well as female morph behaviour, would shed light on the evolutionary and ecological significance of female morphs in this species." (Authors)] Address: Outomuro, D., Dept of Ecology and Genetics, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, 75236, Uppsala, Sweden. E-mail: outomuro.david@gmail.com

**14558.** Pal, P.; Roy, S. (2014): Edible insects: Future of human food - a review. *International Letters of Natural Sciences* 21: 1-11. (in English) ["The practice of eating insects is known as entomophagy. ... People throughout the world have been eating insects as a regular part of their diets for millennia. As people in rural areas suffer from under nutrition, especially protein-energy malnutrition (PEM) in Africa, Latin America and Asia, alternative nutritional food sources are needed. From ants to beetle larvae – eaten by tribes in Africa and Australia as part of their subsistence diets – to the popular, crispy-fried locusts and beetles enjoyed in Thailand, it is estimated that insect-eating is practised regularly by at least 2 billion people worldwide. More than 1900 insect species have been documented in literature as edible, most of them in tropical countries. The most commonly eaten insect groups are beetles, caterpillars, bees, wasps, ants, grasshoppers, locusts, crickets, cicadas, leaf and plant hoppers, scale insects and true bugs, termites, dragonflies and flies. The purpose of the present review is to determine the status of present research in the context of the potentiality of insects as alternative food source to cope up with the emerging problem of global food crisis. .. Dragonflies including *Anax guttatus* and *Trithemis arteriosa* are collected in paddy fields in the DRC (Malaisse, 1997), the Philippines, north and northeast

Thailand (Pemberton, 1995), and China (Feng et al., 2001). Nymphs are often stir-fried or boiled before eating." (Authors)] Address: Pal, P., Department of Zoology, Scottish Church College, 1 & 3 Urquhart Square, Kolkata - 700006, India. E-mail: parthapal\_iicb@yahoo.co.in

**14559.** Palacino-Rodríguez, F.; González-Soriano, E.; Sarmiento, C.E. (2014): Phylogenetic signal of subsets of morphological characters: a case study in the genus *Erythemis* (Anisoptera: Libellulidae). *Caldasia* 36(1): 85-106. (in English, with Spanish summary) ["*Erythemis* Hagen, 1861 shows a considerable variation in genitalic characters, body coloration and wing venation. Since it is known that these traits are affected by different kinds of selection that probably blur their phylogenetic signal, we chose the genus *Erythemis* as a model taxon to analyze and compare the phylogenetic signal of these and other morphologic characters. A cladistic analysis was performed using ten species of the genus plus another seventeen species of Libellulidae as outgroup. Characters were defined following standard criteria and were managed using the software DELTA. Tree search was performed with the software NONA. Partitioned and combined analyses were conducted. Character tracking of characters with  $ri=100$  was used to identify synapomorphies. In agreement with the literature, color characters provided strong phylogenetic signal, meanwhile, genitalia characters offered no synapomorphies. We did not find any character that could support the monophyly of *Erythemis*. The only clade that has strong support from the morphologic set of characters is (*E. vesiculosa*, (*E. simplicicollis*, *E. collocata*)). Contrary to the results found in other Odonata, wing characters offered synapomorphies for some *Erythemis* clades." (Authors)] Address: Palacino-Rodríguez, F., Laboratorio de Artrópodos del Centro Internacional de Física, Univ. Nacional de Colombia. Depto de Biología / Universidad El Bosque, Bogotá D.C., Colombia. [odonata17@hotmail.com](mailto:odonata17@hotmail.com)

**14560.** Palacio, A. del; Muzon, J. (2014): Description of the final instar larva of *Limntron antarcticum* Förster and notes on its female (Anisoptera: Aeshnidae). *Zootaxa* 3884(1): 89-94. (in English) ["The final instar larva of *L. antarcticum* is described and illustrated for the first time based on one specimen collected in Misiones Province, Argentina. It is compared with *L. debile* (Karsch). Color pattern and ovipositor morphology of the female imago are described." (Authors)] Address: del Palacio, A., Instituto de Limnología "Dr. Raúl A. Ringuelet" (CCT-La Plata), CC 712 – 1900 La Plata, Argentina. E-mail: [adelpalacio@ilpla.edu.ar](mailto:adelpalacio@ilpla.edu.ar)

**14561.** Peels, F. (2014): The occurrence of *Ischnura senegalensis* in the Canary Islands, Spain (Odonata: Coenagrionidae). *Notulae odonatologicae* 8(4): 105-111. (in English) ["The occurrence of *I. senegalensis* in the Canary Islands is reported. In May 2014 a breeding population was observed in southern Tenerife, Spain, at a freshwater reservoir near Las Galletas. Characters are provided for discriminating between the two known *Ischnura* species

on the islands, *I. senegalensis* and *I. saharensis*, from photographs." (Author)] Address: Peels, F., Via Caffarini 41, 53100 Siena, Italy. E-mail: info@dragonflypix.com

**14562.** Perroy, R.L.; Belby, C.S.; Mertens, C.J. (2014): Mapping and modeling three dimensional lead contamination in the wetland sediments of a former trap-shooting range. *Science of The Total Environment* 487: 72-81. (in English) ["Highlights: •We mapped 3D Lead contamination in the wetland sediments at a former shooting range. •X-ray fluorescence & imaging allow rapid and inexpensive quantification of contamination. •Highest Pb contamination levels were typically found 10-30 cm below sediment surface. •We report high-resolution volumetric contamination estimates at various action levels. •Our mapping and modelling techniques can be readily applied to other contaminated sites. Abstract: Legacy lead (Pb) contamination from sport shooting activities is a well-known hazard. Assessing the risk this contamination presents to the environment and public health requires a detailed understanding of its spatial distribution, yet our knowledge in this area is limited, especially for wetland shooting ranges. In this study, we analyzed 1351 sediment samples from 456 surficial (0–5 cm) locations and 38 sediment cores (0.3 to 0.9 m) to quantify the three dimensional spatial distribution of Pb contamination in an urban wetland at the site of a former trap shooting range located in southwestern Wisconsin, USA. Non-destructive X-ray images of the sediment cores were used to quantify Pb shot abundance and burial depth. Surficial and core sediment samples were processed and analyzed for total Pb content via X-ray fluorescence (XRF) analysis. X-ray and XRF results were interpolated to create a three-dimensional model of Pb shot density and sediment concentration across the study area. Over 31,000 m<sup>3</sup> of sediment surpassed the US Environmental Protection Agency's contamination threshold of 400 mg/kg Pb, with a maximum calibrated value of 26,700 mg/kg Pb occurring near the center of the expected shot fallout zone. Shot densities of > 50,000 pellets/m<sup>2</sup> were found in the shot fallout zone, primarily 10–30 cm below the sediment surface. X-ray image analysis and XRF analysis of sediment cores provide an accurate and inexpensive technique for rapidly mapping Pb contamination associated with gun clubs and hunting; these findings will benefit environmental contamination studies and remediation efforts at active and abandoned shooting ranges worldwide. ... Supernumerary antenna malformations in Corduliidae (dragonfly) specimens 135 collected within the LRM shot fallout zone were also observed prior to 136 this study, and hypothesized to be linked to high Pb exposure (R. Haro, UW - La Crosse Biology Department, pers. com)."] (Authors)] Address: Perroy, R.L., Dept of Geogr. & Environ.I Sci., Univ. of Hawaii at Hilo, 200W. Kawili Street, Hilo, HI 96720-4091, USA. E-mail: rperroy@hawaii.edu

**14563.** Pessacq, P. (2014): Synopsis of *Epipleoneura* (Zygoptera, Coenagrionidae, "Protoneuridae"), with emphasis on its Brazilian species. *Zootaxa* 3872(3): 201-234.

(in English) ["A revision of the known species of *Epipleoneura* is presented. Material of all Brazilian species was examined. Two new species are described: *E. ottoi* (Holotype: Brazil, Goiás State, São Bartolomeu river) and *E. susanae* (Holotype: Brazil, Mato Grosso State, São Lorenzo river), and the male of *E. humeralis* and the female of *E. kaxuriana* are described for the first time. With the exception of *E. protostictoides*, diagnoses, morphological characterizations, and illustrations of all species including known females are presented. The genital ligula of 25 species is described or redescribed. Morphological intraspecific variation is presented for *E. machadoi*, *E. metallica*, and *E. venezuelensis*." (Author)] Address: Pessacq, P., Laboratorio de Investigaciones en Ecología y Sistemática Animal (LIESA), Universidad Nacional de la Patagonia San Juan Bosco, Sarmiento 849, 9200 Esquel, Chubut, Argentina. E-mail: pablopessacq@yahoo.com.ar

**14564.** Petzold, F.; Fritzlar, F. (2014): Basiserfassungen zur Libellenfauna – Landesweites Probestellennetz für ein Libellenmonitoring in Thüringen. *Landschaftspflege und Naturschutz in Thüringen* 51(1): 3-11. (in German, with English summary) ["The state of Thuringia (Germany) built up a large stock of dragonfly-data set in cooperation with the voluntary working group which explore Thuringian dragonflies. This set of data is to be supplemented by an equably distributed and standardized state wide grid of study areas. The aim of this new established monitoring program is to get more precise information about the change of dragonfly inventory in future. The project concentrates on dragonfly habitats with local importance. Between 2010 and 2012, 44 large scale maps in five rural districts get researched. In the analysed 220 water bodies 51 dragonfly species were recorded - 78 percent of the state wide known species. 15 of this species are recorded at the Thuringian Red List. *Coenagrion mercuriale*, *Leucorrhinia pectoralis*, *Sympetrum meridionale*, and *Sympetrum pedemontanum* are endangered or extreme rare. To protect the dragonfly biodiversity, the most valuable water bodies have to be conserved and deficits of the water body conditions have to be eliminated." (Authors)] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. E-mail: falk\_petzold@web.de

**14565.** Pham, T.T.; Higgins, C.M. (2014): A visual motion detecting module for dragonfly-controlled robots. *Engineering in Medicine and Biology Society (EMBC), 2014 36th Annual International Conference of the IEEE*, 26-30 Aug. 2014: 1666-1669. (in English) ["When imitating biological sensors, we have not completely understood the early processing of the input to reproduce artificially. Building hybrid systems with both artificial and real biological components is a promising solution. For example, when a dragonfly is used as a living sensor, the early processing of visual information is performed fully in the brain of the dragonfly. The only significant remaining tasks are recording and processing neural signals in software and/or hardware. Based on existing works which focused on record-



ing neural signals, this paper proposes a software application of neural information processing to design a visual processing module for dragonfly hybrid bio-robots. After a neural signal is recorded in real-time, the action potentials can be detected and matched with predefined templates to detect when and which descending neurons fire. The output of the proposed system will be used to control other parts of the robot platform."(Authors) For details see: [http://thehigginslab.webhost.uits.arizona.edu/pubs/2011-\\_thuy\\_pham\\_thesis.pdf](http://thehigginslab.webhost.uits.arizona.edu/pubs/2011-_thuy_pham_thesis.pdf) Address: Pham, Thuy T. ; Dept of Electrical and Computer Engineering and Department of Neuroscience, University of Arizona, AZ USA 85716

**14566.** Pierce, F. (2014): Southern Riffle Damner *Notoaeschna sagittata* (Odonata) in the Bend of Islands, Victoria. *The Victorian Naturalist* 131(5): 177-179. (in English) ["*N. sagittata* has been recorded in the Yarra Catchment, 30 km north-east of Melbourne, a significant extension of the documented range. Teneral adults of both sexes were recorded at least 1.8 km from the riparian habitat of the Yarra." (Author)] Address: Pierce, F., PO Box 121, Kangaroo Ground, Victoria 3097, Australia. E-mail: [jmandfp@bigpond.com](mailto:jmandfp@bigpond.com)

**14567.** Pospekhova, N.A.; Regel, K.V.; Gulyaev, V.D. (2014): Ultrastructural study of protective envelopes in *Dioecocestus asper* (Cestoda: Dioecocestidae) megalocercus. *Parazitologiya* 48(2): 89-96. (in English, with Russian summary) ["The megalocercus of *Dioecocestus asper* (Mehlis 1831) from the haemocoel of dragonfly larvae possesses two envelopes: outer (exocyst) and inner (endocyst) ones. The exocyst contains the large endocyst and larval strobila with scolex attached to the latter. Outer and inner surfaces of these envelopes are organized as the tegument and have some structural differences. The exocyst is covered with slender microvilli. Its outer tegument contains numerous mitochondria; the inner one is filled with lipid droplets released into the exocyst's cavity. The well-developed protonephridial (excretory) system consisting of flame cells, collecting ducts and canals is the unique feature of the exocyst, noted for the first time. Thick (more, than 50 microm) distal cytoplasm of the outer tegument of the endocyst is the place of accumulation of uniform globules looking like a hyaloid layer. This outer layer together with underlying fibrous layer (up to 20 microm), apparently, protect the scolex and larval strobila during the transfer through feather clump in the stomach of grebes, definitive hosts of *D. asper*. Muscle cells of both envelopes retain their synthetic activity even in the fully developed metacestode. Probably, they are the main structural element, which produces fibers of the extracellular matrix and maintains the integrity of protective envelopes of the megalocercus." (Authors) The original material was obtained by dissection of dragonfly larvae of the genus *Aeshna* from lakes of the Upper Kolyma basin.] Address: Pospekhova, Natalia, Institute of Biological Problems of the North FEB RAS Magadan, 685000, Russia. E-mail: [posna@ibpn.ru](mailto:posna@ibpn.ru)

**14568.** Post, M. (2014): Die Libellenfauna im Raum Neustadt 2013. *Pollichia-Kurier* 30(1): 20-22. (in German) [The

author summarizes the regional Odonata records in the Neustadt-region (Rheinland-Pfalz, Germany) for the year 2013. Due to a long and cold winter the phenology of many species was shifted. Interesting is that the so-called climate change winners were not harmed by this winter, and partly even expanded their local/regional range due to optimal habitat availability. The situation for some formerly very frequent species as *Lestes sponsa* and *Sympetrum vulgatum* seems to be dramatic. *S. flaveolum* and *S. depressiusculum* are believed to be abandoned the site because they have not been observed in the past years. *Ophiogomphus cecilia* was observed latest on 3-XI-2013] Address: Post, M. E-mail: [libellen-nw@web.de](mailto:libellen-nw@web.de)

**14569.** Rasmussen, N.L.; Van Allen, B.G.; Rudolf, V.H.W. (2014): Linking phenological shifts to species interactions through size-mediated priority effects. *Journal of Animal Ecology* 83(5): 1206-1215. (in English) ["(1.) Inter-annual variation in seasonal weather patterns causes shifts in the relative timing of phenological events of species within communities, but we currently lack a mechanistic understanding of how these phenological shifts affect species interactions. Identifying these mechanisms is critical to predicting how inter-annual variation affects populations and communities. (2.) Species' phenologies, particularly the timing of offspring arrival, play an important role in the annual cycles of community assembly. We hypothesize that shifts in relative arrival of offspring can alter interspecific interactions through a mechanism called size-mediated priority effects (SMPE), in which individuals that arrive earlier can grow to achieve a body size advantage over those that arrive later. (3.) In this study, we used an experimental approach to isolate and quantify the importance of SMPE for species interactions. Specifically, we simulated shifts in relative arrival of the nymphs of two dragonfly species (*Pantala flavescens*, *Tremea carolina*) to determine the consequences for their interactions as intraguild predators. (4.) We found that shifts in relative arrival altered not only predation strength but also the nature of predator-prey interactions. When arrival differences were great, SMPE allowed the early arriver to prey intensely upon the late arriver, causing exclusion of the late arriver from nearly all habitats. As arrival differences decreased, the early arriver's size advantage also decreased. When arrival differences were smallest, there was mutual predation, and the two species coexisted in similar abundances across habitats. Importantly, we also found a nonlinear scaling relationship between shifts in relative arrival and predation strength. Specifically, small shifts in relative arrival caused large changes in predation strength while subsequent changes had relatively minor effects. (5.) These results demonstrate that SMPE can alter not only the outcome of interactions but also the demographic rates of species and the structure of communities. Elucidating the mechanisms that link phenological shifts to species interactions is crucial for understanding the dynamics of seasonal communities as well as for predicting the effects of climate change on these communities." (Authors)] Address: Rudolf, V., Dept of Biology, University of

Virginia, 243, Gilmer Hall, Charlottesville, VA 22904, USA.  
E-mail: vrudolf@virginia.edu

**14570.** Reinhardt, K. (2014): Buchbesprechung: Bönsel, A. & Frank, M. (2013): Verbreitungsatlas der Libellen Mecklenburg-Vorpommerns. Natur + Text, Rangsdorf, ISBN 978-3-942062-12-1. Enomologische Nachrichten und Berichte 58(1/2): 40. (in German) [review] Address: Reinhardt, K., Dept Animal and Plant Sciences, Univ. of Sheffield, Sheffield S10 2TN, UK. E-mail: K.Reinhardt@sheffield.ac.uk

**14571.** Riservato, E.; Fabbri, R.; Festi, A.; Grieco, C.; Hardersen, S.; Landi, F.; Utzeri, C.; Rondinini, C.; Battistoni A.; Teofili C. (com.) (2014): Lista Rossa IUCN delle libellule Italiane. Comitato Italiano IUCN e Ministero dell'Ambiente e della Tutela del Territorio e del Mare, Roma: 39 pp. (in Italian, with English summary) ["The main objectives of this research are: 1) the creation of an expert network for the evaluation of the extinction risk of dragonflies and damselflies in Italy; 2) the evaluation of the extinction risk for all Italian dragonflies and damselflies; 3) the creation of a baseline for future evaluations of the trends in biodiversity conservation in Italy. The assessments of extinction risk are based on the IUCN Red List Categories and Criteria and the most up-to-date guidelines. The assessments have been carried out in a workshop involving experts covering different taxa and regions in Italy, and have been evaluated according to the IUCN standards. All dragonflies and damselflies native or possibly native to Italy have been included in the evaluation. In all cases the entire national population has been evaluated, including large and small islands where necessary. Of the 93 species assessed, one has become Regionally Extinct in recent times. Threatened species total 10, corresponding to 10.9% of the species assessed. Ca. 72% of the species are not currently threatened with extinction. Overall the populations of Italian dragonflies and damselflies are declining, as species in decline outnumber species in expansion by 5 to 1. The main threats are habitat loss and pollution. Threatened species, as well as species experiencing population declines, concentrate in natural freshwater wetlands. The Red List is a fundamental tool for the identification of conservation priorities, but it is not a list of priorities on its own. Other elements instrumental to priority setting include the cost of action, the probability of success, and the proportion of the global population of each species living in Italy, which determines the national responsibility in the long term conservation of that species." (Authors)] Address: Riservato, Elisa, Dipartimento di Biologia Animale, Università di Pavia, Piazza Botta 9, 27100 Pavia, Italy. E-mail: elisa.riservato@unipv.it

**14572.** Riservato, E.; Christille, C.; Marguerettaz, F.; Vanacore Falco, I. (2014): Odonatofauna della Valle d'Aosta (Insecta: Odonata). Rev. Valdôtaine Hist. Nat. 68: 55-90. (in Italian, with English summary) ["The dragonfly fauna of Aosta Valley (NW Italy) was object of a three years study, aimed to increase the knowledge on the distribution of species in the Region. With 44 species, Aosta Valley hosts

46% of Italian species, 4 new species were added to the regional checklist (*Erythromma viridulum*, *Coenagrion hastulatum*, *Orthetrum albostylum* and *O. coerulescens*) and 5 species previously recorded for the area have not be confirmed during the study (*Lestes dryas*, *Sympecma fusca*, *Ceriagrion tenellum*, *Sympetrum fonscolombii* and *Sympetrum pedemontanum*). This paper updates the regional checklist (with maps) and a critical list of species is presented." (Authors)] Address: Riservato, Elisa, Società Italiana per lo Studio e la Conservazione delle Libellule italiane – ODONATA.IT (Onlus), Via San Francesco di Sales, 88, 10022 Carmagnola (TO), Italy

**14573.** Roberts, D. (2014): Rapid habituation by mosquito larvae to predator kairomones. *Journal of Vector Ecology* 39(2): 355-360. (in English) ["Larvae of some species of mosquitoes have been shown to respond to water-borne kairomones from predators by reducing bottom-feeding and replacing it with surface filter-feeding, which uses less movement and is thus less likely to attract a predator. However, if no predator attack takes place, then it would be more efficient to use a risk allocation strategy of habituating their response depending on the predator and the overall risk. The larvae of *Culiseta longiareolata* Macquart live in temporary rain-filled pools, where they are exposed to a high level of predation. Within one hour, they responded to kairomones from dragonfly or damselfly nymphs, or to the fish *Aphanius*, by significantly reducing bottom-feeding activity. Continued exposure to the predator kairomones resulted in habituation of their response to damselflies, a slower habituation to fish, but no habituation to dragonflies even after 30 h. In contrast, the larvae of *Culex quinquefasciatus* Say normally live in highly polluted and thus anaerobic water, where the predation risk will be much lower. They also showed a significant reduction in bottom-feeding after 1 h of exposure to predator kairomones but had completely habituated this response within 6 h of continuous exposure. Some species of mosquito larvae can thus show a very rapid habituation to predator kairomones, while others only habituate slowly depending on the predator and overall predation risk." (Authors)] Address: Roberts, D., Biology Dept, Sultan Qaboos Univ., PO Box 36, Al-Khod 123, Oman. E-mail: derekmr@squ.edu.om

**14574.** Rodriguez, J.S.; Molineri, C. (2014): Description of the final instar larva of *Rhionaeschna vigintipunctata* (Ris, 1918) (Odonata: Aeshnidae). *Zootaxa* 3884(3): 267-274. (in English, with Spanish summary) ["The final instar larva of *Rhionaeschna vigintipunctata* (Ris) (Odonata, Aeshnidae) is described for the first time. The description is based on a series of mature female larvae collected in Tucumán (NW Argentina) and reared to imago. It shares the U-shaped distal excision of epiproct with other larvae of the *Marmaraeschna* group (only *R. pallipes* and *R. brevicercia* known from this stage); but the minute tubercle at each side of the cleft of ligula is absent. Other characters unique to *R. vigintipunctata* include: open ligula (vs. closed in other "*Marmaraeschna*"), and mandibular formula. A table to distinguish the larvae of the three species

of "Marmaraeschna" and biological and distributional data of *R. vigintipunctata* are included." (Authors)] Address: Rodríguez, J.S., Instituto de Biodiversidad Neotropical, CONICET (Argentine Council of Scientific Research), Facultad de Ciencias Naturales e IML, Universidad Nacional de Tucumán, M. Lillo 205, 4000, San Miguel de Tucumán, Argentina. E-mail: josephum@hotmail.com

**14575.** Roland, H.-J.; Stübing, S. (2014): *Sympetrum meridionale* in Deutschland – langfristige Bestandsentwicklung und aktuelle Vorkommen (Odonata: Libellulidae). *Libellula* 33(1/2): 75-98. (in German, with English summary) ["Long-term development and current occurrence of *Sympetrum meridionale* in Germany (Odonata: Libellulidae) – Based on ca 700 field records and data from the literature, the occurrence and distribution of *Sympetrum meridionale* in Germany is compiled and analyzed over four periods between 1890 and 2013. While the species was only sporadically and locally recorded until the turn of the millennium, it clearly dispersed to east and north thereafter. Up to 2013 it was found in all federal states of Germany except Schleswig-Holstein and the city states Bremen and Berlin. In 7 of 13 federal states the species was only observed from 2006 onwards. Presumably the species dispersed northwards along the Rhine valley and immigrated from France, Belgium and the Netherlands to North Rhine-Westphalia. For records in eastern Germany, there are no distinct explanations so far. Both, immigration from Hungary and also from the west seems possible. As invasions in single years could not be ascertained, slow dispersal in Germany with temporary reproduction seems more likely. Perennial colonization was only found in a few regions. Presumably, this dispersal cannot only be explained by improved identification methods and increased attention to this species. For reproduction *S. meridionale* needs shallow water bodies with low water-level for oviposition and flooding during the subsequent months until emergence in the following year. Despite creation of numerous ponds as a result of conservation measures, shallow water bodies with periodically oscillating water levels are still rare, but increasing in number. The continuous high number of annual summer days since the year 2000 may support the dispersal trend." (Authors)] Address: Roland, H.-J., Im Mühlahl 35, 61203 Reichelsheim, Germany. E-mail: hjroland@gmx.de

**14576.** Roland, H.-J.; Hein, A.T.; Martens, A.; Wildermuth, H. (2014): *Sympetrum meridionale* mit Milbenbefall an den Flügeln: Analyse der Funde im Jahr 2013 in Deutschland (Acari: Hydrachnidia; Odonata: Libellulidae). *Libellula* 33(1/2): 99-108. (in German, with English summary) ["Water mites on the wings of *Sympetrum meridionale*: an analysis of the 2013 records in Germany (Acari: Hydrachnidia; Odonata: Libellulidae) – During an extensive survey of *Sympetrum meridionale* in Germany parasitism of this species by the water mite *Arrenurus papillator* was recorded on the basis of photographic documents. The localities of parasitised dragonfly imagines were distributed north to Lower Saxony and Brandenburg and included all federal states with records of *S. meridionale*. Most records

originated from Hesse and Rhineland-Palatinate, both states featured the greatest density of locations and highest number of individuals per locality. A total of 29 parasitised dragonflies were found, 28 thereof bore 1-4 mites on the wings, thus the rate of parasitism and parasite load were low. In addition and for the first time recorded, on one young male at least two mite larvae were attached on the ventral side of the thorax. As *S. meridionale* emerged in 2013 at several German localities the mites presumably originated from there." (Authors)] Address: Roland, H.-J., Im Mühlahl 35, 61203 Reichelsheim, Germany. E-mail: hjroland@gmx.de

**14577.** Rosset, V.; Angélibert, S.; Arthaud, F.; Bornette, G.; Robin, J.; Wezel, A.; Vallod, D.; Oertli, B. (2014): Is eutrophication really a major impairment for small waterbody biodiversity? *Journal of Applied Ecology* 51(2): 415-425. (in English) [Switzerland; "(1) Eutrophication remains a major stress for freshwater biodiversity. Its deleterious consequences on biodiversity are well-documented for large waterbodies. However, the impact of eutrophication may differ in smaller waterbodies, such as ponds and small lakes, which generally support naturally high levels of nutrients in lowlands. Furthermore, this response could depend on the scale considered, from local (individual waterbody, alpha diversity) to regional (the network of waterbodies, gamma diversity). It is also unclear if the richness of threatened species responds in the same way as the richness of the whole assemblage. (2) The present study investigates local- and regional-scale consequences of eutrophication on taxonomic richness (all taxa) and conservation value (threatened taxa) in temperate lowland small waterbodies. Five taxonomic groups were investigated: macrophytes, gastropods, water beetles, adult dragonflies and amphibians, in a set of natural waterbodies and a set of enriched waterbodies covering a large nutrient gradient from mesotrophic to hypertrophic conditions. (3) Globally, our study did not reveal consistent, systematic responses to eutrophication. For macrophytes, the richness and conservation value suffered from eutrophication at both local and regional scales. In contrast, for amphibians and gastropods, eutrophication did not impair biodiversity at the local nor the regional scale. Dragonflies and water beetles showed intermediate situations, with an impairment by eutrophication varying according to the type of waterbodies considered. At the regional scale, each trophic status, even the nutrient-richest, brought an original contribution to biodiversity. (4) Synthesis and applications. The management of eutrophication for small lowland waterbodies has to be considered differently than for lakes. For an individual waterbody (the local scale), nutrient enrichment is not necessarily a major impairment and its impact depends on the taxonomic group considered. Conversely, at the landscape scale, eutrophication is a major pressure on small waterbody biodiversity, especially because nutrient-rich small waterbodies are dominant in the landscape. Therefore, conservation efforts should integrate the notion of pond regional networks or "pondscapes", where the regional biodiversity is supported by a mosaic of trophic conditions, and promote the presence of less-rich



waterbodies." (Authors)] Address: Rosset, Veronique, Univ. of Applied Sciences Western Switzerland, hepia Geneva Technology, Architecture & Landscape, Jussy, Geneva, Switzerland. E-mails: veronique@rosset.org

**14578.** Saha, P.D.; Gaikwad, S.M. (2014): Diversity and abundance of Odonata in parks and gardens of Pune city. *Journal of Entomology and Zoology Studies* 2(5): 308-316. (in English) [Poona(h), Maharashtra, India. "Man-made Parks and gardens play a vital role in maintaining urban insect diversity besides controlling pollution. The objective of this study was to find out the diversity and abundance of Odonates and to evaluate the importance of human-managed urban parks and gardens in supporting Odonata diversity. Thirty big and small parks and gardens of Pune city were surveyed during 2012-2013 at regular intervals to record the diversity of Odonates. A total of 1113 individuals were recorded comprising of 33 species under 6 families. The diversity and abundance of species depends on a number of factors like presence or absence of water bodies, size of the water bodies, level of human disturbances, shade cover, presence of emergent aquatic reeds, degree of pollution and garden management practice." (Authors)] Address: Saha, P.D., Zoological Survey of India, Western Regional Centre, Vidya Nagar, Akurdi, Pune-411044 (Maharashtra), India

**14579.** Sajan, S.K.; Patel, J.R.; Bakshi, M.K.; Singh, A.K.; Kazmi, S.E.H.; Mishra, A.K.; Anand, P. (2014): Diversity and abundance of Odonata in Palamau Tiger Reserve, Jharkhand, India. *Advances in Applied Science Research* 5(6): 126-131. (in English) ["The Odonata survey on diversity and abundance of Palamau Tiger Reserve was carried out for the first time to give a preliminary checklist of species within the reserve. Total 30 species of Odonata were recorded at seven different ranges of which 20 species from Anisoptera and 10 species from Zygoptera. 54% species was recorded from Libellulidae family (16) followed by 13% Coenagrionidae (4), 10% from Calopterygidae (3), 7% from both Gomphidae and Aeshnidae and 9% from others families respectively. The Shannon index shows that Kutku and Baresanar ranges have maximum diversity, whereas Chhipadohar West and Betla having least diverse area. Jaccard index indicate the similarities between Baresanar and Kutku, Betla and Chhipadohar East, Garu East and Garu West respectively. Earlier 17 species recorded from this region by Zoological Survey of India. Out of four species *Rhyothemis flavescens*, *Trithemis pallidinervis*, *Potamarcha congener* and *Lestes viridula* have been not sighted this time. Current survey deals with 13 new record for this reserve." (Authors)] Address: Sajan, S.K., Wild India, Behind Junior DAV School, Gandhi Nagar, Kanke Road, Ranchi, Jharkhand, India

**14580.** Sathe, T.V.; Shinde, K. (2014): Biodiversity, abundance and prey status of odonates from paddy ecosystems of Kolhapur district, India. *Agriculture* 4(9): 4-6. (in English) ["In Kolhapur region paddy is widely cultivated. However, expected yield of the crop has not achieved so

far because of damage caused by insect pests to the crops. Odonata are predatory insects and good biocontrol agents of paddy insect pests and mosquitoes. Therefore, biodiversity, abundance and prey status of Odonata have been studied in paddy ecosystem of Kolhapur. A total of 36 species of odonates have been reported from paddy ecosystem." (Authors)] Address: Sathe, T.V., Department of Zoology, Shivaji University, Kolhapur 416 004, India

**14581.** Schmidt, E. (2014): Später Fund der Südlichen Heidelibelle *Sympetrum meridionale* (Selys, 1841) im Münsterland (20.11.2013) (Odonata, Libellulidae). *Entomologische Nachrichten und Berichte* 58(1/2): 81-82. (in German) [Streckteich, Teichgut Hausdülmen, Dülmen, Westmünsterland, Nordrhein-Westfalen, Germany; 20-XI-2013] Address: Schmidt, E., Coesfelder Str. 230, D-48249 Dülmen, Germany

**14582.** Seehausen, M.; Schardt, L. (2014): A small saline spring-fed pond as habitat for *Aeshna cyanea* and *Pyrrhosoma nymphula* (Odonata: Aeshnidae, Coenagrionidae). *Notul. Odonat.* 8(4): 101-104. (in English) ["Reproduction of *Aeshna cyanea* and *Pyrrhosoma nymphula* in a small saline spring-fed pond near the village Eltville (Hessen, Germany; 50.056971N, 08.084431E) is documented. The maximum conductivity within larval habitat was 12,400  $\mu\text{S}/\text{cm}$  [25°C] and the salinity was 7.8 PSU. These and other values such as chloride, sodium, potassium and calcium are considerably higher than in habitats previously reported for these two species." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Friedrich-Ebert-Allee 2, 65185 Wiesbaden. E-mail: malte.seehausen@museum-wiesbaden.de

**14583.** Shiffer, C.N.; White, H.B. (2014): Dragonfly and damselfly colonization and recolonization of a large, semi-permanent Pennsylvania pond. *Northeastern Naturalist* 21(4): 630-651. (in English) ["Odonata at Ten Acre Pond in central Pennsylvania have been monitored on a yearly, monthly, and often weekly basis for over half a century, making the Odonata fauna of the pond the most thoroughly documented of any habitat in the United States. Here we summarize the yearly and seasonal distribution of all species reported from 1955 through 2011. Of the 938 Odonata surveys at this semi-permanent pond, 60% are since 1994 when observations were last summarized. Of the 86 species observed at least once, 14 appeared since 1994. Several species that were rare or absent before 1980 have established transient populations, and a few with southern affinities have become well established. The pond's water levels often fluctuate dramatically from year to year and through the year. For populations of "resident" species, recolonization from other local populations occurs efficiently after periods of drought." (Authors)] Address: White, H.B., Dept of Chemistry & Biochemistry, Univ. of Delaware, Newark, DE 19716, USA. E-mail: halwhite@udel.edu

**14584.** Soniyagandhi, M.; Kumar, K. (2014): Impact of ag-

rochemicals on Odonata in rice (*Oryza sativa* L.) ecosystem. *JBiopest* 7(1): 52-56. (in English) ["Two supervised field experiments were conducted during kharif, 2012 and rabi, 2012-13 to study the impact of agrochemicals on the population of Odonata in rice at Pandit Jawaharlal Nehru College of Agriculture and Research Institute (PAJANCOA & RI), Karaikal, U.T. of Puduchery, India. The experiment was laid out in a randomized block design with eight treatments and three replications. It includes sole application of herbicide (Butachlor @ 2.5 litres/ha), fertilizers (NPK applied @ 50% N + 10% P + 10% K), insecticide (Chlorpyrifos @ 0.02 per cent seedling dip and foliar spray @ 1250 ml/ha), herbicide + fertilizer, herbicide + insecticide, fertilizer + insecticide, herbicide + fertilizer + insecticide and untreated check. In this experiment eight species of Odonata viz., *Agriocnemis pygmaea*, *Ceriatagrion coromandelianum*, *Ischnura aurora*, *Lestes elatus*, *Diplacodes trivialis*, *Orthetrum sabina*, *Pantala flavescens* and *Rhyothemis variegata* were identified during the crop growth period. The population of Odonata was recorded from 1st week to 12th week after transplanting. During kharif, the overall mean population of Odonata ranged from 0.19 to 0.65 /sweeping. It was found that the per cent reduction was higher in the treatment with herbicide + insecticide (70.7%) compared to the untreated check. During rabi, the overall mean population of Odonata ranged from 0.19 to 0.56/sweeping. A higher per cent reduction was observed in the treatment with herbicide + insecticide (6.07%) as in the kharif. It was concluded from both field experiments a higher population of Odonata was observed in the untreated check followed by the treatment with fertilizer alone while a low population was observed in the herbicide + insecticide treatment followed by insecticide alone." (Authors)] Address: Kumar, K., Department of Agricultural Entomology and Nematology, Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal-609 603. U. T. of Puduchery, India. E-mail: kumarkaliaperumal@yahoo.co.in

**14585.** Stille, M.; Stille, B.; Schröter, A. (2014): *Lindenia tetrphylla* – new for the island of Kérkira (Corfu), Greece (Odonata: Gomphidae). *Notulae odonatologicae* 8(4): 86-90. (in English) ["*L. tetrphylla* is reported from Kérkira (Corfu), Greece, for the first time on the basis of photographic records. On the 28-vi-2014 five adult males were found by the shore of an artificial water reservoir. Given the known habitat preferences of *L. tetrphylla* and the ecological conditions of the reservoir it is supposed that the species may be indigenous on the island." (Authors)] Address: Stille, Marie, Kokkini, Kefalovrisso 1410, 49100 Corfu, Greece. E-mail: stille.corfu@gmail.com

**14586.** Svitra, G.; Gliwa, B. (2014): Data on 23 rare species of dragonflies (Odonata) recorded in Lithuania in 2009–2014. New and rare for Lithuania insect species records and descriptions 26: 5-18. (in English) ["This article presents new data on 23 species of dragonflies registered in 33 administrative districts and municipalities of Lithuania in 2009–2014. Six species (*Leucorrhinia albifrons*, *L.*

*caudalis*, *L. pectoralis*, *Ophiogomphus cecilia*, *Aeshna viridis*, *Sympetma paedisca*) are protected in the European Union according to the Habitats Directive. .. Additionally, the following species are protected in Lithuania: *Coenagrion johanssoni*, *Ischnura pumilio*, *Nehalennia speciosa*, *Anax parthenope*, *Aeshna crenata*, *Gomphus flavipes*, *Cordulegaster boltonii*, *Sympetrum pedemontanum*. The other species we report on are either very rare or in some cases appeared in Lithuania only recently due to changes in their distribution area. Data on distribution of rare and endangered dragonfly species are crucial for protection of their habitats." (Authors)] Address: Lithuanian Entomological Society, Akademijos 2, LT-08412 Vilnius, Lithuania. E-mails: giedsvis@gmail.com, berndgliwa@yahoo.de.

**14587.** Swaegers, J.; Janssens, S.B.; Ferreira, S.; Watts, P.C.; Mergeay, J.; McPeck, M.A.; Stoks, R. (2014): Ecological and evolutionary drivers of range size in *Coenagrion* damselflies. *Journal of evolutionary biology* 27(11): 2386-2395. (in English) ["Geographic range size is a key ecological and evolutionary characteristic of a species, yet the causal basis of variation in range size among species remains largely unresolved. One major reason for this is that several ecological and evolutionary traits may jointly shape species' differences in range size. We here present an integrated study of the contribution of ecological (dispersal capacity, body size and latitudinal position) and macroevolutionary (species' age) traits in shaping variation in species' range size in *Coenagrion* damselflies. We reconstructed the phylogenetic tree of this genus to account for evolutionary history when assessing the contribution of the ecological traits and to evaluate the role of the macroevolutionary trait (species' age). The genus invaded the Nearctic twice independently from the Palearctic, yet this was not associated with the evolution of larger range sizes or dispersal capacity. Body size and species' age did not explain variation in range size. There is higher flight ability (as measured by wing aspect ratio) at higher latitudes. Species with a larger wing aspect ratio had a larger range size, also after correcting for phylogeny, suggesting a role for dispersal capacity in shaping the species' ranges. More northern species had a larger species' range, consistent with Rapoport's rule, possibly related to niche width. Our results underscore the importance of integrating macroecology and macroevolution when explaining range size variation among species." (Authors)] *Coenagrion angulatum* (Canada), *C. armatum* (Russia), *C. caerulescens* (Morocco, Spain), *C. glaciale* (Russia), *C. hastulatum* (Italy, Sweden), *C. hylas* (Russia), *C. interrogatum* (Alaska, Canada), *C. johanssoni* (Finland, Russia), *C. lanceolatum* (Russia), *C. lunulatum* (Sweden, Russia), *C. mercuriale* (Italy, Spain), *C. ornatum* (Slovenia), *C. puella* (Croatia, Spain), *C. pulchellum* (Bosnia, Macedonia, Russia), *C. resolutum* (Alaska, Canada), *C. scitulum* (Italy, Morocco, Portugal, Spain), *Ischnura elegans*, *Paracercion melanotum* and *Enallagma cyathigerum*] Address: Swaegers, J., Deberiotstraat 32, 3000 Leuven, Belgium. E-mail: Janne.Swaegers@bio.kuleuven.be

- 14588.** Takashima, K.; Nakamura, K. (2014): Geographical variation in egg diapause in *Sympetrum frequens*. *International Journal of Odonatology* 17(2-3): 81-87. (in English) ["The effects of photoperiod and temperature on the termination of egg diapause were examined in *Sympetrum frequens*. Eggs were obtained from adult females collected from three locations in Japan and incubated under short- or long-day photoperiods at a constant temperature of 25, 20, or 15°C. Egg diapause was eventually terminated in all treatments. Because differences in the average developmental time were small among the temperature treatments, it was concluded that the rate of diapause development is more rapid at lower temperatures, as in other Odonata species. A clear geographic trend was not found in the egg period, which may reflect the life cycle of *S. frequens*: the timing of reproduction is the same or even earlier in higher than in lower latitudes. Relatively large variations in embryonic period were found among populations and even within a population at 15°C, suggesting that the rate of diapause development is also variable. The results also suggested that a short photoperiod might prevent *S. frequens* eggs from hatching before the onset of winter." (Authors)] Address: Nakamura, K., Department of Biosphere-Geosphere Science, Faculty of Biosphere-Geosphere Science, Okayama University of Science, Okayama 700-0005, Japan
- 14589.** Tamm, J. (2014): Libellenfunde im späten Frühjahr auf Zypern (Odonata). *Libellula* 33(3/4): 177-188. (in German, with English summary) ["Late spring observations of Odonata from Cyprus – From 3 to 17 May 2013, 18 Odonata species were recorded in southwestern Cyprus. The record of *Anax immaculifrons* is of special interest. Observations on habitat choice, diurnal activities, and other behavioural patterns of several species are noted." (Author)] Address: Tamm, J., Elgershäuser Straße 12, 34131 Kassel, Germany. E-mail: jochen.tamm@t-online.de
- 14590.** Tanahashi, M.; Futahashi, R. (2014): The first record of *Ischnura senegalensis* from Akusekijima Island, Tokara Islands. *Aeschna* 50: 135-136. (in Japanese, with English summary) [Japan, 3. VIII. 2013.] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp
- 14591.** Tarng, W.; Lu, N.-Y.; Shih, Y.-S.; Liou, H.-H. (2014): Design of a virtual ecological pond for motion-sensing game-based learning. *International Journal of Computer Science & Information Technology (IJCSIT)* 6(2): 21-39. (in English) ["The campus ecological pond is an effective tool to assist science teaching since it allows students to obtain knowledge of aquatic biology in freshwater environments by practical observation. In this study, a virtual campus ecological pond was developed for applications in science education in elementary schools. The system integrates real ecological situations of aquatic environments into learning activities to enhance the learning interest and motivation of students. They can observe the features of aquatic plants and aquatic animals (including dragonflies) on mobile devices and understand the relation between food chain and ecological balance in aquatic ecosystems by role playing and game missions. The virtual ecological pond can save the cost and manpower needed for building and maintaining a real ecological pond, and it can also solve the problems of insufficient species and difficulty to observe under water. Thus, it is a useful assistant tool for teaching aquatic ecology in elementary schools." (Authors)] Address: Tarng, W., Graduate Institute of e-Learning Technology, National Hsinchu University of Education, Taiwan
- 14592.** Theischinger, G.; Richards, S.J. (2014): A new species of *Lanthanusa* Ris from north-eastern Papua New Guinea (Odonata: Libellulidae). *International Journal of Odonatology* 17(2-3): 127-133. (in English) ["A new species (*Lanthanusa cochlear* nov. spec.) of the endemic New Guinean genus *Lanthanusa* is described from the Trauna River Valley in Western Highlands Province, Papua New Guinea. Characters of the male are illustrated and affinities of the new species are discussed. Some characters of the type species of *Lanthanusa*, *L. cyclopica*, are reassessed and a revised key to the genus is presented." (Authors)] Address: Theischinger, G., Water Science, Office of Environment and Heritage, NSW, Dept of Planning & Environment, PO Box 29, Lidcombe, NSW 1825, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au
- 14593.** Theischinger, G.; Richards, S.J. (2014): The species of *Microtrigonia* Förster (Anisoptera, Libellulidae). *International Dragonfly Fund - Report 76*: 1-12. (in English) ["Several errors and misinterpretations in available keys, diagnoses and descriptions of species in the libellulid genus *Microtrigonia* Förster are corrected. *M. marsupialis* Förster is known only from the holotype male, *M. petaurina* Lieftinck only from the holotype female, and the only species for which both sexes are known is *M. gomphoides* Lieftinck. A species recently collected in Papua New Guinea, *Microtrigonia curvata* sp. nov. (Holotype male from Yukfon Creek, Hindenburg Range), is described, illustrated and discussed." (Authors)] Address: Theischinger, G., NSW Dept of Planning and Environment, Office of Environment and Heritage, PO Box 29, Lidcombe NSW 1825 Australia. E-mail: gunther.theischinger@environment.nsw.gov.au
- 14594.** Theunert, R. (2014): Buchbesprechung: Wildermuth, H. & Martens, A. (2014): Taschenlexikon der Libellen Europas. Alle Arten von den Azoren bis zum Ural im Porträt. Verlag Quelle & Meyer. Wiebelsheim. 824 S. ISBN 978-3-494-01558-3. 69: (in German) [review] Address: not stated
- 14595.** Tyagi, B.K. (2014): Extended distribution and variation in morphological features of *Disparoneura* (*Chloroneura*) *quadrimaculata* (Rambur, 1842) (Odonata: Zygoptera; Protoneuridae) in the Mt. Abu ranges of Southern Rajasthan, India. *Halteres* 5: 69-72. (in English) ["*D. quadrimaculata*, earlier documented to be endemically present in



the mountain ranges of the Western Ghats in southwestern states and the Satpura mountain ranges in Central India, has recently been recorded for the first time near the Nakki Lake in Mount Abu (Alt. 1220 m m.s.l.) range of the Aravalli Hills in south-western Rajasthan, India." (Author)] Address: Tyagi, B.K., Centre for Research in Medical Entomology (ICMR), 4-Sarojini Street, Chinna Chokkikulam, Madurai 625002, T.N., India. E-mail: abktyagi@gmail.com

**14596.** Ulikowski, D.; Piotrowska, I.; Chybowski, L.; Krzywosz, T.; Traczuk, P. (2014): Interaction between juvenile narrow-claw crayfish, *Astacus leptodactylus* (Eschscholtz), and common water frog, *Rana esculenta* (L.), tadpoles or common blue damselfly, *Enallagma cyathigerum* (Charpentier), larvae during rearing under controlled conditions. *Arch. Pol. Fish.* 22: 257-264. (in English) ["Interactions were studied among juvenile *A. leptodactylus*, *R. esculenta* tadpoles and *E. cyathigerum*, larvae during rearing under controlled conditions. Interactions among the species studied had a positive impact on the survival of the crayfish, but the differences were not statistically significant (P 0.5). The juvenile crayfish attacked and consumed the frog tadpoles and damselflies, but the juvenile crayfish very rarely fell prey to them. Only in the initial stage of life and during molting did larval damselflies prey upon juvenile crayfish. After 30 days of the experiment the interaction between crayfish-tadpoles and crayfish-larval damselflies was not noted to have had a statistically significant (P 0.05) impact on crayfish growth. Juvenile crayfish aggression toward tadpoles and larval damselflies was often offset by the loss of even both chelipeds. In the crayfish-larval damselfly interaction the loss of both chelipeds was three-fold more common than it was in the crayfish-tadpole interaction; however, these differences were not statistically significant (P 0.5). The effect of intraspecific interaction (crayfish-crayfish) was more a threat in terms of mortality from cannibalism than were interspecific interactions (crayfish-tadpole and crayfish-larval damselfly)." (Authors)] Address: Ulikowski, D., Department of Lake Fisheries, Inland Fisheries Institute in Olsztyn, Poland, ul. Rajska 2, 11-500 Gizycko, Poland. E-mail: ulikowski@infish.com.pl

**14597.** Varshini, R.A.; Kanagappan, M. (2014): Effect of quantity of water on the feeding efficiency of dragonfly nymph - *Bradinopyga geminata* (Rambur). *Journal of Entomology and Zoology Studies* 2(6): 249-252. (in English) ["Vector-borne diseases such as malaria, filariasis, Japanese encephalitis, dengue and many other arboviral diseases are emerging and resurging as serious public health problems. Chemical pesticides and insecticides failed to give sustained control. Among various predators of mosquito larvae, dragonfly nymphs are efficient, found naturally, safe for human beings, and are also economical in their application. Many factors that affect the feeding efficiency of dragonfly nymphs were studied in the present experiment and one among them was the quantity of water, which negatively correlated (-0.96304) with the feed-

ing efficiency of odonate larvae *B. geminata*. The maximum prey consumption 33.37 was recorded when the quantity of water was 100 ml and minimum predation 12.33 was recorded when it was 500 ml." (Authors)] Address: Kanagappan, M., Department of Zoology and Research Centre, Scott Christian College (Autonomous), Nagercoil, 629003, India

**14598.** Villanueva, R.J.T.; Cahilog, H. (2014): Odonata Fauna of Balut and Sarangani islands, Davao Occidental Province, Philippines. *International Dragonfly Fund - Report 66: 1-23.* (in English) ["Balut and Sarangani islands are two small landmasses situated off the coast of Davao Occidental, Mindanao Island. Despite recent increase on odonatological data from various islands in the Philippines, these two remote islands have never been explored. Hence, a short survey was conducted on first week of April and November 7 - November 14, 2010 on all freshwater systems in these two islands. Twenty-five species under seven families and 21 genera were found representing the first Odonata record for the two islands." (Authors)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**14599.** Wang, J.Z.; Melfi, J.; Leonardo, A. (2014): How do dragonflies recover from falling upside down?. *Bulletin of the American Physical Society, 67th Annual Meeting of the APS Division of Fluid Dynamics, Volume 59, Number 20, Sunday-Tuesday, November 23-25, 2014; San Francisco, California: 1 p.* (in English) [Verbatim: We release dragonflies from a magnetic tether so that they fall from an initially upside down orientation. To recover, the dragonflies roll their body 180 degrees every time. This set up offers an effective method for eliciting a stereotypical turn so that we can collect a large amount of data on the same turn. From the wing and body kinematics, we can tease out the strategy dragonflies use to roll their body. We record these flights with three zoomed in high-speed video cameras. By filming at 4000 to 8000fps, we measure the wing twist along each of the four wings as a part of the 3D wing kinematics. The shape of the wing twist depends on the interaction between the aerodynamic torque and the torque exerted by muscles, therefore providing clues on which of their four wings actively participate in creating the turn. By applying dynamic calculations to the measured kinematics, we further deduce the amount of torques dragonflies exert in order to turn.] Address: Wang, Z. Jane, Theoretical and Applied Mechanics, Cornell University, Ithaca, New York 14853, USA. E-mail: z.jane.wang@cornell.edu

**14600.** Wang, X.; Zhang, Z.; Li, Q.; Wang, Q.; Yan, X. (2014): An information acquisition method based on dragonfly vision mechanism for observed target displacement measurement. *Sensor Letters* 12(2): 352-357. (in English) ["In recent years, river surface optical imaging velocimetry method has been developed as a feasible means for non-

contact river flow measurement during extreme flow conditions. However, due to the complex and variable physical and chemical properties of observed targets (i.e., flow tracers), and the various light disturbances, this kind of method is difficult to acquire the optical information of the observed targets precisely, which will induce failure in the following reconstruction of flow field as well as the river discharge measurement. To solve these problems, this paper presents a novel information acquisition method for observed target displacement measurement, which is inspired by dragonfly vision mechanism. It first designs a three-channel CMOS synchronous polarization imaging system to capture the polarization images of the river surface in three directions synchronously. Then, Stokes vectors are selected to compute the polarization degree image. Experimental results show that this method can improve the acquisition accuracy of the observed targets and provide a solid basis for the large-scale particle image velocimetry system." (Authors)] Address: Wang, X., College of Computer & Information, Hohai University, Nanjing, China

**14601.** Ware, J.L.; Beatty, C.D.; Sánchez Herrera, M.; Valley, S.; Johnson, J.; Kerst, C.; May, M.L.; Theischinger, G. (2014): The petaltail dragonflies (Odonata: Petaluridae): Mesozoic habitat specialists that survive to the modern day. *Journal of Biogeography* 41(7): 1291-1300. (in English) ["Dragonflies are an ancient group of organisms, appearing in the fossil record for the last 325 million years; however, individual dragonfly species—like other arthropod species—are thought to persist only for ~10 million years. Here we report results suggesting that the species of one family—Petaluridae—are very much older. The eleven extant petalurids are found in Australia, New Zealand, Chile, Japan and North America. Through a Bayesian molecular phylogeny and BEAST relaxed molecular clock, we show that the petalurids originated ~160 million years ago, and that many of these species have persisted as independent lineages for ~70 million years. Analysis with LaGrange suggests that these species distributed along the coast of the supercontinent Pangaea, arriving at their current locations through continental drift. These long species 'lifespans' are surprising, especially for a group of habitat specialists with long development times (petalurid larvae live exclusively in fen habitats, and take several years to reach adulthood). As such these dragonflies challenge our understanding of the factors that drive extinction." (Authors)] Address: Ware, Jessica, Department of Biology, 415 Boyden Hall, Rutgers University, Newark, NJ, 07102, USA. E-mail: jware42@andromeda.rutgers

**14602.** Willet, J. (2014): Site condition monitoring for Odonata on seven SSSIs. Scottish Natural Heritage Commissioned Report No. 753: 57 pp. (in English) ["Background: This contract was to carry out Site Condition Monitoring (SCM) of Odonata assemblages at seven designated sites in Scotland. Abernethy SSSI had an additional survey as part of another contract for the northern damselfly, *Coenagrion hastulatum*, which is another notified feature; the results from both surveys have been included

in this report. This contract repeated the various SCM undertaken for Odonata on these sites in 2002, 2003 and 2005. Main findings: - Abernethy: four visits, 11 species recorded, proof of breeding for 10. - Coille Dalavil: two visits, 10 species recorded, proof of breeding for six. - Coille Mhor: two visits, eight species recorded, proof of breeding for four. - Coulin: two visits, 10 species recorded, proof of breeding for seven. - Glen Affric: three visits, 12 species recorded, proof of breeding for 10. - Loch Bran: two visits, nine species recorded, proof of breeding for seven. - Loch Maree: two visits, 11 species recorded, all breeding. - All sites are in favourable-maintained condition." (Author)] Address: Tonhasca, Athayde, Scottish Natural Heritage, Redgorton, PERTH, PH1 3EW, UK. E-mail: athayde.tonhasca@snh.gov.uk

**14603.** Willigalla, C.; Jäckel, K.; Ackermann, J.; Koch, K. (2014): Veränderung der Libellenfauna (Odonata) der Stadt Mainz. *Mainzer naturwissenschaftliches Archiv* 51: 289-307. (in German, with English summary) ["From 2008 to 2013 the monitoring of dragon- and damselflies continued at 13 selected water sites within the urban area of Mainz. In total 44 species could be found, that is 66 % of the 67 species which currently exist in Rhineland-Palatinate. *Chalcolestes viridis*, *Coenagrion puella* and *Sympetrum striolatum* had a high consistency of 90 % within the study area, *S. sanguineum* even of 100 %. Compared to the study during the previous period from 2006 and 2007 the fauna of odonates in the urban area of Mainz enriched by four new species: *Coenagrion scitulum*, *Erythromma lindenii*, *Lestes virens* and *Brachytron pratense*. Moreover, some guests have been observed, namely *E. najas*, *Anax parthenope* and *Leucorrhinia pectoralis*. However, *Orthetrum brunneum* and *Ophiogomphus cecilia* were not sighted in the period of time from 2008 to 2013. The increase in the number of species in Mainz might probably be explained with the current climate-induced range shifts taking place in the dragonfly fauna. It is remarkable, however, that both higher species richness and higher consistencies could be found, despite the lower number of water bodies studied. In cases of good area knowledge it might thus be enough to monitor only selected reference waters to determine early population fluctuations." (Authors)] Address: Willigalla, C., Willigalla – Ökologische Gutachten, Am großen Sand 22, 55124 Mainz, Germany. E-mail: christoph@willigalla.de

**14604.** Yan, J.-Z.; Zheng, M.Z.; Li, Z.P.; Li, Q.S. (2014): Chapter 3: Mechatronics, Robotics and Control: Effects of Phase Relation between Forewing and Hindwing on Aerodynamic Performance in Dragonfly Flight. *Applied Mechanics and Materials* 709: 245-251. (in English) ["Dragonflies possess one of the most maneuverable flights among various insects. As the bionic Micro Air vehicles (MAVs) with the flight capabilities like dragonflies have been widely applied, detailed studies of dragonfly flight become critical and necessary for improvement and accomplishment of MAVs design. The phase relation between the forewings and hindwings is the most distinct feature of

dragonfly flight and it plays an important role in the aerodynamic performance. In this paper, both tethered and quasi-free flapping flight of the dragonfly *Pantala flavescens* was filmed using a high-speed camera in indoor laboratory. Dragonflies tend to flap in-phase when an additional force is expected, while out-of-phase flapping is conducive to the stability and control of flight. In the takeoff maneuver, the large- and small-amplitude wingbeat alternated. Dragonflies obtain a high acceleration rapidly by the suddenly enlarged wingbeat amplitude which increases by 42%, and maintain the velocity and make ready for following acceleration by the small-amplitude but high-frequency wingbeat with amplitude decreases by 51% and frequency increases by 30% relatively." (Authors)] Address: Yan, J.-Z., National Key Laboratory of Science & Technology on Aero-Engine Aero-thermodynamics, Collaborative Innovation Center of Advanced Aero-Engine. School of Energy & Power Engineering, Beihang University, Beijing, China. E-mail: ayjz8993@sina.com

**14605.** Yoshioka, A.; Miyazaki, Y.; Sekizaki, Y.; Suda, S.; Kadoya, T.; Washitani, I. (2014): A "lost biodiversity" approach to revealing major anthropogenic threats to regional freshwater ecosystems. *Ecological Indicators* 36: 348-355. (in English) ["We proposed a method for evaluating the quantitative contributions of hypothesized focal pressures to biodiversity loss from freshwater ecosystems at regional or local scales. The method, called the "lost biodiversity approach" (abbreviated as "LBA") focuses on local biodiversity losses caused by focal pressures. Lost biodiversity is explicitly estimated by statistically modelling the relationships between factors or focal pressures and "differential biodiversity," defined as the difference between local biodiversity at a sampled site and regional species pool(s). We applied LBA to two cases in Japan: (1) the damselfly fauna of 56 agricultural ponds in a rural region sharing the same regional species pool and (2) freshwater fish fauna in the 13 largest river systems in Hokkaido, which includes multiple species pools. In the former, where nestedness of sampled damselfly assemblages was detected, and thus the difference between local species richness and species pool size was used as a simple indicator of differential biodiversity, biodiversity lost to invasive alien species was successfully quantified. In the latter case, where no nestedness of fish assemblages was detected, and differential biodiversity was analyzed based on an index weighting rare species, biodiversity lost to dams and eutrophication were quantified. The advantages of LBA supported by the case studies were its (1) feasibility, using species snapshot presence-absence data, (2) ability to quantify a baseline for each local community when focal pressures were removed, and (3) ability to evaluate impacts of focal pressures even if each local community belonged to a different species pool. This method will be effective in biodiversity hotspot areas." (Authors)] Address: Akira Yoshioka, A., Graduate School of Agricultural and Life-Sciences, The University of Tokyo, 1-1-1 Yayoi, Bunkyo-ku, Tokyo 113-8657, Japan. E-mail: ayoshioka@08.alumni.u-tokyo.ac.jp

**14606.** Yu, X.; Bu, W. (2014): Notes on the retractability of gill tufts in *Pseudolestes mirabilis* (Zygoptera: Pseudolestidae). *International Journal of Odonatology* 17(2/3): 123-126. (in English) ["A detailed observation of living larva of *P. mirabilis* was conducted, with a focus on the gill tufts, which were confirmed to be retractable. Photographs of the larva in life and video records are provided to demonstrate this finding." (Authors)] Address: Bu, W.j., College of Life Sciences, Nankai University, Tianjin, China. E-mail: wenjunbu@nankai.edu.cn

**14607.** Zamorova, M.A.; Zamorov, V.V. (2014): Feeding of common bream *Abramis brama* in the Danube Lakes Yalpug and Kugurluy. *The Journal of V.N.Karazin Kharkiv National University. Series: biology* 20(1100): 138-145. (in Ukrainian, with Russian and English summaries) [In the Danube lakes Yalpug and Kugurluy (Ukraine), organisms from 26 taxa have been found in the diet of *A. brama*. With reference to the weight of diet, larvae of Chironomidae and Odonata, Oligochaeta and dreysena *Dreissena polymorpha* were most important.] Address: Zamorova, M.A., Odessa Il Mechnikov National University, Odessa, Ukraine. E-mail: hydrobiologia@mail.ru

**14608.** Zhang, H.-j. (2014): A new species of *Nychogomphus* (Anisoptera: Gomphidae) from Yunnan Province, China. *International Journal of Odonatology* 17(2-3): 59-62. (in English) ["*Nychogomphus yangi* sp. nov. is described from Yunnan, China (holotype male: Xishangbanna, Yunnan Province, China; deposited at the Shaanxi Bioresource Key Laboratory, Hanzhong, Shaanxi, China). The new species is described and illustrated and compared with its closest congener *Nychogomphus lui*." (Author)] Address: Zhang, H.-j., Shaanxi Bioresource Key Laboratory, Shaanxi University of Technology, Hanzhong 723000, Shaanxi, PR China

**14609.** Zhang, H.-m.; Vogt, T.E.; Cai, Q.-h. (2014): *Somatochlora shennong* sp. nov. from Hubei, China (Odonata: Corduliidae). *Zootaxa* 3878(5): 479-484. (in English) ["*S. shennong* sp. nov. (holotype male, Dajiuhu National Wetland Park in Shennongjia National Nature Reserve, Hubei Province, China, 9 August 2012) is described, illustrated, and compared with the related species *S. dido* Needham and *S. taiwana* Inoue & Yokota." (Authors)] Address: Cai, Q.-h., State Key Laboratory of Freshwater Ecology & Biotechnology, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan 430072, China. E-mail: qhcai@ihb.ac.cn

**14610.** Zhao, H.; Zhong, Z.; Yin, Y. (2014): Functional analysis of the micro/nanostructures of dragonfly wing veins. *Society of Engineering Science 51st Annual Technical Meeting*. 1-3 October 2014, Purdue University, West Lafayette, Indiana, USA: 1 p. (in English) [Verbatim: This article studies the internal micro/nanostructures and reveals the relations between the structures and functions of dragonfly wing veins. Through SEM, we take the microscopic photos of the cross-sections of dragonfly wing veins. From these photos, we obtain the following results:



(a) The micro/nanostructures vary along the axis of the vein, i.e., different cross-sections have different micro/nanostructures. (b) For a given cross-section, the micro/nanostructures are of multilevels and multiscales. (c) At large scale, the structures of the veins are of diversities and disorders. The larger is the size scale. The more complicated are the structures, and the higher are the diversities and disorders. At small scale, the structures of the veins are of unifications and orders. The smaller is the size scale, the simpler is the structures, and the higher are the unifications and orders. (d) At the micro scale, we may induce unified assembling mode for the vein's structures, i.e., "nanofibers/nanolayers (or nanobunches)". (e) Both the mechanical functions and biological functions of the micro/nanostructures of the veins are optimized synthetically.] Address: Zhao, H.-x., Tongji University, China. E-mail: zhx@tongji.edu.cn

## 2015

**14611.** Andrew, R.J.; Verma, P.; Thaokar, N. (2015): A parasitic association of Odonata (Insecta) with *Arrenurus Dugés, 1834* (Arachnida: Hydrachnida: Arrenuridae) water mites. *Journal of Threatened Taxa* 7(1): 6821-6825. (in English) ["The parasitic association between water mites (*Arrenurus* spp.) and Odonata is virtually ubiquitous wherever habitats suitable for both taxa exist. Yet, very little is known about this association within and among the odonate species of India. Here, we present a report on this parasitic relationship in the population of odonates of Wena Dam of Central India observed during the years 2011 and 2012. Of the 376 odonates collected for observation, 35(9.3%) individuals belonging to seven species (*Acisoma panorpoides*, *Brachydiplax sobrina*, *Ceriatrion coromandelianum*, *Crocothemis servilia*, *Diplacodes trivialis*, *Neurothemis tullia tullia*, *Trithemis pallidinervis*) were found to be parasitized by the *Arrenurus* spp. mites. The mites were found attached to the undersurface of the thorax and abdomen. In all the cases, the thorax was found infested while only in seven individuals the abdomen as well as the thorax was found infested with mites. A maximum number of mites on an individual dragonfly was in *C. servilia* (293) followed by *T. pallidinervis* (134) while the highest parasitic load per individual host species was found in *T. pallidinervis* (70.25%) followed by *C. servilia* (32.6%). The average parasitic load per individual female and male was 39.77 and 8.9, respectively." (Authors)] Address: Andrew, R.J., Post Graduate Department of Zoology, Hislop College, Nagpur, Maharashtra 440001, India. E-mail: rajandrew@yahoo.com

**14612.** Andrew, R.J.; Foerster, S. (2015): Egg shell ultrastructure of the dragonfly, *Micrathyrina dictynna* Ris (Anisoptera: Libellulidae). *Zoologischer Anzeiger - A Journal of Comparative Zoology* 254: 15-17. (in English) ["A highly specialized form of egg deposition occurs in *M. dictynna*, which attaches egg-masses onto the underside of leaves high above shallow streams in Central American rainfor-

ests. Here, we describe the ultrastructure of the egg chorion of *M. dictynna* to reveal structural adaptations related to this unusual form of oviposition. We find that the egg chorion is generally divided into a thin, sticky exochorion and a tough, hard, smooth endochorion. The exochorion of eggs collected from the peripheral region of egg masses, however, shows a separation into outer and inner exochorionic layers. The space formed between these layers develops numerous pillars. In eggs collected from the area between the periphery and central region of an egg mass, the exochorion exhibits irregular interconnected patches of elevated areas containing very fine superficial linear reticulations. We propose that the exochorion of peripheral eggs is functionally modified to form a plastron that regulates respiration and restricts water loss of eggs in the inner layers of the egg mass." (Authors)] Address: Foerster, S., Dept of Biology, Barnard College, Columbia Univ., New York, NY 10027, USA. E-mail: sf2041@columbia.edu

**14613.** Bello-Bedoy, R.; González-Santoyo, I.; Serrano-Meneses, M.A.; Vrech, D.; Rivas, M.; Munguía-Steyer, R.; Córdoba-Aguilar, A. (2015): Is allometry of sexual traits adaptive? A field test with territorial damselflies. *Biological Journal of the Linnean Society* 114(2): 327-334. (in English) ["Recent studies have linked static allometry of sexual traits to selective advantages, in terms of sexual selection. An underlying, yet untested, assumption is that the allometry of sexual traits confers higher mating success and/or survival. Here, we investigated whether the allometry of two sexual traits is related to male mating success and survival in two species of damselflies: wing size in *Paraphlebia zoe* and the red-pigmented wing spot in *Hetaerina americana*. We used large field-based data sets of marked-recaptured animals, in which we recorded male mating success and survival. Both sexual traits exhibited hyperallometric patterns; however, allometry was not linked to either mating success or survival. These results indicate that, at least during the period of sexual competition, allometry does not seem to be adaptive. Although our results may only apply to our damselfly study subjects (which nevertheless would require further tests in different seasons and/or study sites), our findings should encourage researchers to evaluate at least whether the assumed adaptiveness of sexual trait allometry holds for their study animals." (Authors)] Address: Córdoba-Aguilar, A., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

**14614.** Bennett, D.M.; Dudley, T.L.; Cooper, S.D.; Sweet, S.S. (2015): Ecology of the invasive New Zealand mud snail, *Potamopyrgus antipodarum* (Hydrobiidae), in a mediterranean-climate stream system. *Hydrobiologia* 746: 375-399. (in English) ["The New Zealand mud snail, *Potamopyrgus antipodarum*, is a widely distributed non-native species of management concern on four continents. In a southern California stream, *P. antipodarum* abundance, which ranged from ca. <10 to nearly 150,000 snails

m<sup>2</sup>, was related to discharge and temperature patterns. Laboratory experiments indicated that *P. antipodarum* (1) survivorship decreased from 13 to 27°C, but its growth rate was higher at 13 and 20°C than 27°C; (2) grazing rates were similar to those of native algiivores in short-term trials; (3) grazing impact was greater than that of a native hydrobiid snail in longer-term trials; (4) ingested different diatom sizes than some other grazers; (5) reduced the abundances of medium-sized and large diatoms, and several filamentous cyanobacteria and chlorophytes, while increasing the relative abundances of tough filamentous chlorophytes (e.g., *Cladophora*); (6) impact on other grazing invertebrates was species specific, ranging from competition to facilitation; (7) reduced the survivorship of *Anaxyrus boreas* tadpoles; and (8) was consumed by non-native *Procambarus clarkii* and naiads of *Aeshna* and *Argia*. Ecological effects of introduced *P. antipodarum* are subtle, occurring primarily at transitory high densities, but flow regulation may enhance their effects by eliminating high flows that reduce their population sizes." (Authors)] Address: Bennett, Danuta, Marine Science Institute, University of California, Santa Barbara, CA, 93106, USA. E-mail: danutabennett@gmail.com

**14615.** Chang, Y.-H.; Wu, B.-Y.; Lai, C.-F. (2015): A study of the ecological benefits of the green energy landscape fountain. *Ecological Engineering* 75: 128-136. (in English) ["The overdevelopment of the environment in modern times has caused damage to our natural habitat and water resources. The survival of many species has been impacted. The main goal of this study is to explore the effects of green energy landscape fountain (GLF) on ecological preservation. The study site is located on the shore of an open water area within the campus of Mingdao University. The study site consists of three water tanks, buried inland, 1.5 m away from the shoreline. An ecological comparison study was performed on the quality of water between the three tanks of water. GLF is a floating island sized 60 cm × 60 cm made of PVC pipes with electricity supplied by solar panels. Changes in numbers of species were documented over a period of one year spanning 4 seasons in 3 different bodies of water. The results showed that the water with GLF installed had more species of organisms. 10 different species of organisms such as *Tetraghatha maxillosa*, *Polyrhachis dives*, *Araneus inustus*, *Ischnura senegalensis*, *Diaea subdola* were found in the water with GLF installed. 7 species often used as benchmark indicators of water pollution were found in water without GLF installed. The findings demonstrate the benefits of GLF on improving species diversity and the quality of water. This study also provides information which can be applied on landscape architecture, architecture and ecology design and engineering in the future." (Authors)] Address: Chang, Y.-H., Dept Landscape Architecture & Environmental Planning, Mingdao Univ., No. 369, Wen-Hua Rd., Peetow, Changhua 52345, Taiwan. E-mail: f89622050@ntu.edu.tw

**14616.** Chessman, B.C. (2015): Relationships between lotic macroinvertebrate traits and responses to extreme

drought. *Freshwater Biology* 60: 50-63. (in English) ["(1.) The prospect of increasing drought intensity in many river basins under climate change threatens the persistence of vulnerable freshwater species. Understanding how the traits of each species affect its resistance and resilience to drought may help to identify those species at most risk and elucidate the mechanisms by which impacts occur. (2.) I analysed macroinvertebrate monitoring data collected from rivers across Australia's Murray–Darling Basin (>106 km<sup>2</sup>) during the middle and later stages of the recent decade-long Millennium Drought and the initial post-drought period. I tested the ability of eight traits, expressing aspects of life history, diet and environmental tolerance, to explain changes in the broad-scale prevalence (the proportion of sites with observed presence) of macroinvertebrate families during and after the drought. (3.) The rate of basin-scale change in the riverine macroinvertebrate assemblage was least in the final stages of the drought. Immediately after the drought, the assemblage did not shift back towards its mid-drought state but instead moved further away. Eleven families that had a statistically significant fall in prevalence during the drought did not increase afterwards. (4.) Negative responses to drought were associated with slower maturation, absence of atmospheric respiration, high rheophily and low thermophily. Positive responses to cessation of drought were associated with having a holometabolous life cycle, greater requirements for dissolved oxygen, high rheophily and low thermophily. (5.) Because several traits were related to drought vulnerability, management to mitigate the adverse ecological effects of future droughts should consider a number of mechanisms by which drought has an effect. These include a loss of flowing water that supports rheophilous species, inadequate duration of wetting for species with a long aquatic phase, and effects of high temperature and hypoxia on species requiring cool conditions and well-aerated water. (6.) A revival of research on the life histories of freshwater invertebrate species and more information on oxygen requirements and temperature and desiccation tolerance are needed to improve our ability to predict the effects of drought." (Author) Taxa are treated at family level and include Odonata.] Address: Chessman, B.C., Centre for Ecosystem Science, School Biological, Earth & Environmental Sciences, Univ. of New South Wales, Kensington, NSW 2052, Australia. E-mail: b.chessman@unsw.edu.au

**14617.** Dayaram, A.; Potter, K.A.; Pailles, R.; Marinov, M.; Rosenstein, D.D.; Varsani, A. (2015): Identification of diverse circular single-stranded DNA viruses in adult dragonflies and damselflies (Insecta: Odonata) of Arizona and Oklahoma, USA. *Infection, Genetics and Evolution* 30: 278-287. (in English) ["Highlights: •Discovered 24 distinct circular single-stranded DNA viral genomes from odonates. •First report of a ssDNA mycovirus in the New World. •High diversity among detected viruses. Abstract: Next generation sequencing and metagenomic approaches are commonly used for the identification of circular replication associated protein (Rep)-encoding single stranded (CRESS) DNA viruses circulating in various environments.

These approaches have enabled the discovery of some CRESS DNA viruses associated with insects. In this study we identified and recovered 31 viral genomes which represent 24 distinct CRESS DNA viruses from seven dragonfly species (*Rhionaeschna multicolor*, *Erythemis simplicicollis*, *Erythrodiplax fusca*, *Libellula quadrimaculata*, *Libellula saturata*, *Pachydiplax longipennis*, and *Pantala hymenaea*) and two damselfly species (*Ischnura posita*, *Ischnura ramburii*) sampled in various locations in the states of Arizona and Oklahoma of the United States of America (USA). We also identified *Sclerotinia sclerotiorum* hypovirulence-associated DNA virus-1 (SsHADV-1) in *P. hymenaea*, *E. simplicicollis* and *I. ramburii* sampled in Oklahoma, which is the first report of SsHADV-1 in the New World. The genome architectures of the CRESS DNA viruses recovered vary, but they all have at least two major open reading frames (ORFs) that have either a bidirectional or unidirectional arrangement. Four of the viral genomes recovered, in addition to the three isolates of SsHADV-1, show similarities to viruses of the proposed gemycircularvirus group. Analysis of the Rep encoded by the remaining 24 viral genomes reveals that these are highly diverse and allude to the fact that they represent novel CRESS DNA viruses." (Authors)] Address: Varsani, A., School of Biological Sciences and Biomolecular Interaction Centre, Univ. of Canterbury, Christchurch 8140, New Zealand. E-mail: arvind.varsani@canterbury.ac.nz

**14618.** Dow, R.A.; Ngiam, R.W.; Ahmad, R. (2015): Odonata of Maludam National Park, Sarawak, Malaysia. *Journal of threatened taxa* 7(1): 6764-6773. (in English, with summary in Bahasa Melayu) ["This paper presents records of Odonata collected in July 2012 in Maludam National Park, Sarawak, Malaysia. A total of 48 species from nine families were collected. Three species were new to science, one of which has already been described as *Prodasineura yulan* Dow & Ngiam, which may be endemic to Maludam. In addition, Maludam is only the second locality recorded in Sarawak for four poorly known species: *Pachycypha aurea*, *Macrogomphus decemlineatus*, *Brachygonia ophelia* and *Brachygonia puella*. Two of these species, *Macrogomphus decemlineatus* and *Brachygonia ophelia*, are recorded for the first time in Sarawak in more than 100 years." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**14619.** Dow, R.A.; Choong, C.Y. (2015): *Mortonagrion megabinlyog* spec. nov. from Brunei (Odonata: Zygoptera: Coenagrionidae). *Zootaxa* 3914(1): 89-93. (in English) ["*M. megabinlyog* spec. nov. is described from a location in Brunei on the island of Borneo. Additional illustrations of its sister species *M. astamii* are provided." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**14620.** Dow, R.A.; Luke, S.H. (2015): *Phaenandrogomphus safei*, a new species from Sabah, northern Borneo (Odonata: Anisoptera: Gomphidae). *Zootaxa* 3905(1):

145-150. (in English) ["*Phaenandrogomphus safei* is described from a male from the Kalabakan Forest Reserve, Sabah, Malaysian Borneo. It is the first species of *Phaenandrogomphus* to be recorded from Borneo. *Onychogomphus treadawayi*, known from Busuanga Island in the Palawan region of the Philippines, is transferred to *Phaenandrogomphus*." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**14621.** Dutra, S.; De Marco, P. (2015): Bionomic differences in odonates and their influence on the efficiency of indicator species of environmental quality. *Ecological Indicators* 49(1): 132-142. (in English) ["Highlights: •Those traits vary between the Neotropical Odonata (Zygoptera and Anisoptera). •Many small size, shade-seek species are associated to Zygoptera suborder. •Zygoptera species shows narrow ecological requirements. •They were associated to different shading, depth, and environmental integrity levels. The influence of environmental changes on organisms depends on their bionomic characteristics, such as mobility, body size, and resource use. Thermoregulatory and dispersal abilities may directly affect the use of odonates as bioindicators since organisms with low dispersal ability can track fine-scale environmental variations and are usually resource specialists. We investigated the utility of Anisoptera and Zygoptera as bioindicators testing possible relationships to their bionomic characteristics. We assessed the variation in species richness, composition, and indicator values in Cerrado areas by quantitative sampling of adult odonates in streams surrounded by different vegetation types, ordered by the degree of vegetation cover. Species composition was efficient in discriminating impacts affecting riparian vegetation, with low richness of rare and specialist species in impacted areas. Damselflies had more narrow requirements, associated to different shading, depth, and environmental integrity levels. No relation between body-size and species indicator value was observed. Despite this, the main use of those species as indicators, especially the Zygoptera, may be related to environmental disturbance created by changes on vegetation cover suggesting their potential use in the analysis of the environmental quality of riparian areas." (Authors)] Address: De Marco, P., Universidade Federal de Goiás, Campus Samambaia, Instituto de Ciências Biológicas, Departamento de Biologia Geral, Laboratório de Ecologia Teórica e Síntese, 74001-970, Goiânia GO, Caixa Postal: 2424, Brazil. E-mail: pdemarco@icb.ufg.br

**14622.** Ellenrieder, N. von; Hauser, M.; Gaimari, S.D.; Pham, T.H. (2015): First records of *Macromia katae* (Macromiidae) and *Indothemis carnatica* (Libellulidae) from Vietnam (Insecta: Odonata). *Check List* 11(1) (Art. 1514): 1-13. (in English) ["In the course of two field trips to Northern Vietnam during March 2012 and June 2014 the Odonata of three National Parks (Cuc Phuong, Tam Dao, and Ba Be) and one Biodiversity Station (Melinh) were sampled. A total of 90 species of odonates in 60 genera and 15 families was recorded, including two new records for Vietnam:



*M. katae* and *I. carnatica*. Diagnostic illustrations for these two species are provided, as well as the listing of the species recorded from the surveyed areas." (Authors) *Zygonyx asahinai*, *Ophiogomphus sinicus*, *Mortonagrion aborense* (Laidlaw 1914), and *Paracercion calamorum* are discussed in more detail.] Address: Ellenrieder, Natalie von, Plant Pest Diagnostics Center, California Dept of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail: natalia.ellenrieder@gmail.com

**14623.** Garrison, R.W.; Dijkstra, K.-D., Hämäläinen, M.; Villanueva, R.J.T. (2015): *Mitragomphus ganzanus* Needham, 1944, a geographically misplaced dragonfly, is a junior synonym of *Gomphidia kirschii* Selys, 1878 (Odonata: Gomphidae). *Zootaxa* 3911(2): 280-286. (in English) ["Based on comparison of specimens and descriptions, *Mitragomphus ganzanus* Needham, 1944, described from Braganza [Bragança], Pará State, Brazil, and known only from the holotype, is found to be a junior synonym of *Gomphidia kirschii* Selys, 1878, a species from the Philippines. The monotypic genus *Mitragomphus* Needham, 1944, is synonymized with the genus *Gomphidia* Selys, 1854." (Authors)] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Dept of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**14624.** Hammill, E.; Atwood, T.B.; Corvalan, P.; Srivastava, D.S. (2015): Behavioural responses to predation may explain shifts in community structure. *Freshwater Biology* 60: 125-135. (in English) ["(1.) Predators exert a strong selective force on the ecosystems in which they exist, thereby altering the structure of ecological communities and leading to the evolution of prey defences. However, how interspecific differences in defence ability affect habitat partitioning amongst competing prey species remains unresolved. (2.) We examined how prey defences affect species distribution in a natural ecosystem: the aquatic food web within Neotropical bromeliads. We first related differences in prey (mosquito) density to the presence and absence of predatory damselfly larvae. We then quantified behavioural responses to predators in the two most abundant mosquito species, and the effects of these behaviours on predator consumption rates. (3.) In the absence of damselflies, *Wyeomyia* was the most abundant mosquito genus in natural bromeliads. However, *Wyeomyia* numbers were reduced in the presence of damselflies. Numbers of the genus *Culex* increased with bromeliad size irrespective of the presence of damselflies. As a result of the differing effects of plant size and damselflies on the two genera of mosquito larvae, *Culex* were more numerous in large bromeliads containing damselflies. (4.) The most abundant *Culex* species, *Culex jenningsi*, had two kinds of behavioural defences: reduced movement and increased time at the water surface. These defences reduced damselfly attack rate on *C. jenningsi*, but not handling time. Consequently, consumption rate was reduced at all but the highest prey densities, altering the damselfly's functional response. Inducible defences were not

seen in the most abundant *Wyeomyia* species, *Wyeomyia abebela*, and pre-exposure to predation risk did not reduce predation on this species. (5.) Inducible behavioural defences, and the associated reductions in predation rate, evidently allow *C. jenningsi* to coexist with predators at a higher density than *W. abebela*. As predation risk is non-randomly distributed amongst bromeliads, divergence between mosquito species in their response to predation may contribute to the coexistence of a number of mosquito species across the landscape." (Authors)] Address: Hammill, E., School of the Environment, University of Technology Sydney, cnr Harris and Thomas St, Ultimo, NSW, 2007, Australia. E-mail: edd\_hammill@hotmail.com

**14625.** Huang, Q.; Gao, J.; Cai, Y.; Yin, H.; Gao, Y.; Zhao, J.; Liu, L.; Huang, J. (2015): Development and application of benthic macroinvertebrate-based multimetric indices for the assessment of streams and rivers in the Taihu Basin, China. *Ecological Indicators* 48(1): 649-659. (in English) ["Highlights: •Multimetric indices (MMIs) based on benthic macroinvertebrates were developed and applied in the Taihu Basin. •We developed two MMIs for two specific aquatic ecoregions in the Basin. •The MMIs were robust and sensitive to anthropogenic ecological impairment. •The general ecological status of the Taihu Basin was lower than "good" status. The development of biological indicators for assessing ecological conditions in streams and rivers is urgently needed in China, particularly in heavily impacted regions. The aim of this study was to develop and apply benthic macroinvertebrate-based multimetric indices (MMIs) for the assessment of streams and rivers in the western hill and eastern plain aquatic ecoregions of the Taihu Basin. MMIs were based on samples collected from October 16 to November 8 2012 at 120 sites in streams and rivers. Least disturbed sites defined the reference conditions. Chemical water quality, physical habitat, and land use were used as criteria to identify reference sites in the basin. Metrics related to benthic macroinvertebrate richness, composition, diversity and evenness, pollution tolerance, and functional feeding groups were screened by range, sensitivity, responsiveness, and redundancy tests. Total number of taxa; percentage of Ephemeroptera, Trichoptera and Odonata (% ETO); Berger-Parker's index (BP); Biotic index (BI); and percentage of filterers-collectors (% FC) were used to construct the MMI for the western hill aquatic ecoregion (MMIW). Total number of taxa, percentage of Crustacea and Odonata (% CO), BP, BI, and % FC were used to construct the MMI for the eastern plain aquatic ecoregion (MMIE). The MMI scores were obtained by combining the rating categories (excellent, good, fair, poor, and very poor). The MMIs were tested using a separate subset of the data, and the results indicated that the newly developed MMIs were robust in terms of percentage of sites correctly classified, coefficient of variation, box-separation ratios, and separation powers. The ecological status was then evaluated based on the MMI scores. The results indicated that the general ecological status of streams and rivers in the Taihu Basin was rated lower than "good", the western hill aquatic ecoregion

was rated "fair" and the eastern plain aquatic ecoregion was rated "poor". Moreover, the MMIs showed a significant negative response to an increasing gradient of disturbance. Therefore, these preliminary MMIs can be used as assessment tools in ecological biomonitoring and management of the Taihu Basin." (Authors)] Address: Gao, J., State Key Laboratory of Lake Science and Environment, Nanjing Institute of Geography & Limnology, Chinese Academy of Sciences, 73 East Beijing Road, Nanjing 210008, PR China. E-mail: gaojunf@niglas.ac.cn

**14626.** Kahilainen, A. (2015): Interactions and patterns between species diversity and genetic diversity. *Jyväskylä studies in biological and environmental science* 295: 68 pp. (in English) ["The similarities in the theories of community ecology and population genetics suggest that species diversity within and between communities and genetic diversity within and between populations are driven by the same four general mechanisms: (1) drift, (2) dispersal, (3) selection, and (4) the formation of new variants (i.e. speciation and mutation). Since, for both species diversity and genetic diversity, the relative significances of each of the first three mechanisms are very much influenced by characteristics of the environment, correlations between species diversity and genetic diversity, i.e. species-genetic diversity correlations (SGDCs), are expected. Considering that practical conservation most often focuses on species diversity (or surrogates thereof), SGDCs could provide information on how conservation and management decisions influence genetic diversities of populations, and thus also their viabilities. Furthermore, teasing apart the drivers of the SGDCs can offer mechanistic explanations for diversity and therefore suggest a process-based approach to conservation. I studied the generalizability of SGDC and the role of environmental characteristics by means of a literary review and empirical studies on natural dragonfly and damselfly communities. I then conducted individual-based simulations to assess how inbreeding depression due to loss of genetic diversity can influence extinction rates in neutral multispecies metacommunities. My results suggest that SGDCs are highly variable in natural systems and that interactions between ecologically similar species can influence their genetic structures. Therefore, the results question the utility of using species diversity or genetic structures of ecologically similar species as surrogates for genetic diversity of species of conservation concern. Furthermore, my results suggest that if intraspecific genetic diversity is not explicitly considered, the extinction rates in multispecies metacommunities might be underestimated." (Author) *Calopteryx splendens*, *C. virgo*] Address: Kahilainen, A., University of Jyväskylä, Department of Biological and Environmental Science, P.O. Box 35, FI-40014 University of Jyväskylä, Finland

**14627.** McBurnie, G.; Davis, J.; Thompson, R.M.; Nano, C.; Brim-Box, J. (2015): The impacts of an invasive herbivore (*Camelus dromedaries*) on arid zone freshwater pools: An experimental investigation of the effects of dung

on macroinvertebrate colonisation. *Journal of Arid Environments* 113: 69-76. (in English) ["Highlights: •Macroinvertebrate abundance was higher in the control mesocosms. •Pollution tolerant taxa such as mosquito larvae were common in treatment mesocosms. •Sensitive fauna, such as larval dragonflies were more common in the controls. Aquatic ecosystems in arid environments provide important refugia and 'stepping-stones' of connectivity for aquatic fauna. Aquatic ecosystems in central Australia are vulnerable to degradation due to the impacts of invasive herbivores such as camels, which degrade small desert waterbodies through drinking, trampling, and fouling with dung. In this study we assessed the impacts of camel dung on the water quality and macroinvertebrate colonization and community composition of small arid zone freshwater pools using experimental mesocosms. Camel dung (2 kg) was added to half the mesocosms (the treatment), the remaining mesocosms (without camel dung) acted as the controls. All mesocosms were sampled weekly for water quality, nutrients, chlorophyll a and macroinvertebrate richness and abundance, over an eight week period during summer. Macroinvertebrate abundance was higher in the control mesocosms in comparison to the treatment mesocosms. Pollution tolerant taxa such as mosquito larvae were common in treatment mesocosms, while sensitive fauna, such as larval mayflies and dragonflies were more common in the controls. The latter are predators and appeared to have a major influence on community composition. Our results reinforce the need for active management of invasive herbivores to protect aquatic biodiversity and to manage potential disease-vector species in central Australia waterbodies." (Authors)] Address: McBurnie, Glenis, Northern Territory Department of Land Resource Management, P.O. Box 1120, Alice Springs NT 0870, Australia. E-mail: glenismcb@gmail.com

**14628.** Monteiro Júnior, C.; Juen, L.; Hamada, N. (2015): Analysis of urban impacts on aquatic habitats in the central Amazon basin: Adult odonates as bioindicators of environmental quality. *Ecological Indicators* 48: 303-311. (in English) ["Thirty streams were surveyed in urban and natural settings in the municipality of Manaus in the central Amazon basin (Brazil) with the objective of identifying the species of adult odonates that can be used as bioindicators of environmental quality. The data collected were used to test the hypothesis that species in the suborder Zygoptera are indicators of better-preserved environments due to their smaller body sizes and reduced tolerances to habitat modification, whereas species in the suborder Anisoptera were presumed to be indicators of impacted habitats with no vegetation. The habitats were classified as preserved, intermediate, and degraded, based on their environmental characteristics. A total of 908 specimens were collected, representing 60 species. The results of the indicator value (IndVal) identified 13 species as indicators of environmental quality, of which nine were typical of preserved habitats, two of intermediate habitats, and four of modified habitats (intermediate or degraded).

Odonate species richness declined with increasing urbanization, a pattern also presented by the zygopterans, although anisopteran species richness was higher in intermediate habitats. Zygopteran species showed high fidelity/specificity for preserved habitats, although a small number of the species of this suborder showed a similar relationship with intermediate or degraded habitats, whereas anisopterans were associated only with disturbed habitats (intermediate and degraded). Overall, the results indicate that the diagnosis of the adult odonate community can provide a rapid and effective tool for evaluation of environmental quality. As many species are stenotopic, they can be used as indicators of good habitat quality, whereas some of the more eurytopic species can indicate disturbed habitats." (Authors)] Address: Monteiro Júnior, C., Laboratório de Ecologia e Conservação, Instituto de Ciências Biológicas, Univ. Federal do Pará, Rua Augusto Correia, N° 1 Bairro Guamá, CEP 66.075-110 Belém, Pará, Brazil. E-mail: csmonteirojr@gmail.com

**14629.** Nel, A.; Fleck, G.; Garcia, G.; Gomez, B.; Ferchaud, P.; Valentin, X. (2015): New dragonflies from the lower Cenomanian of France enlighten the timing of the odonatan turnover at the Early – Late Cretaceous boundary. *Cretaceous Research* 52: 108-117. (in English) ["Three early Cenomanian Odonata are described from France (Jaunay-Clan locality, Vienne), i.e. the aeshnoid *Galloliupanshania incompleta* gen. et sp. nov. in the Liupanshaniidae, the libelluloid *Gallophlebia magnifica* gen. et sp. nov. in the new family Gallophlebiidae closely related to the Early Cretaceous Araripephlebiidae, and *Gallostenophlebia incompleta* gen. et sp. nov., as the youngest record of the clade Stenophlebioptera: Stenophlebiidae. *Gallophlebia* is a new case showing the high diversification of the libelluloid clade during the Cretaceous, while *Gallostenophlebia* corresponds to one of the last "survivors" of the odonatan ancient lineages in relation to the faunistic turnover around the Early-Late Cretaceous boundary." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**14630.** Nie, Z.; Tian, S.; Tian, Y.; Tang, Z.; Tao, Y.; Die, Q.; Fang, Y.; He, J.; Wang, Q.; Huang, Q. (2015): The distribution and biomagnification of higher brominated BDEs in terrestrial organisms affected by a typical e-waste burning site in South China. *Chemosphere* 118: 301-308. (in English) ["Highlights: •The terrestrial ecosystem at the e-waste site has been contaminated by PBDEs. •Deca-BDE is found in the highest concentration among 21 kinds PBDEs in all samples. •Higher brominated congeners were the dominant congeners, especially BDE-209. •Eleven PBDE congeners were biomagnified in the examined food chain. •The feeding habit of terrestrial species may be affect PBDE accumulation. Soil, vegetation, and several terrestrial species including turtledove, chicken, goose, grasshopper, dragonfly, butterfly and ant, were collected from an area surrounding a typical e-waste burning site in South China. The samples were examined to investigate the lev-

els, congener profiles, and biomagnification extent of polybrominated diphenyl ethers (PBDEs) that may be present in the environment as a result of the e-waste, which was processed in a crude recycling style. Elevated levels of S21PBDEs were found in the biota (101–4725 ng g<sup>-1</sup> lipid weight (lw)), vegetation leaf (82.9–319 ng g<sup>-1</sup> dry weight (dw)) and soil samples (5.2–22 110 ng g<sup>-1</sup> dw), indicating that PBDE contamination in the samples collected from the e-waste burning site may pose risks to the local terrestrial ecosystem and local populations. Higher BDE congeners, especially deca-BDE (BDE-209) were the dominant homologs in organisms and nonbiological matrices, followed by nona-BDE and octa-BDE. Biomagnification factors (BMFs) were calculated as the ratio of the lipid-normalized concentration in the predator to that in the prey. The highest BMF (3.4) was determined for BDE-153 in the grasshopper/turtledove food chain. Other higher brominated congeners, such as BDE-202, -203, -154, -183 and -209, were also biomagnified in the terrestrial food chain with BMFs of 1.7–3.3. BDE-47, -100, and -99 were not biomagnified in the examined food chains (BMFs < 1), which suggests that bioaccumulation and biotransformation of PBDEs in terrestrial ecosystems could be distinguished from those in aquatic ecosystems." (Authors)] Address: Huang, Q., MOE Key Lab. of Regional Energy & Environmental Systems Optimization, Resources & Environmental Research Acad., North China Electric Power Univ., Beijing 102206, China. E-mail: huangqf@craes.org.cn

**14631.** Razeng, E.; Watson, D.M. (2015): Nutritional composition of the preferred prey of insectivorous birds: popularity reflects quality. *Journal of Avian Biology* 46: 89-96. (in English) ["Food availability is emerging as a key determinant of avian occurrence and habitat use in a variety of systems, but insectivores have received less attention than other groups and the potential influence of nutritional quality has rarely been considered. Rather than a uniform food source, arthropods vary greatly in terms of nutritional composition, but does this variation translate into differential consumption? Building on previous work that demonstrated clear preference for some arthropod groups by 13 species of ground-foraging insectivores, we compare the nutritional composition of these arthropod groups with other groups commonly encountered but seldom consumed in the same habitat types. Using samples of arthropods collected from a eucalypt woodland in southern Australia, we found the high frequency prey groups (Coleoptera, Lepidoptera, Orthoptera and Araneae) consistently contained higher fractions of crude protein and total fat than the low frequency groups (Diptera, Hymenoptera and Odonata). Even more clear-cut differences were noted in terms of micronutrients; high frequency prey containing significantly greater concentrations of seven elements than low frequency prey and significantly greater amounts per individual arthropod for all eleven elements measured. These results indicate that the nutritional quality plays an important role in prey selection in insectivores and suggests that micronutrients may be more important determi-



nants of prey choice than previously recognized. Integrating these findings with previous work suggesting food limitation may constrain distribution patterns of birds in fragmented landscapes, we contend that variation in nutritional quality helps explain observed patterns in insectivore diets and occurrence. In addition to explaining why smaller and more disturbed habitats are unable to support resident insectivore populations, this bottom-up mechanism may underlie the disproportionate sensitivity of insectivores to land-use intensification." (Authors)] Address: Watson, D.M., Inst. Land, Water & Society, Charles Sturt Univ., Albury 2640, Australia. E-mail: [dwatson@csu.edu.au](mailto:dwatson@csu.edu.au)

**14632.** Saha, P.D.; Gaikwad, S.M. (2015): Odonata assemblage at a small marshy land in Khadki (Pune city) – An assessment. *Journal of Entomology and Zoology Studies* 3(1): 53-64. (in English) ["A total of 17 species of Odonata belonging to 11 genera under 4 families and spread over 2 suborders have been collected from a very small area of 350 m<sup>2</sup> in Khadki of Pune city during a study conducted from April 2012 to January 2014. Though the post-monsoon abundance of Odonata was high but Odonata diversity was greater in pre-monsoon period when the food and nutrition were abundant. In the present study it is found that Libellulidae is the richest family with maximum number of species (10 species) which is followed by family Coenagrionidae (4 species), Platycnemidae (2 species) and Aeshnidae (1 species). The area therefore can be considered as a species rich diversity site in a purely urban backdrop." (Authors)] Address: Saha, P.D., Zool. Survey of India, Western Regional Centre, Vidya Nagar, Akurdi, Pune-411044 (Maharashtra), India

**14633.** Sasamoto, A. (2015): *Anigosomphus* [sic] *yanagisawai* sp. nov., a new gomphid dragonfly from northern Thailand (Odonata: Anisoptera: Gomphidae). *Zootaxa* 3904 (3): 421-426. (in English) ["*A. yanagisawai* sp. nov. (holotype male and paratype specimens) from N. Thailand (Doi Inthanon, ca. 1,400 m a.s.l., Ban Luang, Chiang Mai Prov.), is described and illustrated. This species can apparently be distinguished from the other species of this genus by the morphology of the anal appendages, especially the straight cerci closely disposed to each other and bearing a very strong outer branch." (Author)] Address: Sasamoto, A., Oh 531-3, Tawaramoto-cho, Shiki-gun, Nara pref. 6360345, Japan. E-mail: [akssmt@sea.plala.or.jp](mailto:akssmt@sea.plala.or.jp)

**14634.** Vanacker, M.; Wezel, A.; Payet, V.; Robin, J. (2015): Determining tipping points in aquatic ecosystems: The case of biodiversity and chlorophyll a relations in fish pond systems. *Ecological Indicators* 52: 184-193. (in English) ["Highlights: •We compare different statistical methods and diversity indices to determine tipping points. •We compare tipping points in different taxonomic groups. •SEGMENTED and Jackknife first order are the most adequate method and diversity index to determine tipping points. •Aquatic vascular plants are the best taxonomic group to respond to eutrophic changes. Abstract: The management of biodiversity in aquatic ecosystems requires knowing the

state of water quality linked to regime shifts in various taxonomic groups. We examine this question by studying the fish ponds in the Dombes region, France. These waterbodies are characterized by a high diversity of species. High levels of nutrients due to certain fish farming practices may cause significant eutrophication leading to loss in biodiversity and a shift from high coverage of aquatic vegetation to phytoplankton dominance may also be observed. The aim of this study is to assess tipping points, thresholds for effect, along a gradient of chlorophyll a in different taxonomic groups: aquatic vascular plants, phytoplankton, dragonflies and aquatic macro-invertebrates. Tipping points are analyzed with three different statistical methods: a method which evaluates tipping points with a difference in the mean (TMEAN), a second method which evaluates tipping point by comparing the mean and linear regressions before and after the tipping point (FSTAT) and third a method which evaluates linear regressions with a pivotal tipping point (SEGMENTED). We also compare tipping points for the different taxonomic groups using five different diversity indices: Observed richness, Jackknife first order, Fisher's alpha, Simpson index and Evenness. Our results show that there is an important variation in tipping points following the three statistical methods, but the SEGMENTED is the best method for evaluating tipping points. We observe a high difference of tipping point values for the different taxonomic groups depending on the diversity indices used. Jackknife first order has a better performance to evaluate a eutrophic change according to the diversity than the other indices. In all taxonomic groups, aquatic vascular plants are the most impacted by the chlorophyll a and almost all their tipping points are observed around 60 µg/L chlorophyll a concentrations. No significant relationship is found between chlorophyll a and phytoplankton diversity, while the two other groups, dragonflies and macro-invertebrates, are both impacted by the chlorophyll a but their relevant tipping points are situated in higher values than aquatic vascular plants." (Authors)] Address: Vanacker, Marie, Dept of Agroecology and Environment, ISARA Lyon (Member of the Univ. of Lyon), 23 rue Jean Baldassini, 69364 Lyon, France. E-mail: [mvanacker39@gmail.com](mailto:mvanacker39@gmail.com)

**14635.** Verma, P.; Andrew, R.J.; Khrabvu, K. (2015): Histology of the post ovarian genital complex of the dragonfly *Pantala flavescens* (Fabricius, 1798) (Odonata: Libellulidae). *International Journal of Research Studies in Biosciences* 3(1): 82-89. (in English) ["In *P. flavescens*, the post ovarian genital complex (POGC) consists of a pair of long thin spermatheca with bulbous tips, a small, spherical dorsal bursa copulatrix and a large ventrally placed vagina. The wall of the POGC is basically composed of an outer muscle layer, middle epithelial layer resting on a basement membrane and an internal layer of cuticle. It is externally covered in muscle bands. The internal lining of ST is annulated with cuticular rings and is formed of 3-4 layers of cuticle consecutively undergoing sclerotization. The bursa copulatrix is small and spherical with a thick layer of folded cuticular intima. The fertilization pore is in the form of a valve covered with cuticular spines. The bursa communis

is a tunnel like structure formed by three plates, a median-dorsal plate and paired lateral plates. The vagina is divided into anterior and posterior regions- the anterior region bears large number of small flat finger-like processes or stubs while the posterior region is a long, large, laterally folded, sac like structure which tapers into the female gonopore." (Authors)] Address: Verma, P., Centre for Sericulture & Biological Pest Management Research RTM Nagpur Univ. Nagpur, India. E-mail: payalrverma@gmail.com

**14636.** Weterings, R.; Umponstira, C.; Buckley, H.L. (2015): Predation rates of mixed instar Odonata naiads feeding on *Aedes aegypti* and *Armigeres moultوني* (Diptera: Culicidae) larvae. *Journal of Asia-Pacific Entomology* 18(1): 1-8. (in English) ["Highlights: •Predation rates were negatively related to predator densities. •Predation rates were positively related to prey densities. •Predation rates were much lower and realistic compared to previously recorded rates. •Predation rates based on large Odonata naiads overestimate actual predation. In Thailand several important diseases are transmitted by mosquitoes. Many vector control programs focus on the reduction of these medically important mosquitoes through the application of pesticides, bed-nets and the introduction of biological control agents. Odonates naiads are important, naturally occurring predators of vector mosquitoes. To estimate the predation rates of odonate species in Thailand, we conducted an experiment in which the predation rates were compared across a range of predator and prey densities. We used seven different predator species from different instars that represented the composition of naiads in our study area. Body sizes ranged between 2.6 mm and 15.9 mm. Two different prey species were used, larvae of the mosquito *Armigeres moultوني* Edwards, 1914 and *Aedes aegypti* L. 1762. Predation rates showed a positive non-linear relationship with prey densities and a negative non-linear relationship with predator densities. The mean ( $\pm$  SE) predation rates per predator were 6.2 ( $\pm$  0.8) individuals per 24 h for dragonfly naiads and 5.1 ( $\pm$  0.7) for damselfly naiads. Predation rates were very low compared to previously recorded rates. However, unlike previous research we did not focus on single species in a late stage of development, but on multiple species in all stages that resembled the natural Odonata community composition." (Authors)] Address: Weterings, R., Cat Drop Foundation, Boorn 45, 9204 AZ, Drachten, The Netherlands

**14637.** Xu, M.; Fincke, O.M. (2015): Ultraviolet wing signal affects territorial contest outcome in a sexually dimorphic damselfly. *Animal Behaviour* 101: 67-74. (in English) ["Highlights: •We investigated the role of sex-specific UV-reflective wing ornamentation in *Megaloprepus caerulatus*. •Contest duration and dynamics of males were consistent with opponent-only assessment of wing band size. •UV reflectance of male wing band serves as a 'biological billboard' for body size. •UV reflectance of female white tips did not affect sex recognition. •First direct evidence that UV reflectance of wing ornament affects contest outcome in invertebrates. Ultraviolet (UV) reflectance and UV

vision are both common among animals and are known to function in mate choice and male–male competition among numerous vertebrates. In comparison, examples of functional UV reflectance among invertebrates are scarce. In a territorial damselfly (*Megaloprepus caerulatus*), data from natural territorial contests indicated that males assessed the male wing band of rivals. We investigated the functions of (1) UV reflectance of the male-specific white wing band in territorial contests by staging contests between size- and age-matched, control and UV-reduced males, and (2) UV reflectance of the female-specific wing tip in sex recognition by presenting control and UV-reduced females to territorial males. Results showed that males whose UV reflectance of the white wing bands was reduced were more likely to lose contests. This effect dissipated late in the reproductive season, when breeding sites typically decrease in value. UV reflectance of the female wing tips did not affect male sex recognition, nor did it affect the detectability of a female at a male territory. Our study provides the first direct evidence from invertebrates, and one of the few among all animals, that UV reflectance of wing ornamentation affects the outcome of male contests in the field." (Author)] Address: Xu, Mingzi, Department of Neurobiology and Behavior, Cornell University, Ithaca, NY 14853, USA.



Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for multiple help, and Jürgen Ott, Cédric Vanappelghem, Geert de Knijf and Bernd Kunz for contributing papers to this issue.

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

---

## 1997

**14638.** Verbeek, P.J.M.; Hermans, J.T. (1997): Libellen in en landbouwgebied (Relatienota Gebied Lilbosch) - Dragonflies of the Lilbosch area. *Natuurhistorisch Maandblad* 86(4): 93-97. (in Dutch, with English Summary) ["In the agricultural area around Lilbosch Abbey (The Netherlands) many ponds were created with a view to increasing the natural value of the area- Creation and management of the ponds were based on knowledge of the ecology of the local fauna, with particular regard for dragonflies. The ponds have been constructed with very gentle slopes (1:5) and they are not too deep (max. 1 meter below ground level). In dry summers the water level is about one meter below ground level. Unlike the usual situation, the ponds are not fenced in with barbed wire, so cattle are able to approach them. The grazing impact is very low (one cow or horse on two or three ha) and there are at least six ponds within the area where the cattle arc grazing, which seems to have a very positive effect on the dragonfly fauna. The article discusses the effects of this management and compares the dragonfly fauna of ponds with relative steep slopes and those with gentle slopes. In the few years since the ponds were created and the extensive grazing management implemented, the number of dragonfly species has increased spectacularly. Twenty-nine species were recorded, which means that this has become one of the better dragonfly areas in the Netherlands. At least twenty species have colonized this area. The article also discusses the various dragonfly species recorded and their future in this area." (Authors)] Address: Hermans, J.T.; Hertestraat 21, NL-6067 ER Linne, The Netherlands. E-mail: j.hermans@triangel-linne.nl

## 1998

**14639.** Danielsson, I. (1998): Mechanism of sperm competition in insects. *Ann. Zool. Fennici* 35: 241-257. (in English) ["Sperm competition has been demonstrated in a variety of insects and is in addition to ecological resource distribution and sex ratios, generally believed to

play a major role in the evolution of insect reproductive strategies and mating systems. In this paper. I review the main theories and some of the empirical evidence regarding sperm competition in insects. Sperm utilization is shaped by selection on both males and females, sometimes in opposite directions. Here I focus mainly on adaptive mechanisms for sperm priority and paternity assurance, and consequences of such adaptations for females. I also evaluate the importance of the conflicts between the sexes for the evolution of mating behaviour from existing theory and available empirical evidence. Some urgent research areas for future workers are suggested. An explanation for the large intraspecific variation in last male sperm priority is still lacking. To this end. we need detailed studies of the mechanisms of sperm usage within the female, and to what extent females influence postcopulatory fertilization processes." (Author) The paper includes many references to Odonata.] Address: Danielsson, I., Animal Ecology, Dept of Zoology, Göteborg University, Box 463, SE-405 30 Göteborg, Sweden

## 1999

**14640.** Futahashi, R. (1999): [The collecting record of *Sympetrum depressiusculum* at Enshu-hama, Hamamatsu, Shizuoka Prefecture]. *Suruga no Konchu* 188: 5270-5271. (in Japanese) [14-XI-1998.] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

## 2000

**14641.** Little, B. (2000): *Companion Planting*. New Holland Publishers Ltd: 96 pp. (in English) ["In an age of increasing hostility towards chemical control of the food we eat, "Companion Planting" is the ideal guide to working with nature, to produce healthy and bountiful crops. There is something fascinating about companion planting - it is immensely enjoyable to be able to outwit one's enemies with simple, tried-and-tested methods. More and more gardeners are recognising the good sense of



working with nature instead of trying to club it into submission. Entertaining and often anecdotal, the snippets of wisdom in this book are arranged alphabetically, allowing the reader to easily search for a particular plant or garden pest. In many cases the author offers a method for encouraging a healthy crop or discouraging a nuisance to the gardener. Her summary of good and bad garden companions is a useful quick reference tool for gardeners planting beds or containers of vegetables and herbs." (Publisher) The book includes two notes on damselflies and dragonflies as companions in gardening and pest control.] Address: not stated

**14642.** Ramírez, A. (2000): 4.1.2 Dragonflies and damselflies of Costarican cloud forests. In: N. M. Nadkarni and N. T. Wheelwright (Eds.): *Monteverde: ecology and conservation of a tropical cloud forest*, Oxford Univ. Press, Athens GA.: 97-[Verbatim: Dragonflies and damselflies (order Odonata) are the best known of aquatic insects due to their large size, brilliant colours, and conspicuous flight. Dragonflies perch with their wings outstretched; damselflies rest with their wings held together above the body. Adults and nymphs are voracious predators of smaller insects. Nymphs are aquatic and live in standing or running water. Fourteen families and 280 species of Odonata are recorded from Costa Rica (Paulson 1982), although the actual number is higher. Odonate diversity is greatest in the lowlands and decreases with altitude. Seventy species have been collected from areas above 1200 m, which represents 25% of the species in the country. Of these, only 13 species are restricted to altitudes above 1200 m. However, cloud forests have not been well collected. Biogeography of the cloud forest fauna indicates 41% of the species are of South American origin, 28% are Central American (including endemics), and 7% are North American. The rest are widespread species whose origins are unclear. Some odonate genera contain discrete lowland and highland species. One highland species, *Sympetrum nigrocreatum*, is probably derived from the widespread mid-elevation species *S. illotum*. *Philogenia peacocki* has only been found in cloud forests, whereas *P. carrilliea* is more commonly found at lower altitudes. In the same stream, *P. peacocki* has been found inhabiting the upper parts but is replaced by *P. carrilliea* at lower altitudes, with some overlap of the two species around 1200 m. Some cloud forest species occur at intermediate altitudes (800-1500 m). For example, *Heteragrion majus*, a characteristic inhabitant of streams in cloud forests, is also present at lower altitudes (down to 800 m) in streams that share characteristics with cloud forest streams such as high humidity, steep slopes, and low temperature (17–20°C). Of the species recorded from cloud forests, 60% have nymphs that live in open areas of lakes, marshes, and ponds; 38% inhabit shaded streams; and 2% live in specialized habitats such as bromeliads and tree holes. These proportions depend on the availability of the habitats. In general, open habitats have been better studied than forest streams (Paulson 1982). Nymphs are adapted to live in specific habitats, for exam-

ple, accumulations of dead leaves in riffles. The most limiting factor is the availability of habitat suitable for nymph development. Most species tolerate only narrow ranges of conditions such as temperature, oxygen level, forest cover, types of aquatic vegetation and water pollution. They are good biological indicators and their conservation depends on habitat preservation. Few species are well adapted to highly disturbed habitats.] Address: Ramirez, A., Univ. Georgia, Inst. Ecol., Athens, GA 30602, USA. E-mail: aramirez@arches.uga.edu

## 2002

**14643.** Hollows, J.W.; Townsend, C.R.; Collier, K.J. (2002): Diet of the crayfish *Paraneohpops zealandicus* in bush and pasture streams: insights from stable isotopes and stomach analysis. *New Zealand Journal of Marine and Freshwater Research* 36: 129-142. (in English) ["*P. zealandicus* stomachs from streams in both native bush (mainly tree leaves and dicotyledonous seeds) and exotic pasture settings (mainly grass stems and monocotyledonous seeds) were dominated by allochthonous material. More detritus occurred in stomachs in autumn-winter than in spring-summer, but quantities were similar in crayfish from native bush and pasture streams. The stomachs of larger crayfish contained a significantly greater proportion of detritus than smaller individuals. Aquatic invertebrates were the second most abundant dietary category by volume, with highest values in winter, but there were no significant differences between land uses or crayfish size classes. A wide range of invertebrates was eaten by crayfish, with mayfly nymphs, chironomid larvae, and snails predominating. The latter were numerically more prominent in crayfish from bush than pasture streams. Terrestrial invertebrates were recorded from 4% of stomachs, but there were no significant differences in relation to land use, season, or crayfish size class. Despite aquatic invertebrates making up <4% of stomach volumes on average, stable isotope analysis indicated a greater importance for invertebrate prey in terms of assimilation and incorporation into crayfish biomass. Allochthonous detritus and moss appeared to be unimportant. Whereas the results of stomach analysis provided some evidence of an ontogenetic shift, with detritus assuming greater importance in larger crayfish, this pattern was not supported by isotope analysis because invertebrate prey appeared more important to the diet than detritus. An unidentified carbon source, depleted in <sup>13</sup>C and perhaps of microfloral origin, seems to be an important energy source for crayfish in both stream types." (Authors) The diet included one unidentified dragonfly (larva?).] Address: Hollows, J.W., Fish & Game Otago, P.O. Box 76, Dunedin, New Zealand. E-mail: j.hollows@fishgame

## 2003

**14644.** Bagli, L.; Gentilini, G. (2003): New fossil dragonflies from the Upper Miocene of Monte Castellaro, Pe-

saro, Marches, Central Italy (Insecta Odonata Libellulidae). Quaderno di studi e notizie di storia naturale della Romagna 18: 37-50. (in Italian, with English summary) ["Three new species of dragonflies (Odonata Libellulidae) are described and two forewing bases of an unnamed species of *Libellula*, are examined from the Upper Miocene of Monte Castellaro, Pesaro. Holotypes: *Libellula adriatica* n.sp., partly related to extant *Libellula semifasciata* (Burmeister, 1839) but differing in the two brown crossbands on the wing membrane and the seven crossveins below the pterostigma; *Celithemis zavattinii* n. sp., partly related to fossil species *Celithemis cantalensis* (Nel, Arillo & Martinez-Delclos, 1996) and extant *Celithemis ornata* (Rambur, 1842) and *Celithemis martha* (Williamson, 1922), but quite different in the colour pattern of the wing, in the shape of the discoidal triangle and in the number of antenodal and postnodal crossveins; *Sympetrum marinum* n.sp., partly allied to recent species *Sympetrum vicinum* (Hagen, 1861) and *Sympetrum pedemontanum* (Allioni, 1776), but differing especially in the brown crossband of the wing." (Authors)] Address: Bagli, L., Museo del Territorio di Riccione via Lazio, 10, I-47838 Riccione (RN), Italy. E-mail: bagliloris@libero.it

#### 2004

**14645.** Catling, P.; Cannings, R.; Brunelle, P.M. (2004): An annotated checklist of the Odonata of Canada. 33 pp. (in English) ["This list of the 208 species of Canadian Odonata is current as of December 2004. It uses the scientific nomenclature and English names of the North American list sponsored by the Dragonfly Society of the Americas (Paulson & Dunkle 1999, updates and revisions to September 2004). Most French names come from Pilon & Lagacé (1998), which includes only those species known in the province of Québec as of the date of that publication. We encourage the development of appropriate French names for the whole Canadian fauna. Following the List of Species is a table of species occurrence by province and territory with rankings indicating national and provincial conservation status. Also included are recent additions to the Canadian fauna, taxonomic notes and an extensive list of references that provides the basis for decisions on occurrence and status. It is our intention to keep this list up-to-date. We welcome new information and any suggestions for changes or improvements." (Authors) For details see: [https://www.researchgate.net/publication/252055281\\_An\\_Annotated\\_Checklist\\_of\\_the\\_Odonata\\_of\\_Canada](https://www.researchgate.net/publication/252055281_An_Annotated_Checklist_of_the_Odonata_of_Canada); [http://odonatacentral.org/views/static/dsa/2005\\_canada\\_checklist\\_corrections.pdf](http://odonatacentral.org/views/static/dsa/2005_canada_checklist_corrections.pdf)

**14646.** Terzani, F. (2004): Odonati del Molise (Italia Meridionale): nuovi dati (Odonata). *Onychium* 1: 1-7. (in Italian, with English summary) [Dragonflies from Molise (Southern Italy): new data (Odonata). - Twelve species collected in Molise are listed, four of which are new for the region: *Pyrrhosoma nymphula*, *Cordulegaster trinarciæ*, *Libellula depressa* and *Orthetrum cancellatum*.]

Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**14647.** Terzani, F.; Fabiano, F. (2004): Descrizione di due aggressioni di *Pararge aegeria* (Linneo, 1758) contro *Calopteryx haemorrhoidalis* (Vander Linden, 1825) (Lepidoptera Satyridae e Odonata Calopterygidae). *Onychium* 1: 33-35. (in Italian, with English summary) [Two attacks of *P. aegeria* against *C. h. haemorrhoidalis* are described. Such attacks are explained as a defence of the territory of the butterfly.] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

#### 2005

**14648.** Bordoni, A. (2005): In ricordo di Italo Bucciarelli (1933-2004). *Onychium* 2: 1-5. (in Italian, with English summary) [Obituary, Venetian entomologist Italo Bucciarelli (1933-2004).] Address: Bordoni, A., Museo di Storia Naturale dell'Università di Firenze, Sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: arnaldo.bordoni@libero.it

**14649.** De Meester, L.; Declerck, S.; Stoks, R.; Louette, G.; van de Meutter, F.; de Bie, T.; Michels, E.; Brendonck, L. (2005): Ponds and pools as model systems in conservation biology, ecology and evolutionary biology. *Aquatic Conserv: Mar. Freshw. Ecosyst.* 15: 715-725. (in English) ["(1.) Ponds and pools, broadly defined in this paper to include all small and shallow standing waters that permanently or temporarily contain water, are numerous, diverse and important from a conservation point of view. We here argue that ponds and pools offer powerful potential for studies in ecology, evolutionary biology and conservation biology. (2.) An outline is given of the characteristics of ponds and pools that make them good model systems for large-scale surveys and hypothesis testing through experimental manipulation. Such studies will not only increase understanding of community and genetic structure, as well as of patterns of biodiversity, in small aquatic habitats themselves, but may also contribute significantly to testing general theory. (3.) These merits are illustrated by the recent progress on the understanding of the relative importance of local versus regional factors in structuring populations and communities, as well as of the impact of hydroperiod on community and ecosystem functioning." (Authors) The paper includes references to Odonata.] Address: De Meester, L., Laboratory of Aquatic Ecology, Katholieke Universiteit Leuven, Charles de Bériotstraat 32, 3000 Leuven, Belgium. E-mail: luc.demeester@bio.kuleuven.be

**14650.** Giannini, N.P.; Kalko, E.V. (2005): The guild structure of animalivorous leaf-nosed bats of Barro Colorado Island, Panama, revisited. *Acta Chiropterologica*

7(1): 131-146. (in English) ["We examined data sets on dietary composition of a rich (15 species) assemblage of animal-eating Neotropical leaf-nosed bats (Phyllostomidae: Phyllostominae) that occur syntopically on Barro Colorado Island, Panama. Our aim was to test previously postulated trophic structure of phyllostomines in the light of alternative analytical techniques and new data. The trophic structure of this assemblage, according to new results from Correspondence Analysis, has two main trends of variation: a gradient of increased carnivory (axis 1) and a gradient involving plant and arthropod consumption (axis 2). This rejects previous hypotheses of this guild in which the structure was described as a complex of many independent discrete resources. Although all data sets agree that coleopterans as a group are an important food item for most species, Phyllostominae bats are not typically durophagous; i.e., they lack cranial and dental adaptations for rapid processing of hard-shelled arthropods as found in other bat families. Furthermore, insectivory varies inversely with body size, and is gradually replaced by carnivory in association with increasing mass and limited dental modifications. Together with CA results, this suggests that carnivory is an extreme of animalivory rather than a qualitatively distinct feeding habit among Phyllostominae bats. This conclusion fits biomechanical data that indicate that carnivorous bats are bigger and only modestly modified versions of soft-insect specialists." (Authors) The diet of *Micronycteris hirsuta* and *M. microtis* included a few Odonata.] Address: Giannini, N.P., Dept of Mammalogy, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024-5192, USA. E-mail: norberto@amnh.org

**14651.** Terzani, F. (2005): Ricerche odonatologiche in Toscana. IX. Nuovi dati sull'Arcipelago Toscano (Odonata). *Onychium*, Firenze 2: 6-8. (in Italian, with English summary) ["Odonatological research in Tuscany. IX. New data for the Tuscan Archipelago (Odonata). - Eleven species collected on various islands of the Tuscan Archipelago are listed. Of these species, three are new for Capraia Island (*Aeshna cyanea*, *Sympetrum meridionale*, *S. sanguineum*, one for Pianosa Island (*S. fonscolombii*), one for Elba Island (*S. fonscolombii*), one for Giglio Island (*Chalcolestes viridis*) and one for the Tuscan Archipelago (*S. sanguineum*)." (Authors)] Address: Terzani, F., Museo di Storia Naturale dell'Universita di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**14652.** Torralba Burrial, A.; Ocharan, F.J. (2005): Deformidad abdominal en *Coenagrion mercuriale* (Charpentier, 1825) (Odonata: Coenagrionidae). *Boletín de la SEA* 36: 369-370. (in Spanish) [Aguilar del Alfambra (Teruel, NE Spain) 28.VII.2004. A teratological abnormality of a male *C. mercuriale* is documented.] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antoniotb@hotmail.com

**14653.** Abbott, J. (2007): *Argia* 19(4). *Argia* 19(4): 1-24. (in English) [Calendar of Upcoming Events: 1; 2008 DSA SE Regional Meeting: 2; 2007 Treasurer's Final Report: 2; Northeastern NymphFest 2008 in Athol, Massachusetts: 2; Northeast Regional Meeting of the DSA, in the Northern Adirondacks and St. Lawrence Valley of New York, 26-29 June 2008: 3; BAO Manuscript Acceptance: 23] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**14654.** Abbott, J.C. (2007): Book Review: *Dragons in the Ponds* by Robert H. Armstrong, John Hudson, and Marge Hermans. *Argia* 19(4): 23. (in English) [review of a book directed to introduce children into dragonflying.] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., University of Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**14655.** Abbott, J.C. (2007): New and interesting Odonate discoveries. *Argia* 19(2): 25. (in English) [*Anax amazili*, 8-vi-2007, Captiva Island, Lee County, Florida, USA; *Argia oenea*, 22-v-2007, Fresno Canyon, near La Luz, Otero County, New Mexico, USA] Address: Abbott, J.C., Patterson Labs 219, School of Bio. Sci., Univ. Texas, Austin TX 78712, USA. E-mail: jcabbott@mail.utexas.edu

**14656.** Anonymous (2007): *Libellula*. *Argia* 19(4): 21. (in English) [Reprint of an old poem first published in the *Entomological News* in 1910.] Address: Tennesen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**14657.** Avise, J.C. (2007): Turquoise-tipped Darner (*Rhionaeschna psilus*) in California. *Argia* 19(3): 33. (in English) [16-ix-2007, Huntington Beach, Orange County, California, USA] Address: Avise, J.C., Ecology and Evolutionary Biology, University of California, Irvine, CA, 92697, USA. E-mail: javise@uci.edu

**14658.** Ayres, C.; González, I.; Lorenzo, O.; Cordero, A. (2007): Nuevas citas de *Trithemis annulata* (Palisot de Beauvois, 1807) (Odonata: Libellulidae) en Galicia. *Boln. S.E.A.* 41: 402. (in Spanish) [E Rosal (29T, 0517526X, 463339Y), 19-vii-2005; Cerquido (29T, 0531025X, 4660862Y), Porriño (Pontevedra), x-2005; Con, Villagarcía (Pontevedra) (29T, 0522950, 4717970), summer 2006.] Address: Cordero Rivera, A., Depto de Ecología e Bioloxía Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**14659.** Biggs, K.; Johnson, P.; Roberson, D. (2007): CalOdes/DSA Ode Blitz III: The Owens Valley: Mono and Inyo Counties 10-13 August. *Argia* 19(4): 3-6. (in English)



[Report on a regional faunistic study on Odonata in California, USA.] Address: Biggs, Kathy, 308 Bloomfield Road, Sebastopol CA, 95472, USA. E-mail: bigsnest@sonic.net

**14660.** Bledsoe, R. (2007): First record of Baja Bluet (*Enallagma eiseni*) in California. *Argia* 19(2): 23-24. (in English) [17-vi-2007, Tia Juana Valley Regional Park near San Diego, California, USA] Address: Bledsoe, R. E-mail: rbledsoe@yahoo.com

**14661.** Bridgehouse, D.W. (2007): Significant range extension and County record for *Erythrodiplax berenice* (Seaside Dragonlet) in Nova Scotia. *Argia* 19(4): 13-14. (in English) [Addition to the known records in Nova Scotia, Canada: 2-viii-2007, saltmarsh in the vicinity of Voglers Cove, Lunenburg County, 44.156°N 64.5307°W] Address: Bridgehouse, D.W., 24 Kiel Court, Eastern Passage, NS BSG 1R3, Canada. E-mail: d.bridgehouse@ns.sympatico.ca

**14662.** Daigle, J.J. (2007): Springtime in Tallahassee, Florida 2007. *Argia* 19(2): 5-6. (in English) [Notes on some records in spring of 2007 in Florida, USA] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@nettally.com

**14663.** Danforth, D.; Bailowitz, R. (2007): A new dragonfly species for Arizona. *Argia* 19(4): 16. (in English) [19-xi-2007, Cebadilla Pond, Tucson, Arizona, USA, *Micrathyrina aequalis*] Address: Bailowitz, R., 15444 N. Indian Trail, Tucson, AZ 85750 USA. E-mail: raberg2@q.com

**14664.** De Marmels, J. (2007): How and when did the Vagrant Emperor, *Hemianax ephippiger* (Burmeister, 1839) arrive in the Caribbean?. *Argia* 19(2): 16. (in English) [The author reports on gigantic swarms of the African Desert Locust *Schistocera gregaria* crossed the Atlantic, probably helped by storm winds following a hurricane and arriving on Caribbean islands. Such storms also could explain the arrival of *Anax ephippiger* in the Caribbean region.] Address: De Marmels, J., Inst. Zool. Agricola, Fac. Agronomia, Univ. Central de Venezuela, Apdo. 4579, Maracay 2101, Edo. Aragua, Venezuela. E-mail: demarmjc@hotmail.com

**14665.** Dolný, A.; Matějka, P. (2007): A contribution to population biology of *Libellula fulva* (Odonata: Libellulidae) on coal sludge sedimentation pond (Karviná – Czech Republic). *Ekológia (Bratislava)* 26(4): 341-351. (in English) ["The basic ecological characteristics of the only known population of *Libellula fulva* Müller in the Czech Republic (estimate of population size, territoriality, time of occurrence, mating season etc.) including the description of the habitat and overall dragonfly assemblage in the researched locality are reported. In 2002, we marked 76 males, total number of recaptures was 31. In 2003, we marked 114 males, there was a total 50 recaptures. The estimate of the Schnabel population density of adult males

in the 2002 was 123 specimens (the 95% confidence limits: 88–178). The estimate of the male population size in 2003 was 188 specimens (the 95% confidence interval: 145–271). In 2002 imago activity lasted 70 days, in 2003 only 41 days. In 2002, imago activity became apparent at the end of April; the first immature imago was discovered on 27-IV-2002. The maximum discovered life span of adult specimens we identified to be 16 days in 2002. In 2003 it was 26 days. Immature adults were recorded no later than in the first two weeks of imago occurrence. Interspecific territoriality was observed mainly in relation to *Orthetrum coerulescens*. We recorded 33 species of the dragonflies in the researched locality (12 species of Zygoptera, 21 species of Anisoptera). The only known area with the autochthonous occurrence of *Libellula fulva* in the Czech Republic is the Karviná-Doly – Mokroš locality, where *L. fulva*, curiously, evolves in a rather extreme environment i.e. a dam, which until recently was used for the sedimentation of coal sludge. Furthermore, this species was considered missing or rather extinct from 1913 to 1999 in the whole of the Czech Republic." (Authors)] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Slezská Ostrava 1, Czech Republic. E-mail: Alnes.Dolny@osu.cz

**14666.** Donnelly, T.W. (2007): Book Review: Damsellies of North America. A Color Supplement by Michael L. May and Sidney W. Dunkle. *Argia* 19(4): 23. (in English) [Detailed review with focus on the problems of true documenting colours of specimens and variability of morphs.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**14667.** Donnelly, T.W. (2007): Book Review: Dragonflies of North America, A Color and Learn Book With Activities, by Kathy Biggs and Tim Manolis. *Argia* 19(2): 31. (in English) [Review of a children book on dragonflies.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**14668.** DuBois, B. (2007): GLOM 2007 visits northeastern Illinois. *Argia* 19(4): 17-18. (in English) [Report from the 7th Annual Great Lakes Odonata Meeting held at 8-10 June 2007 at the Visitor Center, Volo Bog State Natural Area, Lake County, Illinois, USA.] Address: DuBois, R., Wisconsin Department of Natural Resources, 1401 Tower Ave., Superior, WI 54880, USA. E-mail: robert.dubois@Wisconsin.gov

**14669.** Gallucci, T. (2007): Red Wasp (*Polistes carolina*) predation on Pale-faced Clubskimmer (*Brechmorhoga mendax*). *Argia* 19(2): 20-21. (in English) [Leakey, Real County, Texas, USA, 23-vi-2007] Address: Gallucci, T., Gulf Coast Laboratory for Wildlife Research and Milk River Film, P.O. Box 6, Camp Verde, Texas 78010-5006, USA. E-mail: hurricanenet@hotmail.com

**14670.** Gallucci, T.; Freeman, B. (2007): Notes on avian predators of Odonata. *Argia* 19(2): 21-23. (in English)

[The authors document photographs of avian predators on Odonata found online or by personal observation.] Address: Gallucci, T., Gulf Coast Laboratory for Wildlife Research and Milk River Film, P.O. Box 6, Camp Verde, Texas 78010-5006, USA. E-mail: hurricanenet@hotmail.com

**14671.** Groover, R. (2007): Dragonfly vivarium construction plans. *Argia* 19(2): 29. (in English) [Construction plan for an outdoor dragonfly vivarium.] Address: Groover, R., J. Sargeant Reynolds Community College, USA. E-mail: rgroover@reynolds.edu

**14672.** Hatfield, J.K. (2007): The dragonflies and damselflies of the Llano Estacado: In search of more new species records on the Texas Panhandle South Plains. *Argia* 19(4): 10-11. (in English) [Additions to the regional list of species from the Lubbock County Texas, USA are given. Special emphasis is given to *Rhionaeschna psi-lus*.] Address: Hatfield, J.K., Lubbock, Texas, USA. E-mail: dragonflywatcher1029@yahoo.com

**14673.** Huang, J.-P. (2007): Multiple invasions and late Pleistocene demographic expansion of the Formosan damselfly, *Euphaea formosa* from Taiwan. M.Sc. thesis, Department of Life Science, Tunghai University: 42 pp. (in English, with Chinese summary) ["We used an endemic Formosan damselfly, *Euphaea formosa* (Insecta: Odonata: Euphaeidae) in Taiwan to investigate the pattern of contemporary population genetic structure using both mitochondrial cytochrome oxidase II (COII) and nuclear internal transcribed spacer (ITS) genes, and to discuss geohistorical events and life history characteristics that may have contributed to the observed patterns. Our results suggested that there was substantial gene flow among populations. Two distinct haplotype clades, one western restricted and one widespread clade, were identified based on COII phylogeny. The COII western clade, which showed a significant isolation by distance pattern, may colonize Taiwan due greatly to recent glacial events. Historical demography estimated using Bayesian skyline plot (BSP) and mismatch distribution showed a pattern of recent population expansion. Significant negative Tajima's D and Fu's FS values coupled with star-like networks of COII widespread clade and ITS also indicate population expansion. We conclude that the colonization and demographic expansion of damselfly populations were likely the result of increased available habitats during late Pleistocene." (Author)] Address: not stated

**14674.** Johnson, J. (2007): Love bites. *Argia* 19(4): 21. (in English) [Gold Lake, Cascade Mountains, Lane County, Arizona, USA; story on an attempt of a male *Argia vivida* to copulate with a female *Octogomphus specularis*.] Address: Johnson, J., 3003 Unander Ave, Vancouver, WA 98660, USA. E-mail: jt\_johnson@comcast.net

**14675.** Keppner, E.J.; Keppner, L.A. (2007): Odonata survey of Bay County, Florida. *Argia* 19(4): 15-16. (in

English) [USA; checklist of 77 species studied between iv-2003 and ix-2007.] Address: Keppner, E.J., 4406 Garrison Road, Panama City, FL 32404, USA. E-mail: ekeppner@bellsouth.net

**14676.** Kerst, C. (2007): Memories of Monty. *Argia* 19(4): 19-20. (in English) [Some personal notes on the times at Purdue University as responsible in B.E. Montgomery's lab to rear odonate larvae.] Address: Kery, Cary. E-mail: cary\_k@comcast.net

**14677.** Klymko, J. (2007): *Celithemis martha* (Martha's Pennant): a new species for New Brunswick. *Argia* 19(4): 11. (in English) [9-viii-2006, 45.2815°N 066.2445°W, Canada] Address: Klymko, J. E-mail: jklymko@gmail.com

**14678.** Lethaby, N. (2007): The discovery of the Exclamation Damsel (*Zoniagrion exclamationis*) south on the central California coast to Santa Barbara County. *Argia* 19(4): 12. (in English) [USA; records of the species along the Californian coast are documented.] Address: Lethaby, N., 6807 Sweetwater Way, Goleta, CA 93117, USA. E-mail: nlethaby@ti.com

**14679.** Martin, K. (2007): Photo documentation of *Stylurus spiniceps* (Arrow Clubtail) nymphal eclosure. *Argia* 19(4): 22. (in English) [5-vii-2007, Connecticut River, northern Massachusetts, USA, detailed documentation of the emergence of *S. spiniceps*.] Address: Martin, Kirsten, Antioch University New England, Keene, NH, USA. E-mail: Kirsten\_Martin@antiochne.edu

**14680.** Meurgey, F. (2007): New and interesting records from Martinique (French West Indies). *Argia* 19(2): 27-28. (in English) [*Lestes tenuatus*, 17-iv-2007, southern part of Martinique; *Triacanthagyna caribbea*, ?2007, La Pagerie, Trois-Ilets, Martinique; *Tramea calverti*, iv-2007, L'Anse Mitan, Martinique] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, 44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**14681.** Michalski, J. (2007): To Nick Donnelly on the occasion of his 75th birthday. *Argia* 19(4): 6-9. (in English) [Biographic notes to one of the most influencing American odonatologists of the 20th and beginning 21<sup>st</sup> century.] Address: Michalski, J., 1223 Mount Kemble Av., Morristown New Jersey 07960, USA. E-mail: huonia@aol.com

**14682.** Roberson, D. (2007): Saving (my) private clubtail. *Argia* 19(2): 7. (in English) [Nice story on tracking the very rare *Gomphus kurilis* at San Antonio River, Monterey County, California, USA at 29-iv-2007. The title photo of *Argia* 19(2)-issue demonstrates the threat of this outstanding dragonfly by a bullfrog ...] Address: Roberson, D., 282 Grove Acre Ave., Pacific Grove, CA 93950, USA. E-mail: creagrus@montereybay.com

**14683.** Sibley, F.C. (2007): Zebra mussels and lake odonates. *Argia* 19(2): 15-16. (in English) [28-vi-2007, Keuka

Lake, Yates Country, New York, USA. Exuviae of *Epi-theca princeps* and *E. cynosura* were infested by mus-sels] Address: Sibley, F.C., The Conservation Agency, 6 Swinburne St. Jamestown, RI 02835, USA. E-mail: fcsibley@empacc.net

**14684.** Soler, E.; Arlés, M. (2007): Nuevos registros de *Zygonyx torridus* (Kirby, 1889) para la Península Ibérica (Odonata, Libellulidae). *Boln. S.E.A.* 41: 376. (in Spanish) [Río Quesa-Escalona, Quesa (Valencia), Spain, 200 m asl 30SXJ9433, 13-VII-2006] Address: Soler, Ester, Universitat de València. Institut Cavanilles de Biodiversitat i Biologia Evolutiva (ICBiBE). Apartat de correus 2085, 46071. València, Spain. E-mail: esther.soler@uv.es

**14685.** Tennessen, K. (2007): Maiden flight. *Argia* 19(1): 15. (in English) [poem] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennes-sen@centurytel.net

**14686.** Tennessen, K. (2007): Rearing and photographing *Orthemis* (Tropical King Skimmers). *Argia* 19(2): 30. (in English) [The note introduces some technical notes of preserving specimens of *Orthemis* urgently needed to separate *O. ferruginea* and *O. discolor* by morphological features.] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennes-sen@centurytel.net

**14687.** Terzani, F. (2007): Ricerche odonatologiche in Toscana. XI. La *Boyeria irene* (Fonscolombe, 1838) (Odonata, Aeshnidae). *Onychium* 5: 26-28. (in Italian, with English summary) [New records of *B. irene* are presented and its distribution in Tuscany, Italy is mapped.] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**14688.** Young, S. (2007): Odes on bank notes. *Argia* 19(2): 28. (in English) [Documentation of the Norwegian 50 Fenti Kroner banknote, probably the only one of official currency with a dragonfly figured. There are also some fantasy banknotes from the "Territory of West Junee" (<http://www.mujand.com/territory-of-west-junee.html>).] Address: Young, S., Austin, Texa, USA. E-mail: birding-biker@austin.rr.com

## 2008

**14689.** Bartolozzi, L.; Cianferoni, F.; Fabiano, F.; Mazza, G.; Rocchi, S.; Terzani, F.; Zinetti, F. (2008): Osservazioni sulla entomofauna della Piana Fiorentina. In: *Un Piano per la Piana. Atli del Convegno, 9 maggio 2008, Polo Scientifico e Tecnológico di Sesto Fiorentino*: 14 pp. (in Italian) [records of *Ischnura pumilio*, *Coenagrion scitulum*, *Brachytron pratense* and *Trithemis annulata* are documented. For details see: <http://www2.msn.unifi.it/upload/sub/specola/IMG/Piano%20per%20la%20piana/06.pdf>] Address: Bartolozzi, L., Museo di Storia Naturale, Sezione di Zoologia "La Specola", Università degli Studi di Firenze, via Romana, 17-50125 Firenze, Italy. E-mail: luca.baitolozzi@umfi.it

**14690.** Collober, O. (2008): Odonates. La virgule - Bulletin de liaison sur les insectes et autres invertébrés du Poitou-Charentes 1: 11-12. (in French) [The following papers are published: Une liste régionale des Odonates menacés; Poursuite de l'inventaire régional des Odonates!; L'Anax napolitain [Anax parthenope], reproducteur en Deux-Sèvres. For details see: [http://www.poitou-charentes-nature.asso.fr/IMG/pdf\\_virgule\\_pcn\\_1.pdf](http://www.poitou-charentes-nature.asso.fr/IMG/pdf_virgule_pcn_1.pdf)] Address: Poitou-Charentes - Nature, 14 rue Jean Moulin, 86240 Fontaine le Comte, France. [www.poitou-charentes-nature.asso.fr](http://www.poitou-charentes-nature.asso.fr)

**14691.** Ferreira, S.; Soares, A.; Grosso-Silva, J.M. (2008): Dragonfly (Insecta, Odonata) records from three northern Portugal localities. *Boletim de la S.E.A.* 42(1): 445-446. (in Spanish, with English summary) ["The known distribution of 21 Odonata species is increased in continental Portugal. Nine species are recorded for the first time from the Natura 2000 site "Valongo", including a new population of *Oxygastra curtisii*. The known distribution of *Anax parthenope* is significantly increased towards the north-west of Iberia." (Authors)] Address: José Manuel Grosso-Silva, J.M., CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, Universidade do Porto, Campus Agrário de Vairão, 4485-661 Vairão; Portugal. E-mail: jmgrossosilva@yahoo.com

**14692.** Marconi, A.; Terzani, F. (2008): Odonati raccolti nella République Démocratique du Congo da M. Spadone (Odonata). *Onychium* 6: 48-53. (in Italian, with English and French summaries) ["Dragonflies collected in the République Démocratique du Congo by M. Spadone (Odonata). Of the 14 species collected in the Bas-Congo Province (République Démocratique du Congo) six are new for this state: *Sapho orichalcea*, *Elattonaura centrafricanam*, *Pseudagrion epiphonematicum*, *Gynacantha vesiculata*, *Lokia corydoni* and *Orthetrum c. chrysostigma*." (Authors)] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**14693.** Terzani, F.; Marconi, A. (2008): Odonati della "Réserve Naturelle de Tchimpounga" (République du Congo) (Odonata). *Onychium* 6: 43-47. (in Italian, with English and French summaries) ["Of the 16 species collected in the Tchimpounga Natural Reserve (Republic of Congo) two are new records for the Republic of Congo [(*Aethiothemis palustris* Martin, 1912 and *Lokia erythromelas* (Ris, 1909))." (Authors)] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com



**14694.** Terzani, F.; Zinetti, B. (2008): Odonati raccolti in alcune aree protette della Provincia di Arezzo (Toscana) (Odonata). *Onychium* 6: 25-42. (in Italian, with English summary) ["Odonata collected in some Natural Reserves of Arezzo Province (Tuscany). Collecting in the Tuscan Natural Reserves in the Province of Arezzo (Central Italy) has yielded 37 species of dragonflies the most interesting of which are *Sympetma fusca*, 1820), *Coenagrion mercuriale castellani*, *Coenagrion scitulum*, *Ischnura pumilio*, *Oxygastra curtisii* and *Sympetrum depressiusculum*. Also included is general information on the Reserves." (Authors)] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**14695.** Wilson, K.D.P. (2008): Crepuscular activity in *Orientogomphus minor* (Laidlaw) comb. nov. from Thailand and clarification of the taxonomic status of closely related species. *Echo* 5: 15-21. (in English) ["9-11th April I explored the Khao Phanom Bencha Forest National Park, Krabi, Thailand. All Thai specimens, formally attributed to *circularis* or *Onychogomphus* sp., belong to *Orientogomphus minor*. *Orientogomphus circularis* is a distinct and relatively large species from north Burma. *O. minor* is a small species ranging throughout Thailand to Peninsular Malaysia (abd. 35.0-36.5, hw 25.0-27.0). *Orientogomphus naninus* is of similar size to *circularis* but is not its junior synonym and neither is it a synonym of *minor*; it is another distinct species from northern Vietnam. A map showing the distribution of all specimens collected belonging to the genus *Orientogomphus* is provided." (Author)] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: wilsonkd@ntlworld.com

## 2009

**14696.** Huang, D.-Y.; Nel, A. (2009): First fossil record of a Lindeniidae from the Miocene Shanwang Formation of China (Odonata, Anisoptera). *Bulletin de la Société entomologique de France* 114(4): 441-443. (in English, with French summary) ["The first Chinese and fifth fossil Lindeniidae is described but not named from the Miocene Shanwang Formation of Linqu City, Shandong Province. Except for an Early Cretaceous taxon from Brazil, all the representatives of this family are from the Oligocene-Miocene of the Palaearctic region." (Authors)] Address: Huang, D.-Y., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, P.R. China. E-mail: huangdiying@sina.com

**14697.** Jones, R.W. (2009): The impact on biodiversity, and integrated control, of water hyacinth, *Eichhornia crassipes* (Martius) Solms-Laubach (Pontederiaceae) on the Lake Nsezi – Nseleni River System. M.Sc. Thesis, Department of Zoology and Entomology Rhodes University: 115 pp. (in English) ["Water hyacinth, a free floating

aquatic plant was discovered by C. von Martius in 1823 in Brazil. It is believed to have been introduced into South Africa, as an ornamental plant, in 1908 to the Cape Province and Natal. Since its introduction, water hyacinth has spread throughout South Africa to the detriment of all aquatic systems that it has been introduced to directly or indirectly. The weed was first positively identified on the Nseleni and Mposa rivers on the Nseleni Nature Reserve which is a protected area near Richards Bay in KwaZulu-Natal in 1982 and formed a 100% cover of the river by 1983. An integrated management plan was implemented in 1995 and resulted in a reduction of the weed from a 100% cover to less than 20% cover in 5 years. The keys to success of the water hyacinth integrated management plan, presented here, were finding the source of the weed, mapping the extent of the water hyacinth infestation, identifying sources of nutrient pollution, appointing a champion to drive the programme, dividing the river into management units, consultation with interested and affected parties, judicious use of herbicides and biological control and a commitment to follow-up. This study further showed that water hyacinth on the Nseleni and Mposa river systems had a negative impact on the biodiversity of the protected area and the control of water hyacinth resulted in the recovery of the benthic invertebrate, amphibian, reptile, fish and avian fauna. The implementation of this integrated management plan was very cost-effective and serves as a model approach to the control of water hyacinth in both South Africa and the rest of the world." (Author) Odonata are treated at the family level.] Address: Jones, R.W., Dept of Zoology & Entomology Rhodes University, P.O.Box 94, Grahamstown 6140. USA

**14698.** Keppner, E.J.; Keppner, L.A. (2009): A beginners guide to the dragonflies and damselflies from Bay and surrounding counties, Florida. Lake Sands District, Boy Scouts of America (ed.): II + 18 pp. (in English) [For details see: <http://lakesandsdistrict.org/docs/Animals/Begin%20Guide%20for%20Boy%20Scouts%208-09.pdf>] Address: Keppner, Lisa, Garrison Road, Panama City, FL 32404 USA. E-mail: lkeppner@bellsouth.net

**14699.** Marconi, A.; Terzani, F. (2009): Dragonflies from Kenya deposited in the Natural History Museum of Florence University, Zoological Section "La Specola" (Odonata). *Onychium* 7: 36-43. (in Italian, with English summary) [A collection of 134 specimens of Odonata from Kenya has been revised; 3 family, 19 genera and 28 species are listed. Morphological details of *Ceriatagrion moorei*, *Gynacantha usambarica*, *Orthetrum brachiale*, *O. caffrum*, *O. julia falsum*, *Tramea basilaris* and *Tritthemis wernerii* are figured.] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**14700.** Ramadan, A.M.; Ihsan, S.E.; Shiha, M.S. (2009): A taxonomic study of the species belonging to Aeshnidae

and Gomphidae Families (Anisoptera: Odonata) on the Syrian coast. *Tishreen University Journal for Research and Scientific Studies - Biological Sciences Series* 31(1): 148-165. (in Arabian, with English summary) [103 specimens of Aeshnidae and Gomphidae "were collected from 11 sites on the Syrian coast during 2006– 2007. Morphological and taxonomical aspects of collected specimens have been studied. Identification keys of genera, and species were obtained according to the most important taxonomic features: ...Gomphus davidi, Onychogomphus macrodon, O. lefebvrei, Paragomphus sinaiticus, Anax imperator, A. parthenope, A. immaculifrons, Hemianax ephippiger, Anaciaeschna isosceles, Aeshna mixta and Caliaeschna microstigma. ... O. macrodon, Paragomphus sinaiticus, A. parthenope, A. immaculifrons, Anaciaeschna isosceles, Aeshna mixta are recorded for the first time in Syria." (Authors)] Address: Ramadan, A.M., Plant Protection Dept, Fac. Agriculture, Tishreen Univ., Lattakia, Syria

**14701.** Roble, S.M.; Carle, F.L.; Flint, O.S. (2009): Dragonflies and damselflies (Odonata) of the Laurel Fork recreation area, George Washington National Forest, Highland County, Virginia: Possible evidence for climate change. In: S. M. Roble and J. C. Mitchell (eds.). 2009. *A Lifetime of Contributions to Myriapodology and the Natural History of Virginia: A Festschrift in Honor of Richard L. Hoffman's 80th Birthday*. Virginia Museum of Natural History Special Publication No. 16, Martinsville, VA: 365-399. (in English) ["The Odonata fauna of the Laurel Fork Recreation Area in the George Washington National Forest, Highland County, Virginia, was sampled on more than 50 dates between 1971 and 2008. A diverse fauna of 66 species (43 dragonflies, 23 damselflies) was documented in the study area, including four species not recorded elsewhere in Virginia and four others that have been recorded from only one other site in the state (two from nearby sites in the same county). Most of the species are confirmed or suspected to breed in the study area at beaver ponds, seepage habitats, headwater streams, or the mainstem of Laurel Fork. Twenty-one species were documented by the collection or observation of only 1-2 adults during the entire study, suggesting that they may have been migrants, strays, immigrants, or rare and declining species. Approximately a quarter of the species recorded in the study area are at or near their southern range limits, and a third of the Laurel Fork fauna is included on the Virginia Division of Natural Heritage program's current list of state-rare species. Collecting occurred primarily during two periods, the first from 1971-1982 and the second from 1992-2003. Five boreal species were only collected during the first period and 12 austral species were only collected during the second period, suggesting a change in community structure that is concordant with climate warming. Record early or late flight dates for Virginia populations were documented for 24 species. The Laurel Fork Recreation Area is a regionally significant site for the protection of biodiversity." (Authors)] Address: Roble, S.M., Virginia Dept of Conservation and Recreation Division of Natural Heritage 217 Governor Street Richmond, Virginia 23219

**14702.** Terzani, F. (2009): Monitoraggio dell entomofauna di una pozza astatica in provincia di Firenze, 2: odonati (Odonata: Lestidae, Coenagrionidae, Aeshnidae, Libellulidae). *Onychium* 7: 17-19. (in Italian, with English summary) [*Lestes barbarus*, *Chalcolestes viridis*, *Ischnura elegans*, *Coenagrion puella*, *Anax imperator*, *Sympetrum sanguineum*, *S. striolatum*, and *S. meridionale* are listed from an astatic pool (Il Ferrone, Impruneta) in the province of Firenze, Italy. A figure of an unusual abdominal pattern in male *Coenagrion puella* is included.] Address: Terzani, F., Museo di Storia Naturale dell'Universita di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**14703.** Terzani, F. (2009): Odonati raccolti nell'Alto Appennino reggiano, parmense e massese (Emilia-Romagna, Toscana) (Odonata). *Onychium* 7: 29-35. (in Italian, with English summary) [Twenty one taxa collected at 18 localities in the High Apennines of the provinces of Parma, Reggio Emilia and Massa-Carrara (Emilia-Romagna, Tuscany, Italy) are listed. *Calopteryx virgo virgo*, *C. virgo meridionalis*, *Lestes dryas*, *Enallagma cyathigerum*, *Coenagrion puella*, *Pyrrhosoma nymphula*, *Platycnemis pennipes*, *Aeshna isosceles*, *A. cyanea*, *Anax imperator*, *A. parthenope*, *Onychogomphus forcipatus unguiculatus*, *Libellula quadrimaculata*, *L. depressa*, *Sympetrum sanguineum*, *S. fonscolombii* and *S. meridionale* are cited for the first time in this geographic area. *Cordulia aenea* is confirmed.] Address: Terzani, F., Museo di Storia Naturale dell'Universita di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

## 2010

**14704.** Gainzarain, J.A. (2010): Primera cita de *Aeshna juncea* (Linnaeus, 1758) (Odonata, Aeshnidae) para Cantabria (norte de España). *Boletín de la S.E.A.* 46(1): 448. (in Spanish) [A record of *A. juncea* is documented: 14-viii-2009, 1280 m asl, Cantabria (municipio de Arredondo; 30TVN4687)] Address: Gainzarain, J.A., Instituto Alavés de la Naturaleza Apdo. de correos 2092 01080 Vitoria-Gasteiz, Spain. E-mail: j.a.gainzarain@euskalnet.net

**14705.** Hermans, J.H. (2010): The dragonfly fauna of southern Limburg. *Natuurhistorisch Maandblad* 99(9): 189-200. (in Dutch, with English summary) ["The article presents an overview of our present knowledge about the dragonflies of the southern part of the province of Limburg. 55 species of dragonflies were observed between 1990 and 2007. Dragonflies of oligotrophic waters (moorland pools or bogs) such as *Ceriagrion tenellum*, *Leucorrhinia rubicunda*, *Aeshna juncea* or *Somatochlora arctica* are restricted to the area around the villages of Brunssum and Schinveld. Species such as *Ischnura elegans*, *Coenagrion puella*, *Aeshna cyanea* and *Libellula depressa*, which show no preference for a particular type

of water, are widespread and abundant in Southern Limburg. Species which prefer running waters are found in the valleys of the river Meuse and the larger brooks, such as Geul and Gulp. Some dragonfly habitats, such as pools and limestone quarries, are discussed separately. Several pools in the Mergelland (the southwestern part of Southern Limburg) have disappeared and many are in a deplorable state due to lack of maintenance. The most common species breeding in such pools are Blue Hawker, Common Bluetail and Broad-bodied Chaser. Limestone quarries are of great importance for dragonflies. The sheltered situation and the continuing limestone extraction provide a special and warm habitat. Most of the dragonfly species recorded there, like *Ischnura pumilio*, *Orthetrum brunneum* and *O. coerulescens* need the dynamic environment found in these quarries." (Author)] Address: Hermans, J.T.; Hertestraat 21, NL-6067 ER Linne, The Netherlands

**14706.** Hoang, T.H.; Locke, K.; Dang, K.C.; De Pauw, N.; Goethals, P.L.M. (2010): Communities in the Du River Basin in Northern Vietnam. *Journal of Freshwater Ecology* 25(4): 637-647. (in English) ["... subtropical northern Vietnam. 70 taxa were identified, which were dominated by aquatic insects, with Diptera, Hemiptera, Ephemeroptera, and Odonata being the orders with the highest diversities ..." (Authors)] Address: Goethals, P.L.M., Laboratory of Environmental Toxicology and Aquatic Ecology, Ghent University, J. Plaieastraat 22, 9000 Gent, Belgium

**14707.** Kiselyova, G.A.; Prokopov, G.A.; Razumeiko, V.N. (2010): The condition of macrozoobenthos of the mountain streams of Crimea. *Science. Rec. Ternopil. nat. ped. the University. Ser. Bull.* 2(43): 245-248. (in Russian) [The list of taxa includes *Calopteryx splendens taurica*, *Onychogomphus forcipatus*, *Gomphus vulgatissimus*, and *Platycnemis pennipes*] Address: Kiselyova, G.A., Tavrida National V.I. Vernadsky University, Simferopol', Ukraine

**14708.** Kuznetsova, V.G.; Grozeva, S. (2010): Achiasmatic meiosis: a review. *Vestnik VOGiS (The Herald of Vavilov Society for Geneticists and Breeding Scientists)* 14(1): 79-88. (in Russian, with English summary) ["Literature data on achiasmatic meiosis are reviewed. Protozoan, plant, and invertebrate taxa in which meiosis has been found are listed. Independent and repeated origin of achiasmatic meiosis in the evolution of living organisms is shown. However in some groups this pattern is a good taxonomic marker allowing us to establish relationships and recognize monophyletic groups. Association of achiasmatic meiosis with heterogametic sex, presence of the synaptonemal complex in the majority of cases and its role as a structure providing for correct segregation of homologous chromosomes in the meiotic anaphase in the absence of chiasmata and crossing over, diversity of types of achiasmatic meiosis, and its evolutionary significance are discussed." (Authors) The paper

includes a passing reference to Odonata.] Address: Kuznetsova, V.G., Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia. E-mail: karyo@zin.ru

**14709.** Terzani, F.; Cianferoni, F.; Mazza, G.; Zinetti, F. (2010): Ricerche odonatologiche in Toscana. XII. Lago di Montieri, provincia di Grosseto (Odonata) - Odonatological research in Tuscany. XII. Montieri lake, Grosseto province (Odonata). *Onychium* 8: 3-5. (in Italian, with English summary) [Between 2003-2007, 10 odonate species of dragonflies have been collected in the Montieri lake, Italy. The records include a tandem between a male *Lestes parvidens* and female *L. viridis*.] Address: Terzani, F., Museo di Storia Naturale dell'Universita di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

## 2011

**14710.** Akamatsu, F.; Toda, H. (2011): Aquatic subsidies transport anthropogenic nitrogen to riparian spiders. *Environmental Pollution* 159(5): 1390-1397. (in English) ["Research highlights: \* d15N of aquatic insects increases downstream with anthropogenic nitrogen inputs. \* d15N of riparian spiders increases with a high dietary proportion of aquatic insects and smaller spider body size. \* The aquatic subsidies transport anthropogenic nitrogen to smaller riparian spiders downstream. Stable nitrogen isotopic composition (d15N) of aquatic biota increases with anthropogenic N inputs such as sewage and livestock waste downstream. Increase in d15N of riparian spiders downstream may reflect the anthropogenic pollution exposure through predation on aquatic insects. A two-source mixing model based on stable carbon isotopic composition showed the greatest dependence on aquatic insects (84%) by horizontal web-building spiders, followed by intermediate (48%) and low (31%) dependence by cursorial and vertical web-building spiders, respectively. The spider body size was negatively correlated with the dietary proportion of aquatic insects and spider d15N. The aquatic subsidies transported anthropogenic N to smaller riparian spiders downstream. This transport of anthropogenic N was regulated by spider's guild designation and body size. Smaller spiders assimilate anthropogenic nitrogen through the predation on aquatic subsidies." (Authors) The diet includes *Sympetrum frequens*, *S. infuscatum*, *S. pedemontanum*.] Address: Akamatsu, F., Department of Environmental Sciences, Shinshu University, 3-1-1 Asahi, Matsumoto, Nagano 390-8621, Japan

**14711.** Akkermans, R.W.; Geraeds, R.P.G. ; Schaik, V.A. van (2011): The expansion of the Broad Scarlet in the Dutch province of Limburg. *Natuurhistorisch Maandblad* 100(7): 113-118. (in Dutch, with English summary) ["Although the first Broad scarlet (*Crocothemis erythraea*) in Limburg was seen as early as 1968, it took until 1995 before the second specimen was spotted in the province. In that year, a number of specimens were



observed at several locations. The site with the largest number of observations at the time was the Doort nature reserve near Echt in the central part of Limburg. From 1995 to 2006, the Broad scarlet expanded its range over the whole of the province, although the rate of expansion was low in the first few years, with rising numbers of observations in a few 1x1 kilometre grid squares. From 1998 to 2002, the species expanded to other grid squares from a few core areas where it was seen every year. Between 2003 and 2005, numbers of the Broad scarlet grew slowly and the species spread across further grid squares. But in 2006, the number of observations exploded and there was a major expansion in terms of grid squares. Since that year, the Broad scarlet has colonised the whole province of Limburg and is now a rather common species. The whole colonisation process took about 12 years. Although there have been rumours about the species producing two generations a year, there is still no proof of this. The existence of two peaks in the flight period diagram suggests a second generation, but further investigation is required." (Authors)] Address: van Schalk, V.A., St. Luciaweg 20, 6075 EK Herkenbosch, the Netherlands

**14712.** Cannings, R. (2011): Hanging from a Leaf. In: Li, J.L. & M.T. Barbour (eds.); B. Boonsoong (ill.): Wading for bugs. Exploring streams with the experts. Oregon State University Press. ISBN 978-0-87071-608-9. 176 pp: 103-107. (in English) ["In Wading for Bugs, nearly two dozen aquatic biologists share their memorable encounters with stream insects. The contributors, based primarily in North America, work in diverse environments – from arctic to desert, from mountain streams to river valleys. They represent a wide range of expertise as authors of standard field texts, leaders in biomonitoring and assessment programs, directors of major laboratories, and specialists in aquatic ecology and taxonomy. The writings in Wading for Bugs allow readers to experience – through the eyes of the scientists – what it's like to study stream insects and to make discoveries that could help develop biological indicators for stream health. General summaries introduce each insect order. Elegant insect drawings accompany each story, along with morphological, life history, and habitat information for each species or family. Wading for Bugs will appeal to general readers as well as students, naturalists, and outdoor enthusiasts curious about streams and the insects that live in them." (Publisher) In chapter 18, Rob Cannings contributes his story on *Stylurus olivaceus*.] Address: <http://osupress.oregon-state.edu/book/wading-for-bugs>

**14713.** Couteyen, S.; Papazian, M. (2011): Contribution à la connaissance des Odonates de l'île de la Réunion 10. *Zyxomma petiolatum* Rambur, 1842, une espèce nouvelle pour l'île (Odonata Libellulidae). *L'entomologiste* 67(1): 21-23. (in French, with English summary) ["*Zyxomma petiolatum*, a Libellulidae known from Asia, Australia and some islands of the Indian Ocean, has been found in la Réunion Island. The monitoring of the

dragonfly fauna allows us to specify that this species has recently settled in the island." (Authors) Étang Gol, Saint-Louis, La Reunion, 24-x-2010.] Address: Couteyen, S., 188 chemin Nid Joli, F-97430 Le Tampon, La Réunion, France. E-mail: [couteyensf@vanadoo.fr](mailto:couteyensf@vanadoo.fr)

**14714.** Evans, M.V. (2011): The relative strength of top-down and bottom-up trophic dynamics in the context of habitat isolation. Senior Honors Thesis. Washington University in St. Louis, Environmental Studies Program: 31 pp. (in English) ["Habitat isolation is rapidly increasing, due, in part, to habitat fragmentation. While isolation's effects on species richness, genetic diversity, predator:prey ratios, etc. have been well studied, little is known about isolation's effect on trophic dynamics. Isolation can potentially alter both top-down and bottom-up dynamics through its effects on local processes, such as predation and herbivory, that influence trophic dynamics. In order to investigate the impact of isolation on trophic dynamics, I conducted an experiment in aquatic mesocosms manipulating isolation and bottom-up and top-down dynamics, through the addition of nutrients and fish, respectively. The strengths of topdown and bottom-up dynamics were differentially affected by isolation. Generally, isolation weakened top-down processes relative to bottom-up processes, which were not significantly altered by isolation. I found predator communities to consist of less efficient predators at high isolation, while herbivore community composition was relatively unaffected by isolation. This suggests that a possible mechanism behind the differential shift in trophic dynamics over isolation may be a change in predator community composition. My experiment illustrated that isolation could indirectly affect communities through its effects on trophic dynamics and suggests further that top-down and bottom-up dynamics do not respond equally to isolation." (Author) Taxa - including Odonata - are treated at the order level.] Address: not stated

**14715.** Geraeds, R.; Hermans, J.; Ramaker, A. (2011): De Gaffelwaterjuffer opnieuw in Limburg gevonden - Dainty bluet rediscovered in Limburg. *Natuurhistorisch Maandblad* 100(3): 41-45. (in Dutch, with English summary) ["The Netherlands; "*Coenagrion scitulum*, which has a Holomediterranean distribution, is slowly expanding its range northward. This damselfly was first found in the Netherlands in 2003, near the village of Tegelen in the province of Limburg. Since no other specimens could be traced in this area, this is likely to have been a migrating individual from a nearby population. The next Dutch reports of the species came from the coastal region in the province of Zeeland, where the species has been spotted each year since 2007. On 21 May 2010, the Dainty bluet was rediscovered in Limburg, this time in the southern part of the province. The specimen was a freshly emerged male. During the following days, Dainty bluets were seen in large numbers, including tandems and emerging damselflies, at a pond in a meadow, making it clear that this pond hosts a population. The discovery of this population

fits in with the increase of the Dainty bluet in Northwestern Europe. In France, the species is expanding northward, and recently populations were discovered in Belgium, Germany and Luxemburg. The Dainty bluet prefers sunny still waters with rich aquatic vegetation such as water-milfoils (*Myriophyllum*) and hornworts (*Ceratophyllum*). Most water bodies where it occurs are sheltered by relatively high vegetations, such as those consisting of Common reed (*Phragmites australis*) and Broadleaf cattail (*Typha latifolia*). The submersed vegetation in the pond in Southern Limburg is dominated by Rigid hornwort (*Ceratophyllum demersum*), while other species include Floating pondweed (*Potamogeton natans*), Sago pondweed (*P. pectinatus*), Common duckweed (*Lemna minor*) and Greater duckweed (*Spirodela polyrhiza*). The pond is sheltered by a hedgerow." (Authors)] Address: Geraeds, R.P.G., Bergstraat 70, 6131 AW Sittard, The Netherlands

**14716.** Guillermo-Ferreira, R.; Vilela, D.S. (2011): Female courtship in *Mnesarete lencionii*? *Agrion* 16(1): 14. (in English) [Verbatim: During our field research at the Ecological Reserve of the "Clube de Caça e Pesca Itororó de Uberlândia", Uberlândia, State of Minas Gerais, Brazil (15°57'S, 48°12'W; altitude 863 m; 640 ha), we collected and observed specimens of the rare *Mnesarete lencionii* Garrison, 2006. The males we observed had the blue-grey-black colouration pattern and hyaline wings described by Garrison (2006). However, although females presented the body colour described, their wings were not hyaline but had a reddish-brown spot at the base and ivory pterostigma. At first glance, we thought *M. lencionii* females were *Hetaerina* males. Only after capturing them we noticed they were females, identified later as *M. lencionii*. Thus, in our curiosity, we made some behavioural observations. The observations presented here are from three males and seven females. Males always remained perched, paying no attention to females around. Females displayed a curious behaviour. They approached the male and perched in front of him and started to make short hovering flights and then returned to the male's perch. Such behaviour may be considered a visual signal for intersexual communication (Corbet 1999) or even a display used to invite males to mate (Abbott 2005). Considering that red spots are used in sexual attraction and courtship by male calopterygids (reviewed by Cordoba-Aguilar & Cordero-Rivera 2005), we wonder if a red spot on a female wing, combined with hovering flights, can eventually have a role in female courtship and male mate choice. We also observed females fighting each other near the male. Apparently, this population had a female biased sex ratio. This fact should indeed promote female-female competition for males. Since this species is rare and we have seen only ten individuals in three years, we provide this note as a suggestion for further studies if someone finds a better population to investigate.] Address: Guillermo-Ferreira, R., Departamento de Biologia, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, SP, Brazil. E-mail: rhainerguillermo@yahoo.com.br

**14717.** Hutchings, G.; Halstead, D. (2011): Dragonflies and damselflies in the hand: An identification guide to boreal forest odonates in Saskatchewan and adjacent regions. *Nature Saskatchewan Special Publication* 29: 158 pp. (in English) ["These aims are ably met in an attractive package that includes about 200 photographic images and over 40 pages of drawings and keys. The clearly written text uses the necessary minimum of technical terms, all well-explained when introduced and included in a glossary. The book's scope is an ecological region, the western boreal forest, rather than a geopolitical entity such as Saskatchewan; it thus covers a broad swath of some of the less populous portions of the three Prairie Provinces. A map clearly outlines the main ecozones within this region. There are no individual distribution maps, but notes in the species accounts give a sense of any trend to north or south, east or west. The region is home to 13 damselfly and 36 dragonfly species (collectively, odonates), plus a number of what the authors call "fringe species" – mostly insects with more southerly or easterly ranges that peter out at the edge of the boreal forest. The total of 49 regular species is roughly half the Manitoba provincial list, and includes one western dragonfly (the Pale Snaketail) that has yet to be recorded in Manitoba. Introductory sections inform us about the life cycle of odonates, their roles as both predators and prey in the boreal ecosystem, and their adaptation to a harsh regime of long winters and brief summers. General tips on observation, identification, and photography are provided. Five landscape photographs show examples of boreal wetland types, and there is a representative photo of exuviae, the larval casings that remain after metamorphosis. The identification to species of such remains is a challenge beyond the book's scope. Each species account has three sections: a description to help with identification details, a brief statement of the preferred habitat, and notes on similar species, relative rarity or abundance, distribution, or behaviour. Illustrations typically show hand-held specimens, carefully posed with key identifying features in sharp focus against an unobtrusive background. There are also many photographs of unrestrained insects, plus closeups or crops of key anatomical details. The latter are mostly grouped on separate pages, with clear cross-referencing from the species accounts. A three-page bibliography provides guidance for further reading, and there is a helpful seasonal key to flight periods. For anyone spending time north of the Winnipeg River or aspen parkland regions, this book will be an excellent field companion. For anyone whose focus is a little farther south, or who simply can't resist good nature books with Manitoba content, it will be a valuable addition to the bookshelf. It is good to see *Nature Saskatchewan's* long tradition of natural history publication progressing so well into the 21st century." (review: Peter Taylor; <http://www.naturemanitoba.ca/sites/default/files/NMNews-NovDec-2011-web2.pdf>)] Address: Available from *Nature Saskatchewan*: email [info@naturesask.ca](mailto:info@naturesask.ca), call (306) 780-9273 or mail 206 - 1860 Lorne St., Regina, SK S4P 2L7, Canada

**14718.** Ige, O.; Adeyemi, C.; Ogunfolakan, A.; Ayansola, A.; Olayemi, A.; Taiwo, Y.; Olayiwola, M.; Oyelade, J. (2011): An Inventory of the geological, biological and cultural resources on Ufe-Oke Hill, Idanre, southwestern Nigeria. *Natural Resources* 2: 180-190. (in English) ["Idanre, which represents a unique topographical landscape within southwestern Nigeria, is being proposed to the United Nations Educational Scientific and Cultural Organization (UNESCO) for designation as a world heritage site. In line with this, we conducted a survey to document the rich geological, biological and cultural resources contained within the Ufe-Oke section of Idanre Hills. Our geological inventory revealed two major rock types, older porphyritic granite and fine grained granite, in addition to other minerals. We identified insects belonging to 174 species while fishes from 4 species were collected. Mammals belonging to 13 species were identified through trapping, sightings and signs, although an even greater variety was inferred from interviews with hunters and visits to local fetish markets. Patterns concerning how these biological taxa are distributed altitudinally along Ufe-Oke Hill are discussed. In addition, in the quarters within Ufe-Oke representing the ancient city of Idanre, we characterized about 200 pieces of anthropological material, which included pottery shards, beads, chinaware, brass bangles and ancient metal coins. We also identified various other major features of archeological interest. Finally we offer recommendations, in the light of our findings, concerning how the variety of resources catalogued in this study can be effectively harnessed while sustaining at the same time the environmental integrity of this site, which offers the greatest opportunities and potential for tourism." (Authors) Insects including Odonata are treated at the order level.] Address: Ige, O., Natural History Museum, Obafemi Awolowo University, Ile Ife, Nigeria. Email: oige@oauife.edu.ng

**14719.** Kazanci, N. (2011): Characteristics of Odonata (Insecta) fauna of Köyceğiz-Dalyan Special Environmental Protected Area (SEPA) and its conservation. *Review of Hydrobiology* 4(2): 87-97. (in English, with Turkish summary) [The Odonata fauna of Köyceğiz-Dalyan SEPA (Mugla province, Turkey) comprises 28 species. From the conservation point of view, *Calopteryx splendens intermedia*, *Caliaeschna microstigma*, *Gomphus flavipes lineatus*, *Anax immaculifrons* and *Lindenia tetraphylla* are most interesting.] Address: Kazanci, Nilgün, Hacettepe University, Science Faculty, Biology Department, Hydrobiology Section, Beytepe, Ankara, Turkey. E-mail: nilgunkazanci@gmail.com]

**14720.** Labandeira, C. (2011): Silurian to Triassic plant and hexapod clades and their associations: new data, a review, and interpretations. *Arthropod Systematics & Phylogeny* 64(1): 53-94. (in English) ["A preliminary evaluation of hexapod herbivore damage from selected compression and permineralized biotas from the 220 million-year Late Silurian to Late Triassic interval has revealed many previously unknown patterns of hexapod herbivore

use of vascular plants as well as detritivore and predator associations. Data was collected from 48 distinctive hexapod herbivore damage types (DTs) from 21 mostly compression biotas, but with special emphasis on the Rlyinyne Chert (Early Devonian, ~ 408 Ma), Calhoun Coal (Late Pennsylvanian, ~ 303 Ma) and Molteno Formation (Late Triassic, ~ 226 Ma). These data indicate a two-phase herbivore colonization of land; later expansion of hexapod functional feeding groups (FFGs) initially in the Late Pennsylvanian wetland environments of equatorial Euramerica, and subsequently in Early Permian fluvial systems in the rest of Euramerica, Gondwana, and Cathaysia; the devastating end-Permian extinction; and subsequent rebound of those same FFGs during the ensuing Triassic. Modern-aspect herbivore, detritivore, and predator FFGs are present in Late Pennsylvanian canopied forests, and the full spectrum of all terrestrial FFGs are in place during the Late Triassic. Freshwater FFGs are delayed when compared to the terrestrial record, originating during the Permian, experiencing expansion during the Triassic, and reaching modern levels of all major trophic types during the Late Jurassic. A major conclusion is the omnipresence of convergence in FFGs throughout this interval and the spatiotemporally changing and ephemeral nature of plant hosts and their hexapod herbivore taxa." (Author) The paper includes many references to Odonata.] Address: Labandeira, C., Department of Paleobiology, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560-0121 and Dept of Entomology, Univ. Maryland, College Park, Maryland 20742 USA. E-mail: labandec@si.edu

**14721.** Lacey, P. (2011): Dragonfly season. *Nature Manitoba News* 3(5): 4-5. (in English) [Popular account of an unnamed locality at the Seine River, Manitoba, Canada.] Address: not stated

**14722.** Lee, Y.H. (2011): Speciation with gene flow in island damselflies. M.Sc. thesis, Department of Life Sciences, Tokai University: 67 pp. (in English, with Chinese summary) ["Geographic isolation has been proposed as a major force in speciation. Allopatric mode of speciation emphasizes the prominent role of physical barriers and restriction of gene flow on population divergence. Under allopatric model, gene flow is considered as an impediment for speciation. The question of how much historical gene flow has occurred in diverged natural populations and species is largely unknown. In this study, we investigated the level of historical gene flow during the speciating process of two sibling species pairs of *Euphaea* damselflies, *E. formosa* + *E. yayeyamana* and *E. decorata* + *E. ornata*, using two mitochondrial and ten nuclear loci. The reconstructed species phylogeny based on *cox2* and *arr* genes indicated that *E. formosa* + *E. yayeyamana*, and *E. decorata* + *E. ornata*, are both valid sister species pairs. The results of multilocus analyses rejected the strict isolation model in *E. formosa* and *E. yayeyamana*, and *E. decorata* and *E. ornata*. Moderate to large



two directional gene flows were detected between *E. formosa* and *E. yayeyamana*, but there is little evidence of gene flow between *E. decorata* and *E. ornata*. The divergence time of *E. decorata* and *E. ornata* was estimated at approximately 0.511 Mya, which was more recent than the split of *E. formosa* and *E. yayeyamana* (1.145 Mya). We concluded that the model of speciation with gene flow best describe the observed sequence variation in *E. formosa* and *E. yayeyamana*, whereas the model of allopatric speciation without gene flow is more appropriate for *E. decorata* and *E. ornata*." (Author)] Address: Lee, Y.H; E-mail: sr74425@hotmail.com

**14723.** Maravalhas, E.; Pereira, P.; Soares, A.; Peixoto, M. (2011): Notes on the distribution and biology of the Splendid Cruiser - *Macromia splendens* (Pictet, 1843) in northern Portugal (Odonata: Macromididae). *Boletín de la S.E.A.* 48(1): 439-440. (in Spanish, with English summary) [*M. splendens* is considered by many odonatologists among rarest and most threatened European dragonflies. During the last few years, the authors have carried out field work to detect this species in continental Portugal, from the northern border to the river Mondego: the results are presented here." (Author)] Address: Maravalhas, E., TAGIS – Centro de Conservação das Borboletas de Portugal Museu Nacional de História Natural, Rua da Escola Politécnica, 58, 1250-102 Lisboa, Portugal. E-mail: emsmaravalhas@gmail.com

**14724.** Maravalhas, E.; Soares, A. (2011): Notes on the distribution and biology of the Hairy Hawker - *Brachytron pratense* (Muller, 1764) - in Portugal (Odonata: Aeshnidae). *Boletín de la S.E.A.* 48(1): 452-454. (in Odonata, Aeshnidae, *Brachytron pratense*, chorology, biology, conservation, Portugal) ["*B. pratense* is ... extremely rare in the Iberian Peninsula, where it has a scattered distribution and is seldom seen. During the years 2008 to 2010 the authors carried out research on the distribution of the species in several coastal districts of western Portugal, and found new populations in areas never reported previously. Our observations allow us to make a first approach on the biology and conservation of the species in continental Portugal." (Authors)] Address: Maravalhas, E., TAGIS – Centro de Conservação das Borboletas de Portugal Museu Nacional de História Natural, Rua da Escola Politécnica, 58, 1250-102 Lisboa, Portugal. E-mail: emsmaravalhas@gmail.com

**14725.** Neves dos Santos, A.F.G.; Neves dos Santos, L.; Araújo, F.G. (2011): Feeding morphology of the Neotropical piscivorous fish *Cichla kelberi* (Perciformes: Cichlidae) introduced into an oligotrophic Brazilian reservoir. *Rev. Biol. Trop. (Int. J. Trop. Biol.)* 59(3): 1245-1255. (in English, with Spanish summary) [Based on the study of 254 stomachs, nearly 50% of number of prey items belonged to Odonata.] Address: Araújo, F.G., Departamento de Biologia, Universidade Federal Rural do Rio de Janeiro, Antiga BR 465, Km 47, Seropédica, Brasil. E-mail: gerson@ufrj.br

**14726.** Papazian, M. (2011): La sinuosité de la nervure costale de l'aile antérieure chez les Palpopleurinae (Odonata, Anisoptera, Libellulidae). *Bulletin de la Société entomologique de France* 116(4): 389-395. (in French, with English summary) ["The undulation of the costal vein of the forewing in Palpopleurinae (Odonata, Anisoptera, Libellulidae). The undulation of the costal vein of the forewing is present in Diastatops, Palpopleura and Zenithoptera. The existence of this hollow is closely related with the shape of the eyes. The very forward positioning of the wings on these perching insects may have a physiologico-behavioral origin." (Author).] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillois, F-13012 Marseille, France. E-mail: mpapazian@ecologie.re

**14727.** Peralta-Maravera, I.; Lopez-Rodriguez, J.; Fenoglio, S.; Bo, T.; Luzon-Ortega, J.M.; Tierno de Figuero, J.M. (2011): Macroinvertebrate colonization of two different tree species leaf packs (native vs. introduced) in a Mediterranean stream. *Journal of Freshwater Ecology* 26(4): 495-505. (in English) ["Allochthonous leaf litter from riparian vegetation represents the main energy source in small lotic systems, where canopy limits autochthonous primary production. In this study, leaf packs of two tree species (the native *Salix neotrichia* and the introduced *Populus x canadensis*) were positioned in the Fardes Stream (southern Spain) to analyze the macroinvertebrate colonization. On two dates, leaf packs were removed, and colonizing macroinvertebrates were collected and identified; at the same time, Surber samples were collected to characterize the riverbed macroinvertebrate coenosis. Leaf packs attracted rich and varied communities of benthic macroinvertebrates, with an increase of the abundance of most taxa over time. No significant differences were found between the colonizing communities of the two leaf types. Some macroinvertebrate species showed a preference for leaf packs, probably due to trophic or hydrologic factors. Considering functional feeding groups, increases in shredders and scrapers and decreases in predators and filterers were detected over time, while collector-gatherers almost did not change in abundance." (Authors) Taxa, including Odonata, are treated at the family level.] Address: Peralta-Maravera, I., Depto de Biología Animal, Facultad de Ciencias, Univ. de Granada, Campus Fuentenueva s/n, 18071, Granada, Spain. E-mail: manujlr@ugr.es

**14728.** Pezzi, G. (2011): The entomofauna in the Special Protection Area (ZPS, Zona di Protezione Speciale) "Bacini ex zuccherificio di Mezzano", Ravenna. 3rd part: Odonata, Blattaria, Mantodea, Orthoptera, Dermaptera, Coleoptera Lucanoidea and Scarabaeoidea. (Insecta Odonata, Blattaria, Mantodea, Orthoptera, Dermaptera, Coleoptera Lucanoidea, Coleoptera Scarabaeoidea). *Quaderno di Studi e Notizie di Storia Naturale della Romagna* 34: 11-19. (in Italian, with English summary) [Italy; the following odonate species are checklisted: *Sympecma fusca*, *Chalcolestes viridis*, *Lestes barbarus*, *L. virens vestalis*,

*Platycnemis pennipes*, *Ischnura elegans*, *Coenagrion scitulum*, *Erythromma viridulum*, *Aeshna affinis*, *A. mixta*, *Anax imperator*, *A. parthenope*, *Libellula quadrimaculata*, *Orthetrum albistylum*, *O. brunneum*, *O. cancellatum*, *Crocothemis erythraea*, *Sympetrum depressiusculum*, *S. fonscolombii*, *S. meridionale*, *S. sanguineum*, *S. striolatum*, *Selysiotthemis nigra*.] Address: Pezzi, G., via Pirandello, 12 C, 48012 Villanova di Bagnacavallo (RA), Italy. E-mail: pzzgrg@libero.it

**14729.** Rocha, J.R.M. da; Almeida, J.R. de; Lins, G.A.; Durval, A. (2011): Insects as indicators of environmental changing and pollution: A review of appropriate species and their monitoring. *Holos environment* 10(2): 250-262. (in Portuguese, with English summary) ["Responses of some species to disturbances can be used as a parameter of analysis about levels of change in the environmental services. These species can be used as environmental bioindicators. Class Insecta has many appropriate species. This paper aims an analysis of bioindicator species of the impact caused by intensive agriculture, deforestation, reforestation and pollution of aquatic and terrestrial environments." (Authors) The paper includes passing references to Odonata.] Address: Rocha, J.R.M. da, Universidade Federal de Mato Grosso - UFMT. Rua. Bento Alexandre dos Santos, 717 Centro. CEP 78.280-000, Mirassol D'Oeste, MT, Brasil

**14730.** Sharapova, T.A. (2011): Zooperiphiton of lakes in the Tobol-Ihinsk forest-steppe area (Tiumen district). *Vestnik ekologii* 12: 119-123. (in Russian, with English summary) ["The article quotes data on development of lake zooperiphyton under different water mineralization, demonstrating reduction of species composition, biomass, diversity of dominants, change of main dominating groups under increasing of salinity in the lakes." (Authors) The single odonate species mentioned is *Erythromma najas*.] Address: not stated

## 2012

**14731.** Bryan, A.L.; Hopkins, W.A.; Parikh, J.H.; Jackson, B.P.; Unrine, J.M. (2012): Coal fly ash basins as an attractive nuisance to birds: Parental provisioning exposes nestlings to harmful trace elements. *Environmental Pollution* 161: 170-177. (in English) ["Birds attracted to nest around coal ash settling basins may expose their young to contaminants by provisioning them with contaminated food. Diet and tissues of Common Grackle (*Quiscalus quiscula*) nestlings were analyzed for trace elements to determine if nestlings were accumulating elements via dietary exposure and if feather growth limits elemental accumulation in other tissues. Arsenic, cadmium, and selenium concentrations in ash basin diets were 5× higher than reference diets. Arsenic, cadmium, and selenium concentrations were elevated in feather, liver, and carcass, but only liver Se concentrations approached levels of concern. Approximately 15% of the total body burden of Se, As, and Cd was sequestered in

feathers of older (>5 days) nestlings, whereas only 1% of the total body burden of Sr was sequestered in feathers. Feather concentrations of only three elements (As, Se, and Sr) were correlated with liver concentrations, indicating their value as non-lethal indicators of exposure. Highlights: \* We examined elemental uptake by grackle nestlings associated with coal ash basins. \*Diet of ash basin nestlings had higher levels of Se, As, and Cd than control nestlings. \*Se, As, Cd, and Sr concentrations of ash basin nestling tissues were elevated. \*Only Se in nestling liver approached published levels of concern. \*Nestling feathers sequestered >15% of the total body burden of Se, As, and Cd." (Authors) The paper includes a passing reference to Odonata as diet of the nestlings] Address: Bryan Jr., A.L., Savannah River Ecology Laboratory, P.O. Drawer E, Aiken, SC 29803, USA. E-mail: lbryan@srel.edu

**14732.** Buczyński, P. (2012): Dragonflies (Odonata). In: R. Kornijów & P. Buczyński, [Eds], *Lake Skomielno (Łęczna-Włodawa Lakeland, Eastern Poland). Environment monograph*. Mantis, Olsztyn: 238-256. (in Bilingual Polish and English) [Lake Skomielno (retention reservoir of the Wieprz-Krzna Canal system) is situated in the Podlasie-Polesie region, Poland. Its Odonata fauna and that of the adjoining habitats (36 species) is described, the odonate communities and their composition are thoroughly analysed and discussed. None of the recorded species is redlisted in Poland, but *Aeshna viridis* and *Leucorrhinia caudalis* are of particular conservation interest.] Address: Buczyński, P., Maria Curie-Skłodowska University in Lublin, Dept of Zoology, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**14733.** Garrison, M. (2012): Strange Bedfellows. *Argia* 24(3): 31. (in English) [Salt Fork, Vermilion River, S Homer, Illinois, USA; *Argia apicalis* tried to copulate with *Progomphus obscurus*.] Address: Garrison, Marla. mgarrison@mchenry.edu

**14734.** Harms, T.M.; Rasmussen, R.D.; Kinkead, K.E.; Berghold, C.L.; Frese, P.; Dinsmore, S.J. (2012): New additions to Iowa Odonata. *Argia* 24(3): 30-31. (in English) [*Ladona deplanata*:16-v-2011, 6-iv-2012, Eldon Wildlife Management Area, Davis County; 25-iv-2012, Donnellson Unit of Shimek State Forest in Lee County; 26-iv-2012, Big Hollow Creek Recreation Area in Des Moines County. *Celithemis fasciata*: 23-vi-2011, Eldon Wildlife Management Area in Davis County; 21-vi-2012, Fox River Wildlife Management Area in Van Buren County. *Didymops transversa*: 5-v-2012, 10-v-2012, Lacey-Keosauqua State Park in Van Buren County. *Libellula semifasciata*; 2008, Horseshoe Bend Division of Port Louisa National Wildlife Refuge in Louisa County. *Ophiogomphus westfalli*: OdonataCentral record #321975.] Address: Harms, T.M., Center for Survey Statistics and Methodology, Iowa State University, 208 Office and Laboratory Building, Ames, IA 50011, USA. E-mail: harmsy@iastate.edu

- 14735.** Heck, B. (2012): Ouachita Spiketail (*Cordulegaster talaria*), new for Oklahoma. *Argia* 24(3): 9-10. (in English) [USA; 18-iv-2011, U.S. Forest Service (FS) Road, about 19.3 km northwest of Broken Bow in McCurtain County, Oklahoma, and 2.9 km south of the intersection of FS roads 53000 and 53420, near the Cedar Creek crossing.] Address: Heck, B., Broken Bow, Oklahoma, USA. E-mail: baheck@pine-net.com
- 14736.** Kucharzyk, R. (2012): Some problems of the dialectal vocabulary – the polish folk names of dragonflies. *Studia z Filologii Polskiej i Słowiańskiej* 47: 69-85. (in Polish, with English summary) ["This paper deals with the polish folk names of a dragonfly – an insect belonging to the order Odonata. Over 90 Polish dialectal names were gathered and analyzed here. The motivation of these names has been discussed in this paper. Moreover, the information about the geographical occurrence of these lexemes is given here. This paper deals with the polish folk names of a dragonfly – an insect belonging to the order Odonata. Over 90 Polish dialectal names were gathered and analyzed here. The motivation of these names has been discussed in this paper. Moreover, the information about the geographical occurrence of these lexemes is given here." (Authors)] Address: not stated
- 14737.** Lhuman, E. (2012): First report of Blue-faced Meadowhawk (*Sympetrum ambiguum*) for Wisconsin. *Argia* 24(3): 23. (in English) [5-vii-2012, near Milwaukee, Wisconsin, USA] Address: Lhuman, Ellen. E-mail: manateemother@aol.com
- 14738.** Marinov, M. (2012): Description of female *Hemicordulia hilaris* Lieftinck, 1975 (Anisoptera: Corduliidae) with brief notes on the biogeography of the genus. *Records of the Auckland Museum* 48: 97-105. (in English) ["Three *Hemicordulia* specimens in the Auckland Museum, collected from the Cook Islands and Fiji, were compared with recently sampled material from Fiji, Tonga and New Caledonia. They were determined to be conspecific with *H. hilaris*, originally described from New Caledonia and confirmed for other parts of the Pacific – Fiji, Samoa and Tonga. The female of *H. hilaris* is described here for the first time and morphological features that separate the species from other congeners are discussed." (Author)] Address: Marinov, M., 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@mpi.govt.nz
- 14739.** Masly, J.P. (2012): 170 Years of "Lock-and-Key": Genital morphology and reproductive isolation. *International Journal of Evolutionary Biology* Volume 2012, Article ID 247352, doi:10.1155/2012/247352: 10 pp. (in English) ["The divergent genital morphology observed among closely related animal species has long been posited as a mechanism of reproductive isolation. Despite the intuitive appeal that rapidly evolving genitalia might cause speciation, evidence for its importance—or even its potential—in reproductive isolation is mixed. Most tests of genital structural isolation between species often fail to find convincing evidence that differences in morphology prevent copulation or insemination between species. However, recent work suggests that differences in genital morphology might contribute to reproductive isolation in less obvious ways through interactions with sensory mechanisms that result in lowered reproductive fitness in heterospecific matings. In this paper, I present a brief history of the "lock-and-key" hypothesis, summarize the evidence for the involvement of genital morphology in different mechanisms of reproductive isolation, discuss progress in identifying the molecular and genetic bases of species differences in genital morphology, and discuss prospects for future work on the role of genitalia in speciation." (Author) The review includes references to Odonata.] Address: Masly, J.P., Department of Zoology, Univ. Oklahoma, 730 Van Vleet Oval, Norman, OK 73019, USA. E-mail: masly@ou.edu
- 14740.** Nagy, Z.; Vajda, C.; Szabó, L.J.; Miskolczi, M.; Devai, G. (2012): The morphometry of male and female adults of the scarce emerald damselfly (*Lestes dryas* Kirby, 1890). *Studia odonatol. hung.* 14: 5-25. (in Hungarian, with English summary) ["We found very few detailed information about the morphometry of *Lestes dryas* on world-wide and on Hungarian basis too. Here we would like to provide more information concerning this species furthermore explore the variation of the examined traits and compare the two sexes by traits. The study based on body and wing traits of male and female adults which were collected in populations of north-eastern Hungary. According to our results males had significantly larger body than females, however other traits (measures on the head, leg and wings) seemed to be smaller. The traits of the anal appendages had a greater variation, than other body traits. The sizes of the wings had smaller variation than the number of cross veins and the cells. The principal component analysis could divide the sexes based on the body traits, but in the case of the wing traits the convex hulls overlapped in a small compass. The discriminant analysis split the two sexes based on both trait groups. According to the linear regression analysis the total body length showed the maximal number of correlations in both sexes." (Authors)] Address: Nagy, Zuzsza, Debreceni Egyetem, Tudományegyetemi Karok, Természettudományi és Technológiai Kar, Hidrobiológiai Tanszék, 4032 Debrecen, Egyetem tér 1, Hungary.
- 14741.** Oldenettel, J.R. (2012): Feeding swarm of Common Green Darners (*Anax junius*). *Argia* 24(3): 16. (in English) [Verbatim: One late afternoon in the fall of 2011, I stopped by the North Roosevelt trap, a popular birding spot in east central New Mexico (aka the "Melrose Trap", 10 miles west of Melrose in Roosevelt County). The trap is a stand of several large cottonwoods among a stand of poplar trees (some 60-70 ft. high) totalling about 2 acres. There is a single 14 ft. diameter pump-fed cattle tank as the only source of standing water. There are usually several (<10) dragonflies hanging



around the tank; Flame Skimmer (*Libellula saturata*), Roseate Skimmer (*Orthemis ferruginea*), Common Green Darner (*Anax junius*), Twelve-spotted Skimmer (*Libellula pulchella*), and Blue-faced Darner (*Coryphaeschna adnexa*) have been seen at various times. There was an emergence of a late ants in progress throughout the area, but I am not sure of the species. Around the open areas of the trap, I observed hundreds of dragonflies (my estimate of the total at the time was about 2000). All identified individuals were Common Green Darners, and I didn't see any individuals that I thought were a different species. A flying ant would not get far off the ground before a dragonfly had scooped it up. Since there are no large bodies of water in the area, I'm guessing these must have comprised a long-distance migrating swarm, something I have never encountered before. I appear to have left this out of my birding notes, so I have no precise date.] Address: Oldenettel, J.R., Socorro, New Mexico, USA. E-mail: Borealowl@aol.com

**14742.** Oriti, R.; Oriti, B. (2012): Spot-winged glider (*Pantala hymenaea*) migration. *Argia* 24(3): 18. (in English) ["Beginning on about 25 July 2012, Inyo County, California, experienced a large migration of *P. hymenaea*. They were seen everywhere, even by casual observers. At some of our favourite dragonfly sites we saw them in amazing numbers. At one site we saw them hang perching in the willows by the several hundreds over a distance of a couple of hundred yards. Great swarms were also seen flying, and it was impossible to estimate their total number. I would conservatively guess that there were tens of thousands flying over the County. This amazing migration lasted about seven days. A few *Pantala flavescens* were seen among them." (Authors)] Address: Ron & Barbara Oriti, 3620 Brookside Dr., Bishop, California, 93514, USA. E-mail: Meteoriti@aol.com

**14743.** Schorr, M. (2012): *Libellula virgo* Linnaeus, 1758 auf Grönland - Eine Neubewertung der Beobachtung von Fabricius (1780). *International Dragonfly Fund - Report* 52: 1-44. (in German, with English summary) ["The record of '*Libellula virgo*' in south-western Greenland by O. Fabricius in the 1770ies is reassessed. It is inferred that the specimen was most probably a female *Calopteryx maculata*. Morphological characteristics presented by Fabricius are compared with those of similar species from continental North America that might have reached Greenland. Origin and transportation of the specimen by accidental wind drift are discussed in some detail." (Author)] Address: Schorr, M., ÖSTLAP, Schulstr. 7B, 54314 Zerf, Germany. E-mail: oestlap@online.de

**14744.** Villanueva, R.J.T.; Seidenschwarz, F. (2012): An annotated checklist of the dragonflies of Cebu Island, the Philippines with notes on conservation. *Philippine Scientist* 49: 1-16. (in English) ["New records and an updated checklist of the dragonflies of Cebu Island are provided. *Drepanosticta sugbo* spec. nov. is described from Kawasan Falls, Badian. Eighteen species are recorded from

Cebu for the first time, which increases the number of known species in the island to 53. *Aethriamanta subsignata* is reported as new to the Philippines. The additions increase the number of formally described species known from the Philippines to 268. Three species, which are endemic to Cebu, are at a very high risk of going extinct within the next decade. The threats to the Cebu dragonfly fauna are briefly discussed and three sites are recommended for immediate conservation measures." (Author)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

## 2013

**14745.** Anbalagan, V.; Paulraj, M.G.; Ignacimuthu, S. (2013): Odonata diversity (Insecta: Arthropoda) in rice and vegetable fields in a north-eastern district of Tamil Nadu, India. *Journal of Research in Biology* 3(4): 977-983. (in English) ["Odonata diversity in vegetable fields (brinjal and okra) and rice fields was studied from January 2005 to December 2008 in Tiruvallur district of Tamil Nadu. Totally 23 species of Anisoptera and 12 species of Zygoptera were recorded and all these species were grouped into eight families. In vegetable fields 31 species of Odonata were recorded under 22 genera. In rice fields the species richness (21 species) and total genera (16) were less than vegetable fields during the entire study period. *Libellulidae* was the large family in both vegetable and rice fields which comprised maximum number of species. *Pantala flavescens*, a migratory species, was the most dominant in numbers throughout the year. Diversity indices clearly showed that Odonata diversity was higher in vegetable fields than in rice fields." (Authors)] Address: Ignacimuthu, S., Entomology Research Institute, Loyola College, Chennai-34, India

**14746.** Berzi-Nagy, L.; Fazekas, A.; Jakab, T.; Szabo, L.J.; Devai, G. (2013): Morphometric data of exuviae in six River Clubtail [*Gomphus flavipes flavipes* (Charpentier, 1825)] populations from the River Tisza. *Studia odonatol. hung.* 15: 73-91. (in Hungarian, with English summary) ["Collecting and measuring exuviae is a useful tool considering protected riverine dragonfly species. In this paper we compared six populations of *G. flavipes* from the whole Hungarian section of the River Tisza relying on morphological traits. The population at Tuzsér in the upper section of the river showed prominent differences from the other five populations." (Authors)] Address: Berzi-Nagy, L., Dept Hydrobiology, Centre of Arts, Humanities & Sciences, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary

**14747.** Bransky, J.W.; Dorn, N.J. (2013): Prey use of wetland benthivorous sunfishes: ontogenetic, interspecific and seasonal variation. *Environmental Biology of Fishes* 96(12): 1329-1340. (in English) ["The intensity of

competitive interactions between fishes is partly determined by prey use and ontogenetic niche shifts. In a wetland where distinct habitat shifts are missing we compared prey use of three generalist benthivorous sunfishes to look for evidence of ontogenetic, interspecific, and "seasonal" variation in prey composition. Diet analysis revealed evidence of diet ontogeny in warmouth (*Lepomis gulosus*, 30–152 mm standard length, SL), but not in bluespotted sunfish (*Enneacanthus gloriosus*, 30–47 mm SL) or dollar sunfish (*Lepomis marginatus*, 30–60 mm SL). Bluespotted and dollar sunfishes consumed small dipteran and amphipod prey and had similar diets in both seasons suggesting a potential for strong interspecific competition. In the dry season, warmouth shifted from using smaller insect prey to larger decapod and fish prey with increasing size. This shift to prey types that were little used by the other species reduced dietary niche overlap with the other sunfishes. After drought and re-flooding (in the wet season), decapods and small fish were less abundant in the wetland and the warmouth ontogenetic shift was less distinct. When matched for gape width, prey composition differed between warmouth and both dollar and bluespotted sunfishes in the wet season, suggesting differences in sunfish foraging modes, but prey use differences were less clear in the dry season when prey were abundant. Both warmouth ontogenetic diet shifts and seasonal variation in prey use (probably mediated by prey abundance) had strong influences on diet overlap and therefore the potential for intra- and interspecific competition between sunfishes in this wetland ecosystem." (Authors) The diet includes Odonata.] Address: Bransky, J.W., Department of Biological Sciences, Florida Atlantic University, 3200 College Avenue, Davie, FL, 33314, USA. E-mail: jacobbransky@gmail.com

**14748.** Costes, A.; Delpon, G.; Calvignac, R.; Alquier, D.; Haber, E.; Danflous, S.; Polisset, P.; Pélozuelo, L. (2013): Etat des lieux des connaissances des populations de quatre odonates d'intérêt patrimonial en Midi-Pyrénées: la Cordulie splendide *Macromia splendens*, la Cordulie à corps fin *Oxygastra curtisii*, le Gomphe de Graslin *Gomphus graslinii* et l'Agrion bleuissant *Coenagrion caerulescens*. 4èmes rencontres naturalistes de Midi-Pyrénées – Albi: 63-66. (in French) [Midi-Pyrénées, France; detailed distribution maps of *Macromia splendens*, *Oxygastra curtisii*, *Gomphus graslinii*, and *Coenagrion caerulescens* are presented.] Address: not stated

**14749.** Crotti, M. (2013): Digenetic Trematodes: an existence as parasites. Brief general overview. *Microbiologia medica* 28(2): 97-101. (in English) ["Digenea is a wide and diverse group of trematodes, whose members are able to parasitize all classes of vertebrates, and several groups of invertebrates. While the usual life-cycle involves three hosts, a great number of species has evolved to increase or to reduce the number of hosts during development, in order to be more successful in their

ecological niche. Differently from other trematodes, digenetic flukes can infect humans, and this process can cause severe diseases like schistosomiasis, which infects around 200 million people worldwide. Finally, digenetic trematodes are not only a threat to humans' health, but also to the economy, causing millions of dollars losses in activities such as aquaculture and animal husbandry. ... Some members of the *Halipegus* genus have been observed to infect four hosts during their development. Zelmer, et al. (45) have described the complex development of *Halipegus occidialis*. This species is a parasite of green frogs, and it is found in North America. The eggs are expelled by frogs and are ingested by snails. Once the cercaria leaves the mollusc, it penetrates the secondary intermediate host, a crustacean (ostracods). The crustaceans are a food source for dragonfly larvae, the third intermediate host. However, Zelmer, et al (45) found out that the insect larva is not a physiological requirement for the further development of the trematode, but instead is an ecological necessity in order for the trematode to reach the definitive host (green frogs do not feed on ostracods, but do feed on dragonfly larvae). [Zelmer DA, Wetzel EJ, Esch GW. The role of habitat in structuring *Halipegus occidialis* metapopulations in the green frog. *Journal of Parasitology*. 1999; 85: 19-24.]. (Author)] Address: Crotti, M. Faculty of Zoology, University of Derby, Derby - East Midlands, U. K. E-mail: mariocche@hotmail.it

**14750.** Datry, T.; Larned, S.T.; Fritz, K.M.; Bogan, M.T.; Wood, P.J.; Meyer, E.I.; Santos, A.N. (2013): Broad-scale patterns of invertebrate richness and community composition in temporary rivers: effects of flow intermittence. *Ecography* 37(1): 94-104. (in English) ["Temporary rivers are increasingly common freshwater ecosystems, but there have been no global syntheses of their community patterns. In this study, we examined the responses of aquatic invertebrate communities to flow intermittence in 14 rivers from multiple biogeographic regions covering a wide range of flow intermittence and spatial arrangements of perennial and temporary reaches. Hydrological data were used to describe flow intermittence (FI, the proportion of the year without surface water) gradients. Linear mixed-effects models were used to examine the relationships between FI and community structure and composition. We also tested if communities at the most temporary sites were nested subsets of communities at the least temporary and perennial sites. Taxon richness decreased as FI increased and invertebrate communities became dominated by ubiquitous taxa. The number of resilient taxa (with high dispersal capacities) decreased with increased FI, whereas the number of resistant taxa (with adaptations to desiccation) was not related to FI. Riverspecific and river-averaged model comparisons indicated most FI-community relationships did not differ statistically among rivers. Community nestedness along FI gradients was detected in most rivers and there was little or no influence of the spatial arrangement of perennial and temporary reaches.

These results indicate that FI is a primary driver of aquatic communities in temporary rivers, regardless of the biogeographic species pool. Community responses are largely due to resilience rather than resistance mechanisms. However, contrary to our expectations, resilience was not strongly influenced by spatial fragmentation patterns, suggesting that colonist sources other than adjacent perennial reaches were important." (Authors) The paper includes a reference to Odonata.] Address: Datry, T., Inst. national de Recherche en Sciences et Technologies pour l'Environnement et l'Agriculture, CS 70077 Lyon, France. E-mail: thibault.datry@irstea.fr

**14751.** Duborget, R. (2013): Observation probable de *Brachythemis impartita* en Haute-Corse (Odonata: Libellulidae). *Martinia* 29(2): 103-104. (in French) [Water reservoir of Teppe Rosse (42,10741°N, 9,46223°E), Corsica, France, 12-viii-2013.] Address: Duborget, R., 9 avenue du général de Gaulle, F-20250 Corte, France. E-mail: robin.duborget@gmail.com

**14752.** Gilbreath, T.M.; Kweka, E.J.; Afrane, Y.A.; Githeko, A.K.; Yan, G. (2013): Evaluating larval mosquito resource partitioning in western Kenya using stable isotopes of carbon and nitrogen. *Parasites & Vectors* 12;6:353. doi: 10.1186/1756-3305-6-353.: 17 pp. (in English) ["Background: In sub-Saharan Africa, malaria, transmitted by the *Anopheles* mosquito, remains one of the foremost public health concerns. *Anopheles gambiae*, the primary malaria vector in sub-Saharan Africa, is typically associated with ephemeral, sunlit habitats; however, *An. gambiae* larvae often share these habitats with other anophelines along with other disease-transmitting and benign mosquito species. Resource limitations within habitats can constrain larval density and development, and this drives competitive interactions among and between species. Methods: We used naturally occurring stable isotope ratios of carbon and nitrogen to identify resource partitioning among co-occurring larval species in microcosms and natural habitats in western Kenya. We used two and three source mixing models to estimate resource utilization (i.e. bacteria, algae, organic matter) by larvae. Results: Laboratory experiments revealed larval  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  composition to reflect the food sources they were reared on. Resource partitioning was demonstrated between *An. gambiae* and *Culex quinquefasciatus* larvae sharing the same microcosms. Differences in larval  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  content was also evident in natural habitats, and *Anopheles* species were consistently more enriched in  $\delta^{13}\text{C}$  when compared to culicine larvae. Conclusions: These observations demonstrate inter-specific resource partitioning between *Cx. quinquefasciatus* and *An. gambiae* larvae in natural habitats in western Kenya. This information may be translated into opportunities for targeted larval control efforts by limiting specific larval food resources, or through bio-control utilizing competitors at the same trophic level. ... Dragonfly nymphs had an isotopic composition indicative of a pri-

marily anopheline diet. Although this result should be interpreted somewhat carefully since only three food sources were taken into account (*Cx. quinquefasciatus*, *An. gambiae* and *An. funestus*), studies suggest that culicine larvae may have a competitive advantage over anophelines when dragonfly nymphs are present in the habitat [2,31]. Our group reported a 70% reduction of *An. gambiae* s.s. larvae exposed to dragonfly nymphs, and used PCR to confirm the presence of *An. gambiae* DNA in the nymph gut content [21]. There may be other significant contributors to the nymph diet, but these resources would presumably occupy the same trophic level of the anophelines. Microcosm experiments with known predators and prey may help to evaluate the role of trophic structure in determining mosquito species success and habitat productivity." (Authors)] Address: Gilbreath, T.M., Ecology and Evolutionary Biology, Univ. of California, Irvine, CA 92697, USA. E-mail: tmgilbreathiii@gmail.com

**14753.** Lafontaine, R.-M.; Delsinne, T.; Devillers, P. (2013): Évolution des populations de libellules de la région de Bruxelles-Capitale – Leurs récentes augmentations – importance de la gestion des étangs. *Les Naturalistes belges* 94: 33-70. (in French, with English summary) ["The dragonfly fauna of the Brussels-Capital Region consists of 56 species. Species richness has considerably varied over time. There was a constant impoverishment of the fauna over the course of the XXth century. At the turn of the Millennium, there were only 27 species of dragonflies and damselflies in Brussels. At the beginning of the XXIst century, the trend reversed. A total of 43 species have been observed in the Region since 2000. We describe this recent evolution, and the reasons that may explain this gratifying return of many species, on the basis of our observations combined with those recorded on observations.be and the databases of the Institut Bruxellois pour la Gestion de l'Environnement (IBGE). A few sites of occurrence of particularly significant assemblages of Odonata are discussed in more detail. Measures needed for the conservation of dragonflies are presented, in particular those related to the management of water bodies and their margins." (Authors)] Address: Lafontaine, R.-M., Institut Royal des Sciences Naturelles de Belgique (IRSNB), unité Biologie de la Conservation, Rue Vautier 29, 1000 Bruxelles, Belgium. E-mail: Rene-Marie.Lafontaine@sciencesnaturelles.be

**14754.** Leandri, F. (2013): Riproduzione di *Oxygastra curtisii* (Dale, 1834) (Insecta, Odonata), presso il Lago Moro, Darfo Boario Terme (BS). - Breeding site of *Oxygastra curtisii* (Dale, 1834) (Insecta, Odonata), in the Lago Moro, Darfo Boario Terme (BS). *Natura Bresciana - Ann. Mus. Civ. Sc. Nat.*, Brescia 38: 127-129. (in Italian, with English summary) [Lago Moro in the Italian Alps (Darfo Boario Terme, Brescia province, Lombardy, Italy), (45.9798°N 10.1602°E), 25.VI.2013] Address: Leandri, F., Vicolo chiuso 2/a, 26037 San Giovanni in Croce (Cremona), Italy. E-mail: faustoleandri@hotmail.com



**14755.** Martini, A.; Resende, D.M.C.; Ribeiro Silva, L.; Duarte, M.A. (2013): Distribuição espacial e temporal da fauna de invertebrados bentônicos na APA do município de Coqueiral, MG, com ênfase em Odonata. *Revista Brasileira de Zoociências* 15(1-3): 183-194. (in Portuguese, with English summary) ["Spatial and temporal distribution of benthic invertebrates fauna in APA of the municipality Coqueiral, MG, with emphasis on Odonata. The benthic invertebrates are a diverse group of organisms that inhabit both lentic and lotic environments and have an important role in the aquatic ecosystem dynamics, and its use for the evaluation of impacts on aquatic environments, widely recommended. Among the benthic invertebrates, highlight the Odonata use for verification of environmental quality. The present study had as objective to know the spatial and temporal distribution of benthic invertebrates fauna in the stream of Ermo, in the APA of the municipality - Coqueiral, MG, with emphasis on Odonata, and infer on the local environmental conditions. Samples were collected during the rainy season (February, 2007) and dry (August, 2007) at seven sites along the stream. First were measured and recorded abiotic variables: water temperature with a thermometer, depth using a graduated ruler and the dissolved oxygen content with oximeter. Later sediments were collected for analysis of benthic invertebrates, using a Surber sampler. For Anisoptera were identified: *Dythemis*, *Nanothemis*, *Octogomphus* and *Progomphus* and for Zygoptera: *Argia*. The Jaccard analysis results showed a higher similarity between points 2 and 3 grouped due to the similarities of physico-chemical parameters, mainly temperature and dissolved oxygen recorded in the stream and a separation of the points 5 and 7. Studies about Odonata fauna are needed due to the great potential bioindicator that these organisms have, mainly because of its wide distribution." (Authors)] Address: Giuntini Martini, A., Faculdade de Tecnologia de Jundiaí – FATEC-JD, Brazil. E-mail: andre.gmartini@gmail.com

**14756.** Nilsson-Örtman, V.; Johansson, F. (2013): Observations récentes de *Leucorrhinia dubia* dans les Pyrénées-Orientales (Odonata: Libellulidae). *Martinia* 29(2): 87-88. (in French) [France, 02-vi-2010, lac de Pradeille and peat bog Racou.] Address: Johansson, F., Department of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**14757.** Nilsson-Örtman, V.; Stoks, R.; De Block, M.; Johansson, F. (2013): Latitudinal patterns of phenology and age-specific thermal performance across six Coenagrion damselfly species. *Ecological Monographs* 83: 491-510. (in English) ["Using a combination of computer simulations and laboratory experiments we test if the thermal sensitivity of growth rates change during ontogeny in damselfly larvae and if these changes can be predicted based on the natural progression of average temperature or thermal variability in the field. The laboratory experiment included replicated species from Southern,

Central and Northern Europe. Although annual fluctuations in temperature represent a key characteristic of temperate environments, few studies of thermal performance have considered the ecological importance of the studied traits within a seasonal context. Instead, thermal performance is assumed to remain constant throughout ontogeny and reflect selection acting over the whole life cycle. The laboratory experiment revealed considerable variation among species in the strength and direction of ontogenetic performance shifts. In four species from Southern and Central Europe, reaction norms were steepest during early ontogeny, becoming less steep during later ontogenetic stages (indicative of low-temperature acclimation). In one Northern European species, the slope of reaction norms did not change during ontogeny. In the other North European species, reaction norms became steeper during ontogeny (indicative of high-temperature acclimation). We had expected high-latitude species to show strong low-temperature acclimation responses, because they have a short flight season and inhabit a strongly seasonal environment. Instead, we found the reversed pattern: low-latitude species displayed strong low-temperature acclimation responses and high-latitude species displayed weak, or even reversed, acclimation responses to low temperatures. These findings suggest that low-temperature acclimation may be less beneficial and possibly more costly in habitats with rapid seasonal transitions in average temperature. We conclude that thermal performance traits are more dynamic than typically assumed and caution against using results from single ontogenetic stages to predict species' responses to changing environmental conditions." (Authors)] Address: Nilsson-Örtman, V., Umeå University, Dept. of Ecology and Environmental Science, Sweden. E-mail: viktor.j.nilsson@gmail.com

**14758.** Ott, J. (2013): „Libellula“ – ein Umweltbildungszentrum entsteht im Moosalbtal. *Heimatjahrbuch Kaiserslautern* 2014: 79-81. (in German) [Report on the current status of the Center for environmental education near Trippstadt, Rheinland-Pfalz, Germany] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**14759.** Ruskova, T. (2013): Untersuchung der Biodiversität der Odonata an Stillgewässern in der Südpfalz. MSc. thesis, University of Ostrava, Faculty of Science, Biology / Systematic Biology and Ecology: (in Czech, with English summary) ["This thesis is focused on the effects of the parasitoids on reproductive lifestyle strategy of the damselfly of Lestidae family. Thesis describes the influence of parasitoidism on the unusual underwater egg-laying strategy in damselfly species. Theoretical part of the thesis is concerned on the issues of literature focused on dragonflies' mating, male's guarding for females, underwater oviposition, parasitoids, water parasitoids and the host-parasitoid interactions. The dates have been taken since 2010 to 2012 on the locality of botanical garden and arboretum of Štramberk (49° 35'

19.57°N 18° 7' 29.68"E) and the locality of the slate quarry ?Na Peklách? on Štramberk (49°34'52.093"N 18°6'52.509"E). The research has been taken at the same time and was focused on the endophytical under-ater egg-laying. Eggs have been tested for presence of parasitoids and for total eggs mortality in relation to water surface. Eggs were always laid on the leafless plants with a circular diameter and with their roofs under the water surface. Plants containing eggs there were *Equisetum variegatum* (Equisetaceae), *Schoenoplectus lacustris* (Cyperaceae) and *Juncus effusus* (Juncaceae). In three years of research, 8674 eggs were checked under a microscope. The rate of parasitoidism on eggs was 13,05 % above the water surface and 6,56% under it. The eggs' mortality was 18,86 % above the water surface and 21,4 % under it. Total rate of mortality is higher under the water surface then above it, which can be explained by many factors." (Author)] Address: Ruskova, Tereza, Department of Biology and Ecology / Institute of Environmental Technologies, Faculty of Sciences, Univ. Ostrava, Chittussiho 10, CZ-710 00 Slezská Ostrava, Czech Republic. E-mail: P11104@student.osu.cz

**14760.** Shoemaker, P.A.; Wiederman, S.D.; O'Carroll, D.C. (2013): Can a competitive neural network explain selective attention in insect target tracking neurons?. *Neural Engineering (NER)*, 2013 6th International IEEE/EMBS Conference, San Diego, CA, USA, 6-8 Nov. 2013. doi: 10.1109/NER.2013.6696081. URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6696081&isnumber=6695843>: 903-906. (in English) ["Small target motion detecting (STMD) neurons in the dragonfly brain (*Hemicordulia tau*) are neural correlates of a highly-specialized and ethologically-significant feature detection function, and the recent discovery of selective attention in STMDs has clear implications for the ability of dragonflies to track and pursue one target from among several. We used a biophysically-plausible neural network model, based on competitive units fed by NMDA-type synaptic inputs and including lateral feedback inhibition, to model these attentional effects in numerical simulations. With appropriate forward gain, the model displays a winner-takes-all behavior that partially captures the selective attention documented in electrophysiological recordings from STMDs. It cannot, however, explain the full range of results that have now been observed in wide-field STMDs, in particular a bias toward attention to targets dependent on their traversal of continuous trajectories." (Authors)] Address: Shoemaker, P.A., Tanner Research, Inc., Monrovia, CA, 91016 USA. E-mail: pat.shoemaker@tanner.com

**14761.** Torralba-Burrial, A.; Armendariz, C.; Nores, C. (2013): Distribución y tamaño poblacional de la libélula amenazada *Oxygastra curtisii* (Odonata: Corduliidae) en Navarra (N Península Ibérica). *XXX Jornadas de la Asociación española de Entomología (AeE)*: 43. (in Spanish) [*O. curtisii* was studied between late June and August 2012 at 24 localities the Bidasona River; the species was

recorded along 12 stretches of the river.] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

## 2014

**14762.** Alcorlo, P.; Jimenez, S.; Baltanas, A.; Rico, E. (2014): Assessing the patterns of the invertebrate community in the marshes of Donana National Park (SW Spain) in relation to environmental factors. *Limnetica* 33(1): 189-204. (in English, with Spanish summary) ["The marshes of Donana (SW, Spain) are some of the largest and best preserved Mediterranean marsh areas represented in Western Europe. They are considered a hotspot of biodiversity, and as such receive protected-area status under two different systems of protected-area management. The importance of submerged macrophytes in the functioning of marsh ecosystems has been addressed in several studies. However, most of the animal biodiversity studies have been developed for vertebrates. Thus, the aims of this study are i) to assess the composition of the invertebrate community in the marsh of Donana (zooplankton and zoobenthos) in a set of sites representing the different habitats of the marsh in both clear and turbid water states; ii) to compare diversity among patches in different states (clear vs turbid water); and iii) to address the main environmental factors that have influenced their community structure and diversity. A total of 102 taxa were recorded. The highest abundance values were attained by cladocerans and ostracods, both microcrustaceans, and by dipteran insects. It was possible to distinguish different marsh environments characterised by patches of clear water, where the macrophyte beds contribute to an increase of the structural heterogeneity of the marsh, providing the invertebrates with shelter and food resources and subsequently influencing different invertebrate assemblages. Conductivity, soluble reactive phosphorus (SRP) and chlorophyll-a concentration were the environmental variables that influenced the presence of turbid patches, which showed lower macrophyte cover, diversity and richness values than those seen in the clear water patches. The relationship between diversity ( $H'$ ) and richness ( $S$ ), suggested that processes related to species migration (i.e., hydrologic connection with other water bodies, flood duration, and dissemination of propagules) are the main constraints influencing the invertebrate community structure in the Donana marshes." (Authors). The list of taxa includes *Enallagma cyathigerum*, *Ischnura graellsii*, *Lestes viridis*, *L. sponsa*, *Aeshna cyanea*, *Anax parthenope*, *Sympetrum fonscolombii*, *S. meridionale*, and *Crocothemis erythraea*.] Address: Alcorlo, Paloma, Dept. Ecol., Univ. Autonoma de Madrid, c/ Darwin no 2, 28049 Madrid, Spain. E-mail: paloma.alcorlo@uam.es

**14763.** Artemieva, E.A.; Muraviev, I.V. (2014): Breeding biology of Blackheaded Wagtail *Motacilla feldegg* Michahelles, 1830 (Passeriformes, Motacillidae, Motacillinae) in South of Russia. *International Journal of Biology* 6(2):

21-29. (in English) ["Species-specific features of black-headed wagtail *Motacilla feldegg* Michahelles, 1830 (Passeriformes, Motacillidae, Motacillinae) breeding biology were identified in south of Russia. A tendency to current species range shift is traced. Critical estimation of literary information about some peculiarities of reproduction and ecology of black-headed wagtail is carrying out on boundary XIX-XXI centuries, estimation of contemporary quantity, limited factories and regularities of species distribution on research territory of European part of Russia are given. Distribution and quantity *M. feldegg* are irregular in this region and determine by presence of nesting biotopes and potential forage reserve. General character of distribution of this species estimates as a local and not numerous that gives foundation to include *M. feldegg* to some region Red Data Books of Russia and neighbouring countries." (Authors) Male diet included 11.3% Coenagrionidae, while female diet didn't include any dragonflies.] Address: Artemieva, E.A., Ulyanovsk State Pedagogical University of I. N. Ulyanov, the Centenary of V.I. Lenin's Birth sq., 4, Ulyanovsk, 432700, Russia. E-mail: hart5590@gmail.com; pliska58@mail.ru

**14764.** Barndt, D. (2014): Beitrag zur Kenntnis der Arthropodenfauna der nährstoffarmen Torfmoosmoore Keilsee und Himmelreichsee (Land Brandenburg). *Märkische Entomologische Nachrichten* 16(2): 93-137. (in German, with English summary) [Germany; only four species are listed: *Aeshna juncea*, *A. subarctica elisabethae*, *Leucorrhinia albifrons* and *L. dubia*.] Address: Barndt, D., Bahnhofstr. 40, 12207 Berlin-Lichterfelde, Germany. E-mail: dr.barndt@kabelmail.de

**14765.** Barwell, L.J.; Azaele, S.; Kunin, W.E.; Nick, J.B. (2014): Can coarse-grain patterns in insect atlas data predict local occupancy? *Diversity and Distributions* 20(8): 895-907. (in English) ["Aim: Species atlases provide an economical way to collect data with national coverage, but are typically too coarse-grained to monitor fine-grain patterns in rarity, distribution and abundance. We test the performance of ten downscaling models in extrapolating occupancy across two orders of magnitude. To provide a greater challenge to downscaling models, we extend previous downscaling tests with plants to highly mobile insect taxa (Odonata) with a life history that is tied to freshwater bodies for reproduction. We investigate the species-level correlates of predictive accuracy for the best performing model to understand whether traits driving spatial structure can cause interspecific variation in downscaling success. Location: Mainland Britain. Methods: Occupancy data for 38 British Odonata species were extracted from the Dragonfly Recording Network (DRN). Occupancy at grains . 100 km<sup>2</sup> was used as training data to parameterize ten downscaling models. Predicted occupancy at the 25, 4 and 1 km<sup>2</sup> grains was compared to observed data at corresponding grains. Model predictive error was evaluated across species and grains. Main conclusions: The Hui model gave the most

accurate downscaling predictions across 114 species: grain combinations and the best predictions for 14 of the 38 species, despite being the only model using information at a single spatial grain. The occupancy.area relationship was sigmoidal in shape for most species. Species' distribution type and dispersal ability explained over half of the variation in downscaling predictive error at the species level. Species with a climatic range limit in Britain were poorly predicted compared with other distribution types, and high dispersal ability was associated with relatively poor downscaling predictions. Our results suggest that downscaling models, using widely available coarse-grain atlas data, provide reasonable estimates of finegrain occupancy, even for insect taxa with strong spatial structure. Linking species-level traits with predictive accuracy reveals general principles about when downscaling will be successful." (Authors)] Address: Barwell, Louise, NERC, Centre for Ecology and Hydrology, Maclean Building, Benson Lane, Crowmarsh Gifford, Wallingford, Oxfordshire, OX10 8BB, UK. E-mail: loubar@nerc.ac.uk

**14766.** Bateman, A.W.; Vos, M.; Anholt, B.R. (2014): When to defend: Antipredator defenses and the predation sequence. *The American Naturalist* 183(6): 847-855. (in English) ["Some authors have suggested that prey species stand to benefit most by defending as early as possible during predator-prey encounters, but species in nature employ antipredator defenses at various stages of interactions with their predators. Whether it is generally most advantageous to defend early or late during such encounters is an open theoretical question. We model conditions under which a prey species might evolve early or late defenses in response to predation. Adapting a two-prey, one-predator Rosenzweig-MacArthur system of differential equations, we analyse the effects of modified antipredator defenses (and their associated costs) on the ability of a new prey type to invade the one-prey, one-predator limiting system at equilibrium. We show that the outcome, in terms of invasion potential, is crucially dependent on the ratio of the prey's proportional population growth rate to the cost of predator encounters." (Author) The paper includes references to Odonata.] Address: Anholt, B.R., Dept Biology, University of Victoria, PO Box 3020, Victoria, BC, V8W 3N5, Canada. E-mail: banholt@uvic.ca

**14767.** Bennett, A.M.; Murray, D.L. (2014): Maternal body condition influences magnitude of anti-predator response in offspring. *Proc. R. Soc. B* 281 no. 1794 20141806: 6 pp. (in English) ["Organisms exhibit plasticity in response to their environment, but there is large variation even within populations in the expression and magnitude of response. Maternal influence alters offspring survival through size advantages in growth and development. However, the relationship between maternal influence and variation in plasticity in response to predation risk is unknown. We hypothesized that variation in the magnitude of plastic responses between families is at least partly due to maternal

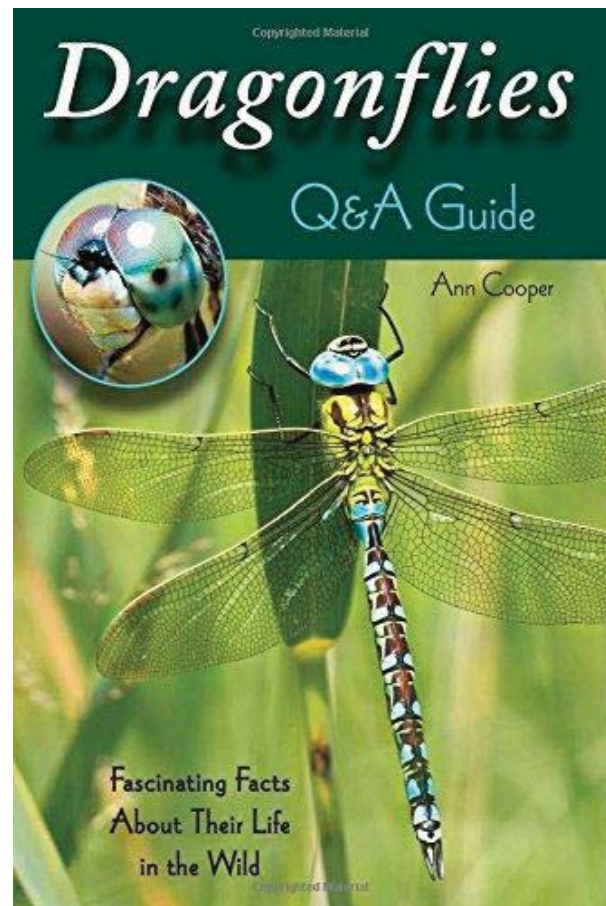


provisioning and examined the relationship between maternal condition, egg provisioning and magnitude of plastic response to perceived predation risk (by dragonfly larvae: *Aeshna* spp.) in northern leopard frogs (*Lithobates pipiens*). Females in better body condition tended to lay more (clutch size) larger (egg diameter) eggs. Tadpoles responded to predation risk by increasing relative tail depth (morphology) and decreasing activity (behaviour). We found a positive relationship between morphological effect size and maternal condition, but no relationship between behavioural effect size and maternal condition. These novel findings suggest that limitations imposed by maternal condition can constrain phenotypic variation, ultimately influencing the capacity of populations to respond to environmental change." (Authors)] Address: Bennett, Amanda, Environmental and Life Sciences, Trent University, 1600 West Bank Drive, Peterborough, Ontario, Canada K9L 7B8. E-mail: amandabennett2@trentu.ca

**14768.** Borisov, S.N. (2014): Uses of traps on mountain pass Chokpak (Western Tien-Shan) for the number of migrating dragonflies (Insecta, Odonata). *Ornithological news of Kazakhstan and Middle Asia* 3: 167-171. (in Russian, with English summary) ["On the Chokpak pass in Western Tien-Shan (N 42°31' E 70°367) in the fall seasons of the 2008-10-th years using ornithological traps of Rybachinskii type the study of migratory dragonflies was conducted. The species of dragonflies caught in the traps were characterized by two different migration strategies. The first group consisted of the species with seasonal vertical migrations (*Sympetrum arenicolor*, *S. striolatum pallidum*, *S. meridionale*, *Aeshna mixta*), the second - of the species with translatitudinal migrations (*S. fonscolombii*, *Anax parthenope*, *A. ephippiger*). It was established that intensity of migration increased with the arrival of cold air fronts. Maximum of three thousand specimens fell in one trap per day. Visible flights of dragonflies near the surface of land were observed exclusively in the opposite south-west wind. It is assumed that the main migrations occur with the favourable wind at great heights and are not available to watch." (Author)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**14769.** Buczyński, P.; Buczyńska, E. (2014): *Aeshna affinis* Vanderl. and *Crocothemis erythraea* (Brullé) (Odonata, Aeshnidae, Libellulidae) recorded near Suwałki (north-east Poland). *Wiad. Entomol.* 33(4): 280-281. (in Polish, with English title) [Poland; *Aeshna affinis*: Żywa Woda-Stara Wieś (54°10'40" N, 22°51'0" E, UTM: FF20), 27-vii-2013. *C. erythraea*: Stańczyki (54°17'46" N, 22°39'23" E, FF01), 27-vii-2013, Żywa Woda-Stara Wieś (54°10'45" N, 22°51'07" E), 27-vii-2013.] Address: Buczyński, P., Maria Curie-Skłodowska University in Lublin, Department of Zoology, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**14770.** Childress, J.M. (2014): Dragonflies and damselflies of Albemarle County, Virginia (Odonata). *Banisteria* 43: 28-39. (in English) ["The Odonata fauna of Albemarle County, Virginia has been poorly documented, with approximately 20 species on record before this study. My observations from 2006 to 2014, along with historical and other recent records, now bring the total species count for the county to 95. This total includes 64 species of dragonflies, which represents 46% of the 138 species known to occur in Virginia, and 31 species of damselflies, which represents 55% of the 56 species known to occur in Virginia. Also recorded here are the observed date ranges for adults of each species and some observational notes." (Author)] Address: Childress, J.M., 4146 Blufton Mill Road Free Union, Virginia 22940, USA



**14771.** Cooper, A. (2014): *Dragonflies: Fascinating facts about their life in the wild. Q&A Guide*, Stackpole Books: 112 pp. (in English) ["Got a question about dragonflies? This book has answers. *Dragonflies: A Q & A Guide* is a lively, illustrated guide for anyone looking to learn more about dragonflies and their lives in the wild. Easy-to-read format for readers looking to dip in or read straight through. Hundreds of questions posed and answered about the dragonfly's anatomy, history, and life cycle. Dozens of stunning colour photos of dragonflies in their habitats. Special sections on record-breaking dragonflies and the relationship between dragonflies and humans." (Publisher)]

**14772.** Cornejo, A. (2014): Estructura de la comunidad de macroinvertebrados dulceacuícolas en el área de concesión minera Cerro Petaquilla, Colón, Panamá. *Scientia (Panamá)* 24(2): 15-35. (in Spanish, with English summary) ["Aiming to characterize the structures of aquatic macroinvertebrate's community in Cerro Petaquilla Mining Project, we established 17 sampling stations, divided in two areas: Buffer Area (AA) and Direct Impact Area (AID), which were evaluated in September, 2007. We did three comparisons: between area, between stations and between microhabitats (backwaters and streams). We collected 8254 individuals from 119 taxa, showing a clear dominance by the groups of aquatic insects from Ephemeroptera group, following by Coleoptera, Trichoptera, Diptera, and, in a lower grade, Odonata. The genera *Thraulodes*, *Farrodes* and *Leptohyphes* represent the 31.34% from all reported individuals. The richness and abundance were higher in AA than AID, but these were non-significance differences. Conversely, the taxonomic richness and abundance were significantly varied between sampling stations and were lower in AA-01, AID-01 and AID-08. The taxonomic richness and abundance were significant varied between the evaluated microhabitat, being higher in streams than backwater. The sampling correctly represents the richness from the area, because all identified taxa are the 83% of the true richness from the area. The macroinvertebrate community was composed of organisms considered natural water indicators of good status. However, we show a negative impact from the mining activities on the pluvial ecosystem, caused by the removal of vegetation cover, which caused the increase of sedimentation levels and affect the macroinvertebrate's community structure in sampling stations AA-01, AID-01 and AID-08." (Author) Odonata are treated at genus level.] Address: Cornejo, A., Colección Zoológica Dr. Eustorgio Méndez, Instituto Conmemorativo Gorgas de Estudios de la Salud, Brazil. E-mail: [acornejo@gorgas.gob.pa](mailto:acornejo@gorgas.gob.pa).

**14773.** Cunha, R.; Fulan, J.A.; Rodrigues dos Santos, L. (2014): Influence of physical and chemical characteristics of water on spatial distribution of Odonata larvae associated with *Eichhornia crassipes* (Mart.) Solms in Uruapiara River, Madeira Basin, State of Amazonas, Brazil. *Estud Biol.* 2014 36(86): 36-42. (in Portuguese, with English summary) ["The objective of this study was to identify the odonates associated with *Eichhornia crassipes*, as well as investigate the main environmental variables that affect its spatial distribution in Uruapiara River, Amazonas, Brazil. The macrophytes were sampled in a hollow square with total area of 0.120m<sup>2</sup>. The removal of the larvae was performed with washing plant with carbonated water. We evaluated the following variables: temperatures of the air and water, dissolved oxygen, pH, turbidity, total phosphorus and total nitrogen. We identified total of 73 larvae distributed in the families Libellulidae (64) and Coenagrionidae (9). Libellulidae was represented by *Erythemis*, *Micrathyria*, *Tauriphila* and *Nephepeltia* and Coenagrionidae by *Acanthagrion*

and *Oxyagrion*. A canonical correspondence analysis (CCA) showed that *Tauriphila* and *Coenagrionidae* were positively affected by the concentration of dissolved oxygen. *Nephepeltia* and *Oxyagrion* were negatively affected by increasing the dissolved oxygen. The study revealed that dissolved oxygen was the most significant factor in the distribution of larvae of Odonata in Uruapiara River." (Authors)] Address: Cunha, Rita de Cássia da, Especialista em Biologia da Conservação, Universidade Federal do Amazonas (UFAM), Manaus, AM - Brasil. E-mail: [cassiafloresta@hotmail.com](mailto:cassiafloresta@hotmail.com)

**14774.** Czerniawska-Kusza, I.; Brożonowicz, A. (2014): Zoobenthos in post-exploitation reservoirs of marls and limestone in Opole Silesia. *Pol. J. Natur. Sc.* 29(4): 307-318. (in English) ["Large layers of carbonate rocks in Opole region for years serve as an exploitation material for the cement-lime industry. The mining results in numerous post-exploitation reservoirs, which biocenosis is poorly known. The objective of the study was to determine the effect of the environmental features on the distribution of macroinvertebrates and the community structure, and to present the significance of these water bodies for regional biodiversity. The research was carried out between June and November 2010 at eight reservoirs. Altogether 66 taxa were found, although only from 12 to 38 were recorded in particular reservoirs. The widespread and abundant were dipterans Chironomidae, dragonflies *Ischnura* sp. and *Coenagrion* sp., and mayflies *Caenis* sp. and *Cloeon* sp., especially numerous in charales meadows. Based on faunistic similarity, three groups of reservoirs were distinguished, which differed in size, character of a littoral zone and origin of waters (underground vs surface)." (Authors)] Address: Czerniawska-Kusza, Izabela, Department of Land Protection, University of Opole, Oleska 22, PL-45-052 Opole Poland. E-mail: [Izabela.Kusza@uni.opole.pl](mailto:Izabela.Kusza@uni.opole.pl)

**14775.** Dao, P.-g. (2014): The design and application of Odonata teaching modules. Dissertation, Institute of Entomology, National Taiwan University: (in Chinese, with English summary) ["This study mainly focuses on the application of dragonfly resource to the nature, living technology and environmental education, and discuss the affection of the five contents of environmental education on Fifth grade students. The objects of this study are two elementary schools in Taoyuan county of Taiwan, which are located in the country yard and city separately. The teaching model is classified into three subjects: biology of dragonfly, digital learning, dragonfly conservation, and the total number of courses are up to ten. The researchers coordinate with class teacher to evaluate the results of the study, and the results confirm with the assessment criteria of teaching model. We deliver the questionnaires, the application of dragonfly resource to the nature, living technology and environmental education, before and after the teaching course to test the affection of teaching model on the kids. There are five lines of conclusions of this study. First, both school kids are highly interested

and study effectively in the dragonfly teaching course model. Second, the dragonfly teaching course model can improve the five contents of environmental education in both schools. We also suggest that the framework of course design should be planned according to the profession of teacher, student interest and local insect materials. The teaching model could be expended to other schools, and also adjusted by the class time and content." (Author)] Address: not stated

**14776.** Deliry, C.; Groupe Sympetrum (2014): *Nouvel Atlas des Libellules de l'Isère*. <http://libellulme.eklablog.com/nouvel-atlas-des-libellules-de-l-isere-2014-a115142710>: 104 pp. (in French) [77 odonate species are known to occur in the French Département Isère. The regional species are mapped and briefly discussed. For details see: <http://www.sympetrum.fr/Atlas38.pdf>] Address: G.R.P.L.S. c/o C. Deliry, 182 rue de la Forge, F-38200 Villette de Vienne, France. E-mail: [president@sympetrum.org](mailto:president@sympetrum.org)

**14777.** Döler, H.-P. (2014): *Nachweis von Leucorrhinia albifrons (Odonata: Libellulidae) in Ostwürttemberg*. *Mercuriale* 14: 27-32. (in German, with English summary) ["On 10-VI-2014 and 11-VI-2014 a male of *L. albifrons* was observed at an extensively used fish pond, called Croßtiefweiher (MTB 6927, 470 m above sea level), located in eastern Württemberg (Germany, county of Ostalb). The Observation represents the second record of this species in Württemberg. Locality, habitat and the accompanying dragonfly fauna are briefly described and the possible origin of *L. albifrons* is discussed." (Author)] Address: Döler, H.-P., Drei-Kreuz-Str. 22, 78597, Germany. E-mail: [lrndorf.hp.doeter@t-online.de](mailto:lrndorf.hp.doeter@t-online.de)

**14778.** Dolný, A.; Helebrandová, J.; Rusková, T.; Šigut, M.; Harabiš, F. (2014): *Ecological aspects of underwater oviposition in Lestes sponsa (Odonata: Lestidae)*. *Odonatologica* 43(3/4): 183-197. (in English) ["Underwater oviposition is a special subtype of endophytic oviposition and constitutes the predominant mode for certain species of Calopterygidae and Coenagrionidae. Very little is known about underwater oviposition in Lestidae and other dragonfly groups (e.g., Anisoptera). In July 2009, we recorded this specific behaviour in a population of *Lestes sponsa* in the Czech Republic (Moravia, Štramberk). We subsequently studied the frequency of this phenomenon at regional (16 sites surveyed in an area of ca 1,260 km<sup>2</sup>) and local (proportions of eggs laid beneath and above the water's surface at three locations) levels. We examined further key environmental factors influencing underwater oviposition and certain ecological parameters (depth and time) of this behaviour in *L. sponsa*. The frequency of underwater oviposition on the regional scale was relatively low (< 20 %), but the frequency of this behaviour on a local scale was sometimes high. At those sites where underwater oviposition occurred, 4,759 (62 %) out of a total of 7,699 eggs were laid underwater. The main factors affecting underwater oviposition were transparency of the water column and type of

submerged vegetation. Ovipositing pairs spent on average 338 seconds under the water at an average depth of 20 cm. Further research should focus on the benefits of this specific oviposition tactic and especially egg mortality during overwintering." (Authors)] Address: Dolný, A., Department of Biology and Ecology/ Institute of Environmental Technologies, Faculty of Natural Sciences, University of Ostrava, Chittussiho 10, CZ-71000 Slezská Ostrava, Czech Republic. E-mail: [ales.dolny@osu.cz](mailto:ales.dolny@osu.cz)

**14779.** Engler, J.O. (2014): *Zoogeographic notes on Orthetrum trinacria with special emphasis on its recent discovery on Corsica, France (Odonata: Libellulidae)*. *Libellula* 33(1/2): 21-26. (in German, with English summary) ["Following its first Corsican record in 2012, a male of *Orthetrum trinacria* was recorded on the small Lavezzi islands, south of Corsica, in September 2013. The record of this species in an area lacking in any possible breeding habitat highlights its high mobility and will be discussed in the context of its colonization of the Mediterranean in the past decades." (Author)] Address: Engler, J.O., Zoologisches Forschungsmuseum Alexander König, Adenauerallee 160, 53113 Bonn, Germany. E-mail: [j.engler.zfmk@uni-bonn.de](mailto:j.engler.zfmk@uni-bonn.de)

**14780.** Esfandiari, M.; Sadeghi, S.; Khadempour, A. (2014): *First record of Odonata nymphs from Karun River, south-west Iran*. *Iranian Journal of Animal Biosystematics* 10(2): 205-208. (in English) [Karun River, Ahvaz, SW Iran, during 2009–2011 40 nymphs of *Ischnura elegans*, *Lindenia tetraphylla*, *Anax parthenope*, *Crocothemis servilia*, and *Brachythemis fuscopalliat*a were recorded. All these species are new additions to the checklist of Odonata for Khuzestan province.] Address: Esfandiari, M., Department of Plant Protection, College of Agriculture, Shahid Chamran University of Ahvaz, Ahvaz, Iran. E-mail: [apameini@yahoo.com](mailto:apameini@yahoo.com)

**14781.** Folorunso, L A; Falaye, A E; Ajani, E K. (2014): *Predatory size of dragonfly (Palpopleura lucia (Drury, 1773) nymphs on guppy (Poecilia reticulata (Peters, 1859))*. *Journal of Fisheries and Aquatic Science* 9(6): 483-486. (in English) ["Attainment of adulthood by a young fish is a function of environment, competition, starvation, cannibalism and predation amongst other factors. Predators do not exhibit predatory qualities from birth, it has to grow over time before the qualities are expressed. Thus, the aim of this study was to determine minimum size of dragonfly (*Palpopleura lucia* (Drury, 1773)) nymphs (Naiads) that can predate on guppy (*Poecilia reticulata*) (Peters, 1859)) with a view to understanding predation in aquaculture. Guppies of 5-12 mm total length were introduced to naiads of varying lengths ranging from 2.00-10.00 mm over a 48 h period. Results obtained showed that naiads >6.00 mm were able to predate on guppies while those <5.5 mm co-habited with guppies without predation. This study thus concludes that aquaculture management practices can be geared towards eliminating naiads >6.00 mm, this will hopefully



assist farmers to optimize human and material resources expended in the control of naiads in aquaculture." (Authors)] Address: Folorunso, L.A., Samaru College of Agriculture, Division of Agricultural Colleges, Ahmadu Bello University, P.M.B 1058, Zaria, Nigeria

**14782.** Frank, M. (2014): Beitrag zur aktuellen Zusammensetzung der Libellenfauna (Odonata) im NSG Gramboweer Moor (Nordwest-Mecklenburg). *Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 17(1): 4-23. (in German) [Landkreis Nordwest-Mecklenburg, Mecklenburg-Vorpommern, Germany; between 2011-2014, an intensive study of the dragonfly fauna of a high bog was conducted. To study the species turn over, the data are compared with observations dating back to 1966, and covering a time period of near 50 years of continuous monitoring of the local odonate fauna. The balance of losses (n=5) and new arrivals (n=4) is quite square.] Address: Frank, M., Zur Traubenmühle 5A, 55268 Nieder-Olm, Germany. E-mail: mikel.frank@gmx.de

**14783.** Frank, M. (2014): Ein neues, großes bodenständiges Vorkommen der Grünen Mosaikjungfer (*Aeshna viridis* Eversmann, Odonata: Aeshnidae) an den Schönberger Torfstichen (Nordwestmecklenburg). *Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 17(1): 42-45. (in German) [In August 2014, near the town of Schönberg, NW-Mecklenburg-Vorpommern, Germany, a population of *A. viridis* was discovered.] Address: Frank, M., Zur Traubenmühle 5A, 55268 Nieder-Olm, Germany. E-mail: mikel.frank@gmx.de

**14784.** Frank, M. (2014): Spätsommerbeobachtungen von Libellen auf Kos, Griechenland, mit vier Erstnachweisen (Odonata). *Libellula* 33(3/4): 211-216. (in German, with English summary) ["Late summer observations of dragonflies on the island of Kos, Greece, with four new records (Odonata) – From the end of August to the beginning of September 2014 during a stay on the island of Kos 13 dragonfly species were recorded. *Erythromma viridulum*, *Aeshna mixta*, *Anax imperator*, and *Orthetrum chrysostigma* were recorded for the first time on the island, increasing the number of odonate taxa known from Kos to 29." (Author)] Address: Frank, M., Zur Traubenmühle 5A, 55268 Nieder-Olm, Germany. E-mail: mikel.frank@gmx.de

**14785.** Futahashi, R. (2014): A revisional study of Japanese dragonflies based on DNA analysis (2). *Tombo* 56: 57-59. (in Japanese, with English summary) ["The recent revisions on the phylogenetic relationships of Odonata at family and superfamily ranks are reported. Several topics in Japanese dragonflies, mainly on the genera *Rhipidolestes* and *Macromidia*, are also provided." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryofutahashi@aist.go.jp

**14786.** Gaurav, S.; Jain, K.K. (2014): Numerical investigation of fluid flow and aerodynamic performance of a dragonfly wing section for Micro Air Vehicles (MAVs) applications. *International Journal of Innovation and Scientific Research* 9(2): 285-292. (in English) ["A comprehensive numerical simulation of fluid dynamics based study of a pleated wing section based on the wing of *Aeshna cyanea* has been performed at ultra-low Reynolds number corresponding to the gliding flight of these dragonflies in order to explore the potential applications of pleated airfoils for micro air vehicle applications. The simulation employs an unstructured triangular mesh based on finite volume discretization done in the ANSYS-14.0 using WorkBench14.0. Whenever, dragonfly wing interacts with the fluid (air taken), several forces and vibrations results out. These forces and vibrations cause certain changes over the dimensional structure over the wing and also influence the flows characteristics. A critical assessment of the computed results was performed. In this work, various flow patterns and aerodynamic performance of pleated airfoil has been obtained at ultra-low Reynolds numbers (2000-3000) at different angle of attacks (AOA) ranging from 0° to 15°. Also there effects on coefficient of Lift and Drag have been analysed. The simulations demonstrate that pleated airfoil produces higher lift and moderate drag that lead to an aerodynamic performance and hence pleated airfoil is an excellent choice for a fixed wing micro-air vehicle application." (Authors)] Address: Jain, K.K., Department of Mechanical Engineering, Sri Ram Institute of Technology, Jabalpur, Madhya Pradesh, India

**14787.** Goertzen, D.; Suhling, F. (2014): Central European cities maintain substantial dragonfly species richness – a chance for biodiversity conservation?. *Insect Conservation and Diversity* 8(3): 238-246. (in English) ["(1.) This study investigates whether cities have the potential of hosting high species diversity of dragonflies (Odonata), a target group in freshwater conservation. (2.) We reviewed the dragonfly fauna of 30 cities in Central Europe and analysed their species richness compared to the regional species pools in the hinterlands, i.e. estimated the amount of regional diversity represented in cities. In particular, we examined the occurrence of species of conservation concern at the European scale. (3.) Results revealed that 92.6% of all 81 Central European dragonfly species occurred in cities, as well as 85.7% of 14 species of conservation concern. As expected, assemblages of city species were subsets of the regional species pool and city species richness increased with regional species numbers. Some cities hosted the complete regional species pool. (4.) Ten species of conservation concern established autochthonous populations and six of them, such as *Aeshna viridis* and *Ophiogomphus cecilia*, were abundant at least in single cities. (5.) We conclude that there is good potential for cities to host high dragonfly diversity and even to promote species of conservation concern. To exploit this potential we recommend city planners to focus on the

needs of regionally characteristic species." (Authors)] Address: Goertzen, Diana, Institut für Geoökologie, Technische Universität Braunschweig, Langer Kamp 19c, 38106 Braunschweig, Germany. E-mail: d.goertzen@tu-bs.de

**14788.** Graf, J.F. (2014): Die Libellenfauna der Kykladeninsel Andros (Odonata). *Libellula* 33(1/2): 27-56. (in German, with English summary) ["The Odonate Fauna of the Cycladic Island of Andros – Data on adult dragonflies from the Cycladic island of Andros were collected between 2006 and 2013. On 289 visits 22 species were identified and 717 individual records were made at 48 different sites. Out of the 18 species already described from this island, all except *Lestes macrostigma* and *Coenagrion scitulum* could be observed again. Six additional species, *Sympecma fusca*, *Aeshna mixta*, *Anax parthenope*, *Anax ephippiger*, *Sympetrum fonscolombii*, and *Trithemis annulata* were observed for the first time on Andros. Altogether, 24 species have now been recorded for Andros, the highest number of all Cycladic islands." (Author)] Address: Graf, J.F., Villa Faros, GR-84503 Batsi, Andros, Greece & Bündtenweg 36, CH-4102 Binningen, Switzerland

**14789.** Grgić, M.; Bogdanović, T.; Dragičević, P.; Romanjek, K. (2014): The fauna of dragonflies (Odonata) in the Spačva forest. *Prirodoslovje* 14(1-2): 105-116. (in Croatian, with English summary) [Between May and October 2012, at ten localities in the Spačva alluvial lowland forest (Croatia) 881 odonate individuals were recorded totalling to 22 species. Species of faunistic interest are *Chalcolestes parvidens*, *Epitheca bimaculata*, *Somatochlora meridionalis*, and *Anax ephippiger*.] Address: Grgic, Marina, Javna ustanova za upravljanje zaštićenim prirodnim vrijednostima, Vukovarsko-srijemske županije, Trg Josipa Runjanina 1, Vinkovci, Croatia. E-mail: marina.grgic123@gmail.com

**14790.** Hassall, C. (2014): Continental variation in wing pigmentation in *Calopteryx* damselflies is related to the presence of heterospecifics. *PeerJ* 2:e438; DOI 10.7717/peerj.438: 15 pp. (in English) ["Wing pigmentation in *Calopteryx* damselflies, caused by the deposition of melanin, is energetically expensive to produce and enhances predation risk. However, patterns of melanisation are used in species identification, greater pigmentation is an accurate signal of male immune function in at least some species, and there may be a role for pigment in thermoregulation. This study tested two potential hypotheses to explain the presence of, and variation in, this pigmentation based on these three potential benefits using 907 male specimens of *Calopteryx maculata* collected from 49 sites (34 discrete populations) across the geographical range of the species in North America: (i) pigmentation varies with the presence of the closely related species, *Calopteryx aequabilis*, and (ii) pigment increases at higher latitudes as would be expected if it enhances thermoregulatory capacity. No gradual latitudinal

pattern was observed, as might be expected if pigmentation was involved in thermoregulation. However, strong variation was observed between populations that were sympatric or allopatric with *C. aequabilis*. This variation was characterised by dark wings through allopatry in the south of the range and then a step change to much lighter wings at the southern border of sympatry. Pigmentation then increased further north into the sympatric zone, finally returning to allopatry levels at the northern range margin. These patterns are qualitatively similar to variation in pigmentation in *C. aequabilis*, meaning that the data are consistent with what would be expected from convergent character displacement. Overall, the results corroborate recent research that has suggested sexual selection as a primary driver behind the evolution of wing pigmentation in this group." (Author)] Address: Hassall, C., School of Biology, Univ. of Leeds, Leeds, UK12.06.2014. E-mail: c.hassall@leeds.ac.uk

**14791.** Hill, M.J.; Wood, P.J. (2014): The macroinvertebrate biodiversity and conservation value of garden and field ponds along a rural-urban gradient. *Fundamental and Applied Limnology / Archiv für Hydrobiologie* 185: 107-119. (in English) ["The biodiversity and conservation value of semi-natural and field ponds in rural locations are widely acknowledged to be high compared to other freshwater habitats. However, the wider value of urban ponds, and especially garden ponds, has been largely neglected in comparison. This study examines the biodiversity and conservation value of aquatic macroinvertebrates in ponds along an urban-rural continuum over three seasons. Macroinvertebrate faunal richness and diversity of garden ponds (in both urban and sub-urban locations) was markedly lower than that associated with field ponds. The fauna recorded in garden ponds were largely a subset of the taxa recorded in the wider landscape. A total of 146 taxa were recorded from the 26 ponds examined (135 taxa from field ponds and 44 taxa from garden ponds); although only 10 taxa were unique to garden ponds. Garden ponds were frequently managed (macrophytes removed or sediment dredged) and contained artificial fountains or flowing water features which allowed a number of flowing water (lotic) taxa to colonise and persist. Despite the relatively limited faunal diversity and reduced conservation value of garden ponds they have the potential to serve as refugia for some taxa, especially Odonata with highly mobile adults. At the landscape scale, garden ponds provide a diverse and abundant range of freshwater habitats that could play an important role in conserving urban-macroinvertebrate biodiversity. However, for this to be achieved there is a need to provide guidance to home-owners on how this potentially valuable resource can help support freshwater biodiversity." (Authors) Anisoptera: 5 taxa and Zygoptera: 7 taxa; only *Ischnura elegans* is detailed..] Address: Hill, M.J., Centre for Hydrological and Ecosystem Science, Department of Geography, Loughborough University, Loughborough, Leicestershire, LE11 3TU, UK. E-mail: m.j.hill@lboro.ac.uk

- 14792.** Holuša, O.; Holušová, K. (2014): The first finding of *Cordulegaster bidentata* (Odonata: Cordulegastridae) in the Cerová vrchovina Hills in Slovakia. *Acta Mus. Beskid.* 6: 77-82. (in Czech, with English summary) ["In May 2014, totally 8 larvae of *C. bidentata* were found at 2 localities in the surroundings of Cerovo village – local part Obručná in the Cerová vrchovina Hills in the southern Slovakia. The finding of larvae of several instars shows the permanent occurrence of species in the Cerová vrchovina Hills. Species occurrence in Slovakia and its area in central Europe are discussed." (Authors)] Address: Holusa, O., Ústav ochrany lesů a myslivosti, Lesnická a dřevařská fakulta, Mendelova Univerzita v Brně, Zemědělská 3, CZ-613 00 Brno, Czech Republic. E-mail: holusao@email.cz
- 14793.** Hu, Z.; Deng, X.-Y. (2014): Aerodynamic interaction between forewing and hindwing of a hovering dragonfly. *Acta Mechanica Sinica* 30(6): 787-799. (in English) ["The phase change between the forewing and hindwing is a distinct feature that sets dragonfly apart from other insects. In this paper, we investigated the aerodynamic effects of varying forewing-hindwing phase difference with a 60° inclined stroke plane during hovering flight. Force measurements on a pair of mechanical wing models showed that in-phase flight enhanced the forewing lift by 17% and the hindwing lift was reduced at most phase differences. The total lift of both wings was also reduced at most phase differences and only increased at a phase range around in-phase. The results may explain the commonly observed behaviour of the dragonfly where 0° is employed in acceleration. We further investigated the wing-wing interaction mechanism using the digital particle image velocimetry (PIV) system, and found that the forewing generated a downwash flow which is responsible for the lift reduction on the hindwing. On the other hand, an upwash flow resulted from the leading edge vortex of the hindwing helps to enhance lift on the forewing. The results suggest that the dragonflies alter the phase differences to control timing of the occurrence of flow interactions to achieve certain aerodynamic effects." (Authors)] Address: Deng, X.-Y., School of Mechanical Engineering, Purdue University, 585 Purdue Mall, West Lafayette, IN, 47906, USA. E-mail: xdeng@purdue.edu
- 14794.** Hupało, K.; Rachalewski, M.; Rachalewska, D.; Tończyk, G. (2014): Gregarine parasitism in two damselfly hosts: Comparison between species, sexes, and sites (Odonata: Calopterygidae). *Odonatologica* 43(3/4): 199-211. (in English) ["We compared gregarine parasitism in imagines of *Calopteryx splendens* (Harris, 1780) and *C. virgo* (Linnaeus, 1758) collected at two sites with sympatric populations in the Spała Landscape Park, Łódź Province, Poland, in July 2012. Gregarine prevalence, intensity, wing load, and aggregation were compared between host species, sexes and sites. Among 140 individuals of both species collected from both sites, 81 (57.8 %) hosted gregarines. The distribution of the parasites was aggregated ( $k = 1.0064$ ) and the highest intensity reached 40 parasites in a single host. There was no difference in gregarine prevalence between species. However, prevalence was different between sexes in both species. Females of *C. splendens* were more often parasitised at site 1, whereas in *C. virgo* males the prevalence was significantly higher at site 2. Secondly, the intensity of parasite infestation and aggregation rate was higher in *C. splendens* at both sampling sites, but we found no differences between sexes except at site 2 where males of *C. splendens* exhibited higher intensity. Thirdly, we found that the parasitism did not affect the damselflies' wing load. Our study revealed differences in patterns of gregarine infection between species, sexes and sampling sites, which confirm that this system of parasitism is complex and influenced by many factors such as physiology and behaviour of the host, environmental conditions or availability of gregarine infectious stages." (Authors)] Address: Hupało, K., Dept of Invertebrate Zoology and Hydrobiology, University of Łódź, 12/16 Banacha, 90-237 Łódź, Poland. E-mail: hrupeq@gazeta.pl
- 14795.** Ikemeyer, D.; Schneider, T. (2014): *Sympetrum vulgatum decoloratum* und weitere Libellenarten in Quellgebieten des Taurusgebirges (Odonata). *Libellula* 33(3/4): 163-176. (in German, with English summary) ["*Sympetrum vulgatum decoloratum* and other Odonata species in headwaters of the Taurus Mountains – From 17 to 24 August 2013 we visited several dragonfly biotopes in the Taurus Mountains in Turkey, situated in the border zone of the provinces Antalya and Konya between the cities of Gündoğmuş, Tapkent, and Sarıveiler. Most of the habitats were headwater and spring meadows in regions from 1,600 m up to 2,000 m above sea level, but also rivulets and ditches were inspected for dragonflies. *Sympetrum vulgatum decoloratum* (Selys, 1884) was found mainly at headwater regions in good numbers. These habitats were above the treeline and surrounded by bulrushes and/or reed. The depth of the water was mainly less than 50 cm. In total 19 Odonata species were found in this region. The most common co-occurring indigenous species are *Ischnura pumilio*, *Lestes barbarus*, *Orthetrum brunneum*, and *Sympetrum flaveolum*, and further on, less common species are *Sympetrum fonscolombii* and *Sympetrum striolatum*. *Sympetrum haritonovi* Borisov, 1983, was not found. All headwater regions are potentially threatened by road building, water engineering and agricultural use. In worst cases the anthropogenic impacts caused the total loss of habitats for Odonata species." (Authors)] Address: Ikemeyer, D., Billerbecker Str. 6, 48329 Havixbeck, Germany. E-mail: dkjikemeyer@t-online.de
- 14796.** Iorio, E. (2014): Confirmation de l'autochtonie de *Somatochlora metallica* en Basse-Normandie (Odonata: Corduliidae). *Martinia* 30(2): 65-72. (in French, with English summary) ["An exuvia of *Somatochlora metallica* has been found on the edge of the Ermitage western pond at Champsecret (Orne department, France). This discovery



confirms the autochthony of this species in Basse-Normandie region. The territorial behaviour of several males observed in the same place at various occasions supports a true settlement of the species instead of an occasional reproduction. A description of the concerned pond is given. The main biotic and abiotic particularities which most probably condition the settlement and a successful larval cycle of this species in Basse-Normandie region are hypothesized. (Author)] Address: Iorio, E., chargé d'études au Groupe d'étude des Invertébrés Armoricaains (GRETIA) - Antenne Pays-de-la-Loire – 5 rue Général Leclerc – 44390 Nort-sur-Erdre, France. E-mail: e.iorio@gretia.org

**14797.** Jenkins, D.; Mizell, R.; Vanbloem, S.; Whitmore, S.; Wiscovitch, L.; Zaleski, K.; Goenaga, R. (2014): An analysis of arthropod interceptions by APHIS-PPQ and customs and border patrol in Puerto Rico. *American Entomologist* 60(1): 44-57. (in English) ["Interpretive Summary: We analyzed arthropod interceptions made by regulatory agencies on traffic coming into and leaving Puerto Rico with the intention of finding patterns that may help predict potential invaders and sources of invasions. The majority (77%) of the arthropods intercepted entering Puerto Rico were intercepted in freight or luggage originating within the Caribbean. We found that the insect order Hemiptera (including scales and mealybugs) were the most frequently intercepted group of arthropods. The order Hemiptera also includes many potential agriculture and environmental pests. A survey of 18 exotic arthropods present in both Puerto Rico and Florida found that the vast majority (89%) are reported from Florida prior to being reported in Puerto Rico. This is likely due to the fact that there are no regulatory barriers between the mainland US and Puerto Rico. Finally, we highlight several exotic arthropods that have recently established in Puerto Rico and discuss what we can learn from these invaders. This work analyzes the patterns of arthropod interceptions by regulatory agencies in the Caribbean, discusses past invasions and their impact, and highlights the weaknesses of the current system of pest-detection. This work will be used to inform future monitoring and detection practices. Technical Abstract: USDA Animal Plant Health Inspection Service Plant Protection and Quarantine (APHIS-PPQ) and Customs and Border Patrol (CBP) inspect traffic entering the United States for arthropods that pose a threat to national agriculture and/or ecosystems. We analyzed interceptions made by these agencies in Puerto Rico and the U.S. Virgin Islands between October 2006 and December 2009 for patterns with regard to the frequency of interceptions, origins of interceptions, and the taxa intercepted. 6952 arthropods were intercepted in freight or luggage entering Puerto Rico and the U.S. Virgin Islands from foreign countries and 9840 arthropods were intercepted from freight or luggage leaving Puerto Rico or the U.S. Virgin Islands destined for mainland U.S. The majority (77%) of the arthropods intercepted entering Puerto Rico were intercepted in freight or luggage originating within the Caribbean. The majority of intercepted arthropods were in the

order Hemiptera (52% of all interceptions), followed by Diptera (16%), Coleoptera (10%), Lepidoptera (8%), Thysanoptera (5%), Acari (4%), and Hymenoptera (2%). The remaining orders (Psocoptera, Collembola, Thysanoptera, Orthoptera, Neuroptera, Isoptera, and Odonata) each comprised less than 1%. The proportions of arthropod orders intercepted from foreign countries were different from the proportions of orders intercepted from Puerto Rico and the US Virgin Islands. Intercepted arthropods from foreign countries were more equitably spread among orders, whereas 89% of the arthropods intercepted from Puerto Rico and the US Virgin Islands were in the orders Hemiptera and Diptera. Hemiptera made up the majority of interceptions in traffic entering Puerto Rico and leaving Puerto Rico. However, the Hemiptera made up 28% of the interceptions from foreign countries, but 69% of the interceptions made from Puerto Rico and the US Virgin Islands. Only 7 of 28 exotic arthropods recently established in Puerto Rico were intercepted during this study and these were intercepted at relatively low frequency (between 3 and 132 interceptions; mean of 35 interceptions). We present data suggesting that most exotic arthropods that occur in both Puerto Rico and Florida established in Florida first, likely due to less stringent or non-existent import inspections for traffic coming into Puerto Rico from the U.S. Finally, we highlight several exotic arthropods that have recently established in Puerto Rico and discuss what we can learn from these invaders." (Authors)] Address: Jenkins, D.A., Tropical Crops and Germplasm Research, 2200 Pedro A. Campos Ave., Suite 201 Mayaguez, PR, 00680. E-mail: David.Jenkins@ars.usda.gov

**14798.** Jo, H.; Gim, J.-A.; Jeong, K.-S.; Kim, H.-S.; Joo, G.-J. (2014): Application of DNA barcoding for identification of freshwater carnivorous fish diets: Is number of prey items dependent on size class for *Micropterus salmoides*?. *Ecology and Evolution* 4(2): 219-229. (in English) ["Understanding predator-prey interactions is a major challenge in ecological studies. In particular, the accurate identification of prey is a fundamental requirement in elucidating food-web structure. This study took a molecular approach in determining the species identity of consumed prey items of a freshwater carnivorous fish (largemouth bass, *Micropterus salmoides*), according to their size class. Thirty randomly selected gut samples were categorized into three size classes, based on the total length of the bass. Using the universal primer for the mtDNA cytochrome oxidase I (COI) region, polymerase chain reaction (PCR) amplification was performed on unidentified gut contents and then sequenced after cloning. Two gut samples were completely empty, and DNA materials from 27 of 28 gut samples were successfully amplified by PCR (success rate: 96.4%). Sequence database navigation yielded a total of 308 clones, containing DNA from 26 prey items. They comprised four phyla, including seven classes, 12 orders, and 12 families based on BLAST and BOLD database searches. The results indicate that largemouth bass show selective preferences in prey item consumption as they mature. These results

corroborate a hypothesis, presence of ontogenetic diet shift, derived through other methodological approaches. Despite the practical limitations inherent in DNA barcoding analysis, high-resolution (i.e., species level) identification was possible, and the predation patterns of predators of different sizes were identifiable. The utilization of this method is strongly recommended for determining specific predator–prey relationships in complex freshwater ecosystems." (Authors) Odonata taxa identified in the diet of *M. salmoides*, based on sequence variation in the cytochrome oxidase I region using stomach contents are *Paracercion* sp., *P. calamorum*, and *P. hieroglyphicum*] Address: Joo, G.-J., Dept Biol. Sciences, Pusan National University, Jang-Jeon Dong, Gum-Jeong Gu, Busan 609-735, South Korea. E-mail: gjjoo@pusan.ac.kr

**14799.** Joshi, S.; Kunte, K. (2014): Dragonflies and damselflies (Insecta: Odonata) of Nagaland, with an addition to the Indian odonate fauna. *Journal of threatened taxa* 6(11): 6458-6472. (in English) ["We surveyed odonates in the districts of Kohima, Peren and Wokha in the state of Nagaland, northeastern India, during April and May 2012 and May 2013. We recorded 69 species, including 43 additions to the known odonates of Nagaland, and one addition - *Calicnemia erythromelas* Selys, 1891 - to the Indian odonate fauna. The known odonate fauna of Nagaland now consists of 90 species in 53 genera and 14 families. We also describe for the first time the female of *Coeliccia schmidtii*, and partially, a heterochromatic form of the female *Ischnura mildredae*." (Authors)] Address: Joshi, S., Indian Foundation for Butterflies. C-703, Alpine Pyramid, Rajiv Gandhi Nagar, Bengaluru, Karnataka 560092, India. E-mail: shantanu@ifoundbutterflies.org

**14800.** Kiauta, B. (2014): In memoriam Gerhard Jurzitza (1929–2014). *Odonatologica* 43(3/4): 137-142. (in English) ["Mainly personal recollections of a friendship with Gerhard Jurzitza, Professor Emeritus of the University of Karlsruhe, Germany, that lasted more than half a century." (Author)] Address: Kiauta, B., P.O. Box 124, 5854 ZJ Bergen / Lb, The Netherlands. E-mail: mbkiauta@gmail.com

**14801.** Kitt, M.; Dietze, R. (2014): Zweifleck und Zierliche Moosjungfer im Bienwald. *POLLICHA-Kurier* 30 (2) – 2014: 17-18. (in German) [*Epithea bimaculata*, 29-iv-2013, Steinfelder Panzergraben, Landkreis Südliche Weinstraße, Rheinland-Pfalz, Germany. *Leucorrhinia caudalis*: 18-vi-2014, „Lettenloch“, clay pit, south of Büchelberg, Landkreis Germersheim, Rheinland-Pfalz, Germany] Address: Kitt, M., Raiffeisenstr. 39, D-76872 Minfeld, Germany, E-mail: MKitt@tonline.de

**14802.** Knapp, U.; Martens, A. (2014): *Enallagma cyathigerum* als Beute einer Imago des Sandlaufkäfers *Cicindela hybrida* (Odonata: Aeshnidae; Coleoptera: Carabidae). *Libellula* 33(3/4): 149-152. (in German, with English summary) ["Predation of *Enallagma cyathigerum* by

an adult *Cicindela hybrida* (Odonata: Aeshnidae; Coleoptera: Carabidae) – On 26 July 2014 near Nuremberg, Bavaria, Germany, an adult *C. hybrida* was observed capturing a mature male *E. cyathigerum* and photographed devouring the prey. In contrast to *Cicindela* larvae adult beetles have not been recorded as predators of Odonata until now." (Authors)] Address: Knapp, U., Sportplatzstr. 27 A, 90765 Fürth, Germany. E-mail: knappfoto@email.de

**14803.** Kok, J.M.; Chahl, J.S. (2014): Systems-level analysis of resonant mechanisms for flapping-wing flyers. *Journal of Aircraft* 51(6): 1833-1841. (in English) ["This paper explores the energetics, efficiency, and performance of flapping-wing actuation. The system-level consequences of energy-saving resonant mechanisms across the full flight envelope of hover, maneuver, and glide of flapping-wing systems is analyzed. A review of the extent to which resonant mechanisms are employed in a dragonfly and how useful they are to a maneuvering flapping-wing micro air vehicle system shows that the value of resonance is limited. It is shown that employing resonant elastic mechanisms in real-world configurations on an aerodynamically efficient flyer could produce insignificant energy savings. This number is further reduced by at least 14% across the operational flapping frequency band of a dragonfly, suggesting that resonance is not the major driver for aerodynamically efficient flyers such as the dragonfly. Using a simple harmonic oscillator as a simplified model, a significant reduction of approximately two to three times in maneuvering limits is demonstrated for a system employing elastic elements. In systems with elastic storage, aeroelastic instabilities leading to reductions in maximum glide speed are possible, especially for aerodynamically dominated systems. It is concluded that the system-level cost of implementing resonant mechanisms indicates against resonance in hover being a primary factor in the design of a dragonfly or dragonfly-inspired aircraft." (Authors)] Address: Kok, J.M., School of Engineering, University of South Australia, Mawson Lakes, South Australia, 5095, Australia

**14804.** Kosterin, O.E.; Constant, J.; Wilson, K.D.P. (2014): Neotype of *Pseudagrion approximans* Selys, 1876 designated to resolve a nomenclatorial confusion in the genus *Aciagrion* [sic] Selys, 1891 (Odonata: Coenagrionidae). *International Journal of Odonatology* 17(2-3): 161-172. (in English) ["To resolve a prevailing nomenclatorial confusion present in the genus *Aciagrion*, *A. tillyardi* Laidlaw, 1919 is placed in synonymy of *A. approximans* (Selys, 1876). The neotype of "Pseudagrion approximans", a male specimen from Khasi Hills preserved in Coll. Selys Longchamps at RBINS, is designated to replace the lost holotype, which was an incomplete specimen of unknown provenance. Secondary sources suggest that Selys Longchamps himself had compared the present neotype specimen with the holotype." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy

of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**14805.** Kundu, M.; Sharma, D.; Brahma, S.; Pramanik, S.; Saha, G.K.; Aditya, G. (2014): Insect predators of mosquitoes of rice fields: portrayal of indirect interactions with alternative prey. *Journal of Entomology and Zoology Studies* 2(5): 97-103. (in English) ["The present commentary highlights the likelihood of indirect interactions in rice fields and allied wetlands using the water bugs, odonate larvae and dytiscid beetles as insect predators of mosquito. The biomass and linkage density of the species were used as input to construct the network and estimate the opportunity of intraguild predation (IGP) and apparent competition (AC). It was evident that IGP increased as a function of insect predator body weight ( $r = + 0.907$ ;  $P < 0.05$ ), while an increase in prey biomass decreased its involvement in AC ( $r = - 0.864$ ;  $P < 0.05$ ). The interaction between mosquito prey and the predators appears to be affected by the biomass and composition of the species assemblage. Assuming chances of IGP and AC, positive preference for mosquito by the insect predators seems to be an important criterion for effective biological control." (Authors) Larvae of *Brachydiplax* sp., *Pantala* sp., *Sympetrum* sp., *Macromia* sp., and *Ceriagrion* sp. were collected and included into the analysis.] Address: Aditya, G., Dept of Zoology, The University of Burdwan, Golapbag, Burdwan 713104, India

**14806.** Kyerematen, R.; Owusu, E.H.; Acquah-Lampsey, D.; Anderson, R.S.; Ntiamao-Baidu, Y. (2014): Species composition and diversity of insects of the Kogyae Strict Nature Reserve in Ghana. *Open Journal of Ecology* 4: 1061-1079. (in English) ["Kogyae Strict Nature Reserve, the only one in Ghana, was established to promote scientific research, particularly on how nature revitalizes itself after major disasters, and also to check the southward drift of the savannah grassland. This study presents the first comprehensive inventory of species composition and diversity of insects of the Reserve. Insects were surveyed between September 2011 and June 2012 to capture the end of the rainy season, the dry season and the peak of the wet season. Samples were taken from two sites within the Reserve, Dagomba and Oku using various sampling techniques including pitfall traps, malaise traps and sweep nets. Insect communities were characterized in terms of, 1) species richness estimators, 2) species richness, 3) Shannon-Weiner Index of Diversity, 4) Pielou's evenness and 5) Bray-Curtis similarity. A total of 8147 individuals representing 135 families from 21 orders were recorded. This included 107 species of butterflies from 9 families and 20 species of dragonflies from 3 families. Oku recorded the highest species numbers ( $S = 63$ ) and richness ( $d = 12.16$ ) with a high evenness of species ( $J = 0.9377$ ) during the peak of the wet season; and the lowest species numbers ( $S = 58$ ) and Margalef's index of ( $d = 10.14$ ) in January. The highest Shannon diversity index of ( $H = 3.927$ ) was recorded at

Dagomba in January. ... A total of 268 odonates belonging to three families and 20 species were recorded from KSNR, comprising of 16 species from the family Libellulidae, three species from the family Coenagrionidae and one species from the family Calopterygidae. 198 individuals belonging to 17 species were recorded at Dagomba whilst 70 species belonging to 11 species were recorded at Oku. Dagomba (ED2) recorded the highest abundance ( $N = 82$ ) as well as species numbers ( $S = 14$ ) of dragonflies during the January sampling corroborated by the highest Shannon Weiner  $H'$  of 2.41, while the lowest species numbers ( $S = 6$ ) and richness ( $d = 1.6$ ) were recorded at Oku (EO3) during the June sampling. Dagomba (ED1) had a relatively low evenness during the September sampling (Table 3)." (Authors) The samples of Odonata are not identified at species level.] Address: Kyerematen, Rosina, Department of Animal Biology and Conservation Science, Univ. of Ghana, Legon, Ghana. E-mail: rkyerematen@ug.edu.gh,

**14807.** Laaß, M.; Hoff, C. (2014): The earliest evidence of damselfly-like endophytic oviposition in the fossil record. *Lethaia* 48(1): 115-124. (in English) ["The reproductive strategy of insects of inserting eggs into plant tissue (endophytic oviposition) is known from the Late Carboniferous onwards. The earliest known ovipositional scars are large, that is up to 38 mm long, and irregular both in size and in shape, and they are not arranged in a regular pattern. Oviposition patterns resembling those of present-day Odonata are first reported from the Late Palaeozoic. These egg cavities are generally of smaller size and have a regular oval shape. They are usually arranged in longitudinal rows or in a zigzag configuration. The most likely tracemakers were gracile damselfly-like insects such as the Archizygoptera, a group closely related to modern Zygoptera. In this paper, the earliest evidence of endophytic oviposition resembling the 'Coenagrionid Type' of Odonatoptera is described. It derives from the Wettin member of the Siebigerode Formation of the Saale-Basin in Central Germany (Upper Carboniferous, Gzhelian) and consists of about 49 elliptical scars with lengths of about 2 mm, probably deposited on a leaf of *Cordaites*. The arrangement of the scars in short transverse rows, their regular size and elliptical shape suggest that the tracemaker was probably a member of the extinct odonatopteran suborder Archizygoptera. If so, the tracefossil described here would be the earliest evidence for this endophytic oviposition in an ancestral group of modern Zygoptera." (Authors)] Address: Laaß, M., Institut für Geowissenschaften, Ruprecht-Karls-Universität Heidelberg, Heidelberg, Germany. E-mail: michael.laass@gmx.de

**14808.** Lima, S.L.; Blackwell, B.F.; DeVault, T.L.; Fernández-Juricic, E. (2014): Animal reactions to oncoming vehicles: a conceptual review. *Biological Reviews* 90(1): 60-76. (in English) ["Animal-vehicle collisions (AVCs) are a substantial problem in a human-dominated world, but little is



known about what goes wrong, from the animal's perspective, when a collision occurs with an automobile, boat, or aircraft. Our goal is to provide insight into reactions of animals to oncoming vehicles when collisions might be imminent. Avoiding a collision requires successful vehicle detection, threat assessment, and evasive behaviour; failures can occur at any of these stages. Vehicle detection seems fairly straightforward in many cases, but depends critically on the sensory capabilities of a given species. Sensory mechanisms for detection of collisions (looming detectors) may be overwhelmed by vehicle speed. Distractions are a likely problem in vehicle detection, but have not been clearly demonstrated in any system beyond human pedestrians. Many animals likely perceive moving vehicles as non-threatening, and may generally be habituated to their presence. Slow or minimal threat assessment is thus a likely failure point in many AVCs, but this is not uniformly evident. Animals generally initiate evasive behaviour when a collision appears imminent, usually employing some aspect of native antipredator behaviour. Across taxa, animals exhibit a variety of behaviours when confronted with oncoming vehicles. Among marine mammals, right whales *Eubalaena* spp., manatees *Trichechus* spp., and dugongs *Dugong dugon* are fairly unresponsive to approaching vehicles, suggesting a problem in threat assessment. Others, such as dolphins *Delphinidae*, assess vehicle approach at distance. Little work has been conducted on the behavioural aspects of AVCs involving large mammals and automobiles, despite their prevalence. Available observations suggest that birds do not usually treat flying aircraft as a major threat, often allowing close approach before taking evasive action, as they might in response to natural predators. Inappropriate antipredator behaviour (often involving immobility) is a major source of AVCs in amphibians and terrestrial reptiles. Much behavioural work on AVCs remains to be done across a wide variety of taxa. Such work should provide broad phylogenetic generalizations regarding AVCs and insights into managing AVCs. .... Soluk, Zercher & Worthington (2011) suggest that the relatively low population size and long adult lifespan of dragonflies (Odonata, Anisoptera) makes them one of the few nonvertebrate groups likely to be impacted by direct AVC mortality. Further, species flight behaviour near roads is a critical metric of potential mortality. At high traffic-volume sites, near wetlands in Illinois USA dragonfly mortality was high although fewer animals attempted to cross (Soluk et al., 2011). Most importantly, the significance of AVC mortality to dragonflies is more pronounced when considering that 63% of species found in the United States are species of conservation concern and, worldwide, 15% of Odonata species are threatened with extinction (Soluk et al., 2011)." (Authors)] Address: Fernández-Juricic, E., Dept Biol. Scien., Purdue Univ., West Lafayette, IN 47907, USA. E-mail: efernan@purdue.edu

**14809.** Lojewski, J. (2014): The role of landmarks in territory maintenance by the Black Saddlebags dragonfly,

*Tramea lacerata*. M.Sc. theses, Graduate School, Eastern Illinois University, Charleston, Illinois: 73 pp. (in English) ["Territoriality can reduce competition for resources, but territorial defense can be costly. Therefore any behaviour that reduces territorial costs may increase the net benefit of territoriality. Some species will align their territory boundaries with conspicuous landmarks that may serve to reduce defense costs. Dragonflies, including *T. lacerata*, defend territories at breeding sites, keeping rival males away to allow themselves access to females. We used three treatments to investigate whether *T. lacerata* used landmarks: constraining landmarks (an object that provided a physical barrier to flight), non-constraining landmarks (an object of the same dimensions and construction that did not impede flight), and a control without landmarks. We observed patrolling male black saddlebags and recorded the locations of turns at their territory boundary and interactions with other dragonflies. When either type of landmark was present, individuals placed their boundary at the landmark far more often than any other location. In addition, individuals that used landmarks had a significantly narrower range of turn locations than those that did not. Unlike other studies the use of a landmark did not seem to reduce defense costs, and interestingly not all individuals used landmarks when they were provided. The lack of an observed reduction in defensive costs could be due to the collection of data during territory maintenance rather than territory establishment, when the costs may have been higher, or landmarks may be important as part of a spatial reference system that aids male dragonflies in efficiently searching for females." (Author)] Address: Lojewski, J., Department of Biological Sciences, Eastern Illinois University, Charleston, IL, 61920, USA

**14810.** Lucas, G.R.; Michell, P.; Williams, N. (2014): Low cost quarry management producing high gain biodiversity: Using GIS to quantify effective quarry management regimes. In: Hunger, E., Brown, T. J. and Lucas, G. (Eds.): Proceedings of the 17th Extractive Industry Geology Conference, EIG Conferences Ltd. 202 pp: 135-146. (in English) ["A large scale biodiversity study of Cefn Mawr quarry, Mold, North Wales provided a scientific database for the operator. The project aimed to develop a set of 'biodiversity indicators' that would inform sustainable mineral operations at mineral extraction sites whilst simultaneously protecting ecological and landscape interests. The results helped fashion the production of the corporate guideline 'Promotion of biodiversity at the mineral extraction sites of HeidelbergCement'. Cefn Mawr quarry is a Carboniferous limestone quarry providing feedstock for the nearby Padeswood Hanson Cement plant. At the time of the survey it was operated by Castle Cement. A range of ecological surveys were carried out over a six month period (covering late spring, summer and early autumn 2008). They included a JNCC Phase 1 Habitat survey, butterfly and dragonfly surveys and an assessment of water bodies for amphibians. Any habitats not categorised by the JNCC Phase 1 Habitat survey

were described as 'Partial Living Spaces' and were incorporated within the GIS model and used to assess the biodiversity of the site. They added significantly to the biodiversity count and biodiversity indicators. The authors argue that Partial Living Spaces should become part of biodiversity audits at mineral extraction sites because of their contribution to the quantification of biodiversity. Data recorded were analysed within ESRI ArcGIS. The analysis considered the range of habitats and levels of floral diversity found within different zones (operational, restoration and buffer) of the quarry. Wildlife was found to be thriving in the most disturbed parts of the quarry with evidence of a range of species found in the operational zone. Around 300 species of flora were identified on the site. The density of flora (species per hectare) found in the operational and restoration zones of the quarry, together were greater than that in the buffer zone. The buffer zone was considered to be an analogue for the surrounding upland countryside. Statutorily-protected and 'Nationally Scarce' species were also present. The analysis demonstrated that a continuous cycle of disturbance is a key factor in increasing the levels of biodiversity within the quarry. The GIS proved to be an effective tool in recording and analysing the variety of habitats and their species. The quarry had not employed any sophisticated or costly procedures to foster biodiversity. Restoration had been conducted using low cost in-house techniques that had been designed to be cost effective and promote biodiversity. The GIS demonstrated that these techniques had been successful. A number of management approaches were suggested to enhance the biodiversity and are now employed by the quarry as part of the Quarry Biodiversity Management Plan." (Authors) Dragonflies were studied, but no results are presented.] Address: Lucas, G.R., Edge Hill University, Department of Geography and Geology, St Helens Road, Ormskirk, Lancashire L39 4QP, UK. E-mail: Lucasg@edgehill.ac.uk

**14811.** Mapi-ot, E.P.; Enguito, M.R.C. (2014): Species richness of adult Odonata in Labo River, Ozamiz City. *Journal of Multidisciplinary Studies* 3(1): 86-99. (in English) [Mindanao, Philippines; "Labo River is one of the water systems in Ozamiz City that provides the water needs of the population. Human-related modifications of this water channel have altered the water quality that supports life forms. Invertebrates are important indicators of ecosystem health. Odonata are well-known invertebrates and are of great ecological importance. Fieldwork was conducted from October 2013 to February 2014 in three sampling sites to determine the species richness of Odonata in Labo River, Ozamiz City. Opportunistic sampling method with the use of sweep nets was employed. 21 species were collected of which four are endemic. Of the total species, thirteen are anisopterans and eight are zygopterans that were categorized into three families: Libellulidae, Platycnemididae, Protoneuridae and Coenagrionidae. The low species richness and the presence of indicator species of environmental disturbance suggest that the sites sampled

are already disturbed. Additional sampling should be conducted in Labo River to have a complete database of Odonata." (Authors)] Address: Mapi-ot, Emmarie, Dept Biological Sciences, Mindanao State Univ. - Iligan Institute of Technology, Iligan City, Philippines; 2 D3C Gahol Apartment, Lopez Jaena St., Davao City, Philippines. E-mail: efmapiot@yahoo.com

**14812.** Marina, C.F.; Bond, J.G.; Muñoz, j.; Valle, j.; Novelo-Gutiérrez, R.; Williams, T. (2014): Efficacy and non-target impact of spinosad, Bti and temephos larvicides for control of Anopheles spp. in an endemic malaria region of southern Mexico. *Parasites & Vectors* 2014, 7:55 doi:10.1186/1756-3305-7-55 : (in English) ["Background: The larvicidal efficacy of the naturally derived insecticide spinosad, for control of immature stages of Anopheles albimanus and associated culicids, was compared to that of synthetic and biological larvicides. Effects on non-target insects were also determined. Methods: A field trial was performed in replicated temporary pools during the rainy season, in southern Mexico. Pools were treated with 10 ppm a.i. spinosad (Tracer 480SC), Bti granules applied at 2 kg/ha (VectoBac WDG, ABG-6511), and 100 ml/ha temephos (50 EC), or an untreated control. Numbers of immature mosquitoes, and aquatic insects in pools were monitored for 20 weeks. Results: Samples of immature mosquitoes comprised approximately 10% An. albimanus, 70% Culex spp. (mostly Cx. melanoconion and Cx. coronator) and 20% Uranotaenia lowii. The most effective larvicides were spinosad and temephos that eliminated An. albimanus in 16 out of 20 post-treatment samples, or 9 weeks of continuous control of immature stages, respectively. These larvicides resulted in 15 and 5 weeks of elimination of Culex spp., respectively, or 20 and 4 weeks of continuous elimination of U. lowii, respectively. Bti treatment provided little consistent control. Aquatic insects were recorded comprising 3 orders, 20 families, 40 genera and 44 species. Shannon diversity index values (H') for aquatic insects were highest in the control (0.997) and Bti (0.974) treatments, intermediate in the spinosad treatment (0.638) and lowest in the temephos treatment (0.520). Severely affected non-target insects in the spinosad and temephos treated pools were predatory Coleoptera, Hemiptera and Odonata, which in the case of spinosad was likely due to the high concentration applied. Bti had little effect on aquatic insects. Conclusions: The spinosad treatment retained larvicidal activity for markedly longer than expected. Spinosad is likely to be an effective tool for control of anopheline and other pool-breeding mosquitoes in tropical regions. Non-target effects of spinosad on aquatic insects merit further study, but were likely related to the concentration of the product used. ... The most severely affected insect species in the spinosad-treated pools were the diving beetle Laccophilus fasciatus (Coleoptera: Dytiscidae), the backswimmer Buena margaritacea (Hemiptera: Notonectidae) and nymphs of the dragonfly Anax amazili (Odonata: Aeshnidae)." (Authors)] Address: Novelo-Gutiérrez, R., Departamento de

Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**14813.** Martens, A.; Schröter, A.; Wildermuth, H. (2014): Deutschsprachige Namen für Libellen des Mittelmeerraumes (Odonata). *Libellula* 33(3/4): 233-244. (in German, with English summary) ["German vernacular names for several species of Mediterranean dragonflies (Odonata) – German vernacular names are available for nearly all western Palaearctic odonate species. The meaning of these names, beginning from Schiemenz (1953), was mainly explained by Wildermuth & Martens (2014). The German translation of Dijkstra & Lewington (2014) expanded the geographical scope to North Africa and Turkey, thus several new names are needed which are presented and explained here." (Authors)] Address: Martens, A., Institut für Biologie und Schulgartenentwicklung, Pädagogische Hochschule Karlsruhe, Bismarckstraße 10, 76133 Karlsruhe, Germany. E-mail: martens@ph-karlsruhe.de

**14814.** Martínez-Darve Sanz, P.; Cano-Villegas, F.J. (2014): Primera cita de *Pantala flavescens* (Fabricius, 1798) (Odonata, Libellulidae) para las Islas Canarias y España (Gran Canaria) (in Spanish, with English summary). First Record of *Pantala flavescens* (Fabricius, 1798) (Odonata, Libellulidae) for the Canary Islands and Spain (Gran Canaria). *Boln. Asoc. esp. Ent.* 38(3-4): 337-340. (in Spanish) [One male, 20-i-2013, Gran Canaria (28R DR47); at the same place one male (probably the one from 20th January) was observed until 26th January. At 27-i-2013, and additional one was observed in a ravine in the south of Gran Canaria (28R DR57).] Address: Cano Villegas, F.J., C/Montemayor, 4 1º-2; 14003-Córdoba, Spain. E-mail: ficanovi2@hotmail.com

**14815.** Martynov, V.V. (2014): New Record of *Lindenia tetraphylla* (Odonata, Gomphidae) in Ukraine. *Vestnik zoologii* 48(5): 476. (in English) ["1 male was revealed in the "Kam'yani Mohyly" Nature Reserve (Donetsk Region, Volodarsk District, 47°31'43" N, 37°07'76" E) 09.07.2014 in the bed of a dried-up stream at the bottom of steppe gully, about 300 m away from the River Karatysh." (Author)] Address: Martynov, V.V., Donetsk National University, Donetsk, Ukraine

**14816.** McLoughlin, S.; Martin, S.K.; Beattie, R. (2014): The record of Australian Jurassic plant-arthropod interactions. *Gondwana Research* 27(3): 940-959. (in English) ["Highlights: • Australian Jurassic plants reveal damage referable to seven arthropod feeding strategies. • Damage occurs on numerous ferns and gymnosperms but is prominent on pteridosperms. • Australian Jurassic plants reveal modest physical defences against arthropod herbivory. • Orthoptera, Coleoptera, Hemiptera and Odonata are candidates for the majority of plant damage.

Abstract: A survey of Australian Jurassic plant fossil assemblages reveals examples of foliar and wood damage generated by terrestrial arthropods attributed to leaf-margin feeding, surface feeding, lamina hole feeding, galling, piercing-and-sucking, leaf-mining, boring and oviposition. These types of damage are spread across a wide range of fern and gymnosperm taxa, but are particularly well represented on derived gymnosperm clades, such as Pentoxylales and Bennettitales. Several Australian Jurassic plants show morphological adaptations in the form of minute marginal and apical spines on leaves and bracts, and scales on rachises that likely represent physical defences against arthropod herbivory. Only two entomofaunal assemblages are presently known from the Australian Jurassic but these reveal a moderate range of taxa, particularly among the Orthoptera, Coleoptera, Hemiptera and Odonata, all of which are candidates for the dominant feeding traits evidenced by the fossil leaf and axis damage. The survey reveals that plant-arthropod interactions in the Jurassic at middle to high southern latitudes of southeastern Gondwana incorporated a similar diversity of feeding strategies to those represented in coeval communities from other provinces. Further, the range of arthropod damage types is similar between Late Triassic and Jurassic assemblages from Gondwana despite substantial differences in the major plant taxa, implying that terrestrial invertebrate herbivores were able to successfully transfer to alternative plant hosts during the floristic turnovers at the Triassic–Jurassic transition." (Authors)] Address: McLoughlin, S., Dept Paleobiology, Swedish Museum of Natural History, S-104 05 Stockholm, Sweden. E-mail: steve.mcloughlin@nrm.se

**14817.** Meng, L.-b.; Song, A.; Tian, X. (2014): Analysis of aerodynamic characteristics of flexible wing of dragonfly based on CFD/CSD method. *Journal of Aerospace* 29(9): 2063-2069. (in Chinese, with English summary) ["A methodology of fluid-structure bi-directional interaction based on computational fluid dynamics/computational structure dynamics (CFD/CSD) was presented. The donor-receptor relationship between two sets of grid system was identified by alternating digital tree (ADT). The local interpolation methods were used for data exchange between these two sets of grids. Flow with moving boundaries was dealt with by Delaunay graph mapping method. The code for nonlinear structural finite element and information transfer was developed and used to connect with the code of flow solver 3D2MUFS developed in the Micro Air Vehicle Center of Nanjing University of Aeronautics and Astronautics (NUAA). It was applied to the aerodynamic computation of dragonfly flapping flight with flexible wing. Results show that the time-averaged vertical force coefficient of the dragonfly wing increases from 0.31 to 0.53, and the time-averaged thrust coefficient increases from 0.07 to 0.13 by flexible deformation. This confirms that the flexible deformation can improve the aerodynamic performance of flapping wing." (Authors)] Address: Meng, L.-b., College of Aerospace



Engineering, Nanjing University of Aeronautics and Astronautics, Nanjing 210016, China

**14818.** Moratin, R. (2014): La Liste rouge des Odonates menacés en Alsace. IMAGO, ODONAT. Document numérique.. Association pour l'étude et la protection des Invertébrés en Alsace (IMAGO) & Office des données naturalistes d'Alsace (ODONAT): 14 pp. (in French) [France. Critically endangered: 4, endangered: 5, vulnerable: 11.] Address: Association pour l'étude et la protection des invertébrés en Alsace, 8 rue Adèle Riton, 67000 Strasbourg, France. <http://association.imago.free.fr/>

**14819.** Nair, M.V.; Subramanian, K.A. (2014): A new species of *Agriocnemis* Selys, 1869 (Zygoptera: Coenagrionidae) from Eastern India with redescription of *Agriocnemis keralensis* Peter, 1981. *Rec. zool. Surv. India* 114(4): 669-679. (in English) [*Agriocnemis kalinga* sp. nov. is described from Odisha. The status of *Agriocnemis keralensis* Peters, 1981 is discussed. Based on recent field studies, *A. keralensis* is redescribed. A revised key to *Agriocnemis* of India is also provided.] Address: Nair, M.V., Nandankanan Zoological Park, Barang-754005, Odisha, Zoological Survey of India, Kolkata-70053, West Bengal, India. E-mail: [manojnair74@gmail.com](mailto:manojnair74@gmail.com)

**14820.** Noble, A.; Hassall, C. (2014): Poor ecological quality of urban ponds in northern England: causes and consequences. *Urban Ecosystems* 18(2): 649-662. (in English) ["The value of ponds in urban areas historically has been overlooked. While some recent studies have described considerable biodiversity in urban areas, it is unclear as to how far this extends to different urban habitats. The aims of this study were to determine the condition of 21 urban ponds in Bradford (northern England) and to quantify the connectivity of wetlands in the district. The study showed that macroinvertebrate (including Odonata) and plant biodiversity was substantially lower than would be expected based on pristine reference sites. Of the 21 ponds surveyed, 15 were found to be classified as having very poor ecological quality, with 5 being classed as poor and just 1 was classed as moderate. The number of aquatic plant species found in the ponds ranged from 0 to 6 and the number of macroinvertebrate families found ranged from 4 to 13. It was suspected that the aquatic plant diversity was low due to management techniques such as the removal of emergent vegetation. The average distance to a wetland was found to be higher in urban areas (533 m) compared to rural areas (448 m) although this difference was small, which indicates that the low diversity found in urban ponds is likely due to habitat variables." (Authors)] Address: Hassall, C., School of Biology, Univ. Leeds, Leeds, LS2 3JT, UK. E-mail: [c.hassall@leeds.ac.uk](mailto:c.hassall@leeds.ac.uk)

**14821.** O'Brien, M.F. (2014): Great Lakes Odonata Bibliography. Michigan Odonata Survey – Technical Note No. 4. January, 2014.: 11 pp. (in English) ["The Great

Lakes Region includes the states and Canadian provinces that drain into the Great Lakes. For this bibliography, The Great Lakes – Superior, Michigan, Huron, Erie, and Ontario comprise a large area of freshwater unrivalled by anywhere else. The Odonata fauna has been studied in the region for over 150 years, and the body of literature is substantial enough to warrant its own bibliography. I purposely left out papers that dealt specifically with faunas not influenced by the Great Lakes, such as SE Pennsylvania and SE New York." (Author)] Address: O'Brien, M.F., Museum of Zoology, University of Michigan, 1109 Geddes Avenue, Ann Arbor, MI 48109, USA. E-mail: [mfobrien@umich.edu](mailto:mfobrien@umich.edu)

**14822.** O'Carroll, D.C.; Wiederman, S.D. (2014): Contrast sensitivity and the detection of moving patterns and features. *Phil. Trans. R. Soc. B* 19 February 2014 vol. 369 no. 1636 20130043: 9 pp. (in English) ["Theories based on optimal sampling by the retina have been widely applied to visual ecology at the level of the optics of the eye, supported by visual behaviour. This leads to speculation about the additional processing that must lie in between—in the brain itself. But fewer studies have adopted a quantitative approach to evaluating the detectability of specific features in these neural pathways. We briefly review this approach with a focus on contrast sensitivity of two parallel pathways for motion processing in insects, one used for analysis of wide-field optic flow, the other for detection of small features. We further use a combination of optical modelling of image blur and physiological recording from both photoreceptors and higher-order small target motion detector neurons sensitive to small targets to show that such neurons operate right at the limits imposed by the optics of the eye and the noise level of single photoreceptors. Despite this, and the limitation of only being able to use information from adjacent receptors to detect target motion, they achieve a contrast sensitivity that rivals that of wide-field motion sensitive pathways in either insects or vertebrates—among the highest in absolute terms seen in any animal." (Authors)] Address: O'Carroll, D.C., Adelaide Centre for Neuroscience Research, School of Medical Sciences, The University of Adelaide, Adelaide, South Australia 5000, Australia. E-mail: [david.ocarroll@adelaide.edu.au](mailto:david.ocarroll@adelaide.edu.au)

**14823.** Outomuro, D.; Cordero Rivera, A.; Nava-Bolanos, A., Cordoba-Aguilar, A. (2014): Does allometry of a sexually selected ornamental trait vary with sexual selection intensity? A multi-species test in damselflies. *Ecological Entomology* 39(3): 399-403. (in English) ["Ornaments may show hyperallometry in certain taxa, i.e. large individuals have proportionally larger ornaments than small ones. One hypothesis suggests that higher sexual selection intensity leads to steeper hyperallometric patterns. This study tested whether an ornamental trait subject to both intra- and intersexual selection showed steeper allometric slopes than when subject solely to intrasexual selection. The study employed the sexually se-

lected male wing pigmentation of 14 calopterygid species (*Hetaerina americana*, *H. cruentata*, *H. occisa*, *H. titia*, *H. vulnerata*, *Calopteryx aquabilis*, *C. haemorrhoidalis*, *C. maculata*, *C. splendens*, *C. virgo*, *Mnesarete pudica*, *Neurobasis chinensis*, *Sapho bicolor*) that differ in sexual selection intensity (intrasexual selection versus intra- and intersexual selection). Hyperallometry was not a uniform pattern in the study species. Furthermore, the allometric slopes did not differ between sexual selection intensities. The allometry of ornamental traits is therefore highly variable even among related species. Other selection pressures – probably species-specific and at a local scale – acting on wing pigmentation might explain the diversity of allometric patterns." (Authors)] Address: Córdoba-Aguilar, A., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, México D.F. 04510, México. E-mail: [acordoba@ecologia.unam.mx](mailto:acordoba@ecologia.unam.mx)

**14824.** Pagliai, F.; Bruni, G. (2014): Segnalazioni di *Cordulia aenea* (Linnaeus, 1758) in Toscana, (Odonata: Corduliidae). *Onychium* 10(2013): 189-190. (in Italian, with English summary) [Fucecchio, prov. Firenze, Italy, 43°47' 54,564" N 10°45' 50,605" E, 2-V-2011, 1 male, 28-IV-2013, 1 male] Address: Pagliai, F., via del Ferrale, 14/4, I-50142 Firenze (Italia), [fpagliai@tiscalinet.it](mailto:fpagliai@tiscalinet.it); Giacomo Bruni, Dipartimento di Biologia, Università degli Studi di Firenze, via Romana, 17, I-50125 Firenze, Italia. E-mail: [giacomo.b90@gmail.com](mailto:giacomo.b90@gmail.com)

**14825.** Petrischak, H. (2014): Exkursion zu Kuckucksbienen, Mosaikjungfern und moosbewachsenen Felsen Deutsch-luxemburgische Naturparadiese. *Biol. Unserer Zeit* 1/2014 (44): 62-69. (in German, with English summary) ["Excursion to the border area of Luxembourg and Germany. The gravel ponds in the alluvial plain of the Moselle in the border area of Luxembourg and the Saarland serve as a significant breeding habitat and stopover site of water birds. Many thermophilic species of dragonflies can also be watched in the "Haff Réimech" nature reserve in Luxembourg. Some wild bees typical of floodplains have found compensatory habitats on sandy slopes. Further north, on both sides of the Sûre, there is a landscape rich in woodlands with deep chasms and great sandstone rock formations (Lower Jurassic) in the border area of Luxembourg and Rhineland-Palatinate. A cool and humid microclimate deep in the valleys and chasms promotes plant species of the Atlantic climate region. Especially Luxembourg's Little Switzerland is characterized by a great species-richness of mosses." (Author) On page 65-66, the Odonata are introduced, basically on publications of Bernd Trockur.] Address: Petrischak, H., Stiftung Forum für Verantwortung, Pestelstr. 2, 66119 Saarbrücken, Germany. E-mail: [petrischak@forum-fuer-verantwortung.de](mailto:petrischak@forum-fuer-verantwortung.de)

**14826.** Pilon, N.; Penati, F. (2014): Contributo alla conoscenza della Odonatofauna della provincia di Sondrio

(Italia, Lombardia). I. Segnalazioni faunistiche. *Il Naturalista Valtellinese* 24(2013): 67-76. (in Italian, with English summary) ["Contribution to the knowledge of the Odonata of the Province of Sondrio (Italy, Lombardy). I. Faunistic records. The odonatofauna of the Province of Sondrio is still poorly known. In summer 2013, seven suitable habitats were surveyed to collect new and reliable data. 13 species have been recorded." (Authors) The records include *Somatochlora arctica*, *S. alpestris*, and *Sympetrum depressiusculum*.] Address: Penati, F., ELITRON, Via Capri 11/3, I-20153, Milano. E-mail: [nicola@elitron.mi.it](mailto:nicola@elitron.mi.it) 2Via dei Sedini 47/a, I-23017, Morbegno (SO), Italy. E-mail: [fabio\\_penati@alice.it](mailto:fabio_penati@alice.it)

**14827.** Pix, A. (2014): Helikomerie bei Odonata – eine ungewöhnliche Exuvie von *Aeshna juncea* (Odonata: Aeshnidae). *Libellula* 33(1/2): 67-73. (in German, with English summary) ["Helicomerism in Odonata – an unusual exuvia of *Aeshna juncea* (Odonata: Aeshnidae) – An exuvia of a female *Aeshna juncea*, collected on 20-vii-1988 at a boggy pond in the Solling area, Germany, showed fusing of its fifth and sixth abdominal segments by a twice twisting intersegmental membrane. Helicomerism is a category of aberrant segmentation in arthropods and annelids known from the field as well as experimental research in developmental biology. It leads to twisted forms of the segmentation. In Odonata this phenomenon is described for the first time." (Author)] Address: Andreas Pix, A., Mönchehofstr. 1, 34127 Kassel, Germany. E-mail: [andreas.pix@t-online.de](mailto:andreas.pix@t-online.de)

**14828.** Power, A.; Gilbert, F. (2014): Dragonflies and damselflies of the St Katherine Protectorate. *Egyptian Journal of Biology* 16: 95-100. (in English) ["The indigenous Bedouin tribes of South Sinai (Egypt) irrigate small gardens for agricultural purposes and this has been shown to boost the biodiversity of plants, birds and insects, including dragonflies (Odonata). The gardens offer water-related resources normally in short supply in arid regions. There is very little information available on the dragonflies and damselflies of the Sinai. We assess the importance of Bedouin gardens to Odonata by recording them in the gardens and in unmanaged habitat in the St Katherine Protectorate. The gardens are widely utilised by Odonata: ten species were recorded in total, all observed in the gardens at least once." (Authors)] Address: Power, A., School of Life Sciences, Univ. Nottingham, Nottingham NG7 2RD, UK. E-mail: [powera2@tcd.ie](mailto:powera2@tcd.ie)

**14829.** Preston, D.L.; Boland, C.E.; Hoverman, J.T.; Johnson, P.T.J. (2014): Natural enemy ecology: comparing the effects of predation risk, infection risk and disease on host behaviour. *Functional Ecology* 28(6): 1472-1481. (in English) ["(1) Growing interest in unifying the field of natural enemy ecology has revealed similarities between predation and parasitism. In parallel with predation, parasite infection – and even the threat of infection – can alter host traits and indirectly affect community interactions. Nonetheless, few studies have considered multiple

mechanisms of natural enemy-induced behavioural alteration in parallel (e.g. effects before and after enemy contact) or the factors that drive variation in behavioural responses. (2) We first evaluated how the threat of infection by a virulent trematode (*Ribeiroia ondatrae*) compared to the well studied risk of predation in triggering inducible defences in amphibian hosts, prior to direct contact with either enemy. We then evaluated five separate factors that influenced the magnitude of parasite-induced behavioural changes after successful transmission. (3) In both the laboratory and an outdoor mesocosm experiment, we found no evidence that tadpoles of two species (*Pseudacris regilla* and *Anaxyrus boreas*) altered their activity levels in response to chemical cues from uninfected host snails, trematode-infected snails, or from conspecifics actively becoming infected. In contrast, tadpoles sharply reduced their activity in response to lethal predation risks posed by caged dragonfly larvae. (4) After infection, however, *Ribeiroia* caused strong decreases in host activity and escape distance that correlated positively with infection intensity and negatively with host size and developmental stage. Five days after infection with a one-time pulse exposure, hosts recovered to near-normal activity levels. Hosts exposed to a chronic daily exposure of equal intensity, however, continued to decrease activity. Unlike *Ribeiroia*, two less virulent trematodes had no detectable effects on host behaviour. (5) Our results highlight key distinctions between predation and parasitism. The contrasting effects prior to enemy contact may stem from the fact that unlike predation, the consequences of macroparasite infection are intensity-dependent and unpredictable. In contrast, the strong changes in host behaviour after infection are more similar to non-consumptive predator effects in terms of their potential influences on host fitness and community interactions." (Authors)] Address: Preston, D.L., Department of Ecology and Evolutionary Biology, University of Colorado, Boulder, Colorado, USA. E-mail: daniel.preston@colorado.edu

**14830.** Rattu, A.; Leo, P.; Moratin, R.; Hardersen, S. (2014): *Diplacodes lefebvrui* in Sardinia, a new species for the Italian fauna (Odonata: Libellulidae). *Fragmenta entomologica* 46(1-2): 121-124. (in English) ["*Diplacodes lefebvrui* (Rambur, 1842) is a libellulid dragonfly, which is common and widespread in Africa and across the Indian Ocean. While this species is fairly common in the south and east of the Mediterranean, its European range is confined to Cyprus, the island of Rhodes and the south of the Iberian Peninsula. Here we report the first record of *D. lefebvrui* for Italy, which was captured near Cagliari (Sardinia) on 11.IX.2013. In October 2014, a population of the same species was observed at a small wetland on the island "Isola di San Pietro" (Sardinia). Here the observed sex ratio of *D. lefebvrui* was strongly biased in favour of females and only a single male was observed." (Authors)] Address: Rattu, A., Via del Pozzetto 1, I-09126 Cagliari, Italy - andrearattu@virgilio.it

**14831.** Rudolf, V.H.W.; Rasmussen, N.L.; Dibble, C.J.; Van Allen, B.G. (2014): Resolving the roles of body size and species identity in driving functional diversity. *Proc. R. Soc. B* 22 April 2014 vol. 281 no. 1781: 21 pp. (in English) ["Efforts to characterize food webs have generated two influential approaches that reduce the complexity of natural communities. The traditional approach groups individuals based on their species identity, while recently developed approaches group individuals based on their body size. While each approach has provided important insights, they have largely been used in parallel in different systems. Consequently, it remains unclear how body size and species identity interact, hampering our ability to develop a more holistic framework that integrates both approaches. We address this conceptual gap by developing a framework which describes how both approaches are related to each other, revealing that both approaches share common but untested assumptions about how variation across size classes or species influences differences in ecological interactions among consumers. Using freshwater mesocosms with dragonfly larvae (*Erythemis simplicicollis*, *Plathemis lydia*, *Pachydiplax longipennis*) as predators, we then experimentally demonstrate that while body size strongly determined how predators affected communities, these size effects were species specific and frequently nonlinear, violating a key assumption underlying both size- and species-based approaches. Consequently, neither purely species- nor size-based approaches were adequate to predict functional differences among predators. Instead, functional differences emerged from the synergistic effects of body size and species identity. This clearly demonstrates the need to integrate size- and species-based approaches to predict functional diversity within communities." (Authors)] Address: Rudolf, V.H.W., Dept of Ecology and Evolutionary Biology, Rice Univ., Houston, TX 77005, USA. E-mail: volker.rudolf@rice.edu

**14832.** Ruppell, G.; Hilfert-Ruppell, D. (2014): Slow-motion analysis of female refusal behaviour in dragonflies. *International Journal of Odonatology* 17(4): 199-215. (in English) ["By means of slow-motion film analysis we found new female refusal behaviour patterns against male harassment in a variety of Odonata species. Often, females could escape simply by flying faster than males. Due to the morphological preconditions, there were differences in the two suborders. In Anisoptera, several behavioural specialities were analysed: (a) females of *Aeshna cyanea*, which oviposit solitarily and endophytically, clung to the substrate with great force when being pulled away by attacking males. (b) *Anax imperator* females showed a very fast, characteristic bending of the abdomen causing sudden U-turns for escape. (c) Solitary *Libellula quadrimaculata* females flew loops to escape pursuing males or to shake them off. They either used the impact of the crashing male for the turning moment or they generated it themselves by an abrupt change of the wing beat direction. In Zygoptera we in-



vestigated different *Calopteryx* species, which all oviposit alone. Fleeing was most common but wing clapping, not cooperating to build a tandem, tandem separation, fast diving for submerged oviposition and threatening and attacking the male were also documented. Fast water current prevented submerged oviposition by *Calopteryx xanthostoma* and increased refusal behaviour by females." (Authors)] Address: Hilfert-Rüppell D., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: d.hilfert@tu-bs.de

**14833.** Sajan, S.K.; Mohapatra, P.P. (2014): New record of Lesser Blue Wing *Rhyothemis triangularis* Kirby, 1889 (Odonata: Libellulidae) from Odisha, India. *Journal of the Bombay Natural history Society* 111(1): 60. (in English) ["*R. triangularis* was sighted on April 07, 2012, from Odisha during an Odonata survey in Kotagarh Wildlife Sanctuary. The species was found in the core area of the Sanctuary in Balliguda forest division near Dupi waterhole (19.89° N; 83.66° E). The terrain is flat with mixed forest." (Authors)] Address: Sajan, S.K., P.G. Dept of Wildlife and Biodiversity Conservation, North Orissa University, Sri Ram Chandra Vihar, Takatpur 757 003, Odisha, India. E-mail: sksajan.sajan@gmail.com

**14834.** Salindra, H.G.; Dayananda, K.; Kitching, R.L. (2014): Ovo-viviparity in the Odonata? The case of *Heliocypha perforata* (Zygoptera: Chlorocyphidae). *International Journal of Odonatology* 17(4): 181-185. (in English) ["In this paper we record a likely instance of ovo-viviparity in a chlorocyphid damselfly from south-western China. If confirmed, this will be the first record of live birthing in the Odonata: indeed in any member of the Palaeoptera. The widespread Asian damselfly *Heliocypha perforata* (Percheron, 1835) is proposed to be, at least facultatively, viviparous. A female was observed and filmed appearing to deposit pro-larvae directly onto the exposed surface of a half-submerged branch in a small stream in Xishuangbanna Autonomous Dai Prefecture, Yunnan, China. The species is known to deposit eggs in bark crevices close to water but no previous case of actual live births is known." (Authors)] Address: Kitching, R.L., Environmental Futures Research Institute, Griffith University, Nathan, Queensland 4111, Australia

**14835.** Samweel, N.; Nazir, T. (2014): Diversity of aquatic insects and function of fluvial ecosystem of Song River of Rajaji National Park, India. *Global Journal of Science Frontier Research: H - Environment & Earth Science* 14(1): 11 pp. (in English) [The density (ind. per m<sup>2</sup>) of Odonata inhabiting the river Song during September 2001-August 2002 is 19 specimens (2,92% of all specimens sampled).] Address: Samweel, N., Department of Forestry Dolphin P.G. Institute of Biomedical and Natural Sciences Manduwala Dehradun Uttarakhand, India. E-mail: nusrat\_samweel@rediffmail.com

**14836.** Schlemmer Brasil, L.; Batista, J.D.; Giehl, N.F.; Valadão, M.B.X.; Oliveira dos Santos, J.; Dias-Silva, K.

(2014): Environmental integrity and damselfly species composition in Amazonian streams at the "arc of deforestation" region, Mato Grosso, Brazil. *Acta Limnologica Brasiliensia* 26(3): 278-287. (in English, with Portuguese summary) ["Aims: Investigated how the loss of environmental integrity affects damselfly species composition in nine sites with different levels of environmental integrity in a Cerrado-Amazon transition region known as "arc of deforestation" in Mato Grosso State Brazil. We also tested the influence of environmental variables on species composition. Methods: We collected in transects of 100 m and used ordination (PCoA) and simple linear regression. Results: Species composition was strongly influenced by the environmental quality of sites, and the best model to explain species composition included variables related to channel morphology. Conclusions: These results are connected to the environmental homogenization and loss of environmental integrity as a result of extensive agricultural practices which alter stream communities of dragonflies in this region." (Authors)] Address: Schlemmer Brasil, L., Programa de Pós Graduação em Ecologia e Conservação, Univ. do Estado de Mato Grosso – UNEMAT, CEP 78690-000, Nova Xavantina, MT, Brazil. E-mail: brasil\_bilogia@hotmail.com

**14837.** Schmitz, M. (2014): Besonders frühe Emergenz von *Aeshna subarctica elisabethae* (Odonata: Aeshnidae). *Libellula* 33(1/2): 63-66. (in German, with English summary) ["Early emergence of *Aeshna subarctica elisabethae* (Odonata: Aeshnidae) – The very early emergence of a female *Aeshna subarctica elisabethae* on 23-v-2009 in the Hahnenmoor, Lower Saxony, is described. This record constitutes the earliest ever documented emergence of the species in Europe. It is assumed that the larva had reached an advanced growth stage in the preceding year, but did not manage to leave the water, thus enabling it to emerge very early the following spring, which was extraordinarily warm and sunny." (Authors)] Address: Schmitz, M., Birkenhang 37, 42555 Velbert-Langenberg, Germany. E-mail: mich.schmitz@gmx.de

**14838.** Schroth, K. (2014): Morphologische Schlupfhilfen bei Libellenlarven (Odonata). *Libellula* 33(1/2): 1-20. (in German, with English summary) ["Morphological emergence assistances in dragonfly larvae – Dragonfly larvae have a cuticular suture that opens during eclosing as well as during emerging. It is located dorsally at the posterior of the thorax and extends from the wing sheaths base over the prothorax up to the forehead and then runs sideways to the eyes. This suture is very stable and the larva requires some force to open it. Therefore, dragonfly larvae in many cases have morphological emergence and ecdysial assistances to control these in tearing the suture at a certain location in order to reduce the effort and to open it like a zipper. Among the various species this opening assistance is differently formed. The morphological emergence assistances seem to be divided into three basic variants: a) Damselflies have a mark right above the wing sheaths base with a notch

(emergence mark), which is a tear-point where the thoracic suture may crack safely with less effort. At this incipient crack the overlying suture, which usually is folded like a zipper, then tears. b) Dragonflies with a short abdomen have a kind of flap (emergence flap) which can break during emergence through the underlying thorax which is folded in the shape of a peak. In all exuviae this emergence flap can be observed because the skin structures are altered there (Schroth 2012a, 2013). c) In aeshnids there is still most need for further study, because they are rarely found in large numbers as mature larvae and examination under the microscope is difficult because of their large size. This study aims to clarify if the shape of emergence marks in Zygoptera is typical for different species and families, and if they can be used for species determination especially in damselfly larvae. Therefore, 15 species of Zygoptera occurring in the district of Nuremberg (Middle Franconia) have been studied and compared." (Author)] Address: Schroth, K., Wilhelm-Aschka-Str. 3, 91224 Pommelsbrunn-Hohenstadt, Germany. E-mail: schroth.karlheinz@t-online.de

**14839.** Seehausen, M. (2014): Exotische Libellen (Odonata) in der Sammlung des Niedersächsischen Landesmuseums Hannover. *Naturhistorica* 156: 29-39. (in German, with English summary) ["The exotic dragonflies and damselflies of the collection at the Lower Saxony State Museum Hanover (NLMH) were determined and catalogued. The 98 specimens in 51 species originate from North and South [America, Africa and Asia. Some specimens were collected by famous pioneers of systematic zoological research in Africa during the 19th Century. Furthermore two specimens of *Chlorogomphus magmficus* are notable: This species - only known from Java and Sumatra - is very rare to find in collections and also photos and figures from free available sources are scarce. Another nice species is one of the largest dragonflies worldwide: *Anotogaster sieboldii* - known for example from China, Japan and Taiwan. Also noteworthy is the exceptionally large number of *Hetaerina* sp. from South America. Unfortunately labels of many specimens are missing, so they are not suitable for scientific examinations." (Author)] Address: Seehausen, M., Museum Wiesbaden Hessisches Landesmuseum für Kunst und Natur, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**14840.** Seehausen, M. (2014): *Orthetrum sabina* über den Aquaristikhandel nach Deutschland importiert (Odonata: Libellulidae). *Libellula* 33(1/2): 109-112. (in German, with English summary) ["*Orthetrum sabina* introduced to Germany via aquarium trade (Odonata: Libellulidae) – On 10-iii-2014 a dragonfly larva has been found in a home aquarium in Uedem (North Rhine-Westphalia). It was transferred to the author and emerged on 15-iii-2014, the imago has been identified as a female *O. sabina*. This is the first record for Germany." (Author)] Address: Seehausen, M., Museum Wiesbaden Hessisches Landesmuseum für Kunst und Natur, Friedrich-

Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**14841.** Soedijo, S. (2014): The performance of natural enemy of rice pest in the rice field of farmers field school of integrated pest control in south Borneo. *International Journal of Science and Research* 3(4): 461-465. (in English) ["Research was conducted by considering about the performance of natural enemy of rice pest in the rice field of alumni and non-alumni Farmers Field School of Integrated Pest Control (SLPHT – Sekolah Lapangan Pengendalian Hama Terpadu) in South Borneo. It starts from January to September 2013. Some research locations are included such as Pasar Kamis Village in Banjar District, Guntung Payung Village in Banjarbaru District, and Sungai Rangas in Banjar District. ...." (Author) The list of taxa includes *Agriocnemis fermina* and *Acisoma panorpoides*.] Address: Soedijo, S., Lambung Mangkurat University, Faculty of Agriculture, Achmad Yani Road, South Kalimantan, Indonesia

**14842.** Stavenga, D.G. (2014): Thin film and multilayer optics cause structural colors of many insects and birds. *Materials Today: Proceedings*. Volume 1, Supplement, 2014: 109-121. (in English) ["Structural effects contribute to the coloration of many animals. Whereas extremely complex structures have evolved, often coloration is due to the most simple structure, namely a thin film. Here we present a number of examples where thin film optics plays a prominent role, namely in insect wings and bird feathers. Most butterfly wing scales have a lower lamina that prominently determines the colour. Damselfly wings (*Hetaerina americana*) with protrusions have reduced thin film reflections. A limited stack of multilayers features also distinct thin film properties, as is shown for feather barbules of the bird of paradise, Lawes' parotia. A simple method to derive the thickness of the wing structures is described." (Authors)] Address: Stavenga, D.G., Computational Physics, Zernike Institute for Advanced Materials, University of Groningen, NL-9747 AG Groningen, the Netherlands. E-mail: d.g.stavenga@rug.nl

**14843.** Sutton, P.G. (2014): Recent developments regarding the entomological fauna of Corfu (Kerkira). *Antenna* 39(1): 3-14. (in English) [Verbatim: In 2009, following the discovery of a new species of dragonfly for the island, *Selysiothemis nigra*, it was reported that Corfu held a total of 40 species (Sutton, 2009a) and the following comparison was made: Corfu has, by far, the richest odonatan fauna of all the Ionian islands. Only *Coenagrion scitulum* is missing from the Corfu list. In comparison, Kefallonia and Lefkada have 20 species of Odonata, and Zakynthos has 14 species. This situation has now changed, and three new species have been added to the Corfu list: *Coenagrion scitulum*, *Erythromma lindenii*, and *Lindenia tetraphylla*. The former two species, *C. scitulum* and *E. lindenii*, were discovered ... during a survey of Corfu for the exuviae of endemic Odonata species in Greece, in May 2012 (Brochard &

van der Ploeg, 2013a). *C. scitulum* was found at two separate locations: one at a reservoir in the extreme south of the island near Kavos, and the other in the vicinity of some small lakes near Poulades in the Rop a Valley. *E. lindenii* was discovered at the same reservoir as *C. scitulum*, near Kavos. The presence of *S. nigra*, which had been found previously in 2007 (Sutton, loc. cit.) was confirmed by the observation of four larvae and a substantial number (163) of exuviae, but no imagines from this emergence were observed. The paper goes on to describe some of the less frequently seen Odonata of Corfu, providing records for *Gomphus schneiderii*, *Onychogomphus forcipatus*, and *Somatochlora meridionalis*. Of particular importance was the record for *Pyrrhosoma elisabethae*, and the authors state that in spite of their best efforts, this species could only be found at a single site two kilometres south-east of Sidari (Brochard & van der Ploeg, 2013b), with "other locations on Corfu formerly known to hold *P. elisabethae* now so heavily polluted by sewage that it seems improbable that they still hold populations of this species." In the same year *P. elisabethae* had been observed at two different localities on the island, one of which was a well-vegetated spring-fed stream near Dassia to the north of Corfu town (Sutton, 2012a) and at a second site near Vatos, where the source of the three imagines observed was assumed to be the Ropa River and its small tributaries. Sadly, a return visit in October 2013, and a subsequent visit in May 2014, found that the Dassia site had also become heavily polluted with all manner of waste materials including motor vehicle oil containers, and the species could not be refound. For this to have happened, so soon after its discovery at this site was gravely disappointing, but reflects the fact that Greece has yet to recover from a financial situation that has led to the pollution of the countryside with rubbish that the local infrastructure cannot apparently afford to collect. If ever there was a species in desperate need of a champion, it is the Greek Red Damselfly, which is in danger of disappearing without trace before those charged with the stewardship of Corfu's natural riches can come up with an effective strategy to save it from extinction. Brochard & van der Ploeg recorded 30 of the 43 species now known to occur on Corfu, but interestingly, did not report the presence of *Somatochlora flavomaculata*. This species was added to the list by Hämäläinen (1983) when it was described as a species new to Greece, and appears to have been recorded on only three occasions with Hämäläinen's record from Perama in 1981, ... Vatos in 1994 (Lopau, 1999), and ... Lake Korission in 1998 (Butler, 1999). In May 2012, I had the good fortune to share an encounter of an emergence of this species with Bosse and Marie Stille, confirming that it is still present in the vicinity of Vatos. The third species new to the island, *L. tetraphylla*, was reported for the first time when five adult males were found at the Kavos reservoir on 28-vi-2014 (Stille et al. 2014). The authors consider the ecological conditions of the reservoir to be sufficiently favourable to suggest that this species may, in

accordance with observations elsewhere in the Mediterranean, be indigenous to the island.] Address: Sutton, P.G., 2 Fir Tree Close, Flitwick, Beds. MK45 1NZ, UK. E-mail: petersutton@freeuk.com

**14844.** Tarasova, O.G.; Karygina, N.V. (2014): Zoobenthos of the native riverbed of the Volga River in the conditions of the present oil pollution. Bulletin ASTU. Ser. : Fisheries. 2014(3): 71-77. (in Russian, with English summary) ["The species composition, quantitative indicators of the zoobenthos of the native riverbed of the Volga River were determined. The percentage ratio of number and biomass of the main groups of the benthos has been calculated. Malacostracans (class Crustacea) were the dominant group of zoobenthos, insects (class Insecta) were subdominant. The greatest quantitative indicators were conditioned by the active development of crustaceans and molluscs in 2011 and 2013. The analysis of oil products content in the water and bottom sediments of the studied watercourse has been done. The increase of the concentrations of petroleum hydrocarbons by the average annual values occurred simultaneously with the increase in the number of organisms of benthic fauna. The picture of the spatial distribution was characterized by coincidence of the areas with the elevated levels of petroleum hydrocarbons and quantitative characteristics of the benthos (near villages Zamyany, Nikolskoe). To estimate the intensity of the transition of oil products from the water column into the bottom sediments, using the calculated coefficient of the bottom accumulation, revealed its increase in 2012, which led to the reduction of density and biomass of zoobenthos. The presence of petroleum hydrocarbons in water, in conditions of intensive accumulation of these substances in the bottom sediments, does not have impact on the benthos. Pollution of bottom sediment positively correlates with the number of benthic organisms, and this link is weakened in case of difficult transition of toxins into soils. As a result of the statistical analysis, the presence of relations of different force and direction has been identified after the modernization of data between the investigated parameters. As a result of the researches, it is established that the influence of oil pollution of the water environment on the species composition and quantitative characteristics of the zoobenthos in the conditions of weakening the accumulation of oil products in soils can be negative. Petroleum hydrocarbons can contribute to the growth of benthic organisms in conditions of the moderate pollution of the bottom sediments." (Authors) The list of taxa includes *Orthetrum cancellatum*.] Address: Karygina, Natalia, Caspian Research Institute of Fishery; Senior Researcher of the Laboratory of Water Problems and Toxicology, 414056, Astrakhan, Russia. E-mail: kaspinfo@mail.ru.

**14845.** Tennessen, K.J. (2014): A hybrid male in the Genus *Ophiogomphus* (Odonata: Gomphidae). Insecta Mundi 0367: 1-6. (in English) ["A gomphid male from west-central Wisconsin (Eau Claire County, North Fork Eau Claire River, 11 June 1994, K. J. Tennessen leg) with characters



that are intermediate between *Ophiogomphus carolus* and *O. rupinsulensis* is described and illustrated. The specimen appears to be a hybrid based on intermediate character states of 1) colour pattern (slightly closer to *O. carolus*), 2) hamule morphology (shaped slightly more like those of *O. carolus*), and 3) anal appendage morphology (slightly more like those of *O. rupinsulensis*). (Author)] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**14846.** Thierry, L.; Zawal, A.; Bonte, D.; Stoks, R. (2014): What factors shape female phenotypes of a poleward-moving damselfly at the edge of its range?. *Biological Journal of the Linnean Society* 112: 556-568. (in English) ["Individuals at the expansion front during a climate-driven range expansion are expected to differ phenotypically from those individuals in core populations. Little information is known about the joint, potentially opposing, effects of stressful conditions at the range edge versus evolutionary changes that take place during range expansion in shaping the phenotypes at the range front. We investigated the effect of range expansion on immune function, body condition and flight-related morphology (flight muscle ratio, wing loading, and wing aspect ratio) of field-collected females of the poleward-moving damselfly *Coenagrion scitulum*. Individuals at the expansion front had a lower body condition, which indicated more stressful conditions at the range edge. Despite the counteracting effect of the shorter growth season, the higher flight muscle ratios at the expansion front indicated a strong selection for dispersal ability during range expansion. The current study suggests that models need to incorporate the interplay of stressful conditions and evolutionary processes at the expansion front to arrive at robust predictions of future species distributions under global warming." (Authors)] Address: Thierry, L., Laboratory of Aquatic Ecology, Evolution and Conservation, KU Leuven, Deberiotstraat 32, 3000 Leuven, Belgium. E-mail: Lieven.thierry@bio.kuleuven.be

**14847.** Tirado Bernat, M. (2014): Primera cita de *Brachytron pratense* (Odonata: Aeshnidae) a la Comunitat Valenciana. *Nemus* 4: 161-163. (in Spanish, with Catalan and English summaries) [Spain, Prat de Cabanes-Torreblanca (40° 14' N, 000° 12' E), 10-IV- 2010.] Address: Bernat, M.T., Gran Avinguda Jaume I 158. 1560 Benicàssim. Castellón, Spain. E-mail: tiradobernat@gmail.com

**14848.** Torralba-Burrial, A.; Armendariz, C.; Rabina, E.; Llamas, A.; Nores, C. (2014): Confirmación de la reproducción de *Gomphus graslinii* (Rambur, 1844) (Odonata: Gomphidae) y odonatofauna fluvial de los Prepirineos del este de Navarra (N Península Ibérica). *Munibe Ciencias Naturales* 62: 7-23. (in Spanish, with English and Catalan summaries) ["*G. graslinii* is a threatened species included in the Spanish Checklist of Endangered Species and in the Habitats Directive of the European Union. Its Iberian distribution is very fragmented, with scarce populations and records published from the northeastern

quadrant, including two records of adult specimens in Navarra. We searched for this species in 23 reaches of Pre-Pyrenean rivers from Eastern Navarra, and provide date on its reproduction in two reaches of Salazar River. Moreover, other 24 dragonfly species have been found, including *Gomphus simillimus* and *Coenagrion caeruleum*, both considered as Vulnerable in the Atlas and Red Book of the Invertebrates of Spain." (Authors)] Address: Torralba-Burrial, A., Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, E-33071 Oviedo, Spain. E-mail: antonioib@hotmail.com

**14849.** Toubal, O.; Boussehaba, A.; Toubal, A.; Samraoui, B. (2014): Biodiversité méditerranéenne et changements globaux : cas du complexe de zones humides de Guerbès-Senhadja (Algérie). *Physio-Géo* 8: 273-295. (in French, with English summary) ["The Guerbès-Senhadja wetland complex is located in north-eastern Algeria, in water-stressed North Africa, one of the most vulnerable regions to climate change (M. HULME et al., 2001). Although identified as one of the hotspots of biodiversity, and granted a formal protection as a Ramsar site, the ecocomplexe has undergone over the last two decades, fast changes in land use that has left many of its natural habitats heavily impacted and degraded, posing a tough challenge to the sustainable use of its natural resources. As climate change will affect the hydrology of wetlands mostly through changes in precipitation and temperature regimes, we attempted first to investigate warming trend and changes in rainfall patterns in the studied area by comparing these two factors over two periods: 1923-1938 and 1987-2007. Our results are in line with some predictive climatic scenarios which expect temperatures to change in North Africa between 0.2 °C and 0.5 °C per decade (M. HULME et al., 2001). Using remote sensing, we drew up a map of land use and vegetation cover across the studied area as a first step to establish the status of the various ecosystems and to use the map as a tool to assess local ecosystems' resilience to change and to mitigate adverse anthropogenic effects. We also identified factors which are fast eroding the ecological integrity of the study area: human encroachment (urban expansion, fragmentation, etc.), sand quarries, overgrazing, hydrological changes, fires and pollution. We noted that while soil erosion is increasing at low to medium altitudes, wind erosion is gradually silting up the area, including dunary marshes and ponds, thus limiting the carrying capacity of habitats and reducing their biodiversity. The draining of marshes is altering their hydrological functions and is inducing the loss of indigenous and hygrophilous plants, replaced by pyrophilous ones. The dam, located upstream of the study area, is also increasing water pollution by reducing the water flow. In order to stem the increasing erosion of local biodiversity and sustain wetlands resilience (K.L. ERWIN, 2009), steps are urgently needed to provide capacity building to local managers, increase connectivity, maintain hydrology, reduce pollution and control invasive species. The phytoecological diagnostic associated to vegetation and

land use maps can be of tremendous help to the management of the area, its conservation and to the sustainable use of its natural resources in the context of global changes." (Authors) *Acisoma panorpoides* is figured.] Address: Samraoui, B., Laboratoire de recherche et de conservation des zones humides, Université de Guelma, GUELMA, ALGÉRIE et Center of Excellence for Research in Biodiversity, King Saud University, Riyadh, Saudi Arabia. E-mail: samraoui@yahoo.fr

**14850.** Tschirnhaus, M. von; Borkenstein, A.; Jödicke, r. (2014): *Lestes dryas* (Odonata: Lestidae) und kommensalische Fliegen (Diptera: Chloropidae), mit einer Übersicht über Kleptoparasitismus bei Halmfliegen. *Mercuriale* 14: 1-12. (in German, with English summary) ["A female *Lestes dryas* caught a planthopper and devoured it within ca 9 min. Ca 2 min after initiation of the feeding process the first individuals of *Conioscinella frontella* arrived and partly succeeded in sucking on the planthopper. For the first time we thus report on kleptoparasitic frit flies (Chloropidae) visiting the prey of a member of Odonata. In addition, a planthopper (Auchenorrhyncha) as prey organism of chloropids is reported for the first time as well. The poor knowledge on this apparently old phylogenetic relation „predator-prey-commensalism" is summarized and compared with that of the sister group, namely freeloader flies (Milichiidae). Arthropods with a repellent odor and disgusting taste, if squeezed or preorally digested by predators, are pre-dominantly used by female flies of certain species as a welcome food. It is unknown if this uncommon food promotes egg ripening or an own defense strategy. A rendezvous strategy may play a role as well. Though all recorded predators are robust arthropods, they scarcely struggle against the troublesome kleptoparasites." (Authors)] Address: Tschirnhaus, M. von, Fakultät Biologie, Universität Bielefeld, Postfach 100117, 33619 Bielefeld m.tschirnhaus@uni-bielefeld.de

**14851.** Umbers, K.D.L.; Fabricant, S.A.; Gawryszewski, F.M.; Seago, A.E., Herberstein, M.E. (2014): Reversible colour change in arthropoda. *Biological Reviews* 89(4): 820-848. (in English) ["The mechanisms and functions of reversible colour change in arthropods are highly diverse despite, or perhaps due to, the presence of an exoskeleton. Physiological colour changes, which have been recorded in 90 arthropod species, are rapid and are the result of changes in the positioning of microstructures or pigments, or in the refractive index of layers in the integument. By contrast, morphological colour changes, documented in 31 species, involve the anabolism or catabolism of components (e.g. pigments) directly related to the observable colour. In this review we highlight the diversity of mechanisms by which reversible colour change occurs and the evolutionary context and diversity of arthropod taxa in which it has been observed. Further, we discuss the functions of reversible colour change so far proposed, review the limited behavioural and ecological data, and argue that the field requires phylogenetically controlled approaches to understanding the evolution of

reversible colour change. Finally, we encourage biologists to explore new model systems for colour change and to engage scientists from other disciplines; continued cross-disciplinary collaboration is the most promising approach to this nexus of biology, physics, and chemistry." (Authors) References to Odonata are documented in Table 1] Address: kate\_umbers@uow.edu.au

**14852.** Vamosi, J.C.; Armbruster, W.S.; Renner, S.S. (2014): Evolutionary ecology of specialization: insights from phylogenetic analysis. *Proc. R. Soc. B* 281: 20142004. <http://dx.doi.org/10.1098/rspb.2014.2004>: 7 pp. (in English) ["In this Special feature, we assemble studies that illustrate phylogenetic approaches to studying salient questions regarding the effect of specialization on lineage diversification. The studies use an array of techniques involving a wide-ranging collection of biological systems (plants, butterflies, fish and amphibians are all represented). Their results reveal that macroevolutionary examination of specialization provides insight into the patterns of trade-offs in specialized systems; in particular, the genetic mechanisms of trade-offs appear to extend to very different aspects of life history in different groups. In turn, because a species may be a specialist from one perspective and a generalist in others, these trade-offs influence whether we perceive specialization to have effects on the evolutionary success of a lineage when we examine specialization only along a single axis. Finally, how geographical range influences speciation and extinction of specialist lineages remains a question offering much potential for further insight." (Authors) The paper includes a reference to Odonata.] Address: Vamosi, J.C., Dept of Biological Sciences, Univ. Calgary, Calgary, Alberta, Canada T2L 0Z3. E-mail: jvamosi@ucalgary.ca

**14853.** Vieira Damaceno, I.; Buys, S.C.; Carriço da Silva, C.; Ferreira Martins, R. (2014): Inventory of Odonata (Insecta) along the margins of the river Dois de Setembro, municipality of Ecoporanga, northwest of Espírito Santo State. *A. Bol. Mus. Biol. Mello Leitão* (N. sér.) 33: 25-33. (in Portuguese, with English summary) ["An inventory of Odonata collected at the margins of the river Dois de Setembro (municipality of Ecoporanga, northwest of Espírito Santo State) is provided. The fieldwork was carried out from June 2011 to February 2012, in five sites along the margins of the river, including environments with distinct antropization degrees. The specimens were collected with insect aerial nets. A total of 421 specimens were collected, representing 19 species and 15 morphotypes. The species more frequently found are *Erythrodiplax basalis*; *Erythrodiplax umbrata*; *Hetaerina auripennis*; *Perithemis lais*. The occurrence of the following species is recorded for the first time from the State of Espírito Santo: *Acanthagrion cuyabae*; *Enallagma novaehispaniae*; *Lestes forficula*. A population of the endangered species *Leptagrion capixabae* was found." (Authors)] Address: Vieira Damaceno, I., Programa de Iniciação Científica, Escola São Francisco de Assis (ESFA), Santa Teresa, ES, Brazil. E-mail: ivanivida@gmail.com

**14854.** Walia, G.; Chabal, S. (2014): Distribution of constitutive heterochromatin and nucleolar organizer regions in two species of family Gomphidae (Odonata: Anisoptera). *The Nucleus* 57(3): 223-227. (in English) ["Spermatogonial and primary spermatocyte chromosomes of *Paragomphus lineatus* and *Nepogomphus modestus* have been described on the basis of C-banding and NOR staining. Both the species possess  $2n$  (males) =23,  $n$  (male) =12 without m chromosomes with XO(male)/XX(female) type sex determining mechanism. The sex chromosome is the largest element in the whole complement in *P. lineatus* but it is medium sized in *N. modestus*. In *P. lineatus*, all the autosomal bivalents possess terminal C-bands while X chromosome is C-positive throughout the length but lightly stained in the centre. Similarly, terminal NOR bands are present on all the autosomal bivalents and X chromosome shows terminal NOR bands with large interstitial band. In *N. modestus*, all the autosomal bivalents except one bivalent possess terminal C-bands while X chromosome represents large C-positive region on one end and small C-negative region on the other end. NOR staining shows terminal / non terminal NOR bands on some autosomal bivalents while X chromosome possesses dark NOR band only on one end." (Authors)] Address: Kaur Walia, Gurinder, Department of Zoology and Environmental Sciences, Punjabi University, Patiala, 147002, India. E-mail: gurinderkaur\_walia@yahoo.co.in

**14855.** Wezel, A.; Oertli, B.; Rosset, V.; Arthaud, F.; Leroy, B.; Smith, R.; Angélibert, S.; Bornette, G.; Vallod, D.; Robin, J. (2014): Biodiversity patterns of nutrient-rich fish ponds and implications for conservation. *Limnology* 15(3): 213-223. (in English) ["Nutrient-rich water bodies are usually expected to host low species richness at the local scale (water body). Nevertheless, they can support a diverse and sometimes unique biodiversity when diversity is considered at a regional scale. This discrepancy between the two scales is well documented for natural water bodies, but little is known about biodiversity of artificial water bodies, like fish ponds. We hypothesise that nutrient-rich water bodies can collectively host high species richness at the regional scale. Thus, these are important ecosystems for the regional conservation of biodiversity. We investigated 84 fish ponds in the Dombes region, France, with five taxonomic groups: macrophytes, phytoplankton, macroinvertebrates, dragonflies, and amphibians. Species richness patterns were determined for a. (single pond),  $\beta$ . (between ponds), and  $\gamma$ . (regional pond network) levels. For most studied species groups, richness per fish pond and at the regional level proved to be relatively high in comparison with natural ponds in other landscapes. Contribution of  $\alpha$ -diversity to regional diversity was highest for dragonflies with 41 %, and lowest for amphibians and macrophytes with 16 and 18 %, respectively. For macroinvertebrate families and phytoplankton genera it was intermediate. Contribution of  $\beta$ -diversity to regional diversity was similar for all species groups with 22–25 %. Furthermore, some ponds hosted a large number of less frequent species and some endangered species, indicating that the

conservation of biodiversity of fish ponds must be established at a regional scale." (Authors)] Address: Wezel, A., Department of Agroecology and Environment, ISARA Lyon, 23 rue Jean Baldassini, 69364, Lyon Cedex 07, France. E-mail: wezel@isara.fr

**14856.** Wijayathilaka, N.; Abayalath, N.; Bandara, C. (2014): Observation of the Vagrant Emperor (*Anax ephippiger*, Odonata, Aeshnidae) in Sri Lanka after 38 years. *Ceylon Journal of Science* 43(2): 83-84. (in English) ["*A. ephippiger* is a widespread dragonfly species whose range extends from Sri Lanka and India through Africa to the Mediterranean region and Europe. However, the species is previously known only from two sightings in Sri Lanka. Thirty-eight years after the last sighting of the species, the authors photographed a male *A. ephippiger* on 3rd of November, 2008 around 4.00 pm." (Authors)] Address: Wijayathilaka, Nayana, Department of Zoology, Faculty of Science, University of Peradeniya, Sri Lanka

**14857.** Wünsch, H.-W.; Gospodinova, H. (2014): *Anax imperator* stürzt nach einer Attacke aufs Wasser und schwimmt ans Ufer (Odonata: Aeshnidae). *Libellula* 33(1/2): 57-62. (in German, with English summary) ["*Anax imperator* falls after being attacked on the water surface and swims to the shore (Odonata: Aeshnidae) – On 2 September 2013 at a pond near Kerpen, Erftkreis, North Rhine-Westphalia, Germany, we observed an attack on a female of *Anax imperator* after its oviposition by a male of *Aeshna mixta*. After the subsequent crash onto the water surface the female of *A. imperator* could save itself swimming over a distance of about five meters in safety to a tree. The observation was partially documented by photos." (Authors)] Address: Gospodinova, H., Am Burgberg 11, 50126 Bergheim, Germany. E-mail: willi@waldschrat-online.de

**14858.** Wünsch, H.-W.; Gospodinova, H. (2014): Beobachtungen zum Beutefangverhalten von *Brachytron pratense* unter Zuhilfenahme eines Spinnennetzes (Odonata: Aeshnidae, Corduliidae; Araneidae). *Mercuriale* 14: 61-64. (in German, with English summary) ["On the observation of *B. pratense* preying *Cordulia aenea* with the aid of a spider's web. (Odonata: Aeshnidae, Corduliidae; Araneidae). In the morning of 8 June 2013 we observed an attack of a male of *B. pratense* against a male of *Cordulia aenea*. Thereby *B. pratense* utilized apparently a web of an araneid to complete its attack. This predation was documented by photos." (Authors)] Address: Wünsch, H.-W., Am Burgberg 11, 50126 Bergheim, Germany. E-mail: willi@waldschrat-online.de

**14859.** Wünsch, H.-W.; Gospodinova, H. (2014): Sitzende Eiablage von *Sympetrum striolatum* bei spätherbstlicher Kälte (Odonata: Libellulidae). *Mercuriale* 14: 39-42. (in German, with English summary) ["Perching oviposition in *S. striolatum* at low temperature in late autumn (Odonata: Libellulidae) - On 04-xi-2013 an unguarded female of



*S. striolatum* perched on a reed near water level and oviposited with immersed vulvar scale and whirring wings. This unusual behaviour we had repeatedly observed before but documented it by photos for the first time. We interpret perching oviposition in this species as a reaction on low temperatures in late autumn, probably in relation to growing exhaustion." (Authors)] Address: Wünsch, H.-W., Am Burgberg 11, 50126 Bergheim, Germany. E-mail: willi@waldschrat-online.de

**14860.** Yeoman, K. (2014): Effect of dragonfly nymph presence and conspecific larvae density on oviposition response of the invasive Asian Tiger Mosquito (*Aedes albopictus*). MSc. thesis, Faculty of The Graduate School, The University of North Carolina at Greensboro: 63 pp. (in English) ["Oviposition site selection is a critical fitness enhancing decision for container breeding insects. Predators have typically been shown to repel gravid females whereas conspecifics have been shown to be attractive at low-intermediate densities but repellent at high densities resulting in hump-shaped relations. The interaction of these two factors has, unfortunately, rarely been studied. In this study, I addressed this question by testing the effect of dragonfly nymphs as larval predators, conspecifics, and their combination on the oviposition response of *Aedes albopictus* mosquitoes. I expected a negative effect of predators, a hump-shaped effect of conspecifics, and a rightward shift in the peak of the hump in the presence of larval predators. I used three levels (0, 1, 3) of caged Odonata nymphs and a range of predetermined conspecific larvae numbers (0, 10, 50, 100, 300, 500). I used two experimental designs: (1) Six 3-by-6 oviposition traps grids each containing all 18 predator-by-larvae combinations; (2) Three transects containing 12 pairs of oviposition traps with both cups containing a similar number of larvae, but one containing a given level (0, 1, 3) of caged nymphs. In the latter, I also cultured a sample of the water medium to evaluate bacterial concentration. Hump-shaped relations of egg number with conspecifics was observed at the grid design for the one nymph level and for the transect design at nymph level zero. The effect predator level on oviposition response was either non-significant or, unexpectedly positive. Due to increased larval mortality in the predator cups, I could not evaluate the third hypothesis concerning the combined effect of conspecifics and predators. Bacterial concentration was negatively associated with number of eggs laid. The absence or positive effect of dragonfly nymphs on *Ae. albopictus* oviposition response is encouraging in terms of its usage as a biocontrol agent for container breeding mosquitoes which in combination with low-intermediate levels of conspecifics could be attractive to gravid female mosquitoes. Their offspring, in turn, will be decimated by the control agent." (Author)] Address: not stated

**14861.** Zessin, W. (2014): Buchbesprechung: BAUMANN, K. & J. MÜLLER (2014): Die Libellen des Nationalparks Harz. Schriftenreihe aus dem Nationalpark

Harz – Band 11, Nationalpark Harz. Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg 17(1): 79-[Review of a book on the regional odonate fauna of the Harz region, Sachsen-Anhalt and Niedersachsen, Germany] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**14862.** Zessin, W. (2014): Buchbesprechung: BÖNSEL, A. & M. FRANK (2013): Verbreitungsatlas der Libellen Mecklenburg-Vorpommerns. Natur + Text, Rangsdorf. Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg 17(1): 78. (in German) [Review of the distribution atlas of the Odonata of Mecklenburg-Vorpommern, Germany.] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**14863.** Zessin, W. (2014): Libellenkundliche (Odonata) Untersuchung am renaturierten Kraaker Mühlbach und Kraaker Kiesgruben-Waldsee, Landkreis Ludwigslust-Parchim, Mecklenburg. Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg 17(1): 53-55. (in German) [Germany; 31 odonate species were recorded between 2009 and 2014. The species are checklisted.] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

## 2015

**14864.** Abbingh, G.J.R. (2015): Ruby Whiteface *Leucorhinia rubicunda* as a prey of a Tiger Beetle larva (*Cicindela* sp.). *Brachytron* 17(1): 44-46. (in Dutch, with English summary) ["On May 30, 2008 a male *L. rubicunda* was found with its abdomen in a small burrow in the Fochteloërveen peat bog. It had been caught by a larva of a tiger beetle (*Cicindela* sp.) that had pulled the abdomen of the dragonfly into its burrow and sucked its prey empty." (Author)] Address: Abbingh, G., Lange Hout 6, 9408 DB Assen, The Netherlands. E-mail: g.abbingh@home.nl

**14865.** Abbott, J.C. (2015): Dragonflies of Texas: A Field Guide. The University of Texas Press: 466 pp. (in English) ["Including nearly half of all dragonfly species found in North America, here is the definitive field guide to the dragonflies of Texas, which will be a valuable resource for naturalists throughout the region. Texas hosts 160 species of dragonflies, nearly half of the 327 species known in North America, making the state a particularly good place to observe dragonflies in their natural habitats. Dragonflies of Texas is the definitive field guide to these insects. It covers all 160 species with in situ photographs and detailed anatomical images as needed. Each species is given a two-page spread that includes photographs of both sexes and known variations when possible, key features, a distribution map, identification, discussion of similar species, status in Texas, habitat, seasonality, and general comments. Many of the groups

also have comparative plates that show anatomically distinctive characteristics. In addition to the species accounts, John Abbott discusses dragonfly anatomy, life history, conservation, names, and photography. He also provides information on species that may eventually be discovered in Texas, state and global conservation rankings, seasonality of all species in chronological order, and additional resources and publications on the identification of dragonflies. 470 pages, colour photos, distribution maps." (Publisher) - See more at: <http://utpress.utexas.edu/index.php/books/abbott-dragonflies#sthash.RsVpP80q.dpuf> Address: <http://utpress.utexas.edu/index.php/books/abbott-dragonflies>

**14866.** Adriaens, T.; De Knijf, G. (2015): A first report of introduced non-native damselfly species (Zygoptera, Coenagrionidae) for Belgium. *Belg. J. Zool.* 145(1): 76-80. (in English) ["One *Ischnura senegalensis* individual emerged from a small home aquarium (28 litre, 28 °C) in Buggenhout (East Flanders) on 19 March 2013. This animal died five days later. The aquarium was used for rearing Betta fish and contained some waterplants. ... Two *Pseudagrion microcephalum* larvae were observed in an aquarium (240 litre, 25 °C) of a private house in Opitter (Limburg, Flanders) from November 2011. The aquarium was designed to represent an Asian freshwater habitat. The materials for aquascaping had been ordered online ..."] (Authors)] Address: Adriaens, T., Research Institute for Nature and Forest (INBO), Kliniekstraat 25, B-1070 Brussels, Belgium. E-mail: [im.adriaens@inbo.be](mailto:im.adriaens@inbo.be)

**14867.** Aulio, K. (2015): Kokemäenjoki River Delta, western Finland – Natural treasury in an exceptionally rapidly changing aquatic environment. *International Letters of Natural Sciences* 32: 36-53. (in English) ["The catchment of the River Kokemäenjoki covers ca. 27 100 square kilometers in western Finland, and the length of the river is ca 120 km. The river discharges into the Bothnian Bay, the northern section of the Baltic Sea. The delta is changing and prograding towards the sea exceptionally rapidly. The pace of the growth of the deltaic formations, as well as the major zones of the macrophytic vegetation is nowadays some 30–40 meters a year. This makes the delta the most rapidly changing aquatic and littoral ecosystem in the Northern Europe. The Kokemäenjoki River delta is often characterized as a biological hotspot, and major sections of the estuary are included in several leading international nature conservation programmes, i.e. The Natura 2000 network of the European Union, the intergovernmental The Ramsar Convention on Wetlands, as well as in the IBA, Important Bird Area programme established by the BildLife International organization. The diversities of both flora and fauna are very high – at least as regards the northern location of the estuary. ... Of the invertebrates, the species composition of dragonflies (Odonata) is best known. There are 25 species of the 55 dragonfly taxa found in Finland. ... The present paper summarizes the data presented in various reports, mainly in Finnish, and majority of them in hardly

accessible depositories." (Author)] Address: Aulio, K., Lankakatu 3 D 16, FI-20660 Littoinen, Finland. E-mail: [kai.aulio@gmail.com](mailto:kai.aulio@gmail.com)

**14868.** Balk, A.; Cassée, E. (2015): Photographic report of a cannibalistic Great emperor (*Anax imperator*). *Brachytron* 17(1): 40-43. (in Dutch, with English summary) ["On June 11th 2014 the authors observed cannibalism among two adult females of *A. imperator* in the 'Amsterdamse Waterleidingduinen' (the Netherlands). We provide a photographic report of this event. Great Emperor normally preys on flying insects smaller than themselves. Cannibalism is unusual for animals the same size since it involves a risk to the predator. One theory suggests that miscommunication between two conspecifics can lead to cannibalism. This way, the female could have mistaken the other individual for a male with mating intentions. This observation confirms opportunistic feeding habits of the species." (Authors)] Address: Balk, Anne, Kievitstraat 36, 2025 ZJ Haarlem, The Netherlands. E-mail: [anne.balk@hotmail.com](mailto:anne.balk@hotmail.com)

**14869.** Barling, N.; Martill, D.M.; Heads, S.W.; Gallien, F. (2015): High fidelity preservation of fossil insects from the Crato Formation (Lower Cretaceous) of Brazil. *Cretaceous Research* 52, Part B: 605-622. (in English) ["Fossil insects from the Lower Cretaceous (Aptian) Crato Formation of north-east Brazil are preserved as goethite replacements in laminated limestones of lacustrine-lagoonal origin. They display remarkable degrees of morphological detail down to the macromolecular level in some examples. We document the fidelity of preservation and reveal an astonishing variety of morphological detail comparable in some instances with that found in amber inclusions." (Authors) Photomicrographs of Crato Formation insects with colour patterns and structural iridescence preserved include the damselfly *Parahemiphlebia mickoleiti* (SMNS66558) showing structural iridescence.] Address: Barling, N., School of Earth and Environmental Sciences, University of Portsmouth, Burnaby Building, Burnaby Road, Portsmouth PO1 3QL, UK. E-mail: [nathan.barling@port.ac.uk](mailto:nathan.barling@port.ac.uk)

**14870.** Barnard, A.; Fincke, O.; Shields, M.; Xu, M. (2015): Melanic individuals in color polymorphic *Enallagma* damselflies result from phenotypic, not genetic, variation. *International Journal of Odonatology* 18(1): 3-14. (in English) ["Genetically determined colour polymorphisms have a long history in the study of evolutionary change acting on populations. The Odonata exhibit relatively high levels of sex-specific colour polymorphisms in mature adults. In *Ischnura* and *Coenagrion*, female-specific polymorphisms are known to be controlled by Mendelian genes. Nearly half of *Enallagma* species have polymorphic females, but the inheritance of any has yet to be determined. Our aims here were to determine: (1) the inheritance of the colour polymorphism in *E. hageni*; and (2) inherent reproductive characteristics of blue female andromorphs and green heteromorphs reared under

controlled conditions as teneral. Maternal morphs, which developed normal coloration in field enclosures within a week, did not differ in copulation time or clutch size, and their offspring did not differ in sex ratio or survivorship to emergence. Surprisingly, no laboratory-reared offspring developed normal mature coloration. Rather, the initially pale parts of the thorax and abdomen, that normally would turn either blue or green, became melanised. Black novel phenotypes also developed in adults of *E. civile*, *E. anna*, *E. carunculatum*, and *E. annexum* that as larvae or teneral adults were reared to sexual maturity under greenhouse conditions that differed from the laboratory conditions used to rear *E. hageni*. We hypothesize that the phenotypic plasticity in body coloration documented in *Enallagma* results from the quality of UV radiation experienced as a sexually immature adult, which is known to affect melanization in other insects. These examples in *Enallagma* offer insights into the origin of colour novelty in Odonata." (Authors)] Address: Finke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**14871.** Bedê, L.C.; Machado, A.B.M.; Piper, W.; de Souza, M.M. (2015): Odonata of the Serra de São José – Brazil's first Wildlife Reserve aimed at the conservation of dragonflies. *Notulae odonatologicae* 8(5): 117-127. (in English) ["Surveys of the odonate fauna of the Serra de São José were carried out between 1996 and 2012, resulting in records of 128 species, including 49 Zygoptera and 79 Anisoptera, grouped in 10 families and 53 genera, with seven new species records for the state of Minas Gerais. The high species richness can be attributed to the existence of a varied set of natural and artificial freshwater biotopes, placed in distinct physiographic contexts along a contact zone between Brazil's Atlantic Forest and Cerrado hotspots. This area figures as a priority site for biodiversity conservation in the State of Minas Gerais, and in 2004 became Brazil's first protected area dedicated to the conservation of odonates and their freshwater habitats." (Authors)] Address: Bedê, L.C., Instituto Terra Brasilis, Rua Bueno Brandão 405, 31010-060 Belo Horizonte, MG, Brazil. E-mail: luciobede@terrabrasilis.org.br

**14872.** Bennett, D.M.; Dudley, T.L.; Cooper, S.D.; Sweet, S.S. (2015): Ecology of the invasive New Zealand mud snail, *Potamopyrgus antipodarum* (Hydrobiidae), in a Mediterranean-climate stream system. *Hydrobiologia* 746: 375-399. (in English) ["*P. antipodarum*, is a widely distributed non-native species of management concern on four continents. In a southern California stream, *P. antipodarum* abundance, which ranged from ca. <10 to nearly 150,000 snails m<sup>2</sup>, was related to discharge and temperature patterns. Laboratory experiments indicated that *P. antipodarum* (1) survivorship decreased from 13 to 27°C, but its growth rate was higher at 13 and 20°C than 27°C; (2) grazing rates were similar to those of native algivores in short-term trials; (3) grazing impact was

greater than that of a native hydrobiid snail in longer-term trials; (4) ingested different diatom sizes than some other grazers; (5) reduced the abundances of medium-sized and large diatoms, and several filamentous cyanobacteria and chlorophytes, while increasing the relative abundances of tough filamentous chlorophytes (e.g., *Cladophora*); (6) impact on other grazing invertebrates was species specific, ranging from competition to facilitation; (7) reduced the survivorship of *Anaxyrus boreas* tadpoles; and (8) was consumed by non-native *Procambarus clarkii* and naiads of *Aeshna* and *Argia*. Ecological effects of introduced *P. antipodarum* are subtle, occurring primarily at transitory high densities, but flow regulation may enhance their effects by eliminating high flows that reduce their population sizes. .... Large crayfish (*Procambarus clarkii*[10 cm) had the highest predation rates on New Zealand mud snails followed by medium *Procambarus* (5–10 cm), the dragonfly *Aeshna walkeri*, and small *Procambarus* (5 cm) (Fig. 13). The damselfly *Argia vivida* also had predator impact indices significantly different from zero, but other taxa only consumed mud snails sporadically (*Protochauliodes*, *Cordulegaster dorsalis*, *Octogomphus specularis*, *Notonecta hoffmanni*, *Drunella* sp., *Paltothemis lineatipes*) or not at all (*Rhyacophila* sp., *Isoperla* sp., *Lepidostoma* sp. *Gumaga nigricula*)." (Authors)] Address: Bennett, Danuta, Marine Science Institute, University of California, Santa Barbara, CA, 93106, USA. E-mail: danutabennett@gmail.com

**14873.** Birdwatch (2015): International partnership aids wildlife conservation in Iraq. *World Birdwatch* 37(1): 3. (in English) ["Now that mobile phones are widespread, a citizen science project to study butterfly and dragonfly distribution was launched last autumn. Enthusiastically received, photos of these two insect groups are now being sent for identification from all over Iraq." (Author)] Address: not stated

**14874.** Booth, A.J.; Moss, S.; Weyl, O.L.F. (2015): Effect of rotenone on gill-respiring and plastron-respiring insects. *African Journal of Aquatic Science* 40(1): 95-100. (in English) ["Rotenone, a commonly-used piscicide, interferes with the cellular respiration of aquatic vertebrates and invertebrates by preventing the uptake of oxygen. While dose-response relationships have been developed for fish, there are limited comparative data available on aquatic insects that respire either with tracheal gills or with a plastron – a thin layer of air trapped by hairs on the exterior of the body. This study assesses the temperature-dependent toxicity of rotenone to gill-respiring aquatic insects, family Coenagrionidae, and plastron-respiring aquatic insects, family Corixidae, at concentrations that are lethal to Mozambique tilapia *Oreochromis mossambicus*. Both groups of insects were found to be differentially susceptible to rotenone, with survival decreasing as functions of both increased concentration and temperature. The dose-response relationship of Mozambique tilapia was found to be similar to that of other fishes, with 100% mortality achieved at 0.025 mg l<sup>-1</sup> at both 20°C and 28°C.



At this concentration, mortality in gill-respiring insects after 48h was 10% at 20°C and 28% at 28°C, which was higher than that of plastron-respiring insects, being 2% and 7% at the same temperatures. At higher concentrations (0.05–0.10 mg l<sup>-1</sup>), however, mortality of both gill. (>50%) and plastron-respiring (>10%) insects became substantial." (Authors)] Address: Booth, A.J., Dept Ichthyology & Fisheries Science, Rhodes Univ., Grahamstown, South Africa. E-mail: t.booth@ru.ac.za

**14875.** Brochard, C.; van der Ploeg, E. (2015): The Desert Darter (*Sympetrum sinaiticum*): a mysterious species. *Brachytron* 17(1): 47-54. (in Dutch, with English summary) ["*S. sinaiticum* was described as a new species in 1977. Almost 20 years later, the larva was described, based on several exuviae. The living larvae had never been caught until 2014. During our travel through Spain in June 2014, we managed to catch several larvae in different stages of development. We photographed the larvae for the first time in history. Even in the field they are easily identified, because of the absence of dorsal spines and the presence of long lateral spines on segment 9 and shorter lateral spines on segment 8." (Author)] Address: Brochard, C., Marsstraat 77, 9742EL Groningen, The Netherlands. E-mail: info@cbrochard.com

**14876.** Bucciarelli, G.M.; Kats, L.B. (2015): Effects of newt chemical cues on the distribution and foraging behavior of stream macroinvertebrates. *Hydrobiologia* 749: 69-91. (in English) ["Many amphibians possess noxious or toxic substances for self defense. These compounds have been characterized largely as chemical defenses, but may promote ecological and evolutionary processes. The California newt, *Taricha torosa*, possesses a potent neurotoxin, tetrodotoxin (TTX), which serves as a chemical defense, chemical cue to conspecifics, and selection pressure that has selected for evolved resistance in a predator. However, the potential effects of TTX upon the broader community and on behaviour, in general, have been overlooked. Field assays conducted during the newt breeding season indicate that the macroinvertebrate community responds to adult newt chemical cues by altering foraging behaviour. In these assays, significantly fewer macroinvertebrates were found in experimental areas with enclosed newts relative to enclosures with a non-predatory amphibian. Laboratory bioassays showed that dragonfly nymphs (*Anax junius*) reduced predatory behaviour and moved less in the presence of adult newt chemical cues. When exposed to TTX, nymph mean angular velocities were reduced four fold and mean velocity magnitude was reduced threefold relative to controls. Overall, these results support the hypothesis that chemical stimuli from predators, and TTX specifically, can shape species interactions at lower trophic levels and potentially affect community organization." (Authors)] Address: Bucciarelli, G. M., Dept Ecol. & Evol. Biol., Univ. California, Los Angeles, Los Angeles, CA, 90095, USA. E-mail: garyb@ucla.edu

**14877.** Buczyński, P.; Górka, M.; Buczyńska, E. (2015): Has *Aeshna viridis* Eversmann, 1836 (Odonata: Aeshnidae) really disappeared from southern Poland (East-Central Europe)? *Polish Journal of Entomology* 84(1): 33-47. (in English) ["50-100 years ago the southern boundary of the distribution area of *A. viridis* ran through southern Poland. However, no records of this species from this area have been reported since then. The species is therefore considered as having retreated northwards. The present research disclosed three new sites of *A. viridis* on the edge of or just beyond its historical distribution area: one in south-western Poland (Trestno: 51°04'N, 17°08'E) and two in the south-east of the country (Krasieczyn: 49°46'N, 22°38'E, Bolestraszyce: 49°49'N, 22°51'E). All the sites were anthropogenic. This demonstrates the survival of a number of populations and the formation of new ones in water bodies formed de novo or to which *Stratiotes aloides* was introduced artificially. This suggests that the conservation of *A. viridis* is possible in this region." (Authors)] Address: Buczyński, P., Maria Curie-Skłodowska University in Lublin, Dept of Zoology, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**14878.** Buggenum, H.J.M. van; Geraeds, R.P.G. (2015): An ecological analyses of the Middelsgraaf brook (NL), a canalized low land stream, based on the presence of dragonflies. *Brachytron* 17(1): 3-15. (in Dutch, with English summary) ["The presence and distribution of the Odonata along the Middelsgraaf, a small canalized lowland stream in the Dutch province of Limburg, was studied during the period 2008-2012. Based on the occurrence and abundance of dragonflies along 24 transects of 250 meters each (e.g. wide spread, presence of larvae or exuviae or numbers of adults) we determined 20 species as resident and 10 species as nonresident (wanderers/migrants). Recently a method was developed to use the habitat preferences of the macrofauna species for the characterisation of streams, lakes and other water bodies. Since the regional water authority Roer and Overmaas monitored both water quality and macro-fauna of the Middelsgraaf brook, we were able to compare the results of three different approaches. In our situation it turned out that the stocktaking of the adult dragonflies indicates more or less the same habitat characteristics and water quality as the whole macro-fauna community. Furthermore the indications for the water quality are the same as the ones that are actually measured. So monitoring dragonflies is a simple method that can be used, for example, to characterize water bodies and to investigate habitat differences between brooks, local situations and external aspects that have an influence on the occurrence of dragonflies." (Authors)] Address: Geraeds, R., Rijksweg Noord 280, 6136 AH Sittard, The Netherlands. E-mail: rob.geraeds@kpnplanet.nl

**14879.** Chapman, J.W.; Reynolds, D.R.; Kenneth Wilson, K. (2015): Long-range seasonal migration in insects: mechanisms, evolutionary drivers and ecological

consequences. *Ecology Letters* 18(3): 287-302. (in English) ["Myriad tiny insect species take to the air to engage in windborne migration, but entomology also has its 'charismatic megafauna' of butterflies, large moths, dragonflies and locusts. The spectacular migrations of large day-flying insects have long fascinated humankind, and since the advent of radar entomology much has been revealed about high-altitude night-time insect migrations. Over the last decade, there have been significant advances in insect migration research, which we review here. In particular, we highlight: (1) notable improvements in our understanding of lepidopteran navigation strategies, including the hitherto unsuspected capabilities of high-altitude migrants to select favourable winds and orientate adaptively, (2) progress in unravelling the neuronal mechanisms underlying sun compass orientation and in identifying the genetic complex underpinning key traits associated with migration behaviour and performance in the monarch butterfly, and (3) improvements in our knowledge of the multifaceted interactions between disease agents and insect migrants, in terms of direct effects on migration success and pathogen spread, and indirect effects on the evolution of migratory systems. We conclude by highlighting the progress that can be made through inter-phyla comparisons, and identify future research areas that will enhance our understanding of insect migration strategies within an eco-evolutionary perspective." (Authors) The publication includes references to *Pantala flavescens*.] Address: Chapman, J.W., AgroEcology Department, Rothamsted Research, Harpenden, Hertfordshire, AL5 2JQ, UK. E-mail: jason.chapman@rothamsted.ac.uk

**14880.** Córdoba-Aguilar, A.; González-Tokman, D.; Nava-Bolaños, A.; Cuevas-Yáñez, K.; Rivas, M.; Nava-Sánchez, A. (2015): Female choice in damselflies and dragonflies. In: Peretti, A.V. & A. Aisenberg (eds.): *Cryptic female choice in arthropods. Patterns, mechanisms and prospects*. Springer: 239-253. (in English) ["Odonates have been frequently labeled as a taxa where males control female's mating and fertilization decisions. Contrary to this position, in our contribution, we review instances where females can actually show choice of mates. Previous to mating, possible selected male traits are wing pigmentation, ability to defend oviposition sites, body color, and temperature. Females may assess male stimulation during copulation, responding via sperm ejection of previous males' sperm. Benefits females may derive from choosing males that can affect offspring are as follows: an increased ability to withstand pathogen infections (for both male and female offspring) or ability to stimulate, attractiveness, and fighting ability (for male offspring only). Finally, we discuss that even for traits that clearly seem to control female reproductive decisions, i.e., abdominal claspers, there is no conclusive evidence that shows that they have evolved and are maintained via male-male competition. Our review thus emphasizes that we are far from admitting that females have little or no reproductive control in this taxa." (Authors)] Address:

Córdoba-Aguilar, A., Depto de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

**14881.** Csabai, Z.; Boda, P.; Boda, R.; Bódis, E.; Danyik, T.; Deák, C.; Farkas, A.; Kálmán, Z.; Lökkös, A.; Málnás, K.; Mauchart, P.; Móra, A. (2015): Aquatic macroinvertebrate fauna of the Kis-Sárrét nature protection area with first records of five species from Hungary. *Acta Biol. Debr. Oecol. Hung.* 33: 9-70. (in English, with Hungarian summary) ["The Kis-Sárrét is one of the most diversified and most precious protected areas of the Körös-Maros National Park, but so far, our knowledge about its aquatic macroinvertebrate fauna was far from exhaustive, and only 163 species have been known. In this study, our aim was to explore the aquatic macroinvertebrate fauna in detail and to compile the annotated checklist of aquatic macroinvertebrates of the area. Thorough faunistical samplings were made in three consecutive years (2012-2014) in three seasons (spring, summer and autumn) in each year at a total of 151 sampling points. Altogether 33 892 individuals belonging to 441 species (... 30 Odonata, ...) were identified. The relatively high numbers of species were impressive in themselves, but the composition was much more surprising. Nearly a quarter of the species (110 of 441, 24.9%) could be highlighted in various aspects. Five species were found in Hungary for the first time..., nine species are protected or IUCN red listed (... *Aeshna isosceles*, *Libellula fulva*, *Leucorrhinia pectoralis*, ...), further 94 species are rare or extremely rare in Hungary (e.g. ... *Erythromma lindenii*, ...), or their occurrences in a lowland area are surprising .... The faunal composition is an interesting mixture of typical marshland species, acidophil bog-dwelling elements and characteristic species of unique slow-flowing, densely vegetated lowland streams." (Authors)] Address: Csabai, Z., University of Pécs, Faculty of Sciences, Institute of Biology, Department of Hydrobiology, Ifjúság útja 6, H-7624 Pécs, Hungary. E-mail: csabai@gamma.ttk.pte.hu

**14882.** Cucco, M. (2015): Nuova segnalazione di *Leucorrhinia dubia* (Vander Linden, 1825) nelle Alpi Graie (Insecta, Odonata). *Rivista piemontese di Storia naturale* 36: 77-87. (in Italian, with English summary) ["The presence of *L. dubia* at Lac Falin near Usseglio is described herein. This rare dragonfly, though being rarely found in Ossola and Aosta Valley, was never previously detected in the Western Alps of Piedmont. The habitat is a peat-bog with abundant *Sphagnum*, located at 1691 m a.s.l." (Author)] Address: Cucco, M., Università del Piemonte Orientale, DISIT, viale Michel 11 - 15121 Alessandria. Italy. E-mail: cucco@unipmn.it

**14883.** De Marco Júnior, P.; Batista, J.D.; Cabelle, H.S. R. (2015): Community assembly of adult odonates in tropical streams: An ecophysiological hypothesis. *PLoS ONE* 10(4): e0123023. doi:10.1371/journal.pone.0123023:

17 pp. (in English) ["Community assembly theory is founded on the premise that the relative importance of local environmental processes and dispersal shapes the compositional structure of metacommunities. The species sorting model predicts that assemblages are dominated by the environmental filtering of species that are readily able to disperse to suitable sites. We propose an ecophysiological hypothesis (EH) for the mechanism underlying the organization of species-sorting odonate metacommunities based on the interplay of thermoregulation, body size and the degree of sunlight availability in small-to-medium tropical streams. Due to thermoregulatory restrictions, the EH predicts (i) that larger species are disfavoured in small streams and (ii) that streams exhibit a nested compositional pattern characterized by species' size distribution. To test the EH, we evaluate the longitudinal distribution of adult Odonata at 19 sites in 1st- to 6th-order streams in the Tropical Cerrado of Brazil. With increasing channel width, the total abundance and species richness of Anisoptera increased, while the abundance of Zygoptera decreased. The first axis of an ordination analysis of the species abundance data was directly related to channel width. Mean and maximum thorax size are positively correlated to channel width, but no relationship was found for the minimum thorax size, suggesting that there is no lower size constraint on the occurrence of these species. Additionally, a nested compositional pattern related to body size was observed. Our results support the EH and its use as an ecological assembly rule based on abiotic factors. Forest cover functions as a filter to determine which species successfully colonize a given site within a metacommunity. As a consequence, the EH also indicates higher threats for small-bodied zygopterans in relation to the loss of riparian forests in tropical streams." (Authors)] Address: De Marco Júnior, P., Laboratório de Teoria, Metacomunidades e Ecologia de Paisagens, Departamento de Ecologia, ICB, Universidade Federal de Goiás, Goiânia, GO, Brazil. E-mail: pdemarco@pq.cnpq.br

**14884.** Dickinson, M.H. (2015): Motor control: How dragonflies catch their prey. *Current Biology* 25(6): R232-R234. (in English) ["Detailed measurements of head and body motion have revealed previously unknown complexity in the predatory behaviour of dragonflies. The new evidence suggests that the brains of these agile predators compute internal models of their own actions and those of their prey." (Author)] Address: Dickinson, M.H., Division of Biology and Bioengineering, California Institute of Technology, Pasadena, CA 91125, USA. E-mail: flyman@caltech.edu

**14885.** Dida, G.O.; Gelder, F.B.; Anyona, D.N.; Abuom, P.O.; Onyuka, J.O.; Matano, A.-S.; Adoka, S.O.; Kanangire, C.K.; Owuor, P.O.; Ouma, C.; Ofulla, A.V.O. (2015): Presence and distribution of mosquito larvae predators and factors influencing their abundance along the Mara River, Kenya and Tanzania. *SpringerPlus* (2015) 4:136: 14 pp. (in English) ["Among all the malaria controlling

measures, biological control of mosquito larvae may be the cheapest and easiest to implement. This study investigated baseline predation of immature mosquitoes by macroinvertebrate predators along the Mara River, determined the diversity of predators and mosquito larvae habitats and the range of their adaptive capacity to water physico-chemical parameters. Between July and August 2011, sampling sites (n=39) along the Mara River were selected and investigated for the presence of macroinvertebrate predators and mosquito larvae. The selected sampling sites were geocoded and each dipped 20 times using standard mosquito larvae dipper to sample mosquito larvae, while a D-frame dip net was used to capture the macroinvertebrate predators. Water physico-chemical parameters (dissolved oxygen, temperature, pH, conductivity, salinity and turbidity) were taken in situ at access points, while hardness and alkalinity were measured titrimetrically. The influence of macroinvertebrate predator occurrence was correlated with mosquito larvae and water quality parameters using Generalized Linear Model (GLM). Predators (n=297) belonging to 3 orders of Hemiptera (54.2%), Odonata (22.9%) and Coleoptera (22.9%), and mosquito larvae (n=4001) belonging to 10 species, which included *An. gambiae* s.l (44.9%), *Culex* spp. (34.8%) and *An. coustani* complex (13.8%), *An. maculipalpis* (3.6%), *An. phaorensis* (1.2%), *An. funestus* group (0.5%), *An. azaniae* (0.4%), *An. hamoni* (0.3%), *An. christyi* (0.3%), *An. ardensis* (0.08%), *An. faini* (0.07%), *An. sergentii* (0.05%) and 0.05% of *Aedes* mosquito larvae which were not identified to species level, due to lack of an appropriate key, were captured from different habitats along the Mara river. It was established that invasion of habitats by the macroinvertebrate predators were partially driven by the presence of mosquito larvae ( $p < 0.001$ ), and the prevailing water physico-chemical parameters (DO, temperature, and turbidity,  $p < 0.001$ ). Understanding abiotic and biotic factors which favour mosquitoes and macroinvertebrate co-occurrence may contribute to the control of malaria." (Authors)] Address: Dida, G.O., School of Public Health and Community Development, Maseno University, Kisumu, Kenya. E-mail: gdidah@gmail.com

**14886.** Dow, R.A.; Reels, G.T.; Ngiam, R.W.J. (2015): Odonata collected at Usun Apau National Park, Miri Division, Sarawak, Malaysia in April and May 2012. *International Dragonfly Fund - Report 79: 1-17.* (in English) ["Results of a collecting expedition to the remote Usun Apau plateau in Sarawak are presented. Interesting records include *Telosticta kajang* (previously only known from the holotype), *Coeliccia* new species, *Amphicnemis* new species." (Authors)] Address: Dow, R.A., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands Email: Rory.dow230@yahoo.co.uk

**14887.** Drury, J.P.; Grether, G.F. (2015): Interspecific aggression, not interspecific mating, drives character displacement in the wing coloration of male rubyspot damselflies (*Hetaerina*). *Proc. R. Soc. B* 281: 20141737.



<http://dx.doi.org/10.1098/rspb.2014.1737>: 8 pp. (in English) ["Traits that mediate intraspecific social interactions may overlap in closely related sympatric species, resulting in costly between-species interactions. Such interactions have principally interested investigators studying the evolution of reproductive isolation via reproductive character displacement (RCD) or reinforcement, yet in addition to reproductive interference, interspecific trait overlap can lead to costly between-species aggression. Previous research on rubyspot damselflies (*Hetaerina* spp.) demonstrated that sympatric shifts in male wing colour patterns and competitor recognition reduce interspecific aggression, supporting the hypothesis that agonistic character displacement (ACD) drove trait shifts. However, a recent theoretical model shows that RCD overshadows ACD if the same male trait is used for both female mate recognition and male competitor recognition. To determine whether female mate recognition is based on male wing coloration in *Hetaerina*, we conducted a phenotype manipulation experiment. Compared to control males, male *H. americana* with wings manipulated to resemble a sympatric congener (*H. titia*) suffered no reduction in mating success. Thus, female mate recognition is not based on species differences in male wing coloration. Experimental males did, however, experience higher interspecific fighting rates and reduced survival compared to controls. These results greatly strengthen the case for ACD and highlight the mechanistic distinction between ACD and RCD." (Authors)] Address: Drury, J.P., Dept of Ecology and Evolutionary Biology, University of California, 612 Charles E. Young Dr. S., Los Angeles, CA 90095, USA. E-mail: [druryj@ucla.edu](mailto:druryj@ucla.edu)

**14888.** Elo, M.; Penttinen, J.; Kotiaho, J.S. (2015): The effect of peatland drainage and restoration on Odonata species richness and abundance. *BMC Ecology* (2015) 15:11: 8 pp. (in English) ["Restoration aims at reversing the trend of habitat degradation, the major threat to biodiversity. In Finland, over the half of the original peatland area has been drained and during recent years restoration of some of the drained peatlands have been accomplished. Short-term effects of the restoration on peatland hydrology, chemistry and vegetation are promising but little is known how other species groups in addition to vascular plants and bryophytes respond to restoration efforts. We studied how abundance and species richness of Odonata respond to restoration by sampling larvae in three sites (restored, drained, pristine) in 12 different study areas. We sampled Odonata larvae before restoration (n = 12), during the first (n = 10) and the third (n = 7) year after restoration and used generalized linear mixed models to analyse the effect of restoration. Before restoration drained sites had lower abundance and species richness than drained sites. During the third year after restoration both abundance and species richness had risen in restored sites. Adults of pre-selected indicator species were detected more often in restored sites than in drained sites. Our results show that Odonatas suffer

from drainage but seem to benefit from peatland restoration and are able to colonize newly formed water pools relatively rapidly." (Authors) For details of the LIFE-project see: <http://www.metsa.fi/sivustot/metsa/en/Projects/LifeNatureProjects/BorealPeatlandLife/Sivut/BorealPeatlandLife.aspx>] Address: Elo, Merja, Dept of Biological and Environmental Science, P.O. Box 35, FI-40014 University of Jyväskylä, Finland

**14889.** Escoto-Moreno, J.A.; Novelo-Gutiérrez, R.; Sigala-Rodríguez, J.; Escoto-Rocha, J.; Carrillo-Lara, D.E.; Reynoso-Velasco, D. (2015): First records of Odonata from Zacatecas State, Mexico. *Notulae odonologicae* 8(5): 151-155. (in English) ["During June, July, and August 2013 a total of 29 species belonging to 16 genera and six families were collected in the hitherto unexplored state of Zacatecas, Mexico. Lestidae, Calopterygidae, Coenagrionidae, Gomphidae, and Libellulidae as well as 28 species and 15 genera are reported for the first time for Zacatecas State." (Authors)] Address: Escoto-Moreno, J.A, Laboratorio de Sistemática Animal, Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, km 4.5 carretera Pachuca-Tulancingo s/n, Ciudad Universitaria, Col. Carboneras, 42184 Mineral de la Reforma, Hidalgo, México. E-mail: [jerjaem2002@yahoo.es](mailto:jerjaem2002@yahoo.es)

**14890.** Farkas, A.; Móra, A. (2015): Contribution to the Odonata fauna of running and standing waters on the flood-plain of the Danube between Ács (1778 rkm) and Dunaföldvár (1560 rkm). *Acta Biol. Debr. Oecol. Hung.* 33: 125-134. (in English, with Hungarian summary) ["In 2013 faunistical studies on odonates were carried out in the Natura 2000 area of the flood-plain of the Danube located in the Danube-Ipoly National Park, with the main subject to detect species of community interest according to the Habitats Directive of the European Union. During our work a total of 26 small watercourses and 13 standing waters were visited usually at one occasion in spring. The study was mainly based on the collections of larvae; in addition, exuviae were also searched for and adults were occasionally recorded. Dragonflies were found at 16 small watercourses and 11 standing waters. A total of 353 larvae and 26 exuviae were collected and 23 specimens were observed as adults, representing altogether 22 species. Our study resulted in many new localities for the majority of the species, since these water bodies received little attention up to date. Five protected species were found (*Aeshna isosceles*, *Coenagrion ornatum*, *Gomphus vulgatissimus*, *Libellula fulva*, *Orthetrum brunneum*), out of them *C. ornatum* is also a species of community interest. This species was first recorded from two watercourses, among them from Sződrákosi-patak in high numbers. Since the populations of *C. ornatum* is decreasing in Hungary and Europe, those habitats where it occurs in high density, such as the Sződrákosi-patak, are of great conservation value." (Authors)] Address: Farkas, Anna, Tornóc u. 27, H-1141 Budapest, Hungary. E-mail: [flavipes@gmail.com](mailto:flavipes@gmail.com)

**14891.** Filippov, A.E.; Popov, V.L.; Gorb, S.N. (2015): The functional significance of density and distribution of outgrowths on co-opted contact pairs in biological arresting systems. *Phil. Trans. R. Soc. B* 5 February 2015 vol. 370 no. 1661 20140032: 7 pp. (in English) ["Microstructures responsible for temporary arresting of contacting surfaces are widely distributed on surfaces in different organisms. Recent morphological studies show that these structures have different density of outgrowths and not ideal distribution pattern on both complementary parts of the contact. One can suggest that this difference is optimized by natural selection to get stronger mechanical arrest within the system. In this paper, we simulate such a system numerically, both in the frames of continuous contact and discrete dynamical models to prove this hypothesis and elucidate other aspects of optimization of such mechanical adhesive systems." (Authors)] Address: Gorb, S.N., Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**14892.** Fincke, O.M. (2015): Trade-offs in female signal apparency to males offer alternative anti-harassment strategies for color polymorphic females. *Journal of Evolutionary Biology* 28(4): 931-943. (in English) ["Colour polymorphisms are known to influence receiver behaviour, but how they affect a receiver's ability to detect and recognize individuals in nature is usually unknown. I hypothesized that polymorphic female damselflies represent an evolutionary stable strategy, maintained by trade-offs between the relative apparency of morphs to male receivers. Using field experiments on *Enallagma hageni* and focal studies of *E. hageni* and *E. boreale*, I tested for the first time the predictions that 1) green heteromorphs and blue andromorphs gain differential protection from sexual harassment via background crypsis and sexual mimicry respectively, and 2) female morphs behaviourally optimize their signal apparency to mate-searching males. First, based on male reactions elicited by females, against a high contrast background the two morphs did not differ in being detected by males and once detected, did not differ in being recognized (eliciting sexual reactions). However, on green ferns, heteromorphs were detected less often (elicited only fly-bys) than andromorphs but once detected, the morphs did not differ in being recognized. In contrast, when perched on a dowel with two male signal distractors, andromorphs were detected less often and once detected, were recognized less often than heteromorphs. Second, in fields where females foraged, andromorphs perched higher on vegetation than heteromorphs, and were more often in the vicinity of males. Neither harassment rates nor evasive behaviours differed between morphs. Males aggregated in high density near shore where solitary females were rare. Equilibrium frequencies of these and other colour morphs should reflect the relative ease with which receivers detect and recognize them in the context where they are encountered." (Author)] Address: Fincke, Ola, Ecology and Evolutionary Biology

Graduate Program, Dept of Biology, University of Oklahoma Norman, OK, USA. E-mail: fincke@ou.edu

**14893.** Fu, J.J.; Hefler, Cs.; Qiu, H.H.; Shyy, W. (2015): Effects of aspect ratio on flapping wing aerodynamics in animal flight. *Acta Mechanica Sinica* 30(6): 776-786. (in English) ["Morphology as well as kinematics is a critical determinant of performance in flapping flight. To understand the effects of the structural traits on aerodynamics of bio-flyers, three rectangular wings with aspect ratios  $AR = 1, 2$  and  $4$  performing hovering-like sinusoidal kinematics at wingtip based Reynolds number of 5300 are experimentally investigated. Flow structures on sectional cuts along the wing span are compared. Stronger K-H instability is found on the leading edge vortex of wings with higher aspect ratios. Vortex bursting only appears on the outer spanwise locations of high-aspect-ratio wings. The vortex bursting on high aspect-ratio wings is perhaps one of the reasons why bio-flyers normally have low-aspect-ratio wings. Quantitative analysis exhibits larger dimensionless circulation of the leading edge vortex (LEV) over higher aspect ratio wings except when vortex bursting happens. The average dimensionless circulation of  $AR1$  and  $AR2$  along the span almost equals the dimensionless circulation at the 50% span. The flow structure and the circulation analysis show that the sinusoidal kinematics suppresses breakdown of the LEV compared with simplified flapping kinematics used in similar studies. The Re effect results on  $AR4$  show that in the current Reynolds number range, the overall flow structure is not sensitive to Reynolds number." (Authors) The paper includes references to Odonata.] Address: Fu, J., Dept of Mechanical and Aerospace Engineering, The Hong Kong University of Science & Technology, Clear Water Bay, Kowloon, Hong Kong SAR, China. E-mail: meqiu@ust.hk

**14894.** Futahashi, R.; Kawahara-Miki, R.; Kinoshita, M.; Yoshitake, K.; Yajima, S.; Arikawa, K.; Fukatsu, T. (2015): Extraordinary diversity of visual opsin genes in dragonflies. *PNAS* 112(11): E1247-E1256. (in English) ["Dragonflies are colourful and large-eyed animals strongly dependent on colour vision. Here we report an extraordinary large number of opsin genes in dragonflies and their characteristic spatiotemporal expression patterns. Exhaustive transcriptomic and genomic surveys of three dragonflies of the family Libellulidae (*Sympetrum frequens*, *Orthetrum albistylum*, and *Libellula fulva*) consistently identified 20 opsin genes, consisting of 4 nonvisual opsin genes and 16 visual opsin genes of 1 UV, 5 short-wavelength (SW), and 10 long-wavelength (LW) type. Comprehensive transcriptomic survey of the other dragonflies representing an additional 10 families also identified as many as 15–33 opsin genes. Molecular phylogenetic analysis revealed dynamic duplications and losses of the opsin genes in the course of evolution. In contrast to many SW and LW genes expressed in adults, only one SW gene and several LW genes were expressed in larvae, reflecting less visual dependence and LW-skewed light conditions for their life-

style under water. In this context, notably, the sand-burrowing or pit-dwelling species tended to lack SW gene expression in larvae. In adult visual organs: (i) many SW genes and a few LW genes were expressed in the dorsal region of compound eyes, presumably for processing SW-skewed light from the sky; (ii) a few SW genes and many LW genes were expressed in the ventral region of compound eyes, probably for perceiving terrestrial objects; and (iii) expression of a specific LW gene was associated with ocelli. Our findings suggest that the stage- and region-specific expressions of the diverse opsin genes underlie the behaviour, ecology, and adaptation of dragonflies." (Authors)] Address: Futahashi, R., Bioproduction Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Ibaraki 305-8566, Japan. E-mail: ryo-futahashi@aist.go.jp

**14895.** Gassmann, D. (2015): Odonata recorded from northeastern Papua New Guinea including the Bismarck Archipelago in May to July 1997. *Faunistic Studies in South-East Asian and Pacific Island Odonata* 10: 1-46. (in English) ["64 (sub)species from 10 families of Odonata were recorded throughout five provinces of Papua New Guinea, including the Bismarck islands of New Britain and New Ireland, from mid-May to early July 1997. The field trip led to the description of two new damselfly species (Gassmann, 1999; Gassmann, 2011) and one possibly new damsel- and dragonfly taxon, respectively. For several taxa, considerable range expansions are provided. *Agriocnemis aderces*, *Hemicordulia hilbrandi*, *Nososticta callisphaena*, *N. plagioxantha* and *Tanymecosticta fissicollis* are recorded for Papua New Guinea for the first time. *Brachydiplax duivenbodei* is a new record for New Britain. *Agriocnemis femina*, *Mortonagrion martini*, *N. africana*, *Rhyothemis resplendens*, *Xiphiagrion cyanomelas*, *Brachydiplax duivenbodei* and possibly *Brachydiplax denticauda* are recorded from New Ireland for the first time." (Author)] Address: Gassmann, D., Zoologisches Forschungsmuseum Alexander König, Arachnida Section, Adenauerallee 160, 53113 Bonn, Germany. E-mail: d.gassmann@zfmk.de

**14896.** Gómez-Tolosa, M.; Mendoza-Cuenca, L.F.; Rioja-Paradela, T.M.; Espinoza-Medinilla, E.E.; Alonso-Eguía-Lis, P.E.; Rivera-Velázquez, G.; Penagos-García, F.E.; Pérez-Munguía, R.M.; Ortega-Salase, H.; Gómez-Cristiani, M.; Gómez-Gutiérrez, R.B. (2015): Odonata (Insecta) de tres cuencas en la costa de Chiapas: lista de especies y registro nuevo. *Revista Mexicana de Biodiversidad* 86: 1-7. (in Spanish, with English summary) ["512 adults of the Odonata order, which correspond to 41 species were collected. These are grouped in 24 genera belonging to the families Calopterygidae, Coenagrionidae and Libellulidae. The percentage of individuals collected was 58.54% for the suborder Zygoptera and 41.46% for the suborder Anisoptera. Expected species accumulation curves ranged from 75.6% in September to 95.2% in January. *Brachymesia herbida* constitutes

the first record for Chiapas (Mexico). The dominant species was *Argia pulla*, which was collected at all sites. Using the Morisita-Horn similarity index, species were grouped and related to the characteristics of the environment in the subregions: high, medium and low." (Authors)] Address: Gómez-Tolosa, María de Lourdes, Instituto de Ciencias Biológicas, Universidad de Ciencias y Artes de Chiapas, Libramiento Norte-Poniente 1150, 29039 Tuxtla Gutiérrez, Chiapas, México. E-mail: maugomeztolosa@hotmail.com

**14897.** Gosden, T.P.; Waller, J.T.; Svensson, E.I. (2015): Asymmetric isolating barriers between different microclimatic environments caused by low immigrant survival. *Proceedings of the Royal Society of London B: Biological Sciences* 282 Issue: 1802: 7 pp. (in English) ["Spatially variable selection has the potential to result in local adaptation unless counteracted by gene flow. Therefore, barriers to gene flow will help facilitate divergence between populations that differ in local selection pressures. We performed spatially and temporally replicated reciprocal field transplant experiments between inland and coastal habitats using males of *Enallagma cyathigerum* as our study organism. Males from coastal populations had lower local survival rates than resident males at inland sites, whereas we detected no differences between immigrant and resident males at coastal sites, suggesting asymmetric local adaptation in a source-sink system. There were no intrinsic differences in longevity between males from the different environments suggesting that the observed differences in male survival are environment-dependent and probably caused by local adaptation. Furthermore, the coastal environment was found to be warmer and drier than the inland environment, further suggesting local adaptation to microclimatic factors has led to differential survival of resident and immigrant males. Our results suggest that low survival of immigrant males mediates isolation between closely located populations inhabiting different microclimatic environments." (Authors)] Address: Gosden, T., School of Biological Sciences, The University of Queensland, St Lucia, Queensland 4072, Australia

**14898.** Guillermo-Ferreira, R.; Gorb, S.N.; Appel, E.; Kovalev, A.; Bispo, P.C. (2015): Variable assessment of wing colouration in aerial contests of the red-winged damselfly *Mnesarete pudica* (Zygoptera, Calopterygidae). *The Science of Nature* (2015) 102:13: 10 pp. (in English) ["Wing pigmentation is a trait that predicts the outcome of male contests in some damselflies. Thus, it is reasonable to suppose that males would have the ability to assess wing pigmentation and adjust investment in a fight according to the costs that the rival may potentially impose. Males of the damselfly *Mnesarete pudica* exhibit red-coloured wings and complex courtship behaviour and engage in striking male-male fights. In this study, we investigated male assessment behaviour during aerial contests. Theory suggests that the relationship between



male resource-holding potential (RHP) and contest duration describes the kind of assessment adopted by males: self-assessment, opponent-only assessment or mutual assessment. A recent theory also suggests that weak and strong males exhibit variations in the assessment strategies adopted. We estimated male RHP through male body size and wing colouration (i.e. pigmentation, wing reflectance spectra and transmission spectra) and studied the relationship between male RHP and contest duration from videodocumented behavioural observations of naturally occurring individual contests in the field. The results showed that males with more opaque wings and larger red spots were more likely to win contests. The relationships between RHP and contest durations partly supported the self-assessment and the mutual assessment models. We then experimentally augmented the pigmented area of the wings, in order to evaluate whether strong and weak males assess rivals' RHP through wing pigmentation. Our experimental manipulation, however, clearly demonstrated that strong males assess rivals' wing pigmentation. We finally suggest that there is a variation in the assessment strategy adopted by males." (Authors)] Address: Guillermo-Ferreira, R., Dept of Biological and Environmental Sciences, Federal University of Grande Dourados (UFGD), Rod. Dourados - Itahum, Km 12, Dourados, Mato Grosso do Sul 79 804-970, Brazil. E-mail: rhainerguillermo@gmail.com

**14899.** Günther, A. (2015): Signalling with clear wings during territorial behaviour and courtship of *Chlorocypha cancellata* (Odonata, Chlorocyphidae). *International Journal of Odonatology* 18(1): 45-54. (in English) ["The reproductive behaviour of the damselfly *Chlorocypha cancellata* (Chlorocyphidae) was filmed at 600 frames per second. Different flight styles including straight, forward flight, threat and courtship display were analysed with respect to changes in wing beat frequency and phase relationships of fore and hind wings. The analysis revealed significant differences in the flight style between non-escalated and escalated threat display as well as changes in the wing beat frequency of a male during courtship dependant on the behaviour of the female. This is the first evidence suggesting that odonate species with clear wings can use specialized flight modes for intraspecific signalling." (Authors)] Address: Günther, A., Naturschutzinstitut Freiberg, Waisenhausstr. 10, 09599 Freiberg, Germany. E-mail: a.guenther@abo.freiepresse.de

**14900.** Haber, W.A.; Wagner, D.L.; de la Rosa, C. (2015): A new species of *Erythrodiplax* breeding in bromeliads in Costa Rica (Odonata: Libellulidae). *Zootaxa* 3947(3): 386-396. (in English, with Spanish summary) ["We describe a new species, *Erythrodiplax laselva* (Libellulidae), that breeds in bromeliads and *Cochlostema* (Commelinaceae) in the eastern lowlands of Costa Rica. The closest known relative is thought to be *E. castanea*, widespread in Central and South America, and not *E. bromeliicola*, which is known to breed in bromeliads in Cuba and Jamaica. The male, female, genitalia, and

larva are described and illustrated." (Authors)] Address: Haber, W.A., Apdo. 50-5655, Monteverde, Costa Rica. E-mail: bill.haber01@gmail.com

**14901.** Hadjoudj, S.; Khelifa, R.; Guebailia, A.; Amari, H.; Hadjadj, S.; Zebba, R.; Houhamdie, M.; Moulai, R. (2015): Emergence ecology of *Orthetrum cancellatum*: temporal pattern and microhabitat selection (Odonata: Libellulidae). *Annales de la Société entomologique de France (NS)* 50(3-4): 343-349. (in English, with French summary) ["Knowledge of both phenology and habitat selection are important assets for conservation and management purposes. Generally, aquatic insect species have an optimal season and larval microhabitat in which their survival and reproductive success are high. In odonates, emergence is usually a seasonal-restricted process during which the insect has to find a good timing and a convenient microhabitat to carry out the final ecdysis out of the water. We investigated temporal emergence pattern and microhabitat choice in *Orthetrum cancellatum* in northeast Algeria, which represents the southern limit of its distribution range. The emergence season lasted 56 days starting from 30.IV and ended on 25.VI, showing a peak on 19.V. The time by which 50% of the annual population has emerged (EM50) was 20 days and the sex ratio was slightly male-biased, with 51.53%. Final instar larvae chose areas with relatively dense vegetation, and this selection was positively dependent on the mean vegetation height and not on sex or body size. Height selection was positively dependent only on the support height that the larva chose. We suggest that larvae consider both predation risks and mainly local microclimate to select their emergence site." (Authors)] Address: Hadjoudj, S., Department of Biological Sciences of the Environment, Faculty of Natural and Life Sciences, University of Abderrahmane Mira, Béjaia 06000, Algeria

**14902.** Halder, U.; Dey, B. (2015): Biomimetic algorithms for coordinated motion: Theory and implementation. *International Conference on Robotics and Automation (ICRA 2015)* (arXiv:1503.04894v1 [cs.RO]): 18 pp. (in English) ["Drawing inspiration from flight behaviour in biological settings (e.g. territorial battles in dragonflies, and flocking in starlings), this paper demonstrates two strategies for coverage and flocking. Using earlier theoretical studies on mutual motion camouflage, an appropriate steering control law for area coverage has been implemented in a laboratory test-bed equipped with wheeled mobile robots and a Vicon high speed motion capture system. The same test-bed is also used to demonstrate another strategy (based on local information), termed topological velocity alignment, which serves to make agents move in the same direction. The present work illustrates the applicability of biological inspiration in the design of multi-agent robotic collectives." (Authors)] Address: Halder, U., Department of Electrical and Computer Engineering, University of Maryland, College Park, MD, USA. E-mail: udit@umd.edu

**14903.** Hämäläinen, M. (2015): Catalogue of individuals commemorated in the scientific names of extant dragonflies, including lists of all available eponymous species-group and genus-group names. International Dragonfly Fund - Report 80: 1-168. (in English) ["A catalogue of 1257 persons commemorated in the scientific names of extant dragonflies (Odonata) is presented together with brief personal information on each entry, typically the full name and year of birth and death (in case of a deceased person). Each individual has a list of the available species, subspecies, genus or subgenus names erected in his or her honour. A total of 1928 available eponymous species-group and 54 genus-group names are listed. These figures include also synonyms and homonyms. It was calculated that of the ca 8400 available species-group names in extant Odonata, ca 23 % are eponyms. Of the 933 new species-group names introduced from 1 January 1995 to 10 March 2015, as many as 42.9 % are eponyms." (Author)] Address: Hämäläinen, M., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, the Netherlands. E-mail: matti.hamalainen@helsinki.fi; libelago@gmail.com

**14904.** Harabiš, F.; Dolný, A.; Helebrandová, J.; Rusková, T. (2015): Do egg parasitoids increase the tendency of *Lestes sponsa* (Odonata: Lestidae) to oviposit underwater? Eur. J. Entomol. 112(1): 63-68. (in English) ["The selection of oviposition sites by insects can significantly affect egg mortality. Spreadwing damselflies (Odonata: Lestidae) predominantly lay their eggs in parts of plants growing above the surface of water and only occasionally also those parts growing underwater. Factors affecting the choice of oviposition site and decision to lay underwater are still poorly understood. We examined whether localities with different risk of egg parasitism, different oviposition strategies (above or below the water surface) and the depth at which the eggs were laid, affected the total number of eggs laid, the proportion parasitized and egg mortality. In general, a significantly higher proportion of the eggs laid above the surface of water were parasitized but spreadwing damselflies showed significant preference for laying eggs underwater at both of the sites studied. This preference, however, had a different effect on the overall mortality of eggs at the two sites studied. Hence underwater oviposition by damselflies may be seen as a conditional anti-predator strategy, occurring only if the benefits exceed potential risks. Underwater oviposition may provide additional benefits other than protection against egg parasitism." (Authors)] Address: Harabiš, F., Dept of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, CZ-165 21 Prague 6, Czech Republic. E-mail: harabis.f@gmail.com

**14905.** Harabiš, F.M.; Dolný, A. (2015): Necessity for the conservation of drainage systems as last refugia for threatened damselfly species, *Coenagrion ornatum*. Insect Conservation and Diversity 8(2): 143-151. (in Eng-

lish) ["(1.) Small streams and rivulets in agricultural landscapes are among the most threatened habitats throughout Europe. Many species occurring primarily within these habitats are listed in the EC Habitats and Species Directive. One example is *C. ornatum*, which was rediscovered during the last decade in the Elbe Valley (Czech Republic) after more than 40 years. The occurrence of this species, however, was observed only at highly altered sites. Several management attempts, unfortunately, had led to the local extinction instead of strengthening of existing populations, precisely because they ignored the habitat preferences of the target species. (2.) This study analysed the effects of several physiochemical and environmental characteristics of 30 ditch segments in relation to the presence and abundance of *C. ornatum*. (3.) The occurrence of *C. ornatum* was found to be positively correlated with the diversity of macrophyte vegetation and negatively with shading. Populations of *C. ornatum* occurred mostly in smaller, well-warmed sections of channel, while the species clearly avoided those sections with gravel or concrete substrates. (4.) The results indicate that under certain circumstances, the ongoing utilisation of channels particularly for drainage accords with the objectives of protecting this species and could substitute for routine conservation management activities. Supplementary effective management should focus on removing overgrowing vegetation, eliminating such negative interventions to the channel as strengthening the stream bed, and encouraging the development of rich vegetation along the watercourses (e.g. by establishing buffers or overflows)." (Authors)] Address: Harabiš, F., Dept of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, CZ-165 21 Prague 6, Czech Republic. E-mail: harabis.f@gmail.com

**14906.** Hava, J. (2015): Contribution to the dragonflies (Odonata) of „Údolí Únitického Potoka Nature Reserve“ and Únitice ponds. Elateridium 9: 111-117. (in Czech, with English summary) [Between 2007 and 2010, eleven odonate species were recorded in Údolí Únitického Potoka Nature Reserve and the nearby Únitice ponds, Czech Republic. Most of species are ubiquitous, but also include *Gomphus vulgatissimus* and *Sympetrum flaveolum*.] Address: Háva, J., Katedra ochrany lesa a entomologie, Fakulta lesnická a dřevařská, Česká zemědělská univerzita, Kamýcká 1176, CZ-165 21, Praha 6 – Suchbátka, Czech Republic. E-mail: jh.dermestidae@volny.cz

**14907.** Hayden, M.T.; Reeves, M.R.; Holyoak, M.; Perdue, M.; King, A.L.; Tobin, S.C. (2015): Thrice as easy to catch! Copper and temperature modulate predator-prey interactions in larval dragonflies and anurans. Ecosphere 6(4):art56. <http://dx.doi.org/10.1890/ES14-00461.1>: 17 pp. ["Amphibians are important indicators of environmental health, and their populations are in worldwide decline. The causes of these declines are diverse and not well understood. In some cases multiple stressors and complex causal mechanisms have been identified. Experimental

studies have shown that contaminants can cause the failure of *Lithobates sylvaticus* tadpoles to initiate predator avoidance behaviours, potentially leading to increased tadpole capture and injury. Copper is a contaminant known to negatively affect amphibians and other aquatic organisms at sub-lethal levels. Mining waste, certain pesticides, vehicle exhaust and brake pad dust are sources of copper, which can enter hydrologic systems through runoff. Additionally, temperature is known to influence predator-prey interactions of ectotherms and is predicted to rise in some areas as climate changes. We examined how copper and temperature affected behaviour and predation dynamics between an odonate predator (*Aeshna sitchensis*) and larval *L. sylvaticus* prey. We found that sublethal concentrations of copper near the analytical detection limits for this element (1.85 µg Cu/L) significantly reduced tadpole and odonate activity. Above-average temperatures (22°C) significantly increased tadpole activity and decreased dragonfly activity, compared with ambient-temperature treatments (17°C). These behavioural responses culminated in an approximately three-fold increase in the number of dragonfly attacks on tadpoles in the elevated-temperature, copper-exposed treatments. We suggest that increased concentrations of dissolved copper and elevated water temperatures are harmful to amphibian prey through maladaptive behavioural responses in the presence of predators." (Authors)] Address: Hayden, Mairin, Dept of Environmental Science, Alaska Pacific University, 4101 University Drive, Anchorage, Alaska 99508 USA. E-mail: hayden.tess@gmail.com

**14908.** Hilfert-Rüppell, D. (2015): High frequency and counterstroking: *Calopteryx splendens* female threatening flight. *International Journal of Odonatology* 18(1): 55-64. (in English) ["A hitherto unknown flight pattern of female *Calopteryx splendens* is described. On a day with heavy winds, when no damselfly could fly in open space of the river, I observed and filmed four to six females foraging in a small bay sheltered by bank vegetation. Females fought for perches and showed a threatening flight with counterstroking and high frequency wing-beating. In all other female flight modes the fore and hind wings were beaten nearly in parallel with a much lower beat frequency. As the newly observed flight mode resembles the courting flight mode of males of *C. splendens* the female's threatening flight is compared with it. At landings of both sexes the wings were beaten in a counterstroking mode for one to seven beats, as well. The possible development of female's threatening flight from wing beating during landing of *C. splendens* is discussed. The relevance of these findings is to extend the knowledge about the variety of flight modes in *Calopteryx* females." (Author)] Address: Hilfert-Rüppell D., Zool. Inst. TU Braunschweig, Fasanenstr. 3, D-38092 Braunschweig, Germany. E-mail: d.hilfert@tu-bs.de

**14909.** Hou, D.; Yin, Y.; Zhao, H.; Zhong, Z. (2015): Effects of blood in veins of dragonfly wing on the vibration characteristics. *Computers in Biology and Medicine* 58:

14-19. (in English) ["Highlights: •The microstructures of dragonfly wing are observed by the SEM. •Accurate three-dimensional FE model of the dragonfly forewing is developed. •The blood in veins is considered in the analysis of the mass, moments of inertia and natural frequency/mode. •We report the influence of the blood on the vibration characteristics of the wing for the first time. How the blood in veins of dragonfly wing affects its vibration characteristics is investigated. Based on the experimental results of the wing's morphology and microstructures, including the veins, the membranes and the pterostigma, accurate three-dimensional finite element models of the dragonfly forewing are developed. Considering the blood in veins, the total mass, mass distribution and the moments of inertia of the wing are studied. The natural frequencies/modal shapes are analyzed when the veins are filled with and without blood, respectively. The based natural frequency of the model with blood (189 Hz) is much closer to the experimental result. Relative to bending modal shapes, the torsional ones are affected more significantly by the blood. The results in this article reveal the multi-functions of the blood in dragonfly wings and have important implications for the bionic design of flapping-wing micro air vehicles." (Authors)] Address: Zhong, Z., School of Aerospace Engineering and Applied Mechanics, Tongji University, Shanghai 200092, P. R. China. E-mail: zhongk@tongji.edu.cn

**14910.** Inomata, N.; Hironaka, K.; Sawada, K.; Kuriwada, T.; Yamahira, K. (2015): Discrepancy in the degree of population differentiation between color-morph frequencies and neutral genetic loci in the damselfly *Ischnura senegalensis* in Okinawa Island, Japan. *Genetica* 143(3): 271-277. (in English) ["Evaluation of relative contribution of natural selection and stochastic processes to population differentiation has been of great interest in evolutionary biology. In a damselfly, *Ischnura senegalensis*, females show colour dimorphism (gynochrome vs. androchrome), and colour-morph frequencies are known to greatly vary among local populations within Okinawa Island, a small island of Ryukyu Archipelago, Japan. In this study, to examine the effects of natural selection and stochastic processes on the within-island variation in colour-morph frequencies, we compared the degree of population differentiation at the colour-morph locus with that at a mitochondrial DNA region and ten nuclear microsatellite loci. F<sub>ST</sub> values at the neutral loci were close to zero, indicating presence of sufficient gene flow (dispersal of adult individuals) between the local populations. In contrast, F<sub>ST</sub> values at the colour-morph locus were significantly different from zero. These results suggest that variation in female colour-morph frequencies observed among local populations in Okinawa Island has been caused by divergent selection acting on the phenotype and/or genes tightly linked with the color locus." (Authors)] Address: Inomata, N., Department of Environmental Science, International College of Arts and Sciences, Fukuoka Women's University, 1-1-1 Kasumigaoka, Higashi-ku, Fukuoka, 813-8529, Japan. E-mail: inomata@fwu.ac.jp



**14911.** Irusta, J.B.; Lencioni, F.A.A. (2015): First record of Pseudostigmatidae (Insecta: Odonata) in the North-east Region of Brazil. Check List 11(2) (Article 1565): 3 pp-["We record the first occurrence of Mecistogaster amalia (Burmeister, 1839) for the state of Rio Grande do Norte, Brazil, which is the first record of this genus and family for the whole Northeast Region of Brazil. This record is based on four collected samples and extends by more than 1,500 km to the north, the area known of distribution of this species." (Authors)] Address: Irusta, J.B., Irusta Consultoria, R. Marabá, 350, D-14. Parnamirim, RN, CEP 59161-230, Brazil. E-mail: jb.irusta@gmail.com

**14912.** Jisha Krishnan, E. K.; Sebastian, C.D. (2015): Genetic and phylogenetic assessment of sexually dimorphic species, *Diplacodes trivalis* (Odonata: Libellulidae) using Cytochrome Oxidase I Gene. Int. J. Pure App. Biosci. 3(2): 317-320. (in English) ["Sexual dimorphism is a characteristic phenomenon exhibited by Libellulidae and Aeshnidae family of Odonates. *Diplacodes trivalis* is a sexually dimorphic Libellulidae species and the present study was carried out to check whether any genetic change had occurred in both the sexes and how it is phylogenetically related with other Odonate members. DNA barcoding using CO I gene offers the opportunity for a standard system of species identification based on the analysis of small fragment of DNA. The PCR amplification of partial cytochrome oxidase I gene of *Diplacodes trivalis* yielded a product of 466bp length (GenBank Accession: KP 835512). The length and nucleotide sequence of DNA and was found to be similar in both sexes. BLASTn program showed 99% sequence similarity to the same species reported from Mizoram, Tamil Nadu and Japan. The result indicated that this sexually dimorphic species does not have any genetic changes with respect to their morphological differentiation." (Authors)] Address: Sebastian, C.D., Molecular Biology Laboratory, Department of Zoology, Univ. of Calicut, Kerala 673b 635 India. E-mail: drcdsebastian@gmail.com

**14913.** Jisha Krishnan, E.K.; Sebastian, C.D. (2015): Genetic variation and phylogeny assessment of *Aciagrion occidentale* (Odonata: Coenagrionidae) using Mitochondrial Cytochrome Oxidase Subunit I gene. International Journal of Science and Research 4(4): 1121-1123. (in English) ["*A. occidentale* is a migratory species widely distributed in montane and submontane areas in open grass besides weedy ponds and herbage. Here we used the COI barcode locus (522bp) to clarify the specific taxonomic status of *A. occidentale*. Molecular data suggests that this species is having 99% sequence similarity to *Aciagrion borneense* found in Netherland [sic!] and confirmed that both are sharing same genus. The N-J tree constructed with BLASTn result depicted that *A. occidentale* is phylogenetically very close to damselflies. Anisopterans and zygopterans are sharing some common characters and the results confirm that Zygoptera is a paraphyletic group derived from the monophyletic groups of Anisoptera and Anisozygoptera." (Authors)]

Address: Sebastian, C.D., Molecular Biology Laboratory, Department of Zoology, University of Calicut, Kerala 673 635 India. E-mail: drcdsebastian@gmail.com

**14914.** Karjalainen, S. (2015): Kirja-Arvostelu: Brochard, C., Groenendijk, D., van der Ploeg, E. & Termaat, T. 2012. Fotogids Larvenhuidjes van Libellen. KNNV Uitgeverij, 320 pp. Brochard, C. & van der Ploeg. 2014. Fotogids Larven van Libellen. KNNV Uitgeverij, 236 pp. *Crenata* 8: 46. (in Finnish) [Book reviews] Address: Karjalainen, S., Tyrskykuja 3 B 15, FIN-02320 Espoo, Finland. E-mail: sk@korento.net

**14915.** Karjalainen, S. (2015): Sudenkorentokesän 2014 kohokohtat. *Crenata* 8: 10-13. (in Finnish, with English summary) ["Dragonfly highlights in 2014. Interesting dragonfly (Odonata) records from Finland in 2014. Two species were recorded for the first time in the country: *Anax ephippiger* was found in Paimio on 24th May 2014 and *Gomphus flavipes* in Savitaipale on 6th September 2014. In addition, eight new provincial records were made including a northern find of *Aeshna viridis* from Ii in the province of Ostrobothnia borealis." (Author)] Address: Karjalainen, S., Tyrskykuja 3 B 15, FIN-02320 Espoo, Finland. E-mail: sk@korento.net

**14916.** Kaur Walia, G.; Kaur, H.; Kaur, J. (2015): Karyomorphological variations in the chromosome complement of *Orthetrum taeniolatum* of family Libellulidae (Odonata: Anisoptera). *Cytologia* 80(1): 95-99. ["*O. taeniolatum*, collected from the Patnitop area of Jammu and Kashmir, has been cytogenetically studied. The species possesses diploid chromosome number  $2n=21m$  with X0 type sex determining mechanism. During the course of meiosis, two autosomal bivalents are distinctly large as compared to the remaining autosomal bivalents. The X chromosome also shows the phenomenon of precocious segregation. The reduction in chromosome number from the type number ( $2n=25m$ ) is due to the fusion of two autosomal pairs, which is very common in case of holokinetic chromosomes. This type of karyomorphological variations in the species has been observed for the first time." (Authors)] Address: Kaur Walia, Gurinder, Dept of Zoology and Environmental Sciences, Punjabi University

**14917.** Keränen, I. (2015): The extent and causes of interspecific reproductive interactions in damselflies. *Jyväskylä studies in biological and environmental science* 304: 42 pp. (in English) ["As species do not live in isolation from each other, they are faced with an elementary choice when searching for a mating partner: a choice between conand heterospecific individuals. Despite the remarkable research effort on hybridization and its avoidance, there are still some less well covered areas, e.g. what is the role of males in hybridization, what patterns are found in sympatric wild populations, what role do alternative reproductive tactics (ARTs) have on the likelihood of heterospecific matings, and what are the true costs of heterospecific interactions. In this thesis I first quantify

the frequency of hybridization, backcrossing and heterospecific matings in sympatric wild populations of *Calopteryx splendens* and *C. virgo* damselflies in Finland. The possible influence of population densities, relative abundances of the species, and operational sex ratios on the frequency of heterospecific matings is also investigated. The second aim is to investigate how the intensity of territorial competition influences males' reproductive response to a heterospecific female. Finally, I dissect the importance of male ARTs on hybridization propensity and I attempt to quantify the reproductive costs that males' hybridization propensity inflicts among the tactics. The results imply a major role for *C. splendens* males in heterospecific reproductive interactions between the study species. Especially territorial males seem to be prone to hybridization, and the prevalence of hybridization is increased with a high availability of *C. virgo* females. Hybridization seems to be costly because there was high discordance between heterospecific mating frequency and observed numbers of hybrids. However, heterospecific courtship did not reduce conspecific mating success. The results also show that *C. splendens* males are able to adjust their level of heterospecific courtship according to the competitive environment as well as to the ART it follows. My thesis is a step towards understanding the causes of species reproductive interactions in wild populations." (Author)] Address: Keränen, I., Department of Biol. & Environmental Science, University of Jyväskylä, Jyväskylä, Finland. E-mail: inka.m.keranen@jyu.fi

**14918.** Kietzka, G.J.; Pryke, J.S.; Samways, M.J. (2015): Landscape ecological networks are successful in supporting a diverse dragonfly assemblage. *Insect Conservation and Diversity* 8(3): 229-237. (in English) [(1.) Ecological networks (ENs) are able to mitigate the negative effects of commercial forestry on terrestrial biodiversity, yet this remains untested for the aquatic fauna. Understanding the anthropogenic and natural variables that drive dragonfly diversity at the landscape and habitat scales, allows the design and implementation of ENs that minimise biodiversity loss across production landscapes. (2.) Here, we determine the relative contribution of anthropogenic disturbances and natural environmental variables to dragonfly assemblages within ENs. Sixty sites, of various freshwater body types, were sampled for adult dragonflies across ENs in a commercial forestry landscape. (3.) Overall, species richness was significantly influenced by river width, water turbidity, water depth and the presence of invasive plants. Nevertheless, overall species composition was influenced by water body type, flow rate and substrate type. Further differences were found when analyses were conducted separately for Anisoptera and Zygoptera. (4.) Counter-intuitively, anthropogenic disturbances had less effect on dragonfly species richness and composition than did natural environmental variables, emphasising the importance of conserving natural heterogeneity. Overall, dragonfly diversity can be successfully conserved in ENs

provided that conservation planning incorporates appropriate local scale variables. These results also suggest that impacts on water quality and dragonfly diversity are minimised by well-designed ENs within this production landscape." (Authors)] Address: Kietzka, Gabriella, Department of Conservation Ecology and Entomology, Stellenbosch University, Matieland, South Africa

**14919.** Kiran, C.G.; Kalesh, S.; Krushnamegh Kunte (2015): A new species of damselfly, *Protosticta ponmudiensis* (Odonata: Zygoptera: Platystictidae) from Ponmudi Hills in the Western Ghats of India. *Journal of Threatened Taxa* 7(5): 7146-7151. (in English) ["The genus *Protosticta* Selys, 1885 has 10 species reported from the Indian region, of which seven are known from the Western Ghats. Here we report a new species, *Protosticta ponmudiensis* from the Ponmudi Hills, Thiruvananthapuram District, Kerala, in the Agasthyamalai region of the southern Western Ghats. The species is distinguished from other *Protosticta* based on its large size, bright green eyes, the broad dorsal stripe on the base of segment 7, and very distinct anal appendages." (Authors)] Address: Kiran, C.G., Travancore Natural History Society, MBRRA-65, Jyothis, Mathrubhumi Rd, Vanchiyoor, Thiruvananthapuram, Kerala 695035, India. E-mail: cgkiran@gmail.com

**14920.** Koch, K. (2015): Influence of temperature and photoperiod on embryonic development in the dragonfly *Sympetrum striolatum* (Odonata: Libellulidae). *Physiological Entomology* 40(1): 90-101. (in English) ["Temperature and photoperiod play major roles in insect ecology. Many insect species have fixed degree-days for embryogenesis, with minimum and maximum temperature thresholds for egg and larval development and hatching. Often, photoperiodic changes trigger the transfer into the next life-cycle stadium. However, it is not known whether this distinct pattern also exist in a species with a high level of phenotypic plasticity in life-history traits. In the present study, eggs of *S. striolatum* are reared under different constant and fluctuating temperatures and photoperiodic conditions in several laboratory and field experiments. In general, and as expected, higher temperatures cause faster egg development. However, no general temperature or light-days for eyespot development and hatching are found. The minimum temperature thresholds are distinguished for survival (2°C), embryogenesis (6°C) and larval hatching (above 6°C). Low winter temperatures synchronize hatching. Above 36°C, no eyespots are visible and no larvae hatch. In laboratory experiments, light is neither necessary for eyespot development, nor for hatching. By contrast to the laboratory experiments, the field experiment show that naturally changing temperature and photoperiod play a significant role in the seasonal regulation of embryonic development. The post-eyespot development is more variable and influenced by temperature and photoperiod than the pre-eyespot development. This developmental plasticity at the end of the embryogenesis might be a general

pattern in the Libellulidae, helping them to cope with variation in environmental conditions." (Author)] Address: Koch, Kamilla, Dept of Ecology, Johannes Gutenberg-University Mainz, Becherweg 13, 55128 Mainz, Germany. E-mail: kochka@uni-mainz.de

**14921.** Koike, M.; Kamoshita, A.; Komatsuda, Y.; Sato, H.; Naganuma, M.; Takatsuto, S. (2015): Development of a new teaching tool aided by ICT for pupils to form a basic concept of insect morphology. *Journal of Science Education in Japan* 39(1): 19-31. (in Japanese, with English summary) ["In this study a new teaching tool aided by ICT was developed for pupils to form a basic concept of insect morphology in elementary school. This tool consists of eighteen panels of heads, thoraxes and abdomens for six kinds of insects (dragonfly, butterfly, fly, honeybee, cicada, mosquito), which are familiar drawings shown in third-grade science textbooks in elementary school. Like a slot machine, three drawings of the head, thorax and abdomen of a given insect must be put together on a PC. This tool was tested for third grade pupils (experimental group) in science class of a public elementary school. Pupils of the same grade (control group) took a conventional lesson in science class. Analyses of answers from questionnaires administered to pupils of both groups showed the following three points: 1) Pupils of the experimental group had much better understanding of the insect morphology when compared with those of the control group. 2) Our teaching tool promoted the learning motivation of the pupils. 3) Pupils of the experimental group pointed out both personal learning and repeated learning as reasons for their better understanding of the learning content in science class. It is thus suggested that our teaching tool is useful for pupils to form a basic concept of insect morphology in elementary school." (Authors)] Address: Koike, M., Faculty of Child Science & Education, Teikyo University of Science, Japan. E-mail: m-koike@ntu.ac.jp

**14922.** Kosterin, O.E. (2015): *Risiphlebia guentheri* sp. nov. (Odonata, Libellulidae) from southeastern Indochina. *Zootaxa* 3964(1): 138-145. (in English) ["*Risiphlebia guentheri* sp. nov. (holotype: Cambodia, Mondul-kiri Province, Dak Dam village environs, a tall grass forest swamp, 12°25' N 107°19' E, ~780 m a.s.l., 16 June 2014, RMNH), the second species in its genus, is described from Central Plateau of the Annamese Mountains. The new species is most probably separated from *R. dohrni* by a 1000-km gap of the range of the genus in Thailand and most of Cambodia." (Authors)] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

**14923.** Kosterin, O.E. (2015): Taxonomical notes on *Indolestes Fraser, 1922* (Lestidae, Zygoptera). 1. *Indolestes gracilis expressor* ssp. nov. from eastern Cambodia. *International Dragonfly Fund Report* 81: 1-11. (in English) ["*Indolestes gracilis expressor* ssp. nov. is described by

a male from Cambodia, Mondul-kiri Province, the river upstream of Buu Sraa Waterfall 12°34' N 107°25' E. Another male presumably belonging to this subspecies was illustrated from southern Laos in literature. The new subspecies is characterised by more inflated apical part of the cercus than in earlier known subspecies and is thought to range in plateaux of eastern Cambodia and southern Laos, although very rare." (Author)] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev Ave. 10, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

**14924.** Kosterin, O.E.; Poggi, R. (2015): Taxonomical notes on *Indolestes Fraser, 1922* (Lestidae, Zygoptera). 2. *Indolestes birmanus* (Selys, 1891) is bona species. *International Dragonfly Fund Report* 81: 13-20. (in English) ["The holotype of *Lestes birmana* Selys, 1891 (currently *Indolestes birmanus* (Selys, 1891)), housed in Museo Civico di Storia Naturale di Genova, is examined and depicted for the first time. Its cerci are not attenuated apically, hence this taxon cannot be a subspecies of *Indolestes gracilis* (Hagen in Selys, 1862)." (Authors)] Address: Poggi, R., Museo Civico di Storia Naturale 'Giacomino Doria', Via Brigata Liguria 9, 16121 Genova, Italy. E-mail: rpoggi@comune.genova.it

**14925.** Kulkarni, M.R.; Padhye, S.; Vanjare, A.I.; Jakhalekar, S.S.; Shinde, Y.S.; Paripatyadar, S.V.; Sheth, S.D.; Kulkarni, S.; Phuge, S.K.; Bhakare, K. Kulkarni, K.; Pai, K.; Ghate, H.V. (2015): Documenting the fauna of a small temporary pond from Pune, Maharashtra, India. *Journal of Threatened Taxa* 7(6): 7196-7210. (in English) ["Most of the limnological studies in India have focussed on a few taxa of large, permanent water bodies, and pond ecosystems, and related temporary water bodies are neglected. We present here a faunal inventory, with representative photographs, for a single, small temporary pond, reporting over 125 species of strictly aquatic fauna and 25 species of associated fauna, even though we did not identify some groups such as Protozoa, Diptera and nymphs of Odonata, etc. The identified species belong to seven taxa of vertebrates and invertebrates together. Arthropoda and Rotifera were the most species rich groups, observed with 83 and 45 representatives, respectively. Coleoptera were the most numerous in terms of species number. Such a small water body holds some endemics as well as otherwise very rare animals and so deserves better attention. We also highlight the potential and importance of such habitats for research and conservation." (Authors). 12 Odonata species are listed.] Address: Ghate, H.V., Dept of Zoology, Modern College, Shivajinagar, Pune, Maharashtra 411005, India. E-mail: hemantghate@gmail.com

**14926.** Lakew, A.; Moog, O. (2015): A multimetric index based on benthic macroinvertebrates for assessing the ecological status of streams and rivers in central and southeast highlands of Ethiopia. *Hydrobiologia* 751: 229-242. (in English) ["This study presents the development of



a multimetric index using benthic macroinvertebrates (BMI) to assess the ecological health of highland rivers in Ethiopia. BMI were collected from 22 reference and 82 impaired sites determined based on hydro-morphological, land use, and physical and chemical criteria. Of 75 potential metrics tested to integrate the multimetric index, only nine core metrics were selected based on their abilities to distinguish reference and impaired sites, strength of correlation with pertinent environmental parameters, and their independence from other metrics. The metrics retained in the multimetric index were total number of taxa, EPT-BH > 1sp (Ephemeroptera, Plecoptera, and Trichoptera taxa where Baetidae and Hydropsychidae taxa are considered if they consist more than one taxon), % Oligochaeta and Red Chironomidae, % COPTE (Coleoptera, Odonata, Plecoptera, Trichoptera, and Ephemeroptera), % EPT-BCH (EPT without Baetidae, Caenidae, and Hydropsychidae), ASPT-SASS (Average South African Scoring System Per Taxa), FBI (Family Biotic Index), % shredders, and % collector gathering. The final index derived from these metrics was divided into five river quality class (high, good, moderate, poor, and bad). A validation procedure showed that the index is stable along different hydrological conditions and sensitive to the current range of anthropogenic disturbances in Ethiopian highland rivers." (Authors)] Address: Lakew, A., National Fishery & Aquatic Life Research Centre, Ethiopian Inst. of Agricultural Research (EIAR), P. O. Box 64, Sebeta, Ethiopia. aschalewlh@yahoo.com

**14927.** Le Rouzic, A.; Hansen, T.F.; Gosden, T.P.; Svensson, E.I. (2015): Evolutionary time-series analysis reveals the signature of frequency-dependent selection on a female mating polymorphism. *The American Naturalist* 185(6): E182-E196. (in English) ["A major challenge in evolutionary biology is understanding how stochastic and deterministic factors interact and influence macroevolutionary dynamics in natural populations. One classical approach is to record frequency changes of heritable and visible genetic polymorphisms over multiple generations. Here, we combined this approach with a maximum likelihood-based population-genetic model with the aim of understanding and quantifying the evolutionary processes operating on a female mating polymorphism in the blue-tailed damselfly *Ischnura elegans*. Previous studies on this colour polymorphic species have suggested that males form a search image for females, which leads to excessive mating harassment of common female morphs. We analyzed a large temporally and spatially replicated data set of between-generation morph frequency changes in *I. elegans*. Morph frequencies were more stable than expected from genetic drift alone, suggesting the presence of selection toward a stable equilibrium that prevents local loss or fixation of morphs. This can be interpreted as the signature of negative frequency-dependent selection maintaining the phenotypic stasis and genetic diversity in these populations. Our novel analytical approach allows the estimation of the strength of frequency-dependent selection from the morph frequency fluctuations around their

inferred long-term equilibria. This approach can be extended and applied to other polymorphic organisms for which time-series data across multiple generations are available." (Authors)] Address: Le Rouzic, A., Laboratoire Évolution, Génomes, et Spéciation, CNRS-LEGS-UPR9034, CNRS-Institut Diversité, Écologie, et Évolution du Vivant-FR3284, Université Paris-Sud, Avenue de la Terrasse, Bâtiment 13, 91198 Gif-sur-Yvette, France. E-mail: lerouzic@legs.cnrs-gif.fr.

**14928.** Leur, L. van (2015): Observation of a Bog Hawker (*Aeshna subarctica*) in the Kampina nature reserve (The Netherlands). *Brachytron* 17(1): 24-25. (in Dutch, with English summary) ["On August 28, 2013 *A. subarctica* was photographed during a search for *A. juncea* at the Zandberg Fens in the Kampina nature reserve (the Netherlands). The only other record of this species in the southern Dutch province of Noord-Brabant dates back to 1925. It is not unlikely that there be undiscovered populations of Bog Hawkers. Therefore a search for this species near fens with Sphagnum vegetation in the months August-September is recommended." (Author)] Address: Leux, Lex van, Hinthamerstraat 146-a, 5211 MT 's-Hertogenbosch, The Netherlands

**14929.** Lojewski, J.A.; Switzer, P.V. (2015): The role of landmarks in territory maintenance by the black saddlebags dragonfly, *Tamea lacerata*. *Behavioral Ecology and Sociobiology* 69(3): 347-355. (in English) ["Territoriality can reduce competition for resources, but territorial defense can be costly; therefore, any behaviour that reduces territorial costs may increase the net benefit of territoriality. Some species will align their territory boundaries with conspicuous landmarks that may serve to reduce defense costs. Dragonflies, including *T. lacerata*, defend territories at breeding sites, keeping rival males away to allow themselves access to females. We used three treatments to investigate whether *T. lacerata* used landmarks: constraining landmarks (an object that provided a physical barrier to flight), non-constraining landmarks (an object of the same dimensions and construction that did not impede flight), and a control without landmarks. We observed patrolling male black saddlebags and recorded the locations of turns at their territory boundary and interactions with other dragonflies. When either type of landmark was present, individuals placed their boundary at the landmark far more often than any other location. In addition, individuals that used landmarks had a significantly narrower range of turn locations than those that did not. Unlike other studies, the use of a landmark did not seem to reduce defense costs, and interestingly not all individuals used landmarks when they were provided. We hypothesize that in this species, landmarks may only reduce costs during territory establishment, rather than during territory maintenance. Alternatively, landmarks may serve as part of a spatial reference system that aids male dragonflies in efficiently searching for females, and thus may be more important in increasing benefits rather than decreasing the costs of ter-

itoriality." (Authors)] Address: Switzer, P.V., Dept Biol. Sciences, Eastern Illinois Univ., Charleston, IL, 61920, USA. E-mail: pvswitzer@eiu.edu

**14930.** Mahdjoub, H.; Khelifa, R.; Zebba, R.; Bouslama, Z.; Houhamdi, M. (2015): Bivoltinism in *Coenagrion mercuriale* (Zygoptera: Odonata) in the southern margin of its distribution range: emergence pattern and larval growth. *African Entomology* 23(1): 59-67. (in English) ["Voltinism is an important life history trait that varies with the environment. In temperate zones, insect populations take a substantially longer time to reach the adult stage in the northern compared to the southern regions. In this study, emergence pattern and larval growth of the threatened *C. mercuriale* were investigated in a population located in the southern limit of its distribution range in order to determine its life history strategies in a hot climate and compare them to those displayed in northern populations. There was no apparent winter diapause. The species produced two generations in a year, with the first generation emerging in mid spring and the second in late summer. The emergence pattern of the first generation was typical of a summer species and lasted 48 days. All larvae emerged by the end of May. Due to some environmental perturbations, the emergence pattern of the second generation was not surveyed, but there was evidence that the emergence season was short (21 days). Larval structure prior to the second emergence of the year showed that only 25% of the population was in the final instar, which explains the shorter emergence season. We assume that the first eggs laid in the spring hatch and grow rapidly to reach the final instar in late summer as a consequence of higher temperatures and potential high food availability. There was a significant seasonal decline in body size in both males and females. The second generation had a significantly smaller body size, presumably due to the short growth season and/or higher growth rate." (Authors)] Address: Khelifa, R., Lab. Ecol. of Terrestrial & Aquatic Systems, Fac. of Sciences, Dept Biol., Badji Mokhtar Univ., Annaba 23000, Algeria. E-mail: rassimkhelifa@gmail.com

**14931.** Mäkinen, J. (2015): Tundrakiiltokorento (*Somatochlora sahlbergi*) Kilpisjärvellä. *Crenata* 8: 14-17. (in Finnish, with English summary) ["*S. sahlbergi* is one of the rarest dragonfly species in the Europe. Only a few breeding localities are known from Finland, Sweden and Norway. This article describes a new breeding locality from Finland. In summer 2014 a total of 36 exuviae, two adult males and one female were found from four adjacent lakes in Laasavaara, a fjell close to the Lake Kilpisjärvi in the municipality of Enontekiö." (Author) 68.93157418 20.93276232 (WGS84), 620 m asl; 68.93379619 20.93345142 (WGS84), 645 m.asl.] Address: Mäkinen, J., Metsänhoitajankatu 12 B 16, FI-00790 Helsinki, Finland. E-mail: makisenjussi@gmail.com

**14932.** Márquez-Rodríguez, J.; Vega-Maqueda, M.A.; Ramos-Terrón, S.; Feria-Zamorano, C.; Ferreras-Romero, M. (2015): Nuevos datos sobre la distribución de

*Orthetrum trinacria* (Selys, 1841) (Odonata: Libellulidae) en el sur de la Península Ibérica. *Arquivos entomológicos* 13: 325-327. (in Spanish, with English summary) [New data on the distribution of *O. trinacria* in the southern Iberian Peninsula are reported, being proved the reproduction of this species in Andalusia by the finding of an exuvia and teneral adults.] Address: Márquez-Rodríguez, J., Departamento de Sistemas Físicos, Químicos y Naturales, Universidad Pablo de Olavide, de Sevilla. A-376 km 1. E-41013 Sevilla, Spain. E-mail: jmarrod1@upo.es

**14933.** Mastrantuono, L.; Pilotto, F.; Rossopinti, A.; Bazzanti, M.; Solimini, A.G. (2015): Response of littoral macroinvertebrates to morphological disturbances in Mediterranean lakes: the case of Lake Piediluco (central Italy). *Fundamental and Applied Limnology / Archiv für Hydrobiologie* 186(4): 297-310. (in English) ["The assessment of the impacts of human morphological alterations on lake ecological condition based on littoral benthic fauna is still in its infancy, especially in the Mediterranean area of Europe. Lake Piediluco is a riverine lake, sited in Central Italy, whose water level is strictly regulated for hydroelectric reasons and hence can be classified as a Heavily Modified Water Body (HMWB) according to the E.U. Water Framework Directive (WFD). Here, we aim at comparing the invertebrate assemblages among sites with a different degree of morphological alterations by identifying potential indicator species and metrics sensitive to morphological alterations, and by comparing the fauna composition collected using two sampling procedures (composite vs habitat-specific samples) with different processing times. Our results show that the invertebrate assemblages of Lake Piediluco differed according to the three types of shoreline alteration (natural, soft- and hard-altered sites) and this was more evident when we analyzed the habitat-specific samples. Several taxa, diversity and metrics based on the number of Ephemeroptera, Trichoptera, Odonata and Mollusca taxa (ETO and ETOM) are found to be sensitive to shoreline alterations and are candidates for inclusion in assessment metrics for WDF compliant monitoring of the ecological status of this lake. While habitat-specific sampling provided a more detailed picture of the assemblages, composite samples provided consistent results and could be used when processing cost is an issue." (Authors) Several odonate taxa are used to measure impacts.] Address: Mastrantuono, Luciana, Dept. of Environmental Biology, Sapienza University of Rome. Piazzale Aldo Moro 5. 00185 Roma. Italy. E-mail: luciana.mastrantuono@uniroma1.it

**14934.** McCauley, S.; Hammond, J.I.; Frances, D.N.; Mabry, K.E. (2015): Effects of experimental warming on survival, phenology, and morphology of an aquatic insect (Odonata). *Ecological Entomology* 40(3): 211-220. (in English) ["(1.) Organisms can respond to changing climatic conditions in multiple ways including changes in phenology, body size or morphology, and range shifts. Understanding how developmental temperatures affect

insect life-history timing and morphology is crucial because body size and morphology affect multiple aspects of life history, including dispersal ability, whereas phenology can shape population performance and community interactions. (2.) It was experimentally assessed how developmental temperatures experienced by aquatic larvae affected survival, phenology, and adult morphology of dragonflies [*Pachydiplax longipennis* (Burmeister)]. Larvae were reared under three environmental temperatures: ambient, +2.5, and +5°C, corresponding to temperature projections for our study area 50 and 100 years in the future, respectively. Experimental temperature treatments tracked naturally-occurring variation. (3.) Clear effects of temperature were found in the rearing environment on survival and phenology: dragonflies reared at the highest temperatures had the lowest survival rates and emerged from the larval stage approximately 3 weeks earlier than animals reared at ambient temperatures. There was no effect of rearing temperature on overall body size. Although neither the relative wing nor thorax size was affected by warming, a non-significant trend towards an interaction between sex and warming in relative thorax size suggests that males may be more sensitive to warming than females, a pattern that should be investigated further. (4.) Warming strongly affected survival in the larval stage and the phenology of adult emergence. Understanding how warming in the developmental environment affects later life-history stages is critical to interpreting the consequences of warming for organismal performance." (Authors)] Address: McCauley, S.J., Department of Biology, Univ. of Toronto Mississauga, 3359 N. Mississauga Rd., Mississauga, ON L5L 1C6, Canada. E-mail: shannon.mccauley@utoronto.ca

**14935.** Mendes, T.P.; Cabette, H.S.R.; Juen, L. (2015): Setting boundaries: Environmental and spatial effects on Odonata larvae distribution (Insecta). *Anais da Academia Brasileira de Ciências* 87(1): 239-248. (in English, with Portuguese summary) ["Environmental characteristics and spatial distances between sites have been used to explain species distribution in the environment, through Neutral (space) and Niche theory (environment) predictions. We evaluated the effects of spatial and environmental factors on Odonata larvae distribution along the Suiá-Missú River Basin, state of Mato Grosso. We tested the hypotheses that (1) the environment is the main factor structuring the community due to its ecophysiological requirements; and (2) the pattern, if present, is clearer for Zygoptera. Samples were made in 12 sites on the Suiá-Missú River Basin in three seasons (2007/2008), with a total of 1.382 Odonata larvae, comprising 10 families, 51 genera and 100 morphospecies. The Anisoptera were more abundant than Zygoptera, comprising 81% of all specimens. The environment affected Zygoptera ( $R=0.291$ ;  $p=0.007$ ) and was the main factor structuring the assembly. Thus, Niche theory was confirmed. The absence of this effect on Anisoptera may be due to the ecophysiological adaptations that enable it

to occupy different habitats. Zygoptera larvae are indicators of changes in habitat structure. The effects of environmental variables on larvae ecology emphasize the strong relationship between these organisms and environmental integrity." (Authors)] Address: Mendes, T.P., Programa de Pós-graduação em Ecologia Aquática e Pesca, Instituto de Ciências Biológicas, Universidade Federal do Pará, Rua Augusto Correia, 1, Bairro Guamá, 66075-110 Belém, PA, Brazil

**14936.** Mihalicz, J.E. (2015): An observation of the overwintering aquatic insects in a Prairie pond in Saskatchewan, Canada. *University of Saskatchewan Undergraduate Research* 1(2): 99-105. (in English) ["In temperate regions freshwater insects annually face the challenge of surviving the winter months or otherwise perishing. Ice formation presents a substantial danger to all life stages, from the eggs to adults. Accordingly, some species have adapted to overwinter within ice and emerge during the spring thaw. The diversity of aquatic species encased in the ice and frozen sediment of a prairie pond in Saskatchewan, Canada and their survival rate upon thawing was assessed in the winter of 2013. A total of 164 specimens were retrieved from the ice and sediment, 73 of which survived after thawing. Survival rate was greatest for *Cymatia americana* (Corixidae, Hemiptera) at 79.6%. Corixids were found in distinct clusters encased in pond ice, a phenomenon not well documented in previous literature. A higher rate of survival was expected among the chironomids, although the value falls within ranges observed in previous studies. Additionally, members of other taxa including Notonectidae (Hemiptera), Haliplidae (Coleoptera), Ceratopogonidae (Diptera), and Coenagrionidae (Odonata) were recovered; however, these specimens exhibited much lower rates of survival. ... All damselfly naiads were found deep within the ice, near the bottom of the sample approximately 24 cm from the surface. These were identified as two possible genera (*Enallagma* and *Coenagrion*) but similarities between them made exact identification difficult." (Author)] Address: Mihalicz, J.E., Department of Biology, College of Arts and Science, University of Saskatchewan, Saskatoon, SK, Canada. E-mail: jem539@mail.usask.ca

**14937.** Mikolajewski, D.J.; De Block, M.; Stoks, R. (2015): The interplay of adult and larval time constraints shape species differences in larval life history. *Ecology* 96(4): 1128-1138. (in English) ["In animals with a complex life cycle, larval life history plasticity is likely shaped by the interplay of selective factors in both larval and adult stages. A wide interspecific variation in responses to larval time constraints imposed by seasonality has been documented. Few studies have addressed differences among closely related species in the evolutionary trajectories of age and size at metamorphosis and their link with larval growth rate under time constraints. None have considered how species-specific length of the reproductive season affects larval developmental responses to time constraints. We tested *Coenagrion hastulatum*, *C. mercuriale*, *C. ornatum*,



and *C. puella*, whether species with a longer reproductive season, facing a smaller threat of missing out on reproduction, react less to larval time constraints and pre-winter food shortage by accelerating development rate and growth rate, and therefore pay less physiological costs. All species increased development and growth rates under larval time constraints. The magnitude of this increase negatively correlated across species with the length of the reproductive period. Under larval time constraints, only the species exhibiting the longest reproductive season suffered a delayed emergence and a reduced investment in energy storage, yet it also showed an increased immune function. Under a longer reproductive season, evolution may favour compensation for larval constraints after metamorphosis. Growth rate was accelerated after pre-winter food shortage to same extent across species; also effects on age and mass at emergence did not differ among species. Time constraints associated with the length of the reproductive season may predictably contribute to species differences in their response to time constraints imposed in the larval stage. Our study adds empirical proof that the interplay of selective factors in the larval and adult stage may determine life history plasticity with regards to larval time constraints." (Authors)] Address: Mikolajewski, D.J., Freie Universität Berlin, Institut für Biologie, Germany. E-mail: d.mikolajewski@gmx.de

**14938.** Mlynarek, J.J.; Iserbyt, A.; Nagel, L.; Forbes, M.R. (2015): Differential water mite parasitism, phenoloxidase activity, and resistance to mites are unrelated across pairs of related damselfly species. *PLoS ONE* 10(2): e0115539. doi:10.1371/journal.pone.0115539: 13 pp. (in English) ["Related host species often demonstrate differences in prevalence and/or intensity of infection by particular parasite species, as well as different levels of resistance to those parasites. The mechanisms underlying this interspecific variation in parasitism and resistance expression are not well understood. Surprisingly, few researchers have assessed relations between actual levels of parasitism and resistance to parasites seen in nature across multiple host species. The main goal of this study was to determine whether interspecific variation in resistance against ectoparasitic larval water mites either was predictive of interspecific variation in parasitism for ten closely related species of damselflies (grouped into five "species pairs"), or was predicted by interspecific variation in a commonly used measure of innate immunity (total Phenoloxidase or potential PO activity). Two of five species pairs had interspecific differences in proportions of individuals resisting larval *Arrenurus* water mites, only one of five species pairs had species differences in prevalence of larval *Arrenurus* water mites, and another two of five species pairs showed species differences in mean PO activity. Within the two species pairs where species differed in proportion of individuals resisting mites the species with the higher proportion did not have correspondingly higher PO activity levels. Furthermore, the proportion of individuals resisting mites mirrored prevalence of parasitism in only one

species pair. There was no interspecific variation in median intensity of mite infestation within any species pair. We conclude that a species' relative ability to resist particular parasites does not explain interspecific variation in parasitism within species pairs and that neither resistance nor parasitism is reflected by interspecific variation in total PO or potential PO activity." (Authors)] Address: Mlynarek, Julia, Biology Dept, Carleton Univ., Ottawa, ON, Canada. E-mail: Julia.mlynarek@carleton.ca

**14939.** Modak, B.K. (2015): Cephaline gregarines of Purulia district, West Bengal, India. *Proc. Zool. Soc.* 68(1): 20-29. (in English) ["On way of survey in the Jhalda block of Purulia district, altogether 44 insect species belonging to 3 orders have been examined. of these 14 species of insects have been found with cephaline gregarine infection. It is revealed that, most of the recorded cephaline gregarine parasites belonged to Gregarina, Hirmocystis, Stylocephalus, Quadruspinospora, Phleobum, Retractocephalus, Odonaticola, Pileocephalus, Steinina and Laterospora genera. Though infestation is species specific, occurrence of two species of gregarines in the same host at the same time is well documented." (Authors) Ten Odonata species are checklisted as host of cephaline gregarines and regionally occurring. Special emphasis is given to *Bradinopyga geminata* and *Pantala flavescens* as host of the genus *Odonaticola*.] Address: Modak, B.K., Department of Zoology, Sidho-Kanho-Birsha University, Purulia District, Purulia 723101, West Bengal, India. E-mail: bkmodak09@gmail.com

**14940.** Mossman, H.L.; Panter, C.J.; Dolman, P.M. (2015): Modelling biodiversity distribution in agricultural landscapes to support ecological network planning. *Landscape and Urban Planning* 141: 59-67. (in English) ["Highlights: • We used ad-hoc biological data to model landscape-scale wetland species richness. • Models were used to assess and improve a proposed ecological connectivity network. • Our evidence-based network was shorter and connected areas of higher richness. • Our results challenge previous assumptions of important network elements. • Odonata were poor proxies for other groups of wetland species. Strategic approaches to biodiversity conservation increasingly emphasise the restoration of ecological connectivity at landscape scales. However, understanding where these connecting elements should be placed in the landscape is critical if they are to provide both value for money and for biodiversity. For such planning to be effective, it is necessary to have information of the distributions of multiple taxa, however, this is of poor quality for many taxa. We show that sparse, non-systematically collected biological records can be modelled using readily available environmental variables to meaningfully predict potential biodiversity richness, including rare and threatened species, across a landscape. Using a large database of ad-hoc biological records (50 501 records of 502 species) we modelled the richness of wetland biodiversity across the Fens, a formerly extensive wetland, now agricultural landscape in

eastern England. We used these models to predict those parts of the agricultural ditch network of greatest potential conservation value and compared this to current strategic network planning. Odonata distribution differed to that of other groups, indicating that single taxon groups may not be effective proxies for other priority biodiversity. Our results challenged previous assumptions that river channels should comprise the main connecting elements in the Fens region. Rather, areas of high ditch density close to a main river are likely to be of greater value and should be targeted for enhancement. This approach can be adopted elsewhere in order to improve the evidence-base for strategic networks plans, increasing their value for money." (Authors)] Address: Mossman, Hannah, Division of Biology and Conservation Ecology, School of Science and the Environment, Manchester Metropolitan University, Chester St, Manchester, M1 5GD, UK. E-mail: h.mossman@mmu.ac.uk

**14941.** Mutlu, O.; Ulak, G.; Kokturk, S.; Celikyurt, I.K.; Akar, F.; Erden, F. (2015): Effects of homeopathic Anax imperator on behavioural and pain models in mice. *Homeopathy* 104(1): 15-23. (in English) ["Background: Homeopathy is a medical theory and practice that asserts that disease can be cured by remedies that produce symptoms in a healthy person similar to those suffered by a patient with a malady. Methods: The aim of this study was to investigate effects of homeopathic Anax imperator (dragonfly) (Anax-i 30c and Anax-i 200c) in the forced swim test (FST), elevated plus-maze (EPM) test, hot plate (HP) test and open field test and examined NPY1 receptor expression, in naive mice. Results: In the FST, treatment with Anax-i 30c or Anax-i 200c significantly diminished immobility time while in EPM test, Anax-i 200c increased the percentage of time spent in open arms as well as the percentage of open arm/total arms. In the HP test, Anax-i 30c or Anax-i 200c decreased the total time mice spent licking their hind paws while in open field test, treatment with Anax-i 200c increased the total distance and speed mice travelled compared to the control group. Three weeks of daily injections with Anax-i 30c or Anax-i 200c caused significant weight loss in mice. Anax-i 30c or Anax-i 200c treatment significantly decreased NPY1 receptor expression, and Anax-i 30c also decreased NPY2 receptor expression. Conclusion: These results suggest that the homeopathic Anax-i exerts antidepressant, anxiolytic and analgesic-like effects and causes hyperlocomotion and weight loss." (Authors)] Address: Mutlu, O., Department of Pharmacology, Faculty of Medicine, Kocaeli University, 41380 Kocaeli, Turkey. E-mail: oguzmutlu80@hotmail.com.

**14942.** Mutonkole Senga, P.; Tshitenge Mbuebue, J.-M.; Masamba, Lulendo, N. (2015): Benthic macroinvertebrates as indicators of water quality: A case-study of urban Funa stream (in Kinshasa, Democratic Republic of Congo). *Open Journal of Water Pollution and Treatment* 2(1): 8-24. (in English) ["Macroinvertebrates ability to indicate various types of anthropogenic stressors is widely

recognized as an integral component of freshwater bio-monitoring. In case of pollution, biodiversity of the aquatic community can be affected and the species composition changes from natural species to tolerant species. In this study, macroinvertebrates were sampled using Surber sampler at 5 locations from October 2007 to September 2008 to determine the environmental quality of Funa water body and to analyze fauna structure assemblages. Water physical chemical data were explored using multivariate analysis of Canonical Component to detect environmental trends. Ten biodiversity indices: specific richness S, abundance A, Shannon-Weiner diversity H', maximum diversity Hmax, evenness J', McNaughton ID, Redundancy R, Capacit'e Biogenique Secondaire (Cb2), Indice Biologique Global Normalis'e (IBGN) and Biologic Monitoring Working Party (BMWP) were used for biological assessment of water quality. Forty-seven species were collected from 3624 specimen dominated by Odonata, Achaeta and Diptera. Four taxa displayed higher relative abundances: Glossiphonidae (20 %), Chironomidae (9 %), Lumbriculidae (9 %) and Hirudidae (8 %). DIMO model splits up sites into two groups in function of H', Hmax, and J'. In addition, rank-frequency diagrams characterized stage 1 and middle between stages 1 and 2 structured curves. In overall, indices showed low values, which expressed the inhospitable character of habitat structure. However, BMWP and IBGN scores of water quality worsened from upstream to downstream." (Authors)] Address: Mutonkole Senga, P., Dept of environment, Univ. of Kinshasa, Democratic Republic of Congo. E-mail: patrick.mutonkole@gmail.com

**14943.** Nair, M.V.; Subramanian, K.A. (2015): A new species of *Agriocnemis* Selys, 1869 (Zygoptera: Coenagrionidae) from eastern India with description of *Agriocnemis keralensis* Peters, 1981. *Rec. zool. Survey. India* 114(4) (2014): 669-679. (in English) [*Agriocnemis kalinga* sp. nov. "is described from Odisha and the status of *Agriocnemis keralensis* Peters, 1981 is discussed. Based on recent field studies, *A. keralensis* is redescribed. A revised key to *Agriocnemis* of India is also provided." (Authors)] Address: Nair, M.J., Nandankanan Zoological Park, Barang-754005, Odisha, India. E-mail: manojnair74@gmail.com

**14944.** Naka, H.; Hashimoto, H. (2015): Effects of deformation and vibration characteristics of wings on flapping flight. *Mechanical Engineering Journal* 2(1) paper no. 14-00262: 11 pp. (in English) ["The dragonfly wing is passively deformed under flapping and has the strength to withstand high flapping frequency simultaneously. These characteristics of deformation and vibration of the wing are important for flapping flight. However, the effect of these characteristics on flapping flight has not been well understood. The purpose of this study is to investigate deformation and vibration characteristics of the dragonfly wing, and then to develop an artificial wing suitable for flapping flight on the basis of the dragonfly wing. In this study, natural frequency and deformation of the dragonfly wing are measured, and the artificial wing is fabricated on the basis

of the results. From the measured results, the dragonfly wing has the high natural frequency of about 120 Hz, and thereby, it does not resonate with flapping. Although base-side of the wing is hardly deformed, the tip-side of the wing is greatly deformed because of the torsional deformation from the nodus of dragonfly wing. On the basis of characteristics of the dragonfly wing, the deformable artificial wing that can deform in the same manner of dragonfly wings was fabricated. Then, aerodynamic force and power consumption under flapping when using the deformable artificial wing was measured. As a result, the power efficiency of aerodynamic force using the deformable artificial wing is five times greater than the power efficiency using a non-deformable wing." (Authors)] Address: Naka, H., Graduate School of Engineering, Tokai University. E-mail: naka@fuji.tokai-u.jp

**14945.** Nakamura, K.; Takashima, K. (2015): Geographical variation in diapause development in eggs of *Symptetrum frequens* (Odonata: Libellulidae). *Applied Entomology and Zoology* 50: 263-270. (in English) ["Geographical differences causing variations in the egg period and the effects of environmental factors on diapause development were examined in *S. frequens*, a univoltine species with an obligatory egg diapause for overwintering. Eggs were obtained from females collected from 11 localities in Japan and incubated under six different combinations of photoperiod and temperature. No clear geographical trends were found in the average egg period under any experimental treatment. Average hatch period (i.e., period from the date when 10 % of the eggs were hatched to the date when 90 % of the eggs were hatched) did not display any geographical trend at 25 and 20 °C. However, at 15 °C, a significant negative correlation was observed between the hatch period and the latitude of the collection site. Similarly, a significant correlation was also detected between the coefficient of variation in the egg period and the average annual temperature near the collection site, but only at 15 °C. Because each egg batch was divided into six groups which were then incubated under different experimental conditions, it was possible to discern that the rate of diapause development at 15 °C varies among eggs from southern populations. The large variations in the egg period in the southern populations at 15 °C were considered to be a risk-spreading strategy: a certain proportion of the eggs were able to maintain diapause until winter, even if the adults laid the eggs early in the season. These differences in the rate of diapause development within a population may be an adaptation to the unpredictable length of the summer–autumn period." (Authors)] Address: Nakamura, K., Dept of Biosphere–Geosphere System Science, Fac. Informatics, Okayama Univ. Science, Okayama, 700-0005, Japan. E-mail: nakamura@big.ous.ac.jp

**14946.** Narzari, S.; Sarmah, J. (2015): A study on the prevalence of entomophagy among the Bodos of Assam. *Journal of Entomology and Zoology Studies* 3(2): 315-320. (in English) ["Entomophagy is a common practice

among rural and urban Bodos - a major tribe of Assam, India. A survey was conducted in the remote rural areas of Assam from June, 2013 to May, 2014. The insects collected from various habitats were preserved by following standard methods. An inventory on the knowledge on the wild edible insects of the Bodos of the studied areas is presented here. The study revealed that a total of 25 species of insects, belonging to eight orders and fourteen families are consumed as food by the Bodos. Out of them ten species belong to order Orthoptera, five to the Hymenoptera, three to Coleoptera, two each to Odonata and Hemiptera and one each to Araneae, Lepidoptera and Isoptera. The ethnozoological knowledge of this tribe ranges from edible to medicinal use. This study aims to make a comprehensive list of edible insects consumed by the Bodos of Assam." (Authors)] Address: Narzari, Silistina, Dept of Biotechnology, Bodoland Univ., Kokrajhar, -783 370, Assam, India

**14947.** Nixon, M.R.; Orr, A.G.; Vukusic, P. (2015): Wrinkles enhance the diffuse reflection from the dragonfly *Rhyothemis resplendens*. *J. R. Soc. Interface* 6 February 2015 vol. 12 no. 103 20140749: 7 pp. (in English) ["The dorsal surfaces of the hindwings of *Rhyothemis resplendens* reflect a deep blue from the multilayer structure in its wing membrane. The layers within this structure are not flat, but distinctly 'wrinkled', with a thickness of several hundred nanometres and interwrinkle crest distances of 5 µm and greater. A comparison between the backscattered light from *R. resplendens* and a similar, but un-'wrinkled' multilayer in *Matronoides cyaneipennis* shows that the angle over which incident light is backscattered is increased by the wrinkling in the *R. resplendens* structure. Whereas the reflection from the flat multilayer of *M. cyaneipennis* is effectively specular, the reflection from the wrinkled *R. resplendens* multilayer spans 1.47 steradians (equivalent to ±40° for all azimuthal angles). This property enhances the visibility of the static wing over a broader angle range than is normally associated with a smooth multilayer, thereby markedly increasing its conspicuousness." (Authors)] Address: Nixon, M.R., School of Physics, Univ. of Exeter, Exeter EX4 4QL, UK, E-mail: m.r.nixon@exeter.ac.uk

**14948.** Ohba, S. (2015): Odonates in an artificial pond in front of the Faculty of Education, Nagasaki University. *Bulletin of Faculty of Education, Nagasaki University* 1: 43-49. (in Japanese, with English summary) [Between April and October 2014, ten odonate species were found in and around an artificial near the Faculty of Education, Nagasaki University. Of these, *Ceriagrion nipponicum*, *Anaciaeschna martini*, *Anax nigrofasciatus*, and *Libellula quadrimaculata* are redlisted for the Nagasaki Prefecture Japan.] Address: Ohba, S., Biological Laboratory, Faculty of Education, Nagasaki University, Japan

**14949.** Orr, A.G.; Kalkman, V.J. (2015): *Nannophlebia leoboppi* sp. nov., a new dragonfly species from New Guinea (Odonata: Anisoptera: Libellulidae). *Zootaxa*



3964(3): 391-395. (in English) ["Nannophlebia leoboppi sp. nov. is described and figured based on a male specimen collected in the Star Mountains of Central New Guinea. This relatively large representative of its genus is compared with its probable nearest relative, *N. antiantha* Lieftinck, 1963, which is also partially figured. The new species brings the total number of *Nannophlebia* species to 25." (Authors)] Address: Orr, A.G., Environmental Futures Research Institute, Griffith University, Nathan, Qld 4111, Australia. E-mail: agorr@bigpond.com

**14950.** Ortiz, C.; Weiss-Penzias, P.S.; Fork, S.; Flegal, A.R. (2015): Total and monomethyl mercury in terrestrial arthropods from the central California coast. *Bulletin of Environmental Contamination and Toxicology* 94(4): 425-430. (in English) ["The aim of this project was to obtain a baseline understanding and investigate the concentration of mercury (Hg) in the tissue of terrestrial arthropods. The 4-month sampling campaign took place around Monterey Bay, California. Total mercury (HgT) concentrations ( $x \pm SD$ , dry weight) for the captured specimens ranged from 22 to 188 ng g<sup>-1</sup> in the Jerusalem crickets (Orthoptera: Stenopelmatidae); 65–233 ng g<sup>-1</sup> in the camel crickets (Orthoptera: Rhaphidophoridae); 25–227 ng g<sup>-1</sup> in the pill bugs (Isopoda: Armadillidiidae); 19–563 ng g<sup>-1</sup> in the ground beetles (Coleoptera: Carabidae); 140–441 ng g<sup>-1</sup> in *Sympetrum corruptum*; 607–657 ng g<sup>-1</sup> in *Cordulegaster dorsalis*; and 81–1,249 ng g<sup>-1</sup> in the wolf spiders (Araneae: Lycosidae). A subset of samples analyzed for monomethyl mercury (MMHg) suggest detrital pill bugs have a higher MMHg/HgT ratio than predatory ground beetles." (Authors)] Address: Cruz Ortiz Jr., C., Institute of Marine Science, University of California - Santa Cruz, 1156 High Street, Santa Cruz, CA, 95064, USA

**14951.** Outomuro, D.; Johansson, F. (2015): Bird predation selects for wing shape and coloration in a damselfly. *Journal of Evolutionary Biology* 28(4): 791-788. (in English) ["Wing shape is related to flight performance, which is expected to be under selection for improving flight behaviours such as predator avoidance. Moreover, wing conspicuousness, usually involved in sexual selection processes, is also relevant in terms of predation risk. In this study, we examined how predation by a passerine bird, the white wagtail *Motacilla alba*, selects wing shape and wing colour patch size in males of *Calopteryx splendens*. The wing colour patch is intra- and intersexually selected in the study species. In a field study, we compared wings of live damselflies to wings of predated damselflies which are always discarded after predation. Based on aerodynamic theory and a previous study on wing shape of territorial tactics in damselflies, we predicted an overall short and broad wing, with a concave front margin shape to be selected by predation. This shape would be expected to improve escaping ability. Moreover, we predicted that wing patch size should be negatively selected by predation. We found that selection operated differently on fore- and

hindwings. In contrast to our predictions, predation favoured a slender general forewing shape. However, the predicted wing shape was favoured in hindwings. We also found selection favouring a narrower wing colour patch. Our results suggest different roles of fore- and hindwings in flight, as previously suggested for *Calopteryx* damselflies and shown for butterflies and moths. Forewings would be more involved in sustained flight and hindwings in flight manoeuvrability. Our results differ somehow from a recently published work in the same study system, but using another population, suggesting that selection can fluctuate across space, despite the simplicity of this predator-prey system." (Authors)] Address: Johansson, F., Dept of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**14952.** Pettavino, M. (2015): Gli Odonati del Parco Naturale Alpi Marittime (Piemonte, Italia). *Rivista piemontese di Storia naturale* 36: 67-76. (in Italian, with English summary) ["Three years of field researches in the Alpi Marittime Natural Park (NW Italy) allowed to identify fifteen species of dragonflies. The reproduction in the area was verified for *Aeshna juncea*, *Enallagma cyathigerum*, *Libellula depressa*, *L. quadrimaculata*, *Somatochlora alpestris* and *Cordulegaster bidentata*. The last two species have a great conservation value in the context of the regional and national fauna." (Author)] Address: Pettavino, M. c/o Museo Civico di Storia Naturale, Parco Cascina Vigna, via S.Francesco di Sales 188, 10022 Carmagnola (TO), Italy. E-mail: massimo.pettavino@gmail.com

**14953.** Phan, Q.T.; Sasamoto, A.; Hayashi, F. (2015): Description of two new species of the genus *Devadatta* from northern Vietnam and central Laos (Odonata: Devadattidae). *Zootaxa* 3941(3): 414-420. (in English) ["Two new species of the genus *Devadatta* Kirby, 1890, *D. kompleri* sp. nov. from northern Vietnam (holotype: male, Mu Cang Chai district, Yen Bai Province) and *D. yokoi* sp. nov. from central Laos (holotype: male, Vang Vieng, Vientiane Province) are described. These new species are allied to *D. ducatrix* Lieftinck, 1969, but are distinguished by specific characteristics of their wings and anal appendages. The other Indochinese species are also briefly discussed." (Authors)] Address: Phan, Q.T., Department of Biology, Tokyo Metropolitan University, Minamiosawa 1-1, Hachioji, Tokyo 192-0397, Japan. E-mail: pqtoan84@gmail.com

**14954.** Ramaker, D.; Travnik, A. (2015): Discovery of a population of *Sympetrum depressiusculum* in the National Park Weerribben and Wieden (The Netherlands). *Brachytron* 17(1): 16-23. (in Dutch, with English summary) ["On 7 August 2013, five teneral females of *S. depressiusculum* were discovered in the Dutch Weerribben & Wieden National Park. Over the following days, various adults and a copula were found as well. The species was found in several places in the National Park. In 2014,

the species was again found in several locations, and reproduction could be proved by the presence of 10 exuviae. The local water control measures and types of vegetation seem favourable for *S. depressiusculum* in Western Europe." (Authors)] Address: Ramaker, D.; Viaductstraat 6, 9725BG Groningen, The Netherlands. E-mail: [dolf@goyatlah.nl](mailto:dolf@goyatlah.nl)

**14955.** Richards, S.J.; Theischinger, G. (2015): Chapter 5 Odonata (Dragonflies & Damselflies). In: Richards, S.J. and N. Whitmore (editors) 2015. A rapid biodiversity assessment of Papua New Guinea's Hindenburg Wall region. Wildlife Conservation Society Papua New Guinea Program. Goroka, PNG: 75-83. (in English) ["We report the results of a survey of Odonata at two broad elevations (~285-910 m asl and 1,770-1,850 m asl) on the southern slopes of the Hindenburg Range in western Papua New Guinea (PNG). Fifty-three species were encountered, including 28 species of Zygoptera and 25 species of Anisoptera. Between 13 and 16 of these species (up to 30%) appear to be new to science. Diversity at the lower, foothill sites was much higher (40 species) than at the montane location, which totalled just 14 species despite higher search effort. However the fauna at the montane site was remarkable for the high proportion of species that are new to science (six of 14 species or 43%). Most of the new species documented during this survey are associated with clear, flowing streams in forest. We present the first comprehensive list of odonate species from the upper Ok Tedi area but note that this is based on just 3 weeks of sampling and that the total diversity of this important indicator group is certainly much higher in this topographically diverse part of Papua New Guinea." (Authors)] Address: Richards, S.J., Vertebrates Dept, South Australian Mus., North Terrace, Adelaide, S.A. 5000, Australia. E-mail: [richards.steve@saugov.sa.gov.au](mailto:richards.steve@saugov.sa.gov.au)

**14956.** Riehl, V. (2015): Morphological characterization of exuvia from co-emerging riverine dragonflies using geometric morphometrics. 14th Annual UW-System Symposium for Undergraduate Research & Creative Activity, 3. Poster Session I, April 24th 2015: 89. (in English) [Verbatim: Among many evolutionary pressures, the physical environment plays a significant role in the refining organism morphology. The purpose of this study is to determine whether geometric morphometrics can be used to differentiate or characterize shape variation among species and sexes of co-emerging riverine dragonflies, including two rare species in New Brunswick, Canada: *Ophiogomphus howei* and *Gomphus ventricosus*. Exuvia from 26 locations along the St. John and Miramichi Rivers were collected in June 2013. Exuvia were identified to species and landmarks were digitized on digital micrographs of the dorsal and ventral surfaces. A multivariate analysis of variance was used to test for differences in body shape between species and sexes within a species. We expect to find significant levels of variation among species in support of taxonomic diagnosis, but fewer differences between sexes with a species. A detailed analysis of shape

will help to confirm the presence of rare and protected species at these sites. Furthermore, this analysis provides a necessary first step toward the examination of phenotypic variation of these species based on differences in habitat hydrology.] Address: Riehl, Valerie, University of Wisconsin-Parkside

**14957.** Rolfhus, K.R.; Wiener, J.G.; Haro, R.J.; Sandheinrich, M.B.; Bailey, S.W.; Seitz, B.R. (2015): Mercury in streams at Grand Portage National Monument (Minnesota, USA): Assessment of ecosystem sensitivity and ecological risk. *Science of The Total Environment* 514: 192-201. (in English) ["Highlights: •GRPO is an ecosystem that is sensitive to mercury contamination. •MeHg values in GRPO streams and food webs are elevated relative to the region. •Mercury enrichment may be due in part to historic local trading activity. •GRPO fish pose a dietary risk to sensitive piscivores, but not to humans. Abstract: Mercury (Hg) in water, sediment, soils, seston, and biota were quantified for three streams in the Grand Portage National Monument (GRPO) in far northeastern Minnesota to assess ecosystem contamination and the potential for harmful exposure of piscivorous fish, wildlife, and humans to methylmercury (MeHg). Concentrations of total Hg in water, sediment, and soil were typical of those in forest ecosystems within the region, whereas MeHg concentrations and percent MeHg in these ecosystem components were markedly higher than values reported elsewhere in the western Great Lakes Region. Soils and sediment were Hg-enriched, containing approximately 4-fold more total Hg per unit of organic matter. We hypothesized that localized Hg enrichment was due in part to anthropogenic pollution associated with historic fur-trading activity. Bottom-up forcing of bioaccumulation was evidenced by MeHg concentrations in larval dragonflies, which were near the maxima for dragonflies sampled concurrently from five other national park units in the region. Despite its semi-remote location, GRPO is a Hg-sensitive landscape in which MeHg is produced and bioaccumulated in aquatic food webs to concentrations that pose ecological risks to MeHg-sensitive piscivores, including predatory fish, belted kingfisher, and mink. ... Larvae of the families Aeshnidae and Corduliidae were the most widely distributed dragonflies collected at GRPO, inhabiting all four stream sites and accounting for 64% of the 201 larvae sampled and analyzed (Table 4). Larvae from three other dragonfly families, including 22 cordulegastrids, 1 gomphid, and 50 libellulids, were found at one or two of the four sites. Mean concentrations of MeHg in larval dragonflies from the four stream sites ranged from 118 to 190 ng/g dry weight in aeshnids and from 136 to 185 ng/g in corduliids. Methylmercury accounted for more than 90% of the total Hg in dragonfly larvae for most taxa and stream sites. For example, mean %MeHg in larvae from the four stream sites ranged from 91% to 97% in corduliids and from 81% to 94% in aeshnids." (Authors)] Address: Rolfhus, K.R., University of Wisconsin-La Crosse, River Studies Center, 1725 State Street, La Crosse, WI 54601, USA. E-mail: [krolfhus@uwlax.edu](mailto:krolfhus@uwlax.edu)

**14958.** Rosenthal, E. (2015): Seasonal variation in the shape of *Hetaerina americana*. Thesis - Honors College, Biology, Baylor University: (in English) ["The ability to fly strongly contributes to the success of insects. The adaptive nature of wing size and shape dictates much of the organism's success flying, both short-term (food and mate acquisition) and long-term (persistence of the species in the environment). Members of Order Odonata are among the most efficient and iconic fliers in the animal kingdom, and wing shape is among many factors contributing to their flight success. The quantitative science of morphometrics is the study and analysis of shape. My study takes a morphometric approach to investigate variation in wing shape for *Hetaerina americana*, a common species of damselfly in North America. Specifically, I focus on variation in wing shape between damselflies emerging in mid-spring after a winter-long larval development versus those emerging in late summer after a warmer, summer-long larval development. Analyses revealed that for both fore wings and hind wings winter developer wing shapes differ significantly from summer developer wing shapes. Fore wings vary in shape more distinctly by season than do hind wings. Summer developer fore wings are broader than those of winter developers, and summer developer hind wings are narrower. This variation in wing shape may be a consequence of seasonal circumstances (shorter, warmer development with a higher larval metabolic rate), or reveal an adaptive strategy for flight in air of varying temperatures. This latter strategy would indicate a genetic plasticity capable of producing wing shapes adaptive to seasonal variation." (Author)] Address: not stated

**14959.** Rychła, A. (2015): Die Niederschlesische Heide (Bory Dolnośląskie): ein Refugium für seltene Moorbibellen im Südwesten Polens? International Dragonfly Fund Report 83: 1-18. (in German, with English and Polish summaries) ["In 2014, Odonata species were investigated in selected habitats, especially in peat bogs, in the western part of the Lower Silesian Wilderness on the German-Polish border. Of particular interest were regionally rare and species protected by Polish law. A total of 39 dragonfly species were observed and for 26 the development was confirmed. There were four legally protected species: *Ophiogomphus cecilia*, *Aeshna subarctica*, *Leucorrhinia albifrons* and *L. pectoralis*, and one endangered species *Orthetrum coerulescens* – category NT in the area. Furthermore, first records for 14 species within the investigated UTM squares are provided. Further, for *O. coerulescens* and *Leucorrhinia rubicunda* historical observations from the field have been updated. The results show a significant dragonfly diversity in the studied areas. Especially valuable are the first records of *A. subarctica* in the field, however, they still require a confirmation of autochthony." (Author)] Address: Rychła, Anna, ul. Osiedlowa 12, Płoty, 66-016 Czerwieńsk, Poland. E-mail: an.rychla@gmail.com

**14960.** Samraoui, B.; Alfarhan, A.H. (2015): Odonata in streams on Mount Edough, Algeria, and in Kroumiria, Tunisia. *African Entomology* 23(1): 172-179. (in English) ["A survey of Odonata in streams on Mount Edough, Algeria, and in Kroumiria, Tunisia, indicated strong faunistic similarities between these two areas, characterized by the presence of lotic dragonfly species with protracted larval development such as *Aeshna cyanea*, *Boyeria irene* and *Onychogomphus uncatatus*. Climatic oscillations and marine transgressions have isolated these mountains and their North African populations in the past geological times, which have led to distinct adaptations and stenotopy in various zoological and botanical groups. These mountain forests are also a refuge for aestivating Odonata with postponed reproductive maturation like *Lestes numidicus*, a species new for Tunisia, *L. barbarus*, *Sympetma fusca*, *Aeshna mixta*, *Sympetrum meridionale* and *S. striolatum*. In the light of increasing human encroachment, urgent conservation efforts are needed to ensure the perpetuity of these unique habitats in North Africa and their biota." (Authors)] Address: Samraoui, B., Laboratoire de Recherche des Zones Humides, Univ. d'Annaba, 4 rue Hassi-Beida, Annaba, Algeria. E-mail: bsamraoui@yahoo.fr

**14961.** Sánchez Herrera, M.; Kuhn, W.R.; Lorenzo-Carballa, M.O.; Harding, K.M.; Ankrom, N.; Sherratt, T.N.; Hoffmann, J.; Van Gossum, H.; Ware, J.L.; Cordero-Rivera, A.; Beatty, C.D. (2015): Mixed Signals? Morphological and molecular evidence suggest a color polymorphism in some Neotropical Polythore damselflies. *PLoS ONE* 10(4): e0125074. doi:10.1371/journal.pone.0125074: 24 pp. (in English) ["The study of colour polymorphisms (CP) has provided profound insights into the maintenance of genetic variation in natural populations. We here offer the first evidence for an elaborate wing polymorphism in the Neotropical damselfly genus *Polythore*, which consists of 21 described species, distributed along the eastern slopes of the Andes in South America. These damselflies display highly complex wing colours and patterning, incorporating black, white, yellow, and orange in multiple wing bands. Wing colours, along with some components of the male genitalia, have been the primary characters used in species description; few other morphological traits vary within the group, and so there are few useful diagnostic characters. Previous research has indicated the possibility of a cryptic species existing in *P. procera* in Colombia, despite there being no significant differences in wing colour and pattern between the populations of the two putative species. Here we analyse the complexity and diversity of wing colour patterns of individuals from five described *Polythore* species in the Central Amazon Basin of Peru using a novel suite of morphological analyses to quantify wing colour and pattern: geometric morphometrics, chromaticity analysis, and Gabor wavelet transformation. We then test whether these colour patterns are good predictors of species by recovering the phylogenetic relationships among the 5



species using the barcode gene (COI). Our results suggest that, while highly distinct and discrete wing patterns exist in Polythore, these "wingforms" do not represent monophyletic clades in the recovered topology. The wingforms identified as *P. victoria* and *P. ornata* are both involved in a polymorphism with *P. neopicta*; also, cryptic speciation may have taking place among individuals with the *P. victoria* wingform. Only *P. aurora* and *P. spateri* represent monophyletic species with a single wingform in our molecular phylogeny. We discuss the implications of this polymorphism, and the potential evolutionary mechanisms that could maintain it." (Authors)] Address: Sherratt, T.N., Dept Biology, Carleton University, 1125 Colonel By Drive, Ottawa ON, K1S 5B6, Canada. E-mail: sherratt@ccs.carleton.ca

**14962.** Schneider, T.; Dumont, H.J. (2015): Odonata records from southern Iran. *Notulae odonatologicae* 8(5): 137-146. (in English) ["Between 28 May and 06 June 2014, Odonata were collected from the southern Iranian provinces of Kerman, Hormozgan, and Fars. In total, 41 odonate taxa were found, nine of which are of Oriental origin. *Enallagma cyathigerum risi* is a new record for Iran. For others, such as *Ischnura nursei* and *Coenagrion vanbrinkae*, limited information is available. Only a few records of *Onychogomphus assimilis* are known, and *Lestes concinnus* had not been seen for more than 60 years in Iran; for *Pseudagrion laidlawi* and *P. decorum*, we report the first breeding populations in Iran." (Authors)] Address: Schneider, T., Arnold-Knoblauch-Ring 76, 14109 Berlin-Wannsee, Germany. E-mail: thomas.rs@gmx.de

**14963.** Shiffer, N.C.; Leppo, B.; White, H.B. (2015): Odonata of Beaver Dam, Huntingdon County, Pennsylvania: A record of faunal succession in a changing habitat. *Argia* 27(1): 12-23. (in English) ["Beaver Dam pond, created in the 1930s by damming Shaver Creek, was destroyed by floods in the mid-1960s and early 1970s, leaving a large wet meadow surrounded by forest and fed by Shaver Creek and numerous springs and seep tributaries. The Odonata fauna of this habitat in central Pennsylvania was first sampled in 1954 and has been revisited over 600 times since, mostly in the past three decades. The habitat succession has resulted in faunal changes. Aside from supporting populations of several Odonata species of conservation interest, it is remarkable in that *Enallagma anna*, a damselfly with western affinities, colonized the site in 2006, the only known location for the species in Pennsylvania and south and east of southeastern Michigan and southern Ontario. We report the yearly and seasonal distribution of the 99 species documented at Beaver Dam and associated stream and wetlands through early 2011." (Authors)] Address: Shiffer, N.C., 234 S. Gill Street, State College, Pennsylvania, 16801, USA. E-mail: tomboshif@yahoo.com

**14964.** Shiffer, N.C.; Leppo, B.; White, H.B. (2015): Odonata of Black Moshannon State Park, Centre County, Pennsylvania. *Argia* 26(4): 7-15. (in English) ["Black

Moshannon State Park includes a variety of freshwater wetlands that support a diversity of Odonata. It is situated 1900 feet (580 m) above sea level in central Pennsylvania. Since 1943, 96 species of Odonata have been observed within the park. We document the fauna that includes a number of species of state and regional conservation concern." (Authors)] Address: Shiffer, N.C., 234 S. Gill Street, State College, Pennsylvania, 16801, USA. E-mail: tomboshif@yahoo.com

**14965.** Sivaperuman, C. (2015): Odonata of Andaman and Nicobar Islands, India. *Aquatic Ecosystem: Biodiversity, Ecology and Conservation*: 153-162. (in English) ["This study was conducted in Andaman and Nicobar Islands from 2008 through 2013 to assess the status and distribution of odonate fauna. The Andaman and Nicobar archipelago consist of 572 islands, extending over 800 km. These islands can be broadly divided into two groups, namely, the Andamans and the Nicobars. The following areas were covered during the study period, namely, Great Nicobar Island, Ritchie's archipelago and North Andaman. The Andaman and Nicobar Islands support unique assemblages of Odonata comprising many species. Further studies are required to better understand the population ecology, habitat destruction and other anthropogenic disturbances to conserve the unique population." (Author)] Address: Sivaperuman, C., Andaman and Nicobar Regional Centre, Zoological Survey of India, Port Blair, 744 102, Andaman and Nicobar Islands, India. E-mail: c\_sivaperuman@yahoo.co.in

**14966.** Sondermann, M.; Gies, M.; Hering, D.; Schröder, M.; Feld, C.K. (2015): Modelling the effect of in-stream and terrestrial barriers on the dispersal of aquatic insect species: a case study from a Central European mountain catchment. *Fundamental and Applied Limnology / Archiv für Hydrobiologie* 186(1-2): 99-115. (in English) ["Worldwide, lotic ecosystems are heavily impacted by anthropogenic disturbance, leading to a significant decline in freshwater biodiversity. In recent years, increasing efforts have been directed towards the restoration and revitalization of disturbed streams and rivers to reverse this trend. Although it is widely acknowledged that species dispersal is the key to the recolonization of restored streams and rivers and ultimately to their ecological recovery, dispersal often remains unaddressed in restoration ecology. In this study, we present an approach to predict larval (aquatic) and adult (terrestrial) dispersal ranges of three lotic insect species (*Hydropsyche dinarica* [Trichoptera], *Calopteryx virgo* [Odonata] and *Dinocras cephalotes* [Plecoptera]) within one life cycle. The actual species' distributions (presence / absence) were obtained from a total of 1,198 sites evenly distributed within the Ruhr catchment, North Rhine-Westphalia, Germany. The predictions for aquatic and terrestrial dispersal were made for two scenarios: with and without dispersal barriers included in the predictive modelling. In-stream dispersal barriers included weirs, dams, culverts and impounded water bodies, whereas terrestrial barriers

were related to the stream corridor (degraded riparian vegetation) and different forms of land use (urban land use, coniferous and deciduous or mixed forest, open land, road infrastructure). We applied a least-cost modelling approach and combined each species' life-cycle-specific dispersal capabilities and the corresponding dispersal barrier's "friction" costs in a grid-based GIS model. Among the three model species, *H. dinarica* was the best disperser and was predicted to be able to reach between 81% (without barriers) and 67% (with barriers) of all river sections in the model catchment within one life cycle. Aerial (terrestrial) dispersal was by far the most important dispersal mechanism. For validation purposes, we conducted a logistic regression analysis to identify sample sites with environmentally suitable habitats. Within these sites that are not considered constrained by habitat limitations, the comparison of actual and predicted absences revealed a better match, if barriers were included in the dispersal models. At the same time the mismatch of actual absences and predicted presences decreased. Our results suggest that dispersal models can contribute to a better assessment of the potential recolonization of rivers. Yet, the dispersal of lotic insects may be considerably overestimated if dispersal barriers remain unaddressed." (Authors)] Address: Sondermann, M., Centre of Water & Environmental Research. Univ. of Duisburg-Essen, Universitätsstr. 5, 45141 Essen, Germany. E-mail: martin.sondermann@uni-due.de

**14967.** Steinhoff, P.O.M. (2015): Results of Odonata larval rearing in the Gunung Mulu National Park, Sarawak, Malaysia from April to August 2014. International Dragonfly Fund - Report 78: 1-11. (in English) ["Records of larval rearing in the Gunung Mulu National Park, Sarawak, Malaysia carried out in 2014 are presented. In total, larvae of 27 species were collected. Larvae of eleven species (22 individuals) were successfully reared out, one individual is currently still being reared. An additional three species were collected right after emergence, with the adult still sitting on its exuvia. Most notable are the samples of *Orthetrum borneense*, *Leptogomphus cf. pendleburyi*, *Coeliccia cf. nemoricola* 1, *Coeliccia cf. nemoricola* 2, *Heliocypha biseriata* and *Elatoneura analis* whose final instar larvae are undescribed." (Author)] Address: Steinhoff, P.O.M., Department of General and Systematic Zoology, University of Greifswald, Anklamer Str. 20, 17489 Greifswald, Germany. E-mail: philipsteinhoff@gmail.com

**14968.** Stip, A.; den Ouden, G.T.; Slagboom, R. (2015): 2015. Dragonflies in the Alblasserwaard. *Brachytron* 17(1): 26-39. (in Dutch, with English summary) ["This paper presents the dragonfly fauna of the Alblasserwaard, an open and wet fen-meadow area in the west of the Netherlands, enclosed by rivers. Between 2000 and 2012 35 species in all were recorded, of which 31 annually. Most of the observed species are quite common and widely distributed. Some bottlenecks and opportunities

for Odonata fauna in this region are discussed." (Authors) *Brachytron pratense*, *Anaciaeschna isocetes*, *Stylurus flavipes*, *Libellula fulva*, *Coenagrion puella*, *C. pulchellum*, *Ischnura pumilio*, *Gomphus pulchellus*, *Sympetrum fonscolombii*, *Pyrrhosoma nymphula*, and *Cordulia aenea* are discussed in detail.] Address: Stip, Anthonie, Driestweg 5, 6721 NG Bennekom, The Netherlands. E-mail: anthonie.stip@vlinderstichting.nl

**14969.** Stretton, T. (2015): Look out for Common Club-tail. Montgomeryshire Wildlife Trust March 2015: 5 pp. (in English) ["*Gomphus vulgatissimus* is an uncommon dragonfly In Montgomeryshire, it is found in the River Severn between Newtown and the English border, as well as the lower reaches of the Vyrnwy. *G. vulgatissimus* is a difficult species to study, due to its unusual life cycle and little work has been done in Montgomeryshire to assess the population status of the species. Records of the species in the area are few and consequently we have little idea how they are doing or where the best areas are. We need your help to change this!" (Author)] Address: Stretton, Tammy. E-mail: tammy@montwt.co.uk

**14970.** Szewo, J.; Nel, A. (2015): The Cretaceous insects: A promising state of the art. *Cretaceous Research* 52, Part B: 628-630. (in English) [A short review of the state of the art of research on insects from the Cretaceous period is given. The recent achievements and priorities for future efforts are indicated. Two references on Odonata are included.] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**14971.** Terzani, F. (2015): Ricerche odonatologiche in Toscana. XIII. *Cordulegaster boltonii* (Donovan, 1807): nuovi dati (Odonata: Cordulegastridae). *Onychium* 11: 67-71. (in Italian, with English summary) [Studies on the Odonata of Tuscany. XIII. *Cordulegaster boltonii* (Donovan, 1807): new records (Odonata: Cordulegastridae). - New records on the distribution of *C. boltonii* in Tuscany and neighbouring regions are given.] Address: Terzani, F., Museo di Storia Naturale dell'Università degli Studi di Firenze, sezione di Zoologia "La Specola", via Romana 17, 50125 Firenze, Italia. E-mail: libellula.ter@gmail.com

**14972.** Terzani, F. (2015): Salvatore Carfi, ricordo di un amico (1939-2014). *Onychium* 11: 172-174. (in Italian) [Obituary] Address: Terzani, F., Museo di Storia Naturale dell'Università degli Studi di Firenze, sezione di Zoologia "La Specola", via Romana 17, 50125 Firenze, Italia. E-mail: libellula.ter@gmail.com

**14973.** Thamarai Selvi, V.P.; Merlin Dayana, L. (2015): Biodiversity of insects in sugarcane field at a Vadipatti, Tamil Nadu, India. *International Research Journal of Environment Sciences* 484: 74-79. (in English) ["Sugarcane is highly important cash crop and sugar production in the country mostly depends on this crop. Sugarcane is known to be attacked by about 200 species of insects

and non insects in India. The light trap collection yielded seven orders namely Odonata, Orthoptera, Hemiptera, Homoptera, Coleoptera, Lepidoptera, and Hymenoptera. Homoptera was the prominent order with 6 species. Insignificant values are observed with the help of Correlation and Regression. Coleoptera was the richer in terms of number of individuals (102) and Odonata was least recorded with less number of individuals (33). The present study reveals that the most of the light trap collected insects were pest of sugarcane agroecosystem. Many predators and parasite of the orders Odonata, Orthoptera, Hemiptera, Homoptera, Coleoptera, Lepidoptera and Hymenoptera were also found in sugarcane field at A.Vadipatti, Periyakulam Taluk, Theni District. Even though, many insects are found in the sugarcane agro ecosystem, many insects were found to be the pest of sugarcane crop. .... Odonata was the moderate order with 4 species. It contributes 33 insects that amount to 6.76% in the total entomofauna. The 6th fortnight collection yielded the maximum number of individuals that 8 during the second half of January 2013 with an average minimum temperature 27.5°C. This period experienced an average rainfall 1.4mm the Odonata population declined during first half of November 2012 with least number of individuals 3. This decline in Odonata population conceded with soar temperature maximum 29°C." (Authors)] Address: J.A. Autonomous College for Women, Periyakulam, Theni District, INDIA

**14974.** Theischinger, G.; Richards, S.J. (2015): A new species of *Microtrigonia* Förster (Anisoptera, Libellulidae) from Papua New Guinea. *International Dragonfly Fund - Report 77*: 1-6. (in English) ["A new species recently collected in Papua New Guinea, *Microtrigonia sinuosa* sp. nov. (Holotype male from upper Sepik Basin), is described, illustrated and discussed. A revised key to the genus is presented." (Authors)] Address: Theischinger, G., NSW Dept of Planning & Environment, Office of Environment & Heritage, PO Box 29, Lidcombe NSW 1825 Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

**14975.** Therry, L.; Bonte, D.; Stoks, R. (2015): Higher investment in flight morphology does not trade off with fecundity estimates in a poleward range-expanding damselfly. *Ecological Entomology* 40: 133-142. (in English) ["(1.) Evolutionary increases in dispersal-related traits are frequently documented during range expansions. Investment in flight-related traits is energetically costly and a trade-off with fecundity may be expected during range expansion. (2.) However, in contrast to wing-dimorphic species, this trade-off is not general in wing-monomorphic species. In the absence of a dispersal–fecundity trade-off, an increased investment in clutch size at the expansion front is expected possibly at a cost of reduced offspring size. (3.) The study evaluated investment in female flight morphology and fecundity-related traits (clutch size, hatchling size) and potential trade-offs among these traits in replicated populations of the poleward range-expanding damselfly *Coenagrion scitulum*.

(4.) Females at the expansion front had a higher relative thorax length, indicating an increased investment in flight; this can be explained by spatial sorting of dispersal ability or in situ natural selection at the expansion front. Edge females produced larger hatchlings, however, this pattern was totally driven by the population-specific thermal larval regimes and could not be attributed to the range expansion per se. By contrast, clutch sizes did not differ between core and edge populations. There was no signal of a dispersal–fecundity trade-off either for a trade-off between clutch size and hatchling size. (5.) These results indicate that evolution of a higher dispersal ability at the expansion front of *C. scitulum* does not trade off with investment in fecundity, hence a dispersal–fecundity trade-off is unlikely to slow down range expansion of this species." (Authors)] Address: Therry, L., Laboratory of Aquatic Ecology, Evolution & Conservation, KU Leuven, Leuven, Belgium. E-mail: Lieven.therry@bio.kuleuven.be

**14976.** Thoma, M.; Althaus, S. (2015): Beobachtungen von Libellen (Odonata) auf dem Col de Bretolet (VS). *Entomo Helvetica* 8: 97-109. (in German, with English and French summaries) ["Dragonfly observations (Odonata) on the Col de Bretolet (Canton of Valais, Switzerland). - We present observations of dragonflies gathered between 2011 and 2014 at the bird ringing station of the Swiss Ornithological Institute on the Col de Bretolet, an alpine pass situated in southwestern Switzerland (canton of Valais, 1920 m a. s. l., 46 ° 08' 34" N 06 ° 47' 45" E). During this period, eight species were recorded. Historical observations include another three species. Only two species, *Aeshna cyanea* and *A. juncea*, successfully completed their life cycles on the pass. *Pyrrhosoma nymphula*, *Anax imperator*, *A. parthenope*, *Cordulegaster bidentata*, *Somatochlora alpestris*, *Sympetrum meridionale*, *S. pedemontanum*, *S. striolatum* and *S. vulgatum* are considered «visitors». For several species the observations at Col de Bretolet represent the upper limit of their known altitudinal range in Switzerland. The records of *A. parthenope* are the highest for the country and the observation from October 18, 2014 is the latest seasonal occurrence of this species in Central Europe. Several species of the genus *Sympetrum* were involved in mass flights. We also present information suggesting directional migrations in autumn for *A. parthenope* and some species of *Sympetrum*." (Authors)] Address: Thoma, M., Naturhistorisches Museum der Bürgergemeinde Bern, Bernastr. 15, CH-3005 Bern, Switzerland. E-mail: thoemi@bluemail.ch

**14977.** Thornton, J.L.; Switzer, P.V. (2015): Factors affecting the spatial distribution of oviposition sites for tandem Black Saddlebags Dragonflies (Odonata: Libellulidae). *Journal of Insect Science* 15: 5pp. (in English) ["Oviposition site location may be affected by (1) factors influencing the costs and benefits to the offspring (e.g., resource availability, competition, predation risk) and (2) factors influencing the costs and benefits to the female (e.g., predation risk or mate harassment). In cases in



which both the male and female are involved in locating a site, costs and benefits may differ for each parent and the resulting oviposition site location may represent the outcome of selection pressures on one or both of them. We studied oviposition behaviour in *Tramea lacerata*, a species in which the male and female typically remain together (i.e., in tandem) while travelling among potential oviposition locations. Oviposition sites tended to be away from pond shoreline at the outer edge of the vegetation on the water's surface. We found that tandems distributed their oviposition locations widely around the pond, and interactions with other dragonflies (typically other *T. lacerata*, either territorial males or tandems) led to a larger distance between consecutive oviposition locations. Interestingly, for 10% of the tandems, the female became separated from the male and oviposited solitarily multiple times. These solitary females spent significantly less time and travelled significantly smaller distances between successive oviposition sites than when in tandem. Our results indicate that while some aspects of oviposition behaviour and site selection may be consistent between the male and female (e.g., the characteristics that make a site suitable), other aspects, such as the distribution of sites, may be a result of a differing benefits and costs for the two sexes, perhaps as a consequence of potential sperm competition." (Authors)] Address: Switzer, P.V., Department of Biological Sciences, Eastern Illinois University, Charleston, IL, USA. E-mail: pvswitzer@eiu.edu

**14978.** Tiple, A.D.; Koparde, P. (2015): Odonata of Maharashtra, India with notes on species distribution. *J. Insect Sci.* (2015) 15(1): 47; DOI: 10.1093/jisesa/iev028: 10 pp. (in English) ["Maharashtra, the third largest state of India, harbours a variety of land-use and occupies six biogeographic provinces. We carried out Odonata surveys in Maharashtra during 2006–2014. Compilation of all these studies along with other authenticated records resulted in a checklist of 134 species of Odonata belonging to 70 genera representing 11 families. The highest numbers of species were recorded from the Libellulidae (48 species) and Gomphidae (22 species) families. A previous study had reported 99 species of Odonata from the Maharashtra state considering records from early 1900's to 2012. Our observations across the state add 33 species to this list. Maharashtra forms a unique source of Odonata diversity and our observations support the importance of this region in providing valuable habitats for Odonata. Here, we discuss several of the new records, how global surveys might help fill the local gap in species distributions, how secondary data deposited through crowd-sourcing can help and what it offers to conservation." (Authors)] Address: Tiple, A.D., Department of Zoology, Vidhyabharti College, Seloo, Wardha, Maharashtra, India. E-mail: ashishdtiple@yahoo.co.in

**14979.** Trueman, J.W.H.; Yeates, D.K. (2015): Can whole-drawer images measure up? A reply to Johnson

et al. (2013). *ZooKeys* 500: 141-149. (in English) ["Johnson et al. (2013) found that morphometric measurements of dragonfly wings taken from actual specimens and measurements taken from whole-drawer images of those specimens were equally accurate. We do not believe that their conclusions are justified by their data and analysis. Our reasons are, first, that their study was constrained in ways that restrict the generalisability of their results, but second, and of far greater significance, their statistical approach was entirely unsuited to their data and their results misled them to erroneous conclusions. We offer an alternative analysis of their data as published. Our reanalysis demonstrates, contra Johnson et al., that measurements from scanned images are not a reliable substitute for direct measurement." (Authors)] Address: Yeates, D.K., The Australian National Insect Collection, CSIRO National Research Collections Australia, PO Box 1700 Canberra ACT 2601, Australia. da-vid.yeates@csiro.au

**14980.** Tüzün, N.; Debecker, S.; Op de Beeck, L.; Stoks, R. (2015): Urbanisation shapes behavioural responses to a pesticide. *Aquatic Toxicology* 163: 81-88. (in English) ["Highlights: •We tested for effects of urbanisation on vulnerability to chlorpyrifos in *Coenagrion puella*. •Behavioural responses to chlorpyrifos differed between urban and rural populations. •Exposed rural larvae decreased activity and feeding at 20 °C and 24 °C. •Exposed urban larvae increased activity and only reduced feeding at 24 °C. •Results suggest local adaptation to higher pesticide levels in urban populations. The degree of urbanisation is rapidly increasing worldwide. Due to anthropogenic impact, urban populations are exposed to higher levels of contaminants and higher temperatures. Despite this, urbanisation is a largely overlooked spatial component in ecotoxicology. We tested in a common garden rearing experiment whether replicated urban and rural populations of *C. puella* differ in their vulnerability to sublethal levels of a widespread pesticide, chlorpyrifos, in terms of ecologically relevant behaviours (exploration behaviour, activity, boldness and food intake), and to what extent these patterns are affected by temperature (20 and 24 °C). Except boldness, all behaviours were affected by previous pesticide exposure. While the pesticide did not affect exploration behaviour at 20 °C, it was associated with increased exploration at 24 °C, which may reflect an increased toxicity of chlorpyrifos at higher temperatures. Importantly, rural and urban larvae showed consistently different, sometimes even opposite behavioural responses to pesticide exposure. When exposed to the pesticide, rural larvae decreased activity and food intake at both temperatures; urban larvae instead increased activity at both temperatures and only reduced food intake at the high temperature. This suggests that urban larvae were less affected by the pesticide, which would be consistent with a scenario of local adaptation to higher contaminant levels. Our results highlight that urbanisation may be an important factor to arrive at a spatially explicit

ecological risk assessment, and may be an ignored reason why studies on the same species may generate widely different vulnerabilities to pesticides." (Authors)] Address: Tüzün, N., Laboratory of Aquatic Ecology, Evolution & Conservation, Univ. Leuven, Charles Deberiotstraat 32, B-3000 Leuven, Belgium. nedim.tuzun@bio.kuleuven.be

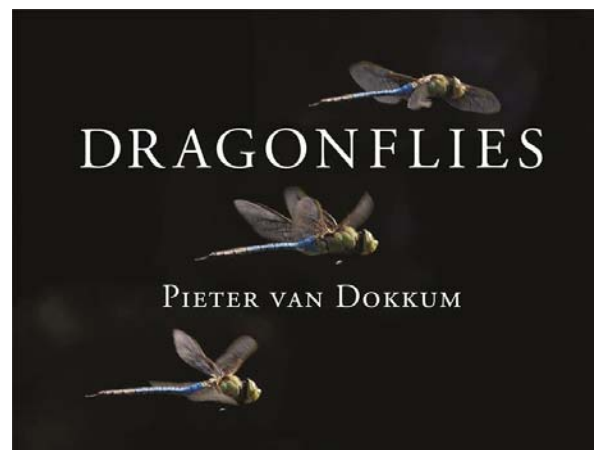
**14981.** Uboni, C.; Nadalon, G.; Schröter, A. (2015): Evidence of breeding of *Selysiothemis nigra* in the regions of Friuli Venezia Giulia and Veneto, northeastern Italy (Odonata: Libellulidae. *Notulae odonatologicae* 8(5): 128-136. (in English) ["Exuviae of *S. nigra* collected at two artificial lakes in the regions of Friuli Venezia Giulia and Veneto on the northern Adriatic coast in Italy represent the northernmost evidence of breeding of the species worldwide. Basic information on the larval habitat is given and the recent apparent range expansion is outlined and discussed." (Authors)] Address: Uboni, Costanza, Via B. Colleoni n15, Trieste, 34144, Italy. E-mail: costanza.uboni@gmail.com

**14982.** Udagedara, U.S.C.; Kularatne, H. (2015): A new record of *Indolestes divisus* (Hagen, 1862) from Kegalle District, Sri Lanka (Odonata: Lestidae). *Notulae odonatologicae* 8(5): 147-150. (in English) ["The rare *I. divisus* endemic to Sri Lanka is reported from Kegalle District for the first time. On 27-iv-2014 and 01-v-2014, respectively, one male and one female were observed and photographed approximately 25 km southwest of Kandy, near Aranayake, at Welimanna village (7°09'30"N, 80°27'18"E). Increasing usage of agricultural pesticides, habitat destruction and water pollution pose potential threats for this newly discovered small population." (Authors)] Address: Udagedara, U.S.C., National Cleaner Production Centre, 251/30, Kirula Road, Narahenpita 10100, Colombo 05, Sri Lanka. E-mail: susanthauoc@gmail.com

**14983.** Ujszegi, J.; Gál, Z.; Mikó, Z.; Hettyey, A. (2015): No observable effect of a glyphosate-based herbicide on two top predators of temporal water bodies. *Environmental Toxicology and Chemistry* 34(2): 307-313. (in English) ["The application of pesticides has been implied to be involved in the world-wide decline of biodiversity, but little is known about the influence of these chemicals on key predators of temporary wetlands. We examined the direct impacts of a frequently applied glyphosate-based herbicide on larval *Aeshna cyanea* and adult male *Lissotriton vulgaris* (Amphibia), two top predators of Central European ephemeral ponds. We measured effects of herbicide-exposure on survival, behaviour, body mass change and predatory activity in an outdoors mesocosm experiment lasting 17 days. We observed no significant effects of exposure on either trait in either predator species. Our results suggest that the herbicide has no immediate effect at environmentally relevant concentrations on the studied predators and these can fulfill their top-down regulatory role also in contaminated ecosystems." (Authors)] Ad-

dress: Ujszegi, J., Lendület Evolutionary Ecology Research Group, Plant Protection Institute, Centre for Agricultural Research, Hungarian Acad. of Sciences, Budapest, Hungary. E-mail: ujszegi.janos@gmail.com

**14984.** Van Dokkum, P. (2015): *Dragonflies: Magnificent creatures of water, air, and land.* Yale University Press: 176 pp. (in English) [This is a coffee table book with only few interesting photographs. Experienced dragonfly watchers and photographers may be a little bit surprised reading the partly enthusiastic reviews of this book. (Martin Schorr)]



**14985.** Virani, R.; Kawade, S. (2015): Odonate diversity of some of the wetlands of Yavatmal district, Maharashtra. *Review of research* 4(6): 1-5. (in English) [Odonate fauna were surveyed from three wetlands of Yavatmal district, Maharashtra, India from July 2013 to May 2014. 38 species are checklisted.] Address: Virani, R., Dept of Zoology, S. M. Collage Pandharkawade, Dt Yvatmal, India

**14986.** Whatley, M.H.; van Loon, E.E.; Cerli, C.; Vonk, A.; van der Geest, H.G.; Admiraal, W. (2014): Linkages between benthic microbial and freshwater insect communities in degraded peatland ditches. *Ecological Indicators* 46: 415-424. (in English) ["Many wetlands are heavily modified and identifying the environmental drivers of indicator groups like aquatic insects is complicated by multiple stressors and co-varying environmental factors. Yet, incorporating data from other biological groups, such as microbial communities, potentially reveals which environmental factors are underpinning insect community composition. In the present study we investigated the application of benthic microbial community composition, as determined by phospholipid fatty acid (PLFA) analysis, alongside aquatic insect data in 25 peatland ditches in the province of North Holland, The Netherlands. We applied clustering and principal component analysis to a matrix of 26 PLFAs to group ditches by the microbial community. Generalized linear models were used to examine correlations between microbial PLFAs, insects, vegetation (emergent and submerged) and abiotic factors. The ratio of heterotrophic (e.g. sulphate re-

ducing bacteria) to autotrophic (e.g. algae and cyanobacteria) derived PLFAs could be estimated as the ratio between saturated and branched to monounsaturated and polyunsaturated fatty acids (SB/MP). SB/MP was correlated with insect community composition, differences in water chemistry (in particular bicarbonate, sulphate and nutrients) and vegetation cover in the ditches. Moreover, ditches distinguished by their microbial communities differed in the number of insects they supported with differences most pronounced for Odonata, Trichoptera and Chironomus larvae. This study demonstrates that integrating microbial and aquatic insect community data provides insight into key environmental drivers in modified aquatic ecosystems and may facilitate the development of remediation strategies for degraded wetlands. Linkages between benthic microbial and freshwater insect communities in degraded peatland ditches." (Authors) Address: Whatley, M.H., Aquatic Ecology & Ecotoxicology, Institute for Biodiversity and Ecosystem Dynamics (IBED), University of Amsterdam, Sciencepark 904, NL-1098 XH Amsterdam, The Netherlands. E-mail: merrin.whatley@gmail.com

**14987.** Wiles, C.M.; Bolek, M.G. (2015): Damselflies (Zygoptera) as paratenic hosts for *Serpinema trispinosum* and its report from turtle hosts from Oklahoma, USA. *Folia Parasitologica* 62: 019, 2015, 8 pp (in English) ["Third-stage larvae of the nematode *Serpinema trispinosum* (Leidy, 1852) were collected from the midgut of four of five species of adult damselflies (Zygoptera) from a non-irrigated restored semipermanent wetland located in Stillwater, Oklahoma, USA. Of the four infected damselfly species, prevalence and mean abundance was highest for the southern spreadwing, *Lestes disjunctus australis* (10%,  $0.2 \pm 0.8$ ) and lowest for the familiar bluethroat, *Enallagma civile* (Hagen) (2.5%,  $0.04 \pm 0.3$ ); whereas mean intensities were lowest for the citrine forktail, *Ischnura hastata* ( $1.5 \pm 0.5$ ) and the eastern forktail, *Ischnura verticalis* ( $1.0 \pm 0$ ). This is the first record of larvae of *S. trispinosum* from damselflies. *Serpinema trispinosum* adults have been reported from 18 species of North and Central American freshwater turtles, whereas microcrustaceans such as copepods serve as intermediate hosts and snails, fish and amphibians serve as paratenic hosts in this nematode's life cycle. However, dietary studies of the 18 species of freshwater turtles reported as definitive hosts for *S. trispinosum* indicate that aquatic insects including damselflies are more commonly reported in turtle diets than are fish or amphibians. Additionally, unlike snails and amphibians, larval damselflies predominantly feed on microcrustaceans, and our observation of *S. trispinosum* infecting damselflies may reflect the importance of these insects as paratenic hosts. In the present study, we provide new host information and measurements for third-stage larvae of *S. trispinosum* from damselfly hosts along with measurements for adult male and female *S. trispinosum* from turtle hosts from Oklahoma, USA." (Authors)] Address: Bolek, M.G., Dept of Zoology, Oklahoma State Univ., 501

Life Sciences West, Stillwater Oklahoma, 74078, USA. Phone: (+1) 405 744 9675; Fax: (+1) 405 744 7824; E-mail: bolekm@okstate.edu

**14988.** Worthen, W.B.; Horacek, H.J. (2015): The distribution of dragonfly larvae in a South Carolina stream: Relationships with sediment type, body size, and the presence of other larvae. *J. Insect Sci.* 15(31): DOI: 10.1093/jisesa/iev013: 7 pp. (in English) ["Dragonfly larvae were sampled in Little Creek, Greenville, SC. The distributions of five common species were described relative to sediment type, body size, and the presence of other larvae. In total, 337 quadrats (1m by 0.5 m) were sampled by kick seine. For each quadrat, the substrate was classified as sand, sand-cobble mix, cobble, coarse, or rock, and water depth and distance from bank were measured. Larvae were identified to species, and the lengths of the body, head, and metafemur were measured. Species were distributed differently across sediment types: *Progomphus obscurus*, were common in sand; *Cordulegaster maculata*, preferred a sand-cobble mix; *Ophiogomphus mainensis*, preferred cobble and coarse sediments; *Boyeria vinosa*, preferred coarse sediments; and *Stylogomphus albistylus*, preferred coarse and rock sediments. *P. obscurus* and *C. maculata* co-occurred more frequently than expected by chance, as did *O. mainensis*, *B. vinosa*, and *S. albistylus*. Mean size varied among species, and species preferences contributed to differences in mean size across sediment types. There were significant negative associations among larval size classes: small larvae (<12 mm) occurred less frequently with large larvae (>15 mm) than expected by chance, and large larvae were alone in quadrats more frequently than other size classes. Species may select habitats at a large scale based on sediment type and their functional morphology, but small scale distributions are consistent with competitive displacement or intraguild predation." (Authors)] Address: Worthen, W.B., Biology Department, Furman University, Greenville, SC 29613, USA. E-mail: wade.worthen@furman.edu

**14989.** Xie, C.-M.; Huang, W.-X. (2015): Vortex interactions between forewing and hindwing of dragonfly in hovering flight. *Theoretical & Applied Mechanics Letters* 5(1): 49 -54. (in English) ["Two tandem flapping wings in viscous flow were modelled by using the immersed boundary method for exploration of the aerodynamics of dragonfly in hovering flight. Interaction between the forewing and the hindwing, and its effect on the lift forces, were examined by varying the phase difference of the wing motions and the inter-distance of the two wings. Two vortex interaction modes were identified at different phase differences and inter-distances, which give rise to significant variations of the lift forces. The first interaction mode increases the lift of the forewing and the second one enhances the lift of the hindwing. The two modes occur at different time during a flapping period and have different influence on the lift of wings as the phase difference varies." (Authors)] Address: Xie, C.-M., Sino-French



Engineer School, Beijing University of Aeronautics and Astronautics, Beijing 100191, China

**14990.** Xu, Q.-H. (2015): Description of the final stadium larva of *Heliocypha perforata perforata* (Percheron), with discussion of the taxonomic characters of the larvae of the genus *Heliocypha* Fraser (Odonata: Zygoptera: Chlorocyphidae). *Zootaxa* 3926(1): 137-141. (in English) ["The final stadium larva of *Heliocypha perforata perforata* is described and illustrated for the first time. It is characterized by having a row of filiform setae present laterally on distal half of prementum, 6-7 setae on the outer side of palpal lobe, very long lateral gills and distinct abdominal colour pattern. The taxonomic characters of the larvae of the genus *Heliocypha* are discussed and summarized. *Heliocypha* larvae share a high similarity with *Rhinocypha* in general appearance and cannot be clearly distinguished from the latter in structure." (Author)] Address: Xu, Q.-H., Department of Garden and Horticulture, Zhangzhou City University, Zhangzhou, Fujian 363000, PR China. E-mail: qihanxu@aliyun.com

**14991.** Yeh, W.-C.; Lee, I.-L.; Wong, K.-C. (2015): Description of *Sarasaeschna kaoi* sp. nov. in Taiwan, with notes on the proposed differentiating characters of the pyanan-group (Odonata, Aeshnidae). *Zootaxa* 3926(1): 122-128. (in English) ["*Sarasaeschna kaoi* sp. nov. collected from Yuli, Hualien County in eastern Taiwan, is easily distinguished from all known congeners by its male having short and straight cerci. Judging from male penile structure, it is considered to belong to the pyanan-group of species and resembles in general appearance the Chinese *S. zhuae* described from Fujian. The only known habitat of *S. kaoi* is a muddy and grassy swamp in natural evergreen forest. The diagnostic characters of the pyanan-group proposed by Karube & Yeh are also discussed." (Authors)] Address: Yeh, W.-C., Division of Forest Protection, Taiwan Forestry Research Institute (TFRI), No.53, Nanhai Rd., Zhongzheng Dist., Taipei City 10066, Taiwan. E-mail: wcyeh@tfri.gov.tw

**14992.** Zheng, D.; Zhang, H.; Zhang, Q.; Li, S.; Wang, H.; Fang, Y.; Liu, Q.; Jarzembowski, E.A.; Yan, E.; Wang, B. (2015): The discovery of an Early Cretaceous dragonfly *Hemeroscopus baissicus* Pritykina, 1977 (Hemeroscopidae) in Jiuquan, Northwest China, and its stratigraphic implications. *Cretaceous Research* 52, Part B: 316-322. (in English) ["The Early Cretaceous dragonfly *Hemeroscopus baissicus* Pritykina is reported for the first time from the Jiuquan Basin, Gansu Province, Northwest China based on adult wings. These wings are different from those from other localities in two aspects: the oblique crossvein 'O' is 3 or 4 cells distal of the subnodus; the wing size is much smaller (30–42 mm in length for forewings). These differences are considered to be intraspecific variations, based on which diagnoses of the genus *Hemeroscopus* and the family Hemeroscopidae are revised. The discovery of *H. baissicus* in Jiuquan suggests that the Zhonggou Forma-

tion may be correlated with the Fuxin Formation in Liaoning Province, the Lushangfen Formation in western Beijing, and the Dongmyeong Formation in southern Korea. A possible migration path of the dragonfly is indicated that it initially appeared in Transbaikalia in the Aptian, migrated southwestwards to Mongolia in the Aptian or early Albian, and then southwestwards to northwest China, southeastwards to northeast China, and southern Korea in the early Albian." (Authors)] Address: Zheng, H., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, China. E-mail: hc Zhang@nigpas.ac.cn

**14993.** Zhu, G.-p.; Yu, X.; Bu, W.j. (2015): Ecology and conservation of *Pseudolestes mirabilis* (Odonata: Zygoptera), a damselfly endemic to Hainan Island of China. *Entomological Science* 18(1): 123-129. (in English) ["Although some efforts have addressed oriental dragonfly conservation, knowledge on the ecology and geographic distribution of such dragonflies remains scant. *P. mirabilis* is endemic to Hainan Island of China. This damselfly was recommended by the International Union for the Conservation of Nature to be of priority for further study and conservation. In this work, we use ecological niche modelling techniques to estimate the dimensions of the realized niches of this damselfly and to predict its potential distribution. Our findings suggest that the phoenix damselfly possessed a small climate space characterized by low temperature and high precipitation. Highly suitable areas are mainly distributed in the low-altitude regions of southern central tree-covered mountains in Hainan. Caution is warranted when considering the potential habitat loss attributed to human activity and climate change." (Authors)] Address: Bu, W.j., College of Life Sciences, Nankai University, Tianjin, China. E-mail: wenjunbu@nankai.edu.cn



Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for multiple help, and Andreas Martens, Asmus Schröter, Cédric Vanappelghem, Geert de Knijf and Bernd Kunz for contributing papers to this issue.

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF) in cooperation with the WORLDWIDE DRAGONFLY ASSOCIATION (WDA)

## Editors:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Dr. Milen Marinov, 7/160 Rossall Str., Merivale 8014, Christchurch, New Zealand. E-mail: milen.marinov@canterbury.ac.nz

Published in Rheinfelden, Germany and printed in Trier, Germany.

ISSN 1438-0269

---

1998

## Last words ...

Going on with a project or task, requires a minimum of feedback. Compiling and preparing the abstracts of OAS requires on an average of 15 minutes per abstract. That is a lot of time considering that in the meantime nearly 16000 abstracts have been arranged. There have been less than the ever same 5-10 people – and I am more than thankful for their encouragement to go on with abstracting! – giving this feedback. More, it was and is frustrating to see that those responsible of WDA never engaged in this journal, even didn't inform the members via a simple e-mail when a new issue was ready, in spite we several times asked them to do so. In the beginning of OAS, Jill Silsby and the board of WDA supported the editors of OAS, but the new generations of boards obviously forgot, OAS was a journal of WDA too.

A journal without feedback is probably without benefit for the majority of readers, and will have to be ceased. And I do so with this double issue. This must not be the final end. But, any restart will depend on private priorities. Hope, there will be a few odonatologists missing OAS...

I am very thankful to Jill and Philip Corbet for all the encouragements without we never would have started the journal. I am thankful to Martin Lindeboom and Klaus Reinhardt for all the years of assistance, and especially to Milen Marinov. Thanks to Pawel Buczynski, who checked the spelling of Slavic languages. And thanks to all who provided papers to be considered as abstract.

Martin Schorr

**14994.** Hutchinson, J.M.C. (1998): Factors influencing the surface fauna of inland blue holes on South Andros, Bahamas. *Cave and Karst Science* 25(2): 83-92. (in English) ["We surveyed the macrofauna (particularly insects, molluscs and birds) of the surface waters of a series of inland, mostly anchialine, blue holes (flooded caves and associated lakes). The number of species was small, but the fauna varied considerably between holes. The following factors are evaluated as causes of these patterns: isolation and past inundation of Andros island, difficulty of dispersal between holes, topography (size of hole, water depth, whether ringed by cliffs), the surrounding vegetation, water quality (salinity, aeration, nutrients), tidal influence, human disturbance and pollution. Conservation issues are discussed, but generally the surface fauna is shared with far more extensive habitats on Andros. The same conclusion is drawn about the fauna of two subaerial caves associated with blue holes. .... A special study was made of Odonata. Around most holes we searched for exuviae, in some holes we found live nymphs, and we also noted whether adults were ovipositing. From this evidence at least seven species were breeding in blue holes: *Ischnura ramburi*, *Neoerythromma cultellatum*, *Anax junius*, *Brachymesia furcata*, *Erythrodiplax berenice*, *Macrodiplax balteata*, *Tramea onusta*. Table 1 shows the strong effect of salinity on diversity. *E. berenice* could breed even in the most saline holes, but the next two most tolerant species were not found breeding in salinities over 9.8 ppt. No dragonflies were observed around Swimming Hole and Co-op Hole despite each being visited twice in suitable conditions. The probable reason is that both lack shallows. The richest blue hole was Battle Hole (12 species), the least saline of the fracture-line holes, with extensive shallows, much algae and extensive overhanging vegetation. In comparison, several of the quarries filled with shallow fresh or weakly brackish water had 14 or

15 species frequenting them. In total we observed 26 species on South Andros, with indications of breeding for 16." (Author)] Address: Hutchinson, J.M.C., School of Biological Sciences, University of Bristol, Woodland Road, Bristol, BS8 1UG, UK. E-mail: John.Hutchinson@bristol.ac.uk

## 2000

**14995.** Davies, N.M.; Norris, R.N.; Thoms, M.C. (2000): Prediction and assessment of local stream habitat features using large-scale catchment characteristics. *Freshwater Biology* 45: 343-369. (in English) ["(1.) Knowledge of what a habitat should be like, in the absence of the effects of human activities, is fundamental to local stream habitat assessment. It has been suggested that stream habitats are influenced by large-scale catchment features. This study aimed to identify these relationships so that local-scale habitat features could be predicted from larger-scale characteristics. (2.) Fifty-one reference sites from the Upper Murrumbidgee River catchment, south-eastern Australia, were classified on the basis of the local features of their stream habitat. Large-scale variables, namely catchment area, stream length, relief ratio, alkalinity, percentage of volcanic rocks, percentage of metasediments, dominant geology and dominant soil type, provided sufficient information for classifying 69% of reference sites into appropriate reference site groups. (3.) A model created using these large-scale catchment variables was able to predict the local habitat features that were expected (E) to occur at a site in the absence of the effects of human activities. These were compared with observed (O) local habitat features to provide an observed-to-expected (O/E) ratio, an assessment score of the habitat at a site. The departure of this ratio from 1 enables identification of those sites that may be impacted. A list of habitat features that are expected at a site can provide targets for habitat restoration or enhancement. (4.) For impacted sites, when habitat assessment from the habitat predictive model was compared with biological assessment from the Australian River Assessment System (AUSRIVAS) predictive model, it was possible to identify whether habitat degradation or water quality degradation was the cause of biological impairment. Such assessment may make it possible to identify rehabilitation goals relevant to the biota." (Authors) Taxa are treated at family level, including Coenagrionidae and Gomphidae.] Address: Davies, N.M., Coop. Research Centre for Freshwater Ecology, Univ.Canberra, ACT 2601, Australia

**14996.** Thapa, V.K. (2000): Appendix to Order Odonata. An inventory of Nepal's insects, Vol. III. IUCN Nepal, Kathmandu. xi + 475 pp: 465-471. (in English) [Nepal; 63 species are checklisted with brief information on localities.] Address: IUCN Nepal, P.O. Box 3923, Kathmandu, Nepal

## 2001

**14997.** Purse, B.V. (2001): The ecology and conservation of the Southern Damselfly (*Coenagrion mercuriale*). PhD Thesis, University of Liverpool: 336 pp. (in English) ["This thesis presents an autecological study of *C. mercuriale*], a

rare insect that is on the northern edge of its range in Britain. The primary aims of this study were to examine habitat use (at both broad and small scales) and to investigate other aspects of development and behaviour in *C. mercuriale* with a view to devising appropriate management practices for the species. *Coenagrion mercuriale* was found to be restricted in its national and global distribution and was estimated to have undergone more than a 30% decline in its British distribution since 1985. It is a stenotopic species being highly sensitive to a number of habitat factors at both broad and small scales of habitat use. A requirement for a thermally advantageous microclimate was reflected in broad scale habitat use (e.g. use of shallow, sun-exposed, permanently flowing waterbodies indicated by perennial, herbaceous, aquatic vegetation) and in habitat use for oviposition and emergence by *C. mercuriale*. This species was found to have a semi-voltine life cycle in Britain, with a shorter larval growth period and flight period than in mainland European populations. Seasonal regulation is probably achieved in Britain by a facultative autumn diapause in the penultimate larval instar. In field experiments, mature adults of *C. mercuriale* exhibited a relatively low rate of emigration and travelled relatively short distances over non-habitat. However, examination of the distances between extant sites suggest that such rates of dispersal may be sufficient to promote founding and persistence of local populations within four large clusters of populations in Britain. Weather conditions, namely temperature were found to effect daily emergence, activity (including reproductive activity) and mature adult survival. Thus, in common with other thermophilic insects, *C. mercuriale* was found to be limited by temperature in many respects on the edge of its range. The requirement for a thermally advantageous microclimate restricts this species to an early successional stage in both its biotopes and a range of management practices are suggested for maintenance of such stages on *C. mercuriale* sites in Britain. Since rates of dispersal seemed highly dependent on landscape structure, management to facilitate movement between sites across non-habitat was also suggested." (Author)] Address: Purse, Beth, Population and Evolutionary Biology Research Group, Nicholson Building, Univ. Liverpool, School of Biological Sciences, Liverpool, L69 3GS, UK. E-mail: beth.purse@bbsrc.ac.uk

**14998.** U.S. Fish and Wildlife Service; Zercher, D. (2001): Hine's Emerald Dragonfly recovery plan. Fort Snelling, MN: 120 pp. (in English) ["Current Status: Hine's Emerald Dragonfly (*Somatochlora hineana*), was listed as endangered in January 1995. Extant *S. hineana* populations are currently known to persist in Illinois, Wisconsin, Michigan, and Missouri. The Illinois population is the most genetically diverse, and the Wisconsin populations are the largest and presumably most secure. Information on the status of the Michigan and Missouri populations is limited because of their recent discoveries. Historically known from Ohio and Indiana, it is thought to be extirpated from these states. Habitat Requirements and Limiting Factors: *S. hineana* occupies marshes and sedge meadows fed by calcareous groundwater seepage and underlain by dolomite bedrock. In general, these



areas are characterized by the presence of slowly flowing water and nearby or adjacent forest edges. Known occupied habitats are currently restricted to the lower Des Plaines River valley, in Illinois; northeastern Door County and Cedarburg Bog, Wisconsin; areas of the Hiawatha National Forest, in the Upper Peninsula of Michigan, three areas in the Lower Peninsula of Michigan, and at three fens in Missouri. Loss of this already rare and restricted habitat to agriculture, commercial and industrial development is the primary cause of the species' decline. Loss of remaining habitat from the same pressures, combined with successional change in the existing habitats and disruption of ecological and hydrological processes, are threats to surviving populations. Recovery Objectives: The objective of this recovery plan is to restore *S. hineana* to viable populations so that it may be removed from the Federal list of Endangered and Threatened Wildlife and Plants. Recovery Criteria: Each of the two Recovery Units contains a minimum of three populations composed of at least three subpopulations. Each subpopulation contains a minimum of 500 reproductive adults for 10 consecutive years. Within each subpopulation, there are at least two breeding habitat areas, each fed by separate seeps and/or springs. For each population, the habitat supporting at least three subpopulations should be legally or formally protected and managed for *S. hineana*, using long-term protection mechanisms such as watershed protection, deed restrictions, land acquisition, or nature preserve dedication. In addition, mechanisms protecting the up gradient groundwater watershed should also be in place." (Authors)] Address: U.S. Fish & Wildlife Reference Service, 5430 Grosvenor Lane, Suite 110, Bethesda, Maryland 20814, USA

## 2002

**14999.** Domek, P.; Joniak, T. (2002): Seasonal changes of macrobenthos under physiological and chemical water conditions in humic lakes. *Materialy 9 Ogólnopolskich Warsztatów Bentologicznych*. - [Abstracts of the 9th Polish Workshop of Benthology]. Mikolaj: 5. (in Bilingual in Polish and English) [Verbatim: The investigation on taxonomic content, density and dominance structure of benthos organisms was carried out in spring and autumn in 1999-2000. Three humic lakes of Drawieński National Park were researched; littoral as well as profundal zone were taken into account. Physico-chemical properties of the lake water were evaluated on the basis of field as well as laboratory analyses. Amount of humic substances (HS) dissolved in the water made it possible to classify Glodne Lake III (GL III) as a polihumic lake, Glodne Lake IV (GL IV) as a mesohumic, and Piaseczno Male Lake (PML) as an oligohumic lake (Eloranta 1999). HS influence the water colour, limit the range of euphotic layer, lower the pH and fix numerous organic as well as inorganic compounds into complexes that are difficult to decomposition. Concentrations of the dissolved reactive phosphorus (DRP) that is easily assimilated by the organisms, were in comparison to the amount of total phosphorus lower than usually associated with this type of lakes. Average annual concentrations of the DRP totaled not more than 0.01

mg P l-1; moreover, in PML the amount was average by a half lower than in other lakes. Concentrations of phosphorus undergo seasonal changes, especially in spring and autumn which is the time of lake water mixing. The modification of settlement conditions caused by the presence of HS, formed living conditions of benthos organisms the lakes. 28 taxons belonging to 10 systematic groups were found. PML and GL IV turned out to be the most rich in fauna (respectively 19 and 18 taxons). In the third of the investigated lakes 12 taxons of macrozoobenthos were found. In GL IV the number of taxons was much higher in autumn than in spring, and in the other lakes their number was similar regardless to the seasonal changes. The most qualitatively differentiated groups were Odonata: *Cordulia aenea*, *Enallagma cyathigerum*, *Ischnura elegans*, *Leucorrhinia* sp., *Pyrrhosoma nymphula* and *Somatochlora metallica*. Of all the other groups of insects only Ephemeroptera, Hirudinea and Coleoptera were represented by more than one taxon. In GL III the most numerous were Diptera (37%) and Ephemeroptera (33%), and the contribution of organisms of other groups, with the exception of Trichoptera, totaled less than 10%. In GL IV the dominance of Diptera was marked even more clearly (54%), and the second numerous were Hydracarina (22%). In PML Diptera constituted a large majority (80%) of macrozoobenthos and contribution of other groups, with the exception of Ephemeroptera, was minimal. Concentration of macrozoobenthos in littoral zone was mostly higher than in profundal and totaled from 2070 ind. m<sup>2</sup> in spring to 2438 ind. m<sup>2</sup> in autumn in GL IV, and in PML from 1426 ind. m<sup>2</sup> in spring to 2714 ind. m<sup>2</sup> in autumn. In profundal zone of GL III macrozoobenthos was not found. Altogether, in profundal zone 3 of all the 28 taxons were found.] Address: not stated

## 2003

**15000.** Goodwin, W.; Goodwin, V. (2003): First field guide to dragonflies of South Africa. SASOL First Field Guides. Random House Struik: 56 pp. (in English) ["This field guide introduces the little-known world of the colourful dragonflies and damselflies of southern Africa. The introduction explores dragonfly characteristics and biology, and offers useful advice for collectors. The author describes 35 species, their physical appearance, habits and habitat; and each account is accompanied by a drawing of the creature's genital appendage (its diagnostic feature), a colour photograph and distribution map." (Publisher)] Address: not stated

**15001.** Mitra, T.R. (2003): Fauna of Sikkim: Insecta, Odonata. State fauna Ser. Zoological Survey of India 9 (Sikkim 2): 125-164. (in English) [A monograph, covering 65 species, with synonymy, localities, descriptions and keys.] Address: Mitra, T.R., Zoological Survey of India, M-Block, New Alipore, Calcutta-700 053, India

**15002.** Theischinger, G.; Fleck, G. (2003): A new character useful for taxonomy and phylogeny of Anisoptera (Odonata). *Bulletin de la Société entomologique de France* 108(4): 409-412. (in English, with French summary) ["The

presence/absence of a well-defined, narrow, largely parallel sided, medio-basal groove of variable length on the ventral face of the prementum is introduced as a useful character for the separation of the larvae of corduliid/corduliine s. l. from libellulid/libelluline s. l. genera. It is pointed out that this groove is also present in some members of all epiproctophoran families. The distribution of the character in Libelluloidea, and its potential for rapid biological assessments and phylogenetic studies are discussed. It is suggested that the absence of the groove/suture is apomorphic. A table showing the hitherto established presence of the groove/suture in the corduliid genera of the World is presented." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

## 2004

**15003.** Bromham, L.; Woolfit, M. (2004): Explosive radiations and the reliability of molecular clocks: Island endemic radiations as a test case. *Syst. Biol.* 53(5): 758-766. (in English) ["The reliability of molecular clocks has been questioned for several key evolutionary radiations on the basis that the clock might run fast in explosive radiations. Molecular date estimates for the radiations of metazoan phyla (the Cambrian explosion) and modern orders of mammals and birds are in many cases twice as old as the palaeontological evidence would suggest. Could some aspect of explosive radiations speed the molecular clock, making molecular date estimates too old? Here we use 19 independent instances of recent explosive radiations of island endemic taxa as a model system for testing the proposed influence of rapid adaptive radiation on the rate of molecular evolution. These radiations are often characterized by many of the potential mechanisms for fast rates in explosive radiations — such as small population size, elevated speciation rate, rapid rate of morphological change, release from previous ecological constraints, and adaptation to new niches — and represent a wide variety of species, islands, and genes. However, we find no evidence of a consistent increase in rates in island taxa compared to their mainland relatives, and therefore find no support for the hypothesis that the molecular clock runs fast in explosive radiations." (Authors) The study includes data on the genus *Megalagrion*.] Address: Bromham, Lindell, Centre for the Study of Evolution, School of Life Sciences, University of Sussex, Falmer, Brighton, BN1 9QG, UK. E-mail: lindell@sussex.ac.uk

**15004.** Kumar, A.; Sharma, G. (2004): Some selected fauna of Gobind Pashu Vihar. *Odonata. Zoological Survey of India* 18(90): 5-8. (in English) [Records of 12 odonate species are based on the collection of Odonata from the Wildlife Sanctuary in the Northern Regional Station of Zoological Survey of India at Dehra Dun.] Address: Kumar, A., Northern Regional Stn., Zool. Surv. India, Dehra Dun-248195, India

**15005.** Mitra, T.R. (2005): *Calicnemia miniata doonensis* Sangal and Tyagi a synonym of *Calicnemia carminea pyrrosoma* Lieftinck (Insecta: Odonata: Plalycnemididae). *Records of the Zoological Survey of India* 104(3-4): 161-162. (in English) ["Taxonomic status of *Calicnemia miniata doonensis* Sangal & Tyagi has been discussed; and contended that *C. m. doonensis* Sangal & Tyagi is the junior synonym of *C. carminea pyrrosoma* Lieftinck." (Author)] Address: Mitra, A., Northern Regional Station, Zooll. Survey of India, 218 Kaulagarh Roads, Dehra Dun - 248195, India

**15006.** Nel, A.; Petrulevicius, J.F.; Gentilini, G.; Martinez-Delclos, W. (2005): Un nouvel Odonate du Miocene d'Italie (Odonata). *Bulletin de la Société entomologique de France* 110(2): 188. (in French) ["Gen. et sp. A" in Nel, A.; Petrulevicius, J.F.; Gentilini, G.; Martínez-Delclòs, X. (2005): Phylogenetic analysis of the Cenozoic family Sieblosiidae (Insecta: Odonata), with description of new taxa from Russia, Italy and France. *Geobios* 38(2): 219-233, is named: *Italolestes stroppai* n. sp.] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**15007.** Rouquette, J.R. (2005): Conservation requirements of the Southern Damselfly in chalkstream and fen habitats. *Science Report SC000017/SR*. Environment Agency, Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, BS32 4UD: V, 160 pp. (in English) ["Background: This report presents the findings of a PhD study investigating the ecology and conservation requirements of *C. mercuriale* in chalkstream and fen habitats in the UK. *C. mercuriale* is a species of conservation concern. Its status in Europe is considered to be 'very vulnerable' and it is threatened over much of its range. It is listed on the EC Habitats and Species Directive and is the only species of dragonfly or damselfly currently given priority status in the UK Biodiversity Action Plan. Further research into the damselfly's ecological requirements was identified as a key requirement in the Species Action Plan, published in 1995. Since that time, a number of studies have been undertaken, including a doctoral thesis on the ecology of the species in heathland streams (Purse 2001, and published as R&D Technical Report W1-021/TR). However, little work has been carried out on *C. mercuriale* in chalkstream and fen habitats in the UK and so important gaps remain in our knowledge of this species. Main objectives: The primary aim of this study was to examine the ecology and habitat requirements of this species in its chalkstream and fen habitats. It is hoped that the study will provide a basis for further conservation efforts, by guiding habitat management plans, informing conservation strategies and suggesting targets for surveillance and monitoring programmes. Fieldwork was performed primarily in the Itchen and Test Valleys in Hampshire (southern England), but also in fen habitat in Oxfordshire and Anglesey. Results: A large multi-site mark-release-recapture study revealed that *C. mercuriale* was extremely sedentary, with dispersal only occurring between adjoining

sites. The median net lifetime movement was 31.9 m and lifetime movements of greater than 500 m were rare. Factors affecting movement are examined and evidence of inverse density dependent movement is provided. It is argued that this latter finding, together with the short distances moved, has profound consequences for the population dynamics and conservation of this species. Adult *C. mercuriale* density and movement were analysed in relation to habitat variables and local population size. Mean adjacent population density was the single most important factor determining density. However, the species was also shown to be associated with a number of habitat features, the most important of which were: a channel substrate consisting primarily of silt, wide underwater ledges (berms), in-channel Conservation requirements of *C. mercuriale* in chalkstream and fen habitats emergent dicots, and bankside monocots. The presence of trees was negatively associated with damselfly density. *C. mercuriale* larvae were found to occur more often and in greater abundance at sites that contained abundant emergent dicots, particularly in smaller, more marginal channels with slow flow. They were rarely found in areas with much tree cover and were more abundant in locations where the banksides were open to grazing and with gentle or stepped bank profiles. *Apium nodiflorum* (fool's water-cress) and *Rorippa nasturtiumaquaticum* (water-cress) were found to be particularly important. Furthermore, they were associated with certain macroinvertebrate taxa that were indicative of well-vegetated, moderate to slow flowing waterbodies, with a predominantly silty substrate. Habitat requirements of adults and larvae have been found to be similar, although larvae were found in greatest abundance in habitats that were slightly further along the successional sequence than those favoured by adults. The nighttime roosting location of adult *C. mercuriale* has also been examined and it has been established that adults are strongly associated with two tussock-forming monocots, *Juncus inflexus* (hard rush) and *Deschampsia cespitosa* (tufted hair grass). Differences in the abundance of these plants have been shown to result in large differences in the number of *C. mercuriale* roosting in different parts of the study site. Conclusions and recommendations: It is concluded that loss of habitat, alterations to management on remaining sites and fragmentation of a once continuous network of sites, are likely to have been the driving forces behind the decline of this species, and that these remain the greatest threats to its continued existence. It is argued that successful conservation of *C. mercuriale* will involve active management of existing sites, together with the creation (or recreation) of a series of new sites to reconnect populations. Recommendations regarding the monitoring, conservation and management of *C. mercuriale* are presented and include: • New habitat should be created within 500 m to 1 km of existing sites, to create a series of 'stepping-stones' that would rejoin existing populations. • Sluice gates should be installed at some sites to enable proper control over water flow. New ditches created should be shallow and slow flowing throughout, or have ample shallow margins. Bank profiles should be shallow or stepped. • Ditch management operations should be carried out every few years on existing

sites to prevent excessive siltation and vegetation choking the channels. Work should be performed on short sections of ditch on rotation or on one side of the channel only. In all deeper channels shallow berms should be created during dredging work. • Banksides should be lightly grazed by cattle right to the water's edge. Extensive shading should be avoided." (Author)] Address: Rouquette, J.R., University of Liverpool, Liverpool, L69 3BX, UK

**15008.** Terzani, F.; Marconi, A. (2005): Odonati del Trentino-Alto Adige e del Cadore (Italia settentrionale) (Odonata). *Onychium* 3: 1-10. (in Italian, with English summary) [Dragonflies from Trentino-Alto Adige and Cadore (Northern Italy). A total of 575 specimens belonging to 18 genera and 32 species was collected in 53 stations of Trentino-Alto Adige and Cadore. *Erythromma viridulum* is new for Cadore.] Address: Terzani, F., Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

## 2006

**15009.** Garzon Sanabria, C. (2006): Caracterización de la fauna de Odonata (Insecta) en el área metropolitana de Bucaramanga/Santander. Tesis de Pregrado. Universidad Industrial de Santander. Bucaramanga: 41 pp. (in Spanish, with English summary) ["Characterization of the fauna of Odonata (Insecta), in the metropolitan area of Bucaramanga-Santander. - Naiad and adult specimens of the Order Odonata were collected during August 2005 to March 2006 taking into account the climatic regime. As a result, a total of 700 specimens distributed in seven families, 27 genera and 52 species were obtained, representing 22% of the Odonata fauna recorded for the country. *Anax amazili* is reported for Colombia for the first time. Correlation found between species collected as naiads and as adults per sampling site was not complete. Shannon Weiner's Indices of diversity (Fairness), Margalefs species richness, Berger Parker Dominancy, and Jaccard's similarity coefficient were calculated in order to determine a possible relationship between the dragonfly community and the ecological state of the ecosystems. A test of correlation of Mantle cloth between the composition of species in each station and the distance in Kilometers among them, was made. The communities of dragonflies were found to respond to conditions particular to each station, which could be attributed to the present fragmentation effects in the study area, and to the intraspecific competition (for territory, mate, food) characteristic of this order." (Author)] Address: Garzon Sanabria, Carolina, Laboratorio de Zoología y Ecología Acuática (LAZOEA), Universidad de los Andes, Apartado 4976, Bogotá D.C., Colombia. lc.garzon88@uniandes.edu.co

**15010.** Marconia, A.; Terzani, F. (2006): Odonati della Sierra Leone (Odonata). *Onychium* 4: 1-22. (in Italian, with English summary) ["The purpose of this study has been to analyze odonatological material belonging to the "La Specola" Zoological Museum in Florence which was not included in Carfi & D'Andrea (1994). This material amounts



to nearly 300 specimens belonging to 35 genera and 74 species pertaining to 9 families. New to Sierra Leone are *Pseudagrion kersteni*, *Heliaeschna fuliginosa*, *Ictinogomphus ferox*, *Phyllomacromia* cf. *lamottei*, *Trithemis aconita* and *Trithemis hecate* and *Palpopleura jucunda*. A female gomphid specimen has been described but cannot be ascribed to any known genus or species." (Authors)] Address: Terzani, F., Museo di Storia Naturale dell'Universita di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

**15011.** Rowshan Akhter, U.S. (2006): The life history of *Ceriagrion coromandelianum* (Fabricius) (Odonata: Coenagrionidae). *Bangladesh J. Zool.* 34(1): 117-126. (in English) ["Mating, oviposition, eggs, different larval instars and duration of the larval period of *Ceriagrion coromandelianum* (Fabricius) collected from Ramna Lake, Dhaka city, Bangladesh, are described." (Author)] Address: Rowshan Akhter, U.S., Department of Zoology, Eden Girls College, Dhaka-1000, Bangladesh

## 2007

**15012.** Contreras-Gardun o, J.; Buzatto, B.A.; Abundis, L.; Nájera-Cordero, K.; Córdoba-Aguilar, A. (2007): Wing Colour Properties do not Reflect Male Condition in the American Rubyspot (*Hetaerina americana*). *Ethology* 113: 944-952. (in English) ["Adult males of *H. americana* dispute riverine territories where females arrive to mate. On the wing basis, these males bear a red pigmentation spot whose area correlates with territorial disputes and mating rate: males with larger spots are more successful. This is explained by the fact that spot size correlates with fat muscular reserves which fuel flight during territorial intrusions. To further our understanding of sexual selection acting on the spot, here we have examined possible differences in three spot colour properties (red chroma, hue and brightness) in three distinct adult male ages [young, middle-aged (when males are more likely to defend a territory) and old], social status (territorial and non-territorial in middle-aged males), and under two potentially, energetically and costly situations: when faced with an immune challenge [comparing a nylonimplanted male group vs. a non-implanted male group in two ages, teneral (previous to colour formation) and middle-aged] and low diet levels (comparing a male set of middle-aged animals that received food ad libitum vs. a male set that received no food). Our results indicate no change in colour properties across any of these comparisons. Taken together, these and previous results suggest that only spot size but not the spot characteristics we measured here, is sexually selected in males of this species at least in terms of pre-copulatory male–male competition. That some of these colour properties have been related to male condition in other calopterygid damselflies cannot be generalized to the *H. americana*." (Authors)] Address: Córdoba-Aguilar, A., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

**15013.** Lahiri, A.R.; Sandhu, R.; Walia, G.K. (2007): *Gynacantha pallampurica* sp. nov. from Northern Himachal Pradesh, India (Odonata: Aeshnidae). *Rec. Zool. Surv. India* 107(3): 45-49. (in English) ["*Gynacantha palolampurica* sp. nov. is described from northern Himachal Pradesh together with illustration and comparative notes (*C. dravida*). Holotype male, Andretta (Pallampur, Himachal Pradesh), 29.ix.2004, coll. G. Walia "in the vicinity of a montane stream surrounded by a thick vegetation" (ZSI Regd. No. 39581H I 3); Allotype female, same data as the Holotype (ZSI Regd. No. 39601H 13) (tip of right forewing lost); Paratype male, same data as the Holotype (ZSI Regd. No. 3959/H 13); Paratype male, same data as the Holotype (ZSI Regd. No. 3961/H13); Paratype male, same data as the Holotype (ZSI Regd. No. 3962/H13) (tip of abdomen lost). The Types have been deposited in the National Zoological Collection." (Authors)] Address: Walia, G.K., Zoology Department, Punjabi University, Patiala-147 002, India

**15014.** Muddeman, J.L. (2007): Primera cita de *Boyeria irene* (Fonscolombe, 1838) (Odonata: Aeshnidae) en Madrid. *Boln. S.E.A.* 41: 382. (in Spanish) [5-IX-2007 fui al Río Cofio, near Valdemaqueda, Madrid (30TUK899828), Spain. The note also includes a record of a road kill of *B. irene*.] Address: Muddeman, J.L., C/ Alcocer 1-1°C, 28214 Fresnedillas de la Oliva, Madrid, Spain. E-mail: john@iberian-wildlife.com

## 2008

**15015.** Couvreur, J.M.; Dufrière, M.; Goffart, P.; Vandevyvre, X.; Etienne, F.; Testaert, D. (2008): Nouvelles estimations des effectifs de l'Agrión de Mercure (*Coenagrion mercuriale*, Zygoptera- Coenagrionidae) dans la plaine du Biran (commune de Beauraing, Belgique) avec une analyse des principaux facteurs écologiques expliquant son abondance. *Bulletin S.R.B. E. / K.B.V.E.* 144: 101-115. (in habitat managing, shrub cover, bank's height, vegetation cover, watercourse's width) ["In this paper we made new estimations of the population of *C. mercuriale* in the Biran's plain (Beauraing - Belgium). A series of ecological factors were also analysed to determine which ones could best explain the differences in abundance, in order to give practical information for managing the watercourses and their surroundings. The results show that though the observed correlation between pH and the abundance of *C. mercuriale* need further investigations, other correlations with physical factors such the degree of shadowing of the watercourse, the banks' height, the watercourse's width and the percentage cover by waterplants revealed themselves to be important to explain the distribution of the species on the site and to give important cues to manage and restore the habitat." (Authors)] Address: Couvreur, J.M., Service Public Wallon (SPW) – Départ. de l'Etude du Milieu naturel et agricole (DEMna), Av. Maréchal Juin 23, B-5030 Gembloux, Belgique. E-mail: jeanmarc.couvreur@spw.wallonie.be

**15016.** Terzani, F.; Carletti, B. (2008): Odonatofauna Toscana: il punto sulle attuali conoscenze della distribuzione regionale (Italia Centrale) (Odonata). *Onychium* 6: 2-24. (in Italian, with English summary) ["The oro-hydrographic position of Tuscan dragonflies preserved in both public and private collections are reported together with their flight period and the number of taxa found at altitude intervals of 200 m." (Authors)] Address: Terzani, F., Museo di Storia Naturale dell'Universita di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: agrion@katamail.com

## 2009

**15017.** Gillies, C.L.; Hose, G.C.; Turak, E. (2009): What do qualitative rapid assessment collections of macroinvertebrates represent? A comparison with extensive quantitative sampling. *Environ. Monit. Assess.* 99: 99-112. (in English) ["It is a fundamental tenet of Rapid Biological Assessments (RBA) that the samples collected reflect the community from which they are drawn. As with any biological sampling, RBA collections are subject to sampling error resulting in the omission of some taxa. The aim of this study is to compare the composition of RBA samples with an estimate of community structure based on extensive quantitative sampling. We used logistic regression to explore the relationships between the frequency of a taxon being collected in an RBA sample and its biological and ecological traits, namely its abundance, distribution, body size and habit. RBA samples and quantitative estimates of community structure were made in riffles in the Kangaroo and Nepean Rivers, New South Wales, Australia. Single RBA samples may collect up to 63% of the taxa that are collected by extensive quantitative sampling at a site. The frequency of a taxon being recorded in an RBA sample was significantly and positively related to all traits tested indicating a bias in the collection methods towards large, abundant and widely distributed taxa. Accordingly, taxa missed by RBA sampling were generally small, narrowly distributed or rare. These findings enhance our understanding of what RBA samples represent, and the bias and source of errors associated with RBA sampling. This study also quantifies the utility of RBA methods for biodiversity assessment." (Authors) Taxa - including Odonata - are treated at family level.] Address: Hose, G.C., Depart. Biological Sciences, Macquarie University, Sydney, NSW 2109, Australia. E-mail: ghose@els.mq.edu.au

**15018.** Hassall, C. (2009): Dragonfly and man. *Antenna* 33(2): 98-99. (in English) [Verbatim: It is impossible to ignore the presence of a group of organisms so biologically fascinating and aesthetically striking as the dragonflies and damselflies. This has resulted in their inclusion within the folklore of cultures wherever they occur, although different traditions are divided over whether they represent good or evil. In the East dragonflies are revered as beautiful, noble creatures. So strong is this sentiment that the dragonfly became a national symbol of Japan. After a 7th century Japanese emperor observed a dragonfly killing a gadfly by which he had just been bitten, a haiku was written which renamed

central Japan Akitsu-shima ("Land of the Dragonflies") in honour of the creature. Dragonflies feature widely in eastern medicine, art, poetry (particularly haiku) and even cuisine, where they traditionally feature as a staple part of the Balinese diet when other food sources are rare. The West, on the other hand, has been far more suspicious of the dragonfly. This is immediately evident in some of the colloquial names for the insects: "horse stinger" (UK and Australia), "devil's darning needle" (USA), "troll's spindle" (Sweden) and "eye poker" (Norway). The various legends which give rise to these monikers involve a range of fallacious "old wives tales". The Native Americans are alone among western peoples in considering the dragonfly to be a positive entity, associating it with renewal, swiftness and purity of water. Interestingly, this final belief in the dragonfly as an indicator of water quality has been confirmed and exploited by modern environmental science. Studies of mankind's effects on freshwaters have revealed that the dragonfly and damselflies are particularly sensitive to these impacts, making them ideal "ecological indicators". Indeed, the monitoring of river quality in Europe involves a survey of the invertebrate communities, including a range of dragonfly species, inhabiting those bodies of water in order to make inferences about the state of the river. For all the distrust of dragonflies in the west, there is no doubt that they perform valuable ecological services. Among other tasks in the ecosystem, dragonflies consume vectors of disease, such as mosquitoes, as well as preying on biting and stinging insects, throughout both the aquatic and terrestrial stages of their life cycles. They, in turn, provide a major food source for fish, thus forming a link between the smaller invertebrates in aquatic systems and the larger vertebrate predators. The ancient nature of the order Odonata (which comprises dragonflies and damselflies) is remarkable compared to other orders of animals. The earliest fossil Odonata have been found in sediments from the Lower Permian which date back 250 million years. This is 10-15 million years before the first dinosaur and considerably older than the oldest representative of the primate order (in which *Homo sapiens* is found), which has only recently been pushed back to 85 million years ago. It has been proposed that groups of organisms such as the Odonata that have such extensive and ostensibly stable evolutionary histories should be resilient to modern global change. Evolutionary time can be likened to a hurdles race: the Odonata have persisted through many trials and tribulations, including four major extinction events (one of which claimed the dinosaurs) and countless less severe oscillations of climate and geology. Each of these represents a hurdle over which an organism must leap to survive. However, clearing each hurdle requires certain adaptations and those adaptations will be inherited by successive generations of that species, enabling it to clear similar hurdles in the future. By this reasoning, the modern Odonata should possess a battery of adaptations that leaves them prepared for almost anything Nature could throw at them. Unfortunately it is at this point where the tale becomes less positive for, although the Odonata are extremely flexible in terms of adapting to changes in environmental conditions, there is

evidence that the modern phase of climate change is unprecedented in their evolutionary history. This, therefore, represents a new hurdle which some or all of the Odonata may fail to clear. Added to this is the synergistic impact of other detrimental, anthropogenic factors such as the pollution of water bodies, the draining of marshes and fens and even the well-intentioned (though ultimately destructive) "amelioration" of water bodies through dredging and introduction of damaging plant and fish species. Thus, while humans have a tendency to view dragonflies in a negative light, it is in fact the dragonflies that suffer from their interaction with man. With popular naturalism beginning to show a greater appreciation for the invertebrate world as well as the more traditional cute and cuddly vertebrates, we can only hope that the public will be inspired to help in the conservation of these creatures. For surely there can be few groups of organisms more appropriate as flagship species for the conservation of our wetlands than the dragonflies.] Address: Hassall, C., School of Biology, University of Leeds, Leeds, LS2 3JT, UK. E-mail: c.hassall@leeds.ac.uk

**15019.** Hu, Z.; McCauley, R.; Schaeffer, S.; Deng, X. (2009): Aerodynamics of dragonfly flight and robotic design. 2009 IEEE International Conference on Robotics and Automation, Kobe International Conference Center, Kobe, Japan, May 12-17, 2009: 3061-3066. (in English) ["A pair of dynamically scaled robotic dragonfly model wings was developed to investigate the aerodynamic effect of wing-wing interaction in dragonfly flight. Instantaneous aerodynamic forces were measured while forewing-hindwing phase difference ( $\gamma$ ) was systematically varied. Experimental results showed that, i) for hovering flight,  $\gamma = 0^\circ$  enhanced the lift force on both forewing and hindwing;  $\gamma = 180^\circ$  reduced the total lift force, but was beneficial for vibration suppression and body posture stabilization. In nature,  $0^\circ$  is employed by dragonflies in acceleration mode while  $180^\circ$  is usually in hovering mode. ii) For forward flight, wing-wing interaction enhances forewing lift while reduced hindwing lift at all phase differences. Furthermore, the total lift was slightly reduced for  $\gamma = 0^\circ$  to  $90^\circ$  and significantly reduced by 18% when  $\gamma = 270^\circ$ . The results consist well with the fact that, dragonflies usually employ  $50^\circ$  to  $100^\circ$  for forward flight, but seldom employ  $270^\circ$ . PIV results are shown for wing-wing interaction analysis." (Authors)] Address: Deng, X., Mechanical Engineering Department, University of Delaware, Newark, DE 19716 USA. E-mail: Deng@udel.edu

**15020.** Machado, A.B.M. (2009): *Palaemnema brasiliensis* spec. nov., first Platystictidae record from Brazil (Zygoptera). *Odonatologica* 38(3): 255-260. (in English) ["The new species is described and illustrated based on male specimens collected in the State of Amapá. Holotype male: Brazil: Amapá, Serra do Navio, I-1957. It is close to *P. edmondi* Calvert and *P. brevigioni* Machet." (Author)] Address: Machado, A.B.M., Departamento de Zoologia, Inst. Cienc. Biol., Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil. E-mail: angelo@icb.ufmg.br

**15021.** Norma-Rashid, Y. (2009): Odonata diversity with one new record for Malaysia in the Kenaboi Forest Reserve, Negeri Sembilan, Malaysia. *Malaysian Journal of Science* 28(4): 65-72. (in English, with Malaysian abstract) ["87 species of Odonata were recorded from the Kaneboi Forest Reserve, Negeri Sembilan. Twelve family groups out of 14 available for the Peninsular were represented. The major highlight is the discovery of the *Gynacantha dravida* belonging to the Family Aeshnidae as a new record for Malaysia. The distribution of species among 3 categories of habitat structure mainly, stagnant waters in ponds, slow to moderate water flow in lowland streams and fast flowing waters in rocky montane areas of waterfall indicated preferred habitat in most species. A number of elusive species were discovered, these are illustrated with diagnostic features described and portrayed. Sensitive species that warrant attention, indicative of atypical habitat requirement are also discussed." (Authors)] Address: Norma-Rashid, Y., Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia. E-mail: ynorma@um.edu.my

**15022.** Trapero-Quintana, A.; Naranjo López, C. (2009): Clave para la identificación de especies de Odonata en estado larval de Cuba. *Boletín de la Sociedad Entomológica Aragonesa* 44: 459-467. ["A set of 24 illustrated dichotomous keys is given for the taxonomical identification of the last instar larvae of 77 species of Odonata reported for the Cuban archipelago. The keys allow the identification of the larvae at the taxonomic levels of suborder, family, genus and species. There are eight species which last instar larva is yet to be described." (Authors)] Address: Trapero-Quintana, A., Universidad de Oriente. Patricio Lumumba s/n, Santiago de Cuba, 90500, Cuba. E-mail: atrapero@cnt.uo.edu.cu

## 2010

**15023.** Barbarin, J.-P. (2010): Recherche d'espèces patrimoniales Odonates - site Natura 2000 Val d'Allier FR-8301038 « Val d'Allier Pont-du-château-Jumeaux Alagnon », Année 2010. Société d'histoire Naturelle Alcide-D'Orbigny, 57 rue de Gergovie, F-63170 Aubière, France: 20 pp. (in French) [Puy-de-Dôme, France; with focus on *Coenagrion mercuriale* and *Oxygastra curtisii* and considering *Ophiogomphus cecilia* and *Leucorrhinia pectoralis*, the results of mapping scheme in 2010 are presented.] Address: Barbarin, J.-P., Société d'histoire Naturelle Alcide-D'Orbigny, 57 rue de Gergovie, F-63170 Aubière, France. www.shnao.net

**15024.** Corazza, C.; Pantaleoni, A.; Sangiorgi, A.; Lefosse, S. (2010): Indagini sull'ecosistema del Po di Primaro, con particolare riferimento ai macroinvertebrati acquatici (Rete Natura 2000, ZPS IT 4060017, Ferrara, Emilia-Romagna, Italia). *Quaderno di Studi e Notizie di Storia Naturale della Romagna* 31: 11-30. (in Italian, with English summary) [Studies on the freshwater ecosystem of the Po of Primaro



river, with particular reference to the benthos macroinvertebrates (Natura 2000 network, SPA IT4060017, Ferrara, Emilia-Romagna, Italy. The hyper eutrophicated river only harbours common odonate taxa: *Ischnura elegans*, *Crocothemis erythraea*, *Sympetrum* sp.) Address: Corazza, Carla, Stazione di Ecologia, Museo di Storia Naturale, via De Pisis, 24, 44121 Ferrara, Italy. E-mail: c.corazza@comune.fe.it

**15025.** Dolný, A.; Mižicová, H. (2010): Habitat requirements and significance of artificial habitats of critically endangered dragonfly *Sympetrum depressiusculum*. *Cas. Sleš. Muz. Opava (A)*, 59: 113-119. (in English, with Czech summary) ["*S. depressiusculum* is currently endangered throughout Europe. This dragonfly, originally from central Siberia, inhabits a close range of natural habitats in Europe, which is even more reduced by inappropriate interventions into the hydrological regime of rivers and lakes. As a result of the anthropogenic changes in aquatic habitats, the species abandons quickly and irreversibly its natural habitats, especially alluvial areas of lakes and unregulated rivers. Recently, however, the species has appeared in artificial habitats, where under suitable conditions numerous populations can be formed. One of the most significant alternative habitats for *S. depressiusculum* are fish breeding ponds. These ponds obviously meet the habitat requirements of the species, because several cases of occurrence have been recorded in these artificial habitats in Central Europe. This paper is primarily focused on the occurrence of the species in fish breeding ponds in the North Moravia region in the Czech Republic. It analyses the factors that influence the occurrence of the species in artificial habitats (fish breeding ponds) in relation to its habitat requirements." (Authors)] Address: Dolný, A., Katedra biologie a ekologie, Přírodovědecká fakulta Ostravské univerzity, Bráfova 7, 701 03, Ostrava 1, Czech Republic. E-mail: Alnes.Dolny@osu.cz

**15026.** Gligorovic, B.; Pesic, V.; Zekovic, A. (2010): Check List of the Dragonflies of the Skadar lake district. *Scripta Scientiarum Naturalium* 1: 101-106. (in English) [The Lake Skadar's drainage basin is situated between 18 41' and 19 47' East longitude and 42 58' and 40 10' North latitude. Located in a karst terrain in the outer part of the southeastern Dinaric Alps, Lake Skadar is the largest of the Balkan lakes. 49 odonate species are listed.] Address: Gligorovic, B., Department of Biology, Faculty of Sciences, University of Montenegro, Cetinjski put b.b., 81000 Podgorica, Montenegro, E-mail: bogic1@cg.yu

**15027.** González-Santoyo, I.; Córdoba-Aguilar, A.; González-Tokman, D.M.; Lanz-Mendoza, H. (2010): Phenoloxidase activity and melanization do not always covary with sexual trait expression in *Hetaerina* damselflies (Insecta: Calopterygidae). *Behaviour* 147: 1285-1307. (in English) ["Sexual selection theory indicates that males use sexual traits to signal immune ability, a hypothesis known as the immunocompetence principle. A positive relationship between sexual traits and immune ability is not always present. Here we illustrate this pattern by using five damselfly

species in the genus *Hetaerina*. Previous studies have documented a positive correlation between sexual trait expression (wing spot size) and immune ability in members of this genus. These studies have also documented that there are fitness and energetic costs of producing and bearing wing pigmentation. First we used five *Hetaerina* species to investigate the correlation between spot size and phenoloxidase (PO) activity (a key insect immune component) in two contrasting seasons. Second, we experimentally challenged males of two *Hetaerina* species and correlated spot size with PO activity and melanization ability. Results indicate either a positive relationship, a negative relationship or, more commonly, no relationship at all between immune components and wing pigmentation. Season did not predict any of these relationships or expression of spot size and PO activity. These results, although limited to two immune components, indicate that the relationship between sexual trait expression and immunity is not always consistent." (Authors)] Address: Córdoba-Aguilar, A., Depto de Ecología Evolutiva, Instituto de Ecología, Univ. Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

**15028.** Iserbyt, A.; Bots, J.; Van Gossum, H.; Jordaens, K. (2010): Did historical events shape current geographic variation in morph frequencies of a polymorphic damselfly? *Journal of Zoology* 282: 256-265. (in English) ["In several animal species, discrete, heritable phenotypic morphs occur in one sex only. This phenomenon is commonly observed in damselfly species where the coexistence of different female colour morphs is often explained in the context of sexual conflict. However, theories based on sexual conflict alone appear to be insufficient for explaining the inter-population variation in morph frequencies. A case in point is the widespread North American damselfly *Nehalennia irene*, in which one female morph occurs predominantly in populations in Western Canada, while another morph is more common in Eastern Canada. Given its large distribution range, historical events may be of particular relevance in explaining the observed spatial variation in morph frequencies in this species. In order to relate the distribution of female morph frequencies with the population genetic structure, we studied sequence variation in five mtDNA gene fragments. Moreover, we compared the population genetic structure of *N. irene* with its sister species *Nehalennia gracilis*, which lacks female polymorphism. Remarkably, our results indicate that the overall genetic variability is three times lower in *N. irene* than in *N. gracilis*, which might be related to the availability of the species' preferred habitat. Furthermore, haplotype and nucleotide diversity of *N. irene* differed considerably among sampled sites and appears to be related to the spatial distribution in female morph frequencies. In addition to previously studied selective agents, we suggest that the species' evolutionary history, such as random genetic drift during recolonization, may also be important in explaining the current geographical distribution of female morph frequencies." (Authors)] Address: Iserbyt, A., Evolutionary Ecology Group, University of Antwerp, Antwerp, Belgium. E-mail: arne.iserbyt@ua.ac.be

**15029.** Sharma, G. (2010): Fauna of Ranthambhore National Park. 5. Insecta: Odonata. Conservation Area Series 43: 67-74. (in English) [In January 2000, ten common Indian odonate species were recorded in Ranthambore National Park, Swaimadhopur, Rajasthan.] Address: Sharma, G., Desert Regional Centre, Zoological Survey of India, Jodhpur, India

**15030.** Staufer, M. (2010): Die Verbreitung der Asiatischen Keiljungfer (*Gomphus flavipes*) an Thaya und March. Endbericht. Im Auftrag des WWF Österreich Wien, November 2010: 21 pp. (in German, with English summary) ["The occurrence of the River Clubtail (*Gomphus flavipes*) at the Morava and Dyje — *G. flavipes* is Europe-wide endangered and in Austria critically endangered. It occurs in Austria mainly in the floodplains of Morava and Dyje. Within this research the occurrence of *G. flavipes* at these two lowland rivers along the Austrian-Czech-Slovakian border area was investigated. Main emphasis was to provide evidence of breeding and to assess conservation status of the population on the basis of exuviae. The species is indigenous at the entire section of the Dyje from km 15-0 and at the Morava from km 69-12. Highest amounts of emergences were found at the upper Morava (Hohenau to Sierndorf). This part of population has an excellent conservation status. Part populations at the middle Morava (Jedenspeigen to Zwerndorf) are in good and the ones of Dyje and lower Morava (Zwerndorf to Marchegg) in moderate to poor condition. Additionally exuviae of *Ophiogomphus cecilia* and *G. vulgatissimus* were registered. The conservation status of *O. cecilia*, which is listed in Annex II and IV of the Habitats Directive, was found to be good at the Dyje, the upper and the middle part of the Morava but only moderate to bad at the lower Morava. Within this study there are no evidences from km 17 downstream. Only few *G. vulgatissimus* were recorded, due to the earlier emergence and main flight period of this species." (Authors) ([https://www.bmlfuw.gv.at/dam/jcr:f0a2bf7f-979b-4d62-b317-161d774515ed/Keiljungfer\\_Endbericht.pdf](https://www.bmlfuw.gv.at/dam/jcr:f0a2bf7f-979b-4d62-b317-161d774515ed/Keiljungfer_Endbericht.pdf))] Address: Staufer, Martina, Dept für Biodiversität der Tiere, Fakultät für Lebenswissenschaften, Univ. Wien, Rennweg 14, A-1030 Wien, Austria. E-mail: m\_staufer@web.de

**15031.** Strobbe, F.; McPeck, M.A.; De Block, M.; Stoks, R. (2010): Survival selection imposed by predation on a physiological trait underlying escape speed. *Functional Ecology* 24: 1306-1312. (in English) ["(1.) In contrast to other phenotypic traits, selection on physiological traits remains largely undocumented. We have evaluated survival selection imposed by predation by dragonflies on the activity of arginine kinase (Ak), a key enzyme delivering energy for escape performance in invertebrates. (2.) To accomplish this, we conducted a semi-natural field enclosure experiment in which we manipulated predation by large dragonfly predators, and quantified escape swimming speed and Ak in the prey, the damselfly *Enallagma vesperum*. To avoid confounding selection on Ak with selection on other swimming speed-related variables, we also scored all morphological and behavioural traits thought to underlie swimming speed in these

damselflies. (3.) Dragonfly predators imposed considerable mortality and selected for faster swimming speed and higher activity levels of Ak. Furthermore, higher Ak levels contributed to higher swimming speeds, confirming the mechanistic role of Ak for escape performance. Although morphological (size of the caudal lamellae which generate thrust) and behavioural (number of beats made by the abdomen during swimming and the start angle of the C-start) variables contribute to increasing swimming speed, we detected no selection on these variables. This may be due to functional redundancy. (4.) Taken together, our results indicated selection on Ak and suggested that selection on physiological traits may be as strong as selection on morphology and life history traits." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

## 2011

**15032.** Kato, K.; Watanabe, M. (2011): Foraging flights of *Sympetrum infuscatum* (Selys) adults inhabiting cedar forest gaps of Satoyama (Odonata: Libellulidae). *Japanese journal of entomology* N.S. 14(3): 177-186. (in Japanese) ["After emergence, adults of *S. infuscatum* moves from rice paddy fields to cedar forests of Satoyama in Japan. They stay in the forest gaps throughout their lives, with intermittent visits to rice paddy fields to oviposit there. The forest gaps are used not for mating but for foraging, resting and roosting. They adopt sit-and-wait tactics for foraging to flying small insects such as Diptera and Hymenoptera. The foraging flights of sexually mature adults were observed from late August to early September. The height of perching site was about 2 m in the forest gaps. Each observation was continued until the adult dragonfly left the gap. The foraging flight occurred with a diurnal rhythm, peaking around noon. Females showed 36 foraging flights on average per hour, while males 24 per hour. The number of daily foraging flights was significantly higher in females than in males. About 34% and 33% of flights in females and males, respectively, were successful to capture the target prey. The daily number of captured prey insects was 102 per female and 64 per male. Since the average dry weight of a prey insect flying in forest gaps was 0.17 mg, the daily food intake of a female and a male was calculated 17 mg and 11 mg, respectively, both of which were similar to the amount of food intake estimated in laboratory-reared adults." (Authors)] Address: Watanabe, M., Dept Biology, Faculty of Education, Mie Univ., Tsu, Mie 514-8507, Japan. E-mail: watanabe@edu.mie-u.ac.jp

**15033.** Ngiam, R.W.J. (2011): Dragonflies of our parks and gardens (in Singapore). National Biodiversity Centre, National Parks Board, Singapore. ISBN: 9789810885212: 110 pp. (in English) ["Dragonflies of Our Parks and Gardens provides an overview of studies of dragonflies done in Singapore, where there are now thought to be 124 species, which

is followed by an illustrated chapter on the anatomy, physiology and ecological roles of dragonflies. A section is given to discussion of each of six public parks and the nature reserves in Singapore and their roles as home for dragonflies. Dragonfly conservation pre-requisites, the need for public partnership, the ongoing National Parks Dragonfly Project, and how individuals can foster dragonflies are all discussed in this stimulating and colourful book. With glossary, distribution, sketchmap, checklist for six public parks, and reading list." (Author)] Address: Ngiam, R.W.J., National Biodiversity Centre, National Parks Board, 1 Cluny Road, Singapore 259569, Republic of Singapore. E-mail: yanrobin@hotmail.com

**15034.** Olcott (2011): Final report for the the West Virginia dragonfly and damselfly atlas. Prepared for: West Virginia Division of Natural Resources, Wildlife Resources Section 324 Forth Avenue, South Charleston, WV 25303: 29 pp + 3 app.. (in English) ["The Atlas was successful in expanding knowledge of odonates in West Virginia. A total of 4628 specimens were collected that included representatives from all families known to occur in the state. Five state records and 655 county records were documented. Distribution for most species was expanded, some quite significantly. All 55 of West Virginia's counties were surveyed, with an average of 12 sites visited in each county. State ranks were revised with 73 species warranting a change in their status based on data collected during the Atlas. Results for species distribution in West Virginia (Appendix 1) are based on 1994 and earlier for historical records and 1995 -2010 for recent records." (Author) For details see: <http://www.wvdnr.gov/publications/PDFFiles/OdonateAtlasReportweb.pdf>] Address: Olcott, Susan, West Virginia Division of Natural Resources, Wildlife Resources Section, District 1, 1110 Railroad Street, PO Box 99, Farmington, WV 26571, USA

**15035.** Papazian, M. (2011): Compte rendu d'expéditions sur le mont Nimba (Afrique occidentale): additif à la faune odonatologique et description de la femelle de *Paragomphus kiautai* Legrand, 1992 (Odonata). Bulletin de la Société entomologique de France 116(2): 169-176. (in French, with English summary) ["A survey was made on the mount Nimba, at the request of the Société des Mines de Fer de Guinée (SMFG) for Guinea, and Arcilor Mittal for Liberia, to realise faunistic inventories, contribution for biological impact inquiries conducted, at the present time, by these two organizations. Odonata were the subject of a special attention. Their collect, at 8 stations located on the slopes of the mountain, allowed to find 42 species among the 127 ones listed by LEGRAND (2003) and to discover five species new for the local fauna: *Heliaeschna fuliginosa* Karsch, 1893, *Heliaeschna ugandica* McLachlan, 1896, *Sleuthemis diploides* Fraser, 1951, *Tramea basilaris* (Palisot de Beauvois, 1805) and *Oxythemis phoenicosceles* Ris, 1909. The capture of a female of *Paragomphus kiautai* Legrand, 1992, allowed its description." (Author)] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France. E-mail: mpapazian@ecologie.re

**15036.** Trapero-Quintana, A.; Reyes-Tur, B.; Cuellar Araújo, N. (2011): Esfuerzo de muestreo necesario para estimar la riqueza específica máxima en tres comunidades de Odonata en Cuba empleando exuvias. Boletín de la S.E.A. 49(2): 285-290. (in Spanish, with English summary) [Sampling effort needed to estimate maximum species richness of three Odonata communities in Cuba using exuviae. Difficulty in recording all species in a given area is common in biodiversity inventories. The aim of this study is to estimate the minimum sampling effort needed to record the maximum richness of odonates in three freshwater habitats of Santiago de Cuba when only exuviae are sampled. Odonate exuviae were collected weekly in an 8 m<sup>2</sup> area in each locality during one year. With this methodology, for the three communities, 30 samples were needed to obtain maximum species richness, according to von Bertalanffy's model." (Authors)] Address: Trapero-Quintana, A., Universidad de Oriente. Departamento de Biología. Patricio Lumumba s/n 90500. Santiago de Cuba. Cuba. E-mail: [atrapero@cnt.uo.edu.cu](mailto:atrapero@cnt.uo.edu.cu)

## 2012

**15037.** Alberts, J.M. (2012): Aquatic-to-terrestrial contaminant flux in the Scioto River basin, Ohio, USA. Master of Science in the Graduate School of The Ohio State University: 155 pp. (in English) ["Aquatic emergent insects provide important prey subsidies to riparian consumers. These aquatic-to-terrestrial feeding relationships provide a pathway through which aquatic contaminants are "reterrestrialized" into riparian food webs. However, influences of land use and land cover (LULC) on the magnitude of aquatic-to-terrestrial contaminant transfers remain largely unexplored. To that end, I investigated aquatic-to-terrestrial contaminant fluxes at 11 study reaches in the Olentangy and Scioto Rivers (OH, USA), representing urban, agricultural, and mixed land uses. At nine study reaches, I collected benthic sediment, aquatic emergent insects (including Coenagrionidae and Aeshnidae), ants (*Formica subsericea*), spiders of the family Tetragnathidae, riparian vegetation, and periphyton. At eight of these reaches, as well as additional four reaches where I erected nest-boxes, I sampled riparian swallows including: bank (*Riparia riparia*), northern rough-winged (*Stelgidopteryx serripennis*), tree (*Tachycineta bicolor*), and cliff (*Petrochelidon pyrrhonota*) swallows. Subsequently, all biological samples were analyzed for  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ . Sediment, ants, spiders, and swallows were tested for a suite of toxic elements including arsenic (As), selenium (Se), lead (Pb), and mercury (Hg). Two-source ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ) mixing models indicated that Tetragnathidae were highly reliant on aquatic insects ( $x = 76.9\%$ ,  $SD = 8.9\%$ ), whereas ant dependence was less but with greater variability ( $x = 27.8\%$ ,  $SD = 25.1\%$ ). Characteristics of shoreline habitat including standing dead trees and % overhanging vegetation explained 70 and 42% of the variation in the contribution of aquatic prey to *F. subsericea* and Tetragnathidae, respectively. Spider density was positively related to land-cover characteristics associated with urbanization (% impervious



surfaces, % invasive shrubs, population density) and near-shore habitat. Shoreline habitat also was strongly related to the overall flux (i.e., contaminant load assimilated into consumer tissue) of Se ( $R^2 = 0.58$ ) and As ( $R^2 = 0.51$ ) to the tetragnathid spider assemblage, and Pb flux to spiders was higher in urban and agricultural reaches than in mixed reaches ( $F = 6.10$ ,  $P = 0.025$ ). *F. subsericea* density exhibited a positive relationship with urbanization ( $R^2 = 0.83$ ). As and Se flux to *F. subsericea* assemblages was positively related to urbanization ( $R^2 = 0.70$ ) as well as shoreline habitat, and Pb flux was higher in urban reaches than other land use types ( $F = 8.68$ ,  $P = 0.017$ ). For swallows, Hg concentrations were significantly higher at rural reaches than at urban reaches ( $t = -2.96$ ,  $P = 0.003$ ,  $df = 24$ ), and Hg concentrations in swallows were positively related to Hg concentrations in sediment ( $R^2 = 0.23$ ,  $P = 0.030$ ), though no relationships were evident for Se in swallows. We found that swallow Hg concentrations were significantly higher in rural than urban reaches ( $t = -2.96$ ,  $P = 0.003$ ,  $df = 24$ ), and marginally so for Se ( $t = -1.54$ ,  $P = 0.068$ ,  $df = 24$ ). To an extent, these relationships appear to be mediated by swallow reliance on aquatic emergent insect prey. For example, swallows that exhibited a higher proportion of aquatic prey in their diet and fed at a higher trophic level also exhibited elevated Se levels. I also found that both Se and Hg concentrations in adult swallows were significantly higher than those observed in juveniles (Se:  $t = -3.47$ ,  $P = 0.013$ ,  $df = 4$ ; Hg:  $t = -4.35$ ,  $P = 0.006$ ,  $df = 4$ ). Collectively, my results indicate that LULC mediates aquatic contaminant flux to terrestrial consumers via regulation of aquatic resource utilization. For riparian arthropods, differences in density associated with landscape variability can result in a significant discrepancy between the magnitude of contaminant export by aquatic emergent insects and the realized contaminant flux to riparian food webs. At a broader spatial scale, riparian swallows may represent a useful assessment tool for contaminant exposure in linked aquatic-terrestrial systems." (Author)] Address: Alberts, J.M., Dept of Biological Sciences, 614 Rieveschl Hall, University of Cincinnati, Cincinnati, OH, 45221, USA. E-mail: albertjy@mail.uc.edu

**15038.** Almeida, D.; Almodovar, A.; Nicola, G.G.; Elvira, B.; Grossman, G.D. (2012): Trophic plasticity of invasive juvenile largemouth bass *Micropterus salmoides* in Iberian streams. *Fisheries Research* 113: 153-158. (in English) ["Biological invasions are a major factor for biodiversity loss, particularly in freshwater environments. Largemouth bass *Micropterus salmoides* is native to North America and is invasive on the Iberian Peninsula, primarily to provide angling opportunities in reservoirs. However, this species is a threat to the endemic Iberian fauna via predation and competition. Currently, there is little information on largemouth bass in European streams. Thus, we assessed the trophic plasticity and body condition of young largemouth bass in both invasive (the regulated Bullaque River) and native (Murray Creek) streams. Abundance of juvenile largemouth bass, percentage of full stomachs and body condition were higher in Bullaque River. Largemouth bass preyed on benthic invertebrates much more heavily in the Bullaque River, whereas

fishes were the most important prey in Murray Creek. Prey richness, diet diversity and trophic niche breadth were higher in the Bullaque River population. Largemouth bass preferred water-column fishes as prey and avoided consuming benthic fishes in Murray Creek, whereas water-column fishes were avoided in Bullaque River. These results demonstrate that largemouth bass display substantial trophic plasticity which possibly facilitates its success as invasive species. Regulated Iberian streams may provide both suitable food and habitat resources with minimal predation pressure, and hence may serve as recruitment sources for this invasive fish." (Authors) In Bullaque river, Odonata nymphs are the most important diet of *M. salmoides*.] Address: Almeida, D., Dept Zoology & Physical Anthropology, Complutense University of Madrid, E-28040 Madrid, Spain. E-mail: dalmeidareal@yahoo.es

**15039.** Bell, H.J.; Syed, N.I. (2012): Control of breathing in invertebrate model systems. *Comprehensive Physiology* 2: 1745-1766. (in English) ["The invertebrates have adopted a myriad of breathing strategies to facilitate the extraction of adequate quantities of oxygen from their surrounding environments. Their respiratory structures can take a wide variety of forms, including integumentary surfaces, lungs, gills, tracheal systems, and even parallel combinations of these same gas exchange structures. Like their vertebrate counterparts, the invertebrates have evolved elaborate control strategies to regulate their breathing activity. Our goal in this article is to present the reader with a description of what is known regarding the control of breathing in some of the specific invertebrate species that have been used as model systems to study different mechanistic aspects of the control of breathing. We will examine how several species have been used to study fundamental principles of respiratory rhythm generation, central and peripheral chemosensory modulation of breathing, and plasticity in the control of breathing. We will also present the reader with an overview of some of the behavioural and neuronal adaptability that has been extensively documented in these animals. By presenting explicit invertebrate species as model organisms, we will illustrate mechanistic principles that form the neuronal foundation of respiratory control, and moreover appear likely to be conserved across not only invertebrates, but vertebrate species as well. .... The central origin of breathing rhythm has been studied in a variety of insect species including ... dragonflies such as *Anax imperator*." (Authors)] Address: Bell, H.J., Division of Pulmonary & Critical Care, Department of Medicine, Penn State Univ., Hershey, Pennsylvania. USA. E-mail: harold.bell@gmail.com

**15040.** Florencio, M.; Díaz-Paniagua, C. (2012): Presencia de *Lestes macrostigma* (Eversmann, 1836) (Odonata: Libellulidae) en las lagunas temporales del Parque Nacional de Doñana (suroeste de España). *Boletín de la S.E.A.* 50(1): 579-581. (in Spanish, with English summary) [Adults of the vulnerable species *L. macrostigma* have been detected as frequent and abundant in temporary ponds of the Doñana National Park. Since this is a species typical of temporary

waters, it should be prospected mainly in years with average or high rainfall, at the beginning of the drying phase of these aquatic habitats. Additionally, we confirm the presence of another vulnerable species, *Coenagrion scitulum* in the same area." (Authors)] Address: Florencio, Margarita

**15041.** Gainzarain, J.A. (2012): Fauna de odonatos (Insecta: Odonata) del Parque Natural de Izki (Álava, norte de España). *Boletín de la SEA* 50: 267-276. (in Spanish, with English summary) ["The odonate fauna of the Izki natural park in Álava (Basque Country, Spain) was studied during the year 2010. A total of 37 species (19 Zygoptera and 18 Anisoptera) were recorded in systematic surveys covering all the wetlands and most rivers of the park. Among the habitats in the study area, rivers and peat bogs host an odonate fauna much poorer than that of ponds and pools. These lentic sites maintain a species richness which increases with their total area and tends to be greater at sites that have water all year round. The conservation status of the odonate community at Izki seems to be good, and its diversity is similar to that of the best Iberian localities, especially in the case of the little pond of Las Rozas, with 33 species in just 2,5 ha." (Author)] Address: Gainzarain, J.A., C/ Xabier 17 3º C 01010 Vitoria-Gasteiz, Spain. E-mail. j.gainzarain@gmail.com

**15042.** Heeffer, J. (2012): Libellen in de Kaaistoep in 2011. *Natuurstudie in De Kaaistoep, Verslag 2011*, 17e onderzoeksjaar. *Natuurmuseum Brabant*: 39-42. (in Dutch) [In 2011, 27 odonate species have been recorded in Kaaistoep, near Tilburg, the Netherlands. In addition, the fluctuation of *Lestes sponsa* and *L. virens* between 1998 and 2011 is documented.] Address: Heeffer, J., Kaar 4, 5133 AZ Riel, The Netherlands

**15043.** Johnson, J.; Valley, S. (2012): Update of the Odonata of Oregon. *Bulletin of American Odonatology* 11(2): 39-47. (in English) ["92 species are currently recorded in Oregon, USA. Additional and updated records since Johnson & Valley (2005) are summarized for 28 species and one hybrid with some range maps updated. The current county records and early/late flight dates for all known species in Oregon are presented." (Authors)] Address: Johnson, J., 3003 Unander Ave, Vancouver, WA 98660, USA. E-mail: jt\_johnson@comcast.net

**15044.** Kiany, M.; Sadeghi, S. (2012): Destroy and pollution of environment of Nahr-e Azam river in Shiraz and endangered Odonata. Abstracts of the 17th National & 5th International Iranian Biology Conference: (in English) [Verbatim: Nahr-e Azam river is one of the most important aquatic ecosystems and water sources of Shiraz using for irrigation of main part of gardens. Main source of this permanent small river is Jooshak spring which its natural and beautiful ecosystem is destroying to make an artificial promenade. Passage of river water had changed and water of spring polluted in short distance with sewage of Ghasre-Ghomshah town. In addition, along the river various pollutants such as sewage, industrial chemicals and polymer wastes

enter to the river water body. Odonata are one of important inhabitant insects in this area that are very sensitive to the polluted environment. Predatory and biological control role of this group on population of other unfavourable insects is especially important. Faunistic studies of this area from five years ago up to now shows richness of Odonata fauna in this environment with around 22 species (about a quarter of total number of odonates of Iran). On the other hand, we found that sudden disappearance of some species in recent years is due to increasing pollution and destroying. If these ruinous actions continue as before, we will lose noteworthy valuable species of this region that some recorded in IUCN red list as endangered species.] Address: Kiany, M., Biol. Dept, Shiraz Univ., Shiraz, Iran. E-mail: mohsen.kiany1@gmail.com

**15045.** Kiany, M.; Sadeghi, S. (2012): A preliminary study on Odonata fauna of Yazd province. Abstracts of the 17th National & 5th International Iranian Biology Conference: (in English) [Verbatim: Although Yazd province has located in central desert of Iran with arid climate, it contains some specific species of Odonata. In this primary study we surveyed, for the first time, Yazd, Mehriz and Taft regions in Yazd province (Iran) to measure Odonata fauna of central desert of Iran. Eight species, from four different families were recorded from this province. One of the species is new for Iranian fauna and is reported for the first time (shown with asterisk below). Freshwater sources for water-dependent insects in these arid regions are prepared by Karizes and the water almost flows a long distance through concrete canals. Adaptation of species with this condition seems to be really interesting. The specimens consist of: *Platycnemis dealbata*, \**Ischnura intermedia*, *Paragomphus lineatus* and *Onychogomphus lefebvrei*, *Crocothemis erythraea*, *Orthetrum chrysostigma* and *Trithemis festiva*.] Address: Kiany, M., Biology Department, Shiraz University, Shiraz, Iran. E-mail: mohsen.kiany1@gmail.com

**15046.** Li, Y.-j.; Nel, A.; Ren, d.; Zhang, B.-l.; Pang, H. (2012): New discoveries of Neogene hawker dragonflies (Insecta, Odonata, Aeshnidae) from Shandong province in China. *Zoosystema* 33(4): 577-590. (in English, with French summary) ["*Epiaeschna matutina* (Zhang, 1989) is re-described and species diagnosis is amended. Two new species, *Aeshna shanwangensis* n. sp. and *Aeshna forficatum* n. sp., are described from the Middle Miocene deposit of Shanwang Formation, Shandong Province, East China. Comparison with other related fossil and recent species is provided." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrns1.mnhn.fr

**15047.** Murria, E.; Jarne, M. (2012): Nuevo registro de *Cordulegaster bidentata* Sélys, 1843 en el Parque Nacional de Ordesa y Monte Perdido (Huesca) (Odonata: Cordulegasteridae). *Boletín de la S.E.A.* 50(1): 262. (in Spanish, with English summary) [Spain. "A new record - 09-VIII-2011 - is provided of *Cordulegaster bidentata* from the Ordesa and

Monte Perdido National Park (Huesca, Spain), 62 years after its first and last record in this area of the Pyrenees." (Authors)] Address: Murria, e., C/ Felix Rodriguez de la Fuente, 1 22623 Aineto (Huesca), Spain. E-mail: entomomurria@hotmail.com

**15048.** Noorhidayah-Mamat; Norma-Rashid, Y.; Zulqarnain, M. (2012): Diversity and habitat preferences of dragonflies (Order: Odonata) in Selangor, Peninsular Malaysia. *Wulfenia* 19(11): 20 pp. (in English) ["A rich collection of 1298 individuals belonging to 54 species from 9 families of Odonata were successfully collected in Selangor. Anisopterans (701 individuals) were found to be more abundant than Zygopterans (597 individuals). Libellulidae (Suborder: Anisoptera) was the most abundant family of odonates in Selangor with 49.11% recorded. Frequency distribution of species showed that *Euphaea ochracea* was the most abundant followed by *Neurobasis chinensis* and *Neurothemis fluctuans*. Preference habitat of odonates was tropical lowland rainforest (TLR) area where high species diversity was found compared to the open areas (OP). This was supported by the higher richness index (R) value in the TLR of 7.26 compared to the OP with 4.46. Similarly, diversity indices (H') and evenness indices (R) showed higher values in TLR with 3.22 and 0.8 than in the OP with 2.83 and 0.7." (Authors)] Address: Noorhidayah-Mamat, Inst. of Biological Science, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia. E-mail: nhidayahm@siswa.um.edu.my

**15049.** Ramos Hernández, J.M.; Rodríguez Toledo, Y.F. (2012): Nueva localidad para el endemismo de Cuba central: *Microneura caligata* Hagen in Selys, 1886 (Odonata: Protoneuridae). *Boletín de la SEA* 50: 408. (in Spanish, with English summary) [vi/vii-2010, Cayaján River (Planta Cantú, Sancti Spiritus, Cuba), 21° 53' N 79° 24' 0; 200 m s.n.m.] Address: Hernández, J.M.R., Apartado Postal 2004, Sancti-Spiritus, Cuba CP 60100

**15050.** Sabari, S,M Rasheed, K.A. (2012): Entomofaunal visitors of Asian Sacred Lotus (*Nelumbo nucifera*) during the pre summer season from Palakkad district. *Millennium Zoology* 13(1): 18-23. (in English) ["Ambalakulam" (Lat.: 10.727570, Lon.: 76.651380), Kannadi panchayath, Palakkad district, Kerala, India. During December 2011- May 2012, the following odonate species were reported: *Urothemis signata*, *Diplacodes trivialis*, *Brachythemis contaminata*, *Crocothemis servilia*, *Aethriamanta brevipennis*, *Rhyothemis variegata* and *Ceriagrion coromandelianum*.] Address: Sabari, S., Post Graduate and Research Department of Zoology, Govt. Victoria College, Palakkad, Kerala, India

**15051.** Tiple, A.D. (2012): Dragonflies and Damselflies (Insecta—Odonata) from Nagpur city environs in Vidharba, together with other records from Maharashtra, India. *Colemania* 27: 1-12. (in English) ["A total of 72 species of odonates belonging to 45 genera of 2 Suborders and 9 families were recorded. Among them, previously unrecorded 10 species were included in the checklist of Nagpur city and

one species (*Ictinogomphus distinctus*) were included in the checklist of Maharashtra State. Family Libellulidae (35 species) with five new records (*Diplacodes lefebvrii*, *Indothemis carnatica*, *Neurothemis intermedia*, *Trithemis kirbyi*, *Urothemis signata*), 17 species from Family Coenagrionidae with one new record (*Pseudagrion spencei*). In family Aeshnidae six species were recorded. Family Gomphidae only four species with two new records (*Anormogomphus heteropterus*, *Ictinogomphus distinctus*). Macromiidae two species were recorded with new species (*Macromia flavicincta*). Two species were recorded from Protoneuridae with one new species (*Prodasineura verticalis*), Two species were recorded from family Platycenemidae. From Family Lestidae two species were recorded, one species recorded in Chlorocyphidae. Of the total 72 species 27 were abundant or very common, 12 were common, 17 rare and 4 very rarely in occurrence." (Author)] Address: Tiple, A.D., Dept of Zoology, Vidyabharti College, Seloo, Wardha 442104, Maharashtra, India. E-mail: ashishdtiple@yahoo.co.in

**15052.** Van Schandevyl, D. (2012): Observations of Odonata in a nature reserve along the river Dender (Belgium - East-Flanders) in 1996-2007. *Brachytron* 15(1): 43-52. (in Dutch, with English summary) ["The article gives a summary of dragonfly observations in the Wellemeersen, a nature reserve of about 100 hectares situated on the left bank of the river Dender near Denderleeuw, in the province of Eastern Flanders (Belgium). The importance of this site as a 'trap area' for dragonflies was first discovered by H. Dumont who published an extended species list in 1971. The area is delimited by linear elements such as railroads and a motorroad which might serve as artificial pathways for dragonfly distribution. The data were collected in the period 1996-2007 and have been published in a comprehensive report with detailed descriptions of the status, observations and distribution (including maps) of each species. In this article, a short description is given of some specific (but mostly artificial) dragonfly biotopes, like old sandpits, large ponds, former bomb holes, fishing ponds and flooded meadows. Most of the 1840 data records were collected by sight. The area was subdivided into 184 separate inventory units to provide detailed location data. All dubious observations were carefully checked. A total of 34 species were found, of which 23 can be considered as autochthonous. All belong to the Red List category 'Not threatened'. Nine species are dwellers. Distribution and abundance are discussed. More than 55% of the records originate from 6 species: *Ischnura elegans*, *Aeshna cyanea*, *Coenagrion puella*, *Sympetrum sanguineum*, *Anax imperator* and *S. striolatum*. The least abundant are *Aeshna grandis*, *Cordulia aenea*, *Crocothemis erythraea*, *Enallagma cyathigerum*, *Erythromma lindennii* and *Lestes sponsa*. The most widespread species within the study area (in more than 50% of the total of 184 inventory blocks) are *Ischnura elegans* and *S. sanguineum*, followed by *A. cyanea*, *S. striolatum* and *A. mixta*. Within the Flemish context, the Wellemeersen can be considered as a fairly rich dragonfly area. A comparison with Dumont's list shows that two species, *Brachytron pratense* and *Aeshna isoceles*, have not been observed again and have most



probably disappeared from the area. On the other hand, new permanent inhabitants are *Erythromma viridulum*, *Crocothemis erythraea* and *Cordulia aenea*. The last two were only occasionally seen during the former period." (Author)] Address: Van Schandevyl, D., Paardekastanje 36, 9470 Denderleeuw, The Netherlands. E-mail: danny.van-schandevijl@telenet.be

**15053.** Wasserman, R.J.; LL Pereira-da-Conceicao, L.L.; Strydom, N.A.; Weyl, O.L.F. (2012): Diet of *Anguilla mossambica* (Anguillidae) eiders of the Sundays River, Eastern Cape, South Africa. *African Journal of Aquatic Science* 37(3): 347-349. (in English) [Dominant Diptera and a few Zygoptera were found as diet of *A. mossambica*.] Address: Wasserman, R.J., Dept of Zoology & Entomology, Rhodes University, PO Box 94, Grahamstown, 6140, South Africa

**15054.** Weber, J.S. (2012): The distribution of heavy metals in known and potential Hine's emerald dragonfly (*Somatochlora hineana*) habitat near the Viburnum Trend mining district of southeast Missouri, USA. Prepared by: J.S. Weber, U.S. Department of the Interior, Fish and Wildlife Service, Southeast Missouri Lead Mining District, Natural Resource Damage Assessment and Restoration: 23 pp. (in English) ["The Viburnum Trend mining district in southeast Missouri, USA is one of the largest producers of lead in the world. Previous biological surveys in the district have found evidence demonstrating metal exposure of birds, insects, fish and crayfish. This study examined heavy metal concentrations in the sediment and water of freshwater wetlands known to be or potentially occupied by the federally endangered *Somatochlora hineana*. Sediment samples were collected from thirteen sites to assess the potential exposure of the dragonfly to mining-derived metals. Water samples were also collected at the sampling sites when sufficient surface water was available for collection. Concentrations of metals (lead, zinc, cadmium, nickel, et al.) were analyzed in the surface water and sediment. Mean concentrations of lead in sediments were significantly greater ( $P < 0.01$ ) at sites potentially impacted by mining compared to reference sites. Sediment concentrations of lead exceeded consensus-based threshold effects concentrations at eight of ten sites potentially impacted by mining. Concentrations of dissolved metals in surface water samples did not exceed Aquatic Life Criteria established by the State of Missouri. These findings suggest that metals associated with mining activities in the Viburnum Trend may have the potential to negatively impact *S. hineana* populations in and around the district." (Author) <http://dnr.mo.gov/env/hwp/docs/Final-HEDReport2011-01-04.pdf>] Address: Weber, J., Environmental Contaminants Specialist, U.S. Fish & Wildlife Service, 101 Park DeVillie Dr. Suite A, Columbia, MO 65203, 573-234-2132 x177, USA. E-mail: John\_S\_Weber@fws.gov

### 2013

**15055.** Alberts, J.M.; Sullivan, M.P.; Kautza, A. (2013): Riparian swallows as integrators of landscape change in a multiuse river system: Implications for aquatic-to-terrestrial

transfers of contaminants. *Science of the Total Environment* 463-464: 42-50. (in English) ["Recent research has highlighted the transfer of contaminants from aquatic to terrestrial ecosystems via predation of aquatic emergent insects by riparian consumers. The influence of adjacent land use and land cover (LULC) on aquatic-to-terrestrial contaminant transfer, however, has received limited attention. From 2010 to 2012, at 11 river reaches in the Scioto River basin (OH, USA), we investigated the relationships between LULC and selenium (Se) and mercury (Hg) concentrations in four species of riparian swallows. Hg concentrations in swallows were significantly higher at rural reaches than at urban reaches ( $t = -3.58$ ,  $P < 0.001$ ,  $df = 30$ ), whereas Se concentrations were positively associated with adjacent land cover characterized by mature tree cover ( $R^2 = 0.49$ ,  $P = 0.006$ ). To an extent, these relationships appear to be mediated by swallow reliance on aquatic emergent insects. For example, tree swallows (*Tachycineta bicolor*) at urban reaches exhibited a higher proportion of aquatic prey in their diet, fed at a higher trophic level, and exhibited elevated Se levels. We also found that both Se and Hg concentrations in adult swallows were significantly higher than those observed in nestlings at both urban and rural reaches (Se:  $t = -2.83$ ,  $P = 0.033$ ,  $df = 3$ ; Hg:  $t = -3.22$ ,  $P = 0.024$ ,  $df = 3$ ). Collectively, our results indicate that riparian swallows integrate contaminant exposure in linked aquatic-terrestrial systems and that LULC may strongly regulate aquatic contaminant flux to terrestrial consumers." (Authors) Coenagrionidae made up nearly 30% of all aquatic individuals collected, whereas Aeshnidae represented the largest-bodied prey item.] Address: Alberts, J.M., Dept of Biol.Sci., Univ. Cincinnati, 2600 Clifton Ave., Cincinnati, OH 45221, USA. E-mail: albertjy@mail.uc.edu

**15056.** Berzi-Nagy, L.; Farkas, A.; Jakab, T.; Szabo, L.J.; Devai, G. (2013): Morphometric data of exuviae in six river clubtail [*Gomphus flavipes flavipes*. (Charpentier, 1825)] populations from the River Tisza. *Studia odonatol. hung.* 15: 73-91. (in Hungarian, with English summary) ["In this paper we compared six populations of *G. flavipes* from the whole Hungarian section of the River Tisza relying on morphological traits. The population at Tuzsér in the upper section of the river showed prominent differences from the other five populations." (Authors).] Address: Berzi-Nagy, L., Dept of Hydrobiology, Centre of Arts, Humanities & Sciences, Faculty of Science & Technology, Univ. of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary

**15057.** Bridgehouse, D.W.; Edsall, J. (2013): Blue Dasher (*Pachydiplax longipennis*) new to Nova Scotia. *Argia* 25(4): 7. (in English) ["An individual female *Pachydiplax longipennis* was first observed and photographed by Jim Edsall on 21 July 2013 in his backyard at Maynard's Lake in Dartmouth, Halifax County, Nova Scotia. No other individuals were observed in the area." (Author)] Address: Bridgehouse, D.W., 24 Kiel Court, Eastern Passage, NS BSG 1R3, Canada. E-mail: d.bridgehouse@ns.sympatico.ca

**15058.** Brockhaus, T. (2013): Anatoli Yurewitsch Haritonov 21.09.1949- 04.04.2013. *Entomologische Nachrichten und Berichte* 57(3): 176-183. (in German) [obituary and bibliography] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**15059.** Cordero-Rivera, A. (2013): Demographics and adult activity of *Hemiphysalis mirabilis*: a short-lived species with a huge population size (Odonata: Hemiphysalidae). <http://natureglenelg.org.au/wp-content/uploads/2014/02/Behaviour-and-ecology-of-Hemiphysalis-mirabilis-by-Adolfo-Cordero-Rivera-2014.pdf>: 38 pp. (in English) ["Conclusions: The observations and analyses presented here (which have to be treated as preliminary) indicate that this species has a copulatory behaviour similar to other Zygoptera, and sperm removal is likely to be performed by males. The specimens that were collected and preserved in ethanol, will be dissected in the next months, and hopefully a detailed description of sperm competition will be possible. *H. mirabilis* males perform an elaborated courtship display, which uses in part its well-known flicking behaviour. This was an unexpected result, and suggests that precopulatory sexual selection might be intense in this species. I was able to observe and describe reproductive behaviour (goal 1 of this work), but I could not observe oviposition, neither elicit egg-laying on humid filter paper and plant tissue. Therefore, the second goal of the study, to develop methods for captive breeding, could not be achieved. Nevertheless, I dissected eggs from two mature females and preserved them in a buffer for transmission electron microscopy. Their study will be done during 2014. The dense vegetation of Long Swamp was too thick for behavioural observations. If females lay eggs at the base of the reeds, this is unlikely to be observed. Even mating pairs were very difficult to detect among the vegetation. Furthermore, individuals in copula were never seen flying, which also difficult detection. The fact that no focal female attempted oviposition suggests that this behaviour might take place during the night. Nevertheless, five females were maintained over night with humid filter paper, and did not lay eggs. The structure of the vegetation at Ming Ming Swamp is more favourable for behavioural observations. *H. mirabilis* was very common when I visited the swamp, and I think that detailed observations at that place would be fruitful to detect oviposition. My mark-recapture experiment, with all the limitations inherent to a study made by only one worker, yielded surprisingly high population density estimates, which are concordant with field observations. Davies (1985) estimated a density of 100 animals per 10 m<sup>2</sup>, which is three times my estimates, but at particular times I observed similar densities. The population of *H. mirabilis* at Long Swamp is therefore huge, very likely more than one million specimens per season. Its has also been found in large numbers in several swamps in Grampians National Park (Reiner Ritcher, pers. comm). I therefore agree with the opinion of other researchers, which suggested that this species should no longer be regarded as critically endangered (Trueman et al. 1992; Watson 1995)."]

Address: Adolfo Cordero Rivera, Evolutionary and Conservation Ecology Group, University of Vigo, EUE Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: adolfo.cordero@uvigo.es

**15060.** Cothran, R.D.; Brown, J.M.; Relyea, R.A. (2013): Proximity to agriculture is correlated with pesticide tolerance: evidence for the evolution of amphibian resistance to modern pesticides. *Evolutionary Applications* 6(5): 832-841. (in English) ["Anthropogenic environmental change is a powerful and ubiquitous evolutionary force, so it is critical that we determine the extent to which organisms can evolve in response to anthropogenic environmental change and whether these evolutionary responses have associated costs. This issue is particularly relevant for species of conservation concern including many amphibians, which are experiencing global declines from many causes including widespread exposure to agrochemicals. We used a laboratory toxicity experiment to assess variation in sensitivity to two pesticides among wood frog (*Lithobates sylvaticus*) populations and a mesocosm experiment to ascertain whether resistance to pesticides is associated with decreased performance when animals experience competition and fear of predation. We discovered that wood frog populations closer to agriculture were more resistant to a common insecticide (chlorpyrifos), but not to a common herbicide (Roundup). We also found no evidence that this resistance carried a performance cost when facing competition and the fear of predation. To our knowledge, this is the first study demonstrating that organophosphate insecticide (the most commonly applied class of insecticides in the world) resistance increases with agricultural land use in an amphibian, which is consistent with an evolutionary response to agrochemicals. ... For mesocosms assigned the predator treatment, we added a single larval dragonfly (*Anax junius*) to the predator cage and fed each predator three times a week using approximately 300 mg of wood frog tadpoles from a mixture of the nine populations." (Authors)] Address: Cothran, R.D., Department of Biological Sciences, University of Pittsburgh, 4249 Fifth Ave., Pittsburgh, PA 15260, USA. E-mail: rdc28@pitt.edu

**15061.** Engel, M.S.; Davis, S.R.; Prokop, J. (2013): Insect wings: The evolutionary development of nature's first flyers. Minelli, A., G. Boxshall & G. Fusco (2013): *Arthropod Biology and Evolution*: 269-298. (in English) ["Powered flight is one of the more spectacular evolutionary novelties to have come about during the 4-billion-year history of life on Earth. Flight bestows upon the flyer another dimension in which to experience life. Suddenly, new avenues are available for dispersal, escape and avoidance, locating a suitable mate, and reaching once unobtainable resources. Moreover, wings can be so much more than merely a means to fly. Properly adapted the wings themselves may play a role in courtship, camouflage and mimicry, thermoregulation, and protection and defence. Despite the profound significance of flight, it is a challenging feat to achieve and control. Powered flight has evolved independently at least four times, three of which occur among the Amniota, while the last is

far flung across the branches of the animal tree of life. It is this last lineage that was also the first to evolve this singularly successful means of locomotion, rivalling in numbers of species all other forms of life combined." (Authors) The paper includes many references to Odonata.] Address: Engel, M.S., Division of Entomology, Natural History Museum, and Department of Ecology and Evolutionary Biology, University of Kansas, 1501 Crestline Drive—Suite 140, Lawrence, Kansas, 66045, USA. E-mail: msengel@ku.edu

**15062.** Escoto-Moreno, J.A.; Márquez, J. (2013): Analysis of the geographical distribution of *Paraphlebia zoe* Selys in Hagen, 1861 (Odonata: Megapodagrionidae). *Entomological News* 122(5) (2011): 416-423. (in English) ["*P. zoe*, an endemic Mexican species included in the IUCN Red List of threatened species, is recorded for the first time in Querétaro state. Based on recent collections in mountain cloud forests during the dry and rainy seasons, we added three new records for Hidalgo. There were compiled 16 historical records of the species, that permitted us to generate a range map for *P. zoe* showing that most records are from the southern region of the Sierra Madre Oriental with some records from the Mexican Gulf provinces. This distributional pattern also occurs in several species of Staphylinidae, Passalidae and Scarabaeidae." (Authors)] Address: Márquez, J., Laboratorio de Sistemática Animal, Centro de Investigaciones Biológicas, Univ. Autónoma del Estado de Hidalgo, km 4.5 carretera Pachuca-Tulancingo s/n, Ciudad Universitaria, Col. Carboneras, 42184 Mineral de la Reforma, Hidalgo, México. E-mail: jmarquez@uaeh.edu.mx

**15063.** Ferronato, B.; Piña, C.I.; Molina, F.C.; Espinosa, R.A.; Morales, V.R. (2013): Feeding habits of Amazonian freshwater turtles (Podocnemididae and Chelidae) from Peru. *Chelonian Conservation and Biology* 12(1): 119-126. (in English) ["We describe here the feeding habits of the Yellow-spotted River turtle (*Podocnemis unifilis*) (n = 20), Geoffroy's side-necked turtle (*Phrynops geoffroanus*) (n = 10), and Gibba turtle (*Mesoclemmys gibba*) (n = 4) from central Peru, Pasco Department, and evaluate food overlaps among them. *Podocnemis unifilis* showed a generalist feeding habit, ingesting animal and plant matter, but tending to be herbivorous, because plant matter made up 62.9% of the volume vs. 3.9% for animal material. The most important items in *P. unifilis* diet were seeds from the Fabaceae (Leguminosae) family and bark. *Podocnemis geoffroanus* and *M. gibba* also had generalist feeding habits. The most important items for *P. geoffroanus* were insects, especially Libellulidae larvae, and plant material. *Mesoclemmys gibba* ingested insects, fish, crustaceans, unidentified plant matter, bark, leaves, stem, and algae, with plant matter being more representative by frequency and volume. Low dietary overlap was observed between *P. unifilis* and *P. geoffroanus*, and both species appeared to overlap with *M. gibba*. To our knowledge, this is the first quantitative dietary study of Peruvian freshwater turtles, and the first diet analysis of wild *M. gibba* in the Amazon basin." (Authors) Libellulidae larvae was the most frequent item (80% of the stomach contents), which represented 37.5% of the volume, therefore,

the most important item in *P. geoffroanus* diet. *P. unifilis* and *M. gibba* also preyed on Odonata, but they only play a very limited role as food for these turtle species.] Address: Ferronato, B., Institute for Applied Ecology, University of Canberra, ACT 2601, Australia. E-mail: brunoferronato@hotmail.com

**15064.** Iqbal, M.A.; Rizvi, S.A.; Ahmed, Z.; Akhter, M.A. (2013): A list of dragonflies (Anisoptera: Odonata) with new records from Pakistan. *International Journal of Biology and Biotechnology* 10(1): 83-90. (in English) [Sixteen odonates dragonflies were collected from different localities of Sindh Province, Pakistan, between 2006-2010.] Address: Iqbal, M.A. (Karachi Univ. (Pakistan). Dept. of Zoology); Rizvi, S.A. (Karachi Univ. (Pakistan). Dept. of Zoology); Ahmed, Z. (Federal Urdu Univ. of Arts, Science and Technology, Karachi (Pakistan). Dept. of Zoology); Akhter, M.A.

**15065.** Kalnins, M. (2013): The dragonfly (Odonata) fauna of strict nature reserve Moricsala, Latvia. *Acta Biol. Univ. Daugavp.* 13(2): 55-58. (in English) ["The current paper summarizes available information on dragonflies of the strict nature reserve Moricsala. Of 59 dragonfly species of nine families recorded in Latvia, 22 species also occur in Moricsala. Estimated number of dragonfly species for strict nature reserve Moricsala is at least 31 to 33 species." (Author)] Address: Kalniņš, M., JSC "Latvian State Forests", Kristapa iela 30, Riga, LV-1046, Latvia. E-mail: martins.kalnins@biol.gov.lv

**15066.** Klecka, J.; Boukal, D.S. (2013): Foraging and vulnerability traits modify predator-prey body mass allometry: freshwater macroinvertebrates as a case study. *Journal of Animal Ecology* 82(5): 1031-1041. (in English) ["Predation is often size selective, but the role of other traits of the prey and predators in their interactions is little known. This hinders our understanding of the causal links between trophic interactions and the structure of animal communities. Better knowledge of trophic traits underlying predator-prey interactions is also needed to improve models attempting to predict food web structure and dynamics from known species traits. We carried out laboratory experiments with common freshwater macroinvertebrate predators (diving beetles, dragonfly and damselfly larvae and water bugs) and their prey to assess how body size and traits related to foraging (microhabitat use, feeding mode and foraging mode) and to prey vulnerability (microhabitat use, activity and escape behaviour) affect predation strength. The underlying predator-prey body mass allometry characterizing mean prey size and total predation pressure was modified by feeding mode of the predators (suctorial or chewing). Suctorial predators fed upon larger prey and had ~3 times higher mass-specific predation rate than chewing predators of the same size and may thus have stronger effect on prey abundance. Strength of individual trophic links, measured as mortality of the focal prey caused by the focal predator, was determined jointly by the predator and prey body mass and their foraging and vulnerability traits. In addition to the feeding mode, interactions between prey escape behaviour (slow or fast), prey



activity (sedentary or active) and predator foraging mode (searching or ambush) strongly affected prey mortality. Searching predators was ineffective in capturing fast-escape prey in comparison with the remaining predator-prey combinations, while ambush predators caused higher mortality than searching predators and the difference was larger in active prey. Our results imply that the inclusion of the commonly available qualitative data on foraging traits of predators and vulnerability traits of prey could substantially increase biological realism of food web descriptions." (Authors)] Address: Klecka, J., Dept of Ecosystems Biology, Faculty of Science, University of South Bohemia, České Budejovice, Czech Republic. E-mail: kleckj01@prf.jcu.cz

**15067.** Leelahakriengkrai, P. (2013): Diversity of freshwater benthos in the ecotourism area at Chiang Dao District in Chiang Mai Province, Thailand. *Biodiversity Journal* 4(3): 399-406. (in English) ["The diversity of benthic diatoms and aquatic insects in the ecotourism areas of Mea Lu and Tong Ta Streams at Chiang Dao District in Chiang Mai Province in the north of Thailand were investigated during the months of July and September 2012 and January 2013, from the upper, middle and lower parts of each stream. A total of 53 taxa of benthic diatoms and 46 families of aquatic insects were found. 47 and 31 taxa of benthic diatoms were found from the Mea Lu and Tong Ta Streams, respectively. 38 and 28 families of aquatic insects were found from the Mea Lu and Tong Ta Streams, respectively. The diversity index of benthic diatoms ranged from 1.17 to 2.66, while the aquatic insects ranged from 0 to 2.14. In the upstream sites of this study, a high abundance of benthic diatoms, such as *Navicula cryptotenella*, *Planothidium rostratum* and *Planothidium lanceolatum*, and aquatic insects, such as *Caenidae* and *Elmidae*, were found. At the downstream sites, a high abundance of benthic diatoms, such as *Nitzschia palea* and *Mayamaea atomus* and aquatic insects, such as *Corixidae*, *Baetidae*, *Chironomidae*, *Simuliidae* and *Hydropsychidae*, were found." (Author) Odonata are treated at family level.] Address: Pongpan Leelahakriengkrai, Biol. Sect., Dept of Science, Fa. Science & Technology, Chiang Mai Rajabhat University, Thailand. E-mail: bank\_2525@hotmail.com

**15068.** Mochon, A. (2013): Capture of the *Rhionaeschna mutata* (Odonata: Aeshnidae) in Quebec, a new provincial record. *Argia* 25(1): 6. (in English) [*Rhionaeschna mutata*, 30-VI-2012, Lac des Atocas, National Park Mont-Saint-Bruno, Canada] Address: Mochon, A. E-mail: mochon.alain@sepaq.com

**15069.** Neff, B.D.; Svensson, E.I. (2013): Polyandry and alternative mating tactics. *Phil. Trans. R. Soc. B* 368: 20120045: 11 pp. (in English) ["Many species in the animal kingdom are characterized by alternative mating tactics (AMTs) within a sex. In males, such tactics include mate guarding versus sneaking behaviours, or territorial versus female mimicry. Although AMTs can occur in either sex, they have been most commonly described in males. This sex bias may, in part, reflect the increased opportunity for sexual selection that typically exists in males, which can result in a

higher probability that AMTs evolve in that sex. Consequently, females and polyandry can play a pivotal role in governing the reproductive success associated with male AMTs and in the evolutionary dynamics of the tactics. In this review, we discuss polyandry and the evolution of AMTs. First, we define AMTs and review game theoretical and quantitative genetic approaches used to model their evolution. Second, we review several examples of AMTs, highlighting the roles that genes and environment play in phenotype expression and development of the tactics, as well as empirical approaches to differentiating among the mechanisms. Third, ecological and genetic constraints to the evolution of AMTs are discussed. Fourth, we speculate on why female AMTs are less reported on in the literature than male tactics. Fifth, we examine the effects of AMTs on breeding outcomes and female fitness, and as a source, and possibly also a consequence, of sexual conflict. We conclude by suggesting a new model for the evolution of AMTs that incorporates both environmental and genetic effects, and discuss some future avenues of research." (Authors) The ontogeny of colour development in *Ischnura elegans* is illustrated.] Address: Neff, B.D., Department of Biology, Western University, 1151 Richmond Street, London, Ontario, Canada N6P 0A7. E-mail: bneff@uwo.ca

**15070.** Oke, O.A.; Akegbejo-Samson, Y.; Omopariola, C.A. (2013): Effect of physico-chemical characteristics of water of River Ogun on the distribution and abundance of aquatic insects. *Journal of Natural Science, Engineering and Technology* 11(1)(2012): 52-61. (in English) ["This study was carried out to determine the abundance, composition, distribution of aquatic insects and physico – chemical factors of Ogun River. The aquatic insects were collected using sweep and pond net (0.5mm) from two study sites during February and middle April, 2012. The water samples and insects were collected once in a week. Insects were sampled using standard entomological methods, while water samples was analysed using standard Winkler's titrimetric and APHA methods to determine the chemical properties. Water analyses were conducted in the laboratory of Ogun State Water Corporation, Abeokuta, Ogun State. While insects identifications were done in the laboratory in the Entomology Laboratory of the College of Natural Sciences, Federal University of Agriculture, Abeokuta, Nigeria. Results show that five orders and thirteen families were found with the highest number of aquatic insects from the order Odonata. The most abundant family were *Coenagrionidae* and *Libellulidae* respectively. Physico – chemical values, water temperature, pH, Dissolved Oxygen (DO), Conductivity and Nutrient were measured. Only conductivity had the greater value among the water quality parameters." (Authors) *Trithemis arteriosa*, *Umma longistima*, *Phaon iridipennis*, *Urothemis assignata* and *Pseudagrion whellani* (= *hamoni*) are listed.] Address: Oke, O.A., Department of Biological Sciences, Federal University of Agriculture, Abeokuta, Nigeria. E-mail: olubodeoke@yahoo.com

**15071.** Oligier, A.I. (2013): To the question of the distribution of dragonflies (Insecta: Odonata) in ecological niches. The

Kharkov Entomol. Soc. Gaz. 21(1): 37-42. (in Russian, with Ukrainian and English summaries) ["Distribution of 34 species of dragonflies on steppe areas of Donetsk region and 38 species on the forest-steppe area (Seversky Donets River floodplain) in ecological niches in 1971–1974 years is shown." (Author)] Address: Oliger A.I., State Nature Reserve 'Prisursky', pos. Lesnoy 9, Cheboksary, Chuvashia, 428034, Russia. E-mail: oliger169@gmail.com

**15072.** Quisil, S.J.C.; Arreza, J.D.E.; Nuñez, O.M.; Vilanueva, R.T.J. (2013): Species richness of Odonata in Lanuza and San Agustin, Surigao del Sur, Philippines. *AES Bioflux* 5(3): 245-260. (in English) ["The Odonata spends its time in water and on land during its life cycle making this invertebrate an important link between aquatic and terrestrial ecosystems. To determine the species richness of Odonata in Lanuza and San Agustin, Surigao del Sur, assessment was conducted in 18 sampling sites in August to October 2012. Forty-nine species were documented where 26 species are under the suborder Zygoptera and 23 under suborder Anisoptera. Himatagan River of Lanuza, Surigao del Sur was found to be the most species-rich. Three species which are indicators of environmental disturbance were found to be abundant in eight sampling sites. These are the highly disturbed sites being in the vicinity of agroecosystems such as rice paddies, eggplant farms and root crop fields. Twenty-three Philippine endemic species were documented. Two species are new Mindanao record and one is endemic to the Philippines. More species are expected to be documented with intensive surveys especially in pristine habitats." (Authors)] Address: Quisil, S.J.C., Dept of Biological Sciences, Mindanao State Univ. - Iligan Institute of Technology, Iligan City, Philippines; 2 D3C Gahol Apartment, Davao City, Philippines. E-mail: samljzq@yahoo.com

**15073.** Rastegar, J.; Havaskary, M.; Khodaparast, S.; Raifei, A. (2013): A contribution to the knowledge of Odonata (Insecta) from West Azarbaijan province, northwestern Iran. *Entomofauna* 34: 369-376. (in English, with German summary) [25 species recorded between 2007 and 2009 are documented.] Address: Rastegar, J., Dept of Entomology, Garmsar Branch, Islamic Azad University, Semnan, Iran. E-mail: jinoos.rastegar@yahoo.com

**15074.** Reyes-Morales, F. (2013): Macroinvertebrados acuáticos de los cuerpos lénticos de la Región Maya, Guatemala. *Revista Científica del Instituto de Investigaciones Químicas y Biológicas, Facultad de Ciencias Químicas y Farmacia, Universidad de San Carlos de Guatemala* 23(1): 7-16. (in Spanish, with English summary) ["The composition of aquatic macroinvertebrate community has been used to determine the ecological status of lentic ecosystems in many water quality studies. In this study, the community structure of the aquatic macroinvertebrates was surveyed in seven lentic bodies (Yaxhá, Sacnab, Petenchel, Quexil, Salpetén, Macanche y Sacpuy) located in the Mayan region in northern Guatemala. At each sampling site a maximum of six sampling stations were set and macroinvertebrate samples were collected with an Ekman dredge. In addition,

measurements of the following physicochemical variables were taken: dissolved oxygen, temperature, pH, salinity, conductivity, total dissolved solids, nutrients, sulfate and depth. A total species richness of 38 taxa was found, Odonata, Coleoptera, Trichoptera and Ephemeroptera were the most diverse orders. Species diversity was high in places where there is no anthropogenic influence and tended to decrease as some human disturbance was observed. The distribution of aquatic macroinvertebrates was influenced by the type of substrate and physicochemical changes."] Address: Reyes-Morales, Fátima, Dirección General de Investigación (DIGI), Facultad de Ciencias Químicas y Farmacia, Univ. de San Carlos de Guatemala, Guatemala, Guatemala. E-mail: fatimarys3@gmail.com

**15075.** Riens, J.R.; Schwarz, M.S.; Mustafa, F.; Hoback, W.W. (2013): Aquatic macroinvertebrate communities and water quality at buffered and non-buffered wetland sites on federal waterfowl production areas in the Rainwater Basin, Nebraska. *Wetlands* 33(6): 1025-1036. (in English) ["Nebraska's Rainwater Basin has an abundance of natural wetlands and is a focal point in the annual migration corridor used by millions of waterfowl and shorebirds. However, these wetlands are in a landscape dominated by agriculture and as a result, siltation and poor water quality are continual problems. We evaluated twelve wetland sites on federally managed Waterfowl Protection Areas from 2007 – 2009 for water quality, sediment quality, and macroinvertebrate diversity. Six of the sites received agricultural runoff directly via culverts and drainage ditches (non-buffered sites) and six sites were protected from agricultural runoff by a vegetated buffer (buffered sites). Mean total number of aquatic macroinvertebrates were significantly greater ( $p < 0.001$ ) for buffered sites ( $230 \pm 744$  standard error) than non-buffered sites ( $97 \pm 24$ ). Water from non-buffered sites had significantly greater turbidity, conductivity, and concentrations of chlorophyll a and atrazine than buffered sites in addition to consistently greater annual averages of total nitrogen and total phosphorus. Furthermore, sediments from non-buffered sites had significantly greater cadmium, potassium, sodium and zinc than buffered sites. Use of vegetative buffers to intercept direct row-crop runoff can improve water quality and aquatic macroinvertebrate diversity and abundance in Rainwater Basin wetlands." (Authors) Taxa - including Odonata - are treated at the family level.] Address: Riens, J.R., US Fish & Wildlife Service, 1936 California Ave., Klamath Falls, OR, 97601, USA. E-mail: john\_riens@fws.gov

**15076.** Satake, K.; Ueno, R. (2013): Distribution of freshwater macroinvertebrates in streams with dams and associated reservoirs on a subtropical oceanic island off southern Japan. *Limnology* 14(2): 211-221. (in English) ["The conservation of endemic fauna in freshwater ecosystems is a topical issue on small oceanic islands. Because these endemics have limited distributions, they are more vulnerable to extinction. This study is the first to clarify the distribution of freshwater macroinvertebrates including endemic and alien species in streams with dams and associated reservoirs on the Ogasawara Islands in the northwestern Pacific

Ocean. In 2007, we conducted a field survey in streams and reservoirs of the Yatsuse River system and collected 22 taxonomic groups from 13 stations. Hierarchical cluster analysis and non-metric multi-dimensional scaling (NMDS) were performed for the presence/absence data of the macroinvertebrates, and the results indicated that (1) most of endemic species were present in inlet streams of dam reservoirs, (2) these endemic species were absent in the bottom sediments of the reservoirs because of oxygen depletion and (3) dams may be barriers to the migration of some species of amphidromous crustaceans. Because human modifications, such as dams and associated reservoirs, on a small oceanic island can rapidly result in fragmentation or loss of freshwater habitats of endemic species, the remaining habitat of these species, such as headwater streams, must be protected and preserved to avoid species extinction." (Authors) The list of taxa includes *Pantala flavescens* and *Ischnura senegalensis*, sampled in the littoral zone of Station 8 and 11. ]Address: Satake, K., National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba, Ibaraki, 305-8506, Japan. E-mail: satanii@nies.go.jp

**15077.** Sharma, A.K.; Bisen, U.K. (2013): Taxonomic documentation of insect pest fauna of vegetable ecosystem collected in light trap. *International Journal of Environmental Science: Development and Monitoring* 4(3): 4-11. (in English) ["The present study was conducted under the study of scope of light trap as IPM technology in Vegetable ecosystem. Information on insect pest fauna of vegetable ecosystem collected in Balaghat region of M.P. The data of trap catch during the year 2006 (Kharif season ) was classified on taxonomic basis, economic aspect (crop pest ) and bio control significance (parasite and predators) a total of 56 species were recorded in Kharif cropping season of vegetable cropping area. These insect pest belongs to 8 orders and 34 families .Lepidoptera was the largest order with 23 species .Other orders were Hemiptera (14species), Coleoptera (11 species) and Orthoptera (4 species). Odonata, Hymenoptera, Isopteran and Dictioptera were the other order of minor significance. Based on economic importance this collection was represented by 39 species of harmful insects (as crop pest ) 17 species of predatory insects (useful as bio-control agents). Category of harmful insect pests includes the major and minor pest species of vegetables, major polyphagous pests, pests of Paddy, Pulses, Cereals, Oilseeds and other crops .The present study reviles that documented information on these species gives broader scope of using light trap as Integrated Pest Management tool against these insect pests of vegetables and other crops. The trap catch data also provide voluble information on bio control agents (predatory) active in vegetable ecosystem." (Authors)] Address: Sharma, A.K., Department of Entomology, JNKVV, Jabalpur (M.P.), India

**15078.** Sharma, G. (2013): Faunal exploration of Kumbhalgarh Wildlife Sanctuary, Rajasthan. 3. Insecta: Odonata. *Conservation Area Series* 47: 31-42. (in English) [A total of 17 species belonging to 13 genera under 4 families and 2 suborders of order Odonata are first time reported from

Kumbhalgarh Wildlife Sanctuary, Rajasthan, India.] Address: Sharma, G., Desert Regional Centre, Zoological Survey of India, Jodhpur, India

**15079.** Stevove, B.; Kovac, V. (2013): Do invasive bighead goby *Neogobius kessleri* and round goby *N. melanostomus* (Teleostei, Gobiidae) compete for food? *Knowledge and Management of Aquatic Ecosystems* (2013) 410, 08: 15 pp. (in English, with French summary) ["Bighead goby (*Neogobius kessleri*) and round goby (*Neogobius melanostomus*) have been invading new non-native areas about two decades successfully. In this study, diet spectrum, seasonal variation, feeding strategy and diet overlap between these two invasive species were assessed. Materials were collected from the Danube at Bratislava by fishing rods and/or electrofishing. The diet spectrum of both species was diverse: a total of 46 food types in bighead goby and 51 food types in round goby were observed. *Dikerogammarus* sp., chironomid larvae and *Corophium* sp. were the most predominant food types in bighead goby, whereas in round goby, chironomid larvae, *Corophium* sp., bryozoans and Cladocera predominated. The diet varied over seasons. In the Slovak part of the Danube, bighead goby and round goby have adapted to local food resources, consuming diverse food from small to large items, both with soft and/or hard body. This enhances the capability of these invasive species to spread successfully. It appears that even if both exploit similar food resources, their proportional content differs. Further differences between these gobies were also found in their food behaviour and feeding strategy. Both species tend to be specialists where possible, but round goby demonstrates higher flexibility towards general feeding strategy." (Authors) In case of *N. kessleri*, a few Coenagrionidae and Gomphidae contributed to diet, in case of *N. melanostomus* no Odonata were found as diet.] Address: Števo, B., Department of Ecology, Faculty of Natural Sciences, Comenius University, Mlynská dolina, 842 15 Bratislava, Slovakia. E-mail: manonik@gmail.com

**15080.** Tanneberger, F.; Bellebaum, J.; Helmecke, A.; Minets, M. (2013): Nesting and foraging characteristics of Aquatic Warblers *Acrocephalus paludicola* in the fast declining Pomeranian population (NE Germany/ NW Poland). *Acta Ornithologica* 48(1): 109-118. (in English) ["Limited food availability could be a cause for the strong decline of the small and isolated Aquatic Warbler population in Pomerania (NE Germany/NW Poland). In this paper, we describe nesting site conditions, nest placement and female foraging behaviour as well as food supply in vegetation types prevailing in Pomeranian breeding areas. Female Aquatic Warblers in Pomerania appeared to select 'managed' sites (where land use maintains suitable conditions for Aquatic Warbler) for nesting, and preferred vertical structures (ditches and edges within 'managed' sites) for foraging. They flew longer distances for provisioning their nestlings than in the core population (E Poland, Belarus) whereas the total distance travelled per 30 minutes was similar. In 'managed' sites, the total invertebrate biomass was larger than in 'unmanaged' sites in early June when



early broods are raised. Pomeranian Aquatic Warblers are able to exploit relatively rich food sources in 'managed' meadows and in vertical structures and may thus balance the higher efforts of flights longer than in Eastern Poland and Belarus. To increase the availability of suitable Aquatic Warbler nesting and foraging sites in Pomerania, management by mowing should be continued. It might yield the best results when providing a mosaic of 'managed' and 'unmanaged' patches." (Authors) No taxonomic details on the diet of *A. paludicola* is given. Biomass of food resources is calculated in the case of Odonata as follows: mean Zygotera fresh weight 11 mg; mean Anisoptera fresh weight 56 mg.] Address: Tanneberger, Franziska, Institute of Botany & Landscape Ecology, Greifswald Univ., Grimmer Str. 88, 17489 Greifswald, Germany. E-mail: tanne@uni-greifswald.de

**15081.** van Strien, A.J.; van Swaay, C.A.M.; Termaat, T. (2013): Opportunistic citizen science data of animal species produce reliable estimates of distribution trends if analysed with occupancy models. *Journal of Applied Ecology* 50(6): 1450-1458. (in English) ["(1.) Many publications documenting large-scale trends in the distribution of species make use of opportunistic citizen data, i.e. observations of species collected without standardized field protocol and without explicit sampling design. It is a challenge to achieve reliable estimates of distribution trends from them, because opportunistic citizen science data may suffer from changes in field efforts over time (observation bias), from incomplete and selective recording by observers (reporting bias) and from geographical bias. These, in addition to detection bias, may lead to spurious trends. (2.) We investigated whether occupancy models can correct for the observation, reporting and detection biases in opportunistic data. Occupancy models use detection/non-detection data and yield estimates of the percentage of occupied sites (occupancy) per year. These models take the imperfect detection of species into account. By correcting for detection bias, they may simultaneously correct for observation and reporting bias as well. We compared trends in occupancy (or distribution) of butterfly and dragonfly species derived from opportunistic data with those derived from standardized monitoring data. All data came from the same grid squares and years, in order to avoid any geographical bias in this comparison. (3.) Distribution trends in opportunistic and monitoring data were well-matched. Strong trends observed in monitoring data were rarely missed in opportunistic data. (4.) Synthesis and applications. Opportunistic data can be used for monitoring purposes if occupancy models are used for analysis. Occupancy models are able to control for the common biases encountered with opportunistic data, enabling species trends to be monitored for species groups and regions where it is not feasible to collect standardized data on a large-scale. Opportunistic data may thus become an important source of information to track distribution trends in many groups of species." (Authors) The study bases on the data of National Database Flora and Fauna and Dutch Dragonfly and Butterfly Monitoring Schemes.] Address: van Strien, A.J., Statistics Netherlands, P.O. Box 24500, 2490 HA The Hague, The Netherlands. E-mail: asin@cbs.nl

**15082.** Vittoz, P.; Cherix, D.; Gonseth, Y.; Lubini, V.; Maggini, R.; Zbinden, N.; Zumbach, S. (2013): Climate change impacts on biodiversity in Switzerland: A review. *Journal for Nature Conservation* 21(3): 154-162. (in English) ["A noticeable increase in mean temperature has already been observed in Switzerland and summer temperatures up to 4.8 K warmer are expected by 2090. This article reviews the observed impacts of climate change on biodiversity and considers some perspectives for the future at the national level. The following impacts are already evident for all considered taxonomic groups: elevation shifts of distribution towards mountain summits, spread of thermophilous species, colonisation by new species from warmer areas and phenological shifts. Additionally, in the driest areas, increasing droughts are affecting tree survival and fish species are suffering from warm temperatures in lowland regions. These observations are coherent with model projections, and future changes will probably follow the current trends. These changes will likely cause extinctions for alpine species (competition, loss of habitat) and lowland species (temperature or drought stress). In the very urbanised Swiss landscape, the high fragmentation of the natural ecosystems will hinder the dispersal of many species towards mountains. Moreover, disruptions in species interactions caused by individual migration rates or phenological shifts are likely to have consequences for biodiversity. Conversely, the inertia of the ecosystems (species longevity, restricted dispersal) and the local persistence of populations will probably result in lower extinction rates than expected with some models, at least in 21st century. It is thus very difficult to estimate the impact of climate change in terms of species extinctions. A greater recognition by society of the intrinsic value of biodiversity and of its importance for our existence will be essential to put in place effective mitigation measures and to safeguard a maximum number of native species." (Authors) The paper includes a discussion section with Odonata.] Address: Vittoz, P., Dept of Ecology & Evolution, Univ. of Lausanne, Bâtiment Biophore, 1015 Lausanne, Switzerland

**15083.** Wezel, A.; Chazoule, C.; Vallod, D. (2013): Using biodiversity to valorise local food products: the case of fish ponds in a cultural landscape, their biodiversity, and carp production. *Aquaculture International* 21(6): 1395-1408. (in English) ["Today, we need to produce sufficient food and simultaneously conserve biodiversity. But, could biodiversity associated with certain food production practices also be used in marketing products? We analyse this possibility for creating a food quality label for carp raised in the Dombes territory, a cultural landscape of fish ponds in France. The biodiversity of 99 fish ponds was studied in the Dombes territory by analysing aquatic vegetation, dragonflies, amphibians, macroinvertebrates, habitats around ponds, and water quality. In addition, a survey with 200 questionnaires and interviews was conducted with consumers to investigate fish and carp consumption and knowledge about quality labels and biodiversity. Findings reveal that fish production practices conserve remarkable species diversity, particularly for aquatic vegetation, dragonflies and amphibians, and habi-

tats around the ponds. This relatively high level of biodiversity is found in spite of having very nutrient-rich fish pond systems, systems for which normally a low level of biodiversity is expected. Nevertheless, currently this biodiversity cannot be valorised for setting up a quality label for locally produced carp. Firstly, few consumers have adequate knowledge about carp and are interested in eating it. Secondly, most of them have less knowledge about the quality label which wanted to be established for carp from the Dombes. Thirdly, only less than one-third of the consumer is familiar with the term "biodiversity". Fourthly, the stakeholder network of the supply chain is presently not able to communicate the message of biodiversity as they themselves lack a sufficient knowledge about biodiversity of their systems. ... In total, 31 dragonfly species were observed. The mean per pond was 13 and a range from 6 to 22. Two endangered dragonfly species were observed, *Leucorrhinia pectoralis* (EU Habitat Directive and French red list of threatened species) and *Aeshna isocles* (French red list of endangered species) (Leclerc et al. 2010). Compared with other wetland areas, for example, the Saone floodplain (Oertli 1995) or the ponds from Switzerland (Oertli et al. 2002), the species richness of the Dombes ponds is high and benefits most likely from the dense network of ponds." (Authors)] Address: Wezel, A., Dept of Agroecology and Environment, ISARA Lyon, 23 rue Jean Baldassini, 69364, Lyon cedex 07, France. E-mail: wezel@isara.fr

**15084.** Wyss, L.A.; Dugger, B.D.; Herlihy, A.T.; Gerth, W.J.; Li, J.L. (2013): Effects of grass seed agriculture on aquatic invertebrate communities inhabiting seasonal wetlands of the southern Willamette Valley, Oregon. *Wetlands* 33(5): 921-937. (in English) ["Wetland loss throughout the United States has contributed substantially to landscape fragmentation and loss in biodiversity. In Oregon's Willamette Valley, only 1 % of native-wet prairie habitat still exists, though seasonal wetlands are still common. These hydrogeomorphic Flats wetlands predominately occur on privately owned and actively farmed lands. We studied these wetlands in spring of 2009 and 2010 in order to quantify and compare aquatic invertebrate communities in two agricultural land-use groups (annual and perennial-grass-seed fields) with native-wet prairie habitat. Community composition in native-prairie, including higher taxa richness and greater diversity, differed from farmed wetlands. Invertebrate densities did not differ among land-uses. However, biomass in perennial-grass wetlands was greater than in annual-grass wetlands both years, and during 2009, it was more than in native-prairie. Lower turbidity, lower conductivity levels, and greater availability of rooted vegetation in native-prairie habitat were conditions associated with differences in invertebrate composition among land-uses. Though invertebrate communities in farmed wetlands differed from native-prairie, the importance of these seasonal wetlands in an altered and fragmented Willamette Valley landscape speaks to their potential contribution for the region's biodiversity and to their inclusion for management of agricultural lands." (Authors) 'Lestidae', 'Libellulidae'] Address: Wyss, L.A., Department of Fisheries and Wildlife, Oregon State University, 104 Nash

Hall, Corvallis, OR, 97331, USA. E-mail: lwyss@cala-pooia.org

2014

**15085.** Alho, J.M.A.G. (2014): Valorization of natural resources through ecotourism in a rural area of low density - Conception of a dragonflies and damselflies route. M.Sc. thesis; Universidade de Évora, Escola de Ciências et tecnologia, Departamento de biologia, Universidade de Lisboa, Instituto Superior de Agronomia: XI + 182 pp. (in Portuguese, with English summary) ["This dissertation aims to study the development of ecotourism and environmental education activities in a rural area of low density, leading to the valorization of its natural and cultural resources and rural patrimony. The geographical area, Querença (Portugal), is a territory rich in natural, cultural and tourist resources and presents a wide diversity of native species, result of its privileged location between the Barrocal and Sierra, and a vast rural material and immaterial patrimony. The organization of various programs of ecotourism, scientific tourism, environmental education activities and the conception of a route for dragonflies and damselflies observation and photography on an Odonata hotspot in the Barrocal Algarvio, "Paisagem Protegida Local da Fonte da Benémola" consist on the strategy to add value to this rural area. Ecotourism is an important socio-economic asset, consisting of a way to sustain the conservation of nature and driving force in the local development of rural areas." (Author)] Address: Alho, Joana Marta Augusto Guerreiro

**15086.** Almeida, M.C. (2014): Diversity and vulnerability of aquatic insects in productive landscapes. Tese (Doutorado) – Programa de Pós-Graduação em Ciências Ambientais, Universidade Federal de Goiás, Goiânia: 156 pp. (in Portuguese, with English summary) ["Loss and habitat fragmentation at the landscape scale, the land use and local integrity of habitats (e.g. riparian forests), associated with the social structure of rural lands are factors that can determine the loss of species. These could be greater where of landscapes is homogenized by the same type of land use, such as in agricultural areas. This has important consequences and could be determine that Conservation Biology practices are not based only on Protected Areas. These approaches applied to aquatic insects occurring in Cerrado of Goiás state show that endangered species of Odonata, distributed in the central and south region presented a historical habitat loss of 76%. Regional assessment according to the criteria of the IUCN, a total of 34.8% of species would be in some category of threat, these 71.5% were Critically Endangered, 22,8% Endangered and 4.9% would be vulnerable. Local environmental variables, spatial structure of habitat and matrix in buffers of 250 meters and habitat spatial structure and matrix in the landscapes of 25 by 25 km explained the local richness of Odonata adults in streams. Richness decreases with increase in pasture in the 250 meters buffers and crop in the landscape and increases with the opening canopy. For Ephemeroptera, Plecoptera and Trichoptera (EPT) immature, richness increases with increasing riparian forest

250 meters buffers, with the opening of canopy and the average conductivity of the water. When we consider the habitat integrity (riparian) associated with the structure of rural property around protected areas, the integrity of riparian vegetation as measured by NDVI was lower in the Buffer Zone of sustainable protect areas associated with small farms. The area of the property dedicated to the cultivation and cattle size has direct impacts to lower NDVI values." (Author)] Address: not stated

**15087.** Andersson, J. (2014): Aquatic insect community structure in urban ponds: effects of environmental variables. M.Sc. thesis, Biology Education Centre and Department of Ecology and Genetics, Uppsala University: 42 pp. (in English) ["I sampled aquatic insects in 26 ponds of varying types in the urban landscape of the city of Stockholm and related insect community structure to environmental variables. I also related environmental factors to species richness, diversity and abundance of the sampled aquatic insects. A Redundancy Analysis (RDA) showed that the most important variables in explaining insect community structure was the remoteness to developed area and the amount of emergent vegetation in the ponds. Species richness increased with distance from developed area, diversity was related to floating vegetation and abundance of insects increased with distance from developed area and with higher amount of forestation and vegetation. The results of my study shows that urbanization effects divide the insect community into clusters of species that are tolerant or intolerant to effects of urbanisation. *Leucorrhinia pectoralis* was found in five (19,2%) of the ponds. My result suggested two important factors that should be considered when planning urban ponds. First, it is important to re-create varying types of ponds and include green buffer areas and second, plant colonisation should be facilitated to better mimic the natural states of ponds." (Author).] Address: Andersson, J. c/o Dept of Ecology and Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**15088.** Ankalgi, S.; Jadesh, M (2014): Diversity of dragonflies and damselflies (Odonata) from Ankalga village (Gulbarga district), Karnataka, India. *International Journal of Recent Scientific Research* 5(10): 1851-1853. (in English) ["The objectives of the present study were to explore the Diversity and abundance of Odonata of Ankalga vilage, near back waters of benethora reservoir, Gulbarga District, Karnataka. Odonata fauna of present study was investigated in monsoon season from July 2013 to October 2013, total 14 species belonging to four families of dragonflies and damselflies were recorded, in which the most abundant family was Libellulidae followed by Coenagrionidae, Gomphidae and Platycnemididae. Libellulidae family represents 10 species, Coenagrionidae represents 2 species, Gomphidae represents 1 species, while Platycnemididae also represents with 1 species. We also calculated the Species diversity (H) and Evenes (E) which is 2.371 and 0.901 respectively. From above study we conclude that he present study area is rich in Odonata fauna in monsoon

season." (Authors)] Address: Ankalgi, Sulochana, Dept of Zoology Gulbarga University, Gulbarga, Karnataka, India

**15089.** Batabyal, A.; Gosavi, S.M.; Gramapurohit, N.P. (2014): Determining sensitive stages for learning to detect predators in larval bronzed frogs: Importance of alarm cues in learning. *Journal of Biosciences* 39(4): 701-710. (in English) ["Successful survival and reproduction of prey organisms depend on their ability to detect their potential predators accurately and respond effectively with suitable defences. Predator detection can be innate or can be acquired through learning. We studied prey-predator interactions in the larval bronzed frogs (*Sylvirana temporalis*), which have the innate ability to detect certain predators. We conducted a series of experiments to determine if the larval *S. temporalis* rely solely on innate predator (*Bradinopyga geminata*) detection mechanisms or can also learn to use more specific cues such as conspecific alarm cues for the purpose. The results of our study clearly indicate that larval *S. temporalis* use both innate and learned mechanisms for predator detection. Predator-naive tadpoles could detect kairomones alone as a potential threat and responded by reducing activity, suggesting an innate predator detection mechanism. Surprisingly, predator-naive tadpoles failed to detect conspecific alarm cues as a potential threat, but learned to do so through experience. After acquiring the ability to detect conspecific alarm cues, they could associate novel predator cues with conspecific alarm cues. Further, post feeding stages of larval *S. temporalis* are sensitive for learning to detect conspecific alarm cues to label novel predators." (Authors) ] Address: Batabyal, Anuradha, Dept of Zoology, University of Pune, Pune, 411 007, India

**15090.** Boer, E.P. de; Hijum, E. van; Brochard, C.; Seijen, R.B van (2014): *Libellenrijk Fryslân: mei ljochtsjende wjukken oer it wetter*. *FaunaX*: 352 pp. (in Dutch) [Includes 64 species recorded from Friesland (North Netherlands), with distribution maps and colour photos of adults, larvae and habitats.] Address: E-mail: tineke@faunax.nl.

**15091.** Bond, J.G.; Mauricio Casas-Martínez, M.; Quiroz-Martínez, H.; Novelo-Gutiérrez, R.; Marina, C.-F.; Ulloa, A.; Orozco-Bonilla, A.; Muñoz, M.; Williams, T. (2014): Diversity of mosquitoes and the aquatic insects associated with their oviposition sites along the Pacific coast of Mexico . *Parasites & Vectors* 2014, 7:41 doi:10.1186/1756-3305-7-41 : 31 pp. (in English) ["Background: The abundance, richness and diversity of mosquitoes and aquatic insects associated with their oviposition sites were surveyed along eight states of the Pacific coast of Mexico. Diversity was estimated using the Shannon index (H'), similarity measures and cluster analysis. Methods: Oviposition sites were sampled during 2–3 months per year, over a three year period. Field: collected larvae and pupae were reared and identified to species following adult emergence. Aquatic insects present at oviposition sites were also collected, counted and identified to species or genus. Results: In total, 15 genera and 74 species of mosquitoes were identified: *Anopheles pseudopunctipennis*, *An. albimanus* and *Aedes aegypti* were the most



abundant and widely distributed species, representing 47% of total mosquito individuals sampled. New species records for certain states are reported. Anopheline diversity was lowest in Sinaloa state ( $H' = 0.54$ ) and highest in Chiapas ( $H' = 1.61$ ) and Michoacán ( $H' = 1.56$ ), whereas culicid diversity was lowest in Michoacán ( $H' = 1.93$ ), Colima ( $H' = 1.95$ ), Sinaloa ( $H' = 1.99$ ) and Jalisco ( $H' = 2.01$ ) and highest in Chiapas ( $H' = 2.66$ ). In total, 10 orders, 57 families, 166 genera and 248 species of aquatic insects were identified in samples. Aquatic insect diversity was highest in Chiapas, Oaxaca and Michoacán ( $H' = 3.60-3.75$ ). Mosquito larval/pupal abundance was not correlated with that of predatory Coleoptera and Hemiptera. Conclusion: This represents the first update on the diversity and geographic distribution of the mosquitoes and aquatic insects of Mexico in over five decades. This information has been cataloged in Mexico's National Biodiversity Information System (SNIB-CONABIO) for public inspection." (Authors) The paper includes references to Odonata.] Address: Novelo-Gutiérrez, R., Depto de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**15092.** Bota-Sierra, C.A. (2014): Nine new records of Odonata for Colombia from the Orinoco Basin (Lestidae, Calopterygidae, Heteragrionidae, Coenagrionidae, Libellulidae). *Notulae odonatologicae* 8(4): 97-100. (in Odonata, new records, Meta department, Colombia) ["Twelve species new for Meta department, Colombia, are listed, among which nine represent new records for Colombia. These are *Telebasis rubricauda*, *Lestes helix*, *L. jerrelli*, *L. minutus*, *Heteragrion bariai*, *Oxystigma cyanofrons*, *Misagría parana*, *Perithemis thais*, and *Zenithoptera lanei*." (Author)] Address: Bota-Sierra, C.A., Grupo de Entomología Universidad de Antioquia (GEUA), Medellín AA 1226, Colombia. E-mail: corneliobota@gmail.com

**15093.** Brockhaus, T. (2014): *Ophiogomphus cecilia* (Fourcroy, 1758) - nun auch an der Chemnitz! (Odonata: Gomphidae). *Mitteilungen Sächsischer Entomologen* 33(110): 153-154. (in German) [19-VII-2014, River Chemnitz, Göritz-hain, Sachsen, Germany] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**15094.** Cannings, R.A. (2014): The dragonflies and damselflies (Odonata) of Canadian grasslands. In: *Arthropods of Canadian Grasslands (Volume 3): Biodiversity and Systematics Part 1*. Edited by H. A. Cárcamo and D. J. Giberson. *Biological Survey of Canada*: 231-269. (in English, with French summary) ["211 odonate species are known from Canada. Grasslands across the country support about 59% of the national fauna. A checklist and systematic overview of 124 species in nine families are presented. Species totals in these families are as follows: Calopterygidae, 2; Lestidae, 7; Coenagrionidae, 31; Aeshnidae, 16; Gomphidae, 15; Cordulegastridae, 1; Macromiidae, 2; Corduliidae, 13; and Libellulidae, 37. The geographical ranges of the species are defined and summarized; according to the definitions

herein, 20 species have boreal ranges, 17 are transition species, 12 are Cordilleran, 1 is Pacific coastal, 10 are western, 4 are more or less restricted to the Great Plains, 16 have southern ranges, 38 are considered eastern, and 6 are widespread species. A summary of studies on grassland Odonata and recommendations for inventory and taxonomic research are provided. The geographical scope of the Canadian grassland fauna is described briefly with respect to lotic and lentic habitats in grasslands of the Cordillera, the Great Plains, and southern Ontario." (Author)] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street, Victoria, British Columbia, V8W 9W2, Canada. E-mail: rcannings@royalbcmuseum.bc.ca

**15095.** Cerny, M.; Waldhauser, M.; Vintr, L. (2014): First documented record of *Gomphus pulchellus* in the Czech Republic (Odonata: Gomphidae). *Libellula* 33(3/4): 189-194. (in English, with German and Czech summaries) ["One male of *G. pulchellus* was recorded and photographically documented on 08-vi-2014 near the township Lány, ca 40 km west of Prague." (Authors)] Address: Cerny, M., Department of Ecology, Charles University in Prague, Viničná 7, Prague, 128 44, Czech Republic. E-mail: cerny@natur.cuni.cz

**15096.** Chakravorty, P.P.; Sinha, M.; and Chakravorty, S.K. (2014): Impact of industrial effluent on water quality and benthic macro invertebrate diversity in fresh water ponds in Midnapore district of west Bengal, India. *Journal of Entomology and Zoology Studies* 2(3): 93-101. (in English) ["A study on the impact of industrial effluent discharge on the distribution and biodiversity of benthic macro-invertebrates and water quality of a fresh water pond, in Gokulpur, West Bengal, India near Tata metaliks (a metal refinery) was carried out during April 2009-March 2010. Two ponds were chosen for this study of which one was used as control. Comparing the physico-chemical parameters in two ponds it was seen that pond G had higher hardness, total suspended solid, pH, phosphate, hydrogen sulphide, cyanide, heavy metals like lead, cadmium and mercury. The total no of macro-benthic taxa and their overall richness indices and diversity indices were higher at pond in Santipukur, (44 taxa) than pond in Gokulpur (22 taxa). The pond S was dominated by Ephemeroptera, Hemiptera where as other order found in small quantities included Coleoptera, Diptera, Molluscs, Crustacea and Odonata (*Urothermis signata*, *Anax* sp., *Enallagma* sp., *Pseudagrion* sp., *Ischnura* sp., *Caliagrion* sp.) On the other hand pond G was mainly dominated by tolerant Diptera and Hemiptera. The relationship between physicochemical parameter and macrobenthic data were investigated by Pearson correlation analysis. This statistical analysis showed that richness and diversity indices in pond G were mainly influenced by water hardness, total suspended solid, phosphate, hydrogen sulphide, lead and cyanide. It was also seen that a lot of species that were present in pond S were absent in pond G. CCA ordination biplot showed the presence of benthic macro-invertebrates in pond G was due to their strong and positive correlation with environmental variables." (Authors)] Address:

Chakravorty, Partha Pratim, Partha Pratim Chakravorty, PG Department of Zoology, Raja, N.L. Khan Women's College, Midnapore, W. Bengal, India

**15097.** Choong, C.Y. (2014): Odonata (Insecta) fauna of Krau Wildlife Reserve, Pahang, Malaysia. *Journal of Wildlife and Parks* 28: 73-80. (in English) ["Records of Odonata collected at sites in Krau Wildlife Reserve, Pahang, in October 2007 and August-September 2013 are presented. A total of 85 species from 14 families were collected. Of these 72 species are the new records for Krau Wildlife Reserve. A new species of *Prodasineura* was collected, and yet to be named. These records are combined with existing records from Krau Wildlife Reserve in literature to produce the checklist of the Odonata known to the reserve. At present 102 species from 14 families are known from Krau Wildlife Reserve." (Author)] Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor. E-mail: cychoong@ukm.edu.my

**15098.** Conniff, K. (2014): Dragonflies of Godavari. *International Centre for Integrated Mountain Development* 30: 40 pp. (in English) ["This is a basic photo guide to identify dragonflies found at ICIMOD Knowledge Park and in the vicinity of Godavari - some are found on the small pond near the Kunda, others in a jungle area beside ICIMOD. Many do not have common names thus the scientific names are given for all." (Author)] Address: Karen Conniff c/o International Centre for Integrated Mountain Development, GPO Box 3226, Kathmandu, Nepal. E-mail: karoconniff@gmail.com

**15099.** Daigle, J.J. (2014): Two new Heteropodagrion species from Ecuador (Odonata: Megapodagrionidae). *Odonatologica* 43(1/2): 35-42. (in English) ["Heteropodagrion nigripes sp. nov. is described and illustrated (holotype male: Ecuador, Morona Santiago Province, 07-xi-1997). It can be distinguished by the black legs and stout white cercus. *Heteropodagrion varipes* sp. nov. is described and illustrated (holotype male: Ecuador, Morona Santiago Province, 18-ix-2005). The bicolored legs and middorsal cercus tooth separates it from other Heteropodagrion species. Both holotypes are deposited in the Florida State Collection of Arthropods, Gainesville, Florida, USA." (Author)] Address: Daigle, J.J., 2067 Little River Lane, Tallahassee, Florida 32311, USA. E-mail: jdaigle@nettally.com

**15100.** Dallai, R. (2014): Overview on spermatogenesis and sperm structure of Hexapoda. *Arthropod Structure & Development* 43: 257-290. (in English) ["The main characteristics of the sperm structure of Hexapoda are reported in the review. Data are dealing with the process of spermatogenesis, including the aberrant models giving rise to a reduced number of sperm cells. The sperm heteromorphism and the giant sperm exceeding the usual sperm size for length and width are considered. The characteristics of several components of a typical insect sperm are described: the plasma membrane and its glycocalyx, the nucleus, the centriole region and the centriole adjunct, the accessory

bodies, the mitochondrial derivatives and the flagellar axoneme. Finally, a detailed description of the main sperm features of each hexapodan group is given with emphasis on the flagellar components considered to have great importance in phylogenetic considerations. This study may be also useful to those requiring an introduction to hexapod reproduction. ... 9.3. The Paleoptera: The two groups Odonata and Ephemeroptera exhibit a quite different sperm structure. The former shares many of the sperm characters present in the neopteran insects: a bi-layered acrosome (Fig. 2B), elongated nucleus, a centriole with microtubular triplets, expanded centriole adjunct material, a coiled flagellum with a 9 + 9+2 axoneme provided with accessory tubules with 16 protofilaments in their tubular wall, two mitochondrial derivatives and two accessory bodies (Fig. 11D) (Jamieson et al., 1999; Dallai et al., 2006). (Fig. 11: "Sperm tail of the dragonfly *Calopteryx* sp. (Odonata) with accessory bodies (ab), mitochondria (m) and accessory tubules with 16 protofilaments.") The sperm of Ephemeroptera, instead, show many autapomorphies: a mono-layered acrosome (Fig. 2C), a cylindrical nucleus, a centriole with triplets giving rise to a 9 + 9+0 flagellar axoneme, absence of central tubules and with large central sheath (Fig. 11C). Axonemal doublets have only inner dynein arms and accessory tubules show 13 protofilaments (Fig. 11C). A single mitochondrion and two crystalline accessory bodies are present (Jamieson, 1987; Dallai et al., 2006). These sperm are motile and, in Cloeon at least, mature sperm give rise to bundles (Lupetti et al., 2011). In the family Leptophlebiidae, as may be expected when the axoneme loses some key elements (here the central tubules and outer dynein arms) sperm are aflagellate and immotile (Gaino and Mazzini, 1991; Dallai et al., 2006; Brito et al., 2011). The two groups Ephemeroptera and Odonata, from a spermatological perspective, appear to be less similar than a common origin would suggest, in fact supporting the Metapterygota (Odonata + Neoptera) (Staniczek, 2000)." (Author) ] Address: Dallai, R., Dept of Life Sciences, Univ. Siena, Via Aldo Moro 2, 53100 Siena, Italy. E-mail: dallai@unisi.it

**15101.** Damerow, J.F. (2014): Diversity and distribution of California dragonflies and other aquatic taxa over the past century. Ph.D., University of California, Berkeley: 155 pp. (in English) ["Climate and land-use change have altered and continue to affect the diversity, composition, and distribution of freshwater organisms throughout the world. This is particularly true in arid and semi-arid regions, where aquatic organisms may experience more pronounced reductions in available habitat with declines in precipitation, increases in water demand, and habitat degradation through human land-use. However, documentation of changes in taxonomic assemblages over long-time periods has been rare because of the difficulty in obtaining historical occurrence data. This dissertation used data from previously published literature, a resurvey study, museum specimens, and enthusiast sightings to document changes in the occurrence rates and distribution of freshwater organisms throughout California over the past century. Summary information regarding

freshwater taxa known to occur in California did not previously exist in a central publication. I therefore conducted a review of several primary groups of stream organisms found in the Mediterranean region of California and statewide. For this work, I gathered data from a variety of literature sources and museum specimens to summarize species composition and endemism in the region, and to identify data gaps and conservation priorities for the examined groups. The remainder of this dissertation focuses largely on changes in Odonata species diversity, composition, and occurrence rates over time in California. This charismatic group was ideal for study of change over time because of their relatively low diversity, well-known taxonomy, and the existence of sufficient historical and current specimen records and more recent enthusiast sightings of odonates. I conducted a resurvey of sites originally sampled for Odonata by Clarence H. Kennedy 1914-1915. This work involved surveys of odonates at 81 sites throughout central California and northwestern Nevada, 45 of which were directly comparable to Kennedy's original sites. I found that while site-level species richness has not changed significantly, assemblages have become more homogeneous across sites. Habitat generalists have generally expanded in the extent of their distribution while habitat specialists have declined. In examining current local and regional factors influencing the occurrence of Odonata species in this region, I found that species occurrence was higher during site visits with higher degree-days, especially for highly mobile groups, including dragonflies and migratory species. The probability of presence across species was lower in highly urban sites, particularly for habitat specialists. Overall, both regional and local factors influenced the occurrence of odonates in the study with implications for conservation. A large component of this dissertation included development and analysis of a database of over 33,000 Odonata occurrence records throughout California over the past century. This database included specimen records from museums in California and large odonate collections elsewhere, as well as statewide enthusiast sightings from recent years. I noted that these unstandardized data contain biases with regards to uneven sampling effort, which must be addressed in analysis. Subsequent analyses of occurrence records before and after 1975 indicated that Odonata distribution may have generally shifted northwards with temperature warming and to lower minimum elevations in response to increased summer water-availability in low-elevation agricultural regions. Similar to results from the resurvey study, the museum specimen data indicated that highly mobile migratory species have increased while habitat specialists have declined. I concluded that a combination of sampling biases, species traits, and climate that have influenced the probability of detection of Odonata species over the last century." (Author)]

Address: Damerow, Joan Elizabeth,

**15102.** Darwall, W.; Carrizo, S.; Numa, C.; Barrios, V.; Freyhof, J.; Smith, K. (2014): Freshwater Key Biodiversity Areas in the Mediterranean Basin Hotspot. Informing species conservation and development planning in freshwater ecosystems. Cambridge, UK and Malaga, Spain: IUCN: x +

86 pp. (in English, with French, Spanish, Arabian, Croatian and Turkish summaries) ["Executive summary: The Mediterranean Basin Biodiversity Hotspot is well known for its globally important biodiversity. The freshwater biodiversity in the Hotspot, not previously widely recognized for its importance, is confirmed here to be unusually diverse and highly threatened, with many species endemic to individual rivers, streams, springs, wetlands and lakes across the region. Key Biodiversity Areas (KBAs) are areas contributing significantly to the global persistence of biodiversity. Based on published information on species conservation status and distributions (source IUCN Red List of Threatened Species) [KBA trigger species are i) freshwater fishes; ii) freshwater molluscs; iii) Odonata and iv) aquatic plants.], 90% of the 3,894 river/lake sub-catchments considered were found likely to meet the criteria qualifying them as Freshwater KBAs. The primary threats to freshwater species across the hotspot are increasing severity of droughts, hydrological alterations following construction of dams, over-abstraction of surface and ground waters, water pollution and invasive species. The impacts of these types of threat tend to spread rapidly throughout catchments such that localized conservation actions restricted to limited parts of a catchment will often fail to address these threats. For this reason the appropriate management unit for most freshwater KBAs is a sub-catchment, or a group of connected sub-catchments. The main criteria employed for a sub-catchment to qualify as a 'proposed KBA' were the presence of threatened or restricted range species, or an ecoregion-restricted community of species. Subsequent evaluation of these proposed KBAs for the three sub-regions of the Hotspot eligible for CEPF funding was conducted through three workshops involving 39 stakeholders in the Balkans (Jahorina, Bosnia and Herzegovina), Turkey and Levant (Azraq, Jordan), and northern Africa (Marrakesh, Morocco). One hundred and sixty-seven freshwater KBAs, covering a total area of 302,557 km<sup>2</sup> were confirmed as valid freshwater KBAs. Of these, 40 KBAs also meet the criteria qualifying them as Alliance for Zero Extinction (AZE) sites where immediate conservation actions are required if a species present in the KBA is not to become globally extinct in the near future. All proposed and validated KBAs are now publicly available for viewing on the World Biodiversity DataBase website ([www.birdlife.org/datazone/freshwater](http://www.birdlife.org/datazone/freshwater)). The current level of inclusion of validated freshwater KBAs within existing protected areas or other KBAs was found to be extremely low. Seventy-five per cent of the total area of these KBAs was found to lie outside the boundaries of any pre-existing protected areas or other KBAs, including 15 freshwater KBAs for which there is no overlap at all. Through this project freshwater KBAs have now been identified, mapped and validated throughout much of the Mediterranean Hotspot. It is now important to raise awareness of their status as validated freshwater KBAs and to develop plans for appropriate conservation actions at these sites. One hundred and eighty-eight potential Site Champions have been identified by stakeholders as individuals/organizations best placed to raise awareness of the existence of the KBAs and the issues faced with respect to threats to biodiversity, and to help



implement the required actions to safeguard these globally important sites. Specific recommendations for conservation actions are mainly focused on improving management of the hydrology of these KBAs, many of which are currently or potentially impacted by over-abstraction and diversion of water, construction of dams, and drought. KBAs need to be managed to ensure Environmental Flows are sufficient to support these fragile freshwater ecosystems and they should be implemented as part of catchment-wide Integrated River Basin Management planning which takes account of the wide range of uses of water across all sectors. There are also important knowledge gaps in site and basin-specific species distributions of many threatened species, and many countries do not yet have baseline inventories of their inland water ecosystems and species assemblages. It is very possible that many new KBAs will be discovered if these biodiversity inventories progress. In conclusion, the Mediterranean Basin Hotspot is found to be globally important for its freshwater biodiversity. This biodiversity is highly threatened largely due to the conflicting demands upon a diminishing supply of fresh water which is further exacerbated by the increased severity of drought across the region. Unless the recommendations given above are followed and Site Champions are mobilized to raise awareness of these globally important freshwater KBAs, species will almost certainly be lost in the very near future. Solutions are available but the willingness to adopt them has to be encouraged. Freshwater species are most often out of sight and out of mind so raising awareness of their presence, the threats they face, and the necessary conservation actions are fundamental to the persistence of freshwater biodiversity in the Mediterranean Hotspot." (Authors) The following odonate trigger species were selected: Turkey and Levant: none; Balkans: *Coenagrion intermedium*, *Ceriagrion georgifreyi*, *Pyrrhosoma elisabethae*, *Boyeria cretensis*; North Africa: *Calopteryx exul*, *Cordulegaster princeps*; Gomphus lucasii] Address: Available from: IUCN Centre for Mediterranean Cooperation, C/ Marie Curie 22, 29590 Campanillas, Malaga, Spain. [www.iucn.org/mediterranean](http://www.iucn.org/mediterranean); [www.iucn.org/publications](http://www.iucn.org/publications)

**15103.** Dunk, K. von der; Kraus, M. (2014): Grundlegende Untersuchungen zur vielfältigen Insektenfauna im Tiergarten Nürnberg unter besonderer Betonung der Hymenoptera. Beiträge zur bayerischen Entomofaunistik 13: 67-207. (in German, with English summary) [Nürnberg, Bayern, Germany; on pages 188f, 14 (common) odonate species are listed.] Address: not available

**15104.** Elias, J.D.; Ijumba, J.N.; Mgaya, Y.N.; Mambo, F.A. (2014): Study on freshwater macroinvertebrates of some Tanzanian rivers as a basis for developing biomonitoring index for assessing pollution in tropical African regions. Journal of Ecosystems Volume 2014, Article ID 985389, <http://dx.doi.org/10.1155/2014/985389>: 8 pp. (in English) ["Macroinvertebrates and physico-chemical parameters were assessed at 15 sites along five rivers in Kilimanjaro region, Tanzania, with the aim of understanding their eco-

logical status and set a base to the development of a biological index for tropical regions. Investigated rivers occur within Pangani basin include Karanga, Rau, Lumbanga, Sere, and Umbwe. Sampling sites were categorized according to the level of water and habitat quality as follows: reference or least impacted (4 sites), moderately impacted (5 sites) and highly impacted (6 sites) sites. A total of 12,527 macroinvertebrates belonging to 13 orders and 48 families were recorded. The highest total abundance of 4,110 individuals per m<sup>2</sup> was found in Karanga river, while Umbwe River had the lowest with 1,203 individuals per m<sup>2</sup>. Chironomidae was the most abundant family (2,588 individuals per m<sup>2</sup>) and the least were Hydridae and Thiaridae, each having 5 individuals per m<sup>2</sup>. High numbers of taxa were noted among the Orders: Ephemeroptera (8), Odonata (8), Diptera (7) and Trichoptera (6). In conclusion, orders with greater diversity of macroinvertebrate families offer a wide range of tolerance to pollution, thus can potentially be used to develop a biomonitoring index for evaluating pollution in Tropical African rivers." (Authors)] Address: Elias, J.D., The Nelson Mandela African Institute of Science and Technology (NM-AIST), School of Materials, Energy, Water and Environmental Sciences (MEWES), Dept of Water & Environmental Science & Engineering (WESE), P. O. Box 447, Arusha, Tanzania. E-mail address: [eliasj@nm-aist.ac.tz](mailto:eliasj@nm-aist.ac.tz)

**15105.** Ellenrieder, N. von; Hauser, M.; Kinnee, S.; O'Hara, J.E.; Stireman III, J.O.; Cerretti, P.; Wood, D.M. (2014): First record of a parasitoid tachinid fly (Diptera: Tachinidae) on a dragonfly (Odonata: Calopterygidae). *Studia dipterologica* 21(2): 335-341. (in English, with German summary) ["During a biodiversity survey in the forest of central Guyana, an adult male of the damselfly *Hetaerina caja dominula* Hagen in Selys was found parasitized by a tachinid larva. This constitutes the first record of a parasitoid on an adult odonate, and of an odonate as host of a tachinid larva. CO1 DNA sequencing of the larva placed it closest to the tachinid genera *Actinodoria* Townsend, *Euhaldaya* Walton, and *Cryptomeigenia* Brauer & Bergenstamm in the tribe *Blondeliini* (subfamily *Exoristinae*). Pictures are provided of the third instar fly larva protruding from the host, of its posterior spiracles, and of the first and second instar cephaloskeletons." (Authors)] Address: Ellenrieder, Natalia von, California State Collection of Arthropods, CDFA, 3294 Meadowview Road, Sacramento, CA 95832. Email: [natalia.ellenrieder@gmail.com](mailto:natalia.ellenrieder@gmail.com)

**15106.** Endersby, I. (2014): Additional distribution records for Victorian dragonflies (Insecta: Odonata). *Continued. Victorian Entomologist* 44(1): 8-15. (in English) [*Dendroaeschna conspersa*, *Diphlebia nymphoides*, *Hemiphlebia mirabilis*, *Nannophlebia risi*] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: [endersby@pacific.net.au](mailto:endersby@pacific.net.au)

**15107.** Fauziyah, S.; Alam, C.; Soesilohadi, R.C.H.; Retnoaji, B.; Alam, P. (2014): Morphological and mechanical characterisation of the hindwing nodus from the Libellulidae family of dragonfly (Indonesia). *Arthropod Structure &*

Development 43(5): 415-422. (in English) ["In this communication, the morphologies and mechanical characteristics of nodi from the hindwings of seven Indonesian Libellulidae dragonfly species are identified (*Acisoma panorpoides* ascalophoides, *Brachythemis contaminata*, *Crocothemis servilia*, *Potamarcha congener*, *Pantala flavescens*, *Orthetrum sabina*, *Neurothemis ramburii*). Geometrical analyses reveal that in all species, the shape of dorsal face resilin is relatively long and thin while ventral face resilin covers a greater surface area than dorsal face resilin, and is shaped like a hook. Finite element analyses reveal that the magnitude of strain energy may differ considerably between species, even though the locations of highest strain energy are usually the same. Importantly, a correlation is found to exist between the mechanical forces that build up in the resilin, the face under investigation (dorsal or ventral) and the elongational shape factor of the resilin." (Authors)] Address: Alam, P., Laboratory of Paper Coating and Converting, Centre for Functional Materials, Abo Akademi Univ., Porthaninkatu 3, Turku 20500, Finland. E-mail: parvez.alam@abo.fi

**15108.** Furlan, N.E (2014): Life histories, diets, and secondary production of Odonata along a temperature gradient on the Copper River Delta, Alaska. MSc thesis, Loyola University Chicago: 79 pp. (in English) ["Dragonflies (Odonata: Epiprocta) and damselflies (Odonata: Zygoptera) are a conspicuous aspect of the biota in ponds on southcentral Alaska's Copper River Delta (CRD). Odonate densities, secondary production, and diets were assessed in sixteen ponds classified by delta region (east vs. west) and landscape type (outwash plain (OP) vs uplifted marsh (UM)). *Enallagma boreale* comprised 48.5% of collected odonates. *Leucorrhinia hudsonica* and *Aeshna juncea* comprised 36.6% and 10.4% of collected odonates, respectively. *L. hudsonica* densities and secondary production were significantly higher ( $p < 0.001$ ) in west UM ponds than in other pond types. Ostracods (Ostracoda) and water boatmen (Corixidae) dominated west OP *A. juncea* diets. Midge larvae (Chironomidae) dominated *A. juncea* diets in remaining pond types, occurring in 68% of foreguts. 27% of *A. juncea* foreguts demonstrated intraguild predation, and 6% of foreguts demonstrated cannibalism. Foreguts containing threespine stickleback (*Gasterosteus aculeatus*) revealed *A. juncea*'s apex predator role in CRD ponds." (Authors)] Address: not stated

**15109.** Gauci, C. (2014): A review of the Odonata of the Maltese Islands. J. Br. Dragonfly Society 30(2): 79-109. (in English) ["This paper is the result of five years of detailed observations of Odonata at several sites in the Maltese Islands. It updates the status and relative abundance of the various species. There is currently only one zygopteran *Ischnura genei* established on the Islands. *Calopteryx virgo* is considered a vagrant, while the occurrence of *C. haemorrhoidalis* is considered to be highly doubtful. There are nine species of anisopterans which are established in the Islands, these being *Anax imperator*, *A. parthenope*, *Orthetrum cancellatum*, *O. coerulescens*, *O. trinacria*, *Sympetrum fonscolombii*, *Crocothemis erythraea*, *Trithemis annu-*

*lata* and *Selysiothemis nigra*. Three more: *Orthetrum nitidissime*, *O. chrysostigma* and *Pantala flavescens*, have recently been added to the Islands' list, while two - *Orthetrum brunneum* and *Sympetrum striolatum* - which were formerly considered common, are now very rare. *Anax ephippiger* is a fairly regular migrant, appearing in considerable numbers in some years. *Aeshna mixta* is rare but might be on the verge of establishing itself on the Islands, following a recent spate of records, including ovipositing females. Various inaccuracies and conflicting statements appearing in previous contributions are corrected. Observations on behaviour are included where these are of special interest as well as where they are in contradiction of what has been stated in the literature." (Author)] Address: Gauci, C., 28. Triq il-Kissier, Mosta, Malta

**15110.** Ghahari, H.; Thipaksorn, A. (2014): A preliminary checklist of Odonata (Insecta from the Arasbaran Biosphere Reserve and vicinity, northwestern Iran. The Journal of Tropical Asian Entomology 3(1): 48-54. (in English) [Geotag: Iran, Arasbaran (East Azarbaijan province, northwestern Iran) [38°40' to 39°08'N; 46°39' to 47°02'E]; a total of 26 odonate species were collected and identified.] Address: Ghahari, H., Department of Entomology, Science and Research Branch, Islamic Azad University, Tehran, Iran

**15111.** Golfieri, B. (2014): Valutazione dello stato morfologico ed ecologico di corsi d'acqua alpini: utilizzo e confronto dell'indice di qualità morfologica (IQM) e di un indice basato sugli odonati. Tesi di dottorato, Dipartimento di Scienze Storiche, Geografiche e dell'Antichità, University of Padona: (in Italian, with English summary) ["This thesis deals with the assessment of morphological and ecological conditions of six Italian alpine rivers. Odonata were chosen as bioindicators to assess the ecological status of river corridors while the assessment of the morphological status of the study cases was performed by using the Morphological Quality Index (MQI) Dragonflies demonstrated to be an effective bioindicator. The results also indicated a significant correlation between MQI and OQI and demonstrated the importance of river processes as drivers for the maintenance of a high diversity of habitats and species within the river corridor." (Authors) [http://gesta.scuoladottorato.it/joomla/images/ALLEGATI/archivio/2012/canazei-2012/Golfieri\\_paper.pdf](http://gesta.scuoladottorato.it/joomla/images/ALLEGATI/archivio/2012/canazei-2012/Golfieri_paper.pdf)] Address: not stated

**15112.** Hoess, R.; Wermeille, E. (2014): Erstmaliger Nachweis der Entwicklung von *Gomphus vulgatissimus* auf über 1.000 m. Mercuriale 14: 33-38. (in German, with English and French summaries) ["First record of a successful development of *Gomphus vulgatissimus* at above 1,000 m above sea level. In 2013 and 2014 two exuviae of *Gomphus vulgatissimus* were found at Lac des Taillères, a small lake in the Swiss Jura mountains at 1,036 m above sea level, proving the development of the species above 1,000 m asl. Adults have been witnessed at the lake and its surroundings since 2008. The climatic conditions and records of high altitudinal reproduction are discussed." (Authors)] Address:

Wermeille, E., Route de Clêmesin 8, CH-2057 Villiers, Switzerland. E-mail: ewermeille@vtx.ch

**15113.** Hrivniak, H.; Manko, P. (2014): Contribution to the knowledge of ecologically significant aquatic insect species of the Topľa river. *Acta Universitatis Prešovensis - Folia Oecologica* 6(2): 9-15. (in Slovakian, with English summary) ["A survey of aquatic macroinvertebrates as available food resources of the Brown trout in the Topľa river (Slovakia) was implemented. This report shows information about occurrence of some endangered and vulnerable species in this river: *Oligoneuriella rhenana* (Ephemeroptera; Oligoneuriidae) (EN), *Taeniopteryx schoenemundi* (Plecoptera; Taeniopterygidae) (EN), *Onychogomphus forcipatus* (Odonata; Gomphidae) (VU), *Atherix ibis* (Diptera; Athericidae) (VU), with the short autecological characteristics. These findings indicate that Topľa river catchment represents a remarkable area in terms of nature conservation, which should be given more attention, particularly in the context of recent ecological negative impacts to the habitats (removal of riparian vegetation, river banks and riverbed disturbances). The occurrence of several rare and endangered species found by this low-intensity and small scale research can also serve as a motivation for further faunistic studies in this area." (Authors)] Address: Hrivniak, H., A. Sviatanka 24, SK - 085 01 Bardejov, Slovakia. e-mail: lubos.hrivniak@gmail.com

**15114.** Jana, D.; Chakraborty, S.K.; Tamili, D. (2014): Diversity of dragonflies (Insecta: Odonata) in contrasting coastal environment of Midnapore (East), West Bengal, India. *Journal of Radix International Educational and Research Consortium* 3(4): 1-11. (in English) [13 odonates species were sampled from November 2007 to October 2010.] Address: Jana, D., Vidyasagar University Paschim Medinipur, India

**15115.** Karaouzas, I.; Dimitriou, E.; Lampou, A.; Colombari, E. (2014): Seasonal and spatial patterns of macroinvertebrate assemblages and environmental conditions in Mediterranean temporary ponds in Greece. *Limnology* 16: 41-53. (in English) ["Mediterranean temporary ponds in Greece have been neglected, and only recently has attention been drawn to their protection and conservation. In this study, the macroinvertebrate fauna of the Mediterranean temporary ponds of western Crete was examined for the first time. In particular, the seasonal and spatial patterns of macroinvertebrate communities were assessed along with the spatio-temporal variation of their environmental conditions and hydroperiod variation. Benthic fauna and abiotic (physicochemical, hydroperiod) data were monitored for 3 years (2006–2008). A total of 63 macroinvertebrate taxa belonging to 33 families were recorded, with *Plea minutissima*, *Berosus affinis*, *Pericoma* sp., *Culex* sp., Chironomidae and Cyprididae being the most abundant. Nutrient pollution was significant in the ponds situated near agricultural areas and could thus explain the poor species richness. NMDS showed a clear spatial and temporal distinction between

lowland and upland sites. Heteroptera species were exclusively encountered in spring, while Coleoptera larvae and adults were present in all seasons, with adults being more abundant during winter. Ordination analysis revealed significant seasonal and inter-annual differences in macroinvertebrate assemblage structure, as confirmed by ANOSIM ( $R = 0.965$ ,  $p = 0.001$ ). Species richness was relatively lower compared to temporary ponds from other regions because of their isolated character, unpredictable hydroperiod and degraded water quality. This study highlights that these fragile ecosystems sustain a unique invertebrate fauna able to endure pond drying by several survival traits and therefore their conservation and protection is necessary." (Authors) Taxa - including Odonata - are treated at the family level.] Address: Karaouzas, I., Hellenic Centre for Marine Research, Institute of Marine Biological Resources and Inland Waters, 46.7 km Athens-Sounio Av., 19013, Anavissos, Attica, Greece. E-mail: ikarz@hcmr.gr

**15116.** Kever, D.; Schott, O.; Goffart, P. (2014): Les odonates des Hautes-Fagnes: effets positifs du récent projet LIFE de restauration des tourbières. *Les Naturalistes Belges* 95(3-4): 33-70. (in French, with English summary) ["Odonata in the "Hautes-Fagnes" plateau: positive effects of peat bogs restoration of the recent Life project": The interest of the "Hautes-Fagnes" high-plateau for dragonflies is known since a long time. After a period of degradation of the peatlands during the last century, the plateau has been the subject of a large scale LIFE project to restore moors and peat bogs between 2007 and 2012 resulting in the creation of countless numbers of new and potentially attractive habitats for dragonflies. The long-term evolution of dragonflies' communities in the "Hautes-Fagnes" is presented here and is put in perspective. The standardized monitoring of dragonflies set up after the LIFE project shows a significant positive effect, both quantitatively and qualitatively, of the restoration work on the area's dragonfly fauna. In particular, all bog species, several of which are regionally rare and endangered, reacted positively, even the most demanding ones." (Authors) The following species are detailed: *Aeshna juncea*, *A. subarctica elisabethae*, *Coenagrion hastulatum*, *Leucorrhinia dubia*, *L. pectoralis*, *L. rubicunda*, *Orthetrum coerulescens*, *Somatochlora arctica* and *Sympetrum danae*.] Address: Kever, D., Service Public de Wallonie (SPW) - Direction Générale Opérationnelle de l'Agriculture, des Ressources Naturelles et de l'Environnement (DG03) - Département de l'Etude du Milieu Naturel et Agricole (DEMNA) - Direction de la Nature et de l'Eau (DNE), Avenue Marechal Juin, 23, B-5030 Gembloux, Belgium. E-mail: david.kever@spw.wallonie.be

**15117.** Khazan, E.S. (2014): Tests of biological corridor efficacy for conservation of a Neotropical giant damselfly. *Biological Conservation* 177: 117-125. (in English) ["Deforestation and forest fragmentation are important drivers of global biodiversity loss and negatively impact ecosystem health and landscape continuity. One approach to reducing these impacts is the establishment of biological corridors. Studies on corridor efficacy have been limited to a small



subset of taxa; while important, these data can rarely be extrapolated to other systems. I tested whether *Megaloprepus caerulatus*, a giant tree-hole breeding damselfly adapted to mature Neotropical forests, can and does disperse from mature forest to fragments that are components of an established corridor. I monitored presence of *M. caerulatus* in four secondary forest fragments of the San Juan-La Selva biological corridor network and in the contiguous La Selva forest. I compared densities of adult *M. caerulatus* and larval presence in artificial and natural breeding sites over the course of one year. None of the artificial holes in fragments were colonized by *M. caerulatus* whereas at La Selva 25% of artificial holes and 63% of natural tree holes were colonized. I tested *M. caerulatus*'s ability to fly over pasture between fragments with a dispersal challenge experiment. Although the damselfly successfully crossed gaps of 25 m, it had difficulty traversing gaps as narrow as 50–100 m. Based on analysis of 360 photos taken from each release distance, the forest edge was less distinguishable from distances P50 m. These results suggest limited conservation utility of existing biological corridor networks for *M. caerulatus*." (Author)] Address: Khazan, Emily, Dept of Biology, University of Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: ekhazan@gmail.com

**15118.** Kiauta, B. (2014): Sketches for the dragonfly fauna (Insecta: Odonata) of the metropolis of Ljubljana, Slovenia. *Natura Sloveniae* 16(1): 15-40. (in Slovene, with English summary) ["An annotated list of 49 species, recorded within the boundaries of the Municipality of Ljubljana, is presented, along with brief comments on selected taxa. A comprehensive regional bibliography, covering the 1763-2010 period, is appended. Biogeographically, the fauna has a northern Mediterranean character, marked by the occurrence of *Calopteryx virgo padana*, *Cordulegaster heros* and *Somatochlora meridionalis*. The increase of biodiversity from the urbanized city centre (13 species), towards the suburbs (38 species) and the adjacent rural neighbourhood (49 species) is emphasized. The ecological features of the odonate assemblage of the Ljubljana city centre are compared with those in the centres of Klagenfurt (Austria: 21 species) and Trieste (Italy: 8 species). Some pending problems in the field of species-, habitat- and biodiversity conservation in selected localities are outlined, with particular reference to the recreational boating on the Ljubljanica river, inadequate management of the Tivoli pond and to the impoundment and regulation of the Gradašèica and Glinšèica streams." (Author)] Address: Kiauta, B., Callunastr. 6, 5853 GA Siebengewald, The Netherlands. E-mail: mbkiauta@gmail.com

**15119.** Krajewski, L.; Jarzombkowski, F.; Kotowska, D. (2014): Yellow-spotted Whiteface *Leucorrhinia pectoralis* (Charpentier 1825) in Gorbacz Nature Reserve (Knyszyn Forest, NE Poland). *Przegląd Przyrodniczy* 25(3): 62-65. (in Polish, with English summary) ["In the middle of June 2014, some territorial males of *L. pectoralis* were observed in the part of "Gorbacz" bog (Knyszyn Forest), where active protection measures had been undertaken. Despite of the recent researches (including dragonflies), the species has not

been reported from the "Gorbacz" nature reserve. *Leucorrhinia pectoralis* population inhabits flooded ditches, wide and sunny after wood clearing. The ditches were blocked up using wooden dams and are being overgrown now by peat mosses, forming floating mats and habitat suitable for dragonflies." (Authors)] Address: Krajewski, L., Zakład Ochrony Przyrody i Krajobrazu Wiejskiego, Instytut Technologiczno-Przyrodniczy, Falenty Al. Hrabaska 3, 05-090 Raszyn, Poland. E-mail: lukkrajewski@wp.pl

**15120.** Krech, M.; Hampel, J. (2014): Reproduktionsnachweise der Flussjungferarten *Gomphus vulgatissimus* (Linnaeus, 1758) und *Gomphus pulchellus* (Selys, 1840) an Abgrabungsgewässern im Stadtgebiet von Erfurt / Thüringen (Insecta: Odonata: Gomphidae). *Thüringer faunistische Abhandlungen* 19: 51-56. (in German, with English summary) ["The paper presents recent observations on the reproduction of *Gomphus vulgatissimus* and *Gomphus pulchellus*. Exuviae of both species have been collected at a complex of gravel and clay pits located in the northern district of the provincial capital Erfurt/Thuringia, Germany. This is the first record of *G. vulgatissimus* for the central Thüringer Becken and the catchment area of the Gera. Moreover records for colonization of a standing water body by *G. vulgatissimus* are scarce in Thuringia. Gravel pits located in catchment areas with a broad hydromorphological variability and poor trophic burden may support the spread of clubtail species in Thuringia." (Authors)] Address: Krech, M., Auf der Großen Mühle 7, 99098 Erfurt, Germany

**15121.** Lingenfelter, A.R.; Geluso, K.; Nenneman, M.P.; Peterson, B.C.; Kerby, J.L. (2014): Distribution, diet, and prevalence of amphibian chytrid fungus in non-native American Bullfrogs (*Lithobates catesbeianus*) at the Valentine National Wildlife Refuge, Nebraska, USA. *Journal of North American Herpetology* 2014(1): 81-86. (in English) [30% of studied stomachs (100% = 27) included items of Odonata.] Address: Geluso, K., Dept Biol., Univ. Nebraska at Kearney, Kearney, Nebraska 68849, USA. E-mail: gelusok1@unk.edu

**15122.** Malikova, E. (2014): The first data on the odonate fauna (Insecta, Odonata) of Zeyskii Nature Reserve (Amurskaya Oblast, Russia). *Amurian zoological journal*. 6(3): 256-259. (in Russian, with English summary) ["15 species of Odonata are reported for the territory of Zeyskii State Nature. The most interesting record is that of *Somatochlora alpestris*, the threatened boreal-alpine species." (Author)] Address: Malikova, Elena, Blagoveshchensk State Pedagogical University, Lenina str., 104, Blagoveshchensk, 675004, Russia. E-mail: e\_malikova@inbox.ru

**15123.** Md Rawi, C.S.; Al-Shami, S.A.; Madrus, M.R.; Ahmad, A.H. (2014): Biological and ecological diversity of aquatic macroinvertebrates in response to hydrological and physicochemical parameters in tropical forest streams of Gunung Tebu, Malaysia: implications for ecohydrological assessment. *Ecohydrology* 7(2): 496-507. (in English) ["In

this study, we have investigated the effects of some hydrological and physicochemical parameters such as water quality, velocity, water depth, river width, water pH, water temperature, ammonia-N, biochemical oxygen demand (BOD), chemical oxygen demand (COD) and dissolved oxygen (DO) on diversity of aquatic macroinvertebrates in forest streams of Gunung Tebu (GT), Malaysia. The results of canonical correspondence analysis identified three groups of the aquatic macroinvertebrates according to their relationships with hydrological and physicochemical parameters. The stream velocity, water quality (i.e. DO, BOD and ammonia-N) in addition to canopy cover, total habitat score and substrate quality were the determinant factors controlling the diversity pattern of the aquatic macroinvertebrates in GT streams. Alteration in the hydrological and physicochemical parameters showed to influence the ecological diversity of the aquatic macroinvertebrates in GT streams. The predators were found to be highly associated with the elevated concentrations of BOD and COD. Shredders were positively correlated with pH, stream velocity, DO and habitat quality indicators (total habitat score, embeddedness, epifaunal and canopy cover). However, the collector-gatherers correlated negatively with all of these parameters. It was concluded that stream velocity, substrate structure and water quality were strong attributes for variation in aquatic macroinvertebrate assemblage structure in tropical forest streams of GT." (Authors) Odonata are treated at genus level.] Address: Salman Abdo Al-Shami, School of Biological Sciences, Universiti Sains Malaysia (USM), 11800 Penang, Malaysia. E-mail: alshami200@gmail.com; salsami@usm.my

**15124.** Mey, W. (2014): Ophiogomphus cecilia in Nähe des Lockwitzbaches im Dresdener Osten. Mitteilungen Sächsischer Entomologen 33(111): Titelseite. (in German) [09.09.2014, garden pond, Lockwitzbach, Dresden, Sachsen, Germany] Address: not stated

**15125.** Misof, B.; Liu, S.; Meusemann, K.; Peters, R.S.; Donath, A.; Mayer, C.; Frandsen, P.B.; Ware, J.; Flouri, T.; Beutel, R.G.; Niehuis, O.; Petersen, M.; Izquierdo-Carrasco, F.; Wappler, T.; Rust, J.; Aberer, A.J.; Aspöck, U.; Aspöck, H.; Bartel, D.; Blanke, A.; Berger, S.; Böhm, A.; Buckley, T.R.; Calcott, B.; Chen, J.; Friedrich, F.; Fukui, M.; Fujita, M.; Greve, C.; Grobe, P.; Gu, S.; Huang, Y.; Jermini, L.S.; Kawahara, A.Y.; Krogmann, L.; Kubiak, M.; Lanfear, R.; Letsch, H.; Li, Y.; Li, Z.; Li, J.; Lu, H.; Machida, R.; Mashimo, Y.; Kapli, P.; McKenna, D.D.; Meng, G.; Nakagaki, Y.; Navarrete-Heredia, J.L.; Ott, M.; Ou, Y.; Pass, G.; Podsiadlowski, L.; Pohl, H.; von Reumont, B.M.; Schütte, K.; Sekiya, K.; Shimizu, S.; Slipinski, A.; Stamatakis, A.; Song, W.; Su, X.; Szucsich, N.U.; Tan, M.; Tan, X.; Tang, M.; Tang, J.; Timelthaler, G.; Tomizuka, S.; Trautwein, M.; Tong, X.; Uchifune, T.; Walz, M.G.; Wiegmann, B.M.; Wilbrandt, J.; Wipfler, B.; Wong, T.K.F.; Wu, Q.; Wu, G.; Xie, Y.; Yang, S.; Yang, Q.; Yeates, D.K.; Yoshizawa, K.; Zhang, Q.; Zhang, R.; Zhang, W.; Zhang, Y.; Zhao, J.; Zhou, C.; Zhou, L.; Ziesmann, T.; Zou, S.; Li, Y.; Xu, X.; Zhang, Y.; Yang, H.; Wang,

J.; Wang, J.; Kjer, K.M.; Zhou, X. (2014): Phylogenomics resolves the timing and pattern of insect evolution. *Science* 346(6210): 763-767. (in English) ["Insects are the most speciose group of animals, but the phylogenetic relationships of many major lineages remain unresolved. We inferred the phylogeny of insects from 1478 protein-coding genes. Phylogenomic analyses of nucleotide and amino acid sequences, with site-specific nucleotide or domain-specific amino acid substitution models, produced statistically robust and congruent results resolving previously controversial phylogenetic relationships. We dated the origin of insects to the Early Ordovician [~479 million years ago (Ma)], of insect flight to the Early Devonian (~406 Ma), of major extant lineages to the Mississippian (~345 Ma), and the major diversification of holometabolous insects to the Early Cretaceous. Our phylogenomic study provides a comprehensive reliable scaffold for future comparative analyses of evolutionary innovations among insects." (Authors)] Address: Misof, B., Abteilung für Entomologie, Zoologisches Forschungsmuseum Alexander Koenig, Adenauerallee 160, D-53113 Bonn, Germany. E-mail: b.misof.zfmk@uni-bonn.de

**15126.** Mochon, A. (2014): Découverte de l'aeschne des nénuphars au lac des Atocas: une première au Québec. *Bulletin de conservation* 2013 | 2014: 18-20. (in French) [Rhionaeschna mutata, 30-VI-2012, Lac des Atocas, National Park Mont-Saint-Bruno, Canada] Address: Mochon, A. E-mail: mochon.alain@sepaq.com

**15127.** Nakanishi, K.; Nishida, T.; Kon, M.; Sawada, H. (2014): Effects of environmental factors on the species composition of aquatic insects in irrigation ponds. *Entomological Science* 17(2): 251-261. (in English) ["Although irrigation ponds contribute to the conservation of aquatic biodiversity, they have experienced declines in recent years. We therefore examined the relationships between various environmental factors and the community composition of aquatic insects, specifically insect predators, in irrigation ponds to gain knowledge that would aid in the conservation and restoration of biodiversity. We selected Odonata, Hemiptera and Coleoptera as target taxonomic groups and conducted censuses of these groups in 21 ponds in Shiga, central Japan. In total, we collected 30 and 10 species (or species groups) of Odonata and Hemiptera, respectively, and 17 species of Coleoptera. A partial canonical correspondence analysis revealed that the following four environmental factors significantly affected the species composition of aquatic insect communities: the number of emergent plant species, percent concrete revetment, presence of litter and peripheral length. Among these variables, the number of emergent plant species was the most potent factor, perhaps because emergent plants serve as sites for oviposition and emergence, and provide refugia for aquatic insects (odonate nymphs in particular). In contrast, some species specifically inhabited sites poor in emergent plants. This study shows that reductions in concrete revetments are necessary for the conservation of biodiversity. This

would lead to increases in the number of aquatic plant species, which provide habitats and oviposition sites for many aquatic insects. Furthermore, to enrich the local biodiversity of aquatic insects, groups of irrigation ponds with different environments are needed." (Authors)] Address: Nakanishi, K., School of Environmental Science, The University of Shiga Prefecture, Hikone, Shiga 522-8533, Japan. Email: k\_mw\_newt@hotmail.com

**15128.** Nakanishi, K.; Nishida, T.; Kon̄, M.; Sawada, H. (2014): Effects of environmental factors on the species composition of aquatic insects in irrigation ponds. *Entomological Science* 17(2): 251-261. (in English) ["Although irrigation ponds contribute to the conservation of aquatic biodiversity, they have experienced declines in recent years. We therefore examined the relationships between various environmental factors and the community composition of aquatic insects, specifically insect predators, in irrigation ponds to gain knowledge that would aid in the conservation and restoration of biodiversity. We selected Odonata, Hemiptera and Coleoptera as target taxonomic groups and conducted censuses of these groups in 21 ponds in Shiga, central Japan. In total, we collected 30 and 10 species (or species groups) of Odonata and Hemiptera, respectively, and 17 species of Coleoptera. A partial canonical correspondence analysis revealed that the following four environmental factors significantly affected the species composition of aquatic insect communities: the number of emergent plant species, percent concrete revetment, presence of litter and peripheral length. Among these variables, the number of emergent plant species was the most potent factor, perhaps because emergent plants serve as sites for oviposition and emergence, and provide refugia for aquatic insects (odonate nymphs in particular). In contrast, some species specifically inhabited sites poor in emergent plants. This study shows that reductions in concrete revetments are necessary for the conservation of biodiversity. This would lead to increases in the number of aquatic plant species, which provide habitats and oviposition sites for many aquatic insects. Furthermore, to enrich the local biodiversity of aquatic insects, groups of irrigation ponds with different environments are needed." (Authors)] Address: Nakanishi, K., School of Environmental Science, The University of Shiga Prefecture, Hikone, Shiga 522-8533, Japan. E-mail: k\_mw\_newt@hotmail.com

**15129.** Ohtaka, A.; Uenishi, M.; Wulandari, L.; Liwat, Y.; Ardianor, Gumiri, S.; Nagasaka, M.; Fukuhara, H. (2014): Structure and abundance of "interrhizon" invertebrates in an oxbow lake in the peat swamp area of Central Kalimantan, Indonesia. *Limnology* 15: 191-197. (in English) ["The faunal composition of "interrhizon" invertebrate communities associated with submerged parts of three kinds of macrophytes, *Eichhornia crassipes*, *Gramineae* spp. and *Polygonum tomentosum*, were studied in an oxbow lake, Lake Tundai, with acidic water (pH 3.9–4.4) in the peat swamp area of Central Kalimantan. The pH, turbidity, and chlorophyll-a concentration in the surface waters tended to be higher in macrophyte stands than in open waters near the

stands. Thirty-one taxa belonging to three groups of invertebrates, Arachnida, Insecta (including "Coenagrionidae" and "Libellulidae"), especially chironomids, and Isopoda, were found from the root systems, of which insects were the most abundant in every macrophyte stand. The interrhizon invertebrates accounted for 0.16–8.7 g wet wt m<sup>2</sup> among three vegetational stands. The diversity and abundance of interrhizon invertebrates are low in Lake Tundai; this could be due to low pH and/or low productivity in the lake water." (Authors)] Address: Ohtaka, A., Faculty of Education, Hirosaki University, Hirosaki, Aomori 036-8560, Japan. E-mail: ohtaka@cc.hirosaki-u.ac.jp

**15130.** Oliver-Morales, C.; Abarca-García, C.A.; Pozos-Zepeda, L.F. (2014): The differential use of habitat between sexes in a *Ischnura* sp. (Odonata: Coenagrionidae) in the Ciénaga of Almoloya del Río, Estado de México. *Entomología Mexicana* 1: 447-451. (in Spanish, with English summary) ["Field observations about the use of habitat allow us to understand the importance of biotic and abiotic interactions. The main objective of this work was describing quantitatively the differences in the use of habitat between males and females of a species of odonates of *Ischnura* spp. Genus. The work has done in a swamp of Almoloya del Río - Lerma, Estado de México. The fieldwork was made in two sites at the same period of time, in the grassland and in the edge of the pond. Our observations revealed higher quantity of females (88.43 % of females and 11% of males) in grassland than into the swamp (25.86 % of females and 74.13% of males). In overall our results shows that the females of *Ischnura* sp. prefers the grassland zones and on contrary, males prefers the pond. We proposed that males occupied pond area, because in these sites they establish territories in where competed for access to a coupled. If this is true, then the use of habitat could be an important selection pressure to establish the degree of competition for access to a partner." (Authors)] Address: Oliver-Morales, Celia, Depto de Ciencias Ambientales, Universidad Autónoma Metropolitana-Unidad Lerma. Avenida Hidalgo Poniente 46, Colonia La Estación, Lerma de Villada, CP. 52006, Estado de México. E-mail: c.oliver@correo.ler.uam.mx

**15131.** Orlofske, J.M.; Baird, D.J. (2014): A geometric morphometric approach to establish body-shape trait criteria for aquatic insects. *Freshwater Science* 33(3): 978-994. (in English) ["Body shapes of aquatic insect larvae reflect phenotypic responses to complex environmental conditions and can be used to infer habitat properties and indicate natural and anthropogenic perturbations in river ecosystems. Investigation of relationships between body shape and physical-habitat characteristics has been restricted by a lack of an objective schema for quantitative characterization of body-shape variation. We present a functional ecological framework for body-shape classification based on defined criteria. We applied a geometric morphometric (GM) approach to the general classification of body shape in 4 morphologically diverse orders, Ephemeroptera (E), Plecoptera (P), Trichoptera (T), and Odonata (O) collected from 3 sites with contrasting hydrological and hydraulic characteristics.



We describe a robust classification of body shapes for E, P, and O, which possess a compartmentalized body plan, and suggest a preliminary classification for T. We compared GM body shapes with body-shape trait states available in trait databases and found discordance between the 2 classifications. We explored the value of GM body shapes to describe taxon shape structure of reference sites and to detect variation reflecting physical properties of the sites. GM body-shape classes can augment the trait states already available and enhance inference regarding habitat status. Patterns in the shape strategies of aquatic insects, particularly EPO taxa, can be used to extrapolate shape information for other taxonomic groups. GM provides a stable shape classification that can contribute to the description of different ecological strategies of aquatic insects. Expanding the scope of shape information available for many taxonomic groups can improve our understanding of how organism phenotype relates to environmental conditions and supports traits-based assessment. A geometric morphometric approach to establish body-shape trait criteria for aquatic insects." (Authors)] Address: Orlofske, Jessica, Canadian Rivers Inst., Dept Biology, P.O. Box 4400, 10 Bailey Drive, Univ. of New Brunswick, Fredericton, New Brunswick, Canada E3B 5A3. E-mail: j.orlofske@unb.ca

**15132.** Palacino-Rodríguez, F.; Contreras-Sánchez, N.A. (2014): Does experimental marking of wings influence resighting success in *Mesamphiagrion laterale* and *Erythrodiplax umbrata*? (Odonata: Coenagrionidae, Libellulidae). *Odonatologica* 43(3/4): 237-246. (in English) ["To investigate if experimental marking affects the probability of resighting, 1,610 individuals of *Mesamphiagrion laterale* (Selys, 1876) and 630 individuals of *Erythrodiplax umbrata* (Linnaeus, 1758) were marked at two sites in Colombia and analysed with respect to marking variables as follows: marking colour used, which wing was marked, and a combination, i.e. the interaction, of these two. The colour and the marked wing were varied, using a different wing each time, and red, black, blue, or green colour. The information was analyzed using contingency tables (Chi-square test) to compare the probability of resighting for individuals within a population marked with a specific colour or on a specific wing to the probability of resighting for all other individuals in the population. In *E. umbrata* the resighting probability ranged as follows: 90.1 to 95.7 % (marking colour type), 90.4 to 95.2 % (wing used), and 87.5 to 97.8 % (wing-colour combination). In the case of *M. laterale*, the resighting probability ranged as follows: 57.2 to 65.0 % (marking colour type), 58.8 to 65.6 % (wing used), and 51.0 to 82.0 % (wing-colour combination). The colour, wing, or combination of wing-colour used for marking didn't have an effect on the resighting probability, suggesting that the method and its variations are adequate to be used in mark-release-recapture studies on odonates. Recommendations are given on what has to be avoided to eliminate potential effects during the marking procedure." (Authors)] Address: Palacino-Rodríguez, F., Grupo de Investigación en Odonatos de Colombia, Laboratorio de Artrópodos-Biotecnología. Centro Internacional de Física (CIF), Universidad Nacional de Colombia, Bogotá D.C., Colombia. E-mail: odonata17@hotmail.com

**15133.** Paulson, D.R.; de Haseth, C.; Debrot, A.O. (2014): Odonata of Curaçao, southern Caribbean, with an update to the fauna of the ABC islands. *International Journal of Odonatology* 17(4): 237-249. (in English) ["A three-year field study (January 2011–December 2013) of the Odonata of Curaçao, supported by photos and exuvial collections, recorded a total of 21 species from the island, almost doubling its previously known fauna. The lists of Odonata known from Aruba and Bonaire were also updated by specimen and photo records, and 24 species are now known from these three islands. During the period of the study, odonates decreased in abundance and diversity in Curaçao, apparently because heavy rains just before the study began led to colonization of the island by several nonresident species that subsequently declined and disappeared as wetlands diminished during a period with normal rainfall." (Authors)] Address: Paulson, D.R., Slater Mus., Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@pugetsound.edu

**15134.** Pinach, J.M.E.; Martínez, C.D.; Pérez, I.S. (2014): Contribución al conocimiento de la odonatofauna (Insecta: Odonata) en la Serranía baja el complejo lagunar de Ballesteros y el del río Moscas (Serranía media) de cuenca (este de España). *Boletín de la Sociedad Entomológica Aragonesa* 55: 169-184. (in Spanish, with English summary) ["Contribution to the knowledge of the dragonflies (Insecta: Odonata) in the Serranía baja and the lagoon complexes of Ballesteros and river Moscas (Serranía media), Cuenca (eastern Spain). This work reports on the distribution of dragonflies (Odonata, Insecta) in Cuenca (eastern Spain), specifically in the Serranía baja and in the lagoon complex of Ballesteros and river Moscas (Serranía media). We provide information for 45 species. Eight have been found for the first time in this area: *Lestes virens*, *Coenagrion puella*, *Ischnura elegans*, *Ceriagrion tenellum*, *Aeshna mixta*, *Gomphus graslinii*, *Crocothemis erythraea* and *Sympetrum sanguineum*. Four species (*Lestes viridis*, *Gomphus simillimus*, *Onychogomphus forcipatus* and *Sympetrum striolatum*) are included that have not been found in this area since the 1950s (Benítez, 1950, quoted by Anselin & Martín, 1986). A new record for *Sympetrum meridionale* is provided, this specie is not cited in this area since the early twentieth century (McLachlan, 1902b)." (Authors)] Address: Pinach, J.M.E., Agente Medioambiental. Servicios Periféricos de la Consejería de Agricultura en Cuenca. Junta de Comunidades de Castilla-La Mancha, Spain. E-mail: jjeva-nach@hotmail.com

**15135.** Popova, O.N.; Haritonov, A.Yu (2014): Disclosure of biotopical groups in the population of the dragonfly *Coenagrion armatum* (Charpentier, 1840). *Contemporary Problems of Ecology* 7(2): 175-181. (in English) ["The spatial temporal distributions of *C. armatum* in Lake Fadikha with edging overgrowth in the Barabinsk forest steppe are described. It is discovered that the local population of this species is divided into two biotopical groups. The specimens of one group develop in the water area and do not migrate to the shore after metamorphosis; in the other, dragonflies develop in the reeds and migrate to the shore for additional

feeding after metamorphosis." (Authors)] Address: Popova, Olga, Institute of Systematics and Ecology of Animals, Siberian Branch, Russian Academy of Sciences, ul. Frunze 11, Novosibirsk, 630091 Russia. E-mail: popova.olga.nik@gmail.com

**15136.** Preston, D.; Forstner, M.R.J. (2014): Aggregation status and cue type modify tadpole response to chemical cues. *Journal of Fish and Wildlife Management* 6(1): 199-207. (in English) ["Many anuran larvae exhibit an antipredator response to chemical cues released by potential predators. The genus *Bufo* is no exception, as many bufonids exhibit an antipredator response (e.g. reduction in activity) to the presence (recent and current) of predators. Using a mesocosm experiment in a field laboratory setting, we tested solo and groups of *Bufo* (*Incilius*) *nebulifer* tadpoles for an antipredator response to chemical cues produced by 1) the presence of anisopteran nymphs (kairomone cue) (*Anax junius*), and 2) the predation of conspecifics by anisopteran nymphs (a combination of diet and alarm cues, which we termed predation cue). We quantified the magnitude of the response by calculating response strength. We analyzed data with a blocked ANOVA followed by a Tukey's honestly significant difference analysis. We found that chemical cue type (kairomone vs predation) enhanced response strength, but aggregation status (solo vs group) did not. However, solo and groups of tadpoles reduced their activity in response to predation cues, whereas only solo tadpoles reduced their activity in response to kairomone cues, a heretofore unobserved phenomenon. Our results suggest that *B. nebulifer* tadpoles modulate their response to specific types of chemical cues depending on their aggregation status. As reduced activity comes at a cost to resource acquisition and growth, aggregation status may indirectly affect the life history of *B. nebulifer*." (Authors)] Address: Preston, D.B., Dept of Biology, Texas State University, San Marcos, TX, USA. E-mail: dpresto1@uno.edu

**15137.** Rivas, M.; Córdoba -Aguilar, A. (2014): Relation between wing spot and the thermoregulation for two species of genera *Hetaerina* (Odonata: Calopterygidae). *Entomología Mexicana* 1: 470-475. (in Spanish, with English summary) ["The pigmentation of odonate wing spot has been recently linked with thermoregulation function. For this reason, we explored some relationship between proportion and allometry of the wing spot with altitude in a gradient of 1912 m in the states of Mexico and Guerrero using *Hetaerina vulnerata* and *H. americana*. Proportion of wing spot was higher at high altitudes than low altitudes although allometry was not related. *H. americana* individuals showed differences in internal temperature regulation, which could explain the differences related to such altitudinal gradient." (Authors)] Address: Rivas, M., Lab. de Ecología de la Conducta de Artrópodos (LECA), Instituto de Ecología, UNAM. Av. Universidad #3000 col. UNAM CU, Coyoacán, CP: 45510, México DF. E-mail: miguelrivassoto@gmail.com

**15138.** Rongo, T.; Dyer, C. (2014): Using local knowledge to understand climate variability in the Cook Islands. Government of the Cook Islands. 55 pp: (in English) [The Maori name of dragonfly is *Karakara vai*.] Address: Rongo, T., Office of the Prime Minister, Private Bag, Avarua, Rarotonga, Cook Islands. E-mail: teina.rongo@cookislands.gov.ck

**15139.** Rowland, A. (2014): A comparative survey of Ackland's Moor and Widow's Tenement pond. *Journal of the Lundy Field Society* 4: 19-38. (in English) ["Ackland's Moor and Widow's Tenement ponds have not previously been surveyed in any detail and are typical of the two types of pond on Lundy – flooded quarry and naturally filled weedy. Their historical context is evaluated and suggestions for their longevity proposed. Their biodiversity is summarised and the differences and similarities compared. Biotic and abiotic measurements were made and comparison is made with previous surveys undertaken at various levels of complexity since 1953. The surveys also record the biodiversity before and after the drought of 2011 when both ponds were dry. Data for both ponds in all four seasons of the year during the period 2009 to 2013 are presented and are found to match closely Lundy ponds which have benefited from recent, regular and in depth surveys." (Author) *Enallagma cyathigerum*, *Sympetrum striolatum*, *Ischnura elegans*] Address: Rowland, A., Mole Cottage, Chapel Close, Woodford, Morwenstow, Cornwall, EX23 9JR, UK. E-mail: morwenstow@btinternet.com

**15140.** Ryazanova, G.I. (2014): Seasonal variation of wing venation in dragonfly populations (Odonata). *Eurasian Journal of Entomology* 13(4): 334-338. (in Russian, with English summary) ["The variability of the number of wing cells has been studied in four populations of the damselfly *Ischnura elegans*. The dynamics of this characteristic has been described within one season and between seasons. The number of cells of the wing at the beginning of the season of imago flight significantly higher than at its end. The number of cells of the wings of different populations may differ significantly even at the same time. However, inter-seasonal changes in the number of wing cells in the different populations have different directions and scales, not allowing the use of particular wing venation as a sustainable comparative population characteristics. Similar variability of wing venation in the season found in species *Coenagrion puella* and *C. hastulatum*. We discuss a latitude spread of the described phenomenon for dragonflies." (Author)] Address: Ryazanova, G.I., Biological Faculty of Moscow State M.V. Lomonosov University, Moscow 119991 Russia. E-mail: RyazanovaGI@mail.ru

**15141.** Sawada, K.; Yamahira, K.; Kuriwada, T. (2014): Interpopulation variation in female color-type frequency of *Ischnura senegalensis* in Okinawa Island, Japan (Odonata: Coenagrionidae). *Odonatologica* 43(3/4): 227-235. (in English) ["*I. senegalensis* has two female colour-types: gynochromes, which are brown, and androchromes, which are green and similar in appearance to conspecific males. *Ischnura senegalensis* females from Okinawa Island, a

small island in the Ryukyu Archipelago, Japan, show colour-type frequencies that vary greatly, even among adjacent local populations. For example, androchrome frequencies were very low (0–4.3 %) in northern populations of the island. However, in the southern populations androchrome frequencies were high and ranged widely (0–67.2 %). Periodical surveys from 2011 to 2013 of two adjacent southern populations revealed that the frequency of colour-type remained constant over time. To our knowledge, this is the first study of temporally stable and extremely high interpopulation variation in female colour-type frequency in Odonata. We discuss possible reasons for the evolution of such high interpopulation variation in colour-type frequency." (Authors)] Address: Sawada, K., Fukuoka High School, 1-29-1, Katakasu, Hakata-ku, Fukuoka, Japan. E-mail: kouji.sene-galensis@gmail.com

**15142.** Schlüter, R.; Kaiser, M.; Schiffgens, T.; Werking-Radtke, J. (2014): Wie geht es der Natur? Zustand des europäischen Naturerbes in NRW. *Natur in NRW* 2/2014: 13-18. (in German) [Nordrhein-Westfalen, Germany; the favourable conservation status of *Coenagrion mercuriale*, *C. ornatum*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Leucorrhinia caudalis*, and *L. pectoralis* is documented. Only *C. mercuriale* and *S. flavipes* are in good conservation status.] Address: Schlüter, R., Landesamt für Natur, Umwelt und Verbraucherschutz NRW (LANUV), Abteilung Naturschutz, Landschaftspflege, Jagdkunde, Fischereiökologie, Leibnizstraße 10, 45659 Recklinghausen, Germany. E-Mail: ralf.schlueter@lanuv.nrw.de

**15143.** Seidel, M.; Borkowski, M. (2014): Die Libellen der Naturschutzgebiete «Töpchiner Seen» und »Mühlenfließ-Sägebach«. *JahreBuch 2014*: 46-49. (in German) [Landkreis: Dahme-Spreewald, Brandenburg, Germany; in June 2012, 20 odonate species were recorded. The list of species includes *Ischnura pumilio*, *Coenagrion pulchellum*, *Somatochlora flavomaculata* and *Leucorrhinia pectoralis*.] Address: not stated

**15144.** Siesa, M.E. (2014): L'atlante delle libellule. Parco delle Groane. Quaderni del Parco Delle Groane: 166 pp. (in Italian) [Italia, region Lombardia; 38 odonate species are detailed giving information on regional distribution, phenology, habitat, morphology and sibling species.] Address: Publisher: Centro parco Polveriera, Via della Polveriera 2, 20020 Solaro (MI), Italy. www.parcogroane.it

**15145.** Silva, D.T.; Silva, L.L.; Amaral, L.P.; Pinheiro, C.G.; Pires, M.M.; Schindler, B.; Garlet, Q.I.; Benovit, S.C.; Baldisserotto, B.; Longhi, S.J.; Kotzian, C.B.; Heinzmann, B.M. (2014): Larvicidal activity of Brazilian plant essential oils against coenagrionidae larvae. *Journal of Economic Entomology* 107(4): 1713-1720. (in English, with Spanish summary) ["Odonate larvae can be serious pests that attack fish larvae, postlarvae, and fingerlings in fish culture tanks, causing significant loss in the supply and production of juveniles. This study reports a screen of the essential oils (EOs) of *Nectandra megapotamica* (Sprengel) Mez,

*Nectandra grandiflora* Nees, *Hesperozygis ringens* (Bentham) Epling, *Ocimum gratissimum* L., *Aloysia gratissima* (Gillies & Hooker) Troncoso, and *Lippia sidoides* Chamisso against Coenagrionidae larvae. In addition, the most effective EO and its 50% lethal concentration (LC50) and chemical analysis are described. The larvae of *Acanthagrion Selys*, *Homeoura Kennedy*, *Ischnura Charpentier*, and *Oxyagrion Selys* were used to assess the EO effects. EO obtained from *H. ringens*, *O. gratissimum*, and *L. sidoides* showed the highest larvicidal effects at 19 h of treatment. The major constituents of the EO of *H. ringens* include pulegone and limonene, while eugenol and -ocimene predominate in the EO of *O. gratissimum*, and carvacrol and -cymene were the major compounds of the EO of *L. sidoides*. Leaf EOs from *H. ringens*, *O. gratissimum*, and *L. sidoides* showed activity against Coenagrionidae larvae at similar concentrations with LC50s of 62.92, 75.05, and 51.65 l liter<sup>-1</sup>, respectively, and these were considered the most promising treatments." (Authors)] Address: Heinzmann, Berta, Department of Industrial Pharmacy, Federal University of Santa Maria, Av. Roraima 1000, Santa Maria, RS, Brazil. E-mail: berta.heinzmann@gmail.com

**15146.** Skolka, M. (2014): *Selysiothemis nigra* (Odonata) - new species for Danube delta. Popa, L. O., C. Adam, G. Chisamera, E. Iorgu, D. Murariu, O. P. Popa (eds) 2014. International Zoological Congress of "Grigore Antipa" Museum - Book of abstracts. "Grigore Antipa" National Museum of Natural History, Bucharest, Romania: 121. (in English) [Romania; Verbatim: In the spring of 2014, during a monitoring survey of the sandy habitats in *Selysiothemis nigra*, is a IUCN Red List Least Concern species. This species is present in Central Asia, Middle East and Mediterranean area. In the past, this species was probably spread all around the Tethys Sea. In the Mediterranean area, the distribution of *Selysiothemis nigra*, is very scattered. It is mentioned from small areas in all Mediterranean basin: Portugal, Spain – mainland and eastern part, Balearic Islands, Sicily, Malta, Sardinia, parts of Italy, Adriatic coast of Croatia and Slovenia, Greece, Cyprus, Crete. In the Black Sea area, this species is present in the southern part of Bulgaria, Crimeea region and Odessa area. Also, this species is present in mainland Russia, near Ural Mountains. For the Black Sea area, *Selysiothemis nigra* is a new species. It was mentioned only in 2002 for Bulgaria and Ukraine. In Romania, this species was mentioned only in 2013, by a British bird-watcher from Danube Delta, on his blog. This year, many specimens, all females, were observed in sandy habitats dominated by *Leymus sabulosus* and *Crambe maritima* among other dragonflies as *Aeshna isosceles*, *Anax parthenope*, *Anax imperator*, *Orthetrum cancellatum*, *Crocothemis erythraea*, *Ischnura elegans*, *Sympetrum vulgatum*, *S. sanguineum*, *Lestes macrostigma*, *Erythromma najas*, *E. viridulum*, *E. lindenii* and *Coenagrion* sp. The presence of a high number of specimens of *Selysiothemis nigra* on the sandbelt that isolate the paramarine lakes from the Black Sea, and the mentions of this species from Ukraine and Bulgaria suggest that this species extended their range northwards in the last decade. In this case, we are in front of a



new example of climate changes induced regional evolutions.] Address: Skolka, M., "Ovidius" University of Constanta. Natural Sciences Department. 1 Aleea Universitatii. corp B. Constanta 900470. Romania E-mail: mskolka@gmail.com

**15147.** Stadler, G. (2014): Ein außergewöhnlich warmer Winter 2013/2014 mit den beiden Winterlibellen *Sympecma fusca* und *S. paedisca*. *Mercuriale* 14: 43-60. (in German, with English summary) ["Residence and activity patterns during hibernation of 27 adults of *Sympecma fusca* were observed and controlled 62 times from late autumn, 2013, until late winter, 2014. Whereas autumn temperatures were near average, the winter was characterised by exceptionally high temperatures. The study was carried out in the nature reserve "Lengwiler Weiher" in the vicinity of the southern shore of Lake Constance, Switzerland. Five specimens of *S. fusca* were captured, marked and released in November, 2013. Three out of these five individuals could be recorded several times until mid-March, 2014. On 23 February 2014, a remarkable observation was done: under cloudy conditions a specimen undertook a short flight although the current temperature was only 6.6° C. After midday the same day an individual could be observed feeding. Furthermore, in the end of February, 2014, few specimens of *S. paedisca* could be recorded, partly in the same habitat." (Author)] Address: Stadler, G., Hueb 6, CH-8580 Sommeri, Switzerland. E-mail: gesta@gmx.ch

**15148.** Stanford-Camargo, S.G.; Medina-Ortiz, G.R.; Ibarra-González, M.P.; Cruz-Miranda, S.G. (2014): Nails of Odonata in three freshwater bodies of Parque Estatal Sierra de Guadalupe, Ecatepec, Estado de Mexico, Mexico. *Entomología Mexicana* 1: 145-149. (in Spanish, with English summary) [In December 2011, odonate larvae (n = 1574) were sampled, and dominance of the eight taxa (*Anax*, *Archilestes*, *Enallagma*, *Hesperagrion*, *Ischnura*, *Libellula*, *Rhionaeschna*, *Sympetrum*) was studied. Dominant genus was *Sympetrum* with app. 75%, followed by *Enallagma* with 11%.] Address: Stanford-Camargo, S.G., Facultad de Estudios Superiores Iztacala UNAM. Colección de artrópodos. Av. de los Barrios No. 1, Los Reyes Iztacala, Tlalnepantla, Estado de México. C.P. 54090. E-mail: sstanford@campus.iztacala.unam.mx1

**15149.** Tajima, Y.; Watanabe, M. (2014): Seasonal variation of genital morphology and sperm removal in *Ischnura asiatica* (Odonata: Coenagrionidae). *Odonatologica* 43(3/4): 213-226. (in English) ["During copulation, *Ischnura asiatica* (Brauer, 1865) males remove the sperm of the females' previous mates from the spermatheca by stimulating vaginal sensilla thereby inducing sperm ejection. Because a wider penis head stimulates the vaginal sensilla more intensely, larger males with wider penis heads can remove much more sperm from the spermatheca. There are two distinct body sizes for spring (large) and summer (small) generations of *I. asiatica*. In the present study we show that in spring, males have wider penis heads and females have a higher number of vaginal sensilla as compared to summer

adults, suggesting that mating males remove more spermathecal sperm in spring than in summer. However, interrupted copulation experiments showed that females of the spring generation had a higher number of spermatozoa in both sperm storage organs than those of the summer generation. Solitary females of the spring generation also had higher numbers of spermatozoa stored than those of the summer generation, suggesting that spring females might have larger sperm storage organs than summer females. Although the removal rate of bursal sperm was almost the same between generations, the removal rate of spermathecal sperm in the summer generation was slightly higher than that in the spring generation. Consequently, spermatozoa derived from previously mated males have a higher probability of remaining in the sperm storage organs in spring than in summer-generation females. The size of sperm storage organs in females might be critical to understanding sperm displacement. This aspect of female anatomy has not been previously considered in studies of sperm competition in odonates." (Authors)] Address: Watanabe, M., Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan. E-mail: watanabe@kankyo.envr.tsukuba.ac.jp

**15150.** Thanaee, I. (2014): Use of benthic macroinvertebrates for biological monitoring. *SDU Research Journal Sciences and Technology* 7(1): 125-137. (in Thai, with English summary) [This publication reviews research studies conducting to apply macroinvertebrates for biological monitoring in freshwater in Thailand.] Address: Thanaee, Isara., Dept of Biology, Fac. Science Mahasarakham Univ., Thailand

**15151.** Theischinger, G.; Endersby, I. (2014): Australian dragonfly (Odonata) larvae: Descriptive history and identification. *Memoirs of Museum Victoria* 72: 73-120. (in English) ["To improve the reliability of identification for Australian larval Odonata, morphological and geographic information is summarised for all species. All known references that contain information on characters useful for identification of larvae are presented in an annotated checklist. For polytypic genera information is provided to clarify whether each species can already, or cannot yet, be distinguished on morphological characters, and whether and under which conditions geographic locality is sufficient to make a diagnosis. For each species the year of original description and of first description of the larva, level of confidence in current identifications, and supportive information, are included in tabular form. Habitus illustrations of generally final instar larvae or exuviae for more than 70% of the Australian dragonfly genera are presented." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**15152.** Vilariño, V.S.; Flechoso del Cueto, M.F.; Baños, I.R. (2014): Ampliación de la distribución conocida de odonatos amenazados en Castilla y León (España). *Boletín de la Sociedad Entomológica Aragonesa* 55: 279-287. (in Spanish, with English summary) ["Improvement of known geographical distribution of threatened Odonata in Castilla y León

(Spain) Abstract: This paper presents the results of field surveys carried out during the summer of 2014 in the largest riverbeds of Castilla y León, aimed at detecting Odonata. We describe new records of riverine Anisoptera species for this region, which are included in the Red List of Threatened Invertebrates of Spain. Specifically, the first records of *Macromia splendens* in Alberche and Tormes rivers, *Oxygastra curtisii* in Tormes, Manzanas, Negro and Alagon rivers, *Gomphus graslinii* in Alagon and Alberche rivers, *Gomphus simillimus* in Esla, Duero, Tormes and Alberche rivers and *Gomphus vulgatissimus* in the Duero river are provided. The presence of *M. splendens* populations, which located at higher altitudes than were previously considered for this species are described as well. Evidence of reproduction in this species has been recorded at an altitude of 1167 masl in the Alberche river." (Authors)] Address: Víctor Salvador Vilariño, V.S., C/ San Francisco nº 57 5ªA. 09400 Aranda de Duero (Burgos), Spain. E-mail: visalvia@yahoo.es

**15153.** Wang, J.-F.; Chen, M.-Y.; Chaw, S.-M.; Morii, Y.; Yoshimura, M.; Sota, T.; Lin, C.-P. (2014): Complete mitochondrial genome of an enigmatic dragonfly, *Epiophlebia superstes* (Odonata, Epiophlebiidae). *Mitochondrial DNA* 26(5): 718-719. (in English) ["This study reported the 15,435 bp-long complete mitochondrial genome of the relict *Epiophlebia superstes* (Odonata, Epiophlebiidae), an enigmatic dragonfly of the paraphyletic 'Anisozygoptera' possessing characteristics similar to members of both extant odonate suborders, the Zygoptera and the Anisoptera. This mitogenome comprises the common set of 37 genes and an A<sub>p</sub>T-rich control region, and has a gene arrangement identical to those of all available odonates. The genome contains three non-coding inter-genic spacers (s1-s3), which occurs in all of other known odonates, but it lacks the inter-genic spacer s5 typically found in the Anisoptera. This result suggests that *E. superstes* possesses a mitogenomic organization more closely related to that of the Zygoptera than that of the Anisoptera." (Authors)] Address: Chung-Ping Lin, Department of Life Science, Tunghai University, Taichung 40704, Taiwan. Tel: 886 4 23590121 ext. 32412. Fax: 886 4 23590296. E-mail: treehops@thu.edu.tw

**15154.** Xu, Q.-h. (2014): The resources of odonates from Zhangzhou, Fujian of China. *Wuyi Science Journal* 30: 63-73. (in English) ["A total of 124 species of odonates, belonging to 78 genera and 17 families, are reported from Zhangzhou Fujian of China. Among them, 7 genera and 19 species are newly recorded from Fujian." (Author)] Address: Xu, Q.-h., Department of Garden and Horticulture, Zhangzhou City University, Zhangzhou Fujian 363000, China. E-mail: qihanxu@aliyun.com

**15155.** Zaika, V.V. (2014): The Dragonfly Banded Darter, *Sympetrum pedemontanum* (Muller, 1766) (Odonata, Libellulidae) in Tuva. *Eurasian entomological journal* 13(4): 321-322. (in Russian, with English summary) [A map with the records of this rare species in Tuva, Russia is presented together with locality details.] Address: Zaika, V.V., Laboratory

of Biodiversity and Geoecology, Tuvan Institute for Exploration of Natural Resources of SB RAS, Internationalnaya Str. 117 A, Kyzyl 667007 Russia. E-mail: odonta@mail.ru.

**15156.** Zurbrigg, E.; Brodo, I.; Cipriani, J.; Hanrahan, C., MacKenzie, A. (2014): The Ottawa Field-Naturalists' Club Awards for 2013, presented April 2014. *The Canadian Field-Naturalist* 128: 432-434. (in English) [Verbatim: Mary Stuart Education Award: Angelika Skevington The Mary Stuart Education Award is given in recognition of outstanding achievements in the field of natural history education in the Ottawa Region. Angela Skevington is the recipient of this award for 2013. Angela is a primary school teacher who is passionate about natural history education. For over 15 years she has taught a variety of grades in different schools, sharing her dedication to good environmental stewardship and her knowledge and wonder of nature with her students every day, every year. Currently Angela teaches a combined Grade 4/5 class at Huntley Centennial Public School in the village of Carp near Ottawa. Wherever she works, Angela has championed such environmental programs as EarthCare Canada and more recently Ontario EcoSchools. Last year her school was recognized with a silver level EcoSchool certification. This achievement required years of diligent effort on Angela's part to engage students and the school community in activities across the 6 areas of environmental practice rated by the EcoSchool Program, including waste minimization and energy conservation. Each school year, she instigates a student-led club (previously called an EarthCare Club, currently dubbed The Dragonflies) that undertakes environmental projects, such as a periodic audit of their school's energy and waste practices. If the audit indicates that there is a problem, such as improper waste disposal, then The Dragonflies club delivers classroom presentations to fellow students demonstrating the proper practice, such as how to separate garbage for recycling. The students in The Dragonflies club also put on plays at school assemblies to demonstrate proper energy and waste practices. Last year, Angela piloted "litterless lunches" with her class. The Dragonflies promoted the idea and this year the whole school is litter-free at lunch. There are many more examples. Through this hands-on practice, students learn how to be active environmental stewards. For the past 3 years, Angela has participated in Ottawa's Clean up the Capital Day. She enlisted classes that were interested in being involved, applied through the City of Ottawa to get materials (bags, gloves) and then they cleaned up the school grounds. On Earth Day, Angela has conducted student plays at the school assemblies featuring pollution, anti-littering, proper recycling. She also encourages the students to create and perform skits, songs and presentations. She does this every year to promote celebration of the natural environment and good environmental stewardship. Field trips and nature appreciation are important parts of Angela's teaching. Habitat is part of the Grade 4 curriculum. She has successfully applied through Ducks Unlimited Canada's Project Webfoot for funding for field trips to a local wetland (such as the Bill Mason Outdoor Education Centre). They have also had field trips to the Bonnechere Caves. In

addition to all of this, Angela leads informal lunchtime field trips for interested students to a nearby natural area, to learn about and develop an appreciation for nature. One day they may focus on birds, the next day on insects, and the third on plants. She applied for and received funding to organize a field trip for The Dragonflies club for a day to learn about bird banding at Innis Point Bird Observatory. The children were excited to each hold a chickadee or nut-hatch. On breaks they played nature games in the field, and went on a nature hike. Angela teams up with her husband Jeff Skevington to help him lead "kid friendly" field trips for The Ottawa Field-Naturalists' Club as well as for other nature clubs in the Ottawa Valley. Angela assisted Jeff and colleagues in hosting a well-attended Bug Day held at the Fletcher Wildlife Garden last year. Angela's efforts are recognized and appreciated, as evidenced by fellow teacher Donna Christie who said: "I feel honoured to work with Angela and know that she has made a positive impact on her students and our school .... She is a scientifically-oriented, dedicated, hard-working educator." The OFNC is delighted to present the Mary Stuart Education Award for 2013 to Angela in recognition of her success in raising awareness of environmental stewardship and respect for nature at her school and more broadly.] Address: not stated

## 2015

**15157.** Achterkamp, B.; van de Hatert, R.J.W. (2015): Common dragonflies as indicators for water habitats: a start on a practical approach. *Brachytron* 17(2): 87-99. (in Dutch, with English summary) ["Dragonflies are widely used as indicator species for water and habitat quality, especially rare species with very specific habitat requirements. However, in many waters only common species occur that have less strict habitat requirements. Nevertheless, even from these common species, indications can be derived about water and habitat quality. During research for water boards in the Netherlands, the authors have developed a system of ecological groups. The groups were developed on the basis of the larval habitat (mainly based on literature) and behaviour of the adults (mainly based on field experience). Each group is indicative for the habitat quality in a certain zone, or of a certain aspect like oxygen concentration. The 'riparian' group consists of species that prefer riparian vegetation with emergent plants in combination with submerged and float-ingleaved plants. The 'water' group seeks the open water surface without emergent vegetation; submerged and float-ingleaved plants can be present and improve habitat quality. The 'shallow' group is comprised of species that can reproduce in eutrophic waters only when there is a broad zone of shallow water with a open vegetation structure that quickly heats in the sun. The groups 'oxygen' and 'pioneer' are self-explanatory. The groups have been developed for relatively eutrophic, stagnant or slow flowing waters in the eastern and southern part of the Netherlands. Comparable classifications in international literature show that the groups are wider applicable. Of course, such grouping always has to be adapted to regional dragonfly faunas, other water types or specific ecological questions. We hope that

these groups will inspire other observers to look closer at the relations between dragonflies and their (micro-) habitat." (Authors)] Address: Achterkamp, B., Bureau Waardenburg, postbus 365, 4100 AJ Culemborg, The Netherlands. E-mail: b.achterkamp@buwa.nl

**15158.** Achterkamp, B.; van de Haterd, R.J.W. (2015): Common dragonflies as indicators for water habitats: a start on a practical approach. *Brachytron* 17(2): 87-99. (in Dutch, with English summary) ["Dragonflies are widely used as indicator species for water and habitat quality, especially rare species with very specific habitat requirements. However, in many waters only common species occur that have less strict habitat requirements. Nevertheless, even from these common species, indications can be derived about water and habitat quality. During research for water boards in the Netherlands, the authors have developed a system of ecological groups. The groups were developed on the basis of the larval habitat (mainly based on literature) and behaviour of the adults (mainly based on field experience). Each group is indicative for the habitat quality in a certain zone, or of a certain aspect like oxygen concentration. The 'riparian' group consists of species that prefer riparian vegetation with emergent plants in combination with submerged and float-ingleaved plants. The 'water' group seeks the open water surface without emergent vegetation; submerged and float-ingleaved plants can be present and improve habitat quality. The 'shallow' group is comprised of species that can reproduce in eutrophic waters only when there is a broad zone of shallow water with a open vegetation structure that quickly heats in the sun. The groups 'oxygen' and 'pioneer' are self-explanatory. The groups have been developed for relatively eutrophic, stagnant or slow flowing waters in the eastern and southern part of the Netherlands. Comparable classifications in international literature show that the groups are wider applicable. Of course, such grouping always has to be adapted to regional dragonfly faunas, other water types or specific ecological questions. We hope that these groups will inspire other observers to look closer at the relations between dragonflies and their (micro-) habitat." (Authors)] Address: Achterkamp, B., Bureau Waardenburg, postbus 365, 4100 AJ Culemborg, The Netherlands. E-mail: b.achterkamp@buwa.nl

**15159.** Adame-Marino, V.; Cupul-Magaña, F.G. (2015): Odonatos (Insecta: Odonata) de Puerto Vallarta, Jalisco, México / Dragonflies and damselflies (Insecta: Odonata) from Puerto Vallarta, Jalisco, Mexico. *Dugesiana* 22(1): 51-53. (in Spanish) [The new state records of *Gynacantha mexicana*, *Leptobasis vacillans* and *Triacanthagyna septima* are documented in detail.] Address: Adame-Marino, Viridiana, Centro Universitario de la Costa, Universidad de Guadalajara. Av. Universidad 203, Delegación Ixtapa, C.P. 48280, Puerto Vallarta, Jalisco, México. viritoti@gmail.com

**15160.** Adarsh, C.K.; Arunraj, R.; Nameer, P.O. (2015): Odonata (Insecta) diversity of Chinnar Wildlife Sanctuary, the southern Western Ghats, India. *Journal of Threatened Taxa* 7(2): 6910-6919. (in English) ["We report 48 species



of odonates, which include 31 species of Anisoptera and 17 species of Zygoptera. Among the dragonflies, the family Libellulidae dominated with 25 species, while Coenagrionidae with seven species was the dominant family among the damselflies. The odonate diversity of Chinnar WS accounted for 31.16 % of the odonates in Kerala and 27.58% of the odonates of the Western Ghats. Chinnar also recorded two species of odonates that are endemic to the Western Ghats, which are, the Pied Reed Tail Protosticta gravelyi and the Travancore Bamboo Tail Esmemudiensis." (Authors)] Address: Adarsh, C.K., Centre for Wildlife Studies, College of Forestry, Kerala Agricultural Univ., KAU (PO), Thrissur, Kerala 680656, India. E-mail: adarshckcof09@gmail.com

**15161.** Adu, B.W.; Ogbogu, S.S.; Kemabonta, K.A. (2015): Dragonflies and damselflies (Insecta: Odonata) as tools for habitat quality assessment and monitoring. FUTA Journal of Research in Sciences 11(1): 36-45. (in English) ["Odonata of Obafemi Awolowo University Ile-Ife, Nigeria were assessed for the purpose of determining the habitat quality of Odonata community in the campus. Adult Odonata were sampled at four study sites at the campus. The study sites are Opa Reservoir spillway stream: OR, Health Sciences: HS, Biological Garden: BG, and Staff Quarters: SQ. A total of 195 individuals comprising of 36 species in six families (Aeshnidae, Libellulidae, Calopterygidae, Chlorocyphidae, Coenagrionidae and Platycnemididae) were sampled at the campus (Identification by K.D Dijkstra). Similarity test on the odonate community structure at the four study sites was conducted using Soerensen's quotient. OR/BG and OR/SQ were similar, while the other paired study sites (BG/SQ, OR/HS, HS/BG and HS/SQ) were dissimilar. Diversity indices results have Shannon Wiener ( $H'$ ) value ranging between 2.20 - 3.05, Simpson value ranging between 0.86 - 0.95 and Margalef value ranging between 3.39 - 5.8 for the four sites. BG was the richest study site with the highest values (Shannon Wiener: 3.05, Simpson: 0.95 Margalef: 5.8 and evenness was 0.92), followed by OR (Shannon Wiener: 2.96, Simpson: 0.94 Margalef: 5.41 and evenness was 0.81). The forest environments of Obafemi Awolowo University appeared been depleted yet possessed the habitat quality that sustained some species of Odonata. Nevertheless BG and OR have proven to possess the best community structure for the existence of Odonata fauna in the campus." (Authors)] Address: Adu, B.W., Dept Biol. Sci., Ondo State University of Science & Technology, Okitipupa, Ondo State Nigeria. E-mail: williamsadubabs@yahoo.com

**15162.** Adu, B.W.; Akindede, E.O.; Obadofin, A.A. (2015): Composition and distribution of dragonflies and damselflies (Insecta: Odonata) in Iloyin Forest, Akure, Southwestern Nigeria. Ethiopian Journal of Environmental Studies and Management 8(5): 517-529. (in English) ["Odonate fauna of Iloyin Forest was studied from October to December 2009 to have an overview of the species composition and distribution with the threat of deforestation in the area. Adult species were collected once a week using a sweep net throughout the period of the study from three study sites (denoted

as I, II and III) with varying levels of anthropogenic disturbance. A total of 76 species belonging to eight families were recorded in the forest. The two most abundant families in the forest were the Libellulidae and Coenagrionidae. Palpolpeura portia, P. lucia and Congothemis dubia were the dominant species of Libellulidae, while Pseudagrion kersteni was the dominant coenagrionid. Some species of Odonata usually associated with shaded forests were encountered in two of the study sites. The highest diversity and evenness indices were recorded at Site I, followed by Site II and the least recorded at Site III. Although shade-loving species recorded in the study area was an indication of its richness in forest Odonata, some may have however become locally endangered or extinct as a result of deforestation. A check in the rate of deforestation could preserve the few forest (endangered) species and restore the locally extinct ones that changed habitats." (Authors)] Address: Adu, B.W., Department of Biological Sciences, Ondo State University of Science and Technology, Okitipupa, Ondo State, Nigeria. E-mail: williamsadubabs@yahoo.com

**15163.** Alekseevich, A.A. (2015): Rare zoological finds in the Sokolii Hills (to the data investigations of 2014 year). Regional development: an electronic scientific journal (ISSN 2410-1672) 2(6): 9 pp. (in Russian, with English summary) [A female Anax imperator was recorded on June 24, 2014 at the shoreline of the Saratov Reservoir, Sokolii and Sorochinskies Hills, Samara region, Russia. <http://regrazvitiye.ru/ekologiya-i-bezopasnost-zhiznedeyatelnosti-26110/>] Address: Alekseevich, G.A., Samara State University of Economics, Russia. E-mail: ecology@samsu.ru

**15164.** Ali, W.K.; Khidhir, A.-Q.S. (2015): Morphological study of the Sympetrum arenicolor Jödicke, 1994 (Odonata: Libellulidae) collected in Kurdistan Région-Iraq. Entomology, Ornithology & Herpetology 4: 168. doi:10.4172/2161-0983.1000168: 6 pp. (in English) ["This study includes a morphological study of the S. arenicolor. The specimens were collected in some localities of Kurdistan region-Iraq from the period of March until November 2014. The adults described in detail, important body parts such as antenna, rostrum, male and female genitalia were illustrated. Localities and date of collecting were mentioned." (Authors)] Address: Ali, W.K., Salahaddin University-Ebil, College of Education-Biology Dept, Iraq

**15165.** Alvarez-Covelli, C.; Alvarez-Covelli, M.A.; Palacino-Rodríguez, F. (2015): Abdomen or wings? Comparing two body places for marking in Mesamphiagrion laterale (Odonata: Coenagrionidae). Odonatologica 44(3): 343-348. (in English) ["To assess a marking technique that avoids alteration of wing aspect and thereby reduces the effect of marking on the organisms' behaviour, adult individuals of Mesamphiagrion laterale (Selys, 1876) were marked on two body regions and their probability of resighting (PR) was estimated. Marks were placed as irregular spots of turquoise, magenta, lime, and orange colour. The PR of wing-marked individuals and abdomen-marked individuals was compared. A total PR of 80% was detected. PR was higher

when the marks were placed on the abdomen (PR=0.72) than on the wings (PR=0.62), but no significance was found between these recapture rates ( $\chi^2=0.413$ ). This exercise should be implemented in other odonate species to see the widespread nature of our results." (Authors)] Address: Álvarez-Covelli, Catalina, Grupo de Investigación en Odonatos de Colombia (GINOCO), Grupo de Investigación en Biología (GRIB), Departamento de Biología Universidad El Bosque, Avenida carrera 9 No. 131 A-02, Bogotá D.C., Colombia. E-mail: catalinaalvarezcovelli@gmail.com

**15166.** Ameka, C.M. (2015): Effects of insect growth regulator pyriproxyfen on dragonfly nymphs as predators of anopheles mosquitoes at Mahanga, Vihiga County, Kenya. M.Sc. thesis, Agricultural Entomology, School of Pure and Applied Sciences of Kenyatta University: XII + 56 pp. (in English) ["Malaria in sub-Saharan Africa is transmitted mainly by *Anopheles gambiae* Complex mosquitoes. One way of controlling these vectors is by targeting their aquatic stages, which is anticipated to cause significant reduction in adult vectors, hence in malaria transmission. Use of insect growth regulator, Pyriproxyfen, is one potential way of controlling malaria vectors. This study set out to determine the nymphocidal activity of Pyriproxyfen on non-target aquatic dragonfly nymphs during its application to control malaria vectors in western Kenya highlands. In this study, validation of dragonfly nymphs as predators of malaria vectors was done and impact of Pyriproxyfen on these nymphs was determined in Mahanga Village of Vihiga County in western Kenya highlands. One hundred dragonfly nymphs were exposed to third instar larvae of *A. gambiae* to determine their predation efficiency by counting the number of larvae remaining after predation. Eighty 5th instar dragonfly nymphs were exposed to Pyriproxyfen (Sumilarv0.5 G) at concentrations of 0.01ppm, 0.05ppm, 0.1ppm, and filtered tap water as control. The experiment was replicated four times and repeated in ten rounds in the laboratory. Observations were made at 24 hour intervals and data collected on mortality of dragonfly nymphs. One gram of Pyriproxyfen was applied in the 10 randomly selected mosquito breeding habitats at Mahanga once every month. Control experiments in *An. gambiae* breeding habitats were done at Muluhoro study site located 10Km away from Mahanga to avoid contamination by Pyriproxyfen (Sumilarv 0.5G). Percentage predation of 95% was obtained in 24 hours of exposure of *An. gambiae* larvae indicating that the dragonfly nymphs are efficient predators of *A. gambiae*. The insect growth regulator Pyriproxyfen (Sumilarv 0.5G) had nymphocidal activity on the dragonfly nymphs at a concentration of 0.05ppm and 0.1ppm in laboratory assays. Abundance of dragonfly nymphs in *An. gambiae* breeding habitat was determined by comparing the abundance of dragonfly nymphs in the intervention sites at Mahanga and non intervention site at Muluhoro. The results indicated that the dragonfly nymphs were present in both sites over the 11month period. Analysis using Generalized Estimation Equations (GEE) showed that the abundance of dragonfly nymphs was significantly different ( $p<0.01$ ) and there was insignificant nymphocidal activity of Pyriproxyfen (Sumilarv 0.5G) on the dragonfly

nymphs in both the intervention and non intervention ( $p>0.05$ ). The findings of this study have shown that Pyriproxyfen (Sumilarv 0.5G) had insignificant nymphocidal activity on dragonfly nymph when used as a larvicide at lower concentrations of 0.05ppm ( $p>0.05$ ). The study recommends that dragonfly nymphs should be included in mosquito control programs as they are predators of mosquito larvae. Additionally, Pyriproxyfen should not be used at higher dosages of more than 0.05ppm as it affects non target dragonfly nymphs." (Author) <http://etd-library.ku.ac.ke/handle/123456789/14269?show=full>] Address: not stated

**15167.** Anankware, P.J.; Fening, K.O.; Osekre, E.; Obeng-Ofori, D. (2015): Insects as food and feed: A review. International Journal of Agricultural Research and Review 3(1): 143-151. (in English) ["This research reviews the contribution of insects to man in his zeal to improve and widen his sources of food, feed and nutrition. It critically looks at major edible insects and how flies and other insects can contribute to the growing demand for cheap protein in the food and feed industry. Priority is also given to nutrition and some rearing models that have been developed and how these can be improved to domesticate these insects into mini-live-stock." (Authors) It is said 29 odonate species being human food, but no details are given.] Address: Anankware, P.J., Department of Crop and Soil Science, Faculty of Agriculture, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. E-mail: anankware@yahoo.com

**15168.** Andrew, R.J. (2015): Observations on a gynochromatic (?) male of the dragonfly, *Rhodothemis rufa* (Rambur, 1842) (Odonata: Libellulidae). Journal of Threatened Taxa 7(3): 7007-7010. (in English) ["*R. rufa* exhibits a conspicuous sexual dimorphism in its body colour. The mature male is characterized by the homogenous striking brilliant red body while the mature female is dull brown with a prominent mid-dorsal light yellow streak running from the top of the head through the thorax and down to the fifth segment of the abdomen. The sexes can easily be identified from quite a long distance. On 7 November 2012, we observed the unusual sight of a female *R. rufa* chasing another female and forming a tandem link which was followed by copulation. This peculiar reproductive behaviour instigated us to net the specimen. On inspection we found that although it appeared a female, it had well developed external male genitalia in the form of the secondary copulatory apparatus on the venter of the second and third abdomen, a pair of coxites on the ninth abdominal tergum and an additional infra anal appendage at the terminal tip of the abdomen. The testes contained a large number of lobules filled with mature spermatozoa, and the vasa differentia also contained mature sperms. The sperm sac was filled with sperms embedded in seminal fluid. Observations indicate that this could be a rare case of a gynochromatic male of *R. rufa* which has retained the colour patterning of the female even after sexual maturity and concomitantly exhibiting active sexual behaviour, although the case of it being a subadult male which has yet to attain its typical red coloration cannot be ruled

out." (Author)] Address: Andrew, R.J., Post Graduate Department of Zoology, Hislop College, Nagpur, Maharashtra 440001, India. E-mail: rajuanrew@yahoo.com

**15169.** Appel, E.; Heepe, L.; Lin, C.-P.; Gorb, S.N. (2015): Ultrastructure of dragonfly wing veins: composite structure of fibrous material supplemented by resilin. *Journal of Anatomy* 227(4): 561-582. (in English) ["Dragonflies count among the most skilful of the flying insects. Their exceptional aerodynamic performance has been the subject of various studies. Morphological and kinematic investigations have showed that dragonfly wings, though being rather stiff, are able to undergo passive deformation during flight, thereby improving the aerodynamic performance. Resilin, a rubber-like protein, has been suggested to be a key component in insect wing flexibility and deformation in response to aerodynamic loads, and has been reported in various arthropod locomotor systems. It has already been found in wing vein joints, connecting longitudinal veins to cross veins, and was shown to endow the dragonfly wing with chordwise flexibility, thereby most likely influencing the dragonfly's flight performance. The present study revealed that resilin is not only present in wing vein joints, but also in the internal cuticle layers of veins in wings of *Sympetrum vulgatum* (SV) and *Matrona basilaris basilaris* (MBB). Combined with other structural features of wing veins, such as number and thickness of cuticle layers, material composition, and cross-sectional shape, resilin most probably has an effect on the vein's material properties and the degree of elastic deformations. In order to elucidate the wing vein ultrastructure and the exact localisation of resilin in the internal layers of the vein cuticle, the approaches of bright-field light microscopy, wide-field fluorescence microscopy, confocal laser-scanning microscopy, scanning electron microscopy and transmission electron microscopy were combined. Wing veins were shown to consist of up to six different cuticle layers and a single row of underlying epidermal cells. In wing veins of MBB, the latter are densely packed with light-scattering spheres, previously shown to produce structural colours in the form of quasicrystalline arrays. Longitudinal and cross veins differ significantly in relative thickness of exo- and endocuticle, with cross veins showing a much thicker exocuticle. The presence of resilin in the unsclerotised endocuticle suggests its contribution to an increased energy storage and material flexibility, thus to the prevention of vein damage. This is especially important in the highly stressed longitudinal veins, which have much lower possibility to yield to applied loads with the aid of vein joints, as the cross veins do. These results may be relevant not only for biologists, but may also contribute to optimise the design of micro-air vehicles." (Authors)] Address: Appel, Esther, Functional Morphology and Biomechanics, Zoological Institute, Kiel University, Am Botanischen Garten 1-9, D-24098 Kiel, Germany. E-mail: eappel@zoologie.uni-kiel.de

**15170.** Arambourou, H.; Stoks, R. (2015): Combined effects of larval exposure to a heat wave and chlorpyrifos in northern and southern populations of the damselfly

*Ischnura elegans*. *Chemosphere* 128: 148-154. (in English) ["Highlights: •Damselfly larvae were sequentially exposed to a heat wave and chlorpyrifos. •Surprisingly, the heat wave positively affected fat storage and immune function. •Chlorpyrifos had strong negative effects on survival, growth and fat storage. •The AChE inhibition by chlorpyrifos was magnified by the heat wave. •Delayed effects of heat waves may make damselflies more vulnerable to pesticides. Abstract: Heat waves are generally associated with an increased energy consumption and could thus increase the vulnerability to subsequent pesticide exposure. We investigated the combined effect of a heat wave and subsequent exposure to the pesticide chlorpyrifos in *Ischnura elegans* damselfly larvae. To assess local thermal adaptation to heat waves, we applied these combined stressors on replicated low- and high-latitude populations in Europe. Unexpectedly, we observed positive sublethal effects of the heat wave: fat content and phenoloxidase activity increased. Chlorpyrifos had strong negative effects on survival, growth rate, and fat content, while phenoloxidase activity increased; these effects between latitudes were found similar. We found little indication of a higher ability to withstand a heat wave in southern larvae. We did detect a synergistic negative effect on AChE activity. This result highlights the importance of considering delayed effects of extreme temperature events when assessing the impact of pesticides under climate change." (Authors)] Address: Arambourou, H el ene, CEREMA DTer IdF, D epartement Ville durable, 12 rue Teisserenc de Bort, 78197 Trappes-en-Yvelines, France. E-mail: helene.arambourou@irstea.fr

**15171.** Arambourou, H.; Stoks, R. (2015): Warmer winters modulate life history and energy storage but do not affect sensitivity to a widespread pesticide in an aquatic insect. *Aquatic Toxicology* 167: 38-45. (in English) ["Highlights: • Damselfly larvae were sequentially exposed to winter warming and chlorpyrifos. • Low and high-latitude European populations of a damselfly were studied. • Damselfly larvae, especially from low latitude, benefited from winter warming. • Chlorpyrifos exposure negatively affected life-history and biochemical markers. • Pesticide effects were not magnified by winter warming. Despite the increased attention for the effects of pesticides under global warming no studies tested how winter warming affects subsequent sensitivity to pesticides. Winter warming is expected to cause delayed negative effects when it increases metabolic rates and thereby depletes energy reserves. Using a common-garden experiment, we investigated the combined effect of a 4 °C increase in winter temperature and subsequent exposure to chlorpyrifos in the aquatic larvae of replicated low- and high-latitude European populations of the damselfly *Ischnura elegans*. The warmer winter (8 °C) resulted in a higher winter survival and higher growth rates compared to the cold winter (4 °C) commonly experienced by European high-latitude populations. Low-latitude populations were better at coping with the warmer winter, indicating thermal adaptation to the local winter temperatures. Subsequent chlorpyrifos exposure at 20 °C induced strong negative effects on survival, growth rate, lipid content and acetylcholinesterase activity



while phenoloxidase activity increased. These pesticide effects were not affected by winter warming. Our results suggest that for species where winter warming has positive effects on life history, no delayed effects on the sensitivity to subsequent pesticide exposure should be expected." (Authors)] Address: Laboratory of Ecotoxicology, IRSTEA Lyon-Villeurbanne, MAEP research Unit, CS, 5 rue de la Doua, F-69626, Villeurbanne, 70077, France

**15172.** Archana, A.; Sharad, S.; Pratibha, A. (2015): Seasonal biological water quality assessment of River Kshipra using benthic macro-invertebrates. *International Journal of Research - Granthaalayah* 3(9): 7 pp. (in English) [India "The water quality of River Kshipra in stretch of 195 km was studied for water quality status using benthic macro invertebrates for all three seasons' monsoon, winter and summer. The River water quality is subject to severe domestic and industrial pollution at compete stretch of River. In the present investigation a total of 13 Orders of macrobenthic fauna i.e. Ephemeroptera, Trichoptera, Placoptera, Coleoptera, Hemiptera, Odonata, Crustacea, Diptera, Pulmonata, Operculata, Pulmonata, Oligochaeta and Hirudinea belong to 3 Phylum's Arthropoda, Mollusca and Annelida were reported. Arthropoda was the most dominant group in all seasons. On seasonal comparison of benthic fauna is observe that abundance were decreasing order were, Winter > Monsoon > summer. To monitor the water quality samples from two years (2010-12) from different stations were collected monthly. The works highlighted the condition of the River water in various seasons with respect of the seasonal abundance of the benthic macro-invertebrates organisms mentioned above. .... Odonata- The presence of these animals indicates input of little organic pollution in the slow moving or standing clean waters. They can be observed around water bodies, nymph of dragons is robust while damsel is slender with distinct head, thorax and abdomen. Order Odonata represented by Family Coenagriidae, Corduliidae and Gomphidae. The seasonal percentage dominance of order Odonata in monsoon (5.37%), followed by (2.70%) in winter and in summer completely absent. This observation clearly indicate highly polluted status in summer because Odonata nymph were found in only fresh water there is abundance of oxygen and unpolluted water. Lonkar and Kedar, (2014) also reported similar observations." (Authors)] Address: Archana, A., School of studies in Zoology and Biotechnology, Vikram University, Ujjain (M.P.), India

**15173.** Arimoro, F.O.; Odume, O.F.; Uhunoma, S.I.; Edegbene, A.O. (2015): Anthropogenic impact on water chemistry and benthic macroinvertebrate associated changes in a southern Nigeria stream. *Environmental Monitoring and Assessment* 187: 1-14. (in English) ["The Ogba River in southern Nigeria is an important water resource for its riparian communities. This study evaluates impact of anthropogenic influences on the Ogba River using water chemistry and macroinvertebrate data sets obtained over a period of 6 months between January and June 2012. Four stations, stations 1-4, characterised by various human activities were chosen along the river. Organic wastes from domestic

and industrial sources were the major point sources of pollutants. Station 2 where the municipal wastewater drains into the river had elevated values of flow velocity, BOD5, sulphate, phosphate, nitrate and sodium. Based on the canonical correspondence analysis (CCA), 5-day biochemical oxygen demand (BOD5), sulphate, nitrate and phosphate were the main factors that help to shape the macroinvertebrate assemblage structure of the Ogba River. Macroinvertebrates clustered strongly by stations than by seasons indicating that water quality differences between the stations were responsible for the observed differences in the biotic assemblage. The preponderance of naidid oligochaetes, baetid nymphs and certain tolerant dipteran taxa including chironomids and ceratopogonids at all four stations was an indication that the entire water body was stressed. The odonates were the single most abundant taxa; their dominance could be attributed to the vegetative nature of the stream, favouring odonate colonisation. Overall, the responses of macroinvertebrates to stress were reflected by the different assemblage structures recorded at the four study stations. Substrate and microhabitat obliteration and poor water quality appeared to be the factors responsible for the observed assemblage structure in the Ogba River." (Authors)] Address: Arimoro, F.O., Applied Hydrobiology Unit, Department of Biological Sciences, Federal University of Technology, P.M.B 65, Minna, Nigeria. E-mail: f.arimoro@futminna.edu.ng

**15174.** Arunachalam, A. (2015): Impact of sago factory effluent on biochemical constituents in different tissues of male larvae of dragonfly *Bradinopyga geminata*. *International Journal of Advanced Research* 3(5): 453-461. (in English) ["The antepenultimate larvae of dragonfly were treated in sublethal concentrations of sago factory effluent. Under effluent stress, biochemical constituents like total free amino acids, total proteins, total free sugars, glycogen content, reducing sugars, total lipids, triacylglycerol and cholesterol were found to decrease in the haemolymph, fat body and testis thus showing physio-metabolic dysfunction in the larvae. It is implied that the metabolic stress caused by the effluent could alter the reproductive process in the male dragonflies." (Author)] Address: Arunachalam, A., Department of Zoology, Vivekanandha College of Arts and Sciences for Women (Autonomous), Elayampalayam, Tiruchengode - 637 205, Tamilnadu, India

**15175.** Asiain, J., Marquez, J.; Irmeler, U. (2015): New national and state records of Neotropical Staphylinidae (Insecta: Coleoptera). *Zootaxa* 3974: 76-92. (in English) ["The distributional patterns of the studied species are commented and the congruence with species of different families of Coleoptera and Odonata (considering taxa at the family level, without any details and basing on personal communication of J. A. Escoto-Moreno) previously analyzed is discussed. Finally, we conclude that some of these patterns can be proposed as hypothesis of primary biogeographic homology." (Authors)] Address: Asiain, Julieta, Laboratorio de Sistemática Animal, Centro de Investigaciones Biológicas, UAEH, Km 4.5, carretera Pachuca-Tulancingo

s/n, Ciudad del Conocimiento, Col. Carboneras, CP 42184, Mineral de la Reforma, Hidalgo, México. E-mail: asiainae@yahoo.com

**15176.** Assandri, G. (2015): L'odonatofauna (Insecta Odonata) delle basse Valli di Susa, Sangone e di Lanzo (Torino, Italia). *Memorie della Società Entomologica Italiana* 92(1-2): 39-75. (in Italian, with English summary) ["The objective of this paper is to fill the knowledge gaps on Odonate fauna of the low Susa, Sangone and Lanzo valleys (Turin, NW Italy), an area for which there was limited prior knowledge. The available information (153 records) have been reviewed and updated at the same time through an in-depth exploration of the territory (between 2009 and 2013), which involved 137 field surveys on 34 sampling sites of diverse nature (28 lentic and 6 lotic), which produced further 913 records. Overall in the study area were found a total of 45 species, with reproduction ascertained for 37 of them. The occurrence of 3 species recorded in the past was not confirmed and 8 are new (compared to the 2007 regional atlas). Some rich and diverse communities were found and also some species considered rare in north-Western Italy (*Boyeria irene*, *Onychogomphus uncutus*, *Cordulegaster bidentata* and *Somatochlora flavomaculata*). Statistically, in the non protected sites there are no less species than those of protected sites (Regional Parks and SPAs). This underline an inadequacy of protected areas network in order to pursue the conservation of this taxon in the studied region, already subjected to a strong anthropogenic pressures that is threatening some sites of great value. It is finally given a qualitative and quantitative indication of the species' flight periods." (Author)] Address: Assandri, G., Dipartimento di Scienze della Terra e dell'Ambiente, Univ. di Pavia, Via Ferrata 9, 27100 Pavia, Italia. E-mail: giacomo.assandri@gmail.com

**15177.** Ball, O.-P.; Pohe, S.R.; Winterbourn, M.J. (2015): Littoral macroinvertebrate communities of dune lakes in the far north of New Zealand. *New Zealand Journal of Marine and Freshwater Research* 49(2): 192-204. (in English) ["The littoral macroinvertebrate faunas of 17 dune lakes on the Aupouri Peninsula in northern New Zealand were examined. Land cover of individual catchments was principally sand dunes and scrub, plantation forest, pasture, or a mixture of plantation forest and pasture. Sampling was concentrated in the sedge beds, submerged macrophytes and surface sediment layers of the littoral zone. Sixty-eight invertebrate taxa were recorded, 11–30 per lake. Relative abundance of major faunal groups differed considerably among lakes but a core group of common species was found in three quarters of them. Neither community composition, nor various measures of species richness were related significantly to catchment land cover classes. A feature of the lake fauna was the occurrence of three introduced species of Gastropoda and eight self-introduced insect species, including five dragonflies. One of the latter, *Hemicordulia australiae*, was found in all lakes and made up 3% of all invertebrates collected." (Authors)] Address: Ball, O.-P., Environmental Sciences Department, NorthTec, Whangarei, New Zealand

**15178.** Baran, A. (2015): Blending Traditional Fish Culture with Non-Traditional Species and Methods at Genoa NFH. 145th Annual Meeting of the American Fisheries Society, August 16-20th August: (in English) [Verbatim: Genoa NFH was established over 80 years ago by the Upper Mississippi River Fish and Wildlife Act. The mission of the hatchery has changed from providing sport fish for area waters to a conservation hatchery concerned with recovery of endangered aquatic species. The hatchery works with over 35 aquatic species including fish, freshwater mussels, salamanders and now an endangered dragonfly. These programs have required different approaches to methods and equipment used in fish culture. Genoa has constructed several mobile rearing units, one for the mussel program, two for the sturgeon program and will begin construction in 2015 on a unit for the Hine's Emerald Dragonfly (*Somatochlora hineana*). These mobile units allow the station to work in the native environments of the different species, using source water from the natal rivers of lake sturgeon or the nutrient rich water of the Mississippi River for the mussels. The design of the mobile units also allows the hatchery to bring wild species on station without compromising the disease status by using UV disinfection on both the incoming and effluent water. These units can be deployed at the hatchery to quarantine potential mussel host fish, future brood fish as well as the new dragonfly species.] Address: Baran, Angela, DOI USFWS Genoa National Fish Hatchery, Genoa, WI, USA

**15179.** Barry, M.J. (2015): Effects of resource distribution on the cost of predator avoidance behaviour in tadpoles. *Hydrobiologia* 758: 99-105. (in English) ["Tadpoles reduce activity and increase hiding in the presence of dragonfly larvae. Several studies demonstrate that tadpoles showing this behaviour have slower growth, however, other studies have found no effect or even positive growth in tadpoles exposed to predators. A recent study demonstrated that swimming is an energetically expensive activity for *Bufo arabicus* tadpoles. Therefore, if food resources are abundant close to refuges, reduced activity may be an advantage and could offset the cost of reduced foraging. I tested this hypothesis by growing *B. arabicus* tadpoles with food provided either near or away from shelters, in the presence or absence of caged dragonfly larvae (*Anax imperator*). In the presence of dragonfly larvae, tadpoles provided with food close to shelters were significantly larger than those with food further away. Control tadpoles under both food treatments were intermediate in size, although not statistically different from the predator + near food tadpoles. The results indicate that access to resources is the main determinant of growth in *B. arabicus* tadpoles and that the energetic cost of swimming is a secondary factor." (Author)] Address: Barry, M.J., Biol. Dept, Sultan Qaboos Univ., PO Box 36, Al Khoud, Muscat, 123, Sultanate of Oman. E-mail: mjbarry@squ.edu.om

**15180.** Baruah, C.; Saikia, P.K (2015): Abundance and Diversity of Odonates in Different Habitats of Barpeta District, Assam, India. *International Research Journal of Biological Sciences* 4(9): 17-27. (in English) ["A total of 45 species of Odonata including 29 species under 3 families of Anisoptera

and 16 species under 3 families of Zygoptera were recorded in four different types of habitats in Barpeta district of Assam during two years (2012 and 2013) of survey. 38 species were recorded from habitats near ponds and rivers, 39 from near beels and 41 species were recorded from open tracts of land. 7 species were recorded from three different types of habitats; 3 species were recorded from two types and 4 species were recorded from two habitat types. 32 species were recorded in all the four habitat types. The most abundant Anisopteran species in ponds was *Diplacodes trivalis*; in beels and rivers it was *Rhyothemis variegata variegata*, and *Pantala flavescens* was most abundant in open tracts. Among the Zygopteran species the most abundant was *Ceragrion coromandelianum* in all the habitats. Shannon-Weiner index ( $H'$ ) was 3.323 in ponds, followed by 3.310 in open tracts of land, 3.243 in rivers and 3.305 in Beels or lakes. Margalef's richness (DMg) index was found to be 6.47 in open tracts; 6.36 in river banks 6.12 in beels and 5.65 in ponds. The Jaccard's similarity index ( $C_j$ ) was 0.88 between beel and river and 0.80 between pond and open tracts." (Authors)] Address: Baruah C., Dept of Zoology, M.C. College, Barpeta, 781301, Assam, India

**15181.** Baruah, C.; Saikia, P.K. (2015): New records of Odonata from Barpeta district, Assam, India. *Journal of Global Biosciences* 4(9): 3335-3343. (in English) ["In a study conducted in the Barpeta district of Assam, India, a total of 47 species of Odonata species were recorded. ... Five species of odonates including *Ictinogomphus angulosus*, *Stylogomphus inglisi*, *Bradinopyga geminate*, *Acia-grion hisopa* and *Mortonagrion aborense* were recorded for the first time from this region." (Authors)] Address: Baruah, C., M. C. College, Barpeta, Assam 781301, India

**15182.** Basumatary, P.; Adhikary, D.; Daimary, M.; Basumatary, N.; Daimary, A. (2015): A preliminary study on the diversity of Odonata in Bodoland University and its vicinity, Assam, India. *International Journal of Scientific and Research Publications* 5(6): 1-8. (in English) [34 odonate species (26 Anisoptera, 8 Zygoptera) were recorded between May 2013 and November 2014.] Address: Basumatary, Paris, Department of Zoology, Bodoland University, Kokrajhar, Kokrajhar-783370, BTC, Assam, India. E-mail: parishbasumatary@gmail.com

**15183.** Bazzanti, M. (2015): Pond macroinvertebrates of the Presidential Estate of Castelporziano (Rome): a review of ecological aspects and selecting indicator taxa for conservation. *Rendiconti Lincei* 26, Supplement 3: 337-343. (in English) ["Macroinvertebrates of 49 (27 temporary and 22 permanent) ponds located in the Presidential Estate of Castelporziano (Rome) were studied from 1989 to 2004 to investigate their community ecology and to provide a first estimation of their conservation value. More than 300 taxa (about 70 % identified to species) were collected. The main environmental factors influencing the number of species in the study ponds were hydroperiod length, depth, surface area, dissolved oxygen concentration and macrophyte spe-

cies richness and abundances. Permanent biotopes generally hosted higher number of taxa than temporary ones. Some taxa were exclusive or more abundant in a pond type. Functional organization (functional feeding groups, habits and resistance to desiccation) of the community appeared similar in the two pond types but differed among mesohabitats. Up to date, about 62 % of the taxa collected have an unknown status with respect to their distribution in Italy (common, rare, threatened and vulnerable). We identified 50 target species with peculiar ecological requirements and/or geographical distribution to promote effective practical basis for pond conservation in Italy. The distribution of rare, vulnerable or threatened species within the ponds studied suggests that the two pond types and all mesohabitats therein should be considered for the sampling procedure to obtain a correct evaluation of pond conservation." (Author) 19 odonate species had been recorded, but no species details are given.] Address: Bazzanti, M., Department of Environmental Biology, "Sapienza" University of Rome, Viale dell'Università 32, 00185, Rome, Italy. E-mail: marcello.bazzanti@uniroma1.it

**15184.** Beard, J.L. (2015): Perch selection by male dragonflies (Odonata, Anisoptera) related to competitive ability and species composition. Ph.D. thesis, Department of Biological Sciences, Old Dominion University, Norfolk: XII, 67 pp. (in English) ["Males of many species of dragonflies (Odonata, Anisoptera) establish territories in aquatic habitats where they compete with other males for access to food and females. Territorial males typically perch on emergent vegetation and chase rival males who intrude into their territories. This dissertation research examined the role of male size in perch height selection, position on the perch, and competitive ability. Four hypotheses were tested: 1) Dragonfly species would vary by size and that territorial species would show sexual size dimorphism (SSD), 2) Perch height selection would be related to dragonfly size, 3) Position on the perch would be related to male size, with larger males selecting perch tops and smaller inferior competitors choosing the sides of perches, and 4) Intraspecific competition would be more important than interspecific competition. Research was conducted at four lakes in southeastern Virginia from 2011-2014. For size measurements, male and female dragonflies (*Brachymesia gravida*, *Celithemis epolina*, *Erythrodiplax simplicicollis*, *Libellula incesta*, *L. needhami*, *L. vibrans*, *Pachydiplax longipennis*, *Plathemis lydia*, *Perithemis tenera*) were captured and measured for total body length, abdomen length, cerci length, forewing length and width, hindwing length and width and fresh mass. For perching experiments, alternating short (30cm above waterline) and tall (90cm above waterline) bamboo perches were placed in two rows, 0.5m and 2.0m from the shore. Any dragonflies that alighted on perches were recorded for species, gender, perch position and length of occupancy. Any interactions with conspecific or heterospecific dragonflies were recorded. Results showed that dragonfly males varied significantly among species in all parameters measured, and SSD was found for some parameters for some of the species. In particular, females of several species had



greater forewing and hindwing widths than males, perhaps related to selection for energy conservation in females. There was no association between dragonfly size and perch height selection. Four species frequently perched on the sides rather than the tops of perches, and these species tended to be poor competitors who lost more contests than they won. The number of intraspecific and interspecific contests did not differ for any species. Neither dragonfly size nor residency on a perch influenced contest outcomes. Overall, these results revealed that dragonfly community interactions were dynamic and did not follow simple rules." (Author)] Address: Beard, Jessica, Dept of Biological Sciences, Old Dominion University, Norfolk, VA 23529, USA

**15185.** Beatty, C.D.; Andrés, J.A.; Sherratt, T.N. (2015): Conspicuous coloration in males of the damselfly *Nehalennia irene* (Zygoptera: Coenagrionidae): Do males signal their unprofitability to other males? *PLoS One*. 2015 Nov 20;10(11):e0142684. doi: 10.1371/journal.pone.0142684. eCollection 2015.: 13 pp. (in English) ["In damselflies, sexual colour dimorphism is commonly explained as a consequence of selection on traits that increase male attractiveness to females. However, while many species in the Coenagrionidae are sexually dimorphic, the males do not engage in displays, and male competition for mates resembles a "scramble". An alternative explanation for the sexual differences in coloration within these species is that sexual dimorphism has evolved as a sex-related warning signal, with males signalling their unprofitability as mates to other males, thereby avoiding harassment from conspecifics. We evaluated an underlying assumption of the theory that male-male harassment rate is influenced by colour by comparing harassment of males of the species *Nehalennia irene* that had been painted to make them appear: (i) similar to an unaltered male (blue), (ii) different from a male (orange) and (iii) more similar to a female (black). When caged together we found that blue-painted males experienced significantly lower harassment than black-painted males. When unpainted males were caged with each type of painted male we found that blue-painted males and the unpainted males housed in the same cages experienced lower rates of harassment than males housed in cages where some males were painted black, suggesting that a single, reliable signal of unprofitability may benefit the individuals that carry it. While our results do not in themselves demonstrate that sexual colour dimorphism originally evolved as an intraspecific warning signal, they do show that harassment is influenced by coloration, and that such selection could conceivably maintain male coloration as a warning signal." (Authors)] Address: Beatty, C.D., Dept of Biology, Santa Clara University, 500 El Camino Real, Santa Clara, CA, 95053-0268, USA. E-mail: cbeatty@scu.edu

**15186.** Bellenguier, L.; Delpon, G. (2015): Sur la détection de *Somatochlora arctica* et l'estimation de ses populations: l'exemple de la tourbière de la Pignole dans le Cantal (Odonata: Corduliidae). *Martinia* 31(1): 35-46. (in French, with English summary) ["Surveys conducted in 2013 on the Pignole peat bog (Cantal department, France) proved the

settlement of a strong population of *Somatochlora arctica*. The well-known species discretion was confirmed, emphasising the need to collect and number the exuviae during the emergence period. The ratio of the number of exuviae found to the number of imagos observed on the wing and at emergence was ca 18. This estimate is expected to vary with space and should be refined by similar numerations in other localities. The discretion of this specie raises the question of its detectability and of the changes in the numbers of its records over time. It appears that the species was obviously largely overlooked before 1980 due to too rare field works and that only intensive field surveys during the last three decades allowed to assess correctly its genuine status in the region." (Authors)] Address: Bellenguier, L., 1123 Avenue Joseph Claussat 63400 Chamalières, France. E-mail: l.belenguier@gmail.com

**15187.** Bellstedt, R.; Petzold, F.; Schuster, C. (2015): Der Kleine Blaupfeil *Orthetrum coerulescens* im Thüringer Wald (Insecta: Odonata). *Mitteilungen des Thüringer Entomologenverbandes* 22(1): 16-17. (in German) [9-vi-2014 and 02-vii-2014, near Tambach-Dietharz, Landkreis Gotha, Thüringen, Germany.] Address: Ronald Bellstedt, R., Brühl 2, 99867 Gotha, Germany

**15188.** Bennett, A.M.; Murray, D.L. (2015): Carryover effects of phenotypic plasticity: Embryonic environment and larval response to predation risk in wood (*Lithobates sylvaticus*) and Northern leopard (*Lithobates pipiens*) frogs. *Canadian Journal of Zoology* 93(11): 867-877. (in English) ["Limitations of phenotypic plasticity affect the success of individuals and populations in changing environments. We assessed the plasticity-history limitation on predator-induced defenses in anurans (wood frogs: *Lithobates sylvaticus* (LeConte, 1825); Northern leopard frogs: *L. pipiens* (Schreber, 1782)), predicting that plastic responses to predation risk by dragonfly larvae (*Aeshna* spp.) in the embryonic environment would limit the defensive response to predators in the larval environment. Predator-conditioned wood frog embryos increased relative tail depth in response to those same cues as larvae, whereas predator-naïve tadpoles did not. However, no carryover effect was noted in the behavioural response of wood frog tadpoles to predation risk. Predator-naïve Northern leopard frog tadpoles increased relative tail depth in response to predation risk in the larval environment. Predator-conditioned leopard frog embryos hatched with, and maintained, a marginal increase in tail depth as larvae in the absence of predation risk. Predator-conditioned leopard frog embryos exposed to predation risk as larvae showed no morphological response. While we find no strong support for the plasticity-history limitation per se, carryover effects across embryonic and larval life-history stages were noted in both wood and leopard frogs, suggesting that predation risk early in ontogeny can influence the outcome of future interactions with predators." (Authors)] Address: Bennett, Amanda, Environmental and Life Sciences, Environmental Science Building, Suite A211, Trent University, 1600 West Bank Drive, Peterborough, ON K9J 7B8, Canada. E-mail: amandabennett2@trentu.ca

**15189.** Bernard, B.; Daraz, B. (2015): *Cordulegaster heros* and *Somatochlora meridionalis* in Ukraine: solving the zoogeographical puzzle at their northern range limits (Odonata: Cordulegastridae, Corduliidae). *Odonatologica* 44(3): 255-278. (in Dragonfly, Anisoptera, Balkan fauna, Eastern Europe, zoogeography, habitat selection) ["The first records of *C. heros* and *S. meridionalis* in Ukraine completed their distribution picture, thereby allowing the zoogeography of Balkan Odonata species at their northern range limit in Eastern Europe to be better understood. Five localities of *C. heros* in the Khotyn and Chernivtsi Uplands showed the eastern colonisation route to have proceeded north through the eastern Subcarpathians and adjacent hilly areas in Romania and southern Ukraine. A habitat and zoogeographical analysis mostly solved the *Cordulegaster*-puzzle in Ukraine and drew a picture of a northern *C. boltonii*-zone divided from a southern *C. heros*-zone by the extensive Podolian Upland. The population of *S. meridionalis* found in the extreme southwestern Ukraine completed the northernmost range limit in Eastern Europe between the known Slovakian and Romanian localities. It occurs in the Transcarpathian Lowland, i.e., the northernmost part of the Great Hungarian Plain in the direct foreground of the Carpathian foothills. Thus, it perfectly follows the species distribution pattern largely based on an extensive border zone of great basins and low foothills of the adjacent mountain ranges of the Carpathians and Alps. The situation and habitat of Ukrainian and eastern Slovakian localities suggest the Tisa River system as the main colonisation route of *S. meridionalis* for Central and Eastern Europe. Clear differences in the population sizes between streams suggested the optimal, acceptable, and marginal habitats of *C. heros*, which differed in the grain size of the bottom sediments, the stream morphology, and water current. *Somatochlora meridionalis* occurred in a several-metre-broad slow flowing and largely shaded canal-like river where specific habitat conditions were responsible for the concentration of species activity near the levee and pipe culvert." (Authors)] Address: Bernard, R., Department of Nature Education and Conservation, Adam Mickiewicz University, Umultowska 89, PL-61-614 Poznań, Poland. E-mail: rbernard@amu.edu.pl

**15190.** Berquier, C. (2015): Étude écologique et patrimoniale du peuplement des odonates de Corse appliquée à la conservation des espèces et des zones humides à enjeux. Ph.D thesis, Université de Corse -Pascal Paoli, Ecole Doctorale "Environnement et société" UMR CNRS 6134 (SPE): 310 pp. (in French, with English summary) ["Corsica is home to a great diversity of wetland subject to anthropogenic pressures and threats which have continued to grow and diversify in recent decades. The conservation of these environments with high heritage value and of the original Odonata community that develops in it, today represents significant environmental and societal challenges in order to preserve essential ecological services provided by these key elements of aquatic and terrestrial ecosystems. The applied research project developed as part of this thesis is focused on improving the knowledge available on the Corsi-

can dragonfly's community, to propose concrete conservation and management measures for this group and its main insular natural habitats. In this objective, the first part of this work has sought to fill principal knowledge gaps identified by previous studies on the situation of listed species, including by greatly intensifying exploration effort at the regional level. The special features, distribution, habitat requirements and ecological of many dragonflies growing in Corsica have been described with great precision. The information available on some taxa with high heritage value increased as illustrated by the comprehensive definition of eco-bio-geographical situation of *Chalcolestes parvidens*. The second part of this work has sought to evaluate and compare the effectiveness of the main sampling methods commonly used for the study of dragonfly's populations. In this context, the information collected on the spatial organization and dynamics of the populations studied were especially used to propose appropriate methods for evaluation and monitoring the species to high conservation issue to main managers of natural areas of the island (County Councils, PNRC, municipalities ...), including the emblematic and threatened *Lestes macrostigma*. The third part of this work is devoted to the development of tools for monitoring the quality of the main Odonata habitats. It lead to the development of a new biological index adapted to assess the ecological status of Corsican rivers: "Odonata Community Index - Corsica '(OCIC). This innovative tool, based on the study of characteristics of Odonata community of watercourses, was particularly effective during its confrontation with other biological indicators currently used on the island. The OCIC index today appear clearly as an alternative solution to improve the efficiency of the ecological quality assessment system of the Corsican rivers, given the representativeness vulnerabilities which have been highlighted by the tests performed. The final part of this thesis, based on heritage and environmental assessments of the insular dragonfly's community made with all the information produced, ended with the development and the proposal of several regional conservation devices whose implementation is encouraged by the state services: a first regional actions plan, a first red list of threatened species and an updated list of species determinative for natural areas of ecological, flora and fauna interest. These important features are intended to contribute to improve the overall state of conservation of Corsican dragonflies and main wetlands that support them. They should enable the implementation of truly operational management actions and ensure better consideration of the main regional conservation and valuation issues identified. In the end, the thesis work that increased more than triple the previously available data on dragonflies of Corsica, will provide a new framework to develop the insular odonatology." (Author)] Address: Berquier, C., Office de l'Environnement de la Corse, Observatoire – Conservatoire des Insectes de Corse, Lieu-dit "Lergie", RN 200, F-20250 Corte, France. E-mail: cyril.berquier@oec.fr

**15191.** Bhadra, C.M.; Truong, V.K.; Pham, V.T.H.; Al Kobaisi, M.; Seniutinas, G.; Wang, J.Y.; Juodkazis, S.; Craw-

ford, R.J.; Ivanova, E.P. (2015): Antibacterial titanium nano-patterned arrays inspired by dragonfly wings. *Scientific Reports* | 5:16817 | DOI: 10.1038/srep16817: 12 pp. (in English) ["Titanium and its alloys remain the most popular choice as a medical implant material because of its desirable properties. The successful osseointegration of titanium implants is, however, adversely affected by the presence of bacterial biofilms that can form on the surface, and hence methods for preventing the formation of surface biofilms have been the subject of intensive research over the past few years. In this study, we report the response of bacteria and primary human fibroblasts to the antibacterial nanoarrays fabricated on titanium surfaces using a simple hydrothermal etching process. These fabricated titanium surfaces were shown to possess selective bactericidal activity, eliminating almost 50% of *Pseudomonas aeruginosa* cells and about 20% of the *Staphylococcus aureus* cells coming into contact with the surface. These nano-patterned surfaces were also shown to enhance the aligned attachment behaviour and proliferation of primary human fibroblasts over 10 days of growth. These antibacterial surfaces, which are capable of exhibiting differential responses to bacterial and eukaryotic cells, represent surfaces that have excellent prospects for biomedical applications." (Authors)] Address: Bhadra, C.M., School of Science, Faculty of Science, Engineering and Technology, Swinburne University of Technology, PO Box 218, Hawthorn, Victoria, 3122 Australia

**15192.** Bhowmik, A.K.; Schäfer, R.B. (2015): Large scale relationship between aquatic insect traits and climate. *PLoS ONE* 10(6): e0130025. doi:10.1371/journal.pone.0130025: 21 pp. (in English) ["Climate is the predominant environmental driver of freshwater assemblage pattern on large spatial scales, and traits of freshwater organisms have shown considerable potential to identify impacts of climate change. Although several studies suggest traits that may indicate vulnerability to climate change, the empirical relationship between freshwater assemblage trait composition and climate has been rarely examined on large scales. We compared the responses of the assumed climate-associated traits from six grouping features to 35 bioclimatic indices (~18 km resolution) for five insect orders (Diptera, Ephemeroptera, Odonata, Plecoptera and Trichoptera), evaluated their potential for changing distribution pattern under future climate change and identified the most influential bioclimatic indices. The data comprised 782 species and 395 genera sampled in 4,752 stream sites during 2006 and 2007 in Germany (~357,000 km<sup>2</sup> spatial extent). We quantified the variability and spatial autocorrelation in the traits and orders that are associated with the combined and individual bioclimatic indices. Traits of temperature preference grouping feature that are the products of several other underlying climate-associated traits, and the insect order Ephemeroptera exhibited the strongest response to the bioclimatic indices as well as the highest potential for changing distribution pattern. Regarding individual traits, insects in general and ephemeropterans preferring very cold temperature showed the highest response, and the insects preferring cold and trichopterans preferring moderate temperature showed the

highest potential for changing distribution. We showed that the seasonal radiation and moisture are the most influential bioclimatic aspects, and thus changes in these aspects may affect the most responsive traits and orders and drive a change in their spatial distribution pattern. Our findings support the development of trait-based metrics to predict and detect climate-related changes of freshwater assemblages." (Authors)] Address: Bhowmik, A.K., Quantitative Landscape Ecology, Institute for Environmental Sciences, University of Koblenz-Landau, Landau, Germany. E-mail: bhowmik@uni-landau.de

**15193.** Blanke, A.; Büsse, S.; Machida, R. (2015): Coding characters from different life stages for phylogenetic reconstruction: a case study on dragonfly adults and larvae, including a description of the larval head anatomy of *Epiophlebia superstes* (Odonata: Epiophlebiidae). *Zoological Journal of the Linnean Society* 174: 718-732. (in English) ["The exclusive use of characters coding for specific life stages may bias tree reconstruction. If characters from several life stages are coded, the type of coding becomes important. Here, we simulate the influence on tree reconstruction of morphological characters of Odonata larvae incorporated into a data matrix based on the adult body under different coding schemes. For testing purposes, our analysis is focused on a well-supported hypothesis: the relationships of the suborders Zygoptera, 'Anisozygoptera', and Anisoptera. We studied the cephalic morphology of *Epiophlebia*, a key taxon among Odonata, and compared it with representatives of Zygoptera and Anisoptera in order to complement the data matrix. Odonate larvae are characterized by a peculiar morphology, such as the specific head form, mouthpart configuration, ridge configuration, cephalic musculature, and leg and gill morphology. Four coding strategies were used to incorporate the larval data: artificial coding (AC), treating larvae as independent terminal taxa; non-multistate coding (NMC), preferring the adult life stage; multistate coding (MC); and coding larval and adult characters separately (SC) within the same taxon. As expected, larvae are 'monophyletic' in the AC strategy, but with anisopteran and zygopteran larvae as sister groups. Excluding larvae in the NMC approach leads to strong support for both monophyletic Odonata and Epirocta, whereas MC erodes phylogenetic signal completely. This is an obvious result of the larval morphology leading to many multistate characters. SC results in the strongest support for Odonata, and Epirocta receives the same support as with NMC. Our results show the deleterious effects of larval morphology on tree reconstruction when multistate coding is applied. Coding larval characters separately is still the best approach in a phylogenetic framework." (Authors)] Address: Büsse, S., 1University Museum of Zoology, Dept of Zoology, University of Cambridge, Downing Street, CB2 3EJ Cambridge, UK

**15194.** Blust, M.; Pfeiffer, B. (2015): The Odonata of Vermont. *Bulletin of American Odonatology* 11(3-4): 69-119. (in English) ["Here we present the status and distribution of 142 species of Odonata from Vermont, compiled from historical records and a recent surge of field work. This marks the first



such compilation for the state. We include descriptions of Vermont's biophysical regions, a history of odonatology in the state and species accounts that feature distribution, conservation rankings and flight periods. In 13 of Vermont's 14 counties we have documented a minimum of 76 odonate species." (Authors)] Address: Blust, M., Dept. of Biology, Green Mountain College, Poultney, VT 05764, USA. E-mail: blustm@greenmtn.edu

**15195.** Boda, R.; Bereczki, C.; Perneckner, B.; Mauchart, P.; Csabai, Z.; (2015): Emergence behaviour of the red listed Balkan Goldenring (*Cordulegaster heros* Theischinger, 1979) in Hungarian upstreams: vegetation structure affects the last steps of the larvae. *J. Insect Conserv.* 19(3): 547-557. (in English) ["In odonates, the emergence behaviour and finding suitable substrates for successful molting may influence the next generation and ultimately can determine the survival of the entire population. Understanding emergence behaviour of endangered species and those granted special conservation status is particularly important. Despite this, little is known about the life history and emergence behaviour of *C. heros*, a characteristic inhabitant of headwater streams. We hypothesised that the taxonomic composition and structure of the vegetation significantly affect the travel distance to the emergence site and the substrate choice. Two stream sections with different riparian zone vegetation were surveyed for exuviae in the emergence periods in two consecutive years, supported with detailed vegetation mapping. Significant differences were found between the vegetation characteristics at the two sites and differences were also found between emergences in edge zones within a site, indicating that the importance of vegetation structure operates within the scale of sites as well as between sites. At the site with more diverse vegetation, smaller horizontal but higher vertical travel distances and more varied emergence substrate choice were found. Habitat composition and complexity appears to determine the emergence behaviour of *C. heros*, so for the successful conservation of this species we recommend choosing appropriate forest management regimes and even maintaining riparian forests in near-pristine condition." (Authors)] Address: Csabai, Z., University of Pécs, Faculty of Sciences, Institute of Biology, Department of Hydrobiology, Ifjúság útja 6, H-7624 Pécs, Hungary. E-mail: csabai@gamma.ttk.pte.hu

**15196.** Boda, R.; Bereczki, C.; Perneckner, B.; Mauchart, P.; Csabai, Z.; (2015): Life history and multiscale habitat preferences of the red-listed Balkan Goldenring, *Cordulegaster heros* Theischinger, 1979 (Insecta, Odonata), in South-Hungarian headwaters: does the species have mesohabitat-mediated microdistribution?. *Hydrobiologia* 760: 121-132. (in English) ["Life cycle and microdistribution patterns of *Cordulegaster heros*, a charismatic species for nature conservation, are poorly known. Life history characteristics and multiscale habitat preferences of the larvae were followed for one year in monthly intervals by systematic samplings in eight headwaters, which resulted in data on 2562 individuals. We hypothesized that meso- and microhabitat complexity play an important role in forming the population

structure and microdistribution of the species. Based on the distribution of the consecutive larval instars, duration of later stages and time of molt and emergence, the larval development of *C. heros* in the Mecsek Mountains lasts for at least three, but with a maximum of four years. All three levels of the multi-habitat structure [habitat (sites), and meso. (riffle/pool sequence) and microhabitats (biotic and different particle-sized abiotic types)] have significant effects on the spatial distribution of the larvae. Densities and population structures vary among the sites, but mesohabitat type and microhabitat diversity (heterogeneity within a pool or riffle) govern the microdistribution. *C. heros* prefers pools with small or medium microhabitat heterogeneity and higher proportion of small particle-sized substrates, especially in younger stages. Older larvae are less sensitive for these effects." (Author)] Address: Csabai, Z., Dept of Hydrobiology, Faculty of Science, University of Pécs, Ifjúság útja 6, Pécs, 7624, Hungary. e-mail: csabai@gamma.ttk.pte.hu

**15197.** Bode-Oke, A.; Zeyghami, S.; Dong, H. (2015): L27.00007: Kinematics and aerodynamics of backward flying dragonflies. *Bulletin of the American Physical Society* 60(21): 1 p. (in English) [Verbatim: Highly maneuverable insects such as dragonflies have a wide range of flight capabilities; precise hovering, fast body reorientations, sideways flight and backward takeoff are only a few to mention. In this research, we closely examined the kinematics as well as aerodynamics of backward takeoff in dragonflies and compared them to those of forward takeoff. High speed videography and accurate 3D surface reconstruction techniques were employed to extract details of the wing and body motions as well as deformations during both flight modes. While the velocities of both forward and backward flights were similar, the body orientation as well as the wing kinematics showed large differences. Our results indicate that by tilting the stroke plane angle of the wings as well as changing the orientation of the body relative to the flight path, dragonflies control the direction of the flight like a helicopter. In addition, our detailed analysis of the flow in these flights shows important differences in the wake capture phenomena among these flight modes. ]

**15198.** Borisov, S.N. (2015): Dragonflies (Odonata) of thermal springs in Central Asia. *Entomological Review* 95(9): 1203-1211. (in English) ["Sixteen species of dragonflies were recorded in 12 thermal springs of Central Asia. Of these, *Ischnura forcipata*, *I. pumilio*, *Orthetrum anceps*, *O. brunneum*, and *Sympetrum haritonovi* were widely distributed in hydrothermal waters. In the high mountains of Pamir, dragonflies can develop only in hot springs. The maximum altitude recorded for the habitat of *O. brunneum* was 3950 m a.s.l." (Author)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**15199.** Borisov, S.N. (2015): Migrations of dragonflies (Odonata) in Central Asia: a review. Part 1. Latitudinal migrations. *Eurasian Entomological Journal* 14(3): 241-256.

(in Russian, with English summary) ["In the first part of the message the review of researches latitudinal migrations of dragonflies in Central Asia is resulted. They are established at 4 species. At *S. fonscolombii*, *P. flavescens* and *A. ephippiger* migratory strategy similar. In the spring of a dragonfly arrive for a reproduction on territory of Central Asia from more southern sites of an area. In the autumn their descendants migrate on the south. Strategy *A. p. parthenope* remains not clear. Existence in populations of this species of two various on life cycles of seasonal cohorts — migrating and resident is supposed. During the spring period of any congestions of migrating dragonflies it is noted. Mass autumn migrations in a southern direction are established on pass Chokpak in Western Tian-Shan (42°31' N, 70°36' E). It is supposed that the basic flights occur here to a fair wind at the big heights. Intensity of migrations increases with arrival of cold air fronts." (Author)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**15200.** Borisov, S.N. (2015): Dragonflies (Odonata) of Sangtuda thermal spring, Central Tajikistan. *Eurasian entomological journal* 14(4): 342-345. (in Russian, with English summary) ["Seven dragonfly species, *Ischnura evansi*, *I. forcipata*, *I. pumilio*, *Ophiogomphus reductus*, *Cordulegaster coronata*, *Orthetrum anceps* and *O. brunneum* are recorded from Sangtuda thermal spring in Central Tajikistan (38°03'40"N, 69°06'08"E)." (Authors)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**15201.** Bota-Sierra, A.; Moreno-Arias, C.; Faasen, T. (2015): Preliminary list of Odonata from the Colombian Amazon, with descriptions of *Inpabasis nigradorsum* sp. nov. & *Diaphlebia richteri* sp. nov. (Coenagrionidae & Gomphidae). *International Journal of Odonatology* 18(3): 249-268. (in English) ["The Colombian Amazon is one of the most biodiverse and unexplored regions in the world. Inventories and deeper research are needed for most of its biota, including for dragonflies. This work reports the results of a trip to the Amazon region in order to collect Odonata. It includes revision of CBUCEs, CEUA and ICN entomological collections and a literature survey of Colombian Amazon Odonata. Two undescribed species in the genera *Diaphlebia* and *Inpabasis* were found. Five genera and 21 species are recorded for the first time in Colombia. Accounts for undescribed species, new records for the country, natural history notes and a discussed list of Colombian Amazon Odonata are provided." (Authors)] Address: Bota-Sierra, C., Grupo de Entomología Universidad de Antioquia (GEUA), Universidad de Antioquia, Medellín, Colombia. E-mail: corneliobota@gmail.com

**15202.** Bots, J.; Iserbyt, A.; Van Gossum, H.; Hammers, M.; Sherratt, T.N. (2015): Frequency-dependent selection on female morphs driven by premating interactions with males. *The American Naturalist* 185(6): 141-150. (in English)

["Species showing colour polymorphisms —the presence of two or more genetically determined colour morphs within a single population— are excellent systems for studying the selective forces driving the maintenance of genetic diversity. Despite a shortage of empirical evidence, it is often suggested that negative frequency-dependent mate preference by males (or diet choice by predators) results in fitness benefits for the rare female morph (or prey type). Moreover, most studies have focused on the male (or predator) behaviour in these systems and largely overlooked the importance of female (or prey) resistance behaviour. Here, we provide the first explicit test of the role of frequency-dependent and frequency-independent intersexual interactions in female polymorphic damselflies. We identify the stage of the mating sequence when frequency-dependent selection is likely to act by comparing indexes of male mate preference when the female has little (females presented on sticks), moderate (females in cages), and high (females free to fly in the field) ability to avoid male mating attempts. Frequency-dependent male preferences were found only in those experiments where females had little ability to resist male harassment, indicating that premating interactions most likely drive negative frequency-dependent selection in this system. In addition, by separating frequency-dependent male mating preference from the baseline frequency-independent component, we reconcile the seemingly contradictory results of previous studies and highlight the roles of both forms of selection in maintaining the polymorphism at a given equilibrium. We conclude that considering interactions among all players —here, males and females— is crucial to fully understanding the mechanisms underlying the maintenance of genetic polymorphisms in the wild." (Authors)] Address: Iserbyt, A., Evolutionary Ecology Group, University of Antwerp, Antwerp, Belgium. E-mail: ame.iserbyt@uantwerpen.be

**15203.** Bouchelouche, D.; Kherbouche-Abrous, O.; Mebarki, M.; Arab, A.; Samraoui, B. (2015): The Odonata of Wadi Isser (Kabylia, Algeria): status and environmental determinants of their distribution. *Revue d'écologie* 70(3): 248-260. (in English, with French summary) ["An odonatological study was carried out during six successive months, from May to October 2013, at Wadi Isser located in the practically unexplored Central North of Algeria. A total of 19 species of Odonata were recorded during the monthly sampling of six stations. Noteworthy was the record of *Lestes numidicus* and *Platycnemis subdilatata*, both Maghrebian endemics. Our results extend considerably towards the west the known distribution of *L. numidicus*, a data deficient (DD) species on the Mediterranean IUCN Red-List. In the light of the present study, no changes in the IUCN Red List classification is proposed with the exception of *L. numidicus* which should be classified as Near-Threatened (NT), pending further investigations. Results also suggest that the variation of the species richness along Wadi Isser may be related to environmental factors. Species richness was positively associated to the density of the riverine vegetation. In contrast, species richness could also be negatively correlated to pollution, an important and recurrent factor of the

erosion of biodiversity of Maghrebian watercourses." (Authors)] Address: Samraoui, B., Laboratoire de Recherche des Zones Humides, Université d'Annaba, 4 rue Hassi-Beida, Annaba, Algeria. E-mail: bsamraoui@yahoo.fr

**15204.** Bried, J.T.; Dillon, A.M.; Hager, B.J.; Patten, M.A.; Luttbeg, B. (2015): Criteria to infer local species residency in standardized adult dragonfly surveys. *Freshwater Science* 34(3): 1105-1113. (in English) ["For dragonflies, the final exuviae are the most identifiable nymphal stage, can substitute for lethal processing of live animals, and definitively indicate life-cycle completion or reproductive success. However, dragonfly exuviae are difficult to find and identify relative to adults, and species richness in exuvial surveys is generally biased low. We tested readily acquired information in adult surveys as indicators of exuviae presence and, therefore, species residency. Repeated concurrent surveys of adults and exuviae were completed at 32 wetlands in New York and 30 wetlands in Oklahoma, USA. We modelled the occurrence of exuviae as logit-linear functions of adult abundance, detection frequency (across surveys), teneral frequency, and frequency of breeding behaviour while controlling for imperfect detectability. Exuviae occupancy probabilities suggested several reliable indicators of species residency: 1) finding adults on =4 surveys, 2) finding tenerals on =2 surveys, and 3) counting >20 adults on =1 surveys (with caveats). The odds of exuviae occurrence when these conditions were met were ~9 to 18× greater than when no adults were detected. Species residency may be accurately inferred during adult surveys, potentially improving freshwater applications and conservation via dragonflies." (Authors)] Address: Dillon, Amanda, Albany Pine Bush Preserve Commission, Albany, New York 12205 USA. E-mail: adillon@albanypinebush.org

**15205.** Bried, J.T.; McIntyre, N.E.; Dzialowski, A.R.; Davis, C.A. (2015): Resident-immigrant dichotomy matters for classifying wetland site groups and metacommunities. *Freshwater Biology* 60(11): 2248-2260. (in English) ["(1.) The fact that species have resident (autochthonous) or immigrant (allochthonous) status at any given locality may have strong implications for ecological analysis. (2.) We used wetlands and adult odonates as a model system to evaluate the resident-immigrant dichotomy for two modes of community analysis: (1) grouping sites based on species compositional variation and (2) identifying metacommunity structure. We tested a hypothesis of gradient-structured (non-random) resident occurrence versus unstructured (random) immigrant occurrence in the metacommunity context and predicted the resident occurrence would more effectively partition community variation and produce stronger site groupings than total (resident + immigrant) occurrence. (3.) Site group classification after fractioning out resident occurrence consistently and in some cases dramatically outperformed total occurrence. Resident damselflies produced the strongest classifications, which we attribute to greater dispersal limitation, environmental sorting or both. (4.) As predicted only the resident occurrence led to identifiable metacommunity structures, primarily Clementsian-style

turnover. This suggests the resident occurrence is gradient-driven with species responding similarly to abiotic filters, whereas immigrant occurrence is more opportunistic and random. (5.) The resident-immigrant dichotomy appears to have strong influence on quantitative classification of sites and metacommunities, and species composition of resident adult damselflies is potentially useful for differentiating and indicating site groups of non-forested freshwater wetlands." (Authors)] Address: Bried, J.T., Department of Integrative Biology, Oklahoma State University, 501 Life Sciences West, Stillwater, OK 74078, USA. E-mail: bried@ok-state.edu

**15206.** Bried, T.J.; Samways, M.J. (2015): A review of odonatology in freshwater applied ecology and conservation science. *Freshwater Science* 34(3): 1023-1031. (in English) ["The academic study of dragonflies and damselflies (odonatology) is well established, but relatively limited attention has been given to odonates in the context of applied ecology and conservation science. We used the Web of Science™ and Odonatological Abstract Service (ISSN 1438-0269) to capture trends in primary literature, characterize study features (habitats, life stages, etc.), identify research themes, and suggest future directions for odonatology in freshwater applied ecology and conservation science. We found no papers in this area prior to 1980, and 411 papers from 1980 through 2013. Nearly 75% of these papers were recent (since 2005) and >40% were very recent (since 2010). We identified several broad and overlapping research themes: 1) model taxa, 2) tools and indicators, 3) odonate-centered work, and 4) methodological issues and improvements (field sampling, data modeling/simulation, conservation/landscape-scale genetics). We found more reliance on fieldbased observational approaches than experiments and model-driven exercises, although the number of papers using model-driven exercises is rapidly increasing. We found a strong focus on adult stages, odonate assemblages, the Odonata as a whole, and studies of particular species. We identified research priorities in areas such as ecological valuation and management, monitoring and assessment, climate change and landscape planning, concordance with other taxa, effects of urbanization, data modeling/simulation, and rare-species ecology and conservation. To help establish an identity and facilitate communication, we suggest naming this diverse realm "applied odonatology". We think applied odonatology has a good future for a range of topics from conservation genetics and population ecology to assessments of anthropogenic impacts and the conservation of biodiversity." (Authors)] Address: Bried, T.J., Department of Integrative Biology, Oklahoma State University, Stillwater, Oklahoma 74078 USA

**15207.** Brockhaus, T. (2015): Die Libellenfauna des Himalaya mit besonderer Berücksichtigung der Arten des Bergregenwaldes (Insecta: Odonata). *Hartmann & Weipert: Biodiversität und Naturlandschaft im Himalaya V. - Erfurt 2015*: 287-320. (in German, with English summary) ["The Dragonflies of the Himalayas with special emphasis on the species of mountainous rain forests (Insecta: Odonata):



The area of reference includes the North West Himalayas (India with the states of Jammu & Kashmir, Himachal Pradesh, Uttarakhand), the Central Himalayas (Nepal, India, Darjeeling in the state West Bengal and the state of Sikkim) and Eastern Himalayas (Bhutan, India, state of Arunachal Pradesh). and also the southeastern Himalayan foothills with the Indian states of Meghalaya and Nagaland. After a comprehensive review of the checklist in Brockhaus (2009) from the Himalayas and its peripheral regions 331 species of dragonflies are known. For some species are represented maps, based on my own observations and from the literature. Most species are part of the Oriental Sino-Indian faunal region. In the mountainous rain forests of the Himalayas habitat specialists of mountain streams and rivers live. They include also the endemic species in the Himalayas *Epiophlebia laidlawi*, *Davidius abberans* and *Neallogaster ornatus*. The inhabited areas differs between 400 to 4050 m above sea level. The endemic species can only above 1300 m above sea level be found. A comparison of the similarity of the faunas of the regions shows that the similarity decreases from east to west. One reason for this is the proportion of Palaearctic species in the fauna of Northwestern Himalayas. For the species of the Palaearctic respectively Holarctic region *Sympetma paedisca*, *Aeshna juncea*, *A. mixta* and *Anax parthenope* distribution maps are presented for the Himalayan area. The phylogeography and its relevance to an update of the IUCN Red List of Threatened Species are discussed. The states of the Himalayan region are worldwide exemplary in the designation of protected areas like National parks. Large protected areas are the most effective means to maintain the habitats of the treated species. Currently we still know so little about their really distribution and ecological needs." (Author)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**15208.** Brockhaus, T. (2015): Funde von *Crocothemis erythraea* (Brullé, 1832) und *Orthetrum albistylum* (Selys, 1848) im Norden Polens. *Odonatrix* 11(2): 59-60. (in German, with English and Polish summaries) [5-VIII-2015; *C. erythraea*, Bialogarda (54°39'46"N, 17°37'37"E); *O. albistylum*: Jezioro Czarnogłowie (Bory Tucholskie: 53°47'39"N, 17°44'03"E)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**15209.** Brockhaus, T.; Roland, H.-J.; Benken, T.; Conze, K.-J.; Günther, A.; Leipelt, K.G.; Lohr, M.; Martens, A.; Mauersberger, R.; Ott, J.; Suhling, F.; Weihrauch, F.; Willigalla, C. (2015): Atlas der Libellen Deutschlands (Odonata). *Libellula Supplement* 14: 1-394. (in German, with English summary) ["Atlas of Odonata of Germany – For the first time, we present a complete overview about the distribution of all dragonfly species occurring in Germany. The atlas is based on a data collection compiled during 2007-2012, which was organized by the atlas-working-group of Gesellschaft deutschsprachiger Odonatologen. The database comprises more than 1.16 million point locality data sets delivered by more than 2,900 persons from all 16 federal states.

Whereas few data date back as far as the year 1800 most are more recent; most recent data are from 2011, for some species with current drastic distribution changes from 2013. While only 1 % of the records are from the first 150 years, more than 63 % are from later than 1995. Since 1995 data were recorded for 79 of the 81 species occurring in Germany, while *Coenagrion hylas* and *Onychogomphus unca* were only observed in Germany before 1995 and are now considered as extinct. The atlas comprises distribution maps for all of the 81 dragonfly species. Each map grid square represents a so called Messtischblatt (MTB) with an area of ca 130 km<sup>2</sup>. For each species the distribution situation is depicted for three time periods: before 1980, 1980-1995, and after 1995. The atlas also includes species monographs where the vertical and horizontal distributions in Germany (according to the database) as well as habitat, life cycle, population trends, and threats are described. Finally, an overview about records of exotic dragonflies recorded in Germany is presented. Basing on this atlas the Red List of Odonata of Germany is presented not in this article but in this issue as well as an extensive presentation of fossil odonate records from Germany.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**15210.** Brodin, T.; Piovano, S.; Fick, J.; Klaminder, J.; Heynen, M.; Jonsson, M. (2015): Ecological effects of pharmaceuticals in aquatic systems—impacts through behavioural alterations. *Philosophical Transactions of the Royal Society of London B: Biological Sciences* 369: 20130580: 10 pp. (in English) ["The study of animal behaviour is important for both ecology and ecotoxicology, yet research in these two fields is currently developing independently. Here, we synthesize the available knowledge on drug-induced behavioural alterations in fish, discuss potential ecological consequences and report results from an experiment in which we quantify both uptake and behavioural impact of a psychiatric drug on a predatory fish (*Perca fluviatilis*) and its invertebrate prey (*Coenagrion hastulatum*). We show that perch became more active while damselfly behaviour was unaffected, illustrating that behavioural effects of pharmaceuticals can differ between species. Furthermore, we demonstrate that prey consumption can be an important exposure route as on average 46% of the pharmaceutical in ingested prey accumulated in the predator. This suggests that investigations of exposure through bioconcentration, where trophic interactions and subsequent bioaccumulation of exposed individuals are ignored, underestimate exposure. Wildlife may therefore be exposed to higher levels of behaviourally altering pharmaceuticals than predictions based on commonly used exposure assays and pharmaceutical concentrations found in environmental monitoring programmes." (Authors)] Address: Brodin, T., Dept of Ecology and Environmental Science, Umea University, 90187 Umea, Sweden. E-mail: tomas.brodin@emg.umu.se

**15211.** Buczek, K. (2015): Human impact on the evolution of a landslide lake. Case Study: Lake Pucółowski Stawek in the Gorce Mts. *Prace Geograficzne* 142: 41-56. (in Polish,

with English summary) ["The paper presents the results of a study of the human impact on the evolution of a landslide lake. An example of a landslide lake subjected to strong anthropogenic influence is that of the Pucółowski Stawek Lake in the Gorce Mts. Historical data analysis, interviews with local inhabitants, and several surveys of the lake area and shoreline at various moments of its history have enabled us to reconstruct the lake's evolution since the early 20th century. Research has shown that since the first field description in 1932, the lake did not become overgrown (as it is very common for this type of lake), until the late 1980s. The reason for its preservation has been human activity. The subsequent acceleration of the overgrowing of the Pucółowski Stawek Lake has been connected with the cessation of mowing, grazing and peat extraction in the lake basin. This has led to the full disappearance of this water body and the reservoir to fen type peat bog. In December 2011, the owners of the lake deepened the lake basin and removed organic sediments at the same time. This led to lake reactivation, although with a changed shoreline. The area of the lake basin decreased about 22% compared with its size in 1968. The same is true of the shoreline development factor which is now 1.08 compared with 1.23 in 1968. Dynamic plant succession has been observed since 2012 in the Pucółowski Stawek Lake, and the lake area has decreased about 27% compared with its size in 2012. The consequences of the action which led to the deepening of the lake significantly affected the fauna and flora of the reservoir, causing improvement in amphibians' habitat conditions. Human activity in this area has led to water reservoir reactivation, giving it unique landscape value as well as increasing its biodiversity by restoring adequate habitat conditions." (Authors) The publication includes a passing reference to *Leucorrhinia dubia*.] Address: Buczek, K., Uniwersytet Jagielloński, Instytut Geografii i Gospodarki Przestrzennej, Gronostajowa 7, 30-387 Kraków, Poland. E-mail: buczek@iop.krakow.pl

**15212.** Buczyński, P. (2015): Polish and dedicated to Poland odonatalogical papers. 13. The year 2014 and the supplement for the year 2013. *Odonatrix* 11(1): 38-42. (in Polish, with English summary) ["The author presents a list of Polish and dedicated to Poland odonatalogical papers published in the year 2014. During that time, 36 papers of various kinds were published, and one M.Sc. thesis was written. Four papers published in the year 2013 are given too." (Author)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**15213.** Buczyński, P. (2015): Dragonflies (Odonata) of anthropogenic waters in middle-eastern Poland. Olsztyn 2015: 272 pp. (in English, with Polish summary) ["The aim of this work is an analysis of the occurrence of dragonflies (Odonata) in the anthropogenic water bodies, on example of a selected, contiguous geographic region. The author discusses data collected in middle-eastern Poland in the years of 1992–2013 (mainly 2001–2011). The research encompasses 327 anthropogenic sites and, for comparison, 630 water

bodies of natural origin. They presented a whole spectrum of essential habitats of the dragonflies in the region. 66 species of dragonflies were found: 64 in anthropogenic and 65 in natural waters. The occurrence of the species in both types of waters was analyzed, and based upon that analysis a division into 5 groups was introduced: anthropophiles of 1st degree, anthropophiles of 2nd degree, anthropotolerant species, anthropoxenes, and anthropophobes. The fauna of the dragonflies of selected types of anthropogenic waters and the most important environmental factors shaping them were discussed. The importance of anthropogenic waters for the protection of the dragonfly species, their assemblages typical of natural waters and the general richness of species were assessed. Also described were the perspectives for their active protection. The role of the anthropogenic waters in the expansion of the thermophilous species was assessed. The results collected were subject to a critical discussion in comparison to the data in literature, with special emphasis being placed on data from middle and middle-eastern Europe." (Author)] Address: Publisher: Wydawnictwo Mantis, ul. Słowicza 11, 11-041 Olsztyn, Poland. E-mail: andrzej.jadwiszczak@wydawnictwo-mantis.eu

**15214.** Büsse, S.; Helmker, B.; Hörschemeyer, T. (2015): The thorax morphology of *Epiophlebia* (Insecta: Odonata) nymphs – including remarks on ontogenesis and evolution. *Sci Rep.* 2015; 5: 12835: 14 pp. (in English) ["The species of *Epiophlebia* are unique among the recent Odonata in showing a mixture of morphological characters of dragonflies (Anisoptera) and damselflies (Zygoptera). The status of the four described extant species of *Epiophlebia* is disputable from a genetic as well as from a morphological point of view. Here we present an analysis of the thoracic musculature of different nymphal instars of *Epiophlebia laidlawi* and *Epiophlebia superstes* to elucidate their morphology and ontogenetic development. In total, 75 muscles have been identified in the thorax of *Epiophlebia*. This represents the highest number of thoracic muscles ever found in any odonate. It includes six muscles that are reported for the first time for Odonata, and three of these are even new for Pterygota. In total, our results indicate that *Epiophlebia* has the most ancestral thoracic morphology among Odonata." (Authors)] Address: Hörschemeyer, T., J.-F.-Blumenbach Institute for Zoology & Anthropology, Department Morphology, Systematics & Evolutionary Biology Georg-August-University Göttingen, Berliner Str. 28, 37073 Göttingen, Germany. E-mail: thoerns@gwdg.de

**15215.** Cabrera-Guzmán, E.; Crossland, M.R.; Shine, R. (2015): Invasive cane toads as prey for native arthropod predators in tropical Australia. *Herpetological Monographs* 29(1): 28-39. (in english) ["The successful spread of invasive Cane Toads (*Rhinella marina*) across tropical Australia has been attributed to a lack of biotic resistance, based upon the inability of most anuran-eating vertebrate predators to tolerate the powerful chemical defenses of the toads. However, despite their high species richness, invertebrates have been much less studied than vertebrates as predators of Cane Toads. Our field and laboratory studies show that

toads are killed and consumed by a phylogenetically diverse array of arthropod taxa. No arthropod predators consumed toad eggs in our laboratory experiments, but fishing spiders, water beetles, water scorpions, and dragonfly nymphs killed toad tadpoles, and ants and fishing spiders killed metamorph toads. Published accounts report predation on toads by crustaceans and hemipterans also. In our experiments, no predators showed any overt ill effects from consuming toad tissue. Dragonfly nymphs (*Pantala flavescens*) and fishing spiders (*Dolomedes facetus*) selectively took Cane Toad tadpoles at higher rates than some simultaneously offered native frog tadpoles. In combination with published data, our experiments suggest that the tadpoles and metamorphs of Cane Toads face high predation rates from the diverse and abundant invertebrate fauna of aquatic and riparian habitats in tropical Australia. The invasion of Cane Toads can potentially have positive effects on populations of many native animal species." (Authors)] Address: Cabrera-Guzmán, Elisa, School of Biological Sciences A08, University of Sydney, NSW 2006, Australia. E-mail, elicabguz@ebd.csic.es

**15216.** Callahan, M.S.; McPeck, M.A. (2015): Multi-locus phylogeny and divergence time estimates of *Enallagma* damselflies (Odonata: Coenagrionidae). *Molecular Phylogenetics and Evolution* 94: 182-195. (in English) ["Highlights: • *Enallagma* damselflies show complex diversification across North America and Eurasia. • Four subclades radiated in the Pleistocene to produce 28 extant species. • Both speciation and extinction rates increased over the last 1.5 million years. Abstract: Reconstructing evolutionary patterns of species and populations provides a framework for asking questions about the impacts of climate change. Here we use a multilocus dataset to estimate gene trees under maximum likelihood and Bayesian models to obtain a robust estimate of relationships for a genus of North American damselflies, *Enallagma*. Using a relaxed molecular clock, we estimate the divergence times for this group. Furthermore, to account for the fact that gene tree analyses can overestimate ages of population divergences, we use a multi-population coalescent model to gain a more accurate estimate of divergence times. We also infer diversification rates using a method that allows for variation in diversification rate through time and among lineages. Our results reveal a complex evolutionary history of *Enallagma*, in which divergence events both predate and occur during Pleistocene climate fluctuations. There is also evidence of diversification rate heterogeneity across the tree. These divergence time estimates provide a foundation for addressing the relative significance of historical climatic events in the diversification of this genus." (Authors)] Address: Callahan, Melissa, Department of Biological Sciences, Dartmouth College, 78 College Street, Hanover, NH 03755, USA. E-mail: callahan.ms@gmail.com

**15217.** Cao, L.; Fu, X.; Wu, K. (2015): Development of 10 microsatellite markers from *Pantala flavescens* and their applicability in studying genetics diversity. *Molecular Biology Reports* 42(8): 1275-1279. (in English) ["*P. flavescens* is

one of the most common species among migration dragonflies. It is often encountered in large swarms during migration or directed dispersal flights. For a better understanding of its gene flow, genetic structure and migration patterns throughout the world, 10 polymorphic microsatellite markers were isolated in this study. We respectively collected 32 *P. flavescens* from three places (Hunan, Liaoning and Heilongjiang) and 20 *P. flavescens* from Beijing. Partial genomic libraries containing microsatellite sequences were constructed with magnetic-bead enrichment method. By screening, sequence analysis, PCR amplification and so on, ten 10 polymorphic microsatellite markers were isolated. In order to assess their applicability, genetic diversity of these novel markers was tested in 96 individuals from three populations in China (Hunan, Liaoning and Heilongjiang). These markers were highly polymorphic, with 3–12 alleles per markers. The observed ( $H_o$ ) and expected ( $H_e$ ) heterozygosities ranged 0.321–0.667 and from 0.531 to 0.948 respectively. The genetic difference between Hunan and Liaoning is 0.429, while the genetic difference between Liaoning and Heilongjiang is 0.0508. These microsatellite markers for *P. flavescens* were developed for the first time, and will be a powerful tool for studying population genetic diversity and dispersal behaviour of *P. flavescens* in China and worldwide." (Authors)] Address: Cao, L., Institute of Plant Protection, Chinese Academy of Agricultural Sciences, No. 2, Yuanmingyuan West Road, Haidian District, Beijing, China. E-mail: clzclz1011@163.com

**15218.** Carle, F.L.; Kjer, K.M.; May, M.L. (2015): A molecular phylogeny and classification of Anisoptera (Odonata). *Arthropod systematics & phylogeny* 73(2): 281-301. (in English) ["A phylogeny of Anisoptera employing 510 representatives of 184 genera (of ca. 380) in 11 families is presented based on an analysis of over 10,000 nucleotides from portions of the large and small subunit nuclear and mitochondrial ribosomal RNA's, the mitochondrial protein coding genes COI and COII, and portions of the nuclear protein coding genes EF-1 $\alpha$  and Histone H3. Ribosomal sequences were structurally aligned and sequences carefully checked to eliminate alignment errors, contamination, misidentification and paralogous gene amplicons. Both the RAXML and Bayesian topology based on consolidation of data at the generic level is ((Austropetaliidae, Aeshnidae), ((Gomphidae, Petaluridae), ((Chlorogomphidae, (Neopetaliidae, Cordulegastridae))), (Synthemistidae, (Macromiidae, (Corduliidae, Libellulidae)))))). As the positions of Petaluridae, Chlorogomphidae, Neopetaliidae, and Cordulegastridae are weakly supported, possible alternative hypotheses are discussed. New taxonomic groups established include: in Gomphidae, Stylogomphini trib.n. and Davidioidini trib.n., and in Libellulidae, Dythemistinae subfam.n. including Dythemistini trib.n., Pachydiplactini trib.n. and Elgini trib.n. New taxonomic arrangements include: placement of Hemigomphini in Ictinogomphinae, and provisional expansion of Synthemistidae to include Gomphomacromiinae and a number of genera formerly placed in several small subfamilies of Corduliidae. Idomacromiinae is



placed sister to remaining Synthemistidae s.l. based on molecular analysis of *Idomacromia* Karsch and *Oxygastra* Selys. Hemicorduliidae and Macrodiplactidae are nested well within Corduliidae and Libellulidae, respectively, and therefore are not accorded family rank. Eleven monophyletic subdivisions of Libellulidae are tentatively recognized as subfamilies: Dythemistinae subfam.n.; Sympetrinae (including Leucorrhiniini and Rhythemistini); Macrodiplactinae; Brachydiplactinae; Tetrathemistinae; Trameinae; Zyxomatinae; Palpopleurinae; Diastatopidinae; Pantalinae (including Trithemistini and Onychothemistini); and Libellulinae. Zygonychini is paraphyletic to and therefore included within Onychothemistini." (Authors)] Address: Carle, F.L., Rutgers, State University of New Jersey, Department of Entomology, 96 Lipman Drive, New Brunswick, New Jersey, 18901, USA. E-mail: Carle@AESOP.Rutgers.edu

**15219.** Catania, S.V.L.; McCauley, S.J. (2015): Evaluating the use of coded-wire tags in individually marking Odonata larvae. *The Canadian Entomologist* 148(3): 371-374. (in English) ["We tested a potential new tool for marking Odonata larvae internally, evaluating the retention rates of injected coded-wire tags (CWT) and the effects of these tags on larval performance. Two species of dragonfly larvae (*Epitheca canis* and *Leucorrhinia intacta*) were injected with CWT. Tag loss rates were assayed over experimental periods of 22 and 60 days, respectively for the two species. To assess whether tagging had negative effects on larvae, mortality, and growth of tagged larvae were compared to untagged larvae held in the same conditions. Tag retention rates were high (92–100%) and CWT were easily retrieved from preserved larvae via dissection, permitting most tagged larvae to be individually identified. There was 100% survival in larvae injected with CWT and tags do not appear to impair growth. The high retention and retrieval rates of this marking approach combined with no increase in mortality associated with tagging suggest that CWT are a useful means of individually labelling a large number of Odonata larvae in a time-efficient manner." (Authors)] Address: Catania, S.V.L., .Dept of Biology, University of Toronto Mississauga, Mississauga, Ontario, Canada L5L 1C6

**15220.** Catil, J.-M. (coord.) (2015): Atlas commenté des libellules du Gers. Centre Permanent d'Initiatives pour l'Environnement Pays Gersois – L'Isle-de-Noé: 80 pp. (in French) [accessible sur [www.cpie32.org](http://www.cpie32.org).] Address: CPIE Pays Gersois, Catil, J.-M., Au Château, 32300 L'Isle-de-Noé, France. E-mail: [gestion@cpie32.org](mailto:gestion@cpie32.org)

**15221.** Cech, M.; Cech, P. (2015): Non-fish prey in the diet of an exclusive fish-eater: the Common Kingfisher *Alcedo atthis*. *Bird Study* 62: 457-465. (in English) ["Capsule: Non-fish prey constitutes an important component of the diet of many fish-eating birds. Aims: In the present study, the role of non-fish prey in the diet of *A. atthis* was evaluated. Methods: The species and size spectrum of prey in the diet was studied at 15 nest sites on 6 trout streams, 1 river and 1 reservoir in the Czech Republic, using the analysis of the nest sediment. Results: 16 933 individual prey items were

identified (99.93% fish and 0.07% non-fish prey). ... The remains of non-fish prey were detected in only 5 of 30 nest sediments. The non-fish prey were mostly composed of large aquatic insect larvae: dragonflies *Anax* sp. and *Aeshna* sp., *Gomphus vulgatissimus* and Great Diving Beetle *Dytiscus marginalis*. Kingfishers also took Spiny-cheek Crayfish *Orconectes limosus*, Newt *Triturus* sp. and a Lizard *Lacerta* sp. The estimated sizes of the non-fish prey ranged from 30 to 90 mm. Conclusion: The catch of non-fish prey appears to be accidental, and is more likely a result of target misinterpretation (fish-like body and fish-like movement) than a Kingfisher regularly switching to prey other than fish. The unique finding of a Lizard is the first record of an amniotic vertebrate in the diet of Common Kingfisher." (Authors)] Address: Cech, M., Biology Centre of the Czech Academy of Sciences, Institute of Hydrobiol., Na Sádkách 7, 370 05 České Budejovice, Czech Republic

**15222.** Chama, L.; Siachoono, S. (2015): Effectiveness of birds, butterflies, dragonflies, damselflies and invertebrates as indicators of freshwater ecological integrity. *Geophysical Research Abstracts* 17, EGU2015-13383, 2015, EGU General Assembly 2015: (in English) [Verbatim: Human activities such as mining and agriculture are among the major threats to biodiversity globally. Discharges from these activities have been shown to negatively affect ecological processes, leading to ecosystem degradation and species loss across biomes. Freshwater systems have been shown to be particularly vulnerable, as discharges tend to spread rapidly here than in other ecosystems. Hence, there is need to routinely monitor the quality of these systems if impacts of discharges from human activities are to be minimised. Besides the use of conventional laboratory techniques, several studies have recently shown that organisms such as birds, butterflies, dragonflies, damselflies and invertebrates are also good indicators of ecological integrity and should therefore be used as alternatives to monitoring the quality of various ecosystems. However, most of these studies have only studied one or two of these organisms against ecosystem health, and it remains unclear whether all of them respond similarly to changes in different drivers of environmental change. We investigated the response of the diversity of birds, butterflies, dragonflies, damselflies and invertebrates to changing water quality along the Kafue River in Zambia. Sampling was done at 13 different sampling points stretching over a distance of 60km along the river. At each point, both the diversity of each organism and the water quality were assessed. Water quality was determined by testing its temperature, pH, redox, electrical conductivity, turbidity and copper parameters. We then tested how the diversity of each organism responded to changes in these water parameters. All water parameters varied significantly across sampling points. The diversity of birds and damselflies remained unaffected by any of the water parameters used. However, the diversity of butterflies reduced with increasing pH, turbidity and copper, albeit it remained unaffected by other water parameters. The diversity of dragonflies reduced with increasing redox, electrical conductivity and turbidity, but remained unaffected by other water parameters.

The diversity of invertebrates reduced with increasing redox and copper, but remained unaffected by other water parameters. Generally, these results suggest that these organisms, especially butterflies, dragonflies and invertebrates can indeed be used as indicators of changing water quality and ecological integrity in particular. However, their use is limited to specific, rather than, all water parameters. Therefore, the decision as to which organisms to use should largely depend on which water quality parameters are to be tested.] Address: Chama, L., Department of Zoology and Aquatic Sciences, School of Natural Resources, Copperbelt University, Jambo Drive, Kitwe, Zambia

**15223.** Chandler, H.C.; Haas, C.A.; Gorman, T.A. (2015): The effects of habitat structure on winter aquatic invertebrate and amphibian communities in pine flatwoods wetlands. *Wetlands* 35: 1201-1211. (in English) ["Natural disturbances play a critical role in structuring many ecosystems. In the southeastern United States, fire suppression and exclusion have removed the natural disturbance regime from many ecosystems, including ephemeral wetlands embedded within longleaf pine forests. We sampled aquatic invertebrate and amphibian communities in 21 pine flatwoods wetlands in northwest Florida from 2012 to 2014. Our objectives were to quantify amphibian and invertebrate community structure, identify differences in amphibian communities across an environmental gradient, and identify how invertebrate communities responded to wetland habitat characteristics. Amphibian communities were more diverse in wetlands with longer hydroperiods but were similar across wetlands with different vegetation structures. To examine the effects of wetland characteristics on aquatic invertebrate communities, we created a set of a priori models relating the abundance of isopods, chironomids, and damselflies to wetland characteristics. The best-approximating models indicated that isopods and damselflies were more abundant in wetlands that were not fire-suppressed. Similarly, total invertebrate abundance was higher in sections of wetlands with low canopy cover when compared to sections of the same wetlands with high canopy cover. Restoration of vegetation structure in wetlands that have experienced long-term fire suppression and wetlands that support longer hydroperiods should be a management priority." (Authors) Aeshnidae and Libellulidae] Address: Chandler, H., Department of Fish and Wildlife Conservation, Virginia Tech, 310 West Campus Drive, MC 0321, Blacksburg, VA 24061, USA. E-mail: houstonc@vt.edu

**15224.** Charjan, A.P.; Virani, R.S.; Thakare, V.G. (2015): Diversity of dragonflies (Insecta: Odonata) in some parts of Murtizapur Taluka of Akola district, Maharashtra. *Biological Forum* 7(1): 1499-1501. (in English) [19 libellulid including one gomphid Odonata species are checklisted.] Address: Charjan, A.P., Dr. R. G. Rathod Arts and Science College, Murtizapur, Akola, (MS), India

**15225.** Charjan, A.P. (2015): Diversity of dragonflies (Insecta: Odonata) in some parts of Murtizapur Taluka of Akola district, Maharashtra. *Biological Forum – An International*

*Journal* 7(1): 1499-1501. (in English) ["Diversity of adult insect Odonata in some part of Murtizapur taluka of Akola district was done for a period of near about one year. In our study 19 species of dragonflies belonging of 2 families and 12 genera were recorded. Under order Odonata and suborder Anisoptera 17 species belonging to family Libellulidae and only 1 species belonging to Gomphidae family were recorded. Odonates can help control small insects like mosquitoes and hence their conservation is of importance." (Authors)] Address: Principal, R. G. Rathod Arts and Science College, Murtizapur, District-Akola, India

**15226.** Chaudhry, M.T.; Mohsin, A.U.; Javed, R.A.; Zia, A.; Bodlah, I. (2015): New records of *Rhodothemis rufa* (Rambur, 1842) and *Lamelligomphus biforceps* (Selys 1878) (Odonata: Anisoptera)

**15227.** from Pakistan with redescription of *L. biforceps* (Selys 1878). *Iranian Journal of Science & Technology* 39A3: 305-309. (in English) ["The current status and distribution of the dragonflies (Anisoptera) of Pakistan were studied during 2005-2009. Two dragonfly species were identified for the first time from Pakistan. Among these, *Rhodothemis rufa* and *Lamelligomphus biforceps* are reported for the first time from Pakistan and re-described owing to having minor taxonomic differences from that of Fraser's description. Some notes on the colour, literature records and geographical distributions are summarized." (Authors)] Address: Chaudhry, M.T., Agricultural Training Institute, Karor, District Layyah, Pakistan. E-mail: drtariq273@yahoo.com

**15228.** Chauhan, A.; Verma S.C.; Thakur, M. (2015): Bio-assessment of water quality of mountainous streams under different land uses in Solan district of Himachal Pradesh, India. *International Journal of Bio-resource and Stress Management* 6(1): 161-166. (in Water quality, land uses, seasons, aquatic insects) ["Investigations were carried out in the Environmental Biology Laboratory of Department of Environmental Science, Dr Y S Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh, India during 2011–2012. Aquatic insects fauna were sampled from mountainous streams of Kandaghat block situated in Solan district under different land uses (agriculture, forest and urban) seasons (rainy, winter and summer). The sampled aquatic insects were identified upto family level by using aquatic insect identification keys with help of stereoscopic binocular microscope. A total of 80 individuals m<sup>2</sup> and 59 individuals m<sup>2</sup> of aquatic insects were recorded under agriculture and urban land uses, respectively. Among all the land uses, forest land use recorded highest aquatic insects (107 m<sup>2</sup>). Maximum aquatic insects (123 m<sup>2</sup>) was during summer season with simpson's biodiversity index of 0.01, whereas agriculture land use (0.11) was highest under different land uses. Maximum diversity of insects indicated less disturbance of the streams. EPT (Ephemeroptera, Plecoptera and Coleoptera) index for agriculture, urban and forest land uses was 3.46, 3.70 and 3.56, respectively. Percentage of individuals of Trichoptera in water bodies under agriculture, Urban and Forest land use were 12.60, 10.98

and 10.16%, respectively. Hemiptera were maximum (7.31%) under forest land use and minimum in Urban land use (2.03%), whereas order Odonata were maximum under Forest land use (9.31%) followed by urban (5.69%) and agriculture land use (4.47%). This indicated that aquatic insect fauna showed variation in distribution and abundance as well as biotic indices in mountainous streams under different land uses thereby reflecting good water quality." (Authors)] Address: Chauhan, A., Dept. of Environmental Science, Dr Y S Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh, 173 230, India. E-mail: aakriti.chauhan89@gmail.com

**15229.** Chen, M.-Y.; Chaw, S.-M.; Wang, J.-F., Villanueva, R.J., Nuñez, O.M., Lin, C.-P. (2015): Mitochondrial genome of a flashwing demoiselle, *Vestalis melania* from the Philippine Archipelago. *Mitogenome Announcement* 26(5): 720-721. (in English) ["This study determined the first complete mitochondrial genome of a demoiselle, *V. melania* using long-range PCR and a primer walking approach. This mitogenome is 16,685 bp long and contains the entire set of 37 genes and an A $\beta$ T-rich control region typically found in insects. Presently, this mitogenome is the largest mitogenome of all available odonates, mainly because of its long A $\beta$ T-rich region (2036 bp). The gene arrangement of the *V. melania* mitogenome is identical to that of other known odonates. The intergenic spacer s5 shared by the Anisoptera is absent in *V. melania*, which supports the view that the absence of the s5 spacer is a synapomorphy of the Zygoptera." (Authors)] Address: Lin, Chung-Ping Lin, Dept of Life Science, Tunghai University, Taichung 40704, Taiwan. E-mail: treehops@thu.edu.tw

**15230.** Chen, Y.H.; Skote, M. (2015): Study of lift enhancing mechanisms via comparison of two distinct flapping patterns in the dragonfly *Sympetrum flaveolum*. *Phys. Fluids* 27, 033604 (2015); <http://dx.doi.org/10.1063/1.4916204>: 24 pp. (in English) ["The computational fluid dynamic model of a live-sized dragonfly (*Sympetrum flaveolum*) hindwing is simulated according to the in-flight flapping motions measured in kinematic experiments. The flapping motion of the simulated wing is accomplished by dynamically re-gridding the wing-fluid mesh according to the established kinematic model for each flapping pattern. Comparisons between two distinct flapping patterns (double figure-eight and simple figure-eight) are studied via analysis of the aerodynamic forces and flow field structures. The result shows that additional lift is generated during supination and upstroke for the double figure-eight pattern, while maximum thrust is generated during pronation for the simple figure-eight pattern. In addition, through our comparisons of the different kinematics, we are able to reveal the mechanism behind the leading edge vortex stabilization prior to supination and the kinematic movement responsible for additional lift generation during supination. By increasing the translational deceleration during stroke-end rotations in the double figure-eight flapping pattern, a trailing edge vortex is formed which is stronger as compared to the single figure-eight flapping pattern, thus enhancing the lift." (Authors)] Address: Skote, M.,

School of Mechanical and Aerospace Engineering, Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798. E-mail: mskote@ntu.edu.sg

**15231.** Cherry, R.; Tootoonchi, M.; Bhadha, J.; Lang, T.; Karounos, M.; Daroub, S. (2015): Effect of flood depth on Rice Water Weevil (Coleoptera: Curculionidae) populations in Florida rice fields. *Journal of Entomological Science* 50(4): 311-317. (in English) ["The rice water weevil, *Lissorhoptrus oryzophilus* Kuschel, is an important pest of rice (*Oryza sativa* L.) grown in Florida. Reports on the effect of flood depth on rice water weevil populations have been inconsistent. Our objective was to determine if flood depth has any significant effect on rice water weevil populations and other arthropods in rice grown in Florida. Sampling was conducted using adult foliar damage scars, core samples for larvae, and sweep nets for arthropods above the water. Results showed that shallow flooding reduced rice water weevil populations in Florida. Sweep net data showed that flood depth had little, if any, effect on populations of damselflies (Odonata), leafhoppers (Cicadellidae), spiders (Arachnida), or stink bugs (*Oebalus* spp.)." (Authors)] Address: Cherry, R., Everglades Research and Education Center, 3200 E. Palm Beach Rd., Belle Glade, Florida 33430 USA. E-mail: rcherry@ufl.edu

**15232.** Chovanec, A.; Schindler, M.; Waringer, J.; Wimmer, R. (2015): The dragonfly association index (Insecta: Odonata) - a tool for the type-specific assessment of lowland rivers. *River Research and Applications* 31(5): 627-638. (in English) ["Species traits of 57 Odonata species occurring in the Austrian bioregion Eastern Ridges and Lowlands (ecoregion Hungarian Lowlands; Illies, 1978) were defined by factor loadings of 12 habitat parameters: stream sections crenon, rhithron and potamon; flow velocity; standing water; temporary water; size of water body; open water; open banks; submerged macrophytes; reed; and riparian trees. On the basis of the species-specific configurations of these habitat parameters, cluster analysis revealed seven dragonfly associations with different habitat needs: association of open waters, association of sparsely vegetated banks, association of reed and riparian trees, association of reed and submerged macrophytes, association of temporary waters, rhithron association and potamon association. Correlations between the associations' habitat requirements and the habitat parameters of the seven (near-)natural river types, which are present in this bioregion were performed to define river type-specific association compositions. From these results, a dragonfly association index was created to assess the ecological status of these rivers within the five-tiered system of the European Union Water Framework Directive, emphasizing hydro-morphological aspects by comparing the type-specific reference situation with the actual status quo of dragonfly colonization. The method was applied at different rivers, particularly for the purpose of evaluating restoration measures." (Authors)] Address: Chovanec, A., Federal Environment Agency Vienna, Dept of Surface Waters, Spittelauer Lände 5, A-1090 Vienna, Austria. E-mail: andreas.chovanec@umweltbundesamt.at



**15233.** Chovanec, A.; Waringer, J.; Wimmer, R.; Schindler, M. (2015): The Dragonfly Association Index (Insecta: Odonata) - A tool for the type-specific assessment of lowland rivers. *River Research and Applications* 31(5): 627-638. (in English) ["Species traits of 57 Odonata species occurring in the Austrian bioregion Eastern Ridges and Lowlands (ecoregion Hungarian Lowlands; Illies, 1978) were defined by factor loadings of 12 habitat parameters: stream sections crenon, rhithron and potamon; flow velocity; standing water; temporary water; size of water body; open water; open banks; submerged macrophytes; reed; and riparian trees. On the basis of the species-specific configurations of these habitat parameters, cluster analysis revealed seven dragonfly associations with different habitat needs: association of open waters, association of sparsely vegetated banks, association of reed and riparian trees, association of reed and submerged macrophytes, association of temporary waters, rhithron association and potamon association. Correlations between the associations' habitat requirements and the habitat parameters of the seven (near-)natural river types, which are present in this bioregion were performed to define river type-specific association compositions. From these results, a dragonfly association index was created to assess the ecological status of these rivers within the five-tiered system of the European Union Water Framework Directive, emphasizing hydro-morphological aspects by comparing the type-specific reference situation with the actual status quo of dragonfly colonization. The method was applied at different rivers, particularly for the purpose of evaluating restoration measures." (Authors)] Address: Chovanec, A., Umweltbundesamt, Abt. Oberflächengewässer, Spittelauer Lände 5, A-1090 Wien, Austria

**15234.** Collins, S.D.; McIntyre, N.E. (2015): Modeling the distribution of odonates: a review. *Freshwater Science* 34(3): 1144-1158. (in English) ["Species distribution models (SDMs) can be used to answer a variety of questions about Odonata (dragonflies and damselflies) distributions because locality data for species are readily available. We provide an overview of SDMs and review 30 studies that have used SDMs to examine factors governing odonate distributions in current and projected future scenarios. These studies had objectives that included predicting the potential geographical distribution of a species based on scattered records, quantifying hotspots for biodiversity and identifying reserve gaps, assessing species' environmental requirements and limitations, quantifying dispersal abilities of species with different life histories, studying niche conservatism among sympatric species, modeling the effect of forecasted climate change on species distributions, and examining the efficacy of different modelling approaches. We point out limitations in the use of SDMs for these purposes, including effects of limited taxonomic coverage and limited spatial resolution at fine scales. We also highlight potential future areas where use of SDMs can advance our knowledge of odonate-environment interactions." (Authors)] Address: Collins, S.D., Department of Biological Sciences, Box 43131, Texas Tech University, Lubbock, Texas 79409-3131 USA. E-mail: stevendouglascollins@gmail.com

**15235.** Córdoba-Aguilar, A.; Vrech, D.E.; Rivas, M.; Nava-Bolaños, A.; González-Tokman, D.; González-Soriano, E. (2015): Allometry of male grasping apparatus in odonates does not suggest physical coercion of females. *Journal of Insect Behavior* 28(1): 15-25. (in English) ["Male abdominal grasping apparatus that are used to secure a female prior, during and after mating, are widespread in arthropods. The scarce evidence regarding its selective regime suggests that they are male adaptations to circumvent female mating decisions, as predicted by the sexual conflict hypothesis. A recent discussion regarding this way of selection suggests that, similar to weapons and traits that have to do with physical endurance, grasping apparatus should show hyperallometry (proportionally larger compared to body size) as an indication of selection towards increased size. We have tested this idea by measuring the length, width and area of the grasping apparatus of five dragonfly species (*Anax junius*, *Rhionaeschna multicolor*, *Dythemis nigrescens*, *D. sterilis* and *Phyllogomphoides pacificus*). We used two proxies of body size (wing and body length). Our measures did not indicate any pattern of hyperallometry. Thus, the grasping apparatus in these animals does not seem to be positively selected for increased size as would be expected if they were forcing females to mate. Given this, we discuss three other explanations for the maintenance of the grasping apparatus in odonates: 1) a firm grip that secures the tandem and mating position; 2) courtship devices subject to female choice; and, 3) isolation structures that mechanically prevent interspecific matings. The first hypothesis, however, could not explain the highly elaborated and species specific morphology of grasping apparatus in these animals. Support for the second hypothesis comes from the fact that odonate females have mechanoreceptor sensilla embedded in their mesostigmal plates (the place grabbed by the grasping apparatus). For the third hypothesis, coevolutionary patterns in morphology in the grasping apparatus and mesostigmal plates in some Zygoptera can also be used as support." (Authors)] Address: Córdoba-Aguilar, A., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

**15236.** Córdoba-Aguilar, A.; Munguía-Steyer, R. (2015): To be or not to be? Mating success and survival trade offs when switching between alternative reproductive tactics. *Journal of Evolutionary Biology* 28(11): 2119-2124. (in English) ["Hormones underlie the decision of assuming a territorial or a nonterritorial role, with territorial individuals usually having higher hormonal levels than nonterritorial individuals. Since a territorial status is linked to higher mating opportunities, it is unclear why animals do not keep high hormonal levels and one explanation is that this would imply survival costs. We have tested this using males of the territorial damselfly *Argia emma* in the field. We increased juvenile hormone levels using methoprene in both territorial and nonterritorial males and predicted: a) that males will keep (the case of territorial males) or become (the case of nonterritorial males) territorial after hormonal increase, and b)

there will be an increase in mating success for nonterritorial males only and an impaired survival for both male tactics. Hormonally-treated males remained or became territorial but had their survival impaired compared to control groups. Also, hormonally-treated, ex-nonterritorial males increased their mating success compared to the other control, nonterritorial males. The reduced survival can be explained proximally by the energy devoted either to the enhanced aggression showed during territory defense or immune function (as detected previously in damselflies). Although nonterritorial males may increase their mating success by switching to a territorial tactic, they are possibly unable to do it naturally as juvenile hormone is dietary dependent and usually nonterritorial animals are in poorer condition than territorial animals." (Authors)] Address: Córdoba-Aguilar, A., Depto de Ecología Evolutiva, Instituto de Ecología, Univ. Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

**15237.** Corser, J.D.; White, E.L.; Schlesinger, M.D. (2015): Adult activity and temperature preference drives region-wide damselfly (Zygoptera) distributions under a warming climate. *Biology Letters* 2015 11 20150001; DOI: 10.1098/rsbl.2015.0001. Published 15 April 2015 : 5 pp. (in English) ["We analysed a recently completed statewide odonate Atlas using multivariate linear models. Within a phylogenetically explicit framework, we developed a suite of data-derived traits to assess the mechanistic distributional drivers of 59 species of damselflies in New York State (NYS). We found that length of the flight season (adult breeding activity period) mediated by thermal preference drives regional distributions at broad (105 km<sup>2</sup>) scales. Species that had longer adult flight periods, in conjunction with longer growing seasons, had significantly wider distributions. These intrinsic traits shape species' responses to changing climates and the mechanisms behind such range shifts are fitness-based metapopulation processes that adjust phenology to the prevailing habitat and climate regime through a photoperiod filter." (Authors) ] Address: Jeffrey D. Corser, E-mail: jdcorser@esf.edu

**15238.** Courville, A. (2015): Organic carbon transport by aquatic insect emergence from permanent and temporary ponds. Departmental Honors in the Department of Environmental Sciences, Texas Christian University, Fort Worth, Texas: (in English) ["Small man-made ponds are the numerically dominant water body in the Great Plains, and they have been hypothesized to be sources of organic carbon (i.e. energy) to surrounding terrestrial food chains. Aquatic insects that live as immature forms in ponds emerge from the ponds as adults and transfer organic carbon from ponds to terrestrial ecosystems (i.e. carbon flux). Terrestrial predators such as birds and bats consume these insects. Pond permanence and the presence of fish are the primary factors controlling insect community structure and carbon flux. Permanent ponds contain fish, whose predation suppresses large aquatic insects and thereby reduces emergence and carbon flux. Temporary ponds that dry and refill

periodically do not contain fish and have larger insect species and higher levels of emergence and carbon flux. The objective of my study was to assess how the flux of carbon from a permanent pond compares to a temporary pond after refilling and to evaluate the taxa-specific carbon flux in permanent and temporary ponds. I examined insect emergence in five permanent ponds with fish and in five temporary ponds that had dried and been refilled at the Eagle Mountain Fish Hatchery in Fort Worth, TX. I monitored the emergence of insects using floating insect emergence traps over a 10-week period. I captured over 48,000 insects, which were preserved in alcohol, counted and measured for body size. Insects were dried and weighed to determine biomass and carbon flux. Carbon flux from temporary ponds started within a week of pond refilling in the form of small midges, and increased throughout the 10-week period as increasingly larger taxa such as mayflies, damselflies, and dragonflies began to emerge. I found that it took two weeks after refilling for temporary ponds to have higher carbon flux than permanent ponds." (Authors)] Address: not stated

**15239.** Cowan, E.M.; Cowan, P.J. (2015): Odonata (Insecta) at a wadi Pool near Nizwa, northern Oman. *Journal of Threatened Taxa* 7(9): 7538-7546. (in English) ["Fourteen damselfly and dragonfly species were recorded in 68 visits to a wadi pool in northern Oman, March 2012 to June 2014. All identifications were based on photographs. Apparently the pool has a core community of eight resident species (*Ischnura evansi*, *Pseudagrion decorum*, *Anax imperator*, *Orthetrum chrysostigma*, *O. sabina*, *Crocothemis erythraea*, *Trithemis annulata*, *T. kirbyi*). *Paragomphus sinaiticus*, globally Near Threatened, was regularly recorded." (Authors)] Address: Cowan, Elaine, School of Education, Univ. Aberdeen, Scotland, UK. E-mail: desertlarksgirl@hotmail.com

**15240.** Cuevas, M.D. (2015): The potential and promotion of entotourism in Gunung Ledang, Johor, Malaysia. Masters thesis, Universiti Tun Hussein Onn Malaysia: xx, 106 pp. (in English) ["This research tries to provide the scientific evidence that insect (including Odonata) tourism or entotourism has potential and is viable. This is achieved through two methods – field observation and data collection, and through questionnaire surveys on tourist perceptions on insects and entotourism. Gunung Ledang was chosen as the research site for several reasons including the easy access to tourist respondents. Surveys showed that tourists are interested in insect. Supported by field observations and data collection, insects have potential to be excellent nature tourism product. Closer examination pointed out that insect groups that are reliable and visible are ants, butterflies, termites, dragonflies, moths, beetles, cicadas and damselflies. Field trials indicated that these insects were viable attractions as they are readily visible, safe, easily recognizable, with some having linkage to local culture. Regardless of the different environmental ambience, time of observation (except early mornings) and seasons, insect were always present. The tendency is there however, that particular environment such as water body (pool/waterfall) would attract certain insects such as odonates. Further surveys on tourists'

perception indicated that they supported entotourism and were willing to participate in one. As Gunung Ledang is a national and state park under the jurisdiction of the Perbadanan Taman Negara Johor (PTNJ), their staff would likely be the candidates as entotourism operators. Thus, this research also gauged the present level of understanding and knowledge on insects by PTNJ staff, supplemented by a training course. Statistically, there is significant increase in the understanding and knowledge of insects after the training. A small booklet was developed based on collections of insects from Gunung Ledang and used during the training. Although, much of the research is about evaluating the potential and viability of insects as tourism product, to diversify tourism products, in line with the Malaysia Government's agenda, it also pointed out the need to conserve Gunung Ledang (watershed with high ecological values and with cultural heritage)." (Authors)] Address: not stated

**15241.** Cuevas-Yáñez, K.; Rivas, M.; Muñoz, J.; Córdoba-Aguilar, A. (2015): Conservation status assessment of *Paraphlebia* damselflies in Mexico. *Insect Conservation and Diversity* 8: 517-524. (in English) ["(1.) We assessed the conservation status of the three Mexican *Paraphlebia* damselflies based on the criterion B of the Red List of the International Union for Conservation of Nature's (IUCN): *P. hyalina*, *P. quinta*, and *P. zoe*. According to this List, *P. hyalina* has not been evaluated, *P. quinta* appears as least concern, and *P. zoe* appears as Vulnerable. Geographical records were taken from literature, enquiries to specialists and field visits. We also projected the future potential geographical range area. (2.) We generated species distribution models (SDM) for *P. quinta* and *P. zoe* (as there were not enough records for *P. hyalina*) as a surrogate of the extension of occurrence (EOO) and also calculated the area of occupancy. Future distributions were projected for years 2020, 2050, and, 2080 based on predicted changes in climatic conditions. (3.) Species distribution models predicted current EOO areas for *P. quinta* and *P. zoe* as 18 860 and 16 440 km<sup>2</sup>, respectively, and around 50% of their distribution coincides with agricultural, pasture or urban sites. (4.) Our SDM results indicate that IUCN-based conservation status of the three species should be changed as follows: *P. quinta* and *P. zoe* moved to endangered category, and *P. hyalina* to data-deficient category based on the reduced EOO areas and the historical loss of habitat. (5.) For *P. quinta*, future climatic projections suggest an initial reduction (2020) followed by an expansion (2050 and 2080) in suitable areas, whereas for *P. zoe* there will be a decrease in predicted area for the three time periods. Preserving areas that provide shade, high humidity and perching sites seems to be a key for *Paraphlebia* species survival." (Authors)] Address: Córdoba-Aguilar, A., Depto de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: [acordoba@ecologia.unam.mx](mailto:acordoba@ecologia.unam.mx)

**15242.** Curry, C.J.; Baird, D.J. (2015): Habitat type and dispersal ability influence spatial structuring of larval Odonata and Trichoptera assemblages. *Freshwater Biology* 60(10):

2142-2155. (in English) ["(1.) Freshwater invertebrate assemblages are believed to be structured by both local and larger scale processes (i.e. dispersal). In rivers, the extent to which dispersal processes influence local assemblage composition may depend on both the taxon and habitat in question. Poor dispersers should display greater spatial structuring than strong dispersers. Likewise, assemblages in poorly connected habitats should experience greater dispersal limitation, and therefore greater spatial structuring. (2.) We sought to test these hypotheses using two contrasting orders of aquatic insect, Odonata and Trichoptera. Odonata are believed to have greater dispersal capacity than Trichoptera. In river ecosystems, these orders inhabit both main channel habitats and more poorly connected riverine wetlands. Multi-habitat surveys of larval Trichoptera and Odonata assemblages were conducted at 34 sites in three 5th-order New Brunswick rivers. The degree of spatial and environmental structuring in assemblages was assessed using redundancy analysis-based variance partitioning. We also assessed the performance of different model-based spatial predictors (asymmetric eigenvector maps, AEMs and principal coordinates of neighbourhood matrices, PCNMs). (3.) For main channel areas, variance explained purely by environmental variables was greater for Odonata, while the purely spatial component of variance was greater for Trichoptera, regardless of the class of spatial descriptor. In riverine wetlands, both the purely environmental and purely spatial components of variance explained were similar or were greater for Trichoptera than for Odonata. (4.) The component of variance explained by spatial variables was greater in riverine wetlands than main channel areas for both Odonata and Trichoptera for most spatial descriptors, suggesting that taxa inhabiting riverine wetlands may experience greater dispersal limitation. However, the magnitude of this difference was relatively small in most cases. Eigenvector-based spatial descriptors (PCNMs, AEMs, netPCNMs) explained more variance than traditional spatial descriptors. For Trichoptera, network-based predictors (AEMs, netPCNMs) explained more variance than PCNMs in main channel areas. (5.) Our results suggest that dispersal ability and habitat type can influence the degree of spatial structuring in aquatic insect assemblages. However, these patterns must be investigated across a wider range of insect groups and at larger spatial scales. Our results also suggest that biomonitoring programs should consider assemblage spatial structure in building reference condition models and that aquatic conservation planners must consider the type and spatial arrangement of habitats in reserve design. Eigenvector-based spatial descriptors hold promise for interpreting biodiversity patterns in freshwater invertebrates, but more work is required to relate patterns to actual dispersal behaviour." (Authors)] Address: Curry, C.J., Canadian Rivers Institute and Department of Biology, University of New Brunswick. P.O. Box 4400 Fredericton, New Brunswick, Canada E3B 5A3. E-mail: [colin.curry@unb.ca](mailto:colin.curry@unb.ca)

**15243.** David, S.; Ábelová, M. (2015): Vázky (Odonata) chrániého areálu Arboretum Mlyňany. *Folia faunistica*



Slovaca 20(2): 135-139. (in Slovakian, with English summary) ["Garden ponds are part of the area Mlynany Arboretum. In 2009 and 2011 a total of 277 specimens of dragonflies belonging to 11 species were collected in the 7 garden ponds. Four eudominant (*Ischnura elegans*, *Chalcolestes viridis*, *Sympetrum sanguineum* and *Coenagrion puella*), one dominant (*Erythromma viridulum*), four subdominant (*Somatochlora metallica*, *Anax imperator*, *Platycnemis pennipes*, *Ischnura pumilio*), one recedent (*Aeshna cyanea*) and subrecedent (*Libellula depressa*) could be distinguished. Dragonfly fauna of the studied garden ponds belong to the initial (pioneer) species colonizing the small man-made garden ponds. There were six autochthonous (*Platycnemis pennipes*, *Ischnura elegans*, *I. pumilio*, *Coenagrion puella*, *Erythromma viridulum* and *Anax imperator*) and one probably autochthonous (*Sympetrum sanguineum*) species found. All observed species we could associate with garden ponds." (Authors)] Address: David, S., ÚKE SAV, Akademická 2, SK-94901 Nitra, Slovakia. E-mail: stanislav.david@savba.sk

**15244.** De Knijf, G.; Demolder, H. (2015): Some dragonfly records from Albania, with *Cordulegaster heros* and *Somatochlora metallica* new for the country (Odonata: Cordulegasteridae, Corduliidae). *Libellula* 34(3/4): 181-185. (in English, with German summary) ["A total of 13 Odonata species were recorded during a short visit to Albania. Two species, *Cordulegaster heros* and *Somatochlora metallica*, are recorded for the first time for this country. One male of *C. heros* was observed on 21-vii-2015 on a small stream before ending up in the Mati River south of Klos. *Somatochlora metallica* was found on 24-vii-2015 at the glacial lake Buni Jezerce in the Prokletije Mountains in northern Albania, nearly at the border with Montenegro." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstr. 25, 1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**15245.** De Knijf, G.; Maes, D.; Onkelinx, T.; De Bruyn, L.; Piesschaert, F.; Pollet, M.; Truyens, P.; Van Calster, H.; Westra, T.; Quataert, P. (2015): Monitoringsprotocol Libellen. Rapporten van het Instituut voor Natuur- en Bosonderzoek 2015. (INBO.R.2015.7886774). Instituut voor Natuur- en Bosonderzoek, Brussel: 36 pp. (in Dutch, with English summary) ["This report describes the protocol for the dragonfly monitoring network in Flanders (Belgium). We list the species that need to be monitored and the methods to do so. Three easily observed species of dragonfly (*Calopteryx virgo*, *Coenagrion pulchellum* and *Aeshna isocetes*) are counted using dragonfly-transects. We explain how the sampling frame was compiled and how we applied a GRTS sampling procedure to determine the monitoring localities in the network. All populations will be counted from the following five rare species: *Coenagrion hastulatum*, *C. lunulatum*, *Somatochlora arctica*, *Leucorrhinia pectoralis* and *Sympetrum depressiusculum*. Adults of these species will be counted around the breeding locality. The two gomphid species (*Gomphus vulgatissimus* and *G. flavipes*) will be monitored by counting the exuviae along transects by the watercourse. Per species, we give the full list of monitoring sites,

the frequency with and the period in which they need to be monitored. For the rare species and the two gomphids, we further list the localities where the species has been observed but without indications of local reproduction. Finally, we refer to the data portal in which the collected records will be stored for analysis." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**15246.** De Knijf, G. (2015): *Pantala flavescens* – a new species for the fauna of Bulgaria (Odonata: Libellulidae). *Notulae odonatologicae* 8(6): 191-196. (in English) ["A male of *P. flavescens* was observed on 30 July 2012 in the Western Rhodope Mountains in the southwest of Bulgaria. This species is new for the Bulgarian fauna. The observation was made along a stream, away from suitable breeding habitat. Therefore, we consider our observation to be of a vagrant individual." (Author)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**15247.** De Knijf G.; Maes D.; Onkelinx T.; De Bruyn L.; Piesschaert F.; Pollet M.; Truyens P.; Van Calster H.; Westra T.; Quataert P. (2015): Monitoringsprotocol Libellen. Rapporten van het Instituut voor Natuur- en Bosonderzoek 2015 (INBO.R.2015.7886774). Instituut voor Natuur- en Bosonderzoek, Brussel: 36 pp. (in Dutch, with English summary) ["This report describes the protocol for the dragonfly monitoring network in Flanders (Belgium). We list the species that need to be monitored and the methods to do so. Three easily observed species of dragonfly (*Calopteryx virgo*, *Coenagrion pulchellum* and *Aeshna isocetes*) are counted using dragonfly-transects. We explain how the sampling frame was compiled and how we applied a GRTS sampling procedure to determine the monitoring localities in the network. All populations will be counted from the following five rare species: *Coenagrion hastulatum*, *Coenagrion lunulatum*, *Somatochlora arctica*, *Leucorrhinia pectoralis* and *Sympetrum depressiusculum*. Adults of these species will be counted around the breeding locality. The two gomphid species (*Gomphus vulgatissimus* and *G. flavipes*) will be monitored by counting the exuviae along transects by the watercourse. Per species, we give the full list of monitoring sites, the frequency with and the period in which they need to be monitored. For the rare species and the two gomphids, we further list the localities where the species has been observed but without indications of local reproduction. Finally, we refer to the data portal in which the collected records will be stored for analysis." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstr. 25, 1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**15248.** De Marco, P.; Corrêa Nóbrega, C.; de Souza, R.A.; Neiss, U.G. (2015): Modeling the distribution of a rare Amazonian odonate in relation to future deforestation. *Freshwater Science* 34(3): 1123-1132. (in English) ["The advance of the deforestation frontier in the Amazon forest, the largest tropical forest and one of the richest ecosystems in the world, has threatened several plant and animal species. A

lack of good biogeographical information of their distributions and a shortage of basic knowledge on their ecology hinder the proper evaluation of the vulnerability of those species. We used species distribution modelling techniques to fill these gaps and to estimate the vulnerability of a forest-dwelling odonate endemic from the Amazon, *Diastatops nigra*. We used the MaxEnt algorithm and compared the efficiency of this method in relation to the type of environmental data set (climate-only and climate+hydrographic environmental variables). We also estimated the decrease in extension of occurrence of *D. nigra* in relation to a recently developed model for future deforestation also produced with the MaxEnt approach. Predicted suitable areas were isolated patches in the central Amazon and many peripheral areas. In general, those areas had stable climates with low seasonality in rainfall. The Amazon deforestation frontier is expanding mainly from the south. The core area of *D. nigra* distribution is in the central Amazon, so in the short-term projection, the main threat for this species was not the deforestation itself. However, deforestation may extirpate some peripheral populations of this species and increase isolation among those patches of suitable areas. We suggest the use of this model for prioritizing future odonate inventories targeting the other species of the group." (Authors)] Address: De Marco, P., Laboratório de Ecologia Teórica e Síntese, Instituto de Ciências Biológicas, Universidade Federal de Goiás Goiânia, Goiás, Brazil

**15249.** Debecker, S.; Sommaruga, R.; Maes, T.; Stoks, R. (2015): Larval UV exposure impairs adult immune function through a trade-off with larval investment in cuticular melanin. *Functional Ecology* 29(1): 1292-1299. (in English) ["Despite the strong impact of ultraviolet (UV) radiation on invertebrates, it is unknown whether it affects immune function across metamorphosis. More generally, the mechanisms on how larval stressors bridge metamorphosis and shape adult fitness in animals with a complex life cycle remain poorly understood. We studied whether cuticular melanin content is upregulated under UV exposure in the larval stage of the damselfly *Coenagrion puella* and whether this is traded off across metamorphosis against a key component of the invertebrate immune response, the melanotic encapsulation response, in the adult stage. Larvae exposed to UV increased the melanin content in their exoskeleton and metamorphosed later and at a smaller mass than animals reared without UV. Across metamorphosis, this was associated with a reduced melanotic encapsulation response, thereby constituting the first proof for a UV driven impaired immune response in an invertebrate. The demonstrated costs of UV exposure in terms of age and mass at metamorphosis and reduced adult immune response likely translate into reduced adult fitness. Path analysis indicated that the immunosuppressive property of larval UV exposure was not mediated by age and mass at metamorphosis, but instead that the adult immune response was traded off against larval cuticular melanin investment. Melanin-based trade-off across metamorphosis provide a new pathway by which effects of larval stressors are carried over to the adult stage and thereby advances our understanding of the still

largely enigmatic mechanisms of carryover effects of larval stressors across metamorphosis. Given the mechanistic base, this carryover effect of larval UV exposure on adult immune function is expected to be general and may constitute a widespread and important cost of UV exposure in invertebrates." (Authors)] Address: Debecker, Sara, Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Charles Deberiotstraat 32 bus 2439, 3000 Leuven, Belgium

**15250.** Denhoff, L.A. (2015): Microhabitat occupancy, distribution, and selection by *Cordulegaster diastatops* (Selys, 1854) (Odonata: Cordulegastridae) in seeps and springs of Madison County, New York. M.Sc. thesis, Environmental and Forest Biology, State University of New York College of Environmental Science and Forestry: 67 pp. (in English) ["Suitable microhabitat availability for dragonfly larvae within a lotic environment influences the distribution and abundance of individuals, yet few studies have addressed this. The objective of this study was to determine how nine microhabitat variables influenced *Cordulegaster diastatops* occupancy within two field sites, as well as to determine if larval dragonflies have the ability to select a characteristic of their microhabitat. Microhabitat variables differed between Nelson Swamp Unique Area (NSUA) and Tioughnioga Wildlife Management Area (TWMA), as well as between occupied and unoccupied sites within NSUA only. NSUA appears to be more suitable for *C. diastatops* than TWMA. Relatively shallow water depth, low water temperature, and slow water velocity along with a substrate that larvae can burrow in are associated with larval presence. In a sediment choice experiment larvae demonstrated the ability to select a substrate type, and most larvae exhibited a preference for fine sand over mixed gravel." (Author)] Address: not stated

**15251.** Derso, S.; Beyene, A.; Getachew, M.; Ambelu, A. (2015): Ecological status of hot springs in eastern Amhara region: Macroinvertebrates diversity. *American Scientific Research Journal for Engineering, Technology, and Sciences* 14(2): 1-22. (in English) [Ethiopia, "Springs are the places where ground water is discharged at specific locations. They vary dramatically as to the type of water they discharge. Hot springs is having the temperature of the water lies significantly above the mean of annual air temperature of that region. Temperature is one of the most important factors that govern species abundance and distribution. The objective of this study is to examine the relationship between biological parameters (macroinvertebrate diversity) with physicochemical water and habitat quality of hot springs in Easter Amhara Region. A cross-sectional study of physical, chemical and biological components of the hot springs was carried out to assess their ecological status. Samples were collected from March to May 2013. Biological samples were collected to provide a qualitative description of the community composition at each sampling site. Water samples were collected for analysis of selected physicochemical parameters following water quality assessment protocols. A total of 1095 macroinvertebrates classified into

10 orders and 31 families of macroinvertebrates were collected from the 12 sampling sites. The most abundant orders were Diptera 49.90%, Odonata 15.53%, Coleoptera 12.97%, and Ephemeroptera 9.5% represented by 14 families. Macroinvertebrate taxa were absent at B1 and H1 sites with the temperature of 72 °C and 70 °C respectively. However, in this study, the macroinvertebrate taxa (Chironomidae and Hydrobiidae) were found within a temperature of 52 °C at S1 and H1 sites. The results are also revealed that as the temperature gradient declines, the macroinvertebrate diversity flourished. Due to this fact, both macroinvertebrate diversity and family biotic index were negatively correlated with temperature and the correlations were significant. Human disturbance and habitat conditions varied considerably among sites in the study area. Although human disturbance and water pollution are among the factors influencing ecological quality, the strong correlations between water temperature and species diversity suggest that temperature is the major environmental gradient affecting aquatic biodiversity in hot springs." (Authors)] Address: Derso, S., Environmental Health Research Team, Ethiopian Public Health Institute, P.O. Box 1242, Addis Ababa, Ethiopia. E-mail: sisayd@ephi.gov.et

**15252.** Dijk, B.; Laurila, A.; Orizaola, G.; Johansson, F. (2015): Is one defence enough? Disentangling the relative importance of morphological and behavioural predator-induced defences. *Behavioral Ecology and Sociobiology* 70(2): 237-246. (in English) ["Many organisms show predator-induced behavioural and morphological phenotypic plasticity. These defence mechanisms are often expressed simultaneously. To estimate the relative importance of these two defences, we conducted a laboratory experiment using tadpoles of the common frog (*Rana temporaria*) as prey and *Aeshna* dragonfly larvae as predators. We first raised tadpoles in the presence and absence of caged predators to induce differences in defensive morphology, and then conducted free ranging predator trials in environments that were either with or without the presence of predation cues to induce differences in defensive behaviour. This 2 × 2 design allowed us to separate the effects of inducible morphology from inducible behaviour. Caged predators induced deeper bodies and tailfins and reduced activity levels in tadpoles. The time to first capture was shortest in tadpoles without morphological or behavioural defences. Tadpoles with a behavioural defence had a significantly longer time to first capture. Tadpoles with only antipredator morphology tended to have a longer time to first capture as compared to those without any induced defences. This treatment also had a higher number of injured tadpoles as compared to other treatments, suggesting that inducible morphology facilitates predator escape due to the 'lure effect'. However, tadpoles with both behavioural and morphological defences did not have a longer time to first capture as compared to tadpoles with only morphological or behavioural induced defences. Our results suggest that both behavioural and morphological antipredator responses contribute to reduced capture efficiency by predators, but their simultaneous expression did not have any additive effect to the time

of first capture and survival, and that the morphology response is most effective when tadpoles are active." (Authors)] Address: Johansson, F., Dept of Ecology & Environmental Science, Animal Ecology Group, Umea Univ., 90187 Umea, Sweden. E-mail: frank.johansson @eg.umu.se

**15253.** Dimapinto, F.A.; Nuneza, O.M.; Villanueva, J.T. (2015): Species diversity of adult Odonata in selected areas of Lanao Del Sur, Philippines. *Journal of Biodiversity and Environmental Sciences* 7(4): 200-210. (in English) ["Field work in selected areas in Lanao del Sur was conducted to determine the Odonato fauna present in the area. Adult Odonata samples were collected using sweep netting and handpicking methods from four sampling sites. Biodiversity indices, similarity index, and canonical correspondence analysis were determined using Paleontological Statistics Software Package (PAST) version 2.17c. Twenty-one species (10 damselflies and 11 dragonflies) were documented with relatively low endemism of 42.86%. High relative abundance of 37.28% was observed in site 4. Sites 1 and 3 were observed to have high species diversity while sites 2 and 4 had moderate species diversity. There was a more or less even species distribution in the areas sampled. Dominance of *Pseudagrion pilidorsum pilidorsum* was recorded in Marawi City. Canonical correspondence analysis showed that environmental factors such as elevation, air temperature and relative humidity affect the abundance of species. It appears that human-induced activities limit the occurrence and abundance of the Odonata, especially the endemic species." (Authors)] Address: Nuñez, Olga, Department of Biological Sciences, Mindanao State University-Iligan Institute of Technology, Iligan City, Philippines. E-mail: olgamnuneza@yahoo.com

**15254.** Domeneghetti, D.; Mondini, S.; Carchini, G. (2015): Odonata species richness in the Castelporziano presidential estate, present and past. *Rendiconti Lincei* 26, Supplement 3: 367-377. (in English) ["The Castelporziano estate, a former game reserve along the Tyrrhenian coast near Rome, is a conserved patch of pristine woodland, in which several species of the Odonates breed in numerous small ponds and a few rivulets. The odonate species of Castelporziano have been recorded since the 1930s, with an in-depth survey carried out in 1997–1998. The present, additional survey on the odonate species of Castelporziano aims at contributing to long-term ecological research, by assessing variations in odonate fauna up to the present, and linking them to environmental changes. The presence of adult Odonata species was assessed in the field by two observers at 20 water bodies (ponds and other sites) from mid-March to early November 2012. The presence of shade, riparian and submerged vegetation, fish and the number of drying-up events during the past decade were also recorded. Results showed a small reduction in the number of odonate species for the entire estate, with several qualitative changes in comparison with previous data. On the contrary, a site-specific analysis of changes from 1997–1998 to 2012 revealed a significant considerable reduction in the average number of species. This was linked to a decrease in



riparian and submerged vegetation. Drying-up events did not appear to be a crucial factor, and fish and shade were essentially unchanged. In conclusion, the Castelporziano water environment seems to have deteriorated, probably as a consequence of the trampling by wild ungulates in woodland ponds." (Authors)] Address: Domeneghetti, D., Department of Biology, University of Rome "Tor Vergata", Via della Ricerca Scientifica, snc, 00133, Rome, Italy. E-mail: dario.eco.domeneghetti@gmail.com

**15255.** Dorji, T. (2015): New distribution records of *Epiphlebia laidlawi* Tillyard, 1921 (Insecta: Odonata) in Bhutan. *Journal of Threatened Taxa* 7(10): 7668-7675. (in English) ["An opportunistic survey for *E. laidlawi* larvae was carried out within five districts in Western and Central Bhutan from 2012 to 2014. The study recorded a total of 21 individuals from five districts and also recorded F0, F3 and F8 instars larvae for the first time in Bhutan. The study adds December and February as possible months to record F0 instars within its range. The record of *E. laidlawi* from Bumthang District extends its range to the eastern most part of the Himalayas, and it also extends its range from Chhukha District to its southern most range within Bhutan. A record from Punakha District fills the gap between the previous and current record of *E. laidlawi* from Wangchhu basin in Western Bhutan and Drangmechhu basin spanning central and eastern Bhutan with Punatshangchhu basin in between. The record from Trongsa District emphasises the importance of the study area as *E. laidlawi*'s habitat. The extent range of *E. laidlawi* within Bhutan is now extended to six districts, viz., Haa, Thimphu, Chhukha, Punakha, Trongsa and Bumthang." (Author)] Address: Dorji, T., College of Natural Resources, Royal University of Bhutan, Lobesa, Punakha, 14001, Bhutan. E-mail: tdorji1.cnr@rub.edu.bt

**15256.** Dow, R.A.; Ngiam, R.W.J. (2015): Odonata from two areas in the Upper Baram in Sarawak: Sungai Sii and Ulu Moh. *International Dragonfly Fund - Report 84*: 1-31. (in English) ["Records of Odonata from two areas in the upper Baram area in Sarawak's Miri Division are presented. 65 species are recorded from the Sungai Sii area and 63 from the Ulu Moh area. Notable records include *Telosticta ulubaram*, *Coeliccia southwelli*, *Leptogomphus* new species, *Macromia corycia* and *Tramea* cf. *virginia*. *Rhythemis regia* is recorded from Sarawak for the first time." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**15257.** Drury, J.P.; Anderson, C.N.; Grether, G.F. (2015): Seasonal polyphenism in wing coloration affects species recognition in rubyspot damselflies (*Hetaerina* spp.). *Journal of Evolutionary Biology* 28(8): 1439-1452. (in English) ["Understanding how phenotypic plasticity evolves and in turn affects the course of evolution is a major challenge in modern biology. By definition, biological species are reproductively isolated, but many animals fail to distinguish between conspecifics and closely related heterospecifics. In some cases, phenotypic plasticity may interfere with spe-

cies recognition. Here, we document a seasonal polyphenism in the degree of dark wing pigmentation in smoky rubyspot damselflies (*Hetaerina titia*)—a shift so pronounced that it led early researchers to classify different forms of *H. titia* as separate species. We further show how the seasonal colour shift impacts species recognition with the sympatric congener *H. occisa*. Interspecific aggression (territorial fights) and reproductive interference (mating attempts) are much more frequent early in the year, when *H. titia* more closely resembles *H. occisa*, compared to later in the year when the dark-phase of *H. titia* predominates. Using wing colour manipulations of tethered damselflies, we show that the seasonal changes in interspecific interactions are caused not only by the seasonal colour shift but also by shifts in discriminatory behaviour in both species. We also experimentally tested and rejected the hypothesis that learning underlies the behavioural shifts in *H. occisa*. An alternative hypothesis, which remains to be tested, is that the seasonal polyphenism in *H. titia* wing coloration has resulted in the evolution of a corresponding seasonal polyphenism in species recognition in *H. occisa*. This study illustrates one of the many possible ways that plasticity in species recognition cues may influence the evolution of interspecific interactions." (Authors)] Address: Drury, J.P., Department of Ecology and Evolutionary Biology, University of California, 612 Charles E. Young Dr. S., Los Angeles, CA 90095, USA. E-mail: druryj@ucla.edu

**15258.** DuBois, R. (2015): Detection probabilities and sampling rates for Anisoptera exuviae along river banks: influences of bank vegetation type, prior precipitation, and exuviae size. *International Journal of Odonatology* 18(3): 205-215. (in English) ["Exuviae collections have considerable value in population studies of Odonata, but methods for standardizing collections or estimating densities and detection probabilities have been little studied. I measured sampling rates for Anisoptera exuviae and used a maximum likelihood, four-pass, depletion population estimator to standardize collections and to estimate exuvial densities and detection probabilities along 10 riverbank stations in Wisconsin. First-pass sampling rates averaged slower than the overall average for experienced collectors (0.53 m min<sup>-1</sup> compared to 0.90 m min<sup>-1</sup>) because more exuviae were present on the first pass, increasing picking and handling time. Neither bank vegetation type (grassy versus forested) nor amount of prior precipitation affected sampling rate. Exuviae detection probabilities for a single pass ranged from 0.49 to 0.75, and averaged 0.64. The mean cumulative probability of detection increased to 0.87 after two passes, 0.95 after three passes, and 0.98 after four passes. A strong negative relationship existed between detectability and the amount of prior precipitation. Bank vegetation type did not affect detection probability. Smaller exuviae had an 8% lower probability of detection than larger exuviae. If four sampling passes are cost-prohibitive for some exuviae studies, making just two passes may provide an adequate estimate of sampling efficiency. The assumption that exhaustive collecting efforts will find all or most of the exuviae

along vegetated natural banks is unfounded." (Author)] Address: DuBois, R., Department of Natural Resources, Bureau of Natural Heritage Conservation, 1701 N. 4th St., Superior, WI 54880, USA

**15259.** DuBois, R.B.; Tennesen, K.T. (How did E. M. (2015): Walker measure the length of the labium of nymphs of *Aeshna* and *Rhionaeschna* (Odonata: Aeshnidae)?): The Great Lakes Entomologist 48(1-2). 79: 92. (in English) ["The exhaustive studies of nymphs of *Aeshna* Fabricius and *Rhionaeschna* Förster by E. M. Walker (1912-1958) have long guided the taxonomy of these groups and formed the basis for keys still in use today. However, uncertainty about how he measured the length of the labium, including the varied terminology he used over the duration of his career concerning this structure, has led to confusion about application of his taxonomic recommendations. We recalculated ratios of the maximum width/length  $W(\max)/L$  by measuring the illustration dimensions of folded labia and prementums in publications throughout his career and compared these data with the ratios he stated in those publications and with ratios derived from measurements of specimens in our collections. Our results show that from 1912 to 1941, Walker restricted length measurement to the prementum proper (which he called the "mentum of the labium"), exclusive of the ventrally visible portion of the postmental hinge. However, in 1941 he reported ratios from length measurements done two ways, excluding the postmental hinge in his description of the nymph of *A. verticalis* Hagen, but including the hinge in his description of the nymph of *A. septentrionalis* Burmeister (Whitehouse 1941). In Walker's most recent and influential work (1958), he included the postmental hinge in labium length measurements of nine species, but restricted length measurements to the prementum for five others. He was consistent with the use of terms, using both "folded labium" by which he meant the prementum plus the postmental hinge, and "prementum" by which he meant only that structure. However, Walker's descriptions of the labium in his latest work are buried in long, frequently punctuated sentences that for most species include the terms "folded labium" and "prementum" in the same sentence, so careful reading is required to know which term is intended in the width/length ratio. Width/length ratios we each calculated independently were invariably similar for a given species and were usually similar to Walker's stated ratio for that species. These similarities affirm our conclusion that while labium measurements must be done with care, they are closely repeatable among workers and will consistently lead to correct determinations in properly designed couplets of dichotomous keys to these genera. We recommend measuring the length of the prementum proper in future studies of these genera when labium ratios are calculated because we found less variability in those cases than when the measurements included the postmental hinge. An approximate conversion between the two methods of calculating  $W(\max)/L$  ratios can be made as follows: ratio calculated when the length of the prementum excluding the postmental hinge is used  $\times 0.88$  is approximately equal to the ratio when the postmental hinge is included for

species of *Aeshna* and *Rhionaeschna* in North America." (Authors)] Address: DuBois, R., Wisconsin Department of Natural Resources, 1401 Tower Ave., Superior, WI 54880, USA. E-mail: robert.dubois@Wisconsin.gov

**15260.** Durand, E.; Rigaux, J. (2015): Further additions to the knowledge of the odonate fauna of Armenia, with first record of *Pantala flavescens* (Odonata: Libellulidae). *Notulae odonatologicae* 8(6): 184-190. (in English) ["As result of two targeted surveys of the Armenian odonate fauna in August 2010 and June 2014 a male *Pantala flavescens* was recorded photographically on the shore of Lake Sevan in the Gegharkunik district, representing the first record for Armenia. *Leucorrhinia pectoralis* was rediscovered at Javakheti-Shirak volcanic plateau (Armenian highland) 75 years after the species was first reported for Armenia. Data on the first evidenced reproduction of *Coenagrion armatum* were also collected." (Authors)] Address: Durand, E., Château Vilain RN7 13410 Lambesc, France. E-mail: mr.oizo3@gmx.fr

**15261.** Ebert, M.; Kölbl-Ebert, M.; Lane, J.A. (2015): Fauna and predator-prey relationships of Ettliling, an Actinopterygian fish-dominated Konservat-Lagerstätte from the Late Jurassic of southern Germany. *PLoS ONE* 10(1): e0116140. doi:10.1371/journal.pone.0116140: 33 pp. (in English) ["The newly recognized Konservat-Lagerstätte of Ettliling (Bavaria), field site of the Jura Museum Eichstätt (JME), is unique among Late Jurassic plattenkalk basins (Solnhofen region) in its abundant, extremely well preserved fossil vertebrates, almost exclusively fishes. We report actinopterygians (ginglymodins, pycnodontiforms, halecomorphs, aspidorynchiforms, "pholidophoriforms," teleosts); turtles; and non-vertebrates (echinoderms, arthropods, brachiopods, mollusks, jellyfish, sponges, biomats, plants) in a current faunal list. Ettliling has yielded several new fish species (*Bavarichthys incognitus*; *Orthogonikleithrus hoelli*; *Aspidorhynchus sanzenbacheri*; *Macrosemimimus fegerti*). Upper and lower Ettliling strata differ in faunal content, with the lower dominated by the small teleost *Orthogonikleithrus hoelli* (absent from the upper layers, where other prey fishes, *Leptolepides* sp. and *Tharsis* sp., occur instead). Pharyngeal and stomach contents of Ettliling fishes provide direct evidence that *Orthogonikleithrus hoelli* was a primary food source during early Ettliling times. Scarcity of ammonites and absence of vampyromorph coleoids at Ettliling differ markedly from the situation at other nearby localities in the region (e.g., Eichstätt, Painten, Schamhaupten, the Mörsheim beds), where they are more common. Although the exact biochronological age of Ettliling remains uncertain (lack of suitable index fossils), many Ettliling fishes occur in other plattenkalk basins of Germany (e.g., Kelheim) and France (Cerin) dated as Late Kimmeridgian to Early Tithonian (eigellingense horizon), suggesting a comparable geologic age. The Ettliling deposits represent an independent basin within the larger Upper Jurassic "Solnhofen Archipelago", a shallow subtropical sea containing scattered islands, sponge-microbial and coral reefs, sandbars, and deeper basins on a vast carbonate platform along the northern margin of the Tethys Ocean." (Authors) The paper in-

cludes a few references to Odonata.] Address: Lane, Jennifer, Div. Paleontology, American Museum of Natural History, New York, New York, USA. E-mail: jlane@amnh.org

**15262.** El Haissoufi, M.; De Knijf, G.; van't Bosch, J.; Benas, N.; Millán Sánchez, A. (2015): Contribution to the knowledge of the Moroccan Odonata, with first records of *Orthetrum sabina*, and an overview of first and last dates for all species. *Odonatologica* 44(3): 225-254. (in English) ["Several field surveys between 2007 and 2014 were undertaken in Morocco. Altogether 54 species were observed during our studies, representing 86 % of the odonate fauna of the country. *Orthetrum sabina* is new for Morocco, increasing the number of species to 63. The species was found at Oued Ez-Zahar near Akhfenir, about 1 700 km off its nearest known locality at Ouargla in Algeria. Two small populations of *Erythromma viridulum* were found for the first time in the Rif, bridging the gap between populations in the Middle Atlas and the Iberian Peninsula. The third observation of *Sympetrum sinaiticum* for Morocco was recorded and we were able to significantly increase the known number of localities of the threatened Moroccan endemic *Cordulegaster princeps*. We further can show that several species (e.g., *Boyeria irene*, *Pyrrhosoma nymphula*) are more widely distributed than believed and occur also at low altitudes in the country. On the other hand, *Calopteryx exul*, *Calopteryx virgo meridionalis*, *Lestes dryas*, *Coenagrion mercuriale*, *Aeshna isoceles* and *Libellula quadrimaculata* are very rare in Morocco and their populations should be monitored to assess their potential decline. Finally, for all Moroccan dragonfly species the first and last observation dates are listed. For 17 of them we provide the earliest observation date and for seven species we prolong the observation period." (Authors)] Address: El Haissoufi, M., Lab. of Ecology, Biodiversity and Environment "LEBE", Dept of Biology, Fac. Sciences, Univ. of Abdelmalek Essâadi, Tétouan, Morocco. E-mail: med.elhaissoufi@gmail.com

**15263.** El Haissoufi, M.; de Knijf, G.; van't Bosch, J.; Benas, N.; Sánchez, A.M. (2015): Contribution to the knowledge of the Moroccan Odonata, with first records of *Orthetrum sabina*, and an overview of first and last dates for all species. *Odonatologica* 44(3): 225-254. (in English) ["Several field surveys between 2007 and 2014 were undertaken in Morocco. Altogether 54 species were observed during our studies, representing 86 % of the odonate fauna of the country. *Orthetrum sabina* is new for Morocco, increasing the number of species to 63. The species was found at Oued Ez-Zahar near Akhfenir, about 1 700 km off its nearest known locality at Ouargla in Algeria. Two small populations of *Erythromma viridulum* were found for the first time in the Rif, bridging the gap between populations in the Middle Atlas and the Iberian Peninsula. The third observation of *Sympetrum sinaiticum* for Morocco was recorded and we were able to significantly increase the known number of localities of the threatened Moroccan endemic *Cordulegaster princeps*. We further can show that several species (e.g., *Boyeria irene*, *Pyrrhosoma nymphula*) are more

widely distributed than believed and occur also at low altitudes in the country. On the other hand, *Calopteryx exul*, *Calopteryx virgo meridionalis*, *Lestes dryas*, *Coenagrion mercuriale*, *Aeshna isoceles* and *Libellula quadrimaculata* are very rare in Morocco and their populations should be monitored to assess their potential decline. Finally, for all Moroccan dragonfly species the first and last observation dates are listed. For 17 of them we provide the earliest observation date and for seven species we prolong the observation period." (Authors)] Address: El Haissoufi, M., Laboratory of Ecology, Biodiversity and Environment "LEBE", Department of Biology, Faculty of Sciences, University of Abdelmalek Essâadi, Tétouan, Morocco. E-mail: med.elhaissoufi@gmail.com

**15264.** Elfaki, E.A. (2015): Investigation of Odonata diversity in different localities in Sudan. *Sudan Journal of Science* 7(2): 46-52. (in English) ["The Odonata and their habitats are a part of the world's natural heritage and this insect order encompasses, worldwide. This study aimed to survey the Odonata species in different sites in Sudan to update data of Odonata in Sudan. A total of 184 individuals were observed from April 2012 to December 2013 and nineteen species of adult Odonata were collected and classified from 6 localities: Kassala, New Halfa, Dinder National Park, El Sabaloka Game Reserve, El Musawwarat and Om Dawwanban. Family Libellulidae showed highest diversity among the other families followed by family Coenagrionidae. Furthermore *Brachythemis leucosticte*, *Pantala flavescens* and *Trithemis annulata* from family Libellulidae present in all study area. With regards *Tamea limbata* was a new country record from Om Dawwanban area." (Author)] Address: Elfaki, E.A., Dept of Zoology, Faculty of Science, Univ. of Khartoum P.O. Box 321, Postal Code 11115, Sudan. E-mail: remma94@gmail.com

**15265.** Endersby, I.; Fliedner, H. (2015): The naming of Australia's dragonflies. Busybird Publishing, PO Box 855, Eltham Victoria, Australia 3095: VII + 278 pp. (in English) [Review of Albert Orr [agorr@bigpond.com]: "Formal zoological nomenclature follows the binomial system of genus and species originally established by the Swedish biologist Carl Linné, or Linnaeus, in his *Systemae Naturae* of 1758. In principle any animal can be uniquely identified in this way, with the genus invariably being a noun, and the species an adjective or another noun which qualifies the genus. The language chosen for this nomenclature was Latin, at that time the universal language of science, understood by all educated people. Equally important was Classical Greek in its Latinised form. With changing educational practices, knowledge of even basic Latin has become comparatively rare, knowledge of Greek even more so, hence the scientific names of animals and plants learned by modern biology students have become totally divorced from any meaning, especially among native English speakers and speakers of non-European languages. Whereas Linnaeus' contemporaries would have recognised the gods, demi-gods and heroes of Classical mythology and literature, the modern Lep-



idopterist who cares to read Homer's *The Iliad* or *The Odyssey*, finds a *dramatis personae* consisting entirely of familiar Swallowtail and Morpho butterflies. In recent times there has been a virtual plethora of books attempting to explain the meanings of Latin and Greek-based Latin names. Many, such as *Latin for Bird Lovers* (Lederer & Burr, 2014) or *The Naming of the Shrew* (Wright, 2014), attempt to entertain as much as to instruct, producing a final result which is somewhat frothy and short on detail. Fortunately odonatologists have been rather better served by scholarly articles explaining the meanings and origins of dragonfly and damselfly scientific names (e.g. Fliedner 1997, 2006, Endersby 2012) and now these two authors have joined forces to produce 'The Naming of Australian Dragonflies'. This volume, a substantial tome of xiii +278 pages in octavo format, gives us the most comprehensive account we might wish for on the origins and meanings of every available species-group or genus-group name for Australia's dragonflies. These include not only the ca 324 accepted species names and 106 genus names, as well as species such as *Rhinocypha tinctoria* and *Neurobasis australis* which are not reliably recorded from Australia and are retained in faunal lists out of sheer obstinacy, but also all available synonyms and homonyms, of which there are more than a few. The book begins with a brief account of the history of the naming of the Australian Odonata, a brief introduction to Latin and Greek prefixes and suffixes and the declensions of the latter and a general discussion of where names come from (people, places, appearance; including colour, pattern, size etc.). There is a detailed tabular breakdown by taxon author of eponyms (named after people, real or legendary) and toponyms (named after a place). The most valuable part of this chapter is the grammatical section. With the odd lapsus (e.g. the topographic suffix, -ensis should be declined: -ensis, -ensis, -ense) this section provides an admirable introduction to the Latin grammar and Greek orthography and the rules for transliteration from Greek to Roman script that are needed to understand how names are formed and modified under gender agreement requirements. I certainly learned a great deal from reading it and while readers unfamiliar with Latin or Greek might find it heavy going, a little effort taken to master these basic rules and to learn the Greek alphabet will be repaid with interest by affording a full understanding of the detailed etymologies which come later. The next chapter provides engaging and interesting biographies of the 41 individuals who have authored or co-authored an Australian dragonfly genus or species name. These are admirable in their detail, and are generally accompanied by a thumbnail black and white portrait, allowing us to put a face to the name, and serve the very useful purpose of demystifying nomenclature. These names were bestowed by flesh and blood human beings who lived on average a respectable  $71.5 \pm 11$  years, apart from the six who are still with us. Indeed even in cases where I have been long acquainted with the individuals concerned I learned several diverting facts. Quite a few of my own cohort can empathise directly with Günther Theischinger whose first class education led initially to employment on the railways. The next and largest

chapter deals with the individual etymologies of every available species-group or genus-group name ever given to an Australian dragonfly. It is well researched, erudite and complete. Where necessary, extracts from original descriptions in their original language are included (with English translations for non-English texts). For those of us attempting to construct generic names of odonates, this section has much information of relevance far beyond the Australian fauna. It has been a custom among odonatologists to use Greek roots when naming genera and Latin for species-group names. Generally Latin is fairly accessible using a good dictionary, but Greek is a completely different proposition. Even with the fattest Lexicon available a lot of background knowledge is needed to tease out the component roots and it is not difficult to completely misunderstand them. The etymologies in this book do the work for us. Anyone studying dragonfly nomenclature working in any region will find their knowledge vastly expanded and deepened by studying these examples. Of course as earlier authors rarely explained their sources there remain unresolved mysteries and educated guesses. Why did Fabricius write *Aeshna*, not *Aeschna* for example? The authors' explanation that this might have come from him adopting an English style of spelling is the most convincing argument I have heard yet. I was particularly taken by the conjectured meaning for *Aethriamanta* – loving the bright sky. I disagree that *Rhythymis Braganza* should be regarded as *incertae sedis* (see p. 11, 123, 268) but rather agree with Hämäläinen (2015) that it was named after a Brazilian monarch as a result of a comedy of errors. This however is the only point of difference I can find in the entire book. Some names simply defy decoding – the meanings of both generic and specific names of the common and widespread *Tholymis tillarga* remain unknown. The book includes an extensive main bibliography of 274 entries, in addition to subsidiary reference lists totalling about 150 items in earlier sections. It is rounded off by five appendices, the first three giving comprehensive statistics on authorship and details of the categorisation of names. The most valuable are Appendix four, which establishes the gender of all generic names and Appendix five which gives the rules for transliteration from Greek to the Roman alphabet. I thought I knew these rules, but in fact several important gaps in my knowledge were exposed and have now been filled. In summary, to anyone with a special interest in zoological etymology or anyone actively involved in zoological nomenclature (i.e. naming new species) I cannot recommend this book too highly. It is well researched, erudite and thorough, with a relevance well beyond Australian shores. Both authors are to be warmly congratulated for having produced such an impressive, informative and useful piece of scholarship." ] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@pacific.net.au

**15266.** Farkas, A.; Mero, T.O.; Mora, A. (2015): Contribution to the Odonata fauna of the Lake Velencei. *Acta Biol. Debr. Oecol. Hung.* 33: 111-123. (in Hungarian, with English summary) ["Faunistical study on odonates was carried out in the Natura 2000 area of Lake Velencei, with a main focus

on the species of community interest. In 2013 at 58 sampling sites 2270 individuals (133 larvae, 638 exuviae and 1499 adults) representing 24 species were collected or observed. The number of species per sampling site ranged from one to 15, with a mean of six species. Six species (*Anax parthenope*, *Cordulia aenea*, *Somatochlora flavomaculata*, *Libellula fulva*, *Orthetrum albistylum*, *Sympetrum fonscolombii*) were first recorded from the territory of the lake. Surprisingly, two of them (*A. parthenope*, *C. aenea*) were among the most frequent species as well. During our study one Natura 2000 species, *Leucorrhinia pectoralis* was found, which is strictly protected in Hungary. Though a low number of adults of this species were observed, the presence of a breeding population was proved by the occurrence of larvae, which were first collected from the lake. Further three species (*Aeshna isosceles*, *S. flavomaculata*, *L. fulva*) are protected in Hungary, among them *A. isosceles* was frequent. Conservation of the mosaic habitats of the Natura 2000 area is essential to preserve the populations of the protected species, especially that of *L. pectoralis*." (Authors)] Address: Farkas, Anna, Dept of Hydrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary. E-mail: flavipes@gmail.com

**15267.** Ferreira, S.; Martínez-Freiría, F.; Boudot, J.-P.; El Haissoufi, M.; Bennis, N.; Alves, P.C.; Watts, P.C.; Thompson, D.J.; Brito, J.C. (2015): Local extinctions and range contraction of the endangered *Coenagrion mercuriale* in North Africa. *International Journal of Odonatology* 18(2): 137-152. (in English) ["Freshwater biodiversity is currently threatened worldwide. In North Africa, 24.4% of Odonata are regionally threatened with extinction. In this region, freshwater resources are particularly scarce and an increasing shortage of water is expected. To better understand the current threats to the endangered North African damselfly *Coenagrion mercuriale* we updated information on extinct and extant populations in North Africa and characterized these localities with regard to their topography, climate and anthropogenic use (anthrome). The *C. mercuriale* populations are being lost and this damselfly is experiencing range contraction. In Morocco nearly 45% of the populations have become extinct in recent decades and in Tunisia a single extant population remains. This species, which occupied predominantly areas of high value for human settlement, is now mainly restricted to high altitude areas. Nevertheless, the extant populations remain under threat of extinction due to increasing demand for water, changes in agricultural practices and land conversion." (Authors)] Address: Ferreira, Sónia, CIBIO/UP - Centre de Investigate em Biodiversidade e Recursos Genéticos, Universidade do Porto, Campus Agrário de Vairao, P-4485-661 Vairão, Portugal. E-mail: hiporame@gmail.com

**15268.** Flechoso, M.F.; Morales, J.; Lizana, M.; González, I. (2015): Taking advantage of the massive emergence of the odonate *Sympetrum flaveolum* as a trophic resource for *Zootoca vivipara*. *Bol. Asoc. Herpetol. Esp.* 26(1): 23-26. (in English) ["In the present work our observations were made

in the municipality of Cervera de Pisuerga (Palencia, North Spain) around two small ponds located in the Natural Park of Fuentes Carrionas-Fuente Cobre, (1660 masl). The UTM grid (Datum ETRS89) is 30T UN66. The habitat was a bog without medium-tall shrubs and abundant clumps of sphagnum (peat moss), grasses and *Erica tetralix*. Most specimens were found at a distance of less than 10 m from water surface. In August 2014, we observed several adult specimens of *Z. vivipara* of which at least two (a male and a female) were feeding on teneral of *S. flaveolum*. At the same time, a massive emergence of teneral resting on the surrounding vegetation was taking place. This predatory behaviour was observed over approximately 2 h. The fact that *Z. vivipara* predate on this Odonata is interesting since predation on dragonfly imago by this species of lizard was not previously reported." (Authors)] Address: Departamento de Biología Animal y Ecología. Universidad de Salamanca. Campus Miguel de Unamuno. 37007 Salamanca. Spain. E-mail: fabioflechoso@hotmail.com

**15269.** Frati, F.; Piersanti, S.; Conti, E.; Rebor, M.; Salerno, G. (2015): Scent of a dragonfly: Sex recognition in a polymorphic coenagrionid. *PLoS ONE* 10(8): e0136697. doi:10.1371/journal.pone.0136697: 14 pp. (in English) ["In polymorphic damselflies discrimination of females from males is complex owing to the presence of androchrome and gynochrome females. To date there is no evidence that damselflies use sensory modalities other than vision (and tactile stimuli) in mate searching and sex recognition. The results of the present behavioural and electrophysiological investigations on *Ischnura elegans*, a polymorphic damselfly, support our hypothesis that chemical cues could be involved in Odonata sex recognition. The bioassays demonstrate that males in laboratory prefer female to male odour, while no significant difference was present in male behaviour between stimuli from males and control. The bioassays suggest also some ability of males to distinguish between the two female morphs using chemical stimuli. The ability of male antennae to perceive odours from females has been confirmed by electrophysiological recordings. These findings are important not only to get insight into the chemical ecology of Odonata, and to shed light into the problem of olfaction in Paleoptera, but could be useful to clarify the controversial aspects of the mating behaviour of polymorphic coenagrionids. Behavioural studies in the field are necessary to investigate further these aspects." (Authors)] Address: Rebor, Manuela, Dipartimento di Biologia Cellulare e Ambientale, Università di Perugia, 06123 Perugia, Italy. E-mail: rebor@unipg.it

**15270.** Fredregill, C.L.; Motl, G.C.; Dennett, J.A.; Bueno Jr., R.; Debboun, M. (2015): Efficacy of two Larvasonic™ units against *Culex* larvae and effects on common aquatic nontarget organisms in Harris County, Texas. *Journal of the American Mosquito Control Association* 31(4): 366-370. (in English) ["The Larvasonic™ Field Arm Mobile Wetlands Unit and SD-Mini were tested for efficacy against *Culex* larvae, and effects on aquatic nontarget organisms (NTO). The Field Arm provided 84.61% to 100% control of caged

Culex larvae out to 0.91-m distance in shallow ditches and 60.45% control of Culex larvae at 0.61-m without any effects to caged NTO. Slow ditch treatment achieved 77.35% control compared to fast treatment (20.42%), whereas 77.65% control was obtained along edges of a neglected swimming pool, compared to near the middle (23.97%). In bucket tests, the SD-Mini provided >97% control of Culex and 85.35% reduction of immature giant water bugs, which decreased slightly (83.45%) over the monitoring period, which was not significantly different from cannibalistic damselflies (62.80%), with reduction of both being significantly higher than other NTO tested. There was a small (0.37%) reduction of dragonflies (naiads), due to cannibalism. Both Larvasonic units could effectively augment conventional larvicide operations in smaller areas without causing resistance within mosquito populations or harming NTO when used properly." (Authors)] Address: Fredregill, C.L., Harris County Public Health & Environmental Services, Mosquito Control Division, 3330 Old Spanish Trail, Building D, Houston, TX 77021

**15271.** Frobel, K.; Schlumprecht, H. (2015): Untersuchungen zur Substrat- und Habitatwahl von *Cordulegaster bidentata* im Landkreis Nürnberger Land (Odonata: Cordulegasteridae). *Libellula* 34(1/2): 3-26. (in German, with English summary) ["Investigations regarding substrate and habitat choice of *Cordulegaster bidentata* in the Nürnberger Land district, Bavaria (Odonata: Cordulegasteridae) – In a survey of 486 forest streams within an area of 400 km<sup>2</sup> in the east of the rural district "Nürnberger Land", Bavaria, larvae and / or imagines of *C. bidentata* were recorded at 148 single springs. The occurrence of *C. bidentata* concentrated in the beech forests at the spring rich slopes of the Frankonian Alb ("Albtrauf") on calciferous springs in White Jurassic or in a transitional layer between White Jurassic and Dogger ("Ornatenton"). The district turned out to be one of the most important areas of *C. bidentata* within Bavaria. Semiquantitative surveys (mainly in potholes) from all springs revealed only one very large occurrence, five large occurrences, five of middle scale, and many low (n = 47) to very low (n = 55) scaled occurrences of larvae. A statistical analysis of substrate and habitat factors as well as the calculation of probability of occurrence at colonized springs reveals the relative importance of habitat factors. Thus, *C. bidentata* prefers springs with high coverage of the curled hook-moss *Palustricola commutata* or other mosses, chalky detritus (spherical chalk concretions) and deadwood. Furthermore, springs with sinter and small deadwood are preferred as well as springs with little human impact, complex spring systems with several neighbouring springs and springs with moderate flow velocity and medium flow rate. Rivulet stretches of 200 to 300 m are significantly preferred whereas stretches shorter than 50 m are avoided. Deadwood plays an essential role in larval occurrence by building stepping structures causing the formation of potholes with detritus coverage and reducing flow velocity within the rivulets. Only about half of the springs located in forests within the survey area are in semi-natural conditions. Only a very small part of the springs is located in strictly protected areas. High land use

pressure and frequent drying processes caused by climate change severely endanger near-natural springs nowadays and in the near future. Hence, it is strongly recommended to keep *C. bidentata* under its current red list status." (Authors)] Address: Frobel, F., BUND Naturschutz in Bayern e.V., Bauernfeindstr. 23, 90471 Nürnberg, Germany. E-mail: kai.frobel@bund-naturschutz.de

**15272.** Furness, A.N.; Soluk, D.A. (2015): The potential of diversion structures to reduce roadway mortality of the endangered Hine's emerald dragonfly (*Somatochlora hineana*). *Journal of Insect Conservation* 19(3): 449-455. (in English) ["Roadways near wetlands and ponds inflict high roadkill rates on a wide variety of taxa. For threatened or endangered species that typically do not have large adult populations, fast reproduction rates, and/or rapid recolonization rates, such mortality is likely to have significant population consequences. Thus, exploring ways to reduce roadkill rates will have considerable conservation benefits. In this study, we evaluate whether a diversion structure can be used to modify flight behaviour of the endangered *S. hineana* in ways that would reduce roadway mortality. Flight behaviour of adult *S. hineana* was observed with and without two 3 m high nets spaced at 6 and 12 m to simulate a small and a larger roadway. The netting significantly deterred ( $p < 0.0001$ ) *S. hineana* adults from crossing the simulated roadway. Flight height was also influenced significantly ( $p = 0.0025$ ) with flight heights over the 6 m net spacing being higher than those over the 12 m spacing. This study suggests that the use of diversion netting in areas where sensitive dragonfly species interact with motor vehicles might aid in reducing roadway mortality and might help reduce the overall impact of roadways on wetland ecosystems." (Authors)] Address: Soluk, D.A., Dept of Biology, University of South Dakota, 414 E. Clark Street, Vermillion, SD, 57069, USA. E-mail: daniel.soluk@usd.edu

**15273.** Gallesi, M.M.; Sacchi, R.; Hardersen, S.; (2015): Does wing shape of andromorph females of *Calopteryx splendens* (Harris, 1780) resemble that of males? *International Journal of Odonatology* 18(4): 305-315. (in English) ["Female limited polymorphism consists in the coexistence of two or more female morphs in the same population and is widespread among odonates. Generally, one female morph, the andromorph, resembles males in colour or, sometimes, also in morphology and behaviour, while one or more other morphs, gynomorphs, differ from males. This phenomenon is probably promoted by advantages to females which arise from reduced sexual harassment. Andromorph females of *C. splendens* keep wing spots, like males (although these ornaments do not match exactly male wing spot colour), while gynomorphs have hyaline wings. Males and gynomorphs show a marked sexual dimorphism in wing shape, and this determines flight patterns which differ between sexes. If andromorphs mimic male wing spots to avoid harassment, they may also benefit from mimicking the male flight morphology, and consequently the male flight pattern. In this case wing shape of andromorph and gyno-



morph females would differ, as the wing shape of andromorphs resembles that of males. In this study we compared the wing morphology of males and of the two female morphs of *C. splendens* using geometric morphometrics. Our results revealed that andromorphs and gynomorphs of this species share the same wing shape, size, and static allometry, and this suggests that flight patterns should also be shared by the two morphs. Thus, females might avoid male harassment by mimicking exclusively male wing pigmentation (male mimicry hypothesis), or confound males through an uncommon appearance (learned mate recognition hypothesis)." (Authors)] Address: Gallesi, M.M., Dipto di Scienze della Terra e dell'Ambiente, Univ. di Pavia, Pavia, Italy

**15274.** Gallesi, M.M.; Mobili, S.; Cigognini, R.; Hardersen, S.; Sacchi, R. (2015): Sexual dimorphism in wings and wing bands of *Sympetrum pedemontanum* (Müller in Allioni 1776). *Zoomorphology* 134(4): 531-540. (in English) [Italy "Sexual dimorphism is common in animals and derives from two mechanisms: sexual selection and sexual niche divergence. These mechanisms may work together as determinants of wing shape in pigmented wings of Odonata. On the one hand, sexual selection by females tends to enlarge the wing areas of males that host pigments; on the other hand, sex-specific flight behaviours, due to differential niche selection, may promote sexual dimorphism. Both sexes of *S. pedemontanum* have ornamented wings with bands, but their function is poorly understood. Therefore, we studied shape and size of wings and wing bands of *S. pedemontanum* using geometric morphometrics to quantify the extent of sexual dimorphism. We also investigated whether sexual dimorphism in wing shape derives from the effect of sexual selection on wing ornamentation or from sexual niche separation. We found sexual dimorphism in wing shape and in the shapes of the bands, but the absence and misdirection of sexual size dimorphism and wing shape dimorphism of bands do not support the hypothesis that wings and wing bands in *S. pedemontanum* are subjected to sexual selection. Instead, the pattern of sexual dimorphism in wing shape seems more likely to be caused by sex-specific flight requirements." (Authors)] Address: Gallesi, M.M., Dipto di Scienze della Terra e dell'Ambiente, Univ. di Pavia, Taramelli 24, 27100 Pavia, Italy. E-mail: marco.gallesi@unipv.it

**15275.** Ganguly, P.; Datta, D. (2015): Notes on a dragonfly (Insects) killing plant, *Plumbago zeylanica*. *Journal of Environment and Sociobiology* 12(2): 231-232. (in English) ["On the occasion of a field study on dragonflies, near and around Rahara, Kolkata, we came across a peculiar plant species, commonly known as Ceylon leadwort, doctorbush or wild leadwort (*Plumbago zeylanica*) which was found to be responsible for the death of numerous dragonflies." (Authors)] Address: Ganguly, P., Ramakrishna Mission Vivekananda Centenary College, Department of Zoology, Kolkata, 700 118, India

**15276.** Garrison, R.W.; Cordero-Rivera, A.; Zhang, H. (2015): Odonata collected in Hainan and Guangdong Provinces, China in 2014. *Faunistic Studies in Southeast Asian*

and Pacific Island Odonata 12: 1-62. (in English) ["A three week trip to Hainan and Guangdong provinces was conducted between 26 May and 11 June 2014, sampling odonates within the vicinity of Diaoluoshan National Nature Reserve, Shuimanxing Village (both Hainan Province) and Nankunshan Nature Reserve (Guangdong Province). Additionally, Cordero and Zhang collected at Shuimanxing Village between 13 and 23 June. A total of 103 species in 78 genera were found for Hainan Province and 51 species in 42 genera in Guangdong Province. Lists of all species by locality, photographs of live specimens, are presented to facilitate identification to other collectors." (Authors)] Address: Garrison, R.W., Plant Pest Diagnostics Branch, California Dept Food & Agriculture, 3294 Meadowview Rd, Sacramento, CA95832-1448, USA. E-mail: rgarrison@cdfa.ca.gov

**15277.** Garrouste, R.; Nel, A. (2015): New Eocene damselflies and first Cenozoic damsel-dragonfly of the isophlebiopteran lineage (Insecta: Odonata). *Zootaxa* 4028(3): 354-366. (in English) ["The study of a new specimen of *Petrolestes hendersoni* from the Eocene Green Formation allows a more precise description of the enigmatic damselfly and the diagnosis of the *Petrolestini*. *Petrolestes messelensis* sp. nov. is described from the Eocene Messel Formation in Germany, extending the distribution of the *Petrolestini* to the European Eocene. The new damsel-dragonfly family *Pseudostenolestidae* is described for the new genus and species *Pseudostenolestes bechlyi*, from the Eocene Messel Formation. It is the first Cenozoic representative of the Mesozoic clade *Isophlebioptera*." (Authors)] Address: Garrouste, R., Institut de Systématique, Évolution, Biodiversité, ISYEB - UMR 7205 – CNRS, MNHN, UPMC, EPHE, Muséum national d'Histoire naturelle, Sorbonne Universités, 57 rue Cuvier, CP 50, Entomologie, F-75005, Paris, France. E-mail: garroust@mnhn.fr

**15278.** Gassmann, D. (2015): Libellen und Vulkane - entomologische Forschungen in Papua-Neuguinea. *Koenigiana* 9(1): 43-54. (in German) [Narrative on a study of Odonata in Papua-New Guinea] Address: Gassmann, D., Zoologisches Forschungsmuseum Alexander Koenig, Arachnida Section, Adenauerallee 160, 53113 Bonn, Germany. E-mail: d.gassmann@zfmk.de

**15279.** Gazzola, A.; Brandalise, F.; Rubolini, D.; Rossi, P.; Galeotti, P. (2015): Fear is the mother of invention: anuran embryos exposed to predator cues alter life-history traits, post-hatching behaviour, and neuronal activity patterns. *Journal of Experimental Biology* 218: 3919-3930. (in English) ["Neurophysiological modifications associated to phenotypic plasticity in response to predators are largely unexplored, and there is a gap of knowledge on how the information encoded in predator cues is processed by prey sensory systems. To explore these issues, we exposed *Rana dalmatina* embryos to dragonfly chemical cues (kairomones) up to hatching. At different times after hatching (up to 40 days), we recorded morphology and antipredator behaviour of control and embryonic-treated tadpoles as well as their neural olfactory responses, by recording the activity

of their mitral neurons before and after exposure to a kairomone solution. Embryonic-treated embryos hatched later and originated smaller hatchlings than control siblings. In addition, embryonic-treated tadpoles showed a stronger antipredator response than controls at 10 (but not at 30) days post-hatching, though the intensity of the contextual response to the kairomone stimulus did not differ between the two groups. Baseline neuronal activity at 30 days post-hatching, as assessed by the frequency of spontaneous excitatory postsynaptic events and by the firing rate of mitral cells, was higher among embryonic-treated tadpoles compared to controls. At the same time, neuronal activity showed a stronger increase among embryonic-treated tadpoles than among controls after a local kairomone perfusion. Hence, a different contextual plasticity between treatments at the neuronal level was not mirrored by the antipredator behavioural response. In conclusion, our experiments demonstrate ontogenetic plasticity in tadpole neuronal activity after embryonic exposure to predator cues, corroborating the evidence that early-life experience can contribute to shaping the phenotype at later life stages." (Authors)] Address: Gazzola, A., Laboratorio di Eco-Etologia, Dip. di Scienze della Terra e dell'Ambiente, Via Ferrata 9, 27100 Pavia, Italy. E-mail: galeozot@unipv.it

**15280.** Geisinger, C.; Koch, K. (2015): Vergleich der Libellenfauna (Odonata) im Naturschutzgebiet Laubenheimer-Bodenheimer Ried in Mainz von 2006 bis 2014. *Mainzer naturwissenschaftliches Archiv* 52: 167-177. (in German, with English summary) [Rheinland-Pfalz, Germany "The odonate fauna in Mainz has been well studied in recent years. Particularly the nature reserve Laubenheimer-Bodenheimer Ried has turned out to have the highest species number. In 2007 and 2010 two new waters were created in the nature reserve area. The dragonfly fauna of these two waters has been mapped extensively in 2011 and 2014. In this study the current species composition of the area was compared with older data of the area (2006-2007, 2008-2013). The new natural protective waters appear to be the preferred emergence habitats for Odonata. In 2014 98.3% of all damselfly exuviae and 92.6% of all dragonfly exuviae were found at the new waters. At the older and well structured clay mining waters relatively few exuviae were found." (Authors)] Address: Geisinger, Christina, Berliner Str. 27, 55131 Mainz, Germany. E-Mail: ChrGeisinger@aol.com

**15281.** Gober, C. (2015): Dragonfly succession in ponds following disturbance by drying and refilling. Departmental Honors in the Department of Environmental Sciences, Texas Christian University, Fort Worth, Texas: (in English) ["Disturbance is an environmental factor that determines ecological community structure. For insect communities in small ponds, the primary disturbance factor is pond drying. Larval insects cannot survive pond drying, but they recolonize ponds after ponds refill. Little is known about dragonfly recolonization rates once ponds refill after a drying event. The purpose of this study was to determine recolonization rates for two dragonfly families after pond refilling. Over the summer of 2014, 10 experimental ponds were studied at

the Eagle Mountain Hatchery in Fort Worth, Texas. Five of the 10 experimental ponds were drained and dried for one month to simulate a natural drying disturbance. The other five ponds were not dried and contained fish. Dip net samples were collected every one to two weeks over a 10-week period. The dragonflies from each sample were identified and counted in order to track temporal changes within the dragonfly community. This study suggests that there are significant differences in recolonization rates for different families of dragonflies." (Author)] Address: not stated

**15282.** Grether, G.F.; Drury, J.P.; Berlin, E.; Anderson, C.N. (2015): The role of wing coloration in sex recognition and competitor recognition in rubyspot damselflies (*Hetaerina* spp.). *Ethology* 121(7): 674-685. (in English) ["The decision rules that animals use for distinguishing between conspecifics of different age and sex classes are relevant for understanding how closely related species interact in sympatry. In rubyspot damselflies (*Hetaerina* spp.), the red wing coloration of mature males is hypothesized to be a key trait for sex recognition and competitor recognition within species and the proximate trigger for interspecific male-male aggression. We tested this hypothesis by manipulating the wing coloration of tethered conspecific intruders and measuring the responses of territory holders of three species in the field. As predicted, covering the red spots of mature males with black ink nearly eliminated territorial responses, and in some cases, territorial holders clasped the blackened males as if they were females. Adding red spots to female wings triggered territorial responses and nearly eliminated sexual responses. Immature males with artificial red spots were attacked at the same rate as mature male intruders, and much more frequently than were immature male controls. The results varied somewhat by species. In *H. titia*, the only species of *Hetaerina* with substantial black wing pigmentation, the effects of blackening the red spots of intruders varied both geographically and seasonally. But even when blackening the red spots of male intruders did not reduce the aggressive response of *H. titia* territory holders, adding artificial red spots to female wings elicited aggressive responses and nearly eliminated sexual responses. The results of this study further strengthen the evidence that interspecific aggression in *Hetaerina* results from overlap in territorial signals and that the derived black wing pigmentation of *H. titia* reduces interspecific aggression." (Authors)] Address: Grether, G.F., Department of Ecology and Evolutionary Biology, 621 Charles E. Young Drive South, University of California, Los Angeles, CA 90095-1606, USA. E-mail: ggrether@ucla.edu

**15283.** Grutters, B.M.C.; Pollux, B.J.A.; Verberk, W.C.E.P.; Bakker, E.S. (2015): Native and non-native plants provide similar refuge to invertebrate prey, but less than artificial plants. *PLoS ONE* 10(4): e0124455. doi:10.1371/journal.pone.0124455: 18 pp. (in English) ["Non-native species introductions are widespread and can affect ecosystem functioning by altering the structure of food webs. Invading plants often modify habitat structure, which may affect the suitability of vegetation as refuge and could thus impact

predator-prey dynamics. Yet little is known about how the replacement of native by non-native vegetation affects predator-prey dynamics. We hypothesize that plant refuge provisioning depends on (1) the plant's native status, (2) plant structural complexity and morphology, (3) predator identity, and (4) prey identity, as well as that (5) structurally similar living and artificial plants provide similar refuge. We used aquatic communities as a model system and compared the refuge provided by plants to macroinvertebrates (*Daphnia pulex*, *Gammarus pulex* and damselfly larvae) in three short-term laboratory predation experiments. Plant refuge provisioning differed between plant species, but was generally similar for native (*Myriophyllum spicatum*, *Ceratophyllum demersum*, *Potamogeton perfoliatus*) and non-native plants (*Vallisneria spiralis*, *Myriophyllum heterophyllum*, *Cabomba caroliniana*). However, plant refuge provisioning to macroinvertebrate prey depended primarily on predator (mirror carp: *Cyprinus carpio carpio* and dragonfly larvae: *Anax imperator*) and prey identity, while the effects of plant structural complexity were only minor. Contrary to living plants, artificial plant analogues did improve prey survival, particularly with increasing structural complexity and shoot density. As such, plant rigidity, which was high for artificial plants and one of the living plant species evaluated in this study (*Ceratophyllum demersum*), may interact with structural complexity to play a key role in refuge provisioning to specific prey (*Gammarus pulex*). Our results demonstrate that replacement of native by structurally similar non-native vegetation is unlikely to greatly affect predator-prey dynamics. We propose that modification of predator-prey interactions through plant invasions only occurs when invading plants radically differ in growth form, density and rigidity compared to native plants." (Authors)] Address: Grutters, B., Department of Aquatic Ecology, Netherlands Institute of Ecology (NIOO-KNAW), Wageningen, The Netherlands. E-mail: b.grutters@nioo.knaw.nl

**15284.** Guillermo-Ferreira, R.; Bispo, P.C.; Appel, E.; Kovalev, A.; Gorb, S.N. (2015): Mechanism of the wing colouration in the dragonfly *Zenithoptera lanei* (Odonata: Libellulidae) and its role in intraspecific communication. *Journal of Insect Physiology* 81: 129-136. (in English) ["Highlights: • We studied the morphological mechanisms of colouration in a libellulid dragonfly. • Wax crystals form a composite structure that enhances colour. • Multi-layered structure of the pigmented cuticle results in iridescence. • Resulting colour is a cue for rival recognition in territorial fights. • Wax and pigment may impose physiological costs and be condition dependent. Abstract: Zenithoptera dragonflies are known for their remarkable bluish colouration on their wings and unique male behaviour of folding and unfolding their wings while perching. However, nothing is known about the optical properties of such colouration and its structural and functional background. In this paper, we aimed to study the relationship between the wing membrane ultrastructure, surface microstructure and colour spectra of male wings in *Zenithoptera lanei* and test the hypothesis that colouration functions as a signal in territorial fights between males. The results show that the specific wing colouration derives from

interference in alternating layers of melanized and unmelanized cuticle in the wing membrane, combined with diffuse scattering in two different layers of wax crystals on the dorsal wing surface, one lower layer of long filaments, and one upper layer of leaf-shaped crystals. The results also show that the thicker wax coverage of the dorsal surface of the wings results in increased brightness and reduced chroma. In the field experiments, we have demonstrated that there is a reduction of aggressive reactions of rivals towards individuals with experimentally reduced amount of blue wing colouration." (Authors)] Address: Guillermo-Ferreira, R., Department of Hydrobiology, Federal University of São Carlos, Rod. Washington Luis, km 235, São Carlos, São Paulo, Brazil. E-mail: rhainerguillermo@gmail.com

**15285.** Gutiérrez, Y.; Freitas, H.L.; Oliveira, E.E. (2015): *Acanthagrion viridescens* (Odonata: Coenagrionidae): description of the final larval stadium and biological notes. *Zootaxa* 4057(1): 125-134. (in English) ["The development of the nymphal stages of *A. viridescens* Leonard was examined under laboratory conditions. Based on specimens collected in Minas Gerais state (Brazilian Southeastern Region), we described and illustrated the last instar nymph and illustrated the egg and other nymphal stages. The nymphs of *A. viridescens* went through 11 instars, each of them with an average duration of approximately 13 days. The combinations of the following characteristics distinguish the last instar nymph of *A. viridescens* from congeners: prementum with 2+1 setae in each side; labial palp with six apical denticles; mandibular formula L 1+2 3 4 5 y a, R 1+2 3 4 5 y- a b; presence of trifold spine in the ventral distal region of the tibia and in the tarsi; format of the male and female gonapophyses; and the distinctive pattern of the tracheae in the caudal gills. This also represents the first record of this species from southeastern Brazil." (Authors)] Address: Gutiérrez, Y., Depto de Entomologia, Univ. Federal de Viçosa, MG, Brasil. E-mail: gutierrez.yeisson@gmail.com

**15286.** Gvoždík, L.; Smolinský, R. (2015): Body size, swimming speed, or thermal sensitivity? Predator-imposed selection on amphibian larvae. *BMC Evolutionary Biology* 2015, 15:238 doi:10.1186/s12862-015-0522-y: 9 pp. (in English) ["Background: Many animals rely on their escape performance during predator encounters. Because of its dependence on body size and temperature, escape velocity is fully characterized by three measures, absolute value, size-corrected value, and its response to temperature (thermal sensitivity). The primary target of the selection imposed by predators is poorly understood. We examined predator (dragonfly larva [*Aeshna cyanea*])-imposed selection on prey (newt larvae) body size and characteristics of escape velocity using replicated and controlled predation experiments under seminatural conditions. Specifically, because these species experience a wide range of temperatures throughout their larval phases, we predict that larvae achieving high swimming velocities across temperatures will have a selective advantage over more thermally sensitive individuals. Results: Nonzero selection differentials indicated that predators selected for prey body size and both



absolute and size-corrected maximum swimming velocity. Comparison of selection differentials with control confirmed selection only on body size, i.e., dragonfly larvae preferably preyed on small newt larvae. Maximum swimming velocity and its thermal sensitivity showed low group repeatability, which contributed to non-detectable selection on both characteristics of escape performance. Conclusions: In the newt-dragonfly larvae interaction, body size plays a more important role than maximum values and thermal sensitivity of swimming velocity during predator escape. This corroborates the general importance of body size in predator–prey interactions. The absence of an appropriate control in predation experiments may lead to potentially misleading conclusions about the primary target of predator-imposed selection. Insights from predation experiments contribute to our understanding of the link between performance and fitness, and further improve mechanistic models of predator–prey interactions and food web dynamics." (Authors) The electronic version of this article is the complete one and can be found online at: <http://www.biomedcentral.com/1471-2148/15/238> Address: Gvoždík, L., Institute of Vertebrate Biology AS CR, Kvetná 8, Brno, 60365, Czech Republic. E-mail: [gvozdik@brno.cas.cz](mailto:gvozdik@brno.cas.cz)

**15287.** Hämäläinen, M. (2015): Who were they? Authors of the scientific names of Finnish dragonflies and persons immortalized in these names. *Crenata* 8: 18-37. (in Finnish, with English summary) ["Including migrants and occasional vagrants, a total of 62 species of dragonflies have thus far been recorded in Finland. In total 24 authors were involved in the naming of these 62 species, namely: Friedrich Brauer, Hermann Burmeister, Toussaint de Charpentier, Edward Donovan, Eduard Eversmann, J.C. Fabricius, A.F. de Fourcroy, H.A. Hagen, J.A.W. Hanseemann, Moses Harris, W.F. Kirby, P.A. Latreille, W.E. Leach, Carolus Linnaeus, O.F. Müller, P.S. Pallas, Edmond de Selys Longchamps, Hans Strøm, J.H. Sulzer, Filip Trybom, P.L. Vander Linden, Edmund M. Walker, H.D.J. Wallengren and J.W. Zetterstedt. Among the species epithets used there are three eponyms honouring Thomas Bolton, C.H. Johanson and John Sahlberg, respectively. For each of these 27 individuals a separate brief biography is presented with special emphasis on their odonatological activities. In addition 6 other authors of subspecies or genus names and one person on whose name an eponymous subspecies name was based are briefly listed. The article includes portraits of some of the above individuals and dragonfly illustrations extracted from old books and other sources." (Autor)] Address: Hämäläinen, M., Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: [libellago@gmail.com](mailto:libellago@gmail.com)

**15288.** Hämäläinen, M.; Kompier, T. (2015): *Bayadera hatvan* sp. nov. from northern Vietnam (Odonata: Euphaeidae). *Tombo*, 57: 15-19. (in English) ["*Bayadera hatvan* sp. nov. (holotype male from Vietnam, Yen Bai province) is described and illustrated for both sexes. A comparison with the superficially similar *B. indica* (Selys, 1853) is provided. This brings the total number of species known in the genus to 17." (Authors)] Address: Kompier, T., Schoutenstraat 69,

2596 SK, Den Haag, the Netherlands. Email: [kompierintokyo@yahoo.com](mailto:kompierintokyo@yahoo.com)

**15289.** Hämäläinen, M.; Dow, R.; Stokvis, F.R. (2015): Revision of the Sundaland species of the genus *Dysphaea* Selys, 1853 using molecular and morphological methods, with notes on allied species (Odonata: Euphaeidae). *Zootaxa* 3949(4): 451-490. (in English) ["The Sundaland species of the genus *Dysphaea* were studied using molecular and morphological methods. Four species are recognized: *D. dimidiata* Selys, *D. lugens* Selys, *D. ulu* spec. nov. (holotype male, from Borneo, Sarawak, Miri division, Upper Baram, Sungai Pejelai, Ulu Moh, 24 viii 2014; deposited in RMNH) and *D. vanida* spec. nov. (holotype male, from Thailand, Ranong province, Khlong Nakha, Khlong Bang Man, 12.13 v 1999; deposited in RMNH). The four species are described and illustrated for both sexes, with keys provided. The type specimens of the four *Dysphaea* taxa named by E. de Selys Longchamps, i.e. *dimidiata*, *limbata*, *semilimbata* and *lugens*, were studied and their taxonomic status is discussed. Lectotypes are designated for *D. dimidiata* and *D. limbata*. *D. dimidiata* is recorded from Palawan (the Philippines) for the first time. A molecular analysis using three markers (COI, 16S and 28S) is presented. This includes specimens of three Sundaland species of the genus (*D. lugens* missing) and two congeners from other regions (*D. basitincta* and *D. gloriosa*). Notes and photographs of the male holotype of *D. walli* Fraser (from Maymyo, Burma) are provided." (Authors)] Address: Hämäläinen, M., Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: [Libellago@gmail.com](mailto:Libellago@gmail.com)

**15290.** Halali, S.; Halali, D.; Rangnekar, P. (2015): Range extension of *Microgomphus souteri* Fraser, 1924 (Insecta: Odonata: Gomphidae) to northern Western Ghats, India. *Journal of Threatened Taxa* 7(8): 7480-7483. (in English) ["During opportunistic surveys conducted at Collem (Goa), a specimen of male *M. souteri* was collected on 14th September 2013. Another male specimen was collected on 28th June 2014. *M. souteri* is recorded for the first time in northern Western Ghats and is a new record for Goa. Type specimen was described from Coorg (Karnataka) and was later recorded from Kerala. The discovery of this species in Goa has expanded its range to the north of the Western Ghats. With this discovery currently 88 species of Odonata are now known from the state.] Address: Halali, S., Dept of Zoology and Wildlife Biology, A.V.C College (Autonomous), Mannampandal, Mayiladuthurai, Tamil Nadu 609305, India. E-mail: [sridharhalali@gmail.com](mailto:sridharhalali@gmail.com)

**15291.** Hamzaoui, D.; Hafiane, M.; Mebarki, M.; Arab, A.; Alfarhan, A.H.; Samraoui, B. (2015): The Gomphidae of Algeria and the Maghreb: status, ecology and conservation (Insecta: Odonata). *International Journal of Odonatology* 18(3): 175-191. (in English) ["A survey of the Gomphidae of Algeria and the Maghreb was carried out during the period 2013–2014. Sampling of eight main wadis across northern Algeria was undertaken and adults and exuviae were recorded. The survey yielded six species of Gomphidae.

Among these, we report on the rediscovery of the Critically Endangered *Lindenia tetraphylla* in Algeria, recorded in the nineteenth century and deemed to have been extinct after an absence of more than a century and a half. An exuvia was collected at Wadi Saoura, which constitutes the first proof of the breeding of this species in Algeria and the third record for North Africa. We also recorded a pale form of *Onychogomphus uncutus*, morphologically distinct from typical Moroccan and European phenotypes, suggesting some degree of subspeciation and inviting further taxonomical investigations of the genus *Onychogomphus* in North Africa. Due to increasing water demand, Gomphidae and their habitats are under great pressure in the Maghreb. Specific threats and conservation measures are discussed." (Authors)] Address: Samraoui, B., Laboratoire de Recherche des Zones Humides, Université d'Annaba, 4 rue Hassi-Beida, Annaba, Algeria. E-mail: bsamraoui@yahoo.fr

**15292.** Harabis, F.; Dolny, A. (2015): Odonates need natural disturbances: how human-induced dynamics affect the diversity of dragonfly assemblages. *Freshwater Science* 34(3): 1050-1057. (in English) ["The still-growing effect of human activities on aquatic habitats has led to proportionately increasing need for restoration activities. Paradoxically, restoration actions can constitute a major threat to freshwater assemblages if they do not respect the specific nature of the target biotopes. We investigated the dynamics of dragonfly assemblages in 20 mine-subsidence pools (habitats with very high and very unpredictable dynamics). We used multivariate methods and diversity indices to compare species richness and species composition of assemblages before and after reclamation actions. During the 10 y of the study, we recorded 10 cases in which aquatic habitats disappeared completely and 6 cases of recovery and successful recolonization of aquatic pools. Disturbances caused by reclamation actions led to significant reduction of diversity and to extirpation of sensitive dragonfly species. Moreover, unlike natural disturbances, disturbances caused by reclamation activity do not support the occurrence of species associated with early successional stages. Major interventions in freshwater habitats can cause alterations that often paradoxically may result in local extinction of sensitive species rather than strengthening of existing populations." (Authors)] Address: Harabiš, F., Dept of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, CZ-165 21 Prague 6, Czech Republic. E-mail: harabis.f@gmail.com

**15293.** Harabis, F.; Dolny, A.; Helebrandova, J.; Ruskova, T. (2015): Do egg parasitoids increase the tendency of *Lestes sponsa* (Odonata: Lestidae) to oviposit underwater? *Eur. J. Entomol.* 112(1): 63-68. (in English) ["The selection of oviposition sites by insects can significantly affect egg mortality. Spreadwing damselflies (Odonata: Lestidae) predominantly lay their eggs in parts of plants growing above the surface of water and only occasionally also those parts growing underwater. Factors affecting the choice of oviposition site and decision to lay underwater are still poorly understood. We examined whether localities with different risk

of egg parasitism, different oviposition strategies (above or below the water surface) and the depth at which the eggs were laid, affected the total number of eggs laid, the proportion parasitized and egg mortality. In general, a significantly higher proportion of the eggs laid above the surface of water were parasitized but spreadwing damselflies showed significant preference for laying eggs underwater at both of the sites studied. This preference, however, had a different effect on the overall mortality of eggs at the two sites studied. Hence underwater oviposition by damselflies may be seen as a conditional anti-predator strategy, occurring only if the benefits exceed potential risks. Underwater oviposition may provide additional benefits other than protection against egg parasitism." (Authors)] Address: Harabis, F., Dept of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, CZ-165 21 Prague 6, Czech Republic. E-mail: harabis.f@gmail.com

**15294.** Harinath, P.; Suryanarayana, K.; Venkata Ramana, S.P. (2015): Diversity and abundance of odonates (dragonflies & damselflies) at Sri Lankamalleswara reserve forest in the Eastern Ghats of southern Andhra Pradesh. *Species* 12(34): 52-66. (in English) [A total number of 33 species of Odonates were recorded from the study area during March 2013 to August 2014.] Address: Harinath, P., Research Scholar, Department of Zoology - School of Life Sciences - Yogi Vemana University Kadapa – 516 003 - Andhra Pradesh, India. E-mail: haributterfly.yvu@gmail.com

**15295.** Hassall, C. (2015): Strong longitudinal variation in wing aspect ratio of a damselfly, *Calopteryx maculata* (Odonata: Zygoptera). *PeerJ* 3:e1219; DOI 10.7717/peerj.1219: 17 pp. (in English) ["Geographical patterns in body size have been described across a wide range of species, leading to the development of a series of fundamental biological rules. However, shape variables are less well-described despite having substantial consequences for organismal performance. Wing aspect ratio (AR) has been proposed as a key shape parameter that determines function in flying animals, with high AR corresponding to longer, thinner wings that promote high manoeuvrability, low speed flight, and low AR corresponding to shorter, broader wings that promote high efficiency long distance flight. From this principle it might be predicted that populations at range edges would exhibit low AR wings. I test this hypothesis using the riverine damselfly, *Calopteryx maculata*, sampled from 34 sites across its range margin in North America. Nine hundred and seven male specimens were captured from across the 34 sites (mean=26.7±2.9 SE per site), dissected and measured to quantify the area and length of all four wings. Geometric morphometrics were employed to investigate geographical variation in wing shape. The majority of variation in wing shape involved changes in wing aspect ratio, confirmed independently by geometric morphometrics and wing measurements. There was a weak positive relationship between wing aspect ratio and temperature, in line with work on other insects. However, there was a strong longitudinal pattern in which western populations exhibited lower wing aspect ratio. This longitudinal pattern may be related

to increasing variability in precipitation from east to west in North America. I discuss my findings in light of research of the functional ecology of wing shape across vertebrate and invertebrate taxa." (Author)] Address: Hassall, C., School of Biol., Univ. of Leeds, Leeds, UK. E-mail: c.hassall@leeds.ac.uk

**15296.** Hassall, C. (2015): Odonata as candidate macroecological barometers for global climate change. *Freshwater Science* 34(3): 1040-1049. (in English) ["Many investigators have described a footprint of global environmental change in macroecological trends across multiple taxa. However, little comparative analysis has been done to evaluate whether some taxa are responding more than others. I tested 2 hypotheses: 1) taxa vary strongly in terms of range shifts and phenological advances in their responses to changing climate, and 2) taxa that shift ranges also advance phenology. I used an initial database of >4 million recorded sightings of UK animal species from 24 orders and found descriptions of range shifts for 612 species and phenological trends for 923 species. I compared the 2 responses for 464 species and found wide variation in the extent to which taxa are responding. Vertebrate taxa were the least well recorded and showed weak or nonsignificant responses. Invertebrates were well recorded and responded strongly in range and phenology, but evidence of an association between range shifts and phenological advances was equivocal. My results show that different taxa are exhibiting different responses to the same environmental change, and that mechanistic and traits-based studies may reveal the causes of that variation. Spatial responses may be constrained by mode of dispersal, and insects and arachnids typically respond strongly, whereas terrestrial vertebrates do not. Phenological responses are complex and may involve species-specific physiological relationships between development and seasonal cues. Use of a model taxon could increase efficiency of monitoring regimes by simplifying monitoring targets and techniques. Potential exists for =1 taxa to be indicators of climate change, whereby the responses of one or a group of species could be used to infer changes at a broader taxonomic scale. I highlight Odonata as a taxon that responds strongly in multiple modalities, is charismatic enough to appeal to citizen scientists, and is an emerging physiological and genetic model." (Author)] Address: Hassall, C., School of Biol., Univ. of Leeds, Woodhouse Lane, Leeds LS2 9JT UK. E-mail: c.hassall@leeds.ac.uk

**15297.** Hassall, C.; Sherratt, T.N.; Watts, P.C.; Thompson, D.J. (2015): Live fast, die old: no evidence of reproductive senescence or costs of mating in a damselfly (Odonata: Zygoptera). *Journal of Animal Ecology* 84(6): 1542-1554. (in English) ["(1.) Recent examples of actuarial senescence in wild insect populations have challenged the long-held assumption that the brevity of wild insect life spans precludes senescence. (2.) We investigate age-related patterns in mating behaviour in adults of a short-lived damselfly, *Coenagrion puella* and the implications of this mating. Using capture histories for 1033 individuals over two field seasons, we conduct both pooled and stratified analyses of variations in breeding activity. (3.) Pooled analyses suggest that there is strong age-related variation in the probability of

being present at the mating rendezvous. However, no age-related variation was observed in the probability of mating. Stratified approaches confirmed a general pattern of age-related declines in survival probability, but provided only equivocal evidence of an effect of age on transition between temporary breeding states. Mating males and females showed greater survival than non-mating individuals, possibly as a consequence of higher body condition. Older males that were not currently breeding were less likely to commence breeding on the next day, but showed no patterns in breeding cessation. Overall, transitions between both breeding states declined with age, suggesting that males that breed tend to continue breeding while those that do not breed continue to be unsuccessful. Female mating rates were consistently high across all ages with no age-related decline apparent. (4.) While previous research has demonstrated actuarial senescence in this population, as does this study, we find little evidence of either age-related declines in reproductive behaviour or breeding-related declines in survival, which might indicate functional senescence or costs of mating, respectively. Indeed, the greater survival in mating individuals of both sexes suggests that variations in individual quality may mediate both reproductive success and longevity. (5.) Contrary to recent studies, we found no compelling evidence for reproductive senescence or a cost of mating in an important and well-studied model odonate. The possible link between condition and ageing suggests that individual quality needs to be taken into account when studying senescence. We recommend the use of multistrata models for the future investigation of these phenomena." (Authors)] Address: Hassall, C., Dept Ecol., Univ. Oulu, PO Box 3000, Oulu 90014, Finland. E-mail: c.hassall@leeds.ac.uk

**15298.** Hassall, C.; Anderson, S. (2015): Stormwater ponds can contain comparable biodiversity to unmanaged wetlands in urban areas. *Hydrobiologia* 745: 137-149. (in English) ["Urban freshwaters provide a range of ecosystem services, including stormwater management, water treatment, biodiversity, and aesthetics. Management of freshwaters should aim to maximise as many of these services as possible, but managers are often focused on individual services. To test for the biodiversity value of stormwater management ponds (SMPs) in Ottawa, Canada, 20 SMPs were surveyed for macroinvertebrates using standardised sampling techniques. These were compared against 10 wetlands that were not managed for stormwater control (a combination of ornamental lakes, natural lakes, and nature reserves) in and around the same urban area (a total of 30 ponds). Natural wetlands and SMPs were very different in their water chemistry, which was correlated with the proportion of urban land use within 1 km of the site, with higher conductivity in SMPs with increasing urban land cover ( $P = 0.046$ ). Despite this, natural wetlands and the richest SMPs contained similar levels of biodiversity and similar macroinvertebrate community structure. This study highlights that stormwater management can occur alongside biodiversity enhancement in urban areas, but correlations between urban land use, water chemistry, and the structure of biological communities suggests that run-off from urban areas is



likely a major factor in structuring biological communities in built-up regions." (Authors) Taxa including Odonata are treated at family level.] Address: Hassall, C., School of Biology, University of Leeds, Leeds, LS2 3JT, UK. E-mail: c.hassall@leeds.ac.uk

**15299.** Hedrick, T.; Combes, S.A.; Miller, L.A. (2015): Recent developments in the study of insect flight. *Canadian Journal of Zoology* 93(12): 925-943. (in English) ["Here we review recent contributions to the study of insect flight, in particular those brought about by advances in experimental techniques. We focus particularly on the following areas: wing flexibility and deformation, the physiology and biophysics of asynchronous insect flight muscle, the aerodynamics of flight, and stability and maneuverability. This recent research reveals the importance of wing flexibility to insect flight, provides a detailed model of how asynchronous flight muscle functions and how it may have evolved, synthesizes many recent studies of insect flight aerodynamics into a broad-reaching summary of unsteady flight aerodynamics insects, and highlights new insights into the sources of flight stability in insects. The focus on experimental techniques and recently developed apparatus shows how these advancements have occurred and point the way towards future experiments." (Authors) The publication includes references to dragonflies.] Address: Hedrick, T., Department of Biology, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599, USA. E-mail: thedrick@bio.unc.edu

**15300.** Heintzman, L.J.; Anderson, T.A.; Carr, D.L.; McIntyre, N.E. (2015): Local and landscape influences on PAH contamination in urban stormwater. *Landscape and Urban Planning* 142: 29-37. (in English) ["Highlights: •We assessed polycyclic aromatic hydrocarbons in urban stormwater and odonates. •Contamination (amounts and agents) differed between water and odonate tissues. •Local factors were more important than landscape factors on PAH levels. •PAHs did not accumulate along a stormwater gradient. Abstract: Polycyclic aromatic hydrocarbons (PAHs) are toxic organic pollutants produced from combustion. Associated with urban runoff, they have been detected worldwide in urban wetlands. Because PAHs and their associated metabolites are often carcinogenic, mutagenic, and teratogenic, they can pose significant risks to wetland-dependent organisms. We investigated the occurrence of 16 PAHs within water samples and tissues of *Enallagma civile* from seven urban wetlands (known regionally as playas) along a constructed stormwater gradient in Lubbock, Texas. PAH detections from water samples were highly variable across sites and dates, with naphthalene and pyrene occurring most often. PAH detections in adult damselflies were also variable but significantly different from corresponding water samples (suggesting bioaccumulation rather than passive chemical exposure), with naphthalene and fluoranthene occurring most often. The number of specific PAH detections was significantly associated with percent impervious surface within 300 m of a playa, but not with position along the stormwater gradient or number of drainage inflows. Therefore, for the urban playas and odonates of Lubbock, local

factors were more important in determining PAH contamination than were landscape-level factors. PAH contamination can be reduced in future urban landscape planning and design by minimizing the amount of impervious surface around stormwater retention ponds, even if they are linked along a hydrologic gradient." (Authors)] Address: Heintzman, L.J., Department of Biological Sciences, Texas Tech University, Mailstop 43131, Lubbock, TX 79409-3131, United States. E-mail: lucas.heintzman@ttu.edu

**15301.** Hernández Rodríguez (2015): Utility of morphometric standardized variables of wing for automated identification of Cuban species and genus of Libellulidae (Insecta: Odonata). *Revista Cubana de Ciencias Biológicas* 4(2): 78-89. (in Spanish, with English summary) ["The classification of the Cuban Odonata is difficult by the complexity of wing venation. These appendixes have become in very useful tools in studies of geometric morphometrics. For this reason the objective of this work is the evaluation of the potential of wing shape differences for numeric classification and as a basis for an automated identification system for genera and species of the family Libellulidae in Cuba. Landmarks were placed in the fore and hind wings. The landmarks configurations were standardized using Procrustes registration. For the taxonomy analysis three shape variables and six lineal, were used for discriminants analysis and classification and regression tree analysis (CART). The discriminant analyses get a 100% of correct discrimination for both wings in 12 species and 8 genera. The trees CART showed groups mixed in the terminal nodes for both wings, however, for the genera the classification tree showed high purity. The results obtained in this study may be used for creation of automatic classification program for the Libellulidae genera correctly classified with analyzed variables." (Author)] Address: Hernández Rodríguez, Majela, Facultad de Biología, Universidad de La Habana, Cuba. E-mail: majela@fbio.uh.cu

**15302.** Hernández Rodríguez, M.; Ávila, D.D. (2015): Diferencias interespecíficas y geográficas en los niveles de asimetría fluctuante en las alas de *Erythrodiplax umbrata*, *Macrothemis celeno* y *Pantala flavescens* (Odonata: Libellulidae). *Poeyana* 501: 8-19. (in Spanish, with English summary) ["Interspecific and geographic differences in fluctuating asymmetry level. Odonata show fluctuating asymmetry like the majority of insects. The distribution of the Cuban dragonflies varies among country regions. However, it remains unknown if this regional variation is reflected in the morphological characteristics of species with wide distribution, mainly over sensitive morphological indexes like the levels of corporal asymmetry. For this reason the objective of this work is the identification of interespecific differences in the levels of fluctuating asymmetry in wings of Cuban dragonflies and their comparison between two country regions. Digital pictures of *Macrothemis celeno*, *Erythrodiplax umbrata* and *Pantala flavescens* (120) were taken. The landmarks were placed in fore and hind wings of both sides of the body, using the program tpsDig. Procrustes superimposition methods, shape principal components analysis,

analysis of euclidean distances matrix and Thin Plate Spline were used for shape analysis. Centroid size, distances between centroids (the differences among species and regions they were proven by Montecarlo analysis), and lineal distances were employed to measure the degree of asymmetry. The Montecarlo test revealed significant differences between *E. umbrata* and *P. flavescens* for the hind wings and between the populations of *E. umbrata* and *M. celeno* of the western and eastern regions. The sum of lineal distances, used as a measure of asymmetry, showed differences in fore wings of *E. umbrata* among both regions of the country, but not among species. The differences found in the levels of asymmetry among species and regions they could be cause of uncertainty in the development, environmental stress and to be reflected directly in processes like the couple's selection, the agility of the flight and the maneuverability, for that to describe this characteristic in the Cuban dragonflies could supplement the studies of ecology, reproductive biology and behaviour carried out until the moment." (Authors)] Address: Hernández Rodríguez, Majela, Facultad de Biología, Universidad de La Habana, calle 25 e/ I y J, Vedado, Plaza de la Revolución, Cuba. E-mail: majela@fbio.uh.cu

**15303.** Hettyey, A.; Tóth, Z.; Thonhauser, K.E.; Frommen, J.G.; Penn, D.J.; Van Buskirk, J. (2015): The relative importance of prey-borne and predator-borne chemical cues for inducible antipredator responses in tadpoles. *Oecologia* 179(3): 699-710. (in English) ["Chemical cues that evoke anti-predator developmental changes have received considerable attention, but it is not known to what extent prey use information from the smell of predators and from cues released through digestion. We conducted an experiment to determine the importance of various types of cues for the adjustment of anti-predator defences. We exposed tadpoles (*Rana temporaria*) to water originating from predators (caged larvae, *Aeshna cyanea*) that were fed different types and quantities of prey outside of tadpole-rearing containers. Variation among treatments in the magnitude of morphological and behavioural responses was highly consistent. Our results demonstrate that tadpoles can assess the threat posed by predators through digestion-released, prey-borne cues and continually released predator-borne cues. These cues may play an important role in the fine-tuning of anti-predator responses and significantly affect the outcome of interactions between predators and prey in aquatic ecosystems. There has been much confusion regards terminology used in the literature, and therefore we also propose a more precise and consistent binomial nomenclature based on the timing of chemical cue release (stress-, attack-, capture-, digestion- or continually released cues) and the origin of cues (prey-borne or predator-borne cues). We hope that this new nomenclature will improve comparisons among studies on this topic." (Authors)] Address: Hettyey, A., Dept of Integrative Biology and Evolution, Konrad Lorenz Institute of Ethology, University of Veterinary Medicine Vienna, Vienna, Austria. E-mail: hettyey.attila@agrar.mta.hu

**15304.** Hill, M.J.; Mathers, K.L.; Wood, P.J. (2015): The aquatic macroinvertebrate biodiversity of urban ponds in a

medium-sized European town (Loughborough, UK). *Hydrobiologia* 760: 225-238. (in English) ["Urbanisation is one of the greatest threats to freshwater biodiversity, with the area of land covered by towns and cities predicted to increase significantly in the future. Ponds are common features in the urban landscape and have been created for a variety of reasons ranging from ornamental/amenity purposes through to the detention of urban runoff and pollution. This paper aims to quantify the aquatic macroinvertebrate biodiversity associated with garden, ornamental and other urban ponds in Leicestershire, UK. We examined the macroinvertebrate biodiversity of 41 urban ponds (13 garden, 12 park and 16 other urban ponds) within the town of Loughborough, UK. Park ponds supported greater macroinvertebrate richness than garden or other urban ponds. Garden ponds were the most taxon poor. Pond size was strongly correlated with macroinvertebrate diversity. Collectively, urban ponds were found to be physically and biologically heterogeneous and were characterised by high community dissimilarity. Urban ponds provide a diverse range of habitats for a mixture of common and rare aquatic macroinvertebrate taxa and represent a valuable biodiversity resource within anthropogenically dominated landscapes. Recognition of the significant contribution of ponds to urban freshwater biodiversity is important for future aquatic conservation within anthropogenically dominated landscapes." (Authors) *Anax imperator*, *Aeshna mixta*, *Coenagrion puella*.] Address: Hill, M.J., Dept of Geography, Centre for Hydrological and Ecosystem Science, Loughborough University, Loughborough, Leicestershire LE11 3TU, UK. E-mail: m.j.hill@lboro.ac.uk

**15305.** Hiroshi, J.; Uéda, T. (2015): Can the use of more selective insecticides promote the conservation of *Sympetrum frequens* in Japanese rice paddy fields (Odonata: Libellulidae)? *Odonatologica* 44(1/2): 63-80. (in English) ["The effect of two relatively selective nursery-box-applied insecticides on *S. frequens* larvae and adults as substitutes for the commonly used insecticides, imidacloprid and fipronil, was examined using an experimental micro-paddy lysimeter (MPL) system. Fifty hatched larvae were placed on the soil surface of separate MPLs that had been treated with imidacloprid, fipronil, dinotefuran, and cartap hydrochloride, as well as an untreated control MPL. At 30 days after transplantation, the complete absence of *S. frequens* larvae and exuviae in the imidacloprid and fipronil-treated MPLs was remarkable. In the control, cartap- and dinotefuran-treated MPLs, the mean number of larvae was  $31.0 \pm 6.0$ ,  $27.0 \pm 6.0$ , and  $6.3 \pm 1.5$ , respectively. No *S. frequens* adults were observed later in the imidacloprid- and fipronil-treated MPLs. The rate of emergence did not differ significantly among the control, cartap- and dinotefuran-treated MPLs. However, the mean head width of *S. frequens* in the dinotefuran-treated MPL was significantly narrower than that of *S. frequens* in the control and cartap-treated MPLs. The mean EM50 in the cartap-treated MPL was significantly longer than that in the control- and dinotefuran-treated MPLs. The findings showed that the ecological impact of cartap on *S. frequens* was slightly less than the application of fipronil, imidacloprid and dinotefuran to rice paddy fields." (Authors)]

Address: Hiroshi, J., School of Food, Agricultural & Environmental Sciences, Miyagi Univ., 2-2-1 Hatatate, Taihaku-ku, Sendai, Miyagi 982-0215, Japan. E-mail: jinguji@myu.ac.jp

**15306.** Hoess, R. (2015): Faunenwandel der Libellen (Odonata) am Moossee (BE) während der letzten 140 Jahre unter dem Einfluss anthropogener Eingriffe. *Entomo Helvetica* 8: 29-39. (in German, with English and French summaries) ["Faunal evolution of dragonflies (Odonata) at Lake Moossee (BE) during the last 140 years under the influence of human activity. - The dragonfly fauna of Lake Moossee and its tributaries has been studied for the past 140 years. During this time, the habitats available to dragonflies have undergone dramatic changes due to three subsequent lowerings of water table between 1780 and 1920, peat digging, canalization of running waters and drainage of the surrounding countryside as well as the establishment of a golf course with newly created standing and running waters in 2003. Seventeen of 53 identified dragonfly species are red listed. *Coenagrion ornatum*, which was common at Lake Moossee before the last land improvement, is presently extinct in Switzerland." (Author)] Address: Hoess, R., Normanenstr. 35, 3018 Bern, Switzerland. E-mail: r.hoess@1st.ch

**15307.** Holusa, O. (2015): Description of the female of *Cordulegaster vanbrinkae* (Lohmann, 1993) (Odonata: Anisoptera: Cordulegastridae). *Zootaxa* 3949(2): 229-238. (in English) ["The female of *C. vanbrinkae* is described and illustrated, basing on four specimens collected in Gilan and Mazandaran Provinces, northern Iran. Their characters and variability are shown and compared with females of *Cordulegaster picta* and *C. heros*." (Author)] Address: Holusa, O., Dept of Forest Protection & Wildlife Management, Fac. Forestry & Wood Technology, Mendel Univ. in Brno, Zemidilská 3, 613 00 Brno, Czech Republic. E-mail: holusao@email.cz

**15308.** Holuša, O.; Dalecky, V.; Namin, J.I. (2015): Habitat choice of *Cordulegaster vanbrinkae* in Iran (Odonata: Cordulegastridae). *Odonatologica* 44(1/2): 11-20. (in English) ["The occurrence of *C. vanbrinkae* was studied in Gilan and Mazandaran provinces in northern Iran in July 2014. Ten localities demonstrated the occurrence of *C. vanbrinkae* at elevations from 169 to 1,424 m a.s.l. Larvae were found at seven localities and oviposition was observed at two localities. A total of 65 males, five females, 95 larvae, and 32 exuviae were found. Habitats were classified into the following types: a) narrow, shallow streams in forests at middle and higher altitudes; b) boulder-stepped shaded forest streams; c) deep cut forest streams with gravel banks, drying to intermittent pools; and d) broader sunlit rivers." (Authors)] Address: Holusa, O., Dept of Forest Protection & Wildlife Management, Fac. Forestry & Wood Technology, Mendel Univ. in Brno, Zemidilská 3, 613 00 Brno, Czech Republic. E-mail: holusao@email.cz

**15309.** Holzinger, W.E.; Chovanec, A.; Waringer, J.A. (2015): Odonata (Insecta). Checklisten der Fauna Österreichs No. 8: 27-48. (in German, with English summary) ["This checklist summarizes our present knowledge of the

Austrian Odonata species inventory. The Austrian fauna is diverse, combining Alpine and Mediterranean elements. Currently, 78 Odonata species are known from Austria. The paper provides updates on distribution and contains introductory chapters dealing with Odonata biology and bioindication, a brief history on Odonata research, and extensive references." (Authors)] Address: Holzinger, W.E., Ökoteam – Institut für Tierökologie und Naturraumplanung, Bergmannsgasse 22, A-8010 Graz, Austria. E-Mail: holzinger@oeko-team.at

**15310.** Hoppenbrouwers, P. (2015): Reproduction of *Aeshna affinis* in the Gelderse Poort in 2010, the Netherlands. *Brachytron* 17(2): 111-115. (in Dutch, with English summary) ["Reproduction of *A. affinis* was established in the Gelderse Poort in 2010. Eight larval skins were found at small shallow waters formed by clay extraction from what is now a wetlands area, and which dry up during the summer. This is probably the third documented place of reproduction in the Netherlands." (Author)] Address: E-mail: peter.hoppenbrouwers@planet.nl

**15311.** Huang, D.; Azar, D.; Cai, C.; Nel, A. (2015): New damselfly genera in the Cretaceous Burmese amber attributable to the Platystictidae and Platycnemididae Disparoneurinae (Odonata: Zygoptera). *Cretaceous Research* 56: 237-243. (in English) ["Two new damselfly genera and species *Mesosticta burmatica* and *Cretadisparoneura hongii*, are described from the mid Cretaceous Burmese amber. They are respectively tentatively attributed to the Platystictidae and to the Platycnemididae: Disparoneurinae. These discoveries confirm that the Zygoptera of the coenagrionomorphan clade with shortened median posterior and cubitus anterior were already rather diverse during the Early Cretaceous." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**15312.** Husain, A. (2015): Odonate fauna of Rajasthan, India with links to Arabia and Himalaya. *Aquatic Ecosystem: Biodiversity, Ecology and Conservation*: 117-151. (in English) ["The present paper deals with the update on odonate fauna of Rajasthan, based on earlier records. All together, there are 53 species belonging 34 genera, 8 families under 2 suborders with 15 species common to Arabia and 51 to Himalaya which confirms the linkage of Rajasthan and Thar Desert to Sahara Desert and Palaearctic Region. A list of 20 more species, recently recorded from southern part of the state, has also been added." (Author)] Address: Husain, A., 41, Hari Vihar, Vijay Park, Dehra Dun, 248 001, Uttarakhand, India. E-mail: drakhlaqhusain@gmail.com

**15313.** Hyytiäinen, A. (2015): Kymmenen vuotta sudenko-  
rentojen lajihavainnointia Lohjan Santojalla (2005–2014) [Ten years of dragonfly observation at Lohja]. *Crenata* 8: 4-9. (in Finnish) [Detailed information on a ten-year survey of the Odonata fauna of a small area at the city of Lohja (SW Finland) is provided. The four observation sites within the study area were composed of a section of the waterside of



Lohjanjärvi lake, an artificial pond at a former sand pit, a mire and a logging site. During the period 2005-2014 a total of 32 species were recorded, corresponding to more than half of the Finnish odonate species. Of particular note were *Sympecma paedisca*, *Coenagrion armatum*, *C. johanssoni*, *Epithea bimaculata*, *Cordulegaster boltonii*, *Leucorrhinia albifrons* and *L. pectoralis*. [A. Schröter]]

**15314.** Ichikawa, Y.; Watanabe, M. (2015): The daily food intake of *Pantala flavescens* females from foraging swarms estimated by the faeces excreted (Odonata: Libellulidae). *Odonatologica* 44(3): 375-389. (in English) ["*P. flavescens* migrates to Japan every spring, where the population rapidly increases until autumn. Adults often form swarms above open grasslands for foraging. Little has been reported on the daily food intake in *P. flavescens*, probably due to the difficulty of observing foraging behaviour. We captured females from foraging swarms and kept them alive in the laboratory, and the faeces excreted were collected each 24-hour-period after capture. Faeces excreted within 24 hours after capture were typically dark brown, formed in oval pellets, including a lot of fragments of cuticle, which must have been derived from the prey. The total dry weight of faeces was 8.00 mg on average. The size of the subsequent faeces decreased, and the colour changed to reddish brown and detectable cuticle fragments were no longer present, suggesting that most of the indigestible parts had been excreted within 24 hours after feeding. When a female was handfed a single sheep blowfly, 4.51 mg of faeces were excreted within 24 hours after feeding, while a starved female excreted 2.23 mg. The daily food intake of a female was estimated to be about 14 mg, corresponding to about 185 small prey insects. Therefore, the mass flight of *P. flavescens* might affect populations of small insects in the open landscape in Japan." (Authors)] Address: Watanabe, M., Dept of Biology, Faculty of Education, Mie Univ., Tsu, Mie 514-8507, Japan. E-mail: watanabe@edu.mie-u.ac.jp

**15315.** Ihechiluru, N.B.; Henry, A.N.; Taiwo, I.E. (2015): Heavy metal bioaccumulation and oxidative stress in *Austroaeschna inermis* (Dragon fly) of the Lagos Urban ecosystem. *J. Environ. Chem. Ecotoxicol.* 7(1): 11-19. (in English) ["Urban ecosystems are often characterized by the receipt of pollutants, especially heavy metals from diverse anthropogenic activities. To better understand the distribution of heavy metals (Cd, Cu, Pb, Mn and Zn), *A. inermis* from five different sites (Unilag, Mile 12, Olushosun Dump site, Imoshe and Badagry) in Lagos, sediments from the respective sites were assessed. This was followed by assessment of lipid peroxidation product; Malondialdehyde (MDA) and antioxidative stress enzymes; superoxide dismutase (SOD), catalase (CAT), glutathione S-transferase (GST) and reduced glutathione (GSH) in *A. inermis*. The results indicate widespread heavy metal distribution with Mn and Zn having the highest concentrations of  $13.369 \pm 0.800$  mg/kg and  $21.473 \pm 2.001$  mg/kg in sediment samples from Mile 12 and Olushosun Dump site respectively. Only Cd was bioaccumulated at two sites (Unilag and Badagry) with biota to soil

accumulation factor (BSAF) of approximately 2. The oxidative stress biomarkers assessment in the insects did not indicate any trend to link heavy metal concentrations with respective sites. However there was strong ( $r = 0.5 < 0.7$ ) to very strong ( $r = 0.7$ ) positive correlation between Pb concentrations in *A. inermis* and most biomarkers. All enzymes and MDA showed negative correlation with the other heavy metals with values mostly between strong ( $r = -0.5 < -0.7$ ) to very strong ( $r = -0.7$ ) negative. The findings from this study reaffirms the ubiquity of heavy metals in the City of Lagos and the relevance of the insects as pollution indicators were discussed." (Authors) Of course, *Austroaeschna inermis* is no resident in Nigeria, Africa.] Address: Henry, A.N., Dept of Zoology, University of Lagos, Akoka-Yaba, Lagos State, Nigeria. Email: amaezenh@gmail.com

**15316.** Ikemeyer, D.; Schneider, E.; Schneider, J.; Schneider, T. (2015): Records of Odonata in North- and North-East Iran including *Sympecma gobica* (Forster, 1900) as a new species for Iran. *Entomologische Zeitschrift* 125(3): 147-152. (in English, with German summary) ["During two field trips (15.–22. July 2013 and 12.–25. July 2014) to the North and North-East provinces of Iran: Gilān, Māzandarān, Golestān, North Chorāsān und Razavi Chorāsān a total of 37 Odonata species could be recorded. *Sympecma gobica* is new for Iran, and now extends its known range significantly to the West. The two most spectacular dragonfly species of the Hyrcanian Forest have recently been described *Aeshna vercanica* and *Cordulegaster vanbrinkae*, which could both be observed again and new insights into their behaviour could be added. *Sympetrum arenicolor* was found in North-Chorāsān, so far only known from a specimen not precisely located and dated in Iran. *Calopteryx orientalis* was frequently observed on shaded running waters in the entire visited region. All females in the provinces Gilān, Māzandarān and Golestān were androchromic. However, in North Chorāsān also heterochrome females were found among the majority of androchromic females. Further east all females were heterochrome and no homochrome (androchromic) females could be detected." (Authors)] Address: Ikemeyer, D., Billerbecker Str. 6, 48329 Havixbeck, Germany. E-Mail: DKJlkemeyer@t-online.de

**15317.** Ilvonen, J.J.; Kaunisto, K.M.; Suhonen, J. (2015): Are genders equally parasitized in damselflies and dragonflies? *Oikos* 125(3): 315-325. (in English) ["Parasitism plays an essential part in ecology and evolution of host species and understanding the reasons for differential parasitism within and among hosts species is therefore important. Among the very important factors potentially affecting parasitism is the gender of the host. Here, we studied whether either females or males are more likely to harbour parasites among Odonatan insects, by relying on an extensive literature review and new field data. We collected data on numerous dragonfly and damselfly species and their ectoparasites (water mites) and endoparasites (gregarines) to examine the generality of similarities and differences in prevalence, intensity and maximum number of parasites of male and female hosts. We found three main results. Firstly, most of the

odonate host species showed no differences between genders in either gregarine or water mite prevalence and intensity. The only exception was female damselflies' higher gregarine prevalence and intensity compared to conspecific males. These inequalities in gregarine parasitism may be due to behavioural and physiological differences between conspecific males and females. In comparison, there were no differences in dragonflies between genders in water mite or gregarine prevalence and intensity. Secondly, damselflies had higher prevalence and intensity levels of both gregarine and water mite parasites compared to dragonflies. Finally, we found a strong species level pattern between female and male parasitism: a certain level of gregarine or water mite parasitism in one sex was matched with a similar parasitism level for the other. This indicates similar exposure and susceptibility to parasites on both genders. Even though significant differences of parasite levels between the genders were observed within certain host species, our results strongly suggest that on a general level a more parasitized sex does not exist in the order, Odonata." (Authors) *Anax junius*, *Brachymesia gravida*, *Calopteryx maculata*, *Calopteryx splendens*, *Calopteryx virgo*, *Celithemis eponina*, *Coenagrion armatum*, *Coenagrion hastulatum*, *Coenagrion johanssoni*, *Coenagrion pulchellum*, *Dythemis fugax*, *Enallagma boreale*, *Enallagma c. cyathigerum*, *Erythemis simplicicollis*, *Erythromma najas*, *Lestes sponsa*, *Libellula luctuosa*, *Nehalennia irene*, *Pachydiplax longipennis*, *Pantala flavescens*, *Perithemis tenera*, *Platycnemis pennipes*, *Sympetrum danae*, *Sympetrum flaveolum*] Address: Ilvonen, J.J., Dept of Biology, Univ. of Turku, FI-20014 Turku, Finland. E-mail: [jjilvo@utu.fi](mailto:jjilvo@utu.fi)

**15318.** Iversen, L.L.; Rannap, R.; Briggs, L.; Sand-Jensen, K. (2015): Variable history of land use reduces the relationship to specific habitat requirements of a threatened aquatic insect. *Population Ecology* 58(1): 155-164. (in English) ["The hutchinsonian realized niche of a species is the most common tool for selecting the actions needed when restoring habitats and establishing conservation areas of species. However, defining the realized niche of a species is problematic due to variation across spatial and temporal scales. In this study we tested the hypothesis that habitat parameters defining the realized niche of a species can be derived from a regional study and that national changes in land use influence the perception of the realized niche across different landscapes. We described the realized habitat niche of the threatened dragonfly *Leucorrhinia pectoralis*, in four Estonian landscapes which all have undergone more than 20 years of habitat degradations. We recorded the presence/absence of *L. pectoralis* and measured 7 habitat variables for 140 lakes and ponds located in one restored and three un-restored landscapes. Lake size and proportion of short riparian vegetation were significantly positive parameters determining the presence of *L. pectoralis* across landscape types. The species was much more habitat specific in the restored landscape, with larger influence of other habitat parameters. Our data suggest that the realized niche of the species in the un-restored landscapes was constrained by the present-day habitats. The study demonstrate that if a

species realized niche is derived from local distribution patterns without incorporating landscape history it can lead to an erroneous niche definition. We show that landscape restoration can provide knowledge on a species' habitat dependencies before habitat degradation has occurred, provided that restoration mitigation reflects the former landscape characteristics." (Authors)] Address: Iversen, L.L., Freshwater Biological Laboratory, Biological Institute, University of Copenhagen, Universitetsparken 4, 2100 Copenhagen, Denmark. E-mail: [lliversen@bio.ku.dk](mailto:lliversen@bio.ku.dk)

**15319.** Jaggwe, A. (2015): Effects of environmental variables on four aquatic insect taxa among smaller water bodies of different ages on farmland. A pilot study. M.Sc. thesis, Halmstad University, School of Business, Engineering and Science, Biological and Environmental Systems (BLESS): 22 pp. (in English) ["High anthropogenic modification like infrastructural development, drainage, eutrophication, dumping garbage, is a threat to biodiversity of smaller water bodies in agricultural landscapes. However, smaller water bodies have historically been constructed for drainage, waste treatment and other purposes. Further, new small water bodies are now being constructed in agricultural areas in Sweden, mainly to remove nutrients and to improve landscape biodiversity. This creates two different age classes (old and new) of smaller water body habitats. I sampled aquatic insects in 27 smaller water bodies of varying types and ages in Halmstad region and related insect biodiversity, species richness, composition structure to environmental variables. I partitioned the region into two locations (Northern and Southern) for easy data comparison and due to difference in topography. The data was analysed using a Canonical Correspondence (CCA) and regression analysis. The CCA results show a difference in the species composition between old and new sites. The most important variables in explaining species assemblage structure was age of the aquatic water bodies. The species richness decreased with increase in nutrient concentration (total phosphorus) according to regression analysis. Species composition and diversity were related to Vegetation and tree cover in and around the water body. The results of my study shows that the older the water bodies the better for specific species like *Aeshna cyanea* and the new water bodies tolerate more specimens. My results suggest that, as there is need to facilitate plant growing, protecting vegetation and trees to better mimic natural conditions of water bodies, creating new water bodies while protecting aged water bodies is important for conservation of biodiversity." (Author)] Address: not stated

**15320.** Jamwal, D.; Verma, P.; Thaokar, N.; Andrew, R.J. (2015): Seasonal variation in the odonates dragonflies of Gandhi Sagar lake of Nagpur city, India. *International Journal of Pharmacology & Biological Sciences* 9(1): 49-53. (in English) ["Gandhi Sagar Lake is one of the most polluted water body of Nagpur city and is located in the centre of thickly populated residential area. Odonates are directly affected by water pollution since the major period of their life cycle as nymphs is spent in water. Although odonates are

categorized as "moderately intolerant organisms" in a water body, no attempts have been undertaken to study the species specific intolerance level in Odonata. The following presentation describes the observation of the seasonal variation of odonates breeding in the polluted water of Gandhi sagar lake. The following eleven odonates were observed breeding in the Gandhi sagar lake: *Anax guttatus*, *Ictinogomphus rapax*, *Brachythemis contaminata*, *Bradinopyga geminata*, *Crocothemis servilia servilia*, *Diplacodes trivialis*, *Orthetrum s. sabina*, *Pantala flavescens*, *Ceriagrion coromandelianum*, *Ischnura aurora* and *I. senegalensis*. These odonates species appear to be robust and opportunistic species and can be categorised as "fairly tolerant organisms". (Authors)] Address: Andrew, R.J., Post Graduate Department of Zoology, Hislop College, Nagpur, Maharashtra 440001, India. E-mail: [rajuandrew@yahoo.com](mailto:rajuandrew@yahoo.com)

**15321.** Janekova, K.; David, S.; Petrovičová, K. (2015): Contribution to the knowledge of dragonflies (Odonata) of the Orava river basin. *Folia faunistica Slovaca* 20(2): 145-155. (in Slovak, with English summary) ["The Orava River basin covers a total area of 1 633 km<sup>2</sup>, there are a lot of marsh habitats, mainly two major types of peatlands – bogs and fens. The authors put together a faunistic overview of the dragonfly data, which were obtained between 2010 and 2014. A total of 36 dragonfly species were identified from 16 investigated localities, detailed records are given. There are 30 species recorded as autochthonous. There are many endangered and protected species, for instance *Sympetma fusca*, *Coenagrion hastulatum*, *Somatochlora arctica*, *Leucorrhinia caudalis*, *L. dubia*, *L. pectoralis*, *L. rubicunda*, there are species of European importance as well. The area is characterized by a sphagnophilous dragonfly fauna, also the complex of small water bodies, the sand and gravel pits, ditches and marshes drainage channels are of a great importance too." (Authors)] Address: Janeková, Katarina, Department of Ecology and Environmentalistics, FNS Constantine the Philosopher University in Nitra, Tr. A. Hlinku 1, SK-949 74 Nitra, Slovakia

**15322.** Jansen, E.; Sardar, F. (2015): Determination of the Southern Darter (*Sympetrum meridionale*) Selys, 1841. *Brachytron* 17(2): 65-75. (in Dutch, with English summary) ["The increased occurrence of *Sympetrum meridionale* in Belgium and the Netherlands renders the identification of *Sympetrum* species more difficult than before. We summarized and verified all known identification characteristics distinguishing *S. meridionale* from its look-alikes *S. vulgatum* and *S. striolatum* on museum specimens and photographs. Moreover, we identified and tested a novel characteristic which allows the separation between these species: *S. meridionale* has pale-colored veins at its wing-base which are absent in *S. vulgatum* and *S. striolatum*. Separating *S. meridionale* from *S. vulgatum* and *S. striolatum* remains tricky despite this new characteristic as exceptions to the rules do occur. Therefore we emphasize that for a reliable identification looking at a combination of characteristics remains necessary." (Authors)] Address: Esther Jansen & Fazal Sardar. E-mail: [info@macromia.nl](mailto:info@macromia.nl)

**15323.** Janssens, L.; Van Dievel, M.; Stoks, R. (2015): Warming reinforces nonconsumptive predator effects on prey growth, physiology, and body stoichiometry. *Ecology* 96(12): 3270-3280. (in English) ["While nonconsumptive effects of predators may strongly affect prey populations, little is known how future warming will modulate these effects. Such information would be especially relevant with regard to prey physiology and resulting changes in prey stoichiometry. We investigated in *Enallagma cyathigerum* damselfly larvae the effects of a 4°C warming (20°C vs. 24°C) and predation risk on growth rate, physiology and body stoichiometry, for the first time including all key mechanisms suggested by the general stress paradigm (GSP) on how stressors shape changes in body stoichiometry. Growth rate and energy storage were higher at 24°C. Based on thermodynamic principles and the growth rate hypothesis, we could demonstrate predictable reductions in body C:P under warming and link these to the increase in P-rich RNA; the associated warming-induced decrease in C:N may be explained by the increased synthesis of N-rich proteins. Yet, under predation risk, growth rate instead decreased with warming and the warming-induced decreases in C:N and C:P disappeared. As predicted by the GSP, larvae increased body C:N and C:P at 24°C under predation risk. Notably, we did not detect the assumed GSP-mechanisms driving these changes: despite an increased metabolic rate there was neither an increase of C-rich biomolecules (instead fat and sugar contents decreased under predation risk), nor a decrease of N-rich proteins. We hypothesize that the higher C:N and N:P under predation risk are caused by a higher investment in morphological defense. This may also explain the stronger predator-induced increase in C:N under warming. The expected higher C:P under predation risk was only present under warming and matched the observed growth reduction and associated reduction in P-rich RNA. Our integrated mechanistic approach unraveled novel pathways of how warming and predation risk shape body stoichiometry. Key findings that (1) warming effects on elemental stoichiometry were predictable and only present in the absence of predation risk and that (2) warming reinforced the predator-induced effects on C:N:P, are pivotal in understanding how nonconsumptive predator effects under global warming will shape prey populations." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: [robby.stoks@bio.kuleuven.ac.be](mailto:robby.stoks@bio.kuleuven.ac.be)

**15324.** Jisha Krishnan, E. K.; Sebastian, C.D. (2015): A preliminary check list of Odonates from Calicut university campus, Calicut, Kerala, South India. *Journal of Entomology and Zoology Studies* 3(2): 260-263. (in English) [27 odonate species are listed.] Address: Sebastian, C.D., Molecular Biology Laboratory, Department of Zoology, University of Calicut, Kerala 673b 635 India. E-mail: [drcdsebastian@gmail.com](mailto:drcdsebastian@gmail.com)

**15325.** Jisha Krishnan, E.K.; Sebastian, C.D. (2015): Analysis of evolutionary divergence of *Neurothemis tullia* (Odonata: Libellulidae) using cytochrome oxidase subunit I gene.



International Journal of Advanced Life Sciences 8(2): 110-114. (in English) [*N. tullia* is an andromorphic libellulidae member commonly found in ponds, marshes, paddy fields, swamps and tanks. Since this species exhibits female polymorphism and sexual dimorphism, the present study analyzed the nucleotide sequence of mitochondrial cytochrome oxidase I (COI) gene to predict any genetic changes that had occurred in this highly conserved region. Results showed that male, female and andromorphic female members showed the same 351 bp length COI gene (GenBank Accession: KP 835513). Phylogenetic tree constructed by the neighbour joining method showed that it is having a sister clade relationship of the same species found in Mizoram with a maximum bootstrap value of 100. Even though sexual dimorphism in the body colouration, body patterns, wing spot, etc may cause misidentification, the present DNA sequence analysis leads to the absolute identification of this species. The male, female and andromorphic female have same base pair length DNA, which confirmed them to belong to the same species. Phylogenetic tree depicted that different species of *Neurothemis* have a sequence divergence in the range of 1-12% and all showed a monophyletic ancestry representing splitting from a single clade and thereby confirmed genus level taxonomy. The study concludes that a vicariance may be the probable reason for the splitting up of this genus into different geographical areas and caused the reproductive isolation of the same genus which in turn leads to the formation of different species." (Authors)] Address: Sebastian, C.D., Molecular Biology Lab., Dept of Zoology, Univ. of Calicut, Kerala 673 635 India. E-mail: drcdsebastian@gmail.com

**15326.** Johnston, P.R.; Mikolajewski, D.J.; Rolff, J. (2015): Identification of viruses associated with larvae of *Leucorhinia dubia*, and *Coenagrion puella* from RNA sequencing data. *International Journal of Odonatology* 18(1): 81-88. (in English) ["Odonata are hosts to a variety of parasites and pathogens. However, very few studies have investigated which viruses infect dragonflies and damselflies. Here, based on next generation RNA sequencing of RNA from *Leucorhinia dubia* and *Coenagrion puella* larvae, data on putative viruses present in odonates are reported. In both species around 20 different putative viruses, often belonging to genera known from other insect species, were found. The annotated genome structure of one novel putative iflavivirus in *C. puella* and new putative iflavivirus, dicistrovirus and posa-lika viruses in *L. dubia* are described. The influence of these viruses on host fitness and their modes of transmission remain to be determined." (Authors)] Address: Mikolajewski, D.J., Freie Univ. Berlin, Inst. Biol., Evolutionsbiologie, Königin-Luise-Str. 1-3, 14195 Berlin, Germany. E-mail: d.mikolajewski@fu-berlin.de

**15327.** Jones, B.R.; Jordan, S. (2015): Genetic consequences of Pleistocene sea-level change on Hawaiian Megalagrion damselflies. *Journal of Heredity* 106(5): 618-627. (in English) ["The Hawaiian Islands have long been an important laboratory for evolutionary research because their geological histories offer many natural experiments. For ex-

ample, the Maui Nui complex, 4 islands that have been repeatedly connected and separated by fluctuating sea levels, lie near Hawaii Island, which has never been connected to another island. Here, we examine the genetic consequences of fluctuating island areas and connectivity using microsatellite analysis of 2 widespread, endemic Hawaiian damselflies. We screened 152 *Megalagrion xanthomelas* individuals from 5 islands at 14 loci and 34 *Megalagrion pacificum* from 3 islands at 11 loci to explore dispersal patterns and genetic diversity. Our data suggest that Pleistocene fluctuations in sea level alternated between creating land bridges that facilitated gene flow between once and future islands, and ocean channels that inhibited dispersal. Furthermore, interglacial periods of high sea stands likely reduced suitable habitat availability, causing the loss of genetic diversity on Maui Nui due to bottlenecks and founder events. Finally, we propose that gene flow from Molokai to Lanai may be enhanced by assisted dispersal from the trade winds that are channeled between volcanoes on western Maui and eastern Molokai. Our results emphasize the importance of variable microevolutionary processes in Hawaiian biogeography." (Authors)] Address: Jordan, S., Department of Biology, Bucknell University, Lewisburg, PA 17837, USA. E-mail: steve.jordan@bucknell.edu

**15328.** Jones, B.R.; Jordan, S. (2015): Genetic consequences of Pleistocene sea-level change on Hawaiian Megalagrion damselflies. *Journal of Heredity* 106(5): 618-627. (in English) ["The Hawaiian Islands have long been an important laboratory for evolutionary research because their geological histories offer many natural experiments. For example, the Maui Nui complex, 4 islands that have been repeatedly connected and separated by fluctuating sea levels, lie near Hawaii Island, which has never been connected to another island. Here, we examine the genetic consequences of fluctuating island areas and connectivity using microsatellite analysis of 2 widespread, endemic Hawaiian damselflies. We screened 152 *Megalagrion xanthomelas* individuals from 5 islands at 14 loci and 34 *Megalagrion pacificum* from 3 islands at 11 loci to explore dispersal patterns and genetic diversity. Our data suggest that Pleistocene fluctuations in sea level alternated between creating land bridges that facilitated gene flow between once and future islands, and ocean channels that inhibited dispersal. Furthermore, interglacial periods of high sea stands likely reduced suitable habitat availability, causing the loss of genetic diversity on Maui Nui due to bottlenecks and founder events. Finally, we propose that gene flow from Molokai to Lanai may be enhanced by assisted dispersal from the trade winds that are channeled between volcanoes on western Maui and eastern Molokai. Our results emphasize the importance of variable microevolutionary processes in Hawaiian biogeography." (Authors)] Address: Jordan, S., Department of Biology, Bucknell University, Lewisburg, PA 17837, USA. E-mail: steve.jordan@bucknell.edu

**15329.** Kanaujia, A.; Kumar, A.; Kushwaha, S.; Kumar, A. (2015): Diversity of odonates (dragonflies and damselflies) and lepidopteron (butterflies) fauna of Nawabganj Bird

sanctuary, Unnao district, Uttar Pradesh, India. *Advances in BioResearch* 6(2): 72-78. (in English) ["Study was done in Nawabganj Bird Sanctuary during January 2013 to January 2014. This Sanctuary has an area of 224.60 hectares and geographically located at 26° 34' N and 80° 40' E. The study reveals 18 species of odonates belonging to 15 genera and 5 families, which include Libellulidae (9 species), Aeshnidae (3 species), Coenagrionidae (3 species), Gomphidae (2 species) and Platycnemididae (1 species). Out of total 18 *Lathrecista asiatica* and *Ischnura aurora* were abundant or very common species and *Anax guttatus* and *Bradinopyga geminata* were rare in observation." (Authors)] Address: Kanaujia, A., Biodiversity & Wildlife Conservation Lab, Department of Zoology, University of Lucknow, Lucknow- 226007, Uttar Pradesh, India. E-mail: adesh.science@gmail.com

**15330.** Karadimas, D. (2015): The Nina-Nina, the Devil and Oruro: The origins of a diabolical figure. *Indiana* 32: 23-45. (in English, with Spanish summary) ["The Diablada festivities, which take place in Oruro mining town in Bolivia, stage 'devils' that come out of the underworld through galleries and mines that communicate with the surface. The captions that accompany the worship of the Virgin of the Mine (Virgen de la Mina) on this occasion show a hero whose nickname in Quechua likewise designates a parasitic wasp, nina nina. In the world of the Andes, this wasp was associated with bad omens and to the devil by the Indian scholar Guaman Poma de Ayala in the 17th century. The contribution refers to these identifications to propose a new approach to the origin of the Diablada festivities suggesting that in the iconographic features of the devil could be recognized the features of the gods of the mountains worshiped by present and pre-Hispanic Andean populations. ... Dragonflies can thus also be designated with the term aya wantu and are also drawn on some pre-Hispanic pottery next to pompilid wasps, such as this Inca-style aribalo preserved in the Rafael Larco Museum where the dragonflies, recognizable thanks to their outstretched wings, are placed next to insects which until now had been interpreted as butterflies, although the drawing and the colours of their wings (orange, or smoky surrounded by black) are typical of pompilid wasps" (Author) The paper includes a further figure "Inca aribalo on which there are flies, dragonflies and pompilid wasps (Ethnologisches Museum, Berlin, V A 49836." with dragonflies pictured.] Address: Karadimas, D., CNRS – Laboratoire d'Anthropologie sociale, France

**15331.** Karlsson, T. (2015): Östergötlands Trollsländor. Entomologiska Föreningen Östergötland: 160 pp. (in Swedish, with English summary) ["Östergötlands Trollsländor is a compilation of the results of a survey of dragonflies in the Swedish county Östergötland during 2008-2012, together with older records. The survey was performed by the Entomological Society in Östergötland, and this society is also the publisher of the book. Östergötlands Trollsländor is the first regional atlas of dragonflies in Sweden. It presents all 52 species noted for Östergötland with pictures and a distribution map. For threatened and rare species pictures of the

habitat is also presented. In addition, the book makes comprehensive comparisons between Östergötland and ten other regions in Europe (Sweden, Latvia, Polen, Germany, Great Britain and France) to show what distinguishes the dragonfly fauna in Östergötland." (Author) Address: E-mail: tommy\_karlsson715@hotmail.com

**15332.** Kaunisto, K.M.; Kaunisto, P.; Vahtera, V.; Suhonen, J. (2015): Populations of the damselfly *Coenagrion hastulatum* at the edge of the species range have fewer gregarine and water mite parasites. *Freshwater biology* 60(4): 794-801. (in English) ["(1.) The metapopulation theory predicts that the more distant a host population is from other populations, the more challenged will be a parasite to colonise it. We studied parasite prevalence of two parasite taxa across the geographical range of their host in Finland, from more dense host population structure in the south of Finland, towards the northern edge of the host distribution characterised by more isolated populations. (2.) We found that prevalence of both water mites and gregarines decreased with increasing latitude towards the distribution edge with more isolated population structure of the host damselfly, *Coenagrion hastulatum*. Furthermore, the prevalences of the two parasite groups were positively correlated. (3.) The results are discussed in the context of three non-mutually exclusive hypotheses, explaining why host species have fewer parasites at the edge of their geographic range: (i) unsuitable host hypothesis, (ii) physiological barrier hypothesis and (iii) metapopulation hypothesis." (Authors)] Address: Kaunisto, K., Zoological Museum, Dept of Biology, FI-20014 University of Turku, Finland. E-mail: kari.kaunisto@utu.fi

**15333.** Kawsar Khan, M. (2015): *Gynacantha subinterrupta* Rambur, 1842: an addition to the odonates (Insecta: Odonata: Aeshnidae) of Bangladesh. *Journal of Threatened Taxa* 7(10): 7704-7705. (in English) ["Two males were collected on 25 October 2014 from Tilagor Eco Park (24°05'49.0"N & 91°05'14.2"E). The dragonflies were perching in the shade of the bush while they were photographed and later captured using an insect sweeping net. The specimens are deposited in the Department of Biochemistry and Molecular Biology, Shahjalal University of Science and Technology, Sylhet (BMBZO-ODO-002 and BMBZO-ODO-003)." (Author)] Address: Kawsar Khan, M., Dept of Biochemistry and Molecular Biology, Shahjalal University of Science and Technology, Bangladesh. E-mail: kawsarkhanbmb@sust.edu

**15334.** Ke, Y.-H.; Ju, Y.-M. (2015): Two rare ophiocordycipitaceous fungi newly recorded in Taiwan. *Botanical Studies* 2015, 56:30 doi:10.1186/s40529-015-0110-x: 6 pp. (in English) ["Background: Ophiocordycipitaceae is a highly diverse fungal family parasitizing a wide range of arthropods and hypogeous fungi. We collected two ophiocordycipitaceous species previously unknown in Taiwan: one emerged from hypogeous fruiting bodies of an *Elaphomyces* fungus and the other was associated with dragonflies (*Planaeschna* sp.). Results: Based on gross morphology, microscopic fea-

tures, ITS sequences, and hosts, the two ophiocordycipitaceous fungi were identified as *Tolypocladium japonicum* and *Ophiocordyceps odonatae*. We isolated axenic cultures of these two fungi, and their anamorphs were obtained. The simplicillium-like anamorph of *T. japonicum* is described herein for the first time. The anamorph of *O. odonatae* produce conidia holoblastically in sympodial sequence and is assignable to *Hymenostilbe*. A dichotomous key to the species of *Ophiocordycipitaceae* reported in Taiwan is provided. Conclusion: A thorough literature study indicates that the two fungi reported herein have rarely been collected. Our identifications of *T. japonicum* and *O. odonatae* agree well with descriptions in the literature and are highly supported by DNA sequence analysis." (Authors)] Address: Ke, Y.-H., Insti. of Plant & Microbial Biology, Academia Sinica, Taipei, Taiwan. E-mail: yumingju@gate.sinica.edu.tw

**15335.** Khan, M.K. (2015): Dragonflies and damselflies (Insecta: Odonata) of the northeastern region of Bangladesh with five new additions to the Odonata fauna of Bangladesh. *Journal of Threatened Taxa* 7(11): 7795-7804. (in English) ["Odonata were surveyed in one reserve forest, two national parks, one Eco Park, one lake and one University campus in the northeastern region of Bangladesh from March 2014 to March 2015. A total of 64 species of Odonata belonging to 41 genera under seven families were recorded. Among them 45 species and 19 genera were new records for the study area. Two species of Anisoptera, i.e., *Anax indicus* and *Gynacantha khasiac*, and three species of Zygoptera i.e., *Matrona nigripectus*, *Agriocnemis kalinga*, and *Prodasi-neura laidlawii* were recorded for the first time from Bangladesh." (Author)] Address: Khan, M.K., Dept Biochem. & Molecular Biol., School of Life Sciences, Shahjalal Univ. of Science & Technology, Sylhet 3114, Bangladesh. E-mail: kawsarkhan-bmb@sust.edu

**15336.** Khelifa, R. (2015): Does water intake after oviposition indicate the end of oviposition and egg depletion in Odonata females? *International Journal of Odonatology* 18(3): 225-231. (in English) ["Oviposition in odonate females is usually considered finished when the female leaves the oviposition site. However, considering that many species lay their eggs within a set of bouts it is difficult to distinguish between the end of the oviposition bout and the end of the oviposition episode because the females can change the oviposition site from one bout to another. In this study, post-oviposition drinking is suggested as behavioural indicator not only for the end of an oviposition episode but also for egg depletion in females, as investigated in 11 species from five families. This behaviour comprises water intake that the female performs at the end of oviposition by dipping the mouthparts in the water a few times before leaving the oviposition site. The role of downward bending of the abdomen displayed during water intake is also discussed." (Authors) *Coenagrion caerulescens*, *Erythromma lindenii*, *Ischnura graellsii*, *Platycnemis subdilatata*, *Sympetma fusca*, *Calopteryx haemorrhoidalis*, *Crocothemis erythraea* *Orthetrum chrysostigma*, *O. coerulescens*, *O. nitidinerve*, *Sympetrum fonscolombii*.] Address: Khelifa, R., Institute of Evolutionary

Biology and Environmental Studies, University of Zürich, Zürich, Switzerland. E-mail: rassimkhelifa@gmail.com

**15337.** Khelifa, R.; Guebailia, A.; Mahdjoub, H.; Aouaouche, M.S.; Houhamdi, M. (2015): Aspects of life history of *Platycnemis subdilatata* (Zygoptera: Platycnemididae) in Northeast Algeria. *International Journal of Odonatology* 18(4): 317-327. (in English) ["The determination of seasonal regulation is important to understand how species have adapted to their local environmental conditions. In this study, we investigate the life history of a North African endemic damselfly, *Platycnemis subdilatata*, in a northeast Algerian population. We combined field and laboratory investigations to assess the embryonic development, larval growth, emergence pattern and adult flight season. The embryonic development was direct and asynchronous, with 50% of all eggs hatching after three weeks of egg laying and a hatching period ranging from 13 to 51 days. Hatching success was 48.8%, and the causes of hatching failure were infertility and unhatchability. Larval population structure was quite asynchronous during the winter and less so before emergence. The occurrence of larval diapause is improbable due to the increase of the proportion of the last larval stadium in late winter. Emergence was asynchronous with half of the larval population (EM50) emerging after 44 days within an emergence season of 122 days. Sex ratio at emergence was slightly female biased (50.6%). The flight season lasted 133 days starting from early May. The species reached its sexual maturity after six and seven days of emergence in male and female, respectively. Lifespan was not significantly different between sexes with a mean of  $7.75 \pm 6.45$  days ( $\pm$  SD). Our results suggest that the species is univoltine with a typical summer species life history." (Authors)] Address: Khelifa, R., Dept of Biology, Faculty of Biological and Agricultural Sciences, University of Tizi Ouzou, Tiz, Algeria. E-mail: rassimkhelifa@gmail.com

**15338.** Kirti, J.; Kaur, S.; Singh, A. (2015): Studies on male genitalia of some species of family Libellulidae (Anisoptera: Odonata) from north-west India. *International Journal of Advanced Research* 3(7): 1-9. (in English) ["The secondary male genitalic attributes of five species i.e. *Sympetrum haematoneura*, *Urothemis signata signata*, *Palpopleura sexmaculata sexmaculata*, *Zygonyx torridus isis* and *Libellula quadrimaculata* have been studied and illustrated in this manuscript. The significance of various genitalic attributes of all the species has also been highlighted." (Authors)] Address: Kirti, J., Dept of Zoology and Environmental Sciences, Punjabi University, Patiala-147002, India

**15339.** Klecka, J. (2015): Aquatic insects of a lowland rainforest in Papua New Guinea: assemblage structure in relation to habitat type. *Biologia* 70(12): 1621-1630. (in English) ["Papua New Guinea is one of the most valuable tropical regions but ecological research of its freshwater invertebrates has been lacking. The goal of this paper is to evaluate the species richness, diversity and structure of aquatic insect assemblages in different habitats in the Wanang River catchment in a well-preserved lowland rainforest. Assemblage structure was studied on two spatial scales - in



different habitats (river, streams and stagnant pools) and in three mesohabitats in the river (slow and fast sections and submerged wood). The results show that headwater streams had the highest morphospecies diversity, while the river had the highest insect abundance. Slow and fast sections of the river differed both in terms of insect abundance and diversity. Furthermore, a number of unique wood-associated species was found on submerged wood. The most notable feature of the assemblage structure was scarcity of shredders and dominance of predators. However, predatory beetles, bugs and dragonfly larvae exhibited contrasting habitat preferences. This study shows that Papua New Guinean lowland rainforests host diverse and distinctly structured freshwater insect assemblages." (Author) Taxa - including Odonata - are treated at the family level.] Address: Klecka, J., Laboratory of Integrative Ecology, Institute of Entomology, Biology Centre of the Academy of Sciences of the Czech Republic v.v.i., Branišovská 31, 37005 České Budějovice, Czech Republic

**15340.** Knorp, N.E.; Dorn, N.J. (2016): Mosquitofish predation and aquatic vegetation determine emergence patterns of dragonfly assemblages. *Freshwater Science* 35(1): 114-125 (in English) [ "Both site-selective oviposition and interactions following colonization can play a role in structuring communities, but the relative importance of each has not been well studied for many animals. We manipulated the presence of a small-bodied fish predator (Eastern Mosquitofish, *Gambusia holbrooki*) and submerged aquatic vegetation (SAV; *Utricularia* spp.) in 24 mesocosms (n = 6 replicates, 4 treatments) to determine the effects of predators and habitat structure on dragonfly oviposition and naiad success. Adults did not avoid ovipositing in mesocosms with mosquitofish predators, but some species did select for or against SAV. No dragonfly naiads emerged from mesocosms with mosquitofish that lacked SAV. In treatments with SAV, total emergence was almost 3× higher in mesocosms without mosquitofish than mesocosms with mosquitofish. Oviposition patterns generally could not account for emergence patterns in the mesocosms, suggesting that libellulid dragonfly production can be severely limited by postcolonization interactions with mosquitofish. The dominant species emerging from the 3 treatments with naiad success varied consistently, a result suggesting that emerging assemblage composition was altered primarily by tolerances to mosquitofish/interspecific interactions. In mesocosms with SAV, the emerging assemblages were more species rich and more similar in the absence than in the presence of mosquitofish. We suggest that stochastic postcolonization egg or early-naiad survival may account for some assemblage variation in the presence of an efficient stage-specific predator like mosquitofish. This assemblage of libellulids appears to be filtered primarily according to vulnerability to fish predators, with SAV serving to reduce intensity of postcolonization interactions." (Authors) *Pantala flavescens*, *Tamea carolina*, *Tamea abdominalis*, *Celithemis eponina*, *Pachydiplax longipennis*, *Libellula needhami*, *Erythemis simplicicollis*.] Address: Knorp, Natalie, School of Environmental Studies,

Tennessee Tech University, Cookeville, Tennessee 38505 USA. E-mail: neknorp42@students.tntech.edu

**15341.** Koch, C. (2015): Lifetime egg production of captive libellulids (Odonata). *International Journal of Odonatology* 18(3): 193-204. (in English) ["The estimation of lifetime egg production (LEP) is a central question in ecology, since the number of eggs produced determines the potential size of the following generation. In this study, I tried to obtain a rough estimation of the LEPs in libellulids in outdoor cages. The main questions were: (1) does hand feeding influence females' life history traits; (2) how long is the maturation period and the lifespan; (3) does the quality/quantity of eggs vary with female age or size; and (4) how many eggs do females lay in their lifetime? I installed two outdoor cages and kept individually marked specimens of *Orthetrum coerulescens* and *Sympetrum striolatum* under semi-natural circumstances. *Orthetrum coerulescens* had a longer life span in hand-fed specimens compared to not hand-fed. The maturation period, number of clutches, clutch size, egg circumference, and LEP did not differ between hand-fed and not hand-fed specimens. The median maturation period was shorter in *O. coerulescens* (24 days hand-fed; 20 days not hand-fed) than in *S. striolatum* (47 days, all hand-fed). The mortality during the maturation period was high in both studied species (*O. coerulescens* 81.48%, *S. striolatum* 89.16%). *Orthetrum coerulescens* had a shorter median life span than *S. striolatum*. The quality/quantity of eggs did not correlate with females' age and size. *Orthetrum coerulescens* had a mean calculated lifetime egg production of 3081 eggs per specimen and *S. striolatum* 1041 eggs per specimen. The data pertain to outdoor cage experiments (a reduced spectrum of prey, no long flights possible, no predators present). Nevertheless, they may provide a very rough estimation of LEP for two libellulid species." (Author)] Address: Koch, Kamilla, Department of Ecology, Johannes Gutenberg-University of Mainz, Becherweg 13, 55128 Mainz, Germany

**15342.** Kok, J.M.; Chahl, J.S. (2015): Effects of uneven stroking on the aerodynamic efficiency of a dragonfly-inspired wing-actuation system. *AIAC16: 16th Australian International Aerospace Congress*. Barton, ACT: Engineers Australia, 2015: 310-317. (in English) ["In this paper, we investigate the effects of using an uneven upstroke to downstroke motion on the aerodynamic efficiency of a dragonfly inspired flapping wing system. Our results show that for a system without elasticity, the highest aerodynamic efficiencies ( $L/P = 0.185$ ) were observed using near symmetrical upstrokes to downstroke profiles ( $\xi = 0.52$ ), but with an optimized pitching profile ( $\alpha_{\text{pitch}} = 8\pi/12$ ,  $\alpha_0 = 4\pi/12$ ). We then modeled the system with elasticity. In systems with low elasticity ( $\lambda < 1.0$ ), the benefits of uneven stroking were minimal with percentage improvements in aerodynamic efficiency with the use of uneven stroking of less than 2%. However, in systems dominated by elastic forces ( $\lambda < 2.0$ ), the improvements in aerodynamic efficiency can be as high as 35%." (Authors)] Address: Kok, J.M.,

School of Engineering, University of South Australia, Mawson Lakes, South Australia, 5095, Australia

**15343.** Koli, V.K.; Bhatnagar, C.; Shekhawat, D.S. (2015): Diversity and species composition of odonates in southern Rajasthan, India. *Proceedings of the Zoological Society* 68(2): 202-211. (in English) ["The study was conducted in south Rajasthan to explore diversity and species composition of Odonata from January 2013 to June 2013. Odonates were sampled from 13 localities i.e., Pichola lake, Udaisagar lake, Badi lake, Ghasa lake, Menar lake, Badwai lake, Rup sagar lake, Roli todgarh Wildlife Sanctuary, Sitamata Wildlife Sanctuary, Karmoi river stream in Sitamata WLS, College campus, Rajsmand lake and Meja dam. During the study period, a total of 1,290 individuals from 8 families and 54 species were recorded. 4 families and 28 species were related to Anisoptera, while 4 families and 26 species belonged to Zygoptera. Suborder Zygoptera were represented by the families Chlorocyphidae, Coenagrionidae, Lestidae and Platycnemididae, and suborder Anisoptera by the Aeshnidae, Gomphidae, Libellulidae and Macromiidae. Libellulidae was the largest family with 24 species, while the most dominant species was *Brachythemis contaminata* (21.80 %). *Orthetrum chrysis* and *Lestes* sp. were found randomly distributed in the study area, while other were aggregated and showed habitat preference." (Authors)] Address: Koli, V.K., Wildlife Research Lab., Dept of Zool., Univ. Coll. of Science, Mohanlal Sukhadia Univ., Udaipur, 313001, Rajasthan, India. E-mail: vijaykoli87@yahoo.in

**15344.** Kolozsvári, I.; Szabo, L.J.; Dévai, G. (2015): Dragonfly assemblages in the upper parts of the River Tisza: A comparison of larval and exuvial data in three channel types. *Acta Zoologica Academiae Scientiarum Hungaricae* 61(2): 189-204. (in english) ["We studied dragonfly assemblages in the Ukrainian section of the River Tisza, which still shows several natural (unregulated) properties. In 2010 and 2011 larvae and exuviae were collected in the vicinity of the villages Vilok, Nove Szelo, Tiszobikeny and of the towns Vinohragyiv and Huszt. We collected our samples from 8 sites in the main channel, 2 sites in side channels and 3 sites in two dead channels. We collected 255 larvae and 1587 exuviae [*Gomphus vulgatissimus*, *Stylurus flavipes*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Soma-tochlora metallica*, *Calopteryx splendens*, *Platycnemis pennipes*, and *Sympecma fusca*]. We compared the species composition of dragonflies in the three habitats. In the case of larvae in the main channel *G. vulgatissimus* (48.0%), *C. splendens* (29.6%) and *O. forcipatus* (20.8%) dominated, while in the oxbow channels *C. splendens* (49.5%) and *P. pennipes* (23.7%) were found most frequently. In the side channels *G. vulgatissimus*, *O. forcipatus* and *C. splendens* were the most frequent species. *S. flavipes* appeared only in the main and side channels, while *S. metallica* and *S. fusca* were only detected in the oxbow channels." (Authors)] Address: Kolozsvári, I., Ferenc Rákóczi II. Transcarpathian Hungarian Institute, István Fodor Research Institute Kos-suth square 6, Beregove 90202, Ukraine. E-mail: kolozsva-ros@gmail.com

**15345.** Kompier, T. (2015): A Guide to the Dragonflies and Damselflies of the Serra dos Orgaos, South-Eastern Brazil / Guia dos Anisoptera e Zygoptera da Serra dos Órgãos, Sudeste do Brasil. Regua publications: xx, 379 pp. (Bilingual in English and Portuguese) ["First comprehensive field guide to the Odonata of the Reserva Ecologica de Guapiacu and the Serra dos Órgãos in south-eastern Brazil. With over 560 stunning colour photos and 125 additional illustrations of all 204 known from this incredible biodiversity hotspot. Featuring illustrations of both males and females and with additional illustrations of different stages of maturity of many. Texts with full descriptions, identification features, behaviour, flight periods, abundance and notes on status and nomenclature." (Author)] Address: <http://regua.org/publications/new-regua-publication-dragonflies-damselflies-of-the-serra-dos-orgaos-2/>

**15346.** Kondo, T.; Palacino-Rodríguez, F.; Pena-Cuellar, R.D. (2015): Report of *Erpetogomphus sabaleticus* Williamson, 1918 (Odonata: Gomphidae) feeding on *Diaphorina citri* Kuwayama (Hemiptera: Liviidae). *Boletín del Museo de Entomología de la Universidad del Valle* 16(1): 17-26. (in English) ["*E. sabaleticus* is for the first time reported preying on *D. citri*. A compiled list of more than 63 species distributed in seven orders and seventeen families of arthropod (insects and spiders) natural enemies of *D. citri* is provided." (Authors)] Address: Palacino-Rodríguez, F., Grupo de Investigación en Odonatos de Colombia, Laboratorio de Artrópodos, Centro Internacional de Física, Univ. Nacional, sede Bogotá / Depto de Biología, Univ. El Bosque, Bogotá, Colombia. E-mail: odonata17@hotmail.com

**15347.** Koparde, P.; Mhaske, P.; Patwardhan, A. (2015): Habitat correlates of Odonata species diversity in the northern Western Ghats, India. *Odonatologica* 44(1/2): 21-43. (in English) ["Sixty-two localities from Sahyadri Tiger Reserve, Maharashtra State, India, were surveyed for habitat correlates of Odonata diversity. Proximate habitat variables (canopy cover, area of water spread on transect, and altitude) and broad scale environmental variables derived from climate database were used. Seventy species were recorded during the survey. *Vestalis apicalis* was found to be the most abundant species. Multiple regression analysis failed to resolve relationship among variables. Proximate habitat variables, except altitude, showed slightly higher contribution in shaping species richness and diversity than broadscale habitat variables. Canonical correspondence analysis based on species abundance data and multiple variables suggested that canopy cover and area of water on the transect are driving species assemblages. Almost all of the Western Ghats endemics recorded during the survey were found to be associated with high canopy forests and streams, suggesting the critical habitat requirement of these species. The study provides baseline and local habitat association data on Odonata, which can be used as evidence in the conservation of the Sahyadri Tiger Reserve corridor which is under threat of forest felling." (Authors)] Address: Koparde, P., Sálím Ali Centre for

Ornithology & Natural History, Anaikatty (Post), Coimbatore-641108, Tamil Nadu, India. E-mail: pankajkoparde@gmail.com

**15348.** Koskinen, J. (2015): Dragonfly communities of North Karelian forest lakes and ponds. M.Sc. Thesis, Department of Biology, University of Eastern Finland: 67 pp., 6 Appendices (in English, with Finnish summary) ["The goal of this thesis is to survey the dragonfly communities of small Southern Boreal forest ponds. Different dragonfly species exhibit different survival strategies against fish predation and the risk of drought and seasonal change. They also differ in the length of larval period. This should lead to different dragonfly community structures in ponds that are fishless compared to ponds that contain fish, and in ponds that are permanent or ephemeral. The heterogeneity and diversity of vegetation is known to be important for dragonfly diversity. The effects of fish predation on dragonfly community structures, abundance and species composition have been studied earlier, but much remains to be studied. Study sites, permanent, semipermanent and ephemeral ponds, both fish-inhabited and fishless, were selected by consulting of Greater Crested Newt (*Triturus cristatus*) research team. Study material was collected from forested ponds in Joensuu and Tohmajärvi municipalities in North Karelia, Eastern Finland. The larvae and exuviae data was collected during summer 2013. Specimens were identified in laboratory and finally used as community data. Environmental variables, such as architectural diversity of vegetation, were also measured. General dragonfly diversity index (Shannon's) and number of species was higher in ponds that contained fish than in ponds that did not. Area of the sampling sites did not correlate significantly with the number of individuals or species. The diversity of vegetational architecture also had a correlation with species richness and odonate Shannon's diversity. The community structures differed clearly between fishless and fish-inhabited ponds. The presence of fish, the ephemerality-permanence of the ponds and the vegetational diversity were all found to explain community structures. The presence of *Sphagnum* spp. peat mosses, and dwarf shrubs were also a frequent factor in community structures. Decoupling the presence of fish from other biotic and abiotic factors in research done in situ remains problematic."] (Author) Address: not stated

**15349.** Kosterin, O.E. (2015): *Onychargia priydak* sp. nov. (Odonata, Platycnemididae) from eastern Cambodia. *International Journal of Odonatology* 18(2): 157-168. (in English) ["*Onychargia priydak* sp. nov. is described from eastern Cambodia. The new species co-occurs with the widespread *Onychargia atrocyana* Selys, 1865 in the same region. Its males differ from those of *O. atrocyana* by a larger paraproct, which are longer than the cerci, and a bright white pruinescence on thorax, femora and the two first abdominal segments. This is the second species in the genus *Onychargia* Selys, 1865. *Onychargia vittigera* Selys, 1865 is synonymised with *O. atrocyana*; *Onychargia indica* Sahni, 1964 does not belong in the genus *Onychargia*."] (Author) Address: Kosterin, O.E., Institute of Cytology and

Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**15350.** Kosterin, O.E. (2015): Dry season Odonata of the Cardamonean coast (Cambodia and Thailand) revisited in 2015. IDF-Report 89: 1-36. (in English) ["The Cardamom foothills were re-assessed for Odonata in the late dry season of 2015 within E Thailand and SW Cambodia. In the narrow coastal strip of Trat Province of Thailand bordering to Cambodia, 44 species (1 unidentified) were recorded, of which 15, namely *Agriocnemis nana*, *Archibasis viola*, *Ischnura senegalensis*, *Pseudagrion microcephalum*, *P. williamsoni*, *Acisoma panorpoides*, *Brachythemis contaminata*, *Brachydiplax farinosa*, *Hydrobasileus croceus*, *Macrodiplax cora*, *Rhyothemis plutonia*, *R. variegata*, *Tholymis tillarga* and *Trithemis pallidinervis* were recorded for Trat Province for the first time. That increased the number of species recorded for the province to 61. Preliminary checklists of Odonata of Ream Peninsula (that is of Ream National Park) and of Koh Rong Island were compiled, mostly on the data of this trip, to count 45 species (2 unidentified) and 17 species, respectively. As many as 36 species were recorded at the village of O'Som, Pursat Province. *Copera marginipes* is added to species recorded from Bokor Hill Station. Superficially similar males of *Pseudagrion australasiae* and *P. microcephalum* were observed in the same locality in Ream National Park."] (Author) Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**15351.** Kosterin, O.E. (2015): Odonata registered on a short excursion to Kyshtovka District, Novosibirsk Province, Russia. IDF-Report 86: 29-46. (in English) ["During a four-day trip to Kyshotovka District, the most northwestern district of Novosibirsk Province, 21 species of Odonata were recorded. Two significant findings were made: that of *Coenagrion ecomutum* is most northern in West Siberia, and that of *Lestes macrostigma* is perhaps the northernmost in its range. The latter species was found over small, shallow, freshwater pools along a roadside. The diversity of this species' habitats in Siberia in comparison to its uniform habitats at brackish water in Western Europe is discussed."] (Author) Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**15352.** Kosterin, O.E.; Karube, H.; Futahashi, R. (2015): Two new subspecies of *Hemicordulia tenera* Lieftinck, 1930 (Corduliidae) from Cambodia and Thailand. *International Dragonfly Fund - Report* 82: 1-19. (in English) ["*Hemicordulia tenera donnellyi* ssp. nov. (holotype P: Chiang Mai Prov., Kunklang: highway 1009, Restaurant; 16°32.0' N 98°31.3' E, 1000 m, 22 v 1996, FSCA) and *H. t. vikhrevi* ssp. nov. (holotype P: Cambodia, Koh Kong Province, ~13 km ENE of Koh Kong, 'Hemicordulia brook', 11°39'55" N, 103°05'34" E, 315 m, 04 xii 2010, RMNH) are described from North



Thailand and South-West Cambodia, respectively. The nominotypical *H. tenera tenera* Lieftinck, 1930 is distributed in the Malay Peninsula, Borneo, Java and Sumatra. Although these three subspecies are genetically very close, they are distinguishable by the relative length and shape of the caudal appendages." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**15353.** Kosterin, O.E. (2015): *Ischnura foylei* sp. nov. (Odonata, Coenagrionidae) from the highlands of Sumatra. *Zootaxa* 4032(2): 179-189. (in English) ["*Ischnura foylei* sp. nov. is described from Indonesia, Sumatra, Jambi Province, Danau Gunung Tujuh (or Danau Sakti), a lake situated in an extinct volcanic crater, 1°41'15"S, 101°25'28"S, 1995 m a.s.l. Structurally it is close to *I. senegalensis* but larger and with differently shaped cerci in males and a more trilobate posterior lobe of the prothorax; males and androchromatic females have a unique colour pattern." (Author)] Address: Kosterin, O.E., Inst. Cytology & Genetics, Siberian Branch, Russian Acad. Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**15354.** Kosterin, O.E. (2015): *Prodasieneura hoffmanni* sp. nov. (Odonata, Platycnemididae, Disparoneurinae) from eastern Cambodia. *Zootaxa* 4027(4): 565-577. (in English) ["*Prodasieneura hoffmanni* sp. nov. is described from Annamense Mountains in eastern Cambodia (holotype: Cambodia, Mondulkiri Province, 4.2 km SE of Dak Dam village, 12°23'10"-18" N 107°19'22"-30" E, 877-878 m asl, 14. VI. 2014, RMNH). The species has a blue pattern, and the male is characterised by medium-broad blue stripes on synthorax and blue colour at the end of the abdomen confined to a tiny spot on S9, dorsum of S10 and cerci. A female of *P. doisuthepensis* Hoess, 2007 is described. Based on original descriptions, the following synonymy is proposed: *Prodasieneura fujianensis* Xu, 2006 = *Prodasieneura huai* Zhou et Zhou, 2007, syn. n.] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**15355.** Kosterin, O.E. (2015): On the Odonata of North Kazakhstan Province. I. First data on Petropavlovsk. IDF-Report 86: 1-28. (in English) ["The fauna of Odonata of the environs of Petropavlovsk, North Kazakhstan, was for the first time examined on two short trips in late June and mid August 2015. Thirty five species were revealed. *Coenagrion ecornutum* was recorded in Kazakhstan for the first time, *Gomphus vulgatissimus* the second time and *Stylurus flavipes* the third time. Range expansion of *C. ecornutum* is discussed. Comparison is attempted of the known local Odonata faunas of the environs of Petropavlovsk, Omsk and Novosibirsk cities residing at the same latitude in the West Siberian Lowland. The Petropavlovsk fauna is very close to that of Omsk. The earlier published Kazakh records of *G. vulgatissimus* and *S. flavipes* are clarified and corrected. Breeding of *Aeshna viridis* in Ishim River (lacking

water soldier) is supposed." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**15356.** Kümmerlen, M.; Schmalz, B.; Cai, Q.; Haase, P.; Fohrer, N.; Jahnig, S.J. (2015): An attack on two fronts: predicting how changes in land use and climate affect the distribution of stream macroinvertebrates. *Freshwater Biology* 60(7): 1443-1458. (in English) ["1. Global environmental change entails not only climatic alterations, but also changes in land use. Freshwater ecosystems are particularly sensitive to both of these changes, and their sustainable management requires better information on likely responses. 2. To examine the effects of climate and land use on the freshwater community, the distributions of stream macroinvertebrates of the Changjiang catchment in southeast China were modelled. The present distributions of 72 taxa were predicted using environmental variables generated by regional climate, land-use and hydrological models. 3. Hydrological predictors, sensitive to both climate and land use, were the most relevant predictors in the species distribution models (SDMs), followed by land use. 4. The stream macroinvertebrates' distributions were then projected for the period 2021 to 2050 using three different future scenarios: (i) climate change, (ii) land-use change and (iii) climate and land-use change combined. 5. Land-use change was predicted to have the strongest negative impact on the community, with reductions in local richness (20%), predicted diversity (0.3%) and range size (25%) and a general shift towards higher altitudes (+12%). The climate-change scenario had a negative effect on predicted diversity (0.1%) and resulted in a moderate altitudinal shift (+3%) along with increased richness (+15%) and range size (+19%). In the combined scenario, climate and land-use changes counterbalanced each other to a certain degree, but had an overall detrimental effect. 6. The results underscore the high relevance of land-use change in future distribution predictions, exemplify the possible effect of interactions between land use and climate on hydrology and indicate how such responses can vary among freshwater taxa. The model also allows the detection of key environmental variables, the identification of vulnerable species and the definition of their potential distributions. This information is essential to establishing effective management and conservation strategies and gives a more comprehensive insight into the possible effects of global environmental change on freshwater ecosystems." (Authors)] Address: Kuemmerlen, M., Dept of River Ecology and Conservation, Senckenberg Research Institute and Natural History Museum Frankfurt, Clamecystr. 12, 63571 Gelnhausen, Germany. E-mail: mathias.kuemmerlen@senckenberg.de

**15357.** Kulijer, D. (2015): *Sympetrum flaveolum* in the Dinaric Alps (Odonata: Libellulidae). *Libellula* 34(1/2): 91-101. (in English, with German summary) ["An overview is given on distribution, habitat and flight season of *S. flaveolum* in Bosnia and Herzegovina, and the status of this species in the Dinaric Alps is discussed. It was found to be common

and widespread in Bosnia and Herzegovina. In the data set consulted, *S. flaveolum* was present in 93 localities and it is thus concluded that the species is quite common. Continuity and abundance of observations, including much evidence of reproduction, indicate the presence of permanent populations in the Dinaric Alps in Bosnia and Herzegovina." (Author)] Address: Kulijer, D., National Museum of Bosnia and Herzegovina, Zmaja od Bosne 3, 71000 Sarajevo, Bosnia and Herzegovina. E-mail: dejan.kulijer@gmail.com

**15358.** Kulijer, D. (2015): *Sympetrum flaveolum* in the Dinaric Alps (Odonata: Libellulidae). *Libellula* 34(1/2): 91-101. (in English, with German summary) ["An overview is given on distribution, habitat and flight season of *S. flaveolum* in Bosnia and Herzegovina, and the status of this species in the Dinaric Alps is discussed. It was found to be common and widespread in Bosnia and Herzegovina. In the data set consulted, *S. flaveolum* was present in 93 localities and it is thus concluded that the species is quite common. Continuity and abundance of observations, including much evidence of reproduction, indicate the presence of permanent populations in the Dinaric Alps in Bosnia and Herzegovina." (Author)] Address: Kulijer, D., National Museum of Bosnia and Herzegovina, Zmaja od Bosne 3, 71000 Sarajevo, Bosnia and Herzegovina. E-mail: dejan.kulijer@gmail.com

**15359.** Kunz, B. (2015): Paarungsaktivitäten mit Dreifach- und Vierfachverbindungen bei *Gomphus vulgatissimus* (Odonata: Gomphidae). *Libellula* 34(1/2): 73-83. (in German, with English summary) [Baden-Württemberg; "On 14 May 2011, at a still water beside the river Jagst near Eberbach, Germany (49°17'35"N, 09°49'59"E), individuals of *G. vulgatissimus* were observed and photographically documented constituting triple and quadruple connections that consisted of two and three males and one female, respectively. The quadruple connection lasted for nearly ten seconds. During five minutes, individuals of both sexes, but mainly males, flew confusingly fast to and fro by a newly created water body with almost clear banks, forming tandems, copulation wheels, triple and quadruple connections in wild disorder. This unusual behaviour ended as suddenly as it had started and might have been triggered by an upcoming thunderstorm. Triple and quadruple connections of *G. vulgatissimus* are reported for the first time." (Author)] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: libellenbernd@gmail.com

**15360.** Kunz, B. (2015): Ist der Waschbär *Procyon lotor* eine Gefahr für *Cordulegaster boltonii*? (Mammalia: Procyonidae; Odonata: Cordulegasteridae). *Libellula* 34(3/4): 203-207. (in German, with English summary) ["First indication of the raccoon as a predator on larvae of *Cordulegaster boltonii* was found at a stream in NE Baden-Württemberg, Germany. In typical microhabitats, like accumulations of sand or detritus in shallow and calm waters, no larvae of *C. boltonii* could be found, but there were footprints of raccoons. The search for larvae at locations with steep banks and deep water (> 40 cm), where raccoons may not search for food, was successful. The larvae of *C. boltonii* obviously use

a broader range of microhabitats than previously thought." (Author)] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: libellenbernd@gmail.com

**15361.** Kunz, B. (2015): Foraging behaviour of *Ischnura genei* in the early morning (Odonata: Coenagrionidae). *Libellula* 34(3/4): 187-194. (in English, with Italian and German summaries) ["In August 2013, at two different locations in Sardinia, individuals of *Ischnura genei* were observed and photographically documented flying at sunrise close above the water surface and picking up prey items. The prey consisted mainly of emerging Ephemeroptera (*Caenis* sp.) and *Culicomorpha* (Diptera)." (Author)] Address: Kunz, B., Hauptstr. 111, D-74595 Langenburg, Germany. E-mail: libellenbernd@gmail.com

**15362.** Kunz, B. (2015): First record of *Ischnura nursei* Morton, 1907 from Oman (Odonata: Coenagrionidae). *Libellula* 34(1/2): 117-124. (in English, with German summary) ["One female specimen, labeled as "*Ischnura spec.*", was found within the Odonata collection of the Museum für Naturkunde Berlin (MfN). It was collected incidentally on 18-xii-2003 around 60 km southeast of Muscat, Oman. A compilation of available records of this species published within the last six years indicates roughly homogeneous distribution between southeastern Iran and Bangladesh." (Author)] Address: Kunz, B., Hauptstr. 111, 74595 Langenburg, Germany. E-mail: libellenkunz@gmail.com

**15363.** Lakhlar, A.; Panhwar, W.A.; Panhwar, F.A. (2015): Studies on the taxonomy of *Crocothemis servilia servilia* (Drury, 1773) (Odonata: Libellulidae). *Archivos Entomol6xicos* 14: 105-106: 105-106. (in English, with Spanish summary) [Description of a common Pakistanian Odonata species.] Address: Lakhlar, A., National College of Science, Sindh, Pakistan. E-mail: amjadlakhlar2@hotmail.com

**15364.** Lambret, P.; Besnard, A.; Matushkina, N. (2015): Plant preference during oviposition in the endangered dragonfly *Lestes macrostigma* (Odonata: Zygoptera) and consequences for its conservation. *J. Insect Conserv.* 19(4): 741-752. (in English) [Marais du Vigueirat, Camargue (Southern France); "Biotic and abiotic features impact the breeding success of animals and thereby induce selection pressures for habitat selection. Little is known about the plant selection by predatory insects which lay their eggs within plants. In previous work, we have highlighted that during oviposition males of *Lestes macrostigma*—an endangered dragonfly species—prefer to land on *Bolboschoenus maritimus* and dead shoots of *Juncus maritimus* but disfavour living shoots in that species, and that females seem to prefer dead material during substrate examination. In this study we assessed behavioural preference in females during substrate examination, substrates suitability for oviposition, the effort females had to make to lay their eggs and their resulting oviposition rate. We show *L. macrostigma* has a preference for *B. maritimus* and, albeit to a lesser extent, for dead substrates. No clear trend appeared regarding substrate suitability. Females had to

make a greater effort to lay an egg within living shoots of *J. maritimus*. By contrast, this effort was less in *B. maritimus* and dead shoots of *J. maritimus* and the oviposition rates were higher for these two types of substrate. We hypothesize that these preferences are relevant in the selection of oviposition substrates which are more likely to be flooded earlier by rainfall, reducing risk of egg desiccation and increasing hatching success. With regard to conservation, *B. maritimus* and *J. maritimus* should be encouraged by wildlife managers especially in habitat restoration programs which aim to increase the number of suitable breeding sites for the species." (Authors)] Address: Lambret, P., Tour du Valat Research Centre, Le Sambuc, 13200 Arles, France. E-mail: lambret@tourduvalat.org

**15365.** Lambret, P.; Besnard, A.; Matushkina, N. (2015): Initial preference for plant species and state during oviposition site selection by an odonate. *Entomological Science* 18: 377-382. (in English) [National Natural Reserve of the Marais du Vigueirat, Camargue (southern France), at the Baisse des Marcells; "Endophytic egg-laying odonates use an ovipositor to insert their eggs inside plant tissues. Before egg deposition, oviposition site selection consists of two crucial steps: (i) the initial choice, typically decided in species that oviposit in tandem within vertical substrates by the male when landing and then by the female by staying on the substrate or flying to another; and (ii) the insertion site choice, made by the female who uses her ovipositor to palpate the substrate. Some odonates prefer to deposit their eggs within specific plant species. Some are able to discriminate between living and dead substrates during the initial choice. However, the extent to which odonates discriminate among distinct plant species during the initial choice is unknown. We studied the initial site preference in *L. macrostigma* to determine whether the males and/or females show a distinct preference among five types of shoots when landing on or when palpating the substrate, respectively. Male *L. macrostigma* preferred to land on *Bolboschoenus maritimus* and dead *Juncus* spp. When focusing on *J. maritimus*, females preferentially palpated the substrate when the male landed on dead shoots. We suggest that the male preference for these substrates is consistent with that of the female during insertion site choice but also during egg deposition. Such behaviour should reduce the duration of oviposition, with benefits of reducing the predation risk and increasing available time for foraging. The advantage in preferring these substrates should be linked to a selection pressure acting on egg development and/or survival." (Authors)] Address: Lambret, P., Tour du Valat Research Centre, Le Sambuc, 13200 Arles, France. E-mail: lambret@tourduvalat.org

**15366.** Le Rouzic, A.; Hansen, T.F.; Gosden, T.P.; Svensson, E.I. (2015): Evolutionary time-series analysis reveals the signature of frequency-dependent selection on a female mating polymorphism. *The American Naturalist* 185(6): E182-E196. (in English) ["A major challenge in evolutionary biology is understanding how stochastic and deterministic factors interact and influence macroevolutionary dynamics

in natural populations. One classical approach is to record frequency changes of heritable and visible genetic polymorphisms over multiple generations. Here, we combined this approach with a maximum likelihood-based population-genetic model with the aim of understanding and quantifying the evolutionary processes operating on a female mating polymorphism in *Ischnura elegans*. Previous studies on this colour-polymorphic species have suggested that males form a search image for females, which leads to excessive mating harassment of common female morphs. We analyzed a large temporally and spatially replicated data set of between-generation morph frequency changes in *I. elegans*. Morph frequencies were more stable than expected from genetic drift alone, suggesting the presence of selection toward a stable equilibrium that prevents local loss or fixation of morphs. This can be interpreted as the signature of negative frequency-dependent selection maintaining the phenotypic stasis and genetic diversity in these populations. Our novel analytical approach allows the estimation of the strength of frequency-dependent selection from the morph frequency fluctuations around their inferred long-term equilibria. This approach can be extended and applied to other polymorphic organisms for which time-series data across multiple generations are available." (Authors)] Address: Le Rouzic, A., Laboratoire Évolution, Génomes, et Spéciation, CNRS-LEGS-UPR9034, CNRS-Institut Diversité, Écologie, et Évolution du Vivant-FR3284, Université Paris-Sud, Avenue de la Terrasse, Bâtiment 13, 91198 Gif-sur-Yvette, France. E-mail: lerouzic@legs.cnrs-gif.fr.

**15367.** Leon, E.J.; Olguín, P.F.; Beltzer, A.H. (2015): Aportes al conocimiento de la dieta del mirasol chico (*Ixobrychus involucris*) (Aves: Ardeidae) en el valle de inundación del río Paraná Medio, Argentina. *Revista FABICIB* 19: 65-74. (in Spanish, with English summary) ["Contributions to the knowledge of the diet of Least Bittern (*Ixobrychus involucris*) (Aves: Ardeidae) flooding in the valley of the middle Paraná river, Argentina. The first input on the diet of *Ixobrychus involucris* in the valley of the Middle Paraná River flood, Argentina are presented. Stomach contents of 13 individuals captured with mist nets and washings were analyzed performed stomach. The trophic diversity stomach ranged between 0.22 and 2.89. The cumulative trophic diversity was 1.58. The trophic spectrum showed Insecta as the most important entity (Odonata, Coleoptera, Hemiptera and Orthoptera). The IR showed: Insects = 10450; Fish and Arachnids = 140. To prey size 55% were insects, the class interval comprising 31-40 mm. In terms of niche breadth: Spring = 0.10, Summer = 0.19, = 0.17 Autumn and Winter = 0.14. Feed efficiency corresponded to: Spring = 88.9; Summer = 91.45; Autumn and Winter = 91.04 = 88.92. For food selectivity, the calculation was not significant. The daily rhythm of feeding activity can display a bimodal pattern with two peaks of activity." (Authors)] Address: Leon, E.J., Facultad de Ciencia y Tecnología, UADER, CP 3100, Paraná - Argentina. E-mail: evelinaleon903@hotmail.com

**15368.** Lorenzo-Carballa, M.O.; Ferreira, S.; Sims, A.M.; Thompson, D.J.; Watts, P.C.; Cher, Y.; Damoy, V.; Evrard,



A.; Gelez, W.; Vanappelghem, C. (2015): Impact of landscape on spatial genetic structure and diversity of *Coenagrion mercuriale* (Zygoptera: Coenagrionidae) in northern France. *Freshwater Science* 34(3): 1065-1078. (in English) ["Loss and fragmentation of habitat is a current main cause of biodiversity loss in freshwater habitats. Odonates (dragonflies and damselflies) depend on these habitats to complete their development. Fragmentation may be a particular threat for odonates because it generates a network of small habitat patches within which populations could suffer from isolation and loss of genetic diversity. The southern damselfly *Coenagrion mercuriale* is categorized on the IUCN red list as Near Threatened, largely because of population fragmentation and demographic declines associated with changes in land use. Small populations at the margin of this species' range are of particular concern because they would be prone to detrimental effects of habitat fragmentation if this species were a poor disperser. We sampled *C. mercuriale* in 16 habitat patches (localities) at 4 main sites in the department of Pas-de-Calais in northwestern France to quantify factors that affect dispersal and genetic diversity. Specimens were genotyped at 12 microsatellite loci to quantify genetic diversity, genetic differentiation, and the potential effect of landscape variables on genetic differentiation, and to detect any potential source-sink structure. Habitat separation had a limiting effect on dispersal by *C. mercuriale*, resulting in 3 main genetic clusters and weak divergence at the main site of Vallée de la Course. Genetic differentiation was low in each main site, implying that the localities within sites were connected at scales of up to ~2 km, albeit with some evidence for isolation at the more isolated localities. Given the degree of isolation of some areas and a lack of apparent genetic mixing in the intervening populations, any movement among the most distantly separated sites must have occurred some time ago. We identified barriers to dispersal, such as woodland, but detecting an unambiguous effect of certain variables, such as urbanization, was difficult because many landscape features were highly correlated." (Authors)] Address: Lorenzo-Carballa, Olalla, Institute of Integrative Biology, Biosciences Building, Crown Street, University of Liverpool, Liverpool L69 7ZB UK. E-mail: m.o.lorenzo-carballa@liverpool.ac.uk

**15369.** Louboutin, B.; Nicolas, M.; Gautier, C. (2015): Redécouverte d'*Ischnura graellsii* en France (Odonata : Coenagrionidae). *Martinia* 31(2): 91-102. (in French, with English summary) ["*Ischnura graellsii* was rediscovered in July 2015, in abundance at two man-made ponds located in the township of Sainte-Léocadie (Pyrénées-Orientales department), in the French Cerdanya. This is for this species, of which the identity had been suspected basing on pictures made in 2013 and 2014, the first observation after the previous quotation by Morton in the Pyrénées-Atlantiques department in 1913. Among the Odonata present on the site, several species, including *Erythromma viridulum* reached here their highest altitude in France (1260 m a.s.l.). In this paper are presented the context of this finding, the features of the site, the odonatological assemblage and the distribution of both *I. elegans* and *I. graellsii* from either side

of the eastern Pyrenees. This French population represents clearly an extension of the nearby Spanish Catalan populations in our country. It is doubtful they can extend more north beyond the special Cerdanyan climate." (Authors)] Address: Louboutin, B., Office pour les insectes et leur environnement (Opie), antenne Languedoc-Roussillon, Centre de Biologie pour la gestion des Populations, Campus International de Baillarguet CS 30 016, F-34988 Montferrier-sur-Lez Cedex, France. E-mail: bastien.louboutin@insectes.org

**15370.** Luiz, L.F.; Contrera, F.A.L.; Neckel-Oliveira, S. (2015): Diet and tadpole transportation in the poison dart frog *Ameerega trivittata* (Anura, Dendrobatidae). *The Herpetological Journal* 25(3): 187-190. (in English) ["Diet and transportation of tadpoles by *Ameerega trivittata* was studied in the eastern Amazon basin. A total of 56 specimens (48 males and 8 females) were sampled, 44 out of which had quantifiable stomach contents. Forty males were recorded to carry between 1 and 18 tadpoles. Forty pools were measured and sampled for tadpoles and odonate naiads, a putative tadpole predator. Myrmicine ants predominated in the diet of males, putatively leading to higher concentrations of alkaloids beneficial during tadpole transport. No relationship was found between male size and the number or size of tadpoles transported, and between pool size and tadpole abundance. The number of tadpoles in the pools was negatively related to the abundance of odonate naiads." (Authors)] Address: Luiz, L.F., Universidade Federal do Amazonas (UFAM), Instituto de Ciências Biológicas, Departamento de Biologia, Laboratório de Evolução e Genética Animal, Av. General Rodrigo Octávio Jordão Ramos, 3000, CEP 69077-000 Manaus, AM, Brasil

**15371.** Machado, A.B.M. (2015): *Perilestes eustaquioi* sp. nov. and new distributional records of Perilestidae (Odonata) in Brazil. *Zoologia (Curitiba)* 32(5): 428-430. (in English) ["*Perilestes eustaquioi* sp. nov. (holotype male deposited in ABMM collection) from the state of Bahia (municipality of Una), northeastern Brazil, is described and illustrated based on one male specimen. It differs from the other species of the genus mainly by the larger size of the anteclypeus in relations to the postclypeus. Together with *P. fragilis* Hagen in Selys, 1862 from the state of Sergipe and *P. solutus* Williamson & Williamson, 1924 from the state of Ceará, these are the first records of Perilestidae from northeastern Brazil." (Author)] Address: Machado, A.B.M.D., Departamento de Zoologia, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais. Caixa Postal 486, 31270-901 Belo Horizonte, MG, Brazil. Email: angelo@icb.ufmg.br

**15372.** Maneechan, W.; Promm, T.O. (2015): Diversity and distribution of aquatic insects in streams of the Mae Klong watershed, western Thailand. *Psyche* Volume 2015 (2015), Article ID 912451: 7 pp. (in English) ["The distribution and diversity of aquatic insects and water quality variables were studied among three streams of the Mae Klong Watershed. In each stream, two sites were sampled. Aquatic insects and water quality variables were randomly sampled seven

times in February, May, September, and December 2010 and in January, April, and May 2011. Overall, 11,153 individuals belonging to 64 families and nine orders were examined. Among the aquatic insects collected from the three streams, the order Trichoptera was most diverse in number of individuals, followed by Ephemeroptera, Hemiptera, Odonata (11.3%), Coleoptera, Diptera, Plecoptera, Megaloptera, and Lepidoptera. The highest Shannon index of diversity of 2.934 and 3.2 was recorded in Huai Kayeng stream and the lowest was in Huai Pakkok stream (2.68 and 2.62). The high diversity of insect fauna in streams is an indication of larger microhabitat diversity and better water quality conditions prevailing in the streams. The evenness value was recorded as high in most sites. The high species diversity and evenness in almost all sites indicated good water quality." (Authors) Taxa are treated at family level.] Address: Maneechan, W., Faculty of Liberal Arts and Science, Kasetsart University, Kamphaeng Saen Campus, Nakhon Pathom 73140, Thailand

**15373.** Manu, M.; Szekely, L.; Oromulu, L.V.; Barbuceanu, D.; Honciuc, V.; Maican, S.; Fiera, C.; Purice, D.; Ion, M. (2015): Bucharest. In: J.G. Kelcey (ed.): *Vertebrates and Invertebrates of European Cities: Selected Non-Avian Fauna*. Springer New York: 257-322. (in English ) ["Eight invertebrate 'groups' were investigated having a total of 503 species, which can be divided into two major categories: above ground and below ground. The above-ground groups are the Coleoptera (beetles), Lepidoptera (butterflies and moths), Odonata (dragonflies and damselflies), Orthoptera (grasshoppers and crickets) and Thysanoptera (thrips). The below-ground groups are the Acari—Mesostigmata (soil mites), Acari—Oribatida (beetle mites), Collembola (spring-tails) and Myriapoda—Diplopoda (millipedes) and Myriapoda—Chilopoda (centipedes) The study revealed different structural complexities of the invertebrate populations (including non-native species) in relation to three groups of factors, namely the habitat and ecological requirements of the species, the characteristic features of the urban environment (including pollution, soil types and the species composition and structure of the vegetation) and the morphology and dynamics of some of the invertebrate groups. Zoological surveys of Bucharest indicate that the city has a rich and interesting invertebrate fauna. There are some scientific studies concerning the impact of pollution on biodiversity in urban habitats and the legal framework to protect green spaces that are generally often neglected. Plans for the expansion and management of urban areas should be based on scientifically comprehensive, interdisciplinary research projects, which will, amongst other benefits, provide a complete inventory of the invertebrate species, which are an excellent group of biological indicators." (Authors)] Address: Manu, Minodora, Department of Ecology, Taxonomy and Nature Conservation, Institute of Biology, Romanian Academy, Spl. Independentei 296, Sector 6, 060031, Bucharest, Romania. E-mail: minodora\_stanescu@yahoo.com

**15374.** Marchant, R.; Grant, T. (2015): The productivity of the macroinvertebrate prey of the platypus in the upper

Shoalhaven River, New South Wales. *Marine and Freshwater Research* 66(12): 1128-1137. (in English) ["The platypus, *Ornithorhynchus anatinus*, feeds almost exclusively on benthic macroinvertebrates, yet no attempt has been made to link its energy demands with the productivity of its benthic macroinvertebrate prey. In the upper Shoalhaven River, NSW, we estimated macroinvertebrate production (in 2009 and 2011) from benthic samples and recorded platypus diet (2009 only) from cheek pouch samples. Ephemeroptera, Trichoptera and Chironomidae were the most numerous of 6 major groups in both the cheek pouches and the benthic samples. Three other groups (Odonata, Coleoptera, Sphaeriidae) were much less abundant in the benthos, but Odonata were common in the cheek pouches. In both years the Ephemeroptera, Trichoptera and Chironomidae had levels of production that were an order of magnitude higher than those of the three other groups. Total macroinvertebrate production for the six groups varied from 7.8 (in 2009) to 13.1 (in 2011) g DW m<sup>-2</sup>y<sup>-1</sup>. Previous estimates of field metabolic demand (FMD) of the platypus enabled calculation of the number that could be supported by a given level of production. The observed levels of production were sufficient to support 13-27 platypuses in 2009 and 22-45 in 2011 along a 1.5km reach of the river." (Authors)] Address: Marchant, R., Department of Entomology, Museum Victoria, GPO Box 666, Melbourne, Vic. 3001, Australia. E-mail: rmarch@museum.vic.gov.au

**15375.** Marinov, M.; Schmaedick, M.; Polhemus, D.; Stirnemann, R.L.; Enoka, F.; Fa'aumu, P.S.; Uili, M. (2015): Faunistic and taxonomic investigations on the Odonata fauna of the Samoan archipelago with particular focus on taxonomic ambiguities in the "Ischnurine complex". *International Dragonfly Fund Report* 91: 1-56. (in English, with Samoan summary) ["New faunistic data is provided on the Odonata inhabiting the three main islands within the Samoan archipelago, namely Savai'i, Upolu and Tutuila as well as the smaller islands of Aunu'u and the Manu'a group. The specimens collected or observed in the field were compared to samples from other nearby Pacific island groups such as Fiji and Tonga. This study makes important contributions towards resolving taxonomic issues regarding the *Ischnura* species described as endemic to Samoa and their relations to other *Coenagrionidae* genera. New diagnostic features for distinguishing between females of the endemic genera *Amorphostigma* and *Pacificagrion*, subspecies separation in the Pacific *Tramea transmarina* and distinguishing between Samoan *Hemicordulia* species are suggested. *Anaciaeschna melanostoma* is proposed as junior synonym of *A. jaspidea*. A possible new subspecies of *Lathrecista asiatica*, confined to the Samoan archipelago, is discussed. The validity of *Agriocnemis interrupta* as a separate species from *A. exsudans* is questioned. Pacific *Pseudagrion* is believed to be represented within the region by one species only, with separate subspecies in Fiji, Tonga and Samoa, although more specimens from Fiji are required to resolve this issue." (Authors)] Address: Marinov, M., Investigation and Diagnostic Centres and Response , Operations Branch, Ministry for Primary Industries, 231 Morrin Rd ,

Auckland 1072 New Zealand. E-mail: Milen.Marinov@mpi.govt.nz

**15376.** Marinov, M. (2015): The seven "oddities" of Pacific Odonata biogeography. *Faunistic studies in South-east Asia and Pacific island Odonata* 11: 1-58. (in English) ["The existing literature on the Odonata inhabiting the three large divisions of the Pacific Ocean (Micronesia, Melanesia, Polynesia) is revised taking into consideration earlier discussions on the species origin, historical faunistic records, various palaeogeographical models proposed for the area, general data on the biology and ecology of this insect order. Special emphasis is paid on the incomplete data set for the region and inconsistency of the exploration of this vast area. The taxonomy and fauna of the Pacific Odonata is far from complete which makes it very difficult to provide any plausible hypothesis on the biogeographical pattern that we observe today. The widely accepted view of long distance dispersal from a centre of origin as the only possible means for species to occupy remote oceanic island archipelagos is critically reviewed. There are seven phenomena in the current Odonata distribution that cannot be explained only by random gene transfer mediated by wind dispersal. Those are called "oddities", however, they are believed to be regularities of past geological events and modern day human associated activities within the Pacific. The rationale for each of them is explained in details and illustrated with distribution maps following the current taxonomy of the group. A new approach is suggested to tackle the question of the origin of the Pacific Odonata by relating the higher taxa distribution to the geological events and palaeontology of the families. It is not intended to be a new hypothesis yet before more systematic studies of the taxonomy and fauna of the group. Therefore, it is believed that the new method suggested here will increase the attention of the scientific community and will boost studies on this insect order within the Pacific Ocean. Discussion on its applicability is provided with attention to details that are difficult to be explained with the Pacific Odonata palaeontology as we know it for the moment." (Author)] Address: Marinov, M., Plant Health & Environment Lab., Investigation & Diagnostic Centres & Response, Ministry for Primary Industries, 231 Morrin Rd, Auckland, New Zealand. E-mail: milen.marinov@mpi.govt.nz

**15377.** Markovic, V., Tomovic, J.; Atanackovic, A.; Kracun, M.; Ilic, M.; Nikolic, V.; Paunovic, M. (2015): Macroinvertebrate communities along the Velika Morava River. *Turkish Journal of Zoology* 39: 210-224. (in English) [Serbia; only five Odonata species have been recorded: *Gomphus vulgatissimus*, *Calopteryx splendens*, *Platycnemis pennipes*, *Ophiogomphus cecilia* and *Onychogomphus forcipatus*.] Address: Markovic, Vanja, Institute for Biological Research "Sinisa Stankovic", University of Belgrade, Belgrade, Serbia. E-mail: vanjam@ibiss.bg.ac.rs

**15378.** Márquez-Rodríguez, J. (2015): Observaciones odonológicas en un río extremo-acidófilo (Andalucía, Sur de España). *Arquivos Entomológicos* 14: 63-66. (in Spanish, with English summary) ["Odonatological observations

from a highly acidophilous river (Andalusia, southern Spain). The first records of *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) in the river Tinto and its associated odonofauna are reported. The new records of this species in the province of Huelva are of faunistic interest, especially by the current lack of records and the selection of extreme acidic waters as a new territorial habitat." (Author)] Address: Márquez-Rodríguez, J., Depto de Sistemas Físicos, Químicos y Naturales. Universidad Pablo de Olavide. A-376, km 1. E-41013 Sevilla, Spain. E-mail: jmarrod1@upo.es

**15379.** Marrón, G.; Carmona, R.; Hernández-Álvarez, A. (2015): Primeros registros de *Erythemis vesiculosa* (Fabricius, 1775; Odonata: Libellulidae) y de *Ischnura barberi* Currie, 1903 (Odonata: Coenagrionidae) para Baja California Sur, México. *Acta Zoológica Mexicana* (n.s.) 31(3): 502-505. (in Spanish, with English summary) ["We report the first records of two species of Odonata for Baja California Sur. An individual of *E. vesiculosa* was in the southern part of the state at San Pedro del Palmar, an oasis near Todos Santos, 1 October 2014, and a couple of *I. barberi* were in the northern part of the state at the Guerrero Negro sewage ponds 21 October 2014; both were photographed. These observations increase to 57 the number of species of the order Odonata recorded in Baja California Sur." (Authors)] Address: Marrón, G., Depto de Biología Marina. Univ. Autónoma de Baja California Sur. A.P. 19-B. La Paz, Baja California Sur, 23080 México. E-mail: atakamara@gmail.com

**15380.** Martens, A. (2015): Alternative oviposition tactics in *Zygonyx torridus* (Kirby) (Odonata: Libellulidae): modes and sequential flexibility. *International Journal of Odonatology* 18(1): 71-80. (in English) ["*Zygonyx torridus* inhabits waterfalls, rapids and riffle sections. Males patrol over these sites. After copulation the partners perform an extensive search while flying in tandem over a wide range. Behavioural studies in Mauritius 1997 and 2014 showed that there is considerable plasticity in oviposition behaviour. Three main modes could be distinguished: (A) egg-laying in tandem during flight; (B) the female placing the eggs while dipping in flight without physical contact with the male; and (C) the female placing the eggs when settled without physical contact with the male. On several occasions two modes, and in a single case all three types, were observed within one oviposition sequence. In odonates, such a high degree of plasticity in reproductive behaviour was not reported previously." (Author)] Address: Martens, A., Pädagogische Hochschule Karlsruhe, Postfach 111062, D-76060 Karlsruhe, Germany. E-mail: andreas.martens@ph-karlsruhe.de

**15381.** Martín, M.; Maynou, X. (2015): Evaluación del estado de amenaza de los odonatos (Insecta: Odonata) de Cataluña (España). *Boletín de la Sociedad Entomológica Aragonesa* 56: 161-172. (in Spanish, with English summary) ["An assessment of the threat status of the dragonflies (Insecta: Odonata) of Catalonia (Spain). We assessed the degree of threat or vulnerability of the 70 dragonfly and damselfly taxa recorded from Catalonia to date by analyzing more than 30,000 observational records from the *Oxygastra*



GEOC (Catalan Odonata Study Group) database that include information on distribution, abundances and breeding habitats. We used two independent methods of assessment: IUCN and IVOC (Vulnerability Index of the Odonata of Catalonia, based on Abellán et al. (2005)). For the first one we considered mainly the criteria related to size and fragmentation of the distribution areas of taxa and the possible evolution of the conservation status of their characteristic habitats. For the second, we took into account the six parameters included in the Vulnerability Index calculation, i.e. overall distribution of the taxon, degree of endemism, rarity, persistence, and rarity and threat to their reproductive habitats. Both methods showed some discrepancies in the assessment of the degree of threat for the different taxa due to differences in the criteria used, underlining their complementarity and reinforcing the assessment. Combining the results obtained by both methodologies resulted in a list of nine species threatened or highly vulnerable: *Coenagrion hastulatum*, *Aeshna isocetes*, *Gomphus graslinii*, *Onychogomphus costae*, *Cordulia aenea*, *Macromia splendens*, *Orthetrum nitidinerve*, *Sympetrum pedemontanum* and *Leucorhinia dubia*." (Authors)] Address: Martín, R., Martí Julià, 19-23, CP-08911 Badalona, Spain. E-mail: ricardo.martin@cllenciats.cat

**15382.** Martynov, V.V.; Nikulina, T.V.; Shokhin, I.V. (2015): New records of *Selysiothemis nigra* (Vander Linden, 1825) (Odonata: Libellulidae) in the Sea of Azov region. *Caucasian Entomological Bulletin* 11(2): 263-265. (in Russian, with English summary) ["A substantial increase of dragonfly fauna in the Sea of Azov region (Priazovye) by species with "southern" ranges was observed during the XXI century. These species are *Lindenia tetraphylla*, *Crocothemis erythraea*, *Sympetrum fonscolombii*, *Hemianax ephippiger*. *S. nigra* is recorded from Donetsk Region and Krasnodar Region for the first time. This record significantly expands the range of the species in Europe. The relationship between change in the regional entomofauna and increasing of average temperatures is not supported. Legitimacy of using of insect localities which directly or indirectly related to human activities in the zoogeographical zonation is discussed." (Authors)] Address: Martynov, V.V., Public Institution Donetsk Botanical Garden, Illicha Av., 110, Donetsk 83059, Ukraine. E-mail: martynov.scarab@yandex.ru

**15383.** Matheson, T.; Ball, O.; Pohe, S. (2015): *Tamea loewii* (Odonata: Libellulidae) on the move. *The Weta* 50(1): 10-17. (in English) ["*T. loewii* has recently become established in New Zealand, with a known distribution on the Aupouri Peninsula north of Kaitiaki. To determine whether the species has spread further south, the littoral zones of eleven central Northland lakes from Ahipara to Waipu were sampled. Searches for exuviae and adults of *T. loewii* were also conducted at each lake. Larval *T. loewii* were only found at the Uretiti sand pit lake near Ruakaka, south of Whangarei. Many exuviae and adults in flight were also observed at the lake, indicating the species is established there. This represents a substantial range expansion and is

the southernmost record of *T. loewii* to date." (Authors)] Address: Ball, O., NorthTec, Department of Applied and Environmental Sciences, Whangarei, New Zealand. E-mail: oball@northtec.co.nz

**15384.** Matsunami, M.; Kitano, J.; Kishida, O.; Michimae, H.; Miura, T.; Nishimura, K. (2015): Transcriptome analysis of predator- and prey-induced phenotypic plasticity in the Hokkaido salamander (*Hynobius retardatus*). *Molecular Ecology* 24(12): 3064-3076. (in English) ["Predator- and prey-induced phenotypic plasticity is widely observed among amphibian species. Although ecological factors inducing diverse phenotypic responses have been extensively characterized, we know little about the molecular bases of variation in phenotypic plasticity. Larvae of the Hokkaido salamander, *Hynobius retardatus*, exhibit two distinct morphs; the presence of their prey, *Rana pirica* tadpoles, induces a broad-headed attack morph, and the presence of predatory dragonfly nymphs (*Aeshna nigroflava*) [= *Aeshna crenata* Hagen, 1856] "induces a defense morph with enlarged external gills and a high tail. To compare the genes involved in predator- and prey-induced phenotypic plasticity, we carried out a de novo transcriptome analysis of Hokkaido salamander larvae exposed to either prey or predator individuals. First, we found that the number of genes involved in the expression of the defense morph was approximately five times the number involved in the expression of the attack morph. This result is consistent with the fact that the predator-induced plasticity involves more drastic morphological changes than the prey-induced plasticity. Second, we found that particular sets of genes were up-regulated during the induction of both the attack and defense morphs, but others were specific to the expression of one or the other morph. Because both shared and unique molecular mechanisms were used in the expression of each morph, the evolution of a new plastic phenotype might involve both the co-option of pre-existing molecular mechanisms and the acquisition of novel regulatory mechanisms." (Authors)] Address: Matsunami, M., Laboratory of Ecological Genetics, Graduate School of Environmental Science, Hokkaido University, Sapporo, Japan. E-mail: mmatsunami@ees.hokudai.ac.jp

**15385.** Maurel, J.-P. (2015): Contribution à l'étude des libellules de Midi-Pyrénées. *Carnets natures* 2: 23-39. (in French, with English summary) [France; between 2004 and 2008, a total of 359 Odonata specimens were identified, representing 45 different species. The list of species includes *Calopteryx splendens*, *Trithemis annulata*, *Oxygastra curtisii*, and *Coenagrion mercuriale*.] Address: Maurel, J.-P., 12 rue Willy Brandt, F-31520 Ramonville-Saint-Agne, France. E-mail: jeanphilippe.maurel@free.fr

**15386.** Mehdi, H.; Anwer, S.F.; Ahmad, A. (2015): Fluid structure interaction of flow around a pleated insect 2D airfoil at ultra low reynolds numbers. *International Journal of Research in Aeronautical and Mechanical Engineering* 3(3): 19-37. (in English) ["In this work, Numerical study of

Fluid Structure Interaction of uniform flow past a two dimensional pleated airfoil is carried out. When the wing interact with the air, it is subjected to both aerodynamic forces acting on the surface of the wing and the inertial force due to the acceleration of deceleration of the wing mass. The interaction between these inertial and aerodynamic forces resulted in wing deformation. The dynamics of a pleated insect wing subjected to aerodynamic loading is studied. The vortex induced vibration and forced vibration of a pleated flexible insect wing subjected to aerodynamic load is studied by using ANSYS-14 multi physics solver. The insect wing is of dragonfly (*Aeshna cyanea*) wing cross section. In the first phase of the work, fluid flow simulation at Reynolds Number-100, 200, 500, and 1000 will be performed with angle of attack  $0^\circ$  to  $15^\circ$ . The result from the CFD solver will be fed in the form of lift and drag forces are then fed into the ANSYS Workbench solver and one way Fluid Structure Interaction analysis is performed." (Authors)] Address: Mehdi, H., MED, Meerut Institute of Technology, Meerut (U.P), 250002, India. E-mail: husainmehdi4u@gmail.com

**15387.** Melfi, J.; Wang, Z.J. (2015): L27.00005: Uncontrolled stability in freely flying insects. *Bulletin of the American Physical Society* 60(21): 1 p. (in English) [Verbatim: One of the key flight modes of a flying insect is longitudinal flight, traveling along a localized two-dimensional plane from one location to another. Past work on this topic has shown that flying insects, unless stabilized by some external stimulus, are typically unstable to a well studied pitching instability. In our work, we examine this instability in a computational study to understand whether it is possible for either evolution or an aero-vehicle designer to stabilize longitudinal flight through changes to insect morphology, kinematics, or aerodynamic quantities. A quasi-steady wingbeat averaged flapping flight model is used to describe the insect. From this model, a number of non-dimensional parameters are identified. The effect of these parameters was then quantified using linear stability analysis, applied to various translational states of the insect. Based on our understanding of these parameters, we demonstrate how to find an intrinsically stable flapping flight sequence for a dragonfly-like flapping flier in an instantaneous flapping flight model.] Address: Wang, Z. Jane, Theoretical and Applied Mechanics, Cornell Univ., Ithaca, NY 14853, USA. E-mail: jane.wang@cornell.edu

**15388.** Merzendorfer, H. (2015): Dragonfly hunting is based on predictive models. *J. Exp. Biol.* 218: 1278-1279. (in English) ["Mischiati, M., Lin, H.-T., Herold, P., Imler, E., Olberg, R. & Leonardo, A. (2015). Internal models direct dragonfly interception steering. *Nature* 517, 333-338." Verbatim: Goalkeepers doubtless need excellent responses to prevent the opposition from scoring that goal. However, exceptional responses are not enough. To reach and catch the ball at the right moment, the goalkeeper has to predict where the ball will end up and calculate where their movements will take them to capture the ball. This type of control has been found only in vertebrates so far. However, a recent study published in *Nature* by a team of researchers led by

Anthony Leonardo from the Howard Hughes Medical Institute, USA, has demonstrated that dragonflies that are in pursuit rely on internal models that predict the effects of movements of their own body and their target, like the goalkeeper catching the ball. Dragonflies are brilliant aeronauts that can hover, fly at high speed and perform agile manoeuvres to defend their territory, mate on the wing or chase prey. Their vision is also excellent: with their large eyes they can see in almost any direction. Usually they lurk on plants where they wait for prey insects to fly over. Once the prey is in focus, the dragonfly rapidly lifts off and manoeuvres to approach the prey at an angle from below, so that it can trap the victim with its capture legs. To analyse this type of hunt in more detail, the team filmed dragonflies in slow motion during pursuits. It became obvious that the dragonflies did not rely exclusively on their reactions, because they did not always respond to unexpected changes in the prey motion. Rather, they tried to align their elongated body with the flight path of their prey to approach and strike from below, minimizing the chances of being discovered. To do so, the head of the dragonfly moves independently from the body, so that the eyes can continuously focus on the prey while the body is aligned with the prey's flight path. The scientists then dissected the head movements in more detail. They set up a flight arena, which allowed them to record the paths of dragonflies and prey with high accuracy using high-speed cameras. They also placed micro-reflective markers on the head and body of the dragonflies to record the relative movements. Based on these data, they then calculated the angular position of the prey image on the dragonfly's eye. What they found was quite surprising, as the head motions turned out to compensate precisely for drift of the prey image on the eye that resulted from the dragonfly's own body movements and the anticipated motion of the prey. The high synchrony and precision of the timing of these head movements suggest that dragonflies use internal calculations to generate models that predict how body and prey movements will influence the position of the image on the dragonfly's eye, and how the head must then be moved to cancel out these effects: classical sensory feedback. This predictive system largely compensates for the dragonfly's own body movements and thus relieves the visual system to detect sudden prey manoeuvres, to which the dragonfly can respond by reactive control. Leonardo and his team have shown for the first time that invertebrates use internal models to predict the effects of their own body movements when targeting prey. The fact that all of the experiments were done under laboratory conditions where the prey's movements are more restricted may suggest that this predictive steering control could be dominated by reactive mechanisms in the wild, thus explaining why it had been overlooked for so long.] Address: Merzendorfer, H., Univ. Osnabrück, Germany. E-mail: merzendorfer@chemie-bio.uni-siegen.de

**15389.** Meyer, M.D.; Davis, C.A.; Dvoretz, D. (2015): Response of wetland invertebrate communities to local and landscape factors in North Central Oklahoma. *Wetlands* 35(3): 533-546. (in English) ["Invertebrates play an important role influencing wetland functions. Specifically, they

provide important food for many waterbirds and other wetland species. To better understand the role environmental factors play in influencing invertebrates, we examined the influence of local and landscape factors on invertebrate communities inhabiting depressional wetlands in Oklahoma. We sampled invertebrates from 58 wetlands during 2009 and 2010. Diversity and taxa richness increased as the season progressed and with vegetation complexity and cover. Diversity and richness decreased as water quality was impacted by nutrient and sediment loading. Local variables occurred more consistently in taxa models than landscape variables. Important local variables included wetland hydrology, vegetation complexity, and water quality, while important landscape variables included density and type of wetlands surrounding wetlands. Land-use practice was the least important landscape variable, but is an important variable due to potential relationships with local variables such as water quality. Low variation (12–26 %) explained by the pCCA suggests other variables may be influencing invertebrate communities, but an alternative explanation is that invertebrates are insensitive to environmental variation. These findings can guide both local management of wetlands and conservation strategies at the watershed or regional scale to benefit not only invertebrates but other wetland dependent species. ... Individual taxa analyses were conducted on taxa occurring in at least 20 % of the samples during both years. These taxa included "Enallagma"... For three taxa (*Callibaetis*, *Enallagma*, and *Ostracoda*), the negative binomial component of the model for sampling date was positive and the binomial component was negative indicating that as the season progressed, biomass of these taxa increased and the probability of the taxa being absent from wetlands decreased. In the models for *Cladocera* and *Enallagma*, the negative binomial for BVEG1 was significantly positive indicating that biomass of these taxa increased as vegetation complexity and submergent cover increased. ... *Enallagma* was less likely to occur at wetlands affected by poor water quality.... *Enallagma* biomass decreased with the amount of rangeland surrounding the wetland. ... *Enallagma*, *Anax*, *Berosus* larvae, *Callibaetis*, and *Physa* were associated with wetlands that contained high vegetation complexity and low turbidity and were located in landscapes characterized by a high occurrence of semi-permanent wetlands." (Authors.) Address: Davies, C.A., Department of Natural Resource Ecology and Management, Oklahoma State University, 008C Agricultural Hall, Stillwater, OK 74078, USA. E-mail: craig.a.davis@okstate.edu

**15390.** Michels, J.; Gorb, S.N.; Reinhardt, K. (2015): Reduction of female copulatory damage by resilin represents evidence for tolerance in sexual conflict. *J. R. Soc. Interface* 12(104): 7 pp. (in English) ["Intergenomic evolutionary conflicts increase biological diversity. In sexual conflict, female defence against males is generally assumed to be resistance, which, however, often leads to trait exaggeration but not diversification. Here, we address whether tolerance, a female defence mechanism known from interspecific conflicts, exists in sexual conflict. We examined the traumatic

insemination of female bed bugs via cuticle penetration by males, a textbook example of sexual conflict. Confocal laser scanning microscopy revealed large proportions of the soft and elastic protein resilin in the cuticle of the spermatheca, the female defence organ. Reduced tissue damage and haemolymph loss were identified as adaptive female benefits from resilin. These did not arise from resistance because microindentation showed that the penetration force necessary to breach the cuticle was significantly lower at the resilin-rich spermatheca than at other cuticle sites. Furthermore, a male survival analysis indicated that the spermatheca did not impose antagonistic selection on males. Our findings suggest that the specific spermatheca material composition evolved to tolerate the traumatic cuticle penetration. They demonstrate the importance of tolerance in sexual conflict and genitalia evolution, extend fundamental coevolution and speciation models and contribute to explaining the evolution of complexity. We propose that tolerance can drive trait diversity." (Authors) The paper includes references to Odonata.] Address: Michels, J., Department of Functional Morphology and Biomechanics, Institute of Zoology, Christian-Albrechts-Universität zu Kiel, Am Botanischen Garten 1 – 9, 24118 Kiel, Germany

**15391.** Michimae, H.; Tezuka, A.; Emura, T.; Kishida, O. (2015): Environment-dependent trade-offs and phenotypic plasticity in metamorphic timing. *Evolutionary Ecology Research* 16: 617-629. (in English) ["Background: Fitness trade-offs of plastic traits between alternative environments are a prerequisite for the evolution of phenotypic plasticity; however, the costs associated with plastic traits have yet to be determined. Most empirical studies have assessed the costs of plastic traits by investigating just two environments (to elicit plasticity), and only one or two environments to evaluate the consequences of plasticity. In contrast, in nature, organisms are constantly subjected to multiple environments, and the expression and magnitude of the costs of plastic traits are occasionally context-dependent. Objective: Analyse the costs of plastic traits across multiple environments. Methods: We determined the benefits and costs of two plastic responses (predator- and prey-induced morphologies) of larvae of the salamander *Hynobius retardatus* to larval survival, time to metamorphosis, and body size at metamorphosis in three different environments [using tadpoles of an anuran frog as prey, larvae of a predatory dragonfly (*Aeshna nigroflava* = *A. crenata*), or no change agent (conspecific larvae only)]. Results: The benefits of the alternative phenotypes were evident in the two inducing environments, but the costs were greater or more easily detected in crossover environments. The trade-offs appeared in combinations in the crossover environments, and thus were context-dependent. Conclusions: The cross-environmental costs of plastic traits are necessary for the evolution of phenotypic plasticity. Our findings highlight the importance of measuring the costs and benefits of plastic traits across multiple environments." (Authors)] Address: Michimae, H., School of Pharmacy, Department of Clinical Medicine (Biostatistics), Kitasato University, Tokyo, Japan, E-mail: michimaeh@pharm.kitasato-u.ac.jp



**15392.** Mikolajewski, D.J.; Rösen, L.; Mauersberger, R.; Johansson, F.; Rolff, J. (2015): Relaxed predation results in reduced phenotypic integration in a suite of dragonflies. *Journal of Evolutionary Biology* 28(7): 1354-1363. (in English) ["While changes in magnitude of single traits responding to selective agents have been studied intensively, little is known about selection shaping networks of traits and their patterns of co-variation. However, this is central for our understanding of phenotypic evolution since traits are embedded in a multivariate environment with selection affecting a multitude of traits simultaneously rather than individually. Here, we investigate inter- and intraspecific patterns of trait integration (trait correlations) in the larval abdomen of dragonflies as a response to a change in predator selection. Species of the dragonfly genus *Leucorrhinia* underwent a larval habitat shift from predatory fish to predatory dragonfly dominated lakes with an associated relaxation in selection pressure from fish predation. Our results indicate that the habitat-shift induced relaxed selection pressure caused phenotypic integration of abdominal traits to be reduced. Intraspecific findings matched patterns comparing species from both habitats with higher abdominal integration in response to predatory fish. This higher integration is probably a result of faster burst swimming speed. The abdomen holds the necessary morphological machinery to successfully evade predatory fish via burst swimming. Hence, abdominal traits have to function in a tight coordinated manner, since maladaptive variation and consequently non-optimal burst swimming would cause increased mortality. In predatory dragonfly dominated lakes no such strong link between burst swimming and mortality is present. Our findings highlight the importance of studying multivariate trait relationships as a response to selection for understanding patterns of phenotypic diversification." (Authors)] Address: Mikolajewski, D.J., Freie Universität Berlin, Institut für Biologie, Evolutionsbiologie, Königin-Luise-Str. 1-3, 14195 Berlin, Germany. E-mail: d.mikolajewski@fu-berlin.de

**15393.** Mikolajewski, D.J.; Conrad, A.; Joop, G. (2015): Behaviour and body size: plasticity and genotypic diversity in larval *Ischnura elegans* as a response to predators (Odonata: Coenagrionidae). *International Journal of Odonatology* 18(1): 31-44. (in English) ["Phenotypic plasticity represents an adaptive tool in organisms including odonates to cope with heterogeneous environmental conditions. However, while some odonate species can occupy various changing habitats, other species are adapted to a narrow range of environmental conditions. Commonly, behavioural modifications are applied to avoid detection and encounters with predators. But reduced behavioural activity results in decelerated growth and reduced body size, a key fitness attribute in odonates. Using larval *Ischnura elegans* we quantified predator induced plastic behavioural reaction norms in order to manifest variance, and by this evolvability of larval behavioural plasticity. In addition we test for potentially underlying genetic correlations of behavioural traits with body size. Our results show that there is large genotypic variance in plastic reaction norms. Furthermore, no present genetic

constraints between behaviour and body size were detected, suggesting potential for independent optimisation of behaviour and body size across environments. Our data indicate that independent phenotypic plasticity in behaviour and body size might enable species to occupy a wide range of environmental conditions." (Authors)] Address: Mikolajewski, D.J., Freie Universität Berlin, Institut für Biologie, Evolutionsbiologie, Königin-Luise-Str. 1-3, 14195 Berlin, Germany. E-mail: d.mikolajewski@fu-berlin.de

**15394.** Milaczewska, E. (2015): 11th National Symposium of the Odonatological Section of Polish Entomological Society – Dubiecko, June 19–22, 2014. *Odonatrix* 11(1): 31-37. (in Polish, with English summary) ["The author reports the symposium, which took place in June 2014 in Dubiecko, in the Carpathian Foreland (south-eastern Poland). Symposium consisted of a scientific session, during which presented several speeches were presented, as well as a field session. Field trips were primarily aimed at recognizing the habitats of the representative of alpine biome – *Corulegaster bidentata*. We also visited typical of the River San valley water bodies in the gravel pit, where we had a chance to observe *Orthetrum albistylum* and *Crocothemis erythraea* among others." (Author)] Address: Milaczewska, Ewa, ul. Cichociemnych 3/13, 03-984 Warszawa, Poland. E-mail: ewa.milaczewska@gmail.com

**15395.** Minnick, M.D.; Gousse, A.D.; Kleiman, R.N. (2015): Resonant cantilever wings for monolithic MAVs. *International Journal of Micro Air Vehicles* 7(4)(2015): 419-430. (in English) ["In this paper we present the concept, fabrication, and testing of resonant cantilever wings for monolithic micro aerial vehicles (MAVs). Combining new analytical and computational fluid dynamic work to determine the resonant mode, forces, and power of resonating curved cantilevers, we present a framework to calculate and optimize robot designs for certain figures of merit (i.e., greatest excess power, smallest size, and fastest time for a swarm to search a volume). The optimization results reveal promising designs on scales ranging from fruit flies to dragonflies with the optimal MAV having a maximum continuous travel speed of 2 m/s, 10 mm wing length, and 9 mg total mass. We then fabricate curved cantilever wings to test the theoretical model, which confirm the resonant frequency, resonant mode shape, power dissipated, and net force generated. This work is the first demonstration of asymmetric force from a symmetric flapping cycle and of the feasibility of curved cantilever wings for completely monolithic MAVs." (Authors)] Address: Minnick, M.D., McMaster University, 1280 Main St. W., Hamilton, ON, Canada. E-mail: minnick@mcmaster.ca

**15396.** Mitchell, A. (2015): Collecting in collections: a PCR strategy and primer set for DNA barcoding of decades-old dried museum specimens. *Molecular Ecology Resources* 15(5): 1102-1111. (in English) ["Natural history museums are vastly underutilized as a source of material for DNA analysis because of perceptions about the limitations of DNA degradation in older specimens. Despite very few exceptions, most DNA barcoding projects, which aim to obtain

sequence data from all species, generally use specimens collected specifically for that purpose, instead of the wealth of identified material in museums, constrained by the lack of suitable PCR methods. Any techniques that extend the utility of museum specimens for DNA analysis therefore are highly valuable. This study first tested the effects of specimen age and PCR amplicon size on PCR success rates in pinned insect specimens, then developed a PCR primer set and amplification strategy allowing greatly increased utilization of older museum specimens for DNA barcoding. PCR success rates compare favourably with the few published studies utilizing similar aged specimens, and this new strategy has the advantage of being easily automated for high-throughput laboratory workflows. The strategy uses hemi-nested, degenerate, M13-tailed PCR primers to amplify two overlapping amplicons, using two PCRs per amplicon (i.e. four PCRs per DNA sample). Initial PCR products are reamplified using an internal primer and a M13 primer. Together the two PCR amplicons yield 559 bp of the COI gene from Coleoptera, Lepidoptera, Diptera, Hemiptera, Odonata and presumably also other insects. BARCODE standard-compliant data were recovered from 67% (56 of 84) of specimens up to 25 years old, and 51% (102 of 197) of specimens up to 55 years old. Given the time, cost and specialist expertise required for fieldwork and identification, 'collecting in collections' is a viable alternative allowing researchers to capitalize on the knowledge captured by curation work in decades past." (Authors)] Address: Mitchell, A., Australian Museum Research Institute, Australian Museum, 6 College Street, Sydney, NSW, 2010, Australia

**15397.** Mitchell, A. (2015): Collecting in collections: a PCR strategy and primer set for DNA barcoding of decades-old dried museum specimens. *Molecular Ecology Resources* 15(5): 1102-1111. (in English) ["Natural history museums are vastly underutilized as a source of material for DNA analysis because of perceptions about the limitations of DNA degradation in older specimens. Despite very few exceptions, most DNA barcoding projects, which aim to obtain sequence data from all species, generally use specimens collected specifically for that purpose, instead of the wealth of identified material in museums, constrained by the lack of suitable PCR methods. Any techniques that extend the utility of museum specimens for DNA analysis therefore are highly valuable. This study first tested the effects of specimen age and PCR amplicon size on PCR success rates in pinned insect specimens, then developed a PCR primer set and amplification strategy allowing greatly increased utilization of older museum specimens for DNA barcoding. PCR success rates compare favourably with the few published studies utilizing similar aged specimens, and this new strategy has the advantage of being easily automated for high-throughput laboratory workflows. The strategy uses hemi-nested, degenerate, M13-tailed PCR primers to amplify two overlapping amplicons, using two PCRs per amplicon (i.e. four PCRs per DNA sample). Initial PCR products are reamplified using an internal primer and a M13 primer. Together the two PCR amplicons yield 559 bp of the COI gene from Coleoptera, Lepidoptera, Diptera, Hemiptera, Odonata and

presumably also other insects. BARCODE standard-compliant data were recovered from 67% (56 of 84) of specimens up to 25 years old, and 51% (102 of 197) of specimens up to 55 years old. Given the time, cost and specialist expertise required for fieldwork and identification, 'collecting in collections' is a viable alternative allowing researchers to capitalize on the knowledge captured by curation work in decades past." (Author)] Address: Mitchell, A., Australian Museum Research Institute, Australian Museum, Sydney, NSW, Australia. E-mail: Andrew.Mitchell@austmus.gov.au

**15398.** Mitra, B.; Ghosh, J.; Chakraborti, U.; Biswas, O.; Roy, S.; Roy, A.B. (2015): Entomofaunal diversity of Bhibhuti Bhusan Wildlife Sanctuary, West Bengal. *Journal of Global Biosciences* 4(7): 2795-2807. (in English) ["Bhibhuti Bhusan Wild Life Sanctuary is a protected area of West Bengal, having an area of approximately 0.64 square kilometer. A total of 241 species of 197 genera under 49 families belonging to seven orders (Collembola, Odonata, Hemiptera, Coleoptera, Diptera, Lepidoptera and Hymenoptera) are reported in this present communication. Of these, Lepidoptera shares maximum species (79) followed by Hemiptera (45), Coleoptera (33), Diptera (31), Odonata (27), Collembola (16) and Hymenoptera (10 species)." (Authors)] Address: Mitra, B., Zoological survey of India, M Block, New Alipore, Kolkata-53, India

**15399.** Mlynarek, J.J. (2015): Testing the enemy release hypothesis in a native insect species with an expanding range. *PeerJ* 3:e1415 <https://dx.doi.org/10.7717/peerj.1415>: 12 pp. (in English) ["The enemy release hypothesis (ERH) predicts that the spread of (invasive) species will be facilitated by release from their enemies as they occupy new areas. However, the ERH is rarely tested on native (non-invasive, long established) species with expanding or shifting ranges. I tested the ERH for *Enallagma clausum* whose range has recently expanded in western Canada, with respect to its water mite and gregarine parasites. Parasitism levels (prevalence and intensity) were also compared between *E. clausum* and a closely related species, *Enallagma boreale*, which has long been established in the study region and whose range is not shifting. A total of 1,150 damselflies were collected at three 'old' sites for *E. clausum* in Saskatchewan, and three 'new' sites in Alberta. A little more than a quarter of the damselflies collected were parasitized with, on average, 18 water mite individuals, and 20% were parasitized by, on average, 10 gregarine individuals. I assessed whether the differences between levels of infection (prevalence and intensity) were due to site type or host species. The ERH was not supported: *Enallagma clausum* has higher or the same levels of parasitism in new sites than old sites. However, *E. boreale* seems to be benefitting from the recent range expansion of a native, closely related species through ecological release from its parasites because the parasites may be choosing to infest the novel, potentially naïve, host instead of the well-established host." (Author)] Address: Mlynarek, Julia, Biology Department, University of Biology, Fredericton, New Brunswick, Canada

**15400.** Mlynarek, J.J.; Knee, W.; Smith, B.; Forbes, M.R. (2015): Regionally widespread parasitic water mites have relatively broad host species ranges. *Canadian Journal of Zoology* 93(10): 741-746. (in English) ["Certain parasite species have free-living stages so habitat range may influence host range. We tested whether regional occurrence and habitat use of parasitic water mites was related to their host species range. We collected 7445 *Arrenurus* mites from 7107 coenagrionid damselflies, representing 11 host species from 13 sites in southeastern Ontario and southwestern Quebec. Because larval water mite larvae are difficult to identify morphologically to species we chose to amplify the barcode fragment of cytochrome oxidase subunit 1 to explore host ranges. Fifteen Operational Taxonomic Units or clades were identified based on the amplification from 217 larval mites. The *Arrenurus* clades that were present in both bog and marsh habitats had a broader host species range than clades found only in marshes (the comparison with one clade found only in bogs lacked statistical power). As predicted, host species range increased with the regional occurrence of an *Arrenurus* clade. Additionally, the most commonly barcoded species also have high host species ranges. This result could be because species with broader host ranges are more common and were more likely to be sampled and barcoded (an explanation we favour), or due to sampling bias. Although this is the first study exploring whether habitat range affects host range, further investigation is needed to tease apart which habitat factors influence host species ranges the most." (Authors)] Address: Mlynarek, Julia, Department of Biology, Carleton University, Nesbitt Building, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: Julia.mlynarek@unb.ca

**15401.** Mlynarek, J.J.; Knee, W.; Forbes, M.R. (2015): Host phenology, geographic range size and regional occurrence explain interspecific variation in damselfly–water mite associations. *Ecography* 38(7): 670-680. (in English) ["In this study, we tested which host species' characteristics explain the nature and level of parasitism for host damselfly (*Coenagrionidae*)–water mite (*Arrenuridae*) parasite associations. Prevalence and intensity of mite parasites, and mite species richness were examined in relation to geographic range size, regional occurrence, relative local abundance, phenology and body size of host damselfly species. A total of 7107 damselfly individuals were collected representing 16 species from 13 sites in southeastern Ontario and southwestern Quebec, Canada. Using comparative methods, differences in prevalence and intensity of parasitism could be predicted by a host species' geographic range and phenology. Barcoding based on Cytochrome Oxidase I revealed 15 operational taxonomic units (OTUs) for mite species. The number of mite OTUs known to infest a given host species was explained by a host species' regional occurrence. Our findings demonstrate the need to measure factors at several ecological scales in order to understand the breadth of evolutionary interactions with host–parasite associations and the selective 'milieu' for particular species of both hosts and parasites." (Authors)] Address: Mlynarek, Julia, Dept of Biology, Carleton Univ., Nesbitt Building, 1125

Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: julia.mlynarek@carleton.ca

**15402.** Mochon, A. (2015): Les libellules du lac des Atocas au parc national du Mont-Saint-Bruno : découverte d'une population de l'aesche des nénuphars au Québec. *Le Naturaliste canadien* 139(2): 20-34. (in French, with English summary) ["An in-depth survey of Odonata was conducted in 2012 and 2013 at the lac des Atocas, a protected wetland within the Mont-Saint-Bruno National Park, located in the temperate deciduous bioclimatic zone of southern Québec, Canada. This small body of water, with peaty banks, covers an area of approximately 0.68 ha, and was used by 53 species of odonates, including more than 40 that live and complete their life cycle there. One of the highlights of the present study was the discovery of a population of *Rhionaeschna mutata*, which is a first for the province of Québec, and represents a northern extension of its known range. In addition, several of the other specimens identified were of species rarely reported in the province, and *Gomphaeschna furcillata* and *Libellula incesta* were new additions to the list for the Montérégie region. Finally, observations of exuviae and adults extended the known spring and fall flight periods for a dozen species" (Author)] Address: Mochon, A.; E-mail: mochon.alain@sepaq.com

**15403.** Moerland, A.; Wouter %A de Baerdemaeker, André %A Boesveld, Arno %A Grutters, Mark A. J. %A van de Poel, J.L. (2015): Rotterdam. In: J.G. Kelcey (ed.): *Vertebrates and Invertebrates of European Cities: Selected Non-Avian Fauna*. Springer New York: 453-494. (in English) ["Rotterdam is located on the west coast of continental Europe (51°55'51" N, 4°8'45" E). It is the second largest city in The Netherlands and occupies almost 320 km<sup>2</sup>, of which a little less than 115 km<sup>2</sup> is water. Rotterdam has a maritime temperate climate with a mild winter, a mean annual precipitation of 815 mm and a mean annual temperature of 10 °C. The average wind speed is 5 m/s. The dominant soil types are sand, sea clay and peat. This chapter is based on records of invertebrates that occurred within the boundaries of Rotterdam from 1 January 1980 until now. The chapter describes the Decapoda (in particular, the crayfish and crab families), 23 species; Diptera, Stratiomyidae (soldierflies), 17 species; Diptera, Syrphidae (hoverflies), 120 species; Heteroptera 'aquatica' (bugs—aquatic families), 31 species; Hymenoptera, Apidae s.l. (bees), 94 species; Lepidoptera (butterflies and moths), 35 and 1034 species, respectively; Mollusca (terrestrial and non-marine aquatic molluscs), 68 and 49 species; Odonata (dragonflies and damselflies), a total of 36 taxa; Orthoptera (grasshoppers and crickets), a total of 24 taxa. The figures include migrants, non-native species and vagrants. The species-richness of these groups of invertebrates is discussed and related to factors such as geomorphological features, geographical position and land use." (Authors)] Address: Moerland, W., Urban Ecology Research Unit, Natural History Museum Rotterdam, Westzeedijk 345, 3015 AA, Rotterdam, The Netherlands. E-mail: moerland@bureaustadsnatuur.nl



**15404.** Mohammed, N.E.M. (2015): Dragonfly nymphs as active predators of Cyclops and mosquito larvae. B.Sc (Hons.) (Zoology), Medical Entomology and vector control, University of Khartoum: XII + 68 pp. (in English, with Arab summary) [Sudan; "The aim of this study is to determine, the efficiency of Odonata full-grown nymphs, represented by certain species as active predators of Cyclops, the intermediate host of *Dracunculus medinensis*. Prey-organisms also used included beside Cyclops the 1st instar Culicine and Anopheline mosquito larvae. Five laboratory experiments were carried out and several variables were investigated. e. g. predation efficiency among full-grown nymphs of *Crocothemis erythraea*, *Aeshna rileyi*) and *Ischnura segenalensis* and predation capacity of members of these families. To test this variable, 50 and then 100 specimens of *Mesocyclops aspericornis* and one full-grown nymph were used in each experiment. Experiments were repeated five times, Relative vulnerability of *Mesocyclops aspericornis* versus Anopheline or Culicine larvae (1st stage), was determined using *I. segenalensis* nymph, twenty-five organisms of each prey animal were used. Variables also included presence or absence of substrata and colour of background. To test these twenty-five *Mesocyclops aspericornis* with one full-grown nymph of *I. segenalensis* were used in each experiment. All experiments were carried out (at room temperature), experiments were conducted using small "Talis" dishes and depth of water was 5cm and surface diameter of water was 16.1cm. Numbers of prey-organisms were recorded after 24hrs. Wild Odonata nymphs and Cyclops were used. Results of predation capacity revealed that the average percent of Cyclops eaten by full-grown nymphs of *Coenagrionidae* was greater (46.4%) than *Libellulidae* (30.6%) and *Aeshnidae* (28.6%). This means that *I. segenalensis* nymph is the most voracious compared to the other two species). Results of vulnerability tests showed that the mean percent of 1st stage Culicine iv larvae consumed by *I. segenalensis* (53.97%) was greater than that of Cyclops (33.94%) and for *Anopheles* larvae consumed the percentage was (64.63%) and for Cyclops (33.66) this means that Culicine and Anopheline larvae were more vulnerable to predation than Cyclops; however Anopheline larvae were more vulnerable than Culicine ones. Similarly experiments on substrata showed that the mean percent of Cyclops eaten from water without plant substrata (42.47%) was greater than that eaten with floating plant substrata (19.68%). This means that presence of substrata did not enhance predation by *I. segenalensis*. As for colours result obtained showed that the mean percent of Cyclops which were eaten by *I. segenalensis* nymphs was greater in white colour background (63.51%) compared to other background colours: red (22.37%), blue (26.62%), green (29.61%) and black ( 22.01 %) and the differences between white colour and other colours were highly significant, ( $P=0.01$ ) on the other hand no significant difference was detected among other four colours. This means that White colour of background did enhance predation." (Author)] Address: not stated

**15405.** Moldowan, P.D.; Keevil, M.G.; Mills, P.B.; Brooks, R.J.; Litzgus, J.D. (2015): Diet and feeding behaviour of

Snapping Turtles (*Chelydra serpentina*) and Midland Painted Turtles (*Chrysemys picta marginata*) in Algonquin Provincial Park, Ontario. *The Canadian Field-Naturalist* 129(4): 403-408. (in English) ["We compare diet and feeding behaviour of Snapping Turtles (*Chelydra serpentina*) and Midland Painted Turtles (*Chrysemys picta marginata*) in Algonquin Provincial Park, Ontario, Canada. We observed young *Chelydra* and *Chrysemys* turtles feeding on insect and amphibian larvae in ephemeral ponds, adult *Chrysemys* terrestrially foraging on odonate larvae, and adult *Chelydra* consuming aquatic vegetation and seeds. These and other observations highlight the importance of seasonally available habitat and food for juvenile turtles. We also discuss the evidence for, and importance of, turtles as seed-dispersal agents for aquatic vegetation. Illustrative video recordings accompany our dietary observations.... On 22 May 2011, an adult female *Chrysemys* was seen climbing onto Sphagnum bog mats to catch emergent dragonfly larvae that were preparing to metamorphose (Video 4, Supplementary Material: <https://www.youtube.com/watch?v=Z7LNdafj1HQ&feature=youtu.be>). The turtle appeared to search actively for terrestrial prey and to identify visually motionless dragonfly larvae. This turtle plucked dragonfly larvae from low-lying stems of bog vegetation and carried her prey back to water before feeding. Freshwater turtles have a soft, flattened eye lens that permits emmetropic (normal-sighted) vision and comparable focus in air and water ..., perhaps allowing efficient foraging in both media." (Authors)] Address: Litzgus, J.D., Dept Biology, Laurentian Univ., 935 Ramsey Lake Road, Sudbury, Ontario P3E 2C6 Canada. E-mail: [jlitzgus@laurentian.ca](mailto:jlitzgus@laurentian.ca)

**15406.** Monroe, E.M.; Britten, H.B. (2015): Single-sample estimation of effective population size in several populations of the endangered Hine's emerald dragonfly. *Freshwater Science* 34(3): 1058-1064. (in English) ["*Somatochlora hineana* is the only odonate on the US Endangered Species list. It prefers discrete fen-and-wet-meadow habitat from Ontario, Canada, to Missouri, USA. This habitat has been destroyed across much of *S. hineana*'s range. Its conservation genetics were assessed by microsatellite analysis in a previous study. We applied 2 common single-sample estimators to the same data set to estimate effective population size ( $N_e$ ), or effective number of breeders, in 5 populations (separated into adult and naiad stage classes) across the species' range in 2008 and 2010–2011. Populations of the species in the Upper Peninsula of Michigan, the Door Peninsula of Wisconsin, and along the Des Plaines River Valley in Illinois are made up of individuals collected from multiple sites, but the other 2 populations, at Cedarburg Bog, Wisconsin, and along the Lower Wisconsin River, consist of samples from single habitats disjunct from other known sites.  $N_e$  for *S. hineana* were similar to those for other endangered insects and ranged from 22 adults in the Des Plaines River Valley population in 2010 to 200 adults in the Door Peninsula population in 2010 based on approximate Bayesian estimation in ONeSAMP and from 8 naiads in the Door Peninsula population to 419 adults in the Des Plaines River Valley population based on the linkage disequilibrium

method in NeEstimator. These Ne values confirm the endangered status of this species and indicate that efforts to maintain current habitats and connectivity to suitable habitat are essential to maintaining genetic diversity." (Authors)] Address: Monroe, Emy, Whitney Genetics Lab, US Fish and Wildlife Service, 555 Lester Avenue, Onalaska, Wisconsin 54650 USA. E-mail: emy\_monroe@fws.gov

**15407.** Mora, A.; Farkas, A. (2015): First records of *Erythromma lindenii* (Selys, 1840) from Hungary (Odonata: Coenagrionidae). *Notulae odonologicae* 8(6): 169-175. (in English) ["The first records of *E. lindenii* from Hungary are presented. In 2014 larvae, exuviae, and adults of *E. lindenii* were collected along running waters in the Kis-Sárrét area, located in the southeastern part of the country. The current knowledge of *E. lindenii* in Hungary is summarized and notes on the habitat of the species are provided." (Authors)] Address: Móra, A., MTA Centre for Ecological Research, Balaton Limnological Institute, Klebelsberg Kuno 3, 8237 Tihany, Hungary. E-mail: mora.arnold@okologia.mta.hu

**15408.** Mori, T.; Yanagisawa, Y.; Kitani, Y.; Sugiyama, M.; Kishida, O.; Nishimura, K. (2015): Gene expression profiles in *Rana pirica* tadpoles following exposure to a predation threat. *BMC Genomics* 2015, 16:258 doi:10.1186/s12864-015-1389-4: 17 pp. (in English) ["Background: *Rana pirica* tadpoles show morphological changes in response to a predation threat: larvae *Aeshna nigroflava* (= *A. crenata*) induce heightened tail depth, whereas larval salamander *Hynobius retardatus* induce a bulgy morphology with heightened tail depth. Although both predators induce similar tail morphologies, it is possible that there are functional differences between these tail morphs. Results; Here, we performed a discriminant microarray analysis using *Xenopus laevis* genome arrays to compare tail tissues of control and predator-exposed tadpoles. We identified 9 genes showing large-scale changes in their expression profile: ELAV-like1, methyltransferase like 7A, dolichyl-phosphate mannosyltransferase, laminin subunit beta-1, gremlin 1, BCL6 corepressor-like 1, and three genes of unknown identity. A further 80 genes showed greater than 5 fold differences in expression after exposure to dragonfly larvae and 81 genes showed altered expression after exposure to larval salamanders. Predation-threat responsive genes were identified by selecting genes that reverted to control levels of expression following removal of the predator. Thirteen genes were induced specifically by dragonfly larvae, nine others were salamander-specific, and sixteen were induced by both. Functional analyses indicated that some of the genes induced by dragonfly larvae caused an increase in laminins necessary for cell adhesion in the extracellular matrix. The higher expression of gremlin 1 and HIF1a genes after exposure to dragonfly larvae indicated an in vivo hypoxic reaction, while down-regulation of syndecan-2 may indicate impairment of angiogenesis. Exposure to larval salamanders caused down-regulation of XCIRP-1, which is known to inhibit expression of adhesion molecules; the tadpoles showed reduced expression of ca(E)-catenin, small muscle

protein, dystrophin, and myosin light chain genes. Conclusion: The connective tissue of tadpoles exposed to larval salamanders may be looser. The differences in gene expression profiles induced by the two predators suggest that there are functional differences between the altered tail tissues of the two groups of tadpoles." (Authors)] Address: Mori, T., Dept of Marine Science & Resources, Nihon Univ. College of Bioresource Sciences, Kameino 1866, Fujisawa 252-0880, Japan. E-mail: mori.tsukasa@nihon-u.ac.jp

**15409.** Mougnot, T.; Bouttier, E. (2015): Bilan provisoire Inventaire des odonates Printemps-été 2015. Atlas de la Biodiversité à Melesse. Bretagne vivante: 7 pp. (in French) [For a full version of the publication see: [http://www.melesse.fr/content/download/16077/145570/file/Inventaire%20participatif%20Volet%20odonate1-EB %20\(2\).pdf](http://www.melesse.fr/content/download/16077/145570/file/Inventaire%20participatif%20Volet%20odonate1-EB%20(2).pdf)] Address: not stated

**15410.** Müller, J.; Steglich, R. (2015): Beitrag zur Libellenfauna (Odonata) im Genthiner Land und Baruther Urstromtal. In: Entomologen-Vereinigung Sachsen-Anhalt e.v. (Hrsg.): Entomofaunistische Untersuchungen im Genthiner Land: 43-48. (in German) [Sachsen-Anhalt, Germany; between 2012 and 2014, 22 odonate species were recorded.] Address: Müller, J., Frankefelde 3, 39116 Magdeburg, Germany. E-mail: FaunOek.JMueller@t-online.de

**15411.** Murányi, D.; Katona, G.; Fekete, J.; Kovács, T. (2015): Review and contribution to the Odonata of Salaj county, Romania. *Studia Universitatis "Vasile Goldis", Seria Stiintele Vietii* 25(4): 250-253. (in English) [An annotated list of 17 Odonata species from Sălaj county, Romania, collected in 2014 and 2015 are given. *Calopteryx virgo*, *Lestes viridis*, *Coenagrion pulchellum*, *Ischnura pumilio*, *I. elegans pontica*, *Aeshna affinis*, *A. cyanea*, *Cordulegaster heros*, *Somatochlora meridionalis*, *Libellula depressa*, *Orthetrum coerulescens* and *O. brunneum* are new records for the area.] Address: Murányi, D., Dept of Civil & Environmental Engineering, Ehime Univ., Matsuyama and Department of Zoology, Hungarian Natural History Museum, Budapest

**15412.** Murugan, K.; Dinesh, D.; Kumar, P.J.; Panneerselvam, C.; Subramaniam, J.; Madhiyazhagan, P.; Suresh, U.; Nicoletti, M.; Alarfaj, A.A.; Munusamy, M.A.; Higuchi, A.; Mehlhorn, H.; Benelli, G. (2015): *Datura metel*-synthesized silver nanoparticles magnify predation of dragonfly nymphs against the malaria vector *Anopheles stephensi*. *Parasitology Research* 114(12): 4645-4654. (in English) ["Malaria is a life-threatening disease caused by parasites transmitted to people and animals through the bites of infected mosquitoes. The employ of synthetic insecticides to control *Anopheles* populations leads to high operational costs, non-target effects, and induced resistance. Recently, plant-borne compounds have been proposed for efficient and rapid extracellular synthesis of mosquitocidal nanoparticles. However, their impact against predators of mosquito larvae has been poorly studied. In this study, we synthesized silver nanoparticles (AgNPs) using the *Datura*

metel leaf extract as reducing and stabilizing agent. The biosynthesis of AgNPs was confirmed analyzing the excitation of surface plasmon resonance using ultraviolet–visible (UV–vis) spectroscopy. Scanning electron microscopy (SEM) showed the clustered and irregular shapes of AgNPs, with a mean size of 40–60 nm. The presence of silver was determined by energy-dispersive X-ray (EDX) spectroscopy. Fourier transform infrared (FTIR) spectroscopy analysis investigated the identity of secondary metabolites, which may be acting as AgNP capping agents. In laboratory, LC50 of *D. metel* extract against *Anopheles stephensi* ranged from 34.693 ppm (I instar larvae) to 81.500 ppm (pupae). LC50 of AgNP ranged from 2.969 ppm (I instar larvae) to 6.755 ppm (pupae). Under standard laboratory conditions, the predation efficiency of *Anax immaculifrons* nymphs after 24 h was 75.5 % (II instar larvae) and 53.5 % (III instar larvae). In AgNP-contaminated environment, predation rates were boosted to 95.5 and 78 %, respectively. Our results documented that *D. metel*-synthesized AgNP might be employed at rather low doses to reduce larval populations of malaria vectors, without detrimental effects on behavioral traits of young instars of the dragonfly *Anax immaculifrons*." (Authors)] Address: Murugan, K., Division of Entomology, Dept Zoology, School of Life Sciences, Bharathiar Univ., Coimbatore, 641046, Tamil Nadu, India

**15413.** Muthukumaravel, K.; Bose Raja, R.; Amsath, A.; Prabakaran, S.; Chezhian, Y. (2015): Seasonal variation of dragonflies diversity in muthupet mangrove forest Tamil Nadu India. *International Journal of Pure and Applied Zoology* 382): 188-192. (in English) [In 2014, *Rhyothemis variegata*, *Anax guttatus*, *Pantala flavescens*, *Brachythemis contaminata*, *Orthetrum sabina*, *Diplacodes trivialis*, *Crocothemis servilia* and *Tamea basilaris* were sampled.] Address: Muthukumaravel, K., Department of Zoology, Khadir Mohideen College, Adirampattinam-614 701, Tamil Nadu, India. E-mail: kumar\_phd\_2003@yahoo.co.in,

**15414.** Mutlu, O.; Ulak, G.; Kokturk, S.; Celikyurt, I.K.; Tanyeri, P.; Akar, F.; Erden, F. (2015): Effects of a dragonfly (*Anax i.*) homeopathic remedy on learning, memory and cell morphology in mice. *Homeopathy* 105(1): 96-101. (in English) ["Highlights: •*Anax i.* impair learning acquisition. •*Anax i.* chronically impair reference memory. •*Anax i.* improved disturbed cell morphology. Background: Homeopathy is a form of alternative medicine in which uses highly diluted preparations that are believed to cause healthy people to exhibit symptoms similar to those exhibited by patients. The aim of this study was to investigate the effects of dragonfly (*Anax imperator*, *Anax i.*) on learning and memory in naive mice using the Morris water maze (MWM) test; moreover, the effects of dragonfly on MK-801-induced cognitive dysfunction were evaluated. Methods: Male balb-c mice were treated with dragonfly (30C and 200C) or MK-801 (0.2 mg/kg) alone or concurrently (n = 10). Dragonfly (D) and MK-801 were administered subchronically for 6 days intraperitoneally 60 min and 30 min, respectively, before the daily performance of the MWM test. Results: This study revealed that in the familiarization session and first session of

the MWM test, *Anax i.* D30 significantly decreased escape latency compared to the control group, although MK-801, D30 and D200 significantly increased escape latency at the end of five acquisition sessions. *Anax i.* combined with dizocilpine maleate (MK-801) also significantly decreased escape latency in the familiarization session and first session of the MWM test, although this combination increased escape latency compared to the MK-801 alone group at the end of the test. Time spent in escape platform's quadrant in the probe trial significantly decreased while mean distance to platform significantly increased in MK-801, D30 and D200 groups. In the MWM test, *Anax i.* combined with MK-801 significantly decreased speed of the animals compared to the MK-801 alone group. General cell morphology was disturbed in the MK-801 group while D30 and D200 seemed to improve cell damage in the MK-801 group. Conclusions: These results suggest that the homeopathic *Anax i.* can impair learning acquisition and reference memory, and it has beneficial effects on disturbed cell morphology." (Authors)] Address: Mutlu, O., Dept of Pharmacology, Medical Faculty, Kocaeli Univ., 41380, Kocaeli, Turkey. E-mail: oguzmutlu80@hotmail.com

**15415.** Nair, G.A.; Morse, J.C.; Marshall, S.A. (2015): Aquatic insects and their societal benefits and risks. *Journal of Entomology and Zoology Studies* 3(3): 171-177. (in English) ["Information on the aquatic insects and their benefits and risks to the society are scanty among the general public, students and the scientific community, when compared with the same on the land forms. In this article, an attempt is made to overcome this deficiency. A brief description is furnished along with the representative photographs of eleven orders of aquatic insects (including Odonata). Detailed information is presented on the beneficial role of aquatic insects in food webs, biomonitoring, fishing and control of noxious weeds. The harmful impacts caused by these animals to the society and the ecosystem by way of general nuisance, transmission of diseases and destruction of crops, are described. The importance of the need for a new generation of aquatic entomologists, is stressed." (Authors)] Address: Nair, G.A., Environmental Resources Research Centre (ERRC), P.B. 1230, Peroorkada, Thiruvananthapuram-695005 Kerala State, India. E-mail: trivandrum46@gmail.com

**15416.** Natsumeda, T.; Takamura, N.; Nakagawa, M.; Kadono, Y.; Tanaka, T.; Mitsushashi, H. (2015): Environmental and biotic characteristics to discriminate farm ponds with and without exotic largemouth bass and bluegill in western Japan. *Limnology* 16(3): 139-148. (in English) ["We compared the environmental and biotic characteristics of farm ponds with and without the invasive fish, largemouth bass (*Micropterus salmoides*), and bluegill (*Lepomis macrochirus*), with varying degrees of aquatic vegetation cover in western Japan. Redundancy analysis (RDA) revealed that aquatic vegetation cover and pond area were significant environmental variables in explaining the variance in aquatic organisms. Aquatic vegetation cover predominantly affected Odonata and Hemiptera larvae, and the native cyprinid, *Hemigrammocypripis rasborella*, while the pond area



mainly affected the two exotic fishes (largemouth bass and bluegill), Viviparidae, Oligochaeta, Ephemeroptera, and chironomid larvae. In the RDA biplot for aquatic organisms, the RDA1 axis appeared to separate the exotic fish group (bluegill, largemouth bass, Gammaridae, Oligochaeta, Viviparidae, Ephemeroptera, Trichoptera, and chironomid larvae) from the native fish group (*H. rasborella*, *Oryzias latipes*, *Rhinogobius* sp., Odonata, shrimps, and Hemiptera larvae). The best path model results indicated that the presence of piscivorous largemouth bass had a significantly negative effect on native fish numbers; largemouth bass also had a positive indirect effect on benthic organism numbers. Our data suggest that the depletion of native fishes via top-down effects by exotic largemouth bass may indirectly increase the number of benthic organisms as a result of trophic-cascading effects." (Authors)] Address: Natsumeda, T., Global Environmental Forum, Tsukuba, Ibaraki, 305-8506, Japan. E-mail: natsumed@mx.ibaraki.ac.jp

**15417.** Nel, A.; Huang, D. (2015): A new genus and species of damsel-dragonfly (Odonata: Stenophlebiidae) from the Lower Cretaceous of Inner Mongolia, China. *Cretaceous Research* 56: 421-425. (in English) ["A taxon of the Stenophlebiidae, *Yixianstenophlebia magnifica* gen. et sp. nov., is described from the Lower Cretaceous Yixian Formation at Liutiaogou, Ningcheng County, Inner Mongolia of China. Its closest relative is the Late Jurassic European genus *Stenophlebia*. This new discovery is helpful to understand the Jehol Biota assemblage at Liutiaogou Locality. It also confirms that the Stenophlebiidae was a very diverse and widespread family during the Early Cretaceous. The causes of its extinction in the Late Cretaceous remain enigmatic." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**15418.** Nel, A.; Huang, D.Y. (2015): A new family of 'libelluloid' dragonflies from the Middle Jurassic of Daohugou, northeastern China (Odonata: Anisoptera: Cavilabiata). *Alcheringa* 39: 525-529. (in English) ["A new well-preserved Middle Jurassic fossil of Cavilabiata is described and attributed to a new family (Daohugoulibellulidae), genus and species (*Daohugoulibellula lini*), from the Daohugou beds of China. Together with examples of *Juralibellulidae* from the same outcrop, they represent the oldest records of the Cavilabiata. The potential closest relative of the new family could be the Late Jurassic *Nannogomphidae*, suggesting a significant diversity of Cavilabiata during the Middle Jurassic." (Authors)] Address: Huang, D., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, PR China. E-mail: dyhuang@nigpas.ac.cn

**15419.** New, T.R. (2015): Vincent Kalkman and Albert Orr: Field guide to the damselflies of New Guinea. *Journal of Insect Conservation* 19(1): 181-182. (in English) ["This field guide, published as a supplement to the Dutch dragonfly journal *Brachytron*, is a welcome and unusual production.

Superbly illustrated by nearly 300 meticulous colour paintings and about 250 line drawings by Dr. Orr, and augmented by a series of colour photographs of living damselflies by Stephen Richards, it brings together the highly scattered information on the damselflies of this large and complex island to form a concise, informative and accessible account. 'Field guides' are perhaps an unusual theme for review in this Journal, but two innovative features vastly enhance the values of this one and deserve consideration for much wider adoption. First, more than 500 copies (of a print run of 1200) are being donated to universities throughout New Guinea, for easy access and use by students within the region (with the hope expressed that they will rapidly become dog-eared through use!). Second, the book is bilingual, with the entire text in both English and Bahasa Indonesian. ...] Address: New, T.R., Dept of Zoology, La Trobe University, Victoria, 3086, Australia. E-mail: T.New@latrobe.edu.au

**15420.** Newell Wohner, P.J.; Cooper, R.J.; Greenberg, R.S.; Schweitzer, S.H. (2015): Weather affects diet composition of rusty blackbirds wintering in suburban landscapes. *The Journal of Wildlife Management* 80(1): 91-100. (in English) ["The rusty blackbird (*Euphagus carolinus*) is a species of conservation concern throughout its range and the cause of the species' population decline is unknown. We studied diet composition of rusty blackbirds with stable isotope mixing models in suburban landscapes in the southeastern United States. We captured blackbirds in Georgia and South Carolina from 2009 to 2012, and estimated proportions of earthworm, other animals, pecan, and acorn incorporated into individual diets. On the Piedmont Plateau, terrestrial and aquatic earthworms constituted the largest proportion incorporated into the diet ( $39\% \pm 2.9$ ; mean  $\pm$  SD by site and year) and animals other than earthworms (mostly larval invertebrates Odonata and Diptera) constituted  $27\% \pm 12.9$ . In contrast, on the Coastal Plain, which featured milder winters than the Piedmont, earthworms constituted a lower proportion ( $19\% \pm 1.2$ ) of incorporated food items and animals other than earthworms comprised  $62\% \pm 3.3\%$  of the diet. Increased incorporation of earthworms in the diet was related to increased upcoming precipitation and daily maximum temperature. Rusty blackbirds incorporated more tree mast into their diet on the Piedmont Plateau than the Coastal Plain. Increased incorporation of tree mast was related to advancing cold temperature. Mast, including crushed pecans (*Carya illinoensis*) and pre-opened small-seeded red oak (*Quercus* spp.) acorns, is a high-lipid dietary component of blackbirds wintering in colder climates, and is incorporated prior to extreme cold weather. Therefore, planting mast trees, especially lipid-rich pecan, could be used to augment resources in known rusty blackbird wintering hotspots. Maintaining shallowly flooded wetlands with a fluctuating water regime and residential lawns with abundant red oak (*Quercus* spp.) leaf litter would promote acorn and invertebrate resources including earthworms." (Authors)] Address: Newell Wohner, Patti, Warnell School of Forestry and Natural Resources, Univ. of Georgia, Athens, GA 30602, USA. E-mail: pjwohner@gmail.com

**15421.** Nicholson, D.B.; Mayhew, P.J.; Ross, A.J. (2015): Changes to the fossil record of insects through fifteen years of discovery. *PLoS ONE* 10(7): e0128554. doi:10.1371/journal.pone.0128554: 61 pp. (in English) ["The first and last occurrences of hexapod families (including Odonata) in the fossil record are compiled from publications up to end-2009. The major features of these data are compared with those of previous datasets (1993 and 1994). About a third of families (>400) are new to the fossil record since 1994, over half of the earlier, existing families have experienced changes in their known stratigraphic range and only about ten percent have unchanged ranges. Despite these significant additions to knowledge, the broad pattern of described richness through time remains similar, with described richness increasing steadily through geological history and a shift in dominant taxa, from Palaeoptera and Polyneoptera to Paraneoptera and Holometabola, after the Palaeozoic. However, after detrending, described richness is not well correlated with the earlier datasets, indicating significant changes in shorter-term patterns. There is reduced Palaeozoic richness, peaking at a different time, and a less pronounced Permian decline. A pronounced Triassic peak and decline is shown, and the plateau from the mid Early Cretaceous to the end of the period remains, albeit at substantially higher richness compared to earlier datasets. Origination and extinction rates are broadly similar to before, with a broad decline in both through time but episodic peaks, including end-Permian turnover. Origination more consistently exceeds extinction compared to previous datasets and exceptions are mainly in the Palaeozoic. These changes suggest that some inferences about causal mechanisms in insect macroevolution are likely to differ as well." (Authors)] Address: Nicholson, D.B., Department of Biology, University of York, York, UK. E-mail: david.nicholson@nhm.ac.uk

**15422.** Nilsson-Örtman, V.; Rogell, B.; Stoks, R.; Johansson, F. (2015): Ontogenetic changes in genetic variances of age-dependent plasticity along a latitudinal gradient. *Heredity* 115(4): 366-378. (in English) ["The expression of phenotypic plasticity may differ among life stages of the same organism. Age-dependent plasticity can be important for adaptation to heterogeneous environments, but this has only recently been recognized. Whether age-dependent plasticity is a common outcome of local adaptation and whether populations harbour genetic variation in this respect remains largely unknown. To answer these questions, we estimated levels of additive genetic variation in age-dependent plasticity in six species of damselflies sampled from 18 populations along a latitudinal gradient spanning 3600km. We reared full sib larvae at three temperatures and estimated genetic variances in the height and slope of thermal reaction norms of body size at three points in time during ontogeny using random regression. Our data show that most populations harbour genetic variation in growth rate (reaction norm height) in all ontogenetic stages, but only some populations and ontogenetic stages were found to harbour genetic variation in thermal plasticity (reaction norm slope). Genetic variances in reaction norm height differed among species, while genetic variances in reaction norm

slope differed among populations. The slope of the ontogenetic trend in genetic variances of both reaction norm height and slope increased with latitude. We propose that differences in genetic variances reflect temporal and spatial variation in the strength and direction of natural selection on growth trajectories and age-dependent plasticity. Selection on age-dependent plasticity may depend on the interaction between temperature seasonality and time constraints associated with variation in life history traits such as generation length." (Authors) *Coenagrion armatum*, *C. johanssoni*, *C. puella*, *C. pulchellum*, *C. mercuriale*, *C. scitulum*] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**15423.** Novelo-Gutiérrez, R.; Gómez-Anaya, J.A.; Smith-Gómez, S.A. (2015): Description of the larva of *Epigomphus crepidus* Kennedy, 1936 (Odonata: Gomphidae). *Zootaxa* 4027(4): 587-592. (in English, with Spanish summary) ["The larva of *E. crepidus* is described and figured and compared with other described congeners. It is characterized by 3rd antennomere spindle-shaped, flattened dorso-ventrally, twice longer than its widest part; ventral pad of hypopharynx pentagonal; prementum subrectangular, with lateral margins slightly convex on apical 0.60; ligula very poorly developed, with a ventral row of nine short, truncate teeth on middle, and dorsal rows of short, stout piliform setae. Abdomen lacking dorsal protuberances, lateral spines on S7-9 divergent; sternites 3-8 divided into five plates, sternites 2 and 9 divided into three plates; male epiproct with a pair of dorsal tubercles rounded apically and divergent at basal 0.30. It differs from other species mainly in 3rd antennomere, sides of prementum and serrations on lateral margins of S7-9." (Authors)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.mx

**15424.** Novikmec, M.; Veselska, M.; Bitušik, P.; Hamerlík, L.; Matúšová, Z.; Klementová, B.R.; Svitok, M. (2015): Checklist of benthic macroinvertebrates of high altitude ponds of the Tatra Mountains (Central Europe) with new records of two species for Slovakia. *Check List* 11(1) (Art. 1522): 1-12. (in English) [The following Odonata taxa are listed: *Platycnemis pennipes*, *Pyrrhosoma nymphula*, *Coenagrionidae* spp. juv., *Aeshna cyanea*, *A. juncea*, *Aeshna* spp. juv., *Somatochlora metallica*, *Somatochlora* sp. and *Sympetrum danae*.] Address: Novikmec, M., Fac. Ecology & Environmental Sciences, Technical Univ. in Zvolen, T. G. Masaryka 24, SK-960 53 Zvolen, Slovakia. E-mail: novikmec@tuzvo.sk

**15425.** Novikmec, M.; Hamerlík, L.; Svitok, M.; Matúšová, Z.; Bitušik, P. (2015): Remarkable faunistic records of aquatic insects from streams of the Kremnické vrchy Mountains, Slovakia. *Lauterbornia* 79: 51-57. (in English, with German summary) [Kremnické vrchy Mts. are a volcanic mountain range located in the middle of Slovakia (the West Carpathians, 48°41' N, 18°55' E) and belong to the catchment of Hron river, a tributary of the Danube. The sampling

was carried out at 15 localities in May, August and October 2013. The rare and red-listed species *Cordulegaster bidentata* was recorded at two sampling points.] Address: Novikmec, M., Department of Biology and General Ecology, Faculty of Ecology and Environmental Sciences, Technical University in Zvolen, T. G. Masaryka 24, SK-960 53 Zvolen, Slovakia. E-mail: novikmec@tuzvo.sk

**15426.** Nowak, A. (2015): Application of Voronoi diagrams in contemporary architecture and town planning. *Challenges of Modern Technology* 6(2): 30-34. (in English) ["Modern design methods rely increasingly on understanding the nature of processes and principles of self-organization of biological structures and their representation using mathematical models that may apply in technology, including architecture. As a result, bionic design elements play a more meaningful role in shaping contemporary architecture and urban planning. The development of computer technology has made it possible to create more complex and complicated structures and surfaces inspired by natural forms. The inspiration for the discretization of the surface, using the Voronoi diagram, as seen in the honeycomb structure or the dragonfly wing, is increasingly applied in shaping the elevation of contemporary buildings. As a mathematical problem, the division of space fascinates scientists as well as architects. Consequently, architects use the spatial Voronoi cells also in shaping the structural forms. Today Voronoi diagrams are an important source of inspiration for architects and urban planners as a surface discretization method and a way of creating structural elements or spatial forms and as flooring patterns in urban projects. The use of mathematical models represent the structure and organization of the forms found in nature, which is increasingly used in the multidisciplinary architectural design. The design of the structures and elements both in architecture and urban planning using methods of computational geometry makes new opportunities for architectural and urban projects as seen by the Voronoi tessellation." (Author)] Address: Nowak, Anna, Warsaw University of Technology, Faculty of Architecture, Department of Structural Design, Construction and Technical Infrastructure, Koszykowa 55, 00-659 Warsaw, Poland. E-mail: anna.patrycja.nowak@gmail.com

**15427.** Nowlin, K.; Boseman, A.; Covell, A.; LaJeunesse, D. (2015): Adhesion-dependent rupturing of *Saccharomyces cerevisiae* on biological antimicrobial nanostructured surfaces. *Journal of The Royal Society Interface* 12(102): 12 pp. (in English) ["Recent studies have shown that some nanostructured surfaces (NSS), many of which are derived from surfaces found on insect cuticles, rupture and kill adhered prokaryotic microbes. Most important, the nanoscale topography is directly responsible for this effect. Although parameters such as cell adhesion and cell wall rigidity have been suggested to play significant roles in this process, there is little experimental evidence regarding the underlying mechanisms involving NSS-induced microbial rupture. In this work, we report the NSS-induced rupturing of a eukaryotic microorganism, *Saccharomyces cerevisiae*. We

show that the amount of NSS-induced rupture of *S. cerevisiae* is dependent on both the adhesive qualities of the yeast cell and the nanostructure geometry of the NSS. Thus, we are providing the first empirical evidence that these parameters play a direct role in the rupturing of microbes on NSS. Our observations of this phenomenon with *S. cerevisiae*, particularly the morphological changes, are strikingly similar to that reported for bacteria despite the differences in the yeast cell wall structure. Consequently, NSS provide a novel approach for the control of microbial growth and development of broad-spectrum microbicidal surfaces. ... The wings of ... *Progomphus obscurus* were all collected from Greensboro, NC, USA." (Authors)] Address: Nowlin, Kyle, Department of Nanoscience, Joint School of Nanoscience and Nanoengineering, University of North Carolina Greensboro, 2907 East Lee Street, Greensboro, NC 27455, USA. E-mail: drlajeun@uncg.edu

**15428.** Okoro, O.J. (2015): Ecology of aquatic insects in Opi lake, Enugu state, Nigeria. M.Sc. Thesis, Department of Zoology and Environmental Biology, Faculty of Biological Sciences, University of Nigeria Nsukka: 110 pp. (in English) ["The ecology of aquatic insects of Opi Lake was carried out to determine their composition, abundance and diversity from February to July, 2014. Adult insects of different species were collected from the water surface using a dip-net with Nytex® netting of 500µm mesh. In addition, adult Insects and nymphs were collected from the vegetation around the lake using a sweep net with mesh size of 250µm, while bottom dwellers were sampled using a scoop net. The lake was divided into three sampling stations as a result of the nature and amount of the vegetation, and the type of substratum found in each location. Station 1 had vegetation, shade and detritus, Station 2 had no shade, very little detritus and vegetation, while Station 3 had shade, detritus with no vegetation. The physico-chemical parameters and heavy metals concentrations of the lake were determined while the climatic data of the area was collected from the Center for Space Science University of Nigeria Nsukka. A total number of 1,042 insects representing 30 species, belonging to 26 families and 8 orders were recorded. Odonata had the highest mean abundance (44.52%) in all the stations, followed by Hemiptera (23.32%) which was the most diverse group. Hemiptera had the highest number of families (8 out of the 26 families collected). Other insect orders collected with their abundance include: Coleoptera (12.28%), Orthoptera (10.29%), Hymenoptera (5.09%), Diptera (3.36%), Trichoptera (1.06%) and Lepidoptera (0.01%). Station 1 recorded the maximum number (46.35%) of aquatic insects throughout the sampling season. However, stations 2 and 3 recorded 28.98% and 24.66% of aquatic insects respectively. The abundance of insects was maximum in the month of July (20.44%) and minimum in April (8.16%). The abundance and distribution of insect species varied and were not constant from one month to another during the period of study, due to biotic and abiotic factors. There was high species diversity of aquatic insects in the different strata of the lake, indicating



the rich and diverse group of insects in the study area. Dissolved Oxygen had an inverse relationship with Orthoptera ( $r = -0.63$ ,  $p < 0.01$ ) and Hymenoptera ( $r = -0.54$ ,  $p < 0.05$ ). Diptera also had negative relationship with depth ( $r = -0.48$ ,  $p < 0.05$ ). There was positive correlation between Hemiptera and Copper ( $r = 0.78$ ,  $p < 0.01$ ), while Iron also correlated positively with Coleoptera ( $r = 0.47$ ,  $p < 0.05$ ) and Lepidoptera ( $r = 0.59$ ,  $p < 0.05$ ). Among the insects and zooplankton, Odonata had positive correlations with Rotifera ( $r = 0.502$ ,  $p < 0.05$ ), Cyclops ( $r = 0.541$ ,  $p < 0.05$ ), Bosmina ( $r = 0.53$ ,  $p < 0.05$ ) and Daphnia ( $r = 0.595$ ,  $p < 0.01$ ). Orthoptera also showed positive relationship with Fish egg ( $r = 0.684$ ,  $p < 0.01$ ). Also, with phytoplankton, Odonata had positive relationship with Chlorophyceae ( $r = 0.505$ ,  $p < 0.05$ ) and Xanthophyceae ( $r = 0.499$ ,  $p < 0.05$ ). Orthoptera correlated positively with Cryptophyceae ( $r = 0.491$ ,  $p < 0.05$ ) and Xanthophyceae ( $r = 0.487$ ,  $p < 0.05$ ). This therefore, adds to the fact that undisturbed habitat quality is more suitable for insects to breed and multiply under the natural ecosystem with abundant food supply." (Author)] Address: not stated

**15429.** Okuyama, H.; Samejima, Y.; Tsubaki, Y. (2015): Smaller damselflies have better flight performance at lower body temperature: implications for microhabitat segregation of sympatric *Mnais* damselflies. *International Journal of Odonatology* 18(3): 217-224. (in English) ["In many cases where two closely related species coexist, ecological interaction or reproductive interference drive species to diversify in their body size and/or other signal traits, often concurrently with microhabitat segregation. However, it is usually unclear how character diversification is associated with microhabitat segregation. We performed laboratory experiments using males of two damselfly species (*Mnais costalis* and *Mnais pruinosa*) collected from a syntopic site in Shiga Prefecture, Japan. We analyzed the effects of body temperature and body size on three indices of flight performance: wing-beat frequency and flight speed as measures of thrust production, and minimum body temperature for flight (MBTF). The results showed that the MBTF was correlated with body size: the smaller species (*M. pruinosa*) flew better than the larger species (*M. costalis*) in a cool environment. The initial flight speed was positively correlated with body temperature, but negatively correlated with body size. The wing-beat frequency was also positively correlated with body temperature, but negatively correlated with body size. The combined effects of body size and body temperature on wing-beat frequency meant that overall, there was no significant difference in initial flight speed. We suggest that the effect that body size and temperature have on flight performance explains the previously documented microhabitat segregation occurring between these two species, with the larger *M. costalis* preferring sunny environments and *M. pruinosa* preferring shady environments."] Address: Okuyama, H., Center for Ecological Research, Kyoto Univ., Hirano, Otsu, Shiga, Japan. Email: g0980134@yahoo.co.jp

**15430.** Oliveira-Junior, J.M.B.; Shimano, Y.; Gardner, T.A., Hughes, R.M.; de Marco Júnior, P.; Juen, L. (2015): Neotropical dragonflies (Insecta: Odonata) as indicators of ecological

condition of small streams in the eastern Amazon. *Austral Ecology* 40(6): 733-744. (in English) ["Sensitive and cost-effective indicators of aquatic ecosystem condition in Amazon streams are necessary to assess the effects of anthropogenic disturbances on those systems in a viable and ecologically meaningful manner. We conducted the present study in the municipality of Paragominas, state of Pará, northern Brazil, where we sampled adult dragonflies in 50 100-m-long wadeable stream sites in 2011. We collected 1769 specimens represented by 11 families, 41 genera and 97 species. The suborder Zygoptera contributed 961 individuals and Anisoptera 808. Among the 97 recorded species, nine were classified as useful indicators of ecological condition, with four species being associated with more degraded streams (three Anisoptera, one Zygoptera) and five with more preserved streams (all were Zygoptera). Anisoptera tend to provide more useful indicators of more degraded environments because they have more efficient homeostatic mechanisms and are more mobile, enabling them to tolerate a wider range of environmental conditions. By contrast, Zygoptera tend to provide a more useful role as indicators of more preserved environments and high levels of environmental heterogeneity because of their smaller body sizes and home ranges and greater ecophysiological restrictions. We conclude from our assessment of this low-order Amazonian stream system that (i) the occurrence of specific odonate species is strongly associated with the configuration of riparian vegetation, (ii) agricultural activities appear to be the main factor determining changes in the composition of odonate assemblages and (iii) these insects can act as useful indicators of the ecological consequences of riparian habitat loss and disturbance. Because generalist species invade moderately degraded areas, those areas may have high species richness but host few species of Zygoptera. Therefore, preserving dense riparian vegetation is necessary to maintain aquatic ecological condition, and that condition can be rehabilitated by planting new trees. Both require enforcing existing environmental regulations, various types of incentives and educating local communities." (Authors)] Address: Oliveira-Junior, J.M.B. de, Programa de Pós-Graduação em Ecologia e Conservação, Universidade do Estado de Mato Grosso, Nova Xavantina, Mato Grosso, Brazil. E-mail: josemaxoliveira@gmail.com

**15431.** Orr, A.G.; Dow, R.A. (2015): Description of the final stadium larvae of *Onychargia atrocyana* Selys, 1865 from Sarawak, identified using DNA barcoding (Odonata: Zygoptera: Platycnemididae), with an overview of larval characters in the Platycnemididae. *Zootaxa* 4040(3): 384-392. (in English) ["The final stadium larva of *O. atrocyana* is described and illustrated based on two female specimens collected at Gunung Mulu National Park, Sarawak, East Malaysia. The larvae were identified by matching the mitochondrial marker COI with that of known adult specimens from Gunung Mulu, Bintulu and Kuching in Sarawak and from Pahang state in West Malaysia. The specimens presented close matches with all adults in this gene. As *O. atrocyana* is a taxonomically isolated species with no close congeners in Borneo the determination is beyond doubt. *O. atrocyana* is the only member of the Onychargiinae for which the larva

is known. It is compared with the known larvae of other platynemid subfamilies, and the possible significance of larval morphology in higher classification of the group is discussed." (Authors)] Address: Orr, A.G., Environmental Futures Research Institute, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**15432.** Orr, A.G.; Günther, A. (2015): Reported ovo-viviparity in *Heliocypha perforata* (Odonata: Chlorocyphidae) – re-assessment of the evidence, based partly on examination of the female reproductive system and mature eggs. *International Journal of Odonatology* 18(2): 169-174. (in English) ["*Heliocypha perforata* (sensu lato) is a common stream-dwelling damselfly widespread in mainland tropical Asia. Recently a report has been published suggesting possible ovo-viviparity in this species, based on the interpretation of evidence from a short video sequence. This video is re-evaluated. The internal and external anatomy of the *H. perforata* female reproductive system, including mature eggs, is examined and illustrated, to the extent that this information casts light on the observations. Three competing hypotheses are considered: (1) a prolarva or larva was expressed from the female's oviduct, due to abnormal retention of the fertilized egg in the oviduct for several days; (2) an egg, deep in the oviposition substrate, previously laid and near hatching, was disturbed by the female's probing ovipositor and the prolarva hatched, becoming briefly caught in the valves of the ovipositor; and (3) a small unidentified aquatic insect, probably of a different species and different order, was disturbed and similarly briefly caught in the valves. Based on the size and colour of the object relative to that of a mature egg and the likelihood of the event, hypothesis 3 is favoured." (Authors)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**15433.** Orr, A.G.; Dow, R.A. (2015): Description of two final stadium platystictid larvae from Borneo, including that of *Drepanosticta ?attala* Lieftinck, identified using DNA barcoding (Odonata: Zygoptera: Platystictidae). *Zootaxa* 3985(4): 565-574. (in English) ["The final stadium larva of *Drepanosticta ?attala*, is described and illustrated based on a single male specimen collected at Kuala Belalong Field Studies Centre, Brunei. The larva was identified by matching the mitochondrial marker COI with that of known adult specimens. The larva presented a good match with both *D. attala* and *D. barbatula* Lieftinck in this gene, but as adults of only the former species had been collected at the locality, it is presumed more likely to be that species. Another, unidentified platystictid larva, Platystictidae A, collected at the same general locality is also described. The two larvae show significant differences from each other and from *D. sundana* Krüger, the only other Oriental region member of the family for which larval morphology is known. The three species are also compared with the larvae of the Neotropical genus *Palaemnema*, which they closely resemble, despite being currently placed in different subfamilies. Based on this known material, Oriental and Neotropical forms differ

significantly in details of mandibular morphology, especially the armature of the molar field." (Authors)] Address: Orr, A.G., Environmental Futures Research Institute, Griffith Univ. Nathan, Queensland 4111, Australia. E-mail: agorr@universal.net.au

**15434.** Ortega-Salas, H.; Gonzalez-Soriano, E. (2015): A new species of *Libellula* Linnaeus, 1758, from the Cuatro Ciénegas basin, Coahuila, México (Anisoptera: Libellulidae). *Zootaxa* 4028(4): 589-594. (in English, with Spanish summary) ["A new species of *Libellula* is described from specimens collected in the most interesting area of Cuatro Ciénegas, Coahuila, México. *Libellula coahuiltecana* sp. nov. is similar in colour and morphology to *L. needhami* Westfall with which it co-occurs locally. It differs from the latter by having conspicuous orange spots on base of wings and nodal area, and costal, subcostal, and wing tip areas slightly infumated with the same colour. Other differences exist in the morphology of the secondary genitalia of males and the shape of the vulvar plate of female." (Authors)] Address: Gonzalez-Soriano, E., Depto Zoología, Inst. Biol., Universidad Autónoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.ibiologia.unam.mx

**15435.** Ortiz-Sandoval, J.J.; Konrad Górski, K.; Alonso González-Díaz, A.; Evelyn Habit, E. (2015): Trophic scaling of *Percichthys trucha* (Percichthyidae) in monospecific and multispecific lakes in western Patagonia. *Limnologia - Ecology and Management of Inland Waters* 53: 50-59. (in English) ["*Percichthys trucha* (Cuvier and Valenciennes, 1833) is a freshwater fish, endemic to southern South America and widely distributed in both, eastern and western sides of the Andes. *Percichthys trucha* has been described as top native predator in lacustrine ecosystems, experimenting diet shifting during their life history development. Salmonid invasions have impacted their natural ecology through trophic niche interference and predation over alternative high quality prey. This study focuses on populations of *P. trucha* in western Patagonia, where its trophic ecology have been less understood. We hypothesised a diet shift between juveniles and adults from lower-trophic position prey toward higher-trophic position prey. Fish were collected from 7 lakes belonging to Puelo and Baker river basins, covering a high diversity of environmental conditions. Stomach content and  $\delta^{15}N$  stable isotope ratio of muscle tissues of 313 individuals were analysed. Results indicate significant differences in diet between juveniles and adults, shifting from planktonic/benthic preys towards benthic/piscivory, and concomitantly enrichment in heavier nitrogen isotope suggest trophic scaling. No trophic scaling was observed in populations inhabiting lakes with any other fish species present, essentially due to lack of *Galaxias* sp. as available prey and absence of cannibalism. Despite the fact that *P. trucha* and *Galaxias* sp. co-occur in studied river basins, no salmonid-free lakes harbouring this two native species were found, making it difficult to elucidate exact effects of salmonids on trophic scaling of *P. trucha*. Consumption of aquatic Odonata nymphs, however, arises as one of potential key mechanism for resilience of native food webs to

salmonid invasion." (Authors)] Address: Habit, Evelyn, Facultad de Ciencias Ambientales y Centro EULA, Universidad de Concepción, Concepción, Chile. E-mail: ehabit@udec.cl

**15436.** Osozawa, S.; Wakabayashi, J. (2015): Killer typhoons began to impact the Japanese Islands from ca. 1.55 Ma, based on phylogeography of *Chlorogomphus* (Gliding Dragonfly). *J. Earth Sci. Climat. Change* 2015, S3 <http://dx.doi.org/10.4172/2157-7617.S3-003>: 5 pp. (in English) ["*Chlorogomphus* is characterized by swarming behaviour, and strong gliding and flying. Therefore this dragonfly is expected to be easily carried by typhoon winds. This dragonfly immigrated and colonized the Pacific coast of southern Japan main islands from the Ryukyu islands. In this study, we demonstrate that the Japan mainland population is phylogenetically common to the northern Ryukyu population, but distinct from the southern Ryukyu and Taiwan populations. The East China Sea was formed between the Ryukyu island arc and Asian mainland by the rifting of the Okinawa trough that started at 1.55 Ma. Prior to this time typhoons lost strength when heading overland over the Ryukyu continental arc and continental China, but since then have maintained their strength northward because they were over water (the newly opened Okinawa trough). *Chlorogomphus* is interpreted to have speciated on each island, but it also migrated northward as a result of typhoons that carried it further than it could normally fly. The present paper shows that such typhoons that now ravage Japan may have been generated since 1.55 Ma and will continue to be dangerous, because the opening of the Okinawa trough is an ongoing process. This phenomenon is unrelated to global warming." (Authors)] Address: Osozawa, S., Department of Earth Sciences, Graduate School of Science, Tohoku University, Sendai 980-8578, Japan. E-mail: osozawa@m.tohoku.ac.jp

**15437.** Ott, J.; Conze, K.-J.; Günther, A.; Lohr, M.; Mauersberger, R.; Roland, H.-J.; Suhling, F. (2015): Rote Liste und Gesamtartenliste der Libellen Deutschlands mit Analyse der Verantwortlichkeit, dritte Fassung, Stand Anfang 2012 (Odonata). *Libellula Supplement* 14: 395-422. (in German, with English summary) ["Red List and checklist of Odonata of Germany, with analysis of the responsibility, version 3, early 2012 – We updated the Red List of Odonata of Germany by applying the criteria developed by the German Federal Agency for Nature Conservation, which deviate from those suggested in the IUCN Red List guidelines. The following criteria were used to assess the species: current state (in the case of dragonflies grid frequencies since 1995 are used), long-term population trend (a guess of population trends since ca 1840), short-term trend (changes in the grid frequencies 1995-2009) and existence of potential risk factors. In Germany so far 81 species of Odonata were recorded in the wild of which 79 species are considered to be established. These have been assessed against the Red List criteria. 30 species were classified into one of the Red List categories and five species into the category "near threatened". *Onychogomphus uncatatus* and *Coenagrion hyalas* are considered as "extinct" in Germany. Since 1998,

when the last Red List was published, *Boyeria irene* was newly found for Germany. Furthermore, the national responsibility for the conservation of odonate species was assessed based on the share Germany has of the total population size of the species. According to this, Germany is responsible to a great extent for conservation of *Corulegaster bidentata* and *Aeshna cyanea*. There is also a notable responsibility for isolated outposts of *Sympecma paedisca*, *Nehalennia speciosa*, *Coenagrion armatum*, *C. ornatum*, *Aeshna caerulea*, and *Somatochlora alpestris*." (Authors)] Address: Ott, J., L.U.P.O. GmbH, Friedhofstraße 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**15438.** Outomuro, D.; Johansson, F. (2015): Bird predation selects for wing shape and coloration in a damselfly. *Journal of Evolutionary Biology* 28(4): 791-799. (in English) ["Wing shape is related to flight performance, which is expected to be under selection for improving flight behaviours such as predator avoidance. Moreover, wing conspicuousness, usually involved in sexual selection processes, is also relevant in terms of predation risk. In this study, we examined how predation by a passerine bird, the white wagtail *Motacilla alba*, selects wing shape and wing colour patch size in males of the banded demoiselle *Calopteryx splendens*. The wing colour patch is intra- and intersexually selected in the study species. In a field study, we compared wings of live damselflies to wings of predated damselflies which are always discarded after predation. Based on aerodynamic theory and a previous study on wing shape of territorial tactics in damselflies, we predicted an overall short and broad wing, with a concave front margin shape to be selected by predation. This shape would be expected to improve escaping ability. Moreover, we predicted that wing patch size should be negatively selected by predation. We found that selection operated differently on fore- and hindwings. In contrast to our predictions, predation favoured a slender general forewing shape. However, the predicted wing shape was favoured in hindwings. We also found selection favouring a narrower wing colour patch. Our results suggest different roles of fore- and hindwings in flight, as previously suggested for *Calopteryx* damselflies and shown for butterflies and moths. Forewings would be more involved in sustained flight and hindwings in flight manoeuvrability. Our results differ somehow from a recently published work in the same study system, but using another population, suggesting that selection can fluctuate across space, despite the simplicity of this predator-prey system." (Authors)] Address: Outomuro, D., Dept of Ecology and Genetics, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, Uppsala, Sweden. E-mail: outomuro.david@gmail.com

**15439.** Palacino Rodríguez, F.; Sarmiento, C.E.; González-Soriano, E. (2015): Morphological variability and evaluation of taxonomic characters in the genus *Erythemis* Hagen, 1861 (Odonata: Libellulidae: Sympetrinae). *Insecta Mundi* 428: 1-68. (in English) ["*Erythemis* is a Neotropical genus with ten species in which morphological characters vary widely. The aim of this paper is to study the taxonomic diversity of the genus *Erythemis* and to test the diagnostic value of morphological characters used to discriminate species. The diagnostic value



of the morphometric characters is tested using discriminant function analysis, principal component analysis, and graphical exploration of the data. A total of 134 characters were studied; of those, 53 are recoded and 81 are proposed in this work. Discrete characters such as colour, genitalia, ventral teeth of male cercus, extension of dark basal area in hind wing, and morphometric characters of abdominal carinae and antenodal wing venation are the most useful for species determination. In contrast, abdomen length/HW length ratio, vulvar lamina length, and spines of femoral structure are highly variable. A lectotype is designated for *Diplax credula* Hagen, 1861. Taxonomic keys for males and females are included, and variation in several characters is presented." (Authors)] Address: Fredy Palacino Rodríguez, F., Lab. de Sistemática y Biología Comparada de Insectos, Lab. de Artrópodos del Centro Internacional de Física, Univ. Nacional de Colombia, Grupo de Investigación en Biología (GRIB), Grupo de Investigación de Odonatos de Colombia (GINOCO), Universidad El Bosque, Bogotá, Colombia

**15440.** Patten, M.A.; Bried, J.T.; Smith-Patten, B.D. (2015): Survey data matter: predicted niche of adult vs breeding Odonata. *Freshwater Science* 34(3): 1114-1122. (in English) ["Assessing and categorizing habitat needs or population trends of organisms with complex life histories, such as Odonata, is challenging. All Odonata have aquatic nymphs and terrestrial adults. As a consequence, their use as indicators of ecosystem health or as umbrella species in conservation plans may be misleading if data from a particular life stage does not reflect actual residency at a freshwater site. We explored this question with an extensive data set for Odonata from Oklahoma, USA, to determine if ecological niches modelled from records of adults (i.e., lacking any evidence of breeding) differed from niches modelled for records indicating breeding (tandem pairs, ovipositing females, larvae, teneral [recently emerged adults], or exuviae [shed exoskeletons of larvae]) at surveyed sites. We predicted that models would be comparable if adult presence strongly indicates local breeding but would be dissimilar if adults occupy many more sites than those at which the species breeds. Our results supported the latter prediction. Adult models were broader geographically and had a wider, more equitable (higher evenness) balance of contributing environmental variables (niche dimensions) than did models for breeders, which tended to be more ecologically specialized. These findings suggest that surveys of adult Odonata, which are relatively easy to obtain because of organized efforts to encourage observations by citizen scientists, can paint a misleadingly broad picture of a species' ecological niche. We recommend that evidence of breeding, especially presence of teneral or exuviae, be used to outline ecological requirements when questions of conservation or population monitoring arise." (Authors)] Address: Patten, M.A., Oklahoma Biological Survey, University of Oklahoma, Norman, Oklahoma 73019 USA. E-mail: mpatten@ou.edu

**15441.** Pauley, L.R.; Earl, J.; Semlitsch, R.D. (2015): Ecological effects and human use of commercial mosquito insecticides in aquatic communities. *Journal of Herpetology* 49(1):

28-35. (in English) ["In the case of contaminants that are commercially available and introduced by humans, understanding where and how often a product is used is critical in assessing its ecological impact. By contextualizing a product's ecotoxicological impact with details regarding its application, we can provide a more complete characterization of the product's environmental risk than is possible with ecotoxicological data alone. We conducted an ecotoxicology experiment to examine the interaction between predator-induced stress and one of three common mosquito insecticide formulations (Mosquito Dunks, Mosquito Bits, and Mosquito Torpedoes) on the performance of Gray Treefrog (*Hyla versicolor*) tadpoles and changes in aquatic communities in pond mesocosms. Then, to describe the extent to which each product was applied in the region surrounding our study area, we conducted a survey of mosquito insecticide practices by individuals who owned or managed property within U.S. Environmental Protection Agency region seven. When applied in the presence of predators, Mosquito Torpedo use resulted in the lowest tadpole survival rates. Mosquito Dunks also reduced tadpole survival when applied in the context of predators ( $P = 0.06$ ), and Mosquito Bits had no effect on tadpole survival. Of land managers who applied a mosquito insecticide, 5% used Mosquito Bits, 5% used Mosquito Torpedoes, and 81% used Mosquito Dunks. Despite the fact that Mosquito Torpedoes appear to have more severe negative effects on tadpole survival than do Mosquito Dunks, the widespread use of Mosquito Dunks by individuals in our survey leads us to recommend that future research efforts be directed toward Mosquito Dunks. ... We used a factorial combination of a predatory insect treatment (with or without dragonfly larvae) crossed with an insecticide treatment (no insecticide, Mosquito Dunks, Mosquito Bits, and Mosquito Torpedoes; see below complete description of insecticide products), with three replications. For the dragonfly predator treatment, one *Anax junius* (green damer) and six *Pachydiplax longipennis* (blue dasher) late-instar larvae were added to each mesocosm on 22 May 2010. These predator densities reflect natural densities in central Missouri (JEE and RDS, unpubl. data)." (Authors)] Address: Pauley, L.R., Division of Biological Sciences, University of Missouri, Columbia, Missouri 65211 USA. E-mail: lrpauley@gmail.com

**15442.** Perello, M.M.; Simon, T.P.; Thompson, H.A.; Kane, D.D. (2015): Feeding ecology of the invasive round goby, *Neogobius melamostomus* (Pallas, 1814), based on laboratory size preference and field diet in different habitats in the western basin of Lake Erie. *Aquatic Invasions* 10(4): 463-474. (in English) ["The round goby, *Neogobius melanostomus*, is an invasive benthic fish species in the Laurentian Great Lakes that is threatening native fish populations through competition, predation, and trophic dynamic change. This study examined the trophic dynamic plasticity of round goby along a depth gradient based on laboratory and field observations to determine prey species consumed and mussel prey size selection. Prey size selection in the laboratory was assessed by presenting individual round goby with quagga mussels (*Dreissena rostriformis bugensis*) of various class sizes (i.e., 6.0-9.9 mm, 10.0-12.9 mm,

13.0-15.9 mm and 16.0-18.9 mm in length). Round goby exhibited a selection preference for small sized quagga mussels, although in individual trial events, mussels were consumed from all four size classes. Prey species consumed from shallow and deep sites in the western basin of Lake Erie were assessed using individual gut contents to calculate measures of prey importance, diversity, and dominance. Based on the Index of Relative Importance (IRI), Cladocera was found to be the most consumed prey item for both males and females and between study sites. Both sexes consumed a variety of prey items although females exhibited greater prey dominance or reliance on one prey item. Round goby individuals at the shallow, natural shoreline site had the highest trophic diversity, while individuals at the deep site exhibited the highest prey dominance. Diet of round goby in the western basin of Lake Erie are mainly dominated by just a few prey items." (Authors) Odonata play a minor role as diet of the round goby.] Address: Perello, Melanie, FT. Stone Laboratory, Ohio State University, Put-in-Bay, OH 45456. USA. E-mail: mmpello@plymouth.edu

**15443.** Pfitzner, W.P.; Beck, M.; Weitzel, T.; Becker, N. (2015): The role of mosquitoes in the diet of adult dragon- and damselflies (Odonata). *Journal of the American Mosquito Control Association* 31(2): 187-189. (in English) ["The flood plains of the Upper Rhine Valley provide excellent conditions for the proliferation of mosquitoes as well as for the development of dragon and damselflies. It could be assumed that mosquitoes belong to the diet of the Odonata and that the latter could be harmed by the reduction of the mosquito population with the purpose of diminishing the massive nuisance for the people living there. A total of 41 adult Odonata were examined by immunoblot for remnants of mosquitoes in their guts. A rabbit antiserum against *Aedes vexans* proteins was used for the immunoblot. Only 3 *Aeshna cyanea* and 1 *Platycnemis pennipes* could be shown to have fed on mosquitoes. In specimens of the genus *Sympetrum* no mosquitoes were detected. It seems very doubtful that mosquitoes are an essential part of the Odonata diet." (Authors)] Address: German Mosquito Control Association (KABS), Georg-Peter-Suess-Str. 3, 67346 Speyer, Germany.

**15444.** Piché, C.; Hutchinson, R. (2015): Les libellules (Odonata) de Gatineau, Québec, d'hier à aujourd'hui. *Le Naturaliste canadien* 140(1): 12-25. (in French, with English summary) ["Gatineau is the fourth largest city in Québec (Canada). It is situated in the southwestern part of the province, on the northern bank of the Ottawa River. At least 87 species of dragonfly have been recorded in Gatineau, and surveys conducted in the city in 2012 and 2013 documented the frequency, relative abundance and breeding of 82 of these. A comparison with historical data for the period from 1886 to 1935, showed that at least 90 % of the species recorded have maintained their presence in the city since the beginning of the 20th century. However, 8 species associated with streams, rivers or temporary wetlands, may have declined or disappeared. By contrast, at least 7 generalist species associated with still water bodies, are expanding in Gatineau. With the exception of one species

from the family Coenagrionidae, these are all from the family Libellulidae. These changes in the dragonfly community are likely due to urban sprawl. Dragonflies, which are useful bio-indicators of environmental changes occurring in wetlands, can be easily observed and monitored through citizen science projects." (Authors)] Address: Caroline Piché. E-mail: piche.boyer@gmail.com

**15445.** Piersanti, S.; Rebor, M.; Salerno, G.; Cordero-Rivera, A.; Frati, F. (2015): A method for rearing a large number of damselflies (*Ischnura elegans*, Coenagrionidae) in the laboratory. *International Journal of Odonatology* 18(2): 125-136. (in English) ["Odonata are important study organisms in many areas of biology. Laboratory experiments with these insects have a great potential for answering evolutionary, ecological and physiological questions. Laboratory studies require insect rearing, because it can provide large sample sizes of specimens that are available throughout the year. These insects are reared under known conditions, and their use does not affect natural populations. The present paper describes a protocol to obtain at least three generations per year of *Ischnura elegans* in laboratory conditions, with hundreds of insects for each generation. Together with the protocol description, data from three annual laboratory populations obtained in Italy from summer 2011 to summer 2013 using this protocol are reported." (Authors)] Address: Rebor, Manuela, Dipto Biol. Cellulare e Ambientale, Univ. di Perugia, 06123 Perugia, Italy. E-mail: rebor@unipg.it

**15446.** Pilotto, F.; Bazzanti, M.; Di Vito, V.; Frosali, D.; Livretti, F.; Mastrantuono, L.; Pusch, M.T.; Sena, F.; Solimini, A.G. (2015): Relative impacts of morphological alteration to shorelines and eutrophication on littoral macroinvertebrates in Mediterranean lakes. *Freshwater Science* 34(2): 410-422. (in English) ["Development of effective methods for assessing the ecological status of lakes based on littoral benthic fauna has been hampered by the lack of quantitative data on the relative impacts of key pressures on the benthic community. We used variance partitioning at 126 sites belonging to 14 natural Mediterranean lakes to analyze the pure and shared effects of eutrophication, morphological alterations, microhabitat type, lake morphometry and geographic position on the littoral macroinvertebrate community. The spatial arrangement of the sampling sites was responsible for 9.1% of the total variance in littoral benthic community composition, lake morphometry accounted for 4.3% of variation, and microhabitat type accounted for 3.9%. Communities appeared to be affected primarily by morphological alterations to lake shorelines, and their impact was 2.5 times as important as that of eutrophication. The structure of littoral benthic communities was governed by processes acting at several spatial scales from region to lake scale. Thus, several pressures and the various spatial scales at which these act should be taken into account when implementing methods of assessing lake ecological condition based on littoral benthic invertebrates. Region-specific methods for subalpine and volcanic lakes might enhance the validity of assessment of results of morphological alterations and improve management of those water resources." (Authors)]

*Ischnura elegans* was used as indicator for 'Unmodified sites with macrophytes', and *Sympetrum fonscolombii* for 'Hard altered sites'.] Address: Pilotto, Francesca, Dept of Public Health and Infectious Diseases, Sapienza University of Rome, Piazzale Aldo Moro 5, 00185 Roma, Italy

**15447.** Pospekhova, N.A.; Regel, K.V. (2015): Morphology and ultrastructure of two schistostomoid cysticercoids (Cestoda: Cyclophyllidea) from the haemocoel of the dragonfly larvae. *Parazitologija* 49(5): 339-351. (in English, with Russian summary) ["Two cysticercoids, belonging to ascocercus type, namely euascocercus and multicercus, were found in haemocoel of dragonfly larvae of the genus *Aeshna* from the lakes of the Magadan Province. The cysticercoid of *Schistostoma* *srivastavi* Raush, 1970 (euascocercus) is formed of the outer (exocyst) and inner (endocyst) envelopes, containing the scolex and larval strobila. The outer and inner surfaces of the exocyst are represented by the tegument covered with microvilli. The microvilli of the outer tegument are restricted by the surface layer, consisting of granular and fibrillar material, and possess different structures at different stages of post-embryonic development. The multicercus of *Mircia* *shigini* (Konyaev et Gulyaev, 2006) is able to multiply asexually by the endogenous budding. The daughters' individuals are formed in the envelope of the multicercus that represents the tegument bearing microvilli. These microvilli are also restricted by the surface layer. The morphology and development of each individual cysticercoid of the multicercus is similar to those of euascocercus. The production of a great amount of cysticercoids, and the presence of the surface layer resembling the laminated layer of *Echinococcus*, relates multicercus to hydatid cysts." (Authors)] Address: Pospekhova, Natalia, Institute of Biological Problems of the North FEB RAS, Magadan, 685000, Russia. E-mail: posna@ibpn.ru

**15448.** Powney, G.D.; Cham, S.S.; Smallshire, D.; Isaac, N.J.B. (2015): Trait correlates of distribution trends in the Odonata of Britain and Ireland: Southern species benefit from climate warming. *PeerJ PrePrints* 2:e648v1 <http://dx.doi.org/10.7287/peerj.preprints.648v1>: 14 pp. (in English) ["A major challenge in ecology is understanding what enables certain species to persist, while others decline, in response to environmental change. Trait-based comparative analyses are useful in this regard as they can help identify the key drivers of decline, and highlight traits that promote resistance to change. Despite their popularity trait-based comparative analyses tend to focus on explaining variation in range shift and extinction risk, seldom being applied to actual measures of species decline. Furthermore they have tended to be taxonomically restricted to birds, mammals, plants and butterflies. Here we utilise a novel approach to estimate trends for the Odonata in Britain and Ireland, and examine trait correlates of these trends using a recently available trait dataset. We found the dragonfly fauna in Britain and Ireland has undergone considerable change between 1980 and 2012, with 33 and 39% of species showing significant declines and increases respectively. Distribution type was the key trait associated with

these trends, where southern species showed significantly higher trends than widespread and northern species. We believe this reflects the impact of climate change as the increased ambient temperature in Britain and Ireland better suits species that are adapted to warmer conditions. We conclude that northern species are particularly vulnerable to climate change due to the combined pressures of a decline in climate suitability, and competition from species that were previously limited by lower thermal tolerance.... Species that showed the greatest declines included: *Aeshna juncea* and *Sympetrum danae*, while *Anax imperator* and *Aeshna mixta* showed the greatest increases." (Authors)] Address: Powney, G.D., Biological Records Centre, NERC Centre for Ecology & Hydrology, Wallingford, UK. E-mail: gary.powney@ceh.ac.uk

**15449.** Preston, D.B.; Forstner, M.R.J. (2015): Houston Toad (*Bufo* (*Anaxyrus*) *houstonensis*) tadpoles decrease their activity in response to chemical cues produced from the predation of conspecifics and congeneric (*Bufo* (*Incilius*) *nebulifer*) tadpoles. *Journal of Herpetology* 49(2): 170-175. (in English, with Spanish summary) ["Anurans have been shown to reduce their activity in the presence of predation-related chemical cues. We exposed tadpoles of the federally endangered Houston Toad, *Bufo* (*Anaxyrus*) *houstonensis*, to three chemical cues: A no-predation cue produced by the presence of only predatory anisopteran nymphs (*Anax junius*), a conspecific-predation cue produced from the consumption of conspecific tadpoles by *A. junius* nymphs, and a heterospecific-predation cue produced from the consumption of coastal plain toad (*Bufo* (*Incilius*) *nebulifer*) tadpoles by *A. junius* larvae. We measured tadpole activity levels before and after exposure to the cues. Tadpole activity was not influenced by the no-predation cue, but it decreased significantly during exposure to either predation cue. The reduction in activity did not differ significantly between predation cue treatments. These data suggest that: 1) *B. houstonensis* tadpoles will respond to predation, but not the presence of a predator alone. 2) There may be a chemical homology between the predation cues. 3) When developing with *B. nebulifer* tadpoles, *B. houstonensis* may experience negative long-term life historical effects." (Authors)] Address: Preston, D.B., Dept of Biology, Texas State Univ., San Marcos, TX, USA. E-mail: dpresto1@uno.edu

**15450.** Prommi, T.; Payakka, A. (2015): Aquatic insect biodiversity and water quality parameters of streams in northern Thailand. *Sains Malaysiana* 44(5): 707-717. (in English) ["Biodiversity of aquatic insect and physicochemical water quality parameters in Mae Tao and Mae Ku watersheds were assessed bi-monthly from February 2011 to February 2012. A total of 59 families representing 9 orders were recorded. At order level, Trichoptera was found at the highest frequency in total abundance (45.75%) followed by Ephemeroptera (18.06%), Hemiptera (13.45%), Odonata (9.62%), Diptera (8.17%), Coleoptera (4.6%), Megaloptera (0.17%), Lepidoptera (0.11%) and Plecoptera (0.07%). The family Hydropsychidae was the most prominent and the most abundant aquatic insect taxa followed by Chironomidae.



Water temperature, dissolved oxygen and ammonia-nitrogen were similar at all sampling stations. Significant variations in pH, electrical conductivity, total dissolved solids, sulfate, nitrate-nitrogen and alkalinity were found at all sampling stations. Taxa richness and diversity index significantly correlated with dissolved oxygen, sulfate, nitrate-nitrogen and ammonia-nitrogen ( $p < 0.05$ ,  $p < 0.01$ ). Physicochemical data and biological data showed that mostly the surface water quality in Mae Tao and Mae Ku watersheds were within Type III of The Surface Water Standard for Agriculture and Water Quality for Protection of Aquatic Resources in Thailand." (Authors) Taxa are treated at family level.] Address: Prommi, T., Faculty of Liberal Arts and Science, Kasetsart University, Kamphaeng Saen Campus, Nakhon Pathom Province, 73140, Thailand. E-mail: faastop@ku.ac.th

**15451.** Pryke, J.S.; Samways, M.J.; De Saedeleer, K. (2015): An ecological network is as good as a major protected area for conserving dragonflies. *Biological Conservation* 191: 537-545. (in English) ["Highlights: •We compared wallows, ponds and marshes in ecological networks and protected area. •Ecological networks shared 3/4 of dragonfly species with the protected area. •Equal numbers of rarest species occurred in both landscapes. •Proximity of plantation trees had only a minor effect. •Ecological networks are as effective as the protected area for aquatic conservation. Abstract: Freshwaters are highly threatened ecosystems, with agro-forestry being a major threat to sub-tropical wetlands. In the Maputaland–Pondoland–Albany global biodiversity hotspot of South Africa, large-scale ecological networks (ENs) of remnant vegetation have been set aside with the aim of mitigating the adverse effects of plantation forestry. However, the effectiveness of these ENs for maintaining freshwater biodiversity, especially that of still waters, is poorly known. In response, we compare mud wallows of large mammals, ponds and small marshes in an EN with those in an adjacent World Heritage Site protected area (PA) as reference. For this comparison we used dragonfly adults in view of their effectiveness as bioindicators. A total of 47 species was recorded at 105 sites. The EN shared 74% of its species with the PA. However, equal numbers of range restricted species were recorded from the EN and the PA. Five species were recorded as particular to the EN and seven to the PA, probably due to habitat heterogeneity across this type of landscape. Pond size, habitat heterogeneity, elevation and dissolved oxygen were important determinants for species richness and diversity. Proximity of plantation trees had only a minor effect, and then only on species composition. Mud wallows were the poorest habitat in terms of dragonfly diversity, owing to the intense disturbance. Wallows, ponds and marshes were largely complementary in their species composition. Overall, the freshwater system in the EN was a good surrogate for that in the PA, indicating the effectiveness of these ENs for maintaining the dragonfly assemblage." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**15452.** Pynnönen, P. (2015): [Identification of *Sympetrum striolatum* and *S. vulgatum*]. *Crenata* 8: 38-43. (in Finnish, with English summary) ["This article describes features to separate Finnish individuals of *S. striolatum* (*nigrescens*) and the Moustached Darer, *S. vulgatum* at the imago stage. In Finland probably all the *striolatum* individuals are darker and therefore separable from the nominate southern form. Most of the Finnish individuals of *striolatum* have dark roundish diffuse spot on the sides of frons, different from how it is typically described in the literature. Only a very small percentage of Finnish individuals lack this spot. The only pale individual I have seen in Finland (Helsinki 24.10.2011) is shown in the photo together with a typical dark Finnish *striolatum* male and a *vulgatum* male." (Authors)] Address: not stated

**15453.** Rache Rodríguez L. (2015): Primer registro del género *Aeschnosoma* Selys, 1871 (Odonata: Corduliidae) para Colombia. *Entomotropica* 30(23): 224-226. (in Spanish, with English summary) ["The genus *Aeschnosoma* is reported here for the first time from Colombia based on larvae in the aquatic Invertebrates collection of the Biology Department of the Universidad Nacional de Colombia, Bogotá. They were collected in the Meta Department and identified as *Aeschnosoma forcipula* Selys, 1871." (Author)] Address: Rache Rodríguez L., Universidad Nacional de Colombia Sede Bogotá. Carrera 30 no. 45-03 AA. 7495. Bogotá D.C., Colombia. E-mail: leonardorache@hotmail.com

**15454.** Radhakrishore, S.R.K.; Khaidem, A.; Gojendro, S.O.; Khamba, S.K. (2015): Protein and carbohydrate contents of certain edible insects in Manipur. *Indian Journal of Entomology* 77(3): 235-239. (in English) ["Fifteen species of edible insects representing ten families were analyzed for protein and carbohydrate contents. These include Hemiptera, Coleoptera, Odonata, Orthoptera, Lepidoptera and Hymenoptera. Protein content was observed to vary from a low of 105.6mg/g to a high of 314.2mg/g. The highest level of total protein was found in *Philosomia ricini* (314.2 mg/g) and the lowest in *Bombyx mori* (105.6 mg/g). *Lethocerus indicus*, a common insect in Manipur was found to contain a protein content of 172 mg/g. Carbohydrate content ranged from 3.68mg/g to 78.68mg/g. The highest carbohydrate content was found in *Vespa basalis* and the least in *Brachytripes portentosus*. Most of these edible insects were found to have more protein content than the conventional animal protein but very less carbohydrate. These insects play a major role in providing an easy source of protein to the people of Manipur." (Authors)] Address: Radhakrishore, S.R.K., Department of Zoology, Manipur College, Imphal, Manipur

**15455.** Raekauskaite, D.; Gliwa, B. (2015): First record of *Crocothemis erythraea* (Odonata: Libellulidae) in Lithuania. *Naujos ir retos Lietuvos vabzdžių rūšys* 26(5): 5-6. (in English) [Single male, 18-07-2014, dry forest Kliošiai, near Klaipėda and Emperor-Wilhelm-Canal, 55°38'28" N, 21°10'37" E] Address: Raekauskaite, Dalia, Upelio 6, LT-93267 Klaipėda, Lithuania, E-mail: dalyte7@gmail.com

**15456.** Ragaei, M.; Sabry, A.H. (2015): Role of color Interference on the insect's cuticle coloration. *International Journal of Science and Research* 4(6): 2306-2314. (in English) ["Interference colours result from the reflection of light from a series of neighbouring interfaces that are separated by distances comparable with a quarter of the wavelength of light. Interference colours are common in some adults of Lepidoptera insects. The integument layers producing interference are formed by modifications of the scales. Each of the blue scales of the *Morpho rhetenor* butterfly, for instance, consists of a flat basal plate carrying a large number of near-parallel vertically aligned ridges that run parallel with the length of the scale. Within each ridge are series of horizontal layers, separated by air spaces. Collectively, the horizontal layers in each adjacent ridge form a series of reflecting surfaces, which are spaced such that a blue colour is produced by interference. Interference colours in other insects are produced by reflection at the interfaces of layers in the cuticle which differ in refractive index. The refractive indices of the alternating layers in the pupa of the danaid butterfly, *Euploea mulciber*, are 1.58 and 1.37. In jewel beetles, *Chrysochroa fulgidissima* (Buprestidae) and tiger beetles, *Cicindela japonica* (Cicindellidae), these layers are in the exocuticle, but in tortoise beetles (Cassidinae) and some butterfly pupae they are in the endocuticle. Interference is responsible for the iridescence of the membranous wings of many different insects, particularly Odonata." (Authors)] Address: Ragaei, M., Pests and Plant Protection Dep. National research Centre, Cairo, Egypt

**15457.** Rajabi, H.; Ghoroubi, N.; Darvizeh, A.; Dirks, J.H.; Appel, E.; Gorb, S.N. (2015): A comparative study of the effects of vein-joints on the mechanical behaviour of insect wings: I. Single joints. *Bioinspiration & Biomimetics* 10(5) 056003. doi:10.1088/1748-3190/10/5/056003: (in English) ["The flight performance of insects is strongly affected by the deformation of the wing during a stroke cycle. Many insects therefore use both active and passive mechanisms to control the deformation of their wings in flight. Several studies have focused on the wing kinematics, and plenty is known about the mechanism of their passive deformability. However, given the small size of the vein-joints, accurate direct mechanical experiments are almost impossible to perform. We therefore developed numerical models to perform a comparative and comprehensive investigation of the mechanical behaviour of the vein-joints under external loading conditions. The results illustrate the effect of the geometry and the presence of the rubberlike protein resilin on the flexibility of the joints. Our simulations further show the contribution of the spikes to the anisotropic flexural stiffness in the dorsal and ventral directions. In addition, our results show that the cross veins, only in one joint type, help to transfer the stress to the thicker longitudinal veins. The deformation pattern and the stress distribution in each vein-joint are discussed in detail. This study provides a strong background for further realistic modelling of the dragonfly wing deformation." (Authors)] Address: Rajabi, H., Institute of Zoology, Functional Morphology and Biomechanics, Kiel University, Kiel, Germany. E-mail: hrajabi@zoologie.uni-kiel.de

**15458.** Rajkov, S.; Vinko, D.; Arandelovic, A. (2015): Faunistic results from the 2nd Balkan Odonatological Meeting – BOOM 2012, Serbia. *Natura Sloveniae* 17(2): 67-76. (in English, with Slovenian summary) ["As a part of the Balkan odonatological cooperation, the 2nd Balkan Odonatological Meeting (BOOM 2012) was held in Vojvodina (Serbia). Altogether, between 7. and 12. 8. 2012, 24 localities were surveyed and 34 dragonfly species found. This represents more than half of the hitherto recorded dragonfly species for the country. Significant results include the second record and a new locality of *Aeshna grandis* for Serbia and the first confirmation of successful reproduction of *Anax ephippiger* in the country. New data on several species with a comparably low number of previously published records for Vojvodina, i.e. *Somatochlora meridionalis*, *Cordulia aenea*, *Gomphus flavipes*, *Sympetrum flaveolum*, *Sympetrum vulgatum* and *Lestes dryas*, is also presented and briefly discussed.] Address: Rajkov, S., Bulevar Oslobođenja 115/73, 21101 Novi Sad, Serbia; E-mail: rajkovs@gmail.com

**15459.** Ramírez-Delgado, J.; López-García, K.; Lara, C.; Serrano-Meneses, M.A. (2015): Wing pigmentation in males of a territorial damselfly: Alternative reproductive tactics, allometry and mating success. *Journal of Insect Behavior* 28(5): 569-581. (in English) ["Alternative reproductive tactics (ARTs) evolve to maximise fitness by favouring alternative phenotypes when high variance in relative fitness occurs amongst individuals. In the damselfly *Hetaerina vulnerata* males occur as either territorial or nonterritorial, depending on whether males acquire and defend an area to which females are attracted for copulation. Territorial males are usually larger, more pigmented and more successful in obtaining copulations than nonterritorial males. Several studies further suggest that territorial males are in overall better condition than nonterritorial ones. Other studies have investigated whether wing pigmentation, a sexual trait in damselflies, scales hyperallometrically with body size, and asked whether this pattern is related to fitness—nonetheless, a clear answer to this question remains elusive. Here we investigate whether i) territorial and nonterritorial males differed in body size and wing pigmentation; ii) body size, wing pigmentation and/or male status (male ART) predicted male mating success; and iii) the allometry of wing pigmentation in territorial and nonterritorial males, and amongst mated and unmated males. We first found that territorial and nonterritorial males did not differ in body size. Second, contrary to what occurs in other damselflies, territorial and nonterritorial males exhibited similar amounts of wing pigmentation. Third, only territory tenure, but not body size or wing pigmentation, predicted male mating success. Finally, with the exception of the relationship exhibited by mated males, which exhibited isometry, wing pigmentation was hyperallometric in all groups of males tested. The latter result suggests that hyperallometry of the sexual trait in this damselfly may not be selectively advantageous." (Authors)] Address: Serrano-Meneses, M.A., Laboratorio de Biología Evolutiva, Centro Tlaxcala de Biología de la Conducta, Universidad Autónoma de Tlaxcala, Carretera Tlaxcala-Puebla Km. 1.5, 90062, Tlaxcala, Mexico. E-mail: serrano.meneses@bath.edu

**15460.** Randrianandrasana, M.; Berenbaum, M.R. (2015): Edible non-crustacean arthropods in rural communities of Madagascar. *Journal of Ethnobiology* 35(2): 354-383. (in English) ["Entomophagy, the practice of eating insects, is not new in many countries, including Madagascar, where insects have long been part of culinary traditions. Promoting this practice would help in enhancing food security as insects are nutritious and affordable for the majority of the population. Because eating insects is also associated with rural life, we conducted a survey in rural communities of Madagascar from April to June 2013. Diversity of edible, non-crustacean arthropods was assessed for each site using the number of times names of arthropods consumed were mentioned by each household. Approximately 65 morpho-species from seven orders of insects, including Hemiptera, Coleoptera, Lepidoptera, Orthoptera, Hymenoptera, Odonata, and Mantodea, and two orders of arachnids, including Araneae and Ixodida, were recorded as the most frequently consumed arthropods during the survey. Preference rankings differed among sites, possibly depending on the availability of the edible species; information on seasonal availability was also recorded from the informants. When comparing factors influencing food security in rural areas, most of the edible species were found between October and March, a time associated with the lean season and elevated food prices. This pattern demonstrates the importance of entomophagy in food security as Malagasy farmers rely heavily on their subsistence crops for their living. Rearing selected edible insects at a marketable level, combined with other insect-based activities such as sericulture, would further improve food security. Promoting the importance of ethnoentomology would be ultimately leading to more effective sustainability of edible insects and conservation of forests in Madagascar." (Authors)] Address: Randrianandrasana, M., Department of Entomology, 320 Morrill Hall, University of Illinois at Urbana-Champaign (UIUC), 505 S. Goodwin Avenue, IL 61801, USA. E-mail: mrandri2@illinois.edu

**15461.** Rathod, D.M.; Parasharya, B.M. (2015): Feeding potential of adult dragonflies, *Pantala flavescens* (Fabricius), *Brachythemis contaminata* Fabricius and *Bradinopyga geminata* Rambur (Anisoptera: Libellulidae) on insect pests under laboratory condition. *Journal of Biological Control* 29(2): 85-88. (in English) ["Feeding potential of three dragonfly species was worked out on the basis of numerical value and fresh prey weight under laboratory condition at Anand (Gujarat) during 2013. Adult dragonflies, viz., *Pantala flavescens*, *Brachythemis contaminata* and *Bradinopyga geminata* were used as predator and *Nilaparvata lugens*, *Aphis craccivora* and *Aedes* sp. were used as prey. Daily biomass consumption of *P. flavescens*, *B. contaminata* and *B. geminata* were 224.51 mg, 149.35 mg and 169.34 mg respectively. The prey numbers consumed by each dragonfly species were significantly different. However, irrespective of prey species biomass consumption was the same. Feeding potential of the dragonflies was positively correlated with their body weight. Feeding potential of females of *P. flavescens* and *B. contaminata* was slightly

higher than their respective males." (Authors)] Address: Rathod, D.M., AINP on Agricultural Ornithology, Anand Agricultural University, Anand-388 110, Gujarat, India

**15462.** Rathod, P.P.; Manwar, N.A.; Raja, I.A. (2015): Visual deception in oviposition site selection in female dragonfly *Bradinopyga geminata* (Rambur) Libellulidae: Anisoptera. *International Journal of Advanced Research* 3(5): 562-565. (in English) ["Vision is the most developed sense in dragonfly, uses for habitat selection and mate recognition. The present investigation explains the role of visual sense in selection of oviposition site in dragonfly. This study was reported in female of *Bradinopyga geminata* which observed to be deceived by the shining black surfaces as water bodies and selected them as its ovipositing site. In our study on reproductive behaviour, we observed ovipositing *B. geminata* females, instead of water body, selected dark brown shining colored flag base, the moving shiny black wheels of heavy vehicles and the front screen glass of a car as its oviposition site and deposited the eggs. Thus it is found that the female of dragonfly *B. geminata* very much depends on its visual sense in selection of its oviposition site and capable of misguided in this regard." (Authors)] Address: Raja, I.A., Department of Zoology, Shri Shivaji College of Arts, Commerce and Science, Akola -444001, India

**15463.** Reborá, M.; Piersanti, S.; Salerno, G.; Gorb, S. (2015): The antenna of a burrowing dragonfly larva, *Onychogomphus forcipatus* (Anisoptera, Gomphidae). *Arthropod Structure & Development* 44(6, Part A): 595-603. (in English) ["Highlights: •The larva of the dragonfly *Onychogomphus forcipatus* has a burrowing lifestyle. •This is the first ultrastructural investigation (SEM, TEM) on its antennal sensilla. •Numerous mechanoreceptors and one possible chemoreceptor are described. •The mechanoreceptors are mostly filiform hairs presumably for current detection. •This is the first report of an antennal gland in palaeopteran insects. Abstract: The larva of *O. forcipatus* has a burrowing lifestyle and antennae composed of four short and broad segments (scape, pedicel and a two-segmented flagellum). The present ultrastructural investigation revealed that different sensilla and one gland are located on the antenna. There is a great diversity of mechanoreceptors of different kinds. In particular club-shaped sensilla, sensilla chaetica, and tree-like sensilla show the typical structure of bristles, the most common type of mechanoreceptors, usually responding to direct touch, while numerous long thin thorny trichoid sensilla show a morphology recalling the structure of filiform hair mechanoreceptors. The latter ones are presumably important in larval Odonata for current detection and rheotactic orientation, especially in a burrowing species. On the smooth apical cuticle of the second flagellar segment, three structures are visible: (1) a small ellipsoidal pit hosting a convoluted peg, the morphology of which resembles that of a typical chemoreceptor (even if pores are lacking), (2) a couple of small pits (not investigated under TEM), and (3) one wide depression with spherical structures, the internal morphology of which lets us assume that it is a gland with unknown function. This is the first report of an antennal gland in palaeopteran insects." (Authors)]



Address: Reborá, Manuela, Dipartimento di Chimica, Biologia e Biotecnologie, University of Perugia, 06121, Italy. E-mail: manuela.reborá@unipg.it

**15464.** Reels, G.; Zhang, H.-m. (2015): A field guide to the dragonflies of Hainan. 463 pp. (in bilingual in Chinese and English) [The diverse freshwater habitats nurture more than 165 species of dragonflies. Among them, 22 are endemic to the island. This book displays the species commonly found on the island and enables us to take a glimpse at the fascinating behaviour of such ancient insects.] Address: Reels, G., 31 St Anne's Close, Winchester SO22 4LQ, UK. E-mail: gtreels@gmail.com

**15465.** Renner, S.; Périco, E.; Sahlén, G.; Martins dos Santos, D.; Consatti, G. (2015): Dragonflies (Odonata) from the Taquari River valley region, Rio Grande do Sul, Brazil. *Check List* 11(5): 1740: 6 pp. (in English) ["A survey of Odonata was carried out in the central region of the state of Rio Grande do Sul: the Taquari River valley. This region was originally covered by deciduous and Semi-deciduous Atlantic Forest, which today only exist in a highly fragmented environment mainly due to agricultural activities. Our survey was conducted in 12 municipalities from this region, between March 2011 and April 2013. Aiming a general overview of the species composition, our sampling sites included lakes, bogs, small streams and river sections, all inside or surrounded by small forest fragments or forest areas. Fifty species of Odonata were collected comprising 29 genera and seven families. The dominant families were Libellulidae (40%) and Coenagrionidae (36%), while Aeshnidae, Gomphidae and Lestidae each only comprise 6% of the total number of species. The findings revealed the presence of a highly diverse odonate assemblage, mainly represented by generalist species in human disturbed fragments and a few forest specialist species in the best preserved remnants only." (Authors)] Address: Renner, S., Centro Universitário Univates, Setor de Evolução e Ecologia, Rua Avelino Tallini, 171, CEP 95900-000, Lajeado, RS, Brazil. E-mail: samuelrenner@hotmail.com

**15466.** Richards, D.R.; Warren, P.H.; Moggridge, H.L.; Maltby, L. (2015): Spatial variation in the impact of dragonflies and debris on recreational ecosystem services in a floodplain wetland. *Ecosystem Services* 15: 113-121. (in English) [Highlights: •We model spatial variation in recreational experiences using three steps. •The net quality of recreational experiences varies at a fine spatial scale. •The noticeability of habitat components strongly impacted visitor experiences. •Noticeability is important in the analyses of recreational ecosystem services. Abstract: Recreation is an important ecosystem service. The interaction between people and habitat components is rarely considered in the analyses of recreational experiences, making it difficult to predict what people will experience. In this study we develop a modelling framework that describes three stages of interaction between people and habitats. This framework considers: (1) the distribution of habitat components in the environment, (2) the proportion of the available components that

visitors notice, and (3) the net impact of multiple components on the quality of the recreational experience. The model was applied to a case study river floodplain, and was used to estimate visitor exposure to a combination of positive habitat components (dragonflies) and negative components (debris). The model provided an index of net impacts on experience quality that showed spatial variation across the floodplain, and this analysis highlighted areas that would deliver more positive experiences to visitors. The results of a sensitivity analysis indicated that neglecting the noticeability (observation rate) of habitat components resulted in different predictions. It is therefore important that the noticeability of habitat components is considered during analyses of recreational experiences, and recreational ecosystem service valuations." (Authors)] Address: Richards, D.R., Dept of Animal & Plant Sciences, Univ. Sheffield, Sheffield, UK. E-mail address: d.r.richards@nus.edu.sg

**15467.** Richards, S.J.; Theischinger, G.; Tamarua, W. (2015): Chapter 3: Dragonflies and damselflies (Odonata) of Manus and Mussau Islands. In: Whitmore N. (editor) 2015. A rapid biodiversity survey of Papua New Guinea's Manus and Mussau Islands. Wildlife Conservation Society Papua New Guinea Program. Goroka, PNG: 27-30. (in English) ["A total of 21 species of Odonata were documented from Manus and Mussau Islands, comprising 9 damselflies and 12 dragonflies. Nineteen of the 21 species were found on Manus and 12 were found on Mussau. One damselfly species in the genus *Drepanosticta* (family Platystictidae) from Manus Island is new to science. No species listed by the IUCN as Data Deficient, or in any threatened category, was detected. The odonate fauna of both Manus and Mussau islands is dominated by widespread species, a feature common to remote oceanic islands. However two species of damselflies, the recently described *Nososticta manuscola* Theischinger and Richards (in press) and the new *Drepanosticta* reported for the first time here, appear to be endemic to Manus Island. Management of the forests in central Manus to ensure long-term persistence of the clear streams and riparian vegetation inhabited by the two endemic species is a high conservation priority. Surveys of the interior of Mussau Island should also be conducted to determine whether additional, and potentially new and endemic, species occur there away from the coastal fringe." (Authors)] Address: Richards, S.J., Vertebrates Dept, South Aust. Museum, North Terrace, Adelaide, S.A. 5000, Australia. E-mail: richards.steve@saugov.sa.gov.au

**15468.** Rieger, E. (2015): Beobachtungen zur Libellenfauna (Odonata) der Jahre 2005 bis 2014 im Lausitzer Bergland. *Mitteilungen Sächsischer Entomologen* 34(112): 13-20, 32. (in German) [The study between 2005 and 2014 of four localities in Sachsen (Germany) resulted in 14 odonate species.] Address: Rieger, Elisabeth, Grenzstr. 35, 01904 Steingwolmsdorf, Germany

**15469.** Roh, C.; Rosakis, A.; Morteza Gharib, M. (2015): G27.00009 : Jet vectoring through nozzle asymmetry. *Bulletin of the American Physical Society* 60(21): 1 p. (in English) [Verbatim: Previously, we explored the functionality of

a tri-leaflet anal valve of a dragonfly larva. We saw that the dragonfly larva is capable of controlling the three leaflets independently to asymmetrically open the nozzle. Such control resulted in vectoring of the jet in various directions. To further understand the effect of asymmetric nozzle orifice, we tested jet flow through circular asymmetric nozzles. We report the relationship between nozzle asymmetry and redirecting of the jet at various Reynolds numbers.] Address: not stated

**15470.** Rohmare, V.B.; Rathod, D.M.; Dholu, S.G.; Parasharya, B.M.; Talmale, S.S. (2015): An inventory of odonates of central Gujarat, India. *Journal of Threatened Taxa* 7(11): 7805-7811. (in English) ["An inventory of Odonata was carried out in six districts of central Gujarat from 2012 to 2014. A total of 42 species belonging to 27 genera, under seven families and two suborders were recorded. A total of 16 species of Zygoptera and 26 species of Anisoptera were recorded. Anand District was surveyed intensively and as a result a maximum of 35 species was recorded (Dragonfly 22 and Damselfly 13), whereas less intensively surveyed districts, i.e., Panchmahal (17) and Dahod (16) had comparatively low species richness. Twenty-two species are being reported for the first time from central Gujarat, raising the total list of odonates to 48. Six species reported in an earlier survey were not encountered during this study. Seven species namely, *Copera marginipes*, *Pseudagrion microcephalum*, *Anaciaeschna jaspidea*, *Anax immaculifrons*, *Epophthalmia vittata*, *Brachydiplax sobrina*, *Tramea basilaris burmeisteri* are being recorded for the first time from Gujarat State. Hence, now the checklist of the odonates of Gujarat is raised to 65 species." (Authors)] Address: Rohmare, V.B., At PO Pohegaon, Kopargaon Taluka, Ahmednagar, Maharashtra 423605, India. E-mail: rohmarevb@gmail.com

**15471.** Román-Heracleo, J.; González-Valencia, L.; López-Medina, G.E. (2015): Primer registro del género *Palaemnema* Selys, 1860 (Odonata: Platystictidae) para el estado de Durango, México. *Dugesiana* 22(1): 17-18. (in Spanish, with English summary) [2012-2014, 34 larvae of the genus *Palaemnema* were sampled along the river Piaxtla, near San Dimas, state of Durango, Mexico] Address: Román-Heracleo, J., CTA, Consultoría y Tecnología Ambiental México S.A. de C.V. Av. Insurgentes Sur 1763, piso 5. Col. Guadalupe Inn. C.P. 01020, Delegación Álvaro Obregón, México. D.F. E-mail: romanjareth@gmail.com

**15472.** Sadeghi, S.; Bakhshi, Y.; Dumont, H. (2015): Wing shape variation among central Asian populations of *Calopteryx splendens*. *Taxonomy and Biosystematics* 7(23): 13-26. (in Persian, with English summary) ["We applied geometric morphometric techniques to explore the morphological variation of forewings between 10 Asian *Calopteryx splendens* populations including Azerbaijan, Russia, Turkey, Uzbekistan, Iran, Turkmenistan, Tajikistan, Kazakhstan, and Kyrgyzstan countries. We focused on the study of the phenetic relationships among the populations in central Asia. The results showed that the northern and western populations of Iran had the largest and smallest centroid

size of the wings, respectively. In addition, differences among wing shape of the 10 studied populations of *C. splendens* were significant. Our results indicated that Tajikistan population has quite distinct divergence and also Turkmenistan and northern part of Iran populations both were very close each other and located in a separate clade. The Azerbaijan, Russia, Turkey, Uzbekistan, west Iran, Kazakhstan and Kyrgyzstan populations were revealed to be more interrelated to each other, although Kazakhstan and Kyrgyzstan populations seems to be more closer than the other." (Authors)] Address: Sadeghi, S., Dept of Biology, Faculty of Sciences, Shiraz University, Shiraz, Iran. E-mail: ssadeghi@shirazu.ac.ir

**15473.** Salunkhe, R.C.; Dhotre, D.P.; Salunke, B.K.; Patil, V.S.; Mahale, V.A.R.J.; Patole, M.S.; Narkhede, K.P.; Shouche, Y.S. (2015): Distribution and molecular characterization of *Wolbachia* endosymbionts in Odonata (Insecta) from central India by multigene approach. *Current Science* 108(5): 971-978. (in English) ["*Wolbachia* are maternally inherited bacterial endosymbionts of arthropods distributed among a wide range of hosts. It is now well known that they induce reproductive manipulations in their arthropod hosts by various phenotypic effects. The objective of the present study was to investigate *Wolbachia* infection among the insect order Odonata comprising 16 species from 5 families. Fifteen odonate species representing five families were found to harbour *Wolbachia* with the overall infection rate of 70%, out of which fourteen species are reported for the first time. According to multilocus sequence typing (MLST) data and phylogenetic analysis, all odonate *Wolbachia* species belong to supergroup F, except *Trithemis pallindinervis*, which belongs to supergroup B. MLST data reveal 20 new, highly similar STs ( $99.32 \pm 0.34$ ). We found a high rate of *Wolbachia* infection in Odonata of India, which indicates importance of this association. The characterization of these *Wolbachia* strains promises to lead to a deeper insight into this interaction, which is essential for further studies based on their phenotypic effects. The study suggests that all the characterized *Wolbachia* STs are totally new and arise as a result of point mutation." (Authors) *Anax guttatus*, *Epophthalmia vittata*, *Ictinogomphus rapax*, *Acisoma panerpoides panerpoides*, *Brachythemis contaminata*, *Crocothemis servilia*, *Diplocodes trivialis*, *Neurothemis tulia*, *Orthetrum sabina*, *Orthetrum glaucum*, *Pantala flavescens*, *Rhyothemis variegeta*, *Trithemis pallindinervis*, *Aciaagrion pallidum*, *Ceriagrion coromandelianum*, *Ischnura senegalensis*] Address: Shouche, Y.S., National Centre for Cell Science, University of Pune Campus, Ganeshkhind, Pune 411 007, India. E-mail: yogesh@nccs.res.in

**15474.** Sampath, P., Liao, H., Curtis, Z., Li, S., and Deloria, C. (2015): Modeling fen hydrology to inform recovery of the endangered Hine's Emerald Dragonfly. *J. Hydrol. Eng.*, 10.1061/(ASCE)HE.1943-5584.0001314 , 05015029: 12 pp. (in English) ["It is generally recognized that fens and the rare species they support can only be effectively managed and protected by treating them as part of a larger, connected groundwater system. However, this underlying groundwater

system is often not well understood. In this research, a geographic information system (GIS)-enabled, hierarchical modelling approach was applied to simulate the multiscale groundwater flow systems for several critical habitat units of the endangered *S. hineana* in Michigan. In particular, models for six habitat units were developed and calibrated to static water level measurements. Reverse particle tracking was used to trace source water and delineate the groundwater contribution areas for the habitat units. The results reveal that the units obtain water from regional groundwater mounds through direct or cascading connections. The travel time for groundwater from the mounds to reach the habitat units varied between 25 days and almost 11 years. These findings suggest that the current approach to fen conservation must be reassessed, from the protection of individual fens to conservation of the broad recharge areas and the multiple fens they support." (Authors)] Address: Sampath, P., Dept. Civil & Environmental Engineering, Michigan State Univ., 428 S. Shaw Ln., Room 3546, East Lansing, MI 48824-1226, USA. E-mail: sampath3@msu.edu

**15475.** Sánchez-Guillén, R.A.; Cordero-Rivera, A. (2015): Confirmation of the presence of *Ischnura senegalensis* (Rambur, 1842) on the Canary Islands. *Animal Biodiversity and Conservation* 38(1): 71-76. (in Spanish, with English summary) ["The presence of one or two species of damselflies of the genus *Ischnura* in the Canary Islands has been a matter of debate in the recent years. The first published records listed *I. senegalensis* as the only zygopteran inhabiting the archipelago, but this proved to be wrong, and until recently, all specimens of *Ischnura* captured in the islands were unanimously regarded as belonging to *I. saharensis*. Recent photographic evidence, however, is compatible with the presence of *I. senegalensis*. In this study, we give morphological and genetic evidence of the presence of *I. senegalensis* in the Canary Islands, and we discuss the importance of voucher specimens to correctly identify very similar species." (Authors)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Univ. de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**15476.** Santana, H.S.; Silva, L.C.F.; Pereira, C.L.; Simião-Ferreira, J.; Angelini, R. (2015): The rainy season increases the abundance and richness of the aquatic insect community in a Neotropical reservoir. *Brazilian Journal of Biology* 75(1): 144-151. (in English, with Portuguese summary) ["Alterations in aquatic systems and changes in water levels, whether due to rains or dam-mediated control can cause changes in community structure, forcing the community to readjust to the new environment. This study tested the hypothesis that there is an increase in the richness and abundance of aquatic insects during the rainy season in the Serra da Mesa Reservoir, with the premise that increasing the reservoir level provides greater external material input and habitat diversity, and, therefore, conditions that promote colonization by more species. We used the paired t test to test the differences in richness, beta diversity, and abundance, and a Non-metric Multidimensional Scaling (NMDS)

was performed to identify patterns in the community under study. Additionally, Pearson correlations were analyzed between the richness, abundance, and beta diversity and the level of the reservoir. We collected 35,028 aquatic insect larvae (9,513 in dry period and 25,515 in the rainy season), predominantly of the Chironomidae family, followed by orders Ephemeroptera, Trichoptera, and Odonata. Among the 33 families collected, only 12 occurred in the dry season, while all occurred in the rainy season. These families are common in lentic environments, and the dominance of Chironomidae was associated with its fast colonization, their behavior of living at high densities and the great tolerance to low levels of oxygen in the environment. The hypothesis was confirmed, as the richness, beta diversity, and abundance were positively affected by the increase in water levels due to the rainy season, which most likely led to greater external material input, greater heterogeneity of habitat, and better conditions for colonization by several families." (Authors)] Address: Santana, H.S., Programa de Pós-graduação em Ecologia de Ambientes Aquáticos Continentais, Universidade Estadual de Maringá – UEM, Av. Colombo, 5790, CEP 87020-900, Jd. Universitário, Maringá, PR, Brazil. E-mail: herick.bio@gmail.com

**15477.** Savard, M. (2015): Découverte du gomphe fléché dans les Appalaches québécoises. *Le Naturaliste canadien* 140(1): 26-31. (in French, with English summary) ["*Stylurus spiniceps* is considered as a discrete species of dragonfly, associated with the St. Lawrence River and its major tributaries. The discovery of populations in the Montérégie and Estrie Regions confirms its presence in the Appalachians natural province in Québec. The absence of records in the lowlands surrounding the island of Montréal and Saint-Pierre lake could indicate a degradation of the aquatic and forest environment in the downstream portion of the Appalachian and Laurentian watersheds. A set of 8 riverine species of Gomphids can serve as biological indicators applied to the hydrographic system of the St. Lawrence." (Author)] Address: Savard, M.; E-mail: michel.savard@ssss.gouv.qc.ca

**15478.** Schiel, F.-J.; Buchwald, R. (2015): Contrasting life-history patterns between vernal pond specialists and hydroperiod generalists in *Lestes* damselflies (Odonata: Lestidae). *Odonatologica* 44(3): 349-374. (in English) ["The aim of our study was to identify life-history mechanisms enabling typical inhabitants of vernal ponds to complete their larval development under the time constrained conditions of their temporary larval habitats. For that reason we compared both hatching phenology and larval development of vernal pond specialists *Lestes barbarus*, *L. dryas*, and *L. macrostigma* with those of the closely related hydroperiod generalists *L. sponsa*, *L. virens*, and *L. viridis* under seminatural conditions. As hypothesized, we found vernal pond specialists of the genus *Lestes* to cope with the short water coverage of their typical larval habitats by the following developmental traits: a) an early hatching date in *L. dryas* and *L. barbarus*, b) large second-stadium larvae, which have to grow less and with fewer larval stadia than the hydroperiod generalists *L. dryas* and *L. macrostigma*, c) a short larval development time in *L.*



macrostigma and d) higher growth rates in *L. dryas* and *L. barbarus* than in the other species. Degree day sums in vernal pond specialists were significantly lower than in their less specialized counterparts. This means, that they would have grown faster than hydroperiod generalists, if thermal conditions during larval development were identical in all species. Due to these developmental adaptations, larvae of *L. dryas* and *L. barbarus* emerged significantly earlier in the course of year than both *L. macrostigma* and the three hydroperiod generalists. Unexpectedly, none of the three studied vernal pond specialists has evolved all of these particular adaptations. This may be because of the close ecological relationship within the genus *Lestes*, and the studied species being generally characterized by univoltine life cycles and fast larval development, which enables all of the European species to reproduce in temporary ponds." (Authors)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**15479.** Schiel, F.-J.; Buchwald, R. (2015): Hatching phenology of Odonata species inhabiting temporary and permanent water bodies (Odonata: Lestidae, Aeshnidae, Libellulidae). *International Journal of Odonatology* 18(2): 105-123. (in English) ["The hatching phenology of 15 Odonata species was studied under seminatural conditions to find out how the hatching modes of typical species of summer dry temporary waters (vernal ponds) differ from those of species inhabiting both permanent and temporary waters. We attempt to answer the following questions. (1) Do vernal pond species hatch earlier in the year than congeneric permanent water species? (2) Can hatching in vernal pond species be delayed under unsuitable environmental conditions, like drought? (3) Can eggs of vernal pond species survive for more than one year? Larvae of vernal pond species, *Aeshna affinis*, *Lestes barbarus*, *L. dryas* and *Sympetrum flaveolum*, hatched significantly earlier than their permanent water counterparts *A. mixta*, *L. sponsa*, *L. virens*, *L. viridis*, *S. danae*, *S. depressiusculum*, *S. meridionale*, *S. sanguineum*, *S. striolatum* and *S. vulgatum*. Only one vernal pond species, *L. macrostigma*, did not show this early hatching. In both vernal pond and permanent water species hatching succession of different clutches of each species varied, which may reflect genotypic differences. In both vernal pond species and permanent water species hatching was delayed when eggs were kept on moist filter paper – simulating drought – instead of being put into water. The hatching success of two vernal pond species and of four out of five studied permanent water species was reduced significantly by keeping eggs on moist filter paper. Survival of eggs for more than one year could not be proved under temperature conditions resembling those in nature." (Authors)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenenweg 9, 77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**15480.** Schmidt, E. (2015): Die Odonatenfauna eines Kiefernheide-Weiher im Teichgut Hausdülmen (Dülmen, Westmünsterland, NRW). *Libellula* 34(1/2): 59-72. (in German, with English summary) ["The dragonfly fauna of a pine

heath pond at a fish farm in North Rhine-Westphalia – 200 excursions between 1991–2014 are the base of an investigation of the dragonfly fauna of a pine heath pond in the cretaceous Haltern sands, north Westphalia, near a fish pond farm. The pond is surrounded by pine wood, has a dark, acid bogwater, at the bank with a drying out belt of *Juncus effusus* and mosses between the reeds. Formerly there had been *J. bulbosus* mats in front of this belt, which usually dried up in summer. After damming the outflow ditch the water level of the pond became permanent, but the floating vegetation (*J. bulbosus* mats) decreased. 31 species of Odonata had been found (in the neighbouring fish farm additional 13 species). *Leucorrhinia dubia* was the only bog species, confined to floating *Sphagnum* mats and therefore only in single specimens, lost since 2006. Also the four species with preference to heath ponds (*Aeshna juncea*, *Sympetrum danae*, *L. rubicunda*, also *Sympecma fusca*.) became suboptimal, but steadily breeding; for *S. fusca* the pond was a regional breeding centre, and favoured f.i. the (temporary) breeding at the carp breeding ponds. As usual three ubiquitous (*Lestes sponsa*, *Enallagma cyathigerum*, *Libellula quadrimaculata*) are breeding at least in middle density. Eight ubiquitous had been usually breeding, ten species had been more or less usually guests from the fish pond farm and its creeks. Four species with bog preference (*L. virens*, *Ceriatrigon tenellum*, *L. pectoralis*, *Orthetrum coerulescens*) had been only rare guests. A speciality was *S. depressiusculum*. This species in this Atlantic region of Germany is confined to the special conditions of carp breeding ponds. It has a strong preference to low reeds for hunting, resting, and precopulation. This is given by the *Juncus effusus*-belt of the heath pond. So the species came to the belt usually in middle density with reproduction activities, but successful (emergence) only in some years. Thus the investigation shows a remarkable dragonfly exchange between the pineheath pond and the fish pond farm." (Author)] Address: Schmidt, E.G., Coesfelder Str. 230, 48249 Dülmen, Germany

**15481.** Schneider, T.; Schneider, E.; Schneider, J.; Vierstraete, A.; Dumont, H.J. (2015): *Aeshna vercanica* sp. nov. from Iran with a new insight into the *Aeshna cyanea*-group (Odonata: Aeshnidae). *Odonatologica* 44(1/2): 81-106. (in English) ["*Aeshna vercanica* sp. nov. is described and illustrated. The male holotype and four male paratypes were collected on 15-vii-2013 in the Hyrcanian forest of the Alborz Mountains, Mazandaran province, northwestern Iran. A specimen collected on 29-vi-2002 in the Talysh Hills, Lankoran area, Azerbaijan, also belongs to the new species. In July 2014 the species, including females, was recorded again at the type locality and additionally ca 400 km further east in Golestan province. Males are similar to *Aeshna cyanea* in the structure of genitalia and terminalia but differ in head morphology, pterostigma length, colour pattern, and behaviour. Females have small abdominal blue or turquoise postero-median dorsal spots which are absent on S9 and S10, thin green antehumeral stripes, a less robust appearance than females of *A. cyanea*, and are more slender and longer. The range of *A. vercanica* sp. nov. covers the Hyrcanian forest along the southern margin of the Caspian

Sea. Analysis of the barcoding COI sequence of DNA confirmed that *A. vercanica* sp. nov. is separated from *A. cyanea* by a genetic distance of more than 4 %. The ITS gave a similar result. A haplotype map could not derive *A. vercanica* sp. nov. directly from *A. cyanea*. They are thus related but different species, and we suggest the common ancestor lived in pre-Pleistocene times. Analysis of *A. cyanea* specimens from across its range revealed two infraspecific clades. The western one extends from the Maghreb to Central Europe; the eastern one from the Caucasus to Eastern Europe, a common scenario for post-glacial invaders. A molecular comparison of the species pair *A. juncea* and *A. subarctica* showed these to be even more closely related than *A. cyanea* and *A. vercanica* sp. nov." (Authors)] Address: Schneider, T., Arnold-Knoblauch-Ring 76, 14109 Berlin, Germany. E-mail: thomas.rs@gmx.de

**15482.** Schneider, T.; Ikemeyer, D.; Dumont, H.J. (2015): New records of dragonflies (Odonata) from Belutschistan-e-Sistan province in Iran. *Zoology in the Middle East* 61(3): 288-290. (in English) [Data of the following species are presented: *Trithemis pallidinerve*, *Brachythemis contaminata*, *Platynemis dealbata*, *Ischnura evansi*, *I. nursei*, *I. pumilio*, *I. rubilio*, *Pseudagrion decorum*, *Diplacodes lefebvrei* and *Selysiothemis nigra*] Address: Schneider, T., Arnold-Knoblauch-Ring 76, 14109 Berlin, Germany. E-mail: thomas.rs@gmx.de

**15483.** Schröter, A.; Seehausen, M.; Kunz, B.; Günther, A.; Schneider, T.; Jödicke, R. (2015): Update of the Odonata fauna of Georgia, southern Caucasus ecoregion. *Odonatologica* 44(3): 279-342. (in English) ["A total of 63 odonate taxa were recorded in Georgia during nationwide surveys in June–July 2014, and June and July–August 2015, corresponding to at least 85 % of the country's Odonata fauna. For the majority of species information from Georgia is provided in English language for the first time. *Selysiothemis nigra* is a new addition to the country's list. The occurrence of *Chalcolestes parvidens* is confirmed and previous records from Georgia listed as *Lestes viridis* are doubted and believed to pertain to *parvidens*. The second and third records only for *L. macrostigma* are presented. Individuals intermediate between *Enallagma cyathigerum* and *E. c. risi* are reported from Georgia for the first time. As to Georgian *Lestes virens*, the infraspecific taxonomy is critically discussed, with special reference to Central Asian forms described as ssp. *marikovskii*. It is recommended to avoid any further splitting into inadequately defined subspecies, as the variability of eastern forms from Central Europe towards Central Asia can be better described as clinal variation within the ssp. *vestalis*. In consequence, the name *marikovskii* is regarded as a junior synonym of *vestalis*: *Lestes virens vestalis* Rambur, 1842 = *L. virens marikovskii* Belyshev, 1961, syn. nov. The diversity of taxa within the *Calopteryx splendens* complex in the Caucasus region is considered to comprise in fact three subspecies in Georgia: ssp. *intermedia*, ssp. *tschaldirica*, and ssp. *mingrelica*. Despite of transition zones and hybridisation each subspecies represents in toto a spatially clearly delimited unit. In ssp.

*intermedia* androchrome females frequently occurred in the Kakheti region in the east of Georgia. The distinct female colour form 'feminalis' of *Calopteryx virgo* is illustrated for the first time and the availability of the name *Calopteryx virgo* var. *feminalis* Bartenev, 1910 is critically discussed. For a number of species the first information from Georgia is provided since their discovery over a century ago, such as *Coenagrion armatum*, *Aeshna serrata*, and *Onychogomphus assimilis*; for *Coenagrion lunulatum* and *C. scitulum* the first data since over 75 years are presented. *Coenagrion ponticum* was recorded throughout the country and at least at two sites found to reproduce syntopically with *C. puella*. New information is provided for the little known *Coenagrion vanbrinkae*, including a formerly unknown pink colour morph of reproductive females. The infraspecific taxonomy of *Ischnura elegans* is critically discussed, with special reference to the taxa *pontica* Schmidt, 1938 and *ebneri* Schmidt, 1938. In addition, new records of *Pyrrhosoma nymphula* and *Coenagrion pulchellum*, both being rare in the Caucasus region, are given. The presence of distinct *Gomphus schneiderii* in Georgia is confirmed as well as the continuous presence of *Gomphus ubadschii* at the Rioni River over 80 years after its description under the homonym »*Gomphus flavipes* var. *lineatus* var. n.«. *Onychogomphus assimilis* and *O. flexuosus* were found to be abundant in the eastern half of the country suggesting that Georgia is an important global stronghold for both threatened species. Males of *Caliaeschna microstigma* exhibited a distinctive tendency for reduced ante-humeral stripes, leaving only a small bluish patch at the posterior part in some males. Vital populations of *Libellula pontica*, endemic to the East Mediterranean, were found and the species is assumed to be well established in the Kakheti region in the East of the country." (Authors)] Address: Schröter, A., Rasenweg 10, 37130 Gleichen, Germany. E-mail: notulae@osmylus.com

**15484.** Schütte, C.; Müller, O. (2015): Dorsolateral cuticular outgrowths in second stadium larvae of *Gomphus flavipes* (Odonata: Gomphidae). *International Journal of Odonatology* 18(1): 65-69. (in English) ["Second and third stadium larvae of *Gomphus flavipes* have dorsolateral cuticular outgrowths in the form of small basal tubercles bearing fan-shaped setae. These sensilla are aligned in two rows on each side of the thorax and abdomen. European species of *Gomphus*, *Onychogomphus* and *Ophiogomphus* that we examined lack these structures, having instead, at most, short hairlike setae in double rows. The fan-shaped setae of *G. flavipes* are present only in second and third stadia, apparently being lost later in larval development. We speculate that this loss might be due to changes in microhabitat or might be some kind of phylogenetic constraint." (Authors)] Address: Schütte, C., Bindestr. 16, D-38162 Weddel, Germany. E-mail: c.schuette@lk-wf.de

**15485.** Segev, O.; Rodríguez, A.; Hauswaldt, S.; Hagemann, K.; Vences, M. (2015): Flatworms (*Schmidtea nova*) prey upon embryos of the common frog (*Rana temporaria*) and induce minor developmental acceleration. *Amphibia-Reptilia* 36(2): 155-163. (in English) ["Amphibians vary in

the degree of pre-metamorphic developmental plasticity in response to risk of predation. Changes in hatching time and development rate can increase egg or tadpole survival respectively by shortening the duration of the more vulnerable stages. The intensity of predator induced developmental response and its direction, i.e. delayed, accelerated, or none, varies considerably between amphibian and predator species. We surveyed freshly deposited clutches of the European common frog *Rana temporaria* in a population in Braunschweig, Germany and found that 62% (N = 20) of the clutches contained planarians (*Schmidtea nova*), with an average of  $3.94 \pm 0.79$  and a maximum of 13 planarians per clutch. A laboratory predation experiment confirmed that this planaria preys on *R. temporaria* eggs and early embryos. We further exposed freshly laid egg masses to either free, caged, or no planarians treatments using floating containers within a breeding pond where the two species co-occur. After 10 days exposure, embryos showed developmental stages 14-25 along the Gosner scale with statistically significant positive effects of both predator treatments. The observed effect was rather slight as predator-exposed individuals showed an increase by a single Gosner stage relative to those raised without planarians. The detected trend suggests that direct and indirect cues from flatworms, rarely considered as anuran predators, might induce a developmental response in *R. temporaria* early developmental stages." (Authors) The paper includes many references to Odonata.] Address: 1Institute of Evolution, University of Haifa, Mt. Carmel, Haifa 31905, Israel; 2Zoologisches Institut, Technische Universität Braunschweig, Mendelssohnstr. 4, D-38106 Braunschweig, Germany

**15486.** Seifert, N.; Koschkar, S.; Schmitz-Ornés, A. (2015): Diet of Baillon's Crakes *Zapornia pusilla*: Assessing differences in prey availability and consumption during the breeding season in the Senegal River Delta, West Africa. *Acta Ornithologica* 50(1): 69-84. (in English) ["The Baillon's Crake *Zapornia* (*Porzana*) *pusilla* is considered as one of the least known Rallidae species of the Palaearctic. Very little information exists about its ecological requirements and knowledge on diet refers to very few observations. Based on the analysis of faecal samples (N = 59) from two study sites in Djoudj National Park (NW Senegal), we describe the major diet components and examine how seasonal and environmental factors influence its dietary composition. All faeces contained remains of invertebrates. Coleopterans were the most frequent prey items with an occurrence in 95% of the samples. Other important food items were: Odonata (82%), Araneae (78%), Nematocera (59%), and Brachycera (44%). Remains of gecko skin were the only evidence for vertebrate prey. 75% of the faeces contained plant matter, especially seeds of *Eleocharis mutata* which constituted in some individuals > 90% of the sample content. Generalized linear models (GLMs) were used to assess whether occurrence of prey items was an effect of selection or environmental variation, considering both consumed items as well as prey availability. Sweep netting was used to provide an estimate of relative abundance of poten-

tial invertebrate prey. Despite pronounced seasonal changes in temperature and humidity, models revealed a lower influence of meteorological variables on prey composition and availability. Rather we found water level, date and site having the highest impact in the models. In contrast to decreasing diversity of available food items in the course of the season, diversity in the faeces remained constant indicating Baillon's Crakes prey less selectively when resources diminish. Furthermore, diversity of Baillon's Crakes' diet was lower at higher water levels, suggesting stronger selectivity when prey abundances are high as implied by positive relationships of several invertebrate groups with water level. Despite the rapidly declining water levels and decreasing abundances of e.g. Nematocera, Odonata and Mollusca in the course of the season, we found no clear shift from aquatic to a more terrestrial dominated composition of taxa in the birds' diet. This might be due to the selection of profitable prey such as araneans or molluscs but could also be explained by better accessibility due to physical changes in the habitats e.g. in the case of consumed Odonata and Saltatoria. High disintegration of invertebrates in the faeces rendered quantification of prey items impossible. Biomass estimates could support the assessment of specialization of the Baillon's Crakes as well as the detection of seasonal succession of the wetlands' biotic communities." (Authors)] Address: Seifert, Nina, Zoological Institute and Museum, Vogelwarte Hiddensee, Ernst Moritz Arndt University Greifswald, Soldmannstr. 23, 17489 Greifswald, Germany. E-mail: nam.seifert@googlemail.com

**15487.** Selvi, K.; Kaya, H.; Akbulut, M.; Öztekin, A.; Çakır, F. (2015): Metal accumulation and biomarker responses of Odonata larvae, *Ischnura elegans* (Vander Linden, 1820) exposed in a lead-zinc mining area in Turkey. 7th International Conference on Information and Communication Technologies in Agriculture, Food and Environment (HAICTA 2015) September 17-20, 2015, Kavala, Greece: 614-623. (in English) ["This study was conducted in September 2014 to determine the effects of metal accumulation on the Odonata larvae. Polluted area in the lower part of the mine founded on Umurbey Stream (Çanakkale, Turkey) and unpolluted area in the upper part of it are defined as the sampling stations. In this study, GSH (Glutathione), TBARS levels and Na<sup>+</sup>, K<sup>+</sup> -ATPase activity were measured after the determination of metal accumulation (Cd, Cu, Fe, Pb, Zn) in the water and in larval *Ischnura elegans*. There was a decrease in Na<sup>+</sup>, K<sup>+</sup> -ATPase activity; although the increase in GSH and TBARS levels in organisms sampled from polluted area. These results indicate that; metal accumulation caused to oxidative stress in Odonata larvae *I. elegans* and this organism reacted by running the compensate mechanisms for it." (Authors)] Address: Selvi, K., Yenice Technical Vocational College, Çanakkale Onsekiz Mart University, Çanakkale, Turkey. E-mail: kahramanselvi@comu.edu.tr

**15488.** Seyab, M.; Azhar Mehmood, S.; Khan, S.; Jan, A.; Haroon (2015): Exploring the dragonfly fauna of Tehsil Tangi district Charsadda, Khyber Pakhtunkhwa, Pakistan. *Journal*



of Entomology and Zoology Studies 3(4): 186-188. (in English) [188 specimens of eleven common dragonfly species (*Orthetrum cancellatum*, *O. glaucum*, *O. chrysis*, *O. pruinosum neglectum*, *O. sabina*, *Pantala flavescens*, *Trithemis festiva*, *Tramea basilaris*, *Crocothemis servilia*, *Acisoma panorpoides panorpoides*, *Ictinogomphus ferox*) are documented. Measurements of wings and abdomen are presented.] Address: Haroon, Dept of Zoology Shaheed, Benazir Bhutto Univ., Main Campus, Sheringal, Dir Upper, Khyber Pakhtunkhwa, Islamic Republic of Pakistan.

**15489.** Shaffery, H.M.; Relyea, R.A. (2015): Predator-induced defenses in five species of larval *Ambystoma*. *Copeia* 103(3): 552-562. (in English) ["While predator-induced plasticity has been demonstrated in a wide range of organisms, relatively few data exist to compare differences among species. In studies of predator-induced plasticity in amphibians, larval anurans have been widely examined, but there are fewer data for larval salamanders. We sought to examine morphological and behavioural defenses in larvae of five species of *Ambystoma* salamanders. We raised five species of larval mole salamanders (*A. barbouri*, *A. gracile*, *A. laterale*, *A. maculatum*, *A. tigrinum*) in separate lab experiments and exposed them to predator cues from larval dragonflies (*Anax junius*). Salamanders did not vary in their refuge use during the experiment, but *A. gracile*, *A. laterale*, and *A. tigrinum* reduced their activity in the presence of predators early in development. Dragonfly (*Anax junius*) cues induced relatively few morphological changes across species: *A. barbouri* developed relatively large heads and deep tails, *A. gracile* and *A. laterale* developed relatively shorter heads, and *A. maculatum* developed relatively wider heads and shorter tails. Our results suggest that behavioural and morphological defenses in *Ambystoma* are highly variable among species and they appear to be less plastic than tadpoles and other salamander species." (Authors)] Address: Shaffery, Heather, Department of Biological Sciences, 4249 Fifth Ave., Univ. Pittsburgh, Pittsburgh, Pennsylvania 15260, USA. E-mail: hshaffery@gmail.com

**15490.** Sharkey, C.R.; Partridge, J.C.; Roberts, N.W. (2015): Polarization sensitivity as a visual contrast enhancer in the Emperor dragonfly larva, *Anax imperator* (Leach, 1815). *Journal of Experimental Biology* 218: 3399-3405. (in English) ["Polarization sensitivity (PS) is a common feature of invertebrate visual systems. In insects, PS is well known for its use in several different visually guided behaviours, particularly navigation and habitat search. Adult dragonflies use the polarization of light to find water but a role for PS in aquatic dragonfly larvae, a stage that inhabits a very different photic environment to the adults, has not been investigated. The optomotor response of the larvae of the Emperor dragonfly, *Anax imperator*, was used to determine whether these larvae use PS to enhance visual contrast underwater. Two different light scattering conditions were used to surround the larval animals: a naturalistic horizontally polarized light field and non-naturalistic weakly polarized light field. In both cases these scattering light fields obscured moving intensity stimuli that provoke an optokinetic response in the

larvae. Animals were shown to track the movement of a square-wave grating more closely when it was viewed through the horizontally polarized light field, equivalent to a similar increase in tracking ability observed in response to an 8% increase in the intensity contrast of the stimuli. Our results suggest that larval PS enhances the intensity contrast of a visual scene under partially polarized lighting conditions that occur naturally in freshwater environments." (Authors)] Address: Sharkey, C.R., School of Biological Sciences, Bristol Life Sciences Building, Tyndall Avenue, University of Bristol, Bristol, BS8 1TQ, UK . E-mail: camilla.sharkey@bristol.ac.uk

**15491.** Sigutova, H.; Sigut, M.; Dolny, A. (2015): Intensive fish ponds as ecological traps for dragonflies: an imminent threat to the endangered species *Sympetrum depressiusculum* (Odonata: Libellulidae). *Journal of Insect Conservation* 19: 961-974. (in English) ["The concept of ecological traps, in which animals settle in low-quality habitats, is well-established. Dragonflies are a good model for investigating the effects of ecological traps because their habitat selection process can be directly observed. Unfortunately, most such studies focus on oviposition on artificial materials, such as car surfaces, gravestones, and plastic foils, which results in complete mortality of the clutch. It remains unclear to what extent intensive fish ponds, ubiquitous in the European agricultural landscape, act as ecological traps for some dragonfly species and how they influence their vulnerability. We investigated the effects of putative ecological traps on the threatened dragonfly *S. depressiusculum* and the common closely related species *S. sanguineum* in a Central European agricultural landscape. Observations of adult behaviour were used to parameterize GLMs examining the attractiveness of five fish ponds (three fish breeding and two intensive) to each species. We also counted exuviae at each pond as a measure of each species' survival. We used GLMMs to determine which factors affected selection of oviposition sites and the environmental factors resulting in ecological traps for each species. All five ponds were attractive to ovipositing pairs of both species, although they were largely unsuitable for subsequent development (four for *S. depressiusculum* and two for *S. sanguineum*). Our results provide evidence that intensive fish ponds act as ecological traps for both species. We believe that cutting of the vegetation surrounding trap habitats could be an effective way to decrease their attractiveness to a wide range of dragonfly species." (Authors)] Address: Šigutová, Hana, Department of Biology and Ecology/Institute of Environmental Technologies, Faculty of Science, University of Ostrava, Chittussiho 10, 710 00 Ostrava, Czech Republic, E-mail: sigutova.hanka@gmail.com

**15492.** Simaika, J.P.; Samways, M.J. (2015): Predicted range shifts of dragonflies over a wide elevation gradient in the southern hemisphere. *Freshwater Science* 34(83): 1133-1143. (in English) ["Human-induced climate change is among the greatest threats to biodiversity, especially when coupled with habitat destruction. For an already water-stressed country like South Africa, changes in temperature

and precipitation regimes, coupled with increasing water demands, are likely to lead to losses in biodiversity. Dragonflies are a well-studied surrogate taxon for aspects of freshwater biodiversity. We created species distribution models for 14 dragonfly species, and predicted the changes in species richness, extent of occurrence, and habitat suitability for the years 2050 and 2080 in South Africa, a poorly studied area for range-change predictions for insects. Model predictions for 2 different emissions scenarios suggest that at least 2 species will be lost from the area by 2050, and 3 by 2080. All are widespread Afrotropical species, but with narrow elevation ranges in South Africa. Only 1 species is predicted to benefit greatly from climate change. The remaining species are predicted to persist with reduced extents of occurrences at higher elevations. Most species we studied (12 of 14) thrive in artificial environments. Therefore, to a certain extent, loss in connectivity is unlikely to play a role for these species. However, the 2 stream specialists that occur in the area are particularly vulnerable because of loss of habitat. Species that currently occur farther north in southern Africa and South Africa also are likely to move southward in the future. Thus, species richness may not necessarily decrease, but replacement of species within communities will be significant." (Authors)] Address: Simaika, J.P., Department of Conservation Ecology and Entomology and Centre for Invasion Biology, University of Stellenbosch, Private Bag X1, Matieland 7602 South Africa. E-mail: simaikaj@sun.ac.za

**15493.** Singh, U.R.; Shaikh, N. (2015): Odonata diversity of Lake Bhoirwadi, Dombivli. In: Panse, C. S., & Kayande, M. S. (Eds.) (2015). Wetlands: Present Status, Ecology and Conservation. UGC Sponsored National Conference on Wetlands: Present Status, Ecology and Conservation. Mumbai: Maharshi Dayanand College: 1 p. (in English) [Verbatim: Odonates life history being closely related to aquatic habitats and their sensitivity to environmental changes, makes them good indicator of wetland environmental status. Bhoirwadi Lake, located in the city Dombivli of district Thane Maharashtra, is subjected to various anthropogenic activities, thereby disturbing its ecology. To know the Odonata diversity of Bhoirwadi Lake, the present study was undertaken for the period of one year from April 2014 to March 2015. A total of 15 Odonata species were recorded belonging to two sub orders namely Anisoptera (dragonflies – 12 species) and Zygoptera (damselflies – 3 species). Of the 15 species, 10 species were found throughout the year.] Address: Singh Ugeshkumari R, K.I.H.E. Society's Maharashtra College, 246-A, JBB Marg, Mumbai-40000, India. E-mail: ugeshs@gmail.com

**15494.** Skvortsov, V.E.; Snegovaya, N.Y. (2015): Two new species of *Cordulegaster* Leach, 1815 from Azerbaijan (Odonata, Cordulegasteridae). International Dragonfly Fund - Report 85: 1-22. (in English) ["Two new *Cordulegaster* species are described and illustrated by drawings, photographs and SEM images. The first one, *C. plagionyx* sp. nov., was discovered in NW Azerbaijan in a low-mountain forest landscape; the second, *C. nachitschevanica* sp. nov., occurs in the subalpine zone of Nakhichevan AR, south of

the main territory of Azerbaijan. Both new taxa look generally similar to *C. insignis* Schneider, 1845; however, each of them reveals unique features and distinctive combinations of characters that set them apart from other species of the genus. Both new species exhibits new types of sex dimorphism previously unknown in *Cordulegaster*. Some traits related to the structure of male appendages and important details of colouration prevent both *C. plagionyx* sp. nov. and *C. nachitschevanica* sp. nov., from being reliably classified under any of two widely accepted groups of species within the genus *Cordulegaster*: the *boltonii*-group and the *bidentata*-group." (Authors)] Address: Skvortsov, V.E., Evolution Department, Faculty of Biology, M.V. Lomonosov Moscow State University, Moscow, 119992, GSP-1, Russia. E-mail: west-urnus@yandex.ru

**15495.** Skvortsov, V.E.; Snegovaya, N.Yu (2015): A second addition to the Odonata fauna of Azerbaijan. International Dragonfly Fund Report 87: 1-38. (in Odonata, fauna, new records, Azerbaijan, *Caliaeschna microstigma*, *Cordulegaster vanbrinkae*, *Coenagrion puella*-complex, *Coenagrion ornatum*, *Coenagrion vanbrinkae*) ["The article contains new faunistic data on 53 Odonata species based on material collected by the authors in Azerbaijan between 2013–2014 and added by revising an old collection made by A.V. Bogachev in the 1930–1940s. Of these, 13 species are new for the country: *Lestes dryas*, *L. sponsa*, *L. virens*, *Coenagrion hastulatum*, *C. lunulatum*, *C. ornatum*, *C. pulchellum*, *Aeshna affinis*, *Brachytron pratense*, *Cordulegaster picta*, *Somatochlora flavomaculata*, *Sympetrum flavolum*, *S. vulgatum*. The new locality of *Cordulegaster picta* is the easternmost for the species. Two new populations of a very rare species *Cordulegaster vanbrinkae* (discovered in the country in 2011) are found. *Somatochlora flavomaculata* and *Brachytron pratense* are generally very rare in the entire Caucasus. *Pantala flavescens* has been rediscovered in the country 100 years after the first record. A large population of *Caliaeschna microstigma*, a species very rare in Azerbaijan, has been found in the northern part of the country; it represents a peculiar dark morph whose features are described in detail. Particularly discussed are the variability of *Coenagrion puella* complex in Azerbaijan and diagnostic features of two other *Coenagrion* species closely related to each other, *C. ornatum* and *C. vanbrinkae*." (Authors)] Address: Skvortsov, V.E., Evolution Department, Faculty of Biology, M.V. Lomonosov Moscow State University, Moscow, 119992, GSP-1, Russia. E-mail: west-urnus@yandex.ru

**15496.** Slagboom, R.; Stip, A. (2015): The Southern Darter (*Sympetrum meridionale*) in the Netherlands in 2013 and 2014. *Brachytron* 17(2): 76-86. (in Dutch, with English summary) ["In 2013, the species was observed with at least 187 individuals at 61 locations, mainly in the southern parts of the Netherlands. At several locations copulations and oviposition was observed. In 2014, the species occurred with at least 121 individuals at 31 locations. Incidentally, there was evidence for local reproduction. We discuss possibilities for the origin of the 2013-invasion and finally address

several factors possibly contributing to the successful reproduction of *S. meridionale* in the Netherlands." (Authors)] Address: Richard Slagboom. E-mail: r.slagboom@kpnmail.nl

**15497.** Smith-Herron, A.J. (2015): *Hoplorhynchus aster* n. sp. (Apicomplexa: Actinocephalidae: Menosporinae) and *Anguilloforma marcelyni* gen. et n. sp. (Apicomplexa: Actinocephalidae: Acanthosporinae) Infecting *Ischnura ramburii* and *Enallagma civile* (Zygoptera: Coenagrionidae) from Texas, U.S.A. *Comparative Parasitology* 82(2): 211-218. (in English) ["*Hoplorhynchus aster* n. sp. (Apicomplexa: Eugregarinida: Actinocephalidae: Menosporinae) and *Anguilloforma marcelyni* (Actinocephalidae: Acanthosporinae) are described from adults of *Ischnura ramburii* and *Enallagma civile*, respectively, from south and west Texas, USA. *H. aster* is the eleventh species described in the genus, and only the second reported from North America. It is distinguished from *H. acanthatholius* by the number of digitations surrounding the epimerite disk (8 in *H. acanthatholius* vs. 14–18 in *H. aster*). *Anguilloforma marcelyni* gen. et n. sp. is distinguished from existing genera within Acanthosporinae by oocysts bearing a total of 14 spines (6 equatorial, 1 at each equatorial vertex, and 4 terminal spines inserted at each pole, 1 at each vertex created by polar truncations); mature trophozoites long and slender; and epimerite a simple, striated cup." (Author)] Address: Smith-Herron, Autumn J., Texas Invasive Species Institute, Sam Houston State Univ., Huntsville, Texas 77341, USA. E-mail: smith-herron@shsu.edu

**15498.** Sniegula, S.; Golab, M.J.; Johansson, F. (2015): Time constraint effects on phenology and life history synchrony in a damselfly along a latitudinal gradient. *Oikos* 125: 414-423. (in English) ["In organisms with complex life cycles living in seasonal environments, the synchronisation of phenological events is important from the ecological and evolutionary perspectives. Life history transitions should be synchronised to a greater degree at northern latitudes. We quantified hatching and emergence timing and synchrony in the obligate univoltine damselfly *Lestes sponsa* along a latitudinal gradient covering its entire north-south range in Europe. In our first experiment, populations from different latitudes were grown in separate climate chambers simulating temperature and photoperiod conditions occurring at their sites of origin. Northern populations expressed early and high synchronous hatching and emergence, central populations intermediate, and southern populations late and low synchronous hatching and emergence. This pattern was expressed at both population and full-sibling family levels, indicating stronger selection for timing and synchronisation in the north compared to the south. In our second experiment, populations from all latitudes were reared in conditions simulating an average temperature and photoperiod over the latitudinal gradient. Interestingly, the pattern of timing and synchronisation was reversed with respect to latitude when compared to the pattern shown in the first experiment, indicating the importance of environmental factors in shaping phenological events. Our results indicate strong selection for timing and synchronisation of life history events at northern latitudes, caused by time constraints.

Our results also show that it is important to use as natural conditions as possible in experiments on life history shifts in organisms with complex life cycles in order to achieve a correct understanding of these shifts." (Authors)] Address: Śniegula, S., Dept Ecosystem Conservation, Inst. Nature Conservation, Polish Academy of Sciences, al. Mickiewicza 33, PL-31-120 Kraków, Poland. E-mail: szymon.sniegula@gmail.com

**15499.** Soares, J.A.C.; Batista-Silva, V.F.; Boneto, D.D.; Bailly, D.; Abelha, M.C.F.; Oliveira, I.A. (2015): Assemblage of immature Odonata (Insecta, Anisoptera) in streams of the Mato Grosso do Sul State: spatial and temporal implications. *Iheringia Série Zoologia* 105(3): 325-332. (in English, with Portuguese summary) ["This study investigated the spatial and temporal distribution of Odonata, Anisoptera assemblages in two streams of the Iguatemi River basin, Água Boa and Perobão, which are under strong anthropogenic pressure. Samplings were carried out in both streams during the rainy (March to December 2008) and dry (June and September 2008) periods. The Mantel test was used to check the influence of spatial autocorrelation on the Odonata composition. Spatial and temporal variations in the composition were summarized by the Principal Coordinates Analysis (PCoA), using Mantel test residuals. Odonata assemblages were further evaluated for abundance, richness, diversity and evenness. The most representative genera in each stream and hydrological period were identified by the Indicator Value Method. The spatial-temporal variations in the attributes of the assemblages were assessed using two-factor analysis of variance. We collected 500 immature individuals of 23 genera and three families. Only the composition and abundance showed significant spatial differences, with the highest mean abundance found in the Perobão Stream. As for the temporal variation, abundance, richness and diversity were significantly higher in the dry period for the two streams. *Miathyria* and *Zenithoptera*, were the indicator genera of the Água Boa Stream and *Erythrodiplax*, *Libellula*, *Macrothemis*, *Progomphus* and *Tramea*, were the indicator genera of the Perobão Stream. The Odonata fauna was mainly influenced by the temporal dynamics of the rainfall regime, and the composition responded only to spatial variations represented by the streams." (Authors)] Address: Batista-SilvaValéria, Universidade Estadual de Mato Grosso do Sul, BR 163, km 20.2, 79980-000 Mundo Novo, MS, Brazil. E-mail: vfb\_silva@uems.br

**15500.** Soinski, M. (2015): Erster Entwicklungsnachweis von *Zygonyx torridus* für Sizilien (Odonata: Libellulidae). *Libellula* 34(1/2): 85-89. (in German, with English and Italian summaries) ["On 31-vii-2014, three exuviae were collected at the Belice River near Selinunte, Sicily. Based on these records as well as several sightings of adults, *Z. torridus* should be regarded as a species to be established in Sicily" (Author)] Address: Soinski, M., Grundstraße 33, 44149 Dortmund, Germany. E-mail: michaelsoinski@web.de

**15501.** Souza, A.M.; Fogaça, F.N.O.; Cunico, A.M.; Higuti, J. (2015): Does the habitat structure control the distribution



and diversity of the Odonatofauna? *Brazilian Journal of Biology* 75(3): 598-606. (in English, with Portuguese summary) ["The statement that the habitat complexity and structure govern the abundance and diversity of biological communities has been widely investigated. In this context, we assumed the hypothesis of habitat heterogeneity, that is, the higher habitat complexity leads to greater diversity of Odonata. In addition, we analyzed the influence of habitat structure on the distribution of this community, and evaluated the effects of abiotic variables. Odonata larvae were collected with sieves and by electrofishing in ten Neotropical streams belonging to the Pirapó River basin. Forty species of Odonata were registered, which were distributed in eight families, Libellulidae stood out with the highest richness. The high gamma diversity and distribution of Odonata were associated with habitat heterogeneity in these streams. However, the abiotic variables also seem to affect the distribution of Odonata species, in view of the impact of the land use in the vicinity of streams." (Authors)] Address: Souza, A.M., Programa de Pós-Graduação em Ecologia de Ambientes Aquáticos Continentais, Núcleo de Pesquisas em Limnologia, Ictiologia e Aqüicultura, Universidade Estadual de Maringá – UEM, Avenida Colombo, 5790, CEP 87020-900, Maringá, PR, Brazil

**15502.** Staats, E.G. (2015): Emergent non-consumptive predator effects alter habitat colonization by dipteran prey. MSc thesis, Virginia Commonwealth University, Richmond, Virginia: IV + 22 pp. (in English) ["When ovipositing, prey organisms avoid habitat patches containing predator cues because predators consume, and negatively affect the fitness of their prey. Richness of predator species often enhances the strength of consumptive predator effects, but little is known about how multiple predators combined affect prey non-consumptively. We quantified dipteran colonization in aquatic mesocosms in response to varied predator richness. Multiple predator species combined reduced oviposition by *Culex* mosquitoes, chironomid midges, and the general colonizing dipteran community more than predicted by the effects of the independent predator species. Previous research which quantifies effects of multiple predators on prey as prey abundance, but does not measure consumption by predators, may be underestimating or overestimating the strength of effect by assuming equal colonization. Our findings enhance understanding of the ways predators influence abundances and distributions of their prey, and yields insight into the ways predators may non-consumptively affect prey by changing prey behaviour. Oviposition by the dipteran community was reduced 37% by *Celithemis eponina* ( $Z = 3.037$ ,  $df = 18$ ,  $P = 0.0024$ ), 31% by *Enallagma* spp. ( $Z = 2.570$ ,  $df = 18$ ,  $P = 0.0102$ ), and 27% by crayfish ( $Z = -2.189$ ,  $df = 18$ ,  $P = 0.0286$ ), relative to the predator-free control." (Author)] Address: Staats, E.G. E-mail: staatseg@vcu.edu

**15503.** Stastný, K.; Cervený, J.; Rezac, M.; Kurka, A.; Veselý, P.; Kadlec, T.; Konvicka, M.; Uricková, L.; Harabiš, F.; Marhoul, P. (2015): Prague. In: J.G. Kelcey (ed.): *Vertebrates and invertebrates of European cities: Selected non-*

*avian fauna*. Springer New York: 379-451. (in English) ["Prague, which is the capital of the Czech Republic, occupies 496 km<sup>2</sup> and has a population of 1.2 million people. This chapter describes six of the major invertebrate groups that occur in the city: Arachnida (spiders and related species)—504 species or 58 % of the national species; Coleoptera—Carabidae (ground beetles)—362 species found between 1790 and 2013 or 70 % of the national list of ground beetles; Lepidoptera (diurnal butterflies)—119 species or c. 74 % of the 161 species recorded in the country; Mollusca (molluscs)—146 species or 65 % of the national species; Odonata (dragonflies and damselflies) 41 species or > 50 % of the national species; and Orthoptera (grasshoppers and crickets)—44 species or 53 % of the national species. Prague is one of the European cities where mollusc fauna has been studied in detail. Altogether, 146 species of gastropods and bivalves were recorded here, which is 60 % of the Czech Republic's mollusc fauna. This surprisingly high species diversity reflects the geological and geomorphological diversity of the city that is crucial for molluscs. The gradient from eusynanthropic species over common assemblages of catholic species to the scattered network of nature reserves inhabited by rare and protected species is described. The highest concentration of non-native mollusc species in the Czech Republic was recorded only in Prague." (Authors)] Address: Harabiš, F., Department of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, 165 21, Czech Republic. E-mail: harabis@fzp.czu.cz

**15504.** Steinhoff, P.O.M.; Uhl, G. (2015): Taxonomy and nomenclature of some mainland SE-Asian *Coelicia* species (Odonata, Platycnemididae) using micro-CT analysis. *Zootaxa* 4059(2): 257-276. (in English) ["The taxonomic status of some mainland Southeast Asian *Coelicia* species is evaluated. The following synonymies are presented: *C. acco* is a junior synonym of *C. pyriformis*; *C. tomokunii* that of *C. scutellum*; *C. onoi* that of *C. cyanomelas*. *C. scutellum hainanense* is promoted to species level, *C. hainanense*. Redescriptions of the holotype of *C. pyriformis* and of the lectotypes of *C. scutellum* and *C. hainanense* are presented with illustrations. The male genital ligulae were examined by means of non-destructive X-ray micro-computed tomography (micro-CT) and subsequent 3D-reconstruction. The advantage of virtual types generated by micro-CT analysis, particularly for the examination of internal structures, is discussed." (Authors)] Address: Steinhoff, P.O.M., Department of General and Systematic Zoology, Zoological Institute and Museum, Ernst Moritz Arndt University of Greifswald, Anklamer Str. 20, D-17489 Greifswald, Germany. E-mail: philipsteinhoff@gmail.com

**15505.** Stigge, H.A.; Bolek, M.G. (2015): The alteration of life history traits and increased success of *Halipegus eccentricus* through the use of a paratenic host: A comparative study. *Journal of Parasitology* 101(6): 658-665. (in English) [Oklahoma, USA; "Complex life cycles are a hallmark characteristic of many parasites; however, little is known about the process by which life cycles become more complex

through the addition of hosts. Paratenic hosts are present in the life cycles of several phylogenetically distinct groups of helminths; this suggests that they may play a key role during this process. This study examined the development of metacercariae of *Halipegus eccentricus* within intermediate microcrustacean and odonate (*Ischnura* sp.) paratenic hosts. Then a comparative approach was used to evaluate how life history traits of *H. eccentricus* within the anuran definitive hosts differ between metacercariae of the same age that developed within an intermediate ostracod host or a paratenic odonate host. The results of this study indicate that metacercariae of *H. eccentricus* do not grow at the same rate in different intermediate hosts, and significant differences exist in growth within intermediate and paratenic hosts. Individuals from odonate paratenic hosts always had larger bodies and suckers than those of metacercariae of the same age that develop within microcrustacean intermediate hosts. Furthermore, metacercariae from odonates were more successful in establishing and migrating in definitive anuran hosts. Last, individuals from paratenic hosts began reproducing earlier within anuran definitive hosts than age-matched worms that develop within the intermediate hosts. Collectively these results suggest that the variation in body and sucker sizes within odonate and microcrustacean hosts may carry over to the definitive host and in the case of *H. eccentricus* using the paratenic host increases transmission and alters other life history traits within definitive hosts. These results indicate that using a paratenic host can affect the success of parasites in subsequent hosts, and therefore these hosts may provide benefits other than just increasing transmission by bridging an ecological gap." (Authors)] Address: Stigge, Heather, Department of Integrative Biology, Oklahoma State University, Stillwater, Oklahoma, 74078, USA. E-mail: heather.stigge@okstate.edu

**15506.** Stoks, R.; Debecker, S.; Dinh Van, K.; Janssens, L. (2015): Integrating ecology and evolution in aquatic toxicology: insights from damselflies. *Freshwater Science* 34(3): 1032-1039. (in English) ["Current legislation and ecological risk assessment fails to protect aquatic biodiversity at low levels of contaminants. We addressed 3 topics embedded in general stress ecology and evolutionary ecology that are relevant to arrive at a better evaluation of the risk of low contaminant levels in aquatic systems: 1) delayed effects of contaminants, 2) interactions between contaminants and biotic interactors, and 3) vulnerability to contaminants under global warming. We developed these topics by capitalizing on the key insights obtained using damselflies as model organisms. First, delayed contaminant effects on important fitness-related effects exist during the larval stage and after metamorphosis in the adult stage. Second, synergistic interactions of contaminants with bacteria and predation risk have been demonstrated, and we present advances in the mechanistic understanding of these synergisms with biotic interactors. Third, we illustrate the strength of assessing the effect of contaminants under global warming using a space-for-time substitution approach and the need to consider temperature extremes. These studies using damselflies as model organisms highlight the relevance of considering

contaminant effects after the exposure period and in the presence of natural stressors, such as predation risk and higher temperatures. They further highlight the need for spatially explicit risk-assessment and conservation tools. These insights are relevant for most aquatic taxa. Indeed most aquatic taxa have a complex life cycle, are strongly affected by predation risk and by warming, and show latitudinal gradients. Better integration of these topics in ecological risk assessment will be a major challenge for both scientists and policy makers, but of crucial importance to preserve aquatic biodiversity." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**15507.** Suhling, F.; Suhling, I.; Richter, O. (2015): Temperature response of growth of larval dragonflies – an overview. *International Journal of Odonatology* 18(1): 15-20. (in English) ["We review the knowledge about the thermal reaction norms of larval growth in Odonata with a focus on the temperature response function. We re-analyze literature data and present our own results on growth rates of larvae of 14 species of Libellulidae reared at different temperatures. Temperature response curves (TRC) were fitted in order to estimate two relevant components of the thermal reaction, namely the optimum temperature for growth ( $T_{opt}$ ) and the increase of growth rate with temperature ( $Q_{10}$ ). We also examined what is known about the thermal minimum ( $T_{min}$ ) and the thermal maximum ( $T_{max}$ ) for growth to delimit the thermal ranges of odonates. All information indicates that larval growth is generally warm adapted, with species-specific variation of  $T_{opt}$  of 21–31°C,  $T_{min}$  of 8–12°C, and  $T_{max}$  of up to 44°C (the latter being the upper lethal limit, the true  $T_{max}$  for growth remains unknown). The values of  $Q_{10}$  distinguish some more specialized species, mostly with high  $T_{opt}$  and of tropical origin, and others being more thermal generalists, often being temperate species and/or from lotic habitats. We examine some biotic and abiotic factors affecting the temperature response of growth and we discuss the temperature response in the light of global warming." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**15508.** Swaegers, J.; Mergeay, J.; St-Martin, A.; De Knijf, G.; Larmuseau, M.; Stoks, R. (2015): Genetic signature of the colonisation dynamics along a coastal expansion front in the damselfly *Coenagrion scitulum*. *Ecological Entomology* 40(4): 353-361. (in English) ["1. Many insects are expanding their distribution range polewards as a result of climate change, which has been shown to be associated with founder effects leading to a reduction in genetic diversity and an increase in genetic differentiation. These spatial genetic patterns may arise from colonisation from a broad expansion front or a limited neighbourhood after a stepping stone model of dispersal. The temporal persistence of such founder effects are poorly understood, mainly because studies looking at the fine-scale initial temporal dynamics of the genetic signature of a range expansion are rare. 2. Us-

ing microsatellite markers, we performed a detailed spatio-temporal genetic analysis of the range expanding damselfly *Coenagrion scitulum* (Rambur) along a coastal axis during the first years after colonisation. 3. A decrease was in (private) allelic richness when going northwards along the coastline, which is consistent with a scenario of cumulative founder events. In spite of the spatiotemporal dynamics in the observation records of the species along the coastline, the spatial genetic data indicated a major contribution from the broad expansion front during the colonisation of the coastline rather than a stepping-stone colonisation process. 4. The fine-scale temporal dynamics of the range expansion indicated the absence of persistent founder effects and instead showed considerable temporal instability in genetic indices at the more northern edge populations. This may be explained by genetic immigration and admixture from the broad expansion front in this active disperser." (Authors)] Address: Swaegers, J., Deberiotstr. 32, 3000 Leuven, Belgium. E-mail: Janne.Swaegers@bio.kuleuven.be

**15509.** Swaegers, J.; Mergeay, J.; Van Geystelen, A.; Thery, L.; Larmuseau, M.; Stoks, R. (2015): Neutral and adaptive genomic signatures of rapid poleward range expansion. *Molecular Ecology* 24(24): 6163-6176. (in English) ["Many species are expanding their range polewards and this has been associated with rapid phenotypic change. Yet, it is unclear to what extent this reflects rapid genetic adaptation or neutral processes associated with range expansion, or selection linked to the new thermal conditions encountered. To disentangle these alternatives, we studied the genomic signature of range expansion in the damselfly *Coenagrion scitulum* using 4950 newly developed genomic SNPs and linked this to the rapidly evolved phenotypic differences between core and (newly established) edge populations. Most edge populations were genetically clearly differentiated from the core populations and all were differentiated from each other indicating independent range expansion events. In addition, evidence for genetic drift in the edge populations, and strong evidence for adaptive genetic variation in association with the range expansion was detected. We identified one SNP under consistent selection in four of the five edge populations and showed that the allele increasing in frequency is associated with increased flight performance. This indicates collateral, non-neutral evolutionary changes in independent edge populations driven by the range expansion process. We also detected a genomic signature of adaptation to the newly encountered thermal regimes, reflecting a pattern of countergradient variation. The latter signature was identified at a single SNP as well as in a set of covarying SNPs using a polygenic multilocus approach to detect selection. Overall, this study highlights how a strategic geographic sampling design and the integration of genomic, phenotypic and environmental data can identify and disentangle the neutral and adaptive processes that are simultaneously operating during range expansions." (Authors)] Address: Swaegers, J., Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Deberiotstraat 32, 3000, Leuven, Belgium

**15510.** Tabugo, S. R.; Casas, P.A.; Pareño, M.T.; Peñaredondo, M.A. (2015): Fluctuating asymmetry and developmental instability in the wings of *Neurothemis terminata* as bioindicator of stress. *Advances in Environmental Biology* 9(19): 10-17. (in English) [Background: Fluctuating asymmetry (FA) is a measure of differences between the right and the left half of bilaterally symmetrical organisms and is a useful trait to monitor developmental instability and ecological stress. Dragonflies are often used for biomonitoring purposes. In this study, analysis was done on eurytopic species *Neurothemis terminata*, since they are widely distributed and adapted to different environment. Analysis was based on the Procrustes method and makes comparison of FA indices of homologous points. Using landmark method for shape asymmetry, anatomical landmarks were used and analyzed using Symmetry and Asymmetry in Geometric Data (SAGE) program. Twenty-nine landmarks on the forewing and thirty five landmarks on the hind wing were tested for samples for all populations. Objective: This study assessed developmental stability in three populations of *Neurothemis terminata* using FA analysis on wings from different barangays (Tibanga, Tominobo and Tipanoy) in Iligan City, Mindanao, Philippines. Results: Procrustes ANOVA results showed variation and significant evidence of FA for all populations with relatively high FA for Tibanga population and no indication of Directional asymmetry (DA). Possible explanation for significant FA for populations mean varying level of stress as experienced by populations, suggesting that there is a significant variation between the left and right side of each individual induced by the genes and the environment. Conclusion: Significant FA and increase FA present inability of species to buffer stress in its developmental pathways hence, would mean developmental instability and have implications on species fitness, adaptation, quality of individuals and the level of endogenous and exogenous stress experienced by individuals or populations during development.] Address: Tabugo, Sharon, Dept Biol. Sciences, Mindanao State Univ. - Iligan Institute of Techonlogy, Iligan City, Philippines. E-mail: sharonrose0297@gmail.com

**15511.** Tajima, Y. (2015): Evolution of sperm displacement mechanism and genital morphology in the damselfly, *Ischnura asiatica*. Dissertation, Graduate School of Life and Environmental Sciences, the University of Tsukuba, Japan: 32 pp. (in English) ["In most species of Odonata, males physically displace rivals' sperm stored in the female sperm storage organs. During copulation, appendages on the male secondary genitalia enter the female sperm storage organs, and trap and remove sperm masses from previous matings. Considerable variations of male and female genitalia among species has been clarified, indicating that males of some species are able to displace all sperm in female sperm storage organs, while males of other species displace not all sperm stored in female sperm storage organs. The *Ischnura asiatica* male has a pair of appendages at the tip of his genitalia that are shorter than the length of the narrow duct from the bursa copulatrix to the spermatheca in the female. Although the males remove bursal sperm during the copulation, the males have no appendages that can remove



spermathecal sperm directly. However, reduction of the number of spermatozoa occurs both in the bursa copulatrix and in the spermatheca during copulation. An alternative mechanism for the reduction of the spermathecal sperm by the male was previously suggested. Females have mechano-receptive sensilla that communicate the presence of an egg to the muscles covering the sperm storage organs for the purpose of fertilization. Then, it is hypothesized that the penis head might mimic the movement of the egg, thus stimulating the sensilla to induce spermathecal sperm ejection by the female. In the present study, in order to clarify the mechanism of sperm removal by stimulating females' sensory system, an interrupted copulation experiment was conducted in the fields in order to examine the relationship between sperm reduction and the morphology of the male's genitalia. The extent of sperm reduction in the spermatheca increased with the width of the penis head. Thus, the hypothesis of the indirect sperm removal mechanism by stimulating females' sensory system was supported. The females might suffer costs such as a loss of genetic variety of their offspring when the sperm displacement is complete. Thus, a counter-adaptation might have evolved in the females to prevent complete sperm displacement. In order to clarify females' adaptation for spermathecal sperm removal, the inter-population and seasonal variation of morphological factors affecting sperm removal, such as the width of the penis head and the number of vaginal sensilla, were examined, and counter-adaptations with which to prevent sperm ejection such as a decrease in the number of vaginal sensilla and an increase in the size of the spermatheca were found in females. Thus, the genital morphology of females and the indirect sperm removal mechanism that makes use of females' sensory system in the reproductive organs were shaped by sexual conflict. Proposing this co-evolutionary scenario for male-female genitalia in *I. asiatica* made it possible to reveal the role of females in genital coevolution." (Author)] Address: not stated

**15512.** Takahashi, Y. (2015): Mechanisms and tests for geographic clines in genetic polymorphisms. *Population Ecology* 57(2): 355-362. (in English) ["A continuous spatial gradient in visible traits, which is called a cline, is a natural model system for quantifying the effects of selection and stochastic factors and their relative importance. Geographic clines in phenotypic traits also provide key insights into the evolutionary forces that lead to allopatric speciation in nature. Thus, the underlying mechanisms for establishing clines and their evolutionary consequences remain key topics in evolutionary biology. However, few experimental studies have confirmed the underlying mechanisms of geographic clines in morph/allele frequencies, probably because of the lack of understanding of the theoretical basis of geographic clines in polymorphisms and/or suitable comprehensive tests. Thus, I present a general review of the underlying mechanisms for establishing geographic clines in polymorphisms. I also provide a case study using the female dimorphic damselfly *Ischnura senegalensis* to illustrate a strategy that confirms the underlying mechanisms of geographic clines in morph frequencies. This review may

help to address geographic clines in other polymorphic systems, as well as contribute to a comprehensive understanding of geographic clines in quantitative traits, and thus, their evolutionary consequences in nature." (Author)] Address: Takahashi, Y., Frontier Research Institute for Interdisciplinary Sciences, Tohoku University, Sendai, Miyagi, 980-8578, Japan. E-mail: takahashi.yum@gmail.com

**15513.** Takahashi, Y. (2015): Mechanisms and tests for geographic clines in genetic polymorphisms. *Population Ecology* 57(2): 355-362. (in English) ["A continuous spatial gradient in visible traits, which is called a cline, is a natural model system for quantifying the effects of selection and stochastic factors and their relative importance. Geographic clines in phenotypic traits also provide key insights into the evolutionary forces that lead to allopatric speciation in nature. Thus, the underlying mechanisms for establishing clines and their evolutionary consequences remain key topics in evolutionary biology. However, few experimental studies have confirmed the underlying mechanisms of geographic clines in morph/allele frequencies, probably because of the lack of understanding of the theoretical basis of geographic clines in polymorphisms and/or suitable comprehensive tests. Thus, I present a general review of the underlying mechanisms for establishing geographic clines in polymorphisms. I also provide a case study using the female dimorphic damselfly *Ischnura senegalensis* to illustrate a strategy that confirms the underlying mechanisms of geographic clines in morph frequencies. This review may help to address geographic clines in other polymorphic systems, as well as contribute to a comprehensive understanding of geographic clines in quantitative traits, and thus, their evolutionary consequences in nature." (Authors)] Address: Takahashi, Y., Frontier Research Institute for Interdisciplinary Sciences, Tohoku University, Sendai, Miyagi, 980-8578, Japan. E-mail: takahashi.yum@gmail.com

**15514.** Tamm, J. (2015): Zur Verbreitung und Ökologie von *Cordulegaster bidentata* in Nordhessen mit besonderer Berücksichtigung ihrer Vorkommen auf Buntsandstein (Odonata: Cordulegastridae). *Libellula* 34(1/2): 27-58. (in German, with English summary) ["On distribution and ecology of *Cordulegaster bidentata* in Northern Hesse, Germany, with emphasis on its occurrence on Bunter Sandstone (Odonata: Cordulegastridae) – The distribution of *C. bidentata* (imagines) has been mapped in eight mountain areas of northern Hesse and in parts of the Rhön Mountains in Thüringen, Germany. It is evident that the species occurs very patchily within some of the geological formations studied. *C. bidentata* was rare in the Bunter sandstone areas mainly mapped, but quite common in adjacent Bunter sandstone areas mapped in former studies. Analysis shows that the species' rarity mainly is the result of both the most important natural habitat structures and man-made impact. The main factors are insufficient slope inclines and long stream drainages, and on the other hand, coniferous plantations and ponds dammed close to the springs. But it was remarkable that even habitats suitable for *C. bidentata* were in many cases not populated by the species. This suggests

that the subpopulations recently may live too far from each other to be able to regenerate locally extinct subpopulations from outside. The species is also distributed patchily on palaeozoic greywacke and limestone. Here again both natural and man-made factors are responsible. *C. bidentata* has not been found in the high Rhön and Rothaar mountains. This suggests that there are climate effects as well, like rainy cool summers or freezing of spring outflows in times of severe frost without snow cover. At least in Hesse, *C. bidentata* should be classified as "highly endangered species" because of its regional rarity and several negative impacts which are strong and increasing." (Author)] Address: Tamm, J., Elgershäuser Str. 12, 34131 Kassel, Germany. E-mail: jochen.tamm@t-online.de

**15515.** Tarboton, W.; Tarboton, M. (2015): A Guide to the Dragonflies & Damselflies of South Africa. Penguin Random House South Africa: 216 pp. (in English) ["This field guide to all the Odonata of South Africa – a total of 162 species – addresses a growing area of interest and fills the gap left by two previous books on the topic, now both out of print. A detailed introduction covers behaviour, life cycles, biology and breeding; and the species entries focus on identification and distribution, with all species photographed from scans of actual insects, beautifully presented in full colour. Comprehensive and fully up to date, this extraordinary study of dragonflies and damselflies of the region will be snapped up by anyone with an interest in the insect life of the region." (Authors)]

**15516.** Tennessen, K.J. (2015): Four new species of Calvertagrion St. Quentin from South America (Odonata: Coenagrionidae). *Odonatologica* 44(3): 397-430. (in English) ["Four new species of Calvertagrion are described from the upper Amazon region of South America east of the Andes foothills, namely *C. albatum* sp. nov. (holotype ♂, Madre de Dios Department, Peru), *C. charis* sp. nov. (holotype male, Loreto Dept, Peru), *C. declivatum* sp. nov. (holotype male, Santa Cruz Department, Bolivia), and *C. mauffrayi* sp. nov. (holotype ♂, Orellana Province, Ecuador). These additions bring the total number of species in the genus to five. Differences in thoracic and abdominal colour pattern, morphology of the pronotum and male appendages are presented as characters in a key separating the known species. The male genital ligula is remarkably uniform within the genus, which is unusual within coenagrionid genera with multiple species." (Author)] Address: Tennessen, K.J., P.O. Box 585, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**15517.** Termaat, T.; van Grunsven, R.A.H.; Plate, C.L.; van Strien, A.J. (2015): Strong recovery of dragonflies in recent decades in The Netherlands. *Freshwater Science* 34(3): 1094-1104. (in English) ["Many dragonfly species in The Netherlands declined in the 20th century because of acidification, eutrophication, and desiccation of lotic and lentic habitats and canalization of streams and rivers. These pressures peaked in the 1970s, when 26 of 65 native species had an unfavourable conservation status on the 1997 Dutch Red List. Since the 1980s, environmental regulations have led to improved water quality, and many habitat restoration

projects have been carried out. We used standardized monitoring data (1999-2013) and unstandardized observations (1991-2013) to investigate how dragonflies have changed in the last 20 y on a national scale. We compared trends of dragonfly species from different habitat types and with southern vs northern distribution in Europe. Dragonflies recovered strongly in The Netherlands in a period of ~20 y, probably because of recent habitat improvements. Lotic species have benefitted more than lentic species, and southern species have more positive trends than northern species, suggesting that climate change has contributed to the recovery. Dragonflies were resilient and able to quickly recover when their habitats were restored. Recovery has led to a better conservation status for many species. Unstandardized data delivered results consistent with those from monitoring data and had greater statistical power to detect trends because many more unstandardized data than standardized data were available. Thus, when the goal is to provide a general overview of changes in dragonflies, unstandardized data can outperform standardized abundance data. However, abundance data may deliver complementary information for individual species. Our results support the suitability of dragonflies as indicators of freshwater habitat condition, but they recover more strongly in The Netherlands than many other insects, possibly because of their higher dispersal abilities or different habitat requirements." (Authors)] Address: Termaat, T., Rijnsteeg 8-10a, 6708 PP Wageningen, The Netherlands. E-mail: tim.termaat@vlinderstichting.nl

**15518.** Theischinger, G.; Richards, S.J. (2015): The genus *Nososticta* Hagen (Odonata: Platynemididae) from the Papuan region with descriptions of ten new species group taxa. *Odonatologica* 44(1/2): 153-224. (in English) ["The males and, when available, females of ten new species and subspecies of *Nososticta* are described from the Papuan region. They are: *Nososticta caerulea* sp. nov. (♂ holotype: Papua New Guinea, Upper Sepik Basin, 09-vi-2010, ♀ described), *Nososticta finisterrae satisbona* ssp. nov. (♂ holotype: Papua New Guinea, Goodenough Island, 26-X-1953), *Nososticta interrupta* sp. nov. (♂ holotype: Indonesia, Papua Province, Kabupaten Asmat, Vriendschap R., 21-25-vii-2009), *Nososticta kaizei* sp. nov. (♂ holotype: Indonesia, Papua Province, Yapen Island, Ambaidiru village, 15-vii-2006, female described), *Nososticta azurosignata* sp. nov. (♂ holotype: Papua New Guinea, Survey Site 2, Sepik Basin, 25-ii-2010), *Nososticta longicauda* (male holotype: Papua New Guinea, Darai Plateau, 24-vii-2003), *Nososticta manuscola* sp. nov. (♂ holotype: Papua New Guinea, Manus Island, 23-ix-2011, female described), *Nososticta parafonticola* sp. nov. (♂ holotype: Papua New Guinea, Upper Sepik Basin, 10-ii-xii-2009, female described), *Nososticta tricolorata* sp. nov. (♂ holotype: Papua New Guinea, Upper Sepik Basin, 01-xii-2009) and *N. truncata* sp. nov. (♂ holotype: Papua New Guinea, Ivimka camp, Lakekamu, 15-xi-1996). In addition females of *N. africana* Schmidt, 1944, *N. aurantiaca* (Lieftinck, 1938) and *N. hiroakii* Sasamoto, 2007 are described and the morphology and variability of a number of additional species is discussed. Diagnostic charac-

ters of the available genders are illustrated, habitat conditions are given and their affinities are discussed. Live photos of selected species are presented. Keys to the males of all *Nososticta* species known from New Guinea and the Solomon Islands, and to the described females from this region are included. *Nososticta lorentzi* Lieftinck, 1938 is considered a synonym of *N. nigrifrons* (Ris, 1913) (syn. nov.)." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**15519.** Theischinger, G.; Gassmann, D.; Richards, S.J. (2015): *Macrocnemis gracilis*, a new genus and species of Idiocnemidinae (Zygoptera: Platycnemididae) from Papua New Guinea. *Zootaxa* 3990(3): 429-436. (in English) ["A new genus and species belonging to the damselfly subfamily Idiocnemidinae from Papua New Guinea, *Macrocnemis gracilis* gen. nov. sp. nov. is described and illustrated. It is the largest known member of the Papuan idiocnemidine radiation, and its affinities to existing genera remain unclear. The new taxon is currently known with certainty only from small streams flowing through mid-montane rainforest in the Hindenburg Range of Papua New Guinea's rugged central cordillera." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**15520.** Therry, L., Bonte, D., Stoks, R. (2015): Higher investment in flight morphology does not trade off with fecundity estimates in a poleward range-expanding damselfly. *Ecological Entomology* 40(2): 133-142. (in English) ["(1.) Evolutionary increases in dispersal-related traits are frequently documented during range expansions. Investment in flight-related traits is energetically costly and a trade-off with fecundity may be expected during range expansion. (2.) However, in contrast to wing-dimorphic species, this trade-off is not general in wing-monomorphic species. In the absence of a dispersal-fecundity trade-off, an increased investment in clutch size at the expansion front is expected possibly at a cost of reduced offspring size. (3.) The study evaluated investment in female flight morphology and fecundity-related traits (clutch size, hatchling size) and potential trade-offs among these traits in replicated populations of the poleward range-expanding damselfly *Coenagrion scitulum*. (4.) Females at the expansion front had a higher relative thorax length, indicating an increased investment in flight; this can be explained by spatial sorting of dispersal ability or in situ natural selection at the expansion front. Edge females produced larger hatchlings, however, this pattern was totally driven by the population-specific thermal larval regimes and could not be attributed to the range expansion per se. By contrast, clutch sizes did not differ between core and edge populations. There was no signal of a dispersal-fecundity trade-off either for a trade-off between clutch size and hatchling size. (5.) These results indicate that evolution of a higher dispersal ability at the expansion front of *C. scitulum* does not trade off with investment in fecundity, hence a dispersal-fecundity trade-off is unlikely to

slow down range expansion of this species." (Authors)] Address: Therry, L., Laboratory of Aquatic Ecology, Evolution and Conservation, KU Leuven, Deberiotstraat 32, 3000 Leuven, Belgium. E-mail: Lieven.Therry@bio.kuleuven.be

**15521.** Tichanek, F.; Tropek, R. (2015): Conservation value of post-mining headwaters: drainage channels at a lignite spoil heap harbour threatened stream dragonflies. *Journal of Insect Conservation* 19: 975-985. (in English) ["Headwaters and small streams are crucial components of riverine systems, harbouring many highly specialized and unique invertebrate species. Unfortunately, the overwhelming majority of the Central European lowland headwaters are channeled, eutrophicated and/or polluted, and many related species have become critically endangered. Artificial streams established to drain some post-mining sites supplement a network of headwaters and generally do not suffer from agricultural pollution. Nevertheless, the biodiversity and conservation potential of the streams at post-mining sites has never been evaluated. We studied the biodiversity of Odonata at 53 sections (30 m) of an extraordinarily dense system of drainage ditches at a large lignite spoil heap in the Czech Republic. We recorded 22 dragonfly species, of which eight are threatened according to the national Red List. Moreover, four of them are closely associated with the endangered environment of small streams. Overall diversity was generally low at very tiny and/or narrowed streams and was also strongly reduced by high water velocity, high bankside inclination and dominance of expansive common reeds. Sufficient cover of rather shallow sediment layers strongly supports the studied diversity indicators. We thus conclude that post-mining streams in drainage ditches could have a strong potential to offer secondary habitats for threatened headwater biodiversity. However, intermittent reed suppression and the establishment of gently sloping banks and a structured stream bottom are necessary measures for maximizing post-mining stream conservation." (Authors)] Address: Tichanek, F., Faculty of Science, Univ. of South Bohemia, Branisovska 1760, 370 05, Ceske Budejovice, Czech Republic. E-mail: f.tichanek@gmail.com

**15522.** Tobin, M.J.; Puskar, L.; Nguyen, S.H.; Hasan, J.; Webb, H.K.; Hirschmugl, C.J.; Nasse, M.J.; Gervinskas, G.; Juodkasis, S.; Watson, G.S.; Watson, J.A.; Mainwaring, D.E.; Mahon, P.J.; Marchant, R.; Crawford, R.J.; Ivanovac, E.P. (2015): Fourier transform infrared spectroscopy and imaging of dragonfly, damselfly and cicada wing membranes. *Spectroscopy Europe* 27(4): 15-18. (in English) ["Conclusion: Insect wings possess some remarkable properties, enabling them to thrive in challenging environments. Often, a combination of nano- and micro-structured topography, with chemical heterogeneity on the micron scale, provides these structures with efficient superhydrophobic, self-cleaning and antibacterial capabilities. Their complex surfaces are providing inspiration for the design of novel coatings and surface structures that can mimic these beneficial properties. High spatial resolution FT-IR spectroscopy and imaging, when combined with other techniques such as SEM and GC-MS, provide unique insights into the complex



chemical patterning that contributes to this functionality. Further developments in FT-IR imaging, such as 3D infrared tomography and scanning near-field nano spectroscopy have the potential to add a further dimension to the chemical and physical information that is enabling us to obtain a greater understanding of these natural surfaces. These techniques can also continue to be applied to the study of manmade material surfaces that attempt to emulate the properties of their biological templates." (Authors) *Diplacodes bipunctata*, *Ischnura heterosticta*] Address: Tobin, M., Infrared Microspectroscopy Beamline, Australian Synchrotron, 800 Blackburn Road, Clayton, Victoria, 3168, Australia

**15523.** Tong, J.; Chang, Z.; Yang, X.; Zhang, J.; Liu, X.; Chetwynd, D.G.; Chen, D.; Sun, J. (2015): Nanoindentation mechanical properties and structural biomimetic models of three species of insects wings. *Journal of Wuhan University of Technology-Mater. Sci. Ed.* 30(4): 831-839. (in English) ["Mimicking insect flights were used to design and develop new engineering materials. Although extensive research was done to study various aspects of flying insects. Because the detailed mechanics and underlying principles involved in insect flights remain largely unknown. A systematic study was carried on insect flights by using a combination of several advanced techniques to develop new models for the simulation and analysis of the wing membrane and veins of three types of insect wings, namely dragonfly (*Pantala flavescens* Fabricius), honeybee (*Apis cerana cerana* Fabricius) and fly (*Sarcophaga carnaria* Linnaeus). In order to gain insights into the flight mechanics of insects, reverse engineering methods were used to establish three-dimensional geometrical models of the membranous wings, so we can make a comparative analysis. Then nano-mechanical test of the three insect wing membranes was performed to provide experimental parameter values for mechanical models in terms of nano-hardness and elastic modulus. Finally, a computational model was established by using the finite element analysis (ANSYS) to analyze and compare the wings under a variety of simplified load regimes that are concentrated force, uniform line-load and a torque. This work opened up the possibility towards developing an engineering basis for the biomimetic design of thin solid films and 2D advanced engineering composite materials." (Authors)] Address: Jin Tong, J., The Key Laboratory of Engineering Bionics (Ministry of Education, China) and the College of Biological and Agricultural Engineering, Jilin University, Changchun, 130022, China. E-mail: jtong@jlu.edu.cn

**15524.** Torres-Cambas, Y.; Lorenzo-Carballa, M.O.; Ferreira, S.; Cordero-Rivera, A. (2015): *Hypolestes hatuey* sp. nov.: a new species of the enigmatic genus *Hypolestes* (Odonata, Hypolestidae) from Hispaniola. *Zootaxa* 4000(2): 207-226. (in English) ["Both sexes of *Hypolestes hatuey* Torres-Cambas, sp. nov. (Odonata: Zygoptera: Hypolestidae) from Hispaniola are described and illustrated here. This newly described species differs from *H. trinitatis* and *H. clara*, the other two species within the genus, by the morphology of the genital ligula and male cerci. Females of *H.*

*hatuey* sp. nov. differ from *H. clara* by the shape of the female antehumeral stripe and wing venation. Morphological distinctiveness in males is supported by genetic differences in the 16S mitochondrial gene. Following the categories and criteria of the IUCN Red List of Threatened Species, we suggest this species should be listed as Data Deficient (DD), given that available data on its distribution are too limited to assess its risk of extinction." (Authors)] Address: Torres-Cambas, Y., Depto Biol., Fac. Cien. Nat., Univ. de Oriente. Patricio Lumumba s/n, Santiago de Cuba, Cuba. E-mail: ytorres@cnt.uo.edu.cu, yusdiel.torres@gmail.com

**15525.** Torres-Cambas, Y.; Trapero-Quintana, A.D.; Lorenzo-Carballa, M.O.; Newell, D.; Suriel, C.; Cordero-Rivera, A. (2015): An update on the distribution of threatened odonate species from the Greater Antilles. *International Journal of Odonatology* 18(2): 89-104. (in English) ["The Antilles harbour several island endemic odonate species, including some palaeoendemics, within a relatively small and anthropized area. Such attributes give this archipelago a special significance for the conservation of Odonata in the Neotropics. However, despite the importance of these islands, inadequately surveyed regions persist, mainly in the Greater Antilles, and there is not enough information to set IUCN threat categories for eight species supposed to be at risk, which are currently classified as data deficient (DD). To update the distribution of endangered (EN), vulnerable (VU) and DD species, we conducted a series of field surveys in Dominican Republic, Jamaica and Cuba, and compiled data from literature, museum collections as well as personal communications. We sampled a total of 37 species, including *Microneura caligata*, *Phyllestes ethelae* and *Hypolestes clara* (EN); *H. trinitatis* (VU); and *Diceratobasis macrogaster*, *Neoneura maria* and *Protoneura capillaris* (DD). We provide new locality records for *M. caligata*, *N. carnatica* (DD), *N. maria* (DD), *P. capillaris*, *H. clara*, *H. trinitatis* and *Erythrodiplax bromeliicola* (DD). According to our results, we suggest changing the category of *D. macrogaster*, *D. melanogaster*, *N. carnatica*, *N. maria* and *P. capillaris* to VU." (Authors)] Address: Torres-Cambas, Y., Depto de Biología, Facultad de Ciencias Naturales, Universidad de Oriente, Patricio Lumumba s/n CP 90500, Santiago de Cuba, Cuba. E-mail: ytorres@cnt.uo.edu.cu

**15526.** Torres-Pachón, M.; Realpe-Rebolledo, E. (2015): Listado preliminar de los odonatos (Insecta: Odonata) del bosque alto andino del Santuario de Fauna y Flora Iguaque, Boyaca, Colombia - Preliminary checklist of the odonats (Insecta: Odonata) of the High Andean Forest of the Santuario de Fauna y Flora Iguaque, Boyaca, Colombia. *Dugesiana* 22(2): 133-136. (in Spanish) [*Rhionaeschna marchali*, *Hetaerina proxima*, *Lestes apollinaris*, *Ischnura chingaza*, *Mesamphiagrion laterale*, *M. ovigerum*, *Oxiagrion miniopsis*] Address: Torres-Pachón, Mónica, Programa de Doctorado en Ciencias. Red de Biodiversidad y Sistemática. Instituto de Ecología, A.C. (INECOL), Apartado 91070, Xalapa. Mexico. E-mail: monibiolo@gmail.com

**15527.** Toth, Z. (2015): Context-dependent plastic response during egg-laying in a widespread newt species. *PLoS ONE*

10(8): e0136044. doi:10.1371/journal.pone.0136044: 18 pp. (in English) ["Previous research on predator-induced phenotypic plasticity mostly focused on responses in morphology, developmental time and/or behaviour during early life stages, but the potential significance of anticipatory parental responses has been investigated less often. In this study I examined behavioural and maternal responses of gravid female smooth newts, *Lissotriton vulgaris*, in the presence of chemical cues originating from invertebrate predators, *Acilius sulcatus* water beetles and *Aeshna cyanea* dragonfly larvae. More specifically, I tested the extent of oviposition preference, plasticity in egg-wrapping behaviour and plasticity in egg size when females had the possibility to lay eggs at oviposition sites with and without predator cues during overnight trials. I found that individuals did not avoid laying eggs in the environment with predator cues; however, individuals that deposited eggs into both environments adjusted the size of the laid eggs to the perceived environment. Females deposited larger eggs earlier in the season but egg size decreased with time in the absence of predator cues, whereas individuals laid eggs of average size throughout the investigated reproductive period when such cues were present. Also, egg size was found to be positively related to hatching success. Individuals did not adjust their wrapping behaviour to the presence of predator cues, but females differed in the extent of egg-wrapping between ponds. Females' body mass and tail depth were also different between ponds, whereas their body size was positively associated with egg size. According to these results, female smooth newts have the potential to exhibit activational plasticity and invest differently into eggs depending on temporal and environmental factors. Such an anticipatory response may contribute to the success of this caudate species under a wide range of predator regimes at its natural breeding habitats." (Author)] Address: Toth, Z., Lendület Evolutionary Ecology Research Group, Plant Protection Institute, Centre for Agricultural Research, Hungarian Academy of Sciences, Budapest, Hungary. E-mail: toth.zoltan@agrar.mta.hu

**15528.** Touchon, J.C.; Vonesh, J.R. (2015): Variation in abundance and efficacy of tadpole predators in a Neotropical pond community. *Journal of Herpetology* 50(1): 113-119. (in English, with Spanish summary) ["Variation in predation risk plays an important role in shaping prey behaviour, morphology, life history, population dynamics, and community structure in freshwater systems. Anuran larvae are important prey in freshwater communities and spatiotemporal variation in risk can arise from changes in the number and identity of predators; however, our understanding of variation in abundance, identity, and foraging rates for natural predator assemblages in tropical pond communities is limited. We surveyed ponds near Gamboa, Panama in 2004 and 2010 to estimate variation in predator communities of tadpoles over space and time. We also conducted short-term predation trials with the 10 most common predators using hatchling tadpoles of two widespread Neotropical frog species, Red-Eyed Treefrogs (*Agalychnis callidryas*) and Pantless Treefrogs (*Dendropsophus ebraccatus*). Predator abundance varied nearly threefold across ponds within a single year and as much as 19-fold within a pond across

years. Dominant taxa also varied, with backswimmers (Notonectidae), poeciliid fish, or libellulid dragonfly naiads being the most common depending upon pond and year. Predation trials revealed that prey-specific predation rates differed among predator taxa. Some presumed predators did not consume hatchlings, whereas others consumed >90% of prey. The smaller *D. ebraccatus* hatchlings generally experienced higher predation rates; however, large invertebrate predators like aeshnid dragonfly naiads, giant water bugs, and fishing spiders consumed more *A. callidryas*. These results suggest that strong but variable larval-stage risk may be an important selective factor shaping tadpole communities and phenotypes in Neotropical ponds." (Authors)] Address: Touchon, J.C., Vassar College, Department of Biology, 124 Raymond Avenue, Poughkeepsie, New York 12604-0731 USA. E-mail: jutouchon@vassar.edu

**15529.** Trockur, B.; Lingenfelder, U. (2015): Die FFH-Libellenarten im Saarland (Insecta: Odonata). *Abh. DELATTINIA* 40: 77-136. (in German, with English and French summaries) ["There are four dragonfly species in the Saarland listed in annex II and/or IV of the EU Habitats Directive. An overall view for each of the species is given concerning distribution and status, based on new data from the years 2012 until 2014. Changes in population size and threatening factors for the species and their occurrence are discussed. The situation for *Coenagrion mercuriale* is critical. Actually only three populations are known, all with low abundances. Both populations in the floodplain of the river Blies are severely threatened by intensive use and inappropriate measures of preservation applied. The third population of the species near Heinitz seems to be stable, but the core of the population depends on right preservation and is therefore indirectly and latently endangered. *Ophiogomphus cecilia* occurs especially in the southeast of the Saarland and clearly shows positive trends. The river Blies is the most important locality for recording. It contains in the meantime a stable population. But the situation at other actual or former localities is not clear. The number of localities of *Leucorrhinia caudalis* is more or less almost constantly increasing in the last years, and thus a positive trend can be attested. The species has an abundant and stable population near Heinitz with increasing abundance, while all other localities in the Saarland show instable conditions in population size. Trends are even negative in some places. *Leucorrhinia pectoralis* has been recorded only twice in the Saarland in 2012 and 2014 and is of unclear status here. Conservation measures for *C. mercuriale* are absolutely required at present to preserve, protect and/or support the populations, and they would be for *Leucorrhinia caudalis* at least in some localities helpful. Species specific requirements on the habitat have to be respected for *O. cecilia* also because of actual or potential threats not only in the areas of the Habitats Directive." (Authors)] Address: Trockur, B., Brückenstr. 25, 66636 Tholey-Hasborn, Germany. E-mail: Bernd@Trockur.de

**15530.** Troyer, R.R.; Turner, A.M. (2015): Chemosensory perception of predators by larval amphibians depends on water quality. *PLoS ONE* 10(6): e0131516. doi:10.1371/

journal.pone.0131516: 10 pp. (in English) ["The acquisition of sensory information by animals is central to species interactions. In aquatic environments, most taxa use chemical cues to assess predation risk and other key ecological factors. A number of laboratory studies suggest that anthropogenic pollutants can disrupt chemoreception, even when at low, non-toxic concentrations, but there are few tests of whether real-world variation in water quality affects chemoreception. Here we investigate whether chemosensory perception of predators (*Anax* sp.) by the gray treefrog, *Hyla versicolor*, depends on water quality. We evaluated the anti-predator response of anuran tadpoles housed in water collected from three sites that represent strong contrasts in the concentration and types of dissolved solids: de-chlorinated tap water, water from an impaired stream, and treated wastewater effluent. Behavioural assays were conducted in laboratory aquaria. Chemical cues associated with predation were generated by feeding tadpoles to dragonfly predators held in containers, and then transferring aliquots of water from dragonfly containers to experimental aquaria. Tadpoles housed in tap water responded to predator cues with an activity reduction of 49%. Tadpoles housed in stream water and wastewater effluent responded to predator cues by reducing activity by 29% and 24% respectively. The results of factorial ANOVA support the hypothesis that the response to predator cues depended on water type. These results show that alteration of the chemical environment can mediate chemical perception of predators in aquatic ecosystems. Because most aquatic species rely on chemoreception to gather information on the location of food and predators, any impairment of sensory perception likely has important ecological consequences." (Authors)] Address: Turner, A.M., Department of Biology, Clarion University, Clarion, PA, USA. E-mail: aturner@clarion.edu

**15531.** Valdivia, F.G.A. (2015): Territoriality of Zenithoptera *lanei* (Anisoptera: Libellulidae) in an area of Brazilian savana. Master's Dissertation, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Univ. Sao Paulo: V + 53 pp. (in Portuguese, with English summary) ["Animal behaviour associated with morphological characteristics supplies evidence for a better understanding of how sexual behaviour has evolved, and how organisms can maximize their reproductive success. Factors such as size, fat reserves and other sexual characters such as coloration are essential to individual better performance in relation to conspecifics. These factors can bring information of the male quality to other conspecifics and females. This quality keeps relation with the physical condition (energy reserves) that they have which is required to succeed in breeding, as reproduction is one of the most expensive activity in energy cost in relation to other activities. The reproductive behaviour is related to the individual fat reserves that influences, among other factors, in the condition that they adopt and to the duration in time of the related interactions to reproduction. Therefore, individuals with more developed characteristics or with better physical conditions will have an advantage in the reproduction comparing with other individuals of the community. The dragonfly Zenithoptera *lanei* is a Neotropical species

present in Brazil, only studied so far by Guillermo-Ferreira in 2015, when structures that conform this pruinosity and his function in the intraspecific communication were described. In this study, describe the sexual behaviour of *Z. lanei*. Was hypothesized that in this species males present territorial behaviour, and that the coloration of wings, body size and the energy reserves (fat) may play an important role in territorial condition and reproductive success. Thus, males with higher quantity of energy and larger size should win more disputes, defend territories and, therefore, maintain the territorial condition. In addition, was also assessed whether this condition of territoriality may influence the duration of the copulation and oviposition by females. The results showed that males are territorial, and its territoriality keeps relation with size and the physical condition. In other words, males with larger body and higher energy reserves have won more disputes and maintained a territory. Although males were territorial, there was no difference between the duration of reproductive interactions, winning males and losers, thus indicating that the reproductive interactions are not influenced by the condition of territoriality of the male." (Author)] Address: Fernando, F.G.A., Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto

**15532.** van der Vliet, R.E.; van den Broeke, M.A. (2015): *Gomphus flavipes* on IJsselooig in lake Ketelmeer. *Brachytron* 17(2): 107-110. (in Dutch, with English summary) ["In 2009, at least 10 exuviae and also a freshly emerged individual of *G. flavipes* were seen and photographed on the island IJsselooig in Ketelmeer in the province of Flevoland. This observation concerns the northernmost place in the Netherlands where exuviae and freshly emerged individuals of the species have been found. Lake Ketelmeer is an extension of the river IJssel where reproduction of *G. flavipes* has been established since 2006. In view of the number of exuviae found on IJsselooig, it is likely that the observations of exuviae and the freshly emerged individual is the result of local reproduction rather than larval drift. The observation indicates that observers should be aware of the occurrence of the species in the province of Flevoland where it has been observed only three times until now." (Authors)] Address: van der Vliet, R.E., Tauw bv, Postbus 3015, 3502 GA Utrecht, The Netherlands. roland.vandervliet@tauw.nl

**15533.** Van Schandevyl, D.; Vercruyssen, W. (2015): Yellow-spotted Emerald (*Somatochlora flavomaculata*) looking for new reproduction sites. *Brachytron* 17(2): 100-106. (in Dutch, with English summary) ["*S. flavomaculata* is a rare species in Belgium. Its distribution is restricted to swampy areas in the eastern part of Flanders and the southernmost part of Wallonia. Sightings of vagrant individuals are exceptional. This article describes the discovery (2013-2014) of the species in East Flanders. Until recently the species was unknown from the western part of Flanders. At the two newly discovered localities (the Wellemerssen in Denderleeuw and the Damvallei, east of Ghent), a small population may be present. In the Netherlands the range of the Yellow-spotted Emerald has greatly increased in the last ten years



and a number of new populations were discovered. Similarly, an expansion of *S. flavomaculata* can be expected in Belgium." (Authors)] Address: Danny Van Schandevyl. E-mail: danny.van.schandevyl@telenet.be

**15534.** Vannini, L.; Bowen, J.H.; Reed, T.W.; Willis, J.H. (2015): The CPCFC cuticular protein family: anatomical and cuticular locations in *Anopheles gambiae* and distribution throughout Pancrustacea. *Insect Biochemistry and Molecular Biology* 65: 57-67. (in English) ["Highlights: •New cuticular protein family described, characterized by a 16 amino acid motif ending C-X(5)-C. •In *Anopheles gambiae*, transcripts localized primarily in epidermis underlying hard cuticle. •Proteins localized primarily in endocuticle. •Family members identified in 14 orders of Hexapoda and 4 classes of Crustacea. Abstract: Arthropod cuticles have, in addition to chitin, many structural proteins belonging to diverse families. Information is sparse about how these different cuticular proteins contribute to the cuticle. Most cuticular proteins lack cysteine with the exception of two families (CPAP1 and CPAP3), recently described, and the one other that we now report on that has a motif of 16 amino acids first identified in a protein, Bc-NCP1, from the cuticle of nymphs of the cockroach, *Blaberus craniifer* (Jensen et al., 1997). This motif turns out to be present as two or three copies in one or two proteins in species from many orders of Hexapoda. We have named the family of cuticular proteins with this motif CPCFC, based on its unique feature of having two cysteines interrupted by five amino acids (C-X(5)-C). Analysis of the single member of the family in *Anopheles gambiae* (*AgamCPCFC1*) revealed that its mRNA is most abundant immediately following ecdysis in larvae, pupae and adults. The mRNA is localized primarily in epidermis that secretes hard cuticle, sclerites, setae, head capsules, appendages and spermatheca. EM immunolocalization revealed the presence of the protein, generally in endocuticle of legs and antennae. A phylogenetic analysis found proteins bearing this motif in 14 orders of Hexapoda, but not in some species for which there are complete genomic data. Proteins were much longer in Coleoptera and Diptera than in other orders. In contrast to the 1 and occasionally 2 copies in other species, a dragonfly, *Ladona fulva*, has at least 14 genes coding for family members. CPCFC proteins were present in four classes of Crustacea with 5 repeats in one species, and motifs that ended C-X(7)-C in Malacostraca. They were not detected, except as obvious contaminants, in any other arthropod subphyla or in any other phylum. The conservation of CPCFC proteins throughout the Pancrustacea and the small number of copies in individual species indicate that, when present, these proteins are serving important functions worthy of further study." (Authors)] Address: Willis, Judith, Department of Cellular Biology, University of Georgia, Athens, GA, USA. E-mail: jhwillis@uga.edu

**15535.** Varshini, R.A.; Kanagappan, M. (2015): Effect of space on the feeding efficiency of dragonfly nymph *Bradinopyga geminata*. *European Journal of Biotechnology and Bioscience* 3(12): 6-10. (in English) ["Among various predators of mosquito larvae, dragonfly nymphs are efficient,

found naturally, safe for human beings, and are also economical in their application. There are many physical, chemical and biological factors like prey species, prey size, prey stage, predator species, predator size, predator stage, aquatic vegetation, quality and quantity of water, illumination, and space affect the feeding efficiency of dragonfly nymphs. These factors serve as a basis for the richness or otherwise biological productivity of any aquatic environment. The present study shows negative correlation where with the increasing space of the basins the feeding efficiency of the nymph decreased. The maximum prey consumption  $34.91 \pm 3.96$  was recorded when the circumference of the basin was 4 cm and the water level was 3 cm height and minimum predation  $16 \pm 2.72$  was recorded when the circumference of the basin was 64 cm and the water level was 3 cm height." (Authors)] Address: Kanagappan, M., Dept of Zoology and Research Centre, Scott Christian College (Autonomous), Nagercoil, 629003, India

**15536.** Venkatesh, A.; Tyagi, B.K. (2015): *Bradinopyga geminata* (Anisoptera: Libellulidae) as a predator of *Aedes aegypti* immatures (Diptera: Culicidae). *International Journal of Mosquito Research* 2(2): 98-105. (in English) ["Predatory potential of 12th instar larvae of *Bradinopyga geminata* on *Aedes* mosquito immatures was observed, by exposing two different prey-predator combinations (Prey: Predator; 200:1 and 1000:5). One and five 12th instar larvae of *B. geminata* were provided with 200 (SET A) and 1000 (SET B) I, II, III & IV instars of *Aedes aegypti* larvae as prey, for a period of 24 hr in plastic containers containing 1 and 5 litres of water respectively. The number of *Ae. aegypti* larvae consumed by *B. geminata* larvae were noted through one day, at an interval of 3 hours. To maintain the prey density, same number of larvae was replenished. In the daily feeding rate experiment the consumption showed a peak during the 9th hour, irrespective of the instar stages. Predation rate of *B. geminata* was more for I instar. The predatory impact values for I instar in both Set A and B were  $4.12 \pm 0.05$  and  $3.6 \pm 0.02$  respectively, and were significant ( $P < 0.01$ ). The comparative clearance rate for Set A and B was highly significant for the first instar ( $P < 0.01$ ). This study revealed that *B. geminata* larvae is an efficient predator of mosquito larvae. The rate of consumption was dependent on the size of the prey and the density of the predator. The predatory impact of *B. geminata* was more for the first instar *Ae. aegypti*, owing to its size and energy requirements. To conclude, *B. geminata* is an efficient bio-control agent for container breeding *Ae. aegypti* and can be an effective tool in the integrated vector control programme." (Authors)] Address: Tyagi, B.K., Centre for Research in Medical Entomology (Indian Council of Medical Research) 4, Sarojini Street, Chinna Chokkikulam Madurai – 625002. India. E-mail: abktyagi@gmail.com

**15537.** Venn, S.; Schulman, H.; Törrönen, S.; Salla, A.; Pajunen, T.; Kerppola, S.; Paukkunen, J.; Nieminen, M.; Vilisics, F.; Karjalainen, S (2015): Helsinki. In: J.G. Kelcey (ed.): *Vertebrates and invertebrates of European cities: Selected non-avian fauna*. Springer New York: 323-377. (in

English ) ["Helsinki is located on a peninsula projecting into the Baltic Sea from the south coast of Finland. The country lies in the Boreal region, which is typified by the mixed coniferous forests, although Helsinki itself is located in a narrow strip of the hemiboreal zone, which also has noble deciduous forest, similar to those of the temperate region. The region is also characterized by a variety of wetland habitats. Descriptions are provided of the following invertebrate taxa: Arachnida, Carabidae, Syrphidae, Apidae sensu lato, Formicidae, Isopoda, Lepidoptera and Odonata, as well as some of the habitats they occupy. The information provided is rather patchy, as the amount of data varies considerably between different taxa and habitats. The urban region contains some sites that are valuable for invertebrate diversity, regardless of their location. The characteristic features of the urban environment, such as mild climate and longer growing season, may be beneficial for some taxa." (Authors)] Address: Karjalainen, S., Neidonpuistontie 6 D 8, FI-02400, Kirkkonummi, Finland. E-mail: sk@korento.net

**15538.** Vieira, V.; Cordero-Rivera, A. (2015): First record of *Pantala flavescens* from the Azores (Odonata: Libellulidae). *Odonatologica* 44(1/2): 1-9. (in English) ["A male of *P. flavescens* was collected on São Miguel island, Azores, on 02-xi-2014. This specimen constitutes both the first record of the species in the Azores and its northernmost record in Macaronesia. The distribution of the species in the Macaronesian islands and the possible origin of the Azorean specimen is briefly discussed." (Authors)] Address: Vieira, V., Departamento de Biologia, Universidade dos Açores, Rua de S. Gonçalo, Apartado 1422, PT-9501-801 Ponta Delgada, Açores, Portugal. E-mail: vvieira@uac.pt

**15539.** Ward, T.A.; Rezadad, M.; Fearday, C.J.; Viyapuri, R. (2015): A review of biomimetic air vehicle research: 1984-2014. *International Journal of Micro Air Vehicles* 7(3): 375-394. (in English) ["Biomimetic air vehicles (BAV) are a class of unmanned aircraft that mimic the flapping wing kinematics of flying organisms (e.g. birds, bats, and insects [including dragonflies]). Research into BAV has rapidly expanded over the last 30 years. In this paper, we present a comprehensive bibliometric review of engineering and biology journal articles that were published on this subject between 1984 and 2014. These articles are organized into five topical categories: aerodynamics, guidance and control, mechanisms, structures and materials, and system design. All of the articles are compartmented into one of these categories based on their primary focus. Several aspects of these articles are examined: publication year, number of citations, journal, authoring organization and country, non-academic funding sources, and the flying organism focused upon for bio-mimicry. This review provides useful information on the state of the art of BAV research and insight on potential future directions. Our intention is that this will serve as a resource for those already engaged in BAV research and enable insight that promotes further research interest." (Authors)] Address: Ward, T.A., Department of Mechanical Engineering, University of Malaya, 50603 Kuala Lumpur, Malaysia. E-mail: DrTomWard@um.edu.my

**15540.** Wasscher, M. (2015): Edmond de Selys Longchamps and the study of dragonflies in the Netherlands. *Brachytron* 17(2): 116-125. (in Dutch, with English summary) ["The importance of Selys for the Dutch study of dragonflies is described, using articles, his published diaries and his scientific correspondence present in RBINS (Brussels) and Naturalis (Leiden). Selys visited the RMNH collection (now NCB Naturalis) in Leiden six times and the collection of *Natura Artis Magistra* in Amsterdam five times. For the RMNH he carried out identifications, they exchanged dragonflies and with some curators he conducted a regular correspondence. The summarizing catalogue which Selys made in 1879 of the RMNH dragonfly collection has unfortunately not yet been found. Selys had a warm friendship with Adrien Maurissen from Maastricht, for whom he wrote a necrology, and with Herman Albarda from Friesland, after whom he named *Sieboldius albardae*. The three publications concerning dragonflies in the Netherlands which appeared in 1852, 1866, and 1889 are clearly influenced by Selys. With that and his regular contact with the RMNH Selys has sown the seeds for the current flourishing study of dragonflies in the Netherlands.] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: marcel.hilair@12move.nl

**15541.** Watanabe, M. (2015): Larval community dynamics in an artificial habitat created for conservation of a local population of the endangered brackish water damselfly *Mortonagrion hirosei* (Odonata: Coenagrionidae). *Odonatologica* 44(1/2): 45-62. (in English) ["Brackish water ecosystems in estuaries are highly threatened due to land development, the improvement of embankments, and reclamation. Several threatened species of dragonflies and damselflies inhabit these ecosystems. The brackish water damselfly, *M. hirosei*, has been an important focus of conservation studies. Here, we describe a conservation project for *M. hirosei* begun in 2003, and review the data collected in order to quantify details of the species' life cycle, especially larvae and larval environment. An artificially established reed community was created as a habitat for this damselfly, and water depth, salinity, and water temperature in the reed bed were continuously monitored thereafter. Because this damselfly is univoltine, the number and distribution of the odonate larvae in the experimental habitat in May, or presence of last-instar larvae of *M. hirosei*, were considered suitable indices of colonisation success. Since many odonate adults, including *M. hirosei*, visited the habitat in the first year and laid eggs, high larval diversity was found in the second year. Although the salinity of water in the reed bed varied because cyclical tidal fluctuations, the saline water gradually excluded odonate larvae that inhabit freshwater only. However, *M. hirosei* survived, and the larval population increased year by year. Consequently, the odonate larval diversity in the artificial habitat decreased, while the population of *M. hirosei* was maintained." (Author)] Address: Watanabe, M., Dept Biol., Fac. Education, Mie Univ., Tsu, Mie 514-8507, Japan. E-mail: watanabe@edu.mie-u.ac.jp

**15542.** Wei, S.-z.; Yang, R.-g.; Lu, C.-w. (2015): Study on emergence of *Asiagomphus hainanensi*. *Modern Agricultural Science and Technology* 640(02): 265-266. (in Chinese, with English summary) [China; The emergence process (metamorphosis to imago) of a reared specimen lasted about 82 minutes and is described in detail.] Address: Wei, S.-z., School of Chemistry and Bioengineering, Tech. Univ., Yizhou Guangxi, 546300, China

**15543.** Wesner, J.S.; Meyers, P.; Billman, E.J.; Belk, M.C. (2015): Habitat selection and consumption across a landscape of multiple predators. *Ecology and Evolution* 5(1): 121-129. (in English) ["Predator community composition can alter habitat quality for prey by changing the strength and direction of consumptive effects. Whether predator community composition also alters prey density via nonconsumptive effects during habitat selection is not well known, but is important for understanding how changes to predator communities will alter prey populations. We tested the hypothesis that predator community composition (presence of caged trout, caged dragonflies [*Ophiogomphus severus*], or caged trout + dragonflies) alters colonization of aquatic mesocosms by ovipositing aquatic insects. In a previous experiment in this system, we found a spatial contagion effect, in which insects avoided pools with predators, but only when predator-free pools were isolated (~5 m away from predator pools). Here, we removed the isolated predator-free pools, allowing us to test whether insects would make fine-scale (~1 m) oviposition decisions in the absence of preferred isolated pools. We also estimated consumptive effects by allowing predators to feed on colonists for 5 days following colonization. All insects collected after 21 days were dipterans, dominated by Chironomidae. Total colonization, measured as the number of developing larvae after 21 days, was not affected by either predator presence or composition. Consumption was significant in the trout only treatment, reducing larval insect density by  $46 \pm 37\%$  (mean  $\pm$  SE). No other predator treatment significantly reduced prey density, although the proportion of chironomid larvae in protective cases increased in response to direct predation from dragonflies, indicating an antipredatory behavioural response. Taken together, these results reveal that predator community composition altered larval survival and behaviour, but colonizing females either did not or could not assess these risks across small scales during oviposition." (Authors)] Address: Wesner, J.S., Department of Biology, University of South Dakota, Vermillion, SD 57069, USA. E-mail: jeff.wesner@usd.edu

**15544.** White, E.L.; Hunt, P.D.; Schlesinger, M.D.; Corser, J.D.; deMaynadier, P.G. (2015): Prioritizing Odonata for conservation action in the northeastern USA. *Freshwater Science* 34(3): 1079-1093. (in English) ["Odonata are valuable biological indicators of freshwater ecosystem integrity and climate change, and the northeastern USA (Virginia to Maine) is a hotspot of odonate diversity and a region of historical and growing threats to freshwater ecosystems. This duality highlights the urgency of developing a comprehensive conservation assessment of the region's 228 resident

odonate species. We offer a prioritization framework modified from NatureServe's method for assessing conservation status ranks by assigning a single regional vulnerability metric (R-rank) reflecting each species' degree of relative extinction risk in the northeastern USA. We calculated the R-rank based on 3 rarity factors (range extent, area of occupancy, and habitat specificity), 1 threat factor (vulnerability of occupied habitats), and 1 trend factor (relative change in range size). We combine this R-rank with the degree of endemism (% of the species' USA and Canadian range that falls within the region) as a proxy for regional responsibility, thereby deriving a list of species of combined vulnerability and regional management responsibility. Overall, 18% of the region's odonate fauna is imperiled (R1 and R2), and peatlands, low-gradient streams and seeps, high-gradient headwaters, and larger rivers that harbour a disproportionate number of these species should be considered as priority habitat types for conservation. We anticipate that our analysis might serve as a model for guiding and standardizing conservation assessments at multiple scales for Odonata and other diverse taxa that have not yet received attention to prioritization." (Authors)] Address: White, E.L., New York Natural Heritage Program, State Univ. of New York College of Environmental Science and Forestry, 625 Broadway 5th Floor, Albany, New York 12233-4757 USA

**15545.** Wildermuth, H.; Roland, H.-J.; Hein, A.T. (2015): Landmilben als Libellenparasiten – bisher bekanntes Wirtsspektrum in Europa (Acari: Prostigmata; Odonata). *Libellula* 34(1/2): 103-115. (in German, with English summary) ["Terrestrial mites as parasites of dragonflies – updated host spectrum in Europe (Acari: Prostigmata; Odonata) – In contrast to aquatic mites as parasites of Odonata few studies of terrestrial mites exist. In order to obtain more information on their distribution and their relation to their odonate hosts, an appeal to odonatologists was made via various photo- and dragonfly platforms on the internet to submit photos of odonates infested by mites. Besides a great amount of images with aquatic mites, 24 photo documents with terrestrial mites came in. Among the host species five have been unknown up to now: *Calopteryx xanthostoma*, *Libellula quadrimaculata*, *Leucorrhinia dubia*, *Sympetrum flaveolum*, and *S. sanguineum*. The parasite load was 1.7 mites per host individual on average. Most mite larvae clung to the host's legs, some also to the abdomen and the thorax, only one to the head. The records of the terrestrial mites originated from eleven localities, most of them from Germany, two from Georgia and one from France. All hitherto published records of terrestrial mites on Odonata are summarized and reviewed. The host spectrum, the distribution in Europe, the prevalence and parasite load as well as the problem of parasitization and/or phoresy of terrestrial mites on Odonata are discussed." (Authors)] Address: Hein, A.T., Ackerstr. 109, 13355 Berlin, Germany. E-mail: post@libellenwissen.de

**15546.** Williams, A.T. (2015): The dragonflies of Reigersbroek and Schrevenhofsbroekje. The effect of nature development on dragonfly fauna. *Natuurhistorisch maandblad*



104(6): 103-109. (in Dutch, with English summary) ["The natural landscape of Reigersbroek and Schrevenhofsbroekje in the province of Limburg is being redeveloped in order to restore its original marshy character. Topsoil removal, the scattering of wet heathland vegetation clippings and the raising of water levels have created different habitats for dragonflies. This restoration work has led to various inventories being carried out of the flora and fauna in the area, and by extension the monitoring of the dragonfly population. The restoration work has resulted in sparsely-planted shallow pools and ponds in Reigersbroek, which is still in a pioneer phase, and two large ponds with structure-rich banks in Schrevenhofsbroekje. The habitats in Reigersbroek currently appear to attract predominantly pioneer species such as *Ischnura pumilio* and *Sympetrum fonscolombii*, but are also visited by fenland dragonflies and vagrants from southern regions such as *Anax parthenope*. A number of ditches in the area have been colonised by *Orthetrum coerulescens* and *Sympetrum pedemontanum*. Given the growth in species and populations since the beginning of the restoration work, it is expected that the variety and quantities of species will continue to develop as the area evolves into a mature, contiguous wetland reserve with management focused on the on the preservation of present populations.] Address: Williams, A.T., Julianastraat 5, 6067 EV Linne, The Netherlands

**15547.** Willkommen, J.; Michels, J.; Gorb, S.N. (2015): Functional morphology of the male caudal appendages of the damselfly *Ischnura elegans* (Zygoptera: Coenagrionidae). *Arthropod Structure & Development* 44(4): 289-300. (in English) ["Highlights: The clasping of the dragonfly *Ischnura elegans* represents an energy-efficient process. •The closing of the male claspers is a mainly passive process. •Surface microstructures and the female thoracic morphology secure the clamping. Odonata are usually regarded as one of the most ancient extant lineages of winged insects. Their copulatory apparatus and mating behaviour are unique among insects. Male damselflies use their caudal appendages to clasp the female's prothorax during both copulation and egg-laying and have a secondary copulatory apparatus for sperm transfer. Knowledge of the functional morphology of the male caudal appendages is the basis for understanding the evolution of these structures in Odonata and respective organs in other insects. However, it is still not exactly known how the zygopteran claspers work. In this study, we applied micro-computed tomography and a variety of microscopy techniques to examine the morphology, surface microstructure, cuticle material composition and muscle topography of the male caudal appendages of *Ischnura elegans*. The results indicate that the closing of the paraproctal claspers is mainly passive. This indirect closing mechanism is very likely supported by high proportions of the elastic protein resilin present in the cuticle of the paraproctal bases. In addition, the prothoracic morphology of the female plays an important role in the indirect closing of the male claspers. Our data indicate that both structures – the male claspers and the female prothoracic hump – function together like a snap-fastener." (Authors)] Address:

Willkommen, Jana, Zoological Institute, Department of Functional Morphology and Biomechanics, Christian-Albrechts-Universität zu Kiel, Am Botanischen Garten 1–9, D-24118 Kiel, Germany. E-mail: jwillkommen@zoologie.uni-kiel.de

**15548.** Worthen, W.B.; Turner, L.H. (2015): The effects of odonate species abundance and diversity on parasitism by water mites (*Arrenurus* spp.): testing the dilution effect. *International Journal of Odonatology* 18(3): 233-248. (in English) ["Water mites (*Arrenurus* spp.) parasitize adult dragonflies. We collected dragonflies weekly at 11 waterbodies in Greenville Co. and Pickens Co., SC, USA, to: (1) compare parasitism prevalence across species, sites, and sampling periods; (2) test the hypothesis that prevalence correlates with host abundance; (3) test the hypothesis that prevalence is inversely related to host diversity (the "dilution effect"); and (4) test the hypothesis that prevalence and intensity vary with ecological conditions. Parasitism prevalence varied among well-sampled ( $N > 30$ ) hosts; *Perithemis tenera*, *Plathemis lydia*, and *Celithemis ornata* had no mites, whereas prevalence exceeded 20% for *Argia fumipennis*, *Celithemis elisa*, and *C. fasciata*. Differences among species, however, varied across sites and through time, suggesting patchy or species-specific relationships not captured by our diffuse analysis at the generic level. Prevalence was positively correlated with species abundance and host site occupancy, as expected for generalist parasites. There was no evidence of a dilution effect: there were no significant negative relationships between prevalence and three measures of species richness (observed richness, extrapolated Sest, or CHAO2 estimated richness), considering all odonate species, parasitized species, or only species in the parasitized families Libellulidae or Coenagrionidae. Odonate communities in more pristine sites had higher mean prevalence ( $18.4 \pm 6.0$ ) and median intensity (4.5) than those in disturbed sites ( $13.1 \pm 7.0$ ; 3.0), but only intensities were marginally significantly different. Parasitism by *Arrenurus* spp. met the criteria for a dilution effect, but did not exhibit this effect as a diffuse community-level response." (Authors)] Address: Worthen, W.B., Biology Department, Furman University, Greenville, SC, USA. E-mail: wade.worthen@furman.edu

**15549.** Yeh, W.-C.; Kiyoshi, T.; Wang, M. (2015): *Sarasaeschna gaofengensis* sp. nov. (Odonata, Aeshnidae), a new dragonfly species described from Yunnan, China. *Bull. Natl. Mus. Nat. Sei., Ser. A*, 41(3): 163-169. (in English) ["*Sarasaeschna gaofengensis* Yeh and Kiyoshi sp. nov. (holotype male, Gaofeng, Yunnan, China) is characterized by razor-like male cerci and widely divaricated epiproct with attenuated apical forks. It possesses a vesica spermalis with flagella adjoining ventral margin of its apical segment and is considered to belong to the *Sarasaeschna pryeri*-group. In the *pryeri*-group, *S. gaofengensis* shares the razor-like male cerci with *S. tsaopiensis* Yeh and Chen described from Taiwan, to which it is believed to be closely related." (Authors)] Address: Yeh, W.-C., Division of Forest Protection, Taiwan Forestry Research Institute No. 53, Nanhai Rd.,

Zhongzheng Dist., Taipei City 10066, Taiwan. E-mail: wcyeh@tfri.gov.tw

**15550.** Yokoi, N. (2015): *Hemicordulia teramotoi* sp. nov. (Odonata, Corduliidae) from southern Laos. *Tombo* 57: 21-26. ["*Hemicordulia teramotoi* sp. nov. (holotype male deposited in the National Museum of Nature and Science, Tokyo) from southern Laos (Pak Son, 1311 m alt., Boloven Plateau, Champasak Province) is described and compared with other species from Southeast Asia. *H. teramotoi* is very similar to *H. edai* but can be distinguished by the shape of male caudal appendages or female cerci." (Author)] Address: Yokoi, N., 2-37-11, Kaisei, Koriyama, Fukushima, 963-8851 Japan Email: yokoi@orange.plala.or.jp

**15551.** Younes, A.; El-Sherif, H.; Gawish, F.; Mahmoud, M. (2015): Potential of *Hemianax ephippiger* (Odonata-Aeshnidae) nymph as predator of *Fasciola* intermediate host, *Lymnaea natalensis*. *Asian Pacific Journal of Tropical Biomedicine* 5(8): 671-675. (in English) ["Objective: To evaluate the predatory capacity of the Odonata, *Hemianax ephippiger* nymph as a biocontrol agent for the freshwater snail *Lymnaea natalensis*, intermediate host of *Fasciola gigantica*. Methods: Observations on the searching, attacking and devouring of the snails with a series of laboratory-based predation experiments, whose aims were to determine daily predation rate, differential predation on small-, medium- and large-sized snails were carried out. Results: Laboratory evaluation revealed that, the Odonata nymph could kill and consume all three sizes of snails. Searching and handling time of the predator differed depending on snail size and predator vulnerability. The predation rate varied also with respect to snail size and density. Conclusions: Our observations suggested that the predator *Hemianax ephippiger* may be a suitable bio-control agent of *Lymnaea natalensis* snail population." (Authors)] Address: Younes, A., Department of Entomology, Faculty of Science, Cairo University, Giza, Egypt. E-mail: alyyounes@hotmail.com

**15552.** Yu, X. (2015): First record of *Ceriagrion fallax* Ris (Odonata: Coenagrionidae) preying on small web-building spiders (Arachnida: Tetragnathidae). *International Journal of Odonatology* 18(2): 153-156. (in English) ["In montane forest of south-western Yunnan, China, a female of *Ceriagrion fallax* was observed and photographed preying on a small web-building spider of the genus *Leucauge*. This is the first record of plucking an orb-weaver spider by a representative of the genus *Ceriagrion*. A brief discussion on the evolution of spider feeding behaviour in odonates is provided." (Author)] Address: Yu, X., Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, PR China. E-mail: lannysummer@163.com

**15553.** Yu, X.; Xue, J.; Hämäläinen, M.; Liu, Y.; Bu, W. (2015): A revised classification of the genus *Matrona* Selys, 1853 using molecular and morphological methods (Odonata: Calopterygidae). *Zoological Journal of the Linnean Society* 174: 473-486. (in English) ["An extensive re-

view of the genus *Matrona* is presented based on mitochondrial (COI) and nuclear (ITS) sequences from 150 samples which cover all the known taxa of this genus. The separation of two main clades (oreades group: *M. oreades*, *M. corephaea* and *M. taoi*; basilaris group: *M. basilaris*, *M. nigripectus*, *M. cyanoptera*, *M. japonica* and *M. annina*) is strongly supported. The classification of all traditional recognized species is confirmed. The Hainan population separates very well from mainland *M. basilaris* populations, which is also confirmed by geometric morphometric analysis of wing shape. Given the implications of the molecular analysis the genus *Matrona* is grouped into two subgenera: subgen. *Matrona* (type species *M. basilaris*) and *Divortia* subgen. nov. (type species *M. oreades*). A new species, *M. (M.) mazu* sp. nov., from Hainan is described. Brief taxonomic notes on the nine recognized species of the genus are given. Lectotype designations of *M. basilaris* and *M. nigripectus* are published." (Authors)] Address: Yu, X., Institute of Entomology, College of Life Sciences, Nankai Univ., Tianjin 300071, China. E-mail: lanny@nankai.edu.cn

**15554.** Yu, X.; Chen, J. (2015): A brief primary faunistic note to the Odonata of Mt Dabieshan in center of eastern China. *IDF-Report* 88: 1-38. (in English) ["From 2011 to 2014, a series of surveys were conducted in Mt Dabieshan range to explore the diversity of Odonata. Totally, 55 species were recorded. The checklist also includes seldom recorded species as *Nihonogomphus bequaerti* and *Coenagrion aculeatum*." (Authors)] Address: Yu, X., Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, 300071, China. E-mail: lannysummer@163.com

**15555.** Yuen, E.Y.L.; Dudgeon, D. (2015): Dietary dependence of predatory arthropods on volant aquatic insects in tropical stream riparia. *Biotropica* 48(2): 218-228. (in English) ["The dietary dependence on volant aquatic insects of eight species of predatory arthropods from three different orders was determined by stable isotope analyses in combination with three-source, two-isotope (C and N) Bayesian mixing models. The predators were collected from riparian zones along three streams in tropical Hong Kong during both the wet and dry seasons. Dietary importance of aquatic insects varied according to predator hunting modes, and showed a consistent pattern across all sites during the wet season. The web-building tetragnathid spider (*Orsinome diporusa*) had the greatest reliance (~40–55%) on this water-to-land subsidy, followed by two species of damselflies (40–50%) (*Rhinocypha perforata*, *Euphaea decorata*), three cursorial spiders (*Lycosidae*, *Pisauridae*, and *Sparassidae*: 32–51%) and two neustic Gerrids (17–36%). Such reliance also varied according to the microhabitat preferences of different cursorial spiders. Four species of predators (Gerrids and cursorial spiders) that were active year-round showed generally consistent reliance on aquatic insects between seasons, which probably reflected the observed lack of seasonal variability in the relative proportions of aquatic and terrestrial prey. There was a marked overlap in isotopic signatures of aquatic and terrestrial prey at all sites which, com-

bined with the absence of data on the extent to which isotopic fractionations may vary among individual species of prey and predators, contributes some uncertainty to the estimates of dietary compositions derived by mixing models. The findings of the present study are thus likely to be indicative rather than definitive. (Authors)] Address: Dudgeon, D., Department of Ecology & Biodiversity, The University of Hong Kong, Pokfulam Road, Hong Kong, China. E-mail: ddudgeon@hkucc.hku.hk]

**15556.** Yuto, C.M.M.; Nuneza, O.M.; Villanueva, J.T. (2015): Species diversity of the odonatofauna of Mts. Pinukis and Gimamaw, Zamboanga del Sur, Philippines. *Journal of Biodiversity and Environmental Sciences* 7(4): 135-146. (in English) ["Odonata is highly sensitive to various changes in the environment which makes it an excellent bioindicator of environmental health. This study was conducted to assess the species richness of Odonata in Mts. Pinukis and Gimamaw, Zamboanga del Sur, Philippines. Eleven sampling sites were surveyed comprising six sites in Mt. Pinukis and five sites in Mt. Gimamaw. Opportunistic sampling using sweep nets was conducted for a total of 192 man-hours. Biodiversity indices, cluster analysis, and detrended correspondence analysis were determined using Paleontological Statistics Software Package (PAST) version 2.17b. Thirty-five species were recorded belonging to 25 genera and 10 families with relatively low endemism of 40%. There was a more or less even species distribution. High relative abundance of 18.83% was observed in site 1. Site11 was observed to have the most number of endemic species. High species diversity was recorded in both Mts. Pinukis and Gimamaw. Detrended correspondence analysis showed that vegetation structure greatly influences habitat preferences of Odonata. It appears that human-induced disturbances limit the occurrence and abundance of the Odonata, especially the endemic species." (Authors)] Address: Nuñez, Olga, Department of Biological Sciences, Mindanao State University-Iligan Institute of Technology, Iligan City, Philippines. E-mail: olgamnuneza@yahoo.com

**15557.** Zebsa, R.; Khelifa, R.; Kahalerras, A. (2015): Emergence pattern, microhabitat choice, and population structure of the Maghribian endemic *Gomphus lucasii* Selys, 1849 (Odonata: Gomphidae) in northeastern Algeria. *Aquatic Insects* 36(3-4) (2014): 245-255. (in English) ["Emergence of *Gomphus lucasii* Selys, 1849, an unstudied Maghreb endemic, was synchronised by overwintering in the final stadium in the Seybouse River in northeastern Algeria. Regular collections revealed that half of the annual population emerged during 10 days, showing a typical 'spring species' emergence pattern. Sex ratio was slightly male biased (51%). Males and females did not differ in vertical stratification. Emergence support choice was not random, but rather depended on support height, body size, and daily population density. Mortality was caused mainly by ants, although deformity of teneral and bird predation were also important factors. *Gomphus lucasii* has been assessed as vulnerable (International Union for Conservation of Nature (IUCN) Red List), and the information provided in our

study will be helpful in future conservation efforts." (Authors)] Address: Zebsa, R., Département d'écologie et du génie de l'environnement, Faculté des Sciences de la Nature et de la Vie et des Sciences de la Terre et de l'Univers, Université 08 Mai 1945, Guelma 24000, Algérie

**15558.** Zebsa, R.; Khelifa, R.; Kahalerras, A. (2015): Adult movement pattern and habitat preferences of the Maghribian endemic *Gomphus lucasii* (Odonata: Gomphidae). *J. Insect Sci.* (2015) 15(1): 151; DOI: 10.1093/jisesa/iev128: 8 pp. (in English) ["The Algerian Cudtail (*Gomphus lucasii* Selys) (Odonata: Gomphidae) is a river-dwelling dragonfly and one of the least known gomphid in the Palearctic. A survey of the movement patterns and habitat requirements of adults was conducted in the largest currently known population, located in the Seybouse River (Northeast Algeria). Daily mark-release-resighting surveys along a 2.5 km stretch of the watercourse and within plots in terrestrial habitats were carried out; a total of 1,316 individuals were marked. The resighting rate along the watercourse was 8.13% and did not significantly vary with sex and age. Adult spatial distribution differed according to sex and age. Mature females were significantly further from the water than males. Mature males were observed not only along the watercourse but also far from the water, up to 450m where reproductive pairs in copula were recorded. Preferred maturation and foraging sites were open grasslands and dense wheat fields. Philopatry to reproductive sites had a mean of 1.11%, while philopatry to emergence site was lower (0.4%) and noted only in males. The mean distance of natal dispersal (from emergence to reproductive areas) was 596.564.94 m. The mean dispersal distance from one reproductive site to another was 180.976238.54 m. Both mature males and females preferred fast flowing water, but females were observed to oviposit in relatively small watercourses." (Authors)] Address: Khelifa, R., Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstr. 190, CH-8057 Zürich, Switzerland. E-mail: rassimkhelifa@gmail.com

**15559.** Zeiri, A.; Nel, A.M Garrouste, R. (2015): A new libelluloid family from the Eocene Green River Formation (Colorado, USA) (Odonata, Anisoptera). *Zootaxa* 4032(3): 290-296. (in English) ["The new family Urolibellulidae is proposed for the new genus and species *Urolibellula eocenica*, based on a fossil dragonfly from the Eocene Green River Formation (USA). This new taxon is considered as the sister group of the extant Libellulidae. As the oldest libellulid dragonfly is dated from the Turonian, the Urolibellulidae should also be at least Late Cretaceous." (Authors)] Address: Zeiri, Asma, Department of Biology, Faculty of Sciences, University of Carthage, 7021, Zarzouna, Bizerte, Tunisia. E-mail: asma\_zairi@yahoo.fr

**15560.** Zhang, H.-m.; Kosterin, O.E.; Cai, Q.-h. (2015): New species and records of *Burmagomphus Williamson*, 1907 (Odonata, Gomphidae) from China. *Zootaxa* 3999: 62-78. (in English) ["Four new species of *Burmagomphus Williamson*, 1907 are described from Southwestern China:



*B. apricus* sp. nov. from Xishuangbanna National Nature Reserve, Menglun Town, Xishuangbanna Dai Autonomous Prefecture, Yunnan Province; *B. magnus* sp. nov. from Huayudong, Nanxi Town, Hekou County, Hani-Yi Autonomous Prefecture of Honghe, Yunnan Province, *B. dentatus* sp. nov. from Zhangjiang River in Xiaoqikong scenic spot, altitude 400 m, Libo County, Guizhou Province, and *B. latescens* sp. nov. from Sifangjing, Mengding Town, Gengma County, Lincang City, Yunnan Province. New records of *Burmagomphus* spp. in China are provided, with *B. asahinai* and *B. williamsoni* *williamsoni* for the first time reported from China. A revised checklist of *Burmagomphus* spp. of China is provided which includes 14 species. A doubtful record of *B. arboreus* and relations of the newly described species are discussed. All types are deposited in the Collection of Aquatic Animals, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan City, Hubei Province, China." (Authors)] Address: Zhang, H., State Key Laboratory of Freshwater Ecology and Biotechnology, Institute of Hydrobiology, Chinese Acad. of Sciences, Wuhan 430072, China. E-mail: zhanghaomiao6988@gmail.com

**15561.** Zhang, H.-m.; Hämäläinen, M.; Cai, Q.-h. (2015): Description of *Echo candens* sp. nov. from western Yunnan, China (Odonata: Calopterygidae). *Odonatologica* 44(1/2): 107-116. (in English) ["A new calopterygid damselfly species *Echo candens* sp. nov. (holotype ♂ from Dehong, Yunnan, China) is described and illustrated for the male sex. The supposed female of this species is shown in a field photograph, taken in Kachin State in Burma. The new species is compared with known species in genus *Echo* and a key to males of all species is provided." (Authors)] Address: Zhang, H., Department of Entomology, College of Natural Resources and Environment, South China Agricultural University, Guangzhou 510642, China. E-mail: zhanghaomiao6988@gmail.com

**15562.** Zhang, Z.-q. (2015): Defragmentation of journals enhances access and collaboration: commentary on the occasion of *Zootaxa* 4,000. *Zootaxa* 4000(5): 596-600. (in English) [*Zootaxa* editor Dennis Paulson excepted 26 papers on Odonata in 2014.] Address: Zhang, Z.-q., Landcare Research, Private Bag 92170, Auckland, New Zealand; ZhangZ@landcareresearch.co.nz

**15563.** Zia, A. (2015): First record of genus *Protosticta* Selys, 1885 (Odonata: Zygoptera: Platystictidae) for Pakistan. *Pakistan J. Zool.* 47(3): 864-866. (in English) ["A new record to the Zygoptera fauna of Pakistan has been added by reporting *Protosticta hearseyi* from two different localities of the country. The genus also is a new record for Pakistan. *P. hearseyi* is a data deficient threatened species known earlier only from India. Detailed distribution and habitat description is provided to fill ecological information of the species. Diagnostic characters are also provided to facilitate identification for future taxonomists based on published description." (Author) Chachal village (33°49'N, 73°29'E; 441m), 10,12-vii-2005; Lehtarar (33°43'N, 73°27'E; 484m), 15-vii-

2005.] Address: Zia, S.A., National Insect Museum, National Agriculture Research Centre, Islamabad – Pakistan. E-mail: saiyedahmed@yahoo.com

## 2016

**15564.** Akram, W.; Ali-Khan, H.A. (2016): Odonate nymphs: Generalist predators and their potential in the management of dengue mosquito, *Aedes aegypti* (Diptera: Culicidae). *Journal of Arthropod-Borne Diseases* 10(2): 253-258. (in English) ["Background: Dengue is amongst the most serious mosquito-borne infectious disease with hot spots in tropical and subtropical parts of the world. Unfortunately, no licensed vaccine for the disease is currently available in medicine markets. The only option available is the management of dengue vector mosquito, *Aedes aegypti* (Diptera: Culicidae). Method: Predatory potential of five odonate nymphs namely *Anax parthenope*, *Bradinopyga geminate*, *Ischnura forcipata*, *Rhinocypha quadrimaculata*, and *Orthetrum sabina* were evaluated against the 4th instar larvae of the dengue vector mosquito, *Aedes aegypti*, under laboratory conditions. The consumption of the mosquito larvae was evaluated at three water volume levels viz., 1 liter, 2 liter and 3 liter. Results: The number of *Ae. aegypti* larvae consumed varied significantly among the five species, and at different levels of water volume ( $P < 0.01$ ). However, the interaction between odonate nymphs and the water volumes was statistically non-significant ( $P > 0.05$ ). *Ischnura forcipata* consumed the highest number of *Ae. aegypti* larvae ( $n=56$ ) followed by *A. parthenope* ( $n=47$ ) and *B. geminate* ( $n=46$ ). The number of larvae consumed was decreased with increasing search area or water volume, and the highest predation was observed at 1-liter water volume. Conclusion: The odonate nymphs could be a good source of biological agents for the management of the mosquitoes at larval stages." (Authors)] Address: Akram, W., Department of Entomology, University of Agriculture, Faisalabad, Pakistan. E-mail: azhar\_naturalist@yahoo.com

**15565.** Allen, A.M.; Singh, N.J. (2016): Linking movement ecology with wildlife management and conservation. *Front. Ecol. Evol.* 3:155.doi: 10.3389/fevo.2015.00155: 13 pp. (in English) ["A common challenge in species conservation and management is how to incorporate species movements into management objectives. There often is a lack of knowledge of where, when, and why species move. The field of movement ecology has grown rapidly in the last decade and is now providing the knowledge needed to incorporate movements of species into management planning. This knowledge can also be used to develop management strategies that are flexible in time and space and may improve the effectiveness of management actions. Therefore, wildlife management and conservation may benefit by strengthening the link with movement ecology. We present a framework that illustrates how animal movement can be used to enhance conservation planning and identify management actions that are complementary to existing strategies. The framework contains five steps that identify (1) the

movement attributes of a species, (2) their impacts on ecosystems, (3) how this knowledge can be used to guide the scale and type of management, (4) the implementation, and (5) the evaluation of management actions. We discuss these five steps in detail, highlighting why the step is important and how the information can be obtained. We illustrate the framework through a case study of managing a highly mobile species, the Atlantic salmon (*Salmo salar*), a harvested species of conservation concern. We believe that the movement-management framework provides an important, and timely, link between movement ecology and wildlife management and conservation, and highlights the potential for complementary, dynamic solutions for managing wildlife." (Authors) References to Odonata a made.] Address: Allen, A.M., Dept Wildlife, Fish & Environmental Studies, Swedish Univ. of Agricultural Sciences, Umeå, Sweden

**15566.** Ansaloni, I.; Prevedelli, D.; Ruocco, M.; Simonini, R. (2016): Checklist of benthic macroinvertebrates of the Lago Pratignano (northern Apennines, Italy): an extremely rich ecosystem. Check List 12(1) (Article 1821): 8 pp. (in English) ["A checklist of the macroinvertebrates fauna of the Lago Pratignano is presented here. The Lago Pratignano is a small, natural water body of the high (1,307 m above sea level) Northern Apennines, Italy. It represents an important site for the conservation of endangered flora and amphibians, and its importance for the conservation of the macroinvertebrate fauna is highlighted. The 82 taxa recorded make it an extremely rich habitat. The most represented group was Diptera, with 31 taxa, followed by Coleoptera, with nine, and Oligochaeta and Arachnida, each with eight taxa. Other groups are present in lower numbers. Despite the scant attention to the study of the macroinvertebrates of small lentic habitats in the Northern Apennines, their importance for the conservation of the invertebrate fauna and the high contribution they give to the biodiversity is highlighted here." (Authors) Five odonate species - *Chalcolestes viridis*, *Coenagrion puella*, *Anax imperator*, *Libellula depressa*, and *L. quadrimaculata* - are listed.] Address: Ruocco, M., Univ. of Modena and Reggio Emilia, Dept of Life Sciences, via Campi 213/d, 41125 Modena (MO), Italy. E-mail: [matteo.ruocco@unimore.it](mailto:matteo.ruocco@unimore.it)

**15567.** Arbeiter, S.; Schulze, M.; Tamm, P.; Hahn, S. (2016): Strong cascading effect of weather conditions on prey availability and annual breeding performance in European bee-eaters *Merops apiaster*. Journal of Ornithology 157(1): 155-163. (in English, with German summary) ["Aerial insectivorous birds depend highly on favourable weather conditions for successful foraging because flight activity of insects is constrained by daily weather. Thus, the variation in weather conditions during reproduction, mediated by prey limitations, should be mirrored in annual reproduction performance, and finally in annual breeding success. We analysed the effect of local weather conditions on the availability of airborne insects and on the variation in brood size and nestling condition of European bee-eaters *Merops apiaster* at the northern edge of their range where years with adverse weather frequently occur. The availability of large flying insects, the common prey of bee-eaters, increased with

air temperatures and duration of daily sunshine. As predicted, local weather conditions affected reproductive performance with annual breeding success (mean 3.7 nestlings per breeding pair, range 1.7–4.9 nestlings) being up to 32 % higher in extraordinary dry and hot summers. Additionally, a nestling's body condition (residual mass) was also affected by sunshine duration during their growth period and internally was co-affected by the number of siblings and the individual rank within the sibling hierarchy. Thus, a prolonged duration of daily sunshine causes a cascade from higher insect flight activity, and, thus, higher food availability for chick-rearing bee-eaters, which finally translates into better chick body conditions and higher annual breeding success. Consequently reproduction and population development of European bee-eaters might be especially susceptible to regional changes in weather and climatic conditions."(Authors) The paper includes references to Odonata.] Address: Arbeiter, Susanne, Zool. Inst. & Museum, Univ. Greifswald, Johann-Sebastian-Bach-Str.11/12, 17489, Greifswald, Germany. E-mail: [susanne.arbeiter@uni-greifswald.de](mailto:susanne.arbeiter@uni-greifswald.de)

**15568.** Aschonitis, V.G.; Feld, C.K.; Castaldelli, G.; Turin, P.; Visonà, E.; Fano, E.A. (2016): Environmental stressor gradients hierarchically regulate macrozoobenthic community turnover in lotic systems of Northern Italy. Hydrobiologia 765: 131-147. (in English) ["Environmental stressors present a hierarchical influence on freshwater organisms. This study investigates the hierarchy of environmental stressor gradients, which regulate the composition of instream macroinvertebrate communities of northern Italy (Po Valley and the south-eastern Alps). Species and environmental data were derived from 585 monitoring sites. Environmental parameters were split into three groups, describing (i) ecoregional, (ii) hydromorphological, and (iii) water quality attributes. Partial Redundancy Analysis (partial RDA) was used to hierarchically rank the group effects, which were expressed as unique (group specific) and joint effects (of two groups together). Overall, ecoregion explained more variance (30.2%) than hydromorphology (24.8%) and water quality (22.3%). Unique effects were generally low, but ecoregional unique effects were twice as high as those of the other groups. The analysis of single environmental variables highlighted significant effects of anthropogenic impact related to the substrate size composition, riparian vegetation, flow conditions, and *Escherichia coli* (surrogate descriptor of organic fecal pollution). Such stressor hierarchies can support biodiversity conservation plans, while the high joint effects of stressor groups suggested the need for combined management activities, addressing the respective stressors and stressor groups in concert. Management measures addressing only one stressor group isolated from others are likely to be less effective, or even ineffective." (Authors) Taxa including Odonata are treated at genus level.] Address: Aschonitis, V.G., Department of Life Sciences and Biotechnology, University of Ferrara, Ferrara, Italy. E-mail: [schvls@unife.it](mailto:schvls@unife.it)

**15569.** Berquier, C.; Antoine Orsini, A.; Ferrat, L.; Andrei-Ruiz, M.-C. (2016): Odonata Community Index – Corsica"

(OCIC): A new biological index based on adult odonate populations for assessment of the ecological status of watercourses in Corsica. *Ecological Indicators* 66: 163-172. (in English) ["Corsica is a French island in the western Mediterranean with numerous distinct geomorphological, landscape, and biological characteristics. These specific attributes, mostly related to insularity, are hardly taken into account by the biological indices currently recommended in the framework of the European Union Water Framework Directive "WFD" for assessing the ecological status of watercourses. Thus, this work has focused on developing an innovative biological index adapted to the specific context of territories such as Corsica, based on the Odonata group. In this context, imago sampling of Odonata was performed at 40 representative stations to assess the 33 major permanent rivers of the island. In parallel, various biological, hydrological, and physicochemical parameters affecting the ecological status of these organisms were recorded. The data collected on nearly 30 species of Odonata allowed for the accurate description of the typical populations of Corsican watercourses, highlighting this group's potential as a biological indicator. An indicator value was assigned to the 12 species identified as the most representative of these environments. The results were used to develop 5 biological indices based on simple statistical descriptors. The index that was found to be the best for assessing the ecological status of the watercourses, as indicated by correlation tests, was named "Odonata Community Index – Corsica" (OCIC), and was finally confronted with the 5 biological indices recommended by the WFD and currently used in Corsica. The results of this study confirm the significant potential of the OCIC index compared to other "official" indicators, that are limited in they do not accurately assess all territories. The results of our tests indicate that this new index using Odonata group appears to be a credible method that could potentially improve the evaluation system currently used for monitoring the ecological quality of watercourses in Corsica." (Authors)] Address: Berquier, C., Office de l'Environnement de la Corse, Observatoire – Conservatoire des Insectes de Corse, Lieu-dit "Lergie", RN 200, F-20250 Corte, France. E-mail: cyril.berquier@oec.fr

**15570.** Blecher, M. (2016): Hebrew names for insects toward environmental education and nature conservation: dragonflies and damselflies as a case study. *Negev, Dead Sea and Arava Studies* 7(3): 58-65. (in Hebrew, with English summary) ["The issue of the report is interdisciplinary: linking biological knowledge and environmental education, connecting zoological taxonomy with the Hebrew language. The necessity of Hebrew names for Israeli dragonflies and damselflies is explained and discussed, and the practice of creating those names is analyzed. The vernacular names were proposed for the taxonomical insect order (Odonata) comprehensively. A methodical consistent approach, as the base for suggesting the names, is briefly described. The complete and clarified names proposal (the first for an arthropods group of the country) was submitted to the Academy of the Hebrew Language. After lengthy process of detailed discussions in the Zoological Terminology Committee,

the Hebrew common names of dragonflies and damselflies have been approved by the Plenary Session of the Academy. The accepted names should be an important tool in education for biodiversity conservation and in promotion for fresh-water habitats protection. Additionally, an up-dated Odonata faunistic list of Israel is given. The list is a concise literature summary for practical conservation purposes." (Authors)] Address: Blecher, M., Israel Nature and Parks Authority - En Gedi Nature Reserve. E-mail: m.blecher@npa.org.il

**15571.** Boonsoong, B. (2016): Phoretic associations between *Nanocladius asiaticus* (Diptera, Chironomidae) and its hosts *Gestroiella* (Heteroptera, Naucoridae) and *Euphaea masoni* (Odonata, Euphaeidae) in streams in Western Thailand. *Annales de Limnologie - International Journal of Limnology* 52: 163-169. ["Phoretic associations between larvae of *Nanocladius* (Plecopteracoluthus) *asiaticus* (Diptera, Chironomidae) and two species in the genus *Gestroiella* (Heteroptera, Naucoridae) were studied in Kanchanaburi and Ratchaburi Provinces (Western Thailand). *Gestroiella siamensis* was used by chironomid larvae as a host more frequently than was *Gestroiella limnocoroides*. Moreover, *N. asiaticus* larvae were associated symphoretically with nymphs of *Euphaea masoni*. This is the first report of a symphoretic association involving *E. masoni*. Approximately 44% of the population of naucorids harboured symphoretic chironomids, whereas only 13% of damselfly nymphs were hosts of the chironomid larvae. Most of the brachypterous male (59%) naucorids hosted chironomid larvae. The attachment site of the chironomids was frequently along the mesofemur and mesosternum of the naucorid hosts. The chironomids were attached to the ventral sides of abdominal segments of *E. masoni* nymphs. There was a positive correlation in body length between chironomids and naucorids ( $r=0.389$ ,  $P<0.01$ ). There are many benefits of symphoresis in the Chironomidae, such as improved feeding opportunities, increased mobility, suitable pupation sites and decreased predation risks." (Author)] Address: Boonsoong, B., Department of Zoology, Faculty of Science, Kasetsart University, Animal Systematics and Ecology Speciality Research Unit (ASESRU), Bangkok 10900, Thailand. E-mail: fscibtb@ku.ac.th

**15572.** Braun, A.P.; Phelps, Q.E. (2016): Channel Catfish habitat use and diet in the Middle Mississippi River. *The American Midland Naturalist* 175(1): 47-54. (in English) [Overall, vegetation, fish, and Cambaridae (freshwater crayfishes) made up the highest mean proportion of stomach contents by weight (27.5%, 20.6%, and 19.9% respectively). Trichoptera constituted the next highest proportion (4.6%), while Collembola, Coleoptera, Odonata, and Bivalvia were minor proportions "River modifications have had detrimental effects on biota that depend on river systems; therefore, information is needed to understand these effects and direct management efforts. Channel catfish (*Ictalurus punctatus*) are important recreationally, commercially, and ecologically in the Middle Mississippi River (MMR), but few studies have examined their habitat requirements, and food



habits have not been evaluated in the MMR. Information about habitat use and food habits could help direct management efforts for channel catfish. To more thoroughly understand the synergistic relation between channel catfish and the associated habitat, we used data from the United States Army Corps of Engineer's Long-Term Resource Monitoring Program to evaluate channel catfish use of large-scale river features (i.e., macrohabitats) and more fine scale mesohabitats (i.e., substrate type, depth, and velocity). Stomach contents from channel catfish were identified and quantified to determine the relative importance of specific prey items in diets. Channel catfish presence was positively affected by current but negatively affected by depth. Off-channel habitats appeared more suitable for channel catfish. In terms of food habits, Cambaridae, fish, and vegetation were most frequently found in the diet, but a variety of other food items were consumed. Conserving premodification habitat characteristics, such as open side channels, shallow sandbars, and seasonally inundated floodplains, as well as habitats with high forage productivity, should help to sustain a stable population of channel catfish in the MMR. Future studies could examine the tenets of the optimal foraging theory within these habitats to determine the mechanisms regulating channel catfish habitat use and prey selection." (Authors)] Address: Braun, A.P., Big Rivers and Wetlands Field Station, Missouri Department of Conservation, 3815 E. Jackson Boulevard, Jackson 63755, USA

**15573.** Brown, A.L.; Robinson, B.W. (2016): Variation in behavioural plasticity regulates consistent individual differences in *Enallagma* damselfly larvae. *Animal Behaviour* 112: 63-73. (in English) ["Highlights: •Larvae of different *Enallagma* species experience constant or variable predation risk. •Larvae predictably vary in plastic behaviour in response to fish predator cues. •More plasticity is associated with reduced variation in plasticity among individuals. •Less variation in plasticity enhances consistent individual differences in behaviour. •Variation in behavioural plasticity and in mean behaviour regulates behaviour types. Plastic behavioural responses by individuals to different conditions and consistent individual differences in mean behaviour across situations both contribute to variation in a population. The relationship between behavioural plasticity and consistent individual differences is not clearly understood but may help predict personality variation in animals. High variation in mean behaviour and low variation in individual plastic responses will tend to maintain the rank order of individuals across situations and so permit consistent individual differences. Conversely, low variation in mean behaviour and high variation in plastic responses, by changing the rank orders of individuals, will erode consistent individual differences. Thus, selection that reduces variation in individual plastic responses should increase the opportunity for consistent individual differences in a population. We tested for relationships between heterogeneous predation regimes, the mean and variance of behavioural plasticity and consistent individual differences among three species groups of larval damselflies. Larvae of *Enallagma signatum*

probably face consistent predation from fish over successive generations, whereas *Enallagma ebrium/hageni* and *Enallagma annexum/boreale* face a changing predation regime over generations either from fish or larval dragonflies. The behavioural reaction norms of larvae in repeated exposure trials to cues from a predatory fish, dragonfly larvae or no predator differed between species groups. *Enallagma ebrium/hageni* expressed the most consistent plastic response to predator cues, less variability in plasticity and greater consistent individual differences across cues compared to more variable plastic responses and low consistent individual differences in *E. signatum*. Selection on behavioural plasticity may enhance consistent individual differences in *E. ebrium/hageni* whereas relaxing selection on plasticity may reduce consistent individual differences in *E. signatum*. More generally, selection on plastic behaviour may enhance behavioural types while selection on mean behaviour may reduce behavioural types in animal populations." (Authors)] Address: Robinson, Beren, Department of Integrative Biology, University of Guelph, Guelph, ON, N1G 2W1, Canada. E-mail: berenrob@uoguelph.ca

**15574.** Bruni, G.; Ricciardi, G.; Vannini, A. (2016): Effectiveness of artificial amphibian breeding sites against non-native species in a public protected area in Tuscany, Italy. *Conservation Evidence* (2016) 13, 12-16: 12-13. (in English) ["The spread of non-native invasive species is among the factors thought to be responsible for the recent global declines in amphibian populations. In a Protected Natural Area of Local Interest in Tuscany, Italy, we tested approaches for preserving the local amphibian populations threatened by the presence of the red swamp crayfish *Procambarus clarkii*. The construction of artificial breeding ponds, with suitable vertical barriers, was initially effective in preventing the spread of the red swamp crayfish and created a source site for amphibians, in particular newt species. Unfortunately, five years after construction, the breeding sites were colonized by fish and crayfish, possibly due to the actions of members of the public.... In addition to the target species, many aquatic insects, such as dragonflies and damselflies (Odonata) (e.g. *Anax imperator*, *Crocothemis erythraea*, *Libellula quadrimaculata*) successfully colonized the reconstructed habitats." (Authors)] Address: Bruni, G., 1 Centro Iniziativa Ambiente Sestese, Circolo Legambiente, via Scardassieri 47/A, 50019 Sesto Fiorentino, Italy. E-mail: giacomo.b90@gmail.com

**15575.** Callahan, M.S.; McPeck, M.A. (2016): Multi-locus phylogeny and divergence time estimates of *Enallagma* damselflies (Odonata: Coenagrionidae). *Molecular Phylogenetics and Evolution* 94, Part A: 182-195. (in English) ["Highlights: •*Enallagma* damselflies show complex diversification across North America and Eurasia. •Four subclades radiated in the Pleistocene to produce 28 extant species. •Both speciation and extinction rates increased over the last 1.5 million years. Reconstructing evolutionary patterns of species and populations provides a framework for asking questions about the impacts of climate change. Here we

use a multilocus dataset to estimate gene trees under maximum likelihood and Bayesian models to obtain a robust estimate of relationships for a genus of North American damselflies, *Enallagma*. Using a relaxed molecular clock, we estimate the divergence times for this group. Furthermore, to account for the fact that gene tree analyses can overestimate ages of population divergences, we use a multi-population coalescent model to gain a more accurate estimate of divergence times. We also infer diversification rates using a method that allows for variation in diversification rate through time and among lineages. Our results reveal a complex evolutionary history of *Enallagma*, in which divergence events both predate and occur during Pleistocene climate fluctuations. There is also evidence of diversification rate heterogeneity across the tree. These divergence time estimates provide a foundation for addressing the relative significance of historical climatic events in the diversification of this genus." (Authors)] Address: Callahan, Melissa, Department of Biological Sciences, Dartmouth College, 78 College Street, Hanover, NH 03755, USA. E-mail: callahan.ms@gmail.com

**15576.** Campos, F.; Velasco, T.; Sanz, G.; Casanueva, P.; Albuquerque, M.T.D.; Antunes, M.H.R. (2016): *Ischnura graellsii* (Insecta: Odonata): a water pollution biovulnerable indicator-probability mapping using spatial uncertainty. *River Research and Applications* 32: 483-489. (in English) ["Monitoring changes of anthropogenic impacts from a broad scope of species in biodiversity research require practical, easy-to-use and efficient assessment as well as monitoring methods. Odonates are a valuable tool for assessing freshwater systems' quality and have been used as bioindicators of environmental variety. The Águeda watershed, located in the central west of the Iberian Peninsula, shows an exponential increase in the last 60 years of natural resource exploitation coupled with alterations in consumer habits, causing significant environmental changes and deferred direct effects on the natural habitats. Fourteen river sites, selected a priori, were sampled. Adult odonates were collected using standardized methods. Selected environmental variables and water quality parameters were evaluated in situ. Precipitation and altitude were the most important physical, environmental variables in explaining the assemblage structure. Meaningful abiotic-biotic as well as biotic-biotic relationships were set up. Furthermore, situations in the urbanized watershed area showed to be highly impacted and closely related with damselfly *Ischnura graellsii*, which should be targeted as a possible vulnerability indicator for polluted fresh waters. A probability map for *Ischnura graellsii* distribution was performed using indicator kriging with external drift and spatial uncertainty obtain through the calculation of two categorical maps (binary), corresponding to the mean (0.485) and the trimmed mean by discharging the 10% lower distribution tail (0.533). The subsequent overlapping of both categorical maps (binary) allowed the definition of the higher spatial uncertainty map for surface water contamination." (Authors)] Address: Albuquerque, M.T.D., Department of Civil Engineering, Polytechnic Institute of Castelo Branco, Avenida Pedro Álvares

Cabral, no 12, 6000-084 Castelo Branco, Portugal. E-mail: teresal@ipcb.pt

**15577.** Casillas-Barragán, I.; Costa-Pereira, P.; Cardoso Peixoto, P.E. (2016): Perceived predation risk decreases movement and increases aggregation of Amazon milk frog (*Anura*, *Hylidae*) tadpoles throughout ontogeny. *Hydrobiologia* 765: 379-386. (in English) ["In order to maximize escaping success, prey may change their predator avoidance behaviours according to their susceptibility. Morphological development during ontogeny may lead to different susceptibility to predators. Consequently, prey may exhibit different predator avoidance strategies according to the ontogenetic state. In this study, we used tadpoles of the Amazon milk frog *Trachycephalus resinifictrix* to evaluate how variation in the ability to actively escape owed to the mobility acquired through ontogeny affects the adoption of predator avoidance strategies. We sampled tadpoles (N = 384) in temporary ponds and divided them in four consecutive developmental stages according to body size and mobility capacity. Subsequently, we measured their movement and spatial distribution when subjected to chemical cues of predators or control solutions. We found that they spent less time moving and increased spatial aggregation after receiving solutions with predator cues, independent of their developmental stage. These results indicate that the variation in escape capacity through larval ontogeny does not determine their antipredator strategy. Since tadpoles of *T. resinifictrix* typically grow in environments with reduced space for active escaping, such as tree holes and bromeliads, it may be that the ability to flee from predators is absent, even when this behaviour increases the survival chances." (Authors) The publication includes references to Odonata.] Address: Casillas-Barragán, Isabel, Department of Physiology, São Paulo University, São Paulo, Brazil. E-mail: isabelcasillasbarragan@gmail.com

**15578.** Chainthong, D.; Boonsoong, B. (2016): Description of two final stadium *Onychogomphus* larvae from Thailand (Odonata: Gomphidae). *Zootaxa* 4066(5): 561-570. (in English) ["The final stadium larvae of *Onychogomphus castor* Lieftinck and *O. duaricus* Fraser are described and illustrated for the first time based on reared specimens from Thailand. The taxonomic characteristics of the larvae of the genus *Onychogomphus* are discussed and summarized. The larva of *O. castor* differs from other Southeast Asian species in having distinct mid-dorsal spines on S2-9, divergent wing pads reaching S5, and lateral spines on S6-9. The larva of *O. duaricus* has a weakly swollen third antennal segment, with short blunt mid-dorsal spines on S2-9, divergent wing sheaths reaching the middle of S4, and lateral spines present on S7-9." (Authors)] Address: Chainthong, D., Animal Systematics and Ecology Speciality Research Unit (ASESRU), Dept of Zoology, Faculty of Science, Kasetsart University, Bangkok 10900, Thailand. E-mail: fsci-btb@ku.ac.th

**15579.** Chakraborty, K.; Moitra, M.N.; Sanyal, A.K.; Rath, P.C. (2016): Important natural enemies of paddy insect

pests in the upper gangetic plains of west Bengal, India. International Journal of Plant, Animal and Environmental Sciences 6(1): 35-40. (in English) ["Survey was conducted at six districts of northern parts of Bengal to investigate the occurrence of natural enemies of insect pests of paddy. A total of 49 predators and 7 parasitoid species were recorded. Spiders appeared to be the most abundant among the predators followed by coleopterans. Greater abundances of enemies of pests were noticed at IPM and SRI fields." (Authors) The following odonate taxa are listed: Agrionemis femina, A.pygmaea, Ischnura aurora aurora, Ischnura senegalensis, and Ceriagrion sp.] Address: Moitra, M.N., P. D. Women's College, Jalpaiguri-735101, W.B., India, E-mail: manab.moitra@gmail.com

**15580.** Chandra, G.; Mondal, B.; Bandyopadhyay, S.; Ghosh, A. (2016): Sex-specific functional responses of dragonfly naiads *Rhodothemis rufa* on *Culex quinquefasciatus* larvae in laboratory bioassay. International Journal of Pest Management 62(2): 135-139. (in English) ["Laboratory bioassay was conducted to establish the biocontrol potentiality of naiads (aquatic nymphal stage) of *Rhodothemis rufa* (Rambur, 1842) against larvae of *Culex quinquefasciatus*, a common vector of filariasis in Tropical countries. From the study, it was noticed that in laboratory condition, the rate of predation of males of *R. rufa* was higher than that of females of almost same size and same species. The results of the present study revealed that both sexes displayed a density-dependent decelerating type-II functional response as the logistic regression estimated a significant negative linear parameter (P1 value of -0.330 and -0.151 for males and females, respectively). Attack rate was almost similar for both sexes (0.082); however, handling time is less in males (0.62 min) than in females (0.852 min). The predator species usually coexist in the same aquatic habitat to that of mosquito larvae and can be effectively used in field condition to reduce the larval densities of mosquitoes in temporary or permanent aquatic water bodies." (Authors)] Address: Chandra, G., Mosquito and Microbiology Research Unit, Dept of Zoology, Univ. of Burdwan, Golapbag, Burdwan, India

**15581.** Chen, Y.H.; Skote, M. (2016): Gliding performance of 3-D corrugated dragonfly wing with spanwise variation. Journal of Fluids and Structures 62: 1-13. (in English) ["Computational fluid dynamics (CFD) analyses are conducted to evaluate the gliding performance of a three-dimensional (3-D) corrugated wing while considering variations in the corrugation pattern across the wing span. Comparisons with the smoothly profiled counterpart assess the overall effect of wing corrugation on the gliding performance of the 3-D dragonfly wing, with primary focus on the effect of three-dimensionality as compared to the 2-D model. Earlier simulations of both 2-D and 3-D gliding corrugated wings showed oscillations on lift and drag, while in nature, such force fluctuation would be undesirable and unrealistic. In contrast, no non-realistic fluctuations are present in this simulation. The feature included here, which has been neglected in the earlier studies, namely the variation of leading edge orientation along the wing span, is the crucial detail for

preventing such non-realistic oscillations. Furthermore, strong spanwise flow occurs in the 3-D corrugated wing used in this study, which earlier models have been incapable to capture." (Authors)] Address: Skote, M., School of Mechanical and Aerospace Engineering, Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798, Singapore. E-mail: mskote@ntu.edu.sg

**15582.** Choi, Y.-S.; Kwon, I.-K.; Yoo, J.-C. (2016): Nestling diet of three sympatric egret species: Rice fields support breeding egret populations in Korea. Ornithological Science 15(1): 55-62. (in English) ["The diets of the Intermediate Egret *Egretta intermedia*, Little Egret *E. garzetta*, and Cattle Egret *Bubulcus ibis* were examined by analyzing nestling regurgitations collected during the breeding season in 2005 at a colony in Asan, South Korea. Intermediate Egret nestlings mainly fed on insects (86.7% of total prey items), but fish were the most important group by biomass (64.3% of total biomass). Little Egret nestlings fed mainly on insects and fishes (43.4% and 33.2% of total items, respectively), and fish contributed 64.2% to the total biomass consumed. Cattle Egret chicks were mainly fed invertebrate prey (96.5% of total items), such as insects and spiders, which comprised just 64.3% of the total biomass of their diet. Loaches and aquatic insect larvae (mainly Odonata and Coleoptera) comprised a large proportion of the nestling diet of the three egret species. This suggests that all species forage primarily in rice fields, which represented the most extensive habitat surrounding the breeding colony." (Authors)] Address: Choi, Yu-Seong, Department of Ecology & Evolution Division, National Institute of Ecology, Geumgang-ro 1210, Maseomyeon, Seocheon 33657, Choongnam, Republic of Korea. E-mail: yschoi3@hanmail.net

**15583.** Cooper, I.A.; Brown, J.M.; Getty, T. (2016): A role for ecology in the evolution of colour variation and sexual dimorphism in Hawaiian damselflies. Journal of Evolutionary Biology 29(2): 418-427. (in English) ["Variation in traits that are sexually dimorphic is usually attributed to sexual selection, in part because the influence of ecological differences between sexes can be difficult to identify. Sex-limited dimorphisms, however, provide an opportunity to test ecological selection disentangled from reproductive differences between the sexes. Here, we test the hypothesis that ecological differences play a role in the evolution of body colour variation within and between sexes in a radiation of endemic Hawaiian damselflies. We analyzed 17 *Megalagrion* damselflies species in a phylogenetic linear regression, including three newly-discovered cases of species with female-limited dimorphism. We find that rapid colour evolution during the radiation has resulted in no phylogenetic signal for most colour and habitat traits. However, a single ecological variable, exposure to solar radiation (as measured by canopy cover) significantly predicts body colour variation within sexes (female-limited dimorphism), between sexes (sexual dimorphism), and among populations and species. Surprisingly, the degree of sexual dimorphism in body colour is also positively correlated with the degree of habitat differences between sexes. Specifically, redder colouration



is associated with more exposure to solar radiation, both within and between species. We discuss potential functions of the pigmentation, including antioxidant properties that would explain the association with light (specifically UV) exposure, and consider alternative mechanisms that may drive these patterns of sexual dimorphism and colour variation." (Authors)] Address: Cooper, Idelle, Biology Dept, James Madison University, Harrisonburg, VA 22807, USA. E-mail: cooperia@jmu.edu

**15584.** Cooper, I.A.; Brown, J.M.; Getty, T. (2016): A role for ecology in the evolution of colour variation and sexual dimorphism in Hawaiian damselflies. *Journal of Evolutionary Biology* 29(2): 418-427. (in English) ["Variation in traits that are sexually dimorphic is usually attributed to sexual selection, in part because the influence of ecological differences between sexes can be difficult to identify. Sex-limited dimorphisms, however, provide an opportunity to test ecological selection disentangled from reproductive differences between the sexes. Here, we test the hypothesis that ecological differences play a role in the evolution of body colour variation within and between sexes in a radiation of endemic Hawaiian damselflies. We analysed 17 Megalagrion damselflies species in a phylogenetic linear regression, including three newly discovered cases of species with female-limited dimorphism. We find that rapid colour evolution during the radiation has resulted in no phylogenetic signal for most colour and habitat traits. However, a single ecological variable, exposure to solar radiation (as measured by canopy cover) significantly predicts body colour variation within sexes (female-limited dimorphism), between sexes (sexual dimorphism), and among populations and species. Surprisingly, the degree of sexual dimorphism in body colour is also positively correlated with the degree of habitat differences between sexes. Specifically, redder colouration is associated with more exposure to solar radiation, both within and between species. We discuss potential functions of the pigmentation, including antioxidant properties that would explain the association with light (specifically UV) exposure, and consider alternative mechanisms that may drive these patterns of sexual dimorphism and colour variation." (Authors)] Address: Cooper, I.A., Biology Department, James Madison University, Harrisonburg, VA 22807, USA. E-mail: cooperia@jmu.edu

**15585.** Cordero-Rivera, A. (2016): Demographics and adult activity of *Hemiphlebia mirabilis*: a short-lived species with a huge population size (Odonata: Hemiphlebiidae). *Insect Conservation and Diversity* 9: 108-117. (in English) ["(1.) Rare species are expected to be more susceptible to extinction, particularly if rarity can be used to describe several characteristics for a particular species. *Hemiphlebia mirabilis*, an endemic damselfly known from a few sites in the South of Australia and Tasmania, has been considered at risk of imminent global extinction, given its small population size, its localised distribution, and the fact that it is a 'living fossil', described as the oldest extant damselfly. (2.) One population found in a protected wetland in Victoria, was studied by behavioural observations of marked animals,

during Nov-Dec 2013. Results indicate that *H. mirabilis* is a short-lived species, with a mature lifespan of about 1 week in males and 4 days in females. (3.) Population size estimates and field observations indicate that this population is huge, likely over one million individuals per generation. Adults show little mobility and fly for short distances, being inactive most of the time, particularly at temperatures below 17 °C or over 35 °C. (4.) The low mobility and cryptic coloration, and the inaccessibility of its preferred habitat might explain why huge populations like the one studied here have remained unnoticed until recently. Nevertheless, both sexes show frequent abdominal flicking displays, and fast rotations over the perching support, both behaviours apparently unique to this species, making them highly conspicuous to human observers. It is concluded that *H. mirabilis* should not be regarded as critically endangered." (Authors)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**15586.** Cordero-Rivera, A. (2016): Sperm removal during copulation confirmed in the oldest extant damselfly, *Hemiphlebia mirabilis*. *PeerJ Preprints* 4:e1810v1 <https://doi.org/10.7287/peerj.preprints.1810v1>: (in English) ["Post-copulatory sexual selection may favour mechanisms to reduce sperm competition, like physical sperm removal by males. To investigate the origin of sperm removal, I studied the reproductive behaviour and mechanisms of sperm competition in the only living member of the oldest damselfly family, *Hemiphlebia mirabilis*, one species that was considered extinct in the 1980s. This species displays scramble competition behaviour, whose males search for females with short flights and both sexes exhibit a conspicuous "abdominal flicking". This behaviour is used by males during an elaborate precopulatory courtship, unique among the Odonata. Females use a similar display to reject male attempts to form tandem, but eventually signal receptivity by a particular body position. Males immobilise females during courtship using their legs, which, contrarily to other damselflies, never autotomize. Copulation is short (range 4.1-18.7 min), and has two stages. In the first stage, males remove part of the stored sperm, and inseminate during the second stage, at the end of mating. The examination of genitalia indicates that males have two horns covered by back-oriented spines, which match the size and form of female genitalia. The volume of sperm in females after copulation was 2.8 times larger than the volume stored in females whose copulation was interrupted at the end of stage I, indicative of a significant sperm removal. These results point out that sperm removal is an old character in the evolution of odonates, probably dating back to the Permian." (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**15587.** Cordero-Rivera, A.; Encalada, A.C.; Sánchez-Guillén, R.A.; Santolamazza-Carbone, S.; von Ellenrieder,

N. (2016): The status of *Rhionaeschna galapagoensis* (Currie, 1901) with notes on its biology and a description of its ultimate instar larva (Odonata, Aeshnidae). *Animal Biodiversity and Conservation* 39(1): 45-63. (in English, with Spanish summary) ["A morphological, molecular, and behavioural characterization of *R. galapagoensis* is presented, based on a series of specimens and observations from San Cristóbal Island, Galápagos, including both adults and larvae. Several of the characters proposed earlier to distinguish between the adults of this species and its closest relative, *R. elsia*, are found to be variable, but the presence of a black band over the fronto-clypeal suture is confirmed as a good diagnostic character. The ultimate instar larvae of *R. galapagoensis* is described for the first time, and diagnosed from its closest relatives by a combination of characters, including the acute angle between the prothoracic apophyses, absence of lateral spines on abdominal segment 6, and length of cerci relative to paraprocts. Molecular analysis confirmed that *R. galapagoensis* and *R. elsia* are sister species, and showed that their genetic distance is the closest among the analyzed species, which is to be expected given the young age of the Galápagos Islands. The larvae of *R. galapagoensis* were very common and widespread in the mountain streams and a pond in the southwest of San Cristóbal. Swarms of tens of individuals formed at sunrise in the coastal vegetation, together with adults of *Tramea cf. cophysa*, feeding on small flying insects. Males showed patrolling behaviour on small sections of the streams and at a pond. Only one copulation was observed, lasting 10 minutes. Females oviposited alone on floating vegetation in running and standing waters. Our observations corroborate that *R. galapagoensis* and *R. elsia* are two parapatric species, morphologically and genetically close. In San Cristóbal, *R. galapagoensis* had large populations, apparently not threatened." (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: [acordero@uvigo.es](mailto:acordero@uvigo.es)

**15588.** Cormont, A.; Siepel, H.; Clement, J.; Melman, T.C.P.; WallisDeVries, M.F.; van Turnhout, C.A.M.; Sparrus, L.B.; Reemer, M.; Biesmeijer, J.C.; Berendse, F.; de Snoo, G.R. (2016): Landscape complexity and farmland biodiversity: Evaluating the CAP target on natural elements. *Journal for Nature Conservation* 30(1): 19-26. (in English) ["Increasing pressures on natural areas and limited conservation budgets require, particularly in rural landscapes in the Western world, an immediate answer to the question how much natural area is required to provide a sustainable future for wild plant and animal species on farmland. The European Union proposed in its Common Agricultural Policy that 3–7% of EU farmland should be managed as ecological focus area (EFA) in order to halt biodiversity loss. For the first time, we empirically assessed the implications of this policy by evaluating the effects of the density of natural elements in agricultural landscapes on multi-taxon species richness, including vascular plants, breeding birds, butterflies, hoverflies, dragonflies, and grasshoppers for an entire European country. We found that species richness increased either as

linear or as a logarithmic function of the proportion of natural elements in the landscape, but not with a sigmoid function as predicted by the 'intermediate landscape complexity' hypothesis. Even landscapes with 3–7% of natural elements harboured generally 37–75% of maximum species richness, indicating good potential of implementing the CAP target to preserve farmland biodiversity. However, differences between the 3 and 7% limits were considerable for butterflies, birds, and hoverflies. Also, the shape of the species richness response was shown to differ between landscape types for butterflies. Thus, it may be necessary to develop tailor-made guidelines at regional levels." (Authors)] Address: Cormont, A., Alterra, Wageningen University & Research Centre, P.O. Box 47, 6700 AA Wageningen, The Netherlands. E-mail: [anouk.cormont@wur.nl](mailto:anouk.cormont@wur.nl)

**15589.** Craves, J.A.; O'Brien, D.S. (2016): *Macromia alleghaniensis* (Odonata: Macromiidae): New for Michigan, with clarifications of northern records. *The Great Lakes Entomologist* 48(3-4): 186-190. (in English) ["An *M. alleghaniensis* collected in Cass County, Michigan on 18 June 2014, represents the first record of the species for the state, as well as the northernmost unequivocal record in North America. Other records north of 40° latitude are clarified and discussed." (Authors)]

**15590.** Dayaram, A.; Galatowitsch, J.L.; Argüello-Astorga, G.R.; van Bysterveldt, K.; Kraberger, S.; Stainton, D.; Harding, J.S.; Roumagnac, P.; Martin, D.P.; Lefeuvre, P.; Varsani, A. (2016): Diverse circular replication-associated protein encoding viruses circulating in invertebrates within a lake ecosystem. *Infection, Genetics and Evolution* 39: 304-316. (in English) ["Highlights: •Sampled molluscs, insect larvae, water and benthic sediments for CRESS DNA viruses. •Recover 169 circular molecules (160 CRESS DNA molecules, nine circular molecules). •Identification of a new RNA–DNA hybrid virus. •Strong association between viral sequences between water and browser organisms. •Strong association between viral sequences between sediments and undefended prey species. Abstract: Over the last five years next-generation sequencing has become a cost effective and efficient method for identifying known and unknown microorganisms. Access to this technique has dramatically changed the field of virology, enabling a wide range of environmental viral metagenome studies to be undertaken of organisms and environmental samples from polar to tropical regions. These studies have led to the discovery of hundreds of highly divergent single stranded DNA (ssDNA) virus-like sequences encoding replication-associated proteins. Yet, few studies have explored how viruses might be shared in an ecosystem through feeding relationships. Here we identify 169 circular molecules (160 CRESS DNA molecules, nine circular molecules) recovered from a New Zealand freshwater lake, that we have tentatively classified into 51 putatively novel species and five previously described species (*DflaCV-3*, -5, -6, -8, -10). The CRESS DNA viruses identified in this study were recovered from molluscs (*Echydrella menzeisii*, *Musculium novaezelandiae*, *Potamopyrgus antipodarum* and *Physella acuta*) and

insect larvae (*Procordulia grayi*, *Xanthocnemis zealandica*, and *Chironomus zealandicus*) collected from Lake Sarah, as well as from the lake water and benthic sediments. Extensive diversity was observed across most CRESS DNA molecules recovered. The putative capsid protein of one viral species was found to be most similar to those of members of the Tombusviridae family, thus expanding the number of known RNA–DNA hybrid viruses in nature. We noted a strong association between the CRESS DNA viruses and circular molecules identified in the water and browser organisms (*C. zealandicus*, *P. antipodarum* and *P. acuta*), and between water sediments and undefended prey species (*C. zealandicus*). However, we were unable to find any significant correlation of viral assemblages to the potential feeding relationships of the host aquatic invertebrates." (Authors)] Address: Varsania, A., School of Biological Sciences, University of Canterbury, Christchurch 8140, New Zealand

**15591.** Deng, Z.; Chen, F.; Yang, Q.; Bian, H.; Du, G.; Yong, J.; Shan, C.; Hou, X. (2016): Dragonfly-eye-inspired artificial compound eyes with sophisticated imaging. *Advanced Functional Materials* 26(12): 1995-2001. (in English) ["The natural compound eye is a striking imaging device with a wealth of fascinating optical features such as a wide field of view (FOV), low aberration, and high sensitivity. Dragonflies in particular possess large, sophisticated compound eyes that exhibit high resolving power and information-processing capacity. Here, a large-scale artificial compound eye inspired by the unique designs of natural counterparts is presented. The artificial compound eye is created by a high-efficiency strategy that combines single-pulse femtosecond laser wet etching with thermal embossing. These eyes have a macrobase diameter of 5 mm and ~30 000 close-packed ommatidia with an average diameter of 24.5 µm. Moreover, the optical properties of the artificial compound eyes are investigated; the results confirm that the eye demonstrates advanced imaging quality, an exceptionally wide FOV of up to 140°, and low aberration." (Authors)] Address: Yang, Q., State Key Lab. Manufacturing System Engineering & Key Lab. of Photonics Technology for Information of Shaanxi Province, School of Electronics and Information Engineering, Xi'an Jiaotong University, Xi'an, P. R. China. E-mail: yangqing@mail.xjtu.edu.cn

**15592.** Di Domenico, M.; Dijkstra, K.-D.B.; Carchini, G. (2016): Redescription of the larva of *Gynacantha cylindrata* Karsch (Insecta: Odonata: Aeshnidae). *Zootaxa* 4078(1): 78-83. (in English) ["The ultimate stadium larva of *G. cylindrata* is described and illustrated based on fifteen male and female exuviae from Bundibugyo, Uganda. The larva resembles those of the few described African species of the genus but shows a denser coverage of spine-like setae on body surface and abundance of hair-like setae on mouthparts. The female gonapophyses appear to be the longest described in the genus up to now and similar to those of *G. villosa*, a species included in the same group of African species." (Authors)] Address: Di Domenico, M., via XXIV Maggio, 28, I – 53100, Siena, Italy. E-mail: didomenicomarco67@gmail.com

**15593.** Dickens, C.W.S.; Graham, P.M. (2016): The South African Scoring System (SASS) Version 5 Rapid Bioassessment Method for Rivers. *African Journal of Aquatic Science* 27: 1-10. (in English) ["The assessment of biota in rivers is a widely recognized means of determining the condition or 'health' of rivers. Benthic macroinvertebrates, in particular, are recognized as valuable organisms for bioassessments, due largely to their visibility to the naked eye, ease of identification, rapid life cycle often based on the seasons and their largely sedentary habits. Numerous bioassessment techniques have been developed over the last three decades, varying in complexity and region of implementation. South Africa has an exemplary history in this field, culminating in the refinement of invertebrate and other techniques and their application in a National River Health Programme. The method presented here is a refinement of the highly successful SASS (South African Scoring System) method developed by Chutter (1994), which forms the backbone of this programme. This paper takes the method to a level where it can, and has been, accredited to ISO standards. The principal changes made include the tighter definition of the technique and the sampling and analytical methods, as well as the introduction of quality control procedures. Some changes have also been made to the list of invertebrates used in this method. Field trials were conducted to test the variability of the method. Of the various indices available to the method, the ASPT is the most consistent over all biotopes (lowest CV%). On the other hand, of the biotopes examined the Gravel/Sand/Mud (GSM) combination is the most variable with respect to the SASS Score and number of taxa encountered. The spatial variability on a reach of river with similar water quality characteristics was found to be statistically negligible. However, one generally finds that statistically significant differences occur between the SASS Scores and the number of taxa counted by different operators. The ASPT, on the other hand, is a more consistent and repeatable measure of river health assessment and, within a given reach of river and considering all biotopes, the differences in results produced by different operators were statistically negligible. The results highlight the need for appropriate competency-based training and consistent application of the method." (Authors) Taxa including Odonata are treated at family level.] Address: Dickens, C.W.S., Hydrobiology, Umgeni Water, P O Box 9, Pietermaritzburg, 3200, South Africa. E-mail: chris.dickens@umgeni.co.za

**15594.** Dorrington, G.E. (2016): Heavily loaded flight and limits to the maximum size of dragonflies (Anisoptera) and griffenflies (Meganisoptera). *Lethaia* 49(2): 261-274. (in English) ["An original hypothesis is presented that the maximum mass and size of living anisopteran dragonflies are constrained by a physiological performance limit: the wing muscle power required to permit reproductively successful males to carry heavier females in the so-called 'wheel position' in flight. It is proposed that the same limit cannot have applied to all fossil Odonatoptera. As the physiology of the giant Carboniferous griffenfly *Namurotypus sippeli* precludes flight in the wheel position, it did not need to carry any substantial load aside from exogenous aerial prey. Based



on its thorax dimensions, it is argued that *Namurotypus* flew with a relatively low maximum specific muscle power output in comparison with living Anisoptera. The extinction of some families of large Mesozoic Odonoptera may have been exacerbated by competition with smaller (stem-) Anisoptera that evolved higher specific power outputs and superior flight performance similar to living Anisoptera. To investigate the credibility of this flight-performance size-limit hypothesis and its consequences, an analysis of the scaling of the required flight power and available muscle power is presented using allometric relations. It is found that for living Anisoptera and fossil Odonoptera, there are different limiting sizes, above which the required specific flight power would exceed the available muscle specific power. These limits are directly related to maximum load-carrying capacity and the atmospheric air density at the habitual altitude. It is suggested that the largest living species of Petaluridae, *Petalura ingentissima*, is close to the proposed Anisoptera size limit at current near-sea-level air density conditions." (Author)] Address: Dorrington, G.E., School of Aerospace, Mechanical and Manufacturing Engineering, PO Box 71, Bundoora, VIC, 3083, Australia

**15595.** Dow, R.A. (2016): A remarkable new species of *Coeliccia* from the Tuyen Lam Lake area, Lam Dong, southern Vietnam (Odonata: Zygoptera: Platynemididae). *Zootaxa* 4103(5): 481-486. (in English) ["*Coeliccia suoitia* sp. nov. (holotype male, from Suoi Tia, Tuyen Lam Lake, Da Lat, Lam Dong Province, Vietnam, deposited in RMNH) is described from males from southern Vietnam. It is a distinctive species that possess highly unusual characters in the thorax and anal appendages that make its ultimate generic placement questionable. Relationships between *Coeliccia* Kirby, *Asthenocnemis* Lieftinck and *Indocnemis* Laidlaw, and within *Coeliccia*, are briefly discussed." (Author)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow230@yahoo.co.uk

**15596.** Dow, R.A. (2016): Odonata collected at the Samunsam Wildlife Sanctuary, Kuching Division, Sarawak, Malaysia in August 2015. *Faunistic Studies in SE Asian and Pacific Island Odonata* 14: 1-12. (in English) ["Results of a collecting trip to the Samunsam Wildlife Sanctuary in western Sarawak are presented. Several species are reported from Sarawak for the first time: *Elattonera* *coomansi*, *Mortonagrion* cf. *aborensis*, *Macrogomphus* *phalantus* and *Pornothemis* *starrei*. Other notable records include *Coeliccia* species, *Prodasiptera* cf. *interrupta* and *Raphisoma* *bispina*." (Author)] Address: Dow, R.A., Naturalis, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**15597.** Dow, R.A.; Affendy, A.; Rahman, H. (2016): *Telosticta fugispinosa* sp. nov. from Sabah (Odonata: Zygoptera: Platystictidae). *Zootaxa* 4103(4): 390-395. (in English) ["*Telosticta fugispinosa* sp. nov. (holotype ♂, from Borneo, Sabah, West Coast division, Crocker Range National Park, Inobong, Kimamabang waterfall stream system, 21 ix 2012, deposited in RMNH) is described from Kinabalu Na-

tional Park and Crocker Range National Park in Sabah, Malaysian Borneo. It is distinguished from all other species of *Telosticta* by the form of the male anal appendages." (Authors)] Address: Affendy, A., Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia

**15598.** Emiliyamma, K.G.; Palot, M.J. (2016): Range extension of *Lestes nodalis* Selys, 1891 (Odonata: Zygoptera: Lestidae) in southern India. *Journal of Threatened Taxa* 8(2): 8528-8530. (in English) ["Here we report the range extension of *L. nodalis*, a northeastern and eastern Indian species to Kerala, southern India for the first time. Additional taxonomic and natural history notes are also given for the species.... Material examined: WGRC/ZSI/IR-INV-4197, 1 male, 21.ii.2011, Narayankulam, Kozhikode District, coll. Md. Jafer Palot; WGRC/ZSI/IR-INV-4198, 1 female, 25.ii.2011, Narayankulam, Kozhikode District, coll. Dhanya Balan; WGRC/ZSI/IR-INV-4199, 1 male, 13.i.2012, Easthill, Kozhikode District, coll. K.G. Emiliyamma." (Authors)] Address: Emiliyamma, K.G., Western Ghats Regional Centre, Zoological Survey of India, Jafer Khan Colony, Kozhikode, Kerala 673006, India. E-mail: kgemily@gmail.com

**15599.** Espanha, J.; de Vasconcelos, M.F.; Eterovick, P.C. (2016): The role of tadpole coloration against visually oriented predators. *Behavioral Ecology and Sociobiology* 70(2): 255-267. (in English) ["An animal's vulnerability to predators can be influenced by its behaviour, morphology, body size, coloration, habitat preferences, and palatability. We tested whether the coloration of *Bokermannohyla saxicola* and *Scinax machadoi* tadpoles affects their survival when exposed to local visually oriented predators at a site in southeastern Brazil. We tested three aquatic invertebrates (*Aeshnidae*, *Belostoma* sp., *Lethocerus* sp.) and birds as tadpole predators. We predicted that predation rates would differ depending on the substrate where the tadpoles positioned themselves (light or dark), hypothesizing that each tadpole would use preferentially a background that conferred camouflage and that predation levels would be lower on such backgrounds compared to others. *B. saxicola* had higher survivorship than *S. machadoi* on light backgrounds at some instances, in accordance with its crypsis hypothesis. However, *B. saxicola* tadpoles did not use light backgrounds more often than dark ones. *S. machadoi* coloration looked disruptive on both light and dark backgrounds, and tadpoles showed no preference or differences in survival rates between these backgrounds. Predation rates did not differ between the two species in a way that could confirm a previous hypothesis of aposematic/mimetic coloration for *S. machadoi* tadpoles. Our results show that colorations that appear to function to impair visual detection may play this role at some circumstances but not others. Tadpole colorations may have evolved in another context, in which avoiding visual detection by predators was a stronger selective pressure. In a context with lower predation pressure from visually oriented predators, the expected background choice behaviour for increased camouflage

may not be strongly selected for." (Authors)] Address: Eterovick, Paula, Programa de Pós Graduação em Biologia de Vertebrados, Pontifícia Universidade Católica de Minas Gerais, Belo Horizonte, 30535-610, Brazil. E-mail: pcterovick@gmail.com

**15600.** Fauziyah, S.; Soesilohadi, R.C.H.; Retnoaji, B.; Alam, P. (2016): Dragonfly wing venous cross-joints inspire the design of higher-performance bolted timber truss joints. *Composites Part B: Engineering* 87: 274-280. (in English) ["This communication concerns the design and development of high performance biomimetic timber joints as inspired by the venous cross-joints of dragonfly wings. A special cross-joint configuration in *Crocothemis servilia* is identified. Between the veins of this cross-joint is a resilin envelope. Finite element modelling reveals that the presence of this resilin envelope reduces the levels of localised stress in the jointing region. By gaining an understanding of the structure and function of this dragonfly wing joint, dragonfly-joint inspired timber trusses are developed by integrating low-modulus adhesives around bolted connectors. We find that not only are the properties of strength, stiffness, toughness and deformability of bolted truss joints vastly improved on applying dragonfly-mimicking technology, but that the fatigue resistance is also enhanced. This preliminary work is an important step forward in the design and development of high-performance biomimetic joints for timber construction." (Authors) ] Address: Alam, P., Laboratory of Paper Coating and Converting, Centre for Functional Materials, Abo Akademi University, Porthaninkatu 3, 20500 Turku, Finland. E-mail: parvez.alam@abo.fi

**15601.** Fazlullah; Saeed, M.; Zia, A.; Farid, A.; Khan, M.S.; Badshah, T.; Zada, N. (2016): Libellulidae (Anisoptera) of upper Swat, Khyber Pakhtunkhwa Pakistan. *Journal of Entomology and Zoology Studies* 4(1): 227-228. (in English) ["A study was carried out during year 2013 to study insects belonging to Libellulidae. Sampling of ten locations was undertaken and adults were collected. The study yielded 15 species belonging to 11 genera of family Libellulidae. The species were *Acisoma panorpoides panorpoides*, *Crocothemis servilia*, *Hydrobasileus croceus*, *Orthetrum anceps*, *Orthetrum pruinosum neglectum*, *Orthetrum sabina*, *Sympetrum meridionale*, *Orthetrum triangulare*, *Pantala flavescens*, *Palpopleura sexmaculata*, *Potamarcha obscura*, *Tholymis tillarga*, *Zygonyx torridus*, *Trithemis festiva* and *Sympetrum orientale*." (Authors)] Address: Fazlullah, Department of Agricultural Sciences, University of Haripur, KP, Pakistan

**15602.** Finley, M.L.D.; Kidd, K.A.; Curry, R.A.; Lescord, G.L.; Clayden, M.G.; O'Driscoll, N.J. (2016): A comparison of mercury biomagnification through lacustrine food webs supporting Brook Trout (*Salvelinus fontinalis*) and other salmonid fishes. *Frontiers in Environmental Science* 4 (Article23): 13 pp. (in English) ["Methylmercury (MeHg) bioaccumulation in lower-trophic-level organisms and its subsequent biomagnification through food webs differs in magnitude among lakes and results in intraspecific variability of

MeHg in top predator fishes. Understanding these differences is critical given the reproductive and neurotoxic effects of MeHg on fishes and their predators, including humans. In this study we characterized the food webs of five lakes in New Brunswick, Canada, supporting Brook Trout (*Salvelinus fontinalis*) using measures of relative trophic position (d15N) and carbon sources (d13C), determined the concentrations of MeHg in invertebrates and total Hg (THg) in fishes, and quantified MeHg biomagnification from primary to tertiary consumers. Methyl Hg and THg concentrations were highest in biota from lakes with lower pH. The trophic magnification slopes (TMS; log Hg vs. d15N) varied significantly among lakes (0.13–0.20; ANCOVA,  $p = 0.031$ ). When combined with data from other salmonid lakes in temperate and Arctic Canada ( $n = 36$ ), among-system variability in TMS was best, but weakly, positively predicted by aqueous total phosphorous ( $p = 0.028, 0.109$ ). These results suggest that lake productivity directly or indirectly influences the biomagnification of MeHg through diverse food webs supporting salmonids." (Authors)] Address: Kidd, Karen, Biology Department and Canadian Rivers Institute, University of New Brunswick, Saint John, NB, Canada. E-mail: kiddk@unb.ca

**15603.** Freeland-Riggert, B.T.; Cairns, S.H.; Poulton, B.C.; Riggert, C.M. (2016): Differences found in the macroinvertebrate community composition in the presence or absence of the invasive alien crayfish, *Orconectes hylas*. *PLoS ONE* 11(3): e0150199. doi:10.1371/journal.pone.0150199: 27 pp. (in English) ["Introductions of alien species into aquatic ecosystems have been well documented, including invasions of crayfish species; however, little is known about the effects of these introductions on macroinvertebrate communities. The woodland crayfish (*Orconectes hylas* (Faxon)) has been introduced into the St. Francis River watershed in southeast Missouri and has displaced populations of native crayfish. The effects of *O. hylas* on macroinvertebrate community composition were investigated in a fourth-order Ozark stream at two locations, one with the presence of *O. hylas* and one without. Significant differences between sites and across four sampling periods and two habitats were found in five categories of benthic macroinvertebrate metrics: species richness, percent/composition, dominance/diversity, functional feeding groups, and biotic indices. In most seasons and habitat combinations, the invaded site had significantly higher relative abundance of riffle beetles (Coleoptera: Elmidae), and significantly lower Missouri biotic index values, total taxa richness, and both richness and relative abundance of midges (Diptera: Chironomidae). Overall study results indicate that some macroinvertebrate community differences due to the *O. hylas* invasion were not consistent between seasons and habitats, suggesting that further research on spatial and temporal habitat use and feeding ecology of Ozark crayfish species is needed to improve our understanding of the effects of these invasions on aquatic communities." (Authors)] Address: Freeland-Riggert, B.T., Missouri Department of Natural Resources, P.O. Box 176, Jefferson City, Missouri, USA. E-mail: Brandye.Freeland-Riggert@dnr.mo.gov

**15604.** Fujimoto, M.S.; Suvorov, A.; Jensen, N.O.; Clement, M.J.; Bybee, S.M. (2016): Detecting false positive sequence homology: a machine learning approach. *BMC Bioinformatics* (2016) 17:101. DOI 10.1186/s12859-016-0955-3: 11 pp. (in English) ["Background: Accurate detection of homologous relationships of biological sequences (DNA or amino acid) amongst organisms is an important and often difficult task that is essential to various evolutionary studies, ranging from building phylogenies to predicting functional gene annotations. There are many existing heuristic tools, most commonly based on bidirectional BLAST searches that are used to identify homologous genes and combine them into two fundamentally distinct classes: orthologs and paralogs. Due to only using heuristic filtering based on significance score cutoffs and having no cluster post-processing tools available, these methods can often produce multiple clusters constituting unrelated (non-homologous) sequences. Therefore sequencing data extracted from incomplete genome/transcriptome assemblies originated from low coverage sequencing or produced by de novo processes without a reference genome are susceptible to high false positive rates of homology detection. Results: In this paper we develop biologically informative features that can be extracted from multiple sequence alignments of putative homologous genes (orthologs and paralogs) and further utilized in context of guided experimentation to verify false positive outcomes. We demonstrate that our machine learning method trained on both known homology clusters obtained from OrthoDB and randomly generated sequence alignments (non-homologs), successfully determines apparent false positives inferred by heuristic algorithms especially among proteomes recovered from low-coverage RNA-seq data. Almost ~42 % and ~25 % of predicted putative homologies by InParanoid and HaMStR respectively were classified as false positives on experimental data set (For the experimental data set (OD\_S) we used 18 Odonata (dragonflies and damselflies) and 2 Ephemeroptera (mayflies) species.). Conclusions: Our process increases the quality of output from other clustering algorithms by providing a novel post-processing method that is both fast and efficient at removing low quality clusters of putative homologous genes recovered by heuristic-based approaches." (Authors)] Address: Suvorov, A., Department of Biology, Brigham Young University, Provo, Utah 84602, USA. E-mail: antony.suvorov@byu.edu

**15605.** Golfieri, B.; Hardersen, S.; Maiolini, B.; Surian, N. (2016): Odonates as indicators of the ecological integrity of the river corridor: Development and application of the Odonate River Index (ORI) in northern Italy. *Ecological Indicators* 61(2): 234-247. (in English) ["The assessment of the ecological conditions of rivers is crucial for their appropriate management and restoration. Bioindicators commonly used to evaluate the river status (i.e. diatoms, aquatic macrophytes, benthic macroinvertebrates and fish) detect alterations of water quality, but are not particularly sensitive to hydromorphological degradation, which is another relevant pressure in river systems. Furthermore, those bioindicators are usually applied only to flowing channels. We developed

a new multimetric index, the Odonate River Index (ORI), to assess the conditions of the whole corridor in alluvial rivers. The ORI is a development of an evaluation system proposed in Austria, and based on the Odonate Habitat Index (OHI). Odonates were chosen as bioindicators for the ecological integrity of the river corridor, since this taxon provides information on the conditions of their aquatic breeding sites, as well as on the surrounding terrestrial areas, due to its amphibiotic life cycle. We used a case study of 18 reaches from six Italian Alpine rivers, characterized by different morphological conditions and level of human impact. Within each study reach, we selected four sites, both lotic and lentic sites. Dragonfly surveys consisted in field observation of adults, and collection of larvae and exuviae. To define the best sampling strategy, we compared the results of the ORI metrics obtained varying the input data by combining different sampling methods: the best compromise between effort and exhaustiveness was obtained coupling the observation of adults with the collection of exuviae. We found the ORI to be a robust and reliable tool to assess the status of the river corridor in a wide range of environmental conditions and river morphology, being particularly suitable to detect hydromorphological degradation and alterations of the structure of aquatic and riparian vegetation. We identified two limiting factors for the applicability of this index: low water temperatures of the main channel (i.e. mean annual value below 10 °C) and river reaches with no or scarce aquatic and riparian vegetation. In addition to the assessment of river conditions, the ORI could also be applied for monitoring the effects of river restoration actions." (Authors)] Address: Golfieri, B., Department of Geosciences, Univ. Padova, Via Gradenigo 6, 35131 Padova, Italy. E-mail: bruno.golfieri@unipd.it

**15606.** Hämäläinen, M. (2016): Description of *Heliocypha vantoli* spec. nov. from Siberut in the Mentawai Islands (Odonata: Chlorocyphidae). *Zootaxa* 4079(4): 495-500. (in English) ["*Heliocypha vantoli* Hämäläinen, spec. nov. [holotype ♂ from Indonesia, Mentawai Islands (off Sumatra), Siberut Island, 29-31 January 2013, deposited at RMNH, Leiden, The Netherlands] is described and illustrated for both sexes and compared with the *Heliocypha* species found in Sumatra and adjacent small islands. Notes on the Odonata fauna of the Mentawai Islands are also provided. *Euphaea aspasia* Selys, 1853 (Euphaeidae) is recorded as new to these islands; differences in the colour pattern of the Siberut and mainland Sumatran specimens are briefly discussed." (Author)] Address: Hämäläinen, M., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: matti.hamalainen@helsinki.fi

**15607.** Hämäläinen, M. (2016): Catalogue of individuals commemorated in the scientific names of extant dragonflies, including lists of all available eponymous speciesgroup and genusgroup names – Revised edition. *IDF-Report* 92: 1-132. (in English) ["A catalogue of 1290 persons commemorated in the scientific names of extant dragonflies (Odonata) is presented together with brief biographical information for each entry, typically the full name and year of birth and death (in case of a deceased person). For each



individual a list is given of all available species, subspecies, genus or subgenus names erected in his or her honour. In total 2021 available names which qualify as eponyms are listed. These comprise 1966 speciesgroup and 55 genusgroup names including synonyms and homonyms. It is calculated that of the ca 8550 available speciesgroup names in extant Odonata, ca 23 % are eponyms. Of the 1065 new speciesgroup names introduced between 1 January 1995 and 31 December 2015, 435 (40.8 %) are eponyms." (Author)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: libellago@gmail.com

**15608.** Harabis, F. (2016): High diversity of odonates in post-mining areas: Meta-analysis uncovers potential pitfalls associated with the formation and management of valuable habitats. *Ecological Engineering* 90: 438-446. (in English) ["A growing number of studies indicate high conservation potential of freshwater habitats occurring in post-mining areas. The overall diversity of these habitats depends on many factors, however, even a high diversity may diminish significantly over time. Therefore, it is difficult to identify and understand the importance of key habitat properties for diversity. Here I present analysis of three studies comparing the diversity of dragonflies and damselflies (Odonata). Each study was performed in different coal mining basins within the Czech Republic (a total of 94 sites). In this analysis, I used generalized linear mixed models and several multivariate methods to analyze the effects of a number of environmental characteristics such as depth, bottom substrate or bank slope, reflecting not only the current quality but also the succession and formation of individual pools. The occurrence of overall 14 nationally red listed species indicates the high conservation value of these habitats, while the 40 species found indicate that these areas contribute significantly to regional diversity. Species richness of individual pools was associated with habitat type (spoil heap vs. mine subsidence) and with several habitat variables, in particular the character of vegetation around aquatic habitats. In conclusion, the results indicate that diversity and species composition are significantly influenced by factors reflecting the formation and subsequent succession of pools. Effective conservation management should concentrate primarily on modifying pools' initial properties such as bottom substrate. Subsequent management should then sustain landscape dynamics, which means in particular to sustain minor disturbances that subsequently affect vegetation succession and prevent excessive overgrowing of expansive vegetation, as doing so is promoting the habitat heterogeneity which is essential to high biodiversity in these areas." (Author)] Address: Harabiš, F., Department of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, CZ-165 21 Prague 6, Czech Republic. E-mail: harabis.f@gmail.com

**15609.** Hasenbein, S.; Lawler, S.P.; Geist, J.; Connon, R.E. (2016): A long-term assessment of pesticide mixture effects on aquatic invertebrate communities. *Environmental Toxi-*

*cology and Chemistry* 35(1): 218-232. (in English) ["To understand the potential effects of pesticide mixtures on aquatic ecosystems, studies that incorporate increased ecological relevance are crucial. Using outdoor mesocosms, the authors examined long-term effects on aquatic invertebrate communities of tertiary mixtures of commonly used pesticides: 2 pyrethroids (permethrin, I-cyhalothrin) and an organophosphate (chlorpyrifos). Application scenarios were based on environmentally relevant concentrations and stepwise increases of lethal concentrations from 10% (LC10) to 50% (LC50) based on laboratory tests on *Hyalella azteca* and *Chironomus dilutus*; repeated applications were meant to generally reflect runoff events in a multiple-grower or homeowner watershed. Pyrethroids rapidly dissipated from the water column, whereas chlorpyrifos was detectable even 6wk after application. Twelve of 15 macroinvertebrate and 10 of 16 zooplankton taxa responded to contaminant exposures. The most sensitive taxa were the snail *Radix* sp., the amphipod *H. azteca*, the water flea *Daphnia magna*, and copepods. Environmentally relevant concentrations had acute effects on *D. magna* and *H. azteca* (occurring 24 h after application), whereas lag times were more pronounced in *Radix* sp. snails and copepods, indicating chronic sublethal responses. Greatest effects on zooplankton communities were observed in environmentally relevant concentration treatments. The results indicate that insecticide mixtures continue to impact natural systems over multiple weeks, even when no longer detectable in water and bound to particles. Combinations of indirect and direct effects caused consequences across multiple trophic levels. ... Summed over the present study period, Zygoptera represented the largest portion of macroinvertebrate abundance (20.9%), followed by the pulmonate snail *Radix* sp. (14.8%) and the amphipod *H. azteca* (13.2%). ... Between the 2 Odonata suborders, the chemical exposure had a greater effect on Anisoptera (positive trend) than Zygoptera. ... Zygoptera was the third most sensitive taxon and displayed a decreased abundance in LC-Chiro in week 2. ... Anisoptera abundance did not significantly deviate from the control over the course of the present study period but displayed a positive trend in all treatments from week 2 to week 5. This trend was not visible in the Odonata abundance, possibly because Anisoptera and Zygoptera responded in opposite directions. ... Zygoptera was the only taxon for which a decrease in emergence was detected." (Authors)] Address: Hasenbein, Simone, Dept of Anatomy, Physiology & Cell Biology, School of Veterinary Medicine, Univ. of California, Davis, California, USA. E-mail: shasenbein@ucdavis.edu

**15610.** Haug, J.T.; Haug, C.; Garwood, R.J. (2016): Evolution of insect wings and development – new details from Palaeozoic nymphs. *Biological Reviews* 91(1): 53-69. (in English) ["The nymphal stages of Palaeozoic insects differ significantly in morphology from those of their modern counterparts. Morphological details for some previously reported species have recently been called into question. Palaeozoic insect nymphs are important, however – their study could

provide key insights into the evolution of wings, and complete metamorphosis. Here we review past work on these topics and juvenile insects in the fossil record, and then present both novel and previously described nymphs, documented using new imaging methods. Our results demonstrate that some Carboniferous nymphs – those of Palaeodictyopteroidea – possessed movable wing pads and appear to have been able to perform simple flapping flight. It remains unclear whether this feature is ancestral for Pterygota or an autapomorphy of Palaeodictyopteroidea. Further characters of nymphal development which were probably in the ground pattern of Pterygota can be reconstructed. Wing development was very gradual (archimeta-boly). Wing pads did not protrude from the tergum posterolaterally as in most modern nymphs, but laterally, and had well-developed venation. The modern orientation of wing pads and the delay of wing development into later developmental stages (condensation) appears to have evolved several times independently within Pterygota: in Ephemeroptera, Odonoptera, Eumetabola, and probably several times within Polyneoptera. Selective pressure appears to have favoured a more pronounced metamorphosis between the last nymphal and adult stage, ultimately reducing exploitation competition between the two. We caution, however, that the results presented herein remain preliminary, and the reconstructed evolutionary scenario contains gaps and uncertainties. Additional comparative data need to be collected. The present study is thus seen as a starting point for this enterprise." (Authors)] Address: Haug, J.T., Functional Morphology, Department of Biology II, GeoBio-Center, LMU Munich, Planegg-Martinsried, Germany. E-mail: joachim.haug@palaeo-evo-devo.info

**15611.** Hill, M.J.; Sayer, C.D.; Wood, P.J. (2016): When is the best time to sample aquatic macroinvertebrates in ponds for biodiversity assessment? *Environmental Monitoring and Assessment* 188:194: 11 pp. (in English) ["Ponds are sites of high biodiversity and conservation value, yet there is little or no statutory monitoring of them across most of Europe. There are clear and standardised protocols for sampling aquatic macroinvertebrate communities in ponds, but the most suitable time(s) to undertake the survey(s) remains poorly specified. This paper examined the aquatic macroinvertebrate communities from 95 ponds within different land use types over three seasons (spring, summer and autumn) to determine the most appropriate time to undertake sampling to characterise biodiversity. The combined samples from all three seasons provided the most comprehensive record of the aquatic macroinvertebrate taxa recorded within ponds (alpha and gamma diversity). Samples collected during the autumn survey yielded significantly greater macroinvertebrate richness (76 % of the total diversity) than either spring or summer surveys. Macroinvertebrate diversity was greatest during autumn in meadow and agricultural ponds, but taxon richness among forest and urban ponds did not differ significantly temporally. The autumn survey provided the highest measures of richness for Coleoptera, Hemiptera and Odonata. However, richness of the aquatic insect order Trichoptera was highest in spring and

lowest in autumn. The results illustrate that multiple surveys, covering more than one season, provide the most comprehensive representation of macroinvertebrate biodiversity. When sampling can only be undertaken on one occasion, the most appropriate time to undertake surveys to characterise the macroinvertebrate community biodiversity is during autumn, although this may need to be modified if other floral and faunal groups need to be incorporated into the sampling programme." (Authors)] Address: Hill, M.J., Centre for Hydrological and Ecosystem Science, Department of Geography, Loughborough University, Loughborough LE11 3TU Leicestershire, UK. E-mail: M.J.Hill@lboro.ac.uk

**15612.** Holzinger, W.E. (2016): In memoriam Wilfried Stark (1947–2015). *Entomologica Austriaca* 23: 197-201. (in German) [Austria, obituary; 7. Dezember 1947 - 25. September 2015] Address: Holzinger, W., Ökoteam - Institut für Tierökologie und Naturraumplanung, Bergmannsgasse 22, 8010 Graz, Austria. E-Mail: holzinger@oekoteam.at

**15613.** Hossie, T.J.; Murray, D.L. (2016): Spatial arrangement of prey affects the shape of ratio-dependent functional response in strongly antagonistic predators. *Ecology* 97(4): 834-841. (in English) ["Predators play a key role in shaping natural ecosystems, and understanding the factors that influence a predator's kill rate is central to predicting predator-prey dynamics. While prey density has a well-established effect on predation, it is increasingly apparent that predator density also can critically influence predator kill rates. The effects of both prey and predator density on the functional response will, however, be determined in part by their distribution on the landscape. To examine this complex relationship we experimentally manipulated prey density, predator density, and prey distribution using a tadpole (prey) - dragonfly nymph (predator) system. Predation was strongly ratio-dependent irrespective of prey distribution, but the shape of the functional response changed from hyperbolic to sigmoidal when prey were clumped in space. This sigmoidal functional response reflected a relatively strong negative effect of predator interference on kill rates at low prey: predator ratios when prey were clumped. Prey aggregation also appeared to promote stabilizing density-dependent intra-guild predation in our system. We conclude that systems with highly antagonistic predators and patchily distributed prey are more likely to experience stable dynamics, and that our understanding of the functional response will be improved by research that examines directly the mechanisms generating interference." (Authors)] Address: Hossie, T., Department of Biology, Trent University, Peterborough, Ontario, Canada. E-mail: thossie@trentu.ca

**15614.** Ilvonen, J.J.; Kaunisto, K.M.; Suhonen, J. (2016): Are sexes equally parasitized in damselflies and dragonflies? *Oikos* 125: 315-325. (in English) ["Parasitism plays an essential part in ecology and evolution of host species and understanding the reasons for differential parasitism within and among hosts species is therefore important. Among the very important factors potentially affecting parasitism is the gender of the host. Here, we studied whether either females

or males are more likely to harbour parasites among odonatan insects, by relying on an extensive literature review and new field data. We collected data on numerous dragonfly and damselfly species and their ectoparasites (water mites) and endoparasites (gregarines) to examine the generality of similarities and differences in prevalence, intensity and maximum number of parasites of male and female hosts. We found three main results. Firstly, most of the odonate host species showed no differences between sexes in either gregarine or water mite prevalence and intensity. The only exception was female damselflies' higher gregarine prevalence and intensity compared to conspecific males. These inequalities in gregarine parasitism may be due to behavioural and physiological differences between conspecific males and females. In comparison, there were no differences in dragonflies between sexes in water mite or gregarine prevalence and intensity. Secondly, damselflies had higher prevalence and intensity levels of both gregarine and water mite parasites compared to dragonflies. Finally, we found a strong species level pattern between female and male parasitism: a certain level of gregarine or water mite parasitism in one sex was matched with a similar parasitism level for the other. This indicates similar exposure and susceptibility to parasites on both sexes. Even though significant differences of parasite levels between the sexes were observed within certain host species, our results strongly suggest that on a general level a more parasitized sex does not exist in the order, Odonata." (Authors)] Address: Ilvonen, J.J., Dept Biology, Univ. of Turku, 20014 Turku, Finland. E-mail: [jjilvo@utu.fi](mailto:jjilvo@utu.fi)

**15615.** Jakob, C.; Poulin, B. (2016): Indirect effects of mosquito control using Bti on dragonflies and damselflies (Odonata) in the Camargue. *Insect Conservation and Diversity* 9: 161-169. (in English) ["(1.) *Bacillus thuringiensis* var. *israelensis* (Bti) has become the most commonly used larvicide to control mosquitoes worldwide. Bti is considered non-toxic to most organisms, except some Diptera such as chironomids, which are a major prey in wetland food webs. (2.) Although Odonata are important predators of mosquitoes and chironomids at the larval and adult stages, no study has ever considered the potential indirect effects of Bti on Odonata abundance through trophic interactions. We addressed this topic in the Camargue where 2500 of the 25 000 ha of mosquito larval biotopes are Bti-sprayed (aqueous solution of VectoBac 12AS at 2.5 L ha<sup>-1</sup>) whenever mosquito larvae appear in water bodies (i.e. 30–50 aerial treatments overall annually). (3.) Adult Odonata were surveyed along a 100-m line transect in spring, summer and autumn at three control and three treated sites over a 5-year period. (4.) Mean number of species (9.9 vs. 5.2) and of individuals (100 vs. 50) detected per year were significantly higher in control areas compared to Bti-sprayed areas. Bti treatment contributed to 87.3% of the explained variance in Odonata richness, compared to 2.9% for site, 6.8% for year and 3.0% for salinity effects. (5.) These results are coherent with other studies carried out in the same area and time period highlighting a lower abundance of chironomids, and a lower intake of odonates by breeding birds in treated areas.

(6.) We conclude that mosquito control using Bti should be acknowledged as a potential threat to Odonata." (Authors)] Address: Poulin, Brigitte, Tour du Valat, Le Sambuc, 13200 Arles, France. E-mail: [poulin@tourduvalat.org](mailto:poulin@tourduvalat.org)

**15616.** Jeremiason, J.D.; Reiser, T.K.; Weitz, R.A.; Berndt, M.E.; Aiken, G.R. (2016): Aeshnid dragonfly larvae as bio-indicators of methylmercury contamination in aquatic systems impacted by elevated sulfate loading. *Ecotoxicology* 25(3): 456-468. (in English) ["Methylmercury (MeHg) levels in dragonfly larvae and water were measured over two years in aquatic systems impacted to varying degrees by sulfate releases related to iron mining activity. This study examined the impact of elevated sulfate loads on MeHg concentrations and tested the use of MeHg in dragonfly larvae as an indicator of MeHg levels in a range of aquatic systems including 16 river/stream sites and two lakes. MeHg concentrations in aeshnid dragonfly larvae were positively correlated ( $R^2 = 0.46$ ,  $p < 0.01$ ) to peak MeHg concentrations in the dissolved phase for the combined years of 2012 and 2013. This relation was strong in 2012 ( $R^2 = 0.85$ ,  $p < 0.01$ ), but showed no correlation in 2013 ( $R^2 = 0.02$ ,  $p > 0.05$ ). MeHg in dragonfly larvae were not elevated at the highest sulfate sites, but rather the reverse was generally observed. Record rainfall events in 2012 and above average rainfall in 2013 likely delivered the majority of Hg and MeHg to these systems via interflow and activated groundwater flow through reduced sediments. As a result, the impacts of elevated sulfate releases due to mining activities were not apparent in these systems where little of the sulfate is reduced. Lower bioaccumulation factors for MeHg in aeshnid dragonfly larvae were observed with increasing dissolved organic carbon (DOC) concentrations. This finding is consistent with previous studies showing that MeHg in high DOC systems is less bioavailable; an equilibrium model shows that more MeHg being associated with DOC rather than algae at the base of the food chain readily explains the lower bioaccumulation factors." (Authors)] Address: Jeremiason, J.D., Gustavus Adolphus College, St Peter, MN 56082, USA. E-mail: [jjeremia@gustavus.edu](mailto:jjeremia@gustavus.edu)

**15617.** Jisha Krishnan, E. K.; Sebastian, C. D. (2016): Analysis of phylogenetic status of different *Neurothemis* (Odonata:libellulidae) species using Cytochrome Oxidase I gene sequence. *Global Journal For Research Analysis* 5(3): 85-87. (in English) ["Here we have analysed the phylogenetic relationships of three different species of *Neurothemis* (*tullia*, *intermedia*, *fulvia*) by the partial sequencing of mitochondrial cytochrome oxidase subunit I (COI) gene. Phylogenetic tree constructed by Neighbour joining method proved that *Neurothemis tullia* and *Neurothemis intermedia* are taxonomically more closer and they together formed a single clade in the tree. *Neurothemis fulvia* is sister to this clade but it represents the most diverged species in terms of branch length and nucleotide substitution. Comparison with the retrieved sequences confirmed that it strictly belong to Libellulidae family. The tree also depicted that *Neurothemis* genus is more close to *Orthetrum sabina* than *Diplacodes trivialis*. Hence the study concluded that DNA



barcoding is an invaluable tool for confirming the species identification and to assess the proper phylogenetic relationships." (Authors)] Address: Sebastian, C. D., Molecular Biology Lab., Dept of Zoology, Univ. Calicut, Kerala, India

**15618.** Jones, D.K.; Hua, J.; Relyea, R.A. (2016): Effects of endosulfan in freshwater pond communities. *Freshwater Science* 35(1): 152-163. (in English) ["Pesticide use has led to ubiquitous contamination of natural habitats that can cause direct and indirect effects on nontarget organisms. Laboratory toxicity tests are valuable for evaluating the direct lethal effects of pesticides, but whether species differences in sensitivity identified from such tests are representative of more natural conditions is unknown. Studies of pesticide effects on communities are needed to understand the indirect effects of pesticides, but many such studies are focused on simplified communities and overlook the contribution of higher trophic levels (i.e., lethal predators), which can have interactive effects with pesticides and may play a large role in influencing community dynamics in contaminated habitats. Much of the research investigating pesticides in communities has focused on organophosphates, carbamates, and pyrethroids, whereas organochlorines are understudied, despite the fact that they can be highly toxic and persist in the environment. We investigated the effect of the organochlorine insecticide endosulfan on aquatic food webs composed of 3 tadpole species, vertebrate and invertebrate predators, zooplankton, and algae. We manipulated endosulfan concentrations (0, 0.2, 3.1, and 27.3 µg/L) and free-ranging predators (adult red-spotted newts [*Notophthalmus viridescens*] and dragonfly larvae [*Anax junius*]). Endosulfan caused direct lethal effects on tadpoles, red-spotted newts, and copepods. Patterns of species sensitivity were consistent with past laboratory experiments. Free-ranging predators caused additive, negative effects on tadpole survival, and affected anuran time to and size at metamorphosis. Our study demonstrated that endosulfan can initiate a wide range of direct and indirect effects on nontarget organisms and interacts additively with lethal predators." (Authors).] Address: Jones, D.K., Dept of Biological Sciences, Rensselaer Polytechnic Institute, Troy, New York 12180 USA. E-mail: jonesd11@rpi.edu

**15619.** Jun, Y.-C.; Kim, N.-Y.; Kim, S.-H.; Park, Y.-S.; Kong, D.-S.; Hwang, S.-J. (2016): Spatial distribution of benthic macroinvertebrate assemblages in relation to environmental variables in Korean nationwide streams. *Water* 2016, 8(1), 27; doi:10.3390/w8010027: 20 pp. (in English) ["Conserving and enhancing freshwater biodiversity are global issues to ensure ecosystem integrity and sustainability. To meet this, it is critical to understand how the biological assemblages are determined by environmental gradients in different spatial scales. Nevertheless, information on their large-scale environmental relationships remains scarce in Korea. We aimed to understand nationwide spatial distribution patterns of benthic macroinvertebrates and important environmental factors affecting their distribution in 388 streams and rivers across Korea. A total of 340 taxa, be-

longing to 113 families in 23 orders of five phyla, were identified. Assemblage composition in most Korean streams included a few predominant colonizers and a majority of rare taxa. Cluster analysis based on benthic macroinvertebrates classified a total of 720 sampling sites into five clusters according to the pollution levels from fast-flowing less polluted streams with low electrical conductivity to moderately or severely polluted streams with high electrical conductivity and slow water velocity. Canonical correspondence analysis revealed that altitude, water velocity and streambed composition were the most important determinants, rather than watershed and water chemistry variables, for explaining the variation in macroinvertebrate assemblage patterns. The results provide basic information for establishing the conservation and restoration strategies of macroinvertebrate biodiversity against anthropogenic disturbances and developing more confident bio-assessment tools for diagnosing stream ecosystem integrity." (Authors) Odonata are treated at the order level.] Address: Hwang, S.-J., Department of Environmental Health Science, Konkuk University, Seoul 143-701, Korea

**15620.** Kalkman, V.J.; Gyeltshen, T. (2016): Records of dragonflies from western Bhutan collected in October 2015. IDF-Report 94: 1-15. (in English) ["Distribution data of dragonflies and damselflies from western Bhutan collected during a trip from 10 October 2015 to 22 October 2015 are presented. In total 53 species were recorded of which eleven are new to the country (*Aciagrion pallidum*, *Anisopleura lestoides*, *Megalestes irma*, *Gynacantha incisura*, *Gynacantha khasiaca*, *Gynacanthaeschna sikkima*, *Lamelligomphus risi*, *Somatochlora daviesi*, *Crocothemis erythraea*, *Sympetrum fonscolombii*, *Tholymis tillarga*). Another three species, one *Megalestes* and two *Cephaloeschna*, were not identified to species level but are also addition to the list of species recorded from Bhutan." (Authors)] Address: Gyeltshen, T., School of Life Sciences, Sherubtse College, Kanglung, Bhutan. E-mail: thinleytshen@gmail.com

**15621.** Kassner, Z.; Dafni, E.; Ribak, G. (2016): Kinematic compensation for wing loss in flying damselflies. *Journal of Insect Physiology* 85(1): 1-9. (in English) ["Highlights: •*Ischnura elegans* can fly using only three of their wings. •We compare the wingbeat kinematics of four-winged flight with three-winged flight. •In three-winged flight the insects increased wingbeat frequency. •The increase was sufficient to explain compensation for loss in total wing area. •The flapping of the remaining wings changed to allow steady flight. Abstract: Flying insects can tolerate substantial wing wear before their ability to fly is entirely compromised. In order to keep flying with damaged wings, the entire flight apparatus needs to adjust its action to compensate for the reduced aerodynamic force and to balance the asymmetries in area and shape of the damaged wings. While several studies have shown that damaged wings change their flapping kinematics in response to partial loss of wing area, it is unclear how, in insects with four separate wings, the remaining three wings compensate for the loss of a fourth

wing. We used high-speed video of flying *I. elegans* to identify the wingbeat kinematics of the two wing pairs and compared it to the flapping kinematics after one of the hindwings was artificially removed. The insects remained capable of flying and precise maneuvering using only three wings. To compensate for the reduction in lift, they increased flapping frequency by  $18\% \pm 15.4\%$  on average. To achieve steady straight flight, the remaining intact hindwing reduced its flapping amplitude while the forewings changed their stroke plane angle so that the forewing of the manipulated side flapped at a shallower stroke plane angle. In addition, the angular position of the stroke reversal points became asymmetrical. When the wingbeat amplitude and frequency of the three wings were used as input in a simple aerodynamic model, the estimation of total aerodynamic force was not significantly different (paired t-test,  $p=0.73$ ) from the force produced by the four wings during normal flight. Thus, the removal of one wing resulted in adjustments of the motions of the remaining three wings, exemplifying the precision and plasticity of coordination between the operational wings. Such coordination is vital for precise maneuvering during normal flight but it also provides the means to maintain flight when some of the wings are severely damaged." (Authors)] Address: Kassner, Z., Dept Zoology, Fac. Life Sciences, Tel Aviv University, 6997801, Israel

**15622.** Kastner, F.; Buchwald, R.; Kömer, F.; Marxmeier, U.; Steffens, P.; Winkler, C.-; Jödicke, K.; Mauschering, I. (2016): Wiederansiedlungen als Maßnahmen des Artenschutzes. Die Grüne Mosaikjungfer (*Aeshna viridis*, Odonata) in Niedersachsen und Schleswig-Holstein – ein Beitrag zum Habitatverbund. *Naturschutz und Landschaftsplanung* 48(3): 87-96. (in German, with English summary) ["Reintroduction as a method of species conservation for the Green Hawker (*Aeshna viridis*) – Contribution to habitat networking in Lower Saxony and Schleswig-Holstein - Habitat loss results in a continuous species decline. Options to stop the decline include the improvement of habitat quality or habitat connectivity and in this context also the reintroduction of species to their former range. This paper presents three species conservation projects in Northern Germany aiming to reintroduce and stabilize the rare and protected dragonfly species Green Hawker (*Aeshna viridis*). The dragonfly *A. viridis* is strongly associated with the Water Soldier (*Stratiotes aloides*) as highly specified plant species for oviposition. In two of the projects *S. aloides* was reintroduced in ponds and ditches in order to establish suitable habitats for *A. viridis*. The results showed that the reintroduction of *S. aloides* can be successfully implemented but does not always succeed. Beside the plants the dragonfly species could also be reintroduced indirectly, either as egg or larvae, by transferring it together with the plants. In the third project larvae of *A. viridis* were reintroduced in a second phase after an efficient resettlement of *S. aloides* some years earlier, since the dragonfly had not been successfully transferred together with the plant." (Authors)] Address: Kastner, Friederike, AG Vegetationskunde und Naturschutz, IBU, Carl von Ossietzky Universität Oldenburg, 26111 Oldenburg, Germany. E-Mail: Friederike.Kastner@uni-oldenburg.de

**15623.** Kautza, A.R.; Sullivan, S.M.P. (2016): The energetic contributions of aquatic primary producers to terrestrial food webs in a mid-size river system. *Ecology* 97(3): 694-705. (in English) ["Rivers are increasingly recognized as providing nutritional subsidies (i.e., energy and nutrients) to adjacent terrestrial food webs via depredation of aquatic organisms (e.g., emergent aquatic insects, crayfish, fish) by terrestrial consumers. However, because these prey organisms assimilate energy from both aquatic (e.g., benthic algae, phytoplankton, aquatic macrophytes) and terrestrial (e.g., riparian leaf detritus) primary producers, river subsidies to terrestrial consumers represent a combination of aquatically- and terrestrially-derived energy. To date, the explicit contribution of energy derived from aquatic primary producers to terrestrial consumers has not been fully explored yet might be expected to be quantitatively important to terrestrial food webs. At 12 reaches along a 185-km segment of the 6th-order Scioto River system (Ohio, USA), we quantified the relative contribution of energy derived from aquatic primary producers to a suite of terrestrial riparian consumers that integrate the adjacent landscape across multiple spatial scales through their foraging activities (tetragnathid spiders, rove beetles, adult coenagrionid damselflies, riparian swallows, and raccoons). We used naturally-abundant stable isotopes ( $^{13}\text{C}$  and  $^{15}\text{N}$ ) of periphyton, phytoplankton, macrophytes, and terrestrial vegetation to evaluate the energetic contribution of aquatic primary producers to terrestrial food webs. Shoreline tetragnathid spiders were most reliant on aquatic primary producers (50%), followed by wider-ranging raccoons (48%), damselflies (44%), and riparian swallows (41%). Of the primary producers, phytoplankton (19%) provisioned the greatest nutritional contribution to terrestrial consumers (considered collectively), followed by periphyton (14%) and macrophytes (11%). Our findings provide empirical evidence that aquatic primary producers of large streams and rivers can be a critical nutritional resource for terrestrial food webs. We also show that aquatically-derived nutrition contributes to both shoreline and broader-ranging terrestrial consumers and thus may be an important landscape-scale energetic linkage between rivers and upland habitats." (Authors)] Address: Kautza, A.R., Univ. of Minnesota Fisheries, Wildlife, & Conservation Biology, USA. E-mail: arkautza@umn.edu

**15624.** Kohli, M.K.; Ware, J.L.; Bechly, G. (2016): How to date a dragonfly: Fossil calibrations for odonates. *Palaeontologia Electronica* 19.1.1FC: 14 pp. (in English) ["Molecular data along with fossils are being used increasingly to recover time-calibrated phylogenetic trees. Recently there have been manuscripts that have used divergence dating to understand evolutionary history of certain clades within Odonata (dragonflies and damselflies), yet the number of such articles is still low. We examined the Odonata fossil record and made a list of fossils that can be used for divergence time analysis. In this manuscript we provide a detailed review of the known crown group fossils for the order Odonata and nine nodes within this clade: Zygoptera, Epiprocta, Anisoptera, Aeshnidae, Gomphidae, Cavilabiata, Macromiidae, Corduliidae, and Libellulidae." (Authors)] Address: Bechly, G., Dept of Paleontology,

State Museum of Natural History, Rosenstein 1, 70191 Stuttgart, Germany. E-mail: guenter.bechly@smns-bw.de

**15625.** Kosterin, O.E.; Yokoi, N. (2016): *Asiagomphus reinhardti* sp. nov. (Odonata, Gomphidae) from eastern Cambodia and southern Laos. *Zootaxa* 4103(1): 35-42. (in English) ["*Asiagomphus reinhardti* sp. nov. is described by two males from Annamense Mountains in eastern Cambodia (holotype: Cambodia, Mondulkiri Province, the left tributary of the main river downstream from Buu Sraa Waterfall, 12°34'01"–19° N 107°24'50"–25'03" E, ca 450 m a.s.l., 15 vi 2014, RMNH) and southern Laos. The species is characterised by a large caudal lobe on S10 in males and a blunt medial lateroventral projection at cercus." (Authors)] Address: Yokoi, N., 32-37-11, Kaisei, Koriyama, Fukushima, 963-8851 Japan. E-mail: yokoi@orange.plala.or.jp

**15626.** Kubohara, T.; Ii, H. (2016): Cu, Co and Ni Contamination index for river using river insects and river plants. *International Journal of GEOMATE* 11(26): 2651-2658. (in English) ["Useful species as an index of metal contamination needs a high metal concentration in a contaminated area and low metal concentration in a non-contaminated area. Moreover, it needs a high metal concentration factor. Metal concentrations of moss were high in the Cu mine area (31 to 21,000 and 2 to 200 mg/kg-dry for Cu and Co) and were low in the other areas (2 to 87 and 2 to 33 mg/kg-dry for Cu and Co). Ni concentrations of caddice-worm were high in the serpentinite area (9 to 590 mg/kg-dry) and were low in the other areas (2 to 74 mg/kg-dry). Moss had the highest concentration factor (160,000, 4,600 and 59,000 for Cu, Co and Ni) among river plants. Therefore, it was clarified that moss was useful species for an index of Cu, Co and Ni contamination among river plants based upon its metal concentration and concentration factor. In river insects, metal concentrations of crane fly larva were high in the Cu mine area (50 to 1,400 and 1 to 82 mg/kg-dry for Cu and Co) and were low in the other areas (11 to 130 and 0.7 to 10 mg/kg-dry for Cu and Co). Crane fly larva had the highest concentration factor for Cu (46,000) and also kept high concentration factor for Co (2,700) among river insects. Ni concentrations of caddice-worm were high in the serpentinite area (52 to 220 mg/kg-dry) and were low in the other areas (0.3 to 20 mg/kg-dry). Caddice-worm had the highest Ni concentration factor (22,000) among river insects. Therefore, it was clarified that crane fly larva was useful species for an index of Cu and Co contamination and caddice-worm was useful species for an index of Ni contamination based upon their metal concentrations and concentration factors." (Authors)] Address: Kubohara, T., Graduate School of Systems Engineering, Wakayama University, Japan

**15627.** Lacerda dos Santos, N.C.; Soares de Santana, H.; Dias, R.M.; Ferreira Borges, H.L.; Ferreira de Melo, V.; Severi, W.; Gomes, L.C.; Agostinho, A.A. (2016): Distribution of benthic macroinvertebrates in a tropical reservoir cascade. *Hydrobiologia* 765: 265-275. (in English) ["The functioning of systems arranged in cascades of reservoirs can be explained by the Cascading Reservoir Continuum

Concept, providing a theoretical framework for addressing ecological processes. In this context, this study tested the following hypotheses: (i) the benthic macroinvertebrate assemblage shows a nested distribution along a reservoir cascade; and (ii) local factors explain the structure of the benthic assemblage in every reservoir along the cascade. Macroinvertebrates play essential role in aquatic systems, especially due to recycling and, in reservoirs, as important links in every food chain. Sampling was conducted quarterly between October 2006 and September 2010 in six reservoirs located in the São Francisco River, Brazil. The benthic macroinvertebrate assemblage showed nested distribution in the reservoirs, indicating that a loss of species occurs along the cascade. Each reservoir presented a different set of variables that explained the distribution of macroinvertebrates, showing the importance of local factors determining the composition and distribution of benthic assemblages in the reservoirs. Therefore, there is a clear interaction between the position of a reservoir along a cascade and the macroinvertebrate assemblages, which indicate the importance of considering this pattern during the decision-making process of constructing new dams on rivers already regulated." (Authors) The list of taxa includes 'Coenagrionidae' and 'Gomphidae'.] Address: Lacerda dos Santos, Natália Carneiro Núcleo de Pesquisas em Limnologia, Ictiologia e Aquicultura – Programa de Pós-graduação em Ecologia de Ambientes Aquáticos Continentais, Univ. Estadual de Maringá, Av. Colombo, 5790, Maringá, PR, CEP 87020-900, Brazil. E-mail: natalia.ictio@gmail.com

**15628.** Lee, H.-J.; Johansson, F. (2016): Compensating for a bad start: compensatory growth across life stages in an organism with a complex life cycle. *Canadian Journal of Zoology* 94(1): 41-47. (in English) ["Organisms with a complex life cycle are characterized by a life history shift through metamorphosis, and include organisms such as insects and amphibians. They must optimize their use of resources and behaviour across different life stages in order to maximize their fitness. An interesting question with regard to such life history shifts is whether growth in the juvenile stage can be compensated for in the adult stage. Here we ask whether damselflies are able to compensate for depressed growth during the juvenile aquatic stage in their terrestrial adult stage. Damselflies emerge at a fixed adult body size, but feed during the adult stage and are thus able to gain mass as adults. We performed a mark recapture study in order to answer whether individuals that emerge from metamorphosis with a low mass are able to compensate by subsequent mass gain during the adult stage. Results showed that compensatory mass gain occurred in the adult stage such that small individuals gained more mass than large individuals. We also found that females gained more mass than males. However, individuals that emerged at a low mass still had lower mass as mature adults than individuals that emerged at a high mass, suggesting that compensation was not complete. This suggests that larval ecology and adult fitness are tightly linked and future research should focus more on elucidating the nature of this relationship." (Authors) *Lestes sponsa*] Address: Johansson, F., Department of Ecology



and Genetics, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, 752 36 Uppsala, Sweden. E-mail: frank.johansson@ebc.uu.se

**15629.** Letsch, H.; Gottsberger, B.; Ware, J.L. (2016): Not going with the flow: a comprehensive time-calibrated phylogeny of dragonflies (Anisoptera: Odonata: Insecta) provides evidence for the role of lentic habitats on diversification. *Molecular Ecology* 25(6): 1340-1353. (in English) ["Ecological diversification of aquatic insects has long been suspected to have been driven by differences in freshwater habitats, which can be classified into flowing (lotic) waters, and standing (lentic) waters. The contrasting characteristics of lotic and lentic freshwater systems imply different ecological constraints on their inhabitants. The ephemeral and discontinuous character of most lentic water bodies may encourage dispersal by lentic species in turn reducing geographical isolation among populations. Hence, speciation probability would be lower in lentic species. Here, we assess the impact of habitat use on diversification patterns in dragonflies (Anisoptera: Odonata). Based on eight nuclear and mitochondrial genes, we inferred species diversification with a model-based evolutionary framework, to account for rate variation through time and among lineages, and to estimate the impact of larval habitat on the potentially non-random diversification among anisopteran groups. Ancestral state reconstruction revealed lotic fresh water systems as their original primary habitat, while lentic waters have been colonised independently in Aeshnidae, Corduliidae and Libellulidae. Furthermore, our results indicate a positive correlation of speciation and lentic habitat colonisation by dragonflies: speciation rates increased in lentic Aeshnidae and Libellulidae, whereas they remain mostly uniform among lotic groups. This contradicts the hypothesis of inherently lower speciation in lentic groups and suggests species with larger ranges are more likely to diversify, perhaps due to higher probability of larger areas being dissected by geographical barriers. Furthermore, larger range sizes may comprise more habitat types, which could also promote speciation by providing additional niches, allowing the coexistence of emerging species." (Authors)] Address: Letsch, H., Dept Botanik & Biodiversitätsforschung, Univ. Wien, Rennweg 14, 1030 Vienna, Austria. E-mail: harald.letsch@univie.ac.at

**15630.** Lima, F.P.; Nobile, A.B.; Freitas-Souza, D.; Carvalho, E.D.; Vidotto-Magnoni, A.P. (2016): Feeding ecology of *Rhinodoras dorbignyi* (Kner, 1855) (Siluriformes: Doradidae) in the Paranapanema River, SP, Brazil. *Biotemas* 29(1): 67-73. (in English, with Portuguese summary) ["Studies describing the diet of fish are important to determine trophic chain relationships, habitat occupation, trophic niches, and to define food habits of species. To describe the diet of *Rhinodoras dorbignyi*, six collections were made bi-monthly in the upper Paranapanema River, SP, from April 2010 to February 2011. Of the 63 samples collected, 30 had stomach content. The diet of this species was determined using two methods: (i) alimentary index (AI%) and (ii) graphical analysis of feeding strategy. Based on the results, *R. dorbignyi* is an insectivorous species and autochthonous

items play an important role in the diet of this species." (Author) Odonata only marginally contribute to the diet of *R. dorbignyi*.] Address: Felipe Pontieri de Lima, F., Univ. Estadual Paulista, Instituto de Biociências Departamento de Morfologia, Laboratório de Biologia e Ecologia de Peixes Distrito de Rubião Júnior, s/n, CEP 18.618-970, Botucatu – SP, Brazil. E-mail: fpl.limao@hotmail.com

**15631.** Macedo, D.R.; Hughes, R.M.; Ferreira, W.R.; Firmiano, K.R.; R.O. Silva, D.R.O.; Ligeiro, R.; Kaufmann, P.R.; Callisto, M. (2016): Development of a benthic macroinvertebrate multimetric index (MMI) for Neotropical Savanna headwater streams. *Ecological Indicators* 64: 132-141. (in English) ["Highlights: •We tested four macroinvertebrate multimetric indices (MMIs) for the Cerrado biome. •We used a statistical criterion for identifying least- and most-disturbed sites. •The best-performing MMI had landscape-adjusted and PCA-selected metrics. •Our MMI is sensitive to anthropogenic pressures at local- and catchment-scales. Abstract: Assessing the ecological impacts of anthropogenic pressures is a key task in environmental management. Multimetric indices (MMIs), based on aquatic assemblage responses to anthropogenic pressures, have been used increasingly throughout the world. The MMI approach is a low-cost, rapid field method that produces an aquatic condition index that responds precisely to anthropogenic pressures, making it useful for conservation and environmental management. We developed four candidate MMIs based on benthic macroinvertebrate assemblages sampled at 40 randomly selected sites to assess the environmental condition of streams upstream of a hydroelectric power plant in the Brazilian Neotropical Savanna biome. Those MMIs were built from landscape-adjusted and unadjusted biological metrics as well as two alternative ways of choosing metrics. The alternative MMIs performances were tested by comparing their precision to distinguish least-disturbed areas, responsiveness to discriminate least- and most-disturbed areas, and sensitivity to anthropogenic pressures at catchment and local scales. The best performing MMI had landscape-adjusted metrics and was produced through use of principal component analysis for metric selection. It included 4 metrics: Ephemeroptera richness, average tolerance score per taxon, percentage of predator individuals, and percentage of Odonata individuals adjusted by elevation. This index discriminated well the anthropogenic pressures at local- and catchment-scales, and at both scales simultaneously, as indicated by an integrated disturbance index. Our methodological development included statistical criteria for identifying least- and most-disturbed sites, calibrating for natural landscape variability, and use of non-redundant metrics. Therefore, we expect it will provide a model for environmental assessment of water resources elsewhere in Brazil and in other nations." (Authors)] Address: Macedo, D.R., Depto de Geografia, Instituto de Geociências, Univ. Federal de Minas Gerais, Av. Antônio Carlos 6627, CEP 31270-901, Belo Horizonte, MG, Brazil. E-mail: rodriguesmacedo@gmail.com

**15632.** Mainwaring, D.E.; Nguyen, S.H.; Webb, H.K.; Jakubov, T.; Tobin, M.; Lamb, R.; Wu, A.H.; Marchant, R.; Craw-

ford R.J.; Ivanova, E.P. (2016): The nature of inherent bactericidal activity: insights from the nanotopology of three species of dragonfly. *Nanoscale* 8: 6527-6534. (in English) ["While insect wings are widely recognised as multi-functional, recent work showed that this extends to extensive bactericidal activity brought about by cell deformation and lysis on the wing nanotopology. We now quantitatively show that subtle changes to this topography result in substantial changes in bactericidal activity able span an order of magnitude. Notably, the chemical composition of the lipid nanopillars was seen by XPS and synchrotron FTIR microspectroscopy to be similar across these activity differences. Modelling the interaction between bacterial cells and the wing surface lipids of 3 species of dragonflies (*Hemianax papuensis*, *Austroaeschna multipunctata*, *Diplacodes bipunctata*), that inhabit similar environments but with distinctly different behavioural repertoires, provided the relationship between surface structure and antibacterial functionality. In doing so, these principal behavioural patterns correlated with the demands for antimicrobial efficiency dictated by differences in their foraging strategies. This work now reveals a new feature in the design elegance of natural multi-functional surfaces as well providing insights into bactericidal mechanism underlying inherently antimicrobial materials, while suggesting that nanotopology is related to evolutionary development of a species through the demands of its behavioural repertoire. The underlying relationship between the processes of wetting, adhesion and capillarity of the lipid nanopillars and bactericidal efficiency suggests new prospects for purely mechano-responsive antibacterial surfaces." (Authors)] Address: Mainwaring, D.E., Faculty of Science, Engineering and Technology, Swinburne Univ. of Technology, PO Box 218, Hawthorn, Victoria 3122, Australia. E-mail: eivanova@swin.edu

**15633.** Mair, L.; Ruete, A. (2016): Explaining spatial variation in the recording effort of citizen science data across multiple taxa. *PLoS ONE* 11(1): e0147796. doi:10.1371/journal.pone.0147796: 13 pp. (in English) ["The collation of citizen science data in open-access biodiversity databases makes temporally and spatially extensive species' observation data available to a wide range of users. Such data are an invaluable resource but contain inherent limitations, such as sampling bias in favour of recorder distribution, lack of survey effort assessment, and lack of coverage of the distribution of all organisms. Any technical assessment, monitoring program or scientific research applying citizen science data should therefore include an evaluation of the uncertainty of its results. We use 'ignorance' scores, i.e. spatially explicit indices of sampling bias across a study region, to further understand spatial patterns of observation behaviour for 13 reference taxonomic groups. The data is based on voluntary observations made in Sweden between 2000 and 2014. We compared the effect of six geographical variables (elevation, steepness, population density, log population density, road density and footpath density) on the ignorance scores of each group. We found substantial variation among taxonomic groups in the relative importance of different geographic variables for explaining ignorance scores.

In general, road access and logged population density were consistently important variables explaining bias in sampling effort, indicating that access at a landscape-scale facilitates voluntary reporting by citizen scientists. Also, small increases in population density can produce a substantial reduction in ignorance score. However the between-taxa variation in the importance of geographic variables for explaining ignorance scores demonstrated that different taxa suffer from different spatial biases. We suggest that conservationists and researchers should use ignorance scores to acknowledge uncertainty in their analyses and conclusions, because they may simultaneously include many correlated variables that are difficult to disentangle." (Authors) The data set includes Odonata.] Address: Mair, Louise, Species Information Centre, Swedish University of Agricultural Sciences (SLU), P.O. 7007, 750 07 Uppsala, Sweden. E-mail: louise.mair@slu.se

**15634.** Marinov, M.; Amaya-Perilla, C.; Holwell, G.I.; Varsani, A.; Van Bysterveldt, K.; Kraberger, S.; Stainton, D.; Dayaram, A.; Curtis, N.; Cruickshank, R.H.; Paterson, A. (2016): Geometric morphometrics and molecular systematics of *Xanthocnemis sobrina* (McLachlan, 1873) (Odonata: Coenagrionidae) and comparison to its congeners. *Zootaxa* 4078(1): 84-120. (in English) ["The taxonomy of the damselfly genus *Xanthocnemis* is revised, with particular focus on populations inhabiting the North Island of New Zealand. Earlier studies revealed two species: *X. sobrina*, restricted to cool, shaded streams in kauri forests and other forested areas, and *X. zealandica*, a common species throughout New Zealand except the Chatham and subantarctic islands. A field study encompassing aquatic habitats throughout the whole North Island was carried out to establish the relationship between morphological variation (body size and various morphological traits over the entire body) observed by previous researchers with ecological conditions and/or geographical location. The main aim was to propose reliable diagnostic features that could be used in future studies. Morphological and molecular variation was assessed. Morphological examination included assigning landmarks for all body parts corresponding to the external morphological features that are usually used in Odonata taxonomy. Molecular analysis targeted fragments of the 28S and 16S rRNA genes. Congruence was sought between both types of data, statistical support for two morphological types previously described as different species and a maximum likelihood phylogenetic tree in conjunction with a pairwise genetic distance matrix constructed from the DNA sequences obtained from the sampled specimens. Geometric morphometrics revealed statistically significant differentiation between specimens identified as *X. zealandica* and *X. sobrina* for four traits: (1) dorsal view of the head for both sexes as well as male appendages from (2) dorsal, (3) ventral and (4) lateral views. Wings appeared different when analysed for males only. Molecular analysis, however, grouped all specimens into a single undifferentiated cluster with very low mean pairwise distance (<0.01) between them showing almost no variation at the molecular level among the sampled populations on the North Island. Therefore, an additional

analysis of the mitochondrial cytochrome c-oxidase I gene was carried out comparing randomly selected North Island specimens to *Xanthocnemis* specimens targeted in other molecular studies (Nolan et al. 2007, Amaya-Perilla et al. 2014). The analysis of the COI gene confirmed that all North and South Island isolates of *Xanthocnemis* cluster together in a well-supported clade with pairwise identity >96% and ~93% pairwise identity with *X. tuanuii* sequences obtained from the Chatham Island specimens. A careful investigation of the thin plate spline deformations generated for the geometric morphometric landmarks showed that the significant variations in the appendages of the *Xanthocnemis* specimens appeared to be the result of size, rather than shape, differences. Therefore, *X. sobrina* is proposed as a synonym of *X. zealandica*. Recently Amaya-Perilla et al. (2014) synonymised *X. sinclairi* with *X. zealandica* and confirmed the status of the Chatham Island *X. tuanuii* as a distinct species. It is therefore proposed that the genus *Xanthocnemis* consists of two species only: *zealandica* occurring all over the North, South and Stewart Islands, and *tuanuii*, endemic to Chatham and Pitt islands. Considering several statistical tests involving body measurements and ecological variables recorded during the field study, as well as various discussion points from similar studies of other species of Odonata, two alternative hypotheses are proposed for future testing. The first hypothesis synonymises *X. sobrina* with *X. zealandica* and suggests a possible explanation for the evolution of the two morphological traits that have previously been considered diagnostic for these species. The second hypothesis suggests that as typical *X. sobrina* were not sampled during this study this could represent a species that is now extinct, unless future studies prove it otherwise." (Authors)] Address: Marinov, M., Investigation and Diagnostic Centres and Response , Operations Branch, Ministry for Primary Industries, 231 Morrin Rd , Auckland 1072 New Zealand. E-mail: Milen.Marinov@mpi.govt.nz

**15635.** Martínez, A.; Larrañaga, A.; Miguélez, A.; Yvon-Durocher, G.; Pozo, J. (2016): Land use change affects macroinvertebrate community size spectrum in streams: the case of *Pinus radiata* plantations. *Freshwater Biology* 61: 69-79. (in English) ["(1.) In low-order forested streams, catchment-scale land-use modifications to vegetation can affect energy inputs into streams and trophic interactions within these donor-controlled food webs. (2.) We examined the effects of *Pinus radiata* plantations on the intercept and slope of the size spectrum (the relationship between log-mass and log-density) of macroinvertebrate communities in low-order forested streams. We compared three streams draining pine plantations with three draining native deciduous forests, all without significant differences in water physicochemical characteristics. (3.) While size spectrum intercept was similar between the two stream types, the slope of the size spectrum was shallower in pine than in deciduous streams based on a decline in the density of the smaller individuals. (4.) The shredder feeding guild showed the largest changes, with a significant reduction in their total density and, specifically, in the density of the smaller individuals from the deciduous to the pine streams. This alteration is

explained by the change in very specialist shredders, such as plecopterans and trichopterans, but not in those with highly mobile crustaceans or more generalist dipterans. (5.) The effect detected for shredders might have scaled up to higher trophic levels as the density of invertebrate predators (small and big) was lower in streams under pine, suggesting a response to prey limitation. 6. These results indicate that the change of in-stream resource quality arising from the replacement of deciduous vegetation by pine plantations can trigger size-specific responses of macroinvertebrates and target specialised feeding guilds such as shredders, and can elicit a bottom-up reaction in the organisation of food webs." (Authors) Boyeria, Calopteryx and Gomphus settled only in deciduous streams, while Cordulegaster inhabitate deciduous as pine streams as well.] Address: Martínez, A., Laboratory of Stream Ecology, Department of Plant Biology and Ecology, University of the Basque Country, P.O. Box 644, 48080 Bilbao, Spain. E-mail: aingeru.martinez@ehu.es

**15636.** Melfi, J.; Leonardo, A.; Wang, J. (2016): Recovery methods of the dragonfly from irregular initial conditions. *Bulletin of the American Physical Society*. Abstract: R41.00013: (in English) [Verbatim: We release dragonflies from a magnetic tether in a wide range of initial orientations, which results in them utilizing multiple methods to regain their typical flight orientation. Special focus is placed on dropping them while upside down, as the recovery method used is a purely rolling motion. Filming this stereotypical motion with a trio of high speed cameras at 4000 fps, we capture detailed body and wing kinematics data to determine how the dragonfly generates this motion. By replaying the flights within a computer simulation, we can isolate the significant changes to wing kinematics, and find that it is an asymmetry in the wing pitch which generates the roll. Further investigation demonstrates that this choice is highly dependent upon the state of the dragonfly, and as such our results indicate the dragonfly both tracks its current state, and changes its mid-flight control mechanisms accordingly.] Address: Wang, Z. Jane, Theoretical and Applied Mechanics, Cornell University, Ithaca, New York 14853, USA. E-mail: z.jane.wang@cornell.edu

**15637.** Meurgey, F. (2016): The genus *Brechmorhoga* Kirby, 1894, in the West Indies, with a proposed new status for *Brechmorhoga archboldi* (Donnelly) (Odonata; Libellulidae). *Zootaxa* 4079(1): 53-64. (in English) ["A revision of the species of *Brechmorhoga* from the Lesser Antilles includes *Brechmorhoga archboldi* (Donnelly, 1970) and *Brechmorhoga praecox grenadensis* Kirby, 1894. New distribution records are provided. *Brechmorhoga archboldi* is synonymized with *B. praecox grenadensis*. Figures, morphological characters of both sexes and the description of the female of *B. p. grenadensis* are given." (Author)] Address: Meurgey, F., Muséum d'Histoire Naturelle 12, rue Voltaire, 44000 Nantes, France. E-mail: francois.meurgey@mairie-nantes.fr

**15638.** Meurgey, F. (2016): *Macrothemis meurgeyi* Daigle, 2007, from Guadeloupe is a junior synonym of *Macrothemis*



celeno (Selys in Sagra, 1857) (Odonata; Libellulidae). *Zootaxa* 4072(3): 387-390. (in English) ["The assignment of *Macrothemis meurgeyi* to *M. celeno* is deduced from the study of supplementary material from Guadeloupe, where it represents a smaller and darker island form of the latter species. Upon examination of specimens identified as *M. meurgeyi* from Guadeloupe, the records for Goyaud (1994) and Meurgey & Picard (2011) should now be changed to *M. celeno*. *Macrothemis* is represented in the West Indies by only two species, *Macrothemis inequiunguis* Calvert, 1895, in Cuba (Peters 1988) and *Macrothemis celeno* occurring from Cuba to Puerto Rico and again on Guadeloupe. During intensive surveys on other Lesser Antillean islands, i.e., Dominica, Martinique, St Lucia, St Vincent and Grenada, I failed to find members of this genus." (Author)] Address: Meurgey, F., Société d'Histoire Naturelle L'Herminier - Muséum d'Histoire Naturelle 12, rue Voltaire, 44000 Nantes – France. E-mail: francois.meurgey@mairie-nantes.fr

**15639.** Miyazaki, Y.; Teramura, A.; Senou, H. (2016): Biodiversity data mining from Argus-eyed citizens: the first illegal introduction record of *Lepomis macrochirus macrochirus* Rafinesque, 1819 in Japan based on Twitter information. *ZooKeys* 569: 123-133. (in English) ["An apparent illegal introduction of *Lepomis macrochirus macrochirus* from Yokohama City, Kanagawa Prefecture, Japan, is reported based on a juvenile specimen and a photograph of two adults collected on 14 June 2015 and deposited in the Kanagawa Prefectural Museum of Natural History. The specimens and photographs were initially reported on the internet-based social networking site, Twitter. Two specimens of *Carassius auratus*, including an aquarium form, were also reported at the same locality and date, suggesting that the illegal introductions originated from an aquarium release. Our report demonstrates an example of web data mining in the discipline of Citizen Science." (Authors) The study includes records of larvae of *Sympetrum* sp.] Address: Miyazaki, Y., Kanagawa Prefectural Museum of Natural History, 499 Iryuda, Odawara-shi, Kanagawa 250-0031, Japan. E-mail: miyazaki@nh.kanagawa-museum.jp

**15640.** Moskowitz, D.P. (2016): The life history, behavior and conservation of the Tiger Spiketail dragonfly (*Cordulegaster erronea* Hagen) in New Jersey. Ph.D. thesis, Graduate School - New Brunswick, Rutgers, The State University of New Jersey: VIII + 128 pp. (in English) ["This dissertation explores the life history and behaviour of *C. erronea* and provides recommendations for the conservation of the species. Like most species in the genus *Cordulegaster* and the family *Cordulegastridae*, the Tiger Spiketail is geographically restricted, patchily distributed with its range, and a habitat specialist in habitats susceptible to disturbance. Most *Cordulegastridae* species are also of conservation concern and *C. erronea* is no exception. However, many aspects of the life history of *C. erronea* and many other *Cordulegastridae* are poorly understood, complicating conservation strategies. In this dissertation, I report the results of my research on *C. erronea* in New Jersey. The research to investigate life history and behaviour included: larval and

exuvial sampling; radio-telemetry studies; marking-resighting studies; habitat analyses; observations of ovipositing females and patrolling males, and the presentation of models and insects to patrolling males. The research reports: the first use of radio-telemetry for the species; the first observations of mating; the first comprehensive report and analysis of larval site emergence site selection; the triggering mechanisms for male recognition of females; adult and larval habitat use, and many other life history and behavioural aspects of the species. The dissertation also provides recommendations for conservation strategies that maybe useful for protecting the Tiger Spiketail and other *Cordulegastridae* species." (Author)] Address: not stated

**15641.** Munguía-Steyer, R.; Córdoba-Aguilar, A.; Maya-García, J.S. (2016): Rubyspot territorial damselflies behave as "Nasty Neighbors". *Journal of Insect Behavior* 29(2): 143-152. (in English) ["Two mutually-excluding hypotheses explain the intensity of aggression between neighbours and their non-neighbours in territorial animals. On one hand, the "dear enemy" hypothesis predicts that territorial animals should be more tolerant towards their neighbours than towards non-neighbours. Conversely, the "nasty neighbor" hypothesis predicts increased aggression towards neighbours than non-neighbours. These different situations depend on who is more likely to be a real competitor, either a neighbour or a non-neighbour, and the intensity of resource competition. Male damselfly of *Hetaerina vulnerata* defend riverine, mating territories that is the main way to have access to females. These territories are not fixed and so males continuously defend them especially against neighbours. Given this, we tested whether the nasty neighbour principle operates in this species. We monitored a population during an entire mating season, and recorded duration of aggressive behaviours. As a key prediction of the nasty neighbour hypothesis, we expected that such behaviours last for longer when encountering a conspecific neighbour than a conspecific non-neighbour. We also predicted that such duration should be date-dependent as territorial competition could increase in the middle of the season when male density is at its highest. Our results corroborated that aggressive behaviours lasted longer against a neighbour male than a non-neighbour male but there was not effect of date. Thus, neighbours may pose a greater risk and may be a strong selective force than non-neighbours in terms of resource competition. Since neighbour males are continuously trying to widen their territory boundaries (a situation that has been also found in other study systems), an owner male may not even need to recognize his neighbours to fight back." (Authors)] Address: Córdoba-Aguilar, A., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

**15642.** Mutlu, O.; Gumuslu, E.; Kokturk, S.; Ulak, G.; Akar, F.; Erden, F.; Kaya, H.; Tanyeri, P. (2016): Effects of chronic administration of adipokinetic and hypertrehalosemic hormone on animal behavior, BDNF, and CREB expression in

the hippocampus and neurogenesis in mice. *Fundamental & Clinical Pharmacology* 30(1): 4-13. (in English) ["Neurosecretory cells in corpus cardiacum of insects synthesize a set of hormones that are called adipokinetic, hypertrehalosaemic or hyperprolinaemic, depending on insect in question. This study investigated effects of chronic administration of *Anax imperator* adipokinetic hormone (Ani-AKH), *Libellula auripennis* adipokinetic hormone (Lia-AKH), and *Phormia-Terra* hypertrehalosaemic hormone (Pht-HrTH) on depression, anxiety, analgesy, locomotion in forced swimming (FST), elevated plus-maze (EPM), hot plate, and locomotor activity tests. Ani-AKH (1 and 2 mg/kg), Lia-AKH (1 and 2 mg/kg), and Pht-HrTH (1 and 2 mg/kg) had antidepressant effects in forced swimming test. Lia-AKH (2 mg/kg) and Pht-HrTH (1 and 2 mg/kg) had anxiolytic effects when given chronically in elevated plus-maze test. Ani-AKH (1 and 2 mg/kg) and Pht-HrTH (2 mg/kg) had antinociceptive effects in hot plate test in male balb-c mice. Ani-AKH (2 mg/kg), Lia-AKH (1 and 2 mg/kg), and Pht-HrTH had locomotion-enhancing effects in locomotor activity test in male balb-c mice. Drug treatment significantly increased brain-derived neurotrophic factor (BDNF) and cyclic adenosine monophosphate (cAMP) response element binding protein (CREB) gene expression levels compared to control levels. Pht-HrTH and Ani-AKH groups had significantly increased numbers of BrdU-labeled cells, while neurodegeneration was lower in the Pht-HrTH group. Our study showed that AKH/RPCH family peptides may be used in treatment of psychiatric illness such as depression and anxiety, in treatment of pain and in diseases related to locomotion system. AKH/RPCH family peptides increase neurotrophic factors in brain and have potential proliferative and neuroprotective effects in hippocampal neurogenesis and neurodegeneration." (Authors)] Address: Mutlu, O., Department of Pharmacology, Faculty of Medicine, Kocaeli University, Kocaeli, Turkey. E-mail: oguzmutlu80@hotmail.com

**15643.** Naka, H.; Hashimoto, H. (2016): The effect of passive deformation of dragonfly wing on aerodynamic characteristics. *Transactions of the JSME* 82(833): 14 pp. (in Japanese, with English summary) ["Dragonflies can perform both of gliding and flapping flight and have high maneuverability in spite of small-size. The aim of this study is to develop Micro Air Vehicle (MAV) based on the flight of dragonfly. The characteristics of wings are very important for development of MAV. Dragonfly wing is easy to be passively deformed in the tip side from the nodus in flapping flight, and thereby, aerodynamic force is generated effectively. In this study, the effect of passive deformation of wing on aerodynamic force was investigated using fluid-structure interaction analysis to develop the artificial wing suitable for dragonfly-like MAV. In this study, aerodynamic characteristics of wings in the gliding flight and aerodynamic force generated in flapping flight are numerically analyzed. In this analysis, nodus wing models, which can deform passively, and rigid wing model, which cannot deform, are used. Nodus wing model imitates the nodus structure; the tip side of this model is free to rotate around leading edge. As a result of gliding flight, the lift coefficient of the nodus wing was lower in low-

angle of attack and was higher in high-angle of attack, compared to rigid wing. Moreover, the more flexible wings are, the more change. The gliding flight is low-angle of attack usually. Therefore, flexible wing is less suitable for the gliding flight than inflexible wing. As a result of flapping flight, the nodus wing made drag force generated during down stroke lower compared with the rigid wing. However, thrust forces generated during up stroke in both wings were the same. Therefore, flexible wings are more suitable for the flapping flight than inflexible wing. The wings of dragonfly-like MAV need to appropriate level of flexibility to upgrade the performance in both case of gliding and flapping flight." (Authors)] Address: Naka, H., Graduate School of Science and Technology, Tokai Univ. 4-1-1 Kitakaname, Hiratsuka-shi, Kanagawa 259-1292, Japan. E-mail: hiromu@keyaki.cc.u-tokai.ac.jp

**15644.** Nayak, A.K.; Roy, U.S. (2016): An observation on the Odonata fauna of the Asansol-Durgapur Industrial Area, Burdwan, West Bengal, India. *Journal of Threatened Taxa* 8(2): 8503-8517. (in English) ["The present investigation was undertaken as a pilot study to examine the diversity, occurrence and distribution pattern of Odonata from the selected study sites of the Asansol-Durgapur industrial area of Burdwan District of West Bengal, India from January 2012 to December 2015. A combination of direct search and opportunistic sighting methods were applied to record 57 different Odonata species (38 dragonflies and 19 damselflies). Among the dragonflies the most diverse family was Libellulidae represented by 36 species while among damselflies Coenagrionidae was the most diverse family represented by 16 species. In spite of the Asansol-Durgapur region being an industrial urban area, the present study revealed a handsome diversity of odonates. A suitable geographic location, favourable climatic conditions, heterogeneous habitat types that included ponds, wetlands, riverbeds, grasslands and agricultural lands along with the presence of appropriate vegetation provided a comfortable shelter for Odonata species to flourish in this ecoregion. All the odonates noted in the present study belong to the Least Concerned category as designated by IUCN." (Authors)] Address: Nayak, A.K., Searsole Junior Basic School, Searsole Rajbari, Burdwan, West Bengal 713358, India. E-mail: amarnayak.stat@gmail.com,

**15645.** Neiss, U.G.; Hamada, N. (2016): Larva of *Palaemnema brasiliensis* Machado (Odonata: Platystictidae), from Amazonas, Brazil. *Zootaxa* 4078(1): 70-77. (in English) ["The larva of *P. brasiliensis* is described and illustrated based on last-instar larvae and exuviae of reared larvae collected in a blackwater stream in Barcelos and Presidente Figueiredo municipalities, Amazonas state, Brazil. The larva of *P. brasiliensis* can be distinguished from the two South American species of the genus with described larvae (*P. clementia* and *P. mutans*), mainly by presence of a single obtuse cusp on the labial palp, the presence and configuration of setae in the caudal lamellae, and the proportional length of terminal filaments of the caudal lamellae. The family is recorded here for the first time in Brazilian state

of Amazonas." (Authors)] Address: Neiss, U.G., Instituto de Criminalística, Depto de Polícia Técnica-Científica, Manaus, Amazonas, Brazil. E-mail: ulisses.neiss@gmail.com

**15646.** Niederer, W. (2016): Libellen (Insecta: Odonata) im Natura-2000-Gebiet Fohramoos (Vorarlberg, Österreich). *inatura – Forschung online* Nr. 26: 5 pp. (in German, with English summary) ["The Odonata of the Natura 2000 site Fohramoos (Vorarlberg, Austria), a bog habitat mosaic at the altitude of 1150m, were studied during the years 2013 und 2014. The investigation focused on the habitats covered by the Habitats Directive. A total number of 17 species was recorded, 11 species were found on active raised bogs. Aspects of nature conversation are discussed." (Authors)] Address: Walter Niederer, W., Im Wiesle 12, A-6974 Gaißau, Austria. E-Mail: walter.niederer@rheindelta.org

**15647.** Nikam, K.N., More, S.V. (2016): Diversity of Insects from Jangamhatti area, Chandgad, Kolhapur district of Maharashtra. *Biolife*4(1): 209-212. (in English) [The collections in 2014 to 2015 also include *Pseudagrion decorum* and *Crocothemis servillia*.] Address: Nikam, K.N., Department of Zoology, R.B. Madkholkar Mahavidyalaya, Chandgad, Maharashtra, India. Email: kedarinikam@gmail.com

**15648.** Nobre, C.E.B. (2016): *Erythrodiplax leticia*: Description of the female and updated geographic distribution (Odonata: Libellulidae). *Zootaxa* 4067(4): 469-472. (in English, with Spanish summary) ["The female of *E. leticia* is described and illustrated. The geographic distribution of the species is updated, and notes on its natural history are provided." (Author)] Address: Nobre, C.E.B., Centro de Conservação e Manejo de Fauna da Caatinga (CEMAFAUNA), Campus Ciências Agrárias, BR 407, Km 12, lote 543. Cep. 56.300-000, Petrolina, Pernambuco, Brazil. E-mail: celnobre@gmail.com

**15649.** Orr, A.G.; Richards, S.J. (2016): Three new species of *Papuagrion* Ris, 1913 (Odonata: Coenagrionidae) from the Hindenburg Wall region of western Papua New Guinea. *Zootaxa* 4072(3): 319-332. (in English) ["Three distinctive new species of *Papuagrion* Ris, 1913 are described from a high altitude area (1,770–1,820 m a.s.l.) at the base of the Hindenburg Wall, Western Province, Papua New Guinea. These are *P. chrysosoma* sp. nov., *P. marijanmatoki* sp. nov. and *P. tydecksjueringi* sp. nov.; all type material is deposited in the South Australian Museum (SAMA). These were the only species of the genus collected at higher altitudes in the Ok Tedi headwaters, and none of them were encountered at lower altitudes (300–900 m) despite intensive searches there. The new species described here bring to 26 the number of *Papuagrion* species known from the New Guinea region." (Authors)] Address: Orr, A.G., Environmental Futures Research Institute, Griffith University, Nathan, Qld 4111, Australia. E-mail: agorr@bigpond.com

**15650.** Ott, J. (2016): Libelle des Jahres 2016: Gemeine Binsenjungfer. *DATZ* 2/2016: 10. (in German) [Introductory note to the German "dragonfly of the year" (*Lestes sponsa*).]

Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**15651.** Phan, Q.T.; Dinh, T.P.A. (2016): Odonata from the Cham Islands, off central Vietnam, collected in September 2015. *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 13: 1-22. (in English) ["The first known Odonata records from the Cham Islands, off Quang Nam Province, central Vietnam are presented based on a brief collecting period in late September 2015. A total of 25 odonate species (8 Zygoptera and 17 Anisoptera) were recorded. Illustrations of the detailed structures of some species are provided." (Authors)] Address: Phan, Q.T., Department of Biology, Tokyo Metropolitan University, Minamiosawa 1-1, Hachioji, Tokyo 192-0397, Japan. E-mail: pqtoan84@gmail.com

**15652.** Piersanti, S.; Frati, F.; Rebor, M.; Salerno, G. (2016): Carbon dioxide detection in adult Odonata. *Zoology* 119(2): 137-142. (in English) ["Highlights: •Single-cell recordings from antennal sensory neurons of *Ischnura elegans* are shown. •Olfactory sensory neurons strongly inhibited by CO<sub>2</sub> were identified in this species. •These neurons responding to CO<sub>2</sub> are also excited by amines and inhibited by acids. •Further investigations are needed to assign a biological role to these Odonata sensory neurons. The present paper shows, by means of single-cell recordings, responses of antennal sensory neurons of the damselfly *Ischnura elegans* when stimulated by air streams at different CO<sub>2</sub> concentrations. Unlike most insects, but similarly to termites, centipedes and ticks, Odonata possess sensory neurons strongly inhibited by CO<sub>2</sub>, with the magnitude of the off-response depending upon the CO<sub>2</sub> concentration. The Odonata antennal sensory neurons responding to CO<sub>2</sub> are also sensitive to airborne odors; in particular, the impulse frequency is increased by isoamylamine and decreased by heptanoic and pentanoic acid. Further behavioural investigations are necessary to assign a biological role to carbon dioxide detection in Odonata." (Authors)] Address: Piersanti, Silvana, Dipartimento di Chimica, Biologia e Biotecnologie, Univ. degli Studi di Perugia, Via Elce di Sotto, 06123 Perugia, Italy. E-mail: silvana.piersanti@unipg.it

**15653.** Pinto, A.P. (2016): The dragonfly's face of the multidimensional Dr. Angelo Barbosa Monteiro Machado: a short bio-bibliography. *Zootaxa* 4078(1): 8-27. (in English) ["In this special issue celebrating the Brazilian researcher Dr. Angelo Barbosa Monteiro Machado's 80th birthday, I present a very short biographical overview focused on his prolific career as odonatologist. The doctor, professor, children's book writer, conservationist, comedian, neuroanatomist, and eventually odonatologist Professor Angelo has published more than 110 papers, of which 79 are on dragonflies. He erected 97 new names, an impressive number for a small and relatively well-known order of insects. Here are presented annotated checklists of his publications on dragonflies (from 1953 to September of 2015), and nomina, as well as few comments of his impact on Neotropical odonatology as a whole." (Authors)] Address: Pinto, A.P.,



Laboratório de Biologia e Sistemática de Odonata (LABIOSIS), Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista s/nº, São Cristóvão 20940-040, Rio de Janeiro, RJ, Brazil. E-mail: [odonata\\_angelo@hotmail.com](mailto:odonata_angelo@hotmail.com)

**15654.** Pinto, A.P.; Almeida, M.V.O. (2016): A taxonomic synopsis of South American Cyanogomphini Carle with description of *Cyanogomphus angelomachadoi* sp. nov. from the Cerrado of Brazil (Odonata: Gomphidae). *Zootaxa* 4078(1): 38-69. (in English) ["A synopsis of Cyanogomphini Carle, 1986 (sensu Belle 1996), including all species currently under the genera *Cyanogomphus* Selys, 1873, and *Tibiagomphus* Belle, 1992, is provided. *Cyanogomphus angelomachadoi* sp. nov. (Holotype male deposited in DZRJ: Brazil, Minas Gerais State, Jaboticatubas municipality, Parque Nacional da Serra do Cipó, collecting site Corrego das Pedras 19.22.17S, 43.36.03W, 76 m a.s.l., 12.XII.2011, A.P.M. Santos & D.M. Takiya leg.) is described and illustrated based on four males and two females from Minas Gerais and Sao Paulo States, southeastern Brazil. The new species is most similar to *C. waltheri* Selys, 1873, from which it can be distinguished by its smaller size; larger pale areas on mesepisternum; pale dorsal surface of metathoracic tibia; larger distal concavity on epiproct, with latero-distal projection, in lateral view forefinger-shaped; and occurrence in Cerrado province. Five species are recognized in Cyanogomphini, and for each one a synonymy, diagnoses, identification key and maps of distribution are presented. The status of sibling taxa *Tibiagomphus uncatus* (Fraser, 1947) and *T. noval* (Rodrigues Capitulo, 1985), as well as the *Agriogomphus*-complex of genera are also discussed." (Authors)] Address: Pinto, A.P., Laboratorio de Biologia e Sistemática de Odonata (LABIOSIS), Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista s/no, Sao Cristovao 20940-040, Rio de Janeiro, RJ, Brazil. E-mail: [odonata\\_angelo@hotmail.com](mailto:odonata_angelo@hotmail.com)

**15655.** Piria, M.; Jakšić, G.; Jakovlic, I.; Treer, T. (2016): Dietary habits of invasive Ponto-Caspian gobies in the Croatian part of the Danube River basin and their potential impact on benthic fish communities. *Science of The Total Environment* 540: 386-395. (in English) ["Highlights: •Dietary habits and impacts of invasive P-C gobies on other fish were studied. •Monkey and round goby preferred Trichoptera, Megaloptera and Coleoptera. •Bighead goby preferred Trichoptera, Gammarus and Pisces. •No negative impacts of the most abundant, monkey goby, on native fish populations. •Round goby negatively impacts native zingel, and bighead goby - chub populations. Abstract: Invasive Ponto-Caspian (P-C1) gobies have recently caused dramatic changes in fish assemblage structures throughout the Danube basin. While their presence in the Croatian part of the basin has been noted and distribution studied, their dietary habits and impacts on native fish communities have, until now, been unknown. In 2011, 17 locations in the Sava River Basin were sampled for fish and 15 for benthic invertebrates. Fish population monitoring data, available for nine

seasons (2003–2006 and 2010–2014) and 12 locations, were used to analyse the impacts of P-C gobies on benthic fish abundance. Gut content analysis indicates that the monkey goby *Neogobius fluviatilis* diet is very diverse, but dominated by Trichoptera, Chironomidae, Bivalvia and Odonata. The diet overlaps considerably with the round goby *Neogobius melanostomus* diet, although Gastropoda are dominant in the latter's diet. Small fish and *Gammarus* sp. dominate the bighead goby *Ponticola kessleri* diet. Comparison of gut content with the prey available in the environment indicates that monkey and round gobies exhibit preference for Trichoptera, Megaloptera and Coleoptera, and bighead goby for Trichoptera, *Gammarus* sp. and Pisces. P-C gobies in the Sava River are spreading upstream, towards the reaches with lower fish diversity. Analyses indicate potentially positive impacts of P-C gobies' presence on some fish populations: round and bighead goby on Balkan golden loach *Sabanejewia balcanica* and monkey goby on common carp *Cyprinus carpio*, crucian carp *Carassius carassius*, burbot *Lota lota* and Balkan loach *Cobitis elongata*. However, there are also indications that bighead and round goby could adversely impact the native chub *Squalius cephalus* and zingel *Zingel zingel* populations, respectively. As P-C gobies are still in the expansionary period of invasion and the ecosystem still adapting to new circumstances, continued monitoring of fish population dynamics in the Sava basin is needed to determine the outcome and impacts of this invasion." (Authors)] Address: Piria, Marina Piria, University of Zagreb, Faculty of Agriculture, Department of Fisheries, Beekeeping, Game management and Special Zoology, Svetošimunska 25, 10000 Zagreb, Croatia. E-mail: [mpiria@agr.hr](mailto:mpiria@agr.hr)

**15656.** Polo-Cavia, N.; Burraco, P.; Gomez-Mestre, I. (2016): Low levels of chemical anthropogenic pollution may threaten amphibians by impairing predator recognition. *Aquatic Toxicology* 172: 30-35. (in English) ["Highlights: •Humic acid and ammonium nitrate impair responses of tadpoles to predator cues. •Even low concentrations of pollutants increase predation risk of tadpoles. •Sublethal pollution may contribute to amphibian declines by disrupting predator recognition. Abstract: Recent studies suggest that direct mortality and physiological effects caused by pollutants are major contributing factors to global amphibian decline. However, even sublethal concentrations of pollutants could be harmful if they combined with other factors to cause high mortality in amphibians. Here we show that sublethal concentrations of pollutants can disrupt the ability of amphibian larvae to recognize predators, hence increasing their risk of predation. This effect is indeed much more important since very low amounts of pollutants are ubiquitous, and environmental efforts are mostly directed towards preventing lethal spills. We analyzed the effects of two common contaminants (humic acid and ammonium nitrate) on the ability of tadpoles of the western spadefoot toad (*Pelobates cultripes*) to recognize chemical cues from a common predator, nymphs of the dragonfly *Anax imperator*. We compared the swimming activity of tadpoles in the presence and absence of water-borne chemical cues from dragonflies at

different concentrations of humic acid and ammonium nitrate. Tadpoles reduced swimming activity in response to predator cues in the absence of pollutants, whereas they remained unresponsive to these cues when either humic acid or ammonium nitrate was added to the water, even at low concentrations. Moreover, changes in tadpole activity associated with the pollutants themselves were non-significant, indicating no toxic effect. Alteration of the natural chemical environment of aquatic systems by pollutants may be an important contributing cause for declines in amphibian populations, even at sublethal concentrations." (Authors.) Address: Polo-Cavia, Nuria, Department of Biology, Universidad Autónoma de Madrid, 28049 Madrid, Spain. E-mail: nuria.polo@uam.es

**15657.** Popova, O.N.; Haritonov, A.Yu.; Erdakov, L.N. (2016): Cyclicity of long-term population dynamics in damselflies of the genus *Coenagrion* (Odonata, Zygoptera) in the Lake Chany basin. *Russian Journal of Ecology* 47(1): 74-81. (in English) ["The cyclicity of population dynamics of abundance has been analyzed in sympatric adult populations of three odonate species monitored for long time (1980–2010) in the Lake Chany basin (Western Siberia). The spectra of odonate population dynamics have been constructed for the first time and shown to be species-specific: each species has its own population cycles, and if the cycles are similar, interspecific differences manifest themselves in the relative power of these cycles. These differences provide for separation of species in time, reducing the stress of competition between them. The population rhythms of all studied species show synchronicity with natural rhythms that are important to them, such as fluctuations of climatic parameters (2–3 year cycles) and hydrological parameters of Lake Chany (2–4-year cycles)."] (Authors)] Address: Popova, Olga, Institute of Systematics and Ecology of Animals, Siberian Branch, Russian Academy of Sciences, ul. Frunze 11, Novosibirsk, 630091, Russia. E-mail: popova-2012@yandex.ru

**15658.** Rajabi, H.; Rezasefat, M.; Darvizeh, A.; Dirks, J.-H.; Eshghi, S.; Shafiei, A.; Mirzababaie Mostofi, T.; Gorb, S.N. (2016): A comparative study of the effects of constructional elements on the mechanical behaviour of dragonfly wings. *Applied Physics A* 122:19: 13 pp. (in English) ["Although wings of insects show a large variation in morphology, they are all made from a network of irregular veins interconnected through membranous areas. Depending on their shape, size, and position, wing veins are usually divided into three different groups: longitudinal veins, cross-veins and ambient veins. The veins together with the membrane and some other elements such as spines, nodus and pterostigma can be considered as the wing's "constructional elements". In spite of rather extensive literature on dragonfly wing structure, the role of each of these elements in determining the wing's function remains mostly unknown. As this question is difficult to answer in vivo using biomechanical experiments on actual wings, this study was undertaken to reveal the effects of the constructional elements on the me-

chanical behaviour of dragonfly wings by applying numerical simulations. An image processing technique was used to develop 12 finite element models of the insect wings with different constructional elements. The mechanical behaviour of these models was then simulated under normal and shear stresses due to tension, bending and torsion. A free vibration analysis was also performed to determine the resonant frequencies and the mode shapes of the models. For the first time, a quantitative comparison was carried out between the mechanical effects selectively caused by different elements. Our results suggest that the complex interactions of veins, membranes and corrugations may considerably affect the dynamic deformation of the insect wings during flight." (Authors) Orthetrum sabina] Address: Rajubi, H., Functional Morphology and Biomechanics. Institute of Zoology, Kiel University, Kiel. Germany. E-mail: harajabi@hotmail.com

**15659.** Rajabi, H.; Ghoroubi, N.; Darvizeh, A.; Appel, E.; Gorb, S.N. (2016): Effects of multiple vein microjoints on the mechanical behaviour of dragonfly wings: numerical modelling. *R. Soc. open sci.* 3: 150610. <http://dx.doi.org/10.1098/rsos.150610>: 16 pp. (in English) ["Dragonfly wings are known as biological composites with high morphological complexity. They mainly consist of a network of rigid veins and flexible membranes, and enable insects to perform various flight manoeuvres. Although several studies have been done on the aerodynamic performance of Odonata wings and the mechanisms involved in their deformations, little is known about the influence of vein joints on the passive deformability of the wings in flight. In this article, we present the first three-dimensional finite-element models of five different vein joint combinations observed in Odonata wings. The results from the analysis of the models subjected to uniform pressures on their dorsal and ventral surfaces indicate the influence of spike-associated vein joints on the dorso-ventral asymmetry of wing deformation. Our study also supports the idea that a single vein joint may result in different angular deformations when it is surrounded by different joint types. The developed numerical models also enabled us to simulate the camber formation and stress distribution in the models. The computational data further provide deeper insights into the functional role of resilin patches and spikes in vein joint structures. This study might help to more realistically model the complex structure of insect wings in order to design more efficient bioinspired micro-air vehicles in future." (Authors)] Address: Gorb, S.N., Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**15660.** Rajabi, H.; Shafiei, A.; Darvizeh, A.; Dirks, J.-H.; Appel, E.; Gorb, S.N. (2016): Effect of microstructure on the mechanical and damping behaviour of dragonfly wing veins. *Royal Society Open Science* 3: 160006. <http://dx.doi.org/10.1098/rsos.160006>: 12 pp. (in English) ["Insect wing veins are biological composites of chitin and protein arranged in a complex lamellar configuration. Although these hierarchical structures are found in many 'venous wings' of insects, very

little is known about their physical and mechanical characteristics. For the first time, we carried out a systematic comparative study to gain a better understanding of the influence of microstructure on the mechanical characteristics and damping behaviour of the veins. Morphological data have been used to develop a series of three-dimensional numerical models with different material properties and geometries. Finite-element analysis has been employed to simulate the mechanical response of the models under different loading conditions. The modelling strategy used in this study enabled us to determine the effects selectively induced by resilin, friction between layers, shape of the cross section, material composition and layered structure on the stiffness and damping characteristics of wing veins. Numerical simulations suggest that although the presence of the resilin-dominated endocuticle layer results in a much higher flexibility of wing veins, the dumbbell-shaped cross section increases their bending rigidity. Our study further shows that the rubber-like cuticle, friction between layers and material gradient-based design contribute to the higher damping capacity of veins. The results of this study can serve as a reference for the design of novel bioinspired composite structures." (Authors) *Sympetrum vulgatum*, *Matrona basilaris basilaris*] Address: Rajabi, H., Functional Morphology & Biomechanics, Zoological Institute, Christian-Albrecht Univ. Kiel, 24098 Kiel, Germany. E-mail: hrajabi@zoologie.uni-kiel.de

**15661.** Razeng, E.; Moran-Ordóñez, A.; Brim Box, J.; Thompson, R.; Davies, J.; Sunnucks, P. (2016): A potential role for overland dispersal in shaping aquatic invertebrate communities in arid regions. *Freshwater Biology* 61: 745-757. (in English) [Australia, "(1.) Traditionally, dispersal of aquatic invertebrates has been thought to be very closely associated with river network structure, despite many species being capable of active or passive dispersal across the terrestrial matrix. However, recent studies of both population genetics and community structure from dryland regions indicate that aquatic species commonly disperse across catchments, implying that movement away from streams is more common than originally thought. This study investigated how aquatic invertebrate metacommunity structure in central Australia is influenced by interactions between species' dispersal traits, dispersal routes and local environmental conditions. (2.) We sampled community composition in 16 perennial and long-term inundated freshwater habitats in central Australia. Aquatic invertebrate taxa were allocated to one of four dispersal trait groups: obligate aquatic, passive aerial, weak flying and strong flying. We then used Mantel tests to examine correlations between trait group community dissimilarities, and four isolation models representing (i) local environmental conditions, (ii) geographical distances, (iii) landscape resistances restricted to river networks and (iv) landscape resistances incorporating overland dispersal 'conduits'. (3.) We found that the community composition of aquatic invertebrates in three of four dispersal trait groups, and all traits combined, was influenced primarily by topographic connectivity via overland dispersal conduits. (4.) Our results suggest that rainfall events and their effect on the landscape as a whole, rather than river flow during these

events, shape aquatic invertebrate metacommunity structure in central Australia. This study provides further support for the importance of overland dispersal conduits to aquatic invertebrates, particularly in arid environments with irregular rainfall." (Authors) Taxa include the "strong flyers" Odonata and are treated at family level.] Address: Razeng, Emma, School of Biological Sciences, Monash University, Clayton, Vic., Australia

**15662.** Richter, R. (2016): First confirmed *Austroepigomphus* adults observed in Victoria. *Victorian Entomologist* 46(1): 20-22. (in English) [*A. praeruptus* ♂ at Seven Creeks, Miepoll, Vic., 9-Jan-2016 36.6065°S, 145.4788°E (WGS84).] Address: Reiner Richter [odonata@mr.id.au](mailto:odonata@mr.id.au)

**15663.** Rodrigues, M.E.; Roque, F.; Ochoa Quintero, J.M.; Penad, J.C.; Caribé de Sousa, D.; De Marco Junior, P. (2016): Nonlinear responses in damselfly community along a gradient of habitat loss in a savanna landscape. *Biological Conservation* 194: 113-120. (in English) ["Highlights: •We evaluated thresholds for damselflies in riparian zones in a savanna landscape. •We sampled 98 streams located in the Pantanal plateau, Brazil. •We used Threshold Indicator Taxa Analysis — TITAN and segmented regression analysis. •We found weak evidence of a threshold between 40 and 60% native vegetation loss. •Maintaining habitat loss above the "zone of increasing risk of impact" should be priority for conservation planners. Abstract: Riparian zones are among the most threatened natural ecosystems, being greatly affected by land use changes across the world. Working in a savanna landscape in the Central-West region of Brazil, we assessed the responses of damselfly communities to changes on native vegetation extent in riparian zones. We sampled damselflies around 98 streams in a continuous gradient of native vegetation loss (0 to 100%). We used the Threshold Indicator Taxa Analysis (TITAN) to test whether the damselfly community showed nonlinear responses related to native vegetation loss within buffers of 250 m radius. We collected 1245 individuals of damselflies, representing 31 species. The TITAN identified 16 species with a significant response: 11 species with negative indicators (Z<sup>-</sup>) and five as positive indicators (Z<sup>+</sup>) in relation to native vegetation loss. Six species showed evidence of nonlinear response (Z<sup>-</sup>), at sites with native vegetation loss between 40% and 60%. We also used segmented regression analysis with species richness, which showed weak evidence of a threshold located at 54% of native vegetation loss. Differently of previous studies with other taxonomic groups in forested environments, our results indicate that the variability around the threshold is higher. Under a precaution perspective and given current levels of vegetation loss around streams where the risk of losing species is higher, we reinforce the importance of appropriate landscape management strategies. In order to effectively conserve biodiversity in aquatic-and-terrestrial environments, the native vegetation loss within pastures and agriculture landscapes, should be above the "zone of increasing risk of impact" level. According to the current Brazilian Forest Act, riparian forest of at least 30 m wide must



be preserved along both sides of each watercourse. In our study 30 m vegetation wide represents only 10% of the 250 m buffer area. It implies that the current Brazilian Forest Act does not preserve the Cerrado's riparian vegetation and its associated aquatic biodiversity, since the amount of native vegetation loss is below the "zone of increasing risk of impact" we detected for damselflies in evaluated landscapes." (Authors)] Address: Rodrigues, M.E., Departamento de Biologia, CCBS, Cidade Universitária, Caixa Postal 549, Campo Grande, Mato Grosso do Sul CEP: 79 070 900, Brazil. E-mail: rodrigues.mbio@gmail.com

**15664.** Rojas, D.; Rojas, M.A. (2016): Presencia de *Symptetrum sinaiticum* (Dumont, 1977) (Odonata, Libellulidae) en Cádiz (Andalucía, España). *Revista gaditana de Entomología* 7: 181-183. (in Spanish, with English summary) [8-XI-2015; a female *S. sinaiticum* is recorded from El Bosque, sierra de Grazalema, Cadiz (UTM 10 km 30STF77)] Address: Rojas, D., 11380, Tarifa, Cádiz, Spain: E-mail: danielrojas92@hotmail.es

**15665.** Rosewarne, P.J.; Mortimer, R.J.G.; Newton, R.J.; Grocock, C.; Wing, C.D.; Dunn, A.M. (2016): Feeding behaviour, predatory functional responses and trophic interactions of the invasive Chinese mitten crab (*Eriocheir sinensis*) and signal crayfish (*Pacifastacus leniusculus*). *Freshwater Biology* 61(4): 426-443. (in English) ["(1.) Freshwaters are subject to particularly high rates of species introductions; hence, invaders increasingly co-occur and may interact to enhance impacts on ecosystem structure and function. As trophic interactions are a key mechanism by which invaders influence communities, we used a combination of approaches to investigate the feeding preferences and community impacts of two globally invasive large benthic decapods that co-occur in freshwaters: the signal crayfish (*Pacifastacus leniusculus*) and Chinese mitten crab (*Eriocheir sinensis*). (2.) In laboratory preference tests, both consumed similar food items, including chironomids, isopods and the eggs of two coarse fish species. In a comparison of predatory functional responses with a native crayfish (*Austropotamobius pallipes*), juvenile *E. sinensis* had a greater predatory intensity than the native *A. pallipes* on the keystone shredder *Gammarus pulex*, and also displayed a greater preference than *P. leniusculus* for this prey item. (3.) In outdoor mesocosms ( $n = 16$ ) used to investigate community impacts, the abundance of amphipods, isopods, chironomids and gastropods declined in the presence of decapods, and a decapod >gastropod >periphyton trophic cascade was detected when both species were present. *Eriocheir sinensis* affected a wider range of animal taxa than *P. leniusculus*. (4.) Stable-isotope and gut-content analysis of wild-caught adult specimens of both invaders revealed a wide and overlapping range of diet items including macrophytes, algae, terrestrial detritus, macroinvertebrates and fish. Both decapods were similarly enriched in  $^{15}\text{N}$  and occupied the same trophic level as Ephemeroptera, Odonata and Notonecta. *Eriocheir sinensis*  $\delta^{13}\text{C}$  values were closely aligned with macrophytes indicating a reliance on energy from this basal resource, supported by evidence of

direct consumption from gut contents. *Pacifastacus leniusculus*  $\delta^{13}\text{C}$  values were intermediate between those of terrestrial leaf litter and macrophytes, suggesting reliance on both allochthonous and autochthonous energy pathways. (5.) Our results suggest that *E. sinensis* is likely to exert a greater per capita impact on the macroinvertebrate communities in invaded systems than *P. leniusculus*, with potential indirect effects on productivity and energy flow through the community." (Authors)] Address: Dunn, Alison, School of Biology, Faculty of Biological Sciences, University of Leeds, Leeds LS2 9JT, U.K. E-mail: a.dunn@leeds.ac.uk

**15666.** Sahlen, G.; Suhling, F.; Martens, A.; Gorb, S., Fincke, O. (2016): For consistency's sake? A reply to Bybee et al. *Systematic Entomology* 41: 307-308. (in English) [Discussion of the termini larva, nymph and naiad.] Address: Sahlen, G., Ecology and Environmental Science, Halmstad University, Halmstad, Sweden

**15667.** Sanchez, S.; Wilson, D.E. (2016): Food items of *Macrotus waterhousii* (Chiroptera: Phyllostomidae) in central Mexico. *Therya* 7(1): 161-177. (in English, with Spanish summary) ["*Macrotus waterhousii* is a phyllostomid bat whose diet is poorly known, particularly in semiarid and temperate central Mexico. In this work additional information is reported from food remains discarded by this bat, including taxonomic composition, frequencies and size range of consumed insects; the assessment of a prediction on prey hardness of food insects, at the ordinal level; relative energy reward of insect prey in the sample; a comparison of the composition of the food sample from the arid study locality against one from a subtropical-temperate site; and brief comments on the known ecological importance of particular prey in the arid site. A sample of insect food remains discarded by *Macrotus waterhousii bulleri*, was recovered from under a roost in semiarid northern Querétaro, Mexico. The taxonomic identity, estimated relative abundance, size, hardness, and ecological relations of prey species in the sample were studied and results were compared with reference to feeding ecology. A comparison of the data with available information on food taken by *Macrotus waterhousii mexicanus* in temperate-subtropical central Mexico was made. Information on the importance of the most relevant identified insects was extracted from literature and analyzed. In Querétaro, Lepidoptera, Hymenoptera, and Coleoptera were frequent; moths dominated but, as a single species, the (winged) ant, *Atta mexicana* was most frequent. Nocturnal insects were frequent; diurnal ones may have been gleaned at night. A sample from Estado de México featured Orthoptera, Coleoptera, and Lepidoptera. Wingspan range of frequent prey in Querétaro was 25-80 mm, but moths over 70 mm were over one fifth of the sample. Prey hardness estimation was similar to that for *Macrotus californicus*. Some insects identified are of ecologic and agricultural relevance. Insects known to be seasonally abundant in the environment were also abundant in the sample, presumably captured according to that availability. However this bat, aside from eating insects of moderate size in proportion to its jaw size, is also capable of capturing

large moths and these may represent a significant energy intake. Most insects are nocturnal species. The taxonomic composition of the food samples from both areas suggests that *M. waterhousii* (sensu lato) may be mostly an opportunistic predator. Local insect fauna composition and dynamics may be hypothesized to influence food taken by *M. waterhousii*. Several insect species consumed by this bat in semiarid Querétaro have crucial roles in the ecology of arid land vegetation, as well as some economic importance for agriculture as pests." (Authors) *Odonata Anax* sp., *Erpetogomphus* sp., *Paltothemis* sp.) account less than 1% of diet items. ]Address: Sánchez, S., Las Flores, San Lorenzo Tepaltitlán 50018, Estado de México, México. E-mail: teofenango@yahoo.com

**15668.** Scales, J.A.; Butler, M.A. (2016): The relationship between microhabitat use, allometry, and functional variation in the eyes of Hawaiian *Megalagrion* damselflies. *Functional Ecology* 30(3): 356-368. (in English) ["(1.) The evolution of visual systems is guided by the interaction of visual requirements imposed by habitat light heterogeneity, eye size, and physical limitations imposed by the resolution-sensitivity tradeoff. The physical constraints related to eye surface area result in a tradeoff between resolution, the ability of the eye to detect detail, and sensitivity, the ability to capture photons, so that both cannot be simultaneously maximized without increases to eye size. How this constraint interacts with ecology and whether it allows the fine tuning of the visual system to smaller scale habitat heterogeneity remains an understudied question in visual ecology. (2.) Here we use closely related species of damselflies in the Hawaiian genus *Megalagrion* which differ in ecology to test whether variation about the resolution-sensitivity tradeoff is the evolutionary result of scaling or differences in microhabitat use. We use regression analyses and phylogenetic comparative methods to examine the effects of size and microhabitat use on traits related to light sensitivity and visual resolution. (3.) We find that eye size is tightly associated with body size in these damselflies, but morphological traits related to light sensitivity and resolution are associated with microhabitat type. Furthermore, size and morphology relationships vary across microhabitats, and resolution tends to be more conserved than variation in light sensitivity. (4.) Additionally, smaller species in visually challenging microhabitats have more regionalized eyes than species with larger eyes in open, well-lit areas. Thus, regionalization of the eye allows a decoupling of size and morphology/performance so that even small insect species can exploit visually challenging habitats. (5.) These results suggest that variation in visual performance results from changes in eye geometry as well as size. These morphological changes are likely adaptive to differences in microhabitat indicating that variation in microhabitat use, even at small scales, can play an important role in the evolution of visual systems." (Authors)] Address: Scales, J.A., Department of Biology, University of Hawaii at Manoa, Honolulu, HI, USA. E-mail: jscales@usf.edu

**15669.** Schädel, M.; Bechly, G. (2016): First record of Anisoptera (Insecta: Odonata) from mid-Cretaceous Burmese amber. *Zootaxa* 4103(6): 537-549. (in English) ["The fossil

dragonfly *Burmaliindenia imperfecta* gen. et sp. nov. is described from mid-Cretaceous Burmese amber as the first record of the odonate suborder Anisoptera for this locality and one of the few records from amber in general. The inclusion comprises two fragments of the two hind wings of a dragonfly. The fossil can be attributed to a new genus and species of the family Gomphidae, presumably in the subfamily Lindeniinae, and features a strange teratological phenomenon in its wing venation." (Authors)] Address: Schädel, M., Department of Evolutionary Biology of Invertebrates, University of Tübingen, Auf der Morgenstelle 28E, 72076 Tübingen, Germany. E-mail: mario.schaedel@student.uni-tuebingen.de

**15670.** Schneider, T.; Ikemeyer, D.; Ferreira, S.; Müller, O. (2016): Rediscovery and redescription of *Coenagrion persicum* (Lohmann 1993) with description of the female, and some notes on habitat selection (Odonata: Coenagrionidae). *Zootaxa* 4103(6): 561-573. (in English) ["*Coenagrion persicum* was described by Heinrich Lohmann in 1993 on the basis of a single male and two larvae captured in 1937 by E.W. Kaiser in Lorestan Province (W-Iran). In June 2015 two of the authors (TS and DI) rediscovered individual-rich populations of this species in two Iranian provinces (Lorestan and Esfahan). We could confirm the structural differences of the male appendages between *C. persicum* and *C. pulchellum* based on a larger number of specimens than in the original description. The structural differences from *C. pulchellum* in females and their phenotypic variation pattern is described. *Coenagrion persicum* and *C. pulchellum* are also genetically distinct regarding two nDNA gene fragments: arginine methyltransferase (PRMT) and phosphoglucose isomerase (PGI). In contrast with *C. pulchellum*, *C. persicum* prefers small springs and running waters with rich herbal vegetation. Our faunistic data indicate that the species is present in the mountains between 1800 m and 2300 m a.s.l.. The species seems to be restricted to W-Iran, where it co-occurs with other rheophilic species." (Authors)] Address: Schneider, T., Arnold-Knoblach-Ring 76, 14109 Berlin-Wannsee, Germany. E-mail: thomas.rs@gmx.de

**15671.** Seguin, C.; Kreder, M. (2016): Amélioration des connaissances de l'Agrion à lunules sur le territoire du Parc Naturel Régional des Volcans d'Auvergne - Année 3: Capacité de déplacement & Stratégie de préservation. SMP-NRVA: 45 pp. + 8pp app.. (in French, with English summary) ["Irish Damselfly (*Coenagrion lunulatum*) is a rare and endangered dragonfly found only in the French Massif Central and especially in the Volcans d'Auvergne Natural Regional Park (PNRVA). After two years of studies about inventory and larval habitat characterisation, 2015 is about moving capacities of this species. On the one hand, Mark-Release-Recapture method enables to understand the population dynamic of the species. On the other hand, recapture shows that *C. lunulatum* can moving punctually on distance longer than 4km. With the current knowledge about the species' ecology, the potential distribution of *C. lunulatum* on the PNRVA has been modelled. This map shows

some population cores well connected, and two isolated areas, in the North and in the South of PNRVA territory, due to small populations, relief, and woodland. Now, it must allow to define priority area where actions will be suggest to preserve this dragonfly." (Authors)] Address: not stated.

**15672.** Segura-Trujillo, C.A.; Lidicker, W.Z.; Álvarez-Castañeda, S.T. (2016): New perspectives on trophic guilds of arthropodivorous bats in North and Central America. *Journal of Mammalogy* 97(2): 644-654. (in English, with Spanish summary) ["Trophic guilds are useful concepts for advancing our knowledge of trophic structure of communities, dynamics of species interactions, redundancy in ecosystem services, resilience to disturbances, response to climate change, conservation strategies, etc. For insectivorous bats, current literature suggests 8 trophic-related guilds. These include 3 guilds based on the openness of foraging areas, 3 based on the style of feeding, and 2 recently proposed subguilds among gleaners. Some gleaners are "passive," using densely cluttered vegetation in which echolocation is ineffective, and others are "actively" gleaning, using echolocation to procure prey. None of these guilds is based on the actual diets of bats. We analyzed 33 reports of diet composition representing 51 species of arthropod-feeding bats inhabiting North and Central America. We wanted to determine if the classical guild structure was concordant with the actual diets of bats and to compare guild structure in the Nearctic with that in the Neotropics. Discriminant function and principle component analyses generated 5 groups of genera based on the proportion of various arthropod taxa (mainly orders) in their diets. These groups were very different from classical guilds and showed almost no overlap among bat genera between the 2 continental regions. A similar analysis based on prey flying ability and hardness of their exoskeletons suggested 4 guilds that were more consistent with classical guild concepts, had higher rates of unambiguous guild assignment, and also showed major continental differences. Our results suggest a new arrangement of 4 guilds for arthropod-feeding bats in North and Central America that are based primarily on 2 features of their prey. New molecular techniques should allow us to build on this arrangement by significantly improving the taxonomic level of prey identification." (Authors) The paper includes references to Odonata.] Address: Álvarez-Castañeda, S.T., Centro de Investigaciones Biológicas del Noroeste, Instituto Politécnico Nacional 195, Playa Palo de Santa Rita Sur, La Paz 23096, Baja California Sur, México. E-mail: sticul@cibnor.mx

**15673.** Shaffery, H.M.; Relyea, R.A. (2016): Dissecting the smell of fear from conspecific and heterospecific prey: investigating the processes that induce anti-predator defenses. *Oecologia* 180(1): 55-65. (in English) ["Prey use chemical cues from predation events to obtain information about predation risk to alter their phenotypes. Though we know how many prey respond to predators, we still have a poor understanding of the processes and chemical cues involved during a predation event. We examined how gray treefrog tadpoles (*Hyla versicolor*) altered their behaviour and morphology when raised with cues from different

stages of predator (*Anax junius*) attack, predators fed different amounts of prey, and predators consuming different combinations of treefrog tadpoles or snails (*Helisoma trivolvis*). We found that starved predators and predators fed snails induced no defensive responses whereas tadpoles exposed to a predator consuming gray treefrogs induced greater hiding, lower activity, and relatively deeper tails. We also found that the tadpoles did not respond to crushed, chewed, or digested conspecifics, but they did respond to consumed (i.e., chewed plus digested) conspecifics. When we increased the treefrog biomass consumed by predators, tadpoles frequently increased their defenses when only tadpoles were consumed and always increased their defenses when the total diet biomass was held constant via the inclusion of snails. When predators experienced temporal variation in diet composition, including cues from snails to cause additional digestive cues or chemical noise, there was no effect on tadpole phenotypes. Our results suggest that amphibian prey rely on cues from both chewing and digestion of conspecifics and that the presence of cues from digested heterospecifics play little or no role in adding chemical noise or increased digestive enzymes and by-products that could potentially interfere with induced defenses." (Authors)] Address: Relyea, R.A., Dept of Biological Sciences, Rensselaer Polytechnic Institute, Troy, NY, 12180, USA. E-mail: relyea@rpi.edu

**15674.** Shao, M.-W.; Kong, L.-C.; Jiang, D.-H.; Zhang, Y.-L. (2016): Phytotoxic and antimicrobial metabolites from *Paraphaeosphaeria* sp. QTYC11 isolated from the gut of *Pantala flavescens* larvae. *Records of Natural Products* 10(3): 326-331. (in English) ["A new lunatoic acid C (1) along with eight known compounds were isolated from *Paraphaeosphaeria* sp. QTYC11 residing in the gut of *P. flavescens* larvae. They were determined on the basis of extensive spectroscopic analysis and by comparison of the corresponding data reported previously. Compounds 1 showed good phytotoxic activities, extremely potent antifungal activities and good antibacterial activities respectively." (Authors)] Address: Zhang, Ying-Lao, College of Chemistry and Life Science, Zhejiang Normal University, Jinhua 321004, PR China. E-mail: ylzhang@zjnu.cn;

**15675.** Shyy, W.; Kang, C.-k.; Chirarattananon, P.; Ravi, S.; Liu, H. (2016): Aerodynamics, sensing and control of insect-scale flapping-wing flight. *Proc. R. Soc. A* 472: 20150712. <http://dx.doi.org/10.1098/rspa.2015.0712>: 37 pp. (in English) ["There are nearly a million known species of flying insects and 13000 species of flying warm-blooded vertebrates, including mammals, birds and bats. While in flight, their wings not only move forward relative to the air, they also flap up and down, plunge and sweep, so that both lift and thrust can be generated and balanced, accommodate uncertain surrounding environment, with superior flight stability and dynamics with highly varied speeds and missions. As the size of a flyer is reduced, the wing-to-body mass ratio tends to decrease as well. Furthermore, these flyers use integrated system consisting of wings to generate aerodynamic forces, muscles to move the wings, and sensing and



control systems to guide and manoeuvre. In this article, recent advances in insect-scale flapping-wing aerodynamics, flexible wing structures, unsteady flight environment, sensing, stability and control are reviewed with perspective offered. In particular, the special features of the low Reynolds number flyers associated with small sizes, thin and light structures, slow flight with comparable wind gust speeds, bioinspired fabrication of wing structures, neuron-based sensing and adaptive control are highlighted." (Authors) The paper includes many references to Odonata.] Address: Shyy, W., Department of Mechanical and Aerospace Engineering, Hong Kong University of Science and Technology, ClearWater Bay, Hong Kong. E-mail: weishyy@ust.hk

**15676.** Siepielski, A.M.; Fallon, E.; Boersma, K. (2016): Predator olfactory cues generate a foraging–predation trade-off through prey apprehension. *R. Soc. open sci.* 3: 150537. <http://dx.doi.org/10.1098/rsos.150537>: 7 pp. (in English) ["Most animals are faced with the challenge of securing food under the risk of predation. This frequently generates a trade off whereby animals respond to predator cues with reduced movement to avoid predation at the direct cost of reduced foraging success. However, predators may also cause prey to be apprehensive in their foraging activities, which would generate an indirect 'apprehension cost'. Apprehension arises when a forager redirects attention from foraging tasks to predator detection and incurs a cost from such multi-tasking, because the forager ends up making more mistakes in its foraging tasks as a result. Here, we test this apprehension cost hypothesis and show that damselflies (*Ischnura cervula*) miss a greater proportion of their prey during foraging bouts in response to both olfactory cues produced by conspecifics that have only viewed a fish predator and olfactory cues produced directly by fish (*Gambusia affinis*). This reduced feeding efficiency is in addition to the stereotypical antipredator response of reduced activity, which we also observed. These results show that costs associated with anti-predator responses not only arise through behavioural alterations that reduce the risk of predation, but also from the indirect costs of apprehension and multi-tasking that can reduce feeding efficiency under the threat of predation." (Authors)] Address: Siepielski, A.M., Department of Biological Sciences, Program in Ecology and Evolutionary Biology, University of Arkansas, Fayetteville, AR 72701, USA. E-mail: amsiepie@uark.edu

**15677.** Siregar, A.Z. (2016): Diversity and status conservation of Odonata in Green Campus University of North Sumatera, Medan-Indonesia. *Jurnal Pertanian Tropik* 3(1): 25-30. (in Indonesian, with English summary) [31 odonate species are recorded at nine sampling sites] Address: Siregar, Ameilia Zuliyanti, Program Studi Agroekoteknologi Fakultas Pertanian USU Medan –Indonesia 20155. E-mail: zuliyanti@yahoo.com, azsyanti@gmail.com

**15678.** Sivasankaran, P.N.; Ward, T.A. (2016): Spatial network analysis to construct simplified wing structural models for Biomimetic Micro Air Vehicles. *Aerospace Science and*

*Technology* 49: 259-268. (in English) ["A procedure for designing a simplified, dragonfly-like wing model that is suitable for use in a Biomimetic Micro Air Vehicle (BMAV) is presented. BMAV are a relatively new class of micro-scaled unmanned air systems that mimic the flapping wing propulsion system of flying biological organisms (like insects). Many insects (e.g. dragonflies) have complex wing vein and membrane patterns that are too small to fabricate using many types of machine cutting tools (e.g. micro laser cutting). Structural dynamic modification using the spatial network analysis approach is used to create a simplified model. Our objective was to minimize the wing vein patterns so that they were within our fabrication tolerances. Simulations were performed for both the detailed and simplified models. The natural frequency and corresponding mode shapes, modal assurance criterion (MAC) and static bend-twist coupling results were very similar. This analysis shows that a simplified model can be designed and fabricated to closely biomimic a real dragonfly wing." (Authors)] Address: Ward, T.A., Department of Mechanical Engineering, University of Malaya, 50603 Kuala Lumpur, Malaysia. E-mail: DrTomWard@um.edu.my

**15679.** Sniegula, S.; Golab, M.J.; Drobniak, S.M.; Johansson, F. (2016): Seasonal time constraints reduce genetic variation in life-history traits along a latitudinal gradient. *Journal of Animal Ecology* 85(1): 187-198. (in English) ["(1.) Time constraints cause strong selection on life-history traits, because populations need to complete their life cycles within a shorter time. We therefore expect lower genetic variation in these traits in high- than in low-latitude populations, since the former are more time-constrained. (2.) The aim was to estimate life-history traits and their genetic variation in an obligately univoltine *Lestes sponsa* along a latitudinal gradient of 2730 km. (3.) Populations were grown in the laboratory at temperatures and photoperiods simulating those at their place of origin. In a complementary experiment, individuals from the same families were grown in constant temperature and photoperiod that mimicked average conditions across the latitude. (4.) Development time and size was faster and smaller, respectively, and growth rate was higher at northern latitudes. Additive genetic variance was very low for life-history traits, and estimates for egg development time and larval growth rate showed significant decreases towards northern latitudes. The expression of genetic effects in life-history traits differed considerably when individuals were grown in constant rather than simulated and naturally variable conditions. (5.) Our results support strong selection by time constraints. They also highlight the importance of growing organisms in their native environment for correct estimates of genetic variance at their place of origin. Our results also suggest that the evolutionary potential of life-history traits is very low at northern compared to southern latitudes, but that changes in climate could alter this pattern." (Author)] Address: Sniegula, S., Dept Ecosystem Conservation, Inst. Nature Conservation, Polish Academy of Sciences, al. Mickiewicza 33, PL-31-120 Kraków, Poland. E-mail: szymon.sniegula@gmail.com

**15680.** Steinhoff, P.O.M.; Butler, S.G.; Dow, R.A. (2016): Description of the final instar larva of *Orthetrum borneense* Kimmins, 1936 (Odonata, Libellulidae), using rearing and molecular methods. *Zootaxa* 4083(1): 99-108. (in English) ["The final instar larva of *O. borneense*, is described and figured for the first time based on exuviae from three male and six female larvae collected in Sarawak, Borneo (East Malaysia). It is compared with an early instar larva, which was matched to the adult *O. borneense* by DNA barcoding, and the known larvae of other species of this genus that occur in the region." (Authors)] Address: Steinhoff, P.O.M., Department of General and Systematic Zoology, University of Greifswald, Anklamer Str. 20, 17489 Greifswald, Germany. E-mail: philipsteinhoff@gmail.com

**15681.** Sugiura, S. (2016): Impacts of introduced species on the biota of an oceanic archipelago: the relative importance of competitive and trophic interactions. *Ecological Research* 31(2): 155-164. (in English) ["Introduced species negatively impact native species through competitive and trophic interactions, particularly on oceanic islands that have never been connected to any continental landmass. However, there are few studies on the relative importance of competitive interactions (resource competition with introduced species) and trophic interactions (predation or herbivory by introduced species) with respect to the negative impacts on native organisms on oceanic islands. A literature review on introduced and native species of the oceanic Ogasawara (Bonin) Islands in the western Pacific Ocean indicated that many native species (e.g., bees, beetles, damselflies, butterflies, land snails, birds, and plants) have been negatively impacted by introduced predators and herbivores (e.g., lizards, rats, flatworms, and goats). Several native plants and bees have been negatively affected by introduced competitors. However, the native species that have competed with introduced species have also suffered from either intense herbivory or predation by other introduced species. Thus, introduced predators and herbivores have had greater impacts on native species than introduced competitors in the Ogasawara Islands." (Author) The publication includes references to Odonata.] Address: Sugiura, S., Graduate School of Agricultural Science, Kobe Univ., Rokkodai, Nada, Kobe 657-8501, Japan. E-mail: sugiura.shinji@gmail.com

**15682.** Tennessen, K. (2016): *Psaironeura angeloi*, a new species of damselfly (Zygoptera: Coenagrionidae) from Central and South America. *Zootaxa* 4078(1): 28-37. (in English) ["*Psaironeura angeloi* sp. nov. (Holotype male deposited in FSCA: Ecuador, Esmeraldas Province, small stream 5.6 km NW of Lita, 00.893°N 78.510°W, 4.II.1997, KJT leg.) is described and illustrated based on specimens from Ecuador, Panama, Costa Rica, and Nicaragua, bringing the total number of species in the genus to five. The new species is closely related to *P. remissa* (Calvert), a Mexican/northern Central American species with broad, foliate male cerci, but is distinct in that the long flagella of the genital ligula lack a small sharp spine unique to *P. remissa*, labrum and clypeus are orangered, and the back of the head is mostly pale in both males and females. In life, the eyes of

the new species are bright red in males versus green and black in *P. remissa*." (Author)] Address: Tennessen, K., Florida State Collection of Arthropods, PO Box 585, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**15683.** Troast, D.; Suhling, F.; Jinguji, H.; Sahlén, G.; Ware, J. (2016): A global population genetic study of *Pantala flavescens*. *PLoS ONE* 11(3): e0148949. doi:10.1371/journal.pone.0148949: 13 pp. (in English) ["Among terrestrial arthropods, the dragonfly species *Pantala flavescens* is remarkable due to their nearly global distribution and extensive migratory ranges; the largest of any known insect. Capable of migrating across oceans, the potential for high rates of gene flow among geographically distant populations is significant. It has been hypothesized that *P. flavescens* may be a global panmictic population but no sufficient genetic evidence has been collected thus far. Through a population genetic analysis of *P. flavescens* samples from North America, South America, and Asia, the current study aimed to examine the extent at which gene flow is occurring on a global scale and discusses the implications of the genetic patterns we uncovered on population structure and genetic diversity of the species. This was accomplished using PCR-amplified cytochrome oxidase one (CO1) mitochondrial DNA data to reconstruct phylogenetic trees, a haplotype network, and perform molecular variance analyses. Our results suggested high rates of gene flow are occurring among all included geographic regions; providing the first significant evidence that *Pantala flavescens* should be considered a global panmictic population." (Authors)] Address: Troast, D., Dept of Biology, Rutgers University, Newark, New Jersey, USA. E-mail: danieltroast@gmail.com

**15684.** Valente-Neto, F.; Roque, F.; Rodrigues, M.E.; Juen, L.; Swan, C.M. (2016): Toward a practical use of Neotropical odonates as bioindicators: Testing congruence across taxonomic resolution and life stages. *Ecological Indicators* 61(2): 952-959. (in English) ["Highlights: •We assessed environmental factors driving larvae and adults of odonates. •We evaluated the congruency between and within life-history stages. •Larvae vs. adult and adult genera vs. species were congruent. •Environmental variables were important to explain the congruence pattern. •For operational reasons, adult genera are recommended in biomonitoring programs. Abstract: Odonates are suggested as bioindicators of human impact. However, their complex life cycles add additional challenges in the practical use as bioindicators, because the level of taxonomic identification could be dependent on life-history stage and, during their ontogeny, dramatic changes occur in their niche (ontogenetic niche shifts). Considering that larvae and adults have different biological characteristics, which could interfere in their performance as bioindicators, we first sought to understand how similar or different environmental factors affect larval and adult life stages in the Odonata. Second, we assessed the level of congruence between (larvae and adult) and within (adult genera and species) life-history stages, considering the taxonomic and numerical resolution. We sampled larvae and adults in 44 streams distributed along a riverine

network in southwest Brazil. Larvae samples constituted 20 sampling units of 1 m length each, using the kick sampling method; adults were collected for 1 h at each site with a hand net along a 100-m transect parallel to the stream/river banks. The influence of environmental factors on larvae and adult was assessed by redundancy analysis coupled with forward selection. The congruence level between response matrices was determined by Procrustes analysis. Our results revealed that a set of environmental variables explained a portion of larvae and adults distribution and some environmental factors affect both between (larvae and adults) and within (adult genera and species) life-history stages. Larvae and adult were about 54% congruent, regardless of taxonomic level of adults. Abundance of adult genera and species were 94% congruent, but numerical resolution (abundance vs. incidence) decreased the congruency by 10%. Environmental variables could influence larvae and adults individually or via carry-over effects, i.e., larval environmental conditions that could affect adult fitness components or vice versa. In addition, some odonate behaviours, such as female selection of more appropriate habitats for laying their eggs, could also help us to explain our results, because it could determine larvae distribution. In a biomonitoring perspective, considering the cost-benefit of taxonomic level and sampling of larvae and adults, our results suggest that abundance of adult genera could be used in biomonitoring programs since they capture, respectively, 94% and 54% of the information carried by adult species and larvae." (Authors)] Address: Valente-Neto, F., Programa de Pós-Graduação em Ecologia e Conservação, Universidade Federal de Mato Grosso do Sul, CP 549, CEP 79070-900 Campo Grande, Mato Grosso do Sul, Brazil. E-mail: fvalenteneto@gmail.com

**15685.** Van Dinh, K.; Janssens, L.; Therry, L.; Gyulavári, H.A.; Bervoets, L.; Stoks, R. (2016): Rapid evolution of increased vulnerability to an insecticide at the expansion front in a poleward moving damselfly. *Evolutionary Applications* 9(3): 450-461. (in English) ["Many species are too slow to track their poleward moving climate niche under global warming. Pesticide exposure may contribute to this by reducing population growth and impairing flight ability. Moreover, edge populations at the moving range front may be more vulnerable to pesticides because of the rapid evolution of traits to enhance their rate of spread that shunt energy away from detoxification and repair. We exposed replicated edge and core populations of the poleward moving damselfly *Coenagrion scitulum* to the pesticide esfenvalerate at low and high densities. Exposure to esfenvalerate had strong negative effects on survival, growth rate and development time in the larval stage and negatively affected flight-related adult traits (mass at emergence, flight muscle mass and fat content) across metamorphosis. Pesticide effects did not differ between edge and core populations, except that at the high concentration the pesticide-induced mortality was 17% stronger in edge populations. Pesticide exposure may therefore slow down the range expansion by lowering population growth rates, especially because edge populations suffered a higher mortality, and by

negatively affecting dispersal ability by impairing flight-related traits. These results emphasize the need for direct conservation efforts toward leading-edge populations for facilitating future range shifts under global warming." (Authors)] Address: Van Dinh, K., Institute of Aquaculture, Nha Trang University, Nha Trang, Vietnam. E-mail: khuongaquatic@gmail.com

**15686.** Vilela, D.S.; Ferreira, R.G.; Del-Claro, K. (2016): The Odonata community of a Brazilian vereda: seasonal patterns, species diversity and rarity in a palm swamp environment. *Biosci. J., Uberlândia* 32(2): 486-495. (in English, with Spanish summary) ["Studies concerning the occurrence of species and seasonality are of great importance for both the elucidation of species distribution and conservation of natural habitats. We performed a survey of Odonata species and studied their seasonality in an endemic endangered palm swamp (i.e. Veredas) environment of the Ecological Reserve of Clube de Caça e Pesca Itororó de Uberlândia, Southeastern Brazil. Between July 2010 and June 2011, we recorded 31 species of five different families and 21 genera. The community was strongly seasonal, since 24 species occurred in the wet season, while ten occurred in both dry and wet season, and only two species occurred only in the dry season. All Anisoptera species preferred lentic habitats, whereas seven of the 18 Zygoptera species preferred lentic habitats and 11 species preferred lotic sites. The five Calopterygidae and Protoneuridae species preferred lotic habitats. The study site exhibits a great diversity of dragonflies and damselflies, which are important elements of the trophic chain in the Cerrado aquatic and neighbouring land environments. This justifies the development of conservation actions in palm swamp areas, which are poorly known and threatened by the constant advance of urban, monoculture and pasture areas in Cerrado." (Authors)] Address: Vilela, D.S., Graduate Program in Entomology, University of São Paulo, FFCLRP, Ribeirão Preto, SP, Brazil. E-mail: deeogoo@gmail.com

**15687.** Villalobos-Jimenez, G.; Dunn, A.M.; Hassall, C. (2016): Dragonflies and damselflies (Odonata) in urban ecosystems: A review. *Eur. J. Entomol.* 113: 217-232. (in English) ["The expansion of urban areas is one of the most significant anthropogenic impacts on the natural landscape. Due to their sensitivity to stressors in both aquatic and terrestrial habitats, dragonflies and damselflies (the Odonata) may provide insights into the effects of urbanisation on biodiversity. However, while knowledge about the impacts of urbanisation on odonates is growing, there has not been a comprehensive review of this body of literature until now. This is the first systematic literature review conducted to evaluate both the quantity and topics of research conducted on odonates in urban ecosystems. From this research, 79 peer-reviewed papers were identified, the vast majority (89.87%) of which related to studies of changing patterns of biodiversity in urban odonate communities. From the papers regarding biodiversity changes, 31 were performed in an urban-rural gradient and 21 of these reported lower diversity towards built up city cores. Twelve of the cases of



biodiversity loss were directly related to the concentrations of pollutants in the water. Other studies found higher concentrations of pollutants in odonates from built-up catchments and suggested that odonates such as *Aeshna juncea* and *Platycnemis pennipes* may be candidate indicators for particular contaminants. We conclude by identifying current research needs, which include the need for more studies regarding behavioural ecology and life-history traits in response to urbanisation, and a need to investigate the mechanisms behind diversity trends beyond pollution." (Authors) ] Address: Hassall, C., School of Biology, University of Leeds, Woodhouse Lane, LS2 9JT, Leeds, UK. E-mail: c.hassall@leeds.ac.uk

**15688.** Vinatier, F.; Lagacherie, P.; Voltz, M.; Petit, S.; Lavigne, C.; Brunet, Y.; Lescourret, F. (2016): An unified framework to integrate biotic, abiotic processes and human activities in spatially explicit models of agricultural landscapes. *Front. Environ. Sci.*, 02 February 2016 | <http://dx.doi.org/10.3389/fenvs.2016.00006> : 7 pp. (in English) ["Recent concern over possible ways to sustain ecosystem services has triggered important research worldwide on ecosystem processes at the landscape scale. Understanding this complexity of landscape functioning calls for coupled and spatially-explicit modelling approaches. However, disciplinary boundaries have limited the number of multi-process studies at the landscape scale, and current progress in coupling processes at this scale often reveals strong imbalance between biotic and abiotic processes, depending on the core discipline of the modellers. We propose a spatially-explicit, unified conceptual framework that allows researchers from different fields to develop a shared view of agricultural landscapes. In particular, we distinguish landscape elements that are mobile in space and represent biotic or abiotic objects (for example water, fauna or flora populations), and elements that are immobile and represent fixed landscape elements with a given geometry (for example ditch section or plot). The shared representation of these elements allows setting common objects and spatio-temporal process boundaries that may otherwise differ between disciplines. We present guidelines and an assessment of the applicability of this framework to a virtual landscape system with realistic properties. This framework allows the complex system to be represented with a limited set of concepts but leaves the possibility to include current modelling strategies specific to biotic or abiotic disciplines. Future operational challenges include model design, space and time discretization, and the availability of both landscape modelling platforms and data." (Authors) The model is based on *Bufo bufo* and *Calopteryx virgo*.] Address: Vinatier, Fabrice, INRA, UMR1221 LISAH (INRA – IRD – SUPAGRO), Montpellier, France

**15689.** Wellenreuther, M.; Sánchez-Guillén, R.A. (2016): Non-adaptive radiation in damselflies. *Evolutionary Applications* 9(1): 103-118. (in English) ["Adaptive radiations have long served as living libraries to study the build-up of species richness, however, they do not provide good models for radiations that exhibit negligible adaptive disparity. Here we

review work on damselflies to argue that non-adaptive mechanisms were predominant in the radiation of this group and have driven species divergence through sexual selection arising from male–female mating interactions. Three damselfly genera (*Calopteryx*, *Enallagma* and *Ischnura*) are highlighted and the extent of (i) adaptive ecological divergence in niche use and (ii) non-adaptive differentiation in characters associated with reproduction (e.g. sexual morphology and behaviours) evaluated. We demonstrate that species diversification in the genus *Calopteryx* is caused by non-adaptive divergence in colouration and behaviour affecting premating isolation, and structural differentiation in reproductive morphology affecting postmating isolation. Similarly, the vast majority of diversification events in the sister genera *Enallagma* and *Ischnura* are entirely driven by differentiation in genital structures used in species recognition. The finding that closely related species can show negligible ecological differences yet are completely reproductively isolated suggests that the evolution of reproductive isolation can be uncoupled from niche-based divergent natural selection, challenging traditional niche models of species coexistence." (Authors)] Address: Wellenreuther, Maren, Evolutionary Ecology, Biology Department, Lund University, Sweden. Email: maren.wellenreuther@biol.lu.se

**15690.** Wiwatanaratnabutra, I.; Zhang, C. (2016): *Wolbachia* infections in mosquitoes and their predators inhabiting rice field communities in Thailand and China. *Acta Tropica* 159: 153-160. (in English) ["*Wolbachia* are inherited, endocyttoplasmic bacteria that infect a wide range of arthropods. Here is the first systematic report on the study of *Wolbachia* infection in mosquitoes and their predators from both Thailand and China. In Thailand, 632 mosquito specimens (20 spp.) and 424 insect predators (23 spp.) were collected from the rice agroecosystem, mostly from the Central region, followed by the Northeast, the North and the South and were inhabiting rice fields, wetlands and ditches. In China, 928 mosquitoes (15 spp.) and 149 insect predators (16 spp.) were collected from rice fields along the Weishan Lake in Shandong province. Specimens were classified in the orders Diptera, Coleoptera, Odonata and Hemiptera. Using *wsp*, *ftsZ*, 16S rRNA and *groE* gene amplifications, *Wolbachia* were detected in 12 mosquito spp. and 6 predator spp. from Thailand and 11 mosquito spp. and 5 predator spp. from China. The relative *Wolbachia* densities of these species were determined using quantitative real-time PCR. The mosquito, *Aedes albopictus*, and the predator, *Agriocnemis femina*, had the highest bacterial densities. These results imply that *Wolbachia* of supergroup B are distributed throughout these insects, probably via horizontal transmission in rice agroecosystems." (Authors)] Address: Department of Plant Production Technology, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Chalokkrung Rd Ladkrabang, Bangkok 10520, Thailand. E-mail: itsanun.wi@kmitl.ac.th

**15691.** Worthen, W.B.; Hart, T.M. (2016): Resistance to *Arrenurus* spp. parasitism in odonates: Patterns across species and comparisons between a resistant and susceptible

host. *Journal of Insect Science* 16(1)(37): 6 pp. (in English) ["Some adult odonates resist parasitism by larval water mites (*Arrenurus* spp.) with melanotic encapsulation, in which the mite's styletome is clogged and the mite starves. In summer 2014, we counted the engorged and resisted mites on 2,729 adult odonates sampled by aerial net at 11 water bodies in Greenville Co. and Pickens Co., SC, and tested the hypothesis that the frequency and intensity of resistance correlates with parasite prevalence (the percentage of parasitized hosts). Resistance prevalence (the percentage of parasitized hosts that resisted at least one mite) varied significantly among host species, exceeding 60% for *Argia fumipennis* and *Celithemis fasciata* but less than 20% for other species. However, neither resistance prevalence nor mean resistance intensity (mean percentage of resisted mites on resisting hosts) correlated with parasite prevalence. We described potential effects of parasitism on host development of *A. fumipennis* and *Pachydiplax longipennis* by comparing the percent asymmetry of forewing lengths between parasitized and unparasitized individuals. There was no significant difference in asymmetry for either males or females of *A. fumipennis*, or males of *Pa. longipennis* (females were not sampled). We also evaluated differences in melanotic encapsulation between *A. fumipennis*, which readily encapsulates mites in nature, and *Pa. longipennis*. We inserted a 2.0-mm piece of sterile monofilament line into the thorax of captured individuals for 24h and compared mean gray value scores of inserted and emergent ends using Image-J software. There was no difference in melanotic encapsulation between species." (Authors)] Address: Hart, T.M., Biology Department, Furman University, Greenville, SC 29613, USA. E-mail: Thomasmhart0@gmail.com

**15692.** Xu, Q.; Lin, W.; Zhuang, F.; Shen, C.; Lin, X. (2016): Acute toxicity of three pesticides to *Orthetrum* larvae. *Chinese Agricultural Science Bulletin* 32(2): 73-76. (in Chinese, with English summary) ["To select efficient and safe pesticides and control dragonfly larvae in fishing ponds, acute toxicity tests of three pesticides (trichlorfon, bifenthrin and clothianidin) to last-stadium larvae of *Orthetrum* were performed respectively. The results showed that LC50 (96 h) values of trichlorfon, bifenthrin and clothianidin to last-stadium larvae of *Orthetrum* were 0.2506, 0.0012 and 0.0517 mg a.i./L, respectively. Comparing LC50 (96 h) values of the three pesticides to the last-stadium larvae of *Orthetrum*, freshwater fishes and the tadpole of *Rana grylio*, and the aquatic ecological characteristics of the three pesticides, clothianidin was recommended as the suitable pesticide for controlling dragonfly larvae in fishing ponds." (Authors)] Address: Xu, Qihan, Zhangzhou City University, Zhangzhou Fujian 363000, China. E-mail: qihanxu@aliyun.com

**15693.** Xu, Q.-h. (2016): Description of the final stadium larva of *Macromia calliope* Ris, 1916 (Odonata: Anisoptera: Macromiidae). *Zootaxa* 4067(5): 594-598. (in English) ["The final stadium larva of *M. calliope* is described and illustrated for the first time and diagnosed against other larvae of Chinese *Macromia* species on the basis of published descrip-

tions. Among the fourteen known Chinese *Macromia* larvae, that of *M. calliope* can be separated from those of non-calliope-group species by having distinctive diamond-shaped black spots located at the outside of the base of the wing sheaths. And in five Chinese calliope-group species, the larva of *M. calliope* can be separated from that of *M. flavocolorata* by apical border of prementum not obviously projecting forwards; from that of *M. septima* by dorsal hook on S3 thinnest and tallest of all; from that of *M. chui* by a relatively smaller body; from that of *M. urania* by nine premental setae on each side of interior prementum, five longer ones accompanied medially by four shorter ones; and finally, from those of all other Chinese *Macromia* species by several distinctive large V-shaped black markings on mid-dorsum of distal abdominal segments." (Authors)] Address: Xu, Q.-h., Department of Garden and Horticulture, Zhangzhou City University, Zhangzhou, Fujian 363000, PR China. E-mail: qihanxu@aliyun.com

**15694.** Yapac, L.A.; Villanueva, R.J.T.; Nuñez, O.M. (2016): Species richness of Odonata in the agricultural area of Sultan Naga Dimaporo, Lanao del Norte, Philippines. *Bulletin of Environment, Pharmacology and Life Sciences* 5(3): 60-67. (in English) ["This study was conducted to determine the species richness of Odonata in the agricultural areas of Sultan Naga Dimaporo, Lanao del Norte. Eight sampling sites were assessed comprising heavily disturbed and slightly disturbed agricultural areas. Sampling was done by sweep netting. Thirteen species composed of 10 Anisoptera and three Zygoptera were documented belonging to 10 genera and three families. Only two endemic species were found (*Diplacina bolivari*, *Coeliccia dinoceras*). *Orthetrum sabina sabina*, an Oriental species, was the most abundant species found in all areas. The agroforestry sites which are slightly disturbed areas had higher species richness, abundance, endemism, and diversity. Results indicate that agricultural land use has adverse impact on species richness of Odonata." (Authors)] Address: Nuñez, Olga, Department of Biological Sciences, College of Science and Mathematics, Mindanao State University-Iligan Institute of Technology, Iligan City, 9200 Philippines. E-mail: olgamnuneza@yahoo.com

**15695.** Yeates, D.K.; Meusemann, K.; Trautwein, M.; Wiegmann, B.; Zwick, A. (2016): Power, resolution and bias: recent advances in insect phylogeny driven by the genomic revolution. *Current Opinion in Insect Science* 13: 16-23. (in English) ["Our understanding on the phylogenetic relationships of insects has been revolutionised in the last decade by the proliferation of next generation sequencing technologies (NGS). NGS has allowed insect systematists to assemble very large molecular datasets that include both model and non-model organisms. Such datasets often include a large proportion of the total number of protein coding sequences available for phylogenetic comparison. We review some early entomological phylogenomic studies that employ a range of different data sampling protocols and analyses strategies, illustrating a fundamental renaissance

in our understanding of insect evolution all driven by the genomic revolution. The analysis of phylogenomic datasets is challenging because of their size and complexity, and it is obvious that the increasing size alone does not ensure that phylogenetic signal overcomes systematic biases in the data. Biases can be due to various factors such as the method of data generation and assembly, or intrinsic biological feature of the data per se, such as similarities due to saturation or compositional heterogeneity. Such biases often cause violations in the underlying assumptions of phylogenetic models. We review some of the bioinformatics tools available and being developed to detect and minimise systematic biases in phylogenomic datasets. Phylogenomic-scale data coupled with sophisticated analyses will revolutionise our understanding of insect functional genomics. This will illuminate the relationship between the vast range of insect phenotypic diversity and underlying genetic diversity. In combination with rapidly developing methods to estimate divergence times, these analyses will also provide a compelling view of the rates and patterns of lineagenesis (birth of lineages) over the half billion years of insect evolution." (Authors) The publication includes references to Odonata.] Address: Yeates, D.K., Australian National Insect Collection, CSIRO National Research Collections Australia, Canberra, ACT 2601, Australia. E-mail: david.yeates@csiro.au

**15696.** Yu, P.; Cheng, X.; Ma, Y.; Yu, D.; Zhang, J. (2016): The complete mitochondrial genome of *Brachythemis contaminata* (Odonata: Libellulidae). *Mitochondrial DNA* 27(3): 2272-2273. (in English) ["In this study, we reported the complete mitochondrial genome of the dragonfly *Brachythemis contaminata* (Odonata: Libellulidae). The entire circular genome is 15,056 bp in length and represents the smallest in presently known odonatan mitogenomes. The DNA molecule contains 13 protein-coding genes, 2 rRNA genes, 22 tRNA genes and a non-coding control region of 323 bp. There were a total of 137 bp short intergenic spacers and 89 bp overlaps in the genome. The gene arrangement is similar to other dragonflies. The base composition of the genome is A (40.2%), T (32.8%), C (15.6%) and G (11.4%) with an AT content of 73.0%. Four start codons (ATA, ATT, ATC and ATG) and two stop codons (TAG and TAA/TA) were found in 13 protein-coding genes. The length of 22 tRNA genes ranged from 63 (trnP) to 72 bp (trnK)."] (Authors)] Address: Zhang, J., Institute of Ecology, Zhejiang Normal University, Jinhua 321004, Zhejiang Province, P. R. China. E-mail: zhang3599533@163.com

**15697.** Yuto, C.M.M.; Lumogdang, L.; Tabugo, S.R.M. (2016): Fluctuating asymmetry as an indicator of ecological stress in *Rhinocypha colorata* (Odonata: Chlorocyphidae) in Iligan city, Mindanao, Philippines. *Entomology and Applied Science Letters* 3(1): 13-20. (in English) ["Odonata species are known to be successful biological indicators because they are particularly sensitive to human disturbances due to their habitat selection which makes them vulnerable to changes. A useful trait to monitor developmental instability (DI) and ecological stress is fluctuating asymmetry (FA),

which is a measure of the differences between the left and right side of bilateral symmetrical organisms. It refers to a slight number and nondirectional deviations from strict bilateral symmetry of biological objects that occur as a result of stochastic microscopic processes. In this study, fore-wing variation of *Rhinocypha colorata*, a Philippine endemic species was investigated. It assessed developmental stability via fluctuating asymmetry in the fore-wings of *R. colorata*, in three populations from three areas: Buruun, Dituclalan, Dalipuga, Iligan City, Mindanao, Philippines. Analysis was based on Procrustes method that makes comparison of FA indices of homologous points. Using landmark method for shape asymmetry, anatomical landmarks were used and analyzed using Symmetry and Asymmetry in Geometric Data (SAGE) program. Twenty landmarks on the fore-wings were tested on samples for all populations. Results obtained showed variation and significantly high FA for all populations with relatively higher FA for Dalipuga. Principal component analysis (PCA) showed that barangay Dalipuga exhibited more variations (74.93%) than that of Dituclalan (72.19%) and Buru-un (67.97%). Possible reasons behind high FA values were anthropogenic activities in the area. FA has been considered as a good indicator of DI and thus acts as a biomarker for environmental stress. Hence, results may reflect inability of the organism to cope with stressing factors and any perturbations during development. Here-with, understanding the relationship between the species and its environment would help determine the health of a given ecosystem. Nonetheless, Odonata, as bioindicator species, can play an important role for biomonitoring purposes." (Authors) ] Address: Tabugo, Sharon, Department of Biological Sciences, Mindanao State University-Iligan Institute of Technology, Iligan City, Philippines. E-mail:sharonrose0297@gmail.com

**15698.** Zaliyati, A.M.; Shariff, S.M. (2016): Diversity of dragonfly communities at two habitats in Negeri Sembilan. *Regional conference on science, technology and social sciences (RCSTSS 2014)*: 557-564. (in English) ["Kuala Pilah and Batu kikir are located in Negeri Sembilan, Malaysia. The changes of flora and fauna community have always been related with the anthropogenic activities. This study was conducted in order to determine the species diversity of dragonfly within two different habitats in Negeri Sembilan. The sampling was carried out from August 2013 to October 2013 at two habitats comprising of UiTM Forest Reserve (Kuala Pilah) and Kampung Lonek Paddy Field (Batu Kikir). A total of 164 individuals of dragonflies were collected, which comprise of 14 species. For Kuala Pilah, a total of 11 species with 62 individuals were collected while for Batu kikir, a total of 9 species with 102 individuals were collected. Family Libellulidae was the dominant family that indicates 99 % of the total collected followed by one percent of total collected by Family Gomphidae. The highest total number of dragonfly individuals was shown by *Potamarcha congener* with 52 individuals that indicate 32 % of total collected while the least number of individuals was shown by the species of *Orthetrum chrysis*, *Tholymis tillarga*, and *Ictinogomphus decoratus* with one individual that indicate only one



percent, respectively. Thus, there was high species diversity ( $H' = 1.9$ ), high species richness ( $R = 2.423$ ), and high species evenness of dragonfly ( $E = 0.792$ ) in UiTM Forest Reserve as compared to Kampung Lonek Paddy Field." (Authors)] Address: Zaliyati, Amira Md, Faculty of Applied Sciences, Universiti Teknologi MARA, Kuala Pilah, Negeri Sembilan, Malaysia. E-mail: amamira3@gmail.com

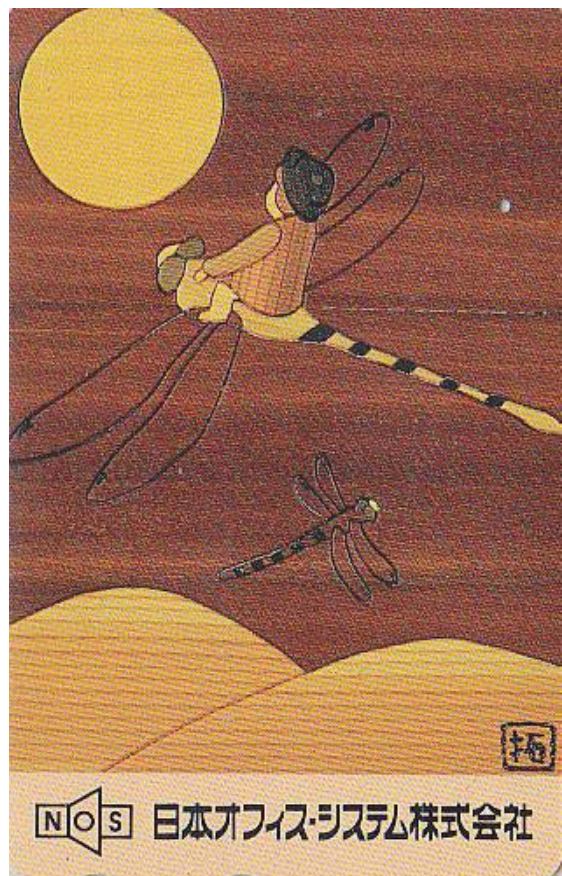
**15699.** Zhang, H.-M.; 1, Yang, G.-H.; Cai, Q.-H. (2016): A new species of *Lamelligomphus* Fraser, 1922 (Odonata: Gomphidae) from southern Yunnan, China. *Zootaxa* 4098(3): 571-581. (in English) ["*Lamelligomphus annakarlorum* sp. nov. is described based on specimens collected from southern Yunnan Province, China (holotype male: Xishuangbanna National Nature Reserve, 21°57'59"N, 101°12'37"E, Xishuangbanna Dai Autonomous Prefecture, Yunnan Province, China). All type specimens of the new species have been deposited in the Collection of Aquatic Animals, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan City, Hubei Province, China. It is compared with *Lamelligomphus camelus* (Martin, 1904), which shares some similar characters." (Authors)] Address: Zhang, H., State Key Laboratory of Freshwater Ecology & Biotechnology, Institute of Hydrobiology, Chinese Acad. of Sciences, Wuhan 430072, China. E-mail: zhanghaomiao6988@gmail.com

**15700.** Zheng, D.; Nel, A.; Wang, B.; Jarzembowski, E.; Chang, S.-C.; Zhang, H. (2016): The first Early Cretaceous damsel-dragonfly (Odonata: Stenophlebiidae: *Stenophlebia*) from western Liaoning, China. *Cretaceous Research* 61: 124-128. (in English) ["A well-preserved forewing of the damsel-dragonfly *Stenophlebia liaoningensis* sp. nov. is described from the Lower Cretaceous Yixian Formation in the Huangbanjigou Village, western Liaoning, China. This is the first discovery of the genus *Stenophlebia* in China, although it was widely distributed in Europe during the Late Jurassic. The discovery adds to the biodiversity of Stenophlebiidae in the Chinese Cretaceous, and provides insight on the evolution of this extinct family." (Authors)] Address: Zhang, D., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, China. E-mail: dranzheng@gmail.com

**15701.** Zheng, D.; Zhang, Q.; Chang, S.-C.; Wang, B. (2016): A new damselfly (Odonata: Zygoptera: Platystictidae) from mid-Cretaceous Burmese amber. *Cretaceous Research* 63: 142-147. (in English) ["The genus *Mesosticta* Huang, Azar, Cai et Nel, 2015 was established based on the wing bases of two damselflies from mid-Cretaceous Burmese amber. Here we describe a new well-preserved platystictid damselfly, *Mesosticta electronica* sp. nov., with complete forewings and hindwings. The diagnosis of *Mesosticta* is revised and augmented in this paper. *Mesosticta electronica* sp. nov. differs from *Mesosticta burmatica* Huang, Azar, Cai et Nel, 2015 in having the arculus slightly distal of Ax2, a free subdiscoidal cell, the hindwing AA ending on the middle area of the posterior side of the discoidal cell, and the base of RP2 being three or four cells distal of

the subnodus. The new discovery adds to the diversity of damselflies in mid-Cretaceous Burmese amber and puts the origin of Platystictidae to at least the mid-Cretaceous." (Authors)] Address: Zheng, D., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, China. E-mail: dranzheng@gmail.com

**15702.** Zheng, D.; Nel, A.; Wang, B.; Jarzembowski, E.; Chang, S.-C.; Zhang, H. (2016): The discovery of the hindwing of the Early Cretaceous dragonfly *Sinaktassia tangi* Lin, Nel & Huang, 2010 (Odonata, Aktassiidae) in northeastern China. *Cretaceous Research* 61: 86-90. (in English) ["A well-preserved female hindwing of the petalurid dragonfly *Sinaktassia tangi* Lin, Nel & Huang, 2010 is described from the Lower Cretaceous Yixian Formation of Inner Mongolia, China. The discovery of this hindwing allows to complete the description of this Chinese Cretaceous taxon, provides distinctive features from other Aktassiidae, and indicates a comparatively wide distribution of this dragonfly in northeast China." (Authors)] Address: Zheng, D., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, China



Many thanks to all who contributed to this issue of OAS! A special thank to Paweł Buczyński for multiple help, and Andreas Martens, Cédric Vanappelghem and Geert de Knijf for contributing papers to this issue.

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 1997

**15703.** Lee, C.M. (1997): Environmental contaminants in potential prey of Aplomado Falcons in the lower Rio Grande valley, Texas. U.S. Fish and Wildlife Service Region 2 Contaminants Programm. Project number: 21410-I 130-2N19: 17 pp. (in English) ["Reintroduction of the northern aplomado falcon (*Falco femoralis septentrionalis*) into its former range in Texas began in 1985, and continued with a full scale release of captive-bred falcons in 1993 on Laguna Atascosa National Wildlife Refuge (NWR). A study was conducted in 1994 to determine whether contaminants in falcon prey posed a threat to the successful recovery of the species. Meadowlark (*Stumella* sp.), mourning dove (*Zenaidura macroura*), cicadas, and dragonflies were collected from two areas on the Laguna Atascosa NWR and from two tracts on the Lower Rio Grande Valley NWR where falcons may disperse. Organophosphate pesticides and PAH's were below detection levels in all samples. With the exception of DDE, all other organochlorine pesticides were also below detection. Mercury concentrations in meadowlark were above levels in prey that have been associated with reproductive anomalies in sensitive aquatic birds, so there may be some concern about reproductive or chronic effects in the aplomado falcon from this heavy metal.] Address: U.S Fish and Wildlife Service, Corpus Christi Ecological Services Field Office, Campus Box 338, 6300 Ocean Drive, Corpus Christi, Texas 78412, USA

**15704.** Mauersberger, R. (1997): Ein älterer Fund von *Erythromma viridulum* (Charpentier) in Brandenburg (Zygoptera: Coenagrionidae). *Libellula* 16(3/4): 191-192. (in German, with English summary) ["A female specimen collected 1971 in Brodowin near Eberswalde represents the third record for Brandenburg, Germany." (Author)] Address: Mauersberger, R., Waldstraße 4, 16278 Steinhöfel, Germany

**15705.** Jeziorski, P. (1998): *Aeshna viridis* does not belong to the fauna of the Czech Republic (Odonata: Aeshnidae). *Klapalekiana* 34: 67-68. (in Czech with English summary) ["Collections of dragonflies from several Czech museums

were studied by the author. The record of *A. viridis* Eversmann, 1836 from the Czech Republic is shown to be based on a wrong determination of a specimen of *Aeshna* (O.F. Muller, 1764). A list of 12 species of Aeshnidae known to occur in the Czech Republic is included." (Author)] Address: Jeziorski, P., Na belide 1, CZ-73564 Havirov-Suchá

## 1998

**15706.** Naylor, G. (1998): The Banded Demoiselle (*Calopteryx splendens* (Harris)) in north Cumbria in 1998. *Carlisle Naturalist* 6(2): 31-32. (in English) ["*C. splendens* was, until recently, restricted in its northern outpost to a few sites along the lower reaches of the river Waver occupying the 10 km grid squares NY15 and NY25. In 1996, as was reported in this newsletter (Clarke and Garner 1996), there were sightings at some places along the river Wampool and close to the river Eden, which expanded its range into squares NY24 and NY35. The records from the Wampool were the first known from that river and those for the Eden were the first there for almost 40 years. The expected continuation of this expansion in 1997 did not come about, but there was one additional record near Rockcliffe, which was also reported in this newsletter (Naylor 1997). This was in another new square, NY36. The expected resurgence seems to have arrived in 1998. Firstly, the Environment Agency reported very large numbers in the usual Waver sites (this also happened in 1996). On 16th July Stephen Hewitt and I observed a female *Calopteryx* in Rickerby Park, Carlisle and although we could not be certain which species, *splendens* or *virgo*, it is very unlikely to have been the latter. This again was a new square (NY45). Two weeks later I found a male and female *splendens* on the banks of the Eden at Cargo. David Clarke followed up this report and saw at least 7 (males and females) at the same site on the next day. During this visit, a local fisherman reported having seen them there in 1997. DC saw another one there on 15th August. At around this time I made an unsuccessful search of the area at Rockcliffe, where I had seen one in 1997. It would appear from these observations that there may now be an established population along the river Eden from at least Carlisle down to Rockcliffe and that searches of other parts of this stretch of river and possibly upstream from Rickerby Park may produce

more sightings. The flight period is from late May to mid-August so make a note of those dates in your diary for 1999. Clarke, D.J. & Garner, S., 1996, A dispersal of the *C. splendens* in the Solway area in 1996, *Carlisle Naturalist* 4 (2): 38. Naylor, G.R., 1997, A further record of the *C. splendens* on the River Eden, *Carlisle Naturalist* 5(2): 35.]" Address: Naylor, G., 2 Fell Cottages, Milton, Brampton, Carlisle, UK

## 2000

**15707.** Brünner-Garten, K. (2000): Lernvermögen entscheidet über den Erfolg: Frosch kontra Libelle. *Galathea* 16/2: 71. (in German, with English summary) ["Frogs always try to catch dragonflies. Usually the eye-controlled vertebrate looks for success with a sudden mighty leap. After failing an extra-intelligent frog was speculated that got its prey by an underwater attack! The egg-laying female dragonfly was not able to compete with this tactic." (Author)] Address: Brünner-Garten, K., Kellerstraße 9 d , 90530 Wendelstein, Germany

**15708.** de Jong, T. (2000): Poelen vol libellen. *De levende Natuur* 101(4): 127-132. (in Dutch, with English summary) ["Ponds with dragonflies. Since 1990 a few hundred ponds have either been restored or newly created in the eastern part of the province of Utrecht. These ponds are important breeding places for amphibians, but also fish, dragonflies and plants use these ponds. In this article the effects of the creation and restoration of ponds on the presence of dragonflies are discussed. Sixty ponds were investigated. In these ponds 29 species of dragonflies were found. There are large differences in the presence of species of dragonflies in the different ponds. Therefore data on the abiotic and biotic characteristics of all ponds were collected to obtain some insight in how an 'ideal' pond for dragonflies can be created. Analysis of these data shows that the most important features of a good pond for dragonflies are a surface of at least 100 m<sup>2</sup>, a minimum depth of 50 cm of water, a sloping bank and plenty of sunlight. The requirements for a good pond for dragonflies are largely the same as for ponds for amphibians. If properly managed, ponds can play an important role as stepping stones in a rural landscape." (Author)] Address: de Jong, T., VIRIDIS, p/a Rijnlaan 25, 4105 GS Culemborg, The Netherlands. E-mail: Viridis@planet.nl

**15709.** Kagimoto, B. (2000): An old male of *Orthetrum poeciuops miyajimaense* guarded females without copulation with the male before. *Tombo* 42: 14. (in Japanese, with English summary) ["At the habitat in Miyajima-island on August 16. 1999. The author and Mr. Masahiko Saeki had observed 5 times that an old male of *O. poecilops miyajimaense* Yuki et Doi made his territory in flight, and even when the females appeared he did not want to copulate with them but only guarded their ovipositions."] Address: not stated

**15710.** Kita, H. (2000): Non-contact sitting-oviposition of *Ictmogomphus clavatus*. *Tombo* 42: 54. (in Japanese, with English summary) ["After a female of *I. clavatus* laid eggs onto floating plant a few times by the usual contact flying-

oviposition, he rested on a leaf and protruded eggs with adhesive thread (Figure). This method is called as "non-contact sitting-oviposition" (Eda, 1960).] Address: Kita, H., Takayama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan

**15711.** Kumar, H.N.; Singh, M.E.; Sharma, A.K.; Sing, M.R.; Amanda Kumar, M. (2000): Faunal component in the diet of liontailed macaque. *Primate Rep.* 58: 57-65. (in English) ["*Macaca silenus* is a habitat specialist, restricted to the climax rainforests of Western Ghats, India. It is primarily a frugivorous sp., but its diet also includes a variety of animals. On dragonflies it is feeding occasionally: head first and the body later. In addition to the wings, the legs are also sometimes rejected." (Authors)] Address: Singh, M.E., Biopsychol. Lab., Univ. Mysore, Mysore -570 006, India

**15712.** Lopes, F.; De Marco, P. (2000): Comportamento territorial em insetos: aspectos corriqueiros e estudos de casos. *Oecologia Brasiliensis* 8: 193-222. (in Portuguese, with English summary) ["Our objective in this review, about insect territorial behaviour, isn't to provide an exhaustive discussion on this issue, but to establish the major theoretical aspects on this theme, for anyone that initiates their studies on it. The paper includes: a) a review about the concept of territoriality, based on the former ideas developed from vertebrate studies and its applicability to insects; b) the major problems in the use of these concepts, in special mistakes with other terms related to the spatial distribution of individuals or other behaviors, associated to competition for resources; c) theoretical considerations on territoriality and, d) case studies in Odonata, as examples on those issues." (Authors)] Address: De Marco, P., Laboratório Ecologia Teórica e Síntese, Departamento de Biologia Geral, Universidade Federal de Goiás, BR-74001-970, Goiania, GO, Brazil. E-mail: pdemarco@icb.ufg.br

**15713.** Raab, R.; Chwala, E. (2000): Die Libellen (Insecta: Odonata) des dynamischen Altarmsystems der Donau bei Regelsbrunn (Niederösterreich). *Abh. Zool.-Bot. Ges. Österreich* 31: 125-147. (in German, with English summary) ["Between 1995 and 1997 on 20 all-day field trips a total of 9025 individuals of 32 dragonfly species were recorded at a dynamic floodplain of the River Danube near Regelsbrunn. The most abundant species was *Platycnemis pennipes* with 52 % of the total catch, followed by *E. viridulum* with 20 %. In 1995 and 1996 the four most widely distributed species were *P. pennipes*, *Calopteryx splendens*, *Ischnura elegans* and *Orthetrum cancellatum*. The paper discusses species composition and the expected effects of hydrological connectivity."] Address: Raab, R., Quadenstr. 13, 2232 Deutsch-Wagram, Austria. E-mail: rainer.raab@gmx.at

## 2001

**15714.** Glotzhofer, R.C.; Chapman, E. (2001): Second location for two rare Odonata in Ohio, *Nannothemis bella* and *Ladona julia*, (Odonata: Libellulidae) discovered at Singer Lake Bog, Summit County, Ohio. *The Great Lakes Entomologist* 34(2): 63-66. (in English) ["Previously the



dragonflies (Odonata, Libellulidae) *Ladona julia* and *Nanothemis bella* were known in Ohio from only one extant population each: *L. julia* from extreme northwest Ohio in Williams County and *N. bella* from west-central Ohio in Champaign County. During the summer of 2000 populations of each of these species were found in close proximity to each other at Singer Lake, a wetlands complex in southern Summit County in northeastern Ohio. This new location is also home to a population of another rare Ohio dragonfly, *Dorocordulia libera* (Odonata, Corduliidae) that was discovered during 1999. The Singer Lake wetlands are proving to be a very significant habitat for Ohio Odonata." (Authors)]

**15715.** Booker, J.S. (2002): *Enallagma civile* (Odonata: Coenagrionidae) life history and production in a west Texas playa. M.Sc. thesis, University of North Texas: IV + 46 pp. (in English) ["Conclusions: This study was conducted to describe the life history of *Enallagma civile* and the other Odonates that inhabit playa habitats in the Southern High Plains of Texas. It was learned that *Enallagma civile* has a low secondary production estimate of 66.8 mg/m<sup>2</sup>. It was also determined that this species, *Enallagma civile*, had a developmental time of approximately 21 days in a playa setting. Another important fact was that *E. civile* was the earliest colonizer of all of the Odonate species studied. It was recorded in the playa at least one week earlier than all of the other Odonates. Odonate populations in the playa continued to increase in size throughout the study. Some populations grew more quickly than others. For instance, the damselfly, *Lestes disjunctus*, had the population that grew the slowest. Its average population estimate per m<sup>2</sup> changed from 0 to approximately 3 in an eight-week time period. On the opposite end of the spectrum, the damselfly, *Enallagma civile*, had an average population estimate per m<sup>2</sup> which increased in size from 2 to approximately 670 naiads in the same eight-week time period. When the playa began to lose water and thus dwindled in size, the Odonate populations all had significant decreases in size. The naiads either became prey for another organism, emerged or died due to lack of water or lack of food. None of the species in this study were able to continue increases in their population sizes during this time. The period after this drought is what is unique. Some of the species continued to have numbers that dwindled, while others maintained relatively similar amounts of naiads. One species, *Anax junius*, actually had a population explosion after the drought when the playa began to refill close to the beginning of September. During the course of this study, much was learned about the niches that Odonates occupy in a playa. The populations of some prominent dragonfly species were studied and their quantities were estimated for different periods during one season. Sizes of head capsules were studied in an effort to determine the development of Odonate populations over a period of time. In addition, field sampling showed high points in population sizes and trends in growth. Research was conducted of the life histories of Odonates and a lot of information was gained about the productivity of dragonflies. This study was a valuable proponent to the collection of information available about playa habitats." (Author)] Address: not stated

**15716.** Kirti, J.S., Singh, A. (2002): Studies on the male secondary genitalia of two species of genus *Sympetrum* Newman (Libellulidae: Anisoptera). *Fraseria* (N.S.) 7: 9-12. (in English) ["The structure of the male secondary apparatus of two species of genus *Sympetrum* Newman, i.e. *S. commixtum* (Selys) and *S. haematoneura* Fraser have been described and illustrated for the first time." (Authors)] Address: Kirti, J.S., Dept of Zoology, Punjabi University, PATIALA - 147 002 (Punjab), India. E-mail archu\_speak@yahoo.co.in

**15717.** MacKenzie, R.A.; Kaster, J.L. (2002): A preservative-free emergent trap for the isotopic and elemental analysis of emergent insects from a wetland system. *The Great Lakes Entomologist* 35: 47-51. (in English) ["This study reports a cost-effective, live emergent trap designed for the preservative-free use in both biogeochemical and ecological analyses of emerging insects. The trap proved to be advantageous in several ways. First, the simple design made the trap time-efficient since it was easy to set-up, change, and maintain. Second, live sampling not only provided uncontaminated organisms for elemental and stable isotopic analyses, it minimized disfigurement. This resulted in rapid and easy handling, as well as identification, of adult insects. Finally, trap avoidance by ephemeropterans and odonates, a common problem encountered in the literature, was minimal and organisms from both insect orders were successfully collected." (Authors)] Address: MacKenzie, R.A., The Center for Great Lakes Studies at the WATER Institute, University of Wisconsin-Milwaukee, 600 E. Greenfield Ave., Milwaukee, WI, 53204

**15718.** Mitra, A. (2004): A checklist of the Odonata of Sikkim, with some new records. *Opusc. zool. Flumin.* 216: 1-8. (in English) ["74 species and subspecies known to occur in the Himalayan state of Sikkim (India) are listed. The locality data and collection dates are provided for 20 species that are new to the state. A complete regional bibliography is appended." (Author)] Address: Mitra, A., 208/K/8 Raja Ram Mohan Roy Road, Netaji Sarak, Calcutta-700008, India

**15719.** Samway, M.; Taylor, S. (2004): Removal of invasive alien trees gives damselflies a reprieve. *Rostrum* 63: 1. (in English) ["Under the auspices of the Working for Water Programme, invasive alien vegetation is being removed in some places in South Africa. This is having an enormously positive impact on certain species that were feared extinct. In the Northern Province *Pseudagrion newtoni* has returned to restored sites, while in the Western Cape several species are recovering, e.g. *Metacnemis angusta*, *Proischnura polychromaticum* and *Chlorolestes umbratus*. Some of these very rare and threatened species are now able to expand back to their former geographical extent.] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**15720.** Fleck, G. (2005): Contribution à la connaissance des Odonates de Nouvelle-Calédonie: notes sur la larve supposée de *Synthemis ariadne* Lieftinck, 1975 (Odonata, Anisoptera, Synthemistidae). Bulletin de la Société entomologique de France 110(2): 165-166. (in French, with English summary) ["Contribution to the knowledge of the Odonata of New Caledonia: notes on the supposed larva of *S. ariadne*. New morphological and biological elements on the supposed larva of *S. ariadne* complete the previously published works." (Author)] Address: Fleck, G., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleckgunther@gmail.com

**15721.** Hatakeyama, S.; Sugaya, Y.; Ogamino, Y. (2005): The acute toxicity of fenthion, an organophosphorus insecticide on damselfly and freshwater shrimp through fenthion-accumulated midge larvae. Jpn. J. Environ. Toxicol. 8(1): 13-22. (in Japanese, with English summary) ["Effects of dietary fenthion (hereafter MPP), an organophosphorus insecticide, on mortality of damselfly larvae, *Ischnura senegalensis*, and freshwater shrimp, *Macrobrachium rdpense*, were assessed using an insecticide-tolerant strain of *Chironomus yoshimatsui* (Chironomid) as a prey organism. Midge larvae had been exposed to MPP of 125, 250, 500 and 1000/ig/L, respectively, for 24-hrs, and resultant, accumulated MPP at 0.9, 2.1, 11.8 and 68 ng/g (wet wt.). In addition, fenthion sulfoxide (FSO) was detected in the midge larvae at higher levels rather than MPP itself. Individual shrimp and damselfly larva (each, ten replicates) were daily fed on MPP accumulated midge larvae (3 or 4 individuals/d) in a flowthrough aquarium. All damselfly larvae died within 3 days by ingesting the midge larvae accumulated 2.1 (2.8) or 11.8 (17.7) ng/g of MPP (FSO in parentheses). While, mortality of the shrimp fed on the midge larvae accumulated 0.9 or 2.1 ng/g MPP increased slowly to 40 and 80%, respectively, until 24 days after start of the experiment. Both predators continued to eat the MPP-accumulated midge larvae without showing hesitation, suggesting that they lack ability to keep away from toxic prey. We estimated the exposure levels of MPP and FSO in the live midge larvae that brought 50% mortality of predators used for the tests." (Authors)] Address: Hatakeyama, S., National Institute for Environment Studies, Japan

**15722.** Jakab, T.; Müller, Z.; Devai, G.; Miskolczi, M. (2005): Adatok a Tisza-tó és környéke szitakötőfaunájához (Odonata) az 1998-1999. évi gyűjtések és megfigyelések alapján. Studia Odonatologica Hungarica 9: 5-31. (in Hungarian, with English summary) ["The paper presents faunistic data on dragonflies collected (larvae, exuviae and adults) and observed (adults) from the shallow lake type reservoir Tisza-tó and its surrounding (in- and outflows, leaking canals). Initially the authors present the methods employed in the field work and in data processing, and introduce the literature they have considered in the identification of species and in reporting faunistic data. Thereafter they provide a detailed survey of collection and observation results from the area. Finally they summarize and evaluate the data on the dragonfly fauna. Collections and observations were made in two years

(1998 and 1999), with the participation of 3 specialists on 58 days and 60 localities in the seven cells (DT65, DT66, DT76, DT77, DT78, DT87 and DT88) of the UTM grid map. In the faunistic report data on 459 larvae (241 males and 218 females), 244 exuviae (122 males and 122 females) and 916 adults (595 males and 321 females) are given in detail, representing 959 data (186 larvae, 107 exuviae and 666 adults). The number of observational data without the number of individuals is 154, thus the total number of data is 1113. By this study 39 species (13 Zygoptera and 26 Anisoptera) were found to occur in the area, out of which 1 comes from the very frequent, 16 from the frequent, 12 from the less frequent, 5 from the rare and 5 from the sporadic class of country-wide occurrence frequency." (Author)]

**15723.** Landwer, B.H.P.; Sites, R.W. (2005): Diagnostic efficacy of morphological characters of larval *Tamea lacerata* Hagen and *Tamea onusta* Hagen (Odonata: Libellulidae) in the Prairie region of Missouri. The Great Lakes Entomologist 38(3/4): 155-163. (in English) ["Distinguishing among species of larvae of the dragonfly genus *Tamea* historically has been problematic, largely due to conflicting characterizations of the larvae of *T. lacerata* Hagen and *T. onusta* Hagen (Odonata: Libellulidae) in the literature. The various systematic treatments usually focused on relative lengths of morphological characters to distinguish the species, but often contradicted one another and themselves as to what the diagnostic values actually were. We traced much of the confusion back to errors in the original larval description of *T. onusta*. We used morphometric analyses to determine the efficacy of previously published characterizations to distinguish between the larvae of *T. lacerata* and *T. onusta*. Previous characterizations, especially those involving relative lengths of the caudal appendages, were generally found to be inadequate for distinguishing larvae of the two species. The most reliable characteristic for distinguishing the two species was found to be the length of the epiproct relative to the length of the paraproct." (Authors)] Address: Landwer, B., Enns Entomology Museum, Division of Plant Sciences, University of Missouri, Columbia, MO 65211, USA. E-mail: brett.landwer@mdc.mo.gov

**15724.** Marzouq, M.K. (2005): Relative growth and morphological variability in *Ischnura evansi* (Morton) (Odonata: Coenagrionidae). Marina Mesopotamica 20(1): 27-38. (in English) ["Morphological variability was studied in a laboratory reared adults of *I. evansi*. Total body length, head width, thorax length, abdomen length and width length were measured in 44 ♂♂ and 69 ♀♀ phenotype (23 blue, 28 orange and 18 orange-brown females). Result indicated that males were smaller than females in all character, females phenotypes were significant difference, linear regression equation for relationship between body length and abdomen length as well as wing length for males and females are significant. Gynochrome 2 females were larger than androchromes, as body size is related to larval nourishment, this suggest an effect of maintenance of polymorphism. The difference of the mean body mass between sexes is significant, head width and wing length increased with body

length." (Author)] Address: Marzoq, M.K., Dept. Biology, College of Education, Univ. Basrah, Iraq

**15725.** McWilliams, L.A. (2005): Variation in diet of the Mexican Free-Tailed Bat (*Tadarida brasiliensis mexicana*). *Journal of Mammalogy* 86(3): 599-605. (in English) ["This study documents the diet of Mexican free-tailed bats (*Tadarida brasiliensis mexicana*) at Carlsbad Cavern, Carlsbad Caverns National Park, Eddy County, New Mexico, and provides information on seasonal variation in food habits of this species throughout its summer residence. Diet was determined from 1,303 fecal samples. 11 orders and 38 families of insects, unidentified insects, 2 orders of Arachnida (Araneae and Acari), bat hair, and mist net were consumed, with Lepidoptera and Coleoptera occurring at greatest percentage volumes and percentage frequencies in the diet. Diet varied significantly throughout the season. 22 food categories exhibited statistically significant variation among sampling sessions. Amounts of Coleoptera, Lepidoptera, Formicidae, Psyllidae, Hymenoptera, and Diptera consumed showed the greatest differences among sampling sessions." (Author)] Address: McWilliams, Lisa, Dept Biol. Sciences, 101 Cary Hall, Auburn Univ., AL 36849, USA. E-mail: mcwilla@auburn.edu

**15726.** Osborn, R. (2005): Odonata as indicators of habitat quality at lakes in Louisiana, United States. *Odonatologica* 34(3): 259-270. (in English) ["Larval Odonata were sampled at 3 lakes. Environmental variables such as chemical composition, water current, turbidity, and vegetation cover were measured. Cross Lake had the most species and greater diversity of species than Chaplin's and Sibley lakes. Most Zygoptera species were found at Cross Lake where carbon availability was highest. Classification and ordination analysis produced similar species groups, providing strong evidence for species assemblages being determined by the measured environmental variables. Tolerant species included *Enallagma civile*, *Erythemis simplicicollis* and *Plathemis lydia*. Species only present at Cross Lake (incl. *Argia sedula*, *Enallagma basidens*, *Ischnura hastata*, *I. kellicotti*, *Celithemis eponina*, *Erpetogomphus designatus*, *Libellula luctuosa*, *L. pulchella*, *Nasiaeschna pentacantha*) were associated with lower levels of ammonia, conductivity, pH, and higher levels of oxygen and increased vegetation. Cross Lake provided habitat that could support more species and was important for species that were less tolerant of ammonia and anoxia. This study provides baseline data for future monitoring and conservation management of these lakes." (Author)] Address: Osborn, R., Dept Biol. Sci., Box 19498, Northwestern State Univ., Natchitoches, LA 71497, USA

**15727.** Perez Bote, J.L.; Ferri Yanez, F.; Torrejon Sanroman, J.M.; Garcia Jimenez, J.M.; Perianes Carrasco, M. (2005): Nueva cita de *Coenagrion mercuriale* (Charpentier, 1840) (Odonata, Coenagrionidae) en Extremadura. *Boletín de la S.E.A.* 37: 306. (in Spanish) [male of *C. mercuriale*, Río Retín (Valencia de las Torres, Badajoz), UTM: 29SQC5755; 18.08.04; leg.: F. Ferri.] Address: Perez Bote, J.L., Área de Zoología, Facultad de Ciencias, Universidad de Extremadura, Avda. de Elvas s/n, E-06071 Badajoz, Spain. E-mail: jlperez@unex.es

**15728.** Walker, J.C. (2005): *Gomphus fraternus* (Odonata: Gomphidae), a new Missouri state record. *The Great Lakes Entomologist* 38(1/2): 104-105. (in English) ["A male *Gomphus fraternus* (Say) (Odonata: Gomphidae) was vouchered from the Meramec River at Castlewood State Park, St. Louis, County, Missouri on 7 June 2005. The collection of this specimen is a new state record for Missouri and represents a significant range extension south and westward for this species." (Author)] Address: Walker, Jane, 1Washington University Tyson Research Center, P.O. Box 258, Eureka, MO 63025, USA. E-mail: walker@biology.wustl.edu

## 2006

**15729.** Dapkus, D. (2006): Interesting records of insects in Pavilniai Regional Park. New and rare for Lithuania insect species 17: 83-85. (in English) ["Pavilniai Regional Park (Vilnius district) was established in 1992 with the aim to protect hilly landscapes created after the last glaciation. It is the smallest regional park in Lithuania (its area is 2153 ha). Anyway, the park is very heterogenous having different kinds of meadows in the slopes of hills (altitudes of the park ranges up to 100 meters), forests and urbanized territories. The river Vilnia crosses the park and has steep slopes and exposures. [...] Odonata. Gomphidae. *Ophiogomphus cecilia* (Fourcroy, 1785). (Author)] Address: Dapkus, D., Department of Zoology, Vilnius Pedagogical University, Studentu str. 39, LT-08106 Vilnius, Lithuania. E-mail: daldap@vpu.lt

**15730.** Dyatlova, E.S. (2006): Analytical review of odonatological studies in the South-Western Ukraine. 11(6): 195-203. ["Species composition of present odonate fauna (Insecta: Odonata) in the South-Western Ukraine has been analysed. According to our and literary data 54 species of 24 genera belonging to 8 families occur in the region. *Sympetrum pedemontanum* and *Coenagrion scitulum* were recorded by us in the investigated area for the first time. The phenology (seasonal dynamics of flight) of Odonata in the South-Western Ukraine has been described. The list of rare species which should be protected in the region is proposed." (Author)] Address: Dyatlova, Elena, Inst. of Zoology, Faculty of Biology, I.I. Mechnikov University of Odessa, Odessa, Ukraine. E-mail: lena.dyatlova@gmail.com

**15731.** Iwata, T.; Fujioka, M. (2006): Effects of winter flooding on aquatic fauna in lotus and rice fields during the growing season. *Japanese Journal of Conservation Ecology* 11: 94-104. (in Japanese, with English summary) ["We compared the aquatic fauna in ordinary rice fields, which are dry in winter, with those in lotus fields, which are flooded in winter. We carried out biweekly sampling of zooplankton and small aquatic animals at 15 pairs of adjacent rice and lotus fields in Ibaraki Prefecture, Japan, during the crop-growing season, when both types of paddy arc flooded. Zooplankton were more abundant in the lotus fields than in the rice fields. The total number and biomass of small aquatic animals peaked in early June in the rice fields, but continued to increase in July in the lotus fields. In the rice fields, crayfish (*Procambarus clarkii*) dominated



in May and tadpoles and insects dominated in June. In the lotus fields, *Rana japonica* tadpoles dominated from April to May and fish dominated from June to July. Some insects (*Rhantus pulverosus* and *Berosus signaticollis*), fish (*Carassius* spp., *Pseudorasbora parva*), and *R. japonica* tadpoles were more abundant in the lotus fields than in the rice fields, while dragonfly larva (*Sympetrum* spp.) and *Hyla japonica* tadpoles were more abundant in the rice fields than in the lotus fields. The observed differences in fauna may be the result not only of winter flooding but also of differences in water management and in the application of fertilizer and pesticides." (Authors)] Address: Iwata, T., College of Agrobiological Resources, University of Tsukuba, Japan

**15732.** Tushabe, H.; Kalema, J.; Byaruhanga, A.; Asasira, J.; Ssegawa, P.; Balmford, A.; Davenport, T.; Fjeldsa, J.; Friis, I.; Pain, D.; Pomeroy, D.; Williams P.; Williams, C. (2006): A nationwide assessment of the biodiversity value of Uganda's Important Bird Areas network. *Conservation Biology* 20(1): 85-99. (in English) ["BirdLife International's Important Bird Areas (IBA) program is the most developed global system for identifying sites of conservation priority. There have been few assessments, however, of the conservation value of IBAs for nonavian taxa. We combined past data with extensive new survey results for Uganda's IBAs in the most comprehensive assessment to date of the wider biodiversity value of a tropical country's IBA network. The combined data set included more than 35,000 site × species records for birds, butterflies, and woody plants at 86 Ugandan sites (23,400 km<sup>2</sup>), including 29 of the country's 30 IBAs, with data on additional taxa for many sites. Uganda's IBAs contained at least 70% of the country's butterfly and woody plant species, 86% of its dragonflies and 97% of its birds. They also included 21 of Uganda's 22 major vegetation types. For butterflies, dragonflies, and some families of plants assessed, species of high conservation concern were well represented (less so for the latter). The IBAs successfully represented wider biodiversity largely because many have distinctive avifaunas and, as shown by high cross-taxon congruence in complementarity, such sites tended to be distinctive for other groups too. Cross-taxon congruence in overall species richness was weaker and mainly associated with differences in site size. When compared with alternative sets of sites selected using complementarity-based, area-based, or random site-selection algorithms, the IBA network was efficient in terms of the number of sites required to represent species but inefficient in terms of total area. This was mainly because IBA selection considers factors other than area, however, which probably improves both the cost-effectiveness of the network and the persistence of represented species. ... Nevertheless, for dragonflies, grasses, and sedges, the data gaps were small enough to make a provisional assessment worthwhile. Although dragonfly species lists were lacking for six IBAs, 86% of the 231 species on the national list have already been recorded from IBAs (Table 1), including 11 of the 13 Ugandan species recently assessed as threatened or near threatened in a provisional red list of East African dragonflies (assessment by V. Clausnitzer, K. D. B. Dijkstra, and F. Suhling, personal communication)." (Authors)] Address:

Tushabe, H., Makerere University Institute of Environment and Natural Resources, P.O. Box 7298, Kampala, Uganda. E-mail: htushabe@hotmail.com

## 2007

**15733.** Bauer, U. (2007): Beobachtungen am Rettenberger Weiher (Landkreis Augsburg). *Berichte des Naturwissenschaftlichen Vereins für Schwaben e.V.* 111: 45-45. (in German) [Bavaria, Germany; records of *Libellula quadrimaculata*, *Calopteryx splendens*, *Anax imperator*, and *Somatochlora spec* are listed.] Address: Bauer, W., Schrofenstraße 33, 86163 Augsburg, Germany

**15734.** Bienek, R.; Hickner, S. (2007): The effects of colonization by Zebra Mussels, *Dreissena polymorpha* on fitness in two anisopteran species: *Hagenius brevistylus* and *Didymops transversa*. *University of Michigan Biological Station, Pellston, MI Ola Fincke, University of Oklahoma, Mentor Biology 390: Evolution: 14 pp.* (in English) ["The colonization of two Anisopteran larvae (*Hagenius brevistylus* and *Didymops transversa*) by *Dreissena polymorpha* was studied in Douglas Lake after the recent mussel invasion from the Lake Huron watershed. Our objectives included measuring the frequency of the zebra mussels on larvae and exuviae, and measuring fitness indirectly by means of "righting" tests, or how long it took the *D. transversa* larvae to "right" itself after being placed upside down. We hypothesized that larvae with zebra mussels attached would show a decrease in fitness because of the increased energy costs. Because we found a low frequency of larvae with mussels, colonization was induced. Our results indicated that as the number of zebra mussels per larva increased, so did "righting" time. "Righting" time also increased as the ratio of mussel weight to larva weight increases. None of the *H. brevistylus* were able to right themselves when observed. There was a significant difference between the average "righting" time for *D. transversa* larvae before after colonization. The larvae with mussels had a higher "righting" time than larvae without mussel attachment, supporting our hypothesis. Because the majority of our larvae were induced with zebra mussels, they had a higher ratio of mussel weight to larval weight than is found in naturally occurring populations in Douglas Lake from previous studies. This indicates that although a large load of zebra mussels may decrease fitness, the occurrence is unusual and may not have an effect on large populations in Lakes."] Address: Bienek, Rosalie, University of Michigan Biological Station, Pellston, MI; Ola Fincke, University of Oklahoma, Mentor, Biology 390: Evolution, August 13, 2007

**15735.** DuBois, R.B.; Stettner, C.R. (2007): *Gomphus spicatus* (Odonata: Gomphidae) rediscovered in Illinois and *Libellula semifasciata* (Odonata: Libellulidae) recorded near Wisconsin. *The Great Lakes Entomologist* 40(1/2): 99-100. (in English) ["We collected one adult male of *G. spicatus* and observed several other males during the mid-afternoon of 10 June 2007 near the Dead River in Illinois Beach State Park (South Unit), Lake County, Illinois. The specimen is deposited in the Odonata Collection of the Wisconsin Department of Natural Resources (WDNR),

which is housed at the WDNR Superior Service Center. The males of *G. spicatus* were perched on a gravel access road where it intersected a hiking trail immediately adjacent to the river, less than 1 km from its mouth at Lake Michigan. The Dead River at the site is a slowly flowing stream that is blocked by a sand bar much of the year, forming an elongated pond. On 22 June 2007, one of us (CRS) returned to the South Unit and observed several *G. spicatus* at each of two interdunal wetlands (pannes) on the calcareous moist sands of the lake plain, about 800 m north of the mouth of the Dead River (about 600 m from the original *G. spicatus* site). Our findings suggest that these sites, which are located less than 30 km from the three lakes where *G. spicatus* was found over 100 years ago, likely provided breeding habitat for *G. spicatus* in 2007. Further surveys of Odonata at the Dead River and the nearby pannes are recommended to determine if populations of *G. spicatus* are persisting in those areas, and surveys of the odonate faunas of Clear, Fox, and Sand lakes would be helpful as well. A single adult female *Libellula semifasciata* Burmeister (Odonata: Libellulidae), commonly called painted skimmer, was also collected on the hiking trail along the Dead River on 10 June 2007 and is deposited in the WDNR Odonata Collection. A number of adult *L. semifasciata* had been observed by CRS along the same hiking trail on several previous occasions and several individuals were again present along that trail on 22 June 2007. The finding of *L. semifasciata* evidently breeding at the Dead River site, which is within 8 km of the Wisconsin state line, is noteworthy because that species has not been found in Wisconsin since Muttkowski (1908) reported it from Milwaukee County in 1903 (Smith et al. 2003; Wisconsin Odonata Survey 2008). Populations of *L. semifasciata* may persist, and should be looked for, in the southern tier of counties of Wisconsin, especially in Kenosha County near Lake Michigan." (Authors)] Address: DuBois, R., Dept Natural Resources, Bureau of Endangered Resources, Ecol. Inventory and Monitoring Section, 1401 Tower Avenue, Superior, Wisconsin 54880, USA. E-mail: Robert.Dubois@wisconsin.gov

**15736.** Eijk, J.-L. van (2007): Large population of *Orthetrum coerulescens* in the northeastern part of the Achterhoek, province of Gelderland. *Brachytron* 10(2): 205-211. (in Dutch, with English summary) ["In 2005, a large population of *Orthetrum coerulescens* was discovered near Eibergen, in the province of Gelderland. On 16 locations, 75 individuals were seen. Mating and deposition of eggs was noticed at several locations. The nearest known populations are at a distance of 25 kilometers. The habitat is described as ditches and artificial brooks which are partly fed by local groundwater. It is argued that the role of this ground water is of vital importance. It prevents the brooks from desiccation during summer and prevents the water to freeze in winter. The author states that more populations are to be discovered since the type of habitat is poorly visited by odonatologists." (Author)] Address: van Eijk, J.-L., Bruno Walterstraat 7, 7556 DV Hengelo, Netherlands

**15737.** Fleck, G. (2007): Contribution à la connaissance des Odonates de Nouvelle-Calédonie: une larve du genre

*Metaphya* Laidlaw, 1912 (Anisoptera, Corduliidae). *Bulletin de la Société entomologique de France* 112(2): 183-186. (in French, with English summary) ["Contribution to the knowledge of the Odonata of New Caledonia: a larva of the genus *Metaphya* Laidlaw, 1912 (Anisoptera, Corduliidae). The larva of *Metaphya elongata* Campion, 1921, is illustrated and described for the first time. The larvae of this genus were unknown until now. A larval generic diagnosis is proposed." (Author)] Address: Fleck, G., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: fleckgunther@gmail.com

**15738.** George, J. (2007): Lundy's lentic waters: Their biology and ecology. Extract from J George, 'Lundy Studies' (2007). Copyright Lundy Field Society and the authors: 103-128. (in English) ["Research on the Lundy freshwater ecosystems in the late 1970s, 1980s and early 1990s showed that the major standing water bodies (lentic waters) supported different populations of organisms, particularly in the planktonic and macroinvertebrate groups. Recent research in the autumn of 2003, spring 2005 and winter 2006 not only demonstrated that these differences still are present, but also gained information on seasonal changes occurring in these waters. Four water bodies, Pondsby, the Rocket Pole Pond, Quarry Pool and the larger pond at Quarter Wall have been studied at all seasons. Differences can be related to the position of the pond on the island and hence degree of exposure, the amount of plant cover and the input of decaying material and nutrients. At various times during the last 27 years smaller, often temporary, bodies of water have been surveyed e.g. pools in North Quarry, smaller pond at Quarter Wall, pond in Barton Field. Brief descriptions of these small ecosystems are given here." (Author) *Ischnura elegans* and *Sympetrum striolatum* are listed.] Address: George, Jennifer, Sabella, Gays Lane, Holyport, Maidenhead, Berks, SL6 2HL, UK. E-mail: georgej@wmin.ac.uk

## 2008

**15739.** Escolà, J. (2008): Nova cita de *Coenagrion hastulatum* (Charpentier, 1825) a Catalunya (Odonata: Coenagrionidae). *Boletín de la S.E.A.* 42(1): 434. (in Spanish) [Female *Coenagrion hastulatum*], Vall d'Aran, Provincia de Lérida (Cataluña), 7-VII-2007, 13.45h, 20°C, 1884 masl (UTM 31TCH22).] Address: Escolà i Garriga, J., Avda. Barcelona nº48 1er-1a 08700 Igualada (Barcelona), Spain

**15740.** Krakowiak, P.J.; Pennuto, C.M. (2008): Fish and macroinvertebrate communities in tributary streams of Eastern Lake Erie with and without Round Gobies (*Neogobius melanostomus*, Pallas 1814). *J. Great Lakes Res.* 34: 675-689. (in English) ["Round gobies have had significant impacts on benthic fish and invertebrate communities in nearshore habitats of the Great Lakes. As round gobies have become more abundant in lake habitats, there has been an expansion of their populations into tributary streams and rivers. We compared stream invertebrate and fish communities in New York tributaries to Lake Erie with round gobies present and absent. Four of six benthic invertebrate metrics differed between streams with and without round gobies. Streams with round gobies present

had reduced Shannon diversity, EPT richness, and EPT/chironomid ratios, and increased macroinvertebrate density relative to streams without round gobies, but there was no difference in non-Diptera density, or total taxa richness. None of the four fish metrics examined differed between streams with and without round gobies. However, darters occurred in all streams lacking round gobies, but did not occur in any streams with round gobies. Comparisons with historical fish and macroinvertebrate distributional data support our suspicion of goby-induced community changes. In these New York streams, round gobies seem to have had significant impacts on invertebrate communities via their consumptive behavior, whereas the impacts on fish communities are less evident. If round gobies continue to expand their distribution inland, the resultant alterations in macroinvertebrate communities may impact the suitability of tributary streams as spawning and nursery habitat for several sport fish species and for energy dynamics in tributary streams." (Authors)] Address: Pennuto, C.M., Dept of Biology, Buffalo State College, 1300 Elmwood Avenue Buffalo, New York 14222, USA.

**15741.** Larsen, T. (2008): New record of the Keeled Skimmer (*Orthetrum coerulescens*) in Denmark. *Ent. Meddr* 76: 165-168. (in English, with Danish summary) ["Three populations of *O. coerulescens* were registered July 2006 at Søby Brunkulslejer, Sepstrup Sande and Nørre Vium. These are the first documented records in Denmark since 1936." (Author)] Address: Larsen, T., Dept Terrestrial Ecol., National Environmental Research Inst., Vejlsvøvej 25, 8600 Silkeborg, Denmark. E-mail: [natursyn@gmail.com](mailto:natursyn@gmail.com)

**15742.** Mitra, A. (2008): Dragonfly (Odonata: Insecta) fauna of Bhutan - an annotated and updated check-list with ten new records. *Fraseria* (N.S.) 7: 105-109. (in English) ["In eastern Bhutan, 18 species and subspecies of dragonflies were collected from the Kuruchu Reservoir area at Mongar, eight from Samdrup Jongkhar, one from Kanglung and one from Yongphula. From southern Bhutan, six species and subspecies were collected from Sarpang, five from Gelephu and eight from Tsirang. Ten species and subspecies of those are now to Bhutan and include *Pseudagrion rubricops*, *Drepanosticta carmlchaeli*, *Lestes dorothea*, *Neurobasis ch. chinensis*, *Scatmogomphus bis-trigatus*, *Diplacodes nebulosa*, *D. lefebvrei*, *Trithemis palUc/inervls*, *Tramea virginia* and *Urothemis s. signata*. *Aeshna p. petalura* was encountered for the first time although Tsuda reported its presence in 1991. Specimens are deposited at the museum maintained by the Department of Zoology, Sherubtse College, Kanglung, Bhutan. An up-to date check-list of 50 species and subspecies of dragonflies known from Bhutan is also provided." (Author)] Address: Mitra, A., Dept of Zoology, Sherubtse College, Kanglung, Bhutan. E-mail: [amitodonata@yahoo.com](mailto:amitodonata@yahoo.com)

**15743.** Teixeira-Gamarra, M.C.; Aoki, C.; Dutra, S.L.; Pinto, N.S.; De Marco Jr., P. (2008): Diversidade de Odonata da Reserva Particular do Patrimônio Natural Engenheiro Eliezer Batista. In: *Descobrimo o paraíso: aspectos biológicos da reserva particular do patrimônio natural engenheiro Eliezer Batista*: 206-219. (in Portuguese) [Brazil, Reserva Particular do Patrimônio Natural Engen-

heiro Eliezer Batista (RPPN EBB), Serra do Amolar Serra do Amolar region. 224 odonate specimens were collected. Libellulidae showed the highest richness and abundance among the families recorded with five species within the genus *Erythrodiplax*. *Triacanthagyna* sp. and *Micrathyria romani* had not yet been recorded for the State of Mato Grosso do Sul. In sum, 24 taxa are listed.] Address: De Marco Jr., P., Lab. Ecologia Teórica e Síntese, Depto de Ecologia, Universidade Federal de Goiás, Brasil. E-mail: [pdemarco@icb.ufg.br](mailto:pdemarco@icb.ufg.br)

**15744.** Theischinger, G. (2008): Notable range extensions of dragonflies in New South Wales - More species in Victoria? *Victorian Entomologist* 38(4): 59-65. (in English) ["Theischinger & Hawking (2003) mentioned that *Criseargiolestes griseus*, *Petalura gigantea*, *Austroaeschna obscura* and *Cordulephya montana* were recently collected only a few kilometers from the New South Wales/Victoria border. None of them was recorded from Victoria in the meantime, it should, however, only be a matter of time until this will happen. Since 2003 records from south-eastern New South Wales of two more species, *Pseudagrion ignifer* Tillyard and *Acanthaeschna victoria* Martin, have become available that make their occurrence in Victoria more likely. In the following the records that extend the known distribution of *P. ignifer* markedly further to the south and that make more believable a previously ignored record of *A. victoria* from Victoria are discussed. Finally details are given of a 17 years old record from Victoria of *Griseargiolestes eboracus* (Tillyard) whose occurrence in Victoria and taxonomic status were recently questioned. Some characters useful for the detection of the three species are discussed and illustrated."] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: [Gunther.Theischinger@environment.nsw.gov.au](mailto:Gunther.Theischinger@environment.nsw.gov.au)

## 2009

**15745.** Clarke, D. (2009): Keeled Skimmers at Glasson Moss NNR. *The Carlisle Naturalist* 17(2): 47. (in English) [Verbatim: Before 2005, *Orthetrum coerulescens* was not known in Cumbria north of their regular site near Grange-in-Borrowdale (NY21). In that year I found them, for the first time but evidently well-established, on runnels just below Carrock Fell (NY33) –see *Carlisle Naturalist* 13:2, p.9. The species is a specialist in slow-moving boggy runnels and in Cumbria at least is never associated with static water. The finding of two males of the species on a dragonfly walk at Glasson Moss led by Mike and Anne Abbs on Saturday 25th July this year was completely unexpected and by far the most northerly record for the county. The insects were evidently showing interest in water trickling over the firebreak at the corner of a pool not far from the Kirkbride-Bowness road. Photographs were obtained, including a fine one by Darren Robson taken on 27th. As there is little flowing water at Glasson Moss, it is perhaps doubtful whether the species could establish there, but this is at least further indication of its relative mobility and therefore of the potential for range extension. Given the amount of apparently suitable habitat at moderate altitudes in Cumbria, the species might well be expected to colonise sites above its



present altitudinal limits of c. 250 m a.s.l. – as well as just spreading further afield.] Address: Clarke, D., Burnfoot, Cumwhitton, Brampton, Cumbria CA8 9EX, UK

**15746.** Faúndez, E.I. (2009): De Monstruos y Prodigios (24): un caso teratológico en *Rhionaeschna variegata* (Fabricius, 1775) (Odonata: Aeshnidae). *Boletín de la Sociedad Entomológica Aragonesa* 44: 597-598. (in Spanish, with English summary) ["A teratologic specimen of *R. variegata* from Chile with tarsal and pretarsal malformations in the mesothoracic and metathoracic left legs is described." (Author)] Address: Faúndez, E., Grupo Entomon, Laboratorio de Entomología, Instituto de la Patagonia, Univ. de Magallanes. Casilla 113-D Punta Arenas, Chile. E-mail: ed.fandez@gmail.com

**15747.** Ferreira, S.; Grosso Silva, J.M.; Sousa, P. (2009): The Dragonflies of Serra da Estrela Natural Park, Portugal (Insecta, Odonata). *Boletín de la Sociedad Entomológica Aragonesa* 44: 417-424. (in English, with Spanish summary) ["The state of knowledge of the odonatofauna of Serra da Estrela Natural Park (Portugal) is presented with comments. Eleven species are recorded for the first time from the Park, including the legally protected *Coenagrion mercuriale* and new records of *Oxygastra curtisii* are presented. Furthermore, past and present records of *Aeshna juncea* and *Sympetrum flaveolum* from Portugal are discussed, and analysed in the context of their distribution in the Iberian Peninsula. Conservation relevance of the Serra da Estrela Natural Park on Portuguese Odonata and its threats are discussed and the necessity of further studies pointed out.... Regarding the altitudinal range, we watched a *Cordulegaster boltonii* "hill-topping" around the tower at Torre (1993 m) on 03-VIII-2005" (Authors)] Address: Ferreira, Sónia, CIBIO/UP - Centre de Investigate em Biodiversidade e Recursos Genéticos, Universidade do Porto, Campus Agrário de Vairao, P-4485-661 Vairão, Portugal. E-mail: hiporame@gmail.com

**15748.** Johnson, J. (2009): Two new odonates for Oregon in two days. *Argia* 21(3): 22-23. (in English) ["Male *Lestes forcipatus* at a pond about 14 miles north of Enterprise, Wallowa County, Oregon, 3-VIII-2009. Female *Aeshna tuberculifera* at a borrow pit near Fry Meadow, Union County, Oregon, 3-VIII-2009." (Author)] Address: Johnson, J., Vancouver, Washington, USA. E-mail: jt\_johnson@comcast.net

**15749.** Matsui, A. (2009): Growth of several fish and dragonfly species in the drainage system of a consolidated paddy field. *Japanese Journal of Conservation Ecology* 14: 3-11. (in Japanese, with English summary) ["This study examined the growth of aquatic animals in the canal system constituting the main, lateral, and farm drains in a consolidated paddy field, with emphasis on canal structure and year-round water flow in the canals. A field survey at six sites, which involved three different canal levels, was carried out in Chikusei, Ibaraki Prefecture, Japan (36°21'N, 139°59'E). Sampling was conducted at monthly intervals from April 2001 to March 2002. Of the freshwater fish, young-of-the-year (YOY) *Zacco platypus* appeared in September, while YOY *Misgurnus anguillicaudatus* appeared in May.

Last instars of *Calopteryx atrata* were collected only in June, suggesting emergence about this time, while those of *Orthetrum albistylum speciosum* were collected in May and July, suggesting a longer duration of emergence. Since populations of the four species decreased during the non-irrigation season when the water level was low, I propose that a marsh be developed as a wintering site in the lower reaches of the canal system in consolidated paddy fields." (Author)] Address: not stated

**15750.** Mishra, S.K. (2009): Insecta: Odonata. Zoological Survey. India, Fauna of Bandhavgarh Tiger Reserve, Conservation Area Series 40: 25-38. (in English) ["Bandhavgarh lies on the extreme north-eastern border of the state of Madhya Pradesh in district Umaria (which was earlier a part of Sahadol district) and the northern flanks of the eastern Satpura mountain range. It is located on the coordinates 23 °30' 12" to 23° 46' 30" N and 80° 47' 15" to 81°11' 45" E at altitudes between 410 m and 810 m. Presently the Reserve's area falls in the two districts Umaria and Katri." "The identification of Odonata collections made from Bandhavgarh Tiger Reserve has revealed 32 species belonging to 24 genera under 7 families. These include 8 species of damselflies (Zygoptera) and 24 species of dragonflies (Anisoptera)." (Author)] Address: Mishra, S.K., Zoological Survey of India, Central Regional Station, Lalapur-482002, India

**15751.** Nakanishi, K.; Taiwa, K.; Kanbara, B.; Noma, N.; Sawada, H. (2009): Comparisons of macro-aquatic animal communities among paddy fields under different cultivation management systems. *Jpn. J. Environment. Entomol. Zool.* 20(3): 103-114. (in Japanese, with English summary) ["To examine the effects of differences in cultivation management, we conducted censuses of macro-aquatic animal communities in paddy fields in Takashima, Shiga prefecture, during April-September, 2008. Among a number of species we selected the following three orders of aquatic insects (Odonata, Hemiptera, and Coleoptera) and fish such as loach, *Misgurnus anguillicaudatus* as target organisms. Four types of paddy fields were set up under different cultivation management systems with two replicates for each treatment: 1) conventional management with an application of standard amounts of agrochemicals and kept dry during winter, 2) reduced-agrochemical management and kept dry during winter, 3) no agrochemical management and kept dry during winter, and 4) no agrochemical management and flooded year round. In paddy fields under the conventional and reduced-agrochemical management systems, aquatic insects were fewer in terms of the number of species and individuals. This was largely to the result: enhanced mortality of aquatic insects, which were assumed to have been killed by agrochemicals used in the early season. In the winter-flooded paddies aquatic insects were most abundant, both in the number of species and individuals throughout the census period. This suggested the critical importance of paddies as units of conservation of aquatic insects. By contrast, loach were less abundant in the winter-flooded paddies, indicating their low suitability as a spawning site and habitat for young fish. To account for this phenomenon, the persistent presence of aquatic insects that act as fish food, and the low availability of plank-

ton as a food resource were suggested and discussed." (Authors)] Address: Nakanishi, K., School of Environmental Science, Univ. of Shiga Prefecture. Hikone, Shiga 522-8533, Japan. E-mail: k\_mw\_newt@hotmail.com

**15752.** Neves dos Santos, A.; Racca-Filho, F.; Neves dos Santos, L.; Gerson Araújo, F. (2009): El pez *Trachelyopterus striatulus* (Siluriformes: Auchenipteridae) como herramienta de muestreo de la entomofauna en un embalse tropical. *Revista de Biología Tropical* 57(4): 1081-1091. ["The fish *T. striatulus* used to sample insects in a tropical reservoir. ... Insectivorous fishes represent good users of these ecosystems and analyzing the aquatic organisms present in fish stomachs, is an alternative way to determine resource abundance and utilization. In this paper, the potential of *Trachelyopterus striatulus* as an insect sampler was examined through dietary analyses of 383 individuals caught between April 1999 and March 2000 in Lajes Reservoir, a 30 km<sup>2</sup> oligotrophic impoundment in Southeast Brazil. We estimated frequency of occurrence and Schoener's index of similarity. Diet changes among seasons and reservoir zones were addressed with DCA and ANOVA analyses. Its diet was 92.1% insects (ten orders and nine families). Hymenoptera (57.90%), Odonata (39.76%) [Aeshnidae (immatures) \*37.74 \*34.32 \*44.27; Aeshnidae (adultes) 3.77 1.35 3.05], Trichoptera (27.41%), Ephemeroptera (26.25%) and Coleoptera (28.96%) were the most common groups. Highest insect occurrence and richness were recorded in autumn-summer, a period of greater rainfall and insect activity. Formicidae, the dominant prey item in all seasons, appeared to be especially important in spring, a season marked by shortness of food resources. Trichoptera and Ephemeroptera were the most consumed prey items in the other seasons. Highest insect occurrence and richness were recorded in the middle and upper reservoir zones, respectively. Trichoptera and Ephemeroptera prevailed in the upper zone, where small pristine rivers and tributaries are abundant, whereas Formicidae and Belostomatidae predominated in the lower and middle zones. Because of its abundance in many freshwater ecosystems of Brazil, the ubiquity of insects in its digestive tract and the low level of prey degradation, *T. striatulus* has potential as an insect sampler of Neotropical reservoirs. However, conventional sampling in Lajes Reservoir is necessary to compare the effectiveness of *T. striatulus* with other insect sampling methods." (Authors)] Address: Neves dos Santos, A.F.G., Depto de Zootecnia e Desenvolvimento Agro-Sócio-Ambiental Sustentável, Univ. Federal Fluminense, Rua Vital Brasil, 64, Fac. de Veterinária, Niterói, RJ - Brasil. E-mail: alejandra-filippo@hotmail.com

**15753.** Trapero Quintana, A.D.; Puerta de Armas, Y.; Rodríguez Fonseca, R.; Cabrera Anaya, A. (2009): El conocimiento sobre las libélulas (Odonata) en la comunidad "La Redonda", Santiago de Cuba. *Boletín de la Sociedad Entomológica Aragonesa* 44: 556-558. (in Spanish, with English summary) [... A survey was conducted with 83 persons of all ages at La Redonda, east of Santiago de Cuba, between April 15th and June 30th, 2007. 31% of them know dragonflies as "cigarillos" ("cigarettes"), while 44% locate them in the surroundings of the Sevilla River, which borders the village. In general terms the survey re-

flects a positive opinion about the existence of odonates in the environment of La Redonda, although there is a lack of knowledge about the biology of the group. We recommend the development of environmental education activities aimed at the villagers." (Authors)] Address: Trapero Quintana, A., Depto de Biología de la Universidad de Oriente, Patricio s/n, Santiago, Cuba, CP 90500, Cuba. E-mail: atrapero@cnt.uo.edu.cu

## 2010

**15754.** Brauckmann, C.; Gröning, E.; Ilger J.-M. (2010): Von den ältesten Insekten. *Entomologie heute* 22: 17-40. (in German, with English summary) ["The present article is a compilation on the most ancient Hexapoda (Devonian, Carboniferous), with special reference to the Konservatlagstätte of Hagen-Vorhalle (Ruhr area, Germany). Since its discovery in 1982, this locality has yielded 310 specimens of Pterygota, many of them nearly completely preserved. The insect fauna of Hagen-Vorhalle includes 18 species, distributed to 5 main groups: Palaeodictyoptera, Megasecoptera, Diaphanopteroidea, Odonatoptera, and basal Neoptera. Several species of the Neoptera were infested with parasitic mites or their larval instars. The main importance of the locality is caused by (1) the high stratigraphical age (Namurian B, Marsdenian, early Late Carboniferous), (2) the great frequency of specimens, and (3) unusually complete preservation which permits more detailed reconstructions of several groups of the Pterygota." (Authors)] Address: Brauckmann, C., Inst. Geologie & Paläontologie, TU Clausthal, Leibnizstraße 10, 38678 Clausthal-Zellerfeld, Germany. E-mail: carsten.brauckmann@tu-clausthal.de

**15755.** Cano Villegas, F.J.; Conesa García, M.A.; Irujita Fernández J.M. (2010): Nuevos datos de *Lestes macrostigma* (Eversmann, 1832) (Odonata) en el Parque Nacional de Doñana (Andalucía, España). *Boletín de la S.E.A* 46: 518-520. (in Spanish, with English summary) [The presence of *L. macrostigma* in Doñana National Park is reported and its emergence is confirmed in three areas within the Park.] Address: Cano Villegas, F.J., Departamento de Ciencias Ambientales, Área de Zoología, Universidad Pablo de Olavide, 41013 (Sevilla). E-mail: fjcanovi1@wanadoo.es

**15756.** Chainthong, D.; Sartori, M.; Boonsoong, B. (2010): *Stylogomphus thongphaphumensis* (Odonata: Anisoptera: Gomphidae), a new gomphid dragonfly and the first record of *S. malayanus* Sasamoto, 2001 from Thailand. *Zootaxa* 4763 (2): 231-245. (in English) ["*S. thongphaphumensis* sp. nov. is described from a type series of specimens reared from larvae (holotype ♂, Huai Khayeng, Thong Pha Phum district, Kanchanaburi Province; 14°36'20N 98°34'38E, 206 m a.s.l., larva collected on 14.XII.2014; adult emerged on 30.IV.2015). All larvae were collected from the same locality in western Thailand. Description of the larva (based on preserved exuviae) is provided as well. The adult of this species can be distinguished from other *Stylogomphus* Fraser, 1922, by the morphology of the male anal appendages, pterothoracic pattern, abdominal pattern, male genitalia and female valvula vulvae (detail provided in the differential diagnosis below). This is the first

species of *Stylogomphus* to be described from Thailand. This study also reports the first record of *S. malayanus* Sasamoto, 2001, from Thailand." (Authors)] Address: Boonsoong, B., Animal Systematics and Ecology Speciality Research Unit (ASESRU), Dept of Zoology, faculty of Science, Kasetsart Univ., Bangkok 10900, Thailand. E-mail: fscibtb@ku.ac.th

**15757.** Copp, G.H.; Tarkan, S.; Godard, M.J.; Edmonds, N.J.; Wesley, K.J. (2010): Preliminary assessment of feral goldfish impacts on ponds, with particular reference to native crucian carp. *Aquatic Invasions* 5(4): 413-422. (in English) ["Introductions of an Asian cyprinid, goldfish *Carassius auratus*, are known to pose a genetic threat to crucian carp *Carassius carassius*, which is native to northern parts of central and western Europe, including southeast England. However, there are no known studies in Europe of goldfish impacts on crucian carp growth and life-history traits, nor on the recipient ecosystems. The present study is the first such attempt, and compares the plants, invertebrates and fish biology (growth, condition, reproduction) in six ponds, two containing crucian carp only (allopatry), two containing goldfish only (allopatry), and two with both species (sympatry). Feral goldfish growth was greatest in sympatry with native crucian carp, whereas crucian carp growth was similar regardless of goldfish presence or absence. However, body condition (LK) and relative fecundity (per unit of body weight) of crucian carp was greatest in sympatry with feral goldfish. LK increased significantly with increasing water conductivity in goldfish but not in crucian carp, and LK was not related to pond invertebrate densities in either fish species. Differences in the plant and aquatic invertebrate communities observed in the study ponds could not be attributed to the introduction and establishment of goldfish, however non-native plant and invertebrate species were observed only in ponds containing goldfish. Differences in growth and condition between the two *Carassius* species does not appear to be due to differences in available food, so elevated somatic growth and reproductive output in crucian carp and faster growth in goldfish in sympatry may be due to non-dietary competitive interactions. The present preliminary study highlights the difficulties of assessing 'real world' impacts of non-native species on native species and ecosystems as well as the need for further study of feral goldfish impacts on European pond ecosystems in general and on native congener crucian carp in particular." (Authors)] Address: Copp, G.H., Centre for Environment, Fisheries & Aquaculture Science, Lowestoft, Suffolk, UK. E-mail: gordon.copp@cefas.co.uk

**15758.** Janský, V.; David, S. (2010): Dragonflies (Odonata) of NR Šúr. In: Majzlan, O. & Vidlicka, L. (eds) 2010. *Príroda rezervácie Šúr*: 119-126. (in Slovakian, with English summary) ["During the inventory research of the Šúr Nature Reserve in the years 2008 and 2009, 32 dragonfly species of 8 families has been recorded. This represents 45,7 % of the dragonfly species of Slovakia. Together with former results of NEMĚÁKOVÁ (1960), MALCHÁREK (1986), ŠÍBL and SEGINKOVÁ (2001), a few records of KRNO (1996) and rare found of a migrant *Lindenia tetraphylla* by Trpiš in 1954, total number of

dragonfly species for this territory is 44. *Libellula fulva* found in 2009 is the last new species for the protected area." (Authors)] Address: Slovenské národné múzeum – Prírodovedné múzeum, Vajanského nábr. 2, P.O.Box 13, 810 06 Bratislava 16, Slovakia. E-mail: entomo@snm.sk

**15759.** Jiskra, (2010): Recent occurrence of Siberian Winter Damsel (*Sympecma paedisca*) in the Karlovy Vary region. *Sbornik Muzea Karl Ovarskeho Kraje* 18: 219-222. (in Czech, with English summary) ["Siberian Winter Damsel (*Sympecma paedisca*) is an endangered species in the whole Europe. In the Czech Republic it occurs only in western and northwestern Bohemia. Typical biotopes of damselflies are various ponds with abundant littoral vegetation. Recently, the occurrence of Siberian Winter Damsel in the Karlovy Vary region was recorded at 21 localities. The most of records comes from smaller ponds, which are used for extensive fish farming and from the pools at the lignite mine dumps. Damselflies are endangered by the inappropriate reclamations of mine dumps and sand pits as well as by intensive fish farming, which is connected with damage of the littoral vegetation, excessive fertilization and liming of ponds." (Author)] Address: not stated

**15760.** Nössing, T.B.; Winkler Werth, F. (2010): Die Libellen in den Naturparks Trudner Horn und Rieserferner-Ahrn. *Naturparks Südtirol Unter der Lupe*. Autonome Provinz Bozen - Südtirol Provincia Autonoma di Bolzano - Alto adige: 32 pp. (in German) [General on dragonflies, with special reference to the fauna of South Tyrol/Alto Adige (Italy) and to the work of the regional working group, "Libella". An account is presented of the 24 species so far recorded from the 2 Nature Parks.] Address: Nössing, T.B., Abteilung Natur und Landschaft, Amt für Naturparke, Rittner Straße 4, 39100 Bozen, Italy. E-mail: naturparke.bozen@provinz.bz.it

**15761.** Rasmussen, R.D.; Otten, J.G.; Dixon, J.W. (2010): New state record and notable range extension for *Libellula semifasciata* (Odonata: Libellulidae). *The Great Lakes Entomologist* 43: 91-93. (in English) ["*L. semifasciata*, is an eastern species of dragonfly that has never been documented in Iowa. In this note we report two observations and the collection of a voucher for this species in southeast Iowa in the last three years. Based on other records of this species, including those from neighboring states and more northerly latitudes, we propose that these observations are evidence of a range extension." (Authors)] Address: Rasmussen, R.D., Muscatine Soil & Water Conservation District, 3500 Oakview Dr, Ste A, Muscatine, Iowa 52761, USA. E-mail: rd\_rass@hotmail.com

## 2011

**15762.** Arndt, E; Domdei, J. (2011): Influence of beaver ponds on the macroinvertebrate benthic community in lowland brooks. *Polish Journal of Ecology* 59(4): 799-811. (in English) [Sachsen-Anhalt, Germany; "Beavers (*Castor fiber*) alter stream ecosystems by dam building resulting in a lower stream velocity, retention of sediments and organic matter as well as modifying physical, chemical and geomorphological conditions in these streams. the effects of



beaver dams on invertebrate benthic communities were examined in two semi-natural lowland brooks. For this purpose, beaver ponds and reference sections upstream and downstream of each pond were sampled. Mollusca, Crustacea and five orders of aquatic insects were analyzed according to taxa richness, abundances, micro-habitat preferences and feeding types to characterize the macroinvertebrate communities. Detailed data in downstream sections and taxa-related parameters of insects (upstream and downstream sections) were analyzed first time. - the abundance of Trichoptera, Plecoptera and Crustacea as well as taxa numbers of ePt taxa decreased significantly in the ponds compared to the free-flowing sections. Odonata and Ephemeroptera did not respond in abundance but in a change of the species composition, because lentic species replaced the lotic species in the impoundment section. - only the number of molluscs increased in the ponds. - regarding the microhabitat preferences, lithal dwellers dominated in all free-flowing sections, whereas its proportion decreased in the ponds. - on the opposite, pelal dwellers increased in the impounded area. - significant differences were also found in proportions of shredders and passive filter feeders (decreasing in ponds), whereas predators increased in the ponds compared to the downstream section of the brooks. ... There occur 10 critical endangered and further 12 endangered species of aquatic insects in the brook system. *Ophiogomphus cecilia* is listed in Annex II of the European Habitats Directive. ... *Calopteryx virgo* is the only of these endangered species which could be recorded also in one of the beaver dams. ... *Cordulegaster boltonii* (Endangered) were limited to brook sections upstream of the ponds." (Authors) ] Address: Arndt, E., Department 1, Anhalt University of Applied Sciences, Strenzfelder Allee 28, D-06406 Bernburg, Germany. E-mail: e.arndt@loel.hs-anhalt.de

**15763.** Chiba, W.A.C.; Passerini, M.D.; Tundisi, J.G. (2011): Metal contamination in benthic macroinvertebrates in a sub-basin in the southeast of Brazil. *Brazilian Journal of Biology* 71(2): 391-399. ["Benthic macroinvertebrates have many useful properties that make possible the use of these organisms as sentinel in biomonitoring programmes in freshwater. Combined with the characteristics of the water and sediment, benthic macroinvertebrates are potential indicators of environmental quality. Thus, the spatial occurrence of potentially toxic metals (Al, Zn, Cr, Co, Cu, Fe, Mn and Ni) in the water, sediment and benthic macroinvertebrates samples were investigated in a sub-basin in the southeast of Brazil in the city of São Carlos, São Paulo state, with the aim of verifying the metals and environment interaction with benthic communities regarding bioaccumulation. Hypothetically, there can be contamination by metals in the aquatic environment in the city due to lack of industrial effluent treatment. All samples were analysed by the USEPA adapted method and processed in an atomic absorption spectrophotometer. The sub-basin studied is contaminated by toxic metals in superficial water, sediment and benthic macroinvertebrates. The Bioaccumulation Factor showed a tendency for metal bioaccumulation by the benthic organisms for almost all the metal species. The results show a potential human and ecosystem health risk, contributing to metal contamination studies in aquatic en-

vironments in urban areas." (Authors)] Address: Chiba, WAC, Programa de Pós-graduação em Ecologia e Recursos Naturais, Centro de Ciências Biológicas e da Saúde, Universidade Federal de São Carlos – UFSCar, Rod. Washington Luís, Km 235, CP 676, CEP 13565-905, São Carlos, SP, Brazil

**15764.** Conze, K.-J. (2011): Die Libellenfauna in Nordrhein-Westfalen – aktueller Stand und Aktivitäten des AK Libellen NRW. *Entomologie heute* 24: 287-295. (in German, with English summary) ["Since 1996 the working group for the conservation and faunistic mapping of the dragonflies in North Rhine-Westphalia has comprehensively collected all country specific data of these insects. For that all available faunistic literature was evaluated; in addition, in the last 15 years about 250 collaborators reported more than 180,000 data sets of field observations. Up to now 81 of the 140 dragonfly species known from Europe have been also reported from Germany. In North Rhine-Westphalia 73 species have been observed so far; 66 species appear to be established, i.e. they are constantly found and are reproducing. While southern species are spreading and populations of streaming water species are increasing, species typically for fens and specialists for nutrient-poor water bodies are remarkably decreasing above average. Altogether the dragonfly fauna in North Rhine-Westphalia shows great dynamics, driven by the geographical situation being the transient area between low- and highland and the atlantic and the continental biogeographical regions as well as by the effects of climate change and the effects of the accelerated anthropogenic change of landscape in the most densely populated federal state of Germany." (Author)] Address: Conze, K.-J., AK Libellen NRW c/o Listerstr. 13, D-45147 Essen, Germany. E-mail: kjc@loekplan.de

**15765.** Devai, G.; Miskolczi, M. (2011): Adatok a Báb-tava és a Nyíres-tó szitakötő-faunájához (Odonata) [Data on the dragonfly (Odonata) fauna from the bogs Báb-tava and Nyíres-tó (NE-Hungary)]. *Studia odonotol. hung.* 13: 63-70. (in Hungarian, with English summary) ["This is the 21th paper of a series directed at communicating faunistical data of Hungary which had been unpublished until December 31, 1987 (cf. DÉVAI, GY. et al. 1993). The authors present faunistical data from two bogs (Báb-tava and Nyíres-tó) in the geographical microregion Beregi-sík in NE-Hungary, over the administrative area of the settlement Csaroda and Beregdaróc. Collections were made in 4 years between 1983 and 1987, with the participation of 4 specialists on 15 days, in one 10×10 km UTM grid map cell (FU 13). In the report information on 487 adults (339 males and 148 females) is given in detail, representing 110 faunistical data. In this study 26 species (9 Zygoptera and 17 Anisoptera) were found to occur in the area, out of which 1 belongs to the very frequent, 16 to the frequent, 7 to the less frequent, 1 to the rare and 1 to the sporadic class of countryside occurrence frequency." (Authors)] Address: Devai, G., Debreceni Egyetem, Tudományegyetemi Karok, Természettudományi és Technológiai Kar, Hidrobiológiai Tanszék, 4032 Debrecen, Egyetem tér 1, Hungary

**15766.** Escola, J.; Müller, P.; Batlle, R.M. (2011): Odonatofauna del nuevo "Estany d'Ivars i Vila-sana" (Pla d'Urgell, Lleida, ne Península Ibérica) (Odonata). Boletín de la S.E.A. 48(1): 329-334. (in Spanish, with English summary) ["Odonata of the new lake "Estany d'Ivars i Vila-sana" (Pla d'Urgell, Lleida, NE Iberian Peninsula). Odonate records from a lake, L'Estany d'Ivars i Vila-sana (Lleida, NE Iberia), whose water levels were restored during the period 2005-2009 after being drained between 1948 and 1951, are given. Records by Ramon Margalef from just before the draining and another present records of near localities are also given." (Authors) ] Address: Grup Oxygastra, Institutio Catalana d'Historia Natural, C/del Carne 47, 08001, Barcelona, Spain. E-mail: [contacte@oxygastra.org](mailto:contacte@oxygastra.org)

**15767.** Gümüşatam, G. (2011): The names given to the Turkish Cypriot people animals for areas of the concept [sic] - Names given to animals by Turkish Cypriots in conception areas. *Diyalektolog - Agiz Arastirmalari Dergisi* 3: 11-32. (in Turkish, with English summary) [yusufçuk, Nr. 216; = dragonfly "In this study, the names given by the Turkish Cypriot people to animals in natural life were evaluated according to their conceptual fields. In addition, these names were compared with Turkey Turkish and similarities were determined. In addition to all these, the names of the determined words in the standard language and zoology are also referred to. Cattle and small cattle, poultry, birds, reptiles, fresh and salt water creatures, etc. and the ways followed in naming the animals included in them were determined. Thus, the tendency of the Turkish Cypriot people to observe nature and to name the living creatures here has been determined, and an answer has been sought to how much they are affected by the cultures they interact with. [Google translate]." (Author)] Address: Gümüşatam, G., Gırm Amerikan Üniversitesi, Eđtim Fakóltesi, E-posta: [gurkangumusatam@gau.edu.tr](mailto:gurkangumusatam@gau.edu.tr).

**15768.** Hancíková, B. (2011): Migrations of dragonflies and damselflies (Odonata). B.Sc., Faculty of Science, Department of Ecology, Univerzita Karlova, Ústrední knihovna, Ovocný trh 3-5, 116 36 Praha: 37 pp. (in Czech, with English summary) ["This study is aimed at the phenomenon of migration, which is not still fully explored and which, by different circumstances, undergo several species of dragonflies. Only for a few species from several tens of migrants generally, their migration route and strategies are explored. These case studies are described and I am also dealing with those species of dragonflies for which migration is not fully explored, and I am pointing out the other possible fields of research. One of the aims of my work is the comparison of different attributes and strategies of migration in dragonflies with other migrants from insect as well as the migratory birds." (Author)]

**15769.** Kawakubo, C.; Hoshikawa, K. (2011): A long-term transition in the community of dragonflies and damselflies on Himenoga-Ike Pond in Mt. Sanbe. *Bulletin of the Shimane Nature Museum of Mt. Sanbe (Sahimel)* 9: 25-33. (in Japanese, with English summary) ["Odonata community on Himenoga-Ike Pond was surveyed from May to October 2009. A total of 1208 adults and 919 nymphs be-

longing to 27 species were recorded. These species could be divided into 9 guild groups according to differences in size of food-capture basket and in mode of pond-space utilization. Bibliographical survey revealed that number of odonata species in the pond has been nearly stable during recent 30 years, 19-22 spp., excluding temporal visitors. However, species composition has changed drastically with turnover rates of 5.5 spp./ 12 years or 7.0 spp./ 18 years. Most of the species-exchanges occurred within guilds, though a guild with much food resources packed 5 species without any extinction events presumably due to seasonal or spatial segregations among them." (Authors)] Address: Kawakubo, Chie; Hoshikawa, Kazuo

**15770.** Klimsa, E. (2011): Exuvienfunde der Schabrackenlibelle *Hemianax ephippiger* (BURMEISTER, 1838) in den Jahren 2008 und 2009 in der "Grube Auhofweiher" bei Schwandorf (Odonata). *Galathea* 27(1): 43-47. (in German, with English summary) ["A compilation of rare dragonflies could be found in 2008 and 2009 in a pond within a clay ditch near the city of Schwandorf, Upper Palatinate, Northern Bavaria. Thorough investigations led to 66 exuvias of *H. ephippiger*. The natural area of this species expands from Africa to Southern Asia. In Southern Europe it reproduces irregularly and migrates into Bavaria from time to time. This paper deals with precise features to identify exuvias from *Hemianax* with certainty. Differences to other dragonfly species are shown in pictures. Unsolved questions remain: what caused *Hemianax* to accept this pond for breeding - despite the high risk that the larvae will not survive our winter temperatures? Is it a certain similarity of our native waterplant *Biysmus compressus* with the favoured rice plants from the reproducing area in Southern Europe, that let the female imago lay the eggs and that guided later on the grown-up larvae towards their last mould into the air? Is the new generation able to find their way back to the South? - More information is needed." (Author)] Address: Klimsa, K., Zeisigstr. 2, 92421 Schwandorf, Germany. E-mail: [eklimsa@t-online](mailto:eklimsa@t-online)

**15771.** Lenssen, J.P.M.; Klutman, A.G.M.; Nijboer, R.C.; Boedeltje, G. (2011): Changes in stream macro-invertebrate communities due to water quality improvements. *Levende Nat.* 112(6): 213-218. (in Dutch, with English summary) ["The last decades have shown a tremendous decrease of organic and nutrient load in streams in The Netherlands. During the last 23 years, macro invertebrates have been monitored in a consistent manner in most of the streams in the Dutch region Oost-Gelderland. The data allow us to assess the effect of improved water quality on macro invertebrate communities during the last 23 years. This effect strongly depends on the stream type. In highly regulated streams, i.e. canalized, enlarged in profile and barraged, we noticed a shift from species with high tolerance against low oxygen concentrations in the water towards species with a slightly higher oxygen demand. However, the resulting community was still dominated by limnophilic species. Different shifts were noticed in unregulated streams, where stream velocities tend to be higher and morphological variation offers a wide variety of substrates. Here we noticed a clear shift towards species with high oxygen demand. Moreover, the number of rare spe-

cies (indicative of undisturbed stream environments) also significantly increased in unregulated waters, whereas no increase occurred in regulated waters. These results clearly demonstrate the interaction between water quality and stream morphology and hydrology. Improvement of water quality is not sufficient if stream hydrology and morphology is not restored. On the other hand, natural stream communities are highly susceptible for changes in water quality." (Authors)] Address: Lenssen, J.P.M., Waterschap Rijn en IJssel, Postbus 148, 7000 AC Doetinchem, Netherlands. E-mail: j.lenssen@wrij.nl

**15772.** Ng, Y.F.; Dow, R.A.; Choong, C.Y. (2011): New records of Odonata (Insecta) from the Cameron Highlands, with first records of two species for Malaysia. *Journal of Science and Technology in the Tropics* 7: 9-16. (in English) ["Records of Odonata collected in the Cameron Highlands in September 2008 are presented. Fifty five species from 14 families were collected as either adults or larvae. *Indolestes anomala* and *Macromia* sp. cf. *cupricincta*, have not previously been recorded in Malaysia, whilst another 16 species do not appear to have been recorded in the Cameron Highlands or immediate surrounds before now." (Authors)] Address: Ng, Y.F., Centre for insect Systematics, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor D.E. Malaysia. E-mail: ng\_yf@ukm.my

**15773.** Phommexay, P.; Satasook, C.; Bates, P.; Pearch, M.; Bumrungsri, S. (2011): The impact of rubber plantations on the diversity and activity of understorey insectivorous bats in southern Thailand. *Biodivers. Conserv.* 20: 1441-1456. (in English) ["Although a large proportion of tropical rain-forest in South-east Asia has been replaced by rubber plantations, there is very little information about the impact of such forest conversion on bat diversity. To address this deficiency, trapping and acoustic monitoring programmes were carried out in Ton Nga Chang and Khao Ban That wildlife sanctuaries in southern Thailand with the purpose of comparing species diversity and activity of understorey insectivorous bats at sites in forest and in nearby monoculture rubber plantations. Insect biomass in both habitats was assessed. Bat species diversity and activity were found to be much lower in rubber plantations than in forested areas and mean insect biomass was determined to be more than twice as high in the latter habitat than in the former. Bats utilising forest were shown to have significantly higher call frequencies but marginally lower wing loadings and aspect ratios than bats found in both habitats. Management strategies to increase biodiversity in rubber plantations are discussed." (Authors)] Address: Bates, P., Harrison Institute, Centre for Systematics and Biodiversity Research, Bowerwood House, St. Botolph's Road, Sevenoaks, Kent TN13 3AQ, UK. E-mail: harrisoninstitute@btopenworld.com

**15774.** Reiss, M. (2011): Substratpräferenz und Mikrohabitat-Fauna-Beziehung im Eukrenal von Quellgewässern. Dissertation Fachbereich Geographie der Philipps-Universität Marburg: 245 pp, Anhang. (in German) ["The function and the ecological significance of the substratum as a hydromorphological element and as a microhabitat for in-

vertebrates of springs are poorly investigated. In eco-faunistic studies which interpret the fauna-microhabitat-relationship of springheads (eucrenal), quantitative and qualitative investigations and analysis of the substrate preferences of invertebrate taxa regarding the eucrenal as an ecotone are still missing. Thereby faunistic research focuses mostly on the aquatic taxa only, rarely on terrestrial organisms. The main objectives of this study are formulated in three questions: 1. Is there a substrate preference for specific taxa considering the ecotone characteristics of springs? 2. What kind of microhabitat functions offers the substrate type for the fauna? 3. Is there a faunistic relevance of substrate specific habitat types that can be ascertained? The results of this study show a significant relevance of the substrate as a microhabitat for the aquatic and terrestrial invertebrate fauna in springs. Therefore only forest springs of the low mountain range were investigated in regions of Hesse and Thuringia. For some taxa a specific substrate preference was found. Microhabitat functions are mostly characterized as food basis, refuge, protection and reproduction area. A first quantitative method to identify fauna-microhabitat-relationship is given with a new approach of a multihabitat-sampling as an integrated method for collecting and recording faunistic data. For the most commonly substrate specific microhabitat types the faunistic evidence and relevance was found. Some results are leading to new hypotheses, which show the importance of further research in the topic of substrate preferences of fauna and fauna-microhabitat-relationships of springs." (Author)] Address: not stated

**15775.** Schmidt, C. (2011): 10 Jahre Libellenmonitoring im FND "Kuhbergbruch". *Landschaftspflege und Naturschutz in Thüringen* 48(2): 70-81. (in German, with English summary) ["Between 2002 and 2011 a monitoring program of Anisoptera was realized at a complex of small anthropogenous ponds in the administrative district of Greiz, Thüringen, Germany. Based on collecting exuviae on a regular basis, it was possible to provide evidence of reproduction of 16 indigenous species. Due to additional observations of imagines, including Zygoptera, the number of species increased to 32 since 1992. Amongst indigenous Anisoptera *Leucorrhinia pectoralis* and *L. rubicunda* are two species of the category 1 in the Red List of Thuringia, furthermore *Aeshna juncea* and *L. dubia* are in category 3. This four important species were described in detail in view of nature conservation by means of phenology, colonization and population development." (Author)] Address: Seifert, C., Hafengasse 9, A-1030 Wien, Austria. carlo\_seifert@web.de

**15776.** Walia, G.K.; Chahal, S.S.; Singh, N. (2011): Cytogenetic studies on three species of genus *Burmagomphus* of family Gomphidae (Odonata: Anisoptera) from India. *International Journal of Zoological Investigations* 7(1): 272-277. (in English) ["Male germ cell chromosomes of *Burmagomphus divaricatus*, *B. pyramidalis* and *B. sivalikensis* ... have been investigated by using conventional staining, C-banding, silver nitrate staining and sequence specific staining. The species were collected from Punjab and Himachal Pradesh, India. All the species possess the chromosome number  $2n = 23$  which is the type number of



the family. Terminal C bands and NOR's are present at the autosomal bivalents and X chromosome is C positive and NOR rich in all the three species, while m bivalents show variation in distribution of C- heterochromatin and NOR's. In the sequence specific staining, whole complement shows bright DAPI signals in *B. divaricatus*, bright CMA3 signals in *B. pyramidalis* and both DAPI and CMA3 signals in *B. sivalikensis*." (Authors)] Address: Walia Gurinder Kaur, Dept of Zoology & Environmental Sciences, Punjabi University, Patiala, Punjab, India

**15777.** Zessin, W. (2011): Neue Insekten aus dem Moler (Paläozän/Eozän) von Dänemark Teil 1 (Odonata: Epallagidae, Megapodagrionidae). *Virgo, Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 14(1): 62-71. (in German, with English summary) ["Some new fossil damselfly genus and species, *Morsagrion ansorgei* n. gen. n. sp., *Furagrion morsi* n. sp., *Hanklitia hankliti* n. gen. n. sp., (Megapodagrionidae), *Ejerslevia haraldi* n. gen. n. sp. and *Solveigia wittecki* n. gen. n. sp. (Epallagidae) are described from the Paleocene/Eocene Fur Formation (Mo clay) of isle of Fur and Mors, Denmark." (Author)] Address: Zessin, W., Lange Str. 9, 19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

## 2012

**15778.** Amaya-Perilla, C.; Palacino-Rodriguez, F. (2012): An updated list of the dragonflies (Odonata) of Meta Department, Colombia, with forty-six new department records. *Bulletin of American Odonatology* 11(2): 29-38. (in English, with Spanish summary) ["As a result of several years of sampling in Meta Department, Colombia, an updated list of dragonflies species is provided, of which 46 are new department records. A total of 12 families, 60 genera, and 144 species are reported, which represents 85% of the families, 68% of the genera, and 44% of the species recorded from Colombia." (Authors)] Address: Amaya-Perilla, Catalina, Grupo de estudios en Biodiversidad y Faunística (Entomología), Programa de Biología Ambiental, Facultad de Ciencias Naturales, Universidad Jorge Tadeo Lozano, Bogotá, Colombia

**15779.** Batema, D.L.; Bellian, A.; Landowski, L. (2012): A survey of Odonata of the Patoka River National Wildlife Refuge and Management Area. *Proceedings of the Indiana Academy of Science* 121(1): 54-61. (in English) ["The Patoka River National Wildlife Refuge and Management Area (hereafter Patoka River Refuge or the Refuge) represents one of the largest intact bottomland hardwood forests in southern Indiana, with meandering oxbows, marshes, ponds, managed moist-soil units, and constructed wetlands that provide diverse and suitable habitat for wildlife. Refuge personnel strive to protect, restore, and manage this bottomland hardwood ecosystem and associated habitats for a variety of wildlife. The Patoka River National Wildlife Refuge Comprehensive Conservation Plan (CCP) lists many species of management priority (McCoy 2008), but Odonata are not included, even though they are known to occur on the Refuge. The absence of Odonata from the CCP is the result of lack of information about this ecologically important group of organisms. Therefore, we

conducted a survey, from May to October 2009, to document their presence, with special attention being paid to rare, threatened, and endangered species. A total of 43 Odonata species were collected and identified. No threatened or endangered species were found on the Refuge, but three species were found that are considered imperiled in Indiana based on Nature Serve Ranks (Stein 2002). Additionally, 19 new odonate records were documented for Pike County, Indiana. The results of this survey will be used by Refuge personnel to assist in management decisions and to help establish priorities for the Patoka River Refuge activities and land acquisition goals." (Authors)] Address: Batema, D.L., Dept of Chemistry, Environmental Studies, Program, Univ. of Evansville, 1800 Lincoln Avenue, Evansville, IN 47722 USA. E-mail: dh28@evaansville.edu

**15780.** Bolshakov, L.V. (2012): New species of Odonata for Tula Province. *Entomological and parasitological Researches in the Volga*: 51-54. (in Russian, with English summary) ["Based on 2011-2012 collections 3 new species of Odonata for Tula Province are presented, including *Anax parthenope* and *Erythromma viridulum* being new for the Centre of European Russia." (Author)] Address: not stated

**15781.** Bratton, J.H. (2012): Miscellaneous invertebrates recorded from the Outer Hebrides, 2010. *The Glasgow Naturalist* 25(4): 130-132: (in English) [Hermetray, 4 August: Lake, NF988741: *Ischnura elegans*, *Sympetrum nigrescens* det. R. Youngmann (Odonata); Ronay, 6 August: Small peaty lake, NF90085566: *Sympetrum danae* larva (Odonata).] Address: Bratton, J.H., 18 New Street, Menai Bridge, Anglesey, LL59 5HN, UK. E-mail: jhnbratton@yahoo.co.uk

**15782.** Campos, F.; Velasco, T.; Santos, E. Sanz, G. (2012): Nueva cita de *Macromia splendens* (Pictet, 1843) (Odonata, Corduliidae) en el oeste de España. *Boln. Asoc. esp. Ent.* 36(1-2): 233-235. (in Spanish) [Spain, Robleda (UTM 29T 7064474), at 755 m.a.s.l., 22-IX-2011.] Address: Campos, F., Universidad Europea Miguel de Cervantes, Calle Padre Julio Chevalier 2, 47012 Valladolid, Spain. E-mail: fcampos@uemc.es

**15783.** Chucholl, C. (2012): Understanding invasion success: life-history traits and feeding habits of the alien crayfish *Orconectes immunis* (Decapoda, Astacida, Cambaridae). *Knowledge and Management of Aquatic Ecosystems* 404, 04: 22 pp. (in English) ["In the present study, the life history and diet of the highly successful North American invader *Orconectes immunis* was assessed for the first time in its introduced European range. In 2007, *O. immunis* population dynamics were monitored in a typical backwater habitat using unbaited funnel traps, and its life history was analysed using Von Bertalanffy's growth function. Juveniles hatched as early as March and may attain sexual maturity at the end of their first summer. The adult population moulted up to four times during the summer months, with the non-breeding form (II) lasting for a remarkably short time period. The high growth rate of *O. immunis* was combined with a short longevity, which was estimated at 2.5 years. The fecundity ranged from 119 to 495 pleopodal eggs. The stomach contents were dominated by

detritus, followed by macroinvertebrates and macrophytes, and no ontogenetic shift in diet was observed. The ability to prey on a wide array of invertebrate taxa presumably supports the sustained high growth rate of *O. immunis*. The presented data provide evidence that *O. immunis* exhibits a strongly r-selected life history and omnivorous feeding habits. These ecological properties have often been linked to successful invaders and enhance the invasiveness of *O. immunis*." (Author)] Address: Chucholl, C., Dept. Experimental Ecology (Bio 3), Univ. of Ulm, Albert-Einstein-Allee 11, 89069 Ulm, Germany. E-mail: Cchucholl@aol.com

**15784.** García-Villanueva, V.; Moreno Tamurejo, J.A.; Maldonado, J.J.; García Corraliza, I. (2012): Fauna de odonatos (Insecta: Odonata) del Parque Natural del Tajo Internacional (Cáceres, oeste de España). Boletín de la SEA 51: 197-202. (in Spanish, with English summary) ["On the Odonata (Insecta) of the International Tagus Natural Park (Cáceres, western Spain): Data are provided on the odonate fauna of the International Tagus Natural Park (Cáceres, Spain) based on samples taken during 2010 and 2011. Forty species have been recorded in the study area (45 including bibliographic records)." (Authors)] Address: García-Villanueva, V., c/ Diego de Jara y Torpa, 11. E-06011 Badajoz, Spain. E-mail: vgvillanueva@telefonica.net

**15785.** Grether, G.F. (2012): The neuroecology of competitor recognition. *Integr. Comp. Biol.* 51(5): 807-818. (in English) ["Territorial animals can be expected to distinguish among the types of competitors and noncompetitors that they encounter on a regular basis, including prospective mates and rivals of their own species, but they may not correctly classify individuals of other species. Closely related species often have similar phenotypes and this can cause confusion when formerly allopatric populations first come into contact. Errors in recognizing competitors can have important ecological and evolutionary effects. I review what is known about the mechanisms of competitor recognition in animals generally, focusing on cases in which the targets of recognition include other species. Case studies include damselflies, ants, skinks, salamanders, reef fishes, and birds. In general, recognition systems consist of a phenotypic cue (e.g., chemical, colour, song), a neural template against which cues are compared, a motor response (e.g., aggression), and sensory integration circuits for context dependency of the response (if any). Little is known about how competitor recognition systems work at the neural level, but inferences about specificity of cues and about sensory integration can be drawn from the responses of territory residents to simulated intruders. Competitor recognition often involves multiple cues in the same, or different, sensory modalities. The same cues and templates are often, but not always, used for intraspecific and interspecific recognition. Experiments have shown that imprinting on local cues is common, which may enable templates to track evolved changes in cues automatically. The dependence of aggression and tolerance on context is important even in the simplest systems. Species in which mechanisms of competitor recognition are best known offer untapped opportunities to examine how competitor-recognition systems evolve (e.g., by comparing allo-

patric and sympatric populations). Cues that are gene products (peptides, proteins) may provide insights into rates of evolution. There are many avenues for further research on the important but understudied question of how animals recognize competitors." (Author) Hetaerina occisa, H. americana, H. cruentata, H. titia] Address: Grether, G.F., Dept of Ecology & Evolutionary Biology, University of California, Los Angeles, CA 90095-1606, USA. E-mail: ggrether@ucla.edu

**15786.** Grözinger, F.; Wertz, A.; Thein, J.; Feldhaar, H.; Rödel, M.O. (2012): Environmental factors fail to explain oviposition site use in the European common frog. *Journal of Zoology* 288(2): 103-111. (in English) ["A 7-year monitoring of potential oviposition ponds of the European common frog *Rana temporaria*, in northern Bavaria, Germany, indicated that breeding ponds were not randomly used. Site fidelity could not consistently explain this pattern. Because amphibians are known to select oviposition sites according to certain habitat characteristics, we investigated pond parameters that may drive breeding site selection in that area. We recorded 44 abiotic and biotic parameters, including variables within-ponds, predator presence, as well as habitat characteristics of the terrestrial area surrounding the ponds. However, multifactorial statistics such as non-metric multidimensional scaling, hierarchical clustering and random forest algorithm as well as single-factor comparisons could not highlight common habitat features of chosen ponds. The results of this study indicate that breeding site choice is more than a pure function of habitat characteristics, and that understanding the reproductive biology, even of such a widespread species as *R. temporaria*, needs more research effort." (Authors)] Address: Rödel, M.O., Museum für Naturkunde, Leibniz Inst. for Research on Evolution & Biodiversity, Invalidenstr. 43, 10115 Berlin, Germany. E-mail: mo.roedel@mfn-berlin.de

**15787.** Hernandez-Manrique, O.L.; Numa, C.; Verdu, J.R.; Galante, E.; Lobo, J.M. (2012): Current protected sites do not allow the representation of endangered invertebrates: the Spanish case. *Insect Conservation and Diversity* 5: 414-421. (in English) ["1. Using a recently created database representing the joint effort of around 100 invertebrate taxonomists, this study uses the information on 52 arthropoda and 27 mollusca species that are endangered and critically endangered to examine to what extent invertebrate species are represented in existing Spanish protected areas. 2. As distribution information is available at a 100 km<sup>2</sup> resolution, we consider different area thresholds to judge cells as being protected. 3. Approximately 19% of the area represented by the grid cells with observed occurrences rates as extant protected reserves, and 36% is included within the Natura 2000 network. 4. If having 50% of the cell area as a Natura 2000 reserve is considered as sufficient to have effective protection, almost 68% of species and 32% of probable populations (contiguous cell groups) would be represented. 5. However, 77% of species and 94% of probable populations are not represented in the current protected reserves if we establish that at least 95% of each cell area should belong to a reserve to provide effective protection. 6. Thus, existing conservation strategies, which are based primarily on the

protection of certain areas and vertebrate species, may be insufficient to ensure the conservation of invertebrate species." (Authors)] Address: Lobo, J.M., Museo Nacional de Ciencias Naturales, CSIC, José Gutiérrez Abascal 2, Madrid 28006, Spain. E-mail: mcnj117@mncn.csic.es

**15788.** Johnson, J. (2012): Wintertime *Sympetrum corruptum* in Oregon. Bulletin of the OES, Spring 2012: 6. (in English) [*S. corruptum* ♂, at Waldport, Lincoln Co., Oregon, 9-XII-2011. USA.] Address: jt\_johnson@comcast.net

**15789.** Jones, J.I.; Murphy, J.F.; Collins, A.L.; Sear, D.A.; Naden, P.S.; Armitage, P.D. (2012): The impact of fine sediment on macro-invertebrates. Rivers Research and Applications 28(8): 1055-1071. (in English) ["The sustainable use of water resources requires clear guidelines for the management of diffuse pollution inputs to rivers. Without informed guidelines, management decisions are unlikely to deliver cost-effective improvements in the quality of rivers as required by current water policy. Here, we review the evidence available for deriving improved guidelines on the loading of fine sediment to rivers based on the impact on macro-invertebrates. The relationship between macro-invertebrates and fine sediments is poorly defined. Studies of the impacts of fine sediment on macro-invertebrates have been undertaken at various scales, which has an influence on the range of responses displayed and the reliability of the results obtained; results obtained from investigations at smaller scales may not manifest at the scale required to manage rivers and vice versa. Many of the identified effects of increased loading of fine sediment on macro-invertebrates occur as a consequence of deposition on the river bed, yet many current management guidelines are based on suspended sediment targets. On this basis, existing water quality guidelines for sediment management are unlikely to be appropriate." (Authors)] Address: Jones, J.I., School of Biological & Chemical Sciences, Queen Mary Univ. of London, Mile End Road, London, E1 4NS, UK. E-mail: j.i.jones@qmul.ac.uk

**15790.** Keppner, E.J. (2012): Odonata records from Bay and Washington counties and the St. Andrew Bay drainage basin, Florida. Bulletin of American Odonatology 11(2): 49-67. (in English) ["An annotated list of the Odonata occurring in Bay and Washington counties and the St. Andrew Bay drainage basin, Florida, is presented based on collections of adults and nymphs from 2003–2012. This survey, combined with reports from the literature, resulted in 114 species of Odonata (36 Zygoptera and 78 Anisoptera) being reported from the survey area with 94 species of odonates reported for Bay County (31 Zygoptera and 63 Anisoptera), 92 for Washington County (28 Zygoptera and 64 Anisoptera), and 99 for the St. Andrew Bay drainage basin (31 Zygoptera and 68 Anisoptera). The Florida Natural Areas Inventory lists 20 of the species reported from the survey area as imperiled and the Florida Fish and Wildlife Conservation Commission lists 13 of those species as Species of Greatest Conservation Need." (Author)] Address: Keppner, E.J., 4406 Garrison Road, Panama City, FL 32404, USA. E-mail: ekeppner@bellsouth.net

**15791.** Michels, J.; Gorb, S.N. (2012): Detailed three-dimensional visualization of resilin in the exoskeleton of arthropods using confocal laser scanning microscopy. Journal of Microscopy 245(1): 1-16. (in English) ["Resilin is a rubber-like protein found in the exoskeleton of arthropods. It often contributes large proportions to the material of certain structures in movement systems. Accordingly, the knowledge of the presence and distribution of resilin is essential for the understanding of the functional morphology of these systems. Because of its specific autofluorescence, resilin can be effectively visualized using fluorescence microscopy. However, the respective excitation maximum is in the UV range, which is not covered by the lasers available in most of the modern commercial confocal laser scanning microscopes. The goal of this study was to test the potential of confocal laser scanning microscopy (CLSM) in combination with a 405 nm laser to visualize and analyse the presence and distribution of resilin in arthropod exoskeletons. The results clearly show that all resilin-dominated structures, which were visualized successfully using wide-field fluorescence microscopy (WFM) and a 'classical' UV excitation, could also be visualized efficiently with the proposed CLSM method. Furthermore, with the application of additional laser lines CLSM turned out to be very appropriate for studying differences in the material composition within arthropod exoskeletons in great detail. As CLSM has several advantages over WFM with respect to detailed morphological imaging, the application of the proposed CLSM method may reveal new information about the micromorphology and material composition of resilin-dominated exoskeleton structures leading to new insights into the functional morphology and biomechanics of arthropods."... CLSM, known resilin-dominated structures including the wing hinge and the prealar arm of the locust *Locusta migratoria* (Insecta, Caelifera, Acrididae; see Weis-Fogh, 1960), a vein joint in the hind wing of *Sympetrum striolatum* (Authors)] Address: Gorb, S.N., Functional Morphology & Biomechanics, Zoological Institute, Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**15792.** Morrill, A.; Forbes, M.R. (2012): Random parasite encounters coupled with condition-linked immunity of hosts generate parasite aggregation. International Journal for Parasitology 42(7): 701-706. (in English) ["Parasite aggregation is viewed as a natural law in parasite-host ecology but is a paradox insofar as parasites should follow the Poisson distribution if hosts are encountered randomly. Much research has focused on whether parasite aggregation in or on hosts is explained by aggregation of infective parasite stages in the environment, or by heterogeneity within host samples in terms of host responses to infection (e.g., through representation of different age classes of hosts). In this paper, we argue that the typically aggregated distributions of parasites may be explained simply. We propose that aggregated distributions can be derived from parasites encountering hosts randomly, but subsequently by parasites being 'lost' from hosts based on condition-linked escape or immunity of hosts. Host condition should be a normally distributed trait even among otherwise homogeneous sets of hosts. Our model shows that mean host condition and variation in host condition have different effects



on the different metrics of parasite aggregation. Our model further predicts that as host condition increases, parasites become more aggregated but numbers of attending parasites are reduced overall and this is important for parasite population dynamics. The effects of deviation from random encounter are discussed with respect to the relationship between host condition and final parasite numbers." (Authors)] Address: Forbes, M.R., Dept Biol., Carleton Univ., 587 Tory Build. 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: mforbes@ccs.carleton.ca

**15793.** Rozner, G.; Ferincz, A.; Miokovics, E. (2012): Data to the distribution of Golden Ringed Dragonfly (*Cordulegaster bidentata* Selys, 1843) and Large Golden Ringed Dragonfly (*Cordulegaster heros* Theischinger, 1979) in Bakony Mountains. *Természeti Kéziratok* 18: 447-455. (in Hungarian, with English summary) ["According to earlier data, *C. bidentata* occurs in the Koszeg Mountains, the Bakony and the North Central Mountains, while *C. heros* is found in the Sopron Mountains, the Ország, the Mecsek and, according to more recent data, in the Zselic. Our studies in 2008-2009 confirmed the occurrence of *C. heros* syntopic *C. bidentata* in several watercourses of the Koszeg Mountains, which was an important new finding for the occurrence of the species, and also confirmed the occurrence of both species in the same water system. On this basis, it was reasonable to assume that *C. heros* could occur in other areas previously considered to be the habitat of *C. bidentata*. In 2010-2011, we extended our studies to the Bakony area and were able to detect *C. heros* in several watercourses and recorded the occurrence of both species in different sections of the same watercourse. Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator)" (Authors)] Address: Rozner, G., Managership of Balaton-felvidéki National Park, 8229 Csopak, Kossuth u. 16., Hungary. E-mail: roznergyuri@gmail.com

**15794.** Soldan, T.; Bojková, J.; Vrba, J.; Bitušík, P.; Chvojka, P.; Papáček, M.; Peltanová, J.; Sychra, J.; Tátosová, J. (2012): Aquatic insects of the Bohemian Forest glacial lakes: Diversity, long-term changes, and influence of acidification. *Silva Gabreta* 18(3): 123-283. ["Aquatic insects have been studied in five Czech (Ěrné, Ěrtovo, Prášílské, Plešné, and Laka) and three German (Großer Arbersee, Kleiner Arbersee, and Rachelsee) lakes and their inlets and outlets in the Bohemian Forest. All available historical and present records, as well as many unpublished data were summarised. Of nine insect orders, 70 families, 214 genera, and 373 species/taxa were found in total (Ephemeroptera 20, Odonata 22, Plecoptera 37, Heteroptera 35, Megaloptera and aquatic Neuroptera 3, Trichoptera 46, Coleoptera 58, Chironomidae 113, other Diptera 39). All aquatic insect groups are discussed from the point of view of species richness, influence of acidification, ecological requirements, distributional ranges of species, and species protection. Altogether 215 species/ taxa were found in the lakes, where Heteroptera, Coleoptera, and Chironomidae were the most species-rich groups (135 taxa). The lowest number of taxa was recorded in strongly acidified Ěrtovo Lake and Rachelsee (55 and 56 taxa, respectively); the highest number of species/taxa was recorded in Laka, Plešné and Prášílské lakes (95, 91 and 89 taxa, respect-

ively). Altogether 237 taxa were found in inlets and outlets; Chironomidae, Trichoptera, and Plecoptera prevailed (151 taxa). Based on the cluster analysis of recent species data, the lakes were classified into four groups which primarily reflect characteristics of the lake littoral and water chemistry. Available data on Ephemeroptera, Plecoptera, Trichoptera, and Heteroptera from the past two decades were analysed in order to reveal possible biological recovery from acid stress. A certain degree of recovery has been documented by the increase in species richness of Ephemeroptera and Heteroptera. Yet the lakes have not been colonised by any acid-sensitive species." (Authors)] Address: Soldan, T., Inst. of Entom, Biol. Centre ASCR, Branišovská 31, CZ-37005 Ěeské Budějovice, Czech Republic

**15795.** Thomas, H.H.; Moosman, P.R.; Veilleux, J.P.; Holt, J. (2012): Foods of bats (Family Vespertilionidae) at five locations in New Hampshire and Massachusetts. *Canadian Field-Naturalist* 126(2): 117-124. (in English) ["Diet and feeding relations of six species of bats at five locations in New Hampshire and Massachusetts were studied to improve understanding of foraging niche differentiation. Fecal samples were collected from 100 Big Brown Bats (*Eptesicus fuscus*), 154 Little Brown Myotis (*Myotis lucifugus*), 49 Northern Myotis (*M. septentrionalis*), 54 Eastern Small-footed Myotis (*M. leibii*), 9 Eastern Red Bats (*Lasiurus borealis*), and 1 Hoary Bat (*L. cinereus*) netted during non-hibernation periods from 2004 to 2008 at four locations in southern New Hampshire and one in north-central Massachusetts. Beetles (Order Coleoptera) were the major food of *E. fuscus* (mean percentage volume = 81.6%, 97% occurrence) followed by moths (Order Lepidoptera), with scarabaeid and carabid beetles the most abundant consumed families by volume and frequency. Moths were the most important item by volume and frequency preyed on by the remaining species (*M. lucifugus*, mean percentage volume 30.7%, 82% occurrence; *M. septentrionalis*, mean percentage volume 42.7%, 82% occurrence; *M. leibii*, mean percentage volume 49.4%, 81% occurrence; *L. borealis*, mean percentage volume 62.8%, 100% occurrence; *L. cinereus*, mean percentage volume 82%, 100% occurrence). Little Brown Myotis consumed the largest variety of prey (40); Northern Myotis consumed the highest volume of spiders (8.1%). Community similarity index values indicated diets of the three species of *Myotis* were more similar to each other (similarity = 0.71) than to those of non-*Myotis*. The diet of *E. fuscus* was more similar to that of the *Myotis* cluster (0.58) than to either species of *Lasiurus*. Results suggest that, despite faunal differences between the U.S. Northeast and other parts of North America, foraging relationships among guild members follows a similar pattern." (Authors)] Address: Thomas, H., Dept of Biol. & Chemistry, Fitchburg State Univ., Fitchburg, Massachusetts 01420 USA

**15796.** Weipert, J.; Bössneck, U. (2012): Die Schutzgebiete der Landeshauptstadt Erfurt (Thüringen). Teil XX: Flora und Fauna des GLB „Alte Lehmgrube bei Schmira“. *Vernate* 31: 105-130. (in German) [The nature reserves of the urban area of Erfurt (Thuringia). Part XX: Flora and fauna of the reserve „Alte Lehmgrube bei Schmira“. The paper

presents the results of floristic and faunistic surveys from 1994 to 2009 within the reserve "Alte Lehmgrube bei Schmira" of the Thuringian state capital Erfurt. The following odonate species are listed: *Aeshna cyanea*, *Coenagrion puella*, *Enallagma cyathigerum*, *Ischnura elegans*, *Lestes sponsa*, *Chalcolestes viridis*, *Libellula depressa*, *Orthetrum cancellatum*, *Pyrrhosoma nymphula*, *Sympetrum vulgatum*] Address: Weipert, J., Institut für biologische Studien, Am Bache 13, 99338 Plaue, Germany. E-mail: info@bios-jw.com

**15797.** Zessin, W. (2012): Buchbesprechungen. *Virgo*, Mitteilungsblatt des Entomologischen Vereins Mecklenburg 15(1): 100-101. (in German) [Hauke Behr: Libellen Einblicke in die biologische Vielfalt der Westmecklenburgischen Seenlandschaft; Dietmar Glitz: Libellen in Norddeutschland. Geländeschlüssel] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

**15798.** Zhang, H.-J. (2012): A new species of *Sympetrum* (Odonata, Libellulidae) from China. *Acta Zootaxonomica Sinica* 37(4): 747-750. (in Chinese, with English summary) ["*Sympetrum shaanxiensis* sp. nov. (Odonata, Libellulidae) from Shaanxi Province, China is described. The type specimens are deposited at the museum of Zoology and Botany, the Shaanxi Bioresource Key Laboratory, Hanzhong, Shaanxi, China. The new species is similar to *S. vulgatum*, but differs from the latter in the characters listed in the Table 1. Etymology. The new species is named from the type locality, Shaanxi Province. Female. Unknown. Measurements (mm). abd. + app. 25-26, hw 28-30. Holotype ♂, Zakoushi, Liuba County, Shaanxi Province (33°37'N, 106°20'E; alt. 1 820 m), 15 July 2007, Leg. ZHANG Hong-Jie. Paratypes: 1 ♂, Baimatan, Huanglong County, Shaanxi Province (35°33'N, 110°10'E; alt. 950 m), 12 Aug. 1987; 1 ♂, Tongchuan City, Shaanxi Province (35°05'N, 109°05'E; alt. 800 m), 18 Aug. 1985; 1 ♂, Qingshui, Zhengba County, Shaanxi Province (32°38'N, 107°45'E; alt. 1 300 m), 22 July 1987. Table 1. Comparison of morphological features between *Sympetrum shaanxiensis* sp. nov. and *S. vulgatum*. Both labium and labrum cream-coloured Labium citrine, labrum orange with black middle lobe or black spot on middle lobe Rear of eyes with two transverse black stripes Rear of eyes with three transverse black stripes. Dorsal synthorax with pale brown antehumeral stripes Dorsal synthorax without antehumeral stripes. Each distal end of abdominal S2-9 with paired very small red spots on mid-dorsum Each distal end of abdominal S2-9 without paired very small red spots on mid-dorsum Interior branch equal to outer branch in posterior hamule Interior branch shorter than outer branch in posterior hamule. Distal segment of penile organ broad triangle-shaped in lateral view Distal segment of penile organ diamond-shaped when viewed from lateral. Ventral subapex of superior anal appendages blunt and rounded, without any cone-shaped projection in lateral view Ventral subapex of superior anal appendages with ten black cone-shaped projections in lateral view." (Author)] Address: Zhang, H.-J., Shaanxi Bioresource Key Laboratory, Shaanxi Univ. of Technology, Hanzhong 723000, China

**15799.** Ajiboye, A.O.; Faturoti, E.O.; Owolabi, O.D. (2013): Food and feeding habits of *Synodontis nigrita*, Valenciennes, 1840 (Pisces: Mochokidae) in Asejire Lake, Nigeria. *International Journal of Lakes and Rivers* 6(1): 1-8. (in English) ["Food and feeding habits of *Synodontis nigrita* were examined in Asejire Lake, South-western, Nigeria between January 2002 and December 2003. A total of 517 specimens of *S. nigrita* were collected bi-monthly from the catches of local fishermen using cast nets, gill nets and bamboo-made traps. The stomach contents were analyzed using frequency of occurrence, numerical and volumetric methods. Two hundred and sixty one (50.48%) had empty stomachs, with the highest recorded in wet season (April-October) and lowest in dry season (November-March). The fish fed mainly on insects from seven taxa. The most frequently consumed insects were the isoptera which occurred in 49.27% of the stomachs, and accounted for 43.85% by number and 37.12% by volume; while dictyoptera were the least consumed insects occurring in 6.86% of stomachs, accounting for 2.84% by number and 8.30% by volume. Feeding habits varied with size, suggesting an age-specific food preference in order to avoid intra-specific competition for available food items in the lake. This coupled with the ability to feed on highly nutritious food probably accounted for the survival of the fish in the lake system." (Authors)] Address: Ajiboye, A.O., Dept of Animal Science & Fisheries Management, Bowen Univ., P.M.B.284, Iwo, Osun State, Nigeria. E-mail: debtron2005@yahoo.com

**15800.** Alvial, I.E.; Orth, K.; Durán, B.C.; Álvarez, E.; Squeo, F.A. (2013): Importance of geochemical factors in determining distribution patterns of aquatic invertebrates in mountain streams south of the Atacama Desert, Chile. *Hydrobiologia* 709: 11-25. (in English) ["The ecology of macroinvertebrate communities in arid regions is still poorly understood. Here we examined how the community structure varied at spatial and temporal scales in streams and tributaries of the Huasco River in semi-arid region of Northern Chile. We expected that macroinvertebrate distribution may be responding to natural processes of mineralization described for Chilean semiarid basins. The relationships among biotic and abiotic variables were assessed through multivariate techniques (principal component analysis, non-metric multidimensional scaling, canonical correspondence analysis), and a two-way analysis of similarity was used to evaluate differences between basins and years (2007, 2008, and 2009). Significant differences in community structure and physical-chemical variables between basins (Del Carmen and Del Tránsito) were found, but not between years. Altitude, Mn, Al, Ca, Na, HCO<sub>3</sub>, and dissolved oxygen were the variables that best accounted for the communities distribution. In particular, high metals concentration in El Tránsito basin should determine low density and diversity of macroinvertebrates. Chironomidae, Ephydriidae, and Glossiphoniidae were associated to waters with high metals content and acidic pH, whereas Baetidae, Hydroptilidae, and Blephariceridae were associated to sites with more favorable physical-chemical conditions. These results contribute to under-

stand the ecological patterns of macroinvertebrates in arid regions and should lead to conservation and monitoring plans for this remote place." (Authors)] Address: Alvial, Ingrid, Center for Advanced Studies in Arid Zones (CEAZA), Casilla 599, La Serena, Chile. E-mail: ingrid.alvial@ceaza.cl

**15801.** Anjos-Santos, D.; Lozano, F.; Costa, J.M. (2013): Fluminagrion gen. nov. for Acanthagrion taxaense Santos, 1965, from Brazil (Odonata: Coenagrionidae). International Journal of Odonatology 16(2): 145-155. (in English, with Spanish summary) ["A new genus of Coenagrionidae, Fluminagrion, from Rio de Janeiro, Brazil is described, diagnosed, and illustrated, based on examination of the type series and additional specimens of Acanthagrion taxaense Santos, 1965, deposited in the collection of MNRJ/Brazil. This genus is characterized by: posterior lobe of prothorax trilobate, with medial lobe rounded and projected in both sexes; segment 3 of genital ligula C-shaped in lateral view, bifid in ectal view, ending in lobes directed laterally with apexes pyramidal in cross-section; male cercus entire and decumbent from proximal fourth, with brush-like setae at about half its length; female lacking mesepisternal fossa, S8 with vulvar spine." (Authors)] Address: Anjos-Santos, D., Laboratorio de Investigaciones en Sistemática y Ecología Animal (LIESA), Sarmiento 849, 9200, Esquel, Chubut, Argentina. E-mail: danielleanhos2@yahoo.com.br

**15802.** Arman, N.Z.; Salmiati; Said, M.I.M.; Azman, S. (2013): Anthropogenic influences on aquatic life community and water quality status in Mengkibol River, Kluang, Johor, Malaysia. Journal of Applied Sciences in Environmental Sanitation 8(3): 151-160. (in English) ["Biological monitoring assessing pollution levels and water quality. The objective of this study was to determine the composition and abundance of benthic macroinvertebrate in a tropical urban river over five consecutive months (No communities from three sampling stations located in the middle section of the Mengkibol River, Kluang were monitored. Biotic, water quality, diversity and evenness indices as well as statistical analysis were applied that the river did not support much macroinvertebrate diversity. Moderately intolerant pollution species such as dragonfly (Insecta: Odonata) were observed to be dominant in each site. However, the occurwater quality of the Mengkibol River. Indices such as the Biological Monitoring Working Party (BMWP), Lincoln Quality Index (LQI), and Water Quality Index (WQI) were also used to assess the level of impact on the Mengkibol River. The relationship between the physicochemical and benthic macroinvertebrate data were investigated by one ANOVA and Pearson's correlation of coefficient analysis. These statistical methods indicate that temperature had addition, the LQI value was generally affected by the BMWP score ( $P < 0.01$ ), while the Pielou Evenness Index (J) was strongly correlated with the BMWP, LQI and Shannon Weiner Diversity Index ( $H'$ ) ( $P$  uniformly.)] Address: Arman, N.Z., Institute of Environmental & Water Resource Management, Univ. Teknologi Malaysia

**15803.** Blanckenhagen, B. von (2013): Erster gesicherter Nachweis der Östlichen Moosjungfer Leucorrhinia albifrons (Burmeister, 1839) in Hessen. Libellen in Hessen 6(1):

46-49. (in German) [male, 28.05.2012, Lahnberge near Marburg, Hessen, Germany (3485350/5633720)] Address: von Blanckenhagen, B., Kaffweg 8, 35039 Marburg, Germany. E-mail: benno.v.blanckenhagen@web.de

**15804.** Brinesha, R.; Janardanana, K.P. (2013): The life history of Pleurogenoides malampuzhensis sp. nov. (Digenea: Pleurogenidae) from amphibious and aquatic hosts in Kerala, India. Journal of Helminthology 88(2): 230-236. (in English) ["The life-cycle stages of Pleurogenoides malampuzhensis sp. nov. infecting the Indian bullfrog Hoplobatrachus tigerinus (Daudin) and the skipper frog Euphlyctis cyanophlyctis (Schneider) occurring in irrigation canals and paddy fields in Malampuzha, which forms part of the district of Palakkad, Kerala, are described. The species is described, its systematic position discussed and compared with the related species, P. gastroporus (Luhe, 1901) and P. orientalis (Srivastava, 1934). The life-cycle stages, from cercaria to egg-producing adult, were successfully established in the laboratory. Virgulate xiphidiocercariae emerged from the snail Digoniostoma pulchella (Benson). Metacercariae are found in muscle tissues of dragonfly nymphs and become infective to the frogs within 22 days. The pre-patent period is 20 days. Growth and development of both metacercariae and adults are described."] Address: Brinesha, R., Parasitology laboratory, Dept of Zoology, Univ. of Calicut, Kerala, India

**15805.** Cannings, R. (2013): Obituary for Gordon Pritchard (1939-2012). Argia 25(2): 25-29. (in English) [Obituary.] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street Victoria, British Columbia V8W 9W2. Canada. E-mail: rcannings@royalbcmuseum.bc.ca

**15806.** Carvalho, F.G.; Oliveira Junior, J.M.B.; Justino de Farias, A.P.; Juen, L. (2013): Use of the ABC curve as a method to detect the effect of anthropogenic change on the Odonata (Insecta) assembly. Interciencia 38(7): 516-522. (in Portuguese, with English summary) ["The insects of the order Odonata are organisms commonly used in biomonitoring studies, since they have some species with very specific requirements and high sensitivity to environmental changes. The aim of this study is to evaluate whether the effects of environmental changes lead to a change in patterns of abundance and biomass of the Odonata assembly, testing the hypothesis that, because of the demands ecophysiological order, with the removal of riparian vegetation took place an increase the in abundance of Anisoptera and a decrease in Zygoptera. Ten streams were sampled, five being altered and five preserved. A comparison of biomass and abundance was done using the W statistic. The hypothesis was supported in part since for Zygoptera the biomass curve for both preserved and altered environments was above the abundance curve, despite the fact that difference in altered environments was very small. For Anisoptera in degraded environments there was a predominance of fast growing and larger body size species, and therefore, the biomass curve extends above the abundance curve. This pattern can be explained by the thermoregulation demands of the suborder. Even considering that Zygoptera did not show a re-



versal of the curves, the technique proved effective in assessing environmental impact and can be employed in biomonitoring programs that use this group." (Author)] Address: de Carvalho, F.G., Biólogo, Estudante M.Sc. no Programa de Ecologia Aquática e Pesca, Universidade Federal do Pará (UFPA), Brasil. E-mail: fernandogeraldo-carvalho@gmail.com

**15807.** Cebulski, B.C.; O'Brien, M.F. (2013): Observations on egg parasitism of *Aeshna tuberculifera* (Odonata: Aeshnidae) by Eulophidae, Trichogrammatidae and Mymaridae (Hymenoptera) in Alger county, Michigan. *The Great Lakes Entomologist* 46: 145-153. (in English) ["Egg parasitoids were reared from a population of *Aeshna tuberculifera* in the Kingston Lake area of Alger County, Michigan, from 1983-2005. Leaves of *Iris versicolor* were repeatedly used for oviposition during the period of observation, with the result that just a few leaves were targeted by different females. Seven species of parasitic Hymenoptera were reared from 1688 eggs. The cumulative rate of parasitization over the course of the study was 18.4%. Three species of parasitoids were responsible for approximately 96% of the parasitized eggs: *Aprostocetus (Ootetrastichus) mymaridis* Girault (Eulophidae) (41%); and the Mymaridae *Polynema* nr. *needhami* (34%) and *Anagrus subfuscus* Förster (21%)."] (Authors)] Address: Cebulski, B.C., 122 White Bear Drive, Negaunee, MI 49866, USA

**15808.** Chakravorty, J.; Ghosh, S.; Meyer-Rochow, V.B. (2013): Comparative survey of entomophagy and entomotherapeutic practices in six tribes of eastern Arunachal Pradesh (India). *Journal of Ethnobiology and Ethnomedicine* 9:50 doi:10.1186/1746-4269-9-50: 12 pp. (in English) ["A consolidated list of edible insects used in the eastern part of Arunachal Pradesh (N.E. India) by Wangcho (Wancho) and Nocte tribes of the Tirap District and the Shingpo, Tangsa, Deori and Chakma of the Changlang District has been prepared. The list is based on thorough, semi-structured field-interviews with 20 informants of each tribal group. At least 51 insect species, belonging to 9 orders were considered edible. The largest number of the edible species belonged to the Coleoptera (14), followed by 10 each of the Orthoptera and Hymenoptera, 9 of the Hemiptera, 3 Lepidoptera, 2 Isoptera and one each of Ephemeroptera, Odonata and Mantodea. As far as therapeutic uses of insects are concerned, 4 species (Hemiptera) were mentioned by the Wangcho (Wancho). Food insects are chosen by members of the various tribes according to traditional beliefs, taste, regional and seasonal availability of the insects. Depending on the species, only certain, but sometimes all, developmental stages are consumed. Preparation of the food insects for consumption involves mainly roasting or boiling. With the degradation of natural resources, habitat loss, rapid population growth, and increasing 'westernization', the traditional wisdom of North-East Indian tribals related to insect uses is at risk of being lost. ] Address: Chakravorty, J., Biochemical Nutrition Laboratory, Dept of Zoology, Rajiv Gandhi Univ., Arunachal Pradesh 791112, India. E-mail: jharnaau@yahoo.com

**15809.** Chen, Jia-Huei (2013): Comparative food habits of two closely-related insectivorous bats and their eco-mor-

phological correlates. MSc. thesis, Dept of Life Sciences, School of Biological Science & Technology, National Cheng Kung University: 46 pp. (in Chinese, with English summary) ["... The diet of *H. terasensis* comprised of 9 insect orders, and that of *H. turpis* additionally included Araneae, Odonata, and Trichoptera and contained a total of 12 orders of arthropods. Both species fed primarily on Coleoptera that accounted for more than 20% in frequency of occurrence and about 40% in volume percentage, while the rest prey orders accounted for different proportions in their respective diets. Hemiptera and Hymenoptera accounted for 53.8% of the total frequency of occurrence and contributed to 50.8% of the volume in the diets of *H. terasensis*. In contrast, Orthoptera, Hemiptera, and Blattodea were more prevalent in the diet of *H. turpis*, but Orthoptera and Lepidoptera were more abundant in volumes. Below the level of order, I found 21 and 13 prey taxon, mostly families, in the diets of *H. terasensis* and *H. turpis*, respectively. Within hemipterans, *H. terasensis* consumed higher proportions of cicadas than *H. turpis*. Overall, *H. terasensis* displayed a more even and thus a more heterogeneous diet than that of *H. turpis*, with a medium dietary overlap between the two species at 0.67, based on Horn's index of similarity. Most wing parameters measured were higher in *H. terasensis* than those of *H. turpis*. A higher wing loading and aspect ratio indicate a faster but less maneuverable flight for *H. terasensis*. In contrast, the flight of *H. turpis* is expected to be more maneuverable and adapted to near vegetation and the ground. In addition, *H. turpis* with higher call frequency would be more tolerant to cluttered environments. Incorporating the general flight potentials of insects, dietary results showed that *H. terasensis*, with higher wing loading and aspect ratio, consumed a higher proportion of faster-flying insects, such as Hymenoptera. The larger body and skull size of *H. terasensis* suggest a more powerful bite force, and the estimated hardness index of prey eaten by *H. terasensis* (3.75) was slightly higher than that of *H. turpis* (3.67). The food habits differed between *H. terasensis* and *H. turpis* in several aspects, and various factors might have contributed to these differences. The dietary results were consistent with the predictions from eco-morphological traits, including body size, wing parameters, and echolocation. Since *H. terasensis* ate more evenly among each insect order, it ate less number of insect orders but had a more heterogeneity diet. This study did not measure food availability on site, thus can't rule out the possibility of dietary differences affected by prey availability. The dietary compositions of *H. terasensis* among sites across Taiwan, however, indicate little dietary variation in space and substantiate our conclusions. Eco-morphological traits constrain animals to explore resources and to a certain extent that have contributed to the different patterns of resource use, thus eco-morphological traits can be a good indicator for resource use patterns of animals with caution." (Author)] Address: Chen, Jia-Huei, National Cheng Kung Univ., No. 1, Daxue Rd, Taiwan 701

**15810.** Chiandetti, I.; Del Bianci, C.; Fiorenza, T. (2013): *Cordulegaster heros* Theischinger, 1979, a new species for the fauna of the province of Udine, north-eastern Italy (Odonata, Cordulegastridae). *Boll. Mus. St. Nat. Venezia*

64: 21-27. (in English, with Italian summary) ["In 2012 and 2013, specimens of *C. heros*, a new species for the Province of Udine, were observed in three areas of the Julian Prealps within the catchment of the torrent Torre. In this note brief details on the characteristics of the discovery site and its associated odonatofauna are also reported." (Authors)] Address: Chiandetti, I., Via Braide Podé 8, I-33010 Colloredo di Monte Albano (UD), Italia. E-mail: chian-det@gmail.com

**15811.** Cuello, J.A.G. (2013): Entomofauna bioindicadora del Río Algodonal, La Ermita, norte de Santander. *Revista ingenio* 6(1): 112-117. ["The river Algodonal is one of the most important bodies of water in the department of North of Santander, Colombia. Could a study of biodiversity of insects associated to the basin of the River Algodonal to determine the quality of the water that is being you dilute below in the municipality of Ocana? For this study it took three sampling stations in the basin of the River. It took samples in transeptos of 100m x 20m, an area of 2000 m<sup>2</sup> for station. The collection was carried out with hand net, manual, aquatic net and pitfall traps. It was collected on the average seven orders for station: Hymenoptera, Coleóptera, Hemipterous, Homoptera, Dipteral, Ortoptera and Odonata, with a total abundance of 431 individuals. They were seven families bioindicadoras: Curculionidae, Veliidae, Libellulidae, Coenagrionidae, Gelastocoridae, Muscidae and Culicidae whose values of importance inside the methodology BMWP/Col added 40 classifying the water in class IV or of doubtful quality what indicates that it is polluted. Physicochemical parameters were evaluated in situ like oxygenate dissolved 5,23 - 7,57 mg/L, PH 7 - 8 and Conductivity 31,8 - 55,4  $\mu$ S-cm, those which leaning with tests of total hardness (mg/L), Chlorides (mg/L), total Alkalinity (mg/L) and Turbidity NTU, determined that the quality of the water is doubtful and that it stops its consumption it should be treated." (Authors)] Address: Cuello, J.A.G., Biólogo, Univ. Francisco de Paula Santander Ocana, Investigador Grupo GIADS, Facultad de Ciencias Agrarias y del Ambiente, Colombia. E-mail: jagranadillo@ufpso.edu.co

**15812.** Curtis, L.R.; Morgans, D.L.; Thoms, B.; Villeneuve, D. (2013): Extreme precipitation appears a key driver of mercury transport from the watershed to Cottage Grove Reservoir, Oregon. *Environmental Pollution* 176: 178-184. (in English) ["An abandoned cinnabar mining and roasting site is in the major sub-basin of the watershed for Cottage Grove Reservoir, Oregon. Average surface sediment total mercury concentration in the river draining this sub-basin ( $0.61 \pm 0.52 \mu\text{g/g}$ ) was about ten-fold higher than three smaller tributaries to the reservoir. Total mercury in reservoir surface sediments averaged  $1.66 \pm 0.70 \mu\text{g/g}$ . Stratigraphy for two sediment cores indicated generally decreased reservoir mercury loading from 1963 to 2002 but two pronounced peaks in mercury deposition. Years of extreme precipitation immediately prior to these peaks at least partially explained them. Epaxial muscle total mercury concentrations of largemouth bass increased with body weight up to  $2.5 \mu\text{g/g}$ . A gradient of mercury concentrations in soils from a 3.3 km diameter grid indicated condensation of mercury vapors from the mine site polluted the sub-basin. Highlights: Pollution of the watershed with

mercury yields a highly persistent human health risk. \*Watershed level events profoundly influence mercury transport into aquatic ecosystems. \*Soil and sediment mercury concentration gradients are a source identification tool." (Authors) Fingerling brown bullhead catfish (*Ameiurus nebulosus*), snails (*Physidae*), bullfrog tadpoles (*Rana*), and Anisoptera and Zygoptera larvae were collected from the reservoir shoreline using a sweepnet. ... (ng/g). Dragonfly a,  $0.49 \pm 0.03$ ,  $35 \pm 12$ . ...] Address: Curtis, L.R., Dept of Environmental & Molecular Toxicology, Oregon State Univ., Corvallis, OR, USA. E-mail: larry.curtis@oregon-state.edu

**15813.** De Nadaï-Monoury, E.; Lecerf, A.; Canal, J.; Buisson, L.; Laffaille, P.; Gilbert, F. (2013): A cost-effective method to quantify biological surface sediment reworking. *Hydrobiologia* 713: 115-125. (in English) ["We propose a simple and inexpensive method to determine the rate and pattern of surface sediment reworking by benthic organisms. Unlike many existing methods commonly used in bioturbation studies, which usually require sediment sampling, our approach is fully non-destructive and is well suited for investigating non-cohesive fine sediments in streams and rivers. Optical tracer (e.g. luminophores or coloured sand) disappearance or appearance is assessed through time based on optical quantification of surfaces occupied by tracers. Data are used to calculate surface sediment reworking (SSR) coefficients depicting bioturbation intensities. Using this method, we evaluated reworking activity of stream organisms (three benthic invertebrates and a fish) in laboratory microcosms mimicking pool habitats or directly in the field within arenas set in depositional zones. Our method was sensitive enough to measure SSR as low as  $0.2 \text{ cm}^2 \text{ day}^{-1}$ , such as triggered by intermediate density ( $774 \text{ m}^2$  of *Gammarus fossarum* (Amphipoda) in microcosms. In contrast, complex invertebrate community in the field and a fish (*Barbatula barbatula*) in laboratory microcosms were found to yield to excessively high SSR ( $>60 \text{ cm}^2 \text{ day}^{-1}$ ). Lastly, we suggest that images acquired during experiments can be used for qualitative evaluation of species-specific effects on sediment distribution." (Authors) *Cordulegaster boltonii*] Address: Gilbert, F., UPS, INP, EcoLab (Laboratoire écologie fonctionnelle et environnement), Univ. Toulouse, 118 route de Narbonne, 31062, Toulouse Cedex 9, France. E-mail: franck.gilbert@univ-tlse3.fr

**15814.** Debata, S.; Ku, H.; Rout, S.; Ku, R. (2013): An observation on Odonata diversity in Hadgarh Wildlife Sanctuary, Odisha, eastern India. *Tigerpaper* 40(2): 10-13. (in English) ["The present study recorded 55 species of odonates under 36 genera and 9 families from the area (Table 1). From all the recorded Anisoptera, Family Libellulidae is dominated by 31 species followed by Aeshnidae (3) and Gomphidae (3). In case of the sub-order Zygoptera, Coenagrionidae is well represented (7), followed by Calopterygidae (3), Protoneuridae (3), Chlorocyphidae (2), Platycnemididae (2) and Lestidae (1)." (Authors)] Address: Debata, S., Dept of Wildlife & Conservation Biology, North Orissa University, India. Email: subrat.debata007@gmail.com.

**15815.** di Lascio, A.; Rossi, L.; Carlino, P.; Calizza, E.; Rossi, D.; Costantini, M.L. (2013): Stable isotope variation in macroinvertebrates indicates anthropogenic disturbance along an urban stretch of the river Tiber (Rome, Italy). *Ecological Indicators* 28: 107-114. (in English) ["Running waters in urbanized areas are large-scale systems of anthropogenic energy dissipation that receive effluents from point and diffuse sources, potentially inducing changes in organic matter decomposition and deposition and thus modifying river metabolism and the feeding patterns of inhabiting populations. Based on the hypothesis that anthropogenic disturbance provides important trophic constraints that influence the trophic niches of local communities, stable isotopes analysis was used to evaluate possible alterations in resource assimilation by aquatic species in response to diffuse and point sources of pollution from the city of Rome. For this purpose, the isotopic signature ( $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$ ) of detritus-based benthic communities and fish was determined upstream and downstream of two wastewater treatment plants (WWTPs) located before and after the urban stretch of the river Tiber. Community-wide metrics as the carbon range and convex hull area encompassing all taxa in a  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  bi-plot were used to measure the species' niche width and overlap. Differences were found between the upstream and downstream signatures, regarding the  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  of both detritivores and predators. The differences were found to be more pronounced at the southern WWTP, located downstream of the city. The lower  $\delta^{15}\text{N}$  in macroinvertebrates at the WWTP-impacted sites reflected the lower  $\delta^{15}\text{N}$  of suspended particulate organic matter and was associated with higher inorganic and organic loads. The decreasing range of  $\delta^{13}\text{C}$  values in macroinvertebrates and fish indicated a narrowing of the niche width downstream of the treatment plants, particularly downstream of the urban area itself. The effects were stronger on detritivores than predators due to direct incorporation of the sewage-derived material that dominated the locally available food sources. These data suggest that isotopic signals coupled with community-wide metrics can be used as functional indicators of treated and untreated sewage impacts on aquatic communities even when the primary targets (species abundance and community structure) appear to be largely unaffected." (Authors) *Ischnura* sp. Is listed.] Address: Rossi, L., Dept Environmental Biol., Sapienza Univ. of Rome, via dei Sardi 70, 00185 Rome, Italy. E-mail: loreto.rossi@uniroma1.it

**15816.** Dijkstra, K.-D.B. (2013): Three new genera of damselflies (Odonata: Chlorocyphidae, Platycnemididae). *International Journal of Odonatology* 16(3): 269-274. (in English) ["The genera *Stenocypha* [type species: *Libellago gracilis*], *Matticnemis* [type species: *Platycnemis doi*] and *Spesbona* [type species: *Metacnemis angusta*], first recognized by molecular analysis, are diagnosed and discussed on morphological grounds." (Author)] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: dijkstra@nrm.nl

**15817.** Geipel, I.; Jung, K.; Kalko, E.K.V. (2013): Perception of silent and motionless prey on vegetation by echolocation in the gleaner bat *Micronycteris microtis*. *Proc. R.*

*Soc. B* 7 March 2013 vol. 280 no. 1754: 8 pp. (in English) ["Gleaning insectivorous bats that forage by using echolocation within dense forest vegetation face the sensorial challenge of acoustic masking effects. Active perception of silent and motionless prey in acoustically cluttered environments by echolocation alone has thus been regarded impossible. The gleaner insectivorous bat *M. microtis* however, forages in dense understory vegetation and preys on insects, including dragonflies, which rest silent and motionless on vegetation. From behavioural experiments, we show that *M. microtis* uses echolocation as the sole sensorial modality for successful prey perception within a complex acoustic environment. All individuals performed a stereotypical three-dimensional hovering flight in front of prey items, while continuously emitting short, multi-harmonic, broadband echolocation calls. We observed a high precision in target localization which suggests that *M. microtis* perceives a detailed acoustic image of the prey based on shape, surface structure and material. Our experiments provide, to our knowledge, the first evidence that a gleaner bat uses echolocation alone for successful detection, classification and precise localization of silent and motionless prey in acoustic clutter. Overall, we conclude that the three-dimensional hovering flight of *M. microtis* in combination with a frequent emission of short, high-frequency echolocation calls is the key for active prey perception in acoustically highly cluttered environments." (Authors)] Address: Geipel, Inga, Institute of Experimental Ecology, University of Ulm, Albert-Einstein-Allee 11, 89069 Ulm, Germany. E-mail: inga.geipel@uni-ulm.de

**15818.** González-Soriano, E.; Novelo-Gutiérrez, R. (2013): Biodiversidad de Odonata en México. *Revista Mexicana de Biodiversidad* 84: 243-251. (in Spanish, with English summary) ["An up to date chapter on the Odonata of Mexico is presented. Since the last update in 2006, 5 new species were described, 11 new records were added and 14 species have been described in their larval stage. Hence, the Mexican list presented here is constituted by a total of 355 species. Comments on endemism, endangered species and/or at risk are included." (Authors)] Address: González-Soriano, E., Inst. de Biol., Depto de Zoología, Univ. Nacional Autónoma de México, Apartado postal 70-153, 04510 México, D. F., México. E-mail: esoriano@ibiologia.unam.mx

**15819.** Harris, S.; Karlsson Green, K.; Pettersson, L.B. (2013): Predator faunas past and present: quantifying the influence of waterborne cues in divergent ecotypes of the isopod *Asellus aquaticus*. *Oecologia* 173(3): 791-799. (in English) ["Waterborne chemical cues are an important source of information for many aquatic organisms, in particular when assessing the current risk of predation. The ability to use chemical cues to detect and respond to potential predators before an actual encounter can improve prey chances of survival. We investigated predator recognition and the impact of chemical cues on predator avoidance in the freshwater isopod *Asellus aquaticus*. This isopod has recently colonised a novel habitat and diverged into two distinct ecotypes, which encounter different predator communities. Using laboratory-based choice experiments, we have quantified behavioural responses to chemical cues



from predators typical of the two predator communities (larval dragonflies in the ancestral habitat, perch in the newly colonised habitat) in wild-caught and lab-reared *Asellus* of the two ecotypes. Individuals with prior experience of predators showed strong predator avoidance to cues from both predator types. Both ecotypes showed similar antipredator responses, but sexes differed in terms of threat-sensitive responses with males avoiding areas containing predator cues to a larger extent than females. Overall, chemical cues from fish elicited stronger predator avoidance than cues from larval dragonflies. Our results indicate that in these isopods, prior exposure to predators is needed to develop antipredator behaviour based on waterborne cues. Furthermore, the results emphasise the need to analyse predator avoidance in relation to waterborne cues in a sex-specific context, because of potential differences between males and females in terms of vulnerability and life history strategies." (Authors)] Address: Karlsson Green, Kristina, Metapopulation Research Group, Dept of Biosciences, Univ. of Helsinki, P.O. Box 65, Helsinki, 00014, Finland. E-mail: kristina.karlsson@biol.lu.se

**15820.** Hellmund, M.; Hellmund, W. (2013): Fossile Kleinlibellen (Odonata, Zygoptera) und ihr endophytischer Fortpflanzungsmodus - Erfolgreiche Strategie seit mindestens 100 Millionen Jahren. *Entomologische Nachrichten und Berichte* 57(1/2): 31-44. (in German, with English summary) ["Fossil damselflies (Odonata, Zygoptera) and their endophytic reproductive behaviour -successful strategy since at least 100 Million years. - For 20 years, we have intensely researched the reproductive behaviour of fossil as well as contemporary damselflies (Zygoptera). Meanwhile we are able to distinguish and differentiate four different modes of ovipositing. To simplify and clarify communication, we created new descriptive labels, e. g. „Coenagrioniden-Typ“ („Zickzack-Modus“ and „Bogen-Modus“) respectively Lestiden-Typ („Einzelreihen-Modus“ and „Doppelreihen-Modus“), which are now fundamentally accepted and adopted by the current junior authors, searching in this field. Based on numerous Contemporary studies it became clear that the fossil egg-sets amazingly agree, both in size and morphology, with egg-sets of taxa belonging to the extant zygopteran families Coenagrionidae and Lestidae. The above-mentioned actualistic studies and observations are the key for understanding and interpreting the processes of the past Earth history, in particular in paleoethology. Zygoptera (damselflies) other than Anisoptera (dragonflies) practice a „balanced strategy“, by producing only a restricted number of eggs each of which is by the female carefully and thoroughly inserted into plant tissue (fresh leaves, leaf litter or small twigs). The egg is this individually protected while developing to a prolarva. This is called „endophytic ovipositioning“. In contrast, most Anisoptera produce a large number of eggs which are dropped freely into wet substratum like mosses or comparable plant material and onto pond water surfaces, practicing a mode of „opportunistic strategy“, despite the drawback that the majority of these eggs may not be able to develop successfully to a prolarva. The latter method is called „Freileger“ or random scattering of eggs." (Authors)] Address: Hellmund, M., Zentralmagazin Naturwissen. Sammlungen Martin-Luther-Univ. Halle-Wittenberg Kustos

Geiseltalmuseum/Geiseltalsammlung, Domplatz 4, 06108 Halle (Saale), Germany. E-Mail: meinolf.hellmund@zn-s.uni-halle.de

**15821.** Jezirorski, P. (2013): First record of *Sympecma gobica* (Odonata: Lestidae) from Iran. *Klapalckiana*, 49: 39-42. ["*Sympecma gobica* Förster, 1900 is recorded for the first time from Iran, collected from Khorasan Razni province. Details of the habitat are provided. All three species of the genus *Sympecma* are now known from Iran." (Author)] Address: Jezirorski, P., Na Belidle 1, CZ-735 64 Havířov-Suchá, Czech Republic. E-mail: jezirko@post.cz

**15822.** Keshari, S.; Kumari, J.; Prasad, M. (2013): Diversity, Distribution and Species composition of Odonates in Ranchi, Jharkhand. *Biospectra* 8(2): 71-76. (in English) ["Biodiversity protection and conservation is on national and international agenda and responsible for sustainable development of a region or a country. Therefore Odonates diversity in Ranchi District was observed during 2011-2012 and 33 species belonging to 8 families were recorded. Altogether randomly collected 24 dragonfly species were sampled and the number of damselflies species samples were 09. Libellulidae was the richest family with 18 species and sub- order Anisoptera. Different habitat types provide good opportunities to these wonderful groups to flourish and survive. Mostly Odonates were aggregated due to habitat specific nature and random distribution indicates availability of resource utilization to survive." (Authors)] Address: Keshari, S., Dept of Zoology, R.L.S.Y.College, Ranchi Univ., Ranchi, Jharkhand, India. E-mail: seemakeshari@gmail.com

**15823.** Khelifa, R.; Zebba, R.; Sakrane, N.E.; Youcefi, A.; Bensouilah, S.; Amari, H. (2013): Long-range movements of an endangered endemic damselfly *Calopteryx exul* Selys, 1853 (Calopterygidae: Odonata). *African Journal of Ecology* 52: 375-377. (in English) ["The study was carried out in Salah Salah (36°27'41.37"N 7°20'22.07"E located upstream Seybouse River (north-east Algeria). It is a 20-m width watercourse with a mean depth of 70 cm and bank vegetation consisted of dense *Typha angustifolia* and *Nerium oleander*. This part of the river was affected by human activities like water pumping and throwing tons of rocks and gravelly soil coming from nearby building constructions into the river bed. We conducted capture-mark-resightings on imagos during five days (20, 22, 25, 28 May and 01 June 2010) in the morning within a stretch of 200 m. The short sampling period was due to conflicts with local people. The current study stretch was isolated from other potential suitable ones by a distance of about 4 km. Adults were individually marked on the left and right wing, thorax and the abdomen using paint spots of different colours. SPSS 17.0 (SPSS Inc, Chicago, IL, USA) was used to perform Mann-Whitney U-test. The species flight period started in early May, and the first reproductive pair was observed on 25 May. A total of 141 imagos (64 males and 77 females) were marked, among which 33 (14 males and 19 females) were subsequently resighted giving a mean resighting rate of 23.40% (21.18% for males and 24.67% for females). All of the latter individuals were resighted only once. Almost all resighted individuals (94%) displayed movements of less than 50 m with a

mean of  $9.35 \pm 8.49$  m ( $9.35 \pm 8.49$  for males and  $9.56 \pm 10.20$  m for females). There was no significant difference in short-scale movements (<50 m) between males and females ( $U = 94.5$ ,  $P = 0.35$ ). However, 6% of resighted individuals carried out long-range movements. An individual male marked on 22 May was resighted two days after in a subpopulation 5.3 km downstream in a site where the species reproductive behaviour and biology were daily studied by our colleagues. Similarly, a female marked on 25 May noted dead during the next day in another subpopulation 4.9 km downstream" (Authors)] Address: Khelifa, R., Institute of Evolutionary Biology and Environmental Studies, University of Zürich, Winterthurerstr. 190, CH-8057, Zürich, Switzerland. E-mail: rassimkhelifa@gmail.com

**15824.** Kim, J.S.; Kwak, J.I.; Noh, T.H. (2013): Characteristics of Odonata communities based on habitat types of superb biotope in Wonju city, Korea. *Korea Journal of Environment and Ecology* 27(2): 209-218. (in Korean, with English summary) ["This study was conducted to analyze the characteristics of odonata communities as habitat types in Wonju City, Korea. The 33 plots were installed at 4 types of biotope like abandoned paddy fields, natural type reservoir, natural type river and forest valley in Wonju city. From the survey, the 9 family and 38 species were identified. As the result of comparative investigation of the species composition of each habitat through TWINSpan analyzing, the difference of species composition was definite in abandoned paddy field, natural type reservoir and forest valley, however, it was uncertain in natural type river. The dominant species and the subdominant species of each habitat were mainly *Sympetrum frequens* and *S. infuscatum* but the distributions of *Paracercion hieroglyphicum*, *Epophthalmia elegans*, and *Anax parthenope julius* were different as habitat types. The order of the index of species diversity was not different between abandoned paddy fields, natural type reservoir and natural type river, but forest valley was low. The abandoned paddy field was shown the most diverse spawning type of odonata, it is considered that hydrophytes play an important role in the abundant of odonata since the sorts of odonata spawning in plants are majority. As the result of analyzing interspecies relationship, *Crocothemis servilia mariannae* and *Orthetrum albistylum*, *C. servilia mariannae*-*Platycnemis phyllopora*, *Lyriothemis pachygastra*-*Sympetrum parvulum* are shown the positive correlation, however, they have a difference in preferred habitat between high correlation species." (Authors)] Address: Kwak, J.I., Urban Ecology Research Center, 124-22 Bang-i-dong, Songpa-gu, Seoul(138-830), Korea. E-mail: kkwark@uos.ac.kr

**15825.** Kubheka, S.P.; Rowe-Rowe, D.T.; Alletson, J.D.; Perrin, M.R. (2013): Possible influence of increased riparian activity (stream modification and agricultural intensification) on abundance of South African otters. *African Journal of Ecology* 51(2): 288-294. (in English) ["Otters are threatened by habitat loss and the pollution of their riverine habitat. Environmental impacts on top predators are often the first indication of habitat deterioration. It is rare for predator-prey-habitats to be monitored over long time intervals (decades), however necessary that may be. Here,

we report on the decline in otter relative abundance in a previously pristine habitat and speculate on its causes. We surveyed sign of coexisting otters (*Aonyx capensis* and *Lutra maculicollis*) along a river in Kamberg Nature Reserve in uKhahlamba Drakensberg Park, KwaZulu-Natal, South Africa. The area, Stillerust, lies downstream of a commercial dairy farm and a rural village-subsistence farming area. Data collected recently were compared with two previous surveys, carried out in 1972-1974 and 1993-1994, and were also compared with a pristine section of river in the nature reserve, upstream of the farming areas. At Stillerust, the number of spraint (scat) sites found, for each otter species, approximated only 25% of those recorded in the earlier studies. In the pristine section of the river, the amount of sign and abundance of otters were similar to those recorded in 1993. Assessments of stream biota and water quality analyses revealed negative changes in the river below the pristine area, down to, and including, Stillerust. Visible signs of pollution were evident. Since the 1970s, the rural village population has increased ca eight-fold, and the commercial farm has changed from an extensive livestock enterprise to an intensive dairy farm ... Amphibians (including *Rana* spp., and *Xenopus laevis*) and dragonflies (*Aeshna*, *Notogomphus*, *Paragomphus*, *Ceratogomphus*, *Anax*, *Orthetrum*, *Diplacodes*, *Crocothemis*, *Sympetrum*, *Trithemis*, *Pantala* spp.) larvae occur mainly in backwaters, oxbows, vleis ..." (Authors)] Address: Perrin, M.R., School of Biological & Conservation Sciences, Univ. KwaZulu-Natal, Scottsville, South Africa 297 Frances Staniland Rd, Pietermaritzburg, South Africa. E-mail: Perrin@UKZN.ac.za

**15826.** Li, J.-m.; Han, D.-m.; Fang, J.; Gu, C.-b. (2013): A study on fauna and diversity of Odonata in Yaoluoping Nature Reserve. *Journal of Biology* 30(5): 73-76. (in Chinese, with English summary) ["The Odonata in Yaoluoping Nature Reserve was investigated in 2010-2011. According to the collections, productions and identifications of the specimens, it was preliminarily confirmed that from 18941 specimens there were 12 families, 53 species of Odonata in Yaoluoping reserve in which there were 13 genus, 26 species of Libellulidae and *Pantala flavescens* was the most dominant species. The floristic analysis suggested Yaoluoping reserve is the transition zone between Palaearctic and oriental region. It was found that the distribution of Odonata was influenced by the water and characteristic of vegetations. The species numbers, dominance and evenness index decreased with the altitude." (Authors)] Address: Li, J.-m., School of Life Science, Anhui University, China

**15827.** Lou, Y.-G.; Zhang, G.-R.; Zhang, W.-Q.; Hu, Y.; Zhang, J. (2013): Biological control of rice insect pests in China. *Biological Control* 67(1): 8-20. (in English) ["Highlights: •Rice is one of the most important food crops in the world. •Damage by insect pests is a serious challenge to rice production in China. •Biological control is an effective method for pest control but not extensively adopted. •Integration of new strategies in biological control should be explored. Abstract: Rice is one of the most important food crops in the world. China has the second largest area of the rice growing in the world and the highest yield of rice

produced. Infestation by insect pests, especially rice planthoppers, stem borers and leaf folders, is always a serious challenge to rice production in China. Current methods for controlling insect pests in China mainly include good farming practices, biological control, breeding and growing resistant varieties, and the use of chemical insecticides. However, for farmers, the favorite method for insect pest control is still the application of chemical insecticide, which not only causes severe environmental pollution and the resurgence of herbivores but also reduces populations of the natural enemies of herbivores. To control insect pests safely, effectively and sustainably, strategies encouraging biological control are currently demanded. Here we review the progress that has been made in the development and implementation of biological controls for rice in China since the 1970s. Such progress includes the species identification of the natural enemies of rice insect pests, the characterization of their biology, and the integration of biological controls in integrated pest management. To develop effective ecological engineering programs whose aim is to implement conservation biological controls, further research, including the evaluation of the roles of plants in non-crop habitats in conservation biological controls, volatiles in enhancing efficiency of natural enemies and natural enemies in manipulating insect pests, and education to increase farmers' knowledge of biological controls, is proposed." (Authors) Address: Lou, Y.-G., State Key Laboratory of Rice Biology, Institute of Insect Science, Zhejiang University, Hangzhou 310058, China

**15828.** Md Rawi, C.S.; Al-Shami, S.A.; Madrus, M.R.; Ahmad, A.H. (2013): Biological and ecological diversity of aquatic macroinvertebrates in response to hydrological and physicochemical parameters in tropical forest streams of Gunung Tebu, Malaysia: implications for ecohydrological assessment. *Ecohydrology* 7(2): 496-507. (in English) ["In this study, we have investigated the effects of some hydrological and physicochemical parameters such as water quality, velocity, water depth, river width, water pH, water temperature, ammonia-N, biochemical oxygen demand (BOD), chemical oxygen demand (COD) and dissolved oxygen (DO) on diversity of aquatic macroinvertebrates in forest streams of Gunung Tebu (GT), Malaysia. The results of canonical correspondence analysis identified three groups of the aquatic macroinvertebrates according to their relationships with hydrological and physicochemical parameters. The stream velocity, water quality (i.e. DO, BOD and ammonia-N) in addition to canopy cover, total habitat score and substrate quality were the determinant factors controlling the diversity pattern of the aquatic macroinvertebrates in GT streams. Alteration in the hydrological and physicochemical parameters showed to influence the ecological diversity of the aquatic macroinvertebrates in GT streams. The predators were found to be highly associated with the elevated concentrations of BOD and COD. Shredders were positively correlated with pH, stream velocity, DO and habitat quality indicators (total habitat score, embeddedness, epifaunal and canopy cover). However, the collector-gatherers correlated negatively with all of these parameters. It was concluded that stream velocity, substrate structure and water quality were strong attributes for variation in aquatic macroinvertebrate

assemblage structure in tropical forest streams of GT." (Authors) Address: Salman Abdo Al-Shami, School of Biological Sciences, Universiti Sains Malaysia (USM), 11800 Penang, Malaysia. E-mail: alshami200@gmail.com; salshami@usm.my

**15829.** Meyer, M.D.; Davis, C.A.; Bidwell, J.R. (2013): Assessment of two methods for sampling invertebrates in shallow vegetated wetlands. *Wetlands* 33(6): 1063-1073. (in English) ["Invertebrates are often used as indicators of wetland health and habitat quality for species such as waterbirds. However, the sampling method may influence the characterization of wetland invertebrate populations. The objective of this study was to compare the effectiveness of two sampling methods, the aquatic D-frame net and Quadrat-Column-Core (QCC) method, in determining invertebrate population metrics in vegetated depressional wetlands of north central Oklahoma. As compared to the D-frame net, use of the QCC method resulted in higher estimates of both total microcrustacean and nonmicrocrustacean density and biomass. Additionally, the QCC method had higher estimates of density and biomass for seven of the eight functional feeding groups and nearly half of the 49 taxa collected from the wetlands. The D-frame net method produced higher estimates of taxa richness and the Shannon index as well as higher densities and biomasses than the QCC method for five taxa. Overall, invertebrate community structure was different between the two sampling methods. In light of differences in the metrics determined for the two sampling methods, the ultimate choice of a sampling method for wetland invertebrates should be based on study objectives." (Authors) Address: Davis, C.A., Dept of Natural Resource Ecology & Management, Oklahoma State Univ., 008C Agricultural Hall, Stillwater, OK, 74078, USA. E-mail: craig.a.davis@okstate.edu

**15830.** Morrill, A.; Mlynarek, J.J.; Forbes, M.R. (2013): Explaining covariation between endo- and ecto-parasites in spreadwing damselflies (Zygoptera: Lestidae). *Canadian Journal of Zoology* 91(10): 761-765. ["Host individuals and populations are commonly infected by more than one type of parasite, yet studies examining parasite effects on host fitness often limit observations or experiments to only a single parasite taxon or to a narrow subset of potential parasite taxa. Addressing covariation between parasite taxa is important for determining the potential for misattributing effects caused by one parasite species to another parasite species, and also for testing more broadly whether host attributes relate to exposure or susceptibility to infection. In this study, parasitism by ectoparasitic water mites (Arrenuridae) and endoparasitic gregarines (Eugregarinidae) of two spreadwing damselfly species, *Lestes disjunctus* Selys, 1862 and *Lestes forcipatus* Rambur, 1842, was measured and analyzed for covariance. No significant correlations between the intensities of the two types of infecting parasites were found when both live and resisted mites were considered. However, significant negative correlations between live mites and gregarines were consistently found in *L. forcipatus* host samples, but never in *L. disjunctus* samples. These results show some species-specific patterns of covariation between mite and gregarine infections in damselflies. We propose potential



underlying causes for this correlation related to parasite–host ecology and to changes in host behaviour resulting from water mite infection of *L. forcipatus*." (Authors)] Address: Morrill, A., Dept of Biol., Nesbitt Building, Carleton Univ., 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: andre\_morrill@carleton.ca

**15831.** Novelo-Gutiérrez, R.; Ramirez, A. (2013): First record of *Telebasis filiola* Perty (Odonata: Coenagrionidae) preying on small web-building spiders (Arachnida: Tetragnathidae). *International Journal of Odonatology* 16(4): 289-292. (in English) ["At a wetland in southeastern Mexico a female of *T. filiola* was observed and photographed preying on a small web-building spider of the genus *Leucauge*. This is the first record of gleaning by a representative of the genus *Telebasis*. A brief discussion on this subject in other odonates is provided." (Authors)] Address: Ramírez, A., Department of Environmental Sciences, University of Puerto Rico, Río Piedras campus. PO Box 190341, San Juan PR 00919, Puerto Rico

**15832.** Nurulain, B.S. (2013): Morphological variation of selected species in the genus *Orthetrum* (Odonata: Anisoptera) in Sarawak. B.Sc. thesis, Universiti Malaysia Sarawak: VII + ? pp ["Dragonflies are widely distributed in the tropical rainforests of the island of Borneo. Dragonflies can be differentiated morphologically at the species level. Study on the morphological variations of four selected species in the genus *Orthetrum* (i.e. *O. glaucum*, *O. testaceum*, *O. chrysis*, and *Orthetrum sabina*) from the suborder Anisoptera in Sarawak was conducted by using voucher specimens deposited in UNIMAS Zoological Museum, Sarawak Forestry Research Centre, and Sarawak Biodiversity Centre. This study was done to determine the morphological variations among dragonflies species based on morphometric characters and to identify the important characters that differentiate the individuals at the species level. A total number of 89 adult individuals were morphologically analysed with 15 morphometric measurements. Cluster Analysis (CA) and Discriminant Function Analysis (DFA) showed that *O. sabina* can be discriminated from *O. glaucum*, *O. testaceum*, and *O. chrysis* mainly based on four major diagnostic characters; length of abdomen, length of thorax, width of thorax, and length of tarsus (hind leg). However, none of the canonical coefficients estimated from the measured characters are suitable to distinguish *O. glaucum*, *O. testaceum*, and *O. chrysis* from each other. The knowledge from this morphometric analysis will assist researchers to choose the best characters to discriminate between the *Orthetrum* species for future research." (Author)] Address: not stated

**15833.** Obregón-Romero, R.; Cano-Villegas, F.J.; Tamajón-Gómez, R.; López Tirado, J. (2013): Primeras citas de *Trithemis kirbyi* Selys, 1891 (Odonata, Libellulidae) en las provincias de Ciudad Real y Huelva, y nuevas aportaciones para la provincia de Badajoz (España). *Boletín de la SAE* 22: 88-93. (in Spanish, with English summary) ["*T. kirbyi* is recorded for the first time, from Ciudad Real (first record from Castilla La Mancha) and Huelva (Andalusia). The presence in the province of Badajoz (Extremadura) is also confirmed. The increment of its distribution range to inland and

the Atlantic coast is shown with this new data." (Authors)] Address: Obregón-Romero, R., Dpto. Botánica, Ecología y Fisiología Vegetal. Área de Ecología. Campus de Rabanales. Universidad de Córdoba, Spain. E-mail: rafaobregonr@gmail.com

**15834.** Oliveira, E.; Takeuchi, S.S.; Cerutti, V.E. (2013): Assembly of Odonata (Insecta) Larvae in limnic environments in the Parque Estadual de Vila Velha, Brazil. *Estud. Biol.* 35(85): 163-176. (in Portuguese, with English summary) ["To analyze the composition, distribution and ecological indices for the assembly of Odonata larvae in 15 sampling points (six lentic and nine lotic) Parque Estadual de Vila Velha, were executed four sampling programs. At the end of each season, between March and December/2011. At each point five samples were extracted, each one obtained at an interval of 15 minutes using sieve (diameter 25 cm, mesh opening of 0,2 mm). A total of 3.061 larvae were collected, these 2.419 recorded in lentic systems and 642 in lotic. Lentic systems in the largest absolute (538) occurs in the Baixo do Coqueiro. In lotic systems (166) occur in Rio Guabirola. Among the seven families registered Coenagrionidae – 40.48% Te Libellulidae – 39.36% are the most abundant and Megapodagrionidae – 0.52%, the smallest representation. Of the 21 genera occurred: *Acanthagrion*, *Aeshna*, *Hetaerina*, *Lestes*, *Macrothemis* and *Telebasis* represent about 88%. The genus richness was close: lentic (10) and lotic (9). The greatest of richness Margalef (17.4) occurs in Rio Guabirola, higher values of Shannon diversity (0.83) occur in rivers Barrozinho and Quebra Perna. The Berger Parker dominance was attended by *Hetaerina* Rio Barrozinho and evenness was more pronounced in Rio Guabirola. The estimator Jackknife 2nd order indicated maximum value (23.4) for genera. The results reflect the importance of this conservation unit with respect to the maintenance of wetlands preserved for biodiversity of this assembly of larvae." (Authors)] Address: Oliveira, Edinalva, Núcleo de Ciências Biológicas e da Saúde da Universidade Positivo (UP), Curitiba, PR - Brasil. E-mail: edinaoli@yahoo.com.br

**15835.** Patten, M.A.; Smith-Patten, B.D. (2013): Odonata species of special concern for Oklahoma, USA. *International Journal of Odonatology* 16(4): 327-350. (in English) ["Assessment of conservation status is a necessary step before management plans can be formulated. Historically such assessments have a strong bias toward vertebrates, particularly endothermic terrestrial vertebrates (i.e. birds and mammals). Invertebrates, by contrast, tend to be ignored, and many insect groups, despite being species rich and reasonably well studied, such as the Odonata (damselflies and dragonflies), have not been assessed or have been assessed only at a broad geographic level (e.g. internationally or continentally). Assessment at a state level recognizes that states often are at the front of regional and local conservation and management planning and implementation. On the basis of our extensive surveys across the Great Plains state of Oklahoma in the central USA, as well as our compilation of thousands of museum specimens dating back to 1877, we were able to discern the status and distribution of each of the 161 species of odonates recorded in the state. In doing so we were able to assess a conservation rank, using

NatureServe criteria, for each species. We conclude that nine species are critically imperiled (S1) in the state. These species require immediate conservation attention, initially at the level of intensive surveys to delineate the full extent of the geographic range in the state and to determine the population size and habitat needs. We categorized an additional 13 species as imperiled (S2) and placed 18 species on a "watch list" (S3). Species on these two lists will require field surveys as well, and regions of high occurrence of listed species ought to be targeted for such efforts and considered as set-asides for preservation of key members of the odonate fauna in the state." (Authors)] Address: Patten, M.A., Oklahoma Biol. Survey & Depart. of Biology, Univ. of Oklahoma, Norman, Oklahoma 73019, USA

**15836.** Petzold, F. (2013): Zwei Einzelfunde der Kleinen Zangenlibelle (*Onychogomphus forcipatus*) im Landkreis Hildburghausen (Insecta: Odonata). Mitteilungen des Thüringer Entomologenverbandes 20(2): 42-45. (in German) [29.06. 2012, Speicher Roth II east of Römhild / Waldhaus (Lkrs. Hildburghausen; MTBO 5529,4 and 08.08.2013 near Bürden in Hildburghäuser Wald.] Address: Petzold, F., Lutherstr. 130, 07743 Jena, Germany. E-mail: falk\_petzold@web.de

**15837.** Polo-Cavia, N.; Gomez-Mestre, I. (2013): Learned recognition of introduced predators determines survival of tadpole prey. *Functional Ecology* 28(2): 432-439. ["Alien predators are one of the major causes for rapid decline and extinction of native species, because they often create novel ecological contexts in which the antipredatory responses of native organisms are no longer fit. Although larval amphibians are often capable of innately responding to chemical cues from local predators through changes in morphology and behaviour, naïve tadpoles generally cannot recognise introduced predators with which they have not shared an evolutionary past. However, in a few documented cases, aquatic organisms have been observed to alter morphology or behaviour in response to alien predators. Such a response may have evolved as adaptive recognition, increasing their repertoire of innate responses to include the novel predator, or may have evolved as the prey's ability to learn new threats by association with conspecific alarm cues. The red swamp crayfish, *Procambarus clarkii*, is a harmful invasive species in aquatic systems worldwide, causing great ecological impact on native amphibian populations during the last decades through intense predation of eggs and tadpoles. We demonstrate that naïve tadpoles of the western spadefoot toad, *Pelobates cultripes*, are not capable of innately recognising waterborne predator cues from the red swamp crayfish. Nevertheless, we demonstrate that *P. cultripes* tadpoles can learn to recognise the cues of the invasive predatory crayfish as a threat when they are exposed to predator cues combined with conspecific alarm cues. Finally, we show that tadpoles conditioned by joint exposure to crayfish and alarm cues enjoy higher survival during predation trials with invasive crayfish. Learning to recognise a newly introduced predator through association with conspecific alarm cues may allow successful generalisation of antipredatory responses by tadpoles. This cognitive ability of tadpoles may contrib-

ute to reduce their vulnerability to alien predators and soothe the impact of invasions in natural populations ... either an invasive predator (*P. clarkii*) or a native one (nymphs of *Anax imperator*). ... We also dip-netted ten dragonfly nymphs (*A. imperator*), and used fyke-nets to ..." (Authors)] Address: Polo-Cavia, Nuria, Dept of Biology, Univ. Autónoma de Madrid, 28049 Madrid, Spain,

**15838.** Rueda, J.; Mesquita-Joanes, F.; Valentín, A.; Dies, B. (2013): Inventario de los macroinvertebrados acuáticos del "Ullal de Baldoví" (Sueca, Valencia, España) tras un programa de restauración. Check-list of the aquatic macroinvertebrates of "Ullal de Baldoví" spring pond (Sueca, Valencia, Spain) after a restoration program. *Bol. R. Soc. Esp. Hist. Nat. Sec. Biol.*, 107: 57-65. (in Spanish, with English summary) [The water body Ullal de Baldoví (Sueca, Valencia) is a priority habitat (Calcareous fens with *Cladium mariscus*, code 7210 of EU priority habitats) system located inside the Albufera Natural Park, composed of reduced surface but deep ponds, associated with subterranean springs. Its progressive reduction and degradation forced the regional government (Consellería de Infraestructuras, Territorio y Medio Ambiente) and the local council of the city of Sueca to start a restoration action that lasted until 2008. This restoration plan was concluded in the framework of a LIFE-Nature development project, "Recovering of a priority habitat in the Albufera Natural Park", known as "Proyecto Ullals" ("Spring pond project"). In the present study we provide a list of the aquatic invertebrates collected in Ullal de Baldoví (Sueca, Valencia) during 2007. This is an emblematic spring system with oligohaline waters, located inside the l'Albufera Natural Park. In total, 81 taxa were found distributed in 6 phyla, 24 orders and 57 families. These results were obtained from six sampling stations accounting for different environments in the Ullal, including a restored area. Three endemisms were found: *Melanopsis tricarinata* (Bruguière, 1789), an species endemic to the Iberian Peninsula, plus *Dugastella valentina* (Ferrer Galdiano, 1924) and *Palaemonetes zariquieyi* Sollaud, 1939 both with even more restricted distributions in the Valencian region. *Leptocheirus pilosus* Zaddach, 1844, an amphipod species belonging to the family Aoridae is reported for the first time in the region. Fifteen taxa belong to the class Ostracoda, two of which are considered invasive alien species (IAS): *Fabaeformiscandona subacuta* (Yang, 1982) and *Stenocypris major* (Baird, 1859). In the study carried out by Poquet et al. (2008) on the ostracods of shallow lakes in the Valencian Community, 6 species were found in the Ullal de Baldoví system during 2000. In comparison, just one of them, *Candonopsis scourfieldi* Brady, 1910, was not collected during the present survey. The limnological results indicate low variability in conductivity, salinity, chlorides and alkalinity in the Ullal (Tab. I). The recent restored part of the system has allowed the colonization of several new taxa into Ullal de Baldoví. When aiming at estimating the maximum biodiversity of an ecosystem, it is essential to carefully select a wide array of habitat types to be sampled, in order to maximize the expected number of taxa. In comparison to a previous survey carried out in 2000 (Sahuquillo et al., 2007) in the same system, the present survey is remarkable with regards to the notably higher number of taxa collected in the Ullal de Baldoví wa-

ter body. The importance of seasonal sampling campaigns is made clear to thoroughly characterise epicontinental aquatic systems, even when studying such a stable water body. Indeed, a monthly monitoring survey for one year would most probably uncover a higher faunistic richness of the system and would maximise its environmental value, a reason to remark the necessity for a preservation of this environment for the future generations." (Authors)] Address: Rueda, J., Dept de Microbiologia i Ecologia, Universitat de València. Dr. Moliner, 50. 46100 Burjassot, Valencia, Spain. E-mail: [juan.rueda@uv.es](mailto:juan.rueda@uv.es)

**15839.** Simon, S.; Hadrys, H. (2013): A comparative analysis of complete mitochondrial genomes among Hexapoda. *Molecular Phylogenetics and Evolution* 69(2): 393-403. (in English) ["With respect to bauplan radiation, species and taxa richness, hexapods have an unassailable lead. But still, the phylogenetic relationships among the orders and infraorders remain a matter of discussion. The rapidly increasing mitochondrial genome sequences from diverse insect species provide the opportunity to explore miscellaneous evolutionary questions in the superclass Hexapoda. A combined primary sequence analyses of the complete available data set has not yet been performed. Until now phylogenetic analyses of subsets of selected taxa resulted to strong supported topologies showing in some instances discrepancies between morphological and nuclear data. This circumstance started the discussion about the limits of complete mitochondrial genomes for inferring deep hexapod relationships. By using the hitherto densest taxon sampling of Hexapoda our analyses resulted in discrepancies to the current phylogenetic hypotheses based on morphological and nuclear data, e.g. monophyly of hexapods and some hexapods orders, e.g. Diptera, Hemiptera and Orthoptera. Nonetheless, compared to previously published studies that strongly support systematically erroneous groups using a sparse taxon sampling, our analyses had no support for these discrepancies. Consequently, we highly recommend interpreting mt-genome based phylogenies with reduced datasets particularly for hexapods with cautions although the inferred relationships are highly supported." (Authors)] Address: Hadrys, Heike, ITZ, Ecology & Evolution, TiHo Hannover, Bünteweg 17d, 30559, Hannover, Germany. E-mail: [heike.hadrys@ecolevol.de](mailto:heike.hadrys@ecolevol.de)

**15840.** Torralba Burrial, A.; Nores Quesada, C.I.; Armendariz, C. (2013): Evaluando la situación de la libélula amenazada *Oxygastra curtisii* (Odonata: Corduliidae) en Navarra (N Península Ibérica). *Biodiversidad florística vegetación Tamega IV Congreso de Biodiversidad: Pósters*: 190. (in Spanish) [Verbatim: About 23% of Iberian dragonflies are regionally threatened in Spain according to the Atlas and Red Book of Threatened Invertebrates in Spain. One of the few dragonflies that, in addition to being threatened, is included in the Habitats Directive and the Spanish Catalogue of Threatened Species is *Oxygastra curtisii*. Generally associated with rivers with backwater areas and alder groves (although it can be found in certain reservoirs and ponds), it has a fragmented distribution in the Iberian Peninsula. It has recently been found in Navarre, far from its main Iberian population centres. In this work, funded by the Government of Navarra through the

public company GANASA, we analyse the biodiversity of the fluvial communities of odonates in the Navarran part of the Bidasoa River, especially the distribution of *O. curtisii*. During the summer of 2012, three sampling campaigns were carried out, covering 20 stretches (about 200 m long), selected according to vegetation and hydromorphological criteria, in order to be able to extrapolate the situation of their populations to the entire Navarrese part of the river. The samplings also recorded the adult odonates found, but given the influence of the meteorological conditions on their detection, the exuviae samplings (almost 1,700 specimens identified) allowed a more accurate evaluation of the odonate communities. These consisted of *Onychogomphus uncatatus*, *O. forcipatus*, *Cordulegaster boltonii*, *Boyeria irene* and *O. curtisii*, for which quantitative data on population size and sex ratio were obtained, and ten other species, mostly Zygoptera, for which only qualitative or adult-based data could be obtained. *O. curtisii* maintains high populations in numerous stretches of the Bidasoa River, having identified the characteristics of the most favourable habitats for the species and those in which it is lacking. Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)

**15841.** Tschiedel, K. (2013): Bericht zum Tag der Artenvielfalt in der Muskauer Heide am 15. Juli 2012, Truppenübungsplatz Oberlausitz. *Berichte der Naturforschenden Gesellschaft der Oberlausitz* 21: 201-221. (in German) [Report about the „Day of Species Diversity“, July 15th 2012 in the army training area “Oberlausitz” on the Muskauer Heide. 7 odonate species, including *Lestes dryas* and *Sympetrum danae*, have been recorded.] Address: Tschiedel, Kerstin, Zum Silberberg 10, 02906 Hohendubrau, Germany. E-mail: [kerstin@tschiedel.net](mailto:kerstin@tschiedel.net)

**15842.** Wesner, J.S. (2013): Fish predation alters benthic, but not emerging, insects across whole pools of an intermittent stream. *Freshwater Science* 32(2): 438-449. (in English) ["Predation effects in streams can cascade to terrestrial food webs through the flux of organisms that develop in the stream and emerge as adults to the terrestrial system. This emergence subsidizes some terrestrial predators, an effect that generally varies based on the magnitude of the subsidy. Factors regulating this magnitude are relatively well known, but factors regulating the trophic structure of the subsidy are not. I tested the hypothesis that predatory fish in natural stream pools alter the biomass and trophic structure (proportion of predatory adults) of emerging aquatic insects. I created a 13× gradient of predatory fish biomass (4 species of *Lepomis* sunfish and the minnow *Notropis boops*; within the range of natural variation) across 10 pools in Brier Creek, Oklahoma (USA). Pool area and substrate composition varied naturally, so I also measured their effect on insects. At the end of the experiment after the stream became intermittent, fish reduced benthic insect biomass but not emergence to the terrestrial habitat. The proportion of predatory insects emerging from pools was positively associated with pool area, but was unaffected by fish density. The best predictor of emergence biomass among pools on any date was the standing crop of benthic insects before fish manipulation, a result suggesting a time lag between measured benthic



standing crop in the stream and subsequent emergence. Fish manipulations occurred during the end of peak summer insect emergence, which may have limited my ability to detect fish effects on emergence. My study demonstrates that variation in the timing of predation may constrain the spatial scale of fish effects in aquatic and terrestrial food webs and suggests that pool size can influence the trophic structure of emerging aquatic insects." (Author)] Address: Wesner, J.S., Dept of Fish, Wildlife, & Conservation Biology, Colorado State University, Fort Collins, Colorado 80523 USA. E-mail: jeffwesner@gmail.com

**15843.** Yu, J.; Wang, T.; Han, S.; Wang, P.; Zhang, Q.; Jiang, G. (2013): Distribution of polychlorinated biphenyls in an urban riparian zone affected by wastewater treatment plant effluent and the transfer to terrestrial compartment by invertebrates. *Science of The Total Environment* 463–464: 252–257. (in English) ["Highlights: •The distribution of PCBs in an urban riparian zone around a wastewater effluent affected river was investigated. •Relatively high abundances of PCB-11 and PCB-28 were found for most samples. •Mid-chlorinated congeners (PCB-153 and PCB-138) were more accumulated in chironomids and dragonflies as well as soil dwelling invertebrates. •Emerging invertebrates can carry waterborne PCBs to the terrestrial compartment. •The estimated annual flux of PCBs from emerging chironomids ranged from 0.66 to 265 ng m<sup>-2</sup> y<sup>-1</sup>. Abstract: In this study, we investigated the distribution of polychlorinated biphenyls (PCBs) in a riparian zone affected by the effluent from a wastewater treatment plant (WWTP). River water, sediment, aquatic invertebrates and samples from the surrounding terrestrial compartment such as soil, reed plants and several land based invertebrates were collected. A relatively narrow range of d13C values was found among most invertebrates (except butterflies, grasshoppers), indicating a similar energy source. The highest concentration of total PCBs was observed in zooplankton (151.1 ng/g lipid weight), and soil dwelling invertebrates showed higher concentrations than phytophagous insects at the riparian zone. The endobenthic oligochaete *Tubifex tubifex* (54.28 ng/g lw) might be a useful bioindicator of WWTP derived PCBs contamination. High bioaccumulation factors (BAFs) were observed in collected aquatic invertebrates, although the biota-sediment/soil accumulation factors (BSAF) remained relatively low. Emerging aquatic insects such as chironomids could carry waterborne PCBs to the terrestrial compartment via their lifecycles. The estimated annual flux of PCBs for chironomids ranged from 0.66 to 265 ng-m<sup>-2</sup> y<sup>-1</sup>. Although a high prevalence of PCB-11 and PCB-28 was found for most aquatic based samples in this riparian zone, the mid-chlorinated congeners (e.g. PCB-153 and PCB-138) became predominant among chironomids and dragonflies as well as soil dwelling invertebrates, which might suggest a selective biodriven transfer of different PCB congeners." (Authors)] Address: Wang, P., State Key Lab. Environ. Chemistry & Ecotoxicology, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing, 100085, China. E-mail: bswang@rcees.ac.cn

**15844.** Aubin, G.; Gaillard, E. (2014): Première preuve de l'autochtonie de *Macromia splendens* dans le bassin de l'Eyrieux (Ardèche) (Odonata: Macromiidae). *Martinia* 30(1): 29-34. (in French, with English summary) ["First evidence of the autochtony of *Macromia splendens* in the basin of the River Eyrieux (Ardèche department) (Odonata: Macromiidae). Summary: Four exuviae of *M. splendens* have been discovered in the Eyrieux River. These data allow spreading the distribution of this species about 35km northward, making the corresponding population the northernmost of the Rhone basin. This observation, which was realized within the framework of the Natura 2000 site FR8201658 "Vallée de l'Eyrieux et ses affluents" inventory, reinforces the interest of this singular area." (Authors)] Address: Aubin, G., Naturalia Environnement, site Agroparc, Le Moitessier, rue Lawrence Durrell, F-840911 Avignon, France. E-mail: g.aubin@naturalia-environnement.fr

**15845.** Battisti, A. (2014): Nuove segnalazioni di *Sympecma paedisca* (Brauer, 1882) (Odonata, Zygoptera) nel S.I.C. "Baraggia di Candelo - IT1130003" Biella (BI). *Rivista Piemontese di Storia Naturale* 35: 93-98. (in Italian, with English summary) ["*S. paedisca* is reported for the first time for the S.C.I. - Baraggia di Candelo, Biella, Italy. In this paper the results of the surveys made in the years 2009, 2010, 2011 and 2012 for this species and for *S. fusca* are reported." (Author)] Address: Battisti, A., Fraz. Feilley 101, Saint Vincent, 11027, Aosta, Italy. E-mail: andre.battisti@gmail.com

**15846.** Berquier, C.; Dommanget, J.-L.; Orsini, A.; Andrei-Ruiz, M.-C. (2014): Complément à l'atlas des odonates de Corse: *Ischnura pumilio* et *Aeshna mixta*, deux espèces à la phénologie particulière (Odonata: Coenagrionidae, Aeshnidae). *Martinia* 30(1): 35-39. (in French, with English summary) ["Thanks to the last surveys realized in the frame of the Regional action plan for Odonata which is implemented by the Corsican environmental office (OEC), the knowledge about the regional distribution, ecology and phenology of the Corsican dragonflies has been greatly improved. Several species which were for a long time considered as rare are in reality more common. They however show a shifted phenology which makes them easy to be missed by most of the observers. This is especially the case for *I. pumilio* and *A. mixta*." (Authors)] Address: Berquier, C., Office de l'Environnement de la Corse – Observatoire Conservatoire des Insectes de Corse, F-20250 Corte, France. E-mail: berquier@oec.fr

**15847.** Cássia da Cunha, R.; Fulan, J.A.; Santos, L.R. (2014): Influência das características físicas e químicas da água na distribuição espacial de larvas de Odonata associadas à *Eichhornia crassipes* (Mart.) Solms no Rio Uruapiara, afluente do Rio Madeira/AM - Influence of physical and chemical characteristics of water on spatial distribution of Odonata larvae associated with *Eichhornia crassipes* (Mart.) Solms in Uruapiara River, Madeira Basin, State of Amazonas, Brazil. *Estud Biol.* 36(86): 36-42. (in Portuguese, with English summary) ["The objective of this study was to identify the odonates associated with *Eichhornia crassipes* (Mart.) Solms, as well as investigate the main environmental variables that affect its spatial distribution in Uruapi-

ara River, Amazonas, Brazil. The macrophytes were sampled in a hollow square with total area of 0.120m<sup>2</sup>. The removal of the larvae was performed with washing plant with carbonated water. We evaluated the following variables: temperatures of the air and water, dissolved oxygen, pH, turbidity, total phosphorus and total nitrogen. We identified total of 73 larvae distributed in the families Libellulidae (64) and Coenagrionidae (9). Libellulidae was represented by *Erythemis*, *Micrathyrina*, *Tauriphila* and *Nepheletia* and Coenagrionidae by *Acanthagrion* and *Oxyagrion*. A canonical correspondence analysis (CCA) showed that *Tauriphila* and Coenagrionidae were positively affected by the concentration of dissolved oxygen. *Nepheletia* and *Oxyagrion* were negatively affected by increasing the dissolved oxygen. The study revealed that dissolved oxygen was the most significant factor in the distribution of larvae of Odonata in Uruapiara River." Address: Cássia da Cunha, Rita, Especialista em Biologia da Conservação, Univde Federal do Amazonas (UFAM), Manaus, AM - Brasil. E-mail: cassiafloresta@hotmail.com

**15848.** Chovanec, A. (2014): *Coenagrion ornatum* (Selys, 1850) und *Ophiogomphus cecilia* (Fourcroy, 1785) (Insecta: Odonata) – Nachweis von zwei FFH-Arten an der Zaya (Niederösterreich). *Beiträge zur Entomofaunistik* 14: 1-11. (in German, with English summary) ["*Coenagrion ornatum* and *Ophiogomphus cecilia*, dragonflies listed in the Habitats Directive, were recorded at the river Zaya, a lowland river in the north-eastern Lower Austria. The two species occurred in a regulated stretch, characterised by low flow velocity and heterogeneous riparian structures. The results of the investigation of a restructured stretch situated upstream are also presented." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: a.chovanec@kabsi.at

**15849.** Clarke, D. (2014): The White-faced Darter (*Leucorrhinia dubia* Vander Linden) re-introduction project in Cumbria. *Journal of the British Dragonfly Society* 30(2): 54-78. (in English) ["*L. dubia* is a small dragonfly especially associated with bog-pools in peatlands. In England, there are only three areas (including one in Cumbria) where it has strong populations, most of its former sites having been lost due to habitat changes, mainly human-induced. A project in Cumbria aims to restore a population that once existed and was lost through afforestation in the mid 20th century. Approved by landowners and conservation bodies in 2008, an annual programme based on IUCN guidelines has been implemented from 2010 onwards to restore a colony at Cumbria Wildlife Trust's Foulshaw Moss Reserve near Morecambe Bay. The donor population, Scaleby Moss, is in north Cumbria. Translocation of larvae has been the main methodology, though experimentation with obtaining eggs began in 2013. Monitoring the populations at both sites, mainly by collecting exuviae at the breeding pools, has been the main measure for ensuring that the population at Scaleby Moss has not been adversely affected and for judging the efficacy of the translocations to Foulshaw Moss. Early years of the project were marred by poor summers but good numbers emerged at Foulshaw Moss in both 2013 and 2014, with clear evidence of on-site breeding. However, it is too soon to say

whether a sustainable colony has been established. The genetic diversity of the new population has yet to be assessed and a current University-based research study on the genetics of the species in the UK may prove helpful in this regard. The long-term management of the donor site remains a concern and reinforces the need for the current project, which will continue for several more seasons. A parallel re-introduction project in Cheshire commenced translocations in 2013." (Author)] Address: Clarke, D., Burnfoot, Cumwhitton, Brampton, Cumbria CA8 9EX, UK

**15850.** Compte-Sart, A., (2014): Nueva especie del género *Lestes* Leach, 1815 (Insecta, Odonata) del Mioceno de Bellver de Cerdanya (Lérida). *Graellsia* 70(1): e001. <http://dx.doi.org/10.3989/graeellsia.2014.v70.097>: 10 pp. (in Spanish, with English summary) ["A new fossil species of insect, *Lestes dianacomptea*, n. sp. of the order Odonata, belonging to the genus *Lestes* Leach, 1815, is described based on wing from the Vallesian (Miocene), of Coll de Saig, in Bellver de Cerdanya (Lérida, Spain). It is compared with all fossil species of the genus and with the nearest extant species, from the Palearctic and Ethiopian regions." (Author)] Address: Compte-Sart, A., Museo Nacional de Ciencias Naturales. Departamento de Biodiversidad y Biología Evolutiva. Madrid, Spain.

**15851.** Curk, F.; Alcocer, A.; Bischooping, I. (2014): Primera cita de la libélula *Aeshna juncea* (Linnaeus, 1758) (Odonata: Aeshnidae) en la provincia de Teruel (España oriental). *Boletín de la Sociedad Entomológica Aragonesa* 55: 246. (in Spanish, with English summary) [An adult male of *A. juncea* was photographed at Toba dam, Orihuela del Tremedal (Teruel), 13-IX-2013.] Address: Curk, F., Lieu dit San Giustu 20215 Vescovato, Corsica, France. E-mail: franckoundara.curk@laposte.net

**15852.** Delphon, G.; Costes, A.; Alquières, D.; Haber, E.; Polisset, P.; Pelozuelo, L. (2014): Nouvelles observations de *Macromia splendens* en région Midi-Pyrénées (Odonata: Macromiidae). *Martinia* 30(2): 47-58. (in French, with English summary) ["*M. splendens* is an iconic dragonfly species of the European fauna. Endemic to South-West of the continent and recognized as vulnerable in its range, it is one of the species taken into account by the French national action plan for Odonata. In the Midi-Pyrénées administrative region (South-Western France), this species was known to reproduce on several rivers: Tarn, Aveyron, Lot and Célé. To improve knowledge of the geographical distribution of this species, targeted surveys were conducted by the Office pour les insectes et leur environnement de Midi-Pyrénées (Opie-MP) in 2012 and 2013, in partnership with the Ligue pour la protection des oiseaux du Tarn (LPO81). 140 exuviae and at least 15 adults were observed during these two years, which demonstrates the presence of the species on several portions of the Lot and Célé rivers and on a significant part of the Aveyron River and its main tributary, the Viaur. The species was found in its classical substitution habitats (dams, including those linked to old mills), but also in a surprising anthropogenic habitat (fishing pond). However, *M. splendens* could not be found on the Tarn River, between Saint-Rome-de-Tarn and Ambialet, where it was known until 2009." (Author)] Address: Delphon,

Gaël, 17 route de Foix, F-09400 Amplaing, France. E-mail: gael.delpon@yahoo.fr

**15853.** Delpon, G.; Belenguier, L.; Krieg-Jacquier, R., Boeglin, Y.; Blanc, C. (2014): Comportement adaptatif de *Leucorrhinia pectoralis* lors de l'émergence en conditions de hautes eaux: conséquences pour la gestion conservatoire des populations (Odonata: Libellulidae). *Martinia* 30(1): 1-6. (in French, with English summary) ["Some surveys were conducted on the 9 June 2013 in the forest pond of Pizay (Ain department, France), looking for *L. pectoralis*. They led to the observation of unusual emergence conditions for this species, as exuviae were found in shaded riparian woods, on willow branches and trunks emerging from flooded areas up to more than 2 m high above the water level. These observations are detailed and connected with the particular weather conditions of this year." (Authors)] Address: Delpon, G., 17 route de Foix 09400 Amplaing, France. E-mail: gael.delpon@yahoo.fr

**15854.** Döler, H.-P.; Ehret, S. (2014): Zur Verbreitung der Speer-Azurjungfer (*Coenagrion hastulatum*) auf der östlichen Schwäbischen Alb (Odonata: Coenagrionidae). *Mercuriale* 14: 13-26. (in German, with English summary) ["In contrast to the negative population trend on the national scale records of *C. hastulatum* on the Eastern Swabian Alb (Germany) have increased since 1986. In the investigation area, in 27 sites records of *C. hastulatum* have currently been confirmed (evidence 2010 to 2014). The standing waters in this area are so-called Hülben (pools of anthropogenic origin) and smaller ponds. Most have an acidic and dystrophic character on account of the specific soil conditions (decalcified loam). The accompanying odonate fauna shows 31 species. Among them are 9 species, which are on the Red List of Baden-Württemberg. The significant increase of records of *C. hastulatum* at waters that are monitored since 1986 suggests a possible link between this trend and both the creation of new small ponds (regionally specific waters called 'Hülben') and periodic maintenance measures for existing waters already begun in the early 1980s and still continued so far. In addition, it is very likely that the increase in search intensity since 2010 has contributed to this positive result." (Authors)] Address: Ehret, S., Seligerstr. 45, 89537 Giengen/ Brenz, Germany. E-mail: Sven-ehret@web.de

**15855.** Dorji, T.; Thinley, K.; Jamstsho, S. (2014): Macroinvertebrate diversity in Threlpang and Kawajangsa freshwater streams in Bhutan. *BeBIO* 5(1): 1-5. ["... Despite the importance of freshwater biodiversity and macroinvertebrates as natural resources, the conservation threat assessment for macroinvertebrate in particular is limited throughout the world, and its study is at early stage in Bhutan. The current study describes the macroinvertebrate composition and diversity in two freshwater streams, viz., Threlpang and Kawajangsa streams located respectively in Trongsa and Thimphu districts of Bhutan. Macroinvertebrates were sampled in December 2011 (Threlpang) and 2012 (Kawajangsa) at two sampling reaches, upper less impaired and lower more impaired by human activities in both the streams. The study revealed total of 9 taxa within the study streams with 8 in Threlpang and 7 in Kawajangsa stream. Threlpang stream was dominated by Ephemero-

ptera (22.1%, n=19), followed by Plecoptera (20.9%, n=18), while Kawajangsa stream was dominated by Trichoptera (57.8%, n=122) followed by Diptera (15.6%, n=33). In both the streams macroinvertebrate composition changed from that of more pollution sensitive taxa in upper reaches to that of less pollution sensitive taxa in lower reaches." (Authors)] Address: E-mail: tdorji1.cnr@rub.edu.bt

**15856.** Eslami, Z.; Pashaei Rad, S.; Dumont, H.J. (2014): *Sympetrum flaveolum* (Odonata: Libellulidae) a new species record for Iran. *Journal of Entomological Society of Iran* 34(2): 71-74. (in English, with Persian summary) [1 ♀, Iran: Isfahan province, Chadegan suburb, 18.vii.2012, N 50°30' E 32°53', irrigation reservoir with poor vegetation.] Address: Eslami, Zohre, Dept Zool., Faculty Biol. Science, Shahid Beheshti Univ., Tehran, Iran. E-mail: eslmi.zohre86@yahoo.com

**15857.** Evangelio Pinach, J.M.; Díaz Martínez, C.; Sendra Pérez, I. (2014): Contribución al conocimiento de la odonofauna (Odonata) en la serranía baja, el complejo lagunar de Ballesteros y el río Moscas (serranía media) de Cuenca (este de España). *Boletín de la Sociedad Entomológica Aragonesa* 55: 169-184. (in Spanish, with English summary) ["This work reports on the distribution of dragonflies in Cuenca (eastern Spain), specifically in the Serranía baja and in the lagoon complex of Ballesteros and river Moscas (Serranía media). We provide information for 45 species. Eight have been found for the first time in this area: *Lestes virens*, *Coenagrion puella*, *Ischnura elegans*, *Ceragrion tenellum*, *Aeshna mixta*, *Gomphus graslinii*, *Crocothemis erythraea* and *Sympetrum sanguineum*. Four species (*Lestes viridis*, *Gomphus simillimus*, *Onychogomphus forcipatus* and *S. striolatum*) are included that have not been found in this area since the 1950s (Benitez, 1950, quoted by Anselin & Martin, 1986). A new record for *S. meridionale* is provided, this species is not cited in this area since the early twentieth century (McLachlan, 1902b)." (Authors)] Address: Evangelio Pinach, J.M., Agente Medioambiental. Servicios Periféricos de la Consejería de Agricultura en Cuenca. Junta de Comunidades de Castilla-La Mancha, Spain. E-mail: jjevanach@hotmail.com

**15858.** Gauci, C. (2014): A review of the Odonata of the Maltese Islands. *Journal of the British Dragonfly Society* 30(2): 79-109. (in English) ["This paper is the result of five years of detailed observations of Odonata at several sites in the Maltese Islands. It updates the status and relative abundance of the various species. There is currently only one zygopteran *Ischnura genei* established on the Islands. *Calopteryx virgo* is considered a vagrant, while the occurrence of *C. haemorroidalis*, is considered to be highly doubtful. There are nine species of anisopterans which are established in the Islands, these being *Anax imperator*, *A. parthenope*, *Orthetrum cancellatum*, *O. coerulescens*, *O. trinacria*, *Sympetrum fonscolombii*, *Crocothemis erythraea*, *Trithemis annulata* and *Selysiothemis nigra*. Three more: *O. nitidinerve*, *O. chrysostigma* and *Pantala flavescens*, have recently been added to the Islands' list, while two – *O. brunneum* and *S. striolatum* – which were formerly considered common, are now very rare. *A. ephipigiger* is a fairly regular migrant, appearing in considerable numbers in some



years. *Aeshna mixta* is rare but might be on the verge of establishing itself on the Islands, following a recent spate of records, including ovipositing females. Various inaccuracies and conflicting statements appearing in previous contributions are corrected. Observations on behaviour are included where these are of special interest as well as where they are in contradiction of what has been stated in the literature." (Author)] Address: Gauci, C., 28, Triq il-Kissier, Mosta, Malta

**15859.** Gerecke, R.; Marrone, F.; sorgi, G.; Dossena, M.; Stoch, F. (2014): The water mites (Acari: Hydrachnidia) of the standing waters of Corsica, Sardinia and Sicily: review and new data. *Italian Journal of Zoology* 81(3): 389-408. (in English) ["A compilation of our present knowledge of the water mites (Acari: Hydrachnidia) adapted to life in standing waters on the three large islands in the western Mediterranean (Corsica, Sardinia and Sicily) is provided. In addition to published data, this study deals with a rich volume of new material from recent field work, mostly deriving from intermittent ponds and pools, an extremely poorly investigated yet peculiar habitat type in the Mediterranean area. Species richness of water mites reported for the standing waters of the three islands amounts to 91 species. Out of the 47 species for which we present new distributional data, *Hydrachna incisa* Halbert, 1903, *Hydrachna leegei* Koenike, 1895, *Piersigia limophila* Protz, 1896, *Hydryphantes crassipalpis* Koenike, 1914 and *Piona laminata* (Thor, 1900) have not been recorded previously from the Mediterranean area. Most of these species were believed to have typical North European distributions. In addition to these, a further 13 species are recorded for the first time from the area covered. In total, 11 species are new for Italy, seven more are new for Sicily, three for Sardinia and seven for Corsica. Redescriptions are given of *Axonopsis complanata* (Müller, 1776) (*A. graeca*, nov. syn), *Brachypoda baderi* (reported for the first time after the original description from Abruzzo, Italy, synonymization with *B. mutila* rejected) and *B. mutila* (recorded for the first time outside Algeria with certainty). For each species, information is given on habitat preference and geographical distribution; the significance of the data is discussed under perspectives of zoogeography and nature protection. The completeness of our knowledge for the three investigated island is assessed using rarefaction curves and non-parametric estimators of species richness; while Sicily can be considered fairly well known, Corsica and Sardinia require further sampling to assess their water mite diversity." (Authors)] Address: Gerecke, R., Institut für Evolution und Ökologie, Abteilung Evolutionsbiologie der Invertebraten, Universität Tübingen, Germany, Biesingerstr. 11, 72070 Tübingen, Germany. E-mail: reinhard.gerecke@uni-tuebingen.de

**15860.** González-Soriano, E.; Novelo-Gutiérrez; R. (2014): Biodiversidad de Odonata en México. *Revista Mexicana de Biodiversidad*, Supl. 85: S243-S251. (in Spanish, with English summary) ["An up to date chapter on the Odonata of Mexico is presented. Since the last update in 2006, 5 new species were described, 11 new records were added and 14 species have been described in their larval stage. Hence, the Mexican list presented here

is constituted by a total of 355 species. Comments on endemism, endangered species and/or at risk are included." (Authors)] Address: Gonzalez-Soriano, E., Depto Zoologia, Inst. Biol., Univ. Autonoma, Apartado Postal 70-153, 04510 Mexico, D.F., Mexico. E-mail: esoriano@mail.i-biologia.unam.mx

**15861.** Gremillion, G.; Humbert, J.S.; Krapp, H.G. (2014): Bio-inspired modeling and implementation of the ocelli visual system of flying insects. *Biological Cybernetics* 108(6): 735-746. (in English) ["Two visual sensing modalities in insects, the ocelli and compound eyes, provide signals used for flight stabilization and navigation. In this article, a generalized model of the ocellar visual system is developed for a 3-D visual simulation environment based on behavioral, anatomical, and electrophysiological data from several species. A linear measurement model is estimated from Monte Carlo simulation in a cluttered urban environment relating state changes of the vehicle to the outputs of the ocellar model. A fully analog-printed circuit board sensor based on this model is designed and fabricated. Open-loop characterization of the sensor to visual stimuli induced by self motion is performed. Closed-loop stabilizing feedback of the sensor in combination with optic flow sensors is implemented onboard a quadrotor micro-air vehicle and its impulse response is characterized.] Address: Gremillion, G., Dept of Aerospace Engineering, University of Maryland, College Park, MD 20742, USA. E-mail: gmgrem@umd.edu

**15862.** Haro, R.J. (2014): All along the watchtower: Larval dragonflies are promising biological sentinels for monitoring methylmercury contamination. *Park Science* 31(1): 70-73. (in English) ["Humans have used other organisms to detect environmental danger for centuries (e.g., the canary in the coal mine). The use of "biosentinels" has developed and expanded to become a mainstay for monitoring environmental contaminants like methylmercury, a pervasive and largely anthropogenic neurotoxin. Biosentinels provide insights on how and where contaminants are entering and moving through aquatic food webs. Many water bodies in the Great Lakes region, including those in national park units, have fish-consumption advisories because of the atmospheric deposition of mercury and its conversion into methylmercury, which can biomagnify. For many years young yellow perch served as the principal biosentinel for monitoring methylmercury. Recent research shows that the diverse assemblage of dragonflies in this region can provide an additional suite of biosentinels, complementing the use of perch among water bodies with fish and expanding the reach of methylmercury monitoring to include fishless ecosystems (e.g., small ponds and wetlands)." (Authors)] Address: Haro, R.J.; E-mail: rharo@uwlax.edu

**15863.** Kirby, D.; Kirby, M. (2014): Mixed pairing between Emerald Damselfly *Lestes sponsa* and Small Red Damselfly *Ceriagrion tenellum*. *Atropos* 52: 75. (in English) [Verbatim: Further to the observations of mixed pairings in *L. sponsa* reported by Pickess (2012) we wish to report another unusual pairing of damselflies. On 11-VII-2014 we visited Cors Caron, Ceredigion, on a sunny and warm day with a moderate breeze. At around 13.00hrs we noticed a

female *C. tenellum* f. *typica* paired with a male *L. sponsa*. We watched them for a few minutes as they remained in tandem but stayed low in the vegetation without any attempt to fly off or *L. sponsa* (♂) paired with *C. tenellum* (♀). I do not get the chance to see *C. tenellum* very often and had been hoping to see the species as Cors Caron is a known breeding site. To see one in these circumstances was particularly memorable, however. Reference: Pickess, B.P., 2012. Mixed pairings: are male Emerald Damselfly *Lestes sponsa* short-sighted or desperate? *Atropos* 12: 76-77.] Address: David & Meg Kirby, Hafodwen, Cae Melyn, Aberystwyth, Ceredigion, SY23 2HA, UK

**15864.** Klecka, J. (2014): The role of a water bug, *Sigara striata*, in freshwater food webs. *PeerJ* 2:e389; DOI 10.7717/peerj.389: 16 pp. (in English) ["Freshwater food webs are dominated by aquatic invertebrates whose trophic relationships are often poorly known. Here, I used laboratory experiments to study the role of a water bug, *Sigara striata*, as a potential predator and prey in food webs of stagnant waters. Multiple-choice predation experiment revealed that *Sigara*, which had been considered mostly herbivorous, also consumed larvae of *Chironomus* midges. Because they often occur in high densities and are among the most ubiquitous aquatic insects, *Sigara* water bugs may be important predators in fresh waters. A second experiment tested the role of *Sigara* as a potential prey for 13 common invertebrate predators. Mortality of *Sigara* inflicted by different predators varied widely, especially depending on body mass, foraging mode (ambush/searching) and feeding mode (chewing/suctorial) of the predators. *Sigara* was highly vulnerable to ambush predators, while searching predators caused on average 8.1 times lower mortality of *Sigara*. Additionally, suctorial predators consumed on average 6.6 times more *Sigara* individuals than chewing predators, which supports previous results hinting on potentially different predation pressures of these two types of predators on prey populations. The importance of these two foraging-related traits demonstrates the need to move from body mass based to multiple trait based descriptions of food web structure. Overall, the results suggests that detailed experimental studies of common but insufficiently known species can significantly enhance our understanding of food web structure." (Authors)] Address: Klecka, J., Laboratory of Theoretical Ecology, Biology Centre of the Academy of Sciences of the Czech Republic, Institute of Entomology, České Budějovice, Czech Republic. E-mail: jan.klecka@entu.cas.cz

**15865.** Kok, J.M.; Chahl, J.S. (2014): Optimisation of a dragonfly-inspired flapping wing-actuation system. *International Journal of Mechanical, Aerospace, Industrial and Mechatronics Engineering* 8(9): 1459-1466. (in English) ["An optimisation method using both global and local optimisation is implemented to determine the flapping profile which will produce the most lift for an experimental wing-actuation system. The optimisation method is tested using a numerical quasi-steady analysis. Results of an optimised flapping profile show a 20% increase in lift generated as compared to flapping profiles obtained by high speed cinematography of a *Sympetrum frequens* dragonfly. Initial optimisation procedures showed 3166 objective function evalu-

ations. The global optimisation parameters - initial sample size and stage one sample size, were altered to reduce the number of function evaluations. Altering the stage one sample size had no significant effect. It was found that reducing the initial sample size to 400 would allow a reduction in computational effort to approximately 1500 function evaluations without compromising the global solvers ability to locate potential minima. To further reduce the optimisation effort required, we increase the local solver's convergence tolerance criterion. An increase in the tolerance from 0.02N to 0.05N decreased the number of function evaluations by another 20%. However, this potentially reduces the maximum obtainable lift by up to 0.025N." (Authors)] Address: Kok, J.M., School Engineering, Univ. South Australia, Mawson Lakes, South Australia, 5095, Australia

**15866.** Korkeamäki, E. (2014): Newly formed wetland pools for *Leucorrhinia pectoralis*: Monitoring results 2013. 13 pp. (in Finnish, with English summary) ["This article examines the factors that affect the colonization of Odonata in new habitats, especially newly formed wetland pools. Wetland pools were dug in Lintulahdet Life project to the shore areas to provide a suitable living environment for odonates. The special target species was *L. pectoralis*. The persistence of Odonata populations was studied by the monitoring with exuviae and adults. The monitoring in the years 2005-2008 and 2013 showed that *L. pectoralis* and many other dragonfly species inhabited the newly formed pools. Potential restoration managements are briefly discussed." (Author)] Address: Korkeamäki, E., Karkunkatu 18 a 4 b, 48600 Karhula, Finland.

**15867.** Kottawa-Arachchi, J.D.; Gamage, R.N.; Jayathilake, G.G. (2014): The role of different ecosystems to maintain odonate and butterfly diversity in Mattakelle Tea Estate, Sri Lanka. *Proceedings of the International Forestry and Environment Symposium 2014 of the Department of Forestry and Environmental Science, University of Sri Jayawardenepura, Sri Lanka*: 133-134. (in English) [Verbatim: A survey on dragonfly and butterfly was conducted at Mattakelle Tea Estate with the objective of assessing the significance of a given tea plantation ecosystem in maintaining dragonfly and butterfly diversity. Odonate and butterfly communities of selected different habitats (seasonal stream, home gardens, small reservoir, Eucalyptus plantation, tea field, marshy land and secondary forest) assessed using line transect method. Dragonfly and butterfly counts were made along two 100 m x 10 m line transects and 30 minutes were spent at each habitat starting from 6.30 – 7.00 am in the morning and same methodology was repeated in all habitats. Other ecological parameters such as air and water temperatures, %RH, pH and EC were also recorded. The intensity of observations was 8 days per month. During two months sampling, 13 species of Odonata and 46 species of butterflies were recorded. Interestingly, 7 dragonfly and 8 butterfly species are in the national threatened category. Present study indicated that small scale reservoir and marshy land habitats maintain the highest dragonfly diversity recording 10 and 8 species where Shannon index (H) = 2.17 and 2.01, respectively. Conversely, home garden and secondary forest habitats recorded significant butterfly diversity with 33 and 32 species

where (H) = 3.31 and 3.28, respectively. This can be explain, as the home garden and secondary forest habitats are well-structured with more plant species that provide feeding and nectarine plants for butterflies. Continuous water supply and water quality may support to maintain highest dragonfly diversity in small reservoir and marshy land habitats. Water sources in home garden and secondary forest have been dried in study period therefore dragonfly diversity was relatively low. Some of the recorded odonate taxa can be used as reliable indicators of ecosystem health. Vegetation structure and the complexity of the ecosystem in tea plantations play a vital role in sustaining odonate and butterfly fauna. Several conservation measures such as increasing plant diversity, introduction of shade trees, feeding and nectarine plants and conduct of good agricultural practices are recommended to protect and conserve odonate and butterfly diversity.] Address: Kottawa-Arachchi, J.D., Hill-Country Environment Association, Tea Research Institute, Talawakelle, Sri Lanka. E-mail: jeevan1188@yahoo.com

**15868.** Krieg-Jacquier, R.; Deliry, C., Bricault, B.; Jacquiera, C. (2014): Autochtonie d'*Oxygastra curtisii* au lac d'Aiguebelette (Odonata: Corduliidae). *Martinia* 30(1): 23-28. (in French, with English summary) ["Autochthony of *O. curtisii* at the lake of Aiguebelette). From 2008, odonatological surveys allowed the discovery of several populations of *O. curtisii* in the Ain department, where only two observations of presumed erratic specimens were previously made. Investigations were then widened out of this department to the closest parts of the south of the Jura Mountains and led to the discovery of the species at the lake of Aiguebelette." (Author)] Address: Krieg-Jacquier, R., 18, rue de la Maconne, F-73000 Barberaz, France. E-mail: regis.krieg.jacquier@gmail.com

**15869.** Liu, B.-p. (2014): Research on Technique of Still-hunt for Catching *Anax parthenope julius* Brauer. *Journal of Anhui Agricultural Sciences* 41(28): 11383-11385. (in Chinese, with English summary) ["*Anax parthenope julius* Brauer has a nice invigorant effect to kidney. A village called Fangliutian which located in central China was selected as the trial venue for research on technique of still-hunt for catching *A. parthenope* and other big dragonflies. First of all, resources of dragonflies in the venue were investigated, then the catching web was made and improved, catching time and place was selected, finally, technique of still-hunt for catching big dragonflies was explored and improved. As a result, 60 *A. parthenope* and 32 big dragonflies which coded OA-1 were caught. Gist of the technique of still-hunt for catching big dragonflies as! the web should be green and bolted on the stiff loop which fixed with a bamboo pole, catcher should wear in red clothes or green camouflage uniform, a gentle line should be tied from the end of the web to the bamboo pole that easy to pull, the catching time should be sunny afternoon in summer, catching place should be a place convenient for the procedure and near a point that the dragon always flied by and little or no float grass in the water lest the head of the dragon maybe apart on the tangle catching procedure among the web and float grass. The technique of still-hunt for catching big dragonflies could be used to catch *A. parthenope* and other big dragonflies." (Authors)] Address:

Liu, B.p., College of Life Science, Northeast Agricultural Univ., China. E-mail: liubaoping323@126.com

**15870.** Liu, Y.; Gao, X. (2014): Overview of Odonata insect resources in Luoyang area. *Shandong Agricultural Sciences* 46(5): 109-112. (in Chinese, with English summary) ["To realize the diversity of Odonata insects in Luoyang area, the samples were collected and investigated in 9 counties and 2 districts of Luoyang area from 2010 to 2013. Finally, more than 700 samples were gathered. They belonged to 57 species, 37 genera, 15 families and 6 superfamilies. According to this survey, the directory of Odonata insects in Luoyang area was listed, and the numbers of genera and species in each family were analyzed." (Authors)] Address: Liu, Y., Henan Forestry Vocational College, Luoyang 471002, China

**15871.** Luglia, M.; Luglia, T.; Delasalle, J.-F. (2014): Bilan des prospections 2003-2009 en Guyane française avec *Acanthagrion minutum* nouveau pour le département (Odonata: Conagrionidae). *Martinia* 30(2): 75-83. (in French, with English summary) ["The authors present the results and the outlooks of their odonate survey carried out in the French Guiana from 2003 to 2009. 369 specimens involving 12 families, 49 genera and 81 species have been captured, with *A. minutum* being new for the country. A quick compilation of our knowledge on this species is done, followed by an overall description of the habitat where it was observed." (Authors)] Address: Luglia, M., 23 avenue Victor Hugo, 13170 Les Pennes-Mirabeau, France. E-mail: mathieu.luglia@gmail.com

**15872.** Malikova, E.I.; Haritonov, A.Yu. (2014): On the fauna of Odonata of Orenburgskaya Oblast. *Eurasian Entomological Journal* 13(4): 329-333. (in Russian, with English summary) ["49 species of Odonata are listed for Orenburgskaya Oblast by recent materials and literature data. 3 species, *Ischnura pumilio*, *Aeshna serrata*, *Anax p. parthenope*, are reported for the first time from the territory." (Authors)] Address: Malikova, Elena, Blagoveshchensk State Pedagogical University, Lenina str., 104, Blagoveshchensk, 675004, Russia. E-mail: e\_malikova@inbox.ru

**15873.** Nicolai, B.; Mammen, K. (2014): Zum Vorkommen der Libellen bei Halberstadt (Nordharzvorland) und die Phänologie von *Coenagrion mercuriale* und *Orthetrum coerulescens* (Odonata). *Abhandlungen und Berichte aus dem Museum Heineanum* 10: 93-112. (in German, with English summary) ["From 2008 to 2014, the dragonfly fauna was observed in a small area near Halberstadt (Sauteichsgraben/ Goldbach/retention basins). A total of 35 species were recorded, with 21 species can be considered as indigenous (at least once mating flights, egg oviposition or newly emerged odonates were found). For the species *C. mercuriale*, *O. coerulescens* and *O. brunneum* data for phenology and biology are given. The presence was noted in detail in *C. mercuriale* (19.05.-10.08.), *O. coerulescens* ([27.05.]02.06.-28.08.) and *O. brunneum* (02.06.-10.08.). Species richness, occurrence of some species mentioned in the Red List of endangered odonates and the outstanding occurrence of the FFH-spe-



cies *C. mercuriale* show the large nature conservation importance of the area. Measures for protection and management of the area were already proposed by NICOLAI & MAMMEN (2009). On their necessity and consistent implementation are explicitly stated." (Authors)] Address: Nicolai, B., Museum Heineanum, Domplatz 36, 38820 Halberstadt, Germany. E-mail: nicolai@halberstadt.de

**15874.** Nieoczym, M.; Kloskowski, J. (2014): Responses of epibenthic and nektonic macroinvertebrate communities to a gradient of fish size in ponds. *Journal of limnology* 74(1): 50-62. (in English) ["Size relationships between fish and organisms from adjacent trophic levels are crucial for predicting the structure and dynamics of aquatic ecosystems. We compared macroinvertebrate communities along a fish-size gradient created by separate stocking of three age cohorts of common carp *Cyprinus carpio* in semi-natural ponds. The specific size range of fish (small, medium and large) corresponding to fish age in ponds was the factor most strongly associated with macroinvertebrate composition. The other significant habitat variables were dissolved oxygen concentration in the water and submerged vegetation abundance in the open-water zone. Among the most numerous taxa in the ponds, relative abundances of Hirudinea, Gastropoda, Odonata and Coleoptera were larger in the presence of small-sized than of larger-sized carp. However, fish size effect was not linear, in that macroinvertebrate assemblages were less similar between ponds containing medium- vs large-sized fish than between ponds with small- vs. large-sized fish. The dissimilarity patterns were mainly determined by disparities in abundance of Corixidae, which unlike other taxa common in the ponds occurred in the greatest numbers in the presence of large-sized carp. Macroinvertebrate diversity was greatest in ponds with small-sized fish and was positively related to emergent macrophyte cover. Enhancement of emergent vegetation is recommended as the most effective management strategy to buffer adverse impacts of fish on macroinvertebrates. If fish are present in the system, assessment of the size structure of fish populations can be advantageous in unravelling the essential processes driving the variation in pond communities." (Authors)] Address: Nieoczym, M., Dept Zoology, Animal Ecology & Hunting, Univ. Life Sciences, Akademicka 13, 20-033 Lublin, Poland. E-mail: mnieoczy@wp.pl

**15875.** Ohtaka, A.; Uenishi, M.; Wulandari, L.; Liwat, Y.; Ardianor; Gumiri, S.; Nagasaka, M.; Fukuhara, H. (2014): Structure and abundance of "interrhizon" invertebrates in an oxbow lake in the peat swamp area of Central Kalimantan, Indonesia. *Limnology* 15(2): 191-197. (in English) ["The faunal composition of "interrhizon" invertebrate communities associated with submerged parts of three kinds of macrophytes, *Eichhornia crassipes*, Gramineae spp. and *Polygonum tomentosum*, were studied in an oxbow lake, Lake Tundai, with acidic water (pH 3.9-4.4) in the peat swamp area of Central Kalimantan. The pH, turbidity, and chlorophyll-a concentration in the surface waters tended to be higher in macrophyte stands than in open waters near the stands. Thirty-one taxa belonging to three groups of invertebrates, Arachnida, Insecta, especially chironomids, and Isopoda, were found from the root systems, of which

insects were the most abundant in every macrophyte stand. The interrhizon invertebrates accounted for 0.16-8.7 g wet wt m<sup>-2</sup> among three vegetational stands. The diversity and abundance of interrhizon invertebrates are low in Lake Tundai; this could be due to low pH and/or low productivity in the lake water ... Odonata. Coenagrionidae gen. sp. - ... Libellulidae gen. sp.]" (Authors): Address: Ohtaka, A., Faculty of Education, Hirosaki University, Hirosaki, Aomori, 036-8560, Japan. E-mail: ohtaka@cc.hirosaki-u.ac.jp

**15876.** Parr, A.J. (2014): Migrant and dispersive dragonflies in Britain during 2012 and 2013. *Journal of the British Dragonfly Society* 30(2): 110-124. (in English) ["The years 2012 and 2013 were quite eventful for migrant and dispersive species in Britain. *Sympetrum fonscolombii* in particular appeared in good numbers during both years, though local breeding was more noticeable during 2012. After record-breaking appearances of *Anax ephippiger* during 2011, another major influx was also noted during autumn 2013. *A. parthenope*, by contrast, had a poor year in 2013, though appearances in the preceding year had been at above-average levels. Species such as *S. danae* and *Ischnura pumilio* showed some notable migratory movements during the period, and rarer migrants similarly produced a number of highlights. The second and third British records of *Leucorrhinia pectoralis* were, for instance, made in coastal Suffolk during late spring 2012, whilst a single *Sympetrum vulgatum* was noted in Kent during autumn 2013. Recent colonist species also fared well during the reporting period, with *Lestes barbarus*, *Coenagrion scitulum* and *Aeshna affinis* all holding their own. Populations of *Chalcolestes viridis* continued to strengthen, and some range expansion was noted, particularly in East Anglia. In addition to these newcomers, regular records of *Anaciaeschna isocetes* from the Westbere region of East Kent hint at the presence of a newly-established population of the species that might well be of immigrant origin (another, confirmed, new population at Paxton Pits, Cambridgeshire, is more likely to be of local derivation)." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk, IP29 5BX, UK

**15877.** Rafay, M.; Hussain, T.; Ruby, T.; Rehman, F.; Ahmad, I.; Abdullah, M. (2014): Role of weeds in creating Agro Ecological stability. *Pak. J. Agri. Sci.* 51(3): 531-538. (in English) ["We devised a study to ascertain the role of weeds in agro-ecosystem. Therefore, we made seasonal cataloguing of the line data on multiple crops i.e., sugarcane, fodder, wheat and mustard to see crops' viability and role of weeds' diversity in preventing insect outbreaks by reducing crop productivity losses. We found that out of fifteen weed species, 11 weed species were of broad-leaved category while four were of pointed-leaves. The arthropod-fauna included insect pest-species from Orthoptera, Hemiptera and Lepidoptera that used weeds as priority food. Besides that, some specific zoophagous insect-predators belonging to orders Odonata (*Lestes* sp.), Coleoptera, Hymenoptera and Araneae were documented on similar weeds, for food, shelter and egg-laying. In the light of our observations, we concluded that there is a significant role of weeds in a crop-system that may support other essential life forms in creating ecological balance." (Authors)] Ad-

dress: Rafay, M., Dept of Forestry, Range & Wildlife Management, The Islamia University of Bahawalpur, Pakistan. E-mail: rafay@iub.edu.pk

**15878.** Rees, H.C.; Maddisonm, B.C.; Middleditch, D.J.; Patmore, J.R.M.; Gough, K.C. (2014): The detection of aquatic animal species using environmental DNA – a review of eDNA as a survey tool in ecology. *Journal of Applied Ecology* 51(5): 1450-1459. (in English) ["(1) Knowledge of species distribution is critical to ecological management and conservation biology. Effective management requires the detection of populations, which can sometimes be at low densities and is usually based on visual detection and counting. Recently, there has been considerable interest in the detection of short species-specific environmental DNA (eDNA) fragments to allow aquatic species monitoring within different environments due to the potential of greater sensitivity over traditional survey methods which can be time-consuming and costly. (2) Environmental DNA analysis is increasingly being used in the detection of rare or invasive species and has also been applied to eDNA persistence studies and estimations of species biomass and distribution. When combined with next-generation sequencing methods, it has been demonstrated that entire faunas can be identified. (3) Different environments require different sampling methodologies, but there remain areas where laboratory methodologies could be standardized to allow results to be compared across studies. (4) Synthesis and applications. We review recently published studies that use eDNA to monitor aquatic populations, discuss the methodologies used and the application of eDNA analysis as a survey tool in ecology. We include innovative ideas for how eDNA can be used for conservation and management citing test cases, for instance, the potential for on-site analyses, including the application of eDNA analysis to carbon nanotube platforms or laser transmission spectroscopy to facilitate rapid on-site detections. The use of eDNA monitoring is already being adopted in the UK for ecological surveys." (Authors)] Address: Rees, Helen, ADAS UK Ltd, School of Veterinary Medicine & Science, Univ. Nottingham, Sutton Bonington Campus, Loughborough, Leicestershire, UK. E-mail: helen.rees@adas.co.uk

**15879.** Ruffoni, A.; Itrac-Bruneau, R.; Varanguin, N. (2014): Première observation d'*Onychogomphus uncatus* avec indice d'autochtonie dans le département de l'Yonne (Odonata: Gomphidae). *Martinia* 30(2): 62-63. (in French) [26-VII-2014, *O. uncatus* at Charny along the Ouanne river (Yonne department), France] Address: Ruffoni, A., Société d'histoire naturelle d'Autun, Maison du Parc, F-58230 Saint-Brisson, France. E-mail: shna.ruffoni@orange.fr

**15880.** Ruffoni, A. (2014): Un mâle d'*Erythromma viridulum* prisonnier temporaire d'une ponte de *Libellula depressa* (Odonata: Coenagrionidae, Libellulidae). *Martinia* 30(1): 7-9. (in French, with English summary) ["A male of *E. viridulum* temporally trapped by a batch of eggs of *L. depressa*: Numerous and various cases of odonate adults being trapped by living organisms have been reported. Most of the cases which concern an accidental capture refer to plants. Here, we are dealing with a male of *E. viridulum* who had a

leg accidentally trapped by a sticky batch of eggs of *L. depressa*. The male finally got free and flew off. To our knowledge, this kind of capture is published for the first time.] Address: Ruffoni, A., Maison du Parc, 58230 Saint-Brisson, France. E-mail: shna.ruffoni@orange.fr

**15881.** Saha, N.; Aditya, G.; Saha, G.K. (2014): Prey preferences of aquatic insects: potential implications for the regulation of wetland mosquitoes. *Medical and Veterinary Entomology* 28(1): 1-9. (in English) ["Wetlands are potential sites for mosquito breeding and are thus important in the context of public health. The use of chemical and microbial controls is constrained in wetlands in view of their potential impact on the diverse biota. Biological control using generalist aquatic insects can be effective, provided a preference for mosquito larvae is exhibited. The mosquito prey preferences of water bugs and larvae of odonate species were evaluated using chironomid larvae, fish fingerlings and tadpoles as alternative prey. Manly's selectivity ( $a_i$ ) values with 95% confidence intervals (CIs) were estimated to judge prey preference patterns. Multivariate analysis of variance (manova) and standardized canonical coefficients were used to test the effects of density on prey selectivity. The  $a_i$  values indicated a significant preference ( $P < 0.05$ ) in all of the insect predators tested for mosquito larvae over the alternative prey as a density-dependent function. On a comparative scale, chironomid larvae had the highest impact as alternative prey. In a multiple-prey experiment, predators showed a similar pattern of preference for mosquito larvae over alternative prey, reflecting a significant ( $P < 0.05$ ) niche overlap. The results suggest that, in a laboratory setting, these insect predators can effectively reduce mosquito density in the presence of multiple alternative prey... and the larvae of the odonate species *Brachydiplax chalybea chalybea*..."] (Authors) Address: Saha, Nabaneeta, Dept of Zoology, University of Calcutta, 35 Ballygunge Circular Road, Kolkata 700019, India. E-mail: nabaneetasaha@gmail.com

**15882.** Singh, M.K. (2014): Studies on the experimental control of dragonfly larvae *Brachythemis contaminata* (Fabr.) (Anisoptera: Libellulidae) with insecticides and bio-insecticides in the laboratory. *International journal of scientific research* 3(10): 45-47. (in English) ["The studies on the control of Odonata larvae *B. contaminata* by insecticides and bioinsecticides were carried out in the laboratory. The results suggest that insecticide and bioinsecticide of different concentrations of Endosulfan, Nuvan, Malathion, Indoneem and a combination of Endosulfan+Indoneem are very effective to eradicate the larvae *B. contaminata* from fishponds. The present study will be useful for proper preparation of the fish nursery ponds of stocking spawn of carp for better management of fish production practices." (Author) ] Address: Singh, M.K., Dept of Biotechnology, AVS Presidency International College, Mana, Raipur-492001(C.G) India

**15883.** Swoszowski, F. (2014): Découverte de *Lestes dryas* dans le Val-d'Oise suite à la mise en oeuvre de travaux de restauration d'une mare (Odonata: Lestidae). *Martinia* 30(2): 41-45. (in French) ["*L. dryas* new species to Val-d'Oise department occurring after a pond restoration

(Odonata: Lestidae): The first record of *L. dryas* in the Val-d'Oise department in 2012 is related. Autochthony was confirmed in 2013. This discovery occurs after the implementation of the restoration of a pond in an alluvial sector." Address: Swoszowski, Florie, Parc naturel régional du Vexin français, Maison du parc, F-95450 Théméricourt, France. E-mail: f.swoszowski@pnr-vexin-francais.fr

**15884.** Tomero, I.; Sala, J.; Gascón, S.; Àvila, N.; Quintana, X.D.; Boix, D. (2014): Aquatic macrofauna of Vila Nova de Milfontes temporary ponds, with the first record of *Cyphon hilaris* Nyholm, 1944 (Coleoptera: Scirtidae) from Portugal. *Boletín de la Sociedad Entomológica Aragonesa* 55: 326-330. (in English, with Spanish summary) ["The aquatic community of 12 temporary ponds located in Vila Nova de Milfontes (south-western Portugal) was sampled in April 2013. We identified a total of 78 taxa, of which insects were the best represented group (59 taxa), with 29 coleopterous taxa, 11 heteropterous taxa and 5 odonate taxa, among others. ..."] (Authors) *Aeshna mixta*, *Coenagrionidae* indet., *Lestes* sp., *Sympetrum fonscolombii*, *S. striolatum*] Address: Tomero, Irene, Institut d'Ecologia Aquàtica, Universitat de Girona, Facultat de Ciències, Campus Montilivi, E-17071 Girona, Catalonia, Spain. E-mail: irene.tomero1987@gmail.com

**15885.** Tsubaki, Y. (2014): Forest light environment as the cradle or forest biodiversity: thermal ecology of *Mnais* damselflies. *Tombo* 56: 49-56. (in Japanese, with English summary) ["Forests have a complex mosaic of light environments that differ in color and brightness as well as a mosaic of thermal environments that differ between shade and light. In this paper, I review studies on habitat selection and reproductive behavior of forest-dwelling damselflies (*Mnais costalis* and *M. pruinosa*) in response to forest light environments. Measurement of canopy openness in a forest habitat in Kinki district, where two species coexist, revealed that *M. costalis* preferred sunny habitats while *M. pruinosa* preferred shady habitats. Species-specific differences in physiological responses to abiotic factors of habitats have been suggested to cause habitat segregation. Our observations on reproductive behavior suggests that habitat thermal condition is an important factor for habitat selection in *Mnais* damselflies, because thermal conditions strongly influence the degree to which *Mnais* can perform physiological and behavioral activities, and this will therefore influence fitness. Copulation success of males in relation to insolation conditions of territorial sites was shown that *M. costalis* males were successful at sunny territorial sites. This was partly because males at sunny sites have higher body temperatures and are able to perform intensive courtship displays toward females. In contrast, mating success of *M. pruinosa* males was not influenced by the insolation condition at territorial sites, probably because males of this species do not show any courtship display. Human-induced forest disturbance alters the geometry of forests, and will significantly affect all the components of fitness that depend on light for both animals and plants. We need detailed knowledge of forest-dwelling species in its natural light environment in order to understand what goes wrong when its habitat is disturbed." (Author)] Address: E-mail: mnais.pruinosa@me.com

**15886.** Van Buskirk, J. (2014): Incipient habitat race formation in an amphibian. *Journal of Evolutionary Biology* 27(3): 585-592. (in English) ["Theory defines conditions under which sympatric speciation may occur, and several possible examples of the process in action have been identified. In most cases, organisms specialize onto habitats that fall into discrete categories, such as host species used by herbivores and parasites. Ecological specialization within a continuous habitat gradient is theoretically possible, but becomes less likely with increasing gene flow among clinal habitat types. Here, I show that habitat race formation is underway in a frog, *Rana temporaria*, along a continuous and spatially mosaic habitat gradient. Tadpoles from 23 populations raised in an outdoor mesocosm experiment showed adaptive phenotypic variation correlated with the predator density in their pond of origin. A survey of microsatellite markers in 48 populations found that neutral genetic divergence was enhanced between ponds with very different densities of predators. This represents a new example of habitat specialization along a continuous habitat gradient with no spatial autocorrelation in habitat." (Author) larval libellulid and corduliid dragonflies] Address: Buskirk, J. van, Inst. Zoology, Univ. of Zürich, CH-8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

**15887.** Villanueva, R.J.T.; Dow, R.A. (2014): Review of the Philippine taxa formerly assigned to the genus *Amphicnemis* Selys, II. Genus *Sangabasis* with descriptions of eight new species (Odonata: Coenagrionidae). *Zootaxa* 3815(1): 1-28. (in English) ["The Philippine genus *Sangabasis* Villanueva is reviewed. Eight new species are described: *S. bukid* sp. nov., *S. bulba* sp. nov., *S. cahilogi* sp. nov., *S. carmelae* sp. nov., *S. feliculoi* sp. nov., *S. hamis* sp. nov., *S. janvantoli* sp. nov., and *S. zamboanga* sp. nov." (Authors)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**15888.** Vince, A.; Bodor, T.; Jakab, T.; Miskolczi, M.; Devai, G. (2014): Data on the dragonfly (Odonata) fauna of the small water courses in the landscape Dél-Nyírség (NE-Hungary). *Studia odonatol. hung.* 16: 67-79. (in Hungarian, with English summary) ["The authors present faunistic data on dragonflies collected (larvae, exuviae and adults) and observed (adults) from the small water courses in the lowland area of the geographical region Dél-Nyírség (NE-Hungary). Firstly the authors offer a brief survey of the faunistic results of the odonatological researches carried out up till now in the ET 56 UTM grid map cell. Secondly they present the methods employed in the collection of specimens and in data processing, and introduce the literature they have considered in the identification of species and in reporting faunistic data. Finally they provide a detailed survey of the collection and observation results from the area and summarize and evaluate the data on the dragonfly fauna. Collections were made in one year (2013), with the participation of four specialists on 25 days and six localities altogether, in one cell (ET 56) of the 10×10 km UTM grid map. In the report, information on 336 specimens (220 males, 112 females, 4 specimens with undecided sex) are given in detail [19 larvae (8 males, 9 females, 2 with undecided sex), 103 exuviae (61 males, 40



females, 2 with undecided sex), 214 adults (151 males, 63 females)], with the observed adults representing altogether 224 faunistical data (16 larvae, 30 exuviae, 171 collected and 7 observed adults). In this study 29 species (14 Zygoptera and 15 Anisoptera) were found to occur in the area, out of which 1 belongs to the very frequent, 14 to the frequent, 9 to the less frequent, 3 to the rare and 2 to the sporadic class of country-wide occurrence frequency." (Authors)] Address: Jalab, T., Kossuth Lajos Secondary Grammar School, Baross Gábor út 36, H-5350 Tiszafüred, Hungary

**15889.** Wittmann, H. (2014): Über einige Libellennachweise aus dem Bundesland Kärnten. Salzburger Entomologische Arbeitsgemeinschaft - Haus der Natur 2/2014: 2-10. (in German) [Austria, Carinthia; records of the following species are documented: *Aeshna caerulea*, *A. cyanea*, *A. juncea*, *Coenagrion hastulatum*, *Cordulegaster bidentata*, *Enallagma cyathigerum*, *Libellula depressa*, *L. quadrimaculata*, *Pyrrhosoma nymphula*, *Somatochlora alpestris*, *Sympecma fusca*, *Sympetrum striolatum*] Address: Wittmann, H., Haus der Natur – Museum für Natur und Technik, Museumsplatz 5, 5020 Salzburg, Austria. E-Mail: helmut.wittmann@hausdernatur.at

**15890.** Wong, W.H.; Tay, Y.C.; Puniamoorthy, J.; Balke, M.; Cranston, P.S.; Meier, R. (2014): "Direct PCR" optimization yields a rapid, cost-effective, non-destructive, and efficient method for obtaining DNA barcodes without DNA extraction. *Molecular Ecology Resources* 14(6): 1271-1280. (in English) ["Macroinvertebrates that are collected in large numbers pose major problems in basic and applied biodiversity research: identification to species via morphology is often difficult, slow and/or expensive. DNA barcodes are an attractive alternative or complementary source of information. Unfortunately, obtaining DNA barcodes from specimens requires many steps and thus time and money. Here, we promote a short cut to DNA barcoding, that is, a nondestructive PCR method that skips DNA extraction ('direct PCR') and that can be used for a broad range of invertebrate taxa. We demonstrate how direct PCR can be optimized for the larvae and adults of nonbiting midges (Diptera: Chironomidae), a typical invertebrate group that is abundant, contains important bioindicator species, but is difficult to identify based on morphological features. After optimization, direct PCR yields high PCR success rates (>90%), preserves delicate morphological features (e.g. details of genitalia, and larval head capsules) while allowing for the recovery of genomic DNA. We also document that direct PCR can be successfully optimized for a wide range of other invertebrate taxa that need routine barcoding (flies: Culicidae, Drosophilidae, Dolichopodidae, Sepsidae; sea stars: Oreasteridae). Key for obtaining high PCR success rates is optimizing (i) tissue quantity, (ii) body part, (iii) primer pair and (iv) type of Taq polymerase. Unfortunately, not all invertebrates appear suitable because direct PCR has low success rates for other taxa that were tested (e.g. Coleoptera: Dytiscidae, Copepoda, Hymenoptera: Formicidae and Odonata). It appears that the technique is less successful for heavily sclerotized insects and/or those with many exocrine glands." (Authors)] Address: Wong, W.H., Dept of Biological Sciences, National Univ. of Singapore, 14 Science Drive 4, Singapore, 117543, Singapore

**15891.** Xu, M.; Wang, Z.; Pan, B.; Yu, G. (2014): The assemblage characteristics of benthic macroinvertebrates in the Yalutsangpo River, the highest major river in the world. *Frontiers of Earth Science* 8(3): 351-361. (in English) ["Aquatic ecosystems of highland rivers are different from those of low altitude rivers because of the specific topography and environmental parameters associated with high altitudes. Yalutsangpo, the upper course of the Brahmaputra River, is the highest major river in the world, flowing from west to east across Tibet, China and pouring into India. Macroinvertebrates were sampled from Yalutsangpo and its tributaries, the Lhasa, Niyang, and Parlong Tsangpo Rivers, from October 2009 to June 2010, to study characters of the highland aquatic ecosystem. Altogether, 110 macroinvertebrate taxa belonging to 57 families and 102 genera were identified from the basin. The biodiversity and composition of macroinvertebrate assemblages were strongly affected by altitude gradients. Local diversity represented by taxa richness and the improved Shannon-Wiener index were high at altitudes of 3,300–3,700 m, among which suitability of habitat was higher due to the better integrated environmental conditions of water temperature, dissolved oxygen, and aquatic vegetation, etc.

Macroinvertebrates were grouped into shredders, scrapers, predators, collector-filterers, and collector-gatherers according to their feeding behaviors. It was found that the distributions of the functional feeding groups varied with habitat altitudes. Shredders were present at altitudes of 2,900–4,400 m, while scrapers mainly inhabited altitudes of 3,500–4,500 m, and collector-filterers preferred 3,500–4,000 m. Even though the local taxa richness was not high at each site, the taxonomic composition and density of the assemblages varied greatly among the different sites, resulting in much higher regional diversity compared to the lowland river with similar flow and substrate conditions. The regional cumulative taxa richness of Yalutsangpo decreased and more families were lost as the altitude increased. However, some families that were newly present as the altitude increased were essential for sustaining the high regional biodiversity. The ordination diagram obtained from Detrended Correspondence Analysis indicated that altitude, river pattern, riverbed structures, bank structures, and flow conditions were the main factors that influenced the macroinvertebrate assemblages in the Yalutsangpo basin." (Authors)] Address: Xu, Mengzhen, State Key Lab. Hydrosience & Engineering, Tsinghua Univ., Beijing 100084, China. E-mail: xumz07@gmail.com

**15892.** Zhao, H.; Meng, Q.; Li, Y. (2014): On diversity of Odonata in the West of Jilin province. *Journal of Beihua University (Natural Science)* 15(6): 821-825. (in Chinese, with English summary) ["The resources of Odonata in the west of Jilin Province (China) were investigated randomly from May 2011 to September 2013. There were 47 species of dragonfly, which belong to 9 families and 28 genera, among which, Gomphidae, Libellulidae, Coenagrionidae and Lestidae were dominant species in west of Jilin. The individuals and species number of *Sympetrum* were the most abundant in Libellulidae, *Trigomphus* are the most in Gomphidae, *Ischnura* is the most in Coenagrionidae, but the individuals and species number had no significant difference among genera in Lestidae. Diversity index of dragonfly showed an obvious rising trend with temperature rising and richness of nutrition levels in Spring, and reached the peak in July, and then diversity index decreased. Evenness index wasn't changed greatly, the dominant concentration index was appeared in May and had a slight fluctuation later." (Authors)] Address: Zhao, H., College of Forest, Beihua University, Jilin 132013, China

**15893.** Zhao, Y.; Wang, D.; Tong, J.; Sun, Ji Y.; Zhang, J. (2014): Statics analysis of dragonfly wing based on finite element model. *Journal of Agricultural Engineering* 30(15): 33-38. (in Chinese, with English summary) ["A dragonfly can hover, flap its wings for flight and fly vertically for a short distance. The membranous wings of a dragonfly have a high load-bearing capacity for static and dynamic load during flight. The mass of the wings of a dragonfly is only 1%-2% of its whole body but the wings can stabilize its body. The statics properties of biomimetic models were researched. The finite element software ANSYS was used to simulate the dragonfly wing. The veins were simulated by pipe20 with two nodes and the membranes by shell43 with four nodes. The influence of geometrical nonlinearity was taken into account but material nonlinearity. The models

were assumed in the elastic range. The three-dimensional model of the dragonfly wing was reconstructed using reverse engineering software Imageware. The veins of dragonfly wing were drawn with AutoCAD and the membranes were added with ANSYS. The finite element models imitating the dragonfly wing were established by using free meshing. The finite element models of the dragonfly wing were simulated with structural statics. The deformation, the stress and the strain of the models under loads were analyzed respectively. The loads include the uniform load, the bending moment and the torque. Under the uniform load, the deformation of the finite element model imitating a dragonfly wing is very small, and increases gradually from the base to the wing tip. The base of the model bears heavy stress, the middle parts smaller, and the wing tip the least. The strain shows a radial pattern along the longitudinal veins, and reduces gradually from the base to the wing tip of the model. Under the bending moment, the deformation and the rotation angle around y axis increase gradually from the base to the wing tip of the model. The heavy stress and strain are mainly concentrated on the base of the model. The small stress and strain are acted on the middle parts and the wing tip. The distribution trend of the stress and strain is in substantial agreement. Under the torque, the finite element model imitating a dragonfly wing deforms only a little as a whole. The heavy deformation is mainly concentrated on the leading edges and the rear edges of the model. The smaller deformation is acted on the middle parts and the least deformation on the base. The maximum stress and strain occur at the middle parts of the model. The minimum stress and strain occur at the base of the model. The dragonfly wing is a two-dimensional truss structure with excellent rigidity. The dragonfly wing deforms only a little under loads. It is shown that the grid structures of the dragonfly wing deforming together at the boundaries of veins and membranes have excellent integrity. The understanding of dragonfly wings' characteristics provides some reference for improving the properties of two-dimensional composite materials through biomimetic designs." (Authors)] Address: Zhao, Y., School of Mechanical & Power Engineering, Henan Polytechnic Univ., Jiaozuo 454000, China

**15894.** Zhu, J.Y.; Zhou, C.Y. (2014): Aerodynamic performance of a two-dimensional flapping wing in asymmetric stroke. *Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering* 228(5): 641-651. (in English) ["A numerical study on the aerodynamic performance of a two-dimensional flapping wing in asymmetric stroke in hovering and forward flight is carried out. The effect of the asymmetry of the stroke on aerodynamic forces and flow structures of the wing is analyzed. It is found that for hovering flight appropriate asymmetric stroke can enhance the aerodynamic performance of the wing at low Reynolds number, but it may not be functioning at moderate and high Reynolds numbers. For forward flight the asymmetric stroke does not increase the lifting efficiency and propulsive efficiency of the wing simultaneously. However, it influences the time history of the aerodynamic force significantly, which may enhance the flight maneuverability of the wing. The present results provide physical insight into the understanding of aerodynamics

and flow structures of insect flight with asymmetric stroke." (Authors)] Address: Zhou, C.Y., Dept Mechanical Engineering & Automation, Harbin Institute of Technology Shenzhen Graduate School, Shenzhen, People's Republic of China. E-mail: cyzhou@hit.edu.cn

## 2015

**15895.** Aoki, T. (2015): Mnais sp. having wings with partly opaque white area. Tombo 57: 38-["I found a female individual of Mnais sp. of which wings had partly opaque white area, on May 24, 2014, at Muraoka-ku, Kami-cho, Mikatagun, Hyogo Pref." (Author)]

**15896.** Azam, I.; Afsheen, S.; Zia, A.; Javed, M.; Saeed, R.; Sarwar, M.K.; Munir, B. (2015): Evaluating insects as bioindicators of heavy metal contamination and accumulation near industrial area of Gujrat, Pakistan. BioMed Research International Volume 2015, Article ID 94275: 11 pp. (in English) ["To study the accumulation and contamination of heavy metals (i.e., Cd, Cr, Cu, Ni, and Zn) in soil, air, and water, few insect species were assayed as ecological indicators. Study area comes under industrial zone of district Gujrat of Punjab, Pakistan. Insects used as bioindicators included a libellulid dragonfly (*Crocothemis servilia*), an acridid grasshopper (*Oxya hyla hyla*), and a nymphalid butterfly (*Danaus chrysippus*) near industrial zone of Gujrat. Accumulation of Cd was highest in insect species followed by Cu, Cr, Zn, and Ni. Hierarchical cluster analysis (HACA) was carried out to study metal accumulation level in all insects. Correlation and regression analysis confirmed HACA observations and declared concentration of heavy metals above permissible limits. Metal concentrations in insects were significantly higher near industries and nal-lahs in Gujrat and relatively higher concentrations of metals were found in Orthoptera than Odonata and Lepidoptera. The total metal concentrations in insects were pointed significantly higher at sites S3 (Mid of HalsiNala), S9 (End of HalsiNala), and S1 (Start of HalsiNala), whereas lowest value was detected at site S6 (Kalra Khasa) located far from industrial area. HACA indicates that these insect groups are potential indicators of metal contamination and can be used in biomonitoring." (Authors)] Address: Azam, Iqra, Dept of Zoology, Institute of Life Sciences, Univ. of Gujrat, Punjab 50700, Pakistan

**15897.** Bailowitz, R.; Danforth, D.; Upson, S. (2015): A Field Guide to the Damselflies and Dragonflies of Arizona & Sonora. Nova Granada Publications: 459 pp. (in English) ["An identification guide for all 167 known species of Odonata of the states of Arizona (USA) and Sonora (Mexico). ... Species accounts begin with the common name approved by the Checklist Committee of the Dragonfly Society of the Americas. Species accounts are organized alphabetically by the scientific (Latin) species name which follows the common name. Each family is divided into genera listed alphabetically. An entry for each genus presents pertinent information concerning important characteristics, distribution, and genera and species numbers. General information includes the habits and habitats of the species, noteworthy or singular behaviors, and selected information of historical or biological import. Field marks are indicated in

bulleted, telegraphic style. For every species, information is presented in a set sequence beginning with the insect's total body length in millimeters. Next, characteristics are cited for the male, from the front of the insect progressing to the abdomen and appendages. Female characters follow. The most important characteristics are in bold print. Descriptions of species in this book are based on populations found in the region covered by this book. The information may or may not apply in other areas of the species' range.]

**15898.** Baltus, H. (2015): Le project LIFE Lomme contribue au developpement des populations de libellules en Haute-Lesse et Haute-Lomme. Les Naturalistes beiges 96(3-4): 37-56. (in French, with English summary) ["From 2010 to 2014, the LIFE Lomme Project has made major restorations of peatlands, meadows and forests. Among these habitats, many ponds have been created and many rivers have become favourable for dragonflies. Standardized surveys based on reliable bioindicators such as dragonflies have been started at the implementation of the project. The number of dragonfly species in the restored sites increased from 21 species in 2009 before the project to 33 species in 2014. Several common dragonflies have already significantly expanded their range and new species appeared. Some specialist species have also shown a rapid growth but others have not yet responded. This clear positive response of dragonflies is clearly due to restorations but also increasing sampling effort as a result of the project implementation." (Author)] Address: Baltus, H., rue Maugere, 1b ä 5150 Floriffoux, Belgium. E-mail: hubert.baltus@gmail.com

**15899.** Benetti, F.; Dioli, P. (2015): Contributo alla conoscenza della Odonatofauna della provincia di Sondrio (Lombardia, Italia). II. Segnalazioni faunistiche nel "Parco Adda-Mallero - Renato Bartesaghi" di Sondrio. Atti Museo civ. Storia naturale Morbegno 26: 5-12. (in Italian, with English summary) ["Contribution to the knowledge of the Odonata of the Province of Sondrio (Lombardy, Italy). II. Faunistic records of the "Adda-Mallero - Renato Bartesaghi Park" in Sondrio. The odonate fauna of the Province of Sondrio has been greatly reduced by pollution and the disappearance of many wetlands. During years 2011-2015, a park near Sondrio with small 'biolakes' was surveyed to collect new and reliable photographic data on Odonata. As result, 14 species have been recorded." (Authors)] Address: Benetti, F., Via Lusardi 11, I- 23100 Sondrio. Italy. E-mail: benetti.franco@alice.it

**15900.** Bhandari, R.; Choubey, V.; Shukla, A. (2015): Diversity and abundance of Odonata in catchments of Bansagar dam, Shahdol (M.P). International Journal of Current Research 7(12): 24034-24037. (in English) ["An Odonata survey on downstream of Sone River was conducted in the surrounding of Bansagar dam in Madhya Pradesh from December, 2014 to November, 2015. The purpose of this one year investigation was to provide information on the diversity and abundance of Odonata. The study revealed that in catchments of river Sone, 22 species of 6 families under 2 sub orders of Odonata were encountered where family Libellulidae was the most diverse with 10 species in contrast to local reference sites of river. The increase of



Odonata in the surrounding of river throughout the study period was best highlighted by the presence of biological pollution indicator species." (Authors)] Address: Bhandari, R., Dept of Zool., Govt. O.F.K. College, Jabalpur (M.P), India

**15901.** Bichuette, M.E.; Gallao, J.E.; von Schimonsky, D.M.; Trajano, E. (2015): Subterranean aquatic fauna of Tapagem Cave, a study in the touristic stretch. ANAIS do 33º Congresso Brasileiro de Espeleologia: 103-108. (in Portuguese, with English summary) ["Studies conducted since the 1970s in Brazil, involving cave fauna until some recent studies, contributed to knowledge mainly to the inventory and ecological-evolutionary categorization. However, the development of Speleological Management Plans of the Vale do Ribeira, which includes the Parque Estadual da Cavema do Diabo (PECD), it achieved a more precise level regarding the location of fauna inside the cave, including the aquatic cave fauna. During an annual cycle, a touristic stretch of Rio das Ostras was sampled inside the cave, which is extremely altered. The aquatic fauna was sampled using Surber traps. The collected fauna was analyzed in the Subterranean Studies Laboratory and 24 species was recorded in the cave, some of which are water quality indicator, exceeding the number of species in previous works (16). Using this data, we conducted an ecosystem analysis to detect weaknesses related to aquatic habitat. Therefore, this study was the basis to the Speleological Management Plan of Tapagem cave and we propose the water monitoring of this cave to assess and minimize the impacts." (Authors)] Address: Bichuette, Maria Elina, Laboratório de Estudos Subterrâneos – LES, Depto de Ecologia e Biologia Evolutiva – DEBE, Centro de Ciências Biológicas e da Saúde – CCBS, Univ. Federal de São Carlos – UFS-Car, São Carlos SP, Brasil. E-mail: bichuette@uol.com.br

**15902.** Boruah, B.; Payra, A.; Das, G.N.; Misra, R.K.; Rout, S.D., Sahu, H.K. (2015): Diversity of Odonata (Insecta) in Padmatola wetland, Balasore, Odisha, India. Asian Journal of Conservation Biology 4(1): 92-97. (in English) ["The present study has been carried out in the Padmatola wetland of Balasore district of Odisha, India during December 2013 and May 2014. This study emphasises a checklist of total 51 species of Odonata. Among this the Anisoptera represented by 33 species with 22 genera from 4 families and Zygoptera represented by 18 species with 9 genera from 3 families. Family Libellulidae is dominant with 28 species and Coenagrionidae is richest with 15 species. But the rapid degradation of the wetland by human activities are the main threat to the odonates along with the biodiversity." (Authors)] Address: Boruah, B., Dept of Wildlife and Biodiversity Conservation. North Orissa University, Odisha- 757003, India

**15903.** Casanueva, P.; Campos, F.; Velasco, T.; Sanz, G.; Nunes, L.F. (2015): Selección de sustrato de emergencia por *Cordulegaster boltonii* (Donovan, 1807) (Odonata: Cordulegasteridae) en un río del centro de la Península Ibérica. Boletín de la Sociedad Entomológica Aragonesa 56: 349-350. (in Spanish, with English summary) ["Emergence site selection by *C. boltonii* in a river in the centre of the Iberian Peninsula: The main emergence substrates of *C. boltonii* in an Iberian river were analyzed. A total of 50 exuviae

were collected from a stretch of river (60m) located in the center of the Iberian Peninsula. Plants were used by larvae as an emergence platform in 86% of cases, and rocks in the remaining cases. The most commonly used plants were Cyperaceae species (*Carex* and *Eleocharis*), and no exuviae were found on trees or tree roots (alder, *Alnus glutinosa* was the only tree species available)." (Authors)] Address: Casanueva, Patricia, Universidad Europea Miguel de Cervantes, Calle Padre Julio Chevalier 2, E-47012 Valladolid, Spain. E-mail: pcasanueva@uemc.es

**15904.** Chelmick, D. (2015): Species Review 9: *Macromia splendens* (Pictet 1843) (The Splendid Cruiser). Journal of the British Dragonfly Society 31(2): 89-118. ["*M. splendens* is the only Western Palearctic representative of an essentially tropical family, the Macromiidae. This European endemic is one of our largest dragonflies and yet, until recent years, hardly anything was known about its life history or distribution. This essentially riparian species favours man-adapted habitats and particularly hydroelectric barrages. It is classified as vulnerable in the European Red List of dragonflies but its populations are stable... (Author)] Address: Chelmick, D., Macromia Scientific, 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ. UK

**15905.** Chovanec, A.; Waringer, J. (2015): Colonization of a 3rd order stream by dragonflies (Insecta: Odonata) – a best practice example of river restoration evaluated by the Dragonfly Association Index (lower Weidenbach, eastern Austria). Acta Zoo. Bot. Austria 152: 89-105. (in English, with German summary) ["Restoration measures implemented on the lower section of a third order stream (Weidenbach, eastern lowlands of Austria) were assessed by carrying out a dragonfly survey. As required under the European Water Framework Directive the assessment was based on a comparison between a river type-specific, near-pristine reference situation and the actual status quo. As a result of large-scale river regulation, there were no natural sections of the river left. Therefore, the ecological requirements of dragonfly associations were correlated with river type-specific features for deriving type-specific communities. Twenty-six breeding species belonging to all six type-specific dragonfly associations were recorded. Applying the Dragonfly Association Index, the restored river section was allocated to class I ("high ecological status"), which corresponds to the reference situation and underlines the success of the implemented restoration measures. These measures were focused on increasing the sinuosity of the river and the in-stream habitat heterogeneity (e.g. by river widening and by creating meanders) and on improving the lateral connectivity in the river system (e.g. by creating backwaters). The results of the study emphasize the necessity of implementing type-specific restoration as a basis for the colonization by a dragonfly fauna characteristic for the river." (Authors) Address: Chovanec, A., Krotenbachgasse 68, A-2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlrt.gv.at

**15906.** Coulter, J.P.; Gennard, D.E.; Mill, P.J. (2015): Ultrastructural evidence for antennal chemoreceptors in *Aeshna grandis* L. (Brown Hawker). Journal of the British Dragonfly Society 31(2): 119-129. (in English) ["The results

of an SEM investigation of the antennae of larval and adult *A. grandis* have revealed that both larva and adult possess a range of sensilla and that the morphological structures present are similar to those found in investigations carried out on other odonate species. While a chemoreceptive ability cannot be concluded categorically, from a structural view point both the larvae and adults of *A. grandis* possess sensilla coeloconica, which have often been associated with chemoreception. From the existing body of work it is likely that odonate larvae and adults use a more diverse range of cues than previously thought during searching, feeding and habitat choice, one of which is chemoreception." (Authors)] Address: Coulter, J.P., School of Life Sciences, Joseph Banks Lab., Green Lane, Lincoln, LN6 7DL 2 School of Biol., Univ. of Leeds, LS2 9JT, UK

**15907.** Díaz Martínez, C.; Evangelio Pinach, J.M. (2015): *Aeshna juncea* (Linnaeus, 1758) (Odonata: Aeshnidae) y *Sympetrum vulgatum ibericum* Ocharan, 1985 (Odonata: Libellulidae): primeras citas de Castilla-La Mancha (centro-este de España) y actualización de su distribución ibérica. *Boletín de la Sociedad Entomológica Aragonesa* 56: 439-444. (in Spanish, with English summary) ["The finding of the threatened dragonflies *A. juncea* and *S. vulgatum ibericum* in the province of Cuenca (Serranía alta) provides the first record of both species in the Castilla-La Mancha administrative region (Spain). Eleven new localities are given for *A. juncea* in the Sistema Ibérico mountain range, at the southern limit of the species' European distribution. In six of them it occurs together with *S. vulgatum ibericum*. The Iberian distribution maps of both dragonflies are updated after a literature, unpublished data and entomological collections review; as result several localities for *S. v. ibericum* are discarded and this subspecies is first recorded for the province of Guadalajara." (Authors)] Address: Díaz Martínez, Cecilia, Dirección Provincial de la Consejería de Agricultura, Medio Ambiente y Desarrollo Rural en Cuenca. Junta de Comunidades de Castilla-La Mancha, Spain. E-mail: ceciliad@jccm.es

**15908.** Dow, R.A.; Hämäläinen, M.; Stokvis, F.R. (2015): Revision of the genus *Devadatta* Kirby, 1890 in Borneo based on molecular and morphological methods, with descriptions of four new species (Odonata: Zygoptera: Devadattidae). *Zootaxa* 4033(3): 301-349. (in English) ["Species of *Devadatta* from Borneo are studied using both morphological and molecular methods. As well as *D. podolestoides* Laidlaw, four new species are recognised from the island: *D. aran* spec. nov. (holotype ♂, from Pulong Tau National Park, Miri division, Sarawak, Malaysia, deposited in RMNH), *D. clavicauda* spec. nov. (holotype ♂, from Bukit Mina, Bukit Mina Wildlife Corridor, Sarawak Planted Forest Project, Bintulu division, Sarawak, Malaysia, deposited in RMNH), *D. somoh* spec. nov. (holotype ♂, from the Sungai Kahei area, Ulu Balui, Kapit division, Sarawak, Malaysia, deposited in RMNH) and *D. tanduk* spec. nov. (holotype ♂, from Poring Hot Springs, Kinabalu National Park, West Coast division, Sabah, Malaysia, deposited in RMNH). The Philippine taxon *D. basilanensis* Laidlaw is considered a good species rather than a subspecies of *D. podolestoides*. The Bornean species plus *D. basilanensis* are provisionally considered to form a spe-

cies group, the *podolestoides*-group, within *Devadatta*. The species of the *podolestoides*-group are so similar in morphology and colouration that they are close to truly cryptic species. Two species appear to exhibit character displacement where their ranges overlap with other *Devadatta* species. A molecular analysis using four markers (COI, 16S, ITS and 28S) is presented. This analysis includes specimens of all species from the *podolestoides*-group and two *Devadatta* species from mainland Asia." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**15909.** Eda, S. (2015): A male of *Nannophya pygmaea* with black dorsal stripes on the abdomen. *Tombo* 57: 51. (in Japanese, with English summary) ["On June 20, 2014, two photos of a mature male of *Nannophya pygmaea* with black dorsal stripes on the abdomen were taken at "the dragonfly paradise" Niiyama in Ina city, Nagano prefecture." (Author)] Address: not stated

**15910.** El Joubari, M.; Hajji, K.; Himmi, O.; El Alami, M.; El Agbani, M.A.; Louah, A. (2015): Etude des Macroinvertébrés (Gastéropodes, Diptères et Odonates) des marais de Smir-Restinga (Nord-Ouest du Maroc). *Entomologie Faunistique – Faunistic Entomology* 68: 17-31. (in French, with English summary) ["The present study treats the biological and ecological aspects of the Odonata, Gastropoda and Diptera of the marshes of Smir-Restinga; it highlights the important qualitative and quantitative taxonomic richness of the latter. Seasonal samplings on the level of eight stations spread out over the whole site, gave a total of twenty families of macroinvertebrates consisted of ... four families of odonates ...] (Authors) Address: El Joubari, Mariam, Laboratoire d'Ecologie, Biodiversité et Environnement, Fac. des Sciences, Université Abdelmalek Esaadi, Avenue de Sebta, Mhanech II 93002. B.P. 212, Tétouan, Maroc. E-mail: eljoubari\_mariam@yahoo.fr

**15911.** Evangelio Pinach, J.M.; Díaz Martínez, C. (2015): Primera cita de *Oxygastra curtisii* (Dale, 1834) (Odonata: Corduliidae) en la región de Castilla-La Mancha (centro-este de España) y confirmación de su reproducción. *Boletín de la Sociedad Entomológica Aragonesa* 56: 379-380. (in Spanish, with English summary) [22-V-2015, Lagunillo del Tejo, Cañada del Hoyo, Cuenca, Spain] Address: Evangelio Pinach, J.M., Agente Medioambiental. Servicios Periféricos de la Consejería de Agricultura en Cuenca. Junta de Comunidades de Castilla-La Mancha (España). [jjevanach@hotmail.com](mailto:jjevanach@hotmail.com)

**15912.** Gallesi, M.M.; Sacchia, R.; Hardersen, S. (2015): Does wing shape of andromorph females of *Calopteryx splendens* (Harris, 1780) resemble that of males? *International Journal of Odonatology* 18(4): 305-315. (in English) ["Female limited polymorphism consists in the coexistence of two or more female morphs in the same population and is widespread among odonates. Generally, one female morph, the andromorph, resembles males in colour or, sometimes, also in morphology and behaviour, while one or more other morphs, gynomorphs, differ from males. This phenomenon is probably promoted by advantages to females which arise from reduced sexual harassment. Andromorph

females of *C. splendens* keep wing spots, like males (although these ornaments do not match exactly male wing spot colour), while gynomorphs have hyaline wings. Males and gynomorphs show a marked sexual dimorphism in wing shape, and this determines flight patterns which differ between sexes. If andromorphs mimic male wing spots to avoid harassment, they may also benefit from mimicking the male flight morphology, and consequently the male flight pattern. In this case wing shape of andromorph and gynomorph females would differ, as the wing shape of andromorphs resembles that of males. In this study we compared the wing morphology of males and of the two female morphs of *C. splendens* using geometric morphometrics. Our results revealed that andromorphs and gynomorphs of this species share the same wing shape, size, and static allometry, and this suggests that flight patterns should also be shared by the two morphs. Thus, females might avoid male harassment by mimicking exclusively male wing pigmentation (male mimicry hypothesis), or confound males through an uncommon appearance (learned mate recognition hypothesis)." (Authors)] Address: Gallesi, M.M., Dipartimento di Scienze della Terra e dell'Ambiente, Università di Pavia, Pavia, Italy

**15913.** Gaona, J.M.; Enrique, F. (2015): Nueva cita para la provincia de Cádiz (Sur de España) de la especie *Orthetrum nitidinerve* (Selys 1841) (Odonata, Libellulidae). *Boletín de la SAE* No 25: 13-15. (in Spanish, with English summary) ["New records for the species *O. nitidinerve* in the province of Cadiz (southern España) (Odonata, Libellulidae). ["*O. nitidinerve* is recorded in a new locality in the province of Cadiz, specifically within Los Alcomocales Natural Park (Los Barrios). Monitoring of the new population was carried out, confirming reproduction of the species. In addition, target species of Odonata are listed in the same habitat." (Authors)] Address: Gaona, J.M., C/Alhóndiga 5-1ºB 11370, Los Barrios, Cádiz, Spain. E-mail: ergaona1@hotmail.com

**15914.** Gaona, J.M.; Enrique, F. (2015): Nueva cita de *Selysiothemis nigra* (Van der Linden, 1825) (Odonata, Libellulidae) en la provincia de Cádiz (S. España). *Boletín de la SAE* 25: 16-17. (in Spanish, with English summary) ["New record of *S. nigra* in Cadiz province (Southern Spain) is provided." (Authors)] Address: Gaona, J.M., C/Alhóndiga 5-1ºB 11370, Los Barrios, Cádiz, Spain. E-mail: ergaona1@hotmail.com

**15915.** Gattolliat, J.-L.; Pasche, A.; Pellet, J.; Salamin Hofmann, C. (2015): L'entomofaune de la réserve naturelle des Grangettes (VD): suivi de trois groupes indicateurs. *Entomo Helvetica* 8: 13-27. (in French, with English and German summaries) ["The present study describes the results of an entomological survey that was carried out between 2013 and 2014 in the marsh landscape of federal importance of Les Grangettes. It focuses on butterflies and day-flying moths (Rhopalocera), grasshoppers (Orthoptera) and dragonflies (Odonata). Butterfly communities seemed particularly degraded in grasslands while grasshoppers exhibited relatively dense and diversified communities in similar habitats. Dragonflies are another diversified group whose populations are more

closely linked to the presence of various types of ponds, both permanent and temporary. Both grasshoppers and dragonflies proved to be efficient biological indicators, just like flora or amphibians, for measuring habitat creation and management success." (Authors)] Address: Gattolliat, J.-L., Musée cantonal de zoologie, Palais de Rumine, Place de la Riponne 6, CH-1014 Lausanne, Switzerland. E-mail: Jean-Luc.Gattolliat@vd.ch

**15916.** Gwardjan, M.; Przybylska, J.; Maniarski (2015): Dragonflies (Odonata) of Kielce. *Naturalia* 4: 90-107. (in Polish, with English summary) ["The paper presents the results of research conducted on water bodies within the city limits of Kielce (Swietokrzyskie Province) in 2008-2015. In 14 sites 46 dragonfly species were recorded, out of 72 species present in Poland. The total number, including species reported in previous publications, amounts to 50. Today 47 species occur which is 65.3% of the Polish dragonfly fauna. Reproduction was confirmed for 31 species, for further 9 it was probable. The highest number of species was found in "Wietrznia" site and other water bodies in sandpits (20-27 species). Good conditions for dragonflies were found on the ash sedimentation lagoons of Kielce Heating Plant, where 8 species created very numerous or numerous populations." (Author)] Address: Gwardjan, M., Towarzystwo Badań i Ochrony Przyrody, 25-501 Kielce, ul. Sienkiewicza 68, Poland. E-mail: mariusz@tbop.org.pl

**15917.** Hämäläinen, M. (2015): From *Echo maxima* to *Archineura maxima* - a slow taxonomic process (Odonata: Calopterygidae). *Notulae odonatologicae* 8(6): 157-168. (in English) ["The treatment of *Echo maxima* Martin, 1904 in the taxonomic literature, a species known only from a single female specimen from northern Vietnam, is briefly reported. Photographs of the holotype are provided and the species' morphological characters are compared with those of the two known *Archineura* species: *incarnata* and *heterinoides*. A new generic combination *Archineura maxima* is introduced." (Author)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: libellago@gmail.com

**15918.** Hamidan, N.; Jackson, M.C.; Britton, J.R. (2015): Diet and trophic niche of the endangered fish *Garra ghorensis* in three Jordanian populations. *Ecology of Freshwater Fish* 25(3): 455-464. (in English) ["*G. ghorensis* is a small riverine cyprinid fish endemic to the southern Dead Sea that is endangered through habitat loss and invasive species. Here, their diet and trophic niche were assessed in three Jordanian populations: an allopatric population, a population sympatric with native *Capoeta damascina* and a population sympatric with invasive *Oreochromis aureus*. Stomach content analyses of samples collected between February 2011 and January 2012 revealed that detritus and algae were prominent food items in their diets, with low dietary contributions of animal material. The most frequent and abundant macro-invertebrates in intestines were Odonata nymphs and gastropod species. The calculation of trophic niche size from the stomach content data revealed that the niche of *G. ghorensis* (0.10) was gener-



ally smaller than sympatric *C. damascina* (0.24), with an overlap of 72%, whereas they had a larger trophic niche than sympatric *O. aureus* (0.20–0.13), with a niche overlap of 54%. These outputs were generally supported by stable isotope analyses of  $d^{13}C$  and  $d^{15}N$  completed on samples collected at the end of the 2011 growth season, although these indicated a greater contribution of animal material to assimilated diet. They also indicated that the trophic niche breadth [as standard ellipse area (SEA)] of *C. damascina* ( $4.18\%^{2}$ ) was higher than *G. ghorensis* ( $2.48\%^{2}$ ) and overlapped by 26%. For *G. ghorensis*, their SEA was slightly larger than *O. aureus* ( $4.33\text{--}4.00\%^{2}$ ), with an overlap of 27%. Although both methods indicated some sharing of food resources between sympatric fishes, there was no evidence suggesting detrimental outcomes for *G. ghorensis* and thus was not considered as a constraint on the status of their populations." (Authors)] Address: Hamidan, N., Dept Life & Environmental Sci., Fac. Science & Technology, Bournemouth Univ., Poole BH12 5BB, UK. E-mail: nashat.hamidan@gmail.com

**15919.** Hasan, J.; Raj, S.; Yadav, L.; Chatterjee, K. (2015): Engineering a nanostructured "super surface" with superhydrophobic and superkilling properties. *RSC Adv.*, 2015, 5: 44953–44959. (in English) ["We present a nanostructured "super surface" fabricated using a simple recipe based on deep reactive ion etching of a silicon wafer. The topography of the surface is inspired by the surface topographical features of dragonfly wings. The super surface is comprised of nanopillars 4  $\mu\text{m}$  in height and 220 nm in diameter with random inter-pillar spacing. The surface exhibited superhydrophobicity with a static water contact angle of  $154.0^{\circ}$  and contact angle hysteresis of  $8.3^{\circ}$ . Bacterial studies revealed the bactericidal property of the surface against both gram negative (*Escherichia coli*) and gram positive (*Staphylococcus aureus*) strains through mechanical rupture of the cells by the sharp nanopillars. The cell viability on these nanostructured surfaces was nearly six-fold lower than on the unmodified silicon wafer. The nanostructured surface also killed mammalian cells (mouse osteoblasts) through mechanical rupture of the cell membrane. Thus, such nanostructured super surfaces could find applications for designing self-cleaning and anti-bacterial surfaces in diverse applications such as microfluidics, surgical instruments, pipelines and food packaging." (Authors)] Address: Hasan, J., Dept of Materials Engineering, Indian Inst. of Science, Bangalore, Karnataka, India 560012. E-mail: kchatterjee@materials.iisc.ernet.in;

**15920.** Hayashi, F. (2015): Mechanisms of sperm displacement in *Calopteryx cornelia*: effects of sexual conflict. *Tombo* 57: 1–7. (in Japanese, with English summary) ["In this short review, the shape and function of female sperm-storage organs and male sperm-removal organs in *C. cornelia* are discussed from the viewpoint of sexual conflict. Females have two sperm-storage organs, a spherical bursa copulatrix (be) and a tubular Y-shaped spermatheca (sp), both of which function equally in sperm storage because the survival rates of stored sperm for 5 days do not differ between be and sp. Males possess a peculiar aedeagus with a recurved head to remove bursal sperm and spiny lateral processes to remove spermathecal sperm as

known generally in other calopterygid damselfly species. However, the male genitalia of *C. cornelia* are morphologically asymmetric after sexual maturation. The left lateral process is well developed (projected outwards) but the right one is positioned along the edge of the recurved head. Experiments by surgical cutting of each lateral process demonstrate that only the left process functions in removal of left spermathecal sperm. Such asymmetric male genitalia may be caused by sexual conflict in sperm displacement processes." (Author)] Address: E-mail: fhayashi@t-mu.ac.jp

**15921.** Hefler, C.; Qiu, H. (2015): Visualization and aerodynamic analysis of an escaping dragonfly. The 13th Asian Symposium on Visualization, Novosibirsk, Russia, 2015: 10 pp. (in English) ["An unsteady flow visualization and force measurement were carried out in order to investigate the effects of the reduced frequency of a dragonfly-type model. The flow visualization of the wing wake region was conducted by using a smoke-wire technique. An electronic device was mounted below the test section in order to find the exact position angle of the wing for the visualization. A load-cell was employed in measuring aerodynamic forces generated by a plunging motion of the experimental model. To find the period of the flapping motion in real time, trigger signals were also collected by passing laser beam signals through the gear hole. Experimental conditions were as follows: the incidence angles of the fore and hind-wing were  $0^{\circ}$  and  $10^{\circ}$ , respectively, and the reduced frequencies were 0.150 and 0.225. The free stream velocities of the flow visualization and force measurement were 1.0 and 1.6m/sec, respectively, which correspond to Reynolds numbers of  $3.4 \times 10^3$  and  $2.9 \times 10^3$ . The variations of the flow patterns and phase-averaged lift and the thrust coefficients during one cycle of the wing motion were presented. Results showed that the reduced frequency was closely related to the flow pattern that determined flight efficiency, and the maximum lift coefficient and lift coefficient per unit of time increased with reduced frequency." (Authors)] Address: Hefler, C., Dept of Mechanical & Aerospace Engineering, Hong Kong University of Science and Technology, Hong Kong SAR, China. E-mail: meqiu@ust.hk

**15922.** Hunt, S.K. (2015): Climate- and habitat-mediation of predator-prey interactions in an invasion context. Master of Science thesis, University of Canterbury. 82 pp. (in English) ["Ecosystems across the globe are facing a range of anthropogenically-driven changes, including biotic invasions, urbanisation and land-use alterations, which can affect ecosystem structure and stability. To manage both native species decline and invasive species spread it is imperative that we can accurately predict how current global environmental change will affect biotic communities. I examined effects of different land uses at both landscape- and habitat-scales on native (*Culex pervigilans*) and exotic (*Aedes notoscriptus*) mosquito distributions in lentic (standing water) freshwater habitats. Because of the importance of land use on habitat characteristics, I expected different land uses would contain different biotic communities, and that mosquitoes would more likely be present in simple communities with fewer predators. Moreover, because habitat disturbance and modification can signific-

antly influence community structure, I expected less diverse pond communities in habitats within highly modified urban and pasture land uses would also be more likely to contain mosquitoes. I found land use affects mosquito presence, and was likely strongly linked with land-use effects on predator presence and taxon richness. Predators were more common in habitats within native forest and tussock grassland, and mosquitoes were almost entirely restricted to urban and pasture habitats. Moreover, local habitat characteristics had a strong influence on both mosquito and predator presence, with deeper and more open habitats supporting greater predator abundance, thereby excluding mosquito larvae. To further investigate the global of climate change on predator-prey interactions involving *Ae. notoscriptus* and *Cx. pervigilans*, I conducted two experiments. Firstly, I measured effects of habitat warming and short- and long-term habitat drying on interactions between the two mosquito species and three predatory invertebrates, *Anisops wakefieldi* backswimmers, *Austrolestes colenisonis* damselflies, and *Procordulia smithii* dragonflies, which represented predators characteristic of different habitat drying regimes. A second experiment further tested interactions between *A. wakefieldi* and the two mosquito species in a wider range of temperatures. There was little evidence that short-term habitat drying affected interaction strengths of any of the predator-prey combinations, but strong evidence for the importance of temperature-mediated predation rates which depended on both predator and prey identities. Here, predators characteristic of more temporary hydroperiods showed temperature-mediated predation responses on the two mosquito species: increasing temperature resulted in greater predation on native *Cx. pervigilans* but not effect on predation on exotic *Ae. notoscriptus*. The second experiment revealed, again, that predation depended on both temperature and mosquito species with higher predation occurring at increased temperature, but also indicated life history traits could mediate the overall effect of temperature-mediated predation. Overall, I have shown that interactions between temperature, predator identity and mosquito species will be very important in determining the potential for mosquitoes to invade under a changing climate. Considering effects of both climate change and land-use-driven habitat modification on the invasion potential of mosquitoes in freshwater communities will therefore be important for managing both native species decline and spread of invaders. Moreover, research and management decisions on critical species like mosquitoes will need to encompass multiple drivers of climate change at both global and local scales." (Author)] Address: not stated

**15923.** Johnson, J. (2015): *Tamea onusta* (Red Saddlebags) new to Oregon. *Argia* 27(4): 14-16. (in English) [*Tamea onusta*, Curry County, Oregon, USA, 29 July 2015.] Address: jt\_johnson@comcast.net

**15924.** Kalita, G.J.; Ray, S.D. (2015): Studies on the diversity and habitat preference of odonates in Deepor Beel Bird Sanctuary, Kamrup, Assam. *Journal of Entomology and Zoology Studies* 3(2): 278-285. (in English) [Deepor beel bird sanctuary, during December 2013 to September 2014. "Deepor beel bird sanctuary lies between 26° 7' 52"

N; 91° 38' 70" E in Kamrup district. A total of 39 species belonging to 5 families and 22 genera were recorded from Deepor beel bird sanctuary. We also recorded *Ceriatrigon rubiae* and *Agriocnemis kalinga*, which is the first formal record from Assam. *Rhyothemis variegata* was the most abundant anisopteran species and *Pseudagrion microcephalum* the most abundant zygopteran species in Deepor beel bird sanctuary." (Authors)] Address: Gaurab Jyoti Kalita, Dept of Wildlife & Biodiversity Conservation, North Orissa Univ., Odisha, India

**15925.** Karube, H. (2015): Additional records of Vietnamese Odonata I, with descriptions of two new gomphid species. *Tombo* 57: 27-35. (in English, with Japanese summary) ["Two new gomphid species from Vietnam, *Trigomphus kompieri* sp. nov. and *Lamelligomphus vietnamensis* sp. nov. are described and illustrated. *Leptogomphus uenoi*, originally described by only female, are re-described together with first male. Records of a few other anisopteran species are presented, including novelties to the Vietnamese fauna." (Author)] Address: Karube, H.; Kanagawa Prefectural Museum of Natural History, 499 Iryuda, Odawara, Kanagawa, 250-0031 Japan. E-mail: paruki@nh.kanagawa-museum.jp

**15926.** Karube, H.; Machida, M. (2015): Record of a gynandromorphic individual of *Lyriothemis pachygastra* (Selys, 1878) (Anisoptera: Libellulidae). *Tombo* 57: 43-45. (in Japanese, with English summary) ["A gynandromorphic individual of *L. pachygastra* was captured at Minamiashigara, Kanagawa Pref., Japan, which is the second record for this species. This individual roughly bears male characteristics on the left side and female characteristics on the right side." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**15927.** Karube, H. (2015): True identity of *Phaenandrogomphus dingavani* (Fraser, 1924) (Odonata: Gomphidae), a new status as *Scalmogomphus dingavani* comb. nov.. *Tombo* 57: 36-37. ["*Onychogomphus dingavani*" was long placed in the genus *Phaenandrogomphus*. It is shown that the species clearly belongs to the genus *Scalmogomphus*." (Author)] Address: Karube, H., Kanagawa Prefectural Museum of Natural History, 499 Iryuda, Odawara, Kanagawa, 250-0031 Japan. E-mail: paruki@nh.kanagawa-museum.jp

**15928.** Kasuya, M. (2015): Observation of sitting-oviposition into water of *Stylogomphus suzukii*. *Tombo* 57: 46-47. (in Japanese, with English summary) ["A female of *S. suzukii* oviposited into water in a sitting position at Fukazawa River in Izunokuni City, Shizuoka Prefecture. Previously this species has been known to release egg masses by flying and striking the water surface." (Author)] Address: not stated

**15929.** Katatani, N.; Kitagawa, K. (2015): Notes on the Odonate fauna of Southeast Asia Part 5. Libellulidae 2 (Genus *Indothemis*, *Pseudothemis* & *Trithemis*). *Aeschna* 51: 33-47. (in Japanese, with English summary) ["This is the fifth report of Southeast Asian Odonata of the genus *In-*

dothemis, Pseudothemis and Trithemis... The genus *In-dothemis* includes *I. carnatica* and *I. limbata*. The genus *Pseudothemis*; *P. jorina* and *P. zonata*. The genus *Trithemis* includes; *T. aurora*, *T. festiva* and *T. pallidinervis*. The feature of the color pattern of the body of the above seven species are shown by photographs and figures. The observations 'on these species and their distribution are also reported. Genus of *In-dothemis* closely resembles that of *Trithemis*. The authors show the differences between *In-dothemis* and *Trithemis*. Two species of *Pseudothemis* are considered to have habitat segregation. However, a place has been found where both species are living together in northern mountain of Laos. The distribution map of two species of *Pseudothemis* is shown." (Authors)] Address: Kitagawa, K., Imaiti 1-11-6, Asahi-ku, Osaka C., Osaka, 535-0011, Japan

**15930.** Kaur, M.; Ware, J.L.; Bechly, G. (2015): How to date a dragonfly: Fossil calibration of dragonfly phylogeny (Odonata: Anisoptera). *Palaeontologia Electronica* 19.1.1FC: 14 pp. (in English) [Molecular data along with fossils are being used increasingly to recover time-calibrated phylogenetic trees. Recently there have been manuscripts that have used divergence dating to understand evolutionary history of certain clades within Odonata (dragonflies and damselflies), yet the number of such articles is still low. We examined the Odonata fossil record and made a list of fossils that can be used for divergence time analysis. In this manuscript we provide a detailed review of the known crown group fossils for the order Odonata and nine nodes within this clade: Zygoptera, Eiprocta, Anisoptera, Aeshnidae, Gomphidae, Cavilabiata, Macromiidae, Corduliidae, and Libellulidae." (Authors)] Address: Bechly, G., Staatliches Museum für Naturkunde, Abt. Paläontologie, Rosenstein 1, 70191 Stuttgart, Germany. E-mail: guenter.bechly@smns-bw.de

**15931.** Kirpik, M.A.; Iskender, A. (2015): Kars Plateau Odonata (Insecta) Faunasinin Belirlenmesi. *Kafkas Üniversitesi Fen Bilimleri Enstitüsü Dergisi* 8(2): 54-65. (in Turkish, with English summary) ["Determination of Kars Plateau Odonata (Insecta) Fauna: Odonata in various puddles, marshy places and various areas have been collected from Kars Center and Administrative district through June 2005 and August 2009. 13 species have been proved: *Calopteryx splendens*, *Lestes sponsa*, *L. barbarus*, *Enallagma cyathigerum*, *Aeshna affinis*, *A. juncea*, *Libellula depressa*, *L. quadrimaculata*, *Leucorrhinia pectoralis*, *Sympetrum pedemontanum*, *S. sanguineum*, *S. flaveolum*, *S. striolatum*. ...." (Authors)] Address: Kirpik, M.A., Kafkas Üniversitesi Fen Edebiyat Fakültesi Biyoloji Bölümü, 36100-Kars, Turkey. E-mail: kirpik80@gmail.com

**15932.** Kobayashi, J. (2015): Morphological characteristics of female genitalia in *Anotogaster sieboldii* (Selys) (Anisoptera: Cordulegastridae). *Tombo* 57: 9-13. (in English) ["The structures of the female genitalia, particularly the ectodermal components, in *A. sieboldii* are described and compared with other Odonata. The female genitalia of *A. sieboldii* resemble those of other taxa, with the following exceptions:(1) spermathecae are composed of a double membrane, (2) medial cuticular plate is situated inside the

*bursa copulatrix*, (3) ventromedial tendon is extraordinarily elongate, and (4) paired vaginal plates on each side of the vagina are absent. Homology of the common spermathecal duct in phylogenetically unrelated Odonata is currently unexplained." (Author)] Address: Kobayashi, J., Laboratory of Entomology, Tokyo Univ. of Agriculture 1737 Funako, Atsugi-shi, Kanagawa 243-0034, Japan E-mail: 43313002@nodai.ac.jp

**15933.** Komposch, B.; Holzinger, W.E. (2015): Wiederaufbau der Vogel-Azurjungfer [*Coenagrion ornatum* (Selys, 1850)] in Kärnten (Insecta: Odonata). *Carinthia* II 205/125: 639-642. (in German, with English summary) ["A small population of *C. ornatum* was discovered in June 2015 in a small drainage rivulet in Krottendorf/Eppendorf north of Lavamünd in southeastern Carinthia. It is the only assured population in Carinthia, existing quite isolated from next habitats in Slovenia and Styria. We recommend to enlarge the adjacent Natura 2000 site „Untere Lavant“ (AT2124000) a little bit to include this population and ensure its further survival.] Address: Komposch, Brigitte, Ökoteam, Bergmannsgasse 22, A-8010 Graz, Austria. E-mail: b.komposch@oekoteam.at

**15934.** Kosterin, O.E. (2015): Taxonomic and faunal notes on *Macromia Rambur*, 1842 from Cambodia (Odonata: Macromiidae). *Odonatologica* 44(1/2): 117-151. (in English) ["Five species of *Macromia* were recently collected in Cambodia. For *Macromia aculeata*, this is the second finding of the species since its description in 1927. This species is very close to *M. arachnomima*, described from Borneo, but comparison of the respective holotypes proved them as different species. Records of *M. arachnomima* from Thailand, Laos, and the Malay Peninsula need to be reconsidered. The closely related species *M. cincta* and *M. cupricincta* have both been found in Cambodia; their diagnostic characters are discussed. *M. berlandi* is supposed to be a northern subspecies of *M. cupricincta*. Variation in *M. chaiyaphumensis* and *M. septima* is considered, and a female of the former is described. Controversies in grouping of Asian *Macromia* species are discussed. Notes on habitats and behaviour of the species considered are briefly provided." (Author)] Address: Kosterin, O.E., Inst. Cytology & Genetics, Siberian Branch, Russian Acad. Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**15935.** Kovacs, T.; Theischinger, G.; Juhasz, P.; Danyik, T. (2015): Odonata from Batanta (Indonesia, West Papua) with description of three new species. *Folia historico-naturalia Musei Matraensis* 39: 17-29. (in English) ["Thirty-eight taxa of Odonata are reported from Batanta Island (including Arefi and Birie Islands). Three new species are described: *Drepanosticta batanta* sp. n., *Palaiargia susannae* sp. n. and *Diplacina olahi* sp. n.. *Hydrobasileus vittatus* is new to New Guinea. The following 15 species are new to the Raja Ampat Islands: *Drepanosticta auriculata*, *Metagrion postnodale*, *Selysioneura* cf. *cervicomu*, *Nososticta* cf. *finisterrae*, *Idiocnemis bidentata*, *I. inornata*, *Agriocnemis femina*, *Ceragrion aeruginosum*, *Ischnura senegalensis*, *Pseudagrion* cf. *civicum*, *Xiphiagrion cyanomelas*, *Diplacodes trivialis*, *Huonia epinephela*, *Neurothemis ramburii*, *Orthetrum ser-*



apia, *Rhyothemis phyllis*." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**15936.** Krech, M.; Hampel, J. (2015): Untersuchungen zur Libellenfauna der Tongruben bei Mittelhausen (Landeshauptstadt Erfurt/Thüringen). Thüringer Faunistische Abhandlungen 20: 63-70. (in German, with English summary) ["A survey on the dragonfly fauna of the clay pits close to Mittelhausen (state Capital Erfurt/Thuringia). From 1998 to 2015 a total of 40 dragonfly species has been recorded. Moreover, the clay pit has been used by 37 species for reproduction. The species has been changed over the past decade for the benefit of thermophile, highly expansive dragonfly species. However, the large number of occurring species as well as the presence of several vulnerable species emphasises the importance of the investigated clay pits as a unique breeding habitat for dragonflies in an extensively urban shaped environment." (Authors)] Address: Krech, M., Auf der Großen Mühle 7, 99098 Erfurt, Germany

**15937.** Kunz, B. (2015): Status and distribution of *Sympetrum sanguineum* in Sardinia (Odonata: Libellulidae). *Libellula* 34(3/4): 161-173. (in German, with English and Italian summaries) ["*S. sanguineum* was recorded in Sardinia in 1990, 2011, and 2013 at 13 locations between 15 and 1,005 m a.s.l. Exuviae or larvae were found at ten locations. Some of these are among the highest reproduction sites for this species in Europe. With records from six of eight provinces, *S. sanguineum* is a native member of the Sardinian dragonfly fauna." (Author)] Address: Kunz, B., Hauptstr. 111, 74595 Langenburg, Germany. E-mail: libellenbernd@gmail.com

**15938.** Li, C.-C.; Lin, S.-C., Hsiao, W.-F. (2015): Morphology and life history of *Ischnura senegalensis* (Odonata: Coenagrionidae). *Formosan Entomol.* 35: 185-193. (in Chinese, with English summary) ["This paper describes the basic biology of *I. senegalensis*, including its life history under laboratory conditions, body colour pattern, behaviour observations, and the ratio of female colour types in the field. In the laboratory rearing of *Ischnura senegalensis*, the egg stage was  $6.0 \pm 2.5$  days, egg and larval stage were  $44.4 \pm 10.5$  days, male adult longevity was  $15.6 \pm 6.9$  days, female adult longevity was  $15.9 \pm 7.0$  days, and the life cycle was  $66.0 \pm 19.9$  days, all at room temperature. The newly emerged male adults were all of a blue turquoise to green turquoise. On the other hand, the newly emerged female adults showed four colour types: orange, green, green turquoise and blue turquoise. The above female colour types were in an approx. ratio of 9 : 3 : 3 : 1 using the chi-square goodness-of-fit test for both the lab. raised ( $\chi^2 = 6.51$ ,  $p > 0.05$ ,  $df = 3$ ) and field populations ( $\chi^2 = 4.55$ ,  $p > 0.05$ ,  $df = 3$ ). In other words, the orange female was the most abundant, followed by the green and green turquoise females, while the blue turquoise female was uncommon.] Address: Li, C.-C., Dept of Bioresources, National Chiayi University, Chiayi, Taiwan

**15939.** Li, Qiu-j.; Huang, Hai-t.; Lei, Chi-i.; Kan, Hon-p.; Wong, Kai-c.; Hu, Shao-f.; Zeng, Wen-h. (2015): Study on diversity and fauna of Odonata in Macao. *Guangdong Agricultural Sciences* 42(24): 157-161. (in Chinese, with English summary) ["An investigation of Odonata in 2014 showed that there were 35 species, belonging to 26 genera, 6 families, in Macao. Among them, *Pantala flavescens*, *Ceriatrigon aeruginosum*, and *Ischnura senegalensis* were dominant species. Faunal characteristics of Odonata in Macao showed that 27 oriental species and 8 cosmopolitan species, occupied 77.14% and 22.86% in total, respectively. The diversity index, evenness index, dominance index, and superiority centrality index of Odonata in Macao were 2.8084, 0.7899, 0.1981 and 0.0910, respectively. Similarity index of Odonata in Macau Peninsula, Taipa Island and Coloane Island was 47%-77%. Richness and diversity of Odonata in Coloane Island was the highest, Taipa Island followed, and Macau Peninsula was the lowest." (Authors)] Address: Li, Q.-j., Guangdong Entomological Inst. / Key Lab. of Integrated Management of agricultural pests, Guangdong Province / Guangdong wildlife protection and utilization of public laboratory, Guangzhou, Macao Special Administrative Region 510 260 IACM, Macau

**15940.** Liebel, H.T.; Segreto, R. (2015): Erweiterung der Höhenverbreitung von *Gomphus vulgatissimus* in Bayern (Odonata: Gomphidae). *Libellula* 34(3/4): 195-201. (in German, with English summary) ["Altitudinal range expansion of *G. vulgatissimus* in Bavaria (Odonata: Gomphidae) – At lake Lautersee (county of Garmisch-Partenkirchen, district Upper Bavaria) an emerging individual of *G. vulgatissimus* was observed on the 16th of May 2015 at an altitude of 1,014 m asl. This is the uppermost evidence of reproduction for this species in Germany. Data of *G. vulgatissimus* from a central Bavarian database of observations was analyzed for altitudinal range shifts of this species. The result indicates a clear range expansion towards higher altitudes and an increase in observations of exuviae at higher altitudes than before." (Authors)] Address: Liebel, H.T., Arzgrubenweg 7, 82481 Mittenwald, Germany. E-mail: heiko.liebel@gmail.com

**15941.** Louboutin, B.; Blanchon, Y.; Gaymard, M.; Houard, X.; Jaulin, S.; Monchaux, G.; Petitot, M.; Rondeau, A.; Ronne, C. (2015): Détection des populations de Gomphidae sur le Rhône méridional. Les invertébrés dans la conservation et la gestion des espaces naturels. Actes du colloque de Toulouse du 13 au 16 mai 2015: 71-76. (in French, with English summary) ["Regional declensions of the objectives of the National Action Plan (PNA) for the threatened dragonflies require appropriation of conservation issues by the different actors. The National Company of the Rhône (CNR), which manages the Rhône River and its annexes environment wished to get involved in improving knowledge on the distribution and ecology of the Rhône river species to integrate them at best in its management. The Rhône is a river relatively difficult to prospect whose odonatological knowledge remains fragmentary. An inventory program to detect the presence, estimate and locate the emergence of the species concerned by the PNA on the southern Rhône sectors has been established for 3 years from 2014 to 2016. This communication presents

the methodology and results for the first year of inventory." (Authors)] Address: not stated

**15942.** Lowdon, J. (2015): The habitat requirements and changing distribution of *Calopteryx splendens* (Harris) (Banded Demoiselle) in Northumberland. *Journal of the British Dragonfly Society* 31(1): 1-13. (in English) ["*C. splendens* is one of many Odonata species expanding their range northwards in Great Britain. This study investigates this shift within the county of Northumberland, alongside an analysis of habitat characteristics (using River Habitat Surveys) and their influence on site selection. The availability of further habitat in the county was also examined, with many currently unoccupied but suitable sites found." (Author)] Address: Lowdon, Jennie, 8 Fell Terrace, Burnopfield, Newcastle upon Tyne, NE16 6DW, UK

**15943.** Machado, A.B.M.; Bedê, L.C. (2015): Two new genera and nine new species of damselflies from a localized area in Minas Gerais, Brazil (Odonata: Zygoptera), *International Journal of Odonatology* 18(4): 269-296. (in English) ["Two new genera, *Franciscobasis* and *Franciscagrion*, and seven new species, i.e. *Acanthagrion franciscoi*, *Franciscobasis franciscoi*, *Franciscobasis sonia*, *Franciscagrion franciscoi*, *Franciscagrion longispinum*, *Minagrion franciscoi* and *Oxyagrion franciscoi*, are described and illustrated. In addition, two new species of *Peristicta* are reported and will be described elsewhere. All these species have been collected along a 600 m stretch of the headwaters of the São Francisco River, within the Serra da Canastra National Park, in the state of Minas Gerais, Brazil. The significance of this finding in such a small area is discussed." (Authors)] Address: Machado, A.B.M., Depto de Zoologia, Inst. Cienc, Biol., Univ. Federale de Minas Gerais, Caixa Postal 486, 31270-901 Belo Horizonte, Minas Gerais, Brazil. E-mail: angelo@icb.ufmg.br

**15944.** Magalhaes, E.R.S.; Yamamoto, K.C.; Anjos, H.D.; Loebens, S.; Soares, M.G.M. (2015): Banks of aquatic macrophytes of floodplain lake: sites of alimentation of two species of the fish in the region of Manaus, Amazon, Brazil. *Actapesca* 3(1): 25-40. (in Portuguese, with English summary) ["The aquatic macrophytes banks in the floodplain lakes of the Amazon river constitute a major environments inhabited by fish. The abundance of aquatic macrophytes suggests that there is a high availability of food, autochthones and allochthones, to fish species. The diet composition of *S. marmoratus* and *C. amazonarum* was evaluated by the analysis of stomach contents of 201 specimens, by frequency of occurrence and gravimetric methods. The results of both methods were combined in the food index (IAi). In the high and low water periods, the food items most eaten by *S. marmoratus* and *C. amazonarum* were insects (Hemiptera and Odonata) and the fish (muscle and scales). The analysis of variance (one-way ANOVA) shows there are significant differences in the food types according length classes. In *S. marmoratus* differences occurring between high and low water periods. But to *C. amazonarum* was different only in high water periods. In conclusion, the aquatic macrophytes banks serve as an important feeding place for *S. marmoratus* and *C. amazonarum* in Amazon floodplain lakes." (Au-

thors)] Address: Magalhaes, E., Depto de Ciências Pesqueiras, Universidade Federal do Amazonas - UFAM, Brazil. E-mail: esnermagalhaes@gmail.com

**15945.** Maingot, M.; Motte, G.; Goffart, P. (2015): Première étude de l'émergence de la Cordulie à corps fin (*Oxygastra curtisii*) le long de l'Ourthe. *Les Naturalistes beiges* 96(3-4): 57-83. (in French, with English summary) ["Emergence is an important and highly vulnerable step in the dragonfly life. This process seemed not to have been directly observed on *O. curtisii*, a remarkable species of West-European fauna, protected by the "Natura 2000" Habitat Directive, while several studies have provided information on its larval and adult life. A preliminary study has therefore been carried out in June 2014 and 2015 on a little section of the river Ourthe (a tributary of the Meuse river), to document this step. Observations of emergence sequences occurred only at night time, between 22h00 and 5h00 in the morning, for a duration of 4 hours to 6 hours, the maiden flight taking place before dawn. This particular mode of emergence, described in some Anisoptera of our regions and more frequently in the tropics, likely allows to escape predation by birds. Given the aggregative character of this species' emergences on trees above larval breeding sites (among immersed roots), this nocturnal tempo presents an obvious selective advantage. The phenomenon of "divided" emergence, consisting of shifting the period of emergence during the day when the nocturnal temperatures are too cool, known from other European species with nocturnal emergence, has not been observed. The temporal and spatial distribution of the emergences, the sex ratio, the supports and positions chosen at the emergence are also presented and discussed." (Authors)] Address: Goffart, P., Observatoire de la Faune, de la Flore et des Habitats, Centre de Recherche de la Nature, des Forêts et du Bois, Avenue de la Faculte d'Agronomic, 22, 5030 Gembloux, Belgium. E-mail: p.goffart@mrv.wallonie.be

**15946.** Malikova, E.I.; Streltsov, A.N. (2015): Artificial water bodies as a base in the dispersal of dragonflies (on the sample of the Kivdinskoe reservoir, Amurskaya oblast). *A.I. Kurentsov's Annual Memorial Meetings* 26: 76-87. (in Russian, with English summary) ["The list of 44 species of dragonflies collected in Amurskaya oblast from Kivdinskoe reservoir (a technological water reservoir to the Raichikhinsk GRES) is given. A number of rare in the Amur region oriental species were abundant there. *Paracercion hieroglyphicum* and *Deiella phaon* are reported for Amurskaya oblast for the first time. Number of species of the studied reservoir is richer by 10-15 species than that of the neighbouring natural water bodies (lakes, oxbows, creeks etc.), probably due to better temperature conditions. The high abundance of the mentioned species suggests that the Kivdinskoe reservoir can serve as a base in the dispersal of southern migrants to the north and west." (Author)] Address: Malikova, Elena, Blagoveshchensk State Pedagogical University, Blagoveshchensk, Russia. E-mail: e\_malikova@inbox.ru

**15947.** Massard, J.A.; Geimer, G.; (2015): Le professeur Jos Hoffmann (1911-2000), pédagogue, zoologue et

défenseur de la nature, membre méritant de la Société des naturalistes luxembourgeois. Bulletin de la Société des naturalistes luxembourgeois 116: 321-345. (in French, with English summary) ["Jos Hoffmann was born in Reckange (commune of Mersch) on 11-XII-1911 and died in Luxembourg-City on 16-XII-2000. He was a natural sciences teacher, first at the 'gymnase d'Echternach' (grammar school), then at the 'Lycée de garçons de Luxembourg' and the 'Cours supérieurs/Cours universitaires de Luxembourg'. The author of numerous faunistical studies of invertebrate groups such as Ephemeroptera, Hirudinea, Myriapoda, Odonata, Plecoptera, Neuropteroidea, Amphipoda, Orthoptera, Mecoptera, Dermaptera, Trichoptera, Oligochaeta and others, he was the outstanding zoologist of the second half of the 20th century in Luxembourg. Jos Hoffmann was an active member of the 'Société des naturalistes luxembourgeois' (Society of Luxembourg naturalists) and above all of the science section of the grand-ducal Institute. He was a keen angler, and a member of the executive board of the 'Fédération luxembourgeoise des pêcheurs sportifs' (Luxembourg federation of sport anglers) as well as the editorial director of 'De Lëtzeburger Sportfëschcher', the federation's bulletin, from 1956 to 1959. In 1948, he had distinguished himself by his resolute intervention during the accidental pollution of the river Eisch by the phenol factory of Steinfort. Just like so many young Luxembourgers two of his brothers had been illegally forced into the German Wehrmacht during World War II by the Nazis occupying Luxembourg, and they had been made prisoners of war on the Eastern Front. This explains why Jos Hoffmann had been a founding member and a member of the executive board of the Luxembourg association of parents of prisoners of war in 1945. In the following years he developed a short-time public activity in the Christian Social Party (Parti chrétien-social). Jos Hoffmann is the father of Jules A. Hoffmann, winner of the Nobel prize for physiology or medicine in 2011." (Author)] Address: Geimer, Gaby, 1a, rue des Romains, 6478 Echternach, Luxembourg. E-mail: gabrielle.geimer@education.lu

**15948.** Maton, P. (2015): Photospot: Norfolk Hawker *Aeshna isosceles*. *Atropos* 55: 72. (in English) [05-VI-2014, Kent Wildlife Trust Reserve, East Blean Woods, UK,] Address: not stated

**15949.** Medina, M.N.D.; Cabras, A.A.; Villanueva, R.J.T. (2015): Description of male *Risioicnemis moroensis* Hämäläinen 1991 (Odonata: Platycnemididae) from Davao City, Mindanao Island, Philippines. *Journal of Advances in Biology* 8(3): 1636-1640. (in English) ["Description of the male *Risioicnemis moroensis* (Hämäläinen, 1991) is provided with confirmation of the taxon into appendiculata group is presented." (Authors)] Address: Dejadena Medina, M.N.D., Research and Publication Center, University of Mindanao, Davao City Philippines. E-mail: mnd\_meditina@umindanao.edu.ph

**15950.** Medina, M.N.D.; Cabras, A.A.; Villanueva, R.J.T. (2015): Odonata of Island Garden City of Samal and its relation to other small islands in The Philippines. *Proceedings of International Conference on Life Sciences and Biotechnology (ICOLIB)*. Exploration and Conservation of

Biodiversity, Jember. ISBN: 978-602-9030-98-3: 93-97. (in English) ["The first record of Odonata fauna in the Island Garden City of Samal is presented with comparison to other small islands in the Philippines. Opportunistic and photo documentation were employed in all fluvial systems surveyed between April 2014 to April 2015. 31 species belonging to 7 families and 22 genera was recorded. 12 species or 39% are zygopterans and 19 species or 61% are anisopterans. A relatively low level of endemism (35%) is recorded which is attributed to the different habitat modifications of its fluvial systems. Kroeber's percentage of similarity revealed Island Garden City of Samal shares similar Odonata species with Siargao and Saranggani Islands characterized by karst ecosystem with low lying topography. Creation of local policy to protect the head waters where most of the endemic species found is urgently needed" (Authors)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**15951.** Medina, M.N.D.; Cabras, A.A.; Villanueva, R.J.T. (2015): Odonata fauna of Compostela, Valley Province, Mindanao Island, Philippines. *International Journal of Current Research in Biosciences and Plant Biology* 2(10): 104-109. (in English) ["The first provincial-wide survey of Odonata was conducted in Compostela Valley Province (Comval). Opportunistic and segmented line transect method was employed in all fluvial systems visited between March and September 2014. A total of 2,883 individuals belonging to 12 families 24 genera and 32 species were recorded. 17 out of 32 species or 53% belongs to suborder Anisoptera while 15 species or 47% are Zygopterans. Compostela Valley province exhibits 56% endemism, one of the highest endemism records in Mindanao. An immediate conservation effort to fluvial systems containing high endemism and species quality is recommended." (Authors)] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**15952.** Michalski, J.; Abbott, J.C. (2015): *The Dragonflies & Damselflies of Trinidad & Tobago*. Kandanum Books, Morristown NJ. 270 pp. (in English) ["Located at the extreme southern tip of the Lesser Antilles, Trinidad and Tobago's biological affinities are with the South American mainland, rather than the Caribbean islands to the north. Together, these two islands are home to over 120 species of Odonata - all covered in this field guide - and provide a perfect introduction to the flora and fauna of the Neotropics." (Publisher)]

**15953.** Miyazaki, T. (2015): On a specimen of *Aeshna mixta* collected by Mr. Syujiro Hirayama (1889~1954) in Chiba Prefecture, Central Japan, with a review on records of the species before 1950. *Tombo* 57: 39-42. (in Japanese, with English summary) ["S. Hirayama (1889-1954)'s report of *A. mixta* from Chiba Prefecture in 1935 was treated as doubtful in the Red Data Book of the Prefecture (2011), because of poor and inadequate knowledge for identification between *A. mixta* and related species, especially *Anaciaeschna martini* at that time. The author examined Hirayama's collection housed in the Museum of Nature and



Human Activities, Hyogo and verified that the specimen of his report was true 'Aeshna mixta'. In addition, a specimen of the same species from Inokashira, Tokyo, was kept in the same collection. The author also reviewed old records of *A. mixta* with drawings and/or photos of specimens and showed that *A. mixta* also occurred in Katsushika, lowland of Tokyo, more than 70 years ago." (Author)] Address: E-mail: t-miyaza@juno.ocn.ne.jp

**15954.** Moali, A.; Durand, E. (2015): Découverte de *Selysiothemis nigra* (Vander Linden, 1825) (Odonata, Anisoptera: Libellulidae) au Lac Mezaïa à Béjaïa, Algérie. *Poiretia* 7: 1-5. (in French, with English summary) ["During a visit to at Bejaïa (NE Algeria) in summer 2013, a population of *S. nigra* has been identified in Mezaïa lake. Several specimens with breeding behaviours were noticed. These observations represent the first documented mention of this species on the Mediterranean coast of Algeria."] Address: Moali, Aïssa, Laboratoire d'Ecologie et Environnement, Université de Béjaïa, 06000, Béjaïa, Algeria. E-mail: aissa.moali@gmail.com

**15955.** Munoz, P.; Torres, F.; Megias, A. (2015): Effects of roads on insects: a review. *Biodivers. Conserv.* 24: 659-682. (in English) ["In the last few decades, mounting evidence points to a negative impact of roads on several groups of animals. Most studies on the effects of roads on animal populations concentrate on vertebrates, and only a few on insects. It is difficult to determine the real effects of roads on insects due to the variety of methods used. We review recent literature examining the ecological impact of roads on insects. The objectives of our synthesis are to gain insight into the effects of the construction and operation of a road on insect groups, and to determine the gaps of knowledge. We found that roads negatively affect the abundance and diversity of insects due to two main factors: (1) the high mortality of some groups when crossing the road, with more impact at higher traffic volumes. (2) The unwillingness of many species to cross a road or live close to it. Roads are major barriers for small or flightless species, although the response varied for flying species. Finally, both experimental and observational evidence support the idea that air pollutants and de-icing salt used for the road maintenance negatively affect insects." (Authors)] Address: Megías, A.G., Depto de Zool., Facultad de Ciencias, Univ. de Granada, Avda Fuentenueva s/n, Granada, Spain. E-mail: adelagm@ugr.es

**15956.** Møller, A.P.; Mousseau, T.A. (2015): Biological indicators of ionizing radiation in nature. In: Armon, R.H. & O. Hänninen (eds.): *Environmental Indicators*: 871-881. (in English) ["Ionizing radiation that consists of  $\alpha$ ,  $\beta$  and  $\gamma$  rays can directly damage DNA and other molecules and as such result in somatic or germline mutations. The consequences of ionizing radiation for living beings cannot be measured with a Geiger counter because it will depend on external dose, internal dose, and the extent of DNA repair. In addition it will depend on the environmental conditions under which living organisms exist. We list environmental indicators of ionizing condition that reveal immediate and long-term consequences ranging from changes in DNA, over damaged cells and organs to altered gene function

and development, reduced fecundity and survival, and hence to negative population trends, and altered communities and ecosystems and perturbed ecosystem functioning. We test for consistency in biological indicator ability across spatial and temporal scales relying on long-term field data collected at Chernobyl and Fukushima, and we test for consistency in indicator ability among indicators. Finally, we address the direct and indirect effects of ionizing radiation and we discuss the species or taxa most susceptible to the effects of radiation ... Indeed, species richness and abundance of birds (Møller & Mousseau 2007a, b, 2009), but also spiders, dragonflies, grasshoppers, bumblebees, butterflies, amphibians, ... In contrast, there were significant interactions for butterflies, dragonflies, ...]. (Authors) Address: Mousseau, T.A., Dept of Biol. Sciences, Univ. South Carolina, Columbia, SC, 29208, USA. E-mail: mousseau@sc.edu

**15957.** Nakanishi, H.; Mori, A.; Takeda, K.; Tanaka, H.; Kobayashi, N.; Tanoi, K.; Yamakawa, T.; Mori, S. (2015): Discovery of radioactive silver (110mAg) in spiders and other fauna in the terrestrial environment after the meltdown of Fukushima Dai-ichi nuclear power plant. *Proc. Jpn. Acad., Ser. B* 91 (2015): 160-174. (in English) ["Six months after the explosion of TEPCO's Fukushima Dai-ichi nuclear power plant, radioactive silver (110mAg), was detected in concentrations of 3754 Bq/kg in *Nephila clavata* (the orb-web spider; Joro-gumo in Japanese) collected at Nimaibashi, litate village in Fukushima Prefecture, whereas 110mAg in the soil was 43.1 Bq/kg. A survey of 35 faunal species in the terrestrial environment during the 3.5 years after the accident showed that most of Arthropoda had two orders higher 110mAg in their tissues than soils, although silver is not an essential element for their life. However, tracing of the activity of 110mAg detected in spider *Atypus karschi* collected regularly at a fixed location showed that it declined much faster than the physical half-life. These results suggest that 110mAg was at once biologically concentrated by faunal species, especially Arthropoda, through food chain. The factors affecting the subsequent rapid decline of 110mAg concentration in faunal species are discussed." (Authors) Sampling includes *Sympetrum croceolum*, *S. frequens* and *Anotogaster sieboldii*.] Address: Mori, S., Graduate School of Agricultural and Life Sciences, The University of Tokyo, 1-1-1 Yayoi, Bunkyo-ku, Tokyo 113-8657, Japan. E-mail: winep@bird.ocn.ne.jp

**15958.** Naraoka, H. (2015): Predation of a lepidopteran larva by *Aeschnophlebia longistigma* (Odonata: Aeshnidae). *Tombo* 57: 49-50. (in Japanese, with English summary) ["A female adult of *A. longistigma* Selys, 1883 preying on a mature larva of *Malacosoma neustria testacea* (Motschulsky, 1861) (Lasiocampidae, Lepidoptera) from a leaf of reed was observed at a pond Hiyamizu-numa, Koshimizu, Tsugaru city, Aomori prefecture on June 21, 2014. The lepidopteran larvae were abundant those days on the shore of the pond." (Author)] Address: Naraoka, H., 36-22, Motoizumi, Fukunoda, Itayanagi-cho, Kita-gun, Aomori Prefecture, 038-3661, Japan. E-mail: sbnkq127@ybb.ne.jp

**15959.** Nor Zaiha, A.; Mohd Ismid, M.S.; Salmiati; Shahrul Azri, M.S. (2015): Effects of logging activities on ecological

water quality indicators in the Berasau River, Johor, Malaysia. *Environmental Monitoring and Assessment* 187: 493-501. (in English) ["Influence of deforestation on biodiversity of aquatic organisms was investigated in a stream in the Ulu Sedili Forest Reserve. The stream was monitored five times from December 2011 until December 2012 with 2-month intervals. Sampling of benthic communities was carried out using rectangular dip net while water quality study using a YSI ProPlus meter and the rest were done in the laboratory. Physicochemical parameters and water quality index (WQI) calculation showed no significant difference among the investigated events. WQI classified the Berasau River between Class II (good) to III (moderate) of river water quality. In total, 603 individuals representing 25 taxa that were recorded with Decapods from genus *Macrobrachium* were widely distributed. Several intolerant taxa, especially Ephemeroptera and Odonata, were also observed in this river. According to Pearson's correlation analysis, the richness and diversity indices were generally influenced by water quality parameters represented by WQI ( $P < 0.01$ ). In conclusion, logging activities have strong attributes for variation in benthic macroinvertebrate assemblage." (Authors) To determine the Odonata, a key from North America was used.] Address: Salmiati, Centre for Environmental Sustainability and Water Security (IPASA), Research Institute for Sustainable Environment (RISE), Universiti Teknologi Malaysia, 81310, Johor Bahru, Malaysia. E-mail: salmiati@utm.my

**15960.** Nuñezza, K.J.M.; Nuñezza, O.M.; Villanueva, R.J.T. (2015): Species diversity of Odonata in Bega watershed, Agusan del Sur, Philippines. *Journal of Biodiversity and Environmental Sciences* 7(5): 69-82. (in English) ["Odonata is dependent upon habitats with standing or flowing water. Its sensitivity to changes in water ecosystems makes it a good biological indicator. This study aimed to determine the species richness of Odonata in Bega Watershed, Prosperidad, Agusan del Sur, Philippines. A survey was conducted in 12 sites on May 8-14, 2014 using sweep netting and hand catching methods. 27 species consisting of 11 species of dragonflies and 16 species of damselflies under 10 families and 20 genera were recorded. Of the 27 species, 17 are endemic with 62.96% endemism. Bega Watershed had high species diversity with an uneven distribution of species. Among the sampled sites, sites 2 and 4 had the highest species richness ( $S=14$ ) while highest species diversity ( $H'=2.47$ ) was recorded in site 4 which is a relatively undisturbed and intact ecosystem. Highest abundance of Odonata was recorded in Site 1, the first level of Bega falls. *Rhinocypha colorata*, an endemic species, was found to be the most abundant and widespread, being found in seven out of 12 sites. Detrended correspondence analysis showed that Odonata prefers semi-forested riparian areas while Bray-Curtis cluster analysis showed that sites 2 and 4 are the most similar sites. The high level of endemism and moderate to high diversity in most of the sites indicate that Bega watershed is a relatively healthy ecosystem and is of high conservation importance." (Authors); Mindanao] Address: Nuñezza, Olga, Dept of Biological Sciences, College of Science and Mathematics, MSU-Iligan Institute of Technology, A. Bonifacio Ave., Tibanga, Iligan City, Philippines. E-mail: olgamnuneza@yahoo.com

**15961.** Olomukoro O. J.; Osuinde, G.A. (2015): Benthic macroinvertebrate in relation to pollution tolerance index of a creek flowing through an urban area in southern Nigeria. *Egerton J. Sci. & Technol.* 15: 141-156. (in English) ["Assessment of the pollution tolerance index (PTI) of Ekpan creek Delta state, Southern Nigeria was studied fortnightly from January to June, 2007. Macroinvertebrates were collected from floating macrophytes (*Eichhornia crassipes*) using the quadrant sampling method and dusted in formalin solution. Physico-chemical parameters were analyzed using test methods according to APHA, 1998 while heavy metals were analyzed with an atomic absorption spectrometer (PYE unicam SP2900) after digestion. Eleven (11) major groups were recorded comprising of 45 species that were sorted, identified and counted. Station one had a relative abundance of 41.1%, station two had 30.7% and station three had 28.2 % respectively of the total population. The dominant groups were Gastropoda (69.9%) and Crustacea (22.0%) while others were rare groups. Polychaete, Crustacea, Coleoptera, Odonata, Gastropoda, Arachnida, occurred both in the rainy and dry season with the exceptions of Collembola and Ephemeroptera which occurred only in the rainy season. Diversity of the benthos showed no significant variation between the stations. There also existed a significant correlation ( $p>0.05$ ) between most of the groups. The PTI values ranged between 11-14 in the study stations and were less than 10 in most months indicating a

compromised water quality." (Authors)] Address: Osuinde, Gloria, Dept of Animal and Environmental Biology, Faculty of Life Sciences, Univ. Benin, P.M.B 1154, Benin City, Edo State, Nigeria. E-mail: gloriaonde@gmail.com

**15962.** Orr, A.; Kalkman, V. (2015): Field guide to the dragonflies of New Guinea. *Brachytron* 17 Supplement 3: 3-156. (in Bilingual in English and Bahasa Indonesia) ["Enables identification of the approximately 175 species presently known from New Guinea, its satellite islands and the Bismark Archipelago. Illustrated by nearly 250 colour drawings and over 300 line drawings by Albert Orr and 36 colour photographs taken in the field. Many species included have never been depicted in colour before." (Publisher)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology & Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**15963.** Parr, A.J.; Long, R. (2015): A Review of the Odonata of the Channel Islands. *Journal of the British Dragonfly Society* 31(1): 30-48. (in English) ["In all, some 37 species of Odonata - comprising 12 zygopterans and 25 anisopterans - have been recorded from the Channel Islands, and records of these species are reviewed. A number of species formerly considered to be resident are now known to be locally extinct, largely as the result of the loss of suitable habitat. A number of species have, by contrast, only started to appear in the Islands within the last twenty years, probably part of the pan-European range changes resulting from climate change." (Authors)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**15964.** Parr, A.J. (2015): Migrant and dispersive dragonflies in Britain during 2014. *Journal of the British Dragonfly Society* 31(2): 64-73. (in English) ["In Britain, the year 2014 was rather a mixed one as far as migrant and dispersive dragonflies were concerned. The period mid-May to mid-July saw significant immigrations of *Anax parthenope* and, in particular, *Sympetrum fonscolombii*. Slightly later, during late July/early August, large numbers of *Aeshna mixta* were also noted in parts of south-east England and a migratory event was probably involved in at least part of this. Events later in the season were, by contrast, very much more low-key, though small numbers of second generation *S. fonscolombii* were noted. Events relating to our new colonist species were similarly mixed. *Chalcolestes viridis* had a good season with significant range expansion being noted. *Lestes barbarus* also seemed to fair well. *Coenagrion scitulum* and *Aeshna affinis* however did less well, with fewer than normal sightings and no sign of any continued immigration. Hopefully, the next few years will see a recovery in the fortunes of these last two species" (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**15965.** Petrulevicius, J.F. (2015): A new Synlestidae damselfly (Insecta: Odonata: Zygoptera) from the early Eocene of Nahuel Huapi Este, Patagonia, Argentina. *Archivos Entomológicos* 14: 287-294. ["A new lestoid genus, *Inacayalestes* gen. nov., based on *Inacayalestes aikunhuapi*

sp. nov. is described from Nahuel Huapi Este locality (Ypresian), Neuquén province, Patagonia, Argentina. The new genus is assigned to Synlestidae and seems to be related to *Ecchlorolestes* Barnard, 1937 and *Synlestes* Selys, 1868, both genera from Southern Hemisphere, from South Africa and Australia, respectively. The new genus enlarges the record of *Lestomorpha* in Argentina to three fossil genera: *Promegalestes Petrulevicius* & Nel, 2004, *Austroperilestes Petrulevicius* & Nel, 2005, and *Inacayalestes* gen. nov., whereas two extant genera are present: *Lestes* Leach, 1815 and *Archilestes* Selys, 1862." (Authors)] Address: Petrulevicius, J.F., División Paleozoología Invertebrados, Facultad de Ciencias Naturales y Museo, Univ. Nacional de La Plata, and Consejo Nacional de Investigaciones Científicas y Técnicas - CONICET Paseo del Bosque, s/n. La Plata (1900), Buenos Aires, Argentina. E-mail: levicius@fcnym.unlp.edu.ar

**15966.** Petzold, F. (2015): Zur aktuellen Verbreitung der Westlichen Keiljungfer *Gomphus pulchellus*, Selys 1840 in Thüringen (Insecta: Odonata). *Thüringer Faunistische Abhandlungen* 20: 71-82. (in German, with English summary) ["After the very first findings of *G. pulchellus* in Thuringia from the early 1990s especially after 2009 many new records were obtained. Currently a total of 39 localities is known, 22 of them with successful reproduction recorded. Nowadays the species occurs throughout Thuringia. The species prefers mesotrophic to eutrophic lentic waters with a sandy-loamy Substrate and a certain maturity. Larvae live in shallows that warm up quickly in spring. All known habitats are anthropogenic in origin, like gravel pits, sand pits or small reservoirs, and are mostly situated at lower elevations." (Author)] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany

**15967.** Poschmann, M.; Wedmann, S.; Schindler, T.; Uhl, D.; Wuttke, W. (2015): Eine Arthropoden/Pflanzen-Taphozönose aus einem pliozänen Kratersee bei Ruppach-Goldhausen, Westerwald (Rheinland-Pfalz, SW-Deutschland). *Mainzer naturwissenschaftliches Archiv* 52: 103-117. (in German, with English summary) ["An arthropod/plant-taphocoenosis from a Pliocene crater lake at Ruppach-Goldhausen, Westerwald (Rhineland-Palatinate, SW Germany). Some plants and insects are reported from laminated sediments of an ancient lake at Ruppach-Goldhausen in the Westerwald area. This taphocoenosis is briefly discussed in terms of age, climate and palaeoecology. Preliminary results suggest that these laminites were deposited in a hydrologically isolated, probably not very large and not particularly deep crater lake. The plant association suggests an Upper Pliocene age and a Cfa-like palaeoclimate. Besides common beetles, there is a notably high share of (semi-)aquatic insects (e. g. Notonectidae, chaoborid pupae) and cladoceran ephippia, which indicate the prolonged existence of an autochthonous aquatic ecosystem within the lake. The fossil preservation hints at quiet conditions at the site of burial. Abundant pyrite framboids suggest anoxic conditions at least below the sediment/water interface." (Authors)] Address: Poschmann, M., Generaldirektion Kulturelles Erbe RLP, Direktion Landesarchäologie, Referat Erdgeschichte, Große



Langgasse 29, 55116 Mainz, Germany. E-Mail: markus.-poschmann@gdke.rlp.de

**15968.** Priyadarshana, T.M.T.S.; Wijewardana, G.V.I.H.; van der Poorten, N.; Jayasooriya, A.L.A.C. (2015): First record of *Gynacantha millardi* (Odonata: Aeshnidae) from Sri Lanka. *Taprobanica* 7(4): 266-267. (in English) ["Dry zone of Sri Lanka, in Bodigama, Uva province/Kuda Oya in Mo-naragala District (06°32'15.6"N, 081°07' 18.3"E; alt. 188 m a.s.l.) on 5 January 2015 at 06:33 PM." (Authors)] Address: Priyadarshana, T.M.T.S., Dept Natural Resources, Fac. Appl. Sciences, Sabaragamuwa Univ. of Sri Lanka, Belihuloya, 70140, Sri Lanka. E-mail: tharakas.priyadarshana@gmail.com

**15969.** Quignot, N.; Grech, A.; Amzal, B. (2015): Data collection on combined toxicity of multiple chemicals for animal health and ecological risk assessment. *EFSA Supporting Publications* 12(7): 1-112. ["There is an increasing need to develop harmonised frameworks and methods for the risk assessment of combined exposure to multiple chemicals. A number of activities have already been undertaken by EFSA, notably in the fields of pesticides and contaminants. This project aims at searching for, reviewing, collecting and synthesizing the published data on combined effects of multiple chemicals in more than 50 species of veterinary and ecological relevance, using extensive literature searches. The taxonomical hierarchy for the literature searches was very wide ranging from bacteria, fungi, invertebrates and vertebrates (amphibians, ... Odonata, ...). In vivo toxicity data were extracted from 199 publications representing 3,074 individual studies on pesticides, environmental contaminants, food-related products, hormones, metals, mycotoxins and pharmaceuticals. The magnitudes of interaction following acute and chronic exposure to multiple chemicals were consolidated via meta-analysis and expressed as mean effect ratios between single and multiple chemicals. Overall, this report illustrates how systematic published data collection and synthesis can support hazard characterisation of combined toxicity of multiple chemicals. Further work is proposed to compare the toxicity datasets for which statically significant interactions have been reported with chemical-specific reference points from EFSA's chemical hazards database. These analyses will allow testing the sensitivity of the toxicological endpoints (e.g. acute versus chronic effects, mortality versus biochemical parameters etc...), the dose dependency of the toxicological interactions and the potential use of the methodology in ecological risk assessment of multiple chemicals." (Authors)] Address: scer@efsa.europa.eu

**15970.** Rault, P.A.; Gourdain, P.; Guicheteau, D.; George, G.; Braud, Y. (2015): Découverte de nouvelles stations de *Cordulie méridionale* *Somatochlora meridionalis* Nielsen, 1935 dans le Var et les Alpes-Maritimes. *Nature de Provence - Revue du CEN PACA*, publication web, octobre 2015: 1-4. (in French, with English summary) ["Discovery of new *S. meridionalis* locations in Var and Alpes-Maritimes. Since 1970, the first presence data of this species in France, *S. meridionalis* has only been reported twenty times, always from the area of Estérel (Var). In 2013, three new locations were discovered, two in the Plaine des Maures (Var) and

one other in the hinterland of Cannes (Alpes-Maritimes). An assessment of the species' conservation status in the PACA region is proposed." (Authors)] Address: Rault, P.A., Service du patrimoine naturel, Muséum national d'Histoire naturelle, Laboratoire d'Écologie Générale, 4, avenue du Petit Château 91800 Brunoy, France. E-mail: parault@mnhn.fr

**15971.** Sakai, S.; Eda, S. (2015): A case of trans-subordinal tandem trials between a male *Mnais pruinosa* and a female *Davidius fujijama*. *Tombo* 57: 13-14. (in Japanese, with English summary) ["A male *M. pruinosa* (Calopterygidae) tried 3 times to form tandem position with a female *D. fujijama* (Gomphidae) at Matsukura river in Ina city, Nagano prefecture on July 15, 2014. This female looked weakened because it kept wings half open and could not fly away on this harassment, which would cause the zygopteran's misconception. This paper is thought to be the first in Japan to report a case of transsubordinal tandem trial." (Authors)] Address: Sakai, M., Fac. Science & Engineering, Chuo Uni., 1-13-27 Kasuga, Bunkyo-ku, Tokyo 112-8551, Japan. Email: boundary.0008@gmail.com

**15972.** Sakurai, S.; Sakurai, D.; Seki, N.; Natsume, H. (2015): An adult female of *Trigomphus melampus* (Selys, 1869) was captured on October 4th, 2014 at Nagatoromachi, Saitama Prefecture, Japan. *Tombo* 57: 47-48. (in Japanese, with English summary) ["An adult female of *T. melampus* was captured at Nagatoromachi, Saitama Prefecture, Japan on October 4th, 2014. This record is unusually late, because the main flight season of this species is from May to July. Past late record of adult of this species in Saitama Prefecture was only in July recorded in 1973 and 1995." (Authors)] Address: not stated

**15973.** Sharma, S.; Shukla, A. (2015): Preliminary study of Odonates in southeast region of Narmada Valley, Jabalpur (M.P.). *International Journal of Recent Scientific Research* 6(10): 7038-7040. (in English) ["... odonates are potential bio control agents of many invertebrates. Odonate assemblage from Narmada Valley in Jabalpur has been investigated. A total of 25 species of Odonata have been distributed in 7 families were sampled. Libellulidae is most dominating family, with 10 species followed by Coenagrionidae with 7 species [...]. Mostly odonates were aggregated due to habitat specific nature and random distribution indicates availability of resource utilization to survive but, in the urban forest area high anthropogenic disturbances were observed which creates high biotic pressure on forest. A detailed list of odonates recorded from urban forest area is presented." (Authors)] Address: Sharma, S., Dept Zool., Government. Model Science College, Jabalpur (M.P.)

**15974.** Siukevicius, S.; Barekute, D.; Ivtnskis, P.; Rlinsaitė, J. (2015): Diversity and distribution of glacial origin forest lakes of Grazute regional park. 8th International Conference on Biodiversity Research. 28.-30.04.2015, Daugavpils, Latvia: 139. (in English) [Verbatim: The investigation on Odonata diversity and distribution of glacial origin forest lakes has been carried out in Grazute regional park (Igalina. Zarasai districts. Lithuania). The material was collected in 25 lakes, two times during the third decade of

May - first decade of June and second decade of July in 2008-2009. The selected lakes were located in four groups, distance in each group apart from one another about 10-20 km. The sampling sites were divided into two groups by lakes surface and water level fluctuations: lakes with small surface area (0.5-5 ha), without discharge, situated in potholes, surrounded with forest and lakes with surface area 3-20 ha without discharge or partly drained, with marshy shore of the lake. Nestedness temperature calculator (NTC) has been used for measurement of species distribution in lakes of two types. The lower temperature level shows that system operating in some rules, when temperature are higher (close 100°) the system are more chaotic. 25 species of dragonflies (Odonata) have been registering during the research period in lakes of first group. The lowest species diversity was establish in small dystrophic lakes, there were registered 4 ordinary, 9 indicator, 8 accidentally species. *Epitheca bimaculata* and *Aeshna juncea* have been found only in small dystrophic lakes. 32 species of Odonata were found in lakes of second group: 9 ordinary species, 11 indicator species and 8 accidental species. The highest number of species was established near lake Palsinis, random distribution of different Odonata species was established in lake Berzinis. Highest species diversity and individual abundance were in lakes of second group, here was established statistical significant higher temperature of matrix  $T = 31.75^\circ$  ( $p = 0.06$ ). The matrix temperature of first group lakes was lowest ( $T = 21.62^\circ$ ), it shown higher stability of species composition.] Address: Siukevicius, S., Univ. Vilnius. Faculty of Natural Sciences. Centre of Ecological & Environmental Science. M.K. Ciurlonio Str. 21/27. Vilnius. Lithuania, e-mail: stanislovas.sinkevicius@gf.vu.lt

**15975.** Stih, A, Koren, T.; Bobinec, A.; Matejcic, M.; Frankovic, M. (2015): The River Zrmanja - another hotspot of dragonfly diversity in the Dinaric karst, Croatia. *Entomologia Croatica* 19(1-2): 43-57. (in English, with Croatian summary) ["The Zrmanja is one of the largest rivers in Dalmatia, along with the rivers Krka and Cetina. At the same time it is one of the least surveyed larger rivers in the region, with only a few published records about its dragonfly fauna so far. Between 1984 and 2010 the authors collected data about the dragonflies around the river Zrmanja and its surroundings. Altogether 29 species were recorded at 17 localities. Of those, 12 species were recorded for the first time for the region. The most valuable record is that of *Coenagrion ornatum*, a local and rare Natura 2000 species. With the overview of the data from museum collections, private field data, published data and data collected during this survey the number of species known from the Zrmanja river increases to 31, making this river one of the best studied areas in Croatia. However, this is probably not the final number of species and new records are to be expected with further research." (Authors)] Address: Štih, Ana, Croatian Herpetological Society – Hyla, Lipovac I n. 7, 10 000 Zagreb, Croatia. E-mail: ana.stih2@gmail.com

**15976.** Takizawa, K.; Tezduyar, T.E.; Buscher, A. (2015): Space-time computational analysis of MAV flapping-wing aerodynamics with wing clapping. *Computational Mechanics* 55(6): 1131-1141. (in English) ["Computational analysis

of flapping-wing aerodynamics with wing clapping was one of the classes of computations targeted in introducing the space-time (ST) interface-tracking method with topology change (ST-TC). The ST-TC method is a new version of the deforming-spatial-domain/stabilized ST (DSD/SST) method, enhanced with a master-slave system that maintains the connectivity of the "parent" fluid mechanics mesh when there is contact between the moving interfaces. With that enhancement and because of its ST nature, the ST-TC method can deal with an actual contact between solid surfaces in flow problems with moving interfaces. It accomplishes that while still possessing the desirable features of interface-tracking (moving-mesh) methods, such as better resolution of the boundary layers. Earlier versions of the DSD/SST method, with effective mesh update, were already able to handle moving-interface problems when the solid surfaces are in near contact or create near TC. Flapping-wing aerodynamics of an actual locust, with the forewings and hindwings crossing each other very close and creating near TC, is an example of successfully computed problems. Flapping-wing aerodynamics of a micro aerial vehicle (MAV) with the wings of an actual locust is another example. Here we show how the ST-TC method enables 3D computational analysis of flapping-wing aerodynamics of an MAV with wing clapping. In the analysis, the wings are brought into an actual contact when they clap. We present results for a model dragonfly MAV." (Authors)] Address: Takizawa, K., Dept of Modern Mechanical Engineering & Waseda Inst. for Advanced Study, Waseda Univ., 1-6-1 Nishi-Waseda, Shinjuku-ku, Tokyo, 169-8050, Japan. E-mail: kenji.takizawa@tafsm.org

**15977.** Tamm J.; Seehausen, M.; Pix, A. (2015): Interspezifische Paarungsversuche von *Cordulegaster bidentata* mit *Aeshna cyanea* und *A. juncea* (Odonata: Cordulegasteridae, Aeshnidae). *Libellula* 34(3/4): 175-180. (in German, with English summary) ["Interspecific attempt of copulation by *C. bidentata* with *A. cyanea* and *A. juncea* [...] – Three observations of attempted interspecific pairings by males of *C. bidentata* with females of *A. cyanea* and *A. juncea* in Hessian hill forests are described. These are the first reports on crosspairing attempts of *C. bidentata*" (Authors)] Address: Tamm, J., Elgershäuser Straße 12, 34131 Kassel, Germany. E-mail: jochen.tamm@t-online.de

**15978.** Tatarinov, A.G.; Kulakova, O.I.; Loskutova, O.A. (2015): The structure of the fauna, ecological and geographical feature of dragonflies (Insecta, Odonata) of the East European Hypoarctic. *Eurasian entomological journal* 14(6): 505-510. (in Russian, with English summary) ["On the territory of East European Hypoarctic identified 28 species of dragonflies of the six families. The basis of taxonomic diversity consists of four families: Libellulidae, Coenagrionidae, Corduliidae and Aeschnidae. Species richness of local faunas gradually decreases towards the North. The nature of the longitudinal distribution is dominated by representatives of transpalearctic and Holarctic groups. In two species: *Coenagrion hylas* and *Leucorrhinia orientalis* in the region has the Western boundary of the distribution. The type of landscape-zonal distribution of East European Hypoarctic prevail temperate species. Hypoarctic species of dragonflies are only two: *Somatochlora sahlbergi* and

Aeshna subarctica." (Authors)] Address: Tatarinov, A.G., Inst. of Biology, Komi Scientific Centre, Ural Branch, Russian Academy of Sciences, ul. Kommunisticheskaya 28, Syktyvkar, Komi Republic, 167982, Russia. E-mail: andrei\_tatarinov@mail.ru

**15979.** Theischinger, G.; Lupiyaningdyah, P.; Richards, S.J. (2015): Two new species of damselflies from Halmahera, Indonesia (Zygoptera: Platystictidae, Platycnemididae). IDF-Report 90: 1-10. (in English) ["Two new species of damselflies are described from central Halmahera in North Maluku Province, Indonesia. They are Drepanosticta pararudicola sp. nov. (Holotype MZB. ODON. 19257) and Nososticta halmahera sp. nov. (Holotype MZB. ODON. 19265). The two species are most similar to the Moluccan taxa D. rudicola and N. moluccensis respectively and their descriptions bring the total number of Drepanosticta species known from Halmahera to five and of Nososticta to two." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**15980.** Theischinger, G.; Richards, S.J. (2015): New species of damselflies from the Hindenburg Wall region of western Papua New Guinea (Odonata: Coenagrionidae, Platycnemididae). Odonatologica 44(3): 431-446. (in English) ["Two new species of Teinobasis and one new species of Nososticta from the Hindenburg Wall region of western Papua New Guinea are described and illustrated. They are Teinobasis cuneata sp. nov. (Holotype SAMA 07-001421), Teinobasis flavolineata sp. nov. (Holotype SAMA07-001422), and Nososticta oculata sp. nov. (Holotype SAMA 07-001424). The new Teinobasis species are both moderately large, slender species with predominantly yellow/ orange faces and black abdomens and they are most similar to T. angusticlavia Ris from the Aru Islands and T. albula Ris from the Lorentz River. The new Nososticta species is most similar to N. finisterrae Förster, a species that is widespread in south-eastern New Guinea, but differs from it in having the blue inter-ocular bar that is typical of finisterrae reduced to two widely separated pale blue spots on the anterior frons." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**15981.** Thompson, D.J.; Kerry, L.; Gotham, P.; Sims, A.M.; Watts, P.C. (2015): Rapid cohort splitting in Coenagrion mercuriale (Charpentier) (Southern Damselfly) following its re-introduction to Venn Ottery Common, Devon. Journal of the British Dragonfly Society 31(1): 24-29. (in English) ["The rapid occurrence of cohort splitting in a population of C. mercuriale, recently re-introduced to Venn Ottery Common, an East Devon Pebblebed site, is described. Evidence of cohort splitting, rather than immigration from one of the other East Devon Pebblebed sites, was confirmed by analysis of 14 microsatellite loci from DNA extracted from a leg of one of the 'odd-year' cohort. This individual carried alleles not previously recorded in any Devon population." (Authors)] Address: Thompson, D.J., Dept of Evolution, Ecology & Behaviour, Inst. Integrative Biology, Univ. Liverpool, Liverpool, L69 7ZB, UK

**15982.** Thompson, D.J.; Thompson, A.L.; Kerry, L.; Gotham, P. (2015): Reintroduction and establishment of Coenagrion mercuriale (Charpentier) (Southern Damselfly) on Venn Ottery Common, Devon. Journal of the British Dragonfly Society 31(1): 14-23. (in English) ["The rationale and mechanics of a programme to re-introduce C. mercuriale to Venn Ottery Common, a Devon Wildlife Trust reserve, is described. The donor sites were in the most genetically diverse area in the UK, Beaulieu Heath in the New Forest. Five hundred animals (100 males and 400 females) were collected and transported over the course of eight days in June 2009 (following a preliminary attempt in 2007). The recipient site was monitored regularly from May 2009 and numbers recorded in regular transect counts rose to 98 in July 2013. The key to the success of the re-introduction was prior knowledge of the habitat requirements of the study species and sustained preparation and maintenance of the recipient site." (Authors)] Address: Thompson, D.J., Dept of Evolution, Ecology & Behaviour, Institute of Integrative Biology, University of Liverpool, Liverpool, L69 7ZB, UK

**15983.** Trippier, R.; Brooks, S.; Isaac, N. (2015): Spatial distribution modelling of the colonisation of Erythromma viridulum (Charpentier) (Small Red-eyed Damselfly) in the UK. Journal of the British Dragonfly Society 31(1): 49-63. (in English) ["Northward shifts of many UK Odonata and increased occurrences of migrants have been well documented over the last few decades. E. viridulum has greatly expanded its European range and is the first damselfly to have colonised the UK since records began. Since its arrival in 1999, the species has spread rapidly in a north westerly direction by approximately 36.5km per year as it has occupied climatically suitable space. In recent years the rate of northward expansion has decreased, however western expansion and range infilling has continued." (Authors)] Address: Trippier, Rebecca, Department of Geography, University College London, London, WC1E 6BT, UK

**15984.** Trippier, R.; Brooks, S. (2015): Voltinism in Erythromma viridulum (Charpentier) (Small Red-eyed Damselfly): a newly colonised damselfly species in the UK. Journal of the British Dragonfly Society 31(2): 74-88. (in English) ["Odonates have displayed strong responses to changing climate through shifting range margins and changes in phenology and voltinism. Newly colonising species may also be competing with previously established species. This study analysed voltinism and feeding behaviour of a recent coloniser, E. viridulum. The results indicate that the populations sampled were likely to be semivoltine, and growth rates suggest that early instar larvae present in July would overwinter in that stage and emerge the following year. This implies that voltinism has not changed in British populations since the species colonised this country. Gut content analysis of larvae found that larval prey items changed through progressive instars but indicated that E. viridulum is unlikely to feed upon other odonate species in the UK." (Authors)] Address: Trippier, Rebecca, Dept Geogr., Univ. College London, London, WC1E 6BT 2Life Sciences, Natural History Museum, London SW7 5BD. UK



**15985.** ShafiqueUrRehman; Khatri, I.; Rustamani, M.A.; Bukero, A.; Pirzado, B.A.; Rajpar, A.R. (2015): Taxonomic studies of dragonflies from Hyderabad, Sindh. *Int. J. Biol. Biotech.* 12(1): 75-79. (in English) ["For present studies dragonflies were collected from various localities of district Hyderabad. Examination and identification of dragonflies revealed the occurrence of nine species among three families; six species of Libellulidae, two of Gomphidae and one of Aeshnidae." (Authors)] Address: Khatri, I., Dept Entomology, Sindh Agriculture Univ., Tandojam, Pakistan. E-mail: imrankhatri.agri@gmail.com

**15986.** Westermann, K. (2015): Bestände und Bestandsveränderungen der Schwarzen Heidelibelle (*Sympetrum danae*) an künstlichen Moorteichen im Oberen Hotzenwald (Hochschwarzwald). *Naturschutz südl. Oberrhein* 8: 119-126. (in German, with English summary) ["When blocking wide moor ditches during reconstitution measurements of moors, transient artificial moor ponds were created in which habitats for dragonflies of extraordinary conservational importance developed rapidly. The water plants colonizing these ponds were dominated by sphagnum mosses which covered almost the entire surface of some ponds within a few years. At first, *S. danae* built up huge populations, but these decreased and collapsed when sphagnum mosses covered a high proportion of the surface of the water. Stopping the silting up process of the ponds is incompatible with the reconstitution goals. Therefore, suggestions for the construction of substitutional habitats were discussed." (Author)] Address: Westermann, K., Buchenweg 2, 79365 Rheinhausen., Germany

**15987.** Westermann, K. (2015): Eine Erfassungsmethode frisch geschlüpfter Schwarzer Heidelibellen (*Sympetrum danae*) an künstlichen Moorteichen im Oberen Hotzenwald (Hochschwarzwald). *Naturschutz südl. Oberrhein* 8: 127-134. (in German, with English summary) ["Freshly emerged *S. danae* whose wings had dried sufficiently to be able to fly, for a long time stayed close to their place of emergence at artificial moor ponds in the upper Hotzenwald (southern Black Forest), even during sunny and warm weather conditions. During noon and in the early afternoon, they could be counted quickly and easily, so it was possible to obtain precise daily numbers. This method was clearly superior to the previously used method of counting exuviae." (Author)] Address: Westermann, K., Buchenweg 2, 79365 Rheinhausen, Germany

**15988.** Wijeyeratne, G. (2015): *A Naturalist's Guide to the Butterflies & Dragonflies of Sri Lanka*. John Beaufoy Publishing Ltd: 176 pp. (in English) ["Increasingly the segmentation between birders, butterfly watchers, dragonfly watchers and photographers is reducing as interests overlap and there is a demand for books that cover the three popular groups of birds, butterflies and dragonflies. Having written and photographed the guide to the birds of Sri Lanka in the series, Gehan de Silva Wijeyeratne has produced a single, compact and portable photographic guide to the butterflies and dragonflies of the country. The emphasis in the 280 species featured is on the commoner species, covering around 90 per cent of the species that a visitor is likely to see. It is also an excellent book for resid-

ents to learn about the commoner butterflies and dragonflies before progressing to more advanced technical books. The guide is focused on field use to help beginners and experts identify species and provides information on their distribution and habitats. As identification of butterflies and dragonflies require a different approach, the two sections are done as two mini photographic field guides with common introductory sections to wildlife watching in Sri Lanka. The book includes information on the key wildlife sites, general introductions to the biology of dragonflies and butterflies, up-to-date checklists with local status and useful references for people who wish to progress further with their study of these charismatic and photogenic animals." (Publisher)]

**15989.** Wittenberg, M.; Kastner, F.; Buchwald, R. (2015): Die Larvenentwicklung von *Aeshna viridis* im NSG Westliches Hollerland, Bremen (Odonata: Aeshnidae). *Libellula* 34(3/4): 127-141. (in German, with English summary) ["Development of the larvae of *Aeshna viridis* in the Westliches Hollerland nature reserve in Bremen – *A. viridis* is an endangered species in Germany, while in Bremen and Lower Saxony it is even on the brink of extinction. There is little known about the larval development of *A. viridis*, the descriptions by Wesenberg-Lund (1913) and Münchberg (1930) from the first half of the 20th century being the most detailed publications. They showed that the development from egg to imago normally takes two years, in rare cases even three years. A large population exists in the north west of Germany in the Westliches Hollerland nature reserve in Bremen. A quantitative cycle of the larval development could be analyzed in this population. *A. viridis* larvae were collected and measured from three ditches on a monthly basis from April to September 2012. We hypothesized that two cohorts would have to be found at the same time in the case of a two year development. For *A. viridis* a two year development was verified in 2012." (Authors)] Address: Wittenberg, Melanie, Haarenfeld 37, 26129 Oldenburg, Germany. E-mail: wittenberg.melanie@googlemail.-com

**15990.** Zebba, R.; Khelifa, R.; Kahalerras, A.; Djalal, H.; Houhamdi, M. (2015): Emergence pattern, site selection, and seasonal regulation of *Onychogomphus costae* Selys, 1885 (Odonata: Gomphidae) in northeastern Algeria. *Aquatic Insects* 36 (3-4)(2014): 257-265. (in English) ["Emergence and seasonal regulation of the dragonfly *O. costae*, were surveyed thoroughly during two consecutive years from two nearby stretches upstream the Seybouse River, northeastern Algeria. The emergence season started in mid-May and lasted 68 and 58 days showing a peak in late May and early June in 2011 and 2012, respectively. During the two years 2011 and 2012, 50% of annual emergence occurred after 25 and 22 days, respectively. Sex ratio was slightly but not significantly male biased. Female exuviae were recorded at higher height than males. Height of the exuviae fixation was positively correlated to support height and head width. Percentage mortality at emergence was mainly due to deformity and predation counting from 7.9% to 9.15% of the total emergent population. The species seasonal regulation is inferred and discussed based on the emergence temporal pattern and larval development." (Au-

thors]] Address: Zebbsa, R., Département d'écologie et du génie de l'environnement, Faculte des Sciences de la Nature et de la Vie et des Sciences de la Terre et de l'Univers, Guelma, Algeria

**15991.** Zheng, D.; Zhang, H.; Zhang, Q.; Li, S.; Wang, H.; Fang, Y.; Liu, Q.; Jarzembowski, E.A.; Yan, E.; Wang, B. (2015): The discovery of an Early Cretaceous dragonfly *Hemeroscopus baissicus* Pritykina, 1977 (Hemeroscopidae) in Jiuquan, Northwest China, and its stratigraphic implications. *Cretaceous Research* 52: 316-322. (in English) ["The Early Cretaceous dragonfly *Hemeroscopus baissicus* Pritykina is reported for the first time from the Jiuquan Basin, Gansu Province, Northwest China based on adult wings. These wings are different from those from other localities in two aspects: the oblique crossvein 'O' is 3 or 4 cells distal of the subnodus; the wing size is much smaller (30e42 mm in length for forewings). These differences are considered to be intraspecific variations, based on which diagnoses of the genus *Hemeroscopus* and the family Hemeroscopidae are revised. The discovery of *H. baissicus* in Jiuquan suggests that the Zhonggou Formation may be correlated with the Fuxin Formation in Liaoning Province, the Lushangfen Formation in western Beijing, and the Dongmyeong Formation in southern Korea. A possible migration path of the dragonfly is indicated that it initially appeared in Transbaikalia in the Aptian, migrated southwestwards to Mongolia in the Aptian or early Albian, and then southwestwards to northwest China, southeastwards to northeast China, and southern Korea in the early Albian." (Authors)] Address: Zhang, H., State Key Lab. Palaeobiology & Stratigraphy, Nanjing inst. Geology & Palaeontology, Chinese Acad. Sciences, 39 East Beijing Rd, Nanjing 210008, China. E-mail: hc Zhang@nig-pas.ac.cn

**15992.** Zheng, D.; Wang, H.; Jarzembowski, E.A.; Wang, B.; Chang, S.-C.; Zhang, H. (2015): New data on Early Cretaceous odonatans (Stenophlebiidae, Aeschnidiidae) from northern China. *Cretaceous Research* 67: 59-65. (in English) ["*Liaostenophlebia yixianensis* gen. et sp. nov., a new stenophlebiid damsel-dragonfly, is described from the Lower Cretaceous Yixian Formation of western Liaoning, northern China. It is the third Chinese damsel-dragonfly belonging to the family Stenophlebiidae to be described. *Liaostenophlebia* gen. nov. differs from the other genera of Stenophlebiidae in having Ax2 shifted just above MAb, a transverse and narrow Hal, a more curved anterior side of the hypertriangle, and a broader cubital-anal area. *Sinostenophlebia zhanjiakouensis* Hong, 1984 was previously attributed to Stenophlebiidae and hardly compares with other genera within this family. A check of the plates of the type species (*Sinostenophlebia zhanjiakouensis* Hong, 1984) suggests that *Sinostenophlebia* Hong, 1984 should be a member of the family Aeschnidiidae and it is very likely that this genus is a junior synonym of *Leptaeschnidium* Pritykina, 1977. The new data increases the diversity of both Stenophlebiidae and Aeschnidiidae in the Lower Cretaceous of China." (Authors)] Address: Zheng, D., Dept Earth Sciences, Univ. Hong Kong, Hong Kong Special Administrative Region, China. E-mail: dranzheng@gmail.com

**15993.** Zhou, J.Z.; Liang, Z. (2015): Redescription of a rare entomogenous fungus *Hymenostilbe odonatae*. *Journal of Mountain Agriculture and Biology* 34(6): 50-52. (in Chinese, with English summary) ["Methods Comparative morphology, molecular phylogeny and resolving network analysis, the host for the dragonfly insect fungi were classified and identified. The results show: The fungus is *Hymenostilbe odonatae* Kobayasi, the main morphological characteristics of orange spore stalk bundles grow from between the film and the festival hosts the whole body back, long 0.4-0.5 cm, width 179-333µm; cylindrical bottle Terrier, 9.7-14 × 3.2 µm, tightly arranged seeds layered, then top with a small sterile stems; conidia solitary columnar, 6.5-9.7 × 1.1-2.2µm. Phylogenetic analysis and network analysis also proved that the evolutionary species of dragonflies layer spore stalk bundles, known for our species but not described in detail." (Authors)] Address: Fungus Resources Institute, Guizhou University, Guiyang, Guizhou, 550025, China

## 2016

**15994.** Abreu, F.; De la Fuente, M.F.; Schiel, N.; Souto, A. (2016): Feeding ecology and behavioral adjustments: flexibility of a small neotropical primate (*Callithrix jacchus*) to survive in a semiarid environment. *Mammal Research* 61(3): 221-229. (in English) ["Semiarid environments are known for climate extremes such as high temperatures, low humidity, irregular precipitations, and apparent resource scarcity. We aimed to investigate how a small neotropical primate (*C. jacchus*; the common marmoset) manages to survive under the harsh conditions that a semiarid environment imposes. The study was carried out in a 400-ha area of Caatinga in the northeast of Brazil. During a 6-month period (3 months of dry season and 3 months of wet season), we collected data on the diet of 19 common marmosets (distributed in five groups) and estimated their behavioral time budget during both the dry and rainy seasons. Resting significantly increased during the dry season, while playing was more frequent during the wet season. No significant differences were detected regarding other behaviors. In relation to the diet, we recorded the consumption of prey items such as insects, spiders, and small vertebrates. We also observed the consumption of plant items, including prickly cladodes, which represents a previously undescribed food item for this species. Cladode exploitation required perceptual and motor skills to safely access the food resource, which is protected by sharp spines. Our findings show that common marmosets can survive under challenging conditions in part because of adjustments in their behavior and in part because of changes in their diet." (Authors)] Address: Souto, A., Dept Zoology, Federal University of Pernambuco, Avenida Professor Moraes Rego, 1235, Cidade Universitária, CEP: 50670-901, Recife, Pernambuco, Brazil. E-mail: asouto.labet@gmail.com

**15995.** Acevedo, V.; Amador, M.; Félix, G.; Barrera, R. (2016): Operational aspects of the centers for disease control and prevention autocidal gravid ovitrap. *Journal of the American Mosquito Control Association* 32(3): 254-257. (in English) ["Dengue viruses cause hundreds of millions of in-

fections every year in tropical and subtropical countries. Unfortunately, there is not a single universal vector control method capable of suppressing *Aedes aegypti* (L.) populations. Amongst novel control tools or approaches are various types of traps targeting gravid females or their eggs. Here, we provide details of the operational use of the Centers for Disease Control and Prevention autocidal gravid ovitrap (CDC-AGO trap) for the surveillance and control of *Ae. aegypti*. Adult mosquitoes were monitored every week in 2 isolated neighborhoods treated with 3 AGO traps per house in 85% of houses and in 2 reference neighborhoods without control traps. Between March 2013 and April 2015 we serviced the AGO traps 14 times in each community (every 2 months). Common trap problems were absent or broken trap tops (1–1.5%), flooded (0.1–0.7%) or dry (0.5–1.3%) traps, and missing (0.3–0.8%) or vandalized (0.5–1.4%) traps. Most traps kept a volume of infusion between 45% and 97% of their original volume (10 liters). Nontarget organisms captured in AGO traps were mostly small flies, and to a lesser extent ants, cockroaches, grasshoppers, butterflies, dragonflies, and lizards. Trap coverage ranged between 83% and 87% of houses in both communities throughout the study. We interpret such high levels of trap retention over time as an expression of acceptance by the community." (Authors)] Address: Acevedo, Verónica, Entomology & Ecology Activity, Dengue Branch, Centers for Disease Control & Prevention, 1324 Calle Cañada, San Juan, PR 00920, Puerto Rico

**15996.** Acharjee, B.K.; Karzee, L. (2016): A checklist of dragonfly (Odonata: Anisoptera) diversity in the campus of University Of Science And Technology, Meghalaya (USTM), Ri Bhoi district, Meghalaya, India. *Journal of Entomology and Zoology Studies* 4(3): 124-127. (in English) ["Northeastern India has been marked by its unique species richness and diversity. Like lepidopteron diversity, distribution and diversity of odonata in this region has been well studied. However no concrete study has been done in Ri-Bhoi district of Meghalaya where the university campus is situated. USTM, a nascent university, is built up in a nice landscape documented by marshy areas and hill sides with good vegetation that harbors good dragonfly diversity. In the present study, a survey has been carried out to ascertain dragonfly diversity and 36 species of dragonflies were recorded. This study is first of its kind and has taxonomic importance as it adds few more species to the list of dragonflies from Ri-Bhoi District of Meghalaya." (Authors)] Address: Acharjee, B.K., Dept of Zoology, University of Science and Technology (USTM), Techno City, Kiling Road, Baridua, 9th Mile, Ri-Bhoi, Meghalaya-793101., India

**15997.** Aidenia, N.I.; Borisov, S.N. (2016): Dragonflies (Odonata) of the Barguzinskaya depression and of the Svyatoi Nos Peninsula (North-Eastern Baikal region, Russia). *Eurasian Entomological Journal* 15(4): 339-348. (in Russian, with English summary) ["29 dragonfly species are recorded in the Barguzinskaya Depression and Svyatoi Nos Peninsula. The development of 13 species at eight thermal springs is noted, and details of dragonfly distribution and taxonomic problems are discussed. In East Siberia *Orthetrum albistylum* inhabits only thermal springs, and in the Barguzinskaya Depression it occurs together

with *Sympetrum pedemontanum*." (Authors)] Address: Borisov, S.N., Institute of Systematics and Ecology of Animals, SB RAS, Frunze Str. 11, Novosibirsk 630091 Russia. E-mail: borisov-sn@yandex.ru

**15998.** Alberts, J.M.; Sullivan, S.M.P. (2016): Factors influencing aquatic-to-terrestrial contaminant transport to terrestrial arthropod consumers in a multiuse river system? *Environmental Pollution* 213: 53-62. (in English) ["Highlights: •River contamination decreased with downstream longitudinal distance from a large urban center. •Recipient consumer dynamics were influenced by riparian habitat complexity. •Contaminant flux via emergent insects was not a strong predictor of terrestrial arthropod body burdens. •Terrestrial consumer body burdens were best predicted by riparian land cover. •Riparian land cover regulated aquatic-to-terrestrial contaminant transport. Abstract: Emerging aquatic insects are important vectors of contaminant transfer from aquatic to terrestrial food webs. However, the environmental factors that regulate contaminant body burdens in nearshore terrestrial consumers remain largely unexplored. We investigated the relative influences of riparian landscape composition (i.e., land use and nearshore vegetation structure) and contaminant flux via the emergent aquatic insect subsidy on selenium (Se) and mercury (Hg) body burdens of riparian ants (*Formica subsericea*) and spiders of the family Tetragnathidae along 11 river reaches spanning an urban-rural land-use gradient in Ohio, USA. Model-selection results indicated that fine-scale land cover (e.g., riparian zone width, shrub cover) in the riparian zone was positively associated with reach-wide body burdens of Se and Hg in both riparian *F. subsericea* and tetragnathid spiders (i.e., total magnitude of Hg and Se concentrations in ant and spider populations, respectively, for each reach). River distance downstream of Columbus, Ohio – where study reaches were impounded and flow through a large urban center – was also implicated as an important factor. Although stable-isotope analysis suggested that emergent aquatic insects were likely vectors of Se and Hg to tetragnathid spiders (but not to *F. subsericea*), emergent insect contaminant flux did not emerge as a significant predictor for either reach-wide body burdens of spider Hg or Se. Improved understanding of the pathways and influences that control aquatic-to-terrestrial contaminant transport will be critical for effective risk management and remediation." (Authors)] Address: Alberts, J.M., Dept Biol. Sciences, 614 Rieveschl Hall, University of Cincinnati, Cincinnati, OH, 45221, USA. E-mail: albertj@mail.uc.edu

**15999.** Al-Obaid, S.; Samraoui, B.; Thomas, J.; El-Serehy, H.A.; Alfarhan, A.H.; Schneider, W.; O'Connell, M. (2016): An overview of wetlands of Saudi Arabia: Values, threats, and perspectives. *Ambio* 46: 98-108. (in English) ["The wetlands of Saudi Arabia are located in a water-stressed region that is highly vulnerable to climate and other global changes. Sebkhass, mudflats, mangroves, and wadis are the dominant wetlands in the arid regions of North Africa and the Arabian Peninsula. These unique wetlands are recognized as a sanctuary for biodiversity and for their economic services generated from mineral extraction, agriculture, and grazing. Despite their ecological values and societal services, the long-term permanence of Saudi Arabia's wet-



lands faces strong challenges resulting from human activities associated with sustained population growth, habitat degradation, and coastal development. This paper consolidates a literature review of Saudi Arabia's wetlands from local to global importance, highlights their biodiversity, and identifies threats and evolution of these vulnerable ecosystems in the arid Arabian Peninsula by focusing on the status of key freshwater taxa (Odonata, freshwater fishes, amphibians, and waterbirds) and documenting changes affecting important wetlands." (Authors)] Address: Samraoui, B., Dept Biology, University of Annaba and Laboratoire de Conservation des Zones Humides, University of Guelma, Algeria. E-mail: bsamraoui@yahoo.fr

**16000.** Anderson, T.L. (2016): Predation risk between cannibalistic aeshnid dragonflies influences their functional response on a larval salamander prey. *Journal of Zoology* 300(3): 221-227. (in English) ["In size-structured populations of predators, the threat of cannibalism can influence behavior of prey that are attempting to avoid predation by larger conspecifics, including reducing their foraging rates. Such behavioral responses subsequently release basal prey of both cannibal and non-cannibal predators from predation risk. However, whether the non-consumptive effects of cannibalism on conspecific predators varies with basal heterospecific prey density is relatively unexplored. I conducted a laboratory study in plastic containers to test whether cannibalism risk influenced the functional response of dragonflies while foraging on three different densities of larval salamander prey. Dragonfly predators foraged with a Type II functional response, and when exposed to cannibalism cues, per capita feeding rates were lower at high prey densities. Salamander prey mortality rates declined with increasing prey densities, but the presence of cannibalism risk did not influence this pattern. Overall, this study shows that functional response curves of predators can vary in response to whether cannibalism risk is present in their environment across a small range of prey densities. Incorporating synergistic effects of multiple processes, such as non-consumptive risk factors and prey density, may help further elucidate the processes that structure both predator and prey population dynamics." (Author)] Address: Anderson, T.L., Division Biological Sciences, University of Missouri, 116 Tucker Hall, Columbia, MO 65211-7400, USA. E-mail: anderstl@gmail.com

**16001.** Antony, J.M.; Sebastian, A.P. (2016): Comparative study on nocturnal insects attracted to various light sources. *Imperial Journal of Interdisciplinary Research* 2(7): 1559-1561. (in English) [India; "This study investigated the influence of different sources of light such as CFL bulb, Incandescent bulb, and LED bulb on nocturnal insects. Insect collections were found to be higher in

the rainy day than the normal dry day. Light attracted insect includes Kissing bug, Moth, Grasshopper, Cricket, Dragonfly, Bugs, Butterflies, Lantern fly. Six orders of insects were found to be attracted to the light source with a significant dominance for incandescent bulb followed by CFL bulb and least towards LED bulb. Among the insects order Diptera are the dominant group that attracted to the light sources. Hemiptera were found to be attracted secondly towards all the light source." (Authors)] Address: Antony, J.M., Dept Zool., Assumption College Changanacherry, Changanassery, Kerala 686101, Indien, India

**16002.** Araujo, J.P.M.; Hughes, D.P. (2016): Diversity of entomopathogenic fungi: Which groups conquered the insect body? *Advances in Genetics* 94: 1-39. (in English) ["The entomopathogenic fungi are organisms that evolved to exploit insects. They comprise a wide range of morphologically, phylogenetically, and ecologically diverse fungal species. Entomopathogenic fungi can be found distributed among five of the eight fungal phyla. Entomopathogens are also present among the ecologically similar but phylogenetically distinct Oomycota or water molds, which belong to a different kingdom, the Stramenopila. As a group of parasites, the entomopathogenic fungi and water molds infect a wide range of insect hosts, from aquatic larvae to adult insects from high canopies in tropical forests or even deserts. Their hosts are spread among 20 of the 31 orders of insects, in all developmental stages: eggs, larvae, pupae, nymphs, and adults. Such assortment of niches has resulted in these parasites evolving a considerable morphological diversity, resulting in enormous biodiversity, the majority of which remains unknown. Here we undertake a comprehensive survey of records of these entomopathogens in order to compare and contrast both their morphologies and their ecological traits. Our findings highlight a wide range of adaptations that evolved following the evolutionary transition by the fungi and water molds to infect the most diverse and widespread animals on Earth, the insects.] Address: Araujo, J.P.M., Penn State Univ., University Park, PA, USA. E-mail: joaofungo@gmail.com

**16003.** Augul, R.S.; Al-Hashmi, A.H.; Al-Saffar, H.H. (2016): New record of the Epaulet Skimmer: *Orthetrum chrysostigma* (Burmeister) (Odonata: Libellulidae) from Iraq. *Journal of Biodiversity and Environmental Sciences* 8(5): 233-238. (in English) ["In this study, *O. chrysostigma* [...] is described as a first time to fauna of Iraq; the specimens were collected from Maysan province, south of Iraq, is described as a first time to fauna. The diagnostic characters and main morphological features were figured." (Authors)] Address: Augul, R.S., Iraq Natural History Research Center & Museum, Univ. of Baghdad, Iraq. E-mail: razzaqshalan@gmail.com

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2016

**16004.** Avila Varshini, R.; Kanagappan, M. (2016): A study on the diversity of odonate larvae in a permanent pond Melpalai at Melpuram in Kanyakumari district, Tamil Nadu, India. *International Journal of Applied Research* 2(3): 592-598. (in English) ["The present study gives an overview of data on the habitat diversity of odonate larvae occurring in a permanent pond Melpalai in Melpuram, Kanyakumari District (Tamil Nadu), India, during August 2013-July 2014. The survey of the permanent pond Melpalai revealed the occurrence of 21 species of Odonata. Libellulidae dominated all the other families, while the family Coenagrionidae occupied the second position. The physicochemical parameters (temperature 22-31.5 °C; pH 6.8-7.13; Total dissolved solids 110-143 ppm; Dissolved oxygen 4.1- 5.1 ml/l; Electric conductivity 58-105) of this pond were more or less ideal for the abundance and distribution of odonate larvae. Various diversity indices were calculated for premonsoon, monsoon and post monsoon seasons and the results indicated that maximum diversity and distribution were occurred during the monsoon season followed by the postmonsoon season and minimum diversity was recorded during the premonsoon season." (Authors)] Address: Avila Varshini, R., Dept of Zoology & Research Centre, Scott Christian College (Autonomous), Nagercoil. 629003, India

**16005.** Baird, I.R.C.; Burgin, S. (2016): Conservation of a groundwater-dependent mire-dwelling dragonfly: implications of multiple threatening processes. *Journal of Insect Conservation* 20(2): 165-178. (in English) ["Groundwater-dependent ecosystems and their dependent species are under increasing threat globally. Petalurid dragonflies are one such group. This review highlights processes that threaten the groundwater-dependent mire habitats of *Petalura gigantea*, a dragonfly with long-lived fossorial larvae. The species is reliant for successful reproduction on areas of emergent seepage, or at least, on a water table that is sufficiently high to cause saturation of the peaty substrate. These microhabitat characteristics are critical for successful oviposition and larval burrow establishment, making the species particularly

vulnerable to any lowering of water tables. The effect of any lowering of water tables, due to groundwater abstraction or longwall coal mining, for example, will be compounded by the effects of more intense fire regimes in these mires and by projected climate change. These threatening processes act in conjunction with a range of other anthropogenic threats and are mirrored globally in threats to other groundwater-dependent mire ecosystems and their dependent species, including other petalurid dragonflies." (Authors)] Address: Baird, I.R.C., 3 Waimea Street, Katoomba, NSW 2780, Australia. E-mail: petalurids@gmail.com

**16006.** Baumann, K. (2016): Veränderungen von Höhenverbreitung und Abundanz von *Somatochlora alpestris* und *Somatochlora arctica* im Harz unter dem Einfluss des Klimawandels (Odonata: Corduliidae). *Libellula* 35(1/2): 43-64. (in German, with English summary) ["Shifts of the altitudinal range and abundance of *S. alpestris* and *S. arctica* in the Harz within the impact of climate change (Odonata: Corduliidae) – From 2000–2015, the abundances of *S. alpestris* and *S. arctica* have been researched on the bogs of the Harz Mountains based on collected exuviae. In raised bogs below 850 m a.s.l. the number of *S. alpestris* has noticeably decreased recently, whereas in the highest locations of about 1,000 m a.s.l. their abundance has increased. On the whole, the proportion of the abundances of *S. alpestris* and *S. arctica* has shifted in favour of *S. arctica* in the raised bogs. In slope located soligenous bogs (which are microclimatically cooler) the abundance of *S. alpestris* has not decreased, not even in the lowest elevations of 650–700 m a.s.l. Meanwhile *S. arctica* has spread its area into the highest located bogs, though its frequency there is still smaller than that of *S. alpestris*. Most probably these processes are caused by the global climate change. Limiting factors for the cryophilic *S. alpestris* are assumed to be too high temperatures or too much fluctuation of the temperatures in the pools (increased larval mortality) and perhaps too high air temperatures (inhibition of the adults' activity). In the case of progressing global warming, very unfavourable conditions for *S. alpestris* in the raised bogs in the Harz Mountains must be forecast. By contrast, the less cold resistant *S. arctica* profits by global warming

and will predictably become the dominant dragonfly in the raised bogs at all elevations in the medium term." (Authors)] Address: Baumann, Katrin, ALNUS GbR, Lärchenweg 15a, 38667 Bad Harzburg, Germany. E-mail: alnus-k.baumann-@t-online.de

**16007.** Bechev, D.N. (2016): New localities of *Sympetrum pedemontanum* (Insecta: Odonata) in Bulgaria. Bulletin of the Natural History Museum - Plovdiv 1: 35-36. (in English) ["Two new localities of *S. pedemontanum* and distributional map of the species in Bulgaria are reported.] Address: Bechev, D.N., University of Plovdiv "P. Hilendarski", Dept Zool., 24 Tzar Assen Str., BG-4000 Plovdiv, Bulgaria. E-mail: dbechev@abv.bg

**16008.** Bennett, A.M.; Longhi, J.N.; Chin, E.H.; Burness, G.; Kerr L.R.; Murray, D.L. (2016): Acute changes in whole body corticosterone in response to perceived predation risk: A mechanism for anti-predator behavior in anurans? Gen. Comp. Endocrinol. 229: 62-66. (in English) ["Anuran larvae exhibit behavioral and morphological plasticity in response to perceived predation risk, although response type and magnitude varies through ontogeny. Increased baseline corticosterone is related to morphological response to predation risk, whereas the mechanism behind behavioral plasticity remains enigmatic. Since tadpoles alter behavioral responses to risk immediately upon exposure to predator cues, we characterized changes in whole body corticosterone at an acute (<1h post-exposure) timescale. Tadpoles (*Lithobates sylvaticus*) at Gosner stage (GS) 25 (free-swimming, feeding larvae) increased corticosterone levels to a peak at 10-20min post-exposure to predator cues, paralleling the acute stress response observed among other taxa. Tadpoles reared for 3 weeks (mean GS29) with predation risk (caged, fed Aeshnid dragonfly nymph) had lower corticosterone levels at 10-20min post-exposure to dragonfly cues than predator-naïve controls, suggesting habituation, although the magnitude of increase was markedly diminished when compared to younger tadpoles (GS25). These experiments represent the first assessment of tadpole hormonal responses to predation risk at the acute timescale. Further research is required to establish causality between hormonal responses and behavioral changes, and to examine how and why responsiveness changes over ontogeny and with chronic exposure to risk." (Authors)] Address: Bennett, A.M., Environ. & Life Sc. Grad. Prog., Trent Univ., 1600 West Bank Drive, Peterborough, Ontario K9J 7B8, Canada. E-mail: abennett@trentu.ca

**16009.** Bhandari, R.; Sharma, J.; Shukla, A.; Rai, S. (2016): Assessment of water pollution using bioindicator (Odonata and Mollusca) in Narmada basin at Jabalpur: A developing smart city. Int. J. Pure App. Biosci. 4(5): 72-77. (in English) ["The smart city mission with "Clean Narmada, Green Jabalpur" intends to promote adoption in environment with basic infrastructure to give a decent quality of life. A clean and sustainable environment of Jabalpur using bio indicators species such as Mollusca and Odonata will be applicable as smart solution where environment disturbed through anthropogenic activities. Odonata and Mollusca are biological indicators so with-

out using chemicals we aimed to know the pollution intensity of river Narmada basin. Benthos assemblage from Narmada basin in Jabalpur has been investigated. A total of 37 species of Odonata and 13 species of Mollusca were sampled." (Authors)] Address: Shukla, A., Research Scholar, Dept Zoology, Govt. Model Science College, Jabalpur (M.P.) India. E-mail: arjunshukla37@gmail.com

**16010.** Bhaumik, S.; Gupta, S.K. (2016): A study of mites associated with insect orders (Lepidoptera, Coeloptera, Hemiptera, Odonata) from Kolkata and its neighbourhood. IJSR - International Journal of Scientific Research 5(7): 75-77. (in English) [Arrenurus congener infested *Crocothemis* sp., Haripal, November 2015] Address: Subhrajit Bhaumik Post graduate Dept Zool., Vidyasagar college (University of Calcutta) Salt lake city, Kolkata 700091

**16011.** Borisov, S.N.; Borisov, A.S. (2016): Dragonflies (Odonata) in ornithological trap in the Baikal Nature Reserve, South-Eastern Baikal area of Russia. Eurasian Entomological Journal 15(2): 127-131. (in Russian, with English summary) [11 anisopteran species "were found in ornithological trap of Rybachinsky' type mounted in the Baikal Nature Reserve (51°38'35.5" N. 105°31'19.0" E) in August 2015. Usage of ornithological traps in faunal and ecological studies of dragonflies is discussed." (Authors)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Bran, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**16012.** Borkenstein, A.; Schröter, A.; Jödicke, R. (2016): *Aeshna viridis* is an early bird – matutinal matings in a crepuscular species (Odonata: Aeshnidae). Odonatologica 45(1/2): 37-56. (in English) ["The hitherto unknown mating activities of *Aeshna viridis* at dawn are described and photographically documented. At first morning light both sexes arrived at the breeding pond flying over dense stands of *Stratiotes aloides*. Their flight style was of two types: the well-known feeding flight and a slow, low, linear and non-aggressive cruising flight. Cruising individuals sometimes formed mating wheels and the couples left the pond. Shortly before sunrise numerous males started to search for receptive females in the tall herbaceous vegetation near the pond. This non-aggressive flight mode was slow and at knee-height, characterised by intrusion into dense thickets; we term it searching flight. It ceased within a period of 45–70 min after sunrise. We assume that the terrestrial vegetation represents the main rendezvous site and that searching flight leads to the majority of matings. One male was recorded grasping a resting female. Wheel formation was completed while perching without further flight, resulting in a distinctive twisted wheel position. Further observations confirmed that such twisted wheels found in the morning are typical. There are also records of occasional matings during the period from noon until late afternoon. The restriction of most mating activities to the period around sunrise rejects the myth of *A. viridis* being a late riser. The mating behaviour of this species with its combination of mainly sunrise-limited searching flight and wheel formation with resting mates seems to be unique in Odonata. In referring



to twilight activities – at dawn and dusk – we use the term ‘crepuscular’ in the general sense and eschew the term ‘eocrepuscular’, making a distinction between morning and evening with the terms ‘matutinal’ (at dawn) and ‘vespertine’ (at dusk).” (Authors)] Address: Borkenstein, Angelika, Lebensborner Weg 5, 26419 Schortens, Germany. E-mail: angelikaborkenstein@t-online.de

**16013.** Borkenstein, A.; Jödicke, R. (2016): Crepuscular collective flight of *Aeshna viridis* in Central Europe (Odonata: Aeshnidae). *Not. Odonat.* 8(8): 297-307. (in English) [“Crepuscular flight activity was studied in *A. viridis* at a woodland pond in NW Germany that harboured an isolated, relatively small breeding population. We observed twilight behaviour in 2014 and 2015 during 14 evenings and four mornings from early July until early September. In twilight, under a clear sky always before sunrise and after sunset, a substantial part of the population gathered at the breeding pond and performed a collective flight over Water Soldier *Stratiotes aloides*, the plant species which also served as habitat for diurnal oviposition and patrol flight. The collective flight usually started with hunting mosquitoes (feeding flight) but within few minutes it gradually changed to a linear and slow flight style performed densely above *Stratiotes* (cruising flight). Only feeding individuals in a higher abundance at dusk gave the impression of swarming. Cruising individuals occasionally formed mating wheels but exclusively at dawn. Generally, males prevailed during the collective flight. We attempt to offer first answers to the question why *A. viridis* regularly performs collective flight and discuss its relation to the vespertine mass swarms reported from Finland and western Siberia.” (Authors)] Address: Borkenstein, A., Lebensborner Weg 5, 26419 Schortens, Germany. E-mail: angelikaborkenstein@t-online.de

**16014.** Bouwman, J.H.; Ketelaar, R.; Ruiter, E.J. (2016): The Norfolk Damselfly (*Coenagrion armatum*) in the Netherlands: a balance fifteen years after its rediscovery. *Brachytron* 18(1): 3-15. (in Dutch, with English summary) [“*C. armatum* was rediscovered in the Netherlands in 1999. The Dutch population is located at the Weerribben and is one of the very few populations of this species in North-West Europe. Since its rediscovery *C. armatum* has been studied intensively in the Netherlands but also in Scandinavia and Germany. Although other nature reserves were intensively investigated, the species was not found outside the Weerribben, even where suitable habitat seems to be present. The habitat where the *C. armatum* is found in the Netherlands and in countries nearby is very specific with an open helophyte vegetation in shallow water. The structure of the vegetation appears to be more important than the plant species that form it. The situation in the Netherlands is fragile with only one large population. Specific management is required, aimed at maintaining current habitat locations and creating new ones.” (Authors)] Address: Bouwman, J.H.. E-mail: j.bouwman@bosgroepen.nl

**16015.** Brouwer, P. (2016): *Trithemis kirbyi* near the Spanish-French border. *Boletín Rola* 8: 5-8. (in English, with Spanish summary) [“Two sightings of *T. kirbyi* are reported from the province of Huesca and located south of the Pirenees. Those

records are the most northernmost for the species so far.” (Author)] Address: Brouwer, P. E-mail: p.brouwer4@upcmail.nl

**16016.** Burbach, K.; Schiel, F.-J. (2016): Verbreitung und Bestandssituation von *Sympetrum depressiusculum* im Südteil des Regierungsbezirks Schwaben, Südwestbayern. *Mercuriale* 16: 9-23. (in German, with English summary) [“Distribution and population size of *S. depressiusculum* in the southwestern prealpine area of Bavaria (Suevia) - In 2012, we recorded *S. depressiusculum* at 20 out of 24 investigated sites in the western part of the prealpine area of Bavaria between Lake Constance and the river Lech (district of Schwaben = Suevia). At 8 sites successful reproduction was evident, at another 4 sites very probable. At 8 sites we observed only single or few individuals and we assume *S. depressiusculum* not to have reproduced there due to a lack of suitable waterbodies. Because of the high water levels during summer, we suppose that 2012 was a very suitable year for successful development of this highly endangered species. At five sites we recorded more than 100 specimens per visit. We estimated population sizes of several hundred individuals per site. We consider the populations of the reed zones of Lake Constance and the Forggensee, a reservoir filled with water of the river Lech and two smaller rivers during the summer, to be essential for the continued existence of *S. depressiusculum* in this part of the Bavarian prealpine region. For conservation purposes, the typical water regime with low water levels during winter and high levels from late spring/early summer to late summer/autumn is to be preserved. Furthermore, annual mowing of reed vegetation is important to keep vegetation density low and to prevent succession of high growing reed plants such as *Phragmites australis*, woody succession of willows (*Salix* spp.) and neophytes.” (Authors)] Address: Burbach, K., Am Bachwinkel 3, 85417 Marzling, Germany. E-mail: k-burbach@web.de

**16017.** Butler, S.G.; Steinhoff, P.O.M.; Dow, R.A. (2016): Description of the final instar larva of *Acrogomphus jubilaris* Lieftinck, 1964 (Odonata, Gomphidae), with information on the distribution of *Acrogomphus* in Borneo. *Zootaxa* 4184(2): 367-375. (in English) [“The final instar larva of *A. jubilaris*, is described and figured for the first time based on exuviae from four male and one female larvae collected in Sarawak, Malaysian Borneo. The adults of *A. jubilaris* are very rarely encountered. The larvae, however, are surprisingly common in forest streams in Borneo. It is compared with *A. malayanus* Laidlaw, 1925 and *A. walshae* Lieftinck, 1935, and notes on behaviour, distribution and habitat are included. A map including all known records of *A. jubilaris* is provided.” (Authors)] Address: Butler, S.G., Red Willow, All Stretton, SY6 6HN Shropshire, UK. E-Mail: sgbutler15@btopenworld.com

**16018.** Campos, V.C. de (2016): Estudo comparativo sobre a dieta do *Galbula ruficauda* (Aves, Galbulidae) no Brasil central. Dissertação (Mestrado em Zoologia), Universidade de Brasília, Instituto de Ciências Biológicas, Departamento de Zoologia, Programa de Pós Graduação em Zoologia: 31 pp. (in Portuguese, with English summary) [“This study compares the diet of the *Galbula ruficauda* between sexes, seasons (rainy season and dry season) and two locations relatively

close to each other along a gallery forest of the Maranhão River and one of its tributaries in central Brazil. Additional comparisons involving the results obtained in this study with data on the diet of this bird in another site in Central Brazil and a forest site in Costa Rica were also carried out. Insects attacked and consumed by wild birds in central Brazil belong to seven orders including: Hymenoptera, Diptera, Lepidoptera, Odonata, Coleoptera, Orthoptera and Mantodea. Small insects like Diptera and micro-Hymenoptera constituted the most abundant items in the diet of this bird, followed by relatively large Hymenoptera (especially wasps), Lepidoptera, Odonata, Coleoptera, Orthoptera and Mantodea. Comparisons involving the proportion of these items in the birds' diet showed no significant differences between sexes, but showed strong differences between seasons. Comparisons involving different locations in Central Brazil showed significant differences in some cases but not in others. Comparisons involving locations in central Brazil and data obtained in Costa Rica also furnished strong significant differences between them." (Author)] Address: not stated

**16019.** Cardona-Rivera, G.A.; Ramírez, A. (2016): Predation of *Telebasis vulnerata* (Odonata: Coenagrionidae) eggs by detritivorous caddisfly larva, *Phylloicus pulchrus* (Trichoptera: Calamoceratidae). *International Journal of Odonatology* 19(4): 253-256. (in English) ["After observing the presence of *P. pulchrus* and tadpoles of *Leptodactylus albilabris* (Anura: Leptodactylidae) on submerged leaves with recently laid eggs of *T. vulnerata*, we set up an experiment to determine if they were consuming Odonata eggs. We collected leaves from the stream, where consumers were positioned over egg masses, and designed an experiment to expose *T. vulnerata* eggs for two days to consumers. Observations indicated that tadpoles did not harm *T. vulnerata* eggs. In contrast, *P. pulchrus* completely scraped eggs from leaves, with little damage to the leaf tissue itself. *P. pulchrus* is detritivorous insect that consume leaf tissue, but it is capable of consuming *T. vulnerata* eggs, potentially as a supplementary food resource." (Authors)] Address: Ramirez, A., Dept Biology, Univ. of Puerto Rico, Mayaguez, Puerto Rico. E-mail: aramirez@ramirezlab.net

**16020.** Catling, P.M. (2016): Climate warming as an explanation for the recent northward range extension of two dragonflies, *Pachydiplax longipennis* and *Perithemis tenera*, into the Ottawa valley, Eastern Ontario. *The Canadian Fieldnaturalist* 130(2): 122-132. (in English) ["Climate warming is accepted as an explanation for the recent appearance of *P. longipennis*, and *P. tenera*, in the Ottawa region, as this range expansion meets 6 criteria: (1) the climate in the newly occupied territory has warmed sufficiently to allow colonization; (2) a new range expectation based on the amount of climate warming is met; (3) other factors potentially promoting spread are excluded; (4) the possibility that range extension is a result of difficulty of observation and/or insufficient fieldwork in earlier times is excluded; (5) there is ample evidence for establishment; and (6) spread has been in the direction of the warmer territory or within it. By 2000, the mean daily temperature in the Ottawa region had increased by about 2°C

since 1880 and about 1.1°C since 1960. This would allow new zonal boundaries and the prediction of expansion from a well-defined and long-occupied area into the Ottawa Valley. The two species entered this region in 2008–2012 and, subsequently, became well established." (Author)] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**16021.** Chaudhry, M.T.; Mohsin, A.; Shaheen, F.S.; Arshad, M.; Zia, A. (2016): Dragonflies (Odonata: Anisoptera) of Pakistan. *Pakistan J. Zool.* 48(6): 1957-1962. (in English) [Existing information on Anisoptera fauna of the country is updated by extensive field surveys during 2006-2011. 68 – including 7 - anisopteran species are reported. A detailed checklist of dragonflies of Pakistan has also been presented in this paper.] Address: Chaudhry, M.T., Barani Agricultural Training Institute, Dahgal, Rawalpindi, Pakistan

**16022.** Chelmick, D.; Luck, J. (2016): Emerald Damselflies (Family Lestidae) in the Weald. *Journal of the British Dragonfly Society* 32(1): 26-38. (in English) ["The Weald is a geologically isolated region in south-east England. All four species of Lestidae recorded in the UK have been observed here. *Lestes sponsa* is a locally common resident, *L. dryas* has been shown to be breeding in the High Weald after many years of absence, while *L. barbarus* remains a vagrant but breeding colonies may exist. Finally, *Chalcolestes viridis* is now known to breed and is probably under recorded. The Wealden Dragonfly Group was created to coordinate recording in this region." (Authors)] Address: Chelmick, D., Macromia Scientific, 31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, UK

**16023.** Choong, C.Y.; Izzat-Husna, M.; Amirrudin, B.A. (2016): Odonata (Insecta) fauna of Tasek Bera Ramsar Site, Pahang, Peninsular Malaysia. *Journal of Wildlife and Parks* 31: 39-48. (in English) ["Records of Odonata collected at several sites in Tasek Berar Ramsar Site, Pahang on 13th – 19th August 2014 are presented. A total of 64 species from 7 families were recorded of which 16 species are new records for Tasek Bera. These records are combined with the existing records from Tasek Bera in previous literature to produce an updated checklist of the Odonata known to Tasek Bera. At present it consists of 92 species from 12 families." (Authors)] Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.edu.my

**16024.** Choong, C.Y. (2016): *Leptogomphus tioman* sp. nov. (Odonata: Anisoptera: Gomphidea) from Tioman Island, Peninsular Malaysia. *Zootaxa* 4171(2): 382 -388. (in English) ["A new species *L. tioman* is described based on male specimens collected from Tioman Island, Peninsular Malaysia. It is close to *L. risi* Laidlaw in thoracic markings but is readily distinguished by its anal appendages and accessory genitalia." (Author)] Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia

**16025.** Chovanec, A.; Spira, Y. (2016): Bewertung der Renaturierungsmaßnahmen in den Unterläufen und Mündungsbereichen von Leitenbach und Sandbach sowie an der Aschach (Oberösterreich) aus libellenkundlicher Sicht (Insecta: Odonata). Beiträge zur Entomofaunistik 17: 1-29. (in German, with English summary) ["River restoration at Leitenbach, Sandbach and Aschach in Upper Austria: assessment by dragonfly surveys (Insecta: Odonata). – The ecological status (with special reference to morphological aspects) of the restored lower courses and mouths of Leitenbach and Sandbach as well as of the restored Aschach in this area was assessed by an investigation of the dragonfly fauna. The Dragonfly Association Index was used to compare rivertype-specific reference conditions with the status quo – this procedure is in line with the requirements of the EU Water Framework Directive. 25 species were recorded, which corresponds to 32 % of the species inventory of Austria; 21 species were autochthonous. At the Leitenbach 23 species were found (20 of them autochthonous), at the Sandbach 16 (14), and at the Aschach 16 (11). The three river sections were colonised by a high number of rheophilic species: *Calopteryx splendens*, *C. virgo*, *Platynemis pennipes*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, and *Orthetrum brunneum*. *G. vulgatissimus*, *O. cecilia*, and *O. forcipatus* are "endangered" according to the Austrian Red List. *O. cecilia* is listed in the Appendices II and IV of the EU Fauna-Flora-Habitat-Directive. Due to the species spectrum found, the three river sections were classified as "high ecological status." (Authors)] Address: Chovanec, A., Umweltbundesamt, Spittelauer Lände 5, 1090 Wien, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

**16026.** Clavijo-Calderón, C.A.; Cázares-Rodríguez, M.E. (2016): Odonatos como bioindicadores de la calidad de agua en Surutato, Sinaloa. Bol. Soc. Mex. Ento. (n. s.) Número especial 2: 1-5. (in Spanish, with English summary) ["Odonata as bioindicators of water quality in Surutato, Sinaloa: A study was conducted along the banks of Surutato stream and dam Helladius Serrano in the town of Surutato, Badiraguato, Sinaloa to compare species of Odonata near affected areas and unaffected in this region and observe their possible use as bio-indicators of quality of the water. Sampling was conducted during 23, 24 and 25 September and on 18, 19 and 20 November 2015. 8 species of Anisoptera and 18 of Zygoptera, found along identified 1.5 km. sampling, including 3 new records for the state were found and the conclusion is proposed to develop more studies in this city of 2 species according to the observations we believe that could be candidates for biomarkers." (Authors)] Address: Clavijo-Calderón, C.A., Unidad Académica Escuela de Biología, Univ. Autónoma de Sinaloa, Ciudad Universitaria, Av. Universitarios s/n. Col. Universitarios, Culiacán Rosales, Sinaloa. C. P. 80030, México. E-mail: carlosclavijo57@gmail.com

**16027.** Cleary, D.F.R. (2016): Diversity and composition of plants, butterflies and odonates in an Imperata cylindrica grassland landscape in East Kalimantan, Indonesia. Journal of Tropical Ecology 32: 555-560. (in English) ["In Indonesia and elsewhere, Imperata cylindrica grassland now

covers millions of hectares of land previously covered by rain forest. In the present study, shrubs, trees and climbers were recorded in sixteen 10 × 20-m plots and herb cover (ferns, grasses and herbaceous dicots) estimated in nested 2 × 2-m subplots. Butterflies and odonates were netted along 300-m transects. All plots and transects were randomly allocated to a 450 ha, I. cylindrica-dominated landscape. A total of 43 shrub, tree and climber, 16 herb, 67 butterfly and 30 odonate species were recorded. Shrubs, trees and climbers were present throughout the study area, but basal area was very low and mainly consisted of invasive species. Imperata cylindrica covered an estimated 65% of the area with other plant species or bare soil covering the remainder. Butterfly and odonate communities mainly consisted of species with large geographic distributions, but some recorded species had more limited distributions. The latter were, however, species known to associate with perturbed forest environments. Variation in the composition of butterflies and odonates was also related to variation in habitat structure (e.g. altitude and slope) and plant composition. Plant composition in particular appeared to structure both butterfly and odonate communities." (Author)] Address: Cleary, D.F.R., Dept Biol., CESAM, Univ. de Aveiro, Campus Univ. de Santiago, 3810-193 Aveiro, Portugal. E-mail: cleary@ua.pt or dfrcleary@gmail.com

**16028.** Corbi, J.J.; Abrahão, D.P.; Mello, J.L.S.; Gorni, G.R. (2016): Record of epibiont ciliates (Ciliophora: Peritrichia) living on larvae of Odonata from Brazil. Brazilian Journal of Biology 77(2): 1-3. (in English) ["Here, we report a first record of epibiont ciliates (Ciliophora: Peritrichia) living on larvae of Coenagrionidae (Odonata) in Brazil (see Figure 1). The organisms were collected in September 2015, from the Monjolinho Reservoir, using a "D" aquatic net, during a survey of benthic macroinvertebrates. This reservoir is located in the campus of the Federal University of São Carlos (São Paulo, Brazil) in a subtropical region (47°53'W and 22°01'S). The Odonata were identified using the special identification key (Hamada et al., 2014; Mugnai et al., 2010). We recorded the occurrence of epibiont ciliates (Protozoa: Ciliophora) living on larvae of Coenagrionidae (Odonata). The epibiont ciliates were found attached to some body part of the Odonata larvae, but most usually located on the head and on the pronotum and mesonotum (thorax) (see Figure 1). The presence of epibionts mostly on the head and on the pronotum and mesonotum (thorax) of the Odonata can bring some feed difficulties for these predator aquatic organism. On the other hand, as pointed by Henebry and Ridgeway (1979) since peritrichs primarily consume bacteria, their location on the body of the host is indifferent. However, adhesion to appendages is probably inadequate because epibionts may be lost with the attrition caused by movements and, according to Green (1974), the frequent perturbation by the antenna of the host interrupts the feeding of peritrichs, causing zooid contraction. On the other hand, Regali-Selegim and Godinho (2004) consider that bigger organisms are easier targets for the epibionts than smaller ones. Consequently, our observations may be related to epibiont preference for these aquatic organisms or to the presence of a comparatively larger adhesion surface



offered by each Odonata individual." (Authors)] Address: Corbi, J.J., Laboratório de Ecologia de Ambientes Aquáticos – LEEA, Departamento de Hidráulica e Saneamento – SHS, Universidade de São Paulo – USP, Avenida Trabalhador São-carlense, 400, CEP 13566-590, São Carlos, SP, Brazil. E-mail: julianocorbi@usp.br

**16029.** Cuéllar-Cardozo, J.A.; Arteaga-Guzmán, E.; Bernal-Arriero, L.; Campo-Garnica, A.; Capera, D.; Ocampo, C.; Ortiz-Ruiz, M.; Rincón-Aceldas, S.; Sánchez, F. (2016): Composición y riqueza de odonatos en tres humedales artificiales suburbanos en Cajicá, Cundinamarca, Colombia. *Rev. Biodivers. Neotrop.* 6(2): 164-170. (in Spanish, with English summary) ["Odonata composition and richness in three artificial, suburban wetlands in Cajicá, Cundinamarca, Colombia. The Sabana de Bogotá landscape has been highly modified and there are artificial wetlands that have been created for different purposes. Very little is known about the biodiversity of these wetlands. Objective: To compare the composition and species richness of Odonata in three artificial wetlands on the Universidad Militar Nueva Granada campus in Cajicá, Cundinamarca, Colombia. Methodology: Adults were captured using entomological nets during March and April, 2015. Three sites were sampled: 1. A wetland near the Bogotá river, 2. A temporary wetland surrounded by grassland, and 3. A wetland bordered by buildings and grassland and with the bottom covered with geomembrane. Results: 817 individuals belonging to the following species were collected: *Rhionaeschna marchali*, *Enallagma civile*, *Ischnura cruzi*, *Ischnura* sp. *Mesamphiagrion laterale* and *Erythrodiplax fusca*. The riverine and temporary wetlands shared four species and showed greater similarity between them than with the geomembrane wetland. There was an association between the frequency of species of Odonata and each of the wetlands; for example; a species was unique to the riverine wetland (*R. marchali*) and another was exclusive to the temporary wetland (*Ischnura* sp.). There were no differences in estimated species richness between the riverine and temporary wetlands, and both had greater richness than the geomembrane wetland. Conclusion: Our results suggest that the differences between the wetlands affected the composition, frequency and richness of Odonata. Increasing the abundance and diversity of macrophytes should help to maintain the diversity of Odonata on campus." (Authors)] Address: Cuéllar-Cardozo, J.A., Programa de Biología Aplicada, Fac. Ciencias Básicas y Aplicadas, Univ. Militar Nueva Granada, Cajicá, Colombia. e-mail: josecuellar1094@gmail.com

**16030.** Cuellar-Cardozo, J.A.; Castro-Rebolledo, M.I. (2016): Biomasa de odonatos en un humedal artificial suburbano, Cajica (Cundinamarca-Colombia). *Rev. Intropica* 11: 97-103. (in English, with Spanish summary) ["The wetlands from Sabana of Bogota have ecological alterations caused by the impact of anthropogenic activities. Second productivity particularly in macroinvertebrates like the odonates, is the most important aspect that can precisely define the conservation degree of wetlands. This study aimed to characterize the Odonata assembly through taxonomic identification, density and

biomass quantification, and to evaluate an allometric relation between the growth of the cephalic amplitude and the dry weight of *Rhionaeschna marchali* (larvae), present in a suburban wetland from Nueva Granada Military University (Cajicá, Cundinamarca). In total seven weekly samplings were made in the period between August and October 2014. Data were obtained in relation to the density, biomass and a linear regression model between the dry mass and cephalic amplitude for *R. marchali* naiads ( $R^2 = 0.61$ ), the others regressions were not significant. *Mesamphiagrion laterale* showed the highest density of adult individuals (0.14 ind m<sup>2</sup>) and *R. marchali* (200 ind m<sup>2</sup>) had the highest density of larvae." (Authors)] Address: Cuellar-Cardozo, J.A., Programa de Biología Aplicada. Facultad de Ciencias Básicas y Aplicadas. Universidad Militar Nueva Granada. Km 2 vía Cajicá-Zipacquirá, Colombia. E-mail: josecuellar1094@gmail.com

**16031.** Das, S.M. (2016): Diversity of Odonata in and around the Vivekananda Kendra Vidyalaya (NEC), Baragolai, Margherita, Tinsukia district of Assam (India). *International Journal of Scientific and Research Publications* 6(8): 406-410. (in English) ["A total of 39 species of Odonates, including 28 species of Anisoptera and 11 species of Zygoptera were recorded in and around the Vivekananda Kendra Vidyalaya (NEC) Baragolai, Margherita, Tinsukia district of Assam (India) between March, 2015 to June, 2016. From the sub-order Anisoptera, Libellulidae was the richest family with 25 species and from the sub-order Zygoptera, Coenagrionidae is the richest family with 9 species. A detail list of odonates recorded from the study area is presented." (Author)] Address: Das, S.M., Department of Biology, Guru Teg Bahadur Academy, Tinsukia, Assam, India

**16032.** David, S.; Funken, J.; Potthast, W.; Blanke, A. (2016): Musculoskeletal modelling under an evolutionary perspective: deciphering the role of single muscle regions in closely related insects. *Journal of The Royal Society Interface*: 13 (123): 9 pp. (in English) ["Insects show a remarkable diversity of muscle configurations, yet the factors leading to this functional diversity are poorly understood. Here, we use musculoskeletal modelling to understand the spatio-temporal activity of an insect muscle in several dragonfly species and to reveal potential mechanical factors leading to a particular muscle configuration. Bite characteristics potentially show systematic signal, but absolute bite force is not correlated with size. Muscle configuration and inverse dynamics show that the wider relative area of muscle attachment and the higher activity of subapical muscle groups are responsible for this high bite force. This wider attachment area is, however, not an evolutionary trend within dragonflies. Our inverse dynamic data, furthermore, show that maximum bite forces most probably do not reflect maximal muscle force production capability in all studied species. The thin head capsule and the attachment areas of muscles most probably limit the maximum force output of the mandibular muscles." (Authors)] Address: David, Sina, Institute of Biomechanics and Orthopaedics, German Sport University Cologne, Cologne 50933, Germany

- 16033.** Dawn, P.; Chandra, K. (2016): Ten new records of Odonata from Chhattisgarh state, India (Odonata: Coenagrionidae, Platycnemididae, Aeshnidae, Macromiidae, Libellulidae). *Notulae odonatologicae* 8(7): 218-221. (in English) ["A field survey in Chhattisgarh during 2012–2014 resulted in ten Odonata species new to the state. These are *Brachydiplax chalybea*, *Hydrobasileus croceus*, *Onychothemis testacea*, *Orthetrum chrysis*, *Tetrathemis platyptera*, *Eophthalmia frontalis*, *Aciagrion olympicum*, *Caconeura ramburi*, *Prodasineura cf. verticalis*, and one unidentified *Gynacantha* sp. These records increase the number of odonate taxa known from Chhattisgarh state to 95." (Authors)] Address: Dawn, P., Prani Vigyan Bhavan, Zoological Survey of India, M-Block, New Alipore, Kolkata 700053, India. E-mail: [prosenjit.dawn@gmail.com](mailto:prosenjit.dawn@gmail.com)
- 16034.** Dawn, P.; Chandra, K. (2016): Description of the larva of *Gynacantha millardi* Selys, 1891 (Odonata: Aeshnidae) from Chhattisgarh, India. *Zootaxa* 4132(2): 290-294. (in English) ["The larva of *G. millardi* is described here from female larvae and male and female exuviae collected from Chhattisgarh, India. Unlike other *Gynacantha* larvae known so far, *G. millardi* has 7 palpal setae almost equal in length; in other species, the palpal setae are of different lengths. The larvae lack a tooth on each side of the median cleft and have a distinct blunt tooth on the inner margin corner of each labial palp. The larvae were found in a semi-stagnant forest pool with enormous growth of aquatic vegetation." (Authors)] Address: Dawn, P., Zoological Survey of India, M - Block, New Alipore, Kolkata - 700053, India. E-mail: [prosenjit.dawn@gmail.com](mailto:prosenjit.dawn@gmail.com)
- 16035.** De Knijf, G.; Sparrow, D.J.; Dimitriou, A.C.; Kent, R.; Kent, H.; Siedle, K.; Lewis, J.; Crossley, L. (2016): Distribution, ecology and status of a threatened species *Ischnura intermedia* (Insecta: Odonata), new for Europe. *International Journal of Odonatology* 19(4): 257-274. (in English) ["The dragonfly genus *Ischnura* has been the subject of numerous studies and is well studied in Europe and the Middle East. Nevertheless, information on the ecology, habitat preferences and phylogenetic relationships of some species is deficient. One species lacking such data is *Ischnura intermedia*, a near endemic species of the Middle East, found for the first time in Europe on Cyprus in 2013, where it occurs in five river valleys. In this study, we monitored *I. intermedia* in Cyprus where the species has a long flight period from the end of March until mid-November. Our results show that it has two and possibly even three generations a year, with the males of the first generation having reduced blue coloration on abdominal segments 8 and 9. *Ischnura intermedia* is confined to small secondary channels adjacent to streams and rivulets where the current slows and water is retained. It appears that populations can only become established at sites that have permanent water. It is therefore anticipated that the species will be under severe pressure within its range. We suggest listing this species as "Endangered" in Europe and globally as "Vulnerable" following the IUCN Red List Categories and Criteria and to prepare a species action plan for the European population of *Ischnura intermedia* on Cyprus. Two partial DNA fragments,
- mtDNA cytochrome b (Cytb) and cytochrome oxidase subunit I (COI) were used to gain insights into the phylogenetic position within *Ischnura*, especially within the *I. pumilio* clade. We demonstrate that *I. intermedia* is clearly separated from *I. pumilio*, but closely related to *I. forcipata*." (Authors) ] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: [geert.deknijf@inbo.be](mailto:geert.deknijf@inbo.be)
- 16036.** Deacon, C.; Samways, M.J. (2016): Larva of one of the world's rarest and most threatened damselflies: *Spesbona angusta* (Odonata: Platycnemididae). *Odonatologica* 45(3/4): 225-234. (in English) ["*S. angusta* is Red Listed as Endangered and a conservation plan for it is urgently required. Quantifying population levels of its larva is part of that plan, yet the larval morphology is poorly known. Four final instar larvae were collected from the only known site in Western Cape, South Africa, in August 2015 and are described here in detail for the first time. The larval morphology is further compared with other South African platycnemidids and its Oriental sister genus *Copera*. Some biological notes are also given." (Authors) ] Address: Deacon, C., Department of Conservation Ecology and Entomology, Stellenbosch University, Matieland, South Africa. E-mail: [charldeacon@sun.ac.za](mailto:charldeacon@sun.ac.za)
- 16037.** Debecker, S.; Sanmartin-Villar, I.; de Guinea-Luengo, M.; Cordero-Rivera, A.; Stoks, R. (2016): Integrating the pace-of-life syndrome across species, sexes and individuals: covariation of life history and personality under pesticide exposure. *Journal of Animal Ecology* 85(3): 726-738. (in English) ["(1.) The pace-of-life syndrome (POLS) hypothesis integrates covariation of life-history traits along a fast–slow continuum and covariation of behavioural traits along a proactive–reactive personality continuum. Few studies have investigated these predicted life-history/personality associations among species and between sexes. Furthermore, whether and how contaminants interfere with POLS patterns remains unexplored. (2.) We tested for covariation patterns in life history and in behaviour, and for life-history/personality covariation among species, among individuals within species and between sexes. Moreover, we investigated whether pesticide exposure affects covariation between life history and behaviour and whether species and sexes with a faster POLS strategy have a higher sensitivity to pesticides. (3.) We reared larvae of four species of *Ischnura* damselflies (*I. elegans*, *I. genei*, *I. graellsii* and *I. pumilio*) in a common garden experiment with an insecticide treatment (chlorpyrifos absent/present) in the final instar. We measured four life-history traits (larval growth rate during the pesticide treatment, larval development time, adult mass and life span) and two behavioural traits (larval feeding activity and boldness, each before and after the pesticide treatment). (4.) At the individual level, life-history traits and behavioural traits aligned along a fast–slow and a proactive–reactive continuum, respectively. Species-specific differences in life history, with fast-lived species having a faster larval growth and development, a lower mass at emergence and a shorter life span, suggested that time constraints in the larval stage were predictably driving life-history evolution both in the larval stage

and across metamorphosis in the adult stage. Across species, females were consistently more slow-lived than males, reflecting that a large body size and a long life span are generally more important for females. In contrast to the POLS hypothesis, there was only little evidence for the expected positive coupling between life-history pace and proactivity. Pesticide exposure decreased larval growth rate and affected life-history/personality covariation in the most fast-lived species. (5.) Our study supports the existence of life-history and behavioural continua with limited support for life-history/personality covariation. Variation in digestive physiology may explain this decoupling of life history and behaviour and provide valuable mechanistic insights to understand and predict the occurrence of life-history/personality covariation patterns." (Authors)] Address: Debecker, Sara, Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Charles Deberiotstraat 32, bus 2439, 3000 Leuven, Belgium. E-mail: sara.debecker@bio.kuleuven.be

**16038.** Degabriele, G. (2016): Notes on behaviour and morphology of some species of Odonata in the Maltese Islands. *Bull. ent. soc. Malta* 8: 96-100. (in English) ["The Maltese Islands have limited availability of freshwater, so the local species of Odonata may adopt behavioural strategies which they may not use elsewhere where water is readily available. Moreover, since local species of Odonata tend to be the more common, hardy and adaptable species found in neighbouring countries, their behavioural strategies and morphological features may be relatively less studied than species which are rarer and perhaps more vulnerable. Between September 2012 and September 2013, behavioural strategies and morphological features of Odonata were observed along four valleys (Wied Qlejgha, Fiddien, Wied ta' Ghajn Rihana, and Wied Hesri) and a saltmarsh (Is-Simar) in Malta." (Author)] Address: Degabriele, G., Dept of Biology, Junior College, University of Malta, Msida MSD 1252, Malta. E-mail: godwin.degabriele@um.edu.mt

**16039.** Dehghani, R.; Atharizadeh, M.; Moghadam, V.K.; Hadei, M. (2016): Study on biting bugs encountered in the aquatic environments in Kashan, Isfahan Province, Iran. *Journal of Coastal Life Medicine* 4(11): 852-855. (in English) ["Summary: Objective: To determine biting bugs of Hemiptera families presenting in the county of Kashan. Methods: For this descriptive study, samples were collected from 17 locations of lentic and lotic waters, 3 times for each. These specimens were identified by using a stereo microscope and morphological keys. Results: Out of 5 535 specimens collected in three times of samplings, 3 024 specimens (54.6%) belonged to order Diptera, 701 specimens (12.7%) belonged to Crustaceans, 691 specimens (12.5%) belonged to Trichoptera, 468 specimens (8.4%) belonged to Hemiptera, 303 specimens (5.5%) belonged to Ephemeroptera, 133 specimens (2.4%) belonged to Odonata, 104 specimens (1.9%) belonged to Coleoptera, 98 specimens (1.8%) belonged to Hydrocarina and 13 specimens (0.2%) belonged to Plecoptera. In this study, Families Corixidae, Notonectidae, Gerriidae and Nepidae from Hemiptera order were identified 45.9%, 26.9%, 25.0% and 2.2%, respectively. Conclusions: These

results lead to the conclusion that Hemiptera fauna is relatively rich in Kashan. More studies by entomologists and biologists are recommended to determine the benefits and damages of these insects on the environment." (Authors)] Address: Dehghani, R. Social Determinants of Health Research Center, Department of Environmental Health, State College of Health, Kashan University of Medical Sciences, Kashan, Isfahan Province, Iran

**16040.** del Palacio, A.; Muzón, J. (2016): Redescription of *Erythrodiplax pallida* (Needham, 1904) (Odonata: Libellulidae). *International Journal of Odonatology* 19(1-2): 23-30. (in English) ["A redescription of both sexes of *E. pallida* is provided based on specimens collected in shallow wetlands associated with flood plains from small streams to large rivers in Corrientes and Buenos Aires provinces, Argentina. The vesica spermalis morphology resembles those of the *basalis* and *nigricans* groups due to the presence of median and posterior lobes and the lack of paired lobes. *E. pallida* is easily distinguished from the other congeners by the white frons." (Authors)] Address: del Palacio, A., Univ. Nacional de Avellaneda, Depto de Ambiente y Turismo, BioGeA, Mario Bravo 1460 CP 1870, Piñeyro, BA, Argentina. E-mail: adelpalacio87@gmail.com

**16041.** Denloye, A.A.; Alafia, O.A.; Ajelara, K.O.; Babalola, O.O.; Dosunmu, O.A.; Owodeinde, F.G.; Solomon, O.O. (2016): Occurrence of *Orthetrum abbotti* Calvert (1892) (Odonata, Libellulidae) and intraguild predation on *Clarias gariepinus* Burchell, 1822 (Suliformes, Clariidae) and *Oreochromis niloticus* L., 1758 (Perciformes, Cichlidae) fries in Lagos fish farms. *Int. J. Aquat. Biol.* 4(5): 325-329. (in English) ["Intraguild predation occurs when species competing for the same resource prey upon or parasitize one another. This may result in economic losses under commercial circumstances. A survey of the insect species of fish farms in Badagry and Ojo Areas of Lagos State, Nigeria was carried out followed by an evaluation of the predatory ability of *Orthetrum abbotti* nymphs on fish fries. Nymph predation was evaluated in the laboratory against fries of *Clarias gariepinus* and *Oreochromis niloticus*. Samples of insects were randomly collected from 10 earthen ponds, 10 concrete ponds and the vegetation surrounding the ponds and identified over a period of 12 weeks from three study fish farms. Six species of insects belonging to four orders namely *Notonecta unifasciata*, *Gerris remigis*, *O. abbotti*, *Aedes aegypti*, *Dysticus marginalis* and *Acentria ephemerella* syn. *niveus* were collected from the ponds. Studies on feeding preference of 5th nymphal instar of *O. abbotti* on fries of *C. gariepinus* and *O. niloticus* over other food types revealed that the dragonfly preferred to feed more on *C. gariepinus* fry than on *O. niloticus* although there was no significant difference in the number of *O. niloticus* and *C. gariepinus* fries preyed upon by *O. abbotti* nymphs." (Authors)] Address: Denloye, A.A., Dept Zool. & Environmental Biology, Fac. Science, Lagos State Univ., Ojo, Lagos, Nigeria. E-mail: bio\_denloye@yahoo.com

**16042.** Deviche, P.; Endersby, I. (2016): First confirmed record of Black-headed Skimmer, *Crocothemis nigrifrons*, in



Victoria. *Victorian Entomologist* 46(3): 58-59. (in English) [Australia; "On 29-XII-2015 and while surveying odonates at Waurn Ponds (lat. 38° 11' 56" S; long. 144° 17' 39" E; 58 m asl), on the grounds of Deakin University, the first author found and photographed a single male *C. nigrifrons* at one of the pond. No individual of this species was observed during previous or subsequent visits to the same site. To our knowledge, this observation provides the first documented record of this species in Victoria." (Authors)] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@pacific.net.au

**16043.** Dijkstra, K.-D. B. (2016): Restore our sense of species. *Nature* 533: 172-174. (in English) ["Klaas-Douwe B. has named a new dragonfly after David Attenborough to mark the broadcaster's 90th birthday — and to honour the importance of knowing the natural world." (Publisher)] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: dijkstra@nrm.nl

**16044.** Ding, Y.; Rong, N.; Shan, B. (2016): Impact of extreme oxygen consumption by pollutants on macroinvertebrate assemblages in plain rivers of the Ziya River Basin, north China. *Environmental Science and Pollution Research* 23(14): 14147-14156. (in English) ["The aim of the study was to estimate the impact of oxygen depletion on macroinvertebrate community structure in benthic space. Macroinvertebrate assemblages and potential of dissolved oxygen (DO) consumption were investigated simultaneously in the plain rivers of the Ziya River Basin. The degree of DO depletion was represented by sediment oxygen demand (SOD) and DO, chemical oxygen demand (CODCr), and ammonia nitrogen (NH<sub>4</sub><sup>+</sup>-N) in the overlying water. The results showed an all-around hypoxia environment formed, and the values of DO, SOD, CODCr, and NH<sub>4</sub><sup>+</sup>-N were separately 0.11–4.03 mg L<sup>-1</sup>, 0.41–2.60 g m<sup>-2</sup> day<sup>-1</sup>, 27.50–410.00 mg L<sup>-1</sup>, and 1.79–101.41 mg L<sup>-1</sup>. There was an abnormal macroinvertebrate assemblage, and only 3 classes, Insecta, Gastropoda, and Oligochaeta, were found, which included 9 orders, 30 families, and 54 genera. The biodiversity was at a low level, and Shannon-Wiener index was 0.00–1.72. SOD, and NH<sub>4</sub><sup>+</sup>-N had major impact on the macroinvertebrate community, and the former had negative effect on most taxa, for instance, Nais, Branchiura, Paraleptophlebia, etc., which were sensitive or had a moderate-high tolerance to pollution. NH<sub>4</sub><sup>+</sup>-N had both positive and negative impacts on benthic animals, for instance, Dicrotendipes, Gomphus, Cricotopus, etc., for the former, and Procladius, Limnodrilus, Hippeutis, etc., for the latter. They all had a moderate-high tolerance to pollution. It is significant to improve DO condition and macroinvertebrate diversity in river harnessing and management." (Authors)] Address: Shan, B., State Key Laboratory on Environmental Aquatic Chemistry, Research Center for Eco-Environmental Science, Chinese Academy of Science, Beijing, 100085, People's Republic of China

**16045.** Dow, R.A.; Choong, C.Y.; Ng, Y.F. (2016): Records of Odonata from Perlis, Malaysia in August 2015, with a checklist of species recorded from the state. *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 16: 1-22. (in English, with Bahasa Melayu abstract) ["The results of a short collecting trip to Perlis in the north-west of Peninsular Malaysia are reported. Eighty three species were collected, at least 61 of these are new records for the state, and three species are recorded from Malaysia for the first time: *Euphaea masoni* Selys, 1879, *Archibasis oscillans* (Selys, 1877) and *Paracercion calamorum* (Ris, 1916). A checklist of the Odonata recorded from Perlis is given in an appendix." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**16046.** Dow, R.A. (2016): Revision of the genus *Coeliccia* Kirby in Borneo part II: Two new species from the membrani-pes-group, with a redescription of *C. macrostigma* Laidlaw (Odonata: Zygoptera: Platynemididae). *Zootaxa* 4184(1): 79-103. (in English) ["*Coeliccia matok* sp. nov. (holotype ♂ from Borneo, Sarawak, Samarahan Division, peat swamp forest at old UNIMAS campus, 25 ii 2008, to be deposited in BMNH) and *Coeliccia paludensis* sp. nov. (holotype ♂ from Borneo, Kalimantan Tengah, peat swamp forest in ex Mega Rice Project Block E, 18 vi 2012, in RMNH) are described from Borneo. The two new species are apparently confined to peat swamp forest (*C. paludensis*) or largely confined to peat swamp forest and related forest formations (*C. matok*). *Coeliccia macrostigma* Laidlaw is redescribed and all available information on it is summarised. Additional terminology for characters of the prothorax in *Coeliccia* species is introduced. Distribution maps are given for all three species considered." (Author)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**16047.** Du, C.-p.; Xu, J.-x.; Zheng, Y. (2016): Application of iterative learning tuning to a dragonfly-like flapping wing micro aerial vehicle. *Chinese Control and Decision Conference (CCDC)*, 28-30 May 2016, Yinchuan, China: 4215-4220. (in English) ["The flight control design of a dragonfly-like flapping wing micro aerial vehicle (FWMAV) is studied in this paper. The main contribution of this work is to design an appropriate flight controller by incorporating a linear-quadratic regulator (LQR) method and an iterative learning tuning (ILT). The linear model of dragonfly-like FWMAV is developed at the equilibrium point. Then a linear-quadratic regulator approach is applied to design the flight controller of FWMAV. However the flight controller performance of FWMAV is sensitive to the input weighting matrix of LQR. In order to improve the flight controller, an iterative learning tuning is developed to optimize the input weighting matrix of LQR problem due to unknown constraints and relations between the state and the control input. Numerical simulation results show that the effectiveness and convergence performance of the flight controller of FWMAV are obtained.] Address: Du, C.-p., School of Aeronautics and Astronautics, Zhejiang University, Hangzhou, 310027, China

**16048.** DuBois, R.B.; Smith, W.A. (2016): Pre-emergent movements and survival of F-0 larvae of *Ophiogomphus rupinsulensis* (Odonata: Gomphidae) in a northern Wisconsin river. *International Journal of Odonatology* 19(1-2): 83-93. (in English) ["We marked and released 276 F-0 larvae of *O. rupinsulensis* in the fall of 2008 in a 99-m riffle (marking riffle) of a small, serially discontinuous, northern Wisconsin river (USA). We then recovered marked exuviae via exhaustive collecting on the banks of a 272-m sampling reach in which the marking riffle was located during spring of 2009. We collected 6054 exuviae of *O. rupinsulensis* along the sampling reach, including 3829 exuviae along the marking riffle (19.3 exuviae m<sup>-1</sup>). Mark retention was complete and our ability to recover marked exuviae in the field was high (92%). We recovered 38 marked exuviae which provided a minimum estimate of survival (14%) for F-0 larvae from late September to the following June. The density of F-0 larvae in the marking riffle in late September was estimated at 22.6 larvae m<sup>-2</sup>. Nearly all F-0 larvae made small downstream movements (97% moved <60 m) at some time during the 36 weeks before emergence, but they did not make substantial longitudinal movements. These results affirmed the premise that locations of found exuviae of *O. rupinsulensis* along a small river are in close proximity to the habitats where the larvae developed." (Authors)] (Address: DuBois, R., Dept of Natural Resources, Bureau of Natural Heritage Conservation, Superior, WI, USA. E-mail: robert.dubois@wisconsin.gov

**16049.** Dumont, H.J.; Chevalier, F. (2016): *Trithemis kirbyi* colonizes the Atlantic Sahara. *Notulae odonatologicae* 8(8): 308-313. (in English) ["We report *Trithemis kirbyi* from the environs of Dakhla in the Atlantic (western) Sahara, currently an extension of South Morocco. In view of the peculiar distribution of this species in west and north-west Africa, and the recent changes in the desert environment brought about by man, we hypothesize that, as in the Iberian Peninsula, such change in distribution was triggered by recent habitat changes and that the origin of the invasion was more likely the Moroccan than the Sahelian populations. Further extension towards the south (the Senegal basin) is expected in the years ahead." (Authors)] (Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@ugent.be

**16050.** Dumont, H.J. (2016): The dragonfly fauna of South Mauretania: 40 years later. *Brachytron* 18(1): 57-67. (in Dutch, with English summary) ["In February 2016, I observed 11 species of dragonflies in the Tagant plateau and Senegal valley. The Tagant area is relatively rich in permanent water, being situated at the transition of Sahara desert and Sahel. I re-visited several water points seen and sampled forty years earlier (1975 and 1976). A comparison with the current situation revealed incisive changes: in many places, new human settlements have appeared, leading to the privatization (fencing) of large parts of oases and other desert areas, a huge proliferation of cattle, and the use of detergents (and presumably, but not observed) of pesticides. *Agriocnemis zerafica*, of which one population north of the Senegal River was known from the oasis of El Houseiniye, had disappeared, and

most other species had decreased in abundance. I was also struck by some biogeographic anomalies: at least two Afro-tropical species that are currently common in Morocco and expanding into the Iberian Peninsula, are not or scarcely found in Mauretania and Senegal. Other species, common in these two countries, have relict populations in the central Sahara (mainly in Algeria and Libya) but are lacking in the western desert and do not reach the Maghreb. The reasons behind this pattern are unknown, but are likely of an ecological (species interaction?) nature. *Hemianax ephippiger* was present but not abundant and did not (yet?) migrate. *Lestes pallidus* was found to associate with *Acacia* trees, abundantly in the Senegal valley, but isolated occurrences were noted up to 100 km from the river. The dynamics of this association tree-dragonfly deserves closer attention. Possibly it is neutral, but it is not excluded that it might be a mutualistic relationship, the first to involve a dragonfly." (Author)] (Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@ugent.be

**16051.** Dutmer, G. (2016): Discovery of a population of *Nehalennia speciosa* in the eastern part of the Netherlands. *Brachytron* 18(1): 16-22. (in Dutch, with English summary) ["*N. speciosa* has always been a very rare species in the Netherlands and was regarded as extinct, with only two reliable records, from 1899 and 1912. In June 2015, a population was found in the eastern part of the Netherlands. Between June 11 and July 31 a maximum of 40 individuals per day, including copulae and teneral were seen. The flight period is from the beginning of June till the end of July. The population was visited regularly and their ecology and behaviour was observed. Although the habitat corresponds with the description in the literature the individuals were only seen on land. The origin of this population is unclear. Possibly it survived the excavations in the early 20th century. The nearest known population is located 200 kilometres away in Germany. Possibly more populations are to be discovered in the border area between the Netherlands and Germany." (Author)] (Address: Gerard Dutmer. E-mail: gerarddutmer@hotmail.com

**16052.** Ehram, M.; Knutie, S.A.; Rohr, J.R. (2016): The herbicide atrazine induces hyperactivity and compromises tadpole detection of predator chemical cues. *Environmental Toxicology & Chemistry* 35(9): 2239-2244. (in English) ["The ability to detect chemical cues is often critical for freshwater organisms to avoid predation and find food and mates. In particular, reduced activity and avoidance of chemical cues signaling predation risk are generally adaptive behaviors that reduce prey encounter rates with predators. The present study examined the effects of the common herbicide atrazine on the ability of Cuban tree frog (*Osteopilus septentrionalis*) tadpoles to detect and respond to chemical cues from larval dragonfly (*Libellulidae* sp.) predators. Tadpoles exposed to an estimated environmental concentration of atrazine (calculated using US Environmental Protection Agency software; measured concentration, 178 µg/L) were significantly hyperactive relative to those exposed to solvent control. In addition, control tadpoles significantly avoided predator chemical cues, but tadpoles exposed to atrazine did not. These

results are consistent with previous studies that have demonstrated that ecologically relevant concentrations of atrazine can induce hyperactivity and impair the olfactory abilities of other freshwater vertebrates. The authors call for additional studies examining the role of chemical contaminants in disrupting chemical communication and the quantification of subsequent impacts on the fitness and population dynamics of wildlife." (Authors)] Address: Ehram, M., Dept of Integrative Biology, University of South Florida, Tampa, Florida, USA

**16053.** Emiliyamma, K.G.; Palot, M.J. (2016): A new species of *Protosticta* Selys, 1885 (Odonata: Zygoptera: Platystictidae) from Western Ghats, Kerala, India. *Journal of Threatened Taxa* 8(14): 9648-9652. (in English) ["A new species of *Protosticta* Selys, 1885 from Kerala part of Western Ghats is described and illustrated. The holotype male and paratype female is distinguished from other *Protosticta* species based on its complete black dorsal surface of abdomen, 7th and 8th abdominal segment without yellow or blue colour dorsally and its distinct anal appendages. The new species, *P. monticola* sp. nov. was collected from shola forests of Idukki District, Kerala, southern Western Ghats. A key is also provided for the identification of all described species of *Protosticta* known from the Western Ghats." (Authors)] Address: Emiliyamma, K.G., Zool. Survey of India, Western Ghat Regional Centre, Kozhikode, Kerala 673006, India. E-mail: kgemily@gmail.com

**16054.** Escoriza, D.; Hassine, J.B.; Sala, J.; Boix, D. (2016): Zoophagy in the larvae of Ibero-Maghrebian Spade-foot Toads. *Herpetologica* 72(4): 281-287. (in English, with French summary) ["The ecological role of anuran larvae is usually defined as a primary consumer. Recent studies have shown, however, that some grazing-rasping species consume animal matter on a regular basis. We investigated zoophagy in two species of Spade-foot Toads (*Pelobates cultripes* and *P. varaldii*). The larvae of both species showed no specific morphological adaptations for macrophagy but are very large and inhabit invertebrate-rich ponds under prolonged summer drought conditions. We hypothesized that both species would consume animals having high nutritional value, and that there would be no difference between the two species in terms of the animals consumed, because tadpoles are broad dietary generalists. We also hypothesized that the consumption of animals would vary during development based on the size limitations of the oral cavity. Examination of the intestinal contents of *P. varaldii* and *P. cultripes* indicated that they had consumed a wide range of invertebrates, as predicted. Differences in the composition of animals between the two species might be attributable to variability in the composition of invertebrate assemblages among ponds. We provide the first evidence of consumption by taxa within *Pelobates* of aquatic species of Insecta (Coleoptera, Diptera, Ephemeroptera, and Odonata), Collembola (*Sminthuridae* and *Poduridae*), large Branchiopoda (*Anostraca*, *Notostraca*, and *Spinicaudata*), and Gastropoda (*Physidae* and *Planorbidae*). We also found a correlation between the diversity of animals consumed and the ontogenetic variation in size in both *Pelobates* species. These findings support the hypothesis that grazing-rasping tadpoles have an omnivorous role in aquatic

trophic webs." (Authors)] Address: Escoriza, D., GRECO, Institute of Aquatic Ecology, Univ. of Girona, Girona 17003, Spain. E-mail: daniel\_escoriza@hotmail.com

**16055.** Evangelio Pinach, J.M.; Sendra Pérez, P.; Díaz Martínez, C. (2016): Primera cita de *Libellula quadrimaculata* Linnaeus, 1758 (Odonata: Libellulidae) y *Lestes sponsa* (Hansemann, 1823) (Odonata: Lestidae) para la provincia de Cuenca (este de España). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)* 59: 291-292. (in Spanish, with English summary) [*L. quadrimaculata*: 14-V-2011, 11:30 h., Laguna de Talayuelas (Serranía baja, Cuenca) (ETRS89, UTM 30SXK5008, 895 m s.n.m.); *L. sponsa*: 15-VII-2013, 11:15 h., Salvacañete (Serranía baja, Cuenca) (ETRS89, UTM 30TXK3141, 1340 m s.n.m).] Address: Evangelio Pinach, J.M., Dirección Provincial de la Consejería de Agricultura, Medio Ambiente y Desarrollo Rural en Cuenca. Junta de Comunidades de Castilla-La Mancha, Spain. E-mail: jjevanach@hotmail.com

**16056.** Evangelio Pinach, J.M. (2016): Primera cita de *Symptetrum sanguineum* (Müller, 1764) (Odonata: Libellulidae) para la provincia de Valencia (Comunidad Valenciana, este de España). *Boln. S.E.A.* 59: 291-292. (in Spanish, with English summary) ["The first record of *S. sanguineum* from Valencia province (Comunidad Valenciana, eastern Spain) is reported: 25-IX-2016, Castielfabib (Rincón de Ademuz, UTM datum ETRS89 X: 641072, Y: 4441361. 1125 m)." (Authors)] Address: Evangelio Pinach, J.M., Dirección Provincial de la Consejería de Agricultura, Medio Ambiente y Desarrollo Rural en Cuenca. Junta de Comunidades de Castilla-La Mancha, Spain. E-mail: jjevanach@hotmail.com

**16057.** Farkas, A.; Danyik, T.; Móra, A. (2016): Riverine dragonflies (Odonata: Gomphidae) of the rivers of Körös-Maros National Park. *Crisicum* 9: 133-164. (in Hungarian, with English summary) ["In 2013 and 2014 systematic collections of Gomphidae exuviae were carried out at altogether 89 sampling sites in the Natura 2000 areas along the rivers of Körös-Maros National Park (Maros, Sebes-Körös, Fehér-Körös, Fekete-Körös, Kettos-Körös, Hármaskörös and Hortobágy-Berettyó). The sampling sites were visited during the emergence periods of gomphid species. Besides Gomphidae, exuviae of other species were also collected, and observational data on adult specimens were occasionally recorded. During our work 8296 exuviae (from which 7323 were exuviae of Gomphidae) were collected and 1854 adults were observed. A total of 26 species were found (18 as exuviae and 23 as adults). In the Maros, Fehér-, Fekete-, Kettos- and Sebes-Körös the co-occurrence of the four Hungarian gomphid species was detected, although only a single exuvia of *O. cecilia* and a single exuvia of *O. forcipatus* was found in the Sebes-Körös and the Maros respectively. In the Hármaskörös and the Hortobágy-Berettyó only the two Gomphus species occurred, but while larger populations exist in the Hármaskörös, their occurrence in the Hortobágy-Berettyó is very sporadic. Furthermore, our collections resulted in several new localities for gomphid species, which was especially evident for *O. cecilia* and *O. forcipatus* and therefore their



distributional areas were remarkably expanded. Comparing the studied rivers, apparently the Maros was the most favourable for gomphids: mean number of exuviae was much higher here than at the other rivers. Except the Hortobágy-Berettyó, stable and viable populations of Gomphidae exist along the studied rivers with great significance in terms of nature conservation. Accordingly, either the studied reaches of the rivers or their Gomphidae populations deserve protection." (Authors)] Address: Farkas Anna, Park u. 2., 1223 Budapest, Hungaria

**16058.** Feindt, W.; Osigus, H.-J.; Herzog, R.; Mason, C.E.; Hadrys, H. (2016): The complete mitochondrial genome of the neotropical helicopter damselfly *Megaloprepus caerulatus* (Odonata: Zygoptera) assembled from next generation sequencing data. *Mitochondrial DNA Part B: Resources* 1(1): 497-499. (in English) ["Odonata is a small order at the base of flying insects (Pterygota). Resolving family-level phylogenetic relationships within this order receives great attention. Hereby, genetic data already resulted in various changes, which are however still under discussion. Mitochondrial genomes may further enhance such phylogenies. This study presents the complete mitochondrial genome of the Neotropical damselfly *M. caerulatus* based on next generation sequencing (NGS) data on total genomic DNA. The total length comprises 16,094 bp and includes the standard metazoan set of 37 genes together with a 1376 p long A+T rich (control) region. Gene content, gene arrangement and base frequency are consistent with other odonate mitochondrial genomes. It further contains four intergenic spacer regions, indicating a possible family specific feature for the Coenagrionidae and its close relatives." (Authors)] Address: Feindt, Wiebke, ITZ, Division of Ecology & Evolution, Univ. of Veterinary Medicine Hannover, Bünteweg 17d, Hannover 30559, Germany. E-mail: wiebke.feindt@ecolevol.de

**16059.** Feindt, W.; Herzog, R.; Osigus, H.-J.; Schierwater, B.; Hadrys, H. (2016): Short read sequencing assembly revealed the complete mitochondrial genome of *Ischnura elegans* Vander Linden, 1820 (Odonata: Zygoptera). *Mitochondrial DNA Part B* 1(1): 574-576. (in English) ["Damselflies of the genus *Ischnura* emerge as organisms with high potential in ecological, evolutionary and developmental research at the base of flying insects. *Ischnura elegans* and *Ischnura hastata* are for example one of the few odonate species where a complete life cycle over generations can be reared under laboratory conditions. We here report the complete mitochondrial genome of *Ischnura elegans* as a valuable genomic resource for future eco-evo-devo studies at the base of flying insects. The genome has a total length of 15,962 bp and displays all typical features of Odonata mitochondrial genomes in gene content and order as well as A + T content. Start and stop codons of all protein-coding genes are consistent. Most interestingly, we found four intergenic spacer regions and a long A + T rich (control) region of 1196 bp, which is almost double the size of the close relative *Ischnura pumilio*. We assume that the adequate insert size and iterative mapping may be more efficient in assembling this duplicated and repetitive region." (Authors)] Address:

Hadrys, Heike, ITZ – Forschungsstätte 'Alter Bahnhof Schapen' Braunschweig, University of Veterinary Medicine Hannover, Hannover/Braunschweig, Germany. E-mail: Heike.-Hadrys@ecolevol.de

**16060.** Feitosa, M.C.B.; Querino, R.B.; Hamada, N. (2016): Association of *Anagrus amazonensis* Triapitsyn, Querino & Feitosa (Hymenoptera, Mymaridae) with aquatic insects in upland streams and floodplain lakes in central Amazonia, Brazil. *Revista Brasileira de Entomologia* 60(3): 267-269. (in English) ["*Anagrus amazonensis* Triapitsyn, Querino & Feitosa (Hymenoptera, Mymaridae) is a parasitoid that uses aquatic insect eggs as a host for the development of its immature stages. The objectives of this study are to record the interaction between *A. amazonensis* and its hosts and the aquatic plants used by these hosts to lay their eggs. Field work was conducted in floodplain lakes and upland (terra firme) streams, in four municipalities in Amazonas State, Brazil, where aquatic plants were scanned for the presence of aquatic insect eggs. In the laboratory, eggs were maintained in plastic containers with water until the emergence of the parasitoid or of the first instar insect. A total of 1223 adults of *A. amazonensis* emerged from eggs of Hemiptera, Lepidoptera and Odonata; these eggs were collected on 12 species of aquatic plants." (Authors)] Address: Feitosa, M.C.B., Instituto Nacional de Pesquisas da Amazônia, Coordenac, ão de Biodiversidade, Curso de pós-graduac, ão em Entomologia, Manaus, AM, Brazil

**16061.** Feriwibisono, B.; Marsoedi; Leksono, A.S. (2016): The model of odonate diversity relationship with environmental factors based on path analysis. *El-Hayah* 6(1): 7-14. (in English) ["This study aims to analyze and describe the relationship between altitude, aerial variables (temperature, light intensity, humidity), water qualities (water temperature, pH, BOD, COD, DO, TOM, and water velocity), and vegetation with the diversity of Odonate assemblages. Odonate samplings were conducted at six survey sites based on altitude and vegetation characteristics. Measurement of altitude, aerial variables, water qualities and vegetation characteristics were replicate in the first day and third day. Analysis of correlations of all environmental factors with the odonate diversity was done through structural equation model using Partial Least Squares (PLS), Open source Smart Software and Microsoft Excel. The aerial variables and water qualities affected indirectly on odonate diversity. The aerial variables directly or with interaction to other factor affected the water qualities and vegetation characteristics. The vegetation characteristics directly influenced to odonate diversity. Water flow affected water quality, light intensity affected the aerial, while morning period observation affected the odonate diversity. Predictive relevance (Q<sup>2</sup>) for a model designed amounted to 99.95%, while the rest of 0.05% are explained by other variables." (Authors)] Address: Feriwibisono, B., Dept of Biology, Fac. of Mathematic and Natural Sciences, Brawijaya University, Jl Veteran Malang, Indonesia. Email: amin28@ub.ac.id

**16062.** Ferreras-Romero, M.; Márquez-Rodríguez, J.; Fernández-Delgado, C. (2016): Long-time effect of an invasive fish on the Odonata assemblage in a Mediterranean lake and

early response after rotenone treatment. *Odonatologica* 45(1/2): 7-21. (in English) ["Over a thirty year period from 1977 to 2007, 16 Odonata species were recorded in the Nature Reserve "Laguna de Zóñar", Cordova, Andalusia, Spain. Thermophilic dragonflies with wide distribution in the African continent were dominant in recent years. In 1985, Common carp *Cyprinus carpio* L., 1758 were introduced in an uncontrolled and illegal action, and aquatic macrophytes and benthonic macroinvertebrates of the lake practically disappeared within ten years. One of the most successful tools for controlling and eradicating invasive fish is the use of chemical compounds such as rotenone. This compound adversely affects aquatic organisms with gill respiration by inhibiting oxygen intake at the cell level. Here, we analyse the effect on the Odonata assemblage of this lake after treatment with rotenone intended to eradicate the carp population. During the first year after treatment, nine Odonata species were recorded, and at least six of them obviously had completed their life cycle in the lake. We also carried out the determination of the five last growth stadia in *Orthetrum cancellatum* larvae, and we propose that, in the southern Iberian Peninsula, this species has a univoltine life cycle with asynchronous emergence." (Authors)] Address: Ferreras-Romero, M., Dept of Physical, Chemical & Natural Systems, Univ. Pablo de Olavide, A376 km 1, 41013 Sevilla, Spain. E-mail: mferrom@upo.es

**16063.** Foglini, C. (2016): Odonata next-door: an updated check-list of two parks in the Northern Milan outskirts (Lombardy, Italy). *Natural History Sciences. Atti Soc. it. Sci. nat. Museo civ. Stor. nat. Milano* 3(2): 35-40. (in English, with Italian summary) ["Odonata are usually regarded as bioindicators and model organisms in many studies and are subjected to increasing threats worldwide. Such insects populate freshwater ecosystems at both natural and urban landscapes and they are also well-known by common people. This work is aimed at summarizing and updating the current knowledge concerning Odonata species inhabiting two parks located at the northern boundary of the Milan outskirts (Italy, Lombardy). Occupancy status for odonate species were obtained merging the field data of surveys conducted during 2014 and 2015 with spare information from specialistic websites and forums, grey literature, and pictures collected at the same sites by occasional observers. The total number of species found in both parks showed an increase of species richness when compared with two previous studies. Moreover, Odonata communities of the two parks showed a common chorological composition and similarity in the species assemblages. This work had also a positive impact about the perception of urban biodiversity: some of the untrained observers, who shared their pictures for species identification, rapidly acquired sufficient knowledge to easily recognize the most common species present in both parks." (Authors)] Address: Foglini, C., Via Leon Battista Alberti 8/A, 20092 Cinisello Balsamo (MI), Italia. E-mail: clafogli@libero.it

**16064.** Gabela Flores, M.V. (2016): Demography and territorial behavior of three species of the genus *Hetaerina* (Odonata: Calopterygidae) along three tropical stream ecosystems. Tesis (Licenciada en Biología), Universidad San

Francisco de Quito, Colegio de Ciencias Biológicas y Ambientales; Quito, Ecuador: 52 pp. ["We studied the demography and territorial behavior of three damselfly species of the *Hetaerina* genus (*H. fuscoguttata*, *H. aurora* and *H. caja*) along three lowland stream ecosystems in western Ecuador. Throughout a Capture-Mark-Recapture (CMR) methodology, we estimated the daily survival rates, sex ratio and longevity of the most abundant species on each location, as well as the respective population size. Overall, we captured more males than females and we found male biased sex ratios in all three studied populations. Throughout focal observations, we analyzed male territorial behavior as well as male and female reproductive behavior of the three *Hetaerina* species. We registered a low number of reproductive events in all populations. Conversely, we registered a higher number of male-male interactions of this territorial genus. However, we did not find evidence that certain morphological characters are related to a male's territorial role." (Author)] Address: not stated

**16065.** Galasso, P., Curcuraci, N., Marletta, A. (2016): First record of *Brachytron pratense* (Müller, 1764) in Sicily (Odonata Aeshnidae). *Biodiversity Journal* 7(1): 51-54. (in English) ["During the spring 2015, some specimens of *B. pratense* were observed and photographed for the first time at the swamp lake "Pantano Cuba", in the southeast coast of Sicily, near to Pachino (Syracuse). This record represents now the southernmost Italian locality for this species." (Authors)] Address: Galasso, P., Stiftung Pro Artenvielfalt, Meisenstr. 65, 33607 Bielefeld, Germany. E-mail: paolo\_galasso@hotmail.com

**16066.** Gallesi, M.M.; Mobili, S.; Cigognini, R.; Hardersen, S.; Sacchi, R. (2016): Season matters: differential variation of wing shape between sexes of *Calopteryx splendens* (Odonata: Calopterygidae). *Zoomorphology* 135(3): 313-322. (in English) ["Insects adapt commonly to seasonally changing habitats and reproductive contexts. Individuals that mature at different times during the year can show patterns of life cycle or morphological variation, possibly associated with changes in reproductive behaviour. Concerning mating strategies of flying insects, wing morphology may be related both to the outcome of male-male contests and to the ability in acquiring females. Therefore, different mating strategies (territorial vs. non-territorial) may have different flight morphology optima that increase fitness in their context. Males of *C. splendens* are mainly territorial early in the season, but with the advancing season and with increasing competition, more and more males adopt a non-territorial pursuing strategy. Given that different mating tactics have different wing morphologies, here we test whether the wing shape of males shifts from a "territorial" to a "non-territorial morphology" during the season. So, early in the season males show highly sexually dimorphic wings, which allow for high manoeuvrability and larger spots, while late in the season wing shapes of males become less sexually dimorphic and more suitable when pursuing females. Additionally, we studied the seasonal variation of other flight related traits, specifically wing lengths, abdomen length and weight. We found that these latter

traits decreased along the season in both sexes without altering sexual dimorphism. However, wing shape, which resulted sexually dimorphic, showed a seasonal variation, decreasing the level of sexual dimorphism. The most probable determinant of this change is phenotypic plasticity triggered by environmental cues, but other explanations of the observed pattern are discussed." (Authors)] Address: Galesi, M.M., Dipto di Scienze della Terra e dell'Ambiente, Univ. Pavia, viale Taramelli 24, 27100, Pavia, Italy. E-mail: marco.galesi@unipv.it

**16067.** Gangadoo, S.; Helliö, C.; Power, A.; Chandra, S.; Watson, G.; Watson, J.; Green, D.W.; Chapman, J. (2016): Biomimetics for early stage biofouling prevention: Templates from insect cuticles. *Journal of Materials Chemistry B, Materials for biology and medicine* 4: 5747-5754. (in English) ["A biomimetic antifouling material study was carried out utilising superhydrophobic cicada and dragonfly wings replicated with a polymer (epoxy resin). They were tested in a marine biofouling study for up to 1 week in addition to biofouling assays of protein, carbohydrate and DNA absorption. The materials were compared against a commercial antifouling paint and a polymeric smooth surface constituting a control sample. The replicated surfaces demonstrated superior antifouling properties in comparison to the control and similar efficiency in DNA (10% reduction), protein and carbohydrate adsorption (15%) to the commercial anti-fouling paint. As the fabricated surfaces have roughness at the nano metre scale it is probable that the low adsorption properties, at least at the early stages, may be related to air trapped at the surface. Interestingly the most disordered replicated surface (dragonfly wing replicate) demonstrated the lowest values of absorption." (Authors)] Address: Gangadoo, S., School of Medical and Applied Sciences, CQUniversity, Australia. E-mail: j.chapman@cqu.edu.au

**16068.** Garzón Gutiérrez, J.; van Hoof, B.A. (2016): Ampliación de la distribución conocida del anisóptero *Oxygastra curtisii* (Dale 1834) (Odonata: Corduliidae) en la Península Ibérica: nueva especie para Cantabria. *Boln. S.E.A.* 59: 301-302. (in Spanish, with English summary) ["A new record of the endangered dragonfly *O. curtisii* is given, based on specimens from two 100km<sup>2</sup> squares of the UTM grid situated in Cantabria (northern Spain). The number of Odonata species known to occur in Cantabria is raised to 45, as this constitutes the first record of the species from the region. Also, the Iberian distribution of the dragonfly is briefly discussed, focusing on nearby populations." (Authors)] Address: Gutiérrez, J.G., Barrio de la Iglesia 18 'La Cabaña'. 39722 Liérganes, Cantabria, Spain. E-mail: jorge.garzon@asociacionalas.org

**16069.** Gassmann, D.; Richards, S.J.; Polhemus, D.A. (2016): *Idiocnemis schorri* sp. nov., a new damselfly species from southern Papua New Guinea (Odonata: Platycnemididae). *Zootaxa* 4171(3): 491-504. (in English) ["*I. schorri* sp. nov. is described from the Hindenburg and Muller Ranges and the Kikori River Basin of southern Papua New Guinea. The new species differs from all congeners by, among other characters, a unique colour pattern on the thorax. Characters of males

and females are illustrated and compared to those of similar species from the *Idiocnemis bidentata* group. The new species is found along small, shallow rainforest streams and is currently known only from the Trans-Fly Foreland and Papuan Gulf Foreland areas of endemism." (Authors)] Address: Gassmann, D., Arachnida Section, Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany

**16070.** Gassmann, D.; Richards, S.J. (2016): *Pseudagrion woodlarkensis* sp. nov., a new damselfly species from Woodlark Island, Papua New Guinea (Odonata: Coenagrionidae). *International Journal of Odonatology* 19(1-2): 31-39. (in English) ["*P. woodlarkensis* sp. nov., a new damselfly species from Woodlark Island, Papua New Guinea, is described and male and female characters are illustrated. The new species differs from all regional congeners by having a predominantly yellow thorax with bold black stripes, and males can be clearly distinguished from all Papuan *Pseudagrion* species by the complex and characteristic cerci which bear an inner process that is oriented obliquely upwards and directed posteriorly. Description of this species brings the number of *Pseudagrion* species currently known from the Papuan biogeographic subregion to 17." (Authors)] Address: Gassmann, D., Inst. Evol. & Ecol. Sciences, Leiden Univ., c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: gassmann@naturalis.nnm.nl

**16071.** Geraeds, R.P.G. (2016): Hibernation Common Winter Damselflies at the Driestruik Nature Reserve. *Natuurhistorisch Maandblad* 105(1): 244-246. (in Dutch, with English summary) ["For several years, *Sympecma fusca* were observed until late autumn along the edge of a forest at the Driestruik nature reserve during surveys of Common lizards (*Zootoca vivipara*). Unlike most European dragonfly species, Common winter damselflies hibernate in the adult stage, rather than as eggs or larvae. For a long time, little was known about the hibernation of this species. Recent research in the Netherlands has shown that at least some of the animals hibernate freely suspended in the vegetation. As of the winter of 2012, the forest edge has been searched annually for hibernating damselflies. None were found during the first two winters, but in the winter of 2014-15 two hibernating animals were found, and three in the winter of 2015-16. Four of the five specimens were found in vegetation, at heights of 10 to 40 cm above the ground. The fifth animal was found in a narrow slit in a fence post. While hibernating, the animals are still active during warmer periods. They can cover short distances by crawling through the vegetation." (Author)] Address: Geraeds, R.P.G., Rijksweg Noord 280, 6136 AH Sittard, Netherlands. E-mail: rob.geraeds@kpnplanet.nl

**16072.** Gitarama, A.M.; Krisanti, M.; Agungpriyono, D.R. (2016): Macrozoobenthic Communities and Accumulation of Chromium in Cimanuk Lama River, West Java. *Jurnal Ilmu Pertanian Indonesia* 21(1): 48-55. (in Indonesian, with English summary) ["The residue of human activities and batik industrial waste water surrounding the river will be able to increase the accumulation of chromium and to disrupt macrozoobenthic communities in the river. The aims of this



study was to assess the impact of human activities surrounding the river to the macrozoobenthic communities and the accumulation of chromium in Cimanuk Lama River, Indramayu District, West-Java. The study has been conducted from April/May 2015 based on three times sampling at three different sampling stations. The result of this study shows that the chromium accumulated in the waters of all station still meet the standard quality ranging from 0,010 to 0,016 mg/l, but only station 1 fulfills the standard quality for chromium accumulated in the river sediment with the range of all stations was about 11,72 to 46,63 mg/kg. The results also show that the community index analysis describes the change of macrozoobenthic community at all stations caused by environmental pressure, especially at the station 2 which is indicated by the highest score of Family Biotic Index. The accumulation of the chromium in the waters and the change of macrozoobenthic community structure are mostly influenced by the use of the Cimanuk Lama river long for agricultural and fisheries activities, and also batik home industry." (Authors)] Address: Gitarama, Arbi Mei, Departemen Manajemen Sumber Daya Perairan, Fakultas Perikanan dan Ilmu Kelautan, Institut Pertanian Bogor, Kampus IPB Darmaga, Bogor 16680. E-mail: arbirama@gmail.com

**16073.** Gladysz, M.; Dolezych, B.; Cuber, P.; Karcz, J.; Laszczyca, P.; Miszta, A. (2016): Mud sediments on anal pyramids of *Libellula quadrimaculata* larvae – accidental phenomenon or bioindicator of heavy metal pollution? (Odonata: Libellulidae). *Odonatologica* 45(3/4): 179-189. (in English) ["The morphology and morphometry of 1089 *L. quadrimaculata* exuviae, collected at three selected sites in Upper Silesia (Poland), were examined with regard to their potential use as bioindicators of habitat quality. The biometric parameters of exuviae were only weakly linked to water quality, i.e., to heavy metal contamination. However, terminal thickenings on the anal pyramid, which were originally thought to be teratogenic, were finally identified as sediments that had been deposited on the anal appendages. These modifications were observed in ca 12 % of the exuviae that had been collected from a site on which river contamination by metals had reached extreme values, thus probably having caused a long-lasting and complex change of the water habitat." (Authors)] Address: Gladysz, M., STB Innovation Centre, Skarszewska 23, 83-110 Tczew, Poland. E-mail: marcin.gladysz@gmail.com

**16074.** Gliwa, B.; Petraska, A.; Svitra, G.; Uselis, V. (2016): Data on one new and 23 rare to Lithuanian fauna species of dragonflies (Odonata) recorded in 2015–2016. New and rare for Lithuania insect species 28: 5-18. (in English, with Lithuanian summary) [*Chalcolestes viridis*; *Lestes barbarus*; *Sympetma paedisca*; *S. fusca*; *Coenagrion lunulatum*; *Erythromma viridulum*; *Nehalennia speciosa*; *Aeshna viridis*; *A. affinis*; *Anax parthenope*; *Cordulegaster boltonii*; *Gomphus flavipes*; *Ophiogomphus cecilia*; *Somatochlora arctica*; *Orthetrum coerulescens*; *O. brunneum*; *O. albistylum*; *Leucorrhinia albifrons*; *L. pectoralis*; *L. caudalis*; *Sympetrum pedemontanum*; *S. fonscolombii*.] Address: Gliwa, B., Lithuanian Entomological Society, Akademijos 2, LT-08412 Vilnius, Lithuania. E-mail: bermdgliwa@yahoo.de

**16075.** Golfieri, B.; Surian, N.; Hardersen, S.; Maiolini, B. (2016): How to comprehensively evaluate river corridor conditions? A comparison of different biotic and morphological indices in northern Italy. EGU General Assembly 2016, held 17-22 April, 2016 in Vienna Austria: 7059. (in English) [Verbatim: The assessment of river conditions is crucial for planning appropriate management actions. The European Water Framework Directive 2000/60/EC (WFD) requires the assessment of biological, physical-chemical and hydromorphological elements to define the ecological status of rivers. The WFD suggests the use of different bioindicators (i.e. benthic macroinvertebrates, diatoms, aquatic macrophytes and fish), the so called "biological quality elements" (BQEs). However, recent studies showed that BQEs-based indices have two main limitations: (i) their standard application is limited to flowing channels and (ii) they are not sensitive to hydromorphological alteration. Hydromorphological conditions are usually evaluated applying methods for physical habitat assessment (i.e. the River Habitat Survey or derived methods) that consist in site-scale inventories of river forms and anthropic structures. The lack of consideration of wider spatial (i.e. reach or catchment scale) and temporal scales (e.g. channel evolution over the last 50-100 years) make such methods inadequate for a sound diagnosis of morphological alterations. The Morphological Quality Index (MQI) and the dragonfly-based Odonate River Index (ORI) were developed in the recent years to overcome the above-mentioned limitations and to assess the condition of the whole river corridor (i.e. the channel and its adjacent floodplain) at reach scale. In this study we correlated the assessments of MQI, ORI and two BQEs-based biotic indices (i.e. STAR\_ICMi for benthic macroinvertebrates and ICMi for diatoms) in 15 lowland river reaches in northern Italy. The selected reaches are characterized by a wide range of morphological degradation. MQI and ORI were highly correlated, probably because both methods work at reach scale and consider the integrity of the whole river corridor, either in terms of morphology or considering ecological aspects. In contrast, no significant relationships were found between MQI and ORI and the BQEs-based indices (i.e. ICMi and STAR\_ICMi). This can be probably attributed to the differences in spatial scale (i.e. site scale) at which the BQEs-based indices apply and to the human pressure that they were originally designed to detect (i.e. water quality). These results show that MQI and ORI are useful tools to evaluate the integrity of the river corridor, at reach scale. The ORI provides information on the ecological condition of the river not covered by the other biotic indices, thanks to the sampling strategy that considers also secondary channels and ponds. We underline the importance of integrating the assessment of the lateral dimension of the river corridor in the evaluation and the need to choose appropriate indicators. The choice of the indicators must also consider the spatial and temporal scale of their application, in order to detect pressures operating at various scales (e.g. water quality and hydromorphological alteration). Only the integration of reach-scale indicators, such as MQI and ORI, would allow for a comprehensive evaluation of river corridor conditions and to define sound and appropriate management actions.]

**16076.** Gordon, A.M.; Youngquist, M.B.; Boone, M.D. (2016): The effects of pond drying and predation on Blanchard's Cricket Frogs (*Acris blanchardi*). *Copeia* 104(2): 482-486. (in English) ["Pond hydroperiod and predators play a central role in structuring aquatic communities. Because of predicted changes in precipitation and temperature patterns associated with climate change, pond hydroperiods will likely be altered. Reduced hydroperiods can impact amphibian populations by restricting the amount of time available for larval growth and by altering predatory interactions via increased predator densities. We investigated how pond drying and predation singularly and interactively affected growth and survival of *A. blanchardi*. We reared recently hatched tadpoles through metamorphosis in outdoor mesocosms using a factorial design incorporating three hydroperiods (fast-drying, slow-drying, or constant) and three larval odonate predator treatments (caged, uncaged, or absent). Caged and uncaged predator treatments were implemented to evaluate both consumptive and non-consumptive effects. There were no differences in survival, time to metamorphosis, or size at metamorphosis in response to drying or predation treatments. Although pond drying rates in this study did not induce measurable responses, it is possible that more extreme conditions could impact metamorphosis. The lack of response to odonate predator presence and cues suggests tadpoles of *A. blanchardi* may rely on other behavioral and phenotypic defenses, such as the tail spot, to escape predation. Developing a more comprehensive understanding of how *A. blanchardi* responds to altered hydroperiod, predators, and their potential interactions is important to predict how this species and other amphibians that breed in diverse aquatic habitats may respond to the influence of climate change on aquatic ecosystems." (Authors)] Gordon, Ashley, Nicholas School of Environment, Environment Hall, Duke University, Durham, North Carolina 27708, USA. E-mail: gordona3@miamioh.edu

**16077.** Guebailia, A.; Khelifa, R.; Bouiedda, N.; Amari, H.; Hadjadj, S.; Zebba, R.; Boualem, M.; Houhamdi, M. (2016): Body size, reproductive behaviour, and microhabitat use of two sympatric *Trithemis* species – what might allow their sympatry? (Odonata: Libellulidae). *Odonatologica* 45(1/2): 23-36. (in English) ["Sympatric territorial species are subject to interference competition when they share the same resources. The interaction becomes stronger when the coexisting species share similar traits, which is often the case in congeners. In this study, we investigated the body size, reproductive behaviour, and microhabitat use of two congeneric dragonflies, *T. annulata* and *T. arteriosa*, in Northeast Algeria from September to November 2012 in order to assess the potential factors that allow their coexistence in the same system. Even though *T. annulata* was larger than *T. arteriosa*, mistaken recognition was often observed. The behavioural sequence of both species exhibited broadly similar patterns in reproductive behaviour but they differed in mate guarding tactics and male-male interference. Copulation duration was shorter in *T. annulata* than in *T. arteriosa*. Oviposition bouts lasted longer in *T. arteriosa* but dipping was faster in *T. annulata*. Analysis of microhabitat choice showed that *T. arteriosa* males preferred vegetated areas to

establish their territories while *T. annulata* used a wide array of habitats including terrestrial ones. Our data suggest that, although the two congeneric species are phenotypically similar and demonstrate low interspecific recognition abilities, they can coexist syntopically because they differ slightly in their habitat use and reproductive behaviour." (Authors)] Address: Guebailia, A., Biology Dept, Fac. Exact Sciences & Nature and Life Sciences, University of Mohamed Essadik ben Yahia, Jijel 18000, Algeria. E-mail: aminaguebailia@gmail.com

**16078.** Günther, A.; Schulze, C. (2016): Erstnachweis von *Orthetrum albistylum* in Brandenburg (Odonata: Libellulidae). *Libellula* 35(3/4): 207-215. (in German, with English summary) ["*O. albistylum* was found in June 2016 in northeastern Germany for the first time. Several mature individuals and one emergence were observed. The records indicate an area expansion from Poland in a westward direction and a new migration path for eastern and south-eastern populations to colonise Germany."] Address: Schulze, Caroline, Meissner Gasse 28, 09599 Freiberg, Germany. E-mail: caroline-schulze@freenet.de

**16079.** Günther, A.; Möckel, B. (2016): Zum Frühjahrsaspekt der Libellenfauna in Zentralmakedonien, Nordgriechenland (Odonata). *Libellula* 35(3/4): 185-194. (in German, with English summary) ["Early spring records of Odonata in Central Macedonia, Northern Greece – Hitherto knowledge about the beginning of the emergence dates of dragonflies on the Greek mainland has been very limited. A total of eight Odonata species were recorded in Central Macedonia during a short visit from March 27th to April 2nd 2016. For *Ischnura pumilio*, *Aeshna isoceles*, *Brachytron pratense*, and *Libellula depressa* we made the earliest seasonal records for Greece. In terms of dragonfly fauna most notable were the new records of *Sympetma fusca*, *I. pumilio*, and *B. pratense*. No records of *B. pratense* have been published from Central Macedonia since 1999. Furthermore, we observed an unusually strong invasion of *Anax ephippiger* to the Greek mainland." (Authors)] Address: Günther, A., Naturschutzinstitut Freiberg, Bernhard-Kellermann-Str. 20, 09599 Freiberg, Germany. E-mail: andre.guenther@ioez.tu-freiberg.de

**16080.** Guillermo-Ferreira, R.; Viela, D.S.; Del-Claro, K.; Bispo, P.C. (2016): *Erythrodiplax ana* sp. nov. (Odonata: Libellulidae) from Brazilian palm swamps. *Zootaxa* 4158(2): 292-300. (in English) ["*E. ana* sp. nov. ( $\sigma$  holotype, six male and three female paratypes), collected in Vereda wetlands (a unique Neotropical savanna environment) in Uberlândia (Minas Gerais) and Chapada dos Guimarães (Mato Grosso), Brazil, is described and illustrated. The new species fits in Borror's *Basalis* Group, and can be distinguished from other species by the combination of the following traits: blue pruinosity dorsally on thorax and third to eighth abdominal segments; sides of the thorax olive-green; face ivory or olive-green; wings hyaline with a small apical brown spot on all four wings, well defined in females; male genitalia with sclerotized erectile posterior lobe and inflatable sac-like median process. Last instar larvae were reared in the laboratory, resulting in the description of the larva. We also followed this

population for 13 months and present resulting biological notes and comments on ontogenetic colour change in males, as well as longevity." (Authors)] Address: Guillermo-Ferreira, R., Dept Hydrobiol., Federal Univ. of São Carlos–UFSCar, São Carlos, São Paulo, Brazil. E-mail: rhainerguillermo@gmail.com

**16081.** Habib, S.; Yousuf, A.R. (2016): Phytophilous macroinvertebrate community of an eutrophic lake in Kashmir Himalayas. *Journal of Entomology and Zoology Studies* 4(5): 318-325. (in English) ["Extensive ecological studies have been carried out on various aspects of Dal Lake, however, the interaction between macrophytes and macroinvertebrates is poorly understood. In order to fill this void a survey of macroinvertebrate community associated with submerged macrophytes was conducted in selected sites of Dal Lake, Kashmir from March to September, 2012. A composite gerking frame box sampler with an inbuilt grappler was used for collection of macrophytes. Altogether 21 invertebrate taxa were collected out of which 18 were identified upto genus level. However, of these only 4 families (Chironomidae, Ceratopogonidae, Planorbidae and Lymnaeidae) showed >75% share on the total abundance. Representatives of some other groups were found occasionally (density ranging from 5-11 individuals per m<sup>2</sup>) these included Dytiscidae, Pisauridae, Corixidae and Gomphidae. Maximum number of macroinvertebrates were found attached to *Ceratophyllum demersum* (198 individuals per m<sup>2</sup>), followed by *Potamogeton crispus* (112 individuals per m<sup>2</sup>), *Hydrilla verticillata* (95 individuals per m<sup>2</sup>) and least for *Myriophyllum spicatum* (8 individuals per m<sup>2</sup>)."] (Authors)] Address: Habib, Shazia, Dept Environmental, Science, University of Kashmir, J&K, India-190006

**16082.** Harisha, M.N. (2016): Assessment of status, diversity and threats of odonates in Komaranahalli Village of Harihar Taluk, Davangere District, Karnataka, India. *International Journal of Plant, Animal and Environmental Sciences* 6(3): 122-127. (in English) ["The present attempt is to analyze the role of aquatic insects especially Odonates diversity in maintaining the status of the Komaranahalli wetland. The study was conducted from November 2012 to October 2013 during which, a total of 33 species of odonates belonging to 6 families have been recorded. Among them Anisoptera were predominant with 24 species, followed by the Zygoptera with 9 species. Among the order-Anisoptera, the family Libellulidae was widely distributed and dominated with high percentage composition followed by the Coenagrionidae among order-Zygoptera i.e., 84%, (n=18) and 67% (n=6) respectively. The status based on the frequency of occurrence shown that 40% were common, 21% were occasional, 18% were very common, 15% were rare and 6% were very rare. The study highlights the importance of odonates and threats in their habitat due to different anthropogenic activities and also provides the baseline data of odonate diversity of Davanagere District of Karnataka state for research on their biology and the conservation."] (Author)] Address: Harisha, M.N., Dept of Post Graduate studies and research in Applied Zoology and Wildlife & Management, Kuvempu Univ., Jnana Sahyadri, Shankaraghatta-577451, Shimoga, Karnataka, India. E-mail: harishwild@gmail.com

**16083.** Harisha, M.N. (2016): Evaluation of status and diversity of odonates of Kondajji lake, Kondajji village, Harihar Taluk, Davanagere district, Karnataka, India. *Journal of Entomology and Zoology Studies* 4(4): 384-388. (in English) ["A study on diversity of odonates was conducted at Kondajji Lake of Kondajji Village located in Harihar Taluk, Davanagere District of Karnataka. The study was conducted to explore status, diversity and threats of Odonates during February 2007 to January 2008. The study revealed a total of 34 species of Odonates in 24 genera belonging to 6 families have been reported. Among them Anisoptera dominated with 25 species, followed by the Zygoptera with 9 species. The family Libellulidae dominated with 20 species among the Anisoptera. Among the Zygoptera, Coenagrionidae was found to be the dominant family with 6 species. Based on the frequency of occurrence 35% of the species were common, 23% were very common, 21% were rare, 15% were occasional and 6% were very rare. According to IUCN categorization all the odonate species recorded from the study area comes under 'Least Concern' (LC) category. The study provides the baseline data on Odonates diversity of some major wetland water bodies of Davanagere District of Karnataka state for research on their biology and the conservation."] (Author)] Address: Harisha, M.N., Dept of Post Graduate Studies & Research in Applied Zoology & Wildlife Management, Kuvempu University, Jnana Sahyadri, Shankaraghatta, Shimoga, Karnataka, India

**16084.** Hellmund, M.; Hellmund, W. (2016): Reproduction structures of damselflies (Odonata, Zygoptera): are they trace fossils or not? *Palaeodiversity* 9(1): 89-94. (in English) ["Following a review of relevant mechanisms and structures, we propose to use binary nomenclature for characterizing and naming most fossil egg-sets, clutches and ovipositions of damselflies as trace fossils. We recommend to sharply distinguish between structures caused by insects and adjoining plant tissues. Only the former are trace fossils, the latter are not."] (Authors)] Address: Hellmund, M., Zentralmagazin Naturwissenschaftlicher Sammlungen, Martin-Luther-Universität Halle-Wittenberg, Domplatz 4, 06108 Halle (Saale), Germany. E-Mail : meinolf.hellmund@zns.uni-halle.de

**16085.** Henze, M.J.; Oakley, T.H. (2016): The dynamic evolutionary history of Pancrustacean eyes and opsins. *Integrative & Comparative Biology* 55(5): 1-13, 25 pp app. (in English) ["Synopsis: Pancrustacea (Hexapoda plus Crustacea) display an enormous diversity of eye designs, including multiple types of compound eyes and single-chambered eyes, often with colour vision and/or polarization vision. Although the eyes of some pancrustaceans are well-studied, there is still much to learn about the evolutionary paths to this amazing visual diversity. Here, we examine the evolutionary history of eyes and opsins across the principle groups of Pancrustacea. First, we review the distribution of lateral and median eyes, which are found in all major pancrustacean clades (Oligostraca, Multicrustacea, and Allotricarida). At the same time, each of those three clades has taxa that lack lateral and/or median eyes. We then compile data on the expression of visual r-opsins (rhabdomeric opsins) in lateral and median eyes across Pancrustacea and find no evidence for



ancient opsin clades expressed in only one type of eye. Instead, opsin clades with eye-specific expression are products of recent gene duplications, indicating a dynamic past, during which opsins often changed expression from one type of eye to another. We also investigate the evolutionary history of peropsins and r-opsins, which are both known to be expressed in eyes of arthropods. By searching published transcriptomes, we discover for the first time crustacean peropsins and suggest that previously reported odonate opsins may also be peropsins. Finally, from analyzing a reconciled, phylogenetic tree of arthropod r-opsins, we infer that the ancestral pancrustacean had four visual opsin genes, which we call LW2, MW1, MW2, and SW. These are the progenitors of opsin clades that later were variously duplicated or lost during pancrustacean evolution. Together, our results reveal a particularly dynamic history, with losses of eyes, duplication and loss of opsin genes, and changes in opsin expression between types of eyes." (Authors)] Address: Oakley, T.H., Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara, CA, USA. E-mail: oakley@lifesci.ucsb.edu

**16086.** Herzog, R.; Osigus, H.-J.; Feindt, W.; Schierwater, B.; Hadrys, H. (2016): The complete mitochondrial genome of the emperor dragonfly *Anax imperator* LEACH, 1815 (Odonata: Aeshnidae) via NGS sequencing. Mitochondrial DNA Part B 1(1): 783-786. (in English) ["Here we report the complete mitochondrial genome of *A. imperator* as the first of its genus. Data were generated via next generation sequencing (NGS) and assembled using an iterative approach. The typical metazoan set of 37 genes (13 protein-coding genes, 22 tRNA genes, and 2 rRNA genes) was detected in the same gene order as in other odonate mitogenomes. However, only three intergenic spacer regions are present in *A. imperator* lacking the distinct s5 spacer, which was regarded as informative feature of the odonate suborder Anisoptera but absent in Zygoptera. With 16,087 bp, it is the longest anisopteran mitogenome to date, mainly due to the long A+T-rich control region of 1291 bp." (Authors)] Address: Herzog, Rebecca, ITZ, Ecology and Evolution, University of Veterinary Medicine Hannover, Bünteweg 17d, 30559 Hannover, Germany. E-mail: rebecca.herzog@ecolevol.de

**16087.** Heynen, M.; Fick, J.; Jonsson, M.; Klaminder, J.; Brodin, T. (2016): Effect of bioconcentration and trophic transfer on realized exposure to oxazepam in two predators, the dragonfly larvae (*Aeshna grandis*) and the Eurasian perch (*Perca fluviatilis*). Environmental Toxicology and Chemistry 35(4): 930-937. (in English) ["Psychoactive substances are used worldwide and constitute one of the most common groups of pharmaceutical contaminants in surface waters. While these pharmaceuticals are designed to be efficiently eliminated from the human body, we know very little about their trophic-transfer potential in aquatic wildlife. Therefore, the goal of this study was to quantify and compare uptake of an anxiolytic (oxazepam) from water (bioconcentration) and via the consumption of contaminated diet (trophic transfer) in *P. fluviatilis* and *A. grandis*. We found bioconcentration (BC) and trophic transfer (TT) of oxazepam in both predator species. However, we observed higher BC for perch (bioconcentration factor [BCF]

3.7) than for dragonfly larvae (BCF 0.5). Perch also retained more oxazepam from consumed prey (41%) than dragonfly larvae (10%), whereas the relative contribution via prey consumption was 14% and 42% for perch and dragonflies, respectively. In addition, we found that BC was negatively correlated with perch weight, indicating that exposure levels in natural contaminated environments differ between individuals of different size or between different developmental stages. Hence, TT of pharmaceuticals may indeed occur, and estimates of environmental exposures that do not consider intake via food or size-dependent bioconcentration may therefore lead to wrongful estimations of realized exposure levels in natural contaminated ecosystems." (Authors)] Address: Heynen, Martina, Dept of Ecology & Environmental Science, Umeå University, Sweden. E-mail: martina.heyne@umu.se

**16088.** Higashikawa, W.; Yoshimura, M.; Yagi, T.; Maeto, K. (2016): Microhabitat use by larvae of the endangered dragonfly *Sympetrum pedemontanum elatum* (Selys) in Japan. Journal of Insect Conservation 20: 407-416. (in English) ["*S. pedemontanum*, which is distributed widely in the Eurasian continent and its neighbouring islands, is listed as a Least Concern species in the International Union for Conservation of Nature Red List (2015). In Japan, however, the population of its subspecies *S. pedemontanum elatum* has been rapidly decreasing since the 1970s. In order to conserve this subspecies, it is important to understand the seasonal microhabitat use by its larvae. However, this has been a difficult task because larvae of *S. pedemontanum elatum* often coexist with those of a common congener, *S. eroticum*, and cannot be morphologically distinguished from the latter. Thus, in this study, we first established a molecular technique based on the polymerase chain reaction to accurately identify each species. In the subsequent field survey in 2015 with its application in the Sakasegawa River, Hyogo Prefecture, we found that *S. pedemontanum elatum* larvae hatch in stagnant water and subsequently advance into weakly flowing water. Our results indicated a change in the microhabitats during the larval developmental process, reflecting the need for a continuous spectrum of stagnant, transitional, and flowing water. Such aquatic environments with a spectrum of water conditions are disappearing in Satoyama, a rural farming area in Japan. This has endangered species such as *S. pedemontanum elatum* and *Oryzias latipes* (Beloniformes: Adrianichthyidae) by depriving them of their favourable habitats. For their conservation, it is necessary to develop methods to recover the traditional aquatic environments in Satoyama." (Authors)] Address: Higashikawa, W., Laboratory of Insect Biodiversity & Ecosystem Science, Graduate School of Agricultural Science, Kobe Univ., Rokkodai-cho 1-1, Nada-ku, Kobe, Hyogo 657-8501, Japan. E-mail: higashi\_n34@yahoo.co.jp

**16089.** Hill, M.J.; Ryves, D.B.; White, J.C.; Wood, P.J. (2016): Macroinvertebrate diversity in urban and rural ponds: Implications for freshwater biodiversity conservation. Biological Conservation 201: 50-59. (in English) ["Ponds are among the most biodiverse freshwater ecosystems, yet face significant threats from removal, habitat degradation and a lack of legislative protection globally. Information regarding the

habitat quality and biodiversity of ponds across a range of land uses is vital for the long term conservation and management of ecological resources. In this study we examine the biodiversity and conservation value of macroinvertebrates from 91 lowland ponds across 3 land use types (35 floodplain meadow, 15 arable and 41 urban ponds). A total of 224 macroinvertebrate taxa were recorded across all ponds, with urban ponds and floodplain ponds supporting a greater richness than arable ponds at the landscape scale. However, at the alpha scale, urban ponds supported lower faunal diversity (mean: 22 taxa) than floodplain (mean: 32 taxa) or arable ponds (mean: 30 taxa). Floodplain ponds were found to support taxonomically distinct communities compared to arable and urban ponds. A total of 13 macroinvertebrate taxa with a national conservation designation were recorded across the study area and 12 ponds (11 floodplain and 1 arable pond) supported assemblages of high or very high conservation value. Pond conservation currently relies on the designation of individual ponds based on very high biodiversity or the presence of taxa with specific conservation designations. However, this site specific approach fails to acknowledge the contribution of ponds to freshwater biodiversity at the landscape scale. Ponds are highly appropriate sites outside of protected areas (urban/arable), with which the general public are already familiar, for local and landscape scale conservation of freshwater habitats." (Authors)] Address: Hill, M.J., Inst. Science & the Environment, Univ. of Worcester, Henwick Grove, Worcester WR2 6AJ, UK. E-mail: matthew.hill@worc.ac.uk

**16090.** Hunger, H. (2016): *Sympetma paedisca* am westlichen Bodensee - weitere neue Beobachtungen zu Bestandsschwankungen und Fortpflanzungshabitaten (Odonata: Lestidae). *Mercuriale* 16: 33-43. (in German, with English summary) ["*S. paedisca* at the westerly Lake Constance - more new findings on population fluctuations and reproduction habitats - New data from surveys carried out in 2015 und 2016 within the shore zones of westerly Lake Constance are presented and compared with the water level fluctuations of Lake Constance between April and September, the period of oviposition, larval development and emergence. The data support the hypothesis presented by Hunger & Schiel (2014) that falling water levels during the summer lead to the death of many larvae in their shallow water habitats. The knowledge about larval habitats of *S. paedisca* remains insufficient, however, findings of exuviae within the nature reserve „Wollmatinger Ried“ can be reported." (Author)] Address: Hunger, H., INULA, Wilhelmstr. 8, 79098 Freiburg, Germany. E-mail: holger.hunger@inula.de

**16091.** Huplalo, K.; Tonczyk, G. (2016): Dragonflies (Odonata) of high mountain habitats. *Kosmos* 65(2): 267-275. (in Polish, with English summary) ["The aim of this article is to characterize the odonatofauna in the mountainous areas and to examine variations in the diversity of Odonata species in different regions of the world. Dragonflies are widespread on all continents except of Antarctica. However, the fossils found in Antarctica suggest that dragonflies were there present 150-200 million years ago. Their diversity reaches its peak in the tropics and in the Oriental regions. Due to the hard environmental

conditions present at high altitudes, dragonflies of high mountain habitats have developed a number of adaptations that enable their development and reproduction even at the height of 5000 m. Dragonflies are merolimnic, so the main factor limiting their occurrence is the lack of water. The highest altitude at which any dragonfly was found was in Himalayas, where at 6300 m a single individual of the common species *Pantala flavescens* was collected. In the distribution of the odonatofauna in high mountain habitats in different world regions there occur both some differences and similarities. On the every continent, with an increase in the altitude the number of species diminishes. However, the diversity of dragonflies occurring at certain heights varies depending on the continent and the mountain chain. So, for example, at the altitude of 3500 m different species are present in the Andes Himalayas, and Cordillera. These differences are mainly due to location of the mountain ranges in different climate zones and on different continents." (Authors)] Address: Hupla, K., Dept of Invertebrate Zoology and Hydrobiology, Faculty of Biology and Environmental Protection, University of Lodz, Banacha 12/16, 90-237 Łódź, Poland. E-mail: hrupeq@gazeta.pl

**16092.** Hykel, M.; Harabis, F.; Dolny, A. (2016): Assessment of the quality of the terrestrial habitat of the threatened dragonfly, *Sympetrum depressiusculum* (Odonata: Libellulidae). *European Journal of Entomology* 113: 476-481. (in English) ["The majority of the conservation strategies for threatened dragonflies are designed to protect only their aquatic habitats. *S. depressiusculum* is a species threatened not only by the destruction of its aquatic habitats but also by its association with a specific terrestrial environment. In this study, we aimed to identify the key elements of the terrestrial environment of adult *S. depressiusculum*. We used generalized linear mixed models to determine habitat preferences of adults and the particular features of habitat patches, such as vegetation cover, vegetation structure and the availability of potential prey. Our results indicate that *S. depressiusculum* adults preferred mainly riparian vegetation but beyond ponds they utilized only certain terrestrial habitats (abandoned fields, meadows, forest clearings). Adults responded positively to habitat patches with a high cover of vegetation and suitable vegetation structure. Adult abundance was affected also by the distance of patches from the natal site. In an agricultural landscape, the availability of such habitat patches may be limited and could influence the abundance and distribution of this species. We suggest that conservation efforts for this species should not only focus on the larval environment but also include suitable surrounding terrestrial habitats. Effective management around natal sites should concentrate on maintaining a heterogeneous landscape, which is extensively managed (e.g. leaving several fields fallow, maintaining managed hay meadows)." (Authors)] Address: Hykel, M., Dept Biology & Ecology / Institute of Environmental Technologies, Faculty of Science, Univ. of Ostrava, Chittussiho 10, CZ-710 00 Slezská Ostrava, Czech Republic. E-mail: michalhykel@seznam.cz

**16093.** Inamura, T.; Hirohashi, K (2016): Abstract: M21.00009: Hovering and targeting flight simulations of a dragonfly-like flapping wing-body model by IB-LBM. *Bulletin of*

the American Physical Society 61(20) (69th Annual Meeting of the APS Division of Fluid Dynamics): (in English) [Verbatim: Hovering and targeting flights of the dragonfly-like flapping wing-body model are numerically investigated by using the immersed boundary-lattice Boltzmann method (IB-LBM). The governing parameters of the problem are the Reynolds number  $Re$  the Froude number  $Fr$ , and the non-dimensional mass  $m$ . We set the parameters at  $Re=200$ ,  $Fr=15$ , and  $m=51$ . First, we simulate free flights of the model for various values of the phase difference angle between the forewing and the hindwing motions and for various values of the stroke angle that the vertical motion of the model depends on the phase difference angle, and the horizontal motion of the model depends on the stroke angle  $\beta$ . Secondly, using the above results we try to simulate the hovering flight by dynamically changing the phase difference angle and the stroke angle  $\beta$ . The hovering flight can be successfully simulated by a simple proportional controller of the phase difference angle and the stroke angle. Finally, we simulate targeting flight by dynamically changing the stroke angle  $\beta$ .] Address: Dept. Aeronautics and Astronautics, Kyoto University

**16094.** Iseni, G.; Beadini, N.; Beadini, Sh.; Jordanova, M.; Rebok, K.; Abdija, Xh.; Qoku, L.; Aliu, H.; Iseni, B.; Kuçiniç, M. (2016): New records on *Pyrrhosoma nymphula* (Sulzer, 1776) and *Ischnura pumilio* (Charpentier, 1825) in the region of Lipkovo, Republic of Macedonia (Odonata: Coenagrionidae). UNIVERSI - International Journal of Education, Science, Technology, Innovation, Health and Environment 2(3): 56-62. (in English) ["*P. nymphula* and *I. pumilio* are relatively well investigated. Besides the earlier records, there are many new records for the presence of *I. pumilio* and *P. nymphula* in Macedonia. According to the latest data species *P. nymphula* was identified on 03.06.2008 in the Great River in the village of Klenovec, western Macedonia, and species *I. pumilio* was identified on 03.06.2008 in Prilep Lake in Prilep and Mountain Galiçica in southwestern Macedonia. However, according to current literature records for the the distribution, biology and phenology of these two species in the region of Lipkovo has never been reported. From our research we managed to confirm the presence of these two species near the river Vuksan above the village Mateç in Lipkovo region on these dates: 24.05. and 28.06.2015, 29.05. and 26.06.2016." (Authors)] Address: Iseni, G., Study Program of Biology, Faculty of Matematical Natural Science, State University of Tetovo, Ilinden pn, 1200 Tetovo, Macedonia

**16095.** Jacob, S.; Manju, E.K (2016): Potential of odonate (dragonflies and damselflies) diversity as a bioindicator of water quality. International Journal of Science and Research 5(7): 2033-2036. (in English) ["In order to determine whether a relationship existed between water quality and odonate fauna, data were collected from four selected sites of Pala Municipality, Kottayam District, Kerala. The Water Quality Index, Simpson's diversity index and Species abundance values were calculated. The area with highest water quality index shows highest species richness and the area with lowest water quality index shows lowest species richness. The abundance of *Brachythemis contaminata* sp. in the polluted area and

*Bradinopyga geminata* sp. in the non-polluted area shows their indicator efficiency. A potential exists for Odonata species diversity, numbers of individuals and occurrence of particular species to be used as a bioindicator of water quality. Advantages include, data that reflects a time period rather than a point in time and also low costs." (Authors)] Address: Jacob, Sonia, Dept Zool., Alphonso College, Pala, India

**16096.** Jawaheri, R.A.; Sahlen, G. (2016): Negative impact of lake liming programmes on the species richness of dragonflies (Odonata): a study from southern Sweden. Hydrobiologia 788: 99-113. (in English) ["Liming programmes aiming to restore fish populations are being implemented in many acidified aquatic systems in northern Europe. We studied Odonata communities in 47 forest lakes in SW Sweden, 13 that are currently being limed, and 8 that have previously been limed. 31 species were recorded, with the highest mean number in untreated lakes, followed by previously treated lakes and currently treated lakes. Species communities differed between untreated and limed lakes, but only few rare species found in the untreated lakes were absent in the treated lakes. Likewise, species known to thrive in acid environments were either rare or showed no preferences. Comparing the number of records of odonate species within a large regional area to the proportion of lakes inhabited in our study, we found that seven of the most commonly observed species occurred less frequently in limed lakes than in the untreated ones, including two of the three most common taxa. Reduced species numbers in limed lakes might be due to conditions on other trophic levels, including fish predation. We argue that Odonata should be considered when developing new biological indices of water quality, although the causes of the observed occurrence patterns need to be studied further." (Authors)] Address: Sahlén, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, S-752 36 Uppsala, Sweden. E-mail: goran.sahlen@set.hh.se

**16097.** Jisha Krishnan, E. K.; Sebastian, C. D. (2016): Analysis of taxonomic relationships and species divergence of Libellulidae (Odonata: Anisoptera) members using Cytochrome Oxidase I gene. International Journal of Advanced Biotechnology and Research 7(2): 545-550. (in English) ["Libellulidae are commonly called 'skimmers' or 'perchers' representing the largest dragonfly family in the world. They are cosmopolitan in distribution and consist of 142 genera and 871 species. This family displays remarkable diversity in behaviour and morphology and consequently focused on studies of comparative population ecology, sexual selection, phylogeography and the evolution of mating behaviour. In the present study we deciphered the phylogenetic relationships of nine Libellulidae members by Neighbour-joining (NJ) and Maximum likelihood methods using partial cytochrome oxidase I gene as the marker. The phylogenetic tree inferred the sister clade relationship of the representing libellulidae members and confirmed the evolutionary divergence in relation with branch length. The averages A+T content of all these species are 62.03 % while G+C content is 37.97 % showing strong A+T bias. The transition/ transversion ratio are found to be 0.858 for purines and 2.533 for pyrimidines indicating



higher mutations are exhibited by the transition of Thymine, Uracil and Cytosine. The present study thus concluded that the mitochondrial cytochrome oxidase subunit I (COI) gene sequence of Libellulidae members demonstrated substantial variation; therefore it can be used for molecular taxonomy and for the phylogenetic studies." (Authors)] Address: Sebastian, C.D., Molecular Biology Lab., Dept of Zoology, University of Calicut, Kerala 673635 India. E-mail: drcdsebastian@gmail.com

**16098.** Jödicke, R. (2016): Vander Linden's name *Agrion pulchella*: a dating problem and its consequences (Odonata: Coenagrionidae). *Notulae odonologicae* 8(8): 254-260. (in English) ["*Coenagrion pulchellum* (Vander Linden) was originally described in 1825 as *Agrion pulchella*, but most synonymic and systematic catalogues and other publications on Odonata cite 1823 or even 1820. The reason for this discrepancy was an incorrect citation in H.A. Hagens synonymic catalogue of the European Odonata from 1840. He referred to one of P.L. Vander Lindens preceding publications published in 1823, which had an extremely low circulation and were not easily to check but definitively don't include the name *pulchella*. A supposed junior synonym, *C. interruptum* (Charpentier), was also introduced in 1825. Lacking any information about precise imprint dates, both names have to be interpreted as simultaneously published synonyms. It is suggested that E. de Selys Longchamps be accepted as the First Reviser who determined their precedence; he fixed the name *pulchella* as the valid one in a monographic work on European Odonata published in 1840. His nomenclatural act corresponds to the current use." (Author)] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. E-mail: reinhard.joedicke@ewetel.net

**16099.** Johnson, J. (2016): *Argia agrioides* (California Dancer) new for Idaho. *Argia* 28(4): 24. (in English) ["*A. agrioides*, Bruneau Dunes State Park, Idaho, USA 19 July 2016.] Address: E-mail: jt\_johnson@comcast.net

**16100.** Johnson, J. (2016): An instance of intergeneric copulation between *Archilestes* and *Lestes*. *Argia* 28(4): 21. (in English) [Brush Prairie area of Clark County, Washington, an instance of copulation between a ♂ *A. californicus* and a ♀ *L.* congener was observed and photographed. The date was 19-IX- 2015.] Address: E-mail: jt\_johnson@comcast.net

**16101.** Johnson, J.T. (2016): *Leptobasis linda* sp. nov. from Ecuador (Odonata: Coenagrionidae). *Zootaxa* 4171(2): 373-381. (in English) ["*L. linda* is described from the Pacific lowlands of Ecuador. The coloration of mature individuals is superficially similar to the widespread *L. vacillans*, but structural and colour characteristics differentiate *L. linda* from all congeneric species. The male caudal appendages and the female posterior margin of the prothorax are unique among *Leptobasis*." (Author)] Address: Johnson, J.T., 3003 Unander Ave., Vancouver, WA 98660, USA

**16102.** Joshi, S.; Kosterin, O.E.; Kunte, K. (2016): New status for Fraser's forgotten *Aciagrion approximans* *krishna*, stat.

nov. (Odonata: Zygoptera: Coenagrionidae) from the Western Ghats of India. *International Journal of Odonatology* 19(1-2): 41-51. (in English) ["*Aciagrion* Selys, 1891 is one of the taxonomically difficult and poorly known genera of Oriental damselflies. *Aciagrion hisopa* race *krishna* Fraser, 1921 was described from Mahabaleshwar, Maharashtra, India. However, later Fraser (1933) doubted the taxonomic necessity of this taxon. His notion of *Aciagrion hisopa* (Selys, 1876) was erroneous, as evidenced by syntypes of this species in Selys' collection, so the ssp. *krishna* is not conspecific with *A. hisopa*. Topotypic specimens of ssp. *krishna* from the Western Ghats were compared to specimens of *Aciagrion approximans* (Selys, 1876) from the Khasi Hills, Meghalaya, which are topotypical because of the recent designation of the neotype of this species in Selys' collection. These two series were found to be very close to each other but differing at the level of subspecies, so we propose a new subspecies status and combination, *Aciagrion approximans* *krishna* Fraser, 1921." (Authors)] Address: Joshi, S., Nat. Centre for Biol. Sciences, Tata Institute of Fundamental Research, Bangalore, India

**16103.** Kalkman, V.J. (2016): Revision of the genus *Celebargiolestes* Kennedy, 1925 (Odonata: Argiolestidae). *Odonatologica* 45(3/4): 235-269. (in English) ["An overview of the study of the dragonflies of Sulawesi is presented and genera in need of revision are listed. One of those genera, *Celebargiolestes*, is revised, a definition of the genus *Celebargiolestes* is given and the male and female of the only hitherto described species, *C. cincta*, are redescribed. Three species are described as new to science: *Celebargiolestes askewi*, *C. orri* and *C. toli*. A key to the males is presented and habitat and distribution of the genus are discussed." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey / Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: vincent.kalkman@naturalis.nl

**16104.** Kannagi, A.; Sivakumar, V.; Santhi, V. (2016): Diversity of dragonflies (Insecta: Odonata) in a deciduous forest of Thoothukudi district, Tamil Nadu, South India. *International Journal of Environmental Protection and Policy* 4(3): 58-63. ["The study of Odonata communities along deciduous forest requires the basic understanding of the abundance, distribution and number of species present. As habitat conditions change, they also exhibit changes in their diversity and distribution. The present study was carried out in Kuthiraimozhi theri deciduous forest located in Thoothukudi District, Tamil Nadu, South India during July 2009 to June 2010 to assess the diversity of odonates. The forest is open, sandy, low tree lands with predominance of thorny, usually hard wood species. Observations were carried out twice in a month during morning, and evening times. A total of 958 dragonflies belonging to 20 species (2 species unidentified) belonging to 16 genera and 4 families were recorded. The family Libellulidae (15 species) was found to be dominant in the study region, followed by families Aeshnidae, Chlorogomphidae and Gomphidae, which were represented by a single species. The data was analyzed for Species richness, Shannon's diversity index and Simpson's index. Maximum number (237) of dragonflies was collected during December 2009 and the

highest Species richness (2.35) and Shannon's diversity index (2.08) was recorded during June 2010. This study has shown that, Odonata diversities along the Kuthiraimozhi theri deciduous forest vary hence these populations can be monitored, related and used as indicators of the physical structure of the deciduous forest and its surrounding ecotones. This inventory has served as the baseline for Odonata communities in the deciduous forest hence can be a measure of monitoring in the near future. Finally, there must be an increase in education on the importance of using local insect species as first level indicators of environmental health which when improved upon can save the nation a lot of money otherwise used in the chemical evaluation and monitoring of environment." (Authors)] Address: Kannagi, A., Research Centre of Zoology, Jayaraj Annapackiam College for Women (Autonomous), Periyakulam, Tamil Nadu, India. E-mail: Anitaarul1911@gmail.com

**16105.** Kanthika, W.A.L.; Kuruppuarachchi, K.A.J.M; Dharmasena, M.C.M.; Cooray, M.G. (2016): Dragonfly (Odonata) species diversity in different land use patterns of lowland tropical wet zone, Colombo District of Sri Lanka. International Forestry and Environment Symposium 21: 30. (in English) [Verbatim: "Many species of Odonates inhabiting in agro-ecosystems, play a crucial role in controlling pest populations and can be considered as a pollution indicator. Damselflies are important bio-control agents especially in the control of mosquito larvae. Individual Odonata species have a wide range of environmental tolerances, and are good indicators of ecosystem health, particularly for wetlands. Odonata are also known to be highly responsive to ecosystem conditions in relation to broad-scale factors such as climate and urbanization. Huge knowledge gap displays in ecology of Odonata species and this preliminary study would provide a considerable knowledge on formulating conservation strategies and ecosystem services of dragonflies. The ecological survey examined the Odonata species diversity and habitat preference in different land use types at low country wet zone of Colombo district, Sri Lanka. Five (05) main land use patterns were selected as sub-urban land set up at Waga Area: a natural forest (Indikada Mukalana), a rubber plantation, a paddy field as an agricultural land use; Urban land setup: The Open university premises (OUSL) at Nawala, Colombo and "Diyatha Uyana" Battaramulla. The ecological survey was carried out with layout of belt transect (100m×2.5 ) adjacent (5-15 m distance) to selected water ways in each different sampling areas of different land use patterns which adapting purposive random sampling technique. Visual observations will be carried out adapting internationally accepted techniques for sampling of flying insects to identify and quantify of Dragonflies. Oonate species specific parameters were recorded in selected sampling sites. Total number of 26 Odonata species including 9 endemics was recorded in all land using patterns all land use patterns. Species diversity (richness and abundance) measured within study sites using Shannon wiener index indicated that the paddy field (2.185), rubber plantation (1.885), natural forest (0.9507), OUSL along polluted Wellawatte canal (0.6745) and Diyatha Uyana (0.619) respectively. The number of dragonfly species and abundance is

remarkably higher in urban sites while number of damselfly is higher in sub-urban paddy field and rubber plantation. *Neurothemis tulia* and *Rhyothemis variegata* species were recorded at all study sites except natural forest. *Brachythemis contaminata* is the most abundant species which is only recorded in urban sites. A considerable species diversity and variation of Odonata species among study sites were recognized. As a conclusive remark, further studies on find limiting factors for diversity, distribution and abundance of odonate species is recommended." (Authors)] Address: Kanthika, W.A.L., Dept of Botany, The Open Univ. of Sri Lanka, Sri Lanka. E-mail: kajmKuruppu@gmail.com

**16106.** Karlsson, T.; Bjelke, U. (2016): Inventering av grön flodtrollslända *Ophiogomphus cecilia* 2015 – metodiktest, förstudie och första provtillfälle inom biogeografisk uppföljning. Länsstyrelsen Östergötland, rapport 2016:8. Länsstyrelsen Östergötland, 581 86 Linköping, Sweden. ISBN: 978-91-7488-408-1: 68 pp. (in Swedish, with English summary) ["The member countries in the European Union is obliged to report the conservation status for species listed in Habitat directive every 6th year. To gather information about population sizes and trends for the species in Sweden, the Swedish Environmental Protection Agency funds a monitoring named "Biogeographical monitoring". The County Administrative Board of Östergötland has been assigned to coordinate the biogeographical monitoring of Odonata and diving beetles (Dytiscidae) listed in the Habitat directive in Sweden. As a first step for establishing a monitoring programme for *O. cecilia*, a survey and method test was performed during the summer 2015. This report presents the result from the survey and suggests a strategy for monitoring the species. *O. cecilia* is restricted to the rivers (with tributaries) Råneälven, Kalixälven and Torneälven in the Sweden. These rivers are situated in the northeastern part of Sweden and are large rivers (often >100 meters width), unregulated and mainly surrounded by woodland, but near the coast to some extent also by cultivated land. The species is redlisted as "Near threatened" (NT) in Sweden due to small distribution area. The aim of this study was to test exuviae-search as a survey method and act as a pilot study to receive more information about timescale, costs and practical considerations. If the survey turned out well, it could also serve as a first sample in the monitoring programme. The survey was performed by Tommy Karlsson, the County Administrative Board of Östergötland and Ulf Bjelke, the Species Species Information Centre during the period 20-24 July 2015. A large number of previously known localities for the species were surveyed as well as new, potential localities. The latter category also includes rivers from which the species not was known. In total, 57 localities were surveyed och *O. cecilia* was found at 13 of these (Tab. 1 and Fig. 2). Exuviae were found at all localities, in total 50 exuviae. They were mainly found up to 30 cm height at straws of *Carex* sp. and within 50 cm from the shoreline. However, 15 exuviae were found 100-400 cm from the shoreline. This was probably due to a higher water level when the dragonflies emerged. Adults were found at three localities, in total four individuals, all newly emerged and close to the exuvia. In addition, an adult was found on the roadside during car driving

and wings from an individual, probably predated by a bird, was found at one locality. All visited localities are shortly described and showed in a map in annex 1 (Bilaga 1). Localities where *O. cecilia* were found is also presented with a picture of the habitat. We assess searching for exuviae as the most appropriate method for monitoring *O. cecilia* in Sweden. It is a quick method since the exuviae are easy to find and the risk of mixing up with other dragonflies species is very low. No other species of the family Gomphidae coexist with *O. cecilia* in Sweden, and the other species that you could find exuviae of at localities for *O. cecilia* (*Aeshna* sp. *Somatochlora metallica*, *Cordulegaster boltonii*) are easy to distinguish (Fig. 3-5). Furthermore, big advantages with surveying exuviae compared to adults is that it is not dependent of the weather and that records of exuviae gives information about the reproduction habitat for the species. Searching for exuviae is a common survey method for *O. cecilia* in several other European countries, and the number of observed exuviae during a certain length of a river (e.g. 50 or 100 meters) is often used to estimate status and trend for a population. However, the trend for the Swedish population is assumed to be stable and annual variation, when the surveyed is performed in relation to emergence and variation between surveyors would probably influence the result more than possible trends with the economic resources available for monitoring today. An appropriate strategy for monitoring *O. cecilia* in Sweden is instead to recurring detect occurrence of the species at a selected number of localities. In table 2 and figure 6, 20 localities for monitoring are suggested." (Authors)] Address: Karlsson, T., Länsstyrelsen Östergötland, 581 86 Linköping, Sweden

**16107.** Karube, H.; Kompier, T. (2016): Occurrence of a new gomphid dragonfly *Anisogomphus neptunus* sp. nov., from northern Vietnam. Tombo 58: 35-39. (in English, with Japanese summary) ["*A. neptunus* is described and illustrated from N. Vietnam. This new species is related to *A. yanagisawai* Sasamoto, 2015, described from N. Thailand." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, Netherlands. E-mail: kompiertokyo@yahoo.com

**16108.** Karube, H. (2016): A second member of the genus *Gomphidictinus* (Odonata: Gomphidae) from northern Vietnam. Tombo 58: 41-45. (in English, with Japanese summary) [*Gomphidictinus kompierei* sp. nov.; "A second member of the genus *Gomphidictinus* is described and figured. This new species, found in N. Vietnam, is easy to separate *G. perakensis* (Laidlaw, 1902) by the shape of its caudal appendages and penile organ and its body maculation." (Author)] Address: Karube, H.; Kanagawa Prefectural Museum of Natural History, 499 Iryuda, Odawara, Kanagawa, 250-0031 Japan. E-mail: paruki@nh.kanagawa-museum.jp

**16109.** Kasai, A.; Takehiko I.H.; Hitoshi, O.; Kazutaka, S.; Daisuke, H.; Koichi, G. (2016): Fipronil application on rice paddy fields reduces densities of common skimmer and scarlet skimmer. Scientific Reports 6:23055. DOI: 10.1038/srep23055: 10 pp. (in English) ["Several reports suggested that rice seedling nursery-box application of some systemic insecticides (neonicotinoids and fipronil) is the cause of the decline in

dragonfly species noted since the 1990s in Japan. We conducted paddy mesocosm experiments to investigate the effect of the systemic insecticides clothianidin, fipronil and chlorantraniliprole on rice paddy field biological communities. Concentrations of all insecticides in the paddy water were reduced to the limit of detection within 3 months after application. However, residuals of these insecticides in the paddy soil were detected throughout the experimental period. Plankton species were affected by clothianidin and chlorantraniliprole right after the applications, but they recovered after the concentrations decreased. On the other hand, the effects of fipronil treatment, especially on Odonata, were larger than those of any other treatment. The number of adult dragonflies completing eclosion was severely decreased in the fipronil treatment. These results suggest that the accumulation of these insecticides in paddy soil reduces biodiversity by eliminating dragonfly nymphs, which occupy a high trophic level in paddy fields." (Authors)] Address: Kasai, A., National Institute for Environmental Studies, Onogawa 16-2, Tsukuba, Ibaraki 305-8506, Japan. E-mail: kasai.atsushi@nies.go.jp

**16110.** Kastner, F.; Buchwald, R. (2016): Habitate von *Coenagrion mercuriale* am nördlichen Arealrand (Kreis Minden-Lübbecke, NRW, Deutschland) (Odonata: Coenagrionidae). *Libellula* 35(1/2): 23-42. (in German, with English summary) ["Habitats of *C. mercuriale* at the northern range (Minden-Lübbecke district, NRW, Germany) (Odonata: Coenagrionidae) – In North Rhine-Westphalia (Germany) the endangered damselfly *C. mercuriale* occurs in the catchment basins of the rivers Ems, Lippe, Hunte, and Weser and is recorded with several populations in the Minden-Lübbecke district. The reproduction habitats at the northern range are small unshaded ditches and brooks with low to moderate flow rate. The aquatic vegetation is lush with a mean cover of 82 % and dominated by *Berula erecta*, *Phalaris arundinacea*, and *Sparganium* spp. The waters exhibit high oxygen content and relatively high temperatures. They are moderately polluted (water quality class II) to considerably polluted (water quality class II–III) and can be classified as base-rich, calcareous waters. The water type, vegetation as well as temperature and oxygen content correspond with habitat descriptions in the literature. Differences consist in cover and height of vegetation, morphology as well as in physical and chemical characteristics of the waters. The populations in the Minden-Lübbecke district belong to the largest in North Rhine-Westphalia. In some of the small flowing waters the damselfly *C. ornatum* was found as well, these occurrences representing the only ones in North Rhine-Westphalia. The maintenance of these waters has been well adapted to the life cycle of the two species in Minden-Lübbecke but there are some more threat factors like further eutrophication and the occasional desiccation of the waterbodies." (Authors)] Address: Kastner, Friederike, AG Vegetationskunde und Naturschutz, Inst. Biol. & Umweltwissenschaften (IBU), Carl von Ossietzky Univ. Oldenburg, 26111 Oldenburg, Germany. E-mail: friederike.kastner@uni-oldenburg.de

**16111.** Kaur Walia, G.; Singh Chahal, S.; Babu, R. (2016): Cytogenetic report on *Gynacanthaeschna sikkima* from India (Odonata: Aeshnidae). *Odonatologica* 45(1/2): 87-94.



(in English) ["Spermatogonial and primary spermatocyte chromosomes of *G. sikkima* (Karsch, 1891) collected from Dalhousie (Himachal Pradesh, India) are described cytogenetically for the first time. The species possesses  $2n$  (male) = 25 as the chromosome number and X0(male)/XX(female) type sex determining mechanism. The chromosome number is less than the modal number ( $2n = 27$ ) of the family which originates from by the fusion of autosomes. All the autosomal bivalents except m bivalent show terminal C-bands while large autosomal bivalent possesses two interstitial and terminal C-bands. X chromosome shows large C-band only on one side. Similarly, terminal NOR bands are present on the one side of 9 autosomal bivalents including m bivalent while X chromosome possesses large interstitial NOR band." (Authors)] Address: Kaur Walia, Gurinder, Dept of Zoology and Environmental Sciences, Punjabi University, Patiala-147002, Punjab, India. E-mail: gurinderkaur\_walia@yahoo.co.in

**16112.** Khelifa, R.; Mellal, M.K.; Zouaimia, A.; Amari, H.; Zebsa, R.; Bensouilah, S.; Laouar, A.; Houhamdi, M. (2016): On the restoration of the last relict population of a dragonfly *Urothemis edwardsii* Selys (Libellulidae: Odonata) in the Mediterranean. *Journal of Insect Conservation* 20(5): 797-805. (in English) ["The restoration of endangered relict populations is challenging in conservation biology because they require specific environmental conditions within an inhospitable regional climate. *U. edwardsii* is the most endangered dragonfly in the Mediterranean with only one known relict small population (Lac Bleu) left in Northeast Algeria. With the absence of successful (re-)colonization over the last two decades, the restoration of the species became a top priority. To improve the status of the species in Northeast Algeria, we carried out a reintroduction and translocation scheme during 2011–2015 and assessed the changes in distribution and population size. Our restoration plan led to the emergence of three populations of which one was restored (Lac Noir), one resulted from successful translocation (Lac Tonga Northeast), and one established after successful colonization (Lac Tonga Southwest). In three localities (Lac Noir, Lac Tonga Northeast, and Lac Tonga Southwest), signs of population growth were observed, whereas no significant trend in the source population (Lac Bleu) was detected. A new population (El Graeate) was also recorded in 2015, but its origin is uncertain. Capture-mark-recapture on adults conducted in 2015 in two sites (Lac Bleu and Lac Noir) showed low recapture rates and no sign of dispersal between the two sites. Dispersal capacity of the species and conservation implications of adult distribution are discussed. This study highlights the importance of using biological indicators in selecting host habitats for the restoration of critically threatened populations." (Authors)] Address: Khelifa, R., Institute of Evolutionary Biology & Environmental Studies, University of Zürich, Zürich, Switzerland

**16113.** Khelifa, R.; Mahdjoub, H.; Aouaouche, M.S.; Houhamdi, M. (2016): Reproductive behaviour of a North African endemic damselfly, *Platycnemis subdilatata* (Odonata: Platycnemididae) and probable senescence effects. *International Journal of Odonatology* 19(3): 157-167. (in English) ["Although *P. subdilatata* is widespread in the Maghreb, many aspects

of its reproductive behaviour, biology and ecology are still unstudied. One particular feature of this species is that its coloration pattern continues to change during maturation and afterwards, which makes it a good model for assessing age effects on behavioural and biological components. This study aims first to investigate the reproductive behaviour and choice of oviposition site, and second to assess clutch size and egg deposition rate as a function of age in a natural population located in North-East Algeria during the reproductive season of 2012. Males seized females next to reproductive sites and in foraging sites. Non-receptive females refused to mate with males by raising their abdomen up while perched or by curving the abdomen up while flying; the angle of abdomen elevation when perched was correlated to male persistence (the number of times that a male tried to grasp the female prothorax while flying over her). Copulation lasted about 14 min, the subsequent oviposition 54 min. Field experiments on oviposition site selection showed that the females prefer to lay eggs in *Typha angustifolia* leaves. Clutch size and egg deposition rate pattern through age showed an increase in early mature life followed by a decrease later on." (Authors)] Address: Khelifa, R., Institute of Evolutionary Biology & Environmental Studies, University of Zürich, Zürich, Switzerland

**16114.** Kiauta, B. (2016): In memoriam Norman Winfrid Moore (1923–2015). *Odonatologica* 45(1/2): 1-6. (in English) ["A short biography of Dr N.W. Moore, the 'Father of global dragonfly conservation', is presented with emphasis on and a brief appreciation of his odonatological work." (Author)] Address: Kiauta, B., Callunastraat 6, 5853 GA Siebengewald/Lb, The Netherlands. E-mail: mbkiauta@gmail.com

**16115.** Kim, J.-S.; Pi, J.-H.; Jung, T.-J.; Lee, K.-J. (2016): The characteristics of Odonata community according to age and size of pond. *Korean Journal of Environment and Ecology* 28(3): 293-301. (in Korean, with English summary) ["15 artificial ponds in Seoul have been examined to find out the characteristics of Odonata community according to age and size of pond. We found 6 families 36 species of Odonata community, and Libellulidae was the most frequent and 19 Species were observed among Libellulidae. Considering relative importance with frequency of appearance and density, *Ischnura asiatica* and *Orthetrum albistylum* was the most frequent. Also, 16 Species including *Lestes temporalis*, *Sympetrum parvulum*, and *Anax nigrofasciatus* were relatively rare. The result of dominant species tells that *I. asiatica* in 1 ~ 3 year old ponds, *Pantala flavescens*-*Orthetrum albistylum*-*Crocothemis servilla mariannae* in order of mention in 4 ~ 6 year old ponds, *Platycnemis phyllopada*-*Ischnura asiatica* in order of mention in 10 or more year old ponds are the dominant species. Species diversity index regarding age of pond has been researched, and species diversity index in 10 year old pond was higher than that of in 1 ~ 3 year old pond. Having done the analysis of variance for types of spawn, there are many species Endophytic egg-layers and pasting in mud or sand in 10 year old artificial ponds. The wider ponds get, the higher species diversity index gets. And, we suggest that desirable size for making artificial ponds to

increase the species diversity index of Odonata is 100~300m<sup>2</sup>. (Authors) ] Address: Pi, J.-H., Dept. of Landscape Architecture, Graduate School, Univ. of Seoul, Seoul 130-743, Korea. E-mail: farmer01@naver.com

**16116.** Kiyoshi, T.; Katatani, N.; Kompier, T.; Yeh, W.-C. (2016): A new species and additional records of the genus *Sarasaeschna* from Laos and Vietnam (Odonata, Anisoptera, Aeshnidae). *Bull. Natl. Mus. Nat. Sci., Ser. A*, 42(4): 181-188. (in English) ["*Sarasaeschna yoshitomii* sp. nov., collected from the northern regions of Laos (Mt. Phou Samsoum, 1640 m and 1940 m, Xiangkhoang) and Vietnam (Mt. Hoang Lien Son, 1900 m, Lao Cai) is mainly distinguished from *S. lienii* to which it is most similar by having a more robust abdomen with the 3rd segment weakly constricted and 7–9th segments broader, male cerci with no basal but two protuberances, one at middle and the other at the base of apical expansion, and flagella of penis smoothly curved in ventral view. A new species-group, *lieni*-group, is proposed to accommodate these species; it is characterized by the following features of the male penile organ: The 4th segment is elongate with crest-like ventro-basal sclerotized plates; the flagella are slightly twisted and protrude more or less obliquely in relation to the long axis of the 4th segment. New records of both *S. minuta* and *S. gao-fengensis* are reported from Vietnam for the first time." (Authors)] Address: Takuya, K., Dept of Zoology, National Museum of Nature and Science, 4–1–1 Amakubo, Tsukuba, Ibaraki 305–0005, Japan. E-mail: kiyoshi@kahaku.go.jp

**16117.** Klotz, S.; Settele, J. (2016): Biodiversität. In: Brasseur, G.; Jacob, D.; Schuck-Zöller, S. (Hrsg.) (2016): *Klimawandel in Deutschland Entwicklung. Folgen, Risiken und Perspektiven*. Springer. Spektrum. XX + 348 pp: 151-160. (in German) [Review of climate change effects on biodiversity, including a passing reference to Odonata.]

**16118.** Kompier, T.; Futahashi, R. (2016): A new subspecies of *Orthetrum melania* from Vietnam (Odonata: Libellulidae). *Tombo* 58: 27-33. (in English, with Japanese summary) ["*O. melania superbum* ssp. nov. is described from Yen Bai Province, northern Vietnam, based on molecular phylogenetic analyses and external morphology. In the new subspecies the pruinosity on the dorsum of the thorax in the mature male is restricted to form two distinct dorsal stripes, which differs from the other known subspecies. This is also the first published record of *O. melania* for Vietnam." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, Netherlands. E-mail: kompiertokyo@yahoo.com

**16119.** Kompier, T. (2016): New species of *Protosticta Selys* from Vietnam with a key to the males of the *P. curiosa* group (Odonata: Platystictidae). *Zootaxa* 4193(2): 347-360. (in English) ["Three new species of *Protosticta Selys*, 1855, are described from Vietnam: *P. proboscis* spec. nov. and *P. albifrons* spec. nov., while *P. satoi* dark form is elevated to specific status as *P. nigra* spec. nov. based on structural and morphological differences. The female of *P. linnaei* is described for the first time and a key provided to the males of

the *P. curiosa* group in Vietnam." (Author)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, the Netherlands. E-mail: kompiertokyo@yahoo.com

**16120.** Koshkin, M.; Schröter, A.; Wildermuth, H. (2016): The 'waterfall spectacle' of *Libellula quadrimaculata*-aggregations (Odonata: Libellulidae). *Odonatologica* 45(3/4): 213-224. (in English) ["A hitherto unknown swarming flight behaviour of *L. quadrimaculata* that included spectacular waterfall-like manoeuvres was observed and photographically documented in May and June 2015 in the steppes of the Kazakh Uplands. This unusual flight behaviour was connected to communal roosting aggregation. It is analysed and compared with common hypotheses and literature on communal roosting and swarm dynamics in Odonata and other animals." (Authors)] Address: Koshkin, M., School Environ. Sciences, Univ. East Anglia, Norwich Research Park, Norwich, Norfolk NR4 7TJ, UK. E-mail: makoshkin@gmail.com

**16121.** Kosterin, O.E. (2016): *Microgomphus alani* (Odonata, Gomphidae) sp. nov. from Cambodia. *Zootaxa* 4114(3): 341-350. (in English) ["*M. alani* sp. nov. is described from two males from the coastal southwestern foothills of the Cardamom Mts. in southwestern Cambodia (type locality: Cambodia, Koh Kong Province, 17 km ENE of Koh Kong, 'Macromia Rivulet', 11°40'17" N, 103°07'28" E, 296 m a.s.l., 3 vi 2014, RMNH). The species is characterised by its small size (hindwing 21–23 mm), cerci with outer angulations, truncated apices and crescent-shaped inner arms sprouting from their middle and not reaching their apices, synthorax with two parallel black lateral stripes and dorsal and collar yellow stripes fused in 7-like manner. Probably females of the same species were earlier reported from Phrae Province in northern Thailand." (Author)] Address: Kosterin, O.E., Inst. of Cytology & Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**16122.** Kosterin, O.E. (2016): *Coeliccia poungyi dasha* subsp. nov. (Odonata, Platycnemididae, Calicnemiinae) from eastern Cambodia. *IDF-Report* 97: 1-16. (in English) ["*C. poungyi dasha* is described from the Annamense Mts. in the eastern Cambodia (holotype: Cambodia, Monduliri Province, a brook, a left tributary of the main river downstream Buu Sraa Waterfall, 12°34'0119" N 107°24'50"25" 03" E, 416490 m a.s., 15.06. 2014, RMNH). The new subspecies differs from the nominotypical one in coloration of the mesepisternum in males and end of the abdomen in both sexes, as well as in the length of the terminal lobe of the genital ligula." (Authors)] Address: Kosterin, O.E., Inst. of Cytology & Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**16123.** Kovacs, T.; Theischinger, G.; Danyik, T. (2016): Odonata from Batanta (Indonesia, West Papua) with description of two new species. *Folia hist. nat. Mus. matraensis* 40: 27-37. (in English) ["Thirty-three taxa of Odonata are reported from Batanta Island (including Arefi and Birie Islands). Two new species are described: *Nososticta dora* sp. n., *Rhyothemis rita* sp. n. The following five species are new to the

Raja Ampat Islands: *Palaiargia charmosyna* Lieftinck, 1932, *Argiocnemis rubescens* Selys, 1877, *Teinobasis superba* (Hagen in Selys, 1877), *Diplacina cf. ismene* Lieftinck, 1933, *Nannophya cf. pygmaea* Rambur, 1842, and eight are new to Batanta: *Argiolestes australis* (Guérin, 1830), *Idiocnemis strumidens* Lieftinck, 1958, *P. charmosyna*, *A. rubescens*, *T. superba*, *D. cf. ismene*, *N. cf. pygmaea*, *Rhyothemis resplendens* Selys, 1878. *Nososticta cf. finisterrae* is deleted from the faunal lists of Odonata of Raja Ampat and Batanta Island. The number of species known to occur on Batanta Island is 47." (Authors)] Address: Kovacs, T., Mátra Museum of Hungarian Natural History Museum, Kossuth Lajos u. 40, 3200 Gyöngyös, Hungary. E-mail: koati@t-online.hu

**16124.** Krajewski, L.; Kurek, P.; Kutera, M.; Swieciak, T. (2016): New recordings of the Banded Darter *Sympetrum pedemontanum* (O. F. Müller in Allioni, 1766) in the Silesia-Cracow Upland (S Poland). *Przegląd Przyrodniczy* 27(2): 103-109. (in Polish, with English summary) ["In August and September 2011 two new sites of *S. pedemontanum* were found in the Silesia-Cracow Upland. Single male imago was observed in Bukowno-Przyziarki and over a dozen of specimens of both sexes between Krochmalnia and Kolonia Krztynia, where the species is probably breeding nearby. In both cases the species was found close to railways - in a ditch draining railway embankment and on a sunny dirt road along railway (probably site of hunting). At both sites other rare species of reophilous odonates co-occured - *Orthetrum coerulescens* and *Ophiogomphus cecilia*. *S. pedemontanum* is known regionally mainly from historical sites, especially in the central part of the upland with watersheds. It seems that the small and clean streams draining undisturbed spring areas are the most important refuges for the species, sensitive to anthropogenic changes." (Authors)] Address: Krajewski, L., Centrum Ochrony Mokradel, ul. Cieszkowskiego 1/3 lok. 31, 01-636 Warszawa, Poland. E-mail: lukkrajewski@wp.pl

**16125.** Krieg-Jacquier, R.; Samsault, E. (2016): Développement larvaire et émergences de Cordulégastrés en milieu souterrain (Odonata: Cordulegastridae). *Martinia* 32(1): 31-42. (in French, with English summary) ["Larval development of French Cordulegaster in subterranean habitat is discussed from observations made in Indre-et-Loire and Ain departments (France). Though very sporadic, this phenomenon raises questions about the trophic resources in such a peculiar habitat." (Authors)] Address: Krieg-Jacquier, R., Groupe de recherches et de protection des libellules *Sympetrum*, 18 rue de la Maconne, F-73000 Barberaz, France. E-mail: regis.krieg-jacquier@gmail.com

**16126.** Kucharski, A. (2016): The distribution of Scarce Chaser *Libellula fulva* O.F. MÜLLER, 1764 (Odonata: Libellulidae) in the valley of the upper San River. *Odonatrix* 125: 5 pp. (in Polish, with English summary) ["The sightings were conducted in the Natura 2000 site (PLH 180045) – Sanisko in Bykowce in Podkarpackie Voivodeship, in south-eastern Poland in the region of the oxbow of San River, situated nearby the mouth of Oslawa River. The existence of single female and exuvium of *Libellula fulva* O.F. MÜLLER, 1764 was reported there in

the June 2015. The site presented in the study is situated far more south than the known distribution of scarce chaser in the southern Poland." (Author)] Address: Kucharski, A., Uherce Mineralne 22H/9, Poland. e-mail: and\_kuch@op.pl

**16127.** Kumar Misra, P.; Elangovan, V. (2016): Light and scanning electron microscopic studies on food habit analysis of insectivorous bats. *Advances in Life Sciences* 5(9): 3649-3654. (in English) ["The food habit analysis of eight insectivorous bats such as *Rhinopoma hardwickii*, *R. microphylum*, *Scotophilus heathii*, *S. kuhlii*, *Pipistrellus coromandra*, *Tophozous nudiventris*, *Megaderma lyra* and *Hipposideros fulvus* were studied using light and scanning electron microscopes. The bat guano was collected from unused buildings, historical monuments and caves from 15 districts of Uttar Pradesh. The pellet analysis revealed that the insectivorous bats fed on nocturnal insects belong to orders Coleoptera, Hymenoptera, Odonata, Hemiptera, Neuroptera, Lepidoptera and Diptera over the study period. The insect remnants such as legs, wings, antennae and elytra were commonly observed in the faecal pellets. The results lead to the conclusion that different insectivorous bats selectively fed on nocturnal insects, possibly agricultural pests, thus the conservation of insectivorous bats would facilitate to control agricultural pests and maintain a balanced ecosystem." (Authors)] Address: Dept of Applied Animal Sciences, Babasaheb Bhimrao Ambedkar Univ., Vidya Vihar Raibareli Road, Lucknow-226025, India. E-mail: elango70@yahoo.com

**16128.** Lanctôt, C.; Wilson, S.P.; Fabbro, L.; Leusch, F.D.L.; Melvin, S.D. (2016): Comparative sensitivity of aquatic invertebrate and vertebrate species to wastewater from an operational coal mine in central Queensland, Australia. *Ecotoxicology and Environmental Safety* 129(7): 1-9. ["Highlights: •Knowledge regarding the toxicity of coal mine wastewater to aquatic biota is limited. •We compared sensitivities of a range of Australian freshwater species. •Acute toxicity was observed in cladocerans and planarians, but not vertebrates. •Condition and hepatosomatic index were reduced in exposed vertebrates. •Tadpoles were generally more sensitive than fish. Abstract: Coal excavation and refinement processes generate substantial volumes of contaminated effluent that may be detrimental to aquatic ecosystems. As such, understanding the impacts of coal mine water releases on aquatic animals and ecosystems is essential for effectively managing and protecting neighbouring environments. Such information will ultimately be applied towards developing ongoing monitoring strategies that are protective of native wildlife. Despite intensive mining operations in Australia, few studies have documented toxicity associated with coal mine wastewater (CMW) on native species. To address existing knowledge gaps, we investigated acute toxicity (48–96 h) using eight native invertebrate species and sub-chronic effects (2 week) using three vertebrate species following exposure to wastewater from two dams (CMW1 and CMW2) located at an open-cut coal mine licensed to discharge into the Fitzroy catchment (Queensland, Australia). Wastewater from these sites is characterized by elevated conductivity, pH, sulfates as well as relatively high total and dissolved metal (loid)s (including As, Al, B, Cu, Mn,



Ni, Se and Zn). Acute exposures revealed cladocerans (*Daphnia carinata*) and planarians (*Dugesia* sp.) to be the most sensitive species, exhibiting significant mortality after 48 and 96 h exposure to CMW2, respectively. Neither wastewater was found to elicit acute toxicity in vertebrates, but a range of sub-lethal morphological effects were observed following the sub-chronic exposures. The overall response pattern was characterized by decreased condition factor and hepatosomatic index in the fish *Hypseleotris compressa* and *Pseudomugil signifier*, and in *Limnodynastes peronii* tadpoles. Tadpoles were generally more sensitive compared to the two fish species. Differences in responses were observed amongst CMW1 and CMW2, which likely relates to differences in physico-chemical properties between sites. Our results have identified several candidate vertebrate and invertebrate species that show promise for ongoing monitoring of water quality and toxicity risk in Central Queensland, Australia." (Authors)] Address: Lanctôt, C., Central Queensland University, School of Medical and Applied Sciences, Gladstone, Qld 4680, Australia. E-mail: c.lanctot@cqu.edu.au

**16129.** Lara-Contreras, J.-C. (2016): New records of Odonata from a tropical dry forest in the department of Huila, Colombia. *Boletín del Museo de Entomología de la Universidad del Valle* 17(1): 21-25. (in English, with Spanish summary) ["The presence of *Micrathyria aequalis* (Hagen, 1861), *M. marcella* (Selys, 1857), *Lestes forcicula* (Rambur, 1842), and *Acanthagrion inexpectum* (Leonard, 1977) is reported for the first time for the Department of Huila, bringing the total number of Odonata species in this part of Colombia to 29." (Author)] Address: Lara-Contreras, J.-C., Universidad Nacional de Colombia, departamento de Biología, Carrera 30 no. 45-03 AA. 7495. Fundación Natura Colombia, Carrera 21 No. 39-43. Bogotá, Colombia. E-mail: juclaraco@unal.edu.co

**16130.** Lee, D.E.; Kaulfuss, U.; Conran, J.G.; Bannister, J.M.; Lindqvist, J.K. (2016): Biodiversity and palaeoecology of Foulden Maar: an early Miocene Konservat-Lagerstätte deposit in southern New Zealand. *Alcheringa* 40(4): 525-541. (in English) ["This paper highlights the biodiversity and palaeoecology of the 23 million year old Foulden Maar, the first Konservat-Lagerstätte deposit described from New Zealand and a key site for reconstructing early Miocene Southern Hemisphere terrestrial ecosystems. The 1000-m-diameter, ca 200-m-deep Foulden Maar volcanic crater lake was a closed system with anoxic bottom waters, capturing and preserving in exquisite detail organisms from the lake and adjacent rainforest. The fossils include numerous leaves, flowers with in situ pollen, fruits, seeds, fish and arthropods. Surrounding Foulden Maar was an evergreen, Lauraceae-dominated notophyll vine forest with a diverse understorey, lianes, epiphytes and mistletoes. Diverse pollination and seed dispersal modes are evident. Fish include larval to adult stages of articulated specimens of *Galaxias*, some with preserved soft tissue and a species of eel resembling *Anguilla*. The arthropod fauna comprises ca 20 families in the orders Araneae, Plecoptera, Odonata, Isoptera, Hemiptera, Diptera, Coleoptera, Trichoptera and Hymenoptera, representing faunas typical of soil, leaf litter, forest floor or freshwater habitats. Many fossil taxa have

close relatives in the extant New Zealand biota; others are now locally extinct. Coprolites containing quartz sands sourced from outside the lake indicate the presence of volant birds, presumably waterfowl. The Foulden Maar Lagerstätte is crucial for reconstructing Miocene lake and forest ecosystems in New Zealand, particularly the terrestrial arthropod component." (Authors)] Address: Lee, Daphne, Department of Geology, University of Otago, PO Box 56, Dunedin, New Zealand. E-mail: daphne.lee@otago.ac.nz

**16131.** Leung, K.K.K.; Hui, W.L.; Fung, T.H. (2016): New dragonfly species for Hong Kong. *Gynacantha ryukyuensis* Asahina, 1962. *Hong Kong Biodiversity* 24: 14-16. (in English) ["*G. ryukyuensis* was found and confirmed to occur in Hong Kong in 2014. *G. ryukyuensis* was first recorded by the AFCD Dragonfly Working Group in Hong Kong's north-east New Territories in 2004, when one male and one female were captured. Two females were then recorded in Tai Lam Country Park and the northeast New Territories in April 2013 and May 2014 respectively (Fig. 18). A male was also captured in Tai Lam Country Park on 6 June 2014 (Fig. 19). All *G. ryukyuensis* recorded in Hong Kong were observed resting in trees during the day in dense woodland with a marsh nearby. In the 2014 record, the female was observed several times chasing prey near a stream with high canopy coverage." (Authors)] Address: not stated

**16132.** Leung, K.K.K.; Tam, T.W. (2016): Changes/updates to the dragonfly checklist in Hong Kong. *Hong Kong Biodiversity* 24: 16-17. (in English) [*Anax indicus*, *Gynacantha ryukyuensis*, *Matrona basilaris*, *Rhyothemis fuliginosa*, *Stylurus kreyenbergi*, *Sympetrum darwinianum*] Address: not stated

**16133.** Levis, N.A.; Schooler, M.L.; Johnson, J.R.; Collyer, M.L. (2016): Non-adaptive phenotypic plasticity: the effects of terrestrial and aquatic herbicides on larval salamander morphology and swim speed. *Biological Journal of the Linnean Society* 118(3): 569-581. (in English) ["Phenotypic plasticity, although ubiquitous, may not always be advantageous. Non-adaptive plasticity is likely to occur in response to novel environmental stress. Anthropogenic contaminants, such as herbicides, are novel stressors that are not present in the evolutionary history of most species. We investigated the pattern and consequences of phenotypic plasticity induced by four glyphosate-based herbicides (two terrestrial and two aquatic) in larvae of the spotted salamander, *Ambystoma maculatum*, by determining (1) whether the herbicides induced different morphologies; (2) if different morphologies translated to differences in burst swim performance; and (3) how induced individuals performed relative to non-induced controls. Different herbicide formulations led to the production of significantly different head and tail morphologies, and tail morphology correlated with fastest escape speed. However, escape speed did not vary among treatments. In addition, three out of four herbicide treatments experienced accelerated growth rates, in terms of the lateral size of tails, although the tail shapes were either similar to preliminary controls or intermediate between preliminary and final controls. These observations suggest that herbicide-induced

morphology is a case of non-adaptive phenotypic plasticity, and that there is potentially a trade-off between growth and development for larvae exposed to different formulations. Understanding the functional significance of induced phenotypes is important for determining their importance in shaping an organism's ecological interactions and evolutionary trajectories. Furthermore, under different conditions, the morphological changes that we observed in response to exposure to herbicides might affect salamander fitness and influence population dynamics." (Authors)] Address: Levis, N.A., Dept Biol., Western Kentucky Univ., Bowling Green, KY, 42101, USA. E-mail: nicholasalevis@gmail.com

**16134.** Li, S.; Zheng, D.-R.; Zhang, Q.; Liao, H.-Y.; Wang, H.; Wang, B.; Wang, J.; Lu, H.-B.; Chang, S.-C.; Zhang, H.-C. (2016): Discovery of the Jehol Biota from the Celaomiao region and discussion of the Lower Cretaceous of the Bayingebi Basin, northwestern China. *Palaeoworld* 25(1): 76-83. (in English) ["Some typical components of the Jehol Biota, including conchostracans *Eosestheria* sp., the mayfly *Ephemeropsis trisetalis* Eichwald, 1864, the aquatic beetle *Coptoclava longipoda* Ping, 1928, and a fragmentary dragonfly, are reported for the first time from the Bayingebi Formation in the Celaomiao region, western Inner Mongolia, China. This discovery indicates that the middle Upper Member of Bayingebi Formation can be correlated with the upper Yixian and the lower Jiufotang formations in western Liaoning Province. Combining it with the radio-isotopic dating result, we further believed that the Upper Member of Bayingebi Formation could be roughly correlated with the Yixian, Jiufotang, and Shahaï formations, and the overlying Suhongtu Formation with the Fuxin Formation in western Liaoning Province. In the major Bayingebi Basin, palaeontological and radio-isotopic dating evidence shows that the Bayingebi Formation has a long depositional history of over 30 Ma: its Upper Member bearing the Jehol Biota and the early Fuxin Biota is probably coeval to the Yixian, Jiufotang and Shahaï formations and has a Barremian–early Albian age; its Lower Member may be Berriasian–Hauterivian in age and could be correlated with the upper Tuchengzi, Zhangjiakou, and Dabeigou formations in northern Hebei Province. This suggests that the Bayingebi Formation should be promoted to the stratigraphic rank of group and subdivided into several secondary units (formations). Unlike the previous result, the Yingen Formation is considered across the Lower Cretaceous–Upper Cretaceous boundary and being late Albian–early Turonian in age." (Authors)] Address: Zhang, H.-C., State Key Lab. of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China. E-mail: hc Zhang@nigpas.ac.cn

**16135.** Li, X.; Zhang, H.; Pan, B.; Tong, X. (2016): Life history and secondary production of the Chinese endemic damselfly *Euphaea opaca* (Odonata: Euphaeidae). *International Journal of Odonatology* 19(1-2): 75-82. (in English) ["*E. opaca* Selys, 1853 is an endemic damselfly to China, but little is known about its biology and ecology. In this study, we investigated the life history and secondary production of *E. opaca* in a third order subtropical stream of Guangdong, China. Larvae were

collected monthly from October 2010 to September 2011 using a Surber net with six replicates from riffle areas. The results show that *E. opaca* exhibited a univoltine life history in South China with recruitment from August to February of the following year; adults first appeared in late April and ended in early September, the flight period roughly coinciding with the rainy season. The mean nymphal density ranged from 1.85 individuals m<sup>-2</sup> (July) to 81.48 individuals m<sup>-2</sup> (January) during the study period. Estimated annual secondary production was 1240.4 mg DWm<sup>-2</sup> year<sup>-1</sup>, and annual production/biomass ratio (P/B) was 6.4." (Authors)] Address: Li, X., Dept Entom., College of Agriculture, South China Agricultural Univ., Guangzhou, PRChina

**16136.** Lorenzo-Carballa, M.O.; Torres-Cambas, Y.; Ferreira, S.; Trapero-Quintana, A.D.; Cordero-Rivera, A. (2016): *Microneura* is a junior synonym of *Protoneura* (Zygoptera, Coenagrionidae). *International Journal of Odonatology* 19(1-2): 13-22. (in English) ["*M. caligata* (Hagen in Selys, 1886) is an endangered damselfly presently known from five localities in the central mountains of Cuba. The precise systematic position of this species within the former Neotropical Protoneuridae has been the subject of debate, with previous results from a phylogenetic analysis based on morphology suggesting that the genus *Microneura* should be placed within the genus *Protoneura*. Here, we used mitochondrial and nuclear DNA sequencing to disentangle the taxonomic status of this species. Our results show that *Microneura* belongs to the *Protoneura* clade, thus making *Microneura* a junior synonym of *Protoneura*. Finally, we provide notes on some observations of emergence and ovipositing behaviour of this species." (Authors)] Address: Torres-Cambas, Y., Departamento de Biología, Facultad de Ciencias Naturales y Exactas, Universidad de Oriente. Patricio Lumumba s/n, Santiago de Cuba, Cuba.

**16137.** Loureiro, N.; Martins, S. (2016): The status of *Ischnura senegalensis* (Odonata: Coenagrionidae) in Cape Verde. *African Entomology* 24(2): 448-452. (in English) ["The first record of a zygopteran breeding population in the Cape Verde archipelago is presented. A small population of *I. senegalensis* was found living in the lagoon 'Lagoinha', Santiago island, where the species was observed in all seven surveys conducted between May 2014 and June 2015. Reproductive behaviour was repeatedly observed and exuviae were found and collected." (Authors)] Address: Loureiro, N., Centre for Environ. Biol. – ACD, Lisbon, and Univ. do Algarve, FCT - DCTMA, Campus de Gambelas, 8005-139 Faro, Portugal.

**16138.** Low, V.L.; Sofian-Azirun, M.; Norma-Rashid, Y. (2016): Playing hide-and-seek with the tiny dragonfly: DNA barcoding discriminates multiple lineages of *Nannophya pygmaea* in Asia. *Journal of Insect Conservation* 20(2): 339-343. (in English) ["We examined the utility of DNA barcode data for assessing genetic diversity of the tiny dragonfly *Nannophya pygmaea* Rambur in Asia. Data analyses inferred from the barcode region of cytochrome oxidase subunit I (COI) were performed with Malaysian *N. pygmaea*, along with the existing COI haplotypes distributed in Asia. We applied four

species delimitation analyses [automatic barcode gap discovery (ABGD), generalised mixed yule coalescent (GMYC), poisson tree processes maximum likelihood (PTP\_ML) and poisson tree processes simple heuristic solutions (PTP\_sh)] to investigate potential lineages in this geographically wide-spread species. Based on our dataset, we provisionally recognize four distinct lineages or operational taxonomic units of *N. pygmaea*, which were represented by the taxa from Japan/Korea, China/Laos/Taiwan, Malaysia and Vietnam, respectively. Phylogenetic analyses showed two well-supported assemblages of *N. pygmaea*: one restricted to the taxa from Malaysia and Vietnam; and the other covering all populations further north (i.e., China, Japan, Korea, Laos and Taiwan). An extraordinarily high degree of genetic distance (up to >12 %) was detected between these two assemblages—suggesting they represent two separate species." (Authors) Address: Low, V.L., Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia

**16139.** Malnas, K.; Müller, Z.; Szabo, T.; Kiss, B. (2016): Data to the Ephemeroptera, Odonata and Trichoptera fauna of the Kőszeg Mountains. *Folia hist. nat. Mus. matraensis* 40: 39-44. (in English) ["We present occurrence records of 15 Ephemeroptera, 6 Odonata and 20 Trichoptera species from streams of the Kőszeg Mountains. ...." (Authors)] Address: Malnas, K., BioAqua Pro Ltd., Soó Rezső u. 21, H-4032 Debrecen, Hungary. E-mail: malnask@gmail.com

**16140.** Mañani-Pérez, J.; Cabrero-Sañudo, F.J.; Tapetado, D.G.; Gómez, J.F.; Villalobos Moreno, A. (2016): Primera cita de *Boyeria irene* (Fonscolombe, 1838) (Odonata: Aeshnidae) para la provincia de Toledo (Castilla-La Mancha, España). *Boln. S.E.A.* 59: 261-262. (in Spanish, with English summary) ["The first record of *B. irene* from Toledo province is presented. This represents a contribution to the knowledge of the Odonata from Toledo, the province of peninsular Spain with the lowest number of records and species of Odonata." (Authors)] Address: Mañani-Pérez, J., Universidad Complutense de Madrid, Depto de Zoología y Antropología Física. Grupo de Seguimiento de Fauna CEI-Campus Moncloa. Madrid, Spain. E-mail de contacto: jmanani3@gmail.com

**16141.** Mancu, O.O.; Popescu, I.E. (2016): More than fifty years after the last recording of *Leucorhina pectoralis* (Charpentier, 1825) (Odonata: Libellulidae) in Romania. *Travaux du Muséum National d'Histoire Naturelle «Grigore Antipa»* 59(2): 109-113. (in English) ["At 4.5 kilometers from this protected area, within the same period, we found several dozen individuals of *L. pectoralis* in a peat exploit area, called "Turbamin", an example of human activities contributing accidentally to maintain a rare and protected species in nature." (Authors)] Address: Popescu, I.E., Alexandra Ioan Cuza" University, Faculty of Biology. Carol I Blvd. 20A. 700505 Iasi. Romania. E-mail: irinellus@yahoo.com

**16142.** Manenti, R.; Zanetti, N.; Pennati, R.; Scari, G. (2016): Factors driving semi-aquatic predator occurrence in traditional cattle drinking pools: conservation issues. *Journal of Limnology* 76(1): 34-40. (in English) ["In several cases, human

impact on water bodies and on their freshwater communities is detrimental, but in some cases the human activity may favour and enhance the biodiversity of small water bodies, as traditional cattle drinking pools. Despite their small size, small water bodies may constitute hot spot of biodiversity often representing the only lentic aquatic biotope in landscapes where superficial water lacks or flows in lotic environments like creeks and streams. Predators are good indicators of biodiversity in ponds and give information of food chain web complexity. In particular, semi-aquatic predators like amphibians and dragonflies may account for a substantial percentage of energy flow between aquatic and terrestrial ecosystems. In this study, we evaluated the conservation value of traditional cattle drinking pools building by assessing the factors determining the occurrence and distribution of the semi-aquatic predators. From April to August 2015, we investigated 30 distinct pools recording several abiotic and biotic environmental variables. We detected 4 semi-aquatic predators: *Salamandra salamandra* larvae, *Triturus carnifex*, *Aeshna* sp. larvae and *Libellula* sp. larvae. Abiotic features played a major role in shaping the predator community that resulted linked to stable, with no dryness period, and large drinking pools. Invertebrate prey biomass was not particularly important, while vegetation cover and occurrence of unpalatable tadpoles were the most important biotic features of the pools. Our study provides novel evidence on the importance of cattle drinking pools management to preserve biodiversity especially in areas where traditional pastoral activity is disappearing." (Authors)] Address: Manenti, R., Dipartimento di Bioscienze, Università degli Studi di Milano, Via Celoria 26, 20133 Milano, Italy. E-mail: raoulmanenti@gmail.com

**16143.** Marinov, M.; Fossati-Gaschnard, O.; Schorr, M. (2016): On a dragonfly collection from Nuku Hiva Island, Marquesas Islands and Paea, Tahiti (French Polynesia) with taxonomic discussion of some Polynesian genera (Insecta: Odonata). *Faunistic Studies in SE Asian and Pacific Island Odonata* 18: 1-12. (in English) ["A small collection of Odonata from Nuku Hiva Island, Marquesas Islands is presented. It adds *Anax guttatus* as a new species to this oceanic group. *Hemicordulia* sp. nov. is reported, but not described because the same species has been sampled before and is pending a formal description. A short taxonomic discussion on observed morphological similarity of male anal appendages in taxa presently assigned to *Amorphostigma*, *Hivaagrion* and *Ischnura* east of New Caledonia is provided. Important considerations for biogeography of the Pacific Odonata are discussed too." (Authors)] Address: Marinov, M., Plant Health & Environment Laboratory, Diagnostic and Surveillance Services, Ministry for Primary Industries, 231 Morrin Rd, 1072 Auckland, New Zealand. E-mail: milen.marinov@mpi.govt.nz

**16144.** Mangaoang, C.C.; Mohagan, A.B. (2016): Odonata diversity at University of southern Mindanao, Kabacan, Cotabato. *Asian Journal of Biodiversity* 7(1): 112-123. ["Odonata are good biocontrol agents of agricultural pests and vector mosquitoes and even an indicator of environmental changes and health status of ecosystem. Despite, limited studies have been conducted especially lowland ecosystems. The study



was conducted using time constraint with 4 exposure hours and opportunistic sampling protocols. Result of the study revealed 13 species of Odonata belonging to three families, 2 of which are Zygoptera and only one family belonging to Anisoptera with 11 species. Libellulidae dominates the recorded species. 8 species are found in USMARC and 6 species in housing. One Philippine endemic was documented - *Rhinocypha colorata*. Diversity is low in the two sampling sites and high disturbance is found in housing (63%). Similarity index showed that 92% are discordant species. Low species diversity and low endemism of Odonata is an indicator that the area is already disturbed as measured by the high number of common/oriental species and existence of environmental and anthropogenic activities. Thus, a conservation strategy for this important species will be implemented." (Authors)] Address: Cherie Cano Mangaoang, Dept of Biological Sciences, University of Southern Mindanao, Kabacan, Cotabato, Philippines. E-mail: chericano1201@gmail.com

**16145.** Manger, R.; van der Heijden, A. (2016): *Forcipomyia paludis* (Diptera: Ceratopogonidae), a new dragonfly parasite for the Netherlands. *Brachytron* 18(1): 50-56. (in Dutch, with English summary) ["This article describes the discovery and distribution of *F. paludis* in the Netherlands. *F. paludis* is almost never observed in the field, but later on photographs of dragonflies. In the National Park Weerribben-Wieden in 2008, pictures were taken of some *Leucorrhinia pectoralis* and a female *Crocothemis erythraea* who had *F. paludis* on their wings. *F. paludis* is the only known midge belonging to the Ceratopogonidae in Europe who parasitizes on the wings of dragonflies. *F. paludis* sucks haemolymph from the wing veins. The new findings of *F. paludis* in the Netherlands and Belgium make the Northwest Europe distribution more complete. The species is currently known in the Netherlands of six areas with open stagnant water, located on sand and peat soil. In the Netherlands, dragonflies are favored by an ever increasing group of photographers. That's why it is expected that *F. paludis* will be discovered in new areas in the Netherlands." (Authors)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

**16146.** Manolis, T. (2016): Odonate exuviae used for roosts and nests by *Sassacus vitis* and other jumping spiders (Araneae: Salticidae). *Peckhamia* 142: 1-16. (in English) ["I systematically collected dragonfly (Anisoptera) exuviae along the margins of backwater lagoons in the American River floodplain, Sacramento County, California, USA, in five years (2008-2010, 2012-13) to document and monitor secondary use of these structures by arthropods, particularly spiders. Of nearly 400 exuviae examined, 28.1% were occupied, or showed signs of occupancy (e.g., unoccupied retreats). Of these occupied exuviae, 93% contained spiders or evidence of spider occupancy, and at least 50% of these were occupied by *Sassacus vitis* (many unoccupied retreats were probably of that species as well). *S. vitis* showed a significant preference for using the exuviae of sedentary, burrowing dragonfly larvae versus those of active, clasping or sprawling larvae. I found *S. vitis* in exuviae as single males and females, in pairs, and using exuviae for molt retreats and nests. 44 *S. vitis* nests

in exuviae provided data on aspects of the species' breeding biology. In addition, a number of these nests were attacked by hymenopteran egg parasitoids in the genera *Idris* (Platygastridae) and *Gelis* (Ichneumonidae). I also found three other salticid species (*Sitticus palustris*, *Synageles occidentalis*, and *Peckhamia* sp.) in exuviae, all guarding egg sacs. Utilization of dragonfly exuviae by *Sassacus vitis* and other salticids is no doubt more frequent and widespread than previously noticed and deserves further scrutiny." (Author)] Address: Manolis, T., 808 El Encino Way, Sacramento, CA 95864, USA. E-mail: Ylightfoot@aol.com

**16147.** Marino, N.A.C.; Srivastava, D.S.; MacDonald, A.A.M.; Leal, J.S.; Campos, A.B.A.; Farjalla, V.F. (2016): Rainfall and hydrological stability alters the impact of top-predators on food web structure and function. *Global Change Biology* 23(2): 673-685. (in English) ["Climate change will alter the distribution of rainfall, with potential consequences for the hydrological dynamics of aquatic habitats. Hydrological stability can be an important determinant of diversity in temporary aquatic habitats, affecting species persistence and the importance of predation on community dynamics. As such, prey are not only affected by drought-induced mortality but also the risk of predation (a non-consumptive effect, NCE) and actual consumption by predators (a consumptive effect, CE). Climate-induced changes in rainfall may directly, or via altered hydrological stability, affect predator-prey interactions and their cascading effects on the food web, but this has rarely been explored, especially in natural food webs. To address this question, we performed a field experiment using tank bromeliads and their aquatic food web, composed of predatory damselfly larvae, macroinvertebrate prey and bacteria. We manipulated the presence and consumption ability of damselfly larvae under three rainfall scenarios (ambient, few large rainfall events and several small rainfall events), recorded the hydrological dynamics within bromeliads, and examined the effects on macroinvertebrate colonization, nutrient cycling and bacterial biomass and turnover. Despite our large perturbations of rainfall, rainfall scenario had no effect on the hydrological dynamics of bromeliads. As a result, macroinvertebrate colonization and nutrient cycling depended on the hydrological stability of bromeliads, with no direct effect of rainfall or predation. In contrast, rainfall scenario determined the direction of the indirect effects of predators on bacteria, driven by both predator CEs and NCEs. These results suggest that rainfall and the hydrological stability of bromeliads had indirect effects on the food web through changes in the CEs and NCEs of predators. We suggest that future studies should consider the importance of the variability in hydrological dynamics among habitats as well as the biological mechanisms underlying the ecological responses to climate change." (Authors)] Address: Marino, N.A.C., Lab.de Limnologia, Depto de Ecologia, Inst. Biol., Centro de Ciências da Saude, Universidade Federal do Rio de Janeiro, PO Box 68020, Rio de Janeiro, RJ, Brazil. E-mail: nac.marino@gmail.com

**16148.** Marino Jr., J.A.; Holland, M.P.; Werner, E.E. (2016): Competition and host size mediate larval anuran interactions with trematode parasites. *Freshwater Biology* 61(5):

621-632. (in English) ["1. How parasites influence individual host traits and survival often depends on the ecological context of the host-parasite interaction, such as the presence of competitors or predators and trait variation among hosts. 2. We examined the effects of three key components of ecological context – host density, size structure and predator cue – on interactions between larval frogs and trematode parasites (Digenea: Echinostomatidae) in mesocosms. 3. We found that effects of parasites on host growth could be either negative or positive, depending on host size and overall growth rate, but not on predator presence. A surprising positive effect of parasites on host growth under some conditions could represent an adaptive host life history response, whereby enhanced growth allows escape from a smaller, less tolerant size class that experiences more negative fitness effects of infection. 4. Notably, only host size class was a strong predictor of infection intensity, but not host density or predator cue. 5. Overall, these results suggest that parasitism, competition and host size interact to influence host fitness. Ecological context thus mediates the interactions between parasites and their hosts, with implications for parasite effects in nature." (Authors)] Address: Marino, J.A., Dept Ecol. & Evolutionary Biol., Univ. Michigan, Ann Arbor, MI 48109, U.S.A. E-mail: jamarino@umich.edu

**16149.** Marinov, M. (2016): A contribution to the dragonfly fauna of Guadalcanal, Solomon Islands (Insecta: Odonata) with description of two new species. *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 17: 1-34. (in English) ["New data on Odonata of the Guadalcanal Island, Solomon Islands are provided following a recently completed Rapid Biodiversity Assessment of the Tetena Haiaja ridge. Two new species, *Lieftinckia ulunorum* and *Procordulia valevahalo* are described. The first is a new member of the Solomon Islands endemic genus while the second is a new genus for the country and the second validated species from the *Corduliidae* family known from this Pacific archipelago. As *L. ulunorum* is found to be very closely related to formerly known *L. lairdi* Lieftinck, 1963, which was also collected during the field trip, both are described in detail based on mature adults and teneral specimens. Comparison with *L. salomonis* Kimmins, 1957 (investigated only from figures published in the original species description) and *Salomocnemis gerdae* Lieftinck, 1987 (also sampled during this study) were provided as well. Additional morphological data is given on the following species: *Teinobasis bradleyi* Kimmins, 1957, female is illustrated here for the first time; *Anax* sp. cf. *gibbosulus*, second record of the genus for the country and *Gynacantha amphora* Marinov & Theischinger, 2012, originally described by a single male, here the description of the female is provided. All other species collected during the field trip will be published separately in the final expedition report." (Author)] Address: Marinov, M., Investigation and Diagnostic Centres and Response, Operations Branch, Ministry for Primary Industries, 231 Morrin Rd, Auckland 1072 New Zealand. E-mail: Milen.Marinov@mpi.govt.nz

**16150.** Márquez-Rodríguez, J.; Vega-Maqueda, M.A. (2016): Confirmación de la emergencia de *Sympetrum sinaiticum* Dumont, 1977 (Odonata: Libellulidae) y entomofauna termófila acompañante en la provincia de Córdoba (España). *Arquivos*

*entomológicos* 16: 47- 56. (in Spanish, with English summary) ["Confirmation of the emergence of *S. sinaiticum* and thermophilic associated entomofauna in the province of Cordova (Spain). New records of *Orthetrum nitidiverrum* in Cordova are reported. New records of this rare species are of faunistic interest, especially because of the scarcity of recent records. This research provides a third population in a very anthropic habitat. The rising of the maximum temperatures in spring has also coincided with the emergence of *S. sinaiticum*, another rare species occurring in Andalusia..."] (Authors) Address: Márquez-Rodríguez, J., Depto de Sistemas Físicos, Químicos y Naturales. Universidad Pablo de Olavide. A-376, km 1. 41013 Sevilla, Spain. E-mail: jmarrod1@upo.es

**16151.** Márquez-Rodríguez, J.; Vega-Maqueda, M.A. (2016): Rarezas odonológicas en un curso afectado por la antropización actual (Insecta: Odonata). *Arquivos entomológicos* 16: 285-292. (in Spanish, with English summary) ["Odonatological rarities in a watercourse affected by current anthropization (Insecta: Odonata). Faunistic data on the Odonata from one of the few permanent watercourses from the Sevilian-Cordovan countryside, a less studied biotope due to the low environmental value of farming lands, are provided. Some species observed are considered as vulnerable in the area, in need of legal protection due to the persistent degradation of the stream." (Authors)] Address: Márquez-Rodríguez, J., Depto de Sistemas Físicos, Químicos y Naturales. Universidad Pablo de Olavide. A-376, km 1. E-41013 Sevilla, Spain. E-mail: jmarrod1@upo.es

**16152.** Martin, K. (2016): Traveling across the toe: riverbank features and their impact on emergence distance of *Gomphus vastus* and *Stylurus spiniceps*. *Bulletin of American Odonatology* 12(1): 1-6. (in English) ["The distance that an emergent dragonfly nymph travels from the water's edge influences its chance of successful eclosion. In many riverine systems, heavy riverbank erosion has led to a variety of bank stabilization methods being applied. In the Turners Falls Reservoir (Massachusetts), bank stabilization methods have included the placement of rocks along the toe of the slope. Dragonflies that travel across these rocks are often exposed to boat wakes, water level changes, and predation. This study investigated how riverbank features (such as rock size, width of riprap zone, slope, and sediment) affected the distance traveled by two species of riverine dragonfly (*Gomphus vastus* and *Stylurus spiniceps*)."] (Author)] Address: E-mail: kirstenmartin@usj.edu

**16153.** Mastropasqua, F.; Liuzzi, C. (2016): New records of *Coenagrion ornatum* in Italy (Odonata: Coenagrionidae). *Fragmenta entomologica* 48(1): 29-31. (in English) ["*C. ornatum* is a damselfly ranging from northwestern Europe to southwestern Asia. It is highly local, and northwestern populations are experiencing a steep decline. In Europe, *C. ornatum* is a species of conservation interest and is listed as Near Threatened due to habitat loss; it is nearly extinct in Italy. We report the finding of 4 male *C. ornatum* on 3 June 2005 in Apulia, southeastern Italy. This is the only recent record for Italy, and highlights the need for further research on

this species in the country." (Authors)] Address: Mastro-pasqua, F., CSdR- Association "Centro Studi de Romita", c/o Filippo d'Erasmus, Via G. Postiglione 9, I-70126 Bari, Italy. E-mail: fabiomastro77@gmail.com

**16154.** Matushkina, N.A.; Buy, D.; Lambret, P. (2016): Egg clutch patterning in *Lestes virens* (Odonata, Lestidae) with evolutionary emphasis on endophytic oviposition in lestid dragonflies. *Insect Science* 23: 893-902. (in English) ["Egg deposition within plants is one of the most widely distributed and ancient behaviours in Odonata. The resulting clutch consists of eggs placed in peculiar pattern that can be characteristic for certain groups of Odonata. Despite their importance for paleontological and evolutionary research, data on egg-clutch positioning are missing or insufficient for most species. Here, patterning of egg clutches in *Lestes virens* was measured and described in detail for the first time. The female usually produces a linear row of single eggs directed at an angle rightward or leftward to the longitudinal axis of plant substrate. Less often eggs are arranged in egg-sets consisting of up to four eggs. Apparently, the female insect follows the rigid behaviour stereotypes during oviposition and is unable to easily switch to the alternate stereotypical behaviour of single egg deposition or production of multi-egg sets. Based on a literature review and original data, egg clutch patterning of European Lestidae is overlaid on pre-existing phylogenies. The resulting evolutionary scenario of egg-clutch patterning can be considered in the framework of egg-laying behaviour in Lestidae." (Authors)] Address: Matushkina, Natalia A., Dept of Zoology, Biological Faculty, National Taras Shevchenko Univ. of Kyiv, vul. Volodymirs'ka, 64, Kyiv UA-01033, Ukraine. E-mail: odonataly@gmail.com

**16155.** McDevitt-Galles, T. (2016): The ecology of aquatic macroinvertebrates: Understanding interactions among drought, introduced fishes, and parasites. M.Sc. thesis, University of Colorado at Boulder: 87 pp. (in English) ["Aquatic macroinvertebrates play key roles in structuring aquatic communities and provide a key link with the surrounding terrestrial environment through their metamorphosis from aquatic larvae to terrestrial adults. It is therefore important to understand how their distribution across a landscape shifts through time and in response to environmental change, such as prolonged drought. Concurrently, because relatively little is known about the parasites that use pond macroinvertebrates as hosts, I also explored the relative importance of factors affecting infection prevalence and parasite load within common invertebrate host taxa. For each year over four years, I sampled 36 ponds within the Bay Area of California, USA, to characterize the diversity and composition of aquatic macroinvertebrates and quantify the parasites that utilize these organisms as hosts. I specifically aimed to answer the following questions: (1) what are the relative influences of non-native fishes and hydroperiod in structuring communities? (2) How does the magnitude of such filters vary through time? And (3) how do host- and habitat-level factors combine to determine patterns of infection with larval dragonflies and damselflies? My results indicated that while fish play a dominant role in structuring the macroinvertebrate composition and

richness, the strength of this effect was attenuated during a prolonged drought such that, by the last year of the study and the height of California superdrought, fish had no detectable effect on the macroinvertebrate diversity or species composition. The parasite survey revealed six parasite taxa using macroinvertebrates as hosts with the majority infecting members of the Odonata. The hierarchical generalized mixed model results suggested that the majority of variation in both infection prevalence and load was associated with site-level variables, such as water chemistry, and with an interaction between the presence of fish and host suborder. These findings suggest that infection probability for odonates is more closely linked to site-level factors than host-level factors though there are potential interactions between the two levels that must be considered." (Authors)] Address: not stated

**16156.** Meira Linares, A.; Horta Maciel-Júnior, J.M.; Espírito Santo De Mello, H.; Fortes Leite, F.S. (2016): First report on predation of adult anurans by Odonata larvae. *Salamandra* 52(1): 42-44. (in English) ["On 9-X-2009 at 20:25 h, we recorded three Odonata larvae of the genus *Anax* attacking and consuming two adult males of *Scinax rogerioi* Pugliesi, Baêta & Pombal, 2009 and an adult male of *Dendropsophus minutus* (Peters, 1872), respectively, at a permanent lake in an open disturbed area in the Municipality of Itabirito, Minas Gerais state, southeastern Brazil (20°15'21" S, 43°54'43" W, 1,319 m a.s.l.)."] Address: Meira Linares, A., Programa de Pós-Graduação em Zoologia de Vertebrados, Pontifícia Univ. Católica de Minas Gerais, CEP 30535-610, Belo Horizonte, Minas Gerais, Brazil. E-mail: bioantonio1@yahoo.com.br

**16157.** Mens, L.P.; Schütte, K.; Stokvis, F.R.; Dijkstra, K.-D.B (2016): Six, not two, species of *Acisoma* pintail dragonfly (Odonata: Libellulidae). *Zootaxa* 4109(2): 153-172. (in English) ["The genus *Acisoma* is revised based on adult male morphology and COI sequence data. Six species are recognised, including the new species *A. attenboroughi* sp. nov. Diagnoses and a key to males of all species and illustrations of all relevant characters are provided. *A. inflatum*, *A. variegatum* and *A. trifidum* are confined to continental Africa, while *A. panoroides* is restricted to Asia. *A. ascalaphoides* is known only from threatened littoral forest fragments on the east coast of Madagascar, while *A. attenboroughi* is widespread across the island. The new species honours Sir David Attenborough on his 90th birthday." (Authors)] Address: Mens, Lotte, Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: lottemens88@gmail.com

**16158.** Michels, J.; Appel, E.; Gorb, S.N. (2016): Functional diversity of resilin in Arthropoda. *Beilstein J. Nanotechnol.* 7: 1241-1259. (in English) ["Resilin is an elastomeric protein typically occurring in exoskeletons of arthropods. It is composed of randomly orientated coiled polypeptide chains that are covalently cross-linked together at regular intervals by the two unusual amino acids dityrosine and trityrosine forming a stable network with a high degree of flexibility and mobility. As a result of its molecular prerequisites, resilin features exceptional rubber-like properties including a relatively low stiffness, a rather pronounced long-range deformability and a



nearly perfect elastic recovery. Within the exoskeleton structures, resilin commonly forms composites together with other proteins and/or chitin fibres. In the last decades, numerous exoskeleton structures with large proportions of resilin and various resilin functions have been described. Today, resilin is known to be responsible for the generation of deformability and flexibility in membrane and joint systems, the storage of elastic energy in jumping and catapulting systems, the enhancement of adaptability to uneven surfaces in attachment in reproductive, folding and feeding systems and the sealing of wounds in a traumatic reproductive system. In addition, resilin is present in many compound eye lenses and is suggested to be a very suitable material for optical elements because of its transparency and amorphousness. The evolution of this remarkable functional diversity can be assumed to have only been possible because resilin exhibits a unique combination of different outstanding properties." (Authors)] Address: Michels, J., Dept of Functional Morphology & Biomechanics, Institute of Zoology, Christian-Albrechts-Universität zu Kiel, Am Botanischen Garten 1–9, 24118 Kiel, Germany. Email: jmichels@zoologie.uni-kiel.de

**16159.** Miguélez, D.; García-Tejero, S.; Hernández, A.; Valadares, L.F. (2016): Diet selection of the Aquatic warbler *Acrocephalus paludicola* during its post-nuptial migration stopover in NW Spain. *Ardea* 104(3): 273-282. (in English) ["Food availability and diet are two key issues in understanding the ecological requirements of a migratory species in stopover sites and in taking effective conservation measures. In the case of the globally threatened Aquatic Warbler, there have previously been no studies examining diet selection in the Iberian Peninsula, a key region for their post-nuptial movements. In this context, the availability of arthropods in different habitats (reeds, rushes and grassland), the composition and biomass of prey in faecal samples, and diet selection were all investigated in a wetland in northwest Spain. The results showed a higher total abundance of arthropods in grassland and rushes: habitats which were more similar to each other, in terms of vegetation physiognomy and composition of invertebrates, compared with reeds. In terms of prey abundance, diet was dominated by Araneae, Heteroptera and Homoptera. However, the groups that contributed most to the ingested biomass were Diptera (Tipulidae), Odonata and Orthoptera, followed by Araneae. Prey selection indices showed a preference for these groups, which all contain insects with a large body length. These diet characteristics showed many similarities with studies in other stopover and breeding areas, but differ in that Araneae were the main arthropod prey at this stopover site." (Authors)] Address: Miguélez, D., Univ. of León, Dep.t of Biodiversity & Environmental Management, Campus de Vegazana s/n E-24071 León, Spain. E-mail: biodavid@hotmail.com

**16160.** Mikolajewski, D.J.; Weißflog, A.; Brauner, O. (2016): Vergleichende Morphologie der Imagines von *Coenagrion lunulatum*, *C. pulchellum* und *C. puella* in einem syntopen Vorkommen (Odonata: Coenagrionidae). *Libellula* 35(3/4): 153-165. (in German, with English summary) ["Comparative adult morphology of *Coenagrion lunulatum*, *C. pulchellum*, and *C.*

*puella* in a syntopic situation (Odonata: Coenagrionidae) – Interspecific competition among odonate species for food, mating partner etc. is a common phenomenon. Because morphology mediates species' behaviour and microhabitat use, competition is expected to increase with species being more similar in their phenotypes. Here we present data for adult body morphology as well as abundance data of parasitic water mites in syntopically occurring *C. lunulatum*, *C. puella*, and *C. pulchellum* at a pond near Wilmersdorf (Brandenburg, Germany). Whereas all three species differed significantly in overall body size (head, thorax, abdomen, and legs), *C. lunulatum* also differed in their wing morphology from *C. puella* and *C. pulchellum*. No such differences were found in the latter two species. All three species also differed in total abundance of water mites, however those differences were completely attributed to body size differences among the three Coenagrion-species. Based on our results, we discuss potential differences in flight behaviour, hunting mode, and microhabitat use among the three studied species." (Authors)] Address: Mikolajewski, D.J., Institut für Biologie, Freie Universität Berlin, Königin-Luise-Straße 1-3, 14195 Berlin, Germany. E-mail: d.mikolajewski@gmx.de

**16161.** Mill, P.J. (2016): A review of the role of the abdomen of aeshnid larvae in respiration, jet-propulsive locomotion and prey capture. 1. The digestive, tracheal, muscular and 72-92. (in English) ["The structure of the digestive, tracheal, muscular and nervous systems in the abdomen of aeshnid larvae is reviewed, with particular regard to the role of the abdomen in producing pressure changes that elicit respiration, jet-propulsive swimming and labial mask extension. The musculature of the labial mask is also described." (Author)] Address: Mill, P.J., School of Biology, University of Leeds, Leeds, LS2 9JT, UK

**16162.** Miyai, K.; Saito, M.; Jinguji, H. (2016): Practice and effectiveness of the program of risk assessment mitigation for Red Dragonflies with farmers' participation. *Transactions of the Japanese society of irrigation, drainage and rural engineering* 84(3): 201-207. (in English Japanese ) ["Recently the population of red dragonflies has declined nationwide in Japan. It is pointed out that the change of paddy field-management is one of the main causes for it. In order to mitigate the influence of such changes, it is necessary to introduce a proper management method suitably adaptable to farmland. To examine the effects of difference in cultivation management, we introduced the program of risk assessment mitigation and conducted of census of red dragonfly and cultivation management in paddy fields in Tajiri, Osaki City, Miyagi Prefecture from 2009 until 2013. We investigated the correlation between the emergence status of the red dragonflies and cultivation methods for paddy fields together with local farmers. The husks of red dragonflies were more sparsely found in the paddy fields where dinotefuran were applied. For conservation of red dragonflies, we started to employ the different pesticides with lower effects on red dragonflies and applied the pesticides only in the peripheral zone of each patch and successfully reduced the insecticidal effects on red dragonflies compared to broadcast application over

the entire fields. Each technique was observed that suppress the decrease of red dragonflies." (Authors)] Address: Miyai, K., Graduate School of Food, Agricultural and Environmental Sciences, Miyagi University

**16163.** Monnerat, M.; Al Dhafer, H.M. (2016): Odonata records from southwestern Saudi Arabia. *Notulae odonatologicae* 8(7): 231-239. (in English) ["Results are presented of a one-week field trip in November 2012 to southwest Saudi Arabia. 19 dragonfly species were collected, observed and photographed at 17 localities in the regions of Makkah, Bahah, 'Asir, and Jizan. A new record of the little known *Trithemis dejouxi* is documented. *Lestes pallidus*, which had not been recorded for decades, is confirmed and new for Jizan. *Anax imperator* and *A. parthenope*, rarely mentioned in literature, were recorded at several localities." (Authors)] Address: Monnerat, C., Faubourg de la Gare 19, 2000 Neuchâtel, Switzerland. E-mail: monnerat.christian@gmail.com

**16164.** Monteiro, C.d.S.; Esposito, M.C.; Juen, L. (2016): Are the adult odonate species found in a protected area different from those present in the surrounding zone? A case study from eastern Amazonia. *Journal of Insect Conservation* 20(4): 643-652. (in English) ["We studied 30 streams in eastern Amazonia, 17 of which were located within a protected area (PA) and the other 13 in the surrounding zone, with the objective of evaluating the diversity of adult Odonata and if there was a difference between the physical habitat variables of the two environments. We hypothesized that a greater diversity of odonate species would be found in the PA due to a greater complexity of habitats. This hypothesis was rejected, however, due to the greater odonate diversity found in the surrounding zone in comparison with the PA. Differences were also found in the species composition of the two environments. Our results indicate that there are differences between the environmental variables in the areas, and the few alterations observed in the surrounding zone may have contributed to the formation of new conditions and habitats appropriate for species that may have been rare. The PA, despite having reduced species richness and abundance in comparison with the surrounding zone, was nevertheless characterized by a more heterogeneous species composition. A quarter of the species were common to both environments, while 34 % were exclusive to the surrounding zone. In this case, it appears that the combination of the protected area and the surrounding zone, which has a low level of disturbance, conserves a wider range of specialist species than either area on its own. The great challenge in the future is finding a way to identify the disturbance levels that would be acceptable, and to prevent over-exploitation of resources in such areas." (Authors)] Address: Monteiro Jr., C., Graduate Program in Zoology, Universidade Federal do Pará/Museu Paraense Emílio Goeldi, Caixa Postal 399, Belém, Pará CEP 66040-170, Brazil. E-mail: claudiomonteiro80@hotmail.com

**16165.** Montemayor, S.I.; Melo, M.C.; Scheibler, E.E. (2016): Forecasting the fate of high mountain ponds in the Andean region under future climate change. *Austral Ecology* 41(8): 983-992. (in English) ["The aims of this study are

(i) to identify areas in the Andean region where the climate will remain stable enough for the survival of the study species; (ii) to analyze how climate change will affect these areas under different climate scenarios; (iii) to generate spatially explicit predictive maps of the expansion or retraction of these areas; and (iv) based on this information, to identify areas with priority for conservation. The analysis was performed using presence-only data for 14 Heteroptera and Odonata species. Current and future models were developed to identify areas where the climate would be suitable for small ponds, using Maxent v3.3.3k, with future models based on three different Global Climate Models for the 2050 period (scenarios A2a and B2a). Model performance was evaluated using the jack-knife approach. Climatic niche breadth and climatic niche similarities were calculated through Levin's concentration metrics and the I statistic index (implemented in ENMTools), respectively. Maxent logistic outputs were converted into binary presence/absence maps, based on the 'minimum training presence logistic threshold', and used to build species richness maps for each condition considered (present and future). Current and future models with areas climatically suitable for small ponds were developed. All the study species proved to be narrow specialists and share similar climatic spaces. Our projections suggest that four of the species would not find suitable climate conditions for survival in the future. The priority area for conservation, where most species would find suitable climate conditions, is located between 33–47°S and 73–70°W. We identified future loss of the priority area towards the east and a small gain towards the north and south. The most probable situation for the year 2050 is a negative precipitation–evapotranspiration balance, and small ponds will probably be very short-lived or dry completely during summer, suggesting a drastic change in species assemblages and species richness of the region, which could become a hot-spot of extinction." (Authors)] Address: Montemayor, Sara, División Entomología, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, CONICET, Paseo del Bosque s/n 1900, La Plata, Argentina. E-mail: smontemay@fcnym.unlp.edu.ar

**16166.** Moore, M.P.; Martin, R.A. (2016): Intrasexual selection favors an immune-correlated color ornament in a dragonfly. *Journal of evolutionary biology* 29(11): 2256-2265. (in English) ["Sexual signaling is predicted to shape the and benefits of ornamentation and the information that ornamentation provides to receivers is necessary to evaluating of a common color ornament in insects, melanin wing ornamentation, using the dragonfly *Pachydiplax longipennis*. We hypothesized that greater ornamentation would improve receive from territorial rivals, but that more ornamented males may have shorter lifespans. Using mark-recapture field observations, we found that more ornamented males had greater territory holding success, and that viability selection did not act on wing melanization. We then compared the aggression of territorial rivals to decoy males before and after experimentally augmenting wing melanization, finding that males significantly reduced aggression following the manipulation. We next hypothesized that wing melanization would signal fighting ability to territorial rivals by reflecting condition

via investment in the costly melanin-synthesis pathway. We observed a positive relationship between ornamentation and the likelihood of winning territorial disputes, suggesting that wing melanization provides information about fighting ability to rivals. We also found a positive relationship between melanin-based immune defense and ornamentation, supporting a link between the signal and condition. We conclude that wing melanization is a condition-related signal of fighting ability, and suggest that this may be a common mechanism promoting the evolution of melanin ornamentation." (Authors)] Address: Moore, M.P., Dept of Biology, Case Western Reserve University, 2080 Adelbert Road, Cleveland, OH 44106, USA. E-mail: mpm116@case.edu

**16167.** Mukherjee, A.; Dey, S.; Roy, U.S. (2016): An observation on Odonata fauna of Gandheswari river bank and adjoining fields and cultivated lands in Bankura district of West Bengal, India. *Annals of Experimental Biology* 4(1): 17-24. ["The present investigation was undertaken as a pilot study to examine the diversity and occurrence of Odonata from Gandheswari River Bank and adjoining fields and cultivated lands in Bankura District of West Bengal, India during January 2014 to December 2014. A combination of direct search and opportunistic sighting methods were applied during the present study to record 58 different Odonata species comprising of 39 dragonflies and 19 damselflies. Among the dragonflies the most diverse family was Libellulidae represented by 30 species while among damselflies Coenagrionidae was recorded as the most diverse family represented by 13 species. However, increasing pollution in River Gandheswari, conversion of land use pattern along with increasing urbanization is causing fragmentation, degradation and loss of habitat types, may be / are affecting biodiversity and needs serious attention from the concerned authorities most urgently. The present study was the first attempt to make a checklist of Odonates from Gandheswari River bank and adjoining regions and further investigations are needed to portray a comprehensive picture of Odonate diversity from this region." (Authors)] Address: Mukherjee, A., Post Graduate Dept of Biological Sciences, Presidency University, 86/1 College Street, Kolkata, West Bengal, India

**16168.** Mwedzi, T.; Bere, T.; Mangadze, T. (2016): Macroinvertebrate assemblages in agricultural, mining, and urban tropical streams: implications for conservation and management. *Environmental Science and Pollution Research* 23(11): 11181-11192. (in English) ["The study evaluated the response of macroinvertebrate assemblages to changes in water quality in different land-use settings in Manyame catchment, Zimbabwe. Four land-use categories were identified: forested commercial farming, communal farming, Great Dyke mining (GDM) and urban areas. Macroinvertebrate community structure and physicochemical variables data were collected in two seasons from 41 sites following standard methods. Although not environmentally threatening, urban and GDM areas were characterised by higher conductivity, total dissolved solids, salinity, magnesium and hardness. Chlorides, total phosphates, total nitrogen, calcium, potassium and sodium were significantly highest in urban sites whilst dissolved oxygen (DO)

was significantly higher in the forested commercial farming and GDM sites. Macroinvertebrate communities followed the observed changes in water quality. Macroinvertebrates in urban sites indicated severe pollution (e.g. Chironomidae) whilst those in forested commercial farming sites and GDM sites indicated relatively clean water (e.g. Notonemouridae). Forested watersheds together with good farm management practices are important in mitigating impacts of urbanisation and agriculture. Strategies that reduce oxygen-depleting substances must be devised to protect the health of Zimbabwean streams. The study affirms the wider applicability of the South African Scoring System in different land uses." (Authors)] Address: Mwedzi, T., School of Wildlife, Ecology & Conservation, Chinhoyi Univ. of Technology, Off Harare-Chirundu Rd, P. Bag 7724, Chinhoyi, Zimbabwe. E-mail: mmmwedzi@gmail.com

**16169.** Myrup, A.R.; Baumann, R.W. (2016): The dragonflies and damselflies (Odonata) of Utha. *Monographs of the Western North American Naturalist* 9: 1-114. (in English, with Spanish summary) ["An updated faunal list containing 94 species of Odonata (60 Anisoptera and 34 Zygoptera) for Utah is presented. Of the 95 Odonata species recorded in past publications as being from Utah, 8 have been removed from the Utah Odonata list, while 7 new state records have been added. Explanations for their removal are provided in the species accounts. The 7 ecoregions found in Utah are briefly described along with their wetland habitats and odonate species. Geographical distribution data by county, drainage, and ecoregion are provided for each species along with information regarding elevation range, flight season, and habitat preferences in Utah. Specific comments relevant to the distribution and abundance of each species are provided. Distribution maps illustrate collection locations against a background of county boundaries and topography. State conservation rankings using methods described by NatureServe are recommended." (Authors)] Address: Myrup, A.R., Science Dept, Timpview High School, Provo, UT 84604. E-mail: alanmy@comcast.net

**16170.** Nel, A.; Simov, N.; Bozukov, V.; Marinov, M. (2016): New dragonflies and damselflies from Middle Miocene deposits in SW Bulgaria (Insecta: Odonata). *Palaeontologia Electronica* Article number: 19.3.35A: 13 pp. (in English) ["The first fossil Odonata discovered in Bulgaria are described and illustrated, i.e., the aeshnid *Oligaeschna bulgariensis* sp. nov., the sieblosiid *Stenolestes rhodopensis* sp. nov., and the dysagrionid *Primorilestes magnificus* sp. nov. These genera are present in both Western Europe and Siberia in the Neogene. Their fossil discoveries in Bulgaria provide a link between these two regions, which are now disconnected." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**16171.** Neog, N.; Rajkhowa, S.M. (2016): Dragon fly diversity in two different ecosystems in and around Assam University, Silchar (Ecoforest and Irongmara). *Journal of Entomology and Zoology Studies* 4(4): 184-190. (in English) ["Unlike butterflies, Odonata are till date not properly explored in the northeastern India. In the present investigation a study of dragon fly diversity in two different ecosystems in and



around Assam University – Ecoforest and Irongmara, located in Cachar district of Assam, was carried out. 17 species of dragonflies were identified which belong to family Libellulidae. *Orthetrum* genus was most abundant of all. Among species *O. sabina* was the most abundant one in both study sites. Species Abundance, Diversity, Richness and Evenness were determined in both the Study sites." (Authors)] Address: Neog, N., Dept Zoology, Sibsagar College, Joysagar, Assam, India

**16172.** Newton, I. (2016): Obituary: Norman Winfrid Moore (1923–2015). *Ibis* 158: 459–461. (in English) [With the death of Norman Moore aged 92, on 21 October 2015, Britain lost one of its most influential conservationists. To ornithologists, Norman was perhaps best known for his work on pesticide impacts on birds. He led the team at Monk's Wood Experimental Station that studied the biological impacts of DDT and other organochlorines in the 1960s. This work eventually contributed to a banning of these chemicals from agricultural use in Britain and elsewhere. However, he was an allround naturalist with a particular interest in birds, dragonflies and butterflies. He became a world authority on dragonflies and their conservation, and was one of the first to appreciate the problems for wildlife of agricultural intensification and habitat fragmentation, and the value of hedgerows in modern farmland. Norman firmly believed in the importance of integrating nature conservation with other landuses, whether agriculture or forestry. He realized that small nature reserves alone could not save biodiversity in a country as highly developed and populated as Britain. He was a founder and first Chairman of the Farming and Wildlife Advisory Group (FWAG). This was a charitable trust which aimed to find practical ways of conserving wildlife on working farms, thus bridging a widening gulf between farmers and conservationists. As a person, Norman was well-informed, charming and modest. With his naturally gentle and thoughtful manner, he became widely regarded as one of conservation's elder statesmen, much loved and respected by all who knew him. Norman was born on 24 February 1923, the son of a doctor, Sir Alan Moore. In 1934 the family moved from Lewes to near Battle in rural Sussex. From boyhood, Norman was a keen naturalist. Birds were his first love, but by his teens butterflies and dragonflies had caught his attention. His first scientific paper, 'Rare Lepidoptera and Odonata in East Sussex', was published in 1939, when he was aged 16. He was educated at Eton College and then Trinity College, Cambridge, where he read Natural Sciences, specializing in zoology. While in Cambridge, he became President of the University Bird Club. Like so many of his generation, his studies were interrupted by war service. He was called up in 1942 and served as a gunnery officer in the Royal Artillery, with active service in Belgium and the Netherlands. When manning observation posts, he kept two notebooks: one with reports on German military activity and the other on wildlife seen at the time. Late in 1944 he suffered a serious leg wound and was captured by German forces. He was one of only four British prisoners in a camp housing 23 000 Russians. Conditions were appalling. On a pint of mangel-wurzel soup per day and one small loaf of bread per week, prisoners were starving, and deaths in the camp numbered more than a hundred per day. On being liberated by the US 7th Armoured

Division in April 1945, more than 9000 men from the camp were hospitalized and de-loused with the new wonder chemical, DDT. After his return to Britain, Norman trained] Address: Ian Newton. E-mail: ine@ceh.ac.uk

**16173.** Ngiam, R.W.J.; Cheong, L.F. (2016): The dragonflies of Singapore: An updated checklist and revision of the national conservation statuses. *Nature in Singapore* 9: 149–163. (in English) ["Over the past few years, the popularisation of local dragonflies (Odonata) among academics and amateurs has resulted in several new records, rediscoveries, and a better understanding of the distribution and conservation significance. Consequently, the species checklist and conservation status categories based on published materials are outdated and do not accurately reflect the current knowledge. Hence, we have conducted a comprehensive assessment of all species to produce the most updated Singapore checklist and revised national conservation status. The total number of Odonata species ever recorded from Singapore now stands at 131 which are composed of nine Nationally Extinct and 122 extant species. Of the extant species, 14 are of highest conservation importance because they are considered Critically Endangered and Very Rare. This paper supersedes previous checklists and conservation statuses. It will be a useful reference for anyone with an interest in Singapore dragonflies." (Authors)] Address: Ngiam, R.W.J., Nat. Biodiversity Centre, Nat. Parks Bd, Singapore Botanic Gardens, 1 Cluny Road, Singapore 259569, Republic of Singapore; Email: ngiam\_wen\_jiang@nparks.gov.sg

**16174.** Niederer, W.; Schmidt, B. (2016): Die Sibirische Winterlibelle *Sympecma paedisca* (Brauer, 1877) in Vorarlberg mit besonderer Berücksichtigung des Rheindeltas. *inatura – Forschung online*, Nr. 33: 11pp. (in German, with English summary) ["*S. paedisca*, an endangered damselfly is reported for Vorarlberg and its extension in Vorarlberg is shown. The nature reserve Rhine delta, a marsh and lowland moor habitat mosaic provides many different necessary reproduction sites and habitat structures. Also other rare dragonflies of marshes like *Sympetrum depressiusculum* were reported. Aspects of nature conversation are discussed." (Authors)] Address: Niederer, W., Im Wiesle 12, A-6974 Gaisau, Austria. E-Mail: walter.niederer@rheindelta.org

**16175.** Ning, X.; Kompier, T.; Yu, X.; Bu, W. (2016): *Paracercion ambiguum* sp. nov. from Lang Son, Vietnam (Zygoptera: Coenagrionidae). *Zootaxa* 4144(2): 263–275. (in English) ["One new species of *Paracercion* Weekers and Dumont, 2004 (*Paracercion ambiguum* Kompier & Yu, 2016, holotype ♂, Vietnam, Lang Son province, Huu Lien Nature Reserve, 1-XII-2013, deposited in Institute of Entomology, College of Life Sciences of Nankai University, Tianjin, China) is proposed on the basis of molecular and morphological evidence. A COI gene tree is presented for *Paracercion* species and several morphologically related genera. The species is described and illustrated for both sexes. Diagnostic figures of the genital ligula and caudal appendages are provided." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, Netherlands. E-mail: kompiertintokyo@yahoo.com

**16176.** Nishizawa, M.; Takada, M.; Watanabe, T.; Hirata, S.; Tanaka, Y.; Matsuura, Y.; Sakuma, D. (2016): List of natural history specimens and records in Minami-Sanriku, Miyagi prefecture during 2012-2014, collected by The Voluntary Biota Survey Group for Minami-Sanriku. *Shizenshi-Kenkyu, Occasional Papers from the Osaka Museum of Natural History* 3(16): 273-292. (in Japanese, with English summary) ["This is a set of records of natural history specimens, which were collected by the activity of The Voluntary Biota Survey Group for Minami-sanriku, during the period from 2012 to 2014 in Minami-sanriku cho, Miyagi prefecture, where was suffered severe Tsunami attack in 2011, and lost all the specimens in Shizugawa Nature Center. This newly collected specimens and records include many rare species occurrence found in surveys of some of the temporal environments formed right after the tsunami, and also many of the lost habitats in reconstruction processes." (Authors) *Ischnura asiatica*, *Coenagrionidae* sp., *Sympetma paedisca*, *Sieboldius albardae*, *Sympetrum frequens*, *S. infuscatum*] Address: Nishizawa, M., Osaka Museum of Natural History, Nagai Park 1-23, Higashi-sumiyoshi-ku, Osaka 546-0034, Japan. E-mail: nishizawa@mus-nh.city.osaka.jp

**16177.** Nituda, C.J.P.; Nuoeza, O.M. (2016): Diet Composition of two species of swiftlets from caves of Northern Mindanao, Philippines. *Bulletin of Environment, Pharmacology and Life Sciences* 5(5): 48-52. (in English) ["Caves serve as sanctuaries for birds especially swiftlets, the most common cave-dwelling birds. This study was conducted to determine and compare the diet composition of the two species of swiftlets, *Collocalia esculenta* and *Aerodramus vanikorensis*. Examination of the gut contents showed that the two bird species are generally insectivorous and the prey items consisted of insects under Orders Coleoptera, Hymenoptera, Diptera, and damselflies. There was no significant difference in the frequency of occurrence of the prey items between species since both species prefer the same prey items. However, percentage occurrence of the different prey items within the same species was significantly different ( $p < 0.05$ ). Coleopterans were the abundant prey items. The wide diversity of the diet of cave swiftlets suggests that these birds are not particularly selective in their diet and are more probably dependent on the available prey. Results indicate that swiftlets are good insect control agents. Collection of swiftlet nests inside caves appears to be a major threat to cave swiftlets." (Authors)] Address: Nuoeza, Olga, Dept of Biological Sciences, College Science & Mathematics, Mindanao State Univ. – Iligan, Institute of Technology, Iligan City, Philippines. E-mail: olgamuneza@yahoo.com

**16178.** Novelo-Gutiérrez, R.; Ramírez, A.; Delgado, D. (2016): The larvae of *Epigomphus jannyae* Belle, 1993 and *E. tumefactus* Calvert, 1903 (Insecta: Odonata: Gomphidae). *PeerJ* 4:e2338 <https://doi.org/10.7717/peerj.2338>: 13 pp. (in English) ["The taxonomic knowledge about immature stages of the insect order Odonata is rather limited in tropical America. Here, the larvae of *E. jannyae* and *E. tumefactus* Calvert, 1903 are described, figured, and compared with other described congeners. *E. jannyae* larva is characterized by 3rd antennomere 1.6 times longer than its widest part; ligula very poorly

developed, with ten short, truncate teeth on middle; apical lobe of labial palp rounded and smooth. Lateral margins on abdominal segments (S5–9) serrated, lateral spines on S6–9 small and divergent; male epiproct with a pair of dorsal tubercles at basal 0.66; tips of cerci and paraprocts strongly divergent. The larva of *E. tumefactus* is characterized by 3rd antennomere 2.3 times longer than its widest part, ligula with 6–7 truncate teeth, apical lobe of labial palp acute and finely serrate. Lateral margins of S6–9 serrate, lateral spines on S7–9; male epiproct with a pair of dorsal tubercles at basal 0.50. Differences with other species were found in 3rd antennomere, lateral spines of S7–9, and the caudal appendages. *Epigomphus* larvae inhabit small, shallow creeks (1st order streams) where they live in fine benthic sediments. When mature, the larva leaves the water in shady places, climbing small rocks at the water's edge and metamorphosing horizontally on flat rocks. These new descriptions bring the total number of *Epigomphus* species with known larval stages to eight; only 28% of the species in this genus are known as larva." (Authors)] Address: Novelo-Gutiérrez, R., Depto de Entom., Inst. de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: roldolfo.novelo@inecol.edu.mx

**16179.** Opaev, A.S.; Panov, E.N. (2016): Variations of space use in males of the banded demoiselle (*Calopteryx splendens*, Zygoptera, Odonata): Alternative tactics or an age-dependent trend? *Entomological Review* 96(5): 525-536. (in English) ["Two spatial tactics are usually distinguished in males of *Calopteryx* damselflies: territorial and nonterritorial. These tactics are believed to underlie two alternative condition-dependent reproductive tactics in these insects, and territorial males are believed to copulate more often. With age, males become weaker, turn nonterritorial, and only occasionally manage to copulate. However, the details of space use by damselflies are poorly known, which hinders the interpretation of the existing empirical data. We describe the space use by individually marked males of the banded demoiselle *C. splendens* studied during three field seasons in Vladimir Province, Russia. Each male on each day of observations was characterized as either territorial or non-territorial, and the sites of encounter were mapped. The probability of being territorial declined with the male's age. The spatial tactics (territorial vs. non-territorial) on a given day strongly influenced the tactics used on the following day. We identified the territorial and non-territorial phases in the life of a male damselfly, which occurred consecutively and had a roughly similar duration. During the territorial phase, the male occupied a certain territory and tried to hold it as long as possible. The male abandoned its territory in two cases: (1) when it was driven onto a different territory as the result of competition with other males, or (2) when it was exhausted and became non-territorial. Thus, the space use by the male changed predictably during its life. Therefore, direct comparison of morphological or other characteristics in territorial vs. non-territorial males, frequently made in the literature, makes little sense. Further progress in studying the so-called "alternative reproductive tactics" in damselflies may be more successfully achieved by comparing individual life trajectories

of different males (e.g. duration of territorial and non-territorial periods, the number of consecutively occupied territories, etc.). We performed correlation analysis and found that the above parameters did not depend on the wing and abdomen length of the males." (Authors) Original Russian Text © A.S. Opaev and E.N. Panov, 2016, published in *Zoologicheskii Zhurnal*, 2016, Vol. 95, No. 4, pp. 417–428.]

**16180.** Orr, A.G.; Kalkman, V.J. (2016): Two new species of *Papuagrion* Ris, 1913 (Odonata: Coenagrionidae) from New Guinea with a survey of distribution records for the genus. *Zootaxa* 4173(1): 18-28. (in English) ["Two new species of *Papuagrion* Ris, 1913 are described from Papua Province, Indonesia. These are *P. marirobi* sp. nov. from Japen Island and *P. stellimontanum* sp. nov., from the Star Mountains. The new species are, respectively, most closely allied to *P. degeneratum* Lieftinck and *P. digitiferum* Lieftinck. They bring the number of *Papuagrion* species to 28. New locality records of several other species are noted." (Authors)] Address: Orr, A.G., Environmental Futures Research Institute, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**16181.** Orr, A.G.; Dow, R.A. (2016): Description of larvae of two species of *Coeliccia* Selys, 1865 from Sarawak, identified using DNA barcoding (Odonata: Platycnemididae). *Odonatologica* 45(1/2): 117-131. (in English) ["The final stadium (F) larva of *Coeliccia flavostriata* Laidlaw, 1918, is described and illustrated based on a mature male specimen, collected at Gunung Serapi, Sarawak, East Malaysia. The larva of *Coeliccia campioni* Laidlaw, 1918, is described from an immature (F-2?) female specimen from Gunung Mulu, Sarawak, East Malaysia. Larvae were identified by matching the mitochondrial marker COI with that of known adult specimens from several localities throughout Sarawak. The specimens presented close matches with all adults in this gene. Despite the disparity in maturity of the specimens several morphological differences, likely to be reflected in the mature larva of *C. campioni*, are identified. Comparisons with known larval descriptions of other *Coeliccia* species are provided. It is concluded that molecular analysis will eventually provide the most reliable practical method of determining the species of larvae of many species from this diverse genus." (Authors)] Address: Orr, A.G., Coop. Research Centre for Tropical Rainforest Ecol. & Management, Environmental Sciences, Griffith Univ., Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**16182.** Ott, J. (2016): Der Kalikokrebs (*Orconectes immunis* (HAGEN, 1870) - eine gravierende Bedrohung für FFH-Libellen- und Amphibien-Arten in der Rheinaue (Crustacea: Decapoda: Cambaridae). *Fauna Flora Rheinland-Pfalz* 13(2): 495-504. (in German, with English summary) ["*O. immunis* – a threat to species of the EC Habitats Directive and to aquatic biotopes of the River Rhine flood plains. The author reports new localities of the invasive calico crayfish in monitoring sites of dragonflies listed in the EC Habitats Directive near Rheinzabern and Sondernheim. Also he reports other localities, where the species was found, as well as of other invasive crayfish-species (signal crayfish and spinycheek crayfish). Because of the negative ecological impact of these

invasive species, in particular of the calico crayfish, on the biocoenosis of aquatic biotopes (amphibians, molluscs, caddisflies, dragonflies) and its high mobility and dispersal power information on the actual range of the species and management measurements for still by the species unimpacted water are demanded." (Authors)] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**16183.** Ott, J. (2016): Ungewöhnlich später Schlupf der Blaugrünen Mosaikjungfer bei Trippstadt / Pfalz. *Polichia Kurier* 32(3): 16-17. (in German) [Late emergence of *Aeshna cyanea* near Trippstadt, Rheinland-Pfalz, Germany, 8. Oktober 2015] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**16184.** Painkra, N.; Shukla, A.; Rai, S. 3 (2016): Diversity of environmental health markers Odonata and Lepidoptera in Gwarighat region of River Narmada, Jabalpur (M.P.) India. *International Journal of Research - Granthaalayah* 4(4): 124-136. (in English) ["River Narmada is the fifth largest westwards flowing river of India. Biodiversity protection and conservation is a national and international agenda and responsible for sustainable development of a region or a country and secondly Lepidoptera and Odonata are potential bio control agents of many invertebrates. Lepidoptera and Odonata assemblage along with river Narmada bank of Gwarighat region in Jabalpur has been investigated. A total of 41 species have been distributed in two orders Odonata with 22 species and Lepidoptera with 19 species were sampled. Libellulidae with 9 species under order Odonata and Nymphalidae with 9 species under Lepidoptera are the most dominating families while others have fewer representatives. Mostly organisms were aggregated due to habitat specific nature and random distribution indicates availability of resource utilization to survive but, in the urban forest area, high anthropogenic disturbances were observed which creates high biotic pressure on forest. A detailed list of Odonata and Lepidoptera recorded from urban forest area is presented." (Authors)] Address: Painkra, Neelima, Dept Zool., Govt. Model Scien. Coll., Jabalpur (M.P.), India

**16185.** Parr, A.J. (2016): Species Review 10: *Chalcolestes viridis* (Vander Linden), the Willow Emerald Damselfly. *Journal of the British Dragonfly Society* 32(2): 93. (in English) ["*C. viridis* is a recent colonist to southeast England, having appeared within the last decade. This damselfly is seemingly flourishing and is steadily expanding its breeding range in the UK. The background to its colonisation of Britain is discussed, along with details of the species' biology, behaviour and current distribution." (Authors)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk, IP29 5BX, UK

**16186.** Parr, A.J. (2016): Migrant and dispersive dragonflies in Britain during 2015. *Journal of the British Dragonfly Society* 32(2): 49-59. ["Like many of its immediate predecessors, the year 2015 was an eventful one for migrant dragonflies in Britain. During June/July there were large-scale immigrations of *Sympetrum fonscolombii*, with records as far north as east Lothian in Scotland. Later in the summer, four *Aeshna* affinis were unexpectedly recorded away from the recently-



established breeding population around the greater Thames Estuary, presumably as a result of fresh immigration. These sightings mostly involved southern counties (Cornwall, Sussex and Suffolk) but included a female in Lancashire. In addition to these highlights, other notable events included the first sightings of *Sympetrum flaveolum* for several years and further autumn appearances of *Anax ephippiger*. An intriguing series of dragonfly sightings over the Christmas period (unfortunately not all well-documented) probably also refer to migrants. In addition to this news relating to primary immigration, significant developments also affected several of our recent colonist species. Both *Erythromma viridulum* and, more especially, *Chalcolestes viridis* thus showed continuing range expansion. While *Lestes barbarus* and *Coenagrion scitulum* seem not to be spreading at present, their recently-established populations do appear stable. Continued monitoring of all of our recent colonist species would seem desirable." (Authors)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk, IP29 5BX, UK

**16187.** Patel, F.; Solanki, D.; Mehta, D.; Shukla, A.; (2016): Diversity of damselfly (Suborder-Zygoptera) in the Victoria Park, reserved forest, Bhavnagar, Gujarat, India. *Journal of Entomology and Zoology Studies* 4(4): 692-965. (in English) ["... Pervasive ecological importance of this charming group of insects makes them valuable to assess disturbance or environmental impact of various kinds in the ecosystem. The central theme of this study is to assay diversity of damselflies in the Victoria Park reserve forest, Bhavnagar city, Gujarat. (21°44'48" N 72°7'54" E) It is a favorable habitat for diversity of damselflies. The seasonal investigation carried out during the period of two years, particularly in monsoon season, 2014 to 2015. During this study total 10 species of damselflies belonging to 3 families and 7 genera were identified and recorded. It is observed that out of the total 10 species, 30% species belongs to genus *Ischnura*, 20% species of genus *Ceriagrion*, while genera like *Agriocnemis*, *Pseudagrion*, *Enallagma*, *Disparoneura*, *Lestes*, each constituting 10% Part. Maximum numbers of diversity were observed during August and September." (Authors)] Address: Patel, Foram, Zoology Department, Sir P.P, Institute of Science, Bhavnagar, Gujarat, India.

**16188.** Patil, S.R.; Chandra, K.; Bhandari, R.; Talmale, S.S. (2016): Predatory encounters between Orb-Weaver Spiders of genus *Neoscona* Simon, 1864 (Araneae: Araneidae) and some odonates: a case study from Nauradehi Wildlife Sanctuary, Madhya Pradesh, India. *The Indian Forester* 142(11): 1135-1139. (in English) ["Prey and predator encounters are significant for studying predation behaviour of Orb-weaver spiders with reference to flying insects. Predatory encounters are studied between five species of Odonates (prey) and two species of Orb-weaver spiders (predator) of Genus *Neoscona* belonging to family Araneidae based on four observations naturally occurred in the Nauradehi Wildlife Sanctuary, Madhya Pradesh, India during years 2012 and 2013 as different events. Factors involving behaviours of Orb-weaver spider and Odonate have influenced these predatory encounters." (Authors)] Address: Patil, S.R., Zoological Survey of India, Central Zone Regional Centre, Jabalpur (Madhya Pradesh), India

**16189.** Pavlova, A., Bechev, D. (2016): Faunistic diversity of Vrachanski Balkan Nature Park. *ZooNotes*, Supplement 3: 77-78. (in English, with Bulgarian summary) ["Till now, 8 species of dragonflies are found in Vrachanska Planina Mountains. All data presented here are from Bulgarian Odonata database." (Authors)] Address: Pavlova, Ameliya, Dept of Zoology, University of Plovdiv, 24, Tsar Assen Str., 4000 Plovdiv, Bulgaria. E-mail: aneliapav@abv.bg

**16190.** Payra, A.; Dash, S.K.; Mishra, A.K.; Palei, H.S., Mishra, R.K.; Rout, S.D. (2016): A preliminary study on Odonata diversity in Athagarh forest division, Odisha, India. *e-planet* 12(2): 43-49 (July 2014) *Forest Division* 43: 43-49. (in English) ["The objective of the present study is to explore the diversity of Odonata in Athagarh Forest Division, Odisha. Odonates were studied from January 2015 to March 2015. In this survey a total of 56 species of odonates were recorded, including 31 species of Anisoptera belonging to 3 families and 25 species of Zygoptera belonging to 5 families. Among these species, Libellulidae and Coenagrionidae were the dominant families with maximum number of species being 26 and 17 respectively." (Authors)] Address: Payra, P.G., Dept of Wildlife & Biodiversity Conservation, North Orissa Univ., Takatpur 757 003, Odisha, India. E-mail: arajushpayra@gmail.com

**16191.** Payra, A.; Tiple, A.D. (2016): Notes on the occurrence of *Mortonagrion aborense* Laidlaw, 1914 (Odonata: Coenagrionidae) from lower West Bengal, India. *Journal of Threatened Taxa* 8(7): 9038-9041. (in English) ["A new distribution record of an Odonata species from lower West Bengal. *M. aborense* is recorded for the first time from Purba Medinipur district, lower West Bengal. Previously the species was recorded only from north-east India (Mizoram, West Bengal, Assam and Nagaland). Diagnostic characters with photogra identification of this rare damselfly species." (Authors)] Address: Payra, A., P.G. Dept Wildlife & Biodiv. Conservation, North Orissa Univ., Sri Ram Chandra Vihar, Takatpur, Odisha 757003, India. E-mail: arajushpayra@gmail.com

**16192.** Perez-Gelabert, D.E.; Suriel, F.A. (2016): Primer registro de acaros acuaticos (*Arrenurus* sp.) como ectoparasitos de odonatos en La Hispaniola. *Novitates Caribaeae* 10: 96-99. (in Spanish, with English summary) ["First record of water mites (*Arrenurus* sp.) as ectoparasites of Odonata in Hispaniola. Water mites of the genus *Arrenurus* Dugès odonates in the Dominican Republic and Hispaniola. The report is based on a single individual *Telebasis dominicana* (Selys, 1857) parasitized by multiple individuals of the water mite *Arrenurus* sp." (Authors)] Address: Perez-Gelabert, D.E., Integrated Taxonomic Inform. System (ITIS) & Dept Entom., National Museum of Natural History, Smithsonian Inst., P.O. Box 37012, Washington, DC 20013-7012, USA. perezd@si.edu

**16193.** Phan, Q.T.; Kompier, T. (2016): Description of two new species of *Coelliccia* from Vietnam (Odonata: Platycnemididae). *Zootaxa* 4196(3): 407-414. (in English) ["*Coelliccia hayashii* sp. nov. (holotype ♂, from Doi waterfall, KaNat, K'Bang district, Gia Lai Province, central Vietnam, deposited in VNMN) and *Coelliccia mattii* sp. nov. (holotype ♂ and

♀ allotype, from Doi Cao, Loc Tan, Bao Lam district, Lam Dong Province, southern Vietnam, deposited in VNMN) are described. The males of both species are characterized by extensive pruinosity on the thorax." (Authors)] Address: Phan, Q.T., Entomology & Parasitology Lab., Center for Molecular Biology, Inst. Res. & Develop., Duy Tan Univ., K7/25 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

**16194.** Pickess, B.P. (2016): *Lestes sponsa* (Hansemann) (Emerald Damselfly) and mixed couplings. *Journal of the British Dragonfly Society* 32(1): 39-43. (in English) ["Details are given of the records involving mixed coupling between male *Lestes sponsa* with six different species of Zygoptera in the UK from 2010 to 2015. A total of 11 couplings are recorded, one with another species of *Lestes*, the other 10 with species from other families - four with single females, three with males and three with pairs. As to why this behaviour occurs is still unclear. Possible reasons for it are discussed." (Authors)] Address: Pickess, B.P., 8 Shaw Drive, Sandford, Wareham, Dorset. BH20 7BT, UK

**16195.** Pitcher, K.A.; Soluk, D.A. (2016): Inter-patch connectivity and intra-patch structure differentially alter prey consumption by multiple predators. *Ecosphere* 7(11) Article e01598: 14 pp. (in English) ["Structural habitat complexity (SHC) and functional habitat connectivity (FHC) have important effects on predator-prey interactions and exert a strong influence on community structure/dynamics in terrestrial and aquatic ecosystems. Although these factors vary simultaneously in most systems, their interactive effects are poorly understood. Using artificial pond mesocosms and multiple prey types, we manipulated plant density (SHC: low, high) and inter-patch distance (FHC: short, long) in a full factorial design to test for potential interactive effects of these factors on competition and predation by a dragonfly larva (*Anax junius*) and fish predator (*Lepomis cyanellus*). When inter-patch distances (FHC) were short, *A. junius* consumed more amphipods ( $36\% \pm 4.6\%$ ) compared with long treatments ( $19\% \pm 4.8\%$ ). We detected no significant effects of plant density (SHC) on prey consumption by *A. junius*. There were significant interactive effects of FHC and SHC on *L. cyanellus* consumption of amphipods and damselflies. The most counterintuitive of these effects was that sunfish consumed more larval damselflies at high plant density ( $64\% \pm 6.0\%$ ) than at low plant density ( $38\% \pm 8.6\%$ ) but only in short connection treatments. This interactive effect of SHC and FHC on damselfly predation by *L. cyanellus* was likely because damselflies exhibited riskier behaviour at higher SHC. Prey consumption with both predators present was additive, but no significant effect of either SHC or FHC on interspecific predation was detected, suggesting compensatory foraging responses. Structural habitat complexity and FHC interactively influence predator foraging behaviour in complex, non-intuitive ways that are highly dependent on the predator/prey combination in question. Structural habitat complexity and FHC are currently being influenced by anthropogenic factors in multiple ways (e.g., habitat loss, global climate change), and being able to predict the responses of biotic communities to these changes should be an important consideration in restoration and conservation efforts."

(Authors)] Address: Pitcher, K.A., Dept of Biology, University of South Dakota, 414 E. Clark Street, Vermillion, South Dakota 57069 USA. E-mail: kristopher.pitcher@usd.edu

**16196.** Poliak, T.N. (2016): Population status of the endemic San Francisco damselfly (*Ischnura gemina*). M.Sc. thesis, Biology: Conservation Biology, San Francisco State University: IX + 64 pp. (in English) ["*I. gemina* is endemic to the San Francisco Bay area, and is identified by the International Union for Conservation of Nature as a vulnerable species. Research from the late 1970s through the 1990s indicates a decline in the species' populations. This study completes a comprehensive survey for *I. gemina*, and the closely related species *I. denticollis*, to determine the status of both species in areas previously surveyed. The study also seeks to determine the extent that various habitat variables, such as water chemistry and vegetation structure, predict the presence of *I. gemina*. Data from this study show a dramatic decline in populations of *I. gemina* since the 1980s and 1990s. In addition, results from this study indicate that *I. gemina* persists in sites with cooler temperatures and lower salinity than do other ischnuran or coenagrionid species. Finally, this study considers past research related to species conservation in light of climate change, and assesses the long-term viability of *I. gemina* under climate change. Of key interest is the tolerance for *I. gemina* under increasing temperatures and sea level rise. The goal for this research is to provide information on the current status of *I. gemina* and recommendations for its long-term conservation." (Author)] Address: not stated

**16197.** Popova, O.N.; Haritonov, A.Yu.; Anishchenko, O.V.; Gladyshev, M.I. (2016): Export of biomass and metals from aquatic to terrestrial ecosystems via the emergence of dragonflies (Insecta: Odonata). *Contemporary Problems of Ecology* 9(4): 458-473. (in English) ["Long-term monitoring of the abundance and spatial distribution of 18 widespread species of Odonata has made it possible to assess their contribution to the export of aquatic productivity that entered the Barabinsk forest-steppe ecosystem. The annual emergence of Odonata varies from 0.8 to 4.9 g/m<sup>2</sup> of the land area and from 2.3 to 13.3 g/m<sup>2</sup> of the water area, which is 4–5 times larger than that in Diptera. The total flux of organic matter from water to terrestrial ecosystems remains relatively stable (sixfold inter-annual variability) irrespective of large interannual variations in the abundance of separate species (e.g., 42-fold interannual variability in *Libellula quadrimaculata*). The metal content was determined in nine Odonata species. Export of metals by dragonflies decreases in the series  $K > Na > Mg > Ca > Fe > Zn > Cu > Mn > Pb > Ni > Cr > Cd$ . Therefore, odonates appear to be quantitatively and qualitatively important providers of aquatic resources to the forest-steppe landscape of Western Siberia." (Authors)] Address: Popova, O.N., Institut Sistematiki i Zkologii Zhivotnykh, 630091 Novosibirsk, Ul. Frunse 11, Russia. E-mail: popova.olga.nik@gmail.com

**16198.** Popova, O.N.; Eremina, E.E. (2016): *Sympetrum fonscolombii* (Selys, 1840) (Odonata, Libellulidae) in northernmost areal localities in Chelyabinskaya and Novosibirskaya Oblast's of Russia. *Eurasien Entomological Journal* 15(1):

45-59. (in Russian, with English summary) ["A migrant dragonfly species, *S. fonscolombii*, was recorded in 2010 in the South Urals and in 2013 in West Siberia in the most northern and northeastern localities where emergence of the summer generation was registered. Development of preimaginal stages was elapsed in optional or obligatory temporary water reservoirs. Single specimens and hemi-populations of imago of *S. fonscolombii* found in the region are considered to be in transit (trans-latitude migration). The detailed characteristics of the habitats of *S. fonscolombii* in the southern Urals and West Siberia are given, species composition of dragonfly complexes is characterized." (Authors)] Address: Popova, Olga, Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk 639991, Russia. E-mail: popova-2012@yandex.ru.

**16199.** Pratama, S.S.; Rosalini, R.A. (2016): Dragonflies Inventory (Odonata) in Kota Waringin Village, Puding Besar District – Bangka Island. *Biovalentia* 2(2): 23-32. (in English) ["Odonata is considered an environmental indicator group of freshwater habitats. Thus there is a need to have a good baseline data to use it for monitoring fluvial habitats. However, species composition of Odonata in Kota Waringin Village is poorly known. This study aims to determine the diversity of dragonfly species in the Kota Waringin Village, Puding Besar District – Bangka Island. Data were collected at Three different ecosystems in Kota Waringin Village area (River in Forest, River in oil palm plantations and yard). Location for data collection based on the availability of water resources using purposive sampling method. The species were identified using identification books (Dragonfly of Singapore and Australian Dragonfly). Based on research we revealed 13 species of dragonflies are exist in three sampling locations (*Agrionoptera insignis*, *Brachydiplax chalybea*, *Heliaeschna crassa*, *Ictinogomphus decoratus melaenops*, *Nannophya pygmaea*, *Neurothemis fluctuans*, *N. ramburii*, *N. terminata*, *Orthetrum chrysis*, *O. sabina*, *Rhodothemis rufa*, *Zygomma petiolatum* and *Rhyothemis phyllis*]" (Authors)] Address: Rosalini, R.A., Biology Dept, State Univ. of Jakarta, Indonesia

**16200.** Priyadarshana, T.S.; Wijewardhane, I.H.; Herath, B.E. (2016): Three new species of the genus *Ceylonosticta* Fraser, 1931 (Odonata: Zygoptera: Platystictidae) from Sri Lanka and the rediscovery of *Ceylonosticta subtropica* (Fraser, 1933). *International Journal of Odonatology* 19(4): 239-252. (in English) ["Three new species of *Ceylonosticta* are described and illustrated: *Ceylonosticta nancyae* sp. nov., *Ceylonosticta rupa-singhe* sp. nov. and *Ceylonosticta alwisi* sp. nov. from Samanala Nature Reserve (Adam's Peak), Kuruwita-Erathna footpath, Ratnapura District, Sri Lanka. *Ceylonosticta subtropica* has been recorded for the first time after 83 years and the first depiction of its genital ligula is provided." (Authors)] Address: Priyadarshana, T.S., Nature Explorations and Education Team, De Soysapura, Moratuwa, Sri Lanka

**16201.** Prokop, J.; Pecharová, M.; Nel, A. (2016): New Cenozoic dragonflies from the Most Basin and Stredohori Complex volcanic area (Czech Republic, Germany). *Journal of Natural History* 50(37-38): 2311-2326. (in English) ["Discovery

of new dragonflies from Oligocene and Miocene deposits of the Most Basin and Český Stredohori Complex volcanic area in northern Bohemia and Saxony (Germany) is reported. *Aeshna zlatkovaceki* sp. nov. is the first described dragonfly from early Miocene salmon-pink baked clays of Želénky near Duchcov. Its fore wing venation pattern seems to be closely related to that of *A. turoliana* Riou and Nel, 1995, known from late Miocene of La Montagne d'Andance in Ardèche, France, and *Aeshna solida* Scudder, 1890, known from late Eocene of Florissant in Colorado, USA. A new occurrence of a libellulid dragonfly ?*Onychothemis rihai* in the Libkovice Member of Most Basin confirms the links to the Cypris Formation in Sokolov and Cheb basins reflecting similar habitats as was already shown on the basis of reconstructed palaeovegetation and shared thermophilous and accessory floristic elements. Other fragmentary fossil material from different localities are discussed." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**16202.** Prunier, F.; Brochard, C. (2016): A 1966 Iberian record of *Orthetrum trinacria*. *Boletín Rola* 8: 23-28. (in English, with Spanish summary) ["Whilst working on the collections of P-A. Robert, one of the authors (CB) discovered a larval specimen that proved to be *O. trinacria*. This specimen was originally collected in 1966 and pre-dates the rediscovery of this species in Europe from Sardinia by six years. The paper also discusses the early records from Iberia and speculates on the possible reasons of its range expansion." (Author)] Address: Prunier, F., Red de Observadores de Libélulas en Andalucía (ROLA), Córdoba, Spain. E-mail: aeaalbosqueanimado.info@gmail.com

**16203.** Rachman, H.T.; Rohman, A. (2016): Dragonflies diversity (Odonata) in Menoreh Karst Central Java - Yogyakarta. *Int'l Journal of Advances in Agricultural & Environmental Engg. (IJAAEE)* 3(2): 255-258. (in English) ["This study aims to determine the diversity of dragonfly species and diversity index of dragonfly species due to tourism in the Menoreh Karst Central Java – Yogyakarta. Data were collected at three Banyu Mudal Waterfall and Anjani Waterfall ). Location for data collection based on the availability of water resources using purposive sampling method. The species were identified using identification books (Dragonfly of Singapore and Australian Dragonfly). The diversity index is analyzed using Shannon - Weinner diversity index. Based on research we revealed 11 species of dragonflies are exist in three sampling locations (*Leptogomphus lansbergei*, *Orthetrum sabina*, *Pantala flavescens*, *Diplacodes trivialis* and *Potamarcha congener*, *Euphaea variegata*, *Nososticta insignis*, *Drepanosticta sundana*, *D. gazella*, *Vestalis luctosa* and *Coellicia membranipes*). 7 species are vulnerable to water pollution. 3 species are endemic to Javan Island." (Authors)] Address: Rachman, H.T., Dept of Biology Education, Faculty of Mathematics & Science, Yogyakarta State University, Indonesia

**16204.** Rajabi, H.; Shafiei, A.; Darvizeh, A.; Gorb, S.N. (2016): Resilin microjoints: a smart design strategy to avoid failure in dragonfly wings. *Scientific Reports* 6:39039 DOI:



10.1038/srep39039: 5 pp. (in English) ["Dragonflies are fast and manoeuvrable fliers and this ability is reflected in their unique wing morphology. Due to the specific lightweight structure, with the crossing veins joined by rubber-like resilin patches, wings possess strong deformability but can resist high forces and large deformations during aerial collisions. The computational results demonstrate the strong influence of resilin-containing vein joints on the stress distribution within the wing. The presence of flexible resilin in the contact region of the veins prevents excessive bending of the cross veins and significantly reduces the stress concentration in the joint." (Authors)] Address: Rajabi, H., Inst. of Zoology, Functional Morphology & Biomechanics, Christian-Albrechts-University, Kiel, Germany. E-mail: ed.leik-inu.eigolooz@ibajarh

**16205.** Rasmussen, N.L.; Rudolf, V.H.W. (2016): Individual and combined effects of two types of phenological shifts on predator-prey interactions. *Ecology* 97(12): 3414-3421. (in English) ["Timing of phenological events varies among years with natural variation in environmental conditions and is also shifting in response to climate change. These phenological shifts likely have many effects on species interactions. Most research on the ecological consequences of phenological shifts has focused on variation in simple metrics such as phenological firsts. However, for a population, a phenological event exhibits a temporal distribution with many attributes that can vary (e.g., mean, variance, skewness), each of which likely has distinct effects on interactions. In this study, we manipulated two attributes of the phenological distribution of a prey species to determine their individual and combined effects on predator-prey interactions. Specifically, we studied how shifts in the mean and variation around the mean (i.e., synchrony) of hatching by tadpoles (*Hyla cinerea*) affected interactions with predatory dragonfly naiads (*Tamea carolina*). At the end of larval development, we quantified survival and growth of predator and prey. We found that both types of shifts altered demographic rates of the prey; that the effects of synchrony shifts, though rarely studied, were at least as strong as those due to mean shifts; and that the combined effects of shifts in synchrony and mean were additive rather than synergistic. By dissecting the roles of two types of shifts, this study represents a significant step toward a comprehensive understanding of the complex effects of phenological shifts on species interactions. Embracing this complexity is critical for predicting how climate change will alter community dynamics." (Authors)] Address: Rasmussen, N.L., Dept Entomology & Nematology, Univ. California, Davis, California 95616 USA. E-mail: solifugae@gmail.com

**16206.** Rathod, D.; Patel, J.R.; Mistry, V.S.; Parasharya, B.M.; Talmale, S.S. (2016): Odonate diversity of Dang forest, a western Ghat extension of Gujarat, India. *Advances in Life Sciences* 5(12): 5377-5385. (in English) ["Odonate diversity was surveyed in Dang forest, a Western Ghats extension of Gujarat, India during 2014 and 2015. Total 55 species belonging to two suborders, 37 genera under eight families were recorded. 19 species of Zygoptera and 36 species of Anisoptera were recorded. Three species namely, *Potamarcha congener*, *Rhyothemis variegata* and *Tamea basilaris* were previously not reported from Dang district and two species i.e. *Enallagma*

*parvum* and *Aethriamanta brevipennis* were not reported earlier from Dang forest. Hence, now checklist of the odonate of Dang forest reaches to 58 species and South Gujarat is raised to 62 species." (Authors)] Address: Rathod, D., 4AINP on Agricultural Ornithology, Anand Agricul. Univ., Anand- 388 110, Gujarat, India. E-mail: darshanarathod500@gmail.com

**16207.** Rathod, D.M.; Dholu, S.G.; Parasharya, B.M.; Mistry, V. (2016): Odonate diversity of a wetland of national importance - Pariej. *Jalaplavit* 6(3): 6-15. (in English) ["Odonate diversity was investigated at Pariej wetland of Gujarat during 2014 to 2015. Total 29 species belonging to five families and 22 genera were recorded. Total 9 species of Zygoptera and 19 species of Anisoptera were recorded. Twelve species were common, 13 were uncommon and 4 were rare." (Authors)] Address: Rathod, Darshana, AINP on Agricultural Ornithology, Anand Agricultural University, Anand-388110, Gujarat, India. E-mail: darshanarathod500@gmail.com

**16208.** Rathod, D.M.; Parasharya, B.M.; Talmale, S.S. (2016): Odonata (Insecta) diversity of southern Gujarat, India. *Journal of Threatened Taxa* 8(11): 9339-9349. (in English) ["The diversity of the Odonata (dragonflies and damselflies) was studied in seven districts of southern area of Gujarat State in India during 2014 to 2015. A total of 55 species belonging to two suborders and 37 genera under eight families were recorded. A total of 18 species of Zygoptera (damselflies) and 37 species of Anisoptera (dragonflies) were recorded. Dang and Navsari districts were surveyed intensively and a maximum of 47 and 35 species were recorded respectively, whereas the districts that were surveyed less intensively, i.e., Bharuch (26), Valsad (21), Surat (29), Narmada (25) and Tapi (27) had comparatively low species richness. Thirty-two species are being reported for the first time from southern Gujarat, raising the total list of odonates to 60. 15 species namely, *Lestes elatus*; *Elattonura nigerrima*; *Dysphaea ethela*; *Paracercion malayanum*; *Pseudagrion spencei*; *Burmagomphus laidlawi*; *Cyclogomphus ypsilon*; *Microgomphus torquatus*; *Onychogomphus acinaces*; *Hylaeothemis indica*; *Lathrecista*; *Rhodothemis rufa*; *Tamea limbata*; *Trithemis kirbyi* and *Zyxomma petiolatum* are recorded for the first time from Gujarat State raising the number of odonates of Gujarat State to 80 species." (Authors)] Address: Rathod, Darshana, AINP on Agricultural Ornithology, Anand Agricultural University, Anand, Gujarat 388110, India. E-mail: darshanarathod500@gmail.com

**16209.** Remmers, W.; Gameiro, J.; Schaberl, I.; Clausnitzer, V. (2016): Elephant (*Loxodonta africana*) footprints as habitat for aquatic macroinvertebrate communities in Kibale National Park, south-west Uganda. *African journal of ecology* 55(3): 342-351. (in English) ["This is the first study where elephant footprints as habitat for aquatic macroinvertebrate communities were assessed. Preliminary observations during the dry season in Kibale Forest, Uganda, indicated that water-filled footprints constituted the majority of stagnant ponds. Consequently, this study aimed at giving an overview of the diversity and ecology of those habitats and the capacity of elephants as ecosystem engineers. The fauna and abiotic factors (age, size, substrate, organic matter, pH,

canopy cover, temperature, conductivity) of 30 water-filled natural elephant footprints were sampled, resulting in the record of 61 morphospecies among 27 families/orders. Species composition was dominated by Hydrophilidae and Dytiscidae and influenced by environmental variables, such as age and organic matter. To study the colonization process, 18 artificial footprints were created within different distances from the water source. After 5 days, 410 specimens were collected, with higher species richness in artificial footprints closer to a natural water source. We conclude that colonization of water-filled footprints is fast, they constitute important habitats with high diversity and variability, and they act as stepping stones for dispersal and add to the ability of elephants as ecosystem engineers. We emphasize the importance of elephants as a key species in ecosystem dynamics and conservation practice." (Authors) Tetrathemis sp., Coenagrionidae, Hadrothemis coacta] Address: Remmers, W., University of Koblenz-Landau, Universitätsstr. 1, 56070 Koblenz, Germany. E-mail: wremmers@uni-koblenz.de

**16210.** Renner, S.; Sahlén, G.; Périco, E. (2016): List of Odonates from the Floresta Nacional de São Francisco de Paula (FLONA - SFP), with two new distribution records for Rio Grande do Sul, Brazil. *Biota Neotrop.* 16(3) e20150132: 7 pp. (in English, with Portuguese summary) ["A survey of Odonata was carried out in the National Forest FLONA - SFP, Northeastern region of the Rio Grande do Sul state, Brazil. This conservation unit is mainly covered by Mixed Ombrophilous Forest (MOF), a subtype of Atlantic Forest biome, being also areas covered in planted Pinus, planted Araucaria and open fields. Our sampling efforts were conducted in thirty aquatic environments inside this reserve during the period between January 2014 and November 2014. The sampling sites were selected randomly, comprehending lakes, bogs, small streams and river sections, all inserted in the four vegetation types occurring in the reserve. 64 species of Odonata were collected and grouped into 23 genera and seven families. The dominant families were Coenagrionidae (32%), Libellulidae (32%), Aeshnidae (12%), and Calopterygidae and Lestidae (9%). As expected, the findings revealed the presence of a highly diverse Odonate assemblage, mainly represented by generalist species in the most human disturbed sectors (Pinus and Open fields) and some specialist species in the pristine forest. Two species were registered for the first time in the state of Rio Grande do Sul, Brazil: *Libellula herculea* Karsch, 1889 (Libellulidae) and *Heteragrion luizfelipei* Machado, 2006 (Heteragrionidae)."] (Authors)] Address: Renner, S., Centro Univer. Univates, Rua Avelino Tallini, 171, Lab. Evolução e Ecol., sala 104, Prédio 8, 95900-000, Lajeado, RS, Brazil

**16211.** Reznickova, P.; Petrovajová, V.; Nerudová, J.; Hadašová, L.; Kopp, R. (2016): The colonization of newly built fishponds by the macroinvertebrate assemblages. *Acta Universitatis Agric. Silv. Mendelianae Brun.* 64(1): 141-149. (in English) ["The succession of standing waters by aquatic macroinvertebrates is a present and insufficiently surveyed topic. This study is addressed to the issue of colonisation of newly created small standing waters. Two fishponds situated in the north of Moravia (Czech Republic) were studied. The aim of this study

was to determine the character and colonisation rate of these ponds by macroinvertebrates, to evaluate the abundance, taxonomic composition and changes in composition of freshwater assemblages as a result of the fish stock influence. Basic abiotic parameters were also measured within the sampling occasions (e.g. water temperature, dissolved oxygen, conductivity, pH, total nitrogen and phosphorus concentrations). Samples of aquatic macroinvertebrates were taken monthly during the years 2012 and 2013, by kick sampling method using the hand net. The character of sampled fishponds was very similar, environmental parameters (e.g. area, substrate, depth etc.) were comparable. The colonisation of both fishponds was very fast. The pioneer colonists were mainly insect larvae (e.g. chironomids). Very low numbers of macroinvertebrates as a result of fish stock influence were recorded on both sites during the observation with the highest abundances in summer season." (Authors)] Address: Reznicková, Ravla, Dept of Zoology, Fisheries, Hydrobiology and Apiculture, Faculty of AgriSciences, Mendel University in Brno, Zemedelská 1, 613 00 Brno, Czech Republic

**16212.** Rivas, M.; Martinez-Meyer, E.; Munoz, J.; Cordoba-Aquilar, A. (2016): Body temperature regulation is associated with climatic and geographical variables but not wing pigmentation in two rubyspot damselflies (Odonata: Calopterygidae). *Physiological Entomology* 41(2): 132-142. (in English) ["It has been proposed that wing pigmented spots function in temperature control in male calopterygids. Using two rubyspot species *Hetaerina americana* and *H. vulnerata*, the present study investigated whether (i) wing spot size and colour-modified aspect can predict temperature gain after a cooling event; (ii) wing spot size is related to the temperature needed to fly and how long it takes to initiate flight; and (iii) wing spot size is related to seasonality and altitude. The results obtained do not support any of these relationships. The results also indicate that *H. vulnerata* can achieve flight at 8 Å °C less than *H. americana*. The present study further investigates whether the species differ in their latitudinal and geographical distribution, and respond differently to bioclimatic variables. The results obtained provide support for this particular hypothesis, showing that *H. vulnerata* inhabits higher altitudes, and is able to tolerate colder environments compared with *H. americana*. Wing spots in the two *Hetaerina* species do not help in thermoregulation, although both species show different temperature control abilities. This difference in thermoregulatory ability may enable the species to colonize different environments and reduce interspecific competition." (Authors)] Address: Rivas, M., Depto de Ecología Evolutiva, Instituto de Ecología, Univ. Nacional Autónoma de México, México, DF, México,

**16213.** Rivera-De la Parra, L.; Sarma, S.S.S.; Nandini, S. (2016): Changes in prey preferences of dragonfly naiads of *Rhionaeschna multicolour* (Hagen, 1861) (Odonata: Aeshnidae) in the presence and the absence of macrophytes. *Aquatic insects* 37(3): 241-252. (in English) ["We offered prey consisting of the rotifers, cladocerans, copepods, amphipods, dipterans and ephemeropterans to the pre-starved and sorted in three size groups of naiads of *R. multicolour* in the presence

of the macrophyte *Egeria densa* Planchon and without it. The naiads consumed up to 25 prey items or in terms of biomass (wet weight) up to 7 mg within 2 h. Biomass intake increased with increasing predator's size. Prey consumption was significantly lower in presence of plants. The cladocerans *Ceriodaphnia dubia* Rihcard, 1894, *Daphnia mendotae* (Taylor & Hebert, 1993) and *Ilyocryptus* sp. were consistently preferred by the dragonfly naiads while *Simocephalus vetulus* (Müller, 1776), *Alona guttata* Sars, 1862 and *Scapholeberis kingi* Sars, 1888 were avoided with and without macrophytes. This study suggests that dragonfly naiads structure the zooplankton community by selective feeding." (Authors)] Address: Sama, S.S.S., Laboratorio de Zoología Acuática, División de Investigación y Posgrado, Univ. Nacional Autónoma de México, Campus Iztacala, Tlalnepantla, México. E-mail: sama@unam.mx

**16214.** Rodrigues, M.E.; Koroiva, R.; Ragalzi-da-Silva, E.; Batista de Moura, E. (2016): *Mecistogaster linearis* (Fabricius) (Odonata: Coenagrionidae): First Record from Mato Grosso do Sul State, Brazil. *EntomoBrasilis* 9 (3): 212-215. (in English, with Portuguese summary) ["Commonly called "helicopter damselflies", *Mecistogaster* species (Coenagrionidae) are recognized by their large body size in comparison with other Odonata species, ability to flap both anterior and posterior wings in opposite directions, and preference for dense forest. These species feed on spiders and require trunks or plants that can accumulate water, like bromeliads, for laying eggs. This relationship with phytotelm environments makes the *Mecistogaster* species sensitive to forest fragmentation and habitat changes. In Brazil, there are records of seven species, mainly in Amazon forest regions. *M. linearis* has a wide distribution reported in the Brazilian states of Acre, Amazonas, Roraima, Para, Rondonia, Mato Grosso, Rio de Janeiro, and Sao Paulo. Herein, we report the first record of *M. linearis* in the state of Mato Grosso do Sul with specimens sampled from the municipality of Corumba, in the Pantanal." (Authors)] Address: Rodrigues, M.E., Universidade Estadual de Mato Grosso do Sul -UEMS, Brasil. E-mail: rodrigues.mbio@gmail.com

**16215.** Röller, O. (2016): Modern Citizen Science - am Beispiel der Libellenkunde (Odonatologie) in Rheinland-Pfalz. *Mainzer Naturwissenschaftliches Archiv* 53: 151-158. ["Based on the recently published Green Paper Citizen Science Strategy 2020 for Germany (Bonn et. al. 2016) we present a definition of Citizen Science. In the field of natural research and nature protection, experience has shown that it makes sense to extend this definition: due to modern and internet based projects of species registration and therefore a participation of a large public the term changes to Modern Citizen Science (Röller 2015). Using the example of the ArtenFinder Rheinland-Palatinate and related to the odonatology in the state of Rhineland-Palatinate/Germany, the characters, the meaning for science as well as the additional benefit of the method of Modern Citizen Science are discussed." (Author)] Address: Röller, O.: E-Mail: kontakt@natur-suedwest.de

**16216.** Román-Heracleo, J.; Guerrero de la Paz, J.G. (2016): Primer registro de la familia Cordulegastridae Leach,

1815 (Insecta: Odonata) para el estado de Jalisco, México. *Dugesiana* 23(1): 44. (in Spanish) [*Cordulegaster* sp., Reserva de la Biosfera Sierra de Manantlán; no further dates.] Address: Román-Heracleo, J., Escuela de Biología. Univ. de Costa Rica. Ciudad Universitaria Rodrigo Facio Brenes, San Pedro, Costa Rica. E-mail: romanjareth@gmail.com

**16217.** Ross, A.J.; Coutiño José, M.A.; Nel, A. (2016): The first records of coenagrionid damselflies (Odonata: Zygoptera: Coenagrionidae: *Neoerythromma* sp. and *Nehalennia* sp.) from Mexican Amber (Miocene). *Boletín de la Sociedad Geológica Mexicana* 68(1): 81-86. (in English, with Spanish summary) ["Two specimens of the damselfly (Odonata: Zygoptera) family Coenagrionidae are described from Mexican amber of early Miocene age, identified as *Neoerythromma* sp. and *Nehalennia* sp. They constitute the first records of the family Coenagrionidae from this amber, and the first fossil records of the genera *Neoerythromma* and *Nehalennia*." (Authors)] Address: Ross, A.J., National Museum of Scotland, Chambers Street, Edinburgh, EH1 1JF, Scotland, UK. E-mail: a.ross@nms.ac.uk

**16218.** Ruf, C.; Gufler, C.; Küry, D. (2016): Populationsentwicklung und Habitatpräferenzen der Westlichen Keiljungfer (*Gomphus pulchellus* Selys, 1840) in der Region Basel (Schweiz) (Odonata: Gomphidae). *Mitteilungen der Naturforschenden Gesellschaften beider Basel* 16: 109-122. (in German, with English summary) ["From 2012 to 2014 an isolated population of *G. pulchellus*, an endangered species of national priority was studied in the Spittelmat Ponds in Riehen (canton Basel-Stadt, Switzerland) and in two other potential breeding sites. The density at emergence was between 34.2 and 50.8 exuviae per 100 meter of shore line while the proportion of male exuviae varied from 42.7 to 54.5 %. The EM50 showed values from 4 to 12 days. The emergence period started when a mean temperature sum of  $1'113.8 \pm 69.3$  °C (January 31st until date of first emergence) was reached. Highest densities of exuviae were found on the south eastern shore of the ponds with approximately 80 % of them attached values on plants part like *Rubus* sp. and *Carex* sp. In the nearby gravel pit Käppelin (Weil am Rhein, Germany) only two exuviae were found and in the Entenweiher exuviae were lacking completely. In 2014 only three larvae of *G. pulchellus* were found in mainly sandy sediments covered by detritus. They seemed to have a very patchy distribution. In experiments larvae chose significantly a sandy sediment of a grain size between 0.05 and 0.5 mm. On sediments covered with detritus the larvae buried themselves after 36 minutes compared to 54 minutes without detritus. The Spittelmat ponds seem to be the main habitat of a metapopulation of which actual size and spread are unknown. To conserve and support the population of the *G. pulchellus* it is proposed to restore the ponds in vicinity of the Spittelmat ponds according to its habitat preferences." (Authors)] Address: Ruf, C., Junkerbifangstr. 14, 4800 Zofingen, Switzerland. E-mail: christian\_ruf@gmx.ch

**16219.** Rychla, A. (2016): Occurrence of the Spotted Darter *Sympetrum depressiusculum* (SELYS, 1841) (Odonata: Libellulidae) in western Poland. *Odonatrix* 126: 8 pp. (in Polish,



with English summary) ["*S. depressiusculum* is currently in decline at the European scale and further decrease of species localities has been already predicted for the next years. The situation of the species seems to be stable in Poland, so far. However, there are many regions without any information on the species occurrence. This paper presents 16 new records of *S. depressiusculum* and summarizes its current distribution in western Poland. Further, the habitat types of the species are described and habitat preferences are discussed. The new localities make up 9 % of all known records in Poland. The species was numerous (> 20 individuals) or fairly numerous (6–20 individuals) at 12 new sites. The reproductive behaviour as well as the breeding success were observed at 9 localities, respectively. *S. depressiusculum* was mostly found in fish ponds (37 % of all sites) and in dystrophic peat bogs (37 %). Almost 90 % of all sites were surrounded by forests. The results show that the species is widely distributed in western Poland and clearly prefers two types of habitats: fish ponds and peat bogs. Further investigations of *S. depressiusculum* should, therefore, focus on these habitat types in this region. The common occurrence of *S. depressiusculum* in the second habitat type is somehow unexpected as the species is not the typical faunistic element of peat bogs. The presented records constitute therefore a good basis to monitor the permanency and stability of the population in western Poland, especially in bog-like biotopes." (Author)] Address: Rychla, Anna, 66-016 Ploty, Poland. E-mail: rychlan@op.pl

**16220.** Rychla, A. (2016): Neue Libellenfunde aus der Niederschlesischen Heide (Bory Dolnoslaskie) in Polen. IDF-Report 100: 1-11. (in German, with English and Polish summaries) ["In this study, the results of the investigation of Odonata, conducted in the years 2015 and 2016 in three boggy protected areas („Zacisze“, „Przygielkowe Moczary“ und „Zurawie Bagno“) of the Lower Silesian Wilderness are presented. A total of 41 species was found. There were eight species new for the investigated area, six of which were of Mediterranean origin. The observation of *Orthetrum albistylum* shows that this species has already reached the western border of Poland and a further expansion to Germany is to be expected. The investigations did not reveal any new findings of *Aeshna subarctica* in the area, so the status of this species is still unclear. Of the rare species the new record of *Leucorrhinia caudalis* in the NSG "Zacisze" was demonstrated. It is the first observation of this species in the Lower Silesian Wilderness and as far as the only one in the southern part of Lubuskie Voivodeship, but the status of the species remains unknown. The study confirms that the biodiversity in the areas is very high. The thermophilous species increase the local diversity in the peat bogs on one hand, but they are also regionally new faunal elements, which may cause strong changes in the bog's dragonfly community on the other hand. Therefore, further systematic research in the peat bogs in this area is necessary." (Author)] Address: Rychla, A., Ul. Osiedlowa 12, Ploty, 66016 Czerwieńsk, Poland. E-mail: an.rychla@gmail.com

**16221.** Saetung, T.; Boonsoong, B. (2016): Description of the final instar larva of *Pseudagrion pruinosum* (Burmeister,

1839) (Odonata: Coenagrionidae) from Thailand. *Zootaxa* 4175(3): 292-300. (in English) ["Herein the final instar larva of *P. pruinosum* is described and illustrated for the first time, based on reared specimens from Thailand. When compared with the other known *Pseudagrion* larvae, *P. pruinosum* is distinguished by three setae on the labial palp, five teeth on the truncate, denticulate lobe on the distal marginal end of the labial palp, one premental seta and a row of three minute setae on each side of the midline, as well as shape and tracheation of caudal gills." (Authors)] Address: Saetung, T., Animal Systematics and Ecology Speciality Research Unit (ASERU), Dept of Zoology, Faculty of Science, Kasetsart Univ., Bangkok, Thailand 10900. E-mail: fscibtb@ku.ac.th

**16222.** Saha, S.; Nirwal, S. (2016): Abstract: R20.00002: Viability of long range dragonfly migration across the Indian Ocean: An energetics perspective. *Bulletin of the American Physical Society* 61(20) (69th Annual Meeting of the APS Division of Fluid Dynamics): [Verbatim: Recently *Pantala flavescens* have been reported to migrate in millions from India to Eastern Africa on a multigenerational migratory circuit of length 14000-18000 kms [R Charles Anderson. (*Journal of Tropical Ecology*), 25(04): 347-358, 2009]. We attempt to understand the ability of dragonflies to perform long range migration by examining the energetics using computer simulations. In absence of a theory for long range insect migrations, we resort to the extensive literature on long range bird migration from the energetics perspective. The flight energetics depends upon instantaneous power and velocity. The mechanical flight power is computed from the power curve which is then converted to mass depletion using Brequet's equation. However, the mechanical flight power itself depends upon the instantaneous velocity which can vary depending upon the current mass. In order to predict the range in our simulations, we assume that the insect progressively tries to achieve the maximum range velocity. The results indicate that the migration range is approximately 1260 kms in 70 hours based on the true airspeed. However, our analysis is restricted by the lack of data and certain caveats in drag prediction and basal metabolism rate.]

**16223.** Saikia, R.; Mishra, H.; Devi, A.; Saikia, D.K. (2016): Biodiversity of odonates in rice eco-system, Titabar, Assam. *Journal of Entomology and Zoology Studies* 4(4): 1376-1381. ["The present study was conducted at Farmers field near Regional Agricultural Research Station, Titabar, main rice bowl of the district Jorhat, Assam. Visual count and catch per unit effort was adopted to record the odonate diversity in the rice field. 68 individuals of odonate belonging to 14 species, equal number of species were recorded from each sub-order, Zygoptera and Anisoptera. The study revealed more number of damselfly population (40) than the dragonfly (28). Vegetative growth of rice crop support more number of Odonates (17 damselfly and 10 dragonfly) followed by reproductive (15 damselfly and 10 dragonfly) and ripening stage (8 damselfly and 8 dragonfly). The most dominant damselfly and dragonfly species were *Ceragrion coromandelianum* and *Diplacodes trivialis* with 11 and 10 individuals respectively. Diversity of damselfly (1.73) was greater than dragonfly (1.42) same as in case of richness and evenness index in vegetative stage. But

dragonfly diversity (1.75) was more than damselfly (1.55) as in richness and evenness index particularly when the crop was at reproductive stage. The ripening stage of rice crop support more or less similar diversity of damselfly (1.32) and dragonfly (1.30) with richness and evenness index (1.44, 1.92 & 0.95, 0.81) respectively." (Authors)] Address: Saikia, Rituraj, Ph. D Scholar Department of Entomology, College of Agriculture, Assam Agricultural University, Jorhat, Assam, India

**16224.** Salami, E.; Ganesan, P.B.; Ward, T.A.; Viyapuri, R.; Romli, F.I. (2016): Design and mechanical analysis of a 3D-printed biodegradable biomimetic micro air vehicle wing. IOP Conference Series: Materials Science and Engineering 152(1): 7 pp. (in English) ["The biomimetic micro air vehicles (BMAV) are unmanned, micro-scaled aircraft that are bio-inspired from flying organisms to achieve the lift and thrust by flapping their wings. There are still many technological challenges involved with designing the BMAV. One of these is designing the ultra-lightweight materials and structures for the wings that have enough mechanical strength to withstand continuous flapping at high frequencies. Insects achieve this by having chitin-based, wing frame structures that encompass a thin, film membrane. The main objectives of this study are to design a biodegradable BMAV wing (inspired from the dragonfly) and analyze its mechanical properties. The dragonfly-like wing frame structure was bio-mimicked and fabricated using a 3D printer. A chitosan nanocomposite film membrane was applied to the BMAV wing frames through casting method. Its mechanical performance was analyzed using universal testing machine (UTM). This analysis indicates that the tensile strength and Young's modulus of the wing with a membrane is nearly double that of the wing without a membrane, which allow higher wing beat frequencies and deflections that in turn enable a greater lifting performance." (Authors)] Address: Salami, E., Dept of Mechanical Engineering, Faculty of Engineering, Univ. of Malaya, Kuala Lumpur, Malaysia. E-mail: erfansalami@hotmail.com

**16225.** Samways, M.; Simaika, J. (2016): Manual of freshwater assessment for South Africa: Dragonfly Biotic Index. *Suricata* 2: 224 pp. (in English) ["Overall, freshwater ecosystems are the most threatened ecosystem type in the world. The scarce South African freshwaters are threatened by alien organisms, high volumes of water abstraction, and pollution. Yet some South African freshwaters are being restored to their former condition. It is important to monitor these systems and note whether they are declining or improving. One way to do this is to use the Dragonfly Biotic Index, which is based on dragonfly biogeography, their sensitivity to change, and the degree to which they are threatened. This index is sensitive and robust and is suitable for assessing and monitoring freshwaters across the country. This manual explains how to use and apply the Dragonfly Biotic Index, while also providing guidelines for species identification. Published by the National Botanical Institute (NBI)." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**16226.** Sanmartín-Villar, I.; Zhang, H.; Cordero-Rivera, A. (2016): Colour polymorphism and ontogenetic colour changes

in *Ischnura rufostigma* (Odonata: Coenagrionidae). *Odonatologica* 45(1/2): 77-86. (in English) ["We describe female colour morphs and ontogenetic colour changes of *I. rufostigma* in three populations from China. Females showed two colour morphs, one androchrome, identical to males, and one gynochrome, with orange coloration when immature and green to brown thorax when mature. Population frequencies show that gynochrome females are the most common morph (71-97 %). In addition, we found high variability in the extent of the blue coloration on the tip of the abdomen of males and androchrome females. We discuss the possible causes of this colour variation and propose that previously described intraspecific forms of *I. rufostigma annandalei*, solely based on the variation of this blue coloration, have no taxonomic relevance." (Authors)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**16227.** Satpathi, C.R.; Mondal, A. (2016): Holistic survey on damselfly (Anisoptera [sic]: Odonata) diversity in rice ecosystem of eastern India. *International Research Journal of Natural Sciences* 4(4): 19-34. (in English) ["This study highlights the richness of damselfly (Anisoptera: Odonata) [sic] fauna associated with rice ecosystems in Eastern India. Sampling of the Damselfly community was conducted during 2010-14 to determine species composition, abundance and distribution in 3 different habitats of rice fields which were selected at 60 m (Chakdaha), 600 m (Cooch Behar) and 1250 m (Kalimpong) respectively. Each location was surveyed at a biweekly interval after transplanting of rice plants and about 10 species of damselfly were recorded as insect predators in rice crops of Eastern India. General morphology, biology, ecology, behavior of the damselfly are being highlighted in the present investigation. After comparing different body parts, double branching keys are prepared for their easy identification. The studies of their diversity showed that maximum and minimum value of both Simpson and Shannon-Weiner index were at the flowering and the vegetative stage of crop respectively. The value of Margalef index and Menhinck index also indicated that the highest value in reproductive stage of rice crop. The studies on Evenness index designated that the value of E1, E2 and E3 were influenced by species richness and not evenness. Consequently the influence of fertilizer on the incidence of damselfly in rice ecosystem showed that there was a remarkable increase of population where high doses of nitrogen (120 kg/ha) were applied followed by the use of mix fertilizer (120:60:60 N:P:K). Although the plot receiving high doses of phosphate @ 60 kg/ha exhibited increase in the level of damselfly population but the distribution was least in the field where potassium fertilizer was used in both kharif (rainy) and rabi (winter) season during 2010 to 2014. The sampling of damselfly population on weed, ratoon rice, rice fallow land exhibited that the bund weed provided resting site for damselfly. The colonization and succession of Damselfly species in the rice field habitat showed a uniform pattern in relation to the growth stage of rice crop. At the end of study, the relevance of Damselfly biosystematics in the context on bio diversities has been given in its legitimate status as bio control agent of rice insect

pests in Eastern India." (Authors) [Address: Satpathi, C.R., Dept of Agricultural Entomology Bidhan Chandra Krishi Viswa-vidyalaya (State agricultural University), P.O- Mohanpur, Dist. – Nadia, West Bengal -741252, India

**16228.** Schad, A.N.; Kennedy, J.H.; Dick, G.O. (2016): Secondary production and seasonal development of the damselfly *Enallagma civile* Hagen, 1861 (Odonata: Coenagrionidae) in a newly constructed urban wetland floodway ecosystem. *Aquatic Insects* 37(2): 159-173. (in English) ["Secondary production and seasonal development of *E. civile* were determined as part of an epiphytic macroinvertebrate study in the Dallas Floodway Extension Trinity River Project Lower Chain of Wetlands, Dallas, TX, USA. These wetlands were constructed to mitigate flooding of the Trinity River, but also provided quality wildlife habitat and removal of wastewater effluent contaminants. Variations in life history were observed between two macrophytes and three different wetlands of varying age, effluent source, and vegetation establishment. Mean annual production of *E. civile* was 1393 mg/m<sup>2</sup>/year, standing stock biomass was 1376 mg/m<sup>2</sup>/year, cohort production/biomass (P/B) ratio was 4.30/year, and annual P/B was 10.18/year. These values are in the upper range of known Odonata production values from a lentic system. *E. civile* biomass growth rates were observed to be higher from populations on the better established macrophyte (*Potamogeton nodosus* Poiret, 1816) and in the longest established wetland." (Authors)] Address: Schad, A.N., Institute of Applied Science, University of North Texas, Denton, TX, USA

**16229.** Schiel, F.-J. (2016): Paarungsversuch eines Männchens von *Ischnura pumilio* mit einem Männchen von *Erythromma viridulum* (Odonata: Coenagrionidae). *Mercuriale* 16: 53-55. (in German, with English summary) ["Intergeneric tandem between a male *Ischnura pumilio* and a male *Erythromma viridulum* (Odonata: Coenagrionidae). – On 15-viii-2016, at ca. 14:00 h CEST, I observed a male *I. pumilio*, which tried to copulate with a male of *E. viridulum*. The tandem was observed at a small temporary pond in the Upper Rhine valley close to the City of Baden-Baden, Germany (48°47'12"N, 8°10'54"E, 122 m ü. NHN). The circumstances of the finding are described and shortly discussed." (Author)] Address: Schiel, F.-J., Turenneweg 9, D-77880 Sasbach, Germany. E-mail: franz-josef.schiel@inula.de

**16230.** Schiel, J.-J.; Buchwald, R. (2016): How to survive the brief water-coverage of vernal ponds? Early hatching date and rapid larval development in *Aeshna affinis* (Odonata: Aeshnidae). *Odonatologica* 45(3/4): 155-177. (in English) ["The objective of our study was to identify mechanisms enabling typical inhabitants of vernal ponds in temperate climate zones to complete their larval development under the time-constrained conditions of temporary larval habitats. We compared both hatching phenology and larval development of *A. affinis* with those of its permanent water congener *A. mixta* under semi-natural conditions and with literature data on other European Aeshnidae. We identified the following traits enabling rapid univoltine development in vernal ponds: i) Seasonally early hatching: *A. affinis* hatched significantly – on average

22 days – earlier than *A. mixta*. ii) Relatively small size difference between the second and the final larval stadium: Second-stadium larvae of *A. affinis* were significantly larger than those of all other European Aeshnidae, but the exuviae are among the smallest of this family in Europe. Therefore, larval growth coefficient and the number of larval stadia are smaller than in any other European Aeshnidae. iii) A low degree-day sum during larval development, being significantly lower than that of *A. mixta*. Although median larval development time of the vernal pond species *A. affinis* was longer than that of *A. mixta*, the first emerged significantly – on average 18 days – earlier than the latter." (Authors)] Address: Schiel, F.-J., INULA, Turenneweg 9, 77880 Sasbach, Germany. E-mail: franz-josef.schiel@inula.de

**16231.** Schneider, B.; Wildermuth, H. (2016): Pferdeegel *Haemopsis sanguisuga* versucht Kleine Moosjungfer *Leucorrhinia dubia* zu verschlingen (Odonata: Libellulidae; Hirudinea: Haemopidae). *Mercuriale* 16: 5-7. (in German, with English summary) ["Horse-leech *Haemopsis sanguisuga* tries to devour *L. dubia* - An adult *H. sanguisuga* was observed and photographically documented trying to devour a male *L. dubia* of a crashed tandem at a small lake in the Swiss Alps." (Authors)] Address: Schneider, B., Wolfbühlstrasse 34A, 8408 Winterthur beatsch@bhemail.ch

**16232.** Schneider, T.; Ikemeyer, D. (2016): Notes on Odonata species in South-West Iran including *Platycnemis kervillei* (Martin, 1909) as a new species for Iran. *Entomologische Zeitschrift* 126(1): 3-8. (in English, with German summary) ["Between 4th and 13th of June 2015, Odonata were inventorized in the southwestern Iranian provinces of Fārs, Kohygilugehva-Boyer Ahmad, Khuzestān, Illām, Kermānshāh, Lorestān, Esfahān, Chahārmahal-va-Bakhtiyāri. Thirty eight taxa were found. *P. kervillei* is new for Iran. Nearly one half (18) of the records are new for Iranian provinces (*Eythromma viridulum orientale*, *E. lindenii zemyi*, *Enallagma cyathigerum risi*, *Coenagrion persicum*, *C. vanbrinkae*, *Anax immaculifrons*, *Calliaeschna microstigma*, *Paragomphus lineatus*, *Onychogomphus lefebvrei*, *O. flexuosus*, *Cordulegaster insignis nobilis*, *Diplacodes lefebvrei*, *Libellula depressa*, *Orthetrum cancellatum*, *Sympetrum sanguineum*, *Trithemis festiva*). About some species, like *E. lindenii zemyi*, *C. persicum*, *C. vanbrinkae*, *O. flexuosus*, restricted information was available for Iran. Records of *E. lindenii zemyi*, *C. persicum* and *O. flexuosus* from Iran date from more than 70 years ago.] Address: Ikemeyer, D., Billerbecker Str. 6, 48329 Havixbeck, Germany. E-Mail: DKJIkemeyer@t-online.de

**16233.** Schneider, T.; Ikemeyer, D. (2016): Records of dragon- and damselflies from Khorāsān-e-Razavi and Khorāzān-e-Shomāli in Northeast-Iran (Odonata). *Entomologische Zeitschrift* 126(4): 211-216. (in english, with German summary) ["During a field trip in 2016 (8.–18. June) to Khorāzān-e-Shomāli and Khorāsān-e-Razavi a total of 33 Odonata species could be recorded. The region near the border to Turkmenistan and Afghanistan has a dry climate and sweet water habitats are sparse. Until now there exists no survey on this interesting region, being a transit zone of Eurosiberian to Irano-Turanian



faunal elements. About 70 % of the recorded Odonata taxa are new for one or both provinces. *Coenagrion scitulum* and *Cordulegaster coronata* were not reported from Iran since over a century. *Ischnura forcipata* one of the most frequent Zygoptera during our trip is new for both provinces. This species expands his distribution from NE-Iran to Sistān-va-Baluchestān in SE-Iran which represents its western distribution limit. *Orthetrum ransonnetii* known from SE-Iran, which was also recorded for the first time from this region, seems to reach its northeastern distribution limit in this region." (Authors) ] Address: Ikemeyer, D., Billerbecker Str. 6, 48329 Havixbeck, Germany. E-Mail: DKJlkemeyer@t-online.de

**16234.** Seehausen, M. (2016): Eine kleine Libellensammlung vom Edersee (Odonata). *Libellen in Hessen* 9: 51-54. (in German) [Hessen, Germany. Records of *Lestes sponsa*, *L. virens*, *L. barbarus*, *Sympetrum sanguineum* and *S. flaveolum* are documented.] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**16235.** Seehausen, M.; Constant, J.; Smets, K. (2016): On a collection of Odonata from Cambodia, with the first record of *Sinictinogomphus clavatus* and a description of the female of *Zyomma breviventre*. *Notulae odonatologicae* 8(7): 222-230. (in English) ["71 specimens of 22 Odonata species from northwestern Cambodia stored at the Royal Belgian Institute of Natural Sciences were examined and catalogued. The specimens were collected between 24-v-2003 and 31-v-2003. *S. clavatus* is recorded in Cambodia for the first time, bringing the national checklist to 161 species. Several specimens of *Z. breviventre* (Martin, 1921), recorded for the third time ever, were collected using mercury vapour light traps. Females of this species are recorded for the first time and both sexes are illustrated. Information on the species' habitat is provided and the genus *Zyommoides* Martin, 1921 is briefly discussed. The following species were also collected at light traps: *Diplacodes trivialis*, *Neurothemis fluctuans*, *N. intermedia atalanta*, *Pantala flavescens*, *Potamarcha congener*, and *Zyomma petiolatum*." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**16236.** Seehausen, M.; Fiebig, J. (2016): A collection of Odonata from North Korea, with first record of *Ischnura elegans* (Odonata: Coenagrionidae). *Notulae odonatologicae* 8(7): 203-211. (in English) ["A collection of 658 Odonata adults, exuviae, and larvae from North Korea comprising 43 species is presented. *Ischnura elegans* is a new record for North Korea." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**16237.** Seehausen, M.; Schröter, A.; Mumladze, L.; Grebe, B. (2016): Additional Odonata records from Georgia, southern Caucasus ecoregion, with the first record of *Ischnura*

*fountaineae* (Odonata: Coenagrionidae). *Notulae odonatologicae* 8(8): 266-283. (in English) ["Records of 57 odonate species group taxa obtained at 76 sampling sites during several field surveys between 2012 and 2016 are presented, corresponding to more than three quarters of the Georgian odonate fauna. *Ischnura fountaineae* is a new addition to the country's list. *Sympetrum arenicolor* was recorded for the second time and *Aeshna serrata* was found at two further lakes on the Javakheti volcanic plateau. For other species, such as *Cordulia aenea* and *Leucorrhinia pectoralis* only very limited and mainly old data was available. In addition, new records for *Coenagrion ponticum*, an endemic of the Caucasus region, as well as for *C. pulchellum* and *C. scitulum*, both rare in the Caucasus region, are given. Further information on the globally threatened gomphids *Onychogomphus assimilis* and *O. flexuosus* are presented, including the first exuviae records of the latter in Georgia. New findings of the nominate taxon of *Sympetrum vulgatum* provided indications on regional distribution pattern and spatial delimitation from ssp. *decoloratum*. Further records of *Pantala flavescens* suggested rather regular occurrence in Georgia, being an integral part of the Georgian dragonfly fauna. The existence of small isolated pockets of *Calopteryx splendens* ssp. *tschaldirica* inside the core area of ssp. *intermedia* in Georgia was confirmed as well as several individuals of ssp. *tschaldirica* from the Georgian stronghold of the taxon in the Javakheti volcanic plateau showing entirely hyaline wings, phenotypically resembling ssp. *waterstoni*. Against the background of general taxonomic difficulties with the *Calopteryx splendens* taxa complex, both phenomena are discussed." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**16238.** Seehausen, M.; Günther, A. (2016): Records of *Neurothemis nesaea* from Sulawesi, with taxonomic annotations on the *N. intermedia*-group (Odonata: Libellulidae). *Odonatologica* 45(3/4): 271-290. ["Several specimens of *N. nesaea* from Central and South Sulawesi were examined. This species hitherto was only known from the original description. Figures of both sexes, annotations concerning the habitat and the type specimens are given (two syntypes deposited at SMF and one at ZMH). For comparison, figures of the wings of *N. intermedia intermedia* (holotype is deposited at RBINS), *N. intermedia atalanta* (two syntypes are deposited at NMS) and *N. intermedia excelsa* are provided, as well as figures of *N. degener* (three syntypes are deposited at RBINS). *N. degener* is not associated with *N. intermedia* but considered to represent a full species. *N. septentrionis* (holotype is deposited at UMMZ) is synonymized with the nominate subspecies of *N. intermedia*." (Authors)] Address: Seehausen, M., Mus. Wiesbaden, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**16239.** Severina, I. Yu.; Isavnina, L.; Knyazev, A.N. (2016): Topographic anatomy of ascending and descending neurons of the supraesophageal, meso- and metathoracic ganglia in paleo- and neopterous insects. *Journal of Evolutionary Biochemistry and Physiology* 52(5): 397-406. (in English)

["Topographic anatomy of ascending (AN) and descending (DN) neurons of the supraesophageal and thoracic ganglia in the nervous system of winged insects (Pterygota), representatives of the infraclasses Palaeoptera (Odonata, *Aeshna grandis*) and Neoptera (Blattoptera, *Periplaneta americana*), was studied. These insects differ in ecological niches, lifestyles, sets of behavioral complexes, levels of locomotor system development, evolutionary age and systematic position. Cell bodies and processes of ANs and DNs were stained with nickel chloride (NiCl<sub>2</sub>), and their topography was studied on total preparations of the supraesophageal and thoracic ganglia. Unlike cockroaches, the dragonfly protocerebrum was found to contain DNs sending their processes to ocelli. Dragonfly DN processes exhibit a specific branching pattern in thoracic ganglia, with collaterals coming off both ipsi- and contralaterally. In cockroaches, collaterals of DN processes come off ipsilaterally. The AN cell bodies in dragonfly meso- and metathoracic ganglia lie both ipsi- and contralaterally relative to the ascending process, whereas in cockroaches most of the AN cell bodies in the same ganglia are located contralaterally. Substantial differences in the distribution of DNs and ANs in insects with different manners of locomotion appear to reflect different degrees of control the supraesophageal ganglion exerts over the activity of segmental centers. This does not seem to be related to the evolutionary age of insects or their systematic position. Probably, different degrees of control over locomotion depend on the way of food acquisition: catching prey in the air in "paleopterous" dragonflies versus maneuverable walking or running over a solid substrate in "neopterous" cockroaches." (Authors)] Address: Isavnina, I.L., Sechenov Institute of Evolutionary Physiology and Biochemistry, Russian Academy of Sciences, St. Petersburg, Russia. E-mail: isavnina@iephb.ru

**16240.** Shapiro, B.G. (2016): Physiology and structure of motion sensitive neurons in the dragonfly visual system. The FASEB Journal 30(1) Supplement 760.2 : (in English) [Verbatim: Aeshnid dragonflies are among the largest North American insects and also among the fastest and most accurate predators. During prey pursuit, they quickly respond to deviations in their flying-prey trajectory and alter their flight paths to intercept their quarry. Remarkably, a deviation in the prey's path results in a dragonfly turn in only 30 ms, much faster than the visual latencies in most animals. Visual neurons, called target-selective descending neurons (TSDNs) are hypothesized to mediate the dragonfly's fast response to flying prey. Once stimulated, these neurons send signals down the nerve cord to the wing-motor circuitry controlling flight, allowing for a flight path correction. In laboratory experiments with restrained dragonflies, TSDN activity is relatively weaker and slower than expected from the behaviour. We are testing the idea that this neural "lethargy" is due to the lack of neuromodulators such as octopamine in the restrained dragonfly's brain. We are investigating this hypothesis by comparing TSDN visual responses before and after injection of the octopamine mimic, chlordimeform. Our results show dramatic increases in TSDN spike activity after chlordimeform injection, suggesting that TSDN activity is augmented in the behaving animal by the neuromodulator, octopamine. Further, utilizing intracellular recording techniques, we aim to identify

the individual neurons which mediate responses to specific types of stimuli, such as approaching objects. Once a cell is identified, we will inject a dye through the recording microelectrode, which will travel within the cell in question up into the brain. This will allow us to obtain a structural representation of the neuron, which can then be linked back to its specific function in the visual processing cascade.] Address: Shapiro, B.G., Biology, Union College, Schenectady, NY, USA

**16241.** Sharkey, C.R.; Partridge, J.C.; Roberts, N.W. (2016): Polarization sensitivity as a visual contrast enhancer in the Emperor dragonfly larva, *Anax imperator* (Leach, 1815). J. Exp. Biol. 218(Pt 21): 3399-3405. ["Summary Statement: Behavioural evidence that polarization sensitivity in the larva of *A. imperator*, reduces the contrast-degrading effect of scattered light under naturalistic horizontally polarized underwater lighting conditions. Polarization sensitivity (PS) is a common feature of invertebrate visual systems. In insects, PS is well known for its use in several different visually guided behaviours, particularly navigation and habitat search. Adult dragonflies use the polarization of light to find water but a role for PS in aquatic dragonfly larvae, a stage that inhabits a very different photic environment to the adults, has not been investigated. The optomotor response of the larvae of *A. imperator*, was used to determine whether these larvae use PS to enhance visual contrast underwater. Two different light scattering conditions were used to surround the larval animals: a naturalistic horizontally polarized light field and nonnaturalistic weakly polarized light field. In both cases these scattering light fields obscured moving intensity stimuli that provoke an optokinetic response in the larvae. Animals were shown to track the movement of a square-wave grating more closely when it was viewed through the horizontally polarized light field, equivalent to a similar increase in tracking ability observed in response to an 8% increase in the intensity contrast of the stimuli. Our results suggest that larval PS enhances the intensity contrast of a visual scene under partially polarized lighting conditions that occur naturally in freshwater environments." (Authors)] Address: Sharkey, Camilla, School of Biological Sciences, Bristol Life Sciences Building, Tyndall Avenue, University of Bristol, Bristol, BS8 1TQ, UK. E-mail: camilla.sharkey@bristol.ac.uk

**16242.** Sharma, D.; Brahma, S.; Saha, N.; Kundu, M.; Saha, G.K.; Aditya, G. (2016): Association of larval Odonata and hydrophytes in wetlands of West Bengal, India: implications for conservation and monitoring. Journal of Entomology and Zoology Studies 4(3): 35-39. (in English) ["The abundance and distribution of the larval odonates depend on the hydrophytes, which was tested in the present study. A total of 19 genera of Odonata were observed in different relative abundance against the hydrophytes. Among the genera, *Ceriatrigon* and *Pantala* respectively, remained dominant over others with significant variations in relative abundance in the samples. Hydrophytes like *Wolffia* and *Marsilea* were key factors in explaining the relative abundance of larval odonates as explained through the canonical correspondence analysis. The species specific abundance seemed highly dependent on the hydrophytes in the concerned water bodies. In order to enhance the

sustenance of the Odonata in wetland habitats, availability of different species of hydrophytes seems to be an essential criterion. Considering the multifunctional role of the larval odonates in the freshwater aquatic communities, conservation effort should include the systematic inclusion of the preferred hydrophytes in the wetlands." (Authors)] Address: Sharma, D., Department of Zoology, University of Calcutta, 35 Ballygunge Circular Road, Kolkata 700019, India

**16243.** Shukla, A.; Rai, S.; Ahirwar, B.K. (2016): Diversity assessment and expansion of Odonata in Narmada basin of Jabalpur region (M.P.). *International Journal of Development Research* 6(5): 7786-7791. (in English) ["An opportunistic survey of Odonata diversity and distribution was done in along with river Narmada region of district Jabalpur to give updated list of species within the study. Odonata play crucial role in ecosystem functioning and can be used as biological indicators as well as potential bio-control agent of environmental quality whereas biodiversity protection and conservation is a national and international agenda and responsible for sustainable development of a region or a country. A total of 38 species are recorded belonging to Zygoptera with 16 species and Anisoptera with 22 species. In order Odonata, Libellulidae with 17 species is the most dominating families among dragonflies and Coenagrionidae with 13 species among damselflies while others have fewer representatives. Bargi dam shows the highest Regional diversity of Odonata in Jabalpur. The present study encourages the conservation of a wide range of dragonfly species in this area." (Authors)] Address: Shukla, A., Research Scholar, Department of Zoology, Govt. Model Science College, Jabalpur (M.P.) India, 482001

**16244.** Shukla, A.; Rai, S.; Ahirwar, B.K.2 (2016): Pollution assessment using bioindicator (Odonata and Mollusca) in Narmada basin at Jabalpur: A developing smart city. *International Journal of Advances in Scientific Research* 2(4): 89-93. (in English) ["The smart city mission of Jabalpur intends to promote adoption with basic infrastructure to give a decent quality of life, a clean and sustainable environment through application of smart solutions where environment disturbed through anthropogenic activities. Odonata and Mollusca are biological indicators so without using chemicals we aimed to know the pollution intensity of river Narmada basin. Benthos assemblage from Narmada basin in Jabalpur has been investigated. A total of 37 species of Odonata and 13 species of Mollusca were sampled. Keywords: smart city, benthic macroinvertebrates, diversity, Jabalpur." (Authors)] Address: Shukla, A., Dept Zoology Govt. Model Science College, Jabalpur (M.P.) India 482001. E-mail: arjunshukla37@gmail.com

**16245.** Simaika, J.P.; Samways, M.J.; Frenzel, P.P. (2016): Artificial ponds increase local dragonfly diversity in a global biodiversity hotspot. *Biodiversity and Conservation* 25(10): 1921-1935. (in English) ["Human demands have led to an increased number of artificial ponds for irrigation of crops year-round. Certain insect species have established in these ponds, including dragonflies (Insecta: Odonata). There has been discussion around the value of artificial ponds for encouraging dragonfly diversity, with little work in biodiversity hotspots

rich in rare and endemic species. We focus here on the Cape Floristic Region (CFR) global biodiversity hotspot, which has many endemic dragonfly species but has few natural ponds. Yet it has many artificial ponds mostly used for irrigation on local farms. This leads to an interesting question: to what extent do these artificial ponds provide habitats for dragonflies in this biologically rich, agriculturally fragmented landscape? To answer this, we recorded dragonfly species richness and abundances from 17 artificial ponds and 13 natural stream deposition pools as reference, in an area of the CFR where there are no local, natural, perennial ponds. 13 environmental and physical variables were recorded at the ponds and pools. We found that although ponds attracted no rare or threatened dragonfly species, they increased the area of occupancy and population sizes of many generalist species. These came from nearby natural deposition pools or from unknown sources elsewhere in the region, so providing refuges which otherwise would not be there. Interestingly, some CFR endemic species were also recorded at our artificial ponds. Overall dragonfly assemblages and those of Anisoptera Zygoptera differed between artificial ponds and deposition pools, suggesting that artificial ponds are to some extent a novel ecosystem. Habitat type, elevation and temperature were significant drivers in structuring overall species assemblages. For the Anisoptera, riparian vegetation and level of landscape connectivity was important, while temperature was not. In contrast, Zygoptera species were most affected by river catchment, habitat type and temperature. In sum, these artificial ponds are stepping stone habitats across an increasingly fragmented landscape. Managing these ponds with perennial water, constant water levels, and maximum complexity and heterogeneity of habitats in terms of vegetation will conserve a wide range of generalists and some specialists." (Authors)] Address: Simaika, J.P., Dept of Soil Science, Faculty of AgriSciences, University of Stellenbosch, Private Bag X1, Matieland 7602, South Africa. E-mail: simaikaj@sun.ac.za

**16246.** Smith, W.A.; Tennessen, K. (2016): Description of the nymph of *Ophiogomphus smithi* (Odonata: Gomphidae), with a key to the species of *Ophiogomphus* in the Western Great Lakes Region. *The Great Lake Entomologist* 49(1-2): 78-96. (in English) ["*O. smithi* is a gomphid dragonfly with restricted distribution which includes northeast Iowa, southeast Minnesota, and central to northwestern Wisconsin. The nymph is described and illustrated based on 173 specimens (66 exuviae of reared specimens plus 107 nymphs) from throughout the species' range. The nymph of *O. smithi* is very similar to nymphs of *O. carolus* Needham, *O. colubrinus* Selys, and *O. rupinsulensis* (Walsh). Nearly all (99%) of *O. smithi* sampled can be distinguished from *O. colubrinus* by prementum terminal width less than or equal to 2.97 mm (98% of *O. colubrinus* greater than 2.97 mm), and from *O. carolus* and *O. rupinsulensis* by the ratio of metatibia length to abdominal segment 10 width being greater than 1.66 (96% of *O. smithi*) vs. less than 1.66 (98.5% of *O. carolus* and *O. rupinsulensis*). Several characters and character combinations previously unused for *Ophiogomphus* nymphs were found to be of taxonomic value, including color pattern on dorsal hooks and dorsum of abdomen, shape of abdominal mid-dorsal punctae,



length and shape of fronto-clypeal ridge setae, and ratio of metatibia length to width of abdomen on segments 9 and 10. An illustrated quantitative key to the 7 species of *Ophiogomphus* occurring in the western Great Lakes region is provided, along with a separate, more qualitative key enabling species identification in the field. *Ophiogomphus smithi* is regularly syntopic only with *O. rupinsulensis*, rarely with *O. carolus* and *O. colubrinus* and not with *O. anomalus*, *O. howei*, or *O. susbehcha*; nymphs inhabit small to medium-sized, sandy, cool to warm stream segments with patches of pea-sized gravel." (Authors)] Address: Smith, W.A., 2043 Overlook Pass, Apt. 4, Middleton, WI 53562, USA. E-mail: smithroo.smith@gmail.com

**16247.** Soboleva, V.A.; Golub, V.B.. (2016): Zoogeographic analysis of the dragonflies fauna (Odonata) of Middle-Russian forest-steppe. Scientific statements, Science Series 34: 48-60. (in Russian, with English summary) ["The paper carries a most comprehensive list to date of the 62 dragonflies species of 8 families of the middle-russian forest-steppe fauna based on original and literature data. The overwhelming zoogeographical bulk of the investigated dragonflies fauna is formed by species having western palearctic ranges which are limited to one or two latitudinal belts (26 species, 44.8% of the total fauna). The second zoogeographical complex of the number of dragonflies species is formed by holarctic as well as intrazonal and boreo-mountain transpalearctic species (20 species, 34.5%). Most of them are very widely distributed in the latitudinal direction as well. A group of the species developing in slack water and weakly stream water reservoirs is a strongly dominant ecological complex. The group of rheophilous species includes *Calopteryx splendens*, *C. virgo*, *Platycnemis pennipes*, *Gomphus vulgatissimus*, *Stylurus flavipes* and *Orthetrum brunneum*." (Authors)] Address: Voronezh State University, 1, Universitetskaya Sq, Voronezh, 394006, Russia. E-mail: strekoza\_vrn@bk.ru

**16248.** Soga, M.; Gaston, K.J.; Yamaura, Y.; Kurisu, K.; Hanaki, K. (2016): Both direct and vicarious experiences of nature affect children's willingness to conserve biodiversity. *Int. J. Environ. Res. Public Health* 13, 529; doi:10.3390/ijerph-13060529: 12 pp. (in English) ["Children are becoming less likely to have direct contact with nature. This ongoing loss of human interactions with nature, the extinction of experience, is viewed as one of the most fundamental obstacles to addressing global environmental challenges. However, the consequences for biodiversity conservation have been examined very little. Here, we conducted a questionnaire survey of elementary schoolchildren and investigated effects of the frequency of direct (participating in nature-based activities) and vicarious experiences of nature (reading books or watching TV programs about nature and talking about nature with parents or friends) on their affective attitudes (individuals' emotional feelings) toward and willingness to conserve biodiversity. A total of 397 children participated in the surveys in Tokyo. Children's affective attitudes and willingness to conserve biodiversity were positively associated with the frequency of both direct and vicarious experiences of nature. Path analysis showed that effects of direct and vicarious experiences on children's willingness to conserve biodiversity were mediated by

their affective attitudes. This study demonstrates that children who frequently experience nature are likely to develop greater emotional affinity to and support for protecting biodiversity. We suggest that children should be encouraged to experience nature and be provided with various types of these experiences." (Authors)] Address: Soga, M., Dept Urban Engineering, School of Engineering, Univ. Tokyo, 7-3-1, Hongo, Bunkyo, Tokyo 113-8656, Japan. E-mail: soga@env.t.u-tokyo.ac.jp

**16249.** Solis, M.; Mugni, H.; Hunt, L.; Marrochi, N.; Fanelli, S.; Bonetto, C. (2016): Land use effect on invertebrate assemblages in Pampasic streams (Buenos Aires, Argentina). *Environmental Monitoring and Assessment* 188: 539. (in English) ["Agriculture and livestock may contribute to water quality degradation in adjacent waterbodies and produce changes in the resident invertebrate composition. The objective of the present study was to assess land use effects on the stream invertebrate assemblages in rural areas of the Argentine Pampa. The four sampling events were performed at six sites in four streams of the Pampa plain; two streams were sampled inside a biosphere reserve, and another one was surrounded by extensive livestock fields. The fourth stream was sampled at three sites; the upstream site was adjacent to agricultural plots, the following site was adjacent to an intensive livestock plot and the downstream site was adjacent to extensive breeding cattle plots. Higher pesticide concentrations were found at the site adjacent to agricultural plots and higher nutrient concentrations at the sites adjacent to agricultural and intensive breeding cattle plots. The invertebrate fauna were also different at these sites. Multivariate analysis showed a relationship between nutrient concentrations and taxonomic composition. Amphipoda (*Hyalella curvispina*) was the dominant group in the reserve and extensive breeding cattle sites, but was not present in the agricultural site. Also, Chironomidae were absent from the agricultural site while present at other sites. Gasteropoda (*Biomphalaria peregriana*), Zygoptera, and Hirudinea were dominant at the most impacted agricultural and intensive breeding cattle sites." (Authors)] Address: hernanmugni@gmail.com

**16250.** Sousa, E.; Quintino, V.; Palhas, J.; Rodrigues, A.M.; Teixeira, J. (2016): Can environmental education actions change public attitudes? An example using the pond habitat and associated biodiversity. *PLoS ONE* 11(5): e0154440. doi:10.1371/journal.pone.0154440: 13 pp. (in English) ["Ponds provide vital ecological services. They are biodiversity hotspots and important breeding sites for rare and endangered species, including amphibians and dragonflies. Nevertheless, their number is decreasing due to habitat degradation caused by human activities. The "Ponds with Life" environmental education project was developed to raise public awareness and engagement in the study of ponds by promoting the direct contact between the public and nature, researchers and pedagogical hands-on exploration activities. A pre-post- project survey was set-up to assess the effects of the project on the environmental consciousness, knowledge and attitude changes towards ponds and the associated biodiversity of school students aged 15 to 18. The survey questions were based on Likert scales and their pre-post project comparisons used

an innovative multivariate hypothesis testing approach. The results showed that the project improved the students' knowledge and attitudes towards ponds and associated biodiversity, especially the amphibians. Ponds can be found or constructed in urban areas and despite small sized, they proved to be interesting model habitats and living laboratories to foster environmental education, by encompassing a high number of species and a fast ecological succession." (Authors)] Address: Sousa, E., CIIMAR—Interdisciplinary Center of Marine and Environmental Research, Porto, Portugal, CIBIO/InBIO—Research Center in Biodiversity and Genetic Resources, Associated Laboratory, Porto, Portugal, Dept of Biology & CESAM—Research Center Environmental & Marine Research, Univ. of Aveiro, Aveiro, Portugal. E-mail: esousa@ciimar.up.pt

**16251.** Stanford-Camargo, S.-G.; Medina-Ortiz, G.R.; Ibarra-González, M.P.; Cruz-Miranda, S.G. (2016): Study of the odonates in the Sierra de Guadalupe, State of Mexico with some observations about their behavior. *Entomología mexicana* 3: 589-595. (in Spanish, with English summary) ["The study of the adult odonates was raised in an annual period from January to December of 2011 in three sites within the state park Sierra de Guadalupe in Ecatepec de Morelos, State of Mexico. A list of the species was realized and some observations about their behavior were annotated. 217 organisms were obtained and grouped in four families 10 genera and 12 species, in which *Sympetrum illotum* was the most abundant and *Anax amazili*, *Pseudoleon superbus*, *Archilestes grandis* and *Hesperagrion heterodoxum* were the less." (Authors)] Address: Stanford-Camargo, S.G., Facultad de Estudios Superiores Iztacala UNAM. Colección de Artrópodos de la FES Iztacala. Avenida de los Barrios No. 1, Los Reyes Iztacala, Tlalnepantla, Estado de México. C. P. 54090. E-mail: sstanford@campus.iztacala.unam.mx

**16252.** Stigge, H.A.; Bolek, M.G. (2016): Evaluating the biological and ecological factors influencing transmission of larval digenetic trematodes: A test of second intermediate host specificity of two North American *Halipegus* species. *Journal of Parasitology* 102(6): 613-621. (in English) ["Host specificity of parasites is a basic principle in parasitology; however, it is not easily measured. Previously, host specificity was calculated as the number of species that a parasite infected, but this is not an accurate description of host usage because some species are capable of being infected but do not contribute to the completion of the life cycle. Instead, measures of host specificity should take into consideration interactions between a parasite and a potential host species as well as interactions between current and subsequent hosts in the life cycle. The objectives of this study were to track the development of 2 trematode species, *Halipegus eccentricus* and *H. occidialis*, in 3 phylogenetically and ecologically distinct microcrustacean second intermediate hosts, and then, evaluate the extent to which each of these hosts contributed to transmission of each *Halipegus* species to the next odonate host in the life cycle. All 3 microcrustacean species exposed became infected with both species of *Halipegus*. The patterns of growth of *H. eccentricus* and *H. occidialis* were similar, but there were consistent differences

in the rates of growth among the microcrustacean species in both *Halipegus* species. Regardless of host species infected, all individuals of both species were considered to be developmentally infective to the next host in the life cycle by 19 days post exposure (DPE) when they lost their excretory bladder. Worms of varying sizes were capable of surviving without this structure suggesting that there is not a strong relationship between the rate of growth of the metacercariae and the development of their osmoregulatory system. Although *Halipegus* species were capable of living without an excretory bladder at 19 DPE, there were differences in their size and rates in which the 3 microcrustaceans contributed to transmission of the parasites to subsequent odonate hosts. Collectively, under controlled laboratory conditions, there was an approximately 2-fold difference in the average percent of worms that established in odonates from the ostracod, *Cypridopsis* sp., than from the harpacticoid copepod, *Phyllognathopus* sp., and the difference was nearly 3-fold between *Cypridopsis* sp. and the cyclopoid copepod, *Thermocyclops* sp. Therefore, despite all 3 microcrustacean species becoming infected, not all species were equally suited for transmission and completion of the life cycle. Differences among the 3 microcrustacean species in cercaria ingestion, metacercarial growth and development, and odonate predation rates on infected microcrustacean species were important factors in determining transmission of the 2 *Halipegus* species to odonate hosts." (Authors)] Address: Stigge, Heather, Dept of Integrative Biology, Oklahoma State University, Stillwater, Oklahoma 74078, USA. E-mail: heather.stigge@okstate.edu

**16253.** Suarez-Tovar, C.M.; Sarmiento, C.E. (2016): Beyond the wing planform: Morphological differentiation between migratory and non-migratory dragonfly species. *Journal of Evolutionary Biology* 29(4): 690-703. (in English) ["Migration is a significant trait of the animal kingdom that can impose a strong selective pressure on several structures to overcome the amount of energy that the organism invests in this particular behaviour. Wing linear dimensions and planform have been a traditional focus in the study of flying migratory species; however, other traits could also influence aerodynamic performance. We studied the differences in several flight-related traits of migratory and non-migratory Libellulid species in a phylogenetic context to assess their response to migratory behaviour. Wings were compared by linear measurements, shape, surface corrugations, and microtrichia number. Thorax size and pilosity were also compared. Migratory species have larger and smoother wings, a larger anal lobe that is reached through an expansion of the discoidal region, and longer and denser thoracic pilosity. These differences might favour gliding as an energy-saving displacement strategy. Most of the changes were identified in the hind wings. No differences were observed for the thorax linear dimensions, wetted aspect ratio, some wing corrugations, or the wing microtrichiae number. Similar changes in the hind wing are present in clades where migration evolved. Our results emphasize that adaptations to migration through flight may extend to characteristics beyond the wing planform and that some wing characteristics in libellulids converge in response to migratory habits whereas other closely related

structures remain virtually unchanged. Additionally, we concluded that despite a close functional association and similar selective pressures on a structure, significant differences in the magnitude of the response may be present in its components." (Authors)] Address: Suárez-Tovar, Catalina, Inst. de Ciencias Naturales, Universidad Nacional de Colombia, A.A, Bogotá, Colombia. E-mail: camsuarezto@unal.edu.co

**16254.** Sueyoshi, M.; Ishiyama, N.; Nakamura, F. (2016):  $\beta$ -diversity decline of aquatic insects at the microhabitat scale associated with agricultural land use. *Landscape and Ecological Engineering* 12: 187-196. (in Japan) ["Several studies report the decline of  $\beta$  diversity caused by agricultural impacts in river ecosystems. However, the susceptible scale of  $\beta$  diversity to agricultural impacts and the indirect effects on  $\beta$  diversity within hierarchically nested ecosystems are unclear. We first tested the hypothesis that  $\beta$  diversity between microhabitats is significantly influenced by agricultural land use. We also examined the indirect effects of agricultural land use on  $\alpha$  and  $\beta$  diversities at the microhabitat scale. Twelve microhabitat samples (25 cm<sup>2</sup>) were collected at 27 reaches within Kitamihorobetsu River, Japan. All reaches were classified into three agricultural intensities based on pasture area (low, middle, and high), and their hierarchical diversities (microhabitat, reach, and catchment) were calculated using additive partitioning. Indirect effects were demonstrated by structural equation modelling using indirect and direct environmental gradients. The  $\alpha$  and  $\beta$  diversities at the microhabitat scale decreased significantly with agricultural intensity. Increasing pasture cover within catchments showed a negative correlation with habitat heterogeneity and water quality (habitat homogenization and water degradation) and a positive correlation with sand cover on streambeds (sedimentation of fine particles). The  $\alpha$  diversity decreased with sedimentation of fine particles, and the  $\beta$  diversity decreased with habitat homogenization and water degradation. Our findings suggest that species diversity of aquatic insects at the microhabitat scale would be susceptible to agricultural land use. Furthermore, we emphasize that the diversity index used to evaluate restoration projects should be carefully selected because influential abiotic factors were different between  $\alpha$  and  $\beta$  diversities." (Authors)] Address: Sueyoshi, M., Graduate School of Agriculture, Hokkaido University, North 9, West 9, Sapporo 060-0859, Japan. E-mail: m-sueyoshi55@pwri.go.jp

**16255.** Sumanapala, A.; Podduwage, D.R. (2016): Notes on the natural history and distribution of *Elatoneura leucostigma* (Fraser, 1933), a montane endemic damselfly (Zygoptera: Platynemididae) in Sri Lanka. *NeBIO* 7(1): 13-16. (in English) ["*E. leucostigma* is one of the rarest damselflies in Sri Lanka. It is endemic to the montane zone of the country and is categorized as a Critically Endangered species at both national and global level. Apart from the limited knowledge on distribution and flight season, nothing is known of the natural history of this species. We present a summary of recent observations of the species confirming its presence in Horton Plains National Park and extending its distribution range to Peak Wilderness Sanctuary. Further, the present records extend its altitudinal range, flight season and provide the first

account on its natural history based on field observations." (Authors)] Address: Sumanapala, Amtila, Foundation for Nature Conservation & Preservation, 16, Sri Saddhananda Rd, Wekada, Panadura, Sri Lanka. E-mail: apsumanapala@gmail.com

**16256.** Sumanapala, A.P.; Jayawardana, N.C. (2016): Range extension off *Lyriothemis defonsekai* van der Poorten, 2009 (Anisoptera: Libellulidae), an endemic odonate from Sri Lanka. *Journal of Threatened Taxa* 8(13): 9589-9591. (in English) ["An immature  $\sigma$  and a mature  $\varphi$  *L. defonsekai* were observed at Yagfirala Forest Reserve (6.36236N & 80.17666E; elevation: 42m) on 01 August 2015 at about 10:30hr. A  $\varphi$  *L. defonsekai* was observed at the same locality at 09:00hr and 15:00hr on the following day (2 August 2015)." (Authors)] Address: Sumanapala, A.P., Foundation for Nature Conservation & Preservation, 16, Sri Saddhananda Road, Wekada, Panadura, Sri Lanka. E-mail: apsumanapala@gmail.com

**16257.** Sumanapala, A.P.; Jayasinghe, H.D. (2016): Range extension of *Heliogomphus lyratus* Fraser, 1933 (Anisoptera: Gomphidae) with notes on its identification, habits and habitat. *Journal of Threatened Taxa* 8(9): 9190-9194. (in English) ["*H. lyratus* is a Sri Lankan endemic dragonfly. It is one of the rarest Sri Lankan dragonflies with only three hitherto known localities. Apart from the faunistic records of the species, nothing much is known of its biology or ecology. We report five new distribution localities for *H. lyratus* with seven different observations. All these new localities extend the previously known range of the species. We also provide some notes on its field identification, habits and habitat based on our field observations." (Authors)] Address: Sumanapala, Amtila, Foundation for Nature Conservation & Preservation, 16, Sri Saddhananda Rd, Wekada, Panadura, Sri Lanka. E-mail: apsumanapala@gmail.com

**16258.** Swarrup, S.; Ganguli, R.; Madras, G. (2016): Nano-material based ionic polymer metal composite insect scale flapping wing actuators. *Mechanics of Advanced Materials and Structures* 23(11): 1300-1311. (in English) ["Small size actuators (8 mm  $\times$  1 mm), IPMNC (RuO<sub>2</sub>/Nafion) and IPMNC (LbL/CNC) are studied for flapping at the frequency of insects and compared to Platinum IPMC-Pt. Flapping wing actuators based on IPMNC (RuO<sub>2</sub>/Nafion) are modeled with the size of three dragonfly species. To achieve maximum actuation performance with *Sympetrum frequens* scale actuator with optimized Young's modulus, the effect of variation of thickness of electrode and Nafion region of *S. frequens* scale actuator is studied. A trade-off in the electrode thickness and Young's modulus for dragonfly size IPMNC- RuO<sub>2</sub>/Nafion actuator is essential to achieve the desirable flapping performance." (Authors)] Address: Ganguli, R., Department of Aerospace Engineering, Indian Institute of Science, Bangalore-560012, India. E-mail: ganguli@aero.iisc.ernet.in

**16259.** Takahashi, H.; Concordel, A.; Paik, J.; Shimoyama, I. (2016): The effect of the phase angle between the forewing and hindwing on the aerodynamic performance of a dragonfly-type ornithopter. *Aerospace* 2016, 3(1), 4; doi: 10.3390/aerospace3010004 : 15 pp. (in English) ["Dragonflies achieve



agile maneuverability by flapping four wings independently. Different phase angles between the flapping forewing and hindwing have been observed during various flight modes. The aerodynamic performance depends on phase angle control, as exemplified by an artificial flying ornithopter. Here, we present a dragonfly-like ornithopter whose phase angle was designed to vary according to the phase lag between the slider-cranks of the forewing and hindwing. Two microelectromechanical systems (MEMS) differential pressure sensors were attached to the center of both forewing and hindwing to evaluate the aerodynamic performance during flapping motions when the phase angle was changed. By varying the phase angle in both the tethered condition and free-flight, the performance of the forewing remained approximately constant, whereas that of the hindwing exhibited obvious variations; the maximum average value was two-fold higher than the minimum. The experimental results suggest that simple phase angle changes enable a flying ornithopter to control flight force balance without complex changes in the wing kinematics." (Authors)] Address: Takahashi, H., Dept of Mechano-Informatics, Graduate School of Information Science & Technology, Univ. Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8654, Japan

**16260.** Takahashi, Y.; Suyama, Y.; Matsuki, Y.; Funayama, R.; Nakayama, K.; Kawata, M. (2016): Lack of genetic variation prevents adaptation at the geographic range margin in a damselfly. *Molecular Ecology* 25(18): 4450-4460. (in English) ["What limits a species' distribution in the absence of physical barriers? Genetic load due to asymmetric gene flow and the absence of genetic variation due to lack of gene flow are hypothesized to constrain adaptation to novel environments in marginal populations, preventing range expansion. Here we examined the genetic structure and geographic variation in morphological traits in *I. asiatica* and *I. senegalensis* along a latitudinal gradient in Japan, which is the distribution center of *I. asiatica* and the northern limit of *I. senegalensis*. Genome-wide genetic analyses found a loss of genetic diversity at the edge of distribution in *I. senegalensis* but consistently high diversity in *I. asiatica*. Gene flow was asymmetric in a south-north direction in both species. Though body size and wing loading showed decreasing latitudinal clines (smaller in north) in *I. asiatica* in Japan, increasing latitudinal clines (larger in north) in these phenotypic markers were observed in *I. senegalensis*, particularly near the northern boundary, which coincided well with the location where genetic diversity began a sharp decline. In ectothermic animals, increasing latitudinal cline in these traits was suggested to be established when they failed to adapt to thermal gradient. Therefore, our findings support the possibility that a lack of genetic variation rather than gene flow swamping is responsible for the constraint of adaptation at the margin of geographic distribution." (Authors)] Address: Takahashi, Y., Frontier Research Inst. Interdisciplinary Sci., Tohoku Univ., Sendai, Miyagi, Japan. E-mail: takahashi.yum@gmail.com

**16261.** Takaki, Y.; Kinoshita, M.; Hayashi, K. (2016): Influence of a past nature experience to life form cognition of the students who want to become preschool teachers. *Research Bulletin of Kyushu Junior College of Kinki University* 46: 15-30. (in Japanese, with English summary) ["About five life species,

influence of a past nature experience to the grade of life form cognition based on a unified evaluation standard were investigated in the students who want to become preschool teachers. Although the differences of degree existed, the life form cognition grade of chicken, dragonfly and crab were higher in the students who experienced capture or breeding of them in the past. On the other hand, the life form cognition grade of carp and tulip were low regardless of having a past nature experience or not. Moreover, the students who could not recognize life form definitely were seen by factors such as a contribution degree to breeding, lack of observation, various form of species, difficulty to make a picture and influence of various media. The experience to watch the real thing directly is useful, but it is necessary to observe it consciously in that experience. Because the life form cognition grade of students seems to lower year by year, it is required to improve the power of observation and interest to nature by a practical lecture." (Authors)] Address: not stated

**16262.** Talukder, R.; Shivakumar, K.N. (2016): Measurement of vibrational stiffness and air damping of damselfly wings. *Journal of Biomaterials and Nanobiotechnology* 7: 127-141. (in English) ["A simple cantilever beam vibration test method made of biomorph and insect wing, were used to measure the vibrational stiffness and the air damping of insect wings. Vibration tests were performed in vacuum pressures to atmosphere and the wing stiffness and air damping factor were measured. The test method was found to be a viable method for measuring wing stiffness, natural frequencies and mode shapes. The vibrational deformation of the insect wings was found to be combination of bending and torsion because of unsymmetrical geometry of wing. The measured stiffness (K) of damselfly wings varied from 0.18 to 0.31 N/m and the air damping ratio ranged from 0.72 to 0.79. The undamped natural frequency (fn) at 13 kPa varied from 249 to 299 Hz and at atmosphere it varied from 168 to 198 Hz." (Authors)] Address: Talukder, R., Center for Composite Materials Research (CCMR), Dept of Mechanical Engineering, North Carolina A&T State Univ. (NC A&T SU), Greensboro, North Carolina, USA

**16263.** Tanaka, K. (2016): Functional biodiversity indicators and their evaluation methods in Japanese farmlands. *The Challenges of Agro-Environmental Research in Monsoon Asia*. Edited by Kazuyuki Yagi and C. George Kuo, National Institute for Agro-Environmental Sciences (NIAES), Tsukuba, Japan, Food and Fertilizer Technology Center (FFTC) for the Asian and Pacific Region, Taipei, Taiwan. NIAES Series 6: 160-169. (in English) ["To mitigate the detrimental environmental effects of modern agriculture, such as those from chemical fertilizers and pesticides, environmentally friendly farming systems have been developed and propagated. Such farming systems are expected to conserve both the wildlife inhabiting agroecosystems and overall biodiversity. However, actually little is known about the effect of environmentally friendly farming systems on biodiversity in agroecosystems. To address this issue, the research project "Selection of functional biodiversity indicators and development of assessment methods" was conducted in Japan across the 2008-2011 fiscal years. After the conclusion of this project in March

2012, a manual was published that describes indicator animals and explains the survey and evaluation methods used. This paper outlines the research project and describes some examples of the manual's contents." (Author)] Address: Tanaka, K., National Institute for Agro-Environmental Sciences, Kannondai 3-1-3, Tsukuba 305-8604, Japan. E-mail: tanaka@affrc.go.jp

**16264.** Tarasov, G.S.; Khamitov, O.I.; Frolova, L.A. (2016): Characterization of littoral macro-zoobenthos communities of the Kuybyshev Reservoir in the area of Kazan. Proceedings of Kazan University (Natural Sciences Series) 158(1): 135-147. (in Russian, with English summary) ["Seasonal fluctuations in the species composition and quantitative indices of benthic communities in the littoral zone of the Kuybyshev Reservoir were investigated near the village of Staroe Arakchino in the summer–autumn season of 2014. On the whole, 40 taxa of macrozoobenthos were identified during the period of investigation. These taxa belong to the following groups of invertebrates: the phylum of Mollusca (the classes of Bivalvia and Gastropoda), the class of Insecta (the orders of Diptera, Ephemeroptera, Odonata), and the phylum of Annelida (the classes of Oligochaeta and Hirudinea). The highest species diversity was observed for insects and mollusks species. There was a reduction in the species diversity compared to the data of a similar research performed in 2010–2013. Zoobenthos samples were characterized by the absence of some orders of insects (Trichoptera, Coleoptera larvae and adults) and Maxillopoda. The abundance and biomass indices of macrozoobenthos in 2014 were lower than the same indices in 2010–2013. Two classes of mollusks (Gastropoda and Bivalvia) formed the dominant group in abundance and biomass. The significant influence on the quantitative indices was produced by *Viviparus viviparus* (L., 1758), as well as by such invasive species as *Dreissena polymorpha* (Pallas, 1771) and *Lithoglyphus naticoides* (Pfeiffer, 1828)." (Authors)] Address: G.S. Tarasov, G.S., Kazan Federal University, Kazan, 420008 Russia. E-mail: gregtar@yandex.ru

**16265.** Terzani, F. (2016): Note su *Cordulegaster boltonii* (Donovan, 1807) in Italia centrosettentrionale (Odonata: Cordulegasteridae). *Onychium* 12: 23-39. (in Italian, with English summary) ["The *Cordulegaster boltonii* (Donovan, 1807) of the central-northern Italy (Odonata: Cordulegasteridae). The "atypical form" of *C. boltonii* inhabitant in the central-northern Italy is described and illustrated." (Author)] Address: Terzani, F., Museo di Storia Naturale dell'Università degli Studi di Firenze, sezione di Zoologia "La Specola", via Romana 17, I-50125 Firenze, Italia. E-mail: libellula.ter@gmail.com

**16266.** Theischinger, G.; Richards, S.J. (2016): A new species of *Gynacantha* Rambur, 1842, from Papua New Guinea (Odonata: Aeshnidae). *Odonatologica* 45(3/4): 317-326. (in English) ["*Gynacantha nuda* sp. nov. is described based on a male from Southern Highlands Province, Papua New Guinea. It is the largest known species of the genus to be reported from New Guinea. Characters of the adult male are illustrated, the affinities of the new species are discussed, and a key is presented to males of the *Gynacantha* species recorded from New Guinea." (Authors)] Address: Theischinger, G., NSW

Dept Planning & Environment, Office of Environment & Heritage, Water Science, PO Box 29, Lidcombe, NSW 1825, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

**16267.** Theischinger, G.; Richards, S.J. (2016): *Palaeosynthemis opaca* sp. nov., a new dragonfly from Papua New Guinea (Anisoptera: Synthemistidae). International Dragonfly Fund - Report 99: 1-8. (in English) ["A new species of the synthemistid genus *Palaeosynthemis* is described from the northern slopes of Papua New Guinea's central cordillera. It is distinguished from all congeners by having females with large, nearly black patches at the bases of both wings. The male is most similar to *P. cervula* and *P. feronia*, but it differs from those species in having superior anal appendages less than three times as long as S10, basally enlarged and otherwise unarmed vs basally not enlarged (*feronia*) and almost four times as long as S10 and armed (*cervula*). Characters of the adults (both sexes) are illustrated and the affinities of the species are discussed." (Authors)] Address: Theischinger, G., Office of Environment and Heritage New South Wales, Sydney, NSW, Australia, and Australian Museum, Entomology, 6 College Street, Sydney, NSW, 2010, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

**16268.** Theischinger, G.; Richards, S.J. (2016): Six new species of *Nososticta* Hagen, 1860 from Papua New Guinea (Odonata: Platycnemididae). *Odonatologica* 45(3/4): 291-316. (in English) ["The males and, when available, females of six new species of the damselfly genus *Nososticta* are described from the upper Fly, Strickland, and Kikori River basins in southern Papua New Guinea. They are *Nososticta caelestis* sp. nov. (♂ holotype, 10-viii-2014), *N. chrismulleri* sp. nov. (♂ holotype, 04-viii-2013), *N. makrodon* sp. nov. (♂ holotype, 01-viii-2013), *N. megantereon* sp. nov. (♂ holotype, 03-viii-2013, ♀ described), *N. ovimacula* sp. nov. (♂ holotype, 29-vii-2013, ♀ described), and *N. paraconifera* sp. nov. (♂ holotype, 02-viii-2013, ♀ described." (Authors)] Address: Theischinger, G., NSW Dept of Planning & Environment, Office of Environment & Heritage, Water Sci., PO Box 29, Lidcombe, NSW 1825, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

**16269.** Timofeev, A.N. (2016): The ecology and behavioral features of dragonflies (Insecta, Odonata) in the forest–steppe zone of Central Chernozem region. *Russian Journal of Ecology* 47(5): 501-507. (in English) ["The species composition of Odonata facultatively associated with forest ecosystems at the adult stage have been studied in the forest–steppe of Central Chernozem region. Factors facilitating the entry of adult dragonflies deep into forested areas, specific features of their behaviour in the forest, and the role of human activities in the spread of these insects in forest ecosystems have been elucidated." (Author)] Address: Timofeev, A.N., Voronezh State Pedagogical Univ., ul. Lenina 86, Voronezh, 394043, Russia

**16270.** Tirado-Hernández, E.L. (2016): Diversidad del orden Odonata en la localidad Surutato, Badiraguato, Sinaloa. *Bol. Soc. Mex. Ento. (n. s.) Número especial 2*: 6-10. (in Spanish, with English summary) ["This study was performed to measure diversity and to identify the species of the order Odonata

in the pine-oak forest in Surutato town, municipality Badiraguato, Sinaloa, Mexico. A total of 24 species of Odonata in this study were captured. Sinaloa only has record of 21 species, which means that 3 new records were obtained. The greatest diversity and abundance was recorded in September with a total of 57 individuals collected, with a variety of Shannon index  $H' = 2.6941$ ; in November were collected 50 individuals, and a diversity of Shannon index  $H' = 1.8328$ ; in December the lowest abundance and diversity of this study was recorded, with a total of 7 individuals, and a diversity of Shannon index  $H' = 0.41012$ .. (Author)] Address: Tirado-Hernández, Ercy Leticia, Universidad Autónoma de Sinaloa, Escuela de Biología Universidad Autónoma de Sinaloa. Calzada de las Américas y Universitarios, s/n, Ciudad Universitaria, Culiacán Rosales, C. P. 80030, Sinaloa, México. E-mail: ercytirado@gmail.com

**16271.** Tomazelli, O.Jr.; Franco, G.M.S.; Munarini, A.; Casaca, J.M.; Niero, R.; Monache, F.D. & Magro, J.D. (2016): *Melia azedarach* L. fruit extract as a potential candidate in controlling the *Neuraeschna* Hagen, 1867 (Odonata: Aeshnidae), predominant predators for fish fingerlings. *Braz. J. Aquat. Sci. Technol.* 20(1): 54-60. (in English) ["Odonata larvae in fishponds prey on fish fingerlings and decrease the profits from production. With the goal of eliminating these larvae from fishponds, large quantities of pesticides are applied. These products are toxic to fish and have unpredictable effects on the food chain. The objective of this study is to evaluate the effect of the plant extract of fruits of *Melia azedarach* (CEE) and of methyl parathion (MP) adsorbed in silica in the control of *Neuraeschna* larvae. The LC50-18h for CEE was 0.57 mg L<sup>-1</sup>, and for MP the LC50-12h was 0.17 mg L<sup>-1</sup>. Two compounds with the highest concentration were isolated and identified from CEE, linoleic acid and melianone. The latter is a triterpene precursor of limonoids, compounds with insecticide properties. The substitution of synthetic pesticides for natural products is a path towards the sustainability of fish farming." (Authors)] Address: Dal Magro, J., Programa de Pós-graduação em Ciências Ambientais (PPGCA) da Univ. Comunitária da Região de Chapecó, Chapecó, SC, Brazil. E-mail: jaci@unochapeco.edu.br

**16272.** Torres-Cambas, Y.; Cabana-Otero, M.; Lorenzo-Carballa, M.O.; Cordero-Rivera, A (2016): Conservation status and protection of three Antillean endemic damselflies. *Journal of Insect Conservation* 20(2): 277-284. (in English) ["*Hypolestes* (Odonata, Zygoptera) is a damselfly genus endemic to the Greater Antilles. The genus comprises three species: *H. clara* from Jamaica, *H. trinitatis* from Cuba, and *H. hatuey* from Hispaniola, which are currently evaluated by the IUCN as Endangered (EN), Vulnerable (VU) and Data Deficient, respectively. Here, we re-assess the conservation status of these species based on their extent of occurrence, as estimated from ecological niche models. In addition, we analyse the coverage offered to each of the three species by the protected areas from Jamaica, Cuba, Dominican Republic and Haiti. Our results support the maintenance *H. trinitatis* in the category of VU, and suggest the re-classification of *H. hatuey* as Near Threatened. The estimated extent of occurrence for *H. clara* is 6422 km<sup>2</sup>, a value close to the threshold of 5000 km<sup>2</sup> between VU

and EN. Therefore, we recommend keeping *H. clara* as EN, until new evidence based on population size and trend could support a change from this category to VU. We found that 14 % of the extent of occurrence for *H. clara* and *H. hatuey*, and 33 % for *H. trinitatis*, are within protected areas. However, the ongoing extensive deforestation in Hispaniola, coupled with the lack of protection in Haiti, could cause a decrease of the extent of occurrence of *H. hatuey* in the future." (Authors)] Address: Torres-Cambas, Y., Depto Biol., Fac. Cien. Naturales y Exactas, Univ. de Oriente. Patricio Lumumba s/n, Santiago de Cuba, Cuba. E-mail: yusdiel.torres@gmail.com

**16273.** Tsurusaki, N.; Yin, Z.; Iwamoto, M. (2016): Adult emergence pattern of the golden frangetail *Sinictinogomphus clavatus* (Odonata: Anisoptera: Gomphidae) in the last year of its occurrence in Lake Koyama, Tottori City, Honshu, Japan. *Sanin Natural History Research* 13: 37-44. (in Japanese, with English summary) ["*S. clavatus* was one of the commonest dragonflies in Lake Koyama in Tottori City (Tottori Prefecture, Honshu, Japan) before the intentional induction of higher salinity (3.5–8.75 ppt) in March in 2012 by the local government. We surveyed pattern of adult emergence of the species by collecting exuviae of larvae every day during the adult emergence from June to early August in 2012 which became the last year of the occurrence of the species in the lake. The results obtained were as follows: 1) There was a tendency that females tend to emerge earlier than males (protogeny). 2) Females were larger than males and individuals molted earlier were larger than those emerged later in both males and females. No adult emergence from the lake has been observed since 2013 due to high salinity." (Authors)] Address: Tsurusaki, N., 4-101 Kohanamachi Minami Tottori City 680 - 8551 Tottori University Dept of Regional Environmental Studies, Japan. E-mail: ntsuru@rs.tottori-u.ac.jp

**16274.** Turiault, M. (2016): The type material of Calopterygidae in the Museum für Naturkunde in Berlin (Odonata). *Odonatologica* 45(1/2): 95-106. (in English) ["A catalogue is presented listing all species-group names associated with type specimens of the family Calopterygidae (Odonata) currently housed in the entomological collection of the Museum für Naturkunde - Leibniz Institute for Evolution and Biodiversity Science in Berlin (Germany). Information on the current status of the species-group names, transcriptions of data labels and references to the original descriptions are provided." (Author) *Archineura incarnata* (Karsch, 1892); *Hetaerina infecta* Calvert, 1901; *Matrona kricheldorffi* Karsch, 1892 = *Matrona basilaris* Selys, 1853; *Mnesarete pruinosa* (Hagen in Selys, 1853); *Mnesarete pudica* (Hagen in Selys, 1853); *Sapho venusta* Karsch, 1889 = *Sapho orichalcea* McLachlan, 1869] Address: Turiault, Mélanie, Uhlenhorster Str. 23, 12555 Berlin, Germany. E-mail: melanieturiault@msn.com

**16275.** Twissell, I.; Hart, A. (2016): Dragonflies & damselflies of Gloucestershire: Their distribution and status. *The Gloucestershire Naturalist* 28 (Special issue): 192 pp. (in English) ["The present publication includes a checklist and accounts of all 35 species of Odonata that have occurred in the two vice-counties with accompanying maps, flight-time histograms



and photographs, as well as their breeding and Red List status, and some of the best locations to visit. The maps show the distribution of species up to the end of 2014, with notes of additional significant sightings that occurred in 2015 in the text. The book includes all of Vice-Counties 33 and 34, covering Gloucestershire as far north as Tweekesbury area, and South Gloucestershire as far south as some areas of Bristol. Three species have been re-recorded since publication of *Distribution of Dragonflies in Gloucestershire in 1991*. The species new to the county since 1991 are Yellow-winged Darter in 1995, Lesser Emperor in 1996, Variable Damselfly in 1998 (although an old record exists in South Gloucestershire VC34; this area not being covered by the 1991 Atlas), Scarce Chaser in 2004, Southern Emerald Damselfly in 2006, Small Red-eyed Damselfly in 2006, Small Red Damselfly in 2013, and Vagrant Emperor in 2013." (Publisher)] Address: not stated

**16276.** Ueda, K.; Ashizawa, J.; Fujimoto, Y.; Shimada, T. (2016): Survey in 2014 of the adult Odonata fauna in Lake Izunuma-Uchinuma and the surrounding area, Miyagi Prefecture, Japan. Research report of Uchinuma 10: 21-37. (in English) ["We carried out qualitative observations of adult Odonata fauna at Lake Izunuma-Uchinuma and the surrounding area, Miyagi Prefecture, Japan, in 2014. We observed a total of 10 families and 37 species including 3 species which newly were recorded. Previous studies have recorded a total of 10 families and 44 species in this area. 7 out of 10 species which were not found in this study were designated as an endangered species by Red List of Miyagi Prefecture and/or Red Data Book in Japan. These results indicate that Lake Izunuma-Uchinuma and the surrounding areas are available for over 30 odonate species as habitat, but not for endangered odonate species." (Authors)] Address: Ueda, K., Miyagi Prefectural Izunuma-Uchinuma Environmental Foundation. 17\_2 Shikimi, Wakayanagi, Kurihara, Miyagi 989-5504, Japan. E-mail maraka@hotmail.co.jp

**16277.** Ujszegi, J.; Gál, Z.; Mikó, Z.; Hettyey, A. (2016): No effect of a glyphosate-based herbicide on larval *Aeshna cyanea* and adult newts (*Lissotriton vulgaris*) in a laboratory-based experiment. *Acta Zoologica Academiae Scientiarum Hungaricae* 62(4): 355-367. (in English) ["Pesticides can exert negative effects on aquatic organisms at very low concentrations. While several prey taxa are frequently used as models in ecotoxicology studies, there is little information about the pesticide-sensitivity of predators. We examined the effects of a frequently applied glyphosate-based herbicide on two common aquatic predators: larval *A. cyanea* dragonflies and adult male *Lissotriton vulgaris* newts, which are top predators in ephemeral water bodies lacking fishes. We exposed predators to the herbicide for 18 days under laboratory conditions and measured potential effects on survival, activity, body mass and predatory activity. To maximize detectability of effects, we applied the herbicide at a concentration of 6.5 mg a. e. glyphosate/L, corresponding to the highest concentration expected in nature. Our results showed that the tested herbicide formulation did not have severe effects on any of the measured fitness-related traits. Results of the present study support the hypothesis that the tested species

are insensitive to the herbicide and are able to fulfil their important ecological role of top-down regulation even in highly contaminated habitats. However, potential long-term or indirect effects of the herbicide on the fitness of aquatic predators remain unknown." (Authors)] Address: Gál, Z., Lendület Evolutionary Ecology Research Group, Plant Protection Institute, Centre for Agricultural Research, Hungarian Academy of Sciences, Budapest, Hungary. E-mail: zoltan.gal89@gmail.com

**16278.** Upton, L.; Price, B.; Percy, D.; Brooks, S. (2016): Applying novel digital visualization tools and traditional morphometrics to the analysis of wing size and asymmetry and to male wing spot size in *Calopteryx splendens* (Harris) (Banded Demoiselle). *Journal of the British Dragonfly Society* 32(1): 8-25. (in English) ["*C. splendens* has sexually dimorphic wing pigmentation: males have a wing spot which is lacking in females. We investigated the relationship between wing size, wing asymmetry and, in males, the size of the pigmented area, against latitude, longitude, mean winter and summer temperatures and the time of year the specimen was collected. A total of 270 specimens were analysed, using Pearson's product moment correlation, from museum collections in England and Scotland. Wing size was significantly positively correlated with latitude and mean winter temperature, in both males and females, and wing spot size was positively correlated with collection day in males. Increasing wing size with latitude follows Bergmann's Rule and increasing wing size with increasing mean winter temperature may reflect increased larval growth during warm winters. Increase in wing spot size through the summer probably does not reflect a temperature response, since increasing summer temperature might be expected to lead to smaller wing spots if these had a thermoregulatory function. It is more likely that enhanced pigmentation of the wing spots may lead to increased reproductive success, which becomes a premium as the summer advances." (Authors)] Address: Upton, Laura, University College London, Gower Street, London, WC1E 6BT, UK

**16279.** Verma, P.; Andrew, R. (2016): Structure of the female reproductive system of the dragonfly *Orthetrum sabina sabina* (Drury 1770) (Anisoptera: Libellulidae). *Journal of Entomology and Zoology Studies* 4(5): 457-462. (in English) ["The female reproductive system in *O. s. sabina* consists of a pair of ovaries and a post ovarian genital complex (POGC). The ovaries are long, thin panoistic type germinal tissues occupying the first to the sixth abdominal segment. The mature ovariole consist of the terminal filament, germarium, vitellarium and pedicel. The POGC is composed of the sperm storage organ and vagina. The sperm storage organ is formed of a small bursa copulatrix and a pair of spermathecae with long tubular duct. The vagina is a short laterally folded tube covered by thick muscle bands. On the mid-dorsal region, the POGC bears a highly complex sclerotized cuticular collar formed of three pairs of cuticular plates. The POGC is ectodermal in origin and is composed of outer muscle, middle epithelial and inner cuticular layer. These layers exhibit site specific modifications with respect to the functional significance of the components." (Authors)] Address: Verma, P., P. G. Dept Zool., Hislop College, Civil Lines, Nagpur-01, Maharashtra, India

**16280.** Vilenica, M.; Alegro, A.; Koletić, N.; Mihaljević, Z. (2016): New evidence of *Lindenia tetraphylla* (Vander Linden, 1825) (Odonata, Gomphidae) reproduction at the north-western border of its distribution. *Nat. Croat.* 25(2): 287-296. (in English, with Croatian summary) ["A total of 12 dragonfly species were recorded at Vlačine Reservoir in the Dinaric Western Balkan region (ER 5) in Croatia. Habitat conditions, i.e. vegetation structure and physico-chemical water properties of the reservoir, are presented and discussed. Habitat conditions were suitable for life cycle completion of Mediterranean species such as *Lindenia tetraphylla* and *Selysiothemis nigra*. Exuviae of *L. tetraphylla* represent new evidence of the species' reproduction in the north-western border of its distribution." (Authors)] Address: Vilenica, Marina, Univ. of Zagreb, Faculty of Teacher Education, Dept in Petrinja, Petrinja, Croatia. E-mail: marina.vilenica@gmail.com

**16281.** Vincy, M.V.; Brilliant, R.; Pradeep Kumar, A.P. (2016): Checklist of Odonata species as indicators of riparian ecosystem of a tropical river, the southern Western Ghats, Kerala, S. India. *Journal of Entomology and Zoology Studies* 4(2): 104-108. (in English) ["A total of 36 species of odonates, including 24 species of Anisoptera belonging to 3 families and 12 species of Zygoptera belonging to five families were recorded from the riparian zones of Meenachil River Basin, Kottayam District. The study was carried for a period of six years from 2009-2015. The highest diversity of odonates was that of family Libellulidae (61.11%), followed by Coenagrionidae (13.89%), Calopterygidae (10.71%), Gomphidae (8.33%) and Platycnemididae (5.56%). Six species were reported for the first time. Our data revealed odonate assemblages specific to the studied habitats such as marshlands, flowing water bodies, stagnant water bodies and vegetation type (wet zone and dry zone). These data will be useful in future studies and conservation of biodiversity in the studied habitats." (Authors)] Address: Vincy, M.V., Dept of Zoology, St., Berchmans College, Changanacherry, India

**16282.** Wada, S. (2016): Odonata species observed in San Diego, California, U.S.A. *Aeschna* 52: 1-16. (in Japanese, with English summary) ["The author stayed in San Diego, California, from July 6th to 31st and August 8th to September 26th in 2014, and collected or took pictures of 20 Odonata species. Among them, the record of *Ischnura ramburii* collected at Buena Vista Creek, Carlsbad, is probably the first record in the coastal area of California. Some of the specimens and photographs reported in this paper were identified by Dr. Rosser W. Garrison." (Author)] Address: Wada, S., 3-8-18, Nishikida, Fukui-shi, 918-8004, Japan

**16283.** Walia, G.K.; Gill, J.K.; Hallan, H.K. (2016): C-Banding and Ag-NOR Staining on *Neurobasis chinensis chinensis* (Linnaeus) of Family Calopterygidae from Himachal Pradesh, India (Odonata: Zygoptera). *Cytologia* 81(2): 175-178. ["*N. c. chinensis* of the family Calopterygidae is the only species of this genus present in India. This species was collected from Andretta and Mcleodganj areas of Himachal Pradesh, India. The species possesses  $2n=23$  which is less than the type number ( $2n=25$ ) of the family. The chromosome

complement shows the presence of large pair of autosomes originated by the fusion of two autosome pairs and is responsible for the reduction in the chromosome number. This fusion has been confirmed by C-banding with the presence of two interstitial and terminal C-bands on the largest autosomal bivalent having two chiasmata while remaining autosomal bivalents possess terminal C-bands and single chiasma which is the characteristic feature of Odonata. Ag-NOR staining shows the presence of terminal NOR bands in seven autosomal bivalents and the X chromosome is rich in NORs. C-banding and Ag-NOR staining have been performed for the first time on this species." (Authors)] Address: Walia Gurinder Kaur, Dept of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab, India

**16284.** Walker, G. (2016): Flight periods of dragonflies and damselflies in Orkney. *Journal of the British Dragonfly Society* 32(2): 60-71. (in English) ["There are eight breeding species of odonate in Orkney, four zygopterans and four anisopterans. Using data from records for Orkney, the flight times of these species have been established to provide an Orcadian flight season table." (Author)] Address: Walker, G., Starafea, Holm, Orkney, KW17 2SB, UK

**16285.** Wandera, D.A.; Mukhwana, M.N. (2016): Effect of flower farm effluents on diversity and composition of macroinvertebrates in Marura wetland. *Agriculture, Forestry and Fisheries* 5(6): 207-214. (in English) ["Wetlands are important sites for biological conservation due to their rich biodiversity which possess high productivity. They also offer shelter to many organisms and offers services such as water purification and flood control. However, biodiversity in wetlands has been reduced due to human activities that cause pollution like, flower farm effluents which are discharged directly to wetlands or river systems. Four water quality parameters; DO, BOD, pH, TDS, TSS and macro-invertebrates composition were investigated at four different stations (S1, S2, S3, S4) adjacent to Equator Flower Farm along the Marura wetland. PAST program was used to calculate diversity indices and richness in the macroinvertebrates communities. Station S2 had the highest temperature (22.6°C), whereas S4 had the lowest temperature (19.6°C). The pH value did not vary along the stations (8.3-6.3). The DO level fluctuated along the river, station S1 had highest level of 3.6 mg/l and lowest station S3 had 0.8mg/l. TSS and TDS did not show significant variations, while BOD levels varied with different stations. The highest value of TN was recorded at Station 3 (0.33±0.045mg/l-1). There was no significant difference ( $p=0.055$ ) in three stations (S1, S2, S4) except S3. In total 10 orders, 30 genera and 30 families of macroinvertebrates were identified. The orders; Odonata, Coleoptera, Hemiptera and Diptera were the main macroinvertebrates found in all station, while the members of orders; Ephemeroptera, Trichoptera, Oligochaeta Mollusca, Gnathobellidae and Isopoda were few in all sampling stations. Station S2 and S4 had the highest species diversity compared to station S1 and S3 which had the lowest diversity. DO, BOD and temperature were found to have a significant effect on abundance and composition of benthic organisms with S3 having less abundance due to its

proximity to the flower farm." (Authors)] Address: Wandera, D.A., Dept of Fisheries and Aquatic Science, University of Eldoret, Eldoret, Kenya. E-mail: dawandera@gmail.com

**16286.** Wasscher, M.T.; Verspui, K.; Cammaerts, R. (2016): An *Aeshna affinis* watercolour by Pierre Léonard Vander Linden (1797-1831) found in the Selys collection. *Notulae odonologica* 8(7): 240-245. (in English) ["A yet unknown watercolour by Pierre Léonard Vander Linden showing a male of *Aeshna affinis* was found in the collection of Edmond de Selys Longchamps in the Royal Belgian Institute for Natural Sciences (RBINS) in Brussels. The circumstances of discovery and a biographical sketch of the artist are provided and the biographical chronology of the drawing is established." (Authors)] Address: Wasscher, M., Minstraat 15bis, 3582 CA Utrecht, The Netherlands, E-mail: marcel.hilair@12move.nl

**16287.** Westermann, E. (2016): Vorkommen und Schutz der Kleinen Moosjungfer (*Leucorrhinia dubia*) im Oberen Hotzenwald (Hochschwarzwald). *Naturschutz südl. Oberrhein* 8: 187-191. (in German, with English summary) ["From 2011 to 2015 populations of dragonflies in the moors of the upper Hotzenwald were recorded. *L. dubia* was recorded in the 1980ies in former peat-digging areas in five moors in this area, which, however, have been largely silted since then. A re-population has occurred since 2012 in artificial moor ponds, which evolved during restitution measurements when wide ditches were blocked. In the first moor the numbers of freshly emerged imagoes increased annually up to at least 700 individuals in 2015. In the second moor the numbers have remained low so far. During several months of draught and heat from July 2015 onwards the water level of the pond with the highest population by far decreased to small remainders, whereas the other water bodies had sufficient water during the whole development period. For the protection of the locally important population the water level needs to be stabilized by further improvement of the water blockings." (Author)] Address: Westermann, Elisabeth, Buchenweg 2, 79365 Rheinhausen., Germany

**16288.** Westermann, K. (2016): Zur Phänologie der Emergenz der Kleinen Moosjungfer (*Leucorrhinia dubia*) im Hochschwarzwald. *Naturschutz südl. Oberrhein* 8: 192-195. (in German, with English summary) ["In two bogs in the Southern Black Forest, in 2014 and 2015 *L. dubia* emerged from mid-May, reaching the highest abundance of emergence during the first ten days of June. Half of each annual population had hatched only after two to three weeks, and in two accurately investigated cases, after 16 and 18 days. In spatially adjacent bog ponds, imagoes emerged in both years on average at statistically significantly different times, which was probably dependent on the daily exposure of the water to sunshine. During the first ten days of July 2015, a pronounced second peak of emergence was observed in one bog. The obtained data about the phenology of emergence differ to existing literature data for the Black Forest. The differences can be explained sufficiently with different altitudes and different degrees of exposure to sunshine of each investigated water body." (Author).] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen., Germany

**16289.** Westermann, K. (2016): Die Libellen des Naturschutzgebiets „Hinterzarter Moor“ – Moorlibellen als Indikatoren des Moorzustands. *Naturschutz südl. Oberrhein* 8: 139-165. (in German, with English summary) ["80 hectares of the "Hinterzarter Moor" are declared as a nature reserve. It consists of a natural transition and peat-bog called „Westmoor“, a partially drained peat-bog called „Ostmoor“, and spruce forests and meadows. In the „Westmoor“ some large bog pools as well as many small water bodies can be found. Between the end of May and beginning of September 2015 exuviae were collected over twelve days at the margins of the water bodies. Due to a pronounced emergence peak of *Aeshna subarctica* four controls were made at the first half of July. All bog dragonflies which can be regularly found in the Black Forest have reproductive populations in the "Westmoor". A very large population of *Aeshna subarctica* and fairly big populations of *Aeshna juncea*, *Somatochlora arctica*, *Leucorrhinia dubia* and *Coenagrion hastulatum* were found. A small but probably stable population of *S. alpestris* at its lower altitudinal distribution limit in the Black Forest was found. remarkably, a small population of *Lestes dryas* was found in a marginal sedge reed, which had been recorded for the first time approximately 40 years ago. A few decades ago marked population decreases of *A. subarctica* and other species were reported from the „Westmoor“, which were related to severe eutrophication and a rapid infilling caused by a nutritional load from a rubbish dump and rivulets. Although the populations of the dragonflies changed dynamically at that time, the present investigation was the first since this occurrence. The result was surprisingly high populations of the representative species, which could only be explained by a partial regeneration of the "Westmoor". *A. subarctica* stood out, which has obviously recently developed a new nucleus of the metapopulation of the area Hinterzarten/ Feldberg. In the future investigations should be carried out at regular intervals of approximately five years and the regeneration should be supported by diverse measurements. In the „Ostmoor“, natural moor water bodies have not existed for quite some time. At present only a few species with a small number of individuals exist in almost completely silted former drainage ditches and peat-digging areas. restitution measurements by the NABU Baden-Württemberg will however lead to a significant increase of the water level in the moor and create new habitats for bog dragonflies." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen., Germany

**16290.** Wildermuth, H. (2016): Auswirkung der Hochmoorregeneration auf die Libellenfauna (Odonata) des Torfrieds Pfäffikon (ZH). *Entomo Helvetica* 9: 41-51. (in German, with English and French summaries) ["Impact of raised bog restoration on the dragonfly fauna of an exploited peat bog in the Swiss Midlands. - The remains of a highly exploited and overgrown peat bog near Pfäffikon (ZH) (Switzerland) were restored in a step-by-step process between 2003 and 2015 by the impoundment of drainage ditches and the partial clearing of woodland. The removal of trees allowed for more sunlight at a number of former peat-ditches thus rendering them more suitable for dragonfly reproduction. Subsequent monitoring from 2010 to 2015 revealed that 16 species of indigenous



Odonata colonized up to ten bodies of water a year. Most of these species were recorded before bog restoration but only in small numbers and restricted to the four peat-ditches that had been left partially cleared. These species dispersed over the cleared area and some populations strengthened significantly. *Leucorrhinia pectoralis*, critically endangered and currently confined to peat-ditches in Switzerland, was of special interest. This libellulid reacted to the implemented measures by establishing a strong and stable population. In order to improve the breeding conditions of odonates, floating mats of vegetation were recently removed from five partially or completely overgrown peat-ditches. For sustainable conservation and promotion of the local dragonfly fauna, reeds are mowed annually and water bodies are managed using a rotational strategy." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**16291.** Wildermuth, H. (2016): Aeshna-Larve wehrt sich gegen Molchgriff mit Kaudalstacheln. *Mercuriale* 16: 45-48. (in German, with English summary) ["Aeshna larva defends itself against newt attack with anal spines - At a small garden pond an adult alpine newt *Ichthyosaura alpestris* was observed to snap an F-0-larva of *A. cyanea* from the side, obviously taking it for a prey. The larva reacted immediately, striking out at the newt by a fierce sideways movement of the abdomen and stabbing the assailant with the anal spines. This accidental Observation is obviously the first report on the use of anal spines by an aeshnid larva as defence weapons against predator attack in a seminatural habitat.] Address: Wildermuth, H., Haltbergstrasse 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**16292.** Willigalla, C.; Schotthöfer, A.; Frank, D. (2016): Zur Situation von *Orthetrum albistylum* in Rheinland-Pfalz (Odonata: Libellulidae). *Libellula* 35(3/4): 217-221. (in German, with English summary) ["The situation of *O. albistylum* in Rheinland-Palatinate (Odonata: Libellulidae) – *O. albistylum* was observed for the second time, in 2016, after the first record in 2008 in Rhineland-Palatinate. On both occasions, only one adult male was found. The total number of dragonfly species recorded for the federal state has now risen to 69." (Authors)] Address: Willigalla Ökol. Gutachten, Am Großen Sand 22, D-55124 Mainz, Germany. E-mail: christoph@willigalla.de

**16293.** Willigalla, C. (2016): Neue Entwicklungen der Libellenfauna im Soonwald, Rheinland-Pfalz (Insecta: Odonata). *Fauna Flora Rheinland-Pfalz* 13(2): 557-571. (in German, with English summary) ["Within the EU-LIFE Project "Soonwald" 49 ponds were maintained and 35 bodies of water newly created in winter 2010. Both at the beginning and at the end of the project, in 2014, the Odonata were mapped at 56 ponds, totally. In 2011 19 Odonata species were registered, in 2014, 25 odonata species were recorded. 17 species showed a positive trend, eight species acted steadily. Three species, *Coenagrion scitulum*, *Sympetma fusca* and *Brachytron pratense*, were indexed for the first time in this physical region, so in total 29 species are known of the Soonwald." (Author)] Address: Willigalla, C., Ökol. Gutachten, Am Großen Sand 22, 55124 Mainz, Germany. E-mail: christoph@willigalla.de

**16294.** Worthen, W.B. (2016): Observation of wing-whirring O Libellulidae). *Notulae odonatologicae* 8(8): 261-265. (in English) ["Dragonflies are classified behaviourally as perchers or fliers. The thermoregulatory behaviour of wing-whirring to generate heat is common in fliers but rare in perchers. On 25-I-2016, I observed and photographed a female *M. atra*, a percher, engaged in wing-whirring behaviour while perched in the Cantarrana Swamp at La Selva Biological Station, Heredia Province, Costa Rica." (Author)] Address: Worthen, W.B., Biology Dept, Furman Univ., Greenville, SC 29613, USA. E-mail: wade.worthen@furman.edu

**16295.** Worthen, W.B.; Morrow, P.H. (2016): Perch selection by three cooccurring species of *Celithemis* (Odonata: Libellulidae): Testing for a competitive hierarchy among similar species. *Psyche*, Volume 2016, Article ID 9028105, <http://dx.doi.org/10.1155/2016/9028105>: 8 pp. (in English) ["In many communities of perching dragonflies (Odonata: Libellulidae), a size-dependent competitive hierarchy creates a positive relationship between male body size and perch height. We tested for this pattern among three similar-sized species: *Celithemis elisa*, *C. fasciata*, and *C. ornata*. Males were caught and photographed from May to July 2015 at Ashmore Heritage Preserve, Greenville County, SC, USA, and perch heights and perch distance to open water were measured. Five indices of body size were measured with ImageJ software: abdomen length, forewing length, hindwing length, area of forewing, and area of hindwing. *C. fasciata* was significantly larger than the other two species for all five anatomical characters and used perches that were significantly taller and closer to open water than the other species, though these differences changed over the summer. Aggressive interactions between and within species were tallied and compared to expected distributions based on mean relative abundances derived from hourly abundance counts. Patterns of interspecific aggression were also consistent with a size-dependent hierarchy: the large *C. fasciata* was attacked less frequently, and the small *C. ornata* more frequently, than predicted by their relative abundances. We conclude that even small differences in body size may contribute to niche partitioning in perch selection." (Authors)] Address: Worthen, W.B., Biology Dept, Furman Univ., Greenville, SC 29613, USA. E-mail: wade.worthen@furman.edu

**16296.** Xu, Q.-h. (2016): Description of the final stadium larva of *Philoganga vetusta* Ris, with discussion of the taxonomic characters of the larvae of the genus *Philoganga* Kirby (Odonata: Philogangidae). *International Journal of Odonatology* 19(1-2): 69-74. (in English) ["The final stadium larva of *P. vetusta* is described and illustrated in detail. The larva of supposed *P. vetusta* from Hong Kong is confirmed, and that of *Philoganga* sp. from Fujian can be determined to be *P. robusta*. The taxonomic characters and systematic status of the larvae of genus *Philoganga* are discussed and summarized." (Authors)] Address: Xu, Q.-h., Dep of Garden and Horticulture, Zhangzhou City University, Zhangzhou, Fujian, PR China

**16297.** Yang, D. (2016): Important Medicinal Insects of China. Henan Science and Technology Press: 432 pp. (in Chinese) [Chapter II treats Odonata.]

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2016

**16298.** Yin, Z.; Tsurusaki, N. (2016): Odonate fauna in Lake Tanegaiké, and two irrigation ponds in Otsuka, Tottori City, Honshu, Japan. *Sanin Natural History Research* 13: 25-35. (in Japanese, with English summary) ["Odonate communities were surveyed in three lakes and ponds (Lake Tanegaiké near Tottori Sand Dunes, Otsuka Pond A in Otsuka, and Otsuka Pond B in Takazumi) in Tottori City, Tottori Pref., Honshu, Japan in 2014. A total of 33 species (21 from Lake Tanegaiké, 28 from Otsuka Pond A (*Trigomphus melampus* is a new record), 28 from Otsuka Pond B (Of these, 11 species are new records) were found. *Shaogomphus postocularis*, which is rare in eastern part of Tottori Prefecture and listed on the red list (2012) of Tottori Prefecture, was found in Lake Tanegaiké. A few individuals of *Tramea virginia*, which is considered to be an immigrated dragonfly species from breeding areas somewhere in Shikoku or Kyushu and its records are scarce in Tottori Prefecture, were found in Otsuka Pond A. Simpson's diversity indices of odonate communities (excluding Family Coenagrionidae) generally increased from spring towards summer and decreased in autumn, though fluctuation of the index was large in Otsuka Pond B due to mowing and drainage of the pond." (Authors)] Address: Tsurusaki, N., Department of Regional Environment, Faculty of Regional Sciences, Tottori University, Tottori City, 680-8551 Japan

**16299.** Yong, H.-S.; Song, S.-L.; Suana, I.W.; Eamsobhana, P.; Lim, P.-M. (2016): Complete mitochondrial genome of *Orthetrum* dragonflies and molecular phylogeny of Odonata. *Biochemical Systematics and Ecology* 69: 124-131. (in English) ["Complete mitogenome of *Orthetrum* dragonflies are determined by next generation sequencing. •Molecular phylogeny based on 13 PCGs is concordant with 15 mitochondrial genes (13 PCGs and 2 rRNA genes). •The Libellulidae (Anisoptera) is monophyletic with two lineages: (*Orthetrum*) + (*Brachythemis* + *Hydrobasileus*). •The Zygoptera is monophyletic with three lineages. •The enigmatic *Epiophlebia superstes* (*Epiophlebiidae*) forms a sister group with Zygoptera. Abstract: Dragonflies of the genus *Orthetrum* are members of the anisopteran family Libellulidae. To date,

there are no reports on the phylogeny of *Orthetrum* dragonflies based on the complete mitochondrial genome (mitogenome). There is only a single entry of a nearly complete mitogenome for *O. melania*. We report here the complete mitogenome of *O. chrysis*, *O. glaucum*, *O. sabina* and *O. testaceum* and their phylogenetic relationships with other taxa of Libellulidae as well as *Epiophlebiidae*, Anisoptera and Zygoptera. The whole mitogenomes of these four species possessed 37 genes (13 protein-coding genes – PCGs, 2 rRNA and 22 tRNA genes) and a non-coding region. Molecular phylogeny based on 13 PCGs was concordant with 15 mitochondrial genes (13 PCGs and 2 rRNA genes). The Libellulidae (Anisoptera) was monophyletic with two lineages: (*Orthetrum*) + (*Brachythemis* + *Hydrobasileus*). It formed a sister group with *Corduliidae*. The Zygoptera was monophyletic with three lineages: (*Calopterygidae*) + (*Euphaeidae* + *Pseudolestidae*) + (*Coenagrionidae* + *Platynemididae*). The enigmatic *Epiophlebia superstes* (*Epiophlebiidae*) forms a sister group with Zygoptera. The complete mitogenome is useful for determining the higher-level phylogenetic relationships of Odonata." (Authors)] Address: Song, Sze-Looi, Institute of Ocean and Earth Sciences, University of Malaya, Kuala Lumpur, Malaysia. looi511@hotmail.com

**16300.** Yu, X. (2016): A description of the larva of *Mesopodagrion tibetanum australe* (Odonata: "Megapodagrionidae"). *International Journal of Odonatology* 19(4): 275-282. (in English) ["The larva of the genus *Mesopodagrion* was identified with the help of DNA barcoding and described for the first time. The larvae have flat horizontal gills resembling those of *Argiolestidae* but the adults lack setae on the shaft of the genital ligula. Molecular data are shown to be useful and necessary in larval identification and should be adopted as a standard tool in future studies." (Author)] Address: Yu, X. Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, PR China. E-mail: lannysummer@163.com

**16301.** Zapata, A.I.; Pereyra, M.C. (2016): Odonatos asociados al curso superior y medio del río Suquía, Córdoba, Argentina. *Revista de la Sociedad Entomológica Argentina* 75(3/4): 135-138. (in Spanish, with English summary) ["The first list of regional odonatofauna of Córdoba is presented

with 24 species. *Acanthagrion lancea* Selys, *Telebasis willinki* Fraser (Zygoptera: Coenagrionidae), *Erythrodiplax nigricans*, *E. umbrata*, *Miathyria marcella*, *Orthemis nodiplaga*, *Pantala flavescens* and *P. hymenaea*, are new records for the province." (Authors)] Address: Zapata, Adriana, Introducción a la Biología, Diversidad Animal I y Museo de Zoología, Facultad de Ciencias Exactas, Físicas y Naturales, Univ. Nacional de Córdoba, Av. Vélez Sarsfield 299, X5000JJC, Córdoba, Argentina. E-mail: adrzapata@unc.edu.ar

**16302.** Zardo, E.L.; Behr, E.R. (2016): Trophic ecology of Loricariichthys melanocheilus Reis & Pereira, 2000 (Siluriformes: Loricariidae) in Ibicuí river, southern Brazil. *Maringá* 38(1): 67-76. (in English, with Portuguese summary) ["Aiming to characterize aspects of the trophic ecology of Loricariichthys melanocheilus in the Ibicuí River, bimonthly samples were taken in lotic and lentic ecosystems. Fish were caught and fixed in 10% formalin and dissected for stomach content analysis. Items were identified to the lowest taxonomic level possible. Stomach fullness (SF), repletion index (RI) and intestinal quotient (IQ) were estimated. Diet was assessed by the frequency of occurrence and the volumetric method, combined to obtain an Alimentary index. Feeding activity was analyzed with mean values of SF, RI and vacuity index (VI), which represents the percentage of empty stomachs. These parameters were compared seasonally, spatially, and according to the circadian rhythm. The main items in the trophic spectrum of *L. melanocheilus* were detritus, sediment, plant organic matter, nematodes, micro crustaceans (Copepoda, Cladocera) and insects (Diptera, Trichoptera, Ephemeroptera and Odonata). No environmental or seasonal variations were found for the consumed items. Feeding activity showed seasonal and environmental variations according to RI but did not significantly change according to SF. The IQ was 1.51, and showed seasonal variations, indicating changes in the diet." (Authors)] Address: Zardo, E.L., Faculdade de Agronomia, Universidade Federal do Rio Grande do Sul, Av. Porto Alegre, Rio Grande do Sul, Brazil. E-mail: everton\_zardo@hotmail.com

**16303.** Zhao, Y.; Wang, D.; Tong, J.; Sun, J. (2016): Nanomechanical behaviour of the membranous wings of dragonfly *Pantala flavescens* Fabricius. *Journal of Bionic Engineering* 13(3): 388-396. (in English) ["The dragonfly has excellent flying capacity and its wings are typical 2-dimensional composite materials in micro-scale or nano-scale. The nanomechanical behavior of dragonfly membranous wings was investigated with a nanoindenter. It was shown that the maxima of the reduced modulus and nanohardness of the in-vivo and fresh dragonfly wings are about at position of 0.7L, where L is the wing length. It was found that the reduced modulus and nanohardness of radius of the wings of dragonfly are large. The reduced modulus and nanohardness of Costa, Radius and Postal veins of the in-vivo dragonfly wings are larger than those of the fresh ones. The deformation, stress and strain under the uniform load were analyzed with finite element simulation software ANSYS. The deformation is little and the distribution trend of the strain is probably in agreement with that of the stress. It is shown that the main veins have better stabilities and load-bearing capacities. The understanding of dragonfly wings'

nanomechanical properties would provide some references for improving some properties of 2-dimensional composite materials through the biomimetic designs. The realization of nanomechanical properties of dragonfly wings will provide inspirations for designing some new structures and materials of mechanical parts." (Authors)] Address: Zhao, Y., College of Mechanical and Power Engineering, Henan Polytechnic Univ., Jiaozuo 454000, China. E-mail: yanruzhao@163.com

**16304.** Zheng, D.; Wang, B.; Chang, S.-C. (2016): *Palaeodisparoneura cretacica* sp. nov., a new damselfly (Odonata: Zygoptera: Platycnemididae) from mid-Cretaceous Burmese amber. *Comptes Rendus Palevol* 16(3): 235-240. (in English, with French summary) ["Abundant odonatans have been discovered from mid-Cretaceous Burmese amber, and Burma has played an important role in early damselfly diversification during the mid-Cretaceous. In this paper, a new damselfly, *Palaeodisparoneura cretacica* sp. nov., is described from Burmese amber. It is the second species of the extinct genus *Palaeodisparoneura* Poinar, Bechly et Buckley, 2010. *P. cretacica* sp. nov. differs from *P. burmanica* Poinar, Bechly et Buckley, 2010 in having more postnodal and postsubnodal crossveins, the base of IR1 being more cells distal of the base of RP2, a hyaline pterostigma and a longer RP3/4. Our find increases the diversity of damselflies during the mid-Cretaceous." (Authors)] Address: Zheng, D., State Key Lab. Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology, Chinese Academy of Sciences, 39 East Beijing Rd, 210008 Nanjing, China. E-mail: dranzheng@gmail.com

**16305.** Zheng, D.; Zhang, Q.; Nel, A.; Jarzembowski, E.A.; Zhou, Z.; Chang, S.-C.; Wang, B. (2016): New damselflies (Odonata: Zygoptera: Hemiphlebiidae, Dysagrionidae) from mid-Cretaceous Burmese amber. *Alcheringa* 41(1): 12-21. (in English) ["Two damselflies, *Burmahemiphlebia zhangi* gen. et sp. nov. and *Palaeodysagrion cretacicus* gen. et sp. nov., are described from the mid-Cretaceous Burmese amber. *Burmahemiphlebia zhangi* is the first record of Hemiphlebiidae from this amber, although the family was cosmopolitan during the Mesozoic. It can be readily distinguished from all other members of Hemiphlebiidae in having very short MP and CuA veins, and in its rectangular discoidal cell. The new fossils support the view that hemiphlebiid damselflies were one of the dominant groups of Zygoptera during the Mesozoic. *Palaeodysagrion cretacicus* is the first dysagrionid damselfly from Burmese amber and the second Mesozoic representative of this predominantly Paleogene group. It differs from other members of Dysagrionidae in having a unique elongate discoidal cell. These new finds increase the diversity of damselflies in mid-Cretaceous Burmese amber." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**16306.** Zheng, D.; Wang, H.; Jarzembowski, E.A.; Wang, B.; Chang, S.C.; Zhang, H. (2016): New data on Early Cretaceous odonatans (Stenophlebiidae, Aeschniidae) from northern China. *Cretaceous Research* 67: 59-65. (in English) ["*Liaostenophlebia yixianensis* gen. et sp. nov., a new stenophlebiid damselfly, is described from the Lower Cretaceous Yixian



Formation of western Liaoning, northern China. It is the third Chinese damselfly belonging to the family Stenophlebiidae to be described. *Liaostenophlebia* gen. nov. differs from the other genera of Stenophlebiidae in having Ax2 shifted just above MAb, a transverse and narrow Hal, a more curved anterior side of the hypertriangle, and a broader cubital-anal area. *Sinostenophlebia zhanjiakouensis* Hong, 1984 was previously attributed to Stenophlebiidae and hardly compares with other genera within this family. A check of the plates of the type species (*Sinostenophlebia zhanjiakouensis* Hong, 1984) suggests that *Sinostenophlebia* Hong, 1984 should be a member of the family Aeschnidiidae and it is very likely that this genus is a junior synonym of *Leptaeschnidium* Pritykina, 1977. The new data increases the diversity of both Stenophlebiidae and Aeschnidiidae in the Lower Cretaceous of China." (Authors)] Address: Zheng, D., State Key Laboratory of Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, China. E-mail: dranzheng@gmail.com

**16307.** Zheng, D.; Wang, B.; Jarzembowski, E.A.; Chang, S.-C.; Nel, A. (2016): The first fossil Perilestidae (Odonata: Zygoptera) from mid-Cretaceous Burmese amber. *Cretaceous Research* 65: 199-205. (in English) ["Palaeoperilestes electronicus gen. et sp. nov. is the first perilestid damselfly described from mid-Cretaceous Burmese amber. This new damselfly can be attributed to the family Perilestidae by the mid-fork being distal of the subnodus and the base of IR2 quite near to the base of RP2, both features found in the extant genera *Perilestes* and *Perissolestes*. *Palaeoperilestes electronicus* gen. et sp. nov. has a strongly zigzagged IR1, however, differing from *Perilestes* and *Perissolestes* which have a straight IR1. The discovery not only adds to the diversity of damselflies in Burmese amber, but also puts the origin of Perilestidae back to at least the mid-Cretaceous." (Authors)] Address: Zheng, D., Dept of Earth Sciences, University of Hong Kong, Hong Kong Special Administrative Region, China. E-mail: dranzheng@gmail.com

**16308.** Zhao, Q.; Pan, Y.; Griffin, J.N.; Sun, J.; Sun, S. (2016): Contrasting trophic-cascade effects driven by variation in morphology of the perches used by a larval damselfly. *Freshwater Biology* 61(5): 693-701. (in English) ["(1.) The presence of habitat structures (e.g. caves, ledges, branches) has well-documented ecological effects. However, it remains largely unknown how variation in the morphology of particular habitat structures affects ecological interactions. (2.) Using an algae-cladoceran grazer-larval damselfly food chain as a model in a series of microcosm experiments, we manipulated food-chain length and the length (long versus short) and diameter (thick versus thin) of vertically orientated damselfly perches (habitat structure) and examined the density of the grazers and algae. Because the larval damselflies are usually more flexible on thinner perches and have broader foraging domains on longer perches, we predicted that when on long and thin perches they would suppress grazer density more efficiently and hence confer a more positive trophic-cascade effect on algal growth. (3.) As predicted, larval damselflies occupying long and thin perches most strongly reduced grazer

density and increased algal density, illustrating a positive trophic cascade. In all other damselfly treatments, and despite reduced grazer density, algal density declined, showing a negative trophic cascade due to an elevation in grazer foraging efficiency under predation risk. This probably resulted from the increased activity of the grazers and their spatial shift to the lower water column where algal density was higher. (4.) In conclusion, perch morphology affected the direction and strength of the trophic cascade by altering both density-mediated and behaviour-mediated indirect interactions. Considering that anthropogenic disturbance is dramatically changing the morphological diversity of habitat structures, we call for more research into the ecological consequences of such physical diversity at community and ecosystem." (Authors)] Address: Sun, S., Dept of Biology, College of Life Sciences, Nanjing University, 163 Xianlin Avenue, 210023 Nanjing, China. E-mail: shcs@nju.edu.cn

**16309.** Zheng, D.; Nel, A.; Wang, B.; Jarzembowski, E.A.; Chang, S.-C.; Zhang, H. (2016): A new damselfly from the Lower Jurassic of northwestern China and its paleobiogeographic significance. *Journal of Paleontology* 90(3): 485-490. (in English) ["A new species of the Lower Jurassic genus *Dorsettia* Whalley, 1985 is described from the Lower Jurassic Badaowan Formation of the Junggar Basin, northwestern China, as *Dorsettia sinica* new species. It provides additional morphological characters for this genus and is the earliest Jurassic dragonfly in China after the end-Triassic extinction. The occurrence of *Dorsettia* in England and northwestern China indicates that the end-Triassic extinction probably did not have a drastic influence on damselfly-dragonflies, or that the dispersal of damselfly-dragonflies was relatively quick during the earliest Jurassic." (Authors)] Address: Zheng, D., Dept of Earth Sciences, Univ. Hong Kong, Hong Kong Special Admin. Region, China. E-mail: dranzheng@gmail.com

**16310.** Zheng, D.; Jarzembowski, E.A.; Chang, S.C.; Wang, B. (2016): A new true dragonfly (Odonata, Anisoptera, Gomphaeschnaoidini) from mid-Cretaceous Burmese amber. *Proceedings of the Geologists' Association* 127(5): 629-632. (in English) ["A new dragonfly, *Cretagomphaeschnaoides jarzembowskiae* gen. et sp. nov., is described from mid-Cretaceous Burmese amber. *Cretagomphaeschnaoides* gen. nov. is of a small size, has a three-celled discoidal triangle, and more undulating vein MAB than other genera in the extinct tribe Gomphaeschnaoidini of the extant family Gomphaeschnidae. This fossil is the second record of Anisoptera in Cretaceous amber."] Address: Zheng, D., State Key Lab. of Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology, Chinese Academy of Sciences, 39 East Beijing Rd, Nanjing 210008, China. E-mail: dranzheng@gmail.com

**16311.** Zou, Y.; van Telgen, M.D.; Chen, J.; Xiao, H.; de Kraker, J.; Bianchi, F.J.; van der Werf, W. (2016): Modification and Application of a Leaf Blowvac for Field Sampling of Arthropods. *Journal of Visualized Experiments* 114, e54655, doi:10.3791/54655 (2016): 5 pp. (in English) ["Rice fields host a large diversity of arthropods, but investigating their pop-

ulation dynamics and interactions is challenging. Here we describe the modification and application of a leaf blower-vac for suction sampling of arthropod populations in rice. When used in combination with an enclosure, application of this sampling device provides absolute estimates of the populations of arthropods as numbers per standardized sampling area. The sampling efficiency depends critically on the sampling duration. In a mature rice crop, a two-minute sampling in an enclosure of 0.13 m<sup>2</sup> yields more than 90% of the arthropod population. The device also allows sampling of arthropods dwelling on the water surface or the soil in rice paddies, but it is not suitable for sampling fast flying insects, such as predatory Odonata or larger hymenopterous parasitoids. The modified blower-vac is simple to construct, and cheaper and easier to handle than traditional suction sampling devices, such as D-vac. The low cost makes the modified blower-vac also accessible to researchers in developing countries." (Authors)] Address: Zou, Yi, Centre for Crop Systems Analysis, Wageningen University, The Netherlands. E-mail: yi.zou.1@hotmail.com

## 2017

**16312.** Abdul, N.H.; Rawi Che, S. Md.; Ahmad, A.H.; Al-Shami, S.A. (2017): Effect of environmental disturbances on Odonata assemblages along a tropical polluted river. *Ekológia (Bratislava)* 36(4): 388-402. (in English) ["Odonata larvae have been intensively used as bioindicators for freshwater pollution as their community structure closely follow changes in the environment and habitat settings. In this study, 28 taxa of Odonata larvae were collected from three stations (upper, middle and lower) of a polluted river in Malaysia. The upper river basin receives effluents from an oil palm plantation. However, the middle station is presumably contaminated with anthropogenic wastes. The lower station is found to receive polluted discharges from aquaculture outlet. Several environmental parameters of water and sediment were continuously measured during the study. The water parameters showed no significant differences amongst the three stations. The species richness of Odonata was 22, 24 and 20 in the upper, middle and lower stations, respectively. The abundance of Odonata was significantly different among the studied sites. The tolerant damselfly, *Pseudagrion* sp. (41.22%), and facultative dragonflies, *Onychothemis* sp. (17.12%), were the most dominant taxa along the river stations. *Onychothemis* sp. and *Paragomphus capricornis* were equally important at the upper station [Important Species Index (ISI) 25.3 and 24.2%, respectively]. *Pseudagrion* sp. only scored an ISI value of 9.7%. *Pseudagrion* sp., *P. capricornis* and *Onychothemis* sp. were dominant in the middle station (ISI: 41.2%, 25.9% and 10.9% respectively), and *Pseudagrion* sp., *Onychothemis* sp. and *Prodasineura* sp. dominated the areas with dense growth of submerged aquatic weeds *Hydrilla* sp. in the lower station (ISI: 47.9, 24.5 and 13.8%, respectively). On the basis of the variations in larval abundance and ISI values, microhabitats differences partly in response to different types of pollutions entering the water structured the Odonata communities in this river basin." (Authors)] Address: Al-Shami, S.A., Dept Biol., Univ. College of Taymma, University of Tabuk, Taymma, P. O. Box 741, Tabuk, Saudi Arabia. E-mail: salshami@ut.edu.sa, alshami200@gmail.com

**16313.** Adawi, S.H.; Qasem, K.R.; Zawahra, M.M.; Handal, E.N. (2017): On some records of dragonflies (Insecta: Odonata: Anisoptera) from the West Bank (Palestine). *Jordan Journal of Biological Sciences* 10(3): 151-157. (in English) ["Three families with 13 species were collected/observed from 35 localities representing various habitats and water bodies in the West Bank (State of Palestine) over the past four years. These are *Brachythemis impartita*, *Crocothemis erythraea*, *Orthetrum brunneum*, *O. chrysostigma*, *O. taeniolatum*, *Sympetrum fonscolombii*, *S. meridionale*, *Trithemis annulata*, *T. arteriosa*, *Paragomphus genei*, *Anax imperator*, *A. parthenope*, and *A. ephippiger*. There may have been a decline in dragonfly diversity in the area due to human population growth accompanied by habitat destruction especially around springs." (Authors)] Address: Handal, E.N., Environmental Quality Authority, Palestine. E-mail: eliashandal93@gmail.com

**16314.** Adham, F.K.; Gabre, R.M.; Ibrahim, I.A. (2017): Effect of some chemical parameters on the abundance degrees of some aquatic insects and invertebrates in El-Zomor and El-Mariotyia canals, Giza (Egypt). *Journal of Basic and Environmental Sciences* 4: 290-297. (in English) ["The effect of some chemical changes in water quality were studied during two years (October 2001 - August 2003) and recorded at six sampling sites situated at El-Zomor and El-Mariotyia canals (branches from the River Nile). The aim of the present work is to study the effect of some chemical parameters on the abundance degrees of some aquatic insects and invertebrates in these two canals. Determination and estimation of the chemical parameters and abundance degrees are carried out in the field and laboratory of Dept of Entomology, Faculty of Science, Cairo University. Data of chemical factors and abundance degrees of collected aquatic invertebrates were analyzed by using one-way analysis of variance (ANOVA). The data obtained showed that, there is a strong correlation coefficients ( $P < 0.05$  &  $r = 0.634$ ) and ( $P < 0.10$  &  $r = 0.506$ ) between electrical conductivity values and insects (Diptera and Odonata) that distributed in these two canals. The semi-logarithmic graphs showed that the water quality of samples is changed to some extent where the chloride ions is higher than bicarbonate and; sulphate, magnesium are higher than calcium and sodium during some reported months especially at El-Zomor canal." (Authors)] Address: Adham, Fatma, K., Dept of Entomology, Faculty of Science, Cairo University, Giza12613, Egypt

**16315.** Afendy, A.; Dow, R.A.; Rahman, H. (2017): New records of Odonata from the Crocker Range National Park, Sabah, Malaysia. *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 22: 1-7. (in English) ["We report here the results from two field trips to collect Odonata in the Crocker Range National Park in western Sabah, Borneo, Malaysia. 36 species were collected. *Telosticta fugispinosa* had not been described at the time of collection, nor had the two *Devadatta* species. There was no published record of *Protosticta* species cf *kinabaluensis* before the 2012 expedition, nor of *Drepanosticta* species cf *crenitis*." (Authors)] Address: Rahman, Homathevi, Institute for Tropical Biology & Conservation, Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia. E-mail: homa.ums@gmail.com

**16316.** Aguzzi, S.; Bogliani, G.; Orioli, V.; Pilon, N. (2017): *Nealennia speciosa* rediscovered in northwestern Italy (Odonata: Coenagrionidae). *Notulae odonatologicae* 8(9): 337-339. (in English) ["At present only one Italian population of *N. speciosa* is known in the northeast of the country, while two populations in the northwest became extinct in the 1980s. In 2016 the authors discovered a further population of *N. speciosa* in a peat bog in north-western Italy. The implementation of a monitoring program both at the local and national scale, as well as targeted searching for other breeding sites in order to collect information to effectively protect the species in Italy is proposed." (Authors)] Address: Aguzzi, S., Associazione Naturalistica Sylvania, via I Maggio 34/62, 20090 Buccinasco (MI), Italy. E-mail: stefano.aguzzi@gmail.com

**16317.** Ahmad, M.A. (2017): Scanning electron microscopy (SEM) study of caudal gills of *Ischnura senegalensis* (Rambur) and *Agriocnemis pygmaea* (Rambur) of Zygopteran Larvae (Odonata: Zygoptera). *International Journal of Zoology Studies* 2(6): 227-232. (in English) ["Clearly there is need for extensive studies of the gills of such ecologically diverse species of damselfly larvae. In the present study an attempt has been made to study the Scanning Electron Microscopy (SEM) study of the caudal gills of damselfly larvae. Scanning electron microscopy greatly clarifies the orientation, structures and arrangement of trachea, its ramification, tracheoles, and chloride cells apart with the arrangement of complex cuticular components because of its depth of field and high resolving power. Therefore, the objectives of the present study are to add information on the detailed fine ultrastructure of the caudal gills of these two species of Zygopteran larvae occupying different microhabitats of the inland waters." (Author)] Address: Ahmad, M.A., Guest Faculty, Department of Zoology, JRS College Jamalpur Munger, TMB Bhagalpur University, Bhagalpur, Bihar, India

**16318.** Ahmad, A.M.; Kumari, K. (2017): Histochemistry of the respiratory surface of the caudal gills of *Ceriagrion coromandelianum* (Fabricius), Zygopteran larvae (Odonata: Zygoptera). *International Journal of Zoology Studies* 2(6): 290-293. (in English) ["The present study showed that mucous cells in the gills of damselfly larvae were found mainly in the surface of the gill lamellae when employing with Schiff's reagent (PAS test), and recognized the presence of muco-polsaccharides. The present cells of the epithelium of the caudal gills have been found to contain acid muco-polysaccharide. The perusal of literature pertaining to the histochemical investigation of the different zones of the caudal gills of Zygopteran Odonate larvae revealed that practically no work has been done so far on these taxa. The aim of the present work was to study histochemical characterization of the caudal gills of damselfly larvae to investigate the deposition of chemicals in respiratory epithelium of the caudal gills of Zygopteran larvae." (Authors)] Address: Ahmad, A.M., Guest Faculty, Dept Zool., JRS College, Jamalpur, Munger, TM Bhagalpur Univ., Bhagalpur, Bihar, India

**16319.** Ahn, S.J.; Chiluwal, K.; Choi, S.H.; Park, C.G. (2017): Diversity of insect fauna in Junam wetland of Korea. *Korean J. Appl. Entomol.* 56(2): 135-145. (in English, with Korean

summary) ["A sampling survey was conducted at three reservoirs of Junam wetland (6.02 km<sup>2</sup>) in Korea to identify the wetland insect fauna along with their dominance, diversity, richness and evenness. Methods of monitoring were visual inspection and sweeping in 2010, Malaise trapping in 2011, light trapping and pitfall trapping in 2012. In total, 9,269 individuals (36.3% coleopterans, 21.3% lepidopterans and 13.9% odonates) were collected, belonging to 574 species, 141 families and 14 orders. For the number of species, lepidopterans shared the highest (31.2%), followed by coleopterans (28.0%) and hemipterans (12.9%). Dominant species were *Enochrus simulans* (Coleoptera) (7.9% of total individuals) followed by *Hydaticus grammicus* (Coleoptera) (4.3%), *Galerucella nipponensis* (Coleoptera) (4.1%), *Elophila interruptalis* (Lepidoptera) (3.1%) and *Apis mellifera* (Hymenoptera) (2.2%). Total counts of coleopterans, lepidopterans and odonates in the three reservoirs were quite high, but the counts were not significantly different among the reservoirs. Insect diversity index (H') and richness index (RI) of the Junam wetland were 5.04 and 59.10, respectively." (Authors)] Address: Park, C.G., Erang Bio-Environment Research System, Haman 52060, Republic of Korea. E-mail: parkcg@gnu.ac.kr

**16320.** Álvarez Fidalgo, M.; Noval Fonseca, N. (2017): *Sympetrum vulgatum ibericum* Ocharan, 1985: primera cita en la provincia de Soria y este de Castilla y León, España (Odonata: Libellulidae). *BVnPC* 6(73): 32-39. (in Spanish, with English summary) ["In this note the first record of *S. vulgatum ibericum* in the province of Soria (the most eastern locality known for this Iberian subspecies in the region of Castile and León) is reported. Besides, an updated distribution map for this species on the Iberian Peninsula is presented.] Address: Álvarez Fidalgo, M., Experta del Grupo Odonata de Biodiversidad Virtual-Oviedo, Asturias, Spain. E-mail: madamcoolpix@gmail.com

**16321.** Alvia, I.; Veliz, D.; Esquivel, C.; Vila, I. (2017): Lack of genetic structure in *Pantala flavescens* among Central and South American localities (Odonata: Libellulidae). *Odonatologica* 46(1/2): 67-82. (in English) ["*P. flavescens* is the most widespread odonate on Earth, absent only in Antarctica and parts of Europe. A recent study performed with sequences of mtDNA suggested the presence of one panmictic population of the species at a global scale. However, combining mitochondrial and nuclear markers could offer more information about the genetic variability of populations. Here, we sequenced a fragment of the COI gene and genotyped eight microsatellite loci in order to analyze the population genetic structure and diversity in individuals collected in Central America (two sites in Costa Rica, separated by 147 km) and two localities in South America (one site in Chile and one in Peru, separated by 52 km). The global FST estimated from COI and microsatellite data showed no evidence of genetic structure. Furthermore, an Analysis of Molecular Variance (AMOVA) performed with both COI and microsatellites also showed no evidence of genetic structure despite the >5 000 km of distance between both geographic regions. These results suggest an extraordinary movement of *P. flavescens* along the American continent, thus corroborating the previous study conducted on this species." (Authors)] Address: Alvia, Ingrid,



Laboratory of Ecology and Genetics, Dept of Ecological Sciences, University of Chile, Las Palmeras 3425, Ñuñoa, Santiago, Chile. E-mail: ingrid.alvial@gmail.com>

**16322.** Andaste, Y.S.; Nugroho, M.A.A.; Benyamin, R.S.B.; Trilaksono, B.R.; Moelyadi, A. (2017): Design and construction of flapping wing micro aerial vehicle robot platform. System Engineering and Technology (ICSET), 2017 7th IEEE International Conference on Shah Alam, Malaysia: 189-193 (in English) ["Flapping Wing Micro Aerial Vehicle (MAV) is the development of Unmanned Aerial Vehicle (UAV) which is smaller and lighter. GaneFly is a flapping wing MAV robot developed in this paper. GaneFly flying platform is designed to be able to fly with flapping mechanism that adapts the flapping wing of the dragonfly and also designed to be able to turn and pitch according to the input command. Design of the GaneFly platform includes the selection and design of mechanical, electrical components, and integration between mechanical and electrical component. Selection of components and materials primarily in the small dimensions and lightweight but still considering the performance. The design of the mechanical adapts to the existing research of the flapping wing MAV. The result of the design is integrated parts with electrical components up to be a flying platform. After going through various processes of trial and repair, the GaneFly platform can fly with its flapping mechanism and can be controlled quite well." (Authors)] Address: Moelyadi, A. Fac. Mechanical & Aerospace Engineering, Institut Teknologi Bandung, Bandung, Indonesia

**16323.** Ansari, M.L.; Soendjoto, M.A.; Dhamono, D. (2017): Capung di kawasan rawa Desa Sungai Lumbuh, Kabupaten Barito Kuala. Prosiding Seminar Nasional Lahan Basah 2016(1). Lambung Mangkurat University Press, Banjarmasin, Indonesia: 89-95. (in English) ["The research aimed to describe species of Odonata found in the swamp area of Sungai Lumbuh Village, Barito Kuala Regency. We took pictures of Odonata and caught it with insect net. Then samples were identified in biology laboratory of Lambung Mangkurat University. We found 14 species; 8 species of Libellulidae, 1 Gomphidae, and 5 Coenagrionidae." (Authors)] Address: Ansari, M.L., Program Studi Magister Pendidikan Biologi, Program Pascasarjana, Univ. Lambung Mangkurat, Jalan Brigjen H. Hasan Basry Banjarmasin 70123, Indonesia. E-mail: lutvi.ansari@gmail.com

**16324.** Arulprakash, R.; Chitra, N.; Gunathilagaraj, K. (2017): Biodiversity of Odonata in rice at Pattukkottai in Tamil Nadu. Indian Journal of Entomology 79(4): 498-502. (in English) ["Odonata diversity assessed in the rice fields of five major rice growing areas ... revealed the occurrence of 19 species. These belong to 16 genera under 3 families viz., Libellulidae (n=12 species), Coenagrionidae (n=6) and Lestidae (n=1). Maximum Odonata abundance, species richness, diversity and evenness was found in the ARS and only 10–15% variation in species composition was found. *Diplacodes trivialis*, *Pantala flavescens*, *Orthetrum sabina*, *Crocothemis servilia*, *Trithemis pallidinervis*, *Ischnura aurora* and *Agriocnemis pygmaea* were the abundant ones." (Authors)] Address: Arulprakash, R., Seed Centre, Tamil Nadu Agricultural University, Coimbatore, 641 003, India. E-mail: avrarulprakash@gmail.com

**16325.** Asma, A.; Sardar, A.M.; Waheed, A.P.; Shabir, A.; Sadia, T.; Shahjahan, R.; Muhsin, A. (2017): Collection and identification of genus *Anax* (Odonata, Aeshnidae) from district Swat. Journal of Entomology and Zoology Studies 5(2): 1440-1442. (in English) ["An extensive field survey was carried out to collect dragonflies of genus *Anax* from Swat during the year 2016-2017. A total of 251 specimens were collected and sorted out into family Aeshnidae genus *Anax* and species *A. imperator* and *A. parthenope* respectively. Additionally, morphological characters along with distributional data are provided." (Authors)] Address: Asma, A., Dept Zool., Hazara Univ. Mansehra, Khyber Pakhtunkhwa, Pakistan

**16326.** Ávila Junior, W.F.; Lencioni, F.A.A.; Carneiro, M.A.A. (2017): *Heteragrion cauei* sp. nov., a new damselfly from Minas Gerais, Brazil (Odonata: Heteragrionidae). Odonatologica 46(3/4): 275-286. (in English) ["*H. cauei* sp. nov. (♂ holotype and ♀ allotype: Brazil, Minas Gerais, Catarina Mendes, Ouro Preto, 18-iii-2016, 20°19'54"S, 43°30'49"W, deposited in coll. MNRJ) is described and illustrated. Based on thoracic coloration, *H. cauei* sp. nov. is part of the group of species formed by *H. gracile*, *H. luizfelipei* and *H. beschkii*; however the new species differs from these species by the morphology of the medial process of the cercus." (Authors)] Address: Ávila Junior, W.F., Univ. Federal de Ouro Preto, Lab. Entom. Ecológica DEBIO/ICEB, Campus Morro do Cruzeiro, CEP 35400-000, Ouro Preto, MG, Brazil. E-mail: walterfaj88@gmail.com

**16327.** Babu, R. (2017): Diversity of odonates (Insecta: Odonata) in fish farm, College of Veterinary and Animal Sciences, CSKHPKV, Palampur, Himachal Pradesh, India. Rec. zool. Surv. India 117(4): 367-375. (in English) ["Odonata diversity in fish farm of Department of Fisheries, CSKHPKV, Palampur, Kangra Valley, Himachal Pradesh were comprehensively studied and documented for the first time. A total of 27 species belonging to 19 genera and 7 families are recorded. Zygoptera were represented by 13 species and 14 species represents Anisoptera. Among the families, Libellulidae was richest family with 13 species and followed by Coenagrionidae with 9 species. The wide range of habitats including foraging and nocturnal roosting habitat at Fish Farm, CSKHPKV leads to greatest species diversity." (Authors)] Address: Babu, R., Southern Regional Centre, Zoological Survey of India, Chennai - 600 028, Tamil Nadu, India

**16328.** Baidya, S. (2017): Biodiversity of dragonflies and damselflies of Acharya Prafulla Chandra College campus, West Bengal in Monsoon and Winter seasons. International Journal of Experimental Research and Review 10: 27-29. (in English) ["The objective of the present study is to explore the diversity and abundance of Odonata in Acharya Prafulla Chandra College in Monsoon and Winter seasons (July, 2016 to March, 2016). They are an important part of ecosystem and an important indicator of environmental quality. As they are predator of mosquito larvae, they also act as mosquito controlling agent. Total 19 species belonging to six families of dragonflies and damselflies were recorded, in which the most abundant (10 species), 8 species from family Coenagrionidae and Gomphidae, Lestidae Aeshnidae, Platycnemididae families

were very least abundant." (Author)] Address: Baidya, S., Department of Zoology, Acharya Prafulla Chandra College, New Barrackpur, Kolkata-700131, West Bengal, India. E-mail: swarnava.bar@gmail.com

**16329.** Barsagade, D.D.; Thakre, R.P.; Gathalkar, G.B.; Kirsan, J.R. (2017): A comparative study of antennal microstructure in two species of damselflies *Rhodischnura nursei* and *Lestes elatus*. *Journal of Entomology and Zoology Studies* 5(2): 1550-1557. (in English) ["Scanning electron microscopic (SEM) studies of the antenna of *R. nursei* and *L. elatus* was investigated comparatively. The antenna of both the species (adult) revealed the presence of various mechano- and chemosensory sensilla. Moreover, the microstructural variations among them were compared, to know the species specificity. The antennal scape of *R. nursei* comprised of sensilla trichoidea ST-I, ST-II, sensilla trichoidea curvata (STC) and sensilla basiconica (SB). Whereas, the scape of *L. elatus* bears ST-I, ST-II, STC, SB-I and SB-II. In *R. nursei*, the pedicel comprised of ST-I, ST-II and microtrichia MT-I, MT-II, whereas, ST and MT are present in *L. elatus*. Subsequently, the flagellum of *R. nursei* comprised of MTP-I, MTP-II, MTP-III, while, MTP-I, MTP-II, MTP-III, and MTP-IV were observed in *L. elatus*. Therefore, the presence of various mechano- and chemosensilla in these damselflies may play a decisive role in olfaction, ability to perceive temperature, humidity or air speed that has been discussed." (Authors)] Address: Barsagade, D.D., Dept of Zoology, MJF Educational Campus, RTM Nagpur University, Nagpur, Maharashtra, India

**16330.** Bashir, I.; Bhat, F.A.; Qadri, H. (2017): Insect Community of Hirpora Wildlife Sanctuary (Shopian), Jammu and Kashmir, India. *Journal of Horticulture* 4(2): 4pp. (in English) ["Insects are known to be the most successful and diverse form of organisms on earth. Insects play an important role in running an ecosystem and help to perform various activities which are necessary for an ecological balance. The study which was carried in 2013 reports the insect diversity of Hirpora wildlife sanctuary (Shopian) and a total of 338 insect individuals of 26 species were recorded belonging to 20 families and 7 orders during the time period of June-Nov. 2013. Lepidoptera order comprise of greater number of insects followed by Hymenoptera, Diptera and Coleoptera while lesser number of insects were found in Odonata, Hemiptera and Orthoptera. The maximum number of insects were recorded in the month of July and August due to the favourable environmental conditions and least number of insects were recorded during the month of October and November at this stage their life cycle changes and their number starts to decline because of non availability of food and drastic change in the environment of which they are a part." (Authors)] Address: Bhat, F.A., Dept of Environmental Sciences, S.P. College Kashmir, Jammu and Kashmir, India. E-mail: fayazevs@gmail.com

**16331.** Battisti, A.; Pavesi, M. (2017): First records of breeding *Sympecma paedisca* (Brauer, 1877) (Odonata Lestidae) in Italy. *Biodiversity Journal* 8(2): 763-768. (in English) ["Oviposition in Italian populations of *S. paedisca* was observed for the first time. This species is listed as Endangered (EN) in the Mediterranean Basin and as Critically Endangered

(CR) in Italy. Several ovipositing tandems were observed for the years 2014, 2015 and 2016, from the 17th of May to the 10th of June, in the "Riserva Naturale Orientata della Baraggia di Candelo" (=Heathlands Oriented Natural Reserve) (North Piedmont), a protected area and a military zone too, in a pond at the edge of the heathland. Oviposition substrates are vertical living *Juncus effusus* L. stems, preferably the isolated ones or those on the external side of the tufts, rather than inside them; eggs are laid about 20 to 50 cm above the water level. In the heathland, around the breeding site, tens of adults were seen every autumn and winter, also in December and January sunny days. Reproductive *S. paedisca* were also occasionally observed in other two localities, namely the lake of Viverone and the "Riserva Naturale Orientata Palude di Casalbeltrame" (=Casalbeltrame Fen Oriented Natural Reserve). Notes on breeding behaviour and a description of both breeding and overwintering area of *S. paedisca* are provided, since knowledge of its breeding and overwintering sites is needed to ensure their protection and therefore the conservation of Italian populations of this damselfly." (Authors)] Address: Battisti, A., Fraz. Feilley 101, Saint Vincent, 11027, Aosta, Italy. E-mail: andre.battisti@gmail.com

**16332.** Batty, P. (2017): Odonata monitoring for the Scottish Beaver Trial 2009-2014 with notes on the post-trial period. *J. Br. Dragonfly Society* 33(2): 79-103. (in English) ["The British Dragonfly Society surveyed *Brachytron pratense* and *Calopteryx virgo* for Scottish Natural Heritage (SNH) as part of the monitoring for the Scottish Beaver Trial 2009-2014. The beavers drastically reduced the aquatic Vegetation in some lochs and constructed dams, increasing the size of one loch four-fold. At the end of the survey *B. pratense* was still breeding at the affected lochs. The study period was too short to evaluate the full effects on this species. Although there was a decline in the numbers of larvae and exuviae at one of the lochs where there was high beaver activity there were no obvious trends at the other three. Since the trial, beavers have moved into new lochs and built dams on one burn. In 2016 *B. pratense* was seen at all lochs and larvae found at the main lochs sampled. The Scottish Government's decision is to allow beavers to remain in Scotland and spread naturally. Results from the survey of *C. virgo* have not been included as the beavers did not use the burns during the survey period. However, these data will be important for future monitoring." (Authors)] Address: Batty, Pat, Kiman Farm, Kilmichael Gien, Lochgilphead, Argyll PA318Q, UK

**16333.** Benchalel, W.; Merah, S.; Bouslama, Z.; Ramdani, M.; Elmsellem, H.; Flower, R. (2017): Odonata as indicators of environmental impacts in rivers, case of wadi El-Kébir-East (northeastern Algeria). *Moroccan Journal of Chemistry* 5(4): 610-621. (in English) ["This paper presents results of two monitoring programs carried out in two decades during April 1993-May 1994, and April 2015 May 2016 in the East Wadi of El-Kébir, a protected area (PNEK) of eastern Numidia (northeastern Algeria). Monitoring was located in areas with different degrees of anthropogenic impacts. Selected environmental variables were recorded during the monitoring periods. The Odonata fauna and biological indices were used

to characterize development of the study area, after two decades and to assess the quality of the environment. The alteration of this river has resulted in a marked simplification of the original (1993-1994) odonatological fauna. Over the past two decades, odonatological species richness has decreased from 14 to 7 species inventoried during the 1993 and 2015 seasons. The phenology of adult was extended until early December 2015, possibly as a result of global warming. Odonata are identified as useful as indicators of environmental change in the monitored river systems. The majority of species such as the Gomphidae are not tolerant of increased contamination and changes in structure of the river. Only some species such as *Lestes vidis*, *Platycnemis subdilatata*, *Ischnura graellsii* and *Ceriatrigonia tenellum*, appear to be adapted to changed conditions and became dominant in heavily disturbed sites. The species disappeared from these sites are clearly associated with good water quality and less disturbance, which highlights the importance of the conservation of the habitats of freshwater and regular monitoring." (Authors)] Address: Benchalel, W., Laboratory of Ecology of Terrestrial and Aquatic Systems. University Badji Mokhtar, Annaba, Algeria

**16334.** Bernal, A. (2017): Distribución actual de *Paragomphus genei* (Selys, 1841) (Odonata: Gomphidae) en la provincia de Cádiz y pautas para la localización y reconocimiento de sus larvas en sus últimos estadios. *Revista de la Sociedad Gaditana de Historia Natural* 11: 7-12. (in Spanish, with English summary) ["New records of the distribution of *P. genei* in the province of Cadiz are given between 2011 and 2016. Information about the behavior and habitat selection of larvae, as well as data that allow their location in natural habitats is provided. Finally, morphologically they described briefly the four last larval instars for this species." (Author)] Address: Email: arturo.libellula@gmail.com

**16335.** Biswas, G.K.; Neogi, A.K.; Pal, A. (2017): First record of *Epophtalmia vittata* Burmeister, 1839 (Insecta, Odonata, Anisoptera) from Dhaka, Bangladesh. *Check List* 13 (6): 845–847: 845-847. (in English) ["We report *E. vittata* from Bangladesh for the first time, based on a specimen collected on 27-V-2016 in the National Botanical Garden, Dhaka. This is first record of any species of the family Macromiidae from Bangladesh. This new record exemplifies gaps in sampling for dragonflies in Bangladesh and suggests that additional research on odonates in the country is needed." (Authors)] Address: Neogi, A.K., Entom. Branch, Dept Zool. Jagannath Univ., Dhaka-1100, Bangladesh. E-mail: amit\_jnu52@yahoo.com

**16336.** Blanke, A.; Schmitz, H.; Patera, A.; Dutel, H.; Fagan, M.J. (2017): Form–function relationships in dragonfly mandibles under an evolutionary perspective. *Journal of the Royal Society Interface* 14(128): 11 pp. (in English) ["Functional requirements may constrain phenotypic diversification or foster it. For insect mouthparts, the quantification of the relationship between shape and function in an evolutionary framework remained largely unexplored. Here, the question of a functional influence on phenotypic diversification for dragonfly mandibles is assessed with a large-scale biomechanical analysis

covering nearly all anisopteran families, using finite element analysis in combination with geometric morphometrics. A constraining effect of phylogeny could be found for shape, the mandibular mechanical advantage (MA), and certain mechanical joint parameters, while stresses and strains, the majority of joint parameters and size are influenced by shared ancestry. Furthermore, joint mechanics are correlated with neither strain nor mandibular MA and size effects have virtually play no role for shape or mechanical variation. The presence of mandibular strengthening ridges shows no phylogenetic signal except for one ridge peculiar to Libelluloidea, and ridge presence is also not correlated with each other. The results suggest that functional traits are more variable at this taxonomic level and that they are not influenced by shared ancestry. At the same time, the results contradict the widespread idea that mandibular morphology mainly reflects functional demands at least at this taxonomic level. The varying functional factors rather lead to the same mandibular performance as expressed by the MA, which suggests a many-to-one mapping of the investigated parameters onto the same narrow mandibular performance space." (Authors)] Address: Blanke, A., Medical & Biological Engineering Research Group, School of Engineering, Univ. Hull, Hull HU6 7RX, UK

**16337.** Blanke, A.; Watson, P.J.; Holbrey, R.; Fagan, M.J. (2017): Computational biomechanics changes our view on insect head evolution. *Proceedings of the Royal Society B* 284(1848): 9 pp. (in English) ["Despite large-scale molecular attempts, the relationships of the basal winged insect lineages dragonflies, mayflies and neopterans, are still unresolved. Other data sources, such as morphology, suffer from unclear functional dependencies of the structures considered, which might mislead phylogenetic inference. Here, we assess this problem by combining for the first time biomechanics with phylogenetics using two advanced engineering techniques, multibody dynamics analysis and finite-element analysis, to objectively identify functional linkages in insect head structures which have been used traditionally to argue basal winged insect relationships. With a biomechanical model of unprecedented detail, we are able to investigate the mechanics of morphological characters under biologically realistic load, i.e. biting. We show that a range of head characters, mainly ridges, endoskeletal elements and joints, are indeed mechanically linked to each other. An analysis of character state correlation in a morphological data matrix focused on head characters shows highly significant correlation of these mechanically linked structures. Phylogenetic tree reconstruction under different data exclusion schemes based on the correlation analysis unambiguously supports a sistergroup relationship of dragonflies and mayflies. The combination of biomechanics and phylogenetics as it is proposed here could be a promising approach to assess functional dependencies in many organisms to increase our understanding of phenotypic evolution." (Authors)] Address: Blanke, A. E-mail: a.blanke@hull.ac.uk

**16338.** Bode-Oke, A.; Zeyghami, S.; Dong, H. (2017): Abstract: L8.00007: How insects initiate flight: Computational analysis of a damselfly in takeoff flight. *Bulletin of the American Physical Society, 70th Annual Meeting of the APS Division*



of Fluid Dynamics. Sunday–Tuesday, November 19–21, 2017; Denver, Colorado: (in English) [Verbatim: Flight initiation is essential for survival in biological fliers and can be classified into jumping and non-jumping takeoffs. During jumping takeoffs, the legs generate most of the initial impulse. Whereas the wings generate most of the forces in non-jumping takeoffs, which are usually voluntary, slow, and stable. It is of interest to understand how non-jumping takeoffs occur and what strategies insects use to generate the required forces. Using a high fidelity computational fluid dynamics simulation, we identify the flow features and compute the wing aerodynamic forces to elucidate how flight forces are generated by a damselfly performing a non-jumping takeoff. Our results show that a damselfly generates about three times its bodyweight during the first half-stroke for liftoff while flapping through a steeply inclined stroke plane and slicing the air at high angles of attack. Consequently, a Leading Edge Vortex (LEV) is formed during both the downstroke and upstroke on all the four wings. The formation of the LEV, however, is inhibited in the subsequent upstrokes following takeoff. Accordingly, we observe a drastic reduction in the magnitude of the aerodynamic force, signifying the importance of LEV in augmenting force production.] Address: Bode-Oke, A.T., Mechanical & Aerospace Engineering, University of Virginia, Charlottesville, VA 22903, USA

**16339.** Borisov, A.S.; Borisov, S.N. (2017): Distribution of *Orthetrum albistylum* (Selys, 1848) (Odonata, Libellulidae) in thermal springs of the Baikal rift zone, Russia. *Eurasian Entomological Journal* 16(4): 299-303. (in Russian, with English summary) ["In East Siberia the dragonfly *Orthetrum albistylum* is restricted to thermal springs due to local climatic conditions; it was recorded from 16 thermal springs of the Baikal rift zone from the south-western part (North-East Pribaikalye) to the north-eastern part (Charskaya Hollow). The northernmost isolated localities of the species are located 770 km from the main part of the areal." (Authors)] Address: Borisov, S.N., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk 630091 Russia. E-mail: borisov-sn@yandex.ru

**16340.** Borisov, A.S.; Borisov, S.N. (2017): A new record of *Lestes barbarus* (Fabricius, 1798) (Odonata, Lestidae) in the Baikal region and distribution in the eastern part of its range. *Eurasian Entomological Journal* 16(5): 416-418. (in *Lestes barbarus*, distribution, Baikal region, Mongolia, China) ["The information on the discovery of *Lestes barbarus* in the south-eastern Baikal region (51°32'37" N, 105°07'35" E) is given. Data on the distribution of the species in the eastern part of the range in the south of Central Siberia, in Mongolia and in Northern China are summarized. This species is usually resident in the western part of the areal, but occurs sporadically in the eastern part of the areal." (Authors)] Address: Borisov, A.S., Inst. of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk 630091 Russia. E-mail: borisov-sn@yandex.ru

**16341.** Borisov, S.N.; Kazenas, V.L. (2017): First record of the dragonfly *Onychogomphus lefebvrei* (Rambur, 1842) (Odonata,

Gomphidae) for the fauna of Kazakhstan. *Eurasian Entomological Journal* 16(4): 320-324. (in Russian, with English summary) ["*O. lefebvrei* is recorded for the fauna of Kazakhstan for a first time based on photographic evidence from seven localities in Western Tien Shan on Karatau Ridge and from material collected from Ugam Ridge. These are the northernmost locations of the species in the Central Asian part of the range. A rare and locally distributed Central Asian species *O. lefebvrei* is usually resident in the south of Kazakhstan.] Address: Kazenas, V.L., Institute of Zoology of the Ministry of Education and Science of the Republic of Kazakhstan, Al-Farabi Prosp. 93, Almaty 050060 Kazakhstan

**16342.** Borisova, N.V.; Buczynski, P. (2017): *Aeshna mixta* Latreille, 1805 (Odonata: Anisoptera): Aeshnidae) - a new species of dragonfly for Chuvashia. *Scientific works of the state natural reserve Prisursky* 32: 94-95. (in Russian, with English summary) ["In 2017 a new species of dragonfly for Chuvashia – *A. mixta* – was found on the Yalchiksky cluster of the Nature Reserve, Prisursky Yalchiksky-steppe zone in the southeast of Chuvashia is probably located on the northern border of its range." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**16343.** Borkenstein, A.; Schröter, A.; Jödicke, R. (2017): Matutinal mating in *Aeshna grandis* and *A. viridis* – a behavioural pair of twins prefers early-morning sex (Odonata: Aeshnidae). *Odonatologica* 46(3/4): 207-226. (in English) ["We investigated the hitherto unknown matutinal mating behaviour of *Aeshna grandis* and found that matings basically occurred at dawn. With the first morning light males began performing a searching flight for females that roosted deep in terrestrial vegetation characterized by reed, rush and grass. Matutinal mating in the distinctive twistedwheel position is documented. Twisted wheels are unique as they are not formed in flight but while perching on vegetation and they show no readiness to escape. The twisted position, with the male hanging upside down and his appendages being obliquely slipped across the female's head, is the result of the formation of mating wheels with the female perched. Later in the morning we observed feeding flight at suitable sites and resting in low vegetation of a wet meadow. During this resting phase some males inspected the vegetation on the wing, described here as 'mid-morning searching flight'. In this situation and also when foraging individuals aggregated, we found untwisted, upright hanging couples, which we interpret as wheels formed in flight – an indication of alternative mating tactics. *A. viridis*, also known to exhibit matutinal matings, occurred syntopically and behaved similarly. We interpret the energy-sapping searching flight at dawn as sexual selection: females select genetic quality by choosing only the fittest mates." (Authors)] Address: Borkenstein, Angelika, Lebensborner Weg 5, 26419 Schortens, Germany. E-mail: angelikaborkenstein@t-online.de

**16344.** Bota-Sierra, C.A.; Novelo-Gutiérrez, R.; Amaya-Vallejo, V. (2017): The rediscovery and redescription of *Epigomphus pechumani* Belle, 1970 (Odonata: Gomphidae), with a description of its female from the Western Colombian Andes.

Zootaxa 4306(3): 419-427. (in English) ["*E. pechumani* Belle, 1970, was described based upon a single male specimen in poor condition, lacking specific locality in Colombia. Here the male is redescribed and the female is described and illustrated for the first time based on a total of 18 adults collected in Tatamá National Park, Risaralda Department, and Farallones de Cali National Park, Valle del Cauca Department, Colombia. A diagnosis, notes on its biology and a distributional map are presented. All material is deposited in the Entomological collection of Universidad de Antioquia." (Authors)] Address: Novelo-Gutiérrez, R., Instituto de Ecología A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.mx

**16345.** Brodin, T.; Piovano, S.; Fick, J.; Klaminder, J.; Heynen, M.; Jonsson, M. (2017): Ecological effects of pharmaceuticals in aquatic systems—impacts through behavioural alterations. *Phil. Trans. R. Soc. B* 369. 20130580. 10 pp. (in English) ["The study of animal behaviour is important for both ecology and ecotoxicology, yet research in these two fields is currently developing independently. Here, we synthesize the available knowledge on drug-induced behavioural alterations in fish, discuss potential ecological consequences and report results from an experiment in which we quantify both uptake and behavioural impact of a psychiatric drug on a predatory fish (*Perca fluviatilis*) and its invertebrate prey (*Coenagrion hastulatum*). We show that perch became more active while damselfly behaviour was unaffected, illustrating that behavioural effects of pharmaceuticals can differ between species. Furthermore, we demonstrate that prey consumption can be an important exposure route as on average 46% of the pharmaceutical in ingested prey accumulated in the predator. This suggests that investigations of exposure through bioconcentration, where trophic interactions and subsequent bioaccumulation of exposed individuals are ignored, underestimate exposure. Wildlife may therefore be exposed to higher levels of behaviourally altering pharmaceuticals than predictions based on commonly used exposure assays and pharmaceutical concentrations found in environmental monitoring programmes." (Authors)] Address: Brodin, B., Dept of Ecology & Environmental Science, Umea Univ., 90187 Umea, Sweden. E-mail: tomas.brodin@emg.umu.se

**16346.** Buczynski, P.; Tończyk, G.; Buczyńska, E.; Gadawski, P.; Michoński, G.; Zawal, A. (2017): On the occurrence of *Gomphus pulchellus* Selys, 1840 (Odonata: Gomphidae) on the Balkan Peninsula. *Acta zool. Bulg.* 69(1): 43-47. (in English) ["The status of a West European endemic species, *G. pulchellus*, is unclear on the Balkan Peninsula. We report *G. pulchellus* from Skadar Lake (one site in Montenegro and one in Albania), among others based on exuviae, thus proving the autochthonic occurrence of the species in the western part of the Balkan Peninsula. A strongly isolated but stable island of the geographical range probably exists here. It is the first record of *G. pulchellus* in Albania." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**16347.** Buczyński, P.; Karasek, T. (2017): Dragonflies (Odonata) of Suwalski Landscape Park - occurrence, threats and perspectives. *Materiały konferencyjne. Stan i ochrona wód suwalskiego Parku Krajoznawczego. Wigry, 15-16 września 2016 roku. Tortul:* 74-79. (in Polish, with English summary) ["The Suwalski Landscape Park protects the naturally valuable areas of the Lithuanian Lake District. Park's values are comparable to those in national parks. The authors present material collected during unsystematic research in the years 2000-2013. At 64 study sites 51 dragonfly species were found (69% of the national fauna). Numerous species threatened in Europe. European Union and Poland, species under protection and occurring near the edge of their distribution ranges were recorded. The knowledge gaps and the probable number of species in the park (ca. 60. including 55 autochthonous species) were provided. The park was regarded as the hot spot of dragonfly species richness in Poland. Lakes eutrophication, tourism intensification and cattle farming were indicated as the threat to the present state of the dragonfly fauna." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**16348.** Buczynski, P.; Buczyńska, E.; Tarkowski, A.; Banach-Binska, B. (2017): An interesting record of *Somatochlora arctica* (ZETTERSTEDT, 1840) (Odonata: Corduliidae) in the Polesie (middle-eastern Poland). *Odonatrix* 111 (2017): 8pp. (in Polish, with English summary) ["*S. arctica* was recorded in 2017 in the nature reserve "Magazyn" in the Sobiborskie Forests (51°27'06"N, 23°37'35"E, UTM: FC80). On a small (1.2 ha), transitional peat bog one imago (18.05.) was observed and one larval exuvium (26.09) was collected. The exuvium was obtained from bare patch overgrown with *Sphagnum* sp. caused by uprooted *Betula pubescens*, the only place that did not dry in the summer. A peat bog in the reserve "Magazyn" is the first site of *S. arctica* found in Polish part of the Polesie. The closest sites of the occurrence of this species has been reported in: south-eastern Poland – about 100 km from the described location, in north-eastern Poland – about 140 km, in the central part of the Polesie on Ukraine and Belarus – almost 400 km. For the time being it is difficult to say whether this population is completely isolated and may be ephemeral or it is a discrete subpopulation within a metapopulation that also inhabits some other peat bogs in this region. Peatlands of the Polish part of the Western Polesie have been intensively investigated since the early 1990s, therefore this species is very rare; otherwise it must have been found earlier. However, its ability to colonize small isolated sites, often clearly astatic may cause that it can be easier to overlook than other typhobionts. Taking this into consideration the further studies on optimal habitats of *S. arctica* are needed in the Western Polesie in Poland as well as the adjacent areas in Ukraine and Belarus." (Authors)] Address: Buczynski, P., Dept Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**16349.** Büsse, S.; Heckmann, S.; Hörschemeyer, T.; Bybee, S. (2017): The phylogenetic relevance of thoracic musculature: a case study including a description of the thorax

anatomy of Zygoptera (Insecta: Odonata) larvae. Systematic Entomology 43(1): 31-42. (in English) ["New morphological techniques allow for the evaluation of novel character systems that are potentially important for phylogenetic analysis. Only a few studies so far have used character systems from the insect thorax for phylogenetics; the reasons for this might include a lack of common terminology or established homology for pterygote insect thorax musculature. Still, recent studies have proposed common terminology and hypotheses of homology, now allowing for an evaluation of thoracic morphological character systems among the groups of winged insects. Using X-ray microtomography ( $\mu$ CT) we present a detailed study of the thorax musculature of Odonata as an important phylogenetic character system, with a matrix of 298 characters with 697 character states, including novel data from the thoracic anatomy of eight damselfly larvae. We also included additional Odonata, Ephemeroptera and Neoptera taxa from the literature and demonstrate the phylogenetic relevance of this character system by reproducing phylogenetic topologies of established relationships. We also compared high-resolution data from Odonata larvae from our study and from recent literature with data from older literature in the adult Odonata. All major clades were successfully recovered, (e.g. Odonata, Epiprocta, Anisoptera and Zygoptera) with high node support, but obtained higher phylogenetic resolution with the larval data. The best phylogenetic resolution was achieved by combining the adult and larval characters. The taxon sampling and character matrix is the largest to date and underlines the potential relevance of the thorax musculature as an important phylogenetic character system." (Authors) Eight Zygoptera larvae (intermediate to late instars) were examined from Coenagrionidae: *Ischnura elegans* (Vander Linden), *Ceriagrion tenellum* (De Villiers), *Coenagrion puella* (L.), *Enallagma cyathigerum* (Charpentier), Calopterygidae (*Calopteryx haemorrhoidalis* Vander Linden, *Calopteryx splendens* (Harris) and Platycnemididae (*Platycnemis pennipes* (Pallas), *Platycnemis latipes* Rambur (see Table S1 for more detail). All applicable regulations for the protection of wildlife species have been followed in each case. The responsible authorities, when necessary have approved the collection of Odonata. The immature stage in Odonata, Ephemeroptera and Plecoptera is referred to as 'naiad', following the terminology suggestions in Bybee et al. (2015). However, for Odonata, the more commonly used term is larva, and thus we have decided to be consistent within the community and use the more general term (cf. Sahlén et al., 2016; Büsse & Bybee, 2017] Address: Büsse, S., Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrechts-University, Am Botanischen Garten 9, D-24118 Kiel, Germany. E-mail: sbuesse@zoologie.uni-kiel.de

**16350.** Büsse, S.; Hörschemeyer, T.; Gorb, S.N. (2017): The head morphology of *Pyrhosoma nymphula* larvae (Odonata: Zygoptera) focusing on functional aspects of the mouthparts. *Frontiers in Zoology* 14:25: 13 pp. (in English) ["Background: The understanding of concerted movements and its underlying biomechanics is often complex and elusive.

Functional principles and hypothetical functions of these complex movements can provide a solid basis for biomechanical experiments and modelling. Here a description of the cephalic anatomy of *P. nymphula* focusing on functional aspects of the mouthparts using micro computed tomography ( $\mu$ CT) is presented. Results: We compared six different instars of the damselfly *P. nymphula* as well as one instar of *Aeshna cyanea* and *Epiophlebia superstes* each. In total 42 head muscles were described with only minor differences of the attachment points between the examined species and the absence of antennal muscle *M. scapopedicellaris medialis* (0an7) in *Epiophlebia* as a probable apomorphy of this group. Furthermore, the ontogenetic differences between the six larval instars are minor; the only considerable finding is the change of *M. submentopraementalis* (0la8), which is dichotomous in the early instars (I1, I2 and I3) with a second point of origin at the postero-lateral base of the submentum. This dichotomy is not present in any of the older instars studied (I6, middle-late and pen-ultimate). Conclusion: However, the main focus of the study herein, is to use these detailed morphological descriptions as basis for hypothetical functional models of the odonatan mouthparts. We present blueprint like description of the mouthparts and their musculature, highlighting the caused direction of motion for every single muscle. This data will help to elucidate the complex concerted movements of the mouthparts and will contribute to the understanding of its biomechanics not in Odonata only." (Authors)] Address: Gorb, S.N., Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**16351.** Buskirk, J. van (2017): Spatially heterogeneous selection in nature favors phenotypic plasticity in anuran larvae. *Evolution* 71(6): 1670-1685. (in English) ["Theory holds that adaptive phenotypic plasticity evolves under spatial or temporal variation in natural selection. I tested this prediction in a classic system of predator-induced plasticity: frog tadpoles (*Rana temporaria*) reacting to predaceous aquatic insects. An outdoor mesocosm experiment manipulating exposure to *Aeshna* dragonfly larvae revealed plasticity in most characters: growth, development, behavior, and external morphology. I measured selection by placing 1927 tadpoles into enclosures within natural ponds; photographs permitted identification of the survivors 6–9 days later. Fitness was defined as a linear combination of growth, development, and survival that correlates with survival to age 2 in another anuran species. In enclosures with many predators, selection favored character values similar to those induced by exposure to *Aeshna* in mesocosms. The shift in selection along the predation gradient was strongest for characters that exhibited high predator-induced plasticity. A field survey of 50 ponds revealed that predator density changes over a spatial scale relevant for movement of individual adults and larvae: 17% of variation in predation risk was among ponds separated by tens to thousands of meters and 81% was among sites =10m apart within ponds. These results on heterogeneity in the selection regime confirm a key tenant of the standard model for the evolution of plasticity." (Author)] Address: Buskirk, J. van, Inst. Zool., Univ. Zürich, 8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch



**16352.** Campbell, O. (2017): A record of the Bladetail *Lindenia tetraphylla* (Vander Linden, 1825) (Odonata: Anisoptera: Gomphidae) from Abu Dhabi, United Arab Emirates. *Tribulus*: 81-82. (in English) [21st April 2017, eastern edge of Lulu Island, an artificial, largely sandy island built just off the Corniche of the island of Abu Dhabi, capital of the United Arab Emirates.] Address: Campbell, O., c/o British School Al Khubairat, PO Box 4001, Abu Dhabi, UAE. E-mail: ojcampbell25@yahoo.com

**16353.** Cannings, R.A.; Pym, R.V. (2017): *Archilestes californicus* McLachlan (Odonata: Zygoptera: Lestidae): a damselfly new to Canada. *J. entomol. soc. Brit. Columbia* 114: 77-82. (in English) ["Russell Pym saw several males and females at a small, shallow, artificial pond at the end of an artificial stream near the entrance to the Liquidity Winery at 4720 Allendale Road, Okanagan Falls, BC (49.32553°N, 119.54993°W). He observed them from 13:00 to 14:00 PDT on 26-IX-2016; one male was photographed. From 16:30 to 17:00 PDT the same day, he recorded a female in knee-high grass, three to four metres from the shore of a dugout pond across the road from Walnut Beach Resort, 4200 Lakeshore Drive, Osoyoos, BC (49.01825°N, 119.43580°W). Cattail (*Typha latifolia*) and willows (*Salix* spp.) lined the pond margins. At the north end of Vaseux Lake the next day, 27-IX-2016, Russell photographed a lone male perched on cattails in a mixed willow swamp and cattail marsh (13:00 to 14:30 PDT). The site was along the boardwalk to the bird blind at 49.30348°N, 119.53696°W."] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville Street, Victoria, BC, Canada V8W 9W2. E-mail: rcannings@royalbcmuseum.bc.ca

**16354.** Casanueva, P.; Hernández, A.; Campos, F.; Santamaría, T. (2017): *Boyeria irene* (Fonscolombe, 1838) y *Cordulegaster boltonii* (Donovan, 1807) (Odonata): Dos estrategias en cuanto a sustratos de emergencia de larvas en un mismo hábitat. *Graellsia* 73(2): e059: 6 pp. (in Spanish, with English summary) ["*B. irene* and *C. boltonii*: two strategies of substrates for emergence in the same habitat: Data on the emergence of coexisting *C. boltonii* and *B. irene* in a mountain stream in the center of Spain (altitude 1200 m a.s.l.) are presented in the study, based on the weekly collection of exuviae. *B. irene* began to emerge 28 days later than *C. boltonii*. Larvae of both species overlapped extensively in their selection of substrates for emergence, although a significantly higher use of trees was found in *C. boltonii*. In comparison to other geographical areas, both species have modified their strategy, delaying the onset of the emergence period. The importance of environmental conditions (especially temperature) is discussed." (Authors)] Address: Casanueva, Patricia, Depto de Ciencias Experimentales, Univ. Europea Miguel de Cervantes, Calle Padre Julio Chevalier 2, E-47012 Valladolid, Spain. E-mail: pcasanueva@uemc.es

**16355.** Casanueva, P.; Sanz Requena, J.-F.; Angeles Hernández, M. (2017): Altitudinal variation of wing length and wing area in *Libellula quadrimaculata* (Odonata: Libellulidae). *Odonatologica* 46(3/4): 227-240. (in English) ["The area and length of the right fore and hind wings and the abdomen length were

analysed in specimens from two Iberian populations of *L. quadrimaculata* Linnaeus, 1758, one on a plateau (782 m a.s.l.) and another in the mountains (1 909 m a.s.l.), with a view to ascertaining whether their morphometric characteristics vary with altitude. Allometric relationships in terms of length and area of the fore and hind wings of both populations were found. The wings are longer and have a greater area in plateau specimens whereas the length of the abdomen did not vary between populations. Between the populations there was an overlap in the wing length measurements. The significance of these parameters in aiding the dragonflies' flight capacity and hence the effects on their lifestyle under different environmental conditions is discussed." (Authors)] Address: Casanueva, Patricia, Depto de Ciencias Experimentales, Univ. Europea Miguel de Cervantes, Calle Padre Julio Chevalier 2, 47012 Valladolid, Spain. E-mail: pcasanueva@uemc.es

**16356.** Casanueva, P.; Hernández, M.A.; Campos, F. (2017): ¿Varía el tamaño de las exuvias de *Cordulegaster boltonii* (Donovan, 1807) (Odonata: Cordulegasteridae) durante el periodo de emergencia en ríos de montaña? *Boletín de la Sociedad Entomológica Aragonesa* 61: 271-272. (in Spanish, with English summary) ["Does the size of the exuviae of *C. boltonii* fluctuate during the emergence period in mountain rivers? It is known that in some species of odonates body size decreases as the emergence is delayed. In this paper we analyse whether this is true in *C. boltonii*. Values of head width, tibia length, and length and width of prementum from 165 exuviae from the Eresma river (central Spain, at 1200 m. a.s.l.) showed that females were bigger than males, but no interaction between date of emergence and gender was found. These data suggest that in this river there is no significant change in body size along the emergence period." (Authors)] Address: Casanueva, Patricia, Depto de Ciencias Experimentales, Universidad Europea Miguel de Cervantes, Calle Padre Julio Chevalier 2, 47012 Valladolid, Spain. E-mail: pcasanueva@uemc.es

**16357.** Ceder, P.; Jönsson, C. (2017): Tillväxttakt hos sydsvenska populationer av trollsländor (Odonata) i ett varmare klimat - en pilotstudie. B.Sc. thesis, School of Business, Engineering and Science, Halmstad University: 16 pp. (in Swedish, with English summary) ["In order to gain better understanding of climate change effects on ecosystems, it is necessary to study the response of different species to predicted climate change. Dragonflies are, due to their ecology, a suitable organism group for conducting such studies. In this pilot study we examined the response in growth- and mortality rate to increased ambient temperatures in an experimental set-up of three temperature levels (20°C, 22°C and 24°C) in larvae of three species from the Aeshnidae family (*Aeshna grandis*, *A. cyanea* and *Anax imperator*). *A. imperator* were, due to insufficient number of collected specimens, excluded in the 22°C temperature regime. The studied species are reproducing in Sweden, but *A. grandis* and *A. cyanea* are native, whereas *A. imperator* is considered newly established since it was first discovered in Sweden in the early 2000's. Our results show that *A. grandis* and *A. cyanea* reacted positively to an increased ambient temperature, in terms of

growth rates. However, the response to increased temperatures differed between the two species as *A. grandis* showed both higher growth- and mortality rate, compared to *A. cyanea*. Thus, we assume that both species are likely to benefit from the ongoing climate change, but that interactions between them may change. Further studies are required to elucidate how the two species will be affected in presence of newly established species, such as *A. imperator*. Although, based on our results, the competitiveness of both native species might increase with rising temperatures - which should be considered in future conservation planning." (Authors)] Address: Sahlén, G., Systematic Zoology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, 752 36 Uppsala, Sweden. E-mail: goran.sahlen@set.hh.se

**16358.** Chee, A. (2017): Electromagnetic Actuation for a Dragonfly Inspired Flapping-Wing Micro Aerial Vehicle. MSc. thesis, Graduate Department of the Institute for Aerospace Studies, University of Toronto: II + 99 pp-["Insect-scale microaerial vehicles is an area within microaerial vehicles which has seen recent growth due to new understandings of insect flight and the availability of new actuation technologies. Prominent flapping wing MAVs were surveyed and relevant observations taken to help guide the project. Alternative actuation technologies for the UTIAS Robotic Dragonfly project were assessed and an electromagnetic actuator was selected. A new design incorporating this actuator was fabricated and tested. The platform features a sub-gram at-scale prototype with independently driven wings, a mass of 222 mg and a wingspan of 75 mm. Experiments demonstrated that the prototype was capable of generating up to 1.34 mN of lift." (Author)] Address: not stated

**16359.** Chelmick, D (2017): *Zygonyx torridus* (Kirby 1889) in Almeria Province. *Boletín Rola* 9: 5-14. (in English, with Spanish summary) ["In 2016, *Z. torridus* was recorded for the first time in the Province of Almeria. This population, which was thriving, is almost 80 km east of the nearest sighting which is in Malaga Province." (Author)] Address: Chelmick, D., FRES, Macromia Scientific, UK. E-mail: david.chelmick@gmail.com

**16360.** Choong, C.Y.; Dow, R.A.; Ng, Y.F. (2017): New records of Odonata from Kelantan, Malaysia, with a checklist of species recorded from the state. *Faunistic Studies in South-east Asian and Pacific Island Odonata* 21: 1-22. (in English, with summary in Bahasa Melayu) ["We report here the results from field trips to collect Odonata in the central and north-eastern parts of Kelantan state, Peninsular Malaysia. Sixty eight species were collected, and 15 of these are new records for the state. Interesting species collected include *Euphaea masoni* Selys, 1879 and *Leptogomphus tioman* Choong, 2016. A checklist of the Odonata recorded from Kelantan with a total 131 confirmed species is given in an appendix." (Authors)] Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.edu.my

**16361.** Choong, C.Y.; Alwen, B.M.; Izzat Husna, M.; Amirudin, B.A. (2017): Odonata fauna of Tioman Island, Pahang,

peninsular Malaysia. *Journal of Wildlife and Parks* 32: 31-40. (in English) ["Records of Odonata observed and collected at sites in Tioman Island, Pahang on four occasions (18-23 – VII-2013, 23-26-III-2014, 16-19-V-2014 and 14-22-IV-2016) are presented. Adult insects were observed and collected during the field surveys. A total of 40 species from 12 families were recorded. Of these, 23 species were new records for Tioman Island and one species (*Leptogomphus tioman*) is a newly described species. Interesting species recorded from the field surveys were *Devadatta argyroides tiomanensis*, *Mortonagrion arthuri*, *Chlorogomphus arooni*, *Macromia* cf. *westwoodi* and *Raphismia bispina*. ... *Mortonagrion arthuri* is a rare and local species found at coastal area where sea water meets fresh water." (Authors) Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.edu.my

**16362.** Choubey, V.; Shukla, A.; Rai, S. (2017): Study of ecological markers in Narmada Valley of Jabalpur Region: A case study. *International Journal of Recent Research and Applied Studies* 4 (2 / 13): 58-64. (in English) ["The Smart City mission of Jabalpur intends to promote adoption with basic infrastructure to give a decent quality of life, a clean and sustainable environment through application of smart solutions where environment disturbed through anthropogenic activities. This smart city mission with "Clean Narmada, Green Jabalpur" intends to promote adoption in environment with basic infrastructure to give a decent quality of life. Biodiversity encompasses the variety of all life on earth. Jabalpur is major city of Madhya Pradesh in India which is rich in biodiversity. The present study was carried out from January 2014 to December 2016. The whole Narmada valley of Jabalpur region including river, forest, grassland and urban area were selected as study site for the collection of sample. In the study total 101 Bioindicator species of various classes were recorded viz., Odonata 37 species (7 Families), Lepidoptera 25 Species (5 Families), Spiders 26 Species (10 Families) and Mollusca 13 Species (2 Class). This study aimed in contributing to plane of biodiversity restoration in studied region and development of management strategies so as to ensure sustenance of all the recorded species and ecosystem services derived from them. The content of this paper will be useful step for future studies." (Authors)] Address: Choubey, V., Dept of Zoology, Govt. Arts College, Panagar Jabalpur (M.P.), India

**16363.** Chovanec, A. (2017): Die Libellenfauna (Odonata) eines Überlauf- und Versickerungsbeckens: Artenspektrum und phänologische Aspekte. *Libellula* 36(1/2): 23-44. (in German, with English summary) ["Odonata of an overflow and seepage reservoir: species inventory and phenological aspects – The dragonfly fauna of a small wetland situated in an overflow and seepage reservoir in Maria Enzersdorf, Austria, was investigated in 2016. In total 27 species were recorded, of which seven were autochthonous and 15 probably or possibly autochthonous. In terms of species associations the odonate community was dominated by pioneer species and species typical of reed and submerged macrophytes. *Ischnura pumilio*, *I. elegans*, *Coenagrion puella* and

*Sympetrum striolatum* showed the highest numbers of individuals. Two species, *C. scitulum* and *S. meridionale*, are "critically endangered" according to the Austrian Red List. Based on a high number of field trips (46) comparative phenological features were documented in detail." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

**16364.** Chovanec, A. (2017): Interspezifische Paarungsversuche unterschiedlicher Libellenarten (Odonata). Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen 69: 91-94. (in German, with English summary) ["Heterospecific pairing attempts in different dragonfly species (Odonata). – In this paper examples of heterospecific pairing attempts of dragonflies including a triple tandem are presented. Observations were made during odonatological investigations of a small wetland in Maria Enzersdorf, Lower Austria, in 2016." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

**16365.** Chovanec, A. (2017): Naturnahe Retentionsräume im niederösterreichischen Flachland als Lebensraum einer flusstypspezifischen Libellenfauna (Odonata). Entomologica Austriaca 24: 27-48. (in German, with English summary) ["Near-natural retention areas in the Lower Austrian lowland as habitat of a rivertype-specific dragonfly fauna (Odonata). In the lowlands of Eastern Austria the morphology of three running waters situated in four near-natural retention areas was evaluated by dragonfly surveys. In line with the requirements of the EU Water Framework Directive, the Dragonfly Association Index was applied to assess the differences between the current odonate fauna and the rivertype-specific reference conditions. The ecological status of the four river sections was classified as "high" and "good" respectively, due to the increased sinuosity of the rivers, the in-stream habitat heterogeneity and the pronounced lateral connectivity by creating backwaters. These measures provided a mosaic of different habitats for both, rheophilic and limnophilic dragonfly species. A total of 38 species were recorded in the four retention areas, which correspond to 49 % of the Austrian dragonfly inventory of 78 species; 33 species were classified as autochthonous in at least one of the investigation areas. The necessity of management measures for the dragonfly fauna, such as preventing tree canopy cover or mowing of reed, is pointed out." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-Mail: andreas.chovanec@bmlfuw.gv.at

**16366.** Chovanec, A. (2017): Beobachtungen zur Unterbrechung der Eiablage bei *Orthetrum brunneum* (Odonata: Libellulidae). Libellula 36(3/4): 139-144. (in German, with English summary) ["Interrupted oviposition in *O. brunneum* – In the case of temporarily high male density and intensive mating activities females of *O. brunneum* interrupted oviposition and perched on algal mats or emergent plant substrates at the oviposition site and thus were no longer recognised by conspecific males. Observations were made at a shallow secondary water body in Lower Austria near Vienna during the flight period between May and September 2016." (Author)]

Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

**16367.** Ciach, M.; Maslanka, B.; Krzus, A.; Wojas, T. (2017): Watch your step: insect mortality on hiking trails. Insect Conservation and Diversity 10(2): 129-140. (in English) ["1. Hiking may have a negative effect on vertebrates, but the impact on insects is unknown. Large-scale hiking may lead to habitat degradation, the introduction of alien species and the killing of insects occurring in places visited by people. 2. The aim of this study was to determine the influence of hiking on the mortality of insects. Randomly selected hiking trails in the western Carpathians (southern Poland) were surveyed and dead insects lying on the trails were collected. To compare the composition of ground-dwelling insects killed on trails, insects from free-living populations were sampled with ground pitfall traps. 3. The species abundance of insects killed on trails and those caught in traps differed significantly. Apart from common species, rare and legally protected insects were also found on the trails. Trail mortality peaked in July along with increasing hiking activity. 4. Body size did not affect mortality, at either the species or individual levels. Species mobility influenced mortality, with less mobile species being more vulnerable to trampling. Trampled insects remained on the ground for a maximum of 72 h, although 50% disappeared within 24 h. 5. Our results indicate that trail-killing is, to some degree, a random process and that hiking can influence insects by the elimination of individuals. Given the total length of hiking trails in Poland (76 400 km), and the significant human impact on natural areas resulting therefrom, hiking may be having a negative influence on insect populations." (Authors)] Address: Ciach, M., Dept of Forest Biodiversity, Inst. Forest Ecology & Silviculture, Fac. Forestry, Univ of Agriculture, al. 29 Listopada 46, 31-425 Krakow, Poland. E-mail: michal.ciach@ur.krakow.pl

**16368.** Cicek, K.; Koyun, M.; Tok, C.V. (2017): Food composition of the Near Eastern Fire Salamander, *Salamandra infraimmaculata* Martens, 1885 (Amphibia: Urodela: Salamandridae) from Eastern Anatolia. Zoology in the Middle East 63(2): 130-135. (in English) ["This study presents data on the food composition of *S. infraimmaculata*, from Bingöl, eastern Turkey. A total of 139 prey items was determined in the food content of 28 individuals (14 juveniles, 7 males, and 7 females). Insecta (N%= 37.4), Gastropoda (27.3%), and Isopoda (25.9%) constitute together 91% of the food items. The most frequent prey groups in the diet are Coleoptera (F%=50.0%), Isopoda (57.1%), and Gastropoda (46.4%). Coleoptera (V%= 34.6%), Gastropoda (28.0%), and Isopoda (23.5%) had the highest prey volumes. No significant difference was found between the sexes in food composition. The species generally feeds upon poorly flying or slow-moving invertebrates, but is opportunistic in taking up more mobile prey species as well. Diptera, Odonata and Hemiptera were found in small numbers only." (Authors)] Address: Çiçek, K.; Zool. Sect., Dept Biol., Fac. Science, Ege Univ., Izmir, Turkey. E-mail: kerim.cicek@hotmail.com

**16369.** Collins, D.S.; McIntyre, N.E. (2017): Extreme loss of diversity of riverine dragonflies in the northeastern U.S. is predicted in the face of climate change. Bulletin of American



Odonatology 12(2): 7-19. (in English) ["Riverine odonates are indicators of riparian health. Since these species are relatively well-surveyed, we can build species distribution models (SDMs) to predict how future climate conditions may impact their habitat availability. Locality data from state surveys were used to generate SDMs for 15 species of riverine odonates in a 784,982 km<sup>2</sup> portion of the northeastern US. Ensemble climate model projections to the year 2080 indicate that climate change will decrease the number of suitable river reaches by 45–99% depending on species, with 935 km of river identified as climate refugia for 20% or more of these species. Among the 15 focal species, the most vulnerable to climate change were *Lanthus parvulus*, *Stylurus scudderi*, and *S. spiniceps*, whereas the least affected were *Hylogomphus abbreviatus* and *Neurocordulia yamaskanensis*. Less suitable habitat was available in the future, meaning that even species that are not currently considered imperiled may become so in future climates unless actual preservation of refugia is enacted." (Authors)] Address: McIntyre, Nancy, Department of Biological Sciences, Texas Tech University, Lubbock, Texas 79409-3131, USA. E-mail: nancy.mcintyre@ttu.edu

**16370.** Condello, E.G.; Razzetti, E.; Liuzzi, C.; D'Agostino, Mastropasqua, F. (2017): First records of *Brachythemis impartita* in peninsular Italy (Odonata: Libellulidae). *Fragmenta entomologica* 49(2): 133-136. (in English) ["Two populations of *B. impartita* are here reported in peninsular Italy. The species was found for the first time in 2015 in Calabria in the area of the Angitola artificial lake (Maierato and Monterosso Calabro municipalities) not far from the Tyrrhenian coast. In 2016 the species was also observed in southern Apulia, along the banks of two artificial lagoons in the municipality of Ugento. Information are provided that confirm the habitat preferences of the species and a northward expansion." (Authors)] Address: Mastropasqua, F., CSdR- Association "Centro Studi de Romita", c/o Filippo d'Erasmus, Bari, Italy. E-mail: fabiomastro77@gmail.com

**16371.** Conesa García, M.A.; Bernal Sánchez, A. (2017): Nuevas claves para la determinación de las larvas del género *Calopteryx* Leach, 1815 (Zygoptera: Calopterygidae) de distribución ibérica. *Boletín de la SAE* N° 27: 40-64. (in Spanish, with English summary) ["New keys for determining the larvae of the genus *Calopteryx* Iberian distribution. This article aims to propose innovative ways of approaching the taxonomic determination of larvae for the three species of the genus *Calopteryx*, existing in the Iberian Peninsula: *C. virgo meridionalis*, *C. haemorrhoidalis* and *C. xanthostoma*. Although the imago can be easily determined, the same cannot be said of their larvae as they have a very homogeneous morphology. Based on the structure of the head, thorax, abdomen and lamellae, we are proposing criteria that allow us to distinguish the three-different species in the last larval stages. In addition, ten parameters are analyzed biometrically in F-0 larvae of the three-species analyzed." (Authors)] Address: Conesa García, M.A., Asociación odonológica de Andalucía. www.libelulas.org. E-mail: mconesa@malaga.uned.es

**16372.** Conze, K.-J. (2017): Libellen auf Zollverein. *Abhandlungen aus dem Westfälischen Museum für Naturkunde* 87:

223-232. (in German, with English summary) ["Over the past 20 years 24 species of dragonflies have been found on the area of the UNESCO World Heritage Zollverein, the majority of which are also native. 14 mostly widespread and numerous species form the basement of the species inventory. Of particular importance are the industrial waterbodies for southern species and the Small Bluetail, which is a pioneer species dependent on small, open shallow waters." (Author)] Address: Conze, K.-J., Hamburgerstr. 92, D-45415 Essen, Germany. E-mail: kjc@loekplan.de

**16373.** Corso, A.; Janni, J.; Pavesi, M.; Viganò, M. (2017): Update to the status of *Pantala flavescens* (Fabricius, 1798) and *Trithemis kirbyi* Selys, 1891 for Italy and Central Mediterranean basin (Odonata Libellulidae). *Biodiversity Journal* 8(1): 33-38. (in English) ["An overview of the records of *P. flavescens* and *T. kirbyi* for the Sicilian Channel islands and mainland Sicily, with comments on their possible status in this area, is provided. In light of the number of observed individuals, *P. flavescens* is likely to be regular in the studied area, with up to 30 individuals recorded per year since autumn 2012. *T. kirbyi*, conversely, is only known from few scattered records, so that its status in the area remains to be elucidated. No evidence of reproductive behaviour nor of actual breeding in this area was hitherto found for any of the two species." (Authors)] Address: Corso, A., Via Camastra, 10 – 96100 Siracusa, Sicily, Italy. E-mail voloerrante@yahoo.it

**16374.** Cuevas-Yañez, K.; Espinosa-Rivera, J.C.; Martínez-Falcón, A.P.; Córdoba-Aguilar, A. (2017): Are all Mexican odonate species documented? An assessment of species richness. *Systematics and Biodiversity* 15(3): 253-258. (in English) ["With the aim of protecting Mexican diversity, one current governmental task is to complete national biological inventories. In the case of odonate insects, several researchers have hypothesized that species richness is complete (205 dragonflies and 151 damselflies), but there has not been any formal exercise to test this. Thus, we have investigated whether odonate species richness (for Mexican endemics, Anisoptera, Zygoptera) and total species) is complete using sample-based and coverage-based rarefaction curves. Along with this, we also showed how good distribution data are in the country. The rarefaction curves have indicated 100% completeness for all groups suggesting that the inventory is complete. However, species' distribution data is highly patchy regarding areas either well (e.g. central Mexico) or badly (e.g. coast of Guerrero and Oaxaca) collected. We encourage researchers to continue odonate sampling in order to support at least three conservation actions: (i) conservation assessment of endangered species; (ii) knowledge of range shifts given rising global temperatures; and (iii) increase public interest and awareness in protected, touristic areas." (Authors)] Address: Cuevas-Yañez, K., Depto de Ecología Evolutiva, Inst. Ecología, Univ. Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, Mexico, D.F., Mexico

**16375.** Czechowski, P.; Gajda, K. (2017): The records of the White-tailed Skimmer *Orthetrum albistylum* (Selys, 1848) (Odonata: Libellulidae) in Lubuskie Province. *Przegląd Przyrodniczy*

28(1): 107-110. (in Polish, with English summary) ["*O. alibistylum* was recorded on nine sites in Lubuskie Province in 2015 (one site) and 2016 (eight sites). The majority of sites were localised in the southern part of the province. Skimmers were seen in two types of habitats – on fishponds and in the Oder River valley. Apart from the sightings described, *O. alibistylum* had been recorded in the province only once. Recent data prove the species' north-westward expansion." (Authors)] Address: Czechowski, P., Instytut Administracji i Turystyki PWSZ w Sulechowie, ul. Armii Krajowej 51, 66-100 Sulechów, Poland. E-mail: paczech@wp.pl

**16376.** Danko, M.J.; Danko, A.; Golab, M.J.; Stoks, R.; Sniegula, S. (2017): Latitudinal and age-specific patterns of larval mortality in the damselfly *Lestes sponsa*: Senescence before maturity? *Experimental Gerontology* 95: 107-115. (in English) ["Highlights: • Populations at high latitudes face higher time constraints and develop faster. • We studied effects of time constraints on accelerated ageing in damselfly larvae. • The high-latitude population exhibited higher mortality rates and ageing rates. • Late hatched individuals showed higher mortality rates. • All populations showed accelerated mortality rates with age in the larval stage. Abstract: Latitudinal differences in life history traits driven by differences in seasonal time constraints have been widely documented. Yet, latitudinal patterns in (age-specific) mortality rates have been poorly studied. Here, we studied latitudinal differences in pre-adult age-specific mortality patterns in the strictly univoltine damselfly *Lestes sponsa*. We compared individuals from three latitudes reared from the egg stage in the laboratory at temperatures and photoperiods simulating those at the latitude of origin (main experiment) and under common-garden conditions at a fixed temperature and photoperiod (supplementary experiment). Results from the main experiment showed that the high-latitude population exhibited higher mortality rates than the central and southern populations, likely reflecting a cost of their faster development. Age-specific mortality patterns, also indicated higher ageing rates in the high-latitude compared to the low-latitude population, which likely had a genetic basis. The strong within-population variation in hatching dates in the low-latitude population caused variation in mortality rates; individuals that hatched later showed higher mortality rates presumably due to their shorter development times compared to larvae that hatched earlier. In both experiments, larvae from all three latitudes showed accelerated mortality rates with age, which is consistent with a pattern of senescence before adulthood." (Authors)] Address: Daňko, M.J., Laboratory of Evolutionary Biodemography, Max Planck Institute for Demographic Research, Konrad-Zuse-Str. 1, 18057 Rostock, Germany. E-mail: danko@demogr.mpg.de

**16377.** Dao, T.-P.; Huang, S.-C. (2017): Compliant thin-walled joint based on Zygoptera nonlinear geometry. *Journal of Mechanical Science and Technology* 31(3): 1293-1303. (in English) ["This paper introduces a Compliant thin-walled joint (CTWJ) that expands the group of existing compliant joints. The CTWJ design is based on the nonlinear geometry of the Zygoptera animal. With a thin-walled structure, the CTWJ allows a considerably large range of motion in the x-and-y

axes. In addition, the thin-walled structure is then filled by polydimethylsiloxane material to reinforce the stiffness of the CTWJ. First, design of experiment methodology is used for the sensitive analysis of the width and the thickness to the strain of joint. The range of motion, the strain, the buckling behavior, and the first natural frequency of CTWJ are investigated via finite element analysis and experiments. The behavior of the CTWJ is subsequently compared with the conventional compliant joints to realize the efficient performance of the CTWJ. The results revealed that the CTWJ has a range of motion and strain energy larger than those of traditional compliant joints. Finally, an example of vibration isolator is modeled by using the CTWJ as planar spring. It is believed that the CTWJ has a great potential for the development of compliant mechanisms in terms of large range of motions in multiple axes." (Authors)] Address: Dao, T.-P., Division of Computational Mechatronics, Inst. Computational Science, Ton Duc Thang Univ., Ho Chi Minh City, Vietnam. E-mail: daothanhphong@tdt.edu.vn

**16378.** Davis, D.R.; DeSantis, D.L.; Gabor, C.R. (2017): Antipredator behavior of the Barton Springs salamander (*Eurycea sosorum*) in response to aquatic invertebrates: potential consequences of habitat restoration. *Hydrobiologia* 795: 129-137. (in English) ["*E. sosorum*, is a fully aquatic salamander found in Barton Springs in Texas, USA, and has benefited from habitat restoration efforts. While important to improve overall habitat quality for this imperiled species, current management and restoration practices may also inadvertently increase the abundance of non-target organisms such as predatory invertebrates. Fish represent major predators of this species, but little is known about the role of invertebrates as potential predators. It is important to understand the role of these aquatic invertebrates as predators of *E. sosorum*, especially if habitat restoration also increases predator abundance. Using adult, predator-naïve salamanders, we examined the antipredator response of *E. sosorum* to chemical cues from the following treatments: crayfish, dragonfly larvae, snails, and water. Salamanders decreased activity (antipredator behaviour) only in response to the crayfish treatment. The responses to dragonfly larvae, snails, and water did not differ, suggesting that dragonfly larvae are not perceived as predators by these salamanders. Our study provides preliminary evidence suggesting that habitat restoration has unexpectedly increased crayfish abundance, which in turn may negatively affect *E. sosorum*, and that future management strategies should consider crayfish removal if salamander abundances decline with increasing crayfish abundance." (Authors)] Address: Davis, D.R., Dept Biol., Univ. of South Dakota, Vermillion, USA

**16379.** De Knijf, G. (2017): Recent observations and status of the Yellow Clubtail (*Gomphus simillimus*) in Belgium and northern France. *Brachytron* 19(2): 71-76. (in Dutch, with English summary) ["A male of the Yellow Clubtail (*Gomphus simillimus*) was observed at the river Chiers where it forms the border between Belgium (Torgny) and France (Velosnes). This is the sixth observation of this species for Belgium and the first for the French region Lorraine. In the last decade, *Gomphus simillimus* has been observed several times from the rivers Aisne, Marne, Seine and Aube in the region

Champagne-Ardenne. Among them several freshly emerged individuals in several years. This indicates the presence of populations at several localities in northeastern France. The habitat requirements of *G. simillimus* seem to be present at the river Chiers between Torgny and Velosnes, so local reproduction may not be excluded, near the locality of the observation or further downstream where the species has also been seen." (Author)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**16380.** de las Heras, M.; Cordero-Rivera, A.; Cabana, M.; Romeo, A.; Rey-Muñiz, X.L.; Mezquita, I.; Gainzarain, J.A.; Vilariño, V.S.; Evangelio-Pinach, J.M.; Díaz, C.; Miralles, A.; Torralba-Burrial, A.; Luque, P.; Prieto, E.; Teruel, S.; Conesa, M.A.; Mudeman, J.; Breña, C.T.; Loureiro, N.; Maravalhas, E.; Soares, A.; Pereira, P.; Fonseca, N. (2017): Distribución ibérica de *Gomphus graslinii*, *Oxygastra curtisii* y *Macromia splendens* (Insecta: Odonata), especies protegidas por la Directiva Hábitats. Boletín Rola 9, primer semestre 2017: 15-54. (in Spanish, with English summary) ["This paper reviews and compiles the information on the distribution of the three species of Anisoptera protected and included in the Habitats Directive that are present in the Iberian Peninsula namely *M. splendens*, *O. curtisii* and *G. graslinii*. In recent decades, these three species have greatly expanded their range and number of localities, primarily due to increased interest from both professionals and amateurs in dragonflies and damselflies found in the Iberian Peninsula. In summary, current evidence shows that the north-west quadrant represents the area of greatest frequency followed by the south-west and north east quadrants. A large number of localities are included within the sites protected by the Natura 2000 Network, and it is in Spain where the three species are most represented. As a result of the data contained in this paper, we propose that the threat status of *G. graslinii* should be revised from "Near Threatened" to "Vulnerable". With regard to the other two species we propose their status remains unchanged. Finally we emphasise the need to sample historical localities from which these species have not been recorded in recent years to ascertain if populations still exist and their viability." (Authors)] Address: de las Heras, M., Asociación de Educación Ambiental El Bosque Animado / ROLA, Spain. E-mail: matias.delasheras.carmona@gmail.com

**16381.** De Roo, P. (2017): Enige bemerkingen over een kwetsbare populatie van de Bosbeekjuffer (*Calopteryx virgo*) in het Peerdsbos (Antwerpse Kempen, België). *Brachytron* 19(1): 16-21. (in Dutch, with English summary) ["During the period 1990-2000 there were no known populations of *C. virgo* anymore in the western part of the Antwerp Campine area (Belgium), where they occurred in the first half of the 20th century. In 2006 however, the author observed some individuals in this region, at the Laarse Brook in the Peerdsbos forest at Brasschaat/Schoten (lon 51,275 lat 4,486). Since 2006 the species has been counted yearly along a 5 km long transect of the Laarse Brook, which has been divided into 9 sections of several hundreds of meters. The article describes the habitat in the different sections and presents an overview

of the monitoring results. After an increase in the first years there was a significant drop in numbers in 2011, but later the population increased again to 141 individuals. In 2015 there was again a prominent drop to only 66. In this year some sections of the brook had been subject to fluctuations in water level or alterations of the habitat structure, and in one of them the habitat of *C. virgo* was completely altered after construction works and reinforcement of the banks with heavy stones. Other sections suffered from extremely low water levels. This case shows that local habitat loss could have serious effects on rather small and vulnerable populations of *C. virgo*. The next years will show to what extent the population of the Laarse Brook will recover." (Author)] Address: E-mail: pierre.de.roo@telenet.be

**16382.** de Vries, R.; Buesink, R.; van Leeuwen, J.; Baller, G. (2017): Odonata observations in the Danube Delta, Romania, from July 2016. *Brachytron* 19(1): 35-43. (in Dutch, with English summary) ["The Danube Delta is one of the most important wetlands of Europe, but its Odonata fauna is still relatively poorly known. This article presents Odonata observations from a visit to the Romanian Danube Delta in July 2016. Records are from around the village of Sfantu Gheorghe as well as from around the villages of Caraorman, Murighiol and Mahmudia. 25 species were recorded in total. In the Sfantu Gheorghe region we found eleven species that had not been reported previously from this part of the delta. These include the first records of *Anax ephippiger* from the Romanian Danube delta, as well as records of *Lestes macrostigma*, *Chalcolestes parvidens* and *Selysiothemis nigra*." (Authors)] Address: Baller, G.. E-mail: gijs.baller@gmail.com

**16383.** Deacon, C.; Simaika, J.P.; Samways, M.J. (2017): Description of final instar larvae of *Ecchlorolestes Selys* spp. from South Africa (Odonata: Synlestidae). *Odonatologica* 46 (3/4): 319-330. (in English) ["The final instar larvae of two rare, endemic South African species, *E. nylephtha* and *E. peringueyi*, are described. This first description illustrates important features in identification, and also gives differences between the genera *Chlorolestes* and *Ecchlorolestes*." (Authors)] Address: Deacon, C., Dept of Conservation Ecology & Entomology, Stellenbosch University, Matieland, South Africa. E-mail: charldeacon@sun.ac.za

**16384.** Debata, S.; Palei, H.S.; Mohapatra, P.P.; Mishra, A.K. (2017): An inventory of Odonata fauna in Bonai Forest Division, Western Odisha, India. *e-planet* 15(1): 76-81. (in English) ["Biodiversity inventory of Odonata was carried out in Bonai Forest Division of Western Odisha, India during 2011 and 2012. During the survey, a total 36 species of Odonates including 26 species of Anisoptera and 10 species of Zygoptera were recorded. Overall, family Libellulidae is dominated by 22 species over others. The odonate diversity of Bonai Forest Division accounted for 37% of the Odonata diversity of Odisha. A long term studies on these lesser known fauna will be useful in understanding their status and monitoring the change over time in this habitat." (Authors)] Address: Debata, S., Dept Biodiversity and Conservation of Natural Resources, Central University of Orissa, Koraput-764021, Odisha, India. E-mail: subrat.debata007@gmail.com



- 16385.** Debecker, S.; Dinh, K.V.; Stoks, R. (2017): Strong delayed interactive effects of metal exposure and warming: latitude-dependent synergisms persist across metamorphosis. *Environ. Sci. Technol.* 51(4): 2409-2417. (in English) ["As contaminants are often more toxic at higher temperatures, predicting their impact under global warming remains a key challenge for ecological risk assessment. Ignoring delayed effects, synergistic interactions between contaminants and warming, and differences in sensitivity across species' ranges could lead to an important underestimation of the risks. We addressed all three mechanisms by studying effects of larval exposure to zinc and warming before, during and after metamorphosis in *Ischnura elegans* damselflies from high- and low-latitude populations. By integrating these mechanisms into a single study we could identify two novel patterns. Firstly, during exposure zinc did not affect survival, whereas it induced mild to moderate post-exposure mortality in the larval stage and at metamorphosis, and very strongly reduced adult life-span. This severe delayed effect across metamorphosis was especially remarkable in high-latitude animals, as they appeared almost insensitive to zinc during the larval stage. Secondly, the well-known synergism between metals and warming was manifested not only during the larval stage but also after metamorphosis, yet notably only in low-latitude damselflies. These results highlight that a more complete life-cycle approach that incorporates the possibility of delayed interactions between contaminants and warming in a geographical context is crucial for a more realistic risk assessment in a warming world." (Authors)] Address: Debecker, Sara, Nat. Inst. Aquatic Resources, Tech. Univ. Denmark, Jægersborg Alle 1D, Charlottenlund 2920, Denmark. E-mail: sara.debecker@kuleuven.be
- 16386.** del Palacio, A.; Diez, F.; Latini, Y. (2017): Odonata from La Pampa province, Argentina. *Odonatologica* 46(1/2): 25-34. (in English) ["In Argentina approximately 280 odonate species have been recorded, which are chiefly found in the north-eastern and north-western regions. With only three previously recorded species, La Pampa province is one of most understudied parts of the country. In the present work we provide a checklist of 17 species from La Pampa, including 14 new records for the province." (Authors)] Address: del Palacio, A., Univ. Nac. de Avellaneda, Depto Ambiente y Turismo, BioGeA, Mario Bravo 1460 CP 1870, Piñeyro, BA, Argentina. E-mail: adelpalacio87@gmail.com
- 16387.** del Palacio, A.; Sarmiento, P.L.; Javier, M. (2017): A new method using Scanning Electron Microscopy (SEM) for preparation of anisopterous odonates. *Microscopy Research and Technique* 80(10): 1085-1088. (in English) ["Anisopterous odonate male's secondary genitalia is a complex of several structures, among them the vesica spermalis is the most informative with important specific characters. The observation of those characters, mostly of membranous nature, is difficult in the Scanning Electron Microscope due to dehydration and metallization processes. In this contribution, we discuss a new and low cost procedure for the observation of these characters in the SEM, compatible with the most common agents used for preserving specimens." (Authors)] Address: del Palacio, A., Lab. de Biodiversidad y Genética Ambiental (BioGeA), Univ. Nac. de Avellaneda, Mario Bravo 1460, CP1870 Piñeyro, Avellaneda, Buenos Aires, Argentina. E-mail: adelpalacio87@gmail.com
- 16388.** Deregnaucourt, I.; Wappler, T.; Anderson, J.M.; Béthoux, O. (2017): A new triadotyped insect from the Late Triassic of South Africa. *Acta Palaeontologica Polonica* 62 (3): 613-618. (in English) ["Extant odonates represent a small subset of the historical biodiversity of this group. Among their successive stem-groups, the Triadotypomorpha are poorly documented. Herein we describe a new species *Reisia riei* from the Molteno Formation (South Africa, Upper Triassic) belonging to this taxon. The comparatively large sample allows a relatively complete description of the wing venation in Triadotypomorpha. We noticed the occurrence of a strongly oblique crossvein located between RA and RP1, a condition documented in some other Pandiscoidalia and which might be of phylogenetic importance. The new species probably inhabited open landscapes and foraged above large water bodies. The documentation of a Gondwanian Triadotypomorpha demonstrates that the group had a worldwide distribution by the Triassic." (Authors)] Address: Deregnaucourt, Isabelle, Sorbonne Univ., UPMC Univ Paris 06, MNHN, CNRS, Centre de recherche sur la paléontologie, Paris (CR2P), 57 rue Cuvier, CP38, 75005 Paris, France. E-mail: isabelle.deregnaucourt@edu.mnhn.fr
- 16389.** Deshmukh, G.D.; Dhamani, A.A.; Rudey, R.J. (2017): Diversity of dragonflies in the agro-forest ecosystem of Nagbhid, Maharashtra (India). *International Journal of Applied Research* 3 Special Issue Part I: 259-261. (in English) ["Odonata are among the oldest animal group. The richness in the diversity of dragonflies is significant as they are considered most important bio-indicator of healthy agro-forest ecosystem. The study area presents unique geographical site, having heavy rainfall during rainy season and extreme hot summer. It is the buffer zone of Tadoba National Park where forest area is infiltrated with paddy cultivation. The present study aimed at exploring species diversity of dragonflies which will help in designing conservation strategy for this important group of animals. In the present study, 25 species of dragonflies belonging to 16 genera of 3 families have been recorded. Among these, Libellulidae is richest family in terms of dragonfly species diversity while, *Pantala flavescens* is the most abundant species." (Authors)] Address: Deshmukh, G.D., Dept of Zoology, RMG College, Nagbhid, Maharashtra, India
- 16390.** Dias Boneto, D.; Batista-Silva, V.F.; Cavalieri Soares, J.A.; Luiz Kashiwaqui, E.A.; Dalla Valle Oliveira, I.A. (2017): Immature Odonata-Anisoptera in the Iguatemi river basin, upper Paraná River, Mato Grosso do Sul State, Brazil. *Acta Scientiarum. Biological Sciences* 39(2): 211-217. (in English, with Portuguese summary) ["This study present an inventory of the genera of Anisoptera in lotic environments of the Iguatemi River basin, upper Paraná River, Mato Grosso do Sul State, Brazil. Samplings were performed from December 2006 to February 2009 in the Iguatemi River and eight streams of the basin. We collected 739 immature Odonata, distributed in 25 genera and three families; of which one genus represent a new record for the Mato Grosso do Sul State.

Progomphus, Tramea, Elasmotemis, Macrothemis, Aphylla and Phylocyca were the most representative genera in the Iguatemi River basin. The genus accumulation curve predicts an increase of new genera for the Iguatemi River basin." (Authors)] Address: Batista-Silva, Valeria, Univ. Estadual de Mato Grosso do Sul, BR-163, Km 20.2, 79980-000, Mundo Novo, Mato Grosso do Sul, Brazil. E-mail: vfb\_silva@yahoo.com

**16391.** Dow, R.A. (2017): A new Bornean species of Drepanosticta allied to *D. actaeon* Laidlaw, with notes on related species (Odonata: Zygoptera: Platystictidae). IDF-Report 104: 1-32. (in English) ["*D. kosterini* sp. nov. (holotype ♂, from Gunung Penrissen, Kuching Division, Sarawak, Malaysian Borneo, deposited in RMNH) is described from both sexes. It is the sister species of *D. actaeon* Laidlaw, 1934; a fresh description of the male of *D. actaeon* and the first description of the female are given, along with discussion of variation in this species. Both *D. actaeon* and *D. kosterini* are considered to belong to a species group also including *D. rufostigma* (Selys, 1886) and a preliminary discussion of variation in this species is given, along with illustrations of both sexes. A neighbour joining COI gene tree for *D. actaeon* and *D. kosterini* is presented. The relationships of *D. actaeon*, *D. kosterini* and *D. rufostigma* to other members of the Platystictidae are briefly discussed." (Author)] Address: Dow, R.A., 6 Bramley Av., Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**16392.** Dow, R.A.; Choon, C.Y.; Ng, Y.F. (2017): *Drepanosticta rahmani* sp. nov., from Kedah, Malaysia (Odonata: Zygoptera: Platystictidae). Zootaxa 4338(1): 44-50. (in English) ["*Drepanosticta rahmani* sp. nov. (holotype ♂, steep tributary to stream in hills between Baling and Gulai, north west Kedah, Malaysia, 15 xi 2016, leg. R.A. Dow, to be deposited in the Natural History Museum, London) is described from both sexes."] Address: Dow, R.A., Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300Kuching, Sarawak, Malaysia. E-mail: rory.dow230@yahoo.co.uk

**16393.** Dow, R.A.; Choong, C.Y.; Ng, Y.F. (2017): New records of Odonata from Kedah, Malaysia in September 2016, with a checklist of species recorded from the state. Faunistic Studies in Southeast Asian and Pacific Island Odonata 23: 1-18. (in English, with Bahasa Melayu summary) ["The results of a short collecting trip to Kedah in the north-west of Peninsular Malaysia, made in September 2016, are reported. 64 species were collected, 13-14 of these are new records for the state and 28-29 are new records for the mainland of Kedah. A checklist of the Odonata recorded from Kedah (including Langkawi Island) is given in an appendix. At least 126 species of Odonata are now known from the state." (Authors)] Address: Dow, R.A., Naturalis Biodiv. Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**16394.** Dow, R.A.; Alfariysi, A.; Bilitoni, J.F. (2017): Odonata survey on Belitung. International Dragonfly Fund - Report 108: 1-24. (in English) ["A survey of Odonata on the Indonesian island of Belitung is reported. The work of Belitung Biodiversity Observer on Odonata is briefly outlined. 64 species were recorded during the survey, including two new records for the

island. A checklist of the known odonate fauna, consisting of 105 species, of the island is given in an appendix." (Authors)] Address: Dow, R.A., 16 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail address: rory.dow230@yahoo.co.uk

**16395.** Dow, R.A., Stokvis, F., Ngiam, R.W.J. (2017): Revision of the Genus *Leptogomphus* Selys in Borneo, including gene trees and a two marker molecular phylogeny (Odonata: Anisoptera: Gomphidae). Zootaxa 4358(2): 201-257. (in English) ["The Bornean members of the genus *Leptogomphus* Selys are revised. Two new species are described: *L. schieli* sp. nov. (holotype ♂, Gunung Penrissen, Kuching Division, Sarawak, Malaysia, to be deposited in BMNH) and *L. sii* sp. nov. (holotype ♂, Sungai Sii, upper Baram, Miri Division, Sarawak, Malaysia, in RMNH). *L. mariae* Lieftinck, 1948 is considered to be a junior synonym of *L. coomansi* Laidlaw, 1936. The true male of *L. pasia* van Tol, 1990 is described for the first time; male specimens previously treated as *L. pasia* or *L. cf pasia* actually belong to a taxon closely allied to, and possibly merely a form of, *L. coomansi*. A description is given of the female of another new species, but the species is not named in the absence of the male. Female specimens from south-western Sarawak, similar to *L. williamsoni* Laidlaw, 1912, are considered likely to also represent a distinct species. The female of *L. pendleburyi* Laidlaw, 1934 is described for the first time and fresh descriptions of the males of *L. coomansi*, *L. pendleburyi* and *L. williamsoni*, and the female of *L. coomansi* are given. Keys to both sexes, and distribution maps are given. A molecular analysis of the Bornean species (except *L. schieli*) using the COI and ITS markers is presented." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**16396.** Dube, T.; DeNecker, L.; van Vuren, J.H.J.; Wepener, V.; Smit, N.J.; Brendonck, L. (2017): Spatial and temporal variation of invertebrate community structure in flood-controlled tropical floodplain wetlands. Journal of Freshwater Ecology 32(1): 1-15. (in English) ["The Phongolo floodplain in South Africa is a unique system because of its biodiversity and socio-economic value. The spatial and temporal changes of invertebrate communities of the downstream floodplain influenced by controlled flooding from an upstream dam are poorly understood. The study investigated the spatial and temporal changes in community assemblage of macroinvertebrates and zooplankton in the permanent wetlands (pans) of the Phongolo floodplain in relation to controlled flooding. This was achieved by sampling during the dry period (September) and after controlled release of water (December). Although controlled flooding did not coincide with significant changes in the taxon diversity of macroinvertebrates and zooplankton, macroinvertebrate regional taxa richness ( $\gamma$ -diversity) was relatively higher in the period coinciding with controlled flood (December) compared to the dry period. For zooplankton, regional taxa diversity was similar in both periods. The average local taxa richness ( $\alpha$ -diversity) was higher after the controlled flooding period for both macroinvertebrates and zooplankton. Spatial species turnover ( $\beta$ -diversity) was lower after the controlled flooding period suggesting the homogenization of aquatic communities

through flooding. The community pattern of macroinvertebrates, but not of zooplankton, significantly changed after the controlled flooding period. The most important local environmental variables determining the distribution of both macroinvertebrates and zooplankton were macrophyte cover and dissolved oxygen. As the invertebrate diversity in this unique floodplain is at least partly dependent on release of water from the dam, future management schemes aimed to meet irrigation demands for agriculture should always consider flooding of the precious floodplain wetlands to maintain ecosystem integrity." (Authors)] Address: Dube, T., Lab. Aquatic Ecol., Evol. & Conservation, Univ. of Leuven, Leuven, Belgium. E-mail: trevor.dube@bio.kuleuven.be

**16397.** DuBois, R.B.; Pratt, D.M. (2017): Species and life stages of Odonata nymphs sampled with large drift nets in two Wisconsin rivers. *The Great Lakes Entomologist* 50(1): 11-16. (in English) ["Because relatively few nymphs of Odonata are caught in most drift studies, they have been inconsistently reported and little is known about the species and life stages that are predisposed to drift. We used large drift nets with relatively coarse mesh sizes (1500 µm) to sample late-instar odonate nymphs in two large rivers in Wisconsin. These nets were presumed to have advantages over smaller, conventional aquatic insect drift nets, including the capability to sample greater water volumes more quickly, sampling for longer periods of time before nets become clogged with debris, and a reduced likelihood of large, active insects escaping from the nets. Nymphs of 14 species of Odonata in five families were caught, but drift densities were low (0.042 m<sup>-3</sup> overall; .0.007 m<sup>-3</sup> for most species) and final instar nymphs (F-0) were collected less frequently than younger nymphs (F-1 through F.4). Gomphidae comprised 83% of the nymphs collected, and three species of Ophiogomphus comprised 78% of the total in the St. Croix River. *O. howei* was the most commonly sampled species (drift density of 0.026 m<sup>-3</sup>), with at least five instars collected." (Authors)] Address: Bob DuBois, B., Dept of Natural Resources, Bureau of Natural Heritage Conservation, 1701 North 4th Street, Superior, Wisconsin 54880, USA. E-mail: robert.dubois@wisconsin.gov

**16398.** Dumont, H.J. (2017): The Odonata of the Tassili-n-Ajjer, Algeria. *Brachytron* 19(1): 44-49. (in English, with Dutch summary) ["15 dragonfly species are reported from the Tassili-n-Ajjer plateau. *Paragomphus genei* is a first record for the Sahara. *Pseudagrion hamoni* is remarkably widespread and common in the Tassili, but is not known from the Mediterranean coastal zone. In general, zygopterans are underrepresented while *Hemianax ephippiger*, the yearly migrant along the Atlantic coast, is rare."] Address: E-mail: henri.dumont@ugent.be

**16399.** Dumont, H.J.; Ikemeyer, D.; Schneider, T. (2017): *Lestes concinnus* and *L. pallidus*: two non-metallic species with wide, complementary ranges (Odonata: Lestidae). *Odonatologica* 46(1/2): 99-110. (in English) ["We reiterate the history of two non-metallic, pale brown to greenish-blue marked with black *Lestes* species – *L. concinnus* and *L. pallidus* – that occur over a wide geographic range in the Old World

and confirm their status as variable but good species, even though their history is marked by all the defects of early taxonomy. *L. thoracicus* is synonymized with *L. concinnus*. We find that males (females not studied) of *L. concinnus* and *L. pallidus* can be separated by the structure of the inferior terminal appendages. The taxonomic distinctness of the two species is corroborated by the base sequence of the barcoding portion of the mitochondrial gene COI (genetic distance more than 6 %). There is a counterintuitive gap between the ranges of both, with only *L. pallidus* present in the southern Arabian Peninsula." (Authors)] Address: Dumont, H.J., Dept of Hydrobiology, Jinan University, Guangzhou, P.R. of China. E-mail: Henri.Dumont@UGent.be

**16400.** Duong, T.M.; Gomez, A.B.; Sherratt, T.N. (2017): Response of adult dragonflies to artificial prey of different size and colour. *PLoS ONE* 12(6): e0179483. [https://doi.org/10.1371/12\(6\): e0179483](https://doi.org/10.1371/10.1371/12(6): e0179483). 14 pp. (in English) ["Aposematism is an evolved, cross-species association between a preys' unprofitability and the presence of conspicuous signals. Avian predators have been widely employed to understand the evolution of these warning signals. However, insect predators are abundant, diverse, and highly visual foragers that have been shown to be capable of learned aversion. Therefore, it is likely that their behaviour also shapes the nature of anti-predator traits. In this study, we evaluated the rates of attack of a community (13 species) of mature adult dragonflies on artificial prey of varying size (2.5–31 mm lengthwise) and colour pattern (black, black/yellow striped). The relative attack rates of dragonflies on prey increased as prey size decreased, but there was no evidence that the attack rates by dragonflies were affected by prey colour pattern and no evidence for an interaction between colour pattern and size. To investigate prey selection by specific predator species under field conditions, we compared the time to attack distributions of black-painted prey presented to two common dragonflies: *Leucorhina intacta* and the larger, *Libellula pulchella*. We found that the two dragonfly species, as well as the two sexes, had different foraging responses. *L. pulchella* was more likely to attack larger prey, and females of both species more likely to attack prey than males. Collectively, our results indicate that dragonflies are highly size selective. However, while the nature of this selectivity varies among dragonfly species, there is little evidence that classic black/yellow warning signals deter attack by these aerial invertebrate predators." (Authors)] Address: Sherratt, T.N., Ottawa-Carleton Inst. Biol., Dept Biology, Carleton Univ., Ottawa, Canada. E-mail: Tom.Sherratt@Carleton.ca

**16401.** Dutta, S.P.; Manohar, M.J. (2017): Odonata diversity of Jalgaon city and around (Maharashtra). *Indian Journal of Entomology* 79(2): 191-201. (in English) ["A total of 46 species of Odonata belonging to 26 genera under 7 families were collected from Jalgaon city and its surrounding area during a study conducted in monsoon and post monsoon seasons, 2012–2014. The post-monsoon abundance was comparatively high. It was observed that the Anisoptera was dominant with 28 species under 3 families. Suborder Zygoptera revealed 18 species under 4 families. Libellulidae was the species rich family (24 species), followed by the Coenagrionidae (12 species), Platycnemididae (3), Lestidae (2), Aeshnidae (2), Gomphidae (2),



and Chlorocyphidae (1). Of the 46 species, 13 were very common, 22 were common, 10 rare and one very rare." (Authors)] Address: Dutta, S.P., Zool. Survey India, Western Regional Centre, Vidya Nagar Sector. No. 29, P.C.N.T. Post, Rawet Rd, Akurdi, Pune, 411044, India. E-mail: priti priyaeco@gmail.com

**16402.** Dwari, S.; Mondal, A.K. (2017): Diversity of Odonates in agricultural fields of Howrah district, West Bengal, India. *Journal of Entomology and Zoology Studies* 5(3): 1588-1595. (in English) ["The present study documented the odonates of agricultural fields of Howrah, West Bengal, India. Agricultural fields are unique ecosystems that provide some odonates to complete their life cycle. So the main aim of this study to prepare a list of those odonates which use these fields. A total number of 17 species of order Odonata were observed, among them 12 species belongs to sub order Anisoptera and 5 species belongs to suborder Zygoptera. Sub-order Anisoptera was represented by the family Libellulidae and suborder Zygoptera by the family Coenagrionidae. Species composition was highest in the family Libellulidae (70%) followed by the family Coenagrionidae (30%). Among all agricultural fields Rice fields (13) contain highest number of odonates followed by Sugarcane (5), Sesame (5) and others. Rice field is show highest diversity of odonates showing 76.471% of total odonates. Odonata documentation is highly necessary in order to assess the agroecosystem health. The fact that health of agroecosystem is proportionately at par with the presence of the odonates can be easily perceived from this study." (Authors)] Address: Dwari, S., Plant Taxonomy, Biosystematics & Molecular Taxonomy Laboratory Dept of Botany and Forestry, Vidyasagar University Midnapore, West Bengal, India

**16403.** Dwari, S.; Chowdhury, S.; Mondal, A.K. (2017): First report of *Lestes elatus* (Hagen in Selys, 1862) from West Bengal, India. *Journal on New Biological Reports* 61: 47-51. (in English) ["The first photographic record of the *L. elatus* from Howrah district, West Bengal, India is presented in this paper. During the Odonata survey of Howrah district of West Bengal this species photographed and identified first time for the state West Bengal. *L. elatus*, recorded in October, 2016. A medium sized pale brownish species documented from bush area of Amta 2 block of Howrah, West Bengal, India." (Author)] Address: Dwari, S., Plant Taxonomy, Biosystematics & Molecular Taxonomy Laboratory Dept of Botany and Forestry, Vidyasagar Univ. Midnapore, West Bengal, India

**16404.** Eck, T. (2017): Tandems der Gemeinen Winterlibelle (*Sympecma fusca*) als Beute von Jagdspinnen (*Dolomedes spec.*) (Odonata: Lestidae, Araneae: Pisauridae). *Mercuriale* 17: 63-66. (in German, with English summary) ["On 29-iii-2017, at ca. 15:30 h CEST, I observed the predation of at least two tandems of *S. fusca* by *Dolomedes spec.* at a shallow water body close to Rheinmunster-Stollhofen, Upper Rhine valley, Germany (48°46,31" N, 8°01'56"E, 119 m a.s.l.). ...." (Author)] Address: Eck, T., Weserstrafie 16, 76437 Rastatt, Germany. E-mail: tom-eck@t-online.de

**16405.** Elanchezhyan, K.; Sowmiya, C.; Agilesh, S.; Venkatesh, M. (2017): Diversity of odonates at agricultural college

campus, Killikulam, Tamil Nadu, India. *Journal of Entomology and Zoology Studies* 5(5): 935-940. (in English) ["A study was conducted to assess the diversity of odonates at Agricultural College Campus, Killikulam, Tamil Nadu, India. A total of 29 species of odonates including 17 species of Anisoptera and 12 species of Zygoptera were recorded at Agricultural College Campus, Killikulam. Libellulidae dominated with 15 species among Anisoptera followed by Aeshnidae (1) and Gomphidae (1). Among Zygoptera, Coenagrionidae (7) was the dominant family followed by Lestidae (2), Euphaeidae (1), Synlestidae (1) and Platycnemididae (1). *Diplacodes trivialis* (Libellulidae) was the most dominant Anisoptera and *Ischnura aurora* (Coenagrionidae), the most abundant Zygoptera among the 29 species recorded." (Authors)] Address: Elanchezhyan, K., Dept Agricultural Entom., Agricult. Coll. & Research Inst., Tamil Nadu Agricultural Univ., Killikulam, Vallanadu, Thoothukudi District Tamil Nadu, India

**16406.** Elfaki, E.A.; Allam, T. (2017): Two new records of Odonata in White Nile State, Sudan. *Journal of Environmental Science and Engineering B* 6: 72-79. (in English) ["White Nile state characterizes by rich healthy habitats especially wetlands which it supports the diversity of wildlife, Odonata species are actually poorly known in the White Nile region. A systematic survey was carried out in aquatic systems located at six localities: Kosti, Al-Kawwa, ELJebelein, Kenana cities, Om Elganateer and El Shawat islands. A total of 357 belonged to 16 species distributed in 4 families were recorded and observed. Libellulidae were dominant, with 9 species, followed by Coenagrionidae; *Brachythemis leucosticta* showed the highest abundance in compare with other species. ELJebelein area showed highest number of Odonata, while Kenana showed highest diversity, 11 species recorded from Kenana sugar scheme and Kenana Zoo Park, *Phyllomacromia africana* and *Olpogastra lugubris* recorded only in Kenana. *Agriocnemis exilis* and *Ictinogomphus ferox* were recorded for first time in Sudan." (Authors)] Address: Elfaki, E.A., Department of Biodiversity, Environment and Natural Resources and Desertification Research Institute, Khartoum 12217, Sudan

**16407.** Ellenrieder, N. von; Garrison, R.W. (2017): A synopsis of the Neotropical genus *Protoneura* (Odonata: Coenagrionidae). *Zootaxa* 4361: 76 pp. (in English, with Spanish summary) ["A synopsis of the Neotropical genus *Protoneura* is presented, including an identification key to its 22 species accompanied by illustrations of diagnostic characters, and characterizations, diagnoses, and distribution maps for all species. A lectotype is designated for *P. peramans* Calvert in Skinner, 1902." (Authors)] Address: Garrison, R.W., Associate Insect Biosystematist, Plant Pest Diagnostics, California Dept Food & Agricult., 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**16408.** Ellenrieder, N. von; Willink Castro, B.; Svensson, E. (2017): Checklist of the dragonflies and damselflies from Guyana (Insecta: Odonata), with new records from the country. *Check List* 13(2): 2104: 22 pp. (in English) ["The first checklist of the odonates from Guyana is presented, including 46

new species records. Literature sources are provided for all species and for the new records full locality data, colour scans or field photographs, taxonomic and biological notes, and maps for those species whose distribution range is increased considerably." (Authors)] Address: Ellenrieder, Natalia von, California State Collection of Arthropods, CDFA, 3294 Meadowview Road, Sacramento, CA 95832. Email: natalia.ellenrieder@gmail.com

**16409.** Escoto-Moreno, J.A.;Novelo-Gutiérrez, R.; Márquez, J.; Adabache-Ortiz, A. (2017): Odonata from the cloud forests of Hidalgo State, Mexico. *Notulae odonologicae* 8(10): 383-390. (in English) ["A total of 32 collecting trips were made to eight sites covered with cloud forest and associated ecotones in Hidalgo State, Mexico. Data were augmented by historical records. A total of 76 named species and two undescribed taxa belonging to 36 genera, 11 families and eight superfamilies of Odonata were recorded. Within these cloud forests are represented 100% of the superfamilies, 91.7% of the families, 78.2% of the genera and 58.5% of the species richness of Odonata known for Hidalgo. Included are restricted species, which together with overall high species-richness qualify these habitats as priority areas for the conservation of odonates in this state." (Authors)] Address: Escoto-Moreno, J.A., Colección Zool., Depto Biol., Centro de Ciencias Básicas, Univ. Autónoma de Aguascalientes. Avenida Universidad # 940. Ciudad Universitaria, 20131 Aguascalientes, Aguascalientes, Mexico. E-mail: jerjaem2002@yahoo.es

**16410.** Faasen, T. (2017): *Telebasis igapocola* sp. nov., a new damselfly from Amazonian Peru and Brazil (Odonata: Coenagrionidae). *International Journal of Odonatology* 20(2): 113-121. (in English) ["To date 57 species of *Telebasis* have been described. Most are Neotropical species, only three extending North of Mexico. From Peru 17 species were known. Most are found in the Amazonian lowlands; two are known from higher elevations in the Andes. From Brazil 26 species were known. In this article another Neotropical species is described, hereby named *Telebasis igapocola*. Males of this species differ from other described species of *Telebasis* with a black and red abdomen by the shape of cerci, paraprocts and genital ligula. Cerci are as long as paraprocts with a blunt tip. Genital ligula has a sharp-angled arrow-shape in ventral view. Females can be distinguished from other *Telebasis* species by the shape of the prothorax with two approximate processes curving caudad." (Author)] Address: Faasen, T., Ecologica, Rondven 22, 6026 PX Maarheeze, the Netherlands. E-mail: tim.faasen@ecologica.eu

**16411.** Ferrández Palacio, J.V.; Álvarez Fidalgo, M. (2017): *Selysiothemis nigra* (Vander Linden, 1825): nueva cita en la provincia de Huesca (noreste de la Península Ibérica) y actualización de su distribución en el territorio peninsular y balear (Odonata: Libellulidae). *BVNPC* 6(78): 74-81. (in Spanish, with English summary) ["... the presence of *S. nigra* in the province of Huesca is confirmed, being also the first record for Aragon in the last twenty years. Furthermore, an update of the species distribution on the Iberian Peninsula and the Balearic Islands is presented." (Authors) La Mina de Selgua

(Monzón, Huesca), 15-VI-2017] Address: Ferrández Palacio, J.V., Usuario de Biodiversidad Virtual.org – Monzón, Huesca, Spain. E-mail: jv\_ferrandez@yahoo.es

**16412.** Ferretti, A.; Pinkert, S.; Nel, A.; Huang, D.-Y. (2017): A new hawker dragonfly from the Middle Jurassic of China (Odonata: Aeshnoptera). *Comptes Rendus Palevol.* 16: 378-381. (in English) ["A new genus and species *Linqibinia panae* of paracymatophlebiid hawker dragonfly is described from the Middle Jurassic Haifanggou Formation (Inner Mongolia, China). Previously only known from Karatau in Kazakhstan, the discovery of another member of this family extends its range across Central Asia. It confirms that the Aeshnoptera was among the most diverse odonatan clades during the Middle-Late Jurassic." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**16413.** Ferri, V.; Soccini, C. (2017): I popolamenti odonotologici ed erpetologici del complesso dei Laghi di Cava in località San Polo di Brescia (Lombardia, Italia Settentrionale). *Natura bresciana: annuario del Museo Civico di Storia Naturale di Brescia* 41: 27-36. (in Italian, with English summary) ["Odonatological and Herpetological fauna of San Polo quarry lakes complex of Brescia (Lombardy, northern Italy). Status and conservation proposals". The results of faunistic and ecological research on the populations of Odonata, amphibians and reptiles of the complex of quarry lakes in San Polo Location in the municipality of Brescia (Lombardy, northern Italy) are on display. During the years of research (2014-2017) 7 species of Zygoptera, 11 species of Anisoptera, 6 species of Amphibia and 8 species of Reptilia were found. Stand out in the general faunal context of the Brescia area the reports of *Pyrrhosoma nymphula*, *Ischnura pumilio* and *Aeshna isosceles* for dragonflies, *Triturus carnifex* for amphibians and *Coronella austriaca*, ... The main threat factors and guidelines for the conservation of these wildlife emergencies are presented." (Authors)] Address: Ferri, V., Via Valverde 4, I - 01016 Tarquinia (Vt), Italy. E-mail: csnarcadia@gmail.com

**16414.** Feurle, A. W.; Holzinger, W. E. (2017): Die Libellenfauna des Dörmleesee in Lingenau (Naturpark Nagelfluhkette), mit dem Erstnachweis der Gabel-Azurjungfer (*Coenagrion scitulum*, Odonata, Insecta) für Vorarlberg. *inatura – Forschung online* 46: 6 pp. (in German, with English summary) ["A survey of the Odonata fauna of the pond Dörmlesee in Lingenau (Vorarlberg; coordinates (WGS84): 9,9106 E; 47,4536 N) carried out in 2017 revealed a total of 14 species. On 21-VI-2017, we spotted a single male of *C. scitulum*. This is the first confirmed record of this species in Vorarlberg. In Austria, *C. scitulum* is autochthonous in its eastern parts (Styria, Burgenland, Lower Austria and Vienna) and has been recorded in Salzburg recently. In addition, an unconfirmed record for Vorarlberg was published in 2002. It is a species with holo-mediterranean distribution and a distinct range expansion (due to climate change) towards Central Europe in recent decades, where it usually inhabits low altitudes. Our record of *C. scitulum* at 663 m a.s.l. therefore is unusual and can be explained by the fact that the Dörmlesee is favoured

by a warm climate." (Authors)] Address: Feurle, A.W., Schwarzen 365/4, A-6861 Alberschwende, Austria. E-Mail: alexander.feurle@gmail.com

**16415.** Filion, A.; Lagrue, C.; Presswell, B.; Poulin, R. (2017): Behavioural modification of personality traits: testing the effect of a trematode on nymphs of the red damselfly *Xanthocnemis zealandica*. *Parasitology Research* 116: 1773-1779. (in English) ["Research on animal personality is increasingly demonstrating that individuals in a population are characterised by distinct sets of behavioural traits that show consistency over time and across different situations. Parasites are known to alter the behaviour of their hosts, although their role in shaping host personality remains little studied. Here, we test the effect of trematode infection on two traits of their host's personality, activity and boldness, in nymphs of *X. zealandica*. Genetic analyses indicate that the undescribed trematode species falls within the superfamily Microphalloidea. Results of laboratory behavioural tests indicate that the two behavioural traits are related to each other: bolder individuals also show higher levels of spontaneous activity than shy ones. However, parasite infection had no effect on either of these behaviours or on their repeatability over three separate testing sessions. Although our findings suggest that this trematode does not influence personality traits of the damselfly host, it remains possible that other standard personality traits not tested here (exploratory tendency, aggressiveness) are affected by infection." (Authors)] Address: Poulin, R., Département des Sciences de l'environnement, Université du Québec à Trois-Rivières, C.P. 500, Trois-Rivières, Québec G9A 5H7, Canada. E-mail: robert.poulin@otago.ac.nz

**16416.** Fitt, R.; Lancaster, L.T. (2017): Range shifting species reduce phylogenetic diversity in high latitude communities via competition. *Journal of Animal Ecology* 86(3): 543-555. (in English) ["1. Under anthropogenic climate change, many species are expanding their ranges to higher latitudes and altitudes, resulting in novel species interactions. The consequences of these range shifts for native species, patterns of local biodiversity, and community structure in high latitude ecosystems are largely unknown but critical to understand in light of widespread poleward expansions by many warm-adapted generalists. 2. Using niche modelling, phylogenetic methods, and field and laboratory studies, we investigated how colonisation of Scotland by a range expanding damselfly, *Ischnura elegans*, influences patterns of competition and niche shifts in native damselfly species, and changes in phylogenetic community structure. 3. Colonization by *I. elegans* was associated with reduced population density and niche shifts in the resident species least related to *I. elegans* (*Lestes sponsa*), reflecting enhanced competition. Furthermore, communities colonized by *I. elegans* exhibited phylogenetic underdispersion, reflecting patterns of relatedness and competition. 4. Our results provide a novel example of a potentially general mechanism whereby climate change-mediated range shifts can reduce phylogenetic diversity within high latitude communities, if colonising species are typically competitively superior to members of native communities that are least-closely-related to the coloniser." (Authors)] Address: Fitt, R.,

Institute of Biological and Environmental Sciences, Univ. Aberdeen, Aberdeen, UK. E-mail: r01mf13@abdn.ac.uk

**16417.** Fleck, G. (2017): Notes on the genus *Navicordulia* Machado & Costa, 1995 (Odonata: Anisoptera: Corduliidae s. str.): description of a new species, phylogenetic affinities and aspects of biogeography. *Zootaxa* 4272(2): 251-262. (in English) ["Based on a single male specimen, a remarkable new species of the genus *Navicordulia* is described from the Massif du Mitaraka in French Guiana (Tumuc-Humac Mountains). Another new species of this genus is also reported from the same locality but is not described. This is the first record of the genus from French Guiana, hitherto being unknown within a radius of more than 1000 km. Apparent rarity or absence of records is probably due to its secretive habits. *Navicordulia tumucurakensis* sp. nov. presents unique characters not present in other species of the genus including: almost no excavation of the anal angle, proximal sternal pilose ridge of abdominal segment 7 transformed into two large lateral oreillets disconnected from the median carina, additional distal sternal pilose ridge transformed into a medial knob, epiproct not extending beyond the distal half of the cerci, very long cerci surpassing those of described species, cerci lacking ventromedial carina and tubercle and exhibiting a distal ventral brush of hair-like setae. It is a forest species inhabiting hilly landscapes at low altitude, unlike other closely related intertropical species which are encountered in more elevated areas above 850 m. It is most closely related to *N. longistyla*, a typical cerrado species from the central Brazilian plateau or possibly to *N. nitens* from the central south Venezuelan Guaiquinima Tepui. Based on unique derived male abdominal structures and also on the female ovipositor and related structures, the South American genus *Navicordulia* and the Southeast Asian/Melanesian genus *Metaphya* are considered current adelphotaxa. This disrupted geographic distribution could be explained by a common ancestor having had a Gondwanian dispersal until the Late Cretaceous or Paleocene." (Author)] Address: Fleck, G. E-mail: fleckgunther@gmail.com

**16418.** Fonseca, N.; Cano-Villegas, F.J.; Soares, A.; Dijkstra, K.-D.B.; Brochard, C. (2017): *Aeshna isoceles* and *Libellula fulva* rediscovered in the Algarve, southern Portugal (Odonata: Aeshnidae, Libellulidae). *Libellula* 36(1/2): 51-58. (in English, with German summary) ["*A. isoceles* and *L. fulva* are rare and local species in the Iberian Peninsula and their presence in the Algarve was summed up to isolated records from the mid-1990. Since 2013 both species were rediscovered and the first evidence of their reproduction was found in Vilamoura." (Authors)] Address: Fonseca, N., Rua da Fábrica 37 – 1.º Fte, 8500-590 Portimão, Portugal. E-mail: nelfonseca@gmail.com

**16419.** Fontana-Bria, L.; Selfa, J.; Tur, C.; Frago, E.; (2017): Early exposure to predation risk carries over metamorphosis in two distantly related freshwater insects. *Ecological Entomology* 42(3): 255-262. (in English) ["1. Predation and competition play a central role in ecological communities, and it is increasingly recognised that animals use early warning cues to reduce the impact of these antagonistic interactions. 2. Strategies to avoid risk can occur during embryo development



through plasticity in egg hatching time. This strategy, and its associated costs and carryover effects on adults are little understood in insects. In this study, these are explored in two distantly related freshwater insects: the damselfly *Ischnura elegans* and the mosquito *Aedes albopictus*. 3. As predicted, damselfly eggs hatched earlier in response to larval predators cues, a treatment that also affected adult size. Risk cues did not affect mosquito egg hatching time, but they did affect larval development time in a sex-dependent manner. 4. The results suggest that responses aimed at avoiding risks can be triggered during the egg stage, and although they can vary dramatically among species, they are likely to be widespread in insects. Early warming responses can be particularly important to understand the ecology of aquatic insects, some of them global vectors of human diseases." (Authors)] Address: Frago, E., CIRAD, UMR Peuplements Végétaux et Bio-agresseurs en Milieu Tropical, CIRAD-3P 7, Chemin de l'IRAT, Ligne Paradis 97410, Saint-Pierre, La Réunion, France. E-mail: enric.frago@cirad.fr

**16420.** Fontana-Bria, L.; Frago, E.; Prieto-Lillo, E.; Selfa, J. (2017): Biogeographic evaluation of the dragonflies and damselflies in the Eastern Iberian Peninsula. *Arxius de Miscel·lània Zoològica* 15: 8-29. (in English, with Spanish summary) ["Insects are one of the most diverse groups of animals in terrestrial ecosystems, and are thus a good model system to study macrogeographic patterns in species' distributions. Here we perform a biogeographical analysis of Odonata in the Valencian Country (Eastern Iberian Peninsula). We also compare the species present in this territory with those in the adjacent territories of Catalonia and Aragon, and with those present in the whole Iberian Peninsula. Furthermore, we update the list of species of dragonflies and damselflies in the Valencian territory (65 species), and discuss the current status of two of them: *Macromia splendens* and *Lindenia tetraphylla*. Our results highlight that the Valencian Country has a higher proportion of Ethiopian elements but a lower proportion of Eurosiberian elements than Catalonia and Aragon. We also emphasize the importance of volunteer work in providing new knowledge on this group of iconic insects, and the relevance of museum collections in preserving them. The role of climate change in the distribution of Odonata is also discussed." (Authors)] Address: Fontana-Bria, Laia, Dept. de Zoologia, Fac. de Ciències Biològiques, Univ. de València, c/ Dr. Moliner 50, 46100 Burjassot, València, Spain. E-mail: Laia.Fontana@uv.es

**16421.** Frances, D.; Moon, J.; McCauley, S.J. (2017): Effects of environmental warming during early life-history on libellulid odonates. *Canadian Journal of Zoology* 95(6): 373-382. (in English) ["Climate warming affects ectotherms globally yet we know little regarding the variability in species' responses to warming, particularly in early life stages. Additionally, intraspecific variation in response to warming is understudied but may determine species' resilience to warming. To assess how temperature affects egg development rate in co-occurring dragonfly species, we manipulated temperature (range: 22° -31° C) and measured time to hatching. Warming decreased egg development time across all species, indicating that while climate warming will advance hatching phenology,

maintained synchrony in hatching order will likely not affect species interactions. Our second experiment examined early life history responses to warming in the dragonfly *Leucorrhinia intacta*. We measured time to hatching, hatchling size, growth rate and survival at four temperatures (23°-30° C), including a treatment with increased thermal variation. Warming resulted in smaller hatchlings with increased growth and mortality rates, while higher thermal variation did not have effects different from those of warming alone. We observed significant intraspecific variation in the responses to warming in both egg development time and hatchling size and this variation was correlated with date of oviposition. High levels of intraspecific variation may be important in buffering populations from the effects of climate warming." (Authors)] Address: Frances, D.N., Dept Biology, Univ. of Toronto Mississauga, Mississauga, ON L5L 1C6, Canada. E-mail: dachin.frances@mail.utoronto.ca

**16422.** Frye, M.A. (2017): Insect vision: A neuron that anticipates an object's path. *Current Biology* 27: R1076-R1078. (in English) ["Dragonflies are superb aerial predators, plucking tiny insect prey from the sky. This ability depends on a visual system that has fascinated scientists for decades, and now one of its visual-target-detecting neurons has been shown to anticipate the image path of prey." (Author)] Address: Frye, M.A., Dept of Integrative Biology & Physiology, Univ. of California Los Angeles, Los Angeles, CA 90095, USA. E-mail: frye@ucla.edu

**16423.** Futahashi, R.; Sugiura, N.; Aoki, T. (2017): The first record of *Sympetrum uniforme* (Selvs, 1883) from Rebun Island, off Hokkaido, Japan. *Tombo* 59: 101. (in Japanese, with English summary) ["A male of *S. uniforme* was collected on Rebun Island, off Hokkaido, northern Japan for the first time, 2-X-2013. This is the second record of this species from Hokkaido." (Authors)] Address: Futahashi, R., Nat. Inst. Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**16424.** Gainzarain, J.A. (2017): *Epitheca bimaculata* – a new species for the fauna of Bulgaria (Odonata: Corduliidae). *Notulae odonatologicae* 8(10): 369-373. (in English) ["A female *E. bimaculata* was photographed on 12-vii-2017 in the Rila Mountains of SW Bulgaria, at an altitude of 2 300 m a.s.l. This is the first record for the country and raises the number of Odonata species known from Bulgaria to 71. The possible origin of the individual is discussed." (Authors)] Address: Gainzarain, J.A., Instituto Alavés de la Naturaleza, apdo. de correos 2092, 01080 Vitoria-Gasteiz, Spain. E-mail: j.gainzarain@gmail.com

**16425.** Galasso, P.; Marletta, A.; Corso, A. (2017): Odonata of the South-eastern swamp lakes 'Pantano Cuba' and 'Pantano Longarini' (Sicily). *Bulletin of the Entomological Society of Malta* 9: 100. (in English) [Verbatim: From March 2015 to September 2017, a study focused on Odonata, funded by the German foundation 'Stiftung Pro Artenvielfalt (Foundation Pro Biodiversity)', was conducted at the swamp lakes 'Pantano Cuba' and 'Pantano Longarini', in the Southeastern coast of

Sicily, near Pachino (Siracusa). This area represents the southern most Italian wetland-complex and is characterised by brackish and standing waters. Alongside with the new data collected during this study, unpublished data collected during previous years will also be reported in this communication, to provide the first complete picture of the Odonata found in this territory. A total of 25 different species were found in Pantano Cuba and Longarini, from the following families: three species of Lestidae, four species of Coenagrionidae, seven species of Aeshnidae and eleven species of Libellulidae. Amongst these species, of particular interest is the discovery of *Brachytron pratense*, recorded for the first time in Sicily during this study and *Pantala flavescens*, never before observed in Italy except for the islands of Linosa and Lampedusa.] Address: Galasso, P., Stiftung Pro Artenvielfalt, Meisenstr. 65, 33607 Bielefeld, Germany. E-mail: paolo\_galasso@hotmail.com

**16426.** Galicia-Mendoza, I.; Sanmartín-Villar, I.; Espinosa-Soto, C.; Cordero-Rivera, A. (2017): Male biased sex ratio reduces the fecundity of one of three female morphs in a polymorphic damselfly. *Behav. Ecol.* 28(4): 1183-1194. (in English) ["Females of *Ischnura graellsii* display 3 color morphs, a male-like androchrome morph and 2 other morphs, infuscans and aurantiaca, which are not male-like. Previous research has suggested that male harassment has a negative effect on female fitness in many different insect species. Studying how male harassment affects fitness of the different female color morphs is key to a better understanding of how these morphs are maintained in natural populations. This study evaluated the response of female morphs of *I. graellsii* to contrasting sex ratios under controlled laboratory conditions. In our experiments, male abundance, through increased harassment, affected differentially the fecundity of females of the 3 color morphs. A male biased (3:1) sex ratio drastically decreased the average fecundity of infuscans females but had no effect on androchrome and aurantiaca females. Taking into account our results and previous studies that indicate that males prefer infuscans females, we propose a mechanism for the maintenance of this polymorphism. In this scenario, within-generation fluctuations in male abundance produce 2 regimes: One in which male abundance disfavors infuscans females by decreasing their fecundity and other in which a low male abundance results in androchromes that do not mate because of their low appeal to males. By studying a simple population genetics model, we found that the mechanism that we propose may contribute to maintain a stable female-limited polymorphism under a wide range of parameter combinations." (Authors)] Address: Cordero-Rivera, A., Depto Ecología e Bioloxía Animal. Grupo de Ecología Evolutiva e da Conservación. Univ. de Vigo, EUET Forestal, Campus de Pontevedra, Pontevedra, 36005, Galiza, Spain

**16427.** Galliani, C.; Scherini, R.; Piglia, A. (2017): Dragonflies and Damselflies of Europe. *WBA Handbook 7 / World Biodiversity Association Handbook 7*: 352 pp. (in English) [Inv, "A simple yet detailed guide suitable both for beginners and more expert readers who wish to improve their knowledge of the order Odonata. This book encompasses images and

photographs of all the European species having a stable population with chapters about their anatomy, biology, behaviour, distribution range and period of flight, plus basic information about the vagrants with only a few sightings reported. On the whole, 143 reported species and over 600 photographs are included." (Publisher)]

**16428.** García Cañal, J.A.; Fatou, P.; Noval Fonseca, N.; Álvarez Fidalgo, M. (2017): Primeros registros e indicios de reproducción de *Anax ephippiger* (Burmeister, 1839) en Asturias (norte de la Península Ibérica) (Odonata: Aeshnidae). *BVnPC* 6(75): 48-55. (in Spanish, with English summary) ["First records and potential reproduction of *A. ephippiger* in Asturias (northern part of the Iberian Peninsula). - Cabo Busto, Valdés (Asturias), 18-X-2014; La Granda, Gozón (Asturias), 29-V-2017] Address: García Cañal, J.A. Experto del Grupo de Aves de Biodiversidad Virtual – Avilés, Asturias, Spain. E-mail: luancopin@gmail.com

**16429.** Gering, E.J. (2017): Male-mimicking females increase male-male interactions, and decrease male survival and condition in a female-polymorphic damselfly. *Evolution* 71(5): 1390-1396. (in English) ["Biologists are still discovering diverse and powerful ways sexual conflicts shape biodiversity. The present study examines how the proportion of females in a population that exhibit male mimicry, a mating resistance trait, influences conspecific males' behaviour, condition and survival. Like most female-polymorphic damselflies, *Ischnura ramburii* harbours both "andromorph" females, which closely resemble males, and sexually dimorphic "gynomorph" counterparts. There is evidence that male mimicry helps andromorphs evade detection and harassment, but males can also learn to target locally prevalent morph(s) via prior mate encounters. I hypothesized that the presence of male mimics could therefore predispose males to mate recognition errors, and thereby increase rates of costly male-male interactions. Consistent with this hypothesis, male-male interaction rates were highest in mesocosms containing more andromorph (vs. gynomorph) females. Males in andromorph-biased mesocosms also had lower final body mass and higher mortality than males assigned to gynomorph-majority treatments. Male survival and body mass were each negatively affected by mesocosm density, and mortality data revealed a marginally significant interaction between andromorph frequency and population density. These findings suggest that, under sufficiently crowded conditions, female mating resistance traits such as male mimicry could have pronounced indirect effects on male behaviour, condition, and survival." (Authors)] Address: Gering, E.J., Current Address: Dept of Integrative Biology, W.K. Kellogg Biological Field Station, 3700 East Gull Lake Drive, Hickory Corners, Michigan 49060, USA. E-mail: geringeb@msu.edu

**16430.** Gezie, A.; Anteneh, W.; Dejen, E.; Mereta, S.T. (2017): Effects of human-induced environmental changes on benthic macroinvertebrate assemblages of wetlands in Lake Tana Watershed, Northwest Ethiopia. *Environmental Monitoring and Assessment* 189(4): 152. (in English) ["Wetlands of Lake Tana Watershed provide various ecological and socioeconomic functions. However, they are losing their vigor

at alarming rate due to unwise management. Hence, there is an urgent need to monitor and assess these resources so as to identify the major drivers of its degradation and to provide information for management decisions. In this context, we aimed to assess the effects of human activities on macroinvertebrate assemblages of wetlands in Lake Tana Watershed. Biotic and abiotic data were collected from 46 sampling sites located in eight wetlands. A total of 2568 macroinvertebrates belonging to 46 families were recorded. Macroinvertebrate metrics such as Biological Monitoring Working Party score, Shannon diversity index, Ephemeroptera and Odonata family richness, and total family richness portrayed a clear pattern of decreasing with increasing in human disturbances, whereas Family biotic index score, which is an indicator of organic pollution, increased with increasing in human disturbances. The regression analysis also revealed that livestock grazing, leather tanning, and eucalyptus plantation were important predictors of macroinvertebrate metrics ( $p < 0.05$ ). In conclusion, human activities in and around the wetlands such as farming, leather tanning, solid waste dumping, and effluent discharges were contributed to the degradation of water quality and decreasing in the macroinvertebrate richness and diversity. These alterations could also reduce the availability of wetland products (sedges, craft materials, etc.) and the related ecosystem services. This in turn has an adverse effect on food security and poverty alleviation with considerable impact on communities who heavily depend on wetland products for their livelihood. Therefore, it is essential to formulate wetland policy for achieving wise use goals and necessary legal and institutional backup for sustainable wetland management in Ethiopia." (Authors)] Address: Gezie, A., Deptt of Biology, Bahir Dar University, Bahir Dar, Ethiopia

**16431.** Guillermo-Ferreira, R.; Appel, E.; Urban, P.; Bispo, P.C.; Gorb, S.N. (2017): The unusual tracheal system within the wing membrane of a dragonfly. *Biology Letters* 13(5). pii: 20160960. doi: 10.1098/rsbl.2016.0960: 5 pp. (in English) ["Some consider that the first winged insects had living tissue inside the wing membrane, resembling larval gills or developing wing pads. However, throughout the developmental process of the wing membrane of modern insects, cells and tracheoles in the lumen between dorsal and ventral cuticle disappear and both cuticles become fused. This process results in the rather thin rigid stable structure of the membrane. The herewith described remarkable case of Zenithoptera lanei shows that in some highly specialized wings, the membrane can still be supplemented by tracheae. Such a characteristic of the wing membrane presumably represents a strong specialization for the synthesis of melanin-filled nanolayers of the cuticle, nanospheres inside the wing membrane and complex arrangement of wax crystals on the membrane surface, all responsible for unique structural coloration." (Authors)] Address: Gorb, S.N., Functional Morphology & Biomechanics, Zoological Institute, Christian-Albrecht Univ. of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**16432.** Gyeltshen, T.; Kalkman, V.J. (2017): Odonata records from western Bhutan, with six new records and a note on the synonymy of Himalagrion with Coenagrion. *Notulae odonatologicae* 8(9): 341-353. (in English) ["Records of 56

species of Odonata collected from western Bhutan between 03- and 15-viii-2015 are listed. Six of these species are new to Bhutan: *Aeshna shennong*, *Anax guttatus*, *Gynacantha sub-interrupta*, *Neallogaster hermionae*, *Asiagomphus odoneli*, and *Rhyothemis phyllis*. The previously published record of *Lestes thoracicus* from Bhutan is considered incorrect and the species is deleted from the list of Bhutanese dragonflies. *Coenagrion tengchongensis* Yu & Bu, 2007 is synonymised with *Himalagrion exclamationis* Fraser, 1919 and *Himalagrion* Fraser, 1919 is synonymised with *Coenagrion* Kirby, 1890, resulting in the new combination of *Coenagrion exclamationis* (Fraser, 1919)." (Authors)] Address: Gyeltshen, T., School of Life Sciences, Sherubtse College, Kanglung, Bhutan. E-mail: thinleytshen@gmail.com

**16433.** Gyeltshen, T.; Kalkman, V.J.; Orr, A.G. (2017): Honouring His Royal Highness the Crown Prince of Bhutan: *Megalestes gyalsey* (Odonata: Synlestidae). *Zootaxa* 4244(4): 588-594. (in English) ["*Megalestes gyalsey* spec. nov. is described from a single male from Trongsa District in Bhutan. The species was discovered during field work conducted in 2015 for the Bhutan invertebrate biodiversity project. The species is named in honour of His Royal Highness Crown Prince Jigme Namgyel Wangchuck, the Gyalsey of Bhutan, on the occasion of his first birthday." (Authors)] Address: Gyeltshen, T., School of Life Sciences, Sherubtse College, Kanglung, Bhutan. E-mail: thinleytshen@gmail.com

**16434.** Gyeltshen, T.; Nfidup, T.; Dorjfi, P.; Dorjfi, T.; Kalkman, V.J. (2017): Bibliography and checklist of the dragonflies and damselflies of Bhutan. *Journal of Threatened Taxa* 9(1): 9743-9747. (in English) ["An overview is given of literature containing distribution records of dragonflies and damselflies in Bhutan. Based on this an annotated checklist is presented which contains 92 species. *Camacinia gigantea* (Brauer, 1867) and *Libellago lineata* (Burmeister, 1839) are listed as new to Bhutan." (Authors)] Address: Gyeltshen, T., School of Life Sciences, Sherubtse College, Kanglung, Bhutan. E-mail: thinleytshen@gmail.com

**16435.** Haber, W.A. (2017): Three new species of *Epigomphus* (Odonata: Gomphidae) from Costa Rica. *Zootaxa* 4282(1): 73-94. (in English, with Spanish summary) ["The male, female and larva of *E. bosquenuboso*, a new species from cloud forest in Costa Rica, is described. The female bears a pair of highly distinctive postocellar horns similar to those of three other species endemic to Costa Rica, *E. corniculatus*, *E. echeverrii*, and *E. verticicornis*. The males of two additional new species, *E. morrisoni* and *E. wagneri*, are described from premontane wet forest on the Pacific slope near Monteverde, resulting in a total of 13 species recorded from Costa Rica." (Author)] Address: Haber, W.A., Apdo. 50-5655, Monteverde, Costa Rica. E-mail: bill.haber01@gmail.com

**16436.** Hämäläinen, M. (2017): The Caloptera damselflies of Thailand – Distribution maps by provinces (Odonata: Calopterygoidea). *Faunistic Studies in SE Asian and Pacific Island Odonata* 19: 1-28. (in English) ["Distribution maps at province level accuracy are presented for the 44 species of the



superfamily Calopterygoidea (in the old sense, excluding the 'megapodagrionid' families) recorded in Thailand. Brief species accounts are presented with information on the distribution, phenology and the first discovery of the species. For eleven species the primary type was collected in Thailand. The history of the discovery and documentation of these insects in Thailand is discussed." (Author)] Address: Hämäläinen, M., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Email: matti.hamalainen@helsinki.fi

**16437.** Hämäläinen, M. (2017): *Rhinocypha peitho* sp. nov. from central Laos (Odonata: Chlorocyphidae). *Odonatologica* 46(1/2): 111-118. (in English) ["A new chlorocyphid damselfly species, *R. peitho* sp. nov. (holotype ♂ from Laos, Vientiane province, Vang Vieng district, Pha Tang), is described and illustrated for the male sex and compared with its congeners, particularly *R. pelops*. *Rhinocypha watsoni* is recorded from Laos for the first time." (Author)] Address: Hämäläinen, M., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: matti.hamalainen@helsinki.fi

**16438.** Hämäläinen, M. (2017): Corrections to the depository records of 22 holotypes of Odonata, originally in the collection of Roland A. Müller. *Notulae odonatologicae* 8(10): 374-378. (in English) ["The published depository record of the holotypes of 22 odonate taxa is corrected. Rather than being deposited at the Senckenberg Museum in Frankfurt am Main (SMF) as stated in the original descriptions, the specimens are deposited at the Naturalis Biodiversity Center in Leiden (RMNH)." (Authors)] Address: Hämäläinen, M., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: matti.hamalainen@helsinki.fi

**16439.** Hardersen, S.; Corezzola, S.; Gheza, G.; Dell'Otto, A.; La Porta, A. (2017): Sampling and comparing odonate assemblages by means of exuviae: statistical and methodological aspects. *Journal of Insect Conservation* 21(2): 207-218. (in English) ["Freshwater species are in serious decline all over the world. Thus, monitoring of freshwater ecosystems and species is crucial to guide policy actions and dragonflies are generally considered to be good indicators for these systems. The aquatic life stage of the Odonata is inherently more susceptible to changes in water quality than the imago and therefore exuviae give better insights into site-specific effects. However, utilizing exuviae for monitoring purposes introduces a number of problems. For example, they often do not persist long in the environment. Some of these problems have been addressed. However, there are no published data that distinguish the influence of sampling frequency and total sampling effort on the faunal completeness. Also the number of exuviae necessary to define local assemblages has not been investigated. These questions were addressed by analyzing the data on exuviae collected in seven sites and we found that for any given total amount of time invested, it was always preferable to conduct more short surveys, rather than fewer surveys lasting longer. The study also showed that a sample size of 300 exuviae allowed us to reliably estimate the similarity of two assemblages from different sites. However, when collecting 40 exuviae or

less, the reliability was low. Based on our findings we recommend sampling exuviae for a minimum of 5 days, evenly spread out over the entire season during which Odonata emerge, to sample each time for approximately 60 min and aim to collect not less than 300 exuviae in total."] Address: Hardersen, S., Centro Nazionale per lo Studio e la Conservazione della Biodiv. Forestale Carabinieri "Bosco Fontana", Mammirolo, Italy

**16440.** Harisha, M.N.; Hosetti, B.B. (2017): Status and conservation issues of Odonates in Bathi Lake, Doddabathi Village, Davanagere District, Karnataka, India. *International Journal of Entomology Research* 2(5): 55-59. (in English) ["The study was conducted from November 2014 to October 2015 at Bathi Lake, Davanagere District of Karnataka. A total of 28 odonate species belonging to 5 families have been recorded. Among them Anisoptera were predominant with 21 species, followed by the Zygoptera with 7 species. The family Libellulidae was widely distributed and dominated with high percentage composition, followed by the Coenagrionidae. The status based on the frequency of occurrence shown that 43% were common, 21% were occasional, 18% were very common, 11% were rare and 7% were very rare. The study highlights the importance of odonates and threats in their habitat due to different anthropogenic activities and also provides the baseline data of odonate diversity of Davanagere District of Karnataka state for research on their biology and the conservation." (Authors)] Address: Harisha, M.N., Dept of Post Graduate Studies and Research in Wildlife & Management, Kuvempu Univ., Jnana Sahyadri, Shankaraghatta, Shivamogga, Karnataka, India

**16441.** Harisha, M.N.; Hosetti, B.B. (2017): Status, diversity and conservation threats of Odonates in Kundavada Lake, Davanagere district, Karnataka, India. *Journal of Entomology and Zoology Studies* 5(1): 312-316. (in English) ["A study on diversity of odonates was conducted at Kundavada Lake located in Davanagere District of Karnataka. The study was conducted to explore status, diversity and conservation threats of Odonata from October 2010 to September 2011. During the study period, a total of 32 species of Odonates in 24 genera belonging to 6 families have been reported. Among them the Anisoptera dominated with 23 (72%) species, followed by the Zygoptera with 9 (28%) species. The family Libellulidae dominated with 19 species. Among the Zygoptera, the Coenagrionidae were found to be the dominant with 6 species and least by the Lestidae with 1 species. Based on the frequency of occurrence of odonates, 37% of the species were common, 22% were occasional, 19% were very common, 16% were rare and 6% were very rare. The study highlights the importance of odonates and threats in their habitat due to different anthropogenic activities and also provides the baseline data on odonate diversity of some major wetlands of Davanagere District of Karnataka state for research on their biology and the conservation." (Authors)] Address: Harisha, M.N., Dept. of Post Graduate Studies and Research in Wildlife and Management, Kuvempu University, Jnana Sahyadri, Shankaraghatta, Shimoga, Karnataka, India

**16442.** Harter, T.S.; Brauner, C.J.; Matthews, P.G.D. (2017): A novel technique for the precise measurement of CO<sub>2</sub> production rate in small aquatic organisms as validated on Aeshnid dragonfly nymphs. *Journal of Experimental Biology* 220: 964-968. (in English) ["The present study describes and validates a novel yet simple system for simultaneous in vivo measurements of aquatic CO<sub>2</sub> production (MCO<sub>2</sub>) and oxygen consumption (MO<sub>2</sub>) rates, thus allowing the calculation of respiratory exchange ratios (RER). Diffusion of CO<sub>2</sub> from the aquatic phase into a gas phase, across a hollow fibre membrane, enabled aquatic MCO<sub>2</sub> measurements with a high-precision infrared gas CO<sub>2</sub> analyser. MO<sub>2</sub> was measured with a PO<sub>2</sub> optode using a stop-flow approach. Injections of known amounts of CO<sub>2</sub> into the apparatus yielded accurate and highly reproducible measurements of CO<sub>2</sub> content (R<sup>2</sup>=0.997, p<0.001). The viability of in vivo measurements was demonstrated on aquatic dragonfly nymphs (Aeshnidae; wet mass 2.17 mg - 1.46 g, n=15) and the apparatus produced precise MCO<sub>2</sub> (R<sup>2</sup>=0.967, p<0.001) and MO<sub>2</sub> (R<sup>2</sup>=0.957, p<0.001); average RER was 0.73±0.06. The described system is scalable, offering great potential for the study of a wide range of aquatic species, including fish." (Authors)] Address: Harter, T.S., Dept of Zoology, University of British Columbia, 6270 University Boulevard, Vancouver, BC, Canada V6T 1Z4. E-mail: harter@zoology.ubc.ca

**16443.** Heino, J.; Bini, L.M.; Andersson, J.; Bergsten, J.; Bjelke, U.; Johansson, F. (2017): Unravelling the correlates of species richness and ecological uniqueness in a metacommunity of urban pond insects. *Ecological Indicators* 73: 422-431. (in English) ["City ponds have the potential to harbour a rich biodiversity of aquatic insects despite being located in an urban landscape. However, our current knowledge on the correlates of pond biodiversity is limited and even less is known about the factors that influence the ecological uniqueness of urban ponds. The multiple environmental gradients, at different spatial scales, that may affect biodiversity and ecological uniqueness of urban ponds can thus be seen both as an opportunity and as a challenge for a study. In this study, we aimed to fill this gap by focusing on aquatic insect assemblages in 51 ponds in the Swedish city of Stockholm, using a metacommunity perspective. We found that species richness was primarily determined by the density of aquatic insects, water depth and proportion of buildings around the pond. The uniqueness of ponds was estimated as local contributions to beta diversity (LCBD), and it was primarily related to the proportion of arable land and industry around the ponds. With regard to the metacommunity we found two interesting patterns. First, there was a negative relationship between richness and LCBD. Second, biodiversity was spatially independent, suggesting that spatially-patterned dispersal did not structure species richness or LCBD. These last two patterns are important when considering conservation efforts of biodiversity in city ponds. We hence suggest that the conservation of insect biodiversity in urban pond should consider the surroundings of the ponds, and that high-richness ponds are not necessarily those that require most attention because they are not ecologically

the most unique." (Authors)] Address: Heino, J., Finnish Environ. Inst., Natural Environ. Centre, Biodivers., Paavo Havaksen Tie 3, 90570 Oulu, Finland. E-mail: jani.heino@environment.fi

**16444.** Hinojosa, J.C.; Martín, R.; Maynou, X.; Vila, R. (2017): Molecular taxonomy of the *Sympetrum vulgatum* (Odonata: Libellulidae) complex in the West Palaearctic. *Eur. J. Entomol.* 114: 373-378. (in English) ["The *S. vulgatum* complex is composed of the subspecies *S. vulgatum vulgatum*, *S. vulgatum decoloratum* (Selys, 1884) and *S. vulgatum ibericum* Ocharan, 1985 in the West Palaearctic. These taxa have parapatric distributions and noticeable morphological differences in colour and body size, and their taxonomic status is debated. Here we revise the systematics of this group using molecular taxonomy, including molecular analyses of mitochondrial (cytochrome c oxidase subunit I, COI) and nuclear (internal transcribed spacer, ITS1) DNA taking into account known morphological differences. Each subspecies has a unique and differentiated COI haplotype, although divergences among them are low (0.4% maximum uncorrected p-distance). The subspecies are not differentiated by the nuclear marker ITS1. The genetic results for these taxa contrast with the deep divergence of the sister species *S. striolatum* (Charpentier, 1840). Given current evidence, we propose to maintain the subspecific status of the *S. vulgatum* complex and hypothesize their biogeographical history. It is likely that the three subspecies became isolated during one of the latest glacial periods, each in a different refugium: *S. vulgatum ibericum* possibly occupied the Iberian Peninsula, *S. vulgatum vulgatum* the Balkan Peninsula or territories further east and *S. vulgatum decoloratum* Anatolia.] Address: Hinojosa, J.C., Inst. Biol. Evol. (CSIC-Univ. Pompeu Fabra), Passeig Marítim de la Barceloneta 37, 08003 Barcelona. E-mail: sirsphingidae2@gmail.com

**16445.** Hirohashi, K.; Inamuro, T. (2017): Hovering and targeting flight simulations of a dragonfly-like flapping wing-body model by the immersed boundary-lattice Boltzmann method. *Fluid Dynamics Research* 49(4) 045502: (in English) ["Hovering and targeting flights of the dragonfly-like flapping wing-body model are numerically investigated by using the immersed boundary-lattice Boltzmann method. The governing parameters of the problem are the Reynolds number  $Re$ , the Froude number  $Fr$ , and the non-dimensional mass  $m$ . We set the parameters at  $Re = 200$ ,  $Fr = 15$  and  $m = 51$ . First, we simulate free flights of the model for various values of the phase difference angle  $\phi_{gr}$  between the forewing and the hindwing motions and for various values of the stroke angle  $\beta$  between the stroke plane and the horizontal plane. We find that the vertical motion of the model depends on the phase difference angle  $\phi_{gr}$ , and the horizontal motion of the model depends on the stroke angle  $\beta$ . Secondly, using the above results we try to simulate the hovering flight by dynamically changing the phase difference angle  $\phi_{gr}$  and the stroke angle  $\beta$ . The hovering flight can be successfully simulated by a simple proportional controller of the phase difference angle and the stroke angle. Finally, we simulate a targeting flight by dynamically changing the stroke angle  $\beta$ ." (Authors)] Address: Inamuro,

T., Advanced Research Institute of Fluid Science and Engineering, Graduate School of Engineering, Kyoto Univ., Kyoto 615-8530, Japan. E-mail: inamuro@kuaero.kyoto-u.ac.jp

**16446.** Hou, D.; Zhong, Z., Yin, Y.; Pan, Y.; Zhao, H. (2017): The role of soft vein joints in dragonfly flight. *Journal of Bionic Engineering* 14: 738-745. (in English) ["Dragonflies are excellent flyers among insects and their flight ability is closely related to the architecture and material properties of their wings. The veins are main structure components of a dragonfly wing, which are found to be connected by resilin with high elasticity at some joints. A three-dimensional (3D) finite element model of dragonfly wing considering the soft vein joints is developed, with some simplifications. Passive deformation under aerodynamic loads and active flapping motion of the wing are both studied. The functions of soft vein joints in dragonfly flight are concluded. In passive deformation, the chordwise flexibility is improved by soft vein joints and the air. In active flapping, the wing rigidity in spanwise direction is maintained to achieve the required amplitude. As a result, both the passive deformation and the active control of inspire the design of biomimetic Flapping Micro Air Vehicles (FMAVs)."] (Authors)] Address: Hou, D., Dept Mechanical Engineering, Shanghai Maritime Univ., Shanghai 201306, China

**16447.** Huang, D.; Azar, D.; Cai, C.; Maksoud, S.; Nel, A.; Bechly, G. (2017): Mesomegaloprepidae, a remarkable new damselfly family (Odonata: Zygoptera) from mid-Cretaceous Burmese amber. *Cretaceous Research* 73: 1-13. (in English) ["Mesomegaloprepis magnificus gen. et sp. nov. is described from more than 14 specimens in eight pieces of mid-Cretaceous (earliest Cenomanian, ca. 99 Ma) amber from Myanmar. Possible phylogenetic affinities with the Neotropical Latibasaliidae, Thaumtoneuridae, and Pseudostigmatinae are discussed, and a relationship with Pseudostigmatinae considered as possible, but because of conflicting evidence separate family status as Mesomegaloprepidae fam. nov. is tentatively preferred. The remarkable degree of homoplastic conflict in the wing venational similarities indicates that these represent relatively weak evidence for phylogenetic relationships. The palaeoecology, including sexual dimorphism in wing colouration, of the new taxon is discussed, and the large number of inclusions explained with possible breeding behaviour in association with water-filled tree holes (phytotelmata) of the amber tree, similar to extant Pseudostigmatinae. The position of all alleged fossil Thaumtoneuridae are discussed and revised: Eothaumtoneura ptychoptera Pongracz, 1935 from the Eocene Geiseltal locality is restored in Thaumtoneuridae. Cretaceous Euarchistigma and Paleogene Eodysagrion are tentatively retained as subfamilies Euarchistigmatinae and Eodysagrioninae in Thaumtoneuridae. Paleogene Dysagrioninae and Petrolestinae are removed from Thaumtoneuridae and attributed to a restored family Dysagrionidae, and Paleocene Latibasaliidae is transferred from Amphipterygoidea to Epallagoidea." (Authors)] Address: Huang, D., State Key Lab. Palaeobiology & Stratigraphy, Nanjing Inst. Geology & Palaeontology, Chinese Acad. Sciences, Nanjing, 210008, People's Republic of China. E-mail: dyhuang@nigpas.ac.cn

**16448.** Huang, D.; Nel, A. (2017): New fossil damsel -dragonfly clarifies the phylogenetic position of the small Jurassic family Juraheterophlebiidae (Odonata: Epiproctophora). *Alcheringa* 41(4): 536-542. (in English) ["A nearly complete specimen of Juraheterophlebia cancellosa sp. nov., the third species of the family Juraheterophlebiidae, is described from the Middle-Late Jurassic of China and shows the exact structure of its forewing discoidal space. As a consequence, this family is restored, separated from Erichschmidtidae, and its diagnosis amended. It is transferred from Heterophlebioptera to Stenophlebioptera, the first clade being now only known from the Early Jurassic. Erichschmidtidae includes the sole species Erichschmidtia nigrimontana, and this family is now considered of uncertain systematic position." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**16449.** Huang, D.; Cai, C.; Nel, A.; Bechly, G. (2017): A new dragonfly family from the mid Cretaceous Burmese amber (Odonata: Aeshnoptera: Burmaeshnidae). *Cretaceous Research* 78: 8-12. (in English) ["The third Cretaceous Aeshnoptera in amber is described from Myanmar. It represents a new family Burmaeshnidae fam. nov., genus and species Burmaeshna azari gen. et sp. nov. Its exact affinities remain uncertain but it is probably the sister group of the Late Cretaceous family Enigmaeshnidae. This discovery supports the hypothesis of an intense period of appearance of many aeshnopteran subclades during the late Early Cretaceous and the Late Cretaceous." (Authors)] Address: Huang, D., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing, 210008, People's Republic of China

**16450.** Huang, D.-Y.; Nel, A.; Cai, C. (2017): An enigmatic hawk dragonfly from the Middle Jurassic of China (Odonata, Aeshnoptera). *Paläontologische Zeitschrift* 91(3): 459-462. (in English) ["The aeshnopteran Propecymatophlebia magnifica gen. et sp. nov. is described from the Middle Jurassic Hiafanggou Formation of Inner Mongolia in China, on the basis of a complete forewing. It confirms the remarkable palaeodiversity of the stem group of the hawk dragonflies in Central Asia in the period between the Middle Jurassic and the Early Cretaceous." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**16451.** Hunger, H.; Bühler, W.; Schiel, F.-J. (2017): Der Ausbreitungsprozess von Coenagrion scitulum in Baden-Württemberg schreitet weiter voran (Odonata: Coenagrionidae). *Mercuriale* 17: 47-56. (in German, with English summary) ["We present the current state of knowledge of the distribution of C. scitulum in Baden-Württemberg. The data show that range expansion continues and that populations in core areas are stabilizing. The most remarkable new records come from the northern Upper Rhine valley and from the western Lake Constance area." (Authors)] Address: Schiel, F.-J., Inst. Naturschutz & Landschaftsanalyse, Turenweg 9, 77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de



**16452.** Ioannidis, P.; Simao, F.A.; Waterhouse, R.M.; Manni, M.; Seppely, M.; Robertson, H.M.; Misof, B.; Niehuis, O.; Zdobnov, E.M. (2017): Genomic features of the damselfly *Calopteryx splendens* representing a sister clade to most insect orders. *Genome Biol Evol.* 9(2): 415-430. (in English) ["Insects comprise the most diverse and successful animal group with over one million described species that are found in almost every terrestrial and limnic habitat, with many being used as important models in genetics, ecology, and evolutionary research. Genome sequencing projects have greatly expanded the sampling of species from many insect orders, but genomic resources for species of certain insect lineages have remained relatively limited to date. To address this paucity, we sequenced the genome of *C. splendens*, a Zygoptera belonging to Palaeoptera, the clade containing the first winged insects. The 1.6 Gbp *C. splendens* draft genome assembly is one of the largest insect genomes sequenced to date and encodes a predicted set of 22,523 protein-coding genes. Comparative genomic analyses with other sequenced insects identified a relatively small repertoire of *C. splendens* detoxification genes, which could explain its previously noted sensitivity to habitat pollution. Intriguingly, this repertoire includes a cytochrome P450 gene not previously described in any insect genome. The *C. splendens* immune gene repertoire appears relatively complete and features several genes encoding novel multi-domain peptidoglycan recognition proteins. Analysis of chemosensory genes revealed the presence of both gustatory and ionotropic receptors, as well as the insect odorant receptor coreceptor gene (*OrCo*) and at least four partner odorant receptors (*ORs*). This represents the oldest known instance of a complete *OrCo/OR* system in insects, and provides the molecular underpinning for odonate olfaction. The *C. splendens* genome improves the sampling of insect lineages that diverged before the radiation of Holometabola and offers new opportunities for molecular-level evolutionary, ecological, and behavioral studies." (Authors)] Address: Zdobnov, E.M., Dept Genetic Medicine & Develop., Univ. Geneva Medical School, Rue Michel Servet 1, 1211, Geneva, Switzerland. E-mail: evgeny.zdobnov@unige.ch

**16453.** Ivicheva, K.N.; Philippov, D.A. (2017): Aquatic macroinvertebrates of raised bogs in the central part of the Vologda Region, Russia. *Transactions of the Karelian Research Centre of the Russian Academy of Sciences 9, Ecological Studies Series: 30-45.* (in Russian, with English summary) ["The aquatic macroinvertebrates fauna of raised bogs is considered as a complex of faunas of different types of within-bog waterbodies. This study was conducted in 2012-2014 at two large wetlands, Shichenskoe and Alekseevskoe (Vologda Region, Russia). Samples were collected from May to September from pools, spaces between hummocks of water tracks, a mire stream and two within-bog lakes. In total, 120 taxa were found (71 taxa identified to species, 25. to genus), belonging to 5 phyla, 8 classes. Insects were prevalent (91 species, among them 55. Diptera, 14. Odonata, 11. Coleoptera, 5. Trichoptera), other groups were scarce (including 12 species of Oligochaeta, 6 Hirudinea, 5 Mollusca). The greatest number of species was registered from Shichenskoe wetland. 109 species, 80 of which were found within the Shichenskiy Landscape Reserve. The

fauna was specific in each of the studied types of waterbodies. In the stream, amphibiotic insects were prevalent. In the water track, the main role belonged to oligochaetes and chironomids. In the lakes, mollusks and hirudineas were dominant. The most specific were the communities of pools, where odonates and chironomids were prevalent. The similarity between the faunas of the studied wetland waterbodies was minimal ( $K_{sc} = 0.07.0.36$ ). Analysis of the trophic structure showed that detritophagous insects were the most abundant, while predators prevailed in terms of biomass. The latter were well represented in most of the studied waterbodies, and this was a distinctive feature of within-wetland waterbodies as compared to non-mire ones. The most favourable conditions for aquatic invertebrates were found in within-bog lakes." (Authors)] Address: Ivicheva, Ksenya, L. S. Berg State Research Institute on Lake and River Fisheries, Vologda Branch, 5 Levichev St., 160012 Vologda, Russia. E-mail: ksenya.ivicheva@gmail.com

**16454.** Jacob, S.; Thomas, A.P.; Manju, E.K. (2017): Bio control efficiency of Odonata nymphs on *Aedes aegypti* larvae. *Journal of Environmental Science, Toxicology and Food Technology* 11(9): 1-4. (in English) ["The predatory potential of *Bradinopyga geminata*, *Crocothemis servilia* and *Ceriatrigon cerinorubellum* larvae on *Aedes aegypti* larvae were recorded for 8 hours with three replicates under laboratory condition to suggest biocontrol methods to get away from the spread of dengue fever. The maximum consumption rate of *B. geminata* was on 1st instar larvae of *Aedes aegypti*. *C. servilia* and *C. cerinorubellum* shows maximum consumption rate on 2nd instar larvae of *A. aegypti*. With respect to the One-way ANOVA test conducted, *B. geminata* shows highest predatory impact on all the instars of *A. aegypti*. The present study reveals that the release of odonata nymphs especially *B. geminata* in areas of dengue epidemics will effectively control the *A. aegypti* larval production and thereby dengue epidemics." (Authors)] Address: Jacob, Sonia, School of Environmental Sciences M.G. University, Kottayam, India

**16455.** Jaggesar, A.; Shahali, H.; Mathew, A.; Yarlagadda, P.K.D.V. (2017): Bio-mimicking nano and micro-structured surface fabrication for antibacterial properties in medical implants. *Journal of Nanobiotechnology* 2017 15:64. 20 pp. (in English) ["Orthopaedic and dental implants have become a staple of the medical industry and with an ageing population and growing culture for active lifestyles, this trend is forecast to continue. In accordance with the increased demand for implants, failure rates, particularly those caused by bacterial infection, need to be reduced. The past two decades have led to developments in antibiotics and antibacterial coatings to reduce revision surgery and death rates caused by infection. The limited effectiveness of these approaches has spurred research into nano-textured surfaces, designed to mimic the bactericidal properties of some animal, plant and insect species, and their topographical features. This review discusses the surface structures of cicada, dragonfly and butterfly wings, shark skin, gecko feet, taro and lotus leaves, emphasising the relationship between nano-structures and high surface con-

tact angles on self-cleaning and bactericidal properties. Comparison of these surfaces shows large variations in structure dimension and configuration, indicating that there is no one particular surface structure that exhibits bactericidal behaviour against all types of microorganisms. Recent bio-mimicking fabrication methods are explored, finding hydrothermal synthesis to be the most commonly used technique, due to its environmentally friendly nature and relative simplicity compared to other methods. In addition, current proposed bactericidal mechanisms between bacteria cells and nano-textured surfaces are presented and discussed. These models could be improved by including additional parameters such as biological cell membrane properties, adhesion forces, bacteria dynamics and nano-structure mechanical properties. This paper lastly reviews the mechanical stability and cytotoxicity of micro and nano-structures and materials. While the future of nano-biomaterials is promising, long-term effects of micro and nano-structures in the body must be established before nano-textures can be used on orthopaedic implant surfaces as way of inhibiting bacterial adhesion." (Authors)] Address: Yarlagadda, P.K.D.V., Science and Engineering Faculty, Queensland University of Technology, Brisbane, Australia. E-mail: y.prasad@qut.edu.au

**16456.** Jentzsch, M.; Glinka, T.; Link, J.; Lehmann, B. (2017): Einsatz eines Autokeschers im Ziegelrodaer Forst – Ergebnisse und Bemerkungen zur Methode (Arachnida: Araneae, Pseudoscorpiones; Insecta: Ephemeroptera, Odonata, Hemiptera, Coleoptera, Hymenoptera, Lepidoptera, Mecoptera, Diptera). *Hercynia N.F.* 50: 31-93. (in German, with English summary) ["In the late summer of 2012 and in the early summer of 2013 the invertebrate fauna of the Ziegelrodaer Forst in the south of Saxony-Anhalt was collected by car-net. The recording of data took place three times daily on eleven days and on six different tracks especially in forest- and partially in open grassland-habitats. A total of more than 198 samples were collected. The intention was to make a contribution towards testing the car-net concerning its ability to catch invertebrates. Approximately 65.5 % of more than 200.000 captured specimens belong to the order of Diptera, followed by the order of Coleoptera with a percentage of about 17.6 %, whereas the third highest amount of about 11.6 % was determined by the order of Hymenoptera. The fourth and fifth places are taken by the order of Hemiptera at a percentage of round about 1.6 % and the class of Arachnida with approximately 0.5 %. The share of the remaining groups of species is around 0.6 %. Altogether 2.5 % of the collected material was classified as undeterminable. Additional to a huge amount of species included in the Red List of endangered animals of Germany and of Saxony-Anhalt, a total of six new records could be registered for Germany and another 18 records for Saxony-Anhalt. Four species were rediscovered in Saxony-Anhalt. Some species of different taxa are still undescribed and thus new to science. The evaluation of the collected sample material has shown that the car-net method is a valuable addition to common collection methods, it provides large amounts of individuals and species and promises the great

est success in capturing beetles and flies." Only four specimens of Odonata were captured: *Aeshna cyanea* (n=2), *Chalcolestes viridis* and *Orthetrum cancellatum*. (Authors)] Address: Jentzsch, M., Hochschule für Technik & Wirtschaft Dresden, Fakultät Landbau/Umwelt/Chemie, Pillnitzer Platz 2, 01326 Dresden, Germany. E-Mail: matthias.jentzsch.2@htw-dresden.de

**16457.** Juárez, G.; González, U. (2017): Contribución al conocimiento de los Odonata (Insecta) de la Región Piura, Perú. *Archivos Entomoloxicos* 17: 21-26. (in Spanish, with English summary) ["The first taxonomic list of Odonata from Piura Region, Peru, which is made up of 8 species belonging to 7 genera and 2 families, is presented. Libellulidae with *Erythrodiplax Brauer*, 1868 are the most diverse respectively. For each of these species geographical distribution and landscape ecosystem to regional level is reported." (Authors)] Address: Juárez, G., Lab. Zoología de Invertebrados. Escuela Profesional de Ciencias Biológicas. Universidad Nacional de Piura, Urb. Miraflores s/n, Castilla, Piura-Perú, Peru. E-mail: norbiol@hotmail.com

**16458.** Kagimoto, B. (2017): The first record of interspecific tandem between *Orthetrum poecilops* Ris, 1916 male and *Orthetrum albistylum* (Selys, 1848) female. *Tombo* 59: 100. (in Japanese, with English summary) ["I observed an interspecific tandem between a *O. poecilops* ♂ and a young *O. albistylum* ♀ in Itsuku-shima Island, Japan. Previously, interspecific tandem has been reported between *O. albistylum* ♂ and *O. poecilops* ♀. To my knowledge, this is the first record of this combination." (Author)] Address: E-mail: miyaiimatonbo@yahoo.co.jp

**16459.** Kang, S.-H.; Lee, J.-E.; Hong, E.-J.; Kim, Y.-J.; Jeong, J.-C. (2017): A faunistic study of insects and arenaceous insects variation by oil spill accidents of Taeanhaean National Park. *Korean J. Environ. Ecol.* 31(6): 500-507. (in Korean, with English summary) ["The study of insect fauna in Taeanhaean National Park in Korea began with the first survey of natural resources in 1996, and then the surveys were conducted seasonally from 2005 to 2014. The surveyed sites were mostly coastal areas, sand dunes, and back grasslands. Insects were collected by sweeping with insect net, suction, pitfall trap, light trap, and Malaise trap. As a result, a total of 1,540 species of 215 families belonging to 17 orders were identified. Lepidoptera was the most populous group at 34.2% and followed by Coleoptera at 28.3%, Hemiptera at 12.7%, Diptera at 8.5%, Hymenoptera at 7.1%, Orthoptera at 4.7%, Odonata at 2.0%, and others. The analysis of change of arenaceous insect fauna before and after the accident by the Hebei Spirit that spilled oil in Taean in December 2007 showed that 45 arenaceous insect species, mostly belonging to Coleoptera, were observed through the whole survey period. The impact of oil spill on the number of arenaceous insect species appearing in the area was minor." (Authors)] Address: Jeong, J.-C., National Park Research Institute, Wonju-si, 26441, Korea. E-mail: entomologist@knps.or.kr

**16460.** Kappes, E.; Kappes, W. (2017): Ungewöhnlich früher Schlupf von *Orthetrum coerulescens* an einem Kühlwassergraben in Norddeutschland (Odonata: Libellulidae). *Mercuriale* 17: 11-16. (in German, with English summary) ["Extraordinary early emergence of *O. coerulescens* at a thermally polluted ditch in northern Germany - On 09-1V-2017 seven individuals of *O. coerulescens* emerged at a thermally polluted ditch with cooling water from an industrial plant near Lüchow-Dannenberg, Lower Saxony (Germany). The earliest records of emergence from 2010 to 2016 in Lower Saxony date from the period between 18th May and 6th June. This extraordinary early emergence, together with the finding conditions, is described in detail and briefly discussed." (Authors)] Address: Kappes, E., Eichenweg 27, 22395 Hamburg, Germany. E-mail: eva.wulf.kappes@t-online.de

**16461.** Karube, H.; Kompier, T. (2017): Two new species of the genus *Cephalaeschna* from northern Vietnam (Odonata: Aeshnidae). *Tombo* 59: 61-70. (in English, with Japanese summary) ["Two new species of the genus *Cephalaeschna* Selys, 1883 are described from northern Vietnam: *C. aipishishi* sp. nov. from Tam Dao National Park and *C. algorei* sp. nov. from Yen Bai Province. Both species belong to a group of species including *C. discolor* Zhang, Cai & Liao, 2013, *C. mattii* Zhang, Cai & Liao, 2013, *C. needhami* Asahina, 1981, and *C. risi* Asahina, 1981, but can be distinguished by details of body maculation and shape of male caudal appendages. Some information on habitat and biology is provided." (Authors)] Address: Karube, H., Kanagawa Prefectural Museum of Natural History, 499 Iryuda, Odawara, Kanagawa, 250-0031 Japan. E-mail: paruki@nh.kanagawa-museum.jp

**16462.** Kassner, Z.; Ribak, G. (2017): Strategy and mechanism for intercepting unpredictable moving targets in the Blue-Tailed Damselfly (*Ischnura elegans*). *International Scholarly and Scientific Research & Innovation* 4(10): 1368. (in English) [Verbatim: "Members of the Odonata order stand out for their maneuverability and superb flight control, which allow them to catch flying prey in the air. These outstanding aerial abilities were fine-tuned during millions of years of an evolutionary arms race between Odonata and their prey, providing an attractive research model for studying the relationship between sensory input – and aerodynamic output in a flying insect. The ability to catch a maneuvering target in air is interesting not just for insect behavioral ecology and neuroethology but also for designing small and efficient robotic air vehicles. While the aerial prey interception of Anisoptera have been studied before, little is known about how Zygoptera intercept prey. Here, high-speed cameras (filming at 1000 frames per second) were used to explore how damselflies catch unpredictable targets that move through air. *I. elegans* were introduced to a flight arena and filmed while landing on moving targets that were oscillated harmonically. The insects succeeded in capturing targets that were moved with an amplitude of 6 cm and frequencies of 0-2.5 Hz (fastest mean target speed of 0.3 m s<sup>-1</sup>) and targets that were moved in 1 Hz (an average speed of 0.3 m s<sup>-1</sup>) but with an amplitude of 15 cm. To land on stationary or slow targets, damselflies either flew directly to the target, or flew sideways, up to a point in which the target

was fixed in the center of the field of view, followed by direct flight path towards the target. As the target moved in increased frequency, damselflies demonstrated an ability to track the targets while flying sideways and minimizing the changes of their body direction on the yaw axis. This was likely an attempt to keep the targets at the center of the visual field while minimizing rotational optic flow of the surrounding visual panorama. Stabilizing rotational optic flow helps in estimation of the velocity and distance of the target. These results illustrate how dynamic visual information is used by damselflies to guide them towards a maneuvering target, enabling the superb aerial hunting abilities of these insects. They also exemplifies the plasticity of the damselfly flight apparatus which enables flight in any direction, irrespective of the direction of the body." (Authors)] Address: not stated

**16463.** Kaunisto, K.; Kaunisto, P.; Ilvonen, J.; Suhonen, J. (2017): Parasitism, immune response and egg production of the damselfly *Coenagrion hastulatum*. *Canadian Journal Zoology* 95(5): 367-372. (in English) ["Theoretical models predict that parasites reduce reproductive success of their hosts, but very few empirical studies have given support to this. Using *C. hastulatum*, we tested how immune response, wing length, and the number of both endo- and ectoparasites affect egg production of host damselflies. The study was conducted with four different populations in Southwest Finland. We found a negative association between endoparasitic gregarines and the number of host eggs. Furthermore, immune response increased with the number of water mites, but decreased with the number of eggs. Contrary to previous studies with other damselfly species, the number of ectoparasitic water mites did not affect the number of eggs. Moreover, wing length, used as an indicator of individual size, was not associated with egg numbers. The negative effect of gregarine parasites on egg numbers is likely to affect the composition of host populations, i.e. damselflies that show higher resistance to these endoparasites will have more of their offspring represented in subsequent generations. In future, more experimental research on the varying effects of different parasite species on the number of eggs is needed." (Authors)] Address: Kaunisto, K.M., Zoological Museum, Biodiversity Unit, Univ. of Turku, Turku, Finland. E-mail: kkauni@utu.fi

**16464.** Kelly, R.S.; Nel, A. (2017): Revision of the damselfly dragonfly family *Campteropterygidae* (Odonata) from the Early Jurassic of England reveals a new genus and species. *Alcheringa* 42: 87-93. (in English) ["Historical fossil insect collections from England were re-examined and the taxa revised. *Lateopterygia* gen. nov. is erected for *Liassopterygia anglicanopsis* (Zeuner) in *Campteropterygidae*. *Petropterygia anglicana* Tillyard is confirmed in this family and *Archithemis liassina* (Strickland) is transferred to this family. Lastly, *Archithemis brodiei* (Geinitz), *Archithemis Handlirsch*, and *Architemistidae* Tillyard (reduced to this sole species) are transferred to the *Heteropterygioidea*." (Authors)] Address: Kelly, R., School of Earth Sciences, University of Bristol, Life Sciences Building, 24 Tyndall Avenue, Bristol, BS8 1TQ, UK. E-mail: richard.kelly@bristol.ac.uk



**16465.** Kerakova, M.; Uzunov, Y.; Varadinova, E. (2017): Comparison of trophic structure of the benthic macroinvertebrates in three Bulgarian riverine water bodies. *Turkish Journal of Zoology* 41: 267-277. (in English) ["The trophic structure of benthic macroinvertebrates in three different types of running water bodies subjected to varying degrees of anthropogenic pressure was analyzed. A seasonal survey was conducted at three Bulgarian rivers in 2011. An adapted version of the multihabitat sampling method was applied along with measuring physical and chemical variables. The ecological status was defined by means of biotic and trophic indexes. Distribution of the functional feeding groups shows that the most sensitive groups, shredders and scrapers, dominate the trophic structure of the mountain river types. In contrast, groups of deposit feeders and filterers prevail at the foothill and plain rivers. Multidimensional scaling plot and redundancy analysis demonstrated that anthropogenic impact and altitude are the main factors determining the distribution of the benthic macroinvertebrates by different functional groups. Seasonality has no leading role in the trophic structure formation of the benthic communities. Our results showed a difference between the trophic composition of the macrozoobenthos found in the mountain sections and those found in the foothill/plain stretches of the rivers. A comparison between the last two areas demonstrated that there was no clear distinction between the trophic composition of the functional feeding groups." (Authors)] Address: Kerakova, Maria, Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Science, Sofia, Bulgaria

**16466.** Khelifa, R. (2017): Partial bivoltinism and emergence patterns in the North African endemic damselfly *Calopteryx exul*: conservation implications. *African Journal of Ecology* 55(2): 145-151. (in English, with French summary) ["*C. exul* ... suffers considerable habitat degradation and local extinctions throughout its geographic range. Although recent studies have investigated its distribution, ecology and larval systematics, the life history of the species is still unknown. In this study, a field survey was conducted to determine larval development, temporal pattern of emergence and general spatial distribution of the species in the Seybouse watershed, north-east Algeria. Larval growth was investigated in two populations: one at about 200 m (low-elevation population) and the second at 600 m of elevation (high-elevation population). The species showed partial bivoltine life cycle in both low- and high-elevation population. The temporal pattern of emergence of the first flight season of the year at low-elevation population was asynchronous with an emergence season lasting 46 days and half of the population emerging in 15 days. The second flight season was shorter with a most likely smaller population size. Sex ratio at emergence was slightly male biased. After ecdysis, teneral stages stayed next to the water within a mean distance of  $4.76 \pm 4.35$  m ( $\pm$  SD) with no significant difference between sexes. Conservation measures that should be taken into account in the elaboration of future management plans for the species are discussed." (Author)] Address: Khelifa, R., Institute of Evolutionary Biology and Environmental Studies, Univ. of Zürich, 6 Winterthurerstr. 190, 8057 Zürich, Switzerland. E-mail: rassimkhelifa@gmail.com

**16467.** Khelifa, R.; Mellal, M.K. (2017): Host-plant-based restoration as a potential tool to improve conservation status of odonate specialists. *Insect Conservation and Diversity* 10(2): 151-160. (in English) ["1. Several species worldwide show rapid range retraction due to habitat degradation, and some of them have restricted distribution and specific resource needs. Such cases deserve particular attention and need urgent conservation actions to avoid extinction, and one way is to facilitate colonisation of new habitats by resource supplementation. 2. Here, we investigate the changes in range distribution, during the last decade (2007–2016), of *C. exul*, and assess the importance of its favourite host-plant (*Potamogeton nodosus*) in colonisation and population dynamics in the last existing population of Algeria. 3. We first used dynamic occupancy models to assess range distribution dynamics and we found that both occupancy and colonisation probabilities of the species were positively dependent on the occurrence of *P. nodosus*. There was also evidence that extinction probability increased with habitat disturbance but decreased with the occurrence of *P. nodosus*. Our experimental restoration showed that the augmentation of patches of *P. nodosus* increased the total number of individuals, the number of reproductive events and philopatry. 4. Our study highlights the importance of insect–plant relationship in the establishment of effective restoration plans because of their implication in colonisation and extinction processes and population dynamics. 5. Since most insect species from different orders and ecosystems are ecologically dependent on plants, our restoration approach may benefit a large range of threatened species and improve their conservation status." (Authors)] Address: Khelifa, R., Inst. Evolutionary Biology & Environmental Studies, Univ. of Zürich, 6 Winterthurerstr. 190, 8057 Zürich, Switzerland. E-mail: rassimkhelifa@gmail.com

**16468.** Khelifa, R.; Theischinger, G.; Endersby, I. (2017): A century on from *The Biology of Dragonflies* by Tillyard 1917: what have we learned since then? *Austral Ecology* 56(2): 138-147. (in English) ["The field of odonatology has developed considerably during the past century. Three figures, namely E. Selys-Longchamps, R.J. Tillyard and P.S. Corbet, have undisputedly founded our current knowledge of odonatology and contributed massively to the understanding of systematics, biology, ecology and behaviour of odonates. The year 2017 will mark the 100th anniversary of Tillyard's *The Biology of Dragonflies*. We review the book and the author's life and contributions to Australian odonatology. We present an updated history of odonatology and highlight prominent advances in the field. The influence of the book on non-scientists is described. Future research in odonatology on aspects that have not been studied and others that need further investigations are discussed." (Authors)] Address: Khelifa, R., Dept of Evolutionary Biology & Environmental Studies, University of Zürich, Winterthurerstr. 190, 8057 Zürich, Switzerland. E-mail: rassimkhelifa@gmail.com

**16469.** Kipping, J.; Günther, A.; Uyizeye, E. (2017): *Pseudagrion kamiranzovu* sp. nov., a new flagship species of damselfly from Rwanda's Nyungwe Forest (Odonata: Coenagri-

onidae). *Odonatologica* 46(3/4): 301-318. (in English) ["*P. kamiranzovu* sp. nov. is described from streams in the montane rainforest of Nyungwe National Park in western Rwanda. The species belongs to the Pseudagrion A-group and is similar to *P. risi* Schmidt in Ris 1936 and *P. gamblesi* Pinhey, 1978 but is characterized by its unique combination of colours, the lack of blue markings on the abdomen, the male appendages and the short pterostigmata. The body size makes it one of the largest members of the genus in continental Africa." (Authors)] Address: Kipping, J., BioCart, Albrecht-Dürer-Weg 8, 04425 Taucha/Leipzig, Germany. E-mail: biocartkiping@web.de

**16470.** Klein, C.E.; Pinto, N.S.; Spigoloni, Z.A.V.; Bergamini, F.M.; de Melo, F.R.; De Marco J., P.; Juen, L. (2017): The influence of small hydroelectric power plants on the richness and composition of Odonata species in the Brazilian Savanna. *International Journal of Odonatology* 21(1): 33-44. (in English) ["Regardless of the economic and social development that damming processes related to hydroelectric power plants bring to a region, they represent a wide range of disturbances to the physical, chemical, and biological characteristics of rivers. We evaluated the effects of dams on Odonata communities from the southeastern region of Goiás, Brazil. 13 streams connected to three dams were studied: seven were used as reference samples (located upstream from the damming site, therefore not directly affected by damming) and six were used as affected area samples (located downstream from the dam). A total of 1128 odonates from six families, 22 genera, and 39 species were captured and identified. The results showed that Odonata richness was affected by the presence of dams, with different effects on Anisoptera and Zygoptera sub-orders. We discuss that these effects are related mostly to the physical and chemical variables in waterbodies directly affected by small hydroelectric power plants (SHPs). It is possible that negative effects on the Odonata community in SHP areas are related to changes in waterflow, pH and turbidity." (Authors)] Address: Pinto, N.S., Theoretical, Metacommunity & Landscape Laboratory TheMetaLand, UFG, Campus Samambaia, Goiânia, Goiás, Brazil. E-mail: nelsonsilvapinto@gmail.com

**16471.** Kojima, T.; Kuroki, I.; Nakamura, K. (2017): Development and sexual dimorphism in body color of in *Sieboldius albardae* larvae (Odonata: Gomphidae). *Naturalistae* 21: 37-42. (in Japanese, with English summary) ["Larvae of *S. albardae* were collected in a stream in Okayama City, Japan. Five larval instars were distinguished from the head width and wing-sheath length. Approximately 90 % of the females were nearly black, whereas approximately 90 % of the males were brown rather than black. Sexual colour dimorphism in larval insects is rare and interesting, although the mechanisms controlling the body colour are unclear." (Authors)] Address: Kojima, T., Dept of Biosphere-Geosphere Science, Fac. Biosphere-Geosphere Science, Okayama Univ. Science, 1-1 Ridai-cho, Kita-ku, Okayama-shi, Okayama-ken 700-0005, Japan

**16472.** Kok, J.M.; Fatiaki, A.; Rosser, K.; Chahl, J.S.; Ogunwa, T. (2017): Dragonfly inspired MAVs - adaptive and evolutionary approaches. 17th Australian International Aerospace Congress: AIAC 2017. Melbourne, Vic.: Engineers Australia, Royal

Aeronautical Society, 2017: 129-138. (in English) ["Flapping wing flight is complex and has not been solved well enough in any technological system to meet any realistic mission requirements. This raises the question as to the value of flapping wing flight for unmanned aerial vehicles (UAV), and begs reasonable questions about the value of research into the topic. Flapping wings will continue to strive to be as efficient as rotary wing craft, with over-actuation. The justification for flapping wing flight is that a flapping wing craft can approach rotary wing hover efficiency while also being capable of efficient cruise of a fixed wing craft. In this paper, we discuss the existing Micro Air Vehicle (MAV) configurations and the pros and cons of each. We review the hybrid fixed wing, rotary wing configurations and present an argument against its use in addressing the MAV design gap. Key characteristics of the dragonfly were analysed and necessary degrees of freedom for the wing kinematics were identified. We reviewed high speed cinematography of existing systems to determine the range of motion of the dragonfly. We observe large variations between different species suggesting that the ideal wing kinematics are specific to the system. We present a case for adaptive learning and identify existing methods that have been applied to real world experimental systems. We also present a method for efficiently coevolving controller and morphological parameters that uses virtual design supplemented with experimental results from hardware." (Authors)] Address: Kok, J.M., Aerospace Div., Aircraft Performance & Survivability Branch, Defence Sci. & Tech. Group, Edinburgh, South Australia, 5011, Australia

**16473.** Kompier, T. (2017): The riddle of *Lyriothemis bivittata* (Rambur, 1842): *Lyriothemis kameliyae* spec. nov. (Odonata: Libellulidae). *Zootaxa* 4250(4): 315-326. (in English) ["*L. kameliyae* spec. nov. from northern Vietnam is described and illustrated for both sexes, and descriptions are given of male and female specimens of *L. bivittata* collected in Vietnam. A comparison of their distinguishing characteristics is provided, and differences from similar *L. tricolor* are discussed. Earlier descriptions and some records of *L. bivittata* are evaluated. Evidently these contain at least some *L. kameliyae* specimens, and therefore historic records of *L. bivittata* require evaluation. The ranges of the two species overlap considerably. Some information is provided on the biology of *L. kameliyae*." (Author)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, the Netherlands. E-mail: kompierintokyo@yahoo.com.

**16474.** Kompier, T. (2017): Two new species of *Stylogomphus* Fraser, 1922 from Vietnam (Odonata: Gomphidae). *Tombo* 59: 46-52. (in English, with Japanese summary) ["*S. annamensis* spec. nov. and *S. delicatus* spec. nov. are described from Quang Binh Province and Lam Dong Province, Central Vietnam, respectively. The former is closest in appearance to *S. chunliuae*, but differs in details of caudal appendages and anterior hamule. The latter is closest to *S. inglisi*, but differs in details of the cerci. Holotypes of both species will be deposited in Naturalis Biodiversity Center, Leiden, The Netherlands (RMNH)." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK, Den Haag, the Netherlands. E-mail: kompierintokyo@yahoo.com

**16475.** Kompier, T.; Phan, Q.T. (2017): *Coeliccia mienrung* spec. nov. from Central Vietnam (Odonata: Platycnemididae). *Zootaxa* 4247(2): 131-140. (in English) ["*C. mienrung* spec. nov. is described from central Vietnam. Detailed differences from the very similar *C. pyriformis* Laidlaw, 1932, are provided. The female of *C. pyriformis* is described for the first time." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, the Netherlands. E-mail: [kompierintokyo@yahoo.com](mailto:kompierintokyo@yahoo.com).

**16476.** Kompier, T.; Holden, J. (2017): A new species of *Gynacantha* Rambur, 1842 from Cat Tien National Park, Vietnam (Odonata: Aeshnidae). *Zootaxa* 4272(3): 411-420. (in English) ["*G. cattienensis* spec. nov. is described from Cat Tien National Park, Dong Nai Province, Vietnam, on the basis of male and female specimens. This species is close in structure to *G. khasiaca* McLachlan, 1896, and differs in details of cerci, auricles and thorax coloration. Historical records of *G. khasiaca* from Vietnam may refer to this new species. Some information on its biology is provided." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, the Netherlands. E-mail: [kompierintokyo@yahoo.com](mailto:kompierintokyo@yahoo.com)

**16477.** Kompier, T. (2017): A new species of *Sinogomphus* May, 1935 and a new subspecies of *Sinogomphus peleus* (Lief-tinck, 1939) from Vietnam (Odonata: Gomphidae). *Tombo* 59: 53-60. (in English, with Japanese summary) ["Males and females of *S. mobydick* spec. nov. and *S. peleus fuscatus* ssp. nov. are described from Vietnam and differences with other members of the genus are provided. *S. mobydick* is closest to *S. leptocercus* and can be separated by details of the caudal appendages. The holotype will be deposited in the Kanagawa Prefectural Museum of Natural History, Japan. *S. peleus fuscatus* differs from the nominate subspecies by a completely black metepisternum. The holotype will be deposited in Naturalis Biodiversity Center, the Netherlands." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK, Den Haag, the Netherlands. E-mail: [kompierintokyo@yahoo.com](mailto:kompierintokyo@yahoo.com)

**16478.** Koneri, R.; Nangoy, M.J.; Saroyo; Tallei, T.E. (2017): Diversity and community composition of dragonfly (Insecta: Odonata) in Tangkoko, Nature Reserve, North Sulawesi, Indonesia. *Bioscience Research* 14(1): 1-8. (in English) ["Analysis of dragonfly diversity is one of the important factors in supporting species conservation. This study was aimed to assess community composition and diversity of dragonfly in the area of Tangkoko Nature Reserve, North Sulawesi. Sampling was carried out along the river in three habitat types. Dragonfly collection was done by a sweeping technique along four transect lines that were applied randomly along 1000 m in every type of habitat. Data analysis included species abundance, richness, diversity and evenness among habitats. The result showed that In these three habitats there were six families, 13 genera, 15 species and 1557 individuals. Family Libellulidae was the most common type of species. The family with the most abundance was Coenagrionidae, while the family with least abundance was Platystictidae. Species with the highest number of individuals was *Pseudagrion* sp and the lowest number was *Pantala flavescens*. The highest abundance and richness of species were found on agricultural land and

the lowest was in primary forest. The highest species diversity and evenness were found in primary forest and the lowest was in secondary forests. The highest diversity of dragonflies in all types of habitats was found in primary forest."] Address: Koneri, R., Dept Biology, Fac. Mathematics and Natural Sciences, Sam Ratulangi Univ., Kampus Bahu Street, Manado, 95115 Indonesia. E-mail: [ronicaniago@unsrat.ac.id](mailto:ronicaniago@unsrat.ac.id)

**16479.** Koroiva, R.; Kvist, S. (2017): Estimating the barcoding gap in a global dataset of *cox1* sequences for Odonata: close, but no cigar. *Mitochondrial DNA Part A* 29(5): 765-771. (in English) ["We evaluated the extent of intraspecific and interspecific genetic distances for two highly diverse infraorders of Odonata: Anisoptera and Zygoptera. All cytochrome c oxidase subunit I sequences (*cox1*), the region chosen for zoological DNA barcoding, present in GenBank for each infraorder were downloaded and curated. For Anisoptera, the final dataset consisted of 2,961 individual *cox1* sequences for 536 species and the equivalent numbers for Zygoptera were 2,477 sequences for 497 species. More than 7 million individual genetic comparisons were made and the results indicated that there is a tendency towards a barcoding gap, but that the size of the gap may not be sufficient to robustly infer identities for some taxa. DNA barcoding may be of less use for some odonate taxa, perhaps pertaining to misidentifications in global databases. However, at local scales or with more confined taxonomical sampling, this tool may yet be beneficial in identifying these charismatic organisms." (Authors)] Address: Koroiva, R., Ecology and Conservation Graduate Program, Univ. Federal de Mato Grosso do Sul, Campo Grande, Mato Grosso do Sul, Brazil. E-mail: [ricardo.koroiva@gmail.com](mailto:ricardo.koroiva@gmail.com)

**16480.** Kosterin, O.E.; Solovyev, V.I. (2017): Odonata found in mid-summer 2015 and 2016 at the north-westernmost Black Sea Coast of the Caucasus, with the first record of *Cordelegaster picta* Selys, 1854 in Russian Federation. *International Dragonfly Fund Report* 107: 1-43. (in English) ["Results are presented of brief odonatological examination of the Black Sea coastal northwesternmost spurs of the Caucasus between Anapa and Gelendzhik (mostly at Kabardinka village), Russia, in late July/early August 2015 and early-mid July 2016. In total, 28 Odonata species were found, including *C. picta* for the first time in Russia. For *C. picta* and *Caliaeschna microstigma*, the world's northernmost records were made. New localities of species rare in this area are reported: one for *Coenagrion scitulum* and three for *Selysiothemis nigra*, including their breeding habitat. Numerous migrant individuals of *Pantala flavescens* were observed in many localities in 2015 but none in 2016. Observations on trophic activity of *Aeshna affinis* and *A. mixta* are reported, the former showing predominantly matutinal and vespertinal activity and the latter diurnal activity. Occurrence of the *Chalcolestes* spp. in the Caucasus is discussed." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: [kosterin@bionet.nsc.ru](mailto:kosterin@bionet.nsc.ru)



**16481.** Kosterin, O.E.; Kompier, T. (2017): *Coeliccia rolandorum* sp. nov. from eastern Cambodia and southern Vietnam, the eastern relative of *C. kazukoae* Asahina, 1984 (Odonata: Platycnemididae). *Zootaxa* 4341(4): 509-527. (in English) ["*C. rolandorum* sp. nov. is described from the eastern Cambodia (holotype: Cambodia, Mondulkiri Province, Buu Sraa Waterfall environs, 12°34' N 107°24' E, ~780 m a.s.l., 16 June 2014, RMNH) and southern and central Vietnam. It is related to *C. kazukoae*, which is known from the Cardamom and Sankamphaeng Mts., and replaces it in eastern Indochina. New distributional data on *C. kazukoae* are presented and its characters are discussed with respect to their change with age." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**16482.** Kosterin, O.E. (2017): Update to Odonata of the Black Sea coast of the western Caucasus, Russia. *International Dragonfly Fund Report* 110: 1-23. (in English) ["Results are presented of a brief odonatological examination of the Abrau and Taman' Peninsulas at the northwesternmost Caucasian Black Sea coast in Krasnodarskiy Krai, Russia, on July 20-26, 2017. Twenty three species have been observed at the former peninsula and five at the latter. The Odonata records at the Abrau Peninsula are summarised, to include 34 species." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**16483.** Kosterin, O.E. (2017): A short survey of Odonata in Stung Treng Province in northern Cambodia in mid-summer 2016. *IDF-Report* 105: 1-40. (in English) ["Results are presented of an odonatological survey of 23 localities in Thala Barivat District of Stung Treng Province, northern Cambodia, on July 26 – August 1, 2016. Most localities were situated in areas of open low deciduous dipterocarp forests on gravel soils, some at hillside areas of tall evergreen dipterocarp forest. The great Mekong River right bank was studied within 7 km downstream of its Nimeth (Nimet, Khon Thai, Labak Koun, Khone Pha Pheng) Waterfall. In total, 55 species were found, of which 52 identified to species and three to genus. Two species, *Gynacantha saltatrix* Martin, 1909 and *Macrogomphus matsukii* Asahina, 1986, were recorded in Cambodia for the first time. Five obligatory lotic species were found at the Mekong River, namely *Dysphaea gloriosa*, *Prodasineura coerulescens*, *Burmagomphus asahinai*, *Nychogomphus duaricus* and *Onychothemis testacea*, including tenerals of *P. coerulescens* and *B. asahinai*. Most probably these species breed in the Mekong reach which is enriched with oxygen downstream of the great waterfall cascade." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**16484.** Kosterin, O.E. (2017): *Calopteryx virgo feminalis* subsp. nov., a long known under the same name but hitherto formally nameless subspecies from the Caucasian Black Sea Coast.

*International Dragonfly Fund Report* 107: 45-57. (in English) ["The populations of *C. virgo* of the Black Sea Coast of the Caucasus have females with the distal hindwing part darkened and males with the underside of S10 and appendages whitish. They are known for more than a century and deserve a subspecific status but since the name *feminalis* Bartenev, 1910 proposed to them is unavailable, a new subspecies is formally erected under the same name, *C. virgo feminalis* Kosterin subsp. nov., with the following type locality: Russia, Krasnodarskiy Krai, Gelendzhik Municipality, Kabardinka village, the Doob River lowermost reaches, 44°38'2653", 37°55'55"57" 58" E." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**16485.** Kousika, J.; Kuttalam, S.; Ganesh Kumar, M. (2017): Evaluation on the effect of tetraniliprole 20 SC, a new chemistry of pyridine derivative to the rice arthropod biodiversity. *Journal of Entomology and Zoology Studies* 5(4): 133-143. (in English) ["A field experiment in rice was conducted to study the insecticide effect of tetraniliprole 20 SC, a new chemistry of pyridine derivative on arthropod biodiversity during 2014 in Boluvampatti, Coimbatore, India. A total of 5,095 individuals belonging to 90 species, 84 genera, 54 families and 11 orders were recorded in rice ecosystem from two classes viz., Insecta and Arachnida. Hemiptera and Hymenoptera were predominant in terms of individuals of exopterygota and endopterygota, respectively. Among exopterygota, maximum individuals were recorded in the order Hemiptera (781) followed by Orthoptera (127), Thysanoptera (85), Odonata (22), ... The biodiversity indices revealed that based on familial level, Species richness indices viz., species number (51), Fishers alpha index (16.483), Q Statistic (16.11), Margelef D index (8.548), Shannon - Weiner index (3.2863) and Brillouin diversity index (3.063), the value was highest in unsprayed field and it was maximum in the month of October." (Authors)] Address: Kousika, J., Research Associate, Dept of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

**16486.** Kovacs, T.; Ambrus, A.; Danyik, T.; Olajos, P. (2017): Vörös Listája és faunisztikai bibliográfiája (Odonata). *Folia Historico-naturalia Musei Matraensis* 41: 25-58. (in Hungarian, with English summary) ["(Red data list and bibliography of locality records of Hungarian Odonata.) A revised list of the Hungarian Odonata (64 species) with IUCN Red List categories is presented. The categories with the species are as follows: Critically Endangered (CR) – *Aeshna viridis*, *Leucorrhinia caudalis*; Endangered (EN) – *Lestes macrostigma*, *Cordulegaster bidentata*, *Epithea bimaculata*, *Leucorrhinia pectoralis*; Vulnerable (VU) – *Coenagrion ornatum*, *Ophiogomphus cecilia*, *Cordulegaster heros*, *Somatochlora flavomaculata*, *Sympetrum depressiusculum*, *S. pedemontanum*; Near Threatened (NT) – *Pyrrosoma nymphula*, *Orthetrum brunneum*; Data Deficient (DD) – *Erythromma lindenii*; Not Applicable (NA) – *Coenagrion hastulatum*, *C. lunulatum*, *Anax ephippiger*, *Sympetrum fonscolombii*, *Sympetrum danae*;

Least Concern (LC) – the other 44 species. Papers concerning the Hungarian Odonata, especially on faunistics, are listed." (Authors)] Address: Kovacs, T., Mátra Museum., Kossuth Lajos u. 40, 3200 Gyöngyös, Hungary. E-mail: koati@matavnet.hu

**16487.** Krassilov, V.; Vassilenko, D.; Sokolova, A.; Barinova, S. (2017): New fossil plant and insect records bearing on Cretaceous climate of western Gobi, Mongolia. *American Journal of Plant Biology* 2(2): 43-48. (in English) ["The paper examines new fossil plant and insect findings in the Cretaceous of the western Gobi as a source of climatologic inference. The isophlebiid dragonflies at the base of the Cretaceous sequence witness to an extension of the Late Jurassic climate warming to the earliest Cretaceous. Climatic fluctuations through the late Neocomian – Cenomanian are indicated by a series of paleofloristic events. The allochthonous localities of *Phoenicopsis* (Czekanowskiales) in the basal members of the Mogotuin Formation, Manlay depression, and Khurendukh Formation, Choyr Basin, are evidence of temperate arboreal vegetation on the bordering basement ridges. A mass occurrence of *Otozamites*, a thermophilic bennettitalean plant in the upper part of the Mogotuin Formation near its boundary with the redbeds of Manlay Formation heralds a xerothermic trend of climatic evolution. The first appearance of *Sequoia* at the top of the Barun Bayan redbeds marks reversion of the trend at about the Albian – Cenomanian boundary." (Authors)] Address: Krassilov, V., Paleontological Institute, Russian Acad. of Sciences, Moscow, Russia. E-mail: vakrassilov@gmail.com

**16488.** Kulijer, D.; Miljevic, I. (2017): Dragonfly (Odonata) fauna of the Zelengora Mountain and Sutjeska National Park. *Glasnik Šumarskog fakulteta Univerziteta u Banjoj Luci* 26: 23-39. (in Croatian, with English summary) ["High mountain habitats of Bosnia and Herzegovina are often isolated and difficult to access. That is why to this day, the dragonfly fauna of the mountain region in BiH remained almost entirely unexplored. The aim of this study was to present the first overview of the dragonfly fauna of Zelengora Mt. and the National Park Sutjeska, the area which includes some of the most important habitats of these insects in the country. This paper is a result of the authors' research combined with the analysis of existing data. The dragonfly fauna of Zelengora Mt. and NP Sutjeska consists of a total of 35 species, representing 55% of the fauna of this insect order in BiH. Together with data obtained with the studies in 2015 and 2016, this paper also includes unpublished data collected by the authors between 2009 and 2014, literature data and the data from the collections of the National Museum of Bosnia and Herzegovina. A total of 457 records from 53 sites were collected and over 76% of these represent new data. According to the number of sites inhabited by a single species, the most numerous are: *Cordulegaster bidentata* (recorded at 26 sites), *Cordulia aenea* (23 sites), *Aeshna grandis* (15 sites), *Libellula quadrimaculata* (15 sites) and *Enallagma cyathigerum* (14 sites). The following localities were inhabited by the highest number of species: Orlovačko Lake (22 species), Gornje Bare Lake (20 species) and Donje Bare Lake (19 species), where also the highest number of threatened and endangered species was recorded. The most important recorded species were:

*Coenagrion scitulum*, *C. hastulatum*, *A. grandis*, *A. juncea*, *Somatochlora*, *Cordulegaster heros*, *C. bidentata* and *Sympetrum flaveolum*. For relict species *C. hastulatum* and *S. metallica*, mountain lakes of Zelengora Mt. are the only known habitat in Bosnia and Herzegovina so far. Additionally, these lakes were determined as the most important habitats in the country for *A. grandis* and *A. juncea*. Among the registered species, 30 species are included in the Red list of protected species in Republic of Srpska. Additionally, we have recorded all three dragonfly species listed on the Red list of the Federation of Bosnia and Herzegovina. Moreover, *C. heros* is listed in Annexes II and IV of the Habitats Directive of the European Union and as vulnerable (VU) species on the Mediterranean Red list." (Authors)] Address: Kulijer, D., Zemaljski muzej Bosne i Hercegovine, Zmaja od Bosne 3, 71000 Sarajevo, Bosnia i Hercegovina. E-mail: dejan.kulijer@gmail.com

**16489.** Kumari, U.; Gautam, D.C. (2017): Karyotypic studies on two species of *Orthetrum* (Anisoptera: Odonata) from Himachal Pradesh. *J. Cytol. Genet.* 18(NS): 1-7. (in English) ["Chromosomes of two species of dragonflies belonging to family Libellulidae, *Orthetrum glaucum* and *O. prunosum* from Hamirpur district of Himachal Pradesh were studied. In both the species the diploid chromosome number was found to be  $2n = 25$  with a pair of m chromosomes in each species. Chromosomes were studied at different meiotic stages and lengths of chromosomes were measured at spermatogonial metaphase. Total complement lengths as well as relative lengths of chromosomes were calculated and karyotypes were prepared for each species." (Authors)] Address: Gautam, D.C., Dept of Biosciences, Himachal Pradesh Univ., Shimla 171 005, India. Email: dcgautam@rediffmail.com

**16490.** Kunz, B. (2017): Première observation historique de *Gomphus graslinii* en Provence-Alpes-Côte d'Azur (Odonata: Gomphidae). *Martinia* 32(2): 76. (in French) [Durance, Peyrolles-en-Provence, 18 juin 1987 (43,6586°N / 5,5993°E ; WGS84) Address: Kunz, B., Hauptstraße 111, 74595 Langenburg, Germany. E-mail: libellenbernd@gmail.com

**16491.** Kuznetsova, V.G.; Maryanska-Nadachowska, A.; Shapoval, N.A.; Anokhin, B.A.; Shapoval, A.P. (2017): Cytogenetic characterization of eight Odonata species originating from the Curonian Spit (the Baltic Sea, Russia) using c-banding and FISH with 18S rDNA and telomeric (TTAGG)<sub>n</sub> probes. *Cytogenet Genome Res* 153: 147-157. (in English) ["We studied the karyotypes of 8 dragonfly species originating from the Curonian Spit (the Baltic Sea, Russia) using C-banding and FISH with 18S rDNA and "insect" telomeric (TTAGG)<sub>n</sub> probes. Our results show that *Leucorrhinia rubicunda*, *Libellula depressa*, *L. quadrimaculata*, *Orthetrum cancellatum*, *Sympetrum danae*, and *S. vulgatum* from the family Libellulidae, as well as *Cordulia aenea* and *Epithecina bimaculata* from the family Corduliidae share  $2n = 25 (24 + X)$  in males, with a minute pair of m-chromosomes being present in every karyotype except for that of *C. aenea*. Major rDNA clusters are located on one of the large pairs of autosomes in all the species. No hybridization signals were obtained by FISH with the (TTAGG)<sub>n</sub> probe in the examined

species with the only exception of *S. vulgatum*. In this species, clear signals were detected at the ends of almost all chromosomes. This finding raises the possibility that in Odonata the canonical "insect" (TTAGG)<sub>n</sub> telomeric repeat is in fact present but in very low copy number and is consequently difficult to detect by in situ hybridization. We conclude that more work needs to be done to answer questions about the organization of telomeres in this very ancient and thus phylogenetically important insect order." (Authors) Dragonflies were collected from April 1 to October 26, 2016, on the Curonian Spit, 12 km S of Rybachy village, at the field station Fringilla (55°05' N, 20°44' E) belonging to the Biological Station of the Zoological Institute, Russian Academy of Sciences, and in some other localities of the Curonian Spit.] Address: Kuznetsova, Valentina, Dept of Karyosystematics, Zool. Inst., Russian Acad. Sci., Universitetskaya nab. 1, 199034 St. Petersburg, Russia. E-mail: valentina\_kuznetsova@yahoo.com

**16492.** Leandri, F. (2017): Contributo alla conoscenza dell'odonatofauna del Parco Nazionale Dolomiti Bellunesi (Dolomiti, Veneto). Frammenti Conocere e tutelare la natura Bellunese 7: 5-16. (in Italian, with English summary) ["This work surveyed dragonfly population in the Dolomiti Bellunesi National Park. Since dragonflies are hemimetabolic insects whose larval stages are linked to aquatic environments, the investigation took place in both lotic and lentic habitat within the Park or in nearby locations. The Dolomiti Bellunesi National Park is located in the Belluno province (North-Eastern Italy) and belongs to the Alpine Biogeographical Region. The park encompasses medium and high mountain habitat in the Southern portion of the Dolomites mountain range. A total of 25 species have been recorded (9 zygoterans, 16 anisopterans), 13 of which within the boundaries of the park. The most common species were *Cordulegaster bidentata*, which finds its natural habitat in streams in hilly and mountain areas, and *Aeshna cyanea*, a common species of wide ecological niche. Two wetland areas outside the Park host species rated as "near threatened" by the IUCN Red List of Italian dragonflies. Such sites are the Vedana lake, which hosts 17 species (including *Cordulia aenea*) and the Prà Toront peat bog, which hosts the alpine and peat bogs species *Somatochlora arctica*." (Author)] Address: Leandri, F., Vicolo Chiuso 2/a – 26037 San Giovanni in Croce (CR) - e-mail: faustoleandri@hotmail.com

**16493.** Leaphart, J.C., Zelmer, D.A. (2017): Wrecking the curve: Altered functional response of *Tetragoneuria* (Odonata: Corduliidae) naiads infected with metacercariae of *Haematoloechus floedae*. *Journal of Parasitology* 103(2): 147-151. (in English) ["The ubiquity of host-parasite interactions and their potential for substantial representation, in terms of overall biomass, within ecosystems suggests that parasites have the capacity to influence energy flow within an ecosystem. Although the influence of certain parasites on prey behavior has been well documented, parasites could also exert an influence on ecosystem dynamics by influencing predator feeding behavior. The functional response of *Tetragoneuria* naiads was characterized by presenting naiads with varying abundances of *Daphnia magna*, after which a subset of the naiads were exposed to cercariae of *Haematoloechus floedae*, and

the feeding trials repeated for both the control and exposed odonates. A type II functional response was chosen as an appropriate model for comparison. An indicator variable approach to nonlinear regression of the functional response data indicated that infected odonate naiads spent significantly more time foraging than they did before infection, whereas there was no significant change in the functional response of the control naiads. Infected odonates also had a slower rate of growth. These results imply a metabolic cost to infection of *Tetragoneuria* naiads by *H. floedae* that might be associated with the encapsulating response to the metacercariae that was observed in infected naiads." (Authors)] Address: Zelmer, D.A., Dept of Biology and Geology, University of South Carolina Aiken, Aiken, South Carolina 29801. USA. E-mail: derekz@usca.edu

**16494.** Leksono, A.S.; Feriwibisono, B.; Arifianto, T.; Pratama, A.F. (2017): The abundance and diversity of Odonata along an altitudinal gradient in East Java, Indonesia. *Entomological Research* 47(4): 248-255. (in English) ["Odonate diversity in East Java was surveyed, and samplings were made during 2 years in ten sites along an altitudinal gradient. The characteristics of odonate assemblages in East Java were analyzed regarding of the number of individuals, the number of species, and Shannon's diversity index. The differences in abundance, species richness, and diversity between study sites were analyzed by an independent t-test. There were 3270 individuals of Odonata belong to 30 species, 7 families and 2 suborders identified from all study sites. The abundance, species richness and diversity of Odonata varied between study sites. The greatest abundance of Odonata was found in Malang Coban Talun (MCT) ( $148.8 \pm 9.5$ ), while the lowest was in South Beach Forest (SBF) ( $14.4 \pm 3.6$ ). The highest species richness and diversity was found in Malang Paddy Field (MPF) (richness =  $14.4 \pm 0.8$  and  $H' = 2.4 \pm 0.1$ ), while the lowest was found in South Coastal Area (SCA) (richness =  $2.8 \pm 0.1$  and  $H' = 0.4 \pm 0.1$ ). A significant positive correlation was detected between the elevation and overall odonate abundance ( $P < 0.05$ ), while there was not significant correlation between that and odonate species richness and diversity." (Authors)] Address: Leksono, A.S., Dept Biol., Fac. Mathematic & Natural Sci., Brawijaya Univ., Malang, Indonesia. E-mail: amin28@ub.ac.id

**16495.** Lesparre, D. (2017): Première observation de *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) au Portugal. *Boletín de la SEA* 60: 363-364. (in French, with Spanish summary) [30 mai 2016, valley of Ribeira das Carreiras, 6 km south of Mértola (Baixo Alentejo).] Address: Lesparre, D., An Amourouz - 28, Rue Gabriel Nogues, 22300 Lannion. France. E-mail: daniel.lesparre@laposte.net

**16496.** Liu, H.; He, G.; Ma, C.; Wang, Q.; Luo, Y. (2017): A computational study of the aerodynamic performance of a dragonfly forewing in gliding flight. *MATEC Web of Conferences* 151, 03001 (2018): 4 pp. (in English) ["Gliding flight is a common mode of flight for dragonfly, the objective of the current research is to use numerical simulations to explore whether the corrugations have positive effect on aerodynamic performance of the dragonfly wings in gliding flight. In order to compare aerodynamic performance of the dragonfly wing and flat



plate, a three-dimensional model of the dragonfly forewing and a three-dimensional flat plate with the same shape of the dragonfly forewing are established. The flow fields around three-dimensional dragonfly forewing and flat plate are simulated for  $Re=10000$  and angles of attack changing from  $0^\circ$  to  $25^\circ$  (with an interval of  $5^\circ$ ), numerical simulation indicate that aerodynamic performance of the dragonfly wing is slightly better than the flat plate over the entire range of parameters tested, especially the effect of the corrugations on the flow is more evident at large angle of attack." (Authors)] Address: Liu, H., Nanchang Hangkong Univ. School Aircraft Engineering, China

**16497.** López Colón, J.I.; Ceballos Escalera, J.M.; López Nieva, P.; Olivares Pantoja, A. (2017): Presencia de *Coenagrion mercuriale* (Charpentier, 1840) en la Zona Especial de Conservación (ZEC) Vegas, cuevas y páramos del sureste de Madrid (Odonata: Zygoptera: Coenagrionidae) (Comunidad Autónoma de Madrid, España). *Archivos Entomológicos* 17: 411-422. (in Spanish, with English summary) ["*C. mercuriale* is a dragonfly included in the Annex II of the Habitat Directive (92/43/EEC) with "Almost threatened" species status by IUCN which populations are declining alarmingly in recent decades. Its effective protection in Spain requires the development of research projects to determine the exact location of its populations and the life cycle and ecology in the different areas where it lives. In this case, the study of a Special Area of Conservation (SAC) in the Autonomous Community of Madrid has been carried out." (Authors)] Address: E-mail: lopezicolon@gmail.com

**16498.** López-González, B.; Quiroz-González, I.H.; Fabela, M.; Medina, G.T.; González, B.E.; Martínez, H.Q. (2017): Calidad del agua de tres sistemas acuáticos con insectos como modelo de estudio en la región fronteriza México – Estados Unidos de América con el enfoque al control de las descargas de aguas residuales. *Bol. Soc. Mex. Ento. (n.s.) Número especial* 3: 27-32. (in Spanish, with English summary) ["Water quality of three aquatic systems with insects as a study model in the border region Mexico-United States of America with the approach to the control of residual water discharges: Sampling was carried out in the Álamo River, Río Bravo and Río San Juan located in the US - Mexico border area to determine water quality based on aquatic macroinvertebrates, such as insects. To determine water quality, the data were analyzed using the Shannon-Wiener index and the Margalef index. In addition, to determine the ecological status of rivers based on diversity, richness and abundance of aquatic insects was used the index of species richness and the EPT index that considers groups of insects susceptible to drastic changes Ephemeroptera, Plecoptera and Trichoptera. The results of the analysis showed that the San Juan River presented the lowest values in the indexes used, categorized as severely impacted, with low diversity and poor water quality, unlike the Río Álamo that presented higher values in the indexes with a quality of moderate water. The main findings in the monitoring stations are aquatic insects of the orders: Ephemeroptera, Odonata, Hemiptera, Trichoptera, Diptera, Lepidoptera and Megaloptera, being presented greater abundance of Ephemeroptera." (Authors)] Address: López-González, B., Univ. Autónoma de

Nuevo León. Fac. Cien. Biol. Ciudad universitaria, Av. Manuel L. Barragán, San Nicolás de los Garza. Nuevo León. México. E-mail: Bernardo.lgzz.11@gmail.com

**16499.** Lorenzo-Carballa, M.O.; Hassall, C.; Encalada, A.C.; Sanmartín-Villar, I.; Torres-Cambas, Y.; Cordero-Rivera, A. (2017): Parthenogenesis did not consistently evolve in insular populations of *Ischnura hastata* (Odonata, Coenagrionidae). *Ecological Entomology* 42: 67-76. (in English) ["1. The evolutionary advantages that have driven the evolution of sex are still very much debated, and a number of benefits of parthenogenesis over sexual reproduction have been proposed. In particular, parthenogenetic individuals are thought to exhibit higher probabilities of establishment following arrival in new, isolated habitats such as islands. 2. One notable example of parthenogenesis occurring in islands is *I. hastata*, an American species that has colonised the Azores archipelago, where the populations consist only of females. This is the only known example of parthenogenesis within the insect order Odonata. 3. Here, two island populations of *I. hastata* were studied, one in the Galapagos and one in Cuba, to test whether island colonisation is consistently associated with parthenogenesis in this species. Field capture–mark–recapture studies and laboratory rearing of field-collected eggs were undertaken in both areas. 4. Sex ratios in the field were found to be heavily female-biased among mature individuals; however, fertility rates of field-collected eggs were high, and the sex ratios in the laboratory did not differ from 1:1. Data from laboratory rearing showed that shorter larval development times and shorter adult life spans in males result in protandry, which might explain the skewed sex ratios in the field. 5. These findings are consistent with sex differences in key demographic parameters which could predispose *I. hastata* to parthenogenesis. However, the Azores population of *I. hastata* remains the only documented case of asexual reproduction in this insect group." (Authors)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**16500.** Low, V.L.; Norma-Rashid, Y.; Yusoff, A.; Vinnie-Siow, W.Y.; Prakash, B.K.; Tan, T.K.; Noorhidayah, M.; Chen, C.D.; Sofian-Azirun, M. (2017): Pleistocene demographic expansion and high gene flow in the Globe Skimmer dragonfly *Pantala flavescens* Fabricius (Odonata: Libellulidae) in Peninsular Malaysia. *Zoologischer Anzeiger - A Journal of Comparative Zoology* 266: 23-27. (in English) ["The demographic history, population structure, and intraspecific diversity of *P. flavescens* in Peninsular Malaysia were characterized based on variation of the mitochondria-encoded cytochrome c oxidase subunit I (COI) sequences. A median-joining network of 94 taxa inferred 71 unique haplotypes across four distinct geographic regions (i.e., northern, southern, central, and eastern). The distribution of these haplotypes, however, revealed no apparent geographical pattern, indicating minimal population genetic structure and high gene flow among all populations. A Mantel test showed an absence of isolation by distance (IBD), no significant association between genetic dis-

tance and geographic distance was observed. Mismatch distribution and neutrality tests provided evidence of demographic expansion during the Pleistocene dating back to 190,000–260,000 years ago. Additionally, species delimitation analyses revealed two operational taxonomic units (OTUs) within so-called *P. flavescens*, one restricted to the isolate from Korea; and the other representing isolates from Malaysia, Japan, and India. The present DNA analyses reflect the impact of the Quaternary glaciation in shaping the current genetic diversity and genetic structure of *P. flavescens* in Peninsular Malaysia." (Authors)] Address: Low, V.L., Tropical Infectious Diseases Research and Education Centre (TIDREC), University of Malaya, Kuala Lumpur, Malaysia

**16501.** Lüders, U.R.; Hermansanz Ortega, F.; Fernández González, R. (2017): Primeras citas de *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) en la provincia de Burgos (Castilla y León, Península Ibérica). *Boletín de la Sociedad Entomológica Aragonesa* 61: 237-238. (in Spanish, with English summary) ["First records of *T. kirbyi* from Burgos province (Castilla y León, Spain)." 13-VI-2017, 2 ♂♂, río Arlanzón, Arlanzón (pueblo), 996 m.a.s.l., 42.321633/3.458253; 21-VI-2017, 1 ♂, río Arlanza, Los Vados, Palacios de la Sierra, 1.045 m.a.s.l., 41.592067/3.102572 (Authors)] Address: Lüders, U.R., C/Fernán González 33, 1ºIzda. 09003 Burgos, Spain. E-mail: Stethophyma@web.de

**16502.** Maes, D.; Adriaens, D.; van der Meulen, M.; Poelmans, L.; Vandeghechuchte, M.; Everaert, J.; Verhaeghe, F.; Anselin, A.; Casaer, J.; Decler, K.; De Knijf, G.; Devos, K.; Engelen, G.; Gouwy, J.; Packet, J.; Stienen, E.; Stuyck, J.; Thomaes, A.; T'jollyn, F.; Speybroeck, J.; Van Den Berge, K.; Van Elegem, B.; Van Landuyt, W.; Vermeersch, G.; Wils, C.; Pollet, M. (2017): Potentially suitable habitat maps for threatened species. Possible applications for nature conservation policy and management in Flanders. *Natuur.focus* 16(2): 56-66. (in Dutch, with English summary) ["Nature policy and management often uses threatened and regionally important species as tools or goals. Knowledge about their ecology and distribution is, therefore, crucial to scientifically underpin conservation measures. Apart from known observations, sites where the focal species is not (yet) observed or sites where potentially suitable ecological conditions are available but that are out of its dispersal range are as important to conserve and manage since they might get colonised in the future or might serve as possible reintroduction sites. To determine potentially suitable sites in an evidence-based approach, we here use so-called mechanistic models that describe the ecological needs of species in a quantitative manner. Subsequently we use a GeoDynamix tool to translate these criteria into a very high resolution map (20 x 20 m) with clusters of grid cells indicating potentially suitable habitats for a given species. These maps are then validated using existing observations and, if necessary, corrected in an iterative way to maximally match the known distribution to the obtained suitability map. We give an example of this method using *Dolomedes fimbriatus*, a species of regional conservation importance. Several possible applications of delineating potentially suitable habitat maps are given: (1) directing people to the most probable sites

when looking for a species for which the distribution is not well known, (2) locating sites where nature management is most appropriate, (3) locating possible reintroduction sites with the highest amount of suitable habitat, (4) locating sites that have a high suitability for a high number of species can underpin the delineation of nature reserves or Natura2000 areas, (5) the tool is able to select the best option for increasing the area of potentially suitable habitats by including the maps of the different potential scenarios and calculating their impact and (6) locating priority sites for defragmentation of the landscape, especially for larger mammals." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**16503.** Makbun, N. (2017): *Anisogomphus yingsaki* (Odonata: Gomphidae) sp. nov., a new gomphid species from Thailand. *Zootaxa* 4306(3): 437-443. (in English) ["*A. yingsaki* sp. nov. (holotype ♂: Ban Na Kha, Ban Muang, Sakon Nakhon province, Thailand, altitude 170–175 m, 22-vi-2016) is described and illustrated. The new species is most similar to *A. bivittatus* from India and Nepal, and also *A. flavifacies*, and *A. resortus* from China in the shape of anal appendages. However, it can be separated from all of these by a combination of the following characters: shape of antehumeral stripes, abdominal pattern, shape of vesica spermalis and female valvula vulvae. The behavior of the new species, including crepuscular activity, is briefly discussed." (Authors)] Address: Makbun, N., 211/5 Moo 4, Takhli, Nakhon Sawan, 60140, Thailand. E-mail: noppadon.makbun@gmail.com

**16504.** Makbun, N. (2017): A new species of the genus *Burmagomphus* Williamson (Odonata: Gomphidae) from Northern Thailand. *Zootaxa* 4269(1): 133-136. (in English) ["*B. Chiangmaiensis* sp. nov. (holotype: Ban Luang, Chom Thong, Chiang Mai province, Thailand, 890-900 m, 14 v 2012) is described and illustrated. It can be differentiated from its most similar congener, *B. apricus* from China, by shape of posterior hamulus, yellow trapezoid band on occiput, and larger size." (Author)] Address: Makbun, N., 211/5 Moo 4, Takhli, Nakhon Sawan, 60140, Thailand. E-mail: noppadon.makbun@gmail.com

**16505.** Mandal, R.; Aditya, S. (2017): An observation on the Odonata diversity in and around Sarojini Naidu College campus, Kolkata, West Bengal, India. *International Journal of Entomology Research* 2(4): 31-34. (in English) ["Odonates play vital role in environmental monitoring and can be used as biological indicators of ecological health. The present investigation was undertaken as a pilot study to study the diversity and abundance of Odonata in Sarojini Naidu College campus, Kolkata, West Bengal, India. A combination of direct search and opportunistic sighting methods were applied to record 23 different Odonata species (18 dragonflies and 5 damselflies) from the study area during May, 2015 to April, 2016. In spite of the college campus being located in an industrial urban area, the present study revealed a striking diversity of odonates. A suitable geographic location, favourable climatic conditions, appropriate vegetation provided a comfortable shelter for Odonata species to flourish in this area. This study is aimed towards contributing to the plan of

biodiversity restoration in our campus and development of management strategies for conservation of this important group of insects." (Authors)] Address: Mandal, Ritu, Dept of Zoology, Sarojini Naidu College for Women, 30, Jessore Road, Dum Dum, Kolkata, West Bengal, India

**16506.** Manger, R. (2017): Behaviour of a female *Sympecma paedisca* during hibernation in the Netherlands. *Brachytron* 19(2): 104-113. (in Dutch, with English summary) ["A female *S. paedisca* has been studied for over three months in the winter, on a heathland in southwest Drenthe. Perching and roosting heights and movements were studied during this period. The weather conditions during this winter were normal for Dutch standards with 34 frost days and seven ice days. From the beginning of December 2016 a female *S. paedisca* stayed for 92 days within a range of about half a square meter. When it was cloudy or raining and the temperature was below five degrees for days, the damselfly remained at one place and moved only a few centimeters on these days. A few times, as the days became longer and the sun gained more power, the female moved a few centimeters. During one visit in the dark, she had not crawled down for extra shelter, but even stayed a little higher. It has been found that this winter damsel only traveled over distances > 10 cm when there was enough solar heat." (Author)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

**16507.** Mansoor, R. (2017): Do herbicide effects on Odonata larvae, depend on their location of origin?: An ecotoxicological study using Glyphosate. Independent thesis Advanced level (degree of Master), Halmstad University, School of Business, Engineering and Science: 22 pp. (in English) ["Concentrations of herbicides in our aquatic ecosystems increase more and more. Among these, the herbicide glyphosate is the most common one. This ecotoxicological study was performed in order to examine the toxic effect of the herbicide glyphosate on aquatic invertebrates. Odonata were selected as study organisms in order to serve as bio-indicators of environmental contamination. Two populations, each of two species (*Erythromma najas* and *Libellula quadrimaculata*) were collected from four different locations, to study inter-specific differences, as well as, differences among populations within a species, in response to herbicide exposure. The experiment was conducted for 15 days in a 2 x 4 factorial design with 4 replicates (n = 32). The most common brand of weed-killer 'Roundup' containing 7.2 gL<sup>-1</sup> of glyphosate) was used as source of glyphosate. Glyphosate was applied at a concentration of 7.6 mgL<sup>-1</sup> in the experiment equalling the high end of environmentally relevant concentrations of glyphosate present in contaminated shallow waters. Response variables measured were larval survival, growth and activity. The results showed that glyphosate exposure reduced the survival of the larvae, but the magnitude of the glyphosate effects depended on species identity of the larvae and varied also with population within species. This study clearly shows that herbicide effects on invertebrate fitness depends on species identity and may even vary within species from different populations, possibly due to evolved resistance of random

genetic variations between populations or due to random genetic variation between populations." (Author)] Address: Mansoor, Ramla, Halmstad University, School of Business, Engineering and Science

**16508.** Marinov, M.; Campbell-Snelling, J.; Marinova, S. (2017): On a probable new oviposition style in female *Antipodochlora braueri* (Odonata: Corduliidae). *Agrion* 21(2): 72-75. (in English) ["Short investigations of known localities of *A. braueri* revealed a behaviour that is considered hitherto to be unrecorded for the species. Female *A. braueri* has usually been reported laying eggs in instream pools of water bodies. During the current study one adult was observed performing movements towards the water surface typical of ovipositing females and therefore considered as probable egg-laying behaviour. The utilised habitat was a small remnant pool completely isolated from other sections of the stream. Since the two sexes of *A. braueri* are morphologically very close, sex determination is preferably achieved in the hand. As the reported adult here was not caught and its sex confirmed the oviposition habitat choice remains to be validated by further observations." (Authors)] Address: Marinov, M., Plant Health & Environment Lab., Diagnostic & Surveillance Services, Ministry for Primary Industries, 231 Morrin Rd, 1072 Auckland, New Zealand. E-mail: milen.marinov@mpi.govt.nz

**16509.** Markovic, D.; Carrizo, S.F.; Kärcher, O.; Walz, A.; David, J.W. (2017): Vulnerability of European freshwater catchments to climate change. *Global Change Biology* 23: 3567-3580. (in English) ["Climate change is expected to exacerbate the current threats to freshwater ecosystems, yet multifaceted studies on the potential impacts of climate change on freshwater biodiversity at scales that inform management planning are lacking. The aim of this study was to fill this void through the development of a novel framework for assessing climate change vulnerability tailored to freshwater ecosystems. The three dimensions of climate change vulnerability are as follows: (i) exposure to climate change, (ii) sensitivity to altered environmental conditions and (iii) resilience potential. Our vulnerability framework includes 1685 freshwater species of plants, fishes, molluscs, odonates, amphibians, crayfish and turtles alongside key features within and between catchments, such as topography and connectivity. Several methodologies were used to combine these dimensions across a variety of future climate change models and scenarios. The resulting indices were overlaid to assess the vulnerability of European freshwater ecosystems at the catchment scale (18 783 catchments). The Balkan Lakes Ohrid and Prespa and Mediterranean islands emerge as most vulnerable to climate change. For the 2030s, we showed a consensus among the applied methods whereby up to 573 lake and river catchments are highly vulnerable to climate change. The anthropogenic disruption of hydrological habitat connectivity by dams is the major factor reducing climate change resilience. A gap analysis demonstrated that the current European protected area network covers <25% of the most vulnerable catchments. Practical steps need to be taken to ensure the persistence of freshwater biodiversity under climate change. Priority should be placed on enhancing stakeholder cooperation at the major



basin scale towards preventing further degradation of freshwater ecosystems and maintaining connectivity among catchments. The catchments identified as most vulnerable to climate change provide preliminary targets for development of climate change conservation management and mitigation strategies." (Authors)] Address: Markovic, Daniela, Faculty of Business Management and Social Sciences, Osnabrück University of Applied Sciences, Caprivistr. 30A, 49076 Osnabrück, Germany. E-mail: markovic@quant-works.de

**16510.** Márquez-Rodríguez, J.; Campos, F.; Vega-Maqueda, M.A.; Ferreras-Romero, M. (2017): Contribución al conocimiento de las poblaciones reproductoras de *Cordulegaster boltonii* (Donovan, 1807) (Odonata: Cordulegasteridae) en Sierra Morena occidental. *Archivos Entomológicos* 18: 275-277. (in Spanish, with English summary) ["Contribution to the knowledge of the *C. boltonii* breeding populations in western Sierra Morena. By collecting last stadium exuviae, the occurrence of breeding populations of *C. boltonii* is reported from three localities within the Sierra de Aracena y Picos de Aroche Natural Park (Sierra Morena, Huelva). Records of other six species are also included." (Authors)] Address: Márquez-Rodríguez, J., Depto de Sistemas Físicos, Químicos y Naturales. Univ. Pablo de Olavide. A-376, km 1. E-41013 Sevilla, Spain. E-mail: jmarrod1@upo.es

**16511.** Márquez-Rodríguez, J. (2017): Odonata records from southeast Portugal. *Archivos entomológicos* 18: 7-16. (in Spanish, with English summary) ["An annotated list of 20 species recorded in summer between 2012 and 2016 during several journeys to SE Portugal is presented. The studied localities on the border between Portugal and Spain, rich in thermophilic species, are a favourable biotope for the settlement of African dragonflies. Species of the genera *Trithemis* Brauer, 1868 and *Crocothemis* Brauer, 1868 are the most abundant. Additional notes on the abundance and distribution in the region along the summer are given." (Author)] Address: Márquez-Rodríguez, J., Zoología. Depto de Sistemas Físicos, Químicos y Naturales - Facultad de Ciencias Experimentales. Universidad Pablo de Olavide. A-376, Km 1. E-41013 Sevilla, Spain. E-mail: jmarrod1@upo.es

**16512.** Marrón, G.; Hernández-Alvarez, A.; Carmona, R. (2017): Riqueza temporal de odonatos (Odonata) en el Oasis San Pedro del Palmar, Baja California Sur, México. *Southwestern Entomologist* 42(1): 313-316. (in Spanish) [Odonate (Odonata) temporary richness in the San Pedro del Palmar Oasis, Baja California Sur, Mexico] Address: Marrón, G., Depto de Biología Marina, Universidad Autónoma de Baja California Sur, A.P. 19-B, La Paz, B.C.S., 23080, Mexico

**16513.** Martens, A.; Dunst, J.; Fröhlich, A.; Grabow, K. (2017): Just 55 days: Rapid development of *Ischnura elegans* and *I. pumilio* in a flooded maize field in Central Europe (Odonata: Coenagrionidae). *Notulae odonatologicae* 8(10): 379-382. (in English) ["At a flooded maize field in the Upper Rhine River floodplain near Elchesheim-Iltingen south of Karlsruhe, Germany, the first emergence of adult *Ischnura elegans* and

*I. pumilio* was recorded on 07-vii-2016, i.e., just 55 days after the beginning of the field being inundated by upward seepage flow caused by the elevated water levels of the River Rhine. These are the first field data on odonate development from oviposition to emergence in Central Europe lasting less than 60 days." (Authors)] Address: Martens, A., Institute for Biology, Karlsruhe Univ. Education, Bismarckstr. 10, 76133 Karlsruhe, Germany. E-mail: martens@ph-karlsruhe.de

**16514.** Marthelot, J.; Brun, P.T. (2017): Abstract: L3.00012: Dragonfly wings-inspired deployable structures. *Bulletin of the American Physical Society*, 70th Annual Meeting of the APS Division of Fluid Dynamics. Sunday–Tuesday, November 19–21, 2017; Denver, Colorado. (in English) [Verbatim: Transport networks of liquids in leaves and insect vasculature are ubiquitous in nature and serve to a broad spectrum of functions. In particular, dragonfly wings present a network of vein structure held together by a very thin rigid film. When a larva undergoes its metamorphosis and emerges, its wings expand tremendously and then harden. Inspired by this insect, we build a model experiment of the inflatable deployable structure composed of a tubular network of the veins. We characterize the in-plane expansion of the structure and study its correlation to the network geometry and the pressure applied in the system. A systematic variation of the geometric and elastic parameters allows us to search for an optimal design and operational conditions for maximal extension, while minimizing the input pressure.]

**16515.** Martynov, V.V.; Nikulina, T.V. (2017): Dragonflies (Insecta, Odonata) of the "Khomutovskaya steppe" Nature reserve. *Nature Conservation Research* 2(2): 47-54. (in Russian, with English summary) ["A review and comparative analysis of the Odonata fauna from the Khomutovskaya Steppe Reserve including nature conservation areas of the northern territories of the Sea of Azov (within Donbass) are given. 28 species of 14 genera from the six families are listed for the Reserve and its protected territories. The Khomutovskaya Steppe Reserve is suggested as a monitoring centre for the dragonfly fauna of the Cis-Azov region." (Authors)] Address: Martynov, V.V., Donetsk Botanical Garden, Donetsk People's Republic. E-mail: martynov.scarab@yandex.ua

**16516.** Mekhlif, A.F.; Khadair, G.T.; Alzakabe, L.H. (2017): Influence of the damselfly, *Ischnura evansi* (Odonata: Coenagrionidae) on the immature stage of *Culex pipiens molestus* (Diptera: Culicidae) as biological control. *Journal of Babylon University/Pure and Applied Sciences* 25(2): 446-454. (in English, with Arabian summary) ["*C. pipiens* are annoying pests and obligate vectors of many vertebrate pathogens. Their immature stages are common in fauna of a wide range quality of water bodies. Most of the alternative biocontrol strategies focus on mosquito immature stages. Predators play a major role in mosquito control programs. The naiads of *I. evansi* naturally inhabitate with the mosquito, *C. pipiens molestus* immature stages, the large naiads with average size  $1.5 \pm 0.5$  cm more than daily predated 12.1 larvae of 1st and 2nd instars, with 0.63 clearance rate, the naiads strongly preferred mosquito larvae over the chironomids *C. ninavah* larvae of the

density 20/liter. The starred naiad tends to ingest the egg rafts. But not more than 3 rafts/day. The presence of the predator with 5 individuals/liter extended the life cycle from 13.0 in control to 20.8 days with high significant effect on 3rd and the instars and pupa stage." (Authors)] Address: Mekhlif, A.F., Dept of Biology, Collage of education, Mousel Univ., Irak. E-mail: atalla@yahoo.com

**16517.** Mendes, T.P.; Oliveira-Junior, J.M.B.; Cabette, H.S.R.; Batista, J.D.; Juen, L. (2017): Congruence and the biomonitoring of aquatic ecosystems: Are odonate larvae or adults the most effective for the evaluation of impacts? *Neotropical Entomology* 46(6): 631-641. (in English) ["Odonata have been widely used as indicators for the biomonitoring of terrestrial and aquatic habitats due to their sensitivity to environmental impacts. We aimed to determine whether the larval or adult phases of these insects were the best predictors of variation in habitat parameters and the loss of environmental integrity. Specimens were collected during three seasons (dry, rainy, and ebb) from 12 points in the Suiá-missu River basin, at the headwaters of the Xingu River in Mato Grosso, Brazil. The Protest analysis indicated a high degree of congruence between the assemblages of larvae and adults in streams with varying degrees of habitat integrity ( $R = 0.832$ ,  $p < 0.001$ ,  $m^2 = 0.307$ ). When the congruence with environmental factors was analyzed, a significant association was found only for the larval phase ( $R = 0.318$ ,  $p = 0.03$ ,  $m^2 = 0.888$ ). When the suborders were analyzed separately, congruence was confirmed for anisopteran adults ( $R = 0.338$ ,  $p = 0.031$ ,  $m^2 = 0.885$ ) and larvae ( $R = 0.417$ ,  $p = 0.003$ ,  $m^2 = 0.826$ ) and for the zygopteran adults ( $R = 0.345$ ,  $p = 0.027$ ,  $m^2 = 0.881$ ) and larvae ( $R = 0.405$ ,  $p = 0.011$ ,  $m^2 = 0.836$ ). These results indicate that both larvae and adults respond systematically to environmental impacts. We suggest that either life phase can be used for biomonitoring, given their effectiveness for the interpretation of disturbance in terrestrial and aquatic habitats. These findings further reinforce the effectiveness of this insect order for the detection of modifications to the environment, showing that they are good indicators of environmental conditions." (Authors)] Address: Mendes, T.P., Ecology & Conservation Lab, Graduate Program in Zoology, Univ Federal do Pará-UFPa, Museu Paraense Emilio Goeldi-MPEG, Belém, PA, Brasil. E-mail: thiagomendes.bio@gmail.com

**16518.** Merahi, H. (2017): Répartition spatio-temporelle de la faune Odonatologique de la région d El-Aouinet. MSc. thesis, Tebessi University: 65 pp. (in French, with Arabian and English summary) ["From a systematic research perspective and of conservation of biodiversity. We have undertaken to improve our knowledge of wild life of the Algerian freshwater macroinvertebrates. Indeed, 8 species belonging to 4 families of Odonates have been identified in two stations in river (Oued Mellegue) of a region called El-Aouinet in the extreme east of Algeria with a considerable domination of Zygoptera with two species *Ischnura graellsii* 52,45% and *I. pumilio* 26,77%. Our research that focuses on inventory and the bioecology is a contribution of the update of the Odonata fauna used as bioindicators of aquatic environments in a semiarid bioclimatic. The same, their presence is therefore

a sure index of the faunistic. Whoever translates by weakness diversity with  $H' > 1.65$  bits and average equilibrium with  $E > 0, 50$ ." (Author)] Address: not stated

**16519.** Mikó, Z.; Ujszegi, J.; Gál, Z.; Hettyey, A. (2017): Effects of a glyphosate-based herbicide and predation threat on the behaviour of agile frog tadpoles. *Ecotoxicology and Environmental Safety* 140: 96-102. (in English) ["Highlights: •Glyphosate-based herbicides can cause behavioural changes in non-target organisms. •We found decreased activity and increased hiding at higher herbicide concentration. •At lower concentration tadpoles tend to move closer to the surface. •We did not find interactive effects of predation threat and herbicide exposure. •Examine behavioural changes effected by contaminants may relevant in ecotoxicology. Abstract: The widespread application of pesticides emphasises the importance of understanding the impacts of these chemicals on natural communities. The most commonly applied broad-spectrum herbicides in the world are glyphosate-based herbicides, which have been suggested to induce significant behavioural changes in non-target organisms even at low environmental concentrations. To scrutinize the behavioural effects of herbicide-exposure we exposed agile frog (*Rana dalmatina*) tadpoles in an outdoor mesocosm experiment to three concentrations of a glyphosate-based herbicide (0, 2 and 6.5 mg acid equivalent (a.e.) / L). To assess whether anti-predator behaviour is affected by the pesticide, we combined all levels of herbicide-exposure with three predator treatments (no predator, caged *Aeshna cyanea* dragonfly larvae or *Lissotriton vulgaris* newt adults) in a full factorial design. We observed hiding, activity, proximity to the predator cage and vertical position of tadpoles. We found that at the higher herbicide concentration tadpoles decreased their activity and more tadpoles were hiding, and at least at the lower concentration their vertical position was closer to the water surface than in tadpoles of the control treatment. Tadpoles also decreased their activity in the presence of dragonfly larvae, but did not hide more in response to either predator, nor did tadpoles avoid predators spatially. Further, exposure to the herbicide did not significantly influence behavioural responses to predation threat. Our study documents a definite influence of glyphosate-based herbicides on the behaviour of agile frog tadpoles and indicates that some of these changes are similar to those induced by dangerous predators. This may suggest that the underlying physiological mechanisms or the adaptive value of behavioural changes may similar." (Authors)] Address: Mikó, Zsannett, Lendület Evolutionary Ecology Research Group, Plant Protection Institute, Centre for Agricultural Research, Hungarian Academy of Sciences, Herman Ottó út 15, Budapest 1022, Hungary. E-mail: miko.zsannett@agrar.mta.hu

**16520.** Mikolajczuk, P. (2017): Mobility of imagines of *Nehalennia speciosa* (CHARPENTIER, 1840) (Odonata: Coenagrionidae): observations of dispersal behavior. *Odonatrix* 132: 4 pp. (in Polish, with English summary) ["Imagines of *N. speciosa* are considered as low mobile due to: 1) their small size and delicate body build; 2) strong attachment to narrow-leaved vegetation in a breeding habitat, within which

they fly at short distances; 3) infrequent observations outside of a breeding habitat; 4) results of mark-release-recapture studies. However, colonization of new habitats and less often adults' presence in unsuitable habitats are regularly reported. Flights, which may be related to colonization haven't been described so far. In the year 2014, several types of long-distance flights were observed at two acidic fens in Poland (Fig. 1). The flights occurred only at evening – after 18:30 CEST, as soon as surface of fens began shaded, with temperature more than 16 °C. The observations show that imagines of *N. speciosa* may actively relocate outside of vegetation at a breeding site and rise actively towards the air space above. Flight type D and E seem to lead to final leave of a site inhabited so far. In further part of flights D and E types, imagines may use air streams. Supposedly, flights related to search for new habitats, may have rather long-distance character, during which imagines observe terrain from a height and fall on suitable places. Occurrence of the dispersal behavior at evening may be related to avoidance of predation, especially by other odonates, which activity significantly decrease at evening." (Author)] Address: Mikolajczuk, P., ul. Partyzantów 59c/26, 21-560 Miedzyrzec, Poland. E-mail: gugapm@wp.pl

**16521.** Miller, E.; Miller, J. (2017): Zur Überwinterung von *Sympetma fusca* im bayerischen Alpenvorland (Odonata: Libellulidae). *Mercuriale* 17: 67-71. (in German, with English summary) ["Hibernation of *S. fusca* in the prealpine area of Bavaria - From 2005 to 2017, we observed the hibernation behaviour of *S. fusca*. The individuals left the developmental water during autumn by stages. During winter they perched at stems of different herbs, grasses and woody plants in a forest clearing. This behavior appears to assure the highest chance of surviving the humid winter climate of the prealpine area. We discuss an alternative hibernation mode hidden under leaf litter, which we consider impossible in our study area." (Authors)] Address: Miller, Elfi, Leharstr. 6c, 86179 Augsburg, Germany

**16522.** Minot, M.; Gaschignard, D. (2017): *Micrathyria wasscheri* sp. nov. from the coastal savannahs of French Guiana (Odonata: Libellulidae). *Odonatologica* 46(3/4): 287-300. (in English) ["On July 2014, a teneral specimen of an unknown *Micrathyria* species was found during the survey of an open marsh in Trou-Poissons in the coastal savannah of French Guiana. Further specimens were subsequently collected at the same place and at two other localities in Kourou and Macouria. The male and female of this new species are described here. *M. wasscheri* sp. nov. seems to depend on open marshes vegetated with *Eleocharis intersincta* (Cyperaceae), which constitute a very specific ecosystem of limited extent. This discovery highlights biodiversity issues in the coastal marshlands ("pri-pri"), which are currently threatened by demographic trends." (Authors)] Address: Minot, M., Normandie Univ, UNIROUEN, IRSTEA, ECODIV, 76000 Rouen, France. E-mail: m.minot@hotmail.fr

**16523.** Miralles-Nunez, A.; Diaz-Martínez, C. (2017): Catálogo provisional de los odonatos (Insecta: Odonata) de la provincia de Toledo (Castilla-La Mancha, España). *Boletín de*

*la Sociedad Entomológica Aragonesa* 61: 297-305. (in Spanish, with English summary) ["Provisional catalogue of the Odonata of Toledo (Castilla La-Mancha, Spain): A provisional catalogue of odonata of the Toledo province is presented based on an exhaustive bibliographic review and the addition of new records from the citizen science platform Biodiversidadvirtual, unpublished data and own records. The catalogue includes 45 species (17 Zygoptera and 28 Anisoptera). Eleven species (*Lestes dryas*, *Ischnura pumilio*, *Aeshna cyanea*, *Anax parthenope*, *Gomphus graslinii*, *G. simillimus*, *Onychogomphus costae*, *O. uncatus*, *Orthetrum brunneum* and *Paragomphus genei*) are cited for the first time in the province, and *P. genei* is also cited for the first time in the region of Castilla-La Mancha. Species cited in the literature but not recorded in this paper are discussed, as well as species that are likely to be present in the province but have not been detected yet. An analysis of the biogeographical composition of the species and their threat category is also included." (Authors)] Address: Miralles-Nunez, Adrià, Área de Biodiversidad y Conservación, Universidad Rey Juan Carlos, Tulipán s/n, Móstoles. 28933, Madrid (España). E-mail: adria.miralles@urjc.es

**16524.** Miralles-Núñez, A.; Álvarez, A. (2017): Primera cita de *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) en la provincia de Toledo (Castilla-La Mancha, España). *Archivos entomológicos* 18: 61-64. (in Spanish, with English summary) [*T. kirbyi* is recorded from Toledo (Spain) for the first time, the only province of southern Spain where the species had not been recorded yet." (Authors)] Address: Miralles-Núñez, Adrià, Área de Biodiversidad y Conservación, Univ. Rey Juan Carlos. C/Tulipán, s/n. E-28933 Móstoles, Spain. E-mail: adria.miralles@urjc.es

**16525.** Miralles-Nunez, A.; Obregón-Romero, R.; Mezquita-Aranburu, I. (2017): Nuevos registros sobre la distribución y reproducción de *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) en la Península Ibérica. *Boletín de la Sociedad Entomológica Aragonesa* 61: 241-244. (in Spanish, with English summary) ["*T. kirbyi* is recorded for the first time from the provinces of Gipuzkoa and Zaragoza and from the Navarra administrative region. That extends the known distribution range of the species in the Iberian Peninsula. Its reproduction in Zaragoza and Huelva is confirmed based on the observation of teneral specimens. Finally, a comprehensive review is provided of the first records and the first cases of reproduction observed in Spain per province. Unpublished data about reproduction are also included." (Authors)] Address: Miralles-Núñez, Adrià, Área de Biodiversidad y Conservación, Univ. Rey Juan Carlos, Tulipán s/n, Móstoles. 28933, Madrid, Spain. E-mail: adria.miralles@urjc.es

**16526.** Miroglu, A. (2017): An interesting dragonfly record, *Selysiothemis nigra* (Vander Linden, 1825) from Black Sea region of Turkey. The 3rd International Symposium on EuroAsian Biodiversity, 05-08 July 2017, Minsk - BELARUS: 17. (in English) [Samsun province, Turkey, July 2011.] Address: Miroglu, A., Ordu University, Fatsa Faculty of Marine Sciences, Ordu/Turkey. E-mail: alimiroglu@gmail.com



**16527.** Mishra, Y.; Sharma, A.K.; Pachori, R.; Kumri, A. (2017): Taxonomic documentation of insect pest fauna of rice collected in light trap at Jabalpur district of Madhya Pradesh. *Journal of Entomology and Zoology Studies* 5(6): 1212-1218. (in English) ["The present investigation was conducted for taxonomic documentation of insect pest fauna of rice. Information on insect pest fauna of rice ecosystem collected in Jabalpur region during the period between the last weeks of June to last week of December 2015. Total 62 species were recorded in kharif cropping season of rice cropping area. These insect belongs to 11 orders and 34 families. ... Orders of minor significance are represented by Odonata and Neuroptera having 2 species each ... These species were grouped on the basis of their economic importance in three major categories viz. Harmful insects- as crop pests 32 species, beneficial insects- as bio-control agents (predators and parasites) 28 species and beneficial insects- as commercially important 2 species. The present study also reviles that documented information on these species gives broader scope of using light trap as Integrated Pest Management tool against these insect pests of vegetables and other crops." (Authors)] Address: Mishra, Y., Dept Entomol., Jawaharlal Nehru Krishi Vishwa Vidyalyaya, Jabalpur, Madhya Pradesh, India

**16528.** Mochon, A. (2017): Une odonatofaune inusitée à la tourbière du parc national de Frontenac. *Le Naturaliste canadien* 141(2): 26-41. (in French, with English summary) ["Odonata were surveyed in the string fen of the Frontenac National Park, situated in the mixed temperate zone of the Appalachian region of southern Québec (Canada). This fen biotope, considered exceptional due to its ecological uniqueness and southern location, was surveyed 22 times from 2014 to 2016, covering the full flight period of the study taxa. Hundreds of adult specimens and exuvia were collected, which together with behavioral observations of adults, served to rate species abundance and to establish which were resident. The fen hosts a unique community of at least 52 odonate species (22 common, 11 occasional and 19 accidental). In total, 33 were proven or considered likely to have resident populations. The ranges of 21 species show a clear northern affinity, with some likely being relic populations in the biogeographic context of the fen, such as *Somatochlora brevicincta*, which until recently, had never been observed south of the St. Lawrence River. Discoveries included 4 threatened or endangered species: *Gomphaeschna furcillata*, *Williamsonia fletcheri*, *S. brevicincta* and *Nannothemis bella*; and 3 species that have recently expanded into Québec: *Enallagma anna*, *E. civile* and *Libellula semifasciata*." (Author)] Address: Mochon, A.; E-mail: mochon.alain@sepaq.com

**16529.** Modiba, R.V.; Joseph, G.S.; Seymour, C.L.; Fouché, P.; Foord, S.H. (2017): Restoration of riparian systems through clearing of invasive plant species improves functional diversity of Odonate assemblages. *Biological Conservation* 214: 46-54. (in English) ["Riparian systems are threatened globally, but contribute disproportionately to biodiversity and ecosystem function. Restoration to reverse their loss is costly, and requires careful monitoring and evaluation. Odonates are amongst the most reliable arthropod bio-indicators

for monitoring riparian ecosystems. Despite functional diversity (FD) reflecting ecosystem pattern and processes better than taxonomic diversity, Odonate FD has yet to be used in evaluating riparian conservation and restoration outcomes. We surveyed 45 sites across six river-systems in northeastern South Africa, to compare Odonate FD and standardised effect size of Odonate FD (sesFD) in riparian systems that had been invaded by alien plants, cleared of alien invasives, and sites that had never been invaded (15 sites each). Although species richness did not differ between treatments, Odonate sesFD was lower in invaded sites than those that had been cleared of alien riparian vegetation and those that had never been invaded. Clearance of 40% of alien riparian vegetation was associated with sesFD greater than that of invaded sites by almost two standard deviations. Representation of traits varied between treatments but was similar between cleared and natural sites, suggesting that invasion by alien plants directly impacts food webs, and that clearance can restore ecosystem processes and ecological services. This study confirms that Odonate FD can respond to restoration efforts. Secondary impacts of restoration to complete suites of functional groups can be anticipated to enhance ecological services and impact food webs at a range of scales." (Authors)] Address: Modiba, R.V., School of Education, Sol Plaatje Univ., Private bag X5008, Kimberley, South Africa

**16530.** Moeller, K.T.; Moeller, A.K.; Moyano, F.; Lundgren, E.J. (2017): Observation of an American black bear eating odonates in Yosemite National Park. *Western North American Naturalist* 77(1): 99-101. (in English) ["American black bears (*Ursus americanus*) are opportunistic omnivores with diets that vary seasonally and geographically depending on food availability. Previous scat analyses across several populations suggest that the majority of animal material in the diet of black bears is from insects (mainly ants and wasps). In 2015, a black bear in Yosemite National Park was observed eating dragonflies, a previously unidentified insect food item. Emerging aquatic insects may be an important but overlooked aspect of black bear diet. Documenting the food sources of organisms is critical to understanding their natural history and ecology. In the case of highly digestible food items, visual observation is an important and underrepresented tactic for documenting diet." (Authors)] Address: Moeller, Karla, School of Life Sciences, Arizona State Univ., Tempe, AZ 85281, USA. E-mail: karla.moeller@asu.edu

**16531.** Möstel, C.; Schorr, M.; Bechly, G. (2017): A new stem-coenagrionoid genus of damselflies (Odonata: Zygoptera) from mid-Cretaceous Burmese amber. *Zootaxa* 4243(1): 177-186. (in English) ["A new genus and species of damselfly, *Burmagrion marjanmatoki*, gen. et sp. nov., is described from Early Cretaceous Burmese amber. It is attributed to the basal stem group of Coenagrionoidea. The inclusion of five wings from the same species suggests that the amber piece contains the remains of a mating pair of damselflies." (Authors)] Address: Möstel, Claudia, Universität Hohenheim, Schloss Hohenheim 1, 70599 Stuttgart, Germany. E-mail: Claudia-Sareyka@web.de

**16532.** Moroz, M.D.; Lipinskaya, T.P. (2017): Aquatic insects of the Neman River and its tributaries. *Entomological Review* 97(1): 30-43. (in English) ["The aquatic insects of the Neman River and its tributaries were studied. 178 species belonging to 9 orders were found: ... Odonata - 16, ... Two species of aquatic insects new for the Belarusian fauna were found, *Pomatinus substriatus* (Ph. Müller, 1806) (Coleoptera) and *Brachycercus europaeus* Kluge, 1991 (Ephemeroptera)."] (Authors)] Address: Moroz, M.D., Scientific & Practical Center for Bioresources, National Academy of Sciences of Belarus, Minsk, 220072 Belarus. E-mail: mdmoroz@bk.ru

**16533.** Moskowicz, D.; May, M. (2017): Adult tiger spiketail (*Cordulegaster erronea* Hagen) habitat use and home range observed via radio-telemetry with conservation recommendations. *Journal of Insect Conservation* 21(5/6): 885-895. (in English) ["*C. erronea* is geographically restricted to the eastern half of North America, patchily distributed within the range and a habitat specialist of small spring and seepage fed headwater streams running through mature forest. These habitats are highly sensitive to disturbance and the Tiger Spiketail is of conservation concern throughout most of its range. Yet little is known about the habitat use of either sex away from the breeding stream hampering conservation strategies. In this study we use miniaturized radio transmitters to investigate the habitat use and home range of individual males and a female Tiger Spiketail in New Jersey. This is the first and only radio-telemetry for this species. We also provide recommendations for habitat protection and conservation. Our studies demonstrate that this species is critically dependent upon mature forest and the high quality, perennial headwater streams that run through them. These habitats are particularly sensitive to disturbance. Except when patrolling and ovipositing, both sexes are in the canopy above the breeding stream and in the adjacent mature forest, indicating the inseparable linkage between the aquatic and forested terrestrial habitat for this species. Our observations also suggest that *C. erronea* occurs in a metapopulation of nearby streams in our study area. Conservation of this species may therefore require forest protection far beyond the breeding stream. In New Jersey, and in other places throughout the range, there are many potential pressures on these habitats and current regulatory protections are not likely suitable. These same habitats may also be important for other Odonate species of conservation concern suggesting that protection of *C. erronea* may benefit a suite of species. We hope the information obtained from this study can assist resource managers in developing conservation and habitat protection measures."] (Authors)] Address: Moskowicz, D., EcolSciences, Inc., 75 Fleetwood Drive, Suite 250, Rockaway, NJ 07866, USA. E-mail: dmoskowicz@ecolsciences.com

**16534.** Muhfil, M.S.; Pramod, P. (2017): Odonates of Coimbatore District, Tamil Nadu, India. *Journal of Threatened Taxa* 9(2): 9814-9828. (in English) ["Odonates were surveyed in Coimbatore District from September 2012 to January 2016. The survey sites covered three major rivers—the Noyyal, Bhavani and Aliyar. Aquatic habitats such as forest streams, riverine sites, irrigational tanks and paddy fields were surveyed in the study. A total of 70 species of odonates were recorded

in the survey, which brings the list of odonates in Coimbatore to 87 species. 18 species are first time records to the district. In this paper, we catalogue odonates and their distribution from the present survey and pre-existing records."] (Authors)] Address: Muhil, Suhirtha, Salim Ali Centre for Ornithology and Natural History, Anaikatti, Coimbatore, Tamil Nadu 641108, India. E-mail: suhirthamuhil@gmail.com

**16535.** Nagahata, Y.; Futahashi, R.; Tshistjakov, Y.A. (2017): New record of *Sympetrum darwinianum* from Russia. *Tombo* 59: 84. (in English, with Japanese summary) ["So far *S. darwinianum* was known from Japan, continental China, and Korean Peninsula (Tsuda, 2000). Here we report an occurrence of this species from Russia from where it has been unknown. Material examined. 1 male (Figs.1 & 2), Lotus lake, near Khasan, Khasansky, Primorsky, Russia, (N 42.454240, E 130.641317), 14-IX-2010, Yoshiyuki Nagahata leg. This male perched on a branch of a broad-leaved tree (Fig. 2) while no other individuals of this species were involved within a hundreds of individuals of *S. uniforme*, *S. frequens*, and *S. kunckeli* observed around the tree at that occasion. Although one of the authors (Y.N.) had opportunities to survey *Sympetrum* species at this locality on September 9, 2008 and also at Vityas, Zarubino, Andreyevka in Gamov Peninsula (approx. 40 km to the north from Khasan) in eight occasions from 2003 to 2014, no other individuals of *S. darwinianum* has been found. This suggests that Khasan is located around the distribution edge of *S. darwinianum* though it remains unknown whether this species is resident at this locality or not. We would like to thank Dr. Oleg E. Kosterin and Mr. Akihiko Sasamoto for helpful information on the odonate fauna of Russia.] Address: Nagahata, Y., ZaoHango91, Yamagata, Yamagata, 990-2305, Japan E-mail: rosalia@muse.ocn.ne.jp

**16536.** Naik, K.L.; Sayeswara, H. (2017): Diversity, occurrence, and abundance of odonates of Tunga river bank, adjoining fields, and cultivated lands in Shivamogga district of Karnataka, India. *Innovare Journal of Science* 5(2): 1-7. (in English) ["Objective: The major objective of this study was to find out the diversity, occurrence, and abundance of odonates of Shivamogga at three localities, viz., Tunga river bank, adjoining fields, and cultivated lands. Methods: Odonates were sampled for 5 months from July to November 2016. Field observations were made once in a week. They were observed, captured, identified, and released immediately at the spot of capture. Odonates were identified using field guides and handbook of common odonates of central India. Results: A total of 29 species of odonates belonging to 7 families and 24 genera were recorded from the study localities. 14 species of dragonflies and 15 species of damselflies were observed and identified. Conclusion: The present investigation shows that the study localities host a number of odonates. Due to different anthropogenic activities, the odonates diversity is in declining mode."] (Authors)] Address: Naik, K.L., Dept Zool., Sahyadri Science College, Kuvempu Univ., Shivamogga - 577 203, Karnataka, India. E-mail: sscoutzoology@gmail.com

**16537.** Nair, V.P. (2017): Dragonflies: Additions to the Odonata (Insecta) fauna of Varadoor, Kannur, Kerala, South India. *Zoo's Print* 32(11): 24-30. (in English) ["Varadoor is a small village about 24 km east from Kannur city, near Sir Syed College Taliparamba, belonging to Kurumathur gramapanchayath of Kannur district (latitude 120.2'N & longitude 750.24'E), Kerala. The village has an area of 50 acres and has agricultural fields, rubber plantations, scrub jungles, home gardens, ponds etc. 44 species of odonates have been reported from Varadoor, Kannur, South India (Nair, 2014). Further surveys indicated the presence of 24 more species at Varadoor, Kerala. This raises the total species of odonates at Varadoor to sixty eight. In order to avoid collection and killing, most of the species which could be visually identified were photo documented and cross checked with field guides. Difficult species were collected with insect net, photographed and released after studying the characters. Certain odonates which resisted capture were photographed and identified upto generic level. The surveys were made during 2012-2016 in all three seasons viz. summer (March to May), monsoons (June to October) and winter (November to February). Collected odonates were identified with the help of standard field guides, Fraser (1933, 1934, 1936), Kiran & Raju (2013), Emiliyamma et. al., (2005, 2007) and Subramanian (2009). Nomenclature and classification followed is after Schorr et. al., (2013). Common name followed is after Kiran & Raju (2013). Odonates were categorized into four groups depending upon their occurrence during the study period. Accordingly species observed 75-100% of survey days were categorized as very common (VC), 50-75% as common (CO), 25-50% as occasional (OC) and below 25% as rare (RA). Species observed only once or twice in any one season is considered as very rare (VR). Of the 24 species observed additionally at Varadoor, three are endemic to Western Ghats. A systematic list of all the odonates reported so far has been given below with figures showing species richness of the suborders. [...] With the addition of 24 species, the odonate diversity of Varadoor reaches 68 species. Three new families viz. Euphaeidae, Chlorociphidae and Protoneuridae have been added under sub order Zygoptera and one family Macromiidae under Anisoptera. *Pseudagrion decorum* (Rambur, 1842), *Ischnura senegalensis* (Rambur, 1842), *Agriocnemis keralensis* Peters, 1981, *Prodasineura verticalis* (Selys, 1860), *Elatoneura tetrica* (Laidlaw, 1917), *Onychothemis testacea* Laidlaw, 1902 and *Epophthalmia vittata* Burmeister, 1839 has not been reported from Kannur as per Emiliyamma et. al., (2007). So they are new records from Kannur. *Paracercion calamorum* (Ris, 1916) is a very rare odonate of Kerala. It has been recorded for the first time from North Kerala in this study. *Pseudagrion indicum* Fraser, 1924, *Euphaea fraseri* (Laidlaw, 1920) and *Microgomphus souteri* Fraser, 1924 are endemic to Western Ghats. Apart from diversity studies, abundance studies and long term monitoring in this area may reveal interesting results. Majority of the odonates were found associated with the stream passing through the area. Urbanisation and water pollution are major threats to the wetlands of this area. Public attentiveness and involvement of local self government is required to conserve the habitat of these odonates." (Author)] Address: not stated

**16538.** Narzari, S.; Samah, J. (2017): Nutritional aspects of an aquatic edible insect *Sympetrum* sp. (Odonata: Libellulidae) of Assam, northeast India. *International Journal of Food Science and Nutrition* 2(4): 38-42. (in English) ["Insects are popularly consumed in different parts of the globe. The aquatic edible nymphs of *Sympetrum* sp. of Assam, Northeast India is little known to science but is a delicacy among certain tribal communities in the region. This study reports the nutritional compositions of the edible nymph of *Sympetrum* sp. The proximate composition analysis revealed that it contains 76.75 g/100g of protein. Mineral analysis by Atomic Absorption Spectrophotometer showed that this food can supplement rich amount of phosphorus, iron and copper to human nutrition. Amino acids analysed by High Performance liquid Chromatography presented all essential amino acids excluding leucine. Fatty acid analysis by Gas Chromatography Mass Spectrometry revealed that it contains 50.62% of Saturated Fatty Acids, 49.36% of Unsaturated Fatty Acids. This study first reports the rich nutritional aspects of the nymphs of *Sympetrum* sp. The results of this work would possibly be a nutritional reference for local consumers." (Authors)] Address: Narzari, Silistina, Dept of Biotechnology, Bodo-land University, Kokrajhar, -783 370, Assam, India

**16539.** Neiss, U.G.; De Marmels, J (2017): *Gynacantha dryadula* sp. nov. from the Guiana Shield (Odonata, Anisoptera: Aeshnidae). *Zootaxa* 4254(5): 563-574. (in English) ["The new species is described and illustrated on the basis of two reared, subterminal males from Brazil, their larval exuviae, a mature male from French Guiana, a mature female from Venezuela, and a mature female from Surinam. One of the Brazilian males is the holotype (BRAZIL, Amazonas State, Manaus, Reserva Florestal Ducke, BR 174-km 26, trail to Acará creek, 02°55'47"S, 59°58'22"W, 0.7 m elevation, deposited in INPA). The new species (total length 50–54 mm) differs from other small species of same genus by colour pattern of thorax, middle and hind tibiae dark with external (dorsal) yellow streak, male cercus with truncated tip lacking apical spine, and male epiproct reaching or slightly surpassing midlength of cercus. The larva, besides of its small size (28–31 mm), has an epiproct with well-developed and slightly diverging apical spines and an unusually long parapropod." (Authors)] Address: Neiss, U.G., Instituto de Criminalística, Departamento de Polícia Técnico-Científica, Manaus, AM, Brazil. E-mail: ulisses.neiss@gmail.com

**16540.** Nel, A.; Frese, M.; McLean, G.; Beattie, R. (2017): A forewing of the Jurassic dragonfly *Austroprotolindenia jurassica* from the Talbragar Fish Bed, New South Wales, Australia. *Alcheringa* 41(4): 532-535. (in English) ["The discovery of a well-preserved dragonfly forewing in the Upper Jurassic Talbragar Fish Bed near Gulgong and attributed to *Austroprotolindenia jurassica* Beattie & Nel allows this taxon to be placed in Protolindeniidae. It extends the palaeogeographical distribution of this family, previously known only from the Jurassic of Europe, to Australia." (Authors)] Address: Frese, M., Univ. Canberra, Institute for Applied Ecology & Faculty of Education, Science, Technology & Mathematics, Bruce, ACT 2601, Australia. E-mail: michael.frese@canberra.edu.au



**16541.** Nel, A.; Gross, M.; Engel, M.S. (2017): First fossil occurrence of the jewel damselflies (Odonata: Chlorocyphidae): a new species from the Late Miocene of Styria, Austria. *Annales de la Société entomologique de France (N.S.)* 53(4): 280–285. (in English, with French summary) ["The first fossil representative of the jewel damselflies (Calopterygoidea: Chlorocyphidae), a family of large, prominent, and often brilliantly colored Old World tropical Zygoptera, is described and figured. *Chlorocypha cordasevae* n. sp. was recovered from the Late Miocene (Early Pannonian, Serravalian to Tortonian, c.11 Ma) locality of Paldau, in the Styrian Basin, Austria. The fossil seems to be related to the African genus *Chlorocypha* Fraser, and within a larger group of African genera also including *Stenocypha* Dijkstra, *Africocypha* Pinhey, and *Platycypha* Fraser, and collectively set apart from southern Asiatic genera. The discovery of a central European species of *Chlorocypha* as recently as the Late Miocene reveals a much wider range to the family than its generally disjunctive modern distribution, demonstrating a Neogene contraction to their range, likely in connection with climatic cooling, drying, and developing seasonality. Modern chlorocyphids live under warm, humid climates, and the presence of *C. cordasevae* in the Pannonian fauna of Paldau further corroborates such a subtropical paleoclimate for the locality at that time." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**16542.** Ngiam, R.W.J.; Orr, A.G. (2017): *Oligoaeschna sirindhomae* sp. nov., a new dragonfly species from Thailand (Odonata: Anisoptera: Aeshnidae). *Zootaxa* 4353(1): 195–200. (in English) ["*Oligoaeschna sirindhomae* sp. nov. is described from a ♂ from Sakaerat Silvicultural Research Station, Nakhon Ratchasima Province in Thailand. It is the only known *Oligoaeschna* species recorded from Thailand since *O. pramoti* (Yeh, 2000) and *O. minuta* (Hämäläinen & Pinratana, 1999) were transferred to the genus *Sarasaeschna*." (Authors)] Address: Ngiam, R.W.J., National Parks Board, Singapore Botanic Gardens, 1 Cluny Road, Singapore 259569. E-mail: [yanrobin@hotmail.com](mailto:yanrobin@hotmail.com)

**16543.** Nieto, C.; Ovando, X.M.C.; Loyola, R.; Izquierdo, A.; Romero, F.; Molineri, C.; Rodríguez, J.; Martín, P.R.; Fernández, H.; Manzo, V.; Miranda, M.J. (2017): The role of macroinvertebrates for conservation of freshwater systems. *Ecology and Evolution* 7: 5502–5513. (in English) ["Freshwater ecosystems are the most threatened ecosystems worldwide. Argentinian protected areas have been established mainly to protect vertebrates and plants in terrestrial ecosystems. In order to create a comprehensive biodiverse conservation plan, it is crucial to integrate both aquatic and terrestrial systems and to include macroinvertebrates. Here, we address this topic by proposing priority areas of conservation including invertebrates, aquatic ecosystems, and their connectivity and land uses. Location: Northwest of Argentina. We modeled the ecological niches of different taxa of macroinvertebrates such as Coleoptera, Ephemeroptera, Hemiptera, Megaloptera, Lepidoptera, Odonata, Plecoptera, Trichoptera, Acari, and Mollusca. Based on these models, we analyzed the con-

tribution of currently established protected areas in the conservation of the aquatic biodiversity and we propose a spatial prioritization taking into account possible conflict regarding different land uses. Our analysis units were the real watersheds, to which were added longitudinal connectivity up and down the rivers. A total of 132 species were modeled in the priority area analyses. The analysis 1 showed that only an insignificant percentage of the macroinvertebrates distribution is within the protected areas in the North West of Argentina. The analyses 2 and 3 recovered similar values of protection for the macroinvertebrate species. The upper part of Bermejo, Sali-Dulce, San Francisco, and the Upper part of Juramento basins were identified as priority areas of conservation. The aquatic ecosystems need special protection and 10% or even as much as 17% of land conservation is insufficient for species of macroinvertebrates. In turn the protected areas need to combine the aquatic and terrestrial systems and need to include macroinvertebrates as a key group to sustain the biodiversity. In many cases, the land uses are in conflict with the conservation of biodiversity: however, it is possible to apply the connectivity of the watersheds and create multiple-use modules." (Authors)] Address: Nieto, Carolina, Institute de Biodiversidad Neotropical (IBN), CONICET-UNT, San Miguel de Tucuman, Tucuman, Argentina. E-mail: [carolinanieto@gmail.com](mailto:carolinanieto@gmail.com)

**16544.** Nijjavalli, H.M.; Hosepti, B.B. (2017): Preliminary observations on Odonata fauna of Daroji Sloth Bear Sanctuary, Ballari District, North Karnataka (India). *Biodiversity Journal* 8(4): 875–880. (in English) ["The preliminary study was conducted from February 2011 to January 2012 at Daroji Sloth Bear Sanctuary, Hosept. The study revealed the occurrence of a total of 22 species of Odonates in 19 genera belonging to 5 families from the study area. Among them the order Anisoptera which includes dragonflies was predominated with 17 (76%) species, followed by the order Zygoptera which includes damselflies with 5 (24%) species. The family Libellulidae was found to be the most dominant by 13 species with high percentage composition i.e., 76%, followed by the family Coenagrionidae by 3 species with 40% of total odonates species recorded from the study area. The status based on the frequency of occurrence of shows that 8 (36%) were common, 5 (23%) were very common, 3 (14%) were occasional, 4 (18%) were rare and 2 (9%) were very rare. The study highlights the importance and also provides the baseline information on status and composition of Odonates at Daroji Sloth Bear Sanctuary, Ballari District of North Karnataka for research on their biology and the conservation." (Authors)] Address: Nijjavalli, H.M., Dept of Post Graduate Studies and Research in Wildlife and Management, Kuvempu Univ., Jnana Sahyadri, Shankaraghatta-577451, Shimoga, Karnataka, India. E-mail: [harishwild@gmail.com](mailto:harishwild@gmail.com)

**16545.** Nishijima, S.; Nishikawa, C.; Miyashita, T. (2017): Habitat modification by invasive crayfish can facilitate its growth through enhanced food accessibility. *BMC Ecology* 17(37): 9 pp. (in English) ["Background: Invasive ecosystem engineers can facilitate their invasions by modifying the physical environment to improve their own performance, but this positive

feedback process has rarely been tested empirically except in sessile organisms. The invasive crayfish *Procambarus clarkii* is an ecosystem engineer that destroys aquatic macrophytes, which provide a physical refuge for animal prey, and this destruction is likely to enhance vulnerability to predators. Using two series of mesocosm experiments, we tested the hypothesis that the invasive crayfish increases its feeding efficiency on animal prey by reducing submerged macrophytes, thus increasing its individual growth rate in a positive density-dependent manner. Results: In the first experiment, increasing crayfish density reduced both macrophytes and animal prey (dragonfly and chironomid larvae) and, importantly, increased the growth rate of individual crayfish, in accordance with our expectation. In the second experiment, we used artificial macrophytes to clarify whether the physical architecture of macrophytes itself protects animal prey and limits crayfish growth rate. Increasing the artificial macrophyte quantity not only increased the survival of animal prey, but also retarded the crayfish growth rate. Conclusions: We conclude that macrophytes strengthen bottom-up control of crayfish, but this effect can be relaxed by increasing the density of crayfish via reduction in macrophytes. This positive feedback process may explain the crayfish outbreaks and regime shifts occasionally observed in invaded freshwater ecosystems." (Authors)] Address: Nishijima, S., Lab. Biodiversity Sci., School of Agricult. & Life Sciences, The Univ. of Tokyo, 1-1-1 Yayoi, Bunkyo, Tokyo 113-8657, Japan. E-mail: nishijimash@gmail.com

**16546.** Okude, G.; Futahashi, R.; Tanahashi, M.; Fukatsu, T. (2017): Laboratory rearing system for *Ichnura senegalensis* (Insecta: Odonata) enables detailed description of larval development and morphogenesis in dragonfly. *Zoological Science* 34(5): 386-397. (in English) ["In an attempt to establish an experimental dragonfly model, we developed a laboratory rearing system for *I. senegalensis*. Adoption of multi-well plastic plates as rearing containers enabled mass-rearing of isolated larvae without cannibalism and convenient microscopic monitoring of individual larvae. Feeding *Artemia* brine shrimps to younger larvae and *Tubifex* worms for older larvae resulted in low mortality, synchronized ecdysis, and normal development of the larvae. We continuously monitored the development of 118 larvae every day, of which 49 individuals (41.5%) reached adulthood. The adult insects were fed with *Drosophila* flies in wet plastic cages, attained reproductive maturity in a week, copulated, laid fertilized eggs, and produced progeny. The final larval instar varied from 9th to 12th, with the 11th instar (56.5%) and the 12th instar (24.2%) constituting the majority. From the 1st instar to the penultimate instar, the duration of each instar was relatively short, mainly ranging from three to 11 days. Afterwards, the duration of each instar was prolonged, reaching 7–25 days for the penultimate instar and 14–28 days for the final instar. Some larvae of final, penultimate and younger instars were subjected to continuous and close morphological examinations, which enabled developmental staging of larvae based on size, shape, and angle of compound eyes and other morphological traits. This laboratory rearing system may facilitate the understanding of physiological, biochemical, and molecular mechanisms underlying metamorphosis, hormonal control, morphogenesis, body color polymorphism, and

other biological features of dragonflies." (Authors)] Address: Okude, G., Dept. Biol. Sci., Graduate School Sci., Univ. Tokyo, Tokyo 113-0033, Japan Bioproduction Research Inst., Nat. Institute of Advanced Industrial Science & Technology (AIST), Tsukuba 305-8566, Japan. E-mail: g-okude@aist.go.jp

**16547.** Okuyama, H.; Takahashi, J. (2017): The complete mitochondrial genome of *Mnais costalis* Selys (Odonata: Calopterygidae) assembled from next generation sequencing data. *Tombo* 59: 77-83. ["We describe the complete mitochondrial genome of *M. costalis* from Shiga Prefecture, which is sympatric region where closely related species show loss of their wing-color polymorphism. The mitochondrial genome of *M. costalis* was determined to be a circular molecule of 15,484 bp. It was predicted to contain 13 protein-coding, 22 tRNA and two rRNA genes, and a non-coding control region. The organization of the genome is similar to that in the other Odonata species, including *M. costalis* (KU871065). The frequencies for occurrence of A, T, C and G nucleotides were 40.02, 26.25, 19.53 and 14.17%, respectively, with an average AT content of 66.27%. Four start codons (ATG, ATC, ATT, and TTG) and four stop codons (TAA, TAG and an incomplete TA and T) were observed in the 13 protein-coding genes. 22 tRNAs were predicted to form the cloverleaf secondary structures." (Authors)] Address: Okuyama, H., Fac. Life Sci., Kyoto Sangyo Univ., Kamigamo-Motoyama, Kita-ku, Kyoto, Kyoto, 608-8555 Japan. E-mail: k5533@cc.kyoto-su.ac.jp

**16548.** Op de Beeck, L.; Verheyen, J.; Stoks, R. (2017): Integrating both interaction pathways between warming and pesticide exposure on upper thermal tolerance in high- and low-latitude populations of an aquatic insect. *Environmental Pollution* 224: 714-721. (in English) ["Highlights: •Exposure to multiple chlorpyrifos (CP) pulses reduced thermal tolerance (CT<sub>max</sub>). •CP effect on CT<sub>max</sub> was lower under warming due to lower CP accumulation. •Reduction in CT<sub>max</sub> can partly be explained by reduction of the aerobic scope. •Thermal adaptation did not shape the impact of warming and CP on CT<sub>max</sub>. •Climate-induced toxicant impact shaped toxicant-induced climate sensitivity. Global warming and chemical pollution are key anthropogenic stressors with the potential to interact. While warming can change the impact of pollutants and pollutants can change the sensitivity to warming, both interaction pathways have never been integrated in a single experiment. Therefore, we tested the effects of warming and multiple pesticide pulses (allowing accumulation) of chlorpyrifos on upper thermal tolerance (CT<sub>max</sub>) and associated physiological traits related to aerobic/anaerobic energy production in *Ichnura elegans*. To also assess the role of latitude-specific thermal adaptation in shaping the impact of warming and pesticide exposure on thermal tolerance, we exposed larvae from replicated high- and low-latitude populations to the pesticide in a common garden rearing experiment at 20 and 24 °C, the mean summer water temperatures at high and low latitudes. As expected, exposure to chlorpyrifos resulted in a lower CT<sub>max</sub>. Yet, this pesticide effect on CT<sub>max</sub> was lower at 24 °C compared to 20 °C because of a lower accumulation of chlorpyrifos in the medium at 24 °C. The effects on CT<sub>max</sub> could partly be explained by reduction of the aerobic scope. Given that these

effects did not differ between latitudes, gradual thermal evolution is not expected to counteract the negative effect of the pesticide on thermal tolerance. By for the first time integrating both interaction pathways we were not only able to provide support for both of them, but more importantly demonstrate that they can directly affect each other. Indeed, the warming-induced reduction in pesticide impact generated a lower pesticide-induced climate change sensitivity (in terms of decreased upper thermal tolerance). Our results indicate that, assuming no increase in pesticide input, global warming might reduce the negative effect of multiple pulse exposures to pesticides on sensitivity to elevated temperatures." (Authors)] Address: Op de Beeck, Lin, Lab. Aquatic Ecol., Evol.n & Conserv., Univ. Leuven, Charles Deberiotstraat 32, 3000 Leuven, Belgium. E-mail: lin.opdebeeck@kuleuven.be

**16549.** Orr, A.G.; Richards, S.J. (2017): Two new *Papuargia* Liefwinck, 1938 from Papua New Guinea (Odonata: Platycnemididae). *Odonatologica* 46(1/2): 137-152. (in English) ["A second species of the hitherto monotypic New Guinean genus *Papuargia* Liefwinck, 1938 and a new subspecies of *P. stueberi* Liefwinck, 1938 are described from Papua New Guinea. These are *P. brevistigma* sp. nov. and *P. stueberi* luciedecknerae ssp. nov. The characters which define the genus are discussed with special reference to the labium and penis, which appears to show a previously unknown synapomorphy." (Authors)] Address: Orr, A.G., Cooperative Res. Centre Tropical Rainforest Ecol. & Management, Environ. Sci., Griffith Univ., Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**16550.** Orr, A.G.; Richards, S.J. (2017): Addendum and corrigenda to *Odonatologica* 46: 137-152. The type repository of *Papuargia stueberi* luciedecknerae ssp. nov. (Odonata: Platycnemididae). *Notulae odonatologicae* 8(10): 391-392. (in English) ["To ensure that the name *P. stueberi* luciedecknerae, described (2017) in *Odonatologica* 41: 283-291, is available, the type repository, inadequately presented in the original description, is stated along with a diagnosis of the subspecies." (Authors)] Address: Orr, A.G., 1 Environmental Futures Research Institute, Griffith University, Nathan, Qld 4111, Australia. E-mail: agorr@bigpond.com

**16551.** Orzechowski, R. (2017): Observations of dragonflies (Odonata) in the western part of the Notecka Forest. *Odonatrix* 134 (2017): 4 pp. (in Polish, with English summary) ["The paper presents results of three weeks' dragonfly observations in the western part of the Notecka Forest (Voivodeship Lubuskie), which took place between the 30-V- and 18-VI-2014. In 4 UTM squares (WU43, WU44, WU54, WU55) 22 species were recorded. *Leucorrhinia pectoralis* and *Crocothemis erythraea* were found in the investigated for the first time." (Author)] Address: Orzechowski, R., ul. Cisowa 1A/6, 65-960 Zielona Góra, Poland

**16552.** Osozawa, S.; Sato, F.; Wakabayashi, J. (2017): Quaternary vicariance of lotic *Coelicia* in the Ryukyu-Taiwan Islands contrasted with lentic *Copera*. *Journal of Heredity* 108(3): 280-287. (in English) ["Lotic Odonata are expected to be more

affected by vicariance than lentic sister species. We demonstrated that severe vicariant speciation acted on lotic *Coelicia* in contrast to lentic *Copera* damselflies, which are both included in the family Platycnemididae. We constructed maximum likelihood and Bayesian inference trees of these Platycnemididae species from the continental islands of Ryukyu (Amami, Okinawa, and Yaeyama islands), Taiwan, and Japan relative to Chinese species using raxmlGUI and BEAST, based on the mitochondrial COI gene (682 bp), COII gene (494 bp), 16SrRNA (478 bp), and the nuclear 28SrRNA gene (807 bp). In BEAUti, we calibrated the splitting age of the MRCA of all the *Coelicia* species as 1.55-0.15 million years ago (Ma), a date that corresponds to a geologic constraint: the Okinawa trough and associated straits, including the Yilan basin in Taiwan, began to rift at 1.55 Ma, isolating the Ryukyu-Taiwan islands from the Chinese continent. The vicariance split *Coelicia* into the Ryukyu-side clade of *Coelicia ryukyuensis* (Coe. r. *ryukyuensis* in Okinawa and Coe. r. *amamii* in Amami) and *Coelicia flavicauda* (Coe. f. *masakii* in Yaeyama and Coe. f. *flavicauda* in southern Taiwan), and the Chinese-side clade of *Coelicia cyanomelas* (northern Taiwan and China), separated by the Okinawa trough. These *Coelicia* species were further deeply differentiated to form local populations on the major islands and some of the minor islands. The *Copera* clade constituted a sister of the lotic *Coelicia* clade, but genetic differentiation was not recognizable in lentic *Copera* between China, Taiwan, and Japan. Base substitution rates applying a strict clock model were estimated for COI: 0.0783, COII: 0.0803, 18SrRNA: 0.0186, 28SrRNA: 0.00577, and combined: 0.0408 substitutions/site/myr, and these rates are relatively high." (Authors)] Address: Osozawa, S., Dept of Earth Sciences, Graduate School of Science, Tohoku University, Sendai 980-8578, Japan

**16553.** Ott, J. (2017): Neozoen in Rheinland-Pfalz – Segen oder Fluch für unsere Arten und Lebensräume? Eine erste Zusammenstellung von Arten im Hinblick auf ihr Schädigungspotenzial für Libellen (Odonata). *Mainzer naturwissenschaftliches Archiv* 54: 193-217. (in German, with English summary) ["For the first time all invasive species – vertebrates and invertebrates – which have a known or potential impact on dragonflies in Rheinland-Palatinate have been compiled. They have direct and indirect effects and even both. To date adult dragonflies are not impacted, but the larval and aquatic stages are, even more and often to a large extent. The most negative impact derives from invasive crayfish (Decapoda), which even leads to destroyed habitats and reduced ecosystem services. Beside the invasive crayfish also some fish, molluscs and insects have a distinct impact. To avoid or at least reduce further damages the execution of existing environmental laws by the authorities must be intensified and the release of new invasive species must be avoided by all means. The expansion of already introduced invasive species must be stopped or should at least been reduced, as prevention is much better from the ecological as well as from the economic point of view. The populations of invasive species as well as their impact have to be monitored permanently. In the general public there is still a lack of knowledge concerning this topic, consequently also pro-



grammes for environmental education should be implemented." (Author)] Address: Ott, J., L.U.P.O. GmbH, Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**16554.** Ott, J. (2017): Erfassung der Libellenfauna am Mühlgraben im Bereich der Lampertsmühle bei Kaiserslautern (Insecta: Odonata). Fauna Flora Rheinland-Pfalz 13(3): 693-706. (in German, with English summary) ["Investigation on the dragonfly fauna of the "Mühlgraben" near the Lampertsmühle (city of Kaiserslautern). The author reports on an investigation of the dragonfly fauna of a two kilometer long ditch, which runs parallel to the river Lauter in the northern part of the city of Kaiserslautern. At first glance the water seemed not very important for nature conservation, but a remarkable diversity of dragonflies was found. So plans to destroy the ditch should be reconsidered and given up." (Author)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**16555.** Ott, J. (2017): Erfassung der Libellenfauna (Odonata) am Glan im Jahr 2015 – mit störungsökologischen Betrachtungen. Mitteilungen der Pollichia 98: 91-104. (in German, with English summary) ["The river Glan, 87.5 km long and situated in the German federal states Saarland and Rhineland-Palatinate, is used for canoe tourism. In particular in its lower section between the villages Lauterecken and Odemheim, where it flows into the river Nahe, this type of recreation led to conflicts with fishing, water management, nature conservation, and the residents. After a moderation in 2015, several studies had been carried out to provide evidence for this impact of canoeing, e.g. on birds, fish and also dragonflies. In this article, the study on the dragonfly fauna of the Glan with reference on their disturbance ecology is presented. 18 species were found in total during summer 2015. The rheophilic *Onychogomphus forcipatus* and *Ophiogomphus cecilia* (which is listed on Annex II and IV of the EC Habitats Directive and according to the national law "strictly protected") are of particular interest here. For these two species (larvae and adults) no significant negative impact could be found, as well as for the other species present at this river and consequently no contravention of the national law could be expected. However, on the basis of all studies some management measurements and some rules of action were proposed to minimize any possible impact, moreover suggestions for more detailed studies on the disturbance ecology of dragonflies were given." (Authors)] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**16556.** O'Brien, M.F.; O'Brien, D.S.; Craves, J.A. (2017): *Cordulegaster erronea* Hagen in Selys (Tiger Spiketail) rediscovered in Michigan (Odonata: Cordulegastridae). The Great Lakes Entomologist 50(1-2): 1-5. (in English) ["*C. erronea* has been included on the list of Michigan Odonata based on one specimen collected in 1934. In 2016, the species was found in Kalamazoo County, Michigan. It is the least abundant *Cordulegaster* species in Michigan, and the habitat requirements in Michigan are compared with known *C. erronea* habitats in

Ohio and New Jersey." (Authors)] Address: O'Brien, M.A., Museum of Zoology, University of Michigan, 3600 Varsity Drive, Ann Arbor, MI 48108, USA.

**16557.** Padinjattayil, S.; Agrawal, A. (2017): Abstract: L8.00009: Flow around a corrugated wing over the range of dragonfly flight. Bulletin of the American Physical Society, 70th Annual Meeting of the APS Division of Fluid Dynamics. Sunday–Tuesday, Nov. 19–21, 2017; Denver, Colorado: (in English) [Verbatim: The dragonfly flight is very much affected by the corrugations on their wings. A PIV based study is conducted on a rigid corrugated wing for a range of Reynolds number 300-12000 and three different angles of attack ( $5^{\circ}$ - $15^{\circ}$ ) to understand the mechanism of dragonfly flight better. The study revealed that the shape of the corrugation plays a key role in generating vortices. The vortices trapped in the valleys of corrugation dictates the shape of a virtual airfoil around the corrugated wing. A fluid roller bearing effect is created over the virtual airfoil when the trapped vortices merge with each other. A travelling wave produced by the moving virtual boundary around the fluid roller bearings avoids the formation of boundary layer on the virtual surface, thereby leading to high aerodynamic performance. It is found that the lift coefficient increases as the number of vortices increases on the suction surface. Also, it is shown that the partially merged co-rotating vortices give higher lift as compared to fully merged vortices. Further, the virtual airfoil formed around the corrugated wing is compared with a superhydrophobic airfoil which exhibits slip on its surface; several similarities in their flow characteristics are observed. The corrugated airfoil performs superior to the superhydrophobic airfoil in the aerodynamic efficiency due to the virtual slip caused by the travelling wave.] Address: not stated

**16558.** Pandey, P.; Mohapatra, A.K. (2017): Diversity of two families Libellulidae and Coenagrionidae (Odonata) in Regional Institute of Education Campus, Bhubaneswar, Odisha, India. Journal of Threatened Taxa 9(2): 9851-9857. (in English) ["Libellulidae and Coenagrionidae are the most dominant families among Odonata. The present study deals with the diversity, occurrence and present status of libellulids and coenagrionids within the Regional Institute of Education Campus in Bhubaneswar, Odisha, India (RIEC). The major objectives of this study are to prepare a preliminary checklist of libellulids and coenagrionids species in the RIEC and to find out the status and distribution of genera and species in their respective families. This study is also aimed at systematic planning for developing different strategies for conservation of odonates in the campus. During this study a total of 24 species have been recorded out of which 20 species belong to the family Libellulidae representing 15 genera and four species belong to the family Coenagrionidae representing four genera. The findings of this study are based on the survey which was carried out for a period of four months in 2015." (Authors)] Address: Pandey, Priyamvada, Dept Life Sci. Education, Reg. Inst. Education (NCERT), Bhubaneswar, Odisha 751004, India. E-mail: riyamwada.pandeytai@gmail.com

**16559.** Parr, A.J. (2017): Migrant and dispersive dragonflies in Britain during 2016. J. Br. Dragonfly Society 33(2): 104-111.

(in English) ["The year 2016 was a relatively quiet one for migrant dragonflies in Britain, at least in terms of the volume of migration. *Anax parthenope* thus had no more than an 'average' season with reports from fourteen sites, while *Sympetrum fonscolombii* had one of its quietest years for some time. Some small scale arrivals of *S. fonscolombii* were never-the-less still observed. Despite the generally low numbers of migrants, a few highlights did, however, stand out. In particular, *Anax ephippiger* was noted at five sites during the autumn, with individuals being photographed on the Scilly Isles (2 sites), the Orkneys (2 sites) and in coastal Norfolk. Our recent colonist species in general seemed to fair well. In particular, *Chalcolestes viridis* continued its range expansion with sightings from no less than four new counties during the season, namely Bedfordshire, Buckinghamshire, Lincolnshire and Northamptonshire. A new breeding site for *Lestes barbarus* was discovered on the Isle of Wight during June, while in Essex not only did *Aeshna affinis* appear in numbers at its strongholds along the greater Thames Estuary, but what seems likely to be a new breeding site was discovered near St Osyth, well away from sites in the south of the county. Other events of note during the year involved important 'extralimital' sightings of a number of our more established resident species that are currently undergoing range expansion. In particular, *Libellula fulva* produced several unexpected sightings, including reports from Leicestershire and Lincolnshire. *Aeshna isoceles* also continued to be seen in new areas." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk, IP29 5BX, UK

**16560.** Payra, A.; Deepak, C.K.; Tripathy, B.; Mondal, K.; Chandra, K. (2017): New distributional record of *Megalestes ima Fraser, 1926* (Odonata: Zygoptera: Synlestidae), a damselfly from Arunachal Pradesh, Eastern Himalayas, India. *Eurasian Entomological Journal* 16(4): 314-318. (in English, with Russian summary) ["*M. ima* is recorded for the first time from Arunachal Pradesh, Eastern Himalayas, India. A single specimen was collected from West Kameng District of Arunachal Pradesh. Information on its distribution, habitat and taxonomic characteristics, viz. male genitalia, wing venation and anal appendages, are described together with information on the distribution of the genera in the Indian sub-continent." (Authors)] Address: Payra, A., Zoological Survey of India, M-Block, New Alipore, West Bengal, Kolkata 700053 India. E-mail: arajushpaara@gmail.com.

**16561.** Payra, A.; Das, G.N.; Pal, A.; Patra, D.; Tiple, A.D. (2017): New locality records of a rare dragonfly *Gynacantha khasiaca* McLachlan, 1896 (Odonata: Aeshnidae) from India. *Biodiversity Journal* 8(1): 27-32. (in English) ["*G. khasiaca* [...] is [...] distributed mainly in South-eastern Asia. During Odonata survey in different parts of North-Eastern and Eastern India from 2014 to 2016, some specimens of this species were observed and photographed from 6 localities. Present record of this species from Purba Medinipur, West Bengal represents its Southernmost distribution in India." (Authors)] Address: Payra, A., Dept of Wildlife & Biodiversity Conservation North Orissa University, Takatpur, Baripada-757003, Odisha, India. E-mail: arajushpayra@gmail.com

**16562.** Paz, L.; Conesa, M.A. (2017): First record and confirmation of reproduction of *Gomphus vulgatissimus* (Linnaeus, 1758) (Odonata: Gomphidae) in Gipuzkoa (Basque Country, Spain). *Munibe, Cienc. nat.* 65: 4 pp. (in Spanish, with English and Basque summaries) ["Following the discovery in 2016 of a *G. vulgatissimus* larva in the river Araxes, this species is recorded for the first time in the province of Gipuzkoa (N Iberian Peninsula), confirming its reproduction on this site." (Authors)] Address: EKOLUR Asesoría Ambiental SLL, Camino de Astigarraga 2, Pl. 4ª dcha.-Of. 8. • 20180 Oiartzun, Sūain. E-mail: leire@ekolur.com

**16563.** Paz Leiza, L.; Conesa García, M.A.; Torralba Burial, A. (2017): Contribución de la red de seguimiento de la calidad de los ríos guipuzcoanos al conocimiento de la distribución de los Odonata de Gipuzkoa (España). *Boletín de la Sociedad Entomológica Aragonesa* 61: 278-280. (in Spanish, with English summary) ["Contribution of the Guipuzcoan river quality monitoring network to the knowledge of the distribution of Odonata in Gipuzkoa (Spain). Abstract: Data on the distribution of rheophilic Odonata are presented, extracted from the analysis of the larvae included in the samples of benthic macroinvertebrates collected in a series of river quality monitoring campaigns conducted in Gipuzkoa (Spain). Records of special interest are those of *Coenagrion mercuriale*, *Onychogomphus forcipatus forcipatus*, *O. forcipatus unguiculatus* and *Oxygastra curtisii*." (Authors) ] Address: Paz Leiza, L., EKOLUR Asesoría Ambiental SLL, Camino de Astigarraga 2, Pl. 4ª dcha.-Of. 8. 20180 Oiartzun, Spain. E-mail: leire@ekolur.com

**16564.** Pérez Fernández, P.J.; Rodríguez Lozano, B. (2017): Primeras citas de *Onychogomphus forcipatus* subsp. *unguiculatus* (Vander Linden, 1820) y *Platycnemis latipes* Rambur, 1842 (Insecta, Odonata) para la provincia de Almería (SE Península Ibérica). *Revista gaditana de Entomología* 7(1): 177-182. (in Spanish, with English summary) ["*O. forcipatus* subsp. *unguiculatus* and *P. latipes* are recorded for first time in the province of Almería, in Caramel river, Segura river basin, within Parque Natural Sierra María - Los Velez." (Authors)] Address: Pérez Fernández, P.J., SERBAL, Sociedad para el Estudio y Recuperación de la Biodiversidad Almeriense. Baqueira Beret nº 2, 04720 Aguadulce 04009, Almería, Spain. E-mail: pedroperez@serbal-almeria.com

**16565.** Peterson, M.G.; Lunde, K.B.; Chiu, M.-C.; Resh, V.H. (2017): Seasonal progression of aquatic organisms in a temporary wetland in northern California. *Western North American Naturalist* 77(2): 176-188. (in English) ["Seasonal wetlands are important habitats for biodiversity of both invertebrate and vertebrate fauna. Many aquatic species have life history traits adapted to colonizing and developing in temporary aquatic habitats, and these traits influence the annual succession of the macroinvertebrate community. The chronology of taxon appearance and the variation in relative abundances during the hydroperiod are important for understanding population dynamics, trophic interactions, and responses to drought. This study investigated the successional

changes in macroinvertebrate abundances in a seasonal wetland in northern California. Water quality parameters were measured regularly, including dissolved oxygen, temperature, pH, surface area, and specific conductance during the wet season (January–July) in 2007–2009. Macroinvertebrates were collected with net sweeps (mesh > 500 mm), and the presence of life stages of amphibians were visually observed from March to June each year. As the hydroperiod progressed, wetland surface area decreased, while water temperature and specific conductance increased. Macroinvertebrate abundance increased with the progression of the hydroperiod, and the richness of macroinvertebrate predator taxa tripled from 2 families in March to 6 families in June. The earliest part of the hydroperiod in the wetland was dominated by *Cyzicus* clam shrimp and *Linderiella occidentalis* fairy shrimp. *Limnephilus* caddisfly larvae were few in number but were found exclusively in the early season. Sequential changes of dominant invertebrate taxa and relative abundances of macroinvertebrates were evident, particularly among several macroinvertebrate predators. Among these predators, the early-season community was dominated by larval dytiscid beetles, while later-season communities demonstrated increased predator richness (e.g., *Notonecta* backswimmers) and were dominated by *Lestes* damselflies. Larvae of the vertebrate predator *Taricha torosa*, which may act as a top predator, were present during the later stages of the hydroperiod. The phenology of individual aquatic taxa and their specific life history strategies may impact the sensitivity of macroinvertebrate populations to increased annual variation in hydroperiod that may result from climate changes in this region." (Authors)] Address: Peterson, M.G., Dept of Environmental Science, Policy and Management, University of California, Berkeley, CA 94720-3114, USA. E-mail: [petersmg@berkeley.edu](mailto:petersmg@berkeley.edu)

**16566.** Petrulevicius, J.F. (2017): First *Frenguelliidae* (Insecta: Odonata) from the middle Eocene of Río Pichileufú, Patagonia, Argentina. *Archivos Entomológicos* 18: 367-374. (in Spanish, with English summary) ["A new genus, *Treintamilun* gen. nov., based on *Treintamilun vuelvenlucha* sp. nov. is described from Río Pichileufú (Lutetian), Río Negro province, Patagonia, Argentina. The new genus is assigned to *Frenguelliidae*. The finding of a second genus and third species of *Frenguelliidae* is noteworthy, contributing to the better knowledge of this little known family and bear out its presence in the Eocene of Patagonia. While the previous species of *Frenguelliidae* were recorded from the Ypresian (52 Ma) of Laguna del Hunco, the new one comes from the neighbour locality 160 Km far and 48 Ma old. The *Frenguelliidae* share a nodal furrow reduced, a ScP reaching costal margin very obliquely at nodus, a nodal Cr sub-vertical and subnodus vertical, and one of the groundplan apparent characters of the Eiproctophora, a curved CuP." (Author)] Address: Petrulevičius, J.F., División Paleozoología Invertebrados, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata and Consejo Nacional de Investigaciones Científicas y Técnicas – CONICET. Paseo del Bosque, s/n. La Plata (1900), Buenos Aires, Argentina. E-mail: [levicius@fcnym.unlp.edu.ar](mailto:levicius@fcnym.unlp.edu.ar)

**16567.** Petrulevičius, J. (2017): A new burmagomphid dragonfly from the Eocene of Patagonia, Argentina. *Acta Palaeontologica Polonica* 62(4): 779-783. (in English) ["A new burmagomphid anisopteran, *Satelitala soberana* gen. et sp. nov. is described from the lower Eocene of Laguna del Hunco, Patagonia, Argentina. The new genus is characterised by hindwing characters such as the subdiscoidal triangle not elongated; anal loop divided longitudinally; paranal cell divided longitudinally; five terminal cells between RP and MA; five terminal cells between MP and CuA; and obtuse angle between PsA and CuP+AA. Burmagomphid dragonflies were represented so far only by one specimen from the middle Cretaceous of Southeast Asia. This new record extends the distribution to Patagonia, to the Cenozoic, and also to paleolake deposits." (Author)] Address: Petrulevičius, J.F., CONICET & División Paleozoología Invertebrados, Facultad de Ciencias Naturales y Museo, Univ. Nac. de La Plata, Paseo del Bosque s/n, La Plata (1900), Argentina. E-mail: [levicius@fcnym.unlp.edu.ar](mailto:levicius@fcnym.unlp.edu.ar)

**16568.** Petzold, F. (2017): Rote Liste und Gesamtartenliste der Libellen (Odonata) von Berlin. 2. Fassung, Stand Juli 2016. In: *Der Landesbeauftragte für Naturschutz und Landschaftspflege / Senatsverwaltung für Umwelt, Klima und Verkehr (Hrsg.): Rote Listen der gefährdeten Pflanzen, Pilze und Tiere von Berlin*, 30 S. doi: 10.14279/depositonce-5849: 1-30. (in German, with English summary) [" [Red List and checklist of the dragonflies of Berlin] So far, 61 species of dragonflies were recorded in Berlin. Since 2005, when the last checklist was published, three species were newly found in Berlin (*Anax ephippiger*, *Crocothemis erythraea*, *Sympetrum meridionale*). A total of 23 species (40 %) were classified as threatened. Four species are considered "extinct or missing". Six species were classified as "critically endangered", three species as "endangered" and seven as "very rare". One species was not rated due to an insufficient data base. 34 species (59 %) are considered to be of least concern. Four species, in the former Red List from 2005 classified as "extinct" (*Epitheca bimaculata*, *Leucorrhinia albifrons*, *L. caudalis*, *Orthetrum coerulescens*), were rediscovered. For selected species information regarding the population status is provided. Furthermore, the degree of endangerment of the Odonata communities of different habitats is discussed." (Author)] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. E-mail: [petzold.falk@googlemail.com](mailto:petzold.falk@googlemail.com)

**16569.** Phan, Q.T. (2017): *Coeliccia duytan* sp. nov. from the Central Highlands of Vietnam (Odonata: Platycnemididae). *Zootaxa* 4324(1): 195-200. (in English) ["*C. duytan* sp. nov. (holotype ♂, from Chu Mom Ray National Park, Kon Tum Province, the Central Highlands of Vietnam, deposited in zoological collection of Duy Tan University) is described based on both sexes. The new species is closely related to *C. hayashii* Phan & Kompier, 2016 by the extensive rectangular pruinosity on the synthorax but differs in lacking a pale antehumeral stripe, genital ligula with flagella pointed at tip and the shape of cerci." (Authors)] Address: Phan, Q.T., Entomology & Parasitology Lab., Center for Molecular Biology, Institute of Research & Development, Duy Tan University, 3 Quang Trung, Da Nang, Vietnam. E-mail: [pqtoan84@gmail.com](mailto:pqtoan84@gmail.com)



**16570.** Phan, Q.T.; To, V.Q.; Ho, V.H.; Pham, A.T.; Ta, P.M. (2017): Study on the damselfly genus *Prodasineura* Cowley, 1934 (Odonata: Zygoptera: Platycnemididae) of Vietnam. Proceedings of the 7th national scientific conference on ecology and biological resources: 989-997. (in English) ["Damselfly of the genus *Prodasineura* Cowley, 1934 had been placed in the family Protoneuridae before Dijkstra et al. (2014) rearranged it into the family Platycnemididae by using a molecular phylogenetic approach. They are very slender built damselfly, the male coloured usually with deep black, striped with blue, red or yellow, respectively. Thoracic pattern are usually used for identifying species in the genus. Superiors of anal appendages are hammer-like with pointed at apex; inferiors is broad at base and tapering abruptly to a round tip. The females are similar in shape of body and thoracic colour pattern. The posterior lobe of female prothorax characteristically well developed and can be good character for separating close species. They are usually found at the slowly flowing near the opened streams of secondary forests or backwaters of swift rivers in lowlands. In this study, three species of the genus *Prodasineura* are recorded for the first time for Vietnam, including *P. doisuthensis* Hoess, 2007, *P. hoffmanni* Kosterin, 2015 and *P. verticalis* Selys, 1860. This result brings the number of *Prodasineura* species known in Vietnam into 7. Moreover, we also provided an updating distribution of all recorded *Prodasineura* species based on several related publications and personal database of the authors." (Authors)] Address: Phan, Q.T., Entomology & Parasitology Lab., Center for Molecular Biology, Institute of Research and Development, Duy Tan University, 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

**16571.** Pierce, A.J. (2017): The first record of *Anax ephippiger* for Thailand and Southeast Asia (Odonata: Aeshnidae). *Notulae odonologicae* 8(9): 365-368. (in English) ["*A. ephippiger* is reported from Thailand for the first time on the basis of photographic records. On 28-ix-2016 one male was found on the outskirts of the village of Saphli, Chumphon province in southern Thailand. *A. ephippiger* was previously unrecorded in Southeast Asia, being the sixth species in the genus to have been recorded in Thailand." (Author)] Address: Pierce, A.J., Conservation Ecol. Program, School of Bioresources and Technology, King Mongkut's Univ. of Tech. Thonburi, Bangkokkhunthien, Bangkok 10150, Thailand; andyp67@gmail.com

**16572.** Pinach, J.M.E.; Teruel, S. (2017): Aportaciones al conocimiento de la odonatofauna (Insecta: Odonata) de la Comunitat Valenciana (este de España). *Boletín de la Sociedad Entomológica Aragonesa* 61: 285-291. (in Spanish, with English summary) ["Contributions to the knowledge of the odonatofauna (Insecta: Odonata) of the valencian community (east of Spain): New information is collected about 14 species of dragonflies scarce in the Valencian Community (distributed less than 10 UTM 10x10 km squares) and/or threatened (includes in the Red List of Invertebrates of Spain), updating their distribution in this Spanish autonomous region. Among these species are *Oxygastra curtisii*, *Gomphus graslinii*, *Onychogomphus costae*, *Orthetrum nitidiverve* or *Brachytron pratense*. We provide the first record of reproduction of *Diplacodes lefebvreii* for the provinces of Castellon and Valencia and the

first record of *Zygonyx torridus* for the province of Castellon." (Authors)] Address: Pinach, J.M.E., Parotets- Sociedad Odonatologica de la Comunitat Valenciana. C/ Padre Vicente Cabanes, 5-12. 46900 Torrent (Valencia, Spain

**16573.** Pinach, J.M.P.; Díaz-Martínez, C. (2017): Odonatos (Insecta: Odonata) del Parque Natural de la Serranía de Cuenca (Castilla-La Mancha, centro-este de España). *Boletín de la Sociedad Entomológica Aragonesa* 61: 257-268. (in Spanish, with English summary) ["The Odonata (Insecta) of the Serranía de Cuenca natural park (Castilla-La Mancha, central-eastern Spain): The odonate fauna of the Serranía de Cuenca natural park and its surrounding area is described from bibliographic records, unpublished data and observations recorded during 2015 and 2016. A total of 49 species have been found so far. *Sympetrum flaveolum*, with a single previous record from 1902, was found at 16 new sites. The known distribution of species which are scarce in Cuenca province or have only recently been detected there, such as *Lestes sponsa*, *L. dryas*, *Anax ephippiger*, *Sympetrum sanguineum* or *Trithemis kirbyi* is extended. Regarding threatened species, *Coenagrion mercuriale* was present at 36 sites, while *Aeshna juncea* and *S. vulgatum ibericum* have their only known provincial localities within the study area." (Authors)] Address: Pinach, J.M.E., Dirección Provincial. Delegación de Agricultura, Medio Ambiente y Desarrollo Rural en Cuenca. C/Colón, 2, 16071 Cuenca, Spain. E-mail: jjevanach@hotmail.com

**16574.** Pinkert, S.; Bechly, G.; Nel, A. (2017): First record of hawker dragonflies from Eocene Baltic amber (Odonata: Anisoptera: Gomphaeschnidae). *Zootaxa* 4272(2): 263-275. (in English) ["Based on three specimens, the first record of hawker dragonflies from Baltic amber is described in a new genus with two new species: *Elektrogomphaeschna peterthieli* gen. et sp. nov. and *E. annekeae* sp. nov.. They belong to the family Gomphaeschnidae and are tentatively attributed to the extinct subfamily Gomphaeschnaoidinae. The latter was previously only known from Cretaceous fossils and is here shown to have survived the K-Pg mass extinction event. This discovery also confirms the still higher diversity of Gomphaeschnidae during the Paleogene compared to the Neogene that was dominated by the more derived Aeshnidae sensu stricto." (Authors)] Address: Pinkert, S., Faculty of Biol., Department of Ecology – Animal Ecology, Philipps-Universität Marburg, Karl-von-Frisch-Strasse 8, 35043 Marburg, Germany. E-mail: StefanPinkert@posteo.de

**16575.** Polaskova, V.; Schenkova, J.; Bartosova, M.; Radkova, V.; Horsák, M. (2017): Post-mining calcareous seepages as surrogate habitats for aquatic macroinvertebrate biota of vanishing calcareous spring fens. *Ecological Engineering* 109, Part A: 119-132. (in English) ["Many studies have investigated the vegetation and terrestrial fauna of post-mining spoil heaps, but little is known about aquatic macroinvertebrates in these areas, particularly at spring-fed habitats. We studied nine seepages (i.e. spring-fed habitats) located at two neighbouring spoil heaps in the Sokolov brown-coal basin (Czech Republic),

characterised by basic water pH, calcium carbonate precipitation, high heavy metal and sulphate concentrations. Along with these nine artificial calcareous seepages, we also sampled macroinvertebrates at 15 natural and well-preserved calcareous spring fens to compare species richness and assemblage similarity between these two systems. We also categorised recorded species as spring specialists or generalists (i.e. matrix-derived species) to compare their importance for the similarity in diversity of these two habitat types. Our study revealed that post-mining calcareous seepages harboured unusually taxa-rich macroinvertebrate assemblages (158 taxa), despite their harsh conditions related to extreme water chemistry. Diptera, with 85 taxa, were the most diverse group, reaching taxon richness comparable with dipteran assemblages in natural calcareous spring fens. According to Sørensen pairwise dissimilarity, dipteran assemblages of postmining and natural sites were more similar in the composition of spring specialists than that of generalists, showing a strict relationship between specialist assemblages and specific environmental conditions of postmining and natural sites. In addition, dipterans inhabiting post-mining seepages were demonstrated not to be limited by their extreme water chemistry, but they seemed to be associated with specific substratum properties, creating a mosaic of various microhabitats. We can therefore conclude that calcareous post-mining seepages have great potential to offer valuable analogues of natural habitats and may create biodiversity refuges for a high number of aquatic invertebrates, including spring habitat specialists and nationally threatened species. Thus, post-mining seepages seem to have similar or even higher conservation potential to more complex and larger post-mining freshwater habitats, such as post-mining streams and mine subsidence pools." (Authors)] Address: Polášková, Vendula, Dept of Botany and Zoology, Faculty of Science, Masaryk Univ., Kotlářská 2, CZ-611 37 Brno, Czech Republic

**16576.** Polette, P.; Abbott, C.; Gouys, J.; Jenard, P.; Julian, P.; Darnaud, S.; Boudot, J.-P. (2017): Premières mentions de *Trithemis kirbyi* (Odonata: Libellulidae) en France. *Martinia* 33(1/2): 15-25. (in French, with English summary) ["During two months starting on 21 June 2017, *T. kirbyi* has been recorded from five localities in continental France, in perfect agreement with the heatwave which reached the whole of the country and nearby regions from 18 to 25 June. These observations are discussed in the light of the expansion and dispersion of the species in Europe, which began in 2003 in remote insular localities and knew further developments since 2007 on the continent. Thanks to its opportunistic behaviour and physiology allowing it to carry out a successful reproductive cycle in most of natural and artificial waterbodies, and its propensity to nomadism allowing it to take advantage of warm atmospheric flows going from Africa to Europe, the species did not take more than ten years to expand from the South to the North of the Iberian Peninsula and to reach France. Rather than a simple step by step expansion, the 2017 French records appear to constitute a long-distance vagrancy which may have reached a mean of 45-90 km per day during six days, favoured by unusual warm weather conditions on the west of Europe. These records deal mostly

with isolated males standing during several consecutive days at a constant place, which suggests that the involved individuals remained the same throughout in a given locality, pointing to an onset of settlement. The possible establishment of the species on the long run in southern France will have to be surveyed during the following years.] Address: Polette, P., Impasse des Amoureux, F-11250 Couffoulens, France. E-mail: p.polette@orange.fr

**16577.** Poulin, B.; Lefebvre, G.; Muranyi-Kovacs, C., Hilaire, S. (2017): Mosquito traps: An innovative, environmentally friendly technique to control mosquitoes. *Int. J. Environ. Res. Public Health* 2017, 14, 313: 8 pp. (in English) ["We tested the use of mosquito traps as an alternative to spraying insecticide in Camargue (France) following the significant impacts observed on the non-target fauna through Bti persistence and trophic perturbations. In a village of 600 inhabitants, 16 Techno Bam traps emitting CO<sub>2</sub> and using octenol lures were set from April to November 2016. Trap performance was estimated at 70% overall based on mosquitoes landing on human bait in areas with and without traps. The reduction of *Ochlerotatus caspius* and *Oc. detritus*, the two species targeted by Bti spraying, was, respectively, 74% and 98%. Traps were less efficient against *Anopheles hyrcanus* (46%), which was more attracted by lactic acid than octenol lures based on previous tests. Nearly 300,000 mosquitoes from nine species were captured, with large variations among traps, emphasizing that trap performance is also influenced by surrounding factors. Environmental impact, based on the proportion of non-target insects captured, was mostly limited to small chironomids attracted by street lights. The breeding success of a house martin colony was not significantly affected by trap use, in contrast to Bti spraying. Our experiment confirms that the deployment of mosquito traps can offer a cost-effective alternative to Bti spraying for protecting local populations from mosquito nuisance in sensitive natural areas." (Authors)] Address: Poulin, Brigitte, Tour du Valat Research Institute for the conservation of Mediterranean wetlands, Le Sambuc, 13200 Arles, France. E-mail: poulin@tourduvalat.org

**16578.** Prokop, J.; Pecharova, M.; Nel, A.; Hömschemeyer, T.; Krzeminska, E.; Krzeminski, W.; Engel, M.S. (2017): Paleozoic nymphal wing pads support dual model of insect wing origins. *Current Biology* 27: 1-7. (in English) ["Highlights: \*Palaeodictyopteran wing pad joints corroborate dual origin of insect wings. \*Three pairs of wing pads were medially articulated and markedly fused with notum. \*Wing pads were functionally unable to perform active flight due to limited divergence. \*Arrangement of wing pad axillary sclerites corresponds to Hamilton's ancestral model. The appearance of wings in insects, early in their evolution [1], has been one of the more critical innovations contributing to their extraordinary diversity. Despite the conspicuousness and importance of wings, the origin of these structures has been difficult to resolve and represented one of the "abominable mysteries" in evolutionary biology [2]. More than a century of debate has boiled the matter down to two competing alternatives—one of wings representing an extension of the thoracic notum, the other

stating that they are appendicular derivations from the lateral body wall. Recently, a dual model has been supported by genomic and developmental data [3–6], representing an amalgamation of elements from both the notal and pleural hypotheses. Here, we reveal crucial information from the wing pad joints of Carboniferous palaeodictyopteran insect nymphs using classical and high-tech techniques. These nymphs had three pairs of wing pads that were medially articulated to the thorax but also broadly contiguous with the notum anteriorly and posteriorly (details unobservable in modern insects), supporting their overall origin from the thoracic notum as well as the expected medial, pleural series of axillary sclerites. Our study provides support for the formation of the insect wing from the thoracic notum as well as the already known pleural elements of the arthropodan leg. These results support the unique, dual model for insect wing origins and the convergent reduction of notal fusion in more derived clades, presumably due to wing rotation during development, and they help to bring resolution to this long-standing debate.] Address: Prokop, J., Dept Zoology, Fac. Science, Charles Univ., Vinicná 7, 128 44 Praha 2, Czech Republic. E-mail: jprokop@natur.cuni.cz

**16579.** Prunier, F. (2017): Observaciones de odonatos en la sierra de Baza, verano 2017. Boletín Rola 10: 19-38. (in Spanish, with English summary) ["The paper presents the results of the first faunistic study of dragonflies undertaken in the Sierra de Baza Natural Park, one of the most arid area in Andalusia. The water bodies present in the park are described, the most relevant ones for Odonata being four permanent streams and various water tanks associated with natural springs. The sampling was carried out during summer 2017 and allows for the detection of 18 species, highlighting populations of *Aeshna cyanea* in lentic waters and *Coenagrion mercuriale* in lotic ones. Finally, samples of benthonic macro-invertebrates allowed to established the water quality of the streams and the associated dragonflies." (Author)] Address: Prunier, F., Asociación de Educación Ambiental El Bosque Animado / ROLA. E-mail: aeaebosqueanimado.info@gmail.com

**16580.** Punam, D.; Mitali, D.; Rezina, A. (2017): A study on aquatic insect diversity on some selected water bodies in Guwahati, Kamrup district, Assam. The Clarion 6(1): 18-22. (in English) ["The present study has generated qualitative and quantitative data of insects from selected habitats of Guwahati, Assam which were then assessed at the family level. Abundance and diversity of aquatic insects was studied in five water bodies, (four ponds and a beel) of Guwahati during 2013 to 2014 and insects belonging to 26 genera, under 17 families and 5 orders were recorded. From this study, it was observed that the most abundant order in all the water bodies is the order Ephemeroptera, followed by Odonata, Hemiptera and Diptera. During the study period abundance of insects was comparatively higher in Dighalipukhuri." (Authors)] Address: Punam, D., Bajali College, Pathsala, India. E-mail: punamjalideka@gmail.com

**16581.** Rafi, M.; Bhat, M.A.; Bhawsar, A.; Vyas, V. (2017): Distribution and abundance of odonates in Palakmati stream of Narmada River Basin. International Journal of Research

in Applied, Natural and Social Sciences 5(11): 127-132. (in English) ["During the present study, odonatan diversity of Palakmati stream was evaluated, using Shannon-Weiner diversity index and Margalef's richness index. Within a 100 m transect, encircling the variety of habitats, odonates were sampled from all the major habitats. A total of 11 species, belonging to 6 families of odonates were recorded, during the study. It was observed during the investigation that, aquatic vegetation forms the favorable habitat for odonates, while it gets negatively affected by the limited shade cover and less riparian vegetation, along the stream banks. During the present survey, low species diversity and richness of odonates were observed in Palakmati stream, possibly due to limited shade cover." (Authors)] Address: Rafi, M., Department of Environmental Sciences and Limnology, Barkatullah University

**16582.** Rajeshkumar, S.; Raghunathan, C.; Kailash Chandra (2017): *Nososticta nicobarica* sp. nov. (Odonata: Platycnemididae: Disparoneurinae) from Great Nicobar Island, India. Zootaxa 4311(3): 426-434. (in English) ["*Nososticta nicobarica* sp. nov. is described (holotype ♂: ZSI-ANRC-T-4418; 11.ii.2016) from Gandhi Nagar, Great Nicobar Island in the Andaman & Nicobar Islands, India. This is the first record for the genus *Nososticta* from the Indian sub-continent, and a formal description is given. The new species is described on the basis of male anal appendages, particularly cerci with a deeply bifurcate, acute apex, distinctly curved downward. Paraprocts almost straight with blunt apex slightly curved upward and inner margin with small, roughly rectangular hook. The female is characterised by the anterior lobe of the pronotum, which bears two long, divergent hornlike processes and a short posterior lobe with paired club-shaped processes. Affinities with species of Lesser Sundaic region are discussed." (Authors)] Address: Rajeshkumar, S., Zoological Survey of India, Andaman and Nicobar Regional Centre, Horticulture road, Haddo, Port Blair-744 102, Andaman & Nicobar Islands. E-mail: rajeshkumar0802@gmail.com

**16583.** Ramos, L.S.; Lozano, F.; Muzón, J. (2017): Odonata diversity and synanthropy in urban areas: A case study in Avellaneda City, Buenos Aires, Argentina. Neotropical Entomology 46(2): 144-150. (in English) ["The increase of human population, especially in urban areas, correlates with an alarming destruction of green spaces. Therefore, understanding the mechanisms by which urbanization processes affect biodiversity is crucial in integrating the environment in a proper urban planning. The main urban center of Argentina is known as the Greater Buenos Aires (GBA), and it includes the autonomous city of Buenos Aires and 24 surrounding districts. Avellaneda, one of the districts of the GBA, is an important urban and industrial center with green areas and low level of urbanization on the coastal area of the Río de la Plata. This paper provides the first Odonata inventory for Avellaneda, determines the species' level of synanthropy with the Nuorteva index, and assess the Odonata species replacement along a latitudinal gradient on the occidental margin of the Río de la Plata." (Authors)] Address: Muzón, J., Lab de Biodiversidad y Genética Ambiental (BioGeA), Univ Nacional de Avellaneda, Avellaneda, Argentina



- 16584.** Rathod, P.P.; Manwar, N.A.; Raja, I.A. (2017): Territory behavior, copulation and oviposition in *Brachythemis contaminata* Odonata: Libellulidae. *International Journal of Applied Research 3 Special Issue Part E*: 125-128. (in English) ["The present investigation explains the reproductive behavior i.e. territory, copulation and oviposition for *B. contaminata* which was carried out for a year between June 2013 to April 2014. The male plays significant role in mating as competing for fertilization by attracting females, but in odonates female also actively involving as taking mating decision, male selection and activities during tandem formation. Territory of mating male is well marked of about 2 to 3 meter in diameter and is at the same place of oviposition. Male prefer territory attachment as strategies of mutual avoidance which reduces energy spent in inter-male fight. Male-females are generally in group with high male ratio till evening and male become more careful and aggressive in evening for his territory. When receptive female visits to mate in male's territory she chooses the fittest male for mating. Male shows aggressiveness, wing vibration, abdominal display, chasing to competitor are the main events use for mating strategies. Copulation takes place in air for only few seconds and mating success for territorial male is high." (Authors)] Address: Rathod, P.P., Dept. of Zoology, Shri Shivaji College of Arts, Commerce and Science, Akola (M.S.), India
- 16585.** Reshetnikova, S.N.; Babkina, I.B.; Simakova, A.V.; Susliaev, V.V.; Blohin, A.N.; Interesova, E.A. (2017): Macrozoobenthos diversity of the Middle Ob river tributaries. *International Journal of Environmental Studies 74(5)*: 803-810. (in English) ["The data show quantitative and qualitative composition of macrozoobenthos of the 12 left-bank confluences of the Middle Ob. The research has documented the presence of various groups, such as Oligochaeta, Diptera, Odonata, Hirudinea, Tabanidae, Trichoptera and Mollusca. The chironomids, molluscs and leeches play a significant role in the generation of biomass in the surveyed streams, and the abundance mostly depends on chironomids, oligochaetes and leeches. In general, zoobenthos abundance ranges from 8.8 (the Shudelka river) to 1839.9 (the Kochebilovka river) ind./m<sup>2</sup>, biomass is from 0.08 (Tatosh river) to 8.37 (Lozunga river) g/m<sup>2</sup>. The amount and benthos biomass of the Middle Ob's second-order tributaries is higher than in the first-order tributaries." (Authors)] Address: Interesova, E.A., Novosibirsk branch of State Scientific-and-Production Centre of Fisheries, Novosibirsk, Russia. E-mail: tomsk.fish.science2gmail.com
- 16586.** Rodrigues, M.E.; Roque, F. (2017): Checklist de Odonata do Estado de Mato Grosso do Sul, Brasil. *Iheringia, Sér. Zool. 107(supl.)*: e2017117: 4 pp. (in English) ["We recorded 198 species of Odonata for the state of Mato Grosso do Sul, distributed in ten families: Calopterygidae (6 spp.), Coenagrionidae (58 spp.), Dictyrididae (1 sp.), Lestidae (5 spp.), Protoneuridae (10 spp.), Pseudostigmatidae (1 sp.), Aeshnidae (8 spp.), Corduliidae (1 sp.), Gomphidae (13 spp.), and Libellulidae (95 spp.), the first record of one family, six genus and 33 species for the state are included." (Authors)] Address: Rodrigues, M.E., Universidade Federal da Grande Dourados, Programa de Pós-graduação em Entomologia e Conservação da Biodiversidade, 79804-970, Dourados, MS, Brasil. E-mail: rodrigues.mbio@gmail.com
- 16587.** Rodríguez Esteban, M. (2017): Primeras citas de las libélulas *Lestes sponsa* (Hansemann, 1823), *Aeshna affinis* Vander Linden, 1820, *Trithemis annulata* (Palisot de Beauvois, 1807) y *Trithemis kirbyi* Selys, 1891 en la provincia de Salamanca (centro-oeste Península Ibérica) (Odonata: Lestidae, Aeshnidae, Libellulidae). *Boletín de la Sociedad Entomológica Aragonesa 61*: 223-226. (in Spanish, with English summary) ["This study provides the first records for Salamanca province (central-western Spain) referring at four dragonfly species, belonging to a diverse biogeographic composition." (Authors)] Address: Rodríguez Esteban, M., Avenida San Agustín, 44. Portal 1. 1º A. 37005. Salamanca (Salamanca), Spain. E-mail: resteban@usal.es
- 16588.** Rychla, A. (2017): Die Libellenfauna des Tongrubengebiets bei Gozdnica (SW Polen) mit besonderer Berücksichtigung von *Leucorrhinia caudalis* (Charpentier, 1840). *International Dragonfly Fund Report 109*: 1-16. (in German, with English and Polish summary) ["Waters of anthropogenic origin potentially represent a high value for the dragonfly fauna. For this reason, post mining waters were examined for dragonflies in a clay pit area near Gozdnica (Lubuskie Voivodeship, SW Poland) in 2017. The main goals of this study were the verification of the potential occurrence of *L. caudalis* in this area as well as the contribution of these water bodies to the regional dragonfly diversity. As a result of the investigation were two new records of *L. caudalis* with reproduction evidence at one water body and the observations of imagines at two sites. Additionally, two further species protected according to national and European law: *L. pectoralis* and *L. albifrons* were found in the area. Furthermore, the entire area is particularly suitable for pioneer colonizers such as *Ischnura pumilio* and *Libellula depressa*, as well as for thermophilous species such as *Orthetrum coerulescens* and *Crocothemis erythraea*. A total of 30 species of dragonflies were detected. For 16 species the proof of reproduction was provided. The examined water bodies are an important habitat for widespread generalists and for rare specialists. Therefore, they significantly contribute to the regional biodiversity." (Author)] Address: Rychla, Anna, ul. Osiedlowa 12, Ploty, 66-016 Czerwiensk, Poland. E-mail: an.rychla@gmail.com
- 16589.** Saha, S.K. (2017): Odonate (Insecta: Odonata) diversity of West Bengal State University Campus; a checklist and pictorial catalogue. *International Journal of Zoology Studies 2(5)*: 132-138. (in English) [Odonata "are amongst the most attractive creatures on earth, first to have conquered the aerial domain. Yet we know little of their diversity in India and detailed ecology and habitat preferences of many species are poorly documented. Although much work have been carried out regarding the abundance and distribution of insect orders, no sufficient effort has been made to study the diversity and distribution of Odonates. Thus, in the present study an attempt has been taken to study the diversity and abundance of Odonates in West Bengal State University (WBSU) campus, West Bengal, India. A total of 32 species of Odonates

were recorded from the study area from July to September, 2017. The family Libellulidae with 18 species was the most dominant among the Anisoptera followed by Gomphidae (1sp.) and family Aeshnidae (1 sp.). Among the Zygoptera, the 11 species recorded belong to the family Coenagrionidae and 1 species of family platycnemididae. As the area houses 32 species of Odonates including 20 species of Anisoptera and 12 species of Zygoptera, it can be presumed to have a good diversity which may be attributed to the grasslands, shrubs and small water bodies inside the campus." (Author)] Address: Saha, S.K., Dept of Zoology, West Bengal State Univ., Berunanpukuria, PO Malikapur, Kolkata, West Bengal, India

**16590.** Saito, V.; Senzaki, Y.; Yonezawa, C.; Chiba, K.; Jinguji, H. (2017): Assessment of mid-summer drainage regime on the potential for *Sympetrum frequens* conservation by using low threshold temperature and total effective temperature for development of larvae to 10th instar. *IDRE Journal* 304(85-1): 37-46. (in Japanese, with English summary) ["The aim of the present study was to clarify the effect of a mid-summer paddy field drainage regime on the conservation of *S. frequens*. We investigated the theoretical lower threshold temperature and total effective temperature required for *S. frequens* egg and larval development under laboratory conditions. The lower theoretical threshold temperature and total effective temperature for egg hatching under early, typical and late inundation conditions were 5.7°C and 55.2 degree-days, 5.6°C and 36.8 degree-days, and 6.8°C and 21.7 degree-days, respectively. The theoretical lower threshold temperature and total effective temperature for larval development to the 10th-instar stage were estimated at 5.6°C and 909.1 degree-days. We then estimated the water temperature in paddy rice fields in Miyagi Prefecture based on meteorological data represented on a 1-km grid. Mean days to hatching and days required for larval development to the 10th-instar stage were estimated based on the paddy field water temperature, theoretical lower threshold temperature, and total effective temperature. These results were then represented in a GIS to show the mean time to hatching in days and the time required for development of 10th-instar larvae. Finally, we compared the estimated time required for the development of 10th-instar larvae and the timing of mid-summer paddy field drainage. We considered that the drainage of paddy fields in mid-summer would be conducted before the development of 10th-instar larvae. Based on these findings, we consider that the adoption of a mid-summer drainage regime by rice farmers after *S. frequens* larvae development to 10th-instar stage would promote the conservation of this species. The risks associated with mid-summer drainage are also discussed." (Authors)] Address: Saito, V., Miyagi Univ., Graduate School of Food, Agricultural and Environmental Sciences, Japan

**16591.** Salmah, M.R.C.; Siregar, A.Z.; Hassan, A., Nasution, Z. (2017): Dynamics of aquatic organisms in a rice field ecosystem: effects of seasons and cultivation phases on abundance and predator-prey interactions. *Tropical Ecology* 58(1): 177-191. (in English) ["The influence of different rice growing seasons and rice cultivation phases on aquatic organisms was investigated in the Manik Rambung rice field (MRRF)

ecosystem in North Sumatera. Composite collections of core samples and aquatic net samples from four rice growing seasons and five cultivation phases (fallow, plough, transplanting-young, tiller, maturepreharvest) were analysed. There were marked seasonal variations in abundances of these organisms, but the abundance pattern in various rice cultivation phases was comparable among rice growing seasons. The rice field was dominated by tubificids, baetids, chironomids and ceratopogonids. High populations of these organisms were observed during the plough, transplanting-young, and tiller phases, but lower in the other rice cultivation phases. The proliferation of larval *Agriocnemis femina*, one of the rice pest predators in the adult stage, was dependent on its interactions with 14 aquatic taxa in different phases; nine taxa in the plough phase and three to five taxa in other phases. Hemipterans, coleopterans, other odonates, chironomids, baetids and tubificids were important for successful emergence of *A. femina* to a predatory adult. Rice cultivation managements that focus on enhancing the population of *A. femina* would contribute to more effective biological control of rice pests in MRRF." (Authors)] Address: Salmah, M.R.C., School of Biol. Sci., Univ. Sains Malaysia, 11800 Penang, Malaysia. E-mail: csalmah@usm.my

**16592.** Samraoui, B. (2017): The hand of man or Santa Rosalia's blessing? A rebuttal of the paper "on the restoration of the relict population of a dragonfly *Urothemis edwardsii* Selys (Libellulidae: Odonata) in the Mediterranean". *J. Insect Conserv.* 22: 345-350. (in English) ["The intentional reintroduction and translocation of animals and plants has, over the last few decades, become an integral part of the panoply of conservation tools. In a recent published paper in *J. Insect Conserv.* (doi: 10.1007/s10841-016-9911-9), Khelifa et al. (2016) claimed to have restored the last relict population of *U. edwardsii* in the Mediterranean. Here, I provide evidence that their claims are unwarranted, and that what has occurred is a natural process of colonisation by a Critically Endangered population which was confined to a single known site. In addition to several inaccuracies contained in the paper, I will demonstrate that the work was inappropriate and question the adopted methodology that may imperil the type population of *U. edwardsii*. I urge for the translocation initiative to be discontinued and discuss other safe approaches that may benefit the newly expanding population." (Author)] Address: Samraoui, B., Dept of Biology, University of Annaba, Annaba, Algeria

**16593.** Sanmartin-Villar, I.; Zhang, H.; Cordero-Rivera, A. (2017): Ontogenetic colour changes and male polymorphism in *Mnais andersoni* (Odonata: Calopterygidae). *International Journal of Odonatology* 20(2): 53-61. (in English) ["Colour-based traits are widespread in flying species due to the importance of visual perception in their communication. Ontogenetic colour changes and reversible physiological colours occur in some species and are used as communication signals to conspecifics. The genus *Mnais* (Zygoptera: Calopterygidae) shows both genetic colour polymorphism and age-related colour changes, making challenging even the identification of species. Here we study three Chinese populations of *M. andersoni* during one month by mark-resighting methods. We describe the ontogenetic body and wing colour changes

of male morphs (orange-winged and hyaline-winged) and females. With maturity, thoracic colour changes from metallic green to copper. The initially transparent wings of the hyaline winged males and females became light amber with age, while the orange-winged males show this colour since emergence to maturity. Whitish pruinosity covered all thorax in orange-winged males, while it remained limited to the ventral part of the thorax in hyaline-winged males and females. Hyaline-winged males presented less abdominal pruinosity than the rest of individuals. Our observations suggest that male morphs of *M. andersoni* are analogous to other species of the genus." (Authors)] Address: Sanmartín-Villar, I., ECOEVO Lab, Universidade de Vigo, Escola de Enxeñaría Forestal, Campus A Xunqueira, 36005 Pontevedra, Galiza, Spain.

**16594.** Sanmartín-Villar, I.; Rivas-Torres, A.; Gabela-Flores, M.V.; Encalada, A.C.; Cordero-Rivera, A. (2017): Female polymorphism and colour variability in *Argia oculata* (Coenagrionidae: Zygoptera). *Neotropical Biodiversity* 3(1): 203-211. (in English) ["Body colouration frequently possesses a communicative function, particularly in species with colour polymorphism and developed visual systems as odonates, and also affects the conspicuousness of animals in relation to the background. Therefore, these factors can influence colour evolution and its development. The ecology and ethology of *A. oculata* were studied in three populations with different degrees of habitat alteration. Three different sources of colour variability were found: female polymorphism, female ontogenetic change and daily change in both sexes. All males observed presented the same blue thoracic colouration pattern, without ontogenetic changes. Some of them (6–48%, variable between populations) showed a darkening of the thorax colouration in the afternoon. The frequency of androchrome females (male-like thoracic colouration) showed a negative relationship with human habitat disturbance. These females changed their body colour from bluish to brownish at old ages. Gynochrome females started their adult life with sky-blue thorax, which turned to olive green and finally to brown with sexual maturation. One gynochrome female returned to the immature colouration in late hours of the day. Colour changes were apparently not associated to sunlight intensity or temperature. Behavioural observations suggest that colour variability in females might contribute to reduce or avoid male harassment. We contextualise our findings in the *Argia* literature and propose physiological and evolutionary mechanisms for their explanation." (Authors)] Address: Sanmartín-Villar, I., ECOEVO Lab, Univ. de Vigo, Escola de Enxeñaría Forestal, Campus A Xunqueira, Pontevedra, Spain. E-mail: sviago@gmail.com

**16595.** Sasamoto, A.; Futahashi, R. (2017): What are Bartenev's (1930) forgotten Japanese species »*Gomphus acutus*« and »*Gomphus excavatus*« (Odonata: Gomphidae)? *Notulae odonatologicae* 8(9): 319-325. (in English) ["The true identities of *G. acutus* and *G. excavatus*, two forgotten taxa named from Japan, are discussed. *G. acutus* is ranked as a junior synonym of *Trigomphus melampus* (Selys, 1869) (syn. nov.). The earlier proposed synonymy of *G. excavatus* with *Asiagomphus pryleri* (Selys, 1883) is confirmed." (Authors)] Address:

Sasamoto, A., 1 531-3 Oh Tawaramoto-cho, Shiki-gun, Nara pref. 636-0345 Japan. E-mail: akssmt@sea.plala.or.jp

**16596.** Savard, M.; Larochelle, M.; Perron, J.-M. (2017): Découverte de la cordulie tricoteuse (*Somatochlora filosa*) au Canada et reconsidération de la cordulie linéaire (*Somatochlora linearis*) au Québec, deux espèces rhéophiles de libellules. *Le Naturaliste canadien* 141(2): 42-52. ["The collection of a nymph of *S. filosa* on September 7, 2016 in Sainte-Catherine-de-Hatley, in the Estrie region of Québec, provides the first record of this species for Canada. The breeding habitat of *S. filosa* in North America is poorly known, and is reported here for only the second time. The unexpected discovery of a relic population, 575 km north of its previously known range, raises questions concerning the original composition of the odonatological fauna of the hardwood forest subzone of Québec – an ecosystem that has been considerably altered since human colonization of the area and the exploitation of natural resources. In addition, during the present study, *S. linearis* specimen collected by Léon Provancher in Saint-Hyacinthe in 1877 was authenticated, and the species reinstated to the list of Odonata of Québec. Finally, it is suggested that 3 other rheophilic emerald species could inhabit forest springs and streams in the southern part of the province." (Authors)] Address: Michel Savard. E-mail: michel.savard@ssss.gouv.qc.ca

**16597.** Schädel, M.; Lechner, T.S. (2017): Two new dragonflies (Odonata: Anisoptera) from the Miocene of Carinthia (Austria). *Zootaxa* 4243(1): 153-164. (in English) ["Two new species of fossil dragonflies from the Middle Miocene fossil site Schaßbach (Carinthia, Austria) are described. The presence of *Gomphaeschna carinthiae* sp. nov. and *Ictinogomphus hassleri* sp. nov. in the fossil record of Central Europe confirms the scenario of a more widespread distribution of the represented genera in the Miocene in contrast to their Recent distribution." (Authors)] Address: Schädel, M., Dept of Evolutionary Biology of Invertebrates, Univ. of Tübingen, Auf der Morgenstelle 28E, 72076 Tübingen, Germany. E-mail: mario.schaedel@student.uni-tuebingen.de

**16598.** Schiel, F.-J.; Hunger, H. (2017): Ausbreitung von *Aeshna isoceles* in der südlichen Oberrheinebene (Odonata; Aeshnidae). *Mercuriale* 17: 37-46. (in German, with English summary) ["Expansion of *A. isoceles* into the southern part of the Upper Rhine valley: We report an apparent range expansion of *A. isoceles* in the German part of a 150 km long section of the Upper Rhine valley ranging from Rastatt in the north to Basel in the south. Only five records of this species are documented from the whole 20th century. Since 2006, however, the species has been reported from 34 waters. *A. isoceles* reproduced in at least eight of these waters. We compare our data with the development in the German land of Baden-Württemberg and in Germany and discuss the findings shortly in the context of current climate warming.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de



**16599.** Schiel, F.-J.; Salcher, M.; Förschler, M. (2017): Libellen im Nationalpark Schwarzwald (Odonata). *Mercuriale* 17: 27-36. (in German, with English summary) ["Odonata in the Black Forest National Park - The Black Forest National Park is situated in the northern Black Forest between the cities of Baden-Baden and Freudenstadt. It was founded in 2014. Altitudes in the Park range from 470 to 1,151 m a.s.l. with an average altitude above 800 m a.s.l. The Park area is characterized by extensive forests growing on poor soils that have developed mainly on red sandstone formations. With a mean annual temperature of 5°C and a mean precipitation of 2,200 mm, the climate in this part of the Black Forest is rough and wet. 25 species of Odonata have been recorded in the National Park area so far, with 20 of them being resident. Six species are confined to small and fish-free peat bog water bodies: *Coenagrion hastulatum*, *Aeshna juncea*, *A. subarctica*, *Somatochlora alpestris*, *Leucorrhinia dubia* and *Sympetrum danae*. *Somatochlora alpestris* is restricted to small semipermanent water bodies in the wet heathlands called "Grinden". These evolved on the mountain ridges since the Middle Ages through grazing with cattle, sheep and goats. In Southwestern Germany, *S. alpestris* occurs exclusively in the Black Forest at altitudes from about 1,000 m a.s.l. One of its distribution centres is in the young National Park. The most common kind of water body in the Park are streams and rivulets that are inhabited by both *Cordulegaster bidentata* and *C. boltonii*. Population densities of both species are low due to the rough climate, the very dynamic runoff and the nutrient-poor, acidic bedrock in the area." (Authors)] Address: Förschler, M., Nationalparkverwaltung Schwarzwald, Kniebisstr. 67, 77740 Bad Peterstal-Griesbach, marc.foerschler@nlp.bwl.de

**16600.** Schlemmer Brasil, L.; Vieira, T.B.; Oliveira-Junior, J.M.; Dias-Silva, K.; Juen, L. (2017): Elements of metacommunity structure in Amazonian Zygoptera among streams under different spatial scales and environmental conditions. *Ecology and Evolution* 7(9): 3190-3200. (in English) ["An important aspect of conservation is to understand the founding elements and characteristics of metacommunities in natural environments, and the consequences of anthropogenic disturbance on these patterns. In natural Amazonian environments, the interfluvies of the major rivers play an important role in the formation of areas of endemism through the historical isolation of species and the speciation process. We evaluated elements of metacommunity structure for Zygoptera sampled in 93 Amazonian streams distributed in two distinct biogeographic regions (areas of endemism). Of sampled streams, 43 were considered to have experienced negligible anthropogenic impacts, and 50 were considered impacted by anthropogenic activities. Our hypothesis was that preserved ("negligible impact") streams would present a Clementsian pattern, forming clusters of distinct species, reflecting the biogeographic pattern of the two regions, and that anthropogenic streams would present random patterns of metacommunity, due to the loss of more sensitive species and dominance of more tolerant species, which have higher dispersal ability and environmental tolerance. In negligible impact streams, the Clementsian pattern reflected a strong biogeographic pattern, which we discuss considering the areas of endemism of Amazonian rivers. As for communities in human-

impacted streams, a biotic homogenization was evident, in which rare species were suppressed and the most common species had become hyper-dominant. Understanding the mechanisms that trigger changes in metacommunities is an important issue for conservation, because they can help create mitigation measures for the impacts of anthropogenic activities on biological communities, and so should be expanded to studies using other taxonomic groups in both tropical and temperate systems, and, wherever possible, at multiple spatial scales." (Authors)] Address: Schlemmer Brasil, L., Programa de Pós Graduação em Ecologia e Conservação, Univ.do Estado de Mato Grosso – UNEMAT, CEP 78690-000, Nova Xavantina, MT, Brazil. E-mail: brasil\_biologia@hotmail.com

**16601.** Schneider, T.; Ikemeyer, D.; Ferreira, S.; Müller, O. (2017): *Gomphus kinzelbachi* Schneider, 1984, in Iran: identification, habitat and behaviour (Odonata: Gomphidae). *Zootaxa* 4216(6): 572-584. (in English) ["*G. kinzelbachi* was described on the basis of a single teneral male captured by B. L. Sage on the Alwand River in eastern Iraq. In late April to early May 2016 two of the authors (TS and DI) discovered three individual-rich populations of this species on the large lowland river Karkeh in southwestern Iran (Khuzestān). This is the first report of a breeding population of this species. Based on collected material we confirmed the structural differences of the male secondary genitalia between *G. kinzelbachi* and *G. davidi* on a larger number of animals. The female of the species is described. *G. kinzelbachi* resembles most closely *G. davidi*, compared to all other West-Palaearctic *Gomphus* species. Therefore, a direct comparison of the two species is given, and additionally some differential diagnostic hints for two other *Gomphus* species reported from Iran is provided. Our observations suggest that *G. kinzelbachi* reproduces on large clean lowland rivers in SE Iraq and SW Iran. In SW Iran only a free flowing stretch of the Karkeh, one of three parallel rivers (Karkeh, Karoon, Dez), seems to be suitable for this species. The other two rivers are affected by dams, dam construction, and increasing salinization. Additional dam constructions are also planned on the Karkeh River, thus, *G. kinzelbachi* may be on the brink of extinction." (Authors)] Address: Schneider, T., Arnold-Knoblauch-Ring 76, 14109 Berlin-Wannsee, Germany. E-mail: thomas.rs@gmx.de

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2017

**16603.** Schneider, T.; Schneider, E.; Ikemeyer, D.; Seidenbusch, R.; Müller, O. (2017): Description of last instar larva of *Gomphus kinzelbachi* Schneider, 1984 and new aspects on distribution and habitats in Iran (Odonata: Gomphinae). *Zootaxa* 4365(4): 455-466. (in English) ["*G. kinzelbachi* was described on the basis of a single teneral male captured by B. L. Sage on the Alwand River in eastern Iraq. A detailed re-description of the male and description of the female were published recently. However, the larva of the species has remained unknown so far. In late April 2017 two of the authors (ES & TS) discovered freshly emerged *G. kinzelbachi*, some of them still on their exuviae, on the upper part of the Zoreh River in southwest Iran (Khuzestān). Larvae ready to emerge were observed leaving the water and climbing reed stalks. The development from last instar larvae to freshly emerged *G. kinzelbachi* was observed, some until maiden flight. Five exuviae and two freshly emerged males were collected for further identification and description. Male and female exuviae of *G. kinzelbachi* are described and compared with exuviae of *G. schneiderii* Selys, 1850, from Mazandarān province in Iran. Furthermore, a key is provided to determine the exuviae of four Iranian species belonging to the subfamily Gomphinae: *Gomphus kinzelbachi*, *G. schneiderii*, *Stylurus ubadschii* (Schmidt, 1953), and *Anormogomphus kiritshenkoi* Bartenev, 1913. In addition, the eastern Mediterranean *Gomphus davidi* Selys, 1887, is included in the comparison, because it seems to be the sister species of *G. kinzelbachi*. During the trips to Iran in 2017 eight new populations of *G. kinzelbachi* on different stretches of the river systems of Marun, Zoreh, Dalaki, Alwand, and Abi Zinkan were detected, enlarging the known range and habitat requirements significantly. The flight period of *G. kinzelbachi* in Iran is also discussed." (Authors)] Address: Schneider, T., Arnold-Knoblauch-Ring 76, 14109 Berlin-Wannsee, Germany. E-mail: thomas.rs@gmx.de

**16604.** Seehausen, M. (2017): Survey of Odonata from Timor Island, with description of the female of *Anax georgius* (Odonata: Aeshnidae). *Faunistic Studies in SE Asian and Pacific Island Odonata* 20: 1-34. (in English) ["The survey is based

on specimens held at Museums in Australia, Belgium and Germany. Altogether 487 specimens of 31 species from Timor were examined. These include: a recent collection from Timor-Leste of 148 specimens (25 species) at the Australian Museum Sydney, an historic collection from West Timor consisting of 338 specimens (20 species) of the ex-collection Eugène Le Moult, stored at the Institut Royal des Sciences Naturelles de Belgique in Brussels, and a single specimen from West Timor of the Coll. Ris stored at the Senckenberg Naturmuseum Frankfurt, Germany. The following nine species are reported from Timor for the first time: *Agriocnemis pygmaea*, *Austroallagma sagittiferum*, *Ischnura heterosticta*, *Xiphiagrion cyanomelas*, *Crocothemis servilia*, *Neurothemis ramburii*, *Orthetrum pruinosum* cf. *schneideri*, *Potamarcha congener* and *Zyxomma obtusum*. The female of *Anax georgius* is described and illustrated. An illustrated key to the *Anax* species of the Lesser Sunda Islands is given and specimens from the Lesser Sunda Islands formerly identified as *Anax gibbosulus* are considered to be *A. panybeus*. Some characters of the *O. pruinosum* taxa group of species, *Tramea stenoloba* and female *Z. obtusum* are discussed. Figures of the male appendages and genital ligulae of *A. sagittiferum*, *Aciagrion fragile* and *X. cyanomelas* are provided, as well as figures of the male secondary genitalia, appendages and the penis of *Trithemis lilacina* and the male appendages of *Epophthalmia vittigera*. A preliminary checklist for Timor including 36 species is given." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich Ebert Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museumwiesbaden.de

**16605.** Seehausen, M. (2017): *Indolestes lafaeci* sp. nov. (Odonata: Lestidae) from Timor, with comparisons to related species. *Zootaxa* 4244(1): 79-90. (in English) ["*I. lafaeci* sp. nov. is described and illustrated (holotype ♂: vi.1929, Soe, South Central Timor Regency, West Timor, Indonesia, ex.-Coll. Le Moult; deposited at the Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium). *Indolestes insularis* comb. nov. is proposed. For comparison, illustrations of the head, synthorax, male anal appendages and genital ligula as well as of the ovipositor of *I. bellax*, *I. gracilis* and *I. insularis* are given." (Author)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2,

65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**16606.** Seehausen, M.; Theischinger, G. (2017): *Nososticta impercepta* sp. nov. (Odonata: Platycnemididae) from Timor, with a key to the Sundaic species. *Zootaxa* 4250(3): 262-274. (in English) ["*N. impercepta* sp. nov. is described and illustrated (holotype ♂: 28.vi.1911, Niki-Niki [South Central Timor Regency], Timor, Indonesia, C.B. Haniel leg., Coll. Ris, No. 2477; deposited at the Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main, Germany). An illustrated key for the species of *Nososticta* known from the Lesser Sunda Islands is given. The occurrence of *N. selysi* in Timor is considered to be doubtful. *Nososticta* emphylla is newly recorded from Sumbawa Island." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**16607.** Seehausen, M. (2017): Nomenclature and status of the *Neurothemis tullia* complex of species (Odonata: Libellulidae). *Odonatologica* 46(1/2): 119-136. (in English) ["Continental and Javanese specimens of the *N. tullia*-group were studied with an emphasis on wing color pattern and structure of the median process of the vesica spermalis. Continental *N. tullia* consists of two main variants: one well-known with a variable white wing pruinescence and a dry season variant in which it is lacking. The type of *Libellula equestris* var. *feralis* represents a distinct Javanese species, thus *N. feralis* is raised from being a subspecies of *N. tullia* to a full species. The variations of the wings as well as the median process of the vesica spermalis of both species are illustrated."] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**16608.** Seidel, M.; Voigt, M.; Langheinrich, U.; Hoge-Becker, A.; Gersberg, R.M.; Arévalo, J.R.; Lüderitz, V. (2017): Re-connection of oxbow lakes as an effective measure of river restoration. *Clean. SoilAirWater* 45(3). 1600211: (in English) ["Six years after re-connection of an oxbow lake from periodically to permanently connected to the main channel, the restoration success was assessed. This permanently connected oxbow lake was compared with the main channel of the Elbe River and with a periodically connected oxbow lake by means of comparisons of the aquatic macroinvertebrates, fish and aquatic macrophyte communities. The permanently connected oxbow was suited as important replacement habitat for riverine invertebrates, especially for clubtails (Odonata) and unionid mussels (*Bivalvia*). The periodically connected oxbow lake was colonized by typical species for shallow lakes. As expected, riverine species did not occur. Meanwhile, the invertebrate community in the main channel was poor and dominated by invasive species (*Dikerogammarus villosus*, *Dreissena polymorpha*). The results concerning fish showed a clear dominance of the rheophilic species spined loach (*Cobitis taenia*) in the permanently connected oxbow lake and of the indifferent species roach (*Rutilus rutilus*) and European perch (*Perca fluviatilis*) in the periodically connected oxbow lake.

However, species number was highest in the main channel. For macrophytes, quantity, number of taxa and growth forms and diversity were lower in the permanently compared to the periodically connected oxbow lake. In conclusion, the re-connection of oxbow lakes to main channels can be an important measure for native species conservation, especially macroinvertebrates, and hence for the implementation of the Water Framework Directive." (Authors)] Address: Seidel, M., Univ. Appl. Sci. Magdeburg-Stendal, Breitscheidstraße 2, Dept of Water & Waste Management, 39114 Magdeburg, Germany. E-mail: Michael.Seidel@hs-magdeburg.de

**16609.** Shahzad, A.; Hamdani, H.R.; Aizaz, A. (2017): Investigation of corrugated wing in unsteady motion. *Journal of Applied Fluid Mechanics* 10(3): 833-845. (in English) ["Delayed stall is the most dominant lift enhancing factor in insect flapping motion. Micro air vehicle operates at Reynolds number 104-105; slightly higher than the insects' Reynolds number (Re). In the present research, the focus is to investigate "stall-absent" phenomenon at Re representative of the micro air vehicles, the effect of spanwise flow on the leading edge vortex and also to study the effect of geometry variations on the aerodynamic performance of the wing in unsteady motion. Corrugated dragonfly airfoil with rectangular wing planform is used, however, with wing kinematics restricted to azimuth rotation only. Three-dimensional finite volume method is used, through commercial software Fluent, to numerically solve time-dependent incompressible Navier-Stokes equations. Computed results at Re 34000 and 100,000 reveal the same phenomenon of delayed stall, as observed in the case of insects. Furthermore, the performance of flat plate, profiled and corrugated wing in a sweeping motion at a high angle of attack is also compared." (Authors)] Address: Aizaz, A., Research Centre for Modelling & Simulation, National Univ. Sci. & Tech., Pakistan. E-mail: ahmadaizaz@cae.nust.edu.pk

**16610.** Shapoval, N.A.; Shapoval, A.P. (2017): Annotated checklist of the dragonflies (Insecta: Odonata) of the Kaliningrad region, north-western Russia. *Ukrainian Journal of Ecology* 7(4): 157-168. (in English) ["The first comprehensive surveys on Odonata were made more than 100 years ago, at the beginning of 20th century by La Baume (1908) and especially by Le Roi (1911) and included 50 species. In the following years, no significant publications which particularly address faunistic and taxonomic studies related to the Kaliningrad region were published. Here we present the first modern, most complete checklist of the dragonflies of the Kaliningrad region with notes on the species composition, abundance, and periods of local flight and seasonal migrations. The current checklist is based on data collected by the authors on the Courish Spit (Kaliningrad region, Russia) in 2007-2016. In total, 278 955 specimens belonging to 57 species were recorded. Additional 7 species are included in the list based on the literature data. Thus, the number of species known for the territory of the Kaliningrad region has risen to 64." (Authors)] Address: Shapoval, N.A., Dept of Karyosystematics, Zoological Institute of Russian Academy of Sciences, Universitetskaya nab. 1, St. Petersburg 199034, Russia. E-mail: nazaret@bk.ru



**16611.** Sharma, G. (2017): Studies on the reproductive behaviour of dragonfly, *Pantala flavescens* (Fabricius, 1798) (Odonata: Insecta: Arthropoda) in Aravalli range and desert ecosystem of Rajasthan, India. *Bio Bulletin* 3(1): 67-73. (in English) ["The reproductive behaviour of *P. flavescens* was studied in different localities of Aravalli Range and Desert Ecosystem of Rajasthan during 2008-15. Courtship is well marked and male demonstrate a circular territory with a radius of about 4-6 meters and defended it from the intruding intra or some inter specific male by chasing it away or by warning signals like wing vibration or abdomen raising. As female entered into the territory, the male starts following her and forms a tandem link, catching hold of her prothorax by his anal appendages. The before wheel tandem lasted for 10-40 seconds and during this period intramale sperm translocation is not observed. The male forced female to form courtship wheel. The courtship wheel lasts for about 70 seconds to 3 minutes and is performed in air above water body. The courtship wheel breaks and in tandem position the female oviposit exophytically on the surface of water and it lasts for 60 seconds to 2 minutes. During oviposition the male in tandem and after release of grip hovers around the female, to defend her from intruding intra or inter specific males. The total duration of reproductive behaviour lasts for 3-6 minutes." (Author)] Address: Sharma, G., Zoological Survey of India, High Altitude Regional Centre, Saproon, Solan, (Himachal Pradesh), India 173211. E-mail: drgaurav.zsi.india@gmail.com

**16612.** Shi, L.; Cshen, R.-R.; Han, Y.; Gao, X.-F.; Chen, C.; Chen, Y.; Zhu, X.-X.; Tian, M.-q.; Sun, W.-J.; Jin, C.-Y.; De, C.-Q. (2017): A preliminary survey of species diversity of the freshwater insects in Inner Mongolia. *Acta Entomologica Sinica* 60(12): 1467-1480. (in Chinese, with English summary) ["[Aim] This study aims to provide the basic scientific data of aquatic insect species in Inner Mongolia and a solid base for their potential application in freshwater quality monitoring and protection by the government and scientists in the future. [Methods] Benthic aquatic insects were sampled by using a qualitative collection method and the water quality was assessed by the family biotic index (FBI), EPT species richness and Shannon-Wiener biodiversity index. [Results] Of 187 freshwater insect species in 72 genera, 59 families, 7 orders collected in the 52 localities, 1 species was new to science; 2 families, 3 genera and 25 species were newly recorded in Inner Mongolia; 1 genus and 2 species were recorded for the first time in China; and 56 additional species are under identification. The diversity of Trichoptera and Ephemeroptera were the highest while that of Plecoptera was the lowest in recorded 7 orders; the proportions of families and individuals of the two orders accounted for 42.37% and 84.29%, respectively, so Trichoptera and Ephemeroptera are dominant groups among the seven orders. The localities of rich species diversity were distributed mainly in the eastern Inner Mongolia, including Hulunber, Hinggan League, Tongliao and Chifeng. The water quality ranks assessed by the family biotic index, EPT species richness and Shannon-Wiener biodiversity index showed that the evaluation results of FBI and EPT species richness were similar, but differed greatly from that of Shannon-Wiener biodiversity index. [Conclusion] There are more abundant species of Trichoptera and

Ephemeroptera with lower tolerance value in Inner Mongolia, so the caddisflies and mayflies are more suitable and better candidates as indicators of water quality in this region." (Authors)] Address: Li, C., College of Agronomy, Inner Mongolia Agricultural University Hohhot 010019 China. E-mail: lirui2003@imau.edu.cn

**16613.** Shumway, N.; Gabryszuk, M.; Laurence, S. (2017): Abstract: L18.00008: Comparing the aerodynamic forces produced by dragonfly forewings during inverted and non-inverted flight. *Bulletin of the American Physical Society, 70th Annual Meeting of the APS Division of Fluid Dynamics. Sunday–Tuesday, November 19–21, 2017; Denver, Colorado:* (in English) [Verbatim: Experiments were conducted with live dragonflies to determine their wing kinematics during free flight. The motion of one forewing in two different tests, one where the dragonfly is inverted, is described using piecewise functions and simulated using the OVERTURNS Reynolds-averaged Navier-Stokes solver that has been used in previous work to determine trim conditions for a fruit fly model. For the inverted dragonfly the upstrokes were significantly longer than the downstrokes, pitching amplitude is lower than that for the right-side up flight and the flap amplitude is larger. Simulations of dragonfly kinematics of a single forewing are presented to determine how the forces differ for a dragonfly flying inverted and a dragonfly flying right-side up.]

**16614.** Siesa, M.E. (2017): *Le libellule delle Alpi - Come riconoscerle, dove e quando osservarle.* Blu Edizioni: 240 pp. (in Italian)]

**16615.** Sigutová, H.; Harabis, F.; Hykel, M.; Dolný, A. (2017): Motorway as a barrier to dispersal of the threatened dragonfly *Sympetrum depressiusculum* (Odonata: Libellulidae): Consequence of mortality or crossing avoidance? *Eur. J. Entomol.* 114: 391-399. (in English) ["Infrastructure is one of the main causes of landscape fragmentation, which results in isolation and loss of populations. Although the negative effect of roads on insects is well documented, only a minority of studies has focused on roads in the context of barriers to dispersal. Flying species in particular have been neglected. We investigated the effect of a four-lane motorway as a barrier to the movement of an isolated population of the threatened dragonfly *S. depressiusculum* in an agricultural landscape in Central Europe. Generalized additive models were used to assess the motorway's effect on (i) the distribution of adult dragonflies in patches of terrestrial habitat surrounding their natal site, and (ii) individual flight behaviour (i.e. willingness or unwillingness to cross the motorway). Movement patterns of marked adults throughout the landscape were also investigated. During one season, significantly fewer adults were found at patches located on the far side of the motorway, indicating it has a barrier effect. Observations on flight behaviour revealed no apparent effect of the motorway. The possible barrier effect for the species studied was therefore presumed to be a consequence of road mortality. Our results indicate that the motorway may influence the dispersal of this threatened species of dragonfly, which is a habitat specialist with particular requirements for its terrestrial environment. Negative effects

on other species with similar behaviour and strategy can be presumed. When establishing new habitats, carrying out re-introductions or translocations, it is necessary to consider that roadways may reduce population size and affect population dynamics by limiting dispersal." (Authors)] Address: Šigutová, Hana, Dept of Biology & Ecology, Faculty of Science, Univ. of Ostrava, Chittussiho 10, 710 00 Ostrava, Czech Republic. E-mail: sigutova.hanka@gmail.com

**16616.** Simon, E.; Kis, O.; Jakab, T.; Kolozsvári, I.; Málnás, K.; Harangi, S.; E. Baranyai, E.; Miskolczi, M.; Tóthmérész, B.; Dévai, G. (2017): Assessment of contamination based on trace element concentrations in *Gomphus flavipes* (Odonata: Insect) larvae of the Upper Tisza Region. *Ecotoxicology and Environmental Safety* 136: 55-61. (in English) ["Highlights: • Dragonfly larvae are frequently used to assess the contamination level of aquatic systems. • The aim of our study was to assess the contamination in the Upper Tisza Region. • Trace element concentrations of *Gomphus flavipes* larvae were studied. • Significant differences were found in trace element concentrations of dragonfly larvae among studied localities. • Our results indicated a continuous pollution of studied rivers. Abstract: Odonata larvae are frequently used to assess the contamination of aquatic systems, because they tolerate a wide range of chemical and biological conditions in freshwater systems. In early 2000, the sediments of the Hungarian section of the River Tisza and the River Szamos were strongly enriched with heavy metals by an accidental mining spill. Earlier studies demonstrated higher contamination levels in the Szamos than in the Tisza, based on sediment analysis. The aim of our study was to assess the contamination in the Upper Tisza Region, along the upper reach of the Tisza, and the lower reach of the Szamos, based on the trace element concentrations of the *Gomphus flavipes* larvae. We collected 269 dragonfly specimens for the analyses. The Al, Ba, Cr, Cu, Fe, Mn, Pb, Sr and Zn element contents were analysed in the dragonfly larvae by microwave plasma atomic emission spectrometry (MP-AES). Significantly higher Ba and Cu concentrations were found in the dragonfly larvae of the Tisza than the Szamos. In spite of this, the Cr, Mn, Pb, Sr and Zn concentration was significantly lower in the dragonfly larvae of the Tisza than the Szamos. For all trace elements significant differences were found along the Tisza. Significant differences were also found in all trace element concentrations of dragonfly larvae among studied localities in the Szamos, except in the cases of Al and Ba. Our results demonstrated that the Szamos was more contaminated with Cr, Mn, Pb, Sr and Zn than the Tisza, but that the Tisza was more contaminated with Ba and Cu than the Szamos, based on the trace element concentrations in *Gomphus flavipes* larvae, which was likely to have been caused by the tributaries of the Tisza. In summary, our results indicated a continuous pollution of the Tisza and the Szamos and their tributaries." (Authors)] Address: Simon, Edina, Dept of Ecology, Univ. Debrecen, Debrecen, Egyetem sq. 1, H-4010, Hungary. E-mail: edina.simon@gmail.com

**16617.** Sobolev, N.A.; Volkova, L.B. (2017): *Lindenia tetraphylla* (Vander Linden, 1825) (Insecta: Odonata: Gomphidae) dragonfly as a target object of the Emerald Network. *Biology*

and Ecology 2017(3): 59-66. (in Russian, with English summary) ["Here we report the data on *L. tetraphylla* in Eastern Europe for assessing the sufficiency of the Emerald Network alone to save it. Although existing protected areas are sufficient to protect the species, the diversity of protected habitats should be extended." (Authors)] Address: Volkova, L.B., Severtsov Institute of Ecology & Evolution RAS, Moscow, Russia

**16618.** Start, D.; Kirk, D.; Shea, D.; Gilbert, B. (2017): Cannibalism by damselflies increases with rising temperature. *Biology Letters* 13(5): 4 pp. (in English) ["Trophic interactions are likely to change under climate warming. These interactions can be altered directly by changing consumption rates, or indirectly by altering growth rates and size asymmetries among individuals that in turn affect feeding. Understanding these processes is particularly important for intraspecific interactions, as direct and indirect changes may exacerbate antagonistic interactions. We examined the effect of temperature on activity rate, growth and intraspecific size asymmetries, and how these temperature dependencies affected cannibalism in *Lestes congener*, a damselfly with marked intraspecific variation in size. Temperature increased activity rates and exacerbated differences in body size by increasing growth rates. Increased activity and changes in body size interacted to increase cannibalism at higher temperatures. We argue that our results are likely to be general to species with life-history stages that vary in their temperature dependencies, and that the effects of climate change on communities may depend on the temperature dependencies of intraspecific interactions." (Authors)] Address: E-mail: denon.start@mail.utoronto.ca

**16619.** Subramanian, K.A.; Babu, R. (2017): A Checklist of Odonata (Insecta) of India, Version 3.0. Zoological Survey of India, Southern Regional Centre, 130, Santhome High Road, Chennai-600 0028, www.zsi.gov.in: 54 pp. (in English) ["Odonata are key components of wetland ecosystem. Odonata of India is represented by 488 species and 27 subspecies in 154 genera and 18 families. The Suborder Zygoptera comprise of 211 species under 59 genera and 9 families; Anisozygoptera one species under one genera and one family; Anisoptera 276 species under 94 genera and 8 families. One species in Zygoptera is considered as incertae sedis. High diversity and endemism is found in the hill streams and rivers of Western Ghats and eastern Himalaya. The taxonomy of adult is well worked out, however the descriptions of larva and their ecology remains as a major gap area, especially for several elusive hill stream breeding species. Geographically, the central India, eastern Ghats, eastern Himalaya and Andaman Nicobar islands remains under explored where new species and records are still awaiting formal scientific description. In the current checklist, with reference to Version 2.0 (2014), there are 58 nomenclatural changes, 30 new additions, 10 deletions and 7 species are kept under doubtful status." (Authors)] Address: Subramanian, K.A., Zoological Survey of India, Prani Vigyan Bhavan, M-Block, New Alipore, Kolkata-700 053, India. E-mail: subbuka.zsi@gmail.com

**16620.** Sun, X.; Gong, X.; Huang, D. (2017): A review on studies of the aerodynamics of different types of maneuvers

in dragonflies. *Archive of applied mechanics* 87(3): 521-554. (in English) ["In the recent decades, biomimetic robots have attracted scientific communities' attention increasingly, as people try to learn from nature in which exist astonishing and uniquely evolved mechanisms shown by very species. Dragonfly, as such one example, demonstrates unique and superior flight performance than most of the other insect species and birds. Researchers are obsessed with the aerodynamic characteristics of an in-flight dragonfly as two pairs of independently controlled wings provide them with an unmatched flying performance and robustness. In this paper, an extensive review of recent studies related to the flight aerodynamics of dragonflies has been conducted. The main research findings about effect of the motion parameters and body attitude on the resulting aerodynamic forces and power requirements in different flight modes of a dragonfly are summarized. Particular attention is given to functional characteristics of dragonfly wings and the importance of mutual interaction between forewing and hindwing for its flyability. This article aims to bring together current understandings of dragonfly aerodynamics and thus has certain reference value to design and control of dragonfly-inspired biomimetic devices." (Authors)] Address: Sun, X. Univ. Shanghai Sci. & Tech., 200093, Shanghai, People's Republic of China

**16621.** Surdo, S. (2017): First record of *Lindenia tetraphylla* (Vander Linden, 1825) and rediscovery of *Orthetrum nitidinode* (Selys, 1841) in Sicily (Insecta: Odonata). *Fragmenta entomologica* 49(2): 5 pp. ["The first Sicilian record of *L. tetraphylla* and a new regional record of *O. nitidinode*, species not recorded since 1975 in mainland Sicily, are here reported. All individuals of *L. tetraphylla* and *O. nitidinode* were observed in the same site in the province of Trapani." (Author)] Address: Surdo, S., Dept of Agriculture, Food & Forest Sciences, Univ. Palermo - Viale delle Scienze, 90128 Palermo, Italy. E-mail: salvatore.surdo@unipa.it

**16622.** Tagun, R.; Kunpradid, T. (2017): The relationship between diversity and distribution of aquatic insect with water quality of Mae Chaem headwater streams, Kanlayaniwattana district, Chiang Mai Province. *Srinakharinwirot Science Journal* 33(1): 117-133. (in Thai, with English summary) ["The aim of this study is to assess the relationship between diversity and distribution of aquatic insect with water quality in Mae Chaem headwater stream, Kanlayaniwattana district, Chiang Mai. Aquatic macroinvertebrates were sampled at Mae Chaem wadeable-headstream at four sites including MJ1, MJ2, MJ3 and MJ4 from December 2014 to August 2015 using D-frame net and obtained some physico-chemical parameter of water quality. A total of 8,889 individuals belonging to 84 families and nine orders were examined. The most aquatic insect abundance were Diptera (54%), Ephemeroptera (26%), Coleoptera (8%), Trichoptera (6%), Odonata (4%), Hemiptera (3%) and others (<1%) respectively. The highest diversity index was recorded at MJ1, 2.564 and lowest diversity index was recorded at MJ2, 0.921. The highest evenness index was found at MJ1, 0.638 and lowest evenness index was found 0.521. In terms of the relative abundance, the most abundant taxa recorded was Chironomidae. The use of biological

indices as BMWPThai score and ASPT and physical and chemical parameters of standard fresh-water surface to evaluate water quality showed that the water quality was moderate to good quality in each sampling sites." (Authors)] Address: E-mail rungnapatag@gmail.com

**16623.** Takahashi, Y. (2017): Genome-wide population genetic analysis identifies evolutionary forces establishing continuous population divergence. *Ecological Research* 32(4): 461-468. (in English) ["Elucidating the mechanism shaping the spatial variations of traits has long been a central concern of evolutionary biologists. Geographic clines of allele/morph frequencies along environmental gradients are suggested to be established and maintained by the balancing of two opposing evolutionary forces, namely selection that generates spatial differentiation in morph frequencies, and selection and/or stochastic factors that lead to the coexistence of multiple morphs within a population. Thus, testing for both selection and stochastic factors is necessary for a comprehensive understanding of the mechanism underlying clinal variation in morph/allele frequency in natural populations. Here, I identified the evolutionary forces responsible for clinal variation of color morph frequency in *Ischnura senegalensis* by comparing the population divergence of putatively neutral loci generated by high-throughput next-generation sequencing (FSTn) with that of the putative color locus (FSTc). No strong correlation was observed between FSTn and FSTc, suggesting that stochastic factors contribute less to color-locus population divergence. FSTc was less than FSTn between populations exposed to similar environmental conditions, but greater than FSTn between populations exposed to different environmental conditions, suggesting that both balancing selection and divergent selection act on the color locus. Therefore, two antagonistic selection factors rather than stochastic and historical factors contribute to establishing the clinal variation of morph frequency in *I. senegalensis*." (Author)] Address: Takahashi, Y., Frontier Research Institute for Interdisciplinary Sciences, Tohoku University, Sendai, Japan

**16624.** Tallei, T.E.; Koneri, R.; Kolondam, B.J. (2017): Sequence analysis of the Cytochrome C Oxidase subunit I gene of *Pseudagrion pilidorsum* (Odonata: Coenagrionidae). *Makara Journal of Science* 21/1: 43-52. (in English) ["*P. pilidorsum* is 1 of over 140 species of *Pseudagrion*, the largest genus of Zygoptera. This species exhibits dimorphism due to the different body colorations of males and females, making them difficult to distinguish from other congeneric species. This study analyzed the cytochrome C oxidase subunit I (COI) gene sequence of *P. pilidorsum* found in Bogani Nani Wartabone National Park (North Sulawesi) and compared it with other sequences of *P. pilidorsum* from distinct geographical locations in Asia. The COI gene for the Sulawesi specimen was amplified using the universal primer pair LCO1490 and HCO2198. A sequence homology search was conducted through BLAST. Multiple sequence alignment was executed using CLUSTAL O (1.2.1). A phylogenetic tree was constructed using the Neighbor-Joining method, and genetic distance was calculated using the Kimura 2-parameter. The COI gene sequence of the Sulawesi specimen lies in the range of 83.99-89.10% with



other *P. pilidorsum* deposited at GenBank, namely KF369526 (Sarawak specimen), AB708543, AB708544, and AB708545 (Japan specimens). The genetic distance falls in the range of 0.146–0.149 between the Sarawak specimen and the Japan specimen; 0.122–0.125 between the Sulawesi and Japan specimens; and 0.185 between the Sulawesi specimen and the Sarawak specimen. It can thus be inferred that the Sarawak and Japan specimens may not belong to the same species; the Sulawesi and Japan specimens may not belong to the same species; and the Sarawak specimen and Sulawesi specimens might be placed in different genera." (Authors) Rory Dow: "The supposed *P. pilidorsum* from Sulawesi in this paper will be *P. ustum*!" 28.05.2017] Address: Tallei, Trina, Dept Biol., Fac. of Mathematics & Natural Sci., Univ. Sam Ratulangi, Manado 95115, Indonesia. E-mail: trina\_tallei@unsrat.ac.id

**16625.** Tamrin, A. (2017): Abundance of *Paederus* sp, *Micraspis* sp, *Austrogomphus* sp, and *Orthetrum* sp. in paddy field using Cowpea and Mung beans as shelter at paddy dikes. Research Journal of Pharmaceutical, Biological and Chemical Sciences 8(2): 1994–2000. (in English) ["*Paederus* sp., *Micraspis* sp., *Austrogomphus* sp. and *Orthetrum* sp. are important biological agents. The presence of them attractive by cowpea and mung beans as shelter. The study was conducted in village of Mappadaelo, sub-districts Tanasitolo, Wajo Regency South Sulawesi, Indonesia, aims impact of cowpea and mung beans as shelter in paddy dikes and their relationship with abundance of predatory insects in rice field. The experiment was arranged in Randomized Block Design, consisting of five treatments with two replication. All of predatory insects were collected with a 12-volt dust vacuum. Predatory insects keep in the glass bottle contain 70% alcohol. Results showed highest population of predatory insects in cowpea at 38 days after rice transplanting is *Paederus* sp. with average 16.5 individual; *Austrogomphus* sp. (11.5 individual) and *Micraspis* sp. (9.0 individual), respectively. The lowest number of *Orthetrum* sp. in similar plant and age (1.5 individual). Mung beans at 38 days after rice transplanting showed highest population of *Micraspis* sp. (11.5 individual) and lowest population in *Orthetrum* sp. on same age (0.0 individual). Our results suggested cowpea played important role as shelter and food source of predatory insects in rice field." (Authors)] Address: Tamrin, A., Dept of Plant Protection, Faculty of Agriculture, Hasanuddin University, Makassar (90245) Indonesia

**16626.** Tennessen, K. (2017): A method for determining stadium number of late dragonfly nymphs (Odonata: Anisoptera). Entomological News 126(6): 299–306. (in English) ["A method for recognizing the final stadium and the four preceding stadia of dragonfly nymphs was derived by dividing hind wing sheath length (WSL) by maximum head width (HW). Based on measurements for 15 species representing all seven North American families, five stadia can be delineated, counting backwards from the final (F-0) to the four preceding stadia (F-1, F-2, F-3, and F-4). The ratio WSL/HW over all species ranged as follows: F-0, 0.89–1.39 (mean 1.16); F-1, 0.57–0.88 (mean 0.70); F-2, 0.36–0.61 (mean 0.46); F-3, 0.24–0.44 (mean 0.32); and F-4, 0.15–0.32 (mean 0.23). As a crude guide, a ratio near 1 or greater indicates F-0, about two-thirds indicates

F-1, about one-half indicates F-2, about one-third indicates F-3, and about one-fourth indicates F-4. *Plathemis lydia* (Libellulidae) had the highest WSL/HW ratio in F-0 (1.32–1.39)." (Author)] Address: Tennessen, K., 125 N. Oxford Street, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**16627.** Tennessen, K.J.; DuBois, R.; Hemeon, K. (2017): Description of the last stadium nymph of *Ladona exusta* (Say) (Odonata: Libellulidae). Entomologica Americana 123(1-4): 1-8. (in English) ["*L. exusta* is a small libelluline dragonfly restricted to the Atlantic coastal region of North America from southern Newfoundland to Virginia. Based on 20 nymphs collected in shallow ponds in Massachusetts, New Jersey and New York, we describe the final unknown nymph of the genus. The palps have 5 major setae, differing from its more widespread congeners, *L. deplanata* and *L. julia*, which normally have 6 on each side, sometimes 7 (rarely 5 or 8). Nearly all *L. exusta* nymphs can be separated from *L. deplanata* using the number of palpal setae (5 v. 6) in conjunction with the ratio of epiproct length to metafemur length (0.42–0.48 v. 0.49–0.67). *L. exusta* is smaller than *L. julia* in a number of characters, the most distinctive of which are prementum length (3.70–3.90 mm vs. 3.90–4.75 mm) and prementum maximum width (3.35–3.85 mm vs. 3.90–4.85 mm)." (Authors)] Address: Tennessen, K., P.O. Box 585, Wautoma, Wisconsin 54982, USA. E-mail: ktennessen@centurytel.net

**16628.** Tennessen, K.J.; Abbott, J.C. (2017): Description of the nymph of *Gomphurus gonzalezi* (Odonata: Gomphidae). International Journal of Odonatology 20(3/4): 201–208. (in English) ["*G. gonzalezi* is a locally distributed dragonfly ranging from the Lower Rio Grande in south Texas southward to San Luis Potosi state in northeastern Mexico. We describe and illustrate the nymph based on specimens from Hidalgo County, Texas. The palpal lobe of *G. gonzalezi* has 7–8 small teeth in a straight line with the bifid end tooth approximately the same size as the more proximal teeth, typical of the *Gomphurus fratermus*-group. *G. gonzalezi* is distinct from the other species in this group by the long, round-tipped posterolateral spines on abdominal segment 9. In the Lower Rio Grande, the nymphs of *G. gonzalezi* bury themselves in sand and mud in slow flowing reaches." (Authors)] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**16629.** Tennessen, K.T.; Trapero-Quintana, A., Cruz Ferreira, F. (2017): Description of the nymph of *Tramea binotata* (Rambur, 1842) (Odonata: Libellulidae). Zootaxa 4337(3): 445–450. (in English) ["The nymph of *T. binotata* is described and illustrated based on reared specimens from Brazil and Ecuador, and also matching nymphs from Venezuela. A new character was discovered, i.e., density of minute spiniform setae scattered on the dorsum of abdominal segments 7 & 8, that separates the Neotropical species into two groups: high density of the tiny setae separates *T. binotata*, *T. insularis* Hagen, 1861 and *T. calverti* Muttkowski, 1910 from the other known species which have zero to only a few of these setae. *T. binotata* is distinct from most other Neotropical species known in the nymph stage by having only 7 or 8 palpal setae, rarely 6 or 9, on one side (versus 10–12); *T. calverti* and

*T. insularis* have similar low numbers of palpal setae (8–10) but each has more premental setae per side (11–14 in *calverti* and *insularis* vs. 8–10, rarely 11, in *binotata*). The nymphs of *Tramea minuta* De Marmels & Rácenis, 1982 and *T. rustica* De Marmels & Rácenis, 1982 are still unknown." (Authors)] Address: Tennesen, K.T., Florida State Collection of Arthropods, Gainesville, USA. E-mail: ktennessen@centurytel.net

**16630.** ter Hofstede, H.; Voigt-Heucke, S.; Lang, A.; Römer, H.; Page, R.; Faure, P.; Dechmann, D. (2017): Revisiting adaptations of neotropical katydids (Orthoptera: Tettigoniidae) to gleaning bat predation. *Neotropical Biodiversity* 3(1): 41-49. (in English) ["All animals have defenses against predators, but assessing the effectiveness of such traits is challenging. Neotropical katydids (Orthoptera: Tettigoniidae) are an abundant, ubiquitous, and diverse group of large insects eaten by a variety of predators, including substrate-gleaning bats. Gleaning bats capture food from surfaces and usually use prey-generated sounds to detect and locate prey. A number of Neotropical katydid signaling traits, such as the emission of ultrasonic frequencies, substrate vibration communication, infrequent calling, and ultrasound-evoked song cessation are thought to have evolved as defenses against substrate-gleaning bats. We collected insect remains from hairy big-eared bat (*Micronycteris hirsuta*) roosts in Panama. We identified insect remains to order, species, or genus and quantified the proportion of prey with defenses against predatory bats based on defenses described in the literature. Most remains were from katydids and half of those were from species with documented defenses against substrate-gleaning bats. Many culled remains were from insects that do not emit mate-calling songs (e.g. beetles, dragonflies, cockroaches, and female katydids), indicating that eavesdropping on prey signals is not the only prey-finding strategy used by this bat. Our results show that substrate-gleaning bats can occasionally overcome katydid defenses." (Authors)] Address: ter Hofstede, Hannah, Dept of Biol. Sciences, Dartmouth College, Hanover, NH, USA. E-mail: Hannah.ter.Hofstede@Dartmouth.edu

**16631.** Theischinger, G.; Burwell, C.J. (2017): A second species of *Oristicta* Tillyard (Odonata: Isostictidae). *Zootaxa* 4323 (1): 83-95. (in English) ["In order to include an additional species in the genus *Oristicta* Tillyard, 1913, the lectotype of its sole species *O. filicicola* Tillyard, 1913 and the holotype of *Phasmoticta interposita* Lieftinck, 1951, its assumed junior synonym, the original descriptions of both and numerous museum specimens identified as *O. filicicola* are studied and discussed. In spite of some variability being noted, it is concluded that they all are *O. filicicola* which is considered a monotypic species. The additional species is described as *Oristicta rosendaleorum* sp. nov. It is comprehensively illustrated, and its affinities are discussed. Possibly sympatric in places with *O. filicicola*, *Oristicta rosendaleorum* sp. nov. has richer black markings, lacks posterolateral processes/horns on the male's pronotum (present in *O. filicicola*), and the male anal appendages are of different form. *Oristicta filicicola* is known from far north-eastern Queensland from Hammond Island (10.5°S) at the tip of Cape York to the Paluma Range (19°S) in the southern

Wet Tropics Bioregion. *Oristicta rosendaleorum* sp. nov. is currently known from only two localities within 20 km of Lake-land (15.9°S) in south-eastern Cape York Peninsula." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**16632.** Theischinger, G.; Richards, S.J. (2017): *Teinobasis vincenti* sp. nov., a new damselfly from the Muller Range in Papua New Guinea (Odonata: Coenagrionidae). *IDF-Report* 106: 1-6. (in English) ["A new species of the genus *Teinobasis* Kirby is described from the Muller Range in Western Province, Papua New Guinea. Its male is distinguished from all other *Teinobasis* species by having a pale labrum, an extensively bright orange thorax, and ventrally bowed superior anal appendages that are markedly shorter than the plump, apically rounded inferiors. Characters of the male are illustrated, and the affinities of the new species are discussed." (Authors)] Address: Theischinger, G., Office of Environment & Heritage New South Wales, Sydney, NSW, Australia, & Australian Museum, Entomology, 6 College Str., Sydney, NSW, 2010, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

**16633.** Thomas, K. (2017): Four-spotted Chaser *Libellula quadrimaculata* Roosting in Large Numbers at Ham Wall Nature Reserve, Somerset. *Atropos* 60: 47-49. (in English) [Verbatim: On 1-VI- 2017 a small group of RSPB staff, including Reserves Ecologists Graham White and Bex Cartwright, were visiting RSPB's Ham Wall nature reserve for an early morning bird survey. Ham Wall sits in the Avalon Marshes, Somerset. Not long after reaching the site, between 04.30 and 05.15hrs, a group of roosting *L. quadrimaculata* were observed in an area of reeds. These were counted, and there were over 600 individuals present. However, it was soon realised that there were more present, and further counting estimated 2,000-3,000 individuals in the area. It is assumed that the dragonflies had roosted there overnight and would then disperse during the daytime. They were observed over subsequent days, but within two weeks the roost was no longer present in this area, although some wings could be found amongst the reeds. Ham Wall is a wetland created on an area previously worked by the peat industry. We are encouraged that the habitat created is suitable for a range of wildlife, including this spectacular display of dragonflies. We will re-visit the area at a similar time in 2018 to determine if this event is repeated (please note, the area that the roost was observed in is a sensitive area for wildlife and is off the path network). This was an interesting observation of a dragonfly roosting in such large numbers; we have not been able to find any similar documented sightings and would be interested to hear if similar observations have been recorded elsewhere.] Address: Thomas, Kelly, Reserves Ecologist, RSPB, The Lodge, Bedfordshire, SG19 2 DL, U.K. E-mail: kelly.thomas@rspb.org.uk

**16634.** Thompson, A.C.; Bazelet, C.S.; Naskrecki, P.; Samways, M.J. (2017): Adapting the Dragonfly Biotic Index to a katydid (Tettigoniidae) rapid assessment technique: case study of a biodiversity hotspot, the Cape Floristic Region, South Af-

rica. *Journal of Orthoptera Research* 26(1): 63-71. (in English) ["Global biodiversity faces many challenges, with the conservation of invertebrates among these. South Africa is megadiverse and has three global biodiversity hotspots. The country also employs two invertebrate-based rapid assessment techniques to evaluate habitat quality of freshwater ecosystems. While grasshoppers (Acrididae) are known indicators of terrestrial habitats, katydids could be as well. Here, we adapt a South African freshwater invertebrate-based rapid assessment method, the Dragonfly Biotic Index (DBI), for the terrestrial katydid assemblage, and propose a new assessment approach using katydids: the Katydid Biotic Index (KBI). KBI assigns each katydid species a score based on a combination of: 1) IUCN Red List status, 2) geographic distribution, and 3) life history traits (which consist of mobility and trophic level). This means that the rarer, more localized, specialized and threatened katydid species receive the highest score, and the common, geographically widespread and Least Concern species the lowest. As a case study, we calculated KBI across one of South Africa's global biodiversity hotspots, the Cape Floristic Region (CFR). We then correlated KBI/Site scores of individual ecosystems with their ecosystem threat scores. The CFR's katydid assemblage did not differ significantly from that of the overall South African katydid assemblage in terms of its species traits, threat statuses, or distribution among tettigoniid subfamilies. Likewise, KBI/Site scores did not differ significantly among ecosystem threat statuses. This may be explained by the coarse spatial scale of this study or by the lack of specialization of the CFR katydid assemblage. Nevertheless, the KBI holds promise as it is a relatively simple and non-invasive technique for taking invertebrate species composition into account in an assessment of habitat quality. In regions where katydid assemblages are well-known, acoustic surveys and KBI may provide an efficient means for assessing habitats." (Authors)] Address: Thompson, Aileen, Dept of Conservation Ecology and Entomology, Stellenbosch University, Private Bag X1, Matieland 7602, South Africa. E-mail: acthompson@sun.ac.za

**16635.** To, V.Q.; Phan, Q.T.; Tran, V.B. (2017): Description of *Coeliccia bhrilueci* sp. nov. (Odonata: Zygoptera: Platycnemididae) from central Vietnam. *Zootaxa* 4341(2): 279-282. (in English) ["*C. bhrilueci* sp. nov. (holotype male from Tay Giang district, Quang Nam province, central Vietnam, deposited in the Zoological collection of the Southern Institute of Ecology, Vietnam Academy of Science and Technology, Ho Chi Minh City, Vietnam) is described based on male specimens. The new species is easily distinguished from other *Coeliccia* species in the Southeast Asian region by the combination of its blue abdominal tip, black anal appendages and structure of genital ligula with two long flagella extending from lateral corners of apical segment. Damselflies of the genus *Coeliccia* Kirby, 1890 display a remarkably high diversity in Vietnam, with at least 17 species currently described, several of which only recently (e.g. Dow 2016, Phan & Kompier 2016, Kompier & Phan 2017). In this paper *C. bhrilueci* sp. nov. from central Vietnam is described. The new species appears to be most similar to *C. cyanomelas* Ris, 1912, *C. pyriformis* Laidlaw,

1932 and *C. mienTrung* Kompier & Phan, 2017, but the combination of a narrow and long antehumeral stripe, entirely black mesepimeron, blue abdominal tip and black appendages is unique for *C. bhrilueci* sp. nov. and allows for the differentiation of this new species from its congeners in the Southeast Asian region." (Authors)] Address: Phan, Q.T., Entomology & Parasitology Lab., Center for Molecular Biology, Institute of Research and Development, Duy Tan University, 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

**16636.** Torres-Cambas, Y.; Ferreira, S.; Cordero-Rivera, A.; Lorenzo-Carballa, M.O. (2017): Identification of evolutionarily significant units in the Cuban endemic damselfly *Hypolestes trinitatis* (Odonata: Hypolestidae). *Conservation Genetics* 18(5): 1229-1234. (in English) ["Species classification may not reflect the underlying/cryptic genetic diversity which should otherwise be conserved as it represents the potential of populations to evolve and adapt. The identification of evolutionarily significant units (ESUs) allows cryptic genetic diversity to be taken into account when designating conservation priorities. Here, we used mitochondrial and nuclear DNA sequences integrated with ecological niche models (ENM) to identify ESUs in *H. trinitatis*, a threatened Cuban endemic damselfly species. We found that this species comprises two distinct genetic groups in Central and Eastern Cuba respectively, which are also geographically isolated, as shown by ENM. Therefore, we propose these groups to be considered as different ESUs. According with their extent of occurrence, number of locations and inferred decline of habitat extent and quality, Central and Eastern ESUs qualify as Endangered [EN B1b(iii)] and Vulnerable [VU B1b(iii)], respectively." (Authors)] Address: Torres-Cambas, Y., Depto de Biol., Fac.Ciencias Naturales y Exactas, Univ. de Oriente, Santiago de Cuba, Cuba

**16637.** Torres-Pachón, M.; Novelo-Gutiérrez, R.; Espinosa de los Monteros, A. (2017): Phylogenetic analysis of the genus *Argia* Rambur, 1842 (Odonata: Coenagrionidae), based on morphological characters of larvae and mitochondrial DNA sequences. *Organisms Diversity & Evolution* 17(2): 409-420. (in English) ["The study of the evolutionary interrelationships among the species encompassed in the Neotropical genus *Argia* has been neglected. The goal of this study is to infer the phylogenetic relationships among 36 species of *Argia* Rambur, 1842, using complementary data sets (i.e., larval morphology and mitochondrial DNA). The morphological data set comprises 76% of the larvae currently described for this genus and includes 97 morphological characters. From those, 47 characters have not been previously used in taxonomic studies involving dragonflies' larvae. This is the first cladistic study based on larvae morphology for species within the sub-order Zygoptera. Data partitions were analyzed individually, as well as total evidence, using parsimony and Bayesian inference as criteria for optimal-tree selection. The results support the monophyly of the North American species of *Argia*. This genus can be identified by the combination of eight synapomorphies, four of which are exclusively found in *Argia*. According to the optimal trees, the individual data sets (i.e., morphology and DNA sequences) have a high level of ho-



moplasia, resulting in soft polytomies and low support for several nodes. The specific relationships of the terminal units differ between the phylogenies; nonetheless, there is historical congruence among them. Within *Argia*, five clades were consistently recovered. Most of those clades have been identified, at least in part, in previous phylogenetic and taxonomic studies. Indubitably, the morphological characters from larvae have historical signal useful for cladistic and taxonomic inference. Therefore, it should be a priority to pay more attention to this source of characters." (Authors)] Address: Espinosa de los Monteros, A., Depto Biol. Evol. Inst. Ecol., A. C. Carretera antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, México. E-mail: alejandro.espinosa@inecol.mx

**16638.** Tost, S.; Chovanec, A. (2017): Beobachtung einer Attacke eines Teichmolches auf ein immatures Weibchen von *Aeshna cyanea* (Odonata: Aeshnidae). *Mercuriale* 17: 57-62. (in German, with English summary) ["Observation of a teneral female *A. cyanea* attacked by a female Common Newt. On June 6th, 2011, a freshly hatched female *A. cyanea* was attacked by a female Common Newt (*Lissotriton vulgaris*) for several hours in a garden pond. In this paper this presumably rarely occurring interaction between an anisopteran imago and a newt is discussed by means of comprehensive literature on predator-prey-relationships between dragonflies and amphibians. The ultimately unsuccessful attack was documented by a photo." (Authors)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

**16639.** Tüzün, N.; Stoks, R. (2017): Carry-over effects across metamorphosis of a pesticide on female lifetime fitness strongly depend on egg hatching phenology: A longitudinal study under seminatural conditions. *Environ. Sci. Technol.* 51(23): 13949-13956. (in English) ["Current ecological risk assessment of pesticides fails to protect aquatic biodiversity. For the first time, we tested two potential reasons for this failure with regard to carry-over effects across metamorphosis: their dependence on hatching period, and the lack of studies quantifying adult fitness under seminatural conditions. Using *Coenagrion puella* sampled from six populations, we designed an outdoor longitudinal one-year study starting from the egg stage. We exposed the aquatic larvae to the pesticide esfenvalerate (0.11 µg/L) during the initial microcosm part. Next, we monitored the lifetime fitness of the terrestrial adults in an insectary. Exposure to the pesticide negatively impacted not only larval traits, but also drastically reduced lifetime mating success of adult females. The impact of this postmetamorphic effect of the pesticide on the population level was three times more important than the effects in the larval stage. Importantly, this carry-over effect was only present in females that hatched early in the season, and was not mediated by metamorphic traits (age and mass at emergence). We provide proof-of-principle under seminatural conditions for two potential pitfalls that need to be considered when improving risk assessment: carry-over effects on adult fitness can (i) be much more important than effects during the larval stage and may not be captured by metamorphic traits, and (ii) be strongly modulated by egg hatching dates."

(Authors)] Address: Tüzün, N., Evol. Stress Ecol. & Ecotoxicology, Univ. Leuven, Deberiotstr. 32, 3000 Leuven, Belgium

**16640.** Turnmore, M. (2017): An early morning dragonfly sighting. *Atropos* 58: 55. (in English) [Verbatim: "In the early hours of 30 August 2016 I was carrying out a pre-dawn bat survey in St Ives, on the north coast of Cornwall, as part of my work as an ecologist. This involved standing looking northwards (towards the sea) at one aspect of a large flat-roofed building, approximately 100m from the seafront. The survey began at approximately 04.50hrs. Weather conditions were dry and calm with a temperature of 15°C and complete cloud cover; sunrise was at 06.36hrs. It was a fairly uneventful survey with a single Common Pipistrelle *Pipistrellus pipistrellus* returning to roost behind hanging tiles on the exterior of the building at around 06.10hrs, after which all bat activity ceased. At around 06.20hrs my attention was drawn towards a movement low over the roof of the building and I was surprised to see a dragonfly appear, flying down to circle a few metres in front of me at around head height, gaining height over the roof, before doing one more similar circuit and disappearing. This appeared to be a patrolling flight rather than a foraging flight. The insect was not seen again, much to my frustration. It appeared to be a small hawk-type dragonfly but unfortunately as it was not yet fully light it was not possible to discern any colours or markings on the insect and confirm the identity. This part of St. Ives is fairly urban with lots of buildings and small gardens but no obvious areas of water—not classic Odonata habitat by any means. The nocturnal occurrence of Odonata at moth-traps is well-known in the UK, being particularly associated with species that are known migrants, and it is generally accepted that most such records refer to migrant insects (Parr, 2006). Whilst Odonata species occurring in the UK are diurnal species that are particularly active in sunny conditions, it is clear that some are capable of nocturnal activity when on migration. Activity at sunrise and sunset is known in some European species, which also includes *Anax imperator* in Spain (Corbet, 1999); the same author notes that many aeshnids may exhibit occasional episodes of activity over water at sunrise and sunset, especially during warm weather. All things considered I suspect this particular sighting relates to *Aeshna mixta*." (Author)] Address: Tunmore, M., The Boat House, Church Cove, Lizard, Cornwall, TK12 7PH, UK

**16641.** Usman, K.; Pervaiz, K.; Rehman, H.U.; Achakzai, W.M.; Saddozai, S. (2017): Exploring of dragonfly fauna in lower region of district Karak KP, Pakistan. *Journal of Entomology and Zoology Studies* 5(1): 708-710. (in English) ["The present study was conducted to explore dragonfly fauna in the lower region (North West) of District Karak Khyber Pakhtunkhwa Pakistan. Duration of the study was one year, i.e., January 2015 to December 2015. A total of 850 specimens were collected from various sampling sites, viz., Rehmat Abad, Soor Dag, Latamber, Shareef Wala and Paloskai Banda of the North West region. The Specimens identified belong to ... Libellulidae, Aeshnidae and Gomphidae, 6 Genera and 6 Species respectively. Family Libellulidae was the largest family consisting 4 Species *Orthetrum triangulare triangulare*, *Palpopleura sexmaculata*, *Pantala flavescens* and *Trithemis*

aurora. Family Aeshnidae and Gomphidae comprising only one species, each *Anax immaculifrons* and *Onychogomphus strigatus* respectively. From the current research it can be concluded that this region have a diverse dragon fly fauna. Similar survey on large scales is recommended to fully evaluate the dragonfly fauna of North West region of District Karak." (Authors)] Address: Usman, K., Dept of Zoology, Hazara University, Mansehra, Khyber Pakhtunkhwa, Pakistan

**16642.** Usman, K.; Pervaiz, K.; Wasif, M.; Rehman, H.U.; Khattak, B. (2017): Exploring of dragonfly fauna in city Karak and its surrounding areas Khyber Pakhtunkhwa, Pakistan. *Journal of Entomology and Zoology Studies* 5(2): 905-907. (in English) ["Karak is located in the Khyber Pakhtunkhwa Province, Pakistan. The Dragonfly fauna in City Karak and its surrounding areas was first time explore during the present study 29 species from 17 families under 25 genera are being reported during February 2014 to October 2014. Salticidae were most commonly occurred species. Duration of the current study was one year, i.e., February 2014 to October 2014. A total of 725 specimens of the dragonfly were collected from various sampling sites of City Karak. These sampling sites were Tehsil colony, Gulshan Abad colony, Rehmania colony, Tappi, Jama, Kach Banda, Porana Bazra and main Karak city respectively. The Specimen collected and identified belong to Libellulidae, Aeshnidae and Gomphidae, 6 genera *Orthetrum*, *Palpopleura*, *Pantala*, *Trithemis*, *Anax* and *Onychogomphus*. Family Libellulidae was the largest family consisting of 7 species while Aeshnidae and Gomphidae comprising only one species each. From the current study, it can be concluded that the City Karak and its surrounding areas having a diverse range of dragonflies. Furthermore, the same study on large scales is recommended to fully explore the dragon fly fauna in this region." (Authors)] Address: Usman, K., Dept of Zoology, Hazara, Univ. Mansehra, Khyber, Pakhtunkhwa, Pakistan

**16643.** Usman, K.; Pervaiz, K.; Rehman, H.U.; Sadia, H.; Akbar, N.U.; Khan, M.Y.; Nawaz, A.; Baloch, H.A.; Ateeq, M.; Zareen, S. (2017): Monitoring of dragonfly fauna in Tehsil Takht-ENasrati district Karak KP, Pakistan. *Journal of Entomology and Zoology Studies* 5(1): 378-379. (in English) ["This paper communicates the exploring of the dragonfly fauna collected from Tehsil Takhti Nusrati District Karak Khyber Pakhtunkhwa, Pakistan. A survey was conducted over a period of one year. A total 733 specimens of dragonfly were collected from various sampling sites of Tehsil Takhti Nusrati. These sampling sites were Takhti Nusrati, Zarki Nasrati, Ganderi Khattak, Bogara and Khada respectively. The specimens collected and identified belonged to 1 Order, 3 Families, 6 Genera and 7 Species. Family Libellulidae was the largest family consisting 5 Species while Family Aeshnidae, and Gomphidae comprising only one species each. From the Present study, it is concluded that Takht-e-Nusrati Tehsil have a diverse dragon fly fauna. Similar survey on large scales is recommended to fully evaluate the dragonfly fauna in the Warana region of District Karak." (Authors)] Address: Usman, K., Dept of Zoology, Hazara University, Mansehra, Khyber Pakhtunkhwa, Pakistan

**16644.** Van der Meer, H. (2017): Note on the behaviour of *Onychogomphus boudoti* in Morocco and discovery of a second population. *Brachytron* 19(2): 117-123. (in Dutch, with English summary) ["In 2011 a new dragonfly species was discovered in Morocco which was described in 2014. During a field trip to Morocco in June 2017 several individuals of *O. boudoti* were observed during two visits at the known site east of Khenifra. The behaviour of these individuals was divergent from the information as described in the article which was published in 2014. We observed several individuals sitting on the ground, especially when the weather was very cloudy. Mating wheels were observed as well, both on the ground, and perched in bushes. Oviposition was performed by the female alone, under some bushes providing shadow over the small stream. Also, a new location is mentioned which was found in 2016." (Author)] Address: Harold van der Meer. E-mail: Harold\_zeearend@hotmail.com

**16645.** VeenaChoubey, R.B (2017): Benthos and venomous snakes in Narmada valley Jabalpur for environment and human welfare. *Global Journal of Multidisciplinary Studies* 6(7): (in English) ["Narmada River, a mighty west flowing river is the fifth largest river in India. At present pollution load of river increases rapidly. Benthic macroinvertebrates are used as pollution indicators that live on or inside the river bed of a water body. Recently this region is rapidly undergoing industrialization, township etc., and such these areas are prone to habitat loss due to which different types of poisonous and non-poisonous snakes are being noticed in the residential areas. Snake bite is an acute life threatening hazard often faced by farm labors and farmers leads to death. This study aims to reduce such problems. The whole Narmada valley of Jabalpur region was selected as study site for the collection of sample. The present study was carried out from January 2014 to December 2016. Sampling of snakes was done as per the requirement of local people. Four study sites had been selected for the investigation of benthos were Bargi dam, Gwarighat, Tilwaraghat and Bhedaghat. Organisms were identified by using standard identification keys provided by Fraser (1933, 1934 and 1936); Mitra (2006); Subramanian (2005, 2009); Andrew et al., (2009); Varshney (1983); Tonapi (1980); Adoni et al., (1985); SubbaRao (1993), Smith (1943); Whitaker & Captain (2004) and indian-snakes.org. In present study total 81 species of various fauna have been recorded viz., Odonata 37 species (7 Families), Lepidoptera 25 Species (5 Families), Mollusca 13 Species (2 Class), Reptiles 06 species (2 families). Benthos helps to assess quality of water and play an important role in food chain for the natural balance. In the same way this study will help people to know venomous snakes when encountered namely, Common Krait, Spectacled Cobra, Russell's viper and Saw-scaled Viper; responsible for more than 80% fatalities in Indian Subcontinent. The whole study on benthos as well as reptile encircle around environment and human welfare." (Authors)] Address: not stated

**16646.** Vermaat, J.E.; Hellmann, F.A.; van Teeffelen, A.J.A.; van Minnen, J.; Alkemade, R.; Billeter, R.; Beierkuhnlein, C.; Boitani, L.; Cabeza, M.; Feld, C.K.; Huntley, B.; Paterson, J.;

WallisDeVries, M.F. (2017): Differentiating the effects of climate and land use change on European biodiversity: A scenario analysis. *Ambio* 46(3): 277-290. (in English) ["Current observed as well as projected changes in biodiversity are the result of multiple interacting factors, with land use and climate change often marked as most important drivers. We aimed to disentangle the separate impacts of these two for sets of vascular plant, bird, butterfly and dragonfly species listed as characteristic for European dry grasslands and wetlands, two habitats of high and threatened biodiversity. We combined articulations of the four frequently used SRES climate scenarios and associated land use change projections for 2030, and assessed their impact on population trends in species (i.e. whether they would probably be declining, stable or increasing). We used the BIOSCORE database tool, which allows assessment of the effects of a range of environmental pressures including climate change as well as land use change. We updated the species lists included in this tool for our two habitat types. We projected species change for two spatial scales: the EU27 covering most of Europe, and the more restricted biogeographic region of 'Continental Europe'. Other environmental pressures modelled for the four scenarios than land use and climate change generally did not explain a significant part of the variance in species richness change. Changes in characteristic bird and dragonfly species were least pronounced. Land use change was the most important driver for vascular plants in both habitats and spatial scales, leading to a decline in 50–100% of the species included, whereas climate change was more important for wetland dragonflies and birds (40–50 %). Patterns of species decline were similar in continental Europe and the EU27 for wetlands but differed for dry grasslands, where a substantially lower proportion of butterflies and birds declined in continental Europe, and 50 % of bird species increased, probably linked to a projected increase in semi-natural vegetation. In line with the literature using climate envelope models, we found little divergence among the four scenarios. Our findings suggest targeted policies depending on habitat and species group. These are, for dry grasslands, to reduce land use change or its effects and to enhance connectivity, and for wetlands to mitigate climate change effects." (Authors)] Address: Vermaat, J.E., Dept Environmental Sciences, Norway's University of Life Sciences, Ås, Norway. E-mail: jan.vermaat@nmbu.no

**16647.** Vieira, V.; Cordero-Rivera, A. (2017): *Ischnura hastata* – a new species for Graciosa Island, Azores, Portugal (Odonata: Coenagrionidae). *Notulae odonologicae* 8(9): 332-336. (in English) ["A small population of *I. hastata* was observed on 20-vii- and 21-vii-2016 at the freshwater pond 'Charco da Caldeira' in the Caldeira of Graciosa island, Portugal. It constitutes both the first record in this island and the presence in all major islands of the Azores archipelago." (Authors)] Address: Vieira, V., Univ. dos Açores, Depto de Biol. & CE3C/ABG – Centre for Ecol., Evol. & Environ. Changes/Azorean Biodiversity Group. Rua da Mãe de Deus 13A, Apartado 1422, PT – 9501-801 Ponta Delgada, Açores, Portugal. E-mail: virgilio.ff.vieira@uac.pt

**16648.** Viganò, M.; Janni, J.; Corso, A. (2017): *Tramea basilaris* on Linosa Island, Italy: A new species for Europe and the Western Palaearctic (Odonata: Libellulidae). *Odonatologica* 46(1/2): 55-66. (in English) ["Two individuals of *T. basilaris* were observed and photographed at Linosa Island south of Sicily on 21-x-2016. This constitutes the first record of this species north of the Sahara, for Europe and for the Western Palaearctic. The closest known record is from Lake Chad, about 2 500 km to the South." (Authors)] Address: Viganò, M., MISC – Via Ongetta, 5 – 21010 Germignaga, Varese, Italy. E-mail: mikivigano@yahoo.com

**16649.** Vilela, D.S.; Del-Claro, K.; Guillermo-Ferreira, R. (2017): The influence of body size and agility in displacement capacity of male damselflies (Odonata, Protoneurinae). *Journal of Insect Behavior* 30(6): 759-767. (in English) ["Alternative mating tactics (AMT) occur in several animal taxa as a way to respond to physiological or environmental factors that affect reproductive success. In other words, males can exhibit different mate acquisition tactics associated with phenotypic variations. Here we present the case of *Epipleoneura williamsoni*, a non-territorial Neotropical damselfly in which larger males actively search for females along the margins of streams and smaller males remain perched on the vegetation and adopt a sit-and-wait strategy. Males were captured, marked and behavioral observations were conducted to take notes on the spatial displacement of individuals. We then measured male body size and agility to test whether these traits could be used to predict flight ability and thus AMT's. Agility was measured by the 2(S) coefficient, which is a surrogate of flight ability and maneuverability. The results show that body size was positively correlated with male flight ability and agility. However, male agility did not predict the adopted AMT. These results suggest that the strategies adopted by *E. williamsoni* males may be a reflection of body condition. This study adds evidence on how selection may act on different phenotypes within a population and how body size variations may result in different displacement capacities and flight agility." (Authors)] Address: Vilela, D.S., Dept Biol., Univ. São Paulo (USP), Ribeirão Preto, Brazil

**16650.** Vilela, D.S.; Ricioli, L.S.; Del-Claro, K.; Guillermo-Ferreira, R. (2017): Female color polymorphism of *Ischnura capreolus* Hagen, 1861 (Odonata: Coenagrionidae) with notes on behavior and ontogenetic color changes. *International Journal of Odonatology* 20(3/4): 191-200. (in English) ["Polymorphism in coenagrionids is widely known, mainly for *Ischnura*. Here, we present the case of *I. capreolus*, a Neotropical species of which, until now, little information concerning color polymorphism and ontogenetic color changes was known. We used a marking and recapture method to evidence ontogenetic coloration changes in females. We show that, in addition to the gynochrome morph, *I. capreolus* females also exhibit at least one additional morph: an androchrome color pattern. Gynochrome females (97.1% of marked females) are green-yellow when young and change to a brownish pattern with age, within a week. Androchrome females (2.9% of marked females) exhibit blue coloration, similarly to males. Our study provides



the first evidence of ontogenetic color change in *I. capreolus*. Furthermore, field observations show that *I. capreolus* is similar to other *Ischnura* species regarding sexual harassment behavior." (Authors)] Address: Vilela, D.S., Graduate Program in Entomology, Dept Biology, Univ. of São Paulo (USP), Ribeirão Preto, Brazil. E-mail: deegoo@gmail.com

**16651.** Villalobos-Jiménez, G.; Hassall, C. (2017): Effects of the urban heat island on the phenology of Odonata in London, UK. *International Journal of Biometeorology* 61: 1337-1346. (in English) ["Urbanisation is one of the major drivers of ecosystem change, and includes increased temperatures in cities leading to an urban heat island (UHI). This study quantified the phenological response of odonates across London, UK, from 1990 to 2012 using a database of 1,031,277 historical sightings. The ordinal flight dates of each species were used to calculate the leading edge, middle, and trailing edge of the flight period (P5, P50, and P95, respectively). The results suggest that the phenology of odonates is affected by the UHI only at a community level: no significant changes in the P5 or P50 of the flight period were found, although the P95 shows a mean advance of 4.13 days compared to rural areas, thus suggesting a contraction of the flight period in urban areas. However, only one individual species (*Sympetrum striolatum*) exhibited an advance in the P95 of the flight period in urban areas compared to rural areas. On the other hand, climate change (minimum temperature) had a much stronger impact on the phenology of odonates at the community level with a significant advance of 6.9 days °C<sup>-1</sup> in the P5 of the flight period, 3.1 days °C<sup>-1</sup> in the P50, and 3.3 days °C<sup>-1</sup> in the P95 flight date. Similarly, a significant advance in P5 was found in 7 of the 15 species tested in response to minimum temperature and 2 species showed a significant advance in P50 in response to minimum temperature, but no species showed a shift in the P95 flight date due to minimum temperature. As shown in previous studies, life history influences the phenological response of odonates, with spring species and those species lacking an egg diapause being the most responsive to increased temperatures, although summer species and species with obligate egg diapause also respond to the UHI by advancing the P95 by 3.8 days and 4.5 days respectively compared to rural areas, thus contracting the flight period. The present study shows that the UHI has negligible impacts on emergence patterns of odonates compared to climate change, which may result from the capacity of aquatic habitats to buffer the microclimatic conditions of the surrounding terrestrial habitats. We conclude by highlighting the importance of climate change on freshwater habitats over the impacts of the UHI." (Authors)] Address: Villalobos-Jiménez, Giovanna, School of Biol., Univ. Leeds, Woodhouse Lane, Leeds LS2 9JT, UK. E-mail: bsgdjv@leeds.ac.uk

**16652.** Vinko, D.; Kulijer, D.; Billqvist, M.; Martens, A. (2017): The biting midge *Forcipomyia paludis* (Macfie, 1936) (Diptera: Ceratopogonidae) in Slovenia, Bosnia and Herzegovina, Croatia and Sweden. *Natura Sloveniae* 19(1): 5-21. (in English, with Slovene summary) ["Records of *F. paludis* from Slovenia and Bosnia and Herzegovina are reported herewith as the first finds of *F. paludis* in both countries, together with new

records from Croatia and Sweden. This biting midge is a temporary ectoparasite of dragonfly imagines and the only ceratopogonid species known in Europe to feed specifically on this insect group. *Forcipomyia paludis* is already known in 18 European countries. Prior to this report, *F. paludis* was known to infest 67 dragonfly species in Europe. 13 dragonfly imagines from 11 sites in Slovenia, 27 imagines from 13 sites in Bosnia and Herzegovina and six imagines from two sites in Croatia having *F. paludis* on their wings were recorded. Additional data for 50 imagines from 15 sites in Sweden are also presented. In Slovenia, the species is known to occur in the Gorenjska, Goriška Brda, Vipava River Valley, Coastal-Karst region, Central Slovenia, Kočevska region and Bela krajina, while in Bosnia and Herzegovina it is known only from south Herzegovina (Ljubuški, Ćapljinina, Mostar and Stolac areas). In Croatia, the species is present in several parts of the country, while in Sweden it occurs only in the southern and middle parts of the country (Skane, Öland, Gotland, Göteborg and Gävle). Six new dragonfly host species and the northernmost occurrence of *F. paludis* are also reported." (Authors)] Address: Vinko, D., Slovene Dragonfly Society, Verovškova 56, 1000 Ljubljana, Slovenia. E-mail: damjan.vinko@gmail.com

**16653.** Voss, K.; Loewy, K. (2017): Hudsonian Emerald (*Somatochlora hudsonica*, Hagen) in Boulder County. <https://assets.bouldercounty.org/wp-content/uploads/2018/10/hudsonian-emerald.pdf>: 34 pp. (in English) ["Dragonfly conservation in parks serves the dual purpose of protecting iconic species of aesthetic value to park visitors as well as preserving aquatic ecosystem function. *S. hudsonica* is the only Colorado dragonfly listed as sensitive by the US Forest Service. Little is known about *S. hudsonica*'s habitat associations, distribution, and life history, all essential for future management of the species. We began answering those basic questions with literature-based habitat suitability models followed by a ground-truthing survey of adults across Boulder County Parks and Open Space (BCPOS) properties that span the suitability gradient to determine the local habitat variables that influence probability of occurrence. To determine breeding habitat, we also conducted an exuvial survey, and set the groundwork for captive rearing. The information collected as part of this project will provide critical baseline data necessary for BCPOS to draft habitat management and monitoring plans for the Hudsonian emerald." (Authors)] Address: Kristofor Voss, K., Dept of Biology, Regis University, kvoss@regis.edu

**16654.** Wang, Z. (2017): Systematic dragonflies names of China (Odonata). *Henan Science* 2017(1): 48-77. (Chinese, with English summary) ["The paper reports all three suborder Zygoptera, Anisozygoptera and Anisoptera 730 dragonfly species (subspecies) belong to 160 genera and 20 families of Odonata from China." (Author)] Address: Wang, Z., Henan Academy of Sciences, Zhengzhou 450002, China

**16655.** Wang, A.R.; Kim, M.J.; Kim, S.S.; An, J.; Kim, I. (2017): Development and validation of microsatellite markers from the Tiny dragonfly, *Nannophya pygmaea* (Odonata: Libellulidae) populations that are endangered in Korea. *Proceed-*

ings of the Korean Society of Applied Entomology, 2017 Annual Meeting of the Korean Soc. Appl. Ento. & Intern. Symp., Emergence of Applied Insects: 153. (in English) [Verbatim: "N. pygmaea is one the smallest dragonflies in the world and listed as a second-degree endangered wild animal in Korea. We developed microsatellite markers and applied selected markers to South Korean populations to understand population genetic characteristics, along with two mitochondrial DNA (mtDNA) gene sequences (COI and ND5). Two mtDNA-based population genetic analysis indicates substantially reduced genetic diversity in an island population (Muuido) compared to others. On the other hand, population-based FST and RST consistently support that N. pygmaea populations are overall well interconnected with a relatively high gene flow. These results may collectively indicate that N. pygmaea populations in South Korea may have rather larger population size than we previously acknowledged based on a single-locus mtDNA sequence and field observation." (Authors)] Address: not stated.

**16656.** Wang, M.; Wang, M.; Shen, L.; Sun, X.; Shi, G.; Ma, W.; Yan, X. (2017): High-performance flexible surface-enhanced Raman scattering substrates fabricated by depositing Ag nanoislands on the dragonfly wing. *Applied Surface Science* 436: 391-397. (in English) ["Highlights: •Dragonfly wing with irregular surface for template gets a high SERS performance. •The optimized structure of Ag on irregular DW was obtained by magnetron sputtering. •The prepared substrates are flexible, low-cost, large-scale and environment-friendly. •The limit of detection reaches 10<sup>-10</sup> M to 4-aminothiophenol. •Rapid and quantitative detection of crystal violet can be achieved by our substrates. Abstract: Natural dragonfly wing (DW), as a template, was deposited on noble metal sliver (Ag) nanoislands by magnetron sputtering to fabricate a flexible, low-cost, large-scale and environment-friendly surface-enhanced Raman scattering (SERS) substrate (Ag/DW substrate). Generally, materials with regular surface nanostructures are chosen for the templates, the selection of our new material with irregular surface nanostructures for substrates provides a new idea for the preparation of high-performance SERS-active substrates and many biomimetic materials. The optimum sputtering time of metal Ag was also investigated at which the prepared SERS-active substrates revealed remarkable SERS activities to 4-aminothiophenol (4-ATP) and crystal violet (CV). Even more surprisingly, the Ag/DW substrate with such an irregular template had reached the enhancement factor (EF) of ~1.05×10<sup>5</sup> and the detection limit of 10<sup>-10</sup> M to 4-ATP. The 3D finite-different time-domain (3D-FDTD) simulation illustrated that the "hot spots" between neighbouring Ag nanoislands at the top of pillars played a most important role in generating electromagnetic (EM) enhancement and strengthening Raman signals." (Authors)] Address: Wang, M., Key Lab. for Microstructural Material Physics of Hebei Province, School of Science, Yanshan Univ., Qinhuangdao 066004, China. E-mail: wml@ysu.edu.cn

**16657.** Wang, R.; Yu, X.; Xue, J.; Ning, X. (2017): Descriptions of larvae of *Vestalaria venusta* (Hämäläinen, 2004) and *Matrona basilaris* Selys, 1853 (Odonata: Calopterygidae). *Zootaxa*

4306(4): 580-592. (in English) ["Larva of *V. venusta* is identified using DNA barcoding match with the adult and described in the first time. Morphological characters are compared with those of *M. basilaris* and *V. amoena*. The validity of genus the *Vestalaria* is reconfirmed. The important role of DNA barcoding in odonate larva identification is emphasized." (Authors)] Address: Yu, X., Inst. Entomology, College of Life Sciences, Nankai Univ., Tianjin, 300071, China. E-mail: lanny-summer@163.com

**16658.** Wang, Y.; Yin, Y.; Zheng, G. (2017): Fluid-coupled vibration control inspired by dragonfly wings. *Topics in Modal Analysis & Testing* 10: 31-36. (in English) ["Dragonfly wings have excellent aerodynamic performance and damping capacity, which is driving people's attention. The existing researches on it are mainly from the vein structure and focusing on the static performance demonstration of dragonfly wings. Flutter analysis is very important during the process of aircraft design. With the inspiration of internal flow of dragonfly wings, the Coriolis force on the pipe wall while vibrating is discussed. By establishing a two-dimensional wing model, using quasi-steady aerodynamic equation, the aerodynamic force and the Coriolis force generated while fluttering were calculated. Theoretical calculation and numerical method are used to find critical velocity with and without internal flow. Coriolis force is proved effective on reducing two-dimensional wing flutter." (Authors)] Address: Wang, Y., School of Aerospace Engineering, Tsinghua Univ., Beijing, China. E-mail: 972559901@qq.com

**16659.** Wei, Y.; Luo, J.; Zhou, Z.; Liu, Y.; Zhang, D. (2017): The research of Odonata resources in Gansu province. *Gansu Agr. Sci. and Techn.* 9: 16-20. (in Chinese, with English summary) ["In this paper the insect resources of Odonata in Gansu province are preliminary study. Through the identification of specimen and literature search there are 69 species of Odonata insect in Gansu province and they belonged to 45 genera, 12 families. Among them, 22 species are newly recorded species in Gansu. Libellulidae are the dominant families with 10 genera and 24 species. The faunal analysis shows that the Palaearctic and Oriental common species are in the majority there are 37 species accounting for 53.6% of the total. In different geographic regions in Gansu province the Odonata resource is most rich in Longnan area." (Authors)] Address: Wei, Y., Dawei Inst. of Plant Protection Gansu Acad. of Agricultural Sci. CLanzhou Gansu 730070 China

**16660.** Wild, N. (2017): Spatio-temporal patterns of dragonfly occurrence on meadows in the Donau-Auen National Park, Lower Austria. *Conference Volume, 6th Symposium for Research in Protected Areas, 2 to 3 November 2017, Salzburg: 727-732.* (in English) ["Dispersal is a characteristic trait in Odonata. While dispersal behavior of dragonflies and damselflies between waterbodies has generally received a great deal of attention, dispersal processes subjected to terrestrial habitats and hence, Odonate's use in the context of foraging activities, have previously only attracted limited interest. This study aimed to investigate the dispersal of dragon-

flies and damselflies to floodplain meadows used for foraging or as refuge. The primary focus was on assessing species-specific dispersal characteristics influencing the spatial distribution of species, species richness and community structure on meadows. Therefore, Odonata were sampled between May and September 2016 at 16 meadow and eight waterbody sites in the Donau–Auen National Park (DANP), Eastern Austria near Orth an der Donau. In total, 1.427 dragonflies were recorded, including 667 observed on meadows. Anisopterans were more likely to disperse long distances from waterbodies than zygopterans, and females showed proportionally higher abundances on meadows than at waterbodies. Species composition, species richness and occurrence of dragonflies were highly influenced by the distance meadows were situated away from waterbodies. Moreover, the results from this study demonstrated that occurrence of Odonata, species richness and the structure of species assemblages are associated with structural characteristics of forest margins adjacent to meadows. For most Odonata species, a positive relationship between heterogeneity in forest margin vegetation structure and occurrence could be found. This study provides important insight into odonate's utilization of meadows embedded in floodplain systems and provides some basis for potential conservation management considerations with the aim to protect terrestrial habitats of rare dragonflies." (Author)] Address: Wild, Natascha, University of Vienna, Dept of Tropical Ecology and Animal Biodiversity, Rennweg 14, 1030 Vienna, Austria. E-mail: nataschawild98@gmail.com

**16661.** Wildermuth, H. (2017): Zum Verhalten der Großen Moosjungfer *Leucorrhinia pectoralis* vor, während und nach dem Schlupf (Odonata: Libellulidae). *Mercuriale* 17: 17-25. (in German, with English summary) ["Behaviour of *Leucorrhinia pectoralis* before, during and after emergence - *L. pectoralis* was studied and photographically documented immediately before, during and shortly after the last ecdysis at small peat ponds in the Swiss Plateau. The larvae, ready to molt, reacted to visual and mechanical stimuli still immediately before eclosion by escape and change of the emergence substrate. After climbing out of the water, the larvae remained still and neither circling movements with the hind legs nor wiggling with the abdomen were observed. Ecdysis from splitting of the larval skin until opening of the wings proceeded according to the well-known type of Libellulidae. In this phase too, the dragonflies were excitable but only reacted slightly to mechanical stimuli. They started for the maiden-flight without preceding warming up by wing whirring. The teneral were shy and escaped quickly from an approaching human observer, seeking cover in the branches of trees." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**16662.** Wildermuth, H. (2017): Zur Erstbeschreibung der Alpen-Smaragdlibelle *Somatochlora alpestris* (Selys, 1840) aus dem Berner Oberland (Odonata: Corduliidae). *Entomo Helvetica* 10: 81-86. (in German, with English and French summaries) ["On 15.07.1838, while on his honeymoon, Edmond de Selys Longchamps collected *S. alpestris* at the Grosse Scheidegg (Bernese Oberland, CH). He described and named the species based on three specimens, which were

later painted in watercolor by Guillaume Séverin. At the same time and locality he collected four specimens of *Leucorrhinia dubia* that he mistakenly considered to be *L. rubicunda*. Understanding of the distribution of *S. alpestris* in Switzerland remained limited for some 130 years and only improved from the late 1970s onwards." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**16663.** Wildermuth, H.; Schneider, B. (2017): Das Blässhuhn als Libellenjäger (Odonata). *Mercuriale* 17: 1-10. (in German, with English summary) ["The Eurasean Coot (*Fulica atra* L.) as dragonfly hunter (Odonata) - Dragonfly monitoring and direct observations at small ponds in Switzerland indicated that Coots, especially during their breeding season, might prey upon numerous emerging and teneral damselflies and dragonflies. Slow motion films (175 frames/s) revealed how young and adult Coots tried to catch odonates as individuals, in tandem, or during copulation by darting their head towards the target and opening the beak for 0.1-0.2 s. In all documented cases damselflies and dragonflies had a narrow escape. It is discussed if Coots at small ponds could impact dragonfly populations." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**16664.** Xu, Q.-h. (2017): The final stadium larva of *Euphaea decorata* Hagen in Selys, 1853, from Fujian, China (Odonata: Zygoptera: Euphaeidae). *Zootaxa* 4244(4): 595-599. (in English) ["The final stadium larva of *E. decorata* is described and illustrated for the first time. The larva of *E. decorata* is typical of the genus and characterized by having a flat and long body with large saccoid caudal gills, seven pairs of lateral abdominal gills, two or three large and sharp spines in front of the ventral margin of the eyes, and tridentate palpal lobes of the prementum. The supposed larva of *Rhipidolestes nectans* is corrected to that of an unknown Euphaeidae. Known Euphaea larvae are shown to be generally very similar, but an old report suggests that the Indian species *E. dispar* and *E. fraseri* may show sufficient differences to restore them to the genus *Indophaea*." (Author)] Address: Xu, Q.-h., Dept of Garden & Horticulture, Zhangzhou City University, Zhangzhou, Fujian 363000, PR China. E-mail: qihanxu@aliyun.com

**16665.** Xue, J.; Yu, X.; Zhang, H.; Chen, X.; Bu, W. (2017): Population genetics and ecological niche modeling shed light on conservation of the island endemic damselfly *Pseudolestes mirabilis* (Odonata, Pseudolestidae). *Hydrobiologia* 790: 273-286. (in English) ["Island endemic species have a much higher risk of extinction than those of mainland. *P. mirabilis*, the single representative of the family Pseudolestidae which is endemic to Hainan Island, is facing a danger of extinction along with the acceleration of urbanization. To investigate population genetics and further evaluate the conservational importance, the mitochondrial gene COI of 126 individuals from 11 populations of the phoenix damselfly were sequenced and analyzed. This is the first comprehensive population ecological study for this species. The results recovered low genetic diversity and weak phylogeographic structure. Mul-



multiple lines of evidence including neutrality test, mismatch distribution analysis, phylogenetic topologies, and Bayesian skyline plot supported a population expansion just after the Last Glacial Maximum. Statistics of genetic diversity, gene flow, and potential habitats reconstruction suggested that the refugia constricted to the south central areas of the island. Meanwhile, the small population size and low genetic variation in some peripheral populations also implied a niche reduction. Increasing human activity and severe environment destruction may be the main reasons causing a recent decline of the population and increasing the risk of extinction. Therefore, urgent conservation efforts must be implemented to ensure the long-term survival of *P. mirabilis*. The present research has provided a way to prioritize and assess management strategies of this charismatic species." (Authors)] Address: Yu, X., Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, China

**16666.** Yalles Satha, A.; Sanraoui, B. (2017): Environmental factors influencing Odonata communities of three Mediterranean rivers: Kebir-Est, Seybouse, and Rhumel Wadis, northeastern Algeria. *Revue d'Ecologie (Terre et Vie)* 72(3): 314-329. (in English, with French summary) ["Odonata are an important component of lotic communities and their abundance and diversity may inform on the health of running waters. The survey of the odonatofauna of three major Algerian wadis: Kebir-East, Seybouse, and Rhumel, led to the identification of 40 species. Our results revealed the presence of *Calopteryx exul*, a Maghrebian endemic, at Wadi Seybouse and seemed to confirm the extinction of the type population at Wadi Rhumel where the species was first recorded in the XIXth Century. The results also indicated the range expansion of several species: *Coenagrion caeruleum*, *Orthetrum nitidum*, *Trithemis kirbyi* and *Urothemis edwardsii* whose relict population is critically endangered. Additionally sampling of abiotic factors (altitude, water temperature, conductivity, etc.) was carried out and data analysed in view of exploring a possible co-structure between the faunistic and environmental data sets. Data analysis indicated that correlation between abiotic factors (hydroperiod, water conductivity and water temperature) and species richness differed between streams and thus Odonata may prove useful in evaluating the ecological integrity of Mediterranean lotic systems." (Authors)] Address: Sanraoui, B., Biology Dept, Univ. Annaba, Annaba, Algeria. E-mail: bsamraoui@gmail.com

**16667.** Yoon, S.S.; Kim, M.-H.; Choi, S.K.; Eo, J.; Kwon, S.-I.; Song, Y.J. (2017): The development of a sampling instrument for aquatic organisms in rice paddy fields: Submerged funnel traps with attractants. *Korean Journal of Environmental Biology* 35(4): 640-647. (in Korean, with English summary) ["The need for an efficient sampling technique to collect aquatic organisms has risen with the increase of interest in rice paddy fields, which have been recognized as important ecosystems supporting biodiversity. In the present study, a submerged funnel trap used with the assistance of attracting agents (fish meal and chemical light) was designed as an easy, objective and quantitative tool for collecting aquatic organisms in the rice paddy fields. The preference for collecting aquatic organisms as a means for attracting agents was analyzed

using a generalized linear mixed model. Also, based on the data of previous research, we compared the community composition of the aquatic macroinvertebrates, which were collected using the quadrat method, and newly designed submerged funnel traps, by analyzing non-metric multidimensional scaling. The results showed that the catching efficiency of 18 of the total 65 taxa was affected by the attracting agents. 12 taxa including *Pomacea canaliculata*, *Hippeutis cantori*, *Austropeplea ollula*, *Erpobdella lineata*, *Ostracoda* spp. *Branchinella kugenumaensis*, *Hydracarina grammicus*, *Rhantus pulverosus*, *Chironomidae* spp., *Rana nigromaculata*, *Cobitidae* spp. etc., favored fish meal and 6 taxa including *Ischnura asiatica*, *Coenagrionidae* spp. *Stemolophus rufipes* etc., were attracted by chemical light. The submerged funnel trap used as a measurement tool for biodiversity was less applicable than the quadrat method; however, it was more effective for the selective collection of specific taxa. We expect that this newly designed trap can be a simple and quantitative method for collecting aquatic organisms, and could be used for long term and extensive surveys in rice paddy fields in the future." (Authors)] Address: Yoon, S.S., National Institute of Agricultural Sciences, RDA, Wanju 55365, Republic of Korea

**16668.** Younas, S.; Rehman, H.U.; Gul, S.; Gul, R.; Khattak, B. (2017): Animal diversity of district Karak, KP, Pakistan. *Journal of Entomology and Zoology Studies* 5(4): 1126-1134. (in English) ["The present study was conducted to explore the vertebrate and invertebrate fauna of district Karak, Khyber Pakhtunkhwa province of Pakistan during the period from May 2016 to May 2017. Karak includes all the vertebrates, including fishes, amphibians, reptiles, birds and mammals. During the present survey, 184 different species of the both vertebrates and invertebrates fauna of the district Karak were observed. ... and 56 species of invertebrates. So from the present study, it may be concluded that the families Cyprinidae, Ranidae, Agamidae, Phasianidae, Equidae, Bovidae, Libellulidae, Formicidae were very dominant in the district Karak." (Authors)] Address: Gul, R., Dept of Chemistry, Kohat Univ. of Science & Technology, KUST, Kohat, Pakistan

**16669.** Yukita, Y.; Ichikawa, Y. (2017): The impact of the tsunami on the habitats or dragonflies in the pacific coastal area of Aomori prefecture, northern Japan. *Tombo* 59: 2-5. ["There were several suitable habitats for dragonflies, comprising ponds and wetlands in the pacific coastal area of Aomori prefecture before the Great East Japan Earthquake and tsunami. Some of them were damaged by the big tsunami, but other water environments, including ponds and wetlands, were reproduced by the tsunami. Many insects including dragonflies invaded those areas, therefore we need to continuously observe them, because such environments are easily changed or could vanish in near future."] Address: not stated

**16670.** Zawal, A.; Thery, L.; Stoks, R.; Michonski, G. (2017): New records of host-parasite relationships between *Coenagrion scitulum* (Rambur, 1842) (Odonata) and water mite larvae (Hydrachnidia) in core and edge host populations. *Acta Parasitologica* 62(1): 38-45. (in English) ["The relationships between water mite larvae parasitizing *C. scitulum* in core

and edge populations were described. A total of 636 larvae of 7 water mite species were found on 143 *C. scitulum* adults (82 females and 61 males). *C. scitulum* was recorded for the first time as a host species for *Arrenurus cuspidator*, *A. bruzelii*, *A. bicuspidator*, *A. tricuspidator*, *A. claviger* and *Hydryphantes octoporus*. The degree of infestation by particular parasite species was typical for these species. In contrast, the parasites' preferences for host body parts were not typical, as they preferred abdominal segments 2-4, which in earlier studies had been avoided by water mite larvae. No differences were found in degree of infestation of *C. scitulum* individuals between core and edge populations, with the exception of *Hydryphantes octoporus*, which parasitized damselflies only in core populations." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**16671.** Zawal, A.; Cuber, P., Szilman, P. (2017): First records of parasitizing water mite larvae (Hydrachnidia) on damselflies (Odonata: Zygoptera) from southwestern Poland. *North-Western Journal of Zoology* 13(1): 144-148. (in English) ["We describe the relationships between the water mites *Arrenurus* s. str. and their damselfly (Zygoptera) hosts from small water bodies in the Silesian Lowland (SW Poland). We found 1088 larvae of five water mite species on 75 adult odonates belonging to six species. The prevalence of infestation was very high (92.3%) due to the cumulative effect of water temperature. This is the first record of parasitism of *Arrenurus cuspidator* on *Enallagma cyathigerum*, *A. maculatum* on *Coenagrion hastulatum*, and *A. tetracyphus* on *Lestes sponsa* and *Enallagma cyathigerum*." (Authors)] Address: Zawal, A., Dept of Invertebrate Zool. & Limnology, Univ.y of Szczecin, Waska 13, 71-415 Szczecin, Poland. E-mail: zawal@univ.szczecin.pl

**16672.** Zhang, H.-M.; Guan, Z.-Y.; Wang, W.-Z. (2017): Updated information on genus *Gomphidictinus* (Odonata: Gomphidae) in China with description of *Gomphidictinus tongi* sp. nov.. *Zootaxa* 4344(2): 321-332. ["A new gomphid species, named as *Gomphidictinus tongi* sp. nov. (Holotype ♂, Mt. Diaoluoshan, altitude 930m a.s.l., Lingshui County, Hainan Province, China) is described here. It is regarded as the third species of *Gomphidictinus* based on the presence of the basal spine on median segment of the penis organ. *Gomphidia interruptistria* Zha, Zhang & Zheng, 2005 is regarded as a junior synonym of *Gomphidictinus perakensis* (Laidlaw, 1902), which is recorded from Yunnan, China." (Authors)] Address: Zhang, H.-m., South China DNA Barcoding Center, Kunming Inst. Zool., Chinese Academy of Sciences 32 Jiaochang Donglu, Kunming 650223, China. E-mail: zhanghaomiao@mail.kiz.ac.cn

**16673.** Zhang, L.; Wen, C.-L.; Wang, M.-Y.; Yang, X.-Z.; Yuan, M.-L. (2017): The complete mitochondrial genome of *Enallagma cyathigerum* (Odonata: Coenagrionidae) and phylogenetic analysis. *Mitochondrial DNA Part B, Resources* 2(2): 640-641. (in English) ["To better understand the diversity and evolution of Odonata, we sequenced and annotated the complete mitochondrial genome (mitogenome) of *Enallagma cyathigerum*. This mitogenome was 16,661 bp in size

and encoded the typical 37 genes, i.e. 13 protein-coding genes (PCGs), 22 transfer RNA genes (tRNAs) and two ribosomal RNA genes. The nucleotide composition of the *E. cyathigerum* mitogenome was significantly biased toward A and T, with an A + T content of 74.2%. Eleven PCGs started with a typical ATN codon, whereas the remaining two PCGs (*nad1* and *nad3*) used TTG as the initial codon. All the 22 tRNAs had a typical secondary cloverleaf structure. The Bayesian phylogenetic analysis based on the concatenated nucleotide sequences of 13 PCGs strongly supported the sister relationship of *E. cyathigerum* and two *Ischnura* species from the same family Coenagrionidae. The phylogenetic tree strongly supported the monophyly of each of the two suborders (Zygoptera and Anisoptera) and recovered a phylogeny of Zygoptera + (Anisoptera + Anisozygoptera)."] Address: Zhang, L., State Key Laboratory of Grassland Agro-Ecosystems, College of Pastoral Agricultural Science & Technology, Lanzhou Univ., Lanzhou, Gansu, People's Republic of China

**16674.** Zheng, D.; Chang, S.-C.; Jarzembowski, E.A.; Wang, B. (2017): The first aeshnoid dragonfly (Odonata: Anisoptera: Telephlebiidae) from mid-Cretaceous Burmese amber. *Cretaceous Research* 72: 105-109. (in English) ["A new true dragonfly, *Cretaeshna lini* gen. et sp. nov., is described based on a forewing from mid-Cretaceous Burmese amber. *Cretaeshna* is probably a member of Telephlebiidae: Telephlebiinae, but differs from the latter in having a weakly-defined IR1 and a short pterostigma. *Cretaeshna lini* is the first aeshnid dragonfly to be found as an amber inclusion and the third Cretaceous true dragonfly recorded in amber. Our find augments the diversity of Mesozoic true dragonflies, and enhances our understanding of the palaeogeographic distribution of aeshnid dragonflies." (Authors)] Address: Zheng, D., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, China

**16675.** Zheng, D.; Nel, A.; Wang, H.; Wang, B.; Jarzembowski, E.A.; Chang, S.C.; Zhang, H. (2017): The first Late Triassic Chinese triadophlebiomorphan (Insecta: Odonatoptera): biogeographic implications. *Sci. Rep.* 7(1): 7 pp. (in English) ["The clade Triadophlebiomorpha represents a morphological 'link' between the Paleozoic griffenflies (Meganisoptera) and the modern taxa. Nevertheless they are relatively poorly known in the body structures and paleobiogeography. The Triassic dragonfly is extremely rare in China with only one previously recorded. A new family, Sinotriadophlebiidae Zheng, Nel et Zhang fam. nov., for the genus and species *Sinotriadophlebia lini* Zheng, Nel et Zhang gen. et sp. nov., is described from the Upper Triassic Bajiantan Formation of Xinjiang, north-western China. It is the second Chinese Triassic odonatopteran and the second largest Mesozoic representative of this superorder in China. The discovery provides new information for the clade Triadophlebiomorpha during the Late Triassic and expands its distribution and diversity in Asia. The find reflects a close relationship between the two Triassic entomofaunas from Kyrgyzstan and the Junggar Basin, and provides a Camian age constraint on the lowermost part of the Bajiantan Formation." (Authors)] Address: Nel, A., Lab.

Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, 75005 Paris, France.  
E-mail: anel@cimrs1.mnhn.fr

**16676.** Zheng, D.; Chang, S.C.; Nel, A.; Jarzembowski, E.A.; Zhuo, D.; Wang, B. (2017): *Electrodysagrion lini* gen. et sp. nov., the oldest *Dysagrionini* (Odonata: Zygoptera: Dysagrionidae) from mid-Cretaceous Burmese amber. *Cretaceous Research* 77: 44–48. (in English) ["The dysagrionid damselflies are relatively diverse in Burmese amber, with two genera already recorded. A new dysagrionid damselfly, *Electrodysagrion lini* Zheng, Nel and Wang, gen. et sp. nov., corresponding to the oldest record of the tribe *Dysagrionini*, is described herein. It has the unique 'sieblosiid-dysagrionine' type of discoidal cell. It differs from other genera of *Dysagrionini* in having no antenodal crossveins distal of Ax2, Arc aligned with Ax2, and only one row of cells in the cubito-anal area below the nodus. This find puts the origin of *Dysagrionini* back to at least the mid-Cretaceous." (Authors)] Address: Zheng, D., State Key Lab. Palaeobiology & Stratigraphy, Nanjing Inst. Geology & Palaeontology, Chinese Acad. Sci., 39 East Beijing Road, Nanjing 210008, China. E-mail: dranzheng@gmail.com

**16677.** Zheng, D.; Dong, C.; Wang, H.; Ye, Y.; Wang, B.; Chang, S.-C.; Zhang, H. (2017): The first damsel-dragonfly (Odonata: Isophlebioidea: Campterothlebiidae) from the Middle Jurassic of Shaanxi Province, northwestern China. *Alcheringa* 41(4): 509–513. (in English) ["Campterothlebiidae is the most diverse family of fossil odonates in China with ten genera recovered mostly from Middle Jurassic strata of Inner Mongolia. We describe a well-preserved campterothlebiid damsel-dragonfly from the Middle Jurassic Yanan Formation in Shanxi Province, northwestern China. This discovery adds to the diversity of Campterothlebiidae and identifies a new Middle Jurassic insect fossil locality in China. Within Campterothlebiidae, the new taxon most closely resembles *Ctenogampsothlebia* from the Middle Jurassic of Inner Mongolia but differs from other genera in having vein AA with four parallel posterior branches uncrossed in the anal triangle." (Authors)] Address: Zheng, D., State Key Lab. Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology, Chinese Acad. of Sciences, 39 East Beijing Road, Nanjing 210008, PR China. E-mail: dranzheng@gmail.com

**16678.** Zheng, D.; Nel, A.; Jarzembowski, E.A.; Chang, S.-C.; Zhang, H.; Xia, F.; Liu, H.; Wang, B. (2017): Extreme adaptations for probable visual courtship behaviour in a Cretaceous dancing damselfly. *Sci. Rep.* 7, 44932; 8 pp. (in English) ["Courtship behaviours, frequent among modern insects, have left extremely rare fossil traces. None are known previously for fossil odonates. Fossil traces of such behaviours are better known among the vertebrates, e.g. the hypertelic antlers of the Pleistocene giant deer *Megaloceros giganteus*. Here we describe spectacular extremely expanded, pod-like tibiae in males of a platycnemidid damselfly from mid-Cretaceous Burmese amber. Such structures in modern damselflies, help to fend off other suitors as well as attract mating females, increasing the chances of successful mating. Modern Platycnemidinae and Chlorocyphidae convergently acquired similar but less developed structures. The new

findings provide suggestive evidence of damselfly courtship behaviour as far back as the mid-Cretaceous. These data show an unexpected morphological disparity in dancing damselfly leg structure, and shed new light on mechanisms of sexual selection involving intra- and intersex reproductive competition during the Cretaceous." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**16679.** Zheng, D.R.; Nel, A.; Wang, B.; Jarzembowski, E.A.; Chang, S.-C.; Zhang, H.C (2017): The first Triassic 'Protodonatan' (Zygophlebiidae) from China: stratigraphical implications. *Geological Magazine* 154(1): 169–174. (in English) ["The clade Triadophlebioptera within the Odonoptera greatly diversified and became widely distributed worldwide during the Triassic. Although abundant insect fossils have been reported from the Triassic of China, no Triassic dragonflies have been recorded. In this paper, *Zygophlebia tongchuanensis* sp. nov., the first species of Zygophlebiidae discovered outside the Madygen Formation of Kyrgyzstan, is described from the Middle–Upper Triassic Tongchuan Formation of Shaanxi Province, northwestern China. The discovery extends the distribution of the family Zygophlebiidae in Asia, indicating a high diversity of Triadophlebioptera during Middle–Late Triassic times. Combined with the palaeontological and geochronological evidence, the age of the Tongchuan Formation is considered to be Anisian – Early Carnian, and the insect-bearing layers are considered to be Ladinian." (Authors)] Address: Zheng, D.R., Department of Earth Sciences, The University of Hong Kong, Hong Kong Special Administrative Region, China. E-mail: dranzheng@gmail.com

## 2018

**16680.** A Mahyoub, J. (2018): Mosquito larvicidal activity of seaweed extracts against *Anopheles d'thali* with reference to its side effects on aquatic non-target organisms. *International Journal of Mosquito Research* 5(6): 34–38. (in English) ["The biological effects of three Seaweed extracts *Seagrass Thalassia hemprichii*, *Sea lettuce Ulva lactuca*, and *Gray Mangrove Avicennia marina* against 4th instar mosquito larvae of *A. d'thali* were evaluated. Values of IC50 (concentration which to inhibit the emergence of 50% of mosquito adults survived from larval treatments) indicated that *A. marina* (107.3 ppm) proved to be the most effective extract against *A. d'thali*, followed by *T. hemprichii* (197.3 ppm) while the seaweed extract *U. lactuca* (335.3 ppm) was the least effective one. Variations in susceptibility levels of *An. d'thali* mosquito larvae may probably due to differences in toxicity levels among the active components of seaweed extracts. On the other hand, treatments with IC90 values of the test extracts *A. marina* (284.7 ppm), *T. hemprichii* (293.8 ppm) and *U. lactuca* (588.3 ppm) did not have any adverse effects towards some aquatic non-target organisms (Odonata naiads, aquatic hemipterous, aquatic coleopterans) prevailing in mosquito breeding sites." (Author)] Address: A Mahyoub, J., Dept of Biology Sciences, Fac. Sciences, King Abdulaziz Univ., Jeddah, Saudi Arabia



- 16681.** Abdillah, M. (2018): Distribusi, karakteristik dan perilaku capung endemik Jawa *Rhinocypha heterostigma* (Rambur, 1882) (Famili: Chlorocyphidae) die Java Timur. *Jurnal Biota* 4(2): 68-72. (in Indonesian, with English summary) ["East Java is a province that has various geographic characteristics. Some of the geographical features that exist have a forest that is habitat of dragonflies and damselflies. One of the dragonfly needles that live in the forest is *R. heterostigma*. This species spreads in Western Java and Central Java. Research on the characteristic and distribution behaviour for this species in Eastern Java has not been previously disclosed. This study aims to determine the distribution, characteristic and behaviour of *R. heterostigma* in Eastern Java. The methods undertaken in this study are direct observation and collection of specimens. Observations show several locations there are species such as Kakek Bodo Waterfall, Sumber Mangli, Mountain Pundak, Tretes Waterfall and Coban Glotak. *R. heterostigma* found in eastern Java has a dark colour pattern to almost the entire wing. Leaving a transparent colour only at the base of the wing with a slight blue pattern in the centre of the wing. This species is often found along with *Euphaea variegata* and interact to keep the territorial. This species always perch on leaf, twigs and rocks among the water streams. This study show that *Rhinocypha heterostigma* found at five locations in East Java and the highest population is at Sumber Mangli." (Author)] Address: Abdillah, M., Prodi Biologi Fakultas Sains dan Teknologi Universitas Islam Negeri Sunan Ampel Surabaya, Indonesia. E-mail: mallahsleiv@gmail.com
- 16682.** Abukenova, V.S.; Blyalova, Zh.Zh. (2018): Specification of odonatafauna species diversity in some areas of Karaganda region. *Bulletin of the Karaganda University. Biology. Medicine. Geography Series* 2(90): 53-58. (in English, with Kazkh and Russian summaries) ["The article provides information on the species composition of dragonflies in some areas of Karaganda region. Specified period, number and place of collection of odonatofauna areas are study. In order to identify the species composition according to literary sources, the author pays special attention to the peculiarities of the morphology of the Odonata. An updated faunal list of species of dragonflies submitted of the vicinities of Karaganda region. Dominant and concomitant types of dragonflies are determined. It is revealed that the background form a family of Libellulidae. In general, to the conditions of the Karaganda region the most common representatives of the family of Libellulidae, in our collections this family is represented by four genera and seven species. Dominant on the number of occurrence of the species in the city of Karaganda of the dragonfly *Sympetrum flaveolum*, codominant is *Lestes barbarus*, rare species is *Libellula fulva*, and in Shakhhtinsk is the dominant species *Libellula quadrimaculata*, codominant is *Orthetrum cancellatum*, rare species is *Platycnemis pennipes* and *Cordulia aenea*. The characteristic features of biology and ecology of mass species are highlighted and described. The article also discusses the features of seasonal activity of dragonflies, marked daily peaks of activity and mating periods." (Authors)] Address: Buketov, Ye.A., Karagandà State Univ., Kazakhstan. E-mail: zhanerke1807@mail.ru
- 16683.** Acquah-Lampsey, D.; Brandl, R. (2018): Effect of a dragonfly (*Bradinopyga strachani* Kirby, 1900) on the density of mosquito larvae in a field experiment using mesocosms. *Web Ecol.* 18: 81-89. (in English) ["Laboratory experiments with food-deprived larvae of odonates suggested that these predators may have the potential to control mosquito populations. However, it remains unclear whether larvae of odonates co-occur with mosquito larvae in the field and whether larvae of odonates reduce the density of mosquito larvae in the field. We exposed 35 water-filled concrete containers in the field in shady and sunny conditions. Some of these containers were partially covered (for simplicity called closed containers, allowing only mosquitoes to lay eggs), whereas others remained open. The density of mosquito larvae was higher in shaded containers and in closed containers. The multivoltine odonate *B. strachani* colonized open containers and the occurrence of these predators resulted in a clear reduction of the mosquito population. Our results indicate that increasing the colonization of water bodies by *B. strachani* is a promising strategy for controlling populations of mosquitoes." (Authors)] Address: Acquah-Lampsey, D., Faculty of Biology, Dept of Ecology–Animal Ecology, Philipps Universität Marburg, Karl-von-Frisch-Strasse 8, 35043 Marburg, Germany
- 16684.** Adu, B.W. (2018): The penultimate and ultimate larvae instars of *Ictinogomphus ferox* (Rambur, 1842) Odonata: Gomphidae from Igbara-oke, southwestern, Nigeria. *Journal of Entomology and Zoology Studies* 6(4): 149-152. (in English) ["*I. ferox* larva was collected at the littoral section of River Owena dam in Igbara-Oke, Nigeria. The penultimate and ultimate instars of the larva was described with the morphological character of the species and was compared with Gomphidia which is also in Nigeria. There is similarity in the general appearance of *Ictinogomphus* larva and that of the Gomphidia. But the *Ictinogomphus* is bigger than the Gomphidia both as larvae or Adults. This study is describing the larvae of *Ictinogomphus ferox* from Nigeria for the first time." (Authors)] Address: Adu, B.W., Dept Biol., the Federal Univ. Technology, Akure, Nigeria
- 16685.** Al-Hashmi, A.H.; Al-Saffar, H.H.; Augul, R.S. (2018): Key to the species of the *Orthetrum* Newman, 1833 (Odonata, Libellulidae) with a new record species in Iraq. *Bull. Iraq nat. Hist. Mus.* 15(1): 15-29. (in English, with Arabian summary) ["This paper provides an identification key to the species of *Orthetrum*, including six species that were collected from different localities in Iraq. The species of *O. anceps* (Schneider, 1845) is registered as a new record in Iraq; the most important characters which are used in diagnostic key are included." (Authors)] Address: Al-Hashmi, A.H., Department of Biology, College of Science, Al Mustansiriyah University, Baghdad, Iraq. E-mail: asmaa\_alhashmi80@yahoo.com
- 16686.** Almeida, T.R.de; Cordero-Rivera, A.; Guillermo-Ferreira, R. (2018): Female colour form has no effect on copulation duration of the polymorphic *Ischnura fluviatilis* (Odonata: Coenagrionidae). *Odonatologica* 47(3/4): 229-243. (in English) ["We studied a population of *I. fluviatilis* in Mato Grosso do Sul (Brazil), to establish the range of female colour polymorphism and associated mating behaviour. We found three female colour

forms: orange and brown, which were the immature and mature coloration of the commoner gynochrome morph, and a blue androchrome morph. We observed mating couples and analysed the relationship between copulation duration and phenotypic characteristics of males and females. There were significant differences between colours for female body size, fecundity, egg size and copulation duration, and in most cases the most deviant colour form was the immature orange. These females were significantly larger, and had the highest fecundity. Androchrome females produced smaller eggs. Copulations lasted on average 65 min, with the shortest copulation durations observed for brown females. Male size and the order of observation (indicative of seasonal effects) explained a significant proportion of variation in copulation duration, but female colour form, fecundity and size were not significant. We found evidence for assortative mating by size. Our results indicate that female colour does not explain variation in copulation duration, and therefore the possibility of cryptic male choice seems unlikely." (Authors)] Address: Almeida, T.R.de, Graduate Program in Entomology and Biodiversity Conservation, Federal University of Grand Dourados, Dourados, MS, Brazil. E-mail: thais\_keuri@hotmail.com

**16687.** Álvarez Fidalgo, M. (2018): Nuevos registros de *Coenagrion caerulescens* (Fonscolombe, 1838) en Asturias (norte de España) (Odonata: Coenagrionidae). *BVnews* 7 (93): 70-79. (in Spanish, with English summary) ["New records of *C. caerulescens* for the province of Asturias are reported, after 30 years without literature records for this region. On the other hand, these data coincide with the highest known altitude for the species on the Iberian Peninsula and in Europe. Finally, the situation of this taxon, vulnerable in Spain and decreasing in Europe, in the northwestern part of the Iberian Peninsula is analyzed." (Author)] Address: Marián Álvarez Fidalgo Experta de los Grupos de Odonata y Lepidoptera de Biodiversidad Virtual – Oviedo, Asturias, Spain. E-mail: madamcoolpix@gmail.com

**16688.** Amaya-Vallejo, V.; Novelo-Gutiérrez, R.; Realpe, E. (2018): The larva and female of *Perigomphus basicornis* Amaya-Vallejo, Novelo-Gutiérrez & Realpe, 2017, and the first record of *Perigomphus pallidistylus* (Belle, 1972) for Colombia (Insecta: Odonata: Gomphidae). *PeerJ*. 2018; 6: e5279: 17 pp. (in English) ["The larva and female of *P. basicornis* are described and illustrated, and compared with the larva and female of *P. pallidistylus*. The larva of *P. basicornis* differs from that of *P. pallidistylus* in having sternum 8 divided in five sclerites, abdominal segments 8 and 9 with small, low protuberances on the tergites and male's epiproct as long as its basal width, mainly. The female of *P. basicornis* differs from that of *P. pallidistylus* in having the apical lobes of vulvar lamina wider, with divergent tips. *P. pallidistylus* is recorded for Colombia for the first time." (Authors)] Address: Amaya-Vallejo, Vanessa, Lab. Zool. y Ecol. Acuática LAZOE, Univ. de Los Andes, Bogotá, Cundinamarca, Colombia

**16689.** Ansari, M.I.; Anwer, S.F. (2018): Numerical analysis of an insect wing in gliding flight: Effect of corrugation on suction side. *Fluid Dynamics and Materials Processing* 14(4): 259-

279. (in English) ["We have conducted a numerical study to investigate the relationship between the aerodynamic performance of an insect wing section and the effect of corrugation in gliding flight. In particular, an Airfoil-CR, corresponding to Kesel's Profile 2 (Kesel, *Journal of Experimental Biology*, vol. 203, 2000), has been used. This profile represents exactly the cross section of the so-called "*Aeshna cyanea*". A smoothed variant of this profile (referred to in the present study as Airfoil-SM) has also been considered. Introducing five different variants of the Airfoil-CR corresponding to different levels of corrugation, namely M1, M2, M3, M4 and M5, an unsteady fluid flow analysis has been carried out in the framework of a Fraction-Step Method (based on a velocity-pressure coupling scheme). Another airfoil M6 has also been considered by taking all the corrugations on the suction side simultaneously while the pressure side remains smooth. Simulations were performed for variety of Reynolds numbers ranging from 150 to 10000, while angle of attack was varied from 0° to 20°. According to the results, the performances (in terms of shear and pressure drags) change as a function of the corrugation and Reynolds number. While the performances of the Airfoil-CR are relatively good at low Reynolds numbers, its behavior changes completely at higher Reynolds number where the best performances are achieved by using the Airfoil-SM. Moreover, steady or oscillatory flow can emerge depending on the considered situations. Address: Ansari, M.I., Zakir Husain College of Engineering & Technology, Aligarh Muslim University, Aligarh, 202002, India. E-mail: mailimran99@gmail.com

**16690.** Antczak-Orlewska, O.; Tonczyk, G. (2018): Damselflies (Odonata: Zygoptera) and dragonflies (Odonata: Anisoptera) in north-eastern Poland: new records. *Odonatrix* 14-10: 3 pp. (in Polish, with English summary) ["The observations were conducted in the lakes, canals, rivers in north-eastern Poland (14 sites) in 2016. In total, 17 dragonfly species were recorded. Among them, one partially protected species: *Gomphus flavipes*." (Authors)] Address: Antczak-Orlewska, Olga, Uniwersytet Łódzki, Katedra Zoologii Bezkręgowców i Hydrobiologii, ul. Banacha 12/16, 90-237 Łódź, Poland. E-mail: olga.antczak@biol.uni.lodz.pl

**16691.** Arjangpay, A.; Darvizeh, A.; Tooski, M.Y. (2018): Effects of structural characteristics of a bionic dragonfly wing on its low velocity impact resistance. *Journal of Bionic Engineering* 15(5): 859-871. (in English) ["The influence of the structural features of dragonfly wings, including the sandwich-type configuration of longitudinal veins and the longitudinal corrugations, on the impact response of a bio-inspired structure is investigated. According to experimental observations of the wing morphology, a novel foam-based composite structure is introduced consisting of E-glass/epoxy face-sheets bonded to a polyurethane foam core. A finite element model is employed to simulate the structural responses of the biomimetic structure under low velocity impact. The initiation and evolution of the impact-induced damage in composite skins are simulated by applying a user-defined progressive damage model together with the interfacial cohesive law for intra- and inter-laminar damages, respectively. To simu-

late the nonlinear behavior of the foam core, a crushable plasticity model is implemented. The numerically obtained results are found to correlate with the experimentally measured ones, acquired by drop-weight testing on a bio-inspired structure. It is numerically predicted that reinforcing the structure with the veins gives the more impact load-bearing capacity and the longitudinal corrugation can increase the stiffness and damage resistance of the structure. Effects of the change in impact location, the configuration of the veins and the corrugated angle on damage resistance of the structures are fully discussed." (Authors)] Address: Arjangpay, A., Department of Mechanical Engineering, University of Guilan, Rasht, Iran

**16692.** Arnaudova, D.N.; Bechev, D.N. (2018): Checklists of Insects of the City of Plovdiv. Part 1: "Otdih i kultura" Park. Bull. Nat. Hist. Mus. Plovdiv, 2018, Supplement 1: 81-93. (in English, with Bulgarian summary) [The checklist of insects of "Otdih i kultura" Park, city of Plovdiv (Bulgaria) contains 442 species from 87 families and including 10 odonate species. (Authors)] Address: Arnaudova, Desislava, Univ. Plovdiv "Paisii Hilendarski", Dept of Zoology, 24 Tzar Assen Str., 4000 Plovdiv, Bulgaria. E-mail: desiarnaudova23@abv.bg

**16693.** Aroudj, N.; Touati, N. (2018): Recensement des odonates dans certaines zones humides dans la région de Bejaia. MSc thesis, Faculté des Sciences de la Nature et de la Vie, Département des Sciences Biologiques et d'Environnement, Spécialité Biologie Animale, Université A. MIRA - Bejaia: 54 pp. (in French, with English summary) ["A preliminary list on odonates from lentic environments in the Bejaia region has been established. Despite the short period of surveys on this taxon, this study reveals that these aquatic habitats are relatively rich in species because with 19 species they represent almost 1/3 of the Algerian odonatafauna. The Belou hill dam (El kseur) is a biotope more diversified in species (17 species) than the Tamelaht marsh, which contains only 12 species. The month of June seems the richest and most favourable for dragonflies development. These two environments share 10 species, 03 of them are omnipresent in all carried out surveys. The ecological structure indices applied to odonatological stands reveal that hill dam is the one that presents the best structured and most stable stands." (Authors)] Address: not stated

**16694.** Asensio-González, R. (2018): Primera cita de *Tritheimis annulata* (Palisot de Beauvois, 1807) (Odonata, Libellulidae) para Bizkaia (País Vasco, España). First record of *Tritheimis annulata* (Palisot de Beauvois, 1807) (Odonata, Libellulidae) in Bizkaia (Basque Country, Spain). Munibe, Cienc. nat. 66: 7 pp. (in Spanish, with English and Euskarian summaries) ["The first record of *T. annulata* in Bizkaia (Basque Country, Spain) is reported, confirming its peninsular expansion. Data on the habitat and the accompanying odonata fauna are included." (Author) Laukariz reservoir (Mungia, Bizkaia) on 20.10.2017] Address: cuestasensio@gmail.com

**16695.** Babu, R.; Srinivasan, G.; Subramanian, K.A. (2018): Range extension of *Ictinogomphus decoratus* (Selys, 1854) (Insecta: Odonata: Gomphidae) to India. Rec. zool. Surv. India

118(4): 426-429. (in English) ["*I. decoratus* is widely distributed in South East Asia. Here we report the range extension of the species to Indian Territory and new addition to the Indian Odonate fauna from the Little Andaman, Andaman and Nicobar Islands." (Authors)] Address: Babu, R., Southern Regional Centre, Zoological Survey of India, Chennai – 600028, Tamil Nadu, India

**16696.** Barbosa, M.S.; Rodrigues Borges, L.; Vilela, D.S.; Venâncio, H.; Santos, J.C. (2018): Comunidade de odonatas de um trecho do Reservatório Sucupira, Rio Uberabinha, Uberlândia, Minas Gerais. Trabalho de Conclusão de Curso (Graduação em Ciências Biológicas) – Universidade Federal de Uberlândia, Uberlândia: 36 pp. (in Portuguese, with English summary) ["Dragonflies (Insecta: Odonata) are widely distributed among freshwater ecosystems of tropical and temperate environments and are sensitive to anthropogenic changes. The objective of this study was to inventory the odonate fauna of a section of the Scupira Reservoir on the Rio Uberabinha, Uberlândia, Minas Gerais, Brazil, and to analyze if seasonal patterns influence its diversity. In addition, the studied proposed to describe the Brazilian distribution of the species sampled. Sampling took place during the dry (August-September 2017) and rainy (February-March 2018) seasons, and recorded 860 individuals of 42 species belonging to 26 and six families. Seven new records for the Triângulo Mineiro Region were recorded, representing the families Gomphidae, Libellulidae and Coenagrionidae. 17 species were exclusive to the rainy season and seven to the dry season, while 18 species were found in both. The rainy season had greater abundance, with four times as many individuals as the dry season. This study contributes by increasing the number of records for odonate species in the Cerrado of Minas Gerais, and reinforces the trend for a greater predominance of this group during the rainy seasons in this biome." (Author)] Address: Silva Barbosa, Marcela, Universidade Federal de Uberlândia (UFU), Instituto de Biologia (INBIO), Laboratório de Ecologia, Evolução e Biodiversidade (LEEBIO). Avenida Amazonas, 20, CEP 38405-302, Uberlândia, MG, Brasil. E-mail: marcela.2802@outlook.com

**16697.** Barbotte, Q.; Ruffoni, A. (2018): Réflexion sur l'utilisation de l'autochtonie des odonates à différentes échelles. Revue scientifique Bourgogne-Franche-Comté Nature 27: 277-290. (French, with English summary) ["At this time, regional Odonata datasets are substantial (usually thousands of data; around 100 000 for Burgundy-Franche-Comté), especially with monitoring for atlas or programs on endangered species. It becomes difficult to analyze such data, particularly concerning the establishment of populations on aquatic environment, because dragonflies tend to move away from their reproduction sites. The aim of the methodology is to identify high stakes stations and to create sophisticated regional maps. This work, based at first on bibliography, provides an autochthony level for species, like reproduction clues for birds, at different scales (station, plot level). In its application, the qualification of an autochthony level is more flexible at plot level than station level where it's strict. To be realized semi-automatically, data needs to be refined (biotopes, numbers, mating,



exuvia, etc.), presence of potential biotopes for dragonflies listed, and computer requests need to be done. The methodology works fairly well for the burgundy dataset and more easily on non streaming environments than on streaming environments, but it may need some requirements modifications." (Authors)] Address: Barbotte, Q., Société d'histoire naturelle d'Autun, France. E-mail: shna.quentin@orange.fr

**16698.** Barnard, A.A.; Masly, J.P. (2018): Divergence in female damselfly sensory structures is consistent with a species recognition function but shows no evidence of reproductive character displacement. *Ecology and Evolution* 8(23): 12101-12114. (in English) ["Males and females transmit and receive signals prior to mating that convey information such as sex, species identity, or individual condition. In some animals, tactile signals relayed during physical contact between males and females before and during mating appear to be important for mate choice or reproductive isolation. This is common among odonates, when a male grasps a female's thorax with his terminal appendages prior to copulation, and the female subsequently controls whether copulation occurs by bending her abdomen to complete intromission. It has been hypothesized that mechanosensory sensilla on the female thoracic plates mediate mating decisions, but it has been difficult to test this idea. Here, we use North American damselflies in the genus *Enallagma* (Odonata: Coenagrionidae) to test the hypothesis that variation in female sensilla traits is important for species recognition. *Enallagma anna* and *E. carunculatum* hybridize in nature, but experience strong reproductive isolation as a consequence of divergence in male terminal appendage morphology. We quantified several mechanosensory sensilla phenotypes on the female thorax among multiple populations of both species and compared divergence in these traits in sympatry versus allopatry. Although these species differed in features of sensilla distribution within the thoracic plates, we found no strong evidence of reproductive character displacement among the sensilla traits we measured in regions of sympatry. Our results suggest that species-specific placement of female mechanoreceptors may be sufficient for species recognition, although other female sensory phenotypes might have diverged in sympatry to reduce interspecific hybridization." (Authors)] Address: Barnard, Alexandra, Ecology and Evolutionary Biology Program, Dept of Biology, University of Oklahoma, Norman, OK. USA. Email: alex.barnard@ou

**16699.** Batzer, D.P.; Murray, K.M. (2018): How important are aquatic predators to mosquito larval populations in natural wetlands? A case study from Carolina bays in Georgia. *Wetlands Ecology and Management* 26: 391-397. (in English) ["Predation is believed to be an important natural control on larval mosquito populations. However, empirical evidence for predator impacts is lacking, especially from natural wetlands (swamps and marshes). Over a 2-year period, we sampled larval mosquito populations and naturally co-occurring predator assemblages (aquatic invertebrates, fishes) from ten depressional wetlands (Carolina bays) located on a wildlife management area in east central Georgia. We collected a diversity of mosquito larvae and predators (odonates, bugs, beetles, flies, and fishes) from the wetlands, with

However, using a community ecology approach with multivariate ordination and correlation techniques, we found no compelling evidence that these predators were controlling mosquito larval distributions (i.e. significant negative *Coquillettidia perturbans*, *Anopheles crucians*) appear well adapted to co-exist with a plethora of naturally occurring predators." (Authors)] Address: Murray, Kelly, Dept of Entomology, University of Georgia, Athens, USA

**16700.** Baux, V.; Krieg-Jacquier, R. (2018): *Leucorrhinia pectoralis* dans l'Ain: rigueur dans les inventaires, conséquences sur la gestion des habitats et la pérennité des populations. 2018. *Revue scientifique Bourgogne-Franche-Comté Nature* 27: 179-190. (in French, with English summary) ["Registered in Annex II and IV of the Habitats Directive, *L. pectoralis* is a protected species in France included in the Plan national d'actions en faveur des Odonates (PNAO) and regarded as « Near Threatened ». In Auvergne-Rhône-Alpes, it is included in the regional implementation of the PNAO and has the same status. To date, knowledge on the distribution of the species in the department of Ain is fragmentary and based mainly on observation of imagos. With the exception of one research, the data concerning reproduction and therefore the presence of perennial populations do not make it possible to decide on the conservation status of the species considered « Near Threatened » in 2013. For two years, after the announcement of a one year drying up of a major site for this species, we study the distribution and behavior of this species in the department. The poor results obtained against the prospecting endeavour suggest that the species is at serious risk of extinction. Today there are possible threats on the species (destruction, drying up of sites, habitat changes) and it is possible that its current status in Ain and hence in Rhône-Alpes is too optimistic. The risk is weighed down since the managers of the departmental natural areas seem to have underestimated the precarious situation of this species that they are supposed to protect." (Authors)] Address: Krieg-Jacquier, R., Groupe de recherche et de protection des Libellules *Sympetrum*. E-mail: regis.krieg.jacquier@gmail.com

**16701.** Bechly, G. (2018): First record and a new species of the fossil dragonfly genus *Proinogomphus* (Odonata: Liassogomphidae) from the Early Jurassic of Bascharage in the Grand Duchy of Luxembourg. *Zootaxa* 4450(1): 108-114. (in English) ["A new species of fossil dragonfly, *Proinogomphus kreuzerorum* sp. nov. (Liassogomphidae), is described from the Early Jurassic black shale of Bascharage in the Grand Duchy of Luxembourg, based on a very well-preserved isolated female hind wing. This genus was previously only known from the Liassic of Braunschweig region in Germany, and is here recorded for the first time for this fossil locality. The classification of the family Liassogomphidae Tillyard, 1935 and the genus *Proinogomphus* Cowley, 1942 is briefly discussed and the diagnosis of the latter is emended." (Author)] Address: Bechly, G., Biologic Institute, Redmond, WA, USA. E-mail: gbechly@biologicinstitute.org

**16702.** Bechly, G. (2018): *Chrismooreia michaelbehei* gen. et sp. nov. (Insecta: Odonata: Asiopteridae), a new fossil damsel-dragonfly from the Early Jurassic of England. *BIO-Complexity* 2018(1): 1–10. doi:10.5048/BIO-C.2018.1. (in English) ["A new fossil damsel-dragonfly *Chrismooreia michaelbehei* gen. et sp. nov. (Insecta: Odonata: Asiopteridae) is described from the Early Jurassic of Charmouth in England. This fossil is the best preserved and first complete specimen of the Mesozoic family Asiopteridae, which was previously only known from isolated wings, and actually represents one of the most complete Liassic odonates known. Body characters are described for the first time and include compound eyes that meet dorsally, robust thorax, legs with short spines, and very long leaf-like cerci. The forewing venation features a short fusion of AA+Cu with MP near the tip of the discoidal cell, which is an absolutely unique character state within the order Odonata, here described for the first time. The wing venation shows a mixture of sphenophlebiid and asiopterid characters, with the latter characters dominating. The classification of Sphenophlebiidae is discussed and its synonymy with Asiopteridae is tentatively rejected, but not ruled out. As further addition to the Liassic odonate fauna from the Charmouth fossil locality, a specimen of *Protomyzomelane* cf. *brunonis* is featured but not formally described as first record of the suborder Archizygoptera and the family Protomyzomelantidae." (Author)] Address: Bechly, G., Biologic Inst., Redmond, Washington, USA. E-mail: gbechly@biologicinstitute.org

**16703.** Bernard, R.; Daraz, B.; Dabert, M. (2018): Redescription of *Ceriagrion mourae* with notes on its position in the genus *Ceriagrion* (Odonata: Coenagrionidae). *International Journal of Odonatology* 21(2): 151-163. (in English) ["The poorly known *C. mourae* is redescribed based on the first material from Zambia and compared with the similar *C. banditum*, *C. junceum* and *C. suave*. Molecular data place *C. mourae* as a sister taxon to the clade (*C. bakeri* (*C. banditum*, *C. junceum*)). Genetic distances between the above-mentioned species are similar at c.7–9% (K2P). Analysis of all published *Ceriagrion* COI sequences revealed a barcoding gap (c.2–6.5%) in the pairwise distance distribution and grouped African sequences according to the known species, except *C. suave* and *C. glabrum*. *C. mourae* was only found at a pool on a temporary stream, which differed from others in the study area by its combination of vegetation and shading. The Zambian locality and two earlier known sites in Mozambique and Tanzania are scattered across the plains and low hills of eastern and southern central Africa." (Authors)] Address: Bernard, R., Dept Nature Education & Conservation, Fac. Biology, Adam Mickiewicz Univ. in Poznan, Poland. E-mail: rbernard@amu.edu.pl

**16704.** Blanke, A. (2018): Analysis of modularity and integration suggests evolution of dragonfly wing venation mainly in response to functional demands. *J. R. Soc. Interface* 15: 20180277. <http://dx.doi.org/10.1098/rsif.2018.0277>. 10 pp. (In English) ["Insect wings show a high variability in wing venation. Selection for function, developmental pathways and phylogeny likely influenced wing vein diversification, however, quantitative data to estimate these influences and their interplay are missing. Here, it is tested how dragonfly wing vein configuration is influenced

by functional demands, development, phylogeny and allometry using the concepts of modularity and integration. In an evolutionary context, modules are sets of characters that evolve in relative independence to other characters, while integration refers to a high degree of association between subparts of a structure. Results show allometric and phylogenetic signal in the wing shape variation, however, patterns of integration and modularity are not influenced by these two factors. Overall, dragonfly wings are highly integrated structures with almost no modular signal. Configuration changes in one wing vein or wing area thus influence wing shape as a whole. Moreover, the fore- and hindwings correlate with each other in their evolutionary shape variation supporting biomechanical data of wing interdependence. Despite the overall high degree of evolutionary integration, functional hypotheses of modularity could be confirmed for two wing areas, the arculus–triangle complex at the base of the wing which is responsible for passive wing folding especially during flapping flight and the location of the pterostigma, a coloured wing cell which is more heavy than other wing cells and passively regulates wing pitch as well as critical flight speeds during gliding. Although evolving as distinct modules, these specific vein regions also show high integration and evolve at the same rates like the whole wing which suggests an influence of these structures on the shape evolution of the rest of the wing. Their biomechanical role as passive regulators of wing corrugation and wing pitch suggests that these structures decisively influenced the evolution of advanced modern flight styles and explains their retention once they had evolved early within the lineage Odonoptera." (Author)] Address: Blanke, A., Inst. Zoology, Biocenter Cologne, Univ. Cologne, Zùlpicher Str. 47b, 50674 Köln, Germany

**16705.** Bössneck, U.; Hampel, I. (2018): Die Schutzgebiete der Landeshauptstadt Erfurt (Thüringen). Teil XXVI: Flora und Fauna des GLB „Geraue Kühnhausen“. *Vernate* 37: 63-92. (in German, with English summary) [During widespread floristic and faunistic investigations in the area of the "Geraue Kühnhausen" reserve, 972 animal and plants species were verified including five odonate species. (Authors)] Address: Hampel, Inga, Stadtverwaltung Erfurt, Umwelt- und Naturschutzamt Stauffenbergallee 18, 99085 Erfurt, Germany. E-mail: inga.hampel@erfurt.de

**16706.** Borisova, N.V.; Karolinsky, E.A. (2018): The annotated list of dragonflies (Insecta: Odonata) of the state Nature Reserve "Prisursky". *Scientific works of the Prisursky State Nature Reserve* 33: 86-90. (in Russian, with English summary) ["A preliminary list of 36 dragonfly species belonging to eight families from the State Nature Reserve «Prisursky» is given. The list is based on original and literature data obtained in 2010–2018. Seven dragonfly species are registered at the reserve for the first time. *Orthetrum albistylum* (Selys, 1848) is a new find for the fauna of the Chuvash Republic." (Authors)] Address: Borisova, N.V. Russia, Cheboksary, FSBI "Prisursky State Reserve", Chuvash Branch of the Russian Entomological Society, Russia. E-mail: natborisova18@yandex.ru

**16707.** Bossley, J.P.; Smiley, P.C. (2018): Effects of student-induced trampling on aquatic macroinvertebrates in

agricultural headwater streams. *Water* 2018, 10(1), 77; doi:10.3390/w10010077: 15 pp. (in English) ["Outdoor education (OE) stream classes provide students with an opportunity to gain hands-on experience with sampling methods for evaluating stream water quality. Trampling by students as a result of stream classes may disrupt the substrate and negatively impact aquatic macroinvertebrates. The impact of student-induced trampling in headwaters as a result of stream classes on aquatic macroinvertebrates has not been evaluated. Our aim was to document the short-term macroinvertebrate responses to an experimental disturbance that simulated the impacts of trampling by students in riffles within small headwater streams. We measured hydrologic variables, visually estimated substrate composition and sampled aquatic macroinvertebrates within control and experimental riffles in three agricultural headwater streams in central Ohio one day prior to experimental disturbance, immediately after disturbance and one day after disturbance. Hydrologic variables and substrate type did not differ daily or between riffle types. Macroinvertebrate abundance, percentage of Ephemeroptera Plecoptera Trichoptera and percentage of Leuctridae increased after experimental disturbance, while diversity, evenness, percentage of clingers and non-metric multidimensional scaling (NMS) axis 1 site scores declined after disturbance. Macroinvertebrate diversity, percent clingers and NMS axis 1 site scores were lower in experimental riffles than control riffles. None of the macroinvertebrate response variables exhibited a significant interaction effect of day × riffle type that is indicative of an effect of the experimental disturbance. Our results suggest the one-time use of an undisturbed riffle within an agricultural headwater stream for an OE stream class is not likely to impact aquatic macroinvertebrates."] Address: Bossley, J.P., Environmental Science Graduate Program, The Ohio State University, 3138A Smith Lab, 174 West 18th, Columbus, OH 43210, USA

**16708.** Bota-Sierra, C.A.; Sánchez-Herrera, M.; Palacino-Rodríguez, F. (2018): Odonata from protected areas in Colombia with new records and description of *Cora verapax* sp. nov. (Zygoptera: Polythoridae). *Zootaxa* 4462(1): 115-131. (in English) ["Colombia is one of the megadiverse countries in the world, but paradoxically it is one of the less explored. The recent red list assessments show the country has the highest number of endangered species in the Neotropical region. Nevertheless, the sampling effort is low especially in protected areas, which probably can harbor some of the rare species included in the red list. As a result of recent surveys in six protected areas of Colombia, we report twelve new records and describe *Cora verapax* sp. nov., a rare species, collected after more than 300 days of field surveys at the National Natural Park Tatamá. In addition, we compiled and mapped published Odonata records from 2001 until now for Colombian protected areas (136 spp.). Among the new records, some species were formerly known as endemics from Panama and Ecuador, and five species are reported for the first time inside protected areas, showing the importance of surveys in these special territories and bringing new data for conservation actions, as red

list assessment or future management plans." (Authors)] Address: Sánchez-Herrera, Melissa, Facultad de Ciencias Naturales y Matemáticas. Universidad del Rosario, Bogotá, Colombia. E-mail: melsanc@gmail.com

**16709.** Bouiedda, N.; Amari, H.; Guebailia, A.; Zebza, R.; Boucenna, N.; Hadjadj, S.; Mayache, B.; Houhamdi, M.; Khelifa, R. (2018): Reproductive behaviour of *Erythromma lindenii* in North-east Algeria (Odonata: Coenagrionidae). *Odonatologica* 47(3/4): 267-276. (in English) ["The reproductive behaviour of the Atlanto-Mediterranean *E. lindenii* has been studied before in Europe, but not in North Africa where the climate is warmer. We investigated the reproductive behaviour in a natural population in Northeast Algeria. We found that the species is non-territorial with quasi-exclusive underwater oviposition. The duration of underwater oviposition was positively correlated to the maximum water depth. We suggest that females predominantly lay eggs underwater to avoid water evaporation, which is common in North Africa. We discuss the differences in the reproductive behaviour between European populations and one in North Africa." (Authors)] Address: Bouiedda, N., Dept Environ. & Agronomic Sciences, Fac. of natural & life sciences, Univ. of Mohamed Essadik Ben Yahia, Jijel 18000, Algeria. E-mail: aminaguebailia@gmail.com; nbouiedda@yahoo.com

**16710.** Brand, P.; Robertson, H.M.; Lin, W.; Pothula, R.; Klingeman, W.E.; Jurat-Fuentes, J.J.; Johnson, B.R. (2018): The origin of the odorant receptor gene family in insects. *eLife* doi: 10.7554/elife.38340: 13 pp. (in English) ["The origin of the insect odorant receptor (OR) gene family has been hypothesized to have coincided with the evolution of terrestriality in insects. Missbach et al. (2014) suggested that ORs instead evolved with an ancestral OR co-receptor (Orco) after the origin of terrestriality and the OR/Orco system is an adaptation to winged flight in insects. We investigated genomes of the Collembola, Diplura, Archaeognatha, Zygentoma, Odonata, and Ephemeroptera, and find ORs present in all insect genomes but absent from lineages predating the evolution of insects. Orco is absent only in the ancestrally wingless insect lineage Archaeognatha. Our new genome sequence of the zygentoman firebrat *Thermobia domestica* reveals a full OR/Orco system. We conclude that ORs evolved before winged flight, perhaps as an adaptation to terrestriality, representing a key evolutionary novelty in the ancestor of all insects, and hence a molecular synapomorphy for the Class Insecta." (Authors)] Address: Brand, P., Dept of Evolution and Ecology, Center for Population Biology, University of California, Davis, Davis, USA. E-mail: pbrand@ucdavis.edu

**16711.** Broyer, J.; Richier, S.; Renaud, C.; Riotton-Roux, B.; Vade, J.-Y. (2018): Consequences of fish farming demise for bird and Odonate species richness in French fishponds. *Revue d'Ecologie* 73(4): 462-473. (in English, with French summary) ["Fishponds are anthropogenic aquatic ecosystems where biodiversity is shaped by fish farming practices. Little is known on the consequences of fish farming cessation. This study describes the variation of species richness in breeding birds and Odonates, between ponds either managed for fish farming, or abandoned, for 4-10 years or > 10 years, in



Sologne (Centre Val-de-Loire region, central France). ... Odonate richness seems to depend on the development of low emergent vegetation. The absence of carp stocking did not correlate with higher frequency for any species. Conservation of low helophyte belts then seems to be the proper management to meet Odonate requirements." (Authors)] Address: Broyer, J., Office National de la Chasse et de la Faune Sauvage, Direction de la Recherche et de l'Expertise, Montfort, 01330 Birieux, France. E-mail: joel.broyer@oncfs.gouv.fr

**16712.** Buczynski, P. (2018): Recenzja – Review. Andrzej Staskowiak, Ryszard Sowa: Wazki Ziemi Skarżyskiej [Damselflies and dragonflies of Skarżysko Land]. PiS Agencja Reklamowo-Wydawnicza, Skarżysko-Kamienna 2018, 126 s. ISBN 978-83-63423-42-1. *Odonatrix* 14\_15 (2018): 3 pp. (in Polish, with English summary) ["The review deals with a book about the odonates of the Skarżysko County (Central Poland, north of Kielce). This book is an interesting combination of a photo album, a popular science book and a faunistic monograph. In the years 2010-2017, the authors have found 52 species; some of them are threatened, legally protected and/or interesting for faunistic and zoogeographic reasons (e.g. *Nehalennia speciosa*, *Aeshna subarctica*, *Ophiogomphus cecilia*, *Epithea bimaculata*, *Cordulegaster boltonii*, *Crocothemis erythraea*, *Sympetrum fonscolombii*, *Leucorrhinia albifrons*, *L. pectoralis*). The occurrence of each species is commented on and illustrated by pictures of imagines and their habitats. This book enriches the knowledge about the occurrence of dragonflies in Poland and Central-Eastern Europe. It should also contribute to the increase of environmental consciousness and education in the studied region." (Author)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**16713.** Buczynski, P.; Obloza, P. (2018): First record of the introducing of exotic dragonfly *Ischnura senegalensis* (RAMBUR, 1842) (Odonata: Coenagrionidae) into Poland. *Odonatrix* 14\_1: 8 pp. (in Polish, with English summary) ["Four females and two males of *I. senegalensis* emerged in March 2018 in Siedlce (Central-Eastern Poland) in a home aquarium with tropical plants, strongly illuminated, with a constant water temperature of 26 °C, with water enriched with CO<sub>2</sub> and fertilized. They probably entered the aquarium as eggs on plants imported from Asia via the Netherlands, which were planted during the so-called restart of this aquarium. The developmental time to the imaginal stage lasted from 38 to 45 days, which is consistent with the data from the breeding at room temperature in Taiwan. This is hardly the third known case of the introduction of an exotic dragonfly into Poland. Earlier, *Mecistogaster* sp. and *Crocothemis servilia* were recorded. There is probably a very large "dark figure" of such cases, due to the fact that odonatologists usually work in the field and the reared dragonflies rarely get out of the closed rooms. So far, none of the introduced species has been acclimatized in Europe, but it cannot be excluded that this will happen if a species from a similar climatic zone arrives here, or if the current increase in air temperatures will continue. Therefore, it is worth observing this phenomenon by visiting distribution centres of aquarium plants

and cooperating with aquarists." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**16714.** Büsse, S.; Heckmann, S.; Hornschemeyer, T.; Bybee, S.M. (2018): The phylogenetic relevance of thoracic musculature: a case study including a description of the thorax anatomy of Zygoptera (Insecta: Odonata) larvae. *Systematic Entomology* 43(1): 31-42. (in English) ["New morphological techniques allow for the evaluation of novel character systems that are potentially important for phylogenetic analysis. Only a few studies so far have used character systems from the insect thorax for phylogenetics; the reasons for this might include a lack of common terminology or established homology for pterygote insect thorax musculature. Still, recent studies have proposed common terminology and hypotheses of homology, now allowing for an evaluation of thoracic morphological character systems among the groups of winged insects. Using X-ray microtomography ( $\mu$ CT) we present a detailed study of the thorax musculature of Odonata as an important phylogenetic character system, with a matrix of 298 characters with 697 character states, including novel data from the thoracic anatomy of eight damselfly larvae. We also included additional Odonata, Ephemeroptera and Neoptera taxa from the literature and demonstrate the phylogenetic relevance of this character system by reproducing phylogenetic topologies of established relationships. We also compared high-resolution data from Odonata larvae from our study and from recent literature with data from older literature in the adult Odonata. All major clades were successfully recovered, (e.g. Odonata, Epirocta, Anisoptera and Zygoptera) with high node support, but obtained higher phylogenetic resolution with the larval data. The best phylogenetic resolution was achieved by combining the adult and larval characters. The taxon sampling and character matrix is the largest to date and underlines the potential relevance of the thorax musculature as an important phylogenetic character system." (Authors)] Address: Büsse, S., Functional Morphology and Biomechanics, Zoological Inst., Christian-Albrechts-Univ., Am Botanischen Garten 9, 24118 Kiel, Germany. E-mail: sbuesse@zoologie.uni-kiel.de

**16715.** Büsse, S.; Gorb, S.N. (2018): Material composition of the mouthpart cuticle in a damselfly larva (Insecta: Odonata) and its biomechanical significance. *Royal Society Open Science* 5: 172117. <http://dx.doi.org/10.1098/rsos.172117>: 15 pp. (in English) ["Odonata larvae are key predators in their habitats. They catch prey with a unique and highly efficient apparatus, the prehensile mask. The mandibles and maxillae, however, play the lead in handling and crushing the food. The material composition of the cuticle in the biomechanical system of the larval mouthparts has not been studied so far. We used confocal laser scanning microscopy (CLSM) to detect material gradients in the cuticle by differences in autofluorescence. Our results show variations of materials in different areas of the mouthparts: (i) resilin-dominated pads within the membranous transition between the labrum and the anteclypeus, which support mobility and might provide shock absorption, an adaptation against mechanical damage; (ii) high degrees of sclerotization in the incisivi of the mandibles, where

high forces occur when crushing the prey's body wall. The interaction of the cuticle geometry, the material composition and the related musculature determine the complex concerted movements of the mouthparts. The material composition influences the strength, mobility and durability of the cuticular components of the mouthparts. Applying CLSM for extracting information about material composition and material properties of arthropod cuticles will considerably help improve finite-element modelling studies." (Authors)] Address: Gorb, S.N., Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**16716.** Buss, N.; Hua, J. (2018): Parasite susceptibility in an amphibian host is modified by salinization and predators. *Environmental Pollution* 236: 754-763. (in English) ["Secondary salinization represents a global threat to freshwater ecosystems. Salts, such as NaCl, can be toxic to freshwater organisms and may also modify the outcome of species interactions (e.g. host-parasite interactions). In nature, hosts and their parasites are embedded in complex communities where they face anthropogenic and biotic (i.e. predators) stressors that influence host-parasite interactions. As human populations grow, considering how anthropogenic and natural stressors interact to shape host-parasite interactions will become increasingly important. We conducted two experiments investigating: (1) the effects of NaCl on tadpole susceptibility to trematodes and (2) whether density- and trait-mediated effects of a parasite-predator (i.e. damselfly) and a host-predator (i.e. dragonfly), respectively, modify the effects of NaCl on susceptibility to trematode infection. In the first experiment, we exposed tadpoles to three concentrations of NaCl and measured parasite infection in tadpoles. In the second experiment, we conducted a 2 (tadpoles exposed to 0 g L<sup>-1</sup> NaCl vs. 1 g L<sup>-1</sup> NaCl) x 4 (no predator, free-ranging parasite-predator (damselfly), non-lethal host-predator (dragonfly kairomone), and free-ranging parasite-predator + dragonfly kairomone) factorial experiment. In the absence of predators, exposure to NaCl increased parasite infection. Of the predator treatments, NaCl only caused an increase in parasite infection in the presence of the parasite-predator. However, direct consumption of trematodes caused a reduction in overall infection in the parasite-predator treatment. In the dragonfly kairomone treatment, a reduction in tadpole movement (i.e. trematode avoidance behavior) led to an increase in overall infection. In the parasite-predator + dragonfly kairomone treatment, antagonistic effects of the parasite-predator (reduction in trematode abundance) and dragonfly kairomone (reduction in parasite avoidance behavior) resulted in intermediate parasite infection. Collectively, these findings demonstrate that NaCl can increase amphibian susceptibility to parasites, and underscores the importance of considering predator-mediated interactions in understanding how contaminants influence host-parasite interactions." (Authors)] Address: Buss, N., Biological Sciences Department, Binghamton University (SUNY), Binghamton, NY 13902, USA. E-mail: nbuss1@binghamton.edu.

**16717.** Buttstedt, L.; Zimmermann, W.; Serfling, C. (2018): Langzeituntersuchung eines gemeinsamen Vorkommens

von Helm- und Vogel-Azurjungfer in Nordthüringen. *Landchaftspflege und Naturschutz in Thüringen* 55(1): 11-19. (in German, with English summary) ["In Thuringia the evidence of the rare *C. ornatum* was first successfully proven in 1998 in the Helme-Unstrut lowland near Artern. At that time this area was a highly frequented and extended incidence of *C. mercuriale*. In 1999 the Natura 2000 site „Mönchenried und Helmegräben bei Artern" was designated to protect this species. From 1999 until 2014 a long-term monitoring in this Natura 2000 site took place supported by the Thuringian State Office for Environment and Geology. Of the 14 Stretches of water that were inhabited by *C. mercuriale* by 2014 only eight had remained. These incidences showed strong fluctuations in population sizes. By 2016 three more of those habitats had gone. For *C. ornatum* by 2014 only one out of the original seven incidences had survived. Throughout the whole study area a severe decline in the overall frequency of both species was recorded and these initially trans-regionally important population densities had seriously declined (population densities from up to 560 individuals of *C. mercuriale* and up to 130 individuals of *C. ornatum* per 100 m). The larvae prefer slightly flooded mud ponds in which the hatching also takes place. The main waterway is barely populated. Reasons for the decline are the uncertain yearly flow of many of the ditches, profile changes to the Kleine Helme that were implemented for flood protection as well as the changes in the water Vegetation due to nutrient discharges (eutrophication) and insufficient Conservation of water bodies. Furthermore, the *Nutria Myocastor coypus* feeds on the wintergreen submerged Vegetation, which then prevents successful laying of eggs (oviposition). The implementation of an existing species-assistance concept and of the Natura 2000 management plan as well as further reaching measures dealing with large-scale drying-up and eutrophication are urgently needed as is the involvement of experts." (Authors)] Address: Büttstedt, L., Ziegeleistr. 26 OT Roßla • 06365 Südharz, Germany. E-mail: lothar-buttstedt@t-online.de

**16718.** Cabana, M.; Cordero-Rivera, A.; Romeo, A. (2018): *Brachytron pratense* (Odonata: Aeshnidae) en la Península Ibérica: distribución, fenología y estado de conservación. *Boln. S.E.A.* 63: 343-347. (in Spanish, with English summary) ["*B. pratense* is a quasi-endemic species of the European continent, distributed in a large part of central Europe, where it is abundant and frequent. However, in the Iberian Peninsula it is scarce and very localized, being found exclusively in the coast. During the last years we have carried out specific samplings for the detection of new populations of this species in Galicia, considerably expanding its distribution area in the region. A bibliographic review of the Iberian records of the species has been carried out, which has allowed us to establish a coastal Eurosiberian distribution pattern, with Galicia being the autonomous region with the largest number of populations and UTM squares of 10x10 km with presence of *B. pratense*." (Authors)] Address: Cabana, M., Grupo de Investigación en Biología Evolutiva (GIBE), Depto de Biología, Fac. de Ciencias, Univ. da Coruña, Campus da Zapateira, s/n, 15071 A Coruña, Spain. E-mail: mcohylla@gmail.com

- 16719.** Cabuga Jr, C.C.; Dedel, J.I.C.; Delabahan, I.C.B.; Ayaton, M.A.; Busia, M.A.; Billuga, N.P.; Angco, M.K.A.; Havana, H.C. (2018): Wing shape variations in *Calopteryx splendens* along a latitudinal gradient using geometric morphometric analysis. *J. Bio. Env. Sci.* 12(3): 73-92. (in English) ["Fluctuating asymmetry (FA) quantifies the degree of variations from a perfect symmetry and therefore expected to reflect the state of genomic and ecological stress undergone by the single species and or populations throughout its development. It identifies the extent of differences from the symmetry of left and right sides of the organisms, as both sides are expected to be identical from its genetic activity and within the environment they inhabit. In this study, geometric morphometric was utilized to measure wing shape variation in the populations of *Calopteryx splendens*. A total of 120 samples consisting of 30 males and 30 females were randomly collected each of the latitudinal gradient and subjected to Procrustes ANOVA and Principal Component Analysis (PCA) by means of Symmetry and Asymmetry in Geometric Data (SAGE) software. In the three factors analyzed: individuals, sides, and individual  $\times$  sides result shows that the collected samples from the high altitude displayed high significant difference ( $P < 0.0001$ ) in the female forewings and hindwings while male forewings and hindwings showed partly non-significant. Whereas, the collected samples from the lower altitude result shows high significant difference ( $P < 0.0001$ ) in the female and male forewings while female and male hindwings shown partly non-significant. It implies that latitudinal gradients could influence wing shape pattern and phenotypic variability was evident between species of the same lineage. Further, utilizing geometric morphometrics is essential in identifying wing shape variations and co-variations among species relatively of the same ancestry." (Authors)] Address: Cabuga Jr, C.C., Biol. Dept, Caraga State Univ., Ampayon, Butuan City, Philippines
- 16720.** Cai, Y.-Y.; Gao, Y.-J.; Zhang, L.-P.; Yu, D.-N.; Storey, K.B.; Zhang, J.-Y. (2018): The mitochondrial genome of *Caenis* sp. (Ephemeroptera: Caenidae) and the phylogeny of Ephemeroptera in Pterygota. *Mitochondrial DNA Part B* 3(2): 477-579. (in English) ["The phylogenetic relationship between Ephemeroptera (mayflies) and Odonata remains hotly debated in the insect evolution community. We sequenced the complete mitochondrial genome of *Caenis* sp. to discuss the phylogenetic relationship of Palaeoptera. The mitochondrial genome of *Caenis* sp. is a circular molecule of 15,254 bp in length containing 37 genes (13 protein-coding genes, 22 tRNAs, and 2 rRNAs), which showed the typical insect mitochondrial gene arrangement. In BI and ML phylogenetic trees using 71 species of 12 orders, our results support the Ephemeroptera as the basal group of winged insects." (Authors)] Address: Cai, Y.-Y., College of Chemistry and Life Science, Zhejiang Normal University, Jinhua, Zhejiang Province, China
- 16721.** Camuñas Mohinelo, F.; Álvarez Fidalgo, M. (2018): Primer registro de *Anax ephippiger* (Burmeister, 1839) en la provincia de Albacete (Castilla-La Mancha, sureste de España) (Odonata: Aeshnidae). First record of *Anax ephippiger* (Burmeister, 1839) in the province of Albacete (Castilla-La Mancha, southeastern Spain) (Odonata: Aeshnidae). *BVNPC* 7(100): 146-149. (in Spanish, with English summary) ["The occurrence of *A. ephippiger*, a species rarely observed in the community of Castilla-La Mancha, is reported in the province of Albacete for the first time." (Authors) Laguna Salada de Pétrola (Albacete), 17-IV-2017.] Address: Camuñas Mohinelo, F., 1. Miembro de la Asociación Fotografía y Biodiversidad – Almansa, Albacete, Spain. E-mail: fcamunas@gmail.com
- 16722.** Cannell, A.E.R. (2018): The engineering of the giant dragonflies of the Permian: revised body mass, power, air supply, thermoregulation and the role of air density. *Journal of Experimental Biology* 221 (19): jeb185405. 7 pp. (in English) ["An engineering examination of allometric and analogical data on the flight of giant Permian insects (Protodonata, Meganeura or griffinflies) indicates that previous estimates of the body mass of these insects are too low and that the largest of these insects (wingspan of 70 cm or more) would have had a mass of 100–150 g, several times greater than previously thought. Here, the power needed to generate lift and fly at the speeds typical of modern large dragonflies is examined together with the metabolic rate and subsequent heat generated by the thoracic muscles. This evaluation agrees with previous work suggesting that the larger specimens would rapidly overheat in the high ambient temperatures assumed in the Permian. Various extant mechanisms of thermoregulation are modelled and quantified, including behaviour, radiation and the constraints on convective respiration and evaporation imposed by air flow through spiracles. However, the effects of these on cooling an overheated insect are found to be limited. Instead, an examination of the heat budget in the flight medium indicates that, at about 1.6 bar (160 kPa), thermoregulation supply enters into equilibrium and, even at high ambient temperatures, overheating can be avoided and enough oxygen sourced. This approach indicates how fossil biology can be used to examine past atmospheres." (Author)] Address: Cannell, A.E.R., ISIPU, Rua Major Francisco Hardy 200 Casa 23, Curitiba 81230-164, Brazil. E-mail: alcannell@gmail.com
- 16723.** Cao, L.-z.; Fu, Y.-w.; Hu, C.-x.; Wu, K.-m. (2018): Seasonal migration of *Pantala flavescens* across the Bohai strait in northern China. *Environmental Entomology* 47(2): 264-270. (in English) ["*P. flavescens* is one of the most common species of migratory dragonflies. *P. flavescens* adults were captured by a searchlight trap on Beihuang Island (BH Island; 38°24'N, 120°55'E) from 2003 to 2016, where there is no freshwater. This inspired our research to analyze the pattern of seasonal migration and population dynamics. Stable hydrogen isotope measurement and the Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPPLIT) were used to simulate the migration pathway of *P. flavescens* between different breeding habitats. The results showed that there was no significant difference among population numbers of this overseas migration across years ( $F_{13, 2161} = 0.85$ ,  $P = 0.604$ ); however, the numbers were significantly different across months ( $F_5, 2161 = 3.91$ ,  $P = 0.003$ ). Our geospatial natal assignment model suggested that *P. flavescens* trapped on BH were originated in different geographical regions and might have three movement strategies: wandering around northern China



and north-bound (positive) and south-bound (negative) movements. Among them, the majority were engaged in wandering around northern China. Model simulations suggested that *P. flavescens* toured around BH. The results contribute to the knowledge of *P. flavescens* population ecology in a large-scale geographic region and will aid in the prediction and interpretation of insect migration patterns in response to climate change." (Authors)] Address: Wu, K.-m., State Key Lab. for Biology of Plant Diseases & Insect Pests, Inst. of Plant Protection, Chinese Acad. of Agricultural Sciences, No. 2 West Yuanmingyuan Road, Beijing 100193, China. E-mail: wukongming@caas.cn

**16724.** Carr, D.M.; Ellsworth, A.A.; Fisher, G.L.; Valeriano, W.W.; Vasco, J.P.; Guimarães, P.S.S. (2018): Characterization of natural photonic crystals in iridescent wings of damselfly *Chalcopteryx rutilans* by FIB/SEM, TEM, and TOF-SIMS. *Biointerphases* 13, 03B406 (2018); <https://doi.org/10.1116/1.5019725>: 8 pp. (in English) ["The iridescent wings of *C. rutilans* are investigated with focused ion beam/ scanning electron microscopy, transmission electron microscopy, and time-of-flight secondary ion mass spectrometry. The electron microscopy images reveal a natural photonic crystal as the source of the varying colors. The photonic crystal has a consistent number and thickness (~195 nm) of the repeat units on the ventral side of the wing, which is consistent with the red color visible from the bottom side of the wing in all regions. The dorsal side of the wing shows strong color variations ranging from red to blue depending on the region. In the electron microscopy images, the dorsal side of the wing exhibits varied number and thicknesses of the repeat units. The repeat unit spacings for the red, yellow/green, and blue regions are approximately 195, 180, and 145 nm, respectively. Three-dimensional analysis of the natural photonic crystals by time-of-flight secondary ion mass spectrometry reveals that changes in the relative levels of Na, K, and eumelanin are responsible for the varying dielectric constant needed to generate the photonic crystal. The photonic crystal also appears to be assembled with a chemical tricomponent layer structure due to the enhancement of the CH<sub>6</sub>N<sub>3</sub><sup>+</sup> species at every other interface between the high/low dielectric constant layers." (Authors)] Address: Carr, D.M., Physical Electronics, Inc., 18725 Lake Drive East, Chanhassen, Minnesota 55317, USA

**16725.** Carrillo-Lara, D.E.; Novelo-Gutierrez, R. (2018): Description of the larva of *Orthemis ferruginea* (Fabricius, 1775) (Odonata: Libellulidae). *Zootaxa* 4455(3): 547-554. (in English, with Spanish summary) ["The last larval stadium of *O. ferruginea* is described and illustrated in detail based on reared material collected in the municipality of Paso de Ovejas, Veracruz, Mexico. It is compared with larvae of other species of the genus previously described. The main structural features are the number of setae on palp, prementum and palp crenations, the size proportion of cerci respect to epi- and paraproc, and the number of sclerites on abdominal sternum 5." (Authors)] Address: Novelo-Gutierrez, R., Instituto de Ecología A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.mx

**16726.** Casas, P.A.C.; Sing, K.-W.; Lee, P.-S.; Nuñez, O.M.; Villanueva, R.J.T.; Wilson, J.-J. (2018): DNA barcodes for dragonflies and damselflies (Odonata) of Mindanao, Philippines. *Mitochondrial DNA Part A, DNA Mapping, Sequencing, and Analysis* 29(2): 206-211. (in English) ["Reliable species identification provides a sounder basis for use of species in the order Odonata as biological indicators and for their conservation, an urgent concern as many species are threatened with imminent extinction. We generated 134 COI barcodes from 36 morphologically identified species of Odonata collected from Mindanao Island, representing 10 families and 19 genera. Intraspecific sequence divergences ranged from 0 to 6.7% with four species showing more than 2%, while interspecific sequence divergences ranged from 0.5 to 23.3% with seven species showing less than 2%. Consequently, no distinct gap was observed between intraspecific and interspecific DNA barcode divergences. The numerous islands of the Philippine archipelago may have facilitated rapid speciation in the Odonata and resulted in low interspecific sequence divergences among closely related groups of species. This study contributes DNA barcodes for 36 morphologically identified species of Odonata reported from Mindanao including 31 species with no previous DNA barcode records." (Authors)] Address: Casas, Princess Angelie S., Dept of Biological Sciences, College of Science and Mathematics, Mindanao State University-Iligan Institute of Technology, 9200 Iligan City, Philippines. E-mail: princessangeliecasas48@gmail.com

**16727.** Cavallaro, M.C.; Liber, K.; Headley, J.V.; Peru, K.M.; Christy A. Morrissey, C.A. (2018): Community-level and phenological responses of emerging aquatic insects exposed to three neonicotinoid insecticides: An in situ wetland limnocorral approach. *Environmental Toxicology and Chemistry* 37(9): 2401-2412. (in English) ["Seasonal aquatic insect emergence represents a critical subsidy link between aquatic and terrestrial ecosystems. Early and late instar larvae developing in wetlands near neonicotinoid-treated cropland are at risk of chronic insecticide exposure. An in situ wetland limnocorral experiment compared emergent insect community responses to imidacloprid, clothianidin, and thiamethoxam. Over 15 weeks, 21 limnocorrals were dosed weekly for 9 weeks to target peak nominal doses of 0.0, 0.05 or 0.5 µg/L, followed by a 6-week recovery period. Thirty-nine aquatic insect taxa were recorded but 11 taxa groups made up 97% of the community composition. Principal response curves indicated that during the dosing period, community composition among the treatments resembled the controls. During the 6-week recovery period, significant deviance was observed in the high imidacloprid treatment with similar trends in the clothianidin treatment, suggesting that community effects from neonicotinoid exposure can be delayed. Non-biting midges (Diptera: Chironomidae) and Zygoptera also emerged 18 to 25 days earlier in the imidacloprid and clothianidin neonicotinoid treatments, relative to controls. These data suggest that phenology and subtle community effects can occur at measured neonicotinoid concentrations of 0.045 µg/L (imidacloprid) and 0.038 µg/L (clothianidin) under chronic repeated exposure conditions. Synchronization and community dynamics are critical to aquatic insects and consumers; thus, neonicotinoids may have broad

implications for wetland ecosystem function." (Authors)] Address: Morrissey, Christy, Department of Biology, University of Saskatchewan, Saskatoon, Saskatchewan, Canada. E-mail: christy.morrissey@usask.ca

**16728.** Celinski, S.; Wolczecka, M.; Kadej, M.; Smolis, A.; Tarnawski, D. (2018): The first record of *Leucorrhinia pectoralis* (CHARPENTIER, 1825) (Odonata: Libellulidae) in the "Stawy Milickie" Nature Reserve. *Przyroda Sudetów* 22: 73-78. (in Polish, with English summary) ["We describe observations of males of *L. pectoralis* in the nature reserve "Stawy Milickie". The observed individuals stayed close to the margins of reed beds and small fragments of open water table surrounded by reeds (the dominant hydrophyte in the site of observation was *Myriophyllum spicatum* L.). The locality found by us in the nature reserve "Stawy Milickie" (Stawno ponds) is among about a dozen records of *L. pectoralis* from Lower Silesia. The great majority of the known localities of the species is located in the south-western part of Lower Silesian province, while the above locality is situated in its north-eastern part, near the boundary of Lower Silesia and Wielkopolska." (Authors) Address: Celinski, S., Pracownia Biologii Konserwatorskiej i Ochrony Bezkręgowców, Zakład Biologii, Ewolucji i Ochrony Bezkręgowców, Instytut Biologii Środowiskowej, Wydział Nauk Biologicznych, Uniwersytet Wrocławski, ul. Przybyszewskiego 65, 51-148 Wrocław, Poland. E-mail: damian.celinski@onet.pl

**16729.** Cezario, R.R.; Viela, D.S.; Guillermo-Ferreira, R. (2018): Final instar larvae of *Argia mollis* Hagen in Selys, 1865 and *Argia smithiana* Calvert, 1909 (Odonata: Coenagrionidae) from the Brazilian Cerrado. *Zootaxa* 4514(1): 137-144. (in English) ["Recent expeditions to the Serra da Canastra and Chapada dos Guimarães National Parks in Brazil resulted in the collection of larvae of *A. mollis* and *A. smithiana*. Thus, here we describe the last instar larvae of these two *Argia* species from the Brazilian Cerrado." (Authors)] Address: Guillermo-Ferreira, R., Laboratory of Ecological Studies on Ethology & Evolution (LESTES), Department of Hydrobiology, Federal University of São Carlos, São Carlos, SP, Brazil.

**16730.** Cham, S. (2018): Observations of egg development, hatching and early instars of *Sympetrum striolatum* (Charpentier) Common Darter. *J. Br. Dragonfly Society* 34(1): 1-18. (in English) ["*S. striolatum* is a common and widespread species across the United Kingdom with the adult and larval stages well studied. The egg stage however is less well known. Observations on egg development, hatching and early instars during late summer indicate a high level of fertilisation and survivorship under controlled conditions." (Author)] Address: Cham, S., 2 Hillside Road, Lower Standon, Henlow, Bedfordshire, SG16 6LQ, UK. E-mail: stevecham1@aol.com

**16731.** Chapman, Olivia; Noyd, Martin; Seres, Kareen (2018): Differences in gregarine parasite load between male and female *Calopteryx maculata*. *Biological Station, University of Michigan (UMBS)*: 12 pp. (in English) ["Damselflies and other insects of the order Odonata are frequently parasitized by gregarine protists. In the trophozoite stage of the gregarine life cycle,

the parasite feeds on the contents of the host's gut and negatively affect its reproductive success. Possibly as a result of its impacts on the host's reproductive system, levels of gregarine parasitism has been observed to differ between male and female damselflies. We aimed to measure relative levels of gregarine parasitism of male and female damselflies of the species *Calopteryx maculata*. In order to do this, we collected damselflies at multiple sites in Michigan's Maple River and dissected individuals to observe the presence of gregarine parasites. Our results indicate that females experience significantly higher levels of gregarine parasitism than their male counterparts. We propose that this difference is the result of increased levels of migratory behavior in female damselflies due to increased parental investment." (Authors)] Address: not stated

**16732.** Chavez-Kendall, K. (2018): Invertebrate predator effects on California vernal pool community assembly. M.S. thesis, Biological Sciences (Ecology, Evolution, and Conservation)--California State University, Sacramento: IX + 44 pp. (in English) ["Predators can help determine the density and diversity of prey populations. Predators can reduce densities of prey, increase diversity of prey species, lower densities of other predators, and cause changes in the overall biomass production of a community. Schmitz (2007) developed a framework to test multi-predator effects, which included two predictions based on the predators' habitat and hunting mode. The first prediction is that increasing predator pressure causes a risk enhancing effect; multiple predators can be more efficient at removing prey and lowering overall prey densities. The second prediction is that competition among multiple predators develop a risk-reducing effect on prey; predators can interfere with one another by competition or intraguild predation, thus lowering their prey capture abilities. Even though there are many predator-prey studies, few have been focused in seasonal wetlands. The purpose of this study was to evaluate multiple predator effects on invertebrate community structure. I predicted that predators in vernal pools would have a risk-enhancing effect, resulting in the reduction of prey densities and increasing overall diversity. To test this hypothesis, I used two different species of predators, backswimmers (Family Notonectidae) and damselfly nymphs. The experimental mesocosm study consisted of nine treatments arranged in a factorial design. Density treatments consisted of three and six predators of the same species; diversity treatments consisted of equal numbers of Notonectidae and Odonata, as well as double density of predator of either species. I found that treatments containing Notonectidae had a negative effect on prey density, while treatments containing equal numbers of predators had a positive effect on prey density, and predator treatment did not have an effect on prey diversity. Communities were more likely to be similar within each treatment and not between treatments. I conclude that a risk-enhancing effect can occur when there are high densities of Notonectidae, additionally, the results suggest that when two different predator species are present in equal densities they may interfere with one another generating a risk-reduction effect on the prey community." (Author)] Address: not stated

**16733.** Cheeseman, S.; Owen, S.; Truong, V.K.; Meyer, D.; Ng, S.H.; Vongsvivut, J.; Linklater, D.; Tobin, M.J.; Wemer, M.; Baulin, V.A.; Luque, P.; Marchant, R.; Juodkazis, S.; Crawford, R.J.; Ivanova, E.P. (2018): Pillars of life: Is There a relationship between lifestyle factors and the surface characteristics of dragonfly wings? *ACS Omega* 2018, 3: 6039-6046. (in English) ["Dragonfly wings are of great interest to researchers investigating biomimetic designs for antiwetting and antibacterial surfaces. The waxy epicuticular layer on the membrane of dragonfly wings possesses a unique surface nanoarchitecture that consists of irregular arrays of nanoscale pillars. This architecture confers superhydrophobic, selfcleaning, antiwetting, and antibiofouling behaviors. There is some evidence available that suggests that lifestyle factors may have influenced the evolution of the wing nanostructures and, therefore, the resulting properties of the wings; however, it appears that no systematic studies have been performed that have compared the wing surface features across a range of dragonfly species. Here, we provided a comparison of relevant wing surface characteristics, including chemical composition, wettability, and nanoarchitecture, of 7 species of dragonfly from three families including Libellulidae, Aeshnidae, and Gomphidae. The characteristic nanopillar arrays were found to be present, and the chemical composition and the resultant wing surface superhydrophobicity were found to be well-conserved across all of the species studied. However, subtle differences were observed between the height, width, and density of nanofeatures and water droplet bouncing behavior on the wing surfaces. The results of this research will contribute to an understanding of the physical and chemical surface features that are optimal for the design of antiwetting and antibacterial surfaces." (Authors)] Address: Ivanova, Elena, School Sci., College Science, Engineering & Health, RMIT Univ., GPO Box 2476, Melbourne, Victoria 3001, Australia

**16734.** Cheng, Y.-C.; Chen, M.-Y.; Wang, J.-F.; Liang, A.-P.; Lin, C.-P. (2018): Some mitochondrial genes perform better for damselfly phylogenetics: species- and population-level analyses of four complete mitogenomes of *Euphaea* sibling species. *Systematic Entomology* 43(4): 702-715. (in English) ["Animal mitochondrial genes continue to provide an efficient and inexpensive assessment of genetic diversity. However, which mitochondrial genes should be selected to best estimate species phylogeny and population genealogy remains uncertain for most under-sampled taxa. We analysed four complete mitochondrial genomes of sibling species of *Euphaea* damselflies, *E. decorata*, *E. ornata*, *E. formosa* and *E. yayeyamana*, to examine the patterns of selection and to evaluate the phylogenetic utility of the mitochondrial genes compared with nuclear genes. The results indicated that mitochondrial protein-coding *nad2* (NADH dehydrogenase subunit 2) and noncoding A + T-rich (control region) genes have the highest mutation rates and more phylogenetic utility [higher parsimony-informative sites; higher  $\alpha$  (the shape parameter of gamma distribution); lower rates of heterogeneity among sites; and higher relative substitution rates] than all the other mitochondrial and nuclear genes analysed. In contrast, the animal DNA barcoding gene cytochrome c oxidase subunit 1 (*cox1*)

had average values for all estimated parameters of phylogenetic performance and was sometimes outperformed by other mitochondrial genes. The majority of the mitochondrial and nuclear genes in *Euphaea* damselflies have experienced frequent purifying selection, except for two cases of potential positive selection in NADH dehydrogenase subunit 3 (*nad3*) and elongation factor 1a (*EF1a*), and all mitochondrial genes had experienced stronger purifying selection than nuclear genes. Our findings indicated that mitochondrial *nad2* and the A + T-rich region should be selected to provide efficient and high-resolution phylogenetic markers for damselflies at the species and population level." (Authors)] Address: Cheng, Y.-C., Dept of Life Science & Center for Tropical Ecology and Biodiversity, Tunghai University, Taichung, Taiwan

**16735.** Chitsaz, N.; Chahl, J.S. (2018): Current knowledge of corrugated dragonfly wing structures and future measurement methodology [online]. In: AIAC 2018: 18th Australian International Aerospace Congress: HUMS - 11th Defence Science and Technology (DST) International Conference on Health and Usage Monitoring (HUMS 2019): ISSFD - 27th International Symposium on Space Flight Dynamics (ISSFD). Melbourne: Engineers Australia, Royal Aeronautical Society., 2019: 412-417. Availability: <<https://search.informit.com.au/documentSummary;dn=322393373525963;res=IENG>> ISBN: 9781925627213. [cited 08 May 19]: 412-417. (in English) ["Dragonflies achieves higher than expected flight performance and manoeuvrability due to aerodynamically significant corrugations and structural complexity of their wings. Their corrugated wings include a combination of various types of the cross vein and of crossvein/ longitudinal vein links that provide high stiffness and low membrane stress. It is paramount to model the aerodynamics of a wing to be able to optimise the aerodynamics of viable flapping wing Micro Air Vehicles (MAVs). This would not be possible without consideration of wing geometry. This paper presents a brief survey of the recently measured geometry of corrugations of dragonflies' wings and their types and initial aerodynamic analysis. It also demonstrates the capability of our new methods for reconstructing the 3D model of the dragonfly wing which illustrates all of the small-scale details and corrugations throughout the wing." (Authors)] Address: Chitsaz, N., School of Engineering, Univ. of South Australia, University Boulevard, Mawson Lakes, South Australia, 5095, Australia. E-mail: [nasim.chitsaz@mymail.unisa.edu.au](mailto:nasim.chitsaz@mymail.unisa.edu.au)

**16736.** Choong, C.Y.; Alwen, B.M.; Tan, C.C. (2018): Odonata (Insecta) fauna of Taman Negara National Park, Malaysia. *Serangga* 23(2): 49-58. (in English) ["Taman Negara National Park is divided into three parts according to states – Taman Negara Pahang, Taman Negara Kelantan and Taman Negara Terengganu. In this study we present the records of Odonata collected at Kuala Kelapoh, Taman Negara Pahang and Gua Bewah, Taman Negara Terengganu. A total of 61 species were recorded from Kuala Kelapoh and 52 species from Gua Bewah. Of these 46 species are the new records for Taman Negara National Park. The high number of new records in this study indicates the Odonata fauna of Taman Negara National Park was not well studied. Notable records from the



study include *Coeliccia sameerae*, *Phyllothemis raymondi* and *Rhinocypha pelops*. The records from Kuala Kelapoh and Gua Bewah are combined with the existing records in literature to produce a checklist of the Odonata for Taman Negara National Park with 101 species from 15 families." (Authors)] Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.edu.my

**16737.** Choong, C.Y.; Alwen, B.M.; Tan, C.C. (2018): Odonata of Sungai Dusun Wildlife Reserve, Selangor, Peninsular Malaysia. *Journal of Wildlife and Parks* 33: 57-64. (in English) ["Records of Odonata collected at Sungai Dusun Wildlife Reserve on two field surveys (8-14 June and 15-20 September 2015) are presented. Adult insects were collected in the field surveys. In total, 33 species from 11 families were recorded from both the field surveys. The species list was dominated by family Libellulidae (14 species), followed by family Platynemididae (five species) and Aeshnidae (four species). The other families (Calopterygidae, Chlorocyphidae, Euphaeidae, Argiolestidae, Philosinidae, Coenagrionidae, Gomphidae and Synthemitidae) were represented only by 1-3 species. Species found abundantly in the sampling site were *Tyriobapta torrida* and *Vestalis amethystina*. Interesting species recorded were *Gynacantha dohrni*, *Burmagomphus arthuri*, *Tetracanthagyna plagiata* and *Oligoaeschna foliacea*. *G. dohrni* is a new record for Peninsular Malaysia. Published Odonata records from other sources were compiled to produce a species list for Sungai Dusun Wildlife Reserve. At present 38 species from 11 families are known to Sungai Dusun Wildlife Reserve.] Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.edu.my

**16738.** Chovanec, A. (2018): Beobachtungen zum Sitzverhalten des Südlichen Blaupfeils (*Orthetrum brunneum*) und anderer Libellulinae (Odonata: Libellulidae). *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen* 70: 9-18. (in German, with English summary) ["Observations on the perching behaviour of *Orthetrum brunneum* and other Libellulinae. – At a small wetland in Lower Austria *O. brunneum* preferably perched on riparian helophytes (93 % of all documented perchings). Horizontal or slightly inclined vegetation structures were preferred. Open littoral ground was used only in few cases. Four-leg perching, which is described in the literature for Libellulinae, was confirmed in this study by evaluating photos: In 92 % of the situations males of *O. brunneum* used four legs; the number of legs used was higher with increasing instability of the substrate (e. g., *Typha* leaves). In ten out of 16 copulae, the *O. brunneum* male perched with six legs while embraced by four legs of the female (6/4-position). In a quite stable horizontal position, one pair showed a 4/2-position. Males of *O. cancellatum*, *Libellula depressa* and *L. quadrimaculata* also used four legs in the majority of the perching situations; *L. quadrimaculata* showed five- or six-leg perching with larger substrate angles." (Authors)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmnt.gv.at

**16739.** Chovanec, A. (2018): Comparing and evaluating the dragonfly fauna (Odonata) of regulated and rehabilitated stretches of the fourth order metarhithron Gurtenbach (Upper Austria). *International Journal of Odonatology* 21(1): 15-32. (in English) ["Mitigation measures carried out at the regulated metarhithron Gurtenbach in Upper Austria were evaluated by a survey of the dragonfly fauna. The assessment method developed in this study was based on the longitudinal distribution of dragonflies along riverine biocoenotic regions (the "Rhithron-Potamon-Concept" explains changes in species composition along a river's length). Numerically expressed habitat preferences led to the definition of a set of six reference species. According to the requirements of the EU Water Framework Directive the current situation of the odonate species was compared with this inventory of river type-specific reference species and assessed in a five-tiered classification system of the "ecologic status". At the regulated stretch the record of five species (including one reference species) was classified as class IV ("poor ecological status"). At the three rehabilitated stretches a total of 23 species were found. Two stretches were classified as showing "good ecological status" (class II), due to the occurrence of two autochthonous reference species (*Calopteryx virgo*, *Onychogomphus forcipatus*). The sensitive method applied not only allowed the evaluation of the differences between regulated and rehabilitated stretches but also the assessment of potamalisation effects within the rehabilitated section due to river bed widening and backwater influences." (Authors)] Address: Chovanec, A., Federal Ministry of Agriculture, Forestry, Environment and Water Management, Department of National and International Water Management, Vienna, Austria. E-mail: andreas.chovanec@bmfuw.gv.at

**16740.** Chovanec, A. (2018): Beobachtungen zur Wahl des Schlupfsubstrates beim Südlichen Blaupfeil, *Orthetrum brunneum* (Odonata: Libellulidae). *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen* 70: 19-23. (in German, with English summary) ["Selection of emergence substrate in *Orthetrum brunneum*. – The preference of *O. brunneum* for stands of *Sparganium erectum* as emergence substrate is shown and discussed. For comparison, positions of exuviae of *Libellula quadrimaculata* and *Sympetrum striolatum* are documented." (Authors)] Address: Chovanec, A., Krotenbachgasse 68, A-2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmnt.gv.at

**16741.** Chovanec, A. (2018): Nachweise gefährdeter Libellenarten (Odonata) an einem kleinen Fließgewässer-System im Bezirk Mödling (Niederösterreich). *Beiträge zur Entomofaunistik* 19: 57-70. (in German, with English summary) ["Records of endangered dragonfly species (Odonata) at a small flowing water system in the district of Mödling (Lower Austria). – In 2018, investigations of the Schirgenbach in Perchtoldsdorf (Lower Austria) revealed, inter alia, records of *Coenagrion ornatum* (listed in Annex II of the EU FFH Directive and "critically endangered" according to the Austrian Red List) and of *Orthetrum coerulescens* ("vulnerable"). At the Luisenquelle in Kaltenleutgeben, which is hydrologically part of the "Schirgenbach-System", *Cordulegaster bidentata* ("vulnerable") was

found." (Authors)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmnt.gv.at

**16742.** Cillo, D.; Bazzato, E. (2018): Conferma di presenza per la Sardegna di *Diplacodes lefebvrei* (Rambur 1842) (Odonata Libellulidae). *Mediterraneanonline/Naturalistica N. 1/2018*: 88-93. (in Italian, with English summary) ["The presence of *D. lefebvrei* is confirmed for a new station in centralwestern Sardinia. Considerations regarding a possible trend of expansion towards the northernmost territories are given, as observed for several other odonates. Porto Alabe, comune di Tresnuraghes (OR), 25.VIII.2015, L. Fancello legit." (Authors)] Address: Cilio, D., Via Zeffiro 8, 09126, Cagliari (CA), Italy. E-mail: davide.cillo@hotmail.it

**16743.** Conniff, K.L.; Limbu, M.S. (2018): Description of *Microgomphus phewataali* sp. nov. from Nepal (Odonata: Gomphidae). *Odonatologica* 47(3/4): 277-288. (in English) ["*M. phewataali* sp. nov. is described from Phewa Taal (Lake), Pokhara, Kaski District, Nepal (28°12'9"N, 83057'38"E, 742 m a.s.l.). Type locality is on south-east side of the lake shouldered by dense forest with small wetlands bordering the lake. A seasonal stream and seepages were found inside the forest. This is the first record of *Microgomphus* sp. from Nepal and it is compared with eleven other Asian species of this genus." (Authors)] Address: Conniff, Karen L., GPO Box 3226, Kathmandu, Nepal. E-mail: karoconniff@gmail.com

**16744.** Cowan, E.M.; Cowan, P.J. (2018): *Ischnura fountaineae* (Insecta: Odonata: Zygoptera) in Oman, eastern Arabia. *Journal of Threatened Taxa* 10(15): 13029-13031. (in English) ["Reviewing our archive of photographs from Oman, we now have eight records of *I. fountaineae* at Hoota Wadi pool. These are: 11-IX-2013, 11 and 19-I, 19-VIII, 9, 16-IX-2015 and 19 and 25-I-2016. We also have three records from Wadi Qtm (23.0720N & 57.6270E, 1,970m), which is on the Saiq plateau of Jebel Akhdar and has an irrigation channel (falaj) and pools. These three records are: 11-IV, 25-VIII-2014 and 18-IV-2016. The records of 11-IV-2014 and 18-IV-2016, at Wadi Qtm, were erroneously reported as *I. evansi* in Cowan & Cowan (2017). The apparent status of *I. fountaineae* in Oman should be "uncommon Western Hajar and Jebel Akhdar regions" (see Cowan & Cowan 2017 for further information about these regions and sites)." (Authors)] Address: Cowan, Elaine Mary, School of Education, University of Aberdeen, AB24 3FX, Scotland, UK. E-mail: e.m.cowan@abdn.ac.uk

**16745.** Cristiano, L.; Lantieri, A.; Boano, G. (2018): Comparison of Pallid Swift *Apus pallidus* diet across 20 years reveals the recent appearance of an invasive insect pest. *Avocetta* 42: 9-14. (in English) ["The diet of the *A. pallidus* in a NW Italian breeding colony was examined in the summers of 2012 and 2013 to compare the current diet against those assessed more than 20 years earlier (1987-1990). By screening 5980 prey items found in food boluses brought by adults to nestlings we identified 37 families or superfamilies pertaining to 8 arthropod orders (Araneae, Coleoptera, Diptera, Hymenoptera, Lepido-

ptera, Mallophaga, Odonata, Hemiptera). The highest percentage of prey was represented by Hemiptera Homoptera (42.9%) and Diptera Brachycera (21.6%), but we also found a good number of Coleoptera (7.0%). We did not find any significant differences in diets after 20 years when comparing prey abundance at higher taxonomic levels, but in the more recent samples, beetles were mostly (above 70%) represented by the allochthonous corn pest *Diabrotica virgifera*, a species totally absent in Italy before the year 2000. We conclude that swift colonies can destroy a huge number of agricultural insect pests, and perhaps even more importantly, regularly checking the swift's diet at specific localities could be a useful tool for monitoring changes and the biodiversity of flying insects in anthropized ecosystems." (Authors)] Address: Boano, G., Museo Civico di Storia Naturale - Via San Francesco di Sales 188, Carmagnola (Turin), Italy. E-mail: g.boano@gmail.com

**16746.** Davies, R.; von Hardenberg, A.; Geary, M. (2018): Recapture rates and habitat associations of *Leucorrhinia dubia* (Vander Linden), (White-faced Darter), on Fenn's and Whixall Mosses, Shropshire. *J. Br. Dragonfly Society* 34(2): 89-101. (in English) ["Land-use changes and habitat loss are important drivers of biodiversity decline at both global and local scales. To protect species from the impacts of land-use change it is important to understand the population dynamics and habitat associations across these scales. Here we present an investigation into the survival and habitat preferences of *L. dubia*, at the local scale at Fenn's and Whixall Mosses, Shropshire, UK. We used Mark-Release-Recapture (MRR) methods to investigate survival and used sightings of individual dragonflies along with habitat data to investigate habitat preference. We found that survival between capture-visits was very low and that *L. dubia* showed a clear preference for the open moss habitat on this site. We also found that the detectability, either through sightings or recaptures, was potentially very low and suggest that this should be taken into account in future analyses. We suggest that, by encouraging recorders to submit complete lists and to repeat visits to sites, detectability could be easily estimated for dragonfly species. Incorporating this into analyses would improve estimates of population trends and habitat associations." (Authors)] Address: Davies, Rachel, Conservation Biology Research Group, Department of Biological Sciences, University of Chester, Chester, CH1 4BJ, Polen. E-mail: m.geary@chester.ac.uk

**16747.** de Almeida, T.R.; Cordero-Rivera, A.; Guillermo-Ferreira, R. (2018): Female colour form has no effect on copulation duration of the polymorphic *Ischnura fluviatilis* (Odonata: Coenagrionidae). *Odonatologica* 47(3-4): 229-243. (in English) ["We studied a population of *Ischnura fluviatilis* Selys, 1876 in Mato Grosso do Sul (Brazil), to establish the range of female colour polymorphism and associated mating behaviour. We found three female colour forms: orange and brown, which were the immature and mature coloration of the commoner gynochrome morph, and a blue androchrome morph. We observed mating couples and analysed the relationship between copulation duration and phenotypic characteristics of males and females. There were significant differences between colours for female body size, fecundity, egg

size and copulation duration, and in most cases the most deviant colour form was the immature orange. These females were significantly larger, and had the highest fecundity. Androchrome females produced smaller eggs. Copulations lasted on average 65 min, with the shortest copulation durations observed for brown females. Male size and the order of observation (indicative of seasonal effects) explained a significant proportion of variation in copulation duration, but female colour form, fecundity and size were not significant. We found evidence for assortative mating by size. Our results indicate that female colour does not explain variation in copulation duration, and therefore the possibility of cryptic male choice seems unlikely." (Authors)] Address: de Almeida, T.R., Fed Univ Grand Dourados, Grad Program Entomol & Biodivers Conservat, Dourados, MS - Brazil

**16748.** De Knijf, G. (2018): First evidence of reproduction of *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) in Portugal. *Boletín Rola* nº 11: 19-24. (in English, with Spanish summary) ["On 18 July 2017 a population of *T. kirbyi* was found at the Ribeira de Asseca in Tavira, Algarve, Portugal. In addition to adult males a newly emerged male was seen. This is the first proof of reproduction of *T. kirbyi* in Portugal and the third record for the country." (Author)] Address: De Knijf, G., Research Inst. of Nature and Forest (INBO), Havenlaan 88 bus 3, 1000 Brussels, Belgium. E-mail: Geert.deknijf@inbo.be

**16749.** de Souza, M.M.; dos Anjos, C.S.; Milani, L.R.; Brunismann, A.G. (2018): Libélulas (Odonata) predadas por moscas-assassinas (Diptera: Asilidae) no estado de Minas Gerais, sudeste do Brasil. *Revista Brasileira de Zoociências* 19(1): 77-81. (in Portuguese, with English summary) ["Dragonflies preyed by robber flies (Diptera: Asilidae) in the state of Minas Gerais, southeastern Brazil. Insects of the Odonata order are important in aquatic ecosystems, acting sometimes as predators and sometimes as prey to birds, fish and other insects, such as the robber flies of the Asilidae family. However, records of this interaction are scarce for Brazil. The purpose of this report is notify the occurrence of predation of the Odonata species *Hetaerina longipes* and *Argia clausenii* by *Archilestris capnoptera* (Wiedemann, 1828). The records were occasionally made at the Parque Estadual Serra do Papagaio and at the Parque Estadual do Ibitipoca, in the years 2015 and 2017. Predation may be a reflection of the frequency of odonate species at the time of the registrations, because the asilids are opportunistic and generalist predators. New studies are however needed to assess the impacts of predation on dragonfly populations." (Authors)] Address: de Souza, M.M., Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas Gerais – Campus Inconfidentes, Inconfidentes, Minas Gerais, Brasil. E-mail: marcos.souza@ifsuldeminas.edu.br

**16750.** de Vega del Val, L.; Aldama Murga, A. (2018): Primeras citas de *Lestes dryas* (Kirby, 1890) (Odonata: Lestidae) y *Gomphus simillimus* (Selys, 1840) (Odonata: Gomphidae) en Cantabria (norte de la Península Ibérica) (Odonata: Aeshnidae, Corduliidae). *Boletín de la Sociedad Entomológica Aragonesa* 63: 355-356. (in Spanish, with English summary) [The

first records of *L. dryas* and *G. simillimus* from Cantabria province (Spain) are provided.] Address: de Vega del Val, L., Técnico de medio ambiente en el P.N. Marismas de Santoña, Victoria y Joyel. (Ayuntamiento de Noja y Sociedad Española de Ornitología SEO/BirdLife). Carretera de Soano, nº 3, 39180 Noja, Cantabria, Spain. E-mail: ludovicodevega@hotmail.com

**16751.** Debata, S.; Swain, K.K. (2018): Odonata (Insecta) diversity of Kuldiha Wildlife Sanctuary and its adjoining areas, Odisha, eastern India. *Journal of Threatened Taxa* 10(15): 12969-12978. (in English) ["A study was carried out to assess the Odonata fauna of Kuldiha Wildlife Sanctuary, Odisha, eastern India from November 2012 to October 2013. During the study a total of 54 species of odonates including 37 species of Anisoptera and 17 species of Zygoptera were recorded. Among the dragonflies, the family Libellulidae was well represented with 30 species whereas among the damselflies, Coenagrionidae was well represented with seven species. Overall, the odonate fauna of Kuldiha Wildlife Sanctuary accounted for 49.09% of the odonate species known from Odisha and 10.73% of India. Therefore, further long-term studies on these lesser-known insect fauna in Kuldiha Wildlife Sanctuary will be useful in understanding their status over time." (Authors)] Address: Aranya Foundation, Plot No-625/12, Mars Villa, Panchasakha Nagar, Dumduma, Bhubaneswar, Odisha 751019, India. E-mail: subrat.debata007@gmail.com

**16752.** Del Palacio, A.; Lozano, F.; Muzon, J. (2018): Description of the final instar larva of *Argia serva* Hagen in Selys, 1865 (Odonata Coenagrionidae). *Anais da Academia Brasileira de Ciências* 90(3): 3017-3022. (in English) ["The American genus *Argia*, with more than 100 species described, is the most speciose genus of Odonata in the world. In this contribution, the final stadium larva of *Argia serva*, the southernmost distributed species of *Argia*, is described and diagnosed based on reared material from Martín García Island, Buenos Aires, Argentina. The larva of this species can be easily separated from the other Argentinean *Argia* by the following combination of characters: sternum of S8 covered with spines (bare in *A. translata*); antennal segment 3 longer than 1+2 (equal to or shorter than 1+2 in *A. joergenseni* and *A. jujuya*); palpal setae absent (present in *A. croceipennis*). A key to the known larvae of *Argia* of the Southern Cone is provided." (Authors)] Address: Del Palacio, A., Lab. de Biodiversidad y Genética Ambiental (BioGeA), Univ. Nacional de Avellaneda, Mario Bravo 1460 esq. Isleta, C.P. 1870, Piñeyro, Buenos Aires, Argentina. E-mail: adelpalacio@undav.edu.ar

**16753.** Denis, A.; Payet, O.; Danflous, S.; Gouix, N.; Santoul, F.; Buisson, L.; Pélozuelo, L. (2018): Intraspecific variability of the phenology and morphology of three protected dragonflies between natural and artificial habitats. *Journal of Insect Conservation* 22: 419-431. (in English) ["Changes in phenology and in body size are two of the three main consequences of global warming on organisms. We investigated whether living in a warm artificial habitat would induce changes in the phenology and body size of dragonflies. We monitored in natura the emergence pattern of three protected and red-



listed dragonfly species in three geographically close systems which differ in thermal profiles: a medium-sized river, one of its tributaries and an artificial lake fed by the water of the tributary. We also investigated the morphological variability of one of the species between the three systems. We showed an asynchrony of emergence for the three species, as well as morphological variability between the lake and the two rivers. Individuals from the lake emerged earlier and were smaller than those from the two rivers. These results are in agreement with a temperature-induced response hypothesis as the lake is warmer than the two rivers. Asynchrony of emergence between neighbouring populations triggers questions related to metapopulation functioning and about the fitness and the fate of the early-emerging individuals. Understanding the response of these species to local thermal conditions will help to improve population monitoring and conservation." (Authors)] Address: Denis, Alice, Conservatoire d'Espaces Naturels Midi-Pyrenees, 75, France. E-mail: [alice.denis@espaces.naturels.fr](mailto:alice.denis@espaces.naturels.fr)

**16754.** Denis, A.S. (2018): Impacts de l'anthropisation sur la diversité odonotologique au sein des cours d'eau: vers une meilleure prise en compte des espèces de la directive habitats faune flore. Laboratoire écologie fonctionnelle et environnement, Sciences de l'Univers, de l'environnement et de l'espace, Université Toulouse III: 174 pp. (in French, partly in English) ["Title: Anthropisation impacts on dragonfly diversity within streams: towards better assessment of anthropogenic impacts upon riverine species of European Community interest. Abstract: In a context of global biodiversity crisis, reconciling the development of wealthgenerating industry and agriculture with nature conservation is a crucial issue. Economic stakeholders are legally obliged to apply the mitigation hierarchy doctrine and thus "avoid, mitigate, and compensate" for their project's impacts. However, for invertebrate protected species, and particularly dragonfly species, basic knowledge on their ecology and population dynamics is lacking. It is thus difficult to accurately anticipate the impacts and propose efficient avoidance and compensation measures. This is particularly true on rivers, which are ecosystems under high pressure owing to their utility for human beings (i.e. water and food resources, transport, energy production, leisure). The aim of this work is to improve knowledge of three protected riverine species of dragonflies: *Oxygastra curtisii*, *Gomphus graslinii* and *Macromia splendens*, and to provide better assessment methods to evaluate the impacts of the anthropisation of streams on their populations. We sought in particular (1) to improve environmental impact assessments and management of these species within Natura 2000 sites by proposing a standardised survey protocol, (2) to assess the consequences of habitat change, especially water temperature warming, on their phenology and morphology, and (3) to describe and evaluate the impacts of weirs and hydroelectric dams on their populations. This work took place in the Midi-Pyrénées region in southern France, where populations of these three species are still present. It was carried out in close partnership with the Conservatoire d'Espaces Naturels de Midi-Pyrénées, which coordinates the Regional

action plan for Odonata, and the Functional Ecology Laboratory EcoLab to ensure direct transfer of the scientific knowledge acquired to the ecosystems managers, economic stakeholders and public authorities responsible for biodiversity conservation." (Author)] Address: not stated

**16755.** Diarra, B.; Konan, K.J.; Yapo, L.M.; Kouassi, K.P. (2018): Aquatic macroinvertebrates associated with free-floating macroinvertebrates associated with free-floating macrophytes in a marginal lentic ecosystem (Ono Lagoon, Côte d'Ivoire). *Journal of Entomology and Zoology Studies* 6(3): 1432-1441. (in English) ["This study aims to investigate macroinvertebrate communities associated with floating macrophytes of Ono lagoon (Côte d'Ivoire). Samples were monthly collected from September 2015 to August 2016. Similarly, abiotic variables (temperature, transparency, depth, conductivity, TDS, pH, dissolved oxygen, NH<sub>4</sub><sup>+</sup>, NO<sub>3</sub><sup>-</sup>, NO<sub>2</sub><sup>-</sup> and PO<sub>4</sub><sup>3-</sup>) were measured. A total of 150 macroinvertebrates belonging to 46 families and 15 orders were identified. Specifically, 125 taxa were found on *Eichhornia crassipes*, 77 on *Salvinia molesta* and 62 on *Pistia stratiotes* of which 52 taxa were exclusively associated with *E. crassipes*, 15 with *S. molesta* and 7 with *P. stratiotes*. Libellulidae (14.39-22.42%) and Corduliidae (10.56-16.47%) exhibited the highest densities. Higher values of taxonomic richness, Shannon index and evenness were recorded for macrophytes stands with a significant difference between invasive plants (*E. crassipes* and *S. molesta*) and native plant (*P. stratiotes*). In flood season, *E. crassipes* was greatly colonised by Odonata and Arachnida and was highly correlated with dissolved oxygen, temperature, PO<sub>4</sub><sup>3-</sup> and depth. The rainy season was characterised by Coleoptera, Diptera, and Gasteropoda as well as highest levels of pH and NO<sub>3</sub><sup>-</sup>. This season was correlated with *S. molesta* and *P. stratiotes*. In dry season, Heteroptera, Decapoda, Lepidoptera and Ephemeroptera were abundant and correlated with transparency." (Authors)] Address: Diarra, B., Lab. Ecol. Tropicale, UFR Biosciences, Univ. Félix Houphouët-Boigny, 22 BP 582 Abidjan 22, Côte d'Ivoire

**16756.** Dias-Silva, L.; Teixeira Duarte, G.; Alves, R.; Ramos Pereira, M.J.; Paglia, A. (2018): Feeding and social activity of insectivorous bats in a complex landscape: The importance of gallery forests and karst areas. *Mammalian Biology* 88: 52-63. ["Worldwide, increasing human activity, such as agriculture and mining, and decreased landscape complexity, are negatively affecting numerous mammal species. For example, bat communities are becoming threatened in many locations mostly due to the loss of their preferred roosting and foraging habitats. Brazilian landscapes and their associated bat communities are no exception, with the situation being further exacerbated by recently adopted permissive environmental laws that have resulted in reduced biodiversity protection and conservation. Therefore, there is an urgent need to understand how landscape and environmental variables relate to bat activities in Brazil in order to support efforts for their conservation. We used acoustic monitoring data to investigate differences in foraging and social activity of insectivorous bats among four habitat types in a heterogeneous landscape in the Cerrado-Atlantic forest ecotone in southeastern Brazil.

We also sampled insect availability and measured temperature at the same sites. Our results showed increased social activity and a greater number of species emitting social calls in karst, and increased feeding activity with a greater number of species emitting feeding buzzes in gallery forest. We also found a positive influence of both temperature and insect abundance on foraging and social activity. Our study provides new insights regarding habitat use by bats in a heterogeneous landscape, and demonstrates the importance of preserving different habitats in heterogeneous landscapes for the conservation of bat species and the ecological functions they perform." (Authors)] Address: Dias-Silva, L., Laboratório de Ecologia & Conservação, Depto de Biologia Geral, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Avenida Antonio Carlos 6.627, 31270-901, Belo Horizonte, MG, Brazil. E-mail: leohenriqueds@gmail.com

**16757.** Díaz-Martínez, C.; Cardo-Maeso, N.; Bernardino Toledo-Sevilla, B.; Simarro-Tórtola, J.; Brotóns-Padilla, M. (2018): Catálogo provisional de los odonatos (Insecta: Odonata) de Castilla-La Mancha (Centro de España). Boln. S.E.A. 63: 325-335. (in Spanish, with English summary) ["Provisional checklist of the Odonata of Castilla-La Mancha (central Spain). The key intention of this paper is to gather all of the available information on Odonata in Castilla-La Mancha, as a starting point for future studies in this administrative region. A dataset of 8439 records of adults, larvae and exuviae from published (44.9%) and unpublished data (55.1%) were gathered, providing information about 34% of the regional territory, with large differences in data coverage between provinces. We present a provisional checklist with 64 species for Castilla-La Mancha, a region with a mainly Mediterranean fauna. It includes the first records of five species from Albacete, three from Toledo, two from Cuenca and two from Ciudad Real; some are threatened taxa, like *Lestes macrostigma* and *Gomphus simillimus*." (Authors)] Address: Díaz-Martínez, Cecilia, Sociedad Entomológica y Ambiental de Castilla-La Mancha (SEACAM). C/ Londres, 7. 45003 Toledo, Spain. E-mail: cdiaz.cuenca@gmail.com

**16758.** Dolmen, D.; Pedersen, J. (2018): *Coenagrion hastulatum* and *C. lunulatum* – their responses to the liming of acidified lakes and the release of fish (Odonata: Coenagrionidae). *Odonatologica* 47(1/2): 101-120. (in English) ["The rare and acidification-tolerant *C. lunulatum* became extinct in Romundstadtjern, a small acidic lake in southern Norway, at some time between 1950 and 1980. The reason was suspected to be liming of the lake to raise the pH level before releasing fish (trout). To substantiate the hypothesis, in 1998–2001 we experimentally limed two other small acidic lakes, Øynaheia A (pH 4.6) and B (pH 4.8), which were also inhabited by *C. lunulatum*. Instead of being made extinct by the liming and the rise of the pH to 7.0, the *C. lunulatum* population at Øynaheia grew strongly during the experimental period. However, when fish (perch) were released later, before 2011, the invertebrate fauna became tremendously impoverished, and *C. lunulatum* was not observed there in 2012, 2014 or 2016. Therefore, liming of lakes does not seem to be a threat to *C. lunulatum*, but the release of fish may probably lead to its extinction. A coexisting population of *C. hastulatum* also grew during the

years of liming, but not as much as *C. lunulatum*. However, it survived the introduction of fish, although in low numbers." (Authors)] Address: Dolmen, D., Norwegian Univ. of Science and Technology (NTNU), The Museum, NO 7491 Trondheim, Norway. E-mail: dag.dolmen@ntnu.no

**16759.** dos Santos, J.; Kroth, N.; Breaux, J.; Albeny-Simões, D. (2018): Do container size and predator presence affect *Culex* (Diptera: Culicidae) oviposition preferences? *Revista Brasileira de Entomologia* 62(1): 40-45. (in English) ["Organisms with complex life cycles typically do not exhibit parental care. Hence, the ability of adult females to choose quality oviposition sites is critical for offspring success. Gravid females of many insect taxa have the capability to detect environmental conditions in water-holding containers (e.g., resource level, presence of competitors or predators) and to choose the sites that are most suitable for offspring growth and development. Mosquitoes may also detect physical container characteristics related to water permanence such as surface area, volume, or container size, and some species such as those in the genus *Culex* have been shown to prefer larger containers. However, predators may also preferentially colonize larger containers; thus, ovipositing females may face decisions based on cues of site quality that balance costs and benefits for offspring. We used a field experiment to determine the oviposition preferences of two *Culex* species in response to experimental container size and predator abundances within the containers. We found that both species avoided ovipositing in the largest containers, which have high abundances of *Chaoborus* sp. and dragonfly larvae (predators). However, the container size most commonly chosen for oviposition (15-L buckets) also had high mean abundance per liter of dragonfly larvae. These results suggest either prey naiveté or reduced vulnerability of these species to dragonflies compared to *Chaoborus* sp. Other potential mechanisms for the observed patterns of are discussed." (Authors)] Address: dos Santos, J., Univ. Comunitária da Região de Chapecó, UNOCHAPECO, Curso de Graduação em Ciências Biológicas, Chapecó, SC, Brazil

**16760.** Dosi, E.M.; Grinang, J.; Nyanti, L.; Khoon, K.L.; Harun, M.H.; Kamarudin, N. (2018): A preliminary study of the macroinvertebrate fauna of freshwater habitats in Maludam National Park, Sarawak. *Mires and Peat* 22, Article 06: 1-7. (in English) ["Macroinvertebrates are diverse and widespread, and they play important ecological roles in aquatic ecosystems; yet little is known about the macroinvertebrate fauna of the peat swamp forests of Borneo. In light of this knowledge gap, we present a preliminary species list of macroinvertebrates in the peat swamp forest of Maludam National Park, Sarawak, Malaysia. Macroinvertebrates were sampled between April 2011 and November 2014 from three stations on the Maludam River, which flows through the National Park. In total, 3,257 individual macroinvertebrates were examined, representing 37 morpho-species from 20 families and eight orders. Of the total number of individuals captured, 51 % were aquatic beetles (Order Coleoptera), 26 % were aquatic bugs (Hemiptera), 10 % were dragonflies (Odonata), 5 % were flies (Diptera) and 4 % were mayflies (Ephemeroptera). Other orders contributed less than 5 % of the total. The dominant species

was the whirligig beetle *Dineutus unidentatus* (36 % of all individuals caught) which may, thus, be a stenotopic habitat specialist. Despite the harsh environmental conditions of Maludam, where aquatic habitats are acidic and low in dissolved oxygen, the area was found to be inhabited by a diverse macroinvertebrate fauna which is likely to contribute to maintaining the important ecosystem services that the peat swamp forest provides." (Authors) Address: Dosi, E.M., Malaysian Palm Oil Board, 6, Persiaran Institusi, Bandar Baru Bangi, 43000 Kajang, Selangor, Malaysia. E-mail: [ellamichael@mpob.gov.my](mailto:ellamichael@mpob.gov.my)

**16761.** Dossi, F.; Leitner, P.; Pauls, S.; Graf, W. (2018): In the mood for wood-habitat specific colonization patterns of benthic invertebrate communities along the longitudinal gradient of an Austrian river. *Hydrobiologia* 805: 245-258. (in English) ["Instream large wood (LW) constitutes an indispensable element of natural river ecosystems. It affects local hydraulics, morphology, nutrient budget, overall habitat complexity, and dynamics. Despite numerous studies about LW as a habitat for benthic communities, information on the varying importance along the longitudinal gradient of a river is lacking. The focus of this study is therefore to investigate general differences between lithal and xylal colonizers and to further investigate trends along the river course. We analyzed lithal and xylal communities at ten sites along the medium-sized Lafnitz River in Southeast Austria. Our results significantly show (1) a general differentiation between lithal and xylal communities, (2) an increasing distinction of the lithal and xylal fauna along the longitudinal gradient of the river, and (3) a distinct correlation between the distance from source and the number of exclusive xylal and nowadays predominantly rare taxa. The presence of LW is therefore directly linked to higher aquatic biodiversity compared to rocky substrates and presents a unique element for river restoration, especially in lower river sections." (Authors)] Address: Dossi, F., IHG - Institute of Hydrobiology and Aquatic Ecosystem, Management, BOKU – Univ. of Natural Resources & Life Sciences, Gregor-Mendel-Str. 33, 1180 Vienna, Austria. E-mail: [florian.dossi@boku.ac.at](mailto:florian.dossi@boku.ac.at)

**16762.** Dow, R.A.; Choong, C.Y.; Ng, Y.F. (2018): Re-description of *Coeliccia erici* Laidlaw, and the description of *Coeliccia sameerae* sp. nov. from Peninsular Malaysia (Odonata: Zygoptera: Platycnemididae). *Zootaxa* 4413(2): 351-367. (in English) ["*Coeliccia erici* Laidlaw, 1917 is re-described and illustrated for both sexes; its taxonomic history and the confusion surrounding it is discussed. *Coeliccia kimurai* Asahina, 1990 is shown to be a junior synonym of *C. erici*. *Coeliccia sameerae* sp. nov. (holotype ♂, small stream near Sungai Lasir, Tasik Kenyir, Terengganu, Malaysia, deposited in the Natural History Museum, London) is described from both sexes from Peninsular Malaysia; this species had been confused with *C. erici* until now. A remark on the status of *C. simillima* Laidlaw, 1917 is made." (Authors)] Address: Dow, R.A., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands; Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300 Kuching, Sarawak, Malaysia. E-mail: [rory.dow230@yahoo.co.uk](mailto:rory.dow230@yahoo.co.uk)

**16763.** Dow, R.A.; Choong, C.Y.; Robi, N.J.; Butler, S.G.; Ngiam, R.W.J.; Reels, G.T. (2018): Odonata from the Lanjak Entimau Wildlife Sanctuary, Sarawak. *International Dragonfly Fund - Report 115*: 1-50. (in English, with Bahasa Melayu abstract) ["Records of Odonata from the Lanjak Entimau Wildlife Sanctuary (LEWS) in Sarawak, Malaysian Borneo are presented. Previous records of Odonata from LEWS are critically examined. One hundred and ten species have been recorded within the sanctuary, including three that have yet to be found outside (*Drepanosticta adenani*, *Telosticta iban* and "*Elatoneura*" mauros); records of four more species are regarded as in need of confirmation, those of another six are incorrect. In addition to the three species only known from LEWS, other notable records include: *Drepanosticta sbong*, *Dysphaea lugens*, *Euphaea* sp. cf. *basalis*, *Pericnemis kiautaurum*, *Burmagomphus insularis*, *Gomphidia caesarea*, *Merogomphus* species, *Phaenandrogomphus safeii*, *Macromia callisto* and *Idionyx montana*. A fresh illustration of the anal appendages of *Drepanosticta sbong* in lateral view is provided to make up for inaccuracies in the original illustration. The taxonomy of *Phaenandrogomphus safeii* is briefly discussed. *Zygonyx errans* Lieftinck, 1953 is considered a subspecies of *Z. ida* not *Z. iris*. Additional records from areas adjacent to LEWS are given in an appendix." (Authors) ] Address: Dow, R.A. Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300 Kuching, Sarawak, Malaysia

**16764.** Dow, R.A.; Zhang, H.-M. (2018): *Yunnanosticta* gen. nov., from Yunnan, a new genus from the Sinostictinae, with the description of two new species (Odonata: Zygoptera: Platystictidae). *Zootaxa* 4375(4): 567-577. (in English) ["*Yunnanosticta* gen. nov. in the platystictid subfamily Sinostictinae is described from Yunnan, China. The genotype is *Y. wilsoni* sp. nov., described here (holotype ♂ from Tongbiguan, Yingjiang County, Dehong Dai & Jingpo Autonomous Prefecture, Yunnan, China, 23 vi 2015, leg. H.M. Zhang, to be deposited in the Natural History Museum, London). *Y. cyaneocollaris* sp. nov. (holotype ♂ from Tongbiguan, Yingjiang County, Dehong Dai & Jingpo Autonomous Prefecture, Yunnan, China, 23 vi 2015, leg. H.M. Zhang, to be deposited in the Natural History Museum, London) is also described." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: [rory.dow@virgin.net](mailto:rory.dow@virgin.net)

**16765.** Dow, R.A.; Reels, G.T. (2018): *Drepanosticta adenani* sp. nov., from the Lanjak Entimau Wildlife Sanctuary in Sarawak (Odonata: Zygoptera: Platystictidae). *Zootaxa* 4379(3): 429-435. (in English) ["*D. adenani* sp. nov. (holotype ♂, from a tributary of Sungai Jela, Nanga Segerak area, Lanjak Entimau Wildlife Sanctuary, Sri Aman Division, Sarawak, Malaysian Borneo, 18 vii 2016, deposited in the Natural History Museum, London) is described from both sexes." (Authors)] Address: Dow, R.A., Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300 Kuching, Sarawak, Malaysia. E-mail: [rory.dow230@yahoo.co.uk](mailto:rory.dow230@yahoo.co.uk)

**16766.** Dow, R.A.; Kompier, T.; Phan, Q.T. (2018): *Drepanosticta emtrai* sp. nov. from Vietnam with a discussion of *Drepano-*



*sticta vietnamica* Asahina, 1997 (Odonata: Zygoptera: Platystictidae). *Zootaxa* 4374(2): 273-282. (in English) ["*D. emtra* sp. nov. is described from Vietnam (holotype ♂ Ha Tinh Province, 9 vi 2015, to be deposited in RMNH). The new species is allied to *D. camichaeli* (Laidlaw, 1915) and a number of other species of *Drepanosticta* including *D. vietnamica* Asahina, 1997. New illustrations of the paratype of *D. vietnamica* are provided and the species is discussed. The *Drepanosticta camichaeli*-group, to which the above mentioned species belong, is defined and discussed." (Authors)] Address: Dow, R.A., Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300 Kuching, Sarawak, Malaysia. E-mail: rory.dow230@yahoo.co.uk

**16767.** Dow, R.A.; Choong, C.Y.; Ng, Y.F. (2018): Re-description of *Coeliccia erici* Laidlaw, and the description of *Coeliccia sameerae* sp. nov. from Peninsular Malaysia (Odonata: Zygoptera: Platynemididae). *Zootaxa* 4413(2): 351-367. (in English) ["*Coeliccia erici* Laidlaw, 1917 is re-described and illustrated for both sexes; its taxonomic history and the confusion surrounding it is discussed. *C. kimurai* Asahina, 1990 is shown to be a junior synonym of *C. erici*. *C. sameerae* sp. nov. (holotype ♂, small stream near Sungai Lasir, Tasik Kenyir, Terengganu, Malaysia, deposited in the Natural History Museum, London) is described from both sexes from Peninsular Malaysia; this species had been confused with *C. erici* until now. A remark on the status of *C. simillima* Laidlaw, 1917 is made." (Authors) ] Address: Dow, R.A., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**16768.** Dow, R.A.; Advento, A.D.; Turner, E.C.; Caliman, J.-P.; Foster, W.A.; Naim, M.; Snaddon, J.L.; Ps, S. (2018): Odonata from the BEFTA Project area, Riau Province, Sumatra, Indonesia. *Faunistic Studies in South-East Asian and Pacific Island Odonata* 24: 1-22. (in English) ["The Odonata found during work on the Biodiversity and Ecosystem Function in Tropical Agriculture (BEFTA) Project in Riau Province, Sumatra, Indonesia are reported. Prior to the BEFTA project we are only aware of published records of 37 species of Odonata from Riau Province (these are listed in an appendix). 75 species have been recorded during the BEFTA project, including five that have not (*Archibasis incisura*, *A. rebecca* and *Pseudagrion williamsoni*), or not definitely (*Argiocnemis* species and *Mortonagrion* species cf *aborensis*), been recorded in Sumatra before. *Macromia dione* is recorded for the first time since its description. The number of species now known from Riau Province is 88; 51 of these are reported from the province for the first time here." (Authors)] Address: Dow, R.A., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**16769.** Dwari, S.; Patra, A.; Mondal, A.K. (2018): First report of *Libellago lineata* (Burmeister, 1839) from South West Bengal, India. *International Journal of Entomology Research* 3(5): 1-3. (in English) ["The first record of *L. lineata* from South West Bengal, India is presented in this paper. During the biodiversity survey of Chotonagpur Plateau regions of West Bengal this species photographed and identified first time for the

Southern part of West Bengal. Previously its distribution was restricted only in North West Bengal. *L. lineata* commonly known as River Heliodor recorded in September, 2017. Small sized damselfly documented from stream of Duarsini forest area, Bundwan and Turga dam, Baghmundi of Purulia District West Bengal, India." (Authors)] Address: Dwari, S., Plant Taxonomy, Biosystematics and Molecular Taxonomy Laboratory UGC-DRS-SAP Department, Dept of Botany & Forestry Vidyasagar University, Midnapore, West Bengal, India

**16770.** Dyatlova, E.S. (2018): Note on the dragonfly fauna of Moldova – Progress report 2011. *International Dragonfly Fund - Report 114: 1-20.* (in English) ["New field sampling was carried out in June 2011 in northern Moldova, the most unstudied area in the Republic of Moldova. A total of 19 Odonata species was recorded during a field trip, with *Libellula fulva* and *Gomphus flavipes* new for Moldova. The presence of species of European concern is discussed. Photos of all visited habitats are included. The fauna of Moldova mostly consists of species which are able to survive in biotopes with high anthropogenic pressure."] Address: Dyatlova, Elena S., Independent Researcher, French boulevard 37/3, Odessa 65044, Ukraine. E-mail: lena.dyatlova@gmail.com

**16771.** El Haissoufi, M.; Bennis, N.; Hernández, M.A.; Casanueva, P.; Campos, F. (2018): Biometrics of exuviae of *Cordulegaster boltonii algerica* Morton, 1916 (Odonata: Cordulegasteridae). *Aquatic Insects* 39(4): 407-413. (in English) ["This study provides the first biometrics analysis of exuviae from Moroccan populations of the Ibero-Maghrebian endemic dragonfly *Cordulegaster boltonii algerica* Morton, 1916 collected in the Rif Mountains. Among the biometric variables that were measured, tibia length was highly correlated with the exuviae body length (BL), and can, therefore, be used to calculate the BL of partially broken exuviae. The head width exhibited the smallest coefficient of variation for both males and females and, therefore, is a valuable measurement that can be used for biometric comparison of different populations. The data presented herein will be used for future comparison with other North African and European populations of *C. boltonii algerica*." (Authors)] Address: El Haissoufia, M., Polydisciplinary Fac. of Taza, Sidi Mohamed Ben Abdellah University, Fes, Morocco. E-mail: med.elhaissoufi@gmail.com

**16772.** Endah Hari Utari (2018): Dragonfly community (Odonata) in Sokokembang Forest, Pekalongan, Jawa Tengah. Undergraduate Thesis. Biologi Majors, Faculty- of Science and Technology, State Islamic University Syarif Hidayatullah, Jakarta: XIII + 53 pp. (in English) ["Odonata hold pivotal roles, as a bio indicator of water quality and as predators in the food chain. The availability of optimal environmental conditions and food resources effect the community structure in the habitat. This research want to find out the dragonfly community structure, to define its distribution patterns, and to describe the influence of the biotic factors. The method used in this research is survey. It was by determining the residential area. In taking the sample, the researcher used line transects along 200 m and insect net. Dragonflies were found 8 types in both observation

sites with a total of 625 individuals belonging to the Libellulidae, Platystictidae, Euphaeidae, Coenagrionidae, and Calopterygidae families. The most common types of dragonfly are *Orthetrum sabina*, *Vestalis luctuosa*, *Euphaea variegata*, and *Drepanosticta spatulifera*. *D. spatulifera* is a Javanese endemic dragonfly with conservation status DD = Data Deficient based on IUCN RedList data. Highest species diversity index ( $H'$ ) was found in the latrine river with a value of 1.605. the index ( $E$ ) of the highest heter value was hair river with a value of 0.860. the index of type of similarity of 77%. the distribution pattern in both locations grouped, uniform and random, and the highest ( $D_i$ ) index of dominance index is 28%. CCA (Canonical Correspondence Analysis) shows the pH of the water and the intensity of light gives a real effect on the dragon community in the smoked forest area. The community of dragonfly was organized based on species diversity, evenness type, similarity type, distribution pattern and index of type dominance." (Author)] Address: not stated

**16773.** Erdakov, L.N. (2018): Cyclicity of perennial changes in the density of the dragonfly population *Libellula quadrimaculata* L., 1758 (Odonata, Libellulidae). Eurasian Journal of Entomology 17(3): 216-222. (in Russian, with English summary) ["Based on the data published in 1969-2009 [Popova, Kharitonov, 2010], a spectrum of the density population fluctuation of *L. quadrimaculata* has been calculated. The resulted spectrum shows seven harmonic components, of which the 6.7-year periodicity predominates by its strength. In the middle frequencies, there is an 11.8-year rhythm. The remaining harmonic components are typical of the high-frequency region of the spectrum. In the order of decreasing their strength, these are 4.3, 3.4-, 2.7- and 2.3-summer rhythms. The dragonfly population is well-coordinated with changes of both the weather and hydrological conditions that are important for it. The dynamics of its density is in agreement with perennial precipitation fluctuations, as well as with changes in the surface area size of Lake Chany. Even external influences, of which the course is not synchronous with density fluctuations, may have harmonic components that could be adjustable for corresponding rhythms of the dragonfly.] Address: Erdakov, L.N., Institute of Systematics and Ecology of Animals, Russian Acad. of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk, 630091 Russia. E-mail: microtus@yandex.ru.

**16774.** Escoto-Moreno, J.A.; Hernández-Hernández, A.; Hernández-Hernández, J.A.; Márquez Luna, J.; Silva-Briano, M.; Novelo-Gutiérrez, R. (2018): The northernmost record of the Neotropical giant damselfly *Megaloprepus caerulatus* (Drury, 1782) (Odonata: Coenagrionidae) in the American continent. Gayana 82(1): 90-93. (in Spanish, with English summary) ["*M. caerulatus* is one of the largest damselflies in the world and it is recorded here for the first time in Acomul, state of Hidalgo, Mexico, being this the northernmost record known in the American Continent, which allows us to discuss its current geographic distribution and its taxonomic status." (Authors)] Address: Novelo-Gutiérrez, R., Red Biodiversidad y Sistemática, Inst. Ecol., A. C. Carretera antigua a Coatepec # 351, El Haya, 91070 Xalapa, Veracruz, México. E-mail: rodolfo.novelo@inecol.mx

**16775.** Eslami, Z., Ebrahimi, M.; Sadeghin, S. (2018): Late spring records of Odonata from the west margin of the Namak Lake, Northwest of Central Plateau of Iran. IDF-Report 125: 1-18. (in English) ["A total of 20 Odonata species were recorded from 15 water bodies (3 natural water bodies and 12 man-made reservoirs) in a desert landscape west of the Namak Lake in the northwest of the Central Plateau of Iran, from 27 May to 20 June, 2017. The study area included Qom province and the northern part of Esfahan province (34.07 to 35.14 N, 51.33 to 50.89 E). For Qom province, 17 out of 18 species found are new provincial records. In addition *Selysiothemis nigra*, *Orthetrum chrysostigma* and *Orthetrum taeniolatum* are new findings for Esfahan province. The species around the man-made reservoirs are characterized by a broad ecological amplitude ("generalists") while species assemblages of natural water bodies consisted of more sensitive species. In the arid climate of central part of Iran, man-made reservoirs are major habitats for Odonata species. Although these reservoirs have increased the amount of habitat for generalist species, they do not foster sensitive and specialist species. Furthermore, considering the more intense droughts predicted for these areas in the future, and the current scenario of environmental degradation, some sensitive species may be in danger of local extinction." (Authors) Address: Sadeghi, S., Dept of Biology, Faculty of Sciences, Shiraz University, Shiraz, Iran. E-mail: hsabersadeghi@gmail.com

**16776.** Ewuim, S.C.; Ogbuozobe, G.O. Ezeonyejaku, D.C.; Mogbo, T.C. (2018): Wet season insect population of an arable land at Ifite-Ogwari Campus of Nnamdi Azikiwe, University, Awka, Nigeria. Animal Research International 15(3): 3065-3069. (in English) ["A study on insect fauna in a fallow plot at Ifite-Ogwari was carried out in rainy season between April and June 2018 using the sweep net. On each sampling occasion thirty sweeps were made across the vegetation of the 39920 m<sup>2</sup> plot to monitor the insects on the foliage. A total of 63 insect species and their larvae comprising 12 families and 16 species were recorded during the sampling period. There was a preponderance of *Camponotus acvapimensis* followed by *Pheidole* sp., *Orthetrum icteromelas*, *Attractomorpha acutipennis*, *Heteropternis thoracica* and *Sphenoptera* sp., with the singletons including *Phaneropterat nana*, *Cardiochiles* sp., *Leptoglossus memberanaceus* and *Anoplocnemis curvipes*. There was no significant difference ( $p > 0.05$ ) in the environmental factors between the three months. The relationships between sweep net catches were not significant ( $p > 0.05$ ). *Pheidole* and species of Odonata served as faunal indicators. Factors that influence the sweep net catches included types of the plant species in the habitat, anthropogenic activities, management practices, locomotor activities and reproductive cycles of insect species. Other factors affecting sweep net catches were also discussed." (Authors)] Address: Ewuim, S. C. Dept Zool. Nnamdi Azikiwe Univ., Awka, Anambra State, Nigeria. Email: cewuim@gmail.com

**16777.** Feindt, W.; Oppenheim, S.J.; DeSalle, R.; Goldstein, P.Z.; Hadrys, H. (2018): Transcriptome profiling with focus on potential key genes for wing development and evolution in *Megaloprepus caerulatus*, the damselfly species with the world's

largest wings. PloS one [12 Jan 2018, 13(1):e0189898]: 17 pp. ["The evolution, development and coloration of insect wings remains a puzzling subject in evolutionary research. In basal flying insects such as Odonata, genomic research regarding bauplan evolution is still rare. Here we focus on the world's largest odonate species—the "forest giant" *M. caerulatus*, to explore its potential for looking deeper into the development and evolution of wings. A recently discovered cryptic species complex in this genus previously considered monotypic is characterized by morphological differences in wing shape and color patterns. As a first step toward understanding wing pattern divergence and pathways involved in adaptation and speciation at the genomic level, we present a transcriptome profiling of *M. caerulatus* using RNA-Seq and compare these data with two other odonate species. The de novo transcriptome assembly consists of 61,560 high quality transcripts and is approximately 93% complete. For almost 75% of the identified transcripts a possible function could be assigned: 48,104 transcripts had a hit to an InterPro protein family or domain, and 28,653 were mapped to a Gene Ontology term. In particular, we focused on genes related to wing development and coloration. The comparison with two other species revealed larva-specific genes and a conserved 'core' set of over 8,000 genes forming orthologous clusters with *Ischnura elegans* and *Ladona fulva*. This transcriptome may provide a first point of reference for future research in odonates addressing questions surrounding the evolution of wing development, wing coloration and their role in speciation." (Authors)] Address: Hadrys, Heike, ITZ – Forschungsstätte 'Alter Bahnhof Schapen' Braunschweig, Univ. of Veterinary Medicine Hannover, Hannover/Braunschweig, Germany. E-mail: Heike.Hadrys@ecolevol.de

**16778.** Fekete, J.; Ézsöl, T.; Kloknicer, T.; Katona G. (2018): Further data on *Cordulegaster bidentata* Selys, 1873 from the territory of Bükk National Park. *Folia Historico-Naturalia Musei Matraensis* 42: 11-14. (in English) ["Our paper presents 34 larva and 10 imago records of *Cordulegaster bidentata* Selys, 1873 from the Bükk Mountains, Northern Hungary from the year 2017 as a continuation of our previous work. Our samplings merely based on the survey of the larvae but some data about adults are also presented." (Authors)] Address: Fekete, Judit, University of Pannonia, Dept of Limnology, Egyetem utca 10, H-8200 Veszprém, Hungary. E-mail: feke.judit@okologia.mta.hu

**16779.** Festi, A. (2018): Wiederfund von *Orthetrum albistylum* (De Selys-Longchamps, 1848) für Südtirol nach 150 Jahren (Odonata, Anisoptera). *Gredleriana* 18: 127. (in German) [Italy, Etsch near Salurn (11,190729°E, 46,239053°N), juvenile, 7-IV-2018] Address: Festi, A., Penegalstr. 7, 39100 Bozen, Italy. E-mail: alex.festi@rolmail.net

**16780.** Fincke, O.M.; Xu, M.; Khazan. E.S.; Wilson, M.; Ware, J.L. (2018): Tests of hypotheses for morphological and genetic divergence in *Megaloprepus* damselflies across Neotropical forests. *Biological Journal of the Linnean Society* 125(4): 844-861. (in English) ["Differences in sexual signalling may initiate speciation by limiting gene flow among diverging populations. *M. caerulatus* exhibits two, visually obvious 'wing types' across

its range. Males from one subspecies have sexually dimorphic, white-banded wings whereas males from the other subspecies lack the sex-specific white wing band. Using mitochondrial (cytochrome c subunit I and 16S) and nuclear (H3) markers, and measures of body size, wing ratio and secondary genitalia, we identified distinct genetic and morphological clades from Mexico to Panama; absence of a wing band was ancestral. To determine if relative reflectance properties of male and female wing tips cue sexual and competitor identity, as they do for wing dimorphic males, we noted reactions of males lacking wing bands to conspecifics with manipulated wings. Isolation by distance explained only 18% of the molecular variation among clades. Relative to wing dimorphic demes, wing monomorphic populations showed lower adult density, lower resource defence and fewer male–male interactions, suggesting lower sexual selection on males. However, not all were less sexually dimorphic in body size. Males lacking wing bands reacted to conspecifics with manipulated wings in ways suggesting that signals for potential mates and competitors do not differ across wing types, a conclusion that awaits more data. Wing mono- and dimorphic demes in *Megaloprepus* occur allopatrically over relatively short distances and may be isolated via secondary genitalia or unknown physiological constraints." (Authors)] Address: Fincke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**16781.** Fischer, I.; Sittenthaler, M.; Chovanec, A. (2018): Zum Vorkommen von drei Arten der Gattung *Leucorrhinia* in Wien (Österreich) mit dem Erstnachweis von *L. albifrons* (Odonata: Libellulidae). *Libellula* 37(3/4): 79-90. (in German, with English summary) ["Occurrence of three *Leucorrhinia* species in Vienna (Austria) with the first record of *L. albifrons* (Odonata: Libellulidae) - In 2017, *L. albifrons* was recorded in Vienna for the first time. The locations were situated at backwater remnants of the former Danubian floodplains. This area, which is called Lobau, is part of the National Park "Donau-Auen". In the Lobau two other species of the genus *Leucorrhinia* were detected: *L. caudalis* and *L. pectoralis*. Accordingly, the inventory of dragonfly species recorded in Vienna comprises 62 species." (Authors)] Address: Fischer, Iris, Naturhistorisches Museum Wien, Zentrale Forschungslaboratorien, Burgring 7, 1010 Wien, Austria. E-mail: iris.fischer@nhm-wien.ac.at

**16782.** Fischer, S. (2018): Haussperlinge *Passer domesticus* nutzen Massenauftreten des Vierflecks *Libellula quadrimaculata* als Nahrungsquelle. *Ornithologische Mitteilungen Jahrgang* 70(7/8): 199-201. (in German, with English summary) ["*P. domesticus* exploiting a mass occurrence of *L. quadrimaculata* as food source. On 05.05.2018, and probably the days immediately preceding and following, House Sparrows intensively exploited the uncommon high density of *L. Quadrimaculata*, in the Linum Pond complex area. On the whole, dragonflies appear to be a somewhat rare source of food for House Sparrows. However, under favourable conditions, the profitability of this prey can indeed encourage them to exploit this food source mire intensively." (Author)] Address: Fischer, S., Unter den Eichen 1a, 14641 Paulinenaue, Germany. E-Mail: miliaria@t-online.de



**16783.** Frantsevich, L.; Frantsevich, L. (2018): Leg deformation during imaginal ecdysis in the downy emerald, *Cordulia aenea* (Odonata, Corduliidae). *Zoology* 127: 106-113. (in English) ["Highlights: •A molting dragonfly pulls its legs through immobile flexed exuvial legs. •Shapes of imaginal legs were viewed in instantly fixed specimens. •Transient intrapodomere bendings repeat angles in exuvial joints. •Bending sites shift distad during the whole molt. •Legs in molting dragonflies must be pliable (as in most arthropods). A dragonfly larva migrates from the water to the shore, perches on a plant stem and grasps it with strongly flexed legs. Adult legs inside the larval exoskeleton fit to the larval legs joint-to-joint. The adult emerges with stretched legs. During the molt, an imaginal leg must follow all the angles in exuvial joints. In turn, larval apodemes are withdrawn from imaginal legs. We visualized transient shapes of the imaginal legs by the instant fixation of insects at different moments of the molt, photographed isolated exuvial legs with the imaginal legs inside and then removed the exuvial sheath. Instant shapes of the imaginal tibia show sharp intrapodomere bends copying the angle in the larval femoro-tibial joint. The site of bending shifts distad during the molt. This is possible if the imaginal leg is pliable. The same problem of leg squeezing is also common in hemimetabolous insects as well as in other arthropods, whereas holometabolous insects overcome problems of a tight confinement either by using leg pliability in other ways but not squeezing (cyclorhaphan flies, mosquitoes) or by pulling hardened legs out without change of their pupal zigzag configuration (moths, ants, honey bees). The pupal legs are not intended to grasp any external substrate." (Authors)] Address: Frantsevich, L., Schmalhausen Institute of Zoology, B. Chmielnicky str. 15, Kiev-30, 01601, Ukraine. E-mail: frantsevych@nas.gov.ua

**16784.** Friedritz, L.; Joest, R.; Kamp, J. (2018): Abundanz und Habitatwahl von Imagines von *Ophiogomphus cecilia* an renaturierten und ausgebauten Abschnitten der Lippe, Nordrhein-Westfalen (Odonata: Gomphidae). *Libellula* 37(3/4): 1-22. (in German, with English summary) ["Abundance and habitat selection of imagines of *Ophiogomphus cecilia* at restored and unrestored sections of the river Lippe, North Rhine Westphalia, Germany – *O. cecilia* is an indicator species of near-natural streams and rivers. It is listed under appendix II and IV of the FFH-Directive and protected under German law. Since the beginning of the 2000s, the species has been extending its range in many regions. At the river Lippe in the district of Soest, North Rhine-Westphalia it has been found in increasing numbers since 2012. In 2017, densities of adult dragonflies as well as habitat parameters were recorded systematically along restored and unrestored Stretches of the Lippe. The highest densities were recorded along restored Stretches, but this difference was not statistically significant. Adult dragonflies preferred Stretches with low Vegetation along the bank and clayey substrates in the river. They avoided stretches with overhanging vegetation, turbulent water surface and muddy sediments. Regarding these parameters, the restored sections were significantly, or tendentially more suitable for colonization." (Authors)] Address: Friedritz, L., Arbeitsgruppe Biodiversität und Ökosystemforschung, Institut für Landschaftsökolo-

gie, Westfälische Wilhelms-Universität Münster, Heisenbergstr. 2, 48149 Münster, Germany. E-mail: lennart.friedritz@googlemail.com

**16785.** Fujita, M.; Yoshioka, T.; Iwata, T.; Ohta, M. (2018): Research report of nature in mountain region in Toyama City (2017). *Bulletin of the Toyama Science Museum* 42: 61-64. (in Japanese, with English summary) ["The geology, topography, fauna, and flora of the alpine and subalpine zone between Tarobedaira and Kumonotaira in Toyama city were researched. Volcanic landforms such as the lava plateau and andesite with platy joint at Kumonotaira were recognized. Cirques in the west slope of the southeast ridge of Yakushidake was recognized as glacial landforms. About 30 species of insects were observed during the research. In general, *Erebia neriene* (Böber), *Aeshna crenata* Hagen, *Cicindela sachalinensis* Morawitz, *Leucorrhinia dubia* (Vander Linden), *Nicrophorus vespilloides* (Herbst) are species observed at places with high altitudes, which were unique results of research of mountainous areas. Rock ptarmigans were observed on the trail of Taroyama and Jii-dake. And more than 2300 plant distribution data were extracted from Exif information of photographs." (Authors)] Address: Fujita, M., Toyama Science Museum, 1-8-31 Nishinakano-machi, Toyama, 939-8084, Japan

**16786.** Fukaya, Y.; Takemura, M.; Koyanagi, T.; Maoka, T.; Shindo, K.; Misawa, N. (2018): Structural and functional analysis of the carotenoid biosynthesis genes of a *Pseudomonas* strain isolated from the excrement of Autumn Darter. *Bioscience, Biotechnology, and Biochemistry* 82(6): 1043-1052. (in English) ["There are many reports about carotenoid-producing bacteria and carotenoid biosynthesis genes. In databases for *Pseudomonas* genome sequences, there are genes homologous to carotenoid biosynthesis genes, but the function of these genes in *Pseudomonas* has not been elucidated. In this study, we cloned the carotenoid biosynthesis genes from a *Pseudomonas* sp. strain, named Akiakane, which was isolated from the excrement of the Autumn Darter dragonfly. Using an *Escherichia coli* functional expression system, we confirmed that the *idi*, *crfE*, *crfB*, *crfI*, and *crfY* gene products of the Akiakane strain show predictable catalytic activities. A cluster of six genes was also found, which was comparable to other carotenoid-producing bacteria that belong to the  $\alpha$ -Proteobacteria or  $\gamma$ -Proteobacteria class. The carotenoid biosynthesis genes of a *Pseudomonas* sp. strain Akiakane isolated from the excrement of the Autumn Darter, were isolated and analyzed." (Authors)] Address: Takemura, M., Research Institute for Bioresources & Biotechnology, Ishikawa Prefectural University, Nonouchi, Japan. mtake@ishikawa-pu.ac.jp

**16787.** Gainzarain, J.A.; Manzano, J. (2018): Primera cita de *Trithemis annulata* (Palisot de Beauvois, 1807) (Odonata, Libellulidae) para la provincia de Álava (norte de la Península Ibérica). *Boln. S.E.A.* 63: 353-354. (in Spanish, with English summary) [*T. annulata* ♂, Álava province (northern Spain), Vitoria-Gasteiz, 4-X-2017." (Authors)] Address: Gainzarain, J.A., Instituto Alavés de la Naturaleza Apdo. de correos 2092 01080 Vitoria-Gasteiz, Spain. E-mail: j.gainzarain@gmail.com

**16788.** Gainzarain, J.A. (2018): Primeras citas para la provincia de Burgos (España) de *Aeshna affinis* Vander Linden, 1820, *Anax ephippiger* (Burmeister, 1839) y *Oxygastra curtisii* (Dale, 1834) (Odonata: Aeshnidae, Corduliidae). Boln. S.E.A. 63: 351-352. (in Spanish, With English summary) ["The first records of *A. affinis*, *A. ephippiger* and *O. curtisii* from Burgos province (northern Spain) are reported." (Author)] Address: Gainzarain, J.A., Instituto Alavés de la Naturaleza Apdo. de correos 2092 01080 Vitoria-Gasteiz, Spain. E-mail: j.gainzarain@gmail.com

**16789.** Gaona Ríos, J.M. (2018): Catálogo provisional de los odonatos de la comarca del Campo de Gibraltar, provincia de Cádiz (Sur de España) (Insecta: Odonata) - Provisional catalogue of the odonates of the Campo de Gibraltar region, province of Cádiz (Southern Spain) (Insecta: Odonata). BVnPC 7(88): 21-34. (in Spanish, with English summary) ["The provisional catalogue of the odonates of the Campo de Gibraltar (province of Cádiz) is presented, based upon an exhaustive bibliographic review and samplings made by the author between 2014 and 2017. The work is complemented with local data concerning preferred habitat and flight period of the cited species." (Author)] Address: Gaona Ríos, J.M., Usuario de BiodiversidadVirtual.org – Los Barrios, Cádiz, Spain. E-mail: ergaona1@hotmail.com

**16790.** Gamika, I.; Artika, E. (2018): Primeros datos de reproducción confirmada de *Anax ephippiger* (Burmeister, 1839) (Odonata: Aeshnidae) en País Vasco y Navarra. First records of confirmed reproduction of *Anax ephippiger* in the Basque Country and Navarre. Munibe, Cienc. nat. 66: 9 pp. (in Spain, with English summary) ["The discovery of a teneral specimen in a reed bed in Navarre in August 2017 and of several exuviae of *A. ephippiger* in an urban pond in Álava (Basque Country) in September 2017, confirm the first reproduction of this species in Navarre and in the Basque Country, respectively." (Authors)] Address: Gamika, Isabel, Plaza Santa Bárbara, 6 – 5 I. 01004 Vitoria-Gasteiz, Spain. E-mail: isabelgamika@gmail.com

**16791.** Garrison, R.W.; von Ellenrieder, N. (2018): Damsel-flies of the genus *Argia* (Odonata: Coenagrionidae) from Ecuador with descriptions of five new species. Zootaxa 4470(1): 1-69. (in English) ["A total of 31 species of *Argia* are reported as present in Ecuador, of which two, *A. huanacina* Förster and *A. jocosa* Hagen, constitute first records for the country, and five are new to science and are described here: *Argia acridens* n. sp. (Holotype ♂: ECUADOR, Manabi Prov., 79 km west of Santo Domingo de los Colorados, approximately 0°20' S, 79°46' W, 260 m, 7 May 1975, Paul J. Spangler et al. leg., in USNM), *Argia cuspidata* n. sp. (Holotype male: ECUADOR, Santo Domingo de los Colorados, approximately 0°18'49" S, 79°1'44" W, 740 m, 7-V- 1975, A. Langley & J. Cohen leg., in USNM), *A. philipi* n. sp. (Holotype ♂: BOLIVIA, Cochabamba Dept., Chapare Prov.: stream 5 km south of Villa Tunari, noon, 16°59'49" S, 65°24'28" W, 350 m, 4-XI-2001, Jerrell J. Daigle leg., in FSCA), *Argia selysi* n. sp. (Holotype ♂: ECUADOR, Napo Prov.: Jatun Yacu, Napo River watershed, approximately 1°1' S, 77°50' W, 700 m, 18 April 1935, William Clarke-Macintyre leg., in UMMZ)

and *A. tennesse* n. sp. (Holotype ♂: ECUADOR, Orellana Prov.: stream 8.5 km east of Loreto, 0°37' 6" S, 77°17' 42" W, 360 m, 14-IX-1997, Kenneth J. Tennessen leg., in FSCA). The new species are illustrated and diagnosed from their congeners and their known distribution areas are mapped. To aid in identification, illustrations needed for diagnosis and / or distribution maps of closely related species are also provided, including: *A. adamsi* Calvert, *A. difficilis* Selys, *A. dives* Förster, *A. huanacina* Förster, *A. fulgida* Navas, *A. infrequentula* Fraser, *A. jocosa* Hagen in Selys, *A. joergenseni* Ris, *A. limitata* Navas, *A. medullaris* Selys, *A. orichalcea* Hagen in Selys and *A. ulmeca* Calvert. *Argia columbiana* Navas and *A. rectangula* Navas are treated as subjective junior synonyms of *Argia medullaris* Selys. A key to the eight known metallic red *Argia* species from South America is provided." (Authors)] Address: von Ellenrieder, Natalia, Plant Pest Diagnostics Center, California Dept of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail: natalia.ellenrieder@gmail.com

**16792.** Garrouste, R.; Lapeyrie, J.; Steyer, J.-S.; Giner, S.; Nel, A. (2018): Insects in the Red Middle Permian of Southern France: first Protanisoptera (Odonoptera) and new Caloneurodea (Panorthoptera), with biostratigraphical implications. Historical Biology 30(4): 546-553. (in English) ["The Permian odonopteran Protanisoptera are discovered for the first time in the playa palaeoenvironments of Gonfaron and Lodève (Southern France). The new genus and species *Bansheeperton gonfaronensis* is erected and described on the basis of a distal half of a wing from the Guadalupian of Gonfaron. It is compared with all the previously described protanisopterans. Another specimen consisting of a basal half of a wing from the Guadalupian of Lodève, attributed to cf. *Bansheeperton gonfaronensis*, is also described. Furthermore, three new panorthopteran Caloneurodea are described from the Early to Middle Permian (Cisuralian and Guadalupian) of Southern France, viz. *Gallogramma galadrieli* gen. et sp. nov. from the le Luc Basin (Gonfaron, Var), and *Paleuthygramma* cf. *acuta* Carpenter, 1943 from the Lodève Basin (Hérault). These new fossils increase the palaeodiversity of the Caloneurodea, an interesting clade which now gathers six species in the red Permian of the Southern France, making it one of the most diverse clade in these palaeoenvironments after the Odonoptera. The present discoveries better support a Guadalupian age for the Gonfaron Formation, even if a Late Cisuralian affinities remains possible." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrns1.mnhn.fr

**16793.** Gavalas, I.; Salteri, A.; Alexiou, S. (2018): The Odonata fauna of Naxos and Iraklia Islands, Greece. Libellula 37(3/4): 181-186. (in German, with English summary) ["The Odonata fauna of the islands Naxos and Iraklia was inventoried from 2011 to 2018, resulting in 22 species for Naxos and five for Iraklia. Two species are added as new to Naxos and all records for Iraklia are new. An updated species list for both islands is presented." (Authors)] Address: Alexiou, S., Deutsches Institut für Lebensmitteltechnik, Prof.-von-Klitzing-Straße 7, 49610, Quakenbrück, Germany. E-mail: s.alexiou@dil-ev.de

**16794.** Gazzola, A.; Russo, G.; Balestrieri, A. (2018): Embryonic and larval defensive responses of agile frog (*Rana dalmatina*) to alien crayfish. *Ethology* 124(5): 347-356. (in English) ["Red swamp crayfish *Procambarus clarkii*, a widespread invasive alien crayfish, represents a serious threat for several freshwater species, including amphibians, which are declining at a global scale. As a shared coevolutionary history is the main factor determining the emergence of antipredator responses, Anuran tadpoles may not be able to cope effectively with this introduced predator. We performed two experiments to assess *R. dalmatina* defensive responses to both *P. clarkii* and native dragonfly larvae (*Anax imperator*). First, we conditioned embryos (collected from two ponds 30 km away from each other) with predators' chemical cues to explore possible variation in hatching time caused by predation risk. In the second experiment, to evaluate how predators' diet affects tadpole behavior, we conditioned tadpoles for a 5-week period with cues from tadpole-fed and gammarid-fed predators and recorded behavioral and morphological responses. Embryos did not alter hatching time in the presence of any predator cue, while tadpoles from both populations strongly reduced activity and visibility when raised in the presence of tadpole-fed dragonfly larvae. Morphological changes were less straightforward and were induced only in one population, for which broader tails and a slight increase in body size of tadpoles exposed to tadpole-fed predators were observed. The lack of defensive responses in crayfish-exposed tadpoles suggests that the spreading of this invasive species in agricultural lowlands of northern Italy may represent a further threat to their conservation." (Authors)] Address: Gazzola, A., Eco-Ethology Lab., DSTA-Department of Earth and Environmental Sciences, University of Pavia, Pavia, Italy

**16795.** Gesriantuti, N.; Herlina, N.; Yunita, N. (2018): Jenis-jenis Odonata di Kawasan Stadion Utama Riau, Pekanbaru. *Jurnal Photon* 9(1): 197-202. (in Indonesian, with English summary) ["The study was conducted from April to May 2017 at Riau Main Stadium, Pekanbaru. The purpose of this research is to know the diversity and distribution Odonata at Riau Main Stadium. Odonata capture is done using the field by field method. The results were found 15 species of Odonata i.e. *Ictinogomphus decoratus*, *Pantala flavescens*, *Rhyothemis phyllis*, *Orthetrum sabina*, *Crocothemis servilia*, *Neurothemis fluctuans*, *Brachythemis contaminata*, *Diplacodes trivialis*, *Tholymis tilarga*, *O. testaceum*, *Trithemis* sp., *T. aurora*., *Lestes concinnus*, *Ceriatrigon auranticum* and *C. aeruginosum*. The highest distribution of Odonata is in Station I compared Station II and Station III." (Authors)] Address: Gesriantuti, N., Fakultas MIPA dan Kesehatan Universitas Muhammadiah Riau, Pekanbaru, Indonesia. E-mail: noviagesriantuti@umri.ac.id

**16796.** Govenor, H.; Krometis, L.A.H.; Willis, L.; Angermeier, P.L.; Hessiony, W.C. (2018): Macroinvertebrate sensitivity thresholds for sediment in Virginia streams. *Integrated Environmental Assessment and Management* 15(1): 77-92. (in English) ["Sediment is the most commonly identified pollutant associated with macroinvertebrate community impairments in freshwater streams nationwide. Management of this physical stressor is complicated by the multiple measures of sediment

available (e.g., suspended, dissolved, bedded) and the variability in natural "healthy" sediment loadings across ecoregions. Here we examine the relative importance of 9 sediment parameters on macroinvertebrate community health as measured by the Virginia Stream Condition Index (VSCI) across 5 ecoregions. In combination, sediment parameters explained 27.4% of variance in the VSCI in a multiregion data set and from 20.2% to 76.4% of variance for individual ecoregions. Bedded sediment parameters had a stronger influence on VSCI than did dissolved or suspended parameters in the multiregion assessment. However, assessments of individual ecoregions revealed conductivity had a key influence on VSCI in the Central Appalachian, Northern Piedmont and Piedmont ecoregions. In no case was a single sediment parameter sufficient to predict VSCI scores or individual biological metrics. Given the identification of embeddedness and conductivity as key parameters for predicting biological condition, we developed family-level sensitivity thresholds for these parameters, based on extirpation. Resulting thresholds for embeddedness were 68% for combined ecoregions, 65% for the Mountain bioregion (composed of Central Appalachian, Ridge and Valley, and Blue Ridge ecoregions), and 88% for the Piedmont bioregion (composed of Northern Piedmont and Piedmont ecoregions). Thresholds for conductivity were 366 mS/cm for combined ecoregions, 391 mS/cm for the Mountain bioregion, and 136 mS/cm for the Piedmont bioregion. These thresholds may help water quality professionals identify impaired and at-risk waters designated to support aquatic life and develop regional strategies to manage sediment-impaired streams. Inclusion of embeddedness as a restoration endpoint may be warranted; this could be facilitated by application of more quantitative, less time-intensive measurement approaches. We encourage refinement of thresholds as additional data and genus-based metrics become available. *Integr Environ Assess Manag* 2019; 15:77–92. Published 2018. This article has been contributed to by US Government employees and their work is in the public domain in the USA." (Authors)] Address: Govenor, Heather, Dept of Biological Systems Engineering, Virginia Tech, Blacksburg, Virginia, USA

**16797.** Grainger, N.; Harding, J.; Drinan, T.; Collier, K.; Smith, B.; Death, R.; Makan, T.; Rolfe, J. (2018): Conservation status of New Zealand freshwater invertebrates, 2018. *New Zealand threat classification series* 28: 29 pp. (in English) ["The conservation status of 675 New Zealand freshwater invertebrate taxa was assessed using the New Zealand Threat Classification System (NZTCS). A full list is presented, along with a statistical summary and brief notes on the most important changes. This list replaces all previous NZTCS lists for freshwater invertebrates." (Authors)] Address: Marinov, M., Investigation and Diagnostic Centres and Response, Operations Branch, Ministry for Primary Industries, 231 Morrin Rd, Auckland 1072 New Zealand. E-mail: Milen.Marinov@mpi.govt.nz

**16798.** Gros, P.; Chovanec, A. (2018): Erste Nachweise der Westlichen Keiljungfer *Gomphus pulchellus* Sélys, 1840 (Odonata: Gomphidae) in Oberösterreich. *Beiträge zur Entomofaunistik* 19: 35-42. (in German, with English summary) ["*G. pulchellus* is a southwest European endemic expanding its



range to north and east since about 100 years. The present paper deals with the first records of this species in Upper Austria, and the locations, the Holzöster lake and the mouth of the Gurtenbach, are described. In the westernmost part of Austria, in Vorarlberg, the species was found in the mid 1980ies and in Salzburg in 2005. Upper Austria is the third Austrian province, where *G. pulchellus* is recorded." (Authors)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmn.gv.at

**16799.** Gurinder Kaur, W.; Neha, K.; Jaspreet Kaur, G. (2018): Chromosomes of *Libellago lineata lineata* (Chlorocyphidae: Odonata). *Indian Journal of Entomology* 80(3): 737-740. (in English) ["Linear characterization and course of meiosis in *L. lineata lineata* are described by conventional staining, C-banding, silver nitrate staining and sequence specific staining. There are two complements  $n=12$  and  $n=13$ , without m chromosomes. Increase in chromosome number is due to the fragmentation of medium sized autosome pair. Dark terminal C-bands are present on 9 autosomal bivalents, while remaining 3 bivalents and X chromosome show less amount of C-heterochromatin; 10 autosomal bivalents show terminal NOR-bands; while X chromosome is NOR-negative. All the autosomes and X chromosome possess less intense DAPI and bright CMA3 signals, which indicate complement is rich in GC rich regions than AT rich regions." (Authors)] Address: Gurinder Kaur, Walia, Dept of Zoology and Environmental Sciences, Punjabi Univ., Patiala, 147002, India. Email: gurinderkaur\_walia@yahoo.co.in

**16800.** Hallworth, M.T.; Marra, P.P.; McFarland, K.P.; Zahendra, S.; Studds, C.E. (2018): Tracking dragons: stable isotopes reveal the annual cycle of a long-distance migratory insect. *Biol. Lett.* 14: 20180741. <http://dx.doi.org/10.1098/rsbl.2018.0741>: 5 pp. (in English) ["Insect migration is globally ubiquitous and can involve continental-scale movements and complex life histories. Apart from select species of migratory moths and butterflies, little is known about the structure of the annual cycle for migratory insects. Using stable-hydrogen isotope analysis of 852 wing samples from eight countries spanning 140 years, combined with 21 years of citizen science data, we determined the full annual cycle of a large migratory dragonfly *Anax junius*. We demonstrate that darners undertake complex long-distance annual migrations governed largely by temperature that involve at least three generations. In spring, the first generation makes a long-distance northbound movement (further than 650 km) from southern to northern range limits, lays eggs and dies. A second generation emerges and returns south (further than 680 km), where they lay eggs and die. Finally, a third resident generation emerges, reproducing locally and giving rise to the cohort that migrates north the following spring. Since migration timing and nymph development are highly dependent on temperature, continued climate change could lead to fundamental changes in the biology for this and similar migratory insects." (Authors)] Address: Hallworth, M.T., Migratory Bird Center, Smithsonian Conservation Biology Institute, Washington, DC 20008, USA. E-mail: mhallworth@gmail.com

**16801.** Hecca, D.; Arinafril, A.; Novia, N. (2018): Diversity of Odonata and aquatic environmental conditions in lake area (water ski and OPI) Jakabaring Palembang - South Sumatra. *Biovalentia* 4(2): 7 pp. (in English) ["Odonata are considered to be good indicators of environmental health and water quality with its presence and diversity in the Jakabaring lake area (Water Ski and OPI). The research location (Water Ski and OPI) utilized by the community as water catchment areas (flood control), recreation and habitat. The Activity in the lake area can affect the benefit of the lake, affecting the quality of the lake waters as a living habitat for animals and plants. However, to describe the diversity of odonata as indicator of the waters in the area of Water Ski and Lake OPI lakes, there is no such thing, therefore the researchers to look at Odonata diversity in the area of Water Ski Lake and Lake OPI Jakabaring Palembang-South Sumatra. The location of the study was determined using the purposive sampling method conducted in April 2018. The species found to identified at the FMIPA Animal Taxonomy Laboratory of Sriwijaya University. Sampling in the morning (07.00 – 10.00 AM) and afternoon (15.00 – 18.00 AM). The results of research in the lake area found 2 families, 11 genere, and 18 species, the total number of all 984 individual species. Odonata species data obtained in the analysis using Past3 software. The diversity index in the Water Ski lake is 1.992 and the diversity index in the OPI lake is 1.758. Diversity index value (2.014), dominance index (0.7922) and evenness index (0.4165). Odonata and environmental conditions of the lake (Water Ski and OPI) still have relationship, the condition of lake water quality is still below water quality criteria threshold. This is what makes the diversity on both lakes has a moderate value." (Authors)] Address: Hecca, Desven, Study Program of Management Environmental, Graduate Program at Sriwijaya University. E-mail: desvenhecca@student.pps.unsri.ac.id

**16802.** Helebrandová, J.; Pyszko, P.; Dolný, A. (2018): Large net cage for captive breeding and behavioural studies of damselfly *Lestes sponsa* (Hansemann, 1823) (Odonata: Lestidae): submerged oviposition as a model behaviour. *Aquatic Insects* 39(1): 43-53. (in English) ["Odonata have a strong potential as model organisms for testing ecological and evolutionary hypotheses because of their short life history, relative ease and cost-effectiveness of care. Unfortunately, very few studies have examined how to create a semi-natural environment for odonates, limiting the biological validity of laboratory manipulation. To better study odonate life cycle and behaviour under controlled conditions, we designed a large net cage that imitated the natural terrestrial as well as aquatic habitat of *L. sponsa*. This species is thought to be capable of submerged oviposition, an unusual behaviour in odonates. We compared multiple variables across natural conditions and the net cage. We demonstrated that between-year variability under natural conditions was generally greater than variability between natural and artificial environments. Overall, semi-natural conditions did not substantially change the *L. sponsa* life cycle (including the unique behaviour of submerged oviposition), suggesting that results from the net cage are likely generalisable to the field." (Authors)] Address: Dolny, A., Dept of Biology & Ecology, Fac. of Science, Univ. of Ostrava, Ostrava, Czech Republic. E-mail: ales.dolny@osu.cz

**16803.** Henarejos-González, J.M.; Sánchez-Balibrea, J.M.; Martínez-Saura, C.M.; Requena-Aznar, C.; Arnaldos-Giner, I.; Fernández-Sempere, M.; López-Barquero, P.; Martínez-López, P.; Ramos, J.; López-Cañizares, C.; Sánchez-Sánchez, M.A.; Ballesteros-Pelegrín, G.A. (2018): Catálogo y distribución geográfica de los Odonatos en la Región de Murcia (SE España). - Catalogue and geographical distribution of Odonata in the Region of Murcia (SE Spain). *Munibe, Cienc. nat.* 66: 137-143. (in Spanish, with English and Euskarian summaries) ["The catalogue and distribution of the Odonata order in the Murcia Region has been updated, comparing this to an earlier one made in the 1950s. The results indicate that 40 species were located in 17 localities in the mid-20th century, while the 2087 citations collected between 1991-2017 confirm the presence of 47 species in 191 localities. 11 new species have been identified for the Region of Murcia, which may have been favoured by the construction of ponds, reservoirs and other infrastructures to supply 225,000 hectares of irrigated land. Of these, the distribution areas of 9 species are expanding towards northern Europe and / or Asia, an effect that may relate to the current climate change process. On the contrary, in the current review 4 species cited in the study conducted in the mid-twentieth century have not been detected." (Authors)] Address: Ballesteros-Pelegrín, G.A., Univ. de Murcia. Depto de Geografía, Spain. E-mail: gabp1@um.es

**16804.** Higashikawa, W.; Yoshimura, M.; Yagi, T.; Maeto, K. (2018): Grass and water preference during oviposition by *Sympetrum pedemontanum elatum* in Japan (Odonata: Libellulidae). *Odonatologica* 47(1/2): 161-178. (in English) ["*S. pedemontanum* is regionally endangered or extinct in several countries despite having a wide distribution across the Eurasian continent and its neighboring islands. Its subspecies *S. p. elatum* in Japan has been decreasing rapidly with the loss of larval habitat in rural areas since the 1970s. Previous studies have detailed habitat use by larvae and mature adults, but information on grass and water preferences during oviposition is still lacking. In this study, we tracked adults as they performed reproductive behaviors and documented the grass height and water conditions preferred for oviposition in a lowland, mid-slope river in Japan. Our results showed that females dipped their abdomens significantly more into stagnant than into flowing water for oviposition and that short surrounding grass and shallow water enhanced oviposition behavior. These findings emphasize the importance of riparian grass management and water flow regulation for the conservation of *S. p. elatum*." (Authors)] Address: Higashikawa, W., Lab. of Insect Biodiversity & Ecosystem Science, Graduate School of Agricultural Science, Kobe University, Hyogo 657-8501, Japan. E-mail: higashi\_n34@yahoo.co.jp

**16805.** Hjalmarsen, E. (2018): On the use of Odonata as ecological indicators. M.Sc. thesis, University of Oklahoma, Norman, Oklahoma: X + 49 pp. (in English) ["The insect order Odonata is unique to use as an ecological indicator for water quality because of its close relationship with aquatic ecosystems and relative ease of observation and species-level identification. My goal was to explore ways in which odonates can respond

to, and therefore indicate, sites with higher water quality. Determining where odonates breed as opposed to where they "merely" occur is key to an understanding of the importance of water quality. It has been asserted that one should conclude that an odonate species breeds if and only if physical (exuvia, teneral) or behavioral (tandem pairing, oviposition) evidence is obtained, yet gathering such evidence requires specialized observational and technical skills. In contrast, reliable observations and counts of adults can be had readily, creating a dilemma over which data to use. For my first chapter, I examined whether adult surveys and reproductive behaviors could predict breeding residency status, represented by presence of teneral (newly emerged odonates), using a large, multi-year dataset from across Oklahoma. Using an occupancy model combined with piecewise regression, I found thresholds and associated Bayesian credible intervals for a suite of odonate taxa. I found similar general thresholds across species but found specific indicator thresholds exist when examining groups on the family and genus level. Thresholds differed among taxonomic groups and decreased in models that included counts of females rather than just of counts of adults any (or unknown) sex. My results can guide future survey protocol: adult observations can remain the primary focus, which broadens the scope of potential observer skill levels (e.g., citizen scientists) while indirectly ensuring breeding to identify sites for water quality surveys. For my second chapter, I examined odonate biodiversity at urbanized water features to determine factors that promote species diversity and abundance, with a goal of using findings to make beneficial improvements to park management to increase water quality. I conducted surveys April–October 2016–2017 at 14 urban sites in central Oklahoma that varied in human use and habitat structure. I compared diversity and species composition among sites and tested which features best predicted higher abundance and species totals. Several variables were good predictors but use of a site for fishing purposes was an overarching indicator of both high species richness and high odonate abundance. Despite higher human use, presence of infrastructure, and increased management of these sites (which are typically negatively associated with biodiversity), odonates (and humans) benefit from maintaining them and ensuring proper water quality persists (i.e., if it is good for fish, it is good for insects)." (Author)] Address: not stated

**16806.** Huang, D.; Azar, D.; Nel, A. (2018): The oldest 'Megapodagrionidae' (Odonata, Zygoptera) discovered in the Lower Cretaceous Yixian Formation, China. *Cretaceous Research* 84: 426-430. (in English) ["*Cretapodagrion sibelleae* gen. et sp. nov., oldest representative and first Mesozoic 'Megapodagrionidae', is described on the basis of a complete wing from the Lower Cretaceous of Yixian Formation (ca. 124.6 Ma) in China. It shows some similarities with the three extant genera of the 'Megapodagrioninae' and the enigmatic genus *Mesopodagrion*." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**16807.** Huang, D.; Fu, Y.; Nel, A. (2018): The first amber stenophlebiid damsel-dragonfly (Odonata, Epiproctophora, Stenophlebiidae) from mid-Cretaceous amber of northern Myanmar.

Cretaceous Research 94: 40-44. (in English) ["*Bumasteno-  
phlebia flecki* gen. et sp. nov., first stenophlebiid damsel-dra-  
gonfly in mid-Cretaceous Burmese amber is described and  
illustrated. It allows to show structures proper to this family,  
previously unknown. In particular, the subnodus is enforced  
by a dorsal chitinous bracket and the nodal furrow is very weak,  
suggesting that the stenophlebiid nodal complex is very par-  
ticular and did not functioned as in other Odonata." (Authors)]  
Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buf-  
fon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**16808.** Huang, D.; Fu, Y.; Gao, J.; Nel, A. (2018): A new dam-  
sel-dragonfly of the small family Selenothemistidae from the  
earliest Late Jurassic of China (Odonata: Isophlebioptera).  
*Palaeoentomology* 1(1): 37-41. (in English) ["The Mesozoic 'an-  
isozygopteran' clade Isophlebiida Bechly, 1996 is quite diverse  
with more than 48 described genera, especially in the two fam-  
ilies Campterophlebiidae Handlirsch, 1920 and Isophlebiidae  
Handlirsch, 1906, in which numerous new genera have been  
recently described mainly from China (see Fossilworks: Gate-  
way to the Paleobiology Database at <http://fossilworks.org/>).  
However, this is not the case for the more inclusive isophlebio-  
pteran clades Euthemistidae Pritykina, 1968, Parazygoptera  
Bechly, 1997, and Selenothemistidae Handlirsch, 1939, that  
comprise ca. 25 described genera. These last groups comprise  
relatively small and delicate damsel-dragonflies, compared  
to the Isophlebiida. Thus, their lower diversity is possibly a re-  
sult of taphonomic bias. They are mainly known from Europe,  
Central Asia and China." (Authors)] Address: Nel, A., Lab.  
Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, 75005 Paris, France.  
E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**16809.** Huang, D.; Cai, C.; Nel, A. (2018): A new damsel-dra-  
gonfly of the small family Selenothemistidae from the Late  
Jurassic of China (Odonata, Isophlebioptera). *Journal of Pale-  
ontology* 92(6): 1049-1053. (in English) ["*Sinothemis difficilis*  
new genus new species, youngest and first accurate Chinese  
representative of the small family Selenothemistidae, is de-  
scribed and illustrated. It is closely related to the genus *Turano-  
themis*, known from the Karatau outcrop in Kazakhstan. The  
genus *Caraphlebia*, known from the Middle Jurassic of Ant-  
arctica, seems to strongly differ from the other representatives  
of this family and may belong to another family. The fossil was  
collected from the Upper Jurassic ( $157.3 \pm 1.5$  Ma; near Oxfor-  
dian/Kimmeridgian boundary) Guancaishan locality, Jianping  
County, Western Liaoning, NE China. It belongs to the late as-  
semblage of the Yanliao biota, while the early assemblage is  
represented by the putatively close damsel-dragonfly *Para-  
liassophlebia* from the Jiulongshan Formation of northern He-  
bei Province." (Authors)] Address: Huang, D., State Key Lab.  
Palaeobiology & Stratigraphy, Nanjing Inst. of Geology & Pal-  
aeontology, Chinese Acad. Sci., Nanjing 210008, People's Re-  
public of China. E-mail: [dyhuang@nigpas.ac.cn](mailto:dyhuang@nigpas.ac.cn)

**16810.** Hykel, M.; Harabiš, F.; Dolný, A. (2018): Diel changes  
in habitat use by dragonflies: Nocturnal roosting site selec-  
tion by the threatened dragonfly *Sympetrum depressiusculum*  
(Odonata: Libellulidae). *Entomological Science* 21(1): 154-163.

(in English) ["Although it is well recognized that insects' hab-  
itat use and requirements may change during the season, very  
little attention has been devoted to diel habitat changes in most  
insects. In this study, we compared habitat utilization patterns  
of *S. depressiusculum*) adult dragonflies between daytime ac-  
tivities and nocturnal roosting. During daytime, we captured  
and marked adult individuals with fluorescent paint in different  
habitats. At night, we searched, using UV light, for marked in-  
dividuals that remained on the habitats. We found that habitat  
selection for daytime activities and that for nocturnal roosting  
differed significantly. Adults clearly avoided ponds and their im-  
mediate surroundings for nocturnal roosting whereas this hab-  
itat type was frequently utilized for daytime activities. We sug-  
gest that nocturnal avoidance of the riparian area is associated  
with lower temperatures, which adversely affect thermoregula-  
tion, and that selection of specific habitats for nocturnal roosting  
is closely associated with vegetation structure providing stabil-  
ity during windy nights and serving as a suitable shelter. Such  
habitat properties are found especially on fallow land, a habitat  
type whose representation in agricultural areas has been grad-  
ually decreasing in recent decades." (Authors)] Address: Hykel,  
M., Department of Biology and Ecology, Faculty of Science,  
University of Ostrava, Slezská Ostrava, Czech Republic

**16811.** Ilvonen, J.J.; Kaunisto, K.M.; Suhonen, J. (2018): Odo-  
nates, gregarines and water mites: why are the same host spe-  
cies infected by both parasites? *Ecological Entomology* 43:  
591-600. (in English) ["1. Odonata are widely parasitised in-  
sects and numerous studies have tried to understand this host-  
parasite relationship. However, most of these studies  
have concentrated on a single host species, neglecting the  
larger pattern within the Odonata order. 2. The aim of this  
paper was to examine different Odonata species for common en-  
do- and ectoparasites and whether a general infection  
pattern can be found. Additionally, the goal was to investigate  
whether the phylogeny of the host species could explain these  
possible infection patterns. To this end, a dataset from the  
existing literature was compiled and the prevalence of endo-  
parasitic gregarines and ectoparasitic water mites was ana-  
lysed for 46 different odonate species. 3. Three distinct patterns  
were found: (i) most of the odonate host species had both greg-  
arines and water mites, rather than only either one or neither;  
(ii) there appears to be a positive association between grega-  
rine and water mite prevalences across host species; (iii) a  
weak phylogenetic signal was detected in gregarine preva-  
lence and a strong one in water mite prevalence. 4. It is hy-  
pothesised that, due to the infection and transmission mecha-  
nisms by which water mites and gregarines infect different odo-  
nate host species, parasitism is aggregated to common, high-  
density species. However, much research is needed in order  
to fully understand this relationship between odonates and their  
parasites, especially within the same host populations and host  
species assemblages." (Authors)] Address: Ilvonen, J.J., Dept  
Biol., 20014 Univ.y of Turku, Turku, Finland. E-mail: [jjilvo@utu.fi](mailto:jjilvo@utu.fi)

**16812.** Immerschitt, I.; Martens, A. (2018): Ejection, inges-  
tion and fragmentation of mesoplastic fibres to microplastics by  
*Anax imperator* larvae (Odonata: Aeshnidae). *Odonatologica*



47(3/4): 57-66. (in English) ["Exposure to plastic litter in ecosystems is increasing globally. Marine and terrestrial ecosystems, as well as freshwater ecosystems, are affected. Despite this, the impact of increased exposure to plastics on the freshwater fauna is largely unexplored. The present work investigates the reactions of 42 *Anax imperator* larvae to plastics in their habitat. Mesoplastic fibres (ca 8 mm long) were presented with a *Chironomus* sp. larva that was placed behind the fibre. In the majority of the observations, ejection attempts using the labium and the front legs were observed. When ingestion occurred, macerated plastic fibres (0.5-3.5 mm) appeared in the faeces of several individuals. Consequently, Odonata larvae turned meso-plastics into microplastics. It is assumed that the mechanical comminution was achieved by the action of the gizzard, which contains strong chitinous teeth." (Authors)] Address: Immerschitt, Isabelle, Institute of Biology, University of Education Karlsruhe, BismarckstraBe 10, 76133 Karlsruhe, Germany. E-mail: isabelle.immerschitt@t-online.de

**16813.** Islam, S.U.; Qasim, M.; Lin, W.; Islam, W.; Arif, M.; Ali, H.; Wu, Z. (2018): Genetic interaction and diversity of the families Libellulidae and Gomphidae through COI gene from China and Pakistan. *Acta Tropica* 182: 92-99. (in English) ["Highlights: •There are 67 sequences of Odonates, comprising two families, 15 genera and 21 species in the present study. •*Crocothemis servilia* had maximum population in the entire collection. •Cytochrome oxidase subunit I (COI) gene was used for whole molecular work. A total of 300 Odonata were collected from six different localities of China and Pakistan. 67 representative samples were selected to sequence their mitochondrial cytochrome oxidase subunit I (COI). An examination of the resultant sequences identified 21 different dragonfly species, belonging to 15 distinct genera, two families, Libellulidae and Gomphidae. Sequence alignment was executed using Clustal-W in BioEdit v6. The phylogenetic tree was constructed through Neighbor-joining method by using Jukes-Cantor model, and genetic divergence was calculated via Kimura 2-parameter using MEGA7, while Genetic diversity was calculated by DnaSP v5. The maximum genetic divergence was observed for *C. servilia*, at 20.49%, followed by Libellulidae sp. with 22.30% while minimum divergence (0.82%) was observed for *Meligomphus ardens*. Likewise, a significant genetic diversity was observed for all species. However, *C. servilia* species presented maximum value (176 mutations) followed by Libellulidae spp. (150 mutations), whereas minimum value (3 mutations) was observed by *Orthetrum testaceum*. Interestingly, the diversity of *C. servilia*, all of which are collected from a single location of China, is much higher than those from Pakistan, which were collected from 5 different places with a spatial distance exceeding 500 Kms. Our results are useful in gaining a full appreciation of the global diversity of dragonflies and the development of conservation measures of this insect." (Authors)] Address: Wu, Z., State Key Lab. of Ecological Pest Control for Fujian and Taiwan Crops, Fuzhou, China. E-mail: wuzujian@126.com

**16814.** Iswandaru, D. (2018): Diversity of dragonflies (Odonata) in swamp ecosystem university of Lampung. *Agricultura* 105-106: 101-109. (in English) ["Swamp is a unique wetland ecosystem with waterlogged conditions, overgrown with distinctive

vegetation types. Swamp ecosystem in University of Lampung are freshwater swamps that are well watered throughout the year and overgrown with aquatic vegetation, making it ideal for the habitat of various types of Odonata. The life cycle of the dragonfly is in two environments, pre-adult phase is aquatic and adult life around the waters, so the dragonflies can be used as an environmental bioindicator. The study aims to find the species of dragonflies with conservation status and trading status, analyzing the relative abundance and diversity of dragonflies founded in the swamp ecosystem at the University of Lampung. This research conducted with exploration method or (field to field) in three locations (R1, R2, R3), the random exploration was done two times at morning and afternoon. The results showed that 12 species of dragonflies from 3 families encountered during study. The highest abundance of dragonfly species *Orthetrum sabina* with 20.14% and the smallest was *Acisoma panorpoides* and *Zyxomma obtusum* with 2.16%. Conservation status of the 12 species are Least Concern (IUCN), unprotected (UU / PP) and non-appendix (CITES). The value of diversity index shows a moderate scale with 2.26, which means the condition of swamp ecosystem in University of Lampung still has good productivity as a habitat to support the life of dragonfly." (Author)] Address: Iswandaru, D., Dept of Forestry, Fac. of Agriculture, Univ. of Lampung. E-mail: univasahanpress@gmail.com

**16815.** Itagawa, S.; Ichinose, T. (2018): Factors affecting the migration range of *Calopteryx atrata* in urban small and medium-sized rivers. *Landscape Research* 11: 32-38. (Japanese, with English summary) ["We investigated the migration range of *C. atrata* using the mark and recapture method in Akuwa River and Ooka River which run through the urban area of Yokohama City, Kanagawa Prefecture, Japan. 286 individuals were marked and released at four spots, and 64 marked individuals were recaptured after several days. Initial findings showed that the maximum total migrant distance was 1319 meters, and the average was 323 meters. The individuals that migrated upper stream were more than those in the lower stream, and the migration range to upper was significantly longer than to the lower. Secondly, we analyzed the factors that promote or stunt the migration of *C. atrata* by GLMM with random effect. Results showed that survival days from release, the area of lower riverbed and coverage of shade were positively correlated with total migration distance. Meanwhile, the coverage of three types of the aquatic plant commonly had a negative correlation with the total migration distance. Also, the coverage area ratio of forest around rivers partly promotes the migration distance of *C. atrata*, if values of factors were added up in a more wide range from the release spot. The study's results showed that continuously establishing preferred riparian habitats with aquatic vegetation and a conservation of forests close to rivers enhance *C. atrata*'s large migration and expanded habitats." (Authors) Address: not stated

**16816.** Jackson, C.; McCalla, S.G.; Amberg, J.; Soluk, D.; Britten, H. (2018): The complete mitochondrial genome of Hine's emerald dragonfly (*Somatochlora hineana* Williamson) via NGS sequencing. *Mitochondrial DNA Part B* 3(2): 562-563.

(in English) ["Data were generated via next generation sequencing (NGS) and assembled using a mitochondrial baiting and iterative mapping approach. The full length circular genome is 15,705 bp with 26.6% GC content. It contains the typical metazoan set of 37 genes: 13 protein-coding genes, 22 transfer RNA (tRNA) and 2 ribosomal RNA (rRNA) genes, and an A + T-rich control region. To our knowledge, this is the first report of the complete *S. hineana* mitogenome." (Authors)] Address: Jackson, C., UMESC, 2630 Fanta Reed Road, La Crosse, WI 54603, USA. E-mail: cjackson@usgs.gov

**16817.** Jacquelin, L.; Desutter-Grandcolas, L.; Chintauan-Marquier, I.; Boistel, R.; Zheng, D.; Prokop, J.; Nel, A. (2018): New insights on basivenal sclerites using 3D tools and homology of wing veins in Odonoptera (Insecta). *Scientific Reports* 8, Article number: 238 (2018). 7 pp. (in English) ["Being implied in flight, mimetism, communication, and protection, the insect wings were crucial organs for the mega diversification of this clade. Despite several attempts, the problem of wing evolution remains unresolved because the basal parts of the veins essential for vein identification are hidden in the basivenal sclerites. The homologies between wing characters thus cannot be accurately verified, while they are of primary importance to solve long-standing problems, such as the monophyly of the Palaeoptera, viz. Odonoptera, Panephemeroptera, and Palaeozoic Palaeodictyoptera mainly known by their wings. Hitherto the tools to homologize venation were suffering several cases of exceptions, rendering them unreliable. Here we reconstruct the odonatopteran venation using fossils and a new 3D imaging tool, resulting congruent with the concept of Riek and Kukalová-Peck, with important novelties, viz. median anterior vein fused to radius and radius posterior nearly as convex as radius anterior (putative synapomorphies of Odonoptera); subcostal anterior (ScA) fused to costal vein and most basal primary antenodal crossvein being a modified posterior branch of ScA (putative synapomorphies of Palaeoptera). These findings may reveal critical for future analyses of the relationships between fossil and extant Palaeoptera, helping to solve the evolutionary history of the insects as a whole." (Authors)] Address: Jacquelin, Lauriane, Institut de Systématique, Évol., Biodiversité, ISYEB - UMR 7205 – CNRS, MNHN, UPMC, EPHE, Mus. Nat. d'Histoire naturelle, Sorbonne Univ., 57 rue Cuvier, CP 50, Entomologie, 75005, Paris, France

**16818.** Jang, J.H.; Yang, G.-H. (2018): Design of wing root rotation mechanism for dragonfly-inspired micro air vehicle. *Applied Sciences* 2018, 8, 1868; doi:10.3390/app8101868 www.mdpi.com/journal/. 18 pp. (in English). ["This paper proposes a wing root control mechanism inspired by the drag-based system of a dragonfly. The previous mechanisms for generating wing rotations have high controllability of the angle of attack, but the structures are either too complex or too simple, and the control of the angle of attack is insufficient. In order to overcome these disadvantages, a wing root control mechanism was designed to improve the control of the angle of attack by controlling the mean angle of attack in a passive rotation mechanism implemented in a simple structure. Links between the proposed mechanism and a spatial four-bar link-based flapping mechanism were optimized for

the design, and a prototype was produced by a 3D printer. The kinematics and aerodynamics were measured using the prototype, a high-speed camera, and an F/T sensor. In the measured kinematics, the flapping amplitude was found to be similar to the design value, and the mean angle of attack increased by approximately 30 at a wing root angle of 0. In the aerodynamic analysis, the drag-based system implemented using the wing root control mechanism reduced the amplitude of the force in the horizontal direction to approximately 0.15 N and 0.1 N in the downstroke and upstroke, respectively, compared with the lift-based system. In addition, at an inclined stroke angle, the force in the horizontal direction increased greatly when the wing root angle was 0 at the inclined stroke angle, while the force in the vertical direction increased greatly at a wing root angle of 30. This means that the flight mode can be controlled by controlling the wing root angle. As a result, it is shown that the wing root control mechanism can be applied to the MAV (micro air vehicle) to stabilize hovering better than the MAV using a lift-based system and can control the flight mode without changing the posture." (Authors) Address: Jang, J.H., Robotics Group, Korea Institute of Industrial Technology, Ansan-si 15588, Gyeonggi-do, Korea. E-mail: jhjang7@kitech.re.kr

**16819.** Jeong, S.Y.; Kim, M.J.; Wang, A.R.; Kim, S.-S.; An, J.; Kim, I. (2018): Complete mitochondrial genome sequence of the tiny dragonfly, *Nannophya pygmaea* (Odonata: Libellulidae). *Conservation Genet. Resour.* 10: 355-358. (in English) ["*N. pygmaea* has been listed as an endangered insect in South Korea. We sequenced the complete 15,112-bp-long mitochondrial genome (mitogenome) of the species. The genome included a typical set of genes (13 protein-coding genes [PCGs], two rRNA genes, and 22 tRNA genes) and one non-coding region with an arrangement identical to that found in most insects. Among the 13 PCGs, only ND1 started with the atypical TTG. The 441-bp-long A+T-rich region possessed the highest A/T content (84.6%) in the genome. *N. pygmaea* was placed as the sister to *Orthetrum* species belonging to Libellulidae. Unlike conventional phylogenetic results, the suborders Anisozygoptera and Zygoptera formed a strong sister group in both Bayesian inference (BI) and maximum likelihood (ML) methods (BI, BPP = 1 and ML, 88–94%), justifying the use of different types of molecular markers for phylogenetic analysis." (Authors)] Address: Kim, I., Dept Appl. Biol., Coll. Agricult. & Life Sciences, Chonnam National Univ., Gwangju 61186, Republic of Korea. E-mail: ikkim81@chonnam.ac.kr

**16820.** Jiao, J.; Zhang, F.; Jiao, T.M Gu, Z.; Wang, S. (2018): Bioinspired superdurable pestle-loop mechanical interlocker with tunable peeling force, strong shear adhesion, and low noise. *Advanced Science* 5(4), 1700787: 7 pp. (in English) ["Velcro, the most typical hook-loop interlocker, often suffers from undesirable deformation, breaking, and noise because of the structure of the hook. Inspired by the arrester system of dragonfly, a new mechanical interlocker with a nylon pestle instead of the traditional hook is developed. The pestle-loop mechanical interlocker shows a tunable peeling force from  $0.4 \pm 0.14$  to  $6.5 \pm 0.72$  N and the shear adhesion force of pestle-loop mechanical interlocker is about twice as much as

that of velcro. The pestle tape can be separated and fastened with the loop tape up to 30 000 cycles while keeping the original adhesive force and the pestle structure. In comparison, only after 4000 cycles most hooks of the commercial velcro are deformed and even broken, completely losing their adhesive function and their hook structure. These experimental results are further supported by finite element simulations—the base of pestle mainly bears the separation-caused strain while the middle of hook does. Notably, the sound volume during the separation of pestle-loop mechanical interlocker is merely  $49 \pm 7.4$  dB, much lower than  $70 \pm 3.5$  dB produced by the velcro." (Authors)] Address: Wang, S., CAS Key Lab. Bio-inspired Materials & Interfacial Science, CAS Center for Excellence in Nanoscience, Technical Inst. of Physics and Chemistry, Chinese Academy of Sci., Beijing 100190, P. R. China. E-mail: stwang@mail.ipc.ac.cn

**16821.** Jinguji, H.; Sawada, D.; Morimoto, M. (2018): Suppression of *Aedes* mosquito larvae using dragonfly larvae released into ovitraps (Diptera: Culicidae; Odonata: Libellulidae). *Odonatologica* 47(3/4): 67-84. (in English) ["There has been a marked increase in the number of dengue cases reported in Japan. In 2014, 162 people contracted dengue fever from the virus transmitted by *Aedes albo-pictus*. The increased prevalence of the disease in Japan implies that climate change and globalization have accelerated the risk of dengue fever spreading to Japan. This study aimed to develop a method for using dragonflies as biocontrol agents for mosquito control. We conducted a field study to determine whether dragonfly larvae could suppress populations of *A. albopictus* larvae. Eighth instar larvae of *Sympetrum frequens* were released into an ovitrap in which they preyed upon mosquitos. Compared to the control treatment, mosquito larvae decreased significantly in ovitraps containing *S. frequens* and *S. infuscatum* (i.e., experimental treatment). The mean number of mosquito larvae remaining in *S. frequens* and *S. infuscatum* ovitraps was  $1.5 \pm 4.6$  (mean  $\pm$  SD) and  $0.6 \pm 1.1$ , respectively. The results showed that *S. frequens* and *S. infuscatum* preyed on 410 to 710 and 339 to 592 mosquito larvae per ovitrap at each site. Based on estimates of the number of mosquito eggs laid in ovitraps during the field trial, *S. frequens* larvae consumed approximately 20.3 to 45.0 % of mosquito eggs in the ovitrap. Suppression effects of *S. frequens* and *S. infuscatum* lasted  $41 \pm 13$  and  $35 \pm 13$  days, respectively. The results obtained suggest that *S. frequens* in ovitraps is effective for regulating larval populations of mosquito vectors." (Authors)] Address: Jinguji, H., School of Food, Agricultural & Environmental Sciences, Miyagi Univ., 2-2-1 Hatatate, Taihaku-ku, Sendai, Miyagi 982-0215, Japan. E-mail: jinguji@myu.ac.jp

**16822.** Jocque, M.; Geeraert, L.; Jones, S.E.I. (2018): Odonata from highlands in Niassa, Mozambique, with two new country records. *Notulae odonatologicae* 9(2): 72-77. (in English) ["'Afro-montane' ecosystems in Eastern Africa are biologically highly valuable, but many remain poorly studied. We list dragonfly observations of a Biodiversity Express Survey to the highland areas in north-west Mozambique, exploring for the first time the Njesi Plateau (Serra Jecchi/Lichinga plat-

eau), Mt Chitagal and Mt Sanga, north of the provincial capital of Lichinga. A total of 13 species were collected. *Allocnemis cf. abbotti* and *Gynacantha immaculifrons* are new records for Mozambique." (Authors)] Address: Jocque, M., Biodiversity Inventory for Conservation NPO (BINCO), Walmer-sumstraat 44, 3380 Glabbeek, Belgium. E-mail: merlijn.jocque@gmail.com

**16823.** Johannsson, O.E. (2018): A key for separating early larval instars of four common cooccurring damselfly species in the U.K.: *Ischnura elegans* (Vander Linden), *Erythromma najas* (Hansemann), *Coenagrion pulchellum* (Vander Linden) and *Enallagma cyathigerum* (Charpentier). *J. Br. Dragonfly Society* 34(1): 19. (in English) ["Ecological studies of species assemblages require the identification of all individuals. This becomes difficult in aquatic insect assemblages where traits change continuously throughout development and separation of similar species is difficult, especially in earlier instars. A key was developed and is presented here to separate the majority of instars of a common assemblage of four damselfly species (*I. elegans*, *E. najas*, *C. pulchellum* and *E. cyathigerum*) in the U.K.. This was part of a study on the factors leading to their co-existence." (Author)] Address: Johannsson, Ora E., Dept of Zoology, University of British Columbia, Vancouver, B.C., Canada, V7R 4A5

**16824.** Johnson, J.T. (2018): Redetermination of select dragonfly specimens (Insecta: Odonata). *Catalog: Oregon State Arthropod Collection* 2(3): 1. (in English) ["16 historical specimens in the Oregon State Arthropod Collection were redetermined by Mr. Johnson during a visit to the collection on November 16, 2018. The redetermined material include specimens now identified as: *Sympetrum* sp., *Plathemis lydia* (Drury, 1773), *Libellula forensis* Hagen, 1861, *Ophiogomphus occidentis* (Hagen, 1885), *Aeshna interrupta* (Walker, 1904), *Aeshna umbrosa* Walker, 1908, *Rhionaeschna californica* (Calvert, 1895), *Aeshna constricta* Say, 1839, and *Aeshna tuberculifera* Walker, 1908.] Address: Johnson, J.T., 3003 Un-ander Avenue, Vancouver, WA 98660, USA. E-mail: gomphus-jim@gmail.com

**16825.** Jude, D.J.; Hensler, S.R.; Murray, M.M. (2018): Round goby and zebra mussel interactions with darters in a warm-water stream community in southern Michigan, USA. *Journal of Freshwater Ecology* 33(1): 395-412. (in English) ["The non-indigenous round goby (*Neogobius melanostomus*) entered the Flint River, Michigan, USA around 1996 while zebra mussels (*Dreissena polymorpha*) invaded in late 1998. We wanted to identify if there were round goby or darter (*Etheostoma/Percina* spp.) diet or density alterations by comparing 1998 data with our 2002 data after mussel colonization. Chironomids dominated the round goby's pre-zebra mussel diet in August 1998 (89% by number), followed by hydrophy-chids (10%). After zebra mussels arrived, diets diversified; chironomids declined to 52%, hydrophy-chids stayed the same, gastropods were more prominent (22%) and 4% were zebra mussels. Data from a site upriver (with no round gobies or zebra mussels) showed darters consumed mostly chironomids (49%), mayflies (11%) and hydrophy-chids (9%), suggesting



reliance on chironomid prey and other interactions compromised the ability of darters to coexist with round gobies downstream, since only one of three species present during 1998 was collected in 2002. Benthic assemblages on rocks changed dramatically ( $R$ -values =0.95) from 1998 to 2002. Blackside darter (*Percina maculata*) density in the presence of round gobies increased eightfold compared with 1998. We hypothesized zebra mussels fostered the growth of macrophytes, resulting in odonates composing 42% by volume of blackside darter diets in 2002 compared with 10% in 1998. Diet overlaps between small and large round gobies and blackside darters were high (Schoener Index =0.55–0.59,  $R$ -values =0.11–0.24), suggesting potential negative competitive interactions. Zebra mussel-mediated ecosystem changes may have decreased interspecific competition for food with blackside darters, allowing coexistence with round gobies. Native darters with varied diets feeding in mid-water, are most likely to coexist with round gobies, especially where dreissenids potentially mediate competitive interactions." (Authors)] Address: Jude, D.J., School for Environment & Sustainability, University of Michigan, Ann Arbor, MI, USA. E-mail: djude@umich.edu

**16826.** Jusys, V.; Gliwa, B. (2018): First record of *Sympetrum meridionale* (Odonata, Libellulidae) in Lithuania. *Lietuvos Entomologu Draugijos Darbai* 1(29): 5-7. (in English, with Lithuanian summary) [Ventes Ragas, bird traps at the ornithological station, 55.3414N 21.1917E. A single ♀ (25.09.2017) and a ♂ (27.09.2017) were captured in the bird traps of Ventes Ragas and documented with pictures.] Address: Jusys, V., Ornithological Station Ventes Ragas, Mariu g. 24, LT-99361 Vente, Lithuania. E-mail: vrventragis@gmail.com

**16827.** Kalfayan, M.; Krieg-Jacquier, R. (2018): First records of *Trithemis arteriosa* and *Brachytron pratense* on the island of Samos, Greece (Odonata: Anisoptera). *Notulae odonologicae* 9(1): 31-36. (in English) ["*T. arteriosa* is reported from the island of Samos in the East Aegean (Greece) and is shown to be reproducing in Greece for the first time. *B. pratense* is recorded for the first time in Samos but no evidence of local breeding was recorded. The significance of these findings is discussed." (Authors)] Address: Kalfayan, M., 5 rue Thiers 77124, Villenoy, France. E-mail: mathias.kalfayan@gmail.com

**16828.** Kalkman, V.J.; Boudot, J.-P.; Bernard, R.; De Knijf, G.; Suhling, F.; Termaat, T. (2018): Diversity and conservation of European dragonflies and damselflies (Odonata). *Hydrobiologia* 811: 269-282. (in English) ["Based on a distribution database brought together for the recently published Atlas of the European dragonflies and damselflies, we describe the patterns of diversity and endemism of these insect groups. Highest species richness, as well as richness of predominantly lentic species, occurs in central and western-central Europe. Strictly lotic species have their centre of diversity in southwest France and parts of the Iberian Peninsula. The highest number of endemic species is found in southwest France, the Iberian Peninsula and the Balkan Peninsula. A comparison of the diversity patterns of Odonata species listed in the EU Habitats Directive with those listed in the European Red List highlights a strong mismatch between species threatened in Europe, which

are mainly found in the Mediterranean, and species legally protected by the European Union, which are concentrated in central and western Europe. This mismatch has a historical origin, as the species listed in the Habitats Directive were mostly selected in the 1970s and 1980s when water quality in western and central Europe was poor. Since the 1990s, water and habitat quality has improved in these parts of Europe while in the same period the pressure on aquatic habitats in the Mediterranean has increased greatly." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey/Naturalis Biodiversity Center, The Netherlands, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: Vincent.kalkman@naturalis.nl

**16829.** Kalyoncu, H.; Salur, A. (2018): Odonata fauna of Alara and Karpuz streams and their relations with physico-chemical variables. *Fresenius Environmental Bulletin* 27(1): 187-195. (in English) ["In this study, it was aimed to determine the Odonata fauna of Karpuz and Alara streams and prevail their relationships with physiochemical parameters. For this purpose, a total of twenty sampling points were chosen on streams. As a result of field studies nine species of Odonata were recorded in Alara Stream and four Odonata species were recorded in Karpuz Stream. *Caliaeshna microstigma*, *Epallage fatime*, *Ischnura elegans* and *Platycnemis pennipes* were described as common species in both streams. *Calopteryx virgo festiva*, *I. elegans*, *P. pennipes* were sampled only in 10th sampling point while *Onychogomphus forcipatus albotialis* and *E. fatime* were sampled in all other sampling points. *Gomphus schneideri* was recorded only at 7th sampling point. *E. fatime* was found in all sampling points except 10th sampling point. *C. microstigma*, *I. elegans* and *P. pennipes* were found in 10th station. *E. fatime* was determined dominant taxon in Karpuz Stream while *C. microstigma* and *O. forcipatus* were dominant in Alara Stream. In both streams water quality of first 8 sampling points were included in quality level I while 9th sampling point was included in quality level I-II and 10th sampling point in quality level II according to physical-chemical variables. 9th and 10th sampling point of each stream were affected by pollutants while the others were less affected." (Authors)] Address: Kalyoncu, H., Ege Univ., Fac. of Science, Dept of Biology, Izmir – Turkey. E-mail: hasan.kalyoncu@ege.edu.tr

**16830.** Kamps, A.; Scieszka, C.; Westmoreland, B. (2018): Effect of body size and Zebra Mussel attachment on exuviae emergence-site selection in five dragonfly species (*Hagenius brevistylus*, *Didymops transversa*, *Macromia illinoiensis*, *Dromogomphus spinosus*, *Epitheca* sp.). University of Michigan: 14 pp. (in English) ["Emergence-site selection in dragonflies is an important factor for their survival during metamorphosis because of possible predation and other factors that may end the dragonfly life cycle during this vulnerable process. This study examined the emergence-site selection of exuviae in five dragonfly species from a lake in Northern Michigan to identify whether or not body size or presence of zebra mussels has a significant impact on site selection. We found that as length increased in proportion to body area, dragonflies were able to travel farther away from the shore. Individual species showed differing trends, when it came to body size relating to distance travelled from the shore. Understanding trends in emergence-site selection is

important to understanding how dragonfly larvae have adapted to their individual environments in order to increase their chances of surviving to adulthood.] Address: Kamps, A., Univ. of Michigan Biol. Station, EEB 392 and Natural History & Evolution

**16831.** Karube, H.; Kosterin, O.E. (2018): *Mattigomphus* gen. nov., a new gomphid genus from Indochina region, separated from *Anisogomphus* (Odonata: Gomphidae). *Tombo* 60: 61-65. (in English) ["A new gomphid genus *Mattigomphus* gen. nov. is described. The new genus consists of two species (*M. tamdaoensis* (Karube, 2001) distributed in northern Vietnam and *M. pinratani* (Hämäläinen, 1991) distributed in northern Thailand) first described and so far placed in *Anisogomphus* Selys, 1858. The genus is characterized mainly by a peculiar male penis (prolonged median segment, reduced posterior lobe and very simple depressed glans) and cerci." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**16832.** Karube, H.; Kompier, T. (2018): Two new species of the genus *Periaeschna* from northern Vietnam, with additional notes on the genus (Odonata: Aeshnidae). *Tombo* 60: 71-78. (in English) ["Two new species of the genus *Periaeschna* Selys, 1883 are described from northern Vietnam: *P. sanoii* sp. nov. and *P. furukawai* sp. nov. from Yen Bai Province. The former species resembles *P. unifasciata* Fraser, 1935, but can be distinguished by details of body maculation and the shape of the male caudal appendages. The latter looks similar to *P. magdalena* Martin, 1909, but is easily distinguished by its large size, abdominal maculation and the shape of the male caudal appendages. Information is provided on other species of *Periaeschna* occurring in Vietnam." (Authors)] Address: Karube, H., Kanagawa Prefectural Museum of Natural History, Odawara, Kanagawa, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**16833.** Kastner, F.; Buchwald, R.; Biedermann, R. (2018): Occurrence of *Aeshna viridis* in marsh ditches in relation to habitat conditions (Odonata: Aeshnidae). *International Journal of Odonatology* 21(3/4): 205-219. (in English) ["Habitat loss and fragmentation induce a decline and endangerment of freshwater organisms such as *A. viridis*, an endangered dragonfly species characterised by a specific insect-plant association to the macrophyte *Stratiotes aloides*. In order to implement conservation measures, a good level of knowledge about the occurrence, habitat requirements and quality, as well as patch size of the species is important. We analysed the influence of several habitat parameters on the presence/absence and abundance of *A. viridis* exuviae using habitat models (generalised linear mixed-effect models). The ditches populated by *A. viridis* were classified as moderately polluted and meso- to eutrophic with a high cover of emerged *S. aloides* stands. The main factor contributing to the presence of *A. viridis* was the coverage of emerged *S. aloides* combined with the ditch width. The 90% probability of the presence of *A. viridis* was achieved at a cover of 14% (8.4 m<sup>2</sup>) and/or 77% (46.2 m<sup>2</sup>) of emerged *S. aloides*. The number of *A. viridis* exuviae was

positively affected by the cover of emerged *S. aloides* and negatively affected by the sediment thickness, water maintenance and water temperature in March and August. The habitat parameters – water temperature and sediment thickness – are associated with *S. aloides* in the beginning of siltation of ditch succession. If ditch cleaning takes place during larvae development, eggs and larvae are removed by these procedures. In an optimal situation, the *S. aloides* populations occur in a mosaic of different states of siltation, which is managed by adapted water maintenance." (Authors)] Address: Kastner, Friederike, Institut für Biologie und Umweltwissenschaften, Carl von Ossietzky Universität Oldenburg, Oldenburg, Germany. E-mail: friederike.kastner@uni-oldenburg.de

**16834.** Kaunisto, K.M.; Morrill, A., Forbes, M.R. (2018): Negative covariance between water mite and gregarine parasitism for adult dragonflies, *Leucorrhinia intacta* (Hagen): an age-related pattern? *Parasitology Research* 117(12): 3909-3915. (in English) ["Studies on parasite-mediated selection often focus on single parasite taxa infecting single species of hosts. However, host populations experience infections by multiple parasite taxa simultaneously; coinfection is expected to influence how host- and/or parasite-related factors affect host exposure and susceptibility to various parasites, and the resulting patterns of infection. We sampled adult dragonflies from a population of *L. intacta* in eastern Ontario, Canada. Dragonflies were exposed to parasitism by both water mites (Arrenuridae) and gregarines (Eugregarinidae). We tested for covariation between these ecto- and endoparasites, while considering potential sex and age biases in host sampling and patterns of infection. Mite parasitism differed dramatically between host sexes: nearly all collected males were parasitized, whereas only half of females were infested. This was likely due to differences in age distributions between sexes in sampled dragonflies. Water mite and gregarine parasitism showed strong, negative covariation, and coinfection occurred far less often than expected by chance, although these patterns were restricted to samples of females which, unlike male samples, likely included many old and young dragonflies. We report the first observation of negative covariation between internal and external parasite taxa in an anisopteran host and suggest this relationship between water mites and gregarines may be more widespread among Odonata and perhaps other insects than previously surmised. We advance hypotheses based on host age-parasitism relationships as well as variable parasite-mediated selection to help explain the sex specificity of observed coinfection patterns in our samples." (Authors)] Address: Kaunisto, K.M., Zool. Mus., Biodiversity Unit, Univ. of Turku, Turku, Finland

**16835.** Kaur, W.G.; Chahal, S.S. (2018): Cytogenetic characterization of *Macromia moorei* Selys, 1874 of family Macromiidae (Odonata: Anisoptera) from India by C-Banding, Silver Nitrate Staining and Sequence Specific Staining. *International Journal of Life Sciences Research* 6(2): 64-68. (in English) ["Live adult male specimens of *M. moorei* have been collected from Andretta, Himachal Pradesh (India). Male germ cell chromosomes of the species have been described on the basis of conventional staining, C-banding, silver nitrate

staining and sequence specific staining. The species possesses  $2n (\sigma) = 25m$ , as the chromosome number and XO ( $\sigma$ )/XX ( $\varphi$ ) type sex determination. Dark terminal C-bands are present on all the autosomal bivalents, while m bivalent shows small terminal C-bands and X chromosome is C-positive throughout the length. Terminal light/dark NOR's are present on all autosomal bivalents including m bivalent, while X chromosome also possesses terminal NOR. During sequence specific staining, all the autosomal bivalents show prominent terminal DAPI and CMA3 bright regions, while m bivalent possesses less bright DAPI and CMA3 signals and X chromosome possesses both DAPI and CMA3 regions. Linear characterization of chromosomes of *M. moorei* has been done for the first time." (Authors)] Address: Kaur Walia, Gurinder, Department of Zoology and Environmental Sciences, Punjabi University, Patiala 147002, Punjab, India

**16836.** Kay, R.T.; Gahala, A.M.; and Bailey, C. (2018): Assessment of water resources in areas that affect the habitat of the endangered Hine's emerald dragonfly in the Lower Des Plaines River Valley, Illinois. U.S. Geological Survey Scientific Investigations Report 2018–5074, <https://doi.org/10.3133/sir20185074>.: 104 pp. (in English) ["Review of previous investigations indicates that potential decreases in groundwater recharge and increased groundwater extraction in the vicinity of the Lower Des Plaines River Valley in Will County, Illinois, may reduce the amount of groundwater flow in the Silurian aquifer in this area. Groundwater discharge from the Silurian aquifer to wetlands in the Lower Des Plaines River Valley plays an important role in sustaining the habitat of the endangered *Somatochlora hineana*. Groundwater modeling performed by previous investigators indicates that increasing the amount of water pumped from the aquifer in support of expanded quarry operations near the Lockport Prairie Nature Preserve has the potential to reduce groundwater discharge to the most productive *S. hineana* habitats in Illinois, potentially degrading the habitat. Model simulations indicate that mitigation procedures designed to artificially enhance groundwater recharge in the vicinity of dragonfly habitats near the Lockport Prairie Nature Preserve are likely to offset the effects of increased pumping. Several areas with smaller, often intermittent populations of *S. hineana* have been identified in other parts of the Lower Des Plaines River Valley and elsewhere in Illinois. Human activities have the potential to produce changes in hydrology and water quality that can threaten all of these habitats." (Authors)] Address: not stated

**16837.** Keilsohn, W.; Narango, D.L.; Tallamy, D.W. (2018): Roadside habitat impacts insect traffic mortality. *Journal of Insect Conservation* 22(2): 183-189. (in English) ["Paved roadways, spanning 6.6 million kilometres across the continental United States, are often bordered by natural or restored habitats and could provide opportunities for pollinator conservation. Because insects are frequently killed by auto traffic, roadside habitats may be ecological traps that kill more pollinators than they produce. Here we compare insect traffic mortality when roadsides are bordered by woodlots, meadows, or lawns. We also compare study sites with and without restored medians to examine the impact of creating habitat that can only

be accessed by crossing traffic. We confined our study to high speed roads (70–90 km h<sup>-1</sup>) with heavy traffic volume. Both habitat type and the presence of a vegetated median affect vehicle strikes fatal to insects. Insect mortality in general, and its effect on bees and butterflies in particular, was consistently lower when roads were bordered by woodlots than when they were bordered by lawn or meadows. Which roadside habitats were associated with the highest insect mortality depended on the taxon in question and the presence or absence of a vegetated median. Butterfly and dragonfly mortality was highest on roads with meadow medians, while bee mortality was highest on roadsides with lawn medians. Across most site comparisons, vegetated medians significantly elevated fatal insect-vehicle strikes. Regardless of the habitat bordering roadsides, insect mortality was unacceptably high for areas being considered for conservation. We suggest four research directions that may lead to reduced insect mortality in roadside habitats." (Authors)] Address: Tallamy, D.W., Dept Entom. & Wildlife Ecology, Univ. of Delaware, 531 South College Ave., Newark, DE 19716, USA. E-mail: dtallamy@udel.edu

**16838.** Kelly, R.S.; Nel, A. (2018): Revision of the damsel-dragonfly family Campteroptelebiidae (Odonata) from the Early Jurassic of England reveals a new genus and species. *Alcheringa* 42(1): 87-93. (in English) ["Historical fossil insect collections from England were re-examined and the taxa revised. Lateoptelebia gen. nov. is erected for *Liassoptelebia anglicanopsis* (Zeuner) in Campteroptelebiidae. *Petroptelebia anglicana* Tillyard is confirmed in this family and *Archithemis liassina* (Strickland) is transferred to this family. Lastly, *Archithemis brodiei* (Geinitz), *Archithemis Handlirsch*, and *Architemistidae* Tillyard (reduced to this sole species) are transferred to the Heteroptelebioidea." (Authors)] Address: Kelly, R., School of Earth Sciences, Univ. of Bristol, Life Sciences Building, 24 Tyndall Avenue, Bristol, BS8 1TQ, UK. E-mail: richard.kelly@bristol.ac.uk

**16839.** Khan, M.K. (2018): Odonata of eastern Bangladesh with three new records for the country. *Journal of Threatened Taxa* 10(13): 12821-12827. (in English) ["A study was conducted in the eastern region of Bangladesh to contribute to the knowledge of the country's Odonata fauna. A total of 75 species belonging to nine families was recorded during the study period from April 2014 to July 2016. *Calicnemia imitans*, *Prodasineura autumnalis*, and *Megalogomphus smithii*, are new records for the country. The *Megalogomphus* genus is recorded for the first time from Bangladesh." (Author)] Address: Khan, M.K., Dept of Biochemistry & Molecular Biology, School of Life Sciences, Shahjalal Univ. of Science & Technology, Sylhet 3114, Bangladesh

**16840.** Khelifa, R.; Zebba, R.; Amari, H.; Mellal, M.K.; Zouaimia, A.; Bensouilah, S.; Laouar, A.; Houhamdi, M. (2018): The hand of man first then Santa Rosalia's blessing: a critical examination of the supposed criticism by Samraoui (2017). *Journal of Insect Conservation* 22(2): 351-361. (in English) ["Samraoui (J Insect Conserv. <https://doi.org/10.1007/s10841-017-9966-2>, 2017) claims that he shows evidence that our conservation plan of *Urothemis edwardsii* has failed and that natu-



ral dispersal was the only cause of the recent rapid range expansion of the species in Northeast Algeria. Here, we show that his analysis is biased, many of his arguments are erroneous and strongly contradictory, many key studies are dismissed, and the few data used as evidence to refute our conclusions rather confirm them. We also provide data to prove that our conservation plan did not cause any harm to the source population by comparing exuviae-based estimation of population size in 2012 and 2016. We discuss the need for future monitoring and management and highlight that the recommendations of Samraoui (J Insect Conserv, 2017) are misleading, and thus are unlikely to bring us closer to an effective long-term conservation of the species in the region. Beyond our criticism, we explain why we should not dismiss the direct and indirect implications of final instar larvae translocation in successful colonization of odonates in particular, which could also be applied to aquatic insects in general." (Authors)] Address: Khelifa, R., Dept of Evolutionary Biology & Environmental, Studies, Univ. of Zürich, Winterthurerstr. 190, 8057 Zürich, Switzerland. E-mail: ras-simkhelifa@gmail.com

**16841.** Khomitskiy, E.E.; Zamotajlov, A.S.; Belyi, A.I. (2018): On vertical migrations in the ground beetles species *Carabus (Megodontus) exaratus* Quens. (Coleoptera, Carabidae). Scientific works of the Prirsursky State Nature Reserve 33: 231-233. (in Russian, with English summary) ["Relocations of the adults carabid beetles genus *Carabus* on the different vertical surfaces may be caused by search for food and water, when unfavorable feeding conditions arise in characteristic beetles habitats.] Address: Khomitskiy E.E., Russia, Krasnodar, FSBEI of HE "Kuban State Agrarian University named after I.T. Trubilina, Russia. E-mail: a\_zamotajlov@mail.ru

**16842.** Kiauta, B. (2018): Some personal recollections of the late Professor Dr Eberhard G. Schmidt (1935-2018). *Odonatologica* 47(3/4): 181-191. (in English) ["Some recollections and anecdotes from 1963 to present are provided and some highlights in odonatological work of ES are emphasized. An outline of his professional career and his bibliography are omitted." (Authors)] Address: Kiauta, B., Callunastraat 6, NL-5853 GA Siebengewald/Lb., The Netherlands. E-mail: mbkiauta@gmail.com

**16843.** Kietzka, G.J.; Pryke, J.S.; Samways, M.J. (2018): Comparative effects of urban and agricultural land transformation on Odonata assemblages in a biodiversity hotspot. *Basic and Applied Ecology* 33: 89-98. (in English) ["Rivers of the Cape Floristic Region (CFR) biodiversity hotspot are threatened by land transformation. This region is a centre of endemism for many taxa, including Odonata. These insects are highly sensitive to changes in physical habitat structure, which makes them good bioindicators, and this led to the development of the Dragonfly Biotic Index (DBI). We investigated the effects of local agricultural and urban land transformations on Odonata species richness, assemblage composition and DBI scores in three CFR rivers. A total of 48 sites were selected and categorized as natural, agricultural or urban land use. Adult male Odonata and four environmental variables were rec-

orded over two seasons. Land transformation significantly influenced Odonata assemblage composition but did not always significantly reduce species richness. Average vegetation height also affected Odonata assemblage composition and decreased species richness. Agricultural and urban sites had Odonata assemblages differing from those in the natural areas. Agricultural and urban local land use types reduced opportunities for some endemic species but provided for the persistence and establishment of widespread, generalist species, as indicated by great changes in DBI scores. Mitigating the adverse influences of land transformation through establishment of protected areas is essential for the conservation of rare taxa, particularly in an area with a high number of endemic species." (Authors)] Address: Kietzka, Gabriella, Dept of Conservation Ecology & Entomology, Stellenbosch University, Matieland 7602, South Africa. E-mail: gabikietzka@gmail.com

**16844.** Kim, M.J.; Jeong, S.Y.; Wang, A.R.; An, J.; Kim, I. (2018): Complete mitochondrial genome sequence of *Macromia daimoji* Okumura, 1949 (Odonata: Macromiidae). *Mitochondrial DNA Part B* 3(1): 365-367. (in English) ["*M. daimoji* has been listed as an Endangered insect in South Korea. We sequenced the complete 15,198 bp mitochondrial genome (mitogenome) of this organism, which is the first mitogenome sequence reported from the family Macromiidae. The genome includes a typical set of genes [13 protein-coding genes (PCGs), 2 rRNA genes, and 22 tRNA genes] and one non-coding region with an arrangement identical to that observed in most insect genomes. Phylogenetic analyses using concatenated sequences of the 13 PCGs and 2 rRNA genes using the Bayesian inference (BI) method placed Macromiidae, represented by *M. daimoji*, as a sister group to Libellulidae with the highest nodal support [Bayesian posterior probabilities (BPP)?=71]. Unlike conventional phylogenetic analysis, the suborders Anisozygoptera and Zygoptera formed a strong sister group (BPP =1), justifying the use of different molecular markers for phylogenetic analysis." (Authors) ] Address: Kim, I., Department of Applied Biology, College of Agriculture and Life Sciences, Chonnam National University, Gwangju, Republic of Korea;

**16845.** Kiyama, K.; Suda, D.; Handa, H. (2018): New record of *Ophiocordyceps odonatae* in Saitama Prefecture. *Bull. Saitama Mus. Nat. Hist. [N. S.]* 12: 29-32. (in Japanese, with English title). Address: Kiyama, K., Saitama Museum of Natural History, Nagatoro 1417-1, Nagatoro, Saitama, 369-1305 Japan

**16846.** Kiyoshi, T.; Katatani, N.; Hong, T.P. (2018): *Sundaeschna* gen. nov. with descriptions of two new species from Vietnam and Myanmar (Odonata, Anisoptera, Aeshnidae). *Bull. Natl. Mus. Nat. Sci., Ser. A*, 44(1): 1-9. (in English) ["*Sundaeschna* gen. nov. is proposed to accommodate two new species in the family Aeshnidae. One species, *S. cattienensis* sp. nov., is described from Dong Nai Province, Vietnam. Another species, *S. tanintharyiensis* sp. nov., is described from Tanintharyi Township, Myeik District, Tanintharyi Region, Myanmar. This new genus resembles the genus *Sarasaeschna* in the tribe Gomphaeschnini, but is easily distinguished by the structure of the fourth penile segment and by the pigmental

spots on the posterior margins of all wings. Both these new species are recorded from lowlands, in contrast with *Sarasaeschna*, whose members generally occur in mountainous regions. These two new species are easily distinguished from each other by the shape of the male epiproct." (Authors)] Address: Kiyoshi, T., Dept of Zoology, National Museum of Nature and Science, 4-1-1 Amakubo, Tsukuba, Ibaraki, 305-0005, Japan. E-mail: kiyoshi@kahaku.go.jp

**16847.** Klein, C.E.; Pinto, N.S.; Spigoloni, Z.V.A.; Bergamini, F.M.; de Melo, F.R.; De Marco, P.; Juen, L. (2018): The influence of small hydroelectric power plants on the richness and composition of Odonata species in the Brazilian Savanna. *International Journal of Odonatology* 21(1): 33-44. (in English) ["Regardless of the economic and social development that damming processes related to hydroelectric power plants bring to a region, they represent a wide range of disturbances to the physical, chemical, and biological characteristics of rivers. We evaluated the effects of dams on Odonata communities from the southeastern region of Goiás, Brazil. 13 streams connected to three dams were studied: seven were used as reference samples (located upstream from the damming site, therefore not directly affected by damming) and six were used as affected area samples (located downstream from the dam). A total of 1128 odonates from six families, 22 genera, and 39 species were captured and identified. The results showed that Odonata richness was affected by the presence of dams, with different effects on Anisoptera and Zygoptera suborders. We discuss that these effects are related mostly to the physical and chemical variables in waterbodies directly affected by small hydroelectric power plants (SHPs). It is possible that negative effects on the Odonata community in SHP areas are related to changes in waterflow, pH and turbidity." (Authors)] Address: Pinto, N., PPG Ecologia e Biomonitoramento, UFBA, Bahia, Brazil. E-mail: nelsonsilvapinto@gmail.com

**16848.** Klop-Toker, K.; Valdez, J.; Stockwell, M. (2018): Community level impacts of invasive mosquitofish may exacerbate the impact to a threatened amphibian. *Austral Ecology* 43(2): 213-224. (in English) ["Invasive fish threaten many native freshwater fauna. However, it can be difficult to determine how invasive fish impact animals with complex life cycles as interaction may be driven by either predation of aquatic larvae or avoidance of fish-occupied waterbodies by the terrestrial adult stage. Mosquitofish (*Gambusia* spp.) are highly successful and aggressive invaders that negatively impact numerous aquatic fauna. One species potentially threatened by *Gambusia holbrooki* is the green and golden bell frog (*Litoria aurea*). However, *G. holbrooki*'s role in this frog's decline was unclear due to declines driven by the chytrid fungal disease and the continued co-existence of these fish and frogs in multiple locations. To clarify the extent to which *Gambusia* is impacting *L. aurea*, we conducted 3 years of field surveys across a deltaic wetland system in south-east Australia. We measured the presence and abundance of aquatic taxa including *G. holbrooki*, and *L. aurea* frogs and tadpoles, along with habitat parameters at the landscape and microhabitat scale. Generalized linear models were used to explore patterns in the abundance and distributions of *L. aurea* and *G. holbrooki*.

We found strong negative associations between *G. holbrooki* and tadpoles of most species, including *L. aurea*, but no apparent avoidance of *G. holbrooki* by adult frogs. Native invertebrate predators (Odonata and Coleoptera) were also absent from *G. holbrooki*-occupied ponds. Due to the apparent naivety of adult frogs toward *G. holbrooki*, the separation of *G. holbrooki* and tadpoles, plus the abundance of alternative predators in *G. holbrooki*-free ponds, we conclude that the impact of *G. holbrooki* on *L. aurea* recruitment is likely substantial and warrants management action." (Authors)] Address: Klop-Toker, K., Conservation Biology Research Group, University of Newcastle, C/O Michael Mahony, School of Environmental and Life Science, University of Newcastle, Callaghan, NSW, 2308 Australia. E-mail: kaya.klop-toker@uon.edu.au

**16849.** Knight, K. (2018): Dragonfly haemolymph looks more like ancestors'. *Journal of Experimental Biology* 2018 221: jeb187112 doi: 10.1242/jeb.187112 Published 3 August 2018: 1. (in English) ["Observing metamorphosing tadpoles pull themselves from the water is a rite of passage shared by budding naturalists the world over. Yet, frogs are not the only animals to pass their early life stages immersed in water. Dragonflies spend the majority of their lives submerged before emerging as aerobic adults, trading in their water-breathing gills for trachea that deliver oxygen to every tissue in the body. However, Philip Matthews from the University of British Columbia (UBC), Canada, explains that the dragonflies and frogs have converged on the same aquatic lifestyle choice from different origins. Dragonfly larvae re-evolved the ability to breathe water from terrestrial ancestors, in contrast to amphibian tadpoles, which spent the whole of their evolutionary history immersed. And Matthews was puzzled; air-breathing animals carry high CO<sub>2</sub> concentrations in their body fluids, while water-breathing species have lower internal concentrations of CO<sub>2</sub> thanks to the high solubility of the gas in water. Would the body fluids of water-breathing dragonfly nymphs resemble those of their aerial ancestors or the species that they re-joined in water? Describing trapping dragonfly nymphs and adults on the UBC campus, Matthews says, 'For the adult dragonflies, you need to be fast', recalling how he, Master's student Dan Lee and undergraduate Raman Ubhi captured the adults with insect nets while the nymphs were easier to collect with dip nets from ponds. Back in the lab, Lee skilfully collected samples of haemolymph (the insect equivalent of blood) from the adults and nymphs at various stages of development, to measure the total amount of CO<sub>2</sub> – which can occur in several different forms – in the insects' bodies. 'We had to develop our own equipment to measure the CO<sub>2</sub> that was released from our tiny 5 µl haemolymph sample', says Matthews, remembering how Lee worked closely with a glass blower to build the bespoke system. In addition, Lee worked with Martin Gutbrod and Fernando Ferreras from PreSens, Germany, who had built a prototype CO<sub>2</sub> probe, to measure the partial pressure of the gas (the pressure exerted by the CO<sub>2</sub> molecules in a liquid) in the haemolymph of early dragonfly nymphs. However, Matthews needed convincing that the partial pressure readings were accurate, so Lee also measured the CO<sub>2</sub> partial pressure of crayfish haemolymph. 'This gave us confidence in the values we recorded in dragonfly nymphs', says Matthews,

as he could compare the new crayfish measurements with values in the literature. Despite their aquatic lifestyle, which should have resulted in low CO<sub>2</sub> levels, the total CO<sub>2</sub> concentration in the haemolymph of the dragonfly nymphs was three times higher than that of crayfish and rainbow trout. 'When we saw this, we were very excited', says Matthews, adding, 'This suggests that they aren't expelling CO<sub>2</sub> as easily as one would expect while breathing water'. And when Lee compared how the dragonflies' total CO<sub>2</sub> levels changed as the insects prepared to depart the water, the total CO<sub>2</sub> levels increased to approach those experienced by the air-breathing adults: '[which] suggests that they might be preparing to become air breathers (or becoming poorer water breathers) during their final instar', says Matthews. So, water-breathing dragonfly nymphs have relatively high levels of CO<sub>2</sub> in their bodies compared with those of other water-breathing creatures, with the consequence that the transition that they undergo – to high total CO<sub>2</sub> levels – as they shift to an aerial lifestyle is less dramatic than it is for emerging tadpoles. And Matthews is eager to find out why aquatic dragonfly nymphs differ so much from other aquatic residents. 'There's so much more to do', he says." (Author)] Address: E-mail: kathryn.knight@biologists.com

**16850.** Kohli, M.K.; Sahlén, G.; Kuhn, W.R.; Ware, J.L. (2018): Extremely low genetic diversity in a circumpolar dragonfly species, *Somatochlora sahlbergi* (Insecta: Odonata: Anisoptera). *Scientific Reports* 8:15114 | DOI:10.1038/s41598-018-32365-7: 10 pp. (in English) ["We present the first empirical treatment of the northernmost breeding dragonfly, *S. sahlbergi*. We sequenced populations from United States, Canada, Finland, Sweden and Norway for cytochrome oxidase I (COI) and D2 region of 28s. We found that, despite geographic barriers across its vast arctic range, *S. sahlbergi* is a single species. Not only does it appear to interbreed across its entire range, there also seems to be almost no variation among European and North American populations in their COI gene fragment (the barcode gene), which is usually extremely variable. We further found that characters thought to be diagnostic for the larvae of *S. sahlbergi* were absent in our European samples. We review and re-describe the habitat of this species based on new findings from recent field observations. Finally, we report for the first time the likely presence of this species in Japan. We hope our findings will encourage further study of this species and other under-studied insect taxa that inhabit the remote Arctic." (Authors)] Address: Kohli, M.K., Dept of Biological Sciences, Rutgers University-Newark, Newark, USA. E-mail: mkk24@njit.edu

**16851.** Kompier, T. (2018): The genus *Asiagomphus* in Vietnam, with descriptions of three new species, and first descriptions of the male of *Asiagomphus auricolor* (Fraser, 1926) and of the female of *Asiagomphus reinhardti* Kosterin & Yokoi, 2016 (Odonata: Gomphidae). *Zootaxa* 4462(3): 301-330. (in English) ["The occurrence in Vietnam of eight species of *Asiagomphus* Asahina, 1985 is discussed. Three new species are described (*Asiagomphus kosterini* [holotype: Da Lat, Lam Dong Prov., (appr. 11.880 N, 108.442 E), 17-IV-2016], *Asiagomphus monticola* [holotype: Xuan Son NP, Phu Tho Prov., (appr. 21.163 N, 104.896 E), 31-V-2014], and *Asiagomphus*

*superciliaris* [holotype: Huu Lien NR, Lang Son Prov., (appr. 21.686 N, 106.376 E), 01-V-2014], and the male of *Asiagomphus auricolor* (Fraser, 1926) and the female of *Asiagomphus reinhardti* Kosterin & Yokoi, 2016 are described for the first time. The female of *Asiagomphus auricolor* is redescribed. Distribution and ecology of all species and a key to the males occurring in Vietnam are provided." (Author)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, Netherlands. E-mail: kompierintokyo@yahoo.com

**16852.** Kompier, T.; Karube, H. (2018): *Chlorogomphus canhvang* sp. nov. from Central Vietnam (Odonata: Chlorogomphidae). *Zootaxa* 4394(3): 437-442. (in English) ["*Chlorogomphus canhvang* sp. nov. [holotype ♂: Along QL15, Quang Binh Province (appr. 17.488 N, 106.302 E), 6.V.2016] is described from the Truong Son Mountains (Quang Binh and Thua Thien—Hue Provinces) in central Vietnam. Detailed differences are given to distinguish the new species from the very similar *C. auratus* Martin, 1910 for both males and females, and information on its ecology is provided." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, the Netherlands. E-mail: kompierintokyo@yahoo.com

**16853.** Kopij, G. (2018): Diet of sympatrically breeding Southern Carmine Bee-eater *Merops nubicoides* and White-fronted Bee-eater *Merops bullockoides*. *Ostrich* 89(2): 191-194. (in English, with French summary) ["*M. nubicoides* and *M. bullockoides* are insectivore, cavity-nesting bird species, both of which occur in the Zambezi Region, north-eastern Namibia. I examined there the diet composition of these species by an analysis of prey remnants. The Southern Carmine Bee-eater chick's diet consisted of exclusively insects, represented by seven orders. The most numerous were orthopterans and beetles (40.9% and 26.1%, respectively; n = 582 prey items). Hymenopterans (18.7%) and bugs (12.9%) supplemented the diet, whereas dragonflies (Odonata) and moths (Lepidoptera) were preyed only occasionally. In the diet of the White-fronted Bee-eater, nesting at the same site, beetles were the most important prey (81.2% of all 101 prey items identified), with scarabaeids comprising more than half of the beetle diet. In comparison with the White-fronted Bee-eater, a lower proportion of beetles, but much larger proportion of orthopterans were recorded in the diet of the Southern Carmine Bee-eater. In both bee-eater species, hymenopterans appear to be less important than was expected. The essential difference in the proportion of main prey groups recorded in Southern Carmine and White-fronted Bee-eaters breeding at the same site may represent a shift in food niche due to both temporal segregation in breeding, and differences in food preferences (feeding sites)." (Authors)] Address: Kopij, G., Dept of Integrated Environmental Sciences, Ogongo Campus, University of Namibia, Oshakati, Namibia. E-mail: gkopij@unam.na

**16854.** Korbaa, M.; Ferreras-Romero, M.; Ruiz-García, A.; Boumaiza, M. (2018): TSOI - a new index based on Odonata populations to assess the conservation relevance of water-courses in Tunisia. *Odonatologica* 47(1/2): 43-72. (in English) ["Global ecological conditions existing in the streams of north-



em Tunisia are very unequal. In consideration of their appropriate management and restoration requirements, breeding populations of 28 Odonata species were studied over an annual cycle in twentyeight watercourses (22 permanent, 6 intermittent). In total, 7 363 larvae and 337 exuviae were collected. We developed a new indicator, the Tunisian Stream Odonatological Index (TSOI), to assess conservation aspects of Odonata biodiversity in African Mediterranean streams by analysing dragonfly communities. The TSOI operates at the species level. Taxonomic richness, voltinism, endemism, relative taxonomic distinctiveness, and regional conservation status (IUCN) are elements taken into account to design this index. Accordingly, presence of both Maghreb endemic and semivoltine species (*Calopteryx exul*, *Platynemis subdilatata*, *Aeshna cyanea*, *Boyeria irene*, *Gomphus lucasii*, *Onychogomphus costae*, *O. forcipatus*, and *O. uncatus*) may provide useful information about the refuge quality of each habitat type for species with different biological features, and their interest level from a conservation point of view. The results of a first application of this approach are presented in the paper as well. As far as we know, a biodiversity conservation index based on benthic invertebrates in the African Mediterranean area has never before been proposed nor used." (Authors)] Address: Korbaa, M., Unit of Hydrobiology, Laboratory of Environment Biomonitoring, Faculty of Sciences of Bizerte, 7021, Jarzouna, Tunisia. E-mail: manelkorbaa@yahoo.fr

**16855.** Kosterin, O.E. (2018): Rediscovery of *Lestes nigriceps* Fraser, 1924 (Odonata: Lestidae) in eastern Cambodia. *Zootaxa* 4526(4): 561-575. (in English) ["*L. nigriceps* was described from a male (later the lectotype) and two non-con-specific females collected in 1922 at Pusa, Bihar State, India, and has never been reported since. In June 2018 a population of *L. nigriceps* was unexpectedly found in eastern Cambodia, Mondulhiri Province. The Cambodian males, their variation and, for the first time, the true female of *L. nigriceps* is described." (Author)] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev Ave. 10, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

**16856.** Kosterin, O.E.; Ahmadi, A. (2018): Odonata observed in Central Zagros, Iran, in late May 2017. IDF-Report 117: 1-65. (in English) ["In the period 18th – 31st May 2017, 33 localities were examined for Odonata in the Central Zagros area of Iran: 16 in Markazi Province, 14 in Lorestan Province and 3 in Esfahan Province; in 27 of those localities Odonata were found, 25 species in total. For Markazi Province, only one species, *Calopteryx splendens*, was previously reported (and also found by us), so of 17 species found there 16 are formally new provincial records (*Epallage fatime*, *Lestes barbarus*, *Coenagrion ornatum*, *C. persicum*, *Enallagma cyathigerum*, *Ischnura elegans*, *I. intermedia*, *I. pumilio*, *Platynemis kervillei*, *Anax imperator*, *Anaciaeschna isocoles*, *Callaeschna microstigma*, *Libellula depressa*, *Onychogomphus lefebvrei*, *Orthetrum brunneum*, *Sympetrum fonscolombii*). Of 17 species found in Lorestan, 5 are new for this province (*L. barbarus*, *Aeshna mixta*, *Orthetrum taeniolatum*, *Sympetrum arenicolor*, *S. striolatum*). Only two species were seen in Esfahan Province, in which little time was spent. Notes on

variation and taxonomy are provided for *Sympetma paedisca*, *C. ornatum* (considered to be a senior synonym of *C. vanbrinkae* because of variation in the presumed main diagnostic character), *E. cyathigerum*, *I. elegans*, *Gomphus schneideri* (including discussion of *G. amseli*), as well as notes on habitats of most species and the general characteristics of the area." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**16857.** Kosterin, O.E. (2018): Spring aspect of Odonata of the Abrau Peninsula, the Black Sea coast of the West Caucasus, as observed in May 2018. *International Dragonfly Fund Report* 120: 1-13. (in English) ["Results of a brief examination of the spring aspect of Odonata at the Abrau Peninsula and some nearby localities on 21-27th May 2018 are presented. *Lestes dryas* and *Callaeschna microstigma* are reported for the Peninsula for the first time, revealing the world northernmost record of the latter. Some old data of Odonata at Novorossiysk and some recent erroneous data on the Krasnodarskiy Krai are referenced and discussed. The known Odonata fauna of the Abrau Peninsula reaches 38 species." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**16858.** Kosterin, O.E. (2018): *Macromidia genialis buusraensis* subspecies nova (Odonata, Synthemistidae s.l.) from eastern Cambodia. IDF-Report 121: 1-26. (in English) ["*M. genialis buusraensis* subspecies nova is described from 10 males and 2 females from three localities of Mondulhiri Province, the eastern Cambodia (the type locality: a brook downstream Buu Sraa Waterfall 12°34' N 107°25' E). The new subspecies is close to *M. g. shanensis* Fraser, 1927 and differs from it by an additional, and the broadest, yellow spot on S7. It is partly syntopic with *Macromidia rapida* Martin, 1907. A brief overview of the current knowledge of the genus *Macromidia* Martin, 1907 is provided." (Author)] Address: Kosterin, O.E., Inst. Cytol. & Genet. SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

**16859.** Kosterin, O.E.; Kompier, T. (2018): *Amphicnemis valentini* sp. nov. from the Cardamom ecoregion in Cambodia and Vietnam (Odonata: Coenagrionidae). *Zootaxa* 4429(2): 281-294. (in English) ["*A. valentini* sp. nov. is described from the Ream Peninsula of Cambodia (holotype: Cambodia, Preah Sihanouk Province, Ream Peninsula, 10.52258 N 103.69556 E, RMNH) and Phú Qu.c Island, Kien Giang Province of Vietnam, both in the Cardamom ecoregion. It is similar to *A. gracilis* Krüger, 1898, which occurs in Peninsular Malaysia and Sumatra, but differs from it by a long process on the male prothorax." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**16860.** Kosterin, O.E.; Borisov, S. (2018): New records and migration strategy of *Anax ephippiger* (Burmeister, 1839) (Odonata, Aeshnidae) in the territory of the Russian Federation. *Eurasian Entomological Journal* 17(1): 73-79. (in English, with Russian summary) ["New records and observations of a migratory dragonfly *A. ephippiger* in Russia and the first record in Abkhazia are provided. Due to a peculiar migratory life strategy these dragonflies inhabit the Caucasus only in the warm season." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**16861.** Kosterin, O.E.; Zaika, V.V. (2018): Update to the knowledge of Odonata of Tuva and southern Krasnoyarskiy Kray, Siberia, Russia. *International Dragonfly Fund - Report* 113: 1-28. (in English) ["*Sympetrum fonscolombii* is for the first time reported for Tuva (Tyva Republic, Russia), as found in the Ubsu-Nur Depression. New data are provided on Odonata of the Turan or Turan-Uyuk Depression of Tuva, including the first record of *Somatochlora exuberata* in Tuva beyond the Todzha Depression and *Coenagrion armatum*, *C. ecomutum*, *Aeshna juncea*, *A. grandis*, *Somatochlora graeseri* and *Libellula quadrimaculata* for the first time reported for the Turan Depression. New distributional data and comments on *Ophiogomphus spinicomis* Selys, 1878 are added. *Somatochlora alpestris* found at Lake Oyskoe is for the first time reported for the southern Krasnoyarskiy Kray." (Authors)] Address: Kosterin, O.E., Inst. Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

**16862.** Kosterin, O.E. (2018): Too pervert: an attempt at an interfamilial homosexual copulation wheel in damselflies. *Agrion* 22(1): 52-53. (in English) [tandem of males of *Coperia vittata* and *Mortonagrion falcatum*, Ream Peninsula, Cambodia, 3 March 2017.] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk State University, Pirogova str. 2, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

**16863.** Kowalska, J.; Rychla, A. (2018): Dragonflies (Odonata) observed at Lake Wojnowskie Zachodnie and Lake Wojnowskie Wschodnie (district Lubuskie) in the years 2009-2017. *Odonatrix* 142: 5 pp. (in Polish, with English summary) ["Irregular observations of adult dragonflies were carried out at Lake Wojnowskie Zachodnie and Lake Wojnowskie Wschodnie (district Lubuskie) in the years 2009-2017. In total, 20 and 17 species were recorded at Lake Wojnowskie Zachodnie and Lake Wojnowskie Wschodnie, respectively. Consequently, the number of species shown in the UTM square WT57 has increased from 8 in the year 2007 (Bernard et al. 2009) up to 24 in the year 2017." (Authors)] Address: Kowalska, Jolanta, ul. Armii Krajowej 3/3, 66-100 Sulechów, Poland. E-mail: j.kowalska.wojciechowska@gmail.com

**16864.** Kumar, D.; Kamath, G.M.; Mohite, P.M.; Kamle, S. (2018): Realization and dynamic studies of CNTs-PDMS

membranes for biomimetic flapping wing applications. *Mechanics of Biological Systems & Micro- and Nanomechanics* 4: 35-37. (in English) ["Aerial and aquatic animals including bats, insects and fish use their wings/fins to generate propulsive forces. Natural fliers deform their wings, actively and/or passively, in bending and twisting modes to generate lift and thrust. Within a flapping cycle, wing skin interacts with surrounding fluid and transfers dynamic loads to the internal stiffening structure. Biomimicking of such complex natural flapping wings is possible if the development involves both materials and structural aspects. In the present study, thin PDMS films are chosen for developing the skin of the biomimetic flapping wings. The films are first characterized for dynamic mechanical properties (storage modulus, loss modulus and loss factor) using a dynamic mechanical analyzer. The tests are done in frequency and strain sweep modes to analyze the effect of strain-rates and strain-amplitudes on the dynamic mechanical properties and generate experimental data for constitutive modeling. The dragonfly and cicada wings are taken as the bioinspiration for developing the biomimetic wings. The fabrication of wing skeletons and their integration with the PDMS membranes are achieved through advanced manufacturing techniques including laser micromachining, photolithography and casting. Two types of composite materials are used for making the wing skeletons, i.e., carbon nanotubes (CNTs)/polypropylene (PP) nanocomposite sheet for cicada inspired wing and carbon fiber/epoxy composite strands for dragonfly inspired wing. Structural dynamic analysis of such light, flexible and small size biomimetic structures are interesting and useful for evaluation of biomimicking performance of used materials and manufacturing methods, but difficult to perform. A real-time high-speed non-contact dynamic testing method based on DIC-FPGA coupling (3D digital image correlation technique coupled with real-time data acquisition system, developed at our lab) is used for determining the natural frequencies and corresponding mode shapes of fabricated wings. Structural dynamic analysis of such light, flexible and hyperviscoelastic structures are interesting and useful but difficult to perform. A high-speed non-contact dynamic testing method based on DIC-FPGA coupling (3D-DIC technique coupled with real-time data acquisition system, developed at our lab) will be used for determining natural frequencies, mode shapes and loss factors of the membranes. Similar studies will also be carried out computationally using Abaqus and validated with the experimental results. The experimental measurements will be performed inside a vacuum chamber to observe the effect of air and compare with computational results. Quasi-static and dynamic mechanical testing of PDMS films will be performed to do hyperelastic and viscoelastic constitutive modelling for FE simulations. The computational study will also be used to design the biomimetic wing structures with internal stiffening structure. The membranes will be reinforced with carbon nanotubes (CNTs) based nanocomposites skeletons and tested for structural dynamic characteristics. This will be done to achieve coupled bending and twisting fundamental mode shape for a wing tested in cantilever form, which is useful to maximize efficiency and generate both lift and thrust. PDMS wings will be developed with different wing skeletons and tested for performing optimization exercise towards the

biomimicking goal. Integration of membrane and nanocomposite skeletons will be achieved through advanced manufacturing techniques including laser micromachining and photolithography. The piezoelectric properties of CNTs could potentially be exploited for sensing and control for morphing and flapping wing applications." (Authors)] Address: Kumar, D., Dept of Aerospace Engineering, Indian Institute of Technology, Kanpur, India

**16865.** Kumar, P.; Sharma, S.; Barman, J. (2018): Habitat preference of odonates (dragonfly and damselfly) along with its diversity, abundance, and richness in Madan Kamdev Temple area (Dewangiri Hill of Kamrup (R) district, Assam, India. *International Journal of Plant, Animal and Environmental Sciences* 8(3): 8-18. (in English) ["The present study was piloted at Madan Kamdev Temple area of the Kamrup (R) district, Assam during December 2017 to May 2018. A total of 32 species of Odonata including 19 species of Anisoptera and 13 species of Zygoptera under 2 families were recorded. 12 species were documented from zone 1 (forest area), 31 species were documented from zone 2 (river bank) and 20 species were from zone 3 (crop fields). 11 species were common in all the zones. The most abundant Anisopteran species was *Pantala flavescens* and most abundant Zygopteran species was *Ceriatrigon coromandelianum*. Shannon Weiner Index (H') was estimated to be 2.644, in forest it was 2.126, near river 2.649 and in crop field it was 2.366. Margalef's Richness Index (DMg) was found to be 4.705, in forest it was 2.456; in near river 4.898 and in crop field it was 3.654. In the present study 4 species i.e. *Crocothemis servilia*, *Neurothemis fulvia*, *Orthetrum sabina* and *Ceriatrigon coromandelianum* used all types of habitat. Maximum number of species and individuals of Odonates were recorded during the mid-day time when temperature is high." (Authors)] Address: Sharma, S., Dept of Ecology and Environmental Science, Assam University, Silchar, India. Email: dudckecr@gmail.com

**16866.** Kuncce, W. (2018): Sub-lethal effects of anthropogenic contaminants on aquatic invertebrates. *Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Science and Technology* 1692. Uppsala: Acta Universitatis Upsaliensis. ISBN 978-91-513-0382-6.: 70 pp. (in English) ["Anthropogenic contaminants are considered to play a substantial role in the decline of freshwater invertebrate diversity. Sub-lethal effects of many of these contaminants on behaviour and life history traits of aquatic invertebrates may contribute to their decline. As contaminants are rarely present in the environment alone, the effects of mixture exposures are highly relevant in assessing the risk these substances pose to the biota. This thesis focuses on sub-lethal effects of exposure to aquatic pollutants, separately and in combination, on fresh-water invertebrates. To investigate the single and combined effects of pesticides, larvae of the midge, *Chironomus riparius* were exposed to a 1 hour pulse of two neonicotinoids and two pyrethroids. This short exposure to environmentally relevant concentrations of pesticides decreased the survival and delayed development in *C. riparius*. The combination of neonicotinoids and pyrethroids did not produce synergistic effects; however, there was some

indication of antagonism. Additionally, larvae of the damselfly, *Coenagrion puella*, were exposed for 14 hours to two environmentally relevant concentrations of pyrethroid pesticides, alone and in combination. Exposure to the pyrethroid, deltamethrin, reduced the larvae's predatory ability. Combined exposure to both deltamethrin and esfenvalerate inhibited the Glutathione S-transferase detoxification pathway and may have additive toxic effects on the larvae's predatory ability. Microplastics are increasingly gaining attention as an aquatic pollutant of major concern with respect to the toxicity of the microplastics themselves as well as their capacity to adsorb persistent organic pollutants like pesticides. To investigate the effects of microplastics and a pyrethroid, alone and in combination, *C. riparius* larvae were raised in sediment spiked with two sizes of polystyrenebased latex microbeads and an environmentally relevant concentration of esfenvalerate under normal and food-restricted conditions. Exposure to both sizes of microplastics and esfenvalerate lead to equally decreased emergence under food-restricted conditions. Additionally, exposure to esfenvalerate led to decreases in survival when food was scarce that did not occur when microplastics were co-present. Antihistamines are also an emerging aquatic contaminant of concern with very little known about their biological effects on aquatic wildlife. Antihistamines could potentially interfere with the histaminergic pathways and thus affect thermal tolerance and temperature preference in aquatic invertebrates. The freshwater snail, *Planorbis corneus*, was exposed for 24 hours to the antihistamine, diphenhydramine. This exposure increased thermal tolerance and righting time, but did not affect temperature preference. The results of the investigation suggest that anthropogenic contaminants alone and/or in combination have sub-lethal effects on life history, behavior and physiology of aquatic invertebrates. Such sublethal effects have the potential to affect populations and community structure in the aquatic and terrestrial environment." (Authors)] Address: Kuncce, W., Dept of Ecology and Genetics, Animal ecology, Norbyvägen 18 D, Uppsala University, SE-752 36 Uppsala, Sweden

**16867.** Laily, Z.; Rifqiyati, N.; Kurniawan, A.P. (2018): Keane-karagaman Odonata pada Habitat Perairan dan Padang Rumput di Telaga Madirda. *Jurnal MIPA* 41(2): 105-110. (in Indonesian, with English summary) ["The study aimed to find out the dragonfly diversity in Madirda Lake in aquatic and grassland habitats. The research method uses sampling points and counts individual counts directly. Data were analyzed by the Shannon-Wiener (H') diversity index and Evenness (E) evenness index. The results of the study showed 19 species of dragonflies from 5 families. 12 species are included in the Anisoptera suborder and 7 species are included in the Zygoptera suborder. One endemic Java dragonfly species was found, *Rhinocypha fenestrata*. The Shannon-Wiener (H') diversity index in 2.11 aquatic habitats and on grassland habitats 0.93, which shows that diversity in aquatic habitats is in the medium category and grassland habitat is in the low category." (Authors)] Address: Laily, Z., Program Studi Biologi, Fakultas Sains dan Teknologi, UIN Sunan Kalijaga, Yogyakarta, Indonesia. E-mail: zainullaily@gmail.com



- 16868.** Lambret, P.; Rutter, I.; Grillas, P.; Stoks, R. (2018): Oviposition plant choice maximizes offspring fitness in an aquatic predatory insect. *Hydrobiologia* 823: 1-12. (in English) ["Evidence for the adaptive value of oviposition site selection in terms of increased offspring fitness is rare in predatory insects. We tested this in *Lestes macrostigma* that prefers the plant *Bolboschoenus maritimus*. We carried out two experiments with shoots containing eggs: we flooded (1) some shoots of the same type (i.e. combination of species and desiccation state) at different dates and (2) different shoot types at the same date. Earlier flooding increased hatching success. Because *B. maritimus* grows in deeper parts of temporary ponds, it is flooded before other plants after the drought season, suggesting that adult oviposition site selection is driven by lower egg desiccation risk. Independently of flooding date, hatching success was higher and larvae hatched earlier when eggs were laid in *B. maritimus*. Faster embryonic development enhances chances to complete larval development before pond desiccation and reduces costs associated with time stress. Offspring higher fitness was more constant between shoots of *B. maritimus* compared to the other types of shoot, suggesting that laying eggs in one shoot of this plant leads offspring to high fitness more surely. Our results indicate that adults choose oviposition plants maximizing offspring fitness (higher hatching success and faster embryonic development)."] (Authors)] Address: Lambret, P., Tour du Valat, Res. Inst. Conservation of Mediterranean Wetlands, Le Sambuc, Arles, France
- 16869.** Langourov, M.; Simov, N.; Bekchiev, R.; Chobanov, D.; Antonova, V.; Dedov, I. (2018): Inventory of selected groups of invertebrates in sedge and reedbeds not associated with open waters in Bulgaria. *Acta zool. bulg.* 70(4): 487-500. (in English) ["Inventory of selected groups of the invertebrate fauna in the EUNIS wetland habitat type D5 "Sedge and reedbeds normally without free-standing water" in Bulgaria was carried out. It included 47 localities throughout the country. The surveyed invertebrate groups included Gastropoda, Odonata, Orthoptera, Heteroptera, ants (Formicidae), Lepidoptera and some coleopterans (Staphylinidae: Pselaphinae). Data on the visited localities, identified species and their conservation status are presented. In total, 316 species of 209 genera and 68 families were recorded. Fifty species were identified as potential indicator species for this wetland habitat type. The highest species richness (with more than 50 species) was observed in wetlands near Marino pole (Plovdiv District) and Karaisen (Veliko Tarnovo District)."] (Authors)] Address: Langourov, M., National Museum of Natural History – Sofia, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria. E-mail: langourov@gmail.com
- 16870.** Laughlin, M.M.; Martin, J.G.; Liesch, P.J.; Olson, E.R. (2018): Dragonfly (Odonata: Corduliidae, Macromiidae, Gomphidae, Aeshnidae) and damselfly (Odonata: Calopterygidae) exuviae observed at record heights in *Pinus strobus* and *Picea abies* canopies. *The Great Lakes Entomologist* 51(1): 26-29. (in English) ["Most odonate species do not typically climb higher than 50 cm when choosing an emergence support. We observed multiple species of odonate nymphs using trees as emergence supports at heights greater than 50 cm and up to 4, 6.9, and 14.6 m for *Calopteryx maculata*, *Somatochlora*, and *Didymops transversa*, respectively. These heights represent the greatest heights ever documented for odonate nymph emergence supports. Our research suggests that some species (*S. minor*; *D. transversa*) appear to have a greater affinity for climbing to great heights during emergence than others (*Dromogomphus spinosus*; *Basiaeschna janata*; *Macromia illinoensis*. Odonate nymphs appeared to have a strong preference for emergence sites at the underside or base of branches. Researchers have hypothesized that competition for emergence sites drives climbing to such great heights. We propose three alternative hypotheses that could potentially explain these unique behaviors."] (Authors)] Address: Laughlin, M.M., Northland College, USA: E-mail: laughm986@myemail.northland.edu
- 16871.** Lee, D.J.; Gutbrod, M.; Ferreras, F.M.; Matthews, P.G. D. (2018): Changes in hemolymph total CO<sub>2</sub> content during the water-to-air respiratory transition of amphibiotic dragonflies. *Journal of Experimental Biology* 2018: jeb.181438 doi: 10.1242/jeb.181438: 9 pp. (in English) ["Anisoptera are amphibiotic; the nymph is aquatic and breathes water using a rectal gill before transitioning to the winged adult that breathes air through spiracles. While the evolutionary and developmental transition from water- to air-breathing is known to be associated with a dramatic rise in internal CO<sub>2</sub> levels, the changes in blood-gas composition experienced by amphibiotic insects, which represent an ancestral air-to-water transition, are unknown. This study measured total CO<sub>2</sub> (TCO<sub>2</sub>) in hemolymph collected from aquatic nymphs and air-breathing adults of *Anax junius*, *Aeshna multicolor* (Aeshnidae), *Libellula quadrimaculata*, and *L. forensis* (Libellulidae). Hemolymph PCO<sub>2</sub> was also measured in vivo in both Aeshnid nymphs and marbled crayfish (*Procambarus fallax* f. *virginalis*) using a novel fiber-optic CO<sub>2</sub> sensor. The hemolymph TCO<sub>2</sub> of the pre- and early-final instar nymphs was found to be significantly lower than that of the air-breathing adults. However, the TCO<sub>2</sub> of the late-final instar Aeshnid nymphs was not significantly different from the air-breathing adult, despite the late-final nymph still breathing water. TCO<sub>2</sub> and PCO<sub>2</sub> were also significantly higher in the hemolymph of early-final Aeshnid nymphs compared to the water-breathing crayfish. Thus, while dragonfly nymphs show an increase in internal CO<sub>2</sub> as they transition from water to air, from an evolutionary standpoint, the nymph's ability to breathe water is associated with a comparatively minor decrease in hemolymph TCO<sub>2</sub> relative to the air-breathing adult.] Address: Lee, D.J., Dept of Zoology, Univ. of British Columbia, Vancouver, BC, V6T 1Z4, Canada. E-mail: pmatthews@zoology.ubc.ca
- 16872.** Lee, D.-Y.; Lee, D.-S.; Bae, M.-J.; Hwang, S.-J.; Noh, S.-Y.; Moon, J.-S.; Park, Y.-S. (2018): Distribution patterns of odonate assemblages in relation to environmental variables in streams of South Korea. *Insects* 2018, 9(4), 152; <https://doi.org/10.3390/insects9040152>: 14 pp. (in English) ["Odonata species are sensitive to environmental changes, particularly those caused by humans, and provide valuable ecosystem services as intermediate predators in

food webs. We aimed: (i) to investigate the distribution patterns of Odonata in streams on a nationwide scale across South Korea; (ii) to evaluate the relationships between the distribution patterns of odonates and their environmental conditions; and (iii) to identify indicator species and the most significant environmental factors affecting their distributions. Samples were collected from 965 sampling sites in streams across South Korea. We also measured 34 environmental variables grouped into six categories: geography, meteorology, land use, substrate composition, hydrology, and physicochemistry. A total of 83 taxa belonging to 10 families of Odonata were recorded in the dataset. Among them, eight species displayed high abundances and incidences. Self-organizing map (SOM) classified sampling sites into seven clusters (A–G) which could be divided into two distinct groups (A–C and D–G) according to the similarities of their odonate assemblages. Clusters A–C were characterized by members of the suborder Anisoptera, whereas clusters D–G were characterized by the suborder Zygoptera. Non-metric multidimensional scaling (NMDS) identified forest (%), altitude, and cobble (%) in substrata as the most influential environmental factors determining odonate assemblage compositions. Our results emphasize the importance of habitat heterogeneity by demonstrating its effect on odonate assemblages." (Authors) ] Address: Lee, D.-Y., Department of Biology, Kyung Hee University, Seoul 02447, Korea

**16873.** Leeb, E.; Hoffmann, F.; Holzinger, W.E. (2018): Ein neues Vorkommen der Zierlichen Moosjungfer (*Leucorrhinia caudalis*) in Österreich (Insecta: Odonata). *Linzer biol. Beitr.* 50/2: 1259-1265. (in German, with English summary) ["Saissesse and Kleiner See are two bog lakes near Velden/Wörthersee (Carinthia) in 600 m a.s.l. Their Odonata fauna was surveyed since the 1990-ies. 23 species could be found at the Saissesse, the Kleiner See hosts 8 species. From a nature conservation point of view, the most important species is *Leucorrhinia caudalis*, present in a small, but stable population. It is one of only two populations in Austria and the only one in the alpine biogeographic region. Furthermore, it is the highest-located reproduction site in Europe. The population of *Epiteca bimaculata* is also noteworthy, as it is the second record from Carinthia. The continuation of the (very sensitive) utilisation of the two lakes and their environs is essential to preserve the suitability as habitat for *L. caudalis* and *E. bimaculata*." (Authors)] Address: Leeb, Eva, Obermüllnerstraße 5 /33, 1020 Wien, Austria. E-Mail: eva.leeb@aon.at

**16874.** Lei, J.; Xiong, W.; Sui, X.-Y. (2018): Feeding habits of the Chinese minnow *Rhynchocypris oxycephalus* (Sauvage & Dabry de Thiersant, 1874) from the upper Yangtze River, China. *Journal of Applied Ichthyology* 34(3): 550-555. (in English) ["The feeding habits of the Chinese minnow, *Rhynchocypris oxycephalus* (Sauvage & Dabry de Thiersant, 1874), were investigated in the Laohegou River, a tributary of the upper Yangtze River, China. A total of 412 specimens were collected by electrofishing in four seasons of 2012, 7 days per season. Diet composition was analyzed

according to season, size classes and sex. The Chinese minnow is a generalist omnivorous species, whose diet consists of aquatic insects and plants. Besides algae, Hemiptera, Ephemera, Trichoptera, Odonata, Diptera were the most dominant food items. The Shannon-Wiener index on diet items showed no significant differences between major food items ( $p > .05$ ) or between seasons, size classes and sexes. In contrast, fullness index and dietary breadth analysis both indicated significant diet changes between seasons. Consequently, this study provides information on feeding habits of *R. oxycephalus*, which may be useful in cultivation trials." (Authors)] Address: Sui, X.-Y., Laboratory of Biological Invasion and Adaptive Evolution, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan, China. E-mail: xiaoyunsui@ihb.ac.cn

**16875.** Lesch, V.; Bouwman, H. (2018): Adult dragonflies are indicators of environmental metallic elements. *Chemosphere* 209: 654-665. (in English) ["Highlights: • 115 Adult dragonflies from 21 sites in South Africa analysed for metallic elements. • Species and sizes had no influence on concentrations, but habitat type did. • Mining was associated with higher concentrations of As and Pb at some sites. • Geographic distributions of concentrations indicated possible pollution sources. • Dragonflies would be good indicators of metallic elements. Abstract: Adult dragonflies (Insecta; Odonata) are aerial predatory arthropods that occur globally except in the polar regions. However, we know of no research on adult dragonflies as potential indicators of metallic elements in the environment or metallic element concentrations and relative contribution patterns between sites, species, size classes, habitat types, and relation to possible pollution sources. There is also no information available about adult dragonflies and their responses to toxic metals. However, metallic elements are toxic in elevated concentrations to all organisms. We predict that adult dragonflies would be suitable indicators of elemental concentrations. We analysed 105 adult male dragonflies from 21 sites in South Africa for 33 metallic elements including Hg, As, Pb, Cr, Cu, Cd, Ni, Se, Al, and Au. The results indicated that all species of dragonflies, regardless of body size, are suitable indicators. Furthermore, different aquatic habitat types did not affect the metallic element concentrations at the scale of this study. Dragonflies collected near wastewater treatment plants showed concentrations of certain elements such as Au higher than from elsewhere. Elements such as As and Pb were found at elevated concentrations (relative to the other sites) in dragonflies collected near mines. Dragonflies from sampling sites near potential pollution sources, but had seemingly isolated water sources, showed lower metallic element concentrations when compared with other sites. We conclude that adult dragonflies would be good indicators of environmental metallic elements." (Authors) *Orthetrum caffrum*; *Brachythemis lacustris*; *Trithemis kirbyi*; *Trithemis arteriosa*; *Trithemis dorsalis*; *Palpopleura jucunda*; *Zosteraeschna minúscula*; *Nesciothemis farinosa*; *Brachythemis leucostica*; *Orthetrum chrysostigma*; *Sympetrum fonscolombii*; *Crocothemis erythraea*; *Tramea limbata*; *Trithemis furva*; *Trithemis annulata*] Address: Lesch,

Velesia, Research Unit: Environmental Sciences and Management, North-West University, Potchefstroom, South Africa. E-mail: velesialesch1@gmail.com

**16876.** Li, Q.; Zheng, M.; Pan, T.; Su, G. (2018): Experimental and numerical investigation on dragonfly wing and body motion during voluntary take-off. *Scientific Reports* 8, Article number: 1011 (2018): 16 pp. (in English) ["We present a detailed analysis of the voluntary take-off procedure of a dragonfly. The motions of the body and wings are recorded using two high-speed cameras at Beihang University. The experimental results show that the dragonfly becomes airborne after approximately one wingbeat and then leaves the ground. During this process, the maximum vertical acceleration could reach  $20\text{m/s}^2$ . Evidence also shows that acceleration is generated only by the aerodynamic force induced by the flapping of wings. The dragonfly voluntary take-off procedure is divided into four phases with distinctive features. The variation in phase difference between the forewing and hindwing and angle of attack in the downstroke are calculated to explain the different features of the four phases. In terms of the key parameters of flapping, the phase difference increases from approximately 0 to 110 degrees; the angle of attack in down-stroke reaches the maximum at first and then decreases in the following take-off procedure. Due to experimental limitations, 2-D simulations are conducted using the immersed boundary method. The results indicate that the phase difference and the angle of attack are highly correlated with the unsteady fluid field around the dragonfly's wings and body, which determines the generation of aerodynamic forces." (Authors)] Address: Li, Q., National Key Laboratory of Science and Technology on Aero-Engine Aero-thermodynamics Collaborative Innovation Center of Advanced Aero-Engine, School of Energy and Power Engineering, Beihang University, Beijing, China

**16877.** Lösch, B.; Festi, A.; Nössing, T.; Winkler, F. (2018): Rote Liste der Libellen Südtirols (Insecta: Odonata). *Gredleriana* 18: 27-45. (in German, with English summary) ["A checklist and red list of the dragonflies and damselflies species of South Tyrol are presented. The red list categories were assigned on the basis of three separately specified indicators: frequency, population trend and habitat loss. Information about habitat preferences, vertical distribution and about a possible particular responsibility and the need for urgent intervention for each single species are provided. The odonatofauna of South Tyrol actually counts 60 species. Of the 58 evaluated species, 9 are extinct (RE) and 20 (34 %) endangered of which 12 are assigned to the categories VU, EN or CR and 8 to NT. 25 species (43 %) are considered of least concern (LC). The intensification of agriculture and urbanization turn out to be the main causes of threat. Other, somewhat less important factors are the abandonment of certain agricultural activities. Most endangered species are running water specialists or species of the ephemeral habitats of floodplains. Further important habitats for endangered dragonfly species include peat bogs." (Authors)] Address: Festi, A., Penegalstr. 7, 39100 Bozen, Italy. E-mail: alex.festi@rolmail.net

**16878.** Lonsdale, O.; Locke, M.M. (2018): Name-bearing type specimens in the Canadian National Collection of Insects, Arachnids & Nematodes (CNC): Blattodea, Dermaptera, Notoptera, Mecoptera, Megaloptera, Myriapoda, Neuroptera, Odonata, Orthoptera, Phthiraptera, Pseudoscorpiones, Psocoptera, Raphidioptera & Siphonaptera. *Zootaxa* 4526(2): 101-126. (in English) [Holotyps of *Williamsonia fletcheri* Williamson 1923 and *Neurocordulia michaeli* Brunelle, 2000 are documented.] Address: Lonsdale, O., Agriculture and Agri-Food Canada, 960 Carling Avenue, Ottawa, Ontario, K1A 0C6, Canada. E-mail: owen.lonsdale@canada.ca

**16879.** Lozano, F.; Rodrigues, M.E. (2018): *Acanthagrion marinae* sp. nov. (Zygoptera: Coenagrionidae): a new species of the apicale group. *Anais da Academia Brasileira de Ciências* 90(3): 2865-2872. (in English) ["*Acanthagrion marinae* sp. nov. (Holotype male: BRASIL, Mato Grosso do Sul, Campo Grande, UFMS,  $20^{\circ}29'56.26''\text{S}$  -  $54^{\circ}36'48.43''\text{W}$ , 547m, leg. M.E. Rodrigues, 03.ii.2015, collection code: VZYG437, MLP) is described and illustrated on the basis of 15 males. The new species belongs to the apicale species group by having horns on S10 and sclerotized hooks on tip of distal segment of the genital ligula. It can be easily distinguished from other species of the group by a combination of characters of the genital ligulae (presence of setae on segment two; absence of setae at flexure; distal lateral lobes of segment three absent). Notes on habitat and a modification of previous keys for the species of the apicale group are provided." (Authors)] Address: Lozano, F., Laboratorio de Biodiversidad y Genética Ambiental/BioGeA, Universidad Nacional de Avellaneda, Mario Bravo 1460 esq. Isleta, 1870 Piñeyro, Buenos Aires, Argentina

**16880.** Luck, J.C. (2018): Discovery of new populations of *Libellula fulva* Muller (Scarce Chaser) in East Sussex. *J. Br. Dragonfly Society* 34(2): 61-78. (in English) ["Although *Libellula fulva*, Scarce Chaser, is known to have established populations on the two main West Sussex rivers the Arun and the Adur, it was thought to be absent in East Sussex. With sightings on both the Cuckmere and Ouse rivers in 2006, it was decided to conduct surveys on both rivers to establish the extent of the populations. This was carried out by the author for the first three years and, for the following three years, with the assistance of a team of helpers. *Libellula fulva* was shown to be present on the Cuckmere River from the White Horse (TQ514007) upstream to Michelham Priory (TQ565099), and on the River Ouse from Hamsey Weir (TQ415127) upstream to Sutton Hall Weir (TQ440187), as well as on some of the tributaries of the River Ouse. Whereas, uniquely, the abdomen of a male *L. fulva* displays clear evidence of mating, it does not, of course, reveal the location. To resolve this, various methods were deployed using larval survey, exuviae search and field observations. It was determined that the species has a preference for breeding in slow moving or still areas of water. This held true even where the male may be holding territory



on faster, moving stretches of river. Copulation was observed on several occasions, supporting this theory, but rarely observed ovipositing was only seen on one occasion." (Author)] Address: Luck, J.C., 4 Mill View, Ringmer, Lewes, East Sussex, BN8 5EP, UK

**16881.** Makbun, N.; Fleck, G. (2018): Description of *Microgomphus farrelli* sp. nov. (Odonata: Anisoptera: Gomphidae) based on adults of both sexes and larvae from Northern Thailand. *Zootaxa* 4422(3): 442-450. (in English) ["The new gomphid species, *Microgomphus farrelli* sp. nov., is described and illustrated on the basis of male and female adult specimens and larvae collected from Chiang Mai and Mae Hong Son province, Northern Thailand. It is compared with other species of the genus. Based on the larvae this species is most closely related to *Microgomphus svihleri* (Asahina, 1970), comb. nov., which is the senior and valid synonym of *Microgomphus thailandicus* Asahina, 1981, syn. nov." (Authors)] Address: Makbun, N., 1211/5 Moo 4, Takhli, Nakhon Sawan, 60140, Thailand. E-mail: noppadon.makbun@gmail.com

**16882.** Mallard, F. (2018): Présentation des indicateurs biologiques des effets du changement climatique sur la biodiversité en région Nouvelle-Aquitaine: les espèces sentinelles du climat. *Bull. Soc. Linn. Bordeaux* 153, nouv. série n° 46(2-4): 341-358. (in French, with English summary) ["Presentation of biological indicators of the effects of climate change on biodiversity in the New Aquitaine region (South West, France): the climate sentinel species: Understanding the local effects of climate change on biodiversity is essential to guide environmental and management policies for natural areas. The lack of knowledge at the regional level has led to the development of a research program "Climate sentinels". The main hypothesis of the program is that effects on biodiversity are particularly detectable in species that have low movement abilities. These "climate sentinel" species would be the first to respond to local climatic variations by adaptation or local extinction. From the territory of New Aquitaine (France), 20 biological indicators of climate change in different ecosystems (dune, dry, wet, mountain and forest) were chosen: plants communities of ecosystems, insects (butterflies, dragonflies, bumblebees), amphibians (*Rana pyrenaica*, *Hyla molleri*, *H. arborea*), reptiles (*Iberolacerta bonnali*, *Timon lepidus*, *Zootoca vivipara*, *Emys orbicularis*, *Vipera berus*) and mammals (*Marmota marmota*, micromammals). This paper presents the method of development of these indicators and the research hypotheses associated with climate sentinel species." (Author)] Address: Mallard, Fanny, Association Cistude Nature, Chemin du Moulinat, F - 33185 Le Haillan, France. E-mail: fanny.mallard@cistude.org

**16883.** Marinov, M. (2018): In memoriam Richard Seidenbusch (1944-2020). *Odonatologica* 47(3/4): 1-14. (in English) ["Personal recollections and anecdotes of a friendship that lasted almost 30 years are given. The full odonatological bibliography of Richard Seidenbusch is appended." (Author)] Address: Marinov, M., Biosecurity Surveillance & Incursion

Investigator Plant Health Team, Ministry for Primary Industries, 8053 Christchurch, New Zealand. E-mail: milen.marinov@mpi.govt.nz

**16884.** Márquez-Rodríguez, J.; López-Márquez, M. (2018): New record of *Calopteryx xanthostoma* (Charpentier, 1825) in Ourense, northwest of Spain (Odonata: Calopterygidae). *Archivos Entomológicos* 19: 163-165. (in English, with Spanish summary) ["A new record of the damselfly *Calopteryx xanthostoma* (Charpentier, 1825) (Odonata: Calopterygidae) in the province of Ourense (Spain) is provided. A photographic record of the species observed at the end of summer is attached: 1 male, Miño River, Ourense, Spain. 42°21'5"N 7°54'40"W. 20 August 2018, 16:30 h." (Authors)] Address: Márquez-Rodríguez, J., Zoología. Departamento de Sistemas Físicos, Químicos y Naturales - Facultad de Ciencias Experimentales. Universidad Pablo de Olavide. A-376, Km 1. E-41013 Sevilla, Spain. E-mail: E-mail: jmarrod1@upo.es

**16885.** Marthelot, J.; Dupuis, T.; Brun, P.-T. (2018): K57.00011: Dragonfly-inspired deployable structures: how to inflate and stay flat? *Bulletin of the American Physical Society, APS March Meeting 2019, Monday–Friday, March 4–8, 2019; Boston, Massachusetts, Session K57: The Extreme Mechanics of Balloons, 8:00 AM–11:00 AM, Wednesday, March 6, 2019: (in English) [Verbatim: Programming the final shape of a soft inflatable structure is a nontrivial challenge. Such a task is routinely accomplished in nature, for example when the wing of an emerging dragonfly deploys over just a couple of minutes. This expansion is guided by a network of veins where hemolymph is injected and subsequently solidifies to generate rigidity. Inspired by dragonflies, we build a model experiment to investigate inflatable deployable structures composed of a tubular network of the veins. We first mimic differential growth to fabricate wrinkled tubular structures. They comprise a soft annular core surmounted by a stiffer and thinner annulus prepared so as to yield a wrinkling instability. We then study the mechanical response of a single wrinkled tubular structure under pressure. We then characterize the in-plane expansion of the structure and study its correlation to the network geometry and the pressure applied to the system. A systematic variation of the geometric and elastic parameters allows us to search for optimal design and operational conditions for a maximal extension while minimizing the input pressure.] Address: not stated.*

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2018

**16888.** Martin, A.E.; Graham, S.L.; Henry, M.; Pervin, E.; Fahrig, L. (2018): Flying insect abundance declines with increasing road traffic. *Insect Conservation and Diversity* 11(6): 608-613. (in English) ["1. One potentially important but underappreciated threat to insects is road mortality. Road kill studies clearly show that insects are killed on roads, leading to the hypothesis that road mortality causes declines in local insect population sizes. 2. In this study we used custom-made sticky traps attached to a vehicle to target diurnal flying insects that interact with roads, sampling along 10 high-traffic and 10 low-traffic rural roads in south-eastern Ontario, Canada. We used a paired sampling design to control for potentially confounding differences in the road characteristics (e.g. road width) and surrounding land covers (e.g. housing density) between high-traffic and low-traffic roads. We then used these data to test the prediction that fewer flying insects collide with vehicles, per vehicle (i.e. insect abundance is lower), on high-traffic than low-traffic roads. 3. We found significantly fewer insects at the high-traffic roads than at the low-traffic roads as predicted. There was a 23.5% decline in the number of insects/km/vehicle on high-traffic relative to low-traffic roads. 4. Given the high rates of insect mortality observed in previous studies, it is likely that road mortality contributes to these observed negative effects of traffic intensity. Thus the growing global road network is a concern for conservationists and land managers, not only because insect population declines contribute to the ongoing global losses of biodiversity but also because insects play a vital role in food webs and provide important ecosystem services." (Authors)] Address: Martin, Amanda, Rideau Valley Wildlife Sanctuary, P.O. Box 266, North Gower, ON, Canada. E-mail: amanda.martin@canada.ca

**16889.** McCauley, S.J.; Hammond, J.I.; Mabry, K.E. (2018): Simulated climate change increases larval mortality, alters phenology, and affects flight morphology of a dragonfly. *Ecosphere* 9(3): 14 pp. (in English) ["For organisms with complex life cycles, climate change can have both direct effects and indirect effects that are mediated through plastic responses to

temperature and that carry over beyond the developmental environment. We examined multiple responses to environmental warming in a dragonfly, a species whose life history bridges aquatic and terrestrial environments. We tested larval survival under warming and whether warmer conditions can create carry-over effects between life history stages. Rearing dragonfly larvae in an experimental warming array to simulate increases in temperature, we contrasted the effects of the current thermal environment with temperatures +2.5° and +5°C above ambient, temperatures predicted for 50 and 100 yr in the future for the study region. Aquatic mesocosms were stocked with dragonfly larvae (*Erythemis collocata*), and we followed survival of larvae to adult emergence. We also measured the effects of warming on the timing of the life history transition to the adult stage, body size of adults, and the relative size of their wings, an aspect of morphology key to flight performance. There was a trend toward reduced larval survival with increasing temperature. Warming strongly affected the phenology of adult emergence, advancing emergence by up to a month compared with ambient conditions. Additionally, our warmest conditions increased variation in the timing of adult emergence compared with cooler conditions. The increased variation with warming arose from an extended emergence season with fewer individuals emerging at any one time. Altered emergence patterns such as we observed are likely to place individuals emerging outside the typical season at greater risk from early and late season storms and will reduce effective population sizes during the breeding season. Contrary to expectations for ectotherms, body size was unaffected by warming. However, morphology was affected: at +5°C, dragonflies emerging from mesocosms had relatively smaller wings. This provides some of the first evidence that the effects of climate change on animals during their growth can have carry-over effects in morphology that will affect performance of later life history stages. In dragonflies, relatively smaller wings are associated with reduced flight performance, creating a link between larval thermal conditions and adult dispersal capacity." (Authors)] Address: McCauley, Shannon, Department of Biology, University of Toronto Mississauga, 3359 Mississauga Road, Mississauga, Ontario L5L 1C6 Canada. E-mail: shannon.mccauley@utoronto.ca

- 16890.** Mearns, B. (2018): First record of *Orthetrum ransonnetii* in the Canary Islands (Odonata: Libellulidae). *Odonatologica* 47(3/4): 213-218. (in English) ["An immature male *O. ransonnetii* was recorded in Barranco de Rio Cabras, on Fuerteventura, on 16-ii-2018. It is the first record of the species in the Canary Islands and in entire Macaronesia, making it also the first record for Spain and entire Europe." (Author)] Address: Mearns, Barbara, Connansknowe, Kirkton, Dumfries, DG1 1SX, UK. E-mail: barbaracmearns@gmail.com
- 16891.** Medina, M.N.D.; Cabras, A.A. (2018): Assessment of Odonata and Lepidoptera fauna of the University of Mindanao Matina, Davao City, Philippines. *Univ. of Min. Intl. Mult. Disc. Res. Jour.* 3(1): 6 pp. (in English) ["Under the umbrella of the "Biodiversity assessment of the University of Mindanao (UM), Matina Campus" a rapid assessment of Odonata and Lepidoptera fauna was conducted between October 2016 and November, 2017. Opportunistic sampling and photo-documentation was conducted in three sampling areas: grassland, mini forest, and open landscapes near the college buildings. Nine species of Odonata were documented where the miniforest has the highest species richness and open landscapes near the buildings have the poorest. One Philippine endemic Odonata species *Ceriagrion lieftincki* was found inhabiting the fluvial systems near the grassland. At present, this endemic species is considered least concern with stable population in the wild. ... The minimal number of Odonata and Lepidoptera within the campus can be attributed to its severely disturbed fluvial systems limiting the survival of endemic species paving the way to more tolerant oriental species. The low species richness of Lepidoptera can be attributed to the low diversity of angiosperms in the campus serving as their host and food plants. The present microhabitat within UM Matina campus is not suitable haven for endemics." (Authors)] Address: Medina, M.N.D., Research and Publication Center, Univ. of Mindanao, Davao City Philippines. E-mail: mnd\_molina@umindanao.edu.ph
- 16892.** Mendes, T.P.; Luiza-Andrade, A.; Cabette, H.S.R.; Juen, L. (2018): How does environmental variation affect the distribution of dragonfly larvae (Odonata) in the Amazon-Cerrado transition zone in Central Brazil? *Neotropical Entomology* 47(1): 37-45. (in English) ["This study investigated the effects of environmental variation on assemblages of dragonfly larvae (Odonata). We hypothesize that there is a significant correlation between species richness, species composition, and abundance of Odonata individuals, and habitat integrity and abiotic variables. To test this hypothesis, we sampled odonate larvae at 12 streams in the Suiá-Miçú River basin in Mato Grosso, Brazil, during three different periods of the year. Local physical and chemical variables (temperature, pH, turbidity, electrical conductivity (EC), dissolved oxygen (DO), total dissolved solids (TDS), and oxidation reduction potential (ORP)) were measured at each site using a multi-parameter probe, and integrity was assessed using the Habitat Integrity Index (HII). The variation in richness, abundance, and composition of Odonata species was related to the environmental variables analyzed, primarily by the abiotic factors pH, electrical conductivity, dissolved oxygen, total dissolved solids, and oxidation reduction potential. Our hypothesis was corroborated for the suborder Anisoptera, which showed a significant relationship with these variables, whereas Zygoptera was only related to pH. Our results show the importance of physical and chemical conditions in ecological studies using Odonata larvae as tools for the management and conservation of freshwater ecosystems." (Authors)] Address: Mendes, T.P., Graduate Program in Zoology – PPGZOO, Univ Federal do Pará – UFPA e Museu Paraense Emílio Goeldi – MPEG, Belém, Brasil
- 16893.** Menon, V. (2018): Dynamical modelling for a dragonfly Micro Aerial Vehicle. M.Sc. thesis, University of Toronto Institute for Aerospace Studies: XI, 117 pp. (in English) ["Researchers are developing ever smaller aircraft called Micro Aerial Vehicles (MAVs). The Space Robotics Group has joined the field by developing a dragonfly-inspired MAV. This thesis presents two contributions to this project. The first is the development of a dynamical model of the internal MAV components to be used for tuning design parameters and as a future plant model. This model is derived using the Lagrangian method and differs from others because it accounts for the internal dynamics of the system. The second contribution of this thesis is an estimation algorithm that can be used to determine prototype performance and verify the dynamical model from the first part. Based on the Gauss-Newton Batch Estimator, this algorithm uses a single camera and known points of interest on the wing to estimate the wing kinematic angles. Unlike other single-camera methods, this method is probabilistically based rather than being geometric." (Authors)] Address: not stated
- 16894.** Mezquita-Aranburu, I. (2018): Catálogo provisional de los odonatos (Insecta, Odonata) de la ZEC Txingudi-Bidasoa (Gipuzkoa, País Vasco, España). Provisional Catalogue of Odonates in the Txingudi-Bidasoa Special Area of Conservation (Gipuzkoa, Basque Country, Spain). *Munibe* 66: 203-217. (in Spanish, with English and Basque summary) ["The present article sets out to compile a provisional catalogue of the odonates present in the Txingudi-Bidasoa SAC, which belongs to the Natura 2000 network, based on data collected between 2007 and 2017, as well as a bibliographical review of the previous references. The catalogue includes the 27 species of odonates observed up to 2017 (12 Zygoptera and 15 Anisoptera). We should like to point out that the aforementioned catalogue is provisional, given that it is likely that a number of new species have yet to be discovered." (Author)] Address: Mezquita-Aranburu, I., Sociedad de Ciencias Aranzadi, Depto de Entomología, Paseo de Zorroaga 11, 20004 Donostia-San Sebastián, Spain. E-mail: mezquitaaranburu@gmail.com
- 16895.** Mill, P.J. (2018): The role of the abdomen of anisopteran larvae in respiration, locomotion and prey capture: A review — 2: Mechanics and neural control. *J. Br. Dragonfly Society* 34(1): 31-60. (in English) ["The dorso-ventral movements of the floor of the larval abdomen produce pressure changes in the body cavity that are used for ventilation of the gills in the branchial chamber, for jet-propulsive swimming



and for labial mask extension (prey capture). The various mechanisms and their neural control are reviewed. The techniques employed for the mechanical and physiological studies are outlined. The review is preceded by a description of the types of nerve cell (neuron) and how they convey information. Details of the mechanics and physiology have been obtained mostly from aeshnid larvae except in the case of labial mask extension." (Author)] Address: Mill, P.J., School of Biology, Univ. Leeds, Leeds, LS2 9JT, UK

**16896.** Miralles-Núñez, A.; Díaz-Martínez, C.; Díaz, A. (2018): Primeros registros de *Sympetrum sanguineum* (Müller, 1764) (Odonata: Libellulidae) en Granada y revisión de su distribución en Andalucía (España). *Boletín Rola* 12: 5-12. (in Spanish, With English summary) ["*S. sanguineum* is reported for the first time from the province of Granada after 34 years without any confirmed record in Andalusia. A critical review of all published records in this area is therein presented." (Authors)] Address: Díaz, Adrià, (Oxygastra-GEOC) Institució Catalana d'Història Natural, Carrer del Carme 47 - 08001 Barcelona, Spain. E-mail: amiralles10@gmail.com

**16897.** Miralles-Núñez, A.; Cabana Otero, M.; Arriadam M.T. (2018): Primera cita y confirmación de la reproducción de *Cordulegaster bidentata* Selys, 1843 (Odonata: Cordulegasteridae) en la Comunidad Foral de Navarra (España). *Boletín de la S.E. A.* 62: 287-289. (in Spanish, with English summary) [*C. bidentata* is recorded for the first time in the Chartered Community of Navarra and the reproduction is confirmed. This record is the western limit of the species worldwide." (Authors)] Address: Miralles-Núñez, A., Grup d'Estudi dels Odonats de Catalunya (Oxygastra-GEOC), Institució Catalana d'Història Natural, Carrer del Carme 47, 08001. Barcelona, Spain. amiralles10@gmail.com

**16898.** Miroglu, A. (2018): Intraspecific variations in the ivory featherleg *Platycnemis dealbata* (Insecta: Odonata) from Turkey. *Applied ecology and environmental research* 16(3): 2213-2218. (in English) ["Intraspecific variations can be observed in many types of animal species in Turkey due to the geographical and ecological characteristics of the region. The aim of this research is to study the *P. dealbata* populations in Turkey and to survey how the Anatolian Diagonal affects them. The *P. dealbata* specimens were collected from Kahramanmaraş and Iğdır Provinces of Turkey in 2010, 2012, 2015, and 2017. Variations were found between these two populations. The variations seen in the *P. dealbata* populations were examined and demonstrated with illustrations." (Authors)] Address: Miroglu, A., Fatsa Fac. of Marine Sci., Ordu Univ., Fatsa-Ordu, Turkey. E-mail: alimiroglu@gmail.com

**16899.** Miroglu, A.; Demiratas, S. (2018): Ecological niche modeling of *Calopteryx splendens* (Harris, 1782) (Insecta: Odonata) subspecies in Turkey. *Süleyman Demirel University, Journal of Natural and Applied Sciences* 21(3): 935-941. (in Turkish, with English summary) ["Turkey is an important region in terms of biodiversity because of its geographical location, topographical structure and the presence of various climate types. The emergence of new species and subpopulations can

be seen. In this study, we evaluated subspecies of *C. splendens* distributed in Turkey. 19 ecological parameters of the current known localities of these subspecies were analyzed. The potential habitats and new locations for the subspecies populations were investigated. Current distribution maps of *C. splendens* subspecies have been made using MaxEnt ecological niche modeling methods. According to these results, it was found that the distribution areas of *C. splendens* subspecies, whose distributions according to faunistic data are known, almost overlapped with the distribution areas of ecological data." (Authors)] Address: Miroglu, A., Fatsa Fac. of Marine Sci., Ordu Univ., Fatsa-Ordu, Turkey. E-mail: alimiroglu@gmail.com

**16900.** Mitchell, W. (2018): Seasonality of odonate-mediated methylmercury flux. Honors thesis, Dept of Biology, Texas Christian Univ., Fort Worth, Texas: 13 pp. (in English) ["Methylmercury (MeHg) is an aquatic contaminant that can be transferred to terrestrial predators by emergent aquatic insects such as odonates. We observed the effects of season on odonate-mediated MeHg flux (calculated as emergent odonate biomass × MeHg concentration) in 20 experimental ponds and the potential risk to nestling Red-winged Blackbirds (*Agelaius phoeniceus*) posed by consuming MeHg-contaminated odonates. Emergent odonates were collected weekly from ponds using emergence platforms from February to October 2017. The MeHg flux from damselflies, aeshnids, and libellulids began in March and peaked in May, June, and July, respectively, and then declined throughout the rest of the summer. Nesting of Red-winged Blackbirds overlapped with peak odonate emergence and odonate-mediated MeHg flux, suggesting that MeHg-contaminated odonates may pose a health risk to nestling Red-winged Blackbirds." (Author)] Address: not stated

**16901.** Mitra, B.; Shah, S.K.; Mishra, P. (2018): Insect Fauna associated with the Tea Ecosystem of North Bengal, India. *Records of the Zoological Survey of India* 118(2): 178-193. (in English) ["Present communication reports 167 species belonging to 139 genera of 42 families under 6 orders of insects from the tea gardens of North Bengal. Of them, Lepidoptera shares maximum number of species (77), followed by Hemiptera (29), Diptera (24), Coleoptera (19), Odonata (12) and Orthoptera (6). ... 1 species of Diptera and Odonata are found as predators of tea pest. ... (Authors)] Address: Zoological Survey of India, H.Q. Office, M- Block, New Alipore, Kolkata – 700053, West Bengal, India

**16902.** Mochon, A.; Savard, M. (2018): Sur les traces de l'épithèque de Provancher au mont Yamaska (Odonata: Cordulidae: *Neurocordulia yamaskanensis*). *Le Naturaliste canadien* 142(3): 10-21. (in French, with English summary) ["*N. yamaskanensis* was the subject of an investigation in 2017 at the foot of Mount Yamaska, in the slow and winding course of the Black River, located in Saint-Pie, Montérégie. This is the type locality of the species, discovered more than 140 years ago by Reverend Léon Provancher, and which had not been explored since at the odonatological level. The collect of exuviae and crepuscular observations of adults have shown that a population of the species is still present in the Mount Yamaska area.

This discreet dragonfly, rarely seen in Québec, usually goes unnoticed because of its crepuscular behavior. This return to the origins of Provancher's discovery in 1875 is a nod to his lasting work, which continues through his magazine *Le Naturaliste canadien*, which in 2018 marks its 150th anniversary." (Authors)] Address: Alain Mochon: mochon.alain@sepaq.com

**16903.** Mokaria, K.; Jethva, B. (2018): Diversity, local distribution and occurrence of dragonflies and damselflies (Odonata: Insecta) In Nalsarovar Bird Sanctuary (Ramsar Site), Gujarat. *International Journal of Scientific and Research Publications* 8(1): 61-73. (in English) ["Nalsarovar is an important wetland in terms of its multiple categories designated such as a Birds Sanctuary, Important Bird and Biodiversity Area, a Ramsar Site of Gujarat State. Total area of Nalsarovar Bird Sanctuary (NBS) area is 120 km<sup>2</sup>. A study was carried out from February 2015 to February 2017 at Nalsarovar Bird Sanctuary. A species inventory was carried out by Visual Encounter Survey (VES). 14 sites were fixed using GPS for the survey. Survey was carried out including all seasons and covering all major habitats. Adult Odonata encountered were recorded. During the entire survey total 30 species of odonates were encountered that belonged to Libellulidae, Gomphidae, Aeshnidae, Coenagrionidae and Lestidae. Total 37 odonate species were encountered depended especially Nalsarovar Bird Sanctuary area combining the past recorded species and species encountered in current research study. Among species encountered during study almost all species belong to Least Concern (LC) category whereas *Indothemis carnatica* (Fabricius, 1798) is listed under Near Threatened (NT) category under IUCN category. During entire study 14 species of odonates were encountered at all sites whereas variations in distribution of 16 Odonate species were encountered at specific sites." (Authors)] Address: Mokaria, K., Dept of Science, The Mahatma Jyotirao Phoolke University, Jaipur, Rajasthan, India. Email: kala303@gmail.com

**16904.** Monasterio León, Y.; Escobés Jiménez, R. (2018): *Sympetrum fonscolombii* (Selys, 1840) y *Anax imperator* Leach, 1815 en la isla de El Hierro, Islas Canarias (Odonata). *Boln. S.E.A.* 63: 336. (in Spanish, with English summary) ["The first record of *S. fonscolombii* is reported from El Hierro, and the presence of *A. imperator* on the island is confirmed, raising to four the odonate species known from this island." (Authors)] Address: Monasterio León, Y., Asociación Española Para la Protección de las Mariposas y su Medio (ZERYNTHIA). [www.asociacion-zerynthia.org](http://www.asociacion-zerynthia.org)

**16905.** Montoya Jiménez, M.; Sanz Sanz, T.; Montoya Amador, R.; Pomeda Maestre, M.Á.; Arriola González, J.Á. (2018): Primera cita de *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) en la provincia de León (Castilla y León, norte de España). *Boletín de la Sociedad Entomológica Aragonesa* 63: 349-350. (in Spanish, with English summary) [The first record in the province of Leon of *T. kirbyi* is provided, being the fourth province in Castilla y León with records of this species.] Address: Montoya Jiménez, M., C/ Alto de la calle, 5 24885 Prioro, León, Spain. E-mail: marioprioro@yahoo.es

**16906.** Moore, M.P.; Lis, C.; Martin, R.A. (2018): Immune deployment increases larval vulnerability to predators and inhibits adult life-history traits in a dragonfly. *Evolutionary Biology* 31(9): 1365-1376. (in English) ["While deploying immune defenses early in ontogeny can trade-off with the production and maintenance of other important traits across the entire life cycle, it remains largely unexplored how features of the environment shape the magnitude or presence of these lifetime costs. Greater predation risk during the juvenile stage may particularly influence such costs by 1) magnifying the survival costs that arise from any handicap of juvenile avoidance traits and/or 2) intensifying allocation trade-offs with important adult traits. Here, we tested for predator-dependent costs of immune deployment within and across life stages using the dragonfly, *Pachydiplax longipennis*. We first examined how larval immune deployment affected two traits associated with larval vulnerability to predators: escape distance and foraging under predation risk. Larvae that were induced to mount an immune response had shorter escape distances but lower foraging activity in the presence of predator cues. We also induced immune responses in larvae and reared them through emergence in mesocosms that differed in the presence of large predatory dragonfly larvae (*Aeshnidae* spp.). Immune-challenged larvae had later emergence overall and lower survival in pools with predators. Immune-challenged males were also smaller at emergence and developed less sexually selected melanin wing coloration, but these effects were independent of predator treatment. Overall, these results highlight how mounting an immune defense early in ontogeny can have substantial ecological and physiological costs that manifest both within and across life stages." (Authors)] Address: Moore, P.M., Dept of Biology, Case Western Reserve Univ., Cleveland, Ohio, USA. E-mail: mpm116@case.edu

**16907.** Moore, P.M.; Lis, C.; Martin, R.A. (2018): Larval body condition regulates predator-induced life-history variation in a dragonfly. *Ecology* 99(1): 224-230. (in English) ["Organisms with complex life cycles commonly exhibit adaptive plasticity in the timing of transitions between life stages. While the threat of predation is predicted to induce earlier transitions, empirical support has been equivocal. When predation risk affects both the propensity to transition to the next life stage and the ability to reach the energetic thresholds necessary to complete the transition, only those individuals in the best physiological condition may be able to accelerate development and emerge earlier. To test this hypothesis, we followed uniquely marked dragonfly larvae (*Pachydiplax longipennis*) through emergence in pools where we factorially manipulated the presence of a large heterospecific predator (*Anax junius*) and cannibalism risk via conspecific size variation. Consistent with our hypothesis, high-condition larvae were more likely to emerge in the presence of the heterospecific predator than in its absence, and low-condition larvae were more likely to emerge in its absence than in its presence. Moreover, high-condition larvae emerged earlier when cannibalism risk was high than when it was low. Predation risk therefore has condition-dependent effects on emergence. As predation risk frequently affects resource accumulation, similar mechanisms across

taxa could commonly underlie the incongruence between empirical results and theoretical expectations for predator-induced life-history variation." (Authors)] Address: Moore, P.M., Dept of Biology, Case Western Reserve University, Cleveland, Ohio, USA. E-mail: mpm116@case.edu

**16908.** Moro Niño, J.-L.; Álvarez Fidalgo, M. (2018): Primera cita de *Onychogomphus costae* Selys, 1885, en la provincia de Valladolid y en Castilla y León (centro-norte de España) (Odonata: Gomphidae) - First record of *Onychogomphus costae* Selys, 1885 in the province of Valladolid and in Castile and León (Central-northern Spain) (Odonata: Gomphidae). *BVnPC* 7(94): 80-86. ["In this note the first record of *Onychogomphus costae* Selys, 1885 in the province of Valladolid, community of Castile and León, is presented. In addition, the knowledge about the flight period of the species in Spain is updated." (Authors) 11-VII-2016, Valbuena de Duero (longitud: 41.643, latitud: -4.304, altitud: 735 msnm; cuadrícula 10 km × 10 km: 30TUM91)] Address: Moro Niño, J.L., Usuario de BiodiversidadVirtual.org – Valladolid, Castilla y León, Spain. E-mail: jluismoro1@gmail.com

**16909.** Moroz, M.D. (2018): The aquatic insects of the Zapadnaya Dvina river tributaries, Belarus. *Eurasian Journal of Entomology* 17(3): 201-211. (in Russian, with English summary) ["151 species from 9 orders of the aquatic insect fauna in the main tributaries of Zapadnaya Dvina river, Belarus, are registered, namely: ... Odonata — 18; ... High abundance of rheophil species indicates a fairly good quality of water in the studied watercourses. ..." (Author)] Address: Moroz, M.D., State scientific & production amalgamation «The scientific and practical center of the National Academy of Science of Belarus for bioresources», Academicheskaya 27, Minsk 220072 Belarus. E-mail: mdmoroz@bk.ru

**16910.** Müller, R.; Eggers, T.O. (2018): Weiterer Fundort von *Boyeria irene* in Niedersachsen (Odonata: Aeshnidae). *Libellula* 37(3/4): 187-191. (in German, with English summary) ["Further record of *B. irene* in Lower Saxony, Germany - In the river Wietze, a Southern tributary of the river Aller, a larva of *Boyeria irene* was found on the 1st of May 2018. The record based on a macroinvertebrate sample within the regular Water Framework Directive Monitoring. Our record proves the expected further dispersion of the species." (Authors)] Address: Müller, R., Planungsbüro Hydrobiologie, Augustastr. 2, 12203 Berlin, Germany. E-mail: info@hydrobiologie.com

**16911.** Mujumdar, N.; Thakuria, D.; Halali, D.; Koparde, P. (2018): Observations on underwater oviposition in *Pseudagrion indicum* Fraser (Odonata: Coenagrionidae): an endemic species from the Western Ghats. *Halteres* 9: 39-44. (in English) ["Opportunistic records from two localities in Northern and Southern Western Ghats highlight the lack of data on breeding biology of these odonates. Observations presented here throw light on the need for documentation of breeding season of these species, which appears to be the post-monsoon season for *P. indicum*. Our work concludes that more emphasis should be given on ecological studies of these insects, especially endemic species that can provide valuable

inputs in designing conservation strategies for potential areas." (Authors)] Address: Mujumdar, Neha, Bombay Natural History Society, Shaheed Bhagat Singh Road, Colaba, Mumbai - 400001, Maharashtra, India. E-mail: nehadm02@gmail.com

**16912.** Nakanishi, K.; Yokomizo, H.; Hayashi, T.I. (2018): Were the sharp declines of dragonfly populations in the 1990s in Japan caused by fipronil and imidacloprid? An analysis of Hill's causality for the case of *Sympetrum frequens*. *Environmental Science and Pollution Research* 25(35): 35352-35364. (in English) ["Neonicotinoids and fipronil are the most widely used insecticides in the world. Previous studies showed that these compounds have high toxicity to a wide taxonomic range of non-target invertebrates. In rice cultivation, they are frequently used for nursery-box treatment of rice seedlings. The use of fipronil and neonicotinoid imidacloprid is suspected to be the main cause of population declines of red dragonflies, in particular *S. frequens*, because they have high lethal toxicity to dragonfly nymphs and the timing of the insecticides' introduction in Japan (i.e., the late 1990s) overlapped with the sharp population declines. However, a causal link between application of these insecticides and population declines of the dragonflies remains unclear. Therefore, we estimated the amount of the insecticides applied for nursery-box treatment of rice seedlings and analyzed currently available information to evaluate the causality between fipronil and imidacloprid usage and population decline of *S. frequens* using Hill's causality criteria. Based on our scoring of Hill's nine criteria, the strongest lines of evidence were strength, plausibility, and coherence, whereas the weakest were temporality and biological gradient. We conclude that the use of these insecticides, particularly fipronil, was a major cause of the declines of *S. frequens* in Japan in the 1990s, with a high degree of certainty. The existing information and our analyses, however, do not allow us to exclude the possibility that some agronomic practices (e.g., midsummer drainage or crop rotation) that can severely limit the survival of aquatic nymphs also played a role in the dragonfly's decline." (Authors) imidacloprid = Neonicotinoid] Address: Hayashi, T.I., 1. National Institute for Environmental Studies, Ibaraki, Japan

**16913.** Nautiyal, P. (2018): Diet components, dietary habits, resource and its use in the coexisting catfish species. *J. Inland Fish. Soc. India*, 50(1): 9-20. (in English) ["In over last six decades fisheries of the Ganga river System in general and the Ganga R. in particular have witnessed a radical change in dominance from the carp to catfish and now to invasive exotic species. Has this happened due modified river environment (natural flows, pollution) or have the species modified the food-web of the river is an issue that should be addressed in deep earnest intent. Among many facets that need to be answered, we should know the food resources base available in the river environment, preferences of fish species, if it is selective and the extent of overlap among the sympatric and co-existing species. The present investigation precisely examines this for the co-existing catfish species, *Rita rita* and *Bagarius bagarius*. *R. rita* feeds with greater intensity than *B. bagarius*. In *R. rita* intensity was high in pre-



monsoon (January to May) compared to *B. bagarius* where intensity was higher in post monsoon (October to December). *R. rita* showed +ve preference for chironomid-Diptera and variety of Trichoptera among insects. Others include crustaceans and gastropod molluscs. In contrast *B. bagarius* shows preferences for a consortium of Diptera (Simuliidae), Trichoptera (Glossosomatidae), Ephemeroptera (Heptageniidae), Coleoptera and Odonata among insect food. It has high preference for fish elements. Both species select these items. There is a biologically significant diet overlap but these species avoid competition not only by selecting different items from the common food resource base but also by seasonal variation in feeding intensity. Such studies need to be extended to fish within and among feeding guilds." (Author)] Address: Nautiyal, P., Dept of Zoology & Biotechnology, H.N.B. Garhwal Univ., Srinagar 246174, Uttarakhand, India. E-mail: pn.mahseer@gmail.com

**16914.** Nel, A.; Prokop, J.; Pecharová, M.; Engel, M.S.; Garrouste, R. (2018): Palaeozoic giant dragonflies were hawked predators. *Scientific Reports* 8:12141 | DOI:10.1038/s41598-018-30629-w: 5 pp. (in English) ["The largest insects to have ever lived were the giant meganeurids of the Late Palaeozoic, ancient stem relatives of our modern dragonflies. With wingspans up to 71 cm, these iconic insects have been the subject of varied documentaries on Palaeozoic life, depicting them as patrolling for prey through coal swamp forests amid giant lycopsids, and cordaites. Such reconstructions are speculative as few definitive details of giant dragonfly biology are known. Most specimens of giant dragonflies are known from wings or isolated elements, but *Meganeurites gracilipes* preserves critical body structures, most notably those of the head. Here we show that it is unlikely it thrived in densely forested environments where its elongate wings would have become easily damaged. Instead, the species lived in more open habitats and possessed greatly enlarged compound eyes. These were dorsally hypertrophied, a specialization for long-distance vision above the animal in flight, a trait convergent with modern hawked dragonflies. Sturdy mandibles with acute teeth, strong spines on tibiae and tarsi, and a pronounced thoracic skewness are identical to those specializations used by dragonflies in capturing prey while in flight. The Palaeozoic Odonoptera thus exhibited considerable morphological specializations associated with behaviours attributable to 'hawkers' or 'perchers' among extant Odonata." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**16915.** Nichols, J. (2018): An assessment of Odonata abundance and impacts from urbanization in La Crosse County, WI. Undergraduate Thesis, Environmental Science: Conservation and Ecology, Carthage College, Kenosha, Wisconsin: 28 pp. (in English) ["Knowledge of the relationships between urbanization and the ecology and distribution of odonates enhances our ability to effectively assess conditions of aquatic ecosystems and nearby terrestrial habitats. With this project, the terrestrial adult Odonata populations and species dynamics between urban and nonurban river

habitats of La Crosse County, WI were assessed using data received by the Wisconsin Odonata Survey. Using the counts of odonates by species from 2009 to 2015, calculations for general odonate abundance as well as species abundance were generated. It was expected that nonurban habitats would yield both more overall numbers of odonates as well as a more species, though the results showed little difference between the two types of locations. There were on average about 1 more individual odonates counted in urban locations. However, a t-test of these means yielded the data to not be considered statistically different (p-value 0.06). There was also little change in species counts for urban habitats, but there was a spike in counts of nonurban locations from 2009 – 2012, where there were 16 counted in 2009 up to 38 in 2012. Though the r-squared values of the corresponding trendlines suggest a low goodness of fit (< 0.001 and 0.27 for nonurban and urban locations), the low values were to be expected, given the variability of the data in terms of how uneven the counts were performed. The data itself was not gathered with regard to a study, as it has been the culmination of citizen scientists recording their own findings as they visited locations. The low values could reflect the bias toward sampling done for the survey, where the surveyor frequented more urban locations. Despite this, research done with regard to adult odonate ecology and 3 distribution is helping to broaden the lacking knowledge we currently have with regard to odonate population ecology, as well as increase our knowledge of the effects on urbanization on populations and habitats." (Authors)] Address: not stated

**16916.** Nourbakhsh, H.Z.; Obeidi, R. (2018): Analysis of the diet of the *Liza abu* (Heckel, 1843) in Mond River in Bushehr seaport. *Advances in BioResearch* 9(3): 140-144. (in English) ["During the fishing season, 765 *Liza abu* were collected from Mond River and the contents of their digestive system were examined. The minimum and maximum length of the collected fish was 45 and 350 mm, respectively. In addition, the gut length to body length ratio (RLG) of the one-year and five-year fish was 4 and 2.2, respectively. The highest frequency of nutrients in the river belonged to the Ephemeroptera, but the feeding preference of this fish was Plecoptera and Odonata in both rivers. The research results revealed that this fish is an omnivorous species given its feeding habits." (Authors)] Address: Nourbakhsh, Haniyeh Ziaei, Dept of Fisheries Sciences, Bushehr Branch, Islamic Azad Univ., Bushehr, Iran

**16917.** Novelo-Gutiérrez, R. (2018): *Cordulegaster virginiae* sp. nov. from Mexico, including a comparison with *C. diadema* Selys, 1868, and a redescription of its larva (Odonata: Cordulegasteridae). *Zootaxa* 4394(3): 371-382. (in English, with Spanish summary) ["*C.r virginiae* sp. nov. is described based on eight adults (7 ♂♂, 1 ♀) collected in cloud forest in municipalities of Banderilla and Xalapa, Veracruz, Mexico. The new species is compared with adults of *C. diadema* Selys, 1868. All the structural differences between both species are located on the abdomen. *Cordulegaster godmani* McLachlan, 1876 is considered a junior synonym of *C. diadema*. The larva of *C. diadema* is redescribed and illustrated in detail based on reared material." (Author)] Address:

Novelo-Gutiérrez, R., Instituto de Ecología A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.mx

**16918.** Nugraha, F.A.D.; Andri Maulidi, A.; Winasis, S.; Kurniawan, N. (2018): Morphometric analysis of *Ischnura aurora* (Brauer, 1865) in two lakes at Semeru Mountain East Java. *Plant and Animal Research Journal* 1(1): 7-12. (in English) ["Lake Ranu Pani has been experiencing environmental damage due to human activities, while Lake Ranu Regulo is still in good condition. This difference in environmental conditions allows for differences in the genetic diversity of animals in the area. The aim of this research is to know the genetic diversity of *I. aurora* based on morphometric analysis in both locations. A total of 8 morphometric characters (in mm) were measured using a digital caliper. Data were analyzed using T test, biplot and cluster. T test results showed that male *I. aurora* in both sites was not significantly different, nor did females, but there were differences between male and female *aurora* at each location ie body color, wing span (WS) and length of hindwing (LH). Biplot analysis showed the uniformity of sample distribution for each character. The dendrogram results described most of the samples were clustered into a single group. The result data showed that genetic diversity of *I.aurora* in Ranu Pani and Ranu Regulo lakes is still low." (Authors)] Address: Winasis, S., Baluran National Park, Bantangan, Situbondo, East Java, Indonesia

**16919.** Ortega-Salas, H. (2018): *Erpetogomphus oxybelis* sp. nov. from Veracruz, Mexico (Odonata: Gomphidae). *Zootaxa* 4378(4): 589-594. (in English, with Spanish summary) ["*E. oxybelis* sp. nov. is described and figured from Río Hondo, Veracruz State, Mexico (18.387 N, -96.174 W, 20 m a.s.l.), the holotype is deposited in the Frost Entomological Museum at Pennsylvania State University, USA [PS-UC]. Relationship with members of the ophibolus group sensu Garrison are discussed." (Author)] Address: Ortega-Salas, H., Depto de Zoología, Inst. de Biología, UNAM, Apartado Postal 70-153, México. E-mail: hector\_os@ciencias.unam.mx

**16920.** Ott, J. (2018): Invasive Krebse und ihre Wirkungen auf Libellen. Wie gewonnen, so zerronnen – erfolgreiche Ansiedlungen geschützter und gefährdeter Arten im Südwesten Deutschlands bedroht. *Naturschutz und Landschaftsplanung* 50(2): 37-43. (in German, with English summary) ["Invasive crayfish and their impact on dragonflies – Successful colonisation of protected and endangered species at risk in the southwest of Germany For many years invasive crayfish have already been regarded as nature conservation problem, but mainly due to their influence on native river crayfish: they transmit the crayfish plague (*Aphanomyces astaci*) leading to their death. Additionally, over the last years proof has been furnished in numerous studies that invasive crayfish also have negative effects on other taxa. The paper illustrates these effects using five examples, mainly related to the group of the dragonflies. The problems caused by invasive crayfish should not be ignored from a nature conservation point of view. In

the near future it might lead to significantly larger losses of dragonflies. Owing to numerous nature conservation measures the dragonfly fauna has recovered in many areas, but these successes are put at risk by the spreading of invasive crayfish species.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**16921.** Ottonello, D.; Oneto, F.; Vignone, M.; Rizzo, A.; Salvidio, S. (2018): Diet of a restocked population of the European pond turtle *Emys orbicularis* in NW Italy. *Acta Herpetologica* 13(1): 89-93. (in English) ["Recently several projects have been implemented for the conservation of *E. orbicularis*, but few aspects of the captive-bred animals released into the wild have been described. In this note we report about the trophic habits of a small restocked population of the endemic subspecies *E. o. ingauna* that is now reproducing in NW Italy. Faecal contents from 25 individuals (10 females, 11 males and 4 juveniles) were obtained in June 2016. Overall, 11 taxonomic categories of invertebrates were identified, together with seeds and plant remains. Plant material was present in 24 out of 25 turtle faecal contents, suggesting that ingestion was deliberate. There were no differences between the dietary habits of females and males, and the trophic strategy of adult individuals was characterised by a relatively high specialization on dragonfly nymphae. These findings suggest that captive bred turtles are adapting well to the wild and that restocked individuals assumed an omnivorous diet, a trophic behaviour typical of other wild turtle populations living in similar habitats." (Authors)] Address: Salvidio, S., DISTAV, Univ. degli Studi di Genova, Corso Europa 26, 16132 Genova, Italy. E-mail: salvidio@dipteris.unige.it

**16922.** Panorel, P.A.; Maglasang, J.C. (2018): Experimental and computational investigation of corrugated dragonfly airfoil performance in small wind turbine applications. *Asia-Pacific Journal of Science, Mathematics and Engineering* 4(2): 4-8. (in English) ["Small wind turbines suffer performance degradation due to its inherent low Reynolds number flow. The flow is initially laminar and is prone to separate even under a mild adverse pressure gradient. Recent studies revealed the capability of corrugated Dragonfly airfoil in delaying flow separation against streamlined airfoils in the low Reynolds number regime. Hence, this paper aims to improve the performance of small wind turbines by leveraging the capabilities of Corrugated Dragonfly airfoil. Experimental results have shown that small wind turbines made from corrugated dragonfly, NACA 4412, and flat plate airfoil had a coefficient of performance of 0.191, 0.284 and 0.099, respectively."] Address: Panorel, P.A., Dept of Mechanical Engineering, MSUlligan, Institute of Tech., Iligan City, Philippines. E-mail: ppanorel@gmail.com

**16923.** Park, C.-D.; Lee, C.-W.; Lim, J.-C.; Yang, B.-G.; Lee, J.-H. (2018): A study on the diet items of American Bullfrog (*Lithobates catesbeianus*) in Ga-hang wetland, Korea. *Korean J. Environ. Ecol.* 32(1): 55-65. (in Korean, with English summary) ["This study was conducted to clarify diet items and predatory behavior of *L. catesbeianus* according to the sex, maturity and season from April to September 2014 at

Gahang wetland of Changnyeong-gun, Gyeongsangnamdo province, Korea. We examined the stomach contents of *L. catesbeianus* using a gastrectomy technique and identified the contents to a genus or species. The examination showed that large and heavy individual of *L. catesbeianus* fed on larger amounts of food. However, there were no statistically significant differences in predation amount according to the sex and maturity of *L. catesbeianus*. The main diet item of during the study period was mostly Insecta (average population rate of 65.5%), followed by Crustacea (13.5%) and Gastropoda (7.9%). The most preferred diet item of *L. catesbeianus* was *Muljarus japonicus*. Surprisingly, *L. catesbeianus* also foraged *Parus major*, *Apodemus agrarius*, and *Crocodyra lasiura*. These findings showed that *L. catesbeianus* directly disturbed the wetland ecosystem. We expect the results will be the important reference data for checking the impact of *L. catesbeianus*, which is designated as invasive species by the Ministry of Environment, on wetland ecosystem." *Cercion melanotum*, *Anax parthenope julius* and *Orthetrum albistylum speciosum* are listed as odonate prey items. (Authors)] Address: Lee, J.-H., National Institute of Biological Resources, Seo-gu Incheon 22689, Korea. E-mail: lee98511@korea.kr

**16924.** Parker, K.; Fuller, C. (2018): Effects of Roundup on feeding behavior of larval Blue Dashers, *Pachydiplax longipennis*. 2018 - Spring Scholars Week (April 16-20): (in English) [Verbatim: "Herbicides are widely used, and prior research has shown that many herbicides are harmful to organisms and the environment. Herbicides enter aquatic environments through runoff or aerial dispersion from fields. The objective of this study was to determine if Roundup (active ingredient Glyphosate) causes negative effects on feeding behavior of larval *Pachydiplax longipennis*. Larvae were captured from rainwater-filled mesocosms at Hancock Biological Station in Murray, KY. Larvae were exposed to one of four concentrations of Roundup (0mg/L, 2.5mg/L, 5mg/L, or 10mg/L). *Daphnia* consumption trials were conducted at 7 and 14 days post-exposure. There were no significant differences among treatments for whether or not larvae ate offered *Daphnia* for Day 7 ( $c^2 = 1.195$ ,  $df = 3$ ) or Day 14 ( $c^2 = 1.283$ ,  $df = 3$ ). For the trials on Day 7, Roundup concentration did not have a significant effect on the time it took the larvae to consume 1, 2, or 4 *Daphnia*; however, exposure significantly increased the time it took the larvae to consume three *Daphnia* ( $P=0.036$ ). For the trials on Day 14, concentration did not have a significant effect on the time it took to consume 1 or 2 *Daphnia*; however, Roundup significantly increased the time it took to consume 3 ( $P=0.050$ ) or 4 *Daphnia* ( $P=0.029$ ). Thus, Roundup slowed prey consumption, suggesting that it could have a negative impact on larval dragonfly predation and, consequently, their overall quality of life. More time to capture and consume food suggests higher energy usage during predation." (Authors)] Address: Parker, Kayleen, Biology Dept, Murray State University, Murray, KY 42071

**16925.** Parr, A.J. (2018): Migrant and dispersive dragonflies in Britain during 2017. *J. Br. Dragonfly Society* 34(2): 79-88. (in English) ["In Britain, the year 2017 proved to be a highly eventful one for migrant and dispersive dragonflies;

indeed it was to be one of the best years on record. Several dispersive species showed notable range expansions (e.g. the first record of *Libellula fulva* for Wales was made at Porthkerry Country Park, Glamorgan, on 7 June), and many of our recent colonist species fared well. The major highlights, however, referred to longer distance migrants, with immigration being noted throughout much of the year. Significant arrivals of *Anax ephippiger* were noted both in early spring 2017 and again in autumn. *Anaxparthenope* had a good year, with records from over 30 sites during the summer, and presumed immigrant *Aeshna affinis* were seen at a few localities in southern England well away from the species' breeding stronghold around the greater Thames Estuary. Perhaps the most significant events of the year involved various members of the Libellulidae. *Sympetrum fonscolombii* appeared in very good numbers, with records from almost 100 sites around the UK. Many individuals stayed around to breed, and a locally-bred second generation was noted during late summer/ autumn at sites as far north as Yorkshire, though productivity was in general low. The other highlights relate to *Crocothemis erythraea*, where a male was present at Longham Lakes in Dorset over 8-9 July; this followed late news, only recently received, of a male seen at Hickling Broad in Norfolk on 5 July 2016. These are the first confirmed British records for over a decade." (Authors)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk, IP29 5BX, UK

**16926.** Patel, R.K.; Ghetiya, L.V.; Patel, S.R.; Patel, P.S. (2018): Study of odonates in South Gujarat in relation to their diversity and morphological characteristics. *Journal of Entomology and Zoology Studies* 6(2): 2796-2807. (in English) ["The present experiment was conducted to study the odonates in South Gujarat in relation to their diversity and morphological characteristics (Morphometrics of forewing, hind wing and abdomen), at Dept of Agricultural Entomology, during 2014-15. Total 37 species of odonates belongs to 28 genera, from eight families were recorded from different localities of South Gujarat. Among them, *Epopthalmia vittata* was the largest in relation to size of forewing (53.24±0.13mm), hind wing (51.32±0.12mm) and abdomen (58.32±0.14mm), while *Acisoma panorpoides* was the smallest in size with measurement of forewing (19.81±0.18mm), hind wing (18.11±0.11 mm) and abdomen (15.75±0.20mm). On the other hand *Lestes umbrinus* was the largest considering the size of forewing (28.08±0.04mm), hind wing (29.68±0.56mm) and abdomen (32.19±0.09mm) in Zygoptera." (Authors)] Address: Patel, R.K., Department of Agricultural Entomology, N. M. College of Agriculture, Navsari Agricultural University, Navsari, Gujarat, India. E-mail: patelrk1692@gmail.com

**16927.** Payra, A.; Deepak, C.K.; Saini, J.; Tripathy, B. (2018): First record of *Pseudagrion pruinatum* (Odonata: Coenagrionidae) from mainland India. *Notulae odonatologicae* 9(1): 26-30. (in English) ["*P. pruinatum* is recorded for the first time from mainland India as well as from Indian Eastern Himalaya. Five males and one female were collected from Miao village of Changlang District, Arunachal Pradesh, India. Information on the species' distribution and morphological characters are given." (Authors)] Address: Payra, A., Zoological



Survey of India, M- Block, New Alipore, Kolkata - 700053, West Bengal, India; arajushpayra@gmail.com

**16928.** Paz Leiza, L.; Conesa García, M.A.; Torralba Burrial, M. (2018): Contribución de la red de control de la calidad biológica de las aguas superficiales de Navarra (España) al conocimiento de la distribución de los odonatos fluviales (Insecta: Odonata). Boletín de la Sociedad Entomológica Aragonesa 63: 337-342. (in Spanish, with English summary) ["Contribution of the surface water biological quality monitoring network from Navarre (Spain) to the knowledge on distribution of riverine odonates (Insecta: Odonata): Data on distribution of the Odonata species of running waters are presented, obtained from the analysis of the larvae contained in the samples of benthic macroinvertebrates collected in river quality monitoring campaigns in Navarre (Spain) over the last years (2011-2017). Records of special interest for conservation are those of: *Coenagrion mercuriale*, *Gomphus simillimus*, *Gomphus vulgatissimus* and *Oxygastra curtisii*." (Authors)] Address: Paz Leiza, Leire, EKOLUR Asesoría Ambiental SLL, Camino de Astigarraga 2, Pl. 4ª dcha.-Of. 8. 20180 Oiartzun, Spain. E-mail: leire@ekolur.com

**16929.** Pérez Fernández, P.J.; Cano-Villegas, F.J.; Rodríguez Loranzo, B. (2018): Primeras citas de *Lestes virens* (Charpentier, 1825) (Odonata, Lestidae) para la provincia de Almería (SE península ibérica). Boletín de la SAE N° 28: 170-174. (in Spanish) [T.M. Paterna del Río, Balsa Grande, 30SWF09, 07-IX-2018: 2 males, 06-X-2018: 12 males, 7 ♀♀ and 9 ♂♂; Spain] Address: Cano-Villegas, F.J., Asociación Odonatológica de Andalucía. Isla de Mallorca, 2 P6 4ªA, 14011 Córdoba, Spain. E-mail: fjcanovi2@hotmail.com

**16930.** Petrulevieius, J.F. (2018): A new Malachite Damselfly (Synlestidae: Odonata) from the Eocene of Patagonia, Argentina. Life: The Excitement of Biology 6(2): 36-43. (in English) ["A new synlestid zygopteran, *Madres delpueblo* n. gen. n. sp., is described from the middle Eocene of Río Pichileufú, Patagonia, Argentina. The new genus is characterised by wing characters such as the discoidal cell narrow and long; Ax2 aligned with the arculus; MP distinctly curved after its origin; CuP+AA fused to the hind margin half of the length of the discoidal cell; CuP closer to Ax2 than to Ax1. Needle damselflies or Malachites are represented in other two Patagonian Eocene localities, by nymphs and adults. The new genus enlarges the fossil record of *Lestomorpha* in Argentina to four extinct genera: *Promegalestes*, *Austroperilestes*, *Inacayalestes* and *Madres* n. gen. versus two Recent ones: *Lestes* and *Archilestes*." (Author)] Address: Petrulevieius, J.F., CONICET - División Paleozoología Invertebrados, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, Paseo del Bosque s/n, La Plata (1900), Argentina. Email: levicius@fcnym.unlp.edu.ar

**16931.** Phan, Q.T.; Karube, H.; Sasamoto, A. (2018): *Drepanosticta draco* sp. nov., a new damselfly from northern Sumatra, Indonesia (Odonata: Platystictidae). Tombo 60: 66-70. (in English) ["*Drepanosticta draco* sp. nov. is described from northern Sumatra based on a single male specimen.

The new species is closely related to *D. pytho* Lieffinck, 1937 but can be distinguished by morphology of paraproct and its robust size, reached to the level of cerci and sharply pointed apex." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**16932.** Phan, Q.T.; Tran, T.T. (2018): Description of *Coeliccia phamiha* sp. n. from central Vietnam (Odonata: Platycnemididae). International Journal of Odonatology 21(1): 45-53. (in English) ["*Coeliccia phamiha* sp. n. (holotype ♂ and paratype ♀ from Dak Et bridge, Deo Lo Xo, Phuoc Son district, Quang Nam Province, Central Vietnam, deposited in zoological collection of Duy Tan University) is described based on both sexes. Judging by the structure of genital ligula and appendages of the ♂ and prothorax of the ♀ it seems close to *C. mienTrung* Kompier & Phan, 2017, but it is easily separated by its markings and structural details. Differential diagnosis between the new species and its allied species is provided." (Authors)] Address: Phan, Q.T., Entomology & Parasitology Laboratory, Institute of Research & Development, Duy Tan University, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

**16933.** Phan, Q.T.; To, V.Q. (2018): Odonata checklist from Son Tra Nature Reserve, Da Nang city, central Vietnam. IDF-Report 111: 7-19. (in English) ["A checklist of 44 odonate species (21 Zygoptera and 23 Anisoptera) from Son Tra Nature Reserve, central Vietnam is provided. *Idionyx thailandica* Hämäläinen, 1985 is recorded for the Vietnamese fauna for the first time, a new *Coeliccia* sp. is awaiting description in the near future, and the taxonomic status of specimens of the genus *Leptogomphus* remains unsettled and will have to be solved in the future." (Authors) *Macromidia genialis shanensis*] Address: Phan, Q.T., Entomology & Parasitology Laboratory, Center for Molecular Biology, Institute of Research & Development, Duy Tan University, 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

**16934.** Phan, Q.T. (2018): Notes on the genus *Indocnemis* Laidlaw, 1917 in Vietnam with description of *Indocnemis marijanmatoki* sp. n. (Odonata, Zygoptera, Platycnemididae). Zoo-Keys 809: 15-29. (in English) ["*Indocnemis marijanmatoki* sp. n. (holotype ♂, 12°07'10.0"N, 108°5'51.0"E, 1503 m a.s.l., Hon Ba Nature Reserve, Nha Trang city, Khanh Hoa Province, central Vietnam) is described based on both sexes. The morphological variation of *Indocnemis orang* (Förster in Laidlaw, 1907) is discussed and its distribution in Vietnam updated." (Author)] Address: Phan, Q.T., Center for Entomology & Parasitology Research, Institute of Research and Training of Medicine, Biology and Pharmacy, Duy Tan University, 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

**16935.** Phan, Q.T.; To, V.Q. (2018): The genus *Megalestes* Selys, 1862 in Vietnam, with first description of female of *Megalestes australis* Karube, 2014 (Odonata: Zygoptera: Synlestidae). IDF-Report 111: 1-6. (in English) ["The male secondary genitalia and the caudal appendages of males and females of the three confirmed Vietnamese *Megalestes*

species (*M. australis*, *M. haui* and *M. micans*) are figured. The female sex of *M. australis* is described for the first time." (Authors)] Address: Phan, Q.T., Entomology & Parasitology Laboratory, Center for Molecular Biology, Institute of Research and Development, Duy Tan University, 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

**16936.** Piersanti, S.; Reborá, M. (2018): The antennae of damselfly larvae. *Arthropod Structure & Development* 47(1): 36-44. (in English) ["The larval antennal sensilla of two Zygoptera species, *Calopteryx haemorrhoidalis* and *Ischnura elegans* are investigated with SEM and TEM. These two species have different antennae (geniculate, setaceous) and live in different environments (lotic, lentic waters). Notwithstanding this, similarities in the kind and distribution of sensilla are outlined: in both species the majority of sensilla types is located on the apical portion of the antenna, namely a composed coeloconic sensillum (possible chemoreceptor), two other coeloconic sensilla (possible thermo-hygroreceptors) and an apical seta (direct contact mechanoreceptor). Other mechanoreceptors such as filiform hairs sensitive to movements of the surrounding medium or bristles positioned to sense the movements of the flagellar segments are present on the antenna. Similarities in the antenna sensilla types and distribution are observed also with other dragonfly species, such as *Onychogomphus forcipatus* and *Libellula depressa*. A peculiar structure with an internal organization similar to that of a gland is observed in the apical antenna of *C. haemorrhoidalis* and *I. elegans* and it is present also in *O. forcipatus* and *L. depressa*. The possible function of this structure is at the moment unknown but it deserves further investigations owing to its widespread presence in Odonata larvae." (Authors)] Address: Piersanti, Silvana, Dipto di Chimica, Biologia e Biotecnologie, Univ. Perugia, Via Elce di Sotto, 1, 06121 Perugia, Italy. E-mail address: silvana.piersanti@unipg.it

**16937.** Pinto, A.P.; Kompier, T. (2018): In honor of conservation of the Brazilian Atlantic Forest: description of two new damselflies of the genus *Forcepsioneura* discovered in private protected areas (Odonata: Coenagrionidae). *Zoologia* 35: e21351: 19 pp. (in English) ["Two new Brazilian Protoneurinae damselflies, *Forcepsioneura regua* sp. nov. (holotype ♂ deposited in DZRJ: Brazil, Rio de Janeiro State, Cachoeiras de Macacu municipality, RPPN Reserva Ecológica de Guapiaçu) and *Forcepsioneura serrabonita* sp. nov. (holotype ♂ deposited in DZRJ: Brazil, Bahia State, Camacan municipality, RPPNs Serra Bonita), are described, illustrated and diagnosed based on males and females. The bluish and smaller *F. regua* sp. nov. has been confused with at least three previously described species, being very similar to the type species of *Forcepsioneura*, *F. garrisoni* Lencioni, 1999, but lacking a defined tubercle-like process on the posterolateral margin of the median lobe of the prothorax in both sexes, which allows it to be distinguished from all other known species. The shape of the cercus of the male of *F. serrabonita* sp. nov. is similar to that of *F. grossiorum* Machado, 2001 and *F. lucia* Machado, 2000, two species with very short ventrobasal process. However, it differs from them mainly by the mediobasal process of the cercus, which is rounded in dorsal view and almost not

visible in lateral view. The taxonomic status of *Forcepsioneura* is discussed and a comparison with the other species of the genus is provided. Based on size, habitat and coloration, *Forcepsioneura* can be informally divided into two groups: (1) large, orange-black and montane species, including *F. grossiorum*, *F. itatiaiae* (Santos, 1970), *F. lucia* and *F. serrabonita* sp. nov.; (2) small, bluish and lowland species, including *F. garrisoni*, *F. haerteli* Machado, 2001, *F. regua* sp. nov. and *F. sancta* (Hagen in Selys, 1860). Our findings highlight the urgency in directing collecting efforts to unexplored areas, as well as the importance of private preserves that harbor the type localities as guardians of the threatened and diverse Atlantic Forest diversity. Together these two localities surveyed account for more than 210 species of odonates, representing almost 24% of the number of Brazilian species. Brazil has the greatest number of known species of odonates in the world. This study shows that further research is required in order to fully understand the diversity of *Forcepsioneura*." (Authors)] Address: Pinto, A.P., Laboratório de Sistemática de Insetos Aquáticos, Depto de Zoologia, Univ. Federal do Paraná. Caixa Postal 19020, 81531-980 Curitiba, PR, Brazil. E-mail: appinto@ufpr.br

**16938.** Popova, O.N.; Haritonov, A.Yu. (2018): On the distribution of *Sympetrum croceolum* in the Russian part of its range (Odonata: Libellulidae). *Odonatologica* 47(3/4): 29-49. (in English) ["We used literature data, museum collections, and fieldwork to compile a list of records and produce a distribution map of *S. croceolum* in the Russian part of its range from where the species was little known to odonatologists outside of Russia for a long time. A detailed description of the fourth record of the species in Western Siberia (Chernyy Mys village, Kolyvanskiy District, Novosibirsk Province), which is globally the northernmost record of the species, is given. We suppose that the West Siberian *S. croceolum* populations originate from westward migrations from the eastern core part of the species' range. Morphometric analysis of specimens from different populations showed that variation of the hind wing size is within the individual variability of *S. croceolum*. By breeding *S. croceolum* in an aquarium from an egg clutch, information on the period of embryonic development and morphometric characteristics of eggs and larvae of younger instars was obtained. The subspecies *Sympetrum croceolum fuscotrum* Belyshev, 1964, is synonymised with the nominotypical subspecies." (Authors)] Address: Popova, Olga, Institute of Systematics & Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091, Russia. E-mail: popova-2012@yandex.ru

**16939.** Prasad Uppu, S.; Manisha, D.; Devi, G.D.; Chengalwa, P.; Devi, B.V. (2018): Aerodynamic analysis of a dragonfly. *Journal of Advanced Research in Fluid Mechanics and Thermal Sciences* 51(1): 31-41. (in English) ["The aim of this work is to determine the Aerodynamic properties of the corrugated dragonfly airfoil in comparison to the traditional smooth NACA 2.5411 airfoil. A simplified dragonfly airfoil is analysed in the current work, at low speeds. A 3D printed model is tested using Six Component strain gauge and the results are compared with NACA 25411 airfoil. Aerodynamic

performance is evaluated at low Reynolds number to associate the results with the regular section. In order to streamline the results both experimental and numerical work is carried over the model at different wind speeds and wind angles. Data obtained provides a valuable insight to the physics of the model which showed a completely nonlinear behaviour resulting in positive aerodynamic forces." (Authors)] Address: Prasad Uppu, S., Dept of Aeronautical Engineering, Institute of Aeronautical Engineering, JNT Univ. Hyderabad, 500043, India. E-mail: shivaprasad047@gmail.com

**16940.** Rajabi, H.; Stamm, K.; Appel, E.; Gorb, S.N. (2018): Micro-morphological adaptations of the wing nodus to flight behaviour in four dragonfly species from the family Libellulidae (Odonata: Anisoptera). *Arthropod Structure & Development* 47(4): 442-448. (in English) ["Highlights: •The shape and material composition of the nodus in percher and flier dragonflies are adapted to their flight behaviour. •The area proportion of the soft, resilin-dominated cuticle is found to decrease from typical perchers to typical fliers. •The presence of a knot-shaped protrusion in the nodus of percher dragonflies is likely to avoid large wing displacements. •We suggest a framework for future research on the relationship between wing morphology and flight behaviour in dragonflies. Abstract: Adult dragonflies can be divided into two major groups, perchers and fliers, exhibiting notably different flight behaviour. Previous studies have yielded conflicting results regarding the link between the wing macro-morphology and flight style in these two groups. In this study, we present the first systematic investigation of the micro-morphological differences of wings of percher and flier dragonflies in four closely related species from the family Libellulidae. Our results suggest that the shape and material composition of wing microstructural components and, in particular, the nodus are adapted to facilitate the specific wing functioning in fliers and perchers. The findings further indicate a decreasing trend in the area proportion of the soft resilin-dominated cuticle in the nodus in the series of species from typical perchers to typical fliers. Such a reduction in the resilin proportion in the nodus of fliers is associated with an increase in the wing aspect ratio. The knot-shaped protrusion at the nodus of perchers, which becomes notably smaller in that of strong fliers, is likely to act as a mechanical stopper, avoiding large wing displacements. This study aims to develop a novel framework for future research on the relationship between wing morphology and flight behaviour in dragonflies." (Authors)] Address: Gorb, S.N., Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**16941.** Rajeshkumar, S.; Raghunathan, C. (2018): Description of a new species of *Nososticta* Hagen (Odonata: Platycnemididae: Disparoneurinae) from Central Nicobar Islands, India. *Zootaxa* 4422(3): 431-441. (in Andaman, *Nososticta nancowra* sp. nov., *Nososticta nicobarica*, Central Nicobar Islands) ["*Nososticta nancowra* Rajeshkumar sp. nov. is described based on eight males and three females from Central Nicobar Islands, India. The diagnostic characteristics of the new species separating it from congeners are discussed.

Morphological variations observed in the anal appendages of males and the pronotum of females are documented. A description of the new species using photographs and drawings is given. An identification key to species of the genus *Nososticta* occurring in Nicobar Islands is given for both sexes." (Authors)] Address: Rajeshkumar, S., Zoological Survey of India, Andaman and Nicobar Regional Centre, Port Blair-744 102, Andaman & Nicobar Islands, India. E-mail: rajeshkumar0802@gmail.com; Raghunathan, C., Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053, India

**16942.** Rampola, R.B.; Nuñez, O.M.; Villanueva, R.J.T. (2018): Species diversity and distribution of Odonata in selected river systems of North Cotabato, Philippines. *Proceedings of the 23rd International Forestry and Environment Symposium 2018 of the Department of Forestry and Environmental Science, University of Sri Jayewardenepura*: 1 p. (in English) [Verbatim: Odonata has long been studied as an insect order that plays an important role in the balance of aquatic environment. The order represents one set of insects that is potential in indicating environmental quality. In this study, the species diversity and distribution of Odonata in selected river systems of North Cotabato, Mindanao, Philippines was assessed. Four rivers were sampled in the study: Mirasol River in Alamada and Nicaan River in Libungan which are relatively disturbed and Raradangan River in Alamada and Kimarayag River in Pigcawayan which are relatively undisturbed. Opportunistic sampling was employed through sweep netting in visual encounter surveys. The association of environmental factors to species distribution was evaluated using Canonical Correspondence Analysis (CCA). Geographic Information System (GIS) was used to create a distribution map of Odonata species in the sampling sites. Fifteen species belonging to five families were recorded of which four (26.67%) species are Philippine endemic. High species diversity ( $H' = 2.13$ ) was recorded in Raradangan River (Site 1). Kimarayag River (Site 4) is considered high in diversity ( $H' = 2.02$ ) next to site 1. Moreover, Sites 2, Mirasol River ( $H' = 1.62$ ) and site 3, Nicaan River exhibited moderate diversity ( $H' = 1.53$ ) in spite of the human disturbances. The Oriental species, *Pseudagrion p. pilidorsum* (Brauer) is the most abundant distributed in all sampling sites. The values for all the parameters (water temperature, pH, dissolved oxygen and relative humidity) in all sampling sites are within the Philippine standard of water quality. Eight species were identified to be affected by high dissolved oxygen, three species were positively affected by relative humidity, and four species were found to have tolerance to change in water temperature. GIS mapping clearly showed spatial aggregation of species within the surrounding habitat. Results indicate that Odonata appears to be associated with habitat variables.] Address: Villanueva, R.J.T., D3C Gahol Apartment, Lopez Jaena St., PH-8000 Davao, Philippines. E-mail: rjtvillanueva@gmail.com

**16943.** Ranjeeta, D-M.; Singh K.I.; Ray D.C. (2018): Predators and parasitoids of rice insect pests under rice ecosystems of Manipur valley. *Indian Journal of Entomology* 80(3): 789-793. (in English) ["Field surveys on predators and parasitoids of rice ecosystem during kharif season (2012–



2014) in the four valley districts (Imphal East, Imphal West, Thoubal and Bishnupur) of Manipur were conducted. Altogether 33 species of predators belonging to 26 genera under 15 families of 5 orders and 15 species of parasitoids belonging to 5 families of Hymenoptera were listed. Among the predators ... damselflies (*Agriocnemis femina*, *A. pygmaea* and *Ischnura aurora*), and dragonflies (*Orthetrum sabina* and *Sympetrum* sp.) were found as dominant species. ... One way ANOVA was done to evaluate the variation in the distribution of predators and parasitoids among the four study sites: among the predators, spider was found to be dominating (73.0) over other groups in Site 4 (Bishnupur District) whereas among the parasitoids, *Cotesia ruficus* (11.0) was dominating in Site 1 (Imphal East). The data revealed the significant variation in the distribution of predators and parasitoids ( $p < 0.01$ ). It was also observed that spiders existed with maximum density in all the four sites (57.4–73.0) while among the parasitoids, *Cotesia ruficus* was observed with maximum density (5.4–11.0)." (Authors)] Address: Ranjeeta, D-M., Ecology & Environmental Science, Assam Univ., Silchar, 788011, India. E-mail: ranjeetamoirangthem1@gmail.com

**16944.** Ribi, W.; Zeil, J. (2018): Diversity and common themes in the organization of ocelli in Hymenoptera, Odonata and Diptera. *Journal of Comparative Physiology A* 204(5): 505-517. (in English) ["We show in a comparative analysis that distinct retinal specializations in insect ocelli are much more common than previously realized and that the rhabdom organization of ocellar photoreceptors is extremely diverse. Hymenoptera, Odonata and Diptera show prominent equatorial fovea-like indentations of the ocellar retinae, where distal receptor endings are furthest removed from the lens surface and receptor densities are highest. In contrast, rhabdomere arrangements are very diverse across insect groups: in Hymenoptera, with some exceptions, pairs of ocellar retinular cells form sheet-like rhabdoms that form elongated rectangular shapes in cross-section, with highly aligned microvilli directions perpendicular to the long axis of cross-sections. This arrangement makes most ocellar retinular cells in Hymenoptera sensitive to the direction of polarized light. In dragonflies, triplets of retinular cells form a y-shaped fused rhabdom with microvilli directions oriented at 60° to each other. In Dipteran ocellar retinular cells microvilli directions are randomised, which destroys polarization sensitivity. We suggest that the differences in ocellar organization between insect groups may reflect the different head attitude control systems that have evolved in these insect groups, but possibly also differences in the mode of locomotion and in the need for celestial compass information." (Authors)] Address: Ribi, W., Research School of Biology, The Australian National University, Canberra, Australia

**16945.** Richards, S.J.; Polhemus, D.A. (2018): A note on the correct repository for the holotype of *Pseudagrion fumipennis* Polhemus, Michalski & Richards (Odonata: Coenagrionidae). *Australian Entomologist* 45(1): 46. (in English) ["The published repository for the holotype of *P. fumipennis*, is corrected to the South Australian Museum, Adelaide, Australia, not the 'Australian Museum of Natural History, Sydney' as

stated in the original description." (Authors)] Address: Richards, S.J., Vertebrates Dept, South Australian Museum, North Terrace, Adelaide, S.A. 5000, Australia. E-mail: richards.steve@saugov.sa.gov.au

**16946.** Richmond, E.K.; Rosi, E.J.; Walters, D.M.; Fick, J.; Hamilton, S.K.; Brodin, T. Sundelin, A.; Grace, M.R. (2018): A diverse suite of pharmaceuticals contaminates stream and riparian food webs. *Nature Communications* volume 9, Article number: 4491 (2018): 9 pp. (in English) ["A multitude of biologically active pharmaceuticals contaminate surface waters globally, yet their presence in aquatic food webs remain largely unknown. Here, we show that over 60 pharmaceutical compounds can be detected in aquatic invertebrates and riparian spiders in six streams near Melbourne, Australia. Similar concentrations in aquatic invertebrate larvae and riparian predators suggest direct trophic transfer via emerging adult insects to riparian predators that consume them. As representative vertebrate predators feeding on aquatic invertebrates, platypus and brown trout could consume some drug classes such as antidepressants at as much as one-half of a recommended therapeutic dose for humans based on their estimated prey consumption rates, yet the consequences for fish and wildlife of this chronic exposure are unknown. Overall, this work highlights the potential exposure of aquatic and riparian biota to a diverse array of pharmaceuticals, resulting in exposures to some drugs that are comparable to human dosages." (Authors)] Address: Richmond, Erinn K., Water Studies Centre, School of Chemistry, Monash University, Clayton 3800 Victoria, Australia. E-mail: erinn.richmond@monash.edu

**16947.** Rodrigues, M.E.; Moura, E.B.; Koroiva, R.; Piovezan Borges, A.C.; Roque, F. (2018): Survey of dragonflies (Odonata) in palm swamps of Cerrado hotspot. *Entomological News* 128(1): 24-38. (in English) ["The palm swamps (i.e. Veredas) in the Cerrado, Brazilian Savanna, are priority areas for conservation. The Veredas' hydrological characteristics are fundamental for the maintenance of biodiversity and economic activities in this region. However, despite this importance, only a few studies have been carried out in these areas, primarily surveys for dragonflies. Here, we sampled 25 palm swamps in a Cerrado region. We found 56 species of Odonata, ten of which were new records for the Mato Grosso do Sul State: Coenagrionidae (6), Libellulidae (3) and Aeshnidae (1). The Veredas harbor both lentic and lotic systems which contribute to the great regional diversity of Odonata. Our results increase our knowledge about Odonata diversity in Veredas areas of the Cerrado, show the importance of these environments for Odonata species, and emphasize the importance of maintaining the Veredas as Permanent Preservation Areas." (Authors)] Address: Moura, E.B., Bioscience Inst., Federal Univ. Mato Grosso do Sul – Cidade Universitária, s/n, 79070-9, Brasil. E-mail: roque.eco@gmail.com

**16948.** Rodrigues, M.E.; De Oliveira Roque, F.; Guillermo-Ferreira, R.; Saito, V.S.; Samways, M.J. (2018): Egg-laying traits reflect shifts in dragonfly assemblages in response to different amount of tropical forest cover. *Insect Conservation*

and Diversity 12(3): 231-240. (in English) ["1. Oviposition site selection by aquatic insects is usually influenced by both aquatic and terrestrial cues. Landscape changes (e.g. native vegetation loss) can affect the level of the reproductive success in aquatic insects, changing local species composition and richness. 2. We investigate whether forest cover loss around streams influences the number of species with exophytic (species which lay eggs directly on the water surface), endophytic (species which lay their eggs directly into plant tissue), or epiphytic (species which lay eggs on the exposed surface of rocks, leaves, trunks or other substrates protruding from the stream surface) oviposition behaviour in dragonfly assemblages. 3. We sampled adult dragonflies in 116 streams in a Neotropical savanna region in Brazil. The relationship between species richness for each behavioural category, and the proportion of forest cover around the streams, was tested using regression analysis. 4. We collected 2413 Anisoptera and Zygoptera individuals, belonging to 8 families, 30 genera, and 63 species. Of these, 25 species were classified as exophytic, 28 as epiphytic, and 10 as endophytic. Our results show that the number of species with exophytic or epiphytic behaviour was strongly related to riparian forest loss. 5. Forest loss changes the habitat, and here, specifically changes site suitability for oviposition. We highlight the importance of using behavioural traits as a bioindicator tool for the assessment of anthropogenic impacts on tropical forest." (Authors)] Address: Rodrigues, M.E., Depto Ciencias Biologicas, CCBS, Rodovia Jorge Amado, Km 16, Salobrinho, Ilheus, Bahia, CEP: 45 662-900, Brazil. E-mail: rodrigues.mbio@gmail.com

**16949.** Rodríguez, J.S.; Gómez, D.; Molineri, C. (2018): New records of Odonata from Argentina. *Odonatologica* 47(3/4): 193-212. (in English) ["The present paper provides new records for Odonata collected in the central and northern regions of western Argentina (23° to 30°S latitude), including the biogeographical provinces of Puna, Monte, Chaco and Yungas. 19 sampling sites were visited at least once. New geographical records for 20 species are reported, including three new national records for Argentina - *Gynacantha mexicana*, *Rhionaeschna comigera* and *Triacanthagyna caribbea* - and 19 new provincial records from 17 species. Two of them involve large range expansions since they were previously known only from the east of the country, viz. *Brachymesia herbida* and *Macromia hemichlora*. Other records involve moderate to small range extensions for 15 species. Photographs of diagnostic characters are given for all the species." (Authors)] Address: Molineri, C., Instituto de Biodiversidad Neotropical, CONICET-Univ. Nacional de Tucumán, Fac. Ciencias Naturales, Ciudad Universitaria, Horco Molle (4107), Tucumán, Argentina. E-mail: carlosmolineri@gmail.com

**16950.** Rojas, D.; Rojas, M.A. (2018): Observación de cópulas de *Sympetrum sinaiticum* Dumont, 1977 (Odonata, Libellulidae) en Cádiz y nuevo registro para Almería (Andalucía, España). *Revista gaditana de Entomología* 9(1): 321-323. (in Spanish, with English summary) ["Copulations of *S. sinaiticum* are observed in the province of Cadiz and a new location for the species is added in the province of Almería." (Authors) 11-XI-2018, El Gaster (30STF98).] Address: Rojas, D., 11380, Tarifa, Cádiz, Spain. E-mail: danrp93@gmail.com

**16951.** Rossi, R., Savoldelli, P.; Sindaco, R. (2018): Climate change and species distribution: the case of *Calopteryx haemorrhoidalis* (Odonata Calopterygidae) in Piedmont (Italy). *Boll. Soc. Ital. Entomol. Ital.* 150(3): 107-110. (in English, with Italian summary) ["Climate change affects species and biological systems in several ways and is documented to be responsible of species distribution shifts. Odonata are reported to respond quickly to climate change, and in last years several Mediterranean species have expanded their range northwards in Europe. In this note, we report the first records of reproductive populations of *C. haemorrhoidalis* in Piedmont (NW Italy), suggesting a northwards latitudinal shift of the range of the species in Italy. The reports of Mediterranean dragonflies and damselflies that in the last years have been recorded for the first time in Piedmont are also outlined." (Authors)] Address: Rossi, Roberta, via Fatebenefratelli 4, 10137 Torino, Italy. E-mail: robertarossipg@gmail.com

**16952.** Saha, P.D.; Rahane, S.; Gaikwad, S.M. (2018): Alpha diversity and species assemblage of Odonata from different habitats in Pune-Chindchwad Municipal Corporation (PCMC) area, Pune, Maharashtra. *International Conference on Frontiers in Life and Earth Science* 5(1): 184-191. (in English) ["The present work is aimed to study diversity and abundance of Odonata of Pimpri-Chinchwad Municipality in Pune city of Maharashtra in Northern western Ghats. This study has been carried out for one year from June 2016 to March 2017. A total number of 32 species under 6 families was observed. The most abundant family was Libellulidae comprising 20 species followed by Coenagrionidae comprising 6 species, Chlorocyphidae comprising 2 species, Lestidae with 2 species, Aeshnidae and Platycnemidae comprising of 1 species. Assemblage of different species in relation to their habitat diversity and diversity indices were also reported." (Authors)] Address: Saha, P.D., Dept of Zoology, Modern College of ACS, Shivajinagar, Pune, Maharashtra, India

**16953.** Saha, S.K.; Mondal, A. (2018): Abundance and diversity of Odonata in and around Uttarpara, Hoogly, West Bengal. *Heritage* 5: 120-124. (in English) ["A study on the abundance, species richness and diversity of Odonate fauna in and around Uttarpara, West Bengal was conducted during October 2015 to March 2016. A total of 209 specimens of odonates belonging to 2 families and 21 species under two sub-orders were recorded during the entire study period. Highest species richness and diversity were observed in habitat A (21, 1.25) followed by habitat C (19, 1.18) and habitat B (12, 1.04) respectively. We observed that the habitat A is most diverse in odonate fauna." (Authors)] Address: Saha, S.K., PG Dep Zoology, Bethune College, Kolkata-6, India

**16954.** Salvador-Vilariño, V.S.; Osorio, C.; Rodríguez Esteban, M. (2018): Nuevos datos sobre la distribución de *Calopteryx haemorrhoidalis* (Vander Linden, 1825) (Odonata: Calopterygidae) en el noroeste ibérico (Castilla y León-Galicia, España). *Archivos Entomológicos* 19: 169-173. (in Spanish, with English summary) ["*C. haemorrhoidalis* is recorded for the first time in the provinces of León and Zamora (Castilla y León), being described the presence of an isolated population of

the species in the sub-basin of the Sil River (León) and the existence of small populations in the Spanish side of the Duero River basin (Zamora-Salamanca). In addition, the occurrence of a population in inland waters of the Ulla River sub-basin in the provinces of Pontevedra and A Coruña (Galicia) is also presented." (Authors)] Address: Salvador-Vilariño, V., Plaza Juan Pablo II, 7, 4ºB. 47015 Valladolid, Spain. E-mail: victor.salvador@jcyll.es

**16955.** Sánchez-Guillén, R.A.; Ott, J. (2018): Genetic consequences of range expansions along several fronts in *Crocothemis erythraea*. *International Journal of Odonatology* 21(2): 81-91. (in English) ["Global warming has altered the ranges of many species, especially those of insects and other ectotherms that are particularly susceptible to rising temperatures. Four decades ago, *C. erythraea* began to demonstrate northern range expansion in Germany, as well as in Belgium, the Netherlands, Poland and the UK. The rapid range expansion of *C. erythraea* has highlighted the capacity of this dragonfly for dispersal, making this species a good model to investigate the genetic consequences of expansions from several fronts. We predict that the recently established populations of *C. erythraea* in central Europe (Germany & Switzerland) will show only a minimal reduction in genetic diversity (because founders may derive from a broader set of core populations) with respect to populations from core regions of this species, and an increase in the genetic differentiation (given the multiple independent expansion axes along the broad front). To test our hypothesis, we compared genetic variation, in terms of genetic diversity and genetic differentiation using two mitochondrial genes (cytochrome b and NADH dehydrogenase), between central Europe and three core regions (south-west Europe, Italy and Africa). Results were in concordance with our hypothesis: populations from central Europe did not show a significant reduction in the overall genetic diversity but were highly differentiated from Africa, Italy and south-west Europe populations." (Authors) ] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**16956.** Sanchez Herrera, M.; Beatty, C.; Nunes, R.; Re-alpe, E.; Salazar, C.; Ware, J.L. (2018): A molecular systematic analysis of the Neotropical banner winged damselflies (Polythoridae: Odonata). *Systematic Entomology* 43(1): 56-67. (in English) ["The Neotropics are a hotspot of global diversity for many groups of organisms, including the dragonflies and damselflies (Insecta: Odonata). While the number of biodiversity surveys and new species descriptions for Neotropical odonates is increasing, diversity in this region is still under-explored, and very few studies have looked at the genetic and morphological diversity among (and within) species. Here, we present an overview of the evolutionary history of the Neotropical damselfly family Polythoridae. The family comprises 57 species across seven genera: Chalcopteryx, Chalcothore, Cora, Euthore, Miocora, Polythore and Stenocora. Using a multi-locus approach, mitochondrial (COI, ND1, 16S) and nuclear (18S, 28S, EF1-alpha) genes were concatenated to estimate phylogenetic relationships. Our results support five monophyletic clades, which were not always congruent with the genera previously considered to be

monophyletic. Only Polythore was recovered as monophyletic, and within it there was geographical structure. We propose the following new genus-level classification: Chalcothore, Chalcopteryx, Cora s.s., Cora s.l., Miocora, Euthore s.l and Polythore. In addition, we proposed the following new combinations: Miocora aurea comb.n., Miocora chiripa comb.n., Euthore confusa comb.n., Euthore klenei comb.n., and Euthore terminalis comb.n., based on our phylogenetic analyses, our evaluation of morphological characters and their geographical distribution: these data each support the monophyletic entities we recover here." (Authors)] Address: Sanchez Herrera, Melissa, Biology Program, Faculty of Natural Sciences and Mathematics, Universidad del Rosario, KR 24 63C-69, Bogota 111221, Colombia. E-mail: melsanc@gmail.com

**16957.** Sansault, E.; Le Naour, A.; baeta, R.; Pincebourde, S. (2018): Génétique et télémétrie, deux outils au service de la connaissance de *Leucorrhinia caudalis* (Charpentier, 1840) (Odonata, Libellulidae). *Revue scientifique Bourgogne-Franche-Comté Nature* 27: 313-316. (in French, with English summary) ["Genetic analyses and telemetry are new tools for a better understanding of how *L. caudalis* populations are connected to each other and what habitats are used during the maturation stage. In Indre-et-Loire we showed a relatively low genetic differentiation between two groups of populations 70 km away to each other. This result may highlight a recent and widespread dispersal phenomenon. On a more local scale, the use harmonic radar and 20 mg passive tags during the maturation stage showed the importance of the canopy in deciduous forests." (Authors)] Address: Le Naour, Aurélie, Institut de Recherche sur la Biologie de l'Insecte (IRBI) - UMR 7261 CNRS/Université de Tours - 37200 Tours, France

**16958.** Sasamoto, A.; Vu, V.L. (2018): Description of a new species of *Cephalaeschna* (Odonata: Anisoptera: Aeshnidae) from northern Vietnam. *Zootaxa* 4471(2): 334-340. (in English) ["*C. yanagisawai* sp. nov. from northern Vietnam (Hoang Lien National Park, Lai Chau Province, 103°45'E, 22°20'N, 1900~2000 m a.s.l.), is described and illustrated. This species can be differentiated from the other species of the genus by body maculation, the morphology of the male anal appendages, and female postero-ventral S10 tergite projecting posteriorly, which is a rare feature in the genus." (Authors)] Address: Sasamoto, A., Tawaramoto-cho, Shikigun, Nara Pref., Japan. E-mail: aksmt@sea.plala.or.jp

**16959.** Schmidt Dalzochio, M.; Renner, S.; Sganzerla, C.; Prass, G.; Ely, G.J.; Salvi, L.C.; Dametto, N.; Périco, E. (2018): Checklist of Odonata (Insecta) in the state of Rio Grande do Sul, Brazil with seven new records. *Biota Neotropica* 18(4): e20180551: 14 pp. (in English, with Portuguese summary) ["The regional knowledge of species diversity and distribution is important to support conservation strategies for species and their habitats. The main goal of this work is to present a checklist of Odonata species in the state of Rio Grande do Sul, as well as their known locations in the municipalities. The preparation of the list was based in data gathered from collections of Museu de Ciências da Universidade do Vale do



Taquari (UNIVATES), Laboratório de Ecologia e Evolução da Universidade do Vale do Taquari (UNIVATES), Museu de Ciências Naturais da Fundação Zootânica, Museu de Zoologia da Universidade do Vale do Rio dos Sinos (UNISINOS) plus data extracted from 65 publications and the sites SpeciesLink, All Odonata and Puget Sound University. A total of 182 Odonata species were recorded, spanning nine families and 57 genera. The most representative family was Libellulidae (80 species) followed by Coenagrionidae (41 species) and seven species are new records for Rio Grande do Sul. The list of species presented here is a significant advance compared to previous counts for Rio Grande do Sul, however, our list is by no means a final one. Some regions of the state remain poorly explored, such as the border to Uruguay also in the northernmost part of the state. Several families remain poorly sampled, especially those that inhabit small forested streams and probably there are many specimens which are not cataloged and identified yet in scientific collections, both in the state and in the country." (Authors)] Address: Schmidt Dalzochio, Marina, Universidade do Vale do Taquari, Laboratório de Ecologia e Evolução, Lajeado, RS, Brasil. E-mail: mahsdalzochio@gmail.com

**16960.** Schmitz, M. (2018): Veränderungen der Odonatenfauna im FFH-Gebiet Heisinger Ruhraue von Mitte der 1980er Jahre bis 2015. *Libellula* 37(3/4): 55-78. (in German, with English summary) ["Changes in the Odonata fauna of the Heisinger Ruhraue from the mid 1980s to 2015 - In the Heisinger Ruhraue Odonata surveys were carried out in the mid 1980s. The results are compared to those of field studies in 1999-2007 and 2009-2015, covering a period of more than 30 years in all. The Heisinger Ruhraue is a Special Area of Conservation under the European Union's Habitats Directive. It consists of the river Ruhr and its floodplain with different types of standing water bodies. From 2003 to 2005 new habitats were created through the implementation of compensation measures. 36 Odonata species have been recorded so far, for 29 breeding was proven or is strongly suspected. The total number of species rose over the years and comprises species of all dragonfly associations described for riverine habitats. The Heisinger Ruhraue is an especially valuable habitat for dragonflies close to the metropolitan Ruhr area and of importance beyond that and neighbouring regions. The highest number of (breeding) species was recorded in 1999-2007. Dragonflies increased due to recolonisation by species inhabiting rivers and streams (following improvement of water quality), the occurrence of Mediterranean species expanding their ranges (climatic changes) and as a consequence of the newly created habitats, supporting thermophile species of shallow open water bodies. The new habitats were subject to vegetative succession and after a few years partly overgrown by higher plants and trees. As a result of vegetative growth and eutrophication at the newly created and other water bodies several species decreased or have not been recorded in the last years. The natural dynamic is restricted in the Stretch of the river Ruhr where the Heisinger Ruhraue is situated. Thus more measures for river development and renaturation are needed to maintain suitable habitats for the different species of dragonfly." (Author)]

Address: Schmitz, M., Birkenhang 37, D-42555 Velbert-Langenberg, Germany. E-mail: mich.schmitz@gmx.de

**16961.** Schneider, T.; Ikemeyer, D.; Dumont, H.J. (2018): *Crocothemis sanguinolenta* new for Iran – an example of influx of African Odonata across the Strait of Hormuz (Odonata: Libellulidae). *Odonatologica* 47(3/4): 219-228. (in English) ["On 14-vii-2018, *C. sanguinolenta* (Burmeister, 1839) was found in a ditch with clear, cold, fast flowing water near Khabr in Kermān, southern Iran (28.7241°N, 56.3298°E; 1 979 m a.s.l.). A male was observed perching on a stone in the water and a pair in the wheel was collected. To our knowledge *C. sanguinolenta* is new for Iran and new for Asia outside of the Arabian Peninsula and the Levant. As winters are cold in the Hazaran Mountain region, reproduction may fail. We speculate that both *C. sanguinolenta* and *Zygonyx torridus* regularly establish bridgeheads across the Strait of Hormuz between Oman and southern Iran, supported by favourable weather during summer." (Authors)] Address: Schneider, T., Arnold-Knoblauch-Ring 76, 14109 Berlin-Wannsee, Germany. E-mail: thomas.rs@gmx.de

**16962.** Schorr, M.; Kosterin, O.E.; Borisov, S.N.; Marinov, M. (2018): *Anormogomphus kiritshenkoi* Bartenev, 1913 (Odonata: Gomphidae): a literature review of the variable spelling of the species epithet, choice of the correct spelling and notes on the type locality of the species. *Zootaxa* 4370(4): 439-445. (in English) ["The spelling of the specific name of an *Anormogomphus* species in its original description by Bartenev (1913) was variable, *kiritshenkoi* (5 times) vs *kiritschenkoi* (1 time). Bartenev himself did not mention this species in his further publications. Later authors proceeded to use different spelling versions of this name, including those not in the original paper. According to the International Code of Zoological Nomenclature (ICZN), the valid spelling should be chosen by the First Reviser. Acting as such, we choose as valid the name spelling *Anormogomphus kiritshenkoi* Bartenev, 1913, since it predominates in the original description, appears in the species subtitle, and is a proper transliteration from Cyrillic to Latin. It also corresponds to the spelling of his name used by A.N. Kiritshenko himself. Information of the type locality of the species is provided." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**16963.** Sconfiatti, R.; Pesci, I.; Paganelli, D. (2018): Terrace springs: habitat haven for macrobenthic fauna in the lower plain of the River Ticino (Lombardy, Northern Italy). *Atti Soc. it. Sci. nat. Museo civ. Stor. nat. Milano*, 5 (2): 19-26. (in English, with Italian summary) ["Springs are important environments between hypogean and epigeal habitats; the interaction between aquatic and terrestrial ecosystems is an important factor for their biotic communities. We investigated the ecology of the macrobenthic community of two lowland springs in the River Ticino valley, focusing on the autoecology of some relevant species and on the role of springs as hotspots of biodiversity in an area threatened by anthropogenic pressure. We collected 26 taxa in total: Diptera (8),

Trichoptera (6), gastropods (5), Coleoptera (2), Crustacea (2), Lumbricidae (1), Odonata (1) [*Cordulegaster boltonii*], Plathelminthes (1). Some of them are stenothermal and oligotrophic species thus quite unusual for a flood plain area characterized by intensive agricultural activities. In conclusion, our study highlights the importance of lowland springs in conserving some habitat-selective macrobenthic species." (Authors)] Address: Paganelli, D., Dept of Earth and Environmental Sciences, University of Pavia, Via S. Epifanio 14, 27100 Pavia, Italia. E-mail: daniele.paganelli@unipv.it

**16964.** Seehausen, M. (2018): *Orthetrum chrysostigma*, the first predominantly African dragonfly species, introduced to a European country via aquarium trade (Odonata: Libellulidae). *Notulae odonatologicae* 9(1): 6-10. (in English) ["In October 2017 a dragonfly larva has been found in a private aquarium in the city of Leimen, Baden-Württemberg, Germany. It emerged on 30-xi-2017 and the imago has been identified as a female *O. chrysostigma*. This is the first record of a predominantly African species introduced via the aquarium trade to Europe and Germany." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**16965.** Seehausen, M. (2018): „H. Sauter s Formosa-Ausbeute" und weitere Libellen aus Asien und Papua-Neuguinea im Übersee-Museum Bremen (Insecta: Odonata). *TenDenZen* 2014 (2018), Jahrbuch XXII, Übersee-Museum Bremen: 103-118. (in German, with English summary) ["The Odonata from Asia and Papua-New Guinea in the collection of the Übersee-Museum Bremen/Germany were determined and catalogued. The biggest part from one source is a collection of Taiwanese dragon- and damselflies from Hans Sauter which were not published before. Furthermore there are Asian specimens from Borneo, China, India, Malaysia, Sri Lanka, Thailand, Japan and Java. Most remarkable is the re-discovery of an excollection of M. E. de Selys Longchamps which was given to Bremen in 1875. Additionally some specimens of *Neurothemis stigmatizans* collected in Papua New-Guinea are listed. *Lestes cf. concinnus*, *Orthetrum luzonicum*, *Pseudothemis zonata* and *Sympetrum baccha arenot* mentioned by F. Ris in his publications about the taiwanese specimens of Hans Sauter. The female of *Prodasineura croconota* was labeled by Erich Schmidt as "Allotype" in 1931. Because there was no publication about a description of this female and Ris described two male specimens from different places this status is wrong. Very rare to be found in collections is *Aristocypha fulgipennis*. Unfortunately there is a wrong label at this specimen with ("Java") as supposed finding locality. This species is only known from Vietnam, Laos and Cambodia. Two specimens of original syntype series were found in the duplicate collection of Selys: *Dysphaea dimidiata* ("race *limbata*") and *Rhinocypha trifasciata*. These have been published more detailed before with a catalogue of the complete ex-collection. Also published before was the first record of *Matrona basilaris* from Hongkong. They were, together with specimens of *Euphaea opaca*, collected by J. T. Lauts between 1878 and 1907. Of *E. opaca* there was only

one historical record before. Also not often to be found in collections is *Epophthalmia vittata*. This species was collected, together with some others, by Tiefermann who was inmate at the British detention center Ahmednagar in India between 1914 and 1918. One specimen of *Macromia moorei* which was mentioned by M.A. Liefstinck could not be found and must be declared as lost. Also there are records of four dragonfly species collected offshore on board of a ship in the Andaman Sea between Andaman-Islands and Mergui Archipelago in the collection." (Author)] Address: Seehausen, M., Museum Wiesbaden Hessisches Landesmuseum für Kunst und Natur, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**16966.** Seehausen, M. (2018): *Anax guttatus* erstmals über den Aquaristikhandel nach Deutschland importiert (Odonata: Aeshnidae). *Libellula* 37(1/2): 91-96. (in German, with English summary) ["In April 2018 five aeshnid larvae were found in a home aquarium in Maintal-Bischofsheim (Hesse). They were transferred to the author and three female *Anax guttatus* emerged. Two larvae died, having been eaten by conspecifics. This is the first record of an introduction of *A. guttatus* in Germany." (Author)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**16967.** Seifert, M. (2018): Neufunde von *Sympetrum meridionale* (Selys, 1841) (Odonata: Libellulidae) in Ostthüringen und Westthüringen, mit Gesamtdarstellung bisheriger Funde in Thüringen. *Thüringer Faunistische Abhandlungen* 23: 105-115. (in German, with English summary) ["In July and August 2018 new discoveries of *S. meridionale* were made and evidence of reproduction was found at three different sites in Thuringia. The circumstances of the new records are described and discussed with reference to habitat structures amongst other factors. All new and previous observations are summarized graphically and as tables, with the aid of the technical information System for nature Conservation, which serves as data storage for the „Arbeitskreis Libellen Thüringen“ (Dragonfly work group Thuringia)." (Author)] Address: Seifert, M., Strenzfelder Allee 10, 06406 Bernburg, Germany. E-mail: Micha-Seifert-web@web.de

**16968.** Sellam-Bouattoura, N.; Attou, F.; Arab, A.; Samraoui, B. (2018): Odonata of the Mazafran hydrosystem: distribution and community structure. *Revue d'Ecologie* 73(4): 537-549. (in English, with French summary) ["One of the objectives of our study is to increase our knowledge of the Odonata in the Mazafran hydrosystem, located in the centre of northern Algeria. This unexplored region in terms of Odonatology, is characterized by its sub-humid Mediterranean climate, and a dry period spread over six months, from May to the end of October. The prospection of 19 sites distributed along the Mazafran hydrographic system during 24 months, from April 2013 to March 2015, allowed us to identify 948 adults involving 15 species. *Calopteryx haemorrhoidalis* (33.1 %) and *Platycnemis subdilatata* (20.5 %) were the most abundant and frequent species.

The results revealed the presence of *Ischnura pumilio*, which is currently relatively rare in the overall Maghreb. Both the physicochemical and climatic characteristics of the various wadi influenced the Mazafran hydrographic system. The seasonal change of flow rate led to a dramatic increase in water temperature and had a considerable impact on sites located at low elevation. Cumulative effects of urban and industrial effluents, river bed degradation, illegal pumping of water for agricultural purpose and reduction of riparian canopy influence the Odonata community and lead to a decrease of species richness and diversity. We urge decision-makers to take urgent steps for the restoration of the natural state and functioning of wadi systems throughout Algeria before their irreversible destruction." ] Address: Sellam-Bouattoura, Nassima, Laboratory of Dynamics and Biodiversity, FSB, USTHB, LP 32 El Alia, Bab Ezzouar. Algiers, Algeria. E-mails: sellamnassima@gmail.com

**16969.** Senouci, H.; Bounaceur, F. (2018): Contribution to the study of diversity and abundance of odonates in some wet biotopes in Tiaret region, Algeria. *Plant Archives* 18(1): 555-560. (in English) ["This research was realised by systematic monitoring during three successive months from April to Jun 2014 in the hydrographic system of Tiaret-Algeria. Sampling was carried from 09 stations in order to explore the species richness and diversity of Tiaret's Odonata, which never has been explored before. A first list of 11 species has been established: 8 species of Zygoptera belonging to: Lestidae, Platynimidiidae, Calopterigidae and Coanagrionidae and 3 species of Anisoptera) belonging to: Ashenidae, Libellulidae and Gomphidae." (Authors)] Address: Senouci, H., Laboratory of Agro-biotechnology and Nutrition in Semi-arid Areas, Faculty of Natural and Life Sciences, Dept of Biology, Compuskarman University, Ibn Khaldoun of Tiaret, Algeria. E-mail: ha-senouci@outlook.fr

**16970.** Serdar, O.; Verep, B. (2018): The investigation of water quality of Iyidere and Çiftekavak streams using physicochemical and biotic indexes. *Int. J. Pure Appl. Sci.* 4(1): 61-71. (in English) ["An investigation was carried out on the streams of Çiftekavak and Iyidere in Rize between April 2010 and March 2011. Water samples were taken monthly from the station which chosen six sample points on Iyidere and two sample point on Çiftekavak Stream. Water quality was evaluated with the standard physicochemical analysis (water temperature, pH, dissolved oxygen, oxygen saturation, electrical conductivity, suspended solid, total hardness, Ca hardness, Mg hardness, biological oxygen demand, nitrite nitrogen, total phosphate) like parameters were determined according to the Inland Water Resources Criteria, Water Pollution Control Regulation. With this study, it was aimed to determine the water quality of 8 stations at Iyidere and Çiftekavak Streams. It had been determined that the physicochemical data were not contaminated with Iyidere grade. However, Çiftekavak Stream had been determined that the pollution be under threat at the level. Benthic macroinvertebrates were analysed and compared with the measurement of parameter. In this study, as biomarker indexes, seven different biotic index such as SI (Saprob Index), FBI (Family Biotik Index), BMWP (Biological Monitoring Index Scores), BBI (Belgium Biotic Index), ASPT

(Medium Taxon Index) and EPT (Ephemeroptera Per Taxon) taxon number were used in evaluation. During the period of this study, 27 taxas which belong to Ephemeroptera, Amphipoda, Tricladida, Coleoptera, Decapoda, Rhynchobdellida, Odonata, Diptera, Trichoptera, Plecoptera, Tubificida and Arthropoda were identified. The Ephemeroptera taxa was the highest abundance values in benthic macroinvertebrates. With this study, it was aimed to determine the water quality at 8 stations at Çiftekavak and Iyidere. Both biologic and physicochemical yields were found to result in unpollution of the Iyidere Stream level. However, Çiftekavak stream was found to be under the threat of pollution." (Authors)] Address: Serdar, O., Munzur University, Fisheries Faculty, Tunceli, Turkey. E-mail: osmanserdar@munzur.edu.tr

**16971.** Shakur, M. (2018): An annotated checklist of Odonate fauna from southern marwar region of Rajasthan. (India). *International Journal of Current Research* 10(9): 73131-73135. (in English) ["Odonates were sampled from 3 sites i.e; 1. Jawai Dam, 2. Near Bijapur and 3. Jawai river near Aravalli. Southern Marwar region of Rajasthan reported 14 species belonging to Libellulidae and 5 species to Zygoptera. *Orthetrum cancellatum*, *Trithemis annulata* and *Rhodischnura nursei* are recorded for the first time." (Authors)] Address: Shakur, M., Biodiversity Research Lab., Zoology Dept, Maharshi Dayanand Saraswati University, Ajmer -305009, Rajasthan, India

**16972.** Sharma, M. (2018): A note on *Brachydiplax chalybea* Brauer, 1868: A first record from Nepal. *International Journal of Entomology Research* 3(6): 29-30. (in English) [Morang, Nepal, 9-VIII-2018 from running water of Gokarna resort, Sundarharaicha Municipality, Morang District, Nepal. (Author)] Address: Sharma, M., Central Department of Zoology, Tribhuvan University, Kalthmandu, Nepal

**16973.** Sharma, M.; Oli, B.R.; Awasthi, S.; Subedi, N.; Pokhrel, P.R. (2018): Dragonflies and damselflies (Insecta: Odonata) of western Nepal: A checklist. *International Journal of Fauna and Biological Studies* 5(6): 140-146. (in English) ["This paper deals with the first comprehensive checklist of odonate species recorded in western Nepal. The present checklist is based on field survey from May 2017 to October 2018 in six different locations of western Nepal which reveals that there are 61 Odonata species belonging 40 genera and 11 families. Family Libellulidae was dominant representing 28 species. Recorded species were common in all regions of Nepal except *Epophthalmia frontalis* which was reported from western and central regions. Local status of recorded species also identified. Accordingly, two species were very common, 26 common, 30 fairly common species and 3 rare species to this region." (Authors)] Address: Sharma, M., Central Dept of Zoology, Tribhuvan University, Kathmandu, Nepal

**16974.** Shi, G.C.; Wang, M.L.; Zhu, Y.Y.; Shen, L.; Ma, W.L.; Wang, Y.H.; Li, R.F. (2018): Dragonfly wing decorated by gold nanoislands as flexible and stable substrates for surface-enhanced Raman scattering (SERS). *Scientific Reports* 8, Article number: 6916: 11 pp. (in English) ["A flexible and



stable biomimetic SERS substrate was successfully fabricated by depositing gold (Au) nanoislands on the dragonfly wings (DW) via a simple DC magnetron sputtering system. Characterizations of the Au/DW nanostructure indicated that the optimum Au/DW-45 (sputtering time was 45 min) substrate owns high sensitivity, good stability and outstanding reproducibility. The limit of detection (LOD) for Rhodamine 6 G (R6G) was as low as  $10^{-7}$  M and enhancement factor (EF) was calculated to be  $2.8 \times 10^6$ . 70-day-duration stability tests showed that Raman intensity of R6G reduced only by 12.9% after aging for 70 days. The maximum relative standard deviations (RSD) of SERS intensities from 100 positions of Au/DW-45 substrate were less than 8.3%, revealing outstanding uniformity and reproducibility. Moreover, the flexible Au/DW-45 bioscaffold arrays were employed to solve the vital problem of pesticide residues. By directly sampling from tomato peels via a "press and peel off" approach, cypermethrin has been rapidly and reliably determined with a LOD centered at  $10^{-3}$  ng/cm<sup>2</sup> and a correlation coefficient (R<sup>2</sup>) of 0.987. The positive results demonstrated that the Au-based DW biomimetic arrays may offer an efficient SERS platform for the identification of various pesticide residues on real samples." (Authors)] Address: Ma, W.L., Dep Mathematics, NC State Univ., Raleigh, 276968205, USA. E-mail: wml@ysu.edu.cn

**16975.** Sindaco, R.; Savoldelli, P.; Bombonata, D. (2018): Le libellule (Insecta: Odonata) di interesse comunitario in Piemonte: lo stato attuale delle conoscenze. Rivista piemontese di Storia naturale 39: 373-388. (in English) ["The state of knowledge on the Odonata of European concern in Piedmont is updated. With the exception of *Coenagrion mercuriale*, for the remaining four species included in the annexes II and IV of the Habitats Directive 92/43/EEC, current data show ranges of comparable or greater extension than those historically known. The increase of known localities for *Sympetma paedisca*, *Gomphus flavipes* and *Ophiogomphus cecilia* is most likely due to the intensification of research in the last decade. Instead, the increase of *Oxygastra curtisii* could be due to a genuine expansion of the range." (Authors)] Address: Sindaco, R., I.P.L.A. – Istit. per le Piante da Legno e l'Ambiente, corso Casale 476, 10132 Torino, Italy. E-mail: sindaco@ipla.org

**16976.** Smit, J.T.; Dijkstra, K.-D.B.; Beentjes, K.; Miller, J.; Madden, H.; van der Hooft, B. (2018): First records of Odonata from Sint Eustatius, Dutch Lesser Antilles. *Notulae odontologicae* 9(2): 78-82. (in English) ["Six species of dragonflies are recorded for the island of Sint Eustatius, Lesser Antilles. Breeding records are established for four out of the six species, despite the lack of natural fresh water sources. DNA barcoding was used to match the larvae with the adults." (Authors)] Address: Smit, J.T., European Invertebrate Survey – the Netherlands / 2 Naturalis Biodiversity Centre, PO Box 9517, 2300 RA Leiden, the Netherlands. E-mail: John.Smit@naturalis.nl

**16977.** Smith-Herron, A.J.; Cook, T.J. (2018): Gregarines infecting *Ischnura* spp. in Louisiana, U.S.A., including description of *Geneiorhynchus gradalis* n. sp. (Apicomplexa: Actinocephalidae: Actinocephalinae) from *Ischnura ramburii* (Odonata:

Zygoptera) in St. John the Baptist Parish, Louisiana, U.S.A. *Comparative Parasitology* 85(1): 42-47. (in English) ["*Geneiorhynchus gradalis* n. sp. (Apicomplexa: Eugregarinida: Actinocephalidae: Actinocephalinae) is described from adults of *I. ramburii*. *Geneiorhynchus gradalis* is placed generically by way of its hesperidiform oocysts being released via simple rupture, by the fact that the epimerite is hemispherical and bears many semifalciform spines, and because association occurs late, just prior to zygote. This species is distinguished from other members of the genus by its distinct oocyst morphometrics (narrowly hesperidiform with distinct bipolar truncations) and by the fact that its epimerite is shallowly toroid, bearing a single anterior row of semifalciform spines and becoming filamentous in mature forms with an absent tumidus. Its diamerite is meager. Herein we describe the new taxon while providing new host and locality records for known actinocephalid gregarines in Louisiana." (Authors)] Address: Smith-Herron, Autumn, Texas Invasive Species Inst., Sam Houston State Univ., Huntsville, Texas 77341, USA. E-mail: smith-herron@shsu.edu

**16978.** Soh, J.; Leng, G.; Fawzi, S.; Thomas, N.; Ngiam, R.W.J. (2018): New record of the dragonfly, *Anax panybeus*, in Singapore. *Singapore Biodiversity Records* 2018: 19-21. (in English) [Pulau Ubin, NParks office at Pulau Ubin Volunteer Hub; 10-X-2017] Address: Ngiam, R.W.J., National Parks Board, Singapore Botanic Gardens, 1 Cluny Road, Singapore 259569. E-mail: yanrobin@hotmail.com

**16979.** Solano, E.; Hardersen, S.; Audisio, P.; Amorosi, V.; Senczuk, G.; Antonini, G. (2018): Asymmetric hybridization in *Cordulegaster* (Odonata: Cordulegasteridae): Secondary postglacial contact and the possible role of mechanical constraints. *Ecology and Evolution*. 2018 DOI: 10.1002/ece3.4368: 15 pp. (in English) ["Two *Cordulegaster* dragonflies present in Italy, the Palaearctic and northern distributed *C. boltonii* and the endemic to the south of the peninsula *C. trinacriae*, meet in central Italy and give rise to individuals of intermediate morphology. By means of mitochondrial and nuclear markers and of Geometric Morphometrics applied to sexual appendages, we defined i) the geographical boundaries between the two species in Italy and ii) we determined the presence, the extent, and the genetic characteristics of the hybridization. Genetic data evidenced asymmetric hybridization with the males of *C. trinacriae* able to mate both interspecifically and intraspecifically. The results contrast with expectations under neutral gene introgression and sexual selection. This data, along with the morphological evidence of significant differences in size and shape of sexual appendages between the males of the two species, seem indicative of the role of mechanical constraints in intraspecific matings. The origin of the two species is dated about to 1.32 Mya and the hybridization resulted related to range expansion of the two species after Last Glacial Maximum and this led to the secondary contact between the two taxa in central Italy. At last, our results indicate that the range of *C. trinacriae*, a threatened and protected species, has been moving northward probably driven by climate changes. As a result, the latter species is currently intruding into the range of *C. boltonii*. The hybrid area is quite extended and the hybrids seem well adapted to the environment. From a conservation

point of view, even if *C. trinacriae* has a strong genetic identity, the discovery of hybridization between the two species should be considered in a future species management." (Authors)] Address: Antonini, Gloria, Dep Biol. & Biotech. "Charles Darwin", Univ. Rome "La Sapienza", Via Alfonso Borelli 50, 00161 Rome, Italy. Email: gloria.antonini@uniroma1.it

**16980.** Solis, M.; Bonetto, C.; Marrochi, N.; Paracampo, A.; Mugni, H. (2018): Aquatic macroinvertebrate assemblages are affected by insecticide applications on the Argentine Pampas. *Ecotoxicology and Environmental Safety* 148: 11-16. (in English) ["Highlights: •Land use in the basin affects the macroinvertebrate assemblages in Pampas streams. •Nutrient concentrations are higher in streams adjacent to crops. •Endosulfan was measured in sediments from cropped streams; a stream with a buffer strip contained lower concentrations. •Macroinvertebrate assemblages in the agricultural streams were different from those in the livestock and reserve streams. Abstract: Agriculture intensification in Argentina has increased agrochemicals consumption in the last decades and might represent an environmental risk for adjacent water bodies. The objective of the present work was to assess the effect of land use on water quality and invertebrate assemblages in the Argentine Pampas streams. Eight streams were sampled on 4 occasions during the 2013/14 growing season. Three streams are located within a biosphere reserve, two drain basins with extensive livestock fields, and three run through intensively cultivated plots; one of them contained a 30 m wide uncultivated grass-covered strip between the crop and the stream. Macroinvertebrates were sampled from emergent vegetation by means of a D-net with a 500 µm pore size, and 30 cm diameter. Higher nutrient concentrations were measured in the agricultural streams. Endosulfan was measured in sediments of the agricultural streams, concentrations being significantly lower in the stream with the buffer strip. Invertebrate assemblages in the cropped streams were significantly different from those in the livestock and reserve streams, those in the latter not being different from each other. Ampullariidae (*Pomacea canaliculata*) and Planorbidae (*Biomphalaria peregriana*) were the taxa best represented in the agricultural streams. Hyalellidae (*Hyalella curvispina*), Zygoptera and Planorbidae (*B. peregriana*) were the taxa best represented in the reserve and livestock streams. Present evidence suggests that the observed differences in the invertebrate composition in the agricultural streams were related with the impact of agrochemicals and that buffer strips represent a useful attenuation practice. Cattle breeding on natural pastures represented a land use with low impact on the invertebrate assemblages." (Authors)] Address: Solis, Marina, ILPLA (Instituto de Limnología "Dr. Raúl A. Ringuelet"), UNLP, FCNyM, CONICET, Boulevard 120 y 62, La Plata, Buenos Aires, Argentina. E-mail: marinasolis@ilpla.edu.ar

**16981.** Somwanshi, N.R.; Sonawane, A.R.; Khandagle, A.J. (2018): New report of *Zygomma petiolatum* (Rambur, 1842). Odonates from Daund Tehsil, MS: India. *International Conference on Frontiers in Life and Earth Science* 5(1): 143-146. (in English) ["Morphological similarity often complicates field identification in insects, leading to data analysis on the basis

of geographic distribution over planet. Still working on morphometrical data analysis on some endemic or rare species it's really challenging job with conservation status, that's the reason for taxonomical analysis done in August to October 2017 on *Z. petiolatum*. The Indian dragonfly genus *Zygomma* is a difficult group to identify on field due to their extreme occurrence during mild sunny evening time with higher flier conditions, and shortest information on identification keys, geographical distribution and natural history. *Z. petiolatum* is commonly known as brown dusk hawk. Primarily based upon the hypothesis that collected specimen may be dragonfly or damselfly as due to showing both characteristic such as, slender abdomen looks like damselfly and spreading of wings, compound eyes, bulgy thorax shown in case of dragonfly. After carefully observing the specimen it showed 8 abdominal segments which were characteristic features of dragonfly." (Authors)] Address: Somwanshi, N.R., Post Graduate Dept of Zoology, Ahmednagar College, Ahmednagar, Maharashtra, India

**16982.** Sonawane, A.R.; Shendge, A.N.; Doshi, S.S.; Kudale, R.G. (2018): A taxonomical shortnote on *Microgomphus torquatus* (Anisoptera: Odonata) from Pavana River (Pune District, Ms: India). *International Journal of Scientific Research in Science and Technology* 5(2): 8-13. (in English) ["*M. torquatus* (Anisoptera) species belonging to Family: Gomphidae, which is also called as Clubtails. This type of the species commonly identified by their unique eyes, which are well separated and black, brown to yellow colouration. This family derived its name gomphides due to its last abdominal segment which are bulbous, club or dilated downward in shape. As compared to other dragonflies it shows variability in body size. Usually this species shows abdomen about 22-25 mm in length in case of male and 26-27 mm in case of female, Hind wings about 20-22 mm in case of male while 23-24mm in case of the Female. Wings are tinted in colouration with brownish shade and abdomen generally 29- 30 mm in length. They show greenish brown coloration, legs are whitish and also possessing black spines on it. They occur in the habitat from River surroundings with shady vegetations." (Authors)] Address: Sonawane, A.R., Post Graduate Dept Zool., Tuljaram Chaturchand college, Baramati, Pune, Maharashtra, India

**16983.** St. Clair, C.R.; Fuller, C.A. (2018): Atrazine exposure influences immunity in the Blue Dasher Dragonfly, *Pachydiplax longipennis* (Odonata: Libellulidae). *Journal of Insect Science* 18(5): 1-7. (in English) ["Agricultural runoff containing herbicide is known to have adverse effects on freshwater organisms. Aquatic insects are particularly susceptible, and herbicide runoff has the potential to affect immunity in this group. Here we examined the effect of ecologically relevant levels of atrazine, an herbicide commonly used in the United States, on immune function in larvae of *P. longipennis* during a long-term exposure at ecologically relevant concentrations. Larvae were exposed to concentrations of 0, 1, 5, and 10 ppb atrazine for 3 or 6 wk. Hemocyte counts, hemolymph phenoloxidase (PO) activity, cuticular PO, and gut PO were measured at the end of each trial period as indicators of immune system strength. Atrazine concentration had

a significant effect on hemocyte counts after controlling for larval size. There was a significant interaction between time and concentration for hemolymph PO, cuticular PO, and a marginal interaction for gut PO. The effect of atrazine on the measured immune parameters was often nonmonotonic, with larger effects observed at intermediate concentrations. Therefore, atrazine affects both hemocyte numbers and PO activity over time in *P. longipennis*, and the changed immune function demonstrated in this study is likely to modify susceptibility to pathogens, alter wound healing, and may decrease available energy for growth and metamorphosis." (Authors)] Address: Fuller, Claire, Dept of Biological Sciences, Murray State University, 2112 Biology Building, Murray, KY 42071, USA. E-mail: cfuller@murraystate.edu

**16984.** Start, D. (2018): Animal behavior and algal camouflage jointly structure predation and selection. *Journal of Evolutionary Biology* 31(5): 773-778. (in English) ["Trait variation can structure interactions between individuals, thus shaping selection. While anti-predator strategies are an important component of many aquatic systems, how multiple anti-predator traits interact to influence consumption and selection remains contentious. Here, I use a common larval dragonfly (*Epithea canis*) and its predator (*Anax junius*) to test for the joint effects of activity rate and algal camouflage on predation and survival selection. I found that active and poorly camouflaged *Epithea* were more likely to be consumed, and thus survival selection favored inactive and well camouflaged individuals. Notably, camouflage dampened selection on activity rate, likely by reducing attack rates when *Epithea* encountered a predator. Correlational selection is therefore conferred by the ecological interaction of traits, rather than by opposing selection acting on linked traits. I suggest that anti-predator traits with different adaptive functions can jointly structure patterns of consumption and selection." (Authors)] Address: Start, D., Toronto, ON, Canada. E-mail: denon.start@mail.u-toronto.ca

**16985.** Stewart, S.S.; Vodopich, D.S. (2018): Seasonal and annual variations on wing shape and wing size of eight damselfly species (Odonata: Calopterygidae, Coenagrionidae). *Odonatologica* 47(3/4): 245-266. (in English) ["This study examined the effects of seasonal and annual variations on wing shape and wing size of eight damselfly species in central Texas. Comparisons included i) populations collected early in the flight season versus those collected late in the flight season, and ii) populations collected from the same locations during several annual flight seasons. We found widespread differences in both wing shape and body size in males and females among most species examined. Wing shape of male and female damselflies collected early varied significantly from those collected late in the flight season for all locations and years sampled. Damselflies emerging early in the flight season were significantly larger than those emerging late, except for *Enallagma civile* showing opposite results. Populations of six species sampled in different years at the same location were compared, and significant differences in wing shape and size occurred in no females and in males of only two species. Our results suggest that differences in seasonal

and year-to-year environmental conditions frequently influence wing shape and body size in multiple damselfly species." (Authors)] Address: Stewart, Sherry, Dept Biol., Baylor Univ., Waco, Texas 76798-7388, USA. E-mail: Sherry\_Stewart@baylor.edu

**16986.** Subramanian, K.A.; Babu, R. (2018): Insecta: Odonata. In: *Faunal Diversity of Indian Himalaya*. Published by the Director, Zool. Surv. India, Kolkata: 227-240. (in English) ["The Odonata fauna of Himalaya is documented based on field surveys by the authors and extensive literature study. A total of 257 species under 112 genera and 18 families are reported, of which 23 species are endemic to the region. The eastern Himalaya comprising of Sikkim, Darjeeling and Arunachal Pradesh have high diversity compared to the Western Himalaya. The cold deserts of Ladakh and Lahul and Spiti has very low diversity. There are no records of Odonata from Trans Himalaya of Sikkim. The Odonata of the region is threatened with anthropogenic activities." (Authors)] Address: Subramanian, K.A.; Babu, R., Zoological Survey of India, Southern Regional Centre, Chennai-600 028, India. E-mails: subbuka.-zsi@gmail.com, baburzsi@gmail.com

**16987.** Subrero, E.; Sforzini, S.; Viarengo, A.; Cucco, M. (2018): Exposure to anti-mosquito insecticides utilized in rice fields affects survival of two non-target species, *Ischnura elegans* and *Daphnia magna*. *Paddy and Water Environment* 17: 1-11. (in English) ["Insecticides are commonly utilized to control mosquito larvae in rice fields. They can, however, have negative effects on both vertebrates and non-target invertebrate species. In this study, we examined the effects of pulse exposition to different concentrations of cypermethrin (0.15, 0.015, 0.0015 mg/L) and diflubenzuron (0.15, 0.015, 0.0015 mg/L) on egg hatching rate, larval growth, and larval survival in *Ischnura elegans*, and on survival of a crustacean, *Daphnia magna*. Insecticide exposure had significant negative effects on hatching rate in damselfly eggs. Exposed damselfly larvae also grew less and showed a higher mortality than control larvae. In *Daphnia*, the acute toxicity test (ISO 6341 in Water quality—determination of the inhibition of the mobility of *Daphnia magna* Straus (Cladocera, Crustacea)—acute toxicity test, Int Organ Stand Geneva, Geneva, 2012) showed an increased inhibition of mobility in the presence of insecticides. We observed a proportional response in relation to insecticide concentration, such that the highest exposure levels showed the largest reduction of vital performances. Our highest tested values correspond to those currently employed in agriculture. This study suggests that exposure to two common insecticides strongly affects non-target invertebrates even at very low concentration levels (cypermethrin 0.0015 mg/L and diflubenzuron 0.0015 mg/L)." (Authors)] Address: Subrero, Erica, DISIT, University of Piemonte Orientale, Alessandria, Italy

**16988.** Suhling, F.; Suhling, I. (2018): Dämmerungsaktivität von *Boyeria irene* an der Örtze (Odonata: Aeshnidae). *Libellula* 37(3/4): 193-201. (in German, with English summary) ["Crepuscular activity of *B. irene* at the Oertze River - We report observations on activity and reproductive behaviour of *B. irene*



in a highly isolated population in northern Germany. We recorded that crepuscular activity Start approximately at sunset and correlated with shifting sunset over the flight season. We also observed mating behaviour during these phases of activity. By comparing our observations with the literature, we conclude that mate finding and mating may be mainly confined to dawn, while oviposition occurs during the day. In addition, we report a case of dispersal, which connects between an older and a more recently established reproduction site." (Authors)] Address: Suhling, F., Insti. Geoökol., TU Braunschweig, Langer Kamp 19c, 38106 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**16989.** Supekar, S.C.; Gramapurohit, N.P. (2018): Larval skipper frogs recognise kairomones of certain predators innately. *Journal of Ethology* 36(2): 143-149. (in English) ["Recognising potential predators is critical for the survival and reproduction of prey animals. However, prey animals may possess an innate ability to recognise the signature odours (kairomones) of only certain native, sympatric predators, while requiring learning to recognise others. Our observations have shown that larval skipper frogs (*Euphylyctis cyanophlyctis*) fail to recognise kairomones of dragonfly nymph, a common predator of amphibian tadpoles with a cosmopolitan distribution. Hence, we wanted to determine if larval skipper frogs totally lack an innate mechanism to recognise kairomones of all aquatic predators, or have an innate ability to recognise kairomones of only certain predators. In a series of experiments, we tested the antipredator response of larval skipper frogs to kairomones of dragonfly nymph (*Bradinopyga geminata*); walking catfish (*Clarias batrachus*); Mozambique tilapia (*Oreochromis mossambicus*); two species of predatory tadpoles, Indian bullfrog (*Hoplobatrachus tigerinus*) and Jerdon's bullfrog (*Hoplobatrachus crassus*); and the checkered keel back snake (*Xenochrophis piscator*). The results clearly indicate that larval skipper frogs have the innate ability to recognise kairomones of the walking catfish, both species of larval bullfrog and checkered keel back snake. However, they lack the innate ability to recognise kairomones of dragonfly nymph and Mozambique tilapia. Prey choice of the Mozambique tilapia and gape-limitation of dragonfly nymphs could be responsible for the lack of innate responses of larval skipper frogs to them. The study provides empirical evidence for the notion that prey can innately recognise certain predators." (Authors)] Address: Supekar, S.C., Dept Zool., Savitribai Phule Pune Univ., Pune, India

**16990.** Sybertz, J. & M. Reich (Hrsg.) (2018): Tierarten im Klimawandel in Harz und Lüneburger Heide. *Natur und Raum* 10, Schriftenreihe Institut für Umweltplanung, Leibniz Universität Hannover: 7-56. (in German, with English summary) ["Within the KLIFF research project, the sensitivity of 227 Red List species (breeding birds, reptiles, amphibians, dragonflies and damselflies, grasshoppers and crickets, and butterflies) to climate change impacts within the "Harz" and "Lüneburger Heide und Wendland" ecoregions, in Lower Saxony, was evaluated. This assessment included the sensitivity of the species towards specific climatic changes as well as their general sensitivity towards environmental changes. Based on

the climate projections for these regions up to the end of the 21st century, increasing mean temperatures, an increase of hot extremes, a decrease of cold periods and a shift in annual precipitation regimes (including a decrease of precipitation in summer and an increase of precipitation in winter) can be expected. About half of the examined species are probably not sensitive towards these climatic changes and most of the sensitive species are sensitive to a low to moderate degree. Overall, more species seem to be affected by a decrease of summer precipitation than by an increase of mean temperatures. On average, the examined species are more sensitive towards environmental changes in general than towards specific climatic changes. As assessments of climate change impacts on species are linked with uncertainties, it is important to take these uncertainties into account when developing nature conservation strategies adapted to climate change. Regarding management strategies, the conservation and restoration of wetlands, as well as the promotion of wildlife corridors and habitat connectivity, are of high importance." (Authors)] Address: Reich, M., Inst. für Umweltplanung, Leibniz Univ. Hannover, Herrenhäuser Str. 2, 30419 Hannover, Germany

**16991.** Szabo, T.; Müller, Z.; Gaspar, A.; Juhasz, P.; Ludanyi, M.; Malnas, K.; Mihaliczku, E.; Olajos, P.; Polyak, L.; Kiss, B. (2018): Contribution to the Hungarian damselfly (Odonata: Zygoptera) fauna, based on nationwide surveys. *Folia Historico-Naturalia Musei Matraensis* 42: 15-70. (in English) ["Between 1996 and 2017 larvae, exuviae and imagoes of damselflies were collected from 2072 sampling sites in Hungary. Altogether 21 damselfly species ... have been recorded. The data for the following species are the most important faunistical results: *Lestes macrostigma*, *Coenagrion ornatum*, *C. scitulum*." (Authors)] Address: Szabó, T., BioAqua Pro Ltd., Soó R. u. 21, H-4032 Debrecen, Hungary. E-mail: szabot@bioaquapro.hu

**16992.** Tamm, J. (2018): Untersuchungen an Larven und Exuvien der *Cordulegaster bidentata* an einem Bach im Kaufunger Wald und ihre ökologischen und methodischen Konsequenzen (Odonata: Cordulegasteridae). *Libellula* 37(3/4): 161-180. (in German, with English summary) ["Investigations on larvae and exuviae of *C. bidentata* at a forest stream in Kaufunger Wald, Germany, and the ecological and methodological consequences - Between 2016 and 2018, a population of *C. bidentata* was studied in a forest stream in Kaufunger Wald. Whereas 40 exuviae were found, using sieves only five larvae could be detected. The highest density of exuviae were found along a short very stony stream section adjoining a spring outflow. Fine-grained Sediments were almost absent there and larvae could not be found. It is obvious that the larvae of *C. bidentata* can also live in stream structures other than fine-grained Sediments. In the case given the only possible structures were fissures in the rocky stream bottom, where larvae could not be caught with sieves. The consequences for the larval ecology and sampling methods are discussed. Moreover, sampling of exuviae is recommended for evidence and estimation of population sizes of *C. bidentata*, because this method has proven to be effective." (Author)] Address:

Tamm, J., Elgershäuser Str. 12, 34131 Kassel, Germany.  
E-mail: jochen.tamm@t-online.de

**16993.** Tavares, R.S.; Pestana, G.; Rocha, A.D., Schiavone, D.C.; Guillermo-Ferreira, R. (2018): Come to the dark side: habitat selection of larval odonates depends on background visual patterns. *Ecological Entomology* 43(5): 640-646. (in English) ["1. Determining which environmental traits enable animals to inhabit and choose preferred habitats is key to understanding ecological processes. Habitat complexity and background colour patterns can act as selective pressures on animal behaviour, and ultimately affect habitat choice. 2. To investigate the role of environmental features on habitat selection, this study looked at whether dragonfly and damselfly larvae show a preference between dark/light or complex environments. Last-instar larvae of *Micrathyrina didyma* and *Acanthagrion lancea* were collected in the Neotropical savanna, and five experiments in laboratory conditions were subsequently carried out. The first experiment tested the preference of larvae for leaves in contrast to a white background. The second experiment compared a preference for white and black backgrounds. As both experiments showed a significant preference for darker backgrounds, a predator was included in the black background in the third experiment, and a macrophyte was included in the white background in the fourth experiment. In this way, favourable and unfavourable conditions were included in the habitat of choice. The fifth experiment tested the influence of environmental complexity on habitat choice. 3. The results of these experiments showed that larvae choose darker backgrounds independently of predation risk, and that macrophytes are as attractive as a dark background. They also suggest that the coenagrionid, but not the libellulid, prefer more complex environments. 4. Overall, these findings suggest that larvae exhibit behavioural preferences for background colour and complexity, which may ultimately drive habitat occupation." (Authors)] Address: Guillermo-Ferreira, R., Laboratory of Ecological Studies on Ethology and Evolution (LESTES), Dept of Hydrobiology, Federal University of São Carlos, UFSCar, Rod. Washington Luís km 235 - São Carlos, São Paulo, SP-310 – 13565-905 Brazil. E-mail: rhainerguillermo@gmail.com

**16994.** Terzani, F. (2018): Ricerche odonatologiche in Toscana. XIV. Il genere *Onychogomphus* Selys, 1854 (Insecta: Odonata: Gomphidae). *Quaderno di Studi e Notizie di Storia Naturale della Romagna* 48: 67-74. (in Italian, with English summary) ["New records and notes on the distribution of *O. forcipatus unguiculatus* (Vander Linden, 1820) and *O. uncatus* (Charpentier, 1840) in Tuscany are given." (Author)] Address: Terzani, F., Museo di Storia Naturale dell'Università degli Studi di Firenze, sezione di Zoologia "La Specola" via Romana 17, I-50125 Firenze, Italy. E-mail: libellula.ter@gmail.com

**16995.** Thakkar, N.R.; Verma, P.R.; Andrew, R.J. (2018): Breeding behaviour of the Coromandel Marsh Dart Damselfly (Zygoptera: Coenagrionidae: *Ceragrion coromandelianum* (Fabricius)) in central India. *Journal of Threatened Taxa* 10(3): 11443-11449. (in English) ["*C. coromandelianum* is one of the most common damselflies in the Indian subcontinent. It flies

among bushes and breeds in stagnant pools, small garden tanks, tubs and ornamental cement ponds containing submerged and/or floating vegetation. The oviposition behaviour of *C. coromandelianum* was observed at the botanical garden of Hislop College, Nagpur, India, where small underground cement tubs are utilized to grow macrophytes. *C. coromandelianum* displays a refined hierarchy of preferences for oviposition and chooses floating leaves of *Nymphaea nouchali* (69%) over *Lemna paucicostata* (23%) and submerged *Hydrilla verticillata* (8%). In an uninterrupted oviposition bout, the female deposits 283 eggs in 16 rows (N=5) on the under surface of the *N. nouchali* leaf. The tiny leaves of *L. paucicostata* holds 7.8 eggs in 4.8 rows (N=10). In *H. verticillata*, the internode region of the stem can house 25.4 eggs (N=10). One or two eggs are also found neatly inserted in the thin leaf base of *H. verticillata*. Decaying plant material is never used for oviposition. The present investigation also clearly demonstrates that the choice of oviposition substrate not only depends upon the presence of aquatic species in the water body but also on the spatial location of the oviposition site." (Authors)] Address: Thakkar, N.R., Centre for Higher Learning & Research in Zoology, Hislop College, Civil lines, Nagpur, Maharashtra 440001, India. E-mail: Nilesh.thavkar@gmail.com

**16996.** Theischinger, G; Richards, S.J; Toko, P.S. (2018): *Nososticta moginae* sp. n. (Odonata: Platynemididae), a new damselfly from Papua New Guinea. *Australian Entomologist* 45(1): 39-45. (in English) ["*N. moginae* sp. n. from Gulf Province, Papua New Guinea, is described from both sexes and its affinities are discussed. It represents the 80th species of the genus and is currently known only from a single location in the Kikori River Basin. A description of the hitherto unknown female of the morphologically similar *Nososticta conifera* Theischinger & Richards, 2006 is also presented." (Authors)] Address: Toko, P.S., New Guinea Binatang Research Centre, Madang, Papua New Guinea & Faculty of Science, Univ. of South Bohemia, Ěeské Budějovice, Czech Republic. E-mail: pagi.sione@gmail.com

**16997.** Theischinger, G. (2018): A new species of *Eusynthemis* Förster, 1903 from the Cooloola sand-mass in south-eastern Queensland, Australia (Odonata: Synthemistidae). *Odonatologica* 47(3/4): 289-297. (in English) ["*Eusynthemis cooloola* sp. nov. (Holotype ♂ from Searys Creek near Rainbow Beach, 25.975°S, 153.073°E) in the Cooloola sand-mass of south-eastern Queensland) is described, illustrated and discussed. It is considered to be the sister species of *Eusynthemis nigra* (Tillyard)." (Author)] Address: Theischinger, G., Research Associate, Australian Museum Research Inst., Australian Museum, 1 Williams Street, Sydney, NSW 2010, Australia; Research Fellow, Office of Environment & Heritage, NSW Dept of Planning & Environment, PO Box 29, Lidcombe, NSW 1825, Australia. E-mail: theischingergunther@gmail.com

**16998.** Theischinger, G.; Richards, S.R.; Toko, P.S. (2018): Three new damselflies from Lake Kutubu, Papua New Guinea (Zygoptera: Argiolestidae, Coenagrionidae, Platystictidae). *IDF-Report* 112: 1-15. (in English) ["We describe three new

species of damselflies from streams draining into Lake Kutubu in Southern Highlands Province, Papua New Guinea. They are *Drepanosticta johncanni* sp. nov. (Platystictidae), *Pseudagrion parafarinicolle* sp. nov. (Coenagrionidae) and *Wahnesia kutubensis* sp. nov. (Argiolestidae). Diagnostic characters of the ♂♂ and, where available of the ♀♀, are illustrated and the probable affinities of the new species are discussed." (Authors)] Address: Theischinger, G., Office of Environment and Heritage New South Wales, Sydney, NSW, Australia, and Australian Museum, Entomology, 6 College Street, Sydney, NSW, 2010, Australia. Email: gunther.theischinger@environment.nsw.gov.au

**16999.** Thomas, C.; Tom, J.; Zecharia, A.P.; Abraham, N.P. (2018): Dragonfly species diversity along the waterside of Kallar river base of Pathanamthitta district, Kerala. *International Journal of Research and Analytical Reviews* 5(4): 900-903. (in English) ["This study aims to understand species diversity of dragonfly along the waterside of Kallariverbase of Pathanamthitta district, Kerala. The survey was carried out by 2014. In the selected area permanent transects were laid and observations on dragonflies was done. 15 species of dragonflies were identified during six month period of study. 14 species from the family Libellulidae and one is from Gomphidae. The species diversity was calculated using Shannon index and Simpson's index." (Authors)] Address: Thomas, C., Dept of Zoology, St. Berchman's College, Changanacherry, India

**17000.** To, C.Q.; Phan, Q.T. (2018): A record of *Sinolestes editus* Needham, 1930 (Odonata: Zygoptera: Synlestidae) from the Central Highlands of Vietnam, with descriptions of the collected male and female specimens. *IDF-Report* 124: 1-9. (in English) ["A record of male and female specimens of *Sinolestes editus* Needham, 1930 collected in Dak Hro village (14°19'45" N, 108°24'23" E, alt. 1,420m a.s.l.), Dak Roong Commune, K'Bang District, Gia Lai Province, Central Highlands of Vietnam is present with a detailed description of the morphology of these two specimens." (Authors)] Address: To, C.Q., Dept of Zoology, Southern Institute of Ecology, Vietnam Academy of Science & Technology, 01 Mac Dinh Chi, Ho Chi Minh City, Vietnam

**17001.** Tol, J. van; Bedjanic, M. (2018): A new *Drepanosticta* species from Seram, Moluccas (Odonata: Platystictidae). *Zootaxa* 4461(1): 127-133. (in English) ["*Drepanosticta seramensis* sp. nov. (holotype ♂: Indonesia, Moluccas, Seram Island, 36 km SW of Wahai, S 2.9768, E 129.2269; 2-xii-1996; deposited in RMNH, Leiden), is described as new to science. It is closely related to *D. moluccana* Lieftinck, 1938 from Buru and *D. amboinensis* van Tol, 2007 from Ambon." (Authors)] Address: Tol, J. van, Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: jan.vantol@naturalis.nl

**17002.** Trapero Quintana, A.D.; Torres Cambas, Y.; Martínez Valle, M. (2018): Las libélulas de Cuba: una actualización taxonómica 10 años después / The dragonflies of Cuba: a taxonomic update 10 years later. *Revista Cubana de Ciencias Biológicas* 6(2): 1-8. (in Spanish, with English summary) ["The present work updates the systematic of the order Odonata

in Cuba to 88 species, ... included in six families and 41 genera. *Coryphaeschna apeora* Paulson, 1994; *Libellula gaigei* Gloyd, 1938 and *Tramea binotata* (Rambur, 1842) are considered new records. The order presents six endemic and they were carried out two you adjust taxonomic for the family Protoneuridae and the genus *Microneura*. Central Cuba is the region least studied for order, and Ciénaga de Zapata and Sagua-Baracoa are the regions of greatest interest for studies with odonates." (Authors)] Address: Trapero Quintana, A.D., Fac. de Biología, Univ. de La Habana, Cuba. E-mail: adrian.trapero@fbio.uh.cu

**17003.** Truong, V.K.; Vongsvivut, J.; Geeganagamage, N.; Tobin, M.J.; Luque, P.; Baulin, V.; Wemer, M.; Maclaughlin, S.; Crawford, R.J.; Ivanova, E.P. (2018): Study of melanin localization in the mature male *Calopteryx haemorrhoidalis* damselfly wings. *Journal of Synchrotron Radiation* 25: 874-877. (in English) ["*C. haemorrhoidalis* exhibiting black wings are found in the western Mediterranean, Algeria, France, Italy, Spain and Monaco. Wing pigmentation is caused by the presence of melanin, which is involved in physiological processes including defence reactions, wound healing and sclerotization of the insect. Despite the important physiological roles of melanin, the presence and colour variation among males and females of the *C. haemorrhoidalis* species and the localization of the pigment within the wing membrane remain poorly understood. In this study, infrared (IR) microspectroscopy, coupled with the highly collimated synchrotron IR beam, was employed in order to identify the distribution of the pigments in the wings at a high spatial resolution. It was found that the melanin is localized in the procuticle of the *C. haemorrhoidalis* wings, distributed homogeneously within this layer, and not associated with the lipids of the epicuticle." (Authors)] Address: Ivanovaa, Elena, Fac. of Science, Engineering & Tech., Swinburne Univ. Tech., PO Box 218, Hawthorn, VIC 3122, Australia. E-mail: elena.ivanova@mit.edu.au

**17004.** Tsutsui, M.H.; Kobayashi, K.; Miyashita, T. (2018): Temporal trends in arthropod abundances after the transition to organic farming in paddy fields. *PloS one* [11 Jan 2018, 13(1):e0190946]: 13 pp. (in English) ["Organic farming aims to reduce the effect on the ecosystem and enhance biodiversity in agricultural areas, but the long-term effectiveness of its application is unclear. Assessments have rarely included various taxonomic groups with different ecological and economic roles. In paddy fields with different numbers of years elapsed since the transition from conventional to organic farming, we investigated changes in the abundance of insect pests, generalist predators, and species of conservation concern. The abundance of various arthropods exhibited diverse trends with respect to years elapsed since the transition to organic farming. Larval lepidopterans, Tetragnatha spiders, and some planthoppers and stink bugs showed non-linear increases over time, eventually reaching saturation, such as the abundance increasing for several years and then becoming stable after 10 years. This pattern can be explained by the effects of residual pesticides, the lag time of soil mineralization, and dispersal limitation. *Ischnura asiatica* did not show a particular trend over time, probably



due to its rapid immigration from source habitats. Unexpectedly, both planthoppers and some leafhoppers exhibited gradual decreases over time. As their abundances were negatively related to the abundance of Tetragnatha spiders, increased predation by natural enemies might gradually decrease these insect populations. These results suggest that the consideration of time-dependent responses of organisms is essential for the evaluation of the costs and benefits of organic farming, and such evaluations could provide a basis for guidelines regarding the length of time for organic farming to restore biodiversity or the economic subsidy needed to compensate for pest damage." (Authors)] Address: Tsutsui, M.H., Lab. Biodiversity Science, Graduate School of Agricultural & Life Sci., Univ. Tokyo, Tokyo, Japan. E-mail: tmiya@es.a.u-tokyo.ac.jp

**17005.** Tuhin, M.S.H.; Khan, M.K. (2018): An updated list of Odonata of southwestern Bangladesh. *Journal of Threatened Taxa* 10(15): 12995-13001. (in English) ["An odonate survey was conducted throughout the southwestern region of Bangladesh, concentrating on eight districts and the Sundarban, from August 2014 to August 2016. A total of 50 species under 30 genera belonging to six families was recorded during the study period. Among these, 31 species belonged to Anisoptera and 19 to Zygoptera. Libellulidae and Coenagrionidae were the most dominant anisopteran and zygopteran families with 28 and 17 species, respectively. *Mortonagrion varalli* was newly added to the odonate fauna of Bangladesh." (Authors)] Address: M. Sajjad Hossain Tuhin, M.S.H., Forestry & Wood Tech. Discipline, Khulna Univ., Khulna 9208, Bangladesh. E-mail: tuhin.taxon@gmail.com

**17006.** Uboni, C.; Merluzzi, P.; Poldini, L.; Riservato, E.; Pizzul, E. (2018): First data on the reproduction of the Vagrant Emperor Anax ephippiger in North-Eastern Italy, Friuli-Venezia Giulia Region (Odonata Aeshnidae). *Bollettino della Società Entomologica Italiana* 150(3): 101-106. (in English, with Italian summary) ["A. ephippiger, is a migrant dragonfly species from Africa and Middle East; in Europe only summer generation are known, without evidence of overwintering larvae. In August 2010 a reproductive breeding site for this species was found in the Friuli-Venezia Giulia Region (north-eastern Italy). This discovery represents the first proof of reproduction for the species in north-eastern Italy. With the aim of increasing the knowledge on the species requirements, a study to delineate the emerging habitat was conducted: dragonfly community (adult and exuviae), vegetation, chemical and physical water parameters were sampled. This yielded data about larval tolerance toward salinity. This new data proves a northward move for the species, which may also have been facilitated by global warming." (Authors)] Address: Uboni, Costanza, Dept of Life Science, Univ. Trieste, Italia. E-mail: costanza.uboni@gmail.com

**17007.** Ueno, D.; Mizukawa, H.; Inanami, O.; Nagasaka, H.; Tatsuta, N.; Narazaki, Y.; Fujino, T.; Watanabe, I.; Kameda, Y.; Nakai, K. (2018): "Caddisfly watch," a biomonitoring program using *Stenopsyche* larvae to determine radioactive cesium contamination in rivers following the Fukushima nuclear disaster. *Landscape and Ecological Engineering* 14(1): 29-35.

(in English) ["The "Caddisfly Watch" program proposes the use of larvae of the caddisfly genus *Stenopsyche* (Trichoptera: Stenopsychidae) to monitor the radioactive cesium ( $^{137}\text{Cs}$ ) pollution, including that of suspended solids, in river environments, as a simple method was essential for this following the Fukushima nuclear disaster in March 2011. A variety of aquatic organisms were collected from rivers in Japan in 2012 and their levels of radioactive Cs measured. Amongst all the organisms collected, the highest concentrations of  $^{137}\text{Cs}$  were observed in caddisfly larvae. These larvae occur at a high density and can be collected at regular intervals in most rivers throughout Japan. It is proposed that caddisfly larvae can be used as bioindicators of radioactive Cs contamination in rivers, as their temporal and spatial changes are easily assessed." The study includes data on *Orthetrum albistylum* and *Sympetrum infuscatum*. (Authors) ] Address: Ueno, D., Dept of Environmental Sci., Fac. of Agriculture, Saga Univ., Saga, Japan. E-mail: uenod@cc.saga.u.ac.jp

**17008.** Underhill, L.; Lofie-Eaton, M.; Navarro, R. (2018): Dragonflies and damselflies of the Western Cape - OdonataMAP report, August 2018. *Biodiversity Observations* 9.7: 1-21. (in English) ["In the two-year period 1 July 2016 to 30 June 2018, citizen scientists added seven species to the list of dragonflies and damselflies in the Western Cape, bringing the total to 76 species. The database available for this report contained 11,267 records of dragonflies and damselflies. This includes the specimen record dating back to the start of the 20th century. Of these records 2,433 records (22%) were added between July 2016 and June 2017, and 4,202 (37%) between July 2017 and June 2018. Thus 59% of the entire Western Cape database of records of Odonata was contributed by citizen scientists in two years." (Authors)] Address: Les G Underhill Animal Demography Unit, Dept of Biological Sciences, Univ. of Cape Town, Rondebosch, 7701 South Africa; Biodiversity and Development Institute, 25 Old Farm Road, Rondebosch, 7700. South Africa

**17009.** Veljkovic, M. (2018): First record of the moustached darter *Sympetrum vulgatum* for the Bjelovar area, Croatia. *Natura Sloveniae* 20(1): 59-60. (in English) ["A juvenile female of *S. vulgatum* was found on 18. 7. 2017 at 11:27 a.m. in a meadow at Gomje Plavnice, Bjelovar (45°56'49.8" N, 16°51'50.0" E, 190 m above sea level), while resting on *Sorghum halepense* (L.) Pers.. A male specimen was found on 18.9. 2017 at 14:35 p.m., while resting on the ground in a backyard at Gomje Plavnice (45°56'32.3" N, 16°51'24.6" E, 230 m above sea level)." (Author)] Address: Veljkovic, Monika, Gomje Plavnice 56, 43000 Bjelovar, Croatia; E-mail: mv52874@gmail.com

**17010.** Verheyen, J.; Temmerman, K.; De Block, M.; Stoks, R. (2018): Voltinism-associated differences in winter survival across latitudes: integrating growth, physiology, and food intake. *Oecologia* 186(4): 919-929. (in English) ["Species that span large latitudinal gradients face strong differences in voltinism and in winter conditions within their range. Latitudinal gradients in winter survival and especially their underlying mechanisms and association with voltinism patterns are poorly stud-

ied. We tested in *Enallagma cyathigerum* whether high-latitude populations were better in dealing with the longer winters compared to central- and low-latitude populations and whether this was associated with changes in voltinism. We thereby evaluated whether higher initial levels and/or lower reductions during winter of energy storage (measured as fat content) and investment in immune function [measured as the activity of phenoloxidase (PO)], and/or stronger compensatory responses in food intake contributed to the higher winter survival in high-latitude populations. To this end, we simulated a long high-latitude winter at 4 °C under manipulated food conditions. Across food levels, winter survival was highest in Swedish larvae, intermediate in Belgian larvae, and lowest in Spanish larvae, indicating latitude-specific thermal adaptation that could be partly linked to differences in voltinism. The semi-voltine Swedish larvae were growing slower before winter and as a result accumulated the highest fat content and PO activity when the winter started compared to the univoltine, faster growing Belgian, and Spanish larvae. Fat content and PO activity declined during the winter, yet equally across latitudes, and were not buffered by compensatory food intake. Our data identified possible underlying physiological mechanisms of winter survival and support the hypothesis that widespread latitude-associated voltinism shifts may be a selective factor contributing to latitudinal shifts in winter survival." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**17011.** Vilela, D.S.; Guillermo-Ferreira, R.; Del-Carlo, K.; Cordero-Rivera, A. (2018): *Argia angelae* (Odonata: Zygoptera: Coenagrionidae) sp. nov. from Chapada dos Guimarães, Mato Grosso, Brazil. *Zootaxa* 4415(3): 549-560. (in English) ["*A. angelae* sp. nov. (Holotype ♂, Brazil, Mato Grosso, Chapada dos Guimarães, Rio Salgadeira (15°21'25" S, 55°49'51" W, 305 m), 1 xi 2015, D. S. Vilela leg., in LESTES, Cod. ACR 8173A) from Chapada dos Guimarães, Brazil is described, illustrated and diagnosed based on comparison with other known sympatric species of the genus. This species inhabits streams throughout the National Park and a map of its known distribution is provided." (Authors)] Address: Vilela, D.S., Lab. Ecol. Studies on Ethology & Evol. (LESTES), Dept Hydrobiol., Fed. Univ. São Carlos, Brazil. E-mail: deeogoo@gmail.com

**17012.** Vilela, D.S.; Guillermo-Ferreira, R.; Cordero-Rivera, A. (2018): Description of the female of *Dicterias atosanguinea* Selys 1853, with notes on male genital ligula and male behavior (Odonata: Dicteriidae). *Zootaxa* 4374(3): 441-450. (in English) ["The female of *Dicterias atosanguinea* Selys, 1853 is described and illustrated based on two specimens collected in Pará and Amazonas States, Brazil. We compare the female with the most closely related species, *Heliocharis amazona* Selys, 1853, and present SEM images of the genital ligula for both *D. atosanguinea* and *H. amazona* males. Additionally we provide behavioral observations on *D. atosanguinea* males." (Authors)] Address: Vilela, D.S., Graduate Program in Entomology, Dept of Biology, University of São Paulo (USP), Ribeirão Preto, Brazil. E-mail: deeogoo@gmail.com

**17013.** Vilela, D.S.; Guillermo-Ferreira, R.; Del-Claro, K.; Cordero-Rivera, A. (2018): Females of two species of *Argia* from Chapada dos Guimarães National Park, Brazil (Odonata: Coenagrionidae). *Zootaxa* 4420(3): 430-438. (in English) ["The female of *Argia tupi* Calvert, 1909 (BRAZIL, Mato Grosso, Chapada dos Guimarães National Park, Cachoeira do Marimbondo (15.4330° S, 55.7198° W, 370 m), 01 xi 2015) is described, illustrated and diagnosed based on comparison with sympatric species of *Argia* Rambur, 1842. We also augmented the description of *Argia bicellulata* (Calvert, 1909) female (BRAZIL, Mato Grosso, Chapada dos Guimarães National Park, Rio Paciencia (15.3438° S, 55.8322° W, 280 m), 25 x 2015)." (Authors)] Address: Vilela, D.S., Graduate Program in Entomology, Dept of Biology, Univ. of São Paulo (USP), Ribeirão Preto, Brazil. E-mail: deeogoo@gmail.com

**17014.** Vilenica, M.; Mihoci, I. (2018): Odonata collection of the Croatian Natural History Museum. *Natura Croatica: Periodicum Musei Historiae Naturalis Croatici* 27(1): 153-184. (in English, with Bosnian summary) ["A total 1,545 Odonata specimens stored in the collection of the Croatian Natural History Museum in Zagreb have been examined. The specimens were collected in the period between 1869 and 2011, mainly in Croatia, but also in the surrounding countries (Austria, Bosnia and Herzegovina, Italy, Montenegro, Serbia, Slovenia) and Switzerland. An overview of 61 species is presented. The most numerous species were *Ischnura elegans* and *Platycnemis pennipes*." (Authors)] Address: Vilenica, Marina, Fac. of Teacher Education, University of Zagreb, Trg Matice hrvatske 12, 44250 Petrinja, Croatia. E-mail: marina.vilenica@ufzg.hr

**17015.** Vinko, D.; Tratnik, A. (2018): Contribution of Biology research Camp 2017 to the knowledge of dragonfly fauna of the Gorenjska region. *Acta Entomologica Slovenica* 26(2): 243-258. ["During Biology research Camp 2017 – Predoslje 38 dragonfly species were reported from 65 localities during 20th to 28th July 2017. Geographically, research was focused on eastern part of Gorenjska region (Central-NW Slovenia). Two species are new for the area: *Ophiogomphus cecilia* and *Anax ephippiger*, each recorded on one site. *A. ephippiger* is also new for the whole Gorenjska region. Additional records of *Lestes barbarus*, *Chalcolestes viridis*, *Erythromma viridulum*, *Aeshna affinis*, *A. isoceles*, *Somatochlora metallica*, *Libellula fulva*, *Sympetrum meridionale* and *S. vulgatum*, which are known only from few sites in the region or are considered rare are added. new populations of *Cordulegaster heros* were recorded, for the first time in the Poljanska dolina Valley. 11 recorded species are included on Slovene red Data List, 4 are in the country protected and 2 are listed on Annexes of Habitats Directive. Also Park Brdo pri Kranju was investigated, where together with our records 39 dragonfly species were recorded, and lake Pristava in Mengeš and two ponds in Hraše, which are with 43 or 30 dragonfly species one of the richest sites in Slovenia according to dragonfly fauna. Altogether 54 dragonfly species are now mapped for eastern part of Gorenjska region although, 8 species were not recorded in recent periods and 63 for the whole region." (Authors)] Address: Vinko, D., Slovensko odonatološko društvo, Verovškova

56, Si-1000 Ljubljana, Slovenia. E-mail: damjan.vinko@gmail.com

**17016.** Walia, G.K.; Katnoria, N. (2018): Morphological variation in the chromosome complement of *Neurobasis chinensis chinensis* of family Calopterygidae (Odonata: Zygoptera). *International Journal of Life Sciences Research* 6(4): 260-266. (in English) ["Chromosome complement of *N. chinensis chinensis* has been characterized by conventional staining and C-banding. The specimens were collected from Sadhupul (Solan), Ghumarwin (Bilaspur) of Himachal Pradesh and Lachhiwala (Dehradun) of Uttarakhand states of India. The species possesses  $2n=23$  as the diploid chromosome number with XO-XX sex determination. Morphological variation in the chromosome complement has been observed in the species collected from different localities. In the spermatogonial metaphase, two large sized autosome pairs are present in specimens of Lachhiwala (Dehradun) and Sadhupul (Solan) and one large pair and other smaller than it are seen in specimens of Ghumarwin (Bilaspur). Similarly, in the diakinesis, two equal sized, large autosomal bivalents possess two interstitial and terminal chiasmata in the specimens of Lachhiwala (Dehradun) and Sadhupul (Solan). On the other hand, one extra large autosomal bivalent shows terminal and interstitial chiasmata, while second small bivalent reveals terminal chiasmata as remaining bivalents in the specimens of Ghumarwin (Bilaspur). These variations have also been confirmed by C-banding. In the diakinesis, C-bands are mostly present at the terminal ends of all the bivalents, while both the autosomal bivalents of Lachhiwala (Dehradun) and Sadhupul (Solan) specimens and one extra large autosomal bivalent of Ghumarwin (Bilaspur) specimens possess terminal as well as interstitial C-bands. X chromosome is C-positive throughout the length in all the specimens." (Authors)] Address: Kaur Walia, Gurinder, Dept of Zoology and Environmental Sciences, Punjabi University, Patiala, India

**17017.** Walia, G.K.; Katnoria, N.; Gill, J.K. (2018): Chromosomes of *Libellago lineata lineata* (Chlorocyphidae: Odonata). *Indian Journal of Entomology* 80(3): 737-740. (in English) ["Linear characterization and course of meiosis in the zygopteran *Libellago lineata lineata* (Chlorocyphidae) are described by conventional staining, C-banding, silver nitrate staining and sequence specific staining. There are two complements  $n=12$  and  $n=13$ , without m chromosomes. Increase in chromosome number is due to the fragmentation of medium sized autosome pair. Dark terminal C-bands are present on 9 autosomal bivalents, while remaining 3 bivalents and X chromosome show less amount of C-heterochromatin; 10 autosomal bivalents show terminal NOR-bands; while X chromosome is NOR-negative. All the autosomes and X chromosome possess less intense DAPI and bright CMA3 signals, which indicate complement is rich in GC rich regions than AT rich regions." (Authors)] Address: Walia, Gurinder Kaur, Dept of Zoology & Environmental Sciences, Punjabi University, Patiala 147002, Punjab, India

**17018.** Walia, G.K.; Chahal, S.S.; Somal, D.S. (2018): Chromosome observations based on C-banding, Ag-NOR and

sequence-specific staining in two *Anax* species from India (Odonata: Aeshnidae). *Odonatologica* 47(1/2): 145-160. (in English) ["The previously known male karyotypes ( $2n = 27$ ,  $m; n = 14, m; X0$  sex determination) of *Anax immaculifrons* and *A. nigrofasciatus nigrolineatus* from Himachal Pradesh are redescribed, based on conventional staining and are described for the first time using three other staining techniques. In the two species, C-bands occur on chiasmatic/non-chiasmatic bivalent ends, there is a C-positive X, while the m bivalent is C-negative in *A. immaculifrons* and C-positive in *A. nigrofasciatus*. The other details are given in the text and micrographs are provided." (Authors)] Address: Kaur Walia, Gurinder, Dept Zool. & Environ. Sci., Punjabi Univ., Patiala-147002, Punjab, India. E-mail: gurinderkaur\_walia@yahoo.co.in

**17019.** Wang, J.; Wang, C.; Zhao, M.; Feng, Y. (2018): Mercury absorption, enrichment and water-land transfer by aquatic insects. *Biotic Resources* 40(6): 507-511. (in Chinese, with English summary) ["Mercury is a non-essential and toxic heavy metal element of the human body. Global mercury pollution has attracted much attention because of its damage to human health. Most of the mercury in nature enters aquatic ecosystems through river runoff and the deposition of rain and snow dust, with at least 10, 000 tons of mercury entering the aquatic ecosystem each year. As an important consumer animal, aquatic insects are an important part of the aquatic ecological food network and play an important role in the material cycle of aquatic ecosystems. This paper introduces the related research between aquatic insects and mercury in recent years, focusing on the absorption and enrichment of mercury by aquatic insects, and analyzing the role of aquatic insects in the water-land transfer of mercury. The research data show that the degree of mercury absorption by aquatic insects is related to environmental factors and is transferred to terrestrial ecosystems through different pathways, which poses a certain threat to the organisms in the upper food chain of terrestrial ecosystems. At the same time of development and utilization of aquatic insects, whether the mercury exceeds the standard should be considered." (Authors)] Address: Wang, J., Res. Inst. of Resource Insects, Chinese Acad. Forestry, Kunming 650233, Yunnan, China. E-mail: jdwang666@163.com.

**17020.** Wasscher, M.; Goudsmits, K. (2018): Unusual Chinese records of *Lestes sponsa*, *Coenagrion armatum* and *Libellula quadrimaculata* (Odonata: Lestidae, Coenagrionidae, Libellulidae), far south of their known range. *Notulae odonatologicae* 9(2): 55-59. (in English) ["In 1995 and 2017 during excursions to high-altitude mountains in the Chinese provinces of Yunnan and Sichuan small numbers of dragonflies were encountered. These included two Palaearctic (*C. armatum*, *L. sponsa*) and one Holarctic (*L. quadrimaculata*) species present well south of their known range. These sightings are noted and revised distribution maps of the three species are presented." (Authors)] Address: Wasscher, M., Minstraat 15 bis, 3582 CA Utrecht, The Netherlands. E-mail: marcel.hilair@12move.nl

**17021.** White, J.C.; House, A.; Punchard, N.; Hannah, D.M.; Wilding, N.A.; Wood, P.J. (2018): Macroinvertebrate community responses to hydrological controls and groundwater



abstraction effects across intermittent and perennial headwater streams. *Science of the Total Environment* 610-611: 1514-1526. (in English) ["Intermittent rivers comprise a significant proportion of river networks globally and their spatial extent is predicted to increase with rising water abstraction pressures. Despite this, the ecological implications of hydrological modifications within intermittent rivers have received limited research attention. This paper examines macroinvertebrate assemblages across intermittent and perennial sections of headwater streams within the Hampshire Avon catchment (United Kingdom) over a five-year period. The composition of faunal assemblages was quantified in relation to four hydrological metrics: the duration of flowing conditions, the geographical proximity to the nearest perennial source along each watercourse (two observed flow parameters) and two modelled groundwater abstraction influences. The results highlight that macroinvertebrate communities inhabiting sites which dry periodically and are positioned at greater distances (>c. 2.5km) above the perennial source (the most upstream point of permanent flow within a given year) possessed the highest conservation values. These sites supported species that are rare in many areas of Europe (e.g. Ephemeroptera: *Paraletophlebia weneri*) or with limited geographical distribution across the United Kingdom (e.g. Trichoptera: *Limnephilus bipunctatus*). A range of faunal community diversity indices were found to be more sensitive to the antecedent flow duration and distance from the perennial source, rather than any effects of groundwater abstraction. Taxonomic richness responded most strongly to these observed flow parameters and varied more markedly with the distance from the perennial source compared to the antecedent flow duration. Several taxa were significantly associated with the observed flow parameters, particularly those predominantly inhabiting perennially flowing systems. However, the distance that such fauna could migrate into intermittent reaches varied between taxa. This research demonstrates the overriding importance of antecedent flow durations and the geographical proximity to perennial sources on macroinvertebrate communities within intermittent and perennial headwater streams." *Calopteryx splendens* is the only odonate species mentioned (Authors)] Address: White, J.C., Dept of Geography, Loughborough Univ., Loughborough, Leicestershire LE11 3TU, UK. E-mail: J.White2@lboro.ac.uk

**17022.** Wildermuth, H.; Weibel, U. (2018): Elisabeth Ris: eine Schweizerin im Namen der Balkan-Adonislibelle *Pyrrhosoma elisabethae* Schmidt, 1948 (Odonata: Coenagrionidae). *Entomo Helvetica* 11: 31-38. (in German, with English and French summaries) ["Elisabeth Ris: a Swiss lady in the name of the Greek Red Damselfly *Pyrrhosoma elisabethae* Schmidt, 1948 (Odonata: Coenagrionidae). - The German odonatologist Erich Schmidt (1890–1969) dedicated *P. elisabethae*, a damselfly endemic to northern Greece and southern Albania, to Elisabeth Ris (1872–1959), the sister of the Swiss psychiatrist and odonatologist Friedrich Ris, in consideration of her social merits. Her merits for entomology were indirect by housekeeping for the family and assistance in the mental hospital of Rheinau, thus disburdening her brother as director of the hospital and supporting him in his entomological studies. After his

death in 1931 she took care of his allowance, amongst others his insect collections of which the Senckenberg Museum Frankfurt a. M. inherited the Odonata and the Naturforschende Gesellschaft in Schaffhausen the Lepidoptera. After her death in 1959, Elisabeth Ris donated 5.000 CHF and her brother's slide collection to this society." (Authors)] Address: Weibel, U., Museum zu Allerheiligen, Baumgartenstr. 6, 8200 Schaffhausen, Switzerland. E-mail: urs.weibel@stsh.ch

**17023.** Wiszniowska, M.; Buczynski, P. (2018): Późne stwierdzenie *Anax ephippiger* (BURMEISTER, 1839) (Odonata: Aeshnidae) w Polsce południowej A late record of *Anax ephippiger* (BURMEISTER, 1839) (Odonata: Aeshnidae) in southern Poland. *Odonatrix* 14\_4 (2018): 4 pp. (in Polish, with English summary) ["A male of *A. ephippiger* was recorded on 8-X-2018 at the "Górnik" Pond in Katowice-Giszowiec (S Poland, 50°12'56" N, 19°04'31" E, UTM: CA66). One of the latest in both Poland and central-eastern Europe, this record is discussed in the context of this species' distribution and biology. A third generation can be ruled out, because the second generation in Poland emerges late (2nd half of July – 1st half of August) and larval development takes at least 80-90 days. The options considered are: (1) direct, late migration from the south; (2) the exceptionally late emergence of the 2nd generation in Poland, possibly resulting from later migration from the south than usual; (3) the return migration of an individual from a population that reproduced farther north. It is worth noting that the date of this Katowice record coincides with the return migration period in central Asia." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**17024.** Xu, S.; Guan, Z.; Huang, Q.; Xu, L.; Vierstraete, A.; Dumont, H.J. (2018): The mitochondrial genome of *Atrocalopteryx melli* Ris, 1912 (Zygoptera: Calopterygidae) via Ion Torrent PGM NGS sequencing. *Mitochondrial DNA Part B* 3(1): 115-117. (in English) ["The mitochondrial genome of *Atrocalopteryx melli* was sequenced and assembled via Next-Generation Sequencing (NGS) and iteratively assembly process with a reference seed. This genome is 15,562 bp long and A + T biased (71%), with 37 genes arranged in common order of Odonata. All protein-coding genes are initiated by typical "ATN" codon, and 9 genes are terminated with a complete stop codon, except *nad4*, *nad5*, *cox2*, and *cox3*, which are terminated with an incomplete codon "T(aa)". The S5 intergenic spacer is absent in this genome, supporting that lacking of S5 as a specific character for damselflies. The A + T rich region of *A. melli* is 267 bp longer than that of *A. atrata*. This mitogenome provides new molecular information for understanding of *A. melli* and *Atrocalopteryx*." (Authors)] Address: Lin, Qiuqi, Inst. Hydrobiology, Jinan Univ., Guangzhou, China. E-mail: tlinqq@jnu.edu.cn

**17025.** Yamaguchi, Y.; Okubo, T.; Matsushita, M.; Wataji, M.; Iwasaki, S.; Hayasaka, K.; Akizawa, K.; Matsuo, J.; Shimizu, C.; Yamaguchi, H. (2018): Analysis of adult damselfly fecal material aids in the estimation of antibiotic-re-

sistant Enterobacterales contamination of the local environment. PeerJ 6:e5755 <https://doi.org/10.7717/peerj.5755>: 19 pp. (in English) ["Because damselflies are ubiquitously but focally present in natural environments and play a critical role as predators of other insect species, the fecal matter of damselflies may be useful for investigating antibiotic-resistant bacterial populations, including human pathogens, in local environments. We therefore examined the prevalence of antibiotic-resistant bacteria, including Enterobacterales, in fecal material from 383 damselflies (adults and larvae) collected from seven locations around Sapporo City, Japan, in 2016 and 2017. Fecal samples were plated on soybean casein digest (SCD) agar plates with and without antibiotics (SCD-A and SCD-w/o, respectively) to identify environmental bacteria and gut bacteria, respectively, and on MacConkey agar plates with antibiotics (MacConkey-A) to select for Gram-negative bacteria, including human pathogenic Enterobacterales species. The prevalence of colonies on each of the plates was compared, and representative colonies on MacConkey-A plates were identified to the species level using an API 20E kit and the MALDI Biotyper system. Overall, SCD-w/o plates showed a gut bacterial load of approximately 108 colony-forming units per adult damselfly or larva. There was a significant difference between the prevalence of colonies on the SCD-A and MacConkey-A plates, and a significantly increased prevalence of antibiotic-resistant bacteria on MacConkey-A plates was observed in samples collected from Shinoroshinkawa. Cluster analysis based on minimum inhibitory concentration values of 59 representative isolates from MacConkey-A agar plates revealed that samples from Shinoroshinkawa contained a higher prevalence of Enterobacterales than those from other sampling locations. Thus, fecal materials discharged by adult damselflies could be used in future studies as a simple tool for estimating antibiotic-resistant bacteria, including Enterobacterales species, in the local environment." (Authors)] Address: Yamaguchi, Y., Hokkaido Sapporo Asahigaoka Senior High School, Sapporo, Japan. E-mail: [hiroyuki@med.hokudai.ac.jp](mailto:hiroyuki@med.hokudai.ac.jp)

**17026.** Yapo, M.L.; Tuo, Y.; Koné, M.; Atse, B.C.; Kouassi, P. (2018): Diversity and distribution of odonata larvae in some tropical fish farm ponds (Southern Côte D'ivoire, West Africa). *Jour. Sci. Res. Allied Sci.* 3(4): 51-64. (in English) ["Diversity and distribution of Odonata larvae collected in some fish farm ponds of Southern Cote d'Ivoire were studied. In each pond, samples were collected in the water column using a 350 µm mesh hand-net and in the sediment using a van Veen grab. Environmental variables such as transparency, temperature, pH, dissolved oxygen, and conductivity were measured in situ. Water samples were taken and conducted to the laboratory where analyses of dissolved inorganic nutrients were carried out. A total of 11 taxa belonging to 3 families (Coenagrionidae, Libellulidae, and Gomphidae) were recorded. Odonata fauna was qualitatively dominated by Coenagrionidae and Libellulidae. Quantitatively this fauna was dominated by Coenagrionidae. *Pseudagrion wellani* was the most abundant taxa within the Odonata assemblage. Azaguie recorded the highest species richness and the highest abundance. This station recorded the maximum values of Shannon-Wiener diversity index and evenness. Odonata can be used as a potential

instrument in future ecology studies in Ivorian aquatic ecosystems." (Authors)] Address: Yapo, M. L., Dépt de Biologie Animale, UFR Sciences Biologiques, Université Peleforo Gon Coulibaly, Korhogo, BP 1328 Korhogo, Côte d'Ivoire

**17027.** Yeo, D.; Puniamoorthy, J.; Ngiam, R.W.J.; Meier, R. (2018): Towards holomorphology in entomology: rapid and cost-effective adult-larva matching using NGS barcodes. *Systematic Entomology* 43(4): 678-691. (in English) ["In many taxa the morphology of females and immatures is poorly known because species descriptions and identification tools have a male bias. The root causes are problems with matching life-history stages and genders belonging to the same species. Such matching is time-consuming when conventional methods are used (e.g. rearing) and expensive when the stages are matched with DNA barcodes. Unfortunately, the lack of associations is not a trivial problem because it renders a large part of the phenome of insects unexplored, although larvae and females are useful sources of characters for descriptive and phylogenetic purposes. In addition, many collectors intentionally avoid females and immature stages, which skews survey results, interferes with collecting life-history information, and makes it less likely that rare species are discovered. These problems even exist for well-studied taxa like Odonata, where obtaining adult-larva matches relies largely on rearing. Here we demonstrate how the matching problem can be addressed with cost-effective tagged amplicon sequencing of a 313-bp segment of *cox1* with next-generation sequencing (NGS) ('NGS barcoding'). We illustrate the value of this approach based on Singapore's odonate fauna which is of a similar size as the European fauna (Singapore, 122 extant species; Europe, 138 recorded species). We match the larvae and adults of 59 species by first creating a barcode database for 338 identified adult specimens representing 83 species. We then sequence 1178 larvae from a wide range of sources. We successfully barcode 1123 specimens, which leads to adult-larva matches for 59 species based on our own barcodes (55) and online barcode databases (4). With these additions, 84 of the 131 species recorded in Singapore have now been associated with a species name. Most common species are now matched (83%), and good progress has been made for vulnerable/near-threatened (55%), endangered (53%), and critically endangered species (38%). We used nondestructive DNA extraction methods in order to be able to use high-resolution imaging of matched larvae to establish a publicly available digital reference collection for odonates which is incorporated into 'Biodiversity of Singapore' (<https://singapore.biodiversity.online/>). We suggest that the methods described here are suitable for many insect taxa because NGS barcoding allows for fast and low-cost matching of well-studied life-history stages with neglected semaphoronts (eggs, larvae, females). We estimate that the specimen-specific amplicons in this study (c. 1500 specimens) can now be obtained within eight working days and that the laboratory and sequencing cost is c. US\$600 (<US\$0.40 per specimen)." (Authors)] Address: Meier, R., Department of Biological Sciences, National University of Singapore, 14 Science Drive 4, #05-20 Singapore, 117543. E-mail: [meier@nus.edu.sg](mailto:meier@nus.edu.sg)

**17028.** Yerokine, M.; Couteyen, S. (2018): Contribution à la connaissance des Odonates de l'île de la Réunion 11. Présence d'*Anax tristis* Hagen, 1867 et *Hemianax ephippiger* (Burmeister, 1839) à la Réunion (Odonata: Aeshnidae). Cahiers scientifiques de l'océan Indien occidental 9: 15-16. (in French) [L'étang de Saint-Paul 14-1-2018, *A. tristis* (n = 2) and *H. ephippiger* (n = 10).] Address: Couteyen, S., Association Réunionnaise d'Ecologie (AReE), France. E-mail: scouteyen@ecologie.re

**17029.** Yin, C.; Jin, L.; Sun, F.; Xu, X.; Shao, M.; Zhang, Y. (2018): Phytotoxic and antifungal metabolites from *Curvularia crepinii* QTYC-1 isolated from the gut of *Pantala flavescens*. *Molecules* 2018, 23, 951; doi:10.3390/molecules23040951: 9 pp. (in English) ["Four metabolites (1–4), including a new macrolide, O-demethylated-zeaenol (2), and three known compounds, zeaenol (1), adenosine (3), and ergosta-5,7,22-trien-3b-ol (4) were isolated and purified from *Curvularia crepinii* QTYC-1, a fungus residing in the gut of *P. flavescens*. The structures of isolated compounds were identified on the basis of extensive spectroscopic analysis and by comparison of the corresponding data with those reported in the literature previously. The new compound 2 showed good phytotoxic activity against *Echinochloa crusgalli* with an IC<sub>50</sub> value of less than 5 g/mL, which was comparable to that of positive 2,4-dichlorophenoxyacetic acid (2,4-D). Compound 1 exhibited moderate herbicidal activity against *E. crusgalli* with an IC<sub>50</sub> value of 28.8 g/mL. Furthermore, the new metabolite 2 was found to possess moderate antifungal activity against *Valsa mali* at the concentration of 100 g/mL, with the inhibition rate of 50%. These results suggest that the new macrolide 2 and the known compound 1 have potential to be used as biocontrol agents in agriculture." (Authors)] Address: Yin, C., School of Life Sci., Anhui Agri. Univ., Hefei 230036, China. E-mail: ying-laozhang@aliyun.com

**17030.** Yoshida, M.; Kawata, N.; Uchida, S. (2018): Dragonflies (Insecta: Odonata) in and around the Yakusa Campus of Aichi Institute of Technology, central Honshu, Japan. *Aichi Institute of Technology Research Report* 53: 85-93. (in Japanese, with English summary) ["Records of dragonflies in and around the Yakusa Campus of Aichi Institute of Technology, central Honshu, Japan, were reviewed, and dragonfly nymphs and adults were collected eight times from April to November in 2016 at five ponds in and around the campus. We found the records of 58 dragonfly species (including two species newly found in 2016) since 1970's in the literature, but only 35 dragonfly species were collected in 2016. This decrease of species richness can be caused by the predation on dragonfly nymphs by the invasive fishes; largemouth bass, *Micropterus salmoides* and bluegill, *Lepomis macrochirus* and by the invasive crayfish, *Procambarus clarkii*, inhabiting four of the five ponds. We propose removal of these invasive predators from the four ponds to enrich the species diversity of dragonflies." (Authors)] Address: not translated

**17031.** Zhang, S.; Sunami, Y.; Hashimoto, H. (2018): Deformation behavior of dragonfly-inspired nodus structured wing in gliding flight through experimental visualization approach.

*Scientific Reports* 8:5751 | DOI:10.1038/s41598-018-24237-x: 7 pp. (in English) ["Dragonfly has excellent flight performance and maneuverability due to the complex vein structure of wing. In this research, nodus as an important structural element of the dragonfly wing is investigated through an experimental visualization approach. Three vein structures were fabricated as, open-nodus structure, closed-nodus structure (with a flex-limiter) and rigid wing. The samples were conducted in a wind tunnel with a high speed camera to visualize the deformation of wing structure in order to study the function of nodus structured wing in gliding flight. According to the experimental results, nodus has a great influence on the flexibility of the wing structure. Moreover, the closed-nodus wing (with a flex-limiter) enables the vein structure to be flexible without losing the strength and rigidity of the joint. These findings enhance the knowledge of insect-inspired nodus structured wing and facilitate the application of Micro Air Vehicle (MAV) in gliding flight." (Authors)] Address: Sunami, Y., Micro/Nano Technology Center, Tokai University, 4-1-1 Kitakaname, Hiratsuka-city, Kanagawa, 259-1292, Japan. E-mail: sunami@tokai-u.jp

**17032.** Zhang, Z.; Zhang, L.; Yu, Z.; Liu, J.; Li, X.; Liang, Y. (2018): In-situ mechanical test of dragonfly wing veins and their crack arrest behavior. *Micron* 110: 67-72. (in English) ["Highlights: •Dynamic fracture process of dragonfly wing was detected by in-situ tensile device. •The nano-mechanical test and in-situ tensile test combined. •The trend of elastic modulus and nano-hardness was consistent with the tensile test. •Veins and the membranes played a different role on function of crack prevention. Abstract: In natural biological systems, many insects in complex environments exhibit exemplary mechanical properties. Dragonfly wings are light and strong enough to withstand wind loading. Their rigid veins play supporting and strengthening roles to enhance resistance to fatigue. To explore the effect of veins on arresting cracking in the wing, the costa, subcosta, radius R1, and two areas of dragonfly hind wings were samples for in situ tensile tests. The fracture process of the samples was observed with a high-speed camera and a scanning electron microscope. The mechanical properties of the veins and the results of nanomechanical tests on the wings were analyzed. The costa was stiffer and more resistant to deformation than the subcosta and radius, but it was less tough. The results of this study may provide inspiration for the design of mechanical structures and materials." (Authors)] Address: Li, X., Key Lab of Bionic Engineering, Ministry of Education, Jilin University, Changchun 130025, China. E-mail: xiujuanli@jlu.edu.cn

**17033.** Zheng, D.; Shi, T.; Wang, H.; Chang, S.-C.; Dou, L.; Wang, B.; Zhang, H. (2018): *Hongheia xui* gen. et sp. nov., the second Earliest Jurassic damsel-dragonfly (Odonata: Campteroptelebiidae) from the Junggar Basin, NW China. *Comptes Rendus Palevol.* 17(6): 346-350. (in English, with French summary) ["A new campteroptelebiid damsel-dragonfly, *Hongheia xui* gen. et sp. nov., is described from the Lower Jurassic Badaowan Formation of the Junggar Basin, NW China. This is the second Chinese Campteroptelebiidae recorded for the earliest Jurassic, reflecting the quick diversification and radiation of the damsel-dragonflies during this



period. *H. nouveau ongha* gen. nov. is closely related to Chinese genera *Zygokaratawia* and *Ctenogampophlebia*, both from the Middle Jurassic of the Daohugou Biota; but differs from these genera in having a larger wing size, RP2 slightly distal of Sn, and a narrower area between IR2 and RP3/4." (Authors)] Address: Zheng, D., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, 39, East Beijing road, Nanjing 210008, China

**17034.** Zheng, D.; Nel, A.; Chang, S.-C.; Wang, B. (2018): A new progobiaeshnid dragonfly (Odonata, Aeshnoptera) from the Lower Cretaceous of Liaoning Province, NE China. *Cretaceous Research* 90: 1-6. (in English) ["The clade Aeshnoptera contains the most diverse fossil dragonfly in China, mainly recorded in the Lower Cretaceous. Here, a new aeshnopteran dragonfly, *Paradecoraeshna liaoningensis* Zheng, Nel and Zhang, gen. et sp. nov., attributed to the family Progobiaeshnidae, is described from the Lower Cretaceous Yixian Formation of Liaoning, NE China. Within Progobiaeshnidae, *Paradecoraeshna* gen. nov. shares mixed characters with *Decoraeshna* and *Mongoliaeshna*. These genera are well-differentiated from Progobiaeshna and Gobiaeshna in having an empty hypertriangle." (Authors)] Address: Zheng, D., State Key Laboratory of Palaeobiology & Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing, 210008, China

**17035.** Zheng, D.; Nel, A.; Zhang, H.; Chang, S.-C.; Jarzembowski, E.A.; Zhuo, D.; Wang, B. (2018): A highly diverse coenagrionoid damselfly group (Odonata: Zygoptera: Burmacoenagrionidae fam. nov.) from mid-Cretaceous Burmese amber. *Journal of Systematic Palaeontology* 17(3): 239-253. (in English) ["The damselfly superfamily Coenagrionoidea is the largest zygopteran group, comprising three-fifths of all extant damselfly species. The Mesozoic fossil record of this superfamily is sparse, whilst it is relatively common in Burmese amber. A new coenagrionoid family, Burmacoenagrionidae Zheng et al., fam. nov., is established here based on four new species in three new genera: *Burmacoenagrion pretiosus* Zheng et al. gen. et sp. nov., *Burmachistigma cheni* Zheng et al. gen. et sp. nov., *Electrocoenagrion elongatum* Zheng et al. gen. et sp. nov. and *Electrocoenagrion forficatum* Zheng et al. gen. et sp. nov. The previously described damselfly genus, *Burma-grion* M€ostel et al., 2017, is transferred to this family. Burmacoenagrionidae Zheng et al. fam. nov. has a long pterostigma covering 3–5 cells, pigmented wings and a sigmoidally curved RA and RP1 distal of the pterostigma, differing from other coenagrionoid damselflies. Until now, this is the most diverse damselfly family reported from Burmese amber, showing that the Coenagrionoidea were already highly diversified 100 million years ago." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**17036.** Zheng, D.; Zhang, H.; Wang, B.; Chang, S.-C. (2018): A new species of damsel-dragonfly (Odonata: Stenophlebiidae: *Cretastenophlebia*) from the Lower Cretaceous of the Jiuquan Basin, northwestern China. *Earth and Environmental*

*Science Transactions of The Royal Society of Edinburgh* 107(2-3): 185-189. (in English) ["Abundant insect fossils have been recorded from the Lower Cretaceous of the Jiuquan Basin, but very few odonatans have been recorded. In this paper, a new damsel-dragonfly, *Cretastenophlebia jiuquanensis* sp. nov., is described from the Lower Cretaceous Zhonggou Formation in the Hanxiagou outcrop, Jiuquan Basin, northwestern China. This is the second species of the genus *Cretastenophlebia* Fleck et al., 2003. *C. jiuquanensis* sp. nov. differs from *Cretastenophlebia mongolica* Fleck et al., 2003 in the presence of a broad discoidal triangle, a basally straight IR1 and less cells along the posterior wing margin between IR2 and RP2. *Cretastenophlebia* has been previously reported from the Lower Cretaceous of Bon-Tsagaan, central Mongolia. The new discovery expands the record of *Cretastenophlebia* to the Jiuquan Basin in Albian." (Authors)] Address: Zheng, D., State Key Lab. of Palaeobiology & Stratigraphy, Nanjing Inst. of Geology and Palaeontology, Chinese Acad. of Sciences, 39 East Beijing Road, Nanjing 210008, China

**17037.** Zheng, D.; Nel, A.; Jarzembowski, E.A.; Chang, S.-C.; Zhou, Z.; Wang, B. (2018): The second mesomegaloprepid damselfly (Odonata: Zygoptera) from mid-Cretaceous Burmese amber. *Cretaceous Research* 90: 131-135. (in English) ["The mesomegaloprepids are some of the most abundant fossil damselflies in mid-Cretaceous Burmese amber characterized by large size, brown colour and dense wing venation. Here we described a new damselfly, *Cretamegaloprepus zhouae* Zheng, Nel and Wang, gen. et sp. nov., representing the second known genus and species of Mesomegaloprepidae Huang et al. (2017). *Cretamegaloprepus* Zheng, Nel & Wang, gen. nov. greatly differs from *Mesomegaloprepus* Huang et al. (2017) in having no secondary antenodal and antesubnodal crossveins, the Arc being aligned with Ax2, free discoidal and subdiscoidal cells, base of IR2 being very far distal of Sn, shorter CuA ending on posterior wing margin before RP2 base, and a net of irregular cells near base of RP2. The diagnostic characters of Mesomegaloprepidae and Mesomegaloprepus are revised based on the new damselfly." (Authors)] Address: Zheng, D., State Key Lab. of Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, China. E-mail: dranzheng@gmail.com

**17038.** Zheng, D.; Nel, A.; Chang, S.-C.; Jarzembowski, E.A.; Zhang, H.; Wang, B. (2018): A well-preserved true dragonfly (Anisoptera: Gomphides: Burmagomphidae fam. nov.) from Cretaceous Burmese amber. *Journal of Systematic Palaeontology* 16(1): 881-889. (in English) ["Amber inclusions have been studied for several centuries, but true dragonflies are extremely rare, with only several poorly preserved wings recorded. In Burmese amber, odonatans are relatively diverse, but true dragonflies are still rare. An excellently preserved true dragonfly, *Burmagomphides electronica* Zheng, Nel & Wang gen. et sp. nov., representing the new family Burmagomphidae Zheng, Nel & Wang fam. nov., is described here from Cretaceous Burmese amber. This is the first well-preserved true dragonfly with complete wings in this amber. It is attributed to the clade Oligophlebiata because it has symmetrical RP

branches at the midfork and a well-developed trigonal planate as in the clade Hagenioidea, and the vein CuAa distinctly shortened with reduced pectinate branching as in *Brevicubitalia*; it differs, however, from the latter two in having a narrow hind wing base." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**17039.** Zheng, D.; Jiang, T.; Nel, A.; Jarzembowski, E.A.; Chang, S.-C.; Zhang, H.; Wang, B. (2018): *Paraburmagomphidae* fam. nov., a new gomphid dragonfly family (Odonata: Anisoptera) from mid-Cretaceous Burmese amber. *Cretaceous Research* 92: 214-219. (in English) ["True dragonflies are comparatively common in Burmese amber. Here, we describe *Paraburmagomphides zhaoi* gen. et sp. nov., and establish a new family *Paraburmagomphidae* fam. nov. This family is placed in the clade 'Oligophlebiata' because it has a distinctly short CuAa with reduced pectinate branching (found in 'Brevicubitalia' and *Burmagomphidae*), and symmetrical RP branching at the midfork (developed in *Hagenioidea* and *Burmagomphidae*). *Paraburmagomphidae* are characterized by crossed discoidal and subdiscoidal triangles and four-celled anal loops." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**17040.** Zheng, D.; Chang, S.-C.; Wang, B. (2018): A new dysagrionid damselfly (Odonata: Zygoptera: Palaeodysagrion) from mid-Cretaceous Burmese amber. *Alcheringa: An Australasian Journal of Palaeontology* 42(2): 300-304. (in English) ["Dysagrionidae are common in Paleogene sedimentary rocks, but rarely recorded in the Mesozoic. This family, however, is diverse in Burmese amber. A new dysagrionid damselfly, *Palaeodysagrion youlini* Zheng, Chang & Chang sp. nov., is described here based on a well-preserved specimen (holotype) in Burmese amber. The new damselfly provides wing apex and body characters for *Palaeodysagrion*. It differs from *Palaeodysagrion cretacia* in having Arc slightly distal of Ax2, the midfork slightly basal of the nodus, Cr and Sn almost perpendicular to RA and RP and in having a simple wing system. This is the fourth dysagrionid damselfly described from the Burmese amber." (Authors)] Address: Chang, Su-Chin, Dept of Earth Sciences, Univ. Hong Kong, Hong Kong Special Administrative Region, PR China. E-mail: [suchin@hku.hk](mailto:suchin@hku.hk)

**17041.** Zheng, D.; Nel, A.; Chang, S.-C.; Jarzembowski, E.A.; Zhuo, D.; Wang, B. (2018): *Paracoryphagrionidae* fam. nov., a pseudostigmatoid damselfly from mid-Cretaceous Burmese amber showing regular series of triangular cells (Odonata: Zygoptera: Coenagrionida). *Cretaceous Research* 81: 93-97. (in English) ["*Paracoryphagrionidae* Zheng, Nel and Wang fam. nov., a new damselfly family based on the genus and species *Paracoryphagrion deltoides* Zheng, Nel & Wang gen. et sp. nov., is described from Burmese amber. *Paracoryphagrionidae* is attributed to the clade *Pseudostigmatoida*, due to the presence of an extremely long, less zig-zagged vein CuA covering numerous cells, reaching the pterostigmal level, and being parallel with the hindwing margin; plus numerous trigonal cells, all shared with *Coryphagrion*

*grandis* Morton, 1924 of this clade. *Paracoryphagrionidae* differ from other pseudostigmatoid families in the absence of the kink of RP1 at the pterostigmal brace, a very long sclerotized pterostigma, only one row of cells in the poststigmal area between the costal margin and RA, and no sigmoidally curved RA and RP1 at the wing apex. *Paracoryphagrion deltoides* is unique within Zygoptera due to the presence of a very elongate pterostigma and many triangular cells in the postsubnodal area." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**17042.** Zheng, D.; Chang, S.-C.; Nel, A.; Jarzembowski, E.A.; Zhuo, D.; Zhang, H.; Wang, B. (2018): A new Gondwanan dragonfly (Odonata: Anisoptera: Araripegomphidae) from mid-Cretaceous Burmese amber. *Cretaceous Research* 92: 168-173. (in English) ["The fossil dragonfly is a perfect model to study past biogeography. *Araripegomphidae* is an ancient Gondwanan family comprising the sole genus *Araripegomphus* previously from the Crato Formation (Upper Aptian) of Brazil. For the first time, a non-rock find, *Araripegomphus shai* sp. nov., is here described from mid-Cretaceous Burmese amber. This rare araripegomphid dragonfly extends the range of *Araripegomphus* to the west Burma block." (Authors)] Address: Zheng, D., State Key Lab. of Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology and Center for Excellence in Life & Palaeoenvironment, Chinese Acad. Sciences, 39 East Beijing Road, Nanjing 210008, China.

**17043.** Zheng, D.; Jarzembowski, E.A.; Chang, S.-C.; Wang, B.; Zhang, H. (2018): New cymatophlebiid dragonflies from the Lower Cretaceous of China and England (Odonata: Anisoptera: Cymatophlebiinae, Valdaeshninae). *Cretaceous Research* 90: 311-317. (in English) ["*Cymatophlebia yixianensis* sp. nov., the first Chinese Cretaceous cymatophlebiid dragonfly (cymatophlebiine), is described from the Lower Cretaceous Yixian Formation of western Liaoning, NE China. *Cymatophlebia yixianensis* sp. nov. has a forked RP2 near the wing margin differing from other species of *Cymatophlebia* Deichmüller 1886. A new valdaeshnine dragonfly, *Valdaeshna mikei* sp. nov., is described from the Lower Cretaceous Upper Weald Clay of southern Surrey, SE England, differentiated from *Valdaeshna surreyensis* Jarzembowski, 1988 in its larger size, a long Pt-brace, and a broad area between Rspl and IR2. An updated diagnosis for *Valdaeshna* Jarzembowski, 1988 is proposed." (Authors)] Address: Zheng, D., State Key Lab. of Palaeobiol. & Stratigraphy, Nanjing Inst. of Geology & Palaeontology and Centre for Excellence in Life & Palaeoenvironment, Chinese Acad. Sci., 39 East Beijing Road, Nanjing 210008, China.

## 2019

**17044.** Abdel-Hamza, A.K.; Ward Shaher, K. (2019): Insect order that the blue-cheeked bee-eater *merops superciliosus persicus* Pallas, 1773 (Coraciiformes: Meropidae) chicks feed on in the provinces of Baghdad and Babylon. *Plant Archives* 19(2): 4121-4124. (in English) ["This study was conducted in Jadiriya, Baghdad and the Emam, Babil provinces during 2017-2018. Results showed that there were significant

differences in the order of insects that birds feed on in the nestling during the day and between the weeks. The highest insect rate was in the first week for order Odonata in Babylon and Baghdad when scored 7 and 10 insect in the morning period respectively. Whereas it scored 7 - 8.4 insects) and (5.3 - 6 insects) in the afternoon and evening respectively. The order Orthoptera scored the lowest rate with 1.3 - 1, 0.6 - 0.6 and 0.3 - 1.3 insects for the morning, afternoon and evening periods, respectively. The number of insects orders started increasing during the second, third and fourth week when the Odonata scored (19.3, 44.3 and 61.6 insects), (14.3, 34.3 and 53.3 insects) for the morning Respectively, (11, 20.3 and 16.6 insects) (8, 15.6 and 19.6 insects) for the afternoon respectively (15.3, 35.3, 45 lactation), 12, 30 and 40.6 insects respectively for the evening period, respectively and the lowest for Orthoptera (1.3, 0.6 and 2.2 insects) (0.6, 1.6 and 1.3 insects), 0.6, 0.6 insect (respectively), 1.3 (1.3, 1.6 insect) and 0.6, 0.3 and 0.6 respectively 2 insects) for the evening. We conclude that the number of insects that chicks feed on the increase with age and prefer large insects, especially dragonflies for feeding." (Authors)] Address: Abdel-Hamza, A.K., Dept of Plant protection, College of Agricultural Engineering Sciences, University of Baghdad, Baghdad, Iraq

**17045.** Abdillah, M.; Millah, N.; Arroyan, N.; Alifudin, F.; Peritiwi, W. (2019): Correlation between Libellulidae diversity and vegetation diversity at Sumber Clangap Village of Puncu, Sub-district of Puncu, District of Kediri. The proceedings of the international symposium of remediation, biomaterial, revegetation and conservation 2018: 56-62. ["Libellulidae are the largest family in Ordo Odonata. Odonata has an antenna with olfactory function. The Odonata olfactory can be used for detecting chemical material in environmental. The environment including vegetation has role on keeping the ground water content. It statement indicate that the vegetation has role on organic material cycle including Libellulidae life. Sumber Clangap is the cold lava flow of Mount Kelud that affected by the eruption in 2014. This study was aimed to know the correlation between Libellulidae diversity and vegetation diversity at Sumber Clangap. There were 7 species of Libellulidae with the highest diversity index at third sampling plots. There were 72 plant species noted at Sumber Clangap with the highest diversity index at the first sampling plots. The paired T-test analysis showed that Libellulidae diversity significantly correlated with vegetation diversity." (Authors)] Address: Abdillah, M., Dept of Biology, Islamic State Univ. Sunan Ampel Surabaya, Jl. A. Yani, No. 117, Kota Surabaya, Indonesia

**17046.** Abdillah, M.M.; Prakarsa, T.B.P.; Tyastirin, E. (2019): Odonata diversity at Sumber Clangap and Sumber Mangli Puncu Village sub district of Puncu district of Kediri. Jurnal Biodjati 4(2): 236-243. (in English) ["Sumber Clangap and Sumber Mangli are geographically located at the Mount Kelud steeps. Administratively located at Puncu Village, Puncu Sub-district and District of Kediri. They provided hab-itat for the flora than fauna especially Odonata that never been studied before. We aimed to study Odonata diversity at Sumber Clangap and Sumber Mangli area. The method used in this study was natural snapshot experiment that conducted by Odonata

monitoring. Micro-climate parameter including air temperature and humidity were noted. Odonata activity and behavior noted for analysis. Collected data were analyzed using Shannon-Wiener heterogeneity index. The results showed that there were 17 species from the whole location. There was *Euphaea variegata*, *Vestalis luctuosa*, *Rhinocypha anisoptera*, *Pericnemis stictica*, *Pseudagrion pruinatum*, *Coeliccia membranipes*, *Gynacantha subinterrupta*, *Idionyx montana*, *Paragomphus reinwardtii*, *Heliogomphus drescheri*, *Neurothemis fluctuans*, *Orthetrum glaucum*, *O. pruinatum*, *O. sabina*, *Pantala flavescens*, *Trithemis festiva* and *Zygonyx ida*. Based on the Shannon-Wiener heterogeneity index the value, Sumber Clangap had heterogeneity index higher ( $H' = 1.97$ ) than Sumber Mangli ( $H' = 1.39$ ). Sumber Mangli has a Java endemic species *P. reinwardtii* and *R. anisoptera* that is spread only at Sumatera and East Java." (Authors)] Address: Abdillah, M.M., Biol. Dept, Fac. Sci. & Tech. UIN Sunan Ampel, Jl. Ahmad Yani No. 117, Jemur Wonosari, Kec. Wonocolo, Surabaya, East Java, Indonesia 60237. E-mail: 1abdillah.kutrik@gmail.com

**17047.** Agrawal, A. (2019): Passive flow control mechanism in a bio-inspired corrugated hydrofoil. SN Applied Sciences (2019) 1:1505: 17 pp. (in English) ["Corrugated hydrofoils are lately getting attention because of their superior aerodynamic performance compared to engineered hydrofoils at low Reynolds numbers ( $Re$ ). A particle image velocimetry (PIV) based study on corrugated hydrofoil is conducted here to understand the flow dynamics around it at ultralow Reynolds numbers ( $Re = 280-11,700$ ). Seven different angles of attack ( $\alpha$ ) are considered in this study ranging from  $-15^\circ$  to  $15^\circ$ . Load cell measurements are undertaken to obtain the force coefficients and further these are compared with the results obtained from PIV data using wake survey method. The wake velocity profiles are examined to understand the variation in force coefficients in a better way. Vortices are found to be trapped in the valley of the corrugations. The lift coefficient increases as the number of vortices increases on the top (suction) surface. A temporal analysis of the data shows that the partially merged co-rotating vortices give higher lift as compared to the fully merged vortices. The maximum aerodynamic performance is obtained at  $-5^\circ$  angle of attack for  $Re = 6760$ . The asymmetry in the geometry combined with asymmetry in the flow helps create relatively high lift for a corrugated wing. The performance of positive and negative angles of attack are compared and it is found that the fluctuation in lift coefficient is comparatively higher. It is hypothesized that the merging of trapped vortices with each other gives the effect of fluid roller bearings; this fluid roller bearing produces a travelling wave, which avoids the formation of boundary layer, thereby leading to high gliding ratio. These detailed results, covering the entire Reynolds number and angle of attack range of dragonfly flight, provide useful insights into the secret of dragonfly flight which will help in better design of micro air vehicles." (Authors)] Address: Agrawal, A., Dept of Mechanical Engineering, Indian Institute of Technology Bombay, Powai, Mumbai 400076, India. E-mail: amit.agrawal@iitb.ac.in

**17048.** Alexiou, S.; Manolas, N.; Lesparre, D. (2019): *Ceragrion georgifreyi* new to the Peloponnisos, Greece (Odonata: Coenagrionidae). *Notulae odonatologicae* 9(3): 91-95.



(in English) ["*C. georgifreyi* is reported from two localities in the North-west Peloponnisos in Greece in 2014 and 2018. Together with recent records of this species from mainland Greece north-east of Athens, as well as from Lesvos island, this suggest that all former records of *Ceriagrion* from continental Greece and the North Aegean islands should be ascribed to *C. georgifreyi* as, after careful examination, were those from Thasos, Kerkira and Zakynthos." (Authors)] Address: Alexiou, S., Deutsches Institut für Lebensmitteltechnik e.V., Prof.-von-Klitzing-Str. 7, 49610 Quakenbrück, Germany. E-mail: s.alexiou@dil-ev.de

**17049.** Aljjanovna, B.T. (2019): Review of insect fauna of urbanocenoses Kerki of the Republic of Turmenistan. XXV International scientific conference: 15-18. (in Russian, with English summary) ["The article presents some results of the study of species composition and structure of entomofauna of agrocenoses in the Eastern part of the Republic of Turkmenistan. The object of the study was the collection of imago insects living on the territory of Kerky and its surroundings. The study revealed 14 species of insects belonging to 7 groups. Dominant species and ecological groups of insects on the basis of trophic relations are revealed." *Sympetrum vulgatum* is the single odonate species listed. (Author)] Address: not stated

**17050.** Alves, R.J.V.; Costa, L.A.A.; Soares, A.; Silva, N.G.; Pinto, A.P. (2019): Open ocean nocturnal insect migration in the Brazilian South Atlantic with comments on flight endurance. *PeerJ* 7:e7583 DOI 10.7717/peerj.7583: 15 pp. (in English) ["We observed a nocturnal insect swarm aboard the oceanographic ship *Cruzeiro do Sul* of the Brazilian Navy, while conducting a survey of the Montague guyot (seamount), 389 km distant from the nearest land in the South Atlantic. The insects came from open sea toward the ship from all directions, attracted by the powerful light of the deck. Most insects collided with the hull and fell into the ocean, but we managed to capture and determine 17 (13 Hemiptera of a single species, three Lepidoptera of three species and one Odonata). With one exception, we are certain that none of the specimens caught originated from the ship. The geographic origin, most likely the coast of Brazil, and flight endurance of these insects were inferred using data on wind speed and direction, provided by the crew of the ship, and were reconstructed using Hysplit modeling of air current trajectories." (Authors) 1. *Anax amazili* (Burmeister, 1839). Material examined. One female (MNRJ ODO-0012, subsequently lost in the fire). Remarks. Species of *Anax* are known as migratory. They spend many weeks in migration routes undertaking distinct behaviors such as foraging (cf., May, 2013). *Anax amazili* is a New World species widespread in the entire American continent occurring from the USA (Needham, Westfall & May, 2000) through central America and the Caribbean Islands (Calvert, 1905) to southern Argentina (von Ellenrieder & Muzón, 2008). It also occurs as a resident species in the Pacific archipelago of Galápagos, about of 1,000 km from the coast (Calvert, 1905; Peck, 1992). The site of capture was about 380 km from the Brazilian coast and almost 800 km west of the closest archipelago, Trindade & Martin Vaz, from which Alves et al. (2019), *PeerJ*, DOI 10.7717/peerj.7583 5/15 only two different Odonata were recorded to date (MNRJ):

*P. flavescens* and *Rhionaeschna* sp. (see Santos, 1981). The pantropical Libellulidae glider *P. flavescens* in the best-known migrant dragonfly species (Samways & Osborn, 1998). The hypothesis that this species forms a global panmictic population has received recent support (Troast et al., 2016). However, it is not known if there is a regular migration route among these land masses.] Address: Alves, R., Depto de Botânica, Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Rio de Janeiro, Brazil

**17051.** Alves-Martins, F.; Calatayud, J.; Medina, N.G.; De Marco, P.; Juen, L.; Hortal, J. (2019): Drivers of regional and local diversity of Amazonian stream Odonata. *Insect Conservation and Diversity* 12(3): 251-261. (in English) ["1. Large Amazonian rivers may act as dispersal barriers for animals with low dispersal abilities, limiting their distribution to certain interfluves. Consequently, the distribution of these taxa would be less affected by macroclimatic gradients. Conversely, high-dispersal taxa would be less constrained by large rivers and may track suitable climates. 2. We evaluate whether Zygoptera and Anisoptera, two Odonata suborders with different dispersal abilities, show differences in distribution patterns across Amazonian interfluves. We further assess the relative importance of macroclimatic and habitat factors in their community assembly. 3. We used network modularity analyses to identify biogeographic species pools and spatial buffers to define metacommunity species pools. Then, we used structural equation models to estimate the relative importance of multi-scale factors on species richness patterns. 4. Zygoptera communities are more similar in species composition within than between interfluves, suggesting that large Amazonian rivers indeed limit the distribution of Zygoptera species. Conversely, the distribution of Anisoptera extends across Amazonian interfluves. Seasonality has a strong positive effect on Odonata richness across scales. In addition, habitat integrity is negatively correlated with the regional species richness and abundance of Anisoptera and positively correlated with Zygoptera local richness. 5. The contrasting effects of habitat integrity on Anisoptera and Zygoptera suggest that the former is favored in open habitats, whereas the latter is so in forests. Despite these differences, both suborders appear to follow similar community assembly mechanisms in Amazonia, with a strong climatic control across scales and an effect of habitat filters on local communities." (Authors)] Address: Alves-Martins, Fernanda, Museo Nacional de Ciencias Naturales (MNCN-CSIC), C/Jos e Guti errez Abascal 2, 28006 Madrid, Spain. E-mail: fernandaalvesmartins@yahoo.com.br

**17052.** Arifi, K.; Tahri, L.; Hafiane, F.Z.; Elblidi, S.; Yahyaoui, A.; Fekhaoui, M. (2019): Diversité des macroinvertébrés aquatiques de la retenue du barrage Sidi Mohammed Ben Abdellah à la confluence avec les eaux de l'oued Grou et bioévaluation de la qualité de ses eaux (Région de Rabat, Maroc). *Entomologie Faunistique – Faunistic Entomology* 72: 13-20. (in French, with English summary) ["The Sidi Mohammed Ben Abdellah Dam (SMBA) in Morocco seems particularly threatened due to the lack of proper management. It is within this framework that this study of the structure and the specific richness of the benthic macroinvertebrates in the confluence zone with the Grou River and the evaluation of

the biological quality of the water at this level are inscribed. The fauna studied was collected monthly between December 2014 and November 2015. Four faunal groups were identified in this work (Annelids, Platyhelminthes, Molluscs and Arthropods). The value of the Global Standardized Biological Index (NGBI) obtained from these four faunal groups, highlights an alarming situation of the ecological quality." (Authors)] Address: Arifi, K., Université Mohammed V - Faculté des sciences, PB: 1040, Av. Ibn Batouta, Rabat, Maroc. E-mail: arifi\_karim@hotmail.com

**17053.** Aryal, M. (2019): A note on *Ischnura nursei* (Morton, 1907): The first record from Nepal (Zygoptera: Coenagrionidae). *Bionotes* 21(2): 35-38. (in English) ["*I. nursei* was photographed on 24-II-2019 at 14:04 hr and on same day at 14:37 hr along the shoreline of Jagadishpur Lake (27°37'19.41"N & 83° 54'1.54"E)."] (Author)] Address: Aryal, M., Butwal-13, Devinagar, Rupan-dehi, Nepal. E-mail: aryalmilan100@gmail.com

**17054.** Asensio, R. (2019): Primera cita de *Trithemis kirbyi* Sélys, 1891 (Odonata: Libellulidae) de Bizkaia (País Vasco, España). *Boln. Sociedad Entomológica Aragonesa (S.E.A.)* 65: 221-224. (in Spanish, with English summary) ["The first record of *T. kirbyi* is reported from Biscay province, Basque Country, confirming the expansive trend across the Iberian Peninsula that began in 2007. Also, information is provided on the accompanying odonatofauna and on some observations, not formally published before, which bring forward the first records of this species by one and two years respectively for the Spanish provinces of Almería and Cáceres." (Author)] Address: Asensio, R., Cuestasensio S.C. Bilbao (Bizkaia), Spain. E-mail: cuestasensio@gmail.com

**17055.** Assandri, G. (2019): A critical review of the odonate fauna of Trentino: annotated check-list and new relevant data for Italy (Insecta: Odonata). *Fragmenta Entomologica* 51(1): 75-88. (in English) ["By the first half of the Twentieth Century, the Odonate fauna of Trentino (Oriental Alps, Italy) was quite well known; subsequently, few surveys on dragonflies were carried out, resulting in a limited update of the knowledge on this taxon. The aim of this study is to provide a critical and annotated check-list of the Odonata of this province for the period from 1851 to 2018. This synthesis is based on a total of 3814 records obtained from the literature (955 records), revision of collections (1048 records), and unpublished recent data (1811 records). An updated and comprehensive Odonatological bibliography of the region is also provided. Overall, 61 species were confirmed to occur (or have occurred) in Trentino. These represent the 64% of the species recorded in Italy and the 43% of the species recorded in Europe. Presence of five additional species (*Ceriagrion tenellum*, *Coenagrion lunulatum*, *C. ornatum*, *Ophiogomphus cecilia*, and *Epithea bimaculata*) should be considered doubtful for Trentino. Further two species (*Platycnemis latipes* and *Onychogomphus uncatatus*) have to be excluded from the fauna of the study area. 45 species were recorded also after 2000, whereas seven species were not confirmed after this year (*Lestes dryas*, *L. virens*, *L. barbarus*, *Sympetma paedisca*, *Coenagrion scitulum*, *Brachytron pratense*, and *Sympetrum flaveolum*). Several

new records resulting from this study (referred to: *Erythromma najas*, *Aeshna subarctica*, *A. caerulea*, *A. grandis*, *Leucorrhinia pectoralis*) have a conservation or biogeographical relevance which transcends the borders of the study area, being noteworthy from an Italian or Alpine perspective and are thus commented in detail. Taxonomic notes on subspecies are also given when relevant." (Author)] Address: Assandri, G., Sezione Zoologia dei Vertebrati, MUSE - Museo delle Scienze, Corso del Lavoro e della Scienza, Trento, Italy. E-mail: giacomo.assandri@gmail.com

**17056.** Assandri, G.; Franceschini, A.; Lencioni, V. (2019): Dragonfly biodiversity 90 years ago in an Alpine region: The Odonata historical collection of the MUSE (Trento, Italy). *Biodiversity Data Journal* 7: e32391. <https://doi.org/10.3897/BDJ.7.e32391>: 13 pp. (in English) ["Background: Historical collections of natural science museums play a fundamental role in documenting environmental changes and patterns of biodiversity transformation. This considered, they should have a pivotal role to plan conservation and management actions. The MUSE - Science Museum of Trento is an Italian regional museum preserving about 5.5 million items (organised in 297 collections). About one million of them are invertebrates, 70% of which are of local origin, gathered in the collection "Miscellanea Invertebrati". Odonata account for a minor part of this collection; however, most of them are of local or regional relevance. A complete catalogue of this collection does not exist to date. New information: The collection was studied in 2017-2018 and this contribution aims to present the Catalogue of the historic collection of Odonata of the MUSE - Museo delle Scienze of Trento (Italy). In all, 836 specimens of adult dragonflies and damselflies are found in the collection referring to an overall 56 species. The collection covers a period between 1924 and 1957 and refer to 74 defined localities, all located in northern Italy (most of them in Trentino - Alto Adige Region). The samples conserved in the collection are, for several species, the only indisputable confirmation of their former occurrence in that region." Authors)] Address: Assandri, G., MUSE - Science Museum of Trento, Trento, Italy

**17057.** Azar, D.; Maksoud, S.; Huang, D.; Nel, A. (2019): First Lebanese dragonflies (Insecta: Odonata, Aeshnoptera, Cavilabiata) from the Arabo-African mid-Cretaceous paleocontinent. *Cretaceous Research* 93(1): 78-89. (in English) ["A new hawk dragonfly *Libanoliupanshania mimi* gen. et sp. nov. is described and illustrated from the lower upper Cenomanian of Hjoula (Lebanon). Its discovery shows that the Cretaceous family *Liupanshaniidae*, currently recorded from South America and Eurasia, was also present in the Arabo-African Cretaceous paleocontinent. Also a new 'libelluloid' family *Libanocorduliidae* fam. nov. is described and illustrated on the basis of the new genus and species *Libanocordulia debiei* gen. et sp. nov. This taxon is characterized by a unique shape of the hindwing subdiscoidal space. Paleobiogeographic implications are discussed. The mid-Cretaceous marine outcrop of Hjoula is potentially a new insect konservat-Lagerstätte liable to provide crucial information on the entomofauna of the paleo-Arabo-African continent at that time." (Authors)] Address: Azar, D., Lebanese University, Fac. of

Sciences II, Dept of Natural Sciences, P.O. Box: 26110217, Fanar, Matn, Lebanon

**17058.** Baba, Y.G.; Kusumoto, Y.; Tanaka, K. (2019): Positive effect of environmentally friendly farming on paddy field odonate assemblages at a small landscape scale. *Journal of Insect Conservation* 23: 467-474. (in English) ["Odonata species can be used to indicate the effects of anthropogenic disturbance on agrobiodiversity. In Japan, populations of some odonate species inhabiting rice paddy fields have decreased strongly owing to their high susceptibility to insecticides, and they therefore need to be conserved. To identify effective conservation strategies, we investigated how agricultural practices (conventional vs. environmentally friendly: EF) and surrounding landscape (area of forest at three spatial scales, namely 50, 100 and 200 m from the edge of the paddy field) influenced the abundance of odonates in rice paddies in Tochigi Prefecture, Japan. Generalized linear mixed-effect models revealed that EF farming increased the abundance of odonate adults and the number of nymphal exuviae, suggesting a strong negative effect of insecticides. The influence of forest area at the local scale on the numbers of odonate adults and nymphal exuviae was small, with the exception of a strong negative influence on adult *Symptetrum infuscatum*: the presence of a large area of forest within 200 m of the edge of the paddy field reduced their abundance, probably reflecting this dragonfly's oviposition site preference. Our results suggest that EF farming could generally support the conservation and recovery of local populations of odonates, but its effectiveness potentially varies depending on the ecological aspects of each species." (Authors)] Address: Baba, Y.G., Institute for Agro-Environmental Sciences, NARO, Tsukuba-shi, Japan. E-mail: ybaba@affrc.go.jp

**17059.** Babosova, M.; Porhajasova, J.I.; Ernst, D. (2019): Dragonflies (Odonata) of Botanical Garden's Pond of SUA in Nitra. *Acta Fytotechnica et Zootechnica* 22(4): 110-113. (in English) ["The faunistic research of dragonflies was realized during 2016 and 2017. The research was carried out under the conditions of Botanical garden's pond of Slovak University of Agriculture (SUA) in Nitra. 229 dragonfly individuals (105 ♂♂ 124 ♀♀) were trapped during the monitored period. Trapped individuals represented 10 species and 3 families of dragonflies. The aim of the research was to determine the species composition of dragonflies of the selected locality. Based on the representation of individual species for the monitored locality, its dominance was also calculated." (Authors)] Address: Babošová, Maria, Slovak Univ. Agriculture in Nitra, Faculty of Agrobiol. & Food Resources, Slovakia

**17060.** Babu, R.; Subramanian, K.A. (2019): A new species of *Gomphidia* Selys, 1854 (Insecta: Odonata: Anisoptera: Gomphidae) from the Western Ghats of India. *Zootaxa* 4652: 155-164. (in English) ["*Gomphidia podhigai* nov. spec. is described from southern Western Ghats, India based on a male specimen. The new species is very distinct from all the known species of *Gomphidia* from Indian subcontinent. Revised keys to the males and known females of *Gomphidia* of India and Sri

Lanka are provided." (Authors)] Address: Subramanian, K.A., Zoological Survey of India, Southern Regional Centre, Santhome High Road, Chennai-600 028, Tamil Nadu, India. E-mail: subbuka.zsi@gmail.com

**17061.** Bashinskiy, I.V.; Senkevich, V.A.; Stoyko, T.G.; Katsman, E.A.; Korkina, S.A.; Osipov, V.V. (2019): Forest-steppe oxbows in limnophase — Abiotic features and biodiversity. *Limnologica* 74: 14-22. (in English) ["The aim of our study was to identify the main abiotic factors that influence the biodiversity of forest-steppe oxbows in limnophase. Experiments were performed in 2016–2017 in Penza oblast, Central Russia. In addition to disturbed water exchange, isolated oxbows experienced such human influence as logging and plowing on watersides, and the construction of roads and mounds. Under those conditions, some water bodies became unstable and temporal, while others remained stable and were relatively unaffected. Higher light intensity in unstable oxbows led to higher plant diversity because of the mass occurrence of helophytes. However, the diversity of hydrophytes in stable oxbows remained higher, which contributed to higher vegetation coverage. This resulted in increased zooplankton diversity, which was also influenced by lower fluctuations in water level and oxygen level. Disturbed water regimes impacted organisms with a full aquatic life cycle (phyto- and zooplankton, fish). The diversity of unstable oxbows decreased due to their isolation from the river and from drying. The absence of fish may positively affect the abundance and biomass of benthos; however, we found no influence on zooplankton. Instability and high fluctuations in water level may lead to the high diversity of organisms that spawn in water. The higher diversity of benthos may also be influenced by the abundance of amphibian larvae which are a necessary food resource. In addition to predation, amphibians are at risk of mass larval mortality because of drying. Although the degradation of oxbows in limnophase is an undesirable consequence of anthropogenic impact, the coexistence of all types of oxbows is necessary to conserve the freshwater biodiversity of foreststeppes." (Authors)] Address: Bashinskiy, I.V., A.N. Severtsov Institute of Ecology & Evolution RAS, Leninskiy 33, 119071, Moscow, Russian Federation. E-mail address: ivbash@mail.ru

**17062.** Batty, P.M (2019): Recent observations of *Aeshna caerulea* (Azure Hawker) in Scotland. *J. Br. Dragonfly Society* 35(1): 1-17. (in English) ["The population of *A. caerulea* in Scotland has been inferred as undergoing a decline. However, many of the apparent gains and losses are likely to be attributable to recording effort. This study revisits sites that have not been recorded from for 10 years or more and investigates other potential bog pools for breeding data through surveying for larvae. Two important breeding populations were found in Glen Garry and above Loch Quoich, extending the known range. These could be part of a much larger complex in the whole area. Breeding pools were also found at Rannoch Moor and Corroul. Recent surveys confirm the importance of higher-level upland blanket bog pools as the breeding habitat for this species. The lack of large larvae underlined the low productivity of the species and a large area may be needed to sustain the population. An update is also given



on the current situation for *A. caerulea* from other sources since 2012, which was the approximate cut-off date for data for the Atlas of British and Irish Dragonflies (Cham et al, 2014). The range of *A. caerulea* is expanding in the Highlands. However, after extensive survey work, it appears possible that the species may have been lost from its most southerly site. More survey work is needed to investigate other, older records and to locate breeding areas." (Author)] Address: Batty, Patricia, Kirnan Farm, Kilmichael Glen, Lochgilphead, Argyll PA31 8QL, UK

**17063.** Bechly, G.; Rasmussen, J.A. (2019): A new genus of hawker dragonfly (Odonata: Anisoptera: Aeshnidae) from the Early Eocene Fur Formation of Denmark. *Zootaxa* 4550(1): 123-128. (in English) ["*Parabaissaeshna ejerslevense* gen. et sp. nov. (Aeshninae: Allopataliini), is described from the Early Eocene Fur Formation (Mo-clay) of the island of Mors, northern Denmark. Its position among traditional "gomphaeschnine" dragonflies is discussed, and it is attributed to the tribe Allopataliini as close relative to the Cretaceous genus *Baissaeshna*, documenting the survival of this lineage through the K-Pg mass extinction. The Recent genus *Boyeria* and the Eocene genus *Anglogomphaeschna* are also transferred to Allopataliini." (Authors)] Address: Rasmussen, J.A., Fossil and Mo-clay Museum, Museum Mors, Nykøbing Mors, Denmark. E-mail: jan.rasmussen@museummors.dk

**17064.** Bellingan, T.A.; Hugo, S.; Woodford, D.J.; Gouws, J.; Villet, M.H.; Weyl, O.L.F. (2019): Rapid recovery of macroinvertebrates in a South African stream treated with rotenone. *Hydrobiologia* 834: 1-11. (in English) ["South Africa's Cape Fold Ecoregion supports a unique freshwater fish assemblage with many endemics. To mitigate impacts of alien invasive fishes on this unique assemblage, nature conservation authority CapeNature used rotenone to remove smallmouth bass (*Micropterus dolomieu*) from the Rondegat River. We investigated whether the rotenone treatments had an adverse impact on the aquatic macroinvertebrate community over the long-term, the first study of its kind in Africa. We monitored macroinvertebrates within treated and untreated (control) sites on multiple sampling events for 2 years before and 2 years after two rotenone treatments. We analysed the difference in invertebrate abundance between treatment and control sites before and after treatment, using generalised linear mixed models with sampling event as a random factor to partition out natural fluctuations in abundances over time. Populations fluctuated widely in control and treatment sites over the study period, and we found no effect that could be clearly attributed to rotenone. We conclude that macroinvertebrates recovered rapidly after treatment, probably through drift from untreated areas upstream, with no long-term adverse effects. We recommend that the presence of uninhabited upstream refuges that may provide demographic rescue be used as a key discriminating factor for future conservation purposed rotenone deployments." (Authors)] Address: Bellingan, T.A., Dept of Entomology and Arachnology, Albany Museum, Grahamstown, South Africa

**17065.** Bemah, H. (2019): Odonata diversity as indicators of freshwater habitat quality in the Owabi Wildlife Sanctuary, Ghana. *Agrion* 23(1): 25-29. (in English) ["The Odonata fauna

of the Owabi Wildlife Sanctuary, Kumasi, Ghana was characterized into different disturbance gradients to assess water quality in the reserve. A total of 207 individuals from 25 species were recorded in the study area. Of these, 105 individuals belonging to 12 species and 102 individuals in 13 species were recorded as Odonata respectively. The forest habitat exhibited the largest damselfly assemblages while the disturbed habitat exhibited the largest dragonfly assemblages.] Address: Hadeeza Bemah. E-mail: hadeezahbemah@yahoo.com]

**17066.** Bhardwaj, M.; Soanes, K.; Lahoz-Monfort, J.J.; Lumsden, L.F.; van der Ree, R. (2019): Little evidence of a road-effect zone for nocturnal, flying insects. *Ecology and Evolution* 9: 65-72. (in English) ["Roads and traffic may be contributing to global declines of insect populations. The ecological effects of roads often extend far into the surrounding habitat, over a distance known as the road-effect zone. The quality of habitat in the road-effect zone is generally degraded (e.g., due to edge effects, noise, light, and chemical pollution) and can be reflected in species presence, abundance, or demographic parameters. Road-effect zones have been quantified for some vertebrate species but are yet to be quantified for insects. Investigating the road-effect zone for insects will provide a better understanding of how roads impact ecosystems, which is particularly important given the role insects play as pollinators, predators, and prey for other species. We quantified the road-effect zone for nocturnal flying insects along three major freeways in agricultural landscapes in southeast Australia. We collected insects using light traps at six points along 2-km transects perpendicular to each highway (n = 17). We sorted the samples into order, and dried and weighed each order to obtain a measure of dry biomass. Using regression models within a Bayesian framework of inference, we estimated the change in biomass of each order with distance from the road, while accounting for environmental variables such as temperature, moon phase, and vegetation structure. The biomass of nine of the ten orders [including Odonata] sampled did not change with distance from the freeway. Orthoptera was the only order whose biomass increased with distance from the freeway. From our findings, we suggest that the impacts of roads on insects are unlikely extending into the surrounding landscape over a distance of 2 km. Therefore, if there are impacts of roads on insects, these are more likely to be concentrated at the road itself, or on finer taxonomic scales such as family or genus level." (Authors)] Address: Bhardwaj, Manisha, Grimsö Wildlife, Research Station, Dept of Ecology, Swedish Univ. of Agricultural Sciences, Riddarhyttan, Sweden. E-mail: manisha.bhardwaj@live.ca

**17067.** Bishnoi, S.; Dang, K. (2019): Diversity of some odonatan insects in Kota, Rajasthan, India. *Journal of Entomology and Zoology Studies* 7(3): 301-303. (in English) ["In the present study attempt has been made to enlist Odonata in four different areas of Kota: Karani mata, C.V. garden, Bhitariya Kund and Yatayat Park. The study was conducted from September 2014 to August 2016. Present investigation revealed the presence of 12 species of Odonata belonging to 2 families (Libellulidae, Coenagrionidae). In the study area the

most dominant family was Libellulidae (7 species) and Coenagrionidae (5 species). The abundance of species was also recorded. Out of the 12 species recorded in 4 survey areas 3 species are abundant, 7 species are occasional and 2 species are rare in the study site. The study indicates a rich and diverse fauna in the survey area." (Authors)] Address: Bishnoi, Subhi, Research Scholar In C.P. Univ., Kota, Rajasthan, India

**17068.** Bittner, T. (2019): Landesweite Artenkartierung - Libellen. *Mercuriale* 18/19: 1-8. (in German, with English summary) ["Odonata mapping in the German land of Baden-Württemberg - Species distribution data represent the central basis for different nature conservation instruments and requirements. The following project is part of the special programme to strengthen biodiversity in Baden-Württemberg. The following elaborations are presented, which enable a regular update of the dragonfly distribution data. Here the work of volunteer mappers of the SGL should be explicitly relied on. The two-part concept targets the FFH dragonfly species on the one hand and all native dragonfly species on the other." (Author)] Address: Bittner, T., LUBW - Landesanstalt für Umwelt Baden-Württemberg, Griesbachstr. 1-3, 76185 Karlsruhe, Germany

**17069.** Bláha, M.; Grabicova, K.; Shaliutina, O.; Kubec, J.; Randák, T.; Zlabek, V.; Buric, M.; Veselý, L. (2019): Foraging behaviour of top predators mediated by pollution of psychoactive pharmaceuticals and effects on ecosystem stability. *Science of the Total Environment* 662: 655-661. (in English) ["Highlights: •Functional response approach was utilized as an endpoint of contaminant exposure. •WWTP effluent with real mixture of PhACs was tested. •Predator feeding behaviour was affected by all tested compounds. •WWTP effluent strengthens interaction strength by increased maximum feeding rate. •Single tested PhACS displayed decreased maximum feeding rate. Abstract: Although pharmaceuticals are recognized as a major threat to aquatic ecosystems worldwide, little is known about their ecological effect on aquatic biota and ecosystems. Drug-induced behaviour changes could have a substantial impact on consumer-resource interactions influencing stability of the community and ecosystem. We combined laboratory experiments and functional response modelling to investigate effects of real wastewater treatment plant (WWTP) effluent, as well as environmentally relevant concentrations of the antidepressants citalopram and opioid pain medication tramadol, on trophic interactions. Our biological system consisted of *Aeshna cyanea* larvae as predator of common carp *Cyprinus carpio* fry. Exposure to WWTP effluent significantly increased *A. cyanea* maximum feeding rate, while those parameters in tramadol and citalopram-exposed larvae were significantly lower from unexposed control group. This suggested the potential of all tested pollutants to have an effect on consumer-resource equilibrium in aquatic ecosystems. While WWTP effluent strengthened interaction strength (IS) of consumer-resource interaction dynamics making the food web more vulnerable to fluctuation and destabilization, tramadol and citalopram could inhibit the potential oscillations of the consumer-resource system by weakening the IS. Similar studies to reveal the potential of pervasive pharmaceuticals to change of consumer-resource interactions

dynamics are needed, especially when real WWTP effluent consisting of mixture of various pharmaceuticals displayed very different effect from single compounds tested." (Authors)] Address: Bláha, M., University of South Bohemia in České Budějovice, Fac. of Fisheries & Protection of Waters, South Bohemian Research Center of Aquaculture & Biodiversity of Hydrocenoses, Zátěš 728/II, 389 25 Vodňany, Czech Republic. E-mail: blaha@frov.jcu.cz

**17070.** Bolshakov, L.V.; Lakomov, A.F. (2019): New and interesting findings of Odonata in the Tula Province. *Eversmannia* 59-60: 6-8. ["Data is given on findings in the Tula region of 8 species of dragonflies, of which 5 are registered for the first time for the fauna of the Tula region, among them *Aeshna serrata* (Hagen, 1856) for the first time for the Center of European Russia, the rest of the species are local or rare." (Authors)]

**17071.** Borges, L.R.; Barbosa, M.S.; Alves Carneiro, M.A.; Vilela, D.S.; Santos, J.C. (2019): Dragonflies and damselflies (Insecta: Odonata) from a Cerrado area at Triângulo Mineiro, Minas Gerais, Brazil. *Biota Neotropica* 19(1), e20180609, 2019: 9 pp, erratum. (in English, with Spanish summary) ["Odonata is considered, among the aquatic insect orders, the second largest group in number of species. Its global richness is estimated in about 6,000 described species. The Brazilian richness represents around 14% of the world's odonatofauna, however, the knowledge on Brazilian dragonflies distribution is still poor. This study purpose an inventory of the dragonflies species present in aquatic habitats from a Preserved Area according to the Brazilian Forest Code, located in the Cerrado biome at Triângulo Mineiro, Minas Gerais. In the dry season, from April to June of 2017, we collected 680 specimens belonging to 36 species and six families. Among the collected species, *Elasmothemis williamsoni* was observed by the first time in Minas Gerais State, and we also found a new species of *Tigriagrion* which is being described by taxonomists. Considering the fast agricultural advance over natural Cerrado systems, species lists can be important to define priority conservation areas for odonate species." (Authors)] Address: Borges, L.R., Univ. Federal de Uberlândia, Instituto de Biologia, Av. Pará 1720, 38405-320. Uberlândia, MG, Brasil

**17072.** Borisov, A.S.; Borisov, S.N. (2019): Spring immigration of dragonflies (Odonata) in Tajikistan. *Eurasian Entomological Journal* 18(5): 305-311. (in Russian, with English summary) ["Four migratory dragonfly species, *Anax ephippiger*, *A. parthenope*, *Pantala flavescens* and *Sympetrum fonscolombii*, arriving in Tajikistan for reproduction in spring 2019 from southernmost parts of the areal, were studied. In spring, populations of the most abundant and widespread immigrant species, *A. parthenope*, presumably include immigrants from both southern and local residents. Ephemeral water ponds, mainly rice fields, are more preferable for oviposition of *P. flavescens* and *S. fonscolombii*, and probably typical of *A. ephippiger*, but a different type water reservoir is necessary for *A. parthenope* and for a number of local eurytopic non-migrating dragonflies." (Authors)] Address: Borisov, A.S., Institute of Systematics and Ecology of Animals, Russian Acad.

of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk, 630091 Russia. E-mails: baswatch@gmail.com

**17073.** Bos-Groenendijk, G.I.; Grunsvan, R.H.A. van; Poot, M.J.M. (2019): Mogelijkheden voor aantalsmonitoring en verspreidingsonderzoek rivierrombout. Rapport VS2019.025, De Vlinderstichting, Wageningen: 15 pp. (in Dutch) ["*Stylurus flavipes* is species that lives in the large rivers (Waal, Rijn, IJssel). The species had disappeared from the Netherlands for a long time, but was rediscovered in 1996. Due to improvements in water quality, the Dutch rivers had become suitable habitats again. The species is now found in large parts of the river area. The river snake is listed in Annex IV of the European Habitat Directive and thus enjoys a legally protected status. The species is therefore a target species within the Ecological Monitoring Network (NEM). However, it is difficult to monitor and because of its way of life it does not fit into the standard method of the dragonfly monitoring network. This report describes the current situation in terms of distribution and number monitoring of the river hummingbird and how monitoring could develop further. In 2019, number monitoring of the river scallop was started for the first time. This was a pilot project to find out whether a good picture of the population developments of the species could be obtained in this way. Based on observations from the NDFF, two locations were selected where potentially many skinks could be found. At both locations different routes are set out according to the method of the dragonfly monitoring network. These routes were visited three times and the skins of the river hawk were sought. The pilot project has produced good results at Loevestein Castle. We expect that this method will provide long-term insights into the population development of the river scoter and therefore recommend continuing this form of monitoring." (Authors) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: not stated

**17074.** Bota-Sierra, C.A.; Sandoval-H, J.; Palacino-Rodriguez, F. (2019): Description of a new species of *Andaeschna* (Odonata: Aeshnidae) from the Western Colombian Andes. *Zootaxa* 4615(3): 594-600. (in English) ["*Andaeschna* is a small and poorly known genus of dragonflies that inhabits the Andes, from Venezuela to northwestern Argentina. Here we describe *A. occidentalis* sp. nov., first species of the genus recorded in the Western Andes, specifically from the Tatamá National Park in Colombia. Males of this species can be differentiated from the other four species in the genus by the unique shape of the distal segment of the vesica spermalis. Likewise, females can be distinguished by their smaller and broader cerci (slightly shorter than S9) and its subquadrate point. The discovery of this beautiful species expands the range of the genus, previously known only in the Eastern Andes." (Authors)] Address: Sandoval-H, Juliana, Inst. de Ecología A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, México. E-mail: [julisando@gmail.com](mailto:julisando@gmail.com)

**17075.** Boudot, J.P.; Havelka, P.; Martens, A. (2019): The biting midge *Forcipomyia paludis* as a parasite of Odonata in North Africa (Diptera: Ceratopogonidae). *Notulae odonotologicae* 9(4): 164-168. (in English) ["In June and July 2013,

at two streams in the Middle Atlas Mountains, Morocco, ceratopogonid midges were photographed on and taken from the wings of six species of odonates. The specimens were identified as *F. paludis*, a widespread European ceratopogonid midge new to Africa. The data increase the range of known hosts with the addition of *Cordulegaster princeps*, *Gomphus simillimus maroccanus* and *Onychogomphus boudoti*." (Authors)] Address: Boudot, J.P., Immeuble Orphée, Apt 703, Cidex 62, 78 rue de la Justice, Ludres, France. E-mail: [jean.pierre.boudot@numericable.fr](mailto:jean.pierre.boudot@numericable.fr)

**17076.** Bried, J.T.; Hinchliffe, R.P. (2019): Improving taxonomic resolution in large-scale freshwater biodiversity monitoring: an example using wetlands and Odonata. *Insect Conservation and Diversity* 12(1): 9-17. (in English) ["1. Immature aquatic insects are a major source of taxonomic difficulty in large-scale freshwater biodiversity monitoring. Adult stages could improve taxonomic resolution for assessing distributions and trends of biodiversity. Odonata have accessible adult stages that should greatly enhance the amount of species-level information. 2. We used Odonata and a wetland monitoring programme in Alberta, Canada to illustrate how much taxonomic information can be lost in larval collections, and an extensive adult records database to estimate what could be gained from adult surveys. 3. Despite processing 22 638 odonate specimens from 975 wetlands throughout Alberta, larval monitoring failed to collect or identify almost 60% of the lentic breeding Odonata species known from adult records. A total of 25 lentic-breeding dragonfly species and 12 lentic-breeding damselfly species were present in adult records and not the larval data, including species of conservation concern. Due to the abundance of early instars, a substantial 82% of the processed damselfly collection and 62% of the processed dragonfly collection was left at suborder. 4. We recommend supplementing aquatic sampling with adult rearing, collecting, and observing (at least Odonata) to improve the basic inventory and overall status assessment in large-scale freshwater biodiversity monitoring. This is especially true when aquatic sampling is restricted to a suboptimal time of year for species identifications." (Authors)] Address: Bried, J.T., Dept of Biological Sciences Murray State Univ., Murry, Kentucky 42071, USA. E-mail: [jbried@murraystate.edu](mailto:jbried@murraystate.edu)

**17077.** Buczynska, E.; Buczynski, P. (2019): Aquatic insects of man-made habitats: Environmental factors determining the distribution of caddisflies (Trichoptera), dragonflies (Odonata), and beetles (Coleoptera) in Acidic Peat Pools. *Journal of Insect Science* 19(1): 1-15. (in English) ["As degradation of sensitive habitats like *Sphagnum* L. (Sphagnales: Sphagnaceae) peatbogs is endangering their invertebrate fauna, artificial peat pools may offer peatbog insect fauna a chance of survival. The entomofauna of seven peat pools in a peatbog and its surrounding natural marginal zone in SE Poland was investigated at the level of species, assemblages and faunistic metrics, indicating the key environmental drivers of the insect distribution and their implications for the biodiversity and potential conservation of these habitats. The species composition, specialists, and insect assemblages of the peat pools were linked with the fauna typical of both peatbogs and dystrophic pools



with an open water surface. The most specialized fauna was found in the pools with the largest Sphagnum cover: only typhobionts, of all the ecological elements, significantly discriminated the fauna of peat pools and the marginal zone. Sphagnum cover was the key structural factor affecting the distribution of all the insects. Additionally, dragonflies were dependent on pH, beetles on temperature, and caddisflies on dissolved oxygen; however, structural factors—apart from Sphagnum cover—pool perimeter and emergent vegetation cover were predominant. Our results show that appropriate management of the structural factors of peat pools, especially Sphagnum cover, and the provision of different successional stages, can enhance biodiversity and help to maintain a valuable specialist fauna. Even along small environmental gradients and in a homogeneous area, the response of insects is highly differentiated. Dragonflies probably best represent the conservation value of the overall invertebrate fauna of Sphagnum bogs." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**17078.** Buczyński, P.; Buczyńska, E.; Michalczuk, W. (2019): From southern Balkans to western Russia: Do first Polish records of *Pantala flavescens* (Fabricius, 1798) (Odonata: Libellulidae) indicate a migration route? *Journal of the Entomological Research Society* 21(1): 11-16. (in English) ["*P. flavescens*, probably the most widespread dragonfly on Earth, has been recorded for the first time in Poland. Two single specimens (males) were observed in middle-eastern and northern part of the country in Summer 2016. Both observation sites are the valuable completion of knowledge about the distribution of this migratory species, which had been previously found only once in Central-Eastern Europe. New data indicates possible migration routes of this species in this region." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**17079.** Buczynski, P.; Tarkowski, A. (2019): Southern skimmer *Orthetrum brunneum* (Fonsc.) (Odonata, Libellulidae) – 58th odonate species found in the Poleski National Park. *Parki nar. Rez. Przyr.* 38(2): 83-87. (in Polish, with English summary) ["A hunting female of *O. brunneum* was recorded on 14.06.2019 on a transitional peat bog in the Poleski National Park (51°24'21.6" N, 23°06'24.5" E, UTM: FB49). It was probably an individual from the meadows near the park. There are no suitable habitats for this species in the park. Including *O. brunneum*, 58 dragonfly species (78% of the national fauna and 85% of the fauna of the Lublin Region) have been found in the Poleski National Park so far. This confirms the importance of this area as a refugium of dragonflies and a hot spot of their species diversity." (Authors)] Address: Tarkowski, A., Katedra Zoologii i Ochrony Przyrody, Instytut Nauk Biologicznych, UMCS w Lublinie, ul. Akademicka 19, 20 – 033 Lublin, Poland. E-mail: tarkowski890@gmail.com

**17080.** Buczynski, P.; Buczyńska, E. (2019): First records of *Gomphus vulgatissimus* (L.) (Odonata: Libellulidae) and *Oulimnius major* (REY) (Coleoptera: Elmidae) in Southwestern

England (Great Britain) with other insect records from Devon County. *Wiad. Entomol.* 38(2): 120-121. (in English, with Polish summary) [UK, River Otter in Ottery St. Mary (50°44'37"N 3°17'00"W. UTM: VB 72): *G. vulgatissimus*, 18 VII 2017, 1 male in flight along the river bank.] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**17081.** Bylak, A.; Rak, W.; Wójcik, M.; Kukula, E.; Kukula, K. (2019): Analysis of macrobenthic communities in a post-mining sulphur pit lake (Poland). *Mine Water and the Environment* 38(3): 536-550. (in English) ["The objective of the study was to define the primary environmental factors affecting the composition of the macrobenthic community in an abandoned open cast sulphur mine pit lake that had been filled with water from a nearby river. We investigated habitats at various depths and the macrobenthic communities; samples were collected by scuba divers. Although rush and submerged vegetation in the subsaline pit lake was abundant and provided potentially good habitat conditions for mayflies, caddisflies, coleopterans, or damselflies, the native insects were scarce. The taxa do not have many representatives in waters with elevated salinity, so those present in the Machów pit lake were mainly euryhaline species. Chironomids were the most abundant macroinvertebrates in shallower zones, whereas non-native zebra mussels were the quantitatively dominant taxon in deep-water zones. Moreover, these non-native mussels were the dominant biomass of invertebrates at all sites in all seasons. The current composition of the invertebrate assemblage was probably primarily determined by the salinated water, which limited the abundance of native species and gave non-native species an edge." (Authors)] Address: Bylak, Aneta, Dept of Ecology & Environmental Monitoring, Univ. of Rzeszów, Rzeszów, Poland. E-mail: abyлак@ur.edu.pl

**17082.** Cabana, M.; Ferreira, R.; Pardo, L.; Romeo, A. (2019): Primeras citas de *Brachytron pratense* (Odonata: Aeshnidae) en la provincia de Lugo (noroeste de la Península Ibérica). *Boln. S.E.A.* 64: 251-252. (in Spanish, with English summary) ["First records of *Brachytron pratense* (Odonata: Aeshnidae) in the province of Lugo (NW Iberian Peninsula). 17 specimens from five dates in May 2019 are documented." (Authors)] Address: Cabana, M., Grupo de Investigación en Biología Evolutiva (GIBE), Depto de Biología. Facultad de Ciencias. Universidade da Coruña. Campus da Zapateira, s/n. 15.071 A Coruña, Spain. E-mail: mcohyala@gmail.com.

**17083.** Cai, Y.; Nga, Y.P.Q.; Ngiam, R.W.J. (2019): Diversity and distribution of dragonflies in Bukit Timah Nature Reserve, Singapore. *Gardens' Bulletin Singapore* 71(Suppl. 1): 293-316. (in English) ["Biodiversity baselines were established for dragonflies of Bukit Timah Nature Reserve, Singapore, based on quantitative and qualitative samplings. Surveys were conducted from December 2014 to February 2016. Hydrological, physicochemical parameters and habitats were analysed to understand the main drivers structuring the dragonfly community. A total of 829 odonate specimens were recorded during the quantitative sampling, comprising 36 species of 28 genera in 11 families. The species diversity in each

of the six sampling sites was compared using the Shannon-Wiener Index ( $H'$ ). Hierarchical clustering and Detrended Correspondence Analysis (DCA) indicated that three main groupings of sites existed, each with a distinct community of associated species. Further analysis by Non-metric multidimensional scaling (NMDS) on the relevant distance based on species composition at the six sampling sites, together with 21 environmental variables showed that these groups were significantly associated with respective environmental variables. An updated species list of Bukit Timah dragonflies is provided for future reference, with 55 species of 43 genera in 12 families. Disturbance and threats to the odonate fauna of the Bukit Timah Nature Reserve are identified and conservation management measures are discussed." (Authors)] Address: Cai, Y., National Biodiversity Centre, National Parks Board, 1 Cluny Road, 259569 Singapore. E-mail: cai\_yixiong@nparks.gov.sg

**17084.** Calvao, L.B.; Juen, L.; Barbosa de Oliveira, J.M.; Batista, J.D.; De Marco, P. (2019): Land use modifies Odonata diversity in streams of the Brazilian Cerrado. *Journal of Insect Conservation* 22(5–6): 675–685. (in English) ["The presence of riparian vegetation provides microclimatic regulation of stream conditions [e.g. luminosity (lux), air temperature ( $^{\circ}$ C) and relative humidity (%)], which varies naturally throughout the day. These variables explain the diurnal behaviour patterns of ectotherms such as Odonata in natural areas. However, human land uses (e.g. pastures) modify the abiotic conditions of riparian environments, favouring the presence of disturbance-tolerant species. In this context, we assess relationships between riparian land use (control streams-natural areas and pasture), abiotic conditions habitat integrity index (in control and pastures streams), (air temperature, luminosity and humidity in control streams), and Odonata diversity (between pasture and control streams and throughout the time of day) in Brazilian savannah (Cerrado) streams. First, the control streams had higher habitat integrity index than pasture. Higher abundance and difference in composition of Odonata species were observed in streams surrounded by pasture relative to natural areas. The conversion of natural areas to pasture near streams was also accompanied by an increase in overall body size of Odonata species. Odonata species richness and abundance in natural areas varied throughout the day, but peaked around 12:00 h, coinciding with changes in air temperature and luminosity. Our study highlights that changes in the physical characteristics of streams through conversion of natural habitats to pasture will change environmental conditions and act as a filter on the distribution and persistence of Odonata species in Cerrado streams." (Authors)] Address: Calvão, L.B., Depto de Ciências Biológicas, Univ. do Estado de Mato Grosso, Nova Xavantina, Brazil

**17085.** Camargo-Martínez, P.A.; Rodríguez-Villamil, D.R. (2019): Anidación del Búho campestre (*Asio flammeus bogotensis*) en la Sabana de Bogotá, Colombia - Nesting of the Short-eared Owl (*Asio flammeus bogotensis*) in the Sabana de Bogotá, Colombia. *Omitología Colombiana* 17: eA02: 1-11. (in Spanish, with english summary) ["Reproduction is one of the most important aspects of a species biology. However, this information is scarce for nocturnal species such

as owls, for which we do not know basic details of the natural history, particularly of species with a Neotropical distribution. The Short-eared Owl is a widely distributed species, the little that is known about its reproductive biology has become a generalized statement from studies in temperate zones. We made observations of three reproductive events of the Short-eared Owl in the Bogotá Savannah between 2014 and 2018. We include data on habitat, nest architecture, eggs, chicks, juveniles and adults description, determination of vocalizations and diet description through the analysis of 18 pellets. *Asio flammeus bogotensis* nests on the ground, in open areas such as grasslands, with an average clutch size of two white and rounded eggs ( $n = 3$ ). ... Regarding the diet we found 136 food items, including insects (beetles and odonates [*Rhionaeschna marchalii*]) 61.76%, small mammals (rodents and shrews) 33.82%, and birds (pigeons and passerines) 4.42%. The predominant prey were Coleoptera (*Ancognatha vulgaris*) and the common mouse (*Mus musculus*). There are still several aspects of the natural history of this and other species that we hope will continue to be studied by ornithologists in the Neotropics." (Authors)] Address: Rodríguez-Villamil, D.R., Grupo de Ornitología de la Universidad Pedagógica Nacional (UPN-O). Departamento de Biología. Énfasis Biología de la Conservación UPN. E-mail: bionaturaldavid@gmail.com

**17086.** Cannings, R.A. (2019): Odonata of Canada. *ZooKeys* 819: 227–241. (in English) ["Since Corbet's thorough 1979 overview of Canadian Odonata, hundreds of regional works on taxonomy, faunistics, distribution, life history, ecology and behaviour have been written. Canada records 214 species of Odonata, an increase of 20 since the 1979 assessment. Estimates of unrecorded species are small; this reflects the well-known nature of the fauna. A major impetus for surveys and analyses of the status of species is the work of the Committee on the Status of Endangered Wildlife in Canada which provides a scientifically sound classification of wildlife species potentially at risk. As of 2017, six species have been designated "Endangered" and two "Special Concern" (only five of which are officially listed under the Federal Species at Risk Act (SARA)). The Order provides a good example of molecular barcoding effort in insects, as many well-accepted morphological species in Canada have been barcoded to some degree. However, more barcoding of accurately identified specimens of many species is still required, especially in most of the larger families, which have less than 70% of their species barcoded. Corbet noted that the larvae of 15 Canadian species were unknown, but almost all larvae are now well, or cursorily, described. Extensive surveys have greatly improved our understanding of species' geographical distributions, habitat requirements and conservation status but more research is required to better define occurrence, abundance and biological details for almost all species." (Authors)] Address: Cannings, R.A., Royal British Columbia Museum, 675 Belleville St, Victoria, BC, V8W 9W2, Canada. E-mail: rcannings@royalbcmuseum.bc.ca

**17087.** Cano Villegas, F.J. (2019): Situación actual de *Aeshna affinis* Vander Linden, 1820 (Odonata: Aeshnidae) en la provincia de Córdoba (Andalucía, Sur de España). *Boln. S.E.A.* 64:

253-254. (in Spanish, with English summary) ["The second record of *A. affinis* in Cordoba is presented, revising his situation in Andalusia, threats and protection status." 2-VI-2016, 22-VII-2018, las Jaras, UTM 30SUH30). (Author)] Address: Cano Villegas, F.J., Asociación Odonatológica de Andalucía. C/ Isla Mallorca nº 2 Portal 6 4ª; 14011 Córdoba, Spain

**17088.** Cano-Villegas, F.J. (2019): Primera cita de *Libellula quadrimaculata* Linnaeus, 1758 (Odonata: Libellulidae) de la provincia de Córdoba (Andalucía, sur de España). Boln. Sociedad Entomológica Aragonesa (S.E.A.) 65: 219-220. (in Spanish, with English summary) [14-V-2019, lateral del Embalse de la Encantada (cuadrícula UTM 30SUH30 a 460 m. s.n.m.).] Address: Cano-Villegas, F.J., Asociación Odonatológica de Andalucía. C/ Isla Mallorca nº 2 Portal 6 4ª; 14011 Córdoba, Spain

**17089.** Cao, L.-z.; Wu, K.-m. (2019): Genetic diversity and demographic history of Globe Skimmers (Odonata: Libellulidae) in China based on microsatellite and mitochondrial DNA markers. Scientific Reports 9( 8619): 8 pp. (in English) ["To analyze genetic characters of migratory dragonflies, we used 10 microsatellite markers and a partial sequence of the mitochondrial gene *Cytb* to investigate genetic diversity and demographic history among 19 populations of *P. flavescens* in eastern the monsoon region of China. In a Bayesian clustering analysis of the microsatellite data, three distinct clades were present, and each population consisted of a mixture of individuals from the three clusters. An AMOVA of the data from both the microsatellite loci and *Cytb* revealed that genetic variation was mainly within each population. For the 543 individuals from the 19 regions, 77 unique haplotypes were obtained by DnaSP 4.0, and a median-joining network showed no obvious geographical pattern and displayed high gene flow and minimal population genetic structure among the 19 populations. According to a Mantel test, there was no significant association between genetic distance and geographic distribution and no isolation by distance. Mismatch distribution and neutrality tests showed no demographic expansion for the 19 populations. Microsatellite and mitochondrial DNA data suggested there was high gene flow and low differentiation among the populations. These results will help provide valuable information to study the migratory route of insects, especially important agricultural pests." (Authors)] Address: Wu, K.-m., Inst. of Plant Protection, Chinese Acad. of Agricultural Sci., Beijing, 100193, P.R. China. E-mail: kmwu@ippcaas.cn

**17090.** Casanueva, P.; Sharifi, F.S.; Hernández, M.A.; Campos, F. (2019): Colour of the gonapophyses in *Cordulegaster boltonii* (Golden-ringed Dragonfly) can help determine the stage of metamorphosis in female final instar larvae. J. Br. Dragonfly Society 35(1): 33-38. (in English) ["The degree of darkening of the gonapophyses in female final instar (F-0) larvae of *C. boltonii* is compared with the four stages (here referred to as 1 - 4) of metamorphosis described by Ferreras-Romero & Corbet (1999) in this species. There is a reasonable degree of correlation, with larvae showing no darkening of the gonapophyses falling mainly in stages 1 and 2, whereas those with more than 25% of darkening fall almost exclusively

into stages 3 and 4. The method described in the current study is a simple method for determining the stage of metamorphosis but it is suggested that, for maximum accuracy, both methods should be used." (Authors)] Address: Casanueva, Patricia, Dept of Experimental Sciences, European Univ. Miguel de Cervantes, CI Padre Julio Chevalier 2, 47012 Valladolid, Spain. E-mail: pcasanueva@uemc.es

**17091.** Catalano, S.; Nadler, S.A.; Fall, C.B.; Marsh, K.J.; Leger, E.; Sened, M.; Priestnall, S.L.; Wood, C.L.; Diouf, N.D.; Ba, K.; Webster, J.P. (2019): *Plagiorchis* sp. in small mammals of Senegal and the potential emergence of a zoonotic trematodiasis. IJP: Parasites and Wildlife 8: 164-170. (in English) ["Trematodes of the genus *Plagiorchis* have a wide geographical distribution and can exploit a variety of hosts. The occurrence and zoonotic potential of *Plagiorchis* spp. have been characterised across several countries in Asia; in contrast, information on *Plagiorchis* parasites in Africa remains anecdotal. We isolated a previously undescribed *Plagiorchis* species from the biliary tract and small intestine of 201 out of 427 small mammals collected in the region of Lake Guiers, Senegal, with local prevalence ranging from 38.6% to 77.0%. Conversely, *Plagiorchis* isolates were not observed in the 244 small mammals sampled in and around the town of Richard Toll, Senegal. Molecular phylogenetics of the internal transcribed spacer region, nuclear ribosomal DNA, and of the cytochrome c oxidase subunit 1 gene, mitochondrial DNA, supported the monophyly and multi-host spectrum of this newly discovered West African *Plagiorchis* species. Sequencing of individual cercariae shed by *Radix natalensis* (Gastropoda: Lymnaeidae) suggested that these freshwater snails may act as suitable first intermediate hosts. Phylogenetic analysis yielded a highly resolved topology indicating two different clades, one composed by *Plagiorchis* spp. infecting rodents, insectivores, and birds, while the other included parasites of bats. Our findings showed the low host specificity and high prevalence of the isolated *Plagiorchis* sp. in the Lake Guiers region, with Hubert's multimammate mice (*Mastomys huberti*) appearing to play a primary role in the epidemiology of this parasite. The results raise concern about the zoonotic potential of *Plagiorchis* sp. in local communities of the Lake Guiers region, and highlight food-borne trematodiasis and their link to land-use change as a neglected public health issue in regions of West Africa." (Authors)] Address: Catalano, S., Centre for Emerging, Endemic & Exotic Diseases, Dept of Pathobiology & Population Sci., The Royal Veterinary College, Univ. of London, Hatfield, AL97TA, UK. E-mail: scatalano@rvc.ac.uk

**17092.** Chelli, A.M.; Zebbsa, R.; Khelifa, R. (2019): Discovery of a new population of the endangered *Calopteryx exul* in central North Algeria (Odonata: Calopterygidae). Notulae odonologicae 9(4): 150-154. (in English) ["*C. exul*, is reported from Algeria. The species was found on the Bousselam river in Bejaia province, central North Algeria, in three different localities. Reproductive behaviour was observed. These new findings extend the known geographic range of the extant populations of the species in Algeria." (Authors)] Address: Chelli, A.M., Laboratoire de Zoologie Appliquée et d'Écophysiologie Animale, Faculté des Sciences de la Nature et de



la Vie, Université de Bejaia, Algeria. E-mail: mchelli70@yahoo.fr

**17093.** Chelmick, D. (2019): *Coenagrion mercuriale* (Southern Damselfly) at Povington, Isle of Purbeck, Dorset. *J. Br. Dragonfly Society* 35(1): 18-32. (in English) ["*C. mercuriale* is found very locally in Southern Britain where it breeds in base rich, slow flowing streams and mires; its two year larval life cycle in the UK requires permanent waters. On the Isle of Purbeck, Dorset, *C. mercuriale* has been found in six sites, only one of which (Harland Moor) is currently thriving. One of the sites, at Povington, which is on MOD land, was discovered in May 1992, and in 1995 the colony was thought to comprise approximately 1500 adults and was the most important in Purbeck. Since that time the colony has declined and in 2016 only one adult was seen. This was the last sighting of this species at Povington. On behalf of the British Dragonfly Society, the author undertook a study of the habitat to investigate the decline. In summary: The colony at Povington came about as a result of changing water flows associated with clay workings, probably in the 1980s. In 1996 it was proposed that the water flows would be diverted entirely away from the site. Following negotiations, a compromise solution was made, allowing some water to continue to flow through the site. Unfortunately, this compromise has provided insufficient water to maintain the colony. Although the water flow has improved, the reduced grazing of the area has led much of the habitat to become overgrown. The problems with water flow and grazing mean that it is unlikely that *C. mercuriale* survives at Povington." (Authors)] Address: Chelmick, D., Macromia Scientific 31 High Beech Lane, Haywards Heath RH16 1SQ, UK. E-mail: david.chelmick@gmail.com

**17094.** Chertoprud, M.V.; (2019): Macrofauna communities in the mountain streams of Sri Lanka (Ceylon). *Inland Water Biology* 12(2): 199-209. (in English) ["The rheophilic macrobenthic communities of the mountainous part of the island of Sri Lanka have been studied based on the material of 170 quantitative stations of small rivers and streams. Thirteen types of communities are described by taxonomic structure (mainly at the genus level) and habitats; similarities with other regions are also shown. A difference between the communities in the lowland (tropical) and highland (subtropical) zones is observed. This paper provides a taxonomic review of the macrofauna sampled and a description of the regional features of its ecology and diversity. Characteristics of the oriental tropical rheophilic communities in comparison with subtropical and boreal Palearctic communities, the influence of altitudinal zonation, the effect of the island on the community structure, and the biogeographic position of Sri Lanka are discussed." (Author)] Address: Chertoprud, M.V., Moscow State University Moscow, Russia. E-mail: lymnaea@yandex.ru

**17095.** Chien, W.-C.; Li, M.-H.; Li, H.-J. (2019): Appropriate management practices help enhance odonate species richness of small ponds in peri-urban landscapes. *Urban Ecosystems* 22: 757-768. (in English) ["Adult odonate biodiversity was investigated to understand their relationship with pond management practices and environmental conditions in a

rapidly urbanized landscape. Twenty-four farm ponds in Taoyuan City were selected and classified into five pond groups based on pond management practices. In total, 21 species, 17 genera, and 6 families of odonates were recorded for a total of 5701 individuals between June 2014 and July 2015. The abundance of Odonata was unrelated to pond size or distance to the nearest pond; however, odonate species richness was negatively and significantly correlated with pond size. Pond management practices considerably affected pond aquatic macrophytes and dike construction materials. Ecology park ponds under intense human management and undisturbed ponds without any human management had higher species richness than did the ponds in the other three fish farming groups. Species richness was highest in small and human-modified ponds. By contrast, species richness was lowest in two fish farming pond groups. These results suggest that pond management practices can increase or reduce odonate species richness depending on the alteration of pond microhabitat features. Our observations suggest that the enhanced habitat quality of small ponds provides an opportunity to protect freshwater biodiversity for local governmental civil servants in urbanized landscapes." (Authors)] Address: Li, M.-H., Environmental Ecology Lab, Dept of Geography, National Taiwan University, 1 Section 4 Roosevelt Roads, Taipei 106, Taiwan. E-mail: meihuili@ntu.edu.tw

**17096.** Choong, C.Y. (2019): Odonata fauna of Pulau Pangkor, Perak, peninsular Malaysia. *The Malaysian Forester* 82(1): 271-276. (in English) ["Records of Odonata collected at sites in Pangkor Island, Perak on 1620 July 2017 are presented. Adult odonates were caught during the field survey using hand-held net. A total of 30 species from seven families was recorded; 17 species were Libellulidae, six were Platycnemididae, three were Coenagrionidae, and one each was Devadattidae, Euphaeidae, Platystictidae and Aeshnidae. Of these, 11 species were new records for Pulau Pangkor. Interesting species recorded were *Mortonagrion arthuri*, *Drepanosticta fontinalis* and *Amphicnemis gracilis*. At present 44 species from nine families are known to Pulau Pangkor." (Author)] Address: Choong, C.Y., Centre for Insect Systematics, Univ. Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.edu.my

**17097.** Chovanec, A. (2019): Syntope Vorkommen von *Erythromma lindenii*, *E. najas* und *E. viridulum* (Odonata: Coenagrionidae) am Unterlauf der Rott (Bayern, Deutschland). *Mercuriale* 18/19: 27-42. (in German, with English summary) ["Odonatological investigations of the lower reach of the river Rott in Bavaria (Germany) in June and July 2018 revealed syntopic occurrences of *E. lindenii*, *E. najas* and *E. viridulum* at two sites. These localities were characterised by submerged macrophytes reaching the water surface, floating leaf plants and strongly reduced flow velocities. One site was situated in an impounded section of the main river, the other in a bypass channel. Further species recorded were, among others, *Gomphus pulchellus*, *G. vulgatissimus*, *Onychogomphus forcipatus* and *Orthetrum albistylum*." (Author)] Address: Chovanec, A., Krotenbachgasse 68 A-2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmnt.gv.at

**17098.** Chovanec, A. (2019): Nachweis von *Orthetrum brunneum* (Odonata: Libellulidae) an einer kleinen überrieselten Asphaltstraße in Niederösterreich: Verhaltensbeobachtungen und Aspekte der Habitatwahl. *Mercuriale* 18/19: 43-57. (in German, with English summary) ["Records of *O. brunneum* at a small, wet asphalt street in Lower Austria: observations of behavioural patterns and aspects of habitat selection. – In 2018, a temporary water course with a maximum length of 120 m on a small street caused by a drainage pipe was colonised by *O. brunneum*. Numbers of individuals and occupied territories were dependent on the length of the wet section. Behavioural patterns, such as the choice of perching sites, are described. Aspects of habitat selection and the role of certain anthropogenic systems as ecological traps for dragonflies are discussed." (Author)] Address: Chovanec, A., Krottenbachgasse 68 A–2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmnt.gov.at

**17099.** Conze, K.-J. (2019): In memoriam of Prof. Dr. Eberhardt Schmidt, 20 July 1935 to 9 July 2018. *Agrion* 23(1): 5. (in English) [Verbatim: In July 2018 Prof. Dr. Eberhardt Schmidt died after a severe illness but in the good custody of his family. Nearly all his life he was an odonatologist, from early beginnings as a pupil in Berlin to more than seventy years of experience in his later years. He published more than 250 scientific papers, around 180 of them about dragonflies! In 1971 he was involved in the foundation of the SIO (Societas Internationalis Odonatologica) and for several years he also worked on the board of this international scientific community of odonatologists from around the world. Together with Rainer Rudolph he founded the GdO (Gesellschaft deutschsprachiger Odonatologen) and for a long time he was the 'guiding spirit' of this society. Early on he gave advice on how to determine and document dragonflies by photographs; this knowledge is even today still very helpful and necessary. Also from the start of GdO he proclaimed long-term monitoring as an important task for odonatologists. We should certainly learn from him! But his huge body of work for the sake of the dragonflies is now a significant part of our baseline knowledge. Many of his papers produced ideas to be followed up and developed further e.g. using dragonflies as bioindicators for nature conservation of watercourses. No doubt, Ebi (as his friends called him) will always stay in our memory! The GdO is now preparing a dedicated supplement of *Libellula* to honour Eberhardt Schmidt.] Address: Klaus-Jürgen Conze. E-mail: kjc@loekplan.de

Cordero-Rivera, A.; Romeo Barreiro, A.; Cabana Otero, M. (2019): *Forcipomyia paludis* (Diptera: Ceratopogonidae) in the Iberian Peninsula, with notes on its behaviour parasitizing odonates. *Boletín de la Sociedad Entomológica Aragonesa* 64: 243-250. (in English, with Spanish summary) ["The adults of Odonata are parasitized by the ceratopogonid dipteran *F. paludis*, which is widely distributed in Europe, but has not been formally cited in the Iberian Peninsula, although it has been cited in the Balearic Islands. However, its presence in photographs stored in citizen science websites, books on odonates, as well as the finding of this species in Galicia in at least two locations, indicate that its distribution in the Iberian Peninsula is wide, particularly on the Mediterranean

coast. A detailed map of the distribution of *F. paludis* in the Iberian Peninsula is provided, as well as photographs under the scanning electron microscope, to facilitate its identification. In Galicia it has been found for several years parasitizing odonates in the lagoon of Doniños (Ferrol), where its main hosts are *Enallagma cyathigerum* and *Ischnura elegans*, although always at very low frequencies. Other species occasionally parasitized in this lagoon were *Sympetrum sanguineum*, *Erythromma viridulum* and *Lestes virens*, in these last two cases a newly emerged individual. Likewise, several adults of *F. paludis* have been observed attacking an individual of *Onychogomphus uncatatus* at the time of the emergence, in this case on the Ulla river, a behaviour that is described and discussed." (Authors)] Address: Cabana Otero, M., Grupo de Investigación en Biología Evolutiva (GIBE). Depto de Biología. Fac. de Ciencias. Universidade da Coruña. Campus da Zapateira, s/n. 15071 A Coruña, Spain. E-mail: mcohyala@yahoo.es

**17100.** Cordero-Rivera, A.; Sanmartín-Villar, I.; Sánchez Herrera, M.; Rivas-Torres, A.; Encalada, A. C. (2019): Survival and longevity in neotropical damselflies (Odonata, Polythoridae). *Animal Biodiversity and Conservation* 42.2: 293-300. (in English, with Spanish summary) ["Survival and longevity in neotropical damselflies (Odonata, Polythoridae). Longevity among insect orders varies greatly, and has mainly been studied in insects in temperate biomes, where seasonality determines high synchronization of reproductive activities and limits lifespan. Most forest damselflies in tropical regions have low population densities and are almost never observed in copula. We hypothesized that selection will favour a high survival rate and hence high lifespan, allowing the animals to be ready for the occasional events that favour reproduction. We studied *Polythore mutata* and *P. derivata*, in Ecuador, using mark-recapture methods. We found that sex affected the rate of recapture, but daily survival rate was affected by sex only in one population. We found evidence that suggests stabilizing or directional selection on body size. The maximum lifespan was 54–63 days. We conclude that the survival rate of *Polythore* damselflies in tropical forests is comparable to that of similar damselflies in temperate zones." (Authors)] Address: Cordero-Rivera, A., ECOEVO Lab, Escola de Enxeñaría Forestal, Universidade de Vigo, Campus A Xunqueira, 36005 Pontevedra, Galiza, Spain. E-mail: adolfo.cordero@uvigo.es

**17101.** Corso, A.; Janni, O.; Pavesi, M.; Sammut, M.; Sciberras, A.; Vigano, M. (2019): Update to the status of *Lindenia tetraphylla* (Vander Linden, 1825) (Odonata Gomphidae) in Italy, with special reference to the Molise region. *Biodiversity Journal* 10(1): 7-12. (in English) ["Data concerning a new reproductive population of *L. tetraphylla*, found by the authors in Molise, Central Italy, between 2012 and 2018, are here reported. The species was recorded in some artificial farm ponds of the inland agricultural area, where localized but conspicuous reproductive populations are annually found. A single sighting from 2017 is also reported from the Abruzzo region, where the species has never been recorded before. The data here discussed update the status for Italy and enlarge the known distribution area. All the sites

where the species is found in Molise are listed and mapped, brief data concerning habitat used are also reported." (Authors)] Address: Corso, A., Via Camastra 10, 96100 Siracusa, Italy. E-mail: zoologywp@gmail.com

**17102.** Corso, A.; Janni, O.; Fracasso, C.; Biscaccianti, A.; De Lisio, L. (2019): New data on the distribution of the endangered dragonflies *Oxygastra curtisii* (Dale, 1834), *Somatochlora meridionalis* (Vander Linden, 1825) and *S. flavomaculata* Nielsen, 1935 in central-southern Italy (Odonata Corduliidae). *Biodiversity Journal* 10(3): 195-200. (in English) ["For *S. curtisii* we reports for the first time its presence in Abruzzo and Molise regions, while for *meridionalis* we report the national south most known sites, while for *flavomaculata* a range extension of more than 200 km south.] Address: Corso, A., Via Camastra 10, 96100 Siracusa, Italy. E-mail: zoologywp@gmail.com

**17103.** Crane, A.L.; Bairos-Novak, K.R.; Jefferson, D.M.; Chivers, D.P.; Ferrari, M.C.O. (2019): Survival, behaviour, and morphology of larval wood frogs, *Lithobates sylvaticus*, under threat from an exotic crayfish predator, *Orconectes virilis*. *Aquatic Ecology* 53(3): 383-392. (in English) ["There are numerous examples of species introductions that have caused declines in native populations. In many cases, exotic species are predators of native prey which do not respond correctly to these new and often much different threats. Amphibians, as a group, have been strongly affected by introductions of fish and other aquatic predators such as crayfish. Our goal in this study was to explore the potential impacts of exotic crayfish on the behaviour, morphology, and survival of native wood frog tadpoles, *L. sylvaticus*. In mesocosms, groups of tadpoles were exposed to either a native predator (larval beetle or dragonfly nymph) or an exotic crayfish, *Orconectes virilis*. Tadpoles were the largest following exposure to dragonflies, indicating that dragonflies were selecting smaller tadpoles. Vertical space use of tadpoles was highest in the presence of crayfish, suggesting that tadpoles were learning to avoid crayfish in the benthos. Mortality was highest in the presence of beetles and lowest with crayfish, and hence in isolation, exotic crayfish were poorer predators of wood frog tadpoles. However, half way through the experiment, we replaced each predator with a new predator of either the same species or a different species to assess how the impact of the new predator was affected by experience with the first predator. When crayfish were added following beetles, the mortality due to crayfish increased significantly, possibly due to differences in predator space use and foraging mode." (Authors)] Address: Crane, A.L., Dept of Biol. Concordia Univ. Montreal Canada

**17104.** Cuellar-Cardozo, J.A.; Lozano-Bernal, M.F.; Díaz-Guamán, J.-W. (2019): Estudio, curaduría y nuevos registros de odonatos presentes en la colección del Museo de La Salle. *Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales* 43(168): 489-493. (in Spanish, with English summary) ["Study, curation and new records of odonates present in the collection of the Museum of La Salle. Colombia is the fifth country with the most Odonata species in Latin America totaling 437 distributed among 11 families, which represent 7.2% of the world's richness. This is reflected in a large number of specimens present in many collections in the country.

The collection of the Museum of La Salle has records since 1968 and it evidences problems in the taxonomic identification and the preservation mode that can put at risk the specimens and the information they represent in the long term. Taking into account this, the objective of this project was to carry out a taxonomic update and to improve the storage conditions of the odonates deposited in the museum. For this, the specimens were identified up to the minimum possible taxonomic level and, at the same time, we undertook curative conservation and storage optimization actions. As a result, a total of 903 individuals were identified belonging to 81 species distributed in 14 departments, Huila being the most representative with 363 specimens, most of them collected between 2010 and 2017. Through a bibliographic review, we found new records for several departments of the country, Cundinamarca being the one with the largest amount. We concluded that the collection of the Museum of La Salle has valuable pieces of information regarding the spatial and temporal distribution of Odonata species in the country. Likewise, we highlight the importance of using the correct technique for specimen preservation and storage." (Authors)] Address: Cuéllar-Cardozo, J.A., Bioprospección y Conservación Biológica, Univ. de La Salle, Bogotá, D.C., Colombia. E-mail: josecuellar1094@gmail.com

**17105.** Cunha, D.L.; Mendes, M.P.; Marques, M. (2019): Environmental risk assessment of psychoactive drugs in the aquatic environment. *Environmental Science and Pollution Research* 26(1): 78-90. (in English) ["The consumption of psychoactive pharmaceuticals has increased worldwide, and wastewater treatment plants are not able to eliminate them from the effluent. An extensive review was carried out to assess the environmental risk (ERA model) based on secondary data about potential impacts on non-target organisms of seven psychoactive drugs consumed worldwide (alprazolam, bromazepam, citalopram, clonazepam, diazepam, lorazepam, and oxazepam). Risk quotients (RQs) were calculated according to the European Medicines Agency (EMA) on ERA of Medicinal Products For Human Use based on (i) the predicted and measured environmental concentrations (PEC and MEC, respectively) of the psychoactive drug in surface water, groundwater, and wastewater effluent and (ii) the predicted no-effect concentration (PNEC) derived from ecotoxicological assays or ECOSAR software. Furthermore, this study reviews and discusses non-standardized ecotoxicity assays, such as sublethal and behavioral effects on different organisms. In total, 903 MEC entries of psychoactive drugs and 162 data on ecotoxicological assays were gathered from the literature survey addressing behavioral effects (115), acute/chronic effects (35), and sublethal effects (12). Citalopram and diazepam were the only substances that are likely to pose an environmental risk (RQ > 1) to surface waters. Even though there is considerable amount of data on behavioral effects of psychoactive drugs to aquatic species, results are currently not integrated into the EMA risk assessment framework. The large amount of data on psychoactive drug concentrations and effects on nontarget organisms collected, interpreted, and discussed in the present study should be used as a baseline for future improvement of ERA strategies." (Authors)] Address: Cunha, D.L., Dept of Sanitary and Environmental Engineering, Rio de Janeiro



State Univ., R. São Francisco Xavier, 524, Rio de Janeiro, RJ, CEP 20550-900, Brazil. [deivisson\\_cunha@uerj.br](mailto:deivisson_cunha@uerj.br).

**17106.** Czechowski, P.; Dubicka, A.; Hadwiczak, M.; Jêdro, G. (2019): New stand of *Aeshna subarctica* Walker, 1908 (Odonata: Aeshnidae) in southern part of Lubuskie voievodship. *Przegad Przyrodniczy* 30(1): 52-58. (in Polish, with English summary) ["The paper presents a new stand for the *A. subarctica* in the southern part of the Lubuskie Voivodeship. The stand was discovered on 18.08.2017 on a small mire near the village of Szprotawka, in the Szprotawa municipality. On the observation day, a dozen or so imagines were found. The presence of a large number of imagines indicates that this is most likely breeding ground for this species. Additionally, paper describes the composition of the mire's odonatofauna. In total, 18 species of dragonflies were found, including two protected species and four species characteristic for this type of habitat. ... *Aeshna subarctica* Walker, 1908 was discovered in 2017 on a small mire near the village of Szprotawka, in the Szprotawa municipality in the Lubuskie voievodship, UTM WT40 square. On 18.08.2017, a dozen or so imagines were observed on the mire. The described site is a small (area of ca. 80 acres) acid transition mire with the vegetation of *Scheuchzeria palustris* order, surrounded by pine forests. On the site there is a periodically drying, small water reservoir. This is the new stand of this protected dragonfly species for the southwestern part of Poland. Observation in 2018 showed complete drying of the mire, which may negatively affect the composition of odonatofauna recorded there and the dragonfly species itself. Apart from *A. subarctica*, 17 dragonfly species were found on the described stand. Of these, 14 are indigenous or probably indigenous. The detected position along with other places described in this part of the country and neighboring Brandenburg in Germany are probably a component of a large metapopulation inhabiting this part of Europe." (Authors)] Address: Czechowski, P., Instytut Administracji i Turystyki, Filia Uniw. Zielonogórskiego, w Sulechowie, ul. Armii Krajowej 51, 66-100 Sulechów, Poland. E-mail: [p.czechowski@wzs.uz.zgora.pl](mailto:p.czechowski@wzs.uz.zgora.pl)

**17107.** Czechowski, P. (2019): Data on the occurrence of the Broad Scarlet *Crocothemis erythraea* (BRULLÉ, 1832) (Odonata: Libellulidae) in Lubusz province (western Poland) in 2016-2018. *Odonatrix* 15\_5 (2019): 8 pp. (in Polish, with English summary) ["*Crocothemis erythraea* ... was recorded at 23 localities in 20 UTM squares (10 x 10 km). Breeding behaviour and/or development was found to be taking place at 11 localities. Broad Scarlets were observed at 18 localities during one season only and at the other 5 sites during two seasons. They were found in various habitats. The largest numbers of these dragonflies were recorded near fish ponds (6 localities), oxbows (3) and beaver ponds (3). The data presented here extend our knowledge of this species in western Poland." (Author)] Address: Czechowski, P., Instytut Administracji i Turystyki, Wydział Zamiejscowy w Sulechowie, Uniwersytet Zielonogórski, ul. Armii Krajowej 51, 66-100 Sulechów, Poland. E-mail: [paczechow@gmail.com](mailto:paczechow@gmail.com)

**17108.** da Silva, M.H.; Teixeira-Gamarra, M.C.; Rodrigues, M.E.; Aoki, C. (2019): Survey of odonate fauna (Insecta:

Odonata) in a stretch of the Maracaju Hills, State of Mato Grosso do Sul, Brazil. *Oecologia Australis* 23(4): 961-968. (in English) ["The scarcity of studies on fauna inventories, especially those addressing insects, is a large problem in many regions of Brazil. To contribute to taxonomic knowledge and broaden the distribution of the order Odonata, we present a survey of odonate fauna of the Maracaju Hills in the state of Mato Grosso do Sul, Brazil. Ten samplings were performed between September 2013 and April 2015, totaling 38 h of active searches. A total of 386 individuals belonging to five families, 21 genera and 37 species were collected. Eleven species belonged to the suborder Zygoptera and 26 belonged to the suborder Anisoptera. The family Libellulidae was the richest and most abundant (25 species; 285 individuals), followed by Coenagrionidae (nine spp.; 81 individuals). Lestidae, Gomphidae and Calopterygidae were each represented by a single species and totaled little more than 5% of the overall sample. Among the genera, *Erythrodiplax* stood out in terms of richness (eight spp.), followed by *Erythemis* (three spp.). The most abundant species were *Erythrodiplax paraguayensis* (N = 75), *E. famula* (n = 50), *Ischnura fluviatilis* (N = 48) and *Micrathyria spuria* (N = 45). The sampling effort represented by the species accumulation curve indicated that the richness of Odonata is close to actual richness, since the curve approached the asymptotic one. *Aphylla molossus*, *Erythemis mithroides* and *Oxyagrion basale* constitutes new records for the state of Mato Grosso do Sul, raising the richness of the state to 212 species." (Authors)] Address: Maria Helena da Silva, Univ. Federal de Mato Grosso do Sul, Campus de Aquidauana (Unidade II), Rua Oscar Trindade de Barros, nº 740, Bairro Serraria, CEP 79200-000, Aquidauana, MS, Brazil. E-mail: [maria\\_helena1212@hotmail.com](mailto:maria_helena1212@hotmail.com)

**17109.** Das, J.; Maity, J. (2019): Seasonal variation of aquatic hemiptera and odonata diversity in River Kangsabati, West Bengal. *Indian Journal of Entomology* 81(3): 609-612. (in English) ["A seasonal study was carried out on aquatic insect diversity of Kangsabati River at three sites, Gandhighat region (site-A), Kangsabati Rail bridge region (site-B), Vidyasagar park region (site-C) of district Paschim Medinipur, near Midnapore town, West Bengal. Nine species of aquatic insects were observed. The order Hemiptera was numerically the most abundant (78.60%), with seven species. Odonata constituted of 21.40% with *Laccotrepes ruber* being the dominant species. *Ranatra elongata* and *Anax guttatus* were similarly present. .... Families Aeshnidae and Coenagrionidae ... constituted 68% and 32%, respectively. Species diversity and evenness of sampling sites when compared, maximum was in site-A and the least in site-B." (Authors)] Address: Maity, J., Dept of Aquaculture Management and Technology, Vidyasagar University, Midnapore, 721102, West Bengal, India. E-mail: [jmaity@mail.vidyasagar.ac.in](mailto:jmaity@mail.vidyasagar.ac.in)

**17110.** David, S.; Sacha, D. (2019): The annotated Odonata Checklist of the Slovak Republic. *Ochrana prírody, Banská Bystrica* 33: 49-78. (in Slovakian, with English summary) ["Since 1977, when Teyrovský published first Checklist of Odonata of then existing Czechoslovakia, several papers have been published putting forward Odonata checklists for

Slovakia. Some of them hard to acquire since published in regional journals, some as table annexes of faunistic reports on dragonflies and overall not widely used. Dragonfly research has intensified in Slovakia over the last decades, leading to confirmation of new species, e.g. *Coeangrion armatum*, *Anax ephippiger*, *Cordulegaster heros*, *Somatochlora meridionalis*, *Leucorrhinia rubicunda*. Other species were confirmed to have been wrongly reported from Slovakia, based on misidentifications, e. g. *Nehalania speciosa*, *C. mercuriale*, *Aeshna caerulea*, *Gomphus pulchellus*, *G. simillimus*, *C. boltonii*. In this paper we present all 79 taxa of the Odonata, which have ever been reported from Slovakia. Out of them, reports of 9 taxa were based solely on misidentifications and they do not occur in Slovakia (*Lestes macrostigma*, *C. mercuriale*, *C. boltonii*, *Ischnura elegans* subsp. *pontica*, *A. caerulea*, *Gomphus simillimus*, *G. pulchellus*, *Lindenia tetraphylla*). From among 69 taxa with solid evidence of their occurrence, 64 have permanent populations, while 5 species do not have any reproducing population here (*Chalcolestes parvidens*, *Sympecma paedisca*, *A. ephippiger* and *L. albifrons*). One species (*C. lunulatum*) was only observed in 1959 and is considered missing in Slovakia. Transitional forms between species *Ch. viridis* and *Ch. parvidens* and *Orthetrum coerulescens* and *O. coerulescens* subsp. *anceps* are mentioned in the paper. With taxa dubiously reported from Slovakia, historical records and taxa whereby evidence of their occurrence (specimens) is missing, we add brief comments. Overview of synonymous names and notes on nomenclature are also added, as appropriate." (Authors)] Address: David, S., Katedra ekológie a environmentalistiky, FPV UKF v Nitre, Trieda A. Hlinku 1, SK-949 01, Nitra, Slovakia. E-mail: sdauid@ukf.sk

**17111.** Dawn, P. (2019): Description of the last instar larva of *Calicnemia eximia* (Selys, 1863) (Odonata: Platycnemididae) from West Bengal, India. *Zootaxa* 4657(1): 183-187. (in English) ["The final instar larva of *C. eximia* is described for the first time from a grass-bed under a waterfall in Buxa Tiger Reserve, Dooars of Darjeeling Himalayas. The larva shows a semi terrestrial nature like other congeners but is unique in having no premental setae and a longer labium. One *C. miniata* larva was also collected from the same locality and is compared with the *C. eximia* larva here." (Author)] Address: Dawn, P., Dept Zool., Shyampur Siddheswari Mahavidyalaya, Ajodhya, Howrah-711312, India. E-mail: prosenjit.dawn@gmail.com

**17112.** De Knijf, G.; Bex, D. (2019): *Leucorrhinia albifrons*, a new species for Belgium (Odonata: Libellulidae). *Brachytron* 20(2): 78-81. (in Dutch, with English summary) ["9-VI-2016 a male of *L. albifrons* was observed near an oligotrophic fen in the Maten in Genk-Diepenbeek. A male, probably the same individual was resighted on 11 and 12 June at the same locality. Although the site and its surroundings were properly surveyed the next days the individual was not seen again until the 19-VI-2016. No further observations are available from this site or other locations in Belgium. Hence, this must be considered as a wandering individual. This observation of *L. albifrons* is the first record for Belgium." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**17113.** De Knijf, G. (2019): First reproduction proof of *Orthetrum albistylum* in Belgium. *Brachytron* 20(2): 55-62. (in Dutch, with English summary) ["We report the first records of *O. albistylum* for Belgium at six different locations. The species was observed with one individual at four locations (Averbode, Etalle, Lavaux-Sainte-Anne, Neerpelt) in 2016, one in 2017 (Ethe), one in 2018 (Etalle) and at two locations (Etalle, Wanlin) in 2019. Proof of successful reproduction was only detected at the site in Etalle, with one male and one teneral male being observed on 1 July 2018 and approximately 10 individuals present on 30 June 2019, among them two copulae, a teneral and one exuvia. At the other four sites, only solitary males and females could be observed. All 114 records of *O. albistylum* are from the period of 30 June to 1 September. The two latest records (15 August and 1 September) are the only two records for Flanders, indicating vagrant individuals. The occurrence of the species in Belgium and the at least temporary reproduction in the southern part of Belgium coincide with ongoing range expansion in western Europa." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**17114.** del Palacio, A.; Lozano, F.; Muzón, J. (2019): Redescription of the last instar of *Remartinia luteipennis luteipennis* (Burmeister, 1839) (Odonata: Aeshnidae). *International Journal of Odonatology* 22(1): 89-94. (in English) ["The final instar of *R. l. luteipennis* is described and illustrated based on reared specimens from Salta Province, Argentina. It is compared with *R. secreta* and *R. l. florida*, and with Calvert's original description of *R. l. luteipennis*. *R. l. luteipennis* can be differentiated by the length of the lateral valvae of the female gonapophyses (equal to the central ones in *R. l. luteipennis*, slightly shorter in *R. secreta*, and longer in *R. l. florida*), and length of S6 lateral spines (1.24 mm in *R. l. luteipennis* 0.4–0.5 mm in *R. secreta*, and 0.2 mm in *R. l. florida*)." (Authors)] Address: del Palacio, A., Lab. de Biodiversidad y Genética Ambiental (BioGeA), Universidad Nacional de Avellaneda, Pineyro, Buenos Aires, Argentina. E-mail: adelpalacio87@gmail.com

**17115.** del Palacio, A.; Muzón, J. (2019): Redescription of *Erythrodiplax chromoptera* Borrer 1942 with comments on the morphology of the vesica spermalis (Odonata: Libellulidae). *Zoologischer Anzeiger* 278: 90-94. (in English) ["A redescription of the male of *E. chromoptera* is provided based on specimens collected in Misiones, Entre Ríos and Buenos Aires provinces, Argentina. The morphology of the vesica spermalis is described and the relation between the *Basalis*, *Connata* and *Nigricans* groups is analyzed. *E. chromoptera* is easily distinguished from the other congeners by the shape of the basal spot of the hind wing and the shape of the median process of the vesica spermalis." (Authors)] Address: del Palacio, A., Lab. de Biodiversidad y Genética Ambiental (BioGeA), Universidad Nacional de Avellaneda, Mario Bravo 1460, Pineyro, CP1870, Avellaneda, Buenos Aires, Argentina. E-mail: adelpalacio87@gmail.com

**17116.** Demnati, F.; Allache, F.; Cohez, D. (2019): Contribution à la connaissance de l'odonatofaune du bassin du

Chott Melghir (Algérie). Bulletin de la Société zoologique de France 144(2): 95-104. (in French, with English summary) ["Odonata are identified from the Chott Melghir basin, which includes the large Ramsar wetlands of Chott Melghir and Merouane, located in the arid bioclimatic zone. The inventory was carried out at 13 sites at lake level altitudes in the basin. The sampling produced 82 individuals of Odonata, representing 11 species, six genera and three families. Libellulidae was the most abundant family, with 71% of individuals, followed by Coenagrionidae (22%) and Aeshnidae (7%). Notes are given on the status and distribution of *Orthetrum nitidinerve*, *Sympetrum meridionale*, *Trithemis kirbyi* and *S. sinaiticum*. Further studies at the catchment level are needed to establish a conservation plan for these bio-indicators at regional and Mediterranean levels." (Authors)] Address: Demnati, Fatma, Dépt des Sciences Agronomiques, Univ. Mohamed Khider, Biskra, Algeria. E-mail: fat\_demnati@yahoo.fr

**17117.** Dinova, D.; Boudot, J.-P.; Conze, K.-J.; Vilenica, M.; Ferreira, S.; Nielsen, R.E.; Jovic, M. (2019): New localities for some important Odonata species in central and southwestern Republic of North Macedonia and the trans-boundary Ohrid Prespa region between Republic of North Macedonia and Albania. Bulletin of the Natural History Museum 12: 153-178. (in English) ["Data related to the 41 species of the dragonfly fauna of central and southwestern Republic of North Macedonia and nearby Albania, gathered during the post European Congress on Odonatology 2012 fieldtrip on July 6-13th, 2012 are presented. The Ohrid . Prespa region was particularly investigated. The majority of previous data available for this area is old and outdated. Additionally, recent species made new surveys necessary. The presence of *Gomphus schneiderii* and *S. flavomaculata* in the region was confirmed whereas *L. pectoralis* was not found again. Conversely, *Coenagrion scitulum* was observed in Albania for the first time. The national Odonata checklists contain now 63 species in Republic of North Macedonia and 59 in Albania.] Address: Dinova, Despina, Macedonian Ecological Society, Blvd. Boris Trajkovski St.7-a, 1000 Skopje, Republic of North Macedonia

**17118.** Djukic, A.; Miriæ, R.; Skejo, J.; Rajkov, S.; Tot, I. (2019): Survey on the damselflies and dragonflies fauna (Insecta: Odonata) of the landscape of outstanding features "Vlasina". Kragujevac J. Sci. 41: 133-146. (in English) ["In this paper we present data on damselflies and dragonflies (Insecta: Odonata) of the Landscape of outstanding features (LOF) "Vlasina". Most of the data were collected during research camps of the Scientific Research Society of Biology and Ecology Students "Josif Panëic" that took place from 2013 to 2018, when 27 Odonata species were recorded. If this research is combined with previously published data, 37 species of Odonata were recorded in Landscape of Outstanding Features "Vlasina". The paper presents distribution and reproduction status of the recorded species, as well as their diversity in this area. The most important species is *Epitheca bimaculata*, because Vlasina represents one of its southernmost and highest habitats in Europe. For *Sympetrum flaveolum*, Vlasina is one of the most important habitats in Serbia, as well as for *Leucorrhinia pectoralis* which is Natura 2000 species." (Authors)] Address:

Djukic, A., Scientific Research Society of Biology and Ecology Students "Josif Panëic", Trg Dositeja Obradoviæa 2, 21000 Novi Sad, Serbia. E-mail: db.e.aleksandar.djukic@student.pmf.uns.ac.rs

**17119.** Dobson, V.; Childs, A. (2019): First record of *Diplacodes trivialis* (Rambur, 1842), a new dragonfly for Oman. Journal of the Emirates Natural History Group 27: 65-66. (in English) [14-XI-2019, south-west of the island near to Ra's Sanaghal, Oman, 20°13.569' N, 58°37.647' E.] Address: Dobson, Victoria, 34, Aristide Tjamali Street, Konias, Paphos, Cyprus. E-mail: vicky2@cytanet.com.cy

**17120.** Dow, R.A. (2019): *Amphicnemis rigiketii* sp. nov. from Sarawak, with notes on *Amphicnemis remiger* Laidlaw, 1912 (Odonata: Zygoptera: Coenagrionidae). Zootaxa 4701(4): 371-382. (in English) ["*A. rigiketii* sp. nov. is described from southwestern Sarawak (holotype ♂ in forest around stream, near road from Kota Samarahan to Siburan, Samarahan Division, Sarawak, Malaysian Borneo, 21 ii 2018, deposited in the Natural History Museum, London). The new species is allied to *A. remiger* Laidlaw, 1912. The female of *A. remiger* is described for the first time and a description of the male from a fresh specimen is provided along with notes on variation." (Author)] Address: Dow, R.A., Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300 Kuching, Sarawak, Malaysia. Email: rory.dow230@yahoo.co.uk

**17121.** Dow, R.A. (2019): Odonata from Sri Aman Division south and west of the Lupar River and from the Kelinggang Range, Sarawak. International Dragonfly Fund - Report 137: 1-26. (in English) ["Records of Odonata from the southwest of Sri Aman Division and the extreme east of Serian Division in Sarawak are presented. The sampled areas are interesting not only because they are poorly known for Odonata but also because many are just to the south and west of the Lupar Line which is a division between the ancient Sunda shelf and more recent geological formations. Differences between the odonate faunas on either side of the Lupar Line are discussed. Eightyfive species of Odonata were recorded during the surveys reported on. The single most notable record is that of *Coeliccia southwelli* Dow & Reels, 2011, which represents a considerable extension to the known range of this species. Other interesting records include *Telosticta dupophila* (Lieftinck, 1933), *T. species cf longigaster* Dow & Orr, 2012, *Podolestes parvus* Dow & Ngiam, 2019 and *Helio gomphus species cf olivaceous* Lieftinck, 1961. Variation in the markings of *Stenagrion dubium* (Laidlaw, 1912) across its range is discussed and a gene tree using the COI marker is presented to illustrate the high variability of this species in this marker. However the variability in COI does not appear to be correlated with other characters." (Author)] Address: Dow, R.A., Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300 Kuching, Sarawak, Malaysia. E-mail: rory.dow230@yahoo.co.uk

**17122.** Dow, R.A.; Ngiam, R.W.J. (2019): A new species of *Podolestes* Selys, 1862 from peat swamp forest in Sarawak (Odonata: Zygoptera: Argiolestidae). Zootaxa 4586(3): 505-



516. (in English) ["*Podolestes parvus* sp. nov. is described and illustrated from both sexes from Sarawak, Malaysian Borneo (holotype ♂ Maludam National Park, Betong Division, Sarawak, 10 vii 2012, deposited in RMNH). The new species is closest to *P. atomarius* Lieftinck, 1950 and is the smallest species yet known in its genus. A full set illustrations of *P. atomarius* is provided for comparison."] (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**17123.** Dressler, P.E. (2019): Gut content analysis of aquatic macroinvertebrates using DNA-based methods. Winthrop University; <https://digitalcommons.winthrop.edu/source/SOURCE2019/posterpresentations/40/>; (in English) [Verbatim: With the great deal of complexity associated with aquatic food webs, many questions regarding species interactions remain unanswered. One such question of importance is: Who is eating whom? This is a question that morphologically based analysis techniques have failed to answer with great accuracy. However, with the advent of DNA-based analysis methods, this question can be answered. DNA-based analysis methods allow for greater certainty in taxonomic identification, because specific gene regions can be targeted using group-specific primers as a means for DNA detection. This approach was used to analyze dragonfly (Odonata, Anisoptera) gut contents using group-specific primers for midges (Chironomidae) and mosquitoes (Culicidae) as potential prey groups. Specimens were collected in Big Dutchman Creek and Winthrop Lake in Rock Hill, South Carolina. DNA was extracted from gut contents of collected specimens. A polymerase chain reaction was performed on each of the extracted samples in order to amplify DNA concentrations. Gel electrophoresis was used as a presence-absence test for DNA from target prey groups. We found that one individual of the genus *Progomphus* contained DNA from the family Chironomidae, but not Culicidae. A second *Progomphus* individual tested negative for both families, illustrating individual variation in feeding. These refined methods will allow for testing of more *Progomphus* individuals and potential prey groups as well as other aquatic macroinvertebrate predators.]

**17124.** Drury, J.P.; Barnes, M.; Finneran, A.E.; Harris, M.; Grether, G.F. (2019): Continent-scale phenotype mapping using citizen scientists' photographs. *Ecography* 42: 1436-1445. (in English) ["Field investigations of phenotypic variation in free-living organisms are often limited in scope owing to time and funding constraints. By collaborating with online communities of amateur naturalists, investigators can greatly increase the amount and diversity of phenotypic data in their analyses while simultaneously engaging with a public audience. Here, we present a method for quantifying phenotypes of individual organisms in citizen scientists' photographs. We then show that our protocol for measuring wing phenotypes from photographs yields accurate measurements in two species of Calopterygid damselflies. Next, we show that, while most observations of our target species were made by members of the large and established community of amateur naturalists at iNaturalist.org, our efforts to increase recruitment through various outreach initiatives were successful. Finally, we present results from

two case studies: 1) an analysis of wing pigmentation in male smoky rubyspots *Hetaerina titia* showing previously undocumented geographical variation in a seasonal polyphenism, and 2) an analysis of variation in the relative size of the wing spots of male *Calopteryx splendens* in Great Britain questioning previously documented evidence for character displacement. Our results demonstrate that our protocol can be used to create high quality phenotypic datasets using citizen scientists' photographs, and, when combined with metadata (e.g. date and location), can greatly broaden the scope of studies of geographical and temporal variation in phenotypes. Our analyses of the recruitment and engagement process also demonstrate that collaborating with an online community of amateur naturalists can be a powerful way to conduct hypothesis-driven research aiming to elucidate the processes that impact trait evolution at landscape scales."] (Authors)] Address: Drury, J.P., E-mail: jonathan.p.drury@durham.ac.uk

**17125.** Dumont, H.J., (2019): In memoriam Wolfgang Schneider (1953–2019). *Odonatologica* 48(3/4): 167-184. (in English) ["Personal recollections of a life-long friendship with Wolfgang Schneider and a brief outline of his life and scientific career are presented."] (Author)] Address: Dumont, H.J., Department of Biology, University of Ghent, 9000 Gent, Belgium

**17126.** Dwivedi, Y.D.; Sudhir Sastry, Y.B. (2019): An experimental flow field study of a bio-inspired corrugated wing at low Reynolds Number. *INCAS Bulletin* 11(3): 55-65. (in English) ["The present paper examined experimentally the glide flight flow visualization and boundary layers of a bio-inspired corrugated dragonfly wing performing a comparison with the results obtained with a flat plate, at low to moderate range of chord Reynolds numbers. The experimental work is performed in an open-end low speed subsonic wind tunnel at different angles of attack ranging from 0 to 120 and Reynolds number  $2.25 \times 10^5$ . The boundary layer measurements were done at a fixed chord location ( $0.7 x/c$ ) and three different semi span locations such as 30%, 60% and 90% of the wing's semi span from the right side of the longitudinal axis of the wing. The flow patterns were visualized by using colored tufts, placed at different span locations. The flow reversal was observed at selected Reynolds numbers and angles of attack only. The boundary layer measurements demonstrated that there exists a clear distinction on the pressure and velocity parameters in all the three tested locations on both types of the wings. The corrugated wing showed significant delay in stall and flow separation compared with the flat plate. The visualization of flow in both wings showed that there subsists a spanwise flow moving from wing tip to root, indicating three dimensional natures of airflows."] (Authors)] Address: Dwivedi, Y.D., Dept of Aeronautical Engineering, Institute of Aeronautical Engineering, Dundigal, Hyderabad, 500043, Telangana, India. E-mail: yddwivedi@gmail.com

**17127.** El-Latif, M.E.A.; Elsayed, K.; Abdelrahman, M.M. (2019): Aerodynamic study of the corrugated airfoil at ultra-low Reynolds number. *Advances in Mechanical Engineering* 11(10): 1-18. (in English) ["In this study, *Aeshna cyanea*

dragonfly forewing mid-cross-section corrugated airfoil was simulated at ultra-low Reynolds number. The corrugated airfoil was compared with its smooth counterpart to study the effect of the corrugations upon the aerodynamic performance. Unsteady two-dimensional laminar flow was solved using FLU-ENT. This study was divided into gliding phase and flapping phase. In the gliding phase, the corrugated airfoil produced a higher lift force with respect to the profiled airfoil at both tested Reynolds numbers (1400, 200) with comparable drag coefficient for all the tested angles of attack. In the flapping phase, both the corrugated airfoil and the flat-plate have a very similar flow behavior which yields a very similar aerodynamic performance at  $Re=1400$ . A structural analysis was performed to compare the corrugated airfoil with the flat-plate. The analysis revealed the superiority of the corrugated airfoil over the flat-plate in decreasing the deflection under the applied load. The reduced frequency was varied to study its impact on the aerodynamic performance. By increasing the reduced frequency, the thrust and the lift forces increased by 82% and 75%, respectively. Any increase in the reduced frequency will increase lift and thrust forces, but the propulsive efficiency will deteriorate." (Authors)] Address: Mahmoud E Abd El-Latief, Aerospace Engineering Dept, Fac. Engineering, Cairo Univ., Ain Shams, Giza 12411, Egypt. E-mail: Mahmoud.Ebrahim@bue.edu.eg

**17128.** Fitria, F.; Hidayati, N.A.; Pranata, A.Y.; Saputra, H.M.; Afriyansyah, B. (2019): Komposisi Odonata di Kabupaten Bangka Selatan. *Ekotonia: Jurnal Penelitian Biologi, Botani, Zoologi dan Mikrobiologi* 4(2): 31-36. (in Bahasa Indonesian, with English summary) ["The existence and diversity Odonata in an area could reflect the quality of a habitat's environment such as pH, temperature, light intensity, conditions of chemical and availability of water and foods. The purpose of this study was to record the composition Odonata in Regency of Southern Bangka. This research was conducted in two habitats namely natural in the form of rivers and artificial in the form of tin mining lakes in Regency of Southern Bangka. The method used was the transect line with a transect length of 100 m. Odonata was captured using an insect net then the number of species is recorded. Abiotic factors measured include temperature, light intensity and pH of water. Result showed that 1,166 individuals Odonata that were found at the study site consisted of 18 species which belong to four family and two suborder. Both the species number and individual found around the river was greater than the tin mining lake. The highest number of species found in the river was 17 and the lowest found tin mining lake was 10. The highest number of individuals found in the river was 694 and the lowest found tin mining lake was 472. The highest diversity indices was at Sebagin river (2.20) and the highest evenness indices was at Nyelanding tin mining lake (0.9639)." (Authors)] Address: Fitria, F., Jurusan Biologi Universitas Bangka Belitung, Bangka, Indonesia. E-mail: fitriafadilatul5@gmail.com

**17129.** Fleck, G.; Neiss, U.G. (2019): The larva of the genus *Misagria* Kirby, 1889 (Odonata: Libellulidae). *Zootaxa* 4706(3): 461-468. (in English) ["The ultimate stadium of *Misagria parana* Kirby, 1889 is described and illustrated for the first time

based on reared material. The larva was hitherto unknown for the genus. Based on *M. parana*, *M. divergens* Westfall, 1992 and *M. cf. calverti* a larval generic diagnosis is given. Larva of the genus *Misagria* is briefly compared to the strongly similar larvae of the Neotropical genera *Cannaphila* Kirby, 1889, and *Dasythemis* Karsch, 1889. Larvae of *Misagria* can be separated from those of *Dasythemis* by the number of palpal setae (seven in *Misagria* vs four in *Dasythemis*) and by the shape of ventral tarsal setae (trifid setae present in *Misagria*), and from those of *Cannaphila* by the number of palpal setae (seven vs five or six) and the chaetotaxy of middorsal abdominal segments (segments three to nine with a diffuse clump of long setae in *Misagria* vs no diffuse clump in *Cannaphila*)." (Authors)] Address: Neiss, U.G., Instituto de Criminalística, Departamento de Polícia Técnica-Científica, Manaus, Amazonas, Brazil. E-mail: ulisses.neiss@gmail

**17130.** Fleck, G.; Juillerat, L. (2019): The genus *Navicordulia* Machado & Costa, 1995 (Insecta: Odonata: Corduliidae s.str.): new species, identification key for males and data on ecology and distribution. *Zoosystema* 41(27): 553-565. (in English, with French summary) ["Based on male specimens a new species of the genus *Navicordulia* Machado & Costa, 1995 is described from South French Guiana. This is the second species of the genus recorded for this country. The male of *Navicordulia pascali* n. sp. can be easily separated from all known males of the other species of the genus by the presence of a remarkable large ventral tooth at the base of the cerci. *Navicordulia pascali* n. sp. is a forest dwelling species inhabiting hilly landscape at low altitude. Adults seem to be on flight during the rainy season. The new species is most closely related to *N. errans* (Calvert, 1909) and *N. leptostyla* Machado & Costa, 1995, both from Cerrado of central Brazil. Affinities with the Venezuelan lowland *N. vagans* (De Marmels, 1989) are also probable. A differential diagnosis is given, and a key for *Navicordulia* species based on male characters is provided. The distributions are also given for all species of the genus. Aspects of ecology and biogeography are discussed." (Authors)] Address: Fleck, G., Entomologiste indépendant, F-07150 Lagorce, France. E-mail: fleckgunther@gmail.com

**17131.** Fontenla, J.L. (2019): Libélulas (Insecta: Odonata) de Playas del este, La Habana, Cuba/ Dragonflies and damselflies (Insecta: Odonata) of Playas del Este, La Habana, Cuba. *Poeyana* 509: 1-7. (in Spanish, with English summary) ["Odonata species composition at eight sites of Eastern Beaches was determined. The observations were made between November 2014 and July 2019. Distances traveled among sites fluctuated between 450m and 1200m. There were observed two species of Zygoptera and 15 species of Anisoptera. Species richness among sites varied between two and 11 species. The most frequent species were *Erythrodiplax umbrata*, *Orthemis ferruginea*, *Erythemis vesiculosa* and *Crocothemis servilia*. In general sense, species composition is characterized by widespread species. Spatial distribution adopted a nested pattern, and species were concentrated in sites that presented temporal ponds of pluvial origin. It is emphasized the presence of rare species in Cuba, like *Celithemis eponina* or habitat specialists like *Erythrodiplax berenice*. This landscape

may represent an important reservoir for biodiversity in urbanized areas with intense flow of people." (Author)] Address: Fontenla, J.L., Instituto de Ecología y Sistemática, carretera Varona 11835, Rpto. Parajón, Boyeros, 11900, La Habana, Cuba. E-mail: fontenla@ecologia.cu

**17132.** Foo Tse Fen, V.; Lim, K.K. (2019): Malayan spineleg dragonfly at Upper Seletar Reservoir. *Singapore Diversity Records* 2019: 104. (in English) [Verbatim: "Subject: *Merogomphus femoralis*. Subject identified by: Lim Kim Keang and Robin Ngiam. Location, date and time: Singapore Island, Central Catchment Nature Reserve, Upper Seletar Reservoir; 11-VIII-2019; around 1145 hrs. Habitat: Secondary forest edge, at the shore of a freshwater lake. Observers: Lim Kim Keang and Veronica Foo Tse Fen. Observation: On a hot and sunny morning, an example estimated to be around 4 cm body length was observed perched for a few minutes on a leaf of a *Syzygium* tree at about 5 m from the ground. A dorso-lateral view of the dragonfly is shown in the accompanying photograph. Remarks: In Singapore, this rare and 'critically endangered' dragonfly is known only from Nee Soon swamp-forest (Soh et al., 2019: 15) which is located at the southern shore of the Upper Seletar Reservoir. The female is apparently undescribed (Tang et al., 2010: 119). The featured dragonfly is believed to be a female of the *M. femoralis*. Compared to the male (see Tang et al., 2010: 119), it has thicker abdominal segments with broader whitish bands. The first abdominal segment also has a single greenish whitish side bar next to the dorsal bar. The male *M. femoralis* has a total body length of 45 mm (Tang et al., 2010: 119). Without the specimen in hand, it is not possible to gauge the female's exact size from the photograph." (Authors)] Address: veronfoo@yahoo.com

**17133.** Fulan, J.A.; Dos Anjos, M.R. (2019): Variation of the rainfall regime in the northern region and its effect on the Odonata (Insecta) in Been River, Amazonas, Brazil. *Acta zoológica mexicana* N.S. 35: 1-6. (in English, with Spanish summary) ["The goal of this work was to know the effect of precipitation in four periods (Rising, Flood, Lowing and Dry) on Odonata larvae living near to the macrophyte *Salvinia auriculata* Aubl., in Been River, Amazonas, Brazil. The biological material was collected in the Been river in the section near the river Madeira, state of Amazonas, Brazil. Sampling was conducted in stands of three macrophytes *S. auriculata* in four periods: rising (November 2012), flood (February 2013), lowing (May 2013), and dry (August 2013). A total of 286 Odonata larvae were identified in the river studied. Six families and 14 genera were identified. The flood period showed the highest abundance in the studied period. *Acanthagrion* presented a positive correlation with flood period in axis 1 and *Telebasis* also positive, but in the dry period. In conclusion, although there are few studies on Odonata larvae associated with floating macrophytes in the Amazon, the results of this work showed the importance of knowing the distribution of larval abundance throughout the year. Flood and dry period showed to be the period with the highest abundance of Odonata genera. In addition, the principal component analysis showed that some species are more sensitive to the periods of the year, *Telebasis* in the dry period and *Acanthagrion* in the flood period." (Authors)]

Address: Fulan, J.A., Universidade Federal do Amazonas, Instituto de Ciências Biológicas, Depto de Biologia, Instituto de Ciências Biológicas. Av. General Rodrigo Octavio, 6200 - Coroado I - CEP: 69080-900 - Manaus, Amazonas, Brazil. E-mail: joaofulan@gmail.com

**17134.** Futahashi, R.; Matsuki, K. (2019): Melanized specimens of *Sympetrum darwinianum* (Selys, 1883. Tombo 61: 46-47. (in Japanese, with English summary) ["A male and female of melanized *S. darwinianum* are recorded from Inzai city, Chiba Prefecture. Both nuclear and mitochondrial DNA analyses indicated that the melanized female is *S. darwinianum*. The wings and abdomen of this female were slightly malformed, probably a consequence of the melanized phenotype." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**17135.** Futahashi, R., Yamahama, Y.; Kawaguchi, M.; Mori, N.; Ishii, D.; Okude, G.; Hirai, Y.; Kawahara-Miki, R.; Yoshitake, K.; Yajima, S.; Hariyama, T.; Fukatsu, T. (2019): Molecular basis of wax-based color change and UV reflection in dragonflies. *eLife* 2019;8:e43045 doi: 10.7554/eLife.43045: 24pp. (in English) ["Many animals change their body color for visual signaling and environmental adaptation. Some dragonflies show wax-based color change and ultraviolet (UV) reflection, but biochemical properties underlying the phenomena are totally unknown. Here we investigated the UV-reflective abdominal wax of dragonflies, thereby identifying very long-chain methyl ketones and aldehydes as unique and major wax components. Although little wax was detected on young adults, dense wax secretion was mainly found on the dorsal abdomen in mature males of *Orthetrum albistylum* and *O. melania*, while pruinose wax secretion was identified on the ventral abdomen in mature females of *O. albistylum* and *Sympetrum darwinianum*. Comparative transcriptomics demonstrated drastic upregulation of *ELOVL17* gene, a member of the fatty acid elongase family, whose expression reflected the distribution of very long-chain methyl ketones. Synthetic 2-pentacosanone, the major component of dragonfly's wax, spontaneously formed light-scattering scale-like fine structures with strong UV reflection, suggesting its potential utility for biomimetics." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science & Technology (AIST), Japan. E-mail: ryo-futahashi@aist.go.jp

**17136.** Galindo-Ruiz, N.; Velasquez-Velez, M.I.; Cano-Cobos, Y.; Sánchez-Guillén, R.A.; Realpe, E. (2019): Description of a putative hybrid between *Ischnura cyane* and *I. capreolus* from Colombia (Odonata: Coenagrionidae). *Notulae odonologicae* 9(4): 144-151. ["Putative hybrids between the sibling species *Ischnura capreolus* and *I. cyane* from the Colombian Cordillera Oriental are reported from the department of Cundinamarca, central Colombia, where species are known to occur sympatrically. *I. capreolus* is quite widespread in South America, from sea level to 1 750 m a.s.l., while *I. cyane* is a Colombian endemic restricted to altitudes between 1 300 and 2 200 m a.s.l.. Hybridisation may be a result of the changes



in distribution of both species leading to increasing sympatry. The putative hybrid is described and illustrated and compared with both putative parental species." (Authors)] Address: Galindo-Ruiz, N., Lab. de Zoología y Ecología Acuática, Depto de Ciencias Biológicas, Univ. de los Andes, Bogotá, Colombia. E-mail: nf.galindo1363@uniandes.edu.co

**17137.** Garrison, R.W. (2019): *Argia nataliae* n. sp. from Colombia (Odonata: Coenagrionidae). *Zootaxa* 4590(4): 477-486. (in English) ["*Argia nataliae* n. sp. (Holotype ♂: COLOMBIA, Antioquia Department, Estación Cristalina, about 28 km west of Puerto Berrio, ca. 6.41 N, 74.58 W, 16 ii 1917, Jesse Hunter & Edward Bruce Williamson leg., in University of Michigan [UMMZ]) is described and illustrated and compared with similar species." (Authors)] Address: Garrison, R.W., Plant Pest Diagnostics Center, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail: argiavivida@gmail.com

**17138.** Garrison, R.W.; Ramon Cabrera, G.M. (2019): *Argia mauffrayi* n. sp. from Ecuador (Odonata: Coenagrionidae). *Zootaxa* 4545(2): 286-292. (in English) ["*A. mauffrayi* n. sp. (Holotype ♂: ECUADOR, Pichincha Province, San Miguel de Los Bancos Cantón, Recinto Milpe, Milpe Bird Sanctuary, Mirador Uno Trail, 0.0333° N, 78.8661 W, 4 ix 2018, William F. Mauffray leg., in Laboratorio de Zoología Terrestre USFQ [ZSFQ]) is described and illustrated and compared with similar species." (Authors)] Address: Garrison, R.W., Ass. Insect Biosystematist, Plant Pest Diagnostics, California Dept of Food & Agri., 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. E-mail rgarrison@cdfa.ca.gov

**17139.** Gassmann, D.; Richards, S.J. (2019): Two new damselflies of the genus *Idiocnemis* Selys from Gulf Province, Papua New Guinea (Odonata: Platycnemididae). *Zootaxa* 4560(1): 121-140. (in English) ["Two new species of the genus *Idiocnemis* Selys, 1886 from southern Papua New Guinea are described: *Idiocnemis lakekamuensis* sp. nov. from the Lakekamu Basin and *I. milou* sp. nov. from Lakekamu and the Kikori River lowlands. Males and females are illustrated and compared with other species of the *Idiocnemis bidentata* group. Both new species are known only from the Papuan Gulf Foreland area of endemism and may be considered endemic to it." (Authors)] Address: Gassmann, D., Arachnida Section, Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany. E-mail: dirk.gassmann@gmail.com

**17140.** Gauci, C. (2019): An update on the status of some of the less common odonate species in the Maltese Islands. *J. Br. Dragonfly Society* 35(2): 61-69. (in English) ["Four new sightings of *Aeshna mixta* in the Maltese Islands are reported. *Anax ephippiger*, which in recent years has been regularly seen ovipositing in small numbers in autumn, has shown a dramatic increase in numbers in the last two years although, to date, there has been no confirmation of successful breeding. The status of *Sympetrum striolatum*, a common species over most of Europe but very rare in the Maltese Islands, is discussed and records of three new sightings are presented." (Author)] Address: Gauci, C., 28, Triq il-Kissier, Mosta, Malta MST1822

**17141.** Geraeds, R.P.G. (2019): Oviposition sites of the Western Willow Spreadwing (*Chalcolestes viridis*) in different herbs along the Vlootbeek brook. *Brachytron* 20(2): 87-93. (in Dutch, with English summary) ["During an inventory of dragonflies along the Vlootbeek brook on 21 August 2019, tandems of *Ch. viridis* were observed while they were ovipositing in Beggar Ticks (*Bidens frondosa*). Normally, *Ch. viridis* lay their eggs in the bark of branches of shrubs and trees that hang above water. Ovipositing in herbs is rare. As far as known egg-laying in herbs has only been observed in Great Willowherb (*Epilobium hirsutum*) in the Netherlands. Along the Vlootbeek brook, ovipositing marks on Beggar Ticks were found at three different locations on eleven different plants. Ovipositing has also been observed on Spearmint (*Mentha citrata*) (two plants), Redshank (*Persicaria maculosa*), Greater Stinging Nettle (*Urtica dioica*) and Great Willowherb (one plant each)." (Authors)] Address: Geraeds, R.P.G., Bergstraat 70, NL-6131 AW Sittard, The Netherlands

**17142.** Gheza, G.; Ancarani, G.; Chiari, C.; Corazzato, C.; Galliani, C.; Minicò, A.; Sacchi, F.; Sand, M.L.; Piglia, A. (2019): Breeding of *Trithemis annulata* in quarry lakes in the continental area of Italy (Odonata: Libellulidae). *Libellula* 38(3/4): 137-155. (in English, with Italian and German summaries) ["In August 2018, an abundant breeding population of *T. annulata* was discovered in some quarry lakes located east of Milan (Lombardy, central Po Plain, northern Italy) and in Ponzarale (province of Brescia, Lombardy). The autochthony of the species was confirmed due to the collection of ten exuviae and the observation of several dozens of teneral and some hundreds of adult individuals. These are the first records of breeding populations of the species in the continental biogeographical zone of Italy. The presence of these populations is discussed from the perspective of the progressive colonization of southern Europe and Italy by this Afrotropical species, which is fostered by ongoing global warming." (Authors)] Address: Gheza, G., Via G. Falcone 23, 27020 Tromello (PV), Italy, gheza.gabriele@gmail.com

**17143.** Giuliano, D.; Bogliani, G. (2019): Odonata in rice agroecosystems: Testing good practices for their conservation. *Agriculture, Ecosystems & Environment* 275: 65-72. (in English) ["Highlights: •Rice crops have recently lost their original value as surrogate wetland habitat. •Ditches may be insufficient to improve paddy suitability for breeding Odonata. •Odonata benefit from a well-developed vegetation, especially on paddy banks. •Semi-natural wetlands are essential to achieve Odonata conservation in rice crops. •Low frequency and rotational mowing should be implemented on paddy and canal banks. Abstract: Paddy systems have recently lost their original value as surrogate habitat for several wetland species due to rice farming intensification. Changes in water regimes largely compromised the survival of many aquatic organisms formerly abundant in rice fields, such as Odonata, inducing the introduction of new agricultural practices supposed to mitigate the negative impacts of intensive rice cultivation on biodiversity. For instance, the construction of a water retention structure (ditch) within paddies has been incentivized in Italy, in order to reduce the detrimental effects of

drying periods on aquatic organisms. In this research, we investigate the effects of ditch occurrence and dimensions on Odonata diversity in rice fields, and furthermore we evaluate the response of these insects to vegetation height on paddy and canal banks, as an approximation of grass management intensity. Field surveys revealed that ditch occurrence may not be sufficient to improve the suitability of rice fields as breeding habitat for Odonata, especially for sensitive species. Paddies with ditches of larger dimensions supported more abundant adult populations than other field types, but no clear differences have been observed concerning larval stages. Conversely, the occurrence of a well-developed bank vegetation produced clear benefits for these insects in rice fields, while a not significant effect have been observed along irrigation canals. In order to achieve Odonata conservation in rice agroecosystems, together with the excavation of large ditches within paddies, the creation of a network of semi-natural wetlands should be encouraged, as well as the implementation of extensive grass management strategies on rice field and canal banks." (Authors)] Address: Giuliano, D., Dept of Earth and Environmental Science, University of Pavia, Via Ferrata 9, 27100 Pavia, Italy. E-mail: [davide.giuliano@alice.it](mailto:davide.giuliano@alice.it)

**17144.** Goertzen, D. (2019): Parkteiche als Lebensraum für Libellen – Einfluss von Wasservögeln und Fischen auf die Libellendiversität. *Libellula Supplement 15*: 71-91. (in German, with English summary) ["City park ponds as habitats for dragonflies – Impact of waterfowl and fish on dragonfly diversity – City park ponds are characterized by high abundances of waterfowl and fish, poor littoral and aquatic vegetation, and artificial shorelines. I investigated how these factors affect dragonfly diversity at city park ponds by conducting experiments at four park ponds in Dortmund (North Rhine Westphalia, Germany) in 2011 and 2012. (1) I investigated the effects of fish and waterfowl predation as well as the presence of submerged vegetation on the diversity of dragonfly larvae by using enclosures. Protection against predators did not have any effect, but the presence of submerged plants promoted diversity. (2) I compared survival and growth rates of larvae of *Coenagrion puella* and *Ischnura elegans* kept in enclosures in two of the ponds, of which one was almost free of dragonfly larvae, while the other was inhabited by a population of *I. elegans*. Both species survived and grew in both ponds. (3) I assessed the effects of shoreline treatment by comparing the diversity of adult dragonflies along transects of different littoral structures (sealed area, mowed lawn, reeds, and aquatic vegetation), including one experimental transect type in which lawn mowing was intermitted for one season. The presence of reeds as well as of aquatic vegetation were essential for increased diversity of adults. These were also the only shoreline structures where reproduction behaviour was observed. From my experiments, I conclude that the degraded littoral zone with often poor vegetation is probably the major reason for depleted dragonfly diversity in city park ponds. This degradation is connected with high waterfowl and fish density, causing eutrophication, turbid water conditions, and grazing, and additionally, with physical pressures (trampling, artificial structures) exerted by recreational use of the ponds." (Author)] Address: Goertzen, Diana., TU Braunschweig, Institut für Geoökologie, Langer Kamp 19c, 38106

Braunschweig, Germany. E-mail: [d.goertzen@tu-braunschweig.de](mailto:d.goertzen@tu-braunschweig.de)

**17145.** Gogoi, M.J.; Payra, A. (2019): Echo peromata recorded in north-eastern India (Odonata: Calopterygidae). *Notulae odonatologicae* 9(3): 113-115. ["A single male of *E. peromata*, a species new to the Indian fauna, was recorded and photographed on 11-vi-2013 in Hunli (28.3271°N, 95.9575°E, 1 280 m a.s.l.) in the Mishmi Hills, Arunachal Pradesh, India. Previously this species was only known from the adjacent Motuo (Medog) County in Tibet." (Authors)] Address: Gogoi, M.J., Scientist-A, Bombay Natural History Society, Hornbill House, Mumbai 400 001, Maharashtra, India. E-mail: [monsoonjyoti@gmail.com](mailto:monsoonjyoti@gmail.com)

**17146.** Golab, M.J.; Johansson, F.; Sniegula, S. (2019): Let's mate here and now – seasonal constraints increase mating efficiency. *Ecological Entomology* 44(5): 623-629. (in English) ["1. Latitudinal climatic conditions shape the length of the mating season and could thus influence reproductive traits. Knowledge of how animals behave along latitudinal clines will increase understanding of the impact of climate on sexual selection and might help in the prediction of whether peripheral populations will spread or shrink in response to changes in climate. 2. This study investigated variation in the mating efficiency of a temperate insect, *Lestes sponsa*, under semi-natural field conditions along a latitudinal gradient covering three regions of the species' distribution: south, central and north. 3. A comparison was done of the proportion of copulating males, the proportion of males that formed tandems but did not copulate (unsuccessful males), and the proportion of males that did not attempt to form a tandem (passive males) in these three regions. 4. It was found that the proportion of copulations was significantly higher at northern latitudes than in the southern and central regions. Southern latitudes had a higher proportion of successful copulations compared with central latitudes. The northern region had a significantly lower frequency of passive males. The southern region had an intermediate proportion of passive males, and the central region had the highest proportion. The proportion of unsuccessful males did not differ between regions. The population density across sites did not affect these results. 5. The study shows that damselflies inhabiting northern populations mate more intensively than individuals from southern and central populations. This suggests that more restrictive environmental conditions during a brief mating season select for higher mating efficiency." (Authors)] Address: Golab, Maria, Institute of Nature Conservation, Polish Academy of Science, 31-120 Krakow, Poland. E-mail: [marysiagolab@gmail.com](mailto:marysiagolab@gmail.com)

**17147.** Gorb, S.N. (2019): Wing surface in the damselfly *Mecistogaster ornata* (Zygoptera, Pseudostigmatidae): interactions between nanoscale wax and sticky spider webs. *International Journal of Odonatology* 22(1): 51-57. (in English) ["The representatives of the damselfly family Pseudostigmatidae are known for their ability to catch small orb web spiders, or in some cases small kleptoparasitic spiders in the webs of other spiders. In this paper, I demonstrate that the nanoscopic crystalline wax coverage of wings in *M. ornata* is partially

altered due to the presence of fluid-contaminated spots corresponding in their shapes and distribution to the typical beads-on-a-string (BOAS) geometry of sticky threads of orb web spiders. The spider fluid has the ability to wet superhydrophobic crystalline wax coverage. Also residues of the sticky threads were revealed in high quantities on the wing surface. The data suggest that the pseudostigmatid damselflies, due to their specific prey capturing method, have some costs and risks of being trapped by the sticky spider webs. However, high resolution SEM images revealed that the crystalline wax coverage of wings, in spite of its wettability by the spider glue, functions as a sacrificial anti-adhesive layer protecting the damselfly surface against spider adhesive traps." (Author)] Address: Gorb, S.N., Functional Morphology & Biomechanics, Zoological Inst., Christian-Albrecht University of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**17148.** Grand, D.; Marinov, M.; Jourdan, H.; Cook, C.; Rouys, S.; Mille, C.; Theuerkauf, J. (2019): Distribution, habitats, phenology and conservation of New Caledonian Odonata. *Zootaxa* 4640: 1-112. (in English, with French summary. ["Compared to other archipelagos of the Pacific, the New Caledonian Odonata fauna is rich and diverse with 56 valid species or subspecies (23 endemics, 41%) from eight families (four Zygoptera: Argiolestidae, Coenagrionidae, Isostictidae, Lestidae, and four Anisoptera: Aeshnidae, Corduliidae, Synthemitidae, Libellulidae) and 31 genera (including four endemics, 13%). In Zygoptera, we record 19 species including 12 endemics (63%), and among Anisoptera, we record 37 species or subspecies, including 11 endemics (30%). We removed five species from the list that had been erroneously recorded as occurring in New Caledonia: *Tamea carolina*, *Austroargiolestes icteromelas*, *Ischnura torresiana*, *Xiphagrion cyanomelas* and *Hemicordulia oceanica*. The occurrence of *Tamea limbata* appears also doubtful, but we were unable to clarify to which taxon this record referred hence we excluded it from our update. From a biogeographic perspective, the New Caledonian fauna has mostly Australian affinities with some connections with south-east Asia and the Pacific region. We provide for each species, whenever information was available, a distribution map with a brief review of its known ecology, behaviour and phenology. We also evaluated each species' conservation status, in light of known threats (range restriction, scarcity and human activity including altered water flow). We consider 17 species (30%) endangered. The most immediate threats concern water pollution including alteration to the flow of water courses caused by mining, deforestation and fires. Invasive species, such as alien fish, may be predators of concern for Odonata larva, although this has not yet been proven in New Caledonia." (Authors)] Address: Marinov, M., Biosecurity Surveillance & Incursion Investigation, Plant Health Team Ministry for Primary Industries 14 Sir William Pickering Drive Christchurch 8053, New Zealand. E-mail: milen.marinov@mpi.govt.nz

**17149.** Graziani, F.; Ceccolini, F.; Cianferoni, F. (2019): New records of *Selysiothemis nigra* (Vander Linden, 1825) and *Erythromma viridulum* (Charpentier, 1840) from Cephalonia Island (Greece) with an updated checklist of the odonatofauna for the island. *Graellsia* 75(2): e093: 5pp. (in English, with Spanish

summary) ["*S. nigra* and *E. viridulum* are recorded from the Greek island of Cephalonia for the first time, on the basis of photographic data. With the present note we also give an updated checklist of the odonatofauna for the island." (Authors)] Address: Cianferoni, F., Zool. Section "La Specola", Natural History Museum of the University of Florence - Via Romana 17, I-50125 Florence, Italy. E-mail: fabio.cianferoni@unifi.it

**17150.** Grimm, H.; Unger, C. (2019): Zur Nahrung des Baumfalken *Falco subbuteo* L. in Nordthüringen. *Vernate* 38: 125-134. (in German, with English summary) ["The food use of a pair of Hobbies and their offspring at a nest site in Esperstedter Ried (northern Thuringia), was recorded by examination of prey-pluckings and pellets at the end of the breeding season in 2018 and 2019. In the poorly structured landscape, only 20 species of birds were used as prey (148 individuals): the Swallow *Hirundo rustica*, the House Martin *Delichon urbicum*, the Skylark *Alauda arvensis* and the Tree sparrow *Passer montanus* accounted for 2/3 of the total avian prey. The maximum sizes of captured birds are discussed. Conditions were favourable for hunting small mammals and ground living insects, due to leaving of early stubble. The latter were mainly captured by the juveniles. A total of 14 individual small mammals (2 species) and 646 invertebrates were detected. Due to the dry weather, the proportion of dragonflies remained low, while that of grasshoppers was relatively high." (Authors)] Address: Grimm, H., Nordstr. 17, 06567 Bad Frankenhausen, Germany. E-mail: herbert\_grimm@t-online.de

**17151.** Günther, A. (2019): Freilandnachweis von *Pantala flavescens* in Deutschland (Odonata: Libellulidae). *Libellula* 38 (3/4): 127-136. (in German, with English summary) ["First field record of *Pantala flavescens* in Germany (Odonata: Libellulidae) – On 6-VII-2019 a single male of *P. flavescens* was observed and photographed in the early post-mining landscape of Lower Lusatia (SE-Brandenburg, Germany). This was the first record of this migratory species in Germany not attributable to human transportation." (Author)] Address: Günther, A., Naturschutzinstitut Freiberg, B.-Kellermann-Str. 20, 09599 Freiberg, Germany. E-mail: andre.guenther@extern.tu-freiberg.de

**17152.** Günther, A. (2019): Successful breeding by *Pantala flavescens* in Germany (Odonata: Libellulidae). *Odonatologica* 48(3/4): 203-210. (in English) ["On 06-vii-2019 a single male of *P. flavescens* was recorded in the early postmining landscape of Lower Lusatia, south-eastern Brandenburg, Germany. This was the first record of this migratory species in Germany not attributable to human transportation. On 17-viii-2019 an exuviae and a single adult in late teneral condition were found at the same site. According to current knowledge this is the first confirmed record of a successful breeding of *P. flavescens* in Europe." (Author)] Address: Günther, A., Naturschutzinstitut. Freiberg, B.-Kellermann-Str. 20, 09599 Freiberg, Germany. E-mail: andre.guenther@extern.tu-freiberg.de

**17153.** Günther, A. (2019): Reproductive behaviour of *Chlorocyphidae*. Part 1. Genus *Sclerocypha* Fraser, 1949 (Odonata). *Odonatologica* 48(3/4): 285-304. (in English) ["The reproductive behaviour of *S. bisignata* was studied in various



fast flowing streams in mountainous regions of Central Sulawesi. Using high speed cinematography males were shown to exhibit protracted threatening flights with a stationary display of the fore wings. In steady threatening flight the abdomen was held horizontally and the stroking of the hind wings paused briefly and regularly every 2-5 wing beats. These flights were interrupted periodically by short bursts of increased intensity where males arched their abdomens upwards and the hind wing beat was continuous. This flight style differs in several respects from any chlorocyphid species yet studied. During courtship the males presented all three pairs of legs; as courtship intensified they briefly raised their abdomen and presented stationary fore wings. Oviposition took place with the female completely submerged. Unlike most Chlorocyphidae, oviposition sites and male display sites were well separated and ovipositing females were unguarded." (Author)] Address: Günther, A., Naturschutzinstitut. Freiberg, B.-Kellermann-Str. 20, 09599 Freiberg, Germany. E-mail: andre.guenther@extern.tu-freiberg.de

**17154.** Gunnarsson, K.; Ekblom, R. (2019): Review of the diet specialisation of the Blue-cheeked bee-eater (*Merops persicus*). *Journal of Ornithology* 160(1): 275-279. (in English) ["Ecological specialisation, e.g. in terms of prey preferences, can have important implications for population biology. Bee-eaters are considered diet specialists; they hunt aerial insects, particularly hymenopterans. However, *M. persicus* has been considered a special case, as it preferentially feeds upon dragonflies. Here we review current literature on the diet of *M. persicus*, and conclude that this species is not as restricted to dragonflies as previously suggested. Instead, populations in different parts of the breeding and wintering ranges seem to specialise on various types of insects (such as wasps, bees, dragonflies, butterflies and mosquitoes)."] (Authors)] Address: Gunnarsson, K., Dept of Ecology & Genetics, Uppsala Univ., Uppsala, Sweden

**17155.** Haber, W.A. (2019): *Gynacantha vargasi* (Odonata: Anisoptera: Aeshnidae) sp. nov. from Costa Rica. *Zootaxa* 4612: 58-70. (in English, with Spanish summary) ["The male and female of *G. vargasi* sp. nov. are described from three sites on the Caribbean slope of Costa Rica. The species is distinguished from its congeners by lime-green lateral thoracic stripes, orange-brown hind femur tipped with black, dorsal side of the hind tibia yellow, unique cercus shape, diurnal behavior, and barcode analysis. A key to all species of *Gynacantha* recorded from Mexico and Central America is provided."] (Author)] Address: Haber, W.A., Apdo. 50-5655, Monteverde, Costa Rica. E-mail: bill.haber01@gmail.com

**17156.** Hadjadjia, S.; Amari, H.; Bouiedda, N.; Guebailia, A.; Boucenna, N.; Mayache, B.; Houhamdi, M. (2019): Emergence ecology and body size dimorphism in *Sympetrum fonscolombii* and *S. meridionale* (Odonata: Libellulidae). *Zoology and Ecology* 29(1): 8 pp. (in English) ["The study of dragonfly emergence provides insights into the understanding of their life history, ecology, and adaptation to abiotic and biotic factors. Here we investigate the emergence ecology and body size of two congeneric dragonflies (*S. fonscolombii*, and *S. meridionale*) in Northeast Algeria, highlighting the seasonal

pattern, sex ratio at emergence, sexual size dimorphism (SSD), and vertical stratification. We found that both species, *S. fonscolombii* in particular, showed quite asynchronous emergence. In both species, and especially in the larger *S. meridionale*, sex ratio was found to be female-biased, which is in line with the hypothesis of a negative relationship between SSD and sex ratio. There was no seasonal pattern of body size observed in both species. In *S. meridionale*, SSD with regard to both body and wing sheath length was male-biased, while in *S. fonscolombii*, it was male-biased with regard to body length and female-biased with regard to wing length. Vertical stratification depended on support height (the higher the support, the higher the height of exuvia fixation) but had a complex relationship with the body size. The biological significance and implications of the vertical stratification-body size relationship are discussed." (Authors)] Address: Amari, H., Dept Biology, Faculty of natural and life sciences, Univ. of Chadli Benjedid, El Taref 36000, Algeria. E-mail: amari.hichem@yahoo.fr

**17157.** Hämäläinen, M.; Kosterin, O.E.; Kompier, T. (2019): *Euphaea cyanopogon* sp. nov. from the Cardamom ecoregion in Cambodia and Vietnam (Odonata: Euphaeidae). *Zootaxa* 4555(1): 28-44. (in English) ["*Euphaea cyanopogon* sp. nov. is described and illustrated from specimens of both sexes collected in the Kampongsaom Peninsula in southern Cambodia and the adjacent Phu Quoc Island in Vietnam, both in the Cardamom ecoregion; the holotype male (at RMNH, Leiden) is from Kbal Chhay Waterfall, Cambodia. The male is characterized by having rather narrow wings without areas of strong pigmentation and a face marked with bright blue. The differences and affinities of the new species with *E. pahyapi* Hämäläinen, 1985 and some of its other congeners are discussed." (Authors)] Address: Hämäläinen, M., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA, Leiden, the Netherlands. E-mail: matti.hamalainen@helsinki.fi

**17158.** Harabiš, F.; Rusková, T.; Dolný, A. (2019): Different oviposition strategies of closely related damselfly species as an effective defense against parasitoids. *Insects* 10(1), 26; <https://doi.org/10.3390/insects10010026>: 9 pp. (in English) ["Parasitoidism is one of the main causes of insect egg mortality. Parasitoids are often able to detect eggs using semiochemicals released from eggs and disturbed plants. In response, female insects adopt a wide variety of oviposition strategies to reduce the detectability of eggs and subsequent mortality. We evaluated the proportion of parasitized and undeveloped eggs of three common damselfly species from the family Lestidae, the most diverse group of European damselflies, in terms of oviposition strategies, notably clutch patterning and the ability to utilize oviposition substrates with different mechanical properties. We assumed that higher costs associated with some oviposition strategies will be balanced by lower egg mortality. We found that the ability of *Chalcolestes viridis* to oviposit into very stiff substrates brings benefit in the form of a significantly lower rate of parasitoidism and lower proportion of undeveloped eggs. The fundamentally different phenology of *Sympetma fusca* and/or their ability to utilize dead plants as oviposition substrate resulted in eggs that were completely free of parasitoids. Our results indicated that ovipositing into

substrates that are unsuitable for most damselfly species significantly reduces egg mortality. Notably, none of these oviposition strategies would work unless combined with other adaptations, such as prolonging the duration of the prolarval life stage or the ability to oviposit into stiff tissue." (Authors)] Address: Harabiš, F., Dept Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, CZ-165 00 Praha–Suchbát, Czech Republic

**17159.** Hardersen, S.; Toni, I. (2019): Proposal for a time-based standard sampling method for the monitoring of *Gomphus flavipes* (Charpentier, 1825) and *Ophiogomphus cecilia* (Fourcroy, 1785) (Odonata: Gomphidae). *Fragmenta Entomologica* 51(1): 55-62. (in English) ["Monitoring of conservation status is an obligation arising from Article 11 of the Habitats Directive for all species of community interest. However, the development of monitoring methods for invertebrate species has received relatively little attention. *G. flavipes* and *Ophiogomphus cecilia* are two dragonfly species, listed in the annexes of the Habitats Directive, which suffered severe declines in the last century and have since recovered. Methods for the monitoring of these two gomphids have been proposed, but these have not been extensively tested and no abundance classes have been proposed for the evaluation of the conservation status of these species. A time-based standard sampling method is proposed for both species and results from numerous sites in Lombardy, northern Italy, are presented. Applying the standard method revealed that it is common for rivers that high water levels preclude sampling of exuviae through the summer and it is better to allow for two seasons when planning the monitoring. A further result is the fact that it was not always possible to sample the same stretches as the dynamic nature of the rivers and fluctuations in water level lead to some river banks becoming unsuitable for sampling during some visits. In these cases the time-based approach was advantageous, as the method did not need to be modified in response to the original bank section becoming unsuitable." (Authors)] Address: Toni, I., Centro Naz. per lo Studio e la Conservazione della Biodiv. Forestale "Bosco Fontana" Carabinieri, Mamirolo, Italy. E-mail: ilariatoni2010@gmail.com

**17160.** Havermeier, L.; Büchner, T. (2019): Erfolgreiche Reproduktion von *Anax ephippiger* im Niederspreer Teichgebiet, Oberlausitz, Sachsen (Odonata: Aeshnidae). *Libellula* 38(3/4): 205-210. (in German, with English summary) ["Early in August 2019, next to drained carp ponds in the Oberlausitz (Saxony), around 60 exuviae were found along the edges of two concrete tanks made for harvesting carp. The exuviae were identified as those of *A. ephippiger*. Two teneral females were spotted close by. These observations serve as another proof of reproduction of *A. ephippiger* in Saxony." (Authors)] Address: Havermeier, Lena, Dresdener Str. 22, 10999 Berlin, Germany. E-mail: lenahavermeier@gmx.de

**17161.** Hayasaka, D.; Kobashi, K.; Hashimoto, K. (2019): Community responses of aquatic insects in paddy mesocosms to repeated exposures of the neonicotinoids imidacloprid and dinotefuran. *Ecotoxicology and Environmental Safety* 175: 272-281. (in English) ["Pesticides are one of major threats

to wetland environments and their communities, and thus the information about ecological impact assessment of agrochemicals on ecosystems is essential for future effective pesticides management. Here, effects of the yearly application of two neonicotinoids, imidacloprid and dinotefuran on aquatic insect communities of experimental rice fields were assessed during two years of monitoring. Both neonicotinoid-treated fields and controls were monitored biweekly throughout the 5-month experimental period until harvest (late October) in each year. Maximum concentrations of imidacloprid (157.5 ig/l in 2014 and 138.0 ig/l in 2015) and dinotefuran (10.54 ig/l in 2014 and 54.05 ig/l in 2015) in water were relatively similar in both years, but maximum residues of imidacloprid (245.45 ig/kg) and dinotefuran (419.5 ig/kg) in the sediment in the second-year were 18 and 175 times higher than in the first year, respectively, with great variability of concentrations among sampling dates. In addition, remaining soil residues of both neonicotinoids were approximately 1 ig/kg (ppb) at the start of the second-year. A total of 6265 individuals of 18 aquatic species belonging to 7 orders were collected. No differences in the number of species between controls and the two neonicotinoids-treated paddies were found between years. However, clear differences in community structures of aquatic insects among the imidacloprid- and dinotefuran-treated mesocosms, and controls and between years were shown by PRC analysis. In particular, imidacloprid likely decreased *Crocothemis servilia mariannae* nymphs, Chironominae spp. larvae, and *Aedes albopictus* larvae, whereas dinotefuran tended to decrease *Guignotus japonicus*, *Orthetrum albistylum speciosum* nymphs, and Tubificidae spp. In addition, long-living species of Coleoptera and Odonata were most sensitive to both neonicotinoids. Changes in composition of feeding functional groups (FFGs) of aquatic insects were more prominent in the first year and became subtler in the second year. One of the possibilities of this phenomenon may be functional redundancy in which species that had low sensitivity to imidacloprid and dinotefuran replaced the vacant niche caused by decreases of other species with high susceptibility within the same feeding functions, although further studies are needed to verify this explanation. Thus, feeding functional traits can be a good indicator for evaluation of changes in ecosystem processes under pesticides exposures. Consequently, the current study emphasized that more realistic prediction of community properties after the repeated application of agrochemicals in successive years should consider for 1) long-term population monitoring, 2) cumulative effects at least over the years, and 3) species' functional traits." (Authors)] Address: Hayasaka, D., Faculty Agri., KINDAI Univ., Nakamachi, 3327-204, Nara, Nara, 631-8505, Japan. E-mail: hayasaka@nara.kindai.ac.jp

**17162.** Haywood, B.T. (2019): Swamp Bluet *Coenagrion Lyelli* Tillyard (Odonata: Zygoptera: Coenagrionidae) In South Australia. *Victorian Entomologist* 49(4): 80-83. (in English) ["*C. lyelli* is recorded from South Australia for the first time. Adult males were observed in a small plantation wetland, 16km east south east of Mt Gambier in Caroline Forest. The species is suggested to be a wind assisted vagrant until such time that breeding is observed in South Australia." (Authors)] Address: Haywood B.T., Moorak, SA, 5291, Australia. E-mail: brytonwood@bigpond.com

**17163.** He, Z.; Zhao, M.; Wang, C.Y.; Sun, L.; Jiang, Y.Y.; Feng, Y. (2019): Purine and uric acid contents of common edible insects in Southwest China. *Journal of Insects as Food and Feed* 5(4): 1-8. (in English) ["Edible insects have recently been considered as a potential food source that may solve problems of malnutrition and starvation worldwide. However, studies exploring insects as food sources are mainly focused on entomophagy and nutrition rather than the potential risks of excessive metabolite contents, such as purine and uric acid. In this study, we analysed guanine, hypoxanthine, xanthine, adenine and uric acid concentrations in 11 species of edible insects from Yunnan and Guizhou provinces in Southwest China, including 5 species of dragonfly, 3 species of wasp and a single species of locust, mealworm and silkworm. Purine and uric acid contents differed distinctly between these insects, and guanine and xanthine were the dominant purines in all samples. The proportions of 4 purines in the total purine content of these insects differed markedly from those in meat samples from poultry and livestock, and uric acid contents varied significantly between aquatic insects and terricolous insects, such as silkworm pupa. Taken together, the present data show that most edible insects are potent food sources of purine." (Authors)] Address: Research Institute of Resource Insects, Chinese Academy of Forestry, Key Laboratory of Cultivating and Utilization of Resource Insects of State Forestry Administration, Bailongsi, Kunming, 650233 Yunnan, China P.R.

**17164.** Hedberg, R. (2019): Biodiversity of aquatic invertebrates in urban ponds: effects of land use. Bachelor thesis, Uppsala University, Disciplinary Domain of Science and Technology, Biology, Biology Education Centre. (Department of Ecology and Genetics): 17 pp. (in English) ["Urban ponds have the potential to hold large abundance and diversity of aquatic invertebrates, which could maintain an overall high biodiversity in the urban landscape. Little is known about how aquatic systems, such as ponds, are affected by the fast rate of urbanisation caused by an increasing human population together with the expansion of cities. The aim of this study was to investigate how landscape variables affect the abundance of six invertebrate groups. Thirty ponds in Stockholm, Sweden, were studied by sampling aquatic invertebrates of the taxonomic groups: Bivalvia, Gastropoda, Odonata, Trichoptera, Coleoptera and Hemiptera. The percentage of open land, developed land, forest and other water bodies around the ponds were investigated to examine possible correlations with invertebrate abundances. In addition, the relationship between the ponds distance to the city centre and invertebrate abundances were examined. The results indicate that the surrounding landscape has an important effect on the abundance of aquatic invertebrates living in the urban ponds. Odonata abundances showed increasing abundances with percentage of forest cover and decreasing abundances with more developed land. Bivalvia and Trichoptera abundances together with Odonata were found positively correlated with distance to the city centre. No significant results were found for Coleoptera, Hemiptera and Gastropoda. Since the taxonomic groups were affected differently by the landscape variables in the urban area, further investigation on how landscape variables affect the diversity of aquatic invertebrates are

needed. Such knowledge would contribute to understand how the landscape variables should be optimised to maintain a high biodiversity in urban ponds." (Author)] Address: not stated

**17165.** Henseler, D.; Müller, M.; Hoess, R. (2019): *Pantala flavescens* neu für die Schweiz, inklusive Entwicklungsnachweis (Odonata: Libellulidae). *Libellula* 38 (3/4): 211-218. (in German, with English summary) ["First record of *P. flavescens* from Switzerland, including proof of development – During a dragonfly survey on 23-viii-2019 in a nature reserve at Holderbank (canton of Aargau) an immature male of *P. flavescens* was observed. On 04-ix-2019 an exuvia was found at the same locality, thus proving development of the species." (Authors)] Address: Henseler, D. SKK Landschaftsarchitekten AG, Lindenplatz 5, CH-5430 Wettingen, Switzerland. E-mail: dominik.henseler@skk.ch

**17166.** Hjalmarson, E.A.; Patten, M.A. (2019): Win-win urban ecology: near-home fishing promotes diversity of Odonata. *Urban Ecosystems* 22(6): 1201-1206. (in English) ["It is generally thought that increased human activity or infrastructure automatically translates to decreased wildlife activity or abundance. We surveyed Odonata at 14 urban parks with water features to determine factors that promote or hinder species richness or overall abundance. We constructed basic decision trees with either richness or abundance as a response variable and a suite of park characteristics (e.g., size, footprint of the water feature(s), habitat heterogeneity, presence and extent of infrastructure) as predictors. We found that the key predictor of both higher odonate richness and higher odonate abundance was the presence and extent of fishing activities. Despite higher human use at parks that promoted angling, as well as more infrastructure and increased management at these parks—factors that typically are thought to be correlated negatively with biodiversity—odonates and humans benefit from maintaining them and, we suggest, ensuring proper water quality persists. If it is good for fish, it is good for aquatic insects." (Authors)] Address: Hjalmarson, Emily, Oklahoma Biological Survey and Department of Biology, University of Oklahoma, Norman, USA

**17167.** Hoess, R. (2019): Erstnachweis einer zweiten Jahresgeneration von *Orthetrum brunneum* (Odonata: Libellulidae) für Mitteleuropa. *Libellula* 38(1/2): 97-102. (in German, with English summary) ["First evidence of a second annual generation of *O. brunneum* in Central Europe – In a rice field at Schwadernau (Switzerland), a teneral female of *O. brunneum* and its exuvia were found in August 2018. The rice field was created in April 2018. As there is no hint of larval displacement, a bivoltine development is likely. A second annual generation is therefore evidenced for this species for the first time in Central Europe. Larval development is assumed to have lasted about 75 days." (Authors)] Address: Hoess, R., Normannenstrasse 35, CH-3018 Bern, Switzerland. E-mail: r.hoess@1st.ch

**17168.** Holtmann, L.; Brüggeshemke, J.; Juchem, M.; Fartmann, T. (2019): Odonate assemblages of urban stormwater ponds: the conservation value depends on pond type. *Journal*



of Insect Conservation 23(1): 123-132. (in English) ["Urbanisation is among the most severe drivers of the recent biodiversity crisis. It has been shown that stormwater ponds have a high value for the conservation of Odonata in urban areas. However, information on the relevance of different types of stormwater ponds is lacking so far. The aim of this study was to compare the Odonata assemblages of three types of urban stormwater ponds (n per type=?10): (i) ponds only containing temporary water bodies (TEMP), (ii) ponds with temporary and small perennial water bodies (TEMP/PERE) and (iii) ponds with one large perennial water body (PERE). We observed distinct differences in environmental conditions and Odonata assemblages among the three types of stormwater ponds. In particular, vegetation structure and the partly interrelated microclimate differed considerably between TEMP on the one hand, and TEMP/PERE and PERE on the other hand. Odonate species richness and exuviae density of threatened species differed, too. Due to their early successional stages with low cover of riparian woodland and shallow water bodies, TEMP were characterised by a warmer microclimate than TEMP/PERE and PERE. Odonate species richness and exuviae density of threatened species were highest in TEMP and lowest in PERE. Moreover, indicator species were only identified for TEMP. Our study showed that stormwater ponds with a temporary hydroperiod play an important role for the conservation of odonates in urban areas. This is especially the case for specialised threatened species, such as *Libellula depressa* and *Ischnura pumilio*." (Authors)] Address: Fartmann, T., Dept Biodiversity & Landscape Ecology, Osnabrück Univ., Osnabrück, Germany

**17169.** Hoppenbrouwers, P. (2019): The discovery of a population of the Lilypad Whiteface (*Leucorrhinia caudalis*) in the Gelderse Poort. *Brachytron* 20(2): 82-86. (in Dutch, with English summary) ["In 2018 a small population of *L. caudalis* was found in an old oxbow of the river Waal in the Ooijpolder of the Gelderse Poort, the Netherlands. In 2016 a male of this species was observed and photographed near Lake Wylerberg in the Gelderse Poort, which was the reason to start searching for the species in 2018. At least seven males and one female were observed in 2018." (Author)] Address: peter.hoppenbrouwers@planet.nl

**17170.** Huang, D.; Fu, Y.; Nel, A. (2019): A possible true Mesozoic Gomphidae s. str. from the mid-Cretaceous Burmese amber (Odonata: Anisoptera). *Cretaceous Research* 95: 341-345. (in English) ["*Gunterbechlya pumilio* gen. et sp. nov., first accurate Mesozoic Gomphidae sensu stricto, is described from the mid-Cretaceous Burmese amber. It is remarkable in its reduced venation with quadrangular discoidal triangles, only found in the extant gomphid genera *Lestinigomphus* and *Archaeogomphus*, the 'libelluloid' *Cordulephyidae* and the *Libellulidae*: 'Tetrathemistinae'. All these taxa are small dragonflies with reduced venation. Possibly the particular quadrangular discoidal triangles of these insects are related to their small sizes. The positions of some Mesozoic taxa currently attributed to the Gomphidae are discussed and none can be considered as genuine representatives of this family." (Authors)] Address: Huang, D., State Key Lab. of Palaeobiology & Stratigraphy, Center for Excellence in

Life & Palaeoenvironment, Nanjing Inst. Geology & Palaeontology, Chinese Acad. Sciences, Nanjing 210008, PR China

**17171.** Huda, K.A.; Dhia, K.K. (2019): Morphological study of three native Odonata species from Basrah Governorate – South of Iraq. *International Journal of Biosciences* 14(5): 141-155. (in English) ["The specimens were collected from three different regions, during the period from December 2017 to November 2018. The diagnostic features of the adults and naiads of the breeding species: *Orthetrum sabina*, *Crocothemis servilla* and *Diplacodes trivialis*, shows the diversity of specific characters for each species which were photographed and figured." (Authors)] Address: Huda Kadhim Ahmed, College of Education for pure science, University of Basrah, Basrah, Iraq. E-mail: hudamcs@yahoo.com

**17172.** Humphreys, R.K.; Ruxton, G.D. (2019): A review of thanatosis (death feigning) as an anti-predator behaviour. *Behavioral Ecology and Sociobiology* 72:22: 16pp. (in English) ["This study examined the growth of aquatic animals in the canal system constituting the main, lateral, and farm drains in a consolidated paddy field, with emphasis on canal structure and year-round water flow in the canals. A field survey at six sites, which involved three different canal levels, was carried out in Chikusei, Ibaraki Prefecture, Japan (36°21'N, 139°59'E). Sampling was conducted at monthly intervals from April 2001 to March 2002. Of the freshwater fish, young-of-the-year (YOY) *Zacco platypus* appeared in September, while YOY *Misgurnus anguillicaudatus* appeared in May. Last instars of *Calopteryx atrata* were collected only in June, suggesting emergence about this time, while those of the dragonfly *Orthetrum albistylum speciosum* were collected in May and July, suggesting a longer duration of emergence. Since populations of the four species decreased during the non-irrigation season when the water level was low, I propose that a marsh be developed as a wintering site in the lower reaches of the canal system in consolidated paddy fields." (Author)] Address: Humphreys, Rosalind, School of Biology, University of St Andrews, Dyer's Brae House, St. Andrews, Fife KY16 9TH, UK. E-mail: rosalingkh08@gmail.com

**17173.** Hunger, H. (2019): Aktualisierter Kenntnisstand zur Verbreitung von *Coenagrion scitulum* in Baden-Württemberg, Stand 2018 (mit Ergänzungen 2019) (Odonata: Coenagrionidae). *Mercuriale* 18/19: 9-16. (in German, with English summary) ["Updated state of knowledge of the occurrence of *C. scitulum* in Baden-Württemberg (SW-Germany) - An update of the current state of knowledge about the distribution of *C. scitulum* in Baden-Württemberg is presented. A new finding at an elevation of 685 m a.s.l. represents the highest known record of this species in Baden-Württemberg hitherto. The species keeps expanding its range rapidly." (Author)] Address: Hunger, H., INULA - Institut für Naturschutz und Landschaftsanalyse Wilhelmstr. 8, 79098 Freiburg, Germany. E-mail: holger.hunger@inula.de

**17174.** Hyde-Roberts, S.; Barker, L.; Chmurova, L.; Dijkstra, K.-D.B.; Schütte, K. (2019): Rediscovery of *Libellulosoma minutum* in the littoral forests of southeast Madagascar

(Odonata: Corduliidae). *Notulae odonatologicae* 9(4): 125-133. (in English) ["After a period of 109 years without detection, we can here confirm the rediscovery of *Libellulosoma minutum* Martin, 1907, in the southeast of Madagascar. Previously known only from historical collections with vague locality data, five individual males were observed in and around the littoral forest fragments of Sainte Luce between 2016–2017. These observations represent the first reported sightings of this 'Data Deficient' (IUCN) species in the wild since René Martin first described it in 1907. Although we cannot be certain Sainte Luce represents the type locality for the species, it must be considered an important area for future monitoring and conservation. A crucial correction is provided regarding the species name." (Authors)] Address: Hyde-Roberts, S., SEED Madagascar. Studio 7, 1A Beethoven Street, London, W10 4LG, UK. samhyderoberts@seedmadagascar.org

**17175.** Iloba, K.I.; Akawo, N.; Anani, C. (2019): Sand dredging impact on macrobenthic invertebrates of a hallowed river in Delta State of Nigeria. *Science World Journal* 14(1): 171-176. (in English) ["River Ethiopie is one of the most revered water bodies in Delta State by communities along its course. Macroinvertebrate samples were collected from three communities; Obi-Iloh, Ebedei-Adonishaka, Ebedei-Obi-Ukwuole designated as Station 1, 2 and 3 respectively, that forbids women entrance but allows men folk to sand dredge. The survey conducted between March and April, 2015, identified 17 taxa of macro invertebrate with 219 individuals. Of the nine order, Hemiptera constituted the most abundant set 42.25%, followed by Decapoda 16.90%, Coleoptera 11.74%, Plecoptera and Arachnida 6.57%, Odonata 5.16%, Diptera 4.23%, Annelida (Lumbriculida and Arhynchobdelida) 3.76% and the least Trichoptera 2.82%. However, non-statistical significant richness exists among these organisms at the stations ( $p = 0.05$ ). Computed biological indices and lower macro invertebrates census revealed that the macro invertebrates were more abundant in stations 3 and 1 than in station 2, identifying the last two stations as unstable and moderately deteriorated. The enlisted significant correlated variables expressed manifold hydrological factors pinpointing human disturbance as impact." (Authors)] Address: Iloba, K.I., Dept of Animal & Environmental Biology, Fac. Sci., Delta State Univ., Abraka, Delta State, Nigeria. E-mail: kisyiloba@gmail.com

**17176.** Iseni, G.; Aliu, H.; Abdija, X.; Iseni, B.; Rushiti, A. (2019): New data about Large Golden-Ringed Dragonfly (*Cordulegaster heros* Theischinger, 1979) in the Lipkovo region. *Journal of Natural Sciences and Mathematics of UT* 4(7-8): 30-33. (in English) ["Three individuals of *C. heros* were observed on 27-V-2016, near the river over the village of Matec. Four individuals of *C. heros* were observed in the same locality on 15-VI-2017. Other species of dragonflies were also observed: on May 27, (29 May) 2016: *Calopteryx virgo*, *Coenagrion puella*, *Pyrrosoma nymphula*, *Ischnura elegans*, *I. pumilio*, *Orthetrum cancellatum*, *Onychogomphus forcipatus*, *Gomphus vulgatissimus*, and on June 5, 2017, were observed: *Libellula depressa*, *Sympetrum meridionale*, and *S. sanguineum*. This data provides an important part of the information on the spread of this species, and this was the

first field trip that confirmed the occurrence of *C. heros* in this region." (Authors)] Address: Rushiti, A., Dept of Biology, Faculty of Natural Sciences and Mathematics, University of Tetova, RNM. E-mail zshi@unite.edu.mk

**17177.** Ismail, N.I.; Yusoff, H.; Budin, S.; Yamin, A.F.M. (2019): An experimental mechanism of a tandem flapping wing for micro aerial vehicle. *Journal of Physics: Conference Series* 1349 (2019) 012014; doi:10.1088/1742-6596/1349/1/012014: 4 pp. (in English) ["Micro Aerial Vehicles, otherwise known as MAVs, is defined as an aerial vehicle that has a 15cm or less wingspan with a take off weight of less than 200g. Its miniature size and manoeuvrability allows it to fly in confined space at low Reynolds number flight conditions (100 – 100,000). In this study, an entothopter design inspired by dragonfly wings was investigated using a subsonic wind tunnel to see the effect of tandem wing configuration on the lift generation. The study was done at different flapping frequency (5-11Hz) and at different flight speed (5m/s, 7m/s, and 9m/s). It was observed that in phase flapping configuration produces better lift for all flapping frequency and all flight speed." (Authors)] Address: Ismail, N.I., Fac. of Mechanical Engineering, Univ. Teknologi MARA, Cawangan Pulau Pinang. E-mail: hamidyusoff@ppinang.uitm.edu.my

**17178.** Janra, M.N.; Yadi, S.; Ilham; Varizal; Pertiwi, I.B.L. (2019): New distributional record of *Rhinagrion macrocephalum* Selys, 1862 in Sumatra based on photographic evidence. *Agrión* 23(2): 44-46. (in English) [12-XII-2017, male of *R. macrocephalum*, in logged secondary lowland rainforest, interspersed with patches of more mature secondary or primary forest, in a riparian plot (2° 9' 10.1232" S, 103° 21' 42.2496" E, 93 m), one of a total of four pairs of riparian.] Address: Janra, M.N., The Biology Department, Andalas University, Jalan Kampus Unand Limau Manis Pauh, Padang, West Sumatra 25163, Indonesia. E-mail: mnjanra@sci.unand.ac.id

**17179.** Jedro, G.; Zydłowicz, K. (2019): Night-time record of *Sympetrum danae* (Sulzer, 1776) (Odonata: Libellulidae) in the Slowiński National Park. *Odonatrix* 1511 (2019): 4 pp. (in Polish, with English summary) ["One male *S. danae* turned up at a white screen illuminated by a 250 W mercury vapour bulb during night-time trapping of moths in the village of Gac (Slowiński National Park, northern Poland) on 30.07.2019. It remained there for some 3 hours. This record provides further confirmation that dragonflies occasionally "visit" sites where this kind of re-search is being carried out." (Authors)] Address: Jedro, G., Slowiński Park Narodowy, ul. Bohaterów Warszawy 1A, 76-214 Smoldzino, Poland. E-mail: rufinus@o2.pl,

**17180.** Ji, Y.; Yu, X. (2019): Molecular test shows the color pattern is not so reliable in diagnostic of genus *Dysphaea* Selys (Odonata: Euphaeidae). *Zoological Systematics* 44(2): 91-99. (in English) ["A molecular study based on COI, 16S and 28S genes reveals that a batch of specimens (7 males and 4 females) of *Dysphaea* Selys, 1853 collected from central Vietnam, which include different color patterns of wings and body, and were originally identified as three different species, are all the same species. This study implies that, in

some group of Odonata, identification only depending on color pattern may be unreliable, no matter what huge variations there are." (Authors) *D. basitincta*, *D. gloriosa* and *D. haomiao*] Address: Yu, X., College of Life Sciences, Chongqing Normal University, Chongqing 401331, China. E-mail: lannysummer@163.com

**17181.** Johnson, J. (2019): An *Epiteca* (*Tetragoneuria*) *canis* × *spinigera* (Beaverpond × Spiny Baskettail) hybrid in Oregon. *Argia* 31(4): 16-18. (in English) [Golden Coyote Wetlands, Josephine County, Oregon, USA, 8 June 2019.] Address: jt\_johnson@comcast.net

**17182.** Jonsson, M.; Andersson, M.; Fick, J.; Brodin, T.; Klaminder, J.; Piovano, S. (2019): High-speed imaging reveals how antihistamine exposure affects escape behaviours in aquatic insect prey. *Science of The Total Environment* 648: 1257-1262. (in English) ["Highlights: •High-speed imaging was successful at capturing fast escape responses. •Antihistamine exposure altered prey escape responses. •The changed behaviour indicates a reduced ability to evade predator attacks. •High-speed imaging should be used in environmental risk assessment. Abstract: Aquatic systems receive a wide range of pharmaceuticals that may have adverse impacts on aquatic wildlife. Among these pharmaceuticals, antihistamines are commonly found, and these substances have the potential to influence the physiology of aquatic invertebrates. Previous studies have focused on how antihistamines may affect behaviours of aquatic invertebrates, but these studies probably do not capture the full consequences of antihistamine exposure, as traditional recording techniques do not capture important animal movements occurring at the scale of milliseconds, such as prey escape responses. In this study, we investigated if antihistamine exposure can impact escape responses in aquatic insect, by exposing damselfly (*Coenagrion hastulatum*) larvae to two environmentally relevant concentrations (0.1 and 1 µg L<sup>-1</sup>) of diphenhydramine. Importantly, we used a high-speed imaging approach that with high-time resolution captures details of escape responses and, thus, potential impacts of diphenhydramine on these behaviours. Our results show overall weak effects of antihistamine exposure on the escape behaviours of damselfly larvae. However, at stage 2 of the C-escape response, we found a significant increase in turning angle, which corresponds to a reduced swimming velocity, indicating a reduced success at evading a predator attack. Thus, we show that low concentrations of an antihistamine may affect behaviours strongly related to fitness of aquatic insect prey – effects that would have been overlooked using traditional recording techniques. Hence, to understand the full consequences of pharmaceutical contamination on aquatic wildlife, high-speed imaging should be incorporated into future environmental risk assessments." (Authors)] Address: Jonsson, M., Dept of Ecology & Environmental Science, Umeå University, SE 90187 Umeå, Sweden. E-mail: micael.jonsson@umu.se

**17183.** Joshi, S.; Sawant, D. (2019): *Ceriagrion chromothorax* sp. nov. (Odonata: Zygoptera: Coenagrionidae) from Sindhudurg, Maharashtra, India. *Journal of Threatened Taxa*

11(7): 13875-13885. (in English) ["*Ceriagrion chromothorax* sp. nov. is described from Western Ghats, India, based on six ♂♂ and one ♀ collected from Sindhudurg District of Maharashtra." (Authors)] Address: Joshi, S., National Centre for Bio-I. Sciences, Tata Inst. Fundamental Research, Rajiv Gandhi Nagar, Kodigehalli, Bengaluru, Karnataka 560097, India.

**17184.** Karube, H.; Terayama, H.; Sakabe, K. (2019): Is the decline of *Sympetrum maculatum* in the Tonoh area in Gifu Prefecture caused by neonicotinoid insecticide? *Tombo* 61: 1-7. (in Japanese, with English summary) ["*S. maculatum* is an endemic dragonfly of Japan and an endangered species in the Japanese Red List. Recently serious decline of the species has been observed in the Tonoh area located in the southeastern part of Gifu Prefecture. The reason of the decline is still not clear, but we consider the reason being lead from chemical pollution of neonicotinoid insecticides. We detected these insecticides in the habitat of *S. maculatum*. In particular, concentration of acetamiprid in the habitat exceeded the allowable limit set by the Ministry of the Environment. It is possible neonicotinoid insecticides are one of the factors of dragonfly decline." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**17185.** Karube, H.; Katatani, N. (2019): Rediscovery of the genus *Dubitogomphus* - description of a new species from Laos and proposal for new combination of *D. bicomutus*. (Odonata: Gomphidae). *Tombo* 61: 8-16. (in English, with Japanese summary) ["*Dubitogomphus laosensis* sp. nov., is described from Dak Cheung, Sekong Province, S. Laos. It is related to *D. bidentatus* Fraser, 1930, described from NE India. *Davidius bicomutus* Selys, 1878 is newly placed to this genus *Dubitogomphus bicomutus* comb. nov. and illustrated. In addition, we for the first time record the latter species from Vietnam. Historical record of the genus *Dubitogomphus* is reviewed." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**17186.** Katatani, N. (2019): Description of *Prodasineura bolavenensis* sp. nov. from southern Laos (Odonata: Platycnemididae). *Tombo* 61: 25-32. (in English, with Japanese summary) ["*Prodasineura bolavenensis* sp. nov. is described from the Bolaven Plateau, south of Paksong, Champasak Province, Laos (15°04' N., 106° 12' E.). The species has a blue pattern, and the male is characterized by pruinescent dark violet stripes on synthorax, instead of visible blue antehumeral stripes in other blue colored congeneric species. Black colour of head and blue colour at the terminal of the abdomen and cerci are also species specific." (Author)] Address: Katatani, N., Nara City, Nara Pref., Japan. E-mail: katatani@pearl.ocn.ne.jp

**17187.** Kazmi, Q.B.; Ghory, F.S. (2019): Inventory of freshwater arthropods in Pakistan. *Arthropods* 8(4): 143-175. (in English) ["Inventory of free-living freshwater arthropods, with synonymical bibliography, occurring in the Pakistani fresh waters is drawn up, almost entirely from taxonomical literature



checked until now. 632 taxa have been recorded since 1892, of these 239 species and sub-species are of Crustacea, 368 species and sub-species are of Insecta, 25 species and sub-species are of Arachnida as well as few unidentified species. The present inventory is composed of the collated records from the publications of the library and internet. Totally 266 selected publications are arranged as resource references." (Authors)] Address: Ghory, Farhana, Marine Reference Collection & Resource Centre, Univ. Karachi, Karachi, Pakistan. E-mail: farhanaghory@yahoo.com

**17188.** Kelly, R.S.; Nel, A. (2019): Revision of some damsel-dragonflies (Odonata, Liassophlebiidae and Anglophlebiidae new family) from the Triassic/Jurassic of England and Antarctica. *Journal of Paleontology* 92(6): 1035-1048. (in English) ["Fossil insects from the Triassic-Jurassic boundary of England could provide an important resource for investigating the severity of extinction events in the terrestrial realm of the uppermost Triassic. However, the fossil record is poorly understood for this period even though there are abundant historical collections. Many of these collections are still in need of taxonomic revision before they can be used to reconstruct past entomofaunas and make inferences about diversity change through time. This paper is part of a larger project to revise the taxonomy of insects across the Triassic-Jurassic boundary of England to better understand changes in insect diversity through the Triassic-Jurassic boundary and associated extinction period. Herein, the damsel-dragonfly family Liassophlebiidae Tillyard, 1925 is revised and an additional specimen from the Early Jurassic of Antarctica is included. *Rossiphlebia* new genus is erected for *Liassophlebia jacksoni* Zeuner, 1962; *L. batheri* Tillyard, 1925 is considered nomen dubium and another specimen originally attributed to *L. batheri* is identified as *L. withersi* Tillyard, 1925. *Liassophlebia* (?) *clavigaster* Tillyard, 1925 and *L. (?) hopei* (Brodie, 1845) are considered incertae sedis at the generic level. *Liassophlebia gigantea* Zeuner, 1962 is based on a fragmentary specimen but has several unique key characteristics. We redescribe it in *Anglophlebia* new genus and tentatively in *Anglophlebiidae* new family in Heterophlebioptera. Also discussed are *L. magnifica* Tillyard, 1925, *L. withersi*, and *L. pseudomagnifica* Whalley, 1985, which are redescribed with updated figures. *Caraphlebia antarctica* Carpenter, 1969 was originally described from the Early Jurassic of Antarctica as being closely related to *Liassophlebia*; it is herein confirmed in *Selenothemistidae* Handlirsch, 1939." (Authors)] Address: Kelly, R.S., School of Earth Sciences, Univ. of Bristol, Life Sciences Building, 24 Tyndall Avenue, Bristol, BS8 1TQ, England, United Kingdom. E-mail: richard.kelly@bristol.ac.uk.

**17189.** Kennedy, A.C.; White, H.B.; Tallamy, D.W. (2019): Predation of dragonfly nymphs by Passerines. *Northeastern Naturalist* 26(3): 21-26. (in English) ["Avian predation of Odonata is fairly well-documented, but most observations are restricted to non-passerine birds eating adult odonates. As nymphal odonates are aquatic, most passerine birds would not encounter them while foraging but instead are more likely to catch teneral adults on their maiden flights. Photo-

graphs taken by naturalists over the past several years suggest that passerine predation on odonate nymphs, while apparently rare, occurs across a wider range of species than previously documented." (Authors)] Address: Kennedy, Ashley, Univ. of Delaware, Dept of Entomology & Wildlife Ecology, Newark, DE 19716, USA. E-mail: kennedy@udel.edu.

**17190.** Khudhair, N.; Yan, C.; Liu, M.; Yu, H. (2019): Effects of habitat types on macroinvertebrates assemblages structure: Case study of Sun Island Bund wetland. *BioMed Research International* Volume 2019, Article ID 2650678, <https://doi.org/10.1155/2019/2650678>: 13 pp. (in English) ["Sun Island Bund Wetland (SIBW) is a river floodplain wetland located at the south part of Heilongjiang Province in Northeast China. An investigation of the influence of habitat type on macroinvertebrates assemblages structure was conducted in July 2016. Nine (9) sampling sites were selected based on sediment type, water condition, and aquatic vegetation type. Macroinvertebrates attributes including density, biomass, and four diversity indices (Simpson diversity index, Margalef richness index, Shannon-Weiner index, and Pielou evenness index) were assessed. A total of 53 taxa were collected during the study period, with the highest density dominated being from aquatic insects and gastropods. *Bellamyia purificata* and *Expalaeon annandalei* were the most dominant among all the species. The results showed that the assemblages structure of macroinvertebrates in different habitats was significantly different. Also, the results with PCA showed that the higher values of invertebrates density, biomass, diversity indices, and species richness had a greater association with the habitat types of silt-humus sediment, closed lentic area, and submerged-floating-emergent vegetation.] Address: Liu, M., College of Wildlife Resources, Northeast Forestry University, Harbin 150040, China. E-mail: manhong@nefu.edu.cn

**17191.** Kiany, M.; Sadeghi, S.; Ehteshami, F. (2019): New record of *Lestes dryas* Kirby, 1890 (Odonata: Lestidae) with the notes on *Platycnemis kervillei* (Marin, 1909) from Iran (Odonata: Platycnemididae). *Iranian Journal of Science and Technology, Transactions A: Science* 43: 2123-2127. (in English) ["*L. dryas* is being reported for the first time in northwestern Iran. This species has also been reported from Turkey, Armenia, Azerbaijan and Afghanistan. The specimens were collected from Deylaman (Gilan Province) on 25-V-2015. *P. kervillei* have also been collected from Ardabil province on 23-V-2015, and from Isfahan province on 21-VI-2017. Photographs from habitats and important specimens' characteristics are provided." (Authors)] Address: Kiany, M., Biology Dept, Shiraz Univ., Shiraz, Iran. E-mail: mohsen.kiany1@gmail.com

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2019

**17192.** Kim, I.; Su, Y.J.; Min, J.K. (2019): Complete mitochondrial genome sequence of Bekko Tombo Libellula angelina Selys, 1883 (Odonata: Libellulidae). Mitochondrial DNA Part B 4(2): 2201-2203. (in English) ["L. angelina has been listed as a critically endangered species by the International Union for Conservation of Nature and is also an endangered insect in South Korea. We sequenced the whole genome (15,233 bp) of L. angelina species, which included a set of typical genes and one major non-coding AT-rich region with an arrangement identical to that observed in most insect genomes. The A + T-rich region harbored one identical repeat composed of 65 bp and two tRNA-like structures (trnF and trnK-like sequences) with proper anticodon and clover-leaf structures. Phylogenetic reconstruction using the concatenated sequences of 13 protein-coding genes (PCGs) and two rRNAs of the representative odonate mitogenomes utilizing both Bayesian inference and maximum-likelihood methods revealed a strong support for the monophyletic Zygoptera and a moderate to high support for the monophyletic Anisoptera suborders. Unlike that in conventional phylogenetic analysis, a relatively strong sister relationship was revealed between the suborders of Anisozygoptera and Zygoptera." (Authors)] Address: Kim, I., Dept of Applied Biology, College of Agriculture and Life Sciences, Chonnam National University, Gwangju, Republic of Korea

**17193.** Kipping, J.; Clausnitzer, V.; Fernandes Elizalde, S.R. F.; Dijkstra, K.D.B. (2019): Chapter 9. The Dragonflies and Damselflies of Angola: An Updated Synthesis. In: B. J. Huntley et al. (eds.), Biodiversity of Angola: 141-165. (in English) ["Prior to 2012, only 158 species of Odonata were known from Angola. Surveys in 2012 and 2013 added 76 species and further additions in 2016 brought the national total to 236 species. This was published earlier in 2017 as the checklist of the dragonflies and damselflies (Odonata) of Angola by the same authors (Kipping et al. Afr Invertebr 58 (1):65-91) on which this chapter is based. Records obtained in 2017 and 2018 and a survey by two of the authors in December 2017 led to the discovery of 25 additional species, of which several are undescribed. We provide a revised checklist here comprising 260 species

and discuss the history of research, the biogeography of the fauna with endemism and the potential for further discoveries. The national total is likely to be above 300 species. This would make Angola one of the richest countries for Odonata in Africa." (Authors)] Address: Kipping, J., BioCart Ökologische Gutachten, Taucha/Leipzig, Germany. E-mail: biocartkipping@email.de

**17194.** Kloen, J.-F. (2019): Habitat preference of the Green Hawker (Aeshna viridis). Brachytron 20(2): 94-102. (in Dutch, with English summary) ["A. viridis has strict habitat requirements. In the Netherlands, this species only occurs in vegetations with Water Soldier (Stratiotes aloides) and a good water quality. The following habitat characteristics are important for Aeshna viridis. The water must be at least three meters wide; the vegetation in the water and on the banks should be rich in species; the water has to be sheltered by trees, bushes or reed; the water should be clear without many algae or rotting organic material. The S. aloides plants should be tall, with leaves reaching at least 19 centimeters above the surface, a total leaf length of at least 34 centimeters and the heart of the plant at least 19 centimeters below the surface." (Author)]

**17195.** Klymko, J.; Weigensberg, M.; Blaney, C.S. (2019): First records of the Lilypad Forktail (Ischnura kellicotti) (Odonata: Coenagrionidae) for the Canadian Maritimes and the Southern Pygmy Snaketail (Lanthus vernalis) (Odonata: Gomphidae) for Nova Scotia. J. Acad. Entomol. Soc. 15: 21-23. (in English) ["The Odonata fauna of the Canadian Maritime provinces has received much attention in recent years. A comprehensive overview was presented by Brunelle (2010), and additions to the Maritimes or individual provinces were reported by Klymko (2011), Klymko and Robinson (2013), McAlpine et al. (2017), and Makepeace et al. (2017). Here we add to this body of work with the first reports of I. kellicotti for the Canadian Maritime provinces and the first report of L. vernalis for Nova Scotia. Most of the occurrences documented in this note are based on specimens collected during a dragonfly exuvia survey of the St. Mary's River, Nova Scotia, in 2011 (Klymko & Robinson 2011) and a damselfly survey of south-western New Brunswick lakes done in 2017 (Klymko and

Weigensberg 2018). Voucher specimens have been deposited in the New Brunswick Museum (NBM) and the Canadian National Collection of Insect (CNCI)." (Authors)] Address: Klymko, J., Atlantic Canada Conservation Data Centre, PO Box 6416, Sackville, NB, Canada E4L 1G6. E-mail: jklymko@mta.ca

**17196.** Knight, S.M.; Pitman, G.M.; Flockhart, D.T.T.; Norris, D.R. (2019): Radio-tracking reveals how wind and temperature influence the pace of daytime insect migration. *Biology Letters* 15(7): 5 pp. (in English) ["Insects represent the most diverse and functionally important group of flying migratory animals around the globe, yet their small size makes tracking even large migratory species challenging. We attached miniaturized radio transmitters (less than 300 mg) to monarch butterflies (*Danaus plexippus*) and common green damer dragonflies (*Anax junius*) and tracked their autumn migratory movements through southern Ontario, Canada and into the United States using an automated array of over 100 telemetry towers. The farthest estimated distance a monarch travelled in a single day was 143 km at a wind-assisted ground-speed of 31 km h<sup>-1</sup> (8.7 m s<sup>-1</sup>) and the farthest estimated distance a green damer travelled in a single day was 122 km with a wind-assisted groundspeed of up to 77 km h<sup>-1</sup> (21.5 m s<sup>-1</sup>). For both species, increased temperature and wind assistance positively influenced the pace of migration, but there was no effect of precipitation. While limitations to tracking such small animals remain, our approach and results represent a fundamental advance in understanding the natural history of insect migration and environmental factors that govern their movements." (Authors)] Address: Knight, Samantha, Dept Integrative Biol., Univ. of Guelph, Guelph, Ontario, Canada N1G 2W1. E-mail: sknigh04@uoguelph.ca

**17197.** Kolar, V.; Boukal, D.S.; Sentsis, A. (2019): Predation risk and habitat complexity modify intermediate predator feeding rates and energetic efficiencies in a tri-trophic system. *Freshwater Biology* 64(8): 1480-1491. (in English) ["(1) To understand the effects of environmental changes on ecosystems, it is important to determine the factors and mechanisms influencing the strength of species interactions in food webs. However, joint effects of predation risk and additional environmental factors on species interaction strengths in multitrophic systems remain largely unexplored, leaving a substantial gap in our understanding of the links between local environmental characteristics and food web properties. (2) To fill this gap, we investigated the effects of habitat complexity and predation risk by top predatory dragonfly larvae (*Aeshna cyanea*) on feeding rates and energetic efficiency (i.e. the ratio of acquired and expended energy) of the larvae of three intermediate predatory odonate species (*Libellula quadrimaculata*, *Sympetrum sanguineum*, and *Ischnura elegans*) preying on cladocerans. (3) We hypothesised that predation risk would decrease the feeding rate, especially in the structurally simple habitat, and increase the metabolic rate of all intermediate predators. We also expected higher feeding rates of intermediate predators using aquatic vegetation as a perching site (i.e. *Sympetrum* and *Ischnura*) in the structurally complex habitat. Finally, we expected to observe habitat- and predation risk-dependent energetic efficiencies of

the intermediate predators driven by changes in feeding and metabolic rates. (4) The effect of predation risk on feeding rates was species specific and differed between the structurally simple and complex habitat. Habitat complexity increased feeding rates but only in the absence of predation risk. Moreover, predation risk signalled by chemical cues significantly increased *S. vulgatum* feeding rates but did not influence the feeding rates of the two other intermediate predators. (5) Metabolic rates varied among the three intermediate predators but were not affected by predation risk. Estimated energetic efficiency decreased with intermediate predator body mass and depended, to a lesser extent, on the interactive effect of habitat complexity and predation risk. (6) Our results imply that the effects of habitat complexity and predation risk on trophic interactions are likely to be determined by traits related to foraging and defence of the intermediate predators and their habitat domains, and that energetic efficiency is mainly determined by predator mass. Given that habitat complexity and predation risk can vary substantially across habitats, we conclude that it is important to consider habitat complexity and predation risk to better understand and predict the effects of environmentally driven variations on trophic interaction strength and metabolic rates that underlie the energetic efficiency of individual consumers. This has important implications for population and community dynamics as well as ecosystem functioning." (Authors)] Address: Kolar, V., Fac. of Science, Dept of Ecosystem Biology, Univ. of South Bohemia, Branišovská 1760, 370 05 České Budejovice, Czech Republic. E-mail: kolarvojta@seznam.cz

**17198.** Kompier, T.; Karube, H. (2019): A new species of *Heliogomphus* from Vietnam (Odonata: Gomphidae). *Zootaxa* 4555(1): 113-120. (in English) ["*Heliogomphus bidentatus* sp. nov. (holotype ♂: Tam Dao National Park, Vinh Phuc Prov., northern Vietnam) is described from north and central Vietnam. This new species is similar to *H. scorpio* (Ris, 1912), but can be separated by the coloration of the thorax and details of the male caudal appendages. Information on its biology and ecology is provided." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, The Netherlands. E-mail: kompierintokyo@yahoo.com

**17199.** Koparde, P.; Dawn, P.; Darshetkar, A. (2019): Odonates across a tropical urbanization gradient (Mula River, Pune, Maharashtra, India). *International Dragonfly Fund Report* 128: 1-13. (in English) ["Globally urban wetlands are under high anthropogenic pressure of degradation. Urban wetlands are hotspots for species losses and rapid turnover in species assemblages. Therefore, studying such wetlands may provide an estimate of the pace of local extinction, concerning wetland-dependent species such as odonates. We undertook a study to document odonate species across a tropical urbanization gradient. We sampled six localities across the gradient across the Mula River that flows through the Pune City, India. We sampled adult odonates using a newly devised Halfcircle Point Count method from September 2016 to March 2017. We took multiple temporal replicates per site. We also sampled larvae across six sites once in November 2016. We measured site characteristics such as canopy cover, solid waste, and water turbidity to understand



the level of disturbance at each site. We recorded 41 odonates, six species (primarily Gomphidae members) exclusively from the larval sampling. We did not find the localization of species in a particular site across the urbanization gradient, possibly because we sampled a relatively short stretch of the river to capture the variation. Here, we update the Odonata list of Pune including data on larvae. We demonstrate that larval sampling complements Odonata surveys, especially in recording Gomphids. We recommend future research to include a longer timespan and extensive sampling area." (Authors) ] Address: Koparde, P., Indian Institute of Science Education & Research Tirupati, Andhra Pradesh, India. E-mail: pankajkoparde@gmail.com

**17200.** Kosterin, O., & Gribkov, A. (2019): The first record of *Libellula depressa* Linnaeus, 1758 (Odonata: Libellulidae) in Siberia, Russia. *Acta Biologica Sibirica*, 5(2): 30-32. ["*L. depressa* was recorded from the NW foothills of Altai Mts. at the Inya River near the Chineta Village (51.34° N, 83.05° E) in Kranoshchekovo District of Altayskiy Kray Province, Russia. This record was made for the first time in the territory of Russia, eastward of Urals and in 150 km NNE of the closest locality in East Kazakhstan in Ust'-Kamenogorsk (Oskemen)."] (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**17201.** Kosterin, O.E.; Garrison, R.; Kompier, T.; Farrell, D. (2019): Taxonomic notes on *Indolestes Fraser*, 1922 (Lestidae, Zygoptera). 3. Male and clarified type locality of *Indolestes anomalus* Fraser, 1946. *Zootaxa* 4555(1): 67-78. (in English) ["The male of *Indolestes anomalus* Fraser, 1946 is described and the holotype female is depicted. Its occurrence in Vietnam, Thailand and Malaysia is discussed, and the type locality is clarified (South Vietnam, Đ.ng Nai River basin)."] (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**17202.** Krieger, A.; Fartmann, T.; Poniowski, D. (2019): Restoration of raised bogs—Land-use history determines the composition of dragonfly assemblages. *Biological Conservation* 237: 291-298. (in English) ["Even though bogs function as the most important terrestrial carbon store on Earth and play a crucial role in the conservation of highly endangered species, the area covered by peatlands is declining globally. Consequently, numerous restoration efforts within degraded bogs have been realized. In many cases, however, it is unknown whether the conservation measures have been successful. We used Odonata (hereafter referred to as dragonflies) as ecological indicators to evaluate the restoration success of rewetting measures in central European degraded raised bogs. Depending on their land-use history (rewetted industrial peat cuts with and without former agricultural use), two types of bog restoration were compared with rural peat cuts (control). Our study demonstrated that restored bogs are important habitats for dragonfly conservation. Both types of restored bogs

were as diverse in overall species richness as the control plots. However, land-use history had a strong effect on restoration success. All raised-bog species of the study area were able to recolonize at least some of the nutrient-poor restored bogs. The situation was different for the nutrient-rich restored bogs. Due to the high nutrient content – caused by the former agricultural use – the characteristic dragonfly fauna of raised bogs will be unlikely to be able to recolonize in these locations in the long term. Nevertheless, the nutrient-rich restored bogs represent an important secondary habitat, especially for transition-bog species. In conclusion, the conducted restoration measures created a network of small oligo- to mesotrophic water bodies, which fosters aquatic macroinvertebrate diversity in bogs." (Authors)] Address: Fartmann, T., Dept Biodiversity & Landscape Ecology, Osnabrück Univ., Barbarastr. 11, 49076 Osnabrück, Germany

**17203.** Kumar, D.; Mohite, P.M.; Kamle, S. (2019): Dragonfly inspired nanocomposite flapping wing for Micro Air Vehicles. *Journal of Bionic Engineering* 16(5): 894-903. (in English) ["The current research is aimed towards the development of dragonfly inspired nanocomposite flapping wing for micro air vehicles (MAVs). The wing is designed by taking inspiration from the hind wing of *Anax parthenope julius*. Carbon nanotubes (CNTs)/polypropylene nanocomposite and low-density polyethylene are used as the wing materials. The nanocomposites are developed with varying CNTs' weight percentage (0% – 1%) and characterized for dynamic mechanical properties, which revealed that the 0.1 weight percentage case produces highest storage modulus values throughout the frequency range (1 Hz – 90 Hz). It is also observed that the storage modulus values are in the range of Young's modulus of veins and membrane of natural insect wings. This is useful to achieve true biomimicking. Advanced manufacturing technique such as photolithography is used for wing fabrication. The length, weight and average thickness of the fabricated wing are ~44 mm, 26.22 mg and 187 µm, respectively. The structural dynamic properties of the fabricated wing are obtained experimentally and computationally using DIC and ANSYS, respectively. The developed dragonfly inspired wing showed a natural frequency of 29.4 Hz with a bending mode shape which is close to the characteristic frequency of its natural counterpart." (Authors)] Address: Kumar, D., Dept of Aerospace Engineering, Indian Institute of Technology Kanpur, Kanpur, India. E-mail: david.kumar1988@gmail.com

**17204.** Lan, D.-Y.; Shen, S.-Q.; Cai, Y.-Y.; Wang, J.; Zhang, J.-Y.; Storey, K.B.; Yu, D.-A. (2019): The characteristics and phylogenetic relationship of two complete mitochondrial genomes of *Matrona basilaris* (Odonata: Zygoptera: Calopterygidae). *Mitochondrial DNA Part B* 4(1): 1745-1747. (in English) ["The relationship of *Matrona* and *Atrocalopteryx* is still unclear. To better understand the phylogenetic relationship of *Matrona* and *Atrocalopteryx*, we sequenced and annotated two complete mitochondrial genomes of *Matrona basilaris* sampled from two different locations. The length of the two complete mitochondrial genomes of *M. basilaris* is 16,149 bp and 15,893 bp for the specimens collected in

Jinhua, Zhejiang Province and Tianmushan, Zhejiang Province, China, respectively. The two mitochondrial genomes include the typical invertebrate set of 37 genes: 13 protein-coding genes (PGCs), 22 tRNA genes, and 2 rRNA genes. The nucleotide composition of the mitogenome is similar to other odonates with high content of A + T (68.9%) and all PCGs use ATN as the start codon. Tandem repeats were detected in the control regions of the two *M. basilaris* samples that accounted for the different sequence lengths of the mitochondrial genomes from the two locations. Finally, BI and ML phylogenetic analysis based on the concatenated nucleotide sequences of the 13 PCGs supported the conclusion that *M. basilaris* is a sister clade to *A. melli*." (Authors)] Address: Yu, D.-N. College of Chemistry & Life Science, Zhejiang Normal University, Jinhua, Zhejiang Province, 321004, China. E-mail: ydn@zjnu.cn

**17205.** Lee, S.-D. (2019): Proposition of dragonfly's appropriate survey period inhabited in temperate zone. *Korean Journal of Environment and Ecology* 33(1): 16-27. (in Korean, with English summary) ["This study was identified the survey period and emergence of main species of dragonfly species, an indicator species that can identify the characteristics of wetland ecosystem. I surveyed the species and population of dragonflies once every two weeks from May 2015 to October 2016 (29 times). From January to March, November and December were excluded from the cluster classification because the dragonflies were not observed. In April and October, the species was emerged but it was not suitable because it could not represent the time of the seasons. When we divide by month, it was able to judge from April to June as spring. Except the May, there were some changes due to rainfall and temperature, and sometimes June was included in the summer season. June, July and August correspond to summer, and September and October fall in autumn. In June and October, the change was expected due to the effects of temperature and so it was judged as a partial fit. Looking at the change of the species, *Coenagrion johanssoni* and *Paracercion calamorum* were increase at the spring, and then *Crocothemis servilia mariannae*, *P. calamorum*, *Anax nigrofasciatus*, *Lyriothemis pachygastra*, *Orthetrum melania* were abruptly enlarge in summer. At last, *Sympetrum kunckeli*, *Lestes temporaris* tended to be higher in autumn." (Author)] Address: Lee, S.-D., Dept. Landscape Archit., Gyeongnam Nat. Univ. Science & Technology, 52725, Korea

**17206.** Lim, D.; Lee, Y. (2019): Fish fauna and the population of a Korean endangered freshwater fish, *Brachymystax lenok tsinlingensis*, in Korea: Bonghwa Habitat. *Environ. Eng. Res.* 24(4): 638-645. (in English) ["This research was an evaluation of the fish fauna and the habitat for *B. lenok tsinlingensis* for 11 stations at the Bonghwa-gun sanctuary. The predominant species in this research area was *Zacco koreanus*. *B. lenok tsinlingensis*, which has been designated as an endangered freshwater fish in Korea, was found in the Bonghwa sanctuary zone, except at stations 5 and 6. The *B. lenok* individuals were shorter in length than 400 mm. In total, 13 endemic species were found, including *Coreoleuciscus splendidus* and *Iksookimia longicorpus*. Specimens of *Koreocobitis*

*naktongensis*, a first grade endangered species, were also collected. The benthic macroinvertebrates consisted of four divisions, four classes, seven orders, 30 families, 60 species, and 10,344 individuals and were distributed among the orders Ephemeroptera (55.9%), Diptera (18.2%), Trichoptera (12.4%), Plecoptera (2.1%), and Odonata (0.3%)." (Authors)] Address: Lee, Y., Dept General Education, Konyang Univ., Daejeon 35365, Republic of Korea. Email: leeyj@konyang.ac.kr

**17207.** Lin, C.-Y.; Hsu, Y.-H.; Wang, J.-F.; Lin, C.-P. (2019): New damselfly hosts and species identification of an aquatic parasitoid *Hydrophylita emporos* (Hymenoptera: Trichogrammatidae) in Taiwan. *Journal of Natural History* 53(35-36): 2195-2205. (in English) ["The host-parasitoid relationship and species identity of aquatic parasitoids of *Coeliccia cyanomelas* and *Psolodesmus mandarinus dorothea* from Fushan and Lienhuachih in Taiwan were studied using morphological characters and DNA barcoding sequences. The parasitoids reared from the damselflies' eggs, and the field-collected parasitoids, were morphologically identified as *H. emporos*, a recently described parasitoid of the damselfly *P. m. mandarinus* from Northern Taiwan. The CO1 (cytochrome c oxidase I) gene tree supported the identification as *H. emporos*, as well as all parasitoid samples from *C. cyanomelas*, *P. m. dorothea* and *P. m. mandarinus*. The sampled *H. emporos* populations did not differ genetically despite their different host associations. However, some genetic differences were found between *H. emporos* populations from Northern and Central Taiwan, indicating that the dispersal of *H. emporos* may be limited by geographical distances. Our results suggest that *H. emporos* can parasitise not only closely related sister subspecies, *P. m. mandarinus* and *P. m. dorothea*, but also phylogenetically distant species of another damselfly family, *C. cyanomelas*. This is the first record of multiple damselfly hosts for the aquatic parasitoid genus *Hydrophylita*. This finding implies that the host range of *H. emporos* and congeneric species may be broader than previously thought." (Authors)] Address: Lin, C.-Y., Dept of Life Science, Nat. Taiwan Normal Univ., Taipei, Taiwan. E-mail: treehopper@ntnu.edu.tw

**17208.** Liu, X.; Zhang, J.; Shi, W.; Wang, M.; Chen, K.; Wang, L. (2019): Priority pollutants in water and sediments of a River for Control Basing on benthic macroinvertebrate community structure. *Water* 2019, 11(6), 1267; <https://doi.org/10.3390/w11061267>: 16 pp. (in English) ["Understanding the drivers of macroinvertebrate community structure is fundamental for adequately controlling pollutants and managing ecosystems under global change. In this study, the abundance and diversity of benthic macroinvertebrates, as well as their chemical parameters, were investigated quarterly from August 2014 to April 2015 in four reaches of the Huai River basin (HRB). The self-organizing map (SOM) algorithm and canonical correspondence analysis (CCA) were simultaneously applied to identify the main factors structuring the benthic community. The results showed that the benthic community structure was always dominated by gastropoda and insecta over seasons and presented obvious spatial and temporal heterogeneity along different pollution levels. The insects were always the top contributors to number

density of the benthic community, except for the summer, and the biomass was mainly characterized by mollusca in all seasons. Statistical analysis indicated that TN and NH<sub>3</sub>-N in water, as well as Hg, As, Cd, and Zn in sediments, were the dominant factors structuring the community, which determined the importance of sediment heavy metal concentrations in explaining the benthic community composition in comparison with other factors. These major factors should be given priority in the process of river pollutant control, which might be rated as a promising way to scientifically improve river health management and ecological restoration." (Authors)] Address: Liu, X., State Key Lab. Hydrology-Water Resources & Hydraulic Engineering, Nanjing 210029, China. E-mail: gclx\_2007@126.com

**17209.** Lohr, M. (2019): Blaubereiftes Weibchen von *Crocothemis erythraea* (Odonata: Libellulidae). *Libellula Supplement* 15: 103-107. (in German, with English summary) ["Pruinescent-coloured female of *C. erythraea* – In August 2018 a pruinose female of *C. erythraea* was observed in the alluvial floodplain of the Upper Weser near Höxter (North Rhine Westphalia, Germany). This is probably the first documented finding of a pruinose female of the species." (Author)] Address: Lohr, M., Technische Hochschule Ostwestfalen-Lippe, An der Wilhelmshöhe 44, 37691 Boffzen, Germany. E-mail: mathias.lohr@th-owl.de

**17210.** Luna-León, C.; Domínguez-Márquez, V.M.; Catalán-Heverástico, C. (2019): Libélulas (Insecta: Odonata) from Tecapulco, Guerrero, Mexico. *Entomología mexicana* 6: 434-437. (in Spanish, with English summary) ["The present investigation was carried out in the locality of Tecapulco, Municipality of Taxco de Alarcón, Guerrero, Mexico, with the purpose of knowing the odonatofauna and its seasonal fluctuation. The catches were made with an entomological network during September to December 2011, at different points where there are ponds. 307 adult specimens of dragonflies were collected, belonging to six families, 15 genera and 25 species. Of the total families identified, Libellulidae represented 52% of the species identified, while the species with the most specimens was *Orthemis ferruginea* with 14% of the individuals collected. The highest value of abundance was presented in the second week of October." (Authors)] Address: Luna-León, C., Integrantes del Cuerpo Académico Sistemas de Producción Agropecuaria de la Facultad de Ciencias Agropecuarias y Ambientales, Universidad Autónoma de Guerrero, Periférico Poniente S/N, Colonia Villa de Guadalupe, Iguala de la Independencia, C. P. 40010, Guerrero, México. E-mail: cluna63@hotmail.com

**17211.** Madruga, O.; de Armas, L.F. (2019): Luciémagas (Coleoptera: Lampyridae) capturadas por arañas y odonatos en Cuba. *Boletín de la Sociedad Entomológica Aragonesa* 65: 265-267. (in Spanish, with English summary) ["Fireflies (Coleoptera: Lampyridae) caught by spiders and dragonflies in Cuba. The Cuban fireflies *Photuris brunnipennis* Jacquelin Duval, 1856, *Robopus nefarius* (E. Olivier, 1912) and *Robopus* sp. are preyed upon by the spiders *Argiope trifasciata* (Förskal, 1775), *Neoscona moreli* (Vinson, 1863), *Eriophora ravilla* (C. L. Koch, 1844), and *Eustala fuscovittata*

(Keyserling, 1864) (Araneae: Araneidae). Two instances of attempted predation (grasping and subsequent release) are also recorded: (1) of *Alecton discoidalis* Laporte, 1833, by a female *Progomphus integer*, and (2) of *Robopus* sp. by the synanthropic spider *Physocyclus globosus* (Taczanowski, 1874) (Pholcidae)." (Authors)] Address: Madruga, O., Museo Nacional de Historia Natural de Cuba, Obispo No. 61, Plaza de Armas, Habana Vieja, CP 10100, La Habana, Cuba. E-mail: ormaily@gmail.com

**17212.** Mangahas, R.S.; Murray, R.L.; McCauley, S.J. (2019): Chronic exposure to high concentrations of road salt decreases the immune response of dragonfly larvae. *Front. Ecol. Evol.* | doi: 10.3389/fevo.2019.00376: 6 pp. (in English) ["Salinization of freshwater ecosystems, due to the application of road salts, is recognized as a potential threat to aquatic communities. Much of the research on the impact of salinity has focused on performance metrics in vertebrates, including respiration and osmoregulation. Here we focus on immune function in of the dragonfly *Anax junius*, a top predator in fishless aquatic habitats. Impacts on this top predator have the potential to cascade through the community, and immune function is known to be both plastic and sensitive to stress. We injected larvae with monofilaments (simulating a parasite) and placed them in one of three environmentally relevant concentrations of deicing road salt: control (dechlorinated tap water with no added salt), low (1000 mgL<sup>-1</sup>), or high salt (3000 mgL<sup>-1</sup>), for either acute (24hr) chronic or (96hr) exposures. We hypothesized that elevated salinity would suppress the immune response and that longer exposure magnifies this effect. As predicted, chronic exposure to high salt concentrations resulted in a significantly reduced larval immune response, however, there was no detectable treatment effects in larvae exposed to low concentrations of road salt or to acute high concentrations. Our results demonstrate that prolonged exposure to high levels of road salt can compromise the immune response of dragonfly larvae. Our findings suggest that insects in aquatic environments that experience sustained environmental salt pollution will be more susceptible to parasites and pathogens, which in turn may affect the impact of this major predator on aquatic community dynamics." (Authors)] Address: Murray, Rosalind L., Univ. Toronto Mississauga, Canada. E-mail: rosalind.murray@utoronto.ca

**17213.** Manger, R. (2019): New population of Dark Whiteface (*Leucorrhinia albifrons*) in 2019 in the Netherlands. *Brachytron* 20(2): 71-77. (in Dutch, with English summary) ["From 2016 to 2018, *L. albifrons* was observed at various locations in the Netherlands. In 2019 the species was no longer observed at those locations. On 20 June a new population of *Leucorrhinia albifrons* was discovered in Overijssel. A maximum of some ten teneral and imagoes were observed per visit. The bog pool has a sandy bottom, circumneutral water and clear sight down to the bottom. The riparian zone is relatively narrow and the vegetation is low and not very diverse. *Potamogeton* sp. are present in the centre. After the population in Friesland in the period 2005-2013, this is the second location in the Netherlands where teneral have been observed. The question is whether this



picky dragonfly will be able to maintain a continued presence in the Netherlands." (Authors)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

**17214.** Marinov, M. (2019): Description of *Hemicordulia tuiwawai* sp. nov. from Kadavu Island, Fiji (Odonata: Corduliidae). International Dragonfly Fund - Report 138: 1-9. (in English) ["*Hemicordulia tuiwawai* sp. nov. (Odonata: Corduliidae) is described and diagnosed based on material collected from Kadavu Island, Fiji; holotype: Wainitayuki River about 750 m above Baidamudamu village, 19.0916, 178.1038; 37 m a.s.l., 06 June 2016, M. Marinov leg. This species is distinguished from its congeners in the field by the contrasting colouration – dark green metallic body with bright yellow spots on the synthorax and base of the abdomen. This pattern is comparable to *H. pacifica* Selys, 1871. However, *Hemicordulia tuiwawai* sp. nov. can be recognised by the larger size and unique shape of the caudal appendages and genital hamule (in males) and vulvar scale (in females)."] (Authors)] Address: Marinov, M., Biosecurity Surveillance & Incursion Investigation Plant Health Team, Ministry for Primary Industries, 14 Sir William Pickering Drive, Christchurch 8544, New Zealand. E-mail: milen.marinov@mpi.govt.nz

**17215.** Marinov, M.; Jacq, F.A.; Ramage, T.; Doscher, C. (2019): Contribution to the Odonata fauna of the Society Islands, French Polynesia (Insecta: Odonata). Faunistic Studies in South East Asian and Pacific Island Odonata 28: 1-37. (in English) ["Following field studies in 2018 the Odonata fauna of Society Islands, French Polynesia is reviewed and the validity of all records analysed. An updated species list is provided, bringing the number of breeding species recorded from this island group to ten. Field studies targeted *Hemicordulia* Selys, 1870 specimens for inclusion in the revision of the Pacific representatives of the genus. Samples were taken mainly from Tahiti and Raiatea, with some additional specimens collected from Bora Bora and Huahine. Only the Society Islands endemic *H. oceanica* Selys, 1871 was encountered on all four islands, being recorded from Bora Bora for the first time. At least one new species of *Hemicordulia* has been reported from the high mountain areas of Tahiti (Jacq et al. 2009, 2014). The present study also emphasises the need for a revision of Zygoptera records from the French Polynesia and the rest of the Pacific. Presently, about 25 endemic species provisionally assigned to *Ischnura* Charpentier, 1840 and *Hivaagrion* Hämäläinen & Marinov, 2014 are known from the Society, Austral and Marquesas island groups (R. Englund, J. Jacq, T. Ramage, D. Polhemus, per. comm.). Only seven of them have been described so far. Detailed morphological and molecular analyses will likely prove the separate generic status of some of the species presently included under *Ischnura*." (Authors)] Address: Marinov, M., Plant Health & Environment Lab., Diagnostic and Surveillance Services, Ministry for Primary Industries, 231 Morrin Rd, 1072 Auckland, New Zealand. E-mail: milen.marinov@mpi.govt.nz

**17216.** Marinov, M.; Bybee, S.; Doscher, C.; Kalfatakmlis, D. (2019): Faunistic studies on Odonata of the Republic of

Vanuatu (Insecta: Odonata). Faunistic Studies in Southeast Asian and Pacific Island Odonata 26: 1-46. (in English, with Bislama summary) ["This study investigates the history of Odonata studies in the Republic of Vanuatu and presents results from a two week field sampling mainly on three islands – Efate, Aneityum and Malekula. A total of 32 species are recognised as currently valid names for the country. Three new species have been collected and will be described elsewhere. Various taxonomic, faunistic and biogeographic issues are discussed in the light of the new material collected during the current study in comparison to already published research. The general conclusion is that provisional species checklist is far from complete. The territory of Vanuatu is still highly insufficiently studied for its Odonata fauna. The local endemic genus *Vanuatubasis* Ober & Staniczek, 2009 is believed to be far more diverse than currently known with three described and three new species collected during the present study." (Authors)] Address: Marinov, M., Investigation & Diagnostic Centres & Response, Operations Branch, Ministry for Primary Industries, 231 Morrin Rd, Auckland 1072 New Zealand. E-mail: Milen.Marinov@mpi.govt.nz

**17217.** Marquez-Rodríguez, J. (2019): New records of *Tricacanthagyna trifida* (Odonata: Aeshnidae) from La Altagracia, Punta Cana, Dominican Republic. Revista Chilena de Entomología 45(3): 359-361. (in English, with Spanish summary) ["On September 02, 2010, we observed seven specimen of *T. trifida* active around a pond and perched on the vegetation of a tourist resort at sunset; Barceló Bávaro Palace (18°39'37,4" N, 68°23'43,3" W)" (Author)] Address: Márquez-Rodríguez, J., Zoology. Dept Physical, Chemical & Natural Systems, Fac. of Experimental Sciences, Univ. Pablo de Olavide, A-376, Km 1, 41013 Seville, Spain. E-mail: jmarrod1@upo.es

**17218.** Martens, A. (2019): Vogelfedern und Libellen: ein Blick auf biotische Wechselwirkungen. Libellula Supplement 15: 109-112. (in German, with English summary) ["Bird feathers and Odonata: a first approach on biotic interactions – Biotic interactions also include indirect ones. The cases described here focus on lost bird feathers and their effects on odonates. A feather of the greylag goose *Anser anser* was found attached to a wing of a *Trithemis annulata* male at a man-made dam near Chania, Crete, Greece on 6 September 2015. In the second case, a feather of the mute swan *Cygnus olor* was used as substrate by an emerging *Ischnura elegans* on 4 August 2013 in the harbour of Karlsruhe, Germany." (Author)] Address: Andreas Martens, A., Inst. für Biologie & Schulgartenentwicklung, Pädagogische Hochschule Karlsruhe, Bismarckstr. 10, 76133 Karlsruhe, Germany. E-mail: martens@ph-karlsruhe.de

**17219.** Mellal, M.K.; Bensouilah, M.; Houhamdi, M.; Khelifa, R. (2019): Reproductive habitat provisioning promotes survival and reproduction of the endangered endemic damselfly *Calopteryx exul*. Journal of Insect Conservation 22(3-4): 563-570. (in English) ["Effective habitat management is predicted to have positive effects on populations and species of conservation concern. Although studies have shown that

ecological processes such as colonization can be promoted after habitat management, we still need more information on the survival and reproductive consequences at the individual level in order to reach positive conservation outcome. Here we assess the effects of reproductive habitat supplementation (host oviposition plant) on survival and mating success of *C. exul*, using capture-mark-recapture data. We first determined that the species prefer to oviposit on floating leaves of *Potamogeton* spp. Based on Cormack-Jolly-Seber modeling, we found that recapture and survival probabilities were positively affected by the number of the host oviposition patches of the host plant. Moreover, we showed a strong positive relationship between adult lifespan and lifetime mating success. Our results suggest that host-plant provisioning for reproduction not only increases the survival of individuals, but also increases the number of matings per lifetime. The procedure of supplying reproductive sites may enhance population growth of threatened odonates and other aquatic insects." (Authors)] Address: Mellal, M.K., Lab. Marine & Coastal Environments Ecobiology, Dept of Biology, Badji Mokhtar University, Annaba, Algeria

**17220.** Mezquita-Aranburu, I. (2019): Primera cita de *Lestes dryas* Kirby, 1890 (Odonata, Lestidae) para Gipuzkoa (País Vasco, España). First record of *L. dryas* from Gipuzkoa (Basque Country, Spain). *Munibe, Cienc. nat.* 67: 4 pp. (in Spanish, with English and Euskarian summaries) [The first record of *L. dryas* in Gipuzkoa (Basque Country, Spain) is reported: 11-VI-2017, Alabita (UTM 30TWN4057, 940 m.a.s.l).] Address: Mezquita-Aranburu, I., Depto de Entomología, Soc. Ciencias Aranzadi Zientzia Elkarte, Zorroagagaina 11, 20004 Donostia-San Sebastián, Spain). E-mail: mezquitaaranburu@gmail.com

**17221.** Minot, M.; Le Gall, M.; Husté, A. (2019): Biometry of the large dragonfly *Anax imperator* (Odonata: Aeshnidae): A study of traits from larval development to adults. *Eur. J. Entomol.* 116: 269-280. (in English) ["Insect larval development affects adult traits but the biometric relationships are usually poorly understood, including large odonates. In this study, measurements of morphological traits of larvae, exuviae and adults of *A. imperator* were recorded. They were used to investigate the effects of early development on adult morphology. Results showed an increase in larval length during the final instar and the length of its exuviae significantly exceeded that of the larva. Length and body mass of teneral adults were strongly related to the length of their exuviae. Adult males were significantly longer than adult females, while both had the same body mass at emergence. Length of teneral adults was negatively related to the date of emergence in both sexes. During maturation, body mass of males only increased slightly whereas that of females increased greatly. Mature specimens were also significantly longer than teneral individuals. Body mass of mature males and length of mature females were both associated with the date of capture. Wing length did not differ between sexes or from data available from Great Britain. This study underscores the importance of taking into account larval growth in order to better understand the adult traits of odonates." (Authors)] Address: Minot, M., Université de Rouen - ECO-DIV, Bat Blondel, Place Emile Blondel, Mont-Saint-Aignan 76821, France. E-mails: marceau.minot1@univ-rouen.fr

(Authors)] Address: Minot, M., Université de Rouen - ECO-DIV, Bat Blondel, Place Emile Blondel, Mont-Saint-Aignan 76821, France. E-mails: marceau.minot1@univ-rouen.fr

**17222.** Miralles-Núñez, A.; Muñoz-Cabrera, M.A. (2019): Primera cita de *Sympetrum sinaiticum* Dumont, 1977 (Odonata: Libellulidae) de la provincia de Guadalajara (Castilla-La Mancha, España). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)* 65: 225-226. (in Spanish, with English summary) [Male, Fuentenovilla, Guadalajara (Castilla-La Mancha). 23-10-2018.] Address: Miralles-Núñez, A., Grup d'Estudi dels Odonats de Catalunya (Oxygastra-GEOC), Institució Catalana d'Història Natural, Carrer del Carme, 47, 08001 Barcelona, Spain. E-mail: amiralles10@gmail.com

**17223.** Mishra, D.; Sharma, V.K.; Pal, A. (2019): Diversity of odonata at Sirpur pond, Indore. *International Journal of Zoology and Applied Biosciences* 4(1): 1-4. (in English) ["Thus a study has been done on the diversity of odonates at Sirpur Pond in Indore district of Madhya Pradesh, India. A total of 16 species of Odonates were recorded from the study area from January 2016 to June 2017. Out of 16 species, 8 species were among the Anisoptera and 8 species were among the Zygoptera. Among the 8 species of Anisoptera, 7 were of family Libellulidae while 1 of family Gomphidae. Among the 8 species of Zygoptera, 7 were of family Coenagrionidae and 1 of family Lestidae." (Authors)] Address: Mishra, D., Department of Zoology, Government Holkar Science College, Near Bhawarkua, Indore, Madhya Pradesh 452017, India. E-mail: devendra2490@gmail.com

**17224.** Mitra, B.; Panja, B.; Chakraborti, U.; Roy, S.; Biswas, O. (2019): First exploration on the insect faunal diversity of Haliday Wildlife Sanctuary, Indian Sundarban. *Research Journal of Life Sciences, Bioinformatics, Pharmaceutical and Chemical Sciences* 5(6): 11-19. (in English) ["Present paper reports 19 species of insects from different orders like Diptera (6 species), Hymenoptera (5 species), Lepidoptera (3 species), Odonata (4 species) and Hemiptera (1 species) from a very small island namely Haliday island (Local name: Zinjira Dwip) of Sundarban Biosphere Reserve, India." (Authors) *Orthetrum sabina*, *Crocothemis servilia*, *Rhyothemis variegata*, *Brachythemis contaminata*] Address: Mitra, B., Ramkrishna Mission Vivekananda Centenary College, Rahara, Kolkata. E-mail: bulganinmitra@gmail.com

**17225.** Moore, M.P.; Lis, C.; Gherghel, I.; Martin, R.A. (2019): Temperature shapes the costs, benefits and geographic diversification of sexual coloration in a dragonfly. *Ecology Letters* 22(3): 437-446. (in English) ["The environment shapes the evolution of secondary sexual traits by determining how their costs and benefits vary across the landscape. Given the thermal properties of dark coloration generally, temperature should crucially influence the costs, benefits and geographic diversification of many secondary sexual colour patterns. We tested this hypothesis using sexually selected wing coloration in a dragonfly. We find that greater wing coloration heats males – the magnitude of which improves flight performance under cool conditions but dramatically reduces it

under warm conditions. In a colder region of the species' range, behavioural observations of a wild population show that these thermal effects translate into greater territorial acquisition on thermally variable days. Finally, geo-referenced photographs taken by citizen scientists reveal that this sexually selected wing coloration is dramatically reduced in the hottest portions of the species' range. Collectively, our results underscore temperature's capacity to promote and constrain the evolution of sexual coloration." (Authors)] Address: Moore, M.P., Dept Biology Case Western Reserve Univ. Cleveland, OH 44106, USA. E-mail: mpm116@case.edu

**17226.** Moskowitz, D.; May, M.L. (2019): Nymph ecology, habitat, and emergence-site selection of *Cordulegaster erronea* Hagen (Tiger Spiketail Dragonfly) in New Jersey with implications for conservation. *Northeastern Naturalist* 26(1): 141-154. (in English) ["*C. erronea* is of conservation concern throughout much of its range; yet only a single study on the nymphs has been conducted, and many aspects of the species' life-history are poorly understood. The present study evaluated the size, age structure, and density of Tiger Spiketail nymphs at a stream on the Schiff Reservation Natural Lands Trust (Schiff) in Mendham Township, Morris County, NJ. We investigated the habitat and surrounding landscape characteristics of this stream and a second stream containing Tiger Spiketails at Schiff. We collected and measured 137 Tiger Spiketail nymphs during this study—82 in the spring and 55 in the fall—representing pre- and postadult emergence. We found 24 exuviae along both study streams and an additional 8 exuviae along 3 other streams in New Jersey, Connecticut, and Delaware. We are aware of only 1 other published report of Tiger Spiketail exuvia, which documented a single specimen. Our data and habitat assessment indicate that the Tiger Spiketail has a long nymphal stage and may be dependent upon high quality, fish-free, perennial headwater streams flowing through extensive forests. This information may assist resource managers in developing conservation strategies and habitat-protection measures for this species." (Authors)] Address: Moskowitz, D., EcolSciences, Inc., 75 Fleetwood Drive, Suite 250, Rockaway, NJ 07866, USA. E-mail: dmoskowitz@ecolsciences.com.

**17227.** Müller, O.; Schumann, V.-F. (2019): Terrestrische Migration der Larven von *Stylurus flavipes* (Odonata: Gomphidae). *Libellula Supplement* 15: 113-120. (in German, with English summary) [Terrestrial Migration of Larvae of *S. flavipes* – *S. flavipes* is a character species of lowland rivers. Its larvae inhabit shallow river banks that contain fine-grain sediments. Though most of these rivers are radically regulated in Europe, there are some less regulated ones, such as the River Elbe or the River Oder, that were able to sustain relatively natural tide dynamics. In summer, the water levels often decrease drastically with the impact on the shallow parts of the river banks drying out within a few hours. Emerging pools that are swiftly separated from the river can become traps for larvae. Would larvae be able to leave the pools if these pools were completely separated from the river? The paper at hand describes the phenomenon of terrestrial migration of larvae for the first time. In our

experiment, some of the larvae left the artificial pools. There seemed to be a specific adaptive behaviour between different instars. Whereas larvae ready to emerge tended to move ashore, the younger ones tended to move towards the river.] Address: Müller, O., Städtisches Gymnasium Carl Friedrich Gauß, Mathematisch-naturwissenschaftlich-technische Spezialschule, Friedrich-Ebert-Str. 52, 5234 Frankfurt (Oder), Germany. E-mail: mueller.ole@gmail.com

**17228.** Müller, R.; Eggers, T.O. (2019): Erstnachweis von *Oecetis tripunctata* (Fabricius, 1793) (Trichoptera, Leptoceridae) in Niedersachsen. *Lauterbornia* 86: 125-129. (in German, with English summary) ["In the lower reaches of the Fuhse, a small lowland river, a larva of the rare caddis fly *O. tripunctata* was found near the village of Wathlingen on 27.09.2018. This is the first find of the species in Lower Saxony and at the same time in North-West Germany." Records of *Calopteryx splendens*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Ischnura elegans*, *Platycnemis pennipes* and *Somatochlora metallica* are documented too.] (Authors)] Address: Eggers, T.O., NLWKN Verden, Bürgermeister-Münchmeyer-Str. 6, 27283 Verden, Germany. E-mail: thomas-ols.eggers@nlwkn-ver.niedersachsen.de

**17229.** Mukherjee, S.; Blaustein, L. (2019): Effects of predator type and alternative prey on mosquito egg raft predation and destruction. *Hydrobiologia* 846: 215-221. (in English) [oas 47 "For a vector species, understanding their egg raft predation (consumption) or destruction is essential for both ecological and human health reasons since it directly influences its fitness. In a mesocosm experiment, we assessed differences in *Culiseta longiareolata* egg raft predation/destruction by three aquatic predators *Notonecta maculata* (backswimmers), *Sympetrum fonscolombii* and *Ommatotriton vittatus* (newts), both in the presence and absence of an alternate prey (*Culex* larva). Egg raft predation and destruction significantly differed between predators types, and strongly influenced by the presence of alternate prey. Backswimmers attacked and destroyed (broke down) all egg rafts until they disintegrated and sank in water regardless of whether an alternate prey was present. Egg raft predation by dragonflies was common in the absence of alternative prey, but rare when alternative prey was present. Predation by newts was rare regardless of whether there was an alternative prey. The number of alternate prey consumed also significantly differed between predators ( $P < 0.001$ ) with backswimmers being the most effective predator. Relatively few studies have tested for egg raft predation/destruction. Hence it is crucial that we conduct similar trials in other landscapes since such predators can prove to be key agents for the biological control of mosquitoes." (Authors)] Address: Institute of Evolution & Dept of Evolutionary & Environmental Biology, Fac. Natural Sciences, University of Haifa, Haifa, Israel

**17230.** Murwitaningsih, S.; Dharma; A.P.; Setyaningsih, M. (2019): Dragonfly diversity in Cibodas Botanical Garden in West Java. *Biopic Tahun* 3(1): 62-67. (in English) ["This study is aimed to investigate the level of dragonfly diversity in Cibodas Botanical Garden, West Java. The method used



in this research was direct observation using catch and release technique. The research was carried out from May to July 2018. A total of 1,510 individuals belonging to eight dragonfly species were found in the four sampling locations. Anisoptera: *Pantala flavescens*, *Orthetrum pruinosum*, *O. sabina*, *O. glaucum*, *Neurothemis fluctuans*, *N. terminata*; Zygoptera: *Ischnura senegalensis*, *Coeliccia membranipes*. The highest values of species diversity index (H') and evenness index (E) were found in Ciismun Waterfall (1,45 and 0,88, respectively). The dominance index (D) in the four sampling sites ranged between 0.25 - 0.32. The highest species richness index (R) was found in Sakura Garden (0,99)." (Authors)] Address: Murwitaningsih, Susanti, Univ. Muhammadiyah Prof. Dr. Hamka, Jakarta, Indonesia. E-mail: murwitaningsih@yahoo.com

**17231.** Naraoka, H. (2019): Daily activity and reproductive behavior of adult *Coenagrion ecornutum* (Selys, 1872) at and around a small pond in Kushiro-marsh, Hokkaido prefecture (Odonata: Coenagrionidae). Tombo 61: 33-40. (in Japanese, with English summary) ["Diurnal activity and reproductive behavior of *C. ecornutum* was investigated at a small pond in Kushiro Marsh, Hokkaido, Japan. Males searching for females was seen from as early as 5 a.m. until 2 p.m. Earliest tandem pairing was seen at around 5 a.m. Nevertheless, copulation was seen only from 9 a.m. until 4 p.m. Tandem oviposition was seen from 10 a.m. to 4 p.m. Total flight time per 5 minutes was longer between 10 and 11 a.m. in males than at other times of the day, while it was longest between 1 and 2 p.m. in females. Copulation can be divided into three stages. Stage I was longer than Stages II and III. Stage II can be further subdivided into two sub-stages (IIa and IIb). Finally, the daily activity of this species is discussed in regard to sex ratio in the rendezvous site." (Authors)] Address: Naraoka, H., 36-71, Aza-Motoizumi, Fukunoda, Itayanagi-cho, Kita-gun, Aomori Prefecture, 038-3661, Japan

**17232.** Natsume, H. (2019): An adult male of *Stylogomphus suzukii* (Oguma, 1926) with unusual blackish thorax. Tombo 61: 44-45. (in Japanese, with English summary) ["An adult male of *S. suzukii* with an unusual blackish thorax is reported. This specimen was collected in Toyohashi city, Aichi Prefecture, on September 24, 1971. Unlike usual specimens, this one is lacking the yellow band on the mesepimeron, and the triangular yellow marking on the upper end of the metepisternum is almost vanished." (Authors)] Address: E-mail: romluna@y4.dion.ne.jp

**17233.** Nel, A.; Roques, P.; Prokop, J.; Garrouste, R. (2019): A new, extraordinary 'damselfly-like' Odonatoptera from the Pennsylvanian of the Avion locality in Pas-de-Calais, France (Insecta: 'Exopterygota'). *Alcheringa* 43(2): 241-245. (in English) ["*Enigmaptera magnifica* gen. et sp. nov., type genus and species of the new odonatopteran family *Enigmapteridae*, is described from the Moscovian of Avion (northern France). It is the sister group of the major clade Neodonatoptera, placed together in the new clade Paneodonatoptera. Its wing venation has characters never found in other Odonatoptera. It is a further case of convergent wing petiolation in this superorder. *E. magnifica*, like the protozygopteran *Jacquesoudardia*

*magnifica* from the same outcrop, probably lived like the extant damselflies along the shores of lakes and rivers, hunting the small insects found in the same deposits. These discoveries show that very small insects were significant elements of the entomofaunal diversity and trophic chains of the Late Carboniferous ecosystems." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, 75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**17234.** Ng, M.F.C. (2019): The bombardier dragonfly, *Lyriothemis cleis*, at Dairy Farm Nature Park. Singapore Biodiversity Records 2019: 43. (in English) [Singapore Island, Bukit Timah, Dairy Farm Nature Park, Wallace Trail; 2 February 2019, around 1200 hrs.] Address: thebudak@gmail.com

**17235.** Ngo, Q.P.; Phan, Q.T.; To, V.Q. (2019): Description of the female of *Davidius monastyrskii* Do, 2005 from the Central Highlands of Vietnam (Odonata: Gomphidae). *International Dragonfly Fund Report* 139: 1-6. (in English) ["The first description of the female of *D. monastyrskii* is made, based on a specimen from the Central Highlands of Vietnam (Mang Yang District, Gia Lai Province)." (Authors)] Address: Phan, Q.T., Center Ento. & Parasit. Res., Inst. Res. & Training of Medicine, Biology & Pharmacy, Duy Tan Univ., 3 Quang Trung, Da Nang city, Vietnam. E-mail: pqtoan84@gmail.com

**17236.** Novelo-Gutierrez, R.; Sites, R.W. (2019): The probable larva of *Anotogaster gregoryi* Fraser, 1923, with new distributional records of the genus from northern Thailand (Odonata: Cordulegastridae). *Zootaxa* 4565(1): 138-144. (in English) ["The probable larva of *A. gregoryi* is described for the first time by supposition based upon four F-0 larvae collected in the provinces of Loei and Phitsanulok, which are new province records for *Anotogaster* in Thailand." (Authors)] Address: Novelo-Gutierrez, R., Inst. de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.mx

**17237.** Novelo-Gutierrez, R.; Gomez-Anaya, J.A. (2019): The larva of *Phyllogomphoides pugnifer* Donnelly, 1979 (Odonata: Gomphidae). *Zootaxa* 4688(4): 578-584. (in English, with Spanish summary) ["The larva of *P. pugnifer* is described for the first time based on reared specimens to emergence, and several F-0 larvae collected in Chiapas and Veracruz states, Mexico. The larva of *P. pugnifer* can be separated from other larvae of the genus by the length/width proportion of structures such as prementum, ligula, and abdominal segment 10, as well as length of cercus relative to epiproct." (Authors)] Address: Novelo-Gutierrez, R., Inst. de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91073 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.mx

**17238.** Novelo-Gutiérrez, R.; Sites, R.W. (2019): The larvae of *Phaenandrogomphus Lieftinck*, 1964 in Thailand, including the description of *P. tonkinicus* (Fraser, 1926) with a larval diagnosis and new province records of *P. asthenes* Lieftinck, 1964 (Odonata: Gomphidae). *Zootaxa* 4700(3): 377-

384. (in English) ["The larva of *P. tonkinicus* is described for the first time based on several F-0 larvae collected in Chiang Mai and Nan provinces of Thailand. The larva of *P. tonkinicus* differs from that of *P. asthenes* Lieftinck, 1964 by having the 3rd antennomere mesal margin strongly convex, 4th antennomere vestigial and dome-like, postclypeus thick and shelf-like, S8 lacking a posterolateral spine, and cerci usually shorter than the epiproct. New Thailand province records of *P. asthenes* also are provided." (Authors)] Address: Novelo-Gutiérrez, R., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: [rodolfo.novelo@inecol.mx](mailto:rodolfo.novelo@inecol.mx)

**17239.** Novelo-Gutiérrez, R.; Sites, R.W. (2019): The larva of *Amphigomphus somnuki* Hämäläinen, 1996 and the first records of the genus *Stylogomphus* Fraser, 1922 for Thailand (Odonata: Gomphidae). *Zootaxa* 4555(1): 121-126. (in English) ["The larva of *A. somnuki* is described for the first time based on an emerged male specimen from Chiang Mai Province, and several F-0 larvae collected in other provinces of Thailand. The larva of *A. somnuki* is the smallest and differs from *A. nakamurai* Karube, 2001 by the caudal appendages densely covered with minute spiniform setae, and from *A. hansonii* Chao, 1954 by the male epiproct with the dorsal tubercles at 0.65 the length of the epiproct. New province records for *A. somnuki* and the first records of *Stylogomphus* Fraser, 1922 for Thailand are provided." (Authors)] Address: Novelo-Gutiérrez, R., Inst. de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: [rodolfo.novelo@inecol.mx](mailto:rodolfo.novelo@inecol.mx)

**17240.** Ohtsu, K. (2019): Acute toxicity test method, dragonfly, Fipronil, Imidacloprid, Japanese common meadowhawk, Paddy field nursery bed insecticides, Pesticide sensibility, *Sympetrum frequens*. *Jpn. J. Environ. Toxicol.* 22(2): 31-40. (in Japanese, with English summary) ["*Akiakane* (*S. frequens*), a Japanese common meadowhawk, is widely distributed in Japan. The larvae hatch in paddy water in a season of rice planting. In recent years in Japan, insecticides for nursery-box application are widely used. As these insecticides include a long-acting type, it is concerned about affecting the growth of *S. frequens* larvae. The objective of this study is to develop acute toxicity test method for 2nd instar larvae of *S. frequens* to some typical insecticides for nursery-box application (Fipronil, Imidacloprid) and compare the sensitivity of these insecticides. A 48-hour acute toxicity test method using a 48-well plate was established. Susceptibility to 2nd instar larvae of *S. frequens* was 48 times higher for fipronil than for imidacloprid. For effective hatching of larvae, it was necessary to treat the eggs at low temperature for at least 4 weeks. The temperature during the acute toxicity test was preferably 21°C. rather than 26°C." (Author)] Address: Ohtsu, K., Institute for Agro-Environmental Sciences, NARO / 3-1-3 Kannondai, Tsukuba City, Ibaraki 305-8604, Japan. Email: [kazu02@affrc.go.jp](mailto:kazu02@affrc.go.jp)

**17241.** Okuyama, H.; Kiyoshi, T.; Takahashi, J.-I.; Tsubaki, Y. (2019): Complete mitochondrial genome sequence of the broad-winged damselfly, *Mnais pruinosa* Selys, 1853 (Odonata:

Calopterygidae). *Mitochondrial DNA Part B* 4(2): 3101-3103. (in English) ["The mitochondrial genome of *M. pruinosa* was identified as a circular molecule of 15,494 bp, and was found to be similar to that of other damselfly species. It was predicted to contain 13 protein-coding (PCG), 22 tRNA, and two rRNA genes, as well as one A+T-rich control region. The genes ATP8 and ATP6 shared seven nucleotides, ATP6 and COIII shared one nucleotide, ND4 and ND4L shared seven nucleotides, and ND6 and Cytb shared one nucleotide. The initiation codon ATG was found in eight genes, ATC in four, and ATT in one; the termination codons TAA, TAG, incomplete TA, and single T were observed in seven, one, two, and three genes, respectively. All the tRNA genes possessed a cloverleaf secondary structure, except for tRNA-His that lacks the TWC loop. The average AT content of mitochondrial genome was 66.18%." (Authors)] Address: Okuyama, H., Fac. Life Sciences, Kyoto Sangyo Univ., Kamigamo, Motoyama, Kita-ku, Kyoto, Japan. E-mail: [k5533@cc.kyoto-su.ac.jp](mailto:k5533@cc.kyoto-su.ac.jp)

**17242.** Okuyama, H.; Kiyoshi, T.; Takahashi, J.-I.; Tsubaki, Y. (2019): A comparison of complete mitochondrial DNA sequences of *Mnais costalis* Selys, 1869 (Odonata: Calopterygidae) from three different populations (one allopatric and two sympatric). *Mitochondrial DNA Part B* 4(2): 3104-3105. (in English) ["In Japan, two closely-related damselflies, *Mnais costalis* and *M. pruinosa* Selys-Longchamps, 1853, coexist, and they exhibit geographic variations in wing color, body size, and habitat preference. In this study, we analyzed the complete mitochondrial genome of *M. costalis* from Saga Prefecture, Japan (sympatric populations that exhibit wing color polymorphism), and compared the genome with *M. costalis* that exhibit monomorphic orange wing color. The mitochondrial genome of *M. costalis* from Saga Prefecture was identified as a circular molecule of 15,488 bp, similar to that found in other *M. costalis* populations. It was predicted to contain 13 protein-coding (PCG), 22 tRNA, and two rRNA genes, along with one A + T-rich control region. Among the PCGs, ATP8 and ATP6, ATP6 and COIII, ND4 and ND4L, and ND6 and Cytb shared seven, one, seven, and one nucleotides, respectively. The initiation codon ATG was found in eight genes, ATC in four, and ATT in one, while the termination codons TAA, TAG, TA, and T were observed in seven, one, two, and three genes, respectively. All the tRNA genes possessed a cloverleaf secondary structure, except for tRNA-His that lacks the T C loop. The average AT content of mitochondrial genome was 66.06%. From a phylogenetic analysis, the loss of wing color polymorphism in monomorphic sympatric populations is likely to occur with the coexistence of two *Mnais* species." (Authors)] Address: Okuyama, H., Faculty of Life Sciences, Kyoto Sangyo Univ., Kamigamo, Motoyama, Kita-ku, Kyoto, Japan. E-mail: [k5533@cc.kyoto-su.ac.jp](mailto:k5533@cc.kyoto-su.ac.jp)

**17243.** Olumukoro, J.O.; Anani, O.A. (2019): Evaluation of aquatic macro-invertebrate populations: a model for emergent bio-monitoring guide for quantifying uncleanness of some Rivers in Northern Central Nigeria. *Nigerian Journal of Technological Research* 14(2): 54-62. (in English) ["The objectives of this study are to examine the composition, abundance and distribution of benthic macroinvertebrate

communities, assess the health status and evaluate the spatial relationships of some selected Rivers. A total of 1251 individuals of macroinvertebrate taxa was recorded in this study. The percentage composition of the taxonomic groups obtained from the 22 stations were: Chironomidae (Diptera) (40.85%), Ephemeroptera (14.95%), Oligochaeta (9.83%), Amphibian (7.99%), Ceratopogonidae (Diptera) (7.11%), Mollusca (4.00%), Hemiptera (3.44%), Coleoptera (2.56%), Ostracoda (2.24%), Zygoptera (1.44%), Nematoda (1.12%), Decapoda (0.80%), Trichoptera (0.56%), Anisoptera (Odonata) (0.48%), Polychaeta (0.32%), Lipdoptera (0.08%) and Hydrachnidae (0.08%). The findings of this study indicated that Omeme, Kpansi Afara and Etsu rivers were classified as very poor category; exceeding the set benchmark. Etsu 11 and Afara Rivers were within the fair category. The Bray-Curtis indices revealed that there was similarity in all the stations Sustainable anthropogenic activities are recommended to avoid displacement of benthic communities." (Authors) ] Address: Olomukoro, J.O., Dept of Animal & Environmental Biology, Faculty of Life Science, University of Benin, Benin City, PMB 1154, Nigeria

**17244.** Ong'wen, F. (2019): Additive effects of dragonfly (*Pantala flavescens*) nymph and fungus (*Beauveria bassiana*) on development and survival of Malaria Mosquito (*Anopheles gambiae*). Thesis, Maseno University: (in English) ["Malaria continues to be a world-wide human health problem. Insecticide resistance challenge efficacy and sustainability of malaria control programs and therefore call for sustainable malaria control strategies. Environmental factors affect mosquito development and survival and should be considered when designing these strategies. However, there is limited knowledge on mosquito ecology, especially on interactions with predator such as *P. flavescens* nymph and parasite such as *B. bassiana* fungus across stages. This study focused on investigating additive effects of *P. flavescens* and *B. bassiana* on *Anopheles gambiae*. Specific objectives were to determine: predation efficacy of *P. flavescens* nymph against *A. gambiae* larvae; development rate of *A. gambiae* larvae reared in presence of varying densities of *P. flavescens* nymphs; efficacy of *B. bassiana* against *A. gambiae* larvae; and survival of adult mosquitoes exposed to fungus after predator and/or parasite pre-exposure at larval stage. All experiments consisted of survival bioassays quantified either as pupation day or dead larvae and adults. Mosquito eggs were obtained from The Center for Global Health Research, KEMRI; dragonfly nymphs from Ahero Irrigation Scheme, Kenya; and *B. bassiana* spores (IMI- 391510) provided by IN2CARE®, The Netherlands. Predation efficacy investigation involved four replicates of 30 larvae exposed to 1 dragonfly nymph. Development rate investigation involved exposing four replicates of 30 larvae to varying numbers (0-4) of constrained dragonfly nymphs. Four replicates of 30 larvae were exposed to varying spore concentration (0-12 mg) to determine fungal efficacy. Three replicates of 30 adults pre-exposed to predator and/or fungus were exposed to same fungus for adult survival. Predation efficacy test showed significant difference in mean number of dead larvae ( $Z=-12.667$ ,  $P<0.001$ ). Development rate test showed significant difference ( $P<0.001$ ) for groups exposed to 1 or 2 nymphs but

group exposed to 4 nymphs ( $P=0.227$ ) was not significantly different. Fungal efficacy test showed that larvae exposed to 3, 6 and 12 mg of fungus had HR, 2.0, 2.5 and 3.5, respectively. In adult survival test, adults not pre-exposed to any factor, those pre-exposed to predator, parasite or both predator and parasite had HR of 45.8, 67.4, 50.9 and 112.0, respectively. It is clear that single and additive effects of the predator and/or parasite affect mosquito development and survival, because it affects mosquito physiology and immunity. However, field studies should be done to prove consistency in the field. The knowledge can then be employed by Ministry of Health for malaria control in areas with *P. flavescens*." (Author)] Address: not stated

**17245.** Onishko, V.V. (2019): New records of dragonflies (Odonata) for Russia, with notes on the distribution and habitats of rare species. Eurasian Entomological Journal 18(3): 222-230. (in Russian, with English summary) ["29 dragonfly species from 8 regions of Russia are reviewed, of which two species, *Sympecma gobica* and *Gomphus schneiderii*, are recorded from the Russian Federation for the first time. Several species are newly recorded for the regions, namely: *Coenagrion ornatum*, *Aeshna crenata*, *A. subarctica*, *Somatochlora arctica*, *Libellula fulva*, *Sympetrum fonscolombii* and *S. striolatum* for Moskovskaya Oblast; *A. subarctica* and *Leucorrhinia caudalis* for Vladimirskaia Oblast; *Anax imperator* for Tverskaya Oblast; *A. ephippiger*, *Brachytron pratense* and *L. fulva* for Rostovskaya Oblast; *Coenagrion ponticum* and *G. schneiderii* for Krasnodarskii Krai and Republic of Adyghe; and *S. fonscolombii* for the Russian Far East." (Authors)] Address: Onishko, V.V., GAU Moscow Zoo, Dept of Herpetology, Bolshaya Gruzinskaya Str. 1, Moscow 123242 Russia. E-mail: wervolf999@yandex.ru.

**17246.** Orr, A.G.; Richards, S.J.; Toko, P.S. (2019): *Rhyacocnemis gassmanni* sp.n. (Odonata: Platycnemididae), a new idicnemidine damselfly from Papua New Guinea. Australian Entomologist 46(1): 33-42. (in English) ["A new species of *Rhyacocnemis gassmanni* sp. n. from Papua New Guinea, is described and illustrated from both sexes with notes on its habitat and habits. It represents the fourth species of an enigmatic genus, known from only a handful of specimens. The placement of the new species is problematical and is discussed." (Authors)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology & Management, Environmental Sciences, Griffith Univ., Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**17247.** Ortega-Salas, H.; González-Soriano, E. (2019): Odonata of the Cuatro Ciénegas Basin. In: Álvarez F. & M. Ojeda (eds) Animal Diversity and Biogeography of the Cuatro Ciénegas Basin. Cuatro Ciénegas Basin: An Endangered Hyperdiverse Oasis. Springer, Cham: 117-128. (in English) ["A summary of the present knowledge on the diversity of Odonata occurring in the Cuatro Ciénegas Basin (CCB) is presented. The work is based on published records, and the results from samplings are carried out between the years 2009 and 2013 in 23 sites. A list of the 67 Odonata species from the CCB is provided including 19 new state records.



Finally, the biogeographic affinities, conservation status, and major threats are discussed." (Authors)] Address: Ortega-Salas, H., Posgrado en Ciencias Biológicas, Univ. Nacional Autónoma de México Ciudad de México, Mexico. E-mail: hector\_os@ciencias.unam.mx

**17248.** Oteman, B.; de Vries, H.H. (2019): Beoordeling van habitatkwaliteit op basis van satellietdata: een pilot met de groene glazenmaker. Rapport VS2019.029, De Vlinderstichting, Wageningen: 30 pp. (in Dutch) ["The rare *Aeshna viridis*, is strongly dependent on the water plant, crabbush. In order to gain more insight into the availability of suitable habitat for the green hawker, this pilot project analyses satellite images for two South Holland polders: Polder Kromme, Geer and Zijde and Polder Nesse. In different satellite images, from 2014, 2017 and 2019, a search for crabgrass was carried out. For this purpose, a spectral profile of crabgrass was drawn up through fieldwork. This profile was then applied to the satellite images. The prediction based on the 2019 satellite image was then validated in the field. This showed that crabgrass, under favourable conditions, can be determined with a 93% accuracy. The best period to use satellite images to detect crabgrass is June-July. For brown crabgrass this is the first half of September. Applying the calculated spectral profile to other satellite images showed that depending on the sensor of the satellite an additional calculation step might be necessary (further calibration). The method with a spectral analysis seems to offer more than enough perspective to be applied in other areas. However, this will require some calibration, possibly through additional field visits. The spatial comparison between 2014, 2017 and 2019 shows that the decline in crabgrass is not spatially clustered. The problem is not limited to a few watercourses or plots, the decline is area-wide." (Authors) Translated with www.DeepL.com/Translator (free version)] Address: not stated

**17249.** Ott, J. (2019): Libellen als Indikatoren für eine Flussrenaturierung – Ergebnisse der dritten Erfolgskontrolle an der Oster (Insecta: Odonata). *Libellula Supplement* 15: 147-162. (in German, with English summary) ["Dragonflies as indicators of the restoration of the river Oster – results of the third success-control-study (Insecta: Odonata) – After 1991, 1996, and 2003, a 4 km long restored stretch of the river Oster (German federal state "Saarland") was investigated for a third time in 2017 and 2018 regarding the dragonfly fauna. This study was part of a so called "Entwicklungs- und Erprobungsvorhaben" (Development and testing project) of the German Federal Agency for Nature Conservation (BfN). The increase of dragonfly diversity and abundances in 1996 and 2003, which was regarded as a success of the restoration project although typical anisopteran species of running waters had not yet appeared, could not be confirmed in the more recent study. *Calopteryx virgo* was the only species of running waters present in a considerable population. The reasons for the present deficiency is the still existing waste water pollution, the impact of fine organic material, as well as the lack of morphodynamics, the effects of the dense riparian alder vegetation, and the immigration of the invasive signal crayfish. Finally, measures for ecological improvement are proposed." (Author) Address: Ott, J.,

L.U.P.O. GmbH, Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**17250.** Ožana, S.; Burda, M.; Hykel, M.; Malina, M.; Prášek, M.; Bárta, D.; Dolný, A. (2019): Dragonfly Hunter CZ: Mobile application for biological species recognition in citizen science. *PLoS ONE* 14(1): e0210370. <https://doi.org/10.1371/journal.pone.0210370>: 13 pp. (in English) ["Citizen science and data collected from various volunteers have an interesting potential in aiding the understanding of many biological and ecological processes. We describe a mobile application that allows the public to map and report occurrences of the Odonata species found in the Czech Republic. The application also helps in species classification based on observation details such as date, GPS coordinates, and the altitude, biotope, suborder, and colour. Dragonfly Hunter CZ is a free Android application built on the open-source framework NativeScript using the JavaScript programming language which is now fully available on Google Play. The server side is powered by Apache Server with PHP and MariaDB SQL database. A mobile application is a fast and accurate way to obtain data pertaining to the Odonata species, which can be used after expert verification for ecological studies and conservation basis like Red Lists and policy instruments. We expect it to be effective in encouraging Citizen Science and in promoting the proactive reporting of odonates. It can also be extended to the reporting and monitoring of other plant and animal species." (Authors)] Address: Dolný, A., Dept of Biology & Ecology, Faculty of Science, Univ. of Ostrava, Ostrava, Czech Republic. E-mail: ales.dolny@osu.cz

**17251.** Pahari, P.R.; Mandal, S.S.; Maiti, S.; Bhattacharya, T. (2019): Diversity and community structure of Odonata (Insecta) in two land use types in Purba Medinipur District, West Bengal, India. *Journal of Threatened Taxa* 11(6): 13748-13755. (in English) ["The present study recorded a total of 45 species of Odonata, of which one species, *Ischnura mildredae*, was recorded for the first time from West Bengal in India. 38 species were found in Tamluk Municipality as compared to 21 species in Haldia Industrial Belt (IB), with 14 species common to both the localities. Index of similarity revealed that the two localities were slightly dissimilar in odonate faunal composition as only 47% of species were shared. In both the localities, Anisoptera was more abundant, comprising over 69% of the total odonates. Libellulidae was the most abundant Anisopteran family in both the localities, comprising over 66% of the total odonates. Coenagrionidae was the most abundant Zygopteran family in both the localities. 13 species of Anisoptera and 11 species of Zygoptera were found only in Tamluk whereas two species of Anisoptera and five species of Zygoptera were found only in Haldia IB. *Crocothemis servilia*, *Pantala flavescens*, and *Ceriagrion coromandelianum* were the dominant species in Tamluk while *Brachythemis contaminata* and *Orthetrum sabina* were the dominant species in Haldia IB. Based on the values of Shannon index, Tamluk was considered unpolluted (=3.16) and Haldia IB moderately polluted (=2.43). Higher equitability index (J=0.87) and very low dominance index (0.06) in Tamluk indicated homogeneity in community composition and relatively

stress-free equitable environment. The present investigation suggests that Odonata can be used as bioindicators of industrial pollution." (Authors)] Address: Pahari, P.R., Dept Zoology, Tamralipta Mahavidyalaya, Tamluk, Purba Medinipur, West Bengal 721636, India

**17252.** Palacino-Rodriguez, F.; Rache Rodríguez, L.; Castillo, D.R. (2019): Description of the last stadium larva of *Erythrodiplax abjecta* (Anisoptera: Libellulidae) from the eastern Colombian Andes. *Zootaxa* 4545(1): 139-145. (in English) ["The final stadium larva of *E. abjecta* is described and illustrated based on reared and field collected specimens from Colombia." (Authors)] Address: Palacino-Rodriguez, F., Grupo de Investi. en Biología (GRIB), Depto Biol., Univ. El Bosque Av. Cra. 9 No. 131<sup>a</sup>-02, Colombia. E-mail: odonata17@hotmail.com

**17253.** Parr, A. (2019): Migrant and dispersive dragonflies in Britain during 2018. *J. Br. Dragonfly Society* 35(2): 48-60. (in English) ["In the UK, 2018 will go down as one of the most spectacular years in modern history for migrant and dispersive dragonflies. *Somatochlora flavomaculata* was recorded as new to Britain when a male was photographed at Carton Marshes near the Suffolk coast on 2 July, while only the fourth ever record of *Leucorrhinia pectoralis* was made elsewhere in Suffolk on 27 May. As well as these great rarities, large scale arrivals of many of the currently less unusual migrant species were also reported, though *Sympetrum fonscolombii* had a rather more low-key year. *Anax ephippiger* appeared in numbers during October and was even seen ovipositing, while it was the second best year ever for *Anax parthenope* in the UK with records from over 40 sites. A substantial arrival of *Aeshna affinis* was noted in southern England during July and early August, and *A. isocetes* also produced a number of unexpected sightings away from breeding sites. Most notable of these was a record from the Exminster Marshes, Devon, on 12 July. In addition to these migratory movements, significant internal dispersal by species such as *Orthetrum caerulescens* was seen during the year. Many of our recent colonist damselflies also had a productive season. *Erythromma viridulum* was noted on the Lizard Peninsula in Cornwall during early July, some 100 km away from previously known UK sites for the species and thus perhaps indicative of a fresh immigration event. Continued immigration by *Lestes barbarus* was also detected during 2018, while the first ever inland breeding site for the species was discovered in Buckinghamshire." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk, IP29 5BX, UK

**17254.** Pastorino, P.; Bertolia, M.; Squadrone, S.; Brizio, P.; Piazza, G.; Oss Noser, A.G.; Prearo, M.; Cesarin, M.; Pizzul, A.E. (2019): Detection of trace elements in freshwater macrobenthic invertebrates of different functional feeding guilds: A case study in Northeast Italy. *Ecohydrology & Hydrobiology* 19(3): 428-440. (in English) ["Trace elements are common contaminants in aquatic ecosystems; their detection in biota yields information on their availability in the environment and provides an indirect indication of freshwater ecological status. We analyzed samples of freshwater macrobenthic invertebrates from six watercourses in Friuli Venezia-Giulia

(Northeast Italy) to verify whether trace elements accumulation is related to their ecological status sensu Water Framework Directive (WFD), and to determine tropic level influences on the accumulation of 18 trace elements in macrobenthic communities. Observed concentrations could be in line with results of ecological status assessment defined by the WFD, in fact two sites classified as "Moderate" had the highest trace elements content. The genus *Calopteryx* (predator) was positively correlated with Be, Cr, Fe, Mn, Mo, Ni, Sn, and V (S range 0.777–0.844). Positive correlations were also determined for the genus *Rhyacophila* (Trichoptera, predator) with Cu (?S = 0.757), suggesting bioaccumulation in macroinvertebrate tissue. Ephemeroptera of the genus *Caenis* (collector-gatherers) were positively correlated with Be, Fe, Mn, Pb, Sb, and V (ps range 0.757–0.802), indicating that ingestion of sediment is the most effective uptake of these metals. Results of this study, albeit preliminary, showed that trace elements detection in aquatic macrobenthic invertebrates is a useful analysis for obtaining information about the status of freshwater course. Our study provides evidence for a greater accumulation of trace elements in predators and collector-gatherers, suggesting that the tropic level of macrobenthic communities influence the accumulation of trace elements." (Authors)] Address: Pastorino, P., Istituto Zooprofilattico Sperimentale del Piemonte, Liguria e Valle d'Aosta, via Bologna 148, 10154 Torino, Italy. E-mail: paolo.pastorino@izsto.it

**17255.** Patel, S. (2019): Proteins: Sustainable source, processing and applications. Chapter 2 - Insects as a Source of Sustainable Proteins: 41-61. (in English) ["Ensuring nutritious food for the ever-growing world population is one of the foremost challenges. As pressure on land and water is mounting, these resources are getting depleted in alarming manner. So, energy and resource-efficient ways of food productions are being searched for. In this regard, insects, the members of phylum Arthropoda, appear very promising as their life cycle is short while turnover rate and biomass conversion rate are high. Entomophagy, the practice of ingesting insects, is an ancient way of feeding but it has mostly been confined to poorer economic strata. Not all, but certain insects such as bees, termites, ants, caterpillars, water bugs, flies, beetle larvae, crickets, grasshoppers, katydids, cicadas, and dragonflies are rich in proteins, fat, and minerals, are nontoxic, and are free of offensive aftertaste. These insect members are candidates for staple human foods. However, food neophobia and the lack of safety assurance are barriers that need to be surmounted before insects become a popular food item. Adequate research and public perception change regarding entomophagy can eradicate food insecurity, while causing a low ecological footprint. This chapter reviews the available literature on edible insects, presents the latest developments in this field, discusses their scope to food security, and proposes the pros and cons of this emerging food trend." (Author)] Address: Patel, Seema, Bioinformatics & Medical Informatics Research Center, San Diego State Univ., San Diego, CA, USA

**17256.** Pattanayak, A.; Pahari, P.R.; Deen, S.Y. (2019): Diversity and abundance of Odonata larvae in a fresh water lentic system of Purba Medinipur District, West Bengal, India.

Journal of Pharmacognosy and Phytochemistry 2019; SP5: 32-36. (in English) ["In total 19 species of Odonata larva have been recorded from a weed infested manmade Freshwater large lentic system near Tamluk, West Bengal (22017'52.56"N, 87055'16.72"E), India. Libellulidae were numerically the most abundant group comprising 66.04 % of the total Odonata larva followed by Coenagrionidae (31.92%) and Gomphidae (2.04%) respectively. Libellulidae represented by 12 species while Coenagrionidae represented by only 6 species and Gomphidae was represented by only one species. Urothemis and Rhodothemis were largest and lowest number of individuals recorded respectively. The water quality was fairly good during the 11 month study period of 2017-18. Various diversity indices were calculated in different seasons and the result shows maximum diversity and abundance during post-monsoon and minimum was in pre-monsoon. Diversity and evenness indices were fluctuated during study period due to seasonal changes of environmental conditions." (Authors)] Address: Pattanayak, A., PG, Dept Zool., Magadh Univ. Bodh-Gaya, Gaya, Bihar, India

**17257.** Pawlak, S. (2019): New habitats of the Green Hawker *Aeshna viridis* EVERSMANN, 1836 (Odonata: Aeshnidae) in the Upper Proсна Valley (Wieruszów Upland). *Odonatrix* 15\_6 (2019): 7 pp. (in Polish, with English summary) ["The article describes hitherto unrecorded habitats of *A. viridis*. This species, strictly protected in Poland, is observed mainly in the northern part of the country. The two new localities – a peat pool (UTM: CB07) and an oxbow (CB16) – are in the Upper Proсна Valley near Łubnice (Łódź Province); they were recorded in 2018. Both support a great abundance of Water Soldier *Stratiotes aloides*. Two-three territorial males and one-two ovipositing females were observed at each site; one exuvium was found by the peat pool. These are the first records of this species in central Poland. All the photographs of the sites and species are by the author." (Author)] Address: Pawlak, S., ul.Konopnickiej 15, 98-400 Wieruszów, Poland. E-mail: slawieru@in-tertia.pl

**17258.** Payra, A.; Dash, S.K.; Udgata, G.; Pati, N.N.; Mishra, R.K.; Sahu, H.K.; Patra, B.K. (2019): A preliminary investigation on Odonata fauna in Sunabeda Wildlife Sanctuary, Nua-pada, Odisha, India. *NeBio* 10(1): 17-22. (in English) ["The first faunistic record of Odonata in Sunabeda Wildlife Sanctuary is being presented here. 8 days of opportunistic sampling and photo documentation were conducted, in selected areas of SWLS during March 2016. The present inventory yielded a total of 38 odonate species belonging to 29 genera and 6 families. Libellulidae, with 22 species was found to be dominated. Records of *Agriocnemis kalinga* Nair & Subramanian, 2015; *Elatoneura nigerima* Laidlaw, 1917 and *Gomphidia t-nigrum* Selys, 1854 were significant as far as their distribution concerned." (Authors)] Address: Payra, A., Dept of Wildlife & Biodiversity conservation, North Orissa University, Odisha, India. E-mail: arajushpayra@gmail.com

**17259.** Payra, A. (2019): New record of andromorphic *Urothemis signata* Rambur (Odonata: Libellulidae) from India. *Revista Chilena de Entomología* 45(4): 643-645. (in English, with Spanish summary) ["First case of an andromorphic

female of *U. signata* from eastern India is presented. Detail comparisons of the andromorphic female with mature male and female of this species are given." (Author)] Address: Payra, A., Dept of Wildlife & Biodiversity Conservation, North Orissa University, Mayurbhanj, Odisha, India. E-mail: arajush-payra@gmail.com

**17260.** Payra, A.; Tiple, A. D. (2019): Odonata fauna in adjoining coastal areas of Purba Medinipur District, West Bengal, India. *Munis Entomology & Zoology* 14(2): 358-367. (in English) ["The Present study was carried out to reveal the odonate diversity in adjoining coastal areas of Purba Medinipur District, West Bengal, India. Study was carried out from January 2014 to January 2018. During the study period a total of 49 species belonging to 35 genera and 7 families were recorded, including addition of 24 species representing 20 genera and 6 families for the district. The maximum number of odonates were found in Libellulidae (n=27 species), followed by Coenagrionidae (n=12), Aeshnidae (n=4), Lestidae (n=2), Platycnemididae (n=2), Gomphidae (n=1) and Macromiidae (n=1). Among the 4 selected study sites, the highest number of odonate species was observed in S3 (n= 39) and lowest in S1 (n= 21). Out of the 49 Odonates recorded from the district, 48 species come under the IUCN Red List of Threatened Category. Among them 45 species come under Least Concern (LC) Category, three species under Data Deficient (DD) and one species Not evaluated... Expansion of urbanization in such adjacent coastal areas is a matter of concern. As expansion of urbanization causing loss of natural and semi natural habitats of odonates, as well as the residual habitat quality may have adversely affected by various forms of pollutants..." (Authors)] Address: Payra, A., Dept of Wildlife & Biodiversity Conservation, North Orissa University, Takatpur, Baripada-757003, Odisha, India. E-mail: arajushpayra@gmail.com

**17261.** Payra, A. (2019): Andromorphic *Crocothemis servilia* (Drury) (Odonata: Libellulidae): new records from India. *Revista Chilena de Entomología* 45(4): 699-703. (in English, with Spanish summary) ["Six new records of andromorphic *C. servilia* from Eastern India are described here. Detail comparisons of the andromorphic female with mature male and female of this species are given." (Author)] Address: Payra, A., Dept of Wildlife & Biodiversity Conservation, North Orissa University, Mayurbhanj, Odisha, India. E-mail: arajush-payra@gmail.com

**17262.** Perez-Gutierrez, L.A. (2019): *Dactylobasis* gen. nov. from Colombia, a new genus of Zygoptera with *Teinobasini* affinities (Odonata: Coenagrionidae). *Zootaxa* 4656(2): 232-242. (in English) ["A new monobasic genus *Dactylobasis* is erected for *D. demarmelsi* sp. nov. (Holotype ♂, COLOMBIA, Chocó Department, Salero 05°19'01" N 76°36'52" W, alt. 129m, 10 VIII 2005. L. A. Pérez leg. UARC), is described and illustrated. The new genus is considered a member of the *Teinobasini* by the presence of an articulated ventral spur at the base of cercus in male. Generic characters are: mesanepisternum entirely metallic green, each with a horn in both sexes, propleuron laterally swollen with a spinulose



conical posterior projection; male paraproct long with ventral branch at half of its length. *Dactylobasis demarmelsi* is probably endemic to the Biogeographic province of Chocó." (Author)] Address: Perez-Gutierrez, L.A., Lab. de Sistemática de Insetos Aquáticos (LABSIA), Univ. Federal do Paraná, Jardim das Américas, Curitiba, PR, Brasil. E-mail: leonperez@mail.uniatlantico.edu.co

**17263.** Petzold, F. (2019): Die Kleine Zangenlibelle (*Onychogomphus forcipatus*) und die Pokaljungfer (*Erythromma lindenii*) an der Oberen Saale (Insecta: Odonata). Thüringer Faunistische Abhandlungen 24: 73-80. (in German, with English summary) ["The current state of knowledge on the occurrence of *O. forcipatus* in Thuringia is briefly described, the occurrence of this species together with *E. lindenii* on the Upper Saale river is reported. Exuviae of *O. forcipatus* found at this river section in 2019 provide the first evidence of the successful development of this species in Thuringia. Based on an increasing number of observations of imagoes in recent years in different regions of Thuringia, it can be assumed that *O. forcipatus* is currently in a phase of expansion." (Author)] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. E-mail: falk\_petzold@web.de

**17264.** Phan, Q.T.; To, V.D.; Trinh, D.M.; Dinh, V.K. (2019): Description of *Protosticta binhi* sp. n. from the Central Highlands of Vietnam (Odonata: Zygoptera: Platystictidae). International Journal of Odonatology 22(3-4): 199-206. (in English) ["*Protosticta binhi* sp. n. is described from the Central Highlands of Vietnam (holotype ♂: Vietnam, Gia Lai Province, K'Bang District, Dak Roong Commune, Dak Hro village, 14.36611° N, 108.4103° E, 1130 m asl, 22 May 2018, T.odo. 22051810, Zoological Collection of Duy Tan University). The new species can be easily distinguished from all other *Protosticta* species by the combination of huge body size, birdhead shape of cerci and paraprocts broad and apically armed with several sharp subapical projections in the male, and the anterior pronotal lobe of the prothorax well developed in the female." (Authors)] Address: Phan, Q.T., Center for Entomology & Parasitology Research, Institute of Research & Training of Medicine, Biology & Pharmacy, Duy Tan University, Da Nang City, Vietnam. E-mail: pqtoan84@gmail.com

**17265.** Phan, Q.T.; To, V.Q.; Payra, A. (2019): First record of *Indolestes cyaneus* (Selys, 1862) from Vietnam and notes on its color variation (Odonata: Zygoptera: Lestidae). Zootaxa 4571(3): 409-416. (in English) ["First record of *I. cyaneus* from Vietnam with providing illustrations of its detailed structures, as well as notes on the coloration of the populations from Taiwan, Nepal and India." (Authors)] Address: Phan, Q.T., Center for Entomology & Parasitology Research, Inst. Res. & Training of Medicine, Biol. & Pharmacy, Duy Tan Univ., 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

**17266.** Phan, Q.T. (2019): *Coeliccia lecongcoi* sp. nov., a new damselfly from the Central Highlands of Vietnam (Odonata: Zygoptera: Platycnemididae). Zootaxa 4551(4): 471-478. (in English) ["*Coeliccia lecongcoi* sp. nov. (holotype ♂, 15.147 N, 107.752 E, Ngoc Linh Nature Reserve, Kon Tum

Province, the Vietnamese Central Highlands) is described and illustrated from both sexes. The new species is allied to *C. duytan* Phan, 2017 and *C. hayashii* Phan & Kompier, 2016 but differs by the synthoracic pattern and structure of the appendages and genital ligula of the male and the posterior pronotal lobe of the prothorax of the female." (Author)] Address: Phan, Q.T., Center for Entomology & Parasitology Res., Institute of Research & Training of Medicine, Biology & Pharmacy, Duy Tan Univ., 3 Quang Trung, Da Nang city, Vietnam. E-mail: pqtoan84@gmail.com

**17267.** Phan, Q.T.; To, V.Q. (2019): Description of new damselfly *Coeliccia schorri* sp. n. (Odonata: Zygoptera: Platycnemididae) with a discussion of the *Coeliccia hayashii*-group in Vietnam. International Journal of Odonatology 22(1): 11-20. (in English) ["*Coeliccia schorri* sp. n. is described based on both sexes (holotype male from Dak Roong Commune, K'bang district, Gia Lai province, central highlands of Vietnam). The combination of the characters of a large pruinose spot on the synthorax, blue abdominal tip, and white appendages in the male and a long spine on the posterior pronotal lobe of the prothorax in the female help distinguish it from all other *Coeliccia* species. The *Coeliccia hayashii*-group, remarkable for the pruinose markings on the male prothorax and synthorax in combination with the structure of the genital ligula which is bifurcated from the base into two long flagella, is discussed." (Authors)] Address: Phan, Q.T., Center for Entomology & Parasitology Research, Institute of Research & Training of Medicine, Biology & Pharmacy, Duy Tan University, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

**17268.** Pineiro Alvarez, X. (2019): Primera cita de *Paragomphus genei* (Selys, 1841) (Odonata, Gomphidae) para la provincia de Ciudad Real (Castilla-La Mancha, España). Boletín de la Sociedad Entomológica Aragonesa 65: 231-232. (in Spanish, with English summary) ["The first record of *P. genei* from Ciudad Real province and second from Castilla-La Mancha region (Spain) is provided." 9-VI-2019, Villarrubia de los Ojos (Ciudad Real) (30S VJ44 y 30S VJ43, a 610 msnm)] Address: Piñeiro Álvarez, X., Revolta 2, Noalla. 36990 Sanxenxo. Pontevedra, Spain. E-mail: xurxolusitanica@gmail.com

**17269.** Piretta, L.; Assandri, G. (2019): First record of the migrant dragonfly *Pantala flavescens* for mainland Italy (Insecta: Odonata). Fragmenta entomologica 51(2): 247-250. (in English) ["In this contribution we report the observation of an individual of the migrant dragonfly *P. flavescens* found at Montanaro (Piemonte, Italy) on 14 Aug 2019. This represents the first record of the species for mainland Italy and one of the very few available for Western and Central Europe before 2019. We discuss two hypotheses on the origin of this individual integrating available literature with very recent records retrieved from citizen science faunistic platforms." (Authors)] Address: Piretta, Lorenza, 1 Via Valle Balbiana 33/1, I-10025, Pino Torinese (TO), Italy. E-mail: lo-renza.piretta@gmail.com

**17270.** Polovic, L.; Miliša, M.; Dražina, T.; Špoljar, M. (2019): The role of dragonflies as the peak predators and indicators

of the health of the Mediterranean ponds. Simpozij o biologiji slatkih voda (SOBS). Zagreb, Hrvatska, 15.02.2019: (in English) [Verbatim: Mediterranean freshwater ponds are specific, sometimes man-made freshwater habitats on islands and coast. Since they're mainly isolated freshwater habitats in the arid and marine environment, they represent precious habitats with high freshwater species diversity. They are sensitive to weather and detrimental human effects due to their properties (e.g. small volume, low depth, karst base, proximity to the sea). These ponds undergo washing of nutrients, toxins and soil from surrounding areas, salinization, water level fluctuations and are often semi-permanent or temporary. Benthic macroinvertebrates are sentinel indicators of water ecological state as well as changes therein. Thus, across the Dugi otok island macroinvertebrates in 10 ponds were sampled. For productivity assessment, head capsule width was measured and 13 instars were distinguished and separated. Benthic community was comprised of 41 taxa of which the top predators - dragonflies were dominant, in biomass and in abundance. Therefore, further research was focused on dragonflies, specifically genera *Sympetrum* and *Anax*. Their presence differed among ponds, depending on the macrophyte coverage, salinity and the dragonfly prey size in the pond. *Sympetrum fonscolombii* was the most abundant species, with the highest biomass and thus it was the best choice for life cycle study. Taking into account the broad taxonomic structure of the benthic community, its trophic composition, and standing stock biomass of the top predator these habitats (although in a rather high trophic state) indicated healthy and stabile ecosystems. Hence, we encourage further protection and research of these curious and precious habitats.] Address: Maria Špoljar: maria.spoljar@biol.pmf.hr

**17271.** Poma, G.; Liu, Y.; Cuykx, M.; Tang, B.; Luo, X.-J.; Covaci, A. (2019): Occurrence of organophosphorus flame retardants and plasticizers in wild insects from a former e-waste recycling site in the Guangdong province, South China. *Science of The Total Environment* 650: 709-712. (in English) ["Highlights: •Large quantities of e-waste are generated worldwide and often inappropriately dismantled. •Occurrence of PFRs was investigated in wild insects from an e-waste recycling site (China). •TEHP was the most abundant PFR, followed by TPHP, TCIPP, TCEP, EHDPHP and TCP. •Odonata were more contaminated, followed by Lepidoptera, Orthoptera, Hemiptera, Coleoptera. •PFR contamination patterns could be explained by insect habitats and feeding habits. Abstract: Due to the fast growth of the electronic industry, a large quantity of electronic waste (e-waste) is generated worldwide and then often inappropriately dismantled and disposed of. In a pilot study, the occurrence of organophosphorus flame retardants and plasticizers (PFRs) was investigated for the first time in several wild insect species collected from a former e-waste recycling site in the Guangdong province, South China. TEHP was the most abundant PFR (average concentration of 5.8 ng/g ww), followed by TPHP (2.5 ng/g ww), TCIPP (2.2 ng/g ww), TCEP (0.8 ng/g ww), EHDPHP and TCP (both 0.1 ng/g ww). Dragonfly nymphs were the most contaminated insects, with total PFR concentrations of 68 ng/g ww, followed by moth adults (26? g/g ww) and terrestrial stinkbug (17 ng/g ww). The different contamination patterns observed in the analyzed insects could

be explained by their different habitats and feeding habits. This study shows that e-waste recycling areas can be an important local source of contamination with PFRs, mainly caused by inadequate recycling activities." (Authors)] Address: Covaci, A., Toxicol. Center, Univ. Antwerp, Universiteitsplein 1, 2610 Wilrijk, Belgium. E-mail: adrian.covaci@uantwerpen.be

**17272.** Poschmann, M.; Nel, A.; Schindler, T. (2019): Erster Nachweis von Riesen-Urilibellen (Odonatoptera: Meganisoptera: Meganeuridae) im Permokarbon des Saar-Nahe-Beckens (Rheinland-Pfalz, SW-Deutschland). *Mainzer naturwissenschaftliches Archiv* 56: 71-86. (in German, with English summary) [First record of giant griffenflies (Odonatoptera: Meganisoptera: Meganeuridae) in the Permocarboniferous of the Saar-Nahe Basin (Rhineland-Palatinate, SW-Germany). A wing fragment from lake deposits of the Meisenheim Formation (Lower Rotliegend, Autunian) near Obermoschel is the first record of giant griffenflies for the Permo-Carboniferous of the Saar-Nahe Basin. With a reconstructed wing span of at least 60 centimetres the animal was comparable in size to the iconic *Meganeura monyi* from the Stephanian of Commeny/France and is currently the largest known insect from Germany. The increased partial pressure of oxygen in the Upper Carboniferous to mid-Permian is discussed as a possible factor controlling the maximum size of griffenflies. The palaeoenvironment of Lake Obermoschel was characterized by large lakes and fluvial systems that provided the open spaces preferred by meganeurids, which were probably agile hawk predators." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrns1.mnhn.fr

**17273.** Prabhakaran, P.V.; Aravindan, T. (2019): Influence of water on Odonates in the paddy fields of Kannur district, Kerala. *International Journal of Advance Research, Ideas and Innovations in Technology* 5(4): 268-271. (in English) ["3 rice fields in Kannur district were selected for the Odonate study: (1) Okra Vayal at Cheruthazham (FWPF), (2) Munda-puram Vayal at Cherukunnu (CPF), and (3) Hariitha Sangam Paddy field at Madayippara (MLHPF)." (Authors)] Address: Prabhakaran, P.V., Sree Narayana College, Kannur, Kerala, India. E-mail: prabharamanthali@gmail.com

**17274.** Rae, J.; Murray, D. (2019): Pathogen vs. predator: ranavirus exposure dampens tadpole responses to perceived predation risk. *Oecologia* 191(2): 325-334. (in English) ["There is increasing interest in how animals respond to multiple stressors, including potential synergistic or antagonistic interaction between pathogens and perceived predation risk (PPR). For prey that exhibit phenotypic plasticity, it is unclear whether infection and PPR affect behaviour and morphology independently, or in an antagonistic or synergistic manner. Using a 2 × 2 factorial experiment involving green frog (*Lithobates clamitans*) tadpoles exposed to ranavirus (FV3) and larval *Anax* spp., we assessed whether anti-predator responses were affected by infection. We found that activity and feeding were reduced additively by both stressors. Body mass of tadpoles from FV3-exposed tanks was lighter relative to control and PPR-only tanks, while metabolism was comparable

across treatments. We found that FV3 exposure compromised morphometric responses to PPR in an antagonistic manner: tadpoles exposed to both treatments had restricted changes in tail depth compared to those receiving singular treatment. We conclude that multiple stressors can have complex and substantive effects on organisms, and that interactions between stressors may yield a range of responses depending on the level of exposure and sensitivity of the organism. Additional work should more fully determine mechanisms underlying the complex interplay between infection and predation risk, across a range of environmental conditions." (Authors)] Address: Rae, J., Environmental & Life Sciences Program, Trent Univ., Peterborough, Canada

**17275.** Rahman, T.; Shoma, S.F.; Feeroz, M.M.; Hasan, K. (2019): Food and feeding behaviour of Chestnut-tailed Starling, *Stumia malabarica* at Jahangirnagar University Campus, Bangladesh. *Jahangirnagar University Journal of Biological Sciences* 8(1): 17-23. (in English) ["Food and feeding behaviour of Chestnut-tailed Starling, *Stumia malabarica* were studied at Jahangirnagar University Campus, Bangladesh, from August 2016 to March 2017. A total of 414 observations were made on the feeding maneuver and it was noted that they were omnivorous consuming 67.15% animal diet compared to 20.53% plant diet. They predominantly consumed insect larvae (39%) followed by beetles (16%), nectar (14%), food wastes (12%), fruits (7%), dragonflies (7%), damselflies (3%), and worms (2%). (Authors)] Address: Rahman, T., Dept of Zool., Jahangirnagar Univ., Savar, Dhaka-1342, Bangladesh

**17276.** Rajapaksha, S.; Kandambi, H.K.D.; Dayawansa, P.N. (2019): Comparison of Faunal Wealth of a Selected Oil Palm Plantation and a Rubber Plantation in the Wet Zone of Sri Lanka. *Proceedings of the 24th International Forestry and Environment Symposium 2019 of the Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Sri Lanka*: 61. (in English) ["A rapid increase in oil palm plantations has been evident in the low country wet zone of Sri Lanka as it is an economically profitable crop. Nevertheless, oil palm receives an immense resistance by the public claiming diminution of the water table and biodiversity wealth. Rubber plantations, which are often replaced by oil palm are claimed to be more environmentally friendly than oil palm plantations. The current study was designed to reveal the faunal wealth of selected oil palm plantations (OPP) and rubber plantations (RP) with reference to microclimatic conditions. It was hypothesized that there is no difference in faunal wealth of OPP and RP as measured by species richness, abundance and diversity indices. Three OPP and two RP in Agalawatta (N 6° 32' 50" E 80° 14' 01"-N 6° 32' 50" E 80° 13' 55") were selected for the study. Species richness and abundance of selected faunal groups were determined with reference to environmental factors (ambient temperature, relative humidity, soil moisture, litter depth, light intensity and canopy cover) from March to September 2018. Species richness and abundance of invertebrates (butterflies and dragonflies) and vertebrates (amphibians, reptiles, birds and mammals) were studied using line transects, circular plot counts, visual encounter survey technique, quadrat cleaning technique, live trapping

and hair tube sampling. Shannon-Weiner Diversity Index (H) was determined for different faunal groups inhabiting OPP and RP. Soil moisture content in OPP was significantly higher than that of RP (t-test  $p < 0.05$ ) while litter depth was significantly higher in RP ( $p < 0.05$ ). Ambient temperature, relative humidity, light intensity and canopy cover did not differ significantly between the two plantations. Species richness of fauna of OPP and RP were 54 (Endemic 16) and 30 (Endemic 5) respectively. Vertebrate diversity did not differ significantly between OPP ( $H = 2.68$ ) and RP ( $H = 2.53$ ), however, invertebrate diversity of OPP ( $H = 2.26$ ) was significantly higher than that of RP ( $H = 0.95$ ) (t-test  $p < 0.05$ ). Diversity of birds and reptiles were higher in RP than OPP while diversity of amphibians and small mammals were higher in OPP. Rare point endemic bush frog *Polypedates ranwellai* was found in oil palm plantations, which is considered as a range extension. This preliminary study revealed that overall faunal wealth of oil palm plantations is slightly higher than that of rubber plantations and this could be attributed to the availability of microhabitats." (Authors)] Address: not stated

**17277.** Reels, G.T. (2019): An annotated check list of Hong Kong dragonflies and assessment of their local conservation significance. *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 30: 1-49. (in English) ["Dragonflies were surveyed at 33 sites across the territory of Hong Kong Special Administrative Region over the period 2016-2017. Surveys included identification of larvae, exuviae and adults, and involved 92 separate site visits. The chosen sites covered the whole spectrum of dragonfly habitats in Hong Kong, with the exception of actively managed fish ponds and reservoirs. 22 of the study locations had been identified as key dragonfly sites by Wilson (1997a). An annotated check list of Hong Kong Odonata was compiled, listing 128 taxa. Comparison of local distribution of dragonflies during the present study with that recorded by Wilson (1997a) indicated that only three species had undergone significant decline in the intervening two decades, while several others (including the conservation significant *Mortonagrion hirosei* Asahina, 1972 and *Orthetrum poecilops* Ris, 1919) had considerably extended local distributions. 28 species of particular conservation importance for Hong Kong were identified and ranked, using a species conservation value assessment metric." (Author)] Address: Reels, G.T., 31 St Anne's Close, Winchester, SO22 4LQ, UK. Email: greels@gmail.com

**17278.** Rehage, H.-O.; Rudolph, R. (2019): Ein weiterer Fund der Sibirischen Winterlibelle (*Sympecma paedisca*) aus Westfalen. *Natur und Heimat* 79(1): 40. (in German) [*S. paedisca*, ♀, NSG Großes Heiliges Meer (bei Hopsten), Nordrhein-Westfalen, Germany, leg. H.J. Reichling, 27.5.1953] Address: Rehage, H.-O., Rinkerodeweg 31, 48135 Münster, Germany

**17279.** Rehman, A.; Ahmad, S.; Zia, A.; Latif, A.; Khan, T.; Afzaal, M.; Kamal, W.; Khan, S.; Tariq, H. (2019): Damselflies (Odonata: Zygoptera) fauna of district Swabi Khyber Pakhtunkhwa, Pakistan. *Journal of Entomology and Zoology Studies* 7(2): 190-193. (in English) ["Study was conducted to explore the damselflies fauna of District Swabi KP (Khyber



Pakhtunkhwa) Pakistan. A total of 238 adult damselflies were collected from 19 localities of the district during the summer seasons of 2015 and 2016. The result revealed 13 species, 10 genera under 5 families. The abundant family was recorded as Coenagrionidae with 7 species and 5 genera viz, *Rhode Ischnura* Morton, *Ischnura aurora rubilio* Selys, *Ischnura forcipata* Morton, *Ceriagrion coromandelianum* Fabricius, *Pseudagrion rubriceps* Selys, *Pseudagrion hypermelas* Selys, *Agriocnemis pygmaea* Rambur, followed by Family Chlorocyphidae with 3 species and 2 genera viz, *Libellago lineata lineata* Burmeister, *Rhinocypha trifasciata* Selys, *R. quadrimaculata* Selys while other families i.e Calopterygidae, Protoneuridae and Euphaeidae were represented by single species and single genera each viz, *Neurobasis chinensis* Linnaeus, *Elatoneura souteri* Fraser, *Bayadera longicauda* Fraser. Details showing valid names, collection localities, number of individual male/female collected are provided for each species." (Authors)] Address: Zia, A., National Insect Museum, National Agriculture Research Centre, Islamabad, Pakistan

**17280.** Reid, D.J.; Tippler, C. (2019): Access to natural substrates in urban streams does not counter impoverishment of macroinvertebrate communities: a comparison of engineered and non-engineered reaches. *Water Air Soil Pollut.* (2019) 230:8: 15 pp. (in English) ["Urban streams are degraded through multiple mechanisms, including severely altered flow regimes, elevated concentrations of waterborne contaminants, removal of riparian vegetation and the loss of a mosaic of heterogeneous aquatic habitats. Engineering of urban stream reaches using concrete is a widespread and extreme case of deliberate alteration of flow regimes and concomitant habitat simplification. To assess the effect of such engineering practices on stream ecosystems, we compared aquatic macroinvertebrate communities from concrete-lined engineered urban reaches, nonengineered urban reaches with natural substrates and reference reaches flowing through minimally disturbed forested subcatchments and with natural substrates, in the Sydney metropolitan region, Australia. The communities from all urban reaches were impoverished and distinctly different from more diverse communities in forested reference reaches. Despite low aquatic habitat heterogeneity, engineered urban reaches had very high abundances of Diptera and some other tolerant taxa. Diptera and/or Gastropoda were dominant in nonengineered urban reaches. Multivariate community structures were dissimilar between the urban reaches and forested reference reaches and between nonengineered and engineered urban reaches. However, the low family-level richness and SIGNAL scores in both urban reach types indicated they were severely ecologically impaired, whether engineered or not. Most macroinvertebrate taxa in the regional pool that were hardy enough to inhabit urban reaches with natural substrates were also present in nearby concreted reaches. The results add weight to the growing evidence that in urban landscapes, regional-scale changes in water quality and flow regimes limit the establishment of diverse macroinvertebrate communities, which cannot be addressed through the provision of increased reachscale habitat heterogeneity." (Authors)] Address: Reid, D.J., Georges Riverkeeper, Hurstville, NSW, Australia. E-mail: davidreid@georgesriver.nsw.gov.au

**17281.** Reis, K.S.S. (2019): Atividade predatória de insetos aquáticos (Odonata: Libellulidae e Coleóptera: Hydrophilidae) sobre girinos (*Rhinella* sp. e *Physalaemus* sp.) na cidade de Capitão Poço, Nordeste Paraense. *Bacharelado em Ciências Biológicas, Universidade Federal Rural da Amazônia*: 41 pp. (in Portuguese, with English summary) ["The predation event regulates the functioning of communities and directly affects the population dynamics of organisms in the environment. Among the predators present in aquatic environments are invertebrates, especially Insecta, which feed on various organisms, whether vertebrates or invertebrates. Tadpoles are one of the food items most consumed by these invertebrates. This experiment studied the predatory activity of two families of aquatic insects (Odonata: Libellulidae and Coleoptera: Hydrophilidae) in relation to the species of tadpoles *Rhinella* sp. and *Physalaemus* sp. in the city of Captain Poço, north-east of Para. The experiment had six treatments performed in two phases (day and night). One-way and factorial ANOVA were observed, with significant differences only observed between treatments 1 (control) and 2 (Libellulidae) ( $F = 7.21$ ,  $p = 0.00$ ), but this family showed no food preference for any of the treatments. species of tadpoles. On the other hand, Hydrophilidae consumed more tadpoles of *Physalaemus* sp., Being the species most consumed in the given experiment ( $F = 4.73$ ,  $p = 0.03$ ). The predatory activity of the insects was performed in both study periods (day and night), with no significant differences ( $F = 1.33$ ,  $p = 0.26$ )." (Authors)] Address: not stated.

**17282.** Rodrigues, M.; Madhava, M. (2019): A preliminary survey on odonates of Kidoor, Kasaragod. *Piculet* 2(1&2): 28-30. (in English) [Kidoor (12.63°N, 74.98°E); 12th July 2019] Address: Maxim Rodrigues. E-mail: maximrodrigues@gmail.com

**17283.** Roman-Heracleo, J.; Springer, M.; Novelo-Gutierrez, R. (2019): Descriptions of the larvae of *Acanthagrion speculum* and *A. trilobatum* from Costa Rica (Odonata: Coenagrionidae). *Zootaxa* 4624(2): 219-229. (in English, with Spanish summary) ["Description of the final instar of *Acanthagrion trilobatum* Leonard, 1977 and *A. speculum* Garrison, 1985 is based on associated specimens from San José, Turrialba and Sarapiquí Provinces, Costa Rica. Illustrations of these two species and a comparative table summarizing the main features of all larvae of *Acanthagrion* described to date are provided. The larva of *A. trilobatum* is distinguished from that of *A. speculum* by shorter lateral caudal lamellae (length 7 mm vs. 8.2 mm), lateral carina of abdominal segments 2–8 with spiniform setae on posterior 1/3 (lateral carinae of only S6–8 with spiniform setae in *A. speculum*), and male gonapophyses incurved (straight in *A. speculum*)." (Authors)] Address: Novelo-Gutierrez, R., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.mx

**17284.** Romero-Lebrón, E.; Gleiser, R.M.; Petrulevicius, J.F. (2019): Geometric morphometrics to interpret the endophytic egg-laying behavior of Odonata (Insecta) from the

Eocene of Patagonia, Argentina. *Journal of Paleontology* 93(6): 1126-1136. (in English) ["Although the order Odonata has a rich fossil record, many questions about its reproductive biology remain unanswered. There are two strategies of egg laying among odonates, exophytic and endophytic, the latter being one of the most revealing vestiges of plant–insect association in the fossil record. We assessed whether geometric morphometrics based on elliptical series of Fourier allow expression of variability of shape in traces of Odonata eggs within a leaf of *Eucalyptus chubutensis* (Berry) González (in part), González, 2009 (Myrtaceae) from Laguna del Hunco (Chubut, Argentina) (early Eocene) and whether this variability is consistent with the ichnotaxonomy of this material. We found that the largest variation corresponds to the compression of the shape while the remaining two components reflect variations in the apex position and its curvature, which changed according to the relative position of the traces in the leaf. There was no evidence that the hardness of the leaf would affect the shape of the egg trace. We postulate that these traces could have been produced by one single female: Variations in the pattern observable in the fossil of an originally three-dimensional structure are consistent with differences in the position of the eggs inserted by a single female who has flexed her abdomen to insert the eggs as she approaches the apex of the leaf (behavior observed also in extant dragonflies). For the first time, endophytic egg traces are analyzed with geometrical morphometrics, and this allows us to make inferences on the oviposition behavior of a female that lived around 52 million years ago." (Authors)] Address: Petrulevicius, J.F., División Paleozoología Invertebrados, Fac. de Ciencias Naturales y Museo, Univ. Nacional de La Plata, Paseo del Bosque s/n, (1900) La Plata, Argentina. E-mail: leVICIUS@fcnym.unlp.edu.ar

**17285.** Rowe, R.J. (2019): *Hemicordulia armstrongi* sp. n. (Odonata: Anisoptera: Corduliidae) from New Zealand. *Australian Entomologist* 46(4): 179-188. (in English) ["The dragonfly previously recognised from New Zealand under the name *Hemicordulia australiae* (Rambur, 1842) is described as a new taxon, *Hemicordulia armstrongi* sp. n. on the basis of morphological differences in both adults and larvae, as well as adult behavioural differences. Photographic evidence requiring confirmation is presented suggesting that the species might co-occur with *H. australiae* in Australia and that *H. australiae* also might occur in New Zealand." (Author)] Address: Rowe, R.J., Res. School of Biology, Evolution, Ecology & Genetics, Australian National University, Canberra, 0200, Australia. E-mail: richard.rowe.dragonflies@gmail.com

**17286.** Sakai, M.; Suda, S.-i.; Okeda, T.; Nomura, R.; Washitani, I.; (2019): The importance of riparian subtropical lucidophyllous forest to odonate conservation. *Aquatic Conservation. Marine and Freshwater Ecosystems* 29(5): 682-692. (in English) ["(1) Glossy, broad-leaved, evergreen (lucidophyllous) forests are found mainly in humid subtropical regions of East Asia and are recognized as a biodiverse biome harbouring numerous endemic species. To date, however, few studies have considered the conservation importance of rivers draining these unique environments. In this study, lotic Odonata were used as indicators to examine factors affecting riparian forest–stream

linkages in a lucidophyllous forest in south-western Japan. (2) Lotic odonates of 10 species, including seven endemic species, and their habitats were studied along 30 stream reaches with varying environmental characteristics. (3) Odonate species richness was greatest in shadier reaches as well as in heterogeneous locations in larger streams. In contrast, larger streams modified by channel enlargement for flood control had few or no odonate species. (4) Protecting larger streams with less human impact and streams in dense riparian forest are the best options for conserving lotic odonates and their habitats in this globally unique forest type. [...] The most common species recorded was *Matrona japonica*, which inhabited most of the study reaches (28 reaches). *M. japonica*, *Coelliccia ryukyensis amamii* (15 reaches), and *Chlorogomphus brunneus costalis* (15 reaches) were classified as common species; *Asiagomphus a. amamiensis* (nine reaches), *Planaeschna milnei naica* (eight reaches), and *Hemicordulia okinawensis* (seven reaches) were classified as uncommon species; and *Anotogaster sieboldii*, *Planaeschna ishigakiana nagaminei*, *Rhipidolestes amamiensis*, and *Stylogomphus ryukyuanus ryukyuanus*, all occurring in one reach, were classified as rare species" (Authors)] Address: Sakai, M., Fac. Science & Engineering, Chuo Univ., 1-13-27 Kasuga, Bunkyo-ku, Tokyo 112-8551, Japan. Email: boundary.0008@gmail.com

**17287.** Salami, E.; Ward, T.A.; Montazer, E.; Ghazali, N.N.N. (2019): A review of aerodynamic studies on dragonfly flight. *Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science* 233(18): 6519-6537. (in English) ["In the recent decades, the design and development of biomimetic micro air vehicles have gained increased interest by the global scientific and engineering communities. This has given greater motivation to study and understand the aerodynamics involved with winged insects. Dragonflies demonstrate unique and superior flight performance than most of the other insect species and birds. They are capable of sustained gliding flight as well as hovering and able to change direction very rapidly. Pairs of independently controlled forewings and hindwings give them an agile flying ability. This article presents a review of all published journal articles, listed in the Thomson-Reuters Web-of-Science database (1985–2018), that are related to the flight aerodynamics of dragonflies or micro air vehicles that biomimic them. The effects of dragonfly wing motions and interactions (between forewing and hindwing) that are necessary to generate the appropriate aerodynamic forces in different flight modes are described. The associated power requirements of these modes are also addressed. This article aims to provide a valuable reference to the aerodynamic design and control of dragonfly-inspired biomimetic micro air vehicles." (Authors)] Address: Salami, E., Dept Mechanical Engineering, Univ. Malaya, Kuala Lumpur, KL 50603, Malaysia. Email: erfansalami@hotmail.com

**17288.** Sampa, T. (2019): The first larval record of *Sympetrum fonscolombii* from Kawasaki city, Kanagawa Prefecture. *Tombo* 61: 51-52. (in Japanese, with English summary) ["In 2018, a larva of *S. fonscolombii* was collected from an elementary school's swimming pool in Kawasaki city, Kanagawa Prefecture. The larva of this species is here recorded

for the first time from Kanagawa Prefecture. It is suggested that this species chooses not only natural water areas but artificial water areas such as swimming pools for an oviposition site. In addition, it is shown that the larva of this species is able to pass the winter in Kawasaki city." (Author)] Address: not stated in English

**17289.** Samraoui, B.; Touati, L.; Samraoui, F. (2019): Slow and steady wins the race: Life cycle and seasonal regulation of *Gomphus lucasii* (Odonata: Gomphidae). *Odonatologica* 48(3/4): 229-246. (in English) ["We investigated the emergence and life cycle of the endangered Maghrebian endemic *G. lucasii* at the Seybouse River in north-eastern Algeria. Starting in mid-April, their emergence, typical of spring species, was highly synchronized and was achieved within two to three weeks. EM50 was reached in three days. Larval sampling indicated that the synchrony was achieved through larvae overwintering in the F-0 stage. Noteworthy was the concomitant presence of a junior cohort throughout the year demonstrating that the species completes a generation in two years. Thus, contrary to what has been reported previously, we argue that *G. lucasii* is a semivoltine species with a 'slow' developmental rate congruent with its distribution in high-risk permanent habitats. This finding has important conservation implications for this threatened endemic species which is facing severe anthropogenic pressures in the context of global changes." (Authors)] Address: Samraoui, B., Laboratoire de Conservation des Zones Humides, Université 8 Mai 1945 Guelma, Algeria. E-mail: bsamraoui@gmail.com

**17290.** Sánchez-Bayoa, F.; Wyckhuys, K.A.G. (2019): Worldwide decline of the entomofauna: A review of its drivers. *Biological Conservation* 232: 8-27. (in English) ["Biodiversity of insects is threatened worldwide. Here, we present a comprehensive review of 73 historical reports of insect declines from across the globe, and systematically assess the underlying drivers. Our work reveals dramatic rates of decline that may lead to the extinction of 40% of the world's insect species over the next few decades. In terrestrial ecosystems, Lepidoptera, Hymenoptera and dung beetles (Coleoptera) appear to be the taxa most affected, whereas four major aquatic taxa (Odonata, Plecoptera, Trichoptera and Ephemeroptera) have already lost a considerable proportion of species. Affected insect groups not only include specialists that occupy particular ecological niches, but also many common and generalist species. Concurrently, the abundance of a small number of species is increasing; these are all adaptable, generalist species that are occupying the vacant niches left by the ones declining. Among aquatic insects, habitat and dietary generalists, and pollutant-tolerant species are replacing the large biodiversity losses experienced in waters within agricultural and urban settings. The main drivers of species declines appear to be in order of importance: i) habitat loss and conversion to intensive agriculture and urbanisation; ii) pollution, mainly that by synthetic pesticides and fertilisers; iii) biological factors, including pathogens and introduced species; and iv) climate change. The latter factor is particularly important in tropical regions, but only affects a minority of species in colder climates and mountain settings of temperate zones. A rethinking of current

agricultural practices, in particular a serious reduction in pesticide usage and its substitution with more sustainable, ecologically-based practices, is urgently needed to slow or reverse current trends, allow the recovery of declining insect populations and safeguard the vital ecosystem services they provide. In addition, effective remediation technologies should be applied to clean polluted waters in both agricultural and urban environments. ... Odonata comprise a relatively small order of insects that depend on water bodies for their larval development. Both nymphs and imagoes are predators of aquatic organisms and flying insects respectively, and they play an important role in controlling nuisance mosquitoes and agricultural pests, e.g. of rice. Of the 118 aquatic species of endangered insects listed by the IUCN, 106 are Odonata, although it is clear that other aquatic taxa are underrepresented due to insufficient knowledge. A recent IUCN assessment indicates that 10% of the world's Odonata are threatened with extinction, although that study only covered a quarter of all species known and acknowledged data gaps for 35% of species, particularly those from tropical and Australasian regions. Given the above, 15% of all species may be threatened. In the USA, recent surveys at 45 sites across California and Nevada were compared to historical records from 1914 to 1915. Occurrence rates of 52 species of Odonata (65% of all recorded) have declined over the 98-year period while those of 29 species have increased. Two generalist and pollution-tolerant species that were not recorded in 1914–1915 greatly expanded their range into California and became common, particularly in urban areas. At least nine species declined significantly, including four species (*Sympetrum danae*, *S. costiferum*, *Ophiogomphus occidentis* and *Libellula nodisticta*) that were also rare in early surveys. Declines occurred mostly among habitat specialists, whereas increases were recorded for generalist and migratory species that replaced the losses at the same sites. Specialist species included those with overwintering diapause, which appear to have declined due to an increase of minimum temperature over the period. While species richness has not declined, Odonata assemblages have become more homogeneous in species composition, which is typically an effect of urbanisation. In Europe, 15% of the 138 Odonata species are currently threatened, with two damselflies (*Ceriatagrion georgifreyi* and *Pyrrhosoma elisabethae*) and one dragonfly (*Cordulegaster helladica* sp. *kastalia*) critically endangered in the Balkan Peninsula. A quarter of all species (33) are declining in population numbers and distribution, whereas 10% of them are increasing and about half remain stable. Major declines took place during post-1960 agricultural intensification, with canalisation of rivers for irrigation and water pollution by urban runoff, pesticides and fertilisers (i.e. eutrophication) being the main drivers of population extinctions over large areas. Ubiquitous species such as *Coenagrion puella* and *Sympetrum striolatum*, however, increased and shifted their range some 300 km northwards in Britain between 1960 and 1970 and 1985–1995. In central Finland, populations of 20 common species of Odonata were surveyed at 34 small creeks over 1995–1996, and their distribution patterns were compared with historic records from 1930 to 1975. Two specialist and lentic dragonflies, *Coenagrion johanssoni* and *Aeshna caerulea* have disappeared



from streams, and 45% of the 219 surveyed populations vanished. Local extinctions occurred in peat bogs and dynamic waters upstream, which are habitats for lentic-specialist species, whereas downstream water bodies had lower losses. Generalist species (i.e., those that breed in both lentic and lotic waters) were less likely to become locally extinct. The construction of agricultural ditches and habitat fragmentation from forestry further impacted on populations of rare species. In Japan, 57 out of 200 Odonata species are declining, with 23 being vulnerable and 19 endangered. The largest drops in abundance and distribution are among lentic species once common in rice paddy fields (e.g., *Lestes japonicus*, *Libellula angelina*, *Sympetrum maculatum* and *S. uniforme*). Island endemics are next in the extinction list, whereas those of lotic habitats of mountain streams are the least affected. The sharp decline in populations of red dragonflies (*Sympetrum* spp.) since the mid-1990s has been linked to the use of fipronil and neonicotinoid insecticides, which affect the aquatic nymphal stages by curtailing the emergence of adults. Of the 155 Odonata species recorded in South Africa, 13 are declining and four are extinct. The protection of rare species in nature reserves of that country does not necessarily guarantee their survival, as current livestock management and other human activities negatively impact on these aquatic insects." (Authors)] Address: Sánchez-Bayo, F., School of Life & Environmental Sciences, Sydney Institute of Agriculture, The University of Sydney, Eveleigh, NSW 2015, Australia

**17291.** Sano, S.; Yamada, Y. (2019): Records of adult *Aeschnophlebia anisoptera* Selys, 1883 and larval *Gynacantha japonica* Barteneff, 1909 from Izu Oshima Island. *Tombo* 61: 49-50. (in Japanese, with English summary) ["A survey of dragonflies was made in Izu-Oshima Island, Tokyo Prefecture, on October 16, 2018. *A. anisoptera* and larva of *G. japonica* Barteneff, 1909 are recorded from the island for the first time." (Author)] Address: not stated in English

**17292.** Sanz Sanz, T.; Pomeda Maestre, N.A.; Arriola González, J.A.; Montoya Jiménez, M. (2019): Nuevos datos sobre la distribución de *Sympetrum flaveolum* (Linnaeus, 1758) (Odonata: Libellulidae) en la provincia de León (Norte de España). *Archivos Entomológicos* 21: 151-156. (in Spanish, with English summary) ["14 new locations of *S. flaveolum* in the province of León (Northern Spain) are presented, which increase its distribution known so far in this territory from 4 to 15 UTM squares of 10x10 km." (Authors)] Address: Sanz Sanz, T., c/ El Esguilo, 4. E-24878 Fresnedo de Valdellorma (León). E-mail: donguillos@hotmail.com

**17293.** Sasamoto, A.; Yokoi, N.; Souphanthong, V.; Phan, Q.T.; Futahashi, R. (2019): Discovery of a third species of the genus *Noguchiphaea* Asahina, 1976 – *Noguchiphaea laotica* sp. n. from Laos (Odonata: Calopterygidae). *International Journal of Odonatology* 22(1): 59-71. (in English) ["*N. laotica*, is described based on specimens from Lon San, Saysomboun Province, Laos. The holotype ♂ and a paratype ♀ are deposited in the National Museum of Nature and Science, Tokyo. This new species is allied to *N. yoshikoae* from northern Thailand, but differs from it in the morphology of the male cercus

which is depressed centrally apically in dorsal view, and with a more robust dorsal spine at about one-third from its base. In addition, DNA analyses confirm that there are genetic differences between *N. laotica* and *N. yoshikoae*. Some observations on the ecology and behavior of *N. laotica* are briefly reported." (Authors)] Address: Sasamoto, A., Oh 531-3, Tawaramoto-cho, Shiki-gun, Japan. E-mail: akssmt@sea.plala.or.jp

**17294.** Schädler, M.; Nicolai, B.; Schäfer, B.; Schulze, M. (2019): Aktuelle Funde südlich verbreiteter Insektenarten (Blattodea, Mantodea, Orthoptera, Odonata) in Mittel- und Ostdeutschland (Sachsen-Anhalt, Sachsen, Brandenburg, Thüringen). *Entomologische Nachrichten und Berichte* 63(3): 269-279. (in German, with English summary) ["Current finds of insect species widespread in the south (Blattodea, Mantodea, Orthoptera, Odonata) in Central and Eastern Germany (Saxony-Anhalt, Saxony, Brandenburg, Thuringia)." Authors]. Records of *Erythromma lindenii*, *Orthetrum brunneum* and *Sympetrum meridionale* are documented. Address: Schulze, M., RANA, Mühlweg 39, 06114 Halle, Germany. E-mail: martin.schulze@rana-halle.de

**17295.** Scheurer, S. (2019): Einfluss von polarisiertem Licht auf Insekten und ihr Eiablageverhalten in der Landwirtschaft. Bachelor thesis, ZHAW Zürcher Hochschule für Angewandte Wissenschaften: 45 pp. ["Linearly polarized light provides crucial visual information to water-seeking insects. Normally, the light reflected off water surfaces is polarized and can therefore be used to recognise the surface as water. At present more and more man-made artificial surfaces with similar reflective properties can be found, which can lead to fatal decisions by insects. In agriculture, for example, woven polypropylene mulch is used, which has corresponding properties. In a pumpkin field in Bütschwil, in the Bernese Seeland, as well as another in Steffisburg near Thun, this mulch is used in the cultivation process. As such, these fields were able to serve as location for field observations. With a focus on Odonata, several field surveys were carried out during the 2019 season and the behaviour of the dragonflies and their species was recorded. Furthermore, a theoretical background for these dragonfly species and the polarization of light is provided. In addition, measurements of different woven polypropylene products with respect to their polarization properties were performed and further possible sources for linearly polarized light were investigated. In both study areas, various dragonflies with species-specific behaviour could be observed, which is typically seen in their reproductive waters. These measurements on the aforementioned ribbon fabrics showed very similar reflective properties to those on water surfaces and only one white fabric had a limited polarizing effect. In addition, research revealed many other possible sources of polarized light, some of which are presented, and possible solutions are discussed. Further study approaches are recommended and a proposal for the introduction of the topic into the study of environmental engineering at the ZHAW is made." (Author)] Address: not stated

**17296.** Schneider, B.; Wildermuth, H. (2019): How do emerging damselflies cope with predator attacks? (Odonata: Zygoptera). *Notulae odonatologicae* 9(4): 152-157. (in English)

["Emerging damselflies are vulnerable to predator attacks and considered to be at high risk at this stage of their life cycle. We filmed bird and frog attacks on damselflies ready to emerge in slow motion and analysed their reactions. Pharate damselfly larvae that had left the water reacted to approaching wagtails and frogs by disengaging from the substrate, dropping with flipping movements back into the water and trying to swim away rapidly thus escaping these predators. It is inferred that until immediately before eclosion, pharate larvae that have left the water are able to recognize approaching predators and to react adaptively. Death feigning only occurs after physical contact with the predator." (Authors)] Address: Schneider, B., Wolfbühlstr. 34A, 8408 Winterthur, Switzerland. E-mail: beatsch@bluemail.ch

**17297.** Schreier, A.L.; Schlaht, R.M.; Swedell, L. (2019): Meat eating in wild hamadryas baboons: Opportunistic trade-offs between insects and vertebrates. *American Journal of Primatology* 2019; e23029: 12 pp. (in English) ["Insects made up 0.5% of the baboons' annual diet, ranging from 0% to 2% of monthly diets (Figure 2). The baboons' insect consumption consisted primarily of locusts and dragonflies). Most of this feeding occurred when swarms of these organisms passed through the Filoha region. In almost all of these cases, most members of the band simultaneously fed on these insects, chasing and jumping up to capture and eat them. Predation success was high with the baboons catching an insect during the majority of attempts; the very large numbers of these insects during outbreaks allowed the baboons to repeatedly catch insects over a period of time generally lasting from 30 min to 1 hr. Almost all insect eating occurred in Acacia scrubland habitat where they spent almost half of their time, although the baboons fed on dragonflies a few times when a swarm passed through their sleeping cliff. (Authors)] Address: Schreier, Amy, Dept Biol., Regis Univ., 3333 Regis Blvd. D 18, Denver, CO, USA. E-mail: aschreier@regis.edu

**17298.** Seehausen, M. (2019): Zur Geschichte und Bedeutung der Libellensammlungen in Institutionen Deutschlands, Österreichs und der Schweiz (Odonata). *Libellula* 38(1/2): 29-70. (in German, with English summary) ["About the history and significance of Odonata collections of institutions in Germany, Austria, and Switzerland – The history and significance of Odonata collections of institutions in Germany, Austria, and Switzerland were examined. Altogether > 236.480 specimens were localized in 103 of about 140 requested institutions. Of these, 76 institutions were in Germany with > 176.480 specimens, eight institutions were in Austria with > 32.300 specimens, and 19 institutions were in Switzerland with > 27.700 specimens. Listed are 49 species and subspecies described on the basis of material from Germany, Austria, and Switzerland. Up to date 13 of these species are valid names within the native fauna. The deposition of the type material is denoted as far as it is known. Some lost collections are specified and difficulties in handling with historical collections are discussed. The potential for further information about distribution and occurrence of the species is considered to be important and revision of the collections suggested." (Author)] Address: Seehausen, M., Museum Wiesbaden, Landesmuseum für Kunst und Natur,

Friedrich-Ebert-Alle 2, D-65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**17299.** Seehausen, M.; Kunz, B.; Havelka, P.; Martens, A. (2019): An ectoparasite of caterpillars, *Forcipomyia fuliginosa* (Diptera: Ceratopogonidae), recorded sucking haemolymph from an *Aeshna juncea* just before maiden flight (Odonata: Aeshnidae). *Notulae odonatologicae* 9(4): 169-172. (in English) ["In June 2014, in a mire near Nadibani, Georgia, a female biting midge of *F. (Microhelea) fuliginosa* was found parasitizing a female of *A. juncea* just before its maiden flight. The midge was observed sucking at a soft area of the mesothorax. *F. fuliginosa* is well known as an ectoparasite of caterpillars and sawfly larvae." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Friedrich-Ebert-Allee 2, 65462 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**17300.** Selvarasu, P.; Gunasekaran, C.; Agnes Deepa, A.; Mohana, P.; Raj Kumar, V. Chinnaraj, P. (2019): Diversity of odonates (Insecta: Odonata) in different habitats of Vellore District, Tamil Nadu, India in eastern Ghats. *International Journal of Recent Scientific Research* 10(4): 32127-32130. (in English) ["The objective of the preliminary study of Odonates is to explore the diversity of Odonata in different habitats are Amirthi streams, Mordhana dam and Pulliyanthangal Lake in Vellore district. Totally the 30 species of Odonates including 17 species under 2 families of Anisoptera and 13 species under 2 families of Zygoptera were recorded from June 2017 to May 2018. The 26 species of Odonates were documented in habitats near Mordhana dam reservoir, 25 species from near Amirthi streams and 16 species were recorded from Pulliyanthangal Lake. 30 species were recorded in all the three different habitats. Among these species, Libellulidae and Coenagrionidae were the dominant families with maximum number of species abundance in the study area. The most abundant Anisopteran species in Amirthi falls are *Diplacodes trivialis* and *Pantala flavescens*, and in Mordhana dam and Pulliyanthangal Lake were encompass with *Brachythemis contaminata*. Among the Zygopteran species the most abundant species are *Ceriatagrion coromandelianum* in all habitats. These data will be useful in future studies and conservation of biodiversity in the studied habitats." (Authors)] Address: Selvarasu, P., Unit of Conservation Biol., Dept Zool., Bharathiar Univ., Coimbatore- 641 046, India

**17301.** Shabani, E.I.; Liu, M.H.; Yu, H.X., Muhigwa, J.-B.; Geng, F.F. (2019): Benthic macroinvertebrate diversity and functional feeding groups in relation to physicochemical factors in Sanjiang plain wetlands, northeast China. *Applied Ecology and Environmental Research* 17(2): 3387-3402. (in English) ["Sanjiang plain wetland is the largest freshwater ecosystem in northeast China, and with its richness in animal and plant species, it displays a high biodiversity. This study provides information about benthic macroinvertebrate diversity and functional groups in association with physicochemical parameters in wetland habitats of Sanjiang plain. Benthic macroinvertebrate samples were collected using a D-frame aquatic net. Shannon-Wiener, Simpson and Pileou's evenness indices were calculated in terms of abundance. The relationship between measured physicochemical variables and benthic

macroinvertebrate functional feeding groups (FFGs) was explored using CCA. A total of 57 macroinvertebrate taxa were collected from the 16 sampling sites. Aquatic insects were the most abundant with 11 families, Dytiscidae, Chironomidae, Leptophlebiidae, Belostomatidae, Corixidae, Geridae, Corduliidae, Gomphidae, Macromiinae, Libellulidae and Phryganeidae. Chironomids were the most diverse and abundant with 26 taxa. The metrics of abundance, Shannon-Wiener, Simpson and Pileou's evenness indices differed significantly among the 16 sampling sites ( $p = 0.0163$ ,  $p = 0.0092$ ,  $p = 0.0474$ ,  $p = 0.0222$ , respectively). The findings showed that these 57 benthic macroinvertebrate taxa were categorized in six functional feeding groups, including 19 predators, 15 gathering-collectors, 7 scrapers, 6 filtering-collectors, 5 omnivores and 5 shredders. CCA results displayed that benthic macroinvertebrate functional feeding groups had strong relationships with the physicochemical characteristics in the wetlands of Sanjiang plain." (Authors)] Address: Liu, M.H., Lab. Hydrobiol., College of Wildlife Resource, Northeast Forestry Univ. Harbin P.O. Box 150040, China. E-mail: manhong@nefu.edu.cn

**17302.** Shaikh, J.; Baloch, N.; Bughio, B.A.; Ashfaque Ahmed, A.; Mutha, S.T.; Kalhor, A.S.; Ali, S. (2019): Distribution of dragonflies and damselflies (Arthropoda: Odonata) from district Jamshoro Sindh. *Journal of Entomology and Zoology Studies* 7(3): 394-396. (in English) [Odonata in district Jamshoro (Almanzar, Kotri, Sehwan, Manjhand and Thano Boola Khan) during year 2017-2018 were studied resulting in 350 specimens: *Crocothemis servilia*, *Orthetrum sabina*, *Bradinopyga geminata*, *Ischnura elegans*, *I. ramburii*, *I. verticalis* [sic].] Address: Shaikh, Jaweria, Dept Zool., Univ. Sindh Jamshoro, Pakistan

**17303.** Shaish, R. (2019): Rediscovery of *Agriocnemis sania* in northern Israel (Odonata: Coenagrionidae). *Notulae odonatologicae* 9(3): 109-112. (in English) ["*A. sania* is an Afro-Sudanese damselfly which was common in northern Israel until the early 1970s and was last recorded in 1986. In October 2014 ca 15 individuals of this species were found at Nahal Zavitan, Golan Heights, northern Israel, suggesting that this species persists in that country." (Author)] Address: Shaish, R., Vardon 71a, 79437, Israel. E-mail: Ficedulars@gmail.com

**17304.** Shapovalov, M.I.; Korotkov, E.A. (2019): Fauna of Odonata of the Adygheya Republic (North-Western Caucasus). *Russian Entomol. J.* 28(4): 341-349. (in English, with Russian summary) ["An annotated checklist of Odonata of the Adygheya Republic (Russia) is given. It includes 43 species of eight families: Calopterygidae (2 species), Coenagrionidae (10), Platynemididae (1), Lestidae (6), Aeshnidae (8), Corduliidae (1), Gomphidae (3) and Libellulidae (12). New collecting sites are given for 39 species. *Coenagrion scitulum*, *Erythromma najas najas*, *Pyrrhosoma nymphula*, *Onychogomphus flexuosus*, *Cordulia aenea*, *Orthetrum cancellatum*, *O. coerulescens anceps*, *Sympetrum fonscolombii* and *Crocothemis erythraea* are described for the first time for the Republic of Adygheya." (Authors)] Address: Shapovalov, M.I., Lab. for Bioecological Monitoring of the Invertebrate Animals of Adygheya, Res. Inst. of Complex Problems, Adyghe State Univ., Gagarina

str. 13, Maykop 385000, Adygheya Republic, Russia. E-mail: shapmaksim2017@yandex.ru

**17305.** Sharma, G. (2019): Studies on the reproductive behaviour of *Ischnura nursei* Morton (Odonata: Insecta) at Asan reservoir, District Dehradun, Uttarakhand, India. *Bio Bulletin* 5(2): 14-17. (in English) ["The reproductive behaviour of *I. nursei* was studied four times at Asan Reservoir, District Dehradun, Uttarakhand during June-July, 2019. Courtship is well marked and male demonstrate a circular territory with a radius of about 0.5-1 meter and defended it from the intruding intra or some inter specific male by warning signals like wing vibration or abdomen raising. As female entered into the territory, the male starts following her and forms a tandem link, catching hold of her prothorax by his anal appendages. The before wheel tandem lasted for 5-8 minutes and during this period intramale sperm translocation from the gonopore to the vesicular spermalis took place 2-3 times of 30-50 seconds duration. The courtship wheel lasts for about 6-10 minutes and is performed of perching on vegetation near the reservoir. After wheel tandem lasted for 5-8 minutes. Oviposition is endophytic among the aquatic vegetation and lasts for 7-12 minutes. The female in tandem climbs down underwater and uses her ovipositor to deposit eggs in the submerged vegetation. During oviposition the male in tandem and after release of grip hovers around the female, to defend her from intruding intra- or inter-specific males. The duration of reproductive behaviour lasts for 22-38 minutes." (Authors)] Address: Sharma, G., Zoological Survey of India, Northern Regional Centre, Kaulagarh Road, Dehradun-248195, Uttarakhand, India

**17306.** Shome, A.R.; Rahman, M.; Alam, M. (2019): An unusual case of gynandromorphism in *Neurothemis tullia* (Odonata: Libellulidae). *Notulae odonatologicae* 9(3): 96-102. (in English) ["An unusual gynandromorphic individual of *N. tullia* is reported from Faridpur District in Bangladesh. The head and thorax, including wings, are clearly bilaterally gynandromorphic. The abdomen is entirely pruinose androchromic with very few light spots left, however the abdominal tip bears female appendages. This unusual combination of gynandromorphism and androchromy is discussed in respect of its possible origin." (Authors)] Address: Alam, M., Dept Zool., Univ. Dhaka, BD-Dhaka 1000, Bangladesh. E-mail: mahabub.zoo@du.ac.bd

**17307.** Shumway, N.; Laurence, S.J. (2019): The impact of deformation on the aerodynamics of flapping dragonfly wings. *AIAA Scitech 2019 Forum, AIAA SciTech Forum*, (AIAA 2019-1378), <https://doi.org/10.2514/6.2019-1378>: 18 pp. (in English) ["As unmanned aerial vehicles continue to decrease in size, the use of flexible wings, imitating those found in nature, is becoming more prevalent. In order to better understand the effects of flexibility 011 the aerodynamics of dragonfly wings, measurements of wing deformations during the free flight of dragonfly specimens were conducted. The OVER-TURNS CFD solver was then modified to simulate the motion of both rigid and deforming wings, following the same bulk kinematics, so that the associated forces and flow fields produced could be compared. The deformation for both fore-



and hindwings resulted in camber during the body-relative downstroke and twist during the upstroke. This pattern of deformation was consistent even when the dragonflies were flying while inverted. Comparing the forces from the simulations revealed that deforming wings produce more lift and a comparable amount of thrust at a much higher efficiency than the rigid wings. This indicates that wings on the MAV scale can have improved efficiency if they are designed to allow a particular deformation pattern." (Authors)] Address: Shumway, N., Univ. Maryland, College Park; Stuart J. Laurence, Univ. of Maryland, College Park

**17308.** Shumway, N.M. (2019): Wing kinematics, deformations, and aerodynamics of dragonflies in free flight. Ph.D. thesis, Faculty of the Graduate School, University of Maryland, College Park: 131 pp. (in English) ["The development of Micro Aerial Vehicles (MAVs) has led researchers to study insects in order to better understand aerodynamic mechanisms and wing kinematics that achieve high performance flight at small scales. Dragonflies in particular are a good candidate for study, as their size is comparable to the target size of MAVs and they are able remain stable while flying in highly variable conditions. To better understand undisturbed steady flight and gust response of dragonflies, experiments were conducted to measure detailed wing kinematics and deformations in free flight both through a quiescent environment and when encountering a lateral gust. A custom testing environment was developed in which dragonflies would fly through an enclosed area with high-speed cameras capturing both their body motion and that of markers placed on their wings. Due to the nature of the setup and how the dragonflies were released, they would frequently fly while inverted rather than upright and a comparison between upright and inverted flight is included in this work. During inverted flight the tested specimens flew in such a way that their wings had a similar orientation in the global reference frame to that of the wings in the upright flights. The two primary kinematic variables that were changed to produce this result were the wing pitch angle and the body elevation angle. In addition, the dragonflies modulated the amount of time spent in the downstroke versus the upstroke so that in either case their wings spent more time moving down in the global frame. When dragonflies encountered a lateral gust, they increased the pitching of their windward wings, using left-right asymmetric kinematics to maintain a straight flight path through the disturbance. From these experimental data, models were developed for both the wing kinematics and the wing deformations, and these were incorporated into flapping wing simulations using the OVERTURNS computational fluid dynamics (CFD) code. Two sets of such CFD simulations were run: one of rigid wings and the other of deforming wings. For both rigid and deforming wings, the interaction between the fore- and hindwing increased the force production on both wings when compared to fore- and hindwings in isolation. The largest differences between isolated and tandem wings were seen for the hindwing as it passed through the wake of the forewing. The wing deformations slightly decreased the total force production, compared to the rigid wings, by reducing the amount of flow separation on the bottom of the wing during the upstroke. The impact of the camber deformation, during the body-relative downstroke, was

dependent on the specific wing kinematics. Though the total force produced decreased, the wing deformations substantially increased the efficiency for both wings." (Author)] Address: not stated

**17309.** Sibley, F.; Paseka, J.; Beckemeyer, R (2019): The Dragonflies and Damselflies of Nebraska. Zea E-Books. 78: III, 95 pp. (in English) ["The Nebraska odonate list has 109 species in Zygoptera with 47 species and Anisoptera with 62 species. Nebraska had been very poorly surveyed prior to 2005 and 63 counties had fewer than 10 records. By 2017 the number of county records had nearly quadrupled, to over 3000 records, the average county total had increased from 9 to 33 and all counties had at least 21 records. An effort was made to collect data more or less uniformly from all 93 Nebraska counties. The areas with intense corn and soybean farming, eastern and southcentral areas, are low in diversity (21-30 species per county), the southeast and western half of the state are higher (31-40 species) and the northwestern and northern Sandhill counties are the richest with more than 50 species per county. The present state list of 109 species represents 12 additions since 1998. Eleven additional species have been reported from the state, but are considered invalid or have been re-identified. This paper presents a short history of odonate study in Nebraska and an analysis of the data for the 109 species recorded in Nebraska to date. Distribution maps by county are included for each identified species." (Authors)] Address: Fred Sibley: fcsibley@empacc.net

**17310.** Šiblova, Z.; Moyzeova, M. (2019): Výskum vážok (Odonata) mokradí Borskej nížiny - Dragonflies and Damselflies (Odonata) research of wetlands in the area of Borska Nižina. *Ekologické štúdie* 10(1): 119-126. (in Slovakian, with English summary) ["The Borská nížina lowland is an important area in terms of the occurrence of rare wetland habitats, to which important dragonfly species with high conservation value are bound. Research was conducted in 2018 during the season from May to August. Together 9 sites were visited, on which 38 species, 7 taxa on genus level (*Cordulegaster* sp.) and 3657 individuals of dragonflies were confirmed. The individual sites were compared based on the dominance calculation and Menhinick's species richness index. For each site the risk factors were evaluated and possible management measures suggested." (Authors) *Anaciaeschna isosceles*, *Anax imperator*, *Brachytron pratense*, *Libellula fulva*, *Orthetrum coerulescens*, *O. brunneum*, *Somatochlora flavomaculata*, *Sympecma fusca*, *Leucorrhinia pectoralis*] Address: Šiblová, Zuzana, Katedra ekológie a environmentalistiky, Fakulta prírodných vied, Univerzita Konštantína Filozofa v Nitre, Trieda A. Hlinku 1, 949 74 Nitra, Slovakia. E-mail: zuzana.siblova@savba.sk

**17311.** Simon, E.; Tóthmérész, B.; Kis, O.; Jakab, T.; Szalay, P.E.; Vincze, A.; Baranyai, E.; Harangi, S.; Miskolczi, M.; Dévai, G. (2019): Environmental-friendly contamination assessment of habitats based on the trace element content of dragonfly exuviae. *Water* 2019, 11(11), 2200; 10 pp. (in English) ["We tested the usefulness of exuviae as an environmentally friendly method for exploring the variability of the trace element contents of protected insect populations without killing specimens. It

is a notable characteristic of dragonflies that they are good ecological indicators for both aquatic and terrestrial habitat quality. Thus, we investigated the trace element accumulation in different stages of dragonflies: larva, exuvia, and adult. Using microwave plasma atomic emission spectrometry (MP-AES), we analysed the concentrations of Al, Ba, Cr, Cu, Fe, Mn, Pb, Sr and Zn. We found that the trace element contents of exuviae are a good proxy of the trace element contents of both the larvae and the adults. We conclude that exuvia is useful for assessing the environmental health of aquatic ecosystems. It is an environmentally friendly method and it can be used even in the case of protected dragonfly species." (Authors)] Address: Simon, Edina, Dept of Ecology, Univ. of Debrecen, Egyetem sq. 1, H-4032 Debrecen, Hungary

**17312.** Sivtseva, L.V.; Davydova, N.G. (2019): First record of *Somatochlora alpestris* (Selys, 1840) (Odonata, Corduliidae) in Yakutia, Russia. *Eurasian Entomological Journal* 18(3): 175-176. (in Russian, with English summary) ["*S. alpestris* S. is newly recorded from Yakutia in the middle course of the river Indigirka near Kulun-Elbut village, 66°49'03" N, 142°43'59" E." (Authors)] Address: Sivtseva, L.V., Inst. Biological Problems of Cryolithozone SB RAS, Prosp. Leninà 41, Yakutsk 677980 Russia. E-mail: sivtseva\_l@mail.ru

**17313.** Slimani, N.; Sánchez-Fernández, D.; Guilbert, E.; Boumaïza, M.; Guareschi, S.; Thioulouse, J. (2019): Assessing potential surrogates of macroinvertebrate diversity in North-African Mediterranean aquatic ecosystems. *Ecological Indicators* 101: 324-329. (in English) ["Highlights: •Macroinvertebrate taxa are assessed as surrogates of aquatic biodiversity in Africa. •We found congruence among their patterns of species richness and composition. •Higher-taxa (mainly genus) can be used to predict species diversity. •We propose the use of Ephemeroptera and Coleoptera at genus level as surrogates. Abstract: The need to use surrogates of biodiversity is quite relevant in threatened habitats harboring high values of biodiversity, such as the Mediterranean aquatic ecosystems. In this study, we assess the performance of eight macroinvertebrate groups (Coleoptera, Heteroptera, Odonata, Trichoptera, Plecoptera, Ephemeroptera, Crustacea, and Mollusca) as surrogates of the whole aquatic macroinvertebrate assemblage in 49 localities from Northern Africa (Tunisia). Specifically, we aimed to test i) the congruence of the patterns of species richness and composition among these eight groups (at species level) in order to propose which groups could be accurate as indicators of diversity of the whole community, and ii) if higher-taxon levels (genera or families) are suitable for predicting overall species richness and composition in these ecosystems. In total, we found 72 families, 157 genera and 280 species. Our results show a high congruence between the patterns of species richness and composition of Ephemeroptera, Coleoptera (even at higher taxonomic levels, especially genus) and the whole community. Thus, we recommend the use of these two groups as surrogates of macroinvertebrate diversity in inland aquatic ecosystem in the study area. They can be used for both i) the rapid and inexpensive monitoring of biodiversity in aquatic ecosystems and ii) conservational studies in order to identify areas

with the highest values of freshwater biodiversity in Mediterranean areas. Finally, high values of congruence among taxonomic levels were found suggesting that, in general, higher taxa can be used as biodiversity surrogates for cost-effective practical survey in Mediterranean aquatic ecosystems from Northern Africa." (Authors)] Address: Slimania, Noura, UMR7179 CNRS/MNHN, Muséum National d'Histoire Naturelle, CP 50, 57 rue Cuvier, 75005 Paris, France. E-mail: noura.slimani@edu.mnhn.fr

**17314.** Smith, G.R.; Harmon, J.J. (2019): Differential oviposition and offspring success of gray treefrogs in the presence of an invasive fish. *Ecosphere* 10(2). Article e02612: 9 pp. (in English) ["Females often decide where to place their eggs or offspring based on the relative risks and benefits of a location. One trade-off may be between ovipositing with predators and ovipositing with competitors. Many amphibians show risk-sensitive oviposition and select oviposition sites based on offspring performance. We examined differential oviposition and offspring success by gray treefrogs (*Hyla versicolor*) in response to the presence of caged or free-ranging invasive western mosquitofish (*Gambusia affinis*) using cattletank mesocosms as experimental ponds. Our experiment sought to answer these questions by comparing the number of eggs laid and tadpoles produced among the experimental treatments: (1) Do gray treefrogs exhibit risk-sensitive oviposition? and (2) What is the relative importance of pre-colonization and post-colonization consumptive and trait-mediated effects of western mosquitofish? Gray treefrogs laid more eggs in control and caged predator mesocosms than in free-ranging predator mesocosms. At the end of the experiment, there were more tadpoles in control and caged predator mesocosms than in free-ranging predator mesocosms. Proportional yield was lower in free-ranging predator mesocosms than control and caged predator mesocosms. Eggs were laid 7.8 d earlier in control mesocosms than caged and free-ranging predator mesocosms. Western mosquitofish therefore had a negative effect on the successful colonization of experimental ponds by gray treefrogs, most likely through direct physical interactions. Our results also suggest gray treefrogs shift oviposition preferences as the number of conspecifics reaches a threshold where competition risk outweighs predation risk. Western mosquitofish therefore have great potential to affect the distribution of gray treefrogs through pre- and post-colonization effects." (Authors)] Address: Smith, G.R., Dept of Biol., Denison Univ., Granville, Ohio 43023 USA. E-mail: smithg@denison.edu

**17315.** Sniegula, S.; Nsanzimana, J.; Johansson, F. (2019): Predation risk affects egg mortality and carry over effects in the larval stages in damselflies. *Freshwater Biology* 64(4): 778-786. (in English) ["1. The non-consumptive predator effect may incur physiological costs that affect growth and development and ultimately survival. While studies have shown that the effect can affect development and growth in organisms with complex life cycles, we have limited knowledge on the effect in the egg and early larval stage. 2. Here, we used a laboratory experiment to examine how the presence of chemical cues, a non-consumptive predator effect, from an aquatic predator,

perch, affected hatching success of larvae in three species of damselfly, *Ischnura elegans*, *Coenagrion pulchellum*, and *Enallagma cyathigerum*. In addition, we examined how exposure to predation risk in the early larval stages affected growth in the late larval stages of *I. elegans*. 3. We found that the presence of chemical predator cues (1) increased egg mortality in all three species, (2) caused earlier hatching of eggs in one species, no change in a second species and a delay in egg hatching in a third species. We also found that predator cues have the potential to cause a carryover effect from early larval stages to late larval stages in terms of larval growth rate. 4. The addition of non-consumptive predator cues in the form of fish water caused higher algal growth than in the control experimental containers, and we suggest that this algal growth has the potential to confound predator stress cues. 5. Our results show that the non-consumptive predator effects affect survival and growth, and hence they have the potential to affect predator-prey dynamics in natural systems. Future studies on such effects in aquatic systems should consider confounding stressors, such as algae, fungi, oxygen, and nutrients levels, that might come with the addition of predation cues in water and thus add additional stress." (Authors)] Address: Sniegula, S., Dept Ecosystem Conserv., Inst. Nature Conservation, Polish Acad. Sciences, Krakow, Poland. Email: [szymon.sniegula@gmail.com](mailto:szymon.sniegula@gmail.com)

**17316.** Solis, M.; Arias, M.; Fanelli, S.; Bonetto, C.; Mugni, H. (2019): Agrochemicals' effects on functional feeding groups of macroinvertebrates in Pampas streams. *Ecological Indicators* 101(6): 373-379. (in English) ["Highlights: • Nutrients and endosulfan concentrations were higher in streams adjacent to crops. • Total invertebrate abundance and taxonomic richness were lower in cropped sites. • Shredders were dominant at the reserve and livestock streams. • Scrapers and predators were dominant at the cultivated sites. • Land use is causing change in functional feeding groups' composition. Abstract: The use of agrochemicals in Argentina has increased over the last decades and may represent an environmental risk for adjacent water bodies. In this work we study the invertebrate assemblages in nine streams sampled at 11 sites with different land use on the adjacent plots in the years 2011–2014. Four sites were located inside a biosphere reserve, 4 sites were located adjacent to livestock plots and the other 3 sites were adjacent to cropped plots. The taxa composition was assessed and sorted into functional feeding groups: shredders, gatherers, filterers, scrapers and predators. Significant differences were detected among the functional feeding groups according to the use given to the adjacent land. Total density and taxonomic richness were significantly higher in the streams next to the reserve and livestock sites than in those adjacent to cropped plots; there were no differences between the first two. Gatherers and shredders density was significantly higher in the reserve and livestock than in the cropped sites. Scrapers and predators were the best represented at the cropped sites. Nutrient concentrations in water and endosulfan concentrations in the bottom sediments were also higher at the cultivated sites, suggesting that agrochemical loads from land cultivation caused the observed differences in composition." (Authors)] Address: Solis, Marina, ILPLA Instituto de Limnología Dr. Raúl A. Ringuelet, CONICET

– UNLP, Boulevard 120 y 62. La Plata, 1900 Buenos Aires, Argentina. E-mail: [marinasolis@ilpla.edu.ar](mailto:marinasolis@ilpla.edu.ar)

**17317.** Spyra, A.; Strzelec, M. (2019): The implications of the impact of the recreational use of forest mining ponds on benthic invertebrates with special emphasis on gastropods. *Biologia* 74: 981-992. (in English) ["The relationships between the distribution and diversity patterns of benthic invertebrates in forest ponds used for different recreational activities were examined in this study. The study was based on sampling of benthic invertebrates, plant coverage, physical and chemical analysis of water samples and multivariate species analysis. Mining ponds varied in their solution chemistry and plant cover, with those used for recreation having significantly lower invertebrate occurrences (755 ind. m<sup>-2</sup>) compared to ponds with no recreational use (2629 ind. m<sup>-2</sup>). Statistically significant differences were also observed in the density of Oligochaeta, Hirudinea, Coleoptera, Trichoptera and Diptera between the two types of ponds. Overall, gastropods were more diverse and abundant in ponds not used for recreation. This appeared to relate strongly to plant cover, since cover was greatly reduced in recreational ponds, although plant diversity was enhanced. Density and diversity of benthic invertebrates was also observed to differ in relation to the kind of recreational use involved (recreational angling, swimming, power boating) although this was not quantified. The occurrence of freshwater snails primarily depended on the Ca concentration, the conductivity of the water and plant cover, but recreational disturbance appeared to reduce abundance where it occurred and was related to a reduction in overall plant cover." (Authors)] Address: Spyra, Aneta, Dept Hydrobiol. Fac. Biol. & Environmental Protection, Univ. of Silesia, ul. Bankowa 9, 40-007 Katowice, Poland. E-mail: [aneta.spyra@us.edu.pl](mailto:aneta.spyra@us.edu.pl)

**17318.** Sreelekshmi, S.; Abhilash, R. (2019): A preliminary study on the odonate diversity of Randapuncha wetland, Kulanada, Patanamthitta district, Kerala. *Science Chronicle* 8 (1&2): 1-8. (in English) ["A study was carried out to assess the Odonata fauna of Randam Puncha wetland near Kulanada in Pathanamthitta district from the first week of April to second week of June 2016. A total of 18 species of Odonates representing 3 families (Libellulidae, Gomphidae, Coenagrionidae) were recorded from Randam Puncha, Kulanada during the study period. *Acisoma panorpoides*, *Aethrimanta brevipennis*, *Brachydiplax chalybea*, *Rhyothemis variegata* and *Orthetrum sabina* were the common dragonflies spotted on the site. On the basis of total number of individuals recorded, Libellulidae was the most dominant family. The Shannon-Weiner diversity index recorded a higher value of 2.405 in Randam Puncha and the Margalef species richness was 2.409. The values of Pielou's evenness index 0.652 showed medium even distribution of species; the dominance index recorded was 0.895. Even though any rare or endangered species were not recorded in the present study, the Randam Puncha wetland showed rich odonate diversity and abundance." (Authors)] Address: Abhilash, R., Dept Zool., Christian College, Chengannur, Kerala, India. E-mail: [greenabilash@gmail.com](mailto:greenabilash@gmail.com)



**17319.** Stand-Perez, M.A.; Bota-Sierra, C.A.; Pérez-Gutiérrez, L.A. (2019): *Heteragrion demarmelsi* sp. nov., with taxonomic notes on Colombian *Heteragrion* species (Odonata: Heteragrionidae). *Zootaxa* 4623(1): 90-112. (in English, with Spanish summary) ["The large genus *Heteragrion* has a wide distribution in the Neotropics from southern Mexico to northern Argentina, occurring from sea level to 1800 m.a.s.l. In Colombia, so far ten species and two subspecies of the genus *Heteragrion* have been found; here we raise this number to 14, with three new records for the country (*H. angustipenne* Selys, 1886, *H. flavidorsum* Calvert, 1909 and *H. valgum* Donnelly, 1992), and the description of *H. demarmelsi* sp. nov. from Leticia Municipality, Amazonas Department. Also, the females of *H. angustipenne* and *H. flavidorsum* are described for the first time. *H. peregrinum* Williamson, 1919 is rediscovered and reported in new locations. Photographs of the main structures of taxonomic importance of males and females of all species of *Heteragrion* from Colombia are presented. Finally, we provide distribution maps, a taxonomic key (for males and females), and comments on the natural history of all *Heteragrion* species known from Colombia, are also included." (Authors)] Address: Stand-Perez, M.A., Grupo de investigación Biodiversidad del Caribe Colombiano, Depto Biol., Univ. del Atlántico, Barranquilla, Colombia. E-mail: mstand20@gmail.com

**17320.** Stavenga, D.G.; Wilts, B.D. (2019): Measuring the refractive index dispersion of (un)pigmented biological tissues by Jamin-Lebedeff interference microscopy. *AIP Advances* 9, 085107 (2019); <https://doi.org/10.1063/1.5113485>: 9 pp. (in English) ["Jamin-Lebedeff interference microscopy is a powerful technique for measuring the refractive index of microscopically-sized solid objects. This method was classically used for transparent objects immersed in various refractive-index matching media by applying light of a certain pre-designed wavelength. In previous studies, we demonstrated that the Jamin-Lebedeff microscopy approach can also be utilized to determine the refractive index of pigmented media for a wide range of wavelengths across the visible spectrum. The theoretical basis of the extended method was however only precise for a single wavelength, dependent on the characteristics of the microscope setup. Using Jones calculus, we here present a complete theory of Jamin-Lebedeff interference microscopy that incorporates the wavelength-dependent correction factors of the half- and quarter-wave plates. We show that the method can indeed be used universally in that it allows the assessment of the refractive index dispersion of both unpigmented and pigmented microscopic media. We illustrate this on the case of the red-pigmented wing of the damselfly *Hetaerina americana* and find that very similar refractive indices are obtained whether or not the wave-plate correction factors are accounted for." (Authors)] Address: Wilts, B.D., Adolphe Merkle Institute, University of Fribourg, CH-1700 Fribourg, Switzerland. E-mail: bodo.wilts@unifr.ch

**17321.** Storari, A.P.; Pereira, D.; Furieri, K.S. (2019): New occurrences of dragonflies in the Atlantic Forest fragments of Santa Teresa, Espírito Santo, Brazil. *Revista Brasileira de Gestão Ambiental e Sustentabilidade* 6(13): 481-497. (in Eng-

lish, Portuguese) ["One of the greatest obstacles to biodiversity conservation is the lack of information to prioritize efforts on practical actions. This lack of information comes mainly from absence of inventories in many areas where few groups have reasonably complete databases. The distribution of the dragonfly fauna of Brazil is little known - only 29% of the Brazilian territory presents data about the richness of Odonata. In this contribution, a database of Odonata species of Santa Teresa Municipality was built, Espírito Santo State, Brazil. The database has 627 specimens registered, 77 species distributed in eight families and 38 genera, 40 of these species are common, one endemic of the State of Espírito Santo, and 19 endemic of Brazil. In relation to the measure of conservation, four species are present in the category Insufficient Data (DD), one present in the Nearly Endangered (NT) category, three species in the Vulnerable category (VU) and one in the category In Danger (EN). 25 species are considered new occurrences for the city. These results suggest that the fauna of the studied region deserves attention and points to the interest in implanting future conservation units in the region of Santa Teresa municipality." (Authors) ] Address: Storari, Arianny, Depto Ciênc. Biol., Centro Ciênc. Humanas e Naturais. Univ. Fed. do Espírito Santo. Avenida Fernando Ferrari, 514. Goiabeiras. Vitória-ES, Brasil (CEP 29075-910). Email: ariannystorari@gmail.com

**17322.** Stretz, P.; Anderson, T.L.; Burkhart, J.J. (2019): Macroinvertebrate foraging on larval *Ambystoma maculatum* across ontogeny. *Copeia* 107(2): 244-249. (in English) ["Understanding community interactions, such as predator-prey dynamics, is vital for determining species viability. Outside of larger macroinvertebrate predators, such as crayfish and dragonfly larvae, there is a paucity of information regarding the effectiveness of other macroinvertebrate predators in consuming larval amphibians, especially caudate larvae, during aquatic life-stages within pond communities. In this study, we tested the ability of a suite of macroinvertebrate predators to consume Spotted Salamander larvae (*Ambystoma maculatum*) at two points during larval development. We tested the ability of macroinvertebrate predators belonging to the genera *Belostoma*, *Lestes*, *Notonecta*, and *Ranatra*, the families *Aeshnidae*, *Dytiscidae*, *Gomphidae*, *Gyrinidae*, *Hirudinae*, *Libellulidae*, and *Notonectidae*, or order *Trichoptera*, as well as larvae of *Rana clamitans*, to consume *A. maculatum* immediately after hatching and several weeks into their larval period across four separate experiments. We tested for significant differences in percent survival of *A. maculatum* among predator treatments using ANOVA. Across all trials, we found a significant effect of predator treatment. Both hatchling and larval *A. maculatum* were susceptible to predation by *Aeshnidae* and *Notonectidae*. In all other treatments, we observed low or zero mortality of hatchlings of *A. maculatum* and 100% survival of larvae of *A. maculatum*. As *Aeshnidae* and *Notonectidae* are both gape unconstrained predators, the increase in larval size did not appear to increase survival of *A. maculatum* due to increased escape performance. Overall, rates of predation are low for *A. maculatum* for most macroinvertebrates during the tested life stages, suggesting that predation by only a handful of invertebrate taxa and vertebrates contribute to high mortality

rates within this system." (Authors)] Address: Stretz, P., Division Biological Sciences, Univ. of Missouri, Columbia, Missouri 65211-7400, USA. Email: pipermstretz@gmail.com

**17323.** Takahashi, M.; Takahashi, Y.; Kawata, M. (2019): Candidate genes associated with color morphs of female-limited polymorphisms of the damselfly *Ischnura senegalensis*. *Heredity* 122: 81-92. (in English) ["Many Odonata species exhibit female-limited polymorphisms, where one morph is similar to the conspecific male in body color and other traits (andromorph), whereas one or more other morphs differ from the male (gynomorphs). Here we investigated the differentially expressed transcripts (DETs) among males and two female morph groups (gynomorphs and andromorphs) using RNA-seq to identify candidate transcripts encoding female-limited polymorphisms in *I. senegalensis*. Seven DETs that had significantly different expression levels between males and gynomorphs, but not between males and andromorphs, were identified. The expression levels of four of these candidate genes, doublesex (*dsx*), black, ebony, and chaoptin (*chp*), were selected for further analysis using qRT-PCR. Sequence analysis of the *dsx* amplicons revealed that this gene produced at least three transcripts. Two short transcripts were mainly expressed in males and andromorphs, whereas the long transcript was specifically expressed in both morph female groups; that is, the expression pattern of the *dsx* splice variants in andromorphs was an intermediate between that of males and gynomorphs. Because the *dsx* gene functions as a transcription factor that regulates the sex-specific expression of multiple genes, its splice variants in *I. senegalensis* may explain why the andromorph is female but exhibits some masculinized traits. Because we did not detect different coding sequences of the candidate genes among the different morphs, a diallelic genomic region controlling alternative splicing of *dsx*, thus determining female-limited polymorphism in *I. senegalensis* most likely lies in a non-coding region of the *dsx* gene or in a gene upstream of it." (Authors)] Address: Takahashi, Y., Dept Biol., Fac. Science, Chiba Univ., 1-33 Yayoi, Inage, Chiba, 263-8522, Japan

**17324.** Tamada, A.; Okude, G.; Futahashi, R. (2019): A white-winged female of *Mnais costalis*. *Tombo* 61: 41-43. (in Japanese, with English summary) ["A white-winged female of *M. costalis* was collected in Shibata city, Niigata Prefecture. Nuclear ITS1 sequence indicated that this specimen is *M. costalis*. Morphological examination showed that the white coloration was attributed to a wax-like substrate secreted outside the wing membrane, which is similar to the white-winged form of *M. pruinosa* previously found in Boso Peninsula, Chiba Prefecture and replaces the opaque area of normal orange-winged males." (Authors)] Address: Futahashi, R., Nat. Inst. Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**17325.** Tennessen, K.J. (2019): Dragonfly nymphs of North America. An identification guide. Springer: 620 pp. (in English) ["This monograph is the first of its kind devoted entirely to the dragonfly nymphs of North America north of Mexico,

the focus being accurate identification of the 330 species of Anisoptera that occur in the region. Nymphal external morphology is described and illustrated in detail, and all terms needed to navigate the dichotomous keys are defined. Species are tabulated with references that provide the most detailed, accurate descriptions for each; species that are inadequately described are so indicated. The key separating the seven families in the region contains several new characters. The families are then covered separately: Aeshnidae (13 genera), Gomphidae (17 genera), Petaluridae (2 genera), Cordulegastridae (2 genera), Macromiidae (2 genera), Corduliidae (7 genera), and Libellulidae (29 genera). Each family is further characterized, followed by a generic key. A drawing of the habitus and diagnostic details for each genus are provided, along with additional diagnostic remarks and notes on habitat and life cycle; for each genus, a map shows its geographic distribution in North America. Full-grown nymphs of all known species of each genus are keyed and diagnosed; characters that apply to earlier instars are noted. Morphological variation in character states was analyzed in order to assess the reliability of previously utilized characters and to discover new characters. Most of the characters used to distinguish all levels of taxa are illustrated; a total of 702 figures, comprising 1,800 original drawings, along with selected photographs where necessary for clarity, accompany the keys. Measurements of total length, head width, and other variables for each species are provided in tables. Difficulties with past keys and descriptions, including errors, omissions and other shortcomings, are addressed. The importance of nymph characters in helping solve generic and specific distinctions and their role in phylogenetic studies is emphasized. Methods for collecting, rearing, and preserving dragonfly nymphs and exuviae are presented. The final chapter discusses research opportunities on North American Anisoptera nymphs, including taxonomic needs, studies on structure and function, life history and microhabitat, water quality indices and conservation efforts. The habitus drawings of all genera are arranged according to family in five plates (Appendix I); although the book is intended as a lab manual, these plates conveniently allow for comparison based on nymph shape making field identification to genus possible in many cases. Appendix II contains a brief history of dragonfly nymph studies in North America. A glossary and an index to scientific names are included." (Publisher)] Address: Tennessen, K.J., Florida State Collection of Arthropods, Gainesville, FL, USA, Wautoma, WI, USA

**17326.** Termaat, T.; van Strien, A.J.; van Grunsven, R.H.A.; De Knijf, G.; Bjelke, U.; Burbach, K.; Conze, K.-J.; Goffart, P.; Hepper, D.; Kalkman, V.J.; Motte, G.; Prins, M.D.; Prunier, F.; Sparrow, D.; van den Top, G.G.; Vanappelghem, C.; Winterholter, M.; Wallis DeVries, M.F. (2019): Distribution trends of European dragonflies under climate change. *Diversity and Distributions* 25 (6):936–950. ["Aim: Poleward range shifts of species are among the most obvious effects of climate change on biodiversity. As a consequence of these range shifts, species communities are predicted to become increasingly composed of warm-dwelling species, but this has only been studied for a limited number of taxa, mainly birds, butterflies and plants. As species groups may vary considerably in their adaptation to climate change, it is desirable to expand these studies to

other groups, from different ecosystems. Freshwater macroinvertebrates, such as Odonata, have been ranked among the species groups with highest priority. In this paper, we investigate how the occurrence of dragonflies in Europe has changed in recent decades, and if these changes are in parallel with climate change. Location: Europe. Methods: We use data from 10 European geographical regions to calculate occupancy indices and trends for 99 (69%) of the European species. Next, we combine these regional indices to calculate European indices. To determine if changes in regional dragonfly communities in Europe reflect climatic warming, we calculate Species Temperature Indices (STI), Multi-species Indicators (MSI) and Community Temperature Indices (CTI). Results: 55 of 99 considered species increased in occupancy at European level, 32 species remained stable, and none declined. Trends for 12 species are uncertain. MSI of cold-dwelling and warm-dwelling species differ in some of the regions, but increased at a similar rate at European level. CTI increased in all regions, except Cyprus. The European CTI increased slightly. Main conclusions: European dragonflies, in general, have expanded their distribution in response to climate change, even though their CTI lags behind the increase in temperature. Furthermore, dragonflies proved to be a suitable species group for monitoring changes in communities, both at regional and continental level." (Authors)] Address: Termaat, T., De Vlinderstichting/Dutch Butterfly Conservation, Wageningen, The Netherlands. E-mail: timtermaat@gmail.com

**17327.** Thakuria, D.; Kalita, J. (2019): Study on the seasonality, habitat and aspects of reproductive behavior of *Calicnemia miles* (Laidlaw, 1917) (Odonata: Platycnemididae) from Assam, India. *Advances in Zoology and Botany* 7(2): 19-23. (in English) ["*C. miles* is a bright red blood colored, damselfly specialized to waterfalls. Apart from the limited knowledge on the flight season, no prior reports on the breeding biology of the species are available. The present study attempts to describe the seasonality, habitat and behavioral aspects of oviposition in *C. miles* recorded from Assam. The population of *C. miles* was recorded during late premonsoon (April-May) and early monsoon season (June-July); peak of flight and copulation was observed in the month of June. The species occupies shady areas near waterfalls and was found to prefer roots of trees, moss carpet and damp seepage of streamlets surrounded by vegetation for mating and oviposition. The female deposits eggs into the plant tissue endophytically. Daily oviposition activity lasts from 80-120 minutes during which the males guards their females in tandem till the entire episode of oviposition." (Authors)] Address: Thakuria, D., Dept Zool., Biodiversity & Conservation Lab. Gauhati Univ., India

**17328.** Thaokar, N.R.; Verma, P.R.; Andrew, R.J. (2019): Moulting pattern and mortality during the final emergence of the Coromandel Marsh Dart Damselfly *Ceragrion coromandelianum* (Zygoptera: Coenagrionidae) in central India. *Journal of Threatened Taxa* 11(13): 14672-14680. (in English) ["The final emergence of *C. coromandelianum* was studied for 50 days (22 January–12 March, 2011) from the botanical garden of Hislop College, Nagpur, India, (a semi controlled site) where

small underground cement tubs/tanks are used to grow macrophytes by the Botany department. In *C. coromandelianum* emergence is asynchronous, diurnal and occurs between 07.00h and 18.00h. Stage-I starts when the ultimate instar nymph of *C. coromandelianum* leaves the water body, searches for a suitable place and then begins to shudder its body to detach the trapped pharate from the nymphal exuvia. The pharate exerts pressure on the thoracic tergites to split the cuticle. Stage-II starts when the head and thorax of the pharate emerges out of the split exuvia. The pharate struggles to remove its trapped body from the nymphal exuvia. During Stage-III, the wings expand but are opaque; pigmentation of the body occurs simultaneously all over the body. Soon the whole body develops its species specific coloration while the expanding wings gain transparency, unfold and separate out and now the imago is ready for its maiden flight. Stages I, II, and III occupy 31.66%, 11.73%, and 56.60% of the total moulting period, respectively. A total of 243 emergences occurred during the observation period, 158 emergences occurred in tanks containing *Pistia stratiotes*, while 65 emergences in tubs containing *Nymphaea nouchali* indicating that *C. coromandelianum* prefers *P. stratiotes* over *N. nouchali* for oviposition. 20 deaths were recorded during the present observation. Failure to moult (15%) and failure to emerge completely out of the exuvia (85%) were the two reasons for mortality." (Authors)] Address: Thaokar, N.R., Centre for Higher Learning & Research in Zoology, Hislop College, Civil lines, Nagpur, Maharashtra 440001, India. E-mail: Nilesh.thavkar@gmail.com

**17329.** Theischinger, G.; Richards, S.J. (2019): *Agyrtacantha picta* sp. nov., a new dragonfly from southern Papua New Guinea (Odonata: Aeshnidae). *Odonatologica* 48(1/2): 155-165. (in English) ["A new species of *Agyrtacantha* is described from the Purari River basin in Gulf Province, Papua New Guinea. The new species is most similar to *A. dirupta*, a species widespread in the Papuan region, but differs from that species and other known congeners by the unique colour pattern on the front and sides of the synthorax and the particularly long and slender anal appendages. Both sexes are described and illustrated, and the species is compared with its most similar congeners." (Authors)] Address: Theischinger, G., Australian Museum, Entomology, 6 College Street, Sydney, NSW 2010, Australia. E-mail: theischingergunther@gmail.com

**17330.** Theischinger, G. (2019): *Austrophya monteithorum* sp. n., a new dragonfly (Odonata: Anisoptera, Libelluloidea) from tropical Queensland, Australia, with notes on its collection and locality. *Australian Entomologist* 46(3): 145-155. (in English) ["*Austrophya monteithorum* sp. n. is described from a larva collected on the summit plateau of Thomson Peak in tropical Queensland, Australia. The species is compared with *A. mystica* Tillyard (type species of the hitherto monotypic genus) and with larvae of other related genera. Details are given of the type locality, which is difficult to access, and of collections that have been made there." (Author)] Address: Theischinger, G., Australian Museum, Entomology, 6 College Street, Sydney, NSW 2010, Australia. E-mail: theischingergunther@gmail.com



- 17331.** Tobias-Loaiza, M.; Tamaris-Turizo, C.E. (2019): Odonatos de la Sierra Nevada de Santa Marta, Colombia: una lista preliminar. *Rev. Acad. Colomb. Cienc. Ex. Fis. Nat.* 43(167): 212-218. (in Spanish, with English summary) ["Odonata of the Sierra Nevada de Santa Marta, Colombia: A preliminary list. We raised a list of Odonata species and genera from eight rivers of the Sierra Nevada of Santa Marta (SNSM) after the revision of scientific articles, theses, and specimens deposited in the Centro de Colecciones de la Universidad del Magdalena (CEBUMAG). We found 38 species distributed in 35 genera and eight families. The Libellulidae family presented the greatest richness (14 genera) and the widest range of altitudinal distribution (between 50 and 2,800 m a.s.l.) found in all vegetable coverages. The Gaira River exhibited the greatest wealth among the revised rivers with 26 genera of which eight are exclusive to the basin while in the Ranchería River only *Progomphus* was registered. *Argia* and *Brechmorhoga* had a wide spatial distribution as they were recorded in six rivers. The review revealed the lack of studies on the eastern and southwestern slopes of the Sierra Nevada de Santa Marta, so it is recommended to carry out taxonomic and biodiversity work to contribute to the knowledge of Odonata in the Colombian Caribbean." (Authors)] Address: Tobias-Loaiza, Grupo de Investigación & Biodiversidad y Ecología Aplicada, Univ. Magdalena, Santa Marta, Colombia. E-mail: melizzatobias.26@gmail.com
- 17332.** Tonczyk, G. (2019): The Odonatological Section of the Polish Entomological Society – 20 years have passed. *Odonatrix* 15\_1: 12 pp. (in Polish, with English summary) ["It was established on the 18th of April, 1998, ... This text presents a brief history of the Section, including changes to board members and the *Odonatrix* newsletter editorial staff, as well as the list of National Odonatological Symposia organised to date." (Author)] Address: Tonczyk, G., Katedra Zoologii Bezkręgowców i Hydrobiologii, Uniwersytet Łódzki, ul. Banacha 12/16, 90-237 Łódź, Poland. E-mail: tonczyk.grzegorz@gmail.com
- 17333.** Torralba-Burrial, A. (2019): Experiencia de aprendizaje no-formal para alumnado de Educación Primaria y Secundaria sobre libélulas (Insecta: Odonata) en el marco de la Semana de la Ciencia. *Boletín de la Sociedad Entomológica Aragonesa* 65: 227-230. (in Spanish, with English summary) ["Science and Technology Week is probably the largest event of scientific communication to society in Spain. A non-formal learning activity on the dragonflies was included among the activities proposed by the University of Oviedo in three academic years for Primary and Secondary Education in Asturias. The experience is described; the contributions presented by the Primary Education students are analysed in order to assess their concept of dragonfly and the diagnostic characteristics of odonates and those species that they considered most interesting, their behaviour and habitats. The students' questions and their learning interests about these insects are discussed, especially in the final years of Primary Education and in Secondary Education, as well as possible ways of motivating biodiversity learning as suggested by their questions. Student participation was higher in Primary Education and the first years of Secondary Education (especially when there had been a previous directed inquiry), and very low in the final years of Secondary Education." (Author)] Address: Torralba-Burrial, A., Dpto. Ciencias de la Educación, Univ. de Oviedo, Oviedo, Spain. E-mail: torralbaantonio@uniovi.es
- 17334.** Torres-Pachon, M.; Novelo-Gutierrez, R; Ruiz-Sanchez, E (2019): A synopsis of *Phyllogomphoides Belle*, 1970 (Odonata: Gomphidae) of Mexico: taxonomy and distribution. *Zootaxa* 4634: 67 pp. (in English, with Spanish summary) ["A synopsis of the 13 species of *Phyllogomphoides Belle*, 1970 known to occur within Mexico is presented. Taxonomic keys for males are based primarily on morphology of anterior and posterior hamules, caudal appendages and of the vulvar lamina in females and includes full descriptions for each species accompanied by high-resolution photographs, drawings, comparative diagnostic notes, natural history and distribution maps. Females of *P. danieli* González & Novelo, 1990 and *P. nayaritensis* Belle, 1987 are described for the first time. Moreover, new records for *P. albrighti* (Needham, 1950) for the states of Guerrero; *P. danieli* González & Novelo, 1990 for Colima, Guerrero and San Luis Potosí; *P. duodentatus* Donnelly, 1979 for Oaxaca; *P. luisi* González & Novelo, 1990 for Nayarit, and *P. pugnifer* Donnelly, 1979 for San Luis Potosí, are also provided." (Authors)] Address: Torres-Pachon, Monica, Programa de Doctorado en Ciencias. Red de Biodiversidad y Sistemática. Instituto de Ecología A.C., Carretera antigua a Coatepec 351, El Haya, Xalapa, Veracruz, México. E-mail: monibiolo@gmail.com
- 17335.** Trapero-Quintana, A.; Torres-Cambas, Y.; Rivas-Torres, A.; Ferreira, S.; Cordero-Rivera, A. (2019): The first record of parasitism by *Forcipomyia* (Diptera: Ceratopogonidae) in Cuban odonates. *Novitates Caribaea* 14: 105-110. (in English, with Spanish summary) ["Several species of biting midges of the genus *Forcipomyia* are frequently found attached to the wings of adult odonates, acting as parasites by sucking haemolymph from the wing veins. Here we report the first finding of *F. incubans* on odonates in the peninsula of Zapata, Cuba. We found the midge on the wings of *Erythrodiplax simplicicollis*, *E. umbrata*, *Crocothemis servilia*, and in the wings and body of *Perithemis domitia*, all species belonging to the family Libellulidae. This is the first record of this interaction for the Antilles." (Authors)] Address: Trapero-Quintana, A., Departamento de Biología Animal y Humana, Facultad de Biología, Universidad de La Habana, Cuba.
- 17336.** Tuhin, S.H. (2019): Checklist and seasonal distribution of odonata (Insecta) of Khulna University campus, Bangladesh. *Journal of Entomology and Zoology Studies* 7(1): 160-164. (in English) ["An extensive survey of odonates were conducted in Khulna University Campus from August 2014 to August 2018. In total 40 species belonging to 24 genera and 4 families of odonates were recorded. Anisoptera contributed with 25 species belonged to 17 genera and two families and Zygoptera contributed with 15 species of 7 genera and two families. Libellulidae found most dominant family of odonates by contributing 24 species over Coenagrionidae, Platycnemididae, and Gomphidae. Species richness increased in monsoon

and 95% of the total species count were recorded in June-October. In winter, species richness declined at lowest number." (Authors)] Address: Md. Sajjad Hossain Tuhin, Forestry & Wood Technology Discipline Khulna Univ., Khulna, Bangladesh

**17337.** Tuskavetska, I. (2019): Diversity and modern study of Odonata in the territory of Lubny district. Education and Science 1(26): 63-70. (in Ukrainian, with English summary) ["The article outlines the main river biocenoses of Lubny district (Ostapivka village, Bopodarivka village, Pisky tillage and Brovarky village), meadows, swamps, marshy lakes, coastal areas of the Sula and Viazovets rivers. The quality of representativeness of the species diversity of the Odonata fauna has been estimated by calculating their dominant index and distribution index in the main biotopes of the studied territory. 25 species of Odonata were caught with 6 families (Libellulidae, Calopterygidae, Coenagrionidae, Gomphidae, Lestidae, Aeshnidae). The most widespread species of this area are Coenagrion puella, C. pulchellum, Calopteryx splendens; common - Ischnura elegans, Lestes virens, L. sponsa, Libellula depressa, Aeshna grandis; rare are Aeshna juncea, Sympetrum danae and Libellula quadrimaculata. The most rich in species composition of the estates of the study area are the coastal areas of the river Viazovets and floodplain meadows with Bohodarivka, and the least numerous - forest glades, coastal areas of the Sula river in the village of Brovarky. Actively fly in the spring-summer period Calopteryx virgo, C. splendens, Coenagrion puchellum, C. puella, and the least in the summer-autumn - Sympetrum vulgatum and S. sanguineum." (Authors)] Address: not stated

**17338.** Tyrell, M. (2019): Hatching of submerged eggs of Chalcolestes viridis (Vander Linden) (Willow Emerald Damselfly). J. Br. Dragonfly Society 35(2): 39-47. (in English) ["C. viridis showed a major expansion of range in 2016 (Parr, 2017), resulting in its discovery at a small pond in Finedon Pocket Park, Northamptonshire in October of that year. In 2017 adults and oviposition were recorded at Finedon into a set of Willow trees (Salix spp.) growing in the water. During the very wet winter of 2017-2018, the pond flooded and the Willows were completely submerged such that no sign of them was obvious by April 2018. Adults were again recorded in 2018 and, during routine recording, some empty scars from 2017 were noted on previously submerged Willow branches. Images taken of these scars alongside those of fresh egg scars and those known to have hatched outside of the water confirmed that the eggs of this species can tolerate submersion during hatching and therefore hypoxic conditions are not required to stimulate egg hatching; neither do they inhibit it. Other observations suggest that egg hatching in C. viridis is stimulated by photoperiod and/or temperature." (Author)] Address: Tyrell, M., 8 Warwick Close, Raunds, Northamptonshire, NN9 6JH

**17339.** Tyrell, M. (2019): Coenagrion pulchellum (Vander Linden) (Variable Damselfly) in Northamptonshire VC32: A review of preferred breeding habitats. J. Br. Dragonfly Society 35(2): 70-78. (in English) ["The habitat preferences of C. pul-

chellum are not well understood, with apparently suitable habitat not selected for breeding. In Northamptonshire, this is a rare species, known from only three sites, one longstanding (Maxey Pits), one discovered in 2018 (Weldon Woodland Park) and the third discovered in 2019 (Wicksteed Park). This review examines the habitats chosen by C. pulchellum and finds that there are many characteristics that are shared with other sites that do not host this species, but that one feature - the presence of flowering lillies (Nymphaea spp.) - is common to all three of the host sites but rare at other sites. C. pulchellum appears to use these exclusively for oviposition, suggesting that the habitats in Northamptonshire, despite its rich matrix of well-vegetated gravel pits, are not suitable unless they possess this type of lilly pad." (Author)] Address: Tyrell, M., 8 Warwick Close, Raunds, Northants, NN9 6JH, UK

**17340.** Üveges, B.; Szederkényi, M.; Mahr, K.; Móricz, A.M.; Krüzselyi, D.; Bókony, V.; Hoi, H.; Hettyey, A. (2019): Chemical defense of toad tadpoles under risk by four predator species. Ecology and Evolution. 2019: 13 pp. (in English) ["Many organisms use inducible defenses as protection against predators. In animals, inducible defenses may manifest as changes in behavior, morphology, physiology, or life history, and prey species can adjust their defensive responses based on the dangerousness of predators. Analogously, prey may also change the composition and quantity of defensive chemicals when they coexist with different predators, but such predator-induced plasticity in chemical defenses remains elusive in vertebrates. In this study, we investigated whether tadpoles of the common toad (Bufo bufo) adjust their chemical defenses to predation risk in general and specifically to the presence of different predator species; furthermore, we assessed the adaptive value of the induced defense. We reared tadpoles in the presence or absence of one of four caged predator species in a mesocosm experiment, analyzed the composition and quantity of their bufadienolide toxins, and exposed them to free-ranging predators. We found that toad tadpoles did not respond to predation risk by upregulating their bufadienolide synthesis. Fishes and newts consumed only a small percentage of toad tadpoles, suggesting that bufadienolides provided protection against vertebrate predators, irrespective of the rearing environment. Backswimmers consumed toad tadpoles regardless of treatment. Dragonfly larvae were the most voracious predators and consumed more predator-naive toad tadpoles than tadpoles raised in the presence of dragonfly cues. These results suggest that tadpoles in our experiment had high enough toxin levels for an effective defense against vertebrate predators even in the absence of predator cues. The lack of predator-induced phenotypic plasticity in bufadienolide synthesis may be due to local adaptation for constantly high chemical defense against fishes in the study population and/or due to the high density of conspecifics." (Authors)] Address: Üveges, B., Lendület Evolutionary, Ecology Research Group, Plant Protection Institute, Centre for Agricultural Research, Hungarian Academy of Sciences, Herman Ottó út 15, 1022 Budapest, Hungary. E-mail: uveges.balint@yahoo.de

**17341.** Umeda, T. (2019): Sympetrum darwinianum (Selys, 1883) with a deformed abdomen. Tombo 61: 48. (in Japanese,

with English summary) ["A mature female specimen of *S. darwinianum* with a deformed abdomen was captured in Oki island, Shimane prefecture. Forth to eighth abdominal segments of the specimen are abnormally short, while the other segments, including the genital organs, are normal. It is interesting that such a deformed individual is able to survive in a natural environment." (Author)] Address: not stated.

**17342.** Uz, A.G. (2019): A research of intra-species wing variations in *Orthetrum brunneum* (Fonscolombe, 1837) (Insecta: Odonata). Hitit University, Graduate School of Natural and Applied Sciences: XIII + 49 pp. (in Turkish, with English summary) ["Geographical and ecological diversity positively affect in-species diversity in different populations of the same species. Dozens of a ecological barrier, especially in Turkey to investigate the effect of Anatolia Diagonale terms of biodiversity has increased in recent years. The aim of this study is to determine the variations of wing morphology of *O. brunneum* species in different populations by using geometric morphometry method. For this purpose, intra-species wing variations of three different *O. brunneum* populations collected from Tunceli province to the east of Anatolia Diagonale and Yozgat province to the west of Anatolia Diagonale and Western Mediterranean Region were investigated. Statistical analysis (Tukey HSD) showed that a large number of biometric characteristics differed statistically among these taxa ( $P < 0.05$ ). According to Principal Component Analysis (PCA), 4 components with total variance Eigen value over 1 can be explained among these groups and samples of Tunceli population are separated from other populations by Discriminant Function Analysis (DFA). These findings support the idea that Anatolian Diagonale may be a barrier for populations of *O. brunneum*. Therefore, it is necessary to study and take into account the variational situations of Anatolian samples." (Author)] Address: not stated

**17343.** Vandromme, M.; Trekels, H.; Ruiz, N.S.; Somarriba, E.; Vanschoenwinkel, B. (2019): Exploring the suitability of bromeliads as aquatic breeding habitats for cacao pollinators. *Hydrobiologia* 828: 327-337. (in English) ["Bromeliads are common plants in the Neotropics. Being epiphytic, they are often incorrectly considered as parasites and removed from agroforestry systems. However, their water-filled leaf axils provide habitats for a diverse group of aquatic organisms, potentially including cacao pollinating dipterans which could be beneficial to local farmers. Thus far, it is unclear how frequently and abundantly potential pollinators occur in bromeliads in cacao plantations. Therefore, we investigated the aquatic fauna in different types of bromeliads in Nicaraguan cacao agroforestry systems. Our main goal was to study the impact of bromeliad morphology and vertical position on aquatic biodiversity with particular attention for larvae of presumed cacao pollinators. Aquatic biodiversity was higher in larger bromeliads and in bromeliads positioned closer to the ground. Particularly invertebrates without flying life stages were deficient in elevated bromeliads suggesting dispersal limitation. Potential cacao pollinators occurred in 66% of the bromeliads and were most abundant in bromeliads with larger tanks that were located higher in the canopy rather than on the plantation floor. We conclude that larvae of cacao pollinators can be common and relatively abundant inhabitants

of tank bromeliads in cacao trees, and it is likely that preserving these habitats could boost local pollinator abundances." (Authors)] Address: Vandromme, M., Community Ecology Lab, Dept of Biology, Vrije Univ. Brussel (VUB), Brussels, Belgium

**17344.** Vary, P.; Sansault, E. (2019): Première observation de *Trithemis annulata* en région Centre-Val de Loire (Odonata: Libellulidae). *Martinia Tome* 34(1-2): 56. (in French) [14-X-2018, lac des Bretonnières (47,351120°N / 0,641493°E, WGS84), Joué-lès-Tours (Indre-et-Loire, 37), France.] Address: Vary, P., 3, rue Edith Piaf, F-37300 Joué-lès-Tours, France. E-mail: p.vary@orange.fr

**17345.** Vassilenko, D.V.; Pritykina, L.N. (2019): *Mongolothemis gobicus* Pritykina et Vassilenko, 2014 is an objective synonym of *Paragonophlebia patriciae* Nel, 2009 (Insecta: Odonata). *Paleontological Journal* 53(3): 323-323. (in English) ["In 2014 we identified a fossil hindwing from the Upper Jurassic Shar Teg locality (Southern Mongolia) as belonging to the extinct dragonfly family Euthemistidae Pritykina, 1968 and described it as the species *Mongolothemis gobicus* Pritykina et Vassilenko, 2014 (Pritykina et Vassilenko, 2014). Later it turned out that this specimen (PIN, no. 4270/873) had previously been described as *Paragonophlebia patriciae* Nel, 2009 belonging to a new genus and new family Paragonophlebiidae Nel, 2009 (Nel, 2009). In our opinion, the erection of a new family is unnecessary but quite acceptable, taking into account the taxonomic importance of the characters used by the author. Thus, the species name *Mongolothemis gobicus* given by us is an objective synonym of *Paragonophlebia patriciae* Nel, 2009." (Authors)] Address: Vassilenko, D.V., Borissiak Paleontological Institute, Russian Academy of Sciences, Moscow, Russia

**17346.** Verheyen, J.; Stoks, R. (2019): Temperature variation makes an ectotherm more sensitive to global warming unless thermal evolution occurs. *Journal of Animal Ecology* 88(1): 624-636. (in English) ["1. To assess long-term impacts of global warming on species there is growing interest in latitudinal intra-specific patterns in thermal adaptation. Yet, while both mean temperatures and daily temperature fluctuations (DTFs) are expected to increase under global warming, latitudinal differences in the effects of DTFs have not been documented. 2. We tested whether low-latitude populations of an ectotherm deal better with greater DTF than high-latitude populations, especially at a high mean temperature close to the optimal temperature for growth where DTF causes exposure to extreme high temperatures. We evaluated the impact of DTFs when assessing the effect of gradual thermal evolution at the high latitude with a space-for-time substitution. 3. We compared effects of both mean temperatures (20°C and 24°C) and DTFs (constant = 0°C, low = 5°C and high = 10°C) on growth rates between low-latitude and high-latitude populations of *Ischnura elegans* in a common-garden experiment. 4 DTFs, if anything, reduced growth and were generally stressful as indicated by reductions in body condition, antioxidant defense and metabolic rate, and increases in oxidative damage. Most negative effects of DTFs were only present at a mean of 24°C when



too high temperatures were reached during a daily cycle. Notably, while 4°C warming was beneficial in terms of growth rate at both latitudes at a constant temperature regime, this changed in a negative effect at high DTF. Moreover, this modulating effect of the mean temperature by DTF differed between latitudes indicating local thermal adaptation. While 4°C warming at low DTF still caused faster growth in low-latitude larvae, it already slowed growth in high-latitude larvae. This supports the emerging insight that warming would increase growth in high-latitude larvae in absence of DTF, yet would decrease growth in the more realistic scenarios with DTF. In contrast, a space-for-time substitution approach suggested that under gradual thermal evolution, the evolved high-latitude larvae would no longer suffer a growth reduction in the presence of DTF. 5. Our study provided important proof-of-principle that jointly integrating gradual thermal evolution and the expected increase in DTF generates opposing predictions of effects of global warming on this ectotherm." (Authors)] Address: Stoks, R., Lab. Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**17347.** Vilela, D.S.; Koroiva, R.; Guillermo-Ferreira, R. (2019): *Heteragrion denisye* sp. nov. (Odonata: Zygoptera: Heteragrionidae), a notable species from Serra da Canastra, Minas Gerais, Brazil. *Zootaxa* 4671(4): 589-594. (in English) ["*Heteragrion denisye* sp. nov. (Zygoptera: Heteragrionidae) is described and diagnosed on specimens collected near a Vereda (i.e. palm swamp) area of the National Park of Serra da Canastra, Minas Gerais, Brazil (-20.2323, -46.6085, 1305 m, 25 x 2018, Vilela, Koroiva, Nobrega & Lera leg.). This species is unique within the genus and it is easily distinguished from congeners due to its blue coloration pattern and cerci morphology, which is robust and presents a reduced apical portion, longer on most *Heteragrion* species." (Authors)] Address: Vilela, D.S., Lab. Ecol. Stud. on Ethology & Evolution (LESTES), Dept of Hydrobiol., Fed. Univ. of São Carlos, Brazil. E-mail: deeegoo@gmail.com

**17348.** Vilela, D.S.; Koroiva, R.; Cordero-Rivera, A.; Guillermo-Ferreira, R. (2019): A further study on *Franciscobasis* Machado & Bedê, 2016 (Odonata: Coenagrionidae), a newly described genus from Minas Gerais, Brazil. *PLoS ONE* 14(10): e0223241. <https://doi.org/10.1371/journal.pone.0223241>: 14 pp. (in English) ["The genus *Franciscobasis* Machado & Bedê, 2016 is endemic to the Serra da Canastra National Park in Minas Gerais state, Brazil. Two species of *Franciscobasis* were described simultaneously with the genus description: *F. franciscoi* and *F. sonia*, the latter described only from females. Through morphological and molecular analysis, we investigated if *F. sonia* may represent the young female of *F. franciscoi*. Resulting data did not present adequate differences between females to characterize them as different species. Therefore, we suggest that *F. sonia* is a junior synonym of *F. franciscoi*, and the female of *F. franciscoi* goes through a complex ontogenetic color change." (Authors)] Address: Vilela, D.S., Graduate Program in Entomology, Dept of Biology, Univ. of São Paulo (USP), Ribeirão Preto, Brazil. E-mail: deeegoo@gmail.com

**17349.** Vilela, D.S.; Guillermo-Ferreira, R.; Encalada, A.C.; Cordero-Rivera, A. (2019): *Philogenia gaiaie* sp. nov. (Zygoptera: Philogeniidae) and description of the female of *P. macuma* Dunkle, 1986, two species from the Ecuadorean lowland rainforest. *Zootaxa* 4683(3): 412-420. (in English) ["*P. gaiaie* sp. nov. (Holotype ♂, Ecuador, Orellana, Tiputini Biodiversity Station, -0.6349, -76.1501, 241 m, 13 xii 2012, A. Cordero-Rivera & M. Sanchez-Herrera leg., in MUAE) from the helena group is described, illustrated, diagnosed and compared with morphologically close species of the genus. *P. gaiaie* can be distinguished from its most similar congener *P. minteri* Dunkle, 1986 by the enlarged cerci and the club-like paraprocts. We also describe the female of *P. macuma* Dunkle, 1986, from a pair collected at Jatun Sacha Biological Reserve, which is also similar to *P. gaiaie* and can be distinguished by the intersternite morphology, ovipositor length and vulvar lamina shape." (Authors)] Address: Vilela, D.S., Lab. of Ecological Studies on Ethology & Evolution (LESTES), Dept of Hydrobiology, Federal University of São Carlos, Brazil.

**17350.** Vilela, S.S.; Cordero-Rivera, A.; Guillermo-Ferreira, R. (2019): The female of *Heteragrion icterops* Selys, 1862 (Odonata: Heteragrionidae) with comments and key on the Brazilian females of *Heteragrion* group B. *Zootaxa* 4576(1): 187-194. (in English) ["The female of *H. icterops*, incompletely mentioned in 1886, is described, illustrated, keyed and diagnosed based on specimens collected in Pará State, North Brazil. We also provide an identification key and diagnostic comments on other two Group B females occurring in Brazil: *H. angustipenne* Selys, 1886 and *H. bariai* De Marmels, 1989. *H. icterops* females can be distinguished from other female congeners by having the genital valves tips leveling the posterior margin of S10 and by the morphology of the intersternites, presenting a well-developed dorsal plate and lacking a posterior plate." (Authors)] Address: Vilela, S.S., Graduate Program in Entomology, Dept Biol., Univ. of São Paulo (USP), Ribeirão Preto, Brazil. E-mail: deeegoo@gmail.com

**17351.** Villalobos-Jiménez G.; Hassall, C. (2019): Wing shape patterns among urban, suburban, and rural populations of *Ischnura elegans* (Odonata: Coenagrionidae). *International Journal of Odonatology* 22(1): 37-49. (in English) ["Odonata are among the most efficient flying insects. However, fragmentation of the landscape can increase distance between habitats and affect costs of dispersal, thus shaping phenotypic patterns of flight-related traits, such as wing shape, wing loading and wing size. Urban landscapes are highly fragmented, which limits dispersal among aquatic habitats. Hence, strong selective pressures can act upon urban populations in favour of individuals with increased flight performance or may lead to the reduction in dispersal traits. Here, we explore differentiation in morphological flight-related traits among urban, suburban, and rural populations of *I. elegans*, which is one of the most abundant species in both urban and rural ponds in Europe. We sampled 20 sites across Leeds and Bradford, UK, in an urban-to-rural gradient from June to August 2014 and 2015 (Nmales = 201, Nfemales = 119). We compared wing shape

among different land use types using geometric morphometrics. Other wing properties analysed were wing aspect ratio, wing loading and wing centroid size. Unexpectedly, no significant effect of urban land use was found on wing shape. However, wing shape differed significantly between males and females. Additionally, females showed significantly larger wing centroid sizes ( $P < 0.001$ ), increased wing loading (forewings:  $P = 0.007$ ; hind wings:  $P = 0.002$ ) and aspect ratio ( $P < 0.001$ ) compared to males across all land use types. Possible mechanisms driving these results are further discussed." (Authors)] Address: Hassall, C., School of Biology, Univ. of Leeds, Woodhouse Lane, LS2 9JT, Leeds, UK. E-mail: c.hassall@leeds.ac.uk

**17352.** Villalona, V.C. (2019): Diversidad e importancia económica de las libelulas (Insecta: Odonata) en la Escuela Agrícola Panamericana a Zamorano, Honduras. Proyecto especial de graduación presentado como requisito parcial para optar al título de Ingeniera Agrónoma en el Grado Académico de Licenciatura. Escuela Agrícola Panamericana, Zamorano, Honduras: V + 34 pp. (in Spanish, with English summary) ["Dragonflies are primary or secondary predators that can be beneficial or detrimental specific to the environment in which they are found. The research taking place within the thesis seeks to find diversity within the Odonata order in Zamorano, study its importance on campus and create an identification guide that facilitates the recognition of some of the species. All data from field collections and reviews of the reference material of the Insects Collection will be specified within the body paragraphs of the thesis. The collection was carried out in lotic and lentic ecosystems during the months of May through August. For 10 weeks, eight hours per week per ecosystem was put forth by two people, where specimens were collected with an entomological network. Within the Insect Collection, the data of all the specimens collected in Zamorano was captured by registering all the information on the collection labels. We found a total of 57 species of dragonflies in Zamorano, 17 of which were obtained within the field collections. Of the species collected (11 Anisoptera and 6 Zygoptera), three of the Anisoptera and one of the Zygoptera species were not reported for Zamorano. The Anisoptera include *Brachymesia furcata*, *Erythemis peruviana*, *Erythrodiplax basifusca* and the one Zygoptera was *Argia joergenseni*. Species such as *Pantala flavescens* and *Brachmesia furcata* are threats in the livestock sector. Anisoptera are vulnerable to *Prosthogonimus* spp, a trematode known for being able to affect birds in pastures. An identification guide is presented for the collected species that helps the knowledge of insect diversity in Zamorano ecosystems." (Authors) Address: not stated

**17353.** Wang, J.-D.; Wang, C.-Y.; Zaho, M.; He, Z.; Feng, Y. (2019): The complete mitochondrial genome of an edible aquatic insect *Epophtalmia elegans* (Odonata: Corduliidae) and phylogenetic analysis. *Mitochondrial DNA Part B*, 4:1: 1381-1382. (in English) ["*E. elegans* is one of edible aquatic insects in Southwest China. In this study, the complete mitochondrial genome *E. elegans* was determined. The mitogenome is 15,719 bp in size (GenBank accession number MK522522), including 13 protein-coding (PCGs), 22 transfer RNAs, 2 ribosomal RNAs

genes, and a noncoding D-loop region. The overall base composition of *E. elegans* mitogenome is 40.40% for A, 15.09% for C, 33.18 for T, and 11.33% for G, with a high AT bias of 73.58%. This mitogenome data can contribute to our understanding of the phylogeny and evolution of *E. elegans*." (Authors)] Address: Wang, J.-D., Key Lab. of Cultivating & Utilization of Resource Insects of State Forestry Administration, Res. Institute of Resource Insects, Chinese Academy of Forestry, Kunming, PR China. E-mail: cywang11@126.com

**17354.** Wang, L.J.; Lin, M.-Y.; Shiao, S.-F.; Sung, C.-H. (2019): The complete mitochondrial genome of *Psolodesmus mandarinus* McLachlan, 1870 (Odonata: Calopterygidae). *Mitochondrial DNA Part B* 4(1): 337-339. (in English) ["In the present report, we describe the complete mitochondrial genome of *P. mandarinus*, from the Hualien County, Taiwan. This mitogenome is 15,176 bp long, containing 13 protein-coding, 22 tRNA, and two rDNA genes. Nucleotide composition of the whole mitogenome was 41% for A, 25.92% for T, 19.06% for C, and 14.03% for G. The AT and GC skewness of mitogenome sequence was 0.225 and 0.152, showing the A-skew and C-skew. The reconstructed phylogenetic relationships of 23 Odonata species based on 13 protein-coding genes were highly supported. *P. mandarinus* grouped within the clade including the other three Calopterygidae genera, *Mnais*, *Vestalis*, and *Atrocalopteryx* was solid supported (100%). It was relatively close to *M. costalis* in the phylogenetic analysis. Our study will be useful for the population genetics, biogeography, and conservation of *P. mandarinus* in the future." (Authors)] Address: Sung, C.-H., Planning & Information Division, Fisheries Research Institute, Keelung, Taiwan. E-mail: chsung@mail.tfrin.gov.tw

**17355.** Wang, Z.J.; Melfi Jr, J.; Leonardo, A. (2019): Dragonfly's Righting Reflex. *Bulletin of the American Physical Society*; 72nd Annual Meeting of the APS Division of Fluid Dynamics. Saturday–Tuesday, November 23–26, 2019; Seattle, Washington. Session G27: Biological Fluid Dynamics: Insect Flight II. 3:48 PM–5:32 PM, Sunday, November 24, 2019. Room: 609. Abstract: G27.00001: ["Insects must right themselves in air so as not to fall. Exactly how insects manage to right themselves via a succession of neural-motor actions is a large mystery in neural behavior of animals. The goal of our work is to find clues about their internal actions through careful measurements and analyses of their aerial acrobatics, in the case of a dragonfly. A dragonfly falling upside down can right itself in about 200ms. During this brief episode, not only it has to sense its perilous condition, it also has to respond with proper muscle actions so to modulate the flapping wing motions such that to generate enough aerodynamic torque in order to correct its orientation. Here, we measure the intricate wing modulations of all four wings that a dragonfly employs to make such a maneuver. We further develop a computational model to simulate the righting maneuver so to tease out the key wing asymmetry that leads to a successful recovery. By analyzing the falling trajectory, we calculate the muscle torque dragonfly used to drive the body rotation. We further conjecture a sensory motor pathway during the dragonfly's righting reflex in response to the perceived horizon.] (Authors) Address: not stated

**17356.** Wehmann, H.-N.; Heepe, L.; Gorb, S.N.; Engels, T.; Lehmann, F.-O. (2019): Local deformation and stiffness distribution in fly wings. *Biology Open* (2019) 8, bio038299. doi: 10.1242/bio.038299: 15 pp. (in English) [Mechanical properties of insect wings are essential for insect flight aerodynamics. During wing flapping, wings may undergo tremendous deformations, depending on the wing's spatial stiffness distribution. We here show an experimental evaluation of wing stiffness in three species of flies using a micro-force probe and an imaging method for wing surface reconstruction. Vertical deflection in response to point loads at 11 characteristic points on the wing surface reveals that average spring stiffness of bending lines between wing hinge and point loads varies ~77-fold in small fruit flies and up to ~28-fold in large blowflies. The latter result suggests that local wing deformation depends to a considerable degree on how inertial and aerodynamic forces are distributed on the wing surface during wing flapping. Stiffness increases with an increasing body mass, amounting to ~0.6 Nm.1 in fruit flies, ~0.7 Nm.1 in house flies and ~2.6 Nm.1 in blowflies for bending lines, running from the wing base to areas near the center of aerodynamic pressure. Wings of house flies have a ~1.4-fold anisotropy in mean stiffness for ventral versus dorsal loading, while anisotropy is absent in fruit flies and blowflies. We present two numerical methods for calculation of local surface deformation based on surface symmetry and wing curvature. These data demonstrate spatial deformation patterns under load and highlight how veins subdivide wings into functional areas. Our results on wings of living animals differ from previous experiments on detached, desiccated wings and help to construct more realistic mechanical models for testing the aerodynamic consequences of specific wing deformations." (Authors)] Address: Lehmann, F.-O., Dept of Animal Physiology, Inst. Biol. Sciences, Univ. Rostock, Albert-Einstein-Str. 3, Rostock 18059, Germany. E-mail: fritz.lehmann@uni-rostock.de

**17357.** Wibowo, S.S.; Basukriadi, A.; Winarni, N.L. (2019): Dragonfly species diversity (Odonata) in three Telaga on the highland freshwater, West Java. *IOP Conf. Ser.: Earth Environ. Sci.* 394 012007: 1-8. (in English) ["Odonata was very selective to the habitat selection. Their sensitivity toward environment makes them be good indicator species. Information of species diversity of Odonata in the highland of tropical freshwater lakes is still rare. The purpose of this research was to compare species diversity of Odonata in Telaga Biru Mount Gede Pangrango National Park, Telaga Warna, Nature Park, and Telaga Saat, West Java. Data of Odonata population were collected using fixed point count method. The results showed that species diversity of Odonata in Telaga Saat is higher than Telaga Warna, Nature Park and Telaga Biru, Mount Gede Pangrango National Park. Species diversity indices of Odonata in the three of lakes ranged between 0.78 – 1.75 and were categorized medium and low diversity. Jaccard index of similarity showed that Telaga Warna and Telaga Saat had the similar communities of Odonata. The high index of species diversity of Odonata in Telaga Saat was probably due to the higher intensity of light, which created the higher air temperature at the lake. Species richness, diversity and Shannon index of Odonata was the highest in Telaga Saat compared two other sites." (Authors)]

Address: Wibowo, S.S., Dept Biol., Fac. Math. & Nat. Sciences, Univ. Indonesia, Depok, Indonesia. E-mail: sri.supardi@ui.ac.id

**17358.** Wildermuth, H.; Schröter, A.; Kohl, S. (2019): The West Palearctic biting midge *Forcipomyia paludis* (Diptera: Ceratopogonidae): first evidence as a parasite on Odonata wings from the Caucasus ecoregion. *Notulae odonatologicae* 9(4): 158-163. (in English) ["The biting midge *F. paludis* was found parasitizing seven Odonata species and subspecies in Georgia, southern Caucasus ecoregion, ca 1 800 km east of the nearest known occurrence in Europe. It is suggested that the distribution of this species ranges continuously from Ireland and Spain to the Caucasus. Three new host species and two new host subspecies are added to the list of considerably more than 70 Odonata species previously recorded as hosting this midge." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**17359.** Wildermuth, H.; Jödicke, R.; Schröter, A.; Borkenstein, A. (2019): Death feigning in sexual conflict between dragonflies (Odonata): does it exist? *Odonatologica* 48(3/4): 211-228. (in English) ["Death feigning, sometimes designated as thanatosis, reflex immobilization, tonic immobility or faking death is generally assumed a last-resort antipredator defence, attempting to avoid being killed and consumed. Recently, faking death has also been claimed to exist with respect to sexual conflict in Odonata. Here we review a number of published cases in Anisoptera that describe how non-receptive females during oviposition escape male harassing by fleeing, plunging into vegetation, freezing immediately and remaining motionless in random body position, no longer being noted by the male hovering nearby. We argue that this reaction of the female does not match the definition of death feigning and propose a new term for it: 'drop and stop' behaviour. In this context it is reasoned how and under what circumstances males, if at all, are able to recognize immobile females and react to them. The adaptive value of 'drop and stop' is discussed and it is suggested that this behaviour in sexual conflict could have evolved from a predator avoiding tactic." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**17360.** Wildermuth, H. (2019): Altersbedingte Veränderungen des Farbmusters während des Imaginalstadiums von *Leucorrhinia pectoralis* (Odonata: Libellulidae). *Libellula* 38(1/2): 117-125. (in German, with English summary) ["Age-related changes of the colour pattern during the imaginal stadium of *L. pectoralis* – In dragonflies, changes during the imaginal stadium become mainly manifest in the colour pattern of the thorax and abdomen. Based on photographs of *L. pectoralis* that were taken during 12 years of flight seasons, the sequence of age-related changes in colouration was judged and reconstructed. After emergence, males and females are deep black with large bright yellow spots on thorax and abdomen. By maturation the males additionally turn red on the dorsum of the thorax and the first abdominal segments. In the course of the reproductive period the spots darken in both genders, turning brown. Only the spot on the seventh abdominal segment, characteristic for the species, remains bright yellow. Maturing and aging in Libellulidae are discussed in respect to their presumptive



physiological and genetic causes." (Authors)] Address: Wildermuth, H., Haltbergstrasse 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**17361.** Wildermuth, H.; Borkenstein, A.; Jödicke, R. (2019): Robert's watercolour of *Sympetrum striolatum* and the ambiguity of the thermoregulatory obelisk posture (Odonata: Libellulidae). *Notulae odonatologicae* 9(3): 83-90. (in English) ["In his 1958 book the well-known Swiss artist and odonatologist Paul-André Robert depicted a male *S. striolatum* adopting obelisk posture that might be interpreted as either warming-up or avoiding heat. We analysed the watercolour based on circumstantial evidence such as direction of irradiation, landscape, locality and season and we conclude that Robert painted the dragonfly in warm-up posture. The same posture was observed in a male held in a non-heated greenhouse on a cold morning. Similar postures were found on various photographs taken in the field at known temperatures. On the other hand, among 1164 analysed photos from our own archives, from other photographers and from the Internet only five pictures exhibited unambiguous heat avoiding posture. Compared with other European *Sympetrum* spp. *S. striolatum* rarely adopts warm-up posture and only exceptionally heat avoiding posture. This species presumably avoids overheating mainly by seeking shade in woods." (Authors)] Address: Wildermuth, H., Haltbergstrasse 43, 8630 Rüti, Switzerland; hansruedi@wildermuth.ch

**17362.** Wildermuth, H. (2019): Färbungsvarianten bei den Weibchen von *Coenagrion puella* (Odonata: Coenagrionidae). *Mercuriale* 18/19: 17-26. (in German, with English summary) ["Colour variants in female *C. puella* – In general, two colour forms of *C. puella* are distinguished: the common green (gynochromatypic or heteromorph) and the usually rare blue (androchromatypic or homeomorph) form. A field study based on photographs of tandems and copulation wheels in the eastern Swiss Plateau revealed that various transitional forms exist, whereby green, blue and rarely also yellow as ground colour occur in different combinations and the black patterns vary as to their extension and shape. It is discussed to what certainty the females of *C. puella* can be identified and assigned to one of the variants on the basis of photographs only." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**17363.** Wildermuth, H. (2019): Zur Bedeutung der fotografischen Dokumentation anekdotischer Ereignisse am Beispiel einer biotischen Interaktion (Odonata: Coenagrionidae, Aeshnidae; Hemiptera: Gerridae). *Libellula Supplement* 15: 173-182. (in German, with English summary) ["On the significance of photographic documentation of anecdotic events considering the example of a biotic interaction (Odonata: Coenagrionidae, Aeshnidae; Hemiptera: Gerridae) – During observations on the oviposition behaviour of *Erythromma viridulum*, a dead female of this species was incidentally detected floating on the water surface with a larval *Anax imperator* and a water strider (*Gerris* sp.) both feeding on the damselfly's body. At the same time, males of *Enallagma cyathigerum* tried to grasp the body and to connect with it. This event was photographically

documented, and based on the pictures, the entire procedure was reconstructed. It is discussed to what extent generalizing conclusions can be drawn from single observations in respect to female recognition in *E. cyathigerum*, and what significance can be assigned to the photographic documentation of such occurrences." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland; hansruedi@wildermuth.ch

**17364.** Wilk, T. (2019): New locality of pygmy damselfly *Nehalennia speciosa* (Odonata: Coenagrionidae) in southern Poland. *Chronmy Przyr. Ojcz.* 75(5): 395-400. (in Polish, with English summary) ["*N. speciosa* is a habitat-specialised dragonfly whose population declines in a significant part of its range. In Europe, including Poland, it is an endangered taxon of high conservation concern, being the only invertebrate species in the country, for which protection zones have to be designated. *N. speciosa* is one of the rarest dragonflies in Poland and its known populations are concentrated mainly in the northern part of the country, in the post-glacial landscape. In 2019, a new site of this species was found in the Nowa Dêba Military Training Area, located in the Sandomierz Forest (Special Area of Conservation Natura 2000, PLH180055 "Enklawy Puszczy Sandomierskie"). On 22 July 2019, 12 imagines were found at a small peatland waterhole and the number was estimated at min. 20 individuals. The discovered population is one of the few in the southern part of the country, being the fourth known site in the Podkarpacie Province. Due to the location within an active military training ground, the population is currently not directly threatened." (Author)] Address: Wilk, T., Ogólnopolskie Towarzystwo Ochrony Ptaków 05–270 Marki, ul. Odrowaca 24, Poland. E-mail: tomaszwilk3@gmail.com

**17365.** Wilson, K.D.P. (2019): The genus *Stylurus* and resolution of *Stylurus annulatus* (Odonata: Gomphidae) and its close allies in Asia. *Agrion* 23(1): 8-24. (in English) ["The distribution of the Holarctic genus *Stylurus* Needham 1897 is reviewed and discussed. The Chinese *S. flavicornis* (Needham, 1931), *S. kreyenbergi* (Ris, 1928) and *S. tongrensis* Liu, 1991 are shown to be junior synonyms of *S. annulatus* (Djakonov, 1926), described from the Russian Far East, for which a revised synonymy is provided. Details are provided of the first record of *S. clathratus* (Needham, 1930) from Hong Kong together with an updated synonymy. Details are also provided of a *Stylurus* sp., potentially a new species, from north Vietnam and a key to the Asian *Stylurus* is provided." (Author)] Address: Wilson, K.D.P., 18 Chatsworth Road, Brighton, BN1 5DB, UK. E-mail: kdpwilson@gmail.com

**17366.** Wood, C.; Fitt, R.N.L.; Lancaster, L.T. (2019): Evolving social dynamics prime thermal tolerance during a poleward range shift. *Biological Journal of the Linnean Society* 126(3): 574-586. (in English) ["Cold tolerance plays a critical role in determining the geographical range limits of species. Previous studies have found that range shifts in response to climate warming are facilitated, paradoxically, by cold acclimation capacities, due to increasingly colder and variable weather at high latitudes. However, the evolutionary dynamics of this process are poorly understood. In this study we combined experiments and field studies to investigate the social and

ecological factors affecting cold tolerances in range-shifting populations of the female-polymorphic *Ischnura elegans* in north-east Scotland, and their consequences for evolutionary change. In the field, we observed both environmental and social effects on cold tolerance and female colour morph frequencies. This process results in a latitudinal cline in female morph frequencies, due to positive feedback between social stress and thermal tolerances. Density manipulations in the laboratory provide experimental evidence that social interactions directly impact cold tolerance. Reciprocal effects of social environments on thermal acclimation may be important but commonly overlooked aspects of allee effects that contribute to the formation of range margins. Moreover, there is a wider need to consider the role of evolving social dynamics to reciprocally shape both the thermal physiology of individuals and the thermal niches of species." (Authors)] Address: Lancaster, Lesley, School Biol. Sciences, Univ. Aberdeen, Aberdeen AB24 2TZ, UK. E-mail: lesleylancaster@abdn.ac.uk

**17367.** Wu, X.; Liu, Z.; Chen, Y.; Wang, B. (2019): Description of larva of *Euphaea superba* Kimmins, 1936 (Odonata: Zygoptera: Euphaeidae) from China. *Zootaxa* 4545(4): 585-592. (in English) ["The final stadium larva of *Euphaea superba* Kimmins, 1936 is described and illustrated based on a male and a female specimens collected in Zhejiang province, China. The larvae were associated with the adults by mtCOI gene sequence. The larva of *E. superba* is diagnosed from other described members of the genus by the gena having 2–4 spines on outer side, the movable hook about 1.6 time as long as median cleft and female with primary genitalia extending to the posterior margin of abdominal segment 10." (Authors)] Address: Wang, B., College of Plant Protection, Nanjing Agricultural University, Jiangsu Province, 210095, PR. China. E-mail: wangbeixin@njau.edu.cn

**17368.** Xirouchakis, S.M.; Alivizatos, H.; Georgopoulou, E.; Dimalexis, A.; Latsoudis, P.; Portolou, D.; Karris, G.; Georgiakakis, P.; Fric, J.; Saravia, V.; Barboutis, C.; Bourdakis, S.; Kakalis, E.; Kominos, T.; Simaiakis, S. (2019): The diet of the Eleonora's falcon (*Falco eleonorae*) in the Aegean archipelago (Greece). *Journal of Natural History* 53 (29-30): 1767-1785. (in English) ["In the present study we investigated the diet of Eleonora's falcons in Greece and assessed the regional dietary pattern of 16 breeding colonies of the Aegean. Overall 224 nests were visited and a total of 8067 prey items were collected which contained two mollusca classes, seven insect orders, one reptile family, two mammalian taxa and at least 54 avian species. ... Cicadas were the most common insects found in pellets (44.7%) followed by ants (35.3%) and beetles (15.8%) ... The contribution of dragonflies, grasshoppers, flies and moths was insignificant i.e. <5%." (Authors)] Address: Xirouchakis, S.M., Nat. Hist. Mus. Crete, Univ. Crete, University Campus (Knossos), Heraklion, Greece. E-mail: sxirouch@nhmc.uoc.gr

**17369.** Yamaguchi, Y.; Sasaki, D.; Okamoto, M.; Shimoyama, K.; Obayashi, S. (2019): Numerical investigation of geometrical corrugation influence to vortex flowfields at low Reynolds number. *Journal of Fluid Science and Technology* 14(3): 1-8. (in English) ["Corrugated wings, which are cross-sectional

shapes of dragonfly wing, are expected to improve aerodynamic performance due to vortices generated by irregular shapes at low Reynolds number region. It is difficult to observe the influence of vortices generated from the unevenness of the shape by experiments. In this research, the flowfields around corrugated wings were calculated using Cartesian mesh-based Computational Fluid Dynamics (CFD), Building-Cube Method (BCM). The simulation grasped the detailed flowfield, which was difficult to be visually observed by the experiment. From the visualization result, it is found that the flow circulation velocity inside the concave and convex surface is not accelerated but slow. The result indicates that the improvement in aerodynamic performance is caused by the shape and position of unevenness." (Authors)] Address: Yamaguchi, Y., Kanazawa Inst. of Technology, 3-1 Yatsukaho, Hakusan, Ishikawa 924-0838, Japan. E-mail: b1406241@planet.kanazawa-it.ac.jp

**17370.** Yang, G. (2019): Descriptions of *Cephalaeschna zhuae* sp. nov. (Odonata: Aeshnidae) from Yunnan, China. *Entomotaxonomia* 41(3): 238-242. (in English, with Chinese summary) ["*Cephalaeschna zhuae* Yang sp. nov. (holotype ♂, from Yunnan Province in China) is described and illustrated, and compared with known Chinese species of *Cephalaeschna*. This new species has a distinct bicolor dorsal carina and special colors on the legs, which can distinguish it from other species of the genus *Cephalaeschna*." (Author)] Address: Yang, G., College of Agriculture & Life Sciences, Dali Univ., Dali, Yunnan 671003, China

**17371.** Yang, Q.; Ren, D.; Pang, H.; Shih, C. (2019): Chapter 6: Odonata – Dragonflies and Damselflies. In: Ren, D., C. Shih, T. Gao, Y. Wang & Y. Yao (eds.): *Rhythms of Insect Evolution: Evidence from the Jurassic and Cretaceous in Northern China*. Wiley-Blackwell. 728 pp. ["The superorder Odonoptera comprise the three orders Geroptera, Protodonata and Odonata. As one of the most basal groups of insects, Odonata are valuable for the study of evolution, especially the origination and development of wings. Odonata mate in the air. The mating rituals are displayed by pairs coupling together and flying in tandem. Aeshnidae are an extinct family which survived from the Late Jurassic to Early Cretaceous. They were usually found near seashores and rarely in deeply intra-continental environments. The Corduliidae comprise the emerald dragonflies or green-eyed skimmers. These dragonflies are usually black or dark brown with areas of metallic green or yellow, and most of them have large, emerald-green eyes. Hemeroscopidae, an extinct family from the Early Cretaceous, are known from fossils collected in the Transbaikal Region, Mongolia and China. The Tarsophlebiidae are an extinct family of medium-sized fossil odonates from the Upper Jurassic and Lower Cretaceous of Eurasia." (Authors)] Address: not stated

**17372.** Yerokine, M. (2019): Contribution à la connaissance des Odonates de l'île de la Réunion. Présence de *Tramea basilaris* (Palisot de Beauvois, 1817) (Odonata: Libellulidae). *Cahiers scientifiques de l'océan Indien occidental* 10: 1-2. (in French) ["Etang de Saint-Paul, January 2018."] Address: Yerokine, M., 5 c, ruelle Delgard, 97419, La Possession, Ile de La Réunion, France. E-mail: myc@wanadoo.fr

**17373.** Yerokine, M. (2019): Contribution à la connaissance des Odonates de l'île de la Réunion 12. *Urothemis edwardsii* (Selys, 1849), une espèce nouvelle pour l'île (Odonata: Libellulidae). Cahiers scientifiques de l'océan Indien occidental 10: 7-8. (in French) [10, 11 and 16 Dezember 2019, l'Etang de St-Paul] Address: Yerokine, M., 5 c, ruelle Delgard, 97419, La Possession, Ile de La Réunion, France. E-mail: myc@wanadoo.fr

**17374.** Yokoi, N.; Soiphanthong, V. (2019): Description of *Macromia murakii* sp. nov. (Anisoptera: Macromiidae) from northern Laos, with a consideration on the taxonomic relationship between similar species *M. chui* and *M. daimoji*. Tombo 61: 17-24. (in English, with Japanese summary) ["*Macromia murakii* is described from northern Laos (Nam Hien, Houaphan Province) as a new species. The holotype ♂ is deposited in the collection of National Museum of Nature and Science, Tsukuba, Ibaraki. This new species can be distinguished from the allied species, *M. daimoji* and *M. chui* by their morphological differences in the caudal appendages and the accessory genitalia. In addition, we discuss the taxonomic relation between *M. chui* and *M. daimoji*, which have been recently argued on synonym, and consider that they are highly possible to be different species." (Authors)] Address: Yokoi, N., Koriyama, Fukushima Pref., Japan. E-mail: yokoi@orange.plala.or.jp

**17375.** Yukita, Y. (2019): A recent record of *Zygomma obtusum* Albarda, 1881 from Iriomote Island. Tombo 61: 53-54. (in Japanese, with English summary) ["*Z. obtusum* has been recorded from the Daitou Islands and Yaeyama Islands, Okinawa Prefecture, in Japan. This species originally inhabited the in Daitou Islands and has been recorded from Yaeyama Island since 1996. However, the population in the Daitou Islands is currently threatened with extinction and the population from the Yaeyama Islands is assumed to be migrants from overseas. Although this species has not been recorded from the Yaeyama Islands in recent years, a male is here recorded from Iriomote Island taken on May 6, 2018." (Authors)] Address: not stated

**17376.** Zaman, M.N.; Fuadi, B.F.; Sul-toni, A. (2019): Diversity of dragonfly genus *Drepanosticta* in tourism forest Curug Cipendok, Banyumas district. Proc. Internat. Conf. Sci. Engin. 2: 115-119. ["Cipendok especially have rich biodiversity. One of the themes is Javanese endemic dragonfly. Around 3 Javanese endemic dragonfly species was recorded in Curug Cipendok. Collection data was carried out in July until August 2017. The method used was exploration following path in several habitats, namely plantation, secondary forest, Pocung lake and field. Purpose of this study is to record the diversity of Javanese endemic dragonfly and distribution *Drepanosticta* in forest tourism curug Cipendok. The result from this observation is found three species that is *D. sundana*, *D. gazella*, and *D. spatulifera*. The highest population is *D. gazella* with 48% from totally individual and lowest is *D. sundana* 13%. The diversity with Shannon-Wiener index is 0.97 that is low diversity. From observation distribution of *Drepanosticta* only founded in a specific habitat, that is a secondary forest." (Authors)]

Address: Mokhammad Nur Zaman, M.N., Biology Dept, Fac. of Science & Technology UIN Sunan Kalijaga Jl. Marsda Adisucipto No. 1 Yogyakarta 55281, Indonesia. E-mail: azamavicenna@gmail.com

**17377.** Zeng, X. (2019): Healable omnidirectional antireflection coatings inspired by dragonfly wings. Dissertation of Department of Chemical Engineering, Zhongxing University: 98 pp. (in Chinese, with English summary) ["In this study, large-area and single-layer non-closed stacks silica colloidal crystal/Shape Memory Polymer composite were fabricated on polyethylene terephthalate (PET) substrates by spin coating technology using 90 nm, 180 nm, and 240 nm silica colloidal particles. The silica colloidal crystal/Shape Memory Polymer composite is etched with the reactive ion etching, and the dragonfly wing inspired structure with different sizes can be fabricated on the PET substrate by different etching time. The graded refractive index, by measuring the optical properties, shows that the dragonfly wing inspired structure is in the visible wavelength range, which can reduce the reflection of the larger light incident angle and improve the transmission. In addition, by studying the characteristics of shape memory polymer, deionized water was applied to the dragonfly wing inspired structure after etching, and the structure collapsed and aggregated, and its transmission decreased from 91.5% to 73.8%, and then acetone solution was applied. The dragonfly wing inspired structure was recovered, and its transmission raised from 73.8% to 91.2%. So, it shows the structure has property of shape memory. Therefore, it is a structure with property of omnidirectional anti-reflection and shape memory." (Author)] Address: not stated

**17378.** Zhang, X.-l.; Jiao, S.-w.; Wu, M.; Saho, X.-x.; Ye, X.-q.; Yan, Y.-n. (2019): Diet of two passerine birds during breeding season in reed wetland of Hangzhou Bay. Chinese Journal of Ecology 38(6): 1810-1816. (in Chinese, with English summary) ["Information on the bird's diet composition is essential to understand how wetland reclamation affects diversity of passerine birds. Samples of feathers of Reed Parrotbill (*Paradoxornis heudei*) and Oriental Reed Warbler (*Acrocephalus orientalis*) and samples of potential dietary insects were collected in the southern Hangzhou Bay (Shangyu, Shaoxing City), during the breeding season from July to August in 2017. Food sources were analyzed by measuring  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values in bird feathers and insect samples. The results showed that the contribution of various diet composition of Reed Parrotbill ranked as: Noctuidae pupa > Lepidoptera > Arachnida > Hymenoptera > Homoptera. The contribution of various diet composition of Oriental Reed Warbler ranked as: Hymenoptera > Arachnida > Odonata > Lepidoptera > Coleoptera > Homoptera. The value of feeding niche breadths of Reed Parrotbill and Oriental Reed Warbler was 5.21 and 5.95, respectively. There was no significant difference in the  $\delta^{13}\text{C}$  values between the two species, indicating an overlap between their feeding niches ( $P > 0.05$ ). However, there was a significant difference in the value of  $\delta^{15}\text{N}$ , with feeding niche overlap being 6.25, suggesting some differences of nutritional levels ( $P < 0.01$ ). Lepidoptera, Arachnida, Hymenoptera, and Homo-



ptera were overlapping food-source insects for the two passerine species. The narrower niche breadth of Reed Parrotbill was inferior, and the loss of reed habitat had greater impacts on Reed Parrotbill." (Authors)] Address: Zhang, X.-I., Research Institute of Subtropical Forestry, Chinese Academy of Forestry, Hangzhou 311400, China

**17379.** Zhao, G.; Yuan, Y.; Zhang, P.; Zang, C.; Zhang, J.; Tao, L.; Zhang, G.; Zhou, H. (2019): Effects of laser-processed unit distribution density on wear resistance of biomimetic 6082 aluminum alloy. *Optics & Laser Technology* 112: 175-182. (in English) ["Highlights: •Bionic surface with various units distribution was prepared on 6082 Al alloy. •The unit present superior microstructure and hardness. •The wear resistance of Al alloy was increased by 53.43%. •An optimal unit distribution interval was obtained to resist wear. •The wear resistance mechanism was analyzed and the stress was simulated. Abstract: Biomimetic coupling units with different distribution densities were produced on the surface of 6082 aluminum alloy first by imitating the non-smooth wearproof surfaces of natural living things and then by simulating their soft-hard alternated surfaces with the laser surface melting technology. The effects and optimal level of unit distribution density on the abrasive resistance of 6082 aluminum alloy were analyzed via wear tests and simulation analysis. It was found biomimetic coupling units considerably improved the wear resistance of 6082 aluminum alloy. Stress analysis and experiments showed the wear resistance of 6082 aluminum alloy was optimized and enhanced by 53.43% from non-treated alloy when the density distribution coefficient of units was 0.4. Moreover, the wearproof mechanism of biomimetic coupling units was experimentally analyzed and discussed." (Authors)] Address: Zhao, G., The Key Lab of Automobile Materials, Ministry of Education, Jilin Univ., Changchun 130025, PR China

**17380.** Zheng, D.; Nel, A.; Jarzembowski, E.A. (2019): The first Cretaceous damselfly of the Jurassic family Steleopteridae (Odonata: Zygoptera), from Surrey, England. *Cretaceous Research* 93(1): 1-3. (in English) ["Steleopteron cretacicus sp. nov., first Cretaceous and most recent representative of the small Mesozoic family Steleopteridae, is described from the Wealden of the UK. This discovery shows that this Jurassic family survived into the Cretaceous. It probably became extinct during or after the great entomofaunal changes of the Albian e Cenomanian event." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**17381.** Zheng, D.; Wang, B.; Nel, A.; Jarzembowski, E.A.; Zhang, H.; Chang, S.-C. (2019): Mesostictinae subfam. nov., an archaic group of platystictid damselflies (Odonata: Zygoptera) from mid-Cretaceous Burmese amber. *Journal of Systematic Palaeontology* 17(1): 1-8. (in English) ["Odonatans are quite rare in the fossil record compared with the other insects, especially in Cretaceous amber inclusions. The extant family Platystictidae is one of the most diverse Zygoptera, but short of fossil records. In this paper, a new species, *Mesosticta davidattenboroughi* sp. nov., is described from mid-Cretaceous Burmese amber, representing the third-known fossil

species of Platystictidae. *M. davidattenboroughi* sp. nov. has a long IR1 beginning one cell distal of the base of RP2, confirming the previous attribution of *Mesosticta* Huang, Azar, Cai & Nel, 2015 to Platystictidae. It differs from other species of *Mesosticta* in having a long IR1 and a basally crossed subdiscoidal cell. The fossil genus *Mesosticta* shares the diagnostic characters of the modern platystictid genera, viz. a basally recessed 'CuP' (shared by all species), a very long IR1 (only in *M. davidattenboroughi* sp. nov.), and a specialized subdiscoidal area mostly rhomboidal in shape (only in *M. electronica* Zheng, Zhang, Chang & Wang, 2016). Based on the platystictid damselflies from Burmese amber, a new subfamily Mesostictinae subfam. nov. is established. Mesostictinae subfam. nov. represents the first fossil group of modern platystictid damselflies, documenting the appearance of Platystictidae as early as mid-Cretaceous. It differs from modern Platystictidae by the presence of fewer postnodal and postsubnodal crossveins, a short MP, the base of RP2 being nearer to the subnodus and the nodus lying more distally." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**17382.** Zheng, D.; Wang, B. (2019): The second hemiphlebiid damselfly (Odonata: Zygoptera) from mid-Cretaceous Burmese amber. *Alcheringa* 43(2): 257-260. (in English) ["*Burmahemiphlebia zhangi* Zheng et al. 2017 is the dominant damselfly found in Burmese amber. Here, a new hemiphlebiid damselfly, *Burmahemiphlebia hui* sp. nov., is described representing the second *Burmahemiphlebia* species discovered in Burmese amber. *Burmahemiphlebia hui* sp. nov. differs from *B. zhangi* in having more postnodal cross-veins, CuP and the separating point of AA from AP basal of  $A \times 1$ , Arc aligned with  $A \times 2$ , RP2 base closer to N than to Pt, and IR1 five cells distal of RP2 base. The new damselfly is extremely rare and the only one known from Burmese amber, unlike *B. zhangi*." (Authors)] Address: Zheng, D., State Key Lab. Palaeobiology & Stratigraphy, Nanjing Inst. Geology & Palaeontology & Center for Excellence in Life & Paleoenvironment, Chinese Acad. of Sciences, 39 East Beijing Road, Nanjing 210008, PR China. E-mail: dranzheng@gmail.com

**17383.** Zheng, D.; Wang, H.; Nel, A.; Dou, L.; Dai, Z.; Wang, B.; Zhang, H. (2019): A new damsel-dragonfly (Odonata: Anisozygoptera: Campteropteroptidae) from the earliest Jurassic of the Junggar Basin, northwestern China. *Alcheringa*: 43(4): 563-567. (in English) ["A new genus and species of campteropteroptid damsel-dragonfly, *Jurassophlebia xinjiangensis* gen. et sp. nov., is described from the Lower Jurassic Badaowan Formation in the Junggar Basin, northwestern China. *Jurassophlebia* differs from all other campteropteroptid genera in having PsA in the same orientation as the distal branch of AA, and in its uniquely open subdiscoidal cell with very acute apical angle in the hind wing. The new discovery adds to the Asian diversity of damsel-dragonflies in the earliest Jurassic." (Authors)] Address: Zheng, D., State Key Lab. Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology & Center for Excellence in Life & Paleoenvironment, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, PR China. E-mail: dranzheng@gmail.com

**17384.** Zheng, D.; Nel, A.; Jarzembowski, E.A.; Chang, S.-C.; Zhang, H.; Wang, B. (2019): Exceptionally well-preserved dragonflies (Insecta: Odonata) in Mexican amber. *Alcheringa*: 43(1): 157-164. (in English) ["Dragonflies (odonatans) are comparatively rare as amber inclusions, and most are not well preserved on account of their size. Here, we report a single piece of Mexican amber with one complete dragonfly and two damselflies. The dragonfly is attributed to the extant gomphid *Erpetogomphus Selys Longchamps*, and the damselflies belong to the extant coenagrionid *Argia Rambur*. Both genera are nowadays distributed widely in Mexico. The new discovery dates the origins of these two genera to the Miocene at least." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**17385.** Zia, A. (2019): *Coeliccia vacca* Laidlaw, 1932 (Odonata: Zygoptera: Platycnemididae) A data deficient potentially threatened species. *Pakistan Journal of Agricultural Research*, 32(4): 706-709. (in English) ["*C. vacca* has been added to the Odonata fauna of Pakistan by reporting it from three mountainous spots in sub Himalayan hill tracts of Pakistan. It is a data deficient, potentially threatened species whose habitat and ecology was never known. To date, there is no information available for its male and immature stages. It is second species for the genus to be recorded from Pakistan. Distributional details along with important taxonomic characters and habitat information is discussed in detail to facilitate readers of this document. A key to the known species of *Coeliccia* from Pakistan is also provided. A need to conduct further surveys in whole hill belt is highly felt with a view to get more information especially for its male and naiads." (Authors)] Address: Zia, A., Institute of Plant & Environmental Protection, National Agriculture Research Centre, Islamabad, Pakistan. E-mail: [saiyyedahmed@gmail.com](mailto:saiyyedahmed@gmail.com)

## 2020

**17386.** Aono, T.; Kagimoto, B. (2020): A second record of *Sympetrum uniforme* (Selys, 1883) from Hiroshima Prefecture, 2019. *Tombo* 62: 130. (in Japanese, with English summary) ["*S. uniforme* is a rare species in Japan. In Hiroshima Prefecture, this species was newly recorded at one pond in Higashi-Hiroshima city in 2018. On 25 October 2019, the first author discovered a male of this species at another pond in Higashi-Hiroshima city." (Authors)] Address: E-mail: [miyajimatonbo@yahoo.co.jp](mailto:miyajimatonbo@yahoo.co.jp)

**17387.** Aparicio Valenciano, A.; Aguirre, J.L.; Larrán, A. (2020): Primera cita de *Diplacodes lefebvrii* (Rambur, 1842) (Odonata: Libellulidae) para la Comunidad de Madrid (España) y biodiversidad de odonatos de la Laguna de Meco. *Boletín de la Sociedad Entomológica Aragonesa* 67: 411-414. (in Spanish, with English summary) ["The present article shows a provisional checklist of the odonates present in the Laguna de Meco (Meco, Madrid). The checklist includes the 21 species of odonates (9 Zygoptera and 12 Anisoptera). We describe the wetland habitat and consider it as an area of special interest for the conservation of Odonata because of the high species richness values. First record of *D. lefebvrii* and new ones of *Anax*

*ephipplger* and *Orthetrum trinacria* for Madrid." (Authors)] Address: Aparicio Valenciano, A., Cátedra de Medio Ambiente. Fac. Ciencias de la Vida. Univ. Alcalá, [alejandro.aparicio@uah.es](mailto:alejandro.aparicio@uah.es)

**17388.** Asensio, R.; Leonardo, J.M. (2020): Confirmación de la presencia y reproducción de *Gomphus vulgatissimus* (Linnaeus, 1758) (Odonata: Gomphidae) en Bizkaia (País Vasco, España). Confirmation of the presence and reproduction of *G. vulgatissimus* in Bizkaia (Basque Country, Spain). *Munibe, Cienc. nat.* 68: 9 pp. ["During 62 macroinvertebrate benthic fauna samplings carried out between 2016 and 2018 along 17 sections of the Cadagua river basin (Bizkaia), six specimens of *G. vulgatissimus* in larval state were captured. Additionally, in 15 routes made in the summer of 2019 along 13 sections of the same river basin for the observation of odonatal imagos, an adult male of *G. vulgatissimus* was identified. These 7 new observations confirm the presence of this species in Bizkaia and represent the first report of its effective reproduction in this Historic Territory. Two new 10x10 km UTM grids have therefore been added to the small distribution area known for this species in the Iberian Peninsula, which is limited to its northern third." (Authors)] Address: CUESTASENSIO S.C. Antonio de Trueba, 8-5º 48012, Bilbao. E-mail: [cuestasensio@gmail.com](mailto:cuestasensio@gmail.com)

**17389.** Atourrohman, M.; Ulfah, M.; Septiani, M.; Silmi, F.I.; Utami, R.T.; Malimah, S.F.; Rahmawati, S.D.; Ananto, A.D.; Dewi, B.A.; Setyawati, S.M. (2020): Karakterisasi dan Identifikasi *Orthetrum sabina* (Odonata: Libellulidae) di Lapangan Rusunawa Jerakah Purwoyoso Semarang: Karakterisasi dan Identifikasi *Orthetrum sabina* (Odonata: Libellulidae) di Lapangan Rusunawa Jerakah Purwoyoso Semarang. *Jurnal Litbang Edusaintech* 1(1): 57-60. (in Indonesian, with English summary) ["This study purpose to identify and characteristic dragonflies in the Rusunawa field. The type of research used is qualitative descriptive research, which aims to determine the morphology of dragonflies with *O. sabina* type and to know the environmental factors that affect dragonfly breeding. The method used in this study is roaming, by searching for dragonflies in the Rusunawa field Jerakah. The dragonfly population found in the Jerakah field is mostly one of which is *O. sabina* .... The number of dragonflies is influenced by several factors, namely temperature, climate, air humidity, water ph and insecticide use." (Authors)] Address: A'tourrohman, M., Dept of Biology, Fac. Science & Technology UIN Walisongo, Semarang 50185, Indonesia. E-mail: [athoqsara11@gmail.com](mailto:athoqsara11@gmail.com)

**17390.** Avila Junior, W.F.; Lencioni, F.A.A.; Carneiro, M.A.A. (2020): *Heteragrion itacolomii* sp. nov. (Odonata: Zygoptera: Heteragrionidae) from Itacolomi State Park, Ouro Preto, Minas Gerais, Brazil. *Zootaxa* 4779(1): 121-130. (in English) ["*H. itacolomii* sp. nov. (♂ holotype: Brazil, Minas Gerais, Ouro Preto, Parque Estadual do Itacolomi, Trilha da Lagoa, 1350m, 23-xii-2018, 20°25'57"S, 43°30'27"W; and ♀ allotype, same data as holotype, but collected in tandem 20-iii-2019, deposited in ABMM-CCT/UFGM collection) is described and illustrated. The new species is similar to *H. tiradentense* Machado & Bede, 2006, *H. muryense* Costa & Santos, 2000 and *H. mantiqueirae* Machado, 2006, based on coloration of the thorax and has

cerci similar to those of *H. freddiemercuryi* Lencioni, 2013. It belongs to Group A and differs from other congeners by the morphology of the ventral expansion and the medial process of the cerci in males. Information about the intersternite of the single female specimen is also provided." (Authors)] Address: Ávila Junior, W.F., Universidade Federal de Ouro Preto, Lab. Entomologia Ecológica DEBIO/ICEB, Campus Morro do Cruzeiro, CEP 35400-000, Ouro Preto, MG, Brazil. E-mail: walterfaj88@gmail.com

**17391.** Bae, Y.J.; Yum, J.H.; Kim, D.G.; Suh, K.I.; Kang, .H. (2020): *Nannophya koreana* sp. nov. (Odonata: Libellulidae): A new dragonfly species previously recognized in Korea as the endangered pygmy dragonfly *Nannophya pygmaea* Rambur. *Journal of Species Research* 9(1): 1-10. (in English) ["*N. koreana* sp. nov., is described from Korea on the basis of morphology and mitochondrial cytochrome oxidase c subunit I (COI) gene sequences. *Nannophya* materials from Korea and other areas in Southeast Asia were compared. The new species was previously recognized in Korea as the endangered *N. pygmaea* Rambur, 1842, which is widely distributed in insular and peninsular Southeast Asia. However, male adults of the *Nannophya* population in Korea could be distinguished from other *N. pygmaea* populations by the presence of a thick, incomplete black stripe on the lateral synthorax that terminated at half-length (vs. continuous to wing base), light orange (vs. red) anal appendages, and 4-5 (vs. 2-3) black teeth on the ventral superior appendages. In addition, the body length of *N. koreana* was generally larger (1.2-1.4 times) than that of *N. pygmaea*, regardless of life stage. COI gene sequences from the two groups exhibited substantial genetic differences (>12%), thereby sufficiently substantiating their differentiation. The taxonomic status, distribution, and habitat of the new species are discussed." (Authors)] Address: Bae, Y.J., National Institute of Biological Resources, Ministry of Environment, Incheon, Republic of Korea. nibrpresident@korea.kr

**17392.** Beddiar, M.; Benchalel, W.; Boucetta, S.; Bouslama, Z.; Elmsellem, H. (2020): Physico-chemical and biological evaluation of the quality of surface water in the Wadi El-Melha watershed (North-East Algeria). *Maroccan Journal of Chemistry* 8(2): 486-496. (in English) ["This environmental study targeted the ecological assessment and classification of the waters' state of health at the level of the Wadi El-Melha watershed flowing from Lake Mellah (northeast of Algeria) through Physico-chemical parameters measured in situ and measured in the laboratory, and the biological quality achieved through Odonates as bio indicators of ecological potential in watercourses. The aim is to conserve the potential of the ecosystem (biotope, habitat and reproduction of species, flow of water, rambling of the bed). The waters' quality of the Wadi El-Melha watershed seems to be generally good at the end of this study despite some recognized disturbances in some sections, which are essentially linked to alterations by, nitrites nitrates and phosphates which in places influence the quality of the surveyed river. In terms of biological quality which was assessed using ecological indices, the results revealed a stability of the stand during the study period. The odonatological procession is diverse (Shannon index  $H' = 2.26$ ), and it is in equilibrium (equitability index  $E = 0.90$ ).

Based on the classification proposed by [1], Wadi El-Melha is among the "middle" rivers, meaning a "moderately polluted" classification. ... The overall relative frequency revealed that the species *Ischnura graellsii* is the most frequent, representing 24.57% of the total population, followed by *Orthetrum coerulescens* with 15.69% *Calopteryx haemorrhoidalis* (12.13%). The other nine species (*Ceriatagrion tenellum*; *Anax imperator*; *Platycnemis subdilatata*; *Chalcolestes viridis*; *Gomphus lucasii*; *Crocothemis erythraea*; *Trithemis annulata*; *Sympetrum striolatum*; *Boyeria irene*) are represented by the respective percentages of 8.36%; 7.84%; 7.12%; 5.21%; 5.16%; 3.82%; 3.66% and 2.89%." (Authors)] Address: Beddiar, M., Lab. Ecol. of Terrestrial & Aquatic System «ECOSTAQ», Badji Mokhtar Univ. Annaba, Algeria. E-mail: Beddiar\_marwa@yahoo.co

**17393.** Bedjanic, M.; Kalkman, V.J.; Subranabian, K.A. (2020): A new species of *Orthetrum* Newman, 1833 (Odonata: Libellulidae) from the Andaman Islands, India. *Zootaxa* 4779(1): 91-100. (in English) ["*Orthetrum andamanicum* sp. nov. (holotype ♂: India, Andaman and Nicobar Islands, South Andaman island, Chidiyatapu, N 11.51, E 92.71; 08-xii-1998; deposited in RMNH, Leiden; RMNH.INS.1152911), is described as new to science. Based on additional photographic records, notes on mature males' life colouration, distribution and habitat of this Andaman endemic are provided." (Authors)] Address: Bedjanic, M., National Institute of Biology, Vecna pot 111, SI-1000, Ljubljana, Slovenia. E-mail: matjaz.bedjanic@nib.si

**17394.** Belenguier, L.; Flammant, P.; Legrand, R. (2020): Le «Lac bleu» de la mine des Rosiers (Puy-de-Dôme): une zone humide originale d'intérêt pour les Odonates et disparue en 2017. *arvensis* 91-92: 1-22. (in French) [The «Lac bleu» of the Rosiers mine, in Saint-Pierre-le-Chastel (63) was a wetland that took place in mining residues. The authors report on its disappearance with the aim of transmitting the information available on this site and its odonatological procession before its destruction. This wetland, which had significant concentrations of certain heavy metals, was home to an important station of *Leucorrhinia dubia*.] Address: Belenguier, L., 123, avenue Joseph Claussat, 63400 Chamalières, France. E-mail: lbelenguier@gmail.com

**17395.** Benchalel, W.; Beddiar, M.; Boucetta, S.; Bouslama, Z. (2020): Bioecology of *Calopteryx haemorrhoidalis* (Zygoptera, Odonata) in response to environmental factors in the Brabtia sector streams, El-Kala, Algeria: implications for ecohydrological biomonitoring. *Studia Universitatis Vasile Goldis Seria Stiintele Vietii (Life Sciences Series)* 30(1): 21-32. (in English) ["Aspects of the phenology, reproductive biology and larval cycle of natural populations of *C. haemorrhoidalis* are described. Populations of this species in Brabtia sector (eastern Numidia, North-East Algeria) were studied between March 2017 and April 2018. An overview of the current state of the population is provided. The streams of Eastern Numidia have suffered over recent years from major disturbances including the effects of 20 rapid climate changes. Although the status of autochthony is preserved in the site, the populations are currently diminished compared to that recorded two dec-



ades ago. Aspects of the species reproductive behavior, biology, and ecology are reported. The species is univoltine with a direct development in 12 larval stages. The effects of some climatic conditions, particularly air temperature, included an extension of the adult phenology period. The species is unable to tolerate a certain amount of stress similar to stagnant water species. The correlation established between the abundance of *C. haemorrhoidalis* and the physico-chemical parameters from the principal correspondence analysis (PCA) shows an ecological gradient, in the distribution of the species, significantly ( $P < 0.001$ ) explained by a requirement for dissolved oxygen, both temperatures and pH." (Authors)] Address: Beddiar, M., Laboratory of Ecology of Terrestrial and Aquatic System «EcoSTaq», Badji Mokhtar University, Annaba, Algeria. E-mail: Beddiar\_marwa@yahoo.com

**17396.** Bhatti, H.; Panhwar, W.A.; Zia, S.A. (2020): Study on the dragonfly (Anisoptera: Odonata) fauna of district Larkana Sindh, Pakistan. *Journal of Entomology and Zoology Studies* 8(2): 619-623. (in English) ["A detailed odonatalogical field investigations were carried out to capture the dragonfly fauna of Larkana district, during March 2018 to October 2018 from various sites. Total of 215 samples recognized into 9 species under 5 genera pertaining to two families. The family Libellulidae was found most dominant with record of 8 species pertaining to 4 genera while family Aeshnidae was recorded with single species. Family Libellulidae showed its wide diversity and over all percentage of Libellulidae was recorded significantly highest (81.39%) and lowest that of family Aeshnidae (18.60%). Beside this, identification keys were also provided for easily isolation of families and genera." (Authors)] Address: Zia, S.A., National Insect Museum, National Agricultural Research Center, Islamabad, Pakistan

**17397.** Borkataki, S.; Taye, R.R.; Padhy, V. D.; Ramalakshmi; Reddy, M.D. (2020): Occurrence of odonates in M. S. Swaminathan School of agriculture (MSSSoA), CUTM, Paralakhemundi campus, Odisha. *Journal of Entomology and Zoology Studies* 8(2): 806-808. (in English) ["The present investigation on occurrence of Odonates was carried out in the campus of M. S. Swaminathan School of Agriculture (MSSSoA), CUTM, Paralakhemundi during 2018-2019. A total of 21 species of Odonata including 14 species of dragonflies under 1 family – Libellulidae of Anisoptera and 7 species of damselflies under 1 family – Coenagrionidae of Zygoptera were recorded from three different types of habitats in MSSSoA campus. The species belonging to the family Libellulidae was found to be abundant with 14 species followed by the family Coenagrionidae with 7 species." (Authors)] Address: Borkataki, S., Assistant Professor, Department of Entomology, Assam Agricultural University, Jorhat, Assam, India

**17398.** Borkenstein, A.; Jödicke, R. (2020): Body posture of *Sympetrum striolatum* at low temperatures in the absence of direct solar irradiation (Odonata: Libellulidae). *Notulae odonologicae* 9(5): 209-217. (in English) ["The flight season of *S. striolatum* in NW Germany extends into the beginning of winter. To understand behavioural thermoregulation we studied the body posture of females and males on cool ( $T < 10^{\circ}\text{C}$ ) and

overcast days. Although this species typically roosts in treetops, we discovered a few individuals perching on birch stems or roosting low on birch twigs. In both situations the wings were held predominantly horizontal relative to the dragonfly's body, the legs were moderately stretched and the body axis was positioned parallel to but distant from the support. When the surface temperature of the bark was cooler than the ambient air, the individuals changed their perching angle to maximize the distance of pterothorax and abdomen from the support." (Authors)] Address: Borkenstein, Angelika, Lebensbomer Weg 5, 26419 Schortens, Germany. E-mail: angelikaborkenstein@t-online.de

**17399.** Brito, J.; Louback-Franco, N.; Mendoza, C.; Nonato, F.; Juen, L. (2020): After 10 years the myth of *Crotalaria* spp. and dragonflies remains alive. *Biota Neotropica* 20(2): 6 pp. (in English, with Portuguese summary) ["The struggle to control insect-borne diseases can lead to make rash decisions. For instance, the controversial method of planting of *Crotalaria* spp. to attract predatory dragonflies can be used to control insect vectors of dengue fever and several other medically significant insect-borne diseases. Nevertheless, there is no scientific support for this assumption. Despite the lack of evidence, in Brazil, there remains a multitude of online articles and grey literature sources still promote *Crotalaria* planting as a means to prevent dengue fever. Here we discuss the reasons why Odonata would not be attracted by *Crotalaria* and, therefore, it cannot not be considered as an efficient method for vector control. Finally, the best practice to avoid the spread of insect-borne diseases in the tropics is to avoid the accumulation of standing water in urban areas." (Authors) fake news] Address: Juen, L., Univ. Fed. do Pará, Lab. de Ecol. e Conservação, Belém, PA, Brasil. E-mail: leandrojuen@ufpa.br

**17400.** Buczynski, P.; Stasiak, K. (2020): *Sympetma paedisca* (BRAUER, 1877) (Odonata: Lestidae) caught in a light trap. *Odonatrix* 16\_6 (2020): 3 pp. (in Polish, with English summary) ["A female of *S. paedisca* was caught on 23.07.2013 in a light trap in a forest near the village of Gołab in east-central Poland ( $51^{\circ}30'N$ ,  $21^{\circ}55'E$ ; UTM: EC60). This odonate was collected during research on the food resources of the Nightjar (*Caprimulgus europaeus*). However, it was probably an individual roosting away from its breeding site, which was stimulated to activity by the strong light from the trap. This species is therefore unlikely to be a potential food item of the Nightjar. But this record is interesting because *S. paedisca* is rare in the Mazovian Lowland and protected by law in Poland." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**17401.** Buczynski, P.; Tonczyk, G. (2020): Polish and dedicated to Poland odonatalogical papers. 18. The year 2019. *Odonatrix* 16\_1 (2020): 5 pp. (in Polish, with English summary) ["The authors present a list of Polish and dedicated to Poland odonatalogical papers that were published in the year 2019. In the reported time period, 38 publications of various kind were published, and one PhD thesis and one Msc thesis were created." (Authors)] Address: Buczynski, P.,

Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**17402.** Buczynski, P.; Buczyńska, E.; Baranowska, M.; Lewniewski, L.; Góral, N.; Kozak, J.; Tarkowski, A.; Szykut, K.A. (2020): Dragonflies (Odonata) of the city of Lublin (Eastern Poland). *Polish Journal of Entomology* 89(3): 153-180. ["The authors discuss the dragonfly fauna of Lublin based on fragmentary historical data and the results of their own research from the period 1992-2019. A total of 54 dragonfly species were recorded: 17 in the historical period and 53 contemporarily. Although the Lublin area is a hot spot of odonate species richness in both the Lublin Upland and central and eastern Poland, it is of little importance for habitat specialists and also endangered and protected species. The species composition of the fauna was analysed in three zones of the city: the outskirts, the urbanized area and the City Centre. The diversity and numbers of dragonflies decreased significantly along this urbanization gradient and some groups of stenotopic species disappeared. The importance of anthropogenic water bodies in maintaining the diversity of dragonflies in urban areas, in particular stormwater ponds and garden ponds, is emphasized." (Authors)] Address: Buczynski, P., Dept of Zoology & Nature Protection, Institute of Biological Sciences, Maria Curie-Skłodowska University, Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**17403.** Buczynski, P.; Bobrek, M.; Bobrek, R. (2020): An interesting record of the accidental introduction of the exotic dragonfly *Pseudagrion microcephalum* (RAMBUR, 1842) (Odonata: Coenagrionidae) to Poland. *Odonatrix* 16\_5 (2020): 6 pp. (in Polish, with English summary) ["One female of the Australian-Oriental *P. microcephalum* emerged in a pet shop with fish aquaria containing tropical plants in Kraków (UTM: DA24) (S Poland) in February 2020. It probably entered the aquarium as an egg or a larva on aquatic plants originating from south-east Asia. This is the fourth known case of the accidental introduction of an exotic odonate to Poland: the earlier ones involved *Mecistogaster* sp., *Crocothemis servilia* and *Ischnura senegalensis*. The case of *P. microcephalum* is particularly interesting, because the plants came from a greenhouse complex in Poland, to which no new plants had been imported for around half a year. Given the larval development time in tropical Coenagrionidae, this indicates the persistence in heated greenhouses of a population of *P. microcephalum* that has been present for at least three or four generations. This is probably the first confirmed information of this kind from Europe. Systematic studies on the existence of reproducing populations of dragonflies in greenhouses cultivating exotic aquarium plants are worth undertaking." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**17404.** Burwell, C.J.; Theischinger, G.; Leach, E.C.; & Burwell-Rodriguez, A.I. (2020): Dragonflies and damselflies (Odonata) of the Eungella region, central coastal Queensland, Australia. *Proceedings of The Royal Society of Queensland* 125: 33-42. (in English) ["We collate records of species of

Odonata from the broader Eungella region within the Clarke Range, central coastal Queensland, Australia, comprising the Eungella plateau, the upper Pioneer Valley as far east as Gargett, and the area around Eungella Dam on the western side of the Clarke Range. Records are based on specimens collected on Griffith University and Queensland Museum surveys of the region in 2013 and 2014, specimen records in museum collections, and observational records sourced using the Atlas of Living Australia and accompanied by identifiable photographs. A total of 58 species are recorded from the Eungella region: 37 dragonflies and 21 damselflies, representing 12 families. Four species appear to be endemic to the Clarke Range. Another six are southern species that occur as far north as Eungella and the broader Clarke Range but do not cross the Burdekin-Lynd Barrier. Two species are essentially confined to northern Queensland and occur south of the Burdekin-Lynd Barrier but only as far south as the Eungella region. The majority of the region's species are widespread, occurring from northern to southern Queensland and often far beyond." (Authors)] Address: Burwell, C.J., Biodiversity Program, Queensland Mus., PO Box 3300, South Brisbane, Queensland, Australia. E-mail: chris.burwell@qm.qld.gov.au

**17405.** Cabana Otero, M.; Barreiro, A.R.; Cordero-Rivera, A. (2020): Primera cita de *Aeshna isocles* (Müller, 1767) (Odonata: Aeshnidae) para la provincia de Lugo y situación de la especie en Galicia (noroeste de la Península Ibérica). *Boletín de la Sociedad Entomológica Aragonesa* 67: 399-400. (in Spanish, with English summary) ["The first record of *A. isocles* from Lugo province is reported, as well as new observations from A Coruña province. The situation of this dragonfly in Galicia (north-western Spain) is briefly described and discussed." (Authors)] Address: Cabana Otero, M., Grupo de Investigación en Biología Evolutiva (GIBE), Depto de Biología. Facultad de Ciencias. Univ. da Coruña. Campus da Zapateira, s/n. 15071 A Coruña, Spain. E-mail: mcohylla@gmail.com

**17406.** Cardoso, F. (2020): Ângelo Machado - In memoriam (1934-2020). *Arquivos de Neuro-Psiquiatria* 78(5): 316-317. (in English) ["Professor Ângelo Barbosa Monteiro Machado, MD-PhD was born in Belo Horizonte City on the 25th of May, 1934). He graduated from the Medical School of Universidade Federal de Minas Gerais (UFMG) but never practiced Medicine. Despite this fact and paradoxically, as we shall see, he exerted a profound and lasting influence over Medicine, particularly in the fields of Neurology and Neurosurgery. Immediately after graduating, he became part of the faculty at the Anatomy Department of UFMG, where received his PhD title in 1963. From 1965 to 1967, he was a research post-doctoral fellow at the Morphology Department of Northwestern University in Chicago, IL. Upon his return to Brazil, in partnership with his main collaborator and wife, Professor Conceição Ribeiro da Silva Machado (1936-2007), he founded the Laboratories of Electron Microscopy and Neurobiology at the Institute of Biological Sciences of Universidade Federal de Minas Gerais (Laboratórios de Microscopia Eletrônica e Neurobiologia do Instituto de Ciências Biológicas, ICB-UFMG). After retiring as a Professor at the Morphology Department in 1987, he returned to work at the same ICB-UFMG, but this

time at the Laboratory of Insects Systematic of the Zoology Department (Laboratório de Sistemática de Inseto do Departamento de Zoologia). After compulsory retirement in 2004, he became Professor Emeritus at ICB-UFMG in the following year. His most significant contributions in the field of Neurobiology were to elucidate the formation of norepinephrine containing synaptic vesicles from the smooth endoplasmic reticulum as well as several aspects of involvement of the autonomic nervous system in experimental models of Chaga's disease. In the field of Entomology, his area of expertise was dragonflies. He described the astonishing number 98 species and 11 genres of these insects. By the way, Professor Ângelo loved dragonflies so much that the tiles marking the rim of the water of the swimming pool at his house were illustrated with drawings of dragonflies. The third intellectual activity to which he was involved was environmentalism. At an age when this was an issue that deserved at best rare footnotes, he vigorously engaged himself on the defense of the environment. Moreover, he developed a late interest in literature, writing dozens of plays and books. Most of them targeted children and teenagers. In 1993, he received the Jabuti Award for the book *O velho da montanha, uma aventura amazônica*. The Jabuti Award is the most prestigious award in Brazilian letters, comparable to the Pulitzer Prize in the USA. His indelible legacy for Neurology had an almost serendipitous nature. Already an assistant to Professor João Afonso Liberato Didio, MD-PhD, then Professor and Chief of Anatomy at UFMG, always tongue-in-cheek, he thought that "there was no future in dissecting". He moved to the sector of Neuroanatomy. With his remarkable didactic skills, he rendered intelligible a subject that was virtually inaccessible to Medical students. Up to that time, they were forced to study thick and hermetic foreign textbooks. The students started copying the lectures, typed them, bounded them together and created a makeshift book that circulated among them semester after semester. After that, Professor Ângelo curated the text and this is how the first edition of the textbook *Functional Neuroanatomy (Neuroanatomia Funcional)* gained life. There is a fastidious overuse of the adjective seminal. Yet in this particular case it is fitting to associate this book with a reproductive function: there are very few Brazilian neurologists that have not fallen in love with the nervous system and decided to pursue a career in Neurology after reading such work. I regret for those who did not have the privilege of meeting Professor Ângelo Machado. To be born in an aristocratic family with plenty of towering figures in Medicine (Lucas Machado), Politics (Cristiano Machado), and Literature (Maria Clara Machado and Abílio Machado) may be an easy way to have one's talent blocked. However, and fortunately, this never happened to him. Aside his intellectual prowess, he was an eccentric and deliciously funny man, warmly called "Angelim" by his peers and students. He also had many other scientific and non-scientific interests. Among these, he was endowed with an unmatched skill for foreign languages; he was a talented amateur comic actor during the Medical School and was a nocturnal flâneur in the bohemian scene of Belo Horizonte. His retirement of the latter (by the way, bitterly regretted by his fellow bohemians!) was caused by the most fateful event of his life: passion for and marriage with Professor Conceição née

Ribeiro Machado, resulting not only in a highly productive scientific partnership, but also in the birth of Lúcia (neuro-pediatrician), Flávia (intensivist), Paulo (biologist) and Eduardo (employee of the Brazilian Central Bank). Professor Ângelo Machado died on the 6th of April 2020." (Author)] Address: Cardoso, F., Univ. Federal de Minas Gerais, Medical School, Internal Medicine Dept, Neurology Service, Movement Disorders Unit, Belo Horizonte MG, Brazil

**17407.** Chan, K.S.; Tan, J.; Goh, W.L.; Earl of Cranbrook (2020): Diet profiling of house-farm swiftlets (*Aves*, Apodidae, *Aerodramus* sp.) in three landscapes in Perak, Malaysia, using high-throughput sequencing. *Tropical Ecology* 60: 379-388. (in English) ["In Peninsular Malaysia, from the 1980s there has been progressive expansion of an industry based on specially designed buildings to house colonies of edible-nest swiftlets (*Apodidae*, *Collocaliini*). The structures are termed house-farms and the birds, house-farm swiftlets. Genetic research has so far failed to establish affinity with any wild form of swiftlets that builds 'white' edible nests; we therefore identify house-farm swiftlets only as *Aerodramus* sp. The diet profiles of house-farm swiftlets were compared in different landscapes in Perak State, Malaysia, using a high-throughput sequencing of total DNA extracted from faecal samples collected at six house-farms, located at Beruas, Gopeng, Ipoh and Pantai Remis, in the month of October 2017. Landscape profiles of the presumed foraging area within 6 km radius of these six sites were estimated using Google MyMaps, and categorised as urban, monocrop or mixed-use. Based on the partial mitochondrial cytochrome oxidase I region (ca. 218-bp), 4852 operational taxonomic units (OTUs) were recovered, of which 266 belonged to arthropods. Overall, the diets of house-farm swiftlets assessed in this study mainly comprised Diptera (64.49%), followed by Hemiptera (16.73%), Coleoptera (13.47%), Lepidoptera (2.04%), Hymenoptera (1.63%), Blattodea (0.82%) and Odonata (0.82%). Ipoh (urban landscape) and Pantai Remis (mixed) recorded the highest diversity of dietary insects. Presence of the aquatic insect families in these diets may reflect extensive freshwater bodies in the urban landscape. Coleoptera and Hemiptera were found to be dominant in the swiftlet diets at two monocrop landscapes Beruas OP1 and Beruas OP2, but did not include the weevil *Elaeidobius kamerunicus*, an important pollinator of oil palm. Results confirm that house-farm swiftlets are opportunistic feeders, so that variation in the diet profiles in Perak reflected the availability of insect prey within the landscapes of the foraging ranges." (Authors)] Address: Chan, K.S., Dept of Biological Science, Faculty of Science, Univ. Tunku Abdul Rahman, Jalan Universiti, Kampar, Malaysia

**17408.** Chiari, C. (2020): Prima segnalazione di *Selysiothemis nigra* (Van der Linden, 1825) (Anisoptera: Libellulidae) per la provincia di Brescia (Pianura Padana, Lombardia). *Natura Bresciana - Ann. Mus. Civ. Sc. Nat., Brescia* 43: 141-143. (in Italian, with English summary) ["First report of *S. nigra* in the Brescia Province (Po Plain, Lombardy). This note documents the finding of a small population of *S. nigra* in a former quarry basin in the municipality of Poncarale (BS). This is the first recorded report for the province of Brescia and for Lombardy



where this species, notoriously nomadic and endowed with migratory capacity, had never been reported." (Author)] Address: Chiari, C., via Donatello 261, 25124 Brescia (Bs), Italy. E-mail: carlo.emidio@gmail.com

**17409.** Chiari, C.; Piglia, A.; Sacchi, F.; Sand, M.L. (2020): Presenza di *Trithemis annulata*, *Obelisco violetto* (Palisot de Beauvois, 1805) (Anisoptera: Libellulidae) in provincia di Brescia nel 2018. *Natura Bresciana - Ann. Mus. Civ. Sc. Nat., Brescia* 43: 145-148. (in Italian, with English summary) ["Presence of *T. annulata* in Brescia Province in 2018. At the beginning of August 2018 some individuals of *T. annulata*, a male and a female, were observed for the first time in province of Brescia at the Fishing Club Laghi Mella in the municipality of Poncarale (UTM WGS84: 32T593473.5034238, 98 m). These former quarry basins are now used for sport fishing. Subsequently, since the beginning of September, an important reproductive population has been identified in the same place where hundreds of adult individuals have been observed intent on mating, oviposition and defence of the territory by conspecifics and by *Orthetrum cancellatum*, *O. albistylum*, *Crocothemis erythraea*, *Anax imperator* and *A. parthenope*. At the same time other groups, composed of small populations and single individuals, were identified in six other artificial basins originating from former gravel and sand quarries located in the upper and lower Brescia plain and located in the municipalities of: Brescia, Montirone, Bagnolo Mella, Roncadelle, Travagliato and Provaglio d'Isèo. The station with the presence of *Trithemis annulata*, located further north in the province of Brescia, was located in Provaglio d'Isèo in the "Lame" of the SIC-ZPS – "Torbiere del Sebino", former peat quarries." (Authors)] Address: Piglia, Alida, Via A. Cechov 21, 20151 Milano, Italy. E-mail: alida.piglia@tiscali.it

**17410.** Chourasia, R.; Bhargava, D.; Vyas, V. (2020): Study on Odonata as health indicator of riparian ecosystem of Betwa River, Bhojpur, Raipur. *Journal of Entomology and Zoology Studies* 8(6): 1339-1344. (in English) ["In the present study Odonates are used as a health indicator of the riparian ecosystem of Betwa river, Raipur (Division: Bhopal). A total of 30 species including 22 species of Anisoptera and 8 species of Zygoptera were recorded in four different sites during the study period from July to December 2019. 23 species recorded from Site A (Riparian zone adjoining to Forest), 22 species recorded from Site C (Bhojpur Ghat), 21 species from Site D (Riparian zone adjoining to Agriculture field), and 16 species from Site B (Jain Temple). Site A was the most abundant habitat with 582 individuals (379 Anisopterans and 203 Zygopterans), followed by Site C with 517 individuals (338 Anisopterans and 179 Zygopterans), followed by Site D with 435 individuals (318 Anisopterans and 117 Zygopterans) and Site B with 200 individuals (184 Anisopterans and 16 Zygopterans) was the least abundant." (Authors)] Address: Chourasia, R., Dept of Zoology & Applied Aquaculture, Barkatullah University, Bhopal, Madhya Pradesh, India

**17411.** Chovanec, A. (2020): Die Libellenfauna (Odonata) eines naturnahen metarhithralen Gewässers im niederösterreichischen Alpenvorland. *Mercuriale* 20: 15-32. (in German,

with English summary) ["The dragonfly fauna (Odonata) of the pristine metarhithron Piesting in the Alpine Foothills of Lower Austria. – In the years 2019 and 2020 a total of six field trips were carried out at a metarhithron stretch of the Piesting, a river situated in the Alpine Foothills of Lower Austria, and a small adjacent backwater, to record the representative spectrum of Odonata species. Investigations focused on the detection of teneral and adult specimens as well as on the observation of reproductive behaviour. The study revealed an inventory of 19 species, 11 of them were certainly, probably or possibly autochthonous. The pristine status of this river section is reflected in the records of river-type specific reference species: the first-degree indicators *Calopteryx virgo* and *Onychogomphus forcipatus*, both probably autochthonous, and the second-degree indicators *Pyrrhosoma nymphula* (certainly autochthonous) and *Orthetrum brunneum*. At the Piesting itself 7 species were found. The backwater comprised a spectrum of 17 species with remarkable records of *Lestes virens* and *Coenagrion ornatum*: both species are "critically endangered" according to the Austrian Red List, *C. ornatum* also is listed in Annex II of the Habitats Directive 92/43/EEC." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-Mail: andreas.chovanec@bmlrt.gv.at

**17412.** Chovanec, A. (2020): Zur Aussagekraft unsystematisch erhobener Libellendaten (Insecta: Odonata) aus einem gewässerlosen Garten. *Beiträge zur Entomofaunistik* 21: 181-210. (in German, with English summary) ["The informative value of dragonfly records (Insecta: Odonata) unsystematically gathered in a private garden without water bodies. – In the period 2009–2019, dragonflies appearing in the author's garden in Lower Austria were unsystematically recorded. Despite the fact, that there is no water body in this 300 m<sup>2</sup> garden, 26 species (one third of the Austrian Odonate fauna) were found, including for example *Coenagrion scitulum* and *Sympetrum meridionale*, both species "critically endangered" in Austria. *S. striolatum* accounts for 42 % of the total sum of 467 records. Studies carried out at running and standing waters in the surroundings of the garden revealed an inventory of 37 taxa belonging to the seven dragonfly associations ("ecologic guilds"), which are described for the bioregion where the garden is situated. The species detected in the garden are representative of the species spectrum recorded in the surrounding area because all associations are also represented by the species found in the garden. *Orthetrum albistylum* was seen only in the garden and not at the waters situated in its surrounding area. The highest number of specimens appearing on one day in the garden was 13, the highest number of species four. The records in the garden also reflect characteristic phenological patterns of winter-, spring-, early/midsummer- as well as midsummer/autumn-species." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-Mail: andreas.chovanec@bmlrt.gv.at

**17413.** Chovanec, A. (2020): Fotografische Dokumentation dunkler Pterostigmata bei Männchen von *Erythromma lindenii* (Selys, 1840) (Odonata: Coenagrionidae). *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen* 72: 1-6.

(in German, with English summary) ["Photographic documentation of dark pterostigmata in males of *Erythromma lindenii* (Selys, 1840) (Odonata: Coenagrionidae). – Both sexes of *E. lindenii* typically show a bright ochre coloured pterostigma that is important for identification in the field. The present paper shows and discusses photographs of male specimens from Austria and Germany with a deviating dark pterostigma." (Authors)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-Mail: andreas.chovanec@bmlrt.gv.at

**17414.** Chovanec, A. (2020): Fotografische Dokumentation einer bemerkenswerten Konstellation von *Pyrrhosoma nymphula* (Odonata: Coenagrionidae) und *Anax imperator* (Odonata: Aeshnidae) bei der Eiablage. *Mercuriale* 20: 67-70. (in German, with English summary) ["Photographic documentation of a remarkable constellation of *P. nymphula* and *A. imperator* during oviposition. – Photos show a female *A. imperator* that chose the same oviposition site as a tandem of *P. nymphula*. The *Anax* female was sitting on top of the *Pyrrhosoma* female and touched it with its legs. *Pyrrhosoma* continued oviposition, at least for a short time." (Author)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-Mail: andreas.chovanec@bmlrt.gv.at

**17415.** Chovanec, A. (2020): Die Libellenfauna der Krems in Ansfelden / Oberaudorf (Oberösterreich) mit einem individuenreichen Vorkommen von *Erythromma lindenii* (Selys, 1840) (Odonata: Coenagrionidae). *Beiträge zur Entomofaunistik* 21: 3-31. (in German, with English summary) ["In the year 2019, 28 Odonate species were recorded at the rehabilitated section of the River Krems in Ansfelden / Oberaudorf (Upper Austria), 22 of them were classified as certainly, probably or possibly autochthonous (reproducing in the investigation area). 21 species (18 of them autochthonous) belong to the inventory of reference species, which is typical of the biocoenotic region of the River Krems in this area, the hyporhithron / epipotamon transition zone. Thus, the dragonfly-based ecological status of this river section was classified as "high". The different hydrological and morphological characteristics of lotic and lenitic sub-sections are reflected by the Odonate fauna and by the results of the assessment procedures: Lotic sub-sections were classified as "high" and "good", lenitic ones as "good" and "moderate". The record of the largest population of the *E. lindenii* ever detected in Austria has to be emphasized. The comparison of the results of the present study with an odonatological investigation of the same study area carried out in 2013 revealed higher total species numbers and higher numbers of rivertype-specific reference species in 2019. The abundances of those species occurring in both years were higher in 2019." (Authors)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-Mail: andreas.chovanec@bmlrt.gv.at

**17416.** Corso, A.; Penna, V. (2020): *Orthetrum chrysostigma* (Burmeister, 1839): new for the Italian fauna (Odonata Libellulidae). *Biodiversity Journal* 11(2): 359-362. (in English) ["Details about the first Italian record of *O. chrysostigma*, obtained in south-western Sicily, are reported. One mature male

was collected in the province of Agrigento in August 2014." (Authors)] Address: Corso, A., Via Camastra 10, 96100 Siracusa, Italy. E-mail: zoologywp@gmail.it

**17417.** Costa Natividade, D.; Ferreira Santana, Q.C.; Silva Pinto, N. (2020): Weight determines the outcome in territorial contests of *Erythrodiplax fusca* Rambur, 1842 (Odonata: Libellulidae). *Rev. Biol. Neotrop. / J. Neotrop. Biol.* 17(2): 103-109. (in Portuguese, with English summary) ["*E. fusca* ... defend their territories close to rivers, lakes and swamps. Disputes over access to females or breeding sites usually occur during flight activities. The objective in this work was to analyze the disputes over territories between males and to evaluate if the winners are heavier than losers. The study was conducted at the Morro Feio Experimental Farm, located in the municipality of Hidrolândia, state of Goiás, Brazil. First, an inspection was carried out to find points on the bank of the stream that males commonly dispute to establish their territories. After the identification of these points, all disputes for territory were counted and at the end of the conflict the two males were collected (winner and loser) and weighed. 74 individuals of *E. fusca* (37 winners and 37 losers) were collected. The fresh weight was decisive to win the dispute, with winner males 10% heavier than losing males. Therefore, this work corroborates the hypothesis that the weight of the males of *E. fusca* is related to increases in probability of victory in disputes over territories." (Authors)] Address: Silva Pinto, N., Centro Univ. Araguaia, Av. T10, 1047 Setor, Bueno, Goiânia, 74223060, Goiás, Brasil. E-mail: nelsonsilvapinto@gmail.com

**17418.** Craves, J.A.; O'Brien, D.S.; Marvin, D.A. (2020): New population of the rare dragonfly *Ophiogomphus howei* (Odonata: Gomphidae) in southern Michigan, United States. *Journal of Insect Science* 20(5), 33: 9 pp. (in English) ["*O. howei* is a rare North American dragonfly, given a global conservation rank of Vulnerable by NatureServe. This species inhabits localized stretches of a limited number of typically undisturbed, high-quality, forested rivers in two disjunct regions in North America. We describe a new population in between the known ranges from an impaired river in a largely urban watershed in southern Michigan. We also report a previously overlooked specimen from a new location in Pennsylvania, and provide current occurrence and conservation status of the species in North America." (Authors)] Address: Craves, Julie, 12200 Centennial Lane, Ann Arbor, MI 48103, 2604 West Lapeer, Lansing, MI 48933, USA. E-mail: jcraves@umich.edu

**17419.** Crescia, P.; Soccini, C.; Ferri, V.; Celletti, S. (2020): First occurrence of *Lindenia tetrphylla* (Vander Linden, 1825) for Northern Lazio (Odonata, Gomphidae). *Atti Soc. it. Sci. nat. Museo civ. Stor. nat. Milano* 7(2): 79-82. (in Italian, with English summary) ["The presence of *L. tetrphylla*, is reported in the Mignone River Valley, Tarquinia (VT) (ZSC IT6010035 "River Mignone - lower course") reconfirming this gomphid for Lazio. This rare dragonfly is localized in Italy and is reported in a few locations in Tuscany, Campania, Umbria, Molise, Abruzzo, Puglia, Sicilia and Sardinia. *L. tetrphylla* was previously reported for a locality in southern Lazio (Lago di Fondi, LT)

on the basis of two preserved specimen in the Entomological Collection A. Costa of the Museum of Zoology of the Naples University in and dating back to the midnineteenth century. The habitat of the species is made up of the gravelly shore and the curtain of willows, poplars and tamarisks of one of the best-preserved rivers in Lazio." (Authors)] Address: Ferri, V., Gruppo Naturalistico della Maremma Laziale, Tarquinia (VT), Italy. E-mail: drvincenzoferri@gmail.com

**17420.** Cuenca Espinosa, E.D. (2020): Odonatos de las charcas artificiales de la sierra del Arca, San Roque (Cádiz, España). *Revista gaditana de Entomología* XI: 99-110. (in Spanish, with English summary) ["We present the results of the Odonata samples carried out in two Sierra del Arca artificial ponds, San Roque (Cádiz, Spain). A total of 24 species were detected. The highest number of species was observed in June, while the highest abundance of individuals occurred in July. The highlights are the populations of *Coenagrion scitulum* because its level of protection and *Paragomphus genei* because its singularity." (Authors)] Address: Cuenca Espinosa, E.D., San Felipe 13, 9ºB – 11300 La Línea de la Concepción (Cádiz), Spain. E-mail: davidcuenca.proyecto@gmail.com

**17421.** Czechowski, P. (2020): New records of dragonflies (Odonata) from Zielona Góra (Lubusz Province – western Poland) in 2016-2019. *Odonatrix* 16\_8 (2020): 7 pp. (in Polish, with English summary) ["In 2016-2019, occasional observations of dragonflies were made on some waterbodies and watercourses within the administrative boundaries of Zielona Góra (western Poland); they were incidental to other environmental projects in this city. The species found at 10 localities are listed, along with single records from three others. Certain species of special interest are characterized from the faunistic, zoogeographical and ecological points of view. A total of 40 species of dragonflies were recorded in Zielona Góra during the four years in question. They included three protected species (*Gomphus flavipes*, *Ophiogomphus cecilia* and *Cordulegaster boltonii*) and one on the Red List of Threatened Species of Poland (*Orthetrum coerulescens*." (Authors)] Address: Czechowski, P., Katedra Turystyki, Filia Uniwersytetu Zielonogórskiego w Sulechowie, ul. Armii Krajowej 51, 66-100 Sulechów, Poland. E-mail: paczechow@gmail.com

**17422.** de Carvalho, G.; Cozzer, G.D.; Rezende, R.; Magro, J.D.; Simões, D.A. (2020): Efeito Sinérgico do BTI e predacion sobre a mortalidade de larvas do mosquito *Aedes aegypti* (Linnaeus, 1762). *Revista Acta Ambiental Catarinense* 17(1): 10-16. ["This study objective was to evaluate the effect of use of predatory Libellulidae larvae associated with BTI on larval reduction of mosquitoes. Our tested hypothesis seeks to answer whether there would be an increase in the mortality of *A. aegypti* larvae caused by the synergistic effect of BTI along with the predator. The microcosms consisted of 300mL containers containing 100mL of water with densities of 100, 200, and 300 larvae of *A. aegypti* and one predator larva. The BTI and BTI + Predator treatments received 0.01ppm BTI. Control received only *A. aegypti* larvae. The results showed a significant effect on BTI + Predator treatment in the density of 1 larva / mL, while in the densities of 2 and 3 larvae / mL the same effect

was not observed, partially corroborating the hypothesis of BTI and predation synergistic effect in larval mortality. Increasing larval density increased predation rate, while the effect of BTI on mortality decreased. Our results show that the synergistic effect exists, but that density-dependent factors may hide such effect." (Authors)] Address: Cozzer, G.D., Mestrando do Programa de Pós-Graduação em Ciências Ambientais pela Universidade Comunitária da Região de Chapecó, Brazil. E-mail: pinocozzer.ps@unochapeco.edu.br

**17423.** Demyr Aydin, D.; Bolu, H. (2020): Odonata Fauna of Diyarbakır Province. *Journal of the Institute of Science and Technology* 10(3): 1494-1506. (in Turkish, with English summary) ["This study was conducted in Diyarbakır (Bağlar, Kayapınar, Sur and Yenipazar districts) province in May, June, July and August of 2017. As a result of the survey studies, 261 samples belonging to the Odonata order were collected. Seven species ... were determined: *Brachythemis fuscopallata*, *Crocothemis erythraea*, *Orthetrum albistylum*, *O. brunneum*, *O. coerulescens*, *Platycnemis dealbata*, *Ischnura elegans*. Six of the 7 species identified in the study are the first records for the Diyarbakır insect fauna." (Authors)] Address: Bolu, H. E-mail: besni@dicle.edu.tr

**17424.** Dow, R.A. (2020): Revision of the genus *Coeliccia* Kirby in Borneo part III: Two new species from the *C. membranipes*-group from Sarawak and Brunei (Odonata: Zygoptera: Platycnemididae). *Zootaxa* 4890(4): 473-492. (in English) ["*C. junis* sp. nov. (holotype ♂ from Borneo, Sarawak, Bintulu Division, Planted Forest Project, Bukit Mina Wildlife Corridor, "Day 4" stream near Bukit Nyegoh and Bukit Jugam, near small brown water pool, 10 viii 2018, deposited in the Naturalis Biodiversity Center, Leiden, the Netherlands) and *Coeliccia roberti* sp. nov. (holotype ♂ from Borneo, Sarawak, Miri Division, Lambir Hills National Park, small stream on Oil Well Trail, 22 iv 2011, deposited in the Naturalis Biodiversity Center, Leiden, the Netherlands) are described from Borneo. Both new species belong to the *Coeliccia membranipes*-group and bring the number of named species known from the group from Borneo to nine and the total number of named species from Borneo currently placed in *Coeliccia* to 15. *Coeliccia junis* is only known from a small area in Sarawak, *C. roberti* is also known from Brunei. Both species are considered likely to be closely allied with *C. macrostigma* Laidlaw." (Author)] Address: Dow, R.A., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**17425.** Dow, R.A.; Zhang, H.-m. (2020): Two new species of *Coeliccia* Kirby from Yunnan, China (Odonata: Zygoptera: Platycnemididae). *Zootaxa* 4838(4): 491-502. (in English) ["Two new species of *Coeliccia* Kirby are described from Yunnan, China: *Coeliccia tongbiguan* sp. nov. and *Coeliccia yunnanensis* sp. nov. (holotype ♂ for both from Tongbiguan National Nature Reserve, Yingjiang County, Yunnan). *C. tongbiguan* is allied to *C. hoanglienensis* Do, known only from Vietnam. *C. yunnanensis* appears to be closely allied to the *Coeliccia hayashii*-group, also from Vietnam. The fifteen named species of *Coeliccia* now known to occur in China are listed, twelve of them occur



in Yunnan, the presence of *C. didyma* in the country is confirmed." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**17426.** Dow, R.A.; Price, B.W. (2020): A review of *Megalogomphus sumatranus* (Krüger, 1899) and its allies in Sundaland with a description of a new species from Borneo (Odonata: Anisoptera: Gomphidae). *Zootaxa* 4845(4): 487-508. (in English) ["*M. sumatranus* and its allies in Sundaland are reviewed. The accessory genitalia of the males of this genus, hardly considered previously, are found to be taxonomically informative. The taxon from Borneo previously treated as *M. sumatranus* is described from both sexes as *M. buddi* sp. nov. (holotype ♂ Sungai Datai, Nanga Bloh, Lanjak Entimau Wildlife Sanctuary, Kapit Division, Sarawak, Malaysia, 22 viii 2013, leg. J. anak Awan & M. anak Adau; deposited at the Naturalis Biodiversity Center, Leiden, the Netherlands). *M. borneensis* (Laidlaw, 1914), described as a subspecies of *M. icterops* (Martin, 1903) and subsequently relegated to the synonymy of that species, is considered to be a distinct species. *M. icterops* is however considered to be a junior synonym of *M. sumatranus*. A re-description of the holotype of *M. borneensis* is provided as is the first description of the female. Descriptive notes with illustrations of *M. sumatranus* are given." (Authors)] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**17427.** Dow, R.A.; Phan, Q.T.; Choong, C.Y. (2020): *Protosticta joepani* sp. nov. from Borneo with notes on *P. kinabaluensis* Laidlaw, 1915 (Odonata: Zygoptera: Platystictidae). *Zootaxa* 4729(3): 371-387. (in English) ["*P. joepani* sp. nov. is described from Malaysian Borneo (holotype ♂ Bario, Kelabit Highlands, Miri Division, Sarawak, Malaysia, deposited in the Naturalis Biodiversity Center, Leiden). It is the sister species of *P. kinabaluensis* Laidlaw, 1915; some descriptive notes and a set of illustrations are provided of the latter species. A COI gene tree for both species is provided. The placement of both *P. joepani* and *P. kinabaluensis* is discussed, but although it is very unlikely that they belong in *Protosticta sensu stricto*, the issue is left open here." (Authors)] Address: Dow, R.A., Sarawak Mus. Campus Proj., Jabatan Muzium Sarawak, Jalan Barrack, 9300 Kuching, Sarawak, Malaysia. E-mail: rory.dow230@yahoo.co.uk

**17428.** Estacio, R.D.; Villanueva, R.J.T.; Freitag, H. (2020): Odonata fauna of riparian habitats in selected areas of Luzon and Mindoro region. *International Journal of Scientific and Research Publications* 10(8): 788-794. (in English) ["Odonata is considered as potential indicator of environmental disturbances. Despite of great efforts in recording the Odonata Fauna of the Philippines in general, the Riparian habitats in Bataan/Subic Bay (Luzon) and Mt. Hinunduang/Baroc River Catchment (Mindoro) are still unexplored. Due to the continuous forest and freshwater habitat destruction, faunal survey of Odonata species is urgent. The present study surveyed selected riparian habitats in these regions in December 2015 to April 2016. A total of 206 species belonging to 20 genera (*Heteronaias*, *Brachydiplax*, *Diplacodes*, *Macrodiplax*, *Neurothemis*, *Orthetrum*, *Pantala*, *Potamarcha*, *Trithemis*, *Zyxomma*, *Neuro-*

*basis*, *Cyrano*, *Rhinocypha*, *Agriocnemis*, *Ischnura*, *Pseudagrion*, *Teinobasis*, *Euphaea*, *Coeliccia*, and *Risicnemis*) were recorded and seven endemic species of the family *Platycnemididae*, *Euphaeidae*, and *Calopterygidae* were documented in both regions. From the collected specimens, one species under the family *Platycnemididae* is new to science but additional collection and evaluation are needed. The data collected contribute to the understanding of Odonata diversity and distributions in the regions and support future conservation and management strategies." (Authors)] Address: Estacio, R.D., College of Arts and Sciences, Quezon City University 673 Qurino High way, San Bartolome, Novaliches, Quezon City, 1116 Philippines. E-mail: jaischneider17@gmail.com

**17429.** Fadila, M.I.; Mardiasuti, A.; Mulyani, Y.A. (2020): Insects as food source for cattle egret (*Bubulcus ibis*) in Jatibarang landfill, Semarang. *IOP Conference Series: Earth and Environmental Science* 528: 8 pp. (in English) ["In the Jatibarang waste landfill, many cattle egrets were foraging for food insects. The objective of this paper was to identify insect (larvae and imago) and its abundance in Jatibarang waste landfill during March to May 2019. Plots (27 plots, 0.5x0.5m) were selected and insect larvae were collected beneath the wastes. Sweep net were used to sample flying (imago) insects. Population of cattle egret were estimated through counting from vantage points. There were 27 species of insects (larva and imago combined). ... 4 species of dragonflies ... High diversity and density (up to 3373.33 individuals/m<sup>2</sup>) of the insects in the garbage dump was able to support high population of cattle egrets, as many as 3365 individuals. The waste landfill can serve as an artificial feeding ground for cattle egrets due the abundant larvae and imago insects.] Address: Mardiasuti, A., Dept of Conservation Forest Resource & Ecotourism, IPB Univ. (Bogor Agricultural University), Bogor, Indonesia. E-mail: aniipb@indo.net.id

**17430.** Faradilla, A.R.; Uthami, M.; Andini, B.; Rachman, H.T. (2020): The life history and microhabitat ecology of a phyto-tem-breeding damselfly *Pericnemis stictica* in Jateviulyo Forest, Yogyakarta. *Treubia* 47(1): 63-75. (in English, with Indonesian abstract) ["This study aims to understand the life history and microhabitat ecology' of a phytotelmata-breeding species. *Pericnemis stictica*. Data was collected at 46 breeding sites in the Jatimulyo Forest. Kulonprogo. Several parameters were recorded from each breeding site. Le. plant species, diameters, depth, water depth, water volume, water pH. and water turbidity'. Naiads and imagoes of *P. stictica* were measured morphometrically'. The data taken was analyzed descriptively using Minitab 19. The results showed that 17 naiads of *P. stictica* were found in 13 bamboo stumps. The bamboo species most commonly used by *P. stictica* as a breeding site was *Dendrocalamns asper*. Naiads of *P. stictica* were found in the same habitat as mosquito larva from genera *Toxorhynchites*, *Aedes*, *Armigeres*. and *Culex*. During the rearing process, it was recorded that *P. stictica* naiads can eat more than ten mosquito larvae a day'. Four males and one female imagoes of *P. stictica* were found. The imagoes were mostly' found in a secondary' forest with shady' ravine areas. Imago's average total length was 7.19 cm Naiad's final instar average size

was 16.7 mm. Water depth, water temperature, bamboo depth, bamboo volume, and humidity' were all positively correlated to *P. stictica*'s phytotelmata-breeding behavior." (Authors)] Address: Faradilla, A.R., Dept of Biology- Education. Yogyakarta State Univ., Jalan Colombo 1. Karang Malang. Caturtunggal Depok. Sleman, Yogyakarta 55281, Indonesia

**17431.** Farrell, D.; Makbun, N. (2020): First records of three Lestidae species in Thailand, with a checklist of the dragonflies known from Nam Nao National Park and Phu Khieo Wildlife Sanctuary (Odonata). *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 32: 1-11. (in English) ["*Indolestes gracilis* expressior Kosterin, 2015, *I. inflatus* (Fraser, 1933) and *Orolestes selysi* McLachlan, 1895, are reported from Thailand for the first time from records based mostly on photographs. The biology and habitats of the species are briefly discussed. A checklist of the Odonata recorded in Nam Nao National Park and Phu Khieo Wildlife Sanctuary is also presented for the first time." (Authors)] Address: Farrell, D., 9/756 Moo 11, Pimanthani Muang Gao, Glang Muang, Amphur Muang, Khon Kaen, 40000, Thailand. E-mail: thaiodonata@gmail.com

**17432.** Felker, A.S. (2020): New damselflies of the Family Kennedyidae (Odonata) from the Permian of European Russia. *Paleontological Journal* 54: 734-742. (in English) ["One new damselfly genus and species, *Progophlebia tarasenkovae* gen. et sp. nov., and two new species from known genera: *Progoneura kityakensis* sp. nov. and *Kennedyia tyulkinensis* sp. nov. of the family Kennedyidae (Odonata: Protozygoptera) from several Permian localities (Vyazovka, Kityak, and Tyulkin) of European Russia are described. All known representatives of the family are briefly reviewed. The distinctive features of the localities are characterized." (Authors)] Address: Felker, A.S., Borissiak Paleontological Institute, RAS, Moscow, Russia

**17433.** Feng, R.-Q.; Luo, F.-Z.; Zhang, L.-J.; Li, M.; Cao, Y.; Yuan, M.-L. (2020): The complete mitochondrial genome of *Sympetrum striolatum* (Odonata: Libellulidae) and phylogenetic analysis. *Mitochondrial DNA Part B Resources* 5(2): 1677-1678. (in English) ["Here, we sequenced and annotated the complete mitogenome of *S. striolatum*. This mitogenome is 15,435 bp in length, consisting of 13 protein-coding genes (PCGs), 22 transfer RNA genes (tRNAs), 2 ribosomal RNA unit genes, and a large non-coding region (putative control region). The *S. striolatum* mitogenome with an A + T content of 71.54% presented a positive AT-skew (0.081) and a negative GC-skew (-0.127). Twelve PCGs started with a typical ATN codon, the remaining one PCG started with TTG (nad1). All tRNAs had a typical secondary cloverleaf structure, except for tmS1 which lacked the dihydrouridine arm. The Bayesian phylogenetic tree of 29 Odonata species based on the concatenated nucleotide sequences of 13 PCGs supported the monophyly of Libellulidae and a closer relationship of *S. striolatum* and *Brachythemis contaminata*." (Authors)] Address: Feng, R.-Q., State Key Lab. of Grassland Agro-Ecosystems, Lanzhou University, Lanzhou, People's Republic of China.

**17434.** Ferwer, W.; Nel, A. (2020): A new damselfly genus and species from Baltic amber (Odonata: Zygoptera: Euphaeidae). *Bulletin de la Société Géologique de France* 191(12): 4 pp. (in English, with French summary) ["The new euphaeid genus and species, *Wolfgangeuphaea ferweri* Nel, are described from the Middle Eocene Baltic amber. It belongs to the Paleogene subfamily Eodichrominae. This new discovery confirms to remarkable past diversity of this family that contains now as many extinct genera and recent ones. They were distributed in North America and Europe, while the family is now-a-day only present in the Old World. There seems to have been a "replacement" of the Euphaeidae by the Calopterygidae during the latest Oligocene and the Neogene." (Authors)] Address: Ferwer, W., Römerfeld 10, 51467 Bergisch Gladbach, Germany

**17435.** Fleck, G. (2020): *Onychogomphus* (*Siriusonychogomphus*) *louissiriusi*, a new species and new subgenus from Thailand (Odonata: Anisoptera: Gomphidae). *Faunitaxys* 8(7): 1-9. (in English). ["Based on reared larvae from Peninsular Thailand, the adult male and the adult female of *Onychogomphus louissiriusi* n. sp. are described and illustrated. This species is placed in *Siriusonychogomphus* n. subg. characterized notably by the combination of following characters: peculiar shape and disposition of larval antennae meeting for a long distance medially thus completely covering labrum and clypeus; unique triangular shape of larval frons; larval abdominal dorsal hook well developed only on second segment and directed anteriorly; hindwing lacking anal loop; vesica spermalis lacking flagellae and instead with pair of oreillets; prepuce rounded and not directed backwards; male caudal appendages strongly developed, of same length and not overlapping, with cerci almost straight in dorsal view, and with epiproct having closely appressed branches and bearing long molar ridge at base. Affinities with other species are discussed, the Bornean *Onychogomphus marijanmatoki* is considered possibly allied to this new species." (Author)] Address: E-mail: fleckgunther@gmail.com

**17436.** Fliedner, H. (2020): The scientific names of Brauer's odonate taxa. *International Dragonfly Fund Report* 148: 1-55. (in English, with German summary) ["An explanation is presented for each of the 135 scientific names given to Odonata by F. M. Brauer (fossils and synonyms included), in addition the names of the actual genera in which Brauer's species are now classified are explained. Prior to that part biographical information is given and Brauer's merits in enlightening the taxonomy of dragonflies are analysed. Conclusions are drawn as to his preferences in odonatological nomenclature and finally the difficulties are discussed, which Brauer had to face in his taxonomic work.] Address: Fliedner, H., Louis Seegelken Str. 106, 28717 Bremen, Germany, E-mail: H.Fliedner@tonline

**17437.** Fukawa, H. (2020): A record of mature *Sympetrum frequens* (Selys, 1883) in May. *Tombo* 62: 140. (in Japanese, with English summary) ["A mature male of *S. frequens*, which is usually seen in autumn, was observed on May 23, 2019 in a wetland at the Sayama Hills in Mizuho-cho, Nishitama-gun, Tokyo." (Authors)] Address: E-mail: work615@gmail.com

- 17438.** Fukaya, W. (2020): A record of *Aeshna mixta* Latreille, 1805 from Saitama Prefecture. Tombo 62: 128-129. (in Japanese, with English summary) ["A male of *A. mixta* was recorded from Kumagaya-shi, Saitama Prefecture on October 1, 2017." (Author)] Address: E-mail: tochiai@au.com
- 17439.** Furieri, K.S.; Fraga, F.B.; Tribull, C.; Colombo, W.D. (2020): Description of two females of *Leptagrion Selys* (Odonata: Coenagrionidae). Zootaxa 4821(2): 343-352. (in English) ["In this paper, we provide taxonomic updates on the genus *Leptagrion Selys*: the females of *L. acutum* Santos and *L. porrectum* Selys are illustrated and diagnosed for the first time. We also add to the original description of *L. acutum* based on a male collected in the Atlantic Forest. A key for females is also provided for the currently known species of Southeast of Brazil." (Authors)] Address: Furieri, Karina, Univ. Federal do Espírito Santo, Centro Universitário Norte do Espírito Santo, São Mateus ES, Brazil. E-mail: kfurieri@gmail.com
- 17440.** Futahashi, H.; Futahashi, M.; Futahashi, R. (2020): The first record of *Anax ephippiger* (Burmeister, 1839) from Toyama Prefecture, Honshu, Japan. Tombo 62: 131-132. (in Japanese, with English summary) ["A male *A. ephippiger* was collected in Kairyu-macni, Imizu-shi, Toyama Prefecture, Honshu, Japan. This is the first record of this species from Toyama Prefecture." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp
- 17441.** Gainzarain, J.A. (2020): Primera cita para el País Vasco (norte de España) de *Aeshna juncea* (Linnaeus, 1758) (Odonata, Aeshnidae). Boletín de la Sociedad Entomológica Aragonesa 67: 401-402. (in Spanish, with English summary) ["The first record of *A. juncea* from the Basque Country administrative region (northern Spain) is reported: at least three males observed at the Ordunte mountain range (Biscay) in August 2020." (Authors)] Address: Gainzarain, J.A., Instituto Alavés de la Naturaleza Apdo. de correos 2092 01080 Vitoria-Gasteiz, Spain E-mail: j.gainzarain@gmail.com
- 17442.** Galasso, P.; Ientile, R. (2020): Odonata checklist of Nature Reserve and SAC (Special Area of Conservation) "Vallone di Piano della Corte" (Sicily, Italy). Biodiversity Journal 11(4): 837-844. (in English) ["From March to September 2018 and 2019, a first monitoring of Odonata promoted by CUTGAN was conducted inside a site of Natura 2000 network, named "Vallone di Piano della Corte", near Agira (Enna), Sicily. A total of 21 different species were recorded, including *Pyrrhosoma nymphula* (Sulzer, 1776), for which there are no stations reported for this side of Sicily." (Authors)] Address: Galasso, P., Stiftung Pro Artenvielfalt, Meisenstraße 65, 33607 Bielefeld, Germany. E-mail: paolo\_galasso@hotmail.com
- 17443.** Galasso, P.; Marletta, A.; Corso, A. (2020): Odonata of Sicilian southeast swamp lakes "Pantano Cuba" and "Pantano Longarini" (SE-Sicily, Italy). Biodiversity Journal 11(1): 57-64. (in English) ["From March 2015 to December 2019 a focused study on Odonata, funded by the German foundation "Stiftung Pro Artenvielfalt" (Foundation Pro Biodiversity), was conducted at the swamp lakes named "Pantano Cuba" and "Pantano Longarini", in the southeast coast of Sicily (Italy), near Pachino, Siracusa. A total of 27 different species were recorded in Pantano Cuba and Longarini, including *Brachytron pratense*, found for the first time in Sicily during this study and *Pantala flavescens*, never seen before in Italy excluding the islands of Linosa and Lampedusa, Sicilian Channel." (Authors)] Address: Galasso, P., Stiftung Pro Artenvielfalt, Meisenstr. 65, 33607 Bielefeld, Germany. E-mail: paolo\_galasso@hotmail.com
- 17444.** Girardin, V.; Grung, M.; Meland, S. (2020): Polycyclic aromatic hydrocarbons: bioaccumulation in dragonfly nymphs (Anisoptera), and determination of alkylated forms in sediment for an improved environmental assessment. Scientific Reports 10(1) (10958): 15 pp. (in English) ["Road runoff carries a mixture of contaminants that threatens the quality of natural water bodies and the health of aquatic organisms. The use of sedimentation ponds is a nature-based solution for the treatment of road runoff. This study assessed the concentration of polycyclic aromatic hydrocarbons (PAHs) and their alkylated homologues in sediment from seven highway sedimentation ponds and three natural urban ponds. In addition, the study explored the bioaccumulation of PAHs in dragonfly nymphs (Anisoptera). Finally, biota-sediment accumulation factors (BSAFs) were estimated. The results revealed a significant difference in the concentrations of 16 priority PAHs in sediment, with overall higher levels in sedimentation ponds (2,911 ig/kg on average) compared to natural urban ponds (606 ig/kg on average). PAH levels increased substantially once alkylated homologues were considered, with alkylated comprising between 42 and 87% of the total PAH in sediment samples. These results demonstrate the importance of alkylated forms in the environmental assessment of PAHs. The bioaccumulation assessment indicates that dragonfly nymphs bioaccumulate PAHs to a certain degree. It is not clear, however, whether they metabolize PAHs. BSAF results ranged from approx. 0.006 to 10 and indicate that BSAFs can be a powerful tool to determine the functionality of sedimentation ponds." (Authors)] Address: Girardin, Viviane, Norwegian Institute for Water Research (NIVA), Gaustadalléen 21, 0349 Oslo, Norway. E-mail: viviane.girardin@niva.no
- 17445.** Golab, M.J.; Brodin, T.; Sniegula, S. (2020): Two experimental designs generate contrasting patterns of behavioral differentiation along a latitudinal gradient in *Lestes sponsa* — Common-garden not so common after all? Ecology and Evolution 10(18): 10242-10253. (in English) ["Understanding why and how behavioral profiles differ across latitudes can help predict behavioral responses to environmental change. The first response to environmental change that an organism exhibits is commonly a behavioral response. Change in one behavior usually results in shifts in other correlated behaviors, which may adaptively or maladaptively vary across environments and/or time. However, one important aspect that is often neglected when studying behavioral expressions among populations is if/how the experimental design might affect the results. This is unfortunate since animals often plastically modify



their behavior to the environment, for example, rearing conditions. We studied behavioral traits and trait correlations in larvae of a univoltine damselfly, *Lestes sponsa*, along its latitudinal distribution, spreading over 3,300 km. We compared behavioral profiles among larvae grown in two conditions: (a) native temperatures and photoperiods or (b) averaged constant temperatures and photoperiods (common-garden). We hypothesized latitudinal differences in behavioral traits regardless of the conditions in which larvae were grown, with northern populations expressing higher activity, boldness, and foraging efficiency. When grown in native conditions, northern larvae were bolder, more active and more effective in prey capture than central and low latitude populations, respectively, as well as showed the strongest behavioral correlations. In contrast, larvae reared in common-garden conditions showed no differences between regions in both individual traits and trait correlations. The results suggest different selective pressures acting on the studied traits across populations, with environment as a central determinant of the observed trait values. Common-garden designed experiments may evoke population-dependent levels of plastic response to the artificial conditions and, hence, generate results that lack ecological relevance when studying multi-population differences in behavior." (Authors)] Address: Golab, Maria, Institute of Nature Conservation PAS, 31-120 Kraków, Poland. E-mail: marysiagolab@gmail.com

**17446.** González, A.; Barnes, C.L.; Wilder, S.M.; Long, J.M. (2020): Differences in macronutrient content of common aquatic macroinvertebrates available as prey for young-of-the-year Scaphirhynchus sturgeons in the lower Missouri River. *Journal of Freshwater Ecology* 35(1): 191-202 (in English) ["Nutrient availability in prey items can have important consequences for the growth, reproduction, survival, and recruitment into adulthood of juvenile fish. For young of the year sturgeon, which are highly dependent on macroinvertebrates as prey, knowing the nutritional content across various prey items within their habitats can help managers during habitat restoration. The objective of this study was to test for differences in the macronutrient composition of major invertebrate groups commonly consumed by young of the year sturgeon in the lower Missouri River in the summer, when sturgeon habitat assessments occur. Potential prey vary considerably in size. In addition, there were significant differences in the concentrations of nutrients. The lowest concentration of lipid was found in Odonata ( $2.36 \pm 1.83 \text{mg } 100 \text{mg}^{-1}$ ; mean  $\pm$  pooled variance standard error) and the highest was in Diptera ( $14.49 \pm 3.30 \text{mg } 100 \text{mg}^{-1}$ ). The lowest concentration of protein was found in Ephemeroptera ( $58.98 \pm 1.90 \text{mg } 100 \text{mg}^{-1}$ ) and the highest concentration was in Trichoptera ( $70.07 \pm 3.26 \text{mg } 100 \text{mg}^{-1}$ ). Some spatial differences were found in energy derived from protein in Ephemeroptera in the lower Missouri River, but not in energy derived from lipid. Our findings provide useful information that can contribute to adaptive management efforts for sturgeons in the lower Missouri River." (Authors)] Address: González, A., Oklahoma Cooperative Fish & Wildlife Res. Unit, Dept of Natural Resource Ecology & Management, Oklahoma State Univ., Stillwater, OK, USA. E-mail: alin.gonzalez\_barnes@okstate.edu

**17447.** Gonzalez, I.G.; Núñez-Avellaneda, M.; Zúñiga, M. (2020): Los macroinvertebrados acuáticos de la región andino-amazónica colombiana: Camino Andakí, departamento de Caquetá. *Revista Colombia Amazonica* 12: 191-202. (in Spanish, with English summary) [This study was carried out in the Pescado river basin where the so-called "Camino Andakí" is located, an ancestral route used by indigenous populations between the low areas of the Caquetá department and the Andes. Within the framework of the "ColombiaBio Expedition to biodiversity in the Andean-Amazon transition of the department of Caquetá", an initiative of COLCIENCIAS and the Instituto Amazónico de Investigaciones Científicas -SINCHI, between January and February 2017, a sampling campaign was carried out for aquatic macroinvertebrates. Twelve stations were established between 410 and 1468 masl and 6290 individuals were collected, distributed in 109 genera. The most diverse order was Coleoptera and the most abundant was Ephemeroptera. Odonata expands the distribution of 11 genera for the department of Caquetá (*Palaemnema*, *Heteragrion*, *Enallagma* \*, *Rhionaeschna* \*, *Archaeogomphus* \*, *Epigomphus* \*, *Gomphoides* \*, *Brachymesia*, *Elga* and *Elasmothemis*\*) and six of them (\*) are new report for the Colombian Amazon basin. The similarity cluster analysis established three groups of taxa that were correlated with the altitude ranges of stations that were clustered in upper, upper middle, and lower middle. The station at Pescado river, Los Angeles village (E-12), showed the lowest affinity in its taxonomic composition compared to the rest of the assembly, an aspect influenced by the rise in the altitudinal range and the replacement of taxa. Ten of the genera found this zone, did not appear in any other sampling station. It is important to continue these studies in areas with little available information, such as the Andean-Amazon region that presents biogeographic elements and important components of the country's and continent's biodiversity." (Authors)] Address: González, I.G., Grupo Ecosistemas Acuáticos Instituto Amazónico de Investigaciones Científicas SINCHI, Avenida Vásquez Cobo entre calles 15 y 16 Leticia, Amazonas, Colombia. E-mail: igegeg@gmail.com

**17448.** Gonzalez Gomez, I.G.; Oviedo-Machado, N.; Núñez-Avellaneda, M. (2020): Primer registro de *Peruviogomphus* (Odonata: Gomphidae) para Colombia. *Boletín Científico Centro de Museos, Museo Historia Natural U. de Caldas* 24(2): 138-143. (in Spanish, with English summary) ["First record of *Peruviogomphus* for Colombia: The knowledge about the distribution of Odonata in Colombia has increased thus contributing to reduce the information gaps in the distribution of some taxa. In this study, the *Peruviogomphus* genus is reported for Colombia, based on two nymphs collected in the Department of Amazonas and deposited in the Colección de Macroinvertebrados Acuáticos de la Amazonia Colombiana (COMAC), of the SINCHI Institute. This finding updates the records of the *Peruviogomphus* genus in South America." (Authors)] Address: González Gómez, I.G., Grupo de Ecosistemas Acuáticos, Colección de Macroinvertebrados Acuáticos de la Amazonia Colombiana (COMAC), Instituto Amazónico de Investigaciones Científicas Sinchi, Avenida Vásquez Cobo entre calles 15 y 16 Leticia, Amazonas - Colombia. E-mail: igegeg\_@hotmail.com.

**17449.** Gonzalez-Soriano, E. (2020): A new species of *Micrathyria* Kirby, 1889 from México and Central America (Anisoptera: Libellulidae), with a key to Mexican species. *Zootaxa* 4718(2): 184-190. (in English) ["*Micrathyria paulsoni* sp. nov. is described on specimens collected in Veracruz, México (19.1593–97.0045), Holotype ♂ 9 July 2000, Laguna de Santo Domingo, Huatusco, leg E. González-Soriano & L. E. González-Figueroa [in Colección Nacional de Insectos (CNIN), Instituto de Biología, UNAM] and compared with similar species. By its enlarged hamular process, this species belong to the so-called *Micrathyria didyma* group." (Author)] Address: Gonzalez-Soriano, E., Instituto de Biología, UNAM, Depto de Zoología, Apdo. Postal 70-153, CP 04510, México, Cd. México. E-mail: esoriano@ib.unam.mx

**17450.** Günther, A. (2020): Reproductive behaviour of *Chlorocyphidae*. Part 2. Genus *Disparocypha* Ris, 1916 (Odonata). *Odonatologica* 49(1/2): 85-106. (in English) ["The reproductive behaviour of *Disparocypha biedermanni* was studied in various streams, mainly in the Lake Poso area of Sulawesi. Flight styles of males were analysed in detail for the first time using high speed cinematography. Protracted threatening flights were particularly common between territorial neighbours. Males flew with regular counter-stroking wing beats and the abdomen held horizontally. Occasionally one of the males performed short ascending flights, pausing the wing beat. These threatening flights were interrupted periodically by short bursts of increased intensity with higher stroke frequency where males arched their abdomens. The escalated threat display could be intensified by tremulous horizontal changes in position. Unlike most *Chlorocyphidae*, mating took place without courtship and oviposition was in vertical mossy structures well above the water. The female was guarded by the male only at the start of oviposition. Possibly the mating system evolved in such a way as to avoid interspecific competition with other *Chlorocyphidae* but this needs more supporting evidence." (Author) ] Address: Günther, A., Naturschutzinstitut Freiberg, B.-Kellermann-Str. 20, 09599 Freiberg, Germany. E-mail: andre.guenther@extern.tu-freiberg.de

**17451.** Haber, W.A. (2020): *Telebasis rojinegra* (Odonata: Zygoptera: Coenagrionidae) sp. nov. from Costa Rica. *Zootaxa* 4755(1): 129-138. (in English, with Spanish summary) ["*Telebasis rojinegra* sp. nov. was recorded from ponds at La Selva Biological Station and three other sites in the Caribbean lowlands of Costa Rica. The new species appears closely related to *T. boomsmae* Garrison, 1994 recorded from Mexico, Belize and Costa Rica, *T. collopistes* Calvert, 1902 ranging from Mexico to Honduras, and *T. garrisoni* Bick & Bick, 1995 from South America, but differs in having straighter and more elongate paraprocts and a half black pattern on the rear of the head. The female mesostigmal plates are also distinct from the above species. *T. rojinegra* was active on the water primarily during afternoon hours] Address: Haber, W.A., Research Associate, Museo de Zoología, Universidad de Costa Rica, San Pedro, Costa Rica. E-mail: bill.haber01@gmail.com

**17452.** Hämäläinen, M. (2020): The etymology of ten eponymous species names of Odonata introduced by Selys in his

'*Odonates de Cuba*' (1857), honouring prominent people or religious movements from classical antiquity and the middle ages. *Notulae odonatologicae* 9(5): 178-184. (in English) ["Ten of the 15 new species-group names of Odonata introduced by Edmond de Selys Longchamps in his '*Odonates de Cuba*' (1857) are considered to be eponyms, named after historical personages, dynasties or religious movements from classical antiquity and medieval times. Seven of these species epithets belong to taxa currently regarded as valid species. In their present combinations these are: *Erythemis attala*, *Macrothemis celeno*, *Micrathyria didyma*, *Telebasis dominicana*, *Erythrodiplax justiniana*, *Miathyria marcella*, *Triacanthagyna septima*. Three are synonymous names: *justina* (in *Erythrodiplax*), *metella* (in *Perithemis*) and *mithra* (in *Erythemis*)." (Author)] Address: Hämäläinen, M., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: matti.hamalainen@helsinki.fi

**17453.** Haring, E.; Fischer, I.; Sittenthaler, M.; Wolf, P.; Koblmüller, S.; Sattmann, H.; Beqiraj, S.; Pešić, V.; Zangl, L. (2020): Intraspecific genetic diversity in selected widespread dragonfly species (Insecta: Odonata). *Acta ZooBot Austria* 157: 239-256. (in English, with German summary) ["Dragonflies inhabit a wide range of habitats, with different species having different species-specific habitat requirements and corresponding niches. Therefore, they are very well suited as indicator species for habitat quality and conservation. Especially in the fields of taxonomy and phylogenetics new insights in odonatology have been gained through molecular genetic methods. Using "DNA barcodes" (DNA sequences of a standardised gene segment, in this case the cytochrome c oxidase 1 gene (COI)), the intraspecific genetic distances of 14 dragonfly species from 18 countries were analysed. We investigated whether there are general differences in intraspecific genetic variability between common species of Zygoptera and Anisoptera. In addition, we examined how DNA sequences with missing data and the different handling of such data in genetic analyses can affect the calculated distances and thus the interpretation of results. Our data show that the dragonfly species studied here generally show very little genetic variation over very large geographical distances, regardless of their assignment to Zygoptera or Anisoptera. The presumably lower active dispersal potential of Zygoptera obviously does not lead to an increased genetic structure. Although these results were consistent across all calculation methods, there were sometimes considerable differences in the way incomplete data were handled. For better comparability, we recommend documenting all parameters in detail in similar studies." (Authors)] Address: Haring, Elisabeth, Central Research Laboratories, Museum of Natural History Vienna, Burgring 7, 1010 Vienna, Austria. E-Mail: elisabeth.haring@nhm-wien.ac.at

**17454.** Hirai, N.; Morioka, T. Ishii, M. (2020): Species diversity of Odonata in Nakaikemi Marsh, Fukui Prefecture, Japan. *Jpn. J. Environ. Entomol. Zool.* 31: 1-12. (in English, with Japanese summary) ["Nakaikemi Marsh was designated as a wetland of international importance under the Ramsar Convention on Wetlands in 2012 because of its rich species diversity and the presence of threatened and endangered animal

and plant species. Although the marsh had been maintained using traditional methods for centuries as rice paddy fields, land use has changed since the abandonment of cultivation in the 1990s. In this study, species diversity of Odonata in the marsh was investigated once a month between April and November 2012 using line-transect and point-census methods for adults and a netting method for larvae. We recorded adults and larvae of 50 Odonata species; a total of 2093 adults from 47 species and 503 larvae from 27 species were observed in the eight surveys. Most of the species found in this study were those recorded in the past, but *Aeschnophlebia longistigma*, *A. anisoptera*, and *Nannophya pygmaea*, which had been continuously observed in the early 1990s, were not recorded. In contrast, we found increased numbers of *Rhyothemis fuliginosa*, *Ischnura senegalensis*, and *Sympetrum croceolum* around the newly formed Sasahana Pond. A population analysis using Kimoto's similarity index ( $C\pi$ ) revealed that the odonatan assemblage around the pond differs from those in other areas in Nakaikemi Marsh. It is possible that the Sasahana Pond has become one of the most important odonatan habitats in the marsh. We found several endangered species and the second highest species richness and diversity in the Ushirodani Valley adjoining the marsh, where traditional methods are used to maintain paddy fields. Invasive alien plant and animal species such as *Solidago altissima* and *Procambarus clarkii* were widespread across the whole area and are considered to harm native vegetation and aquatic animals in the marsh. Our findings indicate that *P. clarkii* density has a significant negative effect on the species diversity of Odonata larvae in the marsh." (Authors)] Address: Hirai, N., Graduate School of Life and Environmental Sciences, Osaka Prefecture University, 1-1 Gakuen-cho, Nakaku, Sakai, Osaka 599-8531 Japan

**17455.** Hong, S.-J. ; Cheong, S.-W. (2020): A Study on the Community Characteristics and Changes of Benthic Macroinvertebrates in the Conservation Area of the Shinbulsan Wetland. *Journal of Environmental Science International* 29(11): 1079-1088. (in Korean, with English summary) ["The Shinbulsan wetland, located in Yangsan-si, Gyeongsangnam-do, South Korea, was designated as a conservation area in 2004. The area was monitored from 2015 to 2019 to investigate the community characteristics and changes of benthic macroinvertebrates. Between 2015 and 2016, several insects of the orders Ephemeroptera, Odonata, and Hemiptera were identified, but their numbers decreased significantly in 2017 and 2018 following the loss and recovery of the moor owing to drought. During this period, there were relatively more insects of the order Diptera. Within this order, three functional feeding groups, gathering-collectors, plant-piercers, and predators were investigated. Predator species were the most abundant (83.3%), whereas gathering-collectors accounted for the largest proportion of individual insects (50.5%). Between 2015 and 2016, when the moors were stable, groups I and III had the highest community stability. After 2017, when the moors had dried up, group III effectively disappeared because of its lower relative resistance and resilience, and only taxa belonging to group I remained. The results of this study indicate that benthic macroinvertebrates that adapt early during moor formation inhabit the Shinbulsan wetland." (Authors)] Address: Cheong,

S.-W., Dept of Biology & Chemistry, Changwon National University, Changwon 51140, Korea

**17456.** Hulo, I., Aleksic, S.; Lovas, G. (2020): Results of the preliminary faunistic research of dragonflies (Insecta: Odonata) of northern Bracka. *Museon* 18: 129-167. (in Serbian, with English summary) ["Results of a preliminary survey of Odonata fauna conducted from 2016 to 2020 are presented. The aim of the research was to map possible habitats in the territory of Northern Backa suitable for the life and reproduction of these insects, as well as to detect the presence or absence of dragonfly species at certain localities. During the research, adult (imago) dragonflies were detected and identified by methods of observation and taking and then analysing of digital photographs. 26 sites with potential dragonfly habits were mapped, out of which 20 sites at standing and 6 sites at flowing waters. A total of 38 species were registered in these habitats, with 37 species observed at standing waters and 22 species at flowing waters. Among the recorded species on the territory of Northern Bačka, the following stand out as rare: *Lestes macrostigma*, *Coenagrion scitulum* and *Sympetrum depressusculum*. The localities with a noticeable diversity of dragonflies are Lake Kelebija, Bački Vinogradi-Ruža majur and Palic-Tresetište, where more than 20 species were registered. However, in many localities significant habitat degradation has been observed due to anthropogenic influence. Besides field surveys, based on examined material in collections, the presence of *S. pedemontanum* in Vojvodina has been established for the first time. This research also confirmed the importance of artificial aquatic habitats that gradually take over the role of extinct or degraded natural biotopes and provide the possibility of survival for certain species of dragonflies. The results of this research provide a basis and an encouragement for further studies and protection activities to save the fauna of dragonflies in this area." (Authors)] Address: Hulo, I., Gradski muzej Subotica, Trg sinagoge 3, 24000 Subotica, Serbia. E-mail: istvanhullo@gmail.com

**17457.** Humala, A.; Polevoi, A.V. (2020): First records of remarkable damselfly species *Nehalennia speciosa* (Odonata: Coenagrionidae) from the Republic of Karelia (Russia). *Russian Entomol. J.* 29(2): 123-136. (in English, with Russian summary) ["Several local populations *N. speciosa* are reported for the first time from the Republic of Karelia. *N. speciosa* is considered a threatened species in Europe even though it is widespread throughout the Palaearctic region. The species was found within several nature protected areas of Karelia, where entomological studies were conducted. The biology and distribution of *N. speciosa* are briefly observed." (Authors)] Address: Humala, A., Forest Research Institute, Russian Academy of Sciences, Pushkinskaya St. 11, Petrozavodsk 185910, Russia. E-mail: humala@krc.karelia.ru

**17458.** Iannella, M.; Console, G.; D'Alessandro, P.; Cerasoli, F.; Mantoni, C.; Ruggieri, F.; Di Donato, F.; Biondi, M. (2020): Preliminary analysis of the diet of *Triturus carnifex* and pollution in mountain karst ponds in Central Apennines. *Water* 2020, 12(1), 44: 15 pp. (in English) ["Mountain karst ponds are sensitive environments, hosting complex trophic networks



where amphibians play a major role, often as top predators. The diet of the Italian crested newt (*Triturus cristatus*) is still poorly known for populations occupying mountain karst ponds. These are traditionally used as livestock's watering points, leading to water pollution due to excreta and wading behavior. The aim of this paper is to understand the relationship between *T. cristatus* diet composition, assessed through the stomach flushing technique, and physical and chemical characteristics in mountain ponds, focusing on parameters altered by livestock pressure, such as ammonium concentration and dissolved oxygen. The high diversity of prey items found within the newts' gut contents confirms the generalist diet even in mountain ponds. The number of prey taxa, their relative abundance and Shannon–Wiener diversity index show variations among the sampled sites, related to livestock organic pollution. Moreover, we report the very first European records of microplastic items in amphibians' stomach content, which also represent the first evidence for Caudata worldwide. Our findings suggest that livestock pressure directly influences *T. cristatus* diet and highlight that the emerging issue of plastics is a threat even in remote high-altitude environments. ... Prey items were counted and classified in 19 different taxa, namely Crustacea (4750 prey items), Diptera (1800), Haptotaxida (328), Odonata (220), Hemiptera (191), Mollusca (135), Ephemeroptera (75), Coleoptera (53), Araneae (35), Acarina (17), Hymenoptera (13), Dermaptera (five), Caudata (four), Trichoptera (three), Tricladida (three), Lepidoptera (two), Julida (two), Neuroptera (one) and Mermithida (one). A total of 641 items could not be determined, due to the high level of deterioration; 161 fragments of plants, 93 particles of inorganic sediments probably deriving from the bottom, 59 microplastic items in the form of fibres, splinters and other undeterminable fragments were also found. " (Authors)] Address: Iannella, M., Dept of Life, Health & Environmental Sciences, Environmental Sciences Sect., Univ. of L'Aquila, Via Vetoio, Coppito, 67100 L'Aquila, Italy

**17459.** Ilahi, I.; Yousafzai, A.M.; Rahim, A.; Haq, T.U.; Wahab, S.; Ali, H.; Halimullah; Farooq, M.; Muhammad, H.; Ullah, F.; Ahmad, B.; Ullah, S.; Hussain, S. (2020): Sensitivity of odonate nymphs to different classes of agricultural insecticides, frequently applied in Swat Valley Pakistan. *Applied Ecology and Environmental Research* 18(3): 4115-4136. (in English) ["The sensitivity of *Ischnura elegans* and *Trithemis aurora* nymphs to six different insecticides were studied during 48-hour exposure in the laboratory conditions. Lambda cyhalothrin was found to be the most toxic. Chlorpyrifos was found least toxic. The highest concentrations of deltamethrin, cypermethrin, lambda-cyhalothrin, chlorpyrifos, dichlorvos and acetamiprid that caused no mortality of *I. elegans* were 0.0078, 0.0039, 0.00048, 0.0078, 0.0039 and 0.00195 ppm, respectively. The highest concentrations of deltamethrin, cypermethrin, lambda-cyhalothrin, chlorpyrifos, dichlorvos and acetamiprid that caused no mortality of *T. aurora* were 0.0039, 0.00195, 0.00048, 0.0156, 0.0078 and 0.000975 ppm, respectively. The lowest concentrations of deltamethrin, cypermethrin, lambda-cyhalothrin, chlorpyrifos, dichlorvos and acetamiprid that caused 100% mortality of *I. elegans* were 0.5, 0.5, 0.0156, 1.0, 0.5 and 0.25 ppm, respectively. The lowest concentrations of deltamethrin, cypermethrin,

lambda-cyhalothrin, chlorpyrifos, dichlorvos and acetamiprid that caused 100% mortality of *T. aurora* were 0.25, 0.25, 0.0312, 2, 1 and 0.125 ppm, respectively. Significantly ( $P < 0.05$ ) lowest LC90 values were observed for lambda cyhalothrin (LC90 against *I. elegans* = 0.01 ppm, LC90 against *T. aurora* = 0.018 ppm). Next to the lambda cyhalothrin, significantly ( $P < 0.05$ ) lowest LC90 values were observed for acetamiprid (LC90 against *I. elegans* = 0.122 ppm, LC90 against *T. aurora* = 0.093 ppm). From the findings of the present study, it was concluded that *I. elegans* and *T. aurora* nymphs are highly sensitive to lambda cyhalothrin and acetamiprid." (Authors)] Address: Ilahi, I., Dept Zool., Univ. of Malakand Chakdara, Dir Lower, Khyber Pakhtunkhwa, Pakistan. E-mail: ikramilahi@uom.edu.pk

**17460.** Ito, H.C.; Shiraishi, H.; Nakagawa, M.; Takamura, N. (2020): Combined impact of pesticides and other environmental stressors on animal diversity in irrigation ponds. *PLoS ONE* 15(7): e0229052. <https://doi.org/10.1371/journal.pone.0229052>: 20 pp. (in English) ["Rice paddy irrigation ponds can sustain surprisingly high taxonomic richness and make significant contributions to regional biodiversity. We evaluated the impacts of pesticides and other environmental stressors (including eutrophication, decreased macrophyte coverage, physical habitat destruction, and invasive alien species) on the taxonomic richness of freshwater animals in 21 irrigation ponds in Japan. We sampled a wide range of freshwater animals (reptiles, amphibians, fishes, mollusks, crustaceans, insects, annelids, bryozoans, and sponges) and surveyed environmental variables related to pesticide contamination and other stressors listed above. Statistical analyses comprised contraction of highly correlated environmental variables, best-subset model selection, stepwise model selection, and permutation tests. Results showed that: (i) probenazole (fungicide) was a significant stressor on fish (i.e., contamination with this compound had a significantly negative correlation with fish taxonomic richness), (ii) the interaction of BPMC (insecticide; also known as fenobucarb) and bluegill (invasive alien fish) was a significant stressor on a "large insect" category (Coleoptera, Ephemeroptera, Hemiptera, Lepidoptera, Odonata, and Trichoptera), (iii) the interaction of BPMC and concrete bank protection was a significant stressor on an "invertebrate" category, (iv) the combined impacts of BPMC and the other stressors on the invertebrate and large insect categories resulted in an estimated mean loss of taxonomic richness by 15% and 77%, respectively, in comparison with a hypothetical pond with preferable conditions." (Authors)] Address: Ito, H.C., Hiroaki Shiraishi1, Megumi Nakagawa1, Noriko Takamura, Japan. E-mail: hiroshibeetle@gmail.com

**17461.** Janni, O.; Viganò, M.; Corso, A. (2020): First records of *Diplacodes lefebvrei* (Rambur, 1842) for Sicily and additional record of *Trithemis kirbyi* Selys, 1891 (Odonata Libellulidae). *Biodiversity Journal* 11(1): 65-68. (in English) ["We report the first records (three specimens on two dates) of *D. lefebvrei* for Sicily, obtained during October 2019 at the island of Linosa, Pelagie Archipelago (Sicily, Italy). Additional records of *T. kirbyi*, already known for the region, are provided." (Authors)] Address: Corso, A., Via Camastra 10, 96100 Siracusa, Italy. E-mail: zoologywp@gmail.com

- 17462.** Janra, M.N.; Herwina, H. (2020): Some additional records to the inventory of dragonflies and damselflies (Odonata) in Andalas University's Limau Manis campus complex, Padang, West Sumatra. *Jurnal Natural* 20(1): 1-5. (in English) ["Since the last publication of the inventory list for Odonata within the boundary of Andalas University's Limau Manis Campus Complex, Padang, (AULMCC) in 2018, the study has been continuously conducted. In this study we add five new species of Odonata for AULMCC, with one species *Drepanosticta* cf. *bispina* requires further investigation and elaboration on its existence in West Sumatra. We also corrected the identification of *Heliocypha fenestrata* into *H. angusta angusta*. With this addition, AULMCC currently resides for 32 species and 9 families of Odonata, increasing from previously 27 species and 8 families." (Authors)] Address: Janra, M.N., Biol. Dept, Fac. of Mathematics & Natural Sciences, Andalas Univ., Jalan Kampus Unand Limau Manis Pauh Padang, West Sumatra 25163, Indonesia. E-mail: mnjanra@sci.unand.ac.id
- 17463.** Janra, M.N.; Herwina, H.; Rahmayani, H.; Rahmawati, L.; Sehati, D.P.; Fandesti, S.R. (2020): Defining the rearing cage for *Agriocnemis femina* damselfly (Odonata, Zygoptera, Coenagrionidae). *Jurnal Riset Biologi dan Aplikasinya* 2(2): 42-48. (in English) ["Rearing insects such as Odonata aim to gain uniform progeny that used for scientific purposes. In Indonesia, unfortunately, this rearing type is not yet common which suggests the time for its initiation. This study has objective to define the type of rearing cage for *A. femina*. It was conducted descriptively by using two smalls (9 x 13 x 23 cm), four medium (14 x 15 x 22 cm) and two larges (20 x 23 x 33 cm) size boxes as cage setups, with or without ornamental plants in it. The feeding was with limited (10-15 *Drosophila* flies provided per day) and unlimited provision. Data was analyzed descriptively. The results showed that *A. femina* lived normally, including eating and mating, within the large cage setup equipped with ornamental plants and unlimited feeding." (Authors)] Address: Janra, M.N., Jln. Kampus Unand Limau Manis Padang, Sumbar 25163 Indonesia. E-mail: mnjanra@sci.unand.ac.id
- 17464.** Jattiot, R.; Latutrie, B.; Nel, A. (2020): The first damselfly (Odonata, Lestidae) from the upper Eocene of Monteils (Gard, France). *Zootaxa* 4750(3): 432-436. (in English) ["The discovery of *Lestes regina* Théobald, 1937 from Monteils (Gard, France) supports the identity of late Eocene age of this outcrop with the historical outcrop of Célas, type locality for the type series of this species. *L. regina* is also documented from the late Eocene Isle of Wight basin, confirming the presence of significant contacts between this southern area and the anglo-Parisian lacustrine basin at that time. Nearly all the Eocene and Oligocene fossil *Lestes* from Western Europe have a particular character, viz. the presence of a supplementary row of cells between the veins MP and CuA. This character is much less frequent in extant *Lestes* and is still unknown among Neogene representatives of the genus." (Authors)] Address: Jattiot, R., Fachbereich 5 Geowissenschaften, Univ. Bremen, Klagenfurter Str. 4, 28357, Bremen, Germany. E-mail: jattiot@uni-bremen.de
- 17465.** Jedro, G.; Maciag, M. (2020): *Aeshna grandis* (Linnaeus, 1758) (Odonata: Aeshnidae) in a light trap. *Odonatrix* 16\_18 (2020): 3 pp. (in Polish, with English summary) ["A male *A. grandis* was caught in a blacklight trap (368 nm UVA) deployed on a raised bog in the Słowiński National Park (UTM XA46, 54.688625; 17.177049) between 20:15 and 23:30 hrs on August 20, 2020. Dragonflies only very occasionally turn up at this type of trap; precisely why they do so is not known. One theory is that they are attracted to the light, because other insects on which they can prey have also been lured there: this might have been the case here. This is the first documented record in Poland of *A. grandis*, and indeed of any odonate, being caught in such a trap." (Authors)] Address: Maciag, M., Nadlesnictwo Gniezno, ul. Wrzesińska 83, 62-200 Gniezno, mirosław.maciag@poznan.lasy.gov.pl
- 17466.** Jedro, M.; Jedro, G. (2020): New localities of Sedgling *Nehalennia speciosa* (Charpentier, 1840) (Odonata: Coenagrionidae) in the Slupia Valley Landscape Park. *Odonatrix* 16\_4 (2020): 7 pp. (in Polish, with English summary) ["*N. speciosa* is a stenotopic species that inhabits mainly small primary water bodies supporting mud sledge *Carex limosa*. To date, over a dozen sites of this species have been discovered in the province of Pomerania, two of which are protected as buffer zones. Sedglings were discovered in the Slupia Valley Landscape Park in July 2017, at two peatbog localities close to the villages of Lipieniec [UTM XA61] and Skotawsko [XA62] in the commune of Czarna Dąbrówka. The central points of both bogs are dystrophic water bodies with mats of *Sphagnum* moss and *Carex* sp. tussocks. Teneral specimens and copulating pairs of the species were present. The populations are stable, with more than 100 individuals at each site. Apart from Sedgling, 16 and 17 other dragonfly species, respectively, were recorded in the two peatbogs, including: *Leucorrhinia dubia*, *L. pectoralis*, *L. albifrons* and *Cordulegaster boltonii*. In addition, the rare, red-listed European sundew moth *Buckleria paludum* (Pterophoridae) was discovered at Skotawsko. Forest buffer zones are crucial for *N. speciosa*: they influence water chemistry and vegetation composition, and also act as windshields. Deforestation, eutrophication, drainage and pesticides are the main factors endangering this species. Protective buffer zones extending up to 100 m around these two localities are planned. Cooperation between officials of the Regional Directorate for Environmental Conservation, foresters, Landscape Park staff and local naturalists is therefore essential for the creation and subsequent maintenance of these two buffer zones and to minimize the adverse, anthropogenic impact on these localities." (Authors)] Address: Jedro, Magdalena, Słowiński Park Narodowy, ul. Bohaterów Warszawy 1A, 76-214 Smoldzino, e-mail: m.jedro@slowinski.pn.pl
- 17467.** Joshi, S.; Agashe, D. (2020): Ontogenic colour change, survival, and mating in the damselfly *Agriocnemis pygmaea* Rambur (Insecta: Odonata). *Ecological Entomology* 45(5): 1015-1024. (in English) ["1. Damselflies often show intra-specific colour variation, which may represent genetic polymorphism or age-related (ontogenic) colour changes. 2. Such variation has distinct implications for the species' ecology and evolution. Colour variation in females of the damselfly *Agriocnemis*

pygmaea was studied, which range from blue male-like individuals (andromorphs) to those with a distinct red colour (heteromorphs). From preliminary observations, it was hypothesised that this species exhibits ontogenetic colour change from heteromorph to andromorph coloration. 3. Mark–recapture experiments and egg counts of dissected females suggested that immature females are heteromorphic and gradually begin to resemble males as they attain sexual maturity. 4. Reflectance spectra of field-caught individuals indicated that, although males are indistinguishable from andromorphs, they could be easily differentiated from heteromorphs. 5. Finally, field observations and mate choice experiments showed that males rarely attempt to mate with heteromorphic females and prefer andromorphs. Together, this study's results suggest that the observed colour variation in *A. pygmaea* females is ontogenetic and is associated with sexual maturity." (Authors)] Address: Joshi, S., Res. Collections, Nat. Centre for Biological Sciences, Bangalore, India. E-mail: shantanu@ifoundbutterflies.org

**17468.** Joshi, S.; Sawant, D. (2020): Description of *Bradinyoga konkanensis* sp. nov. (Odonata: Anisoptera: Libellulidae) from the coastal region of Maharashtra, India. *Zootaxa* 4779(1): 65-78. (in English) ["*Bradinyoga konkanensis* sp. nov. is described based on three males and one female collected from the coastal region of Maharashtra, India. Important characters are illustrated and compared with morphologically similar species *B. geminata* (Rambur, 1842), *Indothemis carnatica* (Fabricius, 1798), and *Indothemis limbata* sita Campion, 1923. *B. konkanensis* sp. nov. is so far the only Western Ghats endemic Odonata species associated with lateritic coastal habitats." (Authors)] Address: Joshi, S., Res. Collections, Nat. Centre for Biological Sciences, Bangalore, India. E-mail: shantanu@ifoundbutterflies.org

**17469.** Joshi, S.; Subramanian, K.A.; Babu, R.; Sawant, D.; Kunte, K. (2020): Three new species of *Protosticta* Selys, 1885 (Odonata: Zygoptera: Platystictidae) from the Western Ghats, India, with taxonomic notes on *P. mortoni* Fraser, 1922 and rediscovery of *P. rufostigma* Kimmins, 1958. *Zootaxa* 4858(2): 151-185. (in English) ["Three new species of *Protosticta* Selys, 1885 (Odonata: Zygoptera: Platystictidae) from the Western Ghats biodiversity hotspot in India: *P. cyanofemora* sp. nov. (wet evergreen forests in Shendurney Wildlife Sanctuary, Kollam, Kerala and Kalakkad Mundanthurai Tiger Reserve, Tirunelveli, Tamil Nadu), *P. myristicaensis* sp. nov. (Myristica swamp at Kathalekan, Shivamogga, Karnataka) and *P. sholai* sp. nov. (montane sholas of Upper Manalar, Meghamalai Wildlife Sanctuary, Theni, Tamil Nadu) are described and illustrated. We compare these three new species with other *Protosticta* spp. from the Western Ghats based on new material and provide comprehensive differential diagnoses with determination key for males of all species occurring in the Western Ghats. The taxonomic validity of *P. mortoni* Fraser, 1922 is established with fresh specimens from Hassan, Karnataka, and rediscovery of *P. rufostigma* Kimmins, 1958 is reported from Kanyakumari Wildlife Sanctuary, Tamil Nadu." (Authors)] Address: Joshi, S., Res. Collections, National Centre for Biological Sciences, Bangalore, India. E-mail: Shantanu@ifoundbutterflies.org

**17470.** Joshi, S.; van der Poorten, N.; Sumanapala, A.; Nielsen, E.; Patel, J.; Nielsen, B.; Sawant, D.; Sherif, M. (2020): New records of polymorphism in Asian Libellulid dragonflies (Insecta: Odonata). *International Journal of Odonatology* 23(4): 337-356. (in English) ["Polymorphism has rarely been reported from the Libellulidae family. Here, we report female-limited polymorphism in females of five species of the Libellulidae and a gynandromorph male of *Brachythemis contaminata* from South Asia. We describe the morphological variation between andromorph and heteromorph females, and collate records of andromorph females from various sources. Yearly number of andromorph female of *Crocothemis servilia*, *Urothemis signata* and *Neurothemis signata* was calculated using records from published literature and unpublished sources, and social media." (Authors) ] Address: Joshi, S., Res. Collections, National Centre for Biological Sciences, Bangalore, India. E-mail: Shantanu@ifoundbutterflies.org

**17471.** Jung, S.-W.; Park, H.-R.; Uy, J.C. (2020): Distribution and biological quality assessment on benthic macroinvertebrates of Wolchulsan National Park, South Korea. *Korean Journal of Marine Criminal Investigation* 4(1): 39-47. (in Korean, with English summary) ["This study presents the distributional pattern and species diversity of benthic macroinvertebrates during the period from April to October, 2018 in Wolchulsan National Park. As a result, a total of 131 species of benthic macroinvertebrates (68 families, 16 orders, 4 phyla) were observed in Wolchulsan National Park. Among the Insecta, Trichoptera (35 spp.: 26.72%) was the most diverse group followed by Ephemeroptera (23 spp.: 17.56%), Odonata (16 spp.: 12.21%), Coleoptera (11 spp.: 8.40%), Diptera (10 spp.: 7.63%), Hemiptera (9 spp.: 6.87%), Plecoptera (8 spp.: 6.11%), and Megaloptera (3 spp.: 2.29%). In addition, Platyhelminthes (1 sp.: 0.76%), Mollusca (6 spp.: 4.58%), Annelida (3 spp.: 2.29%), and Crustacea (6 spp.: 4.58%) were collected. In the result of the Ecological score of benthic macroinvertebrate community (ESB) indicate that almost all sites were evaluated excellent or good for the environmental status, while the sites 9 and 11 showed relatively lower indices (32 and 41 marks) ...." (Author)] Address: Jung, S.-W., DASARI Res. Institute of BioResources, Daejeon, 34127, South Korea

**17472.** Kagimoto, B. (2020): A record of *Trachemys scripta elegans* (Wied-Neuwied, 1839) (Red-eared slider turtle) catching and eating an adult of *Anax parthenope julius* Brauer, 1865. *Tombo* 62: 114-115. (in Japanese, with English summary) ["*T. scripta elegans*, was introduced to Japan from North America, and has been designated as invasive alien species by Ministry of the Environment. This species is omnivorous, and supposed to inflict damage on aquatic creatures, including Odonata. However, there has been only one report so far that this turtle fed an adult Odonata. At the moat at Hiroshima castle, Hiroshima Prefecture, the author observed the turtle attacking an adult of *A. parthenope julius*, that dropped onto water surface, where upon the turtle bit it and dragged it under water in only about 13 seconds." (Author)] Address: not stated



- 17473.** Karube, H.; Kaga, R. (2020): First record of *Sympetrum fonscolombii* (Selvs, 1840) from Daito Islands, Okinawa Prerecture. Tombo 62: 136. (in Japanese, with English summary) [8-X-2019, on Minamidaiojima Island of Daito Islands.] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp
- 17474.** Karube, H.; Sano, S.; Phanara, T. (2020): New record of *Chlorogomphus arooni* Asahina, 1981 (Odonata: Chlorogomphidae) from Cambodia. Tombo 62: 70-72. (in English, with Japanese summary) ["*C. arooni* is for the first time recorded and illustrated from Cambodia. This species was originally described from peninsular Thailand, later additionally recorded from northern Thailand and Malay Peninsula. This is also the first record of the family Chlorogomphidae from Cambodia." (Authors)] Address: Sano, S., Kannonzaki Nature Museum, Yokosuka, Kanagawa Pref., Japan. E-mail: sano-gengoroh@kannonzaki-nature-museum.org
- 17475.** Karube, H.; Phan, Q.T.; Ngo, Q.P. (2020): Additional records of Vietnamese Odonata. III. Odonata from central Vietnam, with description of a new species of *Heliogomphus* (Odonata: Gomphidae). Tombo 62: 38-52. (in English) [45 anisopteran species from central Vietnam are recorded. Odonate fauna of central Vietnam is rich, consisted by northern and southern elements and central endemic species, each distribution of which overlaps in the central. In this study, it is revealed that the distributions of many species expand to the northward and/or southward than before known. In addition, a new species of *Heliogomphus aluoiensis* sp. nov. is described and illustrated. This new species is related to *H. bidentatus* Kompier & Karube, 2019." (Authors)] Address: Karube, H., Kanagawa Prefectural Museum of Natural History, Odawara, Kanagawa, Japan. E-mail: paruki@nh.kanagawa-museum.jp
- 17476.** Kasuya, M. (2020): Records of *Mnais pruinosa* Selys, 1853 adults in Kakitagawa, Shizuoka Pref. from December 2018 to January 2019. Tombo 62: 137-139. (in Japanese, with English summary) ["In winter, from late December 2018 to January 2019, we found adults of *M. pruinosa* (Izu population) on the river bank of spring water upwelling from a riverbed at Kakitagawa, Doniwa, Shimizu-cho, Shizuoka Prefecture. The water temperature remains almost constant at about 15 °C throughout the year, and the bank was surrounded by evergreen forest. The mean daily minimum temperature for December 2018 was about 2.5 °C higher than that for an average year, which may have stimulated adult emergences in winter in this species." (Author)] Address: not stated
- 17477.** Kim, D.G. (2020): Research history of *Nannophya Rambur* (Odonata: Libellulidae): A recently discovered species in addition to *Nannophya koreana* Bae in Korea. Korean Journal of Environmental Biology 38(2): 308-314. (in English) ["The *Nannophya* species in Korea was thought to consist of only *N. pygmaea*. Previous studies on the species, including life history and development, conservation and restoration, habitat characteristics, genetic studies, distribution, behavior, and taxonomy have been conducted. However, a new *Nannophya* species, *N. koreana*, was recently discovered in Korea. Moreover, this new species was found to inhabit both Korea and Japan. Thus, the previous studies should be reevaluated in relation to the new species, *N. koreana*, and the latter should be treated as an endangered species worldwide given the current population instability." (Author)] Address: Kim, D.G., Smith College of Liberal Arts, Sahmyook University, Seoul 01795, Republic of Korea. E-mail: ecology@syu.ac.kr
- 17478.** Kita, H. (2020): Reproductive behavior of *Ischnura aurora* Brauer, 1865 at a puddle on an asphalt-paved parking in Guam. Tombo 62: 111-113. (Japanese, with English summary) ["*I. aurora* is a species that is famous by wind-borne long distance dispersal. I observed this species at a small puddle on an asphalt paved parking in Guam. At this place, mate searching by adult males, oviposition into emergent plants and mate refusal posture by females were observed. Present result may suggest that such an environment is among the variety of the habitats utilized by this species." (Author)] Address: E-mail: kita1114-age@u01.gate01.com
- 17479.** Kobylecki, P. (2020): Dragonflies (Odonata) observed near Wyliny-Ruce (Poland, Podlasie). Odonatrix 16\_21: 4pp. (in Polish, with English summary) ["The observations were conducted in the ponds and rivers near Wyliny-Ruce village in 2014-2020. In total, 34 dragonfly species were recorded, including protected *Leucorrhinia pectoralis* (Charpentier, 1825)." (Author)] Address: Kobylecki, P., ul. Liryczna 8, 04-410 Warszawa, Poland. E-mail: fario@poczta.fm
- 17480.** Kobylecki, P. (2020): Dragonflies (Odonata) of Rembertów. Odonatrix 16\_3 (2020): 5 pp. (in Polish, with English summary) ["The observations were conducted on peatbogs, ponds and other water bodies, a canal and a small river east of Warsaw in 2016-2019. In total, 28 odonate species were recorded, including two protected species: *Sympetma paedisca* and *Leucorrhinia pectoralis*." (Author)] Address: Kobylecki, P., ul. Liryczna 8, 04-410 Warszawa e-mail: fario@poczta.fm
- 17481.** Koroiva, R.; Neiss, U.G.; Fleck, G.; Hamada, N. (2020): Checklist of dragonflies and damselflies (Insecta: Odonata) of the Amazonas state, Brazil. Biota Neotropica 20(1); e2019-0877, 2020: 18 pp. (in English, with Spanish summary) ["Here we provide a checklist of the odonates from Amazonas state, Brazil. We registered 324 species and 101 genera, making Amazonas the Brazilian state with the most Odonata species recorded. The families with the highest number of species were Coenagrionidae with 32 genera and 101 species, followed by Libellulidae with 28 genera and 100 species and Gomphidae with 12 genera and 45 species. Some regions of Amazonas state remain poorly explored, such as the southern area, and large municipalities, such as São Gabriel da Cachoeira. This work underlines the importance of the biological diversity from Amazonas state and the Amazonian Biome for Odonata species richness in Brazil and shows that many areas in the world's largest tropical forest have not yet been sampled." (Authors)] Address: Fleck, G., Lagorce 07150, France

**17482.** Kotabe, A.; Minowa, D.; Saito, K. (2020): A record of *Anax ephippiger* (Burmeister, 1839) from Shizuoka Prefecture in 2019. *Tombo* 62: 133-134. (in Japanese, with English summary) ["In the autumn of 2019, we recorded two males and one female of *A. ephippiger* from Hamamatsu City, Shizuoka Prefecture, Japan." (Authors)] Address: E-mail: rick-enjohnthebeats@yahoo.co.jp

**17483.** Kovalenko, Y. (2020): Some information about dragonfly fauna (Odonata) of the Yagorlyk Reserve. EU integration and management of the Dniester River Basin. Chisinau: Eco-TIRAS, 2020: 151-152. (in Russian) [Google translate: In the aspect of biodiversity monitoring, various "resource taxa" are used, in relation to wetlands, one of such taxa is dragonflies [1]. This a group of insects, despite the mobility and mass migrations of some species, according to some According to [2], they hardly master new water bodies [1]. Dragonflies are known for being beautiful and wonderful flyers and also an important group of animals in freshwater ecosystems. In Bern of the Convention on the Protection of Flora and Fauna, they occupy the lion's place in the European list rare species of insects. In Moldova, where many water bodies dry up, most rivers, ponds and lakes are heavily polluted, the state of the dragonfly fauna should be alarming [3]. Despite the potentially high species diversity of dragonflies in ideal ecological conditions of the reserve "Yagorlyk", this group of insects in the reserve is practically it has not been studied. In the article by B.I. Osecimsky [4] 5 species are indicated: *Calopteryx splendens*, *Ischnura elegans*, *Platycnemis pennipes*, *Aeshna juncea*, *Symptetrum vulgatum*. During the period from March to August 2020, 7 species of dragonflies were found in the reserve. The counts and trapping were carried out in the natural boundaries: Sukhoi Yagorlyk, Balta, Tsybulevka and Litvina. Also explored a section of the coast of the Yagorlyk backwater near the old bridge, where the ideal conditions for hunting dragonflies.] Address: Kovalenko, Y., State reserve "Yagorlyk", Goyany, Dubossary district 4518, Transnistria, Moldova. E-mail: dimid86@list.ru

**17484.** Krasutsky, B.V.; Gashek, V.A. (2020): New finds of insects from the Red Book of the Chelyabinsk region. *Vestnik of Orenburg State Pedagogical University. Electronic Scientific Journal* 2(34): 33-50. (in Russian, with English summary) ["The article provides the information about new places of detection, abundance and bioecological features of 20 species of the insects from the Red Book of the Chelyabinsk region and 4 species of Appendix 3 to it: ... III category: *Ophiogomphus cecilia*, ... The main threats to many of them are significant recreational loads, grazing and logging in the species habitats." (Authors)] Address: Krasutsky, B. V., Chelyabinsk State University, Russian Federation, 454001, Chelyabinsk, ul. Bratfeyev Kashirinyk 129. E-mail: boris\_k.63@mail.ru

**17485.** Krieg, M.; Mohseni, K. (2020): Transient pressure modeling in jetting animals. *Journal of Theoretical Biology* 494, 7 June 2020, 110237: 14 pp. (in English) ["Highlights: • A circulation based model calculates internal pressure dynamics in jellyfish, dragonfly larvae, and squid much more accurately than standard models. • The model is validated for low-inter-

mediate Reynolds numbers. • Body motions of a jellyfish species are optimized for acceleration at the onset of jetting for survival purposes, whereas, velar morphology towards the end of jetting decreases energetic cost. • Impulsive velocity programs in squid improve efficiency by offsetting peaks in pressure and boundary surface velocity thus decreasing total energetic cost. • Dragonfly larvae hindgut geometry reduces refilling work by inducing impingement prior to generation of negative thrust. Abstract: There are many marine animals that employ a form of jet propulsion to move through the water, often creating the jets by expanding and collapsing internal fluid cavities. Due to the unsteady nature of this form of locomotion and complex body/nozzle geometries, standard modeling techniques prove insufficient at capturing internal pressure dynamics, and hence swimming forces. This issue has been resolved with a novel technique for predicting the pressure inside deformable jet producing cavities (M. Krieg and K. Mohseni, *J. Fluid Mech.*, 769, 2015), which is derived from evolution of the surrounding fluid circulation. However, this model was only validated for an engineered jet thruster with simple geometry and relatively high Reynolds number ( $Re$ ) jets. The purpose of this manuscript is twofold: (i) to demonstrate how the circulation based pressure model can be used to analyze different animal body motions as they relate to propulsive output, for multiple species of jetting animals, (ii) and to quantitatively validate the pressure modeling for biological jetting organisms (typically characterized by complicated cavity geometry and low/intermediate  $Re$  flows). Using jellyfish (*Sarsia tubulosa*) as an example, we show that the pressure model is insensitive to complex cavity geometry, and can be applied to lower  $Re$  swimming. By breaking down the swimming behavior of the jellyfish, as well as that of squid and dragonfly larvae, according to circulation generating mechanisms, we demonstrate that the body motions of *Sarsia tubulosa* are optimized for acceleration at the beginning of pulsation as a survival response. Whereas towards the end of jetting, the velar morphology is adjusted to decrease the energetic cost. Similarly, we show that mantle collapse rates in squid maximize propulsive efficiency. Finally, we observe that the hindgut geometry of dragonfly larvae minimizes the work required to refill the cavity." (Authors)] Address: Krieg, M., UHM Ocean and Res Eng, 2540 Dole St, Honolulu, HI 96822, USA. E-mail: kriegmw@hawaii.edu

**17486.** Lancer, B.H.; Evans, B.J.E.; Wiederman, S.D. (2020): The visual neuroecology of Anisoptera. *Current Opinion in Insect Science* 42: 14-22. (in English) ["Highlights: • Dragonflies are highly successful aerial predators that rely almost exclusively on vision to drive behaviour. • Regional specialisations of the dragonfly eye assist in different behaviours. • The neuronal target tracking system is finely tuned for predicting the location of small targets in both background visual clutter and swarming conditions filled with distractors. • Once a target has been observed, the dragonfly may implement a number of distinct pursuit strategies for target capture. Dragonflies belong to the oldest known lineage of flying animals, found across the globe around streams, ponds and forests. They are insect predators, specialising in ambush attack as aquatic larvae and rapid pursuit as adults. Dragonfly adults hunt amidst swarms in condi-

tions that confuse many predatory species and exhibit capture rates above 90%. Underlying the performance of such a remarkable predator is a finely tuned visual system capable of tracking targets amidst distractors and background clutter. The dragonfly performs a complex repertoire of flight behaviours, from near-motionless hovering to acute turns at high speeds. Here, we review the optical, neuronal, and behavioural adaptations that underlie the dragonflies' ability to achieve such remarkable predatory success." (Authors)] Address: Wiederman, S.D., Adelaide Medical School, The University of Adelaide, Adelaide, 5005 South Australia, Australia

**17487.** Lee, S.-D.; Bae, S.-H.; Lee, G.-G. (2020): Understanding the impact of environmental changes on the number of species and populations of Odonata after creating a constructed wetland. *Korean Journal of Environment and Ecology* 34(6): 515-529. (in Korean, with English summary) ["Constructed wetlands undergo biological and physical changes such as an increase in the proportion of arid plants due to the natural succession process after formation. It can adversely affect not only the purification function but also the habitat of species. As such, this study aims to identify environmental factors affecting biodiversity and propose management plans based on the monitoring results of physical environmental changes and the emergence of species in seven constructed wetlands selected based on the water depth and surrounding conditions among the lands purchased by the Nakdong River basin. We examined the environmental conditions and emergence of the Odonata, which is a wetland-dependent species, to predict the trend of changes in biodiversity and abundance. The results showed that the open water area decreased as the emergent plants spread to the deep water in 2015 compared to 2012 when they were initially restored to a depth of 0.2 to 1 m. While a total of 54 dragonfly species were observed, the habitat diversity, such as vegetation, water surface, and grassland, remained similar to the initial formation of the wetlands despite the expansion of the emergent plants. On the other hand, the number of Agrionidae species, which prefer areas with fewer aquatic plants, decreased between 2012 and 2015 due to the diminished water surface. The p-values of the differences in the number of species and population between wetlands by year were 2.568e-09 and 1.162e-08, respectively, indicating the statistically significant differences. The decrease in open water surface was found to have the greatest effect on the biodiversity and habitat density of dragonflies. The time-series survey of constructed wetlands confirmed that the spread of *Phragmites communis*, *P. japonica*, *Typha orientalis*, etc., caused a decrease in species diversity. It suggests that environmental management to maintain the open water surface area is necessary." (Authors) ] Address: Lee, S.-D., Dept. of Landscape Architecture, Gyeongnam National University of Science & Technology, 52725, Korea. E-mail: ecoplan@gntech.ac.kr

**17488.** Legros, V.; Rochat, J.; Reynaud, B.; Strasberg, D. (2020): Known and unknown terrestrial arthropod fauna of La Réunion Island, Indian Ocean. *Journal of Insect Conservation* 24: 199-217. (in English) ["A major part of La Réunion Island has been included on the World Heritage List of the

United Nations Educational, Scientific and Cultural Organization (UNESCO) for its unique landscapes and its outstanding biodiversity. However, there is a lack of knowledge on the arthropod diversity. For this reason, an up-to-date census of Réunion's terrestrial arthropods was undertaken. Of the 3369 species that are reported from Réunion (23 Odonata), 31% are endemic to the island and 40% are endemic to the Mascarenes. A diversity ratio between the numbers of described and expected species in the world was established and then applied to the numbers of reported species in Réunion to estimate the total expected numbers of species on the island. The results predict that between 6751 and 10,812 species of terrestrial arthropods are present in Réunion and that 62% of species remain to be discovered. However, some groups appear underrepresented as expected for Darwinian islands that should be originally composed by species with abilities to colonize remote places. Considering the global biodiversity decline and the numerous threats on Réunion's natural habitats, this article emphasizes the crucial need for conservation of terrestrial arthropods and strongly encourages an increase in the list of protected arthropods." (Authors)] Address: Legros, V., UMR PVBMT, Univ. of La Reunion, Pole de Protection des Plantes, 7 chemin de l'IRAT, 97410 Saint-Pierre, La Reunion, France. E-mail: legros.vincent@wanadoo.fr

**17489.** Lewandowska, E.; Lewandowska, K.; Buczynski, P. (2020): Reproductive success of Wandering Glider *Pantala flavescens* (FABRICIUS, 1798) (Odonata: Libellulidae) recorded in Lake Rakutowskie (central Poland). *Odonatrix* 16\_11 (2020): 7 pp. (in Polish, with English summary) ["The successful reproduction of *P. flavescens* was recorded in the extensive, shallow phytolittoral of Lake Rakutowskie near Włodawek (central Poland). On August 12, 2020, three males were observed during their maiden flights. This is the third known locality of this species in Poland; above all, however, it is the northernmost locality in the entire Palaearctic where reproduction of this species has been confirmed. The new data is analysed in the context of published information on the occurrence of *P. flavescens* in Europe. This is changing dynamically, with increasing numbers of sightings, especially in central and east-central Europe, and ever more records of its successful reproduction. This dragonfly will surely be encountered more and more frequently in central Europe. It will also be worthwhile carefully observing its habitat preferences, especially its reproductive sites." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**17490.** Ihamdi, M.L.; Al Idrus, A.; Santoso, D.; Hadiprayitno, G. (2020): Community structure and diversity of Odonata in Suranadi Natural Park, West Lombok Indonesia. *Biodiversitas* 21(2): 718-723. (in English) ["The importance of the ecological role of odonates is not followed by adequate scientific information on Odonata communities, especially in the Suranadi Natural Park (SNP). The study aimed to monitor the existence and community structure of Odonata in the SNP area every six months in period. The data collection technique was using a survey method by following the transect line, namely the waterway transect line (WTL), plantation border transect (PT) and



settlement border transect (ST). Data collection was done 4 times from April to May 2019, once every 2 weeks. The sampling was done twice in the morning from 08.00 to 11.00 AM and in the afternoon from 03.00 to 05.00 PM. Data were analyzed using the relative frequency equation and Diversity Index. The results showed that there were 16 species of odonates consisting of the family Libellulidae (11 species), Platycnemididae (1 species), Chlorocyphidae (1 species), and Coenagrionidae (3 species). *Orthetrum sabina*, *Neurothemis ramburii*, *Diplacodes trivialis*, *Gynacantha subinterrupta*, *Copera marginipes*, and *Pantala flavescens*, are species that are present in all of each observation sites. The waterway transect has the highest diversity index (2.027), followed by settlement transect (1.367), and the lowest is plantation transect (1.131)." (Authors)] Address: Hadiprayitno, G., Dept of Biology Education, Fac. of Teacher Training & Education Science, Univ. Mataram. Jl. Majapahit 62, Mataram 83125, West Nusa Tenggara, Indonesia. E-mail: gitohadiprayitno@unram.ac.id

**17491.** Lis, C.; Moore, M.P.; Martin, R.A. (2020): Warm developmental temperatures induce non-adaptive plasticity in the intrasexually selected colouration of a dragonfly. *Ecological Entomology* 45(3): 663-670. (in English) ["1. When the breeding environment fluctuates across generations, reproductive traits may evolve plasticity that optimises the balance between survival and mating success for the prevailing environment. 2. For sexually selected colouration, this balance can depend on environmental temperatures. Accordingly, breeding colouration often co-varies with temperature through space and time. However, whether such traits exhibit plasticity in response to environmental temperatures is poorly understood. 3. In the present study, *Pachydiplax longipennis* was reared under ambient or experimentally warmed conditions and tested for plasticity in its intrasexually selected wing colouration. Although wing colouration improves male territorial success, these advantages are smaller under warmer conditions than cooler conditions. It was therefore predicted that males reared under the ambient thermal conditions of the study site (Cleveland, Ohio) would develop more wing colouration than those reared under experimentally warmed conditions. 4. Contrary to this prediction, males reared in warm larval temperatures produced more wing colouration. Thus, although the secondary sexual colouration of this species displays some thermal plasticity, it does not appear to be adaptive relative to the known thermal variation of intrasexual selection in this population. 5. Given that the environment often determines the strength and direction of sexual selection, future studies should consider the potential for non-adaptive, and even maladaptive, developmental plasticity in the sexually selected traits of insects." (Authors)] Address: Moore, M.P., Living Earth Collaborative, Washington University, St Louis, MO 63110, U.S.A. E-mail: moore.evo.eco@gmail.com

**17492.** López-Díaz, J.A.; Gómez, B. (2020): Los Odonata (Insecta) en la entomofilia - The Odonata (Insecta) in entomophilately. *Dugesiana* 27(1): 3-10. ["A global review of the postage stamp inventory is presented with the representation of Odonata as biological organisms. To this end, an exhaustive search was carried out in literature specialized in

entomophilately, in addition to the use of the internet. 426 stamps issued by 113 countries were found, in addition to 102 postal documents (postmarks, first day envelopes, souvenir sheets). The first record of an Odonata in a postage stamp is made by Japan in 1923, while the years 2000, 2011 and 2013 stand out when emitting the greatest number of stamps with these insects. Taxonomically, a total of 182 species is recorded, representing 3.06% of the species recognized for the order. Of the stamps issued, 6.59% represent species in some risk category based on the IUCN." (Authors)] Address: López-Díaz, J.A., Inst. Cien. Biol., Univ. de Ciencias y Artes de Chiapas, Tuxtla Gutiérrez, Chiapas, México. E-mail: juanlodi44@gmail.com

**17493.** Lopez Colon, J.I.; Bahillo de la Puebla, P. (2020): Odonatos del Salar de los Canos, Vera (Almería) (SE de la Península Ibérica) (Insecta, Odonata). *Archivos Entomológicos* 22: 95-103. (in Spanish, with English summary) ["Odonata from Salar de los Canos, Vera (Almería) (SE Iberian Peninsula) (Insecta, Odonata). *Trithemis kirbyi ardens*, *Ceriagrion tenellum*, and *Anax parthenope*, are recorded from Salar de los Canos, a salt wetland in Vera, Almería (SE Iberian Peninsula). The Odonata checklist of that salt wetland is also provided." (Authors)] Address: López Colón, J.I., Plaza de Madrid, 2, 1ºD. E-28523 Rivas-Vaciamadrid, Spain. E-mail: lopezicolon@gmail.com

**17494.** López-Estrada, E.K.; Barona Fernández, J.; Cardo-Maeso, N.; Montejano, S.T.; Díaz-Martínez, C. (2020): *Onychogomphus cazuma* sp. nov. from Spain: Molecular and morphological evidence supports the discovery of a new European dragonfly species (Odonata: Gomphidae). *Odonatologica* 49(1/2): 125-154. (in English) ["*Onychogomphus cazuma* Barona, Cardo & Díaz sp. nov. is described from the mountainous inland area of Valencia in central-eastern Spain. The new species presents a combination of morphological characters that distinguishes it from all other species of the genus and can be readily identified by the morphology of the male appendages and the female vulvar scale, and by the shape of the median lobe of the prementum and the labial palps of the exuvia. Molecular analysis of two genetic markers, one nuclear and one mitochondrial (PRMT and COII), supports the full species rank for this new taxon, which is sister to the north-western African endemic *O. boudoti*. Despite its small known distribution and the vulnerability of its habitat, available data are still insufficient to place this new species into an IUCN Red List of Threatened Species category." (Authors)] Address: López-Estrada, Karen, Museo Nacional de Ciencias Naturales, MNCN-CSIC, José Gutiérrez Abascal, 2, 28006 Madrid, Spain. E-mail: lo-karen21@gmail.com

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2021

**17495.** Akçakaya, R.; Hochkirch, A.; Bried, J.T.; van Grunsven, R.H.A.; Simaika, J.P.; De Knijf, G.; Henriques, S. (2021): Calculating population reductions of invertebrate species for IUCN Red List assessments. *Journal of Insect Conservation* 25: 377-382. (in English) ["Population reductions are often used to assess extinction risk of species in the IUCN Red List. Guidelines for Red List assessments describe specific methods for calculating the amount of reduction for species with strongly fluctuating populations. Recently, an alternative approach that involves expert opinion has been suggested for calculating population reduction in insect species. We argue that, while populations with high temporal variability do present challenges, the alternative suggestion is unnecessary, and inconsistent with the IUCN Red List Categories and Criteria. Implications for insect conservation Consistent application of standardized methods for calculating population reductions allows robust and objective assessment of extinction risk faced by invertebrate species." (Authors)] Address: Akçakaya, H.R., Dept of Ecology and Evolution, Stony Brook University, New York, USA. E-mail: Resit.Akçakaya@stonybrook.edu

**17496.** Akhtar, Z.R.; Tariq, K.; Mavian, C.; Ali, A.; Ullah, F.; Zang, L.-S.; Ali, F.; Nazir, T.; Ali, S. (2021): Trophic transfer and toxicity of heavy metals from dengue mosquito *Aedes aegypti* to predator dragonfly *Tamea cophysa*. *Ecotoxicology* 30(4): 1108-1115. (in English) ["Heavy metal pollution in aquatic habitats can be detrimental to both prey and predators in a food web. To investigate the potential for bio-transfer and bioaccumulation of heavy metals between specific trophic levels, 3rd instar larvae of *Aedes aegypti* were exposed to mercury (Hg), lead (Pb), cadmium (Cd), copper (Cu), and zinc (Zn) for three consecutive generations and fed to dragonfly (*Tamea cophysa*) nymphs. Exposure to Hg caused the highest mortality in *A. aegypti* larvae and *T. cophysa* nymphs. Bioaccumulation and life-history parameters of *A. aegypti*, including egg hatching time, larval and pupal duration, male and female life span, and fecundity, were also evaluated after metals exposure. All life-history parameters

except larval duration were significantly affected by heavy metal treatments. Bioaccumulation of metals in *A. aegypti* larvae and adults gradually and significantly increased from 1st to 3rd generation. To the best of our knowledge, this is the first study describing the acute toxicity of heavy metals to mosquitoes. Our study shows that heavy metals cause dietary toxicity to an aquatic predator, dragonfly, via trophic transfer, which could have considerable consequences on aquatic ecosystems." (Authors)] Address: Tariq, K., Dept of Agriculture Entomology, Abdul Wali Khan University Mardan, Mardan, Khyber Pakhtunkhwa, Pakistan

**17497.** Amaya-Vallejo, V.; Bota-Sierra, C.; Novelo-Gutiérrez, R.; Sánchez-Herrera, M. (2021): Two new species of *Archaeopodagrion* (Odonata, Philogeniidae) from the western foothills of the Tropical Andes, with biological observations and distributional records. *ZooKeys* 1036: 21-38. (in English) ["Two new species of the genus *Archaeopodagrion*, *A. recurvatum* sp. nov. and *A. mayi* sp. nov., are described from the confluence of the Tropical Andes and the Tumbes-Chocó-Magdalena biodiversity hotspots. Adults differ from the other known species in the shape of female posterior lobe of pronotum and male structures of cerci and paraprocts; the larva differs from other *Archaeopodagrion* species in the caudal lamellae structure and in the mandibular formula. The two new species are diagnosed, a morphological key to all known males and females in the genus is provided, and geographical distributions are updated. Finally, observations on habitat preferences for each newly described species are provided." (Authors)] Address: Amaya-Vallejo, Vanessa, Lab. de Zoología y Ecología Acuática, Univ. de los Andes, Bogotá DC, Colombia. E-mail: v.amaya10@uniandes.edu.co

**17498.** Anupama, V.S.; Raj, S.; Devi, S.S., Kumar, A.B. (2021): Diet of exotic *Pirapitinga Piaractus brachypomus* (Cuvier, 1818) from Vembanad-Kole Wetland, India, as inferred from gut content analysis and DNA barcoding. *Asian Fisheries Science* 34: 47-55. (in English) ["Gut contents of the exotic characid fish *Piaractus brachypomus* (Cuvier, 1818) that escaped into the Vembanad-Kole Wetland, India, during the floods were examined for their gut food spectrum. The qualitative analysis of gut contents showed that

the fish is an omnivore with detritus (27 %) as the most dominant food item followed by, plant matter (25 %), crabs (16 %), molluscs (12 %), fish (11 %) and insects (7 %), respectively. DNA barcoding of the gut contents revealed taxa such as *Puntius mahecola* (Valenciennes, 1844) (Cyprinid fish), *Bellamaya* sp. (Mollusca, Gastropoda, Viviparidae), *Spiralothelphusa* sp. (Crustacea, Brachyura, Gecarcinucidae) and *Ictinogomphus* sp. (Insecta, Odonata, Gomphidae) among diet contents. Ontogenic diet shift was not recorded, and none of the fishes showed empty guts, indicating the higher feeding rate and abundance of food in the habitat. The most predominant food item of *P. brachypomus* in the Vembnad-Kol wetland system is crabs in terms of percentage occurrence, percentage number, percentage volume, index of preponderance, and index of relative importance. *Piaractus brachypomus* showed greater variations in diet spectrum from their frugivorous nature in the home range (Amazon basin) to a more generalist heterogeneous feeding nature in the introduced ecosystem. The study found that in a highly biodiverse ecosystem, the introduced alien fish may compete with native fish and feed on native organisms. The paper suggests a precautionary approach in flood plain aquaculture, especially with the increase in extreme climatic events and holistic studies on invasion biology to manage invasive species." (Authors)] Address: Kumar, A.B., Department of Aquatic Biology and Fisheries, Faculty of Science, University of Kerala, Thiruvananthapuram 695581, India. E-mail: bijukumar@keralauniversity.ac.in

**17499.** Araujo, B.R.; Pinto, A.P. (2021): Dragonflies (Insecta: Odonata) from Mananciais da Serra, a Tropical-Araucaria Forest ecotonal remnant in the southern Atlantic Forest, state of Paraná, Brazil. *Zoologia* 38: e55283: 18 pp. (in English) ["This study provides a comprehensive checklist of Odonata species from the protected area of Mananciais da Serra. The survey was conducted in the endangered Atlantic Forest domain at the southern Serra do Mar mountain chain within a well-preserved area in the municipality of Piraquara, state of Paraná, Brazil. Adults and larvae were sampled between June 2017 and March 2020 using different techniques in numerous mesohabitats, including phytotelmata, pools, small streams, and large reservoirs. A total of 1,708 specimens from 9 families, 43 genera and 84 species were sampled resulting in 53 new records for the state of Paraná, almost doubling the known occurrence records for dragonflies and damselflies in that state. Furthermore, two hitherto undescribed females from the genera *Planiplax* and *Heteragrion*, four ultimate stadium larvae from *Planiplax*, *Neocordulia*, *Heteragrion*, and *Acanthagrion*, and five undescribed species were detected, one each from the genera *Heteragrion*, *Progomphus*, *Brechmorhoga*, *Erythrodiplax*, and *Dasythemis*. The estimated richness of odonates in this area is greater than 100 species, while the observed richness corresponding to almost 10% of all Odonata species in Brazil, the species-richest country in the world. These results reiterate the need to investigate under-sampled areas to improve knowledge on diversity, taxonomy, and distribution of neotropical species. Finally, taxonomic notes for some species, including the rare cordulid

*Neocordulia mambucabensis* Costa & T.C. Santos, 2000, are provided." (Authors)] Address: Araujo, B.R., Laboratório de Sistemática de Insetos Aquáticos, Depto de Zoologia, Univ. Federal do Paraná, Caixa Postal 19020, 81531-980 Curitiba, PR, Brazil. E-mail: breno.rda94@gmail.com

**17500.** Archibald, S.B.; Cannings, R.A. (2021): A new genus and species of Euphaeidae (Odonata, Zygoptera) from the early Eocene Okanagan Highlands locality at Republic, Washington, U.S.A.. *Zootaxa* 4966(3): 392-400. (in English) ["We describe *Republica weatbrooki*, a new genus and species of damselfly (Odonata, Zygoptera, Euphaeidae, Eodichromatinae) from the early Eocene (Ypresian) fossil locality at Republic, Washington, U.S.A. Its single specimen is the sole damselfly known from the Okanagan Highlands series of localities in far-western North America." (Authors)] Address: Archibald, S.B., Dept of Biological Sciences, Simon Fraser University, 8888 University Drive, Burnaby, British Columbia, V5A 1S6, Canada. E-mail: sba48@sfu.ca

**17501.** Archibald, S.B.; Cannings, R.A.; Erickson, R.J.; Bybee, S.M.; Mathewes, R.W. (2021): The Cephalozygoptera, a new, extinct suborder of Odonata with new taxa from the early Eocene Okanagan Highlands, western North America. *Zootaxa* 4934(1): 1-133. (in English) ["We describe the Cephalozygoptera, a new, extinct suborder of Odonata, composed of the families *Dysagrionidae* and *Sieblosiidae*, previously assigned to the Zygoptera, and possibly the *Whetwhetaksidae* n. fam. The Cephalozygoptera is close to the Zygoptera, but differs most notably by distinctive head morphology. It includes 59 to 64 species in at least 19 genera and one genus-level parataxon. One species is known from the Early Cretaceous (*Congqingia rhora* Zhang), possibly three from the Paleocene, and the rest from the early Eocene through late Miocene. We describe new taxa from the Ypresian Okanagan Highlands of British Columbia, Canada and Washington, United States of America: 16 new species of *Dysagrionidae* of the existing genus *Dysagrion* (*D. pruettae*); the new genera *Okanagrion* (*O. threadgillae*, *O. hobani*, *O. beardi*, *O. lochmum*, *O. angustum*, *O. dorrellae*, *O. liquetoalatum*, *O. worleyae*, all new species); *Okanopteryx* (*O. jeppesenorum*, *O. fraseri*, *O. macabeensis*, all new species); *Stenodiafanus* (*S. westersidei*, new species); the new genus-level parataxon *Dysagrionites* (*D. delinei* new species, *D. sp. A*, *D. sp. B*, both new); and one new genus and species of the new family *Whetwhetaksidae* (*Whetwhetaksa millerae*)." (Authors)] Address: Archibald, S.B., Dept of Biological Sciences, Simon Fraser University, 8888 University Drive, Burnaby, British Columbia, V5A 1S6, Canada. 2. E-mail: sba48@sfu.ca

**17502.** Arumugam, S.; Athikesava, S. (2021): Diversity and distribution of aquatic insects in pond ecosystem in Cheyyar, Thiruvannamalai district of Tamil Nadu, India. *Uttar Pradesh Journal of Zoology* 42(9): 10-15. (in English) ["Aquatic insects are the most diverse group of organisms in freshwater bodies such as lakes, ponds, rivers, streams, reservoirs, etc. A pond ecosystem is a body of standing water and very important habitats for so many various types of animals



such as fishes, crustaceans, insects and amphibians. Aquatic insects are good bioindicators of water quality for assessment of pollution in short and long-term pollution events. The less or more aquatic insects are providing data to estimate the degree of environmental impact and its potential effects on other living organisms. In this study reveals diversity and distribution of aquatic insects from the pond ecosystem in the Kilpudupakkam, Cheyyar, Thiruvannamalai District for a period from August 2017 to January 2018. The aquatic insects were collected with the help of scoop net and hand nets. Later they were identified using of original literature. The insects identified for following 7 orders viz., Hemiptera, Coleoptera, Odonata, Ephemeroptera, Trichoptera, Diptera and Lepidoptera. Order Hemiptera (33.63%) is the largest population of pond ecosystem and compare with other orders and diversity indices were calculated. The order followed by Hemiptera were Coleoptera (27.21%), Odonata (14.98), Ephemeroptera (8.56%), Trichoptera (7.64%), Diptera (5.50%) and Lepidoptera (2.44%)." (Authors)] Address: Arumugam, S., P. G. and Research Dept Zool., Arignar Anna Govt. Arts College, Cheyyar, Tamil Nadu, India

**17503.** Arunima, J.; Nameer, P.O. (2021): A preliminary checklist of dragonflies and damselflies (Insecta: Odonata) of Vakkom Grama Panchayath, Thiruvanthapuram District, Kerala, India. *Journal of Threatened Taxa* 13(8): 19125-19136. (in English) ["A one-year study was conducted at Vakkom Grama Panchayath, Thiruvananthapuram district, Kerala, to assess the diversity of odonates. We report 49 species, which include 31 species of Anisoptera and 18 species of Zygoptera. Among dragonflies, Libellulidae dominated with 26 species, while Coenagrionidae with 10 species was the dominant family among the damselflies. The odonate diversity of Vakkom Grama Panchayath accounted for 28% of the odonates in Kerala and 25% of the odonates of the Western Ghats. Vakkom Grama Panchayath also recorded the presence of *Mortonagrion varralli* which is an uncommon species in Kerala. This study provides some important baseline information on the odonates of one of the grama panchayaths in Kerala, India. An updated checklist of 57 species of odonates of Thiruvananthapuram district, Kerala is also provided." (Authors)] Address: Arunima, J.; Centre Wildlife Stud., Coll. of Forestry, Kerala Agricult. Univ., Vellankkara, Thrissur, Kerala 680656, India. E-mail: arunima.bindhu@gmail.com

**17504.** Baile, E.L. (2021): The effects of urbanization on insect morphology: a meta-analysis. Honors thesis, University of Tennessee at Chattanooga: 22 pp. (in English) ["Urbanization has been shown to create a rapid change in the environment as you move from rural areas to urban areas. It can create a multitude of effects on the environment. Some examples include, land disturbance, pollution, increasing temperatures and a disturbance in vegetation and biodiversity. Insects are useful organisms that provide maintenance and upkeep for ecosystem functioning. The rapid development of urbanization and how it is changing the environment may impact insect morphology. Measuring morphological change in organisms have been used success-

fully as indicators of environmental and ecological disturbance. Changes that take place in an insect's morphology may indicate stress and environmental instability, which will help deepen the understanding of urbanizations impact on urban ecosystems. To evaluate the effect of urbanization on insect morphology, I conducted a meta-analysis of 23 published peer-reviewed studies focused on insect morphology within the context of urbanization. The resulting sample sizes and effect sizes given for changes in morphological traits were extracted and converted to effect size Pearson's ( $r$ ) for a more uniform measurement to analyze in the meta-analysis. I wanted to assess how urbanization impacted insect morphology and understand what may be the driving the effect of urbanization on insects. To identify possible sources of variation across studies, I analyzed five variables that focused on morphological traits, insect order, ecological level, environmental conditions and sex. The results indicated that although the overall effect size ( $r=0.19$ ) of all studies included showed a change or significant effect in the morphological traits of insects between urban and non-urban areas, only ~25% of those studies had an actual impact. The majority, ~75% of studies did not show urbanization to have a significant impact on insect morphology. The insect orders, Hymenoptera, Hemiptera, Odonata and Orthoptera showed a significant effect in morphological changes. Studies that focused on body size and a combination of multiple morphological traits showed a significant effect in morphological changes. In terms of ecological organizations, both population and community groups studied had a significant effect on insect morphology. Disturbance and temperature were the only environmental conditions that showed a significant effect. Studies that measured changes in insect morphology with combined male and female populations showed a significant effect in morphological changes versus studies that focused on a singular sex. These findings may suggest urbanization is causing morphological changes in insects by some capacity but it is not as impactful as one would presume." (Author)] Address: not stated

**17505.** Barling, N.T.; Heads, S.W.; Martill, D.M. (2021): ADDENDUM: Behavioural impacts on the taphonomy of dragonflies (Odonata) from the Lower Cretaceous Crato Formation, Brazil. *Palaeoentomology* 4(3): 203. (in English) ["In our recent paper discussing the impacts of dragonfly behaviour on their taphonomy from the Lower Cretaceous Crato Formation of Brazil (Barling et al., 2021), we figured eight specimens illustrating dragonflies in various states of preservation. In the caption to this figure we listed the temporary laboratory numbers assigned to these specimens during the study (identified with the prefix "UOP-PAL-") and not their permanent accession numbers. On completion of the study, all specimens were transferred to the Museu de Paleontologia Plácido Cidade Nuvens (MPPCD) at the Universidade Regional do Cariri in Crato, Brazil." (Authors)] Address: Barling, N.T., Camborne School of Mines, College of Engineering, Mathematics and Physical Sciences, University of Exeter, Penryn Campus, Treliever Road, Penryn, Cornwall, TR10 9EZ, UK

**17506.** Baumann, K. (2021): Können intakte Gebirgsmoore in Zeiten des Klimawandels Refugien für seltene Libellenarten (Odonata) sein? Untersuchungen im Nationalpark Harz von 2017 bis 2020. *Libellula Supplement* 16: 35-66. (in German, with English summary) ["Can intact mountain bogs be refuges for rare dragonfly species (Odonata) in times of climate change? Investigations in the Harz National Park from 2017 to 2020 – The emergence abundance of *Aeshna juncea*, *A. subarctica*, *Somatochlora alpestris*, *S. arctica* and *Leucorrhinia dubia* was studied on permanent plots in two intact raised bogs of the Harz Mountains from 2017 to 2020. After the extremely dry summer of 2018, a supplementary exuviae search with a special focus on *S. alpestris* has been carried out in a further total of 19 raised bogs and slope located soligenous bogs. As a result of the drought in 2018, the small pools of the raised bogs were lost as reproductive waters for all species except *S. arctica*. This species endured the drought best, but still suffered significant population losses. *S. alpestris* was most affected by the drought, with probably only a maximum of 150 imagines emerging in the entire Harz Mountains in 2020, distributed among a few waters that had not dried up or had dried up only briefly in 2018. It became apparent that the intact mountain bogs of the Harz Mountains are massively exposed to the consequences of climate change. They can only serve as refuges for dragonflies to a very limited extent." (Author)] Address: Baumann, Kathrin, ALNUS GbR, Lärchenweg 15a, 38667 Bad Harzburg, Germany. E-mail: k.baumann@alnus.de

**17507.** Baumann, K.; Kastner, F.; Borkenstein, A.; Burkart, W.; Jödicke, R.; Quante, U. (2021): Rote Liste der in Niedersachsen und Bremen gefährdeten Libellen mit Gesamtartenverzeichnis. 3. Fassung – Stand 31.12.2020. Informationsdienst Naturschutz Niedersachsen 1/2021: 3-37. (in German, with English summary) ["The volunteer dragonfly working group of Lower Saxony and Bremen („Arbeitsgemeinschaft Libellen in Niedersachsen und Bremen“) has recently compiled a dragonfly atlas for the two federal states (Baumann et al. 2021a). For each species, the atlas includes a comprehensive analysis of the population situation and trend. It was therefore logical to compile a new Red List in this context. The atlas and the Red List are based on a comprehensive data set gathered by well over 1,000 volunteers. The dragonfly fauna of the study region is currently facing rapid changes, primarily caused by climate change. Direct negative effects of climate change have been identified for ten species with an affinity for bogs. In contrast, at least nine other species are profiting from this change, including those extending their range from the south. As a result, the number of species recorded from Lower Saxony and Bremen has increased to 73. Of these, 70 have been assessed in this Red List, 69 are established in the region, and one species is extinct since a long time. A total of 23 species (33 %) are ranked as Extinct or Endangered in the Red List. Almost half of these (11) are threatened with extinction, which is a significant deterioration from the previous Red List in 2007 (6). Overall, however, the number of Red List species has decreased, partly due to measures protecting streams, partly due to climate warming, and partly due to increased

knowledge as a result of improved data." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. E-mail: reinhard.joedicke@magenta.de

**17508.** Beck, S. (2021): Effects of *Microcystis aeruginosa* on New Jersey aquatic benthic macroinvertebrates. M.Sc. thesis, Montclair State University: 36 pp. (in English) ["As increases in anthropogenic eutrophication and climate change contribute to more severe and frequent cyanobacterial harmful algal blooms in freshwater ecosystems worldwide, understanding the effects and consequences cyanobacterial blooms have on aquatic organisms is crucial. *Microcystis aeruginosa* is one of the most common cyanobacteria taxa found in cyanobacterial blooms, producing a number of toxins including Microcystins. This study examined the effects of *Microcystis aeruginosa* on aquatic benthic macroinvertebrates, specifically the pollution intolerant taxa Ephemeroptera, the pollution moderately intolerant taxa Zygoptera, and the pollution tolerant taxa Chironomidae. In a controlled lab environment, macroinvertebrates were exposed to approximately 100,000 cells/ml of *Microcystis aeruginosa*. The survival percentage was lower for macroinvertebrates exposed to *Microcystis aeruginosa* in all three tolerance groups while corresponding with the pollution tolerance levels of the species. These findings support the notion that cyanobacterial blooms have deleterious effects on freshwater ecosystems and can affect aquatic food webs." (Author)] Address: not stated

**17509.** Belevich, O.; Yurchenko, Y.; Alekseev, A.; Kotina, O.; Odeyanko, V.; Tsentalovich, Y.; Yanshole, L.; Kryukov, V.; Danilov, V.; Glupov, V. (2021): Toxic effects of fine plant powder impregnated with avermectins on mosquito larvae and nontarget aquatic invertebrates. *Journal of Medical Entomology* 58(2): 773-780. (in English) ["The toxic effects of an avermectin-impregnated fine plant powder (AIFP) against larval *Aedes aegypti*, *Culex modestus*, and *Anopheles messeae*, as well as selected nontarget aquatic invertebrates, were studied under laboratory conditions. The possibility of trophic transfer of avermectins (AVMs) through the food chain and their toxic effects on predaceous species fed AIFP-treated mosquito larvae was also evaluated. Among mosquitoes, *Anopheles messeae* were the most sensitive to AIFP, while *Cx. modestus* exhibited the least sensitivity to this formulation. Among nontarget aquatic invertebrates, the greatest toxicity of AIFP was observed for benthic species (larval *Chironomus* sp.), whereas predators (dragonflies, water beetles, and water bugs) exhibited the lowest AIFP sensitivity. AIFP sensitivity of the clam shrimp *Lynceus brachyurus*, the phantom midge *Chaoborus crystallinus*, and the mayfly *Caenis robusta* Eaton was intermediate and similar to the sensitivity of the mosquito *Cx. modestus*. However, these nontarget species were more resistant than *An. messeae* and *Ae. aegypti*. Solid-phase extraction of mosquito larvae treated with AIFP and subsequent high-performance liquid chromatography (HPLC) analysis of the extracts revealed an AVM concentration of up to  $2.1 \pm 0.3 \mu\text{g/g}$ . Feeding the creeping water bug *Ilyocoris cimicoides* on the AIFP-treated mosquito larvae resulted in 51% mortality of the predaceous

species. But no toxicity was observed for *Aeshna mixta* larvae fed those mosquito larvae. The results of this work showed that this AVM formulation can be effective against mosquito larvae." (Authors)] Address: Belevich, Olga, Laboratory of Insect Pathology, Institute of Systematics and Ecology of Animals SB RAS, Novosibirsk, Russia

**17510.** Béthoux, O.; Norrad, R.E.; Stimson, M.R.; King, O.A.; Allen, L.F.; Deregnaucourt, I.; Hinds, S.J.; Lewis, J.H.; Schneider, J.W. (2021): A unique, large-sized stem Odonata (Insecta) found in the early Pennsylvanian of New Brunswick (Canada). *Fossil Record* 24: 207-221. (in English) ["A stem relative of dragon- and damselflies, *Brunellopteron norradi* Béthoux, Deregnaucourt and Norrad gen. et sp. nov., is documented based on a specimen found at Robertson Point (Grand Lake, New Brunswick, Canada; Sunbury Creek Formation; early Moscovian, Pennsylvanian) and preserving the basal half of a hindwing. A comparative analysis of the evolution of wing venation in early Odonates demonstrates that it belongs to a still poorly documented subset of species. Specifically, it displays a MPC+CuA fusion, a CuAC+CuP fusion, and a CuP+AA fusion, but it lacks the "extended" MP+Cu = CuA fusion and the "extended" (CuP / CuA+CuP) + AA fusion, the occurrence of which is typical of most Odonata, including *Meganeura*-like species. The occurrence of intercalary veins suggests that its closest relative might be *Gallotypus oudardi* Nel, Garrouste and Roques, 2008, from the Moscovian of northern France." (Authors)] Address: Béthoux, O., CR2P (Centre de Recherche en Paléontologie – Paris), MNHN – CNRS – Sorbonne Univ., 57 rue Cuvier, CP38, 75005, Paris, France. E-mail: obethoux@mnhn.fr

**17511.** Bhakare, S.D.; Nair, V.P.; Pawar, P.A.; Bhoite, S.H.; Sadasivan, K. (2021): Two new species of *Euphaea* Selys, 1840 (Odonata: Zygoptera: Euphaeidae) from northern Western Ghats, India. *Journal of Threatened Taxa* 13(5): 18200-18214. (in English) ["Two new species of the genus *Euphaea* are described from the Western Ghats of Satara District, Maharashtra, distinguished by their distinct morphology and coloration. *E. thosegharensis* Sadasivan & Bhakare sp. nov. is similar to *E. cardinalis* (Fraser, 1924), but is distinguished by the extensor and flexor surface of all femora black while all femora bright red in *E. cardinalis*; apical fourth of Hw black while apical half of Hw black in *E. cardinalis*; genae reddish-orange, black in *E. cardinalis*; a tuft of sparse stub black hair on either side of tergite of S9 while both S8 and S9 with tufts of long ventral hairs in *E. cardinalis*. Male genital vesicle mat black, with distal border rounded angles, while vesicle black and hexagonal in shape with rounded angles in *E. cardinalis* and S9 twice the length of S10, while S9 and S10 of equal length in *E. cardinalis*. *E. pseudodispar* Sadasivan & Bhakare sp. nov., is very close to *E. dispar* (Rambur, 1842), but is differentiated easily by the absence of yellow patch on legs as in *E. dispar*; only apical fifth of Hw black; genae being yellowish-white, while black in *E. dispar*; male genital vesicle brownish-black & rhomboid-shaped and with no transverse rugosities while black with distal border rounded and with fine transverse rugosities in *E. dispar*;

penis with single seta on each side while *E. dispar* has three pairs; sternite of S9 very prominently extending ventrally like a beak in comparison with *E. dispar*. We have identified additional morphological characters useful in taxonomy of *Euphaea* of the Western Ghats for example, tufts of ventral hairs on terminal abdominal segments genital vesicle, penile structure of males and sternite of S9 in the males, and vulvar scales of females. A taxonomic key to all known species of genus *Euphaea* of the Western Ghats is also provided." (Authors)] Address: Bhakare, S.D., 354, Somwar Peth, Near New English School, Satara, Maharashtra 415002, India. E-mail: milind1plus@gmail.com

**17512.** Bhartiy, S.K.; Elangovan, V. (2021): Seasonal prey availability and diet composition of Lesser Asiatic Yellow House Bat *Scotophilus kuhlii* Leach, 1821. *Journal of Threatened Taxa* 13(8): 19002-19010. (in English) ["Diet is an important factor in understanding bat ecology and conservation. This study assessed seasonal prey availability and diet composition of *S. kuhlii* in various districts of Uttar Pradesh between January 2016 to December 2018. Fecal and insect samples were collected seasonally using sweep nets between 1800 and 1900 h. From each location 20 fecal pellets were selected for analysis and searched for taxonomically recognizable remnants. The analysis revealed that *S. kuhlii* fed on Coleoptera, Diptera, Hymenoptera, Isoptera, Orthoptera, Odonata, Blattellidae, Lepidoptera, and Hemiptera, identified from legs, antennae and wings/elytra in fecal pellets. Seasonal variation in the presence of isolated insect remnants and insect abundance at foraging grounds was observed. Thus *S. kuhlii* is a voracious feeder and plays an important role as a pest control agent." (Authors)] Address: Bhartiy, S.K., Department of Zoology, Babasaheb Bhimaro Ambedkar University, Lucknow, Uttar Pradesh 226025, India. E-mail: shanikumarbhartiy@gmail.com

**17513.** Bhowmik, S.; Bora, A. (2021): *Amphithemis vacillans* Selys, 1891 (Odonata: Libellulidae): new addition to the Odonata fauna of Meghalaya, Northeastern India. *Revista Chilena de Entomología* 47(3): 489-492. (in English, with Spanish summary) ["*A. vacillans* is reported for the first time from Meghalaya, Northeastern India. The authors recorded a male individual from the forest of Bymihat, located in Ri-bhoi district of the state on November 23, 2017. The current sighting revised the distribution of this species in India being previously known from Assam and West Bengal." (Authors)] Address: Bora, A., Dept of Zoology, Moran College, Assam, India. E-mail: atanubora2019@gmail.com

**17514.** Bobrek, R. (2020): *Cordulegaster bidentata* Selys, 1843 in fragmented landscape of the Wielickie Foothills: reassessment of the northern limit of species range in the Western Carpathians. *Fragmenta Faunistica* 63(2): 67-80. (in English) ["In 2018–2019, the occurrence of *C. bidentata* in the Wielickie Foothills, located between the Beskidy mountain ranges (in the south) and the Vistula river valley (in the north) was investigated. It was examined whether *C. bidentata* inhabits fragmented landscape, with forest pat-



ches of various sizes. Larvae of this dragonfly were searched in the forest streams, the bottom of which was visually scanned using binoculars. The presence of 49 larvae was confirmed on 17 stream sections out of 53 (32%). They were recorded in almost the entire geographical extent of the study area, from the southernmost to the northernmost forest patches. The neighboring occupied streams were separated by a maximum of 3.7 km, and breeding sites were found in forest patches of an area of 75–1280 ha. It was confirmed that *C. bidentata* occurs up to the orographic edge of the Western Carpathians. Its range is continuous between the northern edge of the Beskidy Mountains and the Vistula valley. New data shift the northern range limit of *C. bidentata* in the Western Carpathians by nearly 20 km. The field method used proved to be efficient in assessing the distribution of larvae in large areas, with relatively little field effort. Its wider use would allow a more complete recognition of distribution of *C. bidentata* in the Carpathian Foothills." (Authors)] Address: Bobrek, R., Polish Society for the Protection of Birds, Odrowaza 24, 05–270 Marki, Poland. E-mail: rafal.bobrek@gmail.com

**17515.** Bobrek, R. (2021): Post-mining ponds in the Sandomierz Forest (SE Poland) as an important site for the conservation of a species-rich odonate assemblage. *Acta zoologica cracoviensia* 64(1): 159-168. (in English) ["In this study, the species composition and diversity of dragonfly and damselfly assemblages of six post-mining ponds differing in habitat conditions, located within a single sand pit in the central part of the Sandomierz Forest (SE Poland) were assessed. In total, 42 species were recorded in 2019, including 35 species considered resident to the site. In the six studied ponds, a range of 8 to 30 species were recorded, including 5 to 26 resident species. In each pond, at least one unique species was found, and one-third of all species were confined to single ponds only. As a result, the qualitative (Jaccard) and quantitative (Bray-Curtis) similarity indices between the pairs of ponds were low, reaching 12-61% and 19-53%, respectively. Thus, despite a lack of distinct barriers and negligible distances between the ponds (max. 350 m), the structure of assemblages in adjacent water bodies differed considerably. This is probably largely due to the habitat selectivity of species. A redundancy analysis (RDA) showed, that factors such as area and plant diversity of the pond were shaping odonate assemblages, explaining 49.1% of the total variance in the dataset. Due to the high species richness and the identification of several species of special concern, the studied sand pit should be considered a valuable secondary habitat for odonates, which – after termination of exploitation – should be regarded as a good candidate for a site designated for the conservation of biodiversity." (Author)] Address: Bobrek, R., Polish Society for the Protection of Birds, Odrowaza 24, 05–270 Marki, Poland. E-mail: rafal.bobrek@gmail.com

**17516.** Borisov, S.N. (2021): Updates to the fauna of dragonflies (Odonata) of the Altaiskii Krai with new records of species for Siberia. *Eurasian Entomological Journal* 20(3): 136-141. (in English, with Russian summary) ["35 dragonfly

species were recorded during an expedition to the Altaiskii Krai, three of which, *Sympecma fusca*, *Anax imperator* and *Orthetrum brunneum*, are recorded for Siberia for the first time. New data on the occurrence of the rare and little-known species *Ischnura pumilio*, *A. parthenope* and *O. albistylum*, are provided. A new record of the migrant species *Sympetrum fonscolombii* in Siberia is also presented." (Author)] Address: Borisov, S.N., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru.

**17517.** Bose, C.N.; Binoy, C.F.; Kakkassery, F.K. (2021): On the diversity and abundance of riparian odonate fauna (Insecta) of the midstream Chalakkudy River, Kerala, India. *Journal of Threatened Taxa*: 19053-19059. (in English) ["The riparian Odonate insect diversity of the midstream Chalakkudy River at six locations assessed from February 2018 to January 2019 has revealed the occurrence of 25 species of odonates. Among them, 10 species are dragonflies belonging to seven genera of the family Libellulidae and the remaining 15 species are damselflies belonging to six families and 11 genera. Five endemic damselfly species have been recorded. *Pseudagrion indicum* is endemic to the Western Ghats, while the remaining four species, *Vestalis apicalis*, *Libellago indica*, *Dysphaea ethela*, and *Heliocypha bisignata*, are endemic to India. Diversity indices of the odonates in all the six locations were analyzed and it showed less abundance at sites where tourist activities are more and with thin native riparian vegetation. Further, the study has unequivocally revealed that thick native riparian vegetation is essential for their perching and existence. By and large, the uncontrolled tourism activities and habitat alteration interfere with the density and diversity of these endemic species." (Authors)] Address: Bose, C.N., Research & Postgraduate Dept of Zoology,, St. Thomas' College (Autonomous), Thrissur, Kerala 680001, India. E-mail: nithabose-123@gmail.com

**17518.** Boudot, J.-P.; Doucet, G.; Grand, D. (2021): Dragonflies and Damselflies of Britain and Western Europe: A Photographic Guide. Bloomsbury Publishing: 152 pp. (in English) ["Dragonflies and damselflies are some of the most beautiful, fragile and resilient insects found in the natural world. With their complex behaviours, astonishing aerobatic skills and preference for freshwater habitats, they are a very rewarding group of animals to observe in the field. Dragonflies and Damselflies of Britain and Western Europe features all 98 species found in the region. Packed with outstanding photography, this comprehensive book includes close-up illustrations to highlight key identification features, diagrams of wing venation, and detailed guides to dragonfly larvae and exuviae. Each species account includes an accurate distribution map and information on field characteristics, confusion species, habitat and ecology. An introduction to the life cycle of Odonata, guidance on when and where to look for them, and the best ways to observe and photograph dragonflies and damselflies in the field are also included. These sections, combined with the identification

guides, make this book the ultimate resource for any field naturalist or entomologist interested in these incredible insects." (Publisher)]

**17519.** Boudot, J.-P. (2021): Synchronism, sex ratio at emergence, and voltinism of *Epithea bimaculata* in Lorraine (North-East France) (Odonata: Corduliidae). *Libellula Supplement* 16: 67-78. (in English, with German summary) ["Population size in *E. bimaculata* varied considerably with time in northeastern France. However, emergences were always synchronised with an EM50 percentile ranging from four to eight days, irrespective of the population size. The sex ratio of all exuviae collected at one locality varied from ca 0.7 to ca 1.0, depending on the year. Larval development of a large part or of the totality of the population was demonstrated to be completed in one year only. These results compared to published data from other countries are discussed." (Author).] Address: Boudot, J.-P., Immeuble Orphée, Apt 703, 78 rue de la Justice, 54710 Ludres, France. E-mail: jean-pierre.boudot@numericable.fr

**17520.** Brito, J.; Calvão, L.; Cunha, E.; Maioli, L.; Barbirato, M.; Rolim, S.; Juen, L. (2021): Environmental variables affect the diversity of adult damselflies (Odonata: Zygoptera) in western Amazonia. *International Journal of Odonatology* 24: 108-121. (in English) ["Our study evaluated the effects of environmental variables on the assemblages of the sub-order Zygoptera, and tested the hypothesis that environmental variables are more important determinants of the structure of these assemblages than limnological variables in streams. We sampled 17 streams in the Carajás National Forest and tested our hypothesis using a linear regression analysis, with the zygopteran species composition, richness, and abundance as the response variables. Our findings indicate that both limnological and physical variables influence, independently, the characteristics of the zygopteran assemblages. The riparian forest maintains the stability of the environment and provides dispersal corridors, along which the zygopterans can reach alternative, suitable environments. The small scale of this study also implies that the continuity of the vegetation is essential for the dispersal of the zygopterans among different landscapes. The high levels of abundance recorded in the better-preserved environments may reflect the maintenance of specific habitats and resource availability. Riparian forest is crucial to the ecological equilibrium of the stream systems, although further research at a broader spatial scale that focuses on a greater diversity of variables should provide more robust insights into the phenomenon." (Authors)] Address: Brito, J., Graduate Program in Ecology, Federal University of Pará, Belém, Brazil. E-mail: jotabio13@gmail.com

**17521.** Brockhaus, T. (2021): Eine auffällige Farbvariante bei Männchen von *Somatochlora metallica* (Odonata: Corduliidae). *Libellula Supplement* 16: 79-85. (in German, with English summary) ["A striking colour variant in males of *S. metallica* – A male colour morph in *S. metallica* is described. Instead of a yellow labium, such individuals have a central greyish-black oval spot on the labial palps (beard labium).

They were found in different regions of Europe. By means of a compilation of climate data in correspondence with the presumable temperature during their emergence and of an emergence experiment with F-0 larvae a temperature-dependent aberration is suggested. However, it is not a discrete colour morph, since continuous transitions can be seen in the individuals." (Author)] Address: Brockhaus, T., An der Morgensonne 5, 09387 Jahnsdorf, Germany. E-mail: t.brockhaus@t-online.de

**17522.** Buczynski, P.; Bielak-Bielecki, P. (2021): Disjunct locality of *Sombre Goldenring Cordulegaster bidentata* Selys, 1843 (Odonata: Cordulegasteridae) in the Sandomierz Basin (SE Poland). *Odonatrix* 17\_5 (2021): 9 pp. (in Polish, with English summary) ["*C. bidentata* was found in the middle course of the Studzienica Stream on the north-eastern edge of the Sandomierz Basin in SE Poland (50.3889°N, 23.09-84°E, UTM: FA48, 219.5 m a.s.l.). One larva was caught on April 27, 2020 during studies conducted as part of the State Environmental Monitoring programme. The locality is described and data on the water parameters are provided. The locality is situated at least 5 km from human habitations in the vast Solska Forest, which consists mainly of moist mixed coniferous woodland. The strongly meandering stream bed is 1-3 m wide. The bottom sediments consist mainly of coarse-grained sand covered with CPOM and FPOM in lentic habitats. The water contains humic acids but its pH is neutral. Almost all the physical and chemical properties of the water meet the first-class quality criteria. The new locality, about 70 km from the Central Beskid Foothills, is the first one in Poland out-side the ranges of mountains and foothills. This discovery suggests that there may be more localities of *C. bidentata* here, forming a disjunct distribution area of this species. This may be a consequence of the relief of the borderland between the Roztocze Upland and the Sandomierz Basin. *C. bidentata* is the 69th odonate species recorded in Lublin Province; 93.4% of the Polish dragonfly fauna is present there." (Authors)] Address: Bielak-Bielecki, P., Główny Inspektorat Ochrony Środowiska, Centralne Laboratorium Badawcze, Oddział w Lublinie, ul. Obywatelska 13, 20-092 Lublin, Poland. E-mail: p.bielak-b@wp.pl

**17523.** Buczynski, P.; Tonczyk, G. (2021): Polish and dedicated to Poland odonatological papers. 19. The year 2020 and additions to the years 2017-2019. *Odonatrix* 17\_1: 7 pp. (in English) ["The authors present a list of Polish and dedicated to Poland odonatological papers that were published in the year 2020. In the reported time period, 51 publications of various kind appeared, and one BSc thesis was created. Five papers from 2017-2019 are also given to supplement the previous lists." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**17524.** Bui, A.P.; Phan, Q.P. (2021): Description of *Coeliccia diehlae* sp. n. from the Central Highlands of Vietnam with keys to the males and females of the pyriformis-group Odonata: Zygoptera: Platycnemididae. *International Journal*

of Odonatology 24: 51-63. (in English) ["*Coeliccia diehlae* sp. n. (holotype ♂ from Ko Roong Commune, Ka Bang District, Gia Lai Province, Central Highlands of Vietnam, deposited in the Zoological Collection of Duy Tan University) is described based on both sexes. This species belongs to the pyriformis-group and comes closest to *Coeliccia phamiha* Phan & Tran, 2018. Keys to the males and females of the pyriformis-group are provided." (Authors)] Address: Bui, A.P., Center for Entomology & Parasitology Research, Institute of Research & Training of Medicine, Biology & Pharmacy, Duy Tan University, Da Nang, 550000, Vietnam

**17525.** Cervený, D.; Fick, J.; Klaminder, J.; McCallum, E.S.; Bertram, M.G.; Castillo, N.A.; Brodin, T. (2021): Water temperature affects the biotransformation and accumulation of a psychoactive pharmaceutical and its metabolite in aquatic organisms. *Environment International* 155 (2021) 106705: 8 pp. (in English) ["Pharmaceutically active compounds (PhACs) have been shown to accumulate in aquatic and riparian food-webs. Yet, our understanding of how temperature, a key environmental factor in nature, affects uptake, biotransformation, and the subsequent accumulation of PhACs in aquatic organisms is limited. In this study, we tested to what extent bioconcentration of an anxiolytic drugs (temazepam and oxazepam) is affected by two temperature regimes (10 and 20°C) and how the temperature affects the temazepam biotransformation and subsequent accumulation of its metabolite (oxazepam) in aquatic organisms. We used European perch (*Perca fluviatilis*) and dragonfly larvae (*Sympetrum* sp.), which represent predator and prey species of high ecological relevance in food chains of boreal and temperate aquatic ecosystems. Experimental organisms were exposed to target pharmaceuticals at a range of concentrations (0.2.6 µg L<sup>-1</sup>) to study concentration dependent differences in bioconcentration and biotransformation. We found that the bioconcentration of temazepam in perch was significantly reduced at higher temperatures. Also, temperature had a strong effect on temazepam biotransformation in the fish, with the production and subsequent accumulation of its metabolite (oxazepam) being two-fold higher at 20°C compared to 10°C. In contrast, we found no temperature dependency for temazepam bioconcentration in dragonfly larvae and no detectable biotransformation of the parent compound that would result in measurable concentrations of oxazepam in this organism. Our results highlight that while organisms may share the same aquatic ecosystem, their exposure to PhACs may change differently across temperature gradients in the environment." (Authors)] Address: Cervený, D., Dept of Wildlife, Fish & Environmental Studies, Swedish Univ. of Agricultural Sciences (SLU), Umeå, Sweden. E-mail: daniel.cervený@slu.se

**17526.** Cetinic, K.A.; Previšić, A.; Rožman, M. (2021): Holo- and hemimetabolism of aquatic insects: Implications for a differential cross-ecosystem flux of metals?. *Environmental Pollution* 277, 15 May 2021, 116798: 9 pp. (in English) ["Highlights: • Emerging aquatic insects facilitate cross-ecosystem transfer of metals. • Metamorphosis alters metal concentrations in aquatic insects. • Holometabolous aquatic

insects exhibit a two-step process in metal flux. • Greater rate of metal decline between larvae/pupae than pupae/adults in Trichoptera. • Bioamplification of toxic metals represents risk for terrestrial insectivores Abstract: Increased metal concentrations in aquatic habitats come as a result of both anthropogenic and natural sources. Emerging aquatic insects that play an indispensable role in these environments, transferring resources and energy to higher trophic levels in both aquatic and terrestrial habitats, may inadvertently also act as biovectors for metals and other contaminants. This study measured levels of 22 different metals detected in biofilm, aquatic and terrestrial life stages of Trichoptera and Odonata, as well as riparian spiders, to examine the uptake and transfer from freshwater to terrestrial ecosystems. We show that emerging insects transfer metals from aquatic to terrestrial ecosystems, however with large losses observed on the boundary of these two environments. Significantly lower concentrations of most metals in adult insects were observed in both hemimetabolous (Odonata) and holometabolous insect orders (Trichoptera). In holometabolous Trichoptera, however, this difference was greater between aquatic life stages (larvae to pupae) compared to that between pupae and adults. Trophic transfer may have also played a role in decreasing metal concentrations, as metal concentrations generally adhered to the following pattern: biofilm > aquatic insects > terrestrial invertebrates. Exceptions to this observation were detected with a handful of essential (Cu, Zn, Se) and non-essential metals (Cd, Ag), which measured higher concentrations in adult aquatic insects compared to their larval counterparts, as well as in aquatic and terrestrial predators compared to their prey. Overall, all metals were found to be bioavailable and biotransferred from contaminated waters to terrestrial invertebrates to some degree, suggesting that risks associated with metal-contaminated freshwaters could extend to terrestrial systems through the emergence of these potential invertebrate biovectors." (Authors)] Address: Rozman, M., Ruder Boskovic Institute, Bijenicka cesta 54, 10000, Zagreb, Croatia. E-mail address: marko.rozman@irb.hr

**17527.** Cezário, R.R.; Firme, P.P.; Pestana, G.C.; Vilela, D.S.; Juen, L.; Cordero-Rivera, A.; Guillermo, R. (2021): Sampling methods for dragonflies and damselflies. In: Jean Carlos Santos & Geraldo Wilson Fernandes (eds.): *Measuring Arthropod Biodiversity. A Handbook of Sampling Methods*: 223-240. (in English) ["Dragonflies and damselflies have become model organisms in ecological and evolutionary studies, mainly because they are considered flagship taxa for the conservation of water resources. Hence, how to standardize collection of odonates for the assessment of their diversity is an issue most researchers working with the group or the ecology of freshwaters may face. We aim at presenting sampling protocols that may aid researchers that are interested in sampling adults, exuviae, and larvae of Odonata. These three life phases have different detectabilities, and we propose that should be combined wherever possible." (Authors)] Address: Cezário, R.R.L, ESTES Lab, Federal University of São Carlos, São Carlos, Brazil



**17528.** Chandran, A.V.; Karakuth, A.K.; Jose, S.K.; Wildermuth, H. (2021): First record of gynandromorphism in *Trithemis aurora* (Odonata: Libellulidae). *Odonatologica* 50(1/2): 55-63. (in English) ["A gynandromorphic individual of *T. aurora* is reported from a garden in Palakkad district, Kerala state, India. Its eyes, thorax, legs, wings, and abdomen show mosaic gynandromorphy. The abdomen is mostly gynochromic with the tip bearing female appendages. Detailed study of the specimen shows that female characters predominate but significant areas exhibit male characters." (Authors)] Address: Chandran, A.V., Dept of Geology & Environmental Science, Christ College, Thrissur, Kerala, India. E-mail: avivekchandran2@gmail.com

**17529.** Chandran, V.A.; Jose, S.K. (2021): Comparison of Odonata diversity in Kole wetlands and selected man-made ponds of central Kerala. *Modern Trends in Biological Research*: 75-79. (in English) ["Diversity of Odonata in Kole wetlands, a Ramsar site and twenty manmade ponds in central Kerala were studied and compared. A total of 44 species (30 dragonflies and 14 damselflies) belonging to 33 genera and eight families were recorded in the study, out of which 14 species were exclusively found in the wetlands. All the species recorded in the man-made ponds were also recorded from the wetlands." (Authors)] Address: A. Vivek Chandran, Subin K. Jose, Dept of Geology and Environmental Science, Christ College (Autonomous), Irinjalakuda, Kerala

**17530.** Chen, M.; Qu, D.-H.; Tian, H. (2021): Dragonfly-wing-inspired polymer design for property enhancement. *Matter* 4(8): 2674-2676. (in English) ["Implementing bio-inspired strategies into the design of advanced functional materials is desirable but challenging. By mimicking the architecture of dragonfly wings, Fu et al. demonstrated an innovative strategy to fabricate a stiff yet tough healable nanocomposite. Its characteristic hierarchical architecture endows the original brittle material with significant mechanical improvement." (Authors)] Address: Chen, M., Key Lab. Advanced Materials & Joint International Research Lab. Precision Chemistry & Molecular Engineering, Feringa Nobel Prize Scientist Joint Research Center, Frontiers Science Center for Materiobiology & Dynamic Chemistry, Institute of Fine Chemicals, School of Chemistry & Molecular Engineering, East China University of Science and Technology, 130 Meilong Road, Shanghai 200237, China

**17531.** Chitsaz, N.; Siddiqui, K.; Marian, R.; Chahl, J. (2021): Numerical and experimental analysis of three-dimensional microcorrugated wing in gliding flight. *J. Fluids Eng.* Jan 2022, 144(1): 011205 : 11pp. (in English) ["In this study, computational fluid dynamics analysis was performed on a three-dimensional (3D) model of a Libellulidae wing to determine aerodynamic performance in gliding flight. The wing is comprised of various corrugated features alongside the spanwise and chordwise directions, as well as twist. The detailed features of real 3D dragonfly wing models, including all the corrugations through both span and chord, have not been considered in the past for a detailed aerodynamic analysis. The simulations were conducted by

solving the Navier–Stokes equations to demonstrate gliding performance over a range of angles of attack at low Reynolds numbers. The numerical model was validated against experimental data obtained from a fabricated corrugated wing model using particle image velocimetry. The numerical results demonstrate that bio-inspired wings with corrugations compared to flat profile wings generate more lift with lower drag, trapping the vortices in the valleys of wing corrugation leading to delayed flow separation and delayed stall. The experimental and numerical results demonstrate that the methodology presented in this study can be used to measure bio-inspired 3D wing flow characteristics, including the influence of complex corrugations on aerodynamic performance. These findings contribute to the advancement of knowledge required for designing an optimized bio-inspired micro-air vehicle." (Authors)] Address: Chitsaz, N., UNISA STEM, Australian Research Centre for Interactive & Virtual Environments, University of South Australia, University Boulevard, Mawson Lakes, South Australia 5095, Australia. E-mail: nasim.chitsaz@mymail.unisa.edu.au

**17532.** Chovanec, A. (2021): Beispiele starker Thoraxbeifung bei Männchen von *Orthetrum coerulescens* in Niederösterreich (Odonata: Libellulidae). *Libellula Supplement* 16: 87-100. (in German, with English summary) ["Examples of strong thoracic pruinescence in males of *O. coerulescens* in Lower Austria – The paper deals with different variations of thoracic pruinescence in *O. coerulescens* found at a small wetland in the Austrian province of Lower Austria in the years 2019 and 2020. Some specimens were intensively pale blue on the thorax, similar to adult males of *Orthetrum brunneum*. This – for this latitude – extraordinary pruinosity is interpreted as species-specific variation and thermoregulatory adaptation to increasing air temperatures in Central Europe due to climate change. Meteorological data for the study region support this hypothesis by showing significantly higher air temperatures in both years compared with long-term monitoring data." (Authors)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlrt.gv.at

**17533.** Córdoba, S. P.; Pérez, E. C. (2021): La Colección Entomológica del Instituto-Fundación Miguel Lillo, Tucumán, Argentina. *Acta Zoológica Mexicana* (n. s.) 37(1): 1-19. (in Spanish, with English summary) ["The Entomological Collection of the Miguel Lillo Foundation-Institute (IFML) preserves and guards the material deposited there, to facilitate study by the entire current and future scientific community. It holds 6,500,000 specimens of the orders Blattodea, Coleoptera, Collembola, Dermaptera, Diptera, Embioptera, Ephemeroptera, Hemiptera, Hymenoptera, Isoptera, Mecoptera, Megaloptera, Lepidoptera, Neuroptera, Odonata, Orthoptera, Phthiraptera, Plecoptera, Psocoptera, Thysanoptera, Trichoptera and Zygentoma. The entomological collection of the IFML preserves 11,216 specimens of the types series assigned to 2,185 species, mainly from the Neotropic, in addition to specimens from various parts of the world. It is made up of the entomological collection preserved dry and in alcohol, in two rooms equipped for the protection and

conservation of the material. It is a benchmark for the biodiversity of neotropical insects and was founded in 1944 based on the material collected by Dr. Miguel Lillo. The objective of this paper is to present in general way, the entomological collection of the I-FML, its organization, characteristics, current situation and future perspectives. Given its importance, both for the scientific community and for society in general, it is necessary to guarantee the conservation of the specimens deposited in it." (Authors)] Address: Córdoba, Silvia, Inst. Entomología, Fundación Miguel Lillo, Miguel Lillo 251 (4000), San Miguel de Tucumán, Argentina.

**17534.** Corral-Lopez, A.; Varg, J.E.; Cano-Cobos, Y.P.; Losada, R.; Realpe, E.; Outomuro, D. (2021): Field evidence for colour mimicry overshadowing morphological mimicry. *Journal of Animal Ecology* 90(3): 698-709. (in English) ["(1) Imperfect mimicry may be maintained when the various components of an aposematic signal have different salience for predators. Experimental laboratory studies provide robust evidence for this phenomenon. Yet, evidence from natural settings remains scarce. (2) We studied how natural bird predators assess multiple features in a multi-component aposematic signal in the Neotropical "clear wing complex" mimicry ring, dominated by glasswing butterflies. (3) We evaluated two components of the aposematic signal, wing colouration and wing morphology, in a predation experiment based on artificial replicas of glasswing butterflies (model) and Polythoridae damselflies (mimics) (*Euthore fasciata*) in their natural habitat. We also studied the extent of the colour aposematic signal in the local insect community. Finally, we inspected the nanostructures responsible for this convergent colour signal, expected to highly differ between these phylogenetically distinct species. (4) Our results provide direct evidence for a stronger salience of wing colouration than wing morphology, as well as stronger selection on imperfect than in perfect colour mimics. Additionally, investigations of how birds perceive wing colouration of the local insect community provides further evidence that a UV-reflective white colouration is being selected as the colour aposematic signal of the mimicry ring. Using electron microscopy, we also suggest that damselflies have convergently evolved the warning colouration through a pre-adaptation. (5) These findings provide a solid complement to previous experimental evidence suggesting a key influence of the cognitive assessment of predators driving the evolution of aposematic signals and mimicry rings." (Authors)] Address: Outomuro, D., Dept of Biological Sciences, University of Cincinnati, Rieveschl Hall, Cincinnati, OH 45221, USA. Email: outomuro.david@gmail.com

**17535.** Daso, J.M.; Arquival, I.B.; Yuto, C.M.M.; Mondejar, E.P. (2021): Species diversity of Odonata in Bolyok Falls, Naawan, Misamis Oriental, Philippines. *AAFL Bioflux*, 14(2): 664-671. (in English) ["This study was conducted to assess the species composition of Odonata in the vicinity of Bolyok Falls in Brgy. Lubilan, Naawan, Misamis Oriental, Philippines. Field sampling was conducted in three sampling sites on March 9, 2019, using sweep netting and hand-picking methods. A total of nine species were identified belonging

to seven families and seven genera of Odonata. *Risicnemis appendiculata* was the most abundant Odonata species. The endemism is high at 77.78% with six species endemic to the Philippines and one endemic to Mindanao. The overall species diversity index of Bolyok Falls is very low at  $H' = 1.59$ . Identified threats of odonates include land clearing for agriculture and expansion of resort facilities near the sampling sites. The high levels of endemism indicate that the area is vital for odonates. Thus, the formulation of mitigation measures for conservation and preservation of species is needed in the area." (Authors)] Address: Daso, J.M., Iligan City East National High School, Sta. Filomena, Iligan City, Philippines. E-mail: jonnymdaso@gmail.com

**17536.** De Knijf, G. (2021): *Forcipomyia paludis* as a parasite of Odonata in Belgium (Diptera: Ceratopogonidae; Odonata), with notes on its ecology and habitat. *Libellula Supplement* 16: 101-114. (in English, with German summary) ["The biting midge *F. paludis* is the only ceratopogonid species known to parasitise Odonata in Europe. This parasite is widely distributed in the Western Palaearctic, but has only once been formally cited for one damselfly species in Belgium. However, many photographs of parasitised Odonata are stored in the citizen science website [www.waarnemingen.be](http://www.waarnemingen.be) in Belgium. A thorough analysis of 2,300 photographs from four sites from 2019 and 2020 resulted in the finding of 100 photographs of 32 species of odonate being parasitised in Belgium. We also found two species, *Coenagrion scitulum* and *Sympetrum vulgatum* for the first time mentioned as hosts. Virtually all *F. paludis* (99%) were found at the sites Buitengoor and Hageven. Biting midges were found in at least 13% of the photographs from Buitengoor and 3% in Hageven. Most records date from the end of May to the end of July. The parasite prevalence was low: 87% of the individuals carried only one or two midges. They seemed to have a slight preference for the forewings over the hind wings (59% versus 41%), but no difference was found between the right and the left wings. The presence of biting midges on Odonata was correlated with the presence of *Cladium mariscus* vegetation. This vegetation type might be the larval habitat of *F. paludis*." (Author)] Address: De Knijf, G., Research Institute for Nature & Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. E-mail: geert.deknijf@inbo.be

**17537.** Deviche, P. (2021): Partial submergence: An undescribed behavioral adjustment for thermoregulation at high ambient temperature in Aeshnidae. *International Journal of Odonatology* 24: 71-81. (in English) ["Many insects including odonates thermoregulate using a combination of behavioral and physiological mechanisms. At high ambient temperature ( $T_a$ ), these mechanisms include decreased heat production and increased heat loss. Heat production can be reduced by decreasing activity. Heat loss can be enhanced by perching in a shaded microhabitat where temperature is cooler than in the surrounding environment. Aeshnids, which are intermittent endotherms, increase heat loss at high  $T_a$  also by increasing hemolymph circulation from the thorax, where most metabolic heat is produced, to the

abdomen, where it dissipates to the environment by convection. While studying two aeshnid species (*Anax junius* and *Rhionaeschna multicolor*) at a Sonoran Desert (Arizona, USA) stream, I observed partially submerged mature individuals of both sexes of these species. This heretofore undescribed behavior was seen only at  $T_a > 43$  °C and almost exclusively during the hottest part of the day (15:00–17:00 hr), when the daily difference between  $T_a$  and water temperature ( $T_w$ ) was, on average, largest. A cooling effect of partial submergence behavior on body temperature would, therefore, presumably be most effective also during this period. Several percher species of libellulids were present at the study site. These dragonflies are not known to use endothermy for thermoregulation or to increase hemolymph circulation to the abdomen to dissipate heat at high  $T_a$ , and none was ever observed to partially submerge. It is suggested in aeshnids that partial submergence at high  $T_a$  serves a thermoregulatory function by facilitating body heat dissipation from the abdomen." (Author)] Address: School of Life Sciences, Arizona State University, Tempe, AZ 85287-4501, USA. E-mail: deviche@asu.edu

**17538.** Díaz-Martínez, C.; Cardo-Maeso, N.; Simarro-Tórtola, J.; Valero, A.G.; Conesa García, M.A. (2021): Ampliación de la distribución conocida y caracterización del hábitat de *Onychogomphus cazuma* Barona, Cardo & Díaz, 2020 (Odonata: Gomphidae) en España. *Boletín de la Sociedad Entomológica Aragonesa* 68: 368-382. (in Spanish, with English summary) ["Extension of the known distribution and habitat characterisation of *O. cazuma* in Spain Abstract: The previously recorded distribution of *O. cazuma* consisted of eight localities in the provinces of Valencia, Albacete and Murcia. This paper presents the results of the sampling carried out between 2019 and 2021, including six new localities in Cuenca, Albacete and Valencia, thus improving the knowledge of the distribution of this Iberian endemic and providing additional records in two of the known localities. The description of the localities where *O. cazuma* is present reinforces the hypothesis of a very specific larval habitat, associated to the existence of hot springs. However, the water temperature may not be a determining factor. The issue of its detectability and some conservation threats and opportunities are pointed out." (Authors)] Address: Díaz-Martínez, Cecilia, Sociedad Entomológica y Ambiental de Castilla-La Mancha, c/Londres, 7, 45003 Toledo, Spain. E-mail: cdiaz.cuenca@gmail.com

**17539.** Dolný, A.; Ožana, S.; Burda, M.; Harabiš, F. (2021): Effects of landscape patterns and their changes to species richness, species composition, and the conservation value of odonates (Insecta). *Insects* 12(6), 478: 14 pp. (in English) [oas 57: "Simple Summary: In this study, we aimed to evaluate the relationship between human transformations of land use/land cover and adult dragonfly diversity. Based on previous studies, we assumed that with increasing rates of environmental degradation and declining levels of naturalness, the representation of species with high conservation value would significantly decrease, which, however, would not affect the regional alpha diversity. Our results have

shown that species richness did not correspond to habitat naturalness, but the occurrence of endangered species was significantly positively correlated with increasing naturalness; thus, habitat degradation and/or the level of naturalness significantly affected species composition, while species richness remained unchanged. Based on our analyses, it is evident that most natural areas, and therefore the least affected areas, provide suitable conditions for the largest number of endangered species. This research extends our knowledge about the impact of human activities, especially the conversion and degradation of habitats, on the composition of odonates and freshwater animals at the regional scale. Abstract: Understanding the impact of the changing proportion of land-use patterns on species diversity is a critical issue in conservation biology, and odonates are good bioindicators of these environmental changes. Some freshwater ecosystems that have been modified due to human activities can serve as important secondary habitats for odonate assemblages; however, the majority of studies addressing the value of secondary habitats in industrial and urban areas for adult dragonfly diversity have been limited to the local scale, and the value of such habitats for gamma diversity is still unclear. The aim of this study was to determine the relationship between human transformations of land use/land cover and dragonfly diversity. We interpolated the information based on dragonfly occurrence per grid cell and land cover data, indicating naturalness and degradation in 677 grid cells in the Czech Republic. Species richness did not correspond to habitat naturalness, but the occurrence of endangered species was significantly positively correlated with increasing naturalness; thus, habitat degradation and/or the level of naturalness significantly affected species composition, while species richness remained unchanged. Threatened species that occur predominantly in natural areas and threatened species with a dominant occurrence in degraded squares were also separated, which indicated that the conservation of the latter should be prioritised." (Authors)] Address: Dolný, A., Dept Biology & Ecology, Fac. Science, Univ. Ostrava, Chittussiho 10, 710 00 Ostrava, Czech Republic. E-mail: ales.dolny@osu.cz

**17540.** Dow, R.A. (2021): An annotated checklist of the Odonata (Insecta) known from Sarawak with records to district level. *Sarawak Museum Journal* LXXX1, No. 101 (New Series); Special Issue 10: 313-422. (in English) ["The first checklist of the Odonata of the state of Sarawak in Malaysian Borneo is presented. 303 species are included in the list. Records are given to district level. For each species, a reference to the first record from each district in which it occurs is given, except where this paper represents the first published district record, in which case this is indicated. Additionally all references for the species containing original records from Sarawak, or significant discussion of material from or relevant to Sarawak, are given. Known taxonomic issues are discussed in notes. The number of records from each district and division is summarised." (Author)] Address: Dow, R.A., Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Email: rory.dow-230@yahoo.co.uk



**17541.** Dow, R.A. (2021): Corrections, amendments and updates to "An annotated checklist of the Odonata (Insecta) known from Sarawak with records to district level". *Faunistic Studies in SE Asian and Pacific Island Odonata* 34: 1-6. (in English) ["Corrections, amendments and some updates to an annotated checklist of the Odonata of Sarawak (Dow 2021) published in a special edition of the Sarawak Museum Journal are listed. With one exception taxonomical updates given here are confined to those based on publications that appeared between the last revision of the manuscript (early April 2019) and its publication (February 2021). The exception is that a *Merogomphus* (?) species lumped under *M. femoralis* Laidlaw, 1931 in Dow (2021) is considered to be a separate species here. Unfortunately there are a number of problems with records at district level and the reader of Dow (2021) is advised to simply ignore the district level records and counts until a revised version of the checklist using an accurate characterisation of Sarawak's districts is produced. Additionally the number of species known from Sarawak is updated to reflect information published in Dow et al. (2021) and in this paper and now stands at 308." (Author)] Address: Dow, R.A., Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands; Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia. Email: rory.dow230@yahoo.co.uk

**17542.** Dow, R.A.; Zhang, H.-m. (2021): First description of the female of *Coeliccia furcata* Hämäläinen, 1986, with descriptive notes on males from Yunnan, China (Odonata: Zygoptera: Platycnemididae). *Zootaxa* 4974(1): 151-164. (in English) ["*Coeliccia furcata* Hämäläinen, 1986, an atypical species of *Coeliccia* Kirby, 1890 with bifurcated male cerci, had been known solely from the holotype male collected in Myanmar in 1938. In recent years the species has been rediscovered in Yunnan, China. The first description of the female is given, along with descriptive notes on the male and illustrations of both sexes, including fresh images of the holotype. Another of the unusual features of *C. furcata* is the extremely simple form of its penile organ, this is discussed and compared with other species from mainland Asia and Japan currently placed in *Coeliccia* and with a simple penile organ." (Authors)] Address: Dow, R.A., Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Email: rory.dow230@yahoo.co.uk

**17543.** Dow, R.A.; Butler, S.G.; Ngiam, R.W.J.; Reels, G.T. (2021): Previously unpublished Odonata records from Sarawak, Borneo, part V: Odonata from the southwest of Sarawak, including the first records from the Bungo Range National Park. *International Dragonfly Fund - Report* 159: 1-77. (in English) ["Records of Odonata from three administrative divisions in the southwest of Sarawak (Kuching, Samarahan and Serian), mostly made during field work funded by the International Dragonfly Fund and the Sarawak Museum Campus Project, are presented. In the first part of the paper 176 species are listed, of which *Burmagomphus plagiatus* Lieftinck, 1964 was recorded from Sarawak for the first time during this study and one or possibly two unnamed

*Onychogomphus sensu lato* species were recorded from Borneo for the first time (one from a single female, the other from an exuvia). *Gynacantha maclachlani* is also recorded from Sarawak for the first time. The first records of Odonata from the Bungo Range National Park are included here. Other notable records include *Drepanosticta drusilla*, *D. kosterini*, *Podolestes chrysopus*, *Libellago stigmatizans*, *Rhinocypha aurofulgens* (recorded from southwest Sarawak for the first time), *Bornargiolestes reelsi*, *Amphicnemis madelenae*, *A. rigiketiti*, *Burmagomphus insularis*, *Gomphidia abbotti*, *Macrogomphus albardae*, *Macromia arachnomima*, *M. callisto* and *Nannophyopsis chalcosoma*. The importance of kampung (village) lands, still mostly farmed by traditional methods and presenting a mosaic of different habitat types in close proximity to each other, for conservation is discussed briefly, taking the Gomphidae as an example. In the second part of the paper some taxonomic issues are discussed and some molecular data is included. Bornean *Libellago stigmatizans* are shown to be indistinguishable from *L. stictica* (Selys, 1859) using COI based DNA barcoding, but the two are clearly separated in ITS. *Gomphidia caesarea* Lieftinck, 1929 is considered to be a junior synonym of *Gomphidia abbotti*, variation in *G. abbotti* is discussed and DNA barcoding data for *G. abbotti* and *G. maclachlani* is presented. The status of *Macrogomphus abnormis* Selys, 1884 is discussed and some COI data is presented to support the view that two species have been treated as *M. parallelogramma* in Borneo until now (an issue that will be dealt with in much more detail in a future paper). One of the *Onychogomphus sensu lato* species is discussed and illustrated from a female and illustrations of the female of "*Phaenandrogomphus*" *safei* are presented for the first time. A detailed list of previously unpublished specimens from the locations covered is given in an appendix and details of specimens used in the molecular analyses are given in a second appendix." (Authors)] Address: Dow, R.A., Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**17544.** Dow, R.A.; Morris, J.R. (2021): The old Odonata (Insecta) Collection of the Sarawak Museum. *Sarawak Museum Journal* LXXX1, No. 101 (New Series); Special Issue 10: 261-311. (in English) ["The old Odonata collection of the Sarawak Museum has been examined and re-identified. An annotated list of the species and specimens present in the collection is given, along with remarks about the locations where they were collected. A total of 378 specimens are present in the collection, 356 of which are from or assumed to be from Sarawak, the remaining 22 specimens are from Sabah (all from Mount Kinabalu). In total, at least 89 species are represented in the collection, however the condition (or sex in some cases) of approximately 15% of the specimens precludes definite identification to species. The collection includes the holotype of *Orchithemis xanthosoma*, one of the syntypes of *Pseudagrionoptera diotima* and paratypes of *Podolestes harrissoni* and *Ictinogomphus acutus*. Other significant material includes the only specimen of *Euphaea ameeke* known from Limbang Division, the only specimen of *Gynacantha bayadera* from Sarawak and a series of

Chlorogomphus specimens." (Authors)] Address: Dow, R.A., Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands; Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia. Email: rory.dow230@yahoo.co.uk

**17545.** El-Latief, M.E.A.; Elsayed, K.; Abdelrahman, M.M. (2021): Parametric study of a corrugated airfoil in a forward flight at ultra-low Reynolds number. SN Applied Sciences volume 3, Article number: 112 (2021): (in English) ["In the current study, the mid cross section of the dragonfly forewing was simulated at ultra-low Reynolds number. The study aims to understand better the contribution of corrugations found along the wing on the aerodynamic performance during a forward flight. Different flapping parameters were employed. FLUENT solver was used to solve unsteady, two-dimensional, laminar, incompressible Navier–Stokes equations. The results revealed that any stroke amplitude less than 1cm generated no thrust force. The stroke amplitude had to be increased to form the reversed Kármán vortices responsible for generating thrust force. The highest propulsive efficiency was found in the Strouhal number range  $0.2 < St < 0.4$  with a peak efficiency of 57% at  $St = 0.39$ . Changing the phase difference between pitching and plunging motions from advanced to synchronized caused lift force to drop 91% and thrust force to increase by 15%. On the other hand, changing the phase difference from synchronized to delayed caused lift and thrust forces to increase by 89% and 36%, respectively, and propulsive efficiency to deteriorate significantly. In all performed simulations, the airfoil was assumed to start motion from rest with no initial angle of attack. The increase in initial angle of attack generates a very high lift force with a fair loss for both thrust force and propulsive efficiency. The decomposition of flapping motion into its elementary motions revealed that the aerodynamic forces generated are a non-linear superposition from both pure pitching and pure plunging aerodynamic forces. This can be attributed to the non-linear interaction between unsteady vortices generated from these decomposed motions." (Authors)] Address: Abdelrahman, M.M., Mechanical Engineering Dept, College of Engineering & Technology, Smart Village Campus, Arab Academy for Science, Technology and Maritime Transport, Giza 12577, Egypt

**17546.** Eriksen, E.; Friberg, N.; Brittain, J.E.; Søli, G.; Ballot, A.; Årstein-Eriksen, E.; Blakseth, T.A.; Veiteberg Braaten, H.F. (2021): Ecological condition, biodiversity and major environmental challenges in a tropical river network in the Bago District in South-central Myanmar: First insights to the unknown. *Limnologica* 86 (2021) 125835: 12 pp. (in English) ["Freshwater ecosystems in the Indo-Burma biodiversity hotspot face immediate threats through habitat loss and species extinction. Systems to monitor ecological status and trends in biodiversity are therefore crucially needed. Myanmar is part of Indo-Burma but with no past experience of biomonitoring in freshwaters. In this study, we aimed to assess the ecological and biodiversity status of a lowland

river network in south-central Myanmar by identifying and quantifying pressures using macroinvertebrates as bioindicators. Novel data on water quality (nutrients, sediments and metals), hydromorphology (Morphological Quality Index; MQI), habitat quality (Litter-Siltation Index; LSI), land use, and macroinvertebrates were collected from 25 river sites. The dominant pressures on rivers were urban land use, inputs of untreated sewage, in-stream and riparian garbage littering, run-off from agricultural fields and plantations, as well as physical habitat degradation. Water chemistry data indicated inputs of sediments and nutrients to degraded streams, but no obvious metal pollution. The LSI and MQI indices indicated high perturbation in agricultural and urban areas, respectively. Ecological status was assessed using a first version of a modified Average Score per Taxon index (ASPT), while biodiversity was assessed by family richness within the orders Ephemeroptera, Plecoptera, Trichoptera, Coleoptera and Odonata (EPTCO), which was tested against the pressure gradient by principal component regressions. ASPT had high diagnostic capabilities ( $R^2 = 0.68$ ,  $p < 0.001$ ) and showed that the index can be used to evaluate ecological water quality in this region. Biodiversity, expressed as family richness, also declined along the gradient ( $R^2 = 0.59$ ,  $p = 0.041$ ), giving support to the fact that current land-use practices in this area are unsustainable." (Authors)] Address: Eriksen, E., Norwegian Institute for Water Research (NIVA), Gaustadalléen 21, 0349, Oslo, Norway

**17547.** Everling, S. (2021): The effect of temperature on the interaction between larvae of a native and a range expanding dragonfly species. MSc. thesis, Biology Education Centre and Department of Ecology and Genetics, Uppsala University: 26 pp. (in English) ["Climate change might affect the distribution of species; therefore, it is important to anticipate the imminent impact of climate change. Even though climate responses have the potential to affect species interactions, most models on the effect of climate change on species distribution assume that species respond to climate individually. Hence studies on competition effects are needed. In this study, I estimated growth, mortality, and behaviour (prey capture success, activity, exploration and boldness) at 20° C and 23° C at intra- and interspecific competition conditions in larvae of a native and a northward dispersing dragonfly. The results showed that the northward expanding *Sympetrum fonscolombii* had a higher growth and survival rate compared to the native *Sympetrum vulgatum* at interspecific conditions. At intraspecific conditions the results showed that temperature had no significant effect on the performance of *S. fonscolombii*, but *S. vulgatum* showed both a higher growth rate and a higher mortality at 23° C. A significant difference between temperatures within prey capture success rate was found in *S. vulgatum* only, during the second observation period. There was a correlation between activity and exploration in both species, between prey capture success rate and activity during the third observation round in *S. vulgatum*, and between prey capture success rate and boldness during the first observation round in *S. fonscolombii*. No other behaviours were correlated. Prey capture success rate was shown to be repeatable in both

species, while boldness was repeatable in *S. vulgatum* only. The behavioural results suggests that behavioural traits are relatively plastic over ontogeny in both species, possibly caused by behavioural variation within each instar. Additionally, boldness, but not activity and exploration, might aid *S. fonscolombii* in their northward expansion. The majority of these results were similar at both temperatures and indicate that *S. fonscolombii* has a higher capacity to tolerate climate change, and their presence might negatively impact the performance of *S. vulgatum*." (Authors)] Address: Everling, S., Uppsala Univ., Disciplinary Domain of Science & Technology, Biology, Biology Education Centre

**17548.** Faasen, T. (2021): *Inpabasis intermedia*, a new species of damselfly from Peru (Odonata: Coenagrionidae); with an illustrated key to all known *Inpabasis*-species. *International Journal of Odonatology* 24: 95-107. (in English) ["*Inpabasis intermedia* sp. n. (holotype ♂: Peru, Loreto Region) is described and illustrated. An illustrated key to both sexes is given for all members of the genus. Males of *I. intermedia* can be distinguished from its congeners by the angled division laterally between dark and light areas of the pterothorax, by the short unbranched paraprocts and rounded cerci which bear only a small apical tooth and by the genital ligula with two long apical processes ending in a flattened hook. Females can be distinguished by the dorso-posteriorly directed posterior prothoracic lobe with straight hind margin." (Author)] Address: Faasen, T., Ecologica, Rondven 22, 6026 PX Maarheeze, The Netherlands. E-mail: tim.faasen@ecologica.eu

**17549.** Fabian, J.M.; Wiederman, S.D. (2021): Spike bursting in a dragonfly target-detecting neuron. *Scientific Reports* 11( 4005) (2021): 6 pp. (in English) ["Dragonflies visually detect prey and conspecifics, rapidly pursuing these targets via acrobatic flights. Over many decades, studies have investigated the elaborate neuronal circuits proposed to underlie this rapid behaviour. A subset of dragonfly visual neurons exhibit exquisite tuning to small, moving targets even when presented in cluttered backgrounds. In prior work, these neuronal responses were quantified by computing the rate of spikes fired during an analysis window of interest. However, neuronal systems can utilize a variety of neuronal coding principles to signal information, so a spike train's information content is not necessarily encapsulated by spike rate alone. One example of this is burst coding, where neurons fire rapid bursts of spikes, followed by a period of inactivity. Here we show that the most studied target-detecting neuron in dragonflies, CSTMD1, responds to moving targets with a series of spike bursts. This spiking activity differs from those in other identified visual neurons in the dragonfly, indicative of different physiological mechanisms underlying CSTMD1's spike generation. Burst codes present several advantages and disadvantages compared to other coding approaches. We propose functional implications of CSTMD1's burst coding activity and show that spike bursts enhance the robustness of target-evoked responses." (Authors) Author-correction: Spike bursting in a dragonfly target-detecting neuron. Joseph M. Fabian & Steven

D. Wiederman. *Scientific Reports* volume 11, Article number: 9596 (2021) Cite this article. The Original Article was published on 17 February 2021. Correction to: *Scientific Reports* <https://doi.org/10.1038/s41598-021-83559-5>, published online 17 February 2021. This Article contains errors in Reference 13 which is incorrectly given as: Evans, B. J. E., Fabian, J. M., O'Carroll, D. C. & Wiederman, S. D. Dragonfly visual neurons selectively attend to features in naturalistic scenes. *J. Neurosci.* 39, 8051 (2020). The correct Reference 13 appears below as Reference 1. 1. Evans, B. J. E., Fabian, J. M., O'Carroll, D. C. & Wiederman, S. D. Dragonfly visual neurons selectively attend to features in naturalistic scenes. *J. Neurosci.* 39, 8051 (2020). bioRxiv 2020.09.14.-297374.] Address: Fabian, J.M., Centre for Neuroscience, Flinders University, Adelaide, SA, Australia. E-mail: Joseph.fabian@finders.edu.au

**17550.** Febriantim, N.A.; Murwitaningsih, S.; Sukandar, P.; Lestari, S. (2021): Dragonfly community in flowing and stagnating water in the Cibodas Botanical Garden Area. *IOP Conference Series: Earth and Environmental Science* 755: 7 pp. (in English) ["The diversity of dragonflies in Indonesia is quite high, namely about 750 species or 12.5% of the total in the world. This study aims to determine the dragonfly community ... in the Cibodas Botanical Garden Area. The research method used was a descriptive exploratory method, while the data collection technique used the Catch and Release technique (TLK). Data analysis in this study used descriptive analysis. Data collection was carried out in May-July 2018. The locations included in the flowing water group were Sakura Park and Ciismun Waterfall, while Air Mancur and Guest House were included in the stagnant water group. The results showed that there were 8 types of dragonflies identified, namely *Orthetrum pruinosum*, *O. sabina*, *O. glaucum*, *Pantala flavescens*, *Neurothemis fluctuans*, *N. terminata*, *Ischnura senegalensis*, *Coeliccia membranipes*. The most common species found was *P. flavescens* with 533 individuals, while the least species found was *Neurothemis terminata* with 4 individuals. Zygoptera was found only in 2 types in this study, namely the *C. membranipes* with the number of 101 individuals and *I. senegalensis* with the number of 19 individuals. The dominant types of dragonflies in flowing and stagnant water are *P. flavescens* and *O. pruinosum*. The *C. membranipes* dragonfly was only found in running water, namely at the location of the Ciismun waterfall and *Ischnura senegalensis* only found in stagnant water, namely at the location of the fountain." (Authors)] Address: Febriantim, N.A., Biology Education, University of Muhammadiyah, Prof. DR. HAMKA, Jakarta, Indonesia 13830

**17551.** Felker, A.S. (2021): New damselflies of the family Kennedyidae (Odonata: Protozygoptera) from the upper Permian deposits of the Volgogda region. *Palaeontological Journal* 4/2021: 41-49. (in Russian, with English summary) ["*Kennedyya suchonensis* sp. nov. is described from Upper Permian (Severodvinian) deposits of the Isady locality (Vologda Region, Velikoustyugsky District). Despite the continuity of the main features of wing venation, new species has



an unusual structure of the stem's discoidal area. This structure is not typical of known Paleozoic damselflies, which allows us to re-consider the morphogenesis of this structure. The evolutionary relationships between damselflies of Isady and other kenedyids are discussed." (Author)] Address: Felker, A.S., Borissiak Paleontological Institute, Russian Academy of Sciences, Moscow, Russia

**17552.** Ferreras-Romero, M.; Suhling, F. (2021): On the dimorphism shown by the females of *Boyeria irene* (Odonata: Aeshnidae) in a southern Spain population. *Libellula Supplement* 16: 115-125. (in German, with English and Spanish summaries) ["A special feature of *B. irene* is a dimorphism of the females, which can have long (f. *typica*) or short (f. *brachycerca*) cerci, which occur at different frequencies. The aim of this work was to investigate whether there is a seasonal change in the occurrence of the two female forms. The exuviae investigated here belong to a population that lives in a permanent highland stream in the central part of the Sierra Morena in the province of Córdoba (Spain) in the southern part of the Spanish distribution area. Female exuviae of the *brachycerca* form accounted for 76.4 to 85.2% in the four years examined, while the annual frequency of the *typica* form varied between 14.8 and 23.6%. In two of the study years, the proportion of the *typica* form decreased during the emergence period. Obviously, this is not a pattern that always occurs, but it must nevertheless be considered in the further analysis of the numerical relationships between the female forms." (Authors)] Address: Ferreras-Romero, M., Depto Sistemas Físicos, Químicos y Naturales. Univ. Pablo de Olavide, 41013 Sevilla, Spain. E-mail: mferrom@upo.es

**17553.** Fliedner, H. (2021): The scientific names of Ris' odonate taxa. *International Dragonfly Fund - Report* 155: 1-145. (in English, with German summary) ["An explanation is presented for each of the more than 300 scientific names given to odonate taxa by the Swiss odonatologist Friedrich Ris (1867-1931), likewise for the names by other authors, into which taxa named (or mistaken) by Ris are now classified. But prior to that part, information is given about the life and work of this scientist. Finally his preferences in odonological nomenclature are analysed and his importance for the taxonomy of Odonata is appraised." (Author)] Address: Fliedner, H., Louis Seegelken Str. 106, 28717 Bremen, Germany. E-mail: H.Fliedner@t-online

**17554.** Flöss, I. (2021): Individuelle Raumnutzung und Wiedersichtungsrate von *Somatochlora flavomaculata* in einer voralpinen Moorlandschaft (Odonata: Corduliidae). *Libellula Supplement* 16: 127-140. ["Individual spatial movements and resighting rates of *S. flavomaculata* in a prealpine mire landscape – In a part of a prealpine mire landscape near Wetzikon, Switzerland, a total of 292 mature males and seven females were individually marked either on their wings or legs in the summer of 1997. 85 males (30.5%) but no females were at least once resighted up to 49 days after marking. Of the wingmarked individuals 33.8% were resighted and 21.3% of the leg-marked ones. There was a

considerable difference between the resighting rates from the first half of the season and the second half due to a longer spell of bad weather in June and July. Multiple resightings within the same day showed that some males relocated their territories only slightly within several hours, whereas some males changed the sites up to 100 m distance. The great time intervals sometimes observed between resightings and, additionally, the resighting of five males up to 1.7 km outside the study area indicate that *S. flavomaculata* moves of a large scale within the mire landscape and thereby even overcomes dense forests." (Author)] Address: Flöss, Isabelle, Langrütistr. 2, 8800 Thalwil, Switzerland. E-mail: isabelle.floess@bluewin.ch

**17555.** Fraker, M.E.; Ludsin, S.A.; Luttbeg, B.; Denver, R.J. (2021): Stress hormone-mediated antipredator morphology improves escape performance in amphibian tadpoles. *Scientific Reports* 11(4427): 9 pp. (in English) ["Complete functional descriptions of the induction sequences of phenotypically plastic traits (perception to physiological regulation to response to outcome) should help us to clarify how plastic responses develop and operate. Rapid tadpoles express several plastic antipredator traits mediated by the stress hormone corticosterone, but how they influence outcomes remains uncertain. We investigated how predator-induced changes in the tail morphology of wood frog (*Rana sylvatica*) tadpoles influenced their escape performance over a sequence of time points when attacked by larval dragonflies (*Anax junius*). Tadpoles were raised with no predator exposure, chemical cues of dragonflies added once per day, or constant exposure to caged dragonflies crossed with no exogenous hormone added (vehicle control only), exogenous corticosterone, or metyrapone (a corticosteroid synthesis inhibitor). During predation trials, we detected no differences after four days, but after eight days, tadpoles exposed to larval dragonflies and exogenous corticosterone had developed deeper tail muscles and exhibited improved escape performance compared to controls. Treatment with metyrapone blocked the development of a deeper tail muscle and resulted in no difference in escape success. Our findings further link the predator-induced physiological stress response of rapid tadpoles to the development of an antipredator tail morphology that confers performance benefits." (Authors)] Address: Fraker, M.E., Dept of Evolution, Ecology & Organismal Biology, The Ohio State University, Columbus, OH 43212, USA. E-mail: mfraker@umich.edu

**17556.** Freienstein, F.M.; Fartmann, T.; Löffler, F. (2020): Libellengemeinschaften extensiv genutzter Karpfenteiche (Insecta: Odonata) - Schlüsselfaktoren für die Biodiversität und Empfehlungen für eine naturschutzgerechte Bewirtschaftung. *Berichte der Naturforschenden Gesellschaft der Oberlausitz* 28: 3-20. (in German, with English summary) ["Dragonfly communities of extensively managed carp ponds (Insecta: Odonata) - key factors for biodiversity and recommendations for management in accordance with nature conservation Owing to the drastic loss of natural freshwater habitats over recent decades, anthropogenic waterbodies are taking on an increased significance for the

conservation of biodiversity. The value of traditionally managed carp-pond complexes for biodiversity is well known. Nevertheless, the periodic draining of ponds for harvesting and high fish-stocking intensities are assumed to have negative effects on biodiversity. However, empirical studies of the impact of carp farming on pond biodiversity are still scarce. In this study, we analyzed the effects of habitat quality and pond management on odonate communities in an extensively managed carp-pond complex in Oberlausitz (Saxony, Germany). The study sites included farmed carp ponds characterized by various habitat structures and stocking intensities as well as abandoned carp ponds and new ponds created for species conservation. The carp-pond complex hosted a very high diversity of dragonflies, which can mainly be attributed to the small-scale coexistence of different management regimes and habitat structures. The most important factors for a high species diversity of odonates were a high structural diversity and a short duration of the drained period. The different pond types harbored distinct odonate assemblages. Owing to the sensitivity of several odonate species to drought, the existence of perennial conservation ponds had a substantial significance for preserving species richness in the study area. Nevertheless, even the ponds with the longest drainage phases hosted odonate species of high conservation concern. The results of this study underline that traditional carp farming can promote odonate diversity in Central European anthropogenic landscapes. Based on our results, we outline recommendations for pond management to maintain the biodiversity of carp ponds." (Authors)] Address: Freienstein, M.T., Universität Osnabrück, Abteilung für Biodiversität & Landschaftsökologie, Barbarastr. 11, 49076 Osnabrück, Germany. E-mail: max.freienstein@uos.de

**17557.** Frömel, T.; Frank, M. (2020): Paarungsversuch von *Sympecma fusca* und *Lestes virens* (Odonata: Lestidae). *Libellen in Hessen* 13: 89-92. (in German) [25.06.2019, „Weilbacher Kiesgruben“, Main-Taunus-Kreis, Hessen, Germany, *Sympecma fusca* male and *Lestes virens* female] Address: Frank, M., Zur Traubenmühle 5A, 55268 Nieder-Olm, Germany. E-mail: mikel.frank@gmx.de

**17558.** Fukaya, W. (2021): Record of a gynandromorph *Anaciaeschna martini* (Seiys, 1897). *Tombo* 63: 66-67. (in Japanese, with English summary) ["A gynandromorph *A. martini* was recorded from Shakuji-mpark, Tokyo. Although it is morphologically almost female, it has blue regions characteristic of a male in the ventral part of the right compound eye." (Authors)] Address: Fukaya, W. E-mail: tochigi@au.com

**17559.** Gajbe, P.U. (2021): Impact of a small artificial water source on the diversity of odonates (Insecta: Odonata) in an urban landscape. *Arthropods* 10(2): 60-65. (in English) ["Rapid urbanisation is mainly responsible for the degradation and fragmentation of natural ecosystems in urban areas. Odonata constitute an important part of urban biodiversity. The odonate larval stage is aquatic and being dependent on freshwater ecosystems, odonates are often

used as ecological indicators for such ecosystems. Both larval and adult odonates are carnivorous and prey on other insects including mosquitoes. Hence, they perform an important role as predators in the ecosystems where they are found. In this study, the impact of a small artificial water source on the diversity of odonates in an urban landscape has been evaluated. The impact of the water source was found to be positive as its availability resulted in an increase in odonate diversity." (Authors)] Address: Gajbe, P.U., Dept Zool., Shri Mathuradas Mohota Coll. Scien., Nagpur 440024, Maharashtra, India. E-mail: pgajbe884@gmail.com

**17560.** Galasso, P.; Amore, E.; Ientile, R.; Signorello, G. (2021): Odonata checklist of Nature Reserve "Complesso Speleo logico Villasmundo - S. Alfio" (Sicily, Italy). *Biodiversity Journal* 12(1): 205-211. (in English) ["From March to September 2018 and 2019, a first monitoring of Odonata promoted by CUT GANA was conducted inside the Nature Reserve named "Complesso Speleologico Villasmundo - S. Alfio", in Melilli (Syracuse), in south-eastern Sicily. A total of 18 different species were recorded, 6 belonging to the Zygoptera suborder and 12 to the Anisoptera suborder, including *Onychogomphus uncatatus* and *Libellula fulva*. Some information on uncommon species recorded in the neighbouring areas are also reported." (Authors)] Address: Galasso, P., Stiftung Pro Artenvielfalt®, Meisenstraße 65, 33607 Bielefeld, Germany. E-mail: paolo\_galasso@hotmail.com

**17561.** Garcia Junior, M.D.N.; Damasceno, M.T.; Martins, M.J.L.; Silva da Costa, T.; Ferreira, R.M.; Souto, R.N.P. (2021): New records of dragonflies and damselflies (Insecta: Odonata) from Amapá state, Brazil. *Biota Neotropica* 21(1): e20201074, 2021: 7 pp. (in English, with Portuguese summary) ["This study aims to present the results of the survey of Odonata species sampled in three counties in the state of Amapá. The state is located in the north of the country, inserted in the Amazon Biome. Odonata were caught between January and December 2018, with 472 specimens being sampled, belonging to seven families, 36 genera and 53 species. In total, 27 of the species found during the study correspond to new records for the state of Amapá. Due to the lack of information on the diversity of the Odonata order in Amapá, the list of species presented should serve as input for new studies contributing to the knowledge of the order in the state." (Authors)] Address: Garcia Junior, M.D.N., Universidade Federal do Amapá, Programa de Pós-Graduação em Biodiversidade Tropical, Macapá, AP, Brasil. E-mail: m.d.juniorbio@gmail.com

**17562.** Garcia-Junior, M. D. N., Damasceno, M. T. dos S., Costa, T. S. da, & Souto, R. N. P. (2021): Data from diversity of Zygoptera (Odonata) in the state of Amapá, Brazil. *Anales de Biología* 43: 101-109. (in English, with Portuguese summary) ["The Amapá is located in northern Brazil, numerous groups are little studied in the state, among them the order Odonata. The objective of the present work is to present data on the diversity of Amapá Damselflies. Sampling was carried out between the years 2018 and 2019. Were captured 602 individuals, of which, 26 species are

new records for the state. The Amapá has so far registered 58 species of Zygoptera, inserted in 27 genera and seven families. Coenagrionidae, with 45 species registered comprised the highest abundance during the study with approximately 81% of the captured organisms. The present work increases the number of species of zygopterans by 44% for the state, thus, the results found acquire high relevance in the recognition of the diversity of the order Odonata in Amapá and the Amazon biome." (Authors)] Address: Garcia-Junior, M.D.N., Laboratory Arthropoda. Dept of Biological and Health Sciences, University Federal of Amapá, Amapá, Brasil. E-mail: m.d.juniorbio@gmail.com

**17563.** Garcia-Júnior, M.D.N.; Souto, R.N.P. (2021): Primeiro registro de Perilestidae (Odonata: Zygoptera) para o estado do Amapá, Brasil. *Biota Amazônia* 11(1): 85-86. (in Portuguese, with English summary) ["Perilestidae are insects of the order Odonata, in the Neotropical region the family comprises 19 species. For Brazil, it is confirmed by the time of occurrence of 12 species, being, in many Brazilian states there are no family records yet. The present paper reports the first occurrence record of Perilestidae (*Perilestes gracillimus* Kennedy, 1941) to the state of Amapá, Brazil. One specimen was collected in a forest environment on the banks of the Cajari River (0°34'09.7"S 52°10'33.5"W) in the month of december 2019. The area is located in the municipality of Laranjal do Jari, which is located south of the state of Amapá. The finding expands the distribution of the Perilestidae family in Brazil." (Authors)] Address: Garcia-Júnior, M.D.N., Programa de Pós-Graduação em Biodiversidade Tropical - PPGBio, Universidade Federal do Amapá (UNIFAP, Amapá, Brasil. E-mail: m.d.juniorbio@gmail.com

**17564.** Gazzola, A.; Balestrieri, A.; Scribano, G.; Fontana, A.; Pellitteri-Rosa, D. (2021): Contextual behavioural plasticity in Italian agile frog (*Rana latastei*) tadpoles exposed to native and alien predator cues. *J. Exp. Biol.* 224(9) /jeb.240-465: 11 pp. (in English) ["Predation is a strong driver for the evolution of prey behaviour. To properly assess the actual risk of predation, anuran tadpoles mostly rely on water-borne chemical cues, and their ability to evaluate environmental information is even more crucial when potential predators consist of unknown alien species. Behavioural plasticity – that is, the capacity to express changes in behaviour in response to different environmental stimuli – is crucial to cope with predation risk. We explored the defensive behaviour of *R. latastei* tadpoles when exposed to the chemical cues of two predator species, one native (dragonfly larvae) and one alien (red swamp crayfish). Firstly, we observed whether a plastic life history trait (i.e. hatching time) might be affected by native predatory cues. Secondly, we recorded a suite of behavioural responses (activity level, lateralization and sinuosity) to each cue. For assessing lateralization and sinuosity, we developed a C++ code for the automatic analysis of digitally recorded tadpole tracks. Hatching time seemed not to be affected by the potential risk of predation, while both predator species and diet affected tadpoles' defensive behaviour. Tadpoles responded to a predator threat by two main defensive strategies: freezing and 'zig-

zagging'. While the first behaviour had previously been reported, the analysis of individual trajectories indicated that tadpoles can also increase path complexity, probably to prevent predators from anticipating their location. We also recorded a decrease in lateralization intensity, which suggests that under predation risk, tadpoles tend to scrutinize the surrounding environment equally on both sides." (Authors)] An invader prowls the ponds and rivers of Northern Italy, taking out locals and threatening entire species; can they fight back? This is not a Hollywood movie; it's happening right now in the gentle streams of Lombardy and the chief intruders are alien red swamp crayfish. 'This highly invasive and voracious predator ... can have dramatic impacts on freshwater fauna and alter aquatic ecosystems', says Daniele Pellitteri-Rosa from the University of Pavia, Italy. The crayfish have already devastated one local species: the Italian agile frog (*Rana latastei*). But hope for this threatened species could lie in the form of the next generation. If embryos in frogspawn can sense a lurking threat, they may be able to alter when they hatch to stand a better chance of survival. Alternatively, tadpoles might be able to improve their odds by taking evasive action when danger looms. Pellitteri-Rosa and colleagues decided to find out how Italian agile frog embryos and tadpoles respond to local predators – such as dragonfly larvae, which they always reside alongside – and the crayfish invaders that threaten their future. Collecting both predators from nearby waterways, Andrea Gazzola fed them on Italian agile frog tadpoles, to make sure that they reeked of danger; predators release the alarming aroma of their dismembered victims in their vicinity. Then, Pellitteri-Rosa retrieved freshly laid Italian agile frog frogspawn from ponds in three nearby areas, taking them to the lab to find out whether the stench of feasting dragonfly larvae would affect when the tiny frog embryos emerged from their eggs. But it did not. The tiny embryos were unable to alter when they hatched to evade danger. So, how would the youngsters fare in later life when faced with peril? Filming 15 day old tadpoles swimming in a cup, Gazzola then infused 2 ml of water carrying the odour either of unfed predators or of predators that had recently dined on tadpoles, while continuing to record the tadpoles' reactions. Sure enough, when Giovanni Scribano and Alessandro Balestrieri (University of Pavia) and Andrea Fontana (Istituto Nazionale di Fisica Nucleare, Italy) scrutinised the movies, they found the tadpoles were afraid of the fed dragonfly larvae, freezing ~80% of the time, while the fasted dragonfly larvae were almost as terrifying for the tadpoles. And when the youngsters did move after catching a whiff of their predator, they wove around more, in a bid to throw off the hunters, and switched course in all directions, to keep an eye out all around. However, the tadpoles were less savvy when Gazzola added eau de crayfish to their water. Only the tadpoles retrieved from a pond where crayfish reside showed any sign of toning down their activity to evade detection. The tadpoles from ponds with few or no crayfish didn't alter their behaviour much, as if they didn't have a care in the world. However, when Gazzola added a dash of water from the container of fed crayfish to the youngsters' home, the developing amphibians became more wary. Even the tadpoles that did not



share their home ponds with crayfish were slightly more cautious, but less so than the youngsters from ponds where crayfish had already taken up residence. It seems that Italian agile frog tadpoles can learn to evade alien predators, probably by learning to associate the scent of devoured tadpoles with the invader's aroma. But Pellitteri-Rosa and colleagues are anxious that time might be stacked against survival for species that are already teetering on the brink.] Address: Pellitteri-Rosa, D., Dipartimento di Scienze della Terra e dell'Ambiente, Università di Pavia, I-27100 Pavia, Italy. E-mail: daniele.pellitterirosa@unipv.it

**17565.** Ge, Y.; Xia, C.; Wang, J.; Zhang, X.; Ma, X.; Zhou, Q. (2021): The efficacy of DNA barcoding in the classification, genetic differentiation, and biodiversity assessment of benthic macroinvertebrates. *Ecology and Evolution* 11(10): 5669-5681. (in English) ["Macroinvertebrates have been recognized as key ecological indicators of aquatic environment and are the most commonly used approaches for water quality assessment. However, species identification of macroinvertebrates (especially of aquatic insects) proves to be very difficult due to the lack of taxonomic expertise in some regions and can become time-consuming. In this study, we evaluated the feasibility of DNA barcoding for the classification of benthic macroinvertebrates and investigated the genetic differentiation in seven orders (Insecta: Ephemeroptera, Plecoptera, Trichoptera, Diptera, Hemiptera, Coleoptera, and Odonata) from four large transboundary rivers of northwest China and further explored its potential application to biodiversity assessment. A total of 1,144 COI sequences, belonging to 176 species, 112 genera, and 53 families were obtained and analyzed. The barcoding gap analysis showed that COI gene fragment yielded significant intra- and interspecific divergences and obvious barcoding gaps. NJ phylogenetic trees showed that all species group into monophyletic species clusters whether from the same population or not, except two species (*Polypedilum. laetum* and *Polypedilum. bullum*). The distance-based (ABGD) and tree-based (PTP and MPTP) methods were utilized for grouping specimens into Operational Taxonomic Units (OTUs) and delimiting species. The ABGD, PTP, and MPTP analysis were divided into 177 ( $p = .0599$ ), 197, and 195 OTUs, respectively. The BIN analysis generated 186 different BINs. Overall, our study showed that DNA barcoding offers an effective framework for macroinvertebrate species identification and sheds new light on the biodiversity assessment of local macroinvertebrates. Also, the construction of DNA barcode reference library of benthic macroinvertebrates in Eurasian transboundary rivers provides a solid backup for bioassessment studies of freshwater habitats using modern high-throughput technologies in the near future." (Authors)] Address: Zhou, Q., Coll. Fisheries, Huazhong Agri. Univ., Wuhan 430070, China. E-mail: hainan@mail.hzau.edu.cn

**17566.** Geiger, M.; Koblmüller, S.; Assandri, G.; Chovanec, A.; Ekrem, T.; Fischer, I.; Galimberti, A.; Grabowski, M.; Haring, E.; Hausmann, A.; Hendrich, L.; Koch, S.; Mamos, T.; Rothe, U.; Rulik, B.; Rewicz, T.; Sittenthaler, M.; Stur, E.; Tonczyk, G.; Zangl, L.; Moriniere, J. (2021): Coverage and

quality of DNA barcode references for Central and Northern European Odonata. *PeerJ* 9:e11192 DOI 10.7717/peerj-11192: 31 pp. (in English) ["Background: Odonata are important components in biomonitoring due to their amphibiotic lifecycle and specific habitat requirements. They are charismatic and popular insects, but can be challenging to identify despite large size and often distinct coloration, especially the immature stages. DNA-based assessment tools rely on validated DNA barcode reference libraries evaluated in a supraregional context to minimize taxonomic incongruence and identification mismatches. Methods: This study reports on findings from the analysis of the most comprehensive DNA barcode dataset for Central European Odonata to date, with 103 out of 145 recorded European species included and publicly deposited in the Barcode of Life Data System (BOLD). The complete dataset includes 697 specimens (548 adults, 108 larvae) from 274 localities in 16 countries with a geographic emphasis on Central Europe. We used BOLD to generate sequence divergence metrics and to examine the taxonomic composition of the DNA barcode clusters within the dataset and in comparison with all data on BOLD. Results: Over 88% of the species included can be readily identified using their DNA barcodes and the reference dataset provided. Considering the complete European dataset, unambiguous identification is hampered in 12 species due to weak mitochondrial differentiation and partial haplotype sharing. However, considering the known species distributions only two groups of five species possibly co-occur, leading to an unambiguous identification of more than 95% of the analysed Odonata via DNA barcoding in real applications. The cases of small interspecific genetic distances and the observed deep intraspecific variation in *Cordulia aenea* are discussed in detail and the corresponding taxa in the public reference database are highlighted. They should be considered in future applications of DNA barcoding and metabarcoding and represent interesting evolutionary biological questions, which call for in depth analyses of the involved taxa throughout their distribution ranges." (Authors)] Address: Geiger, M., Zoologisches Forschungsmuseum Alexander Koenig (ZFMK) - Leibniz Institute for Animal Biodiversity, Bonn, Germany. E-mail: m.geiger@leibniz-zfmk.de

**17567.** González, R.C.; Jerkovic, M.; Arteaga, A.B. (2021): Insectos y arañas asociados a plantas ornamentales en David, Chiriquí, Panamá - Insects and spiders associated with ornamental plants in David, Chiriquí, Panama. *Aporte Santiaguino* 14(1): 9-20. (in Spanish, with English summary) ["The purpose of this work was to know the insects and spiders associated with ornamental plants in David, Chiriquí, Panama. For this, five random samplings were carried out in four locations, randomly selecting 35 plants which belong to 15 families and 20 species. The soil, branches and foliage levels were reviewed, manually collecting the arthropods found. The identification of the specimens was made by consulting specialized documentation and a photographic record was kept. The results obtained indicated that three species of spiders and 15 species of insects were associated with nine plant species. The predominant

spiders were *Argiope argentata* (Araneidae) and *Leucauge venusta* (Tetragnathidae). About defoliating insects, the Family Diapheromeridae (Phasmatodea) and *Oiketeticus kirbyi* (Lepidoptera: Psychidae), were found in *Arecaceae*; three species of Orthoptera associated with Toro grass, of which *Taeniopoda varipennis* (Romaleidae) stood out; Scarabaeidae and Chrysomelidae (Coleoptera) in *schefflera*. The biting-sucking species were represented by nymphs of *Blissus* sp. (Hemiptera: Blissidae) on Toro grass; *Aphis* sp. (Hemiptera: Aphididae) and *Coccus* sp. (Hemiptera: Coccidae), associated with ants (Hymenoptera: Formicidae); nymphs and adults of *Membracis mexicana* (Hemiptera: Membracidae), in *schefflera* shoots and damage by *Gynai-kothrips uzeli* (Thysanoptera: Phlaeothripidae) in *Ficus*. The predatory insects were represented by eggs and larvae of Chrysopidae (Neuroptera), found in *schefflera* and adults of *Orthemis ferruginea* (Odonata: Libellulidae), in water surfaces. The absence of parasitoids, pollinators and the low number of taxa found could be due to the use of synthetic pesticides, which breaks the trophic balance; although the surrounding wild vegetation can serve as a biological corridor for the species survival." (Authors)] Address: González, R.C., Univ. de Panamá. Facultad de Ciencias Agropecuarias, Chiriquí, Panamá. E-mail: rdcg31@hotmail.com

**17568.** González-Soriano, E.; Noguera, F.A.; Pérez-Hernández, C.X.; Zaragoza-Caballero, S.; González-Valencia, L. (2021): Patterns of richness, diversity and abundance of an odonate assemblage from a tropical dry forest in the Santiago Dominguillo Region, Oaxaca, México (Insecta: Odonata). *Biodiversity Data Journal* 9: e60980: 21 pp. (in English) ["A study on the patterns of richness, diversity and abundance of the Odonata from Santiago Dominguillo, Oaxaca is presented here. A total of 1601 specimens from six families, 26 genera and 50 species were obtained through monthly samplings of five days each. Libellulidae was the most diverse family (21 species), followed by Coenagrionidae (19), Gomphidae (4) and Calopterygidae (3). The Lestidae, Platystictidae and Aeshnidae families were the less diverse, with only one species each. *Argia* was the most speciose genus with 11 species, followed by *Enallagma*, *Hetaerina*, *Erythrodiplax* and *Macrothemis* with three species each and *Phyllogomphoides*, *Brechmorhoga*, *Dythemis*, *Erythemis* and *Orthemis* with two species each. The remaining 17 genera had one species each. *Argia pipila* Calvert, 1907 and *Leptobasis vacillans* Hagen in Selys, 1877 were recorded for the first time for the state of Oaxaca. We also analysed the temporal patterns of taxonomic and phylogenetic divergence for the Santiago Dominguillo Odonata assemblage: the Shannon diversity value throughout the year was 21.07 effective species, while the Simpson diversity was 13.17. In general, the monthly phylogenetic divergence was higher than expected for taxonomic distinctness, and lesser for average taxonomic distinctness. Monthly diversity, evenness and taxonomic divergence showed significant positive correlations (from moderate to strong) with monthly precipitation values. The analysis of our results, however, indicates that an increase in rainfall not only influences the temporal diversity of species, but

also the identity of supraspecific taxa that constitute those temporal assemblages, i.e. there is an increase in temporal phylogenetic divergence." (Authors)] Address: González-Soriano, E., Depto de Zoología, Instituto de Biología, UNAM, Ciudad de México, Mexico. E-mail: Enrique González-Soriano (esoriano@ib.unam.mx

**17569.** Günther, A.; Nicolai, B.; Petzold, F.; Waldhauser, M.; Lange, M. (2021): Aktueller Kenntnisstand zur Verbreitung von *Erythromma lindenii* in Ostdeutschland und der Tschechischen Republik (Odonata: Coenagrionidae). *Libellula* 40(1/2): 107-135. (in German, with English and Czech summaries) ["State of knowledge of the occurrence of *E. lindenii* in Eastern Germany and the Czech Republic – In the 20th century, *E. lindenii* was restricted in eastern Germany to a sharply defined, discontinuous enclave, which included parts of Berlin and Brandenburg and extended to western Poland. These isolated populations have been described as the subspecies *E. lindenii lacustre* (Beutler, 1985). The type form is spreading from southwestern Germany to the northeast at least since the 1970s. This expansion of the distribution area led to the first record in Thuringia in 1997, followed by the first record in Saxony-Anhalt from 2000. The first record in Saxony was made in the year 2002. In this case, however, a colonization from Brandenburg is more likely. The Czech Republic was probably colonized from Saxony (first recorded in 2009). The dispersal of the species accelerated considerably, especially in the years 2018 to 2020. In this study we present the current distribution of *E. lindenii* in East Germany and the Czech Republic. Large populations, becoming established in rivers like Saale (Thuringia), Mulde (Saxony) and Berounka (Bohemia), most probably have a key role in the very dynamic expansion of the species in the last few years. This colonization was obviously promoted by mild winters. Furthermore, we suspect positive effects to larval habitats in winter-green submerged vegetation through shorter and less deep freezing of the water bodies in the last years. We do not yet have any indications of direct contacts between the sub-populations of the isolated and the main range. However, this will undoubtedly take place in the next few years." (Authors)] Address: Günther, A., Naturschutzinstitut Freiberg, B.-Kellermann-Straße 20, 09599 Freiberg, Germany. E-mail: andre.guenther@extern.tu-freiberg.de

**17570.** Günther, A.; Lange, M.; Palfi, I. (2021): Erste Nachweise von *Coenagrion scitulum* in Ostdeutschland (Sachsen) deuten auf einen neuen Einwanderungsweg der Art hin (Odonata: Coenagrionidae). *Libellula* 40(1/2): 47-56. (in German, with English summary) ["First records of *C. scitulum* in Eastern Germany (Saxony) suggests a new migration route of the species – In the years 2019 and 2020 *C. scitulum* was recorded in Saxony and Eastern Germany for the first few times. On 06-vii-2019 a single male was photographically documented in the post-mining landscape of the former Berzdorf open-cast lignite mine south of Görlitz in SE Saxony (UTM: VS95). In 2020, at least four single individuals were discovered on a former military training area near Glauchau in SW Saxony (UTM: US23). It is unclear

whether these individuals immigrated in 2020 or were also due to an immigration in 2019 and subsequently successful reproduction. So far, no reproductive behaviour of the species has been observed in Saxony. The geographical location of the closest localities of the species suggests a new, southern migration route from the Czech Republic. This route could become important for the expansion in eastern Germany and western Poland in future years.] Address: Günther, A., Naturschutzzentrum Freiberg, B.-Kellermann-Str. 20, 09599 Freiberg, Germany. E-mail: andre.guenther@extern.tu-freiberg.de

**17571.** Guillermo-Ferreira, R.; Gorb, S.N. (2021): Heat-distribution in the body and wings of the morpho dragonfly *Zenithoptera lanei* (Anisoptera: Libellulidae) and a possible mechanism of thermoregulation. *Biological Journal of the Linnean Society* 133(1): 179-186. (in English) ["Animals that live in hot environments must deal with extreme temperatures and overcome the constraints imposed by overheating. Some species exhibit remarkable adaptations to control body temperature, usually in the form of structures that act as thermal windows to cool down the body by dissipating heat. Here, we describe the case of *Z. lanei*, which inhabits open areas in the Neotropical Savannah and the Amazon. Males have striking and unique adaptations on the wings, not known in any other insect. The wings are covered with wax nanocrystals that reflect ultraviolet light and infrared radiation. Furthermore, the wing membrane is permeated by an intricate system of tracheae, another unique trait in Insecta. We hypothesized that these adaptations might be important not only for intraspecific communication, but also for thermoregulation. We analysed male body and wing temperatures and compared them with another dragonfly with common translucent wings. The results suggest that the dorsal wing surface acts as a cooling system, whereas the ventral surface might serve to elevate body temperature. Therefore, we conclude that *Z. lanei* possesses adaptations that are unique in nature; a complex system of thermoregulation with the dual function of cooling down or elevating body temperature, depending on wing position." (Authors)] Address: Guillermo-Ferreira, R., Department of Hydrobiology, Federal University of São Carlos (UFSCar), São Carlos, São Paulo, Brazil

**17572.** Haberski, A.; Hagelin, J.C.; Barger, C.P.; Sikes, D.S.; DuBour, K.A. (2021): An efficient method for sampling aerial arthropods at nest sites of an insectivorous songbird in steep decline. *Avian Conservation and Ecology* 16(2):1: 10 pp. (in English, with French summary) ["The decline of aerial insectivorous birds has been hypothesized to stem, in part, from a decline in aerial arthropod prey, underscoring the need for long-term monitoring of both bird and arthropod populations. However, trapping arthropods can be time consuming and efficient methods are required. Our primary goal was to identify the optimal combination of insect traps to collect taxonomic orders of prey in the diet of a songbird in steep decline, the Olive-sided Flycatcher (*Contopus cooperi*). Our secondary goal was to sample the arthropod community as broadly as possible, and thereby monitor for

general changes in arthropod assemblages, which may affect multiple species of migratory insectivores. In the boreal forest of central Alaska, we compared captures of canopy Malaise traps and three types of near-ground pollinator traps (blue vane traps, yellow vane traps, and chemically baited wasp traps) at 22 breeding territories where adult flycatchers actively foraged and bred. Combined, traps collected 11,193 specimens from 12 arthropod orders, of which moths (Lepidoptera, 36%), flies (Diptera, 34%), and wasps (Hymenoptera, 18%) were the most abundant, and also known components of flycatcher diets. General linear mixed models determined that canopy Malaise traps collected the greatest overall ordinal richness (11 orders) with a significantly greater abundance of specimens from six orders, two of which are aquatic specialists linked to breeding success of Tree Swallows (*Tachycineta bicolor*), another declining aerial insectivore. The three types of near-ground pollinator traps overlapped in taxa collected, but blue vane traps captured the most flies, bees, and yellowjackets, all of which were not well represented in Malaise samples. All trap types failed to collect dragonflies, a known prey item of breeding *C. cooperi*. We therefore conclude that a combination of canopy Malaise traps and blue vane traps, plus hand-netting of dragonflies, is an efficient combination for quantifying prey abundance on *C. cooperi* territories, while simultaneously monitoring the broadest possible number of arthropod orders near flycatcher nests within the boreal forest." (Authors)] Address: Haberski, A.; Dept of Plant & Environ. Scien., 277 Poole Agricult. Center, Clemson Univ., Clemson, SC 29634-0310, USA. E-mail: habersk@clemson.edu

**17573.** Hämäläinen, M. (2021): An annotated list of individuals commemorated eponymously in scientific names of extant Odonata published in 2016 – 2020. *International Dragonfly Fund - Report 157*: 1-35. (in English) ["From 2016-2020, a total of 276 new scientific species-group and 11 genus-group names of extant Odonata were introduced. From these 124 species-group and 3 genus-group names are eponyms representing a total of 124 individuals. A list of these persons and associated taxa is provided. Additionally, the original etymologies of the taxon names are given verbatim together with references. The publication is a supplement to the catalogue published by the author: *International Dragonfly Fund – Report 92 (2016)*.] Address: Hämäläinen, M., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, the Netherlands. E-mail: libellago@gmail.com

**17574.** Hafeez, B.; Malik, M.F.; Asghar, W.; Shabbir, R.; Latif, I.; Jabeen, A.; Basit, H.; Ghafoor, F. (2020): Diversity and distribution of dragonfly in District Sialkot, Punjab, Pakistan. *Pure Appl. Biol.* 10(4): 988-994. (in English) [In 2019, at 16 localities in four tehsils (Sialkot, Sambrial, Daska, Pasroor) a total of 185 odonate specimens was captured resulting in 10 species: *Pantala flavescens*, *Crocothemis erythraea*, *C. servilia*, *Neurothemis fluctuans*, *Acisoma panorpoides*, *Acisoma variegatum*, *Orthetrum prunosum*, *O. sabina*, *Anax indicus* and *A. ephippiger*.] Address: Hafeez, B., Dept of Zoology, University of Gujrat, Gujrat, Punjab-Pakistan. E-mail: burhanhafeez575@gmail.com



**17575.** Haneef, M.; Crasta, B.R.S.; Chandran, A.V. (2021): Report of *Bradinopyga konkanensis* Joshi & Sawant, 2020 (Insecta: Odonata) from Kerala, India. *Journal of Threatened Taxa* 13(8): 19173-19176. (in English) [1 ♂, Kidoor (12.633°N, 74.981°E, 32m), 20-v-2020] Address: Haneef, M., Department of Botany, Government Brennen College, Thalassery, Kannur, Kerala 670106, India. E-mail: haneefmangad@gmail.com,

**17576.** Hart, I.S.; Utz, R.M.; Taylor, A.N.; Chess, M.; Porter, B.A.; Locy, D.D. (2021): High conservation value of the Odonata assemblage in the upper Ohio River mainstem: A large, regulated river in North America. *The American Midland Naturalist* 185(2): 175-186. (in English) ["Like many large rivers in modern industrialized regions, the Ohio River mainstem is a heavily modified riverine habitat comprised of various reservoir-dam series and shaped channels, rather than a free-flowing system. However, many odonate species in such habitats, even species of conservation concern, have been shown to prosper in degraded lotic habitats due to key life history attributes, such as rapid recolonization following large disturbances. In this study we characterize the assemblage of odonates in a Pennsylvania section of the Ohio River mainstem and determined if any species of conservation concern were present. We also tested hypotheses on distributions in the channel by testing if proximity to banks and channel depths helped predict odonate abundance. Samples were acquired as bycatch to benthic fish sampling conducted using electrified benthic trawling, a novel approach for collecting benthic macroinvertebrates in large freshwater rivers. We found seven odonate species, all of which were known to be species of conservation concern in one or more U.S. states. We also concluded that gradients of bank distance and river depth only weakly predicted odonate abundance, suggesting that the Ohio River species regularly use mid-channel habitat that is several meters deep. Life histories of most of the species collected are typical of those living in large lotic, and occasionally lentic, environments. Studies of other large, temperate rivers show that the ability to persist is not uncommon for odonates in these modified environments, and may be due to their ability to use mid-channel resources successfully. Despite the substantial differences between contemporary and historic conditions of habitats in the Ohio River basin, an odonate assemblage worth conserving continues to be present in the mainstem channel." (Authors) *Stylurus notatus*, *S. scudderi*, *S. spiniceps*, *Gomphurus vastus*, *Macromia illinoensis*, *Didymops transversa*, *Argia translata*] Address: Hart, I.S., Falk School Sustainabil., Chatham Univ., 6035 Ridge Rd, Gibsonsia, Pennsylvania 15044, USA. E-mail: ian.hart167@gmail.com

**17577.** Hasanah, M.; Rohman, F.; Susanto, F. (2021): Development of dragonfly bioecology E-book in empowering students' problem solving skills and environmental attitudes. *AIP Conference Proceedings* 2330, 030021 (2021); <https://doi.org/10.1063/5.0043241> Published Online: 02 March 2021: 9 pp. (in English) ["The research on the deve-

lopment of dragonfly bioecology e-book in empowering student problem-solving skills and environmental attitudes has been carried out. This study aims to produce a teaching material product of dragonfly bioecology e-book that valid and practical. This type of research is descriptive quantitative research. The research sample of 28 students who were randomly assigned to undergraduate students in the Biology Study Program at State University of Malang. The research used the ADDIE development model includes stages of analyze, design, develop, implement, and evaluate. Research data collection using questionnaires and problem-solving questions. The results showed this study obtained a very valid e-book (87.25%) and very practical (88%). A dragonfly bioecology e-book implemented with Problem Based Learning is also effective for empowering problem-solving skills and environmental attitudes. The gain score result of problem-solving skills is 0.39 (medium category), and the gain score result of environmental attitudes is 0.32 (medium category). The conclusion, the dragonfly bioecology e-book is effective in empowering student's problem-solving skills and environmental attitudes." (Authors)] Address: Hasanah, M., Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Negeri Malang, Indonesia. E-mail: miftahul.hasanah.1803418@students.um.ac.id

**17578.** Hasanah, M.; Rohman, F.; Susanto, H. (2021): Environmental indicators based on Odonata diversity around the springs in Malang Raya, East Java. *AIP Conference Proceedings* 2353(1): 030035-1-030035-5. (in English) ["This research was designed to determine the environmental condition based on Odonata diversity found around the springs in Malang, East Java. The research was carried out around the springs, which focused on the species, the number of individuals of Odonata, habitat, and physical condition of the environment. Visual observation was used by the VES method, then counting the number of species and number of individuals within a radius of 200 m from the springs as a focal point of observation. Data collection was done at 4 springs, including Kendedes, Jenon, Taman, and Cangar. The results showed that there were 17 species of Odonata from 7 different families, with a total number of individuals found from 4 Springs as many as 245 individuals. The most common type was *Agriocnemis femina* and *Orthetrum sabina*. The analysis also portrayed a moderate Odonata diversity index and that there was a correlation between the physical condition of the environment and the species of Odonata found in a habitat. This condition can be used to describe the structure of the Odonata community in the area." (Authors)] Address: Rohman, F., Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Negeri Malang, Jl. Semarang 5, Malang 65145, Indonesia. E-mail: fatchur.rohman.fmipa@um.ac.id

**17579.** Hu, F.-S.; Chan, T.-W.; Huang, L.-C.; Lee, I.-L. (2021): Description of the final instar larva of *Cephalaeschna risi* Asahina, 1981 with notes on its semi-terrestrial lifestyle (Odonata: Aeshnidae). *International Journal of Odonatology* 24: 139-148. ["The final instar larva of *Cephalaeschna risi* Asahina, 1981 is described for the first time based on

material from Taiwan. In Taiwan, the larva of *C. risi* can be separated from other aeshnid / larvae by its relatively short antennae and presence of small protuberances on the legs. Diagnostic characters to distinguish it from other known larvae of *Cephalaeschna* are also discussed. A comprehensive description, detailed illustrations, bionomics and observations of the semi-terrestrial lifestyle of *C. risi* are presented. Finally, a key to the genera of Aeshnidae in Taiwan is proposed." (Authors)] Address: Hu, F.-S., Dept of Entom., Nat. Chung Hsing Univ., No. 145, Xingda Rd., South Dist., Taichung City 402, Taiwan. E-mail: fangshuo\_hu@smail.nchu.edu.tw

**17580.** Husband, D.M.; McIntyre, N.E. (2021): Urban areas create refugia for odonates in a semi-arid region. *Insects* 2021, 12(5), 431: 15 pp. (in English) ["In western Texas, most wetlands are fed from precipitation runoff, making them sensitive to drought regimes, anthropogenic land-use activities in their surrounding watersheds, and the interactive effect between these two factors. We surveyed adult odonates in 133 wetlands (49 in grassland settings, 56 in cropland, and 28 in urban areas) in western Texas from 2003–2020; 33 species were recorded. Most species were widespread generalists, but urban wetlands had the highest species richness, as well as the most unique species of any of the three wetland types. Non-metric, multidimensional scaling ordination revealed that the odonate community in urban wetlands was distinctly different in composition than the odonates in non-urban wetlands. Urban wetlands were smaller in surface area than the other wetland types, but because they were fed from more consistently available urban runoff rather than seasonal precipitation, they had longer hydroperiods, particularly during a multi-year drought when wetlands in other land-cover contexts were dry. This anthropogenically enhanced water supply was associated with higher odonate richness despite presumably impaired water quality, indicating that consistent and prolonged presence of water in this semi-arid region was more important than the presence of native land cover within which the wetland existed. Compared to wetlands in the regional grassland landscape matrix, wetlands in agricultural and urban areas differed in hydroperiod, and presumably also in water quality; these effects translated to differences in the regional odonate assemblage by surrounding land-use type, with the highest richness at urban playas. Odonates in human environments may thus benefit through the creation of a more reliably available wetland habitat in an otherwise dry region." (Authors) ] Address: McIntyre, Nancy, Dept of Biological Sciences, Texas Tech University, Lubbock, TX 79409-3131, USA. E-mail: nancy.mcintyre@ttu.edu

**17581.** Huynh, T.Q.; Oyabu, A.; Nomura, S.; Takashima, T.; Usio, N. (2021): Do agrochemical-free paddy fields serve as refuge habitats for Odonata? *Ecologies* 2(1): 15 pp. (in English) ["Agrochemical-free rice farming has attracted interest for restoring paddy field biodiversity and producing safe food. Odonata are commonly used as a biodiversity indicator in these low-input farms. However, the effect of agrochemical-free rice farming on odonate diversity has rarely been

assessed over the entire emergence period of these insects. We investigated whether different farming practices, such as conventional or natural (agrochemical-and fertilizer-free) cultivation, and associated water management strategies affect the emergence rates of Odonata in paddy field landscapes in central Japan. Weekly exuviae sampling in 2017 and 2019 suggested that odonate assemblages differed between conventional and natural paddy fields, with a higher number of taxa emerging from natural paddy fields. Contrary to expectations, conventional paddy fields had equivalent or higher emergence rates of all Odonata and two numerically dominant *Sympetrum* species. Peak emergence periods for numerically dominant taxa differed between the farming types, with the emergence of three *Sympetrum* species peaking in late June in conventional paddy fields and that of *S. frequens* peaking in early to mid-July in natural paddy fields. Our findings suggest that both conventional and natural paddy fields are important habitats for Odonata in Japan." (Authors)] Address: Takashima, T., JA Haku Head Office, Haku 925-8588, Japan

**17582.** Iamba, K.; Waldi, D.; Kumawayo, I.; Elias, M. (2021): A rapid assessment of insect communities in Balsa plantations of East New Britain Province, Papua New Guinea. *International Journal of Entomology Research* 6(2): 109-115. (in English) ["Insect communities were documented across six (6) commercial Balsa plantations in East New Britain Province of Papua New Guinea. Gilalum recorded mostly Coleopterans (50%) while very few Hymenopterans (16.7%), Lepidopterans (16.7%), Orthopterans (16.7%) and Odonata (16.7%). Lepidopterans were common in Kaingaski (55.6%) when compared to other taxa. There were more lepidopterans (58.8%) in Klinwata plantation than other taxa while 23.5% consisted of Orthopterans. Laup plantation had 35.7% lepidopterans, 21.4% hymenopterans, 21.4% odonatans, 14.3% coleopterans and 7.1% orthopterans. Putput had a good representation of lepidopterans (56.2%) followed by coleopterans (28.1%) and orthopterans (9.4%). Putput plantation was the most diverse site having a total of 32 species which were uniformly distributed ( $H=2.66$ ,  $E=0.77$ ). Tanao had the second highest diversity with species richness of 19 which were evenly distributed within the site ( $H=2.37$ ,  $E=0.81$ ). Laup plantation had the third highest diversity of 14 species with uniform distribution ( $H=1.93$ ,  $E=0.73$ ). Klinwata followed with total of 17 species that were less uniform in their distribution within the plantation ( $H=1.72$ ,  $E=0.61$ ). Gilalum recorded 6 species that were not uniformly distributed within the plantation ( $H=0.93$ ,  $E=0.52$ ). Kaingaski plantation had the lowest diversity with 9 species that were poorly distributed within the study site ( $H=0.79$ ,  $E=0.36$ ). From the aforementioned results, we concluded that a plantation with vegetation heterogeneity, complex undergrowth, low anthropogenic disturbances, long-standing trees, strict conservation guidelines and effective monitoring is paramount to enhance species richness of insects." (Authors)] Address: Iamba, K., Dept of Agri., PNG Univ. Natural Res. & Environ., Private Mail Bag, Vudal, Papua New Guinea

**17583.** Jana, P.K.; Mallick, P.H.; Bhattacharya, T. (2021):

A study on the community structure of damselflies (Insecta: Odonata: Zygoptera) in Paschim Medinipur, West Bengal, India. *Journal of Threatened Taxa* 13(7): 18809-18816. (in English) ["For gauging suitability of zygopteran odonates as bioindicators of ecosystems, an attempt was made to record the seasonal diversity of damselflies from seven different types of habitats in Paschim Medinipur District, West Bengal covering 14 land use sites. The study revealed existence of 19 species of damselflies belonging to 10 genera under two families. While the riparian zone had maximum number of species (15), paddy field had the lowest number (six). *Ceriagrion coromandelianum* and *Agriocnemis pygmaea* were the most common species. *C. coromandelianum* was eudominant in grassland and wetland-forest interface, whereas *A. pygmaea* was eudominant in fish pond and paddy field. Six species, viz., *Paracerion calamorum*, *P. malayanum*, *Pseudagrion australasiae*, *P. decorum*, *P. spencei*, and *P. microcephalum* were confined only to the riparian zone. Maximum abundance of damselflies was found in the riparian zone and minimum in the paddy field. Damselflies exhibited a distinct peak in March–April and a lesser peak in September–October. Most of the land use patterns exhibited similar zygopteran faunal composition. Species diversity index was moderate (1.4–2.5) and evenness index was on the higher side (0.76–0.94). Dominance Index ranged from 26.2 to 64.6. Riparian zone appeared to be the least stressed and most equitable habitat with highest diversity and evenness index and lowest dominance index. Paddy field seemed to be the harshest habitat for damselflies with least diversity and highest dominance index. The present study suggests that community analysis of damselflies can be quite useful in the assessment of the quality of any ecosystem." (Authors)] Address: Jana, P.K., Dept Zool., Vidyasagar Univ., Midnapore, Paschim Medinipur, West Bengal 721102, India. E-mail: pathikjana@gmail.com,

**17584.** Janra, M.N.; Herwina, H. (2021): Parasitism on riparian dragonflies (Odonata) at biology education and research forest, Universitas Andalas. IOP Conf. Ser.: Earth Environ. Sci. 757 012083: 7 pp. (in English) ["Parasitism on dragonflies may become the least attention in most entomological studies in Indonesia, since it possesses much indirect effect to human being. The odonata parasitism is caused by the infestation of water mite larvae onto the body of adult dragonflies. In this paper we discuss the result of odonatological survey we did at two tributaries in Biology Education and Research Forest (BERF), Universitas Andalas. The survey had been conducted between August to November 2019. We recorded 17 dragonfly species bound to these tributaries, 12 Zygopterans and 5 Anispterans. Water mite infestation was observed to happen on four Zygopteran species and one Anisoptera. The highest prevalence was shown by *Orthetrum testaceum* (100%), followed by *Euphaea variegata* (16.67%), *Prodasineura verticalis* (14.29%), *Euphaea modigliani* (3.57%) and *Heliocypha angusta angusta* (0.85%). In overall, the prevalence on community level reached 3.29%. The parasitism case observed in the tributaries of BERF can be classified as low incident, each infested odonate only contained a single water mite except

for *O. testaceum* with two water mites. We presume that habitat condition may contribute to the rate of dragonfly parasitism, where a good habitat help lowering the parasitism incident." (Authors)] Address: Janra, M.N., Biology Dept, Fac. of Mathematics & Natural Sciences, Univ. Andalas, Padang, Indonesia. E-mail: mnjanra@sci.unand.ac.id

**17585.** Jiang, B.; Li, J.; Zhang, Y.; Sun, Y.; He, S.; Yu, G.; Lv, G.; Mikolajewski, D.J. (2021): Complete mitochondrial genomes of two damselfly species in coenagrionidae and phylogenetic implications. *Mitochondrial DNA Part B* 6(8): 2445-2448. (in English) ["*Agriocnemis femina* (Brauer, 1868) and *Ischnura senegalensis* (Rambur, 1842) are two damselflies inhabiting paddy lands. As an intermediate predator, they play an important role in controlling certain crop pest and mosquitoes. In this study, we sequenced complete mitogenomes of these two species. The total length of mitogenomes is 15,936 bp in *A. femina* and 15,762 bp in *I. senegalensis*. Both of mitogenomes consist of 13 protein-coding genes, 22 tRNA genes, two rRNA genes, and one control region. The close relationship between *I. senegalensis* and *I. elegans* was further proved by phylogenetic analysis. Our phylogenetic analysis indicated a clear two lineages in Coenagrionidae (Core and ridge-faced Coenagrionidae). Ridge-faced Coenagrionidae consisted of *Megaloprepus caerulatus* and *Ceriagrion fallax*. In core Coenagrionidae, *Ischnura* and *Enallagma* are most closely related; they formed one clade with *Agriocnemis* and then grouped together with *Paracerion*. Our study provides new genetic information for further study in phylogenetic analysis of Coenagrionidae." (Authors)] Address: Jiang, B., College of Life Science, Anhui Normal University, Wuhu, China. E-mail: bin.jiang@ahnu.edu.cn

**17586.** Jödicke, R.; Borkenstein, A. (2021): Der lange Tag der *Leucorrhinia rubicunda* (Odonata: Libellulidae). *Libellula* 40(1/2): 77-92. (in German, with English summary) ["The long day of *L. rubicunda* – Amongst the Central European Libellulidae species *L. rubicunda* displays a particularly long diel activity. We studied the morning and evening activities of this species on hot and sunny days during its main flying season in 2018, both at the water and in its terrestrial habitat. Already three quarters of an hour after sunrise the first males flew from their roosting sites in the canopy of birch trees to sunlit trunks for warming up. About 20 minutes later they started to occupy their perches at the water, where females had already been ovipositing without having been harassed by males. During the whole course of the day typical perching of the males and occasional visits of females at the water with subsequent copulation took place. Oviposition was hardly possible when male abundance was high, because females were constantly disturbed by males. In the evening, as soon as the water was shaded, the behaviour of males switched from perching to permanent flying. Other individuals used this time for collective and sustained hunting in the air or basking on the last sunlit trunks of birch trees. Shortly before sunset the number of wheel formations increased, then the males rapidly



disappeared. Oviposition still regularly took place after sunset, defining *L. rubicunda* as a vespertine species." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. E-mail: reinhard.joedicke@magenta.de

**17587.** Johansson, F.; Watts, P.C.; Sniegula, S.; Berger, D. (2021): Natural selection mediated by seasonal time constraints increases the alignment between evolvability and developmental plasticity. *Evolution* 75(2): 464-475. (in English) ["Phenotypic plasticity can either hinder or promote adaptation to novel environments. Recent studies that have quantified alignments between plasticity, genetic variation and divergence propose that such alignments may reflect constraints that bias future evolutionary trajectories. Here, we emphasize that such alignments may themselves be a result of natural selection and do not necessarily indicate constraints on adaptation. We estimated developmental plasticity and broad sense genetic covariance matrices (G) among damselfly populations situated along a latitudinal gradient in Europe. Damselflies were reared at photoperiod treatments that simulated the seasonal time constraints experienced at northern (strong constraints) and southern (relaxed constraints) latitudes. This allowed us to partition the effects of (1) latitude, (2) photoperiod and (3) environmental novelty on G and its putative alignment with adaptive plasticity and divergence. Environmental novelty and latitude did not affect G, but photoperiod did. Photoperiod increased evolvability in the direction of observed adaptive divergence and developmental plasticity when G was assessed under strong seasonal time constraints at northern (relative to southern) photoperiod. Since selection and adaptation under time constraints is well understood in *Lestes* damselflies, our results suggest that natural selection can shape the alignment between divergence, plasticity and evolvability." (Authors)] Address: Johansson, F., Department of Ecology and Genetics, Animal Ecology, Uppsala University, Uppsala 752 36, Sweden. E-mail: frank.johansson@ebc.uu.se

**17588.** Johari, P.R.; Jain, N. (2021): Comparative study of Odonates in two selected sites (Umed Ganj and Chatra Vilas garden) of Kota, Rajasthan (India). *Journal of Entomology and Zoology Studies* 9(1): 930-933. (in English) ["Odonates are the insects that are commonly seen in and around water bodies. Kota district possesses many ponds and canals. Amongst them Chatra Vilas garden (near a pond) and Umed Ganj (near a canal) were selected for the present study. The study was carried out in three seasons during 2018 to 2019. The collection of adult Odonates was done by belt transect method. According to the survey, total 12 species of Odonates, belonging to two families (Libellulidae and Coenagrionidae) were identified. Species richness was same in both sites but abundance at CV Garden was greater than Umed Ganj. Umed Ganj was highly disturbed due to anthropogenic activities." (Authors)] Address: Johari, P.R., Government Post Graduate College, Kota, Rajasthan India

**17589.** Jones, C.D.; Kingsley, A.; Burke, P.; Holder, M. (2021): Field Guide to The Dragonflies and Damselflies of

Algonquin Provincial Park and the Surrounding Area. 2nd revised edition. Algonquin Field Guide Series: 263pp. (in English) ["A comprehensive field guide to all 135 species of dragonflies and damselflies found in Algonquin Provincial Park and surrounding area, extending across southcentral Ontario and into southwestern Quebec. Detailed, full-colour illustrations of all species, including males, females and variants. Additional close-up illustrations of features important in species identification. Key field marks are highlighted through the use of arrows and accompanying text. Information on identification, similar species, habitat, behaviour, flight period, status and range for each species. Includes an introduction, complete with illustrations and photographs, to anatomy and life cycle, as well as the fundamentals of observation, identification and capture. A site guide to some of the key areas within Algonquin Park to find and observe these fascinating insects. This book is one of many publications produced by The Friends of Algonquin Park, and the first in the new "Field Guide" series." (Publisher)] Address: Publisher: [https://secure.baytides.on.ca/algonquinpark/cgi/algonquinpark/00517.html?id=onK3Zkt3&mv\\_pc=66](https://secure.baytides.on.ca/algonquinpark/cgi/algonquinpark/00517.html?id=onK3Zkt3&mv_pc=66)

**17590.** Jose, J.; Sherif, M.; Chandran, A.V. (2021): A note on the ecology and distribution of Little Bloodtail *Lyriothemis acigastra* Brauer, 1868 (Insecta: Odonata: Libellulidae) in Kerala, India. *Journal of Threatened Taxa*. 13(6): 18642-18646. (in English) ["The behaviour and ecology of *L. acigastra* based on observations from Kadavoor Village, Ernakulam District, Kerala are detailed. Range extension of the species within Kerala after its first report in 2013 is also discussed." (Authors)] Address: Jose, J., Society for Odonate Studies, Velloparampil, Kuzhimattom PO, Kottayam, Kerala 686533, India

**17591.** Ketenchiev, Kh.A.; Kozminov, S.G.; Paritov, A.Yu.; Sabanova, R.K.; Krapivina, E.A. (2021): Comparative study on the fauna composition of dragonflies (Insecta: Odonata) in the Armenian, Iranian and Asia Minor Highlands as part of the Asiatic Mediterranean (Mediterranean faunal subregion, Paleosubtropical region, Boreal kingdom. IOP Conference Series: Earth and Environmental Science, Volume 817, Ninth International Symposium "Steppes of Northern Eurasia" 7 - 11 June 2021, Orenburg, Russian: 9 pp. (in English) ["The paper presents the results of a comparative analysis of the taxonomic composition of the dragonfly faunas in the Armenian, Iranian and Asia Minor Highlands. Among all the regional faunas of the Mediterranean, the odonofauna of the Iranian and Asia Minor highlands is the richest, with 97 species each. The odonofauna of the Armenian Highlands includes 77 species. A specific feature of the Asia Minor odonofauna is the richness of rheophilic species. Among the representatives of the rheophilic fauna, the Gomphidae family in the Iranian Highlands includes 12 species, the genus *Anormogomphus* includes 1 species – *A. kiritschenkoi* Bartenef. There are 7 species in the Gomphidae family in the Armenian Highlands, and 10 species in the Asia Minor Highlands. In the suborder Zygoptera in the Iranian Highlands, the largest family is Coenagrionidae, in which the genus *Ischnura* is the richest in species. Specific

species characteristic of the compared highlands are given. The odonatofaunas of the uplands contain European and Eurasian boreal as well as endemic taxa, which gives the dragonfly fauna a distinctive appearance. Analysis of the odonatofauna of the Asia Minor Highlands shows its eclecticity and species richness. Unlike the dragonfly fauna of the Armenian Highlands, the presence of European species is noticeable in the fauna of the Asia Minor." (Authors)] Address: Kozminov, S.G., Federal State Budgetary Educational Institution of Higher Education "Kabardino-Balkarian State Univ. named after H.M. Berbekov", Nalchik, Russia. E-mail: s\_g\_k@mail.ru

**17592.** Khan, M. A.; Padhy, C. (2021): Aerodynamic characterization of bio-mimicked pleated dragonfly aerofoil. *International Journal of Aviation, Aeronautics, and Aerospace* 8(2): 24 pp. (in English) ["The work inspired by the dragonfly wing corrugation positioned at the front wing's radius section lying at 40% of the total wingspan of forewing from the root section. During gliding flight, dragonfly wings presumed to be an ultra-light aerofoil due to its well-defined cross-sectional corrugation. The aerodynamic simulation carried out to understand the aerodynamic performance of a bio-mimetic dragonfly corrugated airfoil at low Reynolds number range of 75000-150000 to explore the potential advantages of pleated airfoils at a varying angle of attack from 0° to 12°. CFD analysis accomplished by using ANSYS Fluent to understand the aerodynamic performance of the pleated aerofoil and its counterpart profiled aerofoil. The simulation result exhibits aerodynamic commission, i.e. the corrugated aerofoil's gliding ratio (CL/CD), is higher than that of a profiled aerofoil. The analysis demonstrates that the pleated corrugated aerofoil produces a comparable higher lift coefficient than that of profiled aerofoil NACA 0015 and reduces the separation bubble. The vortices trapped inside the valleys, which re-energize the flow and delay flow separation leads to an increment in lift coefficient (CL). These investigations amplify the demand of insect-inspired corrugated wing structure and make a possible application for improved design of pretended wings for micro air vehicles." (Authors)] Address: Padhy, C., Mechanical Engineering Dept, GITAM School of Tech., Hyderabad, India. E-mail: dr.padhy.iitkgp@gmail.com

**17593.** Khan, M.A.; Padhy, C. (2021): Influence of aerodynamic parameters on dragonfly inspired corrugated aerofoil. In: Rushi Kumar B., Sivaraj R., Prakash J. (eds) *Advances in Fluid Dynamics. Lecture Notes in Mechanical Engineering*. Springer, Singapore: 289-304. (in English) ["This work is focused on the variation of corrugation angle and peak height of 2-D corrugated aerofoil inspired from the forewing of 'Pantala Flavescens' or yellow dragonfly basal wing section. A computational analysis is done on a newly designed dragonfly corrugated aerofoil wing-A and wing-B at  $Re = 15.603 \times 10^3$  and the flow is considered as steady and density of the flow is constant. In this study, the aerodynamic performance of 2-D dragonfly corrugated aerofoil is performed at different angle of attack (AoA) with variation in corrugation angle and peak height. With the varying peak height and corrugation angle, there is low wake formation, reduced

drag, and increase in flight performance compared to streamlined aerofoil and flat plate. The computational fluid dynamic (CFD) analysis is performed using a high fidelity fluent solver. The CFD result shows that the aerodynamic performance, i.e., the gliding ratio (CL/CD) (CLCD) of wing-A is higher than wing-B and streamlined aerofoil. The vortex formed is trapped inside the valleys which re-energizes the flow and delays separation leads to an increment in lift coefficient (CL). This finding enhances the knowledge of insect-inspired corrugated wing structure and facilitate the application for improved design of artificial wings for MAVs and UAVs." (Authors)] Address: Padhy, C., Mechanical Engineering Dept, GITAM School of Technology, Hyderabad, India. E-mail: dr.padhy.iitkgp@gmail.com

**17594.** Khelifa, R.; Mahdjoub, H.; Baaloudj, A.; Cannings, R.A.; Samways, M.J. (2021): Effects of both climate change and human water demand on a highly threatened damselfly. *Scientific Reports* 11(7725): 11 pp. (in English) ["While climate change severely affects some aquatic ecosystems, it may also interact with anthropogenic factors and exacerbate their impact. In dry climates, dams can cause hydrological drought during dry periods following a great reduction in dam water discharge. However, impact of these severe hydrological droughts on lotic fauna is poorly documented, despite climate change expected to increase drought duration and intensity. We document here how dam water discharge was affected by climate variability during 2011–2018 in a highly modified watershed in northeastern Algeria, and how an endemic endangered lotic damselfly, *Calopteryx exul* Selys, 1853, responded to hydrological drought episodes. Analysis was based on a compilation of data on climate (temperature, precipitation, and drought index), water dam management (water depth and discharge volume and frequency), survey data on *C. exul* occurrence, and capture–mark–recapture (CMR) of adults. The study period was characterized by a severe drought between 2014 and 2017, which led to a lowering of dam water depth and reduction of discharge into the river, with associated changes in water chemistry, particularly during 2017 and 2018. These events could have led to the extirpation of several populations of *C. exul* in the Seybouse River (Algeria). CMR surveys showed that the species was sensitive to water depth fluctuations, avoiding low and high water levels (drought and flooding). The study shows that climate change interacts with human water requirements and affects river flow regimes, water chemistry and aquatic fauna. As drought events are likely to increase in the future, the current study highlights the need for urgent new management plans for lotic habitats to maintain this species and possible others." (Authors)] Address: Khelifa, R., Dept Zool., Univ. British Columbia, Vancouver, BC V6T 1Z4, Canada. E-mail: rassimkhelifa@gmail.com

**17595.** Khelifa, R.; Mahdjoub, H.; M'Gonigle, L.; Kremen, C. (2021): Integrating high-speed videos in capture-mark-recapture studies of insects. *Ecology and Evolution* 11(11): 6033-6040. (in English) ["Capture–mark–recapture (CMR) studies have been used extensively in ecology and evolution. While it is feasible to apply CMR in some animals, it is

considerably more challenging in small fast-moving species such as insects. In these groups, low recapture rates can bias estimates of demographic parameters, thereby handicapping effective analysis and management of wild populations. Here, we use high-speed videos (HSV) to detect the mark of two large dragonfly species, *Anax junius* and *Rhionaeschna multicolor*, that rarely land and, thus, are particularly challenging for CMR studies. We test whether HSV, compared to conventional "eye" observations, increases the "resighting" rates and, consequently, improves estimates of both survival rates and the effects of demographic covariates on survival. We show that the use of HSV increases the number of resights by 64% in *A. junius* and 48% in *R. multicolor*. HSV improved our estimates of resighting and survival probability which were either under- or overestimated with the conventional observations. Including HSV improved credible intervals for resighting rate and survival probability by 190% and 130% in *A. junius* and *R. multicolor*, respectively. Hence, it has the potential to open the door to a wide range of research possibilities on species that are traditionally difficult to monitor with distance sampling, including within insects and birds." (Authors)] Address: Khelifa, R., Dept of Zoology and Biodiversity, Research Centre, University of British Columbia, Vancouver, BC, Canada

**17596.** Khelifa, R.; Mahdjoub, H.; Baaloudj, A.; Cannings, R.A.; Samways, M.J. (2021): Remarkable population resilience in a North African endemic damselfly in the face of rapid agricultural transformation. *Insects* 12(4), 353; <https://doi.org/10.3390/insects12040353>: (in English) ["There has been a rapid expansion of agricultural area worldwide, resulting in a substantial change in the physical structure, biodiversity, and ecosystem functioning of various natural habitats. In North Africa, many natural habitats have been transformed into agricultural lands, especially in the North, where biodiversity is the highest, to meet the food security and economic development of a rapidly growing population. We estimated the agricultural expansion in North African region between the 1990s and 2000s and found that the percentage of agriculture-free area within the species range declined from 79.5% to 26.2%. Knowing that agroecosystems near lotic environments simplify the structural complexity of habitats (from heterogeneous to homogenous ecological communities) of amphibiotic species such as odonates, we estimated the geographic range of an endemic damselfly and quantified the temporal change in the overlap between agriculture and species occurrence. Our results showed the overlap more than tripled between 1992 and 2005, suggesting that the species experienced a radical change in its terrestrial habitats. We conducted capture-mark-recapture to confirm that the species survives by frequently using croplands and grasslands. Abstract: Agriculture can be pervasive in its effect on wild nature, affecting various types of natural habitats, including lotic ecosystems. Here, we assess the extent of agricultural expansion on lotic systems in Northern Africa (Algeria, Tunisia, and Morocco) and document its overlap with the distribution of an endemic damselfly, *Platycnemis subdilatata* Selys, using species dis-

tribution modeling. We found that agricultural land cover increased by 321% in the region between 1992 and 2005, and, in particular, the main watercourses experienced an increase in agricultural land cover from 21.4% in 1992 to 78.1% in 2005, together with an increase in the intensity of 226% in agricultural practices. We used capture-mark-recapture (CMR) surveys in terrestrial habitats surrounding a stream bordered by grassland and cropland in northeastern Algeria to determine demographic parameters and population size, as well as cropland occupancy. CMR modeling showed that the recapture and survival probabilities had an average of 0.14 (95%CI: 0.14–0.17) and 0.86 (0.85–0.87), respectively. We estimated a relatively large population of *P. subdilatata* (~1750 individuals) in terrestrial habitats. The occupancy of terrestrial habitats by adults was spatially structured by age. Our data suggest that *P. subdilatata* has survived agricultural expansion and intensification better than other local odonate species, mainly because it can occupy transformed landscapes, such as croplands and grasslands." (Authors)] Address: Khelifa, R., Dept Zoology, Univ. British Columbia, Vancouver, BC V6T 1Z4, Canada

**17597.** Kietzka, G.J.; Pryke, J.S.; Gaigher, R.; Samways, M.J. (2021): Congruency between adult male dragonflies and their larvae in river systems is relative to spatial grain. *Ecological Indicators* 124: 14 pp. (in English) ["Highlights: • Dragonfly larvae and adults congruent for abundance and richness at larger scales. At all scales number of matches were never significantly greater than mismatches. The stages responded similarly to water temperature and agriculture. The stages responded differently to ten other variables. Larger scale assessments can use either adults or larvae, smaller scale use both. Abstract: Dragonflies are globally renowned bioindicators, with larvae, exuviae and/or adult life stages used in freshwater quality assessments. However, little is known about the extent to which conspecific adults and larvae occur within close proximity of each other, or how they comparably respond to biotic and abiotic factors. Firstly, we test the extent to which adult male dragonflies are congruent with their larvae at three independent sample unit scales (small 10 m × 3 m, medium 90 m × 3 m, and large 450 m × 3 m) along four rivers, along with a subset of 40 randomly selected small scale sites (small 40) to test for a possible effect of sampling design on the outcomes of the spatial scale analyses. Secondly, we test the extent to which adult males and larvae share similar responses to environmental variables. At medium and large spatial scales, larvae and adults were strongly congruent for abundance, species richness, and Dragonfly Biotic Index (DBI) scores. Despite this, at the small spatial scale, only 15% of observations matched (contained adults and conspecific larvae). This increased to 46% at the medium scale, and 60% at the large scale, neither of which were significantly different from the number of mismatches. Dragonfly species composition differed between larval and adult assemblages at the small, small 40, and medium scales but did not differ at the large scale. Water temperature was the only variable that generally elicited similar responses in both life stages, at all spatial scales. Exuviae here were so under-represented that



they provided no extra information. Assessments, where medium or large spatial scales are suitable for sampling, such as measuring the state of a river, can utilize either life stage. However, for comprehensive biodiversity surveys, both larvae and adults should be sampled." (Authors)] Address: Kietzka, Gabriella, Dept of Conservation Ecology & Entomology, Stellenbosch University, Stellenbosch 7602, South Africa. E-mail: gkietzka@sun.ac.za

**17598.** Kladaric, L.; Cuk, R.; Dukic, I.; Popijac, A.; Marinovic Ruždjak, A. (2021): Can Ephemeroptera, Plecoptera, Trichoptera (EPT) assemblage reflect nitrogen and phosphorus load in the riverine ecosystem? *Natura Croatica* 30(1): 217-230. (in English, with Croatian summary) ["The aim of this paper is to make a comparative analysis of benthic macroinvertebrate compositions in streams and rivers in Croatia with relation to different physical-chemical factors, especially nutrients. Samples were collected according to the AQEM method. At all the sites, 20 taxa were recorded of which Turbellaria, Gastropoda, Bivalvia, Oligochaeta, Hirudinea, Crustacea, Ephemeroptera, Odonata, Plecoptera, Heteroptera, Trichoptera, Coleoptera and Diptera were included in the present study. Water temperature mostly affected the composition of benthic macroinvertebrates to which it was inversely proportional. Nutrient enrichment, i.e., higher concentrations of ammonium, nitrates, nitrites, total nitrogen, orthophosphates and total phosphorus mostly affected Ephemeroptera, Plecoptera, Trichoptera and Diptera, by decreasing their diversity." (Authors)] Address: Kladaric, Lidijia, Central Water Management Lab., Ulica Grada Vukovara 220, HR-10000 Zagreb, Croatia

**17599.** Knoblauch, A.; Thoma, M.; Menz, M.H.M. (2021): Autumn southward migration of dragonflies along the Baltic coast and the influence of weather on flight behaviour. *Animal Behaviour* 176: 99-109. (in English) ["Highlights: • Evidence for dragonfly migration along the Baltic coast in Europe. *Aeshna mixta* and *Sympetrum vulgatum* show directed southward flight. Temperature, cloud cover and wind direction predict migration intensity. Migratory *Aeshna* and *Sympetrum* species respond differently to local weather. The migrant hawk *A. mixta* selects for favourable tail winds. Despite mass movements of insects being documented for decades, whether dragonflies migrate in Europe has not yet been experimentally tested. Similarly, little is known about the influence of weather on the movement decisions and intensity of dragonflies. Taking advantage of large movements of dragonflies along the Baltic Sea coast of Latvia, we investigated whether European dragonflies showed directed movements indicative of migratory behaviour and how weather influences their movements. First, we performed orientation tests with individual dragonflies of two commonly captured species, *A. mixta* and *S. vulgatum*, to determine whether dragonflies showed directed flight and whether flight direction differed from wind direction. Both *A. mixta* and *S. vulgatum* displayed a uniform mean southward orientation, which differed from the prevailing overhead wind direction, indicating migratory behaviour. Second, we investigated the influence of weather conditions on the abundance

of dragonflies captured. Differences in flight behaviour in relation to weather conditions were observed between *A. mixta* and the two smaller *Sympetrum* species (*S. vulgatum* and *S. sanguineum*). Generally, temperature, cloud cover and wind direction were the most important predictors for dragonfly abundance, with temperature positively, and cloud cover negatively, influencing abundance. *A. mixta* appeared to select favourable tail winds (northerlies), whereas abundance of *Sympetrum* increased with more easterly winds. Our results provide important information on the influence of local weather conditions on the flight behaviour of dragonflies, as well as evidence of dragonfly migration along the Baltic coast." (Authors)] Address: Knoblauch, Aline, Inst. of Ecology and Evolution, Univ. of Bern, Bern, Switzerland

**17600.** Königsdorfer, M.; Jedicke, J.; Meyer, C.; Kling, S. (2021): Libellengräben in Schwaben – Grabenpflege für Helm- und Vogel-Azurjungfer. *ANLIEGEN NATUR* 43(1): 45-54. (in German) ["Damselfly ditches in Swabia – management of ditches to conserve the ornate bluet and the southern damselfly: In Bavaria *Coenagrion mercuriale* and *C. ornatum* are endangered and threatened with extinction. Swabia is home to the main distribution of these species and therefore has an outstanding responsibility to preserve the populations of the two species. The project „Damselfly ditches in Swabia“ includes the recording investigation where the two species occur and the maintaining and development of their habitats. The project is successful because it cooperates with local actors and uses established sponsoring structures. The whole project is accompanied by intensive public relation. So the project goals can be ensured even beyond the project duration." (Publisher)] Address: Kling, Susanne, Landschaftspflegeverband Donautal-Aktiv e. V. E-mail: kling@donautal-aktiv.de

**17601.** Kohli, M.; Djernæs, M.; Sanchez Herrera, M.; Sahlen, G.; Pilgrim, E.; Simonsen, T.J.; Olsen, K.; Ware, J. (2021): Comparative phylogeography uncovers evolutionary past of Holarctic dragonflies. *PeerJ* 9:e11338 <https://doi.org/10.7717/peerj.11338>: 25 pp. (in English) ["Here, we investigate the evolutionary history of five northern dragonfly species to evaluate what role the last glaciation period may have played in their current distributions. We look at the population structure and estimate divergence times for populations of the following species: *Aeshna juncea*, *A. subarctica*, *Sympetrum danae*, *Libellula quadrimaculata* and *Somatochlora sahlbergi* across their Holarctic range. Our results suggest a common phylogeographic pattern across all species except for *S. sahlbergi*. First, we find that North American and European populations are genetically distinct and have perhaps been separated for more than 400,000 years. Second, our data suggests that, based on genetics, populations from the Greater Beringian region (Beringia, Japan and China) have haplotypes that cluster with North America or Europe depending on the species rather than having a shared geographic affinity. This is perhaps a result of fluctuating sea levels and ice sheet coverage during the Quaternary period that influenced dispersal routes and refugia. Indeed, glacial Beringia may have been as much a

transit zone as a refugia for dragonflies. *S. sahlbergi* shows no genetic variation across its range and therefore does not share the geographic patterns found in the other circumbo-real dragonflies studied here. Lastly, we discuss the taxonomic status of *Sympetrum danae*, which our results indicate is a species complex comprising two species, one found in Eurasia through Beringia, and the other in North America east and south of Beringia. Through this study we present a shared history among different species from different families of dragonflies, which are influenced by the climatic fluctuations of the past." (Authors)] Address: Kohli, M., Dept of Invertebrate Zoology, American Museum of Natural History, New York, New York, United States

**17602.** Koli, Y.; Dalvi, D. (2021): A new distribution record of the Western Ghats endemic damselfly *Melanoneura bilineata* Fraser, 1922 (Insecta: Odonata) from Maharashtra, India. *Journal of Threatened Taxa* 13(9): 19380-19382. (in English) [8.x.2020., Myristica swamp (15.8090N 74.1210E, 73m), Hevale village, Dodamarg taluka of Sindhudurg district)] Address: Koli, Y., Department of Zoology, Sant Rawool Maharaj College Kudal, Sindhudurg, Maharashtra 416520, India. E-mail: dryjkoli@gmail.com

**17603.** Koli, Y.; Dalvi, A.; Sawant, D. (2021): New records of *Agriocnemis keralensis* Peters, 1981 and *Gynacantha khasiaca* MacLachlan, 1896 (Insecta: Odonata) from Maharashtra, India. *J. of Threatened Taxa* 13(7): 18908-18919. (in English) ["*A. keralensis* is reported for the first time from Maharashtra, India. Previously it was known from Kerala and Goa states. In this paper we report *A. keralensis* from Thakurwadi and Bambuli wetlands and Chipi Plateau, Sindhudurg District. Also, the new record of *Gynacantha khasiaca* MacLachlan, 1896 is confirmed on the basis of specimens collected from Sindhudurg District. Hence, we report the range extension of both *A. keralensis* and *G. khasiaca* in northern Western Ghats. Apart from this, a combined checklist of Odonata fauna of Thakurwadi (51 species), Bambuli wetlands (44 species), and Chipi Plateau (51 species) is provided." (Authors)] Address: Koli, Y., Department of Zoology, Sant Rawool Maharaj College Kudal, Sindhudurg, Maharashtra 416520, India. E-mail: dryjkoli@gmail.com

**17604.** Kompier, T.; Holden, J.; Makbun, N. (2021): A new species of *Lyriothemis* Brauer, 1868 from Vietnam and Thailand (Odonata: Libellulidae). *Zootaxa* 4933(4): 586-594. (in English) ["*Lyriothemis pallidistigma* sp. nov. (holotype ♂: Cat Tien National Park, Dong Nai Prov., southern Vietnam) is described. This species is reminiscent of *L. defonsekai* van der Poorten, 2009 and *L. elegantissima* Selys, 1883, but can be separated by the shape of its secondary genitalia and its patterning. Information on its biology and ecology is provided." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, the Netherlands. E-mail: kompierintokyo@yahoo.com

**17605.** Kompier, T.; Karube, H.; Futahashi, R.; Phan, Q.T. (2021): The genus *Planaeschna* McLachlan, 1895 and its subgroupings in Vietnam, with descriptions of three new

species (Odonata: Aeshnidae). *Zootaxa* 5027(1): 1-35. (in English) ["Twelve *Planaeschna* McLachlan, 1895 species recorded in Vietnam are presented and their subgroupings based on nuclear DNA analysis are discussed. Three new species are described (*Planaeschna crux* sp. nov. [holotype: Pia Oac NP, Cao Bang Prov.], *Planaeschna samurai* sp. nov. [holotype: Khau Pha, Tu Le, Yen Bai Prov.] and *Planaeschna tsuchi* sp. nov. [holotype: Xuan Son NP, Phu Tho Prov.]. *P. celia* Wilson & Reels, 2001 is recorded from Vietnam for the first time. *P. guentherpetersi* Sasamoto, Do & Vu, 2013 is shown to be a subspecies of *P. ishigakiana* Asahina, 1951. The female of *P. cucphuongensis* Karube, 1999 is described for the first time. Additional records are provided for *P. asahinai* Karube, 2011, *P. tamdaoensis* Asahina, 1996, *P. tomokunii* Asahina, 1996, and *P. viridis* Karube, 2004. Lastly, the females of two unidentified *Planaeschna* spp. are illustrated. Information on the ecology of all species is provided." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, the Netherlands. E-mail: kompierintokyo@yahoo.com

**17606.** Koparde, P.; Sridhar Halali, S.; Tiple, A.; Ranganeekar, P.; Sonawane, A.; Payra, A.; Dawn, P.; Raju, A.; Subramanian, K.A. (2021): Lost in time: Re-description and ecological re-assessment of two Indian endemic *Elattonneura* Cowley, 1935 (Zygoptera: Libellulidae) damselflies. *International Journal of Odonatology* 24: 82-94. (in English) ["The Indian *Elattonneura* are a difficult group to identify due to their extreme morphological similarity and sparse information in identification keys and on geographical distribution. The ambiguity is prominent among two Peninsular Indian *Elattonneura* species, *E. nigerrima* (Laidlaw, 1917) and *E. tetrica* (Laidlaw, 1917), described a hundred years ago. Both species were described based on male specimens with scant information on their females. The species are IUCN Red-listed, *E. nigerrima* (Data Deficient) and *E. tetrica* (Least Concern). Hitherto it was thought that *E. nigerrima* was smaller than *E. tetrica* and both have non-overlapping geographical distribution. Here, we re-describe both sexes of *E. nigerrima*; *E. tetrica* along with morphometric data and geospatial analysis. We found that *E. nigerrima* is significantly larger than *E. tetrica*. The species are largely allopatric in distribution, with the former having a much wider spatial distribution than previously thought. Based on our geospatial analysis, we provide occurrence data useful for the future IUCN assessments of *E. nigerrima* and *E. tetrica*. We highlight the importance of updating taxonomic status information and data on spatiotemporal distribution to proceed with the conservation of endemic insects such as *Elattonneura* damselflies. Our study indicates ecological and threat assessments of Indian Odonata species are urgently needed." (Authors)] Address: Koparde, P., School of Ecology & Environmental Management, Faculty of Sustainability Studies, MIT World Peace University, Kothrud, Pune, Maharashtra, India. E-mail: pankajkoparde@gmail.com

**17607.** Koroiva, R.; Pereira-Colavite, A.; Batista, F.R.C.; Vilela, D.S. (2021): Checklist and contribution to the knowledge of the odonatofauna of Paraíba state, Brazil. *Biota*

Neotropica 21(3): e20211196: 10 pp. (in English, with Portuguese summary) ["We present the first listing of odonatan species (Insecta: Odonata) that occur in the state of Paraíba, Brazil. There are 49 species and 29 genera registered, making Paraíba the third in number of species among the Brazilian states of northeastern region. The families with the largest number of species were Libellulidae, with 31 species and 15 genera, followed by Coenagrionidae with 11 species and 7 genera. Interior regions of the state are under-sampled, which should still lead to an underestimated number of species. In addition, we present taxonomic notes of two species collected during our expeditions: males of *Progomphus dorsopallidus* Byers, 1934 and females of *Macromia griseofrons* Calvert, 1909. Here, we detail important characteristics and present figures to aid their morphological identifications." (Authors)] Address: Koroiva, R., Univ. Fed. da Paraíba, Depto de Sistemática e Ecologia, João Pessoa, PB, Brasil. E-mail: ricardo.koroiva@gmail.com

**17608.** Koroiva, R.; Brasil, P.G.; Neiss, U.G.; Vilela, D.S.; Hamada, N. (2020): Dragonflies and damselflies (Insecta: Odonata) housed in the Invertebrate Collection of the Instituto Nacional de Pesquisas da Amazônia, Brazil. *Hetaerina* 2(2): 14-23. ["This paper documents the odonatan specimens deposited in the Invertebrate Collection of the Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas, Brazil. A total of 3901 Odonata specimens are deposited in the collection (3294 genus/species-identified specimens and 607 unidentified specimens) belonging to 206 species and 84 genera. The type collection consists of 14 type specimens (three holotypes, one allotype and ten paratypes). We provide three new species record for Brazil and 11 new species record for Amazonas State. Thus, the Amazonas State has now record 335 species and 103 genera. Only 51% of the Odonata species recorded in Amazonas State are represented in the INPA collection, highlighting the need for more sampling of species." (Authors)] Address: Koroiva, R., Laboratório Multi-usuário do Programa de Pós-Graduação em Ciências Biológicas-Zoologia, Univ. Fed. Paraíba, João Pessoa, Brazil. E-mail: ricardo.koroiva@gmail.com

**17609.** Kovács, T.; Theischinger, G.; Horvath, R.; Juhász, P. (2021): Odonata from Batanta (Indonesia, West Papua) with description of one new species. *Opuscula Zoologica* 52(2): 119-139. (in English) ["58 taxa of Odonata are herewith reported from Batanta Island (including Arefi and Birie Islands). One new species is described: *Argiolestes varga* sp. nov. The following ten species are new to the Raja Ampat Islands: *Papuagrion magnanimum* (Selys, 1876), *Gynacantha rosenbergi* Kaup, 1867, *Palaeosynthemis cf. cervula* (Lieftinck, 1938), *Diplacina smaragdina* Selys, 1878, *Nannophlebia amphicyllis* Lieftinck, 1933, *Pantala flavescens* (Fabricius, 1798), *Rhodothemis nigripes* Lohmann, 1984, *Rhythemis regia* (Brauer, 1867), *Tramea transmarina propinqua* Lieftinck, 1942, *Zyxomma multinervorum* Carpenter, 1897, and fifteen are new to Batanta: *Selysioneura cornelia* Lieftinck, 1953, *P. magnanimum*, *Agyrtacantha dirupta* (Karsch, 1889), *Anax maclachlani* Förster, 1898, *G. rosenbergi*, *P. cf. cervula*, *D. smaragdina*, *N. amphicyllis*, *Nesoxenia mysis*

(Selys, 1878), *P. flavescens*, *R. nigripes*, *R. regia*, *Tetrathemis irregularis* Brauer, 1868, *T. transmarina propinqua*, *Z. multinervorum*. *Metagrion postnodale* (Selys, 1878) and *Selysioneura cf. cervicornu* Förster, 1900 are deleted from the faunal lists of Odonata of Raja Ampat and Batanta Islands. The total number of species recorded for Batanta Island is 62. (Authors)] Address: Kovács, T., Mátra Museum of Hungarian Nat. History Museum, Kossuth Lajos utca 40, 3200 Gyöngyös, Hungary. E-mail: koati1965@gmail.com

**17610.** Krieg-Jacquier, R.; Boudot, J.-P. (2021): Observation d'*Erythromma najas* Hansemann, 1823 dans le département du Var et mise à jour des données sur la région Provence-Alpes-Côte d'Azur (Odonata, Coenagrionidae). *Martinia* 35(3): 10-12 (in French, with English summary) ["Observation of *Erythromma najas* Hansemann, 1823 in the department of Var and update of data from Provence-Alpes-Côte d'Azur region (Odonata, Coenagrionidae); 16-VIII-1996, l'étang Colbert, Cannet-des-Maures (Var), 43.38810°N 6.35930°E 97 m a.s.l.," (Authors)] Address: Krieg-Jacquier, R., 628 route de Marboz 01440 Viriat, France. E-mail: regis.krieg.jacquier@gmail.com

**17611.** Küry, D. (2021): Besiedlung eines neu geschaffenen Fließgewässers im Kanton Basel-Stadt durch *Coenagrion mercuriale* und weitere Libellenarten (Odonata: Coenagrionidae). *Libellula Supplement* 16: 161-176. (in German, with English summary) ["Colonisation of a newly created ditch in the canton Basel-City by *C. mercuriale* and other odonate species – A newly created section of a ditch in the canton Basel-City (Switzerland) was colonised by *C. mercuriale* after ten years. A sporadic monitoring of the Odonata fauna showed that prior to this date *Calopteryx splendens* and *C. virgo* had dominated and only few other species were present. *C. mercuriale* colonised only sectors with low density of vegetation. To colonise the new habitats, it had to disperse over more than 8 km. At the end of the flight period the density was four individuals per 100 m. Since *C. mercuriale* had never before been observed in this region, it is assumed that the species is currently in an initial stage of colonisation. Optimized measures will facilitate the development of a stable population." (Author)] Address: Küry, D., Life Science AG, Greifengasse 7, CH-4058 Basel, Switzerland. E-mail: daniel.kuery@lifescience.ch

**17612.** Lietz, C.; Schaber, C.F.; Gorb, S.N.; Rajabi, H. (2021): The damping and structural properties of dragonfly and damselfly wings during dynamic movement. *Communications Biology* 4( 737) (2021): 14 pp. (in English) ["For flying insects, stability is essential to maintain the orientation and direction of motion in flight. Flight instability is caused by a variety of factors, such as intended abrupt flight manoeuvres and unwanted environmental disturbances. Although wings play a key role in insect flight stability, little is known about their oscillatory behaviour. Here we present the first systematic study of insect wing damping. We show that different wing regions have almost identical damping properties. The mean damping ratio of fresh wings is noticeably higher than that previously thought. Flight muscles and



hemolymph have almost no 'direct' influence on the wing damping. In contrast, the involvement of the wing hinge can significantly increase damping. We also show that although desiccation reduces the wing damping ratio, rehydration leads to full recovery of damping properties after desiccation. Hence, we expect hemolymph to influence the wing damping indirectly, by continuously hydrating the wing system." (Authors) *Aeshna cyanea*, *Sympetrum striolatum*, *Calopteryx splendens*, *Ischnura elegans*] Address: Rajabi, H., Division of Mechanical Engineering and Design, School of Engineering, London South Bank University, London, UK. E-mail: harajabi@hotmail.com

**17613.** Lipinskaya, T. P.; Moroz, M. D. (2021): Native and alien species of macrozoobenthos in rivers of the Belarusian part of the Dnieper River basin. Proceedings of the National Academy of Sciences of Belarus. Biological series 66(1): 64-73. (in Russian, with English summary) ["The Dnieper River basin in Belarus was studied in 2016–2019. In total, 201 species and forms of macrozoobenthos were found and 146 of them were identified to the species level. New habitats of several protected species (... *Anax imperator*, *Ophiogomphus cecilia* and *Gomphus flavipes* ... (Authors)] Address: Lipinskaya, Tatsiana, Scientific and Practical Center for Bioresources of the National Academy of Sciences of Belarus (27, Akademicheskaya Str., 220072, Minsk, Republic of Belarus. E-mail: tatsiana.lipinskaya@gmail.com

**17614.** Liu, Z.; Zhou, T.; Cui, Y.; Li, Z.; Wang, W.; Chen, Y.; Xie, Z. (2021): Environmental filtering and spatial processes equally contributed to macroinvertebrate metacommunity dynamics in the highly urbanized river networks in Shenzhen, South China. *Ecological Processes* 10(23): 12 pp. (in English) [oas 57: "Background: Disentangling the relative roles of environmental filtering and spatial processes in structuring ecological communities is a central topic in metacommunity ecology. Metacommunity ecology in the temperate river ecosystems has been well developed, while less attention has been paid to subtropical urban river networks. Here, we examined the ecological factors and seasonal difference in structuring macroinvertebrates metacommunity assembly in the subtropical urban river networks in Shenzhen, South China. Results: Our results revealed that there was no significant distinction of macroinvertebrate community composition among seasons, with only the relative abundance of Mollusca and Odonata significantly differed in both wet and dry seasons. One possible explanation was that most macroinvertebrates are generally pollution-tolerant taxa characterized with nonseasonal life cycle. In addition, distance-based redundancy analysis and variation partitioning approach revealed that metacommunity was determined equally by the environmental and dispersal-related factors. Further, our results showed that, although a slight temporal variation of relative contribution, the identity and explanation power of ecological factors were different among seasons. Specifically, stronger environmental filtering structuring community dynamics was observed in the dry than wet seasons, which might be owing to higher environmental heterogeneity under a low water-flow condition. Moreover,

we detected that the influence of spatial processes was stronger in the wet than dry seasons, indicating an obvious dispersal processes due to high connectivity among sites. Conclusion: Overall, our results revealed that environmental and spatial factors equally explained variations of macroinvertebrate metacommunity, implying the necessity of considering dispersal-related processes structuring ecological communities in river bioassessment programs. Moreover, degraded habitat conditions and water quality were the predominant factors that affected macroinvertebrate communities, indicating the significance and feasibility of improving local abiotic conditions to sustain local biodiversity. Further, our findings revealed the importance of seasonal dynamics of these urban river networks in structuring macroinvertebrate metacommunity. Thereby, our study improves the understanding of ecological processes governing macroinvertebrate metacommunity and underlines the idea that community ecology studies should go beyond the single snapshot survey in river networks." (Authors)] Address: Xie, Z., Inst. Hydrobiology, Chinese Academy of Sciences, Wuhan 430072, Hubei, China. E-mail: yushunchen@ihb.ac.cn

**17615.** Lohr, M. (2021): *Selysiotthemis nigra* new for continental France (Odonata: Libellulidae). *Libellula Supplement* 16: 177-188. (in English, with French and German summaries) ["On 24-vii-2020 one adult male and two exuviae of *S. nigra* were found in the middle Durance Valley, southern France, in the North of the Var department, not far from the village of Vinon-sur-Verdon. These observations are the first records of the species in continental France. The exuviae were found on the shore of a former gravel pit, while the imago was photographed perching on a stem at a river bank near the Durance. The findings are discussed regarding the hitherto known range of the species, and possible immigration routes are described. The nearest sites where the species occurs are situated in northwestern Italy, northeastern Corsica and northeastern Spain, between 250 and 330 km from the Durance Valley. Most probably there is a migration of *S. nigra* along the shore of the Mediterranean Sea, either from the Southwest (Spain) or the Southeast (Corsica and Italy), before entering continental France and following the Durance Valley. The causes of an increase of records of *S. nigra* in an almost constant range, as well as the obvious spreading of other species like *Trithemis annulata* and *T. kirbyi*, are discussed. Climate change has clearly favoured the expansion of at least *T. annulata* and *T. kirbyi* during the last decades and years, respectively, and these species entered continental France coming from Spain. However, the increase of anthropogenic water bodies like man-made dams, irrigation basins, impoundments or gravel pits have also favoured this trend as recently stated for the highly ubiquitous *T. kirbyi*, for which both climate and habitat changes act in synergy. In the case of *S. nigra*, the increasing availability of such artificial, suitable habitats might be the main reason for the expansion as the species has been demonstrated to have recently established in areas where temperatures have decreased and rainfall increased since the turn of the millenium. Whether climatic factors also have a significant influence on the increase of observations and the small

range expansions of this species might be made clearer by future research." (Authors)] Address: Lohr, M., Technische Hochschule Ostwestfalen-Lippe, An der Wilhelmshöhe 44, 37671 Höxter, Germany. E-mail: mathias.lohr@th-owl.de

**17616.** Lopez-Diaz, J.A.; Gómez, B.; González-Soriano, E.; Gómez-Tolosa, M. (2021): Odonata (Insecta) como indicador de la calidad ambiental en humedales de montaña neotropicales. *Acta Zoologica Mexicana* (N.S.) 37(1): 1-17. (in Spanish, with English summary) ["In order to evaluate the diversity of the Odonata order and relate it to environmental quality, in San Cristobal de Las Casas (Chiapas) four wetlands were chosen according to their accessibility and permissibility. For the environmental typology, among other characteristics, the visual quality was considered, estimated through the Index of the State of Conservation of Wetlands (IECH). Systematic monthly collections of adult odonates were carried out between July 2014 and June 2015. A total of 14 species, distributed in five families and 10 genera were found. The genus *Argia* was the richest, while *Ischnura denticollis* and *Enallagma rua* represented the dominant species. Las Cañadas, a wetland with suboptimal visual quality, presented the greatest diversity of dragonflies by integrating a lotic environment. As one of the parameters evaluated in the visual quality, the degree of alteration of the aquatic vegetation was very important in the differences found in the diversity and abundance of Odonata in the four wetlands. Maria Eugenia and La Kist classified as environments with optimal and regular visual quality, respectively, obtained the greatest similarity in their odonatofauna related to the different life forms of their aquatic vegetation and for the equivalent size of these two wetlands." (Authors)] Address: López-Díaz, J.A., Univ. de Ciencias y Artes de Chiapas, Instituto de Ciencias Biológicas. Libramiento Norte-Poniente s/n, Col. Lajas Maciel. Tuxtla Gutiérrez, Chiapas, México. C.P. 29000. E-mail: juanlodi44@gmail.com

**17617.** Lorenzo-Carballa, M.O.; Garrison, R.W.; Encalada, A.C.; Cordero-Rivera, A. (2021): Darwin returns to the Galapagos: Genetic and morphological analyses confirm the presence of *Tremea darwini* at the Archipelago (Odonata, Libellulidae). *Insects* 2021, 12, 21. <https://doi.org/10.3390/insects12010021>: 17 pp. (in English) ["The status of the *Tremea* species present in the Galapagos Islands (Odonata, Libellulidae) has been the subject of a long-standing debate among odonatologists. Here, we use molecular and morphological data to analyze a series of specimens from this genus collected in 2018 from the Islands of San Cristobal, Isabela, and Santa Cruz, with the aim of determining their relationship with *Tremea calverti* Muttkowski and with their currently considered senior synonym *T. cophysa* Hagen. We combined sequencing of mitochondrial and nuclear DNA with morphological examination of several specimens of *Tremea*, including representatives of continental *T. cophysa* and *T. calverti*. Our molecular analyses place the *Tremea* from Galapagos in the same clade as *T. calverti*, with *T. cophysa* as a closely related species. The morphological analyses found only one consistent difference bet-

ween *T. cophysa* and *T. calverti*: the presence of an accessory lobe in the male vesica spermalis of *T. cophysa* that is absent in *T. calverti* and in the *Tremea* from Galapagos. In agreement with our genetic results, the overall morphological differences documented by us indicate that the Galapagos material examined is conspecific with *T. calverti*. In light of this, and following the principle of priority in taxonomic nomenclature, *Tremea calverti* Muttkowski, 1910 should hereafter be considered a junior synonym of *Tremea darwini* Kirby, 1889." (Authors)] Address: Lorenzo-Carballa, María Olalla, ECOEVO Lab, E.E. Forestal, Campus Univ. A Xunqueira s/n, University of Vigo, 36005 Pontevedra, Spain

**17618.** Mafuwe, K.; Tambara, E.; Matutu, F.F.; Maforimbo, C.; Tsamba, J.; Mapendere, C.; Moyo, S. (2021): Community assembly of adult odonates in lacustrine systems of an understudied world heritage site of south-eastern Zimbabwe. *International Journal of Odonatology* 24: 122-138. (in English) ["Odonata are efficacious for management and conservation efforts in freshwaters. In recent times, increased effort has gone into enhancing awareness, data and information on dragonflies among scientists and policymakers. Here, we examined the Odonata community of dams within the Matobo National Park, a world heritage site in southern Zimbabwe. Specifically, we determined diversity of larval and adult odonate in five dams over one year. Several physico-chemical parameters were measured, including pH, total dissolved salts (TDS), electrical conductivity (EC). Further, we assessed how habitat types (i.e., detritus, sand, gravel, plant type) affect Odonata communities. In addition, surveys were conducted to identify critical threats to Odonata in the Matobo National Park and surrounding areas. Broadly, results showed that Odonata nymphs and volant adults did not change predictably across all sampling occasions. Further, pH was positively correlated with Libellulidae and Platycnemididae, whereas TDS and EC were positively correlated with Libellulidae, Platycnemididae and Macromiidae. Contrariwise, Gomphidae were found to be negatively correlated to TDS, EC and pH. The threat analyses identified natural system modifications, agricultural expansion and intensification, as well as human intrusions and disturbance as the major threats to Odonata and freshwater resources in Matobo National Park. Taken together, these data provide baseline data that will be useful for future monitoring of threats and subsequently conservation strategies in the Matobo National Park and other protected areas in Southern Africa." (Authors)] Address: Mafuwe, K., Univ. of Zimbabwe, Dept Biol. Sciences, Mt Pleasant, Harare, Zimbabwe; Nat. Hist. Museum of Zimbabwe, Park Rd, Bulawayo, Zimbabwe. E-mail: kudzimaffy@gmail.com

**17619.** Maksoud, S.; Azar, D. (2021): Hjoula: A remarkable mid-Cenomanian Lebanese fossil fish Lagerstätte now also promising for fossil insects. *Palaeoentomology* 4(3): 223-227. ["Lebanon is worldwide famous in Palaeontology for its rich Late Cretaceous marine fish deposits in Haqel, Nammoura and Hjoula. Recently, the two latter outcrops yielded surprisingly some complete and none-dislocated fossil insects (Azar et al., 2019; Vršanský & Makhoul, 2013; Nel et

al., 2004), indicating a particular depositional marine palaeoenvironment, close to a palaeoshoreline during the mid-Cenomanian." (Authors)] Address: Maksoud, Sibelle, Lebanese Univ., Faculty of Sciences II, Dept of Natural Sciences, Fanar, P.O. Box 26110217, Fanar–Matn, Lebanon

**17620.** Mallah, S.R.; Khan, M.H.; Agrawal, A. (2021): Dragonfly-inspired corrugated foil flight dynamics in heaving motion across various heaving frequencies. 5-6th Thermal and Fluids Engineering Conference (TFEC) 2021, 26–28 May : 71-79. ["The corrugated wing cross-section significantly affects flight dynamics of a dragonfly. Therefore, a heaving corrugated foil inspired from a dragonfly wing, is being numerically studied in this work. The objective is to understand the effect of heaving frequency on the lift and thrust coefficients of the bio-inspired corrugated foil, thereby unravelling the secret of dragonfly flight at various heaving frequencies of its wing. Two-dimensional numerical simulations are performed over a wide range of reduced frequencies,  $K = 0.09 - 2.63$ , covering the entire range of actual dragonfly wing's flapping frequency. The chord-based Reynolds number is 10,000 and a nondimensional heaving amplitude (normalized by the chord length) is 0.15. The results are compared against a smooth heaving NACA (National Advisory Committee for Aeronautics) 0012 foil. Over the studied heaving frequency range for the corrugated foil, at  $K = 0.09$  net drag on the corrugated foil is observed which transitions into a net thrust at  $K = 1.76$  and thereafter a monotonic increase in thrust is observed up to the largest studied reduced frequency. The drag to thrust transition is earlier for NACA0012 foil compared to corrugated foil because of lower leading-edge vortex strength and further at any studied  $K$ , NACA0012 foil is better in terms of thrust generation. The present study helps understand the influence of varying heaving frequency in the flight dynamics of dragonflies." (Authors)] Address: Mallah, S.R., Department of Mechanical Engineering, Indian Institute of Technology Bombay, Powai, Mumbai 400076, India

**17621.** Mallah, S.R.; Padinjattayil, S.; Agrawal, A.; Sharma, A. (2021): Investigating dragonfly flight dynamics at various heaving amplitudes of its wing. 5-6th Thermal and Fluids Engineering Conference (TFEC): 85-91. (in English) ["The dragonfly wing has a corrugated cross-section that significantly affects its flight dynamics. Therefore, inspired from a dragonfly wing, the corrugated foil performing heaving motion at various heaving amplitude, is being studied through numerical simulations. The objective is to understand the effect of heaving amplitude on the bioinspired corrugated foil, thereby unravelling the secret of dragonfly flight at various heaving amplitude of its wing. Two-dimensional numerical simulations are performed over a wide range of heaving amplitude (normalized by the chord length),  $H = 0.15 - 0.75$ . The chord-based Reynolds number is 10,000 and reduced frequency is 0.87. Further, to explore the effect of corrugations found in dragonfly wing, the results are compared with a smooth heaving NACA (National Advisory Committee for Aeronautics)0012 foil. Over the studied heaving amplitude range for the corrugated foil, at  $H = 0.15$

net drag on the corrugated foil is observed which transits into a net thrust at  $H = 0.3$ , however the time-averaged thrust is less than that for NACA0012 foil at all  $H$ . At any studied  $H$ , corrugated foil out-performs the NACA0012 foil in terms of time averaged lift generation. Therefore, corrugations found in dragonfly wings are for enhancement of lift rather than thrust. The present study helps understand the influence of corrugations of dragonfly wing in the enhanced lift generation mechanisms of dragonflies." (Authors)] Address: Mallah, S.R., Dept Mechanical Engineering, Indian Inst. Technology Bombay, Powai, Mumbai 400076, India

**17622.** Mancini, F.; De Giorgi, R.; Ludovisi, A.; Vizzini, S.; Mancinelli, G. (2021): Ontogenetic shift in the trophic role of the invasive killer shrimp *Dikerogammarus villosus*: a stable isotope study. *Biological Invasions* 23(6): 1803-1817. (in English) ["The introduction of the amphipod *Dikerogammarus villosus* in European fresh waters is to date recognized as a threat to the integrity of invaded communities. Predation by *D. villosus* on native benthic invertebrates is assumed as the key determinant of its ecological impact, yet available information describe the species as a primary consumer as well as a carnivore depending on local conditions. Here, we assessed the trophic position (TP) of *D. villosus* in Lake Trasimeno, a recently invaded lentic system in central Italy, using the CN isotopic signatures of individuals captured in winter spanning two orders of magnitude in body size. TP estimations were compared with those characterizing the native amphipod *Echinogammarus veneris* and other representative invertebrate predators. On average, *D. villosus* showed a trophic position higher than *E. veneris*, and comparable with that of odonate nymphs. An in-depth analysis revealed that large-sized individuals had a trophic position of 3.07, higher than odonates and close to that of the hirudinean predator *Erpobdella octoculata*, while small-sized specimens had a trophic position of 2.57, similar to that of *E. veneris* (2.41). These findings indicate that size-related ontogenetic shifts in dietary habits may per se vary the nature of the interaction between *Dikerogammarus villosus* and native invertebrates from competition to predation. Information collated from published isotopic studies corroborated the generality of our results. We conclude that intra-specific trophic flexibility may potentially amplify and make more multifaceted the impact of the species on other invertebrate species in invaded food webs." (Authors)] Address: Mancini, F., Department of Biological and Environmental Sciences and Technologies, University of Salento, 73100 Lecce, Italy. E-mail: giorgio.mancinelli@unisalento.it

**17623.** Manger, R. (2021): Odonate wing vein preferences in haemolymph sucking *Forcipomyia paludis* (Diptera: Ceratopogonidae; Odonata). *Libellula Supplement* 16: 189-200. (in English, with German summary) ["In summer 2020, the Odonata fauna in the Weerribben-Wieden National Park was examined at various localities for the Odonata parasite *Forcipomyia paludis*. This park is currently one of the localities in the Netherlands where the species is found every year. Five localities in the area have been surveyed and many of the Odonata species were found to be infected by



biting midges. The parasites have been studied in more detail on photos of the Odonata species and an accurate overview was obtained on which wing veins they sucked. The highest numbers of biting midges were observed on the Cubitus vein. Furthermore, 91% of all observed midges sucked on the lower wing veins of the dragonflies and 9% on the upper ones. Biting midges were not observed in all of the sites surveyed in the park." (Author)] Address: Manger, R., Schukkingpad 17, 7971 BV Havelte, The Netherlands. E-mail: rene@mangereco.nl

**17624.** Martens, A.; Wildermuth, H. (2021): Gynandromorphism and intersexuality in Odonata: a review. *Odonatologica* 50(1/2): 65-80. ["Gynandromorphism is a rare phenomenon among insects, and as measured by the number of publications, particularly so in Odonata. The first case of gynandromorphism in the order was reported in 1866, the second in 1917. To date, 56 chimeric individuals have been described in 45 papers. Bilateral gynandromorphs account for about a third of all cases, the remainder consisting of phenotypical mosaics of male and female characters exhibited in wing patterns, genitalia, or other body parts. There are no patterns of gynandromorphism exclusive to Odonata. Here, as a basis for future work, we provide an overview as complete as possible of the known cases in the order of gynandromorphism in a broad sense, including intersexuality. This is the third review on this topic: the first dates from 1929 and the second from 1971, supplemented in 1975. In the last ten years, all new records have been based on photographic evidence rather than collected specimens, a practice which has its limitations and may skew the data by recording only the most obvious of cases. For future research it is recommended that specimens should not only be photographed in the field but also collected and preserved for detailed description and analysis in the laboratory. In addition, researchers should be alive to the possibility of finding gynandromorphs in final instar larvae and exuviae." (Authors)] Address: Martens, A., Institute of Biology, Univ. of Education Karlsruhe, Bismarckstraße 10, 76133 Karlsruhe, Germany. E-mail: martens@ph-karlsruhe.de

**17625.** Martin, R.; Maynou, X. (2021): A case of phoresis between *Rheotanytarsus* Thienemann & Bause, 1913 (Diptera: Chironomidae) and *Calopteryx* Leach, 1815 (Odonata: Calopterygidae). *Boletín de la Sociedad Entomológica Aragonesa* 68: 388-390. (in English, with Spanish summary) ["We describe a case of phoresis of *Rheotanytarsus* sp. (Diptera: Chironomidae) on larvae of *C. virgo meridionalis* and *C. haemorrhoidalis* in a mountain river in the Montseny massif, Catalan Pre-Coastal Range, NE Iberian Peninsula." (Authors)] Address: Martín, R., Martí Julià, 19-23, 08911 Badalona, Spain. E-mail: ricardo.martin@cllicenciats.cat 2 Dr. Salvà, 23, 08224 Terrassa, Spain

**17626.** Matomela, N.H.; Chakona, A.; Kadye, W.T. (2021): Comparative assessment of macroinvertebrate communities within three Afrotropical headwater streams influenced by different land use patterns. *Ecological Indicators* 129 (2021) 107972: 11pp. (in English) ["Headwater streams in

Afrotropical ecoregions harbour locally adapted aquatic communities. However, across many regions in Africa, these ecosystems and their unique aquatic biodiversity have been severely impacted by unsustainable land use practices. We tested the hypothesis that land use disturbances were the primary drivers of community dynamics by comparing spatial and temporal dynamics together with trait-environment relationships of macroinvertebrate communities in three headwater streams influenced by different land use practices. The three headwater streams were distinguished based on high conductivity, total dissolved solids and alkaline pH in the agriculture-disturbed stream, and low temperature in a stream whose riparian zone was invaded by nonnative vegetation compared to a near-natural stream. Macroinvertebrate taxonomic diversity was, nevertheless, comparable among these three streams. Constrained canonical ordination revealed that seasonality was a major driver of macroinvertebrate dynamics that was reflected mostly by the abundances of six macroinvertebrate taxa (*Baetis*, *Dicentropetelum*, *Afronurus*, *Tricorythus*, *Simulium* and *Cheumatopsyche*), whereas land use contributed a small but significant difference. Trait-environment relationships reflected seasonal changes that included the importance of benthic substratum in winter, the occurrence of collector-gatherer invertebrates in spring and aerial breathing traits in summer. Land use-related traits were, nevertheless, reflected by gill respiration and grazer feeding traits represented by *Afronurus* in the near-natural stream, predator traits represented by *Aeshna* and *Lestes* in the invaded stream, and aerial respiration represented by *Enithares*, *Orectogyrus* and *Rhagovelia* in the agriculture-disturbed stream. Our results suggest that environmental variability associated with seasonality probably played a deterministic role within which land use disturbances operated. Overall, our study suggests that importance of using multiple metrics to unpack the patterns associated with land use disturbances in headwater streams." (Authors)] Address: Matomela, N.H., Dept of Ichthyology and Fisheries Science, Rhodes University, PO Box 94, Makhanda (Grahamstown) 6140, South Africa

**17627.** Matrozis, R.; Shergalin, E.E. (2021): Janis Racenis (1915-1980) - Latvian ornithologist and Venezuelan odonatologist. *Russian Ornithological Journal* 30: 317-324. (in Russian) [Janis Racenis was born on April 10, 1915 in Riga - the capital of the then Livonia and modern Latvia, which at that time was part of the Russian Empire, and died on the day of his 65th birth on April 10, 1980 in the capital of Venezuela, the city of Caracas. For his native Latvia in the historical memory, he remained as an ornithologist, and for South America - as an odonatologist (specialist in dragonflies Odonata).] Address: Matrozis, R., Latvian Ornithological Society. E-mail: matruslv@inbox.lv

**17628.** Michalczyk, W.; Buczynski, P.; Piwko-Witkowska, E. (2021): Record of *Sombre Goldenring Cordulegaster bidentata* SELYS, 1843 (Odonata: Cordulegasteridae) in the Roztocze Upland confirms the existence of its disjunct distribution area in south-eastern Poland. *Odonatrix* 17\_6

(2021): 4 pp. (in Polish, with English summary) ["Single males of *C. bidentata* hunting and resting around potential breeding habitat were recorded twice in July 2018 in the lower valley of the Jeleń stream in the Roztocze Upland (50°24'01.7"N 23°11'38.6"E, UTM: FA58, 249 m a.s.l.). This is the first record of this species in this region. *C. bidentata* was also found recently in the Sandomierz Basin. These two localities are separated by a distance of only ca 7 km. The data from the Roztocze Upland confirm the hypothesis that an isolated distribution area of *C. bidentata* exists in the middle part of the River Tanew basin. This is the only area of occurrence of this species in Poland that is not situated in the mountains or foothills. This is due to the favourable terrain on the border of the Roztocze Upland and the Sandomierz Basin, and the unfavourable topography in the central part of the Sandomierz Basin." (Authors)] Address: Michalczuk, W., Zamojskie Towarzystwo Przyrodnicze, ul. Oboźna 19, 22-400 Zamosc, Poland. E-mail: wiack@wp.pl

**17629.** Michalczuk, W.; Buczynski, P. (2021): Reproductive success of Wandering Glider *Pantala flavescens* (Fabricius, 1798) (Odonata: Libellulidae): the second record from Poland. *Odonatrix* 177 (2021): 5 pp. (in Polish, with English summary) ["Two exuviae of *P. flavescens* were found on August 21, 2020 in a small water body (1.21 ha) in the initial stage of succession in a sand mine near Tyszowce, eastern Poland (50°38'09.7" N 23°43'07.8" E, 192 m a.s.l.). This is the fourth locality of this species in Poland and the second one where reproductive success has been confirmed (both cases in 2020). This record is discussed in the context of data from central and eastern Europe. *P. flavescens* is known to have migrated as far north as 55°20' N, possibly even to 55°35' N (uncertain data from Russia). Reproductive success was found farthest north at 50°38' N-52°31' N. First-generation imagines have been observed in Europe from late May to early July, and the development of eggs and larvae is rapid, taking slightly more than 40 days. Therefore, the hatching of second generation individuals can be expected from the first half of July to the first half of August." (Authors)] Address: Michalczuk, W., Zamojskie Towarzystwo Przyrodnicze, ul. Oboźna 19, 22-400 Zamosc, Poland

**17630.** Mikołajczuk, P. (2021): Habitat selection and population dynamics of *Nehalennia speciosa* (Charpentier, 1840) in Southern Podlasie and adjacent areas, Mideastern Poland. *Odonatrix* 17\_Suplement 1.IV, 81 pp, 51 pp suppl. (Polish, with English summary) ["The paper presents rich new data about 61 localities of *Nehalennia speciosa* discovered after 2009 in Mideastern Poland (tab. 1). Acidic Sphagnum mires formed greatest part of the species habitat spectrum there while acidic non-Sphagnum fens were slightly less frequent (fig. 5-l). Alkaline non-Sphagnum fens and water bodies in gravel pits were rarely inhabited by the species (fig. 5-l). The used by *N. speciosa* emergent plant formations were composed by many herbaceous species, but most frequently by – in descending order of frequency – *Carex rostrata*, *Juncus effusus*, *Carex lasiocarpa*, *Eriophorum vaginatum* and *Carex vesicaria* (fig. 6). The localities in the study area usually were only shallowly inundated and

lacked open, stable water bodies. This general feature was more pronounced in the eastern part of the study area, where almost no stable water bodies occurred, and it was less marked in the western part, where the stable water bodies occurred fairly often. Probably all the water bodies had anthropogenic (peat excavation) origin. Most of the recorded localities showed great habitat dynamics related to annual precipitation variability. The water level, being extremely risen in 2010-2011 and still high in further three years (tab. 3, fig. 7b), caused significant changes in the habitats, such as massive decline of forests and expansion of Sphagnum mosses and formations of Cyperaceae. During this time, at least 40–50% of the 37 monitored localities in the eastern part of study area became colonised by *Nehalennia speciosa* or at least attempts of colonisation occurred (tab. 4). The colonisations were really rapid, usually in the first two years of suitable conditions. In the next years, progressive drop in the water level caused drying up of the habitats and decline of the populations. Finally, probably only two of the 37 monitored populations were still existing in 2018, while the rest became extinct (tab. 4, fig. 7b). The main cause of the populations' extinction was, thus, absence of stable permanent water bodies, where *N. speciosa* might have survived the unfavourable dry years. Deep and relatively stable anthropogenic post-peat water bodies turned out, thus, to be very important for the species survival in the study area. The long-term precipitation data, historical maps and paleoecological data from upper peat deposits indicated that the localities in the eastern part of study area were hydrologically unstable also in the past, with a series of wet and dry phases during the 20th and 21st centuries (fig. 9). In many peat profiles, highly decomposed peat layers and botanical indicators of dry conditions, such as *Betula*, *Pinus*, *Carex canescens*, *Calamagrostis canescens* and *Lycopus europaeus*, were found in their 20th century's parts (fig. 8a-b). Some localities remained overgrown by forest for many decades, leaving relatively thick woody peat layers. The age of dying trees during extremely wet years 2010–2011 suggested that a previous similarly extremely wet period occurred here probably in the first half of the 20th century. However, the complex of wet episodes between the 1960s and 1980s was also significant. This situation suggest that occurrence of *N. speciosa* in the eastern part of study area was generally fluctuating not only in the 21st century, but at least since the first half of the 20th century. The paper also includes a synthesis of all published Polish data collected up to 2017 (fig.1, tab. 6) as well as comparison between the current (i.e. known in 2017) and older (2007) state of knowledge (tab. 7). Up to 2007, *N. speciosa* was described from 69 localities in Poland. These localities concentrated mainly in the northern part of the country, in areas covered by the last glaciation (lakelands), locally also in the east and south in old-glacial areas. The older data indicated that the species inhabited in Poland mainly small, natural dystrophic lakes surrounded by transition (Sphagnum) mires. Habitats of other types, such as peat excavation pools and transition mires without open water bodies were more rarely reported and located mainly in the old-glacial areas in the East. Almost all Polish localities known up to 2007 were situated in

forests. According to those data, the species was found most frequently in formations of *Carex lasiocarpa* and *C. limosa*, clearly more rarely in *Carex rostrata* and only exceptionally in other herbaceous plants' formations. Up to 2017, the number of known Polish localities rose to 168. Most of the newly reported localities were situated in old-glacial areas, mainly in the eastern part of country. The current data shows that the habitat spectrum in Poland is generally wider in comparison to older (2007) data and is different in last-glacial and old-glacial areas. In the former, the habitat spectrum was still based mostly on small, midforest dystrophic lakes surrounded by transition (*Sphagnum*) mires with a rim of *Carex limosa*/*Carex lasiocarpa* formations near the open water table, while in the latter the habitat spectrum was more diverse, comprising various types of nutrient-poor peatland (acidic *Sphagnum* mires, acidic and alkaline non-*Sphagnum* fens), in many cases without any open water bodies. Also broader spectrum of inhabited plant formations was recorded in the recently studied old-glacial areas, including e.g. *Carex rostrata*, *C. lasiocarpa*, *Juncus effusus*, *Eriophorum vaginatum*, *Carex vesicaria*, *C. elata*, and *Equisetum fluviatile*. The stable open water bodies inhabited in the old-glacial areas were often of anthropogenic origin. Some of the newly reported localities were also situated completely outside forests. Data from the study area and the recent water level oscillations recognisable on the photomaps indicated that the occurrence of *N. speciosa* in Poland is obviously fluctuating due to precipitation variability. This dynamics is regionally diversified: greater in the old-glacial areas and lesser in the last-glacial areas in the North. The terrestrialisation of natural water bodies is much more advanced in the old-glacial areas, because the lake depressions here are usually shallow and filled with sediments almost completely. For that reason, the habitats here are generally more sensitive to drying out in comparison with the last-glacial areas in the North, where stable, deep post-glacial lakes are still common. Except for mountains in the South of the country, also annual precipitation averages are higher in the last-glacial areas in the North, what is also followed by higher stability of the habitats in that zone. *N. speciosa* was considered as a low-mobile species due to its small size, delicate body build, poor flight activity, strong attachment to narrow-leaved vegetation in development places, very rare observations in unsuitable habitats (even very close, e.g. 100 meters from large populations) and occurrence mostly in stable, natural habitats. However, a) regularly reported colonisations of new habitats, including rapid colonisations of many localities recorded in the study area, b) the species genetics (low diversity, lack of phylogeographic structure) as well as c) its wide, trans-Palaearctic range do not support that conclusion. It seems, therefore, that long-distance relocation of imagines occurs more frequently. This relocation is hypothetically based on specific long-distance dispersal flights that comprise three main phases: 1) active rising into the air, possibly to considerable heights, 2) partly active flight driven and supported by air streams and observation of terrain from a height, 3) falling down into a suitable habitat. This suggested pattern of relocation was supported by data from the study area, where

active flights of imagines high into the air were observed. It might also explain rare observations of imagines in unsuitable habitats." (Author)] Address: Mikolajczuk, P., Sekcja Odonatologiczna Polskiego Towarzystwa Entomologicznego, Poland. E-mail: gugapm@wp.pl

**17631.** Mohidilkhan, Z.M.; Alimovich, M.B. (2021): Seasonal activity of dragonflies (Insecta: Odonata) in the Fergana valley. *Scientific Bulletin of Namangan State University* 2(2): 125-129. (in Tajik, with Russian and English summaries) ["The article discusses the features of seasonal activity of dragonflies in the Fergana valley. It was found that the activity of dragonflies lasts from the second decade of March to the end of October during the year. At the same time, 2 activation time Peaks were observed." (Authors)] Address: Suvanhanovna, Zakirova Mohidilkhan, Andijän state University named after Z.M.Babur

**17632.** Mohira, A.; Makhsetbai, M.; Ikrom, A. (2021): Dragonfly fauna (Insecta: Odonata) of the Khorezm oasis. III international scientific and practical conference | ICNS "SCIENCE AND EDUCATION" : 22-24. (in Russian, with English summary) ["An article about our research on the faunistic analysis of dragonflies in the Khorezm oasis, information on some species of dragonflies that arise in Uzbekistan. Of great scientific and practical importance is the assessment of the current state of dragonflies, one of the most important groups of animals in the ecosystem, analysis of their faunistic composition, substantiation and implementation of scientific conclusions in the development of measures to study their distribution, economic significance and harm." (Authors)] Address: details not stated

**17633.** Monnerat, C.; Weiss, E.; Churko, G.; Fabian, Y. (2021): Die Libellengemeinschaft der Nassreisfelder in der Schweiz (Odonata). *Libellula Supplement* 16: 201-228. (in German, with English and French summaries) ["The dragonfly community in paddy fields in Switzerland (Odonata) – Odonata monitoring carried out in ten Swiss paddy fields in 2019 and 2020 revealed 42 species. Of these, 14 species developed in the fields, of which ten are bivoltine (*Ischnura elegans*, *I. pumilio*, *Anax ephippiger*, *A. imperator*, *A. parthenope*, *Crocothemis erythraea*, *Orthetrum albistylum*, *O. brunneum*, *O. cancellatum*, *Sympetrum fonscolombii*) and four univoltine (*Sympecma fusca*, *Sympetrum depressiusculum*, *S. striolatum*, *S. vulgatum*). The discovery of exuviae of *S. depressiusculum*, *S. striolatum*, and *S. vulgatum* in July 2020 documented their development and the survival of the eggs during the harvest in October and the preparation of the plots for sowing and planting in May. A mass emergence of a second generation of *A. ephippiger* and *S. fonscolombii* was observed in 2019. Population estimates for the Brugg site amounted to thousands or even tens of thousands of individuals, confirming the attractiveness of this habitat for the development of both migratory species in Central Europe. For *A. ephippiger*, the year 2019 corresponds to one of the largest known influxes in Switzerland and Europe over the last thirty years. The proven development of *S. depressiusculum* in the rice field of Ins suggests that rice fields have a



conservatory significance for this threatened species." (Authors)] Address: Monnerat, C., Info fauna, Bellevaux 51, 2000 Neuchâtel, Switzerland. E-mail: christian.monnerat@unine.ch

**17634.** Monnerat, C. (2020): La première donnée suisse d'*Aeshna subarctica* Walker, 1908 est jurassienne! (Odonata: Aeshnidae). *Entomo Helvetica* 13: 117-122. (in French, with German and English summaries) ["An adult male of *Aeshna subarctica* collected in 1967 by Willy Matthey in the Vallée de Joux in the Swiss Jura Mountains was discovered in the entomological collection at the Institute of Biology at the University of Neuchâtel. This specimen represents the first record for this species in Switzerland, as well as in the Jura Mountains." (Author)] Address: Monnerat, C., info fauna, Bellevaux 51, CH-2000 Neuchâtel, Switzerland. E-mail: christian.monnerat@unine.ch

**17635.** Moore, M.P.; Hersch, K.; Sricharoen, C.; Leeb, S.; Reice, C.; Rice, P.; Kronick, S.; Medley, K.A.; Fowler-Finna, K.D. (2021): Sex-specific ornament evolution is a consistent feature of climatic adaptation across space and time in dragonflies. *PNAS* 2021 Vol. 118 No. 28 e2101458118. 7 pp. (in English) ["Adaptation to different climates fuels the origins and maintenance of biodiversity. Detailing how organisms optimize fitness for their local climates is therefore an essential goal in biology. Although we increasingly understand how survival-related traits evolve as organisms adapt to climatic conditions, it is unclear whether organisms also optimize traits that coordinate mating between the sexes. Here, we show that dragonflies consistently adapt to warmer climates across space and time by evolving less male melanin ornamentation—a mating-related trait that also absorbs solar radiation and heats individuals above ambient temperatures. Continent-wide macroevolutionary analyses reveal that species inhabiting warmer climates evolve less male ornamentation. Community science observations across 10 species indicate that populations adapt to warmer parts of species' ranges through microevolution of smaller male ornaments. Observations from 2005 to 2019 detail that contemporary selective pressures oppose male ornaments in warmer years; and our climate-warming projections predict further decreases by 2070. Conversely, our analyses show that female ornamentation responds idiosyncratically to temperature across space and time, indicating the sexes evolve in different ways to meet the demands of the local climate. Overall, these macro- and microevolutionary findings demonstrate that organisms predictably optimize their mating-related traits for the climate just as they do their survival-related traits." (Authors)] Address: Moore, M.P., Living Earth Collaborative, Washington University, St. Louis, MO 63130, USA

**17636.** Murwitaningsih, S.; Setyaningsih, M.; Sandajaja, D.P. (2021): Developing an Android-based guidebook to dragonflies and butterflies. *Advances in Social Science, Education and Humanities Research* 547: 227-231. (in English) ["Dragonflies (Odonata) and butterflies (Lepidoptera) play very important roles in the ecosystem and there are a great many of them. It is estimated that there are more than 5,000

types of dragonflies and 17,500 types of butterflies in the world, among them around 800-1,000 types of dragonflies and 2,200-3,000 types of butterflies can be found in Indonesia. A series of observations conducted in July 2018 at the Cibodas Botanical Garden in West Java found 8 species of dragonflies and 33 species of butterflies. The aim of this research is to develop an Android-based mobile guidebook application for dragonfly and butterfly observation that can be used at any time to easily identify dragonflies and butterflies. This research is a development research that refers to the 4D development model. In the Define stage, activities were carried out to collect initial information related to the diversity of dragonflies and butterflies. In the Design stage, activities were carried out to design books and Android applications. In the Develop stage, validation activities were carried out by dragonfly and butterfly experts, as well as media experts using questionnaires, interviews and discussions (FGD). In the Disseminate stage, activities were carried out to test an android application on students of the Biology Education Department at FKIP UHAMKA. The data obtained were analyzed using quantitative and qualitative descriptive techniques. The test results show that the guidebook was assessed as very good on the presentation aspect, very good for the material and good for the language, with a score of 88%, 85% and 82%, respectively. Thus, this mobile guidebook application, called ODOLEPI, is feasible for use in the observation of dragonflies and butterflies." (Authors)] Address: Murwitaningsih, S., Biology Education Dept, Univ. of Muhammadiyah Prof. Dr. HAMKA, Jakarta, 12130, Indonesia. E-mail: murwitaningsih@uhamka.ac.id

**17637.** Nayak, A.K.; Roy, S. (2021): Further additions to the Odonata (Insecta) fauna of Asansol-Durgapur Industrial Area, Paschim Bardhaman, India. *Journal of Threatened Taxa* 13(6): 18631-18641. (in English) ["In this present communication we report the occurrence of additional 13 Odonate species from the Asansol-Durgapur Industrial Area, West Bengal, India, making the total 76. This paper reports the first record of *Libellago indica* and first photographic records of *Macromia flavicincta* from West Bengal. It also reports the range extension of *Macromia cingulata* from the Purulia District to Paschim Bardhaman District." (Authors)] Address: Roy, S., B-9/138, Kalyani, Nadia, West Bengal 741235, India. E-mail: roy.riju.nitdgp@gmail.com

**17638.** Nel, A.; Huang, D. (2021): A new damselfly dragonfly family from the Middle–Late Jurassic of China (Odonata: E-piproctophora). *Alcheringa* 45(1): 91-94. (in English) ["*Enigmalestes lini* gen. et sp. nov. is described and illustrated on the basis of a complete forewing from the Middle–Late Jurassic of China. It corresponds to a new family *Enigmalestidae* due to a unique combination of characters. We propose to include it in the isophlebiopteran clade *Euparazygoptera*. This new species shows a highly specialized cubitoanal area, features that are convergently present in *Asiapteridae*, *Triasolestidae*, and the enigmatic genus *Germanophlebia*, the latter of which we exclude from the *Euparazygoptera* and transfer into the *Isophlebiida* sit. nov. *Enigma-*

lestes is among the youngest representatives of the Eupazygoptera, otherwise known from the Late Triassic to the Early Jurassic. This discovery confirms the high diversity of the Odonata during the Mesozoic." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**17639.** Nel, A. (2021): Maastrichtian representatives of the dragonfly family Aeschnidiidae question the entomofaunal turnover of the early Late Cretaceous. *Palaeoentomology* 4(3): 209-212. ["Gaps in the fossil record are the major challenge for estimations of impacts of crises of biodiversity of the various clades. They can lead to important misinterpretations in the effects of the different events on the fauna and flora. It is especially the case for the end-Cretaceous, which is 'near the midpoint of a 16-million-year gap in the insect fossil record' (Schachat & Labandeira, 2021: 111). All the important Cretaceous insect Konzentrat Lagerstätten are before the Turonian. The analysis of Schachat et al. (2019) has reconstructed a massive loss of family-level diversity for the insects at the boundary Cretaceous-Cenozoic, a possible artefact due to this gap. An alternative scenario was that a turnover in the entomofauna occurred during the early Late Cretaceous in relation to the floristic changes of the Albian–Cenomanian (Nel et al., 2018). This turnover would have also affected the aquatic insects through important changes in the freshwater environments (Sinitshenkova & Zherikhin, 1996; Ivanov & Sukatsheva, 2002). The current knowledge on the odonatan fossil record suggests a pronounced turnover with the last records of several major clades during the Cenomanian-Turonian and first records of several modern ones during the same period (Nel et al., 2015). The widespread and very diverse Jurassic–Cretaceous family Aeschnidiidae is among the best examples of such extinctions supposed to have occurred after the Cenomanian, because of the absence of any fossil in younger strata." (Author)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**17640.** Nel, A.; Zhang, D. (2021): The recently proposed odonatan 'suborder' Cephalozygoptera: fact or fiction. *Palaeoentomology* 4(2): 165-170. (in English) ["The new 'suborder' Cephalozygoptera was recently proposed for three fossil families of damselfly-like Odonata, on the basis of three characters of the head. Here we show, thanks to counterexamples of the presence of these characters in compression fossils of genuine Zygoptera, that these 'characters' do not exist in reality but are due to deformations and compression of the heads, a very frequent phenomenon in the fossil record of the whole superorder Odonatoptera. Furthermore, these alleged characters would have to have been regarded as symplesiomorphies, insufficient to support a new clade. Consequently, we consider the Cephalozygoptera as unfounded, to be rejected in the current state of knowledge. A new phylogenetic analysis of the whole clade Panodonata would be welcome. We also discuss the position of some previously described fossils: the Paleocene genus *Valerea*

is restored in the Epallagidae (Euphaeidae), and the two Burmese amber genera *Electrodysagrion* and *Palaeodysagrion* are restored in the family *Dysagrionidae*." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**17641.** Nemirini, T. (2021): Improving the performance of horizontal axial wind turbines using bioinspired airfoil shapes for its blades at low Reynolds numbers. PhD. thesis, Department of Electrical and Mining Engineering, University of South Africa. XII + 80pp.(in English) ["Small-scale wind turbines were not considered viable in the past due to their poor efficiencies, mainly because of their aerodynamic effects around the irfoil shape. Recently researchers have renewed interest in enhancing the aerodynamic performances of the blades' designs inspired by the aerodynamic pattern of biological characteristics of insects and marine mammals such as locusts, dragonflies, damselflies, Humpback Whales etc. Bioinspired wing designs have advantages compared to conventional smooth irfoil blades as they can counter the bending forces that the wings experience during flapping. Bio-inspired corrugated airfoil based on dragonfly wing geometries have been reported to perform well compared to conventional airfoil at low Reynolds numbers. Corrugated airfoils reduce flow separation and enhance aerodynamic performance by trapping vortices in the corrugations thus drawing flow towards the airfoil's surface. This results in the higher lift whilst incurring only marginally higher drag. Such airfoils also have an advantage when it comes to span-wise structural stiffness due to the corrugated cross-sections. Replacing conventional turbine blades by tubercles or corrugated blades could enhance turbine performance by reducing the pressure gradient along the leading edge; however, the aerodynamic effects at the leading edge will depend on the variations of wavelength and amplitude. In this study, two types of computational studies were investigated: Optimising a corrugated airfoil and investigating the aerodynamic effects of a sinusoidal shape at the leading edge of a blade. Previous studies used an idealized geometry based on the dragonfly wing cross-section profile but did not attempt to optimize the geometry. In the present study: a two-dimensional CFD model is constructed using ANSYS Fluent Workbench-Design Explorer to determine the optimal corrugated blade profile for four angles of attack (AOA) from 5° to 20° corresponding to typical AOA of small-scale wind turbine blades. Two modified blades with variations of wavelength and amplitude at the leading edge were studied to investigate the aerodynamic effects. Three-dimensional models were constructed using Qblade software and 3D points were exported to AutoCAD Inventor to generate the CAD model. The governing equations used are continuity and Navier-Stokes equations written in a frame reference rotating with the blade. The CFD package used is ANSYS FLUENT 19.0. The simulation was run under steady-state, using SST-k omega turbulence model. The modifications have improved the aerodynamic performance. The optimised corrugated blade produced a maximum increase of CL and L/D. Both modified blades (1 and 2) had their performances measured separately and compared to that of

baseline blade SG6042 (Conventional blade). Modified blade 1 had a lower wavelength and amplitude at the leading edge of 14.3 % and 4 % respectively of the chord. It was noted that the aerodynamic performance decreased by 6%. Modified model 2, on the other hand had a higher wavelength and amplitude at the leading edge. of 40.4 % and 11.9 % respectively of the chord. It was also noted the aerodynamic performance increased by 6%. From the empirical evidence highlighted above, it can be observed that there is a direct correlation between wavelength, amplitude, and aerodynamic performance of the blade." (Author)] Address: Nemirini, T., Dept of Electrical and Mining Engineering, University of South Africa, Private Bag X6, FLORIDA, 1710, SA

**17642.** Ngiam, R.W.J.; Chan, J.P.S.; Khoo, M.D.Y.; Kong, E.Y.L.; Low, B.W. (2021): Description of the larva of *Brachygonia oculata* (Brauer, 1878) (Odonata: Libellulidae) with notes on rearing technique. *Zootaxa* 4966(5): 563-570. (in English) ["The larva of the genus *Brachygonia* Kirby, 1889 is described and illustrated for the first time based on the larvae of *Brachygonia oculata* (Brauer, 1878) discovered and successfully reared in Singapore. Compared to known larvae from genera in the rather heterogeneous subfamily Brachydiplacinae, *B. oculata* is most similar to species from the genus *Brachydiplax* Brauer, 1868 after comparison is made with the larva of *Brachydiplax farinosa* Krüger, 1902." (Authors)] Address: Ngiam, R.W.J., Block 539, Ang Mo Kio, Avenue 10, Unit 13-2577, Singapore 560539. E-mail: yan-robin@hotmail.com

**17643.** Ngo, Q.P.; Phan, Q.T.; Bui, A.P.; Karube, H. (2021): Description of the female *Atratothemis relsi* Wilson, 2005, from central Vietnam, with notes on the male (Odonata: Libellulidae). *Odonatologica* 50(1/2): 107-114. (in English) ["Illustrations of both sexes of *Atratothemis relsi* Wilson, 2005, including a description of the female based on specimens from central Vietnam are presented." (Authors)] Address: Ngo, Q.P., Center for Entomology & Parasitology Research, College of Medicine & Pharmacy, Duy Tan Univ., Da Nang 550000, Vietnam. E-mail: ngo-quocphu@gmail.com

**17644.** Nilamsari, E.I.; Umah, N.; Daradwinta, R.; Nicolla, A.C.; Irsyad, A.N.; Firdasia, W.; Sarifah, Z.; Sukirno, S. (2021): The diversity of Odonata in Parangkusumo Sand Dune Yogyakarta, Indonesia. *IOP Conf. Ser.: Earth Environ. Sci.* 736 012047: 5 pp. (in English) ["Parangkusumo sand dune is a one of unique eolian ecosystem in Yogyakarta. The study on the species diversity of dragonflies in this habitat is still limited. The main purpose of this research was to observe the dragonflies species diversity in Parangkusumo sand dune, Yogyakarta, Indonesia. The collection of dragonflies was done by aerial collection using sweep net. The specimens identification was done in Entomology Laboratory, Faculty of Biology, Universitas Gadjah Mada based on the morphological characters of the adult stage. The results showed that there were 22 species of Odonata, including 17 Anisoptera and 5 Zygoptera. The diversity index ( $H'$ ) was 2.51 which inferred medium diversity. Several species such as

*Anax guttatus*, *Lestes praemorsus* and *Tramea transmarna* were found to be endemic species. The highest relative abundance of the species was *Orthetrum sabina* (21.79%) and lowest abundance of species is *Orthetrum chrysis* (0.14%). Parangkusumo sand dune has medium dragonfly diversity, thus it is recommended this habitat need to be conserved." (Authors)] Address: Nilamsari, E.I., Faculty of Biology, Universitas Gadjah Mada, Yogyakarta, Indonesia. E-mail: elvianindah@mail.ugm.ac.id

**17645.** Noorhidayah, M.; Arpah, A.; Norma-Rashid, Y. (2021): Classification and morphology of *Rhinocypha* spp. (Odonata): A comprehensive taxonomic study within the females. *Zoological Studies* 60: 39 pp. (in English) ["Studies on Odonata have gained worldwide attention as well as locally in Malaysia. Although there is a wealth of data available to be utilized for solving taxonomic problems but ecological and behavioural research areas are more favoured in contrast to taxonomy and systematics. Thus, there are existing confusions for correct identifications in closely related and sympatric species, especially in female odonates. One such example is in the genus of *Rhinocypha*. Consequently, the research is focused on taxonomic work, employing multi-approaches in the form of morphological (morphological diagnostics, Field Emission Scanning Electron Microscope and geometric morphometric analysis), with applying the molecular technique. 17 morphological characteristics were created to differentiate between the females of *Rhinocypha* spp. The FESEM on the female's ovipositor was done to focus on the anal appendages and sheathing valve (V3). Also, the phylogenetic patterns expressed by COI and 16S rRNA genes, and canonical variate analysis for the wing geometric morphometric revealed three clusters that supported the distinction of the *Rhinocypha* group. In summary, this study had effectively developed an integrated approach of classic morphological and trendy molecular, combined with microscopy techniques, FESEM, which provided corroborative evidence in resolving taxonomic uncertainties." (Authors) *Rhinocypha biforata*, *R. fenestrella*, *R. perforata*] Address: Noorhidayah, M., Institute of Biological Science, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia. E-mail: nhidayahm@um.edu.my

**17646.** Novelo-Gutiérrez, R.; Arce-Pérez R. (2021): Description of the larva of *Micrathyria paulsoni* González-Soriano, 2020 (Odonata: Libellulidae). *Zootaxa* 4981(2): 357-364. (in English) ["The last instar larva of *M. paulsoni* is described and illustrated in detail based on specimens collected in Veracruz State, Mexico. It is compared with the larvae of *M. didyma* (Selys in Sagra, 1857) and *M. hypodidyma* Calvert, 1906, all of them belonging into the "*Micrathyria didyma*" group. The main structural features of *M. paulsoni* larva are 9–10 long premental setae plus 4–5 small setae, palpal setae 10, legs banded, a large, submedian, dark spot on each side of a pale middorsal line on S6–9, S8–9 with a posterolateral spine, larger in S9." (Author)] Address: Arce-Pérez R., Inst. Ecología A.C. Red Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: roberto.arce@inecol.mx



**17647.** Novelo-Gutierrez, R. (2021): Description of the larva of *Planiplax sanguiventris* (Calvert, 1907) (Odonata: Libellulidae). *Zootaxa* 4966(5): 578-584. (in English, with Spanish summary) ["The last instar larva of *P. sanguiventris* is described and illustrated in detail based on one specimen collected in the municipality of Tenosique, Tabasco, Mexico. It is compared with the larvae of *P. phoenicura* Ris, 1912 and a congeneric unidentified species from Colombia. The main structural features are the number of setae on palp and prementum, the size of dorsal protuberance on S3, and the length of posterolateral spines on S8–9 and caudal appendages." (Author)] Address: Novelo-Gutierrez, R., Instituto de Ecología A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.mx

**17648.** Novin, T.; Riyanto (2021): The abundance of Odonata insect in Lebak swamp, Bukit Baru, Palembang, Indonesia. *Jurnal Biologi Tropis* 21(1): 255-261. (in English) ["Lebak swamp in Bukit Baru has been largely degraded due to reclamation activity. Lebak swamp plays important role as land resource in Bukit Baru, Palembang. The aim of this study was to examine the composition of Odonata in lebak swamps in Bukit Baru, Palembang, Indonesia. The transect line (1 km) was used to collect odonata in the study area. This study recorded 8 species during the study period. The highest diversity of odonata was found in site A1. The highest abundance of odonata was recorded at site A2 and A4 and dominated by *Ceriatagris coromandelianum* and *Orthetrum sabina*. *Neurothemis ramburii* had the lowest abundance at site A1 and A2, but absent at site A3 and A4. The occurrence of odonate species are lower at site around anthropogenic activity suggests the need to protect the lebak swamp so that such uncommon species will not go into local extinction. *Neurothemis ramburii* can become potential species to evaluate the rate of disturbed environment." (Authors)] Address: Novin, T., Raden Fatah Islamic State Univ., Palembang, Indonesia; E-mail: Novinteristiandi\_uin@radenfatah.ac.id

**17649.** Noviyana, W.; Triyanti, M.; Widiya, M. (2021): Inventory of dragonflies in the Curug Panjang Waterfall area, Muara Beliti District, Musi Rawas Regency. *Journal on Biology and Instruction* 1(1): 1-6. (in English, with Indonesian summary) ["There are many kinds of fauna in the waterfall Curug Panjang Muara Beliti, Musi Rawas Regency. One of the types of fauna found in this area is insects. Dragonflies is insects whose habitats live in water and in the air. This study aims to determine the types of dragonflies and abiotic factors carried out in the Curug Panjang waterfall area by using purposive sampling method. Data collection techniques are observation, documentation and identification. Sampling using insects net. The results of the study have been obtained by 2 sub-orders, 4 families and 12 different species namely *Diplacodes trivialis*, *Orthetrum pruinosum*, *O. sabina*, *O. pruinosum*, *Crocothemis servillia*, *Neurothemis ramburii*, *Trithemis aurora*, *Pantala flavescens*, *Tholymis tillarga*, *Ictinogomphus*, *Agriocnemis pygmaea*, and *Copera marginipes*. Abiotic factor measurement results are

with an average air temperature of 27,75°C, 76% air humidity and 396,5 lux light intensity." (Authors)] Address: Noviyana, Windy, Biology Education STKIP PGRI Lubuklinggau, Jl. Mayor Toha Kel. Air Kuti, Lubuklinggau, Indonesia. E-mail: windy.ny09@yahoo.com

**17650.** Nunes, L.; Casanueva, P.; Santamaría, T.; Hernández, M.A.; Campos, F. (2021): Useful biometric variables in Iberian exuviae of *Boyeria irene* (Fonscolombe, 1838) (Odonata: Aeshnidae). *International Journal of Odonatology* 24: 158-168. (in English) ["In species of similar shape and size, biometric analyses make it possible to establish differences. Within one species, biometrics can help researchers to detect differences between populations and analyze their adaptations to environmental conditions. Until now little was known about the biometrics of the Iberian populations of *B. irene*, a large species living mainly in southern Europe. Eight biometric variables were studied in male and female exuviae of *B. irene* collected in three rivers of the Iberian Peninsula, with the objective of ascertaining which are the most suitable populations of this species to study. An analysis of principal components (PCA) shows that lengths of the epiproct, paraproct and prementum are the most influential in each of the three populations. The other variables (head width, body length, length of the gonapophyses, maximum and minimum width of the prementum) proved not to be relevant in this context." (Authors)] Address: Nunes, Luisa, Escola Superior Agrária de Castelo Branco (ESA-IPCB/CEABN-INBIO), Qta. Sra. Mércules, 6000 Castelo Branco, Portugal. Email: pcasanueva@uemc.es

**17651.** Nur-ul-Islam, H.; Zia, A.; Khan, K.; Ali, H.; Aziz, A. (2021): *Sympetrum hypomelas* (Selys, 1884), an addition to Anisoptera fauna of Pakistan. *Pakistan Journal of Agricultural Research*, 34(3): 538-544. (in English) ["*S. hypomelas* is added to the Anisoptera fauna of Pakistan by reporting it from district Swabi of Khyber Pakhtunkhwa province. Out of 33 sampling sites, specimens of *S. hypomelas* were found from a single locality of the district. Identification of the specimens was done at National Insect Museum, Islamabad. Detailed description including synonyms, differential characters for the species, previous global records, habitat description, measurements of body parts and ecological data for the positive localities are provided. With the addition of this taxon, Anisoptera fauna of Pakistan now counts 74 species. The area carries important ecology and is less explored for odonate fauna. Although in recent past, few faunistic studies were conducted in this area; yet these couldn't add anything new to the country's fauna. The area under district Swabi represents many lush green valleys and possesses lots of water bodies which support a broad complex of Odonata. More surveys in the district are suggested to unveil probable new records from the area. ... Locality: Tehsil Razzar: Village, Qassam Killi/ also known as Shadad Killi (34.10759°N, 72.27002°E; 1112ft), 19. ix. 2018, 1 male; 24. ix. 2018, 1 ♀." (Authors)] Address: Nur-ul-Islam, H., Dept Zool., Abdul Wali Khan Univ. Mardan, Khyber Pakhtunkhwa, Pakistan

**17652.** Odabasi, S. (2021): Assessment of habitat quality using macroinvertebrates and water quality parameters of a clay quarry wetland. *Journal of Advanced Research in Natural and Applied Sciences* 7(2): 274-281. (in English) ["In this study, it is aimed to determine the habitat quality of the Bozalan quarry wetland by using diversity and a compositional index of benthic macroinvertebrates and some of the water quality parameters. The field studies were conducted in the three sampling sites chosen in the wetland three times (March, April, and May) in 2018. The standard multi-habitat method was used for the benthos sampling. Besides, water sampling was performed for the parameters measured in-situ and analyzed in the laboratory to reveal the water quality status of the wetland. Some of the diversity index values of the benthic macroinvertebrates including Shannon Wiener (H'), Evenness Index (EI), and BMWP-e were calculated. The results showed that the sampling sites were categorized into higher classes (I and II) in general according to water quality criteria of the surface waters of Turkey. Fourteen taxa of benthic macroinvertebrates were identified. The most dominant taxa were *Coenagrion* sp. (42.31%), *Baetis rhodani* (15.38%), and *Physella acuta* (10%) in the study area. The highest number of individuals of macroinvertebrates was obtained in March (62 ind./m<sup>2</sup>), meanwhile the highest taxa number was determined in May (10 taxa). The H' index was reached its highest value in May (1.723), whereas the lowest value of the index was in March (1.054). The highest score of the BMWP-e was found in May (26), while the lowest score was found in April (16)."] (Authors)] Address: Odabasi, S., Vocational School of Marine Technologies, Çanakkale Onsekiz Mart University, Çanakkale, Turkey

**17653.** Okude, G.; Futahashi, R. (2021): Pigmentation and color pattern diversity in Odonata. *Current Opinion in Genetics and Development* 69: 14-20. (in English) ["The order Odonata (dragonflies and damselflies) comprises diurnal insects with well-developed vision, showing diverse colors in adult wings and bodies. It is one of the most ancestral winged insect groups. Because Odonata species use visual cues to recognize each other, color patterns have been investigated from ecological and evolutionary viewpoints. Here we review the recent progress on molecular mechanisms of pigmentation, especially focused on light-blue coloration. Results from histology and pigment analysis showed that ommochrome pigments on the proximal layer and pteridine pigments on the distal layer of the epidermis are essential for light-blue coloration. We also summarize genes involved in the biosynthesis of three major insect pigments conserved across insects and discuss that gene-functional analysis deserves future studies."] (Authors) Males of the following species are studied: *Calopteryx japonica*, *C. cornelia*, *Crocothemis servilia* (mature and immature), *Ceragrion melanurum*, *Paracercion hieroglyphicum*, *Lyriothemis pachygastra*, and *Orthetrum japonicum*.] Address: Okude, G., Department of Biological Sciences, Graduate School of Science, The University of Tokyo, Bunkyo-ku, Tokyo, 113-0033, Japan. E-mail: gentaokude@gmail.com

**17654.** Ott, J. (2021): Libellen im Donnersbergkreis. In: Himmler, H. (Koord.) (2021): *Die Natur in der Region am Donnersberg*. Hrsg: POLLICHA-Kreisgruppe Donnersberg e.V. Eigenverlag der POLLICHA-Kreisgruppe Donnersberg. Kirchheimbolanden, 228 S.: 128-133, -219-220. (in German) [Rheinland-Pfalz, Germany; 49 odonate species are checklisted.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**17655.** Orioli, V.; Gentili, R.; Bani, L.; Aguzzi, S. (2021): Microhabitat selection and population density of *Nehalennia speciosa* Charpentier, 1840 (Odonata: Coenagrionidae) in a peripheral microrefugium. *Wetlands* 41 (86). 14 pp. (in English) ["Peripheral populations of boreal tyrophilic animals and plants often occupy relict Alpine peatlands, which act as microrefugia. Ecological conditions within local peatlands can lead to uncommon adaptations, highly valuable for the long-term conservation of species and habitats. *N. speciosa* is an endangered Odonata distributed in Central and Eastern Europe with peripheral populations in the Alps. We investigated the microscale species-habitat association and the conservation status of one of these populations in a relict raised bog. We applied dynamic N-mixture models to assess population ecology and density, while disentangling predictors' effect on ecological and observation process. We counted *N. speciosa* individuals in spring 2018 along with vegetation, water, soil and weather conditions during surveys. Final model resulted reliable according to performance measures. Spatial variation in *N. speciosa* abundance was driven by vegetation type, with a strong selection for flooded hollows where *C. rostrata*, *R. alba* and *S. palustris* vegetation occupy acidic and oligotrophic shallow pools. Population density showed a peak in the first decade of June and increased with accumulation of superficial water. Detection probability was generally low and decreased further when wind blew. The reduced ecological plasticity of the species imperil the species to habitat and climate changes, which will be particularly threatening for its peripheral Alpine populations in the near future, causing water imbalance and rapid vegetation turnover within the peatlands' fragile microhabitat. The studied peat bog could thus be retained a key future microrefugium for the long-term conservation of tyrophilous wildlife and habitats."] (Authors)] Address: Orioli, V., Dept of Earth and Environmental Sciences, Univ. of Milano-Bicocca, Milan, Italy. E-mail: valerio.orioli@unimib.it

**17656.** Pachomski, A.; McNulty, S.; Foss, C.; Cohen, J.; Farrell, S. (2021): Rusty Blackbird (*Euphagus carolinus*) foraging habitat and prey availability in New England: Implications for conservation of a declining boreal bird species. *Diversity* 2021, 13, 99.: 15 pp. (in English) ["*E. carolinus* is an imperiled migratory songbird that breeds in and near the boreal wetlands of North America. Our objective was to investigate factors associated with Rusty Blackbird wetland use, including aquatic invertebrate prey and landscape features, to better understand the birds' habitat use. Using single-season occupancy modeling, we assessed breeding Rusty Blackbird use of both active and inactive beaver-influenced wetlands in New Hampshire and Maine, USA. We

conducted timed, unlimited-radius point counts of Rusty Blackbirds at 60 sites from May to July 2014. Following each point count, we sampled aquatic invertebrates and surveyed habitat characteristics including percent mud cover, puddle presence/absence, and current beaver activity. We calculated wetland size using aerial imagery and calculated percent conifer cover within a 500 m buffer of each site using the National Land Cover Database 2011. Percent mud cover and invertebrate abundance best predicted Rusty Blackbird use of wetlands. Rusty Blackbirds were more likely to be found in sites with lower percent mud cover and higher aquatic invertebrate abundance. Sites with Rusty Blackbird detections had significantly higher abundances of known or likely prey items in the orders Amphipoda, Coleoptera, Diptera, Odonata, and Trichoptera. The probability of Rusty Blackbird detection was  $0.589 \pm 0.06$  SE. This study provides new information that will inform habitat conservation for this imperiled species in a beaver-influenced landscape." (Authors)] Address: Pachomski, Amanda, Department of Environmental and Forest Biology, State University of New York College of Environmental Science and Forestry, 1 Forestry Drive, Syracuse, NY 13210, USA. E-mail: amandapachomski@gmail.com

**17657.** Pachu, A.V.; Kumar, S.; Mohan, V.; Jeeva, V. (2021): Biomonitoring of water quality by the use of aquatic macroinvertebrates of the Mahan River in Singrauli, Madhya Pradesh, India. *Indian Forester* 147(4): 328-338. (in English) ["Aquatic macroinvertebrates in the perennial/seasonal streams of the River Mahan in the Mahan Reserved forest in Singrauli district, Madhya Pradesh were sampled semi-quantitatively with a view to ascertain biological water quality by employing the Macroinvertebrate Water Quality Index (MWQI). The study identified 747 individuals of macroinvertebrates comprising of 32 taxa belonging to 10 orders and 28 families with Ephemeroptera (57%) and Odonata (54%) as the dominant taxa respectively during monsoon and summer. Abundance and richness of macroinvertebrates were relatively high during summer than during the monsoons. Among the Biotic Indices of macroinvertebrates used for biomonitoring, the Taxa Tolerance Score (TTS) indicated 'good' with 'clean, but slightly impacted' water quality, that of the Average Score Per Taxon (ASPT) was 'moderate' and the Macroinvertebrate Water Quality Index (MWQI) indicated 'fair' water quality with 'significant pollution' respectively during both the sampling seasons. This study has improved the authors' knowledge about aquatic biodiversity of the water course and to improve the evaluation of water quality by employing biotic indices based on macroinvertebrates." Odonate taxa are treated at the family level. (Authors)] Address: Pachu, A.V., Institute of Forest Genetics and Tree Breeding, Coimbatore - 641002 India. E-mail: anishpachu@gmail.com

**17658.** Park, S.-C.; Lee, K.Y.; Choi, K.-S.; Han, M.-S.; Ko, M.-H. (2021): Inhabitat status and gastric contents of invasive fish species and the effect on fish fauna at three reservoirs in National Parks of Korea. *Korean Journal of Ichthyology* 33(2): 84-94. (in Korean, with English summary) [„This

study was conducted to elucidate the impact of invasive species, *Micropterus salmoides* and *Lepomis macrochirus* in Geumgyeji, Samgaji and Naejangji reservoirs of National Parks, Korea in 2020. In the Geumgyeji, 1,221 individuals of 11 species in 7 families were collected including *M. salmoides* (relative abundance, 96.3%) and *L. macrochirus* (0.3%), *M. salmoides* fed mainly on *Rhinogobius brunneus* (IRI, 37.2%), Odonata (25.6%), Megaloptera (11.6%), and *M. salmoides* (7.0%). In the results of Samgaji showed that 854 individuals of 10 species in 5 families were collected including *M. salmoides* (60.8%), and *M. salmoides* fed mainly on Decapoda (shrimp, 33.6%), Odonata (34.4%), *R. brunneus* (21.2%), and *Zacco platypus* (6.1%). In the Naejangji showed that 1,075 individuals of 13 species belonging to 7 families were collected including *L. macrochirus* (38.1%) and *M. salmoides* (9.5%), and *L. macrochirus* fed mainly on Branchiopoda (77.5%), Diptera (9.8%), Decapoda (4.0%) and *M. salmoides* fed mainly on *R. brunneus* (73.3%), Decapoda (21.2%). *M. salmoides* of Geumgyeji and Samgaji were apparently introduced more than a 10 years ago. The fish population declined rapidly since the introduction of *M. salmoides*. *L. macrochirus* of Naejangji was introduced more than 20 years ago, which increased its relative abundance to 40%. *M. salmoides* was introduced five to six years ago, and the fish species and population declined rapidly since the introduction of *M. salmoides*. Finally, we discussed the inhabitat status and management of *M. salmoides* and *L. macrochirus* in the National Park." (Authors)] Address: Ko, M.-H., Kosoo Ecology Institute, Seoul 07952, Republic of Korea. E-mail: hun7146@gmail.com

**17659.** Paulson, D.; Marinov, M. (2021): Zootaxa 20th Anniversary Celebration: Odonata section. *Zootaxa* 4979(1): 218-221. (in English) ["During the two decades (2001–2020) of the journal's existence, 346 papers on Odonata were published in Zootaxa. These papers contributed 317 new extant taxa, 26 new fossil taxa, and 106 new larval descriptions. By the end of the period, papers in Zootaxa were contributing slightly more than half of all descriptions of new extant taxa. Research was published from all over the world but predominantly from the American and Asian tropics, and authors from 42 countries contributed papers." (Authors)] Address: Marinov, M., Investigation and Diagnostic Centres and Response, Operations Branch, Ministry for Primary Industries, 231 Morrin Rd, Auckland 1072 New Zealand. E-mail: Milen.Marinov@mpi.govt.nz

**17660.** Paulson, D.R.; Haber, W.A. (2021): Dragonflies and Damselflies of Costa Rica. Comstock: 416 pp. (in English) ["Among the largest of all insects, dragonflies and damselflies are conspicuous. Active during the day, often brightly colored, and extremely photogenic—something about their appearance and dashing flight suggests a primeval world of tree ferns and dinosaurs. The first guide of its kind, this book includes an in-depth introduction with an overview of Costa Rican biodiversity and illustrated morphological terms. The species accounts show males and females of most species, detailed illustrations and close-ups of key distinguishing fea-



tures, and descriptions of habitat, behavior, and range. Dragonflies and Damselflies of Costa Rica gives readers the information they need to identify nearly every species in the country. Experienced dragonfly fans and new enthusiasts alike will find it an indispensable resource. "Written by two leading authorities, this handsome identification guide to the dragonflies and damselflies of Costa Rica is a first for any Central American country. Naturalists, researchers, and conservationists now have a richly illustrated resource with which to delve further into this important and beneficial group of insects. A splendid addition to the hiker's backpack, it is sure to lure new enthusiasts to the Odonata." Ken Tennesen, author of *Dragonfly Nymphs of North America* "This field guide covers the entire odonate fauna of Costa Rica, a biologically diverse country with nearly 300 species. It meets the high standards of Dennis Paulson's previous photographic guides to North American species. This will certainly become essential reading for anyone with an interest in the insects of Costa Rica and, in fact, much of Central America and northern South America." Michael May, coauthor of *Damselflies of North America*] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@pugetsound.edu

**17661.** Payra, A.; Biswas, S.; Boruah, B.; Das, G.N.; Gogoi, M.J. (2021): First record of *Indothemis carnatica* (Fabricius, 1798) from Assam, Northeast India (Odonata: Libellulidae). *Boletín de la Sociedad Entomológica Aragonesa* 68: 385-386. (in English, with Spanish summary) ["*I. carnatica* is reported here for first time from Assam (Northeast India) based on photographic records, from the Jeypore Reserve Forest of Upper Assam." (Authors)] Address: Payra, A., Ramnagar, Purba Medinipur, West Bengal 721441, India. E-mail: arapayra@gmail.com

**17662.** Payra, A.; Dawn, P.; Subramanian, K.A.; Deepak, C.K.; Chandra, K.; Tripathy, B. (2021): New record of *Megalestes gyalsey* Gyeltshen, Kalkman & Orr, 2017 (Zygoptera: Synlestidae) from India, with first description of female and larva. *Zootaxa* 4938(2): 233-242. (in English) ["*M. gyalsey* is recorded for the first time from India, extending the known geographic range of the species. This report is based on the collection of 5 individuals (4 males, 1 female) from Jang waterfall, Tawang, Arunachal Pradesh and 2 males from Neora Valley National Park, Kalimpong district, West Bengal. The female of *M. gyalsey* is described for the first time with notes on the variation in the male. A probable larva of the species is also described and illustrated." (Authors)] Address: Subramanian, K.A., Zoological Survey of India, Southern Regional Centre 130, Santhome High Road, Chennai-600 028, India. E-mail: subbuka.zsi@gmail.com

**17663.** de Paz, V.; Baños-Picón, L.; Rosas-Ramos, N.; Tobajas, E.; Tormos, J.; Asís, J.D. (2021): The role of artificial ponds in maintaining dragonfly populations in an intensified farmland landscape. A case of study in Zamora, Spain. *Journal of Natural History* 54(37-38): 2439- 2454. (in English) ["Freshwater ecosystems are exceptionally threatened habitats and suffer biodiversity losses that exceed those in any

other ecosystem. Small waterbodies have been typically neglected and excluded from conservation strategies, even though they are essential for maintaining freshwater biodiversity. Dragonflies are considered effective surrogates of the diversity of other taxa and bioindicators of the state of aquatic environments. This study compares, in an intensified farmland landscape of western Spain, the capacity of farm ponds to maintain dragonfly diversity by comparing the Odonata communities of the four type of aquatic systems (river, stream, reservoir and farm pond) present in this region, in which the extant of permanent water bodies is scarce. The results showed higher diversity and abundance values in farm ponds than in any other aquatic system, agreeing with previous studies. Also, farm ponds harbour species from every other aquatic system, thereby occupying an intermediate position in the MDS, which demonstrated their potential value to act as stepping stones. Nevertheless, investigation of the dragonfly community composition revealed a generally low degree of ecological integrity of the studied systems, which are negatively impacted by agricultural and livestock farming intensification. These findings support the role of farm ponds in the maintenance of dragonfly diversity in the study area and emphasise the need of a specific legislation to regulate and protect them." (Authors)] Address: de Paz, V., Depto de Biología Animal, Ecología, Parasitología, Edafología y Química Agrícola, Univ. de Salamanca, Salamanca, Spain. E-mail: victordepaz177@usal.es

**17664.** Peng, L.; Zheng, M.; Pan, T.; Su, G.; Li, Q. (2021): Tandem-wing interactions on aerodynamic performance inspired by dragonfly hovering. *R. Soc. Open Sci.* 8: 202275. <https://doi.org/10.1098/rsos.202275>: 15 pp. (in English) ["Dragonflies possess two pairs of wings and the interactions between forewing (FW) and hindwing (HW) play an important role in dragonfly flight. The effects of tandem-wing (TW) interactions on the aerodynamic performance of dragonfly hovering have been investigated. Numerical simulations of single-wing hovering without interactions and TW hovering with interactions are conducted and compared. It is found that the TW interactions reduce the lift coefficient of FW and HW by 7.36% and 20.25% and also decrease the aerodynamic power and efficiency. The above effects are mainly caused by the interaction between the vortex structures of the FW and the HW, which makes the pressure of the wing surface and the flow field near the wings change. During the observations of dragonfly flight, it is found that the phase difference ( $\gamma$ ) is not fixed. To explore the influence of phase difference on aerodynamic performance, TW hovering with different phase differences is studied. The results show that at  $\gamma = 22.5^\circ$ , dragonflies produce the maximum lift which is more than 20% of the body weight with high efficiency; at  $\gamma = 180^\circ$ , dragonflies generate the same lift as the body weight." (Authors)] Address: Pan, T., Res. Institute of Aero-Engine, Beihang Univ., Beijing 100083, People's Republic of China. E-mail: pantianyu@buaa.edu.cn

**17665.** Perron, M.A.C.; Richmond, I.C.; Pick, F.R. (2021): Plants, water quality and land cover as drivers of Odonata

assemblages in urban ponds. *Science of The Total Environment* 773, 15 June 2021, 145467: 12 pp. (in English) ["Highlights: • Dragonfly and damselfly assemblages were largely determined by local-scale factors. Plants and water quality were significant for both terrestrial and aquatic stages. Landscape factors explained less variation in Odonata community structure. Diverse native wetland plant communities benefit Odonata lifecycles. Abstract: As cities expand, urban ecosystems could either contribute to or impede conservation efforts. To maximize the potential for urban areas to support biodiversity, there is a need to understand how systems in an urban environment can sustain the natural history requirements of species. This study compared the relative importance of local-scale factors (plant communities and water quality) to landscape factors (surrounding land cover) in structuring assemblages of a group of well-known indicators of wetlands and aquatic ecotones. Odonata (dragonflies and damselflies), at both the adult and larval life stages, along with plant communities, pond water quality and surrounding land cover types were sampled at 51 ponds across a north temperate metropolitan area. Plant communities (particularly of wetland species) consistently explained the largest amount of variation in both dragonfly and damselfly community structure at all life stages. Pond water quality was of secondary importance for both aquatic and terrestrial life stages, with dragonflies more negatively affected by urban contaminants than damselflies. Overall, surrounding land cover types in pond catchments explained less variation in Odonata community structure, especially in the case of damselflies. However, the presence of adjacent ponds and wetlands had a measurable effect. Plant, water quality and land cover variables together explained as much as half of the variation in Odonata community structure at ponds. Urban ponds could potentially provide high quality habitat for species when designed and managed to promote native wetland plant communities and water quality is maintained." (Authors)] Address: Perron, Mary Ann, Dept of Biology, Univ. of Ottawa, 20 Marie Curie Private, Ottawa, Ontario, Canada, K1N 6N5. E-mail: mperr058@uottawa.ca

**17666.** Peryana, R.; Anggraito, Y.U.; Widiatningrum, T. (2021): Development of supplement book based on dragonfly diversity in Lusi watershed. *Journal of Biology Education* 10(1): 52-62. (in English) ["The Lusi River has local potential for abundant biodiversity, one of them is the diversity of dragonfly species. This local potential can be compiled into a teaching supplement to complement the student's teaching book. Data on the diversity of dragonflies in the Lusi watershed of Blora region was successfully obtained and compiled as a supplementary book of biodiversity chapters. However, the feasibility of the book needs to be assessed by material experts, media experts, teachers, and students. The purpose of this study was to analyze the feasibility and response of teachers and students to the supplement book developed. This study is designed as Research and Development (R&D) that is limited to the small-scale test stage. Eligibility data obtained by using media validation questionnaires and questionnaires made in accordance with BSNP 2014 standards, while teacher and student response data is obtained

by using teacher and student response questionnaires. The validation of material experts against teaching supplements got a score of 93.23% and media experts gave a score of 98.61%, both with very decent categories. However, there are suggestions from material and media validators for minor revisions. Teacher and student responses to teaching supplement received scores of 91.83% and 97.3% respectively with very decent categories. Based on the results of the study, it can be concluded that the teaching supplement of dragonfly diversity in Lusi River watershed is feasible for use in the study of biodiversity chapters." (Authors)] Address: D6 Building 1st Floor Jl Raya Sekaran Gunungpati Semarang, Indonesia. E-mail: risks.peryama@gmail.com

**17667.** Phan, Q.T.; Karube, H.; Hung, N.V.; Anh, T.D. (2021): Description of *Chlorogomphus danhkyi* sp. nov. from Vu Quang National Park, central Vietnam with notes on other congeners from the Park (Odonata: Chlorogomphidae). *Zootaxa* 4985(1): 102-110. (in English) ["*Chlorogomphus danhkyi* sp. nov. (Holotype ♂: Khe Ro, Vu Quang National Park, Ha Tinh Province, 15.0444 N, 107.9270 E, altitude 1480 m) based on both sexes is described. The new species differs from *Chlorogomphus piaoacensis* Karube, 2013 mainly by the shape of male cerci. Other species of *Chlorogomphus* Selys, 1854 from Vu Quang National Park are also recorded." (Authors)] Address: Phan, Q.T., The Center for Entom. & Parasitol. Res., College of Medicine & Pharmacy, Duy Tan Univ., 550000, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

**17668.** Piano, E.; Mammola, S.; Dalle, M.; Riservato, E.; Isaia, M. (2021): Niche partitioning at emergence of two syntopic dragonflies. *Ecologies* 2021, 2(1), <https://doi.org/10.3390/ecologies2010001>: 11pp. (in English) ["We investigated the ecological requirements in the emergence phase of two congeneric species of Aeshnidae, *Aeshna grandis* and *A. juncea*, occurring in syntopy at the southernmost limit of their range. We sampled the exuviae of the two species at the peak of their emergence in three lakes in NW Italy. In each lake we defined 30 to 50 sampling plots along the lake borders where we checked for the presence of exuviae and collected data on the microhabitat composition. By modeling the response of the exuviae presence and abundance against the environmental parameters, we could highlight a partial differentiation in the ecological requirements of the two species at emergence. In particular, *A. grandis* is more influenced by the structure of the aquatic vegetation than *A. juncea* and the niche space occupied by *A. grandis* is wider, almost totally encompassing the one of *A. juncea*. We argue that *A. grandis* exploits microhabitats rich in aquatic plants to avoid competition with *A. juncea*. We suggest the preservation of well-structured aquatic vegetation as a key management practice to preserve the three studied populations of *A. grandis*, a species which has been recognized as Vulnerable for Italy according to the IUCN criteria." (Authors)] Address: Riservato, Elisa, Laboratory of Terrestrial Ecosystems, Dept of Life Sciences & System Biology, University of Turin, Via Accademia Albertina, I-10123 Torino, Italy. E-mail: elisa.riservato@gmail.com

**17669.** Polhemus, D.A.; Kalkman, V.J. (2021): Four new species of Wahnesia Förster, 1900 from the D'Entrecasteaux, Louisiade and Woodlark island groups, Papua New Guinea (Odonata: Argiolestidae). *Zootaxa* 5004(3): 447-464. (in English) ["The species of the damselfly genus Wahnesia Förster, 1900 occurring in the D'Entrecasteaux Islands, Louisiade Archipelago, and on Woodlark Island are reviewed, and four new species are described: *W. muyuw* from Woodlark Island, *W. misima* from Misima Island, *W. tagula* from Tagula (Sudest) Island, and *W. rossel* from Rossel Island, these latter three islands all lying in the Louisiade Archipelago. In addition, new information is presented on the identification and distribution of the two previously described species from the D'Entrecasteaux islands: *W. anulipes* (Lieftinck, 1956) from Goodenough, Fergusson, and Normanby islands, and *W. armeniaca* (Lieftinck, 1956) from Goodenough and Fergusson islands. Illustrations are provided for the male abdominal terminalia and genital ligula of the four new species, as well as the wings and a color photograph of a live male of *W. muyuw*, and the ligula of *W. armeniaca*, accompanied by updated distribution maps for all species treated." (Authors)] Address: Polhemus, D., Dept. of Natural Sciences, Bishop Museum, 1525 Bernice St., Honolulu, HI, 96817, USA. Email: bugman@bpbm.org

**17670.** Pompilio, L.; Mosini, A. (2021): The Odonate fauna of Val Grande National Park (Insecta: Odonata). *Fragmenta entomologica* 53(1): 25-42. (in English) ["The results of a survey aimed at describing the Odonate fauna of Val Grande National Park are presented, which was carried out in the framework of the project "Animal Biodiversity Monitoring in Alpine Habitat". Relevant literature was examined and data collected intensively in summer 2016 and extensively in the period 2014-2019. Prior to this research specific knowledge on dragonfly and damselfly presence and distribution accounted for 6 species for the study area, which were recorded near the northern border but outside the park. The first Odonate checklist here provided is based on 188 records (1173 individuals), of which 137 are recent and unpublished. Comprehensively 25 species were recorded (14 breeding), which represent 26% of the Italian fauna, 36% of Piedmont and 58% of the province of Verbano Cusio Ossola, whereas three species were not confirmed; 10 species were found inside the park (4 breeding). Odonate diversity was remarkable, thanks to Val Grande geographical position between the Alps and the Insubric region and to high rainfall coupled with a complex orography. The study area hosts populations of the boreo-alpine species *Somatochlora alpestris* and *Sympetrum danae*, which are scattered and isolated in Italian Alps, and of the endemic European *Cordulegaster bidentata*; it hosts lotic taxa which are concentrated in SW Europe where they are under pressure because of droughts and exploitation of freshwater. Conservation and status issues of observed dragonflies and damselflies are discussed in the light of the growing interest gained by odonates as ecological indicators. The study proposes to use this knowledge to guide the future expansions of the protected area." (Authors)] Address: Pompilio, Lucia, Società di Scienze Naturali del Verbano Cusio Ossola, Natural

Science Museum of Collegio Mellerio Rosmini, Via Antonio Rosmini 24, 28845 Domodossola (VB), Italy. E-mail: lucia.pompilio@libero.it

**17671.** Pound, K.L.; Larson, C.A.; Passy, S.I. (2021): Current distributions and future climate-driven changes in diatoms, insects and fish in U.S. streams. *Global Ecology & Biogeography* 30(1): 63-78. (in English) ["Aim Biodiversity on Earth is threatened by climate change. Despite the vulnerability of freshwater habitats to human impacts, most climate change projections have focused on terrestrial systems. Here, we examined how the current distributions and biodiversity of stream taxa might change under mitigated, stabilizing and increasing greenhouse gas emissions. Location Conterminous USA. Time period Present day to 2070. Major taxa studied Stream diatoms, insects and fish. Methods We developed species distribution models for 336 freshwater taxa from 1,227 distinct stream localities using water chemistry, watershed and climatic variables. Models based only on climate were used to project changes in the distributions and biodiversity of cold- versus warm-water taxa under representative concentration pathways (RCPs) ranging from 2.6 to 8.5 W/m<sup>2</sup>. Results In all three organismal groups, climate emerged as the strongest predictor of species distributions, providing comparable explanatory power to water chemistry and watershed variables combined. The RCP-based projections suggested a widespread expansion of warm-water taxa, outpacing the decline of cold-water taxa. Consequently, overall species richness would increase, but beta diversity would decrease drastically with the severity of climate change. A closer look at individual taxa and functional guilds revealed that vulnerable cold-water taxa included: (a) diatom guilds forming the base and bulk of the biofilm; (b) environmentally sensitive insects, characteristic of unpolluted streams; and (c) ecologically and recreationally important salmonids, which were forecast to diminish dramatically in source habitats. Warm-water fish projected to increase their distributions include bait bucket release minnows and dominant predators. Main conclusions Our results suggest potentially devastating impacts of climate change on stream ecosystems, with the restructuring of diatom, insect and fish communities, diminished distributions of functionally important taxa and widespread expansion of warm-water taxa, giving rise to biotic homogenization. Given that the magnitude of these biotic shifts depends on the severity of climate change, appropriate current policy decisions are necessary to preserve freshwater ecosystems." (Authors)] Address: Passy, Sophia, Department of Biology, University of Texas at Arlington, Box 19498, Arlington, TX 76019-0498, USA. E-mail: sophia.passy@uta.edu

**17672.** Prakash, L.; Karthik, P. (2021): Effect of vehicular traffic on wild animals in Anaikatty Hills, Southern Western Ghats, India. *Indian Journal of Ecology* 48(1): 108-111. (in English) ["An increase in road networks causing a significant impact on tropical biodiversity, especially the ones passing through forest protected zones have a negative impact on wild animals. The mortality rates of wild animals were investigated by using a fortnight sampling method in the selected stretch



of state highway 164, of Anaikatty Hills, Tamil Nadu. The sampling was performed in two different seasons namely dry and wet from June 2015 to December 2019. A total of 96 species and 419 individuals of road kill observed. Birds are the most affected taxa (30.21 %), followed by reptiles (28.13 %), butterflies (20.83 %), mammals (11.45%), amphibians (5.21 %) and odonates (4.17 %; *Anax guttatus*, *Brachythemis contaminata*, *Diplacodes trivialis*, *Pantela flavescens*) were least affected by vehicular traffic. Conservation and management implications are essential to prevent the local extinction of wildlife from Anaikatty reserve forest." (Authors)] Address: Karthik, P., Salim Ali Centre for Ornithology & Natural History, Anaikatty, Coimbatore-641 108, India. E-mail: karthikwildlifebiology@gmail.com

**17673.** Preston, D.L.; Layden, T.J.; Segui, L.M.; Falke, L.P.; Brant, S.V.; Novak, M. (2021): Trematode parasites exceed aquatic insect biomass in Oregon stream food webs. *Journal of Animal Ecology* 90(3): 766-775. (in English) ["1. Although parasites are increasingly recognized for their ecosystem roles, it is often assumed that free-living organisms dominate animal biomass in most ecosystems and therefore provide the primary pathways for energy transfer. 2. To examine the contributions of parasites to ecosystem energetics in freshwater streams, we quantified the standing biomass of trematodes and free-living organisms at nine sites in three streams in western Oregon, USA. We then compared the rates of biomass flow from snails *Juga plicifera* into trematode parasites relative to aquatic vertebrate predators (sculpin, cutthroat trout and Pacific giant salamanders). 3. The trematode parasite community had the fifth highest dry biomass density among stream organisms (0.40 g/m<sup>2</sup>) and exceeded the combined biomass of aquatic insects. Only host snails (3.88 g/m<sup>2</sup>), sculpin (1.11 g/m<sup>2</sup>), trout (0.73 g/m<sup>2</sup>) and crayfish (0.43 g/m<sup>2</sup>) had a greater biomass. The parasite 'extended phenotype', consisting of trematode plus castrated host biomass, exceeded the individual biomass of every taxonomic group other than snails. The substantial parasite biomass stemmed from the high snail density and infection prevalence, and the large proportional mass of infected hosts that consisted of trematode tissue (M = 31% per snail). 4. Estimates of yearly biomass transfer from snails into trematodes were slightly higher than the combined estimate of snail biomass transfer into the three vertebrate predators. Pacific giant salamanders accounted for 90% of the snail biomass consumed by predators. 5. These results demonstrate that trematode parasites play underappreciated roles in the ecosystem energetics of some freshwater streams." (Authors)] Address: Preston, D.L., Dept of Forest & Wildlife Ecology, Univ. Wisconsin-Madison, Madison, WI, USA. Email: daniel.preston@wisc.edu

**17674.** Pushpalal, M.G.S.; Malkumari, M.G.K.S.; Sumanapala, A.P. (2021): Some observations on the natural history of *Archibasis lieftincki* (Zygoptera: Coenagrionidae). *Agrión* 25(2): 79-81. (in English) [Madugeta Village (6.3848 N, 80.4058 E), Neluwa, Sri Lanka; phenology, Habitat choice, reproductive behaviour] Address: Pushpalal, M.G.S., Post Graduate Institute of Archaeology, University of Kelaniya,

Sri Lanka. E-mail: apsumanapala@gmail.com

**17675.** Quanz, M.E.; Walker, T.R.; Oakes, K.; Willis, R. (2021): Contaminant characterization in wetland media surrounding a pulp mill industrial effluent treatment facility. *Wetlands Ecol. Manage.* 29: 209-229. (in English) ["Three media (sediment, surface water, and dragonfly larvae tissue) were collected from wetlands surrounding an industrial effluent treatment facility prior to closure. Samples were analyzed for metals, total mercury, and polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans (PCDD/PCDF) concentrations. Sediment and surface water concentrations were compared to provincial and federal guidelines, as well as reference wetland concentrations. Exceedances of arsenic, cadmium, chromium, copper, zinc, and PCDD/PCDF guidelines were found in deeper areas of wetlands historically contaminated from effluent, as well as wetlands exposed to current effluent inputs. Composite Libellulidae samples were collected from wetlands, and comparisons were made to reference tissue concentrations ? 20%. Elevated As, Cu and Pb tissue concentrations were measured at two site wetlands, but total mercury (THg) and PCDD/PCDF reference tissue concentrations were higher than wetlands near the effluent treatment facility. Spearman rho tests identified a significant correlation between sediment and tissue Pb concentrations and between surface water and sediment THg concentrations. Results suggest relatively low ecological risk to macroinvertebrates within wetlands near the effluent treatment facility from current effluent inputs, and highlight strengths and weaknesses of federal and provincial guidelines." (Authors)] Address: Quanz, Meaghan, School for Resource & Environmental Studies, Dalhousie Univ., Halifax, Nova Scotia, B3H 4R2, Canada. E-mail: meaghan.quanz@dal.ca

**17676.** Rasaily, B.; Kalkman, V.J.; Katel, O.; Dorji, C. (2021): Composition of the dragonfly fauna at different altitudes in Bhutan based on larval samples. *International Dragonfly Fund - Report 160*: 1-20. (in English) ["In 2020 thirty sites with running water and ten sites with standing water were sampled for both adult and larval odonates in both the pre-monsoon and the post-monsoon period. This sampling was performed along an altitudinal gradient from 500-3000 m in Punakha and Wangduephodrang provinces of Bhutan. The results of the running water sites showed that there are clear differences between the overall abundance, species diversity and species associations at different altitudes. Furthermore, a clear difference was observed in the number of larvae collected in running water in the post-monsoon (404 specimens) and the pre-monsoon (654 specimens) periods, with five species being clearly more abundant in the pre-monsoon and one species being more abundant in the post-monsoon period." (Authors)] Address: Kalkman, V.J., p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**17677.** Rasaily, B.; Kalkman, V.J.; Katel, O.; Suberi, B. (2021): The distribution, phenology and altitudinal range of

dragonflies and damselflies in Bhutan. International Dragonfly Fund - Report 160: 21-74. (in English) ["Odonata are attractive and relatively well studied insects that can serve to monitor the conservation status of freshwater habitats. Their effective use as conservation tools necessitates some basic requirements. It should be possible to identify adults and preferably also larvae with relative ease, and basic data on distribution and habitat preferences needs to be available. Freshwater habitats in Bhutan are relatively well preserved but are nonetheless threatened by both climate change and the construction of hydroelectric installations. Biological monitoring of freshwater biodiversity in Bhutan is therefore urgently needed and should include data on dragonflies and damselflies. In order to establish a framework for effective monitoring we constructed a database of all published records and use these to present information on the distribution, the altitudinal range and phenology of all species thus far recorded from Bhutan." (Authors)] Address: Kalkman, V.J., p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**17678.** Razy Japir, Momin, B.; John, L.Y.; Chung, A.Y.C. (2021): Insect diversity of Sungai Serudong Forest Reserve, Sabah Malaysia. *Serangga* 26(2): 1-15. (in English) ["Insect diversity of Sungai Serudong Forest Reserve in Sabah was investigated under the Heart of Borneo programme in Sabah. The nocturnal insect diversity was evaluated by using light-trap from 7:00 p.m. until 9:00 p.m. for three consecutive nights. Diurnal insects were sampled using sweep net. A total of nine insect orders were recorded namely Coleoptera, Hemiptera, Hymenoptera, Isoptera, Lepidoptera, Neuroptera, Odonata, and Phasmida. ... The mean Shannon Index was 4.00, Simpson Index was 47.76 and Fisher Alpha Index was 83.64. The diversity is considered high, however moderate when compared to other forest reserves in Sabah, Malaysia. This study was able to identify insect communities inside the reserve. It was also able to identify the potential threats affecting the insect diversity. The documented data can serve as baseline information to be used in forest management plan and other relevant research." (Authors)] Address: Razy Japir, Forest Research Centre, Sabah Forestry Dept., P.O. Box 1407, 90715 Sandakan, Sabah, Malaysia. E-mail: razy.japir@sabah.gov.my

**17679.** Ribeiro, C.; Santos, L.R.; Rodrigues, M.E. (2021): New records of the Critically Endangered *Leptagrion acutum* Santos, 1961 (Odonata, Coenagrionidae) from southern Bahia, Brazil. *Check List* 17(1): 59-62. (in English) ["*L. acutum* is endemic to Brazil and, since 2003, listed as Critically Endangered in the Red Book of Threatened Brazilian Fauna. In this study, *L. acutum* is recorded for the first time from the state of Bahia, expanding known occurrences of this species to northern areas of the Atlantic Forest. Three males were collected in the Veracel Station Private Reserve of Natural Heritage. Information concerning distributional records of rare or endangered species is essential because it can add to species' occurrence records and assist in future Red List assessments." (Authors)] Address: Rodrigues,

M.E., Programa de Pós-graduação em Sistemas Aquáticos Tropicais, Lab. de Organismos Aquáticos, Depto de Ciências Biológicas, Univ. Estadual de Santa Cruz (UESC), Rodovia Jorge Amado, KM 16, Ilhéus, Bahia, Zip code: 45662-900, Brazil. E-mail: rodrigues.mbio@gmail.com

**17680.** Rincón, V.; Santamaría, T.; Velázquez, J.; Sánchez Mata, D. (2021): Nuevos registros de reproducción de *Anax imperator* Leach, 1815 (Odonata: Aeshnidae) en montañas del Sistema Central en España. *Graellsia*, 77(1): e136: 4 pp. (in Spanish, with English summary) ["New breeding records of *Anax imperator* Leach, 1815 (Odonata: Aeshnidae) in mountains of the Sistema Central in Spain: Information is presented about the location of breeding sites of the species *Anax imperator* in high mountain lagoons of the Sistema Central in the province of Ávila. In this area, the breeding records of this species in the 1980s were limited to altitudes close to 1300 m a.s.l. However, coinciding with an increase in temperatures due to climate change, this species has been rising in altitude, until successfully breeding at altitudes above 1700 m a.s.l." (Authors)] Address: Rincón, V.; Depto de Farmacología, Farmacognosia y Botánica, Fac. de Farmacia, Universidad Complutense de Madrid, Spain

**17681.** Riyaz, M.; Sivasankaran, K. (2021): A preliminary survey of dragonflies and damselflies (Insecta: Odonata) in and around Hirpora Wildlife Sanctuary Shopian, Kashmir. *Egyptian Academic Journal of Biological Sciences* 14(1): 133-139. (in English) ["Odonata of Hirpora Wildlife Sanctuary are presented. The Sanctuary is located in the District Shopian of Kashmir Valley (33°39'28.6"N 74°41'15.2"E). The area is rich in both floral and faunal diversity with most of the area covered with lush green forests. Around the sanctuary, Agro and Horticultural plantations such as Apple, Pear, Peach and vegetable crops abides most of the land cover in the area. The present study was carried out from June to October 2020. A total number of 10 species from six families were recorded in and around the area. The most abundant species recorded are from the family Libellulidae which are active mostly in the months from June to October. A number of freshwater bodies flow through the district and receives annual precipitation of around 1800mm, which makes the area more suitable for the Odonates diversity. Here we present the first preliminary report of order Odonata collected from the sanctuary and adjoining areas of Kashmir Valley." (Authors)] Address: Sivasankaran, K., Division of Taxonomy & Biodiversity, Entomology Research Institute, Loyola College, Chennai, Tamil Nadu, India. E-mail: ganesh\_swamy-2005@yahoo.com

**17682.** Roucourt Cezario, R.; Guillermo-Ferreira, R. (2021): *Heteragrion gorbi* sp. nov. (Odonata: Heteragrionidae) from southeastern Brazil. *Zootaxa* 4965(1): 78-86. (in English) ["*Heteragrion gorbi* sp. nov. is described and diagnosed based on six males and one female. The specimens were collected in a stream in a Neotropical savannah fragment in Sao Carlos, Sao Paulo, Brazil. We present pictures of the holotype and the female. This is a species with blue coloration pattern, rare among its congeners." (Authors)] Address:

Roucourt Cezario, R., Graduate Program in Entomology, Dept of Biology, Univ. of Sao Paulo (USP), Ribeirao Preto, Brazil. E-mail: rcezario@usp.br

**17683.** Rüppell, G.; Hilfert-Rüppell, D. (2021): Männchenabwehr und Männchenauswahl (female choice) bei Weibchen von *Libellula quadrimaculata* (Odonata: Libellulidae). *Libellula Supplement* 16: 229-238. (in German, with English summary) ["Male repelling and female choice of females of *L. quadrimaculata* – By means of slow motion videos new behaviour can be discovered. Examples therefore were analysed: refusal of males by females of *L. quadrimaculata* by flying loops and active female choice. In the latter case a female was pursued by three males. A small male was always close to the female, who suddenly slowed down and hit the small candidate with its wings. Immediately after that she accelerated. By this a gap developed enabling a larger male to proceed and to grasp the female. This is the first time details of female choice in Anisoptera were analysed." (Authors)] Address: Rüppell, G., An der Wasserfurche 32, 38162 Cremlingen, Germany. E-mail: g.rueppell@freenet.de

**17684.** Rychla, A. (2021): Persistence of exuviae in natural conditions: Results of monitoring of selected dragonfly species (Odonata: Anisoptera) at the lake Plaw in western Poland. *Odonatrix* 172 (2021): 9 pp. (in Polish, with English summary) ["Exuviae of Odonata are valuable sampling material in faunistic, phenological, and monitoring research. However, one of the downsides of this method is impermanence of exuviae in natural conditions, which still makes the designation of sampling frequencies difficult. In this study, the effort has been made to investigate persistence time of exuviae of five selected Anisoptera. The experiment revealed that the average durability of the exuvial material was 4 (median) to 7 (arithmetic mean) days, without any significant differences between species. However, there was considerable variation within the collected material, with minimal and maximal values lying between 1 and 35 days of persistence for individual exuviae. The results indicate, that investigations of rare species may require sampling frequencies at least at weekly scale whereas biweekly sampling should be sufficient to obtain the representative species richness." (Author)] Address: Rychla, Anna, Sekcja Odonatologiczna Polskiego Towarzystwa Entomologicznego. E-mail: rychlan@op.pl

**17685.** Sadasivan, K.; Palot, M.J. (2021): A note on the current distribution of reedtail damselfly *Protosticta rufostigma* Kimmins, 1958 (Odonata: Zygoptera: Platystictidae) from Western Ghats, and its addition to the odonate checklist of Kerala. *Journal of Threatened Taxa* 13(1): 17548-17553. (in English) ["The genus *Protosticta* is represented by nine species in the Western Ghats of peninsular India, of which seven are reported for the state of Kerala. Our recent records of *P. rufostigma* from the Western Ghats of Kerala State is discussed, and despite a thorough literature search no collection records or photographs of the species has been found after the original description from Tamil Nadu. The species is, thus, added to the checklist of odonates of Kerala State.

The description of the live insect, its ecology, status and distribution is discussed." (Authors)] Address: Sadasivan, K., TNHS Odonate Research Group (TORG), Travancore Nature History Society (TNHS), MBRR-65, Jyothis, Mathrubhumi Road, Vanchiyoor, Kerala 695035, India. E-mail: kaleshs2002in@gmail.com

**17686.** Sadasivan, K.; Sethumadavan, M.; Jeevith, S.; Kochunarayanan, B. (2021): Rediscovery of Martin's Duskhawker *Anaciaeschna martini* (Selys, 1897) (Odonata: Aeshnidae) from Western Ghats, peninsular India, with notes on its current distribution and oviposition behavior. *Journal of Threatened Taxa* 13(1): 17543-17547. (in English) ["Rediscovery and recent distribution records of *A. martini* from Western Ghats of peninsular India is discussed with notes on oviposition behavior. Although mentioned in odonate checklists of the region, there are no recent records or photographic evidence of the species from Western Ghats since its last report and collection by F.C. Fraser from Annamalai Hills in 1933." (Authors)] Address: Sadasivan, K., TNHS Odonate Research Group (TORG), Travancore Nature History Society (TNHS), MBRR, Mathrubhumi Road, Vanchiyoor, Trivandrum, Kerala 695024, India. E-mail: kaleshs2002in@gmail.com

**17687.** Santangelo, J.M.; Vanschoenwinkel, B.; Trekels, H. (2021): Habitat isolation and the cues of three remote predators differentially modulate prey colonization dynamics in pond landscapes. *Oecologia* 196: 1027- 1038. (in English) ["Recent evidence suggests predators may change colonization rates of prey in nearby predator-free patches as an example of context-dependent habitat selection. Such remote predator effects can be positive when colonizers are redirected to nearby patches (habitat compression), or negative when nearby patches are avoided (risk contagion). However, it is unknown to what extent such responses are predator- and prey-specific and change with increasing distance from predator patches. We evaluated how cues of fish, backswimmers and dragonfly larvae affect habitat selection in replicated pond landscapes with predator-free patches located at increasing distances from a predator patch. We found evidence for risk contagion and compression, but spatial colonization patterns were both predator- and prey-specific. The mosquito *Culex pipiens* and water beetle *Hydraena testacea* avoided patches next to patches with dragonfly larvae (i.e. risk contagion). Predator-free patches next to patches with backswimmers were avoided only by mosquitoes. Mosquitoes preferentially colonized patches at some distance from a fish or backswimmer patch (i.e. habitat compression). Colonization patterns of beetles also suggested habitat compression, although reward contagion could not be fully excluded as an alternative explanation. Water beetles preferred the most isolated patches regardless of whether predators were present in the landscape, showing that patch position in a landscape alone affects colonization. We conclude that habitat selection can be a complex product of patch isolation and the combined effects of different local and remote cues complicate current attempts to predict the distribution of mobile organisms in landscapes." (Authors)]



Address: Santangelo, J.M., Depto de Ciências Ambientais, Univ. Federal Rural do Rio de Janeiro (UFRRJ), Rodovia BR 465, Km 07, CEP, Seropédica, RJ, 23890-000, Brasil

**17688.** Sánchez-Rosario, A.; Bastardo, R.H. (2021): Confirmation of the presence of *Progomphus integer* (Odonata: Gomphidae) in the Dominican Republic. *Novitates Caribaeae* 17: 184-186. (in Spanish, with English summary) ["*P. integer* is one of four species of Gomphidae endemic to the Greater Antilles, reported for the Dominican Republic in references from the last Century. Recently, some authors suggested that the presence of this species in Hispaniola was doubtful, based on the lack of specific locality records. In this paper, we confirm the presence of the species in the Dominican Republic. Moreover, we provide the first specific localities with some notes of the habitats on which the species was collected." (Authors)] Address: Sánchez-Rosario, América, Universidad Autónoma de Santo Domingo (UASD), Instituto de Investigaciones Botánicas y Zoológicas Prof. Rafael M. Moscoso, Santo Domingo, República Dominicana. E-mail: america.sanchez@hotmail.com

**17689.** Sankar Thampuran, M.V.; Udaya Kumar, K.; Nagaraj, S.; Bharath, S. (2021): A preliminary study on diversity status of Odonates in and around college of forestry Campus, Uttara Kannada, Karnataka, India. *Journal of Entomology and Zoology Studies* 9(1): 1051-1057. (in English) ["Odonata is an insect order with two sub orders, Zygoptera and Anisoptera. They are an amazing insect group with an amphibious life cycle. This makes them an important component of freshwater ecosystems and indicators of ecosystem health. The present study was an attempt made to document and analyse the odonate diversity of College of Forestry Sirsi campus, a 14-ha site in Sirsi, Karnataka, India. The study was done in the field where individual observations were identified and recorded with the help of appropriate field guides. A total of 32 odonate species, i.e., 22 dragonflies and 10 damselflies belonging to 7 families were observed in the study area. Within this diversity, a higher proportion of families Libellulidae and Coenagrionidae respectively was found. This presence of generalists more than specialists might be due to higher proportion of anthropogenic disturbances in the study site." (Authors)] Address: Sankar Thampuran, M.V., Dept of Silviculture & Agroforestry, Coll. Forestry, Kerala Agri. Univ., Thrissur, Kerala, India

**17690.** Santana, M.S.; Bezerra dos Santos, C.; Mitsuka, P.M. (2021): Composição de macroinvertebrados associados a macrófitas aquáticas como parâmetro para avaliação da qualidade da água de um reservatório no semiárido baiano. *Biotemas* 34(3): 1-14. (Portuguese, with English summary) ["Composition of macroinvertebrates associated with aquatic macrophytes as a parameter for assessing water quality in a reservoir in the semiarid region of Bahia. Macroinvertebrates associated with aquatic macrophytes have become more abundant since the plant's morphological characteristics contribute to an increase in colonization, diversity and environmental quality assessment. This study

presents a survey of the composition and richness of macroinvertebrates (Insecta Class) associated with different species of aquatic macrophytes and evaluates the water quality of the Tanque de Aroeiras reservoir, Caetité, Bahia. Macroinvertebrates were collected from macrophyte banks of different biotypes (*Nymphaea* L.; *Ludwigia* L.; *Polygonum ferugineum* Wedd.) and identified at the family taxonomic level. The Biological Monitoring Working Party System (BMWP) and Average Score per Rate (BMWP-ASPT) indices were determined. A total of 7,120 specimens were recorded, with a richness of 27 families, distributed in the following orders: Coleoptera, Diptera, Ephemeroptera, Hemiptera, Odonata (Aeshnidae, Coenagrionidae, Libellulidae, Protoneuridae) and Trichoptera. Coleoptera showed greater richness, while dipterans showed greater dominance, with Chironomidae being more abundant. This fact may be associated with a variety of aquatic life habits that contribute to a greater availability of food resources. The results of the BMWP-ASPT classified the water in this reservoir as likely to be moderately polluted. All things considered, this study highlights the importance of new research for added knowledge regarding the macroinvertebrate community and its application in evaluating the water quality of this reservoir." (Authors)] Address: Santana, M.S., Univ. do Estado da Bahia, Depto de Ciências Humanas, Campus VI CEP 46.400-000, Caetité – BA, Brasil. E-mail: santanamailson4@gmail.com

**17691.** Santos, J.P.; Lopes, G.N.; Gonzaga, K.S.; Abreu, K.G.; Souza Muniz, L.E.; Cartaxo, P.H. (2021): Insetos como bioindicador de qualidade ambiental em ambientes aquáticos - Insects as a bioindicator of environmental quality in aquatic environments. *Revista Thema* 19(2): 356-366. (Portuguese, with English summary) ["Strategies for monitoring the environmental quality of the most diverse ecosystems have been developed, especially for the aquatic environments, spaces severely affected by anthropic actions. Among the techniques developed, the use of bioindicators, species that show sensitivity to changes in the environment and respond to these anthropogenic stimuli are highlighted. In this sense, the present study aimed to analyze in the scientific literature the advances in the use of these organisms, with emphasis to the class Insecta and its applicability of use for the monitoring of the ecological health of aquatic ecosystems. The main orders of insects reported for use in bioindication of the environmental quality of water bodies are Diptera and Odonata. Chironomidae (Diptera) is often applied in studies of heavy metal contamination, and the development of larvae is considered for bioindication, as they develop in contact with the sediment, an important compartment of accumulation of contaminants in the aquatic body. Odonata insects can be used in the larval or adult phase for bioindication whose families may respond to changes in the environment, some being more sensitive than others to environmental changes. The use of these organisms may represent an efficient strategy for monitoring these environments, facilitating the interpretation of the effects of anthropogenic impacts on these ecosystems and their ecological relationships." (Authors)] Address: Santos, J.P., Univ. Fe-

deral da Paraíba – UFPB, Areia/PB – Brasil. E-mail: jpos@agro.adm.br

**17692.** Sanz Sanz, T.; Montoya Jiménez, M. (2021): Primera cita de *Anax parthenope* (Sélys, 1839) (Odonata, Aeshnidae) en la provincia de León (NO de España). *Archivos Entomológicos* 24: 99-101. (in Spanish, with English summary) ["The first record of *A. parthenope* from the province of León (NW Spain) is documented, which remained as the only one in the Castilla y León Autonomous Community from where its occurrence had not been so far reported. Embalse de Villameca, Quintana del Castillo (29TQH32 / 29TQH42), male, 26-VII-2019, Carlos Álvarez Alvarado leg" (Authors)] Address: Sanz Sanz, T., c/ El Esquilo, 4. E-24878 Fresnedo de Valdellorma (León). Spain. E-mail: donguillos@hotmail.com

**17693.** Sasamoto, A.; Vu, V.L (2021): Description of *Cephalaeschna yashiroi* sp. nov. from northern Vietnam, with first record of *C. asahinai* Karube, 2011 female (Odonata: Aeshnidae). *Tombo* 63: 21-27. (in English) ["*C. yashiroi* sp. nov. from northern Vietnam (Hoang Lien National Park, Lai Chau Province, (103°46" E, 22°21" N, 1,900 m a.s.l.), is described and illustrated. This species is differentiated from the other species of the genus in that not acute dorso-frontal margin of frons, two markings of mesepimeron misaligned, abdominal postero-dorsal markings on S2 to S6, and absence of acute apical spine on cercus. In addition, the female of *C. asahinai* Karube, 2011 is for the first time described from the same locality." (Authors)] Address: Sasamoto, A., Tawaramoto-cho, Shiki-gun, Nara Pref. Japan. E-mail: aks-smt@sea.plala.or.jp

**17694.** Saxton, N.A.; Paxman, E.M.; Dean, A.M.; Jensen, C.R.; Powell, G.S.; Bybee, S.M. Factors (2021): Influencing the distribution of endemic damselflies in Vanuatu. *Insects* 2021, 12, 670. <https://doi.org/10.3390/insects12080670>: 11 pp. (in English) ["*Vanuatubasis* Ober & Staniczek is a genus of damselfly endemic to Vanuatu. Little is known about the distribution and general natural history of the genus. We present the results of 14 weeks of fieldwork in Vanuatu to provide a better understanding of the biology of this genus. Specifically, we tested ecological niche models to predict the presence of *Vanuatubasis* throughout the region and explored how water pH may play a role in their distribution and ecology. The results of this fieldwork refined our model and further predicted the presence of this genus on additional islands. We also found stream pH as a strong predictor for the presence of *Vanuatubasis*, with their presence in alkaline streams significantly higher ( $p < 0.001$ ). The mean pH for those streams where the genus was collected was 8.44 ( $n = 53$ )." (Authors)] Address: Saxton, Natalie, Monte L. Bean Museum, Brigham Young Univ., Provo, UT 84602, USA. E-mail: natalie.a.saxton@byu.edu

**17695.** Schröder, N.; Rippel, C.G.; Pessacq P. (2021): Lista de especies de Odonata (Insecta) en reservas en la ecorregión de Campos y Malezales de Misiones, Argentina, con nuevos registros de distribución. *Revista de la Sociedad*

*Entomológica Argentina* 80(1): 70-73. (in English, with Spanish summary) ["The Odonata fauna of four reserves located in Campos y Malezales ecoregion, Misiones Province, was studied between 2014 and 2018. 36 species and eight morphotypes, belonging to six families were identified, representing together 22% of the known species in the Province. Libellulidae with 22 species were followed by Coenagrionidae (15 species). Two species were new records, one for Argentina (*Minagrion waltheri* Selys), and one for Misiones province (*Tholymis citrina* Hagen)." (Authors)] Address: Schröder, Noelia, Lab. Biotecnología Molecular, Inst. Biotecnología Misiones, FCEQyN, UNaM. Posadas, Misiones, Argentina. E-mail: noeliaschroder@gmail.com

**17696.** Schröter, A. (2021): Mit Hansruedi Wildermuth durch den Kaukasus: Erinnerungen an eine dreiwöchige Libellenreise durch Georgien im Juni 2019. *Libellula Supplement* 16: 23-33. (in German, with English summary) ["Personal recollections of a three weeks' dragonfly survey with Hansruedi Wildermuth across Georgia, southern Caucasus ecoregion, in June 2019 – Based on personal recollections, memorable events of a three weeks' trip across Georgia with Hansruedi Wildermuth, his wife Elisabeth, Stefan Kohl, and his wife Franziska are reviewed. Wildermuth's discoveries made during this trip were already published in books and international journals and will stimulate further odonatological research in the country." (Authors)] Address: Schröter, A., Tsulukidse Straße 18, 0190 Tbilissi, Georgia. E-mail: asmus.schroeter@gmx.de

**17697.** Schultz, B.; Koprivnikar, J. (2021): The contributions of a trematode parasite infectious stage to carbon cycling in a model freshwater system. *Parasitology Research* 120(5): 1743-1754. (in English) ["Parasites remain understudied members of most ecosystems, especially free-living infectious stages, such as the aquatic cercariae of trematodes (flatworms). Recent studies are shedding more light on their roles, particularly as prey for a diverse array of aquatic predators, but the possible fates of cercariae remain unclear. While this is critical to elucidate because cercariae represent a large potential source of energy and nutrients, determining the fate of cercariae-derived organic matter involves many logistical challenges. Previous studies utilized elemental and stable isotope analysis when examining host-parasite interactions, but none has used such approaches to track the movement of cercariae biomass within food webs. Here we report that *Plagiorchis* sp. cercariae were effectively labelled with  $^{13}\text{C}$  by introducing this compound in the food of their snail host. We then added  $^{13}\text{C}$ -labelled cercariae as a potential food source to experimental mesocosms containing a simplified model freshwater food web represented by diving beetles (*Dytiscidae* sp.), dragonfly larvae (*Leucorrhinia intacta*), oligochaete worms (*Lumbriculus variegatus*), and a zooplankton community dominated by *Daphnia pulex*. The oligochaetes had the highest ratio of  $^{13}\text{C}$  to  $^{12}\text{C}$ , suggesting benthic detritivores are substantial, but previously unrecognized, consumers of cercariae biomass. In an experiment where *L. variegatus* were fed mass

equivalents of dead *D. pulex* or cercariae, growth was greater with the latter diet, supporting the importance of cercariae as food source for benthic organisms. Given the substantial cercariae biomass possible in natural settings, understanding their contributions to energy flow and nutrient cycling is important, along with developing methods to do so." (Authors)] Address: Schultz, B., Dept Chem. & Biol., Ryerson Univ., Toronto, ON, Canada. bschultz@uoguelph.ca.

**17698.** Schwantes, D.; Gonçalves Junior, A.C.; Manfrin, J.; Campagnolo, M.A.; Zimmermann, J.; Conradi Junior, E.; Bertoldo, D.C. (2021): Distribution of heavy metals in sediments and their bioaccumulation on benthic macroinvertebrates in a tropical Brazilian watershed. *Ecological Engineering* 163, 1 May 2021, 106194: 10 pp. (in English) ["The objectives of this study were (i) to evaluate the quality of the Ouro River, a tropical Brazilian river, assessing the concentration of the metals in surface waters, sediments, and benthic macroinvertebrates; (ii) to investigate the possible sources of pollution in Ouro River basin through field research and spatial analysis (G.I.S.); (iii) to evaluate the possible occurrence of metals bioaccumulation in the trophic chain, by comparing the concentration of the metals in water, sediments (total and bioavailable) and in benthic macroinvertebrates; and (iv), to assess the biological metrics of benthic macroinvertebrates that inhabit the Ouro River, and the possible relation regarding its distribution (richness, abundance, dominance) with the human occupancy. Water, sediment, and macroinvertebrates samples were assessed in five sample sites for 9 months. The macroinvertebrates were arranged, identified, and analyzed taxonomically. The concentrations of Cu, Zn, Fe, Mn, Cd, Pb, and Cr in waters and sediments (total and Mehlich-1) were determined, the obtained results were compared to Brazilian and international standards indexes (Igeo and E.F.). According to our findings, the quality of Ouro River is directly affected by the human activities carried out in the watershed, and despite that the vast majority of the assessed metals in water was found below the legislation maximum levels, these accumulate in sediments, with extremely high enrichment of Cd, and moderately to heavily contamination of Cd, Mn, and Cu. Also, Zn and Pb high bioaccumulation in macroinvertebrates was observed, in which concentrations were 172% and 92% higher than the mean total concentration in sediment. The fit's goodness indicates that Mehlich-1 could be used as an extractant solution for the correlation of Pb in sediments and B.M.I. On average, Pb levels in the benthic are 14.94x higher than the bioavailable fraction in sediments (Mehlich-1). Mainly for Decapoda, Bivalve, and Gastropoda, results indicate high adsorption rates of Pb and Zn. The probable metal contamination in the Ouro River basin is from diffuse sources such as agriculture erosion (fertilizers and fertilizers with heavy and toxic heavy metals)." (Authors) Libellulidae, Calopterygidae] Address: Schwantes, D., Depto de Ciencias Vegetales, Fac. de Agronomía e Ing. Forestal, Pontificia Universidad Católica de Chile, Vicuña Mackenna Avenue 4860, Macul, Santiago, Región Metropolitana, Chile. E-mail: daniel\_schwantes@hotmail.com

**17699.** Seehausen, M.; Turiault, M. (2021): Beobachtungen zum Schlupf von *Stylurus flavipes* am hessischen Oberrhein (Odonata: Gomphidae). *Libellen in Hessen* 14: 57-69. (in German, with English summary) ["Studies of *S. flavipes* emergence at the Upper Rhine in Hesse – From May to September 2020 emergence of *S. flavipes* at the "Nonnenau-Langenu" island on the Rhine near Ginsheim-Gustavsburg /Germany was studied. We searched for emerged individuals and exuviae and measured the length of the emergence sequence, distance from waterline, height of emergence and position and emergence substrate. We collected 1030 exuviae of which 302 were observed in their original emergence position. The remaining 728 exuviae were counted as drift line findings. We observed 46 individuals during emergence. The emergence period spanned 84 days. Emergence mostly took place 10-200 cm away from the waterline at a 10-60 cm above the water's surface. At lower water levels, distances of 500-1000 cm were also regularly covered. Predominantly emergence took place in a vertical position on willow grafts, about a third of the individuals emerged in a horizontal position respectively sloped up to about 45°." (Authors)] Address: Seehausen, M., Boddenweg 12, 18439 Stralsund, Germany. E-mail: 1m.seehausen@gmx.de

**17700.** Sganzerla, C.; Schmidt Dalzochio, M.; Prass, G.; Périco, E. (2021): Effects of urbanization on the fauna of Odonata on the coast of southern Brazil. *Biota Neotropica* 21(1): 10 pp. (in English, with Portuguese summary) ["Urbanization significantly increases the rates of environmental disturbance, being one of the main causes of habitat loss and biodiversity. The growing trend of converting the natural landscape into areas for real estate speculation in the coastal region of the southernmost part of Brazil is a current concern, as the region is home to unique ecosystems, such as dunes, wetlands and large brackish lagoons. As they are organisms sensitive to environmental changes, variations in the structure of Odonata communities are used as indicators of habitat quality reflecting the human impact on the environment. Here we assessed how the Odonata community is affected by the growing urbanization around natural ponds on the coast of the state of Rio Grande do Sul, testing the hypothesis that the increase in the percentage of urbanization negatively influences the Odonata community, following the same pattern found for other groups of invertebrates. The collections took place in 28 coastal ponds, which were classified as urbanized and non-urbanized based on the surrounding ground cover. Anisoptera's richness, abundance and composition were influenced by urbanization, but the same was not found for Zygoptera. The analysis of indicator species specifies three species associated with non-urbanized areas: *Erythrodiplax* sp.1, *Erythemis credula* and *Telebasis corallina*. Our study highlights the importance of Odonata as organisms that indicate environmental integrity and reinforces the need for urban planning strategies that favor the conservation and maintenance of the environments affected by urbanization." (Authors)] Address: Sganzerla, C., Universidade do Vale do Taquari, Laboratório de Ecologia e Evolução, Lajeado, RS, Brasil



**17701.** Shao, H.; Li, Q.; Liu, Y. (2021): The complete mitochondrial genome of *Ceriagrion fallax* (Odonata: Zygoptera: Coenagrionidae) and phylogenetic analysis. *Mitochondrial DNA Part B*, 6:2: 491-492. (in English) [*C. fallax* is ubiquitous in south China and is particularly easy to be found in some rice fields. In this study, we sequenced and analyzed the complete mitochondrial genome (mitogenome) of *C. fallax*. This mitogenome was 15,350 bp long and encoded 13 protein-coding genes (PCGs), 22 transfer RNA genes (tRNAs) and two ribosomal RNA unit genes (rRNAs). The nucleotide composition of the mitogenome was biased toward A and T, with 74.0% of A+T content (A 42.1%, T 31.9%, C 14.6%, G 11.4%). Gene order was conserved and identical to most other previously sequenced Zygoptera dragonflies. Most PCGs of *C. fallax* have the conventional start codons ATN (seven ATG, two ATT, and two ATC), with the exception of *nad3* and *nad1* (TTG). Except for four PCGs (*cox1*, *cox2*, *cox3*, and *nad5*) end with the incomplete stop codon T—, all other PCGs terminated with the stop codon TAA. Phylogenetic analysis showed that *C. fallax* got together with the same family species (*Agriocnemis femina*, *Enallagma cyathigerum*, *Ischnura elegans*, *I. pumilio*) with high support value. The relationships (Megapodagrionidae + ((Calopterygidae + (Euphaeidae + Pseudolestidae)) + (Coenagrionidae + Platynemididae))) were supported within Zygoptera." (Authors)] Address: Yunxiang Liu, Y. State Key Lab. of Plateau Ecology & Agriculture, State Scientific Observing & Experimental Station of Crop Pest in Xining, Ministry of Agriculture & Provincial Key Lab. Agricultural Integrated Pest Management in Qinghai, Qinghai Acad. Agriculture & Forestry Sciences, Qinghai Univ., Ningda Rd No. 251, Xining 810016, China. E-mail: 17791394452@163.com

**17702.** Sharma, M. (2021): A new record of the Emerald Striped Spreadwing *Lestes viridulus* Rambur, 1842 (Zygoptera: Lestidae) from Nepal. *Journal of Threatened Taxa* 13(9): 19383- 19385. (in English) [Swathi (27.650 N & 83.657 E, 132 m), Sunwal municipality of Nawalparasi, southern Terai of central Nepal, 20–23-IX-2019. Records of *Agriocnemis femina* (Brauer, 1868) and *Ischnura nursei* (Morton, 1907) are documented too.] Address: Sharma, M., Central Dept of Zoology, Tribhuvan Univ., Kirtipur, Kathmandu, Nepal. E-mail: munu.nepal50@gmail.com

**17703.** Silva, G.G.; Poulin, R.; Guillermo-Ferreira, R. (2021): Do latitudinal and bioclimatic gradients drive parasitism in Odonata?. *International Journal for Parasitology* 51(6): 463-470. (in English) ["Highlights: • Prevalence of parasites in odonates is driven by latitudinal and bioclimatic gradients. Latitudinal variation affects ecto-, but not endoparasites. Prevalence of water mites is positively associated with latitude. Gregarines are not affected by bioclimatic gradients. Abstract: Prevalence of parasites in wild animals may follow ecogeographic patterns, under the influence of climatic factors and macroecological features. One of the largest scale biological patterns on Earth is the latitudinal diversity gradient; however, latitudinal gradients may also exist regarding the frequency of interspecific interactions such as the prevalence of parasitism in host populations. Odonata are hosts

of a wide range of ecto- and endoparasites, interactions that can be affected by environmental factors that shape their occurrence and distribution, such as climatic variation, ultraviolet radiation and vegetation structure. Here, we retrieved data from the literature on parasites of Odonata, represented by 90 populations infected by ectoparasites (water mites) and 117 populations infected by endoparasites (intestinal gregarines). To test whether there is a latitudinal and bioclimatic gradient in the prevalence of water mites and gregarines parasitizing Odonata, we applied Bayesian phylogenetic comparative models. We found that prevalence of ectoparasites was partially associated with latitude, showing the opposite pattern from our expectations – prevalence was reduced at lower latitudes. Prevalence of endoparasites was not affected by latitude. While prevalence of water mites was also positively associated with vegetation biomass and climatic stability, we found no evidence of the effect of bioclimatic variables on the prevalence of gregarines. Our study suggests that infection by ectoparasites of dragonflies and damselflies is driven by latitudinal and bioclimatic variables. We add evidence of the role of global-scale biological patterns in shaping biodiversity, suggesting that parasitic organisms may prove reliable sources of information about climate change and its impact on ecological interactions." (Authors)] Address: Guillermo-Ferreira, R., LETES Lab, Dept Hydrobiol., Fed. Univ. Sao Carlos, Sao Carlos, SP, Brazil. E-mail address: rhainerguillermo@gmail.com

**17704.** Silva-Filho, E.S.; Guimarães de Araújo-Piovezan, T.; Dantasa, J.O.; Silvestre, M.; Alves, E.E.; Ribeiro, G.T. (2021): Controle de Larvas de *Aedes aegypti* por Ninfas de libélula (Odonata) sob Condições Laboratoriais - *Aedes aegypti* Larvae Control by Dragonflies (Odonata) under laboratory conditions. *Ensaio e Ciência* 25(2): 239-242. (in Portuguese, with English summary) ["Studies of *A. aegypti* control are especially important for reducing the incidence of Dengue, Zika and Chikungunya cases that are responsible for thousands of human deaths in the world. This study hypothesizes that Odonata nymphs influence the *A. aegypti* larvae control with different efficacy among their families, due to their chewing apparatus morphology and to their diverse behavior in nature. The objective was to evaluate the efficiency of seven families of Odonata nymphs as predators of the *A. aegypti* larvae under laboratory conditions. Odonata nymphs of seven families were collected with a net trap at Poxim Açu River. Each nymph was placed in a 20-cm diameter plastic recipient containing river water at room temperature. In order to verify the Odonata nymphs predation on the *A. aegypti* larvae, the predation rate of 30 mosquito larvae was verified on each recipient per day. The Odonata nymphs presented an average predation rate of 6.08 mosquito larvae per day. The families Aeshnidae (9,28) and Libellulidae (8,37) obtained the greatest average predation rate per day. All the Odonata families predated from 25 to 30 larvae in at least one day, except Cordulidae. Therefore, the Aeshnidae and Libellulidae predators were highly effective on the *A. aegypti* control. Thus, they represent a low-cost alternative for *Aedes* control in cisterns and water tanks at home sites, which have similar conditions to the ones

found in this experiment." (Authors)] Address: Guimarães de Araújo-Piovezan, Talita, Instituto Federal de Sergipe. SE, Brasil. E-mail: talit\_a@hotmail.com

**17705.** Singh, A.P.; Chandra, A.; Uniyal, V.P.; Adhikari, B.S. (2021): Catalogue of selected insect groups of Lalwan Community Reserve and Ranjit Sagar Conservation Reserve, Punjab, India. *The Journal of Threatened Taxa* 13(3): 18020-18029. ["We present the first documentation of the insect fauna of Lalwan Community Reserve and Ranjit Sagar Conservation Reserve, Punjab. The survey was conducted in the months of May and June 2019. Selected insect groups were focused on for the rapid documentation of the entomofauna. Overall, we recorded 91 species of insects belonging to the orders Lepidoptera, Coleoptera, and Odonata. A total of 68 species including 46 species of order Lepidoptera, nine species of Odonata, and 13 species of Coleoptera were reported from Lalwan Community Reserve. Thirty-seven species consisting of 23 species of Odonata and 14 species of Lepidoptera were recorded from Ranjit Sagar Conservation Reserve, Punjab." (Authors)] Address: Singh, A.P., Wildlife Institute of India, Post Box #18, Chandrabani, Dehradun, Uttarakhand, 248001, India. E-mail: amarpaulsingh4@gmail.com

**17706.** Snegovaya, N.Yu. (2021): Odonata collected in summer 2020 in Azerbaijan, including a new record of *Stylurus ubadschii* (Gomphidae) and the confirmation of *Aeshna cyanea* (Aeshnidae) for Azerbaijan. *International Dragonfly Fund Report* 156: 1-28. (in English) ["In summer 2020, 35 localities in eleven districts and the vicinity of the two cities Mingechevir and Baku were studied odonatologically. A total of 39 species from 8 families was recorded. *Stylurus ubadschii* Schmidt, 1953 is reported as new for the fauna of Azerbaijan. The first certified find of *A. cyanea* is also reported." (Author)] Address: Snegovaya, Nataly, Zoological Institute NAS of Azerbaijan, proezd 1128, kvartal 504, Baku, AZ 1073, Azerbaijan. Email: snegovaya@yahoo.com

**17707.** Sniegula, S.; Raczynski, M.; Golab, M.J.; Johansson, F. (2020): Effects of predator cues carry over from egg and larval stage to adult life-history traits in a damselfly. *Freshwater Science* 39(4): 804-811. (in English) ["Non-consumptive predator effects experienced in early life stages of prey may result in life-history costs in later life stages. Such effects can, for example, alter the growth rate during the juvenile stage, which may carry over to size at maturity. However, we have limited knowledge of the carry-over effects starting from the egg stage through the larval stage to the adult stage. Here, we present results from a laboratory experiment in which we exposed *Ischnura elegans* to chemical cues originating from a fish predator, perch. We used a 2 × 2-full-factorial design in which the damselflies were exposed to predator cues during either the immobile egg or the mobile larval stage. The presence of predator cues, i.e., non-consumptive predator effects, during the egg stage caused decreased survival, but only until 2 wk after larval hatching. Predator cues during the larval stage caused de-

creased survival until emergence and an increase in development time until emergence. However, mass at emergence was not affected by predator cues. When fish cues were present in the egg or larval stage, there was a lower growth rate until final-instar larvae than in larvae that did not receive fish cues. Our results add to the growing number of studies showing that predation-risk cues in the egg stage can carry over to the adult stage, which ultimately could have consequences for adult life-history traits, such as survival and fecundity." (Authors)] Address: Sniegula, S., Dept Ecosystem Conservation, Inst. of Nature Conservation, Polish Academy of Sciences, aleja Adama Mickiewicza 33, 31-120 Kraków, Poland. E-mail: szymon.sniegula@gmail.com

**17708.** Soboleva, V.A.; Shorenko, K.I.; Golub, V.B. (2021): To the study of dragonflies species diversity (Odonata) of the Karadag Nature Reserve. *Field Biologist Journal* 3(2): 146-153. (in Russian, with English summary) [Ukraine, now Russian occupied territory; Karadag Nature Reserve. The following species are documented: *Sympecma fusca*, *Ischnura elegans*, *Platycnemis pennipes*, *Anaciaeschna isoceles*, *Anax ephippiger*, *Aeshna mixta*, *Sympetrum fonscolombii*, *S. meridionale* and *S. striolatum*.] Address: Soboleva, Viktoria, Voronezh State University, 1 Universitetskaya Sq, Voronezh, 394018, Russia. E-mail: strekoza\_vrn@bk.ru

**17709.** Son, S.-h.; Choi, J.-y. (2021): Influence of environmental characteristics on the community structure of benthic macroinvertebrates in stream-type waterways constructed at upper reaches of Geum River. *Korean Journal of Ecology and Environment* 54(1): 24-38. (in English) ["Microhabitat in the upper stream is created by various environment variables such as the bottom substrate and the physicochemical factors, and may influence the distribution of benthic macroinvertebrates. We investigated the bottom substrate and environmental variables influencing the distribution of benthic macroinvertebrate in 26 stream-type waterways established at upper reaches of Geum River. During study period, total 85 families, 160 species, 9305 individuals of benthic macroinvertebrates were recorded [Odonata: 10 families with 26 species (16,4%); no further details are given]. The stream-type waterways, where the bottom substrates consist mainly of pebble (16~64 mm) and cobble (64~256 mm) or with rapid water velocity (more than 0.2 m/s) and high dissolved oxygen (more than 120%), were supported by high species diversity of benthic macroinvertebrate. Hierarchical cluster analysis and the nonparametric multidimensional scale (NMDS) divided 26 stream-type waterways into a total of three clusters. In Cluster 1, the invertebrate species, such as *Branchiura sowerbyi*, *Cloeon dipterum*, *Ischnura asiatica*, *Paracercion calamorum*, and *Radix auricularia*, closely related to aquatic macrophytes, and *Chironomidae* spp., *Limnodrilus gotoi*, and *Tanytopodinae* sp. were abundant in waterways, with high coverage of silt and clay as well as high turbidity and total nitrogen. The benthic macroinvertebrate species (*Cheumatopsyche brevilineata*, *Drunella ishiyamana*, *Dugesia japonica*, *Ephemera orientalis*, *Gumaga KUa*, *Macrostemum radiatum*, *Potamanthus formosus*, *Semisulcospira libertine*, *Stenelmis*

vulgaris, and Teloganopsis punctisetae) included in Cluster 2 were dominated in sites with high cover rates of pebble and gravel. Cluster 3 was predominantly covered by the Cobbles, was supported by Simulium sp. Such a clear distinction in the study sites means that each stream-type waterways is governed by a clear habitat environment. In the case of some sites with low species diversity, improvement measures are required to restore nature, such as improving the function of inflows and outflows, creating meandering channel, and inducing the settlement of littoral vegetation." (Authors)] Address: Choi, J.-y., National Institute of Ecology, Seo-Cheon Gun, Chungcheongnam province 33657, Republic of Korea. E-mail: jyc311@nie.re.kr

**17710.** Souza, A.G.M. de; Lameira Neto, V. de J.; Pereira Junior, A. (2021): A. Integrative review on biology, water quality and the order Odonata. Research, Society and Development 10(9), p. e24910917605, 2021. DOI: 10.33448/rsd-v10i9.17605: 18 pp. (in Portuguese, with English and Spanish summaries) ["Sciences such as biology generate information about ecosystems, such as aquatic ecosystems, and promote integration with ethnic knowledge associated with botany. The objective of this work was to carry out an integrative review about the interrelationship of biology with various environmental areas, under two aspects, conservation, and balance, to investigate the relationship between biology and research on water quality and the use of the order Odonata as bioindicator of the environmental quality of water bodies. The research method was deductively associated with a quantitative and qualitative approach of a basic nature. The data obtained and analyzed indicated that the biological terms are present in most of the selected literature (n = 46.2%); regarding water quality, there was a small reduction (n = 30.8%); the use of the order Odonata as bioindicators of water quality is still scarce (n = 22.9%). As for the use of descriptors in the analyzed research, the following citations were identified: "Biological terms and water quality" (n = 65.8%); "Odonata and water quality" (n = 21.1%); "Biological terms and Odonata" (n = 13.2%). The order Odonata, as a bioindicator, is evolving (Amount = 33.3%) and with high frequency (fr > 50%) when compared to the application of Biological Terms and Water Quality. So, the application of biology is already effective in environmental areas such as water quality analysis. However, the use of Odonata as bioindicators of water quality is not used very often yet. Thus, it is recommended that there is a greater appreciation by researchers of this relationship, which can contribute to the qualification and monitoring of this natural resource more comprehensively and effectively." (Authors)] Address: de Souza, Annanda, Univ. do Estado do Pará, Brasil. E-mail: annanda.annandasouza@gmail.com

**17711.** Späth, J.; Brodin, T.; Cervený, D.; Lindberg, R.; Fick, J.; Nording, M.L. (2021): Oxylinins at intermediate larval stages of damselfly *Coenagrion hastulatum* as biochemical biomarkers for anthropogenic pollution. Environmental Science and Pollution Research 28: 27629-27638. (in

English) ["Aquatic pollution resulting from anthropogenic activities requires adequate environmental monitoring strategies in sentinel organisms. Thus, biochemical biomarkers have been used as early-warning tools of biological effects in aquatic organisms. However, before using these markers for environmental monitoring, knowledge about their developmental variation is vital. In this study, we assessed baseline levels and developmental variations of a group of potential biomarkers, oxylinins, during the lifespan of *C. hastulatum* using liquid chromatography-tandem mass spectrometry. Effects of wastewater exposure on baseline levels were studied in a subset of damselflies to investigate the responsiveness due to anthropogenic pollution. Thirty-eight oxylinins deriving from four polyunsaturated fatty acids via two enzymatic pathways were detected in damselflies at three larval stages and in the adult form. Overall, oxylinin baseline levels showed developmental variation, which was lowest in the intermediate larval stages. Effects of exposure to wastewater effluent on oxylinin baseline levels were dependent on the life stage and were greatest in the early and intermediate larval stages. The study provides first insights into oxylinin profiles of damselflies at different stages of development and their developmental variation. Based on our results, we propose further strategies for incorporating oxylinins in damselfly larvae as biochemical markers for anthropogenic pollution." (Authors)] Address: Späth, Jana, Dept of Chemistry, Umeå University, 90187 Umeå, Sweden. E-mail: jana.spath@umu.se

**17712.** Stunkle, C.R.; Davidson, A.T.; Shuart, W.J.; McCoy, M.W.; Vonesh, J.R. (2021): Taxa-specific responses to flooding shape patterns of abundance in river rock pools. Freshwater Science 40(2): 397-406. (in English) ["Connectivity and patch size are important landscape characteristics that drive patterns of abundance and diversity across scales. However, responses to connectivity and patch size are dependent on species traits. Riverine landscapes are highly dynamic both spatially and temporally, with hydrologic connectivity being a major driver of abundance and diversity. Here we modeled the densities of 2 taxa that differ in life history and dispersal ability, the Virginia River Snail (*Eliemia virginica*) and skimmer dragonfly larvae (*Pantala* spp.), as a function of flooding, patch area, and season in >300 riverine rock pools. We found key differences in how each taxon responded to these predictors. Specifically, increasing pool flood height had a strong negative effect on snail densities, whereas dragonfly nymph densities increased as pools became isolated from the river channel for longer durations of time. Increasing pool surface area had a positive effect on snail densities, whereas dragonfly nymph densities showed no such relationship. Dragonfly nymph densities were greater in summer and autumn than in spring, but snails showed no difference in their temporal distribution across seasons. Our study highlights how differential responses to landscape characteristics are dependent on organism traits. These findings give insight into patterns of abundance and diversity across spatiotemporal scales." (Authors)] Address: Stunkle, C.R., Center Environmental Studies, Virginia Com-



monwealth Univ., 1000 West Cary Street, Suite 105, Richmond, Virginia 23284 USA. E-mail: crstunkle@vcu.edu

**17713.** Sumanapala, A.P. (2021): *Macromia weerakooni* sp. nov. (Odonata: Anisoptera: Macromiidae), a new dragonfly species from Sri Lanka. *International Journal of Odonatology* 24: 169-177. (in English) ["The genus *Macromia* is represented in Sri Lanka by two endemic species. In this paper a third presumed endemic species is described based on a single male specimen collected at Kirikitta, Weliveriya, Western Province in the low country wet zone of the country. *Macromia weerakooni* sp. nov. differs from its congeners in Sri Lanka by having turquoise blue eyes, an entirely black labrum, a short yellow ante-humeral stripe, an interrupted yellow stripe on the anterior margin of metepisternum and differences in the secondary genitalia and anal appendages. As this is the only record of the species knowledge of its natural history and distribution is limited. This discovery highlights the need for further systematic surveys of Odonata in Sri Lanka using sampling methods suitable for the detection of elusive species." (Author)] Address: Sumanapala, A.P., Dept of Zool. & Environ. Scien., Univ. Colombo, Colombo, Sri Lanka. E-mail: apsumanapala@gmail.com

**17714.** Supanekar, S.P.; Naik, M.S.; Meshram, L.N.; Rokade, A.G.; Pawar, P.R. (2021): Species diversity and abundance of dragonflies and damselflies (Odonata: Insecta) in and around Panvel, Navi Mumbai, Maharashtra (India). *International Journal of Scientific and Research Publications* 11(5): 368-374. (in English) ["Panvel is one of the fast-changing metro city in Navi Mumbai, Maharashtra, India, due to ongoing construction of Navi Mumbai International Airport (NMIA), rampant urbanization, industrialization and unplanned development have resulted into ecological disturbances and habitats fragmentation. Literature review suggest that no baseline data is available with respect to Odonata. Hence present study is undertaken."] 15 species of odonates recorded Address: Supanekar, S.P., Mahatma Phule Arts, Science & Commerce College, Panvel, Navi Mumbai, India. E-mail: sankam23@gmail.com

**17715.** Syahroni, A.M.; Nurrofik, A.; Rachman, H.T.; Syarifudin, A.; Kurnianto, A.S. (2021): Rediscovery of *Ceriagrion annulosum* (Lieftinck, 1934) from Java, Indonesia. *Agrion* 25(2): 74-75. (in English) [12-XI-2020, 8°23'42.84" S 112°32'19.32" E, Sumber Bening Village, Bantur District, Malang, East Java, Indonesia.] Address: Syahroni, A.M., Dept Biol., Brawijaya Univ., Jalan Raya Veteran, Malang City 65145, Indonesia. E-mail: amshahroni@student.ub.ac.id

**17716.** Tanczuk, A.; Bojar, P. (2021): The new site of *Somatochlora arctica* (Zetterstedt, 1840) (Odonata: Corduliidae) in Lublin Province. *Odonatrix* 17\_3: 12 pp. (in Polish, with English summary) ["Lublin Province is one of the best researched area in Poland as far as Odonata are concerned, yet there are still places worth examining and needing protection where one may find interesting habitats and species. The obser-

ations were conducted on two strongly hydrated transitional bogs near the village Zanie in Sandomierz Basin in the south-east of Poland. *S. arctica* is a species protected in Poland, included in the Red Book and the Red List of endangered species. The male of *S. arctica* was seen on 10-VIII-2020, in patrolling flight and feeding and the exuvium of the dragonfly was found on 29-VIII-2020. Furthermore, on this area some other interesting observations of dragonflies were recorded, like protected species *Ophiogomphus cecilia* and "southern" species *Aeshna affinis* and the one from the Red List *Orthetrum coerulescens*. Taking into consideration climatic changes, especially drying out of the water bodies where dragonflies live and reproduce, it is very important to protect such places. The adequate management of habitats may help to preserve populations of protected and rare species." (Authors)] Address: Tanczuk, Agnieszka, ul. Przasniedzki 2/40, 20-838 Lublin, Poland. E-mail: 1atanczuk@gmail.com,

**17717.** Tang, D.H.Y.; Visconti, P. (2021): Biases of Odonata in Habitats Directive: Trends, trend drivers, and conservation status of European threatened Odonata. *Insect Conservation and Diversity* 14(1): 1-14. (in English) ["1. Odonata, are important ecological indicators with widely recognised conservation value. They are generally better researched and protected than other invertebrates, yet, they have received limited protection from the European Union (EU)'s Habitats Directive, which serves as the major legislative tool for species conservation in Europe. 2. We reviewed the conservation status and trends, legal protection status, and knowledge gaps of Odonates within the EU. Among the 22 threatened and 27 endemic species in EU, respectively 19 and 11 of them are not protected by the Directive. Out of the 35 species which are threatened and/or listed on the Annexes, 61.5% of them are declining. 3. Nevertheless, threatened non-Annex species are more likely to have a decreasing population trend than Annex species. There are also 26% of threatened non-Annex species with unknown trends. Inaccuracies in evaluating Odonata trends are also revealed due to the lack of standardised methodology and incomplete surveys. 4. Moreover, most conservation research focuses on climate change's effects on range shift, therefore knowledge gaps exist in understating how water and habitat qualities, the most important Odonate trend drivers, shape Odonata conservation status. 5. There is an urgent need to revise the legal protection status of Odonata in Europe, for instance by revising the EU Habitats Directive Annexes to include threatened damselflies and dragonflies. 6. There is also an urgent need for systematic, standardised, and regular survey to be able to investigate trends and drivers of change to identify priority conservation actions." (Authors)] Address: Visconti, P., Centre for Biodiversity & Environment Research, Univ. College London, London, UK

**17718.** Tann, J. (2021): Images of Australian Odonata wings. *Technical Reports of the Australian Museum Online* 33: 1-101. (in English) ["A recently finished project has created an openly accessible, high-resolution, photographic library of wings of Australian dragonflies and damselflies, order Odonata. The library is an open resource for identification and

research. Both male and female wings of 318 species of Odonata have been photographed with a specialist set-up using identified museum collection material. In general, both wings were removed from the insect body to produce an image with a minimum of visual artefacts. Each resulting image shows a pair of right wings, a scale, an identifying taxonomic name and sex." (Author)] Address: Tann, J., Australian Museum Research Institute, Australian Museum, 1 William Street, Sydney NSW 2010, Australia

**17719.** Tchiboza, S. (2021): The endangered dragonfly *Ceragrion citrinum* Campion, 1914 (Zygoptera: Coenagrionidae) from West Africa and efforts to protect it. *Entomologie heute* 32: 75-81. (in English, with French and Germany summaries) ["*C. citrinum* is a very rare threatened damselfly species that nowadays clearly occurs only in southern Benin in the Gnanhouzoumè Community Forest and especially in the Lokoli Swamp Forest. Both areas are not yet protected and are endangered by human activities. A largely privately initiated project is in the process of sensitising the local population, primarily through the youth, to conservation issues with the help of this rare dragonfly." (Author)] Address: Tchiboza, S., Centre de Recherche pour la Gestion de la Biodiversité (CRGB) 04 B.p. 0385 Cotonou, Bénin. E-Mail: s.tchiboza@crgbbj.org

**17720.** Thakuria, D.; Kalita, J. (2021): Diversity and distribution of odonates in Rani Reserve Forest, Assam, India. *Journal of Threatened Taxa* 13(1): 17487-17503. (in English) ["Odonata are the bioindicators of freshwater ecosystem health and is recognised as an excellent 'flagship' group among insects. Baseline knowledge on the diversity and distribution of odonates over spatiotemporal scale is the key to biodiversity conservation. Rani Reserve Forest of Assam is a mosaic of all the habitat types suitable for odonates. The present work aims at studying the diversity and distribution of Odonates in Rani Reserve Forest. The study was carried out from December 2014 to November 2017 by categorising the study area into three major habitat types: 1. lentic system, 2. lotic system and 3. terrestrial woodland. A total of 67 species belonging to 44 genera, representing 11 families were recorded. First published records of three species, *Onychothemis testacea*, *Philoganga montana* and *Indocnemis orang* from the state are also provided herewith. Species richness was the highest in lentic system whereas recorded the lowest in running waters of larger forested streams. Shannon diversity index also indicated that the lentic system is relatively diverse (2.95) and smaller streams of the lotic system showed the highest species evenness (0.87). Libellulidae (43%) was found to be the most dominant family belonging to suborder Anisoptera followed by Coenagrionidae (22%) of suborder Zygoptera. Philogangidae (1%) recorded the lowest number of species. Taxonomically related species showed distinct ecological segregation within these different habitat types occupying different microhabitats therein." (Authors) monsoon] Address: Thakuria, D., Biodiv. & Cons. Lab., Dept Zool., Gauhati Univ., Gopinath Bordoloi Nagar, Assam 781014, India. E-mail: dipti.thakuria@gmail.com

**17721.** Theischinger, G.; Miller, J.; Tang, C.; Huxley, M.; Jacobs, S. (2021): What will happen to them? Notes on some dragonfly (Odonata) species that are susceptible to the impacts of global warming-induced climate change. *The Victorian Naturalist* 138(3): 68-77. (in English) ["Many aquatic macroinvertebrates that require specific habitat niches are expected to relocate in response to global warming-induced climate change. For some species, relocation will not be possible because of geographic constraints or complete loss of the required habitat. Data compiled by Theischinger et al. (2018) was used to identify some species of Odonata at risk of extinction due to loss of habitat caused by climate change. While numerous species are at risk, this paper details only examples of habitats most likely to be impacted. Twelve species requiring these habitats are discussed. Species most at risk are those requiring alpine, sub-alpine and montane habitats. The combined effects of reduced rainfall and increased temperatures have been identified as the factors most likely to degrade these habitats catastrophically. Australia has limited alpine, sub-alpine and montane regions, and little or no alternative habitat for these species. Also, species requiring spring-fed streams are at risk due to reduced renewal of groundwater, while those that inhabit large slow-flowing rivers, particularly in the Murray Darling Basin, are likely to be impacted by algal blooms." (Authors)] Address: Jacobs, S., 55 Lindley Avenue, Narrabeen, NSW 2101, Australia. E-mail: janrob02@gmail.com

**17722.** Thongprem, P.; Davison, H.R.; Thompson, D.J.; Lorenzo-Carballe, M.O.; Hurst, G.D.D. (2021): Incidence and diversity of *Torix Rickettsia*-Odonata symbioses. *Microbial Ecology* 81: 203-212. (in English) ["Heritable microbes are an important component of invertebrate biology, acting both as beneficial symbionts and reproductive parasites. Whilst most previous research has focussed on the 'Wolbachia pandemic', recent work has emphasised the importance of other microbial symbionts. In this study, we present a survey of odonates (dragonflies and damselflies) for *torix* group *Rickettsia*, following previous research indicating that this clade can be common in other aquatic insect groups. PCR assays were used to screen a broad range of odonates from two continents and revealed 8 of 76 species tested were infected with *Rickettsia*. We then conducted further deeper screening of UK representatives of the Coenagrionidae damselfly family, revealing 6 of 8 UK coenagrionid species to be positive for *torix Rickettsia*. Analysis of *Rickettsia* gene sequences supported multiple establishments of symbiosis in the group. Some strains were shared between UK coenagrionid species that shared mtDNA barcodes, indicating a likely route for mitochondrial introgression between sister species. There was also evidence of coinfecting *Rickettsia* strains in two species. FISH analysis indicated *Rickettsia* were observed in the ovarioles, consistent with heritable symbiosis. We conclude that *torix Rickettsia* represent an important associate of odonates, being found in a broad range of species from both Europe and South America. There is evidence that coinfection can occur, vertical transmission is likely, and that symbiont move-

ment following hybridisation may underpin the lack of 'bar-coding gap' between well-established species pairs in the genus. Future work should establish the biological significance of the symbioses observed." (Authors)] Address: Hurst, G.D.D., Institute of Infection, Veterinary and Ecological Sciences, University of Liverpool, Liverpool L69 7ZB, UK. E-mail: g.hurst@liverpool.ac.uk

**17723.** Tüzün, N.; Savasçi, B.B.; Stoks, R. (2021): Seasonal time constraints shape life history, physiology and behaviour independently, and decouple a behavioural syndrome in a damselfly. *Oikos* 130(2): 274-286. (in English) ["The integration of traits into 'syndromes' has been suggested as a useful framework to advance insights in trait responses to environmental stressors. Yet, how stressors shape the consistency ('repeatability') of traits and their covariation at the individual level remains debated. We studied how seasonal time constraints shape trait repeatability and integration of life-history, behavioural, and physiological traits along a fast-slow continuum, using the 'pace-of-life syndrome' as a framework. We manipulated the photoperiod during the larval development of the damselfly *Ischnura elegans*, generating a time-relaxed early, a control, and a time-constrained late group. The photoperiod treatment did not seem to affect the voltinism of the larvae. As predicted, late-period larvae accelerated development and growth, yet this acceleration was no longer detectable for growth and metabolic rate during the final instar, possibly due to costs of the initial life-history acceleration. This warrants caution when inferring a species' pace-of-life based on a specific developmental stage. The late-period larvae were as predicted more active (only during the later stages of the final instar) and bolder than the control larvae, but not different from the early-period larvae. Most studies on time constraints only compared late and control animals, thereby potentially wrongly concluding adaptive responses to time constraints. Activity, boldness, and body mass were repeatable, while growth and metabolic rates were not. Notably, repeatabilities did not change under time constraints. There was no support for an overall trait integration in a pace-of-life syndrome, yet activity and boldness covaried positively as expected. Importantly, this 'behavioural syndrome' was decoupled in the late-period larvae, which might be adaptive to enhance energy acquisition to fuel the accelerated development rate. Our results suggest that besides the predicted plastic acceleration of life-history, plastic changes in behavioural trait integration may also be an important but overlooked adaptive aspect of responding to time constraints." (Author)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**17724.** Twardochleb, L.; Hiltner, E.; Pyne, M.; Zametske, P. (2021): Freshwater insects CONUS: A database of freshwater insect occurrences and traits for the contiguous United States. *Global Ecology & Biogeography* 2021: 16 pp. (in English) ["Freshwater insects comprise 60% of freshwater animal diversity; they are widely used to assess water qua-

lity, and they provide prey for numerous freshwater and terrestrial taxa. Our knowledge of the distribution of freshwater insect diversity in the USA is incomplete because we lack comprehensive, standardized data on their distributions and functional traits at the scale of the contiguous United States (CONUS). We fill this knowledge gap by presenting Freshwater insects CONUS: A database of freshwater insect occurrences and traits for the contiguous United States. This database includes 2.05 million occurrence records for 932 genera in the major freshwater insect orders, at 51,044 stream locations sampled between 2001 and 2018 by federal and state biological monitoring programmes. Compared with existing open-access databases, we tripled the number of occurrence records and locations and added records for 118 genera. We also present life-history, dispersal, morphological and ecological traits and trait affinities (analogous to fuzzy-coded traits) for 1,007 stream insect genera, assembled from existing databases, reference books and the primary literature. We nearly doubled the number of traits for 11 trait groups and added traits for 180 genera that were not available from open-access databases. Our database, Freshwater insects CONUS, facilitates the mapping of freshwater insect taxonomic and functional diversity and, when paired with environmental data, will provide a powerful resource for quantifying how the environment shapes stream insect diversity and taxon-specific distributions." (Authors)] Address: Twardochleb, Laura, California Dept Water Resources, 3500 Industrial Boulevard, West Sacramento, CA 95799, USA. E-mail: laura.twardochleb@water.ca.gov

**17725.** Uz, A.G.; Salur, A. (2021): Intraspecific wing variations in *Orthetrum brunneum* (Insecta: Odonata): effects of Anatolian diagonal. *Fresenius Environmental Bulletin* 30(3): 2879-2887. (in English) ["Geographical and ecological diversity positively leads to variations in different populations of a species. In Turkey, researches on the effect of Anatolian diagonal with dozens of ecological barriers in terms of biodiversity, have been increased in recent years. The aim of this study is to determine the variations of wing morphologies of *Orthetrum brunneum* populations by using biometric characters. For this purpose, intra-species wing variations of three different *Orthetrum brunneum* populations were investigated where collected from Tunceli province located in east, Yozgat province located in west and Western Mediterranean Region located in south of Anatolian diagonal. Statistical analysis (Tukey HSD) showed that various biometric characteristics differed statistically among these taxon ( $P < 0.05$ ). According to Principal Component Analysis (PCA), four components with total variance Eigen value greater than 1 can be explained among these groups. Tunceli population were divergent from other populations by Discriminant Function Analysis (DFA). These findings support the idea that Anatolian diagonal is a barrier for populations of *O. brunneum*." (Authors)] Address: Salur, A., Hitit Univ., Dept Biol., Fac. of Arts and Sciences, Ikbalkent Campus, Corum, Turkey

**17726.** Van Damme, K.; Vahalik, P.; Ketelaar, R.; Jeziorski, P.; Bouwman, J.; Morris, M.; Suleiman, M.S.; Dumont, H.J.



(2020): Dragonflies of Dragon's Blood Island: Atlas of the Odonata of the Socotra Archipelago (Yemen). *Rendiconti Lincei. Scienze Fisiche e Naturali* 31: 571-605. (in English) ["Odonata are important bioindicators of aquatic ecosystem health. We discuss the distribution and richness of the 22 odonate species known from the Socotra Archipelago UNESCO World Heritage Site (Yemen) in the western Indian Ocean. We compiled 841 records from literature, field data and museum collections, covering a surveying period of 123 years (1896–2019). Distribution of the only endemic, *Azuragrion granti* (McLachlan, 1903), an indicator of pristine lotic waters, is updated. Relatively higher dragonfly species richness occurs in eastern Socotra where suitable aquatic habitats are present all year. We observed a significant drop of the number of taxa over several decades in areas in the Hadiboh Plain where human development impacts are strongest. We discuss the indigenous people's perception of dragonflies to assess the potential of these invertebrates as local flagships for aquatic biodiversity conservation. Our knowledge of the Socotran Odonata remains incomplete, yet they are now among the best studied animal groups in the archipelago. A new record of an Oriental *Anax* indicates that the island's dragonfly fauna may yet harbour surprises. Our compilation of odonate records is the first for Socotra and serves as a baseline for future monitoring of the archipelago's vital aquatic habitats. We converted all records into a geodatabase which we uploaded to an online, freely available web mapping server and mobile application to facilitate research and conservation of the Socotran dragonflies ([www.dragonfliesofsocotra.com](http://www.dragonfliesofsocotra.com))."] (Authors)] Address: Van Damme, K., Senckenberg Res. Inst. & Nat. Hist. Mus. Frankfurt, Senckenberganlage 25, 60325 Frankfurt am Main, Germany. E-mail: [kay.vandamme@gmail.com](mailto:kay.vandamme@gmail.com)

**17727.** Veljkovic, M. (2021): Contribution to the knowledge of dragonfly fauna (Insecta: Odonata) of Bjelovar area, Croatia – results of a four-year photographic study. *Natura Croatica* 30(1): 161-172. (in English, with Croatian summary) ["This paper gives a list of 10 species from five Odonata families observed in Gornje Plavnice near Bjelovar, Croatia in a period between the 18th of June 2017 and the 11th of August 2020. This photographic research, conducted along the Jarak Pond and on the surrounding meadows, agricultural land and forest edge in Gornje Plavnice, represents a contribution to the knowledge of dragonfly fauna of the Bjelovar-Bilogora area as well as of Croatia as a whole." (Author)] Address: Veljkovic, Monika, Gornje Plavnice 56, 43000 Bjelovar, Croatia. E-mail: [monika.veljkovic1@gmail.com](mailto:monika.veljkovic1@gmail.com)

**17728.** Venancio, H.; Vilela, S.S.; Barbosa, M.S.; Santos, J.C. (2021): Dragonflies and damselflies in a region of the Triângulo Mineiro, Minas Gerais: checklist and taxonomic additions. *Biota Neotropica* 21(3): e20201182, 2021: 16 pp. (in English, with Portuguese summary) ["Remaining freshwater systems are historically under threat mainly due to human activities such as agriculture and urbanization. The consequences of such activities are innumerable, and among them there is a decrease of suitable habitats for threatened fauna. In the Brazilian Cerrado, the odonatofauna of palm

swamps and riparian forests are still poorly explored, a fact that difficult conservation efforts of the group. Thus, we performed an inventory in several urban and rural sites containing these phytophysiognomies in Uberlândia, Triângulo Mineiro region, western Minas Gerais state. In total, we found 101 Odonata species, seven families and 46 genera in the municipality, with 76 and 66 species, respectively, belonging to palm swamp and forest sites. From this diversity, eight species were first records in the state of Minas Gerais: *Neuraeschna claviforcipata*, *Phyllocycla* cf. *medusa*, *Diastatops intensa*, *Oligoclada pachystigma*, *O. xanthopleura*, *Angelagrion nathaliae*, *Telebasis sanguinalis* and *Telebasis simulacrum*. We also sampled *Erythrodiplax ana*, a species listed as endangered (EN) by the IUCN red list. Additionally, we include some taxonomic notes of *Forcepsioneura machadorum* females, a newly discovered species in the region. Our results contribute to the Odonata database in Brazil and highlights the importance inventories in poorly explored aquatic ecosystems." (Authors)] Address: Venâncio, H., Univ. de São Paulo, Fac. de Filosofia, Ciências e Letras de Ribeirão Preto, Programa de Pós-Graduação em Entomologia, Ribeirão Preto, SP, Brasil. E-mail: [henrivens@gmail.com](mailto:henrivens@gmail.com)

**17729.** Viella, D.S.; Farias, A.B.S.; Santos, J.C. (2021): *Heteragrion lencionii* (Odonata: Heteragrionidae) sp. nov. from Serra de Itabaiana National Park, Northeastern Brazil. *Zootaxa* 4966(4): 476-482. (in English, with Spanish summary) ["The Neotropical genus *Heteragrion* Selys, 1862 is one of the most speciose among Zygoptera. Notwithstanding, most of its species are poorly known, especially those from undersampled areas such as Northeastern Brazil. Here, we describe *Heteragrion lencionii* sp. nov., from protected areas of Sergipe state (Holotype ♂, Brazil, Sergipe, Areia Branca, Serra de Itabaiana National Park, -10.7484, -37.3390, 179 m, 7.xii.2020, A.B. Farias & A.E. dos Santos leg., in UFS). This is only the second *Heteragrion* species discovered as new for the Northeastern region of Brazil, separated from other congeners by cercus morphology and thoracic coloration pattern." (Authors)] Address: Viella, D.S., Rua Jaime Bilharinho, 575, Fabrício, CEP 38065-280, Uberaba, MG, Brazil. E-mail: [deeogoo@gmail.com](mailto:deeogoo@gmail.com)

**17730.** Vilela, D.S.; Lencioni, F.A.A.; Santos, J.C. (2021): *Leptagrion itabaiana* sp. nov. (Odonata: Coenagrionidae) from Serra de Itabaiana National Park, Sergipe state, Northeastern Brazil. *Zootaxa* 4980(3): 558-564. (in English) ["*Leptagrion itabaiana* sp. nov. (Brazil, Sergipe, Areia Branca, Serra de Itabaiana National Park, (10.7517 S, 37.3415 W, 179 m asl), 3.ii.2021, J.C. Santos leg.) is described, diagnosed, illustrated and compared with morphologically close congeners based on male specimens. The new species can be separated from other *Leptagrion* species mainly by cercus morphology." (Authors)] Address: Vilela, D.S., Rua Jaime Bilharinho, 575, Fabrício, CEP 38065-280, Uberaba, MG, Brazil. E-mail: [deeogoo@gmail.com](mailto:deeogoo@gmail.com)

**17731.** Vilenica, M.; Kerovec, M.; Pozojevic, I.; Mihaljevic, Z. (2021): Odonata assemblages in anthropogenically impacted lotic habitats. *Journal of Limnology* 80(1): 10 pp. (in

English) ["Increasing human pressures have a negative impact on freshwater habitats and their biota worldwide. To protect habitats and the species contained within them, ecological assessments over a gradient of near natural to degraded freshwater habitats are essential. Odonata assemblages were investigated at 46 study sites in Croatia encompassing slightly to heavily modified lowland rivers and streams. Nymphs were sampled between April and September 2016 using a benthos hand net. A total of 19 species was recorded, and *Ischnura elegans* and *Platycnemis pennipes* were most frequently recorded. RDA analysis indicated that water pollution (i.e. levels of chemical oxygen demand and total organic carbon), water temperature and oxygen concentration had the highest influence in the formation of Odonata assemblages at a specific habitat, reflecting their widely recognized bioindicator properties. This study showed that degraded lowland rivers can provide habitat for a relatively low number of species with broad ecological tolerance, while rare and specialist species are generally not able to reproduce there. These results contribute to our knowledge of Odonata occurrence in anthropogenically impacted habitats, and their relationships with such degraded environment." (Authors)] Address: Vilenica, Marina, University of Zagreb, Faculty of Teacher Education, Trg Matice hrvatske 12, Petrinja, Croatia

**17732.** Wade, A. (2021): Role of vegetated buffer zones for mitigating wetland pesticide contamination and protecting aquatic invertebrate communities in northern prairie wetlands. M.Sc. thesis, Toxicology Centre, University of Saskatchewan. XIII, 151 pp. (in English) ["Prairie Pothole Region (PPR) wetlands are unique resources that provide a number of ecosystem services. However, the majority of these wetlands have been drained or otherwise degraded due to agricultural activities. Wetlands in the PPR are frequently contaminated by agrochemicals from surrounding agriculture, which has been previously demonstrated to have negative impacts on wetland ecology. Vegetation buffers have been proven to be effective in mitigating pesticide and nutrient contamination of water bodies, but have yet to be fully researched in their efficacy in protecting PPR wetlands. Here I examined how multiple agricultural stressors impact PPR wetland health, and whether natural wetland vegetation or producer-implemented perennial plantings are effective buffers, able to mitigate some of the negative effects of agriculture to wetlands. Measurements of pesticides, nutrients, other water quality parameters, in addition to aquatic invertebrate community endpoints were used to comprehensively evaluate the health of PPR wetlands. Pesticide contamination was widespread, with 59 of the 60 wetlands sampled in 2018 and 2019 containing one or more pesticides in a single growing season. Natural wetland vegetation and the degree of its disturbance from agricultural activities did not have a significant effect on pesticide concentrations in wetlands, although this disturbance did influence the aquatic invertebrate community. Wider and less disturbed wetland vegetation zones were associated with greater macroinvertebrate richness ( $p = 0.031$ ) and greater abundance of Odonata ( $p = 0.001$ ). Aspects of water quality

were significant predictors of multiple aquatic invertebrate community indices. The occurrence of cyanobacteria blooms as well as increased total nitrogen (TN) were associated with declines in Shannon's diversity (Cyanobacteria:  $p = 0.001$  and TN:  $p = 0.016$ ) and Shannon's Evenness (Cyanobacteria:  $p = 0.002$  and TN:  $p = 0.001$ ) as well as increases in Berger-Parker Dominance (Cyanobacteria:  $p = 0.004$  and TN:  $p = 0.001$ ). The Pesticide Toxicity Index (PTIs) calculated for each wetland was associated with changes to the aquatic invertebrate community including a decline in total and relative insect abundance ( $p = 0.016$  and  $p < 0.001$ ) and an increase in relative snail abundance ( $p = 0.005$ ). Higher PTIs were also associated with a shift in relative abundance of different functional feeding groups ( $p = 0.017$ ). This PTI associated shift in taxa and functional feeding groups likely has greater implications for ecosystem function including the many wildlife species that depend on aquatic insects for food. Perennial buffers are considered an important management tool to reduce the negative impacts of agriculture on surface waters. Perennial vegetated buffers recently planted under conservation incentive programs were evaluated for their efficacy in mitigating pesticide and nutrient runoff and protecting wetland health. Wetlands that were fully surrounded by perennial buffers and/or other natural vegetation contained significantly lower concentrations of pesticides ( $p = 0.001$ ), lower PTIs ( $p < 0.001$ ), and total phosphorus ( $p = 0.005$ ). However, the presence of perennial buffers alone did not have a significant effect on pesticide or nutrient detections, and even those wetlands that were fully surrounded by perennial buffers or additional natural vegetation all contained some detectable pesticide contamination. The presence of perennial buffers was significantly associated with greater abundances of macroinvertebrates ( $p = 0.001$ ), zooplankton ( $p = 0.005$ ), and insects ( $p = 0.039$ ) which may benefit the many wildlife species that depend on wetland invertebrate productivity for food. This study establishes a framework for using wetland invertebrate communities as an integrative biomonitoring tool for assessing effects of complex agricultural stressors to PPR wetlands. The results from this study demonstrate negative effects of multiple agricultural stressors on wetland health, as measured by changes in the aquatic invertebrate community. Findings here suggest that leaving or planting wetland vegetation around PPR wetlands could increase community richness and abundance of beneficial insects, but is not sufficient for protecting wetlands from pesticide contamination. However, surrounding wetlands with perennial vegetation plantings in addition to other natural vegetation could be an effective method for reducing pesticide and nutrient contamination of wetlands and increasing the abundance and diversity of aquatic invertebrates, which are an important food source for many wildlife species. These findings may help guide producers and land managers motivated to improve wetland health and ecosystem services in prairie agricultural landscapes." (Author)] Address: not stated

**17733.** Walia, G.K.; Singh, H. (2021): First cytogenetic report on four species of family libellulidae (Odonata: Anisop-

tera) from India. *International Journal of Entomology Research* 6(2): 223-227. (in English) ["Chromosome complement of *Cratilla lineata*, *Hylaeothemis apicalis*, *Orthetrum chrysis* and *Zygonix irix* of family Libellulidae has been studied by conventional staining, C-banding, silver nitrate staining and sequence specific staining. Among these, *Cratilla lineata*, *Orthetrum chrysis* and *Zygonix irix* possess  $2n$  (‰) = 25 as the chromosome number, while *Hylaeothemis apicalis* reveals  $2n$  (‰) = 23, which is originated by the fusion of X chromosome with an autosome pair as X chromosome is the largest element in the complement. Terminal C-bands and terminal NORfs are present on the autosomal bivalents, while X chromosome is entirely C-positive and NOR-positive in all the species, whereas m bivalent shows variation in distribution of C-heterochromatin and NORfs. Similarly, autosomal bivalents and X chromosome show more DAPI bright signal than CMA3, while m bivalent possesses variation in AT-GC region specificity. Cytogenetically, all these species has been studied for the first time in the world." (Authors)] Address: Walia, Gurinder Kaur, Department of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab, India

**17734.** Walker, G.; Theischinger, G. (2021): Observation before, at and after oviposition of *Tetrathemis irregularis cladophila* (Anisoptera, Libellulidae). *Agrion* 25(2): 51-53. (in English) ["Observations made in tropical Queensland before, at and immediately after the oviposition of *Tetrathemis irregularis cladophila* Tillyard, 1908 are described, illustrated and discussed." (Authors)] Address: Walker, G., 14 Drishane Street, The Gap, Brisbane Queensland 4061 Australia. E-mail: gwalk13@bigpond.net.au

**17735.** Wang, L.-J.; Hsu, M.-H.; Wang, C.-H.; Chung, C.H.; Sung, C.-H. (2021): The complete mitochondrial genome of *Mnais tenuis* Oguma, 1913 (Odonata: Calopterygidae) and its phylogenetic implications. *Mitochondrial DNA Part B Resources* 6(5): 1648-1649. (in English) ["We sequenced and assembled the complete mitochondrial genome of *Mnais tenuis* from Darshi, Taoyuan County, Taiwan. The complete mitogenome of *M. tenuis* is 15,131 bp long, and contains 13 protein-coding, 22 tRNA, and two rDNA genes. Nucleotide compositions of the mitogenome of the *M. tenuis* are A: 40.08%, T: 25.47%, C: 20.38%, and G: 14.07%. The AT and GC skewness of the mitogenome sequence was 0.2228 and -0.183, showing the A-skew and C-skew. The clade including *M. tenuis* and all the other Odonata species received absolute support (100%). The phylogenetic position of Anisozygoptera is sister to Anisoptera. *Mnais* is phylogenetically close to *Psolodesmus*. Mitogenomic data from this study will provide useful information for further studies for the population genetics, speciation and conservation of *M. tenuis* in the future." (Authors)] Address: Chia-Hsuan Sung, Division of Forest Protection, Taiwan Forestry Research Institute, Taipei, Taiwan. E-mail: chsung@mail.tfrin.gov.tw

**17736.** Wang, Y.; Du, Y.; Song, X.; Huang, A. (2021): Characterization and phylogenetic analysis of the complete mitochondrial genome of *Pseudothemis zonata* (Odonata:

Anisoptera: Libellulidae). *Mitochondrial DNA Part B*, 6:1: 24-25. (in English) ["*P. zonata* is a commonly seen dragonfly with a big yellow or white ringlike spot on the third and fourth segments of its abdomen. In this study, we sequenced and analyzed the complete mitochondrial genome (mitogenome) of *P. zonata*. This mitogenome was 15,434 bp long and encoded 13 protein-coding genes (PCGs), 22 transfer RNA genes (tRNAs), and 2 ribosomal RNA unit genes (rRNAs). Gene order was conserved and identical to most other previously sequenced Libellulidae dragonflies. The whole mitogenome exhibited heavy AT nucleotide bias (74.6%). Most PCGs of *P. zonata* have the conventional start codons ATN (six ATG, three ATT, and two ATC), with the exception of *cox1* and *nad1* (TTG). Except for four genes (*cox1*, *cox2*, *cox3*, and *nad5*) end with the incomplete stop codon T, all other PCGs terminated with the stop codon TAA or TAG. Phylogenetic analysis showed that *P. zonata* got together with *Brachythemis contaminata* with high support value, and the relationships ((*Brachythemis* + *Psolodesmus*) + ((*Hydrobasileus* + *Trigomphus*) + (*Orthetrum* + *Acisoma*))) were supported in Libellulidae.] Address: Wang, Y., School of Life Sciences, Gannan Normal University, Ganzhou, PR China; bNational Navel Orange Engineering and Technology Research Center, Ganzhou, PR China

**17737.** Wang, Y.; Du, Y.; Song, X.; Huang, A. (2021): Complete mitochondrial genome sequence of *Anax parthenope* (Odonata: Anisoptera: Aeshnidae) and phylogenetic analysis. *Mitochondrial DNA Part B*, 6:1: 122-123. (in English) ["*A. parthenope* is a big dragonfly which can be seen patrolling around ponds, lakes and other still water. In this study, we sequenced and analyzed the complete mitochondrial genome (mitogenome) of *A. parthenope*. This mitogenome was 15,366 bp long and encoded 13 protein-coding genes (PCGs), 22 transfer RNA genes (tRNAs) and two ribosomal RNA unit genes (rRNAs). The nucleotide composition of the mitogenome was biased toward A and T, with 74.8% of A + T content (A 40.1%, T 34.7%, C 14.0%, G 11.2%). Gene order was conserved and identical to most other previously sequenced Aeshnidae dragonflies. Most PCGs of *A. parthenope* have the conventional start codons ATN (six ATG, three ATT, and two ATC), with the exception of *cox1* and *nad1* (TTG). Except for three genes (*cox1*, *cox2*, and *nad5*) end with the incomplete stop codon T, all other PCGs terminated with the stop codon TAA. Phylogenetic analysis showed that *A. parthenope* is sister to *Anax imperator* with high support value. All 15 Anisoptera species constituted a major clade with well support, and Aeshnidae had a close relationship with Gomphidae and Libellulidae." (Authors)] Address: Wang, Y., School of Life Sciences, Gannan Normal Univ., Ganzhou, China

**17738.** Wang, Z.; Li, B.; Luo, Q.-q.; Zhao, W. (2021): Effect of wall roughness by the bionic structure of dragonfly wing on microfluid flow and heat transfer characteristics. *International Journal of Heat and Mass Transfer* 173 July 2021, 121201: (in English) ["Highlights: • A novel of bionic rectangular microchannel (BRM) with a hydraulic diameter of 1000  $\mu$ m was designed based on the bionic wall roughness (BWR)



of dragonfly wings structure. Using k-w (SST) model on the calculation of turbulence in the microchannel are effectiveness and reliability. The existence of BWR can effectively increase the temperature and velocity fluctuation range of the fluid, and enhance the fluid disturbance and velocity, and generate a large number of regular vortex flow in a wide scope. The effects of the bionic rectangular microchannel (BRM) on flow and heat transfer is significantly better than that of the smooth rectangular microchannel (SRM), and an enhancement of 218% in heat transfer was achieved compared to a SRM, and the thermal enhancement factor is 1.34. Transition occurs when the re number range of flow in BRM is 933–1166. Abstract: In order to strengthen flow and heat transfer performance of the smooth rectangular microchannel (SRM), a novel of bionic rectangular microchannel (BRM) with a hydraulic diameter of 1000  $\mu\text{m}$  was designed based on the bionic wall roughness(BWR) of dragonfly wings structure. The effect of BWR and different microchannel lengths, and BWR with different tiny structures on flow and heat transfer was investigated, and the optimal of BWR's parameter, arrangement, combination and Re number range were studied. The results indicated that the influence of BWR on the flow and heat transfer performance is significantly better than that of SRM. When the Re is 5830, the heat transfer performance of the BRM model is 2.08 times that of SRM, and the heat enhancement factor is 1.233. Moreover, the optimal BRM's maximum velocity of the fluid is 19.6 m/s, which is 3.1 times of that of SRM, and the maximum temperature is 14.3 K lower than that of SRM, and an enhancement of 218% in heat transfer was achieved compared to a SRM, and the thermal enhancement factor is 1.34. Compared with BWR effect, the influence of the entry effect on heat transfer can be ignored, and the existence of BWR increases the number and scope of fluid disturbance and brings a large number and a wide range of high speed vortex flow appears in BRM, and they are regularly distributed after each group of BWR and the central of the microchannel, which further increases the flow velocity and disturbance, and reduces the range of low-speed and high-temperature region near the wall, and finally enhances flow and heat transfer performance." (Authors)] Address: Wang, Z., School of Energy and Power Engineering, University of Shanghai for Science and Technology, Shanghai 200093, PR China

**17739.** Wendel, E. (2021): Effects of pH and conductivity on the condition and abundance of dragonfly larvae. BSc. thesis, Halmstad University, School of Business, Innovation and Sustainability: 17 pp. (in English) ["Acidification in lentic ecosystems can generate significant negative impacts for freshwater organisms. Prior research has shown that most dragonfly (Odonata) species are more tolerant against low pH than other aquatic invertebrates; however, detailed knowledge regarding autecology and physiological burdens of pH and conductivity is still scarce. In this thesis, the effects of two environmental factors on the condition (mass per unit head width) and abundance of dragonfly were researched in a series of 18 lakes in SW Sweden. Regressionary analy-

sis revealed that the larva condition of *Libellula quadrimaculata* is significantly dependent upon pH and presumably also conductivity, while no such relationship was indicated for *Cordulia aenea*. The inferior condition of *L. quadrimaculata* in acidic lakes is presumably an evolutionary adaption, whereas part of its tolerance mechanism utilises more fats and carbohydrates than protein. The data also supports the proposal that the abundance of *L. quadrimaculata* increases at lower pH, although further examination is required to conclude the suspected trend." (Author)] Address: not stated

**17740.** Westra, T.; De Knijf, G.; Ledegen, H.; Van De Poel, S.; Piesschaert, F.; Onkelinx, T. (2021): Resultaten van de Vlaamse libellenmeetnetten voor de periode 2016 - 2020. Rapporten van het Instituut voor Natuur- en Bosonderzoek 2021(12). Instituut voor Natuur- en Bosonderzoek, Brussel. DOI: doi.org/10.21436/inbor.34106517: 53 pp. (in Dutch, with English summary) ["The species monitoring programme meetnetten.be aims at collecting reliable information on priority species in Flanders. It consists of a series of monitoring schemes which were designed by the Research Institute for Nature and Forest (INBO). Species are counted by volunteers in a standardized way under the coordination of the NGO Natuurpunt. This report shows the first results of the dragonfly monitoring schemes for the period 2016 -] 2020. *Coenagrion lunulatum* and *Sympetrum depressiusculum* show a decrease in abundance and *Leucorrhinia pectoralis* shows a strong decrease in abundance. On the other hand, *Gomphus flavipes* shows a strong increase in abundance between 2016 and 2020. For other priority dragonfly species we are not able to detect a trend yet. The continuation of this monitoring project will enable us to detect future patterns. This is the case for following species: *Calopteryx virgo*, *Coenagrion hastulatum*, *C. pulchellum*, *Aeshna isocetes*, *Gomphus vulgatissimus* and *Leucorrhinia caudalis*." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium

**17741.** Xu, Q.-h. (2021): Description of the final stadium larva of *Calicnemia sinensis* Lieftinck, with discussion of the larval characters of genus *Calicnemia* Strand Odonata: Zygoptera: Platycnemididae. International Journal of Odonatology 24: 64-70. (in English) ["The final stadium larva of *Calicnemia sinensis* Lieftinck is described and illustrated in detail. It is characterized by (1) palpal lobe of prementum with two end hooks of unequal size, the inner longer and sharper, and the outer shorter and stouter; (2) inner side of palpal lobe with five long setae above and two or three short ones below; (3) wing sheaths parallel to each other, reaching beyond the distal margin of abdominal segment 6; and (4) caudal gills strongly ridged, median gill large and broad, more than 2 times of lateral gill in width." (Author)] Address: Xu, Q.-h., Dept of Garden & Horticulture, Zhangzhou City University, Zhangzhou, Fujian 363000, PR China. E-mail: qihanxu@aliyun.com

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2019

**17741.** Abe, K.; Takahashi, D.; Hayakawa, K. (2019): Habitat use by the near-endangered dragonfly *Aeshna mixta soneharai* in reservoir ponds in Ueda, Nagano Prefecture, Japan. *Japanese Journal of Conservation Ecology* 24(2): 201-208. (in Japanese, with English summary) ["*A. mixta soneharai* mainly inhabits artificial reservoir ponds and is a natural monument protected by the regulations of Ueda, Nagano Prefecture, Japan. The habitat use of this species was investigated on the Shioda Plain, where there are many reservoir ponds. The percentage of shoreline covered by emergent water plants was higher in ponds with the dragonfly than in those without the dragonfly. In the generalised linear model, forest and apple orchard areas around the ponds positively contributed to the occurrence of this dragonfly, in addition to shoreline emergent plants. A route census at an orchard showed that *A. m. soneharai* used the orchard as habitat. These results are consistent with the reproductive ecology of the species, which uses emergent water plants as spawning sites. *A. m. soneharai* use forest habitat for sub-adult maturation. Similar to forest, sub-adult *A. m. soneharai* are likely to use orchards. This study suggests that restoration near reservoir ponds would be effective for the conservation of *A. m. soneharai*. When it is difficult to restore forest around ponds, apple orchards with economic potential might serve as an alternative habitat." (Authors)] Address: Abe, K., Graduate School of Horticulture, Chiba University, 648 Matsudo, Matsudo City, Chiba 271-8510, Japan. E-mail: ayxa5455@chiba-u.jp

**17742.** Adu, B.W.; Amusan, B.O.; Oke, T.O. (2019): Assessment of the water quality and Odonata assemblages in three waterbodies in Ilara-Mokin, south-western Nigeria. *International Journal of Odonatology* 22(2): 101-114. (in English) [„This study investigated the biological water quality and Odonata assemblages in three waterbodies in Ilara-Mokin, with the aim of determining the ecological integrity of the ecosystems. Sampling of Odonata specimens was carried out over April–August, 2017 between 9.00am and 4.00 pm under favourable conditions. Some physico-chemical

parameters of the water such as dissolved oxygen, electrical conductivity, temperature, flow rate, pH, and water depth were also investigated. A total of 41 odonate species were recorded in this study and this was represented by 29 dragonfly and 12 damselfly species. These species are contained in seven families (Macromiidae, Gomphidae, Libellulidae, Calopterygidae, Coenagrionidae, Chlorocyphidae and Platycnemididae). The seven families were recorded at Aponmu River while Omifunfun River and Isokun River accounted for six and four families respectively. However, the highest number of individuals was collected at Isokun River. Libellulidae was the dominant family. Diversity indices revealed that Aponmu river was the richest in terms of species richness, diversity and taxa distribution (Shannon: 3.18, Simpson D: 0.95, Margalef: 7.38, evenness: 7.38, equitability: 0.93). Dragonfly Biotic Index (DBI) analysis indicated that Omifunfun River represented the best habitat condition in the study area while Isokun River was considered the most perturbed sampled site in the study area. Conservative efforts should be intensified to protect Omifunfun River in order to preserve all extant aquatic biota and other available resources therein." (Authors)] Address: Adu, B.W., Dept Biology, The Fed. Univ. Technology, Akure, Nigeria. E-mail: bwadu@futa.edu.ng

**17743.** Agboola, O.A.; Downs, C.T.; O'Brien, G. (2019): Macroinvertebrates as indicators of ecological conditions in the rivers of KwaZulu-Natal, South Africa. *Ecological Indicators* 106, November 2019, 105465: 10 pp. (in English) ["Highlights: • Macroinvertebrate multimetric assessment of ecological health was conducted. • 38 rivers in KwaZulu-Natal (KZN) Province, South Africa were assessed. • 9 of the selected metrics had strong correlations with environmental variables. • Increasing chemical deterioration along longitudinal gradients of rivers was found. • Macroinvertebrate community metrics could detect pollution and habitat degradation Abstract: This study examined the effectiveness of macroinvertebrate community-based multimetrics to assess the ecological health of 38 rivers in KwaZulu-Natal (KZN) Province, South Africa. The study area comprised of headwater to lowland rivers determined by their hydro-morphology. Of the 40 tested metrics, only 11 core metrics were

finally selected because of their ability to distinguish between reference and impaired sites, correlation strength with environmental variables and their reliability. Nine out of the selected metrics had strong correlations with environmental variables and these were total number of taxa, total number of Diptera taxa, total number of Plecoptera individuals, percentage of Ephemeroptera Plecoptera and Trichoptera taxa, percentage of Odonata taxa, total number of Trichoptera individuals, total number of Gastropoda individuals, total number of Oligochaeta individuals and total number of Coleoptera individuals. This study showed increasing chemical deterioration along longitudinal gradients of the rivers in KZN. We found that macroinvertebrate community metrics could detect nutrient pollution, organic pollution and physical habitat degradation in the rivers of KZN. We recommend more studies and validation of macroinvertebrate community-based metrics in the assessment of rivers in KZN, because they are relatively cheap and easy to use. The use of macroinvertebrate community metrics could be an effective alternative assessment method in the case of the lowland rivers where the lack of quality data often has negative impacts on the use of the biotic indices (South African Scoring System (SASS), Average Score Per Taxon (ASPT) and Macroinvertebrate Response Assessment Index (MIRAI))." (Authors)] Address: Agboola, O.A., School of Life Sciences, Univ. of KwaZulu-Natal, Private Bag X01, Scottsville, Pietermaritzburg 3209, South Africa

**17744.** Albab, A.U.; Leksono, A.S.; Yanuwidi, B. (2019): Land use analysis with Odonata diversity and composition using the ArcGIS in Malang and Batu, East Java. Indonesian Journal of Environment and Sustainable Development 10(2): 73-83. (in English) ["This study aims to analyze the diversity, composition, and community structure of Odonata in the highland and lowland ecosystems and the type of lotic and lentic waters and analyze the description of land use and its relationship with diversity Odonata. There are 8 research locations namely Sumber Maron, Sumber Sirah, Sumber Taman, Bureng River, Umbul Gemulo, Arboretum, Coban Rais River, Coban Talun River. Measurement of biotic and abiotic factors in Odonata habitat and land use analysis using GPS and ArcGIS program ver 10.5, data analysis using the Shannon Wiener diversity index (H'), evenness index (E), Important Value Index (IVI), and similarity index Bray-Curtis. The results showed that the total number of Anisoptera in lotic aquatic ecosystems was 619 individuals divided into 13 species from 3 families, in the lenticular aquatic ecosystem was 533 individuals divided into 15 species from 3 families. The diversity of species in the highlands is higher than in the lowlands, and the diversity in the lentic ecosystem is higher than that of the lotic ecosystem and Odonata has its own tolerance to land use as their habitat especially with minimal human disturbances." (Authors)] Address: Albab, A.U., Dept. Biology, Univ. of Brawijaya, Veteran Malang, Malang 65145, Indonesia. E-mail: albertualbab@gmail.com

**17745.** Allgeier, S.; Friedrich, A.; Brühl, C.A. (2019): Mosquito

control based on *Bacillus thuringiensis israelensis* (Bti) interrupts artificial wetland food chains. Science of The Total Environment 686: 1173-1184. (in English) ["Highlights: • Chironomidae are the non-target aquatic invertebrates most affected by Bti. • Development of newt larvae was indirectly affected in Bti treated food chains. • *Aeshna cyanea* decreased newt survival by 27% when Bti was applied. • Larval chironomids are a key component in the diet of aquatic predators. Abstract: The biocide *Bacillus thuringiensis israelensis* (Bti) has become the most commonly used larvicide to control mosquitoes in seasonal wetlands. Although Bti is considered non-toxic to most aquatic organisms, the non-biting chironomids show high susceptibilities towards Bti. As chironomids are a key element in wetland food webs, major declines in their abundance could lead to indirect effects that may be passed through aquatic and terrestrial food chains. We conducted two mesocosm experiments to address this hypothesis by assessing direct and indirect effects of Bti-modified availability of macroinvertebrate and zooplankton food resources on the predatory larvae of palmate and smooth newts (*Lissotriton helveticus*, *Lissotriton vulgaris*). We examined newt survival rates and dietary composition by means of stable isotope ( $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$ ) analysis in the presence of Bti treatment and a predator (*A. cyanea*). We assessed palmate newts' body size at and time to metamorphosis while developing in Bti treated mesocosms. Chironomid larvae were the most severely affected aquatic invertebrates in all Bti treated food chains and experienced abundance reductions by 50 to 87%. Moreover, stable isotope analysis revealed that chironomids were preferred over other invertebrates and comprised the major part in newts' diet (56%) regardless of their availability. The dragonfly *A. cyanea* decreased survival of newt larvae by 27% in Bti treated mesocosms showing affected chironomid abundances. Increasing intraguild predation is most likely favored by the Bti-induced reduction of alternative prey such as chironomid larvae. The decreased food availability after Bti treatment led to slightly smaller *L. helveticus* metamorphs while their developmental time was not affected. Our findings highlight the crucial role of chironomids in the food webs of freshwater ecosystems. We are also emphasizing the importance of reconsidering human-induced indirect effects of mosquito control on valuable wetland ecosystems particularly in the context of worldwide amphibian and insect declines." (Authors)] Address: Allgeier, Stefanie, iES Landau, Institute for Environmental Sciences, Univ. of Koblenz-Landau, Fortstr. 7, 76829 Landau, Germany. E-mail: allgeier@uni-landau.de

**17746.** Aydin, D.D. (2019): Diyarbakir ili Odonata faunasi. MSc thesis, Dicle Üniversitesi, Fen Bilimleri Enstitüsü: 50 pp. (in Turkish, with English summary) ["In this study, 261 Odonata samples were collected in May, June, July and August 2017 surveys in Diyarbakir (Baglar, Kayapinar, Sur and Yenisehir). Among these samples, it was determined that they belong to 3 families, 5 genera and 7 species group taxa. The species and distribution areas of the Odonata order were investigated. The study was conducted in 2017 in



Diyarbakir. In the spring and summer, field studies were carried out once a week. As a result of the study, 7 species belonging to 3 families belonging to Odonata order were identified. *Brachythemis fuscopalliata*, *Crocothemis erythraea*, *Orthetrum albistylum*, *O. brunneum*, *O. coerulescens*, *Platynemis dealbata* and *Ischnura elegans*. These species identified in the study are the first records for the Diyarbakir insect fauna." (Author)] Address: not stated

**17747.** Barmiento, S.H.; Vriend, L.M.; van Grunsven, R.H. A.; Vijver, M.G. (2019): Environmental levels of neonicotinoids reduce prey consumption, mobility and emergence of the damselfly *Ischnura elegans*. *Journal of Applied Ecology* 56: 2034-2044. (in English) ["1. Freshwaters are among the most endangered ecosystems in the world as a result of anthropogenic interference such as pollution. Pollution in the form of neonicotinoids has been intensively studied, but data thus far is often conflicted by contrasting responses between laboratory and field experiments. In addition, toxicity data are scarce and contradictory for insects such as odonates and a potential risk to them may therefore be overlooked. 2. We investigate the potential risk of neonicotinoids to odonates by exposing nymphs of *I. elegans* to environmentally relevant concentrations of the neonicotinoid thiacloprid. We consider *I. elegans* as an indicator species for other Odonates as it is an abundant, widespread and eurytopic species. We analyse the effects of thiacloprid on multiple endpoints (survival, consumption, growth, molting, mobility and emergence), using cage-experiments as well as controlled field observations in naturally colonized experimental ditches. In addition, we assess sensitivity by either feeding the damselfly nymphs with lab-cultured prey or by letting them feed freely on natural aquatic invertebrates. 3. All sublethal endpoints of *I. elegans* are affected to some degree, and strongly depend on the food offered; free-feeding nymphs are more sensitive than culturefed nymphs. Environmental relevant concentrations of thiacloprid strongly reduce the emergence of *I. elegans* and this effect is more substantial in the natural populations compared to the caged damselflies. This is likely explained by exclusion of additional biotic pressures such as predation in the caged experiment. 4. Policy implications. Literature reports that one out of seven Odonates is threatened and 24% of the species have declining populations. Our observations show that current risks of neonicotinoids to Odonates are underestimated in laboratory experiments as the toxicity is governed by multiple biotic factors such as food quantity/quality and predation. Given the widespread abundance of *I. elegans*, the observed sensitivity to neonicotinoids and current population trends of this species, these results indicate neonicotinoids play a central role in the Odonate decline in general .... Conclusions: Clear effects of environmentally relevant concentrations of the neonicotinoid thiacloprid on the life cycle of *I. elegans* were shown. While no direct effects on mortality were observed at environmental relevant concentrations, all sublethal endpoints tested were affected. Our results strongly depended on the food offered, which indicates that current laboratory assessments performed at ad libitum food underestimate neonicotinoid toxicity in the actual environment. In addition,

it appears that even our realistic exposure scenario using caged individuals in experimental ditches also underestimate toxicity as the emergence of natural populations was more strongly affected. This is likely because biotic pressures such as predation add to toxicity and these pressures are not included within the caged experiment nor the common laboratory approaches. Finally, our observed reduced fitness during the nymph stage and the strong decline in natural emergence can be indicative for neonicotinoids adding to the ongoing *I. elegans* decline." (Authors)] Address: Barmiento, S.H., Inst. Environ. Sciences, Leiden Univ., Leiden, The Netherlands. E-mail: s.h.barmiento@cml.leidenuniv.nl

**17748.** Basha, M. (2019): Microbial communities associated with dragonfly nymphs raised in varying concentrations of Amoxicillin. Undergraduate thesis, under the direction of Colin Jackson from Biological Sciences, The University of Mississippi: 27 pp. (in English) ["The bacteria on and within an organism make up that organism's microbiome. Given interest in the use of antibiotics in agriculture and the effect of microbes on human health, more studies are needed on the microbial community composition of different organisms and how it responds to antibiotic use. This study investigated changes in the amount of antibiotic resistant bacteria present in [the not identified] dragonfly nymphs exposed to differing concentrations of amoxicillin. Next generation sequencing of the 16S rRNA gene was used to identify cultures of these antibiotic resistant bacteria. Increasing the concentration of antibiotics the dragonfly nymphs were exposed to resulted in greater numbers of antibiotic resistant bacteria. From both amoxicillin + TSA and TSA-only plates, Proteobacteria was the most abundant phyla detected. Bacteroidetes was the major phyla detected in nymphs raised in 0% amoxicillin and plated on amoxicillin + TSA plates. There was a high relative proportion of members of the phylum Firmicutes in all samples plated on TSA plates. In the nymphs raised in 0% amoxicillin plated on TSA plates, members of Firmicutes made up the majority of their microbiome. This study demonstrates that the bacterial communities associated with dragonfly nymphs are affected by changes in the environment, and that exposure to antibiotic pollution likely increases the number of antibiotic resistant bacteria within aquatic insects." (Author)] Address: not stated

**17749.** Bechly, G. (2019): New fossil Odonata from the Upper Jurassic of Bavaria with a new fossil calibration point for Zygoptera. *Palaeoentomology* 2(6): 618-632. (in English) ["Three new taxa of odonates are described from the Upper Jurassic Solnhofen limestone from Eichstätt and Painten in Bavaria (Germany), including the first two genuine Zygoptera (*Andrephlebia buergeri* gen. et sp. nov. in fam. inc. sed. and *Jurahemiphlebia haeckeli* gen. et sp. nov. in Hemiphlebiidae) and a new taxon of Stenophlebiptera (*Reschiostenophlebia koschnyi* gen. et sp. nov. in Stenophlebiidae). With an age of about 152 million years, the holotype of *Jurahemiphlebia* from the Painten locality represents the oldest fossil record and thus a new calibration point for crown group Zygoptera, Lestoidea, and Hemiphlebiidae, and the oldest record for any living odonate family. Furthermore, the first relatively complete

specimen of the dragonfly *Prohemeroscopus kuehnapefeli* (Prohemeroscopidae) is described, which was previously known only from a pair of isolated hind wings. A revised diagnosis is provided for the species and genus." (Author)] Address: Bechly, G., Biol. Inst., 16310 NE 80th Street, Redmond, WA 98052, USA. E-mail: gbechly@biologicinstitute.org

**17750.** Black, K.L.; Fudge, D.; Jarvis, W.M.C.; Robinson, B.W. (2019): Functional plasticity in lamellar autotomy by larval damselflies in response to predatory larval dragonfly cues. *Evolutionary Ecology* 33(2): 257-272. (in English) ["Adaptive autotomy is the self-amputation of an appendage in response to external stimuli that benefits survival. Variation in the ease of appendage removal among populations suggests that autotomy performance is under selection, evolves, or is phenotypically plastic, although the latter has never been experimentally tested. We model an autotomy threshold that optimally balances how the benefits of surviving predator attack versus the costs of losing an appendage vary with predator presence. We test for functional plasticity in autotomy threshold in the caudal lamellae of *Enallagma damselfly* larvae [*E. ebrium* / *E. hageni* species-pair] by experimentally manipulating non-lethal cues from predatory dragonfly larvae. Predator cues lead to functional plastic responses in the form of smaller lamellar joints that required lower peak breaking force. This is the first experimental demonstration of functional plasticity in autotomy to cues from a grasping predator, a novel form of indirect predator effects on prey, realized through plasticity in morphological traits that govern the autotomy threshold. This supports the model of optimized autotomy performance and provides a novel explanation for variation in performance among populations under different predator conditions. Plastic autotomy responses that mitigate costs in the face of variation in mortality risks might be a form of inducible defense." (Authors)] Address: Black, Katherine, School of Geography & Earth Sciences, McMaster Univ., Hamilton, Canada

**17751.** Bora, A. (2019): A preliminary survey on odonate communities of Saipung Reserve Forest, Meghalaya, India. *Biological Forum* 11(2): 103-106. (in English) ["Odonate diversity of Saipung Reserve Forest was studied during 2016-2017. A total of 31 species belonging to 5 families, and 20 genera were recorded, which include 22 Anisoptera and 9 Zygoptera species. The genera *Neurothemis*, *Orthetrum* and *Agriocnemis* were found to be the most dominant contributing 3 species each. Being legally protected under state legislation, the forest faces high levels of human interference and anthropogenic activities. The study area therefore requires immense attention to be utilized as a prime site for odonate conservation of the state. The author hopes this study will provide the baseline information for future studies on odonates of the state and of north-east India." (Author)] Address: Bora, A., Meghalaya Biodiversity Board, Sylvan House, Lower Lachumiere, 793003 Shillong, Meghalaya, India

**17752.** Bos-Groenendijk, G.I. & Huskens, K. (2019): *Dagvlinders, libellen en sprinkhanen in de Bruuk 2019*. SNL-monitoring. Rapport VS2019.033, De Vlinderstichting, Wageningen:

24 pp. (in Dutch) [The study area consists of two objects: the Bruuk and the EVZ-Groesbeek, of which the Bruuk covers by far the largest surface. It was studied by De Vlinderstichting for butterflies, dragonflies and grasshoppers. The area covers 75 hectares, for which 4 field visits were made. The required coverage was achieved: 100% of the hectares were visited at least twice. ... 14 species of dragonflies were observed. The species found are fairly common and the numbers are not high, but because only four small pools were involved, the species and numbers are in line with what would be expected based on the type of habitat. ... Translated with www.DeepL.com/Translator (free version)] Address: De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: info@vlinderstichting.nl

**17753.** Bota-Sierra, C.A.; Velasquez-Velez, M.I.; Realpe, E. (2019): A new species of *Ischnura* from the Colombian Central Andes (Odonata: Coenagrionidae). *Odonatologica* 48(1/2) 115-132. (in English) ["Eight species of *Ischnura* are known from Colombia; five of them are Andean endemics, four from the Eastern Cordillera and one from the Central Cordillera. Here, we describe a new species thus far known only from the Central Cordillera, *Ischnura solitaria* sp. nov. (Holotype ♂ from Belmira, Antioquia, Colombia, 6.711305°N, 75.628503°W, 2 615 m a.s.l.). Despite several searching efforts close to this locality, it has only been found at this wetlands site with few individuals. Due to the low population density of less than 50 individuals and the lack of action to protect the extremely small area where the species occurs, it matches the IUCN requirements to be considered 'Critically Endangered'. A taxonomic key to males of *Ischnura* spp. in Colombia, a discussion on the type locality for the rare *I. indivisa* and the presence of *I. fluviatilis* in Colombia are included." (Authors)] Address: Velasquez-Velez, Maria Isabel, Lab. de Zoología y Ecología Acuática LAZOE, Depto de Ciencias Biológicas, Univ. los Andes, Bogota, Colombia. E-mail: mi.velasquez948@uniandes.edu.co

**17754.** Brown, T.A.; Fraker, M.E.; Ludsin, S.A. (2019): Space use of predatory larval dragonflies and tadpole prey in response to chemical cues of predation. *The American Midland Naturalist* 181(1): 53-63. (in English) ["Chemical cues are frequently a key source of information to aquatic organisms. Both predators (kairomones digestive metabolites) and prey (alarm and damage-released cues) may generate chemical cues during their interactions, and different cue types can have different informational values. How predators and prey use the information from chemical cues to make spatial movement decisions influences both their direct interaction rates and their interactions with other species. We measured the spatial response of predatory larval *Anax junius* and predator-naive green frog (*Lithobates clamitans*) tadpoles exposed to several types of chemical cues using experimental mesocosms. We found tadpoles only responded with spatial avoidance when exposed to both *Anax* kairomones and conspecific alarm cues together, whereas *Anax* did not exhibit consistent spatial responses to any cue type. Our results suggest tadpole prey selectively respond

to environmental information from chemical cues (possibly to minimize costly antipredator behavior due to responding to insufficient information or reflecting a need for associative learning). They also show predatory dragonflies may use non-chemical information to make space use decisions (possibly due to inability to detect the same chemical cues as tadpoles)." (Authors)] Address: Fraker, M: E-mail: mfraker2@gmail.com

**17755.** Buczynski, P.; Goral, N.; Kusniers, A.; Polak, M.; Tarkowski, A.; Wrobel, A. (2019): New records of dragonflies (Odonata) from the Suwalki and Podlasie regions in north-eastern Poland. *Odonatrix* 15\_10 (2019). 7 pp. (Polish, with English summary) [35 dragonfly spp. were recorded during an expedition to north-eastern Poland in the second half of July 2019. The most interesting ones were: *Sympecma fusca*, *Erythromma viridulum*, *Aeshna affinis*, *A. subarctica*, *Cordulegaster boltonii*, *Somatochlora arctica*, *Orthetrum albistylum*, *Crocothemis erythraea* and *Leucorrhinia albifrons*. These new data make an important contribution to the knowledge of the fauna of some valuable protected areas, e.g. the Mechacz Wielki Reserve, the Romincka Forest Landscape Park and the Suwalki Landscape Park. New sites of *Cordulegaster boltonii* in the Romincka Forest and in the valley of the River Czarna Hańcza lend support to the hypothesis regarding the existing of an island of the distribution area of this species in the Suwalki Region." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**17756.** Buczynski, P.; Kusal, K.; Tonczyk, G.; Mikołajczuk, P.; Bobrek, M.; Bobrek, R.; Czechowski, P.; Długosz, I.; Długosz, M.; Dubicka, A.; Dumnicka, E.; Goc, M.; Golab, M.J.; Goral, N.; Hadwiczak, M.; Holnicki-Szulc, F.; Jedro, G.; Jirak-Leszczynska, A.; Kusal, B.; Milaczewska, E.; Miszta, A.; Morawski, M.; Raczynski, M.; Snigula, S.; Switala, M.; Tarkowski, A.; Sylwia Woniak, S. (2019): Dragonflies (Odonata) recorded in the Niepolomice Forest and in the valley of the River Raba during the 16th Symposium of the Odonatological Section of the Polish Entomological Society (June 20-23, 2019). *Odonatrix* 15\_8 (2019): 16 pp. (Polish, with English summary) ["The Niepolomice Forest is the largest forest complex in the vicinity of Kraków. However, knowledge of its fauna is very incomplete and very out of date. This area was visited in late June 2019 during field sessions of the 16th National Odonatological Symposium of the Polish Entomological Society. 39 odonate spp. were recorded, including *Leucorrhinia albifrons* for the first time in the Province of Małopolska. This species richness is a function mainly of the natural and semi-natural habitats in the river valleys at the edge of the forest and of the anthropogenic water bodies in its interior (mainly fire protection ponds). Considering the location of the Niepolomice Forest and the diversity of its habitats, one can expect at least 50 spp. to occur here. Although these results are preliminary, they do permit an assessment of the condition of the habitats. The most valuable of the sites researched were the dystrophic Czarny Staw (Black Pond) in the centre of the

forest and the adjacent peat bog. The tyrphophiles *Leucorrhinia pectoralis* and *L. rubicunda* were not found, although historical data indicate that they were present in the Niepolomice Forest 90-100 years ago; their non-discovery in 2019 may have been due to this research period being quite short and too late in the season. A short reconnaissance in the nearby valley of the River Raba yielded 18 species. Comparison of these data with data from the 1970s indicates that its fauna has changed: thermophilic spp. have appeared while some spp. typical of small permanent water bodies have probably disappeared." (Authors) Address: Buczynski, P., Uniwersytet Marii Curie-Skłodowskiej, Zakład Zoologii, ul. Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**17757.** Byrne, A. (2019): Constructing the global Irish woman traveller: Cynthia Longfield's scientific researches in South America, 1921-27. *ABEI Journal - The Brazilian Journal of Irish Studies* 21(2): 27-36. (in English) ["Irish-born Cynthia Longfield (1896-1991) became a leading entomologist after participating in three expeditions to South America in the 1920s. Working unpaid in the British Museum for 30 years, she catalogued Odonata (dragonflies and damselflies) from all over the world, published scientific papers, and collaborated with British, Irish and international scientists. While she made several other collecting expeditions to Africa and South-East Asia in the 1920s and 1930s, her early experiences of South American natural history are a crucial aspect of her formation as an internationally renowned scientist, and are an interesting chapter in the long history of Irish connections with the region. She was a migrant, a traveller, and a scientist, and was a person at once privileged by her class and denied basic equalities due to her gender. This article firstly considers her scientific career in the context of Irish women's migration in the first half of the twentieth century, before focusing on her three voyages to South America in 1921-7 and, finally, examining the ways in which her participation in the St George expedition— as one of just three women aboard ship – was reported in the Anglophone press." (Author)] Address: not stated

**17758.** Chelli, A.M.; Moulai, R. (2019): Diversity and ecological diagnosis of dragonflies of high-mountain temporary ponds in the Akfadou massif forest (Algeria). *Zoology and Ecology* 29(1). 10 pp. (in English) ["An Odonata study was carried out during six successive months at five high-mountain temporary ponds located in the Akfadou massif forest, northeast Algeria. These wetlands are virtually unexplored; some of these places are unknown to the general public. However, some of them appear to face numerous threats. The results obtained by this study gave us an idea of the odonatological settlement in this area. With 18 species of Odonata, this territory contains about 1/3 of the Algerian Odonata fauna, of which nine species reproduce in this forest massif. These study stations share in common three species, namely: *Ischnura graellsii*, *Anax imperator*, and *Orthetrum cancellatum*. These three species are omnipresent in more than 75% of the surveys and are distributed in a consistent way in various biotopes. The first species (*I. graellsii*)



together with *Lestes virens* and *Chalcolestes viridis* dominate in numbers, accounting for more than half of the total numbers recorded. The Shannon-Weaver index and Equitability index applied to odonatological fauna reveal that Agoulmime Ikher (AI) and Agoulmime Tala Guizane (AT) ponds are the best-structured and most stable in terms of stands in this massif." (Authors)] Address: Chelli, A.M., Laboratoire de Zoologie Appliquée et d'Ecophysiologie Animale, Faculté des Sciences de la Nature et de la Vie, Université de Bejaia, Algérie. Email: mchelli70@yahoo.fr

**17759.** Chovanec, A. (2019): Das Rhithron-Potamon-Konzept in der angewandten Odonatologie als Instrument zur Gewässertypisierung und -bewertung (Insecta: Odonata). *Libellula Supplement* 15: 35–61: 35-61. (in German, with English summary) ["The Rhithron-Potamon-Concept in applied Odonatology as an instrument for river typology and assessment – In the present paper, the increase in the number of Odonata species along the river continuum from the source to the lower course is documented. Analyses were done on the basis of valency points allocated to the biocenotic regions (crenon, rhithron, potamon) according to species-specific ecological requirements. A new procedure, based on this Rhithron-Potamon-Concept, for assessing the ecological status of the epipotamon zone of rivers is presented: Based on the allocated valency points, target reference species and accompanying reference species of first and second degree are defined with their respective weighted indicator potential. Differences between the status quo of the dragonfly fauna and the reference fauna are assessed in a new index, the Odonata-River-Zonation-Index. In 2018, this method was applied to the epipotamon of a river in Upper Austria, the River Naarn, in order to evaluate the effect of morphological rehabilitation measures." (Authors).] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmnt.gv.at

**17760.** Córdoba-Aguilar, A.; Rocha-Ortega, M. (2019): Damselfly (Odonata: Calopterygidae) population decline in an urbanizing watershed. *Journal of Insect Science* 19(3), 30. 6 pp. (In English) ["Reduction of terrestrial vegetation and degradation of water quality are among the factors driving insect population decline in growing cities. In this study, we investigated the extent of habitat deterioration, behavioral and physiological responses, and fitness of a *Hetaerina americana* population in a semitropical region in central Mexico. The study population was located in a riverine area that crosses a small urban area (Tehuixtla city). We related two habitat variables (tree/shrub covered area and numbers of wastewater outlets) to presumable damselfly responses (larval and adult abundance, duration of adults exposed directly to sunlight, lipid content and muscle mass, and egg survival) over the years 2002 and 2016. We detected a reduction in terrestrial vegetation cover, an increase in wastewater outlets, and a decrease in larval and adult abundance. Adults were more exposed to sunlight in 2016 than in 2002 and showed a reduced lipid content and muscle mass in 2016. Egg survival also decreased. Although correlative,

these results suggest impairment of damselfly condition (via lipid and muscle reduction) and fitness as urbanization increases." (Authors) Address: Córdoba-Aguilar, A., Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

**17761.** Corso, A. (2019): Morphological variability of *Cordulegaster trinacriae* in Italy (Odonata: Cordulegasteridae). *Odonatologica* 48(3/4): 175-201. (in English) ["This paper describes the most helpful features for field identification of *C. trinacriae* and the relevant morphological variability encountered. In *C. trinacriae* the yellow frons was without a dark horizontal marking in about 70 % of the sample or showed a barely patterned frons, while the remaining 30 % showed a more or less defined dark smudge, though always narrower and less bold than in *C. boltonii*. The percentage of unmarked versus marked frons was similar throughout the distributional range of *C. trinacriae* except in Sicily, where the unmarked yellow frons was much more common (87 %) and in Campania, where individuals with a dark mark on the frons were slightly more common than unmarked ones. In *C. trinacriae* the occipital triangle was almost always yellow with no or almost no dark markings, cleaner, and purer yellow than in *C. boltonii* from central Italy. The appendages of *C. trinacriae* always showed the characteristic form except for a few individuals, which might be hybrids. In *C. boltonii* they were found to be rather variable, especially on individuals from the southern part of its distributional range in central Italy, where intermediates and hybrids occur. Here, the appendages were sometimes similar (but not identical) to *C. trinacriae*, and therefore, this character is considered of limited use in the field. Individuals of *C. trinacriae* can be distinguished in areas of sympatry from intermediate *C. boltonii* and from hybrids when they show the following characters: i) unmarked yellow frons; ii) bright yellow, almost unmarked occipital triangle; ii) typical deeply notched lower appendages and long, sinuous upper appendages." (Author)] Address: Corso, A., MISC – Via Camastra, 10, 96100 Siracusa, Italy. E-mail: zoologywp@gmail.com

**17762.** Csercsa, A.; Krasznai-K., E.A.; Várbíró, G.; Szivák, I.; Tóth, M.; Árvai, D.; Bódis, E.; Deák, C.; Mauchart, P.; Móra, A.; Eros, T.; Padišák, J.; Boda, P. (2019): Seasonal changes in relative contribution of environmental control and spatial structuring on different dispersal groups of stream macroinvertebrates. *Hydrobiologia* 828: 101-115. (in English) ["The role of environmental control and spatial structuring may vary depending on dispersal mode within a metacommunity in stream systems. However, as a result of high seasonal variation in environment conditions and phenological features, there might be considerable seasonal changes in the relative importance of structuring factors. The objective of this study was (i) to determine the relative role of structuring factors for aquatic macroinvertebrates with different dispersal mode groups which have seasonal variation in their dispersal capacity and (ii) to disentangle seasonal changes in metacommunity structuring. We sampled 50

stream sites of the Middle Danube Basin (Hungary) in spring and summer. We compared Distance–Decay Relationships between communities of different dispersal groups (including Odonata) and distance measures, and then we used variation partitioning analysis and Moran's eigenvector maps based on overland and watercourse distances to reveal structuring processes in both seasons. We found that metacommunities of all dispersal groups were influenced in both seasons mainly by environmental factors with additional impacts of the spatial components. Our findings suggest that metacommunities of taxa with temporally stable dispersal capacity have seasonally stable structuring processes, while the relative importance of structuring factors can vary seasonally in groups with seasonally changing dispersal capacity." (Authors)] Address: Csercsa, A., Dept of Limnology, Univ. of Pannonia, Egyetem u. 10, Veszprém 8200, Hungary. E-mail: csercsa.andras@okologia.mta.hu

**17763.** Dal Cortivo, M.; Roncen, N. (2019): Nuovi dati sulle Libellule della Provincia di Belluno (Insecta: Odonata). Bollettino del Museo Civico di Storia Naturale di Verona 43: 5-12. (in Italian, with English summary) ["Ten years after the previous work on the Odonata of the Province of Belluno (Dal Cortivo et al., 2009), here is presented an update of the checklist, with the reporting of a new species for the provincial territory, together with additional data for the distribution of some relevant species, for the majority of which only rather dated bibliographic records were previously known. The finding of *Hemianax ephippiger* (Burmeister, 1839) brings to 48 the number of species of Odonates reported for the Province of Belluno. Among these, in Dal Cortivo et al. (2009), 12 were present in the provincial territory thanks to the bibliographic reports of Marcuzzi (1956), Bucciarelli (1972, 1978) and Marcuzzi e Dalle Molle (1976), no longer confirmed later. It is therefore possible to confirm the presence in Belluno for 9 species. The first confirmed breeding site for *Cordulegaster boltonii*, in the territory of Belluno, inside the Vincheto di Celarda Nature Reserve is reported, where the presence of *Aeshna mixta* was also confirmed 37 years after the last report for the protected area." (Authors)] Address: Roncen, Nicola, Via Calcin, 25 – I-32032 Feltre (BL), Italy. E-mail: nic.roncen@libero.it

**17764.** De Knijf, G.; Ledegen, H.; Westra, T. (2019): Monitoringsprotocol Libellen. Versie – 2.0. Rapport van het Instituut voor Natuur- en Bosonderzoek 2019 (49). Instituut voor Natuur- en Bosonderzoek, Brussel. DOI: doi.org/10.-21436/inbor: 30 pp. (in Dutch, with English summary) ["This report describes the protocol for the dragonfly monitoring network in Flanders (Belgium). We list the species that need to be monitored and the methods to do so. Three easily observed species (*Calopteryx virgo*, *Coenagrion pulchellum* and *Aeshna isocetes*) are counted using dragonfly-transects. We explain how the sampling frame was compiled and how we applied a GRTS sampling procedure to determine the monitoring localities in the network. By means of site counts all populations will be counted from the following six rare species in Flanders: *Coenagrion hastulatum*, *C. lunulatum*, *Somatochlora arctica*, *Leucorrhinia pectoralis*, *L. caudalis*

and *Sympetrum depressiusculum*. Adults of these species will be counted in an area around the breeding locality during one hour visit. *Gomphus vulgatissimus* and *G. flavipes* will be monitored by counting the exuviae along transects by the watercourse. Per species, we give the number of monitoring sites, the frequency with which and the period in which they need to be monitored. Finally, we refer to the data portal and the mobile application in which the collected records will be stored for further analysis and where the locations of the monitoring sites can be consulted." (Authors)] Address: Knijf, G. de, Inst. voor Natuurbehoud, Kliniekstraat 25, 1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**17765.** Deacon, C.; Samways, M.J.; Pryke, J.S. (2019): Aquatic insects decline in abundance and occupy low-quality artificial habitats to survive hydrological droughts. *Freshwater Biology* 64(9): 1643-1654. (in English) ["1. Hydrological extremes have negative impacts on natural, agricultural, and urban landscapes and place substantial ecological pressure on freshwater habitats. However, the role of artificial freshwater habitats during hydrological drought is poorly understood. Insects make up much of total aquatic fauna (including Odonata) and lend themselves to understanding how drought impacts freshwater ecosystems. 2. Using the Greater Cape Floristic Region as an example of a drought-prone area, we determined the effects of a severe drought on a subset of insects occupying lentic habitats in terms of their species richness, diversity, and assemblage composition. Here, we: (1) calculated the percentage change in average precipitation between a record dry season and the last consistently wet decade; (2) identified the environmental variables driving aquatic insect species richness, diversity and composition; (3) identified the environmental differences between natural ponds and artificial reservoirs; (4) determined whether artificial reservoirs act as suitable habitats for focal taxa during drought; and (5) compared these results to other, pre-drought studies. 3. Environmental variables related to water chemistry and physical characteristics were drivers of species richness, diversity, and composition, yet vegetation cover remained a major driver. In terms of marginal vegetation cover, most artificial reservoirs did not resemble natural ponds, yet overall 38.4% of sampled aquatic insect species were shared between natural ponds and artificial reservoirs. We found some rare endemic species in artificial reservoirs that had never before been recorded in this habitat during wet years. When our drought findings were compared to earlier, wet years, species richness did not change significantly, although abundance was much lower during the drought year. 4. We postulate that historically, these aquatic insects, which have been through many ecological filters such as drought, must have sought low-quality habitats to survive water stress periods. Artificial reservoirs, being novel landscape features, cannot fully replace natural ponds, but enable some aquatic insects to survive drought. Artificial reservoirs can be attractive habitats to aquatic insects when they resemble natural ponds, with specific reference to their marginal vegetation characteristics." (Authors)] Address: Deacon, C., Dept Conserv. Ecol. & Entom., Stellenbosch Univ., South Africa. E-mail: charldeacon@sun.ac.za

**17766.** Dehane, H. (2019): Contribution à l'étude de l'inventaire des Odonates à Oued Djedi (Biskra). Mém. de Master, Univ. de Biskra: 53 pp. (in French, with Arabian and English summaries) ["The study of the number and distribution of Odonate gives us an important idea of the health and vitality of its environmental system. In this work we studied the dragonflies in Oued Djedi which passed from Sidi Khaled to the State of Biskra for a period of 9 months (from September 2018 to May 2019). We collected 7 species of dragonflies, including 7 Anisoptera. We have also studied the phenology of these species with a comparison with the model of Samraoui and Corbet (2000). And we did a study on their ecology (life cycle, flight period and reproduction). A comparison of our results with other studies carried out in different regions with different climates (different bioclimatic stages: humid, semihumid, semi-arid, arid and Saharan) shows the influence of climate on the distribution of Odonata species (low specific richness in our region of study)."] (Author) *Anax ephippiger*, *A. imperator*, *Orthetrum chrysostigma*, *Crocothemis erythraea*, *Sympetrum fonscolombii*, *Trithemis annulata*, *T. kirbyi*] Address: not stated

**17767.** Delnat, V.; Tran, T.T.; Janssens, L.; Stoks, R. (2019): Daily temperature variation magnifies the toxicity of a mixture consisting of a chemical pesticide and a biopesticide in a vector mosquito? *Science of The Total Environment* 659: 33-40. (in English) ["Highlights: •The influence of temperature on the toxicity of mixtures has largely been ignored. •Mosquitoes were exposed to two pesticides under daily temperature variation (DTV). •DTV did not increase the toxicity of the single pesticides. •DTV increased the toxicity of the pesticide mixture. •DTV is omnipresent in nature, hence important for risk assessment of mixtures. Abstract: While many studies on the toxicity of pesticides looked at the effects of a higher mean temperature, effects of the realistic scenario of daily temperature variation are understudied. Moreover, despite the increasing interest for the toxicity of pesticide mixtures how this is influenced by temperature has been largely ignored. We tested whether daily temperature variation (DTV) magnifies the toxicity of two pesticides with a different mode of action, the organophosphate pesticide chlorpyrifos (CPF) and the biopesticide *Bacillus thuringiensis* var. *israelensis* (Bti), and of their mixture in the vector mosquito *Culex pipiens*. Single exposure to CPF and Bti increased mortality and reduced female development time, and exposure to CPF also increased female wing length. DTV was not lethal and did not change the toxicity of the individual pesticides. Yet, a key novel finding was that high DTV increased the mortality of the mixture by changing the interaction between both pesticides from additive to synergistic. Given that in nature daily temperature variation is omnipresent, this is important both for vector control and for ecological risk assessment. The higher toxicity of the mixture at high DTV compared to the typically used constant test temperatures in the laboratory urges caution when evaluating the environmental impact of pesticide mixtures."] (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecol., K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: [robby.stoks@bio.kuleuven.ac.be](mailto:robby.stoks@bio.kuleuven.ac.be)

**17768.** Delpon, G.; Vogt-Schilb, H.; Munoz, F.; Richard, F.; Schatz, B. (2019): Diachronic variations in the distribution of butterflies and dragonflies linked to recent habitat changes in Western Europe. *Insect Conservation and Diversity* 12(1): 49-68. (in English) ["1. In the context of ongoing global changes, it is crucial to characterise and understand the species distribution dynamics. Despite increasing emphasis on insects' conservation issues, evidence of distribution changes in insects over a wide range of bioclimatic conditions remains scarce in Western Europe. 2. We examined distribution changes in butterflies and dragonflies in three European countries over 34 years, determined the influence of environmental changes, especially land cover, and assessed how of species ecology related to distinct responses. We analysed the diachronic variations by compiling occurrence data in France, Belgium, and Luxembourg for 240 butterfly and 95 dragonfly taxa. 3. We found contrasting patterns of diachronic variation in butterfly and dragonfly distributions, i.e. a strong gradient of disappearance for butterflies (from northwest to southeast with significantly higher rate of disappearance in urbanised and intensive agriculture areas of north-western France), whereas dragonflies showed lower and heterogeneous variation in occurrences, mainly related to alteration and regression of aquatic habitats. 4. Species responses appeared closely linked to their ecological preferences, with greater decline in habitat specialist species. Butterfly and dragonfly species are constrained by their dependence to host plant species and to aquatic habitats, respectively, and proved to convey complementary insights on the influence of environmental changes in biodiversity dynamics. 5. Conservation priorities were identified across species and administrative units, revealing that almost 80% of the declining taxa were not listed on the current protection lists. Our results support the need to update current French policies in terms of insect conservation."] (Authors)] Address: Schatz, B., Centre d'Ecol. Fonctionnelle et Evolutive (CEFE), UMR CNRS 5175, 1919 route de Mende, 34293 Montpellier Cedex 5, France. E-mail: [bertrand.schatz@cefe.cnrs.fr](mailto:bertrand.schatz@cefe.cnrs.fr)

**17769.** Devillers, P.; Lafontaine, R.-M.; Pasau, B.; Daems, V.; De Boeck, B.; Boeckx, A.; Boon, L.; Devillers-Terschuren, J. (2019): La friche Josaphat à Bruxelles, Schaerbeek. Un site urbain enclavé d'une richesse odonatologique exceptionnelle, 1-22. *Les Naturalistes belges* 100(3): 1-22. (in French, with English summary) ["The site of the former Schaerbeek-Josaphat railway station, locally referred to as friche Josaphat, is a post-industrial wasteland enclosed within the urban fabric of north-eastern Brussels. The inventories that have been conducted there for the last seven years reveal the exceptional richness of its dragonfly fauna. The factors of this richness are the juxtaposition of extensive feeding grounds harbouring a very diverse flora and entomofauna, and small aquatic environments particularly favourable to reproduction, as well as the location of the site in a plain which historically represented a migration and dispersal route for many organisms. Alteration of the site, and in particular a reduction in the area and the continuity of the feeding grounds, would make it lose its high biological, recreational and educational value. Preserved, the site has an



exceptional capacity to fulfill a number of complementary functions, essential for the promotion of the natural heritage in the city of tomorrow, haven of biodiversity, support of leisure activities, teaching and research facility." (Authors)] Address: Pierre Devillers, I.R.S.N.B. E-mail: sphegodes@hotmail.com

**17770.** Díaz, A.; Rodríguez-Flores, D.J.; Rivera-Vega, A.G.; Cruz-Marcano, E.; Velázquez-Oliveras, I.M.; Villanueva-Cubero, L.A. (2019): Ecological factors and the distribution of adult Odonata in Puerto Rico. *Life: The Excitement of Biology* 7(3): 115-147. (in English) ["Puerto Rico's dragonfly and damselfly (Odonata) fauna, while abundant and diverse, is not well known, with the most recent surveys being over 80 years old. This work reports on sampling conducted on the island between late 2015 and early 2017. A total of 1,754 specimens in 19 genera and 30 species were collected, representing 61.2% of the species reported for the island. The number of individuals, number of genera, and number of species were higher on sites with a mean annual precipitation between 1300 mm and 1900 mm and a mean maximum annual temperature between 28.51°C and 32.50°C. Similarly, the number of individuals, number of genera, and number of species were higher on the woodland and shrubland cover types than on any of the other cover types. While some inferences can be made from our data, an increased collection effort in less sampled areas is necessary." (Authors)] Address: Díaz, A., Dept of Biology, University of Puerto Rico at Humacao, Call Box 8690, Humacao, Puerto Rico 00792. E-mail: ariel.diaz@upr.edu

**17771.** Do, Y.; Choi, M.B. (2019): Identifying adult dragonfly prey items using DNA barcoding and stable isotope analysis. *Entomological Research* 49(4): 165-171. (in English) ["Using DNA barcoding and stable isotope analysis, we identified adult dragonfly prey items from the fecal pellets of five dragonfly species — *Nannophya pygmaea*, *Ischnura asiatica*, *Sympetrum eroticum*, *Orthetrum albistylum*, and *Anax parthenope* — collected from a mountain bog located in south-eastern South Korea. Twelve operational taxonomic units (OTUs) belonging to four orders, Coleoptera, Diptera, Hemiptera, and Lepidoptera, were identified as prey items of adult dragonflies using DNA barcoding. Among prey items, Dipterans were the most common, comprising seven of the 10 OTUs. Based on stable isotope analysis, adult dragonflies and their nymphs were among the most numerous predators in both aquatic and terrestrial habitats. Additionally, dragonfly species with smaller adult sizes had different isotopic compositions to those reaching larger adult sizes. Both  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  values were significantly lower in smaller species than in larger species, indicating differences in their trophic levels and carbon sources." (Authors)] Address: Choi, M.B., School Applied Biosciences, College of Agriculture & Life Sciences, Kyungpook National Univ., Daegu, 41566, Republic of Korea. E-mail: kosinchoi@hanmail.net

**17772.** Drury, J.P.; Anderson, C.N.; Cabezas Castillo, M.B.; Fisher, J.; McEachin, S.; Grether, G.F. (2019): A general explanation for the persistence of reproductive interference.

*The American Naturalist* 194(2): 268-275. (in English) ["Reproductive interference is widespread, despite the theoretical expectation that it should be eliminated by reproductive character displacement (RCD). A possible explanation is that females of sympatric species are too similar phenotypically for males to distinguish between them, resulting in a type of evolutionary dilemma or catch-22 in which reproductive interference persists because male mate recognition (MR) cannot evolve until female phenotypes diverge further, and vice versa. Here we illustrate and test this hypothesis with data on *Hetaerina* spp.. First, reproductive isolation owing to male MR breaks down with increasing interspecific similarity in female phenotypes. Second, comparing allopatric and sympatric populations yielded no evidence for RCD, suggesting that parallel divergence in female coloration and male MR in allopatry determines the level of reproductive isolation on secondary contact. Whenever reproductive isolation depends on male MR and females of sympatric species are phenotypically similar, the evolutionary catch-22 hypothesis offers an explanation for the persistence of reproductive interference." (Author)] Address: Drury, J.P. Dept of Biosciences, Durham Univ., Durham DH1 3LE, UK. E-mail: jonathan.p.drury@durham.ac.uk.

**17773.** Encinias, M. (2019): Reproductive character displacement in *Calopteryx aequabilis* and *C. maculata*: Improving species recognition through the divergence of male mating preferences. MSc. thesis, Department of Biology, James Madison University. VI + 25 pp. (in English) ["An ongoing evolutionary question is how co-occurring species maintain reproductive barriers when they are morphologically, behaviorally, and ecologically similar. Without geographic isolation, traits involved in species recognition may be under selection to enhance reproductive barriers. Exaggerated trait differences between species in sympatric populations may reflect selection to reduce misdirected mating between species, or reproductive character displacement. While this phenomenon is widely recognized as an important stage in the speciation process, there is little direct evidence of this process in nature. In two North American damselfly species, *Calopteryx aequabilis* and *C. maculata*, wing pigmentation is sexually dimorphic and also shows exaggerated differences in sympatric populations, particularly in female wings. When these species occur together, they occupy the same mating territories and the potential for misdirected mating is high. I hypothesize that female wing pigmentation is under selection for species recognition. In this study, I conducted male mate choice experiments in which I altered female wings by switching them within and between species. I measured male mating preference of both species in allopatric and sympatric populations by giving males a choice of two female types in a natural setting. Results supported the hypothesis that male preferences in sympatry diverge corresponding to female wing pigmentation. Sympatric *C. aequabilis* males preferred lighter-winged females, which significantly differed from the dark wing preferences of *C. maculata* males and allopatric *C. aequabilis* males. By manipulating the female wing pigmentation directly, I identified that this is the specific trait under selection. These findings

indicate that male mating preferences and female wing pigmentation diverged in sympatry to reduce misdirected mating of two closely related species." (Author)] Address: not stated

**17774.** Favret, C.; Normandin, E.; Cloutier, L. (2019): The Ouellet-Robert Entomological Collection: new electronic resources and perspectives. *The Canadian Entomologist* 151(4): 423-431. ["The Ouellet-Robert Entomological Collection (Université de Montréal, Montréal, Québec, Canada) is one of the largest and most important university collections in Canada. Although officially dedicated in 1984, much of the material in the collection dates to the 1930s and 1940s work of the Clerics of Saint Viator, Joseph Ouellet and Adrien Robert. In order to establish curatorial priorities, a collection profile was conducted grading eight criteria on a scale of 1–4, the most important being the conservation status of the specimens. A taxonomic inventory of the collection was also conducted, including the number of pinned specimens and alcohol vials, as well as a brief geographic description: whether or not at least one specimen of each species was collected in Québec or in North America. Finally, the specimen metadata for Odonata, Ephemeroptera, and Trichoptera were digitised. The inventory and specimen data can be downloaded at [Canadensys.net](http://Canadensys.net). The collection houses approximately 1.5 million specimens, of which one-third are pinned, representing 20 000 species. Half of those species are recorded from Québec. The inventory and profile will be updated and the specimen database grown as portions of the collection are re-curated by personnel and volunteers, including the student-run organisation, "Club QMOR"."] (Authors)] Address: Favret, C.: E-mail: [ColinFavret@AphidNet.org](mailto:ColinFavret@AphidNet.org)

**17775.** Feindt, W. (2019): Conservation genomics: speciation of the Neotropical damselfly species *Megaloprepus caerulatus* – as a model for insect speciation in tropical rainforests. PhD thesis, Naturwissenschaftliche Fakultät der Gottfried Wilhelm Leibniz Universität Hannover: 270 pp. (in English, with German summary) ["The Neotropics are the most diverse ecoregion on earth. This remarkable biological diversity is associated with a great variety of speciation events through a complex geological history and habitat structure. Unfortunately, current changes to climate and habitat are erasing species at shocking rates. Consequently, modern evolutionary and ecological research must combine basic scientific research with state-of-the-art conservation genetics. In evolutionary biology, the study of speciation processes and how phenotypic novelties arise is of central interest. To approach this task in flying insects, the world's largest living odonate species, *Megaloprepus caerulatus* (Odonata: Zygoptera, Pseudostigmatidae) is an excellent model organism. *Megaloprepus caerulatus*, which is the only representative of its genus, has a wide distributional range, from Mexico to Peru, but a narrow and conserved ecological niche. As a forest specialist *Megaloprepus* is dependent on intact old growth rain forests and water filled tree holes to maintain stable but small population sizes. In the last 150 years' speciation processes in this genus were often under

discussion. Because of small but regionally restricted morphological differences, the narrow ecological niche and the continuous conversion of the Neotropical ecoregion over time, speciation seems probable. The central focus of this thesis is to study the effects of paleogeography and ecological changes over time on speciation and phenotypic changes in *Megaloprepus*. Therefore, the population genetic structures and species boundaries are studied, and new insights into RNA-Sequencing (RNA-Seq) are presented as a foundation for large-scale comparative studies. A first study uses two mitochondrial sequence markers and a panel of microsatellites to investigate the population genetic structure of four *Megaloprepus* populations ranging from Mexico to Panama. The results showed relatively low genetic diversity within populations, but a strong differentiation among populations, supporting a speciation hypothesis. A comprehensive biogeographic study followed to falsify or verify this hypothesis. Samples from 11 museum collections and newly collected material across 14 populations from Mexico to Peru were analyzed simultaneously by applying phylogenetics, population genetics, species distribution models, niche comparisons and morphometrics. The results unambiguously proved the speciation hypothesis and revealed that the genus *Megaloprepus* consists of four species. Hereby the estimated diversification times suggest that the species splits were associated with the Andean uplift (10-8 Mya) and migration events following the closure of the Isthmus of Panama (3-2 Mya). The current distribution ranges of the four *Megaloprepus* species are restricted and can be explained by Pleistocene climatic variations as well as by today habitat structure. Even more interesting is the underlying mode of speciation. A strong niche similarity indicates phylogenetic niche conservatism and consequently sets the speciation mode to 'non-adaptive'. However, currently observable divergence in wing patterns is an evolutionary novelty, which are most likely related to the environment but now under sexual selection. The final species description covers all four species, including wing coloration patterns, and variation of shape in the male secondary sexual organs and the prothorax. In a first attempt to approach the great variety of speciation patterns among odonates and to reveal the significantly different radiation patterns of the two sister genera *Megaloprepus* (4 species) and *Mecistogaster* (8 species), three mitochondrial genomes were generated as a valuable resource for future speciation and phylogenetic studies. Hereby, the focus will be on the genes involved oxidative phosphorylation. These results are a solid prerequisite to study speciation, the evolution of taxonomic/genomic key characters and radiation patterns within the family of the Pseudostigmatidae in detail. RNA-Seq is the method of choice for studying ecologically important organisms that lack genomic resources. Consequently, the transcriptome of a single larval thorax is presented. This transcriptome has a high level of completeness (93%) and provides the first reported wing gene sequences for odonates and supplies a valuable resource for future studies on wing coloration and wing development. Furthermore, because RNA-Seq is a frequently used method and for publication it is obligatory to upload raw reads to a public database, a submission guideline for

this process was developed. This guideline includes two all-inclusive protocols explaining all necessary steps to upload data to the National Center for Biotechnology Information (NCBI). RNA-Seq has already revolutionized the understanding of adaptation, speciation, phenotypic variability and population structures, and will continue to contribute to the understanding of evolution. Novel transcript identification and differential expression analyses (also in dependence of environmental conditions) are the most promising approaches. In a race against extinction, flying insects own a significant role for studying speciation and the genomic patterns of diversity." (Author)] Address: Feindt, Wiebke, ITZ, Ecology & Evolution, TiHo Hannover, Bünteweg 17d, 30559, Hannover, Germany. E-mail: feindt.wiebke@gmail.com

**17776.** Fischer, I.; Chovanec, A. (2019): Bewertung des libellen-ökologischen Zustands der Retentionsbecken an Wienfluss und Mauerbach (Wien) (Insecta: Odonata). Beiträge zur Entomofaunistik 20: 161-176. (in German, with English summary) ["Assessment of the ecological status of the retention basins at Wienfluss and Mauerbach. – In the present study the ecological status of seven retention basins at Wienfluss and Mauerbach (Austria, Vienna) has been assessed by an investigation of the dragonfly fauna. The assessment is based on a comparison of the rivertype-specific reference species with the status quo, considering the Rhithron-Potamon-Concept. For metarhithron waterbodies, such as the investigated water sections of Wienfluss and Mauerbach, three first-degree indicator species (*Calopteryx virgo*, *Onychogomphus forcipatus* and *Cordulegaster heros*) and four second-degree indicator species (*Pyrrhosoma nymphula*, *Ophiogomphus cecilia*, *Orthetrum brunneum* and *O. coerulescens*) have been defined. The investigations revealed 24 dragonfly species, 21 of them autochthonous, including species of the reference fauna and species characteristic of epipotamon waterbodies. Thus, the species inventory indicates a transitional zone between rhithron and potamon. Due to the autochthonous occurrence of first- and second-degree species, the retention basins have been classified as a "high" and "good ecological status". (Authors)] Address: Fischer, Iris, Vogtgasse 5/2/18, 1140 Wien, Austria. E-Mail: Fischer.Iris89@gmx.at

**17777.** Fischer, S.; Winter, M.; Siegel, S.; Hering, J.; Boudot, J.-P. (2019): Odonata records from Lake Nasser, Egypt. Notulae odonatologicae 9(3): 116-123. (in English) ["Records of seven Odonata species, including one Zygoptera and six Anisoptera, from a boat trip on Lake Nasser, Egypt (from Aswan to Abu Simbel), are listed. The record of *Selysiothemis nigra* at two localities is the first ever sighting of this species at Lake Nasser, that of *Paragomphus pumilio* the first record in 35 years." (Authors)] Address: Fischer, S., Unter den Eichen 1a, 14641 Paulinenaue, Germany. E-mail: fischer@dda-web.de

**17778.** Fischer, S. (2019): Massenaufreten von *Libellula quadrimaculata* im Linumer Teichgebiet/Brandenburg (Odonata: Libellulidae). *Libellula* 38(1/2): 103-109. (in German, with English summary) ["Large concentrations of at

least 5,500, 3,000 and 5,800 individuals of *L. quadrimaculata* were estimated on three days from the end of April to the beginning of May 2018 in the ponds of Linum in the Brandenburg federal state. In the early morning the dragonflies sat close together on reed stems. During the morning they dispersed in the pond area. As only part of the area was surveyed, the number of dragonflies could be much higher. It was not determined if the masses of *L. quadrimaculata* also emerged in the pond area. The estimated numbers are presumably the highest documented numbers of the species in the federal state of Brandenburg and maybe even in north-eastern Germany in the last 100 years." (Authors)] Address: Fischer, S., Unter den Eichen 1 a, 14641 Paulinenaue, Germany. E-mail: fischer@dda-web.de

**17779.** Flint, P. (2019): Observations of dragonflies (Odonata) from northern Cyprus. *Libellula* 38(1/2): 1-28. (in English, with German summary) ["During observations by two resident observers in northern Cyprus from June 2003 to September 2004 21 species of dragonfly were recorded. These included nine species not previously recorded from the north of the island, two of which, *Erythromma viridulum* and *Trithemis arteriosa*, were not previously mentioned in the island's literature; the former being a new species for the island. These observations were the first long-term observations on the island and were made during a period of rapid climate and habitat change; the results for *Diplacodes lefebvrii*, *Anax parthenope*, *Orthetrum chrysostigma*, *O. sabina*, *Selysiothemis nigra*, *T. annulata*, and *T. arteriosa* appear to reflect these environmental changes. Other significant records include: *Lestes macrostigma* (early records and migration/dispersal), *Sympecma fusca* (early records), *Erythromma lindenii* (recorded in only one previous year), *A. ephippiger* (mass migration) and *Sympetrum striolatum* (winter mating and ovipositing). Thirty two of the wetlands/water bodies we monitored were not mentioned in the earlier literature. The composition of the island's dragonfly fauna is discussed in relation to island biogeography, climate, and habitat diversity. It is suggested that the low species richness and the narrow species range are due to island biogeographical factors, particularly (in the case of the latter) to the island's poor habitat diversity; and that the surprising absence of endemics may be due to the island's aridity and recurrent drought year clusters. From this it is further suggested that the fauna may be relatively high in species which are quick to colonise and which have generalist habitat preferences." (Author)] Address: Flint, P., 14 Beechwood Avenue, Deal, Kent, CT14 9TD, UK. E-mail: peterflint123@btinternet.com

**17780.** Gabela-Flores, M.V.; Sanmartín-Villar, I.; Rivas-Torres, A.; Encalada, A.C.; Cordero-Rivera, A. (2019): Demography and territorial behaviour of three species of the genus *Hetaerina* along three tropical stream ecosystems (Odonata: Calopterygidae). *Odonatologica* 48(1/2): 79-100. (in English) "We studied the demography and territorial behaviour of three species of the damselfly genus *Hetaerina*, *H. aurora*, *H. caja* and *H. fuscoguttata*, along three lowland streams in western Ecuador: Tabuga, Buenaventura and



Moromoro. We measured recapture rates of marked individuals and estimated survival, longevity, sex ratio and population size of the most abundant species at each location. We found male-biased sex ratios in two out of three populations and high recapture rates of *H. fuscoguttata* on the Tabuga river and *H. aurora* at the Moromoro stream. We recorded male territorial behaviour and reproductive behaviour of the three Hetaerina species by direct observation. At all study sites we recorded few reproductive events. Conversely, we registered a high number of male-male agonistic interactions confirming that all species behaved in a territorial manner. We identified three clear behavioural strategies in males: territoriality, site fidelity and non-territoriality. However, we found no phenotypic correlates of males' strategies." (Authors)] Address: Gabela-Flores, María Virginia, Laboratorio de Ecología Acuática, Instituto BIOSFERA, Univ. San Francisco de Quito, Diego de Robles y Vía Inter-oceánica, Campus Cumbayá, 17-12-841, Quito, Ecuador

**17781.** Gallesi, M.M.; Sacchi, R. (2019): Voltinism and larval population structure of *Calopteryx splendens* (Odonata: Calopterygidae) in the Po Valley. *International Journal of Odonatology* 22(1): 21-30. (in English) ["Adaptation of life-history traits is an important factor for the success of insects. Voltinism is a feature that descends from several life-history traits and, given that the latter depend on the specific environment of growth, voltinism can vary between populations across latitudes or habitats. In addition, some insects, like many odonates, have developed different patterns of voltinism within the same population, due to mechanisms of cohort splitting. *C. splendens* is a widespread damselfly in Europe that has been extensively studied regarding its evolutionary ecology, but detailed studies about its voltinism are relatively scarce and confined to the central and northern areas of Europe. So we investigated the voltinism and larval development of a population of *C. splendens* both by captive rearing and in the field in Northern Italy, the southernmost area in which its voltinism has been studied so far. We found an earlier start of larval growth, with respect to previous studies. Additionally, the head-width of larvae of the same instar decreased with the cohort ageing. Finally, the results are consistent with a two-groups emerging pattern that may support partial semivoltinism or partial bivoltinism of *C. splendens* in Northern Italy." (Authors)] Address: Gallesi, M.M., Dipto di Scienze della Terra e dell'Ambiente, Lab. di Acque Interne, Univ. degli Studi di Pavia, Pavia, Italy

**17782.** Garfield, E.; Kang, T.; Kolding, I.; Mayo, J. (2019): Odonate communities across a desert development gradient. *CEC Research* | <https://doi.org/10.21973/N35W97> Fall 2019: 9 pp. (in English) ["Deserts are changing rapidly due to urbanization and climate change. Although human development can destroy habitat, it can also create novel environments that organisms may use or adapt to. In this study we compared artificial ponds to natural oases to determine whether artificial water sources differ in the odonate communities they support, as odonate species are indicators of aquatic habitat quality. We found that odonate community composition differed markedly based on water

source characteristics such as size, human presence, aquatic plant presence, and substrate. This clear difference in odonate species composition indicates that disturbed water sources support different communities than natural springs and oases. Our results may be used to inform development and management of artificial water sources to promote biodiversity in desert ecosystems." (Authors)] Address: Garfield, Ezra, University of California, Berkeley, USA

**17783.** Garrouste, R.; Nel, A. (2019): Alaskan Palaeogene insects: a challenge for a better knowledge of the Beringian 'route' (Odonata: Aeshnidae, Dysagrionidae). *Journal of Systematic Palaeontology* 17(22): 1939-1946. (in English) ["Four 'routes', Beringian, De Geer, Thulean and Turgai Strait, are currently considered to explain Cenozoic continental interchanges between Eurasia and North America. These 'routes' had a crucial importance for vertebrates and insects. While vertebrates are not infrequent in these zones, there is very little direct evidence of insects to date the migrations and justify particular 'routes'. A 'route' is generally chosen on the basis of indirect evidence, such as molecular dating of clades. Alaska, on the Beringian 'route', is especially poor in fossil insects. Here we describe the first two Paleocene–Eocene insects from the Chickaloon Formation in Alaska, viz. *Basiaeschna alaskaensis* sp. nov., the first accurate fossil of this extant Nearctic aeshnid genus, and a representative of the extinct damselfly family Dysagrionidae, distributed in the Palaeogene of Eurasia and North America. These fossils provide direct evidence of the role of Beringia as a land bridge for insects during the Palaeogene. They are also evidence for a warm temperate climate in Alaska during this period of global warmth." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**17784.** Geene, P. (2019): Observations during emergence of *Epithea bimaculata*, 8-11 May 2017. *Brachytron* 20(1): 26-31. (in Dutch, with English summary) ["In spring 2017 I studied the emergence of *E. bimaculata* at the Etangs de la Forge, France. Based on my observations, I found that the species prefers Large Nettle (*Urtica dioica*) for emerging as the leaves hide them from the view of birds and at the same time provide enough space for unfolding the wings during ecdysis." (Author)] Address: Geene, P.: E-mail: [famgeene@zeelandnet.nl](mailto:famgeene@zeelandnet.nl)

**17785.** Godwin, C.M.; Barclay, R.M.R.; Smits, J.E.G. (2019): Tree Swallow (*Tachycineta bicolor*) nest success and nestling growth near oilsands mining operations in Northeastern Alberta. *Journal of Zoology* 97(6): 547-557. (in English) ["Industrial development and contaminant exposure may affect reproductive success and food quality for birds. Tree swallows (*Tachycineta bicolor* (Vieillot, 1808)) nesting near oilsands development in northern Alberta potentially experience elevated environmental stressors that could influence reproduction. We measured reproductive and growth endpoints in tree swallows, predicting reduced reproductive success and nestling growth near oilsands operations compared to reference sites. We also identified

the invertebrate prey in the stomach contents of nestlings to understand variability in the diet and its potential effect on growth and survival of nestlings. From 2012 to 2015, clutch initiation varied among years but was not influenced by proximity to oilsands operations. Hatching and fledging success decreased in response to increased precipitation, regardless of location. Measurements of nestling growth reflected the variation associated with nestling sex and possibly asynchronous hatching. The composition of the nestling diet was significantly different; birds near oil sands development consumed Odonata, while birds at reference sites consumed Ephemeroptera. Nestlings from all sites consumed relatively high quantities of terrestrial insects. Our results demonstrate that factors such as weather conditions, diet, hatching order, and nestling sex are important when interpreting the potential effects of oilsands development on nest success and nestling growth." (Authors)] Address: Godwin, Christine, 324 Killdeer Way, Fort McMurray, AB T9K 0R3, Canada. E-mail: cgodwin@owlmoon.ca

**17786.** Goertzen, D.; Suhling, F. (2019): Urbanization versus other land use: Diverging effects on dragonfly communities in Germany. *Biodiversity and Distributions* 25: 38-47. (in English) ["Aim: Land use change, such as urbanization and intensification of agricultural practices, poses major threats for biodiversity. We examined whether the composition of freshwater species differs between landscapes dominated by urban, agricultural or more natural structures in a region with a long history of landscape transformation. We determined the differences and characteristics of the dragonfly fauna in relation to major land use categories. We particularly focused on urban land use, as it generally induces a high level of landscape transformation. Location: Germany. Methods: We used distribution data of dragonflies derived from a citizen science database, which was compiled for the German distribution atlas. To analyse whether different land use categories are associated with distinct species compositions, we performed the classification method random forest. Results: Based on dragonfly abundance per grid cell, we identified distinct land use-related assemblages that were separated by two gradients, that is, the level of transformation and a gradient from open land to forest. In particular, urban landscapes possessed a distinct species composition with specific species, all of which were opportunistic and supported by warm climate. They also comprised significantly higher  $\alpha$ -diversity than intensive agricultural landscapes. Similar values of  $\beta$ -diversity over all land use categories implied a countrywide homogenized dragonfly fauna, which is probably caused by historic land use. Main conclusions: Our results indicate that land use is a relevant driver for the composition of freshwater species at the landscape scale. Urban landscapes maintain species diversity better than agricultural landscapes, but they modify the species composition. Additional research on the effects of land use change is required to understand species responses and predict future distributions in a changing world in order to plan sustainable conservation strategies." (Authors)] Address: Goertzen, Diana, Institute of Geoecology, Technische Universität Braunschweig, Langer Kamp 19c,

38106 Braunschweig, Germany. E-mail: d.goertzen@tu-braunschweig.de

**17787.** Gomes Pereira, D.F.; Barbosa de Oliveira Junior, J.M.; Juen, L. (2019): Environmental changes promote larger species of Odonata (Insecta) in Amazonian streams. *Ecological Indicators* 98: 179-192. (in English) ["Highlights: • The relationship between environmental factors and functional characters of Odonata is tested. • Type of oviposition and thorax width are the most affected functional characters. • The more impactful environmental factors for the Odonata were habitat integrity and macrophytes cover. Abstract: Species occurrence can be affected by the availability of environments that fit within the limits of variation of its niche and by interaction with other species. Modifications in the environment, especially those caused by mankind, are considered the leading cause for species extinction. Such a response from the species is not random, with patterns that can follow functionality and/or morphology of each taxa. In this context, the objective of this study was to assess how environmental factors affect adult Odonata species, testing the hypotheses: a) that the environment acts as a filter upon the species by means of facilitating or excluding specific characteristics and b) that because of the order's requirements for thermoregulation and reproduction, thorax width and oviposition type are the variables most affected in the group. A total of 97 streams were sampled in eastern Amazonia, distributed along a gradient of different states of preservation, from completely preserved to heavily impacted by plantations and livestock. Six functional characteristics and seven environmental descriptors were selected, and to assess their relationships, a combination of Fourth Corner and RLQ analysis was used. The Habitat Integrity Index was the descriptor with the biggest impact on the Odonata community, presenting a negative correlation with wing width, thorax width and exophytic oviposition, and a positive correlation with endophytic oviposition. Macrophyte cover was the next most relevant environmental descriptor, showing a negative correlation with abdomen length, and positive correlation with thorax width and exophytic oviposition. The results show that poorly preserved environments favour the occurrence of organisms with a wider thorax and the substitution of endophytic oviposition with the exophytic type. Since changes to the environment do not usually alter Odonata richness but rather the composition, these results show a favouritism for groups with mentioned characteristics, such as Libellulidae, to the detriment of other groups (especially Zygoptera), which can result in community homogeneity and both biodiversity and functional loss. The maintenance of well-preserved environments is therefore indispensable in assuring Odonata biodiversity, as well as the best way to preserve the different behavioural and eco-physiological groups in the order. The Odonata community's response, directed through its morphological and behavioural characteristics, sheds light on ecological patterns, and thus the addition of oviposition habits in conservation measures aimed at preserving the order can render them more adequate, as this is a critical aspect of population maintenance and colonization of new sites." (Authors)]

Address: Gomes Pereira, D.F., Programa de Pós-graduação em Ecologia, Univ. Federal do Pará/Embrapa Oriental, Caixa Postal 399, CEP 66040-170 Belém, Pará, Brazil

**17788.** Graham, S.R. (2019): Do *Enallagma exsulans* from streams and lakes show patterns of divergence? M.Sc. thesis, University of Arkansas. 53 pp. (in English) ["Divergent selection across heterogenous environments could lead to adaptive divergence in populations resulting in potential local adaption. These populations have phenotypic differences that are fitness related and make native individuals more fit than non-native individuals. My research focuses on a species of damselfly, *Enallagma exsulans*, to explore local adaptation and morphological differences as a result of divergent selection or plasticity. My first study explored potential local adaptation of wild caught stream and lake *E. exsulans* using a reciprocal transplant design, a classic approach for this objective. The stream and lake sites chosen were on a small spatial scale allowing for potential gene flow among populations, a process that could hinder local adaptation. In the second part of my research, I reared stream and lake *E. exsulans* in a common garden and transplanted them into stream and lake environments. I expected to find that native individuals had higher fitness, measured as growth rates, than non-native individuals indicating local adaptation. Unfortunately, I was unable to collect any results due to a storm damaging my experimental set-up. There are still important questions about local adaptation occurring at small spatial scales with potential for gene flow, and if plasticity is another mechanism for coping with changing environments. In the next part of my study, I used individuals raised in a common garden environment for a small scale mesocosm reciprocal transplant replicating the field study. All larvae lost body mass, no matter the origin of the individual or the condition under which it was tested. I also completed geometric morphometric analyses of wild caught individuals from both stream and lake environments and common garden reared individuals to determine if morphological differences are the result of divergent selection between populations. In wild-caught individuals, I found significant differences in body and lamellae shape between lake and stream populations suggesting divergent selection. In common garden individuals, I did not detect significant differences, suggesting morphological divergence is not genetically based. Last, I completed behavioral assays with common garden individuals placing larvae into stream and lake conditions and scoring behavior, but no results were significant between lake and stream populations." (Author)] Address: not stated

**17789.** Haak, N. (2019): Identification of individual dragonflies. *Brachytron* 20(1): 3-17. (in Dutch, with English summary) ["Individual dragonflies can be identified from a large number of individuals using a picture of their wing venation, similar to identification of humans based on fingerprints or facial recognition. This offers interesting opportunities for dragonfly research although lack of suitable identification software can still be a challenge. In a small city park in the middle of Middelburg (Zeeland, the Netherlands), every

summer a relatively large group of *Aeshna mixta* can be seen that hunt or rest in the park but do not originate there. Using photographs of wing patterns, I registered which individuals were present in the park from day to day. During the research period from July to October 2018, 1008 different Migrant hawkers were identified of which the large majority visited the park just once and left within one day after arrival. Only 9.4% of identified individuals were seen on more than one (two or three) days and just 1.9% visited the park on days that were more than one week apart. The observations suggest that *A. mixta* that visit the park are part of a migratory stream or at least show directional swarming." (Author)] Address: Haak, N.: E-mail: [nh@zeelandnet.nl](mailto:nh@zeelandnet.nl)

**17790.** Haase, P.; Pilotto, F.; Li, F.; Sundermann, A.; Lorenz, A.W.; Tonkin, J.D.; Stoll, S. (2019): Moderate warming over the past 25 years has already reorganized stream invertebrate communities. *Science of The Total Environment* 658: 1531-1538. (in English) ["Highlights: •We studied stream invertebrate communities over 25 years in central Europe. •Temperature increased by 0.5°C. Total abundance and richness increased. •Cold-adapted species declined while warmer-adapted species increased. •Community temperature index increased at a similar pace as physical temperature. •Results raise conservation concerns in view of the stronger future warming. Climate warming often results in species range shifts, biodiversity loss and accumulated climatic debts of biota (i.e. slower changes in biota than in temperature). Here, we analyzed the changes in community composition and temperature signature of stream invertebrate communities over 25 years (1990–2014), based on a large set of samples (n = 3782) over large elevation, latitudinal and longitudinal gradients in central Europe. Although warming was moderate (average 0.5°C), we found a strong reorganization of stream invertebrate communities. Total abundance (+35.9%) and richness (+39.2%) significantly increased. The share of abundance (TA) and taxonomic richness (TR) of warm-dwelling taxa (TA: +73.2%; TR: +60.2%) and medium-temperature-dwelling taxa (TA: +0.4%; TR: +5.8%) increased too, while cold-dwelling taxa declined (TA: -61.5%; TR: -47.3%). The community temperature index, representing the temperature signature of stream invertebrate communities, increased at a similar pace to physical temperature, indicating a thermophilization of the communities and, for the first time, no climatic debt. The strongest changes occurred along the altitudinal gradient, suggesting that stream invertebrates use the spatial configuration of river networks to track their temperature niche uphill. Yet, this may soon come to an end due to the summit trap effect. Our results indicate an ongoing process of replacement of cold-adapted species by thermophilic species at only 0.5°C warming, which is particularly alarming in the light of the more drastic climate warming projected for coming decades." (Authors) The paper includes a passing reference to Odonata.] Address: Pilotto, Francesca, Department of River Ecology and Conservation, Senckenberg Research Institute and Natural History Museum Frankfurt, Gelnhausen, Germany. E-mail address: [francesca.pilotto@senckenberg.de](mailto:francesca.pilotto@senckenberg.de)



**17791.** Haley, S. (2019): How does aquatic invertebrate community structure and abundance relate to brook trout (*Salvelinus fontinalis*) habitat quality? Honours Bachelor of Environmental Management, Natural Resources Management: (in English) ["67 streams located south-west of Lake Nipigon, Ontario, were sampled for brook trout and macroinvertebrate orders. Sixteen orders were used to determine if their community structure significantly changed in different brook trout habitat and different brook trout densities (no brook trout, one to fifteen brook trout or more than 15 brook trout). Though the orders Odonata, Oligochaeta, Trichoptera, Chironomidae, Nematoda, Simuliidae, Gastropoda and Plecypoda varied in response to brook trout habitat quality and abundance, the community structures did not change significantly. Pollutant sensitive orders, Trichoptera, Ephemeroptera, and Plecoptera that are used as indicators and share similar habitat to brook trout did not significantly change in response to brook trout densities. Future direction may involve identifying macroinvertebrates to family or genus level to detect community changes, or analyzing further data such as invertebrate biomass, diversity or richness in these streams." (Authors)] Address: not stated

**17792.** Hashimoto, K.; Eguchi, Y.; Oishi, H.; Tazunoki, Y.; Tokuda, M. Sánchez-Bayo, F.; Goka, K.; Hayasaka, D. (2019): Effects of a herbicide on paddy predatory insects depend on their microhabitat use and an insecticide application. *Ecological Applications* 29(6), 2019, e01945. 11pp. (in English) [ "Indirect effects of agrochemicals on organisms via biotic interactions are less studied than direct chemical toxicity despite their potential relevance in agricultural landscapes. In particular, the role of species traits in characterizing indirect effects of pesticides has been largely overlooked. Moreover, it is still unclear whether such indirect effects on organisms are prevalent even when the organisms are exposed to direct toxicity. We conducted a mesocosm experiment to examine indirect effects of an herbicide (pentoxazone) on aquatic predatory insects of rice paddies. Because the herbicide selectively controls photosynthetic organisms, we assumed that the effects of the herbicide on predatory insects would be indirect. We hypothesized that phytophilous predators such as some Odonata larvae, which cling to aquatic macrophytes, would be more subject to negative indirect effects of the herbicide through a decrease in abundance of aquatic macrophytes than benthic, nektonic, and neustonic predators. Also, we cross-applied an insecticide (fipronil) with herbicide application to examine whether the indirect effects of the herbicide on the assembling predators act additively with direct adverse effects of the insecticide. The herbicide application did not decrease the abundance of phytoplankton constitutively, and there were no clear negative impacts of the herbicide on zooplankton and prey insects (detritivores and herbivores). However, the abundance of aquatic macrophytes was significantly decreased by the herbicide application. Although indirect effects of the herbicide were not so strong on most predators, their magnitude and sign differed markedly among predator species. In particular, the abundance of phytophilous predators was more likely to decrease than

that of benthic, nektonic, and neustonic predators when the herbicide was applied. However, these indirect effects of the herbicide could not be detected when the insecticide was also applied, seemingly due to fipronil's high lethal toxicity. Our study highlights the importance of species traits such as microhabitat use, which characterize biotic interactions, for predicting indirect effects of agrochemicals. Given that indirect effects of the chemicals vary in response to species traits and direct toxicity of other chemicals, efforts to explain this variation are needed to predict the realistic risks of indirect effects of agrochemicals in nature." (Authors) *Indolestes peregrinus*, *Cercion calamorum*, *Aciagrion migratum*, *Lestes temporalis*, *Ischnura senegalensis*, *Zygoptera* spp., *Anax parthenope*, *Crocothemis servilia*, *Orthetrum albistylum*, *Libellulidae* spp.] Address: Hashimoto, K., Faculty of Agriculture, KINDAI University, Nakamachi 3327-204, Nara, 631-8505 Japan. E-mail: atrophaneura4@gmail.com

**17793.** Hefler, C. (2019): Inherent aspects of root flapping tandem wing arrangements in nature: forewing - hindwing interactions in dragonfly flight. Ph.D. thesis, Mechanical and Aerospace Engineering, Hong Kong University of Science and Technology: xxi, 164 pp.- (in English) ["Micro air vehicles (MAVs) are operate in the size region under the same environmental conditions as natural flyers. Insects are a prime target for bioinspired designs of MAVs, as their wing-root fixed musculature is simpler than the flight muscles of birds and bats. Dragonflies are highly aerobatic insects having high aspect ratio wings in tandem; they control individual wings to utilize wake elements of the forewings by their hindwings. This thesis contains my effort to characterize the unique interactions between the wings of dragonflies. I use a spanwise resolved approach to address the gradual change of wing geometric relations in the root fixed flapping wing system. With the use of in-vivo flow measurements two characteristic regions with distinct flow features, and two transient regions delimiting these, were identified. The dimensionless arc length was introduced to describe the effect of interaction in the wings spanwise direction. This parameter includes not only the phasing relations of the wings, but the ventral or dorsal shift in a wing's flapping, thus it is more generally applicable. Additionally, the flight direction was found to affect the inter-wing interactions. Secondly, a multilayer wing is proposed that generates lift with simple flapping motion. The wing takes up a different shape during the downstroke and during the upstroke; that mimics the asymmetric wing pitching of dragonflies. The wing generates an additional trailing edge vortex between its layers during upstroke that can boost thrust. The characteristic parameter defining the performance of the double layer wing is the difference between the dynamic shape deformation during the upstroke and the downstroke. It relates to the ratio of the chord length of the wing's layers. A chord ratio of 0.5 resulted in the best performance. I hope that my work will inspire further scientific research on dragonflies as well as MAV engineering." (Author)] Address: not stated

**17794.** Henze, M.J.; Lind, O.; Kohler, M.; Kelber, A. (2019): Seeing and (not) being seen: Sensory ecology of the blue-

tailed damselfly *Ischnura elegans*. *Frontiers in Physiology*. Conference Abstract: International Conference on Invertebrate Vision. doi: 10.3389/conf.fphys.2013.25.00068: 2 pp. (in English) ["Adult *I. elegans* are colourful insects. Males turn bright green after emergence and become blue over the days. Females show a red or purple colouration first and, when sexually mature, either mimic the blue colour of the males or are camouflaged by an inconspicuous olive-green or brown. In the past, the mating system and the underlying genetics and population ecology of *I. elegans* have been studied intensively. However, the sensory basis of their colour polymorphism for (1) intraspecific and (2) predator-prey interactions have not been explored. We quantified backgrounds in the natural habitat and the body colouration of the damselflies by spectral reflectance measurements, including time series documenting the animals' colour change. (1) To understand the function of the colours for mate and rival detection, we determined the angular, spectral and polarization sensitivity of photoreceptors in the compound eyes of males. Four spectral types of receptors maximally sensitive in the UV (370 nm), blue (440 nm), green (540 nm) and red (600 nm) region of the spectrum were found by intracellular recordings (Fig. 1). The sensitivity curve of the red receptor is narrower than an opsin template indicating spectral filtering, likely by the green receptor. Combining spectral reflectance and spectral sensitivity data in a model enables us to reconstruct the saliency of the different colour morphs to conspecific males searching for mates or trying to chase off rivals. (2) The functions of the colours for predator avoidance are also largely unknown. In similar models, we therefore incorporate known spectral sensitivities of passerines, potential predators on *I. elegans*. This allows us to judge which colour morphs are best camouflaged for the birds. Our goal is a physiologically based understanding of the reasons for colour polymorphism, a common phenomenon in damselflies." (Authors)] Address: not stated

**17795.** Hunger, H.; Benken, T.; Watts, P. (2019): Untersuchungen zur Auswirkung der Habitatfragmentierung auf *Coenagrion mercuriale* mit genetischen Methoden und GIS-Modellen. *Mercuriale* 18/19: 59-95. (in German, with English summary) ["Studies on the impact of habitat fragmentation on *Coenagrion mercuriale* using genetic methods by microsatellite analysis and GIS models in Baden-Württemberg – Microsatellites are highly variable non-coding genomic regions that are inherited like alleles and therefore can be used for population studies. Genomic DNA, taken from 32 occurrences of the species, was isolated from leg samples of *C. mercuriale* and amplified by the polymerase chain reaction (PCR). Thirteen microsatellite loci were synthesized by use of specific primers flanking these microsatellite regions according to a standard protocol. These amplification products were separated by length by capillary electrophoresis and assigned to discrete „alleles“. The variability of these DNA sections at the investigated occurrences forms the basis for the statistical evaluations. A range from 0.425 to 0.591 was determined for the expected heterozygosity (He) as a degree for genetic diversity in the study area. The allele number per locus (Na) fluctuated between 2.71 and

4.86. The values within the core zone (patch 2) were relatively constant (He = 0.482-0.541; Na = 4.0-4.8), whereas larger fluctuations were measured in the isolated patches. There was no clear evidence of a bottleneck. The genetic differentiation (calculated as  $F_{ST}/1-F_{ST}$ ) is small overall in the study area but increases with distance (isolation by distance; IBD). Values from 0.002 to 0.071 were determined for populations less than five km, and values between 0.006 and 0.205 over 20 km apart. The proportion of migrants was estimated using the MCMC algorithm. Based on the genetic studies, the gene flow between the populations was calculated and potential migration routes were described. Dispersal models supplied by the Cost-Distance extension in ArcView Spatial Analyst were calculated for a 54.2 km<sup>2</sup> area in the "Freiburger Bucht", comprising nine genetics sampling sites. First, Euclidean distances were calculated. Following this, three cost matrices were created for the study area: "historic land use" – based on a historic map from the 1850s – "generalised recent land use" – based on ATKIS land use data scaled down to the historic land use map – and "recent land use", a more sophisticated model. All three models were combined with topographic surface data. The "Isolation by Distance Web Service" was then used to quantify the level of correlation between genetic distances and Euclidean respectively cost distances. The level of correlation rose in the order given above, with only the "recent land use" cost matrix yielding cost distances that were correlated with genetic distances on a significant level." (Authors)] Address: Hunger, H., INULA – Institut für Naturschutz und Landschaftsanalyse, Wilhelmstr. 8, 79098 Freiburg, Germany. E-mail: holger.hunger@inula.de

**17796.** Iannella, M.; D'Alessandro, P.; Biondi, M. (2019): Entomological knowledge in Madagascar by GBIF datasets: estimates on the coverage and possible biases (*Insecta*). *Fragmenta Entomologica* 51(1): 1-10. (in English) ["Although Madagascar is one of the world's most important biodiversity hotspots, the knowledge of its faunistic diversity is still incomplete, notwithstanding many field campaigns were organized since the 17th century until nowadays, leading to a huge number of vertebrate and invertebrate records. In this contribution, taking into consideration the geographic distribution by a GBIF dataset including 286,764 records referred to nine insect orders (Coleoptera, Diptera, Hemiptera, Hymenoptera, Lepidoptera, Neuroptera, Odonata, Orthoptera, Trichoptera), we tried to supply some observations on the spatial distribution and to point out some possible biases in the entomological knowledge of Madagascar. Hymenoptera, Coleoptera and Diptera were the most represented orders in the dataset, respectively. Some orders show many "coupled" sampling, with peaks of shared sampled localities between Diptera with Hymenoptera (98.07%) and Hemiptera with Coleoptera (64.21%). Considering the geographic location and the extension of the vegetation macrogroups in Madagascar, the entomological data result unevenly distributed. Current Protected Areas' (PAs) network covers about the 70% of the total of the collecting localities for the nine insect orders considered, even though some, such as Trichoptera, Odonata, and Neuroptera

seem significantly less protected than others. However, the possible new PAs planned for Madagascar could greatly increase in the future the protection level for all 9 insect orders analyzed, especially for Neuroptera, Odonata and Lepidoptera. A percentage of 82.3% of the whole sampling localities falls inside the PAs themselves or within 1000 m from their borders. A similar pattern is observed for the road network: the 62.9% of the localities fall at least at 1000 m from a road, with no sampling localities observed further than 10 km from a road; statistically significant clusters were observed in evaluating these biases, coinciding with major towns or PAs." (Authors)] Address: D'Alessandro, Paola, Univ. of L'Aquila, Dept of Health, Life & Environ. Sciences, Section of Environ. Sciences, Italy. E-mail: paola.dalessandro@univaq.it

**17797.** Ingley, S.J. (2019): Digest: Ecomorphological convergence across the Atlantic. *Evolution* 2019: 1-2. ["Did the remarkable helicopter damselflies (family Pseudostigmatidae) evolve their unique feeding and oviposition behaviors independently on two continents? In this issue, Toussaint et al. use molecular phylogenetic approaches to provide convincing evidence that these 'forest giants' are in fact an example of ecomorphological convergence across the Atlantic Ocean." (Author)] Address: Ingley, S.J., Faculty of Science, Brigham Young University. Hawaii, Laie, Hawaii, USA. E-mail: ingley@byuh.edu

**17798.** Iorio, E. (2019): Résultats d'un suivi odonatologique orienté sur *Lestes dryas* Kirby, 1890 et *L. virens* (Charpentier, 1825) (Odonata: Lestidae) dans les landes de Lessay (Manche). *Invertébrés Armoricaux* 20: 28-52. (in French, with English summary) ["An ecologic study of *Lestes dryas* and of *L. virens* has been made on several stations in the humid heaths of Lessay, between 2015 and 2017. The results give precious informations on favourable and unfavourable factors for these species. Measures are given to make favourable ponds for *L. dryas* and *L. virens* as well as for a higher species richness of Odonata." (Author)] Address: Iorio, E., Entomologie & Myriapodologie, 522 chemin Saunier, F-13690 Graveson, France

**17799.** Jêdro, M.; Jêdro, G.; Goc, M. (2019): Coastal dune slacks – a distinctive dragonfly (Odonata) habitat in the Slowiński National Park. *Przegląd Przyrodniczy* 30(2): 58-67. (in Polish, with English summary) ["Research conducted in the Slowiński National Park in 2017-2019 has shown that the coastal dune slack in forest compartment 29gy of the Park is an important habitat for odonates, including species well adapted to sparsely vegetated, astatic water bodies. The odonate assemblage typical of this habitat includes the yellow-winged darter *Sympetrum flaveolum* (L.), migrant spreadwing *Lestes barbarus* (Fabr.) and robust spreadwing *Lestes dryas* Kirby. The specific nature of this water body is determined not only by its location in the dune slack, but also by its proximity to the sea, which favours colonization by nomadic and dispersive species." (Authors)] Address: Jêdro, Magdalena, Slowiński Park Narodowy, ul. Bohaterów Warszawy 1A, 76-214 Smoldzino, Poland. E-mail: m.jedro@slowinski.pn.pl

**17800.** Kemabonta, K.A.; Adu, B.W.; Nwabueze, O.F.; Ogbogu, S.S.; Ohadiwe, A. (2019): The diversity and distribution of dragonflies and damselflies (Odonata) in University of Lagos, Akoka, Lagos, south-west Nigeria. *The Zoologist* 17: 1-5. (in English) ["The presence of Odonata may be taken as an indication of good ecosystem quality. The greatest numbers of species are found at sites that offer a wide variety of microhabitats. A survey of Odonata fauna inhabiting the University of Lagos, Akoka Lagos, south-west Nigeria was carried out between July and December 2014, with a view of determining its diversity and distribution. Four study sites used were Distance Learning Institute (DLI), Lagoon, Faculty of Science, and High Rise Area. Data collected were subjected to inferential statistics and analysis of variance (ANOVA). Diversity indices were used to compare the odonate species in the study sites. Seven hundred and fifty (750) individuals representing 39 species in 22 genera and four families (Aeshnidae – 3%, Coenagrionidae – 13%, Libellulidae – 81% and Calopterygidae – 3%) were recorded. *Orthetrum* (18%) was the most dominant genus, followed by *Ceragrion* (10%) while *Palpopleura* and *Trithemis* (8%) were the least dominant genera. The site with most diverse Odonata fauna ( $H' = 2.70$ ,  $E = 0.27$ ), was High Rise Area while the least was the Lagoon Area ( $H' = 1.97$ ,  $E = 0.27$ ). Odonata in High Rise Area were significantly lower ( $p > 0.0128$ ) than those in DLI and Science Area which were not significantly different from each other (0.00039 and 0.00368 respectively). The paucity of species with narrow range of adaptation at the university especially at Lagoon Area where they were expected to occur is an indication that the forested part of the campus is under considerable human disturbance. Urgent measures are needed to preserve the natural the natural habitats of these Odonata species." (Authors)] Address: Kemabonta, K.A., Department of Zoology, Faculty of Science, University of Lagos, Lagos State, Nigeria. E-mail: kkemabonta@unilag.edu.ng

**17801.** Khelifa, R. (2019): Females 'assist' sneaker males to dupe dominant males in a rare endemic damselfly: sexual conflict at its finest. *Ecology* 100(12), e02811: 4 pp. (in English) ["Sneaky mating tactic has fascinated scientists for decades, and the mechanisms behind its evolution remains unclear. In many taxa, sneaker males are thought to outsmart the dominant males because they can secure fertilization of eggs either through pre-copulatory or post-copulatory processes (Shuster and Wade 2003). For instance, sneaker males of a fish mimic the female's appearance to dupe the dominant male (Todd et al. 2017) whereas in some insects sneaker males steal females from male's territories and force copulation (Cordero and Andrés 2002)." (Authors)] Address: Khelifa, R., Biodiversity Research Centre, University of British Columbia, Vancouver, British Columbia V6T 1Z4 Canada. E-mail: rassimkhelifa@gmail.com

**17802.** Khelifa, R. (2019): Sensitivity of biodiversity indices to life history stage, habitat type and landscape in Odonata community. *Biological Conservation* 237: 63-69. (in English) ["Highlights: • Improving our understanding of species distribution is key for effective management. • The distribution



of odonates in Northeast Algeria based on adult, oviposition, larvae and exuviae was analyzed. • Combining different life history stages improves the accuracy of species distribution. • The diversity of odonates was influenced by habitat and landscape configuration. Abstract: Assessing biodiversity and prioritizing the conservation of sites requires a robust methodology that minimizes the estimation errors of biodiversity indices and thus maximizes management efficiency. In aquatic insects, while there is still a debate about the use of different life history stages to increase the reliability of the biodiversity estimates, little is known about the effect of habitat and landscape characteristics. Here, odonates are used to assess the sensitivity of important biodiversity indices to the use of different life history stages (adult, oviposition, exuvia, and larva) and the influence of habitat type (lotic vs. lentic) and freshwater landscape complexity (proximity to a diversity of wetlands). Unlike exuvia and larvae, the use of adults gave inaccurate estimates of species richness, Relative Taxonomic Distinctness (RTD), Conservation Priority Index (CPI), but was quite reliable for Dragonfly Biotic Index (DBI). Interestingly, recording the mating state (oviposition) of the adult improved the accuracy of RTD and CPI by ~40 and 60%, respectively. The estimation bias was higher in lotic than in lentic habitat and it increased with the freshwater landscape complexity. Our study shows that applying a multi-life stage approach in biodiversity indices reveals site connectivity at the landscape level." (Authors)] Address: Khelifa, R., Dept Zoology & Biodiversity, Research Centre, Univ.y of British Columbia, Vancouver, BC, Canada

**17803.** Kietzka, G.J. (2019): Dragonflies as bioindicators and biodiversity surrogates for freshwater ecosystems. Dissertation, Doctor of Philosophy (Conservation Ecology) at Stellenbosch University, Department of Conservation Ecology and Entomology, Faculty of AgriSciences: 191 pp. (in English) ["Biological indicators (bioindicators) are useful for rapid and cost-effective ecosystem assessments. Dragonflies are valued for their potential as bioindicators in freshwater ecosystems. My dissertation aims to assess and expand on their use as bioindicators in transformed landscapes and as surrogates for other aquatic biodiversity. Of the three bioindicator categories (environmental, ecological and biodiversity), biodiversity indicators and their application are poorly understood. The umbrella species concept is a biodiversity surrogacy method that aims to conserve a large number of species in an ecosystem by focusing on a select group of co-occurring species. I used the umbrella index, which quantitatively identified a group of seven dragonfly species and a group of eight Ephemeroptera, Plecoptera and Trichoptera (EPT) species, any of which could be used as biodiversity surrogates (Chapter 2). Adult dragonflies can only be surveyed on warm, windless days during summer, but are easily identifiable. On the other hand, their larvae can be sampled under any weather conditions and are also sensitive bioindicators. I showed that the interchangeability of the life stages for assessments was dependent on landscape spatial scale, coupled with the specific question asked (Chapter 3). Comprehensive biodiversity surveys at fine ecological scales should sample both adults

and larvae. However, at larger spatial scales with coarser ecological questions, either adults or larvae can be used. To mitigate the detrimental effects caused by forestry, ecological networks (ENs) are integrated into plantation landscapes. These comprise grassland corridors connected to protected areas (PAs), which often include rivers. They aim to conserve biodiversity by creating habitats or facilitating dispersal of grassland species. I showed that water quality and adult dragonfly diversity did not differ between EN corridors and PAs (Chapter 4). Therefore, the EN approach is an effective method for conserving dragonfly diversity and river ecosystem integrity in plantation landscapes. In the Pietermaritzburg Botanical Gardens, an insect conservation pond was built along a degraded stream. Dragonfly species richness and abundance significantly increased, as both lentic and lotic species were able to colonize the area. Over time, the pond became overgrown and siltation reverted it back to a stream, which negatively affected dragonfly diversity. Shortly after extensive restoration efforts, the dragonfly assemblage had almost completely recovered and closely resembled that of the original pond. This was linked to alien plant removal, decreased vegetation cover and the inclusion of a range of microhabitats. This indicates that conservation ponds need to be actively maintained to keep their function as biodiversity reservoirs. This highlights the value of dragonflies as indicators of habitat quality in aquatic restoration projects. Throughout the thesis, adult dragonflies continuously demonstrated their success as bioindicators. The umbrella index validated the use of dragonflies as biodiversity indicators and surrogates for some of the most sensitive aquatic taxa (the EPT). Although dragonfly larvae and adults are both indicators of water quality, they are not always interchangeable, in terms of sampling at the species level. Their interchangeability depends on the specific question asked and the scale used. I also successfully monitored dragonfly assemblage responses in agricultural lotic and urban lentic environments, which highlighted their benefits for good aquatic conservation planning in transformed landscapes." (Author)] Address: Kietzka, Gabriella, Department of Conservation Ecology and Entomology, Stellenbosch University, Private Bag X1, Matieland 7602, South Africa. E-mail: gabikietzka@gmail.com

**17804.** Kosterin, O.E. (2019): Amendments and updates to F.C. Fraser's key to Indian *Lestes* spp. (Odonata: Lestidae) to resolve confusion of *L. patricia* Fraser, 1924 and *L. nigriceps* Fraser, 1924, with notes on *L. nodalis* Selys 1891 and *L. garoensis* Lahiri, 1987. *Zootaxa* 4671(2): 297-300. (in English) ["Last year I reported the rediscovery in Cambodia of *Lestes nigriceps* Fraser, 1924, described from Pusa, India (Fraser 1924a) but never reported since that time from India (Kosterin 2018). In my paper I presumed non-conspicuity of the male and females of the type series and made critical comments on Fraser's appendage drawing (Fraser 1924a: plate IX: 6) and verbal descriptions (Fraser 1924a; 1933) of this species but did not consider his key for *Lestes* Leach, 1815 in the 1st volume of "Fauna of British India including Ceylon and Burma. Odonata" (Fraser 1933). Later I found a considerable corruption in this key, which could lead

to misidentifications. (It is noteworthy to stress that Fraser explicitly provided keys for males only)." (Author)] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev Ave. 10, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

**17805.** Kosterin, O.E. (2019): Description of a female and variation of *Microgomphus alani* Kosterin, 2016 (Odonata: Gomphidae) in Cambodia, with a note on sexual dimorphism in *Microgomphus* spp.. *Zootaxa* 4701(3): 276-290. (in English) ["*M. alani* was described from two teneral males from the Cardamom Mts. in SW Cambodia; it turned out that the description was based on the holotype with the anal appendages not fully expanded. Further specimens of *M. alani* (all mature) are reported: a male and two females from the Phnom Kulen Mts, NW Cambodia and five males and one female from Mondulkiri Province, E Cambodia. The appendage shape in mature males is illustrated and discussed and the female is described for the first time. The specimens from E Cambodia are ca 15-20% larger than those from SW and NW Cambodia and exhibit some differences in the shapes of the male epiproct and anterior hamulus and face maculation, however evaluated as insufficient to erect a new taxon. A hitherto neglected manifestation of sexual dimorphism in probably most *Microgomphus* spp. and at least some *Heliogomphus* spp. is pointed out. It concerns the mid- and metafemur, in males armed with numerous, dense and small spinulets but with two rows of long, sparse spines in females. An earlier report of *Microgomphus jurzitzai* Karube, 2000 for Cambodia was based on a misidentified *M. alani* specimen and is cancelled. A female specimen earlier identified and described from Thailand as *Heliogomphus selysi* Fraser, 1925 most probably was *M. alani* as well." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**17806.** Kumar, A.; Kumar, N.; Das, R.; Lakhani, P.; Bhushan, B. (2019): In vivo structural dynamic analysis of the dragonfly wing: the effect of stigma as its modulator. *Philosophica Transactions of the Royal Society A. Mathematical, Physical and Engineering Sciences* 377(2150): 14 pp. (in English) ["The flapping of the dragonfly (*Lyrithemis elegatissima*) forewing under in vivo condition has been analysed by image correlation technique to get an insight of its structural dynamics. The modal parameters such as flapping frequency, natural frequencies, mode shapes and modal strain have been obtained that will facilitate the biomimetic design of wings for micro air vehicles. The stigma, which is a pigmented spot at the leading edge of the wing near the tip having heavier mass, takes an active role in the real-time flapping by shaping its trajectory as eight-shaped, which enhances the drag coefficient and stroke efficiency. The extra mass on it and its removal transformed the trajectory into two different elliptical and oval shapes, respectively, which reduced the drag coefficient and stroke efficiency of the flapping wing by altering the flapping kinematics." (Authors)] Address: Kumar, N. E-mail: nkumar@iitpr.ac.in

**17807.** Kutsarov, Y. (2019): Dragonflies and damselflies (Odonata: Insecta) from the Bulgarian stretch of the Danube River and adjacent territories. In: *Biodiversity of the Bulgarian-Romanian Section* ISBN: 978-1-53615-663-8 Editor: Shurulinkov, Hubenov et al.: 119-153. (in English) ["This study intends to collect and present all available information on seasonal and habitat distribution of Odonata in the Bulgarian stretch of the Danube River between chainages 845 (at the Timok River estuary) and 375 (town of Silistra) and adjoining wetlands, (up to 20 km from the river bank) included in 109 MGRS UTM 10x10 km quadrants. To date, 52 species of Odonata have been recorded in the study area, 51 of which were identified in previous publications, including by this study's author, who recorded 46 of the 51 species. From the total number of species, four have not been confirmed as present around the Danube River, one has been removed because of change in taxonomy, and one new species has been recorded in the study area." (Authors)] Address: Kutsarov, Y., Kalimok-Brushlen Ltd., Tutrakan, Bulgaria

**17808.** LeNaour, A.; Baeta, R.; Sansault, E.; Deville, M.; Pincebourde, S. (2019): Telemetry reveals the habitat selected by immature dragonflies: implications for conservation of the threatened dragonfly *Leucorrhinia caudalis* (Odonata: Anisoptera). *Journal of Insect Conservation* 23(1): 147-155. (in English) ["Determining how species use different habitats during critical phases of their development is one of the crucial challenges that conservation biology meets. However, habitat requirements remain unknown for most species, in particular for the rarest and most threatened which by definition are difficult to study. Here, we used animal-borne telemetry to identify the habitat of the sexually immature adults in the threatened dragonfly *Leucorrhinia caudalis*. We used an harmonic radar with customized tags fixed on the back of the abdomen of flying immature dragonflies to monitor their position within an area composed of various types of habitats including open areas, forest and water bodies. From 62 tagged individuals, we obtained 23 detections, all within a quite restricted area around the pond of emergence. About 75% of the detections happened in the forest canopy and the individuals were likely positioned at the top of the trees. The relatively low detection rate was probably due to high predation within the study area during the maturation phase in this dragonfly but long-range dispersal cannot be excluded. The use of forest canopy as a maturation habitat is an important knowledge for planning conservation strategies in this endangered species, especially for populations living in areas without any protection status. Although technological constraints are still limiting its efficiency, animal-borne telemetry appears to be useful to determine precisely habitat selection by rare species." (Authors)] Address: Pincebourde, S., Inst. Recherche sur la Biol. de l'Insecte (IRBI), UMR 7261 CNRS, Univ. de Tours, Tours, France. E-mail: sylvain.pincebourde@univ-tours.fr

**17809.** Lohmann, A. C., Corcoran, A. J. and Hedrick, T. L. (2019): Dragonflies use underdamped pursuit to chase conspecifics. *J. Exp. Biol.* 222, jeb190884. <http://jeb.biologists.org/content/222/11/jeb190884>: 8 pp. (in English) ["Pursuit is

a common behavior exhibited by animals chasing prey, competitors and potential mates. Because of their speed and maneuverability, dragonflies are frequently studied as a model system for biological pursuit. Most quantitative studies have focused on prey pursuits in captive environments. To determine whether a different pursuit strategy is used when chasing conspecifics of nearly equal speed and agility, we recorded 3D flight trajectories from nine territorial chases between male *Erythemis simplicicollis* dragonflies in natural field conditions. During chases, dragonflies used an interception strategy with an unusually high-magnitude gain ( $k = -10.03 \text{ s}^{-1}$  horizontal;  $-8.86 \text{ s}^{-1}$  vertical) and short time delay ( $t = 50 \text{ ms}$ ). The product  $kt$  determines how aggressively a pursuer corrects course to achieve interception. Previous studies of prey pursuit have found  $kt$  values close to  $-1/e$  ( $-0.37$ ), the time-optimal value for achieving pursuit without overshooting. However, we found that dragonflies chasing conspecifics use more negative  $kt$  ( $-0.50$  horizontal;  $-0.44$  vertical), resulting in pursuits with a high degree of overshooting (i.e. moving past the target and alternating position from side to side). We confirmed via simulation that the observed gain and delay produce overshooting. We propose that overshooting is an adaptive feature of conspecific chases that can be achieved with only slight modification of the strategy used for intercepting prey. Overshooting might help avoid potentially damaging collisions while exhibiting the pursuing animal's flight performance and competitive ability. Repeated close approaches might also evoke evasive responses from the other dragonfly, effectively herding the competitor out of the territory." (Authors)] Address: Lohmann, Amanda, Dept Biol., Univ. North Carolina, Chapel Hill, NC 27514, USA. E-mail: amanda.lohmann@duke.edu

**17810.** Lu, K.; Wu, H.; Xue, Z.; Lu, X.; Batzer, D.P. (2019): Development of a multi-metric index based on aquatic invertebrates to assess floodplain wetland condition. *Hydrobiologia* 827: 141-153. (in English) ["The construction of levees breaks the connection of floodplains with river channels. Few assessments have examined the impacts on aquatic ecosystems. We developed a multi-metric index (MMI) based on aquatic invertebrates (including Odonata and treated at the family level) to assess floodplain wetland condition in the Wusuli River, northeastern China. We sampled the aquatic invertebrate communities in 18 floodplain wetlands along the Wusuli River including wetlands from headwater, middle river, and downstream reaches. Each site included paired wetlands with a wetland connected to the river floodplain and a wetland isolated from the floodplain by levees. Metrics related to the aquatic invertebrate community were selected as candidate metrics for the MMI. Then, a range test, discrimination analysis, and correlation analytics were used to select the candidate metrics based on their ability to distinguish reference and isolated wetlands. Four core indicators were selected to build the MMI: total number of taxa, %Gastropoda, Pielou's index, and %Collector-Gatherers. Four ordinal rating categories were defined: poor, fair, good, and excellent condition. The results showed 88.9% of the levee isolated wetlands, which were identified as being in poor or fair condition. Levee construction

has a consistent negative impact on floodplain wetland condition. Our MMI provides a biomonitoring way to determine the success of restoration strategies." (Authors)] Address: Batzer, D.P., Dept of Entomology, Univ. Georgia, Athens, GA 30602, USA. E-mail: dbatzer@uga.edu

**17811.** Mackiewicz, K.; Tonczyk, G. (2019): Records of dragonflies (Odonata) near Sejny (north-eastern Poland) in 2016-2017. *Odonatrix* 15\_9 (2019). 28 pp. (Polish, with English summary) ["59 dragonfly spp. were recorded in north-eastern Poland (near Sejny) during 2016-2017. Protected and southern species were the most interesting ones: *Sympetma paedisca*, *Nehalennia speciosa*, *Ophiogomphus cecilia*, *Aeshna subarctica*, *A. viridis*, *Orthetrum albistylum*, *O. brunneum*, *O. coerulescens*, *Sympetrum depressiusculum*, *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis*, *Sympetrum fonscolombii* and *Crocothemis erythraea*." (Authors)] Address: Mackiewicz, K. E-mail: borsuk68@o2.pl

**17812.** Manger, R.; Mekkes, J.-J. (2019): Discovery of populations of *Somatochlora arctica* in Drenthe and its distribution in the Netherlands. *Brachytron* 20(1): 18-25. (in Dutch, with English summary) ["For the first time *Somatochlora arctica* was observed in the province of Drenthe in 2017. Four locations were discovered that year. A year later the species was also found in Bargerveen, another site in Drenthe. The province contains many potential peat bog areas where the species can settle or has already established. Various studies in Drenthe have shown that most peat areas have improved in quality in recent decades. Since 2006, more new populations of *Somatochlora arctica* have been discovered in the Netherlands. It is difficult to indicate whether the species has expanded in the Netherlands in recent years or whether it has not been observed before due to the lack of knowledge of recognition in the field. The increase in sightings of the species is probably due to a combination of improve habitat quality and a better knowledge of recognition in the field that has been obtained." (Authors)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

**17813.** Marquez-Rodríguez, J. (2019): Observations of swarming behaviour in *Anax parthenope* on the island of Formentera, Spain (Odonata: Aeshnidae). *Libellula* 38(1/2): 111-116. (in English, with German summary) ["On 31-viii-2018 a group of several hundred adults of *Anax parthenope* was observed in the surroundings of Calò Des Mort in southeast Formentera. The group consisted of both sexes and flew in a space of  $2,000 \times 200 \text{ m}$  from the cliff and in adjacent forest areas. It is suggested that the aggregation was part of a migrating swarm." (Author)] Address: Márquez-Rodríguez, J., Zoology Department of Physical, Chemical and Natural Systems, Faculty of Experimental Sciences, University of Pablo de Olavide, A-376, Km 1, 41013 Seville, Spain. E-mail: jmarrod1@upo.es

**17814.** Márquez-Rodríguez, J. (2019): New records of Odonata from La Altagracia. *Revista Chilena de Entomología* 45(3): 503-506. (in English, with Spanish summary) ["This



paper reports six new faunistic records from La Altagracia, Dominican Republic increasing the knowledge of the diversity of Odonata within the province to 15 species. Thus records extend the known geographic range of these species east of Hispaniola." *Brachymesia herbida*, *Erythrodiplax fervida*, *E. justiniana*, *Micrathyria aequalis*, *M. hagenii*, *Perithemis domitia* (Authors)] Address: Márquez-Rodríguez, J., Zoology. Dept of Physical, Chemical & Natural Systems, Fac. of Experimental Sciences, Univ. of Pablo de Olavide, A-376, Km 1, 41013 Seville, Spain. E-mail: jmarrod1@upo.es

**17815.** Martín, A.R. (2019): Análisis preliminar de los odonatos (Insecta: Odonata) de Sierra Nevada (España): distribución, abundancia y estatus de conservación. *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)* 64: 229-241. (in Spanish, with English summary) ["Preliminary analysis of the odonates (Insecta: Odonata) from Sierra Nevada (España): distribution, abundance and conservation status: This article presents the study carried out in the Sierra Nevada mountains from 2012 to 2014. Our main objective is to know the composition of the Odonata of this mountain range. The reproduction of 29 out of 31 species found has been verified. The most frequent species found are *Cordulegaster boltonii* in watercourses and *Libellula depressa* in lentic habitats. This study provides information on how these species are distributed geographically in the said mountains and on their abundance by basin, province and in general, providing relevant information on their distribution patterns. We have analyzed taxonomic and faunistic data, determined the conservation status of less frequent species and identified the priority areas for their conservation." (Author)] Address: Martín, A.R., Centro administrativo del Espacio Natural Sierra Nevada. C/ Carretera antigua de Sierra Nevada, km 7. 18191-Pinos Genil, Granada, Spain

**17816.** Martín, A.R. (2019): Evidencia de la reproducción de *Zygonyx torridus* (Kirby, 1889) (Odonata, Libellulidae) en un tramo de río de carácter geotermal. *Archivos Entomológicos* 21: 133-144. (in Spanish, with English summary) ["Evidence of reproduction of *Z. torridus* on a stretch of river characterized by geothermality. The reproduction of *Z. torridus* in a section of the Adra River with clear geothermal influence is verified, undocumented behaviour in this rare threatened species. The environmental characteristics of the locations where it has been reported from are analyzed in the Ibero-Maghrebian area, observing concurrence in the values of the selected parameters to approach the characterization of the breeding habitat of the species in this vast territory." (Author)] Address: Martín, A.R., Centro Administrativo del Espacio Natural Sierra Nevada. Ctra. antigua de Sierra Nevada, km 7. E-18191 Pinos Genil (Granada). Spain. E-mail: arm6869@hotmail.com

**17817.** Martín, R.; Maynou, X. (2019): The Odonata community of a Mediterranean stream in the Catalan Pre-Coastal mountain range, NE Iberian Peninsula. *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)* 65: 195-206. (in English, with Spanish summary) ["We describe the composition, structure and seasonal variation of the adult Odonata

community of a Mediterranean stream in the Catalan Pre-Coastal mountain range (NE Iberian Peninsula) and assess the stream's conservation value using a multimetric approach based on measurements of species richness, diversity and abundance, presence of bioindicator species and taxa deserving protection status. The species assemblage was comparatively rich –26 species recorded as adults, 22 of them with breeding confirmed– and composed mainly of generalist univoltine taxa typical of slow-flowing and standing waters adapted to a riffle-pool sequence in a seasonal environment. Western Mediterranean, Ibero-Maghrebine and Holomediterranean elements were dominant with 17 species (65%). Analysis of community structure revealed small differences between pools and riffles but the seasonal variation was more pronounced, with diversity and abundance values being maximum in June and July. The most widely represented families were Coenagrionidae and Libellulidae, together including 54% of the species detected. The riverine habitat health indicator species *Boyeria irene* and *Cordulegaster boltonii* had a limited occurrence at the studied stream because the seasonal hydrological fluctuations reduce habitat suitability for these rheophilous taxa. Although we did not find any species categorized as vulnerable or threatened at a regional level, one of the stream inhabitants, *Coenagrion mercuriale*, enjoys protected status under the Habitats Directive (92/43/EEC), which entails the legal obligation to develop and implement appropriate measures for its conservation. The ISOI index, which assesses habitat ecological integrity based on the analysis of the dragonfly community, achieved a score of 18 out of 20, indicating that the environmental quality of the sampled stretch was excellent. Our results show that this type of mid-mountain stream offers an interesting combination of habitats for aquatic invertebrates and is worth protecting from human-caused alterations. Management should focus on the preservation of suitable conditions for running water specialists, since it is their habitats that are becoming increasingly threatened." (Authors)] Address: Martín, R, Martí Julià, 19-23, 08911 Badalona, Spain. ricardo.martin@cllicenciats.cat

**17818.** Mauffray, W.F.; Tennessen, K.J. (2019): A catalogue and historical study of the Odonata of Ecuador. *Zootaxa* 4628(1): 1-265. (in English) ["We present a list of 425 valid Odonata species from Ecuador, providing a brief overview of each genus, a photograph of a representative species of each genus, and all records known to us for each species. Thirty-eight of the 425 species were previously unrecorded from Ecuador. Data were derived from published records, public and private collections, and field records accumulated since the 1960's by the authors and others who have contributed specimen information to this study. A historical study and a comprehensive list of synonyms are presented, and questionable species records are discussed. The physiography of the country, including the general climate of each subregion and current pressures on the environment, is briefly discussed. At present, 44 species of Odonata are considered endemic to Ecuador, and eight species are considered endangered, vulnerable, or near threatened on the IUCN Red List." (Authors)] Address: Tennessen, K.J.,

Research Associate, Florida State Collection of Arthropods, PO Box 585, Wautoma, WI 54982, USA. E-mail: ktennes-sen@centurytel.net

**17819.** Maynou, X.; Martín, R. (2019): Phenology of the Odonata assemblage in a Mediterranean stream in the north-eastern Iberian Peninsula. *Odonatologica* 48(1/2): 27-48. (in English) ["We investigated the Odonata species composition of larvae, final instar (F-0) exuviae, and adults occurring in a sequence of two different mesohabitats - pool and riffle - in a short stretch of a Mediterranean stream running down the Catalan Pre-Coastal Range (north-eastern Iberian Peninsula). We sampled them during the period 2017–2018 and recorded adults of 26 taxa and confirmed by the presence of final instar exuviae that at least 21 were breeding successfully in that environment. We describe, for the first time for this region and habitat type, larval growth patterns, timings of adult emergence, and flight periods of the most abundant species and characterize the life cycles of some of them. These life cycles can be classified into three types: i) univoltine with overwintering in the larval stage and emergence taking place in spring or summer of the following year (*Coenagrion mercuriale*, *C. puella*, *Ceragrion tenellum*, and *Pyrrhosoma nymphula*); ii) predominantly univoltine of the previous type with a small fraction of the population being semivoltine (*Anax imperator* and *Orthetrum coerulescens*, tentative conclusion); and iii) univoltine with overwintering in the egg stage, a short larval growth period in the following spring, emergence in early summer, a long maturation period, and reproduction postponed until late summer or early autumn (*Chalcolestes viridis* and *Sympetrum striolatum*). Our results may contribute to fill in gaps in the knowledge of voltinism and phenology of the life cycles of Odonata in correlation with latitude, geographical area, and habitat type." (Authors)] Address: Maynou, X., Institució Catalana d'Història Natural, carrer del Carme 47, 08001 Barcelona, Spain. E-mail: xavier.maynou@gmail.com

**17820.** Meland, S.; Gomes, T.; Petersen, K.; Håll, J.; Lund, E.; Kringstad, A.; Grung, M. (2019): Road related pollutants induced DNA damage in dragonfly nymphs (Odonata, Anisoptera) living in highway sedimentation ponds. *Scientific Reports* 9, Article number: 16002 (2019). doi:10.1038/s41598-019-52207-4: 15 + 12 pp. (in English) ["Nowadays, stormwater sedimentation ponds are popular in stormwater management because of their ability to mitigate flooding and treat polluted runoff from e.g. roads. In addition, they may provide other ecosystem services such as biodiversity. These man-made habitats will inevitably be polluted and the organisms living therein may be negatively affected by the chemical cocktail present in both the water and sediment compartments. The present study explored DNA damage in dragonfly nymphs (Odonata, Anisoptera) living in highway sedimentation ponds in comparison with natural ponds. The concentrations of Polycyclic aromatic hydrocarbons (PAHs), alkylated PAHs and metals were also determined in sediment samples from the different ponds. The results showed that DNA damage was significantly higher in dragonfly nymphs living in sedimentation ponds compared to nymphs

living in natural ponds. DNA damage was also highly and significantly correlated with the pollution levels in the sediment, i.e., PAH and Zinc. Finally, we report the concentrations of various alkylated PAHs which appeared to be very dominant in the sedimentation ponds. Our results show that there may be a conflict between the sedimentation ponds' primary function of protecting natural water bodies from polluted runoff and their secondary function as habitats for organisms. Overall, we suggest that this must be considered when planning and designing stormwater measures." (Authors)] Address: Meland, S., Norwegian Institute for Water Research (NIVA), Gaustadalléen 21, 0349, Oslo, Norway. E-mail: sondre.meland@niva.no

**17821.** Melo Carneiro, F.; de Souza, J.P.F.; Silva, K.; Nogueira, D.S.; Bichsel, D.; Pinto, N.S.; Bispo de Oliveira, A.A.; Carvalho, P.; Pereira Bastos, R.; Oertli, B.; De Marco Júnior, P. (2019): Low cross-taxon congruence among aquatic organisms in artificial tropical ponds: implications for biomonitoring. *Annales de Limnologie - International Journal of Limnology* 55(21): 9 pp. (in English) ["The use of biodiversity surrogates is often suggested to increase the cost-effectiveness of biomonitoring programs, as this demands less time and taxonomic expertise. In addition, the detection of multi-taxon associations is a first step toward a better understanding of how organisms interact with each other. Such a multi-taxon association is termed a congruence, and can be detected through measuring the similarity in the distributional patterns shown by different biological groups. To assess the ability of different taxa to serve as surrogates for others, we carried out a Procrustes analysis on the beta diversity patterns of seven biological groups (aquatic birds, Amphibians, Macrophytes, Coleoptera, Odonata, Heteroptera and phytoplankton) in 35 ponds of the Cerrado biome. We found that: (i) the values of congruence in the studied ponds were weak; (ii) among all the biological groups compared, the highest congruence was found between amphibians and macrophytes; (iii) amphibians were congruent with the Coleoptera, Heteroptera, and macrophytes; (iv) the different taxa studied had different responses to environmental conditions; and (v) although they showed relatively weak congruence with the other taxa in each pond environment, amphibian communities were the most strongly influenced by environment variables. Almost all the communities observed in these systems showed unique pattern and thus should be studied and monitored in their entirety.] Address: Melo, Fernanda, Laboratório de Ficologia, Campus Goiânia-Laranjeiras, Universidade Estadual de Goiás, Goiânia, Brasil. E-mail: fernanda.carneiro@ueg.br

**17822.** Mey, D. (2019): Erster Reproduktionsnachweis der Schabrackenlibelle, *Anax ephippiger* (Burmeister, 1839) (Insecta: Odonata: Aeshnidae) in Thüringen. *Thüringer Faunistische Abhandlungen* 24: 81-94. (in German, with English summary) ["The first record of reproduction by *A. ephippiger* in Thuringia was recorded in August 2019 on the Seebach agricultural reservoir, which has an area of 105 ha. The species was found on reeds on all shores around the agricultural reservoir. In total, 85 exuvia were collected, especially

from *Schoenoplectus* reeds. A freshly emerged female and an immature male were photographed. The number of species of Odonata in the Seebach agricultural reservoir is increased to at least 32." (Authors)] Address: Mey, D., Meisenweg 4, 99891 Bad Tabarz, Germany

**17823.** Mrazovac-Kurilic, S.; Abulsba, K.S.; Roljevic-Nikolic, S. (2019): Application of mathematical modeling in ecology. *Economics of Sustainable Development* 3(2): 13-19. (in English, with Serbian summary) ["The aim of this paper was implementation of mathematical modeling in ecological research on the example of the prevalence of odonates in Serbia. For research purposes six areas were selected for which the number of species of odonants was given, a similarity coefficient was calculated, and based on the data as the number of species and environmental variables of the place (altitude, temperature and precipitation), multiple linear regression (MLR) model was presented describing the number of species odonants depending on altitude, temperature and precipitation. The areas studied were the rivers Tisa, Sava-Danube, Velika Morava, Južna Morava, as well as the mountain areas Zlatibor and Golija. The occurrence of the species was highest at the Sava-Danube site, followed by the Tisa. Odonates occurrence was lowest in the Golija site. The results of the study showed that environmental variables are significantly associated with odonates distribution. The MLR model based on the species dependence of altitude, temperature, and precipitation showed an extremely high degree of agreement." (Authors)] Address: Mrazovac Kuriliæ, Sanja, Fac. of ecology & environmental protection, University "Union-Nikola Tesla, Serbia. E-mail: mrazovac@gmail.com,

**17824.** Müller, Z.; Szabó, T.; Gáspár, A.; Juhász, P.; Ludány, M.; Málnás, K.; mihaliczku, E.; Olajos, P.; Polyák, L.; Kiss, B. (2019): Contribution to the Hungarian dragonfly fauna, based on the nationwide surveys (Odonata: Anisoptera). *Folia historico-naturalia Musei Matraensis* 43: 33-80. (in English) ["Between 1996 and 2017 dragonfly larvae, exuviae and imagoes were collected from 1846 different sampling locations in Hungary. The published 38 species of Anisoptera belong to 5 families (10 Aeshnidae, 2 Cordulegasteridae, 4 Gomphidae, 4 Cordullidae and 18 Libellulidae). Larval data for the following species are the most important faunistic results: *Aeshna viridis*, *Anax ephippiger*, *Cordulegaster bidentata*, *C. heros*, *Leucorrhinia caudalis* and *L. pectoralis*." (Authors)] Address: Müller, Z., BioAqua Pro Ltd., 4032 Debrecen, Hungary, Soó Rezső u. 21. E-mail: mullerz@bioaquapro.hu

**17825.** Nagy, H.B.; László, Z.; Szabó, F.; Szocs, L.; Dévai, G.; Tóthmérész, B. (2019): Landscape-scale terrestrial factors are also vital in shaping Odonata assemblages of watercourses. *Scientific Reports* volume 9, Article number: 18196 (2019): 8 pp. (in English) ["Habitat loss and fragmentation causes a decline in insect populations. Odonata are especially threatened by the destruction of both aquatic and terrestrial environment. Moreover, effects of large-scale habitat heterogeneity on Odonata assemblages are poorly studied. In a two years study along East-European lowland

watercourses both aquatic and terrestrial environment were studied to reveal the importance of local (e.g. water depth, macrovegetation cover, etc.) and landscape-scale (e.g. farmland patch size, forest patch proportion, etc.) variables to Odonata (as well as to dragonflies and damselflies separately) through increasing spatial sampling scales. The specimens were sampled using 500m long transects from May to September. Results, both on local and landscape scales emphasized the importance of terrestrial environment on Odonata. Local variables influence damselflies, while dragonflies are more sensitive to landscape variables. Damselfly's diversity decreased with increasing macrovegetation cover, while dragonfly's diversity decreased with the increasing degree of land use intensification, but increased with the length of watercourses. It is thus vital to stress the importance of partial watercourse clearing, and moderate maintenance of traditional farm management based on small parcel farming near watercourses to maintain diverse and healthy Odonata assemblages.] Address: László, Z., Hungarian Dept Biol. & Ecology, Babes-Bolyai Univ., str. Clinicilor nr. 5–7, 400006, Cluj-Napoca, Romania. E-mail: laszlozoltan@gmail.com

**17826.** Notteghem, P. (2019): Une libellule nommée *Boyeria irene*. *Revue scientifique Bourgogne-Franche-Comté Nature* 29: 112-117. (in French, with English summary) ["Historic investigations allow to support an interpretation of the origin of the scientific name of *Boyeria irene* (Boyer de Fonscolombe, 1838), Odonata, and to argue in favour of a French name susceptible to be retained as normalized name. ... As a tribute to Etienne BOYER DE FONSCOLOMBE and his daughter, Irène DE SAPORTA, *Boyeria irene* a French name referring to Irène, daughter of its describer. This beautiful dragonfly, endemic to south-western Europe and North Africa, could be given its original French name "L'Aeschna Irène", formulated by Edmond DE SELYS-LONGCHAMPS in 1840. But it could also be called "L'Aeschna d'Irène" or more simply: "L'Irène". There is nothing to prevent us from thinking that the beautiful Irène DE SAPORTA, well named, was a calm and peaceful person, as is indeed the beautiful "libelluline" discovered by her father! Translated with www.DeepL.com/Translator (free version)" (Author)] Address: Notteghem, P., Groupe Odonates Bourgogne - Société d'Histoire Naturel du Creusot - 15 rue de Pommard - 71200 Le Creusot, France. E-mail: patrice.notteghem@orange.fr

**17827.** Ohba, S.-y.; Murakami, R.; Watanabe, R.; Jun, B. (2019): Factors affecting a fauna of aquatic insects in swimming pools of schools in the southern part of Nagasaki, Japan. *Jpn. J. Appl. Entomol. Zool.* 63: 163-173. (in Japanese, with English summary) ["Aquatic insects colonize the swimming pools of schools during the off-season. The present study aimed to investigate 30 swimming pools in southern Nagasaki Prefecture in spring (middle April to middle May) and autumn (late October to early November) 2014. We found 11 families of aquatic insects ... The community composition of aquatic insects was divided into spring and autumn, and its variance was related to the water temperature and organic matter. The major environmental factor related to the number of red list species was considered to be location



near the potential natural habitat of the species. The organic matter falling into the pools affected the existence of *Orthetrum* species nymphs. Odonata nymphs, *Notonecta tringtata* (Heteroptera: Notonectidae), *Anisops ogasawaraensis* (Heteroptera: Notonectidae), *Aquarius pafudum paludum* (Heteroptera: Gerridae), and *Eretes griseus* (Coleoptera: Dytiscidae) were found from most of the pools studied, indicating that these species may be used as teaching materials for science in most schools irrespective of their location." (Authors)] Address: Ohba, S.-y., Biological Laboratory, Faculty of Education, Nagasaki University, Japan

**17828.** Oliveira-Junior, J.M.B.; Dias-Silva, K.; Teodósio, M.A.; Juen, L. (2019): The response of Neotropical dragonflies (Insecta: Odonata) to local and regional abiotic factors in small streams of the Amazon. *Insects* 10, 446: 19 pp. (in English) ["Since the relative role of local and regional abiotic factors on the Odonata diversity in rainforest streams is still poorly understood, we evaluated the effects of these factors on adult Odonata from preserved and altered streams in the Amazonian region. Adult Odonata were sampled in 98 streams in the Eastern Amazon, Pará, Brazil. Six variables were used to measure local environmental factors: habitat integrity index; mean canopy over the channel; and four physical and chemical descriptors of the water. To measure regional environmental factors, six variables were also used: altitude gradient, three bioclimatic variables and two percentage forest variables. In partial redundancy analysis, both abiotic factors (local and regional) were important to explain the variation in the Odonata community. The Odonata community can be influenced by regional and local factors. The relationship between Odonata and the local (e.g., integrity, canopy cover, and physical and chemical descriptors of the water) and regional (e.g., bioclimatic and forest cover variables) environmental variables recorded in this study has important implications for the use of these organisms to monitor small streams of the Eastern Amazon. The scale at which habitat is measured is an important issue in community structuring studies considering the rapid environmental changes. It is of great importance to consider the different scales in studies assessing community structure, once an adequate habitat must meet the ecological needs of all stages of the life of the Odonata."(Authors)] Address: Oliveira-Junior, J.M.B., Programa de Pós-Graduação em Zoologia (PPGZOOL), Programa de Pós-Graduação em Ecologia (PPGECO), Lab. de Ecologia e Conservação (LABECO), Universidade Federal do Pará (UFPA), Rua Augusto Correia, N.1, Bairro Guamá, Belém 66075-110, Pará, Brazil

**17829.** Ortega Salas, H. (2019): Sistemática y distribución del género *Paraphlebia* Sélys in Hagen, 1861 (Odonata: Thaumateuridae) en México y Centroamérica. M.Sc. thesis, Universidad Nacional Autónoma de México, Posgrado en Ciencias Biológicas, Instituto de Biología Sistemática: VI + 108, 2 app. (in Spanish, with English summary) ["For over a century, the genus *Paraphlebia* has remained one of the least known in Mexico and Central America. The use of alar coloration and the relative position of the RP3 vein, have so far been the only diagnostic characters available to separate

the species of this genus. This work provides a taxonomic revision of the genus including the characterization of *P. zoe*, *P. hyalina*, *P. fifth* and *P. duodecima*; the synonymy of *P. abrogata* with *P. quinta*; as well as the description of 10 new species distributed in Mexico, Guatemala, Honduras and Nicaragua. New diagnostic characters and a dichotomous key are proposed for the identification of all males of the species known for this genus. We present maps with the known distributions of all species and finally, the first phylogenetic hypothesis for the genus derived from the 12S, 16S, 28S and CO1 genes, where we differentiate two clades, which are found to be congruent with cerci morphology." (Author)] Address: not stated

**17830.** Petrulevicius, J.F. (2019): A new *Frenguelliidae* (Insecta: Odonata) from the Eocene of Arroyo Chacay, Patagonia, Argentina. *Palaeoentomology* 2(6): 591-595. (in English) ["The family *Frenguelliidae* Petrulevicius & Nel, 2003 was hitherto known from two genera and three species: *Frenguella patagonica* Petrulevicius & Nel, 2003, *F. iglesiasi* Petrulevicius & Nel, 2013 and *Treintamilun vuelvenlucha* Petrulevicius, 2017. *Frenguelliidae* is a very interesting group, controversially considered either an *Epiproctophora*, basal to *Euepiproctophora* by Petrulevicius & Nel (2003, 2007, 2013) and Petrulevicius et al. (2011), or a *Zygoptera* by Nel & Arillo (2006), Nel et al. (2008), Lak et al. (2009) and Bechly & Poinar (2013). Only the *epiproctophoran* hypothesis was discussed and based principally in a putative character of the group, the curved CuP (Petrulevicius & Nel, 2003, 2007, 2013). The *zygopteran* hypothesis could be reasonably adopted due to the presence in *Frenguelliidae* of a character which is absent in the basal *Epiproctophora*: the IR2 aligned with the subnodus (Petrulevicius, 2017). Other characters shared by *Frenguelliidae* and other *Zygoptera* are homoplastic and are also present in some *Epiproctophora*, i.e., *arculus* nearer to Ax2 than to Ax1 in *Cyclothemistidae*: *Triassoneura* (Fujiyama, 1991) and *Epiophlebiidae*: *Mesoepiophlebia* (Nel & Jarzembowski, 1996); the lack of pterostigmal brace in *Campterothlebiidae*: *Ctenogampsothlebia* (Petrulevicius et al., 2011); absence of secondary antenodals could also occur in *Triassoneura*. The morphology of the new species does not contradict the hypothesis postulated by Petrulevicius & Nel (2003, 2007, 2013) about the phyletic position of the group which remains uncertain and its resolution exceeds the possibility of the present work but is a nice topic for future research." (Authors)] Address: Petrulevicius, J.F., Museo La Plata; Dept Cient Paleozool Invertebrados; Paseo Bosque S-N; RA-1900 La Plata; Argentina. E-mail: leVICIUS@netverk.com.ar

**17831.** Petzold, F. (2019): Die Libellenfauna (Insecta, Odonata) des FFH-Gebietes „Pöllwitzer Wald“. *Mauritiana* (Altenburg) 36: 103-118. (in German, with English summary) ["The Special Area of Conservation (SAC) „Pöllwitzer Wald“ hosts with 31 recorded species a particularly diverse dragonfly fauna, ranking above the Thuringian average. Apart from its diversity in pond species, this area holds special significance for dystrophic water species (*Coenagrion hastulatum*, *Leucorrhinia dubia*, *L. rubicunda*, *Sympetrum*

danae). This above-average biodiversity is particularly highlighted by the occurrence of *Leucorrhinia pectoralis*, a highly protected species according to the Habitats Directive. Of this species, the largest number of individuals in Thuringia has currently been recorded in SAC „Pöllwitzer Wald“. In addition to dragonfly fauna assessment, from the viewpoint of dragonfly protection recommendations regarding optimal care and development provided." (Author)] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. E-Mail: petzold.falk@googlemail.com

**17832.** Pinkert, S. (2019): Physiological and historical determinants of the distribution and abundance of insects. Dissertation, Philipps-Universität Marburg: 285 pp. (in English) ["Understanding the consequences of past and future climatic changes on biodiversity has become one of the most important challenges of current ecological research. Due to the fundamental importance of climate for determining the distribution and abundance of species, climatic changes have led to strong shifts of species' ranges to higher altitudes and latitudes as well as to local changes in the phenology and abundance of species during the last decades. Nevertheless, most organisms are incapable of rapid responses to such changes as they are constrained by, for instance, phylogenetic conservatism in thermal adaptations and dispersal limitations. Therefore, a mechanistic understanding of the variation in functional traits of species is crucial for predicting biological responses to climate change. However, so far, most trait-based inferences focused on endotherm taxa, whereas the physiological processes shaping the diversity patterns of ectothermic organisms, particularly of insects, remain poorly understood. The overall objective of this PhD thesis is to investigate the importance of interactions between environmental factors and species' functional traits across regions, scales and taxa, to improve forecasts of the ecological consequences of climate change as well as our understanding of the ecological and evolutionary processes that determine biogeographical patterns, the range size and the abundance of insects. Insects, like 99.9 % of the species on our planet, are ectothermic organisms that in contrast to endothermic organisms, mainly depend on thermal energy from their environment for their activity and for maintaining vital physiological processes. Ectotherms therefore evolved adaptations to the temperature regime in which they live. From a physiological perspective, strong arguments exist that biophysical principles link variation in species' colour lightness and body size to heat gain and loss in endothermic animals. Larger species retain body heat more efficiently than smaller species owing to their lower surface-area-to-volume ratio, and darker coloured species heat up faster than lighter coloured species because they absorb more solar radiation. Other functions include enhanced immunocompetence of larger species and enhanced pathogen resistance (Gloger's rule) as well as UV protection of darker species. Mechanistic links between these two morphological traits, species' physiology and climate are hence probably important determinants of variation in the distribution and abundance of ectotherm organisms, but the limited availability of distributional and morphological data has so

far hampered a large-scale perspective on the physiological processes that shape biogeographical patterns in insects. Constraints to the evolution of species' morphological traits and dispersal abilities can limit the colonization of regions characterized by new climates or habitats and thereby influence geographical patterns in the phylogenetic diversity or geographical rarity of taxa. On the one hand, spatial concentrations of rare species are important conservation targets, because they indicate the distribution of species that are both particularly vulnerable to extinction in the future and unique elements of biodiversity. On the other hand, overall patterns of these facets of diversity provide information about past dispersal events and the ecological processes that shaped contemporary patterns of biodiversity. In six chapters of my thesis I investigate whether biogeographical patterns of insect assemblages are driven by variation in the colour lightness and the body size. I show that melanin-based thermoregulation, pathogen resistance and UV protection are important mechanisms that influence the distribution of dragonflies, butterflies and moths at both local and continental scales. In all studies, species assemblages in cooler climates are on average darker coloured than assemblages in warmer climates. Furthermore, in line with the prediction that darker colouration is advantageous in regions with high humidity and in regions with high solar radiation due to the protective functions of melanin, colour lightness generally decreases with increasing precipitation and insolation. Body size clines are less strong and differ considerably among the considered taxa. In addition, I demonstrate that contrasting effects of the benefits and the energetic costs of an investment into body size and melanization on the range size and abundance of butterfly species can offset each other when their interactions with components of the energy budget are not taken into account. Thus, larger and darker butterfly species only have wider distributions and are more abundant if they compensate the costs of an investment into body size and melanization by reducing mobility costs or increasing energy uptake. In three additional chapters, I investigate whether evolutionary constraints on species' thermal adaptations and dispersal ability influence the composition of insect assemblages and I assess the extent to which diversity patterns of insects are shaped by the contemporary climate and historical climatic changes. Using European dragonflies, I show that both phylogenetic conservatism of thermal adaptations and dispersal limitations constrain the recolonization of previously glaciated areas of Europe, resulting in a decrease of the endemism and phylogenetic diversity of assemblages with decreasing temperature and the increasing proportion of species with a high dispersal ability. In addition, I demonstrate that the climatic changes since the Last Glacial Maximum are consistently major drivers of the endemism and species richness of mammals, birds, amphibians and dragonflies across Africa. However, the results of this study also indicate that the signatures of species' responses to historical climatic changes differ considerably between the considered taxa and are currently less effectively protected. Finally, using a group of flightless orthopterans endemic to Africa, I exemplify that the diversity of this group, and probably most of the insect

diversity today found in the Eastern Arc Mountain biodiversity hotspot, has been generated by the interplay of humid periods that allowed the spread of forest-bound lineages across Africa with aridity-driven fragmentations of forests and their associated faunas. In conclusion, I demonstrate that both body size and colour lightness are major determinants of distribution and abundance of insects, across taxa, regions and scales. Despite the significant contributions of other functions of colour lightness, such as pathogen resistance and UV protection, as well as of the thermoregulatory function of body size, melanin-based thermoregulation is the most important and a strikingly general mechanism that shapes biogeographical patterns of insect. To understand and predict the effects of body size and colour lightness on ecological dynamics of insect species it is, however, crucial to account for their interactions with components of the energy budget, because the contrasting effects of an investment into body size, wing size and melanization on the range size and abundance of species can partly offset each other. Purely correlative approaches that predict spatio-temporal variation in the distribution and abundance of insect species based on easily measured morphological traits are therefore prone to false mechanistic conclusions and likely underestimate the functional importance of morphological traits. Furthermore, phylogenetic conservatism of thermal adaptations and dispersal limitations affect trait-environment relationships and species' responses to historical climatic changes. Together these results highlight the potential of models that integrate morphological, climatic and phylogenetic data for improving predictions of species' responses to climate change as well as our understanding of the processes that generated and maintain the remarkable diversity of insects on Earth." (Author)] Address: Pinkert, S., Department of Ecology – Animal Ecology, Philipps-Universität Marburg, Karl-Von-Frisch-Str. 8, 35043 Marburg, Germany. E-mail: stefanpinkert@posteo.de

**17833.** Pinto, A.P. (2019): First report on the dragonflies from Parque Estadual da Ilha do Cardoso, state of São Paulo, Brazil, with notes on the morphology and behavior of *Lauro-macromia picinguaba* (Odonata: Corduliidae s.l.). *Studies on Neotropical Fauna and Environment* 54(1): 48-60 (in English) ["The dragonflies from the Parque Estadual da Ilha do Cardoso, municipality of Cananéia, located at the southern limit of the state of São Paulo in the Brazilian Atlantic Forest, were surveyed for the first time through a short sampling effort lasting four days in October 2011. A total of 36 species, including four new state records for species of the genera *Lestes*, *Phyllocycla*, *Navicordulia* and '*Schizocordulia*', and three undescribed species of damselflies belonging to *Cyanallagma*, *Forcepsioneura* and *Idioneura* were identified. Some notes are also given for other species, as well as on the morphology and behavior of the intriguing corduliid *Lauro-macromia picinguaba* (incertae sedis). The results, based on a small sample, indicate that the local dragonfly biota at Parque Estadual da Ilha do Cardoso is rich and impressive, and needs to be investigated and protected." (Author) Address: Pinto, A.P., Departamento de Zoologia, Laboratório de Sistemática de Insetos Aquáticos (LABSIA),

Universidade Federal do Paraná, Curitiba, PR, Brazil. E-mail: appinto@ufpr.br

**17834.** Pokorný, J.; Waldhauser, M. (2019): Mapping the distribution of reophilic dragonflies, damselflies and water beetles in the Czech Republic in the years 2012–2015. *Průroda*, Praha 39: 95-112. (in Czech, with English summary) ["Mapping the distribution of reophilic dragonflies and water beetles was carried out in the Czech Republic in the years 2012–2015. The investigations were focussed on sites with current or potential occurrence of the species of European Community importance, *Ophiogomphus cecilia*, *Stylurus flavipes* and the genus *Cordulegaster*. The mapping ran under the scheme "Monitoring and Widescale Mapping of the EC Species of Importance as a Ground for the Completing the Natura 2000 Network in the Czech Republic". Mapping took place in 444 quadrates of grid mapping, i.e. covering two thirds of the area of the country. Five species are on the Red List (Hejda et al. 2017). Twelve obligatory or facultative reophilic species were found: *Calopteryx splendens*, *C. virgo*, *Ischnura elegans*, *Platycnemis pennipes*, *Stylurus flavipes*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Onychogomphus forcipatus*, *Cordulegaster boltonii*, *C. bidentata*, *C. heros* and *Somatochlora metallica*. The results improved our knowledge on the distribution of most of the Goldenring and Clubtail species. Significant new data on their distribution, not only in new quadrates, but also in new extensive areas were gathered. These new findings can be mostly considered as filling in the gaps in our knowledge rather than the species spreading to new areas. A total of 2,167 specimens of water beetles belonging to 115 species were found. ..." (Authors)] Address: Pokorný, J., Hrusice 33, CZ-251 66 Hrusice. E-mail: aegolius.j@seznam.cz

**17835.** Porst, G.; Brauns, M.; Irvine, K.; Solimini, A.; Sandin, L.; Pusch, M.; Miler, O. (2019): Effects of shoreline alteration and habitat heterogeneity on macroinvertebrate community composition across European lakes. *Ecological Indicators* 98: 285-296. (in English) ["Human lake shore alterations often result in a substantial decrease of littoral and riparian habitat diversity and physical complexity, but the intensity at which shore alterations affect biodiversity may differ among European geographical regions. We tested if the response of littoral macroinvertebrate communities to human shoreline alterations is consistent among geographical regions. We compared community composition and diversity of human altered with those of unmodified littoral zones from 51 lakes across seven European countries in four geographical regions based on pooled composite as well as habitat-specific macroinvertebrate samples. Taxon richness and community composition differed among shore types and different habitats in all geographic regions, with morphological alteration having an overall negative effect on macroinvertebrate taxon richness. In addition, habitat heterogeneity also had a strong effect on littoral communities, with highest taxon richness found in the structurally complex macrophyte habitats in all regions. Average proportional densities of Diptera and Oligochaeta taxa generally increa-



sed in morphologically altered shores in all geographical regions, while Bivalvia, Crustacea, Ephemeroptera, Gastropoda and Trichoptera showed comparatively lower numbers in many anthropogenically altered sites. Furthermore, taxon richness was positively correlated with habitat diversity. We were able to relate changes in littoral communities to anthropogenic shoreline alterations, and linked the effect to the loss of habitats and habitat complexity. The results of our study demonstrate that littoral macroinvertebrates respond consistently negative to the influence of morphological alterations across European geographical regions in terms of biodiversity. While macroinvertebrates have previously been identified to be useful descriptors of morphological change in single countries/regions, we can now validate that they can be used to assess the ecological status of lakes in terms of morphological alterations across European regions. Our results can be used to further improve already existing WFD-compliant multimetric indices, for example by including taxa groups, which show a strong reaction to shoreline alterations. This could be supported by the inclusion of a suit of indicator taxa reflecting the loss of complex habitats such as macrophytes in the lake littoral. ... Odonata taxa showed a general decrease from macrophyte to sand and stone habitats in all, but the Northern European lakes". (Authors)] Address: Porst, Gwendolin, Leibniz Institute of Freshwater Ecology & Inland Fisheries (IGB), Department of Ecosystem Research, Müggelseedamm 301, 12587 Berlin, Germany. E-mail: gwendolin.porst@uwi.tu-berlin.de

**17836.** Purwanto, P.B.; Nur Zaman, M.; Ike P, A.; Akbar, M.; Arief, M. (2019): Study of Odonata diversity in Kerangas Forest Sukadamai Village and Punai Beach Simpang Pesak, Belitung Timur. Proceedings of the International Conference on Science and Engineering, Indonesia 2019 2: 133-136. (in English) ["Belitung is known as the biggest tin mining in Indonesia. ... The research was conducted in June 2018 by exploration in Belitung, particularly in Punai beach and Kerangas forest (ex-tin mining) area. 17 dragonfly species were found including *Ictinogomphus decoratus*, *Macrogomphus* sp., *Orthetrum sabina*, *Nannophya pygmaea*, *Neurothemis fluctuans*, *Rhodothemis rufa*, *Rhyothemis phyllis*, *Urothemis signata*, *Pseudagrion coomansi*, *Ceriagrion cerinorubellum*, *Acisoma panorpoides*, *Brachydiplax chalybea*, *Diplacodes nebulosa*, *Orthetrum pruinosum*, *Agriocnemis femina*, *Agriocnemis pygmaea*, and *Ischnura senegalensis*. All species were conducted to find out the diversity using Shannon-Wiener index and resulting 2,77 index." (Authors)] Address: Purwanto, P.B., Biology Dept, Fac. Science & Tech., UIN Sunan Kalijaga Jl. Marsda Adisucipto No. 1 Yogyakarta 55281, Indonesia. E-mail: bimopurwanto91@gmail.com

**17837.** Qiu, G.; Abeyasinghe, K.S.; Yang, X.-D.; Xu, Z.; Xu, X.; Luo, K.; Goodale, E. (2019): Effects of selenium on mercury bioaccumulation in a terrestrial food chain from an abandoned mercury mining region. *Bulletin of Environmental Contamination and Toxicology* 102(3): 329-334. (in English) ["Few reports of the relationship exist between mercury (Hg) and selenium (Se) from locations of severe Hg contamination in terrestrial environments. Here, we report the

concentrations of Hg and Se as well as Se:Hg molar ratios in biotic samples collected from a region with a long history of Hg mining. Nitrogen isotopes ( $\delta^{15}\text{N}$ ) were analyzed to confirm the trophic levels. Results showed that bird feathers at the top trophic level exhibited the highest Hg concentrations, while the lowest concentrations were found in herbivorous insects, demonstrating a significant biomagnification across the food chain. In contrast, herbivorous insects of different types (generalists vs. specialized rice pests, and including *Symeptrem flaveolum*) exhibited both the highest and the lowest concentrations of Se, indicating a lack of biomagnification. Indeed, Se was correlated positively with Hg when Se:Hg ratios were greater than one, suggesting Se:Hg molar ratios can be a controlling influence on Hg in terrestrial organisms." (Authors)] Address: Qiu, G., State Key Laboratory of Environmental Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang, China

**17838.** Rangnekar, P.; Dharwadkar, O.; Sadasivan, K.; Subramanian, K.A. (2019): A new species of *Cyclogomphus* Selys, 1854 (Insecta: Odonata: Gomphidae) from the Western Ghats, India with comments on the status of *Cyclogomphus vesiculosus* Selys, 1873. *Zootaxa* 4656(3): 515-524. (in English) ["A new species of *Cyclogomphus* Selys, 1854 is described from the Western Ghats of India based on male and female specimens collected from Goa and Kerala states. The new species differs from all the known species of *Cyclogomphus* in the shape of the anal appendages as well as the thoracic and abdominal markings. We also provide here an updated key to the *Cyclogomphus* species and comment on the status of *C. vesiculosus* Selys, 1873." (Authors)] Address: Rangnekar, P., Foundation for Environment Research & Conservation. #407, III-A, Susheela Seawinds, Alto-Vaddem, Vasco-da-Gama-403 802, Goa, India. E-mail: rangnekarparag@gmail.com

**17839.** Razkallah, Z.; Houhamdi, M. (2019): Community structure of the odonatofauna of an important Maghreb watershed: the Seybouse (Northeast Algeria). *Zoology and Ecology* 28(4): 395-402. (in English) ["Odonata of the Maghreb have been shown to be particularly diverse and rich in endemic species. Although studies have peaked during the last decade, especially in the Seybouse watershed (Northeast Algeria), a few have used larvae to assess the community structure and ecology of odonates. Here, we present a larva-based investigation of the odonate of the Seybouse watershed conducted during 2015–2016 in a dozen of sites using community ecology quantitative approaches and multivariate analysis to determine the checklist, species richness, abundance, and environmental characteristics of communities. We found 17 species (7 zygopteran and 10 anisopteran), of which *Calopteryx exul*, *Coenagrion mercuriale*, *Gomphus lucasii* were locally and/or globally of conservation concern. There was a strong correlation between the frequency occurrence (distribution) and abundance, meaning that the cosmopolitan species were also the most abundant in the community. The multivariate analysis showed that the communities were structured by substrate type and abiotic factors such as conductivity, dissolved oxygen, and

water flow. Our study also confirms the extinction of some populations of the endangered endemic *C. exul*, and thus rings the alarm for an urgent conservation plan that should manage the extensive water pumping and pollution in the region." (Authors)] Address: Razkallah, Z., Laboratoire d'écologie fonctionnelle et évolutive, Université Chadli Ben-jdid, El Tarf, Algeria. E-mail: zahra.razkallah@yahoo.fr

**17840.** Rocha-Ortega, M.; Rodríguez, E.P.; Córdoba-Aguilar, A. (2019): Spatial and temporal effects of land use change as potential drivers of odonate community composition but not species richness. *Biodiversity and Conservation* 28: 451-466. (in English) ["Land-use changes and land cover change are drivers of diversity. The effects of such drivers over the temporal trend in species richness and composition, particularly on invertebrate diversity in megadiverse countries, is controversial. One key animal group to clarify this controversy is that of odonate insects (dragonflies and damselflies), given their combined close water-land requirements. We have investigated whether changes in land use impact species richness and composition of odonates from 1980 to 1993 (period I) to 1994–2010 (period II) in Mexico. The effect of land use changes and land cover changes on species richness was analyzed using multiple diversity measures and at different spatial scales. In period II, an area reduction in original vegetation and increase in land use occurred. Responses to land use varied among spatial scales and measures of diversity but, overall, species richness in the transformed area was higher than in the original vegetation. However, species composition indicated a high species turnover inside hydrologic regions (watersheds) and across land uses classes, particularly between original and secondary vegetation. Our interpretation is that despite high land use conversion in Mexico, adult odonates seem resilient to land use change in terms of species richness, but not in species composition, which is in partial agreement with the intermediate disturbance hypothesis. Finally, we suggest that hydrologic region scale and use of entropy maximization (HCDT entropy), could provide a reliable biodiversity estimation of species loss associated with land use change." (Authors)] Address: Rodríguez, Pilar, Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. P. 70.275, Circuito Exterior, Ciudad Universitaria, 04510 Coyoacan, DF, México. E-mail: prodrig@conabio.gob.mx

**17841.** Rodríguez, J.S.; Molineri, C. (2019): The larva of *Neoneura confundens* Wasscher and van't Bosch, 2013 (Odonata, Coenagrionidae) and key to the larvae of genus. *Anais da Academia Brasileira de Ciências* 91(4): 10 pp. (in English) ["The beautifully colored damselflies included in *Neoneura* Selys are divided in 28 species known from North, Central and South America. Larval stage is little known, only seven species were described at this stage. We describe and illustrate the final instar larva of *Neoneura confundens* for the first time. Adults associated to this larva correspond to the blue form of the species and are also discussed and illustrated. The larva of *N. confundens* is similar to other *Neoneura* larvae, showing 1 premental seta and a

well-marked nodus in caudal lamellae, but it can be differentiated by having fringed posterior margin in all tibiae and in middle and hind tarsi, among other characters. A key to known larvae of *Neoneura* and new records extending the species range in the southern cone are provided." (Authors)] Address: Instituto de Biodiversidad Neotropical, National Council of Scientific Research/CONICET, Universidad Nacional de Tucumán, Facultad de Ciencias Naturales e IML, Ciudad Universitaria Horco Molle (T4105XAY), Argentina

**17842.** Rodríguez-Escobar, F.E.; Carrillo-Muñoz, A.I.; Serrano-Meneses, M.A. (2019): Seasonal variation in the allometry of wing pigmentation in adult males of the territorial damselfly *Hetaerina vulnerata* (Insecta Odonata). *Ethology Ecology & Evolution* 32(2): 148-161. (in English) ["Several sexually selected traits exhibit positive allometry. One of the explanations for this pattern suggests that positive allometry should be expected only for "pure" threat male signals, whilst isometry and negative allometry should occur in "pure" courtship signals. Wing pigmentation (WP) is a sexually selected trait exhibited by the males of several Zygoptera taxa, which has been the focus of a number of studies of allometry. Whilst WP tends to exhibit positive allometry in many taxa, the pattern is not general. Previous studies have shown that in *Hetaerina vulnerata*, a territorial species in which WP is used as a "pure" threat signal, positive allometry is common. However, little attention has been paid to the seasonal variation in the allometry of WP in this species. To address this research gap, we collected data from a full reproductive season, from a natural population of *H. vulnerata* located in Central Mexico. Our results suggest that, first, male WP and body size generally increase throughout the season. Second, WP increases as the end of the season approaches, independently of body size. Finally, WP tends to be either not related to body size, or to exhibit isometry during the first half of the season (April–June), and positive allometry during the second half of the season (July–October). We suggest that our results may be explained by (i) the availability of resources critical to the development of larvae, as well as the duration of development, and (ii) an increase in the number or larger males towards the end of the season, which may favour the exaggeration of WP. Furthermore, the opportunity for sexual selection may vary, so that WP may be more relevant to male mating success towards the end of the reproductive season." (Authors)] Address: Rodríguez-Escobar, Frida, Depto de Ciencias Químico-Biológicas, Universidad de las Américas Puebla, Puebla, C.P. 72810, México

**17843.** Ryan, S.C.; Belby, C.S.; King-Heiden, T.C.; Haro, R.J.; Ogorek, J.; Gerrish, G.A. (2019): The role of macroinvertebrates in the distribution of lead (Pb) within an urban marsh ecosystem. *Hydrobiologia* 827: 337-352. (in English) ["Environmental risk from contaminated aquatic sediments requires an understanding of its spatial distribution, bio-availability and rate of transfer to resident aquatic and terrestrial biota. We hypothesized that macroinvertebrates play a role in the sequestration, distribution, and dispersal

of lead from lead shot contaminated sediments. To assess this, we sampled the predominant aquatic macroinvertebrate, *Leptocerus americanus*, from sites within the La Crosse River Marsh (La Crosse, WI) identified to contain high levels of lead contamination. We measured lead content in larval cases, larval tissues and emergent adult tissues. Lead concentrations within whole larvae correlated with levels of lead within sediments, and lead was differentially partitioned between larval tissue and their silk cases. Over 90% of the lead was retained in larval cases, while the rest was distributed to the body tissue, which was largely conserved during the process of metamorphosis. Our models support that *L. americanus* emerging from the marsh in the contaminated area transfer as much as 160 mgPb out of the aquatic habitat each year. Our work demonstrates that macroinvertebrates affect the mobilization and dispersal of contaminants within aquatic sediments, and this role should be evaluated when making management decisions regarding contaminated ecosystems." The paper includes only a passing note to Odonata (Authors)] Address: Gerrish, Gretchen, The River Studies Center, Univ. of Wisconsin – La Crosse, La Crosse, WI 54601, USA. E-mail: ggerrish@uwlax.edu

**17844.** Ryazanova, G.I. (2019): Odonata and anthropogenic salinization of inland waters. *Moscow University Biological Sciences Bulletin* 74: 33-39. (in English) [Original publication in *Vestnik Moskovskogo universiteta. Seriya 16. Biologiya* 74(1):42-49. (In Russ.) "Anthropogenic salinization of inland waters and its impact on freshwater biota are topical environmental problems. Such salinization leads to changes in the natural environment, which is undesirable from the point of view of environmental protection and is not indifferent to humans. One of the three most important factors of anthropogenic salinization of fresh water in temperate and cold climates, along with agricultural and mining activities, has been the widespread use of chemical reagents in the fight against road icing. Today, the main components of these reagents are Na and Ca chlorides - cheap and easily accessible natural materials. Their blend of sand and sand, used in de-icing practices, is usually stored in bulk at special outdoor sites all year round. Exposure to precipitation makes it a source of salinization of surrounding soils and waters. In 2015, 2016 and 2018, the salinity of inland water bodies was recorded near the long-term open storage of anti-ice reagents in the Kaluga region. The anthropogenic nature of salinization of the surveyed reservoirs was determined. The main components of water body salinization in the study area are Na and Ca chlorides. Maximum salinization level in the studied conditions is 4‰, the degree of salinization depends on the distance of the reservoir from the road salt storage. The influence of anthropogenic salinity on dragonflies, mainly of the *Coenagrion puella* L. species, was considered. It was found that the influence of increased water salinity is manifested only in slowing down the development of individuals with a high level of fluctuating asymmetry, it does not affect their number in the population. The high salinity of the water only leads to changes in the timing of migration of individuals with high levels of FA. It is assumed that dragonflies, as one of the

mass objects of freshwater biota, obviously, are not subject to significant influence of anthropogenic salinization. Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) Russian Text © The Author(s), 2019, published in *Vestnik Moskovskogo Universiteta, Seriya 16: Biologiya*, 2019, Vol. 74, No. 1, pp. 42–49.] Address: Ryazanova, G.I., Dept of Biology, Moscow State University, Moscow, Russia. E-mail: ryazanovagi@mail.ru

**17845.** Rychla, A. (2019): Besiedlung künstlicher Kleingewässer durch Großlibellen (Odonata: Anisoptera) – eine 4-jährige Studie aus der Niederschlesischen Heide (SW Polen). *International Dragonfly Fund Report* 140: 1-18. (in German, with English summary) ["Dragonflies frequently colonise newly created pools. However, little is known about the long-term establishment of populations, especially of rare and endangered species. The aim of this study was to investigate the colonization process at small artificial waters by dragonflies with special focus on typical peat bog species. From 2015 to 2018, exuviae of Anisoptera were collected quantitatively at six man-made pools, three new and three old ones, in the Lower Silesian Forest. The colonization success by Zygoptera was investigated qualitatively and served as an additional information on the biodiversity of these waters. In total, 26 Odonata species (9 Zygoptera and 17 Anisoptera) with successful reproduction were found. However, species diversity varied significantly both between the pools and the years of study. There were no significant differences between new and old pools. There were four peat bog species (*Aeshna juncea*, *Leucorrhinia dubia*, *L. albifrons*, *L. pectoralis*) among the autochthonous species, Long-term development could only be confirmed for *A. juncea* and *L. dubia* in particular pools. *Leucorrhinia albifrons* occurred only sporadically and was not found in the last study year (2018). By contrast, *L. pectoralis* did complete its development in the years 2017 and 2018. Generally, these species preferred waters with moderately or well developed vegetation. The results confirm that a wide range of species can reproduce in artificial pools. However, permanent reproduction could be recorded for just a few dragonfly species. Consequently, man-made pools in the Lower Silesian Forest should not be considered as long-term surrogate habitats but rather as temporary sub-population patches of the regional dragonfly fauna." (Author)] Address: Rychla, A., ul. Osiedlowa 12, Ploty, PL 66016 Czerwieńsk, Poland. E-mail: rychlan@op.pl

**17846.** Sackville, M.; Brauner, C.J.; Matthews, P.G.D. (2019): Complete larval development of the dragonfly, *Rhionaeschna multicolor*, at 20°C under natural photoperiod (Odonata: Aeshnidae). *Notulae odonatologicae* 9(3): 103-108. (in English) ["*Rhionaeschna multicolor* was reared from hatch to emergence in a controlled laboratory setting for the first time. Complete development at 20°C under natural photoperiod consisted of 13 stadia over 428 ± 3 days. Molt timing and total exuvia length tightly followed semi-log ( $R^2 = 0.993$ ,  $Sy.x = 0.349$ ) and exponential growth curves ( $R^2 = 0.984$ ,  $Sy.x = 1.301$ ), respectively, yielding a mean growth ratio of 1.26 ± 0.026. Winter diapause may persist through spring and summer photoperiods for late stadia nymphs in



these conditions, potentially delaying adult emergence relative to nymphs reared in the wild." (Authors)] Address: Sackville, M., Department of Zoology, University of British Columbia, Vancouver, British Columbia, Canada V6T 1Z4. E-mail: mikesack@zoology.ubc.ca

**17847.** Sánchez-Rosario, A. (2019): Distribución de la riqueza de especies de los odonatos (Insecta: Odonata) de la República Dominicana: una actualización a partir de especímenes de colección. Distribution of species richness of the odonates (Insecta: Odonata) of the Dominican Republic: An update from collection specimens. *Actualidades Biológicas* 41 (111): 72-80. (in Spanish, with English summary) ["Scientific collections are important biodiversity records, as is the one from the Instituto de Investigaciones Botánicas y Zoológicas (IIBZ) from the Universidad Autónoma de Santo Domingo in Dominican Republic. They provide a partial but useful view of the common occurrence localities and information gaps of specific groups of organisms. Presented in this paper are a list of species and an occurrence map of adult odonate specimens represented in the collection from the IIBZ; a comparison of them with reports from previous works was performed. Of the 67 species currently reported in the Dominican Republic, 63 were found in the collection. Regarding previous works, species richness increased in some provinces, such was the case in Distrito Nacional, where it increased from 44 to 51. A correlation analysis examined the association between numeric richness and the drainage density, annual precipitation and surface area of the province; none of the correlations yielded significant results. Additionally, linear mixed effect models were generated, using the mentioned variables as fixed effect and a qualitative variable related to accessibility and population density as random effect. All the models found that a substantial percentage of the variance of the numeric richness is explained by the random effect variable, which means the accessibility conditions the species' occurrence, suggesting a sampling bias exists. From this arises the need of collecting specimens in regions with few records to better comprehend the distribution of odonates in the country." (Author)] Address: Sánchez-Rosario, América, Inst. de Investigaciones Botánicas y Zoológicas Prof. Rafael M. Moscoso, Univ. Autónoma de Santo Domingo, Santo Domingo, República Dominicana. E-mail: america.sanchez@hotmail.com

**17848.** Sansault, É.; Dhuicque, V.; Baeta, R.; Motteau, V. (2019): Découverte de *Leucorrhinia albifrons* en région Centre-Val de Loire et structure des populations du centre-ouest de la France (Odonata: Libellulidae). *Martinia* 34(1/2): 17-25. (in French, with English summary) ["Discovery of *L. albifrons* in the Centre-Val de Loire region and structure of central-western populations in France: In France, *Leucorrhinia albifrons* is a rare species with a fragmented distribution and three areas of occupancy: in the Nouvelle-Aquitaine, in the Bourgogne-Franche-Comté and in the Pays de la Loire regions. Close to this last region, the discovery of a population in Indre-et-Loire department in June 2017 represents the first record of the species for the Centre-Val de Loire region. The conservation status of this population seems favorable

regarding population size and habitat quality. Although it is still unknown whether this population remains from an ancient bigger population or follows a recent colonization, it seems to be isolated from the other sites found in the central western part of France. Oncoming monitoring should provide new information about the population's origins." (Authors)] Address: Sansault, É., Association Naturaliste d'Étude et de Protection des Écosystèmes (ANEPE) Caudalis, 1 rue de la Mairie, 37520 La Riche, France. E-mail: anepe.caudalis@gmail.com

**17849.** Sanubar Guliyeva A. (2019): Species composition and quantitative distribution of the larvae of dragonflies (Odonata) in the new ecological conditions of the lake Mehman. Economic and Social Development. 37th International Scientific Conference on Economic and Social Development – "Socio Economic Problems of Sustainable Development" Book of Proceedings. Editors: Muslim Ibrahimov, Ana Aleksic, Darko Dukic, Baku: 985-988. (in English) ["The paper presents new data on species composition, number and distribution of the larvae of Odonata in new environmental conditions of the different habitats of in the lake Mehman. Field works conducted in 2015 - 2017 in the lake Mehman resulted in the rearings of 25 species and forms of dragonfly larvae. Seven of these *L. nympha*, *S. fusca*, *E. viridulum*, *I. pumilio*, *O. cancellatum*, *L. depressa*, *L. quadrimaculata*, *Cordulia* sp. are new to the lake. Species *Lestes virens*, and *I. elegans*, were found in winter, spring and autumn of 2015 and winter and autumn of 2017; *C. scitulum* in winter and autumn of 2015; *C. hastulatum* - winter, spring and autumn of 2017; *E. fatime* in winter and autumn of 2015 - 2017; in winter and spring of 2015 - 2017. Species *C. mercuriale* [sic!], *C. scitulum*, *L. virens*, *I. elegans*, *C. puella*, *E. najas*, *O. albistylum* are observed in the lake in all seasons and are dominated by widespread. It should be noted that the decrease in the number of larvae of dragonflies in the summer, especially at depths of up to 0.5 m is due to their intensive consumption by fish and water birds and emergence of adult dragonflies which leave the lake. On the other hand, in summer period, the volume of oxygen in shallow water of the lake Mehman greatly reduced, and as a result of evaporation of water, the amount of salts in water is increased. In such circumstances, the probability of occurrence of freshwater organisms in the benthos is naturally decreased. The study of the distribution of larvae of dragonflies on specific habitats of the lake revealed their maximum development on plant and silty habitats, and the minimum - on black silty sand. Changes in biomass of benthic organisms as well as larvae of dragonflies, which developed very poor is analyzed. Poor development of dragonfly larvae in the lake Mehman characterized, on the one hand with their intensive consumption by fish and water birds and on the other hand - the steady worsening of the environmental conditions of the lake." (Author)] Address: Sanubar Guliyeva A., Azerbaijan State University of Economics (UNEC), Azerbaijan. E-mail: Sama2013@bk.ru

**17850.** Schilder, R.J.; Stewart, H. (2019): Parasitic gut infection causes functional and molecular resemblance of *Libellula pulchella* dragonfly flight muscle to skeletal muscle

of obese vertebrates. *Journal of Experimental Biology* 222(5): jeb188508. doi: 10.1242/jeb.188508: 10 pp. (in English) ["We previously demonstrated the existence of a naturally occurring, metabolic disease phenotype in *Libellula pulchella* dragonflies, that shows high similarity to vertebrate obesity and type II diabetes, and is caused by a protozoan gut parasite. To further mechanistic understanding of how this metabolic disease phenotype affects male *L. pulchella* fitness in vivo, we examined infection effects on in situ muscle performance- and molecular traits relevant to *L. pulchella* flight performance in nature. Importantly, these traits were previously shown to be affected in obese vertebrates. Similar to obesity effects in rat skeletal muscle, dragonfly gut infection caused a disruption of relationships between body mass, flight muscle power output and alternative pre-mRNA splicing of troponin T, a trait known to affect muscle calcium sensitivity and performance in insects and vertebrates. In addition, when simulated in situ to contract at cycle frequencies ranging from 20-45Hz, infected individuals' flight muscles displayed a left-shift in the power-cycle frequency curves, i.e., their optimal cycle frequency was significantly reduced. Interestingly, this left-shift resulted in power-cycle frequency curves that were similar to those produced by flight muscles of non-infected, teneral (i.e., physiologically immature) adult *L. pulchella* males. Overall, our results indicate that effects of metabolic disease on skeletal muscle physiology in natural insect systems are similar to those observed in vertebrates maintained in laboratory settings. More generally, they indicate that study of natural, host-parasite interactions can contribute important insight into how environmental factors other than diet and exercise may contribute to the development of metabolic disease phenotypes." (Authors)] Address: Schilder, R.J., Pennsylvania State Univ., Dept Entom., 501 Ag Sciences & Industries Building, State College, PA 16802, USA. E-mail: rjs360@psu.edu

**17851.** Schilling, E.G.; Lawrenz, R.; Kundel, H. (2019): An assessment of the geographic distribution and status of a rare dragonfly, *Rhionaeschna mutata*, at the northwestern edge of its range. *Northeastern Naturalist* 26(3): 523-536. (in English) ["*R. mutata* is a rare North American dragonfly, most widely distributed in the eastern US. In 2009, a reproductive population was found in 2 ponds in eastern Minnesota, establishing a substantial northwestern range expansion. We assessed the geographic distribution of the Spatterdock Darter in the region to inform conservation planning for this species. Using previously defined habitat criteria, we identified potential reproductive ponds in the ecoregion with GIS. In 2015 and 2016, we used multiple methods to survey 25 ponds for Spatterdock Darter nymphs, adults, and exuviae. We found no Spatterdock Darters in the region, despite intensive survey efforts targeted at ponds that met the habitat criteria. The Spatterdock Darter may be present in this water-rich region, but was undetected by our efforts, or a local extirpation may have occurred, possibly linked to recent fish colonization in one of the original reproductive ponds." (Authors)] Address: Schilling, Emily, Biology Dept, Augsburg University, Minneapolis, MN 55454, USA

**17852.** Schneider, T.; Ikemeyer, D. (2019): *The Damselflies and Dragonflies of Iran – Odonata Persica*. Natur in Buch und Kunst (NIBUK) (ISBN 978-3-931921-23-7): 255 pp- ["This book is the first comprehensive publication about damselflies and dragonflies in Iran. Within a period of six years, from 2013 to 2018, the authors travelled 16 times to almost every Iranian province to investigate the indigenous dragonfly fauna. As a result one dragonfly could be described as a new species, *Aeshna vercanica*, and other dragonflies were recorded in Iran for the first time. These are *Lestes dryas*, *L. macrostigma*, *Platycnemis kervillei*, *Coenagrion puella*, *C. pulchellum*, *C. ponticum*, *C. lunulatum*, *Crocothemis sanguinolenta*, *Brachythemis contaminata*, *Trithemis pallidinervis* and *Calopteryx s. tschaldirica*. In total 103 species have been illustrated by photography. For detailed distribution maps data from formerly published literature and available unpublished data about Iranian dragonflies were screened up to the end of 2018 and entered in a database. Further information on biometric data, identification, habitat and taxonomy is given. One of the key objectives of this book is to help preserving the heritage of the Iranian dragonfly fauna which is gravely endangered by the water crisis and all its repercussions. There are distribution maps and 2 to 5 colour photos of each of the 103 species treated in the book." (Publisher] Address: Publisher: Natur in Buch und Kunst, Verlag und Versand, Dieter Prestel, Beiert 11a, 53809 Ruppichteroth, Germany. E-mail: nibuk@nibuk.de

**17853.** Seehausen, M. (2019): Über den Aquaristikhandel nach Deutschland importierte Libellen (Odonata) - eine Übersicht der letzten Jahre. *Libellen in Hessen* 12: 71-80. (in German, with English summary) ["Dragonflies introduced to Germany via the aquarium trade (Odonata) – an overview of recent years. More than 330 Odonata larvae and imago have been given to the author since 2011. Of that 189 Zygoptera and 39 Anisoptera were bred to emergence and the species identified. Nine species were recorded, including two native (*Ischnura elegans*, *Aeshna cyanea*) and seven exotic species (*Agriocnemis pygmaea*, *Ischnura senegalensis*, *Pseudagrion microcephalum*, *Anax guttatus*, *Crocothemis servilla*, *Orthetrum chrysostigma*, *O. sabina*). Except for the African and Mediterranean *O. chrysostigma* all these latter species have a predominantly or exclusively Asian distribution, whereas *Ischnura senegalensis* is wide spread in Asia as well as in Africa. A published record of the American *Ischnura ramburii* has been withdrawn. Seasonal increases in records from November to April is noticeable." (Author)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**17854.** Snegovaya, N.Yu. (2019): Dragonfly (Insecta, Odonata) fauna of Nakhichevan Autonomous Republic (Azerbaijan). *International Dragonfly Fund Report* 127: 1-28. (in English) ["The article presents new faunistic data on 33 Odonata species, based on the material collected by the author in 2012, 2016 and 2017 and a systematic research in 2018 throughout the Nakhichevan Autonomous Republic (AR). *Onychogomphus assimilis* (Schneider, 1845) is a new

record for the fauna of Azerbaijan. Eight species were registered for the first time for the territory of Nakhichevan AR: *Lestes virens*, *Coenagrion scitulum*, *Aeshna mixta*, *Anaciaeschna isoceles*, *Anax parthenope*, *Sympetrum sanguineum*, *Crocothemis erythraea*, and *Selysiothemis nigra*." (Author)] Address: Snegovaya, Nataly, Zoological Institute NAS of Azerbaijan, proezd 1128, kvartal 504, Baku, AZ 1073, Azerbaijan. E-mail: snegovaya@yahoo.com

**17855.** Song, N.; Li, X.; Yin, X.; Li, X.; Yin, J.; Pan, P. (2019): The mitochondrial genomes of palaeopteran insects and insights into the early insect relationships. *Scientific Reports* | (2019) 9:17765 | <https://doi.org/10.1038/s41598-019-54391-9>: 11 pp. (in English) ["Phylogenetic relationships of basal insects remain a matter of discussion. In particular, the relationships among Ephemeroptera, Odonata and Neoptera are the focus of debate. In this study, we used a next-generation sequencing approach to reconstruct new mitochondrial genomes (mitogenomes) from 18 species of basal insects, including six representatives of Ephemeroptera and 11 of Odonata, plus one species belonging to Zygentoma. We then compared the structures of the newly sequenced mitogenomes. A tRNA gene cluster of IMQM was found in three ephemeropteran species, which may serve as a potential synapomorphy for the family Heptageniidae. Combined with published insect mitogenome sequences, we constructed a data matrix with all 37 mitochondrial genes of 85 taxa, which had a sampling concentrating on the palaeopteran lineages. Phylogenetic analyses were performed based on various data coding schemes, using maximum likelihood and Bayesian inferences under different models of sequence evolution. Our results generally recovered Zygentoma as a monophyletic group, which formed a sister group to Pterygota. This confirmed the relatively primitive position of Zygentoma to Ephemeroptera, Odonata and Neoptera. Analyses using site-heterogeneous CAT-GTR model strongly supported the Palaeoptera clade, with the monophyletic Ephemeroptera being sister to the monophyletic Odonata. In addition, a sister group relationship between Palaeoptera and Neoptera was supported by the current mitogenomic data." (Authors)] Address: Song, N., College of Plant Protection, Henan Agri. Univ, Zhengzhou, 450002, China. E-mail: songnan@henau.edu.cn

**17856.** Staufer, M. (2019): Ein ungewöhnliches Vorkommen der Großen Quelljungfer (*Cordulegaster heros* Theischinger, 1979) in der Feuchten Ebene im südlichen Wiener Becken, Österreich (Odonata: Cordulegastridae). *Beiträge zur Entomofaunistik* 20: 127-142. (in German, with English summary) ["In Central Europe *C. heros* inhabits predominantly small forest streams in hilly locations. Therefore, an occurrence in the agricultural landscape within the plains of the Pannonian East of Austria was rather unexpected. Investigations, carried out from 2018 to 2019, revealed a spatially limited population from the Leitha to the western slopes of the Leitha Mountains. Reproduction evidence was found mainly in small streams and ditches of the so-called "Feuchte Ebene", where, due to the particular geological-hydrological conditions, water bodies can be structurally very similar to

those of typical breeding sites. In the Leitha Mountains, hardly suitable habitats for the larvae are present. Due to its central location, the region is considered to be an important connecting corridor between the populations of the Vienna woods and Rosalia Mountains in Austria and the Little Carpathians (Malé Karpaty) in Slovakia." (Author)] Address: Staufer, Martina, Lindenbauergasse 13, 1110 Wien, Österreich (Austria). E-Mail: m\_staufer@web.de

**17857.** Strobl, K.; Moning, C.; Kollmann, J. (2019): Positive trends in plant, dragonfly and butterfly diversity of rewetted montane peatlands. *Restoration Ecology* doi: 10.1111/rec.-12957. 11 pp, 7 pp suppl. mat. (in English) ["Drainage and afforestation of peatlands cause extensive habitat degradation and species losses. Restoration supports peatland biodiversity by creating suitable habitat conditions, including stable high water tables. However, colonization by characteristic species can take decades or even fail. Peatland recovery is monitored shortly after restoration, but initial trends may not continue, and results might differ among taxonomic groups. This study analyzes trends in plant, dragonfly, and butterfly diversity within 18 years after rewetting of montane peatlands in central Germany. We compared diversity and species composition of 19 restored sites with three drained peatlands and one near-natural reference site. Restoration resulted in improved habitat conditions and benefited species diversity, but there were marked differences among taxonomic groups. Dragonflies rapidly colonized small water bodies but their diversity did not further increase in older restoration sites. Characteristic peatland vegetation recovered slowly, since it depended on a high water holding capacity that was only reached after peat started accumulating. Generally, plant diversity developed towards reference conditions albeit incompletely, even 18 years after restoration. Butterflies responded less to peatland restoration; generalists increased only temporarily and specialists could not establish. In conclusion, peatland restoration improves habitat conditions and biodiversity, while trajectories of recovery are nonlinear and incomplete after two decades. This highlights the need of long-term monitoring and a strategic selection of indicator species for evaluation of restoration success." (Authors)] Address: Strobl, Katharina, Chair of Restoration Ecology, Technical University of Munich, Emil-Ramann-Str. 6, 85354 Freising, Germany. E-mail: katharina.strobl@tum.de

**17858.** Sugiman, U.; Romdhoni, H.; Putera, A.K.A.; Robo, R.J.; Oktavia, F.; Raffudin, R. (2019): Oviposition behaviour and oviposition site selection in *Pseudagrion pruinsum* (Burmeister) (Odonata: Coenagrionidae). *Jurnal Entomologi Indonesia* 16(1): 29-40. (in Indonesian, with English summary) ["*Pseudagrion pruinsum* (Burmeister) is a common damselfly that is widely distributed in Southeast Asia. However, information related to the oviposition behavior and habitat is still limited. This study was aimed to determine the behavior of *P. pruinsum* when laying eggs and characterized the oviposition habitat. This research used focal sampling method to observe oviposition behavior and measure habitat parameters on egg-laying location. Results



showed, there was mate guarding when *P. pruinatum* females lay eggs. The male forms a tandem formation (contact mate guarding), then released the female and keep a guarding behavior around the female (non-contact mate guarding). Eggs were placed by the female on plant tissue with the technique of positioning the body to remain on the surface and then submerged. There is no tendency of *P. pruinatum* behavior towards one type or technique. Based on the results of principal component analysis, 75.8% of habitat components can be described for egg-laying habitat. Air temperature, pH, light intensity, and heterogeneity of vegetation positively correlated with the occurrence of egg-laying while TDS, humidity, water depth, and water temperature were negatively correlated. The results of this study concluded that the characteristics of egg-laying techniques included, i.e contact and non-contact mate guarding by the males and females putting eggs on the surface then submerged into water." (Authors)] Address: Sugiman, U. Departemen Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Institut Pertanian Bogor Jalan Agatis, Kampus IPB Dramaga, Bogor 16680, Indonesia. E-mail: usugiman22@gmail.com

**17859.** Supple, J.A. (2019): Descending premotor target tracking systems in flying insects. Doctoral thesis, Department of Physiology, Development, and Neuroscience, University of Cambridge: 198 pp. (in English) ["The control of behaviour in all animals requires efficient transformation of sensory signals into the task-specific activation of muscles. Predation offers an advantageous model behaviour to study the computational organisation underlying sensorimotor control. Predators are optimised through diverse evolutionary arms races to outperform their prey in terms of sensorimotor coordination, leading to highly specialised anatomical adaptations and hunting behaviours, which are often innate and highly stereotyped. Predatory flying insects present an extreme example, performing complex visually-guided pursuits of small, often fast flying prey over extremely small timescales. Furthermore, this behaviour is controlled by a tiny nervous system, leading to pressure on neuronal organisation to be optimised for coding efficiency. In dragonflies, a population of eight pairs of bilaterally symmetric Target Selective Descending Neurons (TSDNs) relay visual information about small moving objects from the brain to the thoracic motor centres. These neurons encode the movement of small moving objects across the dorsal fovea region of the eye which is fixated on prey during predatory pursuit, and are thought to constitute the commands necessary for actuating an interception flight path. TSDNs are characterised by their receptive fields, with responses of each TSDN type spatially confined to a specific portion of the dorsal fovea visual field and tuned to a specific direction of object motion. To date, little is known about the descending representations mediating target tracking in other insects. This dissertation presents a comparative report of descending neurons in a variety of flying insects. The results are organised into three chapters: Chapter 3 identifies TSDNs in damselflies and compares their response properties to those previously described in dragon-

flies. Demoiselle TSDNs are also found to integrate binocular information, which is further elaborated with prism and eyepatch experiments. Chapter 4 describes TSDNs in two dipteran species, the robberfly *Holcocephala fusca* and the killerfly *Coenosia attenuata*. Chapter 5 describes an interaction between small- and wide-field visual features in TSDNs of both predatory and nonpredatory dipterans, finding functional similarity of these neurons for prey capture and conspecific pursuit. Dipteran TSDN responses are repressed by background motion in a direction dependent manner, suggesting a control architecture in which target tracking and optomotor stabilization pathways operate in parallel during pursuit." (Authors)] Address: Supple, J.A., Dept of Physiology, Development & Neuroscience, University of Cambridge, Downing Street, Cambridge CB3 2EG, UK

**17860.** Svensson, E.I. (2019): Eco-evolutionary dynamics of sexual selection and sexual conflict. *Functional Ecology* 33: 60-72. (in English) ["1. The research framework of eco-evolutionary dynamics is increasing in popularity, as revealed by a steady stream of review articles and a recent and influential book, but primary empirical research is lagging behind. Moreover, the few empirical case studies demonstrating eco-evolutionary dynamics might not be entirely representative. 2. Much current research on eco-evolutionary dynamics is focused on how ecological interactions lead to natural selection on phenotypic traits ("eco-evo"), and in turn how the evolutionary change in such traits feed back on ecological dynamics ("evo-eco"). A key feature of eco-evolutionary dynamics is thus a feedback loop between ecology (e.g., population dynamics) and evolution (i.e., genetic change). 3. In contrast to previous research on eco-evolutionary dynamics driven by natural selection, the role of eco-evolutionary feedbacks in sexual selection and sexual conflict is largely unknown. Here, I review theory and the limited empirical evidence in this area and identify some promising future lines of research. 4. I update a past review on contemporary evolution of secondary sexual traits in natural populations and formulate six explicit and rigorous criteria for contemporary evolution of secondary sexual traits by natural or sexual selection or sexual conflict. I then discuss the other key prediction of eco-evolutionary dynamics (i.e., evolution by sexual selection or sexual conflict shapes ecological dynamics). My overview reveals that our current knowledge in this area is limited and mainly come from theoretical models and laboratory experiments. 5. A major challenge in eco-evolutionary dynamics is therefore to link ecological and population dynamics with sexual selection and sexual conflict. This is not an easy task but might be possible with carefully chosen study systems and methods." References to *Ischnura elegans* are made. (Author)] Address: Svensson, E.I., Evolutionary Ecology Unit, Dept Biol., Lund Univ, Lund, Sweden. Email: erik.svensson@biol.lu.se

**17861.** Takahashi, Y.; Noriyuki, S. (2019): Colour polymorphism influences species' range and extinction risk. *Biology letters* 15(7): 5 pp. (in English) ["Polymorphisms in a population are expected to increase the growth rate and the sta-

bility of the population, leading to the expansion of geographical distribution and mitigation of extinction risk of a species. However, the generality of such ecological consequences of colour polymorphism remains uncertain. Here, via a comparative approach, we assessed whether colour polymorphisms influence climatic niche breadth and extinction risk in some groups of damselflies, butterflies and vertebrates. The climatic niche breadth was greater, and extinction risk was lower in polymorphic species than in monomorphic species in all taxa analysed. The results suggest that colour polymorphism facilitates range expansion and species persistence." (Authors)] Address: Takahashi, Y., Graduate School of Science, Chiba University, Chiba, Japan. E-mail: takahashi.yum@gmail.com

**17862.** Thompson, A. (2019): The life history of *Anax junius* (Drury) in Minnesota: Determining instars, growth development pathways, emergence phenology, and the effect of temperature on development (Odonata: Aeshnidae). Ph.D. thesis, University of Minnesota: 135 pp. (in English) ["... the study of dragonflies and damselflies, is presently at a delightful stage of maturity. The basics of odonate life history are well understood but the details of how different species express variations in their development and reproduction, in response to different evolutionary drivers, is ripe for exploration. These variations can only be discovered through field observations executed with thoughtful experimental design and then the observational data collected must be interpreted with appropriate statistical and analytical tools. For a naturalist with a patient and inquisitive mind this kind of research is exceptionally rewarding. Chapters 1, 2, and 3 focus on these goals. Observational data on *A. junius* growth and emergence were collected over a period of two years at Crow-Hassan Park Reserve, near Minneapolis, Minnesota. Severe winter conditions are the largest constraint influencing dragonfly life histories in Minnesota. Odonata must both survive the winter, and time their emergence and reproduction so that they occur during the short growing season. This research was designed to explore how northern *A. junius* have adapted to survive winter. Chapter 1 demonstrates the application of a statistical tool that identifies the number of instars in a field-collected sample of nymphs: a need for interpreting observed growth and development data. This mixed distribution analysis has been used in other fields of entomology, but this is the first time (to the author's knowledge) that it has been applied to dragonflies. Chapter 2 maps nymph growth over time and identifies different *A. junius* growth pathways that are associated with two different overwintering strategies. Chapter 3 summarizes observations of *A. junius* emergence phenology via exhaustive exuviae collection, and reveals that cold temperatures and stochastic events are the greatest constraints on emergence duration. Northern ectoderms, like dragonflies, with life histories that are constrained by severe winters are impacted by climate change. The implications of the changing climate on dragonfly natural history are of increasing conservation interest. Rare and threatened niche species of Odonata could be at risk of extinction if their habitat conditions are altered beyond to what they can adapt to.

However, *A. junius* is a common and abundant dragonfly and is of conservation interest for different reasons. Extremely common species are the skeletons of ecosystems; they make up most of the biomass and provide structure and support for all the other components. A change in the geography or abundance of *A. junius* could have wide-ranging and cascading effects. Models based on known temperature thresholds are required to predict ectoderm response to the changing climate. Chapter 4 describes an experiment that defined these threshold temperatures for the northern winter growth pathway of *A. junius*. Development duration and rate were measured for nymphs reared in different temperature-controlled chambers, and the base and optimum growth temperatures were calculated for the last two nymph development stages. These values can now be used in models to predict the impact of climate change on the phenology of *A. junius* development and emergence. Note: Some materials and methods descriptions, figures, and tables are repeated in this dissertation because each chapter was written with the intent to be published individually." (Author)] Address: not stated

**17863.** Toussaint, E.F.A.; Bybee, S.M.; Erickson, R.J.; Condamine, F.L. (2019): Forest giants on different evolutionary branches: Ecomorphological convergence in helicopter damselflies. *Evolution* 73(5): 1045-1054. (in English) ["The convergent evolution of analogous features is an evolutionary process occurring independently across the tree of life. From the evolution of echolocation, prehensile tail, viviparity, or winged flight, environmental factors often drive this astonishing phenomenon. However, convergent evolution is not always conspicuous or easily identified. Giant damselflies count among the largest flying insects on Earth, and have astonishing ecologies including orb-web spider plucking and oviposition in phytotelmata. One species occurs in the Afrotropics and 18 species are found in the Neotropics. Convergent evolution was historically hypothesized based on the ecological and morphological affinities of these two geographically distant lineages but was not supported by earlier phylogenetic inferences supporting their monophyly. Using a molecular supermatrix approach and a large selection of outgroups, we revisit and reject the monophyly of Afrotropical and Neotropical giant damselflies that is otherwise supported by a morphological phylogeny. Molecular divergence time estimation suggests an origin of Afrotropical giant damselflies in the late Paleogene, and of Neotropical ones at the Cretaceous/Paleogene boundary, thereby rejecting a long-standing West Gondwana vicariance hypothesis. The strong ecological and morphological resemblances between these two independent lineages represents an astonishing case of Amphi-Atlantic tropical convergent evolution." (Authors)] Address: Toussaint, E.F.A., Natural History Museum of Geneva, 1211 Geneva 6, Switzerland. E-mail: emmanuel.toussaint@ville-ge.ch

**17864.** Veras, D.S.; Castro, E.R.; Lustosa, G.S.; de Azevêdo, C.A.S.; Juen, L. (2019): Evaluating the habitat integrity index as a potential surrogate for monitoring the water quality of streams in the cerrado-caatinga ecotone in

northern Brazil. *Environ. Monit. Assess.* 191:562: 9 pp. (in English) ["Human activities have long been altering the natural conditions of streams, including the quality of their water, throughout most of Brazil. This problem is even worse in regions with low rainfall levels, such as the Brazilian Northeast, where water quality needs to be monitored more carefully. In this context, the present study investigated the effects of environmental integrity on the physicochemical characteristics of the streams of the basin of the Itapecuru River in northeastern Brazil. We tested the hypothesis that streams with lower habitat integrity would have higher conductivity, pH, and temperature, due to the reduced input of allochthonous organic matter and the greater washout of sediments to the stream bed. A total of 15 streams, of a sedimentary basin, were evaluated in the municipality of Caxias, in the Brazilian state of Maranhão, between June 2015, and July 2016; each stream was sampled once a month during the drought period in the region, where physicochemical measurements were taken to determine the environmental integrity of the stream through the application of a habitat integrity index. Streams with greater habitat integrity had lower conductivity, pH, and temperature and had higher discharge rates. The index proved to be not an effective tool for the evaluation of water quality, but was found to be important for the management of hydrographic basins by indicating important changes in environmental variables. In this case, the index can be used primarily for the management of hydrographic basins, given that it can be applied straightforwardly, it can be interpreted easily by decision-makers, and it can quantify alterations to the structure of the system with precision." (Authors)] Address: Veras, D.S., Programa de Pós-graduação em Biodiversidade, Ambiente e Saúde, Univ. Estadual do Maranhão, Caxias, Maranhão, Brazil

**17865.** Verheyen, J.; Delnat, V.; Stoks, R. (2019): Increased daily temperature fluctuations overrule the ability of gradual thermal evolution to offset the increased pesticide toxicity under global warming. *Environ. Sci. Technol.* 53(8): 4600-4608. (in English) ["The widespread evidence that global warming can increase species sensitivities to chemical toxicants, and vice versa, and the recent insight that thermal evolution may mitigate these effects is crucial to predict the future impact of toxicants in a warming world. Nevertheless, a major component of global warming, the predicted increase in daily temperature fluctuations (DTFs), has been ignored at the interface of evolutionary ecotoxicology and global change biology. We studied whether a 4 °C warming and a 5 °C DTF increase (to 10 °C DTF) magnified the negative impact of the insecticide chlorpyrifos (CPF) in larvae of low- and high-latitude populations of the damselfly *Ischnura elegans*. While 4 °C warming only increased CPF-induced mortality in high-latitude larvae, the high (10 °C) DTF increased CPF-induced larval mortality at both latitudes. CPF reduced the heat tolerance; however, this was buffered by latitude-specific thermal adaptation to both mean temperature and DTF. Integrating our results in a space-for-time substitution indicated that gradual thermal evolution in high-latitude larvae may offset the negative effects of CPF on heat tolerance under warming, unless the

expected DTF increase is taken into account. Our results highlight the crucial importance of jointly integrating DTFs and thermal evolution to improve risk assessment of toxicants under global warming." (Authors)] Address: Verheyen, Julie, Evolutionary Stress Ecology and Ecotoxicology, University of Leuven, Charles Deberiotstraat 6 32, B-3000 Leuven, Belgium. E-mail: julie.verheyen@kuleuven.be

**17866.** Verheyen, J.; Stoks, R. (2019): Current and future daily temperature fluctuations make a pesticide more toxic: Contrasting effects on life history and physiology? *Environmental Pollution* 248: 209-218. (in English) ["Highlights: • Daily temperature fluctuations (DTFs) increased chlorpyrifos toxicity. • Chlorpyrifos only induced mortality and reduced growth rate in the presence of DTFs. • Chlorpyrifos did not affect life history when the temperature was kept constant. • Current and future DTF increased toxicity to the same extent. Abstract: There is increasing concern that climate change may make organisms more sensitive to chemical pollution. Many pesticides are indeed more toxic at higher mean temperatures. Yet, we know next to nothing about the effect of another key component of climate change, the increase of daily temperature fluctuations (DTFs), on pesticide toxicity. Therefore, we tested the effect of the pesticide chlorpyrifos under different levels of DTF (constant=0°C, low=5°C (current maximum level) and high=10°C (predicted maximum level under global warming)) around the same mean temperature on key life history and physiological traits of *Ischnura elegans* damselfly larvae in a common-garden experiment. At all levels of DTF, chlorpyrifos exposure was stressful: it reduced energy storage (fat content) and the activity of its target enzyme acetylcholinesterase, while it increased the activity of the detoxification enzyme cytochrome P450 monooxygenase. Notably, chlorpyrifos did not cause mortality or reduced growth rate at the constant temperature (0°C DTF), yet increased mortality 6x and reduced growth rate with ca. 115% in the presence of DTF. This indicates that daily short-term exposures to higher temperatures can increase pesticide toxicity. Our data suggest that when 5°C DTF will become more common in the studied high-latitude populations, this will increase the toxicity of CPF, and that a further increase from 5° DTF to 10°C DTF may not result in a further increase of pesticide toxicity. Our results highlight the biological importance of including daily temperature fluctuations in ecological risk assessment of pesticides and as an extra dimension in the climate-induced toxicant sensitivity concept." (Authors)] Address: Verheyen, Julie, Evolutionary Stress Ecology and Ecotoxicology, University of Leuven, Charles Deberiotstraat 6 32, B-3000 Leuven, Belgium. E-mail: julie.verheyen@kuleuven.be

**17867.** Verheyen, J.; Stoks, R. (2019): Shrinking body size and physiology contribute to geographic variation and the higher toxicity of pesticides in a warming world. *Environ. Sci. Technol.* 53, 19: 11515-11523. (in English) ["To improve current and future risk assessment of pesticides under global warming, mechanistic insights and consideration of daily temperature fluctuations (DTFs) are needed. One overlooked mechanism how both higher mean temperatures and DTFs



may increase toxicity is by reducing body size (temperature-size-rule). We studied whether a higher mean temperature and DTF magnified chlorpyrifos toxicity in *Ischnura elegans* damselfly larvae, and whether this was mediated by temperature-induced reductions in body size and/or physiological changes. The lethal effects of chlorpyrifos were magnified at the high mean temperature (up to ~15 %) and under DTF (up to ~33 %), and especially at their combination (up to ~46 %) indicating synergisms. This highlights that not only considering DTFs, but also their interaction with higher mean temperatures is pivotal for realistic predictions of pesticide toxicity. Both higher temperatures and DTFs resulted in smaller larvae, which were more sensitive to chlorpyrifos. Notably, the DTF-induced smaller body sizes, as well as the higher oxidative damage to lipids, contributed to the higher chlorpyrifos toxicity under DTF. By integrating the temperature-size rule and size-pesticide sensitivity pattern we provide proof-of-principle for a novel, likely general mechanism contributing to geographic variation and the higher toxicity of pesticides in a warming world." (Authors)] Address: Verheyen, Julie, Evolutionary Stress Ecology & Ecotoxicology, University of Leuven, Charles Deberiotstr. 6 32, 3000 Leuven, Belgium. E-mail: julie.verheyen@kuleuven.be

**17868.** Wagner, H.C. (2019): Wiener Ameisenbeobachtungen (Hymenoptera: Formicidae). Beiträge zur Entomofaunistik 20: 143-159. (in German, with English summary) ["Ants in the state Vienna were collected on 38 days from 2016 to 2018. Interesting observations are described in detail: ... ant predation behavior of dragonflies (Odonata: Aeshnidae), ...." (Author)] Address: Wagner, H.C., ÖKOTEAM – Institut für Tierökologie und Naturraumplanung, Bergmannsgasse 22, 8010 Graz, Österreich (Austria). E-Mail: heriwagner@yahoo.de

**17869.** Walia, G.K.; Dhillon, G.K. (2019): Mitochondrial COI gene barcoding four species of genus *Ischnura* (Odonata: Coenagrionidae) from India. J. Adv. Zool. 40(1): 69-77. (in English) ["Taxonomically, identification of complex taxa based on external morphological characters may leads to wrong identification of unknown organism at species level because these characters may also be altered due to geographical and seasonal variations. To overcome this molecular taxonomy has been emerged. In India, out of 9 morphologically described species of genus *Ischnura* (Odonata: Coenagrionidae), *Ischnura senegalensis* is the only species, which has been barcoded on the basis of COI gene. During the present study, mitochondrial COI gene has been barcoded for four species of genus *Ischnura* (*I. aurora*, *I. forcipata*, *I. rufostigma* and *I. senegalensis*), collected from fresh water bodies from the states of Punjab and Himachal Pradesh (India). Across the final alignment of COI sequences of 352bp, there are 282 conserved sites (80.1%), which represents that COI gene is highly conserved. Conspecific species show <1% divergence range (0% to 0.6%) and interspecific divergence ranges from 7.5% to 15.6%. COI gene sequences of all the species shows 95 – 100% similarity with the sequences of conspecific species deposited in GeneBank. Mitochondrial COI gene based DNA barcoding has been done for *I. aurora*, *I. forcipata* and *I. rufostigma* for the

first time from India and for *I. forcipata* throughout the world." (Authors)] Address: Walia, G.K., Dept of Zoology and Environmental sciences, Punjabi University, Patiala-147 002, Punjab, India. Email: gurinderkaur\_walia@yahoo.co.in

**17870.** Walia, G.K.; Chahal, S.S. (2019): Cytogenetic report on *Cordulegaster brevistigma* and *Watanabeopetalia atkinsoni* (Odonata: Cordulegastridae, Chlorogomphidae). Odonatologica 48(1/2): 101-113. (in English) ["Live adult male specimens of *C. brevistigma* and *W. atkinsoni* have been collected from Shimla, Himachal Pradesh (India). Male germ cell chromosomes of the species are described on the basis of conventional staining, C-banding, silver nitrate staining and sequence specific staining. Both the species possesses  $2n = 25m$ , as a diploid chromosome number and XO ( $\sigma$ )/XX ( $\varphi$ ) type sex determination. In both the species, dark terminal C-bands are present on all the autosomal bivalents and X chromosome is C-positive throughout the length. Terminal light/dark NORs (Nucleolar Organizer Regions) are present on all autosomal bivalents, while X chromosome also possesses terminal NORs. During sequence specific staining, all the autosomal bivalents show prominent terminal DAPI (4',6-diamidino-2-phenylindole) and CMA<sub>3</sub> (Chromomycin A<sub>3</sub>) bright regions and X chromosome also possesses both DAPI and CMA<sub>3</sub> signals. In addition, a brief review of the size of X element in the allied families Cordulegastridae, Corduliidae and Macromiidae is given." (Authors)] Address: Walia, Gurinder Kaur, Dept of Zoology and Environmental Sciences, Punjabi Univ., Patiala 147002, Punjab, India. E-mail: gurinderkaur\_walia@yahoo.co.in

**17871.** Wei, G.; Shih, C.; Ren, D.; Wang, Y. (2019): A new burmaeshnid dragonfly from the mid-Cretaceous Burmese amber elucidating wing base structure of true Odonata. Cretaceous Research 101: 23-29. (in English) ["A new fossil burmaeshnid, *Proaeschna zhangi* gen. et sp. nov., is described from the mid-Cretaceous Burmese amber. Its well-preserved wing base structure allows us to illustrate the morphological details of wing base in the fossil Odonata for the first time. The proximal costal plate in the new species consists of the anterior and posterior parts which are fused together with a suture. The anterior proximal costal plate in *P. zhangi* and extant Odonata is homologized to the basalare of Protodonata. In addition, *P. zhangi* has developed the semi-detached scutal plate that is similar as the extant Aeshnidae. The traces of venal basivenalia in weakly sclerotized axillary plate contribute useful information to interpret the venation of wing base within Odonata." (Authors)] Address: Ren, D. College of Life Sciences, Capital Normal Univ., Beijing 100037, China. E-mail: rendong@mail.cnu.edu.cn

**17872.** Willink, B.; Duryea, M.C.; Svensson, E.I. (2019): Macroevolutionary origin and adaptive function of a polymorphic female signal involved in sexual conflict. The American Naturalist 194(5): 707-724. (in English) ["Intersexual signals that reveal developmental or mating status in females have evolved repeatedly in many animal lineages. Such signals have functions in sexual conflict over mating and can therefore influence sexually antagonistic coevolution.

However, we know little about how female signal development modifies male mating harassment and thereby sexual conflict. Here, we combine phylogenetic comparative analyses of a color polymorphic damselfly genus (*Ischnura*) with behavioral experiments in one target species to investigate the evolutionary origin and current adaptive function of a developmental female color signal. Many *Ischnura* species have multiple female color morphs, which include a male-colored morph (male mimics) and one or two female morphs that differ markedly from males (heterochrome females). In *Ischnura elegans*, males and male-mimicking females express a blue abdominal patch throughout post-mergence life. Using phenotypic manipulations, we show that the developmental expression of this signaling trait in heterochrome females reduces pre-mating harassment prior to sexual maturity. Across species this signal evolved repeatedly, but in heterochrome females its origin is contingent on the signal expressed by co-occurring male-mimicking females. Our results suggest that the co-option of a male-like trait to a novel female antiharassment function plays a key role in sexual conflict driven by pre-mating interactions." (Authors)] Address: Willink, Beatriz, Dept of Biology, Evolutionary Ecology Unit, Ecology Building, Lund University, Lund 223-62, Sweden. E-mail: beatriz.willink@ucr.ac.cr

**17873.** Wolf, J.; Günther, A. (2019): Libellenfauna des FFH-Lebensraumtyps Dystrophe Stillgewässer in Sachsen. Libellula Supplement 15: 183–202. (in German, with English summary) ["Odonata fauna of the Annex I habitat type Natural dystrophic lakes and ponds in Saxony, Germany – Between 2012 and 2017 the Odonata fauna of 25 sites characterised as Annex I habitat type 3160 Natural dystrophic lakes and ponds in Saxony were investigated. Altogether, 41 odonate species were recorded, 36 of which were found to be autochthonic in at least one of the waterbodies investigated. The number of recorded species was found to be correlated to altitude. Among the autochthonic species, *Libellula quadrimaculata*, *Sympetrum danae*, *Coenagrion puella*, *C. hastulatum*, *Pyrrhosoma nymphula*, *Lestes sponsa*, *L. virens*, *Aeshna cyanea*, *Cordulia aenea*, and *Leucorrhinia dubia* achieved the highest constancy values." (Authors)] Address: Wolf, J., Staatliche Betriebsgesellschaft für Umwelt & Landwirtschaft, Waldheimer Str. 219, 01683 Nossen, Germany. E-mail: juergen.wolf@smul.sachsen.de

**17874.** Xue, J.; Zhang, H.; Ning, X.; Bu, W.; Yu, X. (2019): Evolutionary history of a beautiful damselfly, *Matrona basilaris*, revealed by phylogeographic analyses: the first study of an odonate species in mainland China. *Heredity* 122: 570–581. (in English) [„*M. basilaris* is distributed mainly in mainland China. A total of 423 individuals from 48 populations covering almost the entire range were sampled to explore the genetic diversity, phylogeographic structure, and demographic dynamics of the species using sequences of three mitochondrial genes (COI, COII, and ND1) and a nuclear (ITS1 + 5.8 S + ITS2) gene. Phylogenetic tree, median-joining network, and BAPS analyses indicated a four-group division of the entire population, and the divergence

event was estimated to have occurred in the middle Pleistocene. The diverse terrain of mainland China as well as past climatic oscillations were assumed to have shaped the current phylogeographic pattern of *M. basilaris*. Multiple lines of evidence supported population expansion in Group 1 and Group 2 but not in Group 3 or Group 4. The expansion times corresponded to the transition phase from the LIG (~0.14–0.12 Mya) to the LGM (~0.021–0.018 Mya). The pre-LGM expansion model reflected a different pattern affecting the historical dynamics of the population of East Asian species caused by Pleistocene climatic changes. Interestingly, Group 2 exhibited a disjunctive distribution pattern. The possible reasons were introgression caused by female-biased dispersal or human phoresy during construction of the Forbidden City during the Ming Dynasty of China." (Authors)] Address: Yu, X., Inst. Entom., College of Life Sci., Nankai Univ., Tianjin 300071, China. E-mail: lannysummer@163.com

**17875.** Yen, C.C.; Chung, A.Y.C. (2019): Odonata fauna of Imbak Canyon Conservation Area, Sabah. *Journal of Tropical Biology and Conservation* 16: 1–8. (in English) [„The Odonata fauna of the Imbak Canyon Conservation Area (ICCA) was surveyed during the Batu Timbang Research Station Scientific Expedition on 16–26 August 2017. A total of 62 Odonata species from 13 families were recorded. The family Libellulidae had the highest number of species (27), and this was followed by Coenagrionidae (9 species), Calopterygidae (5 species), Platycnemididae (5 species) and Platystictidae (4 species). The other families (Devadattidae, Chlorocyphidae, Euphaeidae, Lestidae, Philosinidae, Aeshnidae, Corduliidae and Macromiidae) were only represented by 1–3 species. Of the species recorded, 30 are new records for ICCA. The number of species recorded was high, indicating the high diversity of Odonata fauna of ICCA. These records were combined with the existing records in literature to produce a checklist. At present, 68 species from 15 families are known from ICCA." (Authors)] Address: Chung, A.Y.C., Forest Research Centre, Sabah Forestry Dept, P.O. Box 1407, 90715 Sandakan, Sabah, Malaysia. E-mail: cychoong@ukm.edu.my

**17876.** Yu, X.; Zhang, M.; Ning, X. (2019): A study of *Coeliccia cyanomelas* Ris, 1912 (Odonata: Platycnemididae). *International Journal of Odonatology* 22(3–4): 155–165. (in English) ["*C. cyanomelas* is studied based on a large series of specimens from its whole distribution range. Intraspecific variations of color patterns on the thorax are discussed. *C. sexmaculata* Wang, 1994, *C. mingxiensis* Xu, 2006, and *C. wilsoni* Zhang & Huo, 2011 are all assigned as junior synonyms of *Coeliccia cyanomelas*. One 'variety' from Guizhou is reported and discussed briefly." (Authors)] Address: Yu, X., College of Life Sciences, Chongqing Normal University, Chongqing, PR China

**17877.** Zheng, D.; Nel, A.; Jarzembowski, E.A.; Wang, J.; Zhang, H.; Wang, B. (2019): New gomphaeschnid dragonflies (Odonata: Anisoptera: Aeshnoptera) from mid-Cretaceous Burmese amber. *Cretaceous Research* 100: 138–144. (in English) ["A new true dragonfly, named *Kachinaeschna zhui* Zheng, Nel and Wang, gen. et sp. nov., is described

from Cretaceous Burmese amber representing the second gomphaeschnaoidine from this deposit. *Kachinaeschna* Zheng, Nel and Wang, gen. nov. differs from other Gomphaeschnaoidinae in: the absence of an elongate distal paranal cell, directly basal of the anal loop, in the hindwing; a distinct curvature of RP2; and a curve of RP1 at the pterostigmal brace. The gomphaeschnaoidine dragonflies were previously only recorded from the Lower Cretaceous and mainly from the upper Aptian Crato Formation of Brazil. Based on the true dragonfly fossils found in Burmese amber, a possible late Early Cretaceous age is supported for Burmese amber." (Authors)] Address: Zheng, D., Dept of Earth Sciences, University of Hong Kong, Hong Kong Special Administrative Region, China. E-mail: dranzheng@gmail.com

## 2020

**17878.** Lu, S.; Qiu, R.; Hu, J.; Li, X.; Chen, Y.; Zhang, X.; Cao, C.; Shi, H.; Xie, B.; Wu, W.-M.; He, D. (2020): Prevalence of microplastics in animal-based traditional medicinal materials: Widespread pollution in terrestrial environments. *Science of The Total Environment* 709, 20 March 2020, 136214: 9 pp. (in English) ["Highlights: • 20 types of animal medicinal materials and 10 types of fresh animals were collected in China. • Microplastics (MPs) were found in all medicinal materials with average incidence rate of 94.67%. • The abundance of MPs was in the range of  $1.80 \pm 0.38$  to  $7.80 \pm 0.83$  items/individual. • Major MPs were microfibers (84.68%), or PET (40.45%), Rayon (30.64%) and PE (10.11%). • MPs show similar characteristics between medicinal materials and fresh animals. Abstract: Microplastics (MPs) pollution is an emerging environmental and health concern. MPs have been extensively observed in the aquatic environment, yet rarely investigated in the terrestrial ecosystem, especially in relation to health risks. To evaluate potential MPs pollution in land-dwelling animal medicine materials, we collected 20 types of small animal-based medicinal materials and 10 types of available fresh terrestrial animals from eight different regions in China. MPs were found in all medicinal materials with an average incidence rate of 94.67%. The abundance of MPs was in the range of  $1.80 \pm 0.38$  to  $7.80 \pm 0.83$  items/individual or  $1.59 \pm 0.33$  to  $43.56 \pm 9.22$  items/g (dry weight), with polymer distribution by polyethylene terephthalate (40.45%), rayon (30.64%), polyethylene (10.11%), nylon (7.35%), polypropylene (5.93%), and polyvinyl chloride (5.52%). The majority of MPs were microfibers (84.68%), with 15.32% of fragments. Moreover, MPs were directly observed in the intestine, detected in all ten types of fresh medicinal animals with the abundance of  $0.83 \pm 0.35$  to  $3.42 \pm 0.46$  items/individual. Furthermore, significant positive correlations ( $R: 0.32-0.99$ ,  $p < 0.05$ ) of MPs characteristics were found between medicinal materials and fresh animals, including shape, size, color, and polymer distribution of MPs. The results support that MPs in the medicinal materials were likely derived from living animals. This study demonstrates the prevalence of MPs in animal-based, traditional medicinal materials, and also suggests widespread MPs pollution in terrestrial environments and latent health risks." (Authors)] Address: Lu, S., School of Ecological and

Environmental Sciences, Shanghai Key Laboratory for Urban Ecological Processes and Eco-Restoration, East China Normal University, Shanghai 200241, China

**17879.** Lupiyaningdyah, P. (2020): The past, present and future of dragonfly research in Indonesia. *BIO Web Conf.* 19(00024): 4 pp. (in English) ["Up to present, Indonesia has 900 described species of dragonflies with around 70% are endemic; among them, the most diverse is in Papua. This data is collected based on 356 publications from scientific journals, bulletins, magazines, books, theses, and proceedings from 1773 to 2019. There is still a lack of information about what is the most and least popular topics and where is the most explored regions in Indonesia for Odonata research. I categorized the topics into biodiversity, taxonomy and systematics, biogeography, conservation, ecology, education, ethnozoology, history, and molecular. The result shows that the most popular topic is biodiversity by 139 publications and the least are history and molecular by only one publication. Most popular group to be observed is dragonflies in general (both suborders) by 200 publications and the least observed is Anisoptera by only 71 publications. Java is the most explored island for about 160 publications in 250 years." (Authors)] Address: Lupiyaningdyah, P., Zoology Division - Museum Zoologicum Bogoriense, Research Center for Biology, Indonesian Institute of Sciences (LIPI), Gedung Widyasatwaloka, Jl. Jakarta Bogor Km. 46, Cibinong, 16911, Jawa Barat, Indonesia. E-mail: pungkilupi@gmail.com

**17880.** Ma, F.; Hu, Y.; Wu, J. (2020): The complete mitochondrial genome of *Anax parthenope* (Odonata: Anisoptera) assembled from next-generation sequencing data. *Mitochondrial DNA Part B Resources* 5(3): 2823-2824. (in English) ["The complete mitochondrial genome of *A. parthenope* was assembled from next-generation sequencing data. The circularized mitochondrial genome spans 15,306 bp with a high A + T content of 74.7% and consists of 13 protein-coding genes, 22 tRNA genes, and 2 rRNA genes. Its gene composition and order were similar to *Anax imperator*. The overall base composition is 36.6% for A, 34.8% for T, 16.8% for C, and 11.8% for G. A phylogeny of 31 dragonfly species clustered this species within Odonata." (Authors)] Address: Ma, F., Nanjing Inst. of Environmental Sciences, Ministry of Ecology & Environment, Nanjing, China

**17881.** Makepeace, H.S.; Lewis, J.H. (2020): New and notable records of Odonata from New Brunswick, Canada, with a significant eastern range extension of *Enallagma anna*. *Northeastern Naturalist* 27(4): N58-N62. (in English) ["We report the occurrences of *Tramea lacerata*, *Enallagma anna*, and *Epiaeschna heros* from localities in central and southwestern New Brunswick, Canada. The former 2 species are reported here for the first time from the province, and the *E. heros* is reported for the second time, 118 years after the first known specimen was captured in 1899. Our record of a *E. anna* represents a significant geographic range extension (~500 km east)." (Authors)] Address: Lewis, J.H., New Brunswick Mus., 277 Douglas Avenue, Saint John, NB E2K 1E5, Canada. E-mail: jlewis3@unb.ca



**17882.** Medina-Espinoza E.F. (2020): First record of *Heteragrion cooki* from Peru (Odonata: Heteragrionidae). *Notulae Odonatologicae* 9(6): 236-240. (in English) ["*H. cooki* is reported from Peru for the first time based on a specimen collected in Cerros de Amotape National Park, Tumbes, Peru. This record expands the distribution of this species which previously was only known from Ecuador." (Authors)] Address: Medina-Espinoza, Emmy, Depto de Entomología, Museo de Historia Natural de la Universidad Nacional, Mayor de San Marcos, Av. Arenales 1256, Jesús María, Lima, Peru. E-mail: efme.04@gmail.com

**17883.** Metge, T.; Goertzen, D.; Suhling, F. (2020): Libellen der Flora-Fauna-Habitat Richtlinie in Braunschweig (Niedersachsen). *Braunschweiger Naturkundliche Schriften* 16: 1-19. (in German, with English summary) ["Dragonfly records in the city of Braunschweig between 1980 and 2018 were evaluated to provide an overview of the distribution and changes in the population of dragonfly species that are particularly protected by the Habitats Directive (FFH-species). Five FFH-species occurred: *Coenagrion mercuriale*, *Leucorrhinia albifrons*, *L. caudalis*, *L. pectoralis*, and *Ophiogomphus cecilia*. Two of these, *L. pectoralis* and *O. cecilia*, were recorded since the late 1980s and early 1990s, respectively, and have native populations. In the case of *O. cecilia*, there was a significant increase in grid cells occupied during the investigation period. In recent years, *C. mercuriale* and *L. caudalis* were observed. *Leucorrhinia albifrons* was observed only once in 2007. The four established or possibly established species are characteristic for four different types of freshwater habitats and thus possible target species for nature conservation. In this work, we report on the development of the occurrences over a period of four decades and we provide information on possible actions to protect and promote these populations." (Authors)] Address: Suhling, F., Technische Universität Braunschweig, Institut für Geoökologie, Abteilung Landschaftsökologie und Umweltsystemanalyse, Langer Kamp 19c, 38106 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**17884.** Mofu, L.; Woodford, D.J.; Wasserman, R.J.; Dalu, T.M.; Weyl, O.L.F. (2020): Diet of *Glossogobius callidus* (Teleostei: Gobiidae) in freshwater impoundments in the Sundays River Valley of the Eastern Cape, South Africa. *African Journal of Aquatic Science* 44(4): 415-420. (in English) ["Despite the high abundance of the gobiid fish *Glossogobius callidus* in many freshwater ecosystems in South Africa, very few studies have assessed the biology and ecology of the species. Here, we investigated the diet of *G. callidus* populations sourced from Sundays River irrigation ponds. A total of 571 fish grouped into two size classes (TL, range  $\pm$  SD: juveniles of 20–60  $\pm$  45 mm; adults of 61–140  $\pm$  85 mm) were sampled by seine netting; prey items were removed from the guts and identified and sorted to obtain dietary information for each prey group. Of the examined guts, 97% contained prey comprising 17 taxa within 10 taxonomic groups. Teleosts were identified to species level, whereas most dietary components were identified to a broad taxonomic group. Aquatic invertebrates were the most important

component of the diet of *G. callidus*, but the index of relative importance (%IRI) of dominant invertebrate taxa varied according to ontogenetic stage of *G. callidus* and season. Prey taxa included: Diptera, Hemiptera, Trichoptera, Odonata, Cladocera, Copepoda, Hydracarina, Amphipoda, Mollusca and Teleostei. Dipteran prey taxa were consistently encountered in both size classes and across all seasons. *G. callidus* can therefore be regarded as a generalist invertivore." (Authors)] Address: Mofu, L., Dept of Ichthyology and Fisheries Science, Rhodes University, Grahamstown, South Africa. E-mail: l.mofu@saiab.ac.za

**17885.** Muzon, J.; Lozano, F. (2020): *Negragrion sagma* gen.n. and sp.n. from South America with a morphological phylogeny of the New World Ischnurinae (Odonata: Zygoptera: Coenagrionidae). *Anais da Academia Brasileira de Ciências* 92, Suppl. 2, e20190025 DOI 10.1590/0001-376-5202020190025: 11pp. (in English) ["A new coenagrionid genus, *Negragrion*, is described for *N. sagma* sp.n. found in Argentina and Brazil (Holotype and allotype, pair in tandem. Argentina: Corrientes: Santo Tomé, arroyo Ita Cuá sobre RP 94, 28°26'48.30"S 56°00'33.11"W, 24.ii.2003, Muzón & Pessacq coll., MLP). The new genus is characterized by the shape of male cerci (decumbent from base; saddle-shaped; in lateral view with an acute apophysis directed dorsally located at 0.3 from base). The presence of a vulvar spine on S8 of females places this genus within Ischnurinae. A cladistics analysis using morphological data was carried out to determine its phylogenetic position. *Negragrion* gen.n. is recovered within the clade 4 as the sister group of the clade (*Acanthallagma Acanthagrion* (*Oxyagrion*, *Fluminagrion*))." (Authors)] Address: Muzon, J., Universidad Nacional de Avelaneda, Laboratorio de Biodiversidad y Genética Ambiental/BioGeA, Mario Bravo 1460 esq. Isleta, 1870 Piñeyro, Buenos Aires, Argentina

**17886.** Ngo, Q.P.; Phan, Q.T.; Karube, H.; Kompier, T.; Bui, A.P.; Le, H.S. (2020): Description of the female and notes on ecology of *Sieboldius nigricolor* (Fraser, 1924) from central Vietnam (Odonata: Gomphidae). *International Dragonfly Fund Report* 152: 1-7. (in English) ["The female of *S. nigricolor* is formally described from Central Vietnam, and both male and female specimens are illustrated. Information is given on the occurrence and ecology of the species in Vietnam." (Authors)] Address: Phan, Q.T., Center for Entomology & Parasitology Research, Institute of Research & Training of Medicine, Biology & Pharmacy, Duy Tan University, Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

**17887.** Nicolai, B. (2020): Libellen am Leth (Nordharzvorland, Sachsen-Anhalt) im Klimawandel Hotspot der Odonatenfauna und sein schnelles Ende. *Abh. Ber. Mus. Heineanum* 12: 91-115. (in German, with English summary) ["The Leth is a small isolated subsurface lake in the arable landscape of the north-eastern Harz foreland. From 2016 to 2020, the Odonatenfauna was recorded there over 33 days and a total of 31 dragonfly species (12 Zygoptera, 19 Anisoptera) were detected. For 20 species there were indications of reproduction at the lake. Seven species were identified

as once only guests. A number of heat-loving, southern species are to be highlighted. These species include *Lestes barbarus*, *Aeshna affinis*, *Crocothemis erythraea* and *Sympetrum meridionale*, which were down-to-earth during the observation period at the Leth. Two species (*Lestes sponsa*, *Coenagrion lunulatum*), which Handtke (1966, 1968) identified at this location, could not be detected. The hot summers and lack of rainfall in recent years led to the very shallow lake completely drying out in 2020. Due to the general climate development, no temporary water surface is expected in the near future. The Leth thus seems to be lost as a dragonfly hotspot in the northern Harz foreland for an unforeseeable time." (Author)] Address: Nicolai, B., Herbingstr. 20, 38820 Halberstadt, Germany. E-mail: nicolaibea@gmx.de

**17888.** Nidup, T.; Tamang, D.T.; Tobgay, S.; Bajgai, R.C.; Wangmo, S.; Dorji, T.; Wangchuk, K. (2020): Abundance and distribution of threatened *Epiophlebia laidlawi* Tillyard, 1921 (Odonata: Epiophlebiidae) in eastern Bhutan. *Sherub Doenme: The Research Journal of Sherubtse College* 13(1): 79-89. (in English) ["With series of macro-invertebrate studies, *Epiophlebia laidlawi* Tillyard, 1921 is recorded from Trashigang (Gomchu stream) and Trashi Yangtse (Gellingchu, Mangchi and Chuthakang), districts in eastern Bhutan. Its abundance is higher in post-monsoon season. The pH of the water from Gom-chu stream ranged from 6.63-7.50, electrical conductivity from 18.02-241  $\mu\text{S}/\text{cm}$ , total dissolved solids from 11.21-121.66 mg/l, turbidity from 0-2 NTU and water temperature from 8.5-16.3°C. The abundance of the *E. laidlawi* is negatively correlated to water temperature ( $r=-0.650$ ,  $p=0.058$ ) and positively correlated to altitude ( $r=0.496$ ,  $p=0.174$ ) and turbidity ( $r=0.381$ ,  $p=0.312$ ). Six stages of nymphs are measured and reported. The nymph of Gomphidae is the only Odonata nymph found associated with the habitat of *E. laidlawi*. The fish species, *Creteuchiloglanis bumdelingensis* Thoni & Gurung, 2018 is reported from the habitat of *E. laidlawi* and is the additional new locality for the fish in Bhutan. As *E. laidlawi* is Near Threatened, it deserves to be protected through policies and laws of Bhutan. Due to anthropogenic pressure its habitats are disturbed and thus, intervention is required from the policy makers on the conservation of the habitats." (Authors)] Address: Tshering Nidup Royal University of Bhutan, Sherubtse College

**17889.** Novello-Gutiérrez, R.; Bota-Sierra, C.A.; Amaya Vallejo, V. (2020): Description of the larva of the genus *Archaeopodagrion* Kennedy, 1939 (Zygoptera: Philogeniidae). *Zootaxa* 4816(3): 325-332. (in English, with Spanish summary) ["The larva of *A. fernandoi* Bota-Sierra, 2017, is described and illustrated in detail, being the first larva described for the genus *Archaeopodagrion*. The description is based on F-0 larvae collected from the type locality. The larva of *A. fernandoi* shows great resemblance to larvae of *Philogenia* spp., which adds support to the hypothesis of the monophyletic family Philogeniidae which groups together *Archaeopodagrion* and *Philogenia*. However, both genera differ each other by the presence of basal, spiny, fleshy tubercles on caudal lamellae of *Archaeopodagrion*." (Authors)] Address: Novello-Gutiérrez, R., Depto de Entom.,

Inst. de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**17890.** Ogura, K.; Itoh, S.; Futahashi, R. (2020): First record of *Aeschnophlebia anisoptera* Selys, 1883 from Iwate Prefecture, N. Honshu, Japan. *Tombo* 62: 126-127. (in Japanese, with English summary) ["A female *A. anisoptera* was collected at Ueda, Morioka, and a male *A. anisoptera* was photographed at Hanaizumicho-Oimatsu, Ichinoseki. These are the first records of this species from Iwate Prefecture." (Authors)] Address: not stated

**17891.** Okude, G.; Watanabe, K.; Futahashi, R. (2020): DNA analysis of *Neurothemis terminata* Ris, 1911 collected in Ishigaki Island, Okinawa Prefecture, Japan. *Tombo* 62: 106-108. (in English, with Japanese summary) ["We report the results of DNA analyses of a male *Neurothemis terminata* Ris, 1911 collected in Ishigaki Island in 1980. Both nuclear and mitochondrial DNA results indicated that this male is a genuine *N. terminata*. To our knowledge, this individual is the only record of this species from Japan." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**17892.** Okude, G.; Futahashi, R. (2020): Interspecific hybrid between *Paracercion sieboldii* and *P. melanotum* from Japan (Odonata: Coenagrionidae). *Notulae odonatologicae* 9(5): 204-208. (in English) ["Interspecific hybrids have been occasionally found in the field. Here we describe a male of the interspecific hybrid between *Paracercion sieboldii* and *P. melanotum* with intermediate phenotypes between the two parent species from Japan. Nuclear and mitochondrial DNA analyses indicated that this individual was derived from interspecific mating between a female *P. sieboldii* and a male *P. melanotum*. To our knowledge, this is the only report of the hybrid between these two species." (Authors)] Address: Okude, G., Dept of Biological Sciences, Graduate School of Science, University of Tokyo, Tokyo, Japan. E-mail: gentaokude@gmail.com

**17893.** Oliveira de Resende, B.; Ferreira, V.R.S.; Juen, L.; Cabette, H.S.R. (2020): Emergence trap for the collection of exuviae and adult of Odonata. *Oecologia Australis* 24(3): 742-747. (in English) ["Odonates have aquatic larval stages and terrestrial adults. The extreme change in habitat occupation during their life cycle means that combined collection methods, capable of providing data for both larvae and adults, are scarce and are often inefficient. Given this, we applied a method for the collection of specimens of both life phases using emergence traps. During fieldwork, 78 emergence events were recorded for 15 species. We also briefly discuss the emergence pattern of the recorded species. We believe the information obtained here provide an important contribution to the understanding of the ecology and basic biology of Neotropical odonate species, as well as helping to solve the taxonomic problems associated with the identification of larvae." (Authors)] Address: Oliveira de Resende,

B., Universidade do Estado de Mato Grosso, Programa de Pós-Graduação em Ecologia e Conservação, Laboratory of Entomology, Av. Prof. Dr. Renato Figuera Varella, BR 158, Olaria, CEP: 78690-000. Nova Xavantina, MT, Brazil. E-mail: bethania-nx@hotmail.com

**17894.** Oo, S.; Hmwe, K.; Aung, N.; Su, A.; Soe, K.; Mon, T.; Lwin, K.; Thu, M. (2020): Diversity of insect pest and predator species in monsoon and summer rice fields of Taungoo environs, Myanmar. *Advances in Entomology* 8: 117-129. (in English) ["Paddy fields are natural and artificial wetland ecosystems that supply rice for the people and provide the wildlife especially insect diversity of different functional aspects. A total of 71 insect species belonging to 40 families under eight orders were observed during the study period. Among the 71 insect species,..., eight species of dragonfly, ...] (Authors)] Address: Oo, S.S., Zool. Dept, Univ. Yangon, Yangon, Myanmar

**17895.** Oota, K.; Futahashi, R. (2020): First record of *Anax evhippiger* (Burmeister, 1839) from Yakushima Is. off Kyusnu, Japan. *Tombo* 62: 135-136. ["A male *A.x evhippiger* was collected in Koseda, Yakushima Is. (Kagoshima Prefecture), off Kyushu, Japan. This is the first record of this species from the Kyushu region." (Authors)] Address: E-mail: keisuke8200@gm ail.com

**17896.** Ostrovsky, A.M. (2020): Distribution of Winter Damselfly (Odonata: Lestidae) in south-eastern Belarus. *Field Biologist Journal* 2(2): 143-146. (in Russian, with English summary) ["The brief data from our research on distribution of *Sympetrum fusca* and *S. paedisca* in South-Eastern Belarus are analysed in this article. As a results of observations, it was found that *S. paedisca* is much more widespread than previously assumed, and a new habitat of *S. fusca* was discovered in this region." (Author).] Address: Ostrovsky, A.M., Gomel State Medical Univ., 5 Lange St, Gomel, 246000, Republic of Belarus. E-mail: Arti301989@mail.ru

**17897.** Ostrowski, K. (2020): New locality of Ornate Bluet *Coenagrion ornatum* (SELYS, 1850) (Odonata, Coenagrionidae) in the vicinity of Wrocław. *Odonatrix* 16\_20 (2020): 5 pp. (in Polish, with English summary) ["New site of *C. ornatum* in Poland. In the vicinity of Wrocław in the valley of Slezka River (UTM XS44) small population of *C. ornatum* have been observed in 2019 and 2020. It is one of the rarest species in Poland . CR status on the Red List of Dragonflies of Poland. Though today it is known only from Lublin Voivodeship, this species still can be found in Lower Silesia." (Author) ] Address: Ostrowski, K., Marcinkowice 5, 55-020 Zorawina, Poland. E-mail: ostrowski85@go2.pl

**17898.** Osuala, F.I.; Abiodun, O.A.; Oyeleke, B.G.; Humphrey, O.F. (2020): Biodiversity of fauna and heavy metal assessment in selected areas of University of Lagos Akoka Campus, Lagos, Nigeria. *Ife Journal of Science* 22(2): 159-173. (in English) ["The biodiversity of terrestrial fauna and assessment of some heavy metals - cadmium (Cd), chromium (Cr), cobalt (Co), lead (Pb), nickel (Ni) and manganese

(Mn) concentrations in soil samples were investigated in selected areas of the University of Lagos Akoka campus. Atomic Absorption Spectrophotometer (AAS) was used for heavy metals analysis and biodiversity index was calculated with Margalef, Shannon-Weiner and Simpson index. On the basis of the Shannon-Weiner index, Zoological garden had the highest species richness (2.75) while High-Rise (1.71) had the lowest species diversity. On the basis of the Simpson index (1-D), Faculty of Science had the highest species diversity (0.95) while High-Rise had the lowest diversity (0.75). Formicidae (21.60%), Gecarcinidae (13.77%) and Libellulidae (13.51%) were the families with the highest relative abundance in the University of Lagos while Cercopithecidae (0.26%), Elapidae (0.34%) and Gryllidae (0.34%) were the families with least relative abundance. The result of the soil texture (particle size) of the various sampled zones indicated that sand is the dominant component with a mix of loam. Heavy metal mean concentrations of the soil samples from the University of Lagos indicated the presence of Pb (0.17 - 29.67 mg/kg), Ni (0.59 - 6.63 mg/kg), Mn (72.72 - 398.63 mg/kg), Cr (0.01 - 16.23 mg/kg), Cd (0.20 - 0.87 mg/kg) and Co (0.17 - 6.52 mg/kg). All heavy metals detected were below Federal Ministry of Environment (FMEnv) and European Union (EU) permissible limit for heavy metals in soils except Mn. Though, Mn is biologically important with low toxicity, there is need for consistent monitoring of the heavy metals so as not to pose a threat to the biodiversity of the study area." (Authors)] Address: Osuala, F.I., Dept of Zoology, Fac. of Science, University of Lagos, P.M.B. 101017, Lagos, Nigeria. E-mail: fphilosu@yahoo.com

**17899.** Ota, S. (2020): Records of *Somatochlora arctica* (Zetterstedt, 1840) confirmed in 2018-2019 from Fukushima, Gunma, and Tochigi Prefectures — Observations in Fukushima Prefecture, a rediscovery after 60 years. *Tombo* 62: 116-122. (in Japanese, with English summary) ["*S. arctica* was observed in Ozenuma, Fukushima Prefecture and Ozegahara, Gunma Prefecture in 2018, and in Senjogahara, Tochigi Prefecture in 2019. This species has been recorded from these areas in the past, but recent records could not found. Certainly in Fukushima Prefecture, it was the first rediscovery in 60 years since 1958. In Ozenuma and Senjogahara. breeding habitats were confirmed for the first time in each prefecture." (Author)] Address: not stated

**17900.** Papazian, M.; Bonneau, P.; Filippi, G.; Nève, G. (2020): Contribution à la connaissance des Odonates de l'archipel de Sao Tomé-et-Principe 2. Présence d'*Agriocnemis zerafica* Leroi, 1915 (Odonata Coenagrionidae). *L'Entomologiste* 76(2): 69-73. (in French, with English and Portuguese summaries) ["During the second expedition carried out in October and November 2019 as part of the São Tomé-et-Principe « Archipel de Biodiversité » project, *A. zerafica*, was collected on the island of Principe, bringing to 17 the number of Odonates known to the archipelago." (Authors)] Address: Papazian, M., Opie Provence-Alpes-du-Sud, Muséum d'histoire naturelle de Marseille, palais Longchamp, 13233 Marseille cedex 20, France. E-mail: papazianmcm@wanadoo.fr



**17901.** Pattanayak, A., Kumari, M., Pahari, P.R., & Deen, S.N.P.Y. (2020): Aquatic insects (Odonata) diversity in floating and emergent macrophytes in Saheed Matangini Block (Tamluk), West Bengal (India). Uttar Pradesh Journal of Zoology 41(13): 27-33. (in English) ["Geographical zone-wise biodiversity study of different species is of paramount importance to monitor and conserve the species diversity in an ecosystem. The objective of present study was to make a diversity database of macrophyte associated aquatic insects in Purba Medinipur, West Bengal, India. The aquatic insects were collected from aquatic macrophytes, Ipomoea aquatica, Eichhornia crassipes and Nelumbo nucifera grown in 6 water bodies of Sahid Matangigi Block (Tamluk, 22.3°N 87.92°E), Purba Medinipur, West Bengal, India. The results revealed that occurrences of 6 aquatic insect orders (Coleoptera, Hemiptera, Odonata, Diptera, Ephemeroptera and Trichoptera) in Ipomoea aquatica with maximum abundance of 3 odonate families (Libellulidae, Coenagrionidae and Platynemididae). The present biodiversity study of aquatic insects indicate that Odonata especially prefer floating macrophyte as a favourable habitat and therefore higher species diversity therein. Further study is needed considering other aquatic macrophytes in this concern to develop a valid species specific database essential for biodiversity conservation in the rapidly changing present environment." (Authors)] Address: Department of Zoology, Magadh University, Bodh-Gaya, Gaya-824234, Bihar, India

**17902.** Pavithran, S.; Chitra, N.; Arulprakash, R.; Sugumaran, M.P. (2020): Diversity of Odonata in the rice fields of Tamil Nadu. Journal of Entomology and Zoology Studies 8(5): 2115-2118. (in English) ["Odonata is one of the most predominant natural enemy of the rice ecosystems and their diversity in rice fields from different parts of Tamil Nadu viz., Coimbatore, Aduthurai, Pudukkottai, Ramanathapuram, Bhavanisagar and Gudalur was studied. The Odonata assemblage comprised 21 species under 19 genera under 4 families. Anisoptera were dominant with 15 species and 14 genera over Zygoptera (6 species, 5 genera). Libellulidae was the most speciose family with 14 species followed by Coenagrionidae with 5 species. Diversity analysis of Odonata from rice fields of Tamil Nadu revealed that the order of Simpson Diversity index (SID) of diversity was Coimbatore (0.89) > Bhavanisagar (0.88) > Aduthurai (0.87) > Ramanathapuram (0.87) > Gudalur (0.84) > Pudukkottai (0.82). Margalef index ( $\hat{a}$ ) of species richness were high in Coimbatore (2.33) and least in Gudalur (1.55). Evenness of species within the region (Pielou's evenness index, E1) was the highest for Bhavanisagar (0.94) and the lowest for Aduthurai (0.84). Among the different regions, Odonata in rice fields of the Coimbatore and Aduthurai were found to have a maximum similarity." (Authors)] Address: Pavithran, S., Dept Agricultural Entomology, Tamil Nadu Agricultural Univ., Coimbatore, Tamil Nadu, India

**17903.** Payra, A.; Dash, S.K.; Mishra, A.K. (2020): Pseudagrion microcephalum Rambur preying on small web-building spider (Odonata: Coenagrionidae; Araneae: Araneidae). Historical Natural 10(3): 229-232. (in English) ["During our field study on the Odonata fauna in Athgarh Forest division,

Cuttack, Odisha, India, on 05/03/2015 at 08:25 a.m., we observed an adult male *P. microcephalum* in a small open and sunlit wetland near Suhagi Dam (20.558° N; 84.976° E, 96 m a.s.l.). This individual hovered in front of us for some seconds, and then suddenly darted to the nearby leaf, 45 cm distant from the hovering site and 90 cm above water. The damselfly grasped a small unidentified spider from the little cobweb that stuck in leaf groove. At the site of observation, the water, covered by emergent grasses and macrophytes, was 30 cm deep." (Author)] Address: Payra, A., Ramnagar, Purba Medinipur, West Bengal, Pin-72144, India. E-mail: arajushpayra@gmail.com

**17904.** Payra, A. (2020): A record of cannibalism in *Ceragrion coromandelianum* Fabricius (Zygoptera: Coenagrionidae). Revista de la Sociedad Entomológica Argentina 79(4): 44-46. (in English, with Spanish summary) ["During winter season on January 12th, 2014, a case of cannibalism in *C. coromandelianum* was observed near Bara Solemanpur, village of Purba Medinipur district, West Bengal, India. This is the first instance of cannibalism recorded in *C. coromandelianum*, where a female devours its conspecific male." (Author)] Address: Payra, A., Ramnagar, Purba Medinipur, West Bengal, Pin-72144, India. E-mail: arajushpayra@gmail.com

**17905.** Payra, A.; Dash, S.K.; Palei, H.S.; Tiple, A.D.; Mishra, A.K.; Mishra, R.K.; Rout, S.D. (2020): An updated list of Odonata species from Athgarh Forest Division, Odisha, Eastern India (Insecta: Odonata). Mongolian Journal of Biological Sciences 18(1): 55-64. (in English) ["Altogether 72 species of Odonata belonging to 46 genera and 9 families were recorded from Athgarh Forest Division, of which 32 species are representatives of the suborder Zygoptera and 40 species are members of the suborder Anisoptera. Athgarh Forest Division represents 65.4 % of the Odisha state and 14.7 % of the Indian Odonata fauna. Among recorded species, 17 species are newly recorded for Athgarh Forest Division. *Elattona nigerrima* is reported for the first time from the state, and occurrence of *Indothemis carnatica* in Odisha is confirmed here for the first time. *Pseudagrion spencei* is also added to the Odonata fauna of Odisha and reported for the second time in the state from Athgarh Forest Division." (Authors)] Address: Payra, A., Ramnagar, Pin-721441, Purba Medinipur, West Bengal, India

**17906.** Peniston, J.H.; Gomez-Ruiz, P.A.; Panwar, P.; Uno, H.; Ramirez, A. (2020): Target species affects the duration of competitive interactions in the Neotropical dragonfly, *Micrathyrina atra* (Odonata: Libellulidae). Notulae odonatologicae 9(5): 173-177. (in English) ["Dragonflies often engage in aggressive interactions over access to mates, food, or other resources. We should expect species to have behavioral adaptations for minimizing such interactions with other species because they are not competing with them for mates and often require different resources. We conducted observational trials in natural water pools that provide new evidence for one such adaptation in the Neotropical *Micrathyrina atra*-males in this species have shorter interactions with

individuals of other species than with conspecifics." (Authors)] Address: Peniston, J.H., Dept of Biology, University of Florida, Gainesville, FL, USA. E-mail: jimmpen@ufl.edu

**17907.** Perez, E.S.N.; Bautista, M.G. (2020): Dragonflies in the City: Diversity of Odonates in Urban Davao, Philippines. *Journal of Agricultural Science and Technology A* 10: 12-19. (in English) ["Dragonflies are well-known group of insects because of their biological and ecological importance in a community, that is, they indicate the environmental health of an ecosystem. However, in an urban ecosystem, there are many threats that can affect the assemblages of dragonfly species such as the intensification of urbanization which contributes biodiversity loss of most dragonfly species. This study aimed to identify dragonfly species and determine the species richness, relative abundance, species diversity, evenness and effective number of dragonflies in selected areas in Davao City. Opportunistic sampling using sweep net and photo documentation were used during the study. The sampling lasted for three months from June 2017 to August 2017. A total of 962 individuals of dragonflies were observed and recorded comprising of six species of dragonflies from six different genera of one family. *Orthetrum sabina* was the most abundant among the six species recorded in all sampling sites. The species richness was six. Low species diversity was obtained in all sampling which shows that the sites were not evenly distributed and indicating that the study sites were not diverse in terms of the number of species and highly disturbed." (Authors)] Address: Perez, E.S.N., Natural Science Dept, College of Arts and Sciences, University of Southeastern Philippines (USEP), Barrio Obrero, Davao City 8000, Philippines

**17908.** Perron, M.A.C.; Pick, F.R. (2020): Stormwater ponds as habitat for Odonata in urban areas: the importance of obligate wetland plant species. *Biodiversity and Conservation* 29: 913-931. (in English) [Urbanization significantly alters hydrological regimes in cities by reducing infiltration rates and increasing runoff. Stormwater ponds have been constructed in North American cities to mitigate the effects of increased urban runoff by dampening floods and filtering out contaminants. However, these ponds may also provide habitat for wetland species in cities. This study aimed at determining the significance of stormwater ponds as attractive habitats for the adult stages of Odonata, widely considered bioindicators of aquatic and wetland ecosystem health. A total of 41 urban stormwater ponds and ten rural natural ponds were sampled across the National Capital Region of Canada. On average, stormwater ponds had fewer species and lower abundance of dragonflies but, in contrast, more species of damselflies. Stormwater ponds had a higher total plant species richness because of a higher number of non-native species. However, some stormwater ponds had similar odonate and plant species assemblages to natural ponds. The variation in odonate abundance and species composition was largely explained by plant community composition and significantly linked to the presence of specific obligate wetland plant species. Overall, this study highlights the importance of wetland features in cities and points to design

elements of stormwater ponds that could be implemented to enhance biodiversity and ecosystem services." (Authors)] Address: Perron, Mary Ann C., Department of Biology, University of Ottawa, 20 Marie Curie Private, Ottawa, ON K1N 6N5, Canada. E-mail: mperr058@uottawa.ca

**17909.** Petrulevicius, J.F. (2020): First argiolestid damselfly (Odonata: Zygoptera) from the late Palaeocene of Northwest Argentina. *Palaeoentomology* 3(6): 541-545. (in English) ["Megapodagrionids in the wide sense are a polyphyletic group of damselflies. In recent studies there is a tendency to restrict the Megapodagrionidae only to few genera, and to over rank some subfamilies such as Philosiniinae and Argiolestinae to family. These efforts are based on nymphal and wing characters." (Author)] Address: Petrulevicius, J.F., CONICET - División Paleozoología Invertebrados, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, Paseo del Bosque s/n, La Plata (1900), Argentina. E-mail: levicius@fcnym.unlp.edu.ar

**17910.** Phan, Q.T.; Ngo, Q.P.; Bui, A.P. (2020): Description of *Coelliccia lephuocdieui* sp. nov. from the Central Highlands of Vietnam (Odonata: Zygoptera: Platycnemididae) with notes on its congeners. *Zootaxa* 4786(1): 69-80. (in English) ["*C. lephuocdieui* sp. nov. (holotype ♂, 14.2586N, 108.3786E, Kon Ka Kinh National Park in Ayun Commune, Mang Yang District, Gia Lai Province, the Central Highlands of Vietnam) is described and illustrated for both sexes. A comparison of the new species with *C. scutellum* Laidlaw, 1932 and *C. yamasakii* Asahina, 1984 is provided with notes on the morphological variation of the Vietnamese *C. scutellum*. The female of *C. yamasakii* is described for the first time." (Authors)] Address: Phan, Q.T., Center for Entom. & Parasitology Res., Institute of Research & Training of Medicine, Biology & Pharmacy, Duy Tan Univ., 3 Quang Trung, Da Nang city, Vietnam. E-mail: pqtoan84@gmail.com;

**17911.** Phan, Q.T.; Ngo, Q.P.; Toan, T.C.; Tuan, V.A. (2020): Description of *Coelliccia natgeo* sp. nov. from Central Vietnam with keys to the males and females of the hayashii-group (Odonata: Zygoptera: Platycnemididae). *Zootaxa* 4896(1): 96-104. (in English) ["*Coelliccia natgeo* sp. nov. is described from central Vietnam (holotype ♂, 18.2708 N, 105.3431 E, Khe Nhop, Vu Quang National Park, Ha Tinh Province, deposited in the Zoological Collection of Duy Tan University, Da Nang City, Vietnam). The new species differs from other members of the hayashii-group by males lacking antehumeral stripes, spots and pruinosity on the synthorax and female having the central part of the posterior pronotal lobe reduced to a small projection. Keys to the males and females of the hayashii-group are provided." (Authors)] Address: Phan, Q.T., Center for Entom. & Parasit. Res., Insti. Res. & Training of Medicine, Biol. & Pharmacy, Duy Tan Univ., Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

**17912.** Phan, Q.T.; Ngo, Q.P. (2020): A revision of the systematics and distribution of the damselfly genus *Prodasi-neura* Cowley, 1934 (Odonata: Zygoptera: Platycnemididae) in Vietnam with description of two new species. *European*

Journal of Taxonomy 650: 1-27. ["Eight species of the genus *Prodasineura* Cowley, 1934 are recorded from Vietnam, including two newly described species: *Prodasineura lancastrei* sp. nov. and *P. kong* sp. nov. from north and central Vietnam. All species recorded are illustrated, including figures of morphological structures, and distribution maps and keys to the males and females are provided. We consider the record of *P. laidlawi* (Forster in Laidlaw, 1907) a misidentification and exclude it here." (Authors)] Address: Phan, Q.T., Center for Entom. & Parasit. Res., Insti. Res. & Training of Medicine, Biol. & Pharmacy, Duy Tan Univ., Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

**17913.** Phan, Q.T. (2020): Description of *Drepanosticta karubei* sp. nov. from Mindoro Island, the Philippines (Zygoptera: Platystictidae). Tombo 62: 53-56. (in English) ["*Drepanosticta karubei* sp. nov. is described based on a single male from Mt. Falcon, Mindoro Island, the Philippines (deposited in Kanagawa Prefectural Museum, Japan)." (Author)] Address: Phan, Q.T., Center Entom. & Parasit. Res., Insti. Res. & Training of Medicine, Biol. & Pharmacy, Duy Tan Univ., Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

**17914.** Phan, Q.T.; Ngo, Q.P.; Anh, P.B.; Hai, S.L.; Giang, S.N. (2020): Notes on the changes in body color with age in male and female *Coelliccia mattii* Phan & Kompier, 2016 (Odonata: Zygoptera: Platynemididae). International Dragonfly Fund Report 153: 1-6. (in English) ["The changes in coloration with age in males and females of *Coelliccia mattii* Phan & Kompier, 2016 from the Central Highlands of Vietnam are documented. Immature forms have extensive yellow markings on the thorax and S9 is yellowish, while in the fully mature male form, the thorax is largely black and covered in pruinosity and S9 is completely black. S9 is yellowish in the immature female while S9 is black in the fully mature female." (Authors)] Address: Phan, Q.T., Center for Entom. & Parasit. Res., Insti. Res. & Training of Medicine, Biol. & Pharmacy, Duy Tan Univ., Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

**17915.** Phuge, S.; Shetye, K.; Pandit, R. (2020): Effect of water level on insect-tadpole predator-prey interactions. *Acta Oecologica* Volume 108, October 2020, 103649. (in English) ["Highlights: • High water level increases survival of neustonic prey. • Low water level reduces predation pressure on benthic prey. • The presence of mesopredator in the water column increases the survival of prey tadpoles. Abstract: Predator-prey interactions are affected by environmental conditions. We examined the effect of changes in water level on the predator-prey interactions in a food web comprising of a top predator (dragonfly naiad), one mesopredator (backswimmer), and prey tadpoles of species that differ in microhabitat occupancy (neustonic and benthic). The results revealed that under high water level conditions (HWL), predators took longer to attack the neustonic tadpoles (*Microhyla nilphamariensis*) relative to the low-water-level condition (LWL). Dragonfly larvae mostly attacked the benthic tadpoles (*Euphylyctis cyanophlyctis*) when the water level was high. Nevertheless, under LWL, dragonfly larvae

equally attacked both benthic and neustonic tadpoles. Interestingly, dragonfly larvae frequently attacked mesopredators (i.e., backswimmers) when they were presented together with neustonic tadpoles. These results demonstrated that changes in water level influence predator-prey interactions in the pond ecosystem where neustonic tadpoles faced lower risk under HWL. The reduction of water level favored the survival of benthic prey tadpoles. The presence of mesopredator (backswimmers) reduced the predation risk of neustonic tadpoles. These results help to understand how the differences in predation risks shape anti-predator responses in these prey tadpoles." (Authors)] Address: Phuge, S., Dept of Zoology, Savitribai Phule Pune University, Ganeshkhind, Pune, 411007, India

**17916.** Piazzini, S.; Tamburini, M.; Favilli, L. (2020): New records of *Cordulegaster trinacriae* from Pollino National Park, Italy (Odonata: Cordulegasteridae). *Notulae Odonatologicae* 9(6): 256-262. (in English) ["New data on distribution and ecology of *C. trinacriae* from the Calabrian side of the Pollino National Park (Basilicata, Calabria) are presented. The species was recorded at ten localities in the province of Cosenza, nine of which were previously unknown. Larvae were recorded from medium-sized to large rivers at a minimum altitude of 120 m a.s.l. and a maximum of 600 m a.s.l. The riverbeds were mostly intact and protected by a zone of well structured riparian forest. To date, *C. trinacriae* doesn't appear to be at risk in the region, but global climate change and increasing use of fresh water for human purposes are likely to pose a threat in the near future." (Authors)] Address: Piazzini, S., Dept Physical Sci., Earth & Environment, Univ. Siena, via P.A. Mattioli 4, 53100 Siena, Italy. E-mail: piazzini5@unisi.it

**17917.** Pineiro Alvarez, X. (2020): Alta densidad de *Lestes macrostigma* (Eversmann, 1836) (Odonata: Lestidae) en un humedal de La Mancha Húmeda (Ciudad Real, España). *Archivos Entomológicos* 22: 17-22. (in Spanish, with English summary) ["High density of *L. macrostigma* in a wetland of La Mancha Húmeda (Ciudad Real, Spain). A high count of *L. macrostigma* in the restored wetland of Junta de los Ríos, province of Ciudad Real, in June 2019, is reported. An assessment of the water conditions and vegetation associated with this species during the study period is provided. Information on the accompanying odonatofauna in the wetland is also included." (Author)] Address: Piñeiro Álvarez, X., Revolva 2, Noalla. E-36990 Sanxenxo (Pontevedra), Spain. E-mail: xurxolusitanica@gmail.com

**17918.** Qin, J.; Xie, S.; Cheng, F. (2020): Broad diet composition and seasonal feeding variation facilitate successful invasion of the Shimofuri Goby (*Tridentiger bifasciatus*) in a water transfer system. *Water* 12(12), 3411; <https://doi.org/10.3390/w12123411>: 9 pp. (in English) ["The diet composition of an invasive population of Shimofuri goby (*Tridentiger bifasciatus*) was investigated bimonthly during the period from September 2015 through August 2016 in Nansi Lake, a storage lake of the East Route of the South-to-North Water Transfer Project, China. The diet consists of a broad spectrum of prey items, including mollusca (*Bellamya* sp.



and *Physa* sp.), aquatic insects (Odonata sp., Chironomidae sp., and Cirolanidae sp.), other macroinvertebrates (Nematoda sp. and Rhynchobdellida sp.), shrimp (*Palaemon modestus* and *Gammarus* sp.), fish (*Rhinogobius giurinus* and *Tridentiger bifasciatus*), fish eggs, and detritus. Dominant diets shifted from Rhynchobdellida sp. and unidentified digested food in July to *P. modestus* during September and November, and then shifted to both *P. modestus* and *R. giurinus*. Additionally, cannibalism was observed in March before spawning season of the goby, during which large males (SL > 70.0 mm) preyed on small-sized ones. We suggest that broad spectrum of prey items and apparent seasonal shifting of dominant diets in the invasive goby fish, which might be an important mechanism favoring its successful invasion in water transfer system." (Authors)] Address: Qin, J., The Key Lab. Aquatic Biodiversity & Conservation of Chinese Acad. of Sci., Inst. Hydrobiol., Chinese Academy of Sci., Wuhan 430072, China. E-mail: qinjiao@ihb.ac.cn

**17919.** Ramírez, A.; Maldonado-Benítez, N.; Mariani-Ríos, A.; Figueroa-Santiago, J. (2020): Dragonflies and damselflies (Odonata) from Puerto Rico: a checklist with notes on distribution and habitat. *PeerJ* 8:e9711 <https://doi.org/10.7717/peerj.9711>: 18 pp. (in English) ["Background: Conservation of tropical freshwater fauna requires a solid understanding of species biodiversity patterns. We provide an up to date annotated list of Odonata of Puerto Rico, which is based on current reports. The list is complemented with notes on the geographic and altitudinal distribution of this order on the island. We also compare current composition relative to early reports conducted when Puerto Rico was mostly an agricultural region. Methods: We surveyed adult Odonata all over Puerto Rico with the aid of undergraduate students. Students were trained on capturing, preserving, and data basing specimens. All material was centralized, identified by the lead author, and deposited in the Zoology Museum at the University of Puerto Rico (MZUPR), Río Piedras campus. Surveys were complemented with focal collections by the authors and a literature review of published records for Puerto Rico and the Caribbean. We requested records from specialists to obtain the most complete list of species for the island. Results: An annotated list of Odonata from Puerto Rico is presented, reporting 49 species distributed in two suborders and four families. We provide information on species distribution among municipalities and elevations around Puerto Rico. A historic list of species was developed for the 1930s-1940s, when agriculture covered most of Puerto Rico, based on literature and museum specimens. Both current and historic records are similar and suggest that the Odonata fauna is dominated by generalist species and has changed little since the agricultural period. Our list provides a point of reference to understand biodiversity patterns in Puerto Rico and the Caribbean and for assessing the effects of land use change on aquatic insect diversity." (Authors)] Address: Ramírez, A., Dept of Applied Ecology, North Carolina State Univ., Raleigh, NC, USA. E-mail: alonso.ramirez@ncsu.edu

**17920.** Ramos-Sanchez, J.; García-Valero, Á.; Menor-Albero, R.; Tarruella-Rodenas, M.J.; Fernández-Terrer, J.L.;

Martínez-García, T.; Evangelio, J.M. (2020): Primeras citas de *Onychogomphus cazuma* Barona, Cardo & Díaz, 2020 (Odonata: Anisoptera: Gomphidae) para la región de Castilla-La Mancha (centro-este de España). *Anales de Biología* 42: 167-171. (in Spain, with English summary) ["The first data on the biology of *O. cazuma* in Castilla-La Mancha region are provided. Its reproduction in this territory is confirmed by the detection of exuvians and a teneral female. The species had been only detected in the province of Valencia, in locations more than 100 km away." (Authors)] Address: Ramos-Sánchez, J., AHSA, Amigos de los Humedales del sur de Alicante. Apartado de correos 292, 03280 Elche, Spain

**17921.** Ranjan, K.S.; Pawar, A.A.; Roy, A.; Saha, S. (2020): Trans-continental migration of dragonfly *Pantala flavescens* between India and Africa: Energetics and Role of wind. *Bulletin of the American Physical Society*; 73rd Annual Meeting of the APS Division of Fluid Dynamics; Sunday–Tuesday, November 22–24, 2020; Virtual, CT (Chicago time). Session X02: Biological Fluid Dynamics: Flying (10:45am - 11:30am). 10:45 AM, Tuesday, November 24, 2020: (in English) [Verbatim: *P. flavescens* migrates between India and Africa, covering a distance of around 14000-18000 km, crossing the Indian ocean twice, which is very extraordinary for a dragonfly or any flier. The route followed in this migration is India-Maldives-Seychelles-Africa-India, comprising of four legs. For such a migration, flight energetics and role of wind are most important factors. Computation models were developed for energetics, optimal time and route estimation. Energetics estimation shows, a *P. flavescens* can fly for 90hrs, covering a distance of 1400km; without wind, time required for the completion of migration is more than 90hrs for all the legs. Our results show that with wind assistance, the time taken is well within 90hrs for all the legs. Also, *P. flavescens* detour from the virtual direct line connecting the two points of a leg in the sense of geodesic, and it follows the wind, which is expected based on the wind compensation capability of dragonflies. The results clearly show that wind assistance is vital if *P. flavescens* has to complete the migration. *Pantala flavescens* is able to achieve this great feat with the help of winds and stand in league of birds as far as migration flight is concerned.] Address: Indian Inst. Technology Kharagpur

**17922.** Reels, G.T. (2020): A ranking of key dragonfly sites in Hong Kong using a species conservation value assessment metric. *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 31: 1-50. (in English) ["Dragonflies were surveyed at 33 sites across the territory of Hong Kong Special Administrative Region over the period 2016-2017. Surveys included identification of larvae, exuviae and adults, and involved 92 separate site visits. The chosen sites covered the whole spectrum of dragonfly habitats in Hong Kong, with the exception of actively managed fish ponds and reservoirs. Twenty-two of the study locations had been identified as "key dragonfly sites" by Wilson (1997a); eight of these are found to no longer merit such status. Two of the "key dragonfly sites" are here retained and expanded to include adjacent dragonfly-rich areas, and four new key dragonfly

sites are proposed. Sites are evaluated by species richness, number of species of conservation importance (Reels 2019), and by means of a species conservation value metric (Reels 2019) applied to the entire dragonfly species assemblage present at each site. By all such measures, Sha Lo Tung / Hok Tau is determined to be Hong Kong's premier dragonfly site." (Author)] Address: Reels, G.T., 31 St Anne's Close, Winchester, SO22 4LQ, UK. E-mail: gtreels@gmail.com

**17923.** Rippel, C.G.; Neiss, U.G.; Del Palacio, A.; Schröder, N.M.; 4, Fleck, G.; Hamada, N.; Martí, D.A.; Schweigmann, N.J. (2020): Description of the last-instar larva of *Zenithoptera lanei* Santos, 1941 (Odonata: Libellulidae). *Zootaxa* 4732(3): 488-494. (in English) ["The larva of *Z. lanei* is described and illustrated based on three exuviae of reared larvae collected in Misiones, Argentina, Roraima and Amazonas, Brazil. A comparison with the larva of *Z. anceps* Pujol-Luz, 1993 is included." (Authors)] Address: Rippel, Camila, Laboratorio de Genética Evolutiva. Instituto de Biología Subtropical (IBS) CONICET-UNaM. FCEQyN, Félix de Azara 1552, Piso 6°. Posadas, Misiones, Argentina. E-mail: camilag.rippel@gmail.com

**17924.** Rodríguez-Esteban, M.; Hernández Alonso, D. (2020): Nuevas citas de *Brachythemis impartita* (Karsch, 1890) y *Trithemis kirbyi* Selys, 1891 en la provincia de Salamanca (centro-oeste Península Ibérica) (Odonata: Libellulidae). *Archivos entomológicos* 22: 109-112. ["New records of *B. impartita* and *Trithemis kirbyi* in the province of Salamanca (center-western Iberian Peninsula). The 3rd and the 2nd provincial records, respectively, of *Brachythemis impartita* and *Trithemis kirbyi* for the province of Salamanca (central-western Spain) are reported." (Authors)] Address: Rodríguez-Esteban, M., Avda. S. Agustín, 44, portal 1, 1ºA. 37005 Salamanca, Spain. E-mail: elomitoblog@hotmail.com

**17925.** Rodríguez-Esteban, M.; Hernández-Mata, E. (2020): Nuevos registros y confirmación de la reproducción de *Sympetrum vulgatum ibericum* Ocharan, 1985 (Odonata: Libellulidae) en la provincia de Salamanca (España). *Boletín de la Sociedad Entomológica Aragonesa* 66: 231-232. (in Spanish, with English summary) ["New data and evidence of breeding of *S. vulgatum ibericum* Ocharan, 1985 in the province of Salamanca (Spain). Breeding evidences (teneral and reproductive behaviour) of *S. vulgatum ibericum* on Salamanca province are provided." (Authors)] Address: Rodríguez-Esteban, M., Avda San Agustín, 44. Portal 1. 1º A. 37005, Salamanca, Spain. E-mail: elomitoblog@hotmail.com

**17926.** Rodríguez-Esteban, M.; Benito-Ruiz, A.; Hernández-Martín, H.; Martín-Diego, M.; Salvador-Vilariño, V. (2020): Ampliación del rango de distribución conocido de la libélula *Aeshna juncea* (Linnaeus, 1758) (Odonata: Aeshnidae) en Castilla y León (España). *Boletín de la Sociedad Entomológica Aragonesa* 66: 225-230. (in Spanish, with English summary) ["Extension of the known range of the dragonfly *A. juncea* in Castilla y León (Spain). "The first records of *A. juncea* from the provinces of Ávila, Palencia and Salamanca

are presented, and new localities are added from the provinces of Burgos, León, and Zamora (central Iberian Peninsula). Furthermore, detailed information about two published records from Soria province is given." (Authors)] Address: Rodríguez-Esteban, M., Avda San Agustín, 44. Portal 1. 1º A. 37005, Salamanca, Spain. E-mail: elomitoblog@hotmail.com

**17927.** Rodríguez-Esteban, M.; Hernández-Alonso, M.; Palomo-Sepúlveda, M.; Martín-Diego, M.; Hernández-Martín, H.; Andrés-Criado, A.; Benito-Ruiz, A. (2020): Primera observación de *Diplacodes lefebvrii* (Rambur, 1842) y nuevas citas de *Trithemis annulata* (Palisot de Beauvois, 1807) en la provincia de Salamanca (centro-oeste península ibérica) (Odonata: Libellulidae). *Boletín de la Sociedad Entomológica Aragonesa* 67: 407-410. (in Spanish, with English summary) ["This brief note reports the first record of *D. lefebvrii* for the province of Salamanca and region of Castilla y León and new contributions to the distribution of *T. annulata* in the province of Salamanca." (Authors)] Address: Palomo-Sepúlveda, Miryam, Instituto de Biodiversidad CIBIO, Univ. de Alicante, Crta. San Vicente del Raspeig s/n, E-03080 (Alicante), Spain. E-mail: miryampalomo@hotmail.com

**17928.** Rohman, A.; Faradisa, N. (2020): Dragonfly diversity (Insect: Odonata) in Asem Binatur River, Pekalongan, Indonesia. *Borneo Journal of Resource Science and Technology* 10(1): 79-84. (in English) ["This research was conducted in the Asem Binatur River, Pekalongan, Indonesia, from November 2018 to April 2019. The purpose of this study was to determine species diversity, the index value of the Pekalongan River dragonfly diversity by using the point count method. Long hand high net, wrapping paper/papilot and camera were used to catch and observe the dragonflies. The Shannon-Wiener species diversity index was calculated. Seven species of dragonflies were recorded from Asem River. There were *Diplacodes trivalis*, *Neurothemis ramburii*, *N. stigmatizans*, *Crocothemis servilia*, *Pantala flavescens*, *Orthetrum sabina* and *O. chrysis*. The Shannon-Wiener diversity index analysis was ranged from 0 to 0.31, indicating low diversity. Abiotic parameter measurements showed the humidity was 67.17%, the soil pH was 7.11, the light intensity was 46310 lux and the temperature was 30 °C. The analysis of the dragonfly diversity index was correlated with the poor water quality status in Asem Binatur River, Pekalongan." (Authors)] Address: Rohman, A., Biology Education, Faculty of Teacher Training & Education, University of Jember, 68121, Indonesia. E-mail: abdu.fkip@unej.ac.id

**17929.** Roman-Heracleo, J.; Springer, M.; Novelo-Gutiérrez, R. (2020): Redescription of the larva of *Neoerythromma cultellatum* (Hagen in Selys, 1876) (Odonata: Coenagrionidae: Coenagrioninae). *Zootaxa* 4830(3): 565-572. (in English, with Spanish summary) ["The final instar of *N. cultellatum* is redescribed and illustrated based upon reared specimens from Turrialba, Cartago, Costa Rica. This is a detailed complement of the original description provided by García-Díaz (1938) and illustrated with high quality photos of the larval morphology. The larva of *N. cultellatum* is characterized by a slender, spinulose, and yellow to yellowish-

brown body, premental setae 3+1, five palpal setae, male cerci long, and caudal lamella lanceolate, with obvious node, spotted, and markedly tracheate." (Authors)] Address: Roman-Heracleo, J., Sistema de Estudios de Posgrado en Biol., Univ. de Costa Rica, San Pedro Montes de Oca, 2060 San José, Costa Rica. E-mail: romanjareth@gmail.com

**17930.** Román-Heracleo, J.; Springer, M. (2020): First record of *Elga leptostyla* Ris, 1911 (Odonata, Libellulidae) from Costa Rica. *Check List* 16(4): 911-914. (in English) ["During research in the Tirimbina Biological Reserve, on the Caribbean slope of Costa Rica, we captured adult specimens and reared larvae of *Elga leptostyla* Ris, 1911 (Libellulidae). This species was previously reported only from southern Panama to northern South America. Therefore, this is the first record of the species and genus from Costa Rica, increasing the number of Libellulidae species recorded in the country to 95. This species' known distribution is northwards." (Authors)] Address: Román-Heracleo, J., Sistema de Estudios de Posgrado en Biología, Univ. de Costa Rica, San Pedro Montes de Oca, 11501-2060 San José, Costa Rica. E-mail: romanjareth@gmail.com

**17931.** Rusconi, J.M.; Di Battista, C.; Balcazar, D.; Rosales, M.; Achinelly, M.F. (2020): *Amphimermis enzoni* n. sp. (Nematoda: Mermithidae) parasitizing damselflies and dragonflies in Argentina. *Journal of Nematology* 52: 1-9. (in English) ["A mermithid nematode was found parasitizing nymphs of Odonata. The host specimens were collected from the stream Cajaravilla, Magdalena, Buenos Aires state, Argentina. In this work, we described *Amphimermis enzoni* n. sp., a nematode new to science. Nematodes were identified through morphological and molecular methods. The combination of the following characters separates *A. enzoni* n. sp. from other members of the genus *Amphimermis* Steiner: long and S-shaped vagina, twisted spicules for proximal 34% of their length, untwisted for 12%, again twisted for 30%, and untwisted for the last 24%; genital papillae arranged in three rows, medial row marginally longer than sub-medial rows; medial row bifurcated immediately anterior and posterior to cloaca, with 111 genital papillae (73 pre-anals and 38 post-anals). The sequences of 18S rDNA regions from *A. enzoni* formed a well-supported monophyletic clade with two GenBank sequences of *Amphimermis* spp. (EF617354 and EF617355) with 0.63 to 1.26% divergence and two Mermithidae spp. (LC512371 and LC512370) with 0.63 to 1.1% divergence, respectively. To our knowledge, this is the first example of mermithid infection in nymphs of dragonflies and damselflies for South America." (Authors)] Address: Rusconi, J.M., Centro de Estudios Parasitológicos y de Vectores, (CEPAVE)-CCT-La Plata-CONICET-UNLP, Boulevard 120 S/N e/61 y 64, (1900) La Plata, Buenos Aires, Argentina. E-mail: rusconi@cepave.edu.ar

**17932.** Sasamoto, A.; Saitoh, K.; Futahashi, R. (2020): The second record in Japan of *Somatochlora exuberata exuberata* Bartenev, 1910 (Odonata: Corduliidae) from Nagano Prefecture, Honshu, Japan Akihiko. *Tombo* 62: 123-125. (in Japanese, with English summary) ["A female *Somatochlora*

*exuberata exuberata* Bartenev, 1910 was collected at Nagano Prefecture, Honshu, Japan. This is the second record of the nominotypical subspecies from Japan." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**17933.** Sasamoto, S.; Yanagisawa, T.; Yokoi, N.; Zhang, H.; Souphanthong, V.; Futahashi, R. (2020): The record of dark color form of *Merogomphus pavici* from Laos (Odonata: Gomphidae). *Tombo* 62: 73-76. (in English, with Japanese summary) ["*M. pavici* (sometimes incorrectly spelled as "paviei" is the type species of the genus, distributed in Taiwan, southern and eastern continental China, Vietnam, Thailand and Laos (Kosterin, 2016). Male of *M. pavici* usually has yellow and black pattern of synthorax, as typical in Gomphidae, with characteristics abdominal maculation, as shown Fig. 1C (Asahina, 1968 [as *Merogomphus chui*, which is a junior synonym of *M. pavici*]; Chao, 1990). However, we obtained conspicuously dark color form of *M. pavici* from Laos. Although photograph of such specimen has already appeared on Yokoi & Souphanthong (2014), there are no detail remarks. Therefore we here discuss this interesting form on morphology and genetic analysis." (Authors)] Address: Sasamoto, A., Mawaramoto-cho, Shiki-gun, Nara prefecture, 636-0341, Japan. E-mail: akssmt@sea.plala.or.jp

**17934.** Schädel, M.; Müller, P.; Haug, J.T. (2020): Two remarkable fossil insect larvae from Burmese amber suggest the presence of a terminal filum in the direct stem lineage of dragonflies and damselflies (Odonata). *Rivista Italiana di Paleontologia e Stratigrafia* 126(1): 13-35. (in English) ["The fossil record of dragonfly relatives (Odonoptera) dates back to the Carboniferous, yet knowledge about these extinct animals is meagre. For most of the species little is known except for the characteristics of the wing venation. As a result, it is difficult to include fossil larvae in a (wing character based) phylogenetic tree as the wing venation is not visible in most of the larval instars. Two larval specimens from Cretaceous Burmese amber are in the focus of this study. The two specimens likely represent two subsequent early stage larval instars of the same individual. Not only is this an exceptional case to study ontogenetic processes in fossils – the larval instars are morphologically completely different from all known larvae of Odonata with respect to the posterior abdominal region. Therefore, besides the difficulties regarding the phylogenetic interpretation and though all Burmese amber odonatans are known from adults only, a new species – *Arcanodraco filicauda* n. sp. – is formally described. Aside from likely representing a new species, the morphology of the posterior abdominal region is highly informative for reconstructing the character evolution within the lineage towards modern dragonflies and damselflies. A long median process in both of the fossils meets all criteria to be interpreted as a terminal filum (structure or derivative of tergite of abdominal segment 11, annulated in one of the specimens). Although the exact phylogenetic affinity of *Arcanodraco filicauda* n. sp. remains enigmatic, the presence of a larval terminal filum can be reconstructed for the ground



pattern of Odonoptera (including its direct stem lineage)." (Authors)] Address: Schädel, M., Dept of Biology, Ludwig-Maximilians-Univ. München, Großhaderner Str. 2, 82152 Planegg-Martinsried, Germany. E-mail: mario.schaedel@palaeo-evo-devo.info

**17935.** Schneider, T.; Sar, K.D.; Schneider, J. (2020): Odonata from N-Myanmar during dry season – the Putao-Region. *Entomologische Zeitschrift*, Schwanfeld 130(4): 213-216. (in German, with English summary) ["There is a lack of knowledge about the Odonata fauna of Myanmar, because little field work was done there in the last decades. We undertook a first approach to study the Odonata fauna of the Putao-Region (N-Myanmar) during dry season 2019. Thirty-six species were observed during a five day fieldtrip. Most of the species were widely distributed in the deforested surrounding of Putao and belong to common dragonflies of South-East Asia. Other more rare species were restricted to brooks in the natural forests adjacent to the deforested area, like: *Matrona nigripictus*, *Aristocypha fenestrella*, *Euphaea sanguinea*, *Indocnemis orang*, and *Coeliccia svihleri*." (Authors)] Address: Sar, K.D., Lung Sha Yang No.192, Puta-O, Kachin State, Myanmar

**17936.** Schorr, M. (2020): Wolfgang Schneider (10. August 1953 - 17. September 2019). *International Dragonfly Fund Report* 150: 1-2. (in German) [obituary] Address: Schorr, M., Schulstr. 7B, 54314 Zerf, Germany. E-mail: oestlap@online.de

**17937.** Schröder, N.; Anjos-Santos, D.; Rippel, C.G.; Pesacq P. (2020): Description of the last instar larva of *Peristicta aeneoviridis* Calvert, 1909 (Odonata: Coenagrionidae). *Zootaxa* 4728(4): 461-468. (in English) ["The larva of *P. aeneoviridis* is described for the first time, based on material from Misiones Province, Argentina. It differs from the rest of the larvae described for the genus in the shape and coloration of caudal lamellae, femur setae, lacinia teeth and coloration patterns. Additions to the description of the larva of *P. forceps* Hagen in Selys, 1860 are included." (Authors)] Address: Schröder, Noelima, Lab. de Biotecnología Molecular, Instituto de Biotecnología Misiones, FCEQyN, UNaM. Ruta 12 km 7.5—Posadas, Misiones, CP 3300, Argentina

**17938.** Senn, P. (2020): Records of dragonflies (Odonata: Zygoptera, Anisoptera) from an endangered peat pool in Gdynia, northern Poland. *Odonatrix* 16\_2 (2020): 6 pp. (in Polish, with English summary) ["The paper reports 11 odonate species, including *Leucorrhinia pectoralis* (legally protected in Poland), recorded in 2018 at a peat pool in Gdynia, northern Poland, which is endangered by the construction of a new multi-level expressway interchange." (Author)] Address: Senn, P., ul. Kańskiego 7D/9,81-603 Gdynia, Poland. E-mail: petersenn47@gmail.com

**17939.** Sheikh, A.H.; Lone, M.A.; Wani, M.A. (2020): New distributional records of dragonflies (Libellulidae: Anisoptera: Odonata) from Rajori district of Jammu and Kashmir. *Journal of Entomological Research* 44(1): 121-124. (in English) ["The present paper reports five libellulid species from

the Rajori district of Jammu and Kashmir. All five species are reported for the first time from this area: *Orthetrum prunosum*, *O. sabina*, *Crocothemis servilia*, *Neurothemis tullia* and *Tramea basilaris*." (Authors)] Address: Sheikh Altaf Hus-sain, Dept Zool., Government Degree College, Pulwama-192 301, Jammu and Kashmir, India. E-mail: khushialtaf1986@gmail.com

**17940.** Shimbori, O.; Futahashi, H.; Futahashi, R. (2020): Records of *Sympetrum frequens* (Selys, 1883) in January in Toyama Prefecture Osamu. *Tombo* 62: 141-143. (in Japanese, with English summary) ["We recorded *S. frequens* in January in Kami-ichi Town, Toyama Prefecture. To our knowledge, January 19 is the latest appearance date for this species in Japan." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**17941.** Sih, C.; Ngiam, R. (2020): A dragonfly of the genus *Heliaeschna* in Jalan Lembah Thomson estate. *Singapore Biodiversity Records* 2020: 24-25. (in English) ["Singapore Island, Jalan Lembah Thomson; 2-XI-2019; 2200 hrs. Habitat: Suburban housing estate. In the outdoor kitchen of a terrace house." (Authors)] Address: sihchristian@gmail.com

**17942.** Silva Pinto, R.M.; Lopes, J.P.; Trainor, C.R.; Seehausen, M. (2020): New records of Odonata from the eastern Lesser Sunda Islands of Timor, Semau, Rote, and Alor, with discovery of *Hemicordulia eduardi* (Odonata: Corduliidae). *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 33: 1-60. (in English) ["Eleven species of Odonata are reported for the first time from Timor and Semau Islands, 13 new records are reported for Rote Island and four new records for Alor Island. These records increase the checklists to 51 species for Timor (thereof 45 from Timor-Leste), 11 for Semau, 23 for Rote and 13 for Alor. An annotated listing is provided for these four islands. Furthermore three species were rediscovered at Timor: *Indolestes lafaeci* Seehausen, 2017 for the first time since the type series collected in 1929, also the first photographs of living individuals and notes about the habitat are provided; *Diplacodes haematodes* (Burmeister, 1839) for the first time since 1935 and *Tramea loewii* Brauer, 1866 for the first time since an unspecified record published by Lieftinck (1953). The identification of *Hemicordulia eduardi* Lieftinck, 1953, formerly supposed to be an endemic from Sumba Island, is discussed with reference to the holotype male. Also notes about the habitat and behaviour are given. Five taxa of the *Rhyothemis phyllis* (Sulzer, 1776) group were shortly discussed with respect to the individuals from Timor which are provisionally assigned to ssp. *ixias* Lieftinck, 1953. Illustrations of the face, labium and wings of the nominate subspecies as well as of ssp. *ixias*, ssp. *obscura* (Brauer, 1868), ssp. *snelleni* (Selys, 1878), and ssp. *chloe* (Kirby, 1894) are provided." (Authors)] Address: Seehausen, M., Museum Wiesbaden Hessisches Landesmuseum für Kunst und Natur, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

- 17943.** Simaika, J.P.; Ware, J.L.; Garrison, R.W.; Samways, M.J. (2020): Phylogeny of the Synlestidae (Odonata: Zygoptera), with an emphasis on *Chlorolestes* Selys and *Ecchlorolestes* Barnard. *Scientific Reports* 10(15088) (2020) 12 pp. (in English) ["The Synlestidae of southern Africa comprise some highly localized species. All but one species are endemic to South Africa, and many to the Cape Floristic Region. Here we present the first phylogenetic reconstruction of the southern African Synlestidae using nuclear and mitochondrial molecular data. The genera *Ecchlorolestes* and *Chlorolestes* are monophyletic, and we propose that the Neotropical family Perilestidae consisting of two genera, *Perilestes* and *Perisolestes*, be sunk within Synlestidae. We discuss the intra-familial relationships for the southern African Synlestidae." (Authors)] Address: Simaika, J.P., IHE Delft Institute for Water Education, Westvest 7, 2611 AX Delft, The Netherlands. E-mail: j.simaika@un.ihe.org
- 17944.** Snegovaya, N.Yu. (2020): A progress study of the Odonata from Azerbaijan in summer 2019. *International Dragonfly Fund Report* 142: 1-20. (in English) [Azerbaijan, "15 localities in seven districts (Quba, Khachmaz, Goygol, Samukh, Gusar, Siyazan, Shabran). A total of 36 species was recorded, including *Lestes macrostigma*, *Ischnura fountaineae*, *Coenagrion pulchellum*, *Lindenia tetraphylla*, *Sympetrum vulgatum*." (Author)] Address: Snegovaya, Nataly, Zoological Institute NAS of Azerbaijan, proezd 1128, kvartal 504, Baku, AZ 1073, Azerbaijan. E-mail: snegovaya@yahoo.com
- 17945.** Sparrow, D.J.; Makris, C.; Sparrow, R.; Michaelides, M.; Konis, D.; De Knijf, G. (2020): First records of *Aeshna isoceles* and the rediscovery of *Lestes barbarus* on Cyprus (Odonata: Lestidae, Aeshnidae). *Notulae odonatologicae* 9(5): 185-195. (in English) ["In this paper we report the presence of *A. isoceles* for the first time from Cyprus. Five males were observed and photographically documented in May 2012 in a small valley below Rizokarpaso on the Karpasia peninsula. This was, however, not followed up at that time. The species was rediscovered by members of the CDSG in the same valley in April 2019. Reproductive behaviour (copula and oviposition) was observed and a population is assumed to be present. It seems possible that the species has been present on the island for some time but overlooked, due to the remoteness of the site. Furthermore, members of the CDSG also photographically documented a male *L. barbarus* at an agricultural tank near Agridia in August 2019. The last published sighting of this species on Cyprus was of four specimens dating back to 1948 that are stored in the collection of the British Museum of Natural History. We further report on two unpublished sightings of this species at Fasouri marsh in 1997 and on the Gialias river near Kotsiatis in 2002. The records of *Aeshna isoceles* increase the Odonata checklist for Cyprus to 38 species." (Authors)] Address: Sparrow, D.J., Cyprus Dragonfly Study Group (CDSG), P.O. Box 62624, 8066, Paphos, Cyprus. E-mail: davidrospfo@hotmail.com
- 17946.** Spitsyn, V.M.; Zhukova, T.A. (2020): New data on the distribution of Banded Demoiselle *Calopteryx splendens* in the Arkhangelsk region. *Fauna of the Urals and Siberia* 1: 41-42. (in Russian, with English summary) ["We report the northernmost records of *C. splendens* in the Arkhangelsk region. We found specimens of the species in the valleys of the rivers Pinega (64.2792°N, 44.2632°E) and Bolshaya Yura (64.4124°N, 41.6996°E) (the River Severnaya Dvina basin)." (Authors)] Address: Spitsyn, V.M., Federal Center for Integrated Arctic Research, Russian Academy of Sciences, 23, Severnoy Dviny emb., Arkhangelsk, Russia, 163000. E-mail: spitsyn.v.m.91993@yandex.ru
- 17947.** Stand-Perez, M.A.; Perez-Gutierrez, L.A. (2020): *Pseudotepuibasis* gen. nov., a new monotypic genus of Coenagrionidae from Colombian Amazon (Odonata: Zygoptera). *Zootaxa* 4845(4): 576-584. (in English) ["*Pseudotepuibasis* gen. nov. is erected for *P. garrisoni* sp. nov. from the Colombian Amazon (December 2015, Caquetá Department, Solano Municipality, Araracuara, Guacamayo Guard, -72.2497, -0.6308, L. Pérez leg.). Male and female of this new genus are described and illustrated, cerci of male with a ventrobasal spur for which it is considered in the tribe Teinobasini, close to *Tepuibasis* De Marmels, 2007 and *Austrotepuibasis* Machado & Lencioni, 2011, by its color pattern and cerci morphology; and close to *Leptobasis* Selys, 1877 and *Mesoleptobasis* Sjöstedt, 1918, by its genital ligula. Some notable characters of *Pseudotepuibasis* are a chitinized spine-like process directed posteriorly on the genital ligula, male cerci with chitinized median tooth, and thoracic color pattern." (Authors)] Address: Perez-Gutierrez, L.A., Lab. Sistemática de Insetos Aquáticos (LABSIA), Univ. Federal do Paraná, Jardim das Américas, Curitiba, Brasil. E-mail: talysker@gmail.com
- 17948.** Subramanian, K.A.; Babu, R.; Kalkman, V.J. (2020): *Orthetrum erythronigrum* sp. nov. (Odonata: Libellulidae) from the Great Nicobar Island, India. *Zootaxa* 4869(2): 242-250. (in English) ["The male and female of *Orthetrum erythronigrum* sp. nov. are described from Great Nicobar Island and are believed to be endemic to the Nicobar Islands archipelago (holotype male, India, Andaman and Nicobar Islands, Great Nicobar Island, Great Nicobar Biosphere Reserve, N 6.99067, E 93.871363; 01-xii-2018; deposited in ZSI, SRC, Chennai, India). The male of this new species is easily distinguished from other known *Orthetrum* species by its black abdomen with contrasting crimson belly. Female is distinguished by its large size, the black non-metallic head, black thorax and the red abdomen with a distinct black pattern. Based on field observations and photographs, notes on the life colouration of the mature male and information on the distribution and habitat of this Great Nicobar endemic are provided." (Authors)] Address: Sunramanian, K.A., Zoological Survey of India, Southern Regional Centre, Santhome High Road, Chennai-600 028, Tamil Nadu, India. E-mail: subbuka.zsi@gmail.com
- 17949.** Sugiman, U.; Atmowidi, T.; Priawandiputra, W. (2020): Diversity of dragonflies (Insecta: Odonata) in Ujung Kulon National Park. *IOP Conf. Series: Earth and Environmental Science* 457 (2020) 012031: 7 pp. (in English) ["Ujung Kulon National Park is a lowland tropical forest that was still preserved. There was limited information about the diversity

of dragonflies in Ujung Kulon National Park. The purpose of this study was to study species diversity of dragonfly in Ujung Kulon. The research was conducted in Ujung Kulon Peninsula, Banten, Indonesia in five locations and three types of aquatic habitats i.e., natural ponds, streams in forests, and rivers. The transect line method is used to collect adult dragonflies. 31 species ... were reported in this study. 22 species were as new records based on previous publications. There were different species compositions in all habitat types ( $R = 1$ ,  $p = 0.0016$ , one-way ANOSIM with Bray-Curtis similarity index). Natural ponds have the highest anisopteran species richness compared to other habitats. Eight species Anisoptera only were found in natural ponds. Meanwhile, zygopteran species prefer in flowing water habitat." (Authors)] Address: Sugiman, U., Dept Biol., Faculty Math. & Natural Sciences, IPB Univ., Kampus IPB Darmaga, Bogor 16680 Indonesia. E-mail: atmowidi@apps.ipb.ac.id

**17950.** Sugimura, M.; Futahashi, R. (2020): A record of an interspecific hybrid between *Sympetrum eroticum* (Selys, 1883) and *S. kunckeli* (Selys, 1884) from Kochi Prefecture, Shikoku, Japan. *Tombo* 62: 104-105. (in English, with Japanese summary) ["A male interspecific hybrid between *S. eroticum* and *S. kunckeli* was captured in Gudo, Shimanto, Kochi Prefecture, Honshu, Japan. This is the first record of this hybrid from the prefecture. This specimen has intermediate morphological characteristics and the results of nuclear and mitochondrial DNA analyses indicate that this individual was derived from interspecific mating between a male *S. eroticum* and a female *S. kunckeli*."] Address: Sugimura, M., 9-7, Uyamasatsuki-cho, Nakamura City, Kochi Prefecture, 787, Japan. E-mail:tombo@gakuyukan.com

**17951.** Supple, J.A.; Pinto-Benito, D.; Khoo, C.; Wardill, T.J.; Fabian, S.T.; Liu, M.; Pusdekar, S.; Galeano, D.; Pan, J.; Jiang, S.; Wang, Y.; Liu, L.; Peng, H.; Olberg, R.M.; Gonzalez-Bellido, P.T. (2020): Binocular encoding in the damselfly pre-motor target tracking system. *Current Biology* 30(4): 645-656. (in English) ["Highlights: • Demoiselles align their prey frontally during predatory flights • Target-selective descending neurons are homologous in dragonflies and damselflies • TSDN reference frame is binocular-fused in damselflies but sagittal in dragonflies • Summation to threshold explains binocular responses of demoiselle TSDNs. Summary: Akin to all damselflies, *Calopteryx*... possess dichoptic (separated) eyes with overlapping visual fields of view. In contrast, many dragonfly species possess holoptic (dorsally fused) eyes with limited binocular overlap. We have here compared the neuronal correlates of target tracking between damselfly and dragonfly sister lineages and linked these changes in visual overlap to pre-motor neural adaptations. Although dragonflies attack prey dorsally, we show that demoiselles attack prey frontally. We identify demoiselle target-selective descending neurons (TSDNs) with matching frontal visual receptive fields, anatomically and functionally homologous to the dorsally positioned dragonfly TSDNs. By manipulating visual input using eyepatches and prisms, we show that moving target information at the pre-motor level depends on

binocular summation in demoiselles. Consequently, demoiselles encode directional information in a binocularly fused frame of reference such that information of a target moving toward the midline in the left eye is fused with information of the target moving away from the midline in the right eye. This contrasts with dragonfly TSDNs, where receptive fields possess a sharp midline boundary, confining responses to a single visual hemifield in a sagittal frame of reference (i.e., relative to the midline). Our results indicate that, although TSDNs are conserved across Odonata, their neural inputs, and thus the upstream organization of the target tracking system, differ significantly and match divergence in eye design and predatory strategies." (Authors)] Address: Supple, J. A., Dept of Physiology, Development, & Neuroscience, Univ. of Cambridge, Downing Str., Cambridge CB3 2EG, UK

**17952.** Susanth, C.; Anooj, S.S. (2020): Checklist of Odonata of Wayanad District, Kerala. *Indian Journal of Entomology* 82(2): 315-323. (in English) ["This study presents the Odonata diversity of Wayanad district of Kerala. 59 species in 40 genera and seven families are included, of which Libellulidae included the most number of species followed by the Coenagrionidae. A check list of the species observed is provided." (Authors)] Address: Anooj, S.S., Division of Entomology, ICAR-Indian Agricultural Research Institute, New Delhi 110012, India. E-mail: anooj227@gmail.com

**17953.** Susanto, M.A.S.; Abdillah, M.M.; Permana, R.C.; Mubarak, Z.; Anwar, M.S. (2020): Inventarisasi Jenis Capung (Anisoptera) Dan Capung Jarum (Zygoptera) di Sumber Clangap dan Sumber Mangli Kabupaten Kediri. *Seminar Nasional Biologi 5 tahun 2020 - Jurusan Biologi Fakultas Sains dan Teknologi, UIN Sunan Gunung Djati Bandung*: 113-119. (in Indonesian, with English summary) ["Sumber Clangap and Mangli are springs that are located at Puncu Village, Puncu District, Kediri Regency. These two springs are commonly used by local residents as their water resources. Both locations have a good water quality that makes them suitable habitats for dragonflies. This research was aimed to make an inventory of odonate species in Sumber Clangap and Mangli. The method used in this research was belt transect and visual day flying to obtain data on the type and number of dragonflies. The data obtained were then analyzed using the Shannon-Wiener Heterogeneity Index and the percentage of relative abundance. The results showed that the Odonata taken from Sumber Clangap comprised 13 species from 6 families, while in Sumber Mangli there were 10 species from 7 families. Sumber Clangap had a higher value of diversity ( $H' = 1.99$ ) compared to Sumber Mangli ( $H' = 1.79$ ). The percentage of relative abundance analysis showed that *Euphaea variegata* was the most dominant species in both locations with a value of 27.30%." (Authors)] Address: Susanto, M.A.S., Program Studi Biologi, Fakultas Sains dan Teknologi UIN Sunan Ampel Surabaya, Jalan A. Yani 117, Surabaya, Indonesia. E-mail: muhammadazmidwi@gmail.com

**17954.** Suzuki, K.; Watanabe, Y.; Tojo, K. (2020): Embryogenesis of the damselfly *Euphaea yayeyamana* Oguma (Insecta: Odonata: Euphaeidae), with special reference to the



formation of their larval abdominal "gill-like" appendages. *Entomological Science* 23: 280-293. (in English) ["The acquisition of wings in insects is the most significant subject in considering the diversification and adaptive radiation of insects, that is, the "macro-evolution" of insects. In the discussion of the origin of insect wings, Palaeoptera has attracted particular attention in phylogenetic and evolutionary studies. In particular, Ephemeroptera have segmental gill-structures on their abdominal segments during their nymphal stage, and these have been noted in discussions regarding their homology and/or serial homology between wings, gills and appendages. Although Odonata has received little attention in the course of these discussions, there are cases of segmental gill-like structures on their abdomen in the two families, Euphaeidae and Polythoridae. Under such circumstances, in this study, the embryological developmental process in *Euphaea yayeyamana* of Euphaeidae was observed, focusing on the formation process of the gill-like structures. As a result, it was revealed that four of the seven pairs of gill-like projection structures started their visible formation within the middle stages of embryonic development, and the remaining three pairs developed during the early stages of post-embryogenesis. Some joint-like structures existed in all of the gill-like projections. It was revealed that muscle tissue was interposed within these protrusions and that all of the projections themselves fully articulated, and that the nervous system was extended into the protrusions. All of the gill-like projections strongly suggested their homology with the cephalic and thoracic appendages, when we considered them with regard to their serial homology based on the topology of their formation position." (Authors)] Address: Suzuki, K., Department of Biology, Faculty of Science, Shinshu University, Matsumoto, Japan,

**17955.** Taguchi, M. (2020): Variation and blackening of the white pruinosity on the dorsal abdomen in a mature male of the white-tailed skimmer *Orthetrum albistylum* Selys, 1848 (Anisoptera: Libellulidae) in coastal, Yokohama. *Tombo* 62: 91-103. (in English, with Japanese summary) ["The pruinosity, consisting of wax, of *O. albistylum* is considered to play an advantageous role in territorial behavior and communication between individuals, by strongly reflecting ultra violet light (UV). In 2018, in Keihin district, Yokohama City, a blacked male specimen with pruinosity on only half of the abdomen was discovered. As a result of this, we researched variation in this species in five localities; three in the city, one in the northern part of the prefecture (Kenhoku), and one south of Tama district. We found there was a broad spectrum on the dorsum of the 6th abdominal segment of mature male specimens, as divided into five stages, from lacking pruinosity to completely pruinose. In addition, it was revealed that the pruinosity area does not change once maturity is reached. In the coastal region, although UV and radiant heat are strong, the blackish variant was more frequent compared to other regions. This variant is considered to be weaker in its sexual appeal, but the sex ratio in the coastal region was biased to female, and male competition was not so strong. On the other hand, the sex ratio at Kenhoku was most biased to male, and there male

competition appeared to be strongest. The results from Kenhoku showed that the individuals with most developed pruinosity were dominant, and the ratio of this variant was negatively correlated with the ratio of female/male. When immature, the adults of Odonata need to develop the muscle of the thorax, moreover, males of this species have to secrete the wax for pruinosity. Because small worms are not abundant for food in the coastal region, it is speculated that to reduce the burden of producing wax the colour change is an adaptation, creating situation with less male competition. However, a bottleneck effect cannot be excluded in such phenomenon, and actually, multi factors may induce the frequency of blackened variants of the male in the coastal region." (Author)] Address: Taguchi, M., Yaei-Higashi High School, Sagami-hara, Kanagawa 229-0029, Japan. E-mail: taguchim@cameo.plala.or.jp

**17956.** Theischinger, G. (2020): *Nannophya fenshami* sp. nov., a tiny dragonfly from an artesian spring wetland in Queensland, Australia (Anisoptera: Libellulidae). *International Dragonfly Fund - Report* 149: 1-10. (in English) ["*Nannophya fenshami* sp. nov. is described from an artesian spring wetland in Queensland. Diagnostic characters of male, female and larva are presented and illustrated and the probable affinities of the species are discussed." (Author)] Address: Theischinger, G., Australian Museum, Entomology, 6 College Street, Sydney, NSW, 2010, Australia. Email: theischingergunther@gmail.com

**17957.** Theischinger, G.; Richards, S. (2020): *Palaeosynthemis papilio* sp. n., a new dragonfly from Papua New Guinea (Odonata: Anisoptera: Synthemistidae). *Australian Entomologist* 47(3): 169-176. (in English) ["*Palaeosynthemis papilio* sp. n. is described from a single male collected in the Purari River basin in the Gulf Province of south-central Papua New Guinea. The male is most similar to *P. elegans* Theischinger and Richards, 2013, a species currently known only from the Sepik River basin on the northern side of New Guinea's central cordillera, but can be distinguished from that species and all other congeners by the lack of yellow markings on the face, the presence of a pale antehumeral patch and a butterfly-like yellow medio-dorsal patch on abdominal segment 3, and absence of a spine on the dorsum of abdominal segment 10. The new species flies predominantly at dusk, in clearings in lowland tropical rainforest." (Authors)] Address: Theischinger, G., Office of Environment and Heritage New South Wales, Sydney, NSW, Australia, and Australian Museum, Entomology, 6 College Street, Sydney, NSW, 2010, Australia. E-mail: theischingergunther@gmail.com

**17958.** Tierney, A.; Deregnacourt, I.; Anderson, J.M.; Tierney, P.; Wappler, T.; Béthoux, O. (2020): The Triassic Mesophlebiidae, a little closer to the crown of the Odonata (Insecta) than other 'triasolestids'. *Alcheringa: An Australasian Journal of Palaeontology* 44(2): 279-285. (in English) ["Two new, subcomplete forewings belonging to the 'triasolestid assemblage', a group of Triassic stem-relatives of dragon- and damselflies (Odonata), are described. One, re-

covered from Australia (Aranbanga Volcanic Group), belongs to *Mesophlebia antinodalis* Tillyard, 1916, previously documented on the basis of two very incomplete wings. The other, recovered from South Africa (Molteno Formation), is assigned to a new species, *Mesophlebia elegans* sp. nov. The new data allow a reconsideration of the diagnosis of the genus *Mesophlebia* Tillyard, 1916 and a re-instatement of the family Mesophlebiidae Tillyard, 1916. Notably, the new specimens possess, near the wing base, a posterior lobe absent in most 'triassolestid' genera, but present in crown-Odonata and a number of their stem-relatives. *Lobodonata* tax. nov. is erected to accommodate odonates possessing this lobe. The nature of the 'vein-like' element anteriorly delimiting this lobe is discussed. We submit that it might have been initially composed of an invagination of the posterior wing-margin ('fibula'), which was later captured by AA, imposing its course on CuP." (Authors)] Address: Béthoux, O., Sorbonne Université, MNHN, CNRS, Centre de recherche sur la paléontologie – Paris (CR2P), 57 rue Cuvier, CP38, F-75005 Paris, France. E-mail: obethoux@mnhn.fr

**17959.** Tiple, A. (2020): Dragonflies and Damselflies (Odonata: Insecta) of the Bor Wildlife Sanctuary, Wardha, Maharashtra, Central India. *Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa"* 63(2): 131-140. (in English) ["Odonata species diversity was studied in the Bor wildlife sanctuary from 2011 to 2018. A total of 72 species of odonates belonging to 8 families were recorded. The study adds three new species for the Vidarbha region. The highest number of odonates belonged to the family Libellulidae (31 species) followed by Coenagrionidae (15 species), and Aeshnidae (six species). Of the total, 30 species were very common, 18 were common, seven were frequent common, 11 rare and six very rare. Among all, six species were Data Deficient, *Indothemis carnatica* is listed as Near Threatened and 64 were Least Concern, in IUCN red-list of threatened species. The observations support the value of the wildlife sanctuary area in providing valuable resources for Odonata." (Author)] Address: Tiple, A., Dept Zool., Vidyabharti College, Seloo, Wardha 442 104, India. E-mail: ashishdtiple@gmail.com

**17960.** Tiple, A.; Payra, A. (2020): First Record of *Epoththalmia frontalis* from Central India (Insecta: Odonata: Macromiidae). *Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa"* 63(2): 127-130. (in English) ["*E. frontalis*, a new Macromiidae dragonfly for Central India, is recorded from Seoni of Madhya Pradesh based on a collection of a single male. In India, earlier, this species was only known from a few places of Western Ghats and Eastern India. Diagnostic characters with closely resemble species and field photographs are given." (Authors)] Address: Tiple, A., Dept of Zoology, Vidyabharti College, Seloo, Wardha 442 104, India. E-mail: ashishdtiple@gmail.com

**17961.** Tomasi, E. (2020): Fito-Zooceci di dell'Alta Valcellina (Prealpi Carniche) (Parco Naturale Dolomiti Friulane). *Atti Mus. Civ. St. Nat. Trieste* 6: 5-122. (in Italian, with English summary) ["Investigation Gall-making of the high Valcellina, (Friuli Venezia Giulia, North-Eastern Italy). The Autor

reports the results achieved between 1990 and 2011, of the researches concerning the galls of the high Valcellina (Prealpi Carniche) Dolomiti Friulane Natural Park (Friuli Venezia Giulia, Italy NE). 1145 species have been identified, subdivided as follows: ... Insecta Odonata Lestidae (1)...." (Author)] Address: Tomasi, E., Museo Civico di Storia Naturale di Trieste, Via dei Tominz, 4 – I – 34139 Trieste, Italia

**17962.** Tsaryk, Y.; Reshetylo, O.; Nazaruk, K.; Lesnik, V. (2020): Species diversity of invertebrates (Invertebrata) on the routes of student zoology practice in the Western Chornohora (the Ukrainian Carpathians). *Studia Biologica* 14(2): 137-150. (in Ukrainian, with English summary) ["Since the second half of the 19th century invertebrate fauna of the Carpathians has been studied in detail by numerous scientists. The western branches of the Chornohora massif of the Ukrainian Carpathians has been attractive for the researchers of different groups of invertebrates. However, there is no possibility to evaluate their diversity dynamics in this area due to the lack of generalized comparative long-term data. With regard to that and considering the advantageous localization of the high-mountain biological station of Ivan Franko National University of Lviv as a convenient place for such investigation, the aim of our study was to describe the species diversity of invertebrates in the Western Chornohora for the initiation of stationary research of its dynamics. The material was collected by students according to the standard zoological methods during their field practice trips in July 2015–2019 on seven radial routes in various coenotic conditions and on different sites of the Western Chornohora. 149 species of invertebrate animals from 9 classes were identified in total. Insects considerably predominate among them by the species composition (about 80 %). The most common species of the 14 registered orders of Insecta represent Coleoptera (about 40 %), Hymenoptera and Lepidoptera (15 % each). ... The study revealed seven species listed in the Red Data Book of Ukraine (... *Cordulegaster bidentata*, ...." (Authors)] Address: Tsaryk, Y., Ivan Franko National University of Lviv, 4, Hrushevskiyi St., Lviv 79005, Ukraine. E-mail: yosyf.tsaryk@lnu.edu.ua

**17963.** Tunon, M. (2020): Time constraint and genetic (phenotypic) variation in wing shape in a damselfly along a latitudinal gradient. MSc. thesis, Biology Education Centre and Animal Ecology, Uppsala University: 25 pp. (in English) ["This degree project examined the effect of time constraint on wing shape and phenotypic variation in wing shape along a latitudinal gradient in the damselfly species *Lestes sponsa*. Fore and hind wings from individuals originating from three different latitudes: North (66°N), Central (59°N) and South (54°N) Europe were treated with their native temperature and photoperiod. In addition, the north and south populations were treated with south and north conditions respectively, resulting in five groups in total. Morphometric analyses of the wings revealed a positive correlation between body mass and wing centroid size, along with a difference in wing shape between the groups. Forewings and hindwings from the northern group were broader and rounder than wings from the central and southern groups. Additionally, the wings from

the transplant groups resembled those of the native group of their treatment, indicating a phenotypic plasticity in wing shape. Lastly, statistical tests of phenotypic variation revealed that variation was highest in relative warp 2 in the forewings and hindwings, and this warp represents the curvature of the wing both upwards/downwards or towards the inside/outside of the wing. These results on phenotypic variation indicate that even in a new or changing environment, *L. sponsa* could be capable of adapting to varying temperatures and environmental conditions. This study builds our understanding of how this damselfly species, and potentially insects, will be affected by current and future potential climate change." (Author)] Address: not stated

**17964.** Vega-Sanchez, Y.M.; Mendoza-Cuenca, L.F.; Gonzalez Rodriguez, A. (2020): *Hetaerina calverti* (Odonata: Zygoptera: Calopterygidae) sp. nov., a new cryptic species of the American Rubyspot complex. *Zootaxa* 4766(3): 485-497. (in English) ["*Hetaerina americana* Fabricius, 1798 has a long and irresolute taxonomic history. Several synonyms have been suggested (*H. californica* Hagen in Selys-Longchamps, 1859, *H. basalis* Hagen in Selys-Longchamps, 1859, *H. texana* Walsh, 1863, *H. scelerata* Walsh, 1863, etc.), related to the variation in the size of the wing spots as well as to the morphology of the male cerci. However, Calvert (1901) suggested that *H. americana* represents one variable species. Nevertheless, Vega-Sánchez et al. (2019) through a genetic and morphological analysis presented evidence to propose that *H. americana* represents a species complex. In the present work, we describe a new species that belongs to this complex: *H. calverti* sp. nov. The morphological characteristics by which males and females of *H. calverti* differ from *H. americana* are highlighted. The most important character for the differentiation of males is the shape of the cerci and the size of the individuals (when the two species are in sympatry). In females, the main differences are in the shape of the intersternites and the medio-dorsal carina of the last segment of the abdomen. Some generalities about the biology of the species are presented, including geographical distribution patterns and genetic divergence data." (Authors)] Address: González-Rodríguez, A., Inst. de Investigaciones en Ecosistemas y Sustentabilidad, Univ. Nacional Autónoma de México. Antigua carretera a Pátzcuaro #8701, Morelia, Michoacán 58190, Mexico. Email: agrodrig@iies.unam.mx

**17965.** Viela, D.S.; Venacio, H.; Santos, J.C. (2020): Final instar larva of *Acanthagrion truncatum* Selys, 1876 (Zygoptera: Coenagrionidae). *Zootaxa* 4881(2): 393-400. (in English) ["Here we describe the final instar larvae of *A. truncatum*, the 16th described for the genus. We compare the diagnostic characters of *A. truncatum* with other species of the Group II. Although very similar to other *Acanthagrion*, the larvae of *A. truncatum* can be separated from other congeners from having the following character combination: cephalic lobes bulging and rounded, seven antennomeres, 2+1 or 2 premental setae, and nodus at 0.60–0.62 of total length of the lamella." (Authors)] Address: Viela, D.S., Rua Jaime Bilharinho, 575, CEP 38065-280, Uberaba, Minas Gerais, Brazil. E-mail: deeogoo@gmail.com

**17966.** Viella, D.S.; Neiss, U.G.; Koroiva, R.; Guillermo-Ferreira, R.; Hamada, N. (2020): The female of *Epipleoneura spatulata* Rácenis, 1960 (Odonata: Protoneurinae). *Zootaxa* 4803(2): 381-387. (in English, with Portuguese summary) ["Here we describe the hitherto unknown female of *Epipleoneura spatulata* Rácenis, 1960 and present a table of characters (all illustrated) to distinguish it from other known congeneric females. We suggest that the main diagnostic character of the female of *E. spatulata* is the shape of posterior margin of prothorax, which is flat medially with smoothly curved erect lateral projections." (Authors)] Address: Viela, D.S., Rua Jaime Bilharinho, 575, CEP 38065-280, Uberaba, Minas Gerais, Brazil. E-mail: deeogoo@gmail.com

**17967.** Vilela, D.S.; Koroiva, R.; Azevedo Tosta, T.H.; Novaes, M.C.; Guillermo-Ferreira, R. (2020): Dragonflies and damselflies from the West of Minas Gerais, Brazil: checklist and new records. *Biota Neotropica* 20(1): e20190851, 2020: 15 pp. (in English, with Portuguese summary) ["The knowledge about the richness and distribution of Brazilian dragonflies is still being unveiled. Over the years, inventories, reviews, and descriptions have been made. These contributions, apart from the taxonomic value, also provide valuable data on the occurrence of species and their distributions, which are rarely accompanied by notes about natural history and behavior. Keeping this legacy in mind, we collected dragonflies between 2011 and 2019 in Minas Gerais state, which resulted in the registration of 90 species, 41 data, an important tool for conservation actions, and provide additional information about habitat and biology of species." (Authors)] Address: Vilela, D.S., Univ. de São Paulo, Depto de Biologia, Programa de Pós-Graduação em Entomologia, Ribeirão Preto, SP, Brasil. E-mail: deeogoo@gmail.com

**17968.** Villanueva, R.J.T.; Estacio, R.D. (2020): The Odonata collected in October 2019 on Patnanungan Island, Jomalig Island and Panukulan (northeastern Polillo), Philippines, with a checklist of the Polillo Odonata fauna. *International Dragonfly Fund - Report 151*: 1-21. (in English) ["The paper presents new odonatological data from the formerly unstudied islands Patnanungan and Jomalig as well from the northeastern part of Polillo, The Philippines. Four species are new for the Polillo Island group, including one new taxon *Anax parthenope julius* – for The Philippines. Currently, 78 odonate taxa are known from the Polillo group." (Author)] Address: Villanueva, R.J.T., College of Arts & Sciences Education, University of Mindanao, Matina, Davao City, 8000 Philippines. E-mail: rjtvillanueva@gmail.com

**17969.** Vlasov, D.V. (2020): The dragonflies (Insecta: Odonata) of the National Park «Pleshcheevo Lake» (Yaroslavl region). *Scientific proceedings of the Prisursky State Nature Reserve* 35: 109-114. (in Russian, with English summary) [26 species including *Libellula fulva* recorded in the Yaroslavl region for the first time at the imago stage. The paragraph on *Aeshna grandis* includes an observations of imaginal preying for ants (Hymenoptera). Address: Vlasov D.V., Russia, Yaroslavl, Yaroslavl State Historical and Architectural and art museum-reserve, Russia. E-mail: mitrich-koroed@mail.ru



**17970.** Wakhid; Rauf, A.; Krisanti, M.; Sumertajaya, I.M.; Maryana, N. (2020): Aquatic insect assemblages in four urban lakes of Bogor, West Java, Indonesia. *Biodiversitas* 21(7): 3047-3056. (in English) ["Urban lakes represent important habitats for some freshwater organisms and support a high diversity of insect fauna. Study was conducted with the objectives to determine and compare aquatic insect assemblages in four urban lakes of Bogor, West Java, Indonesia. Insects were collected in the littoral zone using D-net at a certain interval along the perimeter of each lake. Sampling was carried out monthly during March, April, and May 2017. A total of 6,686 individuals representing 82 species / morphospecies, 28 families, and seven orders were recorded. Estimation of species richness by Chao1 suggested that sampling completeness for Situ Babakan, Situ Burung, Situ Gede, and Situ Tonjong were 88.71%, 75.86%, 82.17%, and 95.23%, respectively. Rarefaction curves indicated that more sampling would record a higher species richness. The least species richness and diversity of aquatic insect assemblages occurred in Situ Babakan characterized by high organic pollution due to fish farming. Canonical correspondence analysis showed that certain environmental factors were related to some species. ... Odonates such as *Pseudagrion* sp.1, *Rhinocypha* sp., *Acisoma panorpoides*, *Orthetrum sabina* and *Crocothemis servilla* were associated with conditions of a high density of macrophytes. Our study provides baseline data for future monitoring and conservation management of these lakes." (Authors)] Address: Wakhid, Program of Entomology, Graduate School, Institut Pertanian Bogor. Jl. Meranti, Kampus IPB Darmaga, Bogor 16680, Indonesia

**17971.** Wakhid; Rauf, A.; Krisanti, M.; Sumertajaya, I.M.; Maryana, N. (2020): Species richness and diversity of aquatic insects inhabiting rice fields in Bogor, West Java, Indonesia. *Biodiversitas* 21: 34-42. (in English) ["Rice fields occupy the largest cultivated area in agricultural landscape in Indonesia and support a variety of living organisms, including aquatic insects. This study was conducted with the objective to determine the species richness and diversity of aquatic insects inhabiting rice fields. Sampling was made in March, May, and July 2017 in rice fields at Situgede, Pandansari, and Kawungluwuk (Bogor region, West Java, Indonesia), and carried out by dragging dip net on the bottom along the edge of the rice plots. A total of 3,306 individuals representing 45 species of aquatic insects belonging to 30 genera, 20 families, and seven orders were recorded. Order Hemiptera was the most abundance comprising 28.89% of the total insects collected, followed by Diptera (24.80%), Coleoptera (24.41%), and Odonata (21.42%). Functional feeding group analysis showed that collectors-gatherers had the highest proportion (40 - 46%), followed by predators (23-44%) and scrapers (10-35%). Rank-abundance curve showed low species evenness with the four most abundant species were *Micronecta siva* (Kirkaldy) (Hemiptera: Micronectidae), *Chironomus* sp. (Diptera: Chironomidae), *Orthetrum sabina*, and *Helochaeres* sp. (Coleoptera: Hydrophilidae). The Shannon-Wiener index showed the lowest value ( $H' = 1.84$ ) at Situgede and the highest ( $H' = 2.05$ ) at Pandansari. Richness

estimate and individual-based rarefaction curve revealed that rice fields at Pandansari have more species richness than the other two sites. This study provides some insights into the aquatic insect community of the human-made ecosystem and suggests that the ecological approach to pest management is necessary for maintaining ecosystem health and promoting biodiversity." (Authors)] Address: Wakhid, Program of Entomology, Graduate School, Institut Pertanian Bogor. Jl. Lingkar Akademik, Kampus Dramaga, Bogor 16680, West Java, Indonesia

**17972.** Wakimura, K.; Takemon, Y.; Ishiwata, S.; Tanida, K.; Abbas, E.M.; Inai, K.; Taira, A.; Tanaka, A.; Kato, M. (2020): A reference collection of Japanese aquatic macroinvertebrates. *Ecological Genetics and Genomics* 17 (2020) 100065: 6 pp. (in English) ["Properly identified specimen databases that include DNA sequences are mandatory for studies on species identification by DNA barcodes, metabarcoding of biota, and environmental DNA (eDNA) analyses. In addition, high-resolution digital images of well-characterized specimens are useful for morphology-based taxonomy studies. We have isolated the genomic DNA of physical collections (specimens) of Japanese aquatic macroinvertebrates that were stored at the authors' laboratory and determined partial coding regions for 18S rRNA, histone H3, and mitochondrial cytochrome c oxidase subunit I (COI) genes. Through this work, digital data (photographs and DNA sequences) on aquatic macroinvertebrates inhabiting Japan, along with their collection data, have been made available on the J-amir website ([http://www.b.s.osakafu-u.ac.jp/~mkato/J-amir\\_home.htm](http://www.b.s.osakafu-u.ac.jp/~mkato/J-amir_home.htm)). As of March 2020, our collections included 75 taxa of Ephemeroptera (out of 152 species known to inhabit Japan), 30 taxa of Odonata (out of 211 species), 11 taxa of Plecoptera (out of 203 species), and 33 taxa of Trichoptera (out of 484 species), in addition to data of other orders. The website will be continuously updated with new data. Our collection offers a reference for species identification by DNA barcodes, quick image matching of aquatic macroinvertebrates, and evaluating the molecular phylogeny of aquatic insects." (Authors)] Address: Kato, Mikio, Dept of Biological Science, Graduate School of Science, Osaka Prefecture University, 1-1 Gakuen-cho, Naka-ku, Sakai, Osaka, 599-8531, Japan. E-mail: [mkato@b.s.osakafu-u.ac.jp](mailto:mkato@b.s.osakafu-u.ac.jp)

**17973.** Walker, J.; Mahoney, M.; Templeton, A.R.; McKenzie, P.; Vogt, T.E.; Cashatt, E.D.; Smentowski, J.; Day, R.; Gillespie, R.; Henry, B.; Wiker, J.; Braude, S.; Landwer, B. (2020): Contrasting Ozark and Great Lakes populations in the endangered Hines emerald dragonfly (*Somatochlora hineana*) using ecological, genetic, and phylogeographic analyses. *Conservation Science and Practice*. 2020:e162: 15 pp. (in English) ["The federally endangered *S. hineana* is found in fens surrounding the Great Lakes region and in a small portion of the Missouri Ozarks. Most previous work has focused on the populations in the Great Lakes region. We present mark/recapture studies and genetic surveys to address the status of the Ozark populations. The densities and genetic diversity tend to be higher in the Ozarks than in the Great Lakes region. A phylogeographic analysis indicates

that the Ozarks, with its unglaciated fens, is the likely source for the populations currently inhabiting the formerly glaciated Great Lakes region, and genetic diversity decreases with increasing distance from the Ozarks. This work illustrates the inadequacy of using geography alone to identify a population as marginal and of less conservation concern. We also reanalyzed genetic data on the Great Lakes populations, where several populations have been extirpated over the last several decades. We show that the populations in the Great Lakes region have already lost more than 30% of their genetic diversity over just several decades, and the phylogeographic analysis indicates that increased fragmentation is a possibility in this region due to local extirpations. Ecologically and genetically, the Ozark populations should have a high priority in management plans, and the high rate of loss of genetic diversity and potential fragmentation indicates that continued monitoring and management is needed in the Great Lakes region for this highly endangered dragonfly." (Authors)] Address: Templeton, A.R., Dept of Biology, Washington Univ., St. Louis, MO 63130-4899, USA. Email: temple\_a@wustl.edu

**17974.** Wang, C.; Zhang, R.; Zhou, C.; Sun, Z. (2020): Numerical investigation on flapping aerodynamic performance of dragonfly wings in crosswind. *International Journal of Aerospace Engineering*, Volume 2020 |Article ID 7325154: 14 pp. (in English) ["Numerical simulations are performed to investigate the influence of crosswind on the aerodynamic characteristics of rigid dragonfly-like flapping wings through the solution of the three-dimensional unsteady Navier-Stokes equations. The aerodynamic forces, the moments, and the flow structures of four dragonfly wings are examined when the sideslip angle between the crosswind and the flight direction varied from 0° to 90°. The stability of the dragonfly model in crosswind is analyzed. The results show that the sideslip angle has a little effect on the total time-average lift force but significant influence on the total time-average thrust force, lateral force, and three-direction torques. An increase in the sideslip angle gives rise to a larger total time-average lateral force and yaw moment. These may accelerate the lateral skewing of the dragonfly, and the increased rolling and pitching moments will further aggravate the instability of the dragonfly model. The vorticities and reattached flow on the wings move laterally to one side due to the crosswind, and the pressure on wing surfaces is no longer symmetrical and hence, the balance between the aerodynamic forces of the wings on two sides is broken. The effects of the sideslip angle on each dragonfly wing are different, e.g., has a greater effect on the aerodynamic forces of the hind wings than those of the fore wings. When sensing a crosswind, it is optimal to control the two hind wings of the bionic dragonfly-like micro aerial vehicles." (Authors)] Address: Wang, C., School of Mech. Engineer., Dongguan Univ. Tech., Dongguan 523000, China

**17975.** Wildermuth, H.; Schneider, B. (2020): Froschattacken auf schlüpfende Kleinlibellen. *Libellula* 39(1/2): 91-104. (in German, with English summary) ["Frog attacks on emerging damselflies – Besides birds and spiders, frogs are among the most important predators of dragonflies. While

ovipositing females and tandems may successfully avoid being preyed on by frogs, pharate larvae as well as emerging and freshly emerged imagines seem to be helplessly exposed to their predators. However, this is not principally the case. By means of video films from a gravel pit by the river Rhine at the Swiss/German border we demonstrate by several examples that damselflies during emergence may react on approaching green frogs and avoid predation by different tactics. Pharate larvae and emerging imagines either remained motionless and were no longer noticed by the predator or the larvae suddenly disengaged from the substrate and dropped with flipping movements back into the water. Frog attacks occurred at the water line, from floating platforms or by stalking their prey under the water surface. Prey-catching leap and tongue projection were released by movements of the prey, occasionally occurring with some delay. Frog attacks on emerging damselflies were only sometimes successful. Thus, damselflies are able to actively avoid predation even during emergence." (Authors)] Address: Schneider, B., Wolfbühlstrasse 34A, 8408 Winterthur, beatsch@bluewin.ch

**17976.** Wildermuth, H. (2020): Arthropoden im Nahrungsspektrum des Eisvogels *Alcedo atthis*. *Ornithologischer Beobachter* 117: 296-311. (in German, with English summary) ["The food of the Kingfisher mainly comprises small fish, rarely other aquatic vertebrates and occasionally also invertebrates, largely arthropods. While the diversity and the preferred size of fish prey has extensively been studied, comparatively little is known about the arthropod prey spectrum. The aim of this study was to learn more about the crustacean and insect prey, its origin and behaviour in respect to the Kingfisher as predator. Study site was the river Töss near Winterthur (canton of Zürich), a tributary of the river Rhine in the Swiss Plateau. Some of the captured prey was identified on photos and video films. More detailed information was obtained by the analysis of 160 regurgitated pellets that were collected outside the breeding burrow in springtime between 2010 and 2019. Altogether 1415 fragments of 442 prey items could be identified to species or genus level, in some cases only to family level yet. Almost half of the prey were water bugs, predominantly Backswimmers *Notonecta* sp., and one third consisted of dragonfly larvae comprising ten species, most of them *Anax* *Imperator* and *Orthetrum* *cancellatum*. The remaining 18 % were composed of two crustacean Orders, mainly amphipods, and six insect Orders, mayflies and stoneflies among them. The prey originated partly from the river and partly from ponds, depending on the breeding localities and the accessible hunting grounds. Based on direct observation and indirect inferences from pellet analyses the Kingfisher catches its prey usually by plunging into the water but he can also capture it from the water surface or the bottom. Terrestrial prey may be taken from Vegetation, wet mud or dry sand and even from midair. This diurnal bird can also detect primarily nocturnal prey such as the larvae of *Cordulegaster* *boltonii* when they are not completely burrowed in soft ground or occasionally move by day." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**17977.** Wilk, T. (2020): Great abundance of adult Green Snaketails *Ophiogomphus cecilia* (Fourcroy, 1785) along the lower course of the River Biała Nida. *Odonatrix* 16\_15: 6 pp. (in Polish, with English summary) ["There are not many publications in the Polish scientific literature providing data on the overall magnitude of dragonfly populations. This paper presents the results of a count of adult *O. cecilia* along a 16.3 km section of the lower course of the River Biała Nida and a short section of the River Nida. During a canoe trip on 21.08.2020, I recorded 162 adult *O. cecilia*, distributed at regular intervals along the two rivers. The results indicate that this species occurs abundantly on the lower Biała Nida. The paper also discusses the usefulness of counting adults of rheophilic dragonflies during canoe trips, as a complementary research technique that could provide large sets of data for habitat and ecological analyses, and also for the planning of nature conservation measures." (Authors)] Address: Wilk, T., Ogólnopolskie Towarzystwo Ochrony Ptaków, ul. Odrowąża 24, 05-270 Marki, Poland. E-mail: tomaszwilk3@gmail.com

**17978.** Willink, B.; Duryea, M.C.; Wheat, C.; Svensson, E.I. (2020): Changes in gene expression during female reproductive development in a color polymorphic insect. *Evolution* 74(6): 1063-1081. (in English) ["Pleiotropy (multiple phenotypic effects of single genes) and epistasis (gene interaction) have key roles in the development of complex phenotypes, especially in polymorphic taxa. The development of discrete and heritable phenotypic polymorphisms often emerges from major-effect genes that interact with other loci and have pleiotropic effects on multiple traits. We quantified gene expression changes during ontogenetic color development in a polymorphic insect (*Ischnura elegans*), with three heritable female morphs, one being a male mimic. This female color polymorphism is maintained by male mating harassment and sexual conflict. Using transcriptome sequencing and de novo assembly, we demonstrate that all three morphs downregulate gene expression during early color development. The morphs become increasingly differentiated during sexual maturation and when developing adult coloration. These different ontogenetic trajectories arise because the male-mimic shows accelerated (heterochronic) development, compared to the other female morphs. Many loci with regulatory functions in reproductive development are differentially regulated in the male-mimic, including upstream and downstream regulators of ecdysone signaling and transcription factors potentially influencing sexual differentiation. Our results suggest that long-term sexual conflict does not only maintain this polymorphism, but has also modulated the evolution of gene expression profiles during color development of these sympatric female morphs." (Authors)] Address: Svensson, E.I., Dept Zool., Stockholm Univ., Stockholm S-106 91, Sweden. E-mail: erik.svensson@biol.lu.se

**17979.** Wilson, K.D.P. (2020): Taxonomic revisions for a subset of Chinese odonates explained. *International Dragonfly Fund Report* 145: 1-13. (in English) ["Arising from a number of 2019 IUCN Red List assessments for a subset of Chinese Odonata, a series of corrections and taxonomic

revisions were made to the World Odonata List. The rationale for these amendments is provided here. *Paragomphus wuzhi-shanensis* Liu, 1988 is shown to be a junior synonym of *Paragomphus pardalinus* Needham (1942). *Epophthalmia kuani* Jiang 1998 is synonymised as a junior synonym of *Epophthalmia elegans* (Brauer, 1865) and *Epophthalmia bannaensis* Zha & Jiang, 2010 is treated as a junior synonym of *Epophthalmia vittata* Burmeister, 1839. *Idionyx pseudovictor* Xu, 2013 is shown to be junior synonym of *Idionyx claudia* Ris, 1912 and *Sympetrum anomalum* Needham, 1930 is treated as a junior synonym of *Sympetrum maculatum* Oguma, 1922." (Author)] Address: Wilson, K.D.P., 18 Chatsworth Road, Brighton, BN1 5DB, UK. Email: kdpwilson@gmail.com

**17980.** Wolterink, K.K. (2020): Verklaring versnelde afname van venlibellen in Nederland. *Afstudeerwerkstuk, Aeres Hogeschool Almere*. 40 pp. (Dutch, with English summary) ["Insect populations are suffering a very severe global decline. A lot of publications focus on pollinators, because of their financial merits. A different group of species that are suffering from a severe decline, are acid water dragonflies. There are several well-known reasons for the decline of dragonflies. The reason why acid water dragonflies show a faster decline than other dragonflies however, is not as well researched or described. *Coenagrion lunulatum*, *C. hastulatum* and *Aeshna juncea* are 3 rare species that are showing a rapid decline in the Netherlands. The rapid decline of these 3 species is researched in this report, using a collection of available literature. Reasons known to cause a decline in dragonfly populations were researched. These reasons were then looked at, to see whether they impact acid water dragonflies more severely than other species, causing the faster decline. The influence of species characteristics, invasive species, drought, accumulation of sludge, acidification, a lack of balance in water chemistry, conductivity, habitat fragmentation and lack of proper nature conservation were researched. Afterwards the impact of each effect was weighted according to relevant literature, to check which effects had the largest impact on acid water dragonflies compared to other species of dragonfly. The results showed multiple effects have a more negative effect on acid water dragonflies than on other species. Drought has the biggest impact on dragonflies in general, and an even larger impact on acid water dragonflies. The pressure of invasive species has a large effect on acid water dragonflies in the form of sunfish. Moorland pools are sensitive to acidification, and severe acidification can lead to local extinction of dragonflies. The species characteristics of acid water dragonflies also influence them negatively. Some of the researched effects have been inadequately researched, making it difficult to make an accurate measurement of their effect. To make these measurements more reliable, specific research into these effects has to be done in pools where the 3 researched species occur. In conclusion, it is not possible to name a single reason for the rapid decline of acid water dragonflies. The faster decline is mostly caused by the increased sensitivity to well-known reasons for the decline of dragonflies. Droughts cause the most issues, but invasive species, negative species characteristics and acidification



also contribute to the rapid decline." (Author)] Address: not stated

**17981.** Wonglersak, R.; Fenberg, P.B.; Langdon, P.G. (2020): Temperature-body size responses in insects: a case study of British Odonata. *Ecological Entomology* 45(4): 795-805. (in English) "1. Body size is highly correlated with physiological traits, fitness, and trophic interactions. These traits are subject to change if there are widespread reductions of body size with warming temperatures, which is suggested as one of the 'universal' ecological responses to climate change. However, general patterns of body size response to temperature in insects have not yet emerged. 2. To address this knowledge gap, we paired the wing length (as a proxy for body size) of 5331 museum specimens of 14 species of British Odonata with historical temperature data. Three sets of analyses were performed: (i) a regression analysis to test for a relationship between wing length and mean seasonal temperature within species and subsequent comparisons across species and suborders; (ii) an investigation of whether the body size of species has an effect on sensitivity to warming temperature; and (iii) a linear-mixed effects model to investigate factors that potentially affect temperature-size response. 3. The regression analysis indicated that wing length is negatively correlated with mean seasonal temperatures for Zygoptera, whereas Anisoptera showed no significant correlation with temperature. 4. There is a significant decline in wing length of all Zygoptera (but not Anisoptera) with collection date, suggesting that individuals emerging later in the season are smaller. 5. Life-cycle type was not important for predicting wing length-temperature responses, whereas sex, species, and suborder were indicated as important factors affecting the magnitude of temperature-size responses in Odonata. 6. Overall, wing lengths of Zygoptera are more sensitive to temperature and collection date than Anisoptera." (Authors)] Address: Wonglersak, R., Department of Life Sciences, The Natural History Museum, 7th Floor DC2, Cromwell Road, London SW7 5BD, U.K. E-mail: r.wonglersak@soton.ac.uk

**17982.** Xu, Y.-H. (2020): Redescription of the final stadium larva of *Megalestes heros* Needham from Fujian, China, with discussion of the characters of genus *Megalestes* Selys (Odonata: Zygoptera: Synlestidae). *Zootaxa* 4728(3): 381-384. (in English) ["The final stadium larva of *M. heros* is redescribed and illustrated in detail. It is characterized by having a long and cylindrical body, a very long prementum with two end hooks of unequal size on lateral lobe, parallel wing sheaths, long and slender legs, female ovipositor short reaching the basal third of S10, and based on a distinct abdominal color pattern. The major diagnostic characters of the larvae of the genus *Megalestes* are as follows: (1) body smooth and slender, with long abdomen and leaf-shaped caudal gills; (2) antenna filiform, seven-segmented, third segment longest; (3) median cleft present in median lobe of prementum; lateral lobe with two end hooks of unequal size, the inner one being longer and larger than the outer, movable hook without setae; (4) wing sheaths parallel to each other." (Author)] Address: Xu, Y.-H., Dept of Garden & Horticulture,

Zhangzhou City Univ., Zhangzhou, Fujian 363000, PR China. E-mail: qihanxu@aliyun.com

**17983.** Yang, G.-H.; Liu, Q. (2020): Descriptions of the last instar larvae of two species of *Megalestes* Selys from Yunnan, China (Odonata: Zygoptera: Synlestidae). *International Journal of Odonatology* 23(4): 357-363. (in English) ["The final stadium larvae of *Megalestes micans* Needham, 1930 and *M. kurahashii* Asahina, 1985 are described and illustrated from Yunnan Province, China, and a key to the known larvae of seven species of the genus *Megalestes* is provided. All exuviae will be stored at the Invertebrate Collection of the College of Agriculture and Life Sciences, Dali University, Dali, Yunnan, China." (Authors)] Address: Yang, G.-h., College of Agriculture and Life Sciences, Dali University, Yunnan, PR China. E-mail: yanggh727@sina.com

**17984.** Yokoi, N.; Souphanthong, V.; Teramoto, T. (2020): *Nannophya miyahatai* sp. nov., a new dragonfly from Bolaven Plateau, southern Laos (Odonata: Libellulidae). *Tombo* 62: 63-69. (in English, with Japanese summary) ["A new species of the genus *Nannophya* Rambur, 1842 is described from the Bolaven Plateau, southern Laos. The new species, *N. miyahatai*, can be easily distinguished from similar species, *N. pygmaea* by its slim body, thorax maculation and number of cells in the anal field of hind wing. Holotype specimen is deposited in the National Museum of Nature & Science, Tsukuba, Japan." (Authors)] Address: Yokoi, N., Koriyama, Fukushima, Japan. E-mail: yokoi@orange.plala.or.jp

**17985.** Yokoyama, Y.; Ikushima, T.; Minamide, Y.; Hirose, Y. (2020): A record of bluish compound eyes and body maculation in males of *Sarasaeschna pryleri* (Martin, 1909) from Hokkaido Prefecture. *Tombo* 62: 109-110. (in English, with Japanese summary) ["The color of body maculation of *S. pryleri* usually changes from yellow to green with maturity. However, the authors discovered three individuals, in which the mature color was vivid blue, instead of green, from Teshikugu-cho, Hokkaido." (Authors)] Address: Yokoyama, Y. E-mail: wild.yam@ray.ocn.co.jp

**17986.** Yoshioka, A.; Shimizu, A.; Oguma, H.; Kumada, N.; Fukasawa, K.; Jingu, S.; Kadoya, T. (2020): Development of a camera trap for perching dragonflies: a new tool for freshwater environmental assessment. *PeerJ* 8:e9681 <https://doi.org/10.7717/peerj.9681>. 21 pp. (in English) ["Although dragonflies are excellent environmental indicators for monitoring terrestrial water ecosystems, automatic monitoring techniques using digital tools are limited. We designed a novel camera trapping system with an original dragonfly detector based on the hypothesis that perching dragonflies can be automatically detected using inexpensive and energy-saving photosensors built in a perch-like structure. A trial version of the camera trap was developed and evaluated in a case study targeting red dragonflies (*Sympetrum* spp.) in Japan. During an approximately 2-month period, the detector successfully detected *Sympetrum* dragonflies while using extremely low power consumption (less than 5 mW). Furthermore, a short-term field experiment using time-lapse

cameras for validation at three locations indicated that the detection accuracy was sufficient for practical applications. The frequency of false positive detection ranged from 17 to 51 over an approximately 2-day period. The detection sensitivities were 0.67 and 1.0 at two locations, where a time-lapse camera confirmed that *Sympetrum* dragonflies perched on the trap more than once. However, the correspondence between the detection frequency by the camera trap and the abundance of *Sympetrum* dragonflies determined by field observations conducted in parallel was low when the dragonfly density was relatively high. Despite the potential for improvements in our camera trap and its application to the quantitative monitoring of dragonflies, the low cost and low power consumption of the detector make it a promising tool." (Author)] Address: Yoshioka, A., Fukushima branch, National Institute for Environmental Studies, Miharu, Fukushima Prefecture, Japan. E-mail: yoshioka.akira@nies.go.jp

**17987.** Zakirova, M.; Muminov, B. (2020): Morphobiological characteristics of the facility of dragonfly (Insecta: Odonata) of the Fergana Valley. *Universum* 3(69): 9-14. ["The present study describes the morphobioecological features of the fauna of Odonata in the natural landscapes of the Fergana Valley of the Republic of Uzbekistan: *Sympecma fusca*, *Lestes dryas Calopteryx virgo*, *C. splendens*, *Ischnura elegans*, *Aeshna isosceles*, *A. juncea*, *Anax parthenope*, *A. imperator*, *Sympetrum vulgatum*, *Orthetrum cancelatum*, *O. brunneum*." (Authors)] Address: Muminov, B., Andijàn state University named after Z.M.Babur, Uzbekistan, Andijan. E-mail: muminovba@gmail.com

**17988.** Zaman, M.N.; Purwanto, P.B.; Iman, D.I.; Farida; Sari, A.M.; Maulany, S.L.; Luthfika, M.; Rofiah, N.; Halimah, G. S.; Cahya (2020): Dragonfly and damselflies at Gajahwong River in D.I. Yogyakarta urban district. *Proceeding International Conference on Science and Engineering* 3: 73-76. (in English) ["This study aims to reveal the population of dragonflies in the Gajah Wong river in urban areas in Yogyakarta. The method used is an exploratory method that is by exploring the Gajahwong river which is located between the southern ring road at Giwangan to the northern ring at Catur Tunggal. The results showed that 16 types of dragonflies and 9 types of damselflies were found there. The species which has the most number is *Orthetrum sabina* with 253 individuals, and the less type is *Gynacantha subinterrupta*, and *Zyxomma obtusum* which only found one individual for each. Whereas for damselflies most species is *Pseudagrion rubriceps* with 255 and *Ischnura senegalensis* is the less which only has one individual." (Authors)] Address: Zaman, M.N., Faculty of Science and Technology, UIN Sunan Kalijaga, Jl. Marsda Adisucipto No 1 Yogyakarta 55281, Indonesia. E-mail: azamavicenna@gmail.com

**17989.** Zhang, H.; Hämäläinen, M. (2020): Description of a new *Caliphaea* species from Yunnan, China (Odonata: Calopterygidae). *Zootaxa* 4895(1): 103-110. (in English) ["*Caliphaea hermannkunzi* sp. nov. (holotype ♂ China, Yunnan Province, Lufeng County, Chuxiong City, Gaofeng village, 10 June 2019) is described and illustrated for both sexes

and compared with its named congeners, from which it differs in the colour pattern of synthorax and the structure of the male anal appendages." (Authors)] Address: Zhang, H., South China DNA Barcoding Center, Kunming Institute of Zoology, Chinese Academy of Sciences, 32 Jiaochang Donglu, Kunming 650223, China. E-mail: zhanghaomiao@mail.kiz.ac.cn

**17990.** Zheng, D.-r.; (2020): A review of Odonata in Mid-Cretaceous Kachin amber of north Myanmar. *Acta Palaeontologica Sinica* 59(1): 49-57. (in Chinese, with English summary) ["In the past five years, abundant and diverse odonatanans were described from mid-Cretaceous Kachin amber, including three extant suborders. The odonatanans in Kachin amber are quite diversified with 35 species described and dominated by the damselfly *Burmahemiphlebia zhangii*. These odonatanans contain some first fossil records of extant damselflies, i.e., *Perilestidae*, *Platycnemididae* and *Platystictidae*. Some dragonflies previously only recorded in the Cretaceous sedimentary rocks, such as *Araripogomphidae*, *Gomphaeschnidae* and *Stenophlebiidae*, provide a late Early Cretaceous age for Kachin amber. The dragonflies in Kachin amber contribute to discussing the origin, evolution and palaeogeography of Odonata." (Author)] Address: Zheng, D.-r., Dept of Earth Sciences, University of Hong Kong, Hong Kong Special Administrative Region, China. E-mail: drzheng@hku.hk

**17991.** Zheng, D.; Jarzembowski, E.A. (2020): A brief review of Odonata in mid-Cretaceous Burmese amber. *International Journal of Odonatology* 23(1): 13-21. (in English) ["Odonatanans are rare as amber inclusions, but quite diverse in Cretaceous Burmese amber. In the past two years, over 20 new species have been found by the present authors after studying over 250 odonatanans from 300,000 amber inclusions. Most of them have now been published, and here we provide a brief review. Three suborders of crown Odonata have been recorded, including the damselfly families or superfamilies *Platycnemididae*, *Platystictidae*, *Perilestidae*, *Hemiphlebiidae*, *Coenagrionoidea*, *Pseudostigmatoidea*, *Mesomegaloprepidae* and *Dysagrionidae*, plus the dragonfly families *Lindenidae*, *Gomphaeschnidae* and *Burmaeschnidae*, and the damsel-dragonfly family *Burmaphlebiidae*." (Authors)] Address: Jarzembowski, E.A., The Natural History Museum, London, UK. E-mail: jarzembowski2@live.co.uk

**17992.** Zoch, L., Reich, M. (2020): Torfmooskultivierungsflächen als neuer Lebensraum für Moorlibellen. *Libellula* 39(1/2): 27-48. (in German, with English summary) ["The cultivation of peat moss *Sphagnum* spp. ('Sphagnum farming') is considered as a new, climate-friendly and sustainable alternative to drained peatland-agriculture. By rewetting the sites and establishing peat moss, potential habitats for typical peatland species are created. In 2015 and 2016 two cultivation sites were established in Lower Saxony, Germany, in cooperation with the substrate company Klasmann-Deilmann GmbH. The dragonfly fauna was investigated on the two cultivation sites, and additionally on a 10-year-old rewetted site and two nearnatural raised bogs in 2017 and 2018. In total 31 species were recorded on all sites. Some characteristic

peatland species (*Aeshna juncea*, *Leucorrhinia rubicunda*) have already been observed with reproductive behavior on the cultivation sites as well as first species (*Ceriatrigon tenellum*, *Libellula quadrimaculata*, *Sympetrum danae*) with exuviae. Therefore, the cultivation sites are suitable as reproduction habitat for some dragonfly species after only two years, but are not equivalent to natural raised bogs, at least in the short term." (Authors)] Address: Reich, M., Institut für Umweltplanung, Herrenhäuser Str. 2, D-30419 Hannover, Germany. E-mail: reich@umwelt.uni-hannover.de

**17993.** Zuyderduyn, C. (2020): First successful reproduction of Vagrant Emperor (*Anax ephippiger*) in the dutch dunes. *Brachytron* 21: 31-37. (in Dutch, with English summary) ["Short note „on successful reproduction of *A. ephippiger* in 2019 in a dune reserve in the Netherlands, after a period of influx of this species earlier that year. In September 2019, 166 exuviae were collected in a small water body and several freshly emerged living and dead imagines were observed. The habitat consists of a small (10 x 5 m) dune pond holding permanent water and with pioneering vegetation such as *Chara* species and a *Phragmites australis* belt. Although the 2019 influx of Vagrant Emperor resulted in numerous observations of copulations and oviposition, this represents one of very few reports of successful reproduction of the species in the Netherlands." (Authors)] Address: Zuyderduyn, C. E-mail: purperstreep@hotmail.com

## 2021

**17994.** Khelifa, R.; Mahdjoub, H. (2021): EcoDragons: A game for environmental education and public outreach. *Insects* 2021, 12, 776. 14 pp. (in English) ["Simple Summary: We face serious ecological and societal issues that require a rethinking of our approaches to involving the public in problem-solving and decision-making. Researchers need help from community scientists to gather data and generate fruitful discussions to tackle planetary problems. However, the establishment and maintenance of strong links between scientists and society require innovative ways of communication outside conventional educational institutions. Here, we propose a game that teaches the players the basics of ecological thinking when approaching environmental issues and biodiversity conservation. The game is called EcoDragons and it uses dragonflies as the main biological entity to colonize, establish and maintain biodiversity in an empty landscape that regularly faces climatic and anthropogenic disturbances. While the current EcoDragons was based on European dragonflies, the concept is highly adaptable to dragonflies of other regions (changing the species names), or even to other taxonomic groups. Besides the various pedagogical benefits, the game has the potential to foster public engagement in biodiversity conservation and community science. Abstract: Environmental education is crucial to tackling the pressing ecological and societal issues on our planet. Although there are various ways to approach environmental education and raise public awareness, games are potentially an effective vehicle of knowledge and engagement because they vulgarize the scientific information in a universal

'language' and bring people together. Here, we designed a game, EcoDragons, that integrates principles of ecology, biological conservation, life history, and taxonomy. The protagonists of the game are dragonflies and damselflies. The aim of the game is to colonize habitats with different species and use ecological processes (e.g., predation, competition, and mutualism) and conservation measures (e.g., restoration and reintroduction) to face random environmental disturbances (e.g., climate warming, drought, pollution, and biological invasion). The version of the game presented in this paper was based on European species. The game includes 50 species (25 dragonflies and 25 damselflies). The winner of the game is the one who occupies more habitats, establishes and maintains the largest number of species, and solves more anthropogenic disturbances. EcoDragons has a global outreach potential to educate the public about ecology, conservation, and organismic life history, and will probably engage people in environmental advocacy." (Authors)] Address: Khelifa, R., Zoology Dept, Univ. of British Columbia, Vancouver, BC V6T 1Z4, Canada. E-mail: rassimkhelifa@gmail.com

**17995.** Yang, G.-H.; Zhang, H.-m.; Orr, A.G. (2021): Descriptions of larvae of *Caliphaea angka* Hämäläinen, 2003 and *Mnais gregoryi* Fraser, 1924 (Odonata: Calopterygidae). *Zootaxa* 4926(2): 276-284. (in English) ["The larvae of *C. angka* and *M. gregoryi* are described and illustrated for the first time from Erhai lake Basin, Yunnan Province, China. Notes on their habitat are provided. This paper represents the first verified description of the larva of *Caliphaea* Hagen in Selys, 1859." (Authors)] Address: Zhang, H., State Key Laboratory of Freshwater Ecology and Biotechnology, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan 430072, China. E-mail: zhanghaomiaoo6988@gmail.com

**17996.** Yang, L.-J.; Kapri, N. ; Waikhom, R.; Unnam, N.K. (2021): Fabrication, aerodynamic measurement and performance evaluation of corrugated flapping wings. *Journal of Aeronautics, Astronautics and Aviation* 53(1): 83-93. (in English) ["This paper deals with the fabrication, aerodynamic measurement, and performance evaluation of the corrugated wing patterns on a flapping wing micro air vehicle (FWMAV). The corrugated wing pattern is generally seen in insects. Insect wings with their corrugated topological features give themselves high load-bearing capacity during flapping and hovering. It is believed that appropriate corrugated structures on insect wings enhance aerodynamic performance. A new fabrication process using polydimethylsiloxane (PDMS)-molding and parylene coating was proposed and implemented for a 24 cm-span FWMAV, which is composed of corrugated wing inspired by the dragonfly wing. The fabrication includes the master wing template made by three-dimensional (3D) printing, the PDMS molding process for wing template duplication, and the final parylene coating to obtain corrugated wings. The parylene-C thickness was selected as 40 µm. For comparing the aerodynamic performance, two types of flapping wings were implemented on the FWMAVs: first with a pair of parylene corrugated wings and the other with polyethylene terephthalate (PET) flat membrane (without corrugation) wings. The lift signal was



then measured by the load cell in a wind tunnel. Regarding the aerodynamic performance of flapping wings, a systematic performance estimation of finding the cruising conditions and the cruising lift for FWMAVs was investigated through the massive wind tunnel data. The parylene flapping wings with corrugation attained lift coefficients of 7.8-8.0, which the PET flat membrane wing cannot achieve so far." (Authors)] Address: Waikhom, R., Dept of Mechanical & Electromechanical Engineering, Tamkang University, 151, Ying-Zhuan Rd., Tamsui District, New Taipei City, 251301, Taiwan. E-mail: reshmiwaikhom@gmail.com

**17997.** Ye, Y.; Hu, C.; Jiang, Y.; Davison, G.W.H.; Ding, C. (2021): Three-dimensional niche partitioning between two colonially nesting ardeid species in central China. *Avian Research* volume 12, Article number: 33 (2021): 8 pp. (in English) ["Background: Interspecific competition is known to be strongest between those species that are both closely related and sympatric. Egrets are colonially nesting wetland birds that often overlap and can therefore be expected to compete in roosting and nesting habitat as well as in diet. According to the niche partitioning hypothesis, it is to be expected that these similar species would show differentiation in at least one of the main niche dimensions to reduce competition. We tested niche partitioning between the colonially nesting Little Egret (*Egretta garzetta*) and Cattle Egret (*Bubulcus ibis*) in temporal, spatial and trophic dimensions. Methods: Field study was conducted in three mixed egret colonies in Yangxian County, southwest Shaanxi Province, central China. For each nest colony we recorded its spatial location, the height of nesting trees and of nests, the height of roosting trees and of roosting individuals within the trees. We determined the first egg-laying and first hatching dates of the two species. Craw dissection of storm-killed egret nestlings was used to measure the diet. Six transects were surveyed to study foraging habitat selection. Results: We found that hatching time of Little Egrets peaked earlier (by about 1 month) than that of Cattle Egrets. Cattle Egrets nested and roosted higher than Little Egrets. The foraging habitats used by Little Egrets were dominated by river banks (73.49%), followed by paddy fields (13.25%) and reservoirs (10.84%), whereas Cattle Egret foraging sites were characterized by grasslands (44.44%), paddy fields (33.33%) and river banks (22.22%). Little Egrets consumed more fishes (65.66%) and Odonata larvae (13.69%) than Cattle Egrets, while Cattle Egrets were found feeding mainly on Coleoptera (29.69%) and Orthoptera (23.29%). Little Egrets preyed on larger mean biomasses of food items than Cattle Egrets. Conclusions: Our results confirm the niche partitioning hypothesis as a mechanism for coexistence among ecologically similar species. In two coexisting egret species, niche partitioning is multidimensional, such that the two coexistent species occupy differing ecological space based on all three temporal, spatial and trophic niche dimensions." (Authors)] Address: Ding, C., School of Ecol. & Nature Conserv., Beijing Forestry Univ., Beijing 100083, China. E-mail: cqding@bjfu.edu.cn

**17998.** Yu, D.-N.; Yu, P.; Zhang, L.; Storey, K.B.; Gao, X.; Zhang, J. (2021): Increasing 28 mitogenomes of Ephemeroptera, Odonata and Plecoptera support the Chiasmomyaria

hypothesis with three different outgroup combinations. *PeerJ* 9:e11402 <https://doi.org/10.7717/peerj.11402>: 25 pp. (in English) ["Background: The phylogenetic relationships of Odonata (dragonflies and damselflies) and Ephemeroptera (mayflies) remain unresolved. Different researchers have supported one of three hypotheses (Palaeoptera, Chiasmomyaria or Metapterygota) based on data from different morphological characters and molecular markers, sometimes even re-assessing the same transcriptomes or mitochondrial genomes. The appropriate choice of outgroups and more taxon sampling is thought to eliminate artificial phylogenetic relationships and obtain an accurate phylogeny. Hence, in the current study, we sequenced 28 mt genomes from Ephemeroptera, Odonata and Plecoptera to further investigate phylogenetic relationships, the probability of each of the three hypotheses, and to examine mt gene arrangements in these species. We selected three different combinations of outgroups to analyze how outgroup choice affected the phylogenetic relationships of Odonata and Ephemeroptera. Methods: Mitochondrial genomes from 28 species of mayflies, dragonflies, damselflies and stoneflies were sequenced. We used Bayesian inference (BI) and Maximum likelihood (ML) analyses for each dataset to reconstruct an accurate phylogeny of these winged insect orders. The effect of outgroup choice was assessed by separate analyses using three outgroups combinations: (a) four bristletails and three silverfish as outgroups, (b) five bristletails and three silverfish as outgroups, or (c) five dip-lurans as outgroups. Results: Among these sequenced mitogenomes we found the gene arrangement IMQM in Heptageniidae (Ephemeroptera), and an inverted and translocated tRNA-Ile between the 12S RNA gene and the control region in Ephemereillidae (Ephemeroptera). The IMQM gene arrangement in Heptageniidae (Ephemeroptera) can be explained via the tandem-duplication and random loss model, and the transposition and inversion of tRNA-Ile genes in Ephemereillidae can be explained through the recombination and tandem duplication-random loss (TDRL) model. Our phylogenetic analysis strongly supported the Chiasmomyaria hypothesis in three different outgroup combinations in BI analyses. The results also show that suitable outgroups are very important to determining phylogenetic relationships in the rapid evolution of insects especially among Ephemeroptera and Odonata. The mt genome is a suitable marker to investigate the phylogeny of inter-order and inter-family relationships of insects but outgroup choice is very important for deriving these relationships among winged insects. Hence, we must carefully choose the correct outgroup in order to discuss the relationships of Ephemeroptera and Odonata." (Authors)] Address: Zhang, L., The Department of Biology, College of Chemistry and Life Science, Zhejiang Normal University, Jinhua, Zhejiang, China. E-mail: zhangjiayong@zjnu.cn

# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2012

**17999.** Brockhaus, T. (2012): Wie kam *Somatochlora alpestris* (Selys) in die zentraleuropäischen Gebirge? Der Lebensraumwechsel einer stenothermen transpaläarktisch verbreiteten Kaltzeitart am Beispiel des Erzgebirges (Sachsen) (Odonata, Anisoptera, Corduliidae). *Entomologische Nachrichten und Berichte* 56(1): 17-28. (in German, with English summary) ["How arrived *S. alpestris* in the mountains of Central Europe? The habitat change of a stenothermal ice-age species. The case of the Erzgebirge Mts. (Saxony) as an example. – *S. alpestris* is a cold-stenothermal species exhibiting recent transpalaeartic boreo-montane disjunction. The north of the area extends into the subarctic permafrost region of North Eurasia, while mountains in Eurasia were colonised into the Alpine regions. By comparing recent ecological conditions in the northern Permafrost regions of Scandinavia with the conditions during the coldest period of the Weichselian, 21.000 years BP. it is shown that *S. alpestris* may have inhabited an enormous transpalaeartic area during the last cold time. It included the periglacial areas of Central Europe between the northern ice core and the ice cores of the European mountains. At the end of the last cold time the species inhabited those boreal areas which became ice-free, or it withdrew into the Eurasian mountains, respectively. From pollen analyses much is known about the genesis of the bogs in the Erzgebirge. On the basis of this example it is outlined, how the habitat change from the periglacial cold-time tundra into the recent bogs took place during a time interval of approximately 14.000 years." (Author)] Address: Brockhaus, T., An der Morgensonne 5, 09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**18000.** Buczynski, P. (2012): Polish and dedicated to Poland odonatological papers. 10. The year 2011. *Odonatrix* 8(1): 27-30. (in Polish, with English summary) [The author presents a list of Polish and dedicated to Poland odonatological papers that were published in the year 2011. In the reported time period, 34 papers of various kind were published, and 1 Bach. thesis was written. Two papers published in the year 2010 are given too.] Address: Buczynski, P., Dept of

Zool., Maria Curie-Skłodowska University, Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**18001.** Buczynski, P. (2012): Materials to the knowledge of dragonflies (Odonata) of Lublin region. Part IV. The collection of Yuri Mikhailovich Kolosov. *Odonatrix* 8(1): 23-27. (in Polish, with English summary) [The author discusses one of the oldest well preserved collection of dragonflies from Poland, collected in the years 1899–1915. Kolosov (1892–1943) was a Russian entomologist connected with the School of Agriculture and Forestry in Puławy. He published the description of migration of *Libellula quadrimaculata* through Puławy, mentioning incidentally 18 other species (Kolosov 1915). His collection is preserved in the Museum and Institute of Zoology of Polish Academy of Sciences. It consists of 102 specimens, belonging to 34 species. The collection is incomplete, as evidenced by the lack of many common species: the fauna of the studied area had at least over 40 species and the material was mainly collected in the valley of the central River Vistula in the vicinities of Puławy (51°25'N, 21°58'E). The collection of Kolosow is a unique record of the old composition of the valley of the River Vistula, with the great share of non-recorded contemporary tyrphophilous dragonflies as well as lacustrine species associated with moderately eutrophic oxbows (e.g. *Nehalennia speciosa*, *Aeshna juncea*, *Epitheca bimaculata*, *Leucorrhinia* spp.). The record of *Orthetrum albistylum* is also valuable – then it was the northernmost site in the whole range of this species.] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**18002.** Buczyński, P.; Dawidowicz, L.; Wagner, G.; Jarska, W. (2012): New locality of the Sedgling *Nehalennia speciosa* (Charpentier, 1840) (Odonata: Coenagrionidae) in the Suwalki Region. *Odonatrix* 8(1): 11-13. (in Polish, with English summary) ["The authors give a new site of *Nehalennia speciosa* in north-eastern Poland: a transitional peat bog in Błaskowizna village (54°15'22"N, 22°49'19"E). On July 4 and 7, 2011 about 10 individuals of the species were observed, with territorial males in it. They inhabited the flooded depression in the center of the peat bog grown with *Carex*

lasiocarpa swamp with addition of: *Utricularia minor*, *Aldrovanda vesiculosa*, *Menyanthes trifoliata* and *Dryopteris thelypteris*. *Aeshna juncea* during metamorphosis was also noted there. In other zones of the peat bog, in a buffering zone as well as beaver canals with open water, 12 dragonfly species were recorded, including 9 autochthonic ones (*Enallagma cyathigerum*, *Coenagrion puella*, *C. pulchellum*, *Aeshna grandis*, *A. juncea*, *A. subarctica*, *Cordulia aenea*, *Leucorrhinia pectoralis*, *L. rubicunda*). The discussed site is threatened by drainage and overgrowing by alder and reed (now at initial stage). It requires protective activities. The peat bog in B<sup>3</sup>askowizna is only the fifth site of *N. speciosa* known from the Suwa<sup>3</sup>ki Region. This results from the lack of adequately targeted research not the lack of the species itself. The similar diagnosis can be made for just 13 km distant south-western areas of Lithuania where only one site of this species has been discovered so far." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**18003.** Dossena, M.; Yvon-Durocher, G.; Grey, J.; Montoya, J.M.; Perkins, D.M.; Trimmer, M.; Woodward, G. (2012): Warming alters community size structure and ecosystem functioning. *Proc. R. Soc. B.* 279: 3011-3019. (in English) ["Global warming can affect all levels of biological complexity, though we currently understand least about its potential impact on communities and ecosystems. At the ecosystem level, warming has the capacity to alter the structure of communities and the rates of key ecosystem processes they mediate. Here we assessed the effects of a 48C rise in temperature on the size structure and taxonomic composition of benthic communities in aquatic mesocosms, and the rates of detrital decomposition they mediated. Warming had no effect on biodiversity, but altered community size structure in two ways. In spring, warmer systems exhibited steeper size spectra driven by declines in total community biomass and the proportion of large organisms. By contrast, in autumn, warmer systems had shallower size spectra driven by elevated total community biomass and a greater proportion of large organisms. Community-level shifts were mirrored by changes in decomposition rates. Temperature-corrected microbial and macrofaunal decomposition rates reflected the shifts in community structure and were strongly correlated with biomass across mesocosms. Our study demonstrates that the 4°C rise in temperature expected by the end of the century has the potential to alter the structure and functioning of aquatic ecosystems profoundly, as well as the intimate linkages between these levels of ecological organization." *Ischnura elegans*, *Libellula quadrimaculata*, *Orthetrum cancellatum* (Authors)] Address: Dossena, M., School of Biological and Chemical Sciences, Queen Mary University of London, London E1 4NS, UK

**18004.** Ishizawa, N. (2012): Observation of an annular solar eclipse. *Newsletter from Kunugiyama Forest* 18: 1-4. (in English) [rice paddies at Bodaigi, Tokorozawa City, Saitama Prefecture, Japan (35°46'14" N, 139°25'26" E). "*Orthetrum albistylum speciosum* were flying around at an extremely low light intensity at the partial solar eclipse (Ta ca. 22°C),

therefore, the reason why the delayed appearance of them seemed to be due to low Ta; the time when Ta exceeded 20°C was 8:20 a.m. The light intensity at the magnitude maximum of the former partial solar eclipse was 771 lx (Ta: 22.3°C), the perching posture of *O.a. speciosum* male was changed from the normal posture with its body axis parallel to the horizon (Photo 3A) to near the upright position (Photo 3B Ishizawa, 2011) e.g. the posture of sleeping. Such behaviours at the solar eclipse were also observed by Katatani (2010) at Nara Prefecture. It is assumed that dragonflies may adopt sleeping posture when the light intensity lowers ca. less than 1,000 lx. Even when the light intensity exceeds 2,000 lx like this time, dragonflies might not be active at lower Ta. The factor of Ta influenced on them more than the annular solar eclipse. *O. a. speciosum* and *O. japonica* are said to be the perchers and ectothermic insects that depend their thermoregulation on the solar power. At the annular solar eclipse the light intensity doesn't seem to influence on the behaviour of animals." (Author)] Address: Ishizawa, N., 1644-15, Yamaguchi, Tokorozawa City, Saitama Pref., Japan. E-mail: greffect708@htk.ne.jp

**18005.** Janeková, K.; David, S. (2012): The faunistic-ecological research of Odonata in the lower part of inundation area of the Orava river (NW Slovakia).. *Folia faunistica Slovaca* 17(2): 117-125. (in Slovak, with English summary) ["The area of Odonata exploration belongs to the Orava region, which is situated in NW Slovakia. The examined localities spread out in the lower part of inundation area of the Orava river, in surroundings of the town Dolný Kubín. The entire research of dragonflies was carried out in years 2008 – 2010 at 6 localities, which represent 6 types of biotopes – a gravel pit, an oxbow lake, an old river branch, a submontane river, an oxbow-lake and old flooded quarries and gravel-pit. 29 species of dragonflies have been found in the localities. The eudominant ones are *Coenagrion puella*, *Enallagma cyathigerum*, *Platycnemis pennipes* and *Erythromma najas* respectively. There are 10 endangered species e. g. *Sympetma fusca*, *Somatochlora meridionalis*, *Crocothemis erythraea* and *Sympetrum meridionale*. From the Odonata biodiversity point of view the most valuable locality is the above mentioned gravel-pit Pámica. We have found 23 Odonata species there." (Authors)] Address: Janeková, Katarína, Katedra ekológie a environmentalistiky FPV Univerzity Konštantína Filozofa v Nitre – spoločné pracovisko ÚKE SAV, pobočka Nitra s FPV UKF v Nitre, Tr. A. Hlinku 1, 949 74 Nitra, Slovakia. E-mail: katkajanekova@gmail.com

**18006.** Klein, B.A. (2012): The curious connection between insects and dreams. *Insects* 2012, 3, 1-17; doi:10.3390/insects3010001: 17 pp. ["A majority of humans spend their waking hours surrounded by insects, so it should be no surprise that insects also appear in humans' dreams as we sleep. Dreaming about insects has a peculiar history, marked by our desire to explain a dream's significance and by the tactic of evoking emotions by injecting insects in dream-related works of art, film, music, and literature. I surveyed a scattered literature for examples of insects in dreams, first from the practices of dream interpretation, psychiatry, and



scientific study, then from fictional writings and popular culture, and finally in the etymology of entomology by highlighting insects with dream-inspired Latinate names. A wealth of insects in dreams, as documented clinically and culturally, attests to the perceived relevance of dreams and to the ubiquity of insects in our lives... One common contextual category for dream interpretation is the killing of annoying insects. To kill lice on your body signifies a release from anxiety and sorrow, and to clean lice from your body signifies hope for the release of evils [37]. For Europeans, to kill a wasp denotes the dreamer's ability to stand up fearlessly against opponents [34], and to eat a dragonfly means that you are consumed by passion at the risk of hurting others' feelings [35]. Interpretations exist for dreams about most of the insect orders, of which the parasitic, biting, and stinging insects are well represented." (Author)] Address: Klein, B.A., Dept of Neurobiology and Behavior, Cornell University, Ithaca, NY 14853, USA

**18007.** Lok, A.F.S.L.; Tang, H.B. (2012): Odonates: Damselflies and dragonflies. In: Alvin F. S. L. Lok, W. F. Ang, Hugh T. W. Tan, Richard T. Corlett and P. Y. Tan (eds.): The native fauna of the Native Garden @ HortPark: Birds, fishes, amphibians, reptiles, butterflies, moths, damselflies, and dragonflies. Raffles Museum of Biodiversity Research, National University of Singapore and Centre for Urban Greenery and Ecology, National Parks Board, Singapore, 2012: 113-147. (in English) [Singapore; a total of 25 odonates were recorded between 10 May to 9 December 2010.] Address: Lok, A.F.S.L., Blk 656D Jurong West St 61 #07-323, Singapore 643656. E-mail: alvinfrancislok@yahoo.com

**18008.** Michalczuk, W. (2012): New records of the Sedgling *Nehalennia speciosa* (Charpentier, 1840) in Roztocze and the Sandomierska Basin (Odonata: Coenagrionidae). *Odonatrix* 8(1): 14-18. (in Polish, with English summary) ["Four sites of *N. speciosa* have been known so far from Central and Eastern Roztocze as well as the Biłgorajska Plain (NE part of the Sandomierska Basin). In the years 2008–2011, next 7 sites were recorded. In contrary to the northern part of the occurrence of this species in Poland, here it occurs first of all in transitional peat bogs with small water bodies in the advanced stage of succession and highly hydrated peatmoss. The dominating habitat type is also different than in the national scale: these are *Sphagnum* sp. patches with bottle sedge. One of the sites refers to a fen." (Author)] Address: Michalczuk, W., Zamojskie Towarzystwo Przyrodnicze, ul. Partyzantów 74/59, 22-400 Zamosc, Poland. E-mail: wiack@wp.pl

**18009.** Mikołajczuk, P.; Milaczevska, E. (2012): New localities of the Sedgling *Nehalennia speciosa* (Charpentier, 1840) (Odonata: Coenagrionidae) in the eastern part of Masovia and in the northern part of the Lublin District. *Odonatrix* 8(1): 1-10. (in Polish, with English summary) ["The authors give 17 new sites of *N. speciosa* discovered in the years 2010–2011 in central–eastern Poland. This data is essential due to poor level of studying of this area and the species itself: stenotopic, under protection and very strongly

threatened in Poland (EN category on the Red list of dragonflies of Poland). Species co-occurring with Sedgling were also given, indicating autochthonous species (marked with \* symbol) and probably autochthonous (#). Among new sites 7 ones have situated in the eastern part of Masovia and 10 in the northern part of the Lublin District. They fill the gap between sites in northern Poland and the Łęczyńsko-Włodawskie Lake District and the areas of Koźienice. Therefore the state of maintenance of the species in the central-eastern part of the country is much better than it was suggested earlier (Bernard et al. 2009). Other discoveries in eastern Poland also confirm this fact ... The localities of Sedgling known before and new ones probably do not form the isolated range island but they belong to the extension of its compact main part situated in northern Poland. This is even more likely that at least in eastern Masovia there are numerous peat bogs located in forests similar to those described in this paper. This suggests the existence of a large number of yet unknown sites of *N. speciosa* which can form compact concentrations on which the analysis of satellite maps and geological maps of the Quaternary seem to indicate. In Poland *N. speciosa* inhabits: I. narrow zone of floating and waterlogged mats of vegetation on the boundary of open water table of lakes and small water bodies, and II. at least partially flooded parts of *Sphagnum* peat bogs and fens, usually at their small depression. Habitats of the first type are dominating (Bernard, Buczyński 2008). Among the localities we studied, we observed two types of environments, however, the rarer second type was more often (Bernard, Buczyński 2008). The preferences of imagines of *N. speciosa* towards *Carex* sp., *C. rostrata*, *C. lasiocarpa* and *Eriophorum vaginatum* were observed. New data shows that the number of localities in potential gaps of the range of *N. speciosa* can be large. Therefore taking a look for this species in other areas where such studies have not been conducted is needed." (Authors)] Address: Mikołajczuk, P., ul. Partyzantów 59c/26, 21-560 Międzyrzec Podlaski, Poland. E-mail: gugapm@wp.pl

**18010.** Pérez, I.S.; Palomares, G.M.; López Alabau, A. (2012): Odonatos del Parque Natural "Hoces del Cabriel" (Valencia, España) (Odonata). *Boletín de la S.E.A.* 50: 317-320. (in Spanish, with English summary) ["Data are provided on the odonate fauna of the Hoces del Cabriel Natural Park (Valencia, Spain) based on samples taken from Spring to Autumn in 2010 and 2011. Thirty-two species have been detected in the study area." (Authors)] Address: Pérez, I.S., C/Camino 14, 2o, 3a. 46300 Utiel (Valencia), Spain. E-Mail: natxosendra@gmail.com

**18011.** Perkin, J.S.; Shattuck, Z.R.; Bonner, T.H. (2012): Life history aspects of a relict Ironcolor Shiner *Notropis chalybaeus* population in a novel spring environment. *The American Midland Naturalist* 167(1): 111-126. (in English) [*N. chalybaeus* (Cyprinidae) "is generally absent from groundwater-dominated systems throughout its range; however, a relict disjunct population occurs within the spring-fed upper reaches of the San Marcos River in central Texas. We conducted monthly seine collections within the restricted 2.2

km headwater range of the species to assess food habits and reproductive life history within a unique spring-run environment. Prey items were dominated by aquatic insects including Diptera (16% by weight), Ephemeroptera (13%), and Odonata (5%), as well as terrestrial insects (9%). The population consisted of four age groups with a maximum life span of 2.5 y. Reproductive ecology showed a protracted spawning season ranging Mar.–Dec. during which multiple clutches were produced. Reproductive maturity was reached at approximately 1 y (36 mm SL), mean mature oocyte diameter was 0.8 mm, and number of mature oocytes per clutch ranged 46–326. Comparisons between ironcolor shiner populations in the San Marcos River and thermally dynamic Marshalls Creek of Pennsylvania revealed mature female size was larger ( $T_{38} = 10.48$ ,  $P < 0.01$ ) and mature oocyte diameter smaller ( $T_{38} = 16.87$ ,  $P < 0.01$ ) in the upper San Marcos River. Literature accounts regarding ironcolor shiner reproductive ecology suggest a latitudinal trade-off between reproductive season length and oocyte size. Our findings provide further evidence for the roles of photoperiod and water temperature in structuring the reproductive seasonality of spring-dwelling fishes, specifically the lack or delay of terminating cues in stenothermal waters. In this manner, aquifer depletion and alteration of thermal regimes threaten spring-dwelling fishes by disrupting naturally occurring reproductive cues." (Authors)] Address: Perkin, J.S., Division of Biology, Kansas State Univ., 116 Ackert Hall, Manhattan 66506, USA. E-mail: jperkin@ksu.edu

**18012.** Pliuraite, V.; Kesminas, V. (2012): Ecological impact of Eurasian beaver (*Castor fiber*) activity on macroinvertebrate communities in Lithuanian trout streams. *Central European Journal of Biology* 7(1): 101-114. (in English) ["Our study found that beaver activity affects macroinvertebrate assemblages of both beaver ponds and downstream sites. The percentage composition of the invertebrate faunae of beaver ponds was strikingly different from the invertebrate faunae of upstream forested and downstream sites. The number of EPT (ephemeropteran, plecopteran, trichopteran) taxa in the upstream forested sites in all streams was higher than in beaver pond and downstream sites. Statistically significant differences were found in absolute and relative abundances of EPT and Chironomidae between different streams sites. The absolute and relative abundance of pollution-sensitive EPT was significantly higher in forested sites than in beaver pond and downstream sites in all measured streams. Beaver ponds had a significantly higher absolute and relative abundance of Chironomidae compared with upstream forested and downstream sites. We found that Plecoptera and Coleoptera were absent from beaver pond sites. The absolute abundance of Plecoptera was significantly higher in upstream forested sites than in downstream sites in all three streams. Gatherers were the dominant functional feeding group in relative abundance in all three habitat types. The percentage of gatherers was higher in beaver ponds than in forested and downstream sites." (Authors) *Calopteryx splendens* *Gomphus vulgatissimus*] Address: Pliuraite, Virginija, Nature Research Centre, 08412 Vilnius-21, Lithuania. E-mail: virga@eko.lt

**18013.** Thomsen, P.F.; Kielgast, J.; Iversen, L.; Wiuf, C.; Rasmussen, M.; Gilbert, M.T.P.; Orlando, L.; Willerslev, E. (2012): Monitoring endangered freshwater biodiversity using environmental DNA. *Molecular ecology* 21(11): 2565-2573. (in English) ["Freshwater ecosystems are among the most endangered habitats on Earth, with thousands of animal species known to be threatened or already extinct. Reliable monitoring of threatened organisms is crucial for data-driven conservation actions but remains a challenge owing to nonstandardized methods that depend on practical and taxonomic expertise, which is rapidly declining. Here, we show that a diversity of rare and threatened freshwater animals—representing amphibians, fish, mammals, insects and crustaceans—can be detected and quantified based on DNA obtained directly from small water samples of lakes, ponds and streams. We successfully validate our findings in a controlled mesocosm experiment and show that DNA becomes undetectable within 2 weeks after removal of animals, indicating that DNA traces are near contemporary with presence of the species. We further demonstrate that entire faunas of amphibians and fish can be detected by high-throughput sequencing of DNA extracted from pond water. Our findings underpin the ubiquitous nature of DNA traces in the environment and establish environmental DNA as a tool for monitoring rare and threatened species across a wide range of taxonomic groups. ... We specifically surveyed six animal species representing different taxonomic groups: the amphibians common spadefoot toad (*Pelobates fuscus*) and great crested newt (*Triturus cristatus*), the fish European weather loach (*Misgurnus fossilis*), the mammal Eurasian otter (*Lutra lutra*), the dragonfly large white-faced darter (*Leucorrhinia pectoralis*) and the crustacean tadpole shrimp (*Lepidurus apus*). ... The success rate of the DNA-based species detection by qPCR in ponds with known occurrence of the targeted species was 100% for the fish, 91–100% for the amphibian species, 82% for the dragonfly and 100% for the tadpole shrimp .... the system for *L. pectoralis* was tested negative for *L. dubia*, *L. rubicunda*, *Anax imperator* and *Cordulia aenea*." (Authors);] Address: Willerslev, E., Centre for GeoGenetics, Natural History Museum of Denmark, Univ. Copenhagen, Øster Voldgade 5-7, DK-1350 Copenhagen, Denmark. E-mail: ewillerslev@snm.ku.dk

## 2016

**18014.** Bomphrey, R.J.; Nakata, T.; Henningsson, P.; Lin, H.-T. (2016): Flight of the dragonflies and damselflies. *Phil. Trans. R. Soc. B* 371: 20150389. 15 pp. (in English) ["This work is a synthesis of our current understanding of the mechanics, aerodynamics and visually mediated control of dragonfly and damselfly flight, with the addition of new experimental and computational data in several key areas. These are: the diversity of dragonfly wing morphologies, the aerodynamics of gliding flight, force generation in flapping flight, aerodynamic efficiency, comparative flight performance and pursuit strategies during predatory and territorial flights. New data are set in context by brief reviews covering anatomy

at several scales, insect aerodynamics, neuromechanics and behaviour. We achieve a new perspective by means of a diverse range of techniques, including laser-line mapping of wing topographies, computational fluid dynamics simulations of finely detailed wing geometries, quantitative imaging using particle image velocimetry of on-wing and wake flow patterns, classical aerodynamic theory, photography in the field, infrared motion capture and multi-camera optical tracking of free flight trajectories in laboratory environments. Our comprehensive approach enables a novel synthesis of datasets and subfields that integrates many aspects of flight from the neurobiology of the compound eye, through the aeromechanical interface with the surrounding fluid, to flight performance under cruising and higher-energy behavioural modes." (Authors)] Address: Bompfrey, R.J., Structure and Motion Laboratory, Department of Comparative Biomedical Sciences, Royal Veterinary College, North Mymms, Hatfield AL9 7TA, UK. E-mail: rbompfrey@rvc.ac.uk

**18015.** Debecker, S.; Sanmartín-Villar, I.; Guinea-Luengo, M.; Cordero-Rivera, A.; Stoks, R. (2016): Integrating the pace-of-life syndrome across species, sexes and individuals: covariation of life history and personality under pesticide exposure. *Journal of Animal Ecology* 85(3): 726-738. (in English) ["(1.) The pace-of-life syndrome (POLS) hypothesis integrates covariation of life-history traits along a fast-slow continuum and covariation of behavioural traits along a proactive-reactive personality continuum. Few studies have investigated these predicted life-history/personality associations among species and between sexes. Furthermore, whether and how contaminants interfere with POLS patterns remains unexplored. (2.) We tested for covariation patterns in life history and in behaviour, and for life-history / personality covariation among species, among individuals within species and between sexes. Moreover, we investigated whether pesticide exposure affects covariation between life history and behaviour and whether species and sexes with a faster POLS strategy have a higher sensitivity to pesticides. (3.) We reared larvae of four species of *Ischnura* damselflies (*I. elegans*, *I. genei*, *I. graellsii* and *I. pumilio*) in a common garden experiment with an insecticide treatment (chlorpyrifos absent/present) in the final instar. We measured four life-history traits (larval growth rate during the pesticide treatment and development time; adult mass and lifespan) and two behavioural traits (larval feeding activity and boldness, each before and after the pesticide treatment). (4.) At the individual level, life-history traits and behavioural traits aligned along a fast-slow and a proactive-reactive continuum, respectively. Species-specific differences in life history, with fast-lived species having a faster larval growth and development, a lower mass at emergence and a shorter lifespan, suggested that time constraints in the larval stage were predictably driving life-history evolution both in the larval stage and across metamorphosis in the adult stage. Across species, females were consistently more slow-lived than males, reflecting that a large body size and a long lifespan are generally more important for females. In contrast to the POLS hypothesis, there was only little evidence for the expected positive coupling between life-history pace and proactivity.

Pesticide exposure decreased larval growth rate and affected life-history/personality covariation in the most fast-lived species. (5.) Our study supports the existence of life-history and behavioural continua with limited support for life-history/personality covariation. Variation in digestive physiology may explain this decoupling of life history and behaviour and provide valuable mechanistic insights to understand and predict the occurrence of life-history/personality covariation patterns." (Authors)] Address: Debecker, Sara, Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Leuven, Belgium. E-mail: sara.debecker@bio.kuleuven.be

## 2017

**18016.** Agus, M.; Pujiastuti, Y.; Windusari, Y. (2017): The Diversity of the dragonfly (Odonata) as an indication of water quality. *Science & Technology Indonesia* 2(4): 80-84. (in English) ["Information on the diversity of dragonfly in the University area is still not much. Reduced areas that support the growth and development of dragonfly species are thought to have an impact on the decline of the population and the diversity of these species. The purpose of this study identified and analyzed the diversity of dragonfly species. Dragonfly are collected through direct capture and using sticky traps, then visual observations are made for identification. Environmental conditions in the area of Sriwijaya University Campus is still good, with the visibility of environmental parameters in the form of DO, BOD and COD still meet environmental quality standards so that dragonflies are still able to lay eggs to keep their generation. Sriwijaya University campus found 19 species of Odonata belonging to 5 families and 2 sub-ordo, with the value of species diversity index of 2.05 and moderate." (Authors)] Address: Agus, M., Environmental Management Dept, Graduate School of Sriwijaya Univ. E-mail: agusmuhammad@student.pps.unsri.ac.id

**18017.** Ajibade, A.O.; Ajani, E.K.; Omitoyin, B.O. (2017): The predatory behaviour of nymphs of dragonfly (*Africocypha varicolor*) on fry of African mud catfish (*Clarias gariepinus*) and control by skunk weed (*Petivera alliacea*) root-extract in aquaculture. *Fisheries and Aquaculture Journal* 8(3) • 1000219: 5 pp. (in English) ["The use of natural organic extract instead of synthetic chemicals in harvesting wild fish and eliminating unwanted aquatic biota is popular in Nigeria. This research, therefore, investigated the possibility of using the root extract of a common weed in southwestern Nigeria, named *P. alliacea*, in checkmating the predatory influence of nymphs of dragonfly which frequently attack fry of African mud catfish. Activity of extract was first assessed through a brine shrimp test in a 24 hr investigation before concentrations of 0.0 g/l, 0.22 g/l, 0.48 g/l, and 1.06 g/l were applied under laboratory conditions in plastic aquaria against the naiads. The 96 hr Lc50 was 0.47 g/l obtained using probit analysis. The regression equation for the probit curve was  $y=3.173+3.5$  ( $y$ =probit value,  $x$ =actual concentration and  $r=0.7$ =coefficient of correlation). An average of



six fry and one fry were consumed by one dragonfly nymph every 96 hr at two weeks and three weeks old, respectively." (Authors)] Address: Ajibade, A.O., Dept of Fisheries Technology, Oyo State College of Agriculture and Technology, P.M.B. 10, Igboora, Nigeria. E-mail: porkyprof@yahoo.ca

**18018.** Akshatha Rao, B.S: Anusha, T.N.; Karthik, M.K.; Lakshmi, K.S.; Pavan Kumar, K.S.; Shashwathi, H.S.; Vagdevi Rao, K.C.; Vishwajith, H.U.; Keshava Murthy, M.V. (2017): Odonate diversity in selected habitats of Sringeri Taluk, Chikmagalur district. *Journal of Environmental Science, Toxicology and Food Technology* 11(9): 56-59. (in English) ["Dragonflies and Damselflies, collectively called Odonates and are one of the most common insects flying over forests, fields, meadows, ponds and rivers. Few streams, ponds, marshes, swamps and hilly green areas with lesser disturbance of humans were selected for the present study. Transect method was employed for the present study. A line transect of 500m length was laid in ten selected study areas and the odonates observed along the transects were documented and photographed. The diversity and abundance of the documented species of dragonflies and damselflies were measured and the Shannon and Simpson's diversity indices were calculated using the standard formulae available. 52 species belonging to 28 genera and 10 families are documented in the present study. Out of these 29 are anisopterans and remaining 23 are zygopterans." (Authors)] Address: Murthy, M.V., Department of Zoology, Sri J C B M College Sringeri, India

**18019.** Al-Hashmi, A.H. (2017): External morphological study of the *Sympetrum fonscolombeii* (Selys, 1840) (Odonata: Anisoptera: Libellulidae) in Baghdad. *Al-Mustansiriyah Journal of Science* 28(2): 11-15. (in English, with Arabian summary) ["The specimens were collected from different region in Baghdad / Iraq, by using air net during April 2016. In this study, a morphological characters of *Sympetrum fonscolombii* (Selys, 1840) is include three region of body (head, thorax and abdomen); in addition, male and female genitalia. Such characters were supported by Figures.] Address: Al-Hashmi, Asmaa, Department of Biology, College of Science, Mustansiriyah University, Iraq. E-mail: asmaa\_alhashmi80@yahoo.com

**18020.** Amaya-Vallejo, V., Novelo-Gutierrez, R.; Realpe, E. (2017): *Perigomphus basicornis* sp. nov. (Odonata: Gomphidae) from Anchicayá, Colombia. *Zootaxa* 4294(3): 395-400. (in English) ["The new species is described and illustrated based on adult males obtained from mature larvae collected in Anchicayá zone, Valle del Cauca, Colombia, and reared in Universidad de Los Andes laboratory, Bogotá, Colombia. The adult differs from the other described species of *Perigomphus* in the shape of the cerci and the size of the epiroct. Larvae are easy to collect in field but challenging to rear in the lab because of their habitat preferences. Adults are difficult to find in the field as they live high in the canopy. Holotype: reared male and exuviae, 22.xi.2016; deposited in Instituto de Ecología, A.C., Xalapa, Mexico." (Authors)] Address: Amaya-Vallejo, Vanessa, Univ. de los Andes, Lab.

de Zoología y Ecología Acuática LAZOE. Cra 1 N°18A-12, Lab J307 Bogotá, Colombia

**18021.** Angradi, T.R.; Bartsch, W.M.; Trebitz, A.S.; Brady, V.J.; Launspach, J.J. (2017): A depth-adjusted ambient distribution approach for setting numeric removal targets for a Great Lakes Area of Concern beneficial use impairment: Degraded benthos. *Journal of Great Lakes Research* 43(1): 108-120. (in English) ["We compiled macroinvertebrate data collected from 1995 to 2014 from the St. Louis River Area of Concern (AOC) of Lake Superior. Our objective was to define depth-adjusted cutoff values for benthos condition classes to provide an analytical tool for quantifying progress toward achieving removal targets for the degraded benthos beneficial use impairment. We used quantile regression to model the limiting effect of depth on selected benthos metrics, including taxa richness, percent non-oligochaete individuals, combined percent Ephemeroptera, Trichoptera, and Odonata individuals, and density of ephemeropterid mayfly nymphs (Hexagenia). We created a scaled trimetric index from the first three metrics. Metric values above the 75th percentile quantile regression model prediction were defined as being in relatively excellent condition in the context of the degraded beneficial use impairment for that depth. We set the cutoff between good and fair condition as the 50th percentile model prediction, and we set the cutoff between fair and poor condition as the 25th percentile model prediction. We examined sampler type, geographic zone, and substrate type for confounding effects. Based on these analyses we combined data across sampler types and created separate models for each of three geographic zones. We used the resulting condition-class cutoff values to determine the relative benthic condition for three adjacent habitat restoration project areas. The depth-limited pattern of ephemeropterid abundance we observed in the St. Louis River AOC also occurred elsewhere in the Great Lakes. We provide tabulated model predictions for application of our depth-adjusted condition class cutoff values to new sample data." (Authors)] Address: Angradi, T.R., United States Environmental Protection Agency, Office of Research & Development, National Health & Environmental Effects Research Laboratory, Mid-Continent Ecology Division, 6201 Congdon Blvd., Duluth, MN 55804, USA

**18022.** Ansari, N.A. (2017): Diversity of odonate fauna in Surajpur Lake: An urban wetland of Upper Gangetic Plain, Northern India. *Journal of Ecology and Environmental Sciences* 43(2): 73-79. (in English) ["Surajpur Lake is a prominent urban wetland site in Upper Gangetic Plain, Northern India known for its rich avifaunal and other aquatic biodiversity. Present study was carried out to assess the odonate diversity from March 2010 to February 2013 by applying standard survey techniques. During the study period, a total of 36 species belonging to 29 genera and 5 families of odonate fauna were recorded. Anisoptera were represented by 25 species and Zygoptera by 11 species. Libellulidae was the dominant family among the dragonflies and Coenagrionidae among the damselflies. The relative abundance of odonates includes 14 species as common, 11 as very common,

7 were occasional, 3 were rare and one was very rare out of 36 species. The diversity of odonate fauna discussed in the light of results hitherto unreported." (Authors)] Address: unknown

**18023.** Arambourou, H.; Sanmartín-Villar, I.; Stoks, R. (2017): Wing shape-mediated carry-over effects of a heat wave during the larval stage on post-metamorphic locomotor ability. *Oecologia* 184(1): 279-291. (in English) ["Two key insights to better assess the ecological impact of global warming have been poorly investigated to date: global warming effects on the integrated life cycle and effects of heat waves. We tested the effect of a simulated mild (25 °C) and severe (30 °C) heat wave experienced during the larval stage on the flight ability of the damselfly *Ischnura elegans*. To get a mechanistic understanding of how heat stress may translate into reduced post-metamorphic flight ability, we evaluated the hypothesized mediatory role of adult size-related traits, and also tested alternative pathways operating through changes in wing shape and two flight-related traits (both relative fat and flight muscle contents). Exposure to a heat wave, and particularly the severe one, shortened the larval stage, reduced adult size-related traits and modified the wing shape but did not significantly affect emergence success, relative fat content and relative flight muscle mass. Notably, the heat wave negatively affected all components of flight ability. Unexpectedly, the heat wave did not reduce flight ability through reducing size. Instead, we identified a novel size-independent mechanism bridging metamorphosis to link larval environment and adult flight ability in males: through affecting wing shape. The present study advances mechanistic insights in the still poorly understood coupling of life stages across metamorphosis. Additionally, our results underscore the need for integrative studies across life stages to understand the impact of global warming." (Authors)] Address: Arambourou, Hélène Irstea, Research Unit MAEP (Freshwater Systems, Ecology and Pollution), Villeurbanne Cedex, France

**18024.** Arjangay, A.; Darvizeh, A.; Tooski, M.Y.; Ansari, R. (2017): An experimental and numerical investigation on low velocity impact response of a composite structure inspired by dragonfly wing configuration. *Composite Structures* 184: 327-336. (in English) ["The low velocity impact response of a novel foam-based composite structure inspired by microstructural features of dragonfly wings is investigated through the use of FE model and experiments. A nonlinear progressive damage model of the composite skins is incorporated into the FE code by VUMAT subroutine. Inter-laminar damage is reproduced using interface cohesive elements and the foam core is modeled as a crushable foam material. The numerical results are compared with experimental data acquired by impact testing on bio-inspired structures consisting of E-glass/epoxy skins filled by polyurethane foam, where a good agreement is achieved. To assess the contribution of the sandwich vein on the impact behavior of the structure, a comparison is made between different veiny structures and monolithic laminates with the same materials under low velocity impact. It is concluded that the sandwich vein can limit the damage propagation and makes the rest

of the structure remain intact." (Authors)] Address: Arjangay, A., Dept Mechanical Engineering, Univ. of Guilan, P.O. Box 3756, Rasht, Iran. E-mail: azadeh.arjangpay@gmail.com

**18025.** Babořová, M.; Noskovic, J.; Ivanic Porhajařová, J. (2017): Dragonflies (Odonata) of the Nature Reserve Torozlín and water area Štrkáren gravel-pit in the southwestern part of the Slovak Republic. *Acta fytotechn zootech* 20(3): 49-53. (in English) ["Over the period of the years 2014 and 2015 in the locality of nature reserve Torozlín and water area Štrkáren gravel-pit being located at the village Komjatice, lying in the southwestern part of the Podunajská pahorkatina upland was evaluated the species of dragonflies. 179 individuals of dragonflies were collected during the monitoring period, of which 13 species were determined as belonging to eight families. On the locality of the Torozlín Nature Reserve, the dominant species were *Ischnura elegans* (37.50%), *Platycnemis pennipes* (28.85 %), *Sympetrum vulgatum* (10.58 %), *S. sanguineum* (5.76 %) and *Platycnemis pennipes* (54.67 % *Ischnura elegans* (37.33 %) and *Libellula depressa* (5.34 %). Based on the fact that the Torozlín site has a marshy character, the species composition was more varied. Protection and vulnerability were assessed by the Red List of IUCN, the European Red List of dragonflies and the Red List of dragonflies of the Slovak Republic. Evaluation of protection was carried out under the Decree of the Ministry of Environment of the Slovak Republic No. 492/2006 Collection of Laws. For individual species found also their dominance was calculated." (Authors)] Address: Babořová, Mária, Slovak Univ. of Agriculture in Nitra, Faculty of Agrobiological & Food Resources, Department of Environmental & Zoology, Tr. Anreja Hlinku 2, 949 76 Nitra, Slovakia. E-mail: Maria.Babosova@uniag.sk

**18026.** Babu, R. (2017): Diversity of Odonates (Insecta: Odonata) in Fish Farm, College of Veterinary and Animal Sciences, CSKHPKV, Palampur, Himachal Pradesh, India. *Rec. zool. Surv. India* 117(4): 367-375. (in English) ["Odonata diversity in fish farm of Department of Fisheries, CSKHPKV, Palampur, Kangra Valley, Himachal Pradesh were comprehensively studied and documented for the first time. A total of 27 species belonging to 19 genera and 7 families of two suborders are recorded. The suborder Zygoptera was represented by 13 species and 14 species represents Anisoptera. Among the families, Libellulidae was richest family with 13 species and followed by Coenagrionidae with 9 species. The wide range of habitats including foraging and nocturnal roosting habitat at Fish Farm, CSKHPKV leads to greatest species diversity." (Authors)] Address: Babu, R., Southern Regional Centre, Zoological Survey of India, Chennai - 600 028, Tamil Nadu, India

**18027.** Bakare, S.S.; Verma, P.R.; Andrew, R.J. (2017): Ultrastructure of spermatozoa of *Anax guttatus* (Odonata: Aeshnidae). *Odonatologica* 46(3/4): 241-254. (in English) ["In *A. guttatus* the mitochondria accumulate at the base of the nucleus to form a single nebenkern during spermiogenesis. An electron dense matrix 'centriole adjunct' is formed at the base of the nucleus surrounding the nebenkern. The acrosomal

vesicle migrates to the anterior end of the nucleus. The ultrastructure of the spermatozoa reveals that its elongated head lodges an apical inverted 'T' shaped, double-layered acrosome and a long, electron-dense nucleus, while the tail is composed of the axoneme, a pair of identical mitochondria derivatives, and the lateral/osmophilic bodies. The nucleus is displaced on one side by the axoneme. The axoneme consists of microtubules, and these are arranged into nine outer peripheral inter-singlets, nine peripheral doublets, and two central tubules (9+9+2 type). The mitochondrial derivatives and lateral bodies surround the axoneme at the tail region of the spermatozoon. A large number of cristae are evident in the longitudinal section of the derivatives. The spermatozoon of *A. guttatus* is therefore characterized by several unique features, such as the absence of a centriole, a spiked double layered acrosome, and a long nucleus with a sub-central axoneme running all along its length. The mitochondria derivative runs parallel to the axoneme, while a pair of lateral bodies is located parallel to the mitochondrial derivatives." (Authors)] Address: Andrew, R.J., P. G. Dept of Zoology & Higher Learning, Hislop College, Civil Lines, Nagpur, 440 001, (MS), India. E-mail: [rajuandrew@yahoo.com](mailto:rajuandrew@yahoo.com)

**18028.** Balazas, A. (2017): Dragonfly (Insecta: Odonata) assemblage of three types of habitats in the the south of Central Slovakia. *Mendel Net* 24: 304-309. (in English) ["Several field works between 2016 and 2017 were undertaken on the south of Central Slovakia. Three different types of biotopes based on their species richness and abundance (flooded quarry, fishpond and peat bog) were distinguished and compared in Cerova vrchovina Upland and Juhoslovenska kotlina Lowland. The most diverse locality was flooded quarry with 23 species, followed by fishpond with 13 species, while the lowest diversity had peat bog with 11 species. A total of 27 species were observed. Among them, 4 lepidoptera, 1 platycnemid, 8 coenagrionids, 3 aeshnids, 1 cordulid and 10 libellulids were presented. At 16 of them larval stage was recorded. According to the actualised Czech Republic's Red List of dragonflies 4 species belongs to Critically endangered, 2 to Endangered, 4 to Vulnerable and 6 to Near Threatened category. New additions to the Cerova vrchovina Upland's species list were added. *Le. Coenagrion pulchellum*, *Anaciaeschna isocetes*, *Aeshna grandis* and *Libellula fulva*. New locality of *Epitheca bimaculata* in the Special Protected Area Poipie is given. The most significant result is record of *Sympetrum depressiusculum* after almost two decades in Slovakia." (Authors)] Address: Balazas, A., Dept Zool., Fisheries, Hydrobiology & Apiculture, Mendel Univ. in Brno, Zemedelska 1, 613 00 Brno, Czech Republic. E-mail: [balazsaeko@gma.il.com](mailto:balazsaeko@gma.il.com)

**18029.** Barbosa de Oliveira-Junior, J.M.; De Marco Junior, P.; Dias-Silva, K.; Leitão, R.P.; Leal, C.G.; Pompeu, P.S.; Gardner, T.A.; Hughes, R.M.; Juen, L. (2017): Effects of human disturbance and riparian conditions on Odonata (Insecta) assemblages in eastern Amazon basin streams. *Limnologia* 66: 31-39. (in English) ["Riparian vegetation is an important determinant of the physical, chemical, and biological condition of streams, and odonates are useful indicators of

riparian condition. To identify environmental factors that structure Odonata assemblages in tropical forest streams, we collected adult odonate specimens and habitat data from 50 stream sites located in the Brazilian municipality of Paragominas (Pará state). We collected 1769 specimens representing 11 families, 41 genera, and 97 species. Of these species, 56 were Zygoptera, and 41 were Anisoptera. Improved environmental condition was reflected in increased Zygoptera species richness and reduced Anisoptera species richness. Channel shading was strongly and positively related to Zygoptera richness, and negatively to Anisoptera richness. Zygoptera species richness, but not Anisoptera species richness, was related positively to bank angle, quantity of wood in the stream bed, electrical conductivity, and decreased water temperature. Altered riparian vegetation structure was the principal determinant of odonate assemblage structure. Our results indicate that maintaining intact riparian vegetation is fundamental for conserving or re-establishing aquatic odonate assemblage structure." (Authors)] Address: Barbosa de Oliveira-Junior, J.M. Programa de Pós-Graduação em Zoologia, Lab. de Ecologia e Conservação, Universidade Federal do Pará/Museu Paraense Emílio Goeldi, Rua Augusto Correia, N°. 1, Bairro Guamá, CEP: 66075-110, Belém, Pará, Brazil. E-mail: [josemaxoliveira@gmail.com](mailto:josemaxoliveira@gmail.com)

**18030.** Barden, P.; Ware, J.L. (2017): Relevant relicts: The impact of fossil distributions on biogeographic reconstruction?. *Insect Systematics and Diversity* 1(1): 73-80. (in English) ["Localized extinction can play a significant role in obscuring reconstructions of historical biogeography. Insects, one of the most diverse clades in the tree of life, have complex patterns of local endemism, patterns of relictual distributions, and clades which are rather widespread and cosmopolitan. At the same time, insects have a rich fossil record that can contribute to the inference of ancestral geographical distributions, in light of present ranges. Here, we review current and ancestral insect distributions to explore the impact of fossil ranges on ancestral area reconstruction. Known examples of relictual distributions within Phasmatodea and termites are discussed, while we test the impact of fossil inclusion on biogeographic reconstruction within ants and dragonflies. The inclusion of fossil distributions increases the breadth of ancestral ranges across several nodes in ant and dragonfly phylogenies, which has implications for biogeographically based interpretations of past evolutionary ecology for these groups. More broadly, the incorporation of fossil data into estimates of ancestral distributions will not only improve the accuracy of those estimates but also provide additional temporal context." (Authors)] Address: Barden, P., New Jersey Institute of Technology, Newark, NJ, USA. E-mail: [barden@njit.edu](mailto:barden@njit.edu)

**18031.** Barnard, A.A.; Fincke, O.M.; McPeck, M.A.; Masly, J.P. (2017): Mechanical and tactile incompatibilities cause reproductive isolation between two young damselfly species. *Evolution* 71(10): 2410-2427. (in English) ["External male reproductive structures have received considerable attention as a cause of reproductive isolation (RI), because the morphology of these structures often evolves rapidly



between populations. This rapid evolution presents the potential for mechanical incompatibilities with heterospecific female structures during mating and could thus prevent interbreeding between nascent species. Although such mechanical incompatibilities have received little empirical support as a common cause of RI, the potential for mismatch of reproductive structures to cause RI due to incompatible species-specific tactile cues has not been tested. We tested the importance of mechanical and tactile incompatibilities in RI between *Enallagma anna* and *E. carunculatum*, two damselfly species that diverged within the past ~250,000 years and currently hybridize in a sympatric region. We quantified 19 prezygotic and postzygotic RI barriers using both naturally occurring and lab-reared damselflies. We found incomplete mechanical isolation between the two pure species and between hybrid males and pure species females. Interestingly, in species pairs for which mechanical isolation was incomplete, females showed greater resistance and refusal to mate with hybrid or heterospecific males compared to conspecific males. This observation suggests that tactile incompatibilities involving male reproductive structures can influence female mating decisions and form a strong barrier to gene flow in early stages of speciation." (Authors)] Address: Barnard, Alexandra, Ecology & Evolutionary Biology Program, Dept of Biology, Univ. of Oklahoma, Norman, Oklahoma, USA. E-mail: alex.barnard@ou.edu

**18032.** Basallo, J.P.E- (2017): Control biológico de larvas de *Culex* sp. mediante el uso de náyades de Odonata en condiciones de laboratorio. M. Sc. Salud Pública, Universidad Distrital Francisco José de Caldas, Facultad de Medio Ambiente y recursos naturales, Tecnología en Saneamiento Ambiental, Bogotá D. C.: 63 pp. (in Spanish, with English summary) ["In the city of Bogotá *Culex quinquefasciatus* represent a problem for public health due to its sting can cause allergies and discomfort in humans and domestic animals. Therefore, its population control has been sought with different methods. Biological control with natural predators is one of the control mechanisms used, for which consumption was evaluated during the months of October to December of 2016 and the months of January and February of the 2017. The aim of this study was to evaluate the biological control of *Culex* sp. in their different stages (I, II, III and IV), by nymphs of the suborders Zygoptera and Anisoptera (Insecta: Odonata), commonly known as devil's horses and dragonflies. Taking into account related studies where it is shown that these can be an effective biological control, it was determined that the consumption is higher in Anisoptera than in Zygoptera and that the two suborders have a preference for stage II larvae." (Author)] Address: not stated

**18033.** Bastos dos Santos, T.; Cardoso Peixoto, P.E. (2017): Agonistic interactions in the dragonfly *Micrathyrina unguolata*: does male fighting investment come from an innate ability or an indomitable will? *Behavioral Ecology and Sociobiology* 71(7), Article number: 104: (in English) ["In fights between males for access to mating territories, the winner may be the rival with the highest fighting capacity or that places the highest value on the disputed site. However, it is also

possible that both factors simultaneously affect dispute settlement. Therefore, a better understanding of contest resolution rules may be achieved by simultaneously investigating how winning chances depend on individual motivation linked to resource value and on individual traits linked to fighting capacity. In this study, we used males of *Micrathyrina unguolata* to evaluate whether individual fighting ability, individual motivation, or the interaction between both factors determine the individual investment in territorial contests. For this, we simulated the approach of an intruder to trigger a territorial defense response by either resident (marked males present in the territory for at least 1 day before the experiment) or substitute males (marked males that occupied the territories after we removed the residents). Resident males fought longer against the potential intruder than their substitute counterparts. However, traits related to fighting ability had a marginal effect on the time invested in fights. These results indicate that resident males are more willing to invest in fights regardless of their physical or physiological attributes. Distinct motivational levels among individuals should increase the variation in mean contest duration among rival pairs. If this effect is widespread, it may have important implications for studies that investigate contest rules by relating fighting duration and individual traits. Significance statement: In many species, the winner of territorial fights is the individual with higher fighting ability or the one that values more the disputed resource and consequently is more motivated to fight. However, because these two factors may interact to determine the winner, investigations should benefit by simultaneously evaluating the effect of fighting ability and motivation on contest resolution. Here, we induced fights between focal males against artificially introduced rivals to test if male investment in fights is affected by an interaction between traits linked to fighting ability and motivational status. We showed that the prior occupation of a territory was the main determinant of the time spent fighting. We conclude that the previous occupation of a territory may increase individual motivation to fight due to higher valuation of the resource and eventually may surpass the effect of fighting ability to determine the winner." (Authors)] Address: Bastos dos Santos, Tamires, Programa de pós-graduação em Zoologia, Universidade Estadual de Feira de Santana, Feira de Santana, Brazil

**18034.** Beatty, C.D.; Sánchez Herrera, M.; Skevington, J.H.; Rashed, A.; Van Gossum, H.; Kelso, S.; Sherratt, T.N. (2017): Biogeography and systematics of endemic island damselflies: The Nesobasis and Melanesobasis (Odonata: Zygoptera) of Fiji. *Ecology & Evolution* 7(17): 7117-7129. (in English) ["The study of island fauna has greatly informed our understanding of the evolution of diversity. We here examine the phylogenetics, biogeography, and diversification of the damselfly genera *Nesobasis* and *Melanesobasis*, endemic to the Fiji Islands, to explore mechanisms of speciation in these highly speciose groups. Using mitochondrial (COI, 12S) and nuclear (ITS) replicons, we recovered Garli-part maximum likelihood and MrBayes Bayesian phylogenetic hypotheses for 26 species of *Nesobasis* and eight species/subspecies of *Melanesobasis*. Biogeographical patterns were

explored using Lagrange and Bayes-Lagrange and interpreted through beast relaxed clock dating analyses. We found that *Nesobasis* and *Melanesobasis* have radiated throughout Fiji, but are not sister groups. For *Nesobasis*, while the two largest islands of the archipelago—Viti Levu and Vanua Levu—currently host two distinct species assemblages, they do not represent phylogenetic clades; of the three major groupings each contains some Viti Levu and some Vanua Levu species, suggesting independent colonization events across the archipelago. Our Beast analysis suggests a high level of species diversification around 2–6 Ma. Our ancestral area reconstruction (Rasp-Lagrange) suggests that both dispersal and vicariance events contributed to the evolution of diversity. We thus conclude that the evolutionary history of *Nesobasis* and *Melanesobasis* is complex; while inter-island dispersal followed by speciation (i.e., peripatry) has contributed to diversity, speciation within islands appears to have taken place a number of times as well. This speciation has taken place relatively recently and appears to be driven more by reproductive isolation than by ecological differentiation: while species in *Nesobasis* are morphologically distinct from one another, they are ecologically very similar, and currently are found to exist sympatrically throughout the islands on which they are distributed. We consider the potential for allopatric speciation within islands, as well as the influence of parasitic endosymbionts, to explain the high rates of speciation in these damselflies." (Authors)] Address: Beatty, C.D., Dept Ecol. & Evol. Biol., Cornell Univ., Ithaca, NY, USA. Email: christopher.beatty@cornell.edu

**18035.** Bhusnar, A.R.; Sathe, T.V. (2017): Biology of a dragonfly *Crocothemis servilia servilia* Drury (Odonata: Libellulidae), a predator of paddy pests in Kolhapur. *IOSR Journal of Pharmacy and Biological Sciences* 12(3): 18-21. (in English) ["*C. servilia* is biocontrol agent of paddy pests in Kolhapur region of Maharashtra. It predates on paddy jassid *Nilaparvata* sp., Paddy borer *Chilo suppressalis* (Walker) and Jowar stem borer *Chilo partellus* (Swin). Therefore, biology of *C. servilia servilia* has been studied under laboratory conditions (24±°C, 70 - 75% RH and 12 hr Photo period). It completes its life cycle within 3 months, egg stage lasts for 18 days and nymphal period is 72 days. There are 12 instars, each has about 7 ;V 10 days duration. During nymphal period they feed on paramoecium, daphnia, redworms and mosquito larvae. Adult survives for 4 days without food. Mated female can lay about 140-150 eggs in water body/water trough. A single mated female, an average can produce 142 adults under laboratory conditions." (Authors)] Address: Bhusnar, A.R., Dept Zoology, Yashwantrao Chavan Warana Mahavidyalaya Warananagar, India

**18036.** Blades, D.C.A.; Copley, C.; Lee, K. (2017): An efficient storage system for adult Odonata specimens, with application for other museum collections. *Collection Forum* 31(1-2): 15-22. (in English) ["A new system of storing adult Odonata (damselfly and dragonfly) specimens is described and compared to existing storage systems. The major design innovation is the use of tongue and groove ("zipper lock") resealable polyethylene envelopes manufactured to fit the

standard index card and specimen arrangement currently used in major collections. Other design improvements include low-cost, adhesive-free specimen trays and glass-top drawers built to fit in standard-dimension Cornell insect cabinets. Comparisons of materials and designs with other available systems are presented and discussed. Finally, examples are presented of this new system's applicability to other collections such as Lepidoptera and Archeology." (Authors)] Address: Blades, D.C.A., Research Associate, Dept of Entomology, Natural History Section, Royal British Columbia Museum, Victoria, British Columbia, Canada V8W 9W2. E-mail: david.blades@gov.bc.ca

**18037.** Bota-Sierra, C.A.; Novelo-Gutiérrez, R. (2017): The genus *Heteragrion* (Odonata: Zygoptera) in Northwestern Colombia, with the description of *Heteragrion tatama* sp. nov. *Zootaxa* 4347(3): 553-571. (in English) ["The Neotropical forest specialist genus *Heteragrion* counts with 54 species and one subspecies described to date, eight of which have been recorded from Colombia. Here, information on *Heteragrion* species resulting from ten years of exploration of northwestern Colombia and examination of museum collections, including types and species from Central America, is presented. A new species endemic to the Tatamá National Park in the western Andes, *Heteragrion tatama* sp. nov. is described, as well as the female of *Heteragrion aequatoriale* Selys, 1886. *Heteragrion calendulum* Williamson, 1919 was rediscovered, a century after its first collection, which allowed us to compare it with *Heteragrion atrolineatum* Donnelly, 1992, and to conclude that the latter species is its junior synonym. We present pictures of female prothoracic intersternite, which offer valuable taxonomic information. The variation in coloration patterns for *H. aequatoriale* and *Heteragrion mitratum* Williamson, 1919 is discussed, and maps with new distributional data, a taxonomic key, natural history notes and photographs of the *Heteragrion* species distributed west of the Magdalena valley in Colombia, are also provided." (Authors)] Address: Bota-Sierra, C.A., Red de Biodiversidad y Sistemática, Instituto de Ecología, A.C., Xalapa, Veracruz, México. E-mail: comeliobota@gmail.com

**18038.** Bota-Sierra, C.A. (2017): Two new species of the family Philogeniidae (Odonata: Zygoptera) from the Western Colombian Andes. *International Journal of Odonatology* 20(3/4): 137-150. (in English) ["The family Philogeniidae was recently proposed as a monophyletic clade grouping the genera *Philogenia* and *Archaeopodagrion*. Here, two new species found during recent expeditions to the Western Colombian Andes are described, *Archaeopodagrion fernandoi* sp. nov. and *Philogenia martae* sp. nov. Also, *Philogenia zetekii* is recorded for the first time in Colombia. Natural history notes, a taxonomic key for *Archaeopodagrion*, a distributional map, illustrations, photographs, and notes on the morphology of Philogeniidae are provided." (Author)] Address: Bota-Sierra, C.A., Red de Biodiversidad y Sistemática, Instituto de Ecología, A.C. Xalapa, Mexico

**18039.** Bota-Sierra, C.A.; Sandoval-H, J. (2017): The female of *Oreialagma oreas* (Odonata: Coenagrionidae),

with notes on the species natural history. *International Journal of Odonatology* 20(3/4): 165-172. (in English) ["*Oreialagma oreas* (Ris, 1918) is a recently rediscovered Colombian Andean endemic species, for which the information available is very scarce. It was originally described from a single male. Since 2008, *O. oreas* has been recorded in new localities but its life history remained unknown. Here we describe and diagnose the species female for the first time and show evidence of female dichromatism in the genus. Also, we present photographs and illustrations of males and females, a distribution map, and information on this species biology, reporting that it breeds on bromeliads as other species in the genus." (Authors)] Address: Sandoval-H, Juliana, Departamento de Ciencias Biológicas, Facultad de Ciencias Naturales, Universidad ICESI, Calle 18 No. 122.135, Cali, Colombia. Email: julisando@gmail.com

**18040.** Bowler, D.E.; Hof, C.; Haase, P.; Kröncke, I.; Schweiger, O.; Adrian, R.; Baert, L.; Bauer, H.G.; Blick, T.; Brooker, R.W.; Dekoninck, W.; Domisch, S.; Eckmann, R.; Hendrickx, F.; Hickler, T.; Klotz, S.; Kraberg, A.; Kühn, I.; Matesanz, S.; Meschede, A.; Neumann, H.; O'Hara, R.; Russell, D.J.; Sell, A.F.; Sonnewald, M.; Stoll, S.; Sundermann, A.; Tackenberg, O.; Türkay, M.; Valladares, F.; van Herk, K.; van Klink, R.; Voigtländer, K.; Wagner, R.; Welk, E.; van Klink.; Vermeulen, R.; Wiemers, M.; Wiltshire, K.H.; Böhning-Gaese, K. (2017): Cross-realm assessment of climate change impacts on species' abundance trends. *Nature Ecology & Evolution* 1(67): (in English) ["Climate change, land-use change, pollution and exploitation are among the main drivers of species' population trends; however, their relative importance is much debated. We used a unique collection of over 1,000 local population time series in 22 communities across terrestrial, freshwater and marine realms within central Europe to compare the impacts of long-term temperature change and other environmental drivers from 1980 onwards. To disentangle different drivers, we related species' population trends to species- and driver-specific attributes, such as temperature and habitat preference or pollution tolerance. We found a consistent impact of temperature change on the local abundances of terrestrial species. Populations of warm-dwelling species increased more than those of cold-dwelling species. In contrast, impacts of temperature change on aquatic species' abundances were variable. Effects of temperature preference were more consistent in terrestrial communities than effects of habitat preference, suggesting that the impacts of temperature change have become widespread for recent changes in abundance within many terrestrial communities of central Europe." The data set includes Odonata. (Authors)] Address: Bowler, Diana, Senckenberg Biodiv. & Climate Res. Centre, 60325 Frankfurt/M., Germany. E-mail: diana.e.bowler@gmail.com

**18041.** Brasil, L.S.; Da Silva G., Nubia F.; Batista, J.D.; De Resende, B.O.; Cabette, H.; Soares, R. (2017): Aquatic insects in organic and inorganic habitats in the streams on the Central Brazilian savanna. *Revista Colombiana de Entomología* 43(2): 286-291. (in English, with Spanish summary) ["A major part of the mechanisms that affects species distribution is related to environmental conditions. Within a stream channel

the accumulation of substrates like litter, roots, stones, gravel and sand create habitats that act as shelter and/or food source to aquatic communities, in this way supporting, or not, the establishment of different species. Based on this fact we verified the structure of aquatic insect communities in organic and inorganic habitats within Cerrado streams. Tested for differences on genera richness (i), individual abundance (ii) and genera composition (iii), and also (iv) verified if there are any indicator genera, which are faithful and specific to organic or inorganic habitats. Sampled organic (litter) and inorganic (sand and gravel) substrates in five sections of three streams and collected individuals of the orders Ephemeroptera, Plecoptera, Trichoptera, Odonata and Heteroptera (EPTOH). Community composition differed between habitats, with organic ones having higher richness and abundance, besides being the only habitat that presented faithful and specific genera (six). It is argued that this difference may be caused due to shelter and food supply provided by organic substrates." (Authors)] Address: Brasil, L.S., Av. Perimetral, 1901/1907, Museu Paraense Emílio Goeldi, Campus de Pesquisa Coordenação de Zoologia - Terra Firme Belém, Pará, Brasil - CEP 66017-970, Caixa Postal 399. E-mail: brasil\_biologia@hotmail.

**18042.** Breviglieri, C.P.B.; Oliveira, P.S.; Romero, G.Q. (2017): Fear mediates trophic cascades: Nonconsumptive effects of predators drive aquatic ecosystem function. *The American Naturalist* 189(5): 490-500. (in English) ["Predators control prey populations and influence communities and the functioning of ecosystems through a combination of consumptive and nonconsumptive effects. These effects can be locally confined to one ecosystem but can also be extended to neighboring ecosystems. In this study, we investigated the nonconsumptive effects of terrestrial avian predators on the communities of aquatic invertebrates inhabiting bromeliads and on the functioning of these natural ecosystems. Bromeliads with stuffed birds placed nearby showed a decrease in aquatic damselfly larvae abundance and biomass, and we can infer that these changes were caused by antipredator responses. These larvae, which are top predators in bromeliad ecosystems, changed the composition of the entire aquatic invertebrate community. While total species richness, mesopredator richness, and shredder abundance increased in the presence of birds, scraper biomass decreased, possibly as a consequence of the increase in mesopredator richness. High scraper biomass in the absence of birds may have accelerated detrital decomposition, making more nutrients available for bromeliads, which grew more. These results show that nonconsumptive effects triggered by terrestrial predators can cascade down to lower trophic levels and dramatically affect the functioning of aquatic ecosystems, which can in turn alter nutrient provision to terrestrial ecosystems." (Authors)] Address: Breviglieri, C.P.B., Dept of Animal Biology, Inst. of Biology, State Univ. of Campinas (UNICAMP), Campinas, São Paulo 13083-970, Brazil. E-mail: crassopaulo@gmail.com

**18043.** Buczynski, P.; Szlauer-Lukaszewska, A.; Tonczyk, G.; Buczynska, E. (2017): Groyne: a factor modifying the



occurrence of dragonfly larvae (Odonata) on a large low-land river. *Marine and Freshwater Research* 68: 1653-1663. (in English) ["The regulation of rivers and their valleys has had a strong, negative influence on the maintenance of their original biota. Nevertheless, some hydro-engineering works conducted along already regulated rivers may be beneficial, creating habitats for endangered species and assemblages. Such works include the construction of groynes. We analysed this effect on the occurrence of dragonfly larvae along middle and lower stretches of the Oder, where groynes were built over a distance of 306 km, creating an area of uniform habitat. We demonstrated that the presence of groynes increased not only the abundance of dragonfly larvae, but also the species richness and diversity of these insects. Habitats were recreated for assemblages typical of a river with highly diverse habitat conditions, from typically riverine assemblages to those occurring in oxbow lakes, also endangered by regulations. The fauna along the stretches with groynes was richer and more valuable than that along the stretches without groynes, achieving values approaching those obtained from modelled unregulated rivers. This can be put down to greater habitat heterogeneity and groyne-reduced levels of waves produced by ships. The presence of groynes provides the key to the restoration or stabilisation of the populations of certain species and to renaturalisation processes." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**18044.** Büsse, S.; Bybee, S.M. (2017): Larva, nymph and naiad – a response to the replies to Bybee et al. (2015) and the results of a survey within the entomological community. *Systematic Entomology* 42: 11-14. (in English) ["Conclusions: The goal of this survey was not to seek an outcome based on the idea that 'winner takes all' or 'might is right'; the most prevalent opinion is not necessarily the most scientifically 'correct' one. However, we felt it was important to explore the current usage across the entomological community regarding the terminology for immature insects. Our goal is to foster the most complete understanding possible regarding the usage of these terms and the terminology of the immature stage of insects. It is important to be aware that there are different terminologies and opinions in order to make a conscious decision as to which terminology to choose, as specialized terminology is useful for facilitating efficient and accurate communication across discipline boundaries (as well as insect groups). The scientific world is fraught with different opinions and ideas. The way that we discuss, frame, test and refute these opinions and ideas is central to the scientific process. The need for efficient and accurate communication among scientists is paramount. Simply being aware of the opinions that exist regarding how terminology is applied, the history of that terminology and its actual usage is a step forward." (Authors)] Address: Büsse, S., Dept Funct. Morphology & Biomech., Inst. Zool., Kiel Univ., Am Botanischen Garten 9, 24118 Kiel, Germany. E-mail: sbuesse@zoologie.uni-kiel.de

**18045.** Buxton, V.L.; Sperry, J.H. (2017): Reproductive decisions in anurans: A review of how predation and competition affects the deposition of eggs and tadpoles. *BioScience*

667(1): 26-38. (in English) ["The selection of breeding habitat has broadscale implications for species distributions and community structure and smaller-scale ramifications for offspring survival and parental fitness. In anurans, offspring deposition is a decisionmaking process that involves the assessment of multiple factors at a breeding site, including the presence of predators and competitors. Evolutionary theory predicts that adult anurans should seek to minimize the risk of predation to offspring, reduce the pressure of competition, and maximize offspring survival. Many experimental studies have demonstrated the ability of anurans to assess deposition sites for predation and competition and to choose accordingly, but our understanding of the various ecological factors involved in site choice and the broader consequences of choice is still limited. Here, we review and synthesize the literature on the influence of predators [including Odonata] and competitors on anuran deposition behaviour. We highlight current gaps in our understanding of this topic and outline future avenues of research." (Authors)] Address: Buxton, Valerie, Dept of Natural Resources & Environmental Sciences, Univ. of Illinois, Urbana-Champaign, USA. E-mail: vbuxton2@illinois.edu

**18046.** Casanueva Gómez, P.; Carpintero, P.; Hernández Árbol, M.A.; Santamaría, T.; Sánchez-Bordona, F.C. (2017): Un análisis biométrico en exuvias de *Anax imperator* Leach, 1815 (Odonata, Aeshnidae) en lagunas de la provincia de Salamanca, España. *Boletín de la Asociación Española de Entomología* 41(1-2): 197-210. (in Spanish, with English summary) ["A biometric analysis of exuviae of *A. imperator* in lagoons of Salamanca province, Spain. Little is known about the biometry of the *A. imperator* exuviae in the Iberian Peninsula and their possible geographical variations. To find out, four nearby lagoons have been sampled, all within the province of Salamanca, central-western Iberian Peninsula. Several features of the 217 sampled exuviae were measured: prementum (maximum width, minimum and length), cephalic width and total length (including anal pyramid), and relation between the lateral spine length on the seventh segment and the length of the ninth abdominal segment. Except the minimum width, mean values of all other measurements vary significantly among lagoons. Focus is set on whether these variations are influenced by environmental characteristics (salinity of water, mainly)." (Authors)] Address: Casanueva Gómez, Patricia, Depto de Ciencias Experimentales, Univ. Europea Miguel de Cervantes, 47012 Valladolid, España. E-mail: pcasanueva@uemc.es

**18047.** Castaños, C.E.; Córdoba-Aguilar, A.; Munguía-Steeyer, R. (2017): Physiological condition and wing pigmentation expression in a damselfly with seasonal polyphenism. *Physiological Entomology* 42(4): 346-354. (in English) ["Secondary sexual traits can be indicators of individual condition that may present seasonal polyphenism as a result of the differential costs of expression along the season. Wing spots in male damselflies of the Calopterygidae family are secondary sexual traits associated with intrasexual competition and mate choice. *Hetaerina titia* Drury is a calopterygid damselfly where males show red and black wing spots, contrasting with other

species of the genus whose males only express a red wing spot. In the present study, we evaluate the seasonal variation of the expression of male's red and black wing spots and their allometric patterns. Additionally, we measure male condition in the form of proteins, lipids, soluble carbohydrates and glycogen in early and late seasons. Black wing spots present higher variation than red wing spots and males of the late season are more pigmented. Allometry is positive for wing red spot in the early season and for black spot in the late season. Males of the late season present a higher concentration of proteins, soluble carbohydrates and glycogen, although there is no variation in the lipid content. The results of the present study suggest that, in *H. titia* males, black pigmentation replaces the function of the red pigmentation to signal condition. Both traits, however, may be heavily affected by environmental situations (e.g. food availability)." (Authors)] Address: Córdoba-Aguilar, A., Depto Ecología Evol., Inst. de Ecología, Univ. Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: [acordoba@ecologia.unam.mx](mailto:acordoba@ecologia.unam.mx)

**18048.** Chari, L.D.; Moyo, S.; Richoux, N.B.; (2017): Trophic ecology of adult male Odonata. I. Dietary niche metrics by foraging guild, species, body size, and location. *Ecological Entomology* 43: 1-14. (in English) ["1. Information on the dietary niches of adult odonates is sparse, as they are highly mobile and evasive animals, which makes them difficult to observe in their natural habitat. Moreover, there is a lack of knowledge on how varying behavioural traits of odonates relate to phenomena like niche partitioning. 2. This study investigated niche partitioning amongst odonate species, foraging guilds and size classes in a riverine system in the Eastern Cape province of South Africa. A combination of stable isotope and fatty acid-based niches was used to infer odonate feeding. 3. Both fatty acid and stable isotope-based niches showed that there was niche separation amongst odonates that forage in flight (fliers) and those that forage from a perch (perchers), amongst odonates of different size classes (damselflies, medium- and large-sized dragonflies), and amongst species, although varying levels of niche overlap were observed in each case. 4. Niche sizes of odonates varied between an upstream and a downstream site. Generally greater niche overlap was recorded at the narrow upstream site (associated with low insect emergence rates) than the wider downstream site (associated with high insect emergence rates), indicating that a greater degree of resource sharing occurred at the upstream site where aquatic food was less abundant. 5. The findings of this study suggest that dietary niches of odonates can be influenced by foraging guild, body size, and/or environmental conditions, and additional study in a variety of regions is recommended to determine the greater applicability of these findings." (Authors)] Address: Chari, L.D., Dept of Zoology and Entomology, Rhodes University, Grahamstown, South Africa

**18049.** Chovanec, A.; Wildermuth, H. (2017): Ein seltener Fall unbewachter Eiablage bei *Coenagrion scitulum* (Odonata: Coenagrionidae). *Libellula* 36(3/4): 135-138. (in German, with English summary) ["Unguarded oviposition of *C. scitulum*

– A single ovipositing female *C. scitulum* was observed at a small water body in Lower Austria in July 2016. This is presumably the first documented case of unguarded oviposition without immediately preceded copulation in a Coenagrion species." (Authors)] Address: Chovanec, A., Krotenbachgasse 68, A-2345 Brunn am Gebirge, Austria. E-mail: [andreas.chovanec@bmlfuw.gv.at](mailto:andreas.chovanec@bmlfuw.gv.at)

**18050.** Chovanec, A. (2017): Sanierung morphologischer Defizite und Anlage flussbegleitender Kleingewässer – Erfolgskontrolle gewässerökologisch wirksamer Maßnahmen an der Pram (Oberösterreich) durch den Einsatz von Libellen (Odonata) als Bioindikatoren. *Beiträge zur Entomofaunistik* 18: 13-37. (in German, with English summary) ["The present study deals with the assessment of the morphological status of a three kilometres long rehabilitated river section of the river Pram from Riedau to Zell (Upper Austria) by calculating the Dragonfly Association Index (DAI). The DAI was developed to compare rivertype-specific reference conditions with the status quo; this procedure follows the requirements of the EU Water Framework Directive. Furthermore, the colonisation of two newly created small water bodies near the river Pram by dragonflies was investigated. A total of 27 species (25 autochthonous) were found at the river Pram and the standing waters, which correspond to 35 % of the Austrian species (78 species). A total of 14 autochthonous species were detected at the river itself. The DAI-based assessment procedure reveals a high ecological status for this river section. *Ophiogomphus cecilia* one of three gomphid species recorded at the Pram, is listed in the Appendices II and IV of the EU Fauna-Flora-Habitat-Directive." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-Mail: [andreas.chovanec@bmlfuw.gv.at](mailto:andreas.chovanec@bmlfuw.gv.at)

**18051.** Chovanec, A. (2017): Spätsommeraspekt der Libellenfauna (Odonata) ausgewählter Standorte an Bodensee und Dornbirnerach (Vorarlberg). *inatura – Forschung online* 45: 10 pp. (in German, with English summary) ["This paper deals with the late summer aspect of the dragonfly fauna at selected sites of the Austrian shore of Lake Constance and at the Dornbirnerach. Investigations carried out by the end of July / beginning of August 2017 revealed a species inventory of 19 spp., 17 at the Lake Constance, 5 at the Dornbirnerach. Particular highlights are the records of the autochthonous population of *Sympetrum depressiusculum*, («critically endangered» according to the Austrian Red List and «vulnerable» according to the European Red List) and of *Somatochlora flavomaculata*, («endangered» according to the Austrian Red List). Both species were found at the Lake Constance. *Boyeria irene*, already sighted at the Constance Rhine (Suisse) and at the Lake Constance in Germany but not detected for Austria at all, was not found." (Author)] Address: Chovanec, A., Umweltbundesamt, Spittelauer Lände 5, 1090 Wien, Austria. E-Mail: [andreas.chovanec@bmlfuw.gv.at](mailto:andreas.chovanec@bmlfuw.gv.at)

**18052.** Chovanec, A. (2017): Auswirkungen von Restrukturierungsmaßnahmen am Rußbach (Niederösterreich, Weinviertel) auf die Libellenfauna (Insecta: Odonata). *Wiss. Mitt. Niederösterr. Landesmuseum* 27: 69-96. (in German, with

English summary) ["The ecological status (with a special focus on hydro-morphology) of two rehabilitated sections of the Rußbach in Lower Austria was assessed by an odonotological study. Dragonfly surveys were carried out in 2015, which was one year after the finishing of the hydraulic engineering at the section Unterolberndorf (UO) and about ten years after the creation of the near-natural retention area Schleinbach (SB). Key element of the assessment procedure, which is in compliance with the Austrian Water Act and the EU Water Framework Directive, is a comparison between the current situation and the river type-specific reference conditions. Due to the size of the catchment areas the two sections belong to different river types. This is the reason why different reference communities were used in the assessment procedure, which was carried out on the basis of the Dragonfly Association Index (DAI). The DAI has been developed in order to evaluate the ecological status of lowland rivers of the bioregion Eastern Ridges and Lowlands. A total of 23 dragonfly species was recorded, which nearly corresponds to 30 % of the Austrian inventory of Odonate species; twenty species were autochthonous at least at one of the two river sections. Twelve of the 23 species were found at both sections. Five species are "threatened" Red List species, one of them, *Coenagrion ornatum*, which was autochthonous at both sections, is listed in the Appendix II of the Fauna-Flora-Habitat Directive. At the section UO a total of 15 species were recorded, with 12 species of them being classified as autochthonous. At the section SB 20 species were found, with 17 of them being autochthonous. The abundances of most species at the section SB were remarkably low, owing to shadowing by riparian woods, encroachment of dense reed and drying out of the standing water body in the retention area. Both river sections were ranked as class II ("good ecological status"), therewith representing the second best class and quality target in the 5-tiered classification scheme. Management measures in order to save the status are proposed." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. e-mail: andreas.chovanec@bmlfuw.gv.at

**18053.** Chumchal, M.M.; Drenner, R.W.; Greenhill, F.M.; Kennedy, J.H.; Courville, A.E.; Gober, C.A.A.; Lossau, L.O. (2017): Recovery of aquatic insect-mediated methylmercury flux from ponds following drying disturbance. *Environmental Toxicology and Chemistry* 36(8): 1986-1990. (in English) ["Small ponds exist across a permanence gradient and pond permanence is hypothesized to be a primary determinant of insect community structure and insect-mediated methylmercury (MeHg) flux from ponds to the surrounding terrestrial landscape. Here we present the first experiment examining the recovery of insect-mediated MeHg flux following a drying disturbance that converted permanent ponds with insectivorous fish to semi-permanent ponds without fish. We used floating emergence traps to collect emergent insects for 10 weeks in the spring and summer from five ponds with fish (permanent) and five ponds that were drained to remove fish, dried and refilled with water (semi-permanent). During the 73 day period after semi-permanent ponds were refilled, total MeHg flux from semi-permanent

ponds was not significantly different than total MeHg flux from permanent ponds, indicating that insect-mediated MeHg flux had rapidly recovered in semi-permanent ponds following the drying disturbance. Methylmercury fluxes from Anisoptera and phantom midges (Diptera: Chaoboridae) were significantly greater from newly refilled semi-permanent ponds than permanent ponds but the MeHg fluxes from other eight emergent insect taxa did not differ between treatments. The present study demonstrates the impact of drying disturbance and the effect of community structure on the cross-system transport of contaminants from aquatic to terrestrial ecosystems. This article is protected by copyright." (Authors)] Address: Chumchal, M.M., Department of Biology, Texas Christian University, Fort Worth, Texas, USA. E-mail: m.m.chumchal@tcu.edu

**18054.** Ciolan, E.; Cicort-Lucaciu, A.-S.; Sas-Kovács, I.; Ferenti, S.; Covaciu-Marcov, S.-D. (2017): Wooded area, forest road-killed animals: Intensity and seasonal differences of road mortality on a small, newly upgraded road in western Romania. *Transportation Research Part D: Transport and Environment* 55: 12-20. (in English) ["Highlights: •On a recently modernized road from Romania numerous invertebrates and vertebrates were killed. •Animals related with forests and watercourses had the highest road mortality. •The surrounding forests had existed before the road, which affects the native fauna of the region. •The seasonality of road mortality is due to the victims' life cycle and meteorological conditions. The roads are one of the most obvious expressions of modern society, being considered vital for economical growth. Nevertheless, roads have a very strong negative impact upon environment, manifested, among others, by road mortality. In Romania numerous minor roads are currently upgraded and asphalted. In the year 2016, on a road of this kind, in a wooded mountain area, we recorded 1628 road killed animals belonging to 48 taxons. The majority were forest and wet areas animals (earthworms, snails, amphibians, etc), characteristic for the road's vicinity. Flying or dry areas animals were fewer. The road crosses the forest and the wet areas animals' habitats. Now, they are certain victims on the road, because its recent upgrade had increased the cars' speed. Road mortality differed between periods and according to the road surroundings aspect. The highest road mortality intensity was registered at the end of the spring. It has dropped in the summer and then rose again in the autumn, but just moderately. The animals were affected according to their life cycle and ecological demands. On this minor road surrounded by relatively uniform wooded habitats, the road mortality differences were determined in the first place by the demandings and life cycle of the victims, which were affected by meteorological conditions. This studied road is a proof of how forest native animals are exposed once their habitat is crossed by a road." (Authors) The paper includes a reference to Odonata.] Address: Ciolan, E., "Ioan Ciordas" Tech. College Beius, Ioan Ciordas str, 5, Beius, Romania

**18055.** Clausnitzer, V.; Simaika, J.P.; Samways, M.J.; Daniel, B.A. (2017): Dragonflies as flagships for sustainable



use of water resources in environmental education. *Applied Environmental Education & Communication* 16(3): 196 - 209. (in English) ["Sustainable use of freshwater is globally important. Yet implementation of changes in water management is poor, especially in developing countries. This is an indication that, despite our dependence on freshwater, we lack awareness of the need to protect these systems. Here we promote dragonflies as an easy-to-learn tool in environmental education programs. Dragonflies have been employed successfully as indicators of ecosystem health in environmental impact assessments and monitoring programs globally. They can be used as environmental sentinels and as whistleblowers for freshwater health, providing an effective tool for environmental impact assessments and freshwater monitoring. We give detailed examples here of some successful projects from South Africa, Tanzania, and Japan. The approaches developed are models that pave the way for more water awareness projects elsewhere, especially in developing countries, where biodiversity and pressures on freshwater systems are high." (Authors)] Address: Clausnitzer, Viola, Senckenberg Museum Nat. History, Görlitz, Görlitz, Germany. E-mail: Viola.Clausnitzer@senckenberg.de

**18056.** Cook, P. (2017): Female color variation and male harassment in the polymorphic damselfly *Megalagrion calliphya*. MSc. thesis, Department of Biology, James Madison University: VI, 25 pp. (in English) ["Female dimorphism is commonly hypothesized to be a result of adaptations to male harassment. I tested whether polymorphic female coloration in the Hawaiian damselfly *M. calliphya* is under selection from male sexual harassment via two possible forms of negative frequency-dependent selection: the male mimicry and the learned mate recognition hypotheses. I measured male behavior toward tethered females at mating sites under naturally occurring conditions and found no evidence for either hypothesis. Harassment rates did not significantly differ between female morphs. One measure of morph frequency did predict harassment of all individuals, but this relationship was driven by a single population. I found no evidence that negative frequency-dependent selection contributes to the maintenance of polymorphism in this species. Future studies of female polymorphism should test other selective pressures which may act on polymorphism." (Author)] Address: not stated

**18057.** Cordero-Rivera, A. (2017): Sexual conflict and the evolution of genitalia: male damselflies remove more sperm when mating with a heterospecific female. *Sci Rep.* 2017 Aug 10;7(1):7844. doi: 10.1038/s41598-017-08390-3. (in English) ["In *Calopteryx* damselflies, males remove rivals' sperm stored by the female, thereby reducing sperm competition. This behaviour may create a sexual conflict, because females could lose the sperm stored in the spermatheca, used for long-term storage. Comparative evidence suggested antagonistic coevolution between sexes, which might prompt the evolution of narrow spermathecal ducts, or longer spermathecae, hindering sperm removal. *Calopteryx haemorrhoidalis* and *C. splendens* coexist and sometimes hybridize. Therefore, here I predicted that if females

coevolve with conspecific males, heterospecific males should have an advantage when interspecific matings occur because females will show less resistance to them than to conspecific males. By hand-pairing females to males of both species, I found that in intraspecific and interspecific matings, sperm was almost completely removed from the bursa (97-100%), but only partially from the spermathecae, with more spermathecal removal in interspecific (63-71%) than intraspecific matings (14-33%). This suggests that heterospecific males are more efficient in sperm removal as predicted by a sexually-antagonistic coevolutionary scenario. Furthermore, in most cases, only the left spermatheca was emptied, suggesting that the evolution of more than one spermatheca might also be a female counter-adaptation to regain control over fertilization." (Author)] Address: Cordero Rivera, A., Depnto de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Univ., 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**18058.** Cordero-Rivera, A. (2017): Phenotypic variability in *Hemiphlebia mirabilis* (Odonata: Hemiphlebiidae): insights into the origin of the discoidal cell in odonates. *Austral Entomology* 56(4): 433-438. (in English) ["This paper reports on the studies of two populations of the locally distributed damselfly *Hemiphlebia mirabilis* Selys in south-eastern Australia to determine the length of the maturation period, describe age-related changes in colouration, and quantify phenotypic variability in body size and wing venation. Modern odonates have a closed discoidal cell, which likely increases flight efficiency, but *H. mirabilis* was thought to always have an open discoidal cell in the fore wings. The study of 82 specimens documents variability in the discoidal cell character of wings as open or closed, with a minority of specimens showing all four discoidal cells closed, and others having one hind wing cell also open. Males are larger than females and body size decreases over the short flight season. Recapture histories of marked animals suggest that males emerge earlier than females and that sexual maturation takes 4-5 days. They become progressively darker, from metallic green to bronze, and their wings less flexible with age. The colour of pterostigma is sexually dimorphic. Male paraprocts and female anal valves are bright white, but in some specimens show a sky bluish tint when observed in direct daylight. Given that recent molecular studies suggest that *H. mirabilis* has evolved from an ancestral lineage, body colouration and wing venation may be plesiomorphic characters for this taxon." (Authors)] Address: Cordero-Rivera, A., ECOEVO Lab, University of Vigo, EUE Forestal, Campus Universitario, 36005 Pontevedra, Galiza, Spain. E-mail: adolfo.cordero@uvigo.es

**18059.** Cordero-Rivera, A. (2017): Behavioral diversity (Ethodiversity): A neglected level in the study of biodiversity. *Frontiers in Ecology and Evolution* 5(7): 8 pp. (in English) ["The concept of biodiversity embraces a multifaceted and hierarchical analysis of the complexity of life, with implications in many areas of science, philosophy, ethics, politics, and even religion. Three levels are included in the commonly accepted definitions: genetical, species, and ecosystem diversity,

going from the intraspecific level to the landscape. Here, I argue that a fourth level, never included in biodiversity studies, is of prominent relevance: ethological diversity or "ethodiversity." There is a growing number of studies describing alternative behaviors, behavioral plasticity, learning, and even personality, as characteristics of animal populations or individuals. Ethodiversity is also relevant in unraveling cryptic biodiversity, such as species that differ in their behavior but are otherwise undistinguishable. Maintaining ethodiversity is therefore essential in conservation, and cannot be achieved simply by focusing on genetic diversity. Behavior has profound ecological consequences, particularly in species interactions, and is a crucial element in the adaptability of animals to new environments. Ethodiversity is important at the intraspecific, inter-population, and species level and has practical relevance in several fields, like captive breeding, eco-novelty, and popular science. Finally, I expect ethodiversity to show a latitudinal cline, with more diverse and elaborate behaviors per species in the tropical regions, given the increase in interactions near the equator." (Author)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: a-cordero@uvigo.es

**18060.** Coughlan, N.E.; Stevens, A.L.; Kelly, T.C.; Dick, J.T.A.; Jansen, M.A.K. (2017): Zoochorous dispersal of freshwater bivalves: an overlooked vector in biological invasions? *Knowl. Manag. Aquat. Ecosyst.* 2017, 418, 42: 8 pp. (in English, with French summary) ["Vectors that underpin the natural dispersal of invasive alien species are frequently unknown. In particular, the passive dispersal (zoochory) of one organism (or propagule) by another, usually more mobile animal, remains poorly understood. Field observations of the adherence of invasive freshwater bivalves to other organisms have prompted us to assess the importance of zoochory in the spread of three prolific invaders: zebra mussel *Dreissena polymorpha*; quagga mussel *Dreissena bugensis*; and Asian clam *Corbicula fluminea*. An extensive, systematic search of the literature was conducted across multiple online scientific databases using various search terms and associated synonyms. In total, only five publications fully satisfied the search criteria. It appears that some fish species can internally transport viable adult *D. polymorpha* and *C. fluminea* specimens. Additionally, literature indicates that veligers and juvenile *D. polymorpha* can adhere to the external surfaces of waterbirds. Overall, literature suggests that zoochorous dispersal of invasive bivalves is possible, but likely a rare occurrence. However, even the establishment of a few individuals (or a single self-fertilising *C. fluminea* specimen) can, over-time, result in a substantial population. Here, we highlight knowledge gaps, identify realistic opportunities for data collection, and suggest management protocols to mitigate the spread of invasive alien species. ... Two adult zebra mussels *Dreissena polymorpha* attached to the dorsal carapace of an odonata nymph *Epicordulia* sp. (*Corduliidae*) larva. The nymph was collected on Lake Mendota, Madison, WI (43°04'38.800N 89°24'10.600W) on 24th October 2016 via a minnow trap in 2m of water"]

(Authors)] Address: Coughlan, N.E., Institute for Global Food Security, School Biol. Sciences, Queen's Univ. Belfast, Medical Biology Centre, 97 Lisburn Rd, Belfast BT9 7BL, Northern Ireland. E-mail: neil.coughlan.zoology@gmail.com

**18061.** Cowan, E.M.; Cowan, P.J. (2017): The Odonata (Insecta) of northern and central Oman. *Journal of Threatened Taxa* 9(10): 10776-10791. ["Oman is largely a desert country with a mainly arid climate. We summarise published records of Odonata (Insecta) for northern and central Oman, present our photographic records of the same there for 50 sites and give an apparent-status statement for most species (the more afro-tropical Dhofar governorate is excluded). Highlights are photographed *Orthetrum ransonnetii*, *Macrodiplax cora* (ovipositing in tandem) and *Urothemis thomasi*. Of the 44 species for Oman, 36 have been recorded in northern and central Oman (eight zygopteran and 28 anisopteran species). All are Least Concern except *Arabineura khalidi* and *Urothemis thomasi*, both Endangered, and *Paragomphus sinaiticus*, Near Threatened." (Authors)] Address: Cowan, Elaine M., School of Education, University of Aberdeen, AB24 3FX, Scotland, UK. E-mail: desertlarksgirl@hotmail.com

**18062.** Cuevas-Yáñez, K.; Benítez, M.; Rocha, M.; Córdoba-Aguilar, A. (2017): Large-scale human environmental intervention is related to a richness reduction in Mexican odonates. *Revista Mexicana de Biodiversidad* 88: 664-673. (in English, with Spanish summary) ["It is unclear how land use change, reduction in tree cover and human footprint impact species occurrence and co-occurrence especially at a large regional scale. This is particularly prevalent for species with complex life cycles, for example odonates (dragonflies and damselflies). We evaluated richness of odonates in Mexico in terms of land use, tree cover and human footprint. We also analyzed how odonate species co-occur to interpret our richness analysis using a community perspective. We used odonate collecting records from year 2000 to 2014. Odonate geographical records were more abundant in forest and agricultural areas, and decreased in areas without vegetation. Although our results may suffer of incomplete samplings, there was a positive relationship between species richness and tree cover, and a quadratic relationship with human footprint was observed. These results indicate that some degree of forest disturbance may still sustain relatively high odonate richness levels. Finally, species tend to co-occur in particular ensembles with some species being key in their ecological communities. Further studies should detail the role these key species play in their environments to provide community stability." (Authors)] Address: Cuevas-Yáñez, Karina, Depto Ecología Evolutiva, Inst. de Ecología, Universidad Nacional Autónoma de México, Apartado postal 70-275, Ciudad Univ., 04510 Ciudad de México, Mexico

**18063.** de Souza, M.M.; Pires, E.P.; Brunismann, A.G.; Milani, L.R.; Pinto, A.P. (2017): Dragonflies and damselflies (Odonata) from the wetland of the Rio Pandeiros, northern region of Minas Gerais State, Brazil, with a description of the male of *Archaeogomphus vanbrinkii* Machado (Anisoptera: Gomphidae). *International Journal of Odonatology* 20(1):

13-26. (in English) ["The Odonata from the Refúgio Estadual da Vida Silvestre do Rio Pandeiros (RVSP), located in the Cerrado domain, Minas Gerais State, Brazil, were rapidly surveyed. Sampling efforts were undertaken along the Rio Pandeiros margins during four sampling periods between the rainy (spring–summer) and dry seasons (autumn–winter) from July 2014 to April 2015. We sampled 97 adult specimens of 48 species from seven families, and there were 21 species of Zygoptera, and 27 species of Anisoptera. The dry season yielded a greater species richness and abundance, with Libellulidae dominant along the overall sampling period. A comparison with other biotas in Minas Gerais bringing together a total list of 204 species is provided. RVSP represents an ecotone between the Cerrado and Caatinga domains at the São Francisco river basin and its assemblage exhibited higher similarity index with other Cerrado areas in that state. Our sampling included rare species, many hitherto known only from their type series, and seven new state records were detected for *Hetaerina proxima*, *Enallagma novaehispaniae*, *Oxyagrion fernandoi*, *Telebasis griffinii*, *Telebasis obsoleta*, and *Erythrodiplax leticia*. In addition, the first known male of *Archaeogomphus vanbrinki* is described and taxonomic notes presented. The nomenclature status of the specific name "vanbrinki" is revised, and as a consequence all subsequent spellings other than the original are considered unjustified emendations in light of the International Code of Zoological Nomenclature." (Authors)] Address: de Souza, M.M., Instituto Federal de Educação, Ciências e Tecnologia no Sul de Minas Gerais, Campus Inconfidentes, MG, Brazil

**18064.** Deacon, C.; Samways, M.J. (2017): Conservation planning for the extraordinary and Endangered *Spesbona damselfly*. *Journal of Insect Conservation* 21(1): 121-128. (in English) ["*S. angusta* is one of the world's rarest insects, is Red Listed as Endangered, and occurs today at only one known locality in the Cape Floristic Region (CFR), South Africa. It has some unusual characteristics, including rapid and reversible colour change in both sexes, and a larva with frilled lamellae that lives in a micro-habitat free of competitors and large anisopteran enemies. We define here the characteristics of its habitat and record some other unusual behavioural traits, including the adult male's ability to sail on the water surface, very strong site selection for oviposition, and female approach to males, all in the context of its conservation. We used satellite imagery to determine the location of habitats within its locality. We further used infrared imagery to identify warmer and cooler habitats within the area. Details of its occurrence were mapped, based on observational data acquired throughout the flight season. From this, we were able to establish that its population moves around its locality, and we also establish its environmental requirements for conservation. We also indicate its umbrella value for representing two other threatened odonate species, Endangered *Proischnura polychromatica* and Vulnerable *Syncordulia legator*, as well as some other CFR endemic odonates. Conservation of this species requires continual monitoring and removal of invasive alien trees as a priority. Translocation should also be considered as various risks to

this one locality are high. A potential site is identified." (Authors)] Address: Deacon, C., Department of Conservation Ecology and Entomology, Stellenbosch University, Matieland, South Africa. E-mail: charldeacon@sun.ac.za

**18065.** Delnat, V.; Debecker, S.; Stoks, R. (2017): Integrating trait multidimensionality, predation and autotomy to explain the maintenance of boldness. *Animal Behaviour* 130: 97-105. (in English) ["Highlights: •Mechanisms maintaining bolder animals within populations are not fully understood. •We scored boldness traits and linked these to autotomy and mortality by predation. •Boldness-related traits did not frequently covary, indicating multidimensionality. •Bold individuals were not killed more by predators. •Bold larvae relied more on autotomy to compensate increased risk-taking behaviour. There is an ongoing debate on how personality types are maintained within populations. We tested, for the first time, the potential of trait multidimensionality and trait compensation, where prey compensate for the costs of one trait by relying more on another one, in maintaining variation in boldness within a population. We studied how four boldness-related traits and swimming escape performance covary and shape the probability of survival and autotomy of *Ischnura pumilio* damselfly larvae in an experiment with predatory dragonfly larvae. Our results did not support the common belief that bold individuals are selected against in terms of survival selection by predation. Instead, we found survival selection favouring individuals combining being bold for two boldness-related traits. The four boldness-related traits did not covary frequently, supporting the multidimensionality of boldness. Moreover, animals bolder for one trait (activity in the presence of predator cues) were shyer for another trait (response to predator cues), which indicated trait compensation. However, the support for trait compensation was limited. The only other case of trait compensation was that bold larvae compensated for their increased risk-taking behaviour in the presence of a predator with a higher probability of autotomy. These patterns may contribute to maintaining variation in boldness in damselfly populations. Just as boldness-related traits are multidimensional, the mechanisms underlying their persistence in natural populations are also likely to be multifaceted." (Authors)] Address: Stoks, R., Lab. Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**18066.** Dronzikova, M.V. (2017): Influence of river pollution on the biodiversity of dragonflies (Odonata) in the Tom' River Basin. *Bulletin of Kemerovo State University. Series: Biological, Engineering and Earth Sciences* 3 (2017): 4-10. (in Russian, with English summary) ["Some species are so sensitive to environmental changes that may serve as indicators, which defines their significance for a complex evaluation of ecosystem condition on the territory under study. The current research shows that separate species of dragon-flies (and the reophile species in particular) are very sensitive to pollution and can serve as the indicators of environment. The research was conducted mainly in the area around the cities of Novokuznetsk, Mezhdurechensk, Osynniky, Kiselevsk,



Prokopyevsk and Tashtagol, where the Tom-river is contaminated with pollutants from industrial sewage. The authors made an attempt to analyze the odonatocomplexes of the water sources of the Tom' River basin (the Tom, the Kondoma, the Aba, The Mrass-su) and register the chemical structure of the water. The results showed that the general odonatocomplex of the Tom' River basin consists of 6 kinds of rheophils. However, downstream from large industrial centers, there is a sharp decline in the number of species, almost to the point of complete disappearance at some rivers, which clearly correlates with the degree of water pollution." (Author)] Address: Dronzikova, Marina, Kemerovo State University (Novokuznetsk branch), 23, Tsiolkovsky St., Novokuznetsk, Russia, 654041. E-mail: m\_dronzikova@mail.ru

**18067.** Dubcova, D. (2017): Reprodukční chování samcu páskovce kroužkovaného (*Cordulegaster boltonii*). Diplomová práce. Univerzita Karlova, Přírodovědecká fakulta, Katedra ekologie, Raha: 65 pp. (in Czech, with English summary) [Communication among animals often relies on visible signals and the ability to compatibly perceive them. Correct signal perception is especially important for animals with male sexual selection. In my master's thesis, I am addressing the issue of how does a male golden-ringed dragonfly (*C. boltonii*) recognize a female of the same kind and therefore, what is the main trigger of copulation behavior. Dragonflies display a wide variety of colors and possess very big eyes. These characteristics already suggest that they are very liable on color vision (Futahashi, 2015). Their sight is perfectly developed within the insect class and plays the most important role in the imagines in comparison to other senses. The ability to orient themselves using sight is not just important for orientation in space, nonetheless it is important for reproduction. Since golden-ringed dragonflies do not demonstrate visible color dimorphism, previous as well as my research suggests that the key role for female reconnaissance is primarily their typical movement above water surface during oviposition. In my research, I presented variable types of lure - females to male *C. boltonii* and I observed what is the foremost trigger of reproduction behavior in the males. Besides the above mentioned female movement I achieved to demonstrate that the males perceive also the markings respectively the black striping of their counterpart. Moreover, I confirmed my hypotheses that if a male performs the same movements as a female, the other males do consider him a female. *C. boltonii* do not display color sexual dimorphism therefore the movement is the key signal which allows the male to recognize the sex of another dragonfly. I further examined if the males would react positively to an artificial substitute and how much would their reactions differ from the reactions to a proper female dragonfly. Since recently several studies addressed also the ability of ultraviolet light perception within sexually dimorphic kinds of dragonflies, I at-tempted to determine if golden-ringed dragonflies possess and perceive UV markings as well. It turned out that *C. boltonii* reflect UV markings among each other and even with more significantly stronger stimuli by which a male recognizes a female, the absence of UV markings significantly lowers their reactivity." (Author)] Address: not stated

**18068.** Dwivedi, Y.D.; Ho, W.H.; Donepudi Jagadish; Rao, P.M.V. (2017): Spanwise flow analysis of gliding bio-inspired corrugated wing. *Jour. of Adv. Research in Dynamical & Control Systems*, 12-Special Issue: 313-322. (in English) ["Most of the artificially flying machines have profiled smooth wing section, however the natural low Reynolds number flyers like insects specifically the dragonfly, do not have such types of profiled wings instead have corrugated wings with well-defined pattern. This paper presents an experimental flow visualisation and boundary layers measurements of a bio-inspired corrugated wing and compared with a flat plate at low to moderate chord Reynolds numbers ranging from  $1.5 \times 10^5$  to  $3.75 \times 10^5$  by varying the angle of attack from 00 to + 120 by using low speed subsonic open wind tunnel. The boundary layer measurements were done at a fixed chord location ( $0.7 x/c$ ) and different semispan locations (30%, 60% and 90% of the wing's semispan) from the longitudinal axis of the wing. Flow visualisation was done by using coloured tufts, placed in different span locations. The flow reversal was observed at particular Reynolds numbers and angles of attack only. The boundary layer measurements showed that there is a clear distinction on the velocity gradient profile in all the three tested semispan locations on both the types of the wings. The corrugated wing showed delayed stall and flow separation compared with the flat plate. The visualization of flow in both wings showed that there exists a spanwise flow moving from wing tip to root, indicating that there exist a three dimensional fluid flows." (Authors)] Address: Dwivedi, Y.D., School of Mechanical Engineering, VFSTR University, Vadlamudi, Guntur, Andhra Pradesh, India

**18069.** Eda, S. (2017): Unusual connections in copulation, and oviposition behaviour in dragonflies. *Tombo* 59: 29-45. (in Japanese, with English summary) ["Unusual connections and oviposition behaviour, including abnormal patterns, of Odonata are reviewed. Unusual connections are divided into male-male tandem in the same and different species, male-female tandem in the different species with and without copulation or oviposition, and triple connections of the same and different species. The triple connections are classified into A, B, AB, O, MMM types (cf. Fig. 2) and Y and X types are newly proposed. The quartets were also observed in 4 cases. Oviposition (ovi.) behaviour can be divided into the following 9 types (cf. Fig. 3). A: Sitting ovi. into plant, B: sitting ovi. into mud, C: Sitting ovi. into water, D: Flying ovi. into mud, E: Flying ovi. into water, F: Sitting ovi. onto plant surface, G: Flying ovi. onto plant surface, H: Sitting ovi. above water, I: Flying ovi. above water. Among Japanese species, F and H types are unusual." (Author)] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND02767@nifty.com

**18070.** Fan, X.-L.; Lin, Z.-H. (2017): Vulnerability and behavioral responses of South Chinese anuran tadpoles to native dragonfly (*Pantala flavescens*) naiads and introduced western mosquitofish (*Gambusia affinis*). *Journal of Freshwater Ecology* 32(1): 529-539 . (in English) ["Anti-predator behavior is an important fitness component in most animals. Alien predator species are a serious threat to amphibian populations. We studied the vulnerability and behavioral defenses

of tadpoles of six Chinese anurans in response to the introduced, active foraging predator *Gambusia affinis* (western mosquitofish) and compared them with the responses to the native ambush predator *Pantala flavescens* (naiad stage) in laboratory experiments. The tadpoles were *Bufo gargarizans*, *Duttaphrynus* (formerly *Bufo*) *melanostictus*, *Rana zhenhaiensis*, *Fejervarya multistriata*, *Microhyla onata*, and *Hoplobatrachus chinensis* from Lishui, Zhejiang, South China. Our data showed that both native *P. flavescens* and introduced *G. affinis* could prey on the six tadpole species to different degrees and that the two toad tadpoles (*B. gargarizans* and *D. melanostictus*) were significantly less vulnerable to predation than the frog ones. The reduced vulnerability of toad tadpoles to predation may be attributed to their unpalatability and their continuous swimming ability, traits that are adaptive in more permanent habitats. Compared with the ambush predator *P. flavescens*, tadpoles reduced their activity level and used spatial avoidance measures when encountering *G. affinis*. Overall, our results suggest that some of the tadpoles in the study area are likely to recognize and respond to the predation threats of *G. affinis*." (Authors)] Address: Lin, Z.-H., Dept Ecol. & Biol. Res., College of Ecol., Lishui Univ., Zhejiang, P. R. China. E-mail: zhlin1015@126.com

**18071.** Fonseca, N.; Soares, A.; Félix, R.M.; Leitão, D. (2017): First evidence of breeding of *Zygonyx torridus* (Odonata: Libellulidae) in Portugal. *Notulae odonatologicae* 8(9): 326-331. (in English) ["Exuviae of *Z. torridus* collected in July 2015 at Ribeira da Boina stream, Algarve, represent the first evidence of this species breeding in Portugal. The status and current knowledge of *Z. torridus* in the country is summarized and notes on the habitat of the species are provided." (Authors)] Address: Fonseca, N., Rua da Fábrica 37-1.º Fte, 8500-590 Portimão, Portugal. E-mail: nelfonseca@gmail.com

**18072.** Futahashi, R. (2017): Molecular mechanisms underlying color vision and color formation in dragonflies. In: Toshio Sekimura & H. Frederik Nijhout (editors): *Diversity and evolution of butterfly wing patterns. An integrative approach.* Springer Nature. ISBN 978-981-10-4955-2: 303-320. (in English) ["Dragonflies are colorful diurnal insects with large compound eyes. Because they visually recognize conspecific and heterospecific individuals, their body color plays essential roles in ecology and reproductive biology. Here I introduce the recent topics of molecular mechanisms underlying color vision and color formation in dragonflies. Complex wing color polymorphism is recognized among the two closely related Japanese *Mnais* species, presumably due to stepwise character displacement to avoid interspecific mating. We discovered an extraordinary large number of visual opsin genes by RNA sequencing of 12 dragonfly species. Manual correction after de novo assembly was crucial for determining the exact number and sequence of opsin genes. Each opsin gene was differentially expressed between the adult and larva, as well as between dorsal and ventral regions of adult compound eyes, highlighting the behavior, ecology, and adaptation of aquatic larva to terrestrial adult. The repertoire of opsin genes differed among dragonfly species, plausibly involved in the diversity of the habitat and

behavior of each species. We also found that sex-specific yellow-red color transition in red dragonflies is regulated by redox changes in ommochrome pigments, which unveils a previously unknown molecular mechanism underlying body color change in animals. Establishment of the methods of gene functional analyses in dragonflies is desired for future studies." (Author)] Address: Futahashi, R., Bioproduction Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan

**18073.** Gabel, F.; Lorenz, S.; Stoll, S. (2017): Effects of ship-induced waves on aquatic ecosystems. *Science of the Total Environment* 601–602: 926-939. (in English) ["Highlights: • Effects of ship-induced waves are reviewed. • Abiotic: increase of erosion, resuspension of sediments and chemicals and turbidity. • Biotic: effects on dislocation, growth, reproduction and diversity on all trophic levels. • Effects on ecosystem services and management options are discussed. Most larger water bodies worldwide are used for navigation, and the intensity of commercial and recreational navigation is expected to further increase. Navigation profoundly affects aquatic ecosystems. To facilitate navigation, rivers are trained and developed, and the direct effects of navigation include chemical and biological impacts (e.g., inputs of toxic substances and dispersal of non-native species, respectively). Furthermore, propagating ships create hydrodynamic alterations, often simply summarized as waves. Although ship-induced waves are recognized as influential stressors, knowledge on their effects is poorly synthesized. We present here a review on the effects of ship-induced waves on the structure, function and services of aquatic ecosystems based on more than 200 peer reviewed publications and technical reports. Ship-induced waves act at multiple organizational levels and different spatial and temporal scales. All the abiotic and biotic components of aquatic ecosystems are affected, from the sediment and nutrient budget to the planktonic, benthic and fish communities. We highlight how the effects of ship-induced waves cascade through ecosystems and how different effects interact and feed back into the ecosystem finally leading to altered ecosystem services and human health effects. Based on this synthesis of wave effects, we discuss strategies for mitigation. This may help to develop scientifically based and target-oriented management plans for navigational waters that optimize abiotic and biotic integrity and their ecosystem services and uses." (Authors)] Address: Gabel, Friederike, Institute of Landscape Ecology, University of Münster, Heisenbergstr, 2, 48149 Münster, Germany

**18074.** Gabryszuk, M. (2017): Photogrammetric reconstruction of tandem-wing kinematics for free-flying dragonflies undergoing a range of flight maneuvers. M.Sc. Thesis, Faculty of the Graduate School of the University of Maryland, College Park: VIII, 111pp. (in English) ["Photogrammetric methods are used to reconstruct the body and wing kinematics of free-flying dragonflies. A novel experimental setup was designed and constructed to allow for repeated untethered flights in a constrained flight arena. Kinematic data are presented for twelve individual flights and a total of 23 complete

wing strokes, including unaccelerating, accelerating, climbing, and turning flight. High variability is observed in the wing motions employed by individual dragonflies, particularly in terms of stroke amplitude, pitch angle, and wingbeat frequency. Forewing and hindwing flapping is found to be neither in phase nor fully out of phase across all cases, with the forewings lagging the hindwings by an average of 90 degrees. Downstroke durations are observed to be shorter than upstroke durations except in highly accelerating flights. Migratory dragonflies are found to exhibit notably different wing kinematics than non-migratory species." *Erythemis simplicicollis*, *Pachydiplax longipennis*, *Pantala hymenaea* (Author)] Address: not stated

**18075.** Gainzarain, J.A.; Lasa, J.M. (2017): Presencia de *Brachytron pratense* (Müller, 1764) (Odonata, Aeshnidae) en una localidad montana de la provincia de Álava (norte de España). *Boletín de la Sociedad Entomológica Aragonesa* 61: 231-232. (in Spanish, with English summary) ["Presence of *B. pratense* at a montane locality in the province of Álava (northern Spain). "The Iberian distribution of the species appears to be very limited by altitude, and is restricted to coastal or very altitude, and is restricted to coastal localities or those very close to the coast. the coast, so the discovery of a population in Álava at 1000 m a.s.l. is noteworthy. of a population in Álava at 1000 m a.s.l. is noteworthy. On 26 June 2016 two males were observed at the Iturbaz reservoir, in the Entzia mountain range (30TWN56). Entzia (30TWN5640), one of which was photographed (Fig. 1). Two males were found again on 4 July at the same place, where, as on the same date where, as on the previous date, they flew constantly over a very specific area at over the water in a very specific area of the banks. In 2017, repeated visits to this repeated visits to this locality, and the species was observed again on three occasions on three occasions: 25 May (two, maybe three, ♂), 2 June (two ♂), 2 June (two ♂), 2 June (two ♂), 2 June (two ♂) and 2 June (two ♂). June (two ♂), and 7 June (one ♂), in all cases showing the same behaviour as in 2016. showing the same behaviour as in 2016. On subsequent visits, on 13 and 21 June no individuals were detected. As no juveniles or females have been observed, but the continued presence of males in two consecutive of males in two consecutive years in a locality very distant from other far away from other sites occupied by the species clearly points to the existence of an established to the existence of an established population in this pond." (Authors) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Gainzarain, J.A., Instituto Alavés de la Naturaleza. Apdo. de correos 2092 01080 Vitoria-Gasteiz, Spain. E-mail: [j.gainzarain@gmail.com](mailto:j.gainzarain@gmail.com)

**18076.** García-García, P.L.; Vázquez, G.; Novelo-Gutiérrez, R.; Favila, M.E. (2017): Effects of land use on larval Odonata assemblages in cloud forest streams in central Veracruz, Mexico. *Hydrobiologia* 785: 19-33. (in English) ["This study analyzes the effect of stream water quality and its relationship with habitat characteristics on larval Odonata assemblages in streams found in tropical montane cloud forests, pastures, and coffee plantations in the upper La Antigua River

watershed. The main factors that influenced larval Odonata assemblages in forest streams were low temperatures and high oxygen levels in water, coupled with a high diversity of the substrate and riparian vegetation; in pasture streams and coffee plantation streams, sedimentation strongly affected the composition of larval Odonata assemblages. In all the streams, species richness (0 D) was higher during the dry season. The highest Shannon a diversity (1 D) values were found in forest streams during the rainy season; however, in pasture and coffee plantation streams, 1 D values were higher during the dry season. The low species turnover in forest streams suggests that these streams provide highly stable conditions for Odonata assemblages; however, in pasture and coffee plantation streams, the higher turnover was related to the more variable water and habitat conditions. Thus, the persistence of Odonata assemblages in the upper La Antigua River watershed is closely related to the conservation status of the tropical montane cloud forests." (Authors)] Address: García-García, P.L., Red de Ecología Funcional, Instituto de Ecología, A. C., Carretera Antigua a Coatepec 351, Congregación El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: [gabriela.vazquez@inecol.mx](mailto:gabriela.vazquez@inecol.mx)

**18077.** Gerner, N.V.; Kone, M.; Ross, M.S.; Pereira, A., Ulrich, A.C.; Martin, J.W.; Liess, M. (2017): Stream invertebrate community structure at Canadian oil sands development is linked to concentration of bitumen-derived contaminants. *Science of the Total Environment* 575: 1005-1013. (in English) ["Highlight: • Aquatic exposure and effects were examined in Northern Alberta (Canada). • Effects on invertebrate community structure were monitored. • Effects at concentrations 100 times below the acute sensitivity of *Daphnia magna* • A biological indicator system, SPEARoil, was designed. • SPEARoil is applicable for future routine monitoring of oil sands related effects. In Canada, the Athabasca oil sands deposits are a source of bitumen-derived contaminants, reaching the aquatic environment via various natural and anthropogenic pathways. The ecological effects of these contaminants are under debate. To quantify the effects of bitumen-derived contaminants we monitored the aquatic exposure of polycyclic aromatic hydrocarbons (PAHs), metals, and naphthenic acids as well as the invertebrate community in the Athabasca River and its tributaries. PAH concentrations over 3 consecutive years were related to discharge and were highest in the year with high autumn rainfall. In the year with the highest PAH concentrations, these were linked with adverse effects on the aquatic invertebrate communities. We observed relative effects of the composition and concentration of contaminants on the invertebrate fauna. This is reflected by the composition and abundance of invertebrate species via the use of the species' traits "physiological sensitivity" and "generation time". Applying the SPEAR approach we observed alterations of community structure in terms of an increased physiological sensitivity and a decrease of generation time for the average species. These effects were apparent at concentrations 100 times below the acute sensitivity of the standard test organism *Daphnia magna*. To rapidly identify oil sands related effects in the field we designed a biological indicator system, SPEARoil,



applicable for future routine monitoring.] Address: Gerner, Nadine, UFZ, Helmholtz Centre for Environmental Research, Department System-Ecotoxicology, Permoserstr. 15, 04318 Leipzig, Germany

**18078.** Giuliano, D. (2017): L'entomofauna del S.I.C. IT1110033 "Stazioni di *Myricaria germanica*" (Insecta: Odonata; Orthoptera; Lepidoptera: Rhopalocera). *Rivista piemontese di Storia naturale* 38: 207-224. (in Italian, with English summary) ["This paper presents the results of a one-year monitoring project on insect fauna carried out in the SCI IT1110033 "Stazioni di *Myricaria germanica*". Dragonflies, grasshoppers and butterflies were chosen as target taxa in this research, providing an overview of the diversity status of these groups in the study area. Overall, 15 dragonfly, 30 grasshopper and 51 butterfly species were found, enhancing and updating the information about the presence and the distribution of these insects in the SCI. While dragonflies are strictly relied on small wetlands and ditches within the Pellice's river ecosystem, grasshopper and butterfly diversity depends mainly on habitat heterogeneity. The relatively high quality of the river ecosystem, together with the extensive management of meadows, produce a number of habitats (e.g. dry grasslands, gravel beds, bushes, hay meadows, etc.) essential for hosting species with a wide range of ecological requirements. Therefore, the conservation of the river ecosystem quality and the maintenance of an extensive meadows management are critical measures to preserve the entomological diversity in the SCI." (Author)] Address: Giuliano, D., via G. Matteotti 2 - 10066 Torre Pellice (TO), Italy. E-mail: [davide.giuliano@alice.it](mailto:davide.giuliano@alice.it)

**18079.** Gleason, J.E.; Rooney, R.C. (2017): Aquatic macroinvertebrates are poor indicators of agricultural activity in northern prairie pothole wetlands. *Ecological Indicators* 81: 333-339. (in English) ["The Northern Prairie Pothole Region (NPPR) of Alberta, Canada, contains numerous shallow marshes that serve as important habitat for wildlife and provide essential ecosystem services. Many of these wetlands have been destroyed or degraded by human activity and the majority of remaining wetlands occur in landscapes affected by crop and cattle production. Alberta has implemented a conservation policy which requires the creation of wetland assessment tools. Aquatic macroinvertebrates are frequently used as indicators of environmental condition in rivers, but their effectiveness as indicators in prairie pothole wetlands is not clear. To evaluate the capacity of aquatic macroinvertebrates identified to family-level resolution to serve as regional bioindicators of agricultural disturbance in NPPR wetlands, we sampled macroinvertebrates at 64 fishless wetlands. The wetlands spanned a gradient in the extent of agriculture from 0 to 100% cover within a 500 m buffer around each wetland. We discovered that, contrary to our predictions, macroinvertebrate family richness and community composition could not predict agricultural disturbance (cropping or cattle grazing). We conclude that efforts to develop bioindicators for NPPR wetlands should be redirected to other taxa that are less costly to identify to species and that exhibit sensitivity to agricultural disturbance. ... We were particularly

optimistic about chironomids and odonates, but we could discern no relationship between these taxa and land use. For Odonata, these results are contrary to both our predictions and previous research from Alberta's NPPR (e.g., Hornung and Rice, 2003; Silver and Vamosi, 2012). One explanation for this discrepancy may be that these studies identified larval odonates to genus, but as mentioned this was beyond the scope of our limited study." (Authors)] Address: Gleason, Jennifer, Dept of Biology, Univ. of Waterloo, Waterloo, ON, N2L 3G1, Room 251 Biology 2 Building, Canada

**18080.** Golab, M.J.; Golab, P.A.; Contreras-Garduño, J.; Zajac, T.; Sniegula, S. (2017): The effects of habitat deterioration and social status on patrolling behavior in the territorial damselfly *Calopteryx splendens*. *Polish Journal of Ecology* 65(1): 122-131. (in English) ["Patrolling behaviour plays an important role in resource defense and in shaping social interactions in territorial species. However, it is not clear whether and how resource deterioration affects patrolling and interactions between territorial males. We addressed this issue by studying the territorial patrolling of *C. splendens* males, which use riverine vegetation patches composed of floating rafts of *Potamogeton natans* as territories. Males can hold single territories established on one vegetation patch (solitary residents) or hold adjacent territories established on shared vegetation patch (contiguous residents). The study predicted that solitary males engage more in patrolling than contiguous residents and that patrolling intensity is proportional to patch quality. Two types of semi-natural vegetation patches were sunk: of high and low quality measured on the basis of the patch size (range 2–5 m<sup>2</sup>) and its attractiveness to damselflies (measured as number of residents, non-territorial males and contests observed at a given patch). Changes in number of patrolling flights were monitored for solitary and two contiguous residents: first which hold territory situated closer to the patch centre and secondary holding territory nearer to the edge of a patch. Results indicated that solitary residents patrolled more often than either of the two contiguous residents. Habitat deterioration significantly reduced the patrolling intensity of both single and first contiguous resident, however, their patrolling activity was not resumed at the same intensity after the original patch had been restored. The secondary resident of a contiguous pair did not respond to habitat deterioration, but increased its patrolling activity following restoration. Patch quality was found to have no impact on patrolling, which implies that social context can be more important in predicting changes in patrolling behaviour in response to resource deterioration." (Authors)] Address: Golab, Maria, Inst. of Nature Conservation, Polish Academy of Sciences, Mickiewicza 33, 31-120 Krakow, Poland. E-mail: [marysiagolab@gmail.com](mailto:marysiagolab@gmail.com)

**18081.** Gómez-Anaya, J.A.; Novelo-Gutiérrez, R. Astudillo-Aldana, M.R. (2017): Efecto de las descargas domésticas y de beneficio de café sobre la calidad del agua y la diversidad de larvas de Odonata (Insecta) en un arroyo de bosque mesófilo de montaña en Veracruz, México. *Revista Mexicana de Biodiversidad* 88: 372-380. (in Spanish, with English summary) ["Effect of domestic and coffee mill discharges on the

water quality and the Odonata larval diversity in a mountain cloud forest stream in Veracruz, Mexico: Two contrasting sites along Huehueyapan River (Veracruz, Mexico), one relatively conserved and the other one impacted by domestic and coffee mill discharges, were compared based on water quality data, and the structure of the Odonata larval assemblages. Riparian vegetation of both sites was differentially modified or replaced. Physical and chemical parameters and Odonata larvae were gathered from January to November 2001. A Hotelling-T test was used to compare the physico-chemical parameters while rank/abundance graphs and Renyi diversity profiles were constructed using Odonata larvae data. A total of 2,212 larvae of 13 species in 7 genera were collected. The sites were very similar in number of species and Odonata larval assemblage structure, however, some of the most abundant species at both sites showed significant differences in abundance. The observed differences between the 2 sites are mainly explained by differences in the structure of riparian vegetation and the availability of substrates for odonates and, secondarily, by physical and chemical changes in the water. An abundance ratio was established based on the most abundant species for monitoring future impairment or recovery changes." (Authors)] Address: Gomez-Anaya, J.A., Red de Biodiv. y Sistemática, Inst. de Ecología A.C., Carretera antigua a Coatepec Num. 351, El Haya, 91070 Xalapa, Veracruz, Mexico

**18082.** Grof-Tisza, P.; LoPresti, E.; Heath, S.K.; Karban, R. (2017): Plant structural complexity and mechanical defenses mediate predator-prey interactions in an odonate-bird system. *Ecology and Evolution* 7(5): 1650-1659. (in English) ["Habitat-forming species provide refuges for a variety of associating species; these refuges may mediate interactions between species differently depending on the functional traits of the habitat-forming species. We investigated refuge provisioning by plants with different functional traits for Odonata nymphs emerging from water bodies to molt into their adult stage. During this period, nymphs experience high levels of predation by birds. On the shores of a small pond, plants with mechanical defenses (e.g., thorns and prickles) and high structural complexity had higher abundances of odonate exuviae than nearby plants which lacked mechanical defenses and exhibited low structural complexity. To disentangle the relative effects of these two potentially important functional traits on nymph emergence-site preference and survival, we conducted two fully crossed factorial field experiments using artificial plants. Nymphs showed a strong preference for artificial plants with high structural complexity and to a lesser extent, mechanical defenses. Both functional traits increased nymph survival but through different mechanisms. We suggest that future investigations attempt to experimentally separate the elements contributing to structural complexity to elucidate the mechanistic underpinnings of refuge provisioning." (Authors)] Address: Grof-Tisza, P., Department of Entomology & Nematology, University of California, Davis, CA, USA. Email: pgroftisza@ucdavis.edu

**18083.** Groover, R.S. (2017): Temporal and Spatial Aspects of the Colonization and Re-Colonization of Dragonflies in

Lentic Habitats. Dissertation, George Mason University, Fairfax, VA: xii, 147 pp. (in English) ["This dissertation describes dragonfly species of Hanover County, Virginia, which species are most likely to be first colonizers of a new or reconstructed impoundment, which species are never found as first colonizers, and which species are the dominant species three years after the impoundment fills with water. In this Piedmont region of Virginia, *Erythemis simplicicollis*, *Libellula incesta*, *Libellula luctuosa*, and *Perithemis tenera* were the first to colonize all sites researched. *Celithemis eponina* and *Pachydiplax longipennis* did appear as first colonizers, but not at all sites. Proximity to a source site appears to be a determinate for these six species, not any size or behavioral characteristics. Seventeen species, no matter what the proximity of a source site, never were first colonizer species for a new impoundment. During this research three species not previously noted on published species lists from government or organizations for this county were collected: *Anax junius*; *Libellula pulchella*; and *Pantala hymenaea*. Seven species found during this study are new additions for the Commonwealth of Virginia official species list for Hanover County: *A. junius*; *A. longipes*; *Celithemis eponina*; *C. fasciata*; *Libellula vibrans*; *Pantala flavescens*; and *Tramea lacerata*. Investigations regarding dominance after three years indicated that dominance did not change; whatever species arrived first, maintained dominance. Additional community structure in the lentic habitat was observed. This dissertation investigated the impact of wind on dispersal direction. In a manipulated mark and observation experiment, findings indicate that wind velocity in excess of 5 km/hr. resulted in the dragonfly's dispersal downwind. Less than 5 km/hr. results in varied direction of flight. Wind direction and velocity may impact direction of dispersal for adult dragonflies. Larval dragonflies were reared in an outdoor vivarium, the first of its kind, with documented survival of 74%, or greater, of the tenebrals." (Author)] Address: not stated

**18084.** Gwiazda, R.; Ledwon, M.; Neubauer, G. (2017): Sex-specific foraging behaviour of adult Whiskered Terns *Chlidonias hybrida* in response to body mass and offspring age. *Acta Ornithologica* 52(1): 81-92. (in English) ["Understanding foraging strategies remains a central question in behavioural ecology, but studies investigating how foraging of sexes is affected by other individual characteristics, like body size, are still scarce. We investigated how foraging behaviour during chick rearing varies in males and females with brood size, offspring age and individual body mass of parents, in a sexually size-dimorphic waterbird, the Whiskered Tern *Chlidonias hybrida*. Our study took place at the carp fish ponds in southern Poland, where both invertebrates (dragonflies, a typical prey of females — caught by picking) and small vertebrates (fish, tadpoles, frogs, males typical prey — caught by plunge-diving) are plentiful and available for both sexes during chick-rearing period. In total, 1680 attacks of 29 uniquely marked birds (16 males and 13 females) were observed during chick-rearing period. Foraging techniques were affected by sex of the parent and offspring age, interacting with body mass, and brood size. Males foraged mainly by plunge diving, but avoided this foraging technique

if their broods were small and when offspring were young, probably because the chicks were too small to consume vertebrate prey caught by diving. In contrast, females foraged mostly by picking prey from the air, water surface or floating leaves, for most of chick-rearing period, but increased frequency of plunge diving as offspring age increased. A significant interaction between body mass and offspring age suggests that birds differing in body mass foraged differently as their offspring grew. We conclude that despite sex-specific differences in foraging behaviour (and prey type delivered to the chicks), both sexes in the Whiskered Tern alter foraging behaviour in response to both brood and individual birds' attributes." (Authors)] Address: Gwiazda, R., Inst. Nature Conservation, Polish Acad. Sciences, Adama Mickiewicza 33, 31-120 Kraków, Poland. E-mail: gwiazda@iop.krakow.pl

**18085.** Gyeltshen, T.; Kalkman, V.; Orr, A. (2017): Field guide to the common Dragonflies and Damselflies of Bhutan. National Biodiversity Centre, Bhutan: 74 pp. (in English) ["This field guide is designed to enable identification, generally to species level, of mature male dragonflies and damselflies known to occur in Bhutan. At present over 110 species are known from Bhutan of which 49 are depicted in this guide. Although the guide does not include all species known from Bhutan it does include all common species and we therefore hope that with its help the great majority of specimens encountered in the field can be identified. Females cannot generally be identified with this guide, but many closely resemble the males in pattern and even when they are very different, in the field they are often recognisable by the males with which they associate, especially when observed mating." (Authors)] Address: Gyeltshen, T., Ugyen Wangchuk Institute for Conservation of Environment and Research, Bumthang, Bhutan. E-mail: thinleytshen@gmail.com

**18086.** Gyeltshen, T. (2017): A survey of Odonata from eastern Bhutan, with nine new national records. *Notulae odonatologicae* 8(9): 354-364. (in English) ["Odonates were collected in five districts (Tashigang, Samdrupjongkhar, Lhuntse, Pemagatshel and Zhemgang) in the eastern half of Bhutan between 13-iv- and 30-v-2016 and in Lhuntse district and Kanglung region in June 2016. A total of 16 localities were visited and 42 species were found, nine of which are new to Bhutan. These are *Philoganga montana*, *Anisogomphus occipitalis*, *Gomphidae* sp., *Davidius zallorensis*, *Stylogomphus inglisi*, *Chlorogomphus preciosus*, *Lyriothemis bivittata*, *Potamarcha congener* and *Zygonyx iris*, increasing the number of Odonata species known from Bhutan to 104." (Author)] Address: Gyeltshen, T., Dept Zool., School of Environmental & Life Sciences, Sherubtse College, Kanglung, Bhutan. E-mail: thinleytshen@gmail.com

**18087.** Hartika, W.; Diba, F.; Wahdina (2017): Keanekaragaman jenis capung (Odonata) pada ruang terbuka hijau kota Pontianak. *Jurnal Hutan Lestari* 5(2): 156-163. (in English) ["Dragonflies are spread throughout the world; the number is very abundant, especially in a wide variety of habitats. This study aims to determine the type of dragonfly in the area of Sylva UNTAN Arboretum Forest City, Forest City

Hall of Governors, the football field UNTAN Jogging Track and Field UNTAN as part of a green open space in the city of Pontianak. The second objective was to determine the existence of the diversity of the types of dragonflies in the area of green open space, as well as to determine the species diversity index, the percentage of relative abundance, evenness index and species richness index. The study was conducted in April-May 2016, with the methods time search. Results of the study found 12 species of dragonflies. 8 species belonging to the suborder Anisoptera Libellulidae families and 4 types belong to the suborder Zygoptera which includes family Coenagrionidae and Platycnemididae." (Authors) ] Address: Hartika, W., Fakultas Kehutanan, Universitas Tanjungpura Jalan Imam Bonjol Pontianak 78124, Indonesia. Email : widyazulharzi@gmail.com

**18088.** Hashim, N.A.; Aziz, M.A.; Basari, N.; Saad, K.; Jasmi, A.H.; Hamid, S.A. (2017): Diversity and guild structure of insects during rice flowering stage at a selected rice field in Penang, Malaysia. *Malays. Appl. Biol.* 46(3): 161-169. (in English) ["A study on diversity of insects in rice field was conducted at Kg Terus, Guar Perahu in Penang. This study aims to determine the diurnality and guild structure of insect in rice field specifically during the flowering stage of rice. Insects were collected using sweep net method and light trap method. Overall, a total of 1936 insect specimens representing 28 species, 19 families and seven orders were collected. Twenty five species from 19 families were caught during day time while 17 species from 13 families were trapped at night. Coleopterans were the dominant insect captured during day time sampling with *Micraspis crocea* from family Coccinellidae captured in highest number (223). In contrast, Hemipterans was dominant during night time with *Nilaparvata lugens* from family Delphacidae found in highest number (258). The Odonata recorded the highest diversity index ( $H' = 1.2587$ ) while Coleoptera recorded the highest richness index ( $Imargalef = 5.8390$ ) values for diurnal insect. For nocturnal insect, Hemiptera recorded the highest values for both diversity index ( $H' = 1.2655$ ) and richness index ( $Imargalef = 5.8390$ ). In term of guild structure, the rice pest was the most dominant insect found in rice field for both diurnal and nocturnal group. This followed by predator, others (visitor/pollinator) and parasitoid groups. Result of this study will identify the classification of insect present during the flowering stage of rice allowing farmers to forecast pest population build up to assist in the pesticides selection that will be generally applied at the end of flowering stage. This consequently will help to conserve beneficial insects and lower the pest management cost." (Authors)] Address: Hashim, N.A., School of Food Science & Technology, Univ. Malaysia Terengganu, 21030 Kuala Nerus, Terengganu, Malaysia. E-mail: aida.hashim@umt.edu.my

**18089.** Henarejos González, J.M. (2017): Revisión de las especies de odonatos presentes en la Región de Murcia. Máster en Tecnología, Administración y Gestión del Agua. Facultad de Biología. Curso 2014-2016: 48 pp. (in Spanish, with English summary) ["This paper is based on the compilation of quotes from Odonata species to have a global view



of their status in the Region of Murcia. The quotations come from volunteer naturalists, mostly, and references. Odonata current populations with a previous job done by Andreu-Rubio (1953) is compared. After analyzing the data, changes are detected in the populations of certain species, including notes that populations have changed a lot, absence and appearance of new species." (Author)] Address: not stated

**18090.** Higashikawa, W.; Yoshimura, M.; Yagi, T.; Maeto, K. (2017): Short and flat grass preferred by adults of the endangered dragonfly *Sympetrum pedemontanum elatum* (Odonata: Libellulidae). *Applied Entomology and Zoology* 52: 605-613. (in English) ["*S. pedemontanum* (Müller in Allioni) is widely distributed across the Eurasian continent and its neighboring islands. However, the populations of its subspecies *S. pedemontanum elatum* (Selys) in Japan have been rapidly decreasing with the loss of habitats in rural and suburban areas since the 1970s. For the conservation of this subspecies, which is now listed as endangered in many prefectures, it is important to understand the habitat preferences of the adults. Previous studies indicate that adult males of this species tend to fly on the flat surface of rice paddy fields. Thus, we hypothesized that they preferred short and flat grass. Field experiments in the Sakasegawa River, Hyogo Prefecture, Japan, showed that adult *S. p. elatum* significantly preferred the trimmed grass of *Phragmites japonicus* to untreated shaggy grass, regardless of sex. Our results indicate the importance of grass management for the conservation of this species, not only in and around paddy fields but also in fluvial habitats, which are abundant in Japan." (Authors)] Address: Higashikawa, W., Research Evaluation Division, Research Planning & Coordination Dept, Forestry & Forest Products Res. Inst., Tsukuba, Ibaraki, Japan

**18091.** Hill, M.J.; Biggs, J.; Thornhill, I.; Briers, R.A.; Gledhill, D.G.; White, J.C.; Wood, P.J.; Hassall, C. (2017): Urban ponds as an aquatic biodiversity resource in modified landscapes. *Global Change Biology* 23: 986-999. (in English) ["Urbanization is a global process contributing to the loss and fragmentation of natural habitats. Many studies have focused on the biological response of terrestrial taxa and habitats to urbanization. However, little is known regarding the consequences of urbanization on freshwater habitats, especially small lentic systems. In this study, we examined aquatic macro-invertebrate diversity (family and species level) and variation in community composition between 240 urban and 782 nonurban ponds distributed across the United Kingdom. Contrary to predictions, urban ponds supported similar numbers of invertebrate species and families compared to nonurban ponds. Similar gamma diversity was found between the two groups at both family and species taxonomic levels. The biological communities of urban ponds were markedly different to those of nonurban ponds, and the variability in urban pond community composition was greater than that in nonurban ponds, contrary to previous work showing homogenization of communities in urban areas. Positive spatial autocorrelation was recorded for urban and nonurban ponds at 0–50 km (distance between pond study sites) and negative spatial autocorrelation was observed at

100–150 km and was stronger in urban ponds in both cases. Ponds do not follow the same ecological patterns as terrestrial and lotic habitats (reduced taxonomic richness) in urban environments; in contrast, they support high taxonomic richness and contribute significantly to regional faunal diversity. Individual cities are complex structural mosaics which evolve over long periods of time and are managed in diverse ways. This facilitates the development of a wide range of environmental conditions and habitat niches in urban ponds which can promote greater heterogeneity between pond communities at larger scales. Ponds provide an opportunity for managers and environmental regulators to conserve and enhance freshwater biodiversity in urbanized landscapes whilst also facilitating key ecosystem services including storm water storage and water treatment." (Authors)] Address: Hassall, C., School of Biology, Univ. of Leeds, Woodhouse Lane, LS2 9JT, Leeds, UK. E-mail: c.hassall@leeds.ac.uk

**18092.** Hoeymans, B. (2017): The dragonfly fauna of the Merkske valley. *Brachytron* 19(2): 55-70. (in Dutch, with English summary) ["A total of 50 species of damselflies and dragonflies has been observed in the Merkske valley. Thirty-eight of them have populations in the study area and probably three more species are also reproducing. Seven species are only known to occur erratically. Most of these have rather a Mediterranean or southeastern origin. Colonisation of the area by *Gomphus vulgatissimus* is expected in the near future. Two species, *Aeshna subarctica* and *Sympetrum flaveolum* no longer occur in the area. The impressive list of species illustrates the regional importance of Het Merkske for the dragonfly population." (Author)] Address: Hoeymans, B.: E-mail: bart.hoeymans@vlaanderen.be

**18093.** Holzweber, H.; Waringer, J.; Chovanec, A. (2017): Ökologie von Hochmoorlibellen (Insecta: Odonata) im Freiwald und Weinsbergerwald (Ober- und Niederösterreich). *Acta ZooBot Austria* 154: 75-88. (in German, with English summary) ["The ecological status of mires is mostly evaluated by vegetation; however, dragonflies (Odonata) are reliable and valuable indicators for the hydrological and morphological status of mires. Based on the occurrence of autochthonic Odonata, the Dragonfly Association Index (DAI) thereby gives information about the ecological situation of mires. For this investigation the ecology of dragonflies in mires was observed between April and September 2015. Study sites were situated in seven bogs in the Freiwald and Weinsbergerwald area in the Austrian Bohemian Massif, with 27 sampling sites in total. Overall, 14 different dragonfly species were found, and 11 species are autochthonic. *Coenagrion hastulatum*, *Aeshna juncea*, *Leucorrhinia dubia*, *Somatochlora alpestris* and *Somatochlora arctica* are autochthonic dragonflies which are dependent on mires. Additionally, the sampling sites were divided into different quality classes, based on vegetation, and were assessed via a DAI developed specifically for this region, which is also applicable to other limnological ecosystems. For the development of this DAI, 53 potentially occurring dragonfly species were classified by their ecological requirements via cluster analysis. As a result, we defined nine associations which correlate with mire-specific

characteristics. In the mires of this region three fundamental associations were extracted: association in mires with open water, association in mires without open water and association in marshy waters with emerged vegetation. The results show that three sampling sites are in a very good condition, three are in a good and 21 sampling sites are in a bad condition. Most of the mires in this region are anthropogenically affected, and the reproduction sites for specific dragonflies depending on mires continually decrease. Via individual preservation and renaturation these sites could persist, recover and even increase, thereby providing habitats for rare mire plants and animals." (Authors)] Address: Holzweber, Helene, Oberrosenauerwald I 38, A-3920 Groß Gerungs, Austria. E-Mail: helene.holzweber@chello.at

**18094.** Horgan, F.G.; Ramal, A.F.; Villegas, J.M.; Jamorlin, A.; Bernal, C.C.; Perez, M.O.; Pasang, J.M.; Naredo, A.I.; Almazan, M.L.P. (2017): Effects of bund crops and insecticide treatments on arthropod diversity and herbivore regulation in tropical rice fields. *Journal of Applied Entomology* 141(8): 587-599. (in English) ["Ecological engineering using vegetable or flower strips is promoted as a potential pest management strategy in irrigated rice. Farmers in the Philippines often plant rice levees (bunds) with vegetables, particularly string beans (*Vigna unguiculata* [L.] Walpers) to supplement income, but without considering the potential for pest management. This study examines the effects of planted bunds on rice herbivores and their natural enemies. We compared arthropods in (a) rice fields that had string beans planted on bunds, (b) fields without string beans and without any insecticide applications and (c) fields without string beans but with insecticide treatments (standard practice). Rice yield was similar across all treatments; however, the vegetation strips produced an extra 3.6 kg of fresh string bean pods per metre of bund. There were no apparent increases in major natural enemy groups in fields with string beans compared to fields with conventional bunds. Fields with insecticide treatments had higher damage from leafhoppers (Lepidoptera: Pyralidae). The sprayed fields also had lower parasitism of planthopper eggs and fewer predatory Odonata. Furthermore, the mortality of planthopper (Delphacidae: Hemiptera) and stemborer (Pyralidae) eggs by parasitoids and predators was density dependent only in the unsprayed fields (with and without string beans). Our results demonstrate that planting string beans on rice bunds improves the productivity of rice farms, but our ecological engineering system did not appreciably affect natural enemy or herbivore abundance; however, chemical insecticides adversely affected pest regulatory ecosystem functions leading to higher pest damage." (Authors)] Address: Horgan, F.G., Centre for Compassionate Conservation, Univ. of Tech. Sydney, 15 Broadway, Ultimo, Sydney NSW 2007, Australia. E-mail: f.g.horgan@gmail.com

**18095.** Huang, D.; Cai, C.; Nel, A. (2017): A new Burmese amber hawker dragonfly helps to redefine the position of the aeshnopteran family Burmaeshnidae (Odonata: Anisoptera: Aeshnoidea). *Cretaceous Research* 79: 153-158.. (in English) ["The new genus and species *Angustaeshna magnifica* of Burmaeshnidae is described on the basis of a new

fossil from Burmese amber. The genus *Cretaeshna* from the same amber is transferred from the Telephlebiidae into the Burmaeshnidae. We redefine this last family, no longer considered as the sister group of the Late Cretaceous Enigmaeshnidae, but as putative sister group of the Telephlebiidae in the Aeshnoidea. No known fossil belongs to the Telephlebiidae." (Authors)] Address: Huang, D., State Key Lab. of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, People's Republic of China. E-mail: dyhuang@nigpas.ac.cn

**18096.** Ichikawa, Y.; Yokoi, T.; Watanabe, M. (2017): Thermal factors affecting egg development in the wandering glider dragonfly, *Pantala flavescens* (Odonata: Libellulidae). *Applied Entomology and Zoology* 52(1): 89-95. (in English) ["*P. flavescens* arrives in Japan from tropical regions every spring. The offspring colonize areas throughout Japan, with rapid increases in populations in the autumn, but all individuals die in the winter, suggesting low tolerance to low temperatures. However, few quantitative data on egg development and water temperature have been reported for this species. Females at the reproductive stage were collected from fields throughout the flying season and their eggs released using an artificial oviposition technique. Almost all of the eggs were fertilized. Egg size was stable throughout the seasons. Most eggs hatched within a period of 5 days at high water temperatures (35 and 30 °C), which were recorded in the shallow ponds and rice paddy fields from summer to early autumn. However, the egg-stage duration increased with declining water temperature. All eggs in water at 15 °C had failed to hatch by 90 days. The calculated critical temperature of water was determined to be approximately 14.3 °C; the total effective temperature for the egg stage was about 80 degree-days. Thus, low water temperatures in winter may prevent *P. flavescens* overwintering in Japan." (Authors)] Address: Yokoi, T., Graduate School of Life and Environmental Sciences, University of Tsukuba. Tsukuba, Ibaraki 305-8572, Japan. E-mail: tomoyoko@envr.tsukuba.ac.jp

**18097.** Itoh, S. (2017): The impacts of the big tsunami with the 2011 of the Pacific coast of Tohoku Earthquake to the populations of *Sympetrum striolatum imitoides* inhabit coastal area of Iwate Prefecture, north-eastern Honshu, Japan. *Tombo* 59: 6-10. (in Japanese, with English summary) ["The population of *S. striolatum imitoides* at Iwate Prefecture is limited in the middle to southern coastalline of the prefectural area. 11 March 2011, the big tsunami with the 2011 off the Pacific Coast of Tohoku Earthquake hit this area and many plants and animals were damaged. The author researched *S. striolatum imitoides* of this area in the flight season and confirmed the survived the adult insect 6/7 localities until 2012 flight season." (Author)] Address: Itoh, S., Kinoshita 4-9-7-102, Wakabayashi-ku, Sendai-shi, Miyagi, 984-0047 Japan

**18098.** Ivanova, E.P.; Song Ha Nguyen, S.H.; Guo, Y.; Baulin, V.A.; Webb, H.K.; Truong, V.K.; Wandiyanto, J.V.; Garvey, C.J.; Mahon, P.J.; Mainwaring, D.E.; Crawford, R.J. (2017): Bactericidal activity of self-assembled palmitic and

stearic fatty acid crystals on highly ordered pyrolytic graphite. *Acta Biomaterialia* 59: 148-157. (in English) ["The wings of insects such as cicadas and dragonflies have been found to possess nanostructure arrays that are assembled from fatty acids. These arrays can physically interact with the bacterial cell membranes, leading to the death of the cell. Such mechanobactericidal surfaces are of significant interest, as they can kill bacteria without the need for anti-bacterial chemicals. Here, we report on the bactericidal effect of two of the main lipid components of the insect wing epicuticle, palmitic (C<sup>16</sup>) and stearic (C<sup>18</sup>) fatty acids. Films of these fatty acids were re-crystallised on the surface of highly ordered pyrolytic graphite. It appeared that the presence of two additional CH<sub>2</sub> groups in the alkyl chain resulted in the formation of different surface structures. Scanning electron microscopy and atomic force microscopy showed that the palmitic acid microcrystallites were more asymmetric than those of the stearic acid, where the palmitic acid microcrystallites were observed to be an angular abutment in the scanning electron micrographs. The principal differences between the two types of long-chain saturated fatty acid crystallites were the larger density of peaks in the upper contact plane of the palmitic acid crystallites, as well as their greater proportion of asymmetrical shapes, in comparison to that of the stearic acid film. These two parameters might contribute to higher bactericidal activity on surfaces derived from palmitic acid. Both the palmitic and stearic acid crystallite surfaces displayed activity against Gram-negative, rod-shaped *Pseudomonas aeruginosa* and Gram-positive, spherical *Staphylococcus aureus* cells. These microcrystallite interfaces might be a useful tool in the fabrication of effective bactericidal nanocoatings. Statement of Significance: Nanostructured cicada and dragonfly wing surfaces have been discovered to be able physically kill bacterial cells. Here, we report on the successful fabrication of bactericidal three-dimensional structures of two main lipid components of the epicuticle of insect wings, palmitic (C<sup>16</sup>) and stearic (C<sup>18</sup>) acids. After crystallisation onto highly ordered pyrolytic graphite, both the palmitic and stearic acid films displayed bactericidal activity against both Gram-negative *Pseudomonas aeruginosa* and Gram-positive *Staphylococcus aureus* cells. The simplicity of the production of these microcrystallite interfaces suggests that a fabrication technique, based on solution deposition, could be an effective technique for the application of bactericidal nanocoatings." (Authors)] Address: Ivanova, Elena, School of Science, Faculty of Science, Engineering and Technology, Swinburne University of Technology, Hawthorn, VIC 3122, Australia

**18099.** Iwai, N.; Akasaka, M.; Kadoya, T.; Ishida, S.; Aoki, T.; Higuchi, S.; Takamura, N. (2017): Examination of the link between life stages uncovered the mechanisms by which habitat characteristics affect odonates. *Ecosphere* 8(9): e01930. 10.1002/ecs2.1930: 7 pp. (in English) ["The larval and adult stages of amphibious animals are affected by both aquatic and terrestrial habitat characteristics, and each stage also affects the other. However, this link between life stages has been largely overlooked in previous studies. We examined the effect of aquatic and terrestrial habitat characteristics on

the diversity of larval and adult odonates, taking into account the link between the two life stages. Species diversity of adult and larval odonates and aquatic plants, as well as patterns of land use, was investigated in 63 irrigation ponds. We created structural equation models, with paths from land use and aquatic plants characteristics to larval and adult stages of odonates, as well as between the two stages, and chose the best model based on the lowest Akaike information criterion. Adult odonates, but not larvae, were affected by aquatic and terrestrial habitat characteristics, suggesting that the former is the key stage for odonate communities. We observed a positive relationship between the diversity of aquatic plants and larval odonates, but this was in fact due to the effects of aquatic plants on adults, which carried over to the larval stage. Our study showed that a consideration of the link between life stages is crucial for a complete understanding of the relationship between habitat characteristics and amphibious animal populations." (Authors)] Address: Iwai, N., The Institute of Agriculture, Tokyo University of Agriculture and Technology, 3-5-8 Saiwai-cho, Fuchu, Tokyo 183-8509 Japan. E-mail: iwain@cc.tuat.ac.jp

**18100.** Jacquot, P., Mora, F., Ruffoni, A. (2017): L'atlas des libellules de Bourgogne-Franche-Comté: des approches différentes, un objectif conjoint. *Revue scientifique Bourgogne-Nature* 25: 216-232. (in French, with English summary) ["In connection with the administrative fusion of the former regions Bourgogne and Franche-Comté, contacts were established between observers' networks to put the bases of a future common atlas dealing with the group of dragonflies. Forts of a first fruitful partnership which became a reality in 2013 by the publication of a collective work on the day butterflies (ESSAYAN et al., 2013), it is indeed seemed more than ever convenient to pursue this collaboration which, besides mutualizing skills and experiences, will allow a more effective evaluation of the status of the species of dragonflies of our parts of the country. The authors suggest raising a brief history of the evolution of the knowledge, presenting the current local contexts, and putting some methodological bases." (Authors)] Address: Jacquot, Perrine, Conservatoire botanique national de Franche-Comté - Observatoire régional des Invertébrés, France. E-mail: perrine.jacquot.ori@cbnfc.org

**18101.** Janssens, L.; Stokks, R. (2017): Stronger effects of Roundup than its active ingredient glyphosate in damselfly larvae. *Aquatic Toxicology* 193: 210-216. (in English) ["Highlights: •Commercial pesticide formulations can be more toxic than their active ingredient. •We compared the effects of Roundup and its active ingredient glyphosate. •Roundup was more toxic than glyphosate in terms of survival, behaviour and physiology. •Glyphosate itself reduced growth rate, escape swimming speed and fat content. •Sublethal effects matter when comparing commercial products and active ingredients. Abstract: Pesticides are causing strong decreases in aquatic biodiversity at concentrations assumed safe by legislation. One reason for the failing risk assessment may be strong differences in the toxicity of the active ingredient of pesticides and their commercial formulations. Sublethal effects, especially those on behaviour, have been



largely ignored in this context, yet can be equally important as lethal effects at the population and ecosystem levels. Here, we compared the toxicity of the herbicide Roundup and its active ingredient glyphosate on survival, but also on ecologically relevant sublethal traits (life history, behaviour and physiology) in damselfly larvae. Roundup was more toxic than glyphosate with negative effects on survival, behaviour and most of the physiological traits being present at lower concentrations (food intake, escape swimming speed) or even only present (survival, sugar and total energy content and muscle mass) following Roundup exposure. This confirms the toxicity of the surfactant POEA. Notably, also glyphosate was not harmless: a realistic concentration of 2 mg/l resulted in reduced growth rate, escape swimming speed and fat content. Our results therefore indicate that the toxicity of Roundup cannot be fully attributed to its surfactant, thereby suggesting that also the new generation of glyphosate-based herbicides with other mixtures of surfactants likely will have adverse effects on non-target aquatic organisms. Ecotoxicological studies comparing the toxicity of active ingredients and their commercial formulations typically ignore behaviour while the here observed differential effects on behaviour likely will negatively impact damselfly populations. Our data highlight that risk assessment of pesticides ignoring sublethal effects may contribute to the negative effects of pesticides on aquatic biodiversity." (Authors)] Address: Janssens, Lizanne, Evolutionary Stress Ecology and Ecotoxicology, University of Leuven, Deberiotstraat 32, B-3000 Leuven, Belgium

**18102.** Jiang, Y.; He, Z.; Zhao, M.; Wang, C.; Sun, L.; Feng, Y. (2017): Oil content and fatty acid composition of six kinds of common edible dragonfly naiads. *China Oils and Fats* 42(3): 135-139. (in Chinese, with English summary) ["In order to evaluate the nutritional value of common edible dragonfly naiads in Yunnan and Guizhou provinces, the oil content and fatty acid composition of *Epophthalmia elegans*, *Anax parthenope julius*, *Ictinogomphus rapax*, *Partiala flavescens*, *Sinictinogomphus clavatus* and *Orthetrum pruinatum neglectum* were analyzed by Soxhlet extraction method and GC-MS. The results showed that the oil contents of six kinds of dragonfly naiads were 5.72% -11.90%. The oil contents of *Sinictinogomphus clavatus* and *Orthetrum pruinatum neglectum* were the highest and the lowest respectively. 18-29 kinds of fatty acids were identified, including odd-number carbon fatty acids, EPA and DHA, which had special functions. The unsaturated fatty acids (UFA) accounted for 61.50% -65.22% of total fatty acids and the polyunsaturated fatty acids (PUFA) accounted for 29.57% -50.00% of total UFA. The contents of hexadecanoic acid were the highest, which were 17.57% -24.61%. The ratios of n-6 PUFA to n-3 PUFA were 0.68 -1.30, which were similar to the freshwater fish oils. The ratios of saturated fatty acid to monounsaturated fatty acid to PUFA in *Pantala flavescens* and *Orthetrum pruinatum neglectum* were 1.17:1.2:1 and 1.3:1.18:1, which were close to the ratios recommended by the North Atlantic Treaty Organization and the American Heart Association (1:1.5:1 and (0.8 - 1) :1.5:1)." (Authors)] Address: Jiang, Y., Research Institute of Resources Insects, Chinese Academy of Forestry, Kunming 650224, Yunnan, China

**18103.** Jiang, Y.; Zhao, M.; Me, Z.; Wang, C.; Sun, L.; Feng, Y. (2017): Nutrition composition and evaluation of six edible dragonfly naiads. *Biotic Resources* 39(5): 352-359. (in Chinese, with English summary) ["To utilize the resource of edible dragonflies scientifically, we analyzed and valued the nutritional composition of six common edible dragonfly naiads collected in Yunnan and Guizhou provinces of China. The contents of protein, oil, carbohydrate, moisture, ash, amino acid, mineral element and fat soluble vitamin were analyzed by Kjeldahl method, Soxhlet extraction method, anthrone colorimetry method, auto analysis of free amino acid method, atomic absorption method, inductively coupled plasma mass spectrometry method (ICP-MS) and high performance liquid chromatography (HPLC). The results showed that the average content of moisture of six common edible dragonfly naiads were 81.17%, the average contents of protein, oil, carbohydrate and ash were 65.62%, 9.80%, 3.01% and 5.47% respectively from dry basis. Their amino acid composition fits the ideal protein pattern established by WHO/FAO, and the limiting amino acids were Met + Cys and Trp. The closeness degrees of protein of six common edible dragonfly naiads to egg protein were 0.59~0.66. They were rich in mineral elements, especially Calcium and Selenium, and as high as 0.252~3.859 mg · kg<sup>-1</sup> or tocopherol was detected in six specimens. Edible dragonflies have prospects of development and utilization, but it should be noted that some heavy metal elements in some species exceed the standard." (Authors)] Address: Jiang, Y., Research Institute of Resources Insects, Chinese Academy of Forestry, Kunming 650224, Yunnan, China

**18104.** Joest, R. (2017): Neue Daten zum Vorkommen der Grünen Flussjungfer (*Ophiogomphus cecilia*) an der Lippe im Kreis Soest. *ABU info* 39-40: 22-26. (in German) [50 records of the middle section of River Lippe (Landkreis Soest, Nordrhein-Westfalen [NRW], Germany) between Lippstadt and western border near the town of Hamm are documented. "*O. cecilia* is considered an indicator of near-natural flowing waters. For some time now, the already extinct species has re-established itself in NRW. It has been recorded on the river Lippe in the district of Soest since 2009. The number of records, the regular occurrence and the first exuviae indicate that this species is native to the area. The records originate from the river Lippe below Lippstadt to below Lippborg. The largest number of records was found in renaturalised sections between Lippstadt and Eickelborn. These sections are characterised by shallower and fast-flowing areas as well as sand deposits and deadwood and do not have a continuous woody fringe due to grazing on the banks. Besides the improvement of water quality and climatic changes, renaturation measures can be seen as a cause for the settlement of *O. cecilia* on the Lippe." ] Address: Joest, R., Arbeitsgemeinschaft Biologischer Umweltschutz – Biologische Station Soest, Bad Sassendorf-Lohne. E-mail: r.joest@abu-naturschutz.de

**18105.** Johansson, F.; Halvarsson, P.; Mikolajewski, D.J.; Höglund, J. (2017): Phylogeography and larval spine length of the dragonfly *Leucorrhinia dubia* In Europe. *PLoS ONE*

12(9): e0184596. <https://doi.org/10.1371/journal.pone.0184596>: 9 pp. (in English) ["Presence or absence of predators selects for different kind of morphologies. Hence, we expect variation in traits that protect against predators to vary over geographical areas where predators vary in past and present abundance. Abdominal larval spines in dragonfly larvae provide protection against fish predators. We studied geographical variation in larval spine length of the dragonfly *Leucorrhinia dubia* across Western Europe using a phylogenetic approach. Larvae were raised in a common garden laboratory experiment in the absence of fish predators. Results show that larvae from northern Europe (Sweden and Finland) had significantly longer larval spines compared to larvae from western and central Europe. A phylogeny based on SNP data suggests that short larval spines is the ancestral stage in the localities sampled in this study, and that long spines have evolved in the Fenno-Scandian clade. The role of predators in shaping the morphological differences among the sampled localities is discussed." (Authors)] Address: Johansson, F., Dept of Ecology & Genetics, Uppsala Univ., Uppsala, Sweden. E-mail: frank.johansson@ebc.uu.se

**18106.** Jones, D.K.; Hintz, W.D.; Schuler, M.S.; Yates, E.K.; Mattes, B.M.; Relyea, R.A. (2017): Inducible tolerance to agrochemicals was paved by evolutionary responses to predators. *Environ. Sci. Technol.* 51(23): 13913-13919. (in English) ["Recent research has reported increased tolerance to agrochemicals in target and nontarget organisms following acute physiological changes induced through phenotypic plasticity. Moreover, the most inducible populations are those from more pristine locations, far from agrochemical use. We asked why do populations with no known history of pesticide exposure have the ability to induce adaptive responses to novel agrochemicals? We hypothesized that increased pesticide tolerance results from a generalized stressor response in organisms, and would be induced following sublethal exposure to natural and anthropogenic stressors. We exposed larval wood frogs (*Lithobates sylvaticus*) to one of seven natural or anthropogenic stressors (predator cue (*Anax* spp.), 0.5 or 1.0 mg carbaryl/L, road salt (200 or 1000 mg Cl<sup>-</sup>/L), ethanol-vehicle control, or no-stressor control) and subsequently tested their tolerance to a lethal carbaryl concentration using time-to-death assays. We observed induced carbaryl tolerance in tadpoles exposed to 0.5 mg/L carbaryl and also in tadpoles exposed to predator cues. Our results suggest that the ability to induce pesticide tolerance likely arose through evolved antipredator responses. Given that antipredator responses are widespread among species, many animals might possess inducible pesticide tolerance, buffering them from agrochemical exposure." (Authors)] Address: Jones, D.K., Darrin Fresh Water Institute, Dept of Biological Sciences, Rensselaer Polytechnic Inst., Troy, New York 12180, United States

**18107.** Joshi, S.; Kunte, K. (2017): Two new dragonfly species (Odonata: Anisoptera: Aeshnidae) from north-eastern India. *Zootaxa* 4300(2): 259-268. (in English) ["*Cephalaeschna acanthifrons* sp. nov. collected from Eaglenest Wildlife Sanctuary, West Kameng District, Arunachal Pradesh,

India, and *Planaeschna poumai* sp. nov. collected from two localities in Senapati District, Manipur, India, are described and compared with congeneric species. These records also represent the first reports of these obscure genera from India in the past 30 years." (Authors)] Address: Joshi, S., National Centre for Biological Sciences, GKVK Campus, Bellary Rd, Bengaluru, Karnataka 560065, India. E-mail: shantanu@ifoundbutterflies.org

**18108.** Joshi, S.; Veino, J.; Veino, D.; Veino, L.; Veino, R.; Kunte, K. (2017): Additions to the Indian dragonfly fauna, and new records of two enigmatic damselflies (Insecta: Odonata) from northeastern India. *Journal of Threatened Taxa* 9(7): 10433-10444. (in English) ["*Pseudothemis zonata* and *Burmagomphus divaricatus* are reported for the first time from northeastern India—hitherto not reported from the west of Thailand. The female of *Anisopleura vallei*, is described for the first time, with new records of this species from four localities in Kohima District, Nagaland, India. Previously, the only known record of this species was the type series collected by St. Quentin in 1935. We also provide new records of *Schmidtiphaea chittaranjani* which was previously known only from the holotype." (Authors)] Address: Joshi, S., National Center for Biological Sciences (NCBS), GKVK, Bellary Road, Bengaluru, Karnataka 560065, India. E-mail: shantanu@ifoundbutterflies.org

**18109.** Jung, S.W.; Cho, Y.C.; Lee, H.-G. (2017): Community characteristics and biological quality assessment on benthic macroinvertebrates of Bongseonsa stream in Gwangneung Forest, South Korea. *Korean J. Environ. Ecol.* 31(6): 508-519. (in Korean, with English summary) ["There have been many studies on monitoring of biodiversity changes and preservation of Gwangneung Forest Biosphere Reserve (GFBR) in South Korea in recognition of the rare ecosystem that has been preserved for a long period. However, there are few studies on diversity and community characteristics of benthic macroinvertebrates as an indicator of stream health of GFBR. The purpose of this study was to assess the water quality of Bongseonsa Stream that penetrated through Gwangneung Forest and the nearby torrents by analyzing the benthic macroinvertebrates community during April to September 2016. The investigation collected a total of 114 species of benthic macroinvertebrates belonging to 56 families, 17 orders, 8 classes, and 5 phyla from the Bongseonsa Stream and Kwangneung Stream. Ephemeroptera and Trichoptera were the largest groups in species diversity with 30 species (32.3%) and 16 species (17.2%), respectively, and Tubificidae sp., *Baetis fuscatus*, *Antocha* KUa, and *Cheumatopsyche brevilineata*, which usually habit in contaminated streams, appeared frequently. Among the feeding function groups, the gatherers and hunters appeared relatively frequently, and the shredders and scrapers appeared frequently in the torrents. Among the habitat oriented groups, the clingers and burrower appeared more frequently and represented the microhabitats in the shallow areas. The result of the analysis of benthic macroinvertebrates community showed that the dominant index was 0.48±0.10 in average while it was lowest with 0.33 in GS 8 of the Gwangneung Forest torrent

and highest in BS 1 of Bongseonsa Stream. The diversity and richness indices were inversely proportional to the dominant index and were 2.53 and 4.22, respectively, in GS 8 where the dominant index was low. The result of the analysis of community stability showed that area I, which had high resistance and restoration, was high in Bongseonsa Stream while the area III, which had low resistance and restoration, was high in Gwangneung Forest, indicating that the water system in Gwangneung Forest had a wider distribution of species sensitive to agitation. The biological water quality assessment showed ESB of  $50.88 \pm 17.69$ , KSI of  $1.11 \pm 0.57$ , and BMI of  $78.55 \pm 11.05$  GS 8 of Gwangneung Forest torrent was judged to be the highest priority protective water area with the best water environment and I class water quality with ESB of 63, KSI of 0.55, and BMI of 89.9. On the contrary, BS 1 of Bongseonsa Stream was judged to be the high priority improvement area that had the lowest water quality rating of III with ESB of 25, KSI of 2.13, and BMI of 62.7. Although the diversity of water beetle was higher in the water system of nearby Bongseonsa Stream than the water system inside the Gwangneung Forest, the annual community structure appeared to have distinct differences." Lamelligomphus ringens (Authors)] Address: Lee, H.-G., Department of Biological Science, Sangji University, Wonju 26339, Korea. E-mail: momingdew@sangji.ac.kr

**18110.** Kalnins, M. (2017): *Argiolestes spungisi* sp. nov. (Odonata: Argiolestidae) from New Guinea. Telnov, D. et al. (eds) 2017: Biodiversity, Biogeography and Nature Conservation in Wallacea and New Guinea, III: 357-362, plates 52-55. (in English) ["A new species of *Argiolestes* is described: *Argiolestes spungisi* sp. nov. (type locality: Indonesia, West New Guinea, Doberai Peninsula, Ayamaru village 23 km SE, Aqafu springs, deposited LINC). Ecological notes on habitat (forest brooks) of type locality are given." (Author)] Address: Kalnins, M., The Entomological Society of Latvia, Dzervenu iela 9-12, LV-2150, Sigulda, Latvia. E-mail: martins.kalnins@biology.lv

**18111.** Karlsson, E. (2017): Temperature acclimation in dragonfly larvae: which species are more vulnerable to global warming? M.Sc. thesis, Biology Education Centre and Department of ecology and genetics/Animal ecology, Uppsala University: 33pp. (in English) ["Climate change is affecting all known habitats on earth. Increased temperatures in aquatic habitats will not only heat the waters but will also cause larger variation in temperature fluctuation. Many animals in aquatic systems are adapted to specific habitats in these waters and may face disadvantages if temperatures changes too much. In my project, I have used larvae of dragonflies and damselflies to examine how they might be affected by changes in water temperature caused by climate change. I sampled damselfly and dragonfly larvae in three lakes around Uppsala at two water depths, in order to examine whether these species differed in their depth distribution. Larvae exposed to thermal fluctuations should be better at adapting to the increase in temperature from global warming. In a laboratory experiment I tested the ability to acclimate to three temperatures (18, 21 and 24 °C) in three

species of damselfly larvae (*Ischnura elegans*, *Coenagrion pulchellum*, and *Erythromma najas*), over four different time intervals (1, 2, 12 and 24 hours) for *E. najas* and two time intervals for *I. elegans* and *C. pulchellum*. To measure acclimation, I introduced prey items in a laboratory experiment, and counted how many strikes and captures the larvae managed to do during a 10 min interval after being acclimated to the four different time intervals. The results of the field sampling in the lakes showed species specific depth distribution differences in dragonfly and damselfly larvae, with the majority of species preferring the surface over the bottom. The results from the temperature acclimation experiments showed that species changed then strikes and capture success on prey over the different time intervals, and especially *E. najas* showed a clear trend that suggest adaptation to temperate changes. Species differed in prey capture behaviour, with *E. najas* having the highest and *C. pulchellum* the lowest number of strikes and capture success. Results also suggested that *E. najas* is able to acclimate to the temperatures over the time period tested. This species also had a wide depth distribution in the lakes, which might explain its faster acclimation, even though a similar depth distribution was found in the non acclimating *C. pulchellum*. The other two species (besides *E. najas*) showed less clear patterns with regard to acclimation and it was difficult to tell if they were able to acclimate to the tested temperatures. My results suggest that damselfly larvae species are able to acclimate in prey capture behaviour over relatively short time periods in response to temperature fluctuations, and they might therefore be able to adapt to increasing temperature fluctuations in the future." (Author)] Address: Karlsson, E., Biology Education Centre & Department of ecology and genetics/Animal ecology, Uppsala University

**18112.** Kaunisto, K.M.; Roslin, T.; Sääksjärvi, I.E.; Vesterinen, E.J. (2017): Pellets of proof: First glimpse of the dietary composition of adult odonates as revealed by metabarcoding of feces. *Ecology and Evolution*. 2017;7. <https://doi.org/10.1002/ece3.3404>: 8588-8598. (in English) ["Recent advances in molecular techniques allow us to resolve the diet of unstudied taxa. Odonates are potentially important top-down regulators of many insects. Yet, to date, our knowledge of odonate prey use is based mainly on limited observations of odonates catching or eating their prey. In this study, we examine the potential use of metabarcoding in establishing the diet of three adult odonate species (*Lestes sponsa*, *Enallagma cyathigerum*, and *Sympetrum danae*) at a site in southwestern Finland. To this purpose, we compared three different methods for extracting DNA from fecal samples: the Mache-rey-Nagel Nucleospin XS kit, a traditional salt extraction, and the Zymo Research Fecal Microprep kit. From these extracts, we amplified group-specific mitochondrial markers (COI and 16S rRNA) from altogether 72 odonate individuals, and compared them to comprehensive reference libraries. The three odonate species show major overlap in diet, with no significant differences between individuals of different size and/or gender, reflecting opportunistic foraging of adult odonates. Of a total of 41 different prey species detected, the most frequently consumed ones were Diptera, with additional records of six other orders. Based on our data, the best DNA



extraction method is the traditional salt extraction, as it provides the most information on prey content while also being the most economical. To our knowledge, this is the first study to resolve the species-level diet of adult odonates. Armed with the appropriate methodological caveats, we are ready to examine the ecological role of odonates in both terrestrial and aquatic food webs, and in transferring subsidies between these two realms." (Authors)] Address: Kaunisto, K.M., Zoological Museum, Biodiv. Unit, Univ. Turku, Turku, Finland. E-mail: kkauni@utu.fi

**18113.** Kever, D.; Schott, O. (2017): Les effect positifs du Life Hautes Fagnes sur les libellules. Une synthèse des résultats après cinq ans de suivi standardisé (2013-2017). *Miscellanea Faniae* 33: 2-6. (in French) ["Initiated in 2013 following the large-scale restorations carried out by the LIFE Nature project 'Restoration of the moors and peat bogs of the High Fens Plateau', the monitoring of odonates quickly showed encouraging results (Kever 2014, Kever et al. 2014). We propose here to present a summary of the main highlights after five years of post-LIFE monitoring (2013-2017)."] (Authors)] Address: Kever, D., SPW/DGO3/DEMNA/DNE, Station scientifique des Hautes-Fagnes, Mont-Rigi, Route de Botrange, 137 - B-4950 Robertville, Belgium. E-mail: david.kever@spw.wallonie.be

**18114.** Khandakera, M.S.K.; Dudek, D.M.; Beers, E.P.; Dillard, D.A. (2017): Expression, crosslinking, and developing modulus master curves of recombinant resilin. *Journal of the Mechanical Behavior of Biomedical Materials* 69: 385-394. (in English) ["Highlights: • Recombinant resilin comprising exons 1 & 2 crosslinked for mechanical testing. • DMA tests conducted as function of temperature, frequency, & ethanol concentration. • Storage modulus increases observed spanning three orders of magnitude. • Glass transition, H-bonding, or structural reorganization likely responsible for effect. • Properties of recombinant resilin are in fair agreement with actual insect resilin. Abstract: Resilin is a disordered elastomeric protein found in specialized regions of insect cuticles, where low stiffness and high resilience are required. Having a wide range of functions that vary among insect species, resilin operates across a wide frequency range, from 5 Hz for locomotion to 13 kHz for sound production. We synthesize and crosslink a recombinant resilin from clone-1 (exon-1 + exon-2) of the gene, and determine the water content (approximately 80 wt%) and dynamic mechanical properties, along with estimating surface energies relevant for adhesion. Dynamic moduli master curves have been developed, by applying the time-temperature superposition principle (TTSP) and time-temperature concentration superposition principle (TTCSP), and compared with reported master curves for natural resilin from locusts, dragonflies, and cockroaches. To our knowledge, this is the first time dynamic moduli master curves have been developed to explore the dynamic mechanical properties of recombinant resilin and compare with resilin behavior. The resulting master curves show that the synthetic resilin undergoes a pronounced transition with increasing ethanol concentrations, with the storage modulus increasing by approximately three orders of magnitude. Although possibly a glass transition, alternate

explanations include the formation of intramolecular hydrogen bonds or that the chitin binding domain (ChBD) in exon-2 might change the secondary structure of the normally disordered exon-1 into more ordered conformations that limit deformation." (Authors)] Address: Khandakera, M.S.K., Dept Biomedical Engineering & Mechanics, Virginia Tech, Blacksburg, VA 24061, USA. E-mail: mkkhanda@vt.edu.

**18115.** Khelifa, R. (2017): Spatiotemporal pattern of phenology across geographic gradients in insects. 2017. University of Zürich, Faculty of Science: 141 pp. (in English, with German summary) ["Phenology – the timing of recurrent biological events – influences nearly all aspects of ecology and evolution. Phenological shifts have been recorded in a wide range of animals and plants worldwide during the past few decades. Although the phenological responses differ between taxa, they may also vary geographically, especially along gradients such as latitude or elevation. Since changes in phenology have been shown to affect ecology, evolution, human health and the economy, understanding phenological shifts has become a priority. Although phenological shifts have been associated with changes in temperature, there is still little comprehension of the phenology-temperature relationship, particularly the mechanisms influencing its strength and the extent to which it varies geographically. Such questions would ideally be addressed by combining controlled laboratory experiments on thermal response with long-term observational datasets and historical temperature records. Here, I used odonates (dragonflies and damselflies) and Sepsid scavenger flies to unravel how temperature affects development and phenology at different latitudes and elevations. The main purpose of this thesis is to provide essential knowledge on the factors driving the spatiotemporal phenological dynamics by (1) investigating how phenology changed in time and space across latitude and elevation in northcentral Europe during the past three decades, (2) assessing potential temporal changes in thermal sensitivity of phenology and (3) describing the geographic pattern and usefulness of thermal performance curves in predicting natural responses. Additionally, this thesis presents (4) a new behavior in odonates and (5) a commemoration of the 100th anniversary of a noteworthy book in odonatology. In Chapter I, the phenological shift of adult odonates across latitude and elevation was examined with long-term observation data of 54 species in six European countries, historical temperature records and experimental studies on species-specific thermal performance curves. Geographic variation in phenological shifts is expected since the magnitude of recent climate warming varies across both space (latitude and elevation) and time (seasons). However, little information exists on whether the average temperature, fluctuation of temperature or physiological response to such temperature fluctuations is the best predictor of phenology. First, phenology has shifted across both latitude and elevation, but to a different extent (magnitude), increasing with latitude and decreasing with elevation. Although average temperature explained some of the variation in spatiotemporal pattern of phenology, the physiological response (development) to temperature fluctuations provi-

ded better predictions. These results indicate that while researchers rely mostly on temperature data to explain phenological shifts, understanding the non-linear relationship between temperature and development would permit more robust predictions. Chapter II investigates the temporal changes in sensitivity of phenology to temperature (ST) using the same data as chapter one. Here, I tested the hypothesis that the phenology of species has become less sensitive to temperature over time, and that this pattern may vary geographically. There was an overall decline in ST between 1980 and 2013, but geographically this decline was observed along latitudinal but not elevational gradients. To explain this geographic pattern of ST, I tested three non-mutually exclusive hypotheses: (1) the position of the environmental temperature within the thermal performance curve determines the strength of the response of species to warming, (2) photoperiod has declined after phenological advancements and caused the decline in the thermal response of species, and (3) reduced chilling by winter warming has affected the response of species to spring temperature. I found the strongest support for hypotheses 2 (photoperiod limitation) and 3 (winter warming). These findings reveal that interactions between environmental cues may change the response of species to warming, thereby rendering long-term predictions very challenging. Chapter III focuses on the use of the thermal performance curve (TPC) for predicting larval development under laboratory and field conditions. Although the average temperature has been used extensively to assess the effect of warming, recent studies have highlighted the relevance of temperature fluctuations in shaping thermal responses. More importantly, there is missing knowledge on the usefulness of TPC in predicting development under natural conditions. I therefore combined laboratory and field experiments in five species of Sepsis flies (Diptera: Sepsidae), using distant populations from the temperate region (Europe, Africa and North America), to compare observed development data with theoretical estimates derived from TPC. The predictability of development under fluctuating temperature was better in the laboratory than in the field. Interestingly, accounting for temperatures that fall below a critical minimum improves the predictability of development such that flies not encountering cold conditions show predictable development times whereas flies encountering cold conditions tend to emerge earlier than expected. This study reveals the importance of cold temperatures in shaping thermal reaction norms, thus providing new insights to improve predictions of the responses of ectotherms to future climate change. Chapter IV provides the first description of sexual death feigning in a dragonfly species. Death feigning (playing dead) is a widespread behavior in animals, being recorded in mammals, birds, fish, reptiles, amphibians and insects. However, sexual death feigning, with one sex playing dead to avoid the opposite sex, is particularly rare. To date, the only four cases recorded include a species of spider, two species of robber flies and a species of mantis. Although death feigning has been documented in odonates, this thesis is the first record of sexual death feigning in *Aeshna juncea*. I suggest that sexual conflict has been the primary driver of the evolution of this behavior due to high levels of male harassment in this species.

Since the moorland hawkler is widespread in Europe where dragonflies have been studied extensively, it is likely that other cases of sexual death feigning remain undiscovered. Chapter V presents a commemoration of an important book in odonatology – *The Biology of Dragonflies* by Tillyard (1917) – and discusses the influence of this book on the field of odonatology, the contributions of the author to the understanding of dragonfly biology and systematics and the scientific advances over the last century. Tillyard has set the foundation for the study of the biology of dragonflies by providing the basic knowledge on their morphology, anatomy and embryology that is still in use today. I divide the history of odonatology into four major periods: Selys era, Tillyard era, Corbet era and the blossoming era (contemporary odonatology). This thesis, as well as many other studies on dragonflies, would not have seen the light of day without Tillyard's (1917) '*The Biology of Dragonflies*'; I therefore dedicate a chapter of my thesis to its 100th anniversary. The results shown in this thesis are particularly important because, unlike plants, ectotherms (cold-blooded animals) have received very little attention in the study of geographic and temporal patterns of phenology. Even though this group of animals encompasses most of the global biodiversity, its members share similar thermal adaptations (thermal performance curve). Consequently, understanding the mechanisms affecting their spatiotemporal pattern of phenology would help us predict their future response and adjust management plans accordingly." (Author)] Address: Khelifa, R., Zool. Dept, Univ. British Columbia, Vancouver, BC V6T 1Z4, Canada. E-mail: rassimkhelifa@gmail.com

**18116.** Kietzka, G.J.; Pryke, J.S.; Samways, M.J. (2017): Aerial adult dragonflies are highly sensitive to in-water conditions across an ancient landscape. *Diversity and Distributions* 23(1): 14-26. (in English) ["Aim: Adult dragonflies are renowned for being good bioindicators of anthropogenic change, but their response to the heterogeneity of undisturbed river systems has received little investigation. The Cape Floristic Region (CFR) has had a long lineage of natural selection which has honed life stages to the fine grain of the river systems. This leads to the intriguing question: How sensitive are the aerial adults to the in-water conditions? Location: Rivers of the CFR, in the Western Cape Province, South Africa, are naturally heterogeneous and complex ecosystems running across a geologically ancient landscape. The CFR is a significant centre of local endemism for many taxa, including dragonflies. Methods: We investigated dragonfly assemblages and 20 environmental variables along untransformed reaches of three CFR rivers. Results: We found that each river has its own particular 'signature' dragonfly assemblage. We also found that certain in-water parameters were the most important factors driving adult dragonfly assemblages, and not variables associated with substrate or riparian vegetation under these historic, natural conditions. This responsiveness to a heterogeneous range of in-water variables was similar from one river to the next, and also was independent of species turnover among the different dragonfly assemblages. Main conclusions: From a conservation perspective, the natural variation in certain water parameters, particularly in-water conditions, is essential for supporting

the full suite of adult dragonfly species. Challenging but important for conservation planning is that each river has its own biotic merit. Addressing this challenge also means that maintenance and restoration of historic, heterogeneous, in-water conditions in addition to the removal of alien invasive trees which are already known to be highly detrimental to this largely irreplaceable dragonfly fauna. Prioritizing which rivers to conserve can be achieved through using indices involving dragonflies." (Authors)] Address: Kietzka, Gabriella, Department of Conservation Ecology and Entomology, Stellenbosch University, Private Bag X1, Matieland 7602, South Africa. E-mail: gabikietzka@gmail.com

**18117.** Kobashi, K.; Harada, T.; Adachi, Y.; Mori, M.; Ihara, M.; Hayasaka, D. (2017): Comparative ecotoxicity of imidacloprid and dinotefuran to aquatic insects in rice mesocosms. *Ecotoxicology and Environmental Safety* 138: 122-129. (in English) ["Highlights: • Effects of imidacloprid and dinotefuran on paddy aquatic invertebrates were compared. • While applied at the same dose, residues of imidacloprid in both water and soil were higher than those of dinotefuran. • The number of species affected by imidacloprid exposures was higher than dinotefuran. • Dragonflies and chironomids are susceptible to neonicotinoids. • Mesocosms are key tools for assessing ecological risks of pesticides. Abstract: There are growing concerns about the impacts of neonicotinoid insecticides on ecosystems worldwide, and yet ecotoxicity of many of these chemicals at community or ecosystem levels have not been evaluated under realistic conditions. In this study, effects of two neonicotinoid insecticides, imidacloprid and dinotefuran, on aquatic insect assemblages were evaluated in experimental rice mesocosms. During the 5-month period of the rice-growing season, residual concentrations of imidacloprid were 5–10 times higher than those of dinotefuran in both soil and water. Imidacloprid treatment (10 kg/ha) reduced significantly the populations of, *Crocothemis servilia mariannae* and *Lyriothemis pachygastra* nymphs, whereas those of *Orthetrum albistylum speciosum* increased slightly throughout the experimental period. However, *Notonecta triggutata*, which numbers were high from the start, later declined, indicating possible delayed chronic toxicity, while *Guignotus japonicus* disappeared. In contrast, dinotefuran (10 kg/ha) did not decrease the populations of any species, but rather increased the abundance of some insects, particularly Chironominae spp. larvae and *C. servilia mariannae* nymphs, with the latter being 1.7x higher than those of controls. This was an indirect effect resulting from increased prey (e.g., chironomid larvae) and lack of competition with other dragonfly species. The susceptibilities of dragonfly nymphs to neonicotinoids, particularly imidacloprid, were consistent with those reported elsewhere. In general, imidacloprid had higher impacts on aquatic insects compared to dinotefuran." (Authors)] Address: Hayasaka, D., Graduate School of Agriculture, KINDAI University, 3327-204 Nakamachi, Nara 631-8505, Japan. E-mail: hayasaka@nara.kindai.ac.jp

**18118.** Kobayashi, T.; Ralph, T.J.; Lobb, J.; Miller, J.; Theischinger, G.; Hunter, S.J.; Jacobs, S.J. (2017): Dunphy Lake in Warrumbungle National Park, NSW: aquatic animal community after

the Wambelong fire in 2013. *Australian Zoologist* 39(3): 469-479. (in English) ["Fires are a common occurrence in Australian terrestrial ecosystems. A large fire occurred in January 2013 within and adjacent to the Warrumbungle National Park, near Coonabarabran in NSW, burning over 560 km<sup>2</sup> of the park and surrounding region (the Wambelong fire). The Wambelong fire affected Dunphy Lake, the only lake in the park. In this study, we assessed the post-fire aquatic animal community of the lake in March and September 2014. At the times of sampling the lake was largely dry and had only small isolated pools. We found 53 invertebrate taxa including the larvae of *Austrogynacantha heterogena* and one vertebrate species (larvae of the frog *Litoria rubella*) in the pool-water samples. Artificial inundation of the lake sediment samples under laboratory conditions led to the emergence of 31 taxa, totalling 62 taxa in the lake overall. Most taxa found in the lake are opportunistic and characteristic of those in still-water bodies. Dunphy Lake seems to be highly resilient in sustaining diverse aquatic animals. We highlight the importance of complementary pre- and post-fire data for improved assessments and interpretations of fire impacts to guide monitoring of post-fire recovery." (Authors)] Address: Kobayashi, T., Science Division, Office of Environment & Heritage NSW, PO Box A290 Sydney South NSW 1232, Australia. E-mail: Yoshi-Kobayashi@environment.nsw.gov.au

**18119.** Koprivnikar, J.; Urichuk, T.M.Y.; Szuroczi, D. (2017): Influences of habitat and arthropod density on parasitism in two co-occurring host taxa. *Canadian Journal of Zoology* 95(8): 589-597. (in English) ["Habitat attributes are known to influence infectious diseases such as those caused by parasites, but most studies have only considered single host and/or parasite taxa, making it difficult to assess which features may be of general importance and to predict how alterations could affect disease dynamics. We examined infection with trematode (flatworm) parasites in two commonly co-occurring host taxa, larval amphibians and larval odonates to investigate links with landscape-level features, including agricultural activity. We also assessed pond community composition with respect to the abundance and richness of aquatic arthropods known to prey upon tadpoles and/or free-swimming trematode infectious stages. Larval amphibians from agricultural sites were most likely to be parasitized but had lower infection intensities, and infected hosts were positively associated with increasing distance to the nearest forest habitat, but negatively with road distance. The opposite was observed for larval odonate infection status; however, probability and intensity of parasitism in both host taxa was negatively associated with greater predatory arthropod abundance, consistent with the "dilution effect" of biodiversity on infectious diseases. Our approach demonstrates the importance of considering multiple host taxa when studying habitat links to diseases, and future studies incorporating even greater diversity will be needed." (Authors)] Address: Koprivnikar, J., Dept of Chemistry & Biology, Ryerson Univ., 350 Victoria Street, Toronto, ON M5B 2K3, Canada. E-mail: jkoprivn@ryerson.ca

**18120.** Koroiva, R.; Pepinelli, M.; Rodrigues, M.E.; Roque,



F.; Lorenz-Lemke, A.P.; Kvist, S. (2017): DNA barcoding of odonates from the Upper Plata basin: Database creation and genetic diversity estimation. *PLoS ONE* 12(8): e0182283.: 14 pp. (in English) ["We present a DNA barcoding study of Neotropical odonates from the Upper Plata basin, Brazil. A total of 38 species were collected in a transition region of "Cerrado" and Atlantic Forest, both regarded as biological hotspots, and 130 cytochrome c oxidase subunit I (COI) barcodes were generated for the collected specimens. The distinct gap between intraspecific (0–2%) and interspecific variation (15% and above) in COI, and resulting separation of Barcode Index Numbers (BIN), allowed for successful identification of specimens in 94% of cases. The 6% fail rate was due to a shared BIN between two separate nominal species. DNA barcoding, based on COI, thus seems to be a reliable and efficient tool for identifying Neotropical odonate specimens down to the species level. These results underscore the utility of DNA barcoding to aid specimen identification in diverse biological hotspots, areas that require urgent action regarding taxonomic surveys and biodiversity conservation." (Authors)] Address: Koroiva, R., Ecology & Conservation Graduate Program, Universidade Federal de Mato Grosso do Sul, Campo Grande, Mato Grosso do Sul, Brazil. E-mail: ricardo.koroiva@gmail.com

**18121.** Koroiva, R.; Rodrigues, M.E.; Valente-Neto, F.; Roque, F. (2017): Odonates from Bodoquena Plateau: checklist and information about endangered species. *Biota Neotropica* 17(3), e20160310: 8 pp. (in English, with Portuguese summary) ["Here we provide an updated checklist of the odonates from Bodoquena Plateau, Mato Grosso do Sul state, Brazil. We registered 111 species from the region. The families with the highest number of species were Libellulidae (50 species), Coenagrionidae (43 species) and Gomphidae (12 species). 35 species are registered in the IUCN Red List species, four being Data Deficient, 29 of Least Concern and two species being in the threatened category. *Phyllogomphoides suspectus* Belle, 1994 (Odonata: Gomphidae) was registered for the first time in the state." (Authors)] Address: Koroiva, R., Universidade Federal do Mato Grosso do Sul, Instituto de Bociências, Cidade Universitária, 79070-900, Campo Grande, MS, Brazil

**18122.** Kosterin, O.E.; Chartier, G. (2017): Update of 2014 and 2016 to Odonata found at the marshy coast of SW Cambodia including three species added for the country. *International Dragonfly Fund - Report 101*: 1-26. (in English) ["The Odonata fauna of flat marshy areas of the Gulf of Siam coast in Koh Kong Province of Cambodia, containing 55 species, is considered. The published data of 2010- 2013 and new data of 2014 and 2016 on the surroundings of Koh Kong town are compiled and the first data on the area of large swampy Melaleuca forests at Andoung Tuek village are presented as well as some occasional photographic records. *Gynacantha bayadera*, *Lyriothemis mortoni* and *Pomothemis serrata* were for the first time recorded for Cambodia. *Mortonagrion falcatum* was found unexpectedly abundant at Andoung Tuek." (Authors)] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev Ave.

10, Novosibirsk, 630090, Russia; Novosibirsk State University, 2 Pirogova St, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

**18123.** Kumara, H.I.G.C.; Samarawikrama, V.A.M.P.K. (2017): Diversity of dragonfly species in the Hakkinda Islands of Mahaweli River in the Gatabe area. Project Report. A Research Grant in the Faculty of Humanities and Social Sciences University of Ruhuna: 19 pp. (in English) ["Hakkinda Islands surrounded by the Mahaweli River, close to the Kandy-Gatambe area is a bio-geographical hotspot in Sri Lanka, however, bio-geographical importance of these islands has been overlooked during the last few decades as a result of development projects and varied human activities. Considering that, the President of Sri Lanka has made an order declaring the Waratenna-Hakkinda area as a protected environmental area. According to the rudimentary survey, this protected area can be identified a special habitat to dragonfly species... Since the knowledge about diversity of dragonfly species is limited, this research's main objective is to bridge that gap in prevalent knowledge. This research is guided by Quantitative-Deductive research methodology. Under this methodology, line transects and quadrat sampling methods have been used in primary data collection process. According to research findings, a total of 16 dragonfly species from 8 families are identified and both riverine forest and river islands have rich diversity compared with home gardens in the area. Among the available species, 37.5% are identified to be endemic to the country. *Neurobasis chinensis*, *Vestalis apicalis* and *Libellago finalis* are identified to be vulnerable species. This research concludes that even if there are a high diversity of dragonfly species in the river islands and riverine forest areas, human activities and their irresponsible behaviour have directly / indirectly negatively influenced on dragonfly habitats and their breeding colonies. The research, thus, identifies an immediate requirement for a mechanism and regulations to protect a biologically important breeding colony of dragonfly species and their habitats to protect their diversity." (Authors)] Address: Kumara, H.I.G.C., Department of Geography, Faculty of Humanities & Social Sciences. University of Ruhuna

**18124.** Lambret, P.; Boudot, J.-P.; Chelmick, D.; De Knijf, G.; Durand, E.; Judas, J.; Stoquet, A. (2017): Odonata surveys 2010–2016 in the United Arab Emirates and the Sultanate of Oman, with emphasis on some regional heritage species. *Odonatologica* 46(3/4): 153-205. (in English) [oas 55: "Six field trips were carried out in the United Arab Emirates (UAE) and the Sultanate of Oman in autumn 2010, late winter 2013, spring 2014, autumn 2014, spring 2015 and spring 2016. We recorded 37 species at 87 localities, including new localities for some species of regional interest. Information on all observed Odonata species was recorded including their life stage, behaviour, habitat and water characteristics. Exuviae were also systematically collected. *Urothemis thomasi* was discovered at several new sites in the Hajar Mountains, the Dhofar and the Al Wusta regions, filling in the gap between the Dhofar and the Muscat area. In addition, new localities for two Arabian endemics:

Arabicnemis caerulea and Arabineura khalidi were found, with their occurrence in the Dhofar region extending their known area and demonstrating that A. khalidi cannot be regarded as a strict Hajar endemic. Important differences were noticed in the species composition of formerly surveyed localities, which may be ascribed to habitat degradation through management directed towards human recreation. Lastly, the well-known and diverse zoogeographical influences of Omani and the Emirati odonatofauna are confirmed with a large set of species of African origin in the Dhofar and a smaller set of species of Indomalayan origin visiting both the Dhofar and the northeast of the region during migrations and establishing, at least temporary, reproductive localities." (Authors)] Address: Lambret, P., Tour du Valat, Research Institute for the Conservation of Mediterranean Wetlands, Le Sambuc, 13200 Arles, France. lambret@tourduvalat.org

**18125.** Lambret, P.; Hilaire, S.; Stoks, R. (2017): Egg hatching phenology and success of *Lestes macrostigma* in two temporary brackish ponds. *International Journal of Odonatology* 20(1): 1-12. (in English) ["Although a full life cycle approach is optimally needed to make conservation decisions, the egg stage is often neglected for insect species of special conservation interest. Water management and related abiotic factors are relevant factors to consider in aquatic species. *Lestes macrostigma* is a threatened damselfly restricted to temporary brackish waters. Here we provide detailed information on its hatching success and phenology in two natural field populations. Shoots containing fresh egg clutches of *L. macrostigma* were sampled in late June, just after the oviposition period. In the fall, shoots were separately placed in plastic boxes in two ponds in southern France. Examination of eggs indicated *L. macrostigma* overwinters at an early embryonic stage. The following spring we monitored hatching in detail. Hatching began on 15 March in both ponds and ended on 27 April. Hatching was synchronized, with half of the eggs hatching within five days in the first pond and 14 days in the second pond. Lower water temperatures decreased hatching success and likely also delayed hatching. Embedment of shoots in ice increased egg mortality. Based on our data, wildlife managers are encouraged to maintain water levels high during winter to reduce the risk of freezing of *L. macrostigma* eggs." (Authors)] Address: Lambret, P., Tour du Valat, Research Institute for the Conservation of Mediterranean Wetlands, Le Sambuc, 13200 Arles, France. E-mail: lambret@tourduvalat.org

**18126.** Lamelas-López, L.; Florencio, M.; Borges, P.A.V.; Cordero-Rivera, A. (2017): Larval development and growth ratios of Odonata of the Azores. *Limnology* 18(1): 71-83. (in English) ["To fully understand odonate life cycles, it is vital to analyse the patterns of larval growth, which are tightly associated with variations in environmental factors. However, the identification of larval instars is often difficult, especially for early development stages. We hypothesise that pond hydroperiod influences odonate larval growth, and test this idea with novel information about the environmental characteristics of 12 study ponds in Terceira Island (Azores). This study, which represents the first analysis of larval

development of Odonata in the Azores, involved determining the instars of development and growth ratios. We measured the morphological characteristics of 898 Odonata larvae, and found that they significantly differed between temporary and permanent ponds. To estimate the larval instars, we used two methods: frequency distribution methods and correlation diagrams between body characteristics. The first method was the most effective, allowing the estimation of 17 instars for *Anax imperator*, 13 for *Sympetrum fonscolombii* and 10 for *Ischnura hastata*, as well as growth ratios between instars for head width, total length, abdomen length, wings and antenna length. Our results also suggest that a combination of the two methods is the most appropriate strategy for estimating the number of instars and growth ratios during larval development." (Author)] Address: Lamelas-López, L., CE3C, Centre for Ecology, Evolution & Environmental Changes/Azorean Biodiversity Group & Universidade dos Açores - Depto de Ciências e Engenharia do Ambiente, Rua Capitão João d'Ávila s/n, 9700-042 Angra do Heroísmo, Açores, Portugal. E-mail: lucaslamelaslopez@gmail.com

**18127.** Lancaster, L.T.; Dudaniec, R.Y.; Hansson, B.; Svensson, E.I. (2017): Do group dynamics affect colour morph clines during a range shift? *Journal of Evolutionary Biology* 30(4): 728-737. (in English) ["Species exhibiting colour-polymorphism are thought to have an ecological advantage at the landscape scale, because spatial segregation of alternatively-adapted ecotypes into diverse habitats can increase the total species' niche breadth and thus confer greater geographic range size. However, morph frequencies are also influenced by intra-populational processes such as frequency- or density-dependent social interactions. To identify how social feedback may affect clinal variation in morph frequencies, we investigated reciprocal interactions between morph-specific thermal tolerance, local climatic conditions, and social environments, in the context of a colour-morph frequency cline associated with a recent range expansion in *Ischnura elegans* in Sweden. Cold tolerances of gynochromes (female-like female morph) were positively correlated with local gynochrome frequencies, suggesting a positive frequency-dependent fitness benefit of being common. In contrast, androchrome (male-mimic female morph) cold tolerances were improved following recent exposure to cold weather, suggesting a beneficial environmental acclimation effect. Thus according to an environment-matching hypothesis for clinal variation, androchrome frequencies should therefore increase towards the (cooler) range limit. In contrast to this prediction, gynochrome frequencies increased at the expanding range limit, consistent with a positive frequency-dependent social feedback when invading novel climates. Our results suggest that when phenotypes or fitnesses are affected by interactions with conspecifics, beneficial social effects on environmental tolerances may i) facilitate range shifts and ii) reverse or counteract typical patterns of intraspecific interactions and environment-matching clines observed in stable populations observed over broader geographic scales." (Authors)] Address: Lancaster, Lesley, Univ. of Aberdeen, Zoology Building, Tillydrone Ave., Aberdeen AB24 2TZ, UK. E-mail: lesleylancaster@abdn.ac.uk

**18128.** Lancaster, L.T.; Morrison, G.; Fitt, R.N. (2017): Life history trade-offs, the intensity of competition, and coexistence in novel and evolving communities under climate change. *Phil. Trans. R. Soc. B* 372: 20160046: 10 pp. (in English) ["The consequences of climate change for local biodiversity are little understood in process or mechanism, but these changes are likely to reflect both changing regional species pools and changing competitive interactions. Previous empirical work largely supports the idea that competition will intensify under climate change, promoting competitive exclusions and local extinctions, while theory and conceptual work indicate that relaxed competition may in fact buffer communities from biodiversity losses that are typically witnessed at broader spatial scales. In this review, we apply life history theory to understand the conditions under which these alternative scenarios may play out in the context of a range-shifting biota undergoing rapid evolutionary and environmental change, and at both leading- edge and trailing-edge communities. We conclude that, in general, warming temperatures are likely to reduce life history variation among competitors, intensifying competition in both established and novel communities. However, longer growing seasons, severe environmental stress and increased climatic variability associated with climate change may buffer these communities against intensified competition. The role of life history plasticity and evolution has been previously underappreciated in community ecology, but may hold the key to understanding changing species interactions and local biodiversity under changing climates. This article is part of the themed issue 'Human influences on evolution, and the ecological and societal consequences'." The paper includes many references to Odonata. (Authors)] Address: Lancaster, Lesley, Institute of Biological & Environmental Sciences, University of Aberdeen, Aberdeen AB24 2TZ, UK

**18129.** Le Gall, M.; Chaput-Bardy, A.; Husté, A. (2017): Context-dependent local movements of the blue-tailed damselfly, *Ischnura elegans*: effects of pond characteristics and the landscape matrix. *Journal of Insect Conservation* 21(2): 243-256. (in English) ["The loss of ponds and the fragmentation of their surrounding landscape negatively impacts the biodiversity of wetlands, such as damselflies. They are short-distance dispersers and can be influenced by the quality of suitable habitats and the landscape matrix. The aim of this study was to test the effect of the environmental context (i.e. pond characteristics and the surrounding landscape) on movements and survival probability in a damselfly species, *Ischnura elegans*. Three approaches (i.e. capture-mark-recapture, individual tracking and translocation studies) were performed in Northwestern France. The characteristics of ponds did not influence damselfly survival. However, the landscape context affected movements within ponds, and between ponds. Individuals from open-field ponds moved over longer distances than individuals from urban ponds. Moreover, in cases of disturbances, such as a pond drying up, movements from one pond to another were observed only in the open-field context. The ecological quality of the pond did not appear to affect survival of individuals, probably because *I. elegans* has a high tolerance to changes in ecological factors. However, higher local movements depend on the degree of openness of the

landscape. Landscape context is hence a key issue in damselfly conservation planning and in maintaining ecological continuities, such as along greenways and blueways, and specifically the degree of landscape openness during pond creation." (Authors)] Address: Husté, Aurelié, Normandie University, UNIROUEN, IRSTEA, ECODIV, 76000 Rouen, France. E-mail: aurelie.huste@univ.rouen.fr

**18130.** Leandro, C.; Jay-Robert, P.; Vergnes, A. (2017): Bias and perspectives in insect conservation: A European scale analysis. *Biological Conservation* 215: 213-224. (in English) ["Insects are among the most diverse and abundant organisms on Earth, and they play a major role in ecosystem functioning. To protect them from decline, some conservation measures have been put in place, based primarily on threatened species lists. This is the case in Europe, where 123 of the 105,000 known European insect species are currently protected. Yet how were these few species selected? Are those species representative of the European entomofauna? Is it possible for a conservation policy based on the protection of only 0.12% of described species to be effective? In this study, we aimed to measure bias in the selection of species for conservation by comparing protected and unprotected species in Europe. To this end, we considered 15 characteristics divided into five main categories: 'Taxonomy', 'Morphology', 'Diet', 'Knowledge' and 'Distribution'. We investigated bias in species selection and found that protected species were significantly larger, better known, more widespread and more multicoloured than a randomly selected set of unprotected species. Moreover, butterflies, dragonflies and grasshoppers were overrepresented, as were nectarivorous and saproxylophagous species. In contrast, Hymenoptera and Diptera, together representing >40% of European entomofauna, do not appear on the current list of protected species. To address this bias, we propose recommendations to improve the protection of insects at the European scale, including making lists more 'dynamic', introducing new criteria, and a paradigm shift towards conserving assemblages and ecological function. Existing technical and societal means could be used to achieve an integrative conservation approach for insects." (Authors)] Address: Leandro, Camilla, Univ. Paul Valéry Montpellier 3, Univ Montpellier, EPHE, CNRS, IRD, CEFE UMR 5175, F-34000, Montpellier, France. E-mail: camilla.leandro@cefe.cnrs.fr

**18131.** Lencioni, F.A.A. (2017): *Leptagrion lencionineto* sp. nov. from the Serra da Mantiqueira of south-eastern Brazil (Odonata: Coenagrionidae). *Odonatologica* 46(3/4): 255-264. (in English) ["*Leptagrion lencionineto* sp. nov. is described from two males, the holotype and a paratype, collected in Brazil: São Paulo, Campos do Jordão, Condomínio Paradise, alt. 1 796m a.s.l., 16-x-2005, F. Lencioni Neto leg., both deposited in the author's collection. The new species differs from all congeners by the elevated and bifurcated hind lobe of prothorax." (Authors)] Address: Lencioni, F.A.A., Rua Aníbal, 216 – Jardim Coleginho – BR-12310-780, Jacareí, S.P., Brazil. E-mail: odonata@zygoptera.bio.br



**18132.** Lesch, V.; Bouwman, H.; Kinoshita, A.; Shibata, Y. (2017): First report of perfluoroalkyl substances in South African Odonata. *Chemosphere* 175: 153-160. (in English) ["Highlights: • Dragonfly samples collected in South Africa analysed at NIES for PFASs. • PFOS was quantifiable in all individuals. • Quantifiable concentrations differ between southern and northern sites. • Agricultural areas in the northern sites had low concentrations. • Industrial areas in the southern sites had significantly higher concentrations. Abstract: Perfluorinated substances are global and ubiquitous pollutants. However, very little is known about these substances in invertebrates, and even less in terrestrial invertebrates in particular. We analysed adult male dragonflies from six sites in South Africa for perfluoroalkyl substances (PFASs), including perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), perfluorodecanoic acid (PFDA), perfluoro-*n*-undecanoic acid (PFUnA), perfluoro-*n*-dodecanoic acid (PFDoA), perfluorohexanoic acid (PFHxA), and perfluorohexane sulfonic acid (PFHxS). PFOS was detected in all individuals, with less quantifiable occurrences of the other substances. The dragonflies from the three northern sites located in farming areas had significantly lower SPFAAs concentrations than the southern sites located closer to industrial areas (median SPFAAs of 0.32 ng/g wm (wet mass) for North, and 9.3 ng/g wm for South). All substances except PFOS occurred at similar concentrations at all six sites when quantifiable, but PFOS dominated in the Southern sites. The highest median concentration was from Bloemhof Dam (SPFAAs = 21 ng/g wm), which is known to be polluted by PFOS. Perfluorinated substances are not known to be manufactured in South Africa, therefore the residues detected are likely to have been derived from imported products. Odonata play a significant role in freshwater ecology. Any impacts on these aquatic and aerial predators are likely to have effects on aquatic and associated ecosystems. Further studies are required over a much larger geographic region and to investigate sources." (Authors)] Address: Lesch, Velesia, Research Unit for Environmental Sciences and Management, North-West University, Potchefstroom, South Africa. E-mail: velesialesch1@gmail.com

**18133.** López, J. A. (2017): Diversidad de libélulas (Insecta: Odonata) en los humedales de montaña de San Cristóbal de Las Casas, Chiapas, México. Tesis, Instituto de Ciencias Biológicas, Universidad de Ciencias y Artes de Chiapas: IV, 91 pp. (in Spanish) ["The aim of this study was to assess the diversity of the order Odonata (Insecta) in the mountain wetlands of San Cristóbal de Las Casas. Four sampling sites were chosen according to their accessibility and permissibility, corresponding to three lentic and one lotic environment. All sites were characterised and a Wetland Conservation Status Index (WCSI) was constructed. Systematic monthly sampling was carried out at each site during the period July 2014-June 2015. A one-kilometre transect close to the water bodies was walked and the sampling effort consisted of six hours of collecting adult odonates with an aerial entomological net/person. The type of sampling was with and without replacement. As a result, 14 odonate species were obtained, distributed in five families and 10 genera. *Ischnura*

*denticollis* and *Enallagma rua* were the most dominant species. The quality of the sampling was reliable and representative. Although the Kruskal-Wallis analysis of variance did not determine significant differences between odonate richness, Las Cañadas obtained the highest number of species due to its high heterogeneity of microhabitats as a lotic environment. On the other hand, the ANOVA test did elucidate significant differences between the abundance of odonates in the different sampling sites, largely due to the anthropogenic impact on aquatic macrophytes in Las Cañadas and Cinco de Marzo, which in turn allowed these wetlands to be the most diverse, unlike María Eugenia and La Kisst, which maintain a better state of conservation of this type of vegetation. These results are in line with the intermediate disturbance hypothesis, and therefore, Hutcheson's paired analysis determined significant differences between the diversity of most of the wetlands. On the other hand, nested assemblages were found in all wetlands, which could indicate local colonisation and extinction of species. Likewise, Jaccard's coefficient estimated the highest species similarity among the lentic wetlands, while the highest complementarity was between Las Cañadas and La Kisst. Because of these characteristics, the similarity dendrogram separated the odonatofauna by type of environment (lentic-lotic) and by the conservation status found in the wetlands. Finally, the frequency of occurrence of odonates in relation to mean monthly temperature and precipitation determined a clear difference between the seasonality and voltinism of the different odonate species in San Cristóbal." (Author) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: not stated

**18134.** Lu, Y.-H.; Jin, L.-P.; Kong, L.-C.; Zhang, Y.-L. (2017): Phytotoxic, antifungal and immunosuppressive metabolites from *Aspergillus terreus* QT122 isolated from the gut of dragonfly. *Current Microbiology* 74(1): 84-89. (in English) ["Insect gut microbes have been considered as a resource for bioactive metabolites. The aim of this study was to characterize the compounds of a fungus *Aspergillus terreus* QT122 associated with the gut of dragonfly. Five main phytotoxic, antifungal, and immunosuppressive substances were isolated from the fungus QT122. The structures of such compounds were identified as emodin (1), 1-methyl emodin (2), terrein (3), methyl 6-acetyl-4-methoxy-7,8-dihydroxynaphthalene-2-carboxylate (4), and dihydrogeodin (5) on the basis of spectroscopic analysis and by comparison of the corresponding data to those reported in the literature previously. The compound 3 exhibited the best phytotoxic activity against the radicle growth of *A. retroflexus* L. and *E. crusgalli* L. with their IC<sub>50</sub> values of 11.2 and 3.1 µg/mL, which were comparable to that of the positive control of 2,4-dichlorophenoxyacetic acid (2,4-D) with the IC<sub>50</sub> values of 8.1 and 1.6 µg/mL, respectively. The compounds 2-3 showed potent antifungal activity in the growth of *Alternaria solani* with the IC<sub>50</sub> value of less than 0.1 µg/mL and the compound 2 also had great inhibitory effect against the growth of *Fusarium oxysporum* f. sp. *cucumerinum* (IC<sub>50</sub> < 0.1 µg/mL), which was comparable to that of referenced cycloheximide with IC<sub>50</sub> value of below 0.1 µg/mL. The compounds 3-5 exhibited strong immunosuppressive activities against the T cell viability with the inhibition rates

of more than 99%, which were comparable to positive cyclosporin A under the concentration of 20 µM. These results suggest that the compounds 2–5 have the potential to be used as bio-control agents in agriculture or immunosuppressive agents." (Authors)] Address: Zhang, Y.-L., College of Chemistry and Life Sciences, Zhejiang Normal University, Jinhua, People's Republic of China. E-mail: ylzhang@zjnu.cn

**18135.** Luke, S.H.; Dow, R.A.; Butler, S.; Khen, C.V.; Aldridge, D.C.; Foster, W.A., Turner, E.C. (2017): The impacts of habitat disturbance on adult and larval dragonflies (Odonata) in rainforest streams in Sabah, Malaysian Borneo. *Freshwater Biology* 62: 491-506. (in English) ["1. Dragonfly assemblages ... in Southeast Asian rainforests are extremely diverse but increasingly threatened by habitat disturbance, including logging and conversion of forest to oil palm plantations. 2. Land-use change can affect dragonfly larval stages by altering within-stream environmental conditions, and adults by loss of perches, shade and hunting habitat. However, the extent to which dragonflies are affected by land-use change is not well known, and strategies for conservation are poorly developed. 3. We surveyed dragonfly adults and larvae, forest quality and stream environmental conditions across 16 streams in Sabah, Malaysia. Habitat surrounding the streams included pristine forest, selectively logged forest, oil palm with forested riparian buffer strips and oil palm without buffers. 4. Overall abundance and species richness of adult dragonflies stayed constant with habitat disturbance, but larval abundance and richness decreased with higher habitat disturbance, and larvae were largely absent from oil palm streams. There was also a clear shift in community composition of both adult and larval dragonflies. Anisoptera adults were more species rich and abundant, but Zygoptera adults were less species rich in more disturbed sites. 5. The presence of riparian buffers in oil palm plantations offered some protection for forest-associated dragonfly species, and streams with wider riparian buffers supported adult assemblages more similar to those found in logged forest. However, oil palm streams with riparian buffers still contained a depauperate larval assemblage compared to logged forest areas, and dragonfly assemblages in narrow riparian buffer streams were similar to those found in streams surrounded by continuous oil palm. 6. Our results provide clear evidence of the effect of land-use change on dragonflies. Conservation efforts to conserve forest communities should target the preservation of existing forest areas, but management within oil palm plantation landscapes to preserve riparian buffers can still have a marked beneficial effect on dragonfly communities." (Authors)] Address: Luke, Sarah, Department of Zoology, University of Cambridge, Cambridge, U.K.

**18136.** Macadam, C.R.; Stockan, J.A. (2017): The diversity of aquatic insects used as human food. *Journal of Insects as Food and Feed* 3(3): 1-8. (in English) ["This paper assesses the diversity of aquatic insects and insects with aquatic larvae used as human food. Over 250 species have been used as food in 48 countries around the world. Coleoptera comprises the largest number of species utilised, followed by Odonata and Hemiptera. All life stages are eaten but primarily

larvae and adults. Currently, economic valuation is largely limited to Southeast Asia, although there is considerable potential to expand this. A few species including *Lethocerus indicus* (Lepeletier and Serville, 1825) have been negatively impacted due to exploitation as a food item coupled with other environmental pressures." (Authors)] Address: Macadam, C. R., Buglife – The Invertebrate Conservation Trust, Balallan House, 24 Allan Park, Stirling FK8 2QG, UK. E-mail: craig.macadam@buglife.org.uk

**18137.** Machado, A.B.M. (2017): *Hetaerina dutati* sp. nov. from Brazil with notes on *H. amazonica* Sjöstedt, 1918 (Odonata: Calopterygidae). *Odonatologica* 46(3/4): 265-273. (in English) ["*Hetaerina dutati* sp. nov. is described and illustrated based on specimens collected in forest streams in the state of Para in Brazil. The new species is close to *Hetaerina amazonica* Sjöstedt, 1918 differing from it mainly by the structure of male appendages and female epiproct. Some notes are made on topotypes of *H. amazonica*." (Author)] Address: Machado, A.B.M., Depto Zool., Univ. Federal de Minas Gerais, Caixa Postal 486, 31270-901 – Belo Horizonte, Minas Gerais, Brazil. E-mail: angelo@icb.ufmg.br

**18138.** Mahmood, T.; Adil, A. (2017): Diet composition of small Indian mongoose (*Herpestes javanicus*) varies seasonally in its native range. *Animal Biology* 67(1): 69-80. (in English) ["Feeding habits of mammals are very important to investigate in any ecosystem and are a central topic in ecology and population biology. The current study aimed at investigating diet composition of *H. javanicus* in an agro-ecosystem of Sialkot District using a faecal analysis method. Results revealed a diverse diet of the species, comprising both animal and plant matter. Animals were consumed more heavily (58%) than plants (8%). The predominant prey species were insects, while rodents, birds, seeds and plant leaves comprised a smaller portion of the diet. The insects prey species belonged to five different orders: Odonata, Orthoptera, Coleoptera (ground beetles), Dermaptera and Hymenoptera (family Formicidae; ants). The consumption of insects was higher during the summer season. Mammalian prey included five different rodent species: *Bendicota bengalensis* (lesser bandicoot rat), *Nesokia indica* (short-tailed mole rat), *Suncus murinus* (Asian musk shrew), *Tatera indica* (Indian gerbil) and *Mus musculus* (house mouse). Prey species richness was higher in the summer as was the diversity index, while the evenness index showed slightly higher values in spring and autumn compared to summer and winter. We conclude that small mammals are important prey species of the mongoose while insects are eaten regularly and in reasonably large numbers in its native range." (Authors)] Address: Mahmood, T., Dept of Wildlife Management, PMAS-Arid Agriculture University, Rawalpindi 46300, Pakistan. E-mail: tariqjanjua75@uuar.edu.pk

**18139.** Makepeace, H.S.; Lewis, J.H.; Sabine, D.L.; McAlpine, D.F.; Brunelle, P.M. (2017): First occurrences of the *Celithemis eponina* (Halloween Pennant) in Maritime Canada (Odonata: Libellulidae) and *Ischnura hastata* (Citrine Forktail) (Odonata: Coenagrionidae) in New Brunswick. *J.*

Acad. Entomol. Soc. 13: 46-48. (in English) ["During the late evening of 21 August 2013, HSM captured an adult female *C. eponina* at Tennants Cove, Kings County, New Brunswick (45.5857° -65.9864°). This specimen is now deposited in the insect collection of the New Brunswick Museum (NBM 52802). The capture site was an old field dominated by Poaceae, Cyperaceae, and Solidago spp. (Asteraceae) adjacent to a marshy inlet in the Saint John River. Single *C. eponina* were subsequently also observed, but not captured, on the 13 August 2016 by HSM at Fidele Lake, Charlotte County, New Brunswick (45.2117° -66.6309°) and on 19 August 2016 by HSM and DLS at Woodard Lake, Charlotte County, 8.5 km southwest (45.1483° -66.6930°. On 16 September 2015, JHL encountered a single adult male of *Ischnura hastata* on roadside vegetation at Black Beach, Saint John County, New Brunswick (45.1445° -66.2365°). The specimen was captured and is now deposited in the New Brunswick Museum insect collection (NBM 47709). The site is typical Maritime coastal old-field habitat, dominated by *Symphotrichum* spp. (Asteraceae) and *Solidago* spp., and is adjacent to the Bay of Fundy." (Authors)] Address: McAlpine, D.F., NB Museum, 277 Douglas Avenue, Saint John, NB, Canada, E2K 1E5. E-mail: Donald.McAlpine@nbm-mnb.ca

**18140.** Manenti, R.; Zanetti, N.; Pennati, R.; Scari, G. (2017): Factors driving semi-aquatic predator occurrence in traditional cattle drinking. *J. Limnol.* 76(1): 34-40. (in English) ["In several cases, human impact on water bodies and on their freshwater communities is detrimental, but in some cases the human activity may favour and enhance the biodiversity of small water bodies, as traditional cattle drinking pools. Despite their small size, small water bodies may constitute hot spot of biodiversity often representing the only lentic aquatic biotope in landscapes where superficial water lacks or flows in lotic environments like creeks and streams. Predators are good indicators of biodiversity in ponds and give information of food chain web complexity. In particular, semi-aquatic predators like amphibians and dragonflies may account for a substantial percentage of energy flow between aquatic and terrestrial ecosystems. In this study, we evaluated the conservation value of traditional cattle drinking pools building by assessing the factors determining the occurrence and distribution of the semiaquatic predators. From April to August 2015, we investigated 30 distinct pools recording several abiotic and biotic environmental variables. We detected 4 semi-aquatic predators: *Salamandra salamandra* larvae, *Triturus carnifex*, *Aeshna* sp. larvae and *Libellula* sp. larvae. Abiotic features played a major role in shaping the predator community that resulted linked to stable, with no dryness period, and large drinking pools. Invertebrate prey biomass was not particularly important, while vegetation cover and occurrence of unpalatable tadpoles were the most important biotic features of the pools. Our study provides novel evidence on the importance of cattle drinking pools management to preserve biodiversity especially in areas where traditional pastoral activity is disappearing." (Authors)] Address: Manenti, R., Dipartimento di Bioscienze, Università degli Studi di Milano, Via Celoria 26, 20133 Milano, Italy. E-mail: raoulmanenti@gmail.com

**18141.** Manger, R.; Moorlag, H.A. (2017): An emerging Blue hawker (*Aeshna cyanea*) at the end of October in the Netherlands. *Brachytron* 19(2): 114-116. (in Dutch, with English summary) ["On the 24th of October 2017, a male *A. cyanea* emerged at a garden pond in Hoogeveen and flew away two days later. For the time being, this is the latest observation of an emerged *A. cyanea* in the Netherlands. The place of emergence was near a rather shallow garden pond in a sheltered garden. The year 2017 was one of the warmest years in the Netherlands since meteorological data were first recorded. It is suspected that the dragonfly had a one-year larval development, and therefore could emerge so late in the season." (Authors)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

**18142.** Marques, T.S.; Brito, E.S.; Lara, N.R.F.; Beloto, L.M.; Valadao, R.M.; de Camargo, P.B.; Verdade, L.M. (2017): The trophic niche of *Mesoclemmys vanderhaegei* (Testudines: Chelidae): evidence from stable isotopes. *Zoologia* 34: e19985: 6 pp. (in English) ["Ecological niche is the multidimensional space comprising the resources used by an organism. Intraspecific variation in resource exploitation is common in reptile populations to maximize coexistence of individuals. The use of stable isotope analysis is an effective tool when there are variations in resource exploitation, since it can provide quantitative information about food consumption and habitat use. *M. vanderhaegei* (Bour, 1973) is a medium-sized turtle with a limited distribution in south central Brazil and Paraguay. In spite of that, little is known about its ecology. In this study we used stable isotope analysis to understand the intraspecific trophic niche variation in *M. vanderhaegei* at Serra das Araras Ecological Station, state of Mato Grosso, Brazil. The isotopic ratios of  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  were determined in claw samples collected from 14 males and 14 females. Isotopic niche width values were not statistically different between the sexes, there was a high degree of overlap between sexual niches and there were no relationships between isotopic compositions and body size. These results suggest that individuals of both sexes and throughout their ontogenetic development exploit food resources with the same isotopic baseline." The paper includes a reference to Odonata. (Authors)] Address: Marques, T.S., Nucleo de Estudos Ambientais, Univ. de Sorocaba. Rodovia Raposo Tavares km 92,5, 18023-000 Sorocaba, SP, Brazil. E-mail: thiagomq@yahoo.com.br

**18143.** Martin, J.M.; Saaristo, M.; Bertram, M.G.; Lewis, P.J.; Coggan, T.L.; Bradley O. Clarke, B.O.; Wong, B.B.M. (2017): The psychoactive pollutant fluoxetine compromises antipredator behaviour in fish. *Environmental Pollution* 222: 592-599. (in English) ["Highlights: •Mosquitofish (*G. holbrooki*) exposed to fluoxetine (FLX) at two realistic levels. •FLX at the lower level increased activity in the presence or absence of a predator. •FLX at both levels reduced latency to enter predator strike zone. •FLX caused sex-dependent reduction in 'freezing' after a simulated predator strike. •Exposure to FLX can have detrimental sub-lethal impacts on antipredator behaviour. Abstract: Pharmaceuticals are increasingly being detected in aquatic ecosystems worldwide. Particularly concerning are pharmaceutical pollutants



that can adversely impact exposed wildlife, even at extremely low concentrations. One such contaminant is the widely prescribed antidepressant fluoxetine, which can disrupt neurotransmission and behavioural pathways in wildlife. Despite this, relatively limited research has addressed the behavioural impacts of fluoxetine at ecologically realistic exposure concentrations. Here, we show that 28-day fluoxetine exposure at two ecologically relevant dosages—one representing low surface water concentrations and another representing high effluent flow concentrations—alters antipredator behaviour in Eastern mosquitofish (*Gambusia holbrooki*). We found that fluoxetine exposure at the lower dosage resulted in increased activity levels irrespective of the presence or absence of a predatory dragonfly nymph (*Hemianax papuensis*). Additionally, irrespective of exposure concentration, fluoxetine-exposed fish entered the predator 'strike zone' more rapidly. In a separate experiment, fluoxetine exposure reduced mosquitofish freezing behaviour—a common antipredator strategy—following a simulated predator strike, although, in females, this reduction in behaviour was seen only at the lower dosage. Together, our findings suggest that fluoxetine can cause both non-monotonic and sex-dependent shifts in behaviour. Further, they demonstrate that exposure to fluoxetine at environmentally realistic concentrations can alter antipredator behaviour, with important repercussions for organismal fitness." (Authors)] Address: Martin, J.M., School of Biological Sciences, Monash University, Victoria, Australia. E-mail: jake.martin@monash.edu

**18144.** Martínez-López, J.I.; Villeda-Callejas, M.; Barrera-Escorcia, H.; Domínguez-Rocha, G.; Lara-Vázquez, J.A.; Guedea-Fernández, G.E.D. (2017): Histologic description of the compound eyes of *Orthemis ferruginea* (Fabricius) (Anisoptera: Libellulidae) and *Enallagma civile* (Hagen) (Zygoptera: Coenagrionidae). *Entomología mexicana* 4: 726-731. (in Spanish, with English summary) ["Odonates are large airborne predators, this ability is directly related to the size of their photoreceptors. The main objectives of this work were to describe the structure of the compound eyes in adult odonates and the selection of staining techniques and better exposure times to the dye. Histological technique were done in the compound eyes of *E. civile* and *O. ferruginea* staining with Hematoxylin-eosin and Argentic Impregnation, separately and using phase contrast microscope observation blue and green filters. At the level of histological arrangement, it was shown that the compound eyes in *O. ferruginea* and *E. civile* presented the same cellular components but with some variations: well-defined corneogenic cells were located, the crystalline cones have a heterogeneous arrangement, being of different sizes in *O. ferruginea*, the measurements of the rdbom were 540 im and 251 im, respectively. The use of the blue filter in phase contrast microscopy highlights better staining with Hematoxylin and Eosin; while the green filter does the same but with the silver stain." (Authors)] Address: Villeda-Callejas, María del Pilar, Laboratorio de Zoología, Facultad de Estudios Superiores Iztacala, Universidad Nacional Autónoma de México, Avenida de Los Barrios Número 1, Los Reyes Iztacala, C. P. 54090, Tlalnepantla, Estado de México. E-mail: mapili\_villeda@yahoo.com.mx

**18145.** Martins, R.T.; Couceiro, S.R.M.; Melo, A.S.; Moreira, M.P.; Hamada, N. (2017): Effects of urbanization on stream benthic invertebrate communities in Central Amazon. *Ecological Indicators* 73: 480-491. (in English) ["Urbanization and its physical and chemical effects on aquatic environments influence invertebrate communities negatively. Yet, it is not clear how urbanization affects inter-annual variation of invertebrate assemblages in streams. We 1) evaluated urbanization effects on the ecological conditions (biotic and abiotic) of streams in Manaus and 2) analyzed invertebrate community variation over time (between 2003 and 2010). Data on abiotic variables and invertebrates from 2003 were obtained from a previous study. In 2010 we sampled abiotic variables and invertebrate communities in the same low-order urban streams sampled in 2003 (n = 40). We recorded high values of total nitrogen, total phosphorous, deforestation, total impervious area (TIA), water temperature, pH, and electrical conductivity in the most urbanized streams, as compared to the least-impacted ones. In contrast, the least-impacted streams had high dissolved oxygen concentrations. Water quality was poorer in 2010 than in 2003: oxygen concentration was lower and total nitrogen, total phosphorous, deforestation, and TIA significantly higher in 2010. We recorded higher inter-annual variation of abiotic variables in the most-impacted streams as compared to the least-impacted streams. EPT (% of Ephemeroptera, Plecoptera, and Trichoptera) and richness metrics decreased with urbanization. On the other hand, % OP (percent of Oligochaeta and Psychodidae) increased with urbanization. Observed and EPT richness and % OP increased between 2003 and 2010. On the other hand, rarefied richness decreased between years. Increases of observed and EPT richness between 2003 and 2010 were related to low inter-annual variability in streams conditions; however, differences of % OP and rarefied richness were not related to inter-annual variability in environmental conditions. The degree of urbanization did not explain the magnitude of the within-stream difference of invertebrate communities between 2003 and 2010. The increased effects of urbanization represented by the abiotic variables sampled and the reduction of invertebrate richness and increased dominance of tolerant taxa indicate that public policy is not enough to protect or mitigate human impacts on the urban water systems under study." (Authors)] Address: Martins, R.T., Programa de Pós-Graduação em Entomologia, Coordenação de Biodiversidade, Instituto Nacional de Pesquisas da Amazonia . INPA, Av. Andre Araujo, 2936, CP 478, CEP 69067-375, Manaus, AM, Brazil

**18146.** Masahiro, S.; Hirai, N.; Ishii, M. (2017): Early community assembly of aquatic insects in experimental ponds established across the forest margin of a Satoyama coppice. *Jpn. J. Environ. Entomol. Zool.* 28(3): 133-142. (in English, with Japanese summary) ["We investigated early community assembly of aquatic insects across the forest margin in Satoyama, the traditional rural landscape in Japan. In April 2011, we established six experimental ponds using plastic tanks (220 L, 20 cm in depth) filled with tap water, with two each outside (Plot A), at the margin (Plot B) and inside (Plot C) a Satoyama coppice in Osaka Prefecture. We surveyed aquatic

insects twice monthly between May and December and canopy openness as the indicator of environmental factors related to coppice forest seasonally. A total of 72,324 individuals belonging to 25 insect taxa were recorded in this study with 14,076, 5,699, 4,098, 14,079, 19,935 and 14,437 individuals from 17, 5, 10, 12, 13 and 12 taxa recorded at Ponds A1, A2, B1, B2, C1 and C2, respectively. In all ponds, taxa richness gradually increased until July or August and thereafter gradually decreased or remained constant. Abundance of each abundant family except Libellulidae differed significantly among the three plots or in time–plot interactions. The most dominant taxa changed from Chironomidae to Notonectidae (*Notonecta triguttata*) and then to Baetidae (*Cloeon* spp.) in Ponds A1 and A2, from Chironomidae to Libellulidae (*Orthetrum melania*) and again to Chironomidae in Pond B1 and from Chironomidae to Baetidae in Pond B2. Only Chironomidae was dominant in Ponds C1 and C2. Non-metric multidimensional scaling showed that community assembly differed among plot locations across the forest margin, although canopy openness was similar at Plots B and C. Our results show that aquatic insect communities developed rapidly in newly created habitats in Satoyama and the environmental gradient across the forest margin generated taxonomic diversity. With regard to the functional characteristics of aquatic insects, predatory plankton, herbivorous neuston and detritivores colonized abundantly inside the forest, and predatory divers and herbivorous benthos colonized abundantly outside the forest. Our results demonstrate that creation of aquatic habitats across a forest margin would be effective for conserving taxonomic and functional diversity of aquatic insect communities in Satoyama, one of the biodiversity hotspot habitats in Japan." (Authors)] Address: Masahiro, S., Graduate School of Life & Environmental Sciences, Osaka Prefecture Univ., Nakaku Gakuen-cho 1-1, Sakai, Osaka 599-8531, Japan

**18147.** Mason, N.A. (2017): Effects of wind, ambient temperature and sun position on damselfly flight activity and perch orientation. *Animal Behaviour* 124: 175-181. (in English) ["Highlights: •I examined effects of abiotic factors on damselfly flight and perching behaviour. •Activity increased at low wind speeds but was uncorrelated with ambient temperature. •Perched damselflies tended to face the wind (showed rheotaxis) during high winds. •Sun position was uncorrelated with perching orientation. •At higher temperatures, however, resting damselflies tended to face the sun. Many animals rely on movement for survival and reproduction. Directed movements incur metabolic costs, however, and animals adjust their behaviour to optimize energy expenditures in different abiotic conditions. Physical flows and solar radiation vary over time and space and influence animal behaviour at multiple spatiotemporal scales. Here, I quantify the effects of wind speed, wind direction, ambient temperature and sun position on the fine-scale movement ecology and perch orientation of a widespread damselfly, *Enallagma doubledayi*. Through field observations, I found that damselflies fly, forage and engage competitors in territorial interactions more often in calm rather than windy conditions. Furthermore, perched damselflies exhibit rheotaxis, in which individuals typically face into the wind,

presumably to minimize biomechanical costs associated with drag and possibly to detect inbound prey on the water surface and in the air column. In contrast, ambient temperature and the position of the sun were largely unassociated with activity levels and damselfly orientation. At higher ambient temperatures, however, perched odonates faced the sun with increasing consistency, perhaps to thermoregulate by minimizing exposure to solar radiation. Taken together, these findings suggest that damselflies preferentially fly when the ratio of animal speed to wind speed is high and adjust their perch orientation to minimize energy loss. These findings strengthen conceptual links between activity budgets and perch orientation strategies among animals in variable abiotic conditions." (Author)] Address: Mason, N.A., Dept of Ecology and Evolutionary Biology, Cornell University, Ithaca, NY 14853, USA. E-mail: nicholas.albert.mason@gmail.com.

**18148.** May, M.L.; Gregoire, J.A.; Gregoire, S.M.; Lubertazzi, M.A.; Matthews, J.H. (2017): Emergence phenology, uncertainty, and the evolution of migratory behavior in *Anax junius* (Odonata: Aeshnidae). *PLoS ONE* 12(9): e0183508. <https://doi.org/10.1371/journal.pone.0183508>: 27 pp. (in English) ["Mass migrations by Odonata, although less studied than those of Monarch butterflies and plague locusts, have provoked comment and study for many years. Relatively recently, increasing interest in dragonflies, supported by new technologies, has resulted in more detailed knowledge of the species involved, behavioral mechanisms, and geographic extent. In this paper we examine, in four independent but complementary studies, how larval habitat and emergence phenology interact with climate to shape the evolution of migratory strategy in *Anax junius*, a common species throughout much of the eastern United States and southern Canada. In brief, we argue that fish predation on larvae, coupled with the need for ample emergent vegetation for oviposition and adult eclosion, dictates that larval development and survival is optimal in ponds that are neither permanent nor extremely ephemeral. Coupled with annual variation in regional weather and winters in much of their range too cold for adult survival, conditions facing newly emerged *A. junius* may unpredictably favor either local reproduction or long-distance movement to more favorable areas. Both temperature and hydroperiod tend to favor local reproduction early in the adult activity period and migration later, so late emerging adults are more likely to migrate. No single pond is always predictably suitable or unsuitable, however, so ovipositing females also may spread the risk to their offspring by ovipositing at multiple sites that, for migrants, may be distributed over very long distances." (Authors)] Address: May, M.L., Department of Entomology, Rutgers University, New Brunswick, NJ, United States of America. E-mail: may@aesop.rutgers.edu

**18149.** May, M.L. (2017): Body temperature regulation in the dragonfly, *Arigomphus villosipes* (Odonata: Anisoptera: Gomphidae). *International Journal of Odonatology* 20(3/4): 151-163. (in English) ["Regulation of thoracic muscle temperature has been investigated in a number of dragonfly species but is poorly known in the large and diverse family, Gomphidae. Moreover, temperatures of other body regions

have been recorded in very few ectothermic insects. In addition, correlations among multiple components of thermoregulatory behavior have rarely been examined quantitatively. Here I examine thermoregulation in *Arigomphus villosipes*, a medium-sized gomphid common at the shores of lakes and ponds in the northeastern USA. Measurements of the temperatures of the thorax (Tth), head (Th) and abdomen (Tab), using standard "grab and jab" techniques, indicate that both Tth and Th are relatively independent of air temperature (Ta). It is not clear whether Tth and Th are independently regulated, although some data suggest that they might be. *Arigomphus villosipes* can warm its thoracic musculature endothermally to maintain high Tth during cool Ta in conditions of low solar radiation intensity. However, regulation is principally behavioral, involving variation in body and wing postures and perhaps in perch substrate choice. Certain of these behaviors are closely associated to form suites of behavior that together are adapted to enhance or inhibit heating, while others are constrained by trade-offs with other functional demands. The former have a significant demonstrable effect on Tth. These combinations of behaviors results in a well-developed capacity for thermoregulation, allowing the insects to expand their activity periods and choice of perches, and probably improving male performance during competitive chases of females prior to mating." (Author)] Address: May, M.L., Department of Entomology, Rutgers University, New Brunswick, NJ, USA. E-mail: may@aesop.rutgers.edu

**18150.** Maynou X.; Martín, R.; Aranda, D. (2017): The role of small secondary biotopes in a highly fragmented landscape as habitat and connectivity providers for dragonflies (Insecta: Odonata). *Journal of Insect Conservation* 21: 517-530. (in English) ["Habitat loss and degradation are considered major threats to freshwater biodiversity and to invertebrates in particular. These often irreversible processes may lead to local and regional extinctions of species, most notably of stenotopic taxa. In spite of this, a number of studies have shown that small habitat patches can sustain rich and abundant communities. The present work assesses the relevance of a group of four small man-made (secondary) wildlife ponds to Odonata species diversity and abundance. Results obtained on pond recruiting capacity, species richness, abundance and habitat use by means of exuviae collection and monitoring of adults using a capture-mark-recapture (CMR) method indicate the potential suitability of these small aquatic biotopes and the surrounding landscape as habitat providers and stepping stone connectors in the Vallès lowlands (Catalonia, Spain). This region, close to the metropolitan area of Barcelona, has severely degraded natural habitats and high landscape fragmentation due to infrastructure, urban and industrial expansion. A comparison among a greater number of sites (ponds and sections of streams and rivers) distributed across the region showed that adequately managed small waterbodies harbour richer Odonata communities than others that are unmanaged or managed specifically for other types of fauna or uses. Appropriate care of these small biotopes avoids disturbance and keeps them free from vertebrates like fish and waterfowl which, under certain conditions, may have a strong influence on the invertebrate communities because,

apart from feeding on larvae, they may have a negative impact on macrophyte development and water quality. While rivers and streams, the only natural aquatic habitats in the area, may be both expensive and technically challenging to restore and manage successfully, the creation and/or restoration of small ponds and short river sections in suitable locations can be a cost-effective method for enhancing freshwater vegetation and invertebrate diversity in this impacted landscape. ... Adults of a total of 24 species were recorded between 2015 and 2016 in the Vallès lowlands. Of these, 15 were anisopterans. In and around the Gallecs study ponds the number of taxa recorded was 18, 12 of them belonging to Anisoptera. Six taxa, *Lestes virens virens*, *Ischnura pumilio*, *Pyrrosoma nymphula*, *Platynemis latipes*, *Onychogomphus forcipatus unguiculatus* and *Sympetrum meridionale*, were considered accidentals. Excluding them, the number of species per sampling site in the region ranged from 1 to 13 (Online Resource 2). The average species richness was 7.58 ( $\pm$  SE = 0.68) with 12 sites (50%) hosting 7–9 species. The most widespread taxon was *Ischnura graellsii* (present at 22 sites), followed by *Anax imperator* Leach, 1815 and *Orthetrum cancellatum* (18) and *Crocothemis erythraea* and *Sympetrum fonscolombii* (17). Other fairly well distributed taxa were *Chalcolestes viridis*, *Anax parthenope* and *Sympetrum striolatum* (13) and *Aeshna mixta* and *Trithemis annulata* (11). The rest had a more restricted distribution (1–7 sites)" (Authors)] Address: Maynou X., Catalan Odonata Study Group, Institució Catalana d'Història Natural, Barcelona, Spain

**18151.** McMullen, L.E.; De Leenheer, P.; Tonkin, J.D.; Lytle, D.A. (2017): High mortality and enhanced recovery: modelling the countervailing effects of disturbance on population dynamics. *Ecology Letters* 20(12): 1566-1575. (in English) ["Disturbances cause high mortality in populations while simultaneously enhancing population growth by improving habitats. These countervailing effects make it difficult to predict population dynamics following disturbance events. To address this challenge, we derived a novel form of the logistic growth equation that permits time-varying carrying capacity and growth rate. We combined this equation with concepts drawn from disturbance ecology to create a general model for population dynamics in disturbance-prone systems. A river flooding example using three insect species (a fast life-cycle mayfly, a slow life-cycle dragonfly and an ostracod) found optimal tradeoffs between disturbance frequency vs. magnitude and a close fit to empirical data in 62% of cases. A savanna fire analysis identified fire frequencies of 3–4 years that maximised population size of a perennial grass. The model shows promise for predicting population dynamics after multiple disturbance events and for management of river flows and fire regimes." (Authors)] Address: Lytle, D.A., Dept Integrative Biology, Oregon State Univ., Corvallis, OR, USA, E-mail: lytle@oregonstate.edu

**18152.** Meadows, A.J.; Owen, J.P.; Snyder, W.E. (2017): Keystone nonconsumptive effects within a diverse predator community. *Ecology and Evolution* 7(23):10315- 10315 (in English) ["The number of prey killed by diverse predator communities is determined by complementarity and interference



among predators, and by traits of particular predator species. However, it is less clear how predators' nonconsumptive effects (NCEs) scale with increasing predator biodiversity. We examined NCEs exerted on *Culex* mosquitoes by a diverse community of aquatic predators. In the field, mosquito larvae co-occurred with differing densities and species compositions of mesopredator insects; top predator dragonfly naiads were present in roughly half of surveyed water bodies. We reproduced these predator community features in artificial ponds, exposing mosquito larvae to predator cues and measuring resulting effects on mosquito traits throughout development. Nonconsumptive effects of various combinations of mesopredator species reduced the survival of mosquito larvae to pupation, and reduced the size and longevity of adult mosquitoes that later emerged from the water. Intriguingly, adding single dragonfly naiads to ponds restored survivorship of larval mosquitoes to levels seen in the absence of predators, and further decreased adult mosquito longevity compared with mosquitoes emerging from mesopredator treatments. Behavioral observations revealed that mosquito larvae regularly deployed "diving" escape behavior in the presence of the mesopredators, but not when a dragonfly naiad was also present. This suggests that dragonflies may have relaxed NCEs of the mesopredators by causing mosquitoes to abandon energetically costly diving. Our study demonstrates that adding one individual of a functionally unique species can substantially alter community-wide NCEs of predators on prey. For pathogen vectors like mosquitoes, this could in turn influence disease dynamics." (Authors)] Address: Meadows, Amanda, Entomology, Washington State Univ., Pullman, WA, USA. E-mail: amanda.meadows@wsu.edu

**18153.** Mekhlif, A.F.; Khadair, G.T.; Alzakabe, L.A. (2017): Influence of the damselfly, *Ischnura evansi* (Odonata: Coenagrionidae) on the immature stage of *Culex pipiens molestus* (Diptera: Culicidae) as biological control.. Journal of Babylon University/Pure and Applied Sciences/ No.(2)/ Vol.(25): 446-454. (in English, with Arabian summary) ["The mosquitoes *Culex pipiens* are annoying pests and obligate vectors of many vertebrate pathogens. Their immature stages are common in fauna of a wide range quality of water bodies. Most of the alternative biocontrol strategies focus on mosquito immature stages. Predators play a major role in mosquito control programs. The naiads of the damselfly, *Ischnura evansi* (Coenagrionidae) naturally inhabitate with the mosquito, *C. pipiens molestus* immature stages, the large naiads with average size  $1.5 \pm 0.5$ cm more than daily predated 12.1 larvae of 1st and 2nd instars, with 0.63 clearance rate, the naiads strongly preferred mosquito larvae over the chironomids *C. ninavah* larvae of the density 20/liter. The starved naiad tends to ingest the egg rafts. But not more than 3 rafts/day. The presence of the predator with 5 individuals/liter extended the life cycle from 13.0 in control to 20.8 days with high significant effect on 3rd and the instars and pupa stage." (Authors)] Address: Mekhlif, Atalla, Department of Biology Directorate of Ninvah collage of science, Collage of education Ministry of education for women, Moussel Univ. Babylon Univ., Irak. E-mail: atalla@yahoo.com

**18154.** Mendes, F.; Kiffer Jr., W.P.; Moretti, M.S. (2017): Structural and functional composition of invertebrate communities associated with leaf patches in forest streams: a comparison between mesohabitats and catchments. *Hydrobiologia* 800: 115-127. (in English) ["We evaluated the influence of mesohabitats and catchments on the structural and functional composition of invertebrate communities [including 'Odonata'] associated with leaf patches in Atlantic Forest streams. We hypothesized that invertebrate communities would be more influenced by inter-habitat than inter-catchment variation, i.e., invertebrate taxonomic and trophic composition would differ more between pools and riffles than among catchments. Invertebrate richness differed among catchments only, while values of total abundance and biomass were higher in pools. The influence of mesohabitats on the structure of invertebrate communities was high, and most taxa had specificities with one mesohabitat. Among insect shredders, *Gryopterigidae* (Plecoptera) and *Blattodea* occurred more in riffles; *Phylloicus*, *Nectopsyche*, and *Triplectides* (Trichoptera) occurred more in pools. The biomass of omnivorous macroconsumers (*Trichodactylus fluviatilis* and *Macrobrachium potiuna*) was higher in pools and also differed among catchments. Except gathering-collectors, the taxonomic composition of functional feeding groups differed between pools and riffles. The obtained results corroborated the hypothesis that the structural and functional composition of invertebrate communities is more influenced by inter-habitat than by inter-catchment variation, and reinforced the importance of maintaining the biological and geomorphological characteristics of streams to allow the accumulation of leaves in different mesohabitats and preserve the aquatic biodiversity." (Authors)] Address: Mendes, F., Laboratory of Aquatic Insect Ecology, University of Vila Velha, Av. Comissário José Dantas de Melo 21, 29.102-920 Vila Velha, Brazil. E-mail: marcelo.moretti@uvv.br

**18155.** Miguel, T.B.; Calvão, L.B.; Carneiro Vital, M.V.; Juen, L. (2017): A scientometric study of the order Odonata with special attention to Brazil. *International Journal of Odonatology* 20(1): 27-42. (in English) ["The insects of the order Odonata have an aquatic larval stage and land-dwelling adults. These insects play an important role in aquatic ecosystems and are excellent bioindicators. The present study was based on a scientometric analysis of the research available on the Odonata, which aimed to identify the principal trends and gaps in the database on these organisms, compiled online from databases of the Institute for Scientific Information – ISI, Scielo and journals *Odonatologica* and *International Journal of Odonatology*. A total of 2317 papers were analyzed, permitting the detection of the following tendencies: a gradual increase in the number of papers occurred over time, most of the papers had an ecological perspective, most focused primarily on the adult stage and species level, and 49 studies focused on bio-indication by examining variation in the composition of the community, fluctuating asymmetry, bioaccumulation, species richness and abundance, and odonate habitat index (OHI). The increase in the ecological studies of odonates may reflect the dynamic characteristics of this order, and its relatively well-defined systematics,

principally in the case of the adults. Despite the increase in the number of publications, there are still many gaps, such as biogeography, parasitism, competition within and among species, evolutionary and phylogenetic relationships, as well as studies of the larval stages of these organisms. Given the sensitivity of the members of this order to environmental variables, they may be used for the evaluation of aquatic systems, given their roles as detectors, exploiters or accumulators, depending on the type of response to environmental modifications." (Authors)] Address: Miguel, T.B., Programa de Pós-Graduação em Ecologia e Conservação, Univ. do Estado de Mato Grosso, Br 158, Km 148, CEP: 78690-000, Nova Xavantina, MT, Brazil. E-mail: thiagobmiguel@hotmail.com

**18156.** Mikl, L.; Adámek, Z.; Všeticková, L.; Janác, M.; Roche, K.; Šlapanský, L.; Jurajda, P. (2017): Response of benthic macroinvertebrate assemblages to round (*Neogobius melanostomus*, Pallas 1814) and tubenose (*Proterorhinus semilunaris*, Heckel 1837) goby predation pressure. *Hydrobiologia* 785: 219-232. (in English) ["One of the main assumed impacts of invasive gobies is predation on benthic macroinvertebrates. Despite numerous dietary studies, however, quantitative evaluations of impact in European river systems are scarce. Here, we investigate the impact of tubenose (*Proterorhinus semilunaris*, Heckel 1837) and round (*Neogobius melanostomus*, Pallas 1814) gobies on macroinvertebrates in a lowland river (River Dyje, Czech Republic) by allowing and preventing gobiid access to rip-rap substrate naturally colonised by invertebrates at two sites (Site 1—tubenose goby only, Site 2—tubenose and round gobies). Gobies had a negative impact on invertebrates at both sites, with overall invertebrate density reduced by 15% (ca. 17.9 g m<sup>-2</sup> per year) at Site 1 and 36% (ca. 23.6 g m<sup>-2</sup> per year) at Site 2. Both species showed increased impact in summer and ingested larger invertebrates preferentially, resulting in an overall reduction in invertebrate body size. Tubenose gobies had a significant impact on Annelida, Gastropoda, Crustacea and Ephemeroptera nymphs, while tubenose and round goby together impacted Anoptera nymphs, Odonata nymphs and Chironomidae larvae. Our results confirm that round and tubenose gobies can have a significant negative impact on aquatic invertebrate density and community composition." (Authors)] Address: Mikl, L., Inst. Vertebrate Biology, Acad. Sciences Republic, Kvetná 8, 603 65 Brno, Czech Republic. E-mail: libor.mikl@seznam.cz

**18157.** Mitamura, T. (2017): The impacts of the Great East Japan Earthquake and tsunami to individual number of Odonata on coastal area of Fukushima Prefecture, north eastern Honshu, Japan. *Tombo* 59: 23-28. (in Japanese, with English summary) ["On 11-III-2011, the coastal area of Fukushima prefecture was inundated by the Great East Japan Earthquake and tsunami. The disaster damaged many human lives and biodiversity. Since the habitat of organism was exposed to radiation by the accident of Fukushima No.1 nuclear power plant, investigation of natural environment is not progressing in the coastline area of Fukushima Prefecture. The number of Odonata decreased after the tsunami. *Mortonagrion hirosei* and *Platycnemis foliacea sasakii* have disappeared in Fukusnima pref. The number of Aeshnidae species

decreased to 7 from 12 in Matsukawa-ura, Soma." (Authors)] Address: Mitamura, T., 7-4 Sekiai, Koori-mächi, Date-gun, Fukushima pre f., 969-16, Japan

**18158.** Mozhui, L.; Kakati, L.N.; Changkija, S. (2017): A study on the use of insects as food in seven tribal communities in Nagaland, Northeast India. *Journal of Human Ecology* 60(1): 42-53. (in English) ["This paper documents the use of insect as food among seven tribal communities of Nagaland. Information was obtained through personal field interviews with 240 informants with the help of semi-structured questionnaires. It was found that 82 species of insects belonging to 9 orders (Odonata, Orthoptera, Mantodea, Isoptera, Hemiptera, Coleoptera, Hymenoptera, Lepidoptera and Diptera) are an important traditional food item principally consumed by the tribal people. Insects are preferred as eggs, larvae, nymphs, pupa or adult which are cooked, roasted or consumed raw. Documentation was done by calculating the "use value" (UV) of each species. It is evident from the study that insects can enhance nutritional deficiencies and can also improve the livelihood of the rural poor in the region. Hence, an inventory of food insects covering as many tribes is necessary so as to get benefit from their natural diversity before the existing traditional information is lost." (Authors)] Address: Mozhui, L., Research Fellow, Ecology Lab., Dept of Zoology, Nagaland University, Lumami 798 627, Nagaland, India. E-mail: Lobenommozhui@gmail.com

**18159.** Nagahata, Y.; Kawashima, I. (2017): Odonata larvae collected at the tidal wave sites in a year of the Great East Japan Earthquake. *Tombo* 59: 15-22. (in Japanese, with English summary) ["At the sites attacked by the tsunami wave caused by the 2011 off the Pacific coast of Tohoku Earthquake on March 11, 2011, Odonata larvae were investigated on November, 2011, 8 months after the disaster. Many of the water areas have occurred on the places which were once rice paddies or farmlands before the tsunami. Most of them came newly into existence after the tsunami, but a few ponds and marshes continued existing from the past. Around 10 species of the three families of Odonata larvae were examined during the survey. Among them, *Ischnura* sp. (*I. asiatica* or/and *I. senegalensis*) and *Anax parthenope* were discovered from wider range, which are supposed to expand the distributions after the tsunami. On the other hand, the populations of *Aeschnophlebia anisoptera* and *Polychanthagyna melanictera*, which were locally distributed even before the tsunami, have continued to exist, overcoming the disaster." (Authors)] Address: Nagahata, Y., Zao Hango 91, Yamagata, Yamagata, 990-2305, Japan E-mail: rosalia@muse.ocn.ne.jp

**18160.** Nangoy, M.J.; Koneri, R. (2017): Dragonfly in Bogani Nani Wartabone National Park north Sulawesi. *Asian Journal of Biodiversity* 8(1): 47-61. (in English) [oas 55;" As a group of freshwater invertebrates, dragonflies (Odonata) are commonly used as ecological indicators of freshwater ecosystems. This study analyzes the diversity of Odonata in various types of habitat at Bogani Nani Wartabone National Park, North Sulawesi, Indonesia: Sampling was conducted over three months in three habitat types, viz (primary

forest, secondary forest, and agricultural land). Samples were taken along the transect line using a sweep net. Samples were collected from 9:00 am to 03:00 pm during the periods that odonates are most active. Identification was based on external morphological characteristics using the relevant guide. In total, 1235 specimens of Odonata were obtained belonging to 19 species, 17 genera, and 7 families. Abundance, and richness of dragonfly species positively correlated with air temperature, but negatively correlated with humidity and vegetation cover. Based on the results of this study, ... *Nososticta flavipennis*, *Rhinocypha frontalis*, and *Teinobasis* sp are found only in primary forests and are not found in other habitats. They can be used as indicators of forest health. The highest abundance, richness, diversity, and evenness of dragonfly species are found on agricultural land, while the lowest were found in secondary forests." (Authors)] Address: Nangoy, M.J., Animal Science, Faculty, Sam Ratulangi University, Kampus Bahu Street, Manado 95115, Indonesia. E-mail: mnangoy@unsrat.ac.id

**18161.** Nasirian, H.; Irvine, K.N. (2017): Odonata larvae as a bioindicator of metal contamination in aquatic environments: application to ecologically important wetlands in Iran. *Environmental Monitoring and Assessment* 189(9) 436: 18 pp. (in English) ["The objectives of this study were twofold: (i) assess the bioaccumulation characteristics of a suite of metals associated with several different species of Odonata and (ii) examine Odonata species richness as a reflection of ecosystem health in two ecologically important wetlands of southwestern Iran, the Shadegan and Hawr Al Azim wetlands. Levels of arsenic (As), cadmium (Cd), cobalt (Co), chromium (Cr), copper (Cu), iron (Fe), mercury (Hg), manganese (Mn), lead (Pb), and zinc (Zn) were determined using inductively coupled plasma optical emission spectrometry (ICP-OES) in nine different Odonata larva species. Based on these data, biota-sediment accumulation factors (BSAFs) were calculated and generally, it was found that Cr, Cu, Mn, and Zn were being taken up by the Odonata (BSAFs >1). Because of its prevalence in the wetland and its observed ability to take up metals, it is suggested that *Ischnura ramburii* is an appropriate indicator of ecosystem health for these wetlands with respect to metal contamination. Odonata species richness across all sites was 49, while for the individual sites, the greatest species richness was 26 and the lowest species richness was 13. The species richness value across all sites is quite healthy, given the arid climate of the region." (Authors)] Address: Nasirian, H., Dept of Medical Entomology & Vector Control, School of Public Health, Tehran Univ. of Medical Sciences, Tehran, Iran. E-mail: hanasirian@yahoo.com

**18162.** Nel, A.; Weis, R. (2017): A new Early Jurassic damselfly from the Grand Duchy of Luxembourg (Odonata: Campterophlebiidae). *Alcheringa* 41(3): 1-5. (in English) ["*Gallodorsettia kronzi* gen. et sp. nov., the first representative of the damselfly family Campterophlebiidae from the Toarcian of Grand Duchy of Luxembourg, is described herein. Its closest relative is the genus *Dorsettia*, known from the early Lower Jurassic of UK and China. The Campterophlebiidae seem to be rare in the Early Jurassic of Western Europe,

despite being one of the most diverse odonatan families at that time, especially in Asia." (Authors)] Address: Weis, R., Musée national d'histoire naturelle, Luxembourg, Section Paléontologie, 25, rue Münster L-2160 Luxembourg, Grand-Duché de Luxembourg. E-mail: rweis@mnhn.lu

**18163.** Ngiam, R.W.J.; Lim, W.L.; Collins, C.M. (2017): A balancing act in urban social-ecology: human appreciation, ponds and dragonflies. *Urban Ecosystems* 20(4): 743-758. (in English) ["Green spaces in cities provide cultural ecosystem services (CES) such as nature connection, wildlife interaction and aesthetic appreciation which can improve aspects of human well-being. Recognising these benefits, researchers are now examining the complex relationship between humans and nature in urban social-ecology. Most studies investigate people's appreciation and valuation of different green space features and their contribution to urban biodiversity. Recommendations arising from such studies are best practices to achieve a balance between landscape aesthetic and ecological objectives, but many knowledge gaps still exist. In a social-ecological project in Greater London, appreciation of ponds and dragonflies in urban green spaces, and the environmental factors determining dragonfly diversity were investigated. We found ponds and their appearance were valued by people as enhancing their green space experience. The preference for wild-looking ponds was moderate. Dragonflies were enjoyed for their colour and high visibility, especially by those who had basic dragonfly knowledge. Species richness of dragonflies was positively associated with habitat heterogeneity in and around a pond. However, people were unable to relate a heterogeneous pond to more dragonfly species. For the first time, some factors that influence the human appreciation-ponds-dragonflies (HPD) relationship in an urban context are revealed. To fully realise the CES potential of ponds and dragonflies in Greater London, a HPD framework is proposed. The framework underpins strategies that foster cultural sustainability for ponds and dragonfly conservation." (Authors)] Address: Ngiam, R.W.J., Conservation Division, National Parks Board, Singapore Botanic Gardens, Singapore, Singapore

**18164.** Nilsson-Örtman, V.; Johansson, F. (2017): The rate of seasonal changes in temperature alters acclimation of performance under climate change. *The American Naturalist* 190 (6): 743-761. (in English) ["How the ability to acclimate will impact individual performance and ecological interactions under climate change remains poorly understood. Theory predicts that the benefit an organism can gain from acclimating depends on the rate at which temperatures change relative to the time it takes to induce beneficial acclimation. Here, we present a conceptual model showing how slower seasonal changes under climate change can alter species' relative performance when they differ in acclimation rate and magnitude. To test predictions from theory, we performed a microcosm experiment where we reared a mid- and a high-latitude damselfly species alone or together under the rapid seasonality currently experienced at 62°N and the slower seasonality predicted for this latitude under climate change and measured larval growth and survival. To separate acclimation



effects from fixed thermal responses, we simulated growth trajectories based on species' growth rates at constant temperatures and quantified how much and how fast species needed to acclimate to match the observed growth trajectories. Consistent with our predictions, the results showed that the midlatitude species had a greater capacity for acclimation than the high-latitude species. Furthermore, since acclimation occurred at a slower rate than seasonal temperature changes, the midlatitude species had a small growth advantage over the high-latitude species under the current seasonality but a greater growth advantage under the slower seasonality predicted for this latitude under climate change. In addition, the two species did not differ in survival under the current seasonality, but the midlatitude species had higher survival under the predicted climate change scenario, possibly because rates of cannibalism were lower when smaller heterospecifics were present. These findings highlight the need to incorporate acclimation rates in ecological models." Coenagrion armatum, C. pulchellum (Authors)] Address: Nilsson-Örtman, V., Dept of Ecology and Evolutionary Biology, University of Toronto, 25 Willcocks Street, Toronto, Ontario M5S 3B2, Canada. E-mail: viktor.j.nilsson@gmail.com

**18165.** Nixon, M.R.; Orr, O.G.; Vukusic, P. (2017): Covert linear polarization signatures from brilliant white two-dimensional disordered wing structures of the phoenix damselfly. *J. R. Soc. Interface* 2017 14 20170036: 8 pp. (in English) ["Pseudolestes mirabilis reflects brilliant white on the ventral side of its hindwings and a copper-gold colour on the dorsal side. Unlike many previous investigations of odonate wings, in which colour appearances arise either from multilayer interference or from wing-membrane pigmentation, the whiteness on the wings of *P. mirabilis* results from light scattered by a specialized arrangement of flattened waxy fibres and the copper-gold colour is produced by pigment-based filtering of this light scatter. The waxy fibres responsible for this optical signature effectively form a structure that is disordered in two dimensions and this also gives rise to distinct optical linear polarization. It is a structure that provides a mechanism enabling *P. mirabilis* to display its bright wing colours efficiently for territorial signalling, both passively while perched, in which the sunlit copper-gold upperside is presented against a highly contrasting background of foliage, and actively in territorial contests in which the white underside is also presented. It also offers a template for biomimetic high-intensity broadband reflectors that have a pronounced polarization signature." (Authors)] Address: Nixon, M.R., School of Physics, University of Exeter, Exeter EX4 4QL, UK. E-mail: m.r.nixon@exeter.ac.uk

**18166.** Okude, G.; Futahashi, R.; Kawahara-Miki, R.; Yoshitake, K.; Yajima, S.; Fuka, T. (2017): Electroporation-mediated RNA interference reveals a role of the multicopper oxidase 2 gene in dragonfly cuticular pigmentation. *Applied Entomology and Zoology* 52(3): 379-387. (in English) ["Dragonflies are colorful insects, and recent RNA sequencing studies have identified a number of candidate genes potentially involved in their color pattern formation and color vision. However, functional aspects of such genes have not

been assessed due to the lack of molecular genetic tools applicable to dragonflies. We established an electroporation-mediated RNA interference (RNAi) procedure using the tiny dragonfly *Nannophya pygmaea* Rambur, 1842 that targets the multicopper oxidase 2 gene (MCO2; also known as lac-case2 gene) responsible for cuticular pigmentation in many insects. RNA sequencing of *N. pygmaea* and genomic survey of the dragonfly *Ladona fulva* identified four multicopper oxidase family genes: MCO1, MCO2, MCO3 and multicopper oxidase-related protein gene (MCORP). In *N. pygmaea*, MCO2 was specifically expressed around the cuticular pigmentation period, whereas MCO1 was constantly expressed. MCORP was expressed at adult stages, and MCO3 was scarcely expressed. When we applied *in vivo* electroporation, final instar larvae injected with MCO2 small interfering RNA became adults with patchy unpigmented regions. RNAi without *in vivo* electroporation did not affect cuticular pigmentation, suggesting that dragonflies do not show a systemic RNAi response. These results indicate that MCO2 is required for cuticular pigmentation across diverse insects, and highlight the usefulness of the electroporation-mediated RNAi method in dragonflies." (Authors)] Address: Futahashi, R., Bioproduction Res. Inst., National Inst. of Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki, 305-8566, Japan

**18167.** Olbrich, M.; Seifert, M. (2017): Erstnachweis der Zierlichen Moosjungfer *Leucorrhinia caudalis* (Charpentier, 1840) (Insecta: Odonata) in Thüringen und Anmerkungen zur Libellenfauna des Naturschutzgebietes „Phönix Nord“ (Altenburger Land, Thüringen). *Mauritiana* 32: 346-359. (in German, with English summary) ["In the mining landscape of the nature reserve "Phönix Nord" *L. caudalis* was observed on 27-V-2017. This is the first observation for Thuringia. The examiner discuss the current distribution, behaviors and habitat requirements for the species in this article. Also current observations of *Gomphus pulchellus*, *Sympetrum fonscolombii* and other remarkable dragonfly species of this very diverse stretch of waters get described." (Authors)] Address: Olbrich, M., Hempelstr. 5, 04177 Leipzig, Germany. E-Mail: maximilian.olbrich@gmail.com

**18168.** Oliveira-Junior, J.M.B.; Ligeiro, R.; Juen, L. (2017): Odonata (Insecta) as a tool for the biomonitoring of environmental quality. *Ecological Indicators* 81: 555-566. (in English) ["Highlights: •Different assemblage characteristics can potentially be used to assess loss of environmental integrity. •Species composition was the characteristic that best evaluated ecological integrity. •Taxonomic diversity and taxonomic distinction also achieved good results. •Species richness and abundance/biomass relationships did not provide good responses. •Deconstructing Odonata assemblages and choosing the right indicators are mandatory for efficient ecological assessments. Abstract: Despite the fundamental dependence of human populations on water resources, a range of anthropogenic impacts, in particular the removal of riparian vegetation, threaten freshwater environments. One of the most effective means of evaluating the effects of anthropogenic disturbance in aquatic ecosystems is the use of bioindicators, and the insects of the order Odonata are

among the most efficient indicators, due to their enormous sensitivity to environmental changes. In this context, the present study aimed to verify which parameters of the odonate community (species richness, abundance/biomass, composition, taxonomic diversity and taxonomic/phylogenetic distinctness) are most effective for the evaluation of the loss of environmental integrity. The study focused on 50 streams in the northeast of the Brazilian state of Pará. The streams were sampled during the dry season, between June and August 2011. The physical characteristics of each stream were evaluated using a Habitat Integrity Index (HII). The species composition provided the best parameter for the evaluation of ecological integrity, providing a relatively accurate assessment at a lower mean research cost than other parameters. Taxonomic diversity and distinctness also provided relatively reliable results, contributed additional information on the evolutionary relationships among the odonate taxa, and also provided a low-cost approach. Deconstructing communities is necessary to detect impacts, considering the considerable variation in the environmental requirements of the different species. Overall, the parameter that best responded to gradients of disturbance was species composition, followed by diversity and taxonomic distinctness. Given these findings, odonate-based biomonitoring should focus on these parameters to guarantee the optimal detection and evaluation of habitat alterations." (Authors)] Address: Miguel, T.B., Programa de Pós-Graduação em Ecologia e Conservação, Univ. do Estado de Mato Grosso, Br 158, Km 148, CEP: 78690-000, Nova Xavantina, MT, Brazil. E-mail: thiagobmiguel@hotmail.com

**18169.** Ott, J.; Munzinger, S. (2017): Aussagekraft von Datenkennwerten aus Citizen-Science-Beobachtungsdaten. Ableitung Roter Listen am Beispiel der Libellen. *Naturschutz und Landschaftsplanung* 49(10): 325-333. (in German, with English summary) ["Significance of data parameters from citizen science monitoring data. Derivation of Red Lists – the example of dragonflies Using the example of dragonflies the paper demonstrates the establishment of practicable Red Lists for different federal states and for the German Federal Republic based on a relatively small database from naturgucker.de. This data collection only comprises 1/19 compared to the German Atlas of the GdO (Society of German-speaking odonatologists), which underlies the current federal Red List. The study shows that a nearly identical Red List can be produced with the help of a specially developed "mAI-value" (mAI = multi-dimensional index of the frequency of species). This value consists of three components. The method appears to be a quick and cost-effective alternative to the otherwise elaborate and time-consuming development, at least for the group of the dragonflies. Processing the data from the "Artenfinder Rheinland-Pfalz" the application provided similarly positive results." (Authors)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**18170.** Ottonello, D.; D'Angelo, S.; Oneto, F.; Malavasi, S.; Zuffi, M.A.L. (2017): Feeding ecology of the Sicilian pond turtle *Emys trinacris* (Testudines, Emydidae) influenced by seasons and invasive aliens species. *Ecological Research* 32(1): 71-80. (in English) ["Feeding ecology of a species is

the result of its evolutionary history, biology, physiology and local constraints, such as prey availability, intra- and inter-specific interactions and environmental characteristics. In this study we investigated the still unknown diet of the Sicilian pond turtle, with special emphasis to the relationships with recently introduced alien species in the "Lake Preola and Gorghi Tondi" Nature Reserve (Sicily, Italy). A total of 83 faecal samples were collected in three different periods. *E. trinacris* seems an opportunistic and generalist species. The main prey taxa were aquatic invertebrates [including Odonata], including the invasive *Procambarus clarkii*, while non-aquatic preys are found sporadically. Plant matter, mainly leaves and roots of aquatic forms, was also found in high frequency with a high occurrence of fruits and seeds in spring. We did not find a significant difference in diet composition within sex and age, while an evident divergence was found between periods and sites. In particular, we noticed a decrease in prey abundance and in food-niche breadth from pre-reproductive period to post-reproductive period. Moreover a very clear difference was found between a site with allochthonous fishes and a site fish-free, with a more abundant and wide diet spectrum in the last one, as a result of the increased availability of prey. We highlighted the importance to take any possible actions to avoid the spread of fishes in other basins and to study the indirect impact of *Procambarus clarkii*, as possible vector of harmful trace element." (Authors)] Address: Ottonello, D., Dept Environmental Sciences, Informatics & Statistics, Ca` Foscari Univ.of Venice, Via Torino 155, 30172 Venezia Mestre, Italy. E-mail: dario.ottonello@unive.it

**18171.** Pal, A. (2017): Dragonflies and damselflies of University of North Bengal campus, West Bengal, India with new distribution record of *Agriocnemis kalinga* Nair & Subramanian, 2014. *Journal of Threatened Taxa* 9(12): 11067-11073. (in English) ["A study was made to determine the present status of the diversity of Odonata from University of North Bengal campus and its surroundings. The study shows the presence of total 69 species of odonates belonging to 41 genera and nine families from the area. *A. kalinga* is recorded for the first time from northern Bengal." (Authors)] Address: Pal, A., Dept of Botany, University of North Bengal, Rajarammohunpur, Darjeeling, West Bengal 734013, India. E-mail: aaratrikp05@gmail.com

**18172.** Palomo, M.; Quirce, C.; Galante, E. (2017): La Estación Biológica de Torretes (Ibi, Alicante): un espacio para la conservación de odonatos. *Cuadernos de Biodiversidad* 53: 52-60. (in Spanish, with English summary) ["Odonates are biological indicators of the aquatic environments quality, because them require, in most cases, clean and well oxygenated waters to develop their larval stages. Many species have been included in the Red List of threatened species for their vulnerability to contaminated environments. A study of Odonata fauna was carried out in several permanent water points in the Biological Station - Botanical Garden of Torretes (Ibi, Alicante), a Mediterranean forest space of 53 hectares, managed by the Research Institute CIBIO of the

University of Alicante. This center aims to investigate and disseminate the value of biodiversity and conservation. In the biological station was collected 16 species Odonates of the 28 reported in natural environments for the Alicante province, which highlight the importance of this natural space in the conservation and biodiversity of these insects." (Authors)] Address: Galante, E., Centro Iberoamericano de la Biodiversidad. Universidad de Alicante, Spain. E-mail: galante@ua.es

**18173.** Parkinson, D.; Goffart, P.; Kever, D.; Motte, G.; Schott, O. (2017): Réponse des odonates à la restauration des tourbières ardennaises. *Forêt.Nature* 142: 48-55. (in French) ["In view of the many new water bodies created, a positive effect on odonates of the hydrological restoration work carried out in the framework of the recent LIFE "peatland" projects in the peaty environments of Haute-Ardenne was to be expected. This study, targeting more particularly the species specialised in peat bogs, effectively shows a positive evolution of the populations concerned of these species, as a result of the restoration work: increase in specific diversity and abundance, extension of the distribution area of the populations on a local and regional scale. Based on the analysis of a dataset collected in the Hautes-Fagnes according to a specific methodology, preliminary results are also presented concerning the influence of different environmental factors results show the interest in carrying out restoration work on a regional scale and the very good short-term reactivity of odonates to these interventions. The future capitalisation of the benefits already observed from these projects for Walloon biodiversity will depend on the monitoring of the future management of the restored sites, through the implementation of the management plans drawn up in the wake of the restoration projects." (Authors) Translated with www.DeepL.com/Translator (free version) ] Address: Goffart, P., Direction de la nature et de l'eau (SPW, DGO3, DEMNA) Avenue Maréchal Juin 23, B-5030 Gembloux, Belgium. E-mail: p.goffart@mrv.wallonie.be

**18174.** Parr, A. (2017): A male *Coenagrion puella* resembling *C. pulchellum* (Odonata: Coenagrionidae). *Libellula* 36 (1/2): 59-65. (in English, with German summary) ["On 22-V-2016, a male *Coenagrion* sp. damselfly was observed in the county of Norfolk, Great Britain, which was finally assigned to *C. puella* despite its general visual appearance being very similar to *C. pulchellum*. This individual is placed on record, and potential causes for the aberration – including the possibility of hybridization – are discussed." (Author)] Address: Parr, A., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk IP29 5BX, UK. E-mail: adrian.parr@btinternet.com

**18175.** Payra, A.; Bhutia, N.G. (2017): Some new records of Odonata (Insecta) fauna from Sikkim Himalaya, India. *Ambient Science* 4(2); Online DOI:10.21276/ambi.2017.04.2.nn01: 2 pp. (in English) ["The topography of the Sikkim state is kind of varied and also the elevation ranges from 200 to 8598m. The climate of the state divided into the tropical, temperate and alpine Zones. The State is endowed with rich floral and faunal diversity. However, Odonata fauna of Sikkim has been far less explored. With the addition of the new records

of *Caliphaea confusa*, *Zygonyx iris* and validation of the occurrence of *Rhinocypha unimaculata* for the State Sikkim, Odonata diversity counts now 77. However, further surveys will identify more species of Odonates from Sikkim.] Address: Payra, A., Dept of Wildlife and Biodiversity Conservation, North Orissa University, Odisha - 757003, India

**18176.** Pestic, V.; Gligorovic, B.; Savic, A.; Buczyński, P. (2017): Ecological patterns of Odonata assemblages in karst springs in central Montenegro. *Knowl. Manag. Aquat. Ecosyst.* 2017, 418, 3: 20 pp. (in English, with French summary) ["Karstic springs are important habitats for maintaining freshwater biodiversity. However, little is known about Odonata larvae assemblages in karstic springs, and studies about the ecological factors that determine species distribution in these habitats are still lacking. In this study the composition of Odonata larvae communities from 91 springs located in the central part of Montenegro was investigated. The richest fauna was found in sublacustrine springs, followed by limnocrenes, while that of the rheocrenes was less rich. The results obtained confirm the main research hypothesis that Odonata larvae assemblages in the karstic springs in the central part of Montenegro were comparably influenced by the environmental parameters acting on the level of individual springs as well as the factors acting at the landscape level. Odonata larvae assemblages divided springs into four groups. On the other hand, the springs could be divided into three groups based on habitat and landscape characteristics. CCA indicates that disturbance factors such as the permanence and directness of human influence on springs for use as drinking water sources are foremost in determining Odonata assemblages at the level of individual springs. The habitat scale considered several factors that influence Odonate assemblages, including altitude and riparian vegetation. This study proves that further odonatological studies in springs should include both types of factors and their interactions." (Authors)] Address: Pešić, V., Dept of Biology, University of Montenegro, Cetinjski put b.b., 81000 Podgorica, Montenegro. E-mail: vladopesic@gmail.com

**18177.** Phillips, I.D.; Prestie, K.S. (2017): Evidence for substrate influence on artificial substrate invertebrate communities. *Environmental Entomology* 46(4): 926-930. (in English) ["Cobble baskets are frequently used as a tool to measure differences in benthic macroinvertebrate communities between waterbodies; however, underlying differences in substrate type may influence the resultant colonization of baskets, misrepresenting communities. This study tests the hypothesis that cobble basket placement influences the resulting benthic macroinvertebrate community. Cobble basket arrays (n = 4) were deployed in Dog Lake, Saskatchewan, in 2011 (97 d) and 2012 (95 d) on cobble habitats and soft or sandy substrates ~100 m apart. Baskets placed on cobble substrate had significantly higher Shannon–Weaver diversity relative to those placed on soft substrate in both years, and higher % EPT (Ephemeroptera Plecoptera Trichoptera) in 2011, but total density was not significantly different. Non-metric multidimensional scaling revealed that the community was different between both treatments, characterized



by higher densities of *Gammarus lacustris* Sars in baskets placed on soft sediment in both years, higher densities of *Aeshna* sp. and *Mystacides* sp. on cobble substrate in 2011, and higher densities of *Helobdella stagnalis* (L.) and *Glossophinia complanata* (L.) on cobble substrate in 2012. The results were consistent with the hypothesis that baskets placed on cobble substrate versus soft substrate will result in differing community colonization. The resulting recommendation for monitoring and assessment using cobble baskets in lakes is that baskets be placed on comparable substrate type when comparing between lakes, and that cobble beds be chosen as a more appropriate substrate for deployment, as the added habitat complexity of baskets on soft sediment may act as an attractant and not reflect the true community composition of that habitat." (Authors)] Address: Phillips, I.D., Water Quality & Habitat Assessment Services, Water Security Agency, 101-108 Research Dr., Saskatoon, Saskatchewan, S7N 3R3, Canada. E-mail: iain.phillips@wsask.ca

**18178.** Phillips, N.; Knowles, K.; Bomphrey, R.J. (2017): Petiolate wings: effects on the leading-edge vortex in flapping flight. *Interface Focus* 7: 20160084: 13 pp. (in English) ["The wings of many insect species including crane flies and damselflies are petiolate (on stalks), with the wing planform beginning some distance away from the wing hinge, rather than at the hinge. The aerodynamic impact of flapping petiolate wings is relatively unknown, particularly on the formation of the lift-augmenting leading-edge vortex (LEV): a key flow structure exploited by many insects, birds and bats to enhance their lift coefficient. We investigated the aerodynamic implications of petiolation  $P$  using particle image velocimetry flow field measurements on an array of rectangular wings of aspect ratio 3 and petiolation values of  $P \frac{1}{4}$  1–3. The wings were driven using a mechanical device, the 'Flapperatus', to produce highly repeatable insect-like kinematics. The wings maintained a constant Reynolds number of 1400 and dimensionless stroke amplitude  $L^*$  (number of chords traversed by the wingtip) of 6.5 across all test cases. Our results showed that for more petiolate wings the LEV is generally larger, stronger in circulation, and covers a greater area of the wing surface, particularly at the mid-span and inboard locations early in the wing stroke cycle. In each case, the LEV was initially arch-like in form with its outboard end terminating in a focus-sink on the wing surface, before transitioning to become continuous with the tip vortex thereafter. In the second half of the wing stroke, more petiolate wings exhibit a more detached LEV, with detachment initiating at approximately 70% and 50% span for  $P \frac{1}{4}$  1 and 3, respectively. As a consequence, lift coefficients based on the LEV are higher in the first half of the wing stroke for petiolate wings, but more comparable in the second half. Time-averaged LEV lift coefficients show a general rise with petiolation over the range tested." (Authors)] Address: Bomphrey, R.J.; E-mail: rbomphrey@rvc.ac.uk

**18179.** Piano, E.; Isaia, M.; Falasco, E.; La Morgia, V.; Soldato, G.; Bona, F. (2017): Local versus landscape spatial influence on biodiversity: a case study across five European

industrialized areas. *Environmental Monitoring and Assessment* 189:126: 12 pp. (in English) ["Land use change — mostly habitat loss and fragmentation — has been recognized as one of the major drivers of biodiversity loss worldwide. According to the habitat amount hypothesis, these phenomena are mostly driven by the habitat area effect. As a result, species richness is a function of both the extent of suitable habitats and their availability in the surrounding landscape, irrespective of the dimension and isolation of patches of suitable habitat. In this context, we tested how the extent of natural areas, selected as proxies of suitable habitats for biodiversity, influences species richness in highly anthropogenic landscapes. We defined five circular sampling areas of 5 km radius, including both natural reserves and anthropogenic land uses, centred in five major industrial sites in France, Italy and Germany. We monitored different biodiversity indicators for both terrestrial and aquatic ecosystems, including breeding birds, diurnal butterflies, grassland vegetation, Odonata, amphibians, aquatic plants and benthic diatoms. We studied the response of the different indicators to the extent of natural land uses in the sampling area (local effect) and in the surrounding landscape (landscape effect), identified as a peripheral ring encircling the sampling area. Results showed a positive response of five out of seven biodiversity indicators, with aquatic plants and Odonata responding positively to the local effect, while birds, vegetation and diatoms showed a positive response to the landscape effect. Diatoms also showed a significant combined response to both effects. We conclude that surrounding landscapes act as important biodiversity sources, increasing the local biodiversity in highly anthropogenic contexts." (Authors)] Address: Isaia, M., Dept of Life Sciences & Systems Biology, Univ. of Turin, Turin, Italy

**18180.** Pires, M.M.; Stenert, C.; Maltchik, L. (2017): Partitioning beta-diversity through different pond hydroperiod lengths reveals predominance of nestedness in assemblages of immature odonates. *Entomological Science* 20(1): 318-326. (in English) ["Patterns of freshwater invertebrate assemblage structure in the transition from permanent to non-permanent lentic habitats are well described in the literature. However, the effects of small changes in the hydroperiod of non-permanent ponds on invertebrate assemblage structure remain less studied, especially on  $\beta$ -diversity. Thus, we tested the effects of different pond hydroperiod lengths on the assemblage structure of immature odonates, in terms of both  $\alpha$ - and  $\beta$ -diversity. Small high-altitude ponds with different hydroperiod lengths (assigned to 'short', 'medium' and 'long' hydroperiods) were sampled in southern Brazil between 2013 and 2014. Based on the hypothesis that shorter hydroperiods filter constituents of lentic fauna, i.e. that long-living species cannot inhabit shorter-hydroperiod ponds, we expected to find higher  $\alpha$ - and  $\beta$ -diversity in longer hydroperiods, as well as predominance of the nestedness component in  $\beta$ -diversity. Restricted occurrence of some genera and higher  $\alpha$ -diversity of immature odonate assemblages was detected in long-hydroperiod ponds. Within-hydroperiod  $\beta$ -diversity values did not vary among hydroperiods, because the occasional occurrence of some genera with high dispersal  $\alpha$ -

bility of adults in short-hydroperiod ponds yielded similar values of the  $\beta$ -diversity among hydroperiods. Partitioning of  $\beta$ -diversity among hydroperiods revealed a significant higher contribution of the nestedness component rather than turnover. This pattern is explained by the occurrence of some generalist genera across the whole gradient of hydroperiod, as a subset of fauna in longer-hydroperiod ponds. Thus, our results suggest that reduction in hydroperiod length, if occurring in the future climate change, would favour habitat-generalist taxa in lentic ecosystems." (Authors)] Address: Pires, M.M., Unisinos Avenue, 950, Postal Code 93.022-750, São Leopoldo, RS, Brazil. E-mail: marquespiresm@gmail.com

**18181.** Popova, O.N.; Haritonov, A.Y.; Sushchik, N.N.; Makhutova, O.N.; Kalachova, G.S.; Kolmakova, A.A.; Gladyshev, M.I. (2017): Export of aquatic productivity, including highly unsaturated fatty acids, to terrestrial ecosystems via Odonata. *Science of The Total Environment* 581–582: 40-48. (in English) ["Highlights: •We measured abundance and emergence of odonates in forest-steppe during 31 years. •Odonates bring organic carbon to the land, which is equal to land insect production. •Highly unsaturated fatty acids (HUFA) were measured in biomass of odonates. •Odonates subsidize essential HUFAs in land as many as all other amphibiotic insects. Abstract: Based on 31-year field study of the abundance and biomass of 18 species of odonates in the Barabinsk Forest–Steppe (Western Siberia, Russia), we quantified the contribution of odonates to the export of aquatic productivity to surrounding terrestrial landscape. Emergence varied from 0.8 to 4.9 g of wet biomass per m<sup>2</sup> of land area per year. Average export of organic carbon was estimated to be 0.30 g·m<sup>-2</sup>·year<sup>-1</sup>, which is comparable with the average production of herbivorous terrestrial insects in temperate grasslands. Moreover, in contrast to terrestrial insects, emerging odonates contained high quantities of highly unsaturated fatty acids (HUFA), namely eicosapentaenoic acid (20:5n<sup>-3</sup>, EPA), and docosahexaenoic acid (22:6n-3, DHA), which are known to be essential for many terrestrial animals, especially for birds. The export of EPA + DHA by odonates was found to be 1.92–11.76 mg·m<sup>-2</sup>·year<sup>-1</sup>, which is equal to an average general estimation of the export of HUFA by emerging aquatic insects. Therefore, odonates appeared to be a quantitatively and qualitatively important conduit of aquatic productivity to forest-steppe ecosystem." (Authors)] Address: Gladyshev, M.I., Siberian Federal University, Svobodny av. 79, Krasnoyarsk 660041, Russia. E-mail: glad@ibp.ru

**18182.** Preston, T.M.; Ray, A.M. (2017): Effects of energy development on wetland plants and macroinvertebrate communities in Prairie Pothole Region wetlands. *Journal of Freshwater Ecology* 32(1): 29-34. (in English) ["Energy production in the Williston Basin, USA, results in the coproduction of highly saline, sodium chloride-dominated water (brine). The Prairie Pothole Region (PPR) overlies the northeastern portion of the Williston Basin. Although PPR wetlands span a range of salinity, the dominant salt is sodium sulfate, and salinities are much lower than brine. Introduction of brine to wetlands can result in pronounced water-quality changes; however, the ecological effects of such contamination are

poorly understood. We examined the effects of brine contamination on primary productivity, emergent macrophyte tissue chemistry, and invertebrate communities [including Odonata] from 10 wetlands in the PPR. Based on a recognized Contamination Index (CI) used to identify brine contamination in the PPR water-quality samples indicated that six wetlands were uncontaminated while four were contaminated. Across this gradient, we observed a significant decrease in above-ground biomass and a significant increase in tissue chloride concentrations of hardstem bulrush (*Schoenoplectus acutus*) with increased CI values. Additionally, a significant decrease in macroinvertebrate taxonomic richness with increased CI values was observed. These findings provide needed insight on the biological effects of brine contamination on PPR wetlands." (Authors)] Address: Preston, T.M., U.S. Geological Survey, Northern Rocky Mountain Science, USA. E-mail: tmpreston@usgs.gov

**18183.** Pujiastuti, Y.; Windusari, Y.; Agus, M. (2017): The distribution and composition of Odonata (Dragonfly and Damselfly) in Sriwijaya University, Inderalaya Campus South Sumatera. *Journal of Biological Researches* 23(1): 1-5. (in English) ["The information about distribution and composition of Odonata in Sriwijaya University campus area is still not much. The decrease areas supporting the growth of Odonata influence distribution and composition of these species. The objective of research was to analyze the distribution and composition of Odonata in Sriwijaya University, Inderalaya Campus. This research had been conducted from December 2016 until February 2017 and continued in April 2017 by using visual observation, direct capture, and sticky traps. The sampling locations were determined by five points of observation station by using purposive sampling method. The result revealed Odonata living in Sriwijaya University, Inderalaya Campus is was aggregated and consisted of 22 species belonged to five families. The highest composition of species was found in Libellulidae (77.65%) followed by Coenagrionidae (17.86%)." (Authors)] Address: Pujiastuti, Yulia, Department of Plant Protection, Faculty of Agriculture, Sriwijaya University

**18184.** Pujol-Buxó, E.; García-Guerrero, C.; Llorente, G.A. (2017): Alien versus predators: effective induced defenses of an invasive frog in response to native predators. *Journal of Zoology* 301(3): 227-234. (in English) ["Inducible defenses enhance fitness of prey living in environments with unpredictable predation risk, but these plastic reactions depend on the detection of the threat by the prey. To anuran larvae confronted with unknown predators, only prey-borne cues are noticeable, generally triggering either an incomplete set of reactions or no response at all. Thus, we should expect a certain disadvantage for establishing invasive anurans if tadpoles are unable to recognize local predators. Here, we test the presence and effectiveness of inducible defenses in tadpoles of the invasive frog *Discoglossus pictus* confronting two native predators. Using both lab and mesocosm experiments, we also evaluate the effects these predators may exert on the invasive frog populations. Interestingly, although *D. pictus* has been introduced from another continent,

its native (African) and invasive (European) ranges are included in the same ecoregion (Mediterranean Basin), sharing several genera and species of aquatic predators. In both experiments and using both invertebrates, tadpoles responded to the native predators, and our results match those usually reported in similar predator-prey systems using combinations of native species. Moreover, these reactions seem clearly effective in reducing mortality and injury rates of *D. pictus* tadpoles. We believe that the introduced frog is highly benefiting from a previous knowledge of populations of these or similar predator species. Therefore, even though native and invasive ranges of *D. pictus* are in different continents, the similarity of predator communities of both areas may be advantageous for its establishment and expansion." (Authors)] Address: Pujol-Buxó, E., Dept de Biologia Evolutiva, Ecologia i Ciències Ambientals, Universitat de Barcelona, Barcelona, Spain. Email: epujolbuxo@ub.edu

**18185.** Quintana, A.T.; Tur, B.R. (2017): Emergence patterns of Odonata (Insecta) from a lotic habitat in Eastern Cuba. *Revista de Biología Tropical/International Journal of Tropical Biology and Conservation* 65(2): 807-818. (in Spanish, with English summary) ["The emergence patterns of tropical odonates (dragonflies and damselflies) are scarcely known. We studied the emergence patterns of odonates in a freshwater lotic system in Giro, Northern Santiago de Cuba, between January and December 2008. We visited the locality between 09:00 and 14:00, on a weekly basis, and collected exuviae from a fixed section (8 x 1 m<sup>2</sup>) offshore, along the riparian vegetation. We collected data on species composition and, for each species, abundance, relative biomass and emergence pattern. We collected 443 exuviae belonging to 22 species: seven Zygoptera and 15 Anisoptera. Half of the annual Odonata emergence took place in the dry season (December to March) with the highest value in February (25%). For species for which we found seven or more exuviae per month, *Enallagma coecum* and *Macrothemis celeno* tended to be a synchronal emergence. We also found temporal segregation of the emergence pattern between *M. celeno* and *Protoneura capillaris*, *Neoneura maria*, *Progomphus integer* and *Scapania frontalis*. These differences were probably related to the highest annual fluctuations of temperature, relative humidity and number of rainy days per month. We concluded that there is an asynchrony and heterogeneity in Odonata emergence times in the studied freshwater lotic system." (Authors)] Address: Trapero-Quintana, A., Departamento de Biología, Universidad de Oriente. Ave. Patricio Lumumba s/n. Santiago de Cuba 90500, Cuba. E-mail: trapero76@gmail.com

**18186.** Rajabi, H.; Schroeter, V.; Eshghi, S.; Gorb, S.N. (2017): The probability of the wing damage in the dragonfly *Sympetrum vulgatum* (Anisoptera: Libellulidae): a field study. *Biology Open* 6(9): 1290-1293. (in English) ["Dragonfly wings resist millions of cycles of dynamic loading in their lifespan. During their operation, the wings are subjected to relatively high mechanical stresses. They further experience accidental collisions which result from the insects' daily activities, such as foraging, mating and fighting with other individuals. All these factors may lead to irreversible wing damage.

Here, for the first time, we collected qualitative and quantitative data to systematically investigate the occurrence of damage in dragonfly wings in nature. The results obtained from the analysis of 119 wings of more than 30 individuals of *S. vulgatum*, collected at the second half of their flight period, indicate a high risk of damage in both fore- and hindwings. Statistical analyses show no significant difference between the extents of damage neither in fore- and hindwings nor in male and female dragonflies. However, we observe a considerable difference in the probability of damage in different wing regions. The wing damage is found to be mainly due to two failure modes: wear and fracture." (Authors)] Address: Rajabi, H., Institute of Zoology, Functional Morphology and Biomechanics, Kiel University, D-24118 Kiel, Germany. E-mail: hrajabi@zoologie.uni-kiel.de

**18187.** Ramos-Merchante, A.; Prenda, J. (2017): Macroinvertebrate taxa richness uncertainty and kick sampling in the establishment of Mediterranean rivers ecological status. *Ecological Indicators* 72: 1-12. (in English) ["Freshwater macroinvertebrates have been extensively used as environmental indicators and are the most prevalent biological group used in aquatic bioassessment in the European Water Framework Directive (WFD 2000/60/EEC), usually through several popular indices, as the Biological Monitoring Working Party (BMWP). Many of these indices are based on taxa richness, i.e. the number of taxa present in a given area, as the simplest and most common measure of biodiversity. Given the importance to the WFD of the ecological status assessment by macroinvertebrates and the consequences thereof, sampling requires careful consideration and evaluation of the associated uncertainty. In this work, carried out in a Mediterranean river, we show that after 20 sample "kicks" it was possible to estimate the true taxa richness using Clench nonlinear asymptotic models (CM). However, cumulative curves of taxa extracted with kick sampling underestimated the true number of theoretical taxa (A). In order to achieve an acceptable error a very large sample size was required, always >20 kicks. According to these criteria, sampling was clearly inefficient in most localities. The minimum effort required to achieve a significant and acceptable level of taxa richness, for 90% of A, should be between 25 and 71 kicks and for 95% of A, 52–150 kicks. Both satisfactory percentages represent a mean difference of 2 (range 0–6) and 3 (range 1–8) taxa actually not being captured from the total predicted for each locality, for 90 and 95% of the CM asymptote, respectively. This study shows that by using the 20 kicks methodology it is possible to achieve reliable true macroinvertebrate richness estimates, but the establishment of the community composition, i.e. the full taxa making up any index score, will be inaccurate to an unknown degree." Odonata are treated at the family level (Authors)] Address: Prenda, J., Dept Integrated Sciences, Univ. of Huelva, Campus Universitario El Carmen, Avda, Andalucía s/n, 21071, Huelva, Spain. E-mail: jprenda@uhu.es

**18188.** Rana, J.S.; Semalty, B.; Singh, P.; Swami, N.; Dewan, S.; Singh, J.; Gusain, M.P.; Gusain, O.P. (2017): Checklist of benthic macroinvertebrate taxa along different riparian land use types in Alaknanda River catchment of the Central



Himalaya, Uttarakhand (India). Proceedings of the Zoological Society 72(2): 130-153. (in English) ["A checklist of benthic macroinvertebrates recorded at 08 different riparian land use (RLU) types in Alaknanda river catchment (ARC) in the Central Himalaya (India) is provided here. Among 77 taxa recorded, 73 insect genera belonged to 9 orders and 52 families at different RLU types. Majorities were nymphs and larvae of Ephemeroptera, Plecoptera, Trichoptera, Coleoptera, Lepidoptera, Odonata [including obviously wrong identifications], Hemiptera, Megaloptera and Diptera. The highest number of insect taxa (50) was recorded from Dense Mixed Forest; whereas, the lowest (27) was recorded from barren site i.e., Montane Barren. Also, the forested site had most number of common taxa (25). Benthic macroinvertebrates at Chir Pine Forest serves as a link between Dense Mixed Forest and Open Mixed Forest. Agricultural sites had 36 taxa in common. Interestingly the agricultural sites share 24 taxa with the forested sites. Overall 13 benthic insect taxa were ubiquitous in ARC, while 15 were rare, confined to a single site." (Authors)] Address: Rana, J.S., Freshwater Biology Unit, Dept Zoology & Biotechnology, Hemvati Nandan Bahuguna Garhwal Univ., Srinagar (Garhwal), India

**18189.** Rapacciuolo, G.; Ball-Damerow, J.E.; Zeilinger, A.R.; Resh, V.H. (2017): Detecting long-term occupancy changes in Californian odonates from natural history and citizen science records. *Biodiversity and Conservation* 26(12): 2933-2949. (in English) ["In a world of rapid environmental change, effective biodiversity conservation and management relies on our ability to detect changes in species occurrence. While long-term, standardized monitoring is ideal for detecting change, such monitoring is costly and rare. An alternative approach is to use historical records from natural history collections as a baseline to compare with recent observations. Here, we combine natural history collection data with citizen science observations within a hierarchical Bayesian occupancy modeling framework to identify changes in the occupancy of Californian Odonata over the past century. We model changes in the probability of occupancy of 34 odonate species across years and as a function of climate, after correcting for likely variation in detection probability using proxies for recorder effort and seasonal variation. We then examine whether biological traits can help explain variation in temporal trends. Models built using only opportunistic records identify significant changes in occupancy across years for 14 species, with eight of those showing significant declines and six showing significant increases in occupancy in the period 1900–2013. These changes are consistent with estimates obtained using more standardized resurvey data, regardless of whether resurvey data are used individually or in conjunction with the opportunistic dataset. We find that species increasing in occupancy over time are also those whose occupancy tends to increase with higher minimum temperatures, which suggests that these species may be benefiting from increasing temperatures across California. Furthermore, these species are also mostly habitat generalists, whilst a number of habitat specialists display some of the largest declines in occupancy across years. Our approach enables more ro-

bust estimates of temporal trends from opportunistic specimen and observation data, thus facilitating the use of these data in biodiversity conservation and management." (Authors)] Address: Rapacciuolo, G., Dept of Ecology and Evolution, Stony Brook University, Stony Brook, USA. E-mail: giorapac@gmail.com

**18190.** Renner, S.; Périco, E.; Ely, G.; Sahlén, G. (2017): Preliminary dragonfly (Odonata) species list from the Pampa biome in Rio Grande do Sul, Brazil, with ecological notes for 19 new records for the State. *Biota Neotropica* 17(4) e20170374: 8 pp. (in English) ["An inventory of Odonata was carried out in the southern half of the state of Rio Grande do Sul, Brazil, in the Pampa biome. Originally, this biogeographical region was covered mostly by open fields and grassland, with sections of higher vegetation surrounding water bodies and rocky hills. Today the landscape is fragmented due to agricultural activities, mainly cattle farming, rice crops and forest plantations. Our survey was conducted in three municipalities from this region, between March 2015 and April 2016. Aiming at a general overview of the species composition, our sampling sites were selected on a wide basis, including lakes, bogs, temporary water bodies, small streams and river sections. 82 species of Odonata were collected comprising 40 genera and seven families. The dominant families were Libellulidae (56,1%), Coenagrionidae (24,5%) and Aeshnidae (7,3%). We found a diverse odonate assemblage, adding 19 new species records for the state of Rio Grande do Sul." (Authors)] The following species are detailed: *Mnesarete lencionii* Garrison, 2006, *Argia lilacina* Selys, 1865, *Minagrion waltheri* Selys, 1876, *Oxyagrion rubidum* (Rambur, 1842), *Archaeogomphus densus* Belle, 1982, *Brechmorhoga nubecula* Rambur, 1842, *Dasythemis venosa* Burmeister, 1839, *Diastatops obscura* (Fabricius, 1775), *Dythemis nigra* Martin, 1897, *Erythemis vesiculosa* Fabricius, 1775, *Erythrodiplax lygaea* Ris, 1911, *Gynothemis venipunctata* Calvert, 1909, *Idiataphe longipes* Hagen, 1861, *Macrothemis heteronycha* Calvert in Ris, 1909, *Macrothemis lutea* Calvert, 1909, *Micrathyria spuria* Selys, 1900, *Orthemis aequilibris* Calvert, 1909, *Orthemis attenuata* Erichson, 1848, *Tholymis citrina* Hagen, 1867] Address: Renner, S., Universidade do Vale do Taquari, Laboratório de Ecologia e Evolução, Rua Avelino Talini, 171, Bairro Universitário, 95900-000 Lajeado, RS, Brazil

**18191.** Roberts, D. (2017): Mosquito larvae can detect water vibration patterns from a nearby predator. *Bulletin of Entomological Research* 107(4): 499-505. (in English) ["Mosquito larvae have been shown to respond to water-borne kairomones from nearby predators by reducing their activity, and thus visibility. If they can identify the predator, they can then alter their response depending upon the associated predation risk. No studies have shown that mosquito larva may also detect water-borne vibrations from the predator. Final instar larvae of three mosquitoes: *Culiseta longiareolata*, *Culex perexiguus* and *C. quinquefasciatus*, were exposed to recorded vibrations from feeding dragonfly nymphs, to dragonfly kairomones and the combined effect of both. Predator vibrations caused *C. longiareolata* to significantly re-

duce bottom feeding and instead increased the more passive surface filter feeding. The larvae also significantly increased escape swimming activity. These behavioural changes were not significantly different from the effect of dragonfly kairomones, and there was no synergistic or additional effect of the two. *C. perexiguus* gave a smaller (but still significant) response to both dragonfly vibrations and to kairomones, probably due to a different feeding behaviour: when lying on the bottom, it was an inactive filter feeder. *C. quinquefasciatus* did not respond to either vibrations or kairomones and during these experiments was entirely an inactive surface filter feeder. Both *C. longiareolata* and *C. perexiguus* were thus able to detect and identify vibrations from feeding dragonfly nymphs as an anti-predator strategy. The lack of response in *C. quinquefasciatus* is probably a result of living in water that is highly polluted with organic material, where few predators can survive." (Author)] Address: Roberts, D., Biol. Dept, Sultan Qaboos Univ., Oman

**18192.** Roque, F.O.; Corrêa, E.C.; Valente-Neto, F.; Stefan, G.; Schulz, G.; Barbosa Souza, P.R.; Motta, C.M.; Bavutti, L.L.O.; Colzani, E.; Demétrio, M.F.; Escarpinati, S.C.; Silvestre, R.; Vaz-de-Mello, F.Z.; Siqueira, T.; Ochoa Quintero, J.M. (2017): Idiosyncratic responses of aquatic and terrestrial insects to different levels of environmental integrity in riparian zones in a karst tropical dry forest region. *Austral Entomology* 556(4): 459-465. (in English) ["Decisions about biodiversity conservation depend on how different taxonomic groups respond to human-influenced environmental change. Here, we ask whether richness and composition of terrestrial (frugivorous butterflies and dung beetles) and aquatic insects (Plecoptera, Trichoptera, Ephemeroptera, Odonata and Coleoptera) change in a congruent manner across a gradient of riparian habitat degradation in a karst tropical dry forest region of Brazil, the Bodoquena Plateau. Our results showed incongruent ordination patterns based on the different taxa analysed. We found no correlation between richness and composition of the groups and environmental integrity. Incongruent responses among the taxonomic groups may be a consequence of high variability in ecological requirements among different taxa. Additionally, the effect of human disturbance on these taxonomic groups can be masked by the predominant presence of generalist species in tropical dry forests and by historical factors related to the adaptability of several species to changing ecosystems." (Authors)] Address: Roque, F.O., Center for Tropical Environmental and Sustainability Science (TESS), James Cook University, Cairns, QLD 4878, Australia. E-mail: roque.eco@gmail.com

**18193.** Sahito, H.A.; Bhutto, S.R.; Kousar, T.; Jatoti F.A.; Mangrio, W.M.; Ghumro, B.D.; Shah, Z.H. (2017): Morphotaxonomic characteristics of dragonfly, Lesser Emperor, *Anax parthenope* (Selys, 1839) (Odonata: Aeshnidae) at region Sukkur, Sindh. *J. of Advanced Botany and Zoology* 5(2): 1-6. (in English) ["Odonates are ecologically important as both predators and prey. Their larvae constitute a natural biological control over mosquito larvae and thus help to control several epidemic diseases like malaria, dengue, filaria etc. *A. parthenope* has been identified for the first time at region

Sukkur, Sindh - Pakistan. The study was mainly emphasized on morphological differences between male and female specimen. Both male and female specimens were having some same but mostly different characteristics. Like both male and female had large green compound eyes touching dorsally, head was found hypognathous, thorax dark green with visible thoracic segments, male had slightly larger than female wings, bigger in size and more colorful. Which was very rare in insects, fore and hind wings were not similar, forewing narrow and elongated whereas; the hind wings were broad basally, distal part of the wing was yellowish, abdomen was black dorsally and ventrally but found greenish from lateral side. It was concluded that there was a lot of potential to explore Odonata fauna of this region. The climate and topography of this area along with lot of natural pastures and aquatic bodies support dragonflies' life and biology. However, due to rapid increase in urbanization, suitable habitats of Odonata were disappearing at an alarming rate. Thus, only single specie was found. Further surveys and necessary conservation measures were also adopted, therefore, suggested as need of the day to utilize it, in right direction after knowing its species complex." (Authors)] Address: Sahito, H.A., Dept of Zoology, Fac. of Nat. Sci., Shah Abdul Latif Univ., Khairpur, Sindh, Pakistan. E-mail: hakim.sahito@salu.edu.pk

**18194.** Sakai, S.; Eda, S. (2017): A case of unusual oviposition by *Sympetrum frequens* while in tandem. *Tombo* 59: 96. (in English, with Japanese summary) ["The female or a tandem pair of *S. frequens*, continued to oviposit for about 20 seconds striking eggs into the water while the male rested on grasses at Nyukasa highland in Ina city, Nagano prefecture on September 9, 2016." (Authors)] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**18195.** Sakai, S.; Eda, S. (2017): Interspecific copulation and oviposition between male *Sympetrum croceolum* and female *S. speciosum*, whose flying oviposition behaviors belong to different types. *Tombo* 59: 97-99. (in Japanese, with English summary) ["On 15-X-2016, a case of interspecific tandem copulation and oviposition between a male *S. croceolum* and a female *S. speciosum* was observed and photographed at Kasahara, Ina city, Nagano prefecture. The oviposition behavior of this interspecific pair correlated with that of *S. croceolum* in which the abdominal tip of the female is plunged into the water but the eggs are released while the abdominal tip is in the air, though no eggs were observed on this occasion. This result would suggest that the initiative is taken by the male rather than the female when they perform flying oviposition in tandem." (Authors)] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**18196.** Satpathi, C.R. (2017): A treatise on dragonflies (Order: Odonata, Class: Insecta) of rice ecosystems in eastern India. *World Scientific News* 86(2): 67-133. (in English) ["This study highlights the 75 species of dragonfly fauna associated with rice ecosystems in eastern India out of which 15 species were regular and rest were sporadic. From the general

taxonomic point of view all the species were grouped under 5 families of under order Odonata. Comparing different body parts the double branching keys were prepared for easy identification of 15 common dragonfly species recorded in rice ecosystems of West Bengal. Each key begins with a couplet (a pair of alternative) and each of which leads to another couplet. Finally the reader reaches the specific identity of species. Free hand drawing of wings of the 50 dragonflies were also used for separate identification of these insect species. In addition to this, different studies were made on courtship and mating, egg laying habitats, nymphal development, longevity, flight capacity of dragonfly to make the study more interesting to the reader. The population build up of dragonfly, favors to certain altitude as well as availability of water which is reverse to the other group of insects. Three different localities were selected at 9.75 m (Chakdaha), 200 m (Cooch Behar) and 1250 m (Kalimpong) of which former two represent an unique physiographic ecological system in Eastern India characterized by extreme diversities of dragonfly inhabiting there. The studies on natural enemies of dragonfly along with their major threats indicated that about 2, 4 and 4 species were critically endangered, endangered and vulnerable in rice ecosystem of West Bengal. Dragonflies are very sensitive to changes in landscape and are reliable indicators of wetland health. Therefore the effective conservation of dragonfly depends entirely on conservation of their habitats. Different studies were made to estimate the role of dragonfly in integrated pest management of rice crop in West Bengal. An investigation was also carried out to find out the crop stage wise diversification of individual predator and found that dragonfly was more diverse during flowering to ripening stages of crop respectively. The values Simpson and Shannon diversity index showed that dragonflies are specific flowering to ripening stage of crop. Subsequently the value of Margalef index and Menhinick index also indicated that the aforesaid predators were more diverse in flowering stage of crop whereas it was least in vegetative stage of crop. From the Hill's diversity the number of abundant and most abundant species was calculated where maximum and minimum were obtained from dragonfly and staphylinid respectively. The studies on colonization and succession of major dragonfly taxa in the rice field indicated that it followed a uniform pattern in relation to growth stages as well different phases in the rice field. The studies on relative abundance of dragonfly in different ecosystems reflected that their population in fields could be conserved and enhanced through maintenance of rice weed flora on bund or allowing ratoon rice after the rice crop during fallow period. The fallow land has limited effect on incidence of insect predator in rice crop. The relative ranking chart of 50 important predators in rice ecosystem of West Bengal indicates that the insect belonging to Coleopteran (17) were top of the list whereas dragonfly was third (10). The validity of chart may increase over time and they will need to be updated periodically." (Author)] Address: Satpathi, C.R., Dept of Agri. Entomology, Fac. Agriculture, Bidhan Chandra Krishi Viswavidyalaya, P.O. Krishi Viswavidyalaya, Mohanpur, District Nadia, West Bengal, 741252, India. E-mail: csatpathi2003@yahoo.co.in

**18197.** Siepielski, A.M.; Beaulieu, J.M. (2017): Adaptive

evolution to novel predators facilitates the evolution of damselfly species range shifts. *Evolution* 71(4): 974-984. (in English) ["Most species have evolved adaptations to reduce the chances of predation. In many cases adaptations to coexist with one predator generate tradeoffs in the ability to live with other predators. Consequently, the ability to live with one predator may limit the geographic distributions of species, such that adaptive evolution to coexist with novel predators may facilitate range shifts. In a case study with *Enallagma* damselflies, we used a comparative phylogenetic approach to test the hypothesis that adaptive evolution to live with a novel predator facilitates range size shifts. Our results suggest that the evolution of *Enallagma* shifting from living in ancestral lakes with fish as top predators, to living in lakes with dragonflies as predators, may have facilitated an increase in their range sizes. This increased range size likely arose because lakes with dragonflies were widespread, but unavailable as a habitat throughout much of the evolutionary history of *Enallagma* because they were historically maladapted to coexist with dragonfly predators. Additionally, the traits that have evolved as defenses against dragonflies also likely enhanced damselfly dispersal abilities. While many factors underlie the evolutionary history of species ranges, these results suggest a role for the evolution of predator-prey interactions." (Authors)] Address: Siepielski, A.M., Dept of Biological Sciences, University of Arkansas, Fayetteville AR 72701, USA. Email: amsiepie@uark.edu

**18198.** Simon, S.; Sagasser, S.; Saccenti, E.; Brugler, M.R.; Schranz, M.E.; Hadrys, H.; Amato, G.; DeSalle, R. (2017): Comparative transcriptomics reveal developmental turning points during embryogenesis of a hemimetabolous insect, the damselfly *Ischnura elegans*. *Sci Rep.* 2017 Oct 19;7(1):13547. doi: 10.1038/s41598-017-13176-8.: 14 pp. (in English) ["Identifying transcriptional changes during embryogenesis is of crucial importance for unravelling evolutionary, molecular and cellular mechanisms that underpin patterning and morphogenesis. However, comparative studies focusing on early/embryonic stages during insect development are limited to a few taxa. *Drosophila melanogaster* is the paradigm for insect development, whereas comparative transcriptomic studies of embryonic stages of hemimetabolous insects are completely lacking. We reconstructed the first comparative transcriptome covering the daily embryonic developmental progression of *I. elegans*, an ancient hemimetabolous representative. We identified a "core" set of 6,794 transcripts - shared by all embryonic stages - which are mainly involved in anatomical structure development and cellular nitrogen compound metabolic processes. We further used weighted gene co-expression network analysis to identify transcriptional changes during Odonata embryogenesis. Based on these analyses distinct clusters of transcriptional active sequences could be revealed, indicating that embryos at different development stages have their own transcriptomic profile according to the developmental events and leading to sequential reprogramming of metabolic and developmental genes. Interestingly, a major change in transcriptionally active sequences is correlated with katabolism (revolution) during mid-embryogenesis, a 180° rotation of the embryo within the



egg and specific to hemimetabolous insects." (Authors)] Address: Simon, Sabrina., Biosystematics Group, Wageningen Univ. & Research, Droevendaalsesteeg 1, 6708 PB, Wageningen, The Netherlands. E-mail: sabrina.simon@wur.nl.

**18199.** Singh, D.; Singh, B.; Hermans, J.T. (2017): Dragonflies and damselflies (Odonata: Insecta) of Keoladeo National Park, Rajasthan, India. *Journal of Threatened Taxa* 9(7): 10445-10452. (in English) ["The present study was undertaken to examine the diversity, occurrence and distribution pattern of damselflies and dragonflies (Odonata) in Keoladeo National Park from 2010–2015. A combination of direct search, observation and opportunistic sighting methods were used to record 37 different species of Odonata (9 damselflies and 28 dragonflies). Among the Odonata recorded, the most diverse families are Libellulidae presented by 22 species and Coenagrionidae was present with eight species. According to the list presented by Palot & Soniya (2000) 21 species could be added; of the species presented here five are recorded for the first time from Rajasthan." (Authors)] Address: Singh, D., Nahchani (village+post), Tehsil- Kiraoli, Agra District, Uttar Pradesh 283122, India. E-mail: dhirendrasingh711@gmail.com

**18200.** Smirnov, N.A. (2017): Addition to the fauna of Dragonflies and Damselflies (Odonata) of Chernivtsi Region (Ukraine). *Ukrainska Entomofaunistyka* 8(2): 27-32. (in Ukrainian, with English and Russian summaries) ["According to the results of author's field studies and the material deposited at the Natural Museum of Yuriy Fedkovych Chernivtsi National University new data on nine species of dragonflies and damselflies from Chernivtsi Region are provided." (Author) *Chalcolestes viridis*, *Anaciaeschna isocoles*, *Anax ephippiger*, *Anax parthenope*, *Epithea bimaculata*, *Libellula fulva*, *Sympetrum fonscolombii*, *Leucorrhinia pectoralis*, *Erythromma viridulum*] Address: Smirnov, N.A.: E-mail: nazarsm@ukr.net

**18201.** Sniegula, S.; Janssens, L.; Stoks, R. (2017): Integrating multiple stressors across life stages and latitudes: Combined and delayed effects of an egg heat wave and larval pesticide exposure in a damselfly. *Aquatic Toxicology* 186: 113-122. (in English) ["Highlights: •Exposure of eggs to an heat wave was followed by exposure of larvae to a pesticide. •Heat exposure of the eggs had delayed costs in adult damselflies. •Larval pesticide exposure reduced fitness traits in larval and adult stage. •Both stressors were mainly additive and never synergistic. •Multistressor studies should integrate across life stages to capture total costs. Abstract: To understand the effects of pollutants in a changing world we need multistressor studies that combine pollutants with other stressors associated with global change such as heat waves. We tested for the delayed and combined impact of a heat wave during the egg stage and subsequent sublethal exposure to the pesticide esfenvalerate during the larval stage on life history and physiology in the larval and adult stage of the damselfly *Lestes sponsa*. We studied this in a common garden experiment with replicated central- and high latitude po-

pulations to explore potential effects of local thermal adaptation and differences in life history shaping the multistressor responses. Exposure of eggs to the heat wave had no effect on larval traits, yet had delayed costs (lower fat and flight muscle mass) in the adult stage thereby crossing two life history transitions. These delayed costs were only present in central-latitude populations potentially indicating their lower heat tolerance. Exposure of larvae to the pesticide reduced larval growth rate and prolonged development time, and across metamorphosis reduced the adult fat content and the flight muscle mass, yet did not affect the adult heat tolerance. The pesticide-induced delayed emergence was only present in the slower growing central-latitude larvae, possibly reflecting stronger selection to keep development fast in the more time-constrained high-latitude populations. We observed no synergistic interactions between the egg heat wave and the larval pesticide exposure. Instead the pesticide-induced reduction in fat content was only present in animals that were not exposed to the egg heat wave. Our results based on laboratory conditions highlight that multistressor studies should integrate across life stages to fully capture cumulative effects of pollutants with other stressors related to global change." (Authors)] Address: Sniegula, S., Institute of Nature Conservation, Polish Academy of Sciences, Al. Mickiewicza 33, 31-120 Krakow, Poland

**18202.** Sniegula, S.; Golab, M.J.; Johansson, F. (2017): Cannibalism and activity rate in larval damselflies increase along a latitudinal gradient as a consequence of time constraints. *BMC Evolutionary Biology* 17, Article number: 167: 9 pp. (in English) ["Background: Predation is ubiquitous in nature. One form of predation is cannibalism, which is affected by many factors such as size structure and resource density. However, cannibalism may also be influenced by abiotic factors such as seasonal time constraints. Since time constraints are greater at high latitudes, cannibalism could be stronger at such latitudes, but we know next to nothing about latitudinal variation in cannibalism. In this study, we examined cannibalism and activity in larvae of the damselfly *Lestes sponsa* along a latitudinal gradient across Europe. We did this by raising larvae from the egg stage at different temperatures and photoperiods corresponding to different latitudes. Results: We found that the more seasonally time-constrained populations in northern latitudes and individuals subjected to greater seasonal time constraints exhibited a higher level of cannibalism. We also found that activity was higher at north latitude conditions, and thus correlated with cannibalism, suggesting that this behaviour mediates higher levels of cannibalism in time-constrained animals. Conclusions: Our results go counter to the classical latitude-predation pattern which predicts higher predation at lower latitudes, since we found that predation was stronger at higher latitudes. The differences in cannibalism might have implications for population dynamics along the latitudinal gradients, but further experiments are needed to explore this." (Authors)] Address: Johansson, F., Dept of Ecology & Genetics, Uppsala Univ., 751 05 Uppsala, Sweden. E-mail: frank.johansson@ebc.uu.se

**18203.** Sniegula, S.; Prus, M.A.; Golab, M.J.; Outomuro, D.

(2017): Do males with higher mating success invest more in armaments? An across-populations study in damselflies. *Ecological Entomology* 42(4): 526-530. (in English) ["1. Males with higher mating success would be expected to invest more in traits that facilitate mating, leading to steeper allometry of those traits with respect to body size. Across-population studies following latitudinal variation in male mating success are an excellent study system to address this question. 2. Males of the damselfly *Lestes sponsa* were used to investigate whether the allometric patterns of the length and width of the anal appendages, used for grasping the female prior to mating, corresponded to male mating success. Across a large latitudinal gradient, it was hypothesised that there is a larger investment in the grasping apparatus, i.e. a steeper allometric slope, following higher mating success. 3. Behavioural observations in field enclosures showed the highest mating success at high latitude, while there were no significant differences in mating success between the central and low latitudes. Positive allometry was found for the length of the anal appendages in high-latitude males, while central- and low-latitude males showed no significant regressions of the traits on body size. 4. These results partially support the hypothesis, as high-latitude, more successful males invested more in the length (but not the width) of the grasping apparatus than did central- and low-latitude males. Therefore, higher mating success might be facilitated by larger investment in armaments. Intraspecific studies on allometric patterns of traits that participate in mating success might offer new insights into the role of those traits in the reproductive behaviour of a species." (Authors)] Address: Sniegula, S., Dept of Ecosystem Conservation, Institute of Nature Conservation, Polish Academy of Sciences, al. Mickiewicza 33, 31-120 Krakow, Poland E-mail: szymon.sniegula@gmail.com

**18204.** Start, D.; Gilbert, B. (2017): Predator personality structures prey communities and trophic cascades. *Ecology Letters* 20(3): 366-374. (in English) ["Intraspecific variation is central to our understanding of evolution and population ecology, yet its consequences for community ecology are poorly understood. Animal personality – consistent individual differences in suites of behaviours – may be particularly important for trophic dynamics, where predator personality can determine activity rates and patterns of attack. We used mesocosms with aquatic food webs in which the top predator (dragonfly nymphs) varied in activity and subsequent attack rates on zooplankton, and tested the effects of predator personality. We found support for four hypotheses: (1) active predators disproportionately reduce the abundance of prey, (2) active predators select for predator-resistant prey species, (3) active predators strengthen trophic cascades (increase phytoplankton abundance) and (4) active predators are more likely to cannibalise one another, weakening all other trends when at high densities. These results suggest that intraspecific variation in predator personality is an important determinant of prey abundance, community composition and trophic cascades." (Authors)] Address: Start, D., Dept of Ecology & Evolutionary Biology, Univ. of Toronto, Toronto, ON, Canada M5S 3B3. E-mail: denon.start@mail.utoronto.ca

**18205.** Suhling, F.; Martens, A.; Suhling, I. (2017): Long-distance dispersal in Odonata: Examples from arid Namibia. *Austral Ecology* 42(5): 544-552. (in English) ["We report cases of long-distance dispersal in Odonata, some of which were directly observed by identifying single individuals of riverine species in unsuitable habitat, mostly desert, far distant from reproduction habitats. The shortest possible linear distances of the observation points to reproduction habitats were measured. Furthermore, established populations of riverine species were recorded in artificial lakes in central and southern Namibia far distant from the next regular reproduction sites. Our records demonstrate that single individuals of riverine species were probably covering distances of several hundred kilometres over arid landscape without any intervening possible reproduction habitat. Although it is likely that only small numbers of individuals of the river populations may disperse long distances, relatively recent colonizations of artificial habitats suggest that a few, or even single, dispersing individuals may lead to large-scale-range expansions." (Authors)] Address: Suhling, F., Institute of Geoecology, Landscape Ecology and Environmental Systems Analysis, Technische Universität Braunschweig, Langer Kamp 19c, 38106 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**18206.** Sushchik, N.N.; Popova, O.N.; Makhutov, O.N.; Gladyshev, M.I. (2017): Composition of fatty acids in the eye of a dragonfly. *Doklady Biochemistry and Biophysics* 475: 1-3. (in English) [We have studied the fatty acid composition of eyes of amphibiotic insects, namely, the odonate *Sympetrum flaveolum*. The main polyunsaturated fatty acid of odonate's eyes has been found to be 20:5n-3 (eicosapentaenoic fatty acid, EPA) rather than 18:2n-6 and 18:3n-3, which usually dominate in eyes of terrestrial insects, or 22:6n-3, which dominates in eyes of vertebrates. The prevalence of EPA in odonate's eyes probably provides a more effective transmission of light signal in this animal compared to terrestrial insects. It is important for odonates because vision plays a decisive role in finding and catching prey." (Authors)] Address: Sushchik, N.N., Institute of Biophysics of the Federal Research Center "Krasnoyarsk Scientific Center of the Siberian Branch of the Russian Academy of Sciences", Russia

**18207.** Swaegers, J.; Strobbe, F.; McPeck, M.A.; Stoks, R. (2017): Selection on escape performance during ecological speciation driven by predation. *Animal Behaviour* 124: 153-159. (in English) ["Highlights: •We reconstructed selection on escape traits during habitat shifts in damselflies. •Fish predation selected for decreased swimming propensity but did not affect speed. •Dragonfly predation selected for increased speed but did not affect propensity. •Quantitative genetic rearing showed both escape traits to be heritable. •Phenotypic evolution of antipredator traits may occur at an ecological time-scale. Despite the many study systems in which predation has played a major role in phenotypic diversification and speciation, the underlying selective regimes imposed by different predator assemblages have rarely been quantified. We did so for the damselfly genus *Enallagma* which strongly diverged in antipredator traits when the ancestral species occupying lakes containing fish (hereafter fish lakes) repeatedly

invaded fishless lakes with dragonfly larvae as top predators (hereafter dragonfly lakes). In two selection experiments in field enclosures we quantified the selection on two key escape traits of two fish-lake *Enallagma* species associated with survival selection by fish in the ancestral fish lakes and by dragonfly predators in the invaded fishless, dragonfly lakes. In accordance with the different hunting modes, fish imposed selection for a decreased swimming propensity while dragonfly larvae imposed selection for increased swimming speed in one of the two species. In two complementary quantitative genetic rearing experiments, we found relatively low but significant broad-sense heritabilities for both escape traits. Integrating these estimates for the selection coefficients and the heritabilities suggests that the evolutionary increase in swimming speed associated with the habitat shift may have occurred rapidly. Our study suggests that the phenotypic evolution of ecologically important traits related to habitat shifts may occur at an ecological timescale." (Authors)] Address: Swaegers, J., Dept Biology, Lab. Aquatic Ecol., Evolution & Conservation, Univ. of Leuven, Leuven, Belgium

**18208.** Tamm J. (2017): Zur Beeinträchtigung und Gefährdung von *Cordulegaster bidentata* unter Berücksichtigung von Kartierungen der Imagines in einigen deutschen Mittelgebirgen (Odonata: Cordulegastridae). *Libellula* 36(1/2): 1-21. (in German, with English summary) ["On impairment and endangering of *C. bidentata* in consideration of mapping imagines in central German highlands – *C. bidentata* (imagines) has been mapped in several highland forests of Central Germany in the years 2008 to 2016. It was found at 89 of 726 spring sites mapped. On this basis, knowledge could be gained about the structures of both populated and unpopulated habitats and moreover about important human impact. The latter mainly was evident in the form of large-scale coniferous forests, ponds close to the springs, crossing spring areas by heavy forest harvesters and by forest roads and in the form of massive deposits of branch wood wastes on the springs and streams. The threat situation of the species resulting from these impairments is analysed. Future developments are estimated. *C. bidentata* is classified as "endangered" in Germany and in some regions even "critically endangered" in its present situation." (Author)] Address: Tamm, J., Elgershäuser Str. 12, 34131 Kassel, Germany. E-mail: jochen.tamm@t-online.de

**18209.** Theischinger, G.; Richards, S.J.; Toko, P.S. (2017): *Bironides ypsilon* sp. nov. and *Nannophlebia ballerina* sp. nov., two new stream-dwelling dragonflies from southern Papua New Guinea (Odonata: Libellulidae). *Odonatologica* 46(3/4): 331-349. (in English) ["Two new species of stream-dwelling libellulid dragonflies are described from Gulf Province, Papua New Guinea. *Bironides ypsilon* sp. nov. and *Nannophlebia ballerina* sp. nov. are both small black and yellowish green dragonflies that appear to be confined to the vicinity of clear forest streams where adults were found perched on low vegetation. Characters of both sexes are illustrated, and the affinities of the new species are discussed." (Authors)] Address: Toko, P.S., New Guinea Binatang Research Center, Madang, Papua New Guinea. E-mail: pagi.sione@gmail.com

**18210.** Theischinger, G.; Richards, S.J. (2017): Insular odonates in Melanesia: a new species of damselfly from Manus Island, Papua New Guinea (Zygoptera: Platystictidae) and comments on *Nososticta manuscola* Theischinger et Richards. In: Telnov, D. et al. (eds) 2017: Biodiversity, Biogeography and Nature Conservation in Wallacea and New Guinea, III: 495-499, plates 101-103. (in English) ["*Drepanosticta gazelle* sp. nov., is described from Manus Island, Papua New Guinea. The new species is most similar to *D. antilope* Theischinger et Richards, 2005, another insular species known only from New Britain Island to the south-east of Manus. The female of *Nososticta manuscola* Theischinger et Richards, 2015, a species previously known from a single male, is described for the first time and data on variation in male morphology are provided." (Authors)] Address: Theischinger, G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**18211.** Tiple, A.D.; Talmale, S.S.; Padwad, S.V. (2017): A comparative description between new record of dragonfly *Burmagomphus pyramidalis* Laidlaw from central India and earlier available record. *Ambient Science* 4(2): 4 pp. (in English) ["*B. pyramidalis* Laidlaw, 1922 was reported so far from south to southwest India. Present report of the species from Tropical Forest Research Institute (TFRI) Jabalpur and Pachmarhi Biosphere Reserve (Hoshangabad Dist.), Madhya Pradesh is for the first time from the central parts of India. The study provides here variations in collected specimens in antehumeral marking on the thorax and the 9 abdominal segment. In specimen two upper antehumeral portion narrow, broaden at middle, again somewhat narrow and broaden at extreme humeral portion touches to the base of 2 pair of legs, also interrupted at the middle at humeral region as against upper antehumeral portion broad, narrow at middle, and broaden at extreme humeral portion, however, a conspicuous transverse citron yellow band dorsally seen on hind margin. In specimen one 9 abdominal segment with two big yellow triangular marks dorsally present on hind margin. Variations between collected two specimens of and available description by Fraser (1926 & 1934) are discussed." (Authors)] Address: Tiple, A.D., Department of Zoology, Vidyabharti College, Seloo, Wardha-442104, Maharashtra, India

**18212.** Tol, J. van (2017): Mission Report: Entomological fieldwork Bhutan May-June 2017. Internal report of Naturalis Biodiversity Center, Leiden, The Netherlands, December 2017: 60 pp. (in English) ["Three years ago, the National Biodiversity Centre (Bhutan) and Naturalis Biodiversity Center signed a Memorandum of Understanding for scientific cooperation. An important partner for the scientific and outreach activities was the Bhutan Trust Fund for Environmental Conservation (Thimphu), which provided a grant of USD 150,000 for the period 2014-2016. Although the grant ended by the end of 2016, but it was decided that further entomological fieldwork was needed, for instance to prepare for the next phase which will focus on applied entomology and water quality assessment. Costs of the Bhutanese counterparts for this fieldwork were covered by a grant of Naturalis." (Author)] Address: Tol, J. van, National Museum of Natural History, P.O. Box 9517,



**18213.** Torres-Pachon, M.; Novelo-Gutierrez, R. (2017): *Phyllogomphoides enriquei* (Odonata: Gomphidae) a new species from Mexico. *Zootaxa* 4312(3): 595-600. (in English, with Spanish summary) ["*Phyllogomphoides Belle*, 1970, is the second most diverse genus with 46 species within neotropical Gomphidae, after *Progomphus* Selys, 1854 with 69 species. Most of the Mexican species are very similar in color pattern, however, the male accessory genitalia, cerci and epiproct allow to identify and separate species. Here, *Phyllogomphoides enriquei* sp. nov. (holotype ♂: Mexico, Michoacan, Municipality of Tepalcatepec, Rio Pinolapa, 19°00.524 N; 103°01.456 W, elevation 616m, 04 July 2005, R. Novelo & J.A. Gomez leg.; to be deposited in Coleccion Entomologica del Instituto de Ecologia, A.C., Xalapa) is described and illustrated, being characterized by the anterior hamuli bilobed, tumid anteriorly, ending in a strong spine posteriorly, followed by a wide, deep cleft between anterior and posterior lobes. It appears to be closely related to *Phyllogomphoides luisi* Gonzalez-Soriano & Novelo-Gutierrez, 1990. A distributional map of *Phyllogomphoides* species from Michoacan State is provided. With this discovery, the number of species of *Phyllogomphoides* for Mexico rises to 13." (Authors)] Address: Torres-Pachon, Mónica, Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera antigua a Coatepec 351, El Haya, 91070, Xalapa, Veracruz, Mexico. E-mail: monica.torres@posgrado.ecologia.edu.mx

**18214.** Tüzün, N.; Op de Beeck, L.; Stoks, R. (2017): Sexual selection reinforces a higher flight endurance in urban damselflies. *Evolutionary Applications* 10(7): 694-703. (in English) ["Urbanisation is among the most important and globally rapidly increasing anthropogenic processes, and is known to drive rapid evolution. Habitats in urbanised areas typically consist of small, fragmented and isolated patches, which is expected to select for a better locomotor performance, along with its underlying morphological traits. This, in turn, is expected to cause differentiation in selection regimes, as populations with different frequency distributions for a given trait will span different parts of the species' fitness function. Yet, very few studies considered differentiation in phenotypic traits associated with patterns in habitat fragmentation and isolation along urbanisation gradients, and none considered differentiation in sexual selection regimes. We investigated differentiation in flight performance and flight-related traits, and sexual selection on these traits across replicated urban and rural populations of *Coenagrion puella*. To disentangle direct and indirect paths going from phenotypic traits over performance to mating success, we applied a path analysis approach. We report for the first time direct evidence for the expected better locomotor performance in urban compared to rural populations. This matches a scenario of spatial sorting, whereby only the individuals with the best locomotor abilities colonise the isolated urban populations. The covariation patterns and causal relationships among the phenotypic traits, performance and mating success strongly depended on the urbanisation level. Notably, we detected sexual selection for a higher flight endurance only in urban populations, indicating that the higher flight performance of

urban males was reinforced by sexual selection. Taken together, our results provide a unique proof of the interplay between sexual selection and adaptation to human-altered environments." (Authors)] Address: Tüzün, N., Lab. Aquatic Ecol., Evolution & Conservation, Univ. of Leuven, Charles Deberiotstraat 32, 3000 Leuven, Belgium. E-mail: nedim.tuzun@kuleuven.be

**18215.** Turiault, M. (2017): The type material of *Isostictidae*, *Dicteriadidae*, *Argiolestidae* and *Megapodagrionidae* in the Museum für Naturkunde in Berlin (Odonata). *Odonatologica* 46(3/4): 351-358. (in English) ["A catalogue listing all species-group names associated with type specimens of the families *Isostictidae*, *Dicteriadidae*, *Argiolestidae* and *Megapodagrionidae* (Odonata) currently housed in the entomological collection of the Museum für Naturkunde - Leibniz Institute for Evolution and Biodiversity Science in Berlin (Germany) – includes current status of the species-group names, transcriptions of data labels and references to the original descriptions." (Authors)] Address: Turiault, Mélanie, Uhlenhorster Str. 23, 12555 Berlin, Germany. E-mail: melanieturiault@msn.com

**18216.** Uiterwaal, S.F.; Mares, C.; DeLong J.P. (2017): Body size, body size ratio, and prey type influence the functional response of damselfly nymphs. *Oecologia* 185(3): 339-346. (in English) ["Predator-prey interactions play a crucial role in structuring food webs, and the functional response is one way to measure the strength of this interaction. Here, we examine how predator and prey body size affects the functional response of a generalist predator—damselfly [mostly *Ischnura verticalis* and *Enallagma civile*] nymphs—feeding on three prey types: copepods, *Daphnia*, and *Chydorus*. Our results suggest that consumption of copepods is independent of predator body size, while increased predator body size is associated with an increased space clearance rate for *Daphnia* and a reduced space clearance rate for *Chydorus*. When considered together, foraging rates on *Daphnia* and *Chydorus* (both cladocerans) are consistent with a hump-shaped functional response, with peak foraging rates occurring at an intermediate predator-prey size ratio. Thus, although most food web theory assumes allometric predator-prey links or peaked functional responses at intermediate predator-prey size ratios, our results suggest that both relationships may occur in food webs, in addition to size-independent functional responses." (Authors)] Address: Uiterwaal, Stella, School of Biological Sciences, University of Nebraska-Lincoln, Lincoln, USA

**18217.** Usio, N.; Nakagawa, M.; Aoki, T.; Higuchi, S.; Kadono, Y.; Akasaka, M.; Takamura, N. (2017): Effects of land use on trophic states and multi-taxonomic diversity in Japanese farm ponds. *Agriculture, Ecosystems & Environment* 247(1): 205-215. (in English) ["Highlights: •Farm ponds are among the most biodiverse anthropogenic freshwater habitats. •Land use and fish abundance were among the significant factors affecting the trophic states of ponds. •Multi-taxonomic richness patterns changed along the gradient of trophic states. •A clear-water state was associated with diverse aquatic plants, macroinvertebrates, and adult Odonata. •A turbid

state was associated with diverse phytoplankton and fish. Abstract: Farm ponds are among the most biodiverse anthropogenic freshwater habitats because of their small size, shallow water depth, and aquatic vegetation. Land-use changes, such as converting riparian vegetation to human use or changing the management practices of farm ponds, are assumed to be major factors that change such ecosystems from a clear-water state to a turbid state, leading to deterioration of water quality and biodiversity in such ponds. Using the database of a large-scale pond survey, we evaluated the effects of surrounding land use (landscape factors and modern pond management practices), fish abundance, and other environmental variables on total phosphorus concentration and taxonomic richness patterns of six biological indicators associated with changes in the trophic state. Local- and landscape-level vegetation structure associated with land use and total fish abundance were among the factors influencing the total phosphorus concentration of farm ponds, a main driver of trophic state changes. In addition, a transition from a clear-water state to a turbid state was associated with lower taxonomic richness of aquatic plants, macroinvertebrates, and adult Odonata, and a higher taxonomic richness of phytoplankton and fish. Based on these results, we discuss potential land-use and pond management strategies for conserving and/or restoring the water quality and biodiversity of farm ponds through maintenance of a clear-water state." (Authors)] Address: Usio, N., Institute of Nature and Environmental Technology, Kanazawa University, Kanazawa 920-1192, Japan. E-mail: sio@se.kanazawa-u.ac.jp

**18218.** Van Allen, B.G.; Rasmussen, C.J.; Dibble, C.J.; Clay, P.A.; Rudolf, V.H.W. (2017): Top predators determine how biodiversity is partitioned across time and space. *Ecology letters* 20: 1004-1013. (in English) ["Natural ecosystems are shaped along two fundamental axes, space and time, but how biodiversity is partitioned along both axes is not well understood. Here, we show that the relationship between temporal and spatial biodiversity patterns can vary predictably according to habitat characteristics. By quantifying seasonal and annual changes in larval dragonfly communities across a natural predation gradient we demonstrate that variation in the identity of top predator species is associated with systematic differences in spatio-temporal  $\beta$ -diversity patterns, leading to consistent differences in relative partitioning of biodiversity between time and space across habitats. As the size of top predators increased (from invertebrates to fish) habitats showed lower species turnover across sites and years, but relatively larger seasonal turnover within a site, which ultimately shifted the relative partitioning of biodiversity across time and space. These results extend community assembly theory by identifying common mechanisms that link spatial and temporal patterns of  $\beta$ -diversity." (Authors)] Address: Rudolf, V.H.W., BioSciences, Rice University, Houston, TX, USA. E-mail: volker.rudolf@rice.edu

**18219.** Van Dievel, M.; Stoks, R.; Janssens, L. (2017): Beneficial effects of a heat wave: higher growth and immune components driven by a higher food intake. *Journal of Experimental Biology* 220: 3908-3915. (in English) ["While heat

waves will become more frequent and intense under global warming, the ability of species to deal with extreme weather events is poorly understood. We investigated how a heat wave influenced growth rate and investment in two immune components (phenoloxidase activity and melanin content) in larvae of *Ischnura elegans* and *Enallagma cyathigerum*. Late instar larvae were kept at 18°C (i.e. their average natural water temperatures) or at a simulated long heat wave at 30°C. To explain the heat wave effects, we quantified traits related to energy uptake (food intake and growth efficiency), energy expenditure (metabolic rate measured as activity of the electron transport system, ETS) and investment in energy storage (fat content). The two species differed in life strategy with *I. elegans* having a higher growth rate, growth efficiency, ETS activity, and fat content. In line with its preference for cooler water bodies, the heat wave was only lethal for *E. cyathigerum*. Yet, both species benefited from the heat wave by increasing growth rate, which can be explained by the higher increase in food intake than metabolic rate. This may also have contributed to the increased investments in energy storage and immune components under the heat wave. This mediatory role of food intake indicates the critical role of food availability and behaviour in shaping the impact of heat waves. Our results highlight the importance of including behavioural and physiological variables to unravel and predict the impact of extreme climate events on organisms." (Authors)] Address: Van Dievel, Marie, Evolutionary Stress Ecology & Ecotoxicology, Univ. of Leuven, Charles Deberiotstr. 32, 3000 Leuven, Belgium. E-mail: Marie.VanDievel@kuleuven.be

**18220.** Vermeulen, T. (2017): Dragonflies (Odonata) of the Moervaart depression. *Brachytron* 19(2): 90-103. (in Dutch, with English summary) ["The area of the Moervaart depression (East Flanders, Belgium), a historic landscape formed between 20 000 and 11 000 years ago as a relic of a glacial lake, represents a dragonfly hotspot. A five-year (2012-2016) monitoring project shows the area has become attractive to several species of dragonflies. In response to recent restoration efforts and improved management of nature reserves new species have quickly colonized the area. These include *Aeshna isoeles*, *Brachytron pratense* and *Lestes virens*. The area Boudelo Foundation (Sinaai) is especially species-rich. The microclimate of some water habitats in the Moervaart depression also attracts some scarce southern species, including *Anax parthenope* and *Aeshna affinis*. The diversity of dragonflies is related to variation in suitable habitats." (Author)] Address: Vermeulen, T.; E-mail: tommy.vermeulen@skynet.be

**18221.** Verspui, K. (2017): Nineteenth century water-colours of dragonflies and damselflies with a connection to the Netherlands. *Brachytron* 19(1): 3-15. (in Dutch, with English summary) ["The rediscovered damselfly and dragonfly watercolour collection of Edmond de Selys Longchamps is brought to the attention by discussing those watercolours that have a connection with the Netherlands. The watercolours of *Heterargia optata* (currently *Palaiargia optata*), *Calicnemis erythromelas* (currently *Calicnemis erythromelas*), *Vestalis*

elongata, Hagenius albarda (currently Sieboldius albarda), Epophthalmia vittata and Aeschna rufescens (currently Aeschna isocles) are presented as examples. The diversity, value and accessibility of this nineteenth-century collection of odonate watercolours are discussed." (Authors)] Address: Verspui, Karin: E-mail: karin.verspui@gmail.com

**18222.** Verspui, K.; Wasscher, M.T. (2017): The damselfly and dragonfly watercolour collection of Edmond de Selys Longchamps: II Calopterygines, Cordulines, Gomphines and Aeschnines. *International Journal of Odonatology* 20(2): 79-112. (in English) ["In the nineteenth century Edmond de Selys Longchamps added watercolours, drawings and notes to his extensive collection of dragonfly and damselfly specimens. The majority of illustrations were executed by Selys and Guillaume Severin. The watercolour collection is currently part of the collection of the Royal Belgian Institute for Natural Sciences in Brussels. This previously unpublished material has now been scanned and is accessible on the website of this institute. This article presents the part of the collection concerning the following sous-familles according to Selys: Calopterygines (currently superfamilies Calopterygoidea and Epiophlebioidea), Cordulines (currently superfamily Libelluloidea), Gomphines (currently superfamily Petaluroidea, Gomphoidea, Cordulegastroidea and Aeshnoidea) and Aeschnines (currently superfamily Aeshnoidea). This part consists of 750 watercolours, 64 drawings and 285 text sheets. Characteristics and subject matter of the sheets with illustrations and text are presented. The majority (92%) of all sheets with illustrations have been associated with current species names (Calopterygines 268, Cordulines 109, Gomphines 268 and Aeschnines 111). We hope the digital images and documentation stress the value of the watercolour collection of Selys and promote it as a source for odonate research." (Authors)] Address: Verspui, Karin, Lingedijk 104, Tricht, the Netherlands. Email: karin.verspui@gmail.com

**18223.** Villalobos Jiménez, G. (2017): The impacts of urbanisation on the ecology and evolution of dragonflies and damselflies (Insecta: Odonata). Ph.D. thesis, The University of Leeds School of Biology: XV, 234 pp. (in English) ["Urbanisation is one of the main drivers of ecosystem change. The impacts of urban land use on biodiversity have been investigated, but other aspects of ecology have been overlooked, as well as the effects of urban stressors. Understanding the effects of specific urban stressors is crucial in order to appropriately manage urban areas and conserve their biodiversity. Odonata are a suitable taxon for evaluating the impacts of urbanisation on both terrestrial and aquatic ecosystems. Here, using a combination of field and laboratory data, I study the ecological impacts of urban stressors on odonates. I found that the urban heat island has negligible impacts on the phenology of odonates compared to climate change. Moreover, noise disturbance reduces significantly the feeding rate of the damselfly *Ischnura elegans*, although anthropogenic noise has no significant impact. Regarding the impacts of polarised light pollution (PLP), the strength of polarotaxis increased significantly with age in laboratory-reared specimens, but there was no significant differentiation between

urban and rural populations. However, field-caught urban specimens showed less preference to polarised light compared to rural populations, suggesting strong selective pressures are acting upon urban populations, but no adaptation has occurred. Flight-related traits showed no significant differentiation among urban and rural populations of *I. elegans*. Lastly, biodiversity patterns did not differ among urban and rural areas, although aquatic vegetation and presence of fish were the main drivers of community composition. These results show odonates can tolerate a wide range of urban stressors, notably *I. elegans*. However, PLP, fish, and absence of aquatic vegetation in urban ponds can have a negative impact on odonate biodiversity, which has important implications on conservation and management of urban areas. Urban ecosystems are complex, thus an integrative approach is necessary in order to understand in depth the impacts of urbanisation on biodiversity." (Author)] Address: Villalobos Jiménez, Giovanna, School of Biology, Univ. of Leeds, Woodhouse Lane, Leeds LS2 9JT, UK. E-mail: bsgdjv@leeds.ac.uk

**18224.** Vinko, D.; Kulijer, D.; Dinova, D.; Rimeeska, B.; Brauner, O.; Olias, M. (2017): Faunistic results from the 5th Balkan odonatological meeting - BOOM 2015, Republic of Macedonia. *Acta Entomologica Slovenica* 25(1): 89-114. (in English, with Slovenian summary) ["Dragonfly research in the West Balkans experienced significant boost in recent years, also due to the establishment of the Balkan Odonatological Meetings (BOOM) in 2011. The main goal of BOOM is to contribute to research and protection of dragonflies of the Balkan Peninsula. This paper presents the faunistic results of the 5th BOOM, held in Republic of Macedonia. Between 7 and 15 August 2015, 46 sites were surveyed and 41 dragonfly species found. This represents more than half of the hitherto recorded dragonfly species for the country. This paper includes data for localities and habitats from central and southern part of R. Macedonia, which was less investigated in the past. Significant results include the first documented report of *Selysiothemis nigra* for the country. New data on several species with a comparably low number of previously published records for R. Macedonia, i.e. *Chalcolestes parvidens*, *Calliaeschna microstigma*, *Lindenia tetraphylla*, *Cordulegaster heros*, *C. bidentata*, *C. insignis*, *Somatochlora meridionalis*, *S. flavomaculata*, *Sympetrum vulgatum* and *S. flavolum*, are also presented and brief discussion is provided." (Authors)] Address: Vinko, D., Slovene Dragonfly Society, Verovškova 56, SI-1000 Ljubljana, Slovenia. E-mail: damjan.vinko@gmail.com

**18225.** Vivas-Santeliz, J.; De Marmels, J. (2017): Current knowledge of Odonata in Venezuela: diversity and distribution of endemic taxa. *Odonatologica* 46(1/2): 35-54. (in English) ["So far, 525 species and 14 subspecies of odonates are known to occur in Venezuela. These are distributed in 124 genera and 13 families, with an undescribed species of the genus *Ypirangathemis* and *Paracordulia*. Despite Venezuela being one of the countries of Latin America with a very high diversity of described species, research on odonates is stagnant, mainly due to the small number of odonatologists and even more because of the political, economic and

social situation in this country, rendering field trips to collect odonates almost impossible. The country harbours a significant number of endemics, including six endemic genera and a total of 78 endemic species. The Pantepui region, as well as the Andean and Coastal Cordilleras all have high levels of endemism. A majority of endemic species is found within protected areas. However, threats to their survival have increased over the years, since there are no conservation plans for them or their habitats. Just seven species have so far been evaluated and catalogued in the Red Data Book of Venezuelan fauna, among them *Phyllogomphoides brunneus*, which is the only species of Odonata included in this Red Data Book that is not endemic to the country. The present paper aims to identify the distributions and diversity of endemic species in Venezuela, which can be used as a base to others investigations, including conservation studies in which they are assessed for inclusion in the Red List." (Authors)] Address: Vivas-Santeliz, J., Museo del Instituto de Zoología Agrícola Francisco Fernández Yépez, Fac. de Agronomía, Univ. Central de Venezuela, Maracay, Estado Aragua, Venezuela. E-mail: jonjvs1@gmail.com

**18226.** Walia, G.K.; Katnoria, N. (2017): Linear characterization of chromosomes in two species of family Euphaeidae (Odonata: Zygoptera). *International Journal of Entomology Research* 2(4): 75-78. (in English) ["Chromosome complement and meiotic behavior of chromosomes in two species of family Euphaeidae have been described by conventional staining, C- banding, silver nitrate staining and sequence specific staining. *Anisopleura lestoides* reveals two complements n=12 (without m chromosomes) and n=13 (with m chromosome), while *Bayadera indica* possess n=13m. In *Anisopleura lestoides* all the autosomal bivalents including m bivalent are showing terminal C-bands and NOR bands. Whereas in *Bayadera indica*, terminal C-bands on both ends in 9 autosomal bivalents and C-bands on one side in 3 bivalents, whereas terminal NOR bands are present in 10 autosomal bivalents, 1 NOR band on one side in 1 bivalent, m bivalent is C-negative and NOR-negative. X chromosome is C-positive and NOR rich in both the species. In the sequence specific staining, two autosomal bivalents show both CMA3 and DAPI bright signals and remaining bivalents including m bivalent and X chromosome possess CMA3 bright and DAPI dull regions in *Anisopleura lestoides*, while all the chromosomes show both DAPI and CMA3 bright signals in *Bayadera indica*." (Authors)] Address: Walia, Gurinder Kaur, Dept of Zoology and Environmental Sciences, Punjabi University, Patiala 147002, Punjab, India

**18227.** Waller, J.T.; Svensson, E.I. (2017): Body size evolution in an old insect order: No evidence for Cope's Rule in spite of fitness benefits of large size. *Evolution* 71(9): 2178-2193. (in English) ["We integrate field data and phylogenetic comparative analyses to investigate causes of body size evolution and stasis in an old insect order: odonates ("dragonflies and damselflies"). Fossil evidence for "Cope's Rule" in odonates is weak or non-existent since the last major extinction event 65 million years ago, yet selection studies show consistent positive selection for increased body

size among adults. In particular, we find that large males in natural populations of the banded demoiselle (*Calopteryx splendens*) over several generations have consistent fitness benefits both in terms of survival and mating success. Additionally, there was no evidence for stabilizing or conflicting selection between fitness components within the adult life-stage. This lack of stabilizing selection during the adult life-stage was independently supported by a literature survey on different male and female fitness components from several odonate species. We did detect several significant body size shifts among extant taxa using comparative methods and a large new molecular phylogeny for odonates. We suggest that the lack of Cope's rule in odonates results from conflicting selection between fitness advantages of large adult size and costs of long larval development. We also discuss competing explanations for body size stasis in this insect group." (Authors)] Address: Waller, J.T., Evolutionary Ecology Unit, Department of Biology, Lund University, SE-223 62 Lund, Sweden. E-mail: john.waller@biol.lu.se

**18228.** Wang, A.R.; Kim, M.J.; Kim, S.S.; Kim, I. (2017): Additional mitochondrial DNA sequences from the dragonfly, *Nannophya pygmaea* (Odonata: Libellulidae), which is endangered in South Korea. *International Journal of Industrial Entomology* 35(1): 51-57. (in English) ["The tiny dragonfly, *Nannophya pygmaea* (Odonata: Libellulidae), is an endangered insect in South Korea. Previously, a partial mitochondrial DNA sequence that corresponded to a DNA barcoding region has been used to infer genetic diversity and gene flow. In this study, we additionally sequenced the barcoding region from *N. pygmaea* that had been collected from three previously sampled populations (40 individuals) and these sequences were combined with the preexisting data. We also selected and sequenced an additional mitochondrial gene (ND5) to find further variable gene regions in the mitochondrial genome. DNA barcoding sequences of 108 individuals from five South Korean localities showed that genetic diversity was highest in Gangjin, Jeollanam-do Province. Muuido, which was previously occupied by a single haplotype, was also found to have an identical haplotype, which confirmed the low genetic diversity on this islet. Gene flow among populations is highly limited, and no clear distance- or region-based geographic partitioning was observed. Phylogenetic relationships among haplotypes showed that there were no discernable haplotypes in South Korea. ND5 provided slightly more haplotypes compared to the barcoding region in 40 individuals (14 vs. 10 haplotypes in the COI gene). It also had a slightly higher within-locality diversity estimate, which suggested that ND5 had potential as mitochondrial DNA-based marker for population genetic analysis." (Authors)] Address: Kim, I., Department of Applied Biology, College of Agriculture & Life Sciences, Chonnam National University, Gwangju 61186, Republic of Korea. E-mail: ikkim81@chonnam.ac.kr



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2010

**18229.** Batista, J.D. (2010): Sazonalidade, impacto ambiental e o padrão de diversidade beta de Odonata em riachos tropicais no Brasil Central. Vicososa, Minas Gerais, Brazil. Federal University of Viçosa.: X, 98 pp. (in Portuguese, with English summary) ["Seasonality, environmental impact and pattern of beta diversity of Odonata in tropical streams of Central Brazil: In this study, I investigated how seasonality and environmental impacts affect the composition and structure of Odonata communities, testing the following hypotheses: 1) the potential species distribution modeling can be useful as a tool to predict environmental changes; 2) changes in the landscape deriving from anthropization affect the distribution and pattern of beta diversity of Odonata; 3) seasonality causes effect in the distribution and richness pattern of Odonata. The study was carried out in streams of river Pindaíba basin, Mato Grosso, with samplings in the dry and rainy seasons, between 2005 and 2009. Sampling of Odonata was done by fixed-areas scan method. Results showed that 1) the distribution model predicted a greater quantity of families and species at all sites in relation to validation data. This result was attributed to habit and species activity hour constraints and sampling effort. However, the use of models can be an important strategy for biodiversity analyses in systems with few historic information about biogeographic distribution; 2) the turnover pattern was dominant for Anisoptera and for Zygoptera, even in areas with smaller integrity. Increase of nestedness in Anisoptera, and the inverse pattern in Zygoptera, can be the result of different levels of specialisation of these groups, producing an unbalanced pattern of unique species in the two systems; 3) the greater richness of Odonata was found in the rainy season, which is an inverse pattern in relation to previous studies in Atlantic Forest, suggesting that Odonata in Cerrado rivers were less controlled by temperature constraints. Finally, it was showed that variation in water temperature acts as a stressing factor in community dynamics, decreasing the number of species that are not adapted to severe environmental conditions, favouring the synchrony of the remaining species due to ecological similarity." (Author)] Address: not stated

**18230.** Fulan, J.A.; Raimundo, R.; Figueiredo, D.; Correia, M. (2010): Abundance and diversity of dragonflies four years after the construction of a reservoir. *Limnetica* 29(2): 279-286. (English, with Portuguese summary) ["Few studies have investigated the impacts of river impoundments on reservoir constructions. Reservoir construction deeply changes dragonflies' habitat structures, especially in relation to shoreline vegetation. This study investigated the effects of the impoundment of the Guadiana River and its tributaries on dragonflies four years after the construction of a reservoir. A total of 17 dragonfly species (11 Zygoptera and ten Anisoptera), representing six families, were recorded in 21 sites in the years 1999 and 2003. *Aeshna mixta*, *Coenagrion caerule-scens*, *C. scitulum*, *Sympetrum fonscolombii*, *S. meridionale* and *S. striolatum* were sampled just before the impoundment took place, and *Anax parthenope*, *Onychogomphus forcipatus*, *Orthetrum coerulescens*, *Trithemis annulata*, *Platycnemis acutipennis* and *P. latipes* were recorded only after the construction of the reservoir. We concluded that the construction of the Alqueva Reservoir four years earlier did not change the dragonfly species richness, possibly because of species overlap, but that the species composition was modified. Changes in marginal vegetation may have been important to new species compositions." (Authors)] Address: Fulan, J.A., Federal University of Amazonas, Brazil, Campus of Humaitá, Brazil. E-mail: joaofulan@uevora.pt

**18231.** Grand, D. (2010): Deux siècles d'étude des libellules en Rhône-Alpes (Insecta, Odonata). *Bulletin mensuel de la Société linnéenne de Lyon hors-série n°2* 2010: 23-29. (French, with English summary) ["Two centuries of regional odonatology: A general presentation of the order Odonata (systematics, biology) is proposed first of all, followed by information on these insects in Rhone-Alpes, a region situated at the crossroads of Alpine, Atlantic and Mediterranean climates. Then, a synthesis summarizes more than two centuries of regional odonatology, where the local status of 7 species is discussed and specified. Finally, the study leads to the report of an improvement of the biodiversity of the regional dragonflies, especially owed these last 50 years to a much better knowledge of their current distribution

and, additionally, to the effects of the global warming." (Author)] Address: deceased

**18232.** Kovacs, T.; Ambrus, A. (2010): Faunistical Studies on the Odonata of the Szigetköz, NW Hungary. In: Gubányi, A. & Mészáros, F. (eds.): *A Szigetköz állattani értékei. Magyar Természettudományi Múzeum, Budapest: 39-48.* (Hungarian, with English summary) ["Odonata populations have been studied for the longest period of time in the Szigetköz area of Hungary. A total of 51 species were found in the Szigetköz (3196 data) at six permanent sampling sites and some 70 sampling sites examined at varying intervals. With the 52 species found in the imago form the presence of a total of 53 Odonata species were proven in this area. The diversion of the course of the river Danube has led to the disappearance of 2 species- *Coenagrion ornatum* and *Aeshna viridis*— from Szigetköz. The diversion of the river did not cause detectable changes in the faunas of the following habitat types: flood plain and the shallow and deep gravel pit lakes beyond the embankments, the eastern moor of the riverside forest Parti-erdo and the Mosoni Danube. But the water replenishment of the area has significantly changed the character of some of the typical, stagnant, slowly flowing water bodies, which harboured rich vegetation. The number of valuable elements of the rich fauna, which is a characteristic feature of stagnant waters, has decreased. The number of riverine species, as well as those tolerant of a wide range of conditions, along with the population size of such species, has increased. In some cases this process has led to the decrease of the total number of species. This trend is a result of decreasing habitat diversity." (Authors)] Address: Kovacs, T., Mátra Museum., Kossuth Lajos u. 40, HU-3200 Gyöngyös, Hungary. E-mail: koati@matavnet.hu

**18233.** Mitra, T.R.; Babu, R. (2010): Revision of Indian species of the families Platycnemididae and Coenagrionidae (Insecta: Odonata: Zygoptera). Taxonomy and zoogeography. Records of the Zoological Survey of India (Occasional Paper No. 315): 104 pp. (in English) ["The book deals with detailed geographical distribution in the World of each species with records of authorities. It also discusses the relationship between *Ischnura* and *Rhodischnura*; *Agriocnemis* and *Mortonagrion*. It comments on taxonomic status and distribution of species of *Paracercion*, *Enallagma* and *Pyrrosoma*; *Agriocnemis corbeti* Kumar & Prasad, *Agriocnemis keralensis* Peter, *Calicnemia mahesi* Sahni, *Coenagrion kashmirensis* Das, *Archibasis sushmae* Baijal, *Onychargia indica* Sahni, *Enallagma insulae* Fraser, *Calicnemia miniata doonensis* Sangal & Tyagi; comments on the new combination of *Mortonagrion aborense* (Laidlaw); finally comments on the taxonomic status of several taxa appeared in the recent literature." (Authors)] (Address: Mitra, T.R., Zoological Survey of India, M-Block, New Alipore, Calcutta-700 053, India

**18234.** Mogren, C.L.; Trumble, J.T. (2010): The impacts of metals and metalloids on insect behavior. *Entomologia Experimentalis et Applicata* 135(1): 1-17. (in English) ["In toxicology studies, the use of death as an endpoint often fails

to capture the effects a pollutant has on disruptions of ecosystem services by changing an animal's behavior. Many toxicants can cause population extinctions of insect species at concentrations well below the EC25, EC50, or EC90 concentrations traditionally reported from short-term bioassays. A surprising number of species cannot detect metal and metalloid contamination, and do not always avoid food with significant metal concentrations. This frequently leads to modified ingestion, locomotor, and reproductive behaviors. For example, some species show a tendency to increase locomotor behaviors to escape from locations with elevated metal pollution, whereas other insects greatly decrease all movements unrelated to feeding. Still others exhibit behaviors resulting in increased susceptibility to predation, including a positive phototaxis causing immatures to move to exposed positions. For purposes of reproduction, the inability to avoid even moderately polluted sites when ovipositing can lead to egg loss and reduced fitness of offspring. Ultimately, impaired behaviors result in a general reduction in population sizes and species diversity at contaminated sites, the exceptions being those species tolerating contamination that become dominant. Regardless, ecosystem services, such as herbivory, detritus reduction, or food production for higher trophic levels, are disrupted. This review evaluates the effects of metal and metalloid pollution on insect behaviors in both terrestrial and aquatic systems reported in a diverse literature scattered across many scientific disciplines. Behaviors are grouped by ingestion, taxis, and oviposition. We conclude that understanding how insect behavior is modified is necessary to assess the full scope and importance of metal and metalloid contamination." (Authors) The paper includes a reference to *Sympetrum corruptum*.] Address: Mogren, Christina, Dept Entom., Univ. California, 900 University Avenue, Riverside, CA 92521, USA. E-mail: cmogr001@student.ucr.edu

**18235.** Norma-Rashid, Y. (2010): Odonata of Fraser's hill, montane ecozones with conservation implications. Proceedings of National Biodiversity Seminar 2008, ISBN 978-967-5557-05-7: 49-59. (in English, with Malaysian summary) ["In this study, the fauna, habitat preference and ecological features of the dragonflies occurring in the montane forests of Fraser's Hill were investigated with vernacular names also mentioned. To date, 26 species from eight family groups have been documented from current and previous works. The available habitats in the ecozone are listed together with the distinctive associated species. Species diversity in higher latitudes is known to be not as diverse but what has been highlighted in the paper is the degree of endemism reaching 23%. Evident from the findings are existence of taxonomically isolated species such as *Devadatta argyroides* (Selys, 1859), *Onychothemis coccinea* (Lieftinck, 1953) and *O. testacea* (Laidlaw, 1902). The Action Plan proposed by Moore (1997), regarded these dragonflies as priority species from the Oriental region apt for further study and conservation action. Implications for potentially endangered, threatened or vulnerable species status within the study area are also evaluated. The paper concluded that among other suggestions there should be an initiative to create odonate refuges

as these creatures resembled natural flagships for raising public awareness of the importance of conserving forests, aquatic habitats and biodiversity." (Author)] Address: Norma-Rashid, Y., Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur. E-mail: ynorma@um.edu.my

**18236.** Prasad, M.; Mondal, S.D. (2010): Odonata: Zygoptera. Zool. Surv. India, Fauna of Uttarakhand, State Fauna Series, 18 (Part-2): 17-28. (in English) ["Suborder Zygoptera (Odonata) fauna of Uttarakhand State has been studied and a total of 47 species/subspecies belonging to 24 genera and 9 families are recorded from the State. Of these, *Lestes umbrinus* Selys is recorded for the first time from Uttarakhand State. Two species/ subspecies viz., *Agriocnemis corbeti* Kumar & Prasad and *Calicnemia carminea pyrrhosoma* Lieftinck are endemic to the State. *Rhinocypha biforata biforata* Selys is so far known only from the Uttarakhand." (Authors)] Address: Prasad, M., Zoological Survey of India, M-Block. New Alipore. Kolkata-700 053, India

**18237.** Prasad, M.; Mondal, S.D. (2010): Odonata: Anisoptera. Zool. Surv. India, Fauna of Uttarakhand, State Fauna Series, 18 (Part-2): 29-52. (in English) ["Anisoptera fauna of present day Uttarakhand has been studied comprehensively. A total of 75 species and subspecies belonging to 40 genera under 5 families and two suborders are recorded from the State. Out of these 4 species are recorded for the first time from the Uttarakhand. Keys, collection data~ distributional range in India and outside India have been provided in the text." (Authors)] Address: Prasad, M., Zoological Survey of India, M-Block. New Alipore. Kolkata-700 053, India

**18238.** Simon, A. (2010): Synthèse des connaissances préalable à la déclinaison régionale du Plan National d'Action Odonates en Haute-Normandie. Première partie: Etat des lieux des connaissances. Direction Régionale de l'Environnement, de l'Aménagement et du Logement: 78 pp. (in French) ["As part of its strategy to combat the erosion of biodiversity, the Ministry of Ecology, Energy, Sustainable Development and the Sea (MEEDDM) has developed National Action Plans (NAP). One of these plans concerns Odonata. In order to better take into account the specific characteristics of the different territories, this NAP must be adapted to the regions. In order to anticipate this regional adaptation, the DREAL of Haute-Normandie commissioned the Conservatoire des Sites Naturels de Haute-Normandie to produce a preliminary summary, gathering the available information on the subject. This preliminary summary presents: - The state of knowledge available on the Odonata of Upper Normandy. - The results of additional field surveys carried out for the preparation of this synthesis. - The inventory of regional actors likely to be concerned by the implementation of the Odonata Action Plan. On the basis of available knowledge and the recently drawn up Red List of Odonates in Haute-Normandie, a list of 17 species of odonates threatened in Haute-Normandie was validated by the CSRPN to be included in the regional version of the action plan. This document also presents the updated lists of ZNIEFF determining species

and regional rarity indices." (DeepL)] Address: Conservatoire des Sites Naturels de Haute-Normandie, Rue Pierre de Coubertin, B.P. 424, 76 805 Saint-Etienne-du-Rouvray, France. <http://www.cren-haute-normandie.com>

**18239.** Tanczuk, A. (2010): Interesting observations of dragonflies from Odra II quarry in Opole (Poland, Opole Region). Odonatrix 16\_17 (2020): 6 pp. (Polish, with English summary) ["The observations were conducted in the area of Odra II Quarry in Opole in 2018-2019. In total, 18 dragonfly species were recorded. Among them, 4 southern species *Orthetrum brunneum*, *O. coerulescens*, *Sympetrum fonscolombii* and *Crocothemis erythraea* were observed. Further, some phenological data concerning the occurrence of early appearance of imagines in April and May and late observations of some species in late September and October were presented." (Authors)] Address: Tanczuk, Agnieszka, ul. Prżłocniczki 2/40, 20-838 Lublin, Poland. E-mail: atanczuk@gmail.com

**18240.** Walia, G.K.; Kaur, H.; Kaur, J. (2010): Cytogenetical studies on five species of the family Libellulidae (Anisoptera: Odonata). Hislopia 3(2): 111-119. (in English) ["Cytogenetical analyses have been carried on five species of the family Libellulidae viz., *Brachythemis contaminata*, *Crocothemis servilia*, *Orthetrum pruinosum neglectum*, *O. sabina* and *Trithemis aurora*. Different cytological parameters like conventional staining, C-banding and silver- nitrate staining have been performed. All the species possess  $2n=25m$  as the diploid chromosome number, which is the type number of the family. Distribution and localization of heterochromatin have been compared in all the species on basis of banding studies. Silver nitrate staining has been done for the first time on the four species of the family Libellulidae." (Authors)] Address: Walia, G.K., Dept of Zoology, Punjabi University, Patiala - 147002, India

## 2012

**18241.** Abd, I.F.; Al-Asady, H.S. (2012): External morphological study of *Diplacodes trivialis* Rambur (Odonata: Libellulidae): New record to Iraq. Ibn Al-Haitham Journal for Pure and Applied Science: 70-82. (in Arabian, with English summary) [A specimen from Maisan Governorate caught in 2010 is studied and figured.] Address: I. F. Abd, I.F., Dept of Biology, College of Education (Ibn AL-Haitham) University of Baghdad, Iraq

**18242.** Afrane, Y.A.; Lawson, B.W.; Brenya, R.; Kruppa, T.; Yan, G. (2012): The ecology of mosquitoes in an irrigated vegetable farm in Kumasi, Ghana: abundance, productivity and survivorship. Parasites & Vectors 2012, 5:233: 7 pp. (in English) ["Background: Irrigated vegetable farms within the city of Kumasi, Ghana, create hotspots for the breeding of malaria vectors, which could lead to high transmission of malaria. This study investigated the abundance and productivity of mosquitoes in an irrigated vegetable farm in Kumasi, Ghana. Methods: Adult mosquito productivity was estimated five days in a week in different irrigated scheme types

(dug-out wells, furrows and footprints) for 12 weeks using emergence traps. Larval sampling was done five days a week to estimate the abundance of larvae from the different irrigated schemes types. Results: Mosquito breeding in the irrigated vegetable field was confined to dug-out wells, furrows and human footprints. Mosquito productivity ( $m^2$ /week) was highest in the dugout wells followed by the human footprints and the least was in the furrows (11.23, 5.07 and 4.34 *An. gambiae*/ $m^2$ /week). Larval abundance for the late instars (3rd, 4th and pupae) also followed the same trend, with the dug-out wells having the highest larval abundance followed by the human footprints and then the furrows (13.24, 6.81, 5.87 larvae/week). Mosquito productivity and abundance was negatively correlated with rainfall ( $R^2=0.209$ ;  $P < 0.01$ ). Conclusion: This study showed that adult and larval mosquito abundance and larval survival were high in the irrigated fields in the irrigated vegetable farm. This therefore, contributed significantly to adult mosquito populations and hence malaria transmission in the city." (Authors) The paper includes a passing reference to Odonata.] Address: Yaw AAfrane, Y.A., School Health Sci., Bondo Univ. College, Bondo, Kenya. E-mail: yaw\_afrane@yahoo.com

**18243.** Baeta, R.; Sansault, E.; Pincebourde, S. (2012): Déclinaison régionale du Plan National d'Actions en faveur des Odonates en région Centre 2013-2017. Association Naturaliste d'Étude et de Protection des Écosystèmes « Caudalis » / Institut de Recherche sur la Biologie de l'Insecte / Direction Régionale de l'Environnement, de l'Aménagement et du Logement Centre: 112 pp. (in French, with English summary) ["Conservation of Odonata species contributes to the maintenance of biodiversity and to the functioning of natural ecosystems. They are particularly sensitive to environmental changes as they are potentially exposed to threats in both aquatic and terrestrial medium. A national plan for the conservation of Odonata species was launched in 2010 in France, with the aim to assess the population level of 18 species that were declared under threat. This national plan is downscaled here at the level of the region Centre. This regional plan reviews our knowledge on population level of several Odonata species, and suggests action plans for the period 2013-2017 in terms of increasing knowledge, conservation management and communication at several levels. This approach aims at stabilizing these threaten species in the region Centre by networking all actors in the conservation of Odonata species. The review shows that the sampling effort has increased substantially since 2000s, although it remains heterogeneous over the region Centre territory. The region Centre hosts 8 species targeted by the national plan (priority 1). In addition, the regional plan targets 13 species of priority level 2 and 9 of priority level 3. The regional plan proposes 9 actions to increase our knowledge. As specified in the national plan, the species *Leucorrhinia caudalis* is among the main targets of this plan. The Loire Valley is also of concern as 2 species of priority level 1, *Gomphus flavipes* and *Ophiogomphus cecilia*, are associated to this particular freshwater system. Finally, 5 actions for conservation management / administration, and 3 actions for communication and training are proposed with the aim to protect

these Odonata species and their habitats." (Authors)] Address: Sansault, E., Association Naturaliste d'Étude et de Protection des Écosystèmes (ANEPE) « Caudalis », 118 rue de l'Ermitage, F-37100 Tours, France. E-mail: anepe.caudalis@gmail.com

**18244.** Bhat, S.U.; Dar, G.A.; Sofi, A.H.; Dar, N.A.; Pandit, A.K. (2012): Macroinvertebrate community associations on three different macrophytic species in Manasbal Lake. Research Journal of environmental Sciences 6(2): 62-76. (in English) ["Three macrophytic species namely *Ceratophyllum demersum*, *Hydrilla verticillata* and *Potamogeton lucens* were investigated for the macroinvertebrate association [including "Odonata"] in Manasbal Lake. A total of 15 macroinvertebrate taxa were reported from these macrophytic species belonging to three phyla including Annelida, Mollusca and Arthropoda. Arthropoda was the dominant phyla comprising of class Insecta, Crustacea and Arachnida. Annelida was the second dominant phyla represented by two classes Hirudinea and Oligochaeta. Mollusca were only represented by families, Lymnaeidae and Planorbidae. All the three phyla showed dominance pattern with respect to macrophytic species in the order of *Ceratophyllum demersum* followed by *H. verticillata* and then *P. lucens*. The results of study also showed that, the *C. demersum* comparatively harboured large density of macroinvertebrates than the other two macrophytic species, despite the fact that the total number of macroinvertebrate taxa remained the same on all the three macrophytic species thereby reflecting homogeneity of habitats. Among the insects, Chironomidae was dominant taxa on *C. demersum* followed by *H. verticillata* and then *P. lucens*." (Authors)] Address: Ullah Bhat, S., P.G. Dept of Environmental Science, Centre of Research for Development, University of Kashmir, Srinagar

**18245.** Billqvist, M.; Elleström, O. (2012): Världrekord i tundratrollslanda? fauna&flora 107(3): 40-44. (in Swedish) [World record in *Somatochlora sahlbergi*? In the summer of 2012, it was probably more individuals of *Somatochlora sahlbergi* on wings in Tavvavuoma than it had ever been reported anywhere in the world. After several years of negative reports, unlucky with the weather and poorly documented, and few individuals that appeared species completely explode on the very mosquito-rich late July / August.] Address: Billqvist, M.: E-mail: magnus.billqvist@gmail.com

**18246.** Brandon, A. (2012): Odonata news and events from across the vice counties of Anglesey, Merionethshire, Caernarvonshire, Denbighshire and Flintshire. Y Fursen - North Wales Dragonfly Newsletter No 68: 6 pp. (in English) [Records of *Cordulegaster boltonii*, *Lestes sponsa*, *Aeshna mixta*, *Sympetrum danae*, *Calopteryx virgo*, *Ischnura elegans* are documented.] Address: Brandon, A., North Wales Dragonfly Recorder, Bryn Heilyn, Rowen, Conwy LL32 8YT. UK. E-mail: allanrowenconwy@antispam.sky.com

**18247.** Campos, F.; Velasco, T.; Santos, E.; Sanz, G. (2012): Nueva cita de *Macromia splendens* (Pictet, 1843) (Odonata, Corduliidae) en el oeste de España. Boletín de



la Asociación Española de Entomología 36(1-2): 233-235. (in Spanish, with English title) [22-IX-2011, Robleda (UTM 29T 7064474), 755 m a.s.l.] Address: Campos, F., Univ. Europea Miguel de Cervantes, Calle Padre Julio Chevalier 2, 47012 Valladolid, Spain. E-mail: fcampos@uemc.es

**18248.** Carrère, V.; Blanchon, Y. (2012): Découverte de *Gomphus flavipes* (Charpentier, 1825) en Languedoc-Roussillon (Odonata, Anisoptera: Gomphidae). *Martinia* 28(1): 55- (in French) [Verbatim: "On 20 July 2010, an imago of *G. flavipes* was observed on the Gard bank of the Rhône, in the commune of Codolet (Y. Blanchon, pers. obs.). This is the first record of this species in the Languedoc-Roussillon region. This observation is to be put in relation with the rediscovery of this gomphid in the Rhône-Alpes region in the Rhône valley (GRAND et al., 2011. *Gomphus flavipes* (Charpentier, 1825) rediscovered in the Rhône river basin (Anisoptera: Gomphidae). *Martinia*, 27 (1): 9-26), then in Provence-Alpes-Côte d'Azur (BLANCHON et al., 2011. Rediscovery of *Gomphus flavipes* (Charpentier, 1825) in Provence-Alpes-Côte d'Azur (Odonata, Anisoptera: Gomphidae). *Martinia*, 27 (2): 121-122). Almost a year later, on 19 May 2011, and about 150 km from the nearest known breeding areas (on the Rhône at Arles), an exuvia of *G. flavipes* was found on the Aude, in the commune of Cuxac-d'Aude. On 10 June 2011, a second exuvia was found in the same sector (L. Spanneut, pers. comm.), then a third on 20 June 2011. This series of observations constitutes the first evidence of reproduction of this gomphid in Languedoc-Roussillon. On each occasion, a single exuvia of *G. flavipes* was recorded, while no imago was observed. The species was found in the company of exuviae of *Gomphus simillimus* Selys, 1840, *G. pulchellus* Selys, 1840, *G. vulgatissimus* (Linnaeus, 1758), *Onychogomphus forcipatus unguiculatus* (Vander Linden, 1823) and *Oxygastra curtisii* (Dale, 1834). The dominant species was *G. simillimus* on 19 May and *G. vulgatissimus* on 20 June. On 10 June, *G. flavipes* was the only exuvia recorded. In this sector, the Aude has a minor bed about 30 metres wide. Its banks are sandy and occupied by riparian vegetation. Numerous roots are visible on the banks above and in the water; branches of dead wood also emerge from the river. One exuvia was found on roots at the level of the banks, another on the trunk of a shrub, a few tens of centimetres above the water. It should be noted that at the beginning of 2011, the Aude was subjected to a major flood, which was likely to modify the habitats and populations of dragonflies present. As a result, exuviae were rare and localised on the river banks during the 2011 surveys. These findings suggest that the species could very probably reproduce in other localities in Languedoc-Roussillon, in particular on the banks of the Rhône in Gard." Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Carrère, V., 19 avenue Georges Clemenceau, F-13360 Roquevaire, France. E-mail: carrerevincent@free.fr

**18249.** Cheetham, S.; Loznik, B.; Stephenson, T.; Mahmoud, N.; Fanning, E. (2012): Frontier- Costa Rica Forest Phase 122. Frontier- Costa Rica Forest Phase 122 Science Report Phase Dates: 2nd April – 11th June 2012: 41

pp. (in English) ["3.4.3 Preliminary results: We captured a total of 314 individuals (3436 when *U. imbuta* and *U. fastigiata* are included) representing 53 species, belonging to 29 genera and 9 families (7 Anisoptera, 2 Zygoptera, see Appendix 1). Two species could not be identified to genus level and are classified as Unknown species A and B. A total of 39 species were recorded during the surveys and an additional 14 were found on other occasions. Two families stand out for having both the most genera and species: Libellulidae and Coenagrionidae. The two families combined comprise ~ 73% of the species found in the area. 8.0 Appendix 1. Preliminary species checklist of Odonata on the land of Osa Conservation (current as of June 2012)" (Authors)] Address: not stated

**18250.** Chen, K.; Xiao, N.; Wang, B.; Li, J. (2012): The effects of petroleum exploitation on water quality bio-assessment and benthic macro-invertebrate communities in the Yellow River Delta wetland, Dongying. *Acta Ecologica Sinica* 32(6): 1970-1978. (in Chinese, with English summary) ["The major environmental risks associated with petroleum extraction (e. g. oil spills and leaks) are well known. There is a lot of information on the impacts of petroleum exploration on benthic communities in foreign studies. In this study, we probed the effects of petroleum exploration on macro-invertebrate assemblages, which are important components of benthic communities in this wetland ecosystem. The object of the investigation was to provide scientific data to guide the management, ecological restoration, conservation of biodiversity, and sustainable development of aquatic ecosystems. Physicochemical variables were measured at 34 sites in the Yellow River Delta wetland, Dongying, China, in October 2009, and benthic macro-invertebrate assemblages were collected using a D-frame net and a Peterson grab. The water body in the study area was oligohaline, its salinity ranging between 0.05 and 5 ppt. A total of 84 macro-invertebrate taxa, belonging to 70 genera, 41 families, 12 orders, 6 classes, and 3 phyla, were collected. Insecta comprised 52.4% of all benthic invertebrate taxa, of which Odonata and Diptera accounted for 23% and 24%, respectively. The structure and diversity of macro-invertebrate assemblages were expressed using the Shannon-Wiener index, the Margalef index and the dominance index. Water quality was assessed by the Shannon-Wiener index and the biotic index. The dominant species at most of the sites were either *Chironomus* spp. or *Glyptotendipes* spp. with overall dominance indices of 0.0315 and 0.0522, respectively. Pearson correlation analysis showed that the Shannon-Wiener index was negatively correlated with total nitrogen (TN) ( $r = -0.446$ ,  $P = 0.02$ ) but was not correlated with any of the other physicochemical variables measured. The biotic index was not correlated with any of the physicochemical variables. The numbers of molluscan taxa were negatively correlated with salinity ( $r = -0.422$ ,  $P = 0.028$ ) and positively correlated with pH ( $r = 0.435$ ,  $P = 0.023$ ). Likewise, the percentages of individual Mollusca at the sites were negatively correlated with salinity ( $r = -0.395$ ,  $P = 0.041$ ) and positively correlated with pH ( $r = 0.565$ ,  $P = 0.002$ ). The numbers of oligochaete taxa were significantly positively correlated with TN ( $r =$

0.524,  $P = 0.005$ ). The petroleum content of the water was not correlated with any of the biological indices and was not considered to be a major stressor. Canonical correspondence ordination analysis (CCA) showed that TN, pH, and salinity were the major contributors to the macro-invertebrate community structure, with 12.18% of species variation explained by these three variables. The substrate and hydrophytes also had effects on the structure of the macro-invertebrate communities. Cluster analysis and MDS ordination of sampling sites showed that all sites could be divided into 11 separate groups at the similarity level of 30%. Oligochaeta and Mollusca were the two main taxa responsive to environmental variables. The bio-assessment indicated that the Shannon-Wiener diversity index was a better indicator of water quality than the biotic index. Bio-assessment using the Shannon-Wiener index showed that the water quality of the Yihong River tributary, the Guangli River upstream, the Tiao River upstream, and the Dongzhang reservoir were clean, that nine sites were slightly polluted, and that the remaining sites were moderately to heavily polluted. We proposed that a comprehensive evaluation of water quality should ideally combine the Shannon-Wiener index, the biotic index, and physicochemical measurements. Additionally, other evaluation methods could be developed based on the biological indices for this region, taking into account the special characteristics of this native ecological environment." (Authors)] Address: Cheng, K., Lab. of Aquatic Insects and Stream Ecology Department of Entomology Nanjing Agricultural University Nanjing 210095 China

**18251.** Delpon, G. (2012): Contribution à l'inventaire des Odonates du Tarn Maitre de stage caeruleus, l'agrion bleuissant, coeur copulateur. Rapport de Stage, Août 2012. OPIE-MP: 43 pp. (in French) ["The Tarn is home to a large number of Odonata species, due to the variety of climates and environments found there. Despite this richness, the department has long remained little surveyed and has hardly been taken into account in defining the French distribution of many species. Furthermore, despite the adoption in 2011 of a National Action Plan for Odonates, no such plan has been put in place by the Midi-Pyrénées region, even though several of the species present there are highly threatened. Based on these observations, a dynamic collection of naturalist data has emerged over the last few years in the department. The OPIE-MP is thus involved in a project to inventory the Odonata of the Tarn, alongside the "albistylum" group of the LPO Tarn. This report presents the results of the surveys carried out during June and July 2012 with the aim of making a significant contribution to this project. Particular interest was taken in five species targeted by the PNA Odonates, for which the Midi-Pyrénées region has a significant conservation responsibility, in order to update their distribution: *Macromia splendens*, *Oxygastra curtisii*, *Gomphus graslinii*, *Coenagrion mercuriale* and *C. caeruleus*." (DeepL)] Address: Delpon, Gaël, 17 route de Foix 09400 Amplaigne, France. E-mail: gael.delpon@yahoo.fr

**18252.** Devai, G.; Miskolczi, M.; Devai, E. (2012): Adatok a Bükk-vidék szitakötő-faunájához (Odonata) az imágók

felmérése alapján [Data on the dragonfly (Odonata) fauna of the geographical region Bükk-vidék (N-Hungary) based on a survey of adults]. *Studia odonotol. hung.* 14: 49-64. (in Hungarian, with English summary) ["The authors present faunistical data based on collections of adults in odonotological studies carried out in the mountain area of the geographical region Bükk-vidék (N-Hungary). .... Collections were made between 1989 and 1992, with the participation of 3 specialists on 36 days and 58 localities altogether, in 14 cells (DT 69, DU 51–53, DU 60–63, DU 70–73, DU 81–82) of the 10×10 km UTM grid map. In the report information on 1723 adults (1202 males and 521 females) are given in detail, representing 773 faunistical data. In this study 42 species (19 Zygoptera and 23 Anisoptera) were found to occur in the area, out of which 1 belongs to the very frequent, 18 to the frequent, 14 to the less frequent, 3 to the rare and 6 to the sporadic class of country-wide occurrence frequency." (Authors)] Address: Devai, G., Dept of Ecology, Kossuth L. Univ., 4010 Debrecen, P.O. Box 71, Hungary

**18253.** Devai, G.; Miskolczi, M.; Jakab, T. (2012): Adatok a Nagy-morotva (Rakamaz és Tiszanagyfalu) szitakötő-faunájához (Odonata) [Data on the dragonfly (Odonata) fauna of the backwater Nagy-morotva (Rakamaz and Tiszanagyfalu, NE-Hungary)]. *Studia odonotol. hung.* 14: 37-48. (in Hungarian, with English summary) ["The authors present faunistical data on dragonflies collected (larvae, exuviae and adults) and observed (adults) from the backwater Nagy-morotva in the geographical microregion Borsodi-Tisza-hullámtér (an active floodplain area of River Tisza in NE-Hungary), over the administrative area of the settlements Rakamaz and Tiszanagyfalu. ... Collections were made in 2009, with the participation of 4 specialists on 5 days and 8 localities, in 1 cell (EU 32) of the 10×10 km UTM grid map. In the report information on 392 specimens (215 males, 166 females, 11 specimens with undecided sex) are given in detail [138 larvae (64 males, 64 females, 10 with undecided sex), 140 exuviae (66 males, 73 females, 1 with undecided sex), 114 adults (85 males, 29 females)], with the observed adults representing altogether 176 faunistical data (70 larvae, 43 exuviae, 63 collected and 59 observed adults). In this study 23 species (9 Zygoptera and 14 Anisoptera) were recorded in the area, out of which 1 belongs to the very frequent, 9 to the frequent, 9 to the less frequent, 1 to the rare and 3 to the sporadic class of country-wide occurrence frequency." (Authors)] Address: Devai, G., Dept of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

**18254.** Devai, G. (2012): A Magyar Természettudományi Múzeum munkatársai által a Bükki Nemzeti Park kutatási programja keretében gyűjtött szitakötők (Odonata) faunisztikai adatai [Data on the dragonfly (Odonata) fauna collected in course of the Bükk National Park research programme by the specialists of the Hungarian Natural History Museum]. *Studia odonotol. hung.* 14: 65-71. (in Hungarian, with English summary) ["The author presents faunistical data from 13 localities in the Bükk National Park and its surroundings in 7 cells (DU 52, 53, 60, 61, 62, 63, 70) of the 10×10 km UTM grid map. The total investigated area belongs to the

geographical mesoregion Bükk-vidék of the mountain area Északi-középhegység (NE-Hungary). Collections were made between 1957–1982, with the participation of 5 specialists and one unidentified person on 5 years and 12 days. In the report information on 71 adults (40 males and 31 females) is given in detail, representing 22 faunistical data. In this study 16 species (8 Zygoptera and 8 Anisoptera) were found to occur in the area, out of which 1 belongs to the very frequent, 12 to the frequent, 2 to the less frequent and 1 to the rare class of country-wide occurrence frequency." (Author)] Address: Devai, G., Department of Ecology, Kossuth L. University, H-4010 Debrecen, P.O. Box 71, Hungary

**18255.** Dobias, J. (2012): Factors affecting dragonfly species composition in newly created pools and assessment of invertebrate predation on pools zooplankton. Diplomová práce, Katedra ekologie, Přírodovědecká fakulta, Univerzita Karlova v Praze: 97 pp. (in Czech, with English summary) ["To identify and quantify the influence of physico-chemical, biotic and geographic factors on the population of Odonata is an essential tool for research of their ecology. The aim of this study was to 1) assess how these factors influence species richness, diversity and spatial distribution of dragonflies in 42 newly constructed or renewed pools located in the Kokořínsko Protected Landscape Area, which is characterized by two valleys of Libichovka and Pšovka creeks, low human impact, and a great diversity of small water bodies and 2) use laboratory experiments in order to estimate the relationship between large predatory invertebrates of these pools (*Aeshna cyanea*, *Coenagrion puella*, *Chaoborus crystallinus* and *Notonecta glauca*) and their common prey (*Daphnia curvirostris*) in an artificial environment with or without aquatic macrophytes. The pools were monitored and sampled between years 2005 and 2006. In total, 23 dragonflies species were found inhabiting these lentic habitats, comprising 11 species belonging to the suborder Zygoptera and 12 species belonging to the suborder Anisoptera, including a rare species *Sympetrum depressiusculum* (larvae). Most variability in the dragonfly species richness was explained by the size of the water surface area, followed by the location of the pools (inside or outside the floodplain) and after all, by the number of available pools in the neighbourhood. Much of the residual variability was explained by the species composition of zooplankton, which is a common food source for dragonfly larvae. Based upon the geographical location of pools, I have found out that the species richness of dragonflies is positively autocorrelated only over short distances (up to 1 km distance from other pools), this autocorrelation is very similar between the two suborders (Zygoptera and Anisoptera). The species composition of dragonflies in the pools was monitored for two years. No high differences occurred over the two years, however, the studied pools differed from each other. The variability in dragonfly species composition was largely explained by the size of the water surface area, followed by the age of the pools, the history of the habitat and lastly, by the connection to a spring or a ditch. Whilst most variance in the species composition variability of the Zygoptera suborder was explained by the size of the water surface area, in the Anisoptera suborder most

variation in diversity was explained by the position of the pool (in a floodplain or a ravine), followed by the number of available pools in the neighbourhood. Dependence of the diversity on the distance to neighbouring pools has not been significant, except for the long-distant pools on the peripheral areas of the region. Laboratory experiments were conducted to assess predation pressure of either individual predator species or their combinations, under presence/absence of submersed macrovegetation. In combined treatments, an interference between predators has been detected in one out of three experiments. The effect of aquatic macrophytes on prey consumption has been significant, however, its influence differed remarkably between assessed species: presence of vegetation had a negative effect to *Coenagrion puella* and a positive one on *Aeshna cyanea*." (Author)] Address: not stated

**18256.** Drinan, T.J. (2012): The impact of conifer plantation forestry on the ecology of peatland lakes. PhD Thesis, School of Biological, Earth and Environmental Sciences, College of Science, Engineering and Food Science, University College Cork: VIII + 286 pp. (in English) ["Blanket bog lakes are a characteristic feature of blanket bog habitats and harbour many rare and threatened invertebrate species. Despite their potential conservation value, however, very little is known about their physico-chemical or biological characteristics in western Europe, and their reference conditions are still unknown in Ireland. Furthermore, they are under considerable threat in Ireland from a number of sources, particularly afforestation of their catchments by exotic conifers. Plantation forestry can potentially lead to the increased input of substances including hydrogen ions (H<sup>+</sup>), plants nutrients, dissolved organic carbon (DOC), heavy metals and sediment. The aims of this study were to investigate the effect of conifer plantation forestry on the hydrochemistry and ecology of blanket bog lakes in western Ireland. Lake hydrochemistry, littoral Chydoridae (Cladocera) and littoral macroinvertebrate communities were compared among replicate lakes selected from three distinct catchment land use categories: i) unplanted blanket bog only present in the catchment, ii) mature (closed-canopy) conifer plantation forests only present in the catchment and iii) catchments containing mature conifer plantation forests with recently clearfelled areas. All three catchment land uses were replicated across two geologies: sandstone and granite. Lakes with afforested catchments across both geologies had elevated concentrations of phosphorus (P), nitrogen (N), total dissolved organic carbon (TDOC), aluminium (Al) and iron (Fe), with the highest concentrations of each parameter recorded from lakes with catchment clearfelling. Dissolved oxygen concentrations were also significantly reduced in the afforested lakes, particularly the clearfell lakes. This change in lake hydrochemistry was associated with profound changes in lake invertebrate communities. Within the chydorid communities, the dominance of *Alonopsis elongata* in the unplanted blanket bog lakes shifted to dominance by the smaller bodied *Chydorus sphaericus*, along with *Alonella nana*, *Alonella excisa* and *Alonella exigua*, in the plantation forestry-affected lakes, consistent with a shift in lake

trophy. Similarly, there was marked changes in the macroinvertebrate communities, especially for the Coleoptera and Heteroptera assemblages which revealed increased taxon richness and abundance in the nutrient-enriched lakes. In terms of conservation status, despite having the greatest species-quality scores (SQS) and species richness, three of the four International Union for the Conservation of Nature (IUCN) red-listed species of Coleoptera and Odonata recorded during the study were absent from lakes subject to catchment clearfelling. The relative strengths of bottom-up (forestry-mediated nutrient enrichment) and top-down (fish) forces in structuring littoral macroinvertebrate communities was investigated in a separate study. Nutrient enrichment was shown to be the dominant force acting on communities, with fish having a lesser influence. These results confirmed that plantation forestry poses the single greatest threat to the conservation status of blanket bog lakes in western Ireland. The findings of this study have major implications for the management of afforested peatlands. Further research is required on blanket bog lakes to prevent any further plantation forestry-mediated habitat deterioration of this rare and protected habitat." (Author)] Address: Drinan, T.J., School of Biological, Earth & Environmental Sciences, University College Cork, Distillery Fields, North Mall, Cork, Ireland. E-mail: tomdrinan@gmail.com

**18257.** Emmanuel, J.; Joshua, G.; Shams, S.B. (2012): Comparative study of ecological conditions of four wetlands of Punjab using macroinvertebrates as bioindicators. *The Journal of Animal & Plant Sciences* 22(4): 908-914. (in English) ["A baseline study was conducted from November 2006 to October 2007 to investigate the status of aquatic macroinvertebrates [including Odonata, not further detailed] as bioindicators and their ecological linkages to physico-chemical characteristics of four wetland areas of Punjab namely, Balloki Headworks, Qadirabad Headworks, Rasul Headworks and Kalar Kahar Lake, India. The sampling points were marked on a map using GPS... The hydrological parameters such as temperature, pH, LDO, salinity and TDS were recorded to get knowledge of the effect of season on the pond ecosystem. Macroinvertebrate sampling from the pelagic water was done using a dip net of mesh size approximately 0.6 mm, dragged in the water for 15 minutes. These were then preserved and identified up to the order level. The results revealed that Balloki area being under the effect of dry season and agricultural stress had more tolerant species. The presence of pollution sensitive Ephemeroptera was justified by low TDS and high LDO at Rasul Headworks. The hydrology and fauna of Kalar Kahar Lake was exclusively different from the other sites. In this case pH, TDS, salinity were highest whereas LDO was the lowest. The relative abundance of sensitive to tolerant species was in accordance with the hydrological data." (Authors)] Address: Emmanuel, J., Kinnaird College for Women, Lahore, India. E-mail: burningchokes@gmail.com

**18258.** Förschler, M.; Bense, U.; Berthold, P.; Dietz, C.; Doczkal, D.; Dorka, U.; Ebel, C.; Hessner, W.; Höfer, H.; Hölzer, A.; Köppel, C.; Kolb, A.; Laufer, H.; Lieser, M.; Marx,

J.; Meineke, J.-U.; Münch, W.; Murmann-Kristen, L.; Rennwald, E.; Römpf, I.; Roth, K.; Schanowski, A.; Schelkle, E.; Schiel, F.-J.; Schlund, W.; Schroth, K.-E.; Späth, V.; Stader, P.; Steiner, A.; Stübner, S.; Turni, H.; Waldenspuhl, T.; Wolf, T.; Ziegler, J.; Zimmermann, P. (2012): Ökologisches Potenzial eines möglichen Nationalparks im Nordschwarzwald. Chancen in Prozessschutz-, Entwicklungs- und Managementzonen aus naturschutzfachlicher Sicht. *Naturschutz und Landschaftsplanung* 44(9): 273-281. (in German, with English summary) ["Ecological Potential of a National Park in the Northern Black Forest – Opportunities in zones for process protection, development and management from a nature conservation point of view The discussion about a possible national park on the Northern Black Forest is currently in full swing. The National Park initiative aims to make available an area of at least 10,000 ha in the medium to long term for the cycle of natural processes in the forest. In an initial phase of 30 years it will be possible to instigate certain forest developments in partial areas, e.g. the promotion of firs, beeches or pines in favour of the upcoming generation. The central question from a nature conservation perspective is which are the positive effects of such a large protection area for the preservation of rare species and the re-establishment of the local species diversity. Summing up, it is expected that the protection of the natural processes in an area of this size will promote many typical species and ecological interactions. These processes and developments should be accompanied by a specialist monitoring (including research) of nature conservation, regional experts of species protection and scientists." (Authors) References to *Cordulegaster bidentata* and *Aeshna subarctica* are made.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenenweg 9, 77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**18259.** Gallo, S. (2012): Trophic transfer of contaminants in tree swallows (*Tachycineta bicolor*) nesting near Lake Calumet, Illinois. M.Sc thesis, University of Illinois at Urbana-Champaign: 125 pp. (in English) [Tree swallow nestlings, eggs, and diet and sediment grab samples were used to quantify risks of exposure to 15 trace elements, 31 polychlorinated biphenyl (PCB) congeners, 15 polybrominated diphenyl ether (PBDE) congeners and 13 organochlorine pesticides in the Calumet area of northeastern Illinois, USA. Nesting success and clutch size were measured in tree swallows to determine whether local contaminants reduced tree swallow fitness. Overall nesting success was not reduced when compared among sites and to range averages; 71-90% of clutches started had at least one nestling fledge. Likewise there were no differences among sites in the proportion of eggs that hatched and nestlings that fledged. Generally, contaminant concentrations in the media were considered low or not elevated, although sediment concentrations of cadmium, chromium, and nickel at some sites were higher than the "probable effects concentration" or the "probable effects level" for sediment dwelling organisms, and lead, manganese, and zinc were above the "severe effects levels" at some sites. Calumet nestlings in 2005 were fed between 51 and 64% aquatic insects by mass. Terrestrial insects



in the nestling tree swallow diet contained significantly greater concentrations of lead than aquatic insects consumed by the nestling tree swallows. Mean mercury concentrations in nestlings ranged from 0.10 to 0.18 mg/kg dry weight (dw) and egg concentrations ranged from 0.11 to 0.23 mg/kg dw and approximately 5% of the total mercury mass in nestlings came from the eggs. Egg mercury concentrations, which are acquired directly from the mother, were positively correlated with the timing of nesting, and negatively correlated with brood size. Nestlings at Indian Ridge in 2004 and Powderhorn in 2005 accumulated the greatest mass of mercury. Mean sum PCB concentrations in tree swallow eggs ranged from 463 to 830 ng/g wet weight (ww) and from 105 to 208 ng/g ww in nestlings. Egg concentrations contributed approximately 48% of the total PCB mass in nestlings. Nestlings at Big Marsh in both years, and Indian Ridge in 2004 accumulated the greatest mass of PCBs. Nestlings from both Big Marsh and Indian Ridge in 2005 accumulated the most PBDEs, with approximately 21% of the total mass in nestlings coming from the eggs. Mean sum PBDE concentrations in eggs ranged from 47 to 78 ng/g ww and from 20 to 62 ng/g ww in nestlings, and these results appear to be among the first reported PBDE concentrations in tree swallows. Powderhorn had no record of sediment contamination that was found, however low levels of contaminants were in the sediment and biota there. Tree swallow nestlings accumulated a variety of contaminants from the Calumet sites through their diet, though eggs contributed significant amounts for some compounds like PCBs. Understanding contaminant presence and uptake in wetlands of the Calumet area is particularly useful due to the loss of wetland habitat in this region.] Address: not stated

**18260.** Gamboa, M.; Kimbirauskas, R.K.; Merritt, R.W.; Monaghan, M.T. (2012): A molecular approach to identifying the natural prey of the African creeping water bug *Naucoris*, a potential reservoir of *Mycobacterium ulcerans*. *Journal of Insect Science* 12:2: 10 pp. (in English) ["The extra-oral digestion of creeping water bugs (*Naucoridae*: Hemiptera) hinders the study of their diet using the standard method of identifying prey body parts in the gut. Genetic methods are available, but rely on PCR tests or similar diagnostics to confirm suspected prey. Where the potential prey is unknown and a broad search for all possible prey is desirable, methods that can potentially capture any prey item are required. *Naucoris* sp. is known to harbor *Mycobacterium ulcerans* (*Actinomycetales*: *Mycobacteriaceae*), the causative bacterium of Buruli ulcer. Outbreaks of Buruli ulcer have been associated with disturbed freshwater habitats, but the mode of transmission to humans remains unclear. Here we examine the diet of *Naucoris* sp., a dominant aquatic predator in water bodies in Ghana where the prevalence of Buruli ulcer is high. We cloned and sequenced 576 PCR products (mtDNA *rrnL*, *cox1*) isolated from the gut of 60 *Naucoris* sp. individuals to determine diet composition as broadly as possible. Using phylogenetic analysis of newly sequenced clones and 6 potential prey taxa collected from the site, sequences isolated from *Naucoris* sp. guts matched locally collected *Coleoptera* (*Hydrophilidae*). Blastn queries to

GenBank of other clone sequences produced matches to (*Anura*) (*n* = 1), *Rotifera* (*n* = 5), and *fungi* (*n* = 4) as additional components of the diet. Our results suggest that sp. in this Buruli ulcer-endemic area feeds on a wide range of prey and body sizes, and that the approach could be successfully applied to studies of aquatic food webs where morphological identification of prey is impossible and where little or no a priori knowledge is available. ... Genomic DNA was extracted from ... *Odonata* (*Zygoptera*) (*n* = 8) ..." (Authors)] Address: Gamboa, Maribet, Leibniz - Institute of Freshwater Ecology and Inland Fisheries (IGB), Müggelseedamm 301, 12587 Berlin, Germany. E-mail: gamboa@igb-berlin.de

**18261.** Gandhi, N. (2012): Study of terrestrial birds with special reference to insects as their food base around three reservoirs in Central Gujarat. PhD. thesis, Department of Zoology, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara -390002 India: 370 pp. (in English) [*Odonata*: pp 129-175] Address: not stated

**18262.** Geguzis, R. (2012): Benthic macroinvertebrate communities in natural and channelized sites of the merkys river basin streams. *Žemes Ukio Mokslai* 19(4): 273-287. (in Lithuanian, with English summary) ["The present study contains the results of an investigation of the abundance and taxonomic composition of benthic macrofauna, collected in natural and straightened sites of 3 streams of the basin of the Merkys River. The current The current velocity, velocity, velocity, water discharge, riverbed overgrowth with plants and direct sun pass were highest in the natural sites of the investigated streams and lowest in the straightened sites of the investigated streams. A total of 72 macroinvertebrate taxa belonging to 48 families were identified in the investigated sites of the streams. 18 macroinvertebrate taxa were found only in the natural sites in the forest of the investigated streams and 7 were found in the straightened sites of the investigated rivers. The data obtained showed that the total taxon number and EPT taxon number of macroinvertebrates in the same stream natural sites in the forest were higher than those in the straightened stream sites. Caddisflies *Brachycentrus maculatus* dominated in the natural sites of the streams Spengla and Amarnia, chironomids *Cricotopus algarum* dominated in the straightened sites of all investigated streams. It has shown that the total abundance of macroinvertebrates in the natural sites in the forest of the investigated streams in the forest of the investigated streams as significantly higher in comparison with the straightened sites in the field. The highest total abundance of macroinvertebrates was determined in the natural site in the forest of the stream Spengla ( $4180 \pm 45 \text{ ind.m}^{-2}$ ) and the lowest abundance was found in the straightened site in the field of the stream Gruda ( $640 \pm 17 \text{ ind.m}^{-2}$ ). The data of this investigation showed that the abundance of mayflies (*Ephemeroptera*), caddisflies (*Trichoptera*), EPT was significantly higher in the natural sites in the forest of the investigated streams, while the percentage of pollution-tolerant *Chironomidae* was higher in the straight straightened sites in the field of the streams Spengla and Amarnia." (Author) *Calopteryx splendens*, *Gomphus vulgatissimus*] Address: Ramunas

Gegužis, R., Aleksandro Stulginskio universitetas, Studentų g. 11, LT-53361 Akademija, Kauno r., Lietuva. E-mail: ramunas.geguzis@gmail.com

**18263.** Hassall, C.; Hollinshead, J.; Hull, A (2012): Temporal dynamics of aquatic communities and implications for pond conservation. *Biodiversity and conservation* 21: 829-852. (in English) ["Conservation through the protection of particular habitats is predicated on the assumption that the conservation value of those habitats is stable. We test this assumption for ponds by investigating temporal variation in macroinvertebrate and macrophyte communities over a 10-year period in northwest England. We surveyed 51 ponds in northern England in 1995/6 and again in 2006, identifying all macrophytes (167 species) and all macroinvertebrates (221 species, excluding Diptera) to species. The alpha-diversity, beta-diversity and conservation value of these ponds were compared between surveys. We find that invertebrate species richness increased from an average of 29.5 species to 39.8 species between surveys. Invertebrate gamma-diversity also increased between the two surveys from 181 species to 201 species. However, this increase in diversity was accompanied by a decrease in beta-diversity. Plant alpha-, beta- and gamma-diversity remained approximately constant between the two periods. However, increased proportions of grass species and a complete loss of charophytes suggests that the communities are undergoing succession. Conservation value was not correlated between sampling periods in either plants or invertebrates. This was confirmed by comparing ponds that had been disturbed with those that had no history of disturbance to demonstrate that levels of correlation between surveys were approximately equal in each group of ponds. This study has three important conservation implications: (i) a pond with high diversity or high conservation value may not remain that way and so it is unwise to base pond conservation measures upon protecting currently-speciose habitats; (ii) maximising pond gamma-diversity requires a combination of late and early succession ponds, especially for invertebrates; and (iii) invertebrate and plant communities in ponds may require different management strategies if succession occurs at varying rates in the two groups." (Authors)] Address: Hassall, C., Dept of Biology, Carleton University, Ottawa, ON K1S 5B6, Canada. E-mail: chassall@connect.carleton.ca

**18264.** Horvath, G.; Marton, J. (2012): Adatok a Tiszamente Csongrád és Rószke közötti szakaszának szitakötő-faunájához (Odonata) [Faunistical data on dragonflies (Odonata) from the inundation area of River Tisza between Csongrád and Rószke]. *Studia odonotol. hung.* 14: 27-36. (in Hungarian, with English summary) ["The paper presents faunistical data on dragonflies collected (larvae, exuviae and adults) and observed (adults) in the inundation (active and ancient floodplain) area of River Tisza along both sides between settlements Csongrád and Rószke. The fieldwork was carried out in water bodies and their margins. Collections and observations were made in three years (2009–2011), with the participations of 2 specialists on 24 days and 13 localities altogether, in 7 cells (DS 21, DS 33, DS 34, DS 35, DS

36, DS 37, DS 44) of the 10×10 km UTM grid map. In the report information on 311 larvae (114 males, 129 females and 68 young specimens of unidentifiable sex on the basis of morphological features), 41 exuviae (22 males and 19 females) and 204 adults (162 males and 42 females), altogether 556 specimens (298 males, 190 females and 68 young specimens of unidentifiable sex on the basis of morphological features) is given in detail, representing 109 faunistical data (58 larvae, 15 exuviae and 36 adults). The number of observational data without the number of individuals is 66, thus the total number of data is 175. In this study 20 species (8 Zygoptera and 12 Anisoptera) were found to occur in the area, out of which 10 belong to the frequent, 7 to the less frequent, 2 to the rare and 1 to the sporadic class of country-wide occurrence frequency." (Authors)] Address: Horvath, G., Dept of Ecology, Fac. Natural Sciences & Informatics, Univ. of Szeged, Közép fasor 52., 6726 Szeged, Hungary

**18265.** Jessat, M.; Kipping, J.; Klaus, D.; Kahnt, A. & Baumkötter, G. (2012): Das ENL-Projekt „Pleißeaue Altenburger Land – Maßnahmen zur Entwicklung der Natura 2000-Gebiete im Altenburger Land, Thüringen“ – Eine Projektbeschreibung. *Mauritiana (Altenburg)* 23: 4-53. (in German, with english summary) ["Formerly the Pleiße flood plain in Altenburger Land was species-rich and characterized by humid grassland with shallow depressions and ponds. With the ending 20th century many kinds of animals and plants of this habitat disappeared or are now on the verge of extinction. Intensively farmed and drained land is characterizing the scene/ landscape. In the year 2008 the NABU-Stiftung Nationales Naturerbe and the Mauritium Altenburg started the project for the development of nature and landscape "Pleiße flood plain in Altenburger Land – activities for the development of nature 2000-areas in Altenburger Land, Thuringia". With financial support of the European Union and Thuringia a lot of things happened along the river line in two areas of "Council Directive on the conservation of natural habitats and of wild fauna and flora" many small ponds were created, 2.000 metres of a moat were uncovered, grassland became humid again and extensive farming was starting. Humid grassland, floodplain typical trees and shrubs and floodplain habitats close to nature are able to develop again. The conservation of large meager lowland hay meadows with stocks of *Sanguisorba officinalis* and occurrence of *Maculinea nausithous* and *Maculinea teleius* had been the target of protection as well as optimization of the conditions for *Triturus cristatus* and *Lutra lutra* in eutrophic closed waters. Running waters with underwater vegetation and the only Thuringian Population of *Bufo viridis* in primary habitats were the focus as well. A promising project approach, in which nature protection, landscaping, agriculture and recreation are connected." (Authors) The paper includes a few references to Odonata.] Address: Kipping, J., BioCart Ökologische Gutachten, Albrecht-Dürer-Weg 8, 04425 Taucha, Germany. E-mail: biocartkippping@email.de

**18266.** Kelly, P.T. (2012): Insect emergence from a large river system in the presence and absence of bighead (*Hypophthalmichthys nobilis*) and silver (*H. molitrix*) carp. M.Sc.

thesis, College of Science and Allied Health, Biology – Aquatic Science, University of Wisconsin-La Crosse: IX, 58 pp. (in English) ["Aquatic insect emergence is an important resource for terrestrial insectivores that rely on aquatic insects while raising young, or when terrestrial production is low. Emerging insects also transfer valuable high-energy lipids from phytoplankton to terrestrial consumers. The objectives of this project were to: (1) quantify insect emergence in two large-river systems that differed in primary productivity, and (2) determine the impacts of bighead and silver carp on the emergent insect community. Floating traps (surface area = 0.25 m<sup>2</sup>) were used to sample emerging adult insects, and were placed in study sites with and without Asian carp. Insects were sorted, identified to family, and individually weighed to determine emergent biomass rates. Sites with carp displayed the greatest insect flux; however, insect diversity was greatest at sites without carp, and lowest at the sites with carp. Emergent insect diversity was correlated with the presence of aquatic vegetation. Insect abundance was also linearly related to algal standing stock (measured as chlorophyll a). This suggests that primary productivity in large river systems have a positive impact on the magnitude of insect emergence, and that the diversity of insects increases with aquatic vegetation. Bighead and silver carp may positively impact insect emergence by removing zooplankton competitors, but may decrease insect diversity by a reduction in large-sized phytoplankton food resources." (Author) Taxa - including Odonata - are treated at family level: Coenagrionidae, Corduliidae, Macromiidae] Address: not stated

**18267.** Lambert, J.-L. (2012): Potentialités de présence de *Boyeria irene* (Fonscolombe, 1838) et *Ophigomphus cecilia* (Fourcroy, 1785) en Champagne-Ardenne. *Naturelle* 4: 8-16. (in French) ["Within the framework of the regional version of the National Action Plan for Odonates, we need to improve our knowledge of the priority species in Champagne-Ardenne, including *B. irene* and *O. cecilia*. The still fragmentary knowledge on the distribution and habitat of *B. irene* in the region must be improved. The confirmation or denial of the presence of *O. cecilia* in the Champagne-Ardenne also needs to be clarified (Ternois, 2011). These two taxa appear in particular on the benthic macrofauna listings established according to the samples taken at several IBGN stations (DREAL Champagne-Ardenne studies since 1988). However, experience shows that confusion can easily arise at the generic level when using the dichotomous key used by the determiners responsible for drawing up the taxonomic lists. The 5th annual day devoted to odonates at the Metz Interregional Delegation of the Office National de l'Eau et des Milieux Aquatiques is an opportunity to carry out targeted investigations on two stations where IBGN (Indice Biologique Global Normalisé) surveys are carried out in the river Aube where the genera *Boyeria* McLachlan, 1896 and *Ophigomphus* Selys, 1854 appear in the listings." Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version) (Authors)] Address: Lambert, J.-L., ONEMA, Service Départemental de la Marne, France. E-mail: [jean-luc.lambert18@wanadoo.fr](mailto:jean-luc.lambert18@wanadoo.fr)

**18268.** Liberski, J. (2012): Breath of levante – odonatological impressions from the Strait of Gibraltar. *Odonatrix* 8(2): 43-51. (in Polish, with English summary) ["The paper presents data from southern Andalusia (Spain), from the period between 16.08 to 2.09.2011. It was at 8 sites during ornithological studies. Those were: 1. Bolonia (36°6'3,92" N, 5°43'58,12" W, UTM TE59); 2. Cabrito (36°3'19,05" N, 5°33'12,97" W, TE69); 3. La Peña (Valle de Santuario) (36°3'52,77" N, 5°38'52,35" W, TE69); 4. La Janda (36°13'10,84" N, 5°46'59,01" W, TF41); 5. El Algarrobo (36°5'25,21" N, 5°29'2,28" W, TE79); 6. Palmones (36°10'9,59" N, 5°26'35,91" W, TF80); 7. Los Barrios (36°13'44,69" N, 5°29'6,96" W, TF71), 8. Algeciras (36°6'24,63" N, 5°26'28,45" W, TE89). At site no. 3 there was a small stream, at site no. 4 rice field with irrigating canals, at site no. 6 – the estuary of the River Rio Palmones and its pools, at site no. 7 – strongly polluted small water bodies within the area of rubbish dump. The rest of the bird-watching sites was situated far from the potential breeding sites of dragonflies. 11 dragonfly species were noted: *Calopteryx haemorrhoidalis*, *Ischnura pumilio*, *I. graellsii*, *Anax ephippiger*, *A. parthenope*, *Orthetrum chrysostigma*, *Brachythemis imparita*, *Crocothemis erythraea*, *Sympetrum fonscolombii*, *Trithemis annulata* and *T. kirbyi*. The most distributed was *S. fonscolombii*, observed at every sites, and *O. chrysostigma*. The most numerous were *S. fonscolombii* and *C. erythraea*. The richest in dragonflies were rice fields in La Janda. The observed species are common in southern Spain. An exception and, at the same time, the most interesting one among others was *T. kirbyi*. This is African species, in continental Europe known until recently from the study area, otherwise noted in Sardinia. Nowadays, it has been in territorial expansion; it has inhabited the neighbouring province Malaga and was noted in central-western Andalusia (Seville)." (Author)] Address: Liberski, J., skrytka poczt. 4, 41-407 Imielin, Poland. E-mail: [jakub\\_liberski@gazeta.pl](mailto:jakub_liberski@gazeta.pl)

**18269.** Lillo, E.P.; Arlandis, J.S. (2012): Un caso de teratología abdominal en *Anax parthenope* (Selys, 1839) (Odonata: Aeshnidae). *Boletín de la SEA* 50: 539-540. (in Spanish, with English summary) [A teratology involving the abdomen in a specimen of *A. parthenope*, with reproductive implications, is described." (Authors).] Address: Prieto-Lillo, E.P., Universidad de Valencia, Facultad de Ciencias Biológicas, Departamento de Zoología, Laboratorio de Entomología. Dr. Moliner 50, 46100 Burjasot (Valencia), Spain. E-mail: [ezequiel.prieto@uv.es](mailto:ezequiel.prieto@uv.es)

**18270.** Lillo, E.P.; Fontana-Bria, L.; Arlandis, J.S. (2012): Villafranca del Cid (Castellón, España), enclave de relevante contribución a la odonofauna valenciana (Insecta: Odonata). *Boletín de la SEA* 50: 521-526. (in Spanish, with English summary) ["The new odonatological records of *Sympetrum sanguineum* (Müller, 1764), *S. vulgatum ibericum* (Ocharan, 1985), *S. flaveolum* (Linnaeus, 1758) and *Lestes sponsa* (Hansemann, 1823) constitute a remarkable rise in the number of species included in the Comunitat Valenciana's odonatological catalogue, now at 65 species, highlighting the relevance of "La Rambla de las Truchas" (north-

western Castellón province), a river ecosystem of great significance for the preservation of several dragonfly populations in the east of the Iberian Peninsula." (Authors)] Address: Prieto-Lillo, E.P., Universidad de Valencia, Facultad de Ciencias Biológicas, Departamento de Zoología, Laboratorio de Entomología. Dr. Moliner 50, 46100 Burjasot (Valencia), Spain. E-mail: ezequiel.prieto@uv.es

**18271.** Lillo, E.P.; Arlandis, J.S. (2012): Ejemplar teratológico de *Gomphus simillimus* (Selys, 1840) (Odonata: Gomphidae). Boletín de la SEA 50: 543-544. (in Spanish, with English summary) ["A teratological specimen of *G. simillimus*, with a malformation in the apical area of the right hindwing and a significant reduction in the left mesothoracic leg, is described." (Authors)] Address: Prieto-Lillo, E.P., Univ. de Valencia, Facultad de Ciencias Biológicas, Depto de Zoología, Laboratorio de Entomología. Dr. Moliner 50, 46100 Burjasot (Valencia), Spain. E-mail: ezequiel.prieto@uv.es

**18272.** Lis, L. (2012): *Leucorrhinia albifrons* (Burmeister, 1839) (Odonata: Libellulidae) in an anthropogenic habitat in the former sulfur mine "Jeziórko" (Sandomierz Basin). Odonatrix 8(2): 55-58. (in Polish, with English summary) ["In the year 2012 a small autochthonic population of *L. albifrons* was discovered in the area of the former underground mine of sulphur Jeziórko (south-eastern Poland, 50°33'34"N, 21°48'00"E, UTM EB50). It inhabited one of the artificial water bodies created in the frames of reclamation of this area, situated in the depression, gathering flowing or discharging waters from the surrounding areas. In May and June a few individuals of *L. albifrons* was observed, with juvenile specimens of both sexes in it. The habitat of *L. albifrons* was characterized by abundant swamp vegetation (*Phragmites australis* mainly) and moderately abundant floating and submerged vegetation (*Potamogeton natans*, *Ceratophyllum demersum*, *Utricularia vulgaris*). Water was transparent, moderately alkaline (pH: 7.71), quite strongly mineralized (electrolytic conductivity: 2325  $\mu\text{S}\cdot\text{cm}^{-1}$ , dissolved solids: 1163  $\text{mg}\cdot\text{dm}^{-1}$ , salinity: 1.2 PSU). Compact range of *L. albifrons* in Poland is limited to lakelands in the north of the country. Farther towards the south there is a zone of the insular occurrence, on single sites or their groups. This zone reaches south-eastern Poland through which the range boundary is running from Slovakia only one single sites is known, historical and doubtful one. The site in Jeziórko situated near the southern range boundary of *L. albifrons* which is marked nowadays by three sites in the Przemysl Foothills. Its discovery is a valuable supplement to the knowledge about the distribution of the species on the edge of its range. This shows that this species can occur at more sites and in more regions than previously thought. The new site confirms also the previous data that the occurrence of the species in the marginal zone of the range is in large part connected with secondary habitats which can locally contribute to the increase in species distribution in comparison to historical period." (Author)] Address: Lis, L., Zakład Zoologii, Uniwersytet Marii Curie-Skłodowskiej, ul. Akademicka 19, 20-033 Lublin, Poland. E-mail: lisulis@o2.pl

**18273.** Lorthiois, M., Cheyrezy, T.; Gaudet, S.; Lecomte, T.; Simon, A. (2012): *Leucorrhinia* à gros thorax en Haute Normandie - *Leucorrhinia pectoralis* (Charpentier, 1825) (Odonata, Libellulidae). L'Entomologiste Haut-Normand 2: 2-10. (in French) ["Conclusion The odonatological fauna of Haute Normandie, France has thus included a 50th species since spring 2012: the *L. pectoralis*. Observed at 5 stations in the region, 3 in Seine-Maritime and 2 in Eure, this species has reached us thanks to an exceptional invasion phenomenon. This has affected the whole of north-eastern France and the region constitutes its known western limit. Many potentially favourable environments were surveyed despite the difficult weather conditions during the presence of the species in the region. However, many peat ponds were not visited and the species may have swarmed on some of them. Even if evidence of reproduction was only formally observed on one of the five sites where the species was found, we cannot exclude the temporary establishment of other populations elsewhere in Haute-Normandie. Consequently, we will have to be particularly vigilant in the spring of 2014 and 2015, and even as early as 2013, to detect any new populations of this protected species." (Authors) Translated with www.DeepL.com/Translator (free version)] Address: Lorthiois, M., 13, rue de Fort Dauphin - 76350 Oissel, France. E-mail: matthieu\_lorthiois@yahoo.fr

**18274.** Mahmoud, M.F. (2012): Insects associated with sesame (*Sesamun* [i.e. *Sesamum*] *indicum* L.) and the impact of insect pollinators on crop production. Pesticides and Phytomedicine 27(2): 117-129. (in English) ["A survey of insects associated with sesame, *Sesamum indicum* L. (Pedaliaceae) was conducted at the Agriculture Research Farm of The Faculty of Agriculture, University of Suez Canal during the growing seasons 2010 and 2011. All different insect species found on the experimental site were collected for identification. Sampling was done once a week and three times a day. Three methods were used to collect insects from the sesame plants (a sweep net, pitfall traps, digital camera and eye observation). A total of 31 insect species were collected and properly identified during the survey. Insects recorded on the plants were divided into four groups, true pollinators (Hymenoptera), other pollinators (Diptera, Coleoptera and Lepidoptera), pests (Orthoptera, Odonata [*Ischnura senegalensis*, *Crocothemis erythraea*], Hemiptera and Homoptera) and natural enemies (Coleoptera, Hymenoptera, Neuroptera and Dictyoptera). For studying the impact of insect pollination on sesame production, the experiment was divided in two: opened and non-opened pollination of sesame. 50 plants from nonopened pollination were covered with a perforated paper bag to allow the air to pass through and to prevent insects from approaching the plants. Quantitative and qualitative parameters were measured as follows: pod weight, number of seeds in each pod, weight of 1000 seeds, germination (%), seedlings vigour and oil content (%). Results clearly demonstrate that the opened pollination improved the crop production." (Authors)] Address: Mahmoud, M.F., Suez Canal University, Ismailia (Egypt). Faculty of Agriculture, Plant Protection Department



- 18275.** Milton Montaña, C.; Meza, A.M.; Dias, L.G. (2012): La colección entomológica cebuc y su potencial como colección de referencia de insectos acuáticos. *Bol. cient. mus. hist. nat.* 16(2): 173-184. (in Spanish, with English summary) [Entomology collections constitute a country or region's natural history archive, where specimen preservation and its associated information are the basis for taxonomic, ecological, phylogenetic, and biogeographic studies. The Entomology Collection of the Biology Program of the Universidad de Caldas (CEBUC) has had an entry and deposit of reference specimens since 1993. Despite the time passed since its creation, it did not count on an appropriately organized collection. With the objective of optimizing the collection and organizing the information associated with the conserved species, its curation process was carried out. In parallel, an analysis of the taxonomic determination of the exemplars was done, finding that a total of 34184 exemplars were identified to the family level, of which 29542 (86.42%) are identified to the genus level. A total of 28542 liquid-stored aquatic insects are recorded, distributed in 28 orders, 90 families, and 215 genera and/or morphotypes, collected from different rivers and streams of the Caldas department. By analyzing the source data of the aquatic insect exemplars of the CEBUC, it was possible to determine that the greatest richness and abundance of aquatic insects is associated to leaf litter substrate. The generalist collectors' trophic guild is the dominant group among the aquatic insects deposited in the collection. In regards to the dry-preserved collection, it currently contains 5642 individuals, grouped in 14 orders belonging to 111 families. In this manner, CEBUC becomes an important reference tool for future investigations, in addition to manifesting the diversity of Colombia's central coffee region." (Authors) The collection includes 101 specimens with five families] Address: Milton Montaña, C., Programa de Biol., Fac. de Ciencias exactas y naturales, univ. de Caldas. milf-m@hotmail.com
- 18276.** Murria, E.; Jarne, M. (2012): Nuevo registro de *Cordulegaster bidentata* Sélys, 1843 en el Parque Nacional de Ordesa y Monte Perdido (Huesca) (Odonata: Cordulegastriidae). *Boletín de la SEA* 50: 262. (in Spanish, with English summary) ["A new record is provided of *C. bidentata* from the Ordesa y Monte Perdido National Park (Huesca, Spain), 62 years after its first and last record in this area of the Pyrenees." (Authors)] Address: Murria, E., C/ Felix Rodriguez de la Fuente, 1 22623 Aineto (Huesca), Spain. E-mail: entomomurria@hotmail.com
- 18277.** Ndenga, B.A.; Simbauni, J.A.; Mbugi, J.P.; Githeko, A.K. (2012): Physical, chemical and biological characteristics in habitats of high and low presence of anopheline larvae in western Kenya highlands. *PLoS ONE* 7(10): e47975: 7 pp. (in English) ["Background: Characteristics of aquatic habitats determine whether mosquitoes will oviposit, hatch, develop, pupate and successfully emerge into adults or not, thus influencing which mosquito species will occupy a habitat. This study determined whether physiochemical and biological characteristics differ between habitats with high and low presence of anopheline larvae. Methods: Physical, chemical and biological characteristics were evaluated in selected habitats twice per month within three highland valleys in western Kenya. Aquatic macro-organisms were sampled using a sweep-net. Colorimetric methods were used to determine levels of iron, phosphate, nitrate, ammonium and nitrite in water samples. Generalized Estimating Equations (GEE) was used to compare parameters between the two categories of anopheline presence. Results: Habitats with high anopheline presence had greater abundance of mosquito aquatic stages and tadpoles and two times more levels of nitrate in water, whereas habitats with low anopheline presence had wider biofilm cover and higher levels of iron in water. Conclusion: Habitats of high and low presence of anopheline larvae, which differed in a number of physical, chemical and biological characteristics, were identified in valleys within western Kenya highlands. Differences in habitat characteristics are critical in determining the number of anopheline larvae that will fully develop and emerge into adults." (Authors)] Address: Ndenga, B.A., Dept of Zoological Sciences, Kenyatta University, Nairobi, Kenya. E-mail: bndenga@yahoo.com
- 18278.** Nelson, S. (2012): Sampling guide for the collection of dragonfly larvae and water samples from National Parks for mercury analysis. University of Maine (UMaine)/George J. Mitchell Center, Acadia Learning/Schoodic Education Research Center (SERC) Institute, National Park Service (NPS) – Air Resources Division (ARD): 12 pp. (in English) [[http://participatoryscience.org/sites/default/files/DragonflyHg\\_SamplingGuide\\_NationalParks\\_March2012.pdf](http://participatoryscience.org/sites/default/files/DragonflyHg_SamplingGuide_NationalParks_March2012.pdf)] Address: Nelson, Sarah: Email: sarah\_nelson@umit.maine.edu
- 18279.** Olivier, X. (2012): Primeres dades sobre les comunitats d'odonats (Insecta: Odonata) de la Garrotxa. *Annals de la delegado de la Garrotxa de la Inst. Cat. Hist. Nat.* 5: 67-78. (in Spanish, with English summary) ["This article represents a first attempt to characterize the odonate communities found in a large number of different types of habitat in La Garrotxa. Data was gathered during monitoring carried out between 2005-2011 at a total of 42 stations. Species richness, densities and the phenology of the odonate communities, as well as the characteristic species of each habitat, were analyzed on a basis of indicators of presence and density." (Author)] Address: Oliver, X., Delegació de la Garrotxa de la Institució Catalana d' Història Natural, C/ Fontanella, 3, E-17800 Olot, Spain. E-mail: xevioliver@gmail.com
- 18280.** Pinto, A.P.; Carvalho, A.L. (2012): Taxonomic and distributional notes on *Telebasis Selys, 1865*, with a re-description of *T. pallida* Machado, 2010, and an evaluation of the *T. racenisi* Bick & Bick, 1995 "complex" of species (Odonata, Coenagrionidae). *Deutsche Entomologische Zeitschrift* 59(2): 189-200. (in English) ["A full checklist of the species of *Telebasis Selys, 1865*, housed in the Brazilian collections Coleção Entomológica "Prof. Jos Alfredo Pinheiro Dutra", Departamento de Zoologia, Instituto de Biologia, Universidade Federal do Rio de Janeiro (DZRJ), and Museu

de Zoologia, Universidade de S o Paulo (MZSP) is presented. A total of 325 specimens representing 19 species were studied. Ten new records for Brazilian States were found for *T. carmesina* Calvert, 1909 (Rio de Janeiro and Rio Grande do Sul), *T. corallina* (Selys, 1876) (Pernambuco), *T. demarara* (Williamson, 1917) (Maranhao), *T. filiola* (Perty, 1834) (Para ba and Santa Catarina), *T. gigantea* Daigle, 2002 (Sao Paulo), *T. inalata* (Calvert, 1961) (Mato Grosso do Sul), *T. pallida* Machado, 2010 (Goias) and *T. obsoleta* (Selys, 1876) (Mato Grosso do Sul), as well as a new record of *T. carminita* Calvert, 1909 for Suriname. *Telebasis pallida* Machado, 2010 is redescribed and diagnosed based on 14 males collected near the type locality, and its genital ligula is described and illustrated for the first time. Furthermore, the status of the three species of the *Telebasis racenisi* Bick & Bick, 1995 "complex" is evaluated. Of these, *Telebasis pareci* Machado, 2010 syn. n. is proposed as junior subjective synonym of *Telebasis lenkoi* Machado, 2010, and a possible synonymy among the three species is discussed under *T. racenisi*." (Authors)] Address: Pinto, A.P., Laboratory of Systematics on Aquatic Insects (LABSIA), Departamento de Zoologia, Universidade Federal do Paraná, P. O. Box 19020, 81531-980, Curitiba, PR, Brazil

**18281.** Popova, O.N.; Haritonov, A.Yu. (2012): On the change of the ranges of certain dragonfly (Odonata) species of the Russian fauna. *Proceedings of the Russian Entomological Society. St. Petersburg* 83(1): 73-82. (in Russian, with English summary) ["Many examples of changing the dragonfly ranges and dragonflies' invading new habitats are described. The range is suggested to be treated as a dynamic lace with widely varying «density» and location of separate populations. The active dragonfly settling in recent years is explained by the increasing destabilization of atmospheric processes involving also the Earth's biosphere." (Authors) Among others, the paper discuss the following species: *Coenagrion ecornutum*, *C. glaciale*, *C. hylas*, *C. johanssoni*, *Nehalennia speciosa*, *Aeshna subarctica*, *Anax parthenope*, *Gomphus epoptalmus*, *Nihonogomphus raptus*, *Macromia amphigena*] Address: Popova, Olga, Institut Sistematiki i Zkologii Zhivotnykh, 630091 Novosibirsk, Ul. Frunse 11, Russia. E-mail: popova.olga.nik@gmail.com

**18282.** Poulin, B. (2012): Indirect effects of bioinsecticides on the nontarget fauna: The Camargue experiment calls for future research. *Acta Oecologica* 44: 28-32. (in English) ["Following its high selectivity and low toxicity to nontarget organisms, *Bacillus thuringiensis* var. *israelensis* (Bti) has become the most commonly used microbial agent to control mosquitoes worldwide. Considered non-toxic to mammals, birds, fish, plants and most aquatic organisms, Bti direct effects on the nontarget fauna are largely limited to non-biting midges (Chironomidae). Studies addressing the indirect effects of Bti through food web perturbations are scanty and showed no significant results. Mosquito-control in southern France was implemented in 1965 using various insecticides over 400 km of coast. In spite of a high mosquito nuisance, the Camargue wetlands were excluded from this control programme to preserve biodiversity. The expanding use of Bti

has prompted the implementation of an experimental mosquito control in 2006 involving 2500 of the 25,000 ha of larval biotopes of the Camargue, accompanied by impact studies on the nontarget fauna. Using birds from natural and human-inhabited areas as model species, we assessed trophic perturbations caused by three years of Bti applications. The preliminary results of this 5-yr programme revealed significant effects of Bti spraying on abundance of reed-dwelling invertebrates serving as food to passerines [including Odonata], as well as on the diet and breeding success of house martins nesting in rural estates and small towns. Very few studies (if any) have provided such compelling evidence of an insecticide affecting vertebrate populations, putting into question the environmental-friendly character of Bti, at least in some areas. The significance of these results are discussed within a wider context and completed with an analysis of the current Bti bibliography to highlight and orient priorities for future research on this topic." (Author)] Address: Poulin, Brigitte, Tour du Valat Research Center, Le Sambuc, 13200 Arles, France. E-Mail: poulin@tourduvalat.org.

**18283.** Sannier, D. (2012): Inventaire des Odonates (Odonata) et synthèse des connaissances dans les réserves naturelles catalanes. Master 2ème Année Pro, Biodiversité – Écologie - Environnement, Université Joseph Fourier Grenoble 1: 152 pp. (in French, with English summary) ["Odonata are insects highly dependent on wetlands, making it a taxonomic group endangered. Thus, respectively 30 % and 15 % of world's and European species are considered as "threatened" and over a quarter of French species are on a Red List in preparation. The Catalan federation of nature reserves initiated a campaign of inventories to better know these insects and apprehend local conservation issues. It's in this context that this study is included: its main objective is to make an Odonata inventory of the Madres-Coronat south side. So, 26 taxa were inventoried, which 21 of them are formally indigenous. Among this species, six are news for the nature reserve of Nohèdes and three for the Catalan nature reserves. Spatial distribution and time division of every taxa as well as the four main odonatological corteges of Madres-Coronat are characterized. The conservation issues are significant, in particular for 6 highly interesting species: *Somatochlora arctica*, *Cordulegaster bidentata*, *Coenagrion hastulatum*, *Sympetrum flaveolum*, *S. danae*, *Aeshna juncea*. Many efforts are still needed to complete knowledge about Odonata in the Catalan nature reserves, except perhaps Madres-Coronat's ones. The implementation of population monitoring at the Estany del Clot should also allow to measure their evolution in the Nohèdes's nature reserve." (Author)] Address: Sannier, D., Univ. Joseph Fourier – Grenoble 1 - UFR de Biologie, 2231 rue de la Piscine, Bâtiment C de Biologie, B.P. 53, 38041 Grenoble Cedex 9, France

**18284.** Sharma, G. (2012): Studies on the reproductive behaviour of *Pseudagrion rubriceps* Selys (Odonata: Arthropoda) at Gyan Sarovar, Mount Abu, Rajasthan, India. *Raghunathan, E., Sivaperuman, C. and Venkataraman, K. 2012. Recent Advances in Biodiversity of India: 1-529* (Published by the Director, Zool. Surv. India, Kolkata): 251-255.

(in English) ["The reproductive behaviour of *Pseudagrion rubriceps* has been studied three times at study site on dated 19.09.08, 20.09.08 and 21.09.08. The conspicuous sexual dimorphism with a bright orange face of male, while much paler in females made easy to keep a close watch on a species. The observations on different activities, their duration and variabilities in the reproductive behaviour of *P. rubriceps* were recorded as below." Information are given to: "(a) Territoriality, (b) Before wheel tandem, (c) Copulatory wheel position, (d) After wheel tandem, and (e) oviposition".] Address: Sharma, G., Desert Regional Centre, Zoological Survey of India, Jhalamand, Pali Road, Jodhpur-342 005, Rajasthan, India, E-mail: drgaurav.zsi.india@gmail.com

**18285.** Vizslán, T. (2012): Adatok Sajóbáony környékének szitakötő-faunájához (Odonata) [Data on the dragonfly (Odonata) fauna from the surroundings of the settlement Sajóbáony (N-Hungary)]. *Studia odonotol. hung.* 14: 73-79. (in Hungarian, with English summary) ["The author presents faunistical data based on collections of dragonfly adults in the surroundings of the settlement Sajóbáony. The sampling sites are situated in one 10×10 km UTM grid map cell (DU 73) of a geographical microregion (Tardonai-dombság) in the mountain area Bükk-vidék (N-Hungary). ... Collections were made in 1989 and 1990, with the participation of 2 specialists on 22 days and 3 localities altogether. In the report information on 278 adults (185 males and 93 females) are given in detail, representing 93 faunistical data. In this study 24 species (11 Zygoptera and 13 Anisoptera) were found to occur in the area, out of which 1 belongs to the very frequent, 13 to the frequent, 5 to the less frequent, 2 to the rare and 3 to the sporadic class of country-wide occurrence frequency." (Authors)] Address: Vizslán, T., 9027 Gyr, Nagysándor József u. 36., IV/17

**18286.** Vliegthart, A. (2012): Kwaliteit van tijdelijke natuur in de Haven van Amsterdam. Rapport VS2012.022, De Vlinderstichting, Wageningen: 22 pp. (in Dutch, with English summary) ["The goal of the 'Green Deal Temporary Nature' is to stimulate temporary nature development and to study the problems faced. One of the main targets is research on development of this new nature areas. Amsterdam Harbour has initiated as the first Dutch company a pilot 'Temporary Nature' on their site. Simple provisions were made to improve biodiversity like constructing artificial relief and creating ponds on the pilot site. In addition of the monitoring of Natterjack Toad and Orchids, research on quality of the temporary nature areas is started using an inventory of butterflies, dragonflies and grasshoppers. In this research three areas (in total 21 ha) in Westpoort where potentially nature could develop were studied. The pilot area, which was the focus of this research, is the biggest and it was created by Amsterdam Harbour in 2007. For the purpose inventory of butterflies, dragonflies and grasshoppers was done for their good qualities as indicators of nature development. In total 30 species of butterflies, dragonflies [10 species recorded] and grasshoppers in the three temporary nature areas of Westpoort were found and their relation with the habitat were assessed. These species are associated to the nature

development and quality. Many indicative species of pioneer vegetation and (flowery) grasslands were found. These species were found here because of the early stage of development of the area. The discovery of at least two individuals of Bluewinged grasshoppers was promising surprise of the study. They most probably have colonised the area from the dunes nearby. This indicative species of open sandy areas and pioneer habitat proves the available ecological balance in the pilot area. The dragonfly diversity seemed to be increasing and quality of good fresh water improving. The quality of the flowery grasslands is high and provide good quality of habitat that not only for butterflies, but also for rare plant species like Orchids, Grass of Parnassus and Yellow-wort. The conclusion is was that this 'temporary nature' develops fast and in the right direction. There are already flowery meadows with high grassland butterfly diversity, which is positive since they are under high pressure. The investigated area of 'temporary nature' functions as important stepping stone in the region for this group and other species associated with open sand and pioneer habitat. These are usually dynamic systems from where species can disperse. Due to the natural succession, the species typical of pioneer habitat will disappear and the terrain transform potentially to a more developed habitat and host other species. The data from the National Databank Flora & Fauna shows that the species diversity is available in the direct vicinity. The pilot project of Amsterdam Harbour creating the artificial relief and ponds in the temporary nature area, achieved a very good positive development for the biodiversity in the area. At this moment the area is a very important habitat and stepping stone for species of pioneer habitat and grasslands, which are currently threatened in the Netherlands." Address: De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: info@vlinderstichting.nl

**18287.** Walia, G.K. (2012): Chromosomal studies on two species of family Platycnemididae (Odonata: Zygoptera). *Hislopia journal* 5(1): 55-58. (in English) ["Karyological Investigations have been carried out on the male individuals of *Copera annulata* and *Copera vittata*. These species were collected from Jammu & Kashmir, while former species was also collected from Assam. Both the species possess the type number of the family, that is, 25m as the diploid chromosome number with XO sex determining mechanism. *Copera vittata* has been studied cytologically for the first time from India and chromosome complement (2n=25m) of *Copera annulata* is different from earlier report (2ns27m)." (Author)] Address: Walia, G.K., Dept of Zoology & Environmental Sciences, Punjabi University, Patiala- 147002, India.

**18288.** Ajuria Ibarra, H.; Reader, T. (2013): Reasons to be different: do conspicuous polymorphisms in invertebrates persist because rare forms are fitter? *Journal of Zoology* 290(2): 81-95. (in English) ["Many invertebrate species show conspicuous colour polymorphisms, the study of which has provided us with important insights in evolutionary biology. The potential importance of frequency-dependent selection

in the maintenance of polymorphisms was identified by theoretical studies more than 50 years ago, and since then, the topic has received considerable attention from those seeking to explain observed diversity in natural populations. Here, we consider the different ecological interactions that have been shown to lead to negative frequency-dependent selection in invertebrate populations in the wild, and assess the likely relative importance of this mechanism in comparison with alternatives that may promote genetic and phenotypic diversity. The literature shows that frequency dependence can result from a wide array of ecological interactions, in particular, those involving mate choice, sexual conflict and predation. However, even though negative frequency-dependent selection is the most common explanation for the occurrence of conspicuous polymorphisms in invertebrates, conclusive evidence of its importance in natural populations is largely absent. A particular problem is that in most studies, it is the only explanation considered. In the most comprehensively studied systems, it has been shown that multiple mechanisms (both selective and neutral) operate to maintain observed phenotypic variation, and that negative frequency-dependent selection is not the most important of these. Thus, as yet at least, we do not have strong grounds for believing that negative frequency-dependent selection is a major diversifying force in invertebrate morphology. However, without more comprehensive studies in a wider range of ecological contexts, we are equally unable to dismiss it as weak and/or irrelevant." (Authors) The paper includes references to Odonata.] Address: Ajuria Ibarra, Helena, School of Biology, University Park, Univ. Nottingham, Nottingham, NG7 2RD, UK. Email: [ajuria\\_i@yahoo.com](mailto:ajuria_i@yahoo.com)

**18289.** Alcorlo, P.; Baltana, A. (2013): The trophic ecology of the red swamp crayfish (*Procambarus clarkii*) in Mediterranean aquatic ecosystems: a stable isotope study. *Limnetica* 32(1): 121-138. (in English) ["The red swamp crayfish (*Procambarus clarkii*) is an invasive species in most of its current distribution range. As an omnivorous species that feeds on items of many trophic levels [including Odonata] and is eaten by many others, it occupies a key trophic position within the invaded food webs. This trophic position, in combination with its active physiology, makes *P. clarkii* a suitable organism for ecotoxicological studies and, more specifically, a bio-indicator of heavy metal pollution. These characteristics also make *P. clarkii* a likely vector of contaminants toward higher trophic levels. In this study, we (i) describe aquatic food webs in three contrasting Mediterranean wetlands in the lower Guadalquivir River Basin, southwestern Spain, each populated by invasive *P. clarkii* but having a different heavy metal concentration, (ii) assess the trophic role of crayfish and temporal trends in its diet using stable isotope analysis ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ), and (iii) assess the relationship of crayfish isotopic signatures to the content of heavy metals (Cu, Zn, Pb, Cd, As) bioaccumulated in crayfish body tissues. We detected significant between-site differences in carbon and nitrogen isotopic signatures but found significant between-date differences only for nitrogen signatures. Between site changes in carbon and nitrogen isotopes were due primarily to variations in the relative contribution of autochthonous vs.

allochthonous primary producers and shifts in crayfish abundance through time, respectively. Isotopic food web models were used to distinguish between systems driven by a detritus-based energy pathway and systems supported by detritus and primary producers. The trophic positions estimated for crayfish and other invertebrates at each site were low, suggesting the prevalence of omnivory and the occurrence of a trophic continuum rather than discrete levels. Isotopically, crayfish occupy a predator position in the observed food webs, which is consistent with the predominance of animal food sources in the species' diet. No significant changes were found between crayfish ontogenetic stages using isotopic ratios. The site with the highest concentration of heavy metals showed the highest  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values, and a significant correlation was found between five heavy metal elements (As, Cd, Zn, Cu, Pb) measured in crayfish and their nitrogen isotope signatures ( $r = 0.72$ ,  $p < 0.0001$ ), thus reinforcing its contamination biomarker role." (Authors)] Address: Alcorlo, Paloma, Department of Ecology, Universidad Autonoma de Madrid, E-28049 Madrid, Spain. E-mail: [paloma.alcorlo@uam.es](mailto:paloma.alcorlo@uam.es)

**18290.** Amann, P. (2013): Die Libellenfauna der Jagdberggemeinden. Naturmonographie Jagdberggemeinden. Dornbirn (inatura Erlebnis Naturschau Dornbirn): 207-228. (in German, with English summary) ["Within the framework of inatura's investigation into the flora and fauna of the Jagdberg communities, I was given the task of examining and documenting the dragonfly populations in the region. Collections were taken on dragonfly habitats over a period of two years (2010-2012). These recent collections were supplemented with unpublished data from Georg Amann from 2003-2004. This work should interest experts as well as laymen who are interested in nature. The dragonfly species which inhabit the investigated region were described, their typical behaviours were documented, and hints were given on how and where to observe them. The results: Of the 55 dragonfly species registered in Vorarlberg, 27 were detected in the Jagdberg communities. Six of the observed species are considered highly endangered according to Hostettler (2001). (*Calopteryx virgo*, *Cordulegaster bidentata*, *C. boltonii*, *Ischnura pumilio*, *Sympetma paedisca*, *Sympetrum pedemontanum*) Especially the *C. virgo* and both the *Cordulegaster* species could be observed over a number of years. These insects have found their final retreat and reproduction space in the small, flat moorlands in the Jagdberg communities in Vorarlberg. In conclusion, three examples of development possibilities are presented which the Jagdberg communities could implement to create living and protection space for dragonflies. A concrete catalogue of measures and positive examples of successful intervention by the communities completes the work." (Author)] Address: Amann, P., Wiesenbachweg 8, A-6824 Schlins, Austria. E-mail: [p.amann@aon.at](mailto:p.amann@aon.at)

**18291.** Assmann, B.R.; Silva, J.E.A.; Marinho, J.R. (2013): Analise da dieta alimentar de tartarugas-de-agua-doce da familia Chelidae em lagos rasos costeiros em Rio Grande, RS. *Vivencias* 9(16): 36-52. (in Portuguese, with



English summary) ["Feeding analysis of freshwater turtles in coastal shallow lakes in Rio Grande, RS: Turtles are vertebrates most easily recognizable due to their morphological specializations associated with different habitats they occupy basically aquatic or semi-aquatic, exist species that are carnivorous, herbivores and omnivores. There is a significant lack of research lines on turtles in academic institutions outside the region southeast, mainly of Chelidae Family. The increase in the concentration of nutrients through the artificial enrichment of aquatic ecosystems can influence the availability of certain food items in the diet of turtles Chelidae Family. Obtaining data on the diet of these turtles allows to know the variations and food preferences when they are exposed to different conditions of human disturbance in their aquatic environment. The objective of this study was to determine the feeding diet composition of freshwater turtles of genres *Acanthochelys* and *Phrynops*, Chelidae Family. Catches and recaptures of specimens family Chelidae occurred during two weeks in August, October, November, December 2011 and January 2012, a period corresponding between 8 hours and 18 hours in three shallow lakes in Campus Carreiros of FURGS in Rio Grande, RS. Catches were performed manually with dip nets and traps water cylindrical of type covo average size. After immobilization of the animal, the analyzes of diet occurred through the technique by of gastric lavage in specimen captured, and subsequent analysis of the stomach contents of each individual. We collected a total of 19 individuals in the three lakes, 14 of espécie *Acanthochelys spixii* and five species of *Phrynops hilarii*. The diet was primarily composed of aquatic invertebrates and individuals of the order Diptera that were the most representative. The availability of food for *Acanthochelys spixii* and *Phrynops hilarii* and is directly related to the limnological conditions of the lakes where these species live." (Authors) Odonata contributed < 10% to diet of different Chelidae species.] Address: not stated

**18292.** Badawy, R.M.; El Hoseny, I.; Talal, M. (2013): Biodiversity and seasonal fluctuation of aquatic and semiaquatic insects in Rashid stream, kafr El Zayat (Gharbyia governorate). Egypt. Acad. J. Biolog. Sci. 6(1): 47-66. (in English) ["Rashid branch of Nile River is a principle stream in Kafr El Zayat (Gharbyia governorate) for drinking and irrigation to different essential crops. Five stations were selected for seasonal collection, resulted in 539 specimens, belonging to 7 orders and 22 families and 31 species. The total population density was higher during Spring (41.9%), then in Summer (25.1). Order Diptera was the most abundant (33.8%), ... then order Odonata (16.7%) (Libellulidae & Coenagrionidae), the highest representation was during Spring; ..." (Authors)] Address: Badawy, R.; Entomology Department, Faculty of Science, Ain Shams University, Cairo, Egypt

**18293.** Bouteloup, R. (2013): Etude des cortèges odonotologiques des lentilles calcaires angevines Expertise approfondie sur les populations de *Cordulia* à corps fin (*Oxygastra curtisii* Dale, 1834). Rapport de stage de Master 2, Expertise Faune Flore, Inventaires et indicateurs de biodiversité, Année 2012-2013: CPIE Loire et Mauges, Maison de Pays,

BP 50048, 49602 Beaupreau Cedex, France. 49 pp. (in French, with English summary) [In 2012, the reproduction of *O. curtisii*, was observed on a former quarry in St-Aubin-de-Luigné, located in the west of Maine-et-Loire. The study carried out by the CPIE Loire et Mauges is part of the National Action Plan for Odonates and aims to fill in the gaps in the presence of the species in stagnant environments. Odonatological inventories on other calcareous duckweeds have been carried out by collecting exuviae and observing imagos. They will also make it possible to identify the odonatological communities present. The study highlights the odonatological richness of the limestone water bodies through the presence of species with different ecological requirements and sometimes good populations of *Oxygastra curtisii*. The dispersal of individuals could not be demonstrated despite the Capture-Mark-Recapture protocol implemented on this occasion. Finally, the study highlights the preferred habitat structures for the emergence of the species." (Author, DeepL)] Address: CPIE Loire et Mauges, Maison de Pays, BP 50048, 49602 Beaupreau, Cedex, France

**18294.** Bulankova, E.; Beracko, P.; Derka, T. (2013): Occurrence of protected species (*Gomphus flavipes*, Odonata and *Palingenia longicauda*, Ephemeroptera) in the Danube River and its deltas (Romania, Slovakia). Scientific Annals of the Danube Delta Institute Tulcea, Romania 19: 21-24. (in English) ["Large population of *Gomphus flavipes* was found in the Malý Dunaj (Small Danube), in the area called Danube's "Inland Delta", in 2000–2001. Watching of dragonflies in the Danube Delta (Romania) demonstrated another large population in 2007–2008. In contrast with these observations are our results, from long-term monitoring of dragonflies in the Danube, in the area influenced by the Gabčíkovo power plant (operational since 1992). Changes in hydromorphology in this section started in 19th century and at present dam represents a significant impact on the functioning of the Danube ecosystem. During 20 years monitoring we found only one larva of *Gomphus flavipes* in the Danube at the site downstream of the dam. Another critically endangered species, mayfly *Palingenia longicauda* was found in the Danube Delta in 2009. We observed emergence of giant mayfly in the Danube's arm in Romania. *Palingenia longicauda* disappeared totally in the 1930s from many European rivers. At present it occurs in Tisza and Rába rivers (Hungary) and has been reintroduced in Lippe and Odra rivers (Germany). New findings of large populations of *Palingenia longicauda* in the Romanian Delta has been unknown till now. Findings of large population of *Gomphus flavipes* in deltas confirm that river deltas are of high importance for aquatic biodiversity conservation." (Authors)] Address: Beracko, P., Faculty of Natural Sciences of Comenius University: Mlynská dolina, 842 15 Bratislava 4, Slovakia. E-mail: beracko@fns.uniba.sk

**18295.** Caut, S.; Angulo, E.; Díaz-Paniagua, C., Gomez-Mestre, I. (2013): Plastic changes in tadpole trophic ecology revealed by stable isotope analysis. *Oecologia* 173(1): 95-105. (in English) ["Amphibian larvae constitute a large fraction of the biomass of wetlands and play important roles in

their energy flux and nutrient cycling. Interactions with predators and competitors affect their abundance but also their foraging behaviour, potentially leading to non-consumptive cascading effects on the whole trophic web. We experimentally tested for plastic changes in larval trophic ecology of two anuran species in response to competitors and the non-lethal presence of native and non-native predators, using stable isotope analysis. We hypothesized that tadpoles would alter their diet in the presence of competitors and native predators, and to a lesser extent or not at all in the presence of non-native predators. First, we conducted a controlled diet experiment to estimate tadpole turnover rates and discrimination factors using *Pelobates cultripis* and *Bufo calamita*. Turnover rates yielded a half-life of 15–20 days (attaining a quasi-isotopic equilibrium after 2 months), whereas discrimination factors for natural controlled diets resulted in different isotopic values essential for calibration. Second, we did an experiment with *P. cultripis* and *Rana perezi* (= *Pelophylax perezi*) where we manipulated the presence/absence of predators (*Anax imperator*, *Procambarus clarkii*) and heterospecific tadpoles using microcosms in the laboratory. We detected a significant shift in trophic status of both amphibian species in the presence of non-native crayfish: the  $\delta^{15}\text{N}$  values and macrophyte consumption of tadpoles increased, whereas their detritus consumption decreased. This suggests that tadpoles could have perceived crayfish as a predatory risk or that crayfish acted as competitors for algae and zooplankton. No dietary changes were observed in the presence of native dragonflies or when both tadpole species co-occurred. Stable isotopic analysis is an efficient way to assess variation in tadpoles' trophic status and hence understand their role in freshwater ecosystems. Here we provide baseline isotopic information for future trophic studies and show evidence for plastic changes in tadpoles' use of food resources under different ecological scenarios." (Authors)] Address: Caut, S., Estación Biológica de Donana, CSIC, Avda. Americo Vespucio, s/n, 41092 Sevilla, Spain. E-mail: stephaneaut@gmail.com

**18296.** Cavalieri, C.; Dionisi, V.; Petrucci, M.; Poggiani, L. (2013): *Libellule del Metauro*. Fondazione Cassa di Risparmio di Fano (ed.): 144 pp. (in Italian) [Regional odonate fauna of the Umbria region of central Italy. ISBN 978-88-98714-01-8]

**18297.** Charrier, M. (2013): *Les libellules de Maine-et-Loire*. Inventaire et cartographie. *Les Naturalistes Angevins* 4: 91 pp. (in French) [nv; "This atlas of odonates, the result of field surveys, is as accurate an inventory as possible of the odonotological fauna in Maine-et-Loire. Each monograph presents the current distribution of each species contacted at least once in the department and provides details on the environments frequented and the periods of flight recorded (distribution map, phenological diagram, status as well as photographs). In addition to the involvement of local naturalists, under the aegis of the Angevin Naturalists Association, the production of this atlas was facilitated by the involvement of other departmental associations with data - Mauges Nature, the CPIE Loire et Mauges, the LPO Anjou and the PNR Loire-Anjou-Touraine." (Publisher, DeepL)]

**18298.** Chung, A.Y.C.; Chew, S.K.F.; Majapun, R.; Nilus, R. (2013): Insect diversity of Bukit Hampuan Forest Reserve, Sabah, Malaysia. *Journal of Threatened Taxa* 5(10): 4461-4473. (in English, with Bahasa Malaysia summary) ["An insect diversity survey was carried out at Bukit Hampuan Forest Reserve, adjacent to Kinabalu Park in Sabah, Malaysia. ... Diurnal insects were sampled using sweep nets and fine forceps. A total of 19 Bornean endemic insect species were recorded, comprising 15 moth and four beetle species. ... Some dragonfly species were sampled along the streams in the forest adjacent to Kg. Lohan Bongkud, e.g. *Macromia westwoodii* at about 700m while others were collected at the Bukit Hampuan FR open area at 1,370m, e.g. *Pantala flavescens*. *Macromia westwoodii* is a large dragonfly, with its hindwing measuring up to 50mm. It is fairly common on clear fast forest streams from the lowlands to 900m but is extremely inconspicuous and wary. *Pantala flavescens* is the most wide ranging odonate species in the world, being found throughout the tropics and subtropics, from dense primary forest up to at least 3000m (Orr 2003)."] (Authors)] Address: Chung, A.Y.C., Forest Research Centre, Sabah Forestry Dept, P.O. Box 1407, 90715 Sandakan, Sabah, Malaysia. E-mail: arthur.chung@sabah.gov.my

**18299.** Colborne, S.F.; Peres-Neto, P.R.; Longstaffe, F.J.; Neff, B.D. (2013): Effects of foraging and sexual selection on ecomorphology of a fish with alternative reproductive tactics. *Behavioral Ecology* 24(6): 1339-1347. (in English) ["The foraging ecology of fish is often considered to be the primary determinant of body shape due to tight links between morphology, swimming performance, and foraging efficiency. Fish foraging on littoral benthic macroinvertebrates typically have a deeper body shape than those foraging on pelagic zooplankton in the water column. However, morphological traits often have multiple ecological functions, which could result in performance trade-offs between functions. Here, we provide the first examination of body shape and diet in a species with alternative reproductive tactics, in this case, bluegill sunfish (*Lepomis macrochirus* Rafinesque, 1819). Bluegill males mature into either "parental" or "cuckolder" reproductive tactics. Parentals build nests and provide sole parental care and defense of the young. Cuckolders instead act as "sneakers" darting into the nests of parental males while mating is occurring and then later in life become "satellites," mimicking female appearance and behavior. Using stable carbon and nitrogen isotopic analysis of diet, we found that parentals and females consumed primarily pelagic zooplankton yet were the deepest in body shape. Sneakers consumed more littoral resources but were the most streamlined. Satellite males also consumed predominately littoral resources but had a deeper body form that was more similar to females than to size-matched juveniles. Our results differ from past studies of foraging ecomorphology and suggest that other selection pressures, such as sexual selection in species with alternative reproductive tactics, may also be an important factor influencing shape. ... we collected the 5 most common littoral prey groups in Lake Opinicon (snails, amphipoda, isopoda, larval ephemeroptera, and larval Odonata)."] (Authors)] Address: Neff, B.D., Dept Biology, Univ.

Western Ontario, Biological & Geological Sciences Building, London, Ontario N6A 5B7, Canada. E-mail: bneff@uwo.ca

**18300.** de Camargo, N.F.; Ribeiro, J.F.; de Camargo, A.J.A.; Vieira, E.M. (2013): Diet of the gracile mouse opossum *Gracilinanus agilis* (Didelphimorphia: Didelphidae) in a neotropical savanna: intraspecific variation and resource selection. *Acta Theriologica* 59(1): 183-191. (in English) ["Investigation of the effect of endogenous and exogenous factors on the diet of animals is necessary for a better understanding of their feeding habits. This approach can provide relevant information on the autoecology of a species and its ecological interactions. We investigated the composition and intraspecific variation in the diet of the marsupial *Gracilinanus agilis* in areas of dry woodland forests (i.e., cerrado) in the Cerrado of Central Brazil, taking into consideration the availability of prey (arthropods) in the environment. We found insects, spiders, birds, and fruits in the scats of *G. agilis*. Insects (orders Hymenoptera, Isoptera, Hemiptera, and Coleoptera) and fruits were the most frequently consumed resources. Males fed more heavily on insects than females did, whereas during the warm-wet season (October to April), the reproductive females fed on insects more than the nonreproductive females did. On the other hand, the consumption of fruits and vertebrates did not vary between seasons, sexes, or according to female reproductive condition. Moreover, reproductive females fed more frequently on ants and beetles than nonreproductive females did. We also detected both positive (for Isoptera and Hemiptera) and negative (for Hymenoptera) selection of insects during the cool-dry season, whereas in the warm-wet season, these resources were consumed according to their availability in the environment. Our study revealed that *G. agilis* is an insectivore-omnivore species, but fruits also are a relevant part of its diet. This marsupial seemed to select their prey qualitatively according to its energy demands and nutritional requirements." (Authors) Odonata: Percentage of the total number of samples (0,92%) and absolute frequency (N=4) of food items detected in 422 scat samples of *Gracilinanus agilis* in four areas of cerrado (closed woodland forest) located in central Brazil (Brasília, DF).] Address: Vieira, E.M., Laboratório de Ecologia de Vertebrados, Departamento de Ecologia, Instituto de Ciências Biológicas, CP 04457, Universidade de Brasília (UnB), Brasília, DF, 70919-970, Brazil. E-mail: emvieira@unb.br

**18301.** de Klerk, A.R.; Wepener, V. (2013): Macroinvertebrate assemblage changes as an indicator of water quality of perennial endorheic reed pans on the Mpumalanga Highveld, South Africa. *Journal of Environmental Protection* 4: 10-21. (in English) ["Reed pans are a very uncommon type of endorheic wetland, and as such the amount of information available is very limited. Thus, they are being impacted on by various agricultural, livestock and other anthropogenic activities. The objectives of this study were to determine the spatial and temporal variations of macroinvertebrate community structures in reed pans and the environmental factors (i.e., water quality) responsible for the maintenance of these structures. Reed pans were studied over

four different seasons, during which time subsurface water, sediment and macroinvertebrate samples were collected and analyzed. The reed pans studied showed that the macroinvertebrates were able to reflect various changes in reed pans with regard to seasonal variability and anthropogenic impacts on water quality. These anthropogenic impacts caused the disappearance of sensitive macroinvertebrate taxa and the increase of tolerant macroinvertebrate taxa." (Authors) *Anax imperator*, *Aeshna minuscula*, *Ceriatrigon glabrum*, *Tetralthemis pollenii*] Address: de Klerk, A.R., Dept Zool., Univ. of Johannesburg, Johannesburg, South Africa. E-mail: adklerk@csir.co.za

**18302.** Delpont, G. (2013): Étude de l'écologie et gestion conservatoire de *Leucorrhinia pectoralis* sur le territoire du Parc Naturel Régional des Volcans d'Auvergne. PNR des Volcans d'Auvergne: 111 pp. (in French) ["*L. pectoralis*, is a scarce and threatened dragonfly species. It is listed in Annexes II and IV of the UE Habitats Directive (92/43/EEC) and it is a protected species in France. In Auvergne (France), the Jolan peatbog is the only site where its reproduction has been proven. This peatbog is located in the Parc naturel régional des Volcans d'Auvergne and is integrated in a Natura 2000 site. The species is known to grow in former peatdiggings. Nowadays, this population is highly threatened because of its isolation and the small number of individuals. In order to apply conservation measures adapted to the local context, a characterization of larval habitats and a survey across the site were carried. The results of this study allowed to localize seven peatdiggings which are potentially favorable to *L. pectoralis*. They are isolated on a fen dominated by sedges (*Carex rostrata*). They are characterized by a depth approaching 3 meters, by the presence of water plants (*Utricularia minor*, *Sparganium minimum*, *Potamogeton natans*, ...) and by a high density of *Salix* sp groves around them. A reduced number of adults have been observed during a period of only 18 days. A single male territory has been inventoried on the only peatdiggings which has a free water area higher than 30%. Rapid evolution of other pits to advanced successional stages over the last years has been highlighted. This dynamic implies a decrease of the availability of suitable habitat for the species. Based on these findings, measures were built to restore breeding habitats of *L. pectoralis* in the Jolan peatbog in order to maintain the local population. Linked to these actions, a standardized survey protocol has been proposed. Beyond these emergency measures, management recommendations on a larger scale were given to ensure the sustainability of the population over the long term. In the future, it will be essential to gradually broaden the discussion to a larger scale in order to restore a network of favorable and interconnected sites." (Author)] Address: Delpont, Gaël, 17 route de Foix 09400 Amplaigne, France. E-mail: gael.delpont@yahoo.fr

**18303.** Dhal, S.; Mitchell, C.P.J. (2013): Saltwater flotation for more efficient matrix separation of wetland macroinvertebrates does not affect total mercury or methylmercury concentrations. *Environmental Toxicology and Chemistry* 32(6):

1233-1236. (in English) ["We compared benthic wetland invertebrate matrix separation techniques (handpicking vs. saltwater flotation) to test for effects on invertebrate mercury concentrations. Neither total mercury nor methylmercury concentrations differed significantly between techniques across eight taxa. Matrix separation by the flotation technique took significantly less time and resulted in significantly greater abundance recovery in some taxa. We conclude that the saltwater-based flotation technique does not lead to mercury contamination or analytical interference issues." (Authors) ... three significantly different ranges, in groups (see Table 1: Corixidae and Caenidae range 180 - 400 ng g<sup>-1</sup>, Notonectidae, Dytiscidae, and the Odonata other than Aeshna spp. range 180 - 650 ng g<sup>-1</sup>, and Aeshna spp. range 590– 780 ng g<sup>-1</sup>."] Address: Mitchell, C.P.J., Univ. of Toronto – Scarborough, Dept of Physical & Environmental Sciences, Toronto, ON, Canada. E-mail: carl.mitchell@utoronto.ca

**18304.** Florencio, M.; Diaz-Paniagua, C.; Gomez-Rodriguez, C.; Serrano, L. (2013): Biodiversity patterns in a macroinvertebrate community of a temporary pond network. *Insect Conservation and Diversity* 7(1): 2-21. (in English) [Donana National Park (SW Spain) "(1.) Macroinvertebrate assemblages of temporary ponds are ideal model systems to explore biodiversity patterns and metacommunity ecology. In addition, the study of the environmental variables driving such biodiversity patterns is essential in establishing proper guidelines for the conservation of the singular fauna of temporary ponds, especially since such ponds are vulnerable systems. (2.) We analysed the macroinvertebrate assemblages and environmental characteristics of 80 ponds spread across the Donana National Park, SW Spain to (i) analyse macroinvertebrate b-diversity and metacommunity structure; and (ii) discern the main environmental and spatial drivers of these patterns. (3.) The pond network was highly heterogeneous as temporary ponds were highly variable. Macroinvertebrate b-diversity partitioning showed that species replacement made the greatest contribution to total b-diversity while the contribution of nestedness was small. The macroinvertebrate community structure and b-diversity were similarly driven by: electrical conductivity (and co-variables alkalinity, pH, and ion concentrations), plant richness (and the co-variable pond surface area), maximum depth, marsh, and coastal proximity as well as two spatial descriptors extracted from Moran's eigenvector maps. The spatial descriptors indicated that large interpond distances were involved, suggesting that species dispersal limitations only take place over long distances in the area. (4.) Those taxa that departed from the general nested pattern, termed idiosyncratic, significantly contributed to the maintenance of high pond network diversity through the species replacement and occurred within particular environmental conditions in the pond network. (5.) These results reveal that environmental heterogeneity and connectivity are key factors in the preservation of high macroinvertebrate diversity in nested pond networks with high numbers of idiosyncratic species. ...Odonatans preferred northern temporary ponds with the lowest conductivity values; for example *S. fonscolombii* was observed almost exclusively in these ponds." (Authors)

*Aeshna affinis*, *A. mixta*, *Coenagrion scitulum*, *Ischnura elegans*, *I. pumilio*, *Lestes barbarus*, *L. dryas*, *L. macrostigma*, *L. virens*, *Crocothemis erythraea*, *Sympetrum fonscolombii*, *S. meridionale*, *S. sanguineum*, *S. striolatum*, *Orthetrum brunneum*, *O. cancellatum*, *O. nitidinerve*] Address: Florencio, Margarita, Donana Biological Station-CSIC, Am erico Vespucio s/n, 41092 Seville, Spain. E-mail: margarita@ebd.csic.es

**18305.** Fontanarrosa, M.S.; Chaparro, G.N.; O'Farrell, I. (2013): Temporal and spatial patterns of macroinvertebrates associated with small and medium-sized free-floating plants. *Wetlands* 33(1): 47-63. (in English) ["Macrophytes play an important role in structuring communities in aquatic ecosystems due to their influence on ecological processes and attributes of biological aquatic assemblages. Freshwater macroinvertebrates comprise a functionally and taxonomically diverse group in shallow lakes, which serve as food for fish, amphibians, and water birds, and are involved in the breakdown of organic matter and nutrients. Here, we investigated macroinvertebrate assemblages associated with small and medium-sized free-floating plants (FFP) by describing their structure, analyzing functional aspects (considering functional feeding groups and habits), and determining how much of the variation in fauna composition is explained by environmental factors, mainly FFP. Differences in structure, functional feeding groups and habits of macroinvertebrate assemblages were associated with different compositions and percentages of cover of FFP. Gradients of richness and diversity of macroinvertebrates were positively related to the complexity of FFP mats, which was associated with the structure of roots and leaves." (Authors) "*Aeshna* sp., *Sympetrum* sp., *Coenagrionidae*"] Address: Fontanarrosa, Maria, Lab. de Limnología, Instituto de Ecología, Genética y Evolución de Buenos Aires (CONICET-UBA), Fac. Cs. Exactas y Naturales, Universidad de Buenos Aires, Int. Güiraldes 2160, Pab. II, 4°Piso. Lab.95, 44. CP C1428EHA, Buenos Aires, Argentina. E-mail: fontanarrosa@ege.fcen.uba.ar

**18306.** Gering, E.J. (2013): Causes and consequences of color polymorphism in Rambur's forktail (*Ischnura ramburii*). PhD thesis, Faculty of the Graduate School of The University of Texas at Austin, University of Texas at Austin: XVI + 121 pp. (in English) ["Variation in male and female forms occurs in countless animal taxa, and has fascinated evolutionary biologists since Darwin and Wallace. The underpinnings of male variation have been elucidated in diverse groups; less is known about the selective forces that diversify female forms in nature. Female-polymorphic damselflies provide ideal systems in which to study how female variation evolves. Colour polymorphic damselflies typically contain one female morph that resembles the male ("andromorph") and one or more alternative morphs with distinctive coloration ("gynomorphs" or "heteromorphs"). My thesis draws upon the unique context of a biological invasion to elucidate factors that promote and maintain this variation in female colour. Empirical work in my dissertation is focused upon Rambur's Forktail (*Ischnura ramburii*), a species native to the Americas that invaded Hawaii in the 1970s. I first examine whether female colour morphs diverge in mating rates



or other reproductive traits within the native and invasive range, to see whether such traits might affect morph frequency dynamics in the invasion context (Chapter 2). Next, I test whether variation in selective regimes, both across female development and among populations, predicts variation in andromorph coloration (Chapter 3). Upon finding andromorphs to follow predictions of mimicry theory, I ask whether andromorph presence might result in increased male-male interaction rates, due to sex recognition errors (Chapter 4). Finally, I document recent, rapid evolution of andromorphy within Hawaii populations, and conduct mesocosm experiments to test the potential for density- and frequency-dependent selection to promote and maintain colour polymorphism. Results indicate 1) andromorphs may benefit from reduced mating, but male-like morphology may also incur reproductive constraints; 2) andromorph colour variation accords with mimicry theory: andromorphs resemble syntopic males, and resemblance is maximized after reproductive onset; 3) male-male interactions increase in the presence of andromorphs, to male detriment; 4) gynomorphs are subject to negative-frequency dependence in high-density populations, which may have driven the rapid evolution of andromorphy in Hawaii following introduction to the islands. These findings offer new insights into multiple mechanisms by which colour polymorphism can arise and be maintained within native and invasive contexts.] Address: Gering, E.J., Integrative Biology, University of Texas at Austin, 1 University Station C0930, Austin, TX 78712, USA

**18307.** Graf, W.; Chovanec, A.; Hohensinner, S.; Leitner, P.; Schmidt-Kloiber, A.; Waringer, J.; Ofenböck, G. (2013): Das Makrozoobenthos als Indikatorgruppe zur Bewertung großer Flüsse unter Einbeziehung aquenökologischer Aspekte. *Österreichische Wasser- und Abfallwirtschaft* 65(12): 386-399. (in German, with English summary) ["With the guideline 2000/60/EG, which called for the creation of a framework on water policy, the environmental policy of the European Community took on a new dimension. The goal of the guideline is (among others) the creation of a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater in order to avoid their deterioration; and to protect and improve the status of aquatic ecosystems, their associated land ecosystems directly dependent on them, and wetlands in terms of their water budget. Thanks to various forms of use, e.g. hydropower production, flood protection and ship traffic, especially major European rivers like the Danube, Rhine and Elbe have changed massively from their original typological characteristics. Reference conditions are hardly anywhere to be found, many native species are now extinct, and river biotopes are often dominated by invasive species. The size and depth of these rivers also pose challenges in terms of taking samples, and it has also become apparent that all methods currently used to assess rivers' ecological status focus solely on the main channels; the various habitats to be found in large rivers' riparian systems aren't taken into account. However, there is international consensus that these systems are key elements in rivers' processes and biodiversity, and as such are significant for the continuing functionality of major rivers. In

the context of an Austrian Ministry of Life-funded research project, the Institute of Hydrobiology and Aquatic Ecosystem Management's Working Group on Benthic Ecology and Ecological Status Assessment, together with the University of Vienna and the Environment Agency Austria, is currently working to develop a practice-oriented riparian zone index based on macrozoobenthos as an indicator of quality. To date, Europe has no Water Framework Directive-compliant assessment systems for riparian zones. Given the fact that established methods are limited to river's main channels, precluding a holistic view of and approach to river ecosystems, this project represents a pioneering work in the field of European water resource management.] Address: Chovanec, A., Umweltbundesamt, Spittelauer Lände 5, 1090, Wien, Austria. E-mail: andreas.chovanec@umweltbundesamt.at

**18308.** Grether, G.F.; Anderson, C.N.; Drury, J.P.; Kirschel, A.N.G.; Losin, N.; Okamoto, K.; Peiman, K.S. (2013): The evolutionary consequences of interspecific aggression. *Annals of the New York Academy of Sciences* 1289(1): 48-68. (in English) ["Competition has always been a cornerstone of evolutionary biology, and aggression is the predominant form of direct competition in animals, but the evolutionary effects of aggression between species are curiously understudied. Only in the past few years, existing theoretical frameworks have been extended to include interspecific aggression, and significant empirical advances have been made. After arguing that agonistic character displacement (ACD) theory provides the most suitable theoretical framework, we review new empirical evidence for ACD and the results of mathematical models of the process. We consider how ACD can be distinguished empirically from ecological and reproductive character displacement and the additional challenges posed by developmental plasticity. We also provide the first taxonomically broad review of theoretical and empirical work on the effects of interspecific aggression on species coexistence and range limits. We conclude by highlighting promising directions for future research on the evolutionary effects of interspecific aggression." Hetaerina (Authors)] Address: Grether, G.F., Dept Ecology & Evolutionary Biology, 621 Charles E. Young Drive South, Univ. of California, Los Angeles, CA 90095-1606. ggrether@ucla.edu

**18309.** Guillermo-Ferreira, R.N. (2013): Morfologia funcional da coloração das asas em Odonata. Dissertation, Tese apresentada à Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto da Universidade de São Paulo: IX + 150 pp. (in Portuguese, with English and Spanish summaries) ["In Nature, animals carry particularities such as courtship and territorial behaviors which show their conspicuous coloration and call the attention of scientists since the primordial ages of biological sciences. Several animal groups exhibit coloration patterns which are used as intraspecific signals for communication. These signals can be derived from pigments, structural colors, fluorescence and bioluminescence. Although such signals have been studied for more than a century, the functional morphology of colorful characters in animals have been underexplored. Therefore, this thesis had the goal of studying the morphology and optical properties of

sexual ornaments in insects of the order Odonata, regarding their function in reproductive and territorial behavior. Three Neotropical species of Odonata were used as models in this study: *Chalcopteryx scintillans* (Polythoridae), *Zenithoptera lanei* (Libellulidae) and *Mnesarete pudica* (Calopterygidae). The results obtained show the relationship between coloration and behavior in these species, suggesting that wing structures and pigmentation are signals used by these animals during sexual recognition, territorial contests and courtship behavior, with the potential role of individual quality indicators." (Author)] Address: Guillermo-Ferreira, R., Depto de Biol., Fac. de Filosofia, Ciências e Letras de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, SP, Brazil. E-mail: rhainerguillermo@yahoo.com.br

**18310.** Ha, N.S.; Truong, Q.T.; Goo, N.S.; Park, H.C. (2013): Relationship between wingbeat frequency and resonant frequency of the wing in insects. *Bioinspiration & Biomimetics* 8(4):046008. 12 pp. (in English) ["In this study, we experimentally studied the relationship between wingbeat frequency and resonant frequency of 30 individuals of eight insect species from five orders: Odonata (*Sympetrum flaveolum*), Lepidoptera (*Pieris rapae*, *Plusia gamma* and *Ochloides*), Hymenoptera (*Xylocopa pubescens* and *Bombus rustricus*), Hemiptera (*Tibicen linnei*) and Coleoptera (*Allomyrina dichotoma*). The wingbeat frequency of free-flying insects was measured using a high-speed camera while the natural frequency was determined using a laser displacement sensor along with a Bruel and Kjaer fast Fourier transform analyzer based on the base excitation method. The results showed that the wingbeat frequency was related to body mass ( $m$ ) and forewing area ( $A_f$ ), following the proportionality  $f \sim m^{1/2}/A_f$ , while the natural frequency was significantly correlated with area density ( $f_0 \sim m_w/A_f$ ,  $m_w$  is the wing mass). In addition, from the comparison of wingbeat frequency to natural frequency, the ratio between wingbeat frequency and natural frequency was found to be, in general, between 0.13 and 0.67 for the insects flapping at a lower wingbeat frequency (less than 100 Hz) and higher than 1.22 for the insects flapping at a higher wingbeat frequency (higher than 100 Hz). These results suggest that wingbeat frequency does not have a strong relation with resonance frequency: in other words, insects have not been evolved sufficiently to flap at their wings' structural resonant frequency. This contradicts the general conclusion of other reports—that insects flap at their wings' resonant frequency to take advantage of passive deformation to save energy." (Authors)] Address: Ha, N.-S., Biomimetics & Intelligent Microsystem Lab., Dept Advanced Technology Fusion, Division of Interdisciplinary Studies, Konkuk University, Seoul 143-701, Korea

**18311.** Hutter, G.; Graf, W.; Weichselbaumer, P. (2013): Gewässerzustand und tierische Besiedelung der Fließgewässer der Vorarlberger Jagdberggemeinden. *Naturmonografie Jagdberggemeinden*, Dornbirn: 193-206. (in German, with English summary) ["Due to topography the aquatic ecosystem at the Jagdberggemeinden is heterogeneous and water courses range from higher regions (1985 m above sea level) to the lowland (480 m); its total length covers 34 kilometers.

About 40 % of streams and rivers are morphologically unaffected. The remaining sections are heavily impaired by various constructions. Nevertheless rivers and brooks are densely populated with aquatic invertebrates. Within the most sensitive insect orders EPT (Ephemeroptera, Plecoptera and Trichoptera) 94 different species are currently known from the area." (Authors) In addition, *Cordulegaster boltonii* is listed for the Kirchenbach.] Address: Hutter, G., Institut für Umwelt & Lebensmittelsicherheit des Landes Vorarlberg, Montfortstr. 4, 6901 Bregenz, Austria

**18312.** Iqbal, M.A.; Rizvi, S.A.; Akhter, M.A. (2013): The Dragonflies (Odonata. Anisoptera) of Sindh, Pakistan. LAP Lambert Academic Publishing: 100 pp. (in English) ["Dragonflies are predators, they themselves are subject to predation by frogs, spiders, fish, water bugs, birds, lizards, and even other large dragonflies. Dragonflies have great agricultural importance because they are voracious predators of those insects which are pest of many field crops. In the present studies about 600 specimens of the order Odonata were collected from the various localities, include sixteen species belonging to eleven genera, representing three families, two subfamilies of the suborder Anisoptera, and were described in detail with special reference to their male and female genitalia from Sindh, Pakistan. The research techniques and information are helpful for graduate and research students of Zoology, Entomology & Agricultural Sciences." (Publisher)

**18313.** Janssens, L.; Stoks, R. (2013): Predation risk causes oxidative damage in prey. *Ecology letters* 9(4): 20130350: 4 pp. (in English) ["While there is increasing interest in non-consumptive effects of predators on prey, physiological effects are understudied. While physiological stress responses play a crucial role in preparing escape responses, the increased metabolic rates and shunting of energy away from other body functions, including antioxidant defence, may generate costs in terms of increased oxidative stress. Here, we test whether predation risk increases oxidative damage in *Enallagma cyathigerum* damselfly larvae. Under predation risk, larvae showed higher lipid peroxidation, which was associated with lower levels of superoxide dismutase, a major antioxidant enzyme in insects, and higher superoxide anion concentrations, a potent reactive oxygen species. The mechanisms underlying oxidative damage are likely to be due to the shunting of energy away from antioxidant defence and to an increased metabolic rate, suggesting that the observed increased oxidative damage under predation risk may be widespread. Given the potentially severe fitness consequences of oxidative damage, this largely overlooked non-consumptive effect of predators may be contributing significantly to prey population dynamics." (Authors)] Address: Janssens, Lizanne, Laboratory of Aquatic Ecol., Evol. & Conserv., Univ. Leuven, Deberiotstr. 32, 3000 Leuven, Belgium. E-mail: lizanne.janssens@bio.kuleuven.be

**18314.** Johansson, H (2013): Fish stocking and its effect on biodiversity in Hökensås area: A comparison of invertebrate fauna between lakes. BcS. Student thesis: 22 pp. (in Swedish, with English summary) ["Pisciculture has been

shown to affect biodiversity negatively, e.g. owing to increased nutrient loading and modified genetic set by breeding at other qualities than what is advantageous in the wild. The purpose of this study was to investigate which impact stocked fish has on the invertebrate fauna and thereby biodiversity. The study is performed at Hökensås area in Västra Götalands län, where there are about 20 lakes included in a sport fishing business. There are seven lakes included in the study; four which yearly became stocked with fish and three non-stocked. By bottom fauna samples invertebrate fauna has been collected, identified, counted and measured [including "Odonata"]. No significant differences have been detected between the lake groups considering diversity index, number of taxa or size of taxa. Nor has significant correlation between amount stocked fish/year- and (a) diversity index, (b) number of taxa been shown. A possible factor that may have affected the result is, from a statistical point of view, the low number of lakes, the varying qualities of the lakes and that the collecting of invertebrate fauna was performed too early in the year than optimal. Strong correlation between number of taxa and grade of acidification was detected." (Author)] Address: Johansson, Hanna, University of Skövde, School of Life Sciences

**18315.** Jones, T.A.; Chumchal, M.M.; Drenner, R.W.; Timmins, G.N.; Nowlin, W.H. (2013): Bottom-up nutrient and top-down fish impacts on insect-mediated mercury flux from aquatic ecosystems. *Environmental Toxicology and Chemistry* 32(3): 612-618. (in English) ["Methyl mercury (MeHg) is one of the most hazardous contaminants in the environment; it adversely affects the health of both wildlife and humans. Recent studies have demonstrated that aquatic insects biotransport MeHg and other contaminants to terrestrial consumers, but the factors that regulate the flux of MeHg out of aquatic ecosystems via emergent insects have not been studied. We used experimental mesocosms to test the hypothesis that insect emergence [Libellulidae] and the associated flux of MeHg from aquatic to terrestrial ecosystems is affected by both bottom-up nutrient effects and top-down fish consumer effects. In the present study, nutrient addition led to an increase in MeHg flux primarily by enhancing the biomass of emerging insects whose tissues were contaminated with MeHg, whereas fish decreased MeHg flux primarily by reducing the biomass of emerging insects. Furthermore, we found that these factors are interdependent such that the effects of nutrients are more pronounced when fish are absent, and the effects of fish are more pronounced when nutrient concentrations are high. The present study is the first to demonstrate that the flux of MeHg from aquatic to terrestrial ecosystems is strongly enhanced by bottom-up nutrient effects and diminished by top-down consumer effects." (Authors)] Address: Chumchal, M.M., Biology Dept, Texas Christian University, Fort Worth, Texas, USA. E-mail: m.m.chumchal@tcu.edu

**18316.** Karjalainen, S. (2013): Sudenkorentojen kolmois-tandemit: havaintoja Suomesta [Dragonflies in triple tandem: records from Finland]. *Crenata* 6: 17-19. (in Finnish, with English summary) ["This paper lists all known Finnish records of

dragonflies in triple tandem. A total of nine records are known. They concern the following species: *Calopteryx splendens*, *C. virgo*, *Lestes sponsa*, *Sympetrum danae*, *Leucorrhinia dubia* and *L. rubicunda*. In two of the cases the triple connection was heterospecific." (Authors)] Address: Karjalainen, S., Neidonpuistontie 6 D 8, FI-02400 Kirkkonummi, Finland. Email: sk@korento.net

**18317.** Kitagawa, K.; Katatani, N. (2013): Notes on the odonate fauna of Southeast Asia Part 3. Amphipterygidae 1 (Genus *Devadatta*). *Aeschna* 49: 47-56. (in Japanese, with English summary) ["This is the third report of Southeast Asian Odonata of the genus *Devadatta* of the family Amphipterygidae. Six species and 2 subspecies are known; *D. argyroides argyroides*, *D. argyroides tiomanensis*, *D. cyanocephala*, *D. ducarix*, *D. glaucinotata*, *D. multinervosa*, *D. podolestoides podolestoides* and *D. podolestoides basilanensis*. *D. multinervosa* found in Laos and the female of *D. podolestoides basilanensis* distributed in the Philippines are not observed. The feature of the color pattern of the body, the caudal appendages of male and the distal abdominal segments of female are shown by photographs. The observations on these species and their distribution are also shown." (Authors)] Address: Kitagawa, K., Imai 1-11-6, Asahi-ku, Osaka C., Osaka, 535-0011, Japan

**18318.** Kolariková, K.; von Tümpling, W.; Bartels, P. (2013): Bioaccumulation of HCH isomers in selected macroinvertebrates from the Elbe River: sources and environmental implications. *Environmental Monitoring and Assessment* 185(5): 4333-4346. (in English) ["Sediments of the Elbe River have been extremely polluted by contaminants originating from previous large-scale hexachlorocyclohexane (HCH) production and the application of  $\gamma$ -HCH (lindane) in its catchment in the second half of the twentieth century. In order to gain knowledge on bioaccumulation processes at lower trophic levels, field investigations of HCHs in macroinvertebrates were carried out along the longitudinal profile of the Elbe and tributary. Among the sites studied, concentrations in macroinvertebrates ranged within five orders of magnitude (0.01–100  $\mu\text{g}/\text{kg}$ ). In general, lower values of HCH isomers were observed at all Czech sites (mostly <1  $\mu\text{g}/\text{kg}$ ) compared with those in Germany. At the most contaminated site, Spittelwasser brook (a tributary of the Mulde), extremely high concentrations were measured (up to 234  $\mu\text{g}/\text{kg}$   $\alpha$ -HCH and 587  $\mu\text{g}/\text{kg}$   $\beta$ -HCH in *Hydropsychidae*). In contrast, the Obríství site, though also influenced by HCH production facilities, showed only negligibly elevated values (mostly <1  $\mu\text{g}/\text{kg}$ ). Results showed that fairly high levels of  $\alpha$ -HCH and  $\beta$ -HCH compared to  $\gamma$ -HCH can still be detected in aquatic environments of the Elbe catchment, and these concentrations are decreasing over time to a lesser extent than  $\gamma$ -HCH. Higher HCH concentrations in sediments in the springtime are considered to be the result of erosion and transport processes during and after spring floods, and lower concentrations at sites downstream are thought to be caused by the time lapse involved in the transportation of contaminated particles from upstream. In addition, comparison with fish (bream) data from the literature

revealed no increase in tissue concentrations between invertebrates and fish." (Authors)] Address: Kolariková, Kateřina, Institute for Environmental Studies, Charles University, Benátská 2, 128 01, Praha 2, Czech Republic. E-mail: katarina.kolarikova@natur.cuni.cz

**18319.** Kremer, P. (2013): Entwicklung, Interpretation und Vergleich von ökologischen Nischenmodellen ausgewählter Segellibellen (Odonata: Libellulidae) in Deutschland. Wissenschaftliche Prüfungsarbeit gemäß §12 der Landesverordnung über die Erste Staatsprüfung für das Lehramt an Gymnasien vom 07. Mai 1982, in der derzeit gültigen Fassung der Johannes Gutenberg-Universität in Mainz, Fach: Biologie: 90 pp. (in German) ["The ecological niche is defined as an n-dimensional hyperspace composed of the sum of all abiotic and biotic environmental factors in which a species can survive and reproduce. Each living being has its specific ecological niche, limited by the total amount of tolerance areas, which can be modelled by known information about a species. Dragonflies are considered bioindicators that indicate the condition of water bodies and make the influence of climate change clear through migration. On the one hand, they are of great ecological importance, and on the other hand, there is a very high level of knowledge about these relatively large insects. Therefore, they are very suitable objects for niche modelling. Libellulidae are the most species-rich family within the Anisoptera. In this work, I created ecological niche models for nine of the 22 species of damselfly found in Germany. I was interested in whether it is generally possible to create niche models for dragonflies. I also checked how well the models can predict the actual distribution and how differences in the quality of the models come about. I then investigated whether the models could be transferred to other geographical areas. The study area comprised the eight southern German states of Baden-Württemberg, Bavaria, Rhineland-Palatinate, Saarland, Hesse, Thuringia, Saxony and North Rhine-Westphalia. Abiotic environmental parameters and distribution data of the species at mixed table leaf level were used as prediction parameters. The study period covers the years 1991 to 2006. 127 initial parameters were used, which were tested for correlation in pairs. There remained 61 and 62 independent parameters, respectively, which were used in the calculation of the models. The model calculation was carried out with the Maximum Entropy Method (MaxEnt). In order to incorporate the strongly correlated climate parameters into the models, four basic models were first created for each species. The climate parameters used were adapted to the life cycle of the dragonflies and were tested individually in the basic models. The basic models were gradually reduced to a few parameters and a final model was created for each of the nine species. The results were validated both in the study area (internally) and in the five northern federal states of Saxony-Anhalt, Brandenburg, Lower Saxony, Schleswig-Holstein and Mecklenburg-Western Pomerania (externally). For validation, the average AUC value, kappa, sensitivity and specificity were determined. The results varied greatly in terms of quality (AUC values between 0.518 and 0.968). Two models had very low quality. For seven species, I was able to model the ecological

niche and it was possible to create raster maps with distribution predictions of good to very good quality for the study area. The model parameters could be explained with the help of the habitat requirements of the respective species. A correlation was found between the AUC values and the number of occupied survey table sheets of the respective species. The more frequently the species occurred in the study area, the lower the AUC values achieved. This could explain the differences in model quality. For the external validation area, only very low values for sensitivity and kappa were achieved. It was not possible to transfer the model to the validation area and produce raster maps with distribution predictions. For dragonflies in general, several relevant parameters could be identified. Temperature plays the decisive role. Especially for the endangered and threatened species, models of high quality could be created, which makes it possible to identify habitats worth protecting and to stop their destruction or to renature them." (Author, DeepL)] Address: not stated

**18320.** Labroche, A. (2013): La diversité odonatologique des étangs Cagneaux. Bulletin de la Société d'Histoire Naturelle des Ardennes 102(2012): 86-99. (in French) [Les étangs Cagneaux, Saint-Marcel, NW of Charleville-, France. Between 2003-2012, a total of 32 species was recorded, including *Epithea bimaculata* and *Leucorrhinia caudalis* (11-VI-2003), is discussed in details with focus on its habitat requirements, and the red-listed *Aeshna grandis*, *A. isocetes*, *Gomphus vulgatissimus*, *Cordulegaster boltonii boltonii*, *Somatochlora metallica metallica* and *Epithea bimaculata* are outlined from a regional point of view.] Address: Labroche, A., 8a rue de Guépin, 08460 Saint-Marcel, France. E-mail: aurelienlabroche@gmail.com

**18321.** Laltanpuui; Mathai, M.T.; Gurusubramanian, G.; Lalremsanga, H.T.; Kumar, N.S. (2013): Diversity of Libellulidae (Insecta: Odonata) in Mizoram, northeast India. In: K. Khelchandra Singh, Kulendra C. Das & H. Lalruatsanga (eds.): Bioresources and Traditional Knowledge of Northeast India: 236-239. (in English) ["In the present study, 28 species of libellulidae belonging to genus *Acisoma*, *Aethriamanta*, *Bradinopyga*, *Brachydiplax*, *Brachythemis*, *Cratillia*, *Crocothemis*, *Diplacodes*, *Neurothemis*, *Orthetrum*, *Pantala*, *Potamarcha*, *Rhyothemis*, *Tetrathemis*, *Tramea*, *Trithemis* and *Tholymis* were collected and their distribution along the altitudinal range has been recorded for the first time in Mizoram. Among the species recorded during the present study, 10 species belonging to 8 genera were recorded for the first time in Mizoram. *Crocothemis servilia*, *Trithemis festiva*, *T. aurora*, *Orthetrum glaucum*, *O. pruinatum* and *Pantala flavescens* were the dominant species in all the surveyed sites. Five species, namely - *Acisoma paranorpoids*, *Tramea basilaris*, *Diplacodes nebulosa*, *Brachydiplax sorbina* and *B. chalybea* were found only in the lower altitudes less than 100 m above sea level. *Trithemis pallidinervis* was found only in high altitude more than 1000 m above sea level.] Address: Laltanpuui, Dept of Zoology, Madras Christian College, Tambaram, Chennai - 600 059, India. E-mail: laltetei@yahoo.co.in



**18322.** MacColl, A.D.C.; El Nagar, A.; de Roij, J. (2013): The evolutionary ecology of dwarfism in three-spined sticklebacks. *Journal of Animal Ecology* 82(3): 642-652. (in English) ["Body size is a defining phenotypic trait, but the ecological causes of its evolution are poorly understood. Most studies have considered only a single putative causal agent and have failed to recognise that different environmental agents are often correlated. Darwin suggested that although trait variation across populations is often associated with abiotic variation, evolution is more likely to be driven by biotic factors correlated with the abiotic variation. This hypothesis has received little explicit attention. We use structural equation modelling to quantify the relative importance of abiotic (pH, metal concentrations) and biotic (competition, predation) factors in the evolution of body size in three-spined sticklebacks *Gasterosteus aculeatus* on the island of North Uist, Scotland. We combine phenotypic data from multiple isolated populations, detailed characterisation of their environment and a common garden experiment that establishes the genetic basis of size differences. Three-spined sticklebacks on North Uist show almost unprecedented intraspecific evolution of body size that has taken place rapidly (<16 000 years). The smallest fish mature at only 7% of the mass of ancestral, anadromous fish. Dwarfism is associated with reduced abundance of a smaller competitor species, the nine-spined stickleback *Pungitius pungitius*, and with low pH indicative of poor resource conditions. Dwarfism also tends to occur where an important predator, the brown trout *Salmo trutta*, is also small. The abundance of *P. pungitius* and the size of *S. trutta* are themselves related to underlying abiotic environmental variation. Despite the close association between abiotic and biotic factors across populations, our results support Darwin's hypothesis that biotic factors, associated with variation in the abiotic environment, are more important in explaining evolution than is abiotic variation per se. This study demonstrates the importance of considering the relationships between environmental variables before conclusions can be drawn about the causes of (body size) evolution on islands." (Authors) *Aeshna juncea* and *Sympetrum* spp. larvae are present at low density where there is emergent vegetation, which is rare in the North Uist lochs.] Address: MacColl, A., School of Biology, Univ. Nottingham, University Park, Nottingham, UK. E-mail: [andrew.maccoll@nottingham.ac.uk](mailto:andrew.maccoll@nottingham.ac.uk)

**18323.** Macedo, M.N.; Coe, M.T.; DeFries, R.; Uriarte, M.; Brando, P.M.; Neill, C.; Walker, W.S. (2013): Land-use-driven stream warming in southeastern Amazonia. *Philos. Trans. R. Soc. London B Biol. Sci.* 368(1619): 9 pp. (in English) ["Large-scale cattle and crop production are the primary drivers of deforestation in the Amazon today. Such land-use changes can degrade stream ecosystems by reducing connectivity, changing light and nutrient inputs, and altering the quantity and quality of streamwater. This study integrates field data from 12 catchments with satellite-derived information for the 176 000 km<sup>2</sup> upper Xingu watershed (Mato Grosso, Brazil). We quantify recent land-use transitions and evaluate the influence of land management on

streamwater temperature, an important determinant of habitat quality in small streams. By 2010, over 40 per cent of catchments outside protected areas were dominated (greater than 60% of area) by agriculture, with an estimated 10 000 impoundments in the upper Xingu. Streams in pasture and soya bean watersheds were significantly warmer than those in forested watersheds, with average daily maxima over 4°C higher in pasture and 3°C higher in soya bean. The upstream density of impoundments and riparian forest cover accounted for 43 per cent of the variation in temperature. Scaling up, our model suggests that management practices associated with recent agricultural expansion may have already increased headwater stream temperatures across the Xingu. Although increased temperatures could negatively impact stream biota, conserving or restoring riparian buffers could reduce predicted warming by as much as fivefold." The paper includes a passing reference to *Odonata*: Batista (2010); <https://www.locus.ufv.br/handle/12-3456789/7837> (Authors)] Address: Macedo, Marcia, Woods Hole Research Center, Falmouth, MA 02540, USA. Email: [mmacedo@whrc.org](mailto:mmacedo@whrc.org)

**18324.** Mauersberger, R.; Brauner, O.; Petzold, F.; Kruse, M. (2013): Die Libellenfauna des Landes Brandenburg. *Naturschutz und Landschaftspflege in Brandenburg* 22(3/4): 168 pp. (in German) [Federal state Brandenburg, Germany: checklist of species, phenology, habitats and regional distribution (maps) are outlined in detail.] Address: Mauersberger, R., Bahnhofstr. 24, D-17268 Templin, Germany. E-mail: [Foerderverein\\_Ueckermark.Seen@t-online.de](mailto:Foerderverein_Ueckermark.Seen@t-online.de)

**18325.** McGoff, E.; Aroviita, J.; Pilotto, F.; Miler, O.; Solimini, A.G.; Porst, G.; Jurca, T.; Donohue, L.; Sandin, L. (2013): Assessing the relationship between the Lake Habitat Survey and littoral macroinvertebrate communities in European lakes. *Ecological Indicators* 25: 205-214. (in English) ["Implementation of the EU Water Framework Directive (WFD) has drawn much attention to hydromorphological alterations of surface waters. The Lake Habitat Survey (LHS) protocol provides a method for characterising and assessing the physical habitats of lakes and reservoirs. Two metrics were developed based on this method: the Lake Habitat Modification Score (LHMS) and the Lake Habitat Quality Assessment (LHQA), as measures of lake modification and habitat value, respectively. However, the use of these metrics to predict measures of ecological quality remains largely untested. Thus, we assessed the relationships between LHS metrics and the littoral macroinvertebrate community in 42 lakes across Europe. A significant relationship was found between littoral macrophyte descriptors and riparian natural land cover variables of the LHQA score and macroinvertebrate community composition in 2 out of 4 European regions. No relationship was found between macroinvertebrate community composition and the LHMS. Some significant correlations were found between selected macroinvertebrate metrics and the LHS scores, but this pattern was not consistent across regions, and no relationship was found with the overall LHMS or LHQA scores. This demonstrates that the LHS metrics do not consistently predict the quality

of littoral macroinvertebrate communities across Europe, and a region specific approach may be necessary. However, we could demonstrate a relationship between the site specific LHS variables and the macroinvertebrate community at the site level, and in some cases at the regional level. Therefore, although the LHS metrics do not appear to be a useful for relating habitat quality and pressure to littoral macroinvertebrate communities, selected LHS variables may exhibit stronger relationships with the biota." (Authors) Indices include "Odonata".] Address: McGoff, Elaine, Department of Aquatic Sciences & Assessment, Swedish University of Agricultural Sciences (SLU), P.O. Box 7050, SE 750 07 Uppsala, Sweden. E-mail: elaine.mcgoff@slu.se

**18326.** Meng, X.G.; Sun, M. (2013): Aerodynamic effects of wing corrugation at gliding flight at low Reynolds numbers. *Phys. Fluids* 25, 071905 (2013); doi: 10.1063/1.4813-804: 15 pp. (in English) ["Corrugation gives an insect-wing the advantages of low mass, high stiffness, and low membrane stress. Researchers are interested to know if it is also advantageous aerodynamically. Previous works reported that corrugation enhanced the aerodynamic performance of wings at gliding flight. However, Reynolds numbers considered in these studies were higher than that of gliding insects. The present study showed that in the Reynolds number range of gliding insects, corrugation had negative aerodynamic effects. We studied aerodynamic effects of corrugation at gliding motion using the method of computational fluid dynamics, in the Reynolds number range of  $Re = 200-2400$ . Different corrugation patterns were considered. The effect of corrugation on aerodynamic performance was identified by comparing the aerodynamic forces between the corrugated and flat-plate wings, and the underlying flow mechanisms of the corrugation effects were revealed by analyzing the flow fields and surface pressure distributions. The findings are as follows: (1) the effect of corrugation is to decrease the lift, and change the drag only slightly at  $15^\circ-25^\circ$  angles of attack, lift is decreased by about 16%; at smaller angles of attack, the percentage of lift reduction is even larger because the lift is small). (2) Two mechanisms are responsible for the lift reduction. One is that the pleats at the lower surface of the corrugated wing produce relatively strong vortices, resulting in local low-pressure regions on the lower surface of the wing. The other is that corrugation near the leading edge pushes the leading-edge-separation layer slightly upwards and increases the size of the separation bubble above the upper surface, reducing the "suction pressure," or increasing the pressure, on the upper surface." (Authors)] Address: Sun, M., Ministry-of-Education Key Laboratory of Fluid Mechanics, Beijing University of Aeronautics and Astronautics, Beijing 100191, China

**18327.** Mikołajczuk, P. (2013): New sites of Pygmy Damselfly *Nehalennia speciosa* (Charpentier, 1840) (Odonata: Coenagrionidae) in the southern part of Podlasie with notes on ecology and species mobility. *Odonatrix* 9(1): 1-12. (in Polish, with English summary) ["The Author discusses 7 new sites of *N. speciosa* in the southern Podlasie (central-eastern Poland). Two of them (no. 4 and 5) are situated within

agricultural landscape and have no forest buffering zone. It shows that the environment without forest surrounding but with suitable spatial structure of vegetation – a key factor for *N. speciosa* – can be inhabited by this species. Microhabitat preferences of Pygmy Damselfly found during studies were interesting. Except for sedge species given in the literature as most preferable plant species by *N. speciosa*, at sites discussed in this paper the leading plant components for this species were *Equisetum fluviatile* (sites 4 and 5) and *Eriophorum vaginatum* (site 2). These are, respectively, only the fourth and second confirmed records of this kind in Poland. At two sites within the study area imagines as well as larval development in larger patches of *Carex vesicaria* (site 6 in this paper) were also found. Moreover, at one of them, many larvae were collected in the aggregation of *Eriophorum angustifolium*. At both known sites with *E. vaginatum* imagines were present in its clumps while larvae – at their bases and probably in spaces between, with flooded *Sphagnum*. These are the examples of inconsiderable spatial separation of larval and imaginal habitats although they were close. The similar situation was found in south-eastern Poland, where *Molinia caerulea* grew on land in the direct neighbourhood to a flooded peat bog excavation. *Carex elata* as the leading plant component was found at one of the sites from eastern Mazowsze. The clumps of *C. elata* were not massive and did not display typical hummock-hollow structure. Loose clump formations of *Carex* sp. (*C. elata* probably) are also known at one site in south-eastern Poland. All of these observations confirm that ecological plasticity and habitat spectrum of *N. speciosa* are bigger than previously thought. Presented data shows the ability of *N. speciosa* for the colonization of new sites. Site 3 was not the place of development: the observed individuals are the example of dispersion. However, site 2 had originally the character of a bog forest with large trees. Suitable conditions appeared there until 2011 due to a record increase in groundwater level and the death of almost all the trees – the site was colonized in this year. Distance from the nearest active site is ca. 400 and 700 m. Therefore *N. speciosa* is fully mobile, at least for close distances (ca. 1 km) and certainly these are not exceptional cases. Many sites of *N. speciosa* in southern Podlasie dry up partly or entirely during dry summers. At some of them the periods without water could be longer than hydration periods. It is not clear whether the presence of the species in many of these sites is the result of surviving by the larvae unfavourable hydrological conditions, or rather the result of colonization. Clarification of this issue should provide further observations of dried sites in the year 2012." (Author)] Address: Mikołajczuk, P., ul. Partyzantów 59c/26, 21-560 Międzyrzec Podlaski, Poland. E-mail: gugapm@wp.pl

**18328.** Miler, O.; Porst, G.; McGoff, E.; Pilotto, F.; Donohue, L.; Jurca, T.; Solimini, A.; Sandin, L.; Irvine, K.; Aroviita, J.; Clarke, R.; Pusch, M.T. (2013): Morphological alterations of lake shores in Europe: A multimetric ecological assessment approach using benthic macroinvertebrates. *Ecological Indicators* 34: 398-410. (in English) ["Besides pollution, lakes are affected by human alterations of lake-shore morphology.

However, ecological effects of such alterations have rarely been studied systematically. Hence, we developed tools to assess the ecological effects of anthropogenic morphological alterations on European lake-shores based on pressure-specific response patterns of littoral macroinvertebrate community composition. Littoral invertebrates were sampled from 51 lakes in seven European countries. Sampling covered a range of natural to heavily morphologically degraded sites including natural shorelines, recreational beaches, ripraps and retaining walls. Biological data were supplemented by standardized morphological data that were collected via a Lake Habitat Survey (LHS) protocol and subsequently used to develop a morphological stressor index. Two biotic multimetric indices were developed based on habitat-specific samples (Littoral Invertebrate Multimetric based on Habitat samples, LIMHA) and composite samples (Littoral Invertebrate Multimetric based on Composite samples, LIMCO) through correlations with the morphological stressor index. Similarity analyses showed strong spatial differences in macroinvertebrate community composition between four main geographical regions, i.e. Western, Northern, Central and Southern Europe. The morphological stressor index as well as LIMCO and LIMHA have been developed for each geographical region specifically, thereby optimizing correlations of LIMCO and LIMHA with the respective morphological stressor index. The metric composition of LIMCO and LIMHA and their correlation coefficients with the morphological stressor index are comparable to existing national and regional methods that assess morphological lakeshore degradation via macroinvertebrate communities. Hence, LIMCO and LIMHA indices constitute a new stressor-specific assessment tool that enables comparable lake morphology assessment across Europe, as it has been developed involving a uniform methodology followed by regionalized optimization. These tools fulfil the standards of the EU Water Framework Directive and thus may complement existing assessment approaches used in lake monitoring focusing solely on lake eutrophication so far." (Authors) The index includes "Odonata".] Address: Miler, O., Leibniz Institute of Freshwater Ecol. & Inland Fisheries (IGB), Müggelseedamm 301, 12587 Berlin, Germany. E-mail: oliver.miler@web.de

**18329.** Mohammed, I.F.A.; Al-Asady, H.S. (2013): External morphological study of *Sympetrum decoloratum* Selys (Odonata: Libellulidae). *Ibn Al-Haitham Journal for Pure and Applied Science* 26(1): 34-45. (in Arabian, with English summary) [The morphology of *S. decoloratum* is outlined and figured in detail.] Address: Al-Asady, H.S., Dept. of Biology/College of Education for Pure Science(Ibn-Al-Haitham)/ University of Baghdad, Iraq

**18330.** Monvoisin, C. (2013): Etude des cortèges d'Anisoptères des cours d'eau et de l'implication des microhabitats ligneux dans leur répartition. Rapport de stage Master 1 Patrimoine Naturel et Biodiversité, UFR SVE: 23 pp. (in French) ["The study was carried out on sections of four rivers in the Pays de la Loire region: the Sèvre nantaise (between the Grossière bridge and Terbin, in Boussay), the upstream part of the Erdre (between Nort sur Erdre and Joué sur

Erdre), the Huisne (between Saint Mars La Brière and Monfort le Gesnois and between Brêteau and Vouvray sur Huisne), and the upstream part of the Mayenne (between Gué de Loré and la Frétière). Conclusion: Anisopteran species and their environment are linked by complex relationships that are difficult to define. Multiple factors are involved throughout their life cycle. The effects of certain variables such as the nature of the sediments, the nature and presence of hydrophytes, helophytes, herbaceous plants as well as the physico-chemical quality of the water have yet to be studied on these rivers. Furthermore, the sampling carried out could not be standardised in terms of the total length of bank surveyed per river, so comparisons between sites seem less relevant. Research must be continued over several years and several rivers to try to define the factors involved in the presence of particular species of Anisoptera." (Author, DeepL) *Boyeria irene*, *Oxygastra curtisii*, *Gomphus pulchellus*, *G. vulgatissimus*, *Onychogomphus forcipatus*] Address: not stated

**18331.** Morgenstern, R. (2013): Vergleich von Nischenmodellen bei Libelluliden (Odonata). Diplomarbeit Johannes-Gutenberg Universität Mainz Fachbereich Biologie. Institut für Zoologie, Abteilung Ökologie, Johann-Joachim-Becherweg 13, 55128 Mainz: 58 pp, appendix- (in German) ["The concept of the ecological niche, established by Hutchinson in 1958, is still relevant today. The underlying principle, namely that a species has a certain fitness along the gradients of certain environmental parameters, is used in current studies to predict, for example, the distribution or the change in distribution of a species under certain conditions. In this work, I investigated the similarities and differences of niche models within two genera of the damselfly family. I also tested whether species with more occurrences or rarer species could be modelled better. For this purpose, I first collected data on topography, land use, landforms and climate for all federal states in Germany, in addition to occurrence data for the 13 species of the two genera *Orthetrum* and *Sympetrum*. From these raw data, I created 127 prognostic variables, which were then tested for correlation with each other in order to use only parameters in the models that do not correlate with each other. This allowed me to calculate five seasonally different niche models for each species using MaxEnt software and validate the best ones internally and externally. For this purpose, I chose central and southern Germany as the internal model creation space and northern Germany as the external validation space. The specificity, sensitivity and kappa value were used for validation. It turned out that all models produced an AUC value (goodness of fit measure from 0 to 1) above 0.5, which made them better than a model based on random predictions. However, only for the less widespread species were very good niche models found with AUC values above 0.7. These good models used temperature parameters most often, indicating the thermophily of damselflies, because as temperatures increased, so did the probabilities of occurrence. In addition, it became apparent that soil pH values seem to play a greater role than previously assumed, as these also very often played an important role in the niche models. However, the models created for Central and

Southern Germany did not transfer so well to the external validation area of Northern Germany, which could probably be due to the very different characteristics of the two areas as well as the fact that a complete fitness curve, i.e. niche mapping, was not achieved for all parameters. As a conclusion, it can be said that the niche modelling of the damselflies was quite successful and that the results of this work were also found in the other genera of the family. For more comprehensive models that can be better transferred to unknown territory, a finer observation level, a larger study area, more specific parameters or a combination of these three is probably necessary. After all, Germany only represents a section of the total distribution of the species studied, and the chosen level of observation and the characteristics studied do not seem to lead to the desired results for all species." (Authors, DeepL.) Address: E-mail: robertmo@students.uni-mainz.de

**18332.** Noel, N. (2013): La Grande Aeshne en Normandie; *Aeshna grandis* (Linnaeus, 1758) (Odonata, Aeshnidae). *L'Entomologiste Haut-Normand* 3: 9-13. (in French) [*A. grandis* is a rare species in Normandy. Two main population nuclei are known in Normandy: one formed by populations located in the south of the Eure (Avre valley, Iton valley) and the Perche ornais and a second in the north of the Seine-Maritime (Bresle valley, in continuity with the populations present in Picardy). In 2013, in Normandy, sightings of the species relatively far from the sites where it was previously known are at the origin of this article. In Haute-Normandie, the species has been observed in new localities: - Commune of Canéhan (76), in the Yères valley by Nicolas MOULIN (1 ♂, 23-VIII-2013). Observation located more than 25 km from the nearest site where the species is known (Bresle valley). - Commune of Heudreville-sur-Eure (27), in the Eure valley, by Adrien SIMON (1 ♂, on 30-VIII-2013 and 05-IX-2013). Observation located more than 35 km from the nearest known breeding site. - Commune de la Vieille-Lyre (27), in the Risle valley, by Nicolas NOEL (1 ♂, on 23-IX-2013 and 25-IX-2013). Observation located more than 12 km from the nearest known breeding site. - Commune of Guichainville, in the Iton valley (27), by Emmanuel MACE. Observation (05-VIII-2013) located more than 15 km from the nearest known breeding site.] Address: Noel, N. 2 rue des Andelys, 27380 Douville-sur-Andelle, France. E-mail: nicolas.noel27@orange.fr

**18333.** OPIE Franche-Comté (2013): Listes rouges régionales d'insectes de Franche-Comté: Libellules (Odonates), Criquets, Sauterelles et Grillons (Orthoptères), Papillons de jour (Rhopalocères & Zygènes) et Mantres (Mantidés). maison de l'environnement de Franche-Comté 7 rue Voirin - 25000 BESANCON: 16 pp. (in French) [Red list of Odonata from the Départements Doubs, Jura, Haute-Saône and Territoire de Belfort, the region in France bordering to the western border of Switzerland.] Address: OPIE Franche-Comté, maison de l'environnement de Franche-Comté, 7 rue Voirin - 25000 Besancon, France. E-mail: cbnfc@cbnfc.org; www.cbnfc.org

**18334.** Siepielski, A.M.; Wang, J.; Prince, G. (2013): Non-

consumptive predator driven mortality causes natural selection on prey. *Evolution* 68(3): 696-704. (in English) ["Predators frequently exert natural selection through differential consumption of their prey. However, predators may also cause prey mortality through non-consumptive effects, which could cause selection if different prey phenotypes are differentially susceptible to this non-consumptive mortality. Here we present an experimental test of this hypothesis, which reveals that non-consumptive mortality imposed by predatory dragonflies causes selection on their damselfly prey favouring increased activity levels. These results are consistent with other studies of predator driven selection, however, they reveal that consumption alone is not the only mechanism by which predators can exert selection on prey. Uncovering this mechanism also suggests that prey defensive traits may represent adaptations to not only avoid being consumed, but also for dealing with other sources of mortality caused by predators. Demonstrating selection through both consumptive and non-consumptive predator mortality provides us with insight into the diverse effects of predators as an evolutionary force." (Authors)] Address: Siepielski, A.M., Dept Biol., Univ. San Diego, 5998 Alcalá Park, San Diego, California 92110, USA. E-mail: adamsiepielski@sandiego.edu

**18335.** Simon, A. (2013): Précisions sur la répartition de la naïade aux yeux rouges: *Erythromma najas* (Hansemann, 1823), (Coenagrionidae, Odonata) en Haute-Normandie. *L'Entomologiste Haut-Normand* 3: 52-55. (in French) [*E. najas* is considered "exceptional" in Haute-Normandie and classified as "critically endangered" on the regional red list established in 2010 according to the methodology recommended by the IUCN. In the years following this assessment, targeted research on this species was undertaken and it was found that it was in fact somewhat more widespread than previously assumed. This article presents the new evidence gathered in recent years.] Address: Simon, A., 3, rue de la Bouillotte – 27350 Hauville, France. E-mail: simon.adrien1@voila.fr

**18336.** Soucek, D.J.; Levenson, J.M.; Gallo, S.; Hill, W.R.; Bordson, G.O.; Talbot, J.L. (2013): Risks to birds in the Lake Calumet region from contaminated emergent aquatic insects. RR Series (Illinois Sustainable Technology Center); RR-122: 76 pp. (in English) ["The highly industrialized Grand Calumet River basin includes an extensive wetlands complex that has been severely degraded through heavy industrial activity, sewage and industrial discharges, landfills, and hazardous waste storage/disposal. Sediments and other environmental media in this area are contaminated with heavy metals and organic compounds. Our objective was to empirically quantify risks to insectivorous birds in the Lake Calumet wetlands region from contaminated sediments via ingestion of aquatic insects using tree swallows (*Tachycineta bicolor*) as a model organism. To accomplish this objective, we completed the following tasks: (1) assessed organic contaminant transfer (polychlorinated biphenyls [PCBs], organochlorine pesticides, polybrominated diphenylethers [PBDEs]) from an aquatic ecosystem (sediment



and benthic macroinvertebrates) to a terrestrial food chain (tree swallows feeding on emergent aquatic insects), (2) quantified elemental contaminants in these locales and biota, (3) evaluated ecological effects these contaminants may have on tree swallows, comparing mercury loads and nesting ecology data at different sites as a case study, and (4) assessed the value of stable isotope data in determining how food chain length and food source (aquatic versus terrestrial, location of origin) affects contaminant loads in tree swallows nesting at Lake Calumet wetlands. With the exception of timing of nest initiation and other variables that are dependent on nest initiation timing (e.g., clutch size, and nestling mass), we observed no differences among sites in tree swallow nesting ecology endpoints. A variety of inorganic and organic contaminants were accumulated by nestlings via their insect diets, but concentrations of nearly all the contaminants were at the lower end of ranges in the literature. The exception to this trend was dichlorodiphenyldichloroethylene (DDE) concentrations in eggs and nestlings at Big Marsh which were among the higher reported values. To our knowledge, this paper is the first report of PBDEs concentrations in tree swallow nestlings. Our stable isotope analysis suggested a terrestrial origin for many of the contaminants as has been suggested by others." (Authors)] Address: not stated

**18337.** Susmita, G.; Sushmita, D.; Pinki, P. (2013): Use of aquatic insects in Water quality assessment of ponds around two cement factories of Assam, India. *International Research Journal of Environment Sciences* 2(7): 15-19. (in English) ["Present study was carried out using aquatic insects as bio monitors in a few ponds located near Badarpur and Bokajan cement factories, Assam, North East India. Study revealed presence of aquatic insect order Hemiptera, two families (Gerridae and Notonectidae) and three species (Anisops sp., Gerris sp. and Buena sp.) from the ponds located around Cement factory, Badarpur. Anisops sp. was found eudominant in all the ponds except pond 1 where Gerris sp. was eudominant. Ponds (pond 5 and 6) located around Bokajan Cement Factory revealed presence of two aquatic insect orders (Hemiptera and Odonata), five families (Notonectidae, Gerridae, Nepidae, Coenagrionidae and Libellulidae) and eight species (Gerris sp., Anisops sp., Limnometra sp., Ranatra sp., Pseudogriion sp., Ischnura sp., Libellula sp., Sympetrum sp.). In Pond 5, Gerris sp. was found eudominant. In Pond 6, Anisops sp. was found eudominant. In each of the five ponds diversity index (Shannon H' Log Base 10) values were found less than 1 where as signal values were found less than 5.5. Study reported low diversity and occurrence of only tolerant group of aquatic insects in the aquatic systems around the cement factories confirming the fact that aquatic insects are good indicator of water quality." (Authors)] Address: Susmita, G., Dept of Ecology & Environment Science, Assam Univ., Silchar-788004, India

**18338.** Tennessen, K. (2013): *Gomphus lynnae* (Columbia Clubtail) in New Mexico. *Argia* 25(3): 15. (in English) [Gila River, Grant County, New Mexico, 19-V-2013. Photo by Ken Tennessen. Owyhee River, Malheur County, Oregon, 10-VI-2013. Photo by Jim Johnson.] Address: Tennessen, K., 125

N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennes-  
sen@centurytel.net

**18339.** Terzani, F.; Mazza, G.; (2013): 559 - *Cordulegaster bidentata bidentata* Selys, 1843 (Odonata Cordulegastri-  
dae). *Boll. Soc. Entomol. Ital.* 145 (1): 1- (in Italian) ["Lazio: Prov. Viterbo, Acquapendente, loc. Il Sasseto, Torre Alfina, m 550, 5.VI.2010, Mazza G. legit, 1 female (Coll. Mus. St. Nat. Univ., Firenze)."] (Authors)] Address: Terzani, F., Museo di Storia Naturale dell'Universita di Firenze, sezione di Zoologia "La Specola", Via Romana 17, I-50125 Firenze, Italy. E-mail: libellula.ter@gmail.com

**18340.** Varshney, P.K.; Agrahari, R.K.; Singh, S.K.; Yadav, A.K.; Pandey, A.K. (2013): Biological diversity of live food spectrum at Maa Chandrika Devisite in upstream of river Gomti in Lucknow (India). *Journal of Ecophysiology & Occupational Health* 12(3/4) (2012): 113-127. (in English) ["An upstream location along the course of river Gomti in Lucknow, Maa Chandrika Devi, was identified for the present study. The water quality of the river at the site was moderate with mean DO 6.15 mg l<sup>-1</sup> whereas nitrate (22.70 mg l<sup>-1</sup>), phosphate (2.40 mg l<sup>-1</sup>) and COD (48.72 mg l<sup>-1</sup>) were high. The high concentration of nutrients as well as COD during pre-monsoon may be due to low precipitation and influx of effluents during summer. Phytoplanktons were represented by Chlorophyceae, Bacillariophyceae and Xanthophyceae. Phytoplankton mainly contributed by Gonatozygon (10.89%), Closteridium (30%), Cladophora (34.94%) and Cosmerium (14.49%). Protozoa, Ostracoda, Rotifera, Cladocera, Copepoda, Diptera and Oligochaeta were the zooplankton phyla. The dominant zooplankton genera were Brachionus (13.38%), Daphnia (5.55%), Moinodaphnia (6.94%), Cyclops (22.22%), Mesocyclops (11.11%) and Diaptomus (8.33%) apart from worms (8.33%). Benthic fauna was represented by Oligochaeta, Chironomus, Crustacea, Diptera, Odonata, Nematoda, Pelecypoda, Gastropoda and leech. Chironomus with contribution of 54.09% dominated the fauna. Other predominant groups were Oligochaeta (20.16%), Pelecypoda (16.57%) and Diptera (4.99%). In general, high population density of phytoplankton, zooplankton and benthos were encountered during premonsoon season. Low population of zooplankton compared to phytoplankton and increasing number of rotifers next to copepods and cladocerans as well as presence of protozoans indicated substantial load of organic matter. The organic pollution indicator benthic species like Branchiura, Tubifex, Chironomus, Cullicoid larvae (Diptera), Lamellidans, Corbicula, Lymnaea and leech also supported the polluted environment. Shannan-Wiener index of less than 1 for Diptera, Gastropoda and Pelecypoda indicated the stressed environment. Low abundance of plankton population in spite of high nutrient budget of the ecosystem was the function of great infestation of water quality which indicated extreme state of pollution." (Authors)] Address: Varshney P.K., National Bureau of Fish Genetic Resources, (ICAR), Lucknow, Uttar Pradesh, India. E-mail: pkvarshney1@gmail.com

**18341.** Wiener, J.G.; Haro, R.J.; Rolfhus, K.R.; Sandheinrich, M.B.; Bailey, S.W.; Northwick, R.M.; Gostomski, T.J.

(2013): Bioaccumulation of contaminants in fish and larval dragonflies in six National Park units of the western Great Lakes region, 2008-2009. Natural Resource Data Series NPS/GLKN/NRDS—2013/427. National Park Service, Fort Collins, Colorado: 108 pp. (in English) ["The authors report results of an initial assessment completed during 2008 and 2009 of selected bioaccumulative contaminants in aquatic organisms in six national park units within the Great Lakes Inventory and Monitoring Network. The park units included in the study were Grand Portage National Monument, Indiana Dunes National Lakeshore, Isle Royale National Park, Pictured Rocks National Lakeshore, Sleeping Bear Dunes National Lakeshore, and Voyageurs National Park. The principal objectives of this project were (1) to assess spatial patterns in contamination of aquatic biota in the six park units, (2) to identify park units and surface waters where concentrations of bioaccumulative contaminants may pose a risk to organisms atop aquatic food webs, and (3) to evaluate temporal trends in contamination of aquatic food webs in parks of the Great Lakes Network." (Authors) lead; mercury; DDT; PCB; PFC; PBDE] Address: Wiener, R.J., University of Wisconsin-La Crosse, River Studies Center, 1725 State Street, La Crosse, Wisconsin 54601, USA

**18342.** Zurawlew, P. (2013): Dragonflies (Odonata) of the borderland between the Kalisz High Plain and Rychwalska Plain (Great Poland). *Odonatrix* 9(2): 33-54. (in Polish, with English summary) ["Paper summarizes six-year long (2007–2012) studies on dragonflies (Odonata) in the county of Pleszew (Western Poland) as well as the eight border sites located in the area of adjacent counties (Fig. 1). The whole area is in the macroregion of the Południowopolska Lowland, in the borderland of two mesoregions: the Kalisz High Plain and Rychwalska Plain. The research was aimed at understanding the species composition of dragonflies and discovering as many sites of rare species as possible. 58 sites lying on the Kalisz High Plain and 85 sites located in the Rychwalska Plain were controlled. Noteworthy is the presence of tens Sphagnum peat bogs in the studied part of the Rychwalska Plain. ... Most of the sites were controlled irregularly (mainly between June and August), often only once. The records of particular species were differentiated into three categories: 1) development confirmed (larvae, exuviae, teneral imagines, intensive reproductive behavior – copulations, tandems, laying eggs), 2) development likely (single reproductive behavior, territorial imagines, a large population in the environment suitable for development), 3) development possible (single imagines observed only). In the years 2007–2012 in the discussed area 55 species of dragonflies were recorded (data in this paper), as well as *Aeshna juncea* given earlier (Bernard, Tończyk 2011). Total number of 56 species comprise 77% of the species reported in Poland so far (Bernard et al. 2009). For many species important information clearly enriching the knowledge of their distribution in this part of Poland was collected. This particularly refers to the species associated with Sphagnum bogs (*Aeshna subarctica*, *Leucorrhinia albifrons*, *L. dubia* and *L. rubicunda*), thermophilous species (*Aeshna affinis*, *Orthemis albistylum*, *O. brunneum*, *O. coerulescens*, *Crocothemis*

*erythraea*, *Sympetrum fonscolombii* and *S. meridionale*) as well as rare and very rare in south-western Poland (*Lestes barbarus*, *Sympecma paedisca*, *Coenagrion lunulatum*, *Epi-theca bimaculata* and *Leucorrhinia caudalis*). Protection of the studied Sphagnum peat bogs, where many rare and protected species of vascular plants (Zurawlew & Zurawlew 2010) and the dragonflies (this study) are present, should be one of the priorities of the Forestry Grodziec managing this area. The four tables given in this paper show: studied habitats with the number of species (Tab. 1), a list of the sites of all species and the observed flight period (Tab. 2), the sites with the highest number of species (Tab. 3) and the listing of the occurrence of dragonflies for 15 UTM squares covering the studied area (Tab. 4)." (Author)] Address: Zurawlew, P., Kwilen 67a, 63-313 Chocz, Poland. E-mail: grusleon@gmail.com

## 2014

**18343.** Hanciková, B. (2014): Local dispersal of golden-ringed dragonfly *Cordulegaster boltonii* - Lokální disperse páskovce *Cordulegaster boltonii*. MSc. thesis, Faculty of Science, Department of Ecology, Univerzita Karlova, Praha: 47 pp. (in Czech, with English summary) ["We carried out a pilot study of local dispersion and patterns of movement of *C. boltonii*. *Cordulegasteridae* is a family with many primitive traits present and rather restricted geographical distribution ranges (at least among European species). Their migration seems to be limited despite the body size that predetermines them to high mobility over large spatial scale. Linear habitat (upper parts of narrow forest streams) specialisation along with behavioural ecology (peculiar premating habit of scanning streams for females) is a unique life history, which bring lot of questions. We collected mark-release-recapture data during two adult flight seasons in year 2010 and 2011. We were simultaneously capturing patrolling males along three separate streams (Dracice, Koštenický and Struha) in total length of 9.9 km in, located in the Natural park Česká Kanada, in the Southern Czech Republic. We captured and marked 440 individuals and recorded 113 recapture events (26 % recapture rate) in year 2010 and 355 individuals were marked, 171 recapture events made (48 % recapture rate) in 2011. Our data suggested high level of stream fidelity (only 10 inter stream dispersal events, 2.8 % dispersal rate). What was as well reflected in a closeness of population estimated by Craig analyse. Patrolling males had home range about 250 m, home ranges had large overlaps that resulted in a high-density male cooccurrence not territoriality. Despite general expectation males rather stayed within favoured and crowded patch than moved into a bit more unfavourable low density patches, which were readily being abandoned. There was not observed a correlation between female (even though very rare) visits and patches favoured by males. We have not found any preference for patrol flight direction (upstream vs. downstream). During sampling we observed interesting behavioural interaction when we found that time schedule of patrolling males on streams is not random and a large proportion of males were patrolling subsequently within one minute interval." (Author)] Address: not stated

**18344.** Lan, H.-b.; Ran, J.-c. (2014): Odonata in stream of Maolan karst forest. Hubei Agricultural Sciences 53(7): 1528-1534. (in Chinese, with English summary) ["Based on investigations and identifications, 63 species of 11 families were found in Odonata of stream in Maolan karst forest, among which there were 25 Libellulidae, 4 Gomphidae, 7 Coenagrionidae, 6 Aeshnidae Rambur, 5 Platyenemididae, 2 Macromidae, 3 Agriidae, 4 Epallagidae, 2 Amphipterygidae, 4 Libellaginidae, 1 Megapodagrionidae. There were new records of Guizhou in *Gynacantha saltatrix*, *Orthetrum glaucum*, *Rhyothemis fuliginosa*, *Mnais earnshawi*, *Philoganga vetusta*, *Libellago lineata*, *Agriocnemis lacteola*." (Authors)] Address: Lan, H.-b., Management Department of Maolan Nature Reserve in Guizhou, Libo 558400, Guizhou, China. E-mail: lanhongbo0913@163.com

**18345.** Morikawa, M.; Akihito, A.; Kobayashi, T. (2014): The litter supply regulates the structure of the dragonfly larva community. Journal of the Japanese Society of Vegetation Technology 39(1): 15-20. (Japanese, with English summary) ["The species diversity and population of dragonfly larvae are spatially different. In this study, we did mesocosm experiments to examine the effect of litter supply on the dragonfly larvae community. Size and species composition of dragonfly larvae and presence / absence of chironomid, a food resource for dragonfly larvae, were also controlled in the experiment. The results indicated that the litter provide the hiding places for small larvae, and consequently extend the survival time of them. Therefore, the litter supply regulates the structure of the dragonfly larva community." (Authors)] Address: E-mail : masatonium@yahoo.co.jp

**18346.** Ojha, N. (2014): A new tool for predicting distribution patterns of African dragonflies in space and time: sensitivity analyses of model parameters and environmental variables. PhD. thesis, Faculty of Environment and Natural Resources, Albert-Ludwigs-Universität, Freiburg im Breisgau, Germany. xvi, 154 pp. (in English) [*Pseudagrion kersteni* "In the last few decades, Africa has been a dynamic continent regarding the changes in landscape, population and climate. To identify effects of the changes in environmental conditions on biodiversity, species distribution modelling (SDM) can be of use and SDM has been used in wide array of ecological applications such as determining hotspots, planning of reserves, designing survey for biodiversity inventory, or assessing the impacts of environmental change on biodiversity. Odonata which require both terrestrial and aquatic ecosystem for a lifecycle, is suitable species to consider as flagship species for many ecological studies. Here, a logistic regression based new SDM tool, the 'SpeeDi Tool' is presented focusing on modelling the distribution of African Odonata species using the Odonata Database of Africa. The use of geographic information system (GIS) in pre- and postprocessing is integral part of the SDM workflow and GIS and statistical modelling is integrated in the SpeeDi Tool. The user centred approach for the development of the SpeeDi Tool offers usability and achievement of the goal (i.e. predicting the distribution range) with ease. *Pseudagrion kersteni*, a widely spread dragonfly species in

sub-Saharan Africa, is taken as species of interest to demonstrate the use and ability of the SpeeDi Tool. An expert-drawn watershed based range map from IUCN serves the purpose for visually comparing the modelled spatial distribution and, thus, enables to evaluate the predicted range. The SpeeDi Tool has several modelling parameters, some of which have been new in SDM field, namely, elastic-net factor which has not been applied to SDM using background samples until now, soft buffer threshold (SBT) which is a new concept introduced here, and weights for samples. In addition to the use of background samples, it introduces the modelling by using presence samples with absence and / or background samples; the combination of presence, absence and background samples is a new option not found in existing SDM tools yet. In order to gain confidence in using the SpeeDi Tool, several sensitivity analyses are performed using *P. kersteni* samples for different modelling approaches for applying different modelling parameters and for using different environmental geodatasets. These sensitivity analyses are thought for determining the optimum values of different regression parameters to maximise the model's performance, and for finding the important environmental variables and their effects on the prediction of distribution ranges. The concept similar to that of a virtual species is used to evaluate general applicability of the SpeeDi Tool. The sensitivity analyses of modelling parameters showed a) the elastic-net regularisation is superior to L1 or L2 regularisation, b) the uncertainty in population prevalence in background samples can be reduced by applying SBT, c) weights can be effective in reducing effects of sampling bias, d) the number of background samples is sensitive for fitting the model, and e) product interaction of variables are necessary for better prediction of distribution range. The sensitivity of environmental datasets showed a) monthly climate datasets should be preferred over synthesised bioclimatic datasets, b) predicted distributions using land-cover datasets with different classification schemes are not much different but the contribution of land cover classes in different datasets indicated that false interpretation regarding ecological significance of these classes can be possible. Further, the results for the modelling of *A. minuscula* showed that there is not much difference in distribution range when modelled at spatial resolutions of 1 km and 8 km. The results also indicated that modelling extent should not extend too far beyond the species' native region." (Author)] Address: not stated

**18347.** Verny, A.; Simon, A. (2014): Découverte de *Lestes dryas* (Kirby, 1890) dans le massif forestier de la Madeleine à Evreux (Odonata, Lestidae). L'entomologiste Haut-Normand 4: 7-8. (in French) ["The existence of perennial populations of *Lestes dryas* (Odonata: Lestidae) in Haute-Normandie has never been reported before. The only observation of the species in the region concerned a single, erratic male in 2012. This note relates the discovery of a possible population in Haute-Normandie. Details on the context of observation and the conditions of development of the species are also provided. (DeepL)] Address: Simon, A., CenHN – Rue Pierre de Coubertin BP 424 – 76805 Saint-

Etienne-du-Rouvray Cedex, France. E-mail: a.simon@cren-haute-normandie.com

**18348.** Villeda-Callejas, M.; Barrera-Escorcia, H.; Rojas-Frias, V.L.; Lara-Vazquez, J.A.; Flores-Maya, S.; Guedea-Fernandez, D. (2014): Histologic description of the compound eyes of *Pseudoleon superbus* (Libellulidae) and *Enallagma novaehispaniae* (Coenagrionidae). *Entomologia Mexicana* 1: 1133-1138. (in Spanish, with English summary) ["The histological sections showed that the compound eyes of *P. superbus* and *E. novaehispaniae* and have the same cellular components with variations as are the dimensions of the ommatidia, 756.9  $\mu$ m and 365.5  $\mu$ m respectively; conical and well-defined cells in both species were located, crystalline cones have a homogeneous arrangement in both species, but more elongated in *P. superbus*. Pigment distributed cells were observed throughout the ommatidium in damselfly more intense pigmentation regarding dragonflies. The rhabdium is thin and separated by the cytoplasm of the cells of the retina with number six with slight variations in appearance." (Authors)] Address: Villeda-Callejas, Maria del Pilar, Laboratorio de Zoología1, Laboratorio de Microscopía2, FES Iztacala, UNAM. Av. de los Barrios # 1, Los Reyes Iztacala, Tlalnepantla, Edo. de Mexico. Mexico C. P. 54090. E-mail: mapili\_villeda@yahoo.com.mx,

**18349.** Zajac, A. (2014): Effects of herbicides on the Hine's Emerald Dragonfly. M.Sc. thesis, University of South Dakota. 75 pp. (in English) ["We are currently experiencing a global decline in biodiversity that is resulting in endangered species becoming increasingly prevalent. This decline has many causes, but threats from habitat contamination and invasive species have become especially concerning for the federally endangered Hine's emerald dragonfly (*Somatochlora hineana*) whose already limited habitat is being invaded by reed canarygrass (*Phalaris arundinacea*). There is concern that this invasive grass could have negative effects on *S. hineana* populations. An herbicide, Fusilade DX (fluazifop-p-butyl) can be effective in reducing this invasive grass. However, herbicide application could result in habitat contamination and could have significant negative effects on aquatic fauna. To safely apply this herbicide, we need to know how *S. hineana* and plant and animal community members will react to the presence of Fusilade DX and if it will reduce reed canarygrass in the area. However, an endangered organism can be difficult to experiment with and mortality from experiments could be harmful to the continuation of the species. We therefore set out to find a surrogate for *S. hineana* to use in toxicological experiments. We did this by capturing *Aeshna umbrosa*, *Boyeria vinosa*, *Epitheca princeps*, and *Somatochlora williamsoni* dragonfly larvae and comparing their response to one and two year old *S. hineana* larvae in toxicological testing. Glyphosate was used for this testing as Fusilade DX had been shown to have very little effect in pre-experiment work and there was also interest in using a more powerful herbicide if Fusilade DX proved to be ineffective. We exposed dragonfly larvae to glyphosate at concentrations of 0mg/L, 100mg/L, 1,000mg/L, 10,000mg/L and 50,000mg/L for 96 hours. We

found significant differences between the two age classes of *S. hineana* with two year old larvae experiencing no mortality, but found *S. hineana* to be the least sensitive of all species tested. We also found *S. williamsoni* to react most similarly to *S. hineana* and would recommend its use in further surrogate studies. We also set out to determine the effects of Fusilade on plant and animal communities. We did this by applying Fusilade DX to *S. hineana* habitat and comparing control and treatment plots. We found Fusilade to decrease growth of reed canarygrass by 32.5%, but not overall coverage. It also had no significant effect on native plant coverage or any direct or indirect effect on *S. hineana* populations." (Author)] Address: not stated

**18350.** Zandigiacomo, P.; Chiandetti, I.; Fiorenza, T.; Nadalon, G.; Uboni, C. (2014): Odonata of Friuli Venezia Giulia: Second update of checklist and further remarks. *Gortania* 36: 33-44. (in English, with Italian summary) ["Within the Project "Atlas of the Odonatofauna of the Friuli Venezia Giulia region", additional remarks of the Odonata of the region (North-eastern Italy) was carried out in the years 2010-2014. The new data have allowed us to enrich the regional Checklist of Odonata with five species: *Chalcolestes parvidens* and *Lindenia tetraphylla* that have not been observed previously in the region and *Anax ephippiger*, *Gomphus vulgatissimus*, and *Sympetrum flaveolum* that have been detected in previous years. In addition, knowledge of the distribution of twelve species that are rare or of natural interest has been improved. At the present time the Checklist of Odonata of Friuli Venezia Giulia includes 62 species representing 66% of the Italian fauna. Two species, *L. tetraphylla* and *Cordulegaster heros* Theischinger, 1979, are listed in the Annexes of the Habitats Directive. The list includes some species that have migratory tendencies and probably do not breed regularly in the region, such as *L. tetraphylla* and *A. ephippiger*. It is possible that in the near future other species might be found, some of which have already been reported for the region. Despite the considerable richness of species, we highlight a critical status for some species that are typical of mountain or alpine habitats, such as *Coenagrion hastulatum*, *C. heros*, *Somatochlora alpestris*, *S. arctica*, *Sympetrum danae* and *Leucorrhinia*. In addition, *Nehalennia speciosa* is near extinction at the regional and national level due to the presence of just one breeding site located in a peat bog in the morainic hilly area." (Authors)] Address: Zandigiacomo, P., Dipartimento di Scienze agrarie e ambientali (DISA) – Entomologia, Università degli Studi di Udine, Via delle Scienze 208, I-33100 Udine, Italy. E-mail: pietro.zandigiacomo@uniud.it

## 2015

**18351.** Amoroso, N.; Chalcraft, D.R. (2015): Duration of colonization and interactions between early and late colonists determine the effects of patch colonization history on patch biodiversity. *Oikos* 124(10): 1317-1326. (in English) ["Patches can vary in their colonization history as the result of many factors, including differences in patch size and isolation, which alter the timing and duration in which one or



more species colonize a patch. Prior work has found that the particular time that a species colonizes a patch can affect the performance of co-occurring species, but it is less clear whether it affects the biodiversity of the patch. Our objective was to evaluate how two components of colonization history affect biodiversity – the total duration of the colonization window in which a predator is able to colonize the patch and the particular time in the patch's colonization history (i.e. early versus late in community development) that colonization by a predator occurs. We conducted an experiment to examine how the duration and timing in which predatory dragonflies colonize recently filled ephemeral ponds affects insect biodiversity. Dragonfly colonization history had an important effect on insect biodiversity. Ponds with a longer colonization history by dragonflies had fewer insect morphotypes than ponds with a shorter colonization history. The timing of dragonfly colonization (i.e. early versus late in community development) had no effect on the number of insect morphotypes present despite altering both the rate of dragonfly metamorph production and the abundance of larval dragonflies present at the end of the study. The effect of duration of long-term dragonfly colonization on biodiversity stemmed from early colonists weakening the influence of later colonists on insect biodiversity. Though colonization by dragonflies reduced adult insect abundance, differences in the time in which dragonflies colonized ponds had no effect on total insect abundance. Moreover, differences in patch biodiversity appears to be affected more by variation in the duration a patch was colonized by a predator than variation in the time in which a patch was colonized by a predator." (Authors)] Address: Chalcraft, D.R., Dept of Biology & Center for Biodiversity, East Carolina Univ., Greenville, USA. E-mail: chalcraftd@ecu.edu

**18352.** Angot, D. (2015): Présentation et répartition communale des Libellules de Chalonnes sur Loire, Atlas de la Biodiversité Chalonnoise. Ville de Chalonnes sur Loire: 64 pp. (in French) ["Conclusion: The inventories have made it possible to significantly improve our knowledge of the dragonflies of the Chalonnois. 45 species are now known in the area, which represents almost three quarters of the species in the department and a little less than half of the species in France. The data collected over the last 10 years, and particularly in 2015, has made it possible to collect more than 1100 data on the group. This work would not have been possible without the work of naturalists and local associations such as the CPIE Loire Anjou and the LPO Anjou. The synthesis of these data made it possible to publish distribution maps, to specify the status and the autochthony of each species in order to present the results in the communal monographs presenting the ecology and the local distribution. Following the synthesis and study of the group in the commune, it appears that the great wealth of environments allows a large number of species to carry out their life cycle. The Chalonnois region is home to special habitats that allow certain remarkable species to develop and maintain their populations. On the Louet and the Loire, Gomphus flavipes and Ophiogomphus cecilia seem to be well established. On the old quarries, Oxgastrea curtisii breeds (three quarries in

Chalonnes). On two small streams, Coenargion mercuriale is present and breeds. These four species are protected at French and European level, but other species also have a special status. There are, for example, 18 species that are determinants for the establishment of Natural Zones of Faunistic and Floristic Interest (ZNIEFF). All these data give Chalonnes a particular responsibility in terms of the preservation of aquatic ecosystems (ponds, watercourses, ponds), but also for terrestrial environments and in particular natural meadows which host a significant number of individuals during the maturation period. The complementarity and relative proximity of these environments enables the needs of a large number of species to be met. These species can then carry out their life cycle from the aquatic to the aerial phase in good conditions. It should be emphasised that the publication of this document does not mean that data collection has stopped. Specific data and certain studies on the commune will enable the improvement of knowledge to be continued (monitoring of pools, collection of exuviae, monitoring of the mouth of the Layon). The distribution maps, even if they largely specify the distribution of the species, are far from exhaustive and only reflect the state of knowledge at a given moment. The wealth of odonatological species in the Chalonnois is a perfect illustration of the diversity and quality of the Chalonnois landscapes, which express this beautiful and fragile biodiversity, a real heritage that should be preserved and made known." (Author) Translated with www.\_DeepL.com/Translator (free version) Département Maine-et-Loire] Address: not stated

**18353.** Bai, Y.; Dai, D.-F.; Bao, K.-O.; Quin, A.-N.; Ling, R.-J.; Wang, H.-R. (2015): Using geometric morphometrics to quantify the sexual dimorphism of Pantala flavescens. Chinese Journal of Applied Entomology 52(2): 363-369. (in Chinese, with English summary) ["We obtained wing shape information by digitizing the fore and hindwings of P. flavescens. Sexual dimorphism in wing shape and vein structure was then analyzed by principal component analysis (PCA) and the thin-plate spline (TPS) graphical technique. The PCA results indicate significant sexual dimorphism in the fore and hindwing. TPS indicates that forewing differences are mainly in the nodus and triangle, whereas hindwing differences were mainly in the nodus and in the area of the cubital and anal veins. Centriod size (CS) indicates that females have a bigger fore and hindwing than males. Sexual dimorphism in wing shape in P. flavescens probably reflects selection for different wing shape and vein structure in each sex." (Authors)] Address: Bai, Y., Institute of Zoology, Shaanxi Normal University, Xian 710062, China

**18354.** Ball-Damerow, J.E.; Oboyski, P.T.; Resh, V.H. (2015): California dragonfly and damselfly (Odonata) database: temporal and spatial distribution of species records collected over the past century. ZooKeys 482: 67-89. (in English) ["The recently completed Odonata database for California consists of specimen records from the major entomology collections of the state, large Odonata collections outside of the state, previous literature, historical and recent field surveys, and from enthusiast group observations. The

database includes 32,025 total records and 19,000 unique records for 106 species of dragonflies and damselflies, with records spanning 1879–2013. Records have been geographically referenced using the point-radius method to assign coordinates and an uncertainty radius to specimen locations. In addition to describing techniques used in data acquisition, georeferencing, and quality control, we present assessments of the temporal, spatial, and taxonomic distribution of records. We use this information to identify biases in the data, and to determine changes in species prevalence, latitudinal ranges, and elevation ranges when comparing records before 1976 and after 1979. The average latitude of where records occurred increased by 78 km over these time periods. While average elevation did not change significantly, the average minimum elevation across species declined by 108 m. Odonata distribution may be generally shifting northwards as temperature warms and to lower minimum elevations in response to increased summer water availability in low-elevation agricultural regions. The unexpected decline in elevation may also be partially the result of bias in recent collections towards centers of human population, which tend to occur at lower elevations. This study emphasizes the need to address temporal, spatial, and taxonomic biases in museum and observational records in order to produce reliable conclusions from such data." (Authors)] Address: Oboyski, P.T., Collections Manager & Curatorial Supervisor, Essig Museum of Entomology, 1170 Valley Life Science Building, University of California, Berkeley, 1101 VLSB, #4780, Berkeley, CA 94720, USA

**18355.** Brabender, M. (2015): The impact of shore types on benthic macroinvertebrate community structure and functioning in a large lowland river. Dissertation, Fakultät Umweltwissenschaften, Technische Universität Dresden: 129 pp. (in English, with German summary) ["Shore zones of large rivers are hot spots of biodiversity and contribute significantly to riverine ecosystem functioning. Today, shore degradation and other structural impairments like river straightening and channelization are strong impact factors on river ecosystem health. However, we still lack a thorough understanding of how structural shore zone degradation affects benthic community composition and their inherent ecosystem functions. In this thesis I tested the influence of training structure induced environmental factors on benthic macroinvertebrate community composition and the share of non-native species. Moreover, I assessed the community-associated ecosystem functions in terms of secondary production and resource utilization. In the main channel, communities were composed of only a few specialized taxa with low abundances, which contributed little to riverine secondary production. This is probably due to the harsh conditions produced by constantly high flow velocities and relocation of the fine sandy sediment. Main channel habitats were hardly affected by the adjacent training structure. Hence, species compositions and productivities were similar at all investigated main channel sites. By contrast, each of the shore communities was diverse, highly abundant and productive in comparison to the main channel. However, variations between shore structure communities and their ecosystem

functions were prominent. One particular training structure, i.e. the off-bankline revetment, bore the most diverse and by far most productive benthic community, which utilized vast total amounts of basal resources ( $1,323 \text{ g DM m}^{-2} \text{ y}^{-1}$ ). Varying sediment compositions, availability of macrophytes and diverse flow velocities, including lentic conditions, were revealed as key factors for increasing biodiversity, secondary production and resource utilization. Allochthonous boulder habitats were generally highly prone to non-native species invasion. Neozoa proved less productive than many native community members and consumed minor relative and total amounts of the prevailing resource pelagic algae. The present quantitative comparison of shore type specific effects on biodiversity, biomass and productivity provides managers with a tool to improve the ecological attributes of large river ecosystems with an unchangeable, impaired macrostructure. In its entirety, this thesis constitutes a sound basis to increase the mechanistic understanding of the way in which shore zone manipulation can affect riverine benthic communities and their associated ecosystem functions." (Author) The paper includes data on Gomphidae (*Stylurus flavipes*, *Gomphus vulgatissimus*)] Address: not stated

**18356.** Combes, S.A. (2015): Neuroscience: Dragonflies predict and plan their hunts. *Nature* 517: 279-280. (in English) ["An analysis reveals that the dragonfly's impressive ability to catch its prey arises from internal calculations about its own movements and those of its target — the first example of such predictions in invertebrates." (Author)] Address: Combes, Stacey, Department of Organismic and Evolutionary Biology, Concord Field Station, Harvard University, Bedford, Massachusetts 01730, USA.

**18357.** Guliyeva, S.A.; Aliyev, R.A. (2015): Species composition and quantitative distribution of larvae of dragonflies (Odonata) in the new ecological conditions of the lake Aggol. *Journal of Zaporizhzhya National University* 2(2015): 93-98. (in Russian, with English summary) ["The paper presents new data on species composition, number and distribution of the larvae of Odonata in new environmental conditions of the different habitats of in the lake Aggol. Field works conducted in 2011-2012 in the lake Aggol resulted in the rearings of 28 species and forms of dragonfly larvae. Six of these *Coenagrion concinnum*, *C. armatum*, *Aeshna viridis*, *Sympetrum striolatum*, *S. sanguineum*, *S. meridionale* are new to the lake. Species *Coenagrion concinnum* and *C. armatum* were found in winter, spring and autumn of 2011 and winter and autumn of 2012; *Aeshna viridis* in winter and autumn of 2011; *Sympetrum striolatum* - winter, spring and autumn of 2011; *S. sanguineum* in winter and autumn of 2011-2012; *S. meridionale* in winter and spring of 2011-2012. The widest distributed species belong to the genera *Coenagrion*, *Aeshna* and *Sympetrum*. The maximum development of larvae of dragonflies was registered in winter ( $106 \text{ ind./m}^2$ ,  $1,10 \text{ g/m}^2$ ) and minimum in summer ( $12 \text{ ind./m}^2$ ,  $0,14 \text{ g/m}^2$ ). Ecology of the fauna is studied in detail. In the study period (2011-2012) the number of species of dragonfly larvae reaches a minimum in summer (6 species), and the maximum (27 species) in winter. Species

Coenagrion scitulum, C. lunulatum, C. puella, C. mercuriale [sic!], Anax imperator, Sympetrum flaveolum are observed in the lake in all seasons and are dominated by widespread. It should be noted that the decrease in the number of larvae of dragonflies in the summer, especially at depths of up to 0.5 m is due to their intensive consumption by fish and water birds and emergence of adult dragonflies which leave the lake. On the other hand, in summer period, the volume of oxygen in shallow water of the lake Aggol is greatly reduced, and as a result of evaporation of water, the amount of salts in water is increased. In such circumstances, the probability of occurrence of freshwater organisms in the benthos is naturally decreased. Average annual number of dragonfly larvae per square meter of the lake Aggol in 2011 was 88 ind./m<sup>2</sup>, and biomass - 0.31 g/m<sup>2</sup>. During this period, the maximum development of the larvae of dragonflies observed in winter (141 ind./m<sup>2</sup>, 0.50 g/m<sup>2</sup>), and the minimum - in the summer (25 ind./m<sup>2</sup>; 0.10 g/m<sup>2</sup>). In contrast to 2011, in 2012 the average annual number of dragonfly larvae per square meter lake was 66 ind./m<sup>2</sup>, and biomass -0.24 g/m<sup>2</sup>. It is shown that the maximum development of dragonfly larvae was observed in winter (126 ind./m<sup>2</sup>; 0.47 g/m<sup>2</sup>) and the minimum (11 ind./m<sup>2</sup>, 0.03 g/m<sup>2</sup>) - during the summer season. The study of the distribution of larvae of dragonflies on specific habitats of the lake revealed their maximum development on plant and silty habitats, and the minimum - on black silty sand. Changes in biomass of benthic organisms as well as larvae of dragonflies, which developed very poor is analyzed. The index of the average biomass of dragonfly larvae per square meter of lake in the 60s was 0.27 g/m<sup>2</sup> in 70s - 0, 20 g/m<sup>2</sup>, in 80s - 0.13 g/m<sup>2</sup>, and in 2011-2012 - 0.28 g/m<sup>2</sup>. Poor development of dragonfly larvae in the lake Aggol is characterized, on the one hand with their intensive consumption by fish and water birds and on the other hand - the steady worsening of the environmental conditions of the lake." (Authors) Imishli Rayon (district) Address: Guliyeva, S.A., Inst. of Zoology Azerbaijan Nat.l Acad. of Sciences, 1073, Azerbaijan, Baku, passage 1128, block 504.

**18358.** Hämäläinen, M. (2015): Nomenclatorial fossicking - unearthing forgotten Selysian species names of Belgian Odonata. *Notulae odonatologicae* 8(6): 197-201. (in English) ["Five forgotten available species group names in Odonata, introduced by Edmond de Selys Longchamps in 1831, are listed and their taxonomic status is discussed. The following synonymies are presented: *Agrio[n]* cyaneus Selys, 1831 and *Agrio[n]* oeneus Selys, 1831 are junior subjective synonyms of *Calopteryx virgo* (Linnaeus, 1758); *Agrio[n]* cellaris Selys, 1831 and *Agrio[n]* virescens Selys, 1831 are junior subjective synonyms of *Calopteryx splendens* (Harris, 1780). *Agrio[n]* coralinus Selys, 1831, an obvious coenagrionid species, is ranked as a nomen dubium."] Address: Hämäläinen, M., Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: libellago@gmail.com

**18359.** He, H.C.; Fan, Q.-x.; Chu, W.-h.; Wang, F.; Wu, Q.-w.; Zaho, Z.-b.; Zhang, C.-m.; Zhang, Y.-l. (2015): The predation intensity of *Pantala flavescens* nymph on *Paramisgurnus dabryanus* larvae and juveniles and its prey selection.

*Freshwater Fisheries* 45(6): 108-112. (in Chinese, with English summary) ["This study was conducted to determine the predation intensity of *Pantala flavescens* nymph on *Paramisgurnus dabryanus* (5, 15, 25, 35 days after hatching, DAH) and the prey selection of the *Pantala* nymph on loach larvae, chironomus larvae, and tubificidae. The results showed that both the instar of *Pantala* nymph and the size of loach were related to the predation intensity of the *Pantala* nymph on Chinese loach. The predation intensity of 9 ~ 12 instar *Pantala* larvae on *P. dabryanus* was significantly stronger than that of 5~8 instar larvae. *P. dabryanus* at 25 DAH couldn't be captured and eaten by *Pantala* larvae less than 5-8 instar, and *P. dabryanus* at 35 DAH couldn't be captured and eaten by *Pantala* larvae less than 9-12 instar. The feeding rates of 5 -8 instar *Pantala* larvae on 5 and 15 DAH loach showed no significant difference, and the feed rates of 9 - 12 instar *Pantala* larvae on 5, 15, and 25 DAH loach showed no significant difference. *P. flavescens* nymph could prey on *P. dabryanus*, chironomus larvae, and tubificidae, with the preference in the order of chironomus larvae > tubificidae > *P. dabryanus*." (Authors)] Address: He, H.C., College of Fishery, Huazhong Agricultural Univ., Wuhan 430070, China

**18360.** Hothem, R.L.; May, J.T.; Gibson, J.K.; Brussee, B.E. (2015): Concentrations of Metals and Trace Elements in Aquatic Biota Associated with Abandoned Mine Lands in the Whiskeytown National Recreation Area and Nearby Clear Creek Watershed, Shasta County, Northwestern California, 2002–2003. Prepared in cooperation with the National Park Service. Open-File Report 2015–1077. U.S. Department of the Interior, U.S. Geological Survey: 64 pp. (in English) ["Park management of the Whiskeytown National Recreation Area, in northwestern California, identified a critical need to determine if mercury (Hg) or other elements originating from abandoned mines within the Upper Clear Creek watershed were present at concentrations that might adversely affect aquatic biota living within the park. During 2002–03, the U.S. Geological Survey, in cooperation with the National Park Service, collected aquatic invertebrates, amphibians, and fish, and analyzed them for Hg, cadmium, zinc, copper, and other metals and trace elements. The data from the biota, in conjunction with data from concurrent community bioassessments, habitat analyses, water quality, and concentrations of metals and trace elements in water and sediment, were used to identify contamination "hot spots." In 2002, we selected collection sites within the study area based on the presence of historical mines and results from sampling of bed sediment in 2001. In 2003, collection sites were selected based on sediment data as well as data on water and biota from this study in 2002. Eleven sites were sampled in both 2002 and 2003, 11 sites were sampled only in 2002, and 14 sites were sampled only in 2003. Comparisons of sites within the Upper Clear Creek watershed indicated that most of the more contaminated sites were outside of the park boundaries, especially at sites within the French Gulch, Cline Gulch, and Whiskey Creek watersheds. The site with the highest overall contamination within the park, based on both fish and invertebrate data, was WLCC, a site on Willow Creek impacted by acid mine

drainage and listed as impaired under Section 303(d) of the Clean Water Act. Compared with other recently evaluated mine-impacted watersheds in northern California, invertebrates, amphibians, and fish from sites within the Upper Clear Creek watershed tended to have significantly lower concentrations of Hg than at most other sites. For other metals and trace elements, Upper Clear Creek sites were only compared with the Deer Creek watershed, Nevada County, California. Copper from both Willow Creek sites (WLCC and WLTH) in the Clear Creek watershed was the only metal with concentrations in biota that were significantly higher than biota from Deer Creek. ... The target aquatic macroinvertebrates for elemental analysis in this study were predatory insects, depending on their abundance and availability at each sample site. Taxa collected were larval dragonflies (Gomphidae, Libellulidae, Aeshnidae, and Cordulegastridae), adult water striders (Hemiptera: Gerridae), larval stoneflies (Plecoptera: Perlidae), larval dobsonflies (Megaloptera: Corydalidae), and adult predaceous diving beetles (Coleoptera: Dytiscidae). Banana slugs (Gastropoda: Arionidae) also were collected at a limited number of sites. ... The highest mean concentration of HgT in dragonflies (Gomphidae) was from MDOX in 2003 (0.115 µg/g), with the second highest from CLN2 (0.110 µg/g). All the most elevated HgT concentrations were from sites outside the park boundaries." (Authors)] Address: Director, Western Ecological Research Center, U.S. Geological Survey, 3020 State University Drive East, Sacramento, California 95819, USA. <http://werc.usgs.gov/>

**18361.** Jäckel, K.; Koch, K. (2015): Anisoptera-Exuvien (Odonata): nur leere Hüllen? *Libellula* 34(3/4): 143-159. (in German, with English summary) ["Anisoptera exuviae: Only empty husks? – Many organisms leave moulting skins that can be utilised by secondary users. Exuviae of Anisoptera are relatively robust and remain relatively long on the substrate. Therefore, we asked ourselves the following questions: To what extent and for what purpose can secondary users be found in exuviae? Which taxa can be found as secondary users? Do secondary users prefer exuviae of certain dragonfly species? For our study, we systematically collected exuviae of Anisoptera in the nature reserve area Eich-Gimbsheimer Altrhein (Germany, Rheinland-Palatinate) in 2013 and 2014. In 2013 secondary users were found in 30 % and 2014 in 67 % of the exuviae. The differences in the occupation rate with secondary users likely roots in the modified method. The exuviae were screened in the field with flashlights and only taken inside the lab when we found a secondary user in 2013. We certainly missed some secondary users or their traces, like faeces or spider webs. In 2014, all exuviae found were collected. Overall, we found arthropods from 18 genera and 18 families. The secondary users distributed to the orders Arachnida, Diplopoda (Millipedes), Collembola (Springtails), and Insecta (Insects). The family of spiders (Araneae) was most common (2013: 71 %, 2014: 78 %). Within the spiders, the genus Clubiona of the family of Clubionidae (sack spiders) was most abundant. Clubiona sp. was found at all ages. With a few exceptions, only one secondary user per exuviae was found. The taxa compositions of secondary users at the family level were

significantly different in the two years. In 2013, large-volume exuviae were occupied primarily; in 2014, this pattern was not confirmed. In general, exuviae of Anisoptera can be used by different arthropods as a temporarily microhabitat." (Authors)] Address: Koch, Kamilla, Institut für Zoologie, Abteilung Evolutionäre Ökologie, Johannes Gutenberg-Universität Mainz, Becherweg 13, 55128 Mainz, Germany. E-mail: [kochka@uni-mainz.de](mailto:kochka@uni-mainz.de)

**18362.** Jisha Krishnan, E. K.; Sebastian, C. D. (2015): Assessment of the phylogenetic relationship among Coenagrionidae family (Odonata: Zygoptera) using Coi gene marker. Proceedings 25th SWADESHI SCIENCE CONGRESS, a national seminar, 16-18 December 2015, Sree Sankaracharya University of Sanskrit, Kalady, Ernakulam, Kerala: 337-339. (in English) ["Zygoptera represents the most ancient damselflies with their ancestors known to exist 250 million years ago. They are geographically distributed in all continents except Antarctica and ecologically important as bioindicators and biocontrol agents. Coenagrionidae is the most abundant damselfly family among the Zygopterans. In the present study, we assessed the phylogenetic relationships of 3 Coenagrionidae members (*Ischnura aurora*, *Ceragrion coromandelianum* and *Copera marginipes*) using mitochondrial cytochrome oxidase subunit I (COI) gene marker. The partially amplified PCR product of this gene yielded 606 bp, 573 bp and 616 bp long DNAs respectively. The nucleotide BLAST analysis confirmed the taxonomic identity of all these species. We had taken two species from Coenagrionidae and Calopterygidae families from NCBI GenBank for comparative study. Phylogenetic tree constructed by Neighbour joining method showed that Coenagrionidae members represent monophyletic ancestry due to its consistent divergence from a common ancestor. Among these members, *Ischnura aurora* are having a sister clade relationship with *Copera marginipes* which remained in the same clade and *Ceragrion coromandelianum* with *C. cerinorubellum* in another clade. The average A+T content of all these species are 62.03% while G+C content is 37.97% showing a strong A+T bias. The nucleotide substitution analysis states that *Copera marginipes* is having highest value than other members due to the transition of Cytosine and Thymine. Thus the present study concluded that cytochrome oxidase I is an effective tool for the species identification and phylogenetic relationships of closely related species." (Authors) ] Address: Sebastian, C. D., Molecular Biology Laboratory, Department of Zoology, University of Calicut, Kerala, India. E-mail: [drcdsebastian@gmail.com](mailto:drcdsebastian@gmail.com)

**18363.** Kastner F.; Buchwald, R.; Willen, M. (2015): Artenhilfsprogramme für die FFH Libellenarten *Aeshna viridis*, *Coenagrion mercuriale* und *Coenagrion ornatum* in NW-Deutschland. Abschlussbericht zum gleichnamigen DBU-Projekt, Oldenburg: 59 pp, Anh. (in German) ["The development of watercourses and the intensification of land use have led to a loss of many typical floodplain habitats and small water bodies. This loss of primary habitats can be compensated for a number of species by colonising anthropogenic ditch systems as secondary habitats. The odonates A.



viridis, *C. mercuriale* and *C. ornatum*, which were selected as target species in this project, are classified as "Critically Endangered" (RL 2), "Critically Endangered" (RL 1) or "Extinct" (RL 0) on the German Red List as well as for Lower Saxony and North Rhine-Westphalia and are listed in the Annexes of the Habitats Directive. The aim of the project was to determine the current distribution and population structure of the three dragonfly species in the study areas and to describe the colonised habitats in more detail. Based on this, initial measures for habitat optimisation and habitat connectivity were carried out as the basis for a species protection concept. *A. viridis*, which is bound to *Stratiotes aloides* plants, was detected in the Hunte-Weser lowlands in the sub-areas NSG Bornhorster Huntewiesen, Iprump/Oberhausen, Huntorf and Warleth as well as in the areas of Delmenhorst, NSG Werderland and NSG Hollerland. However, the recorded exuviae numbers per sub-area differ significantly from each other. The importance of large and dense emerged *S. aloides* stands for the occurrence of *A. viridis* can be confirmed and a lower threshold value of 20 % cover or 12 m<sup>2</sup> growth area of a *S. aloides* stand can be determined. In terms of water chemistry, the colonised ditches are classified as meso- to eutrophic and moderately to significantly anthropogenically polluted. The results of the reintroduction of *S. aloides* into suitable water bodies show that this is a suitable method for planning and implementing species protection measures precisely targeted at target species. For the long-term protection and conservation of *A. viridis* and *S. aloides* populations, ecological ditch maintenance following the example of Bremen plays an essential role. The conservation, optimisation and networking of habitats (with *S. aloides* populations) is the basis for the protection of *A. viridis*. The populations of *C. mercuriale* in the areas of Espelkamp and Ilwede with Barlage and Großer Dieckfluss in the district of Minden-Lübbecke are among the largest of the species in North Rhine-Westphalia. The population of *C. ornatum* near Espelkamp represents the main population of the species in North Rhine-Westphalia. The colonised water bodies in Minden-Lübbecke are characterised as follows: narrow incised water bodies with wide banks, mostly strongly sunlit, low to moderate flow velocity, shallow water depth, cover of emerged vegetation between 20 % and almost 100 %, well-developed submerged vegetation. Characteristic plant species are *Berula erecta*, *Phalaris arundinacea* and *Sparganium* spp. In terms of water chemistry, the waters can be classified as eutrophic and moderately to significantly anthropogenically polluted. The dispersal tendency of *C. mercuriale* is very low overall, but few individuals travel long distances. For the long-term conservation of both species, the continuation of adapted watercourse maintenance and a further reduction of emerging woody plants along the Kleine Aue near Espelkamp play a decisive role. Furthermore, the drying up of water bodies and their eutrophication pose a challenge for the future conservation of both species." (Authors, DeepL)] Address: Kastner, Friederike, AG Vegetationskunde und Naturschutz, IBU, Carl von Ossietzky Universität Oldenburg, 26111 Oldenburg, Germany. E-Mail: Friederike.Kastner@uni-oldenburg.de

**18364.** Krams, A.; Krama, T.; Trakimas, G.; Kaasik, A.; Rantala, M.J.; Škute, A. (2015): Reproduction is costly in an infected aquatic insect. *Ethology Ecology & Evolution* 29(1): 74-84. (in English) ["Internal energy reserves of animals are limited, and the current investment in reproduction often decreases survival or future reproductive success. Some studies showed that copulatory activities impair the strength of immune function in insects, while the recent evidence is contradictory. In this study we tested whether copulatory activity affects the rate of encapsulation response in males of *Calopteryx splendens* damselfly in allopatric populations, and in sympatric populations where *C. splendens* stay together with their superior competitor *C. virgo*. We also counted the number of eugregarines, which are common parasites of damselflies. Copulation activity did not affect the immunity of *C. splendens* males in allopatric populations. In sympatric populations *C. splendens* males had more gut parasites, and we found a significant interaction between parasite number and copulatory activity on the rate of encapsulation. Our results suggest that the costs of reproduction are higher in infected males, which may affect reproductive investment and sexual selection." (Authors)] Address: Krams, A., Institute of Ecology and Earth Sciences, Univ. of Tartu, Tartu, Estonia. E.mail: indrikis.krams@ut.ee

**18365.** Kreder, M.; Colleu, M.-A., Pont, L. (2015): Amélioration des connaissances de l'Agriion à lunules *Coenagrion lunulatum* sur le territoire du Parc naturel régional des Volcans d'Auvergne. *Syndicat Mixte du Parc naturel régional des Volcans d'Auvergne*: 49 pp + 16 p d'annexes.- (in French) ["*C. lunulatum* is a rare and discreet species found only in the French Massif Central. Its habitat is mainly comprised in the region of Auvergne, more specifically in the territory of the Volcans d'Auvergne Natural Regional Park, which is the entity responsible for the protection and preservation of this species. The study of 2014 aims at improving the knowledge of the habitat and distribution of this species. Surveys have identified 39 stations, whose 9 were not yet known. The analysis of the species' distribution shows a fragmented population, however without landscape discontinuity. Thus, according to the displacement abilities of the species, exchanges between different populations are hypothetically possible. The results of habitat characterization show the importance of the presence of emergent plants, but also highlights the importance of sunny banks, low intensity of pasture as well as the absence of fishes. A strategy of effective preservation of *C. lunulatum* will consist, on one hand, in the implementation of concrete and direct population management measures at the site scale and, on the other hand, by protecting a continuum of potentially favourable sites to different populations and thus allowing for the establishment of a sustainable population." (Authors)] Address: not stated

**18366.** Kulijer, D.; Miljevic, I. (2015): First record of *Leucorhinia caudalis* for Bosnia and Herzegovina (Odonata: Libellulidae). *Notulae odonatologicae* 8(6): 176-183. (in English) ["On 30-vi-2013, a single young male of *L. caudalis* was col-

lected at a gravel pond near Banja Luka, Bosnia and Herzegovina. This is the first record of the species for the country and its southernmost occurrence in southeastern Europe, where it is an extremely rare species, restricted to the floodplains of the Sava and Danube Rivers. Recent surveys suggest further decline of the species in the region. Habitat characteristics at the capture site correspond with the previously described preferred habitats of the species. Floating and submerged vegetation was well developed and dominated by *Potamogeton* spp. and *Myriophyllum* spp., while sedges and reeds grew along the margins. The distribution, habitats and status of the species in the Balkans and central Europe are outlined and discussed (western Balkans, Hungary and Slovakia). Data on the species' distribution in western Europe are also provided." (Authors)] Address: Kulijer, D., National Museum of Bosnia and Herzegovina, Zmaja od Bosne 3, 71000 Sarajevo, Bosnia and Herzegovina. E-mail: dejan.kulijer@gmail.com

**18367.** Lancaster, L.T.; Dudaniec, R.Y.; Hansson, B.; Svensson, E.I. (2015): Latitudinal shift in thermal niche breadth results from thermal release during a climate-mediated range expansion. *Journal of Biogeography* 42(10): 1953-1963. (in English) ["Aim: Climate change is currently altering the geographical distribution of species, but how this process contributes to biogeographical variation in ecological traits is unknown. Range-shifting species are predicted to encounter and respond to new selective regimes during their expansion phase, but also carry historical adaptations to their ancestral range. We sought to identify how historical and novel components of the environment interact to shape latitudinal trends in thermal tolerance, thermal tolerance breadth and phenotypic plasticity of a range-shifting species. Location: Southern and central Sweden. Methods: To evaluate phenotypic responses to changes in the thermal selective environment, we experimentally determined the upper and lower thermal tolerances of > 2000 wild-caught damselflies (*Ischnura elegans*) from populations distributed across core and expanding range-edge regions. We then identified changing correlations between thermal tolerance, climate and recent weather events across the range expansion. Niche modelling was employed to evaluate the relative contributions of varying climatic selective regimes to overall habitat suitability for the species in core versus range-edge regions. Results: Upper thermal tolerance exhibited local adaptation to climate in the core region, but showed evidence of having been released from thermal selection during the current range expansion. In contrast, chill coma recovery exhibited local adaptation across the core region and range expansion, corresponding to increased climatic variability at higher latitudes. Adaptive plasticity of lower thermal tolerances (acclimation ability) increased towards the northern, expanding range edge. Main conclusions: Our results suggest micro-evolutionary mechanisms for several large-scale and general biogeographical patterns, including spatially and latitudinally invariant heat tolerances (Brett's rule) and increased thermal acclimation rates and niche breadths at higher latitudes. Population-level processes unique to climate-mediated range expansions may commonly underpin

many broader, macro-physiological trends." (Authors)] Address: Lancaster, Lesley, Univ. of Aberdeen, School of Biological Sciences, Zoology Building, Tillydrone Avenue, Aberdeen AB24 2TZ, UK. E-mail: lesleylancaster@abdn.ac.uk

**18368.** Lauth, E. (2015): Sukzessionsstudie der Uferzonen des Wallerseees und des Wenger Moores am Beispiel der Odonatenfauna. *Reihe Gewässerschutz* 17: 129-150. ["At 13 different types of the shores of the Wallersee and in the Wenger Moor the adult dragonflies and exuviae were recorded before (1998) and after (2008) the increase of the water surface. The odonates regain areas with low water level and well developed vegetational structures. The comparative study clearly is referring to a trend of repopulation of these areas. In fact, the species richness and abundance of the odonates, which prefer dense reeds and extended plants with floating leaves, increased noticeable."] Address: Lauth, Elke, Hinterbuch 26, 5163 Perwang, Austria

**18369.** Lauth, E.; Waringer, J. (2015): Libellen als Bioindikatoren für den ökologischen Zustand der Seeufer der Trumer Seen. *Reihe Gewässerschutz* 17: 95-128. (in German, with English summary) ["For the first time dragonflies are used as bioindicators for the assessment of the ecological state of lakesides. In the study area the human influence is high. Drainage and fertilization cause a change in the vegetation of the lakesides. The dragonfly communities can clearly show these impacts." (Authors)] Address: Lauth, Elke, Hinterbuch 26, 5163 Perwang, Austria

**18370.** Marino, N.A.C.; Srivastava, D.S.; Farjalla, V.F. (2015): Predator kairomones change food web structure and function, regardless of cues from consumed prey. *Oikos* 125(7) : 1017-1026. (in English) ["Predation risk in aquatic systems is often assessed by prey through chemical cues, either those released by prey or by the predator itself. Many studies on predation risk focus on simple pairwise interactions, with only a few studies examining community-level and ecosystem responses to predation risk in species-rich food webs. Further, of these few community-level studies, most assume that prey primarily assess predation risk through chemical cues from consumed prey, even heterospecific prey, rather than just those released by the predator. Here, we compared the effects of different predation cues (predator presence with or without consumed prey) on the structure and functioning of a speciose aquatic food web housed in tropical bromeliads. We found that the mere presence of the top predator (a damselfly) had a strong cascading effect on the food web, propagating down to nutrient cycling. This predation risk cue had no effect on the identity of colonizing species, but strongly reduced the abundance and biomass of the macroinvertebrate colonists. As a result, bacterial biomass and nitrogen cycling doubled, with a concomitant decrease in bacterial production, but CO<sub>2</sub> flux was unaffected. These community and ecosystem effects of predator presence cues were not amplified by the addition of chemical cues from consumed prey. Our results show that some of the consequences of predation risk observed in controlled experiments with simplified food webs

may be observed in a natural, species-rich food web." (Authors)] Address: Marino, N.A.C., Lab. de Limnologia, Depto de Ecologia, Inst. de Biologia, Centro de Ciências da Saúde, Univ. Federal do Rio de Janeiro, PO Box 68020, Rio de Janeiro, RJ, Brazil. E-mail: nac.marino@gmail.com

**18371.** Mikó, Z.; Ujszegi, J.; Gál, Z.; Imrei, Z.; Hettyey, A. (2015): Choice of experimental venue matters in ecotoxicology studies: Comparison of a laboratory-based and an outdoor mesocosm experiment. *Aquatic Toxicology* 167: 20-30. (in English) ["The heavy application of pesticides and its potential effects on natural communities has attracted increasing attention to inadvertent impacts of these chemicals. Toxicologists conventionally use laboratory-based tests to assess lethal concentrations of pesticides. However, these tests often do not take into account indirect, interactive and long-term effects, and tend to ignore different rates of disintegration in the laboratory and under natural conditions. Our aim was to investigate the importance of the experimental venue for ecotoxicology tests. We reared tadpoles of the agile frog (*Rana dalmatina*) in the laboratory and in outdoor mesocosms and exposed them to three initial concentrations of a glyphosate-based herbicide (0, 2 and 6.5 mg a.e./l glyphosate), and to the presence or absence of caged predators (dragonfly larvae [*Aeshna cyanea*]). The type of experimental venue had a large effect on the outcome: The herbicide was less lethal to tadpoles reared in outdoor mesocosms than in the laboratory. Further, while the herbicide had a negative effect on development time and on body mass in the laboratory, tadpoles exposed to the herbicide in mesocosms were larger at metamorphosis and developed faster in comparison to those reared in the absence of the herbicide. The effect of the herbicide on morphological traits of tadpoles also differed between the two venues. Finally, in the presence of the herbicide, tadpoles tended to be more active and to stay closer to the bottom of laboratory containers, while tadpole behaviour shifted in the opposite direction in outdoor mesocosms. Our results demonstrate major discrepancies between results of a classic laboratory-based ecotoxicity test and outcomes of an experiment performed in out-door mesocosms. Consequently, the use of standard laboratory tests may have to be reconsidered and their benefits carefully weighed against the difficulties of performing experiments under more natural conditions. Tests validating experimentally estimated impacts of herbicides under natural conditions and studies identifying key factors determining the applicability of experimental results are urgently needed." (Authors)] Address: Mikó, Z., Evolutionary Ecology Research Group, Plant Protection Institute, Centre for Agricultural Research, Hungarian Academy of Sciences, Herman Ottout 15, Budapest 1022, Hungary. E-mail: miko.zsannett@agrar.mta.hu

**18372.** Ngo, C.D.; Ngo, B.V.; Hoang, T.T.; Nguyen, T.T.T.; Dang, H.P. (2015): Feeding ecology of the common sun skink, *Eutropis multifasciata* (Reptilia: Squamata: Scincidae), in the plains of central Vietnam. *Journal of Natural History* 49(39-40): 2417-2436. (in English) ["We studied the feeding ecology of *Eutropis multifasciata* in the tropical plains

of central Vietnam to understand better the foraging mode, spatiotemporal and sexual variation in dietary composition, and rarefaction curves of prey-taxon richness for males and females. Stomach contents (n = 161) were collected from October 2013 to May 2014 using a nonlethal stomach-flushing technique. A total of 680 food items (624 animal items and 56 plant items, [and including Odonata]) was found in 161 stomachs of skinks, representing 19 unique animal categories. We found that the diet of *E. multifasciata* is composed mainly of small, sedentary and clumped prey and that this skink specialises on spiders, insect larvae, snails, grasshoppers and crickets (with a combined importance index of 60%). Dietary composition, prey size and total prey volume in *E. multifasciata* changed between dry and rainy seasons and among regions. The total volume of food items consumed by males was larger than that of females, and the diversity and evenness index of prey categories were larger in males than in females. However, using rarefaction curves revealed that females have the higher prey-taxon richness after points between 130 and 140 prey items for frequency, and between 160 and 170 prey items for number of items, and the differences were not statistically significant. The foraging behaviour of *E. multifasciata* best fits a 'widely foraging' model." (Authors)] Address: Ngo, C.D., Faculty of Biology, College of Education, Hue University, Hue, Vietnam. E-mail: ndc6868@gmail.com

**18373.** Orlofske, S.A.; Jadin, R.C.; Johnson, P.T.J. (2015): It's a predator–eat–parasite world: how characteristics of predator, parasite and environment affect consumption. *Oecologia* 178(2): 537-547. (in English) ["Understanding the effects of predation on disease dynamics is increasingly important in light of the role ecological communities can play in host–parasite interactions. Surprisingly, however, few studies have characterized direct predation of parasites. Here we used an experimental approach to show that consumption of free-living parasite stages is highly context dependent, with significant influences of parasite size, predator size and foraging mode, as well as environmental condition. Among the four species of larval trematodes and two types of predators (fish and larval damselflies [*Enallagma* sp.]) studied here, parasites with larger infective stages (size >1,000 µm) were most vulnerable to predation by fish, while small-bodied fish and damselflies (size <10 mm) consumed the most infectious stages. Small parasite species (size approx. 500 µm) were less frequently consumed by both fish and larval damselflies. However, these results depended strongly on light availability; trials conducted in the dark led to significantly fewer parasites consumed overall, especially those with a size of <1,000 µm, emphasizing the importance of circadian shedding times of parasite free-living stages for predation risk. Intriguingly, active predation functioned to help limit fishes' infection by directly penetrating parasite species. Our results are consistent with established theory developed for predation on zooplankton that emphasizes the roles of body size, visibility and predation modes and further suggest that consumer–resource theory may provide a predictive framework for when predators should significantly influence parasite transmission. These results

contribute to our understanding of transmission in natural systems, the role of predator–parasite links in food webs and the evolution of parasite morphology and behavior." (Authors)] Address: Orlofske, Sarah, Dept of Ecology and Evolutionary Biology, University of Colorado, Boulder, CO, 80309, USA. E-mail: s.a.orlofske@gmail.com

**18374.** Pamungkas, D.W.; Ruspindi, E.C.A.; Ani, N.L. (2015): Diversity and distribution of dragonflies (Odonata) in Bromo Forest Area (BKPH Lawu Utara : KPH Surakarta) Central Java. Proceedings of International Conference on Life Sciences and Biotechnology (ICOLIB). Exploration and Conservation of Biodiversity, Jember. ISBN : 978-602-9030-98-3: 123-127. (in English) ["Odonates diversity in Bromo forest area (KPH Surakarta) was observed, where we recorded 21 species. Libellulidae was the richest family with 12 species and Orthetrum was the most common genera. Zygoptera were represented by 7 species and 14 species represent Anisoptera. River stream along the forest area with multiple vegetation structure may provides good habitat to Odonata lives. Mostly odonates were aggregated due to habitat specific nature, the presence of family Gomphidae, *P. reinwardtii* in this study showed there is a good condition of water. A detailed list of odonates recorded from Bromo forest area is presented." (Authors)] Address: Pamungkas, D.W., Biodiversitas Study Club, Department Biology, Faculty of Mathematics and Science, Sebelas Maret University. Jl. Ir. Sutami 36A Surakarta 57126, Central Java, Indonesia. E-mail: diagal.wisnu@gmail.com

**18375.** Ramlee, S.N.S. (2015): Studies of breeding habitats and seasonal occurrence of mosquitoes in Putrajaya and Kuala Selangor, with laboratory experiments of guppies and dragonfly nymphs as potential biocontrol predators against mosquito larvae. PhD thesis, University of Malaya: xxviii, 305 pp. (in English) ["Mosquito control is essential for the control of vector borne diseases. Many synthetic insecticides are widely used for controlling adult and larval mosquito populations. However, there are multirole effects: e.g. the harmful effects of chemicals on non-target organisms, the development of resistance to these chemicals in mosquitoes and the recent resurgence of different mosquito-borne diseases. The objectives of this study are to determine the potential breeding habitats of the mosquitoes, mosquito indices, mosquito species, density of mosquito larvae, perceptions of respondents on bio control and to conduct captivity studies on predator–prey relationships. Entomological surveillance was carried out in six localities in the urban and suburban areas from January until December 2010 to identify potential breeding sites for mosquitoes and mosquito species populations. A total of 442 representative households in six localities were selected. Breeding habitats were sampled outdoors in the surroundings of the housing areas. There was a significant difference in the number of mosquito larvae collected, where the urban areas had a higher density in contrast to suburban areas. The study indicated that the most predominant species found in both areas was *Aedes albopictus* with gardening utensils as a preferred breeding habitat for urban area and artificial containers for

suburban area. Entomological indices were calculated to predict future outbreaks in the localities. Ovitrap surveillance was carried out in one year to study the relationship between ovitrap surveillance and environmental parameters, which revealed no significant difference in the population numbers for both areas and no correlation to the environmental factors. Questionnaires on the perceptions of chemical in mosquito control and the potential use of bio control were distributed to staffs in health office and also public in both study areas. In general the public had high uncertainties (scoring on 'not sure' for all the 4 questions given ranging from 47.9% to 27%). This is due to the public being unfamiliar to bio control as indicated in question 1 (56%) in contrast to staff very aware on bio control (75%). Fatigue was the most frequently reported symptom by staff and breathing difficulty reported by public. Natural bio control agent surveillance was conducted in both study areas. *Poecilia reticulata* and Odonata nymph species was the most natural predator collected at study areas. Three species of Odonata nymphs consumed more *Aedes* species than *Culex* species but there was no significant difference in the predator feeding efficiency. In terms of prey preferences of guppy, both male and female consumed more *Aedes* species than *Culex* species. The behaviour of mosquito larvae species and predator (guppy and Odonata nymph) species showed direct influence on the predatory activities. All predators exhibited diurnal activities; they were day-time stalkers and actively consumed more mosquito larvae during the day time. The efficiency of predatory activities depends on several factors such as water volume, number of predator, and number of prey density. These results concluded that both common biocontrol agent (guppies) and potential biocontrol agent (Odonata nymphs) are efficient predators in laboratory experiment and thus likely candidates to be utilized as an environmental friendly mosquito management strategy." (Author)] Address: not stated

**18376.** Salcher, M.; Schiel, F.-J. (2015): Neunachweise der Helm-Azurjungfer (*Coenagrion mercuriale*) bei Tübingen (Odonata: Coenagrionidae). *Mercuriale* 15: 5-12. (in German, with English summary) ["We report about new records of *C. mercuriale* west of the city of Tübingen in the federal state of Baden-Württemberg (southwestern Germany). The species was found there by the first author in the years 2013 to 2015 at eight sites in the valleys of the rivers Ammer and Neckar. The reproduction sites are small rivulets and ditches with dense aquatic and riparian vegetation, which are typical habitats for the species. The populations are separated both from those at the Prealpine Area and the Upper Rhine valley by distances from at least 70 km of mountainous and forested landscape. Therefore we suppose the populations to be overlooked. Furthermore there seems to be a high extinction risk because of the high isolation of the habitats." (Authors)] Address: Salcher, M., Poltringer Hauptstr. 97, 72119 Ammerbuch, Germany. E-mail: martin\_salcher@web.de

**18377.** Samin, N.; Sakenin, H.; Thipaksorn, A. (2015): The species of Odonata (Insecta) from the Arasbaran Biosphere



Reserve and vicinity, northwestern Iran. *Wuyi Science Journal* 31(1): 85-92. (in English) [Arasbaran (East Azarbaijan province, northwestern Iran), *Aeshna mixta*, *Anax ephippiger*, *Anax imperator*, *Anax parthenope*, *Calopteryx intermedia*, *Ischnura elegans ebneri*, *Ischnura evansi*, *Ischnura pumilio*, *Coenagrion vanbrinkae*, *Sonjagaster nobilis*, *Epallage fatime*, *Onychogomphus assimilis*, *Crocothemis erythraea*, *Libellula depressa*, *Orthetrum anceps*, *O. brunneum*, *O. ransonneti*, *O. sabina*, *Pantala flavescens*, *Trithemis annulata*, *T. arteriosa*, *T. festiva*, *T. kirbyi*, *Zygonyx torrida*, *Platycnemis dealbata*] Address: Samin, N., Young Researchers & Elite Club, Science & Research Branch, Islamic Azad Univ., Tehran, Iran. E-mail: n\_samin63@yahoo.com

**18378.** Sanchez-Guillen, R.A.; Cordoba-Aguilar, A.; Hansson, B.; Ott, J.; Wellenreuther, M. (2015): Evolutionary consequences of climate-induced range shifts in insects. *Biological Reviews* 91(4): 1050-1064. (in English) ["Range shifts can rapidly create new areas of geographic overlap between formerly allopatric taxa and evidence is accumulating that this can affect species persistence. We review the emerging literature on the short- and long-term consequences of these geographic range shifts. Specifically, we focus on the evolutionary consequences of novel species interactions in newly created sympatric areas by describing the potential (i) short-term processes acting on reproductive barriers between species and (ii) long-term consequences of range shifts on the stability of hybrid zones, introgression and ultimately speciation and extinction rates. Subsequently, we (iii) review the empirical literature on insects to evaluate which processes have been studied, and (iv) outline some areas that deserve increased attention in the future, namely the genomics of hybridisation and introgression, our ability to forecast range shifts and the impending threat from insect vectors and pests on biodiversity, human health and crop production. Our review shows that species interactions in de novo sympatric areas can be manifold, sometimes increasing and sometimes decreasing species diversity. A key issue that emerges is that climate-induced hybridisations in insects are much more widespread than anticipated and that rising temperatures and increased anthropogenic disturbances are accelerating the process of species mixing. The existing evidence only shows the tip of the iceberg and we are likely to see many more cases of species mixing following range shifts in the near future." (Authors) *Crocothemis erythraea*] Address: Sanchez-Guillen, Rosa, Department of Biology, Lund University, Lund 223 62, Sweden. E-mail: rosa.sanchez-guillen@biol.lu.se

**18379.** Sivtseva, L.V. (2015): On the seasonal activity of Odonata in Central Yakutia. *Science and Education* 2015(4): 137-142. (in Russian, with English summary) ["The phenology of 25 species of damselflies and dragonflies in the cryosemiarid conditions of Central Yakutia is studied. Total flight activity of the imago is continued during 5 months from May to September. Six seasonal groups are revealed: hibernating – the first 10 days of May – the last 10 days of August (*Sympetma paedisca*), late spring-summer – the last 10 days of May – the last 10 days of July (3 species), late spring-late

summer – the last 10 days of May – the last 10 days of August (1), summer – 10 days in the middle of June – the last 10 days of July (9), summer-late summer – 10 days in the middle of June – the first 10 days of September (9), and the summer-autumn – 10 days in the middle of July – the last 10 days of September (2 species). Emergence of damselflies and dragonflies from reservoirs occur within seventy days from the last 10 days of May to the last 10 days of July and their greatest diversity (25 species) is observed in the period from the 11th to the end of July. The period of seasonal flight activity of adults Odonata in the investigated area essentially does not differ from the period of flight in the North-East of the European part of Russia. The terms of flight of damselflies and dragonflies in the Central Yakutia, in comparison with phenological data of the north of the Far East appear longer for a month, and is shorter for a month than in the south of Siberia and the Far East." (Author)] Address: Sivtseva, L.V., Institute for Biological Problems of Cryolithozone SB RAS, Yakutsk, Russia

**18380.** Westermann, K.; Westermann, E. (2015): Exuvienfunde der Großen Moosjungfer (*Leucorrhinia pectoralis*) auf 940 m NN im Oberen Hotzenwald – erster Bodenständigkeitsnachweis im Schwarzwald. *Naturschutz südl. Oberrhein* 8: 118- (in German) [*L. pectoralis*: The first proof of successful reproduction by records of exuviae (20/25-V-2014) of at 940 m a.s.l. in the upper Hotzenwald, Baden-Württemberg, Germany is documented.] Address: Westermann, K., Buchenweg 2, 79365 Rheinhausen., Germany

**18381.** Winkler, C. (2015): Die Libellenfauna der Moor- und Heidegewässer im Raum Sorgwold. *Faun.-Ökol. Mitt. Suppl.* 39: 53-64. (in German, with English summary) ["The dragonflies were mapped from April 7th to October 10th 2010 in the region around Sorgwold (Schleswig-Holstein, northern Germany) at 24 standing waters of four bog and heathland areas. In total 32 species were recorded. The three most frequent species were *Enallagma cyathigerum*, *Libellula quadrimaculata* and *Leucorrhinia rubicunda*. For the threatened or near threatened species *Coenagrion hastulatum*, *C. lunulatum*, *Lestes dryas*, *Aeshna juncea*, *A. subarctica elisabethae*, *Leucorrhinia dubia*, *L. pectoralis*, *L. rubicunda* and *Sympetrum flaveolum* population size, habitats and effects of habitat management are presented and discussed. Most of these species prefer mesotrophic or oligotrophic bog or heathland waters. *L. pectoralis*, *L. dryas*, and *S. flaveolum* were found in recently established shallow waters only, which let presume that they benefit from the habitat management. All other threatened species benefit from management too, especially from cutting trees and scrubs at the edge of peat cuttings and restoration of wetlands." (Author)] Address: Christian Winkler Bahnhofstr. 25 24582 Bordesholm Email: chr.winkler@email.de

**18382.** Zamorova, M.A. (2015): The feeding of bream *Abramis brama* in the Danube lake Kotlabuh. *Science. zap. Ternopil. nat. ped. un-tu. Ser. Biol.*, 2015, No 3-4 (64): 242-245. (in Ukrainian, with English summary) ["It was found out that in the Kotlabuh Lake the feeding range of bream *A.*

brama is quite wide and composed of organisms from 37 taxa. Regardless of the season, *Dreissena polymorpha* was the most important in the diet of bream (by weight). Besides, in the autumn there also were Lymnaeidae, larvae of Trichoptera, Hirudinea, larvae of Odonata, Ephemeroptera; in the spring - larvae of Ephemeroptera, Coleoptera, molluscs Unionidae, Viviparidae, larvae of Trichoptera and Hirudinea. According to the values of the index of relative importance for the whole period of studies *Dreissena polymorpha*, Oligochaeta, Amphipoda, Hirudinea and larvae of Trichoptera, Chironomidae dominated in bream's feeding. In spring and autumn gastropods can be considered as the favorite food of fish." (Author) ] Address: Zamorova, M.A., I. I. Mechnykov Odesa National University, Ukraine

## 2016

**18383.** Jung, S.-W.; Min, H.-K.; Hwang, H.-S.; Seo, Y.-J.; Bae, Y.-J.; Paek, W.-K. (2016): Diversity of aquatic insects of Taean area in South Korea, with notes on species-specific distribution. Korean Journal of Environment and Ecology 30(1): 58- 70. (in Korean, with English summary) ["An investigation was carried out to study the diversity of aquatic insects, functional feeding groups (FFGs), habitat oriented groups (HOGs), and species-specific distribution in the Taean area in Korea from June to August, 2015. As a result, a total of 72 species belonging to 30 families and six orders were identified in all the investigated regions. Odonata (22 spp.: 30.56%) was the largest group in species richness followed by Coleoptera (21 spp.: 29.16%), Hemiptera (17 spp.: 23.61%) and Diptera (8 spp.: 11.11%) while for Ephemeroptera and Trichoptera, only two species (2.78%) were found. In addition, Plecoptera and Megaloptera inhabiting clean and flowing waters were not found. In the FFGs, predators (48 spp.: 66.67%) were relatively larger as represented by Odonata, Coleoptera, and Hemiptera, whereas shredders and scrapers were lower in proportion. The dominant groups of HOGs were swimmers (24 spp.: 33.33%), climbers (18 spp.: 25.0%), and sprawlers (12 spp.: 16.67%), which were characterized as aquatic insects community of island. Four species: *Cybister lewisianus* Sharp, *Helophorus auriculatus* Sharp, *Agrypnia pagetana* Curtis, *Diplonychus esakii* Miyamoto & Lee that are designated as Endangered, Near Threatened, and Vulnerable (Korean Red List) have been found to inhabit the Taean area. Also, two species belonging to the exportable species group (*Ceriagrion auranticum* Fraser, *Paracercion melanotum* (Selys)) and one species belonging to the climate-sensitive biological indicator group (*Ischnura elegans* (Van der Linden)) were identified. In this study, four significant species including the Endangered are presented on the Korean distribution map based on the information in the national ecosystem survey accumulated for 7 years (2006-2012) by the Ministry of Environment." (Authors)] Address: Jung, S.-W., Research and Promotion Division, National Science Museum, Daejeon 34143, Korea

**18384.** Minot, M. (2016): Suivi des populations de *Leucorrhinia pectoralis* (Insecta: Odonata) et étude des habitats favorables à l'implantation de l'espèce dans le Canton de

Neuchâtel. Master's Thesis, Université de Rouen: 48 pp, app. (in French, with English summary) ["After the restoration of peatlands which were previously exploited in two valleys, the dragonfly *Leucorrhinia pectoralis* settled down in the Swiss Jura. This species listed at the second annexe of the Bern Convention is critically endangered in Switzerland. **18385.** As part of a 5 years populations study, this work enabled to estimate the size of the biggest populations based on the mark-recapture of 529 individuals. The numbers of mature males are estimated at 296 and 80 on both main peatlands. This is respectively as many and two times less than than in 2015. This decline for one of the populations is probably due to the unfavourable climatic conditions in 2016. Only three inter-peatland movements were observed. Two of them were done by immatures, among the 134 individuals that we marked. Contrary to the value found in the bibliography, the sex-ratio at the emergence seems to be much more favourable to the females with only 38 % of males. Beside the mark-recapture study, the vegetation was mapped and abiotic factors were recorded on 111 water ponds. A statistical study enabled then to highlight the environmental factors that attract *L. pectoralis* on the sites and are favourable to its reproduction. Habitats seems to be more attractive when the pH is high, with few sphagnum and the presence of *Potentilla palustre* and *Typha latifolia*. *L. pectoralis* prefers the water ponds with several different units of vegetation: a patchwork of structures. Conservation measures can be applied to maintain transition environments, which structure is similar to the old natural low-marshes. An example of management on 7 water ponds in the « Marais de Brot » based on dredging at regular time intervals was then presented." (Author)] Address: Minot, M., Normandie Univ, UNIROUEN, IRSTEA, ECODIV, 76000 Rouen, France. E-mail: m.minot@hotmail.fr

**18386.** Renner, S.; Sahlén, G.; Périco, E. (2016): Testing dragonflies as species richness indicators in a fragmented subtropical Atlantic forest environment. Neotropical Entomology 45(3): 231- 239. (in English) ["We surveyed 15 bodies of water among remnants of the Atlantic Forest biome in southern Brazil for adult dragonflies and damselflies to test whether an empirical selection method for diversity indicators could be applied in a subtropical ecosystem, where limited ecological knowledge on species level is available. We found a regional species pool of 34 species distributed in a nested subset pattern with a mean of 11.2 species per locality. There was a pronounced difference in species composition between spring, summer, and autumn, but no differences in species numbers between seasons. Two species, *Homeoura chelifera* and *Ischnura capreolus*, were the strongest candidates for regional diversity indicators, being found only at species-rich localities in our surveyed area and likewise in an undisturbed national forest reserve, serving as a reference site for the Atlantic Forest. Using our selection method, we found it possible to obtain a tentative list of diversity indicators without having detailed ecological information of each species, providing a reference site is available for comparison. The method thus allows for indicator species to be selected in blanco from taxonomic groups that are

little known. We hence argue that Odonata can already be incorporated in ongoing assessment programs in the Neotropics, which would also increase the ecological knowledge of the group and allow extrapolation to other taxa." (Authors)] Address: Renner, S., Lab de Evolução e Ecologia, Centro Universitário Univates, Rua Avelino Talini, 171, Bairro Universitário, 95900-000 Lajeado, RS, Brasil; samuelrenner@hotmail.com

## 2017

**18387.** Kipping, J.; Clausnitzer, V.; Fernandes Elizalde, S.R.F.; Dijkstra, K.-D.B. (2017): The dragonflies and damselflies (Odonata) of Angola. *African Invertebrates* 58(1): 65-91. (in English) ["Prior to 2012, only 158 species of Odonata were known from Angola. Surveys in 2012 and 2013 added 76 species and two further additions in 2016 brought the national total to 236 species. We provide a revised checklist with taxonomic notes and discuss the history of research, the biogeography of the fauna, and the potential for further discoveries. The national total is likely to be above 300 species. This would make Angola one of the richest countries for Odonata in Africa. The endemic species formerly classified in *Chlorocypha* are transferred to *Platycypha*." (Authors)] Address: Kipping, J., BioCart Ökologische Gutachten, Albrecht-Dürer-Weg 8, 04425 Taucha/Leipzig, Germany

**18388.** Wang, X.; Zhang, Z.; Ren, H.; Chen, Y.; Wu, B. (2017): Role of soft matter in the sandwich vein of dragonfly wing in its configuration and aerodynamic behaviors. *Journal of Bionic Engineering* 14(3): 557-566. (in English) ["The microstructure of the main longitudinal veins of the dragonfly wing and the aerodynamic behaviours of the wing were investigated in this paper. The microstructure of longitudinal vein presents two circumferential chitin layers and a protein-fiber soft layer. The dragonfly wing is corrugated due to the spatial arrangement of longitudinal veins. It was found that the corrugation angle could significantly influence the lift/drag ratio across a range of attack angles by the wind tunnel experiments. The results of the finite element analysis indicate that the protein soft layer of vein facilitates the change of the corrugation angle by allowing substantial relative twisting deformation between two neighbouring veins, which is not possible in veins without a soft sandwich layer." (Authors)] Address: Wang, X., Dept of Engineering Mechanics, Appl. Mechanics Lab., Tsinghua Univ., Beijing 100084, China

**18389.** Ware, J.L.; Pilgrim, E.; May, M.L.; Donnelly, T.W.; Tennessen, K. (2017): Phylogenetic relationships of North American Gomphidae and their close relatives. *Systematic Entomology* 42(2): 347-358. (in English) ["Intrafamilial relationships among clubtail dragonflies (Gomphidae) have been the subject of many morphological studies, but have not yet been systematically evaluated using molecular data. Here we present the first molecular phylogeny of Gomphidae. We include six of the eight subfamilies previously suggested to be valid, and evaluate generic relationships within them. We have included examples of all genera reported from the Nearctic except *Phyllocycla*. This sample

includes all North American species of *Ophiogomphus*, which has allowed us to explore intrageneric relationships in that genus. Our particular focus is on the closest relatives of the genus *Gomphus*, especially those North American species groups that have been commonly treated as subgenera of *Gomphus*. The *Gomphus* complex is split into additional genera, supported by molecular and morphological evidence: *Phanogomphus*, *Stenogomphurus*, *Gomphurus* and *Hylogomphus* are here considered to be valid genera. The genus *Gomphus*, in our restricted sense, does not occur in the western hemisphere; in addition, *G. flavipes* is transferred to *Stylurus*." (Authors)] Address: Ware, Jessica L., Dept of Biology, Rutgers University, Newark, NJ, USA. E-mail: jware42@andromeda.rutgers.edu

**18390.** Wellenreuther, M. (2017): Balancing selection maintains cryptic colour morphs. *Molecular Ecology* 26: 6185-6188. (in English) ["Animals display incredibly diverse colour patterns, a testament to evolution's endless innovation in shaping life. In many species, the interplay between males and females in the pursuit of mates has driven the evolution of a myriad of colour forms, from the flashy peacock tail feathers to the tiniest colour markings in damselflies. In others, colour provides crypsis by allowing to blend into the background and to escape the eyes of predators. While the obvious benefits of this dazzling diversity for reproduction and survival seem straightforward, its maintenance is not. Theory predicts that genetic drift and various forms of selection reduce variation over time, making the persistence of colour variants over generations a puzzle. In this issue of *Molecular Ecology*, Lindtke et al. (2017) study the cryptic colour morphs of *Timema cristinae* walking sticks to shed light on the genetic architecture and mechanisms that allow colour polymorphism maintenance over long timescales. By combining genome-wide data with phenotyping information from natural populations, they were able to map the green and melanistic colour to one genomic region with highly reduced effective recombination rate between two main chromosomal variants, consistent with an inversion polymorphism. These two main chromosomal variants showed geographically widespread heterozygote excess, and genomic signatures consistent with long-term balancing selection. A younger chromosomal variant was detected for the third morph, the green-striped colour morphs, in the same genomic regions as the melanistic and the green-unstriped morphs. Together, these results suggest that the genetic architecture of cryptic *T. cristinae* morphs is caused by nonrecombining genomic blocks that have been maintained over extended time periods by balancing selection making this study one of the few available empirical examples documenting that balancing selection of various forms may play an important role in maintaining adaptive genetic variation in nature." The paper includes references to *Ischnura elegans*. (Authors)] Address: Wellenreuther, Maren, Seafood Res. Unit, Plant & Food Research Limited, Nelson, New Zealand. Email: maren.wellenreuther@plantandfood.co.nz

**18391.** Westenbrink, F.; Ketelaar, R. (2017): Veranderingen in de libellenfauna van de Gorsselse Heide: 1949-

2016. *Brachytron* 19(1): 22-34. (in Dutch, with English summary) ["The Gorssele Heide is a heathland remnant with some bogs and ponds in an area called De Achterhoek in the eastern part of the Netherlands. Since 1949 was this nature area regularly visited by odonatologists who observed a total of 43 species of dragonflies. Acidification and desiccation resulted in a decrease and the disappearance of typical species like *Sympetma paedisca*, *Leucorrhinia rubicunda* and *Aeshna juncea*. Eutrophication in the second part of the former century caused an increase of *Pyrrhosoma nymphula*, *Sympetrum sanguineum* and *Brachytron pratense*. Since the beginning of this century species from the southern part of Europe were added to the species list. Due to climate changes *Crocothemis erythraea*, *Aeshna affinis*, *Erythromma lindenii* and *Sympetrum fonscolombii* colonized the Gorssele Heide. A special observation was the settlement and rapid increase of *Lestes virens* and the simultaneous disappearance of *L. sponsa*. The last three years the area was intensively managed to restore the quality of the degenerated heath and ponds. As a consequence a rapid increase of former scarce species like *Orthetrum cancellatum* and *Libellula depressa* occurred. As the landscape of the Gorssele Heide basically did not change, the observed variations in the dragonfly population seem to be a derivative of the extreme nationwide fluctuations seen the last decades in the Netherlands and Flanders." (Authors)] Address: Westenbrink, F. E-mail: f.westenbrink@kpnmail.nl

**18392.** Westermann, K. (2017): Die Libellen des Hirschbädermooses im Feldberggebiet. *Naturschutz am südlichen Oberrhein* 9: 123-140. (in German, with English summary) ["The Hirschbädermoos is a moor which is mainly supplied by precipitation, and which is located in the Feldberg area (southern Black Forest) at an altitude of roughly 1280 m. In 2016, the moor dragonflies emerged there from 5th of June onwards. until and including the 2nd of September all exuviae were collected 15 times. until the end of the 20th century, this moor was the last remaining habitat in the Black Forest in which *Aeshna caerulea* bred. Since then, there have been no recordings and it is probably now extinct in the Black Forest. Although 2015 was a very hot and dry year, in 2016 main habitats of the moor dragonflies *Aeshna subarctica*, *Leucorrhinia dubia*, *Somatochlora arctica* und *S. alpestris* were found here. Therefore, an increase and stabilisation of the former two species must have occurred. In 2011, the upper parts of three old drainage ditches, which had a damaging effect on the moor, were blocked. It is very likely that this was the main cause for the population increase in some species. However, this measurement is not sufficient, because in 70 % of the 77 big pools and other water bodies, no or only very small populations of successfully emerged moor dragonflies were recorded. The water bodies dried up even in the "normal" summer of 2016 and were very likely dried up for a long period in 2015. Suggestions for a continuing reconstitution of the moor were elaborated. Moor dragonflies are perfectly suited as indicators of the condition of the water bodies in which they develop and also indirectly of the moor." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany

**18393.** Westermann, K. (2017): Zur Drift der Larven der Kleinen Zangenlibelle (*Onychogomphus forcipatus*) im Fluss-System Elz-Dreisam-Leopoldskanal-Restrhein. *Naturschutz am südlichen Oberrhein* 9: 141-154. (in German, with English summary) ["The drift of larvae of *O. forcipatus* in the river system Elz-Dreisam-Leopoldskanal-Restrhein. According to investigations along a 34 km channel-like constructed section of the river system of the Elz, Dreisam, Leopoldskanal and Restrhein (districts of Emmendingen and Breisgau-Hochschwarzwald, Baden-Württemberg) the hatching abundance of *O. forcipatus* reached a high number of up to 27 exuviae / meter and year along the river bank at the lower reaches. at the middle reaches, there were significantly fewer. In contrast, the abundance of adult males along the middle reaches was much higher than along the lower reaches. This phenomenon can only be explained by downstream drift of a high portion of larvae over a large distance which is compensated by an upstream flight movement of the imagoes. The downstream drift of the larvae facilitates the buildup of a large population of *O. forcipatus* with several hundreds of thousands of freshly emerged imagoes. Drifted larvae find a large supply of refuges which are protected from flooding and with lower stream velocity along the Leopoldskanal and lower reaches of Elz and Dreisam. In the significantly warmer eutrophic lower reaches, which are presumably richer in feed, the development is faster, leading to an earlier emergence on average of the imagoes. adult imagoes gather along the middle reaches in the area of quickly flowing and turbulent sections, which seem to be the preferred sites for pairing and oviposition. the eggs and young larvae are deposited on water which is cooler and has higher oxygen levels than in the lower reaches. If this drift is enforced due to severe floods in the form of a „catastrophic drift“ or if the larvae drift more spontaneously as a strategy in view of an advantage of the biology of the population, remains unclear." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinhausen, Germany

**18394.** White III, H.B.; O'Brien, M.F. (2017): Naming an undescribed dragonfly: Williamson's *Williamsonia* and the travails of R. Heber Howe Jr.. *Northeastern Naturalist* 24 (Monograph 14): 1-43. ["R. Heber Howe Jr. (1875–1932), a New England preparatory school teacher and natural historian, became interested in dragonflies after one of his students found the rare *Williamsonia lintneri* (Hagen) school property. Subsequently, Howe quickly became a prominent regional authority on Odonata through his own studies and through his frequent correspondence with E.B. Williamson and other established dragonfly authorities. In 1922, while Howe was drafting an article on the history of *W. lintneri*, Williamson discovered a second species of *Williamsonia*, which Howe may have also recognized. Correspondence archived from this period reveals a dispute between Howe and Williamson about naming and describing the new species that peripherally involved Philip P. Calvert and Clarence H. Kennedy, other well-established dragonfly specialists, and Canadian entomologists James H. McDunnough and Edmund M. Walker. Howe's position in the dispute that the new species had previously been named in the literature, though not



formally described, did not prevent Williamson from describing and naming *Williamsonia fletcheri*. Yet behind the scenes, expressed in letters, the saga reveals tensions that can develop, exposing personality traits, among specialists with competing interests." (Author)] Address: White III, H.B., Dept of Chemistry & Biochemistry, University of Delaware, Newark, DE 19716, USA. E-mail: halwhite@udel.edu

**18395.** Wiederman, S.D.; Fabian, J.M.; Dunbier, J.R.; O'Carroll, D.C. (2017): A predictive focus of gain modulation encodes target trajectories in insect vision. *eLife* 2017; 6:e26478: 19 pp. (in English) ["When a human catches a ball, they estimate future target location based on the current trajectory. How animals, small and large, encode such predictive processes at the single neuron level is unknown. Here we describe small target-selective neurons in predatory dragonflies that exhibit localized enhanced sensitivity for targets displaced to new locations just ahead of the prior path, with suppression elsewhere in the surround. This focused region of gain modulation is driven by predictive mechanisms, with the direction tuning shifting selectively to match the target's prior path. It involves a large local increase in contrast gain which spreads forward after a delay (e.g. an occlusion) and can even transfer between brain hemispheres, predicting trajectories moved towards the visual midline from the other eye. The tractable nature of dragonflies for physiological experiments makes this a useful model for studying the neuronal mechanisms underlying the brain's remarkable ability to anticipate moving stimuli." (Authors) *Hemicordulia tau*] Address: Wiederman, S.D., Adelaide Medical School, University of Adelaide, Adelaide, Australia. E-mail: wiederman@adelaide.edu.au

**18396.** Wildermuth, H. (2017): Die Libellenfauna (Odonata) zweier neu angelegter Wiesenweiher - Sukzession, Prädation, Manipulation. *Libellula* 36: 109-134. (in German, with English summary) ["Odonata of two newly created meadow ponds: succession, predation, and manipulation – In the southern Canton of Zürich (Switzerland) the Odonata fauna of two meadow ponds, created in autumn 2010, was recorded on 72 days from 2012 to 2017. In total, ca 1.000 data sets were collected for 37 recorded species, 14 of them with regular reproduction. The results are summarized in tables with regard to the following aspects: (1) yearly presence and evidenced reproduction of all species, (2) maximum yearly number of imagines per recording day, and (3) number of recording days per year with presence of the species. Spectrum of species, origin, and reproduction success of the various species are discussed in respect of the neighbouring potential of species, water regime, water fowl as possible predators, vegetation and its succession, and clearing of prevailing aquatic vegetation. For the promotion of the local odonate fauna at newly created small ponds in rural landscape adequate habitat maintenance is indispensable." (Author)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**18397.** Williams, E.B.; Chumchal, M.M.; Drenner, R.W.; Kennedy, J.H. (2017): Seasonality of odonate-mediated

methyl mercury flux from permanent and semi-permanent ponds and potential risk to red-winged blackbirds (*Agelaius phoeniceus*). *Environmental Toxicology and Chemistry* 36 (10): 2833-2837. (in English) ["Methyl mercury (MeHg) is an aquatic contaminant that can be transferred to terrestrial predators by emergent aquatic insects such as odonates. We assessed the effects of month and pond permanence on odonate-mediated MeHg flux (calculated as emergent odonate biomass x MeHg concentration) in 10 experimental ponds and the potential risk to nestling red-winged blackbirds (*Agelaius phoeniceus*) posed by consuming MeHg-contaminated odonates. Emergent odonates were collected weekly from permanent ponds with bluegill (*Lepomis macrochirus*) (n = 5) and semi-permanent ponds without fish (n = 5) over an 8-month period (January - August, 2015). Methyl mercury flux from damselflies, aeshnid dragonflies and libellulid dragonflies began in March and peaked in April, May and June, respectively, and then declined throughout the rest of the summer. Odonate-mediated MeHg flux from semi-permanent ponds without fish was greater than odonate-mediated MeHg flux from permanent ponds with fish. Nesting of red-winged blackbirds overlapped with peak odonate emergence and odonate-mediated MeHg flux. Because the diet of nestling red-winged blackbirds can be dominated by damselflies and dragonflies, we tested the hypothesis that MeHg-contaminated odonates may pose a health risk to nestling red-winged blackbirds. Methyl mercury concentrations in odonates exceeded wildlife values (the minimum odonate MeHg concentrations causing physiologically significant doses in consumers) for nestlings, suggesting that MeHg-contaminated odonates can pose a health risk to nestling red-winged blackbirds." (Authors)] Address: Williams, E.B., Dept of Biology, Texas Christian University, Fort Worth, Texas, USA.

**18398.** Willink, B.; Svensson, E.I. (2017): Intra- and intersexual differences in parasite resistance and female fitness tolerance in a polymorphic insect. *Proc. R. Soc. B* 284 (1847): 8 pp. (in English) ["To understand host-parasite interactions, it is necessary to quantify variation and covariation in defence traits. We quantified parasite resistance and fitness tolerance of a polymorphic damselfly (*Ischnura elegans*), an insect with three discrete female colour morphs but with monomorphic males. We quantified sex and morph differences in parasite resistance (prevalence and intensity of water mite infections) and morph-specific fitness tolerance in the females in natural populations for over a decade. There was no evidence for higher parasite susceptibility in males as a cost of sexual selection, whereas differences in defence mechanisms between female morphs are consistent with correlational selection operating on combinations of parasite resistance and tolerance. We suggest that tolerance differences between female morphs interact with frequency-dependent sexual conflict, which maintains the polymorphism locally. Host-parasite interactions can therefore shape intra- and intersexual phenotypic divergence and interfere with sexual selection and sexual conflict." (Authors)] Address: Willink, Beatriz: E-mail: beatriz.willink@biol.lu.se

**18399.** Worthen, W.B. (2017): Perch selection in a guild of tropical dragonflies (Odonata: Libellulidae): relationships with body size and thermal ecology. *International Journal of Odonatology* 20(2): 63-78. (in English) ["In the temperate zone, male perch height of co-occurring dragonfly species (Odonata: Libellulidae) often correlates with species body size. I tested for this relationship in a guild of tropical dragonflies at a wetland at La Selva Biological Station, Heredia, Costa Rica. Males of 12 species were observed perching in January–February 2016. Mean male perch height was positively correlated with species body size. For six common species, I quantified differences in perch substrate selection, relationships between diurnal activity, temperature and radiation, and aggressive interactions. The largest species, *Libellula herculea* and *Orthemis discolor*, exhibited typical heliotherm behavior: they used sunny perches at mid-day, and activity correlated more with radiation than temperature. *Orthemis cultriformis*, a slightly smaller heliotherm, was active at mid-day but used shadier perches. *Micrathyrina atra* – previously classified as a “behavioral endotherm” – behaved accordingly, avoiding over-heating by flying early and perching in moderate light. The smallest common species, *Erythrodiplax fervida*, departed from the expected “thermoconformer” behavior by showing no relationship between activity and temperature, perching throughout the day in shaded grasses. The medium-sized *Cannaphila insularis* was unusual, perching 1 m higher than other species. Like larger heliotherms, activity occurred mid-day and correlated with solar radiation. Larger species exhibited greater degrees of interspecific aggression than smaller species. *Cannaphila insularis* is a docile species, but juveniles and females resemble the larger, more aggressive *O. cultriformis*. I hypothesize that *C. insularis* perches high to escape harassment and “reproductive interference” by *O. cultriformis*.” (Author)] Address: Worthen, W.B., Biology Dept, Furman Univ., Greenville, SC, USA, 29613. E-mail: wade.worthen@furman.edu

**18400.** Wright, I.A.; Belmer, N.; Davies, P.J. (2017): Coal mine water pollution and ecological impairment of one of Australia's most 'Protected' High Conservation-Value rivers. *Water Air and Soil Pollution* 228:90: 19 pp. (in English) ["The environmental regulation of a coal mine in the greater Sydney area has failed to recognise the importance of and protect a high conservation-value river located in a World Heritage listed area. This study measured the water quality and ecological health (using macroinvertebrates) of the Wollangambe River and its tributaries near the point of the waste water discharge of a coal mine and assessed the longitudinal impact for 22 km downstream. The investigation revealed two important aspects. The first is the significant impact of the waste water discharge when compared to the otherwise near-pristine condition of the high conservation value river system. The second is the spatial extent of the pollution from the mine that extends at least 22 km downstream from the outflow of coal mine wastes. The resulting water pollution is causing major impairment of the aquatic ecosystem, with reduced abundance, taxonomic richness and loss of pollution-sensitive macroinvertebrate groups. Water pollu-

tion from the mine includes thermal pollution, increased salinity and increased concentrations of zinc and nickel. The mine's waste discharge also strongly modified the river's ionic composition. The study also highlights the failure of the regulatory and governance systems that enable the mine to operate in a manner that causes major environmental impacts.” Aeshnidae (Authors)] Address: Wright, I.A., School of Science & Health, Western Sydney Univ., Locked Bag 1797, Penrith 2751, Australia. E-mail: i.wright@westernsydney.edu.au

**18401.** Yano, A.; Urabe, M. (2017): Larval stages of *Neoplagioporus elongatus* (Goto and Ozaki, 1930) (Opecoelidae: Plagioporidae), with notes on potential second intermediate hosts. *Parasitology International* 66(2): 181-185. (in English) ["Highlights: •Cercaria of *Neoplagioporus elongatus* were identified using a molecular technique. •The cercaria was cotylomicrocercous-type developing in *Semisulcospira nakasekoeae*. •Experimental 2nd-intermediate hosts are oligochaetes, leeches and some dragonflies. Abstract: The morphology of sporocysts and cercariae of *Neoplagioporus elongatus* (Goto and Ozaki, 1930) is described for the first time. A cotylomicrocercous cercaria obtained from the sorbeoconch snail *Semisulcospira nakasekoeae* was confirmed to be the cercaria of *N. elongatus*, based on the degree of sequence identity of the COI gene to that of adult worms. Freshwater annelids (oligochaetes and leeches) and some aquatic insects (odonates) were demonstrated experimentally to be potential second intermediate hosts.” (Authors)] Address: Urabe, M., Dept of Ecosystem Studies, School of Environmental Science, The University of Shiga Prefecture, 2500 Hassaka, Hikone, Shiga 522-8533, Japan. E-mail: urabe@ses.usp.ac.jp

**18402.** Younes, A.; El-Sherief, H.; Gawish, F.; Mahmoud, M. (2017): Experimental evaluation of Odonata nymph in the biocontrol of schistosomiasis intermediate hosts. *Asian Pacific Journal of Tropical Biomedicine* 6(12): 995-1000. (in English) ["Highlights: •*Bulinus truncatus* and *Biomphalaria alexandrina* snails are obligatory hosts of *Schistosoma*. •Elimination or reducing these snails will reduce the chances of transmission of Schistosomiasis disease. •The predator *Hemianax ephippiger* was evaluated against these snails. •*H. ephippiger* can be used in biological control of the freshwater snails. Abstract: Objective: This study has been carried out to evaluate the predatory potential of the Odonata nymph on freshwater snails that serve as intermediate hosts for *Schistosoma* species (*Bulinus truncatus* and *Biomphalaria alexandrina*). Methods: Observations on the searching, attacking and devouring of the two snail types with series of laboratory-based predation experiments, whose aims were to determine daily predation rate, differential predation, prey preference considering small-, medium- and large-sized snails were conducted. Results: Laboratory evaluation revealed that, the Odonata nymph could kill and consume the two intermediate hosts. The number of snails consumed differed according to the snail type, size and density. The times taken for searching and handling times were dependent on

the snail size, type and satiation of the predator. The predation rate varied also with respect to snail type, size and density. This study also evaluated that Odonata nymphs consumed more *B. truncates* per unit time than *B. alexandrina*, and that there may be a preference for smaller than larger snails. Conclusion: According to our observation, the predator, *H. ephippiger* nymph may be a suitable bio-control agent in connection with *Schistosoma* intermediate hosts." (Authors)] Address: Younes, A., Dept Entom., Fac. of Science, Cairo Univ., Giza, Egypt. E-mail: alyyounes@hotmail.com

**18403.** Yu, X. (2017): An overview of taxonomy of the family Calopterygidae and checklist of China. Highlights of Sciencepaper Online, 2017,10(15): 1701-1706. (in Chinese, with English summary) ["Calopterygidae is the most beautiful species of Odonata. China is one of the countries in which calopterygids have the highest diversity. In this paper, the taxonomic history of Calopterygidae insect was reviewed briefly with a checklist of Chinese species, including 12 genera and 38 species. This work added a new record of China, and provided basic information for further related research." (Author)] Address: College of Life Sciences, Nankai University, Tianjin 300071

**18404.** Zamoroka, A.M.; Bidychak, R.M.; Geriak, Yu.M.; Glotov, S.V.; Kaprus, I.Ya.; Kozoriz, Yu.H.; Martynov, A.V.; Mykhayliuk-Zamoroka, O.V.; Pushkar, T.I.; Rizun, V.B.; Slobodian, O.M.; Smirnov, N.A.; Utevsy, S.Yu.; Shparyk, V.Yu. (2017): Distribution of rare invertebrate animals listed in the Red Data Book of Ukraine in Ivano-Frankivsk Region. Ukrainian Entomological Journal 2(13): 77-94. (in Ukrainian, with Russian and English summaries) ["In the current study we present comprehensive list of 65 rare invertebrate animal species listed in third edition of the Red Data Book of Ukraine and their records in Ivano-Frankivsk Region of Ukraine. Some of the listed species are under protection of International legal acts such as Bern Convention – 15 species, European Red List – 14 species, Red List of IUCN – 21 species and EU Habitats Directive – 11 species. We provide detail data on their records, estimation of populations size and their range in Ivano-Frankivsk Region. We found that two species are, possibly, extinct in the Region. Populations of three species are critically endangered and dramatically decreasing in the size. Fifteen species are characterized by small and stable populations. We revealed that populations of fourteen species are large in size with high density of individuals. Two species rapidly increased their range northward and currently penetrated into Ivano-Frankivsk Region. However, there are no sufficient data on population size for the rest 29 species. We described distribution of the rare species within Ivano-Frankivsk Region. According to our data, 21 species are widely distributed in the Region occupying the Carpathian Mountains, the Precarpathian Lowland and the Podillya Eminence. Seventeen species were registered only in the Carpathian Mountains; all other species distributed mainly within the Precarpathian Lowland and/ or the Podillya Eminence. Present data can be used in preparation the IV edition Red data Book of Ukraine, and also be a base for creation Red book of Ivano-

Frankivsk Region." (Authors)] Address: Zamoroka, A.M.. E-mail: andrii.zamoroka@pu.if.ua,

**18405.** Zeuss, D.; Brunzel, S.; Brandl, R. (2017): Environmental drivers of voltinism and body size in insect assemblages across Europe. Global Ecology and Biogeography 26(2): 154-165. (in English) ["Aim: General geographical patterns of insect body size are still a matter of considerable debate, mainly because the annual number of generations (voltinism) and its relationship with body size have largely been ignored. We present the first analyses of voltinism and body size of insect assemblages at a continental scale using lepidopteran and odonate species. We hypothesize that voltinism is strongly driven by environmental conditions and constrains body size on macroecological scales. Location: Europe. Methods: We compiled the distribution, voltinism and body size of 943 lepidopteran and odonate species within a 50 km × 50 km grid system, thereby presenting a novel method for estimating the body volume of species from digital images. Regressions and structural equation modelling were applied to distinguish the effects of temperature, productivity and season length on mean voltinism and body size within grid cells. We accounted for spatial autocorrelation with autoregressive models and analysed the possible effect of species richness and intraspecific variability. Results: Voltinism consistently decreased with latitude for both lepidopterans ( $r^2 = 0.76$ ) and odonates ( $r^2 = 0.86$ ), with species having on average fewer generations per year in northern Europe and more generations per year in southern Europe. The effects of temperature, productivity and season length on body size contrasted in sign between lepidopterans and odonates, leading to opposing geographical patterns across Europe. Main conclusions: Voltinism in insect assemblages is strongly driven by environmental temperature, and trade-offs between voltinism and body size influence the occurrence of species at macroecological scales. Insects with the ability to extend their generation time over multiple years can overcome this constraint, allowing for a relatively large body size in cold areas. Our results furthermore support the idea that body sizes of terrestrial and aquatic insects form contrasting geographical patterns because they are differently affected by temperature and resource constraints." (Authors)] Address: Zeuss, D., Faculty of Biology, Dept of Ecology – Animal Ecology, Philipps-Univ. Marburg, Karlvon-Frisch-Str. 8, 35043 Marburg, Germany. E-mail: dirk.zeuss@biologie.uni-marburg.de

**18406.** Zeyghami, S.; Bode-Oke, A.T.; Dong, H. (2017): Quantification of wing and body kinematics in connection to torque generation during damselfly yaw turn. Science China Physics, Mechanics & Astronomy 60(014711): 13 pp. (in English) ["This study provides accurate measurements of the wing and body kinematics of three different species of damselflies in free yaw turn flights. The yaw turn is characterized by a short acceleration phase which is immediately followed by an elongated deceleration phase. Most of the heading change takes place during the latter stage of the flight. Our observations showed that yaw turns are executed via drastic rather than subtle changes in the kinematics of

all four wings. The motion of the inner and outer wings were found to be strongly linked through their orientation as well as their velocities with the inner wings moving faster than the outer wings. By controlling the pitch angle and wing velocity, a damselfly adjusts the angle of attack. The wing angle of attack exerted the strongest influence on the yaw torque, followed by the flapping and deviation velocities of the wings. Moreover, no evidence of active generation of counter torque was found in the flight data implying that deceleration and stopping of the maneuver is dominated by passive damping. The systematic analysis carried out on the free flight data advances our understanding of the mechanisms by which these insects achieve their observed maneuverability. In addition, the inspiration drawn from this study can be employed in the design of low frequency flapping wing micro air vehicles (MAV's)." (Authors)] Address: Zeyghami, S., Department of Mechanical and Aerospace Engineering, University of Virginia, Charlottesville, USA

**18407.** Zhang, R.; Xie, P.; Zhou, C.; Wang, C. (2017): Three-dimensional numerical study on the interaction of contralateral insect wings in asymmetric stroke. Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering 232(9): 1671-1684. (in English) ["Asymmetric flight of insects and birds is often seen in nature which is a conventional way for them to obtain the flexibility of maneuver in turning, hovering, and gliding. A numerical study on the interaction between contralateral wings of a dragonfly in asymmetric forward flight is carried out using the finite volume method. Various asymmetric flights with different advance ratios are considered where the aerodynamic forces, torques of each wing, pressure distributions, vorticity, and velocity fields are analyzed. A number of symmetric flights corresponding to the asymmetric flights are also studied. The results indicate that the interaction between the contralateral wings of a dragonfly is very small even when the dragonfly is in an asymmetric flight no matter how the advance ratios vary in the range concerned. With a typical example of asymmetric forward flights the difference in the mean value of vertical force coefficient is generally less than 5% compared with that for its corresponding symmetric flight. It is found that a small lateral flow region (LFR) is formed near the body, and there is a small lateral flow across the symmetric plane of the body. But this flow is very weak and resulted interaction between contralateral wings is very small. The result has confirmed in a way that dragonflies take a quite different way from fruit flies to obtain the lift with the contralateral wings. That is, fruit flies employ clap-and-fling mechanism which needs contralateral wings to be close enough to extrude the flow and generate lift, which means the contralateral two wings are so close that strong interaction happens, while dragonflies flap their contralateral wings on two sides of the vertical central plane with a relatively far distance between the wings where the interaction of contralateral wings is negligibly weak." (Authors)] Address: Peng Xie, Harbin Institute of Technology (Shenzhen) D207B HIT Campus in Univ. Town of Shenzhen, Shenzhen 518055, Guangdong, China. Email: xie.peng@hit.edu.cn

**18408.** Zheng, D.; Chang, S.-C.; Wang, B.; Zhang, H. (2017): New Early Cretaceous dragonfly *Sinojagoria magna* Li et al., 2012 (Odonata, Gomphaeschnidae) emending the Chinese tribe Sinojagorini. Cretaceous Research 74: 192-197. (in English) ["The monotypic dragonfly tribe Sinojagorini was only recorded from the Lower Cretaceous Yixian Formation of the Huangbanjigou outcrop of western Liaoning, NE China. Its diagnostic characters are incomplete because its subordinates were established based on forewings and fragmentary hindwings or only forewings. A well-preserved dragonfly attributed to *Sinojagoria magna* Li et al., 2012 is described herein from the same horizon and locality of the type specimen, not only improving the description of this species but also providing additional diagnostic characters for Sinojagorini. The new specimen further supports the sister-group relationship between Sinojagorini and the remaining Gomphaeschnaoidinae." (Authors)] Address: Zheng, D., State Key Lab. of Palaeobiology & Stratigraphy, Nanjing Institute of Geology & Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, China

**18409.** Zhu, C.; Wang, P.; Li, Y.; Chen, Z.; Li, H.; Ssebuge, P.; Zhang, Q.; Jiang, G. (2017): Trophic transfer of hexabromocyclododecane in the terrestrial and aquatic food webs from an e-waste dismantling region in East China. Environmental Science: Processes & Impacts 19(2): 154-160. (in English) ["A Trophic transfer of hexabromocyclododecane (HBCD) was investigated in both the terrestrial and aquatic food webs from an e-waste dismantling region in East China. The mean  $\Sigma_3$ HBCDs concentrations in the terrestrial species varied from 0.91 (0.16-1.85) ng g<sup>-1</sup> lipid weight (lw) in *Pantala flavescens* to 40.3 (22.1-51.1) ng g<sup>-1</sup> lw in rat (*Rattus norvegicus*). Isomeric profile indicated that  $\alpha$ -HBCD presented a decreasing trend along the trophic level (TL) (from 97.2% to 16.3% of  $\Sigma_3$ HBCDs), while  $\gamma$ -HBCD showed a reversed trend (from 2.8% to 73.6% of  $\Sigma_3$ HBCDs). Trophic magnification factor (TMF) derived from the slope of regression line between TLs and ln-transferred  $\Sigma_3$ HBCDs was 0.10, suggesting a trophic dilution of HBCD in the terrestrial food web. By contrast, in the aquatic species,  $\Sigma_3$ HBCDs concentrations varied from 5.02 (3.5-6.55) ng g<sup>-1</sup> lw in apple snail (*Ampullaria gigas* spix) to 45.9 (14.9-67.8) ng g<sup>-1</sup> lw in grass carp (*Ctenopharyngodon idellus*).  $\alpha$ -HBCD was the dominant isomer, followed by  $\gamma$ -HBCD in the majority of species. Positive linear relationship was observed in the plots of ln  $\Sigma_3$ HBCDs versus TLs ( $R^2=0.81$ ,  $p=0.06$ ). TMF for  $\Sigma_3$ HBCDs was 6.36, indicating a trophic magnification of HBCD in the aquatic food web. Although these results demonstrated the distinct trophic transfer of  $\Sigma_3$ HBCDs in the different ecosystems, further research is needed to eliminate the uncertainty of the tendencies, due to the non-significant relationship and limited species." (Authors)] Address: Wang, P., State Key Lab. of Environmental Chemistry & Ecotoxicology, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing 100085, China. E-mail: qhzhang@rcees.ac.cn.

**18410.** Šidagyte, E.; Razlutskiy, V.; Alekhovich, A.; Ry-



bakovas, A.; Moroz, M.; Šniaukštaite, V.; Vaitonis, G.; Arbačiauskas, K. (2017): Predatory diet and potential effects of *Orconectes limosus* on river macroinvertebrate assemblages of the southeastern Baltic Sea basin: implications for ecological assessment. *Aquatic Invasions* 12(4): 523-540. (in English) ["Invasive crayfish can affect macroinvertebrate assemblages and thus alter conventional macroinvertebrate-based ecological assessment. We aimed to reveal potential impacts of the North American crayfish *Orconectes limosus* on river assessment in the Neman River basin (southeastern Baltic Sea). A laboratory experiment using identical macroinvertebrate assemblages was conducted to compare feeding selectivity and effects between *O. limosus* and the European *Astacus leptodactylus*. Field experiments were conducted to evaluate potential impacts of *O. limosus* on disturbed and undisturbed crayfish-free macroinvertebrate assemblages: one dominated by Oligochaeta vs. one co-dominated by Ephemeroptera-Plecoptera-Trichoptera and Mollusca (EPT codominated). In the laboratory experiment, both crayfish species preferred feeding on Diptera (mostly chironomids), but *O. limosus* also selected Trichoptera and Ephemeroptera. Family richness did not change, but both species inflated the Shannon Diversity index by reducing Diptera domination. *Astacus leptodactylus* treatments had higher Shannon Diversity and percentage of EPT abundance compared to *O. limosus* treatments. Field experiments indicated (1) negative, (2) assemblage-specific, or (3) no effects of *O. limosus* on macroinvertebrate metrics. A negative effect, especially in the undisturbed assemblage, was observed on simple additive metrics based on taxa presence data, such as total or EPT family richness, or BMWP (Biological Monitoring Working Party) score. Assemblage-specific effects were indicated for some metrics based on relative abundances. In the Oligochaeta dominated assemblage, Shannon Diversity was inflated and the percentage of Oligochaeta abundance was reduced. In the EPT codominated assemblage Shannon Diversity was deflated while the relative abundance of Oligochaeta was not affected. No effects were observed when using the ASPT (Average BMWP Score Per Taxon) or percentage of EPT abundance. We conclude that *O. limosus* may have a more diverse predatory diet than *A. leptodactylus*, and thus can have a stronger effect on macroinvertebrate taxa sensitive to disturbances. Therefore, the invasion of *O. limosus* can alter macroinvertebrate assemblages and compromise conventional ecological assessment, even when it displaces resident *Astacus* species. ... No changes were observed in Odonata (Calopterygidae, Gomphidae) and Coleoptera abundances after terminating the experiment in any aquarium" (Authors)] Address: Šidagyte, E., Nature Research Centre, Akademijos St. 2, 08412 Vilnius, Lithuania. E-mail: e.sidagyte@gmail.com

**18411.** Anderson, C.B.; Johnson, M.; Lopez, M.E. (2018): Establishing habitat-specific indicator species in Tierra del Fuego with freshwater macroinvertebrates. *New Zealand Journal of Marine and Freshwater Research* 52(1): 145-154. ["As a tool to understand Tierra del Fuego's basic ecology and detect changes due to human pressures, this

study develops habitat bioindicators. We compared the freshwater benthic macroinvertebrates at 61 study sites in six habitat types: grassland streams, urbanised streams, forested streams, beaver ponds, lakes and peat bog ponds. Forty-nine taxa were identified; insects were the most diverse group. Beaver pond, lake and grassland stream assemblages were similar, as were those from lakes, grassland streams and peat bog ponds. Fourteen taxa were habitat-specific. In forests, these included mayfly scrapers (*Andesiops*, *Meridialaris*) and blackfly filterers (*Gigantodax*). In lakes, two copepod filterers were indicators, and in urban streams, one shredder (*Aphroteniella*) and three collector-gatherers (springtail, earthworm, aquatic worm). Predators (*Corixa*, *Aeshna*) were characteristic of peat bog ponds. Beaver ponds had no indicator species. Establishing links between species and ecosystems constitutes the beginning of a broader effort to understand anthropogenic impacts to Fuegian watersheds." (Authors)] Address: Anderson, C.B., Institute of Polar Sciences, Environment & Natural Res., National University of Tierra del Fuego, Ushuaia, Tierra del Fuego, Argentina. E-mail: canderson@alumni.unc.edu

**18412.** Bried, J.T.; Murray, S.N.; Jog, S.K.; De Marco Jr, P. (2018): Emergence timing and fixation height in *Pachydiplax longipennis* (Odonata: Libellulidae) at varying substrate density and sunlight exposure. *International Journal of Odonatology* 21(3-4): 181-187. (in English) ["Emergence substrate and sunlight penetration inherently trade off in patchy vegetation. Given the importance of solar radiation at emergence, we expected greater sunlight availability in sparse vegetation to advance emergence timing and reduce the average height of emergence fixation. We used outdoor mesocosms stocked with varying cattail (*Typha*) densities and late-stage *Pachydiplax longipennis* larvae. As predicted, emergence based on exuviae observations began significantly earlier (5 d) at lower cattail density and greater sunlight exposure, with over 60% of the emergence completed midway into the experiment period, compared to about 50% in the medium and higher density cattail. This finding suggests lag effects under relatively limited light availability in a temperate-centered lentic-breeding heliotherm. Contrary to our prediction, we found significantly greater emergence heights at lower cattail density ( $x=18.0\text{cm}$ ) than at medium ( $x=13.0\text{cm}$ ) and higher ( $x=10.0\text{cm}$ ) densities. We recommend further study of emergence heights using larval choice experiments in natural settings. Variation in emergence timing and fixation height under the substrate-sunlight trade-off may be driven proximally by larval choices/development and ultimately by adult activity." (Authors)] Address: Bried, J.T., Dept Biological Sciences, Univ. of Arkansas, Fayetteville, AR, USA. E-mail: bried@uark.edu

**18413.** Bried, J.T.; Hinchliffe, R.P. (2018): Improving taxonomic resolution in large-scale freshwater biodiversity monitoring: an example using wetlands and Odonata. *Insect Conservation and Diversity* 12: 9-17. (in English) ["1. Immature aquatic insects are a major source of taxonomic difficulty in large-scale freshwater biodiversity monitoring. Adult stages could improve taxonomic resolution for assessing

distributions and trends of biodiversity. Odonata have accessible adult stages that should greatly enhance the amount of species-level information. 2. We used Odonata and a wetland monitoring programme in Alberta, Canada to illustrate how much taxonomic information can be lost in larval collections, and an extensive adult records database to estimate what could be gained from adult surveys. 3. Despite processing 22 638 odonate specimens from 975 wetlands throughout Alberta, larval monitoring failed to collect or identify almost 60% of the lentic-breeding Odonata species known from adult records. A total of 25 lentic-breeding dragonfly species and 12 lentic-breeding damselfly species were present in adult records and not the larval data, including species of conservation concern. Due to the abundance of early instars, a substantial 82% of the processed damselfly collection and 62% of the processed dragonfly collection was left at suborder. 4. We recommend supplementing aquatic sampling with adult rearing, collecting, and observing (at least Odonata) to improve the basic inventory and overall status assessment in large-scale freshwater biodiversity monitoring. This is especially true when aquatic sampling is restricted to a suboptimal time of year for species identifications." (Authors)] Address: Bried, J.T., Dept of Biological Sciences, University of Arkansas, Fayetteville, AR, USA. E-mail: bried@uark.edu

**18414.** Bried, J.T.; Siepielski, A.M. (2018): Opportunistic data reveal widespread species turnover in *Enallagma* damselflies at biogeographical scales. *Ecography* 41: 958-970. (in English) ["An information tradeoff exists between systematic presence/absence surveys and purely opportunistic (presence-only) records for investigating the geography of community structure. Opportunistic species occurrence data may be of relatively limited quality, but typically involves numerous observations and species. Given the quality-quantity tradeoff, what can opportunistic data reveal about spatial patterns in community structure? Here we explore opportunistic data in describing geographic patterns of species composition, using over 4,600 occurrence records of *Enallagma* damselflies in the United States. We tested phylogenetic scale (genus level, *Enallagma* major clades, *Enallagma* subclades) and spatial extent (U.S. vs. watershed regions), hypothesizing that nonrandom structure is more likely at larger spatial extents. We also used three sets of systematic presence/absence surveys as a benchmark for validating opportunistic presence-only records. Null model analysis of matrix coherence and species replacements showed many cases of nonrandom structure and widespread species turnover. This outcome was repeated across spatial and environmental gradients and community composition scenarios. Turnover dominated across the U.S. and two watersheds spanning biogeographic boundaries, but random assemblages were prevalent in a third watershed with limited longitudinal extent. Turnover also pervaded each level of phylogeny. Opportunistic presence-only datasets showed identical patterns as systematic presence/absence datasets. These results indicate that extensive opportunistic data can be used to detect species turnover, especially at geographic scales where range

margins are crossed." (Authors)] Address: Bried, J.T., Department of Biological Sciences, University of Arkansas, Fayetteville, AR, USA. E-mail: bried@uark.edu

**18415.** Carey, N.; Strachan, S.R.; Robson, B.J. (2018): Impacts of Indian waterfern (*Ceratopteris thalictroides* (L.) Brongn.) infestation and removal on macroinvertebrate biodiversity and conservation in spring-fed streams in the Australian arid zone. *Aquatic Conservation: Marine and Freshwater Ecosystems* 28(2): 466-475. (in English) ["1. Removal of invasive macrophytes is a priority for river managers. However, the ecological effects of macrophyte removal on macroinvertebrate diversity are rarely examined but may be of particular significance in conservation reserves and when threatened species are present. 2. This study investigated the macroinvertebrate fauna inhabiting invasive and native macrophytes in spring-fed channels in the Millstream-Chichester National Park, Australia. The effects of waterfern management (periodic hand-weeding) were examined by comparing assemblages at weeded and unweeded reaches on three occasions. 3. *Ceratopteris thalictroides* harboured a diverse, insect-dominated macroinvertebrate assemblage, including the endangered damselfly *Nososticta pilbara*. Total taxon richness was similar between waterfern and native macrophytes, but macroinvertebrate assemblages differed in the dry season. Damselflies (including *N. pilbara*) were associated with waterfern-dominated reaches, whereas dragonfly nymphs were more common among native macrophytes. 4. Weeding altered macroinvertebrate assemblage composition. Some weeded reaches developed assemblages indistinguishable from those in native-dominated reaches, but others did not. Weeded reaches often supported taxa that were rare or absent from waterfern-dominated reaches, including suspension feeders, found also in native-dominated reaches. 5. Odonata are particularly diverse at Millstream, with 18 species recorded. Odonate species richness was significantly lower at weeded reaches than unweeded reaches. *Nososticta pilbara* and other short-range endemic species were absent from weeded reaches. As most odonates are univoltine, these adverse effects on local population size may affect species persistence. 6. Invasive macrophyte species may support a high diversity of native invertebrates, including endangered and short-range endemic species. Furthermore, although hand-weeding appeared to enable a greater diversity of species to co-exist, the removal of a large biomass of macrophytes appeared to remove whole cohorts of insect populations from stream reaches, including endangered species. Removal of invasive macrophytes should not be implemented without understanding their effects on invertebrate assemblage composition and life-cycles." (Authors)] Address: Robson, Belinda, Environmental and Conservation Sciences, Murdoch University, Murdoch Western Australia 6150. Email: b.robson@murdoch.edu.au

**18416.** Felker, A.S.; Vasilenko, D.V. (2018): A new genus and species of the damselfly family Hemiphlebidae from the Lower Cretaceous Chernovskiy Kopi locality (Eastern Transbaikalia). *Paleontological Journal* 52(2): 142-145. (in

English) ["*Thairia transbaikalica* Felker et Vasilenko, gen. et sp. nov. (Odonata, Hemiphlebiidae) from the Mesozoic Chernovskii Kopi locality is described. A short review of known genera of Hemiphlebiidae is provided. Relative age of enclosing rocks is discussed." (Authors) Original Russian Text © A.S. Felker, D.V. Vasilenko, 2018, published in *Paleontologicheskii Zhurnal*, 2018, No. 2, pp. 34–37.] Address: Felker, A.S., Paleontological Institute. A.A. Borisyak RAS, Moscow, Russia. E-mail: lab@palaeoentomolog.ru

**18417.** Henry, E.R.; Rivera, J.A.; Linkem, C.N.; Scales, J.A.; Butler, M.A. (2018): Damselflies that prefer dark habitats illustrate the importance of light as an ecological resource. *Biological Journal of the Linnean Society* 123(1): 144–154. (in English) ["Habitat associations provide clues to the resources that influence the life of animals. Food distribution, structural microhabitat or degree of insolation can determine species' strategies for energy acquisition, locomotor strategy or thermoregulation. A growing body of research suggests that insolation may be important not for heat, but rather for visual performance in communication, crypsis or prey capture. Odonates are famous for their heliothermic habitat associations. *Megalagrion nigrohamatum nigrolineatum* is a forest-dwelling damselfly endemic to the island of O'ahu and part of an ecologically diverse adaptive radiation with spectacular body coloration. Although many *Megalagrion* exploit full sun, *nigrolineatum* can be curiously found in deep shade raising the possibility that it is shade-seeking. Here, we show that *nigrolineatum* selects perches based on light, and not perch type or temperature. Surprisingly, they did not select the brightest locations available (as might be expected if they are extending their visual function in a challenging habitat), but chose darker perches in a fairly dark habitat. This strategy opens up niche space that is abundantly available in forests, yet little-occupied by other odonates. We discuss implications of shade-seeking for communication, evolutionary diversification and preserving future evolutionary potential." (Authors)] Address: Henry, Elizabeth, Department of Biology, University of Hawaii at Manoa, 2538 McCarthy Mall, Edmondson 216, Honolulu, HI 96822, USA. E-mail: erh@hawaii.edu

**18418.** Jesús, F.; Hladki, R.; Gérez, N.; Besil, N.; Niell, S.; Fernández, G.; Heinzen, H.; Cesio, M.V. (2018): Miniaturized QuEChERS based methodology for multiresidue determination of pesticides in odonate nymphs as ecosystem biomonitors. *Talanta* 178(1): 410–418. (in English) ["Highlights: •A method to determine 73 pesticide residues in 0.2 g odonate nymphs was developed. •The methodology is simple, low cost, miniaturized and environmentally friendly. •LOQs of 1 µg kg<sup>-1</sup> for many compounds were achieved. •Two positive findings of metsulfuron-methyl were obtained in real samples. •The developed and validated methodology can be used for monitoring programs. Abstract: The impacts of the modern, agrochemicals based agriculture that threatens the overall systems sustainability, need to be monitored and evaluated. Seeking for agroecosystems monitors, the present article focus in the occurrence and abundance of aquatic macroinvertebrates, that have been frequently

used as bioindicators of water quality due to their relationship with land use. Some of these organisms are on the top of the food chain, where bioaccumulation and biomagnification processes can be observed, and they can turn into secondary pollution sources of systems and terrestrial organisms as well. Odonate nymphs, which belong to the functional group of predators, were selected for this study. A methodology to determine 73 pesticide residues in odonate nymphs by LC-MS/MS and GC-MS/MS was developed. A QuEChERS sample preparation strategy was adapted. As it is complex to obtain samples especially in disturbed ecosystems, the method was minimized to a sample size of 200 mg of fresh nymphs. The method was validated and good recoveries (71–120%) with RSDs below 20% for the majority of the studied pesticides at least at two of the assayed levels 1, 10 and 50 µg kg<sup>-1</sup> were obtained. For 32 analytes the limit of quantitation was 1 µg kg<sup>-1</sup> and 10 µg kg<sup>-1</sup> for the others. The lineal range was observed between 1–100 µg kg<sup>-1</sup> in matrix-matched and solvent calibration curves for most of the assessed pesticides. LC-MS/MS matrix effects were evaluated, 40% of the analytes presented low or no signal suppression. Only flufenoxuron presented high matrix effects. The obtained methodology is adequate for pesticide multiresidue analysis in aquatic macroinvertebrates (odonates) aiming to contribute to the ecological state evaluation of freshwater ecosystems." (Authors)] Address: Jesús, Florencina, Polo de Desarrollo Universitario Abordaje holístico, CenUR Litoral Norte Sede Paysandú, Univ. de la República, Ruta 3 km 363, Paysandú CP 60000, Uruguay

**18419.** Suhonen, J.; Ilvonen, S.; Dunn, D.W.; Dunn, J.; Härmä, O.; Ilvonen, J.J.; Kaunisto, K.M.; Krams, I. (2018): Parasitism affects variation in a male damselfly sexual ornament. *Ethology Ecology & Evolution* 30(3): 256–266. (in English) ["Sexually selected ornaments in animals are costly, with parasitism often affecting the degree to which they are expressed. Male *Calopteryx splendens* damselflies exhibit melanised 'wing spots'. Those possessing large spots are favoured by females but also have an increased likelihood of being attacked by *C. virgo*, a common sympatric competitor. Melanin is used to produce the wing spots, but it is also used in immune defence against parasites that commonly infect damselflies. A total of 261 *C. splendens* males were collected from 26 Finnish and Latvian populations, of which half were found to be sympatric with *C. virgo*. It was found that males which originated from populations in which eugregarine parasites were present had smaller wing spots than individuals from parasite-free populations. Contrary to previous studies, the wing spots of *C. splendens* males in populations sympatric with *C. virgo* were not found to be smaller than those in allopatric populations. Parasite presence in *C. splendens* was found to be strongly associated with populations sympatric with *C. virgo*. The results suggest that the presence of *C. virgo* may increase rates of parasitism in *C. splendens*, and show that parasitism is an important additional factor to interspecific aggression in determining variation in the sizes of the wing spots of *C. splendens* males. These findings highlight a lack of understanding on the determinants of the expression of secondary sexual characters

and the processes of how parasitism affects hosts." (Authors)] Address: Suhonen, J., Dept of Biology, University of Turku, FI-20014 Turku, Finland

2019

**18420.** Debecker, S.; Stoks, R. (2019): Pace of life syndrome under warming and pollution: integrating life history, behavior and physiology across latitudes. *Ecological monographs* 89(1): 22 pp. (in English) ["To fully comprehend and predict the impact of drivers of global change such as climate warming and pollution, integrated multi-trait approaches are needed. As organismal traits are often correlated, responses to stressors are expected to induce coordinated changes in many traits. A promising framework to study this is the pace-of-life syndrome (POLS), which predicts the integration of life-history, behavioral and physiological traits along a fast-slow continuum. Using an integrative multi-trait approach we evaluated the presence of a POLS both within and across latitudes and how POLS patterns are affected by warming and metal pollution. We studied this in *Ischnura elegans* damselfly larvae of replicated low-and high latitude populations that strongly differ in voltinism (3-4 generations per year vs. 1 every two years) reared in a common-garden experiment at two temperatures. Across latitudes, life history, behavior and physiology covaried in accordance with the POLS, with the fast-paced low-latitude damselflies characterized by a fast growth rate, high activity and more explorative and risk taking behavior, fast metabolic rate and low investment in immune function (activity of phenoloxidase). This fast POLS strategy was associated with a higher sensitivity to metal exposure and a higher vulnerability to predation. Warming caused opposite responses between the latitudes consistent with differential thermal adaptation in growth rate, behavior and oxidative stress parameters. Despite this, damselflies of both latitudes showed a consistent pattern in phenotypic correlations among traits that, moreover was not affected by warming and metal exposure. Within latitudes there was no full support for the POLS. More active larvae were more explorative and risk taking, which aligned with the fast-slow life-history axis, but less strong than at the across-latitude level. Physiological traits were also integrated within latitudes, yet there was no unambiguous coupling with the fast-slow life-history continuum. The consistent syndrome structure, if underpinned by genetic correlations, may restrict the independent evolution of individual traits, yet may not necessarily constrain adaptive evolution of integrated trait sets. This is because the covariance pattern was to a large extent similar across latitudes and within latitudes, suggesting adaptive trait integration guiding adaptive evolution of trait sets along the fast-slow continuum." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**18421.** Lavimi, R.; Hojaji, M.; Manshadi, M.D. (2019): Investigation of the aerodynamic performance and flow physics on cross sections of dragonfly wing on flapping and pitching motion in low Reynolds number. *Proceedings of the*

*Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering* 233(2):095441001773732: 589-603. (in English) ["In this research, the flow physics and aerodynamic performance of dragonfly cross sections, used in Micro Aerial Vehicles (MAVs), in low Reynolds are investigated. The main objective of the research is to study the performance of dragonfly wing cross-sections flapping motion in Reynolds 5000 and 10,000. Pitching motion is one of the most important mechanisms in force lifting generation, and the effects of Reynolds number and mean angle of attack on aerodynamic coefficients have been extensively investigated for the pitching motion. In the present study, the geometry of two cross sections of dragonfly was extracted. Incompressible, two-dimensional and unsteady Navier–Stokes equations have been used to simulate the flow. *k-ε* RNG model was used for turbulence modeling. To simulate the wing pitching motion, the dynamic mesh method was used. The results showed that in flapping motion, pitching-up rotation has caused a rapid increase in lift coefficient. Furthermore, it was found that the absence of stall does not increase the lift and drag coefficients, while formation of new strong vorticity layers have caused an increase in lift coefficient. On the other hand, corrugations on the cross sections of the dragonfly in the pitching motion cause the delay of separation and increasing the lift coefficient. In flapping motion and the pitching motion, the lift coefficients of three cross sections were increased due to stronger vorticity layers by reducing the Reynolds number. Due to the existence of corrugations, the first and the second cross sections have good aerodynamic performance, compared to the flat plate. The comparison carried out in the current research showed that the second cross section is a proper replacement for the flat plate in MAVs." (Authors)] Address: Lavimi, R., Dept of Mechanical Engineering, Najafabad Branch, Islamic Azad University, Najafabad, Iran

**18422.** Malkmus, R. (2019): Zur vertikalen Verbreitung der Libellen in den Tiroler Alpen um Mayrhofen (Odonata). *Libellula* 38(1/2): 71-92. (in German, with English summary) ["The vertical distribution of dragonflies in the surroundings of Mayrhofen (Tyrol) - During ten field trips to the mountains around Mayrhofen, Austria (Tuxer Alps, Zillertaler Alps, Kitzbüheler Alps) between 2012 and 2018, 14 species of Odonata were recorded at 40 localities (water bodies) between 1,800 and 2,500 m a.s.l.: 5 indigenous species (*Coenagrion puella*, *Aeshna caerulea*, *A. juncea*, *Somatochlora alpestris*, *Leucorrhinia dubia*), two species (*Enallagma cyathigerum*, *Libellula quadrimaculata*) with supposed reproduction and seven species (*Lestes sponsa*, *Ischnura elegans*, *Pyrrhosoma nymphula*, *A. cyanea*, *Sympetrum danae*, *S. sanguineum*, *S. striolatum*) as vagrants. The hitherto known maxima of the vertical distribution could be extended for nine species (*L. sponsa*, *C. puella*, *E. cyathigerum*, *I. elegans*, *P. nymphula*, *A. cyanea*, *L. quadrimaculata*, *S. danae*, *S. sanguineum*) with reference to Tyrol and for six species (*E. cyathigerum*, *I. elegans*, *P. nymphula*, *A. cyanea*, *L. quadrimaculata*, *S. danae*) with respect to Austria. At the sites on average three species of dragonflies were recorded, rarely more than five, and eleven at one locality. *Aeshna caerulea*,



*A. juncea* and *S. alpestris* were the only species with occurrence higher than 2,400 m a.s.l. and dominant at 28, 33 or 17 localities, respectively, within the investigated area. *C. puella* and *E. cyathigerum* that were recorded at 13 of 40 localities, were revealed as the most common species. Many waters, mainly at altitudes between 1,800 and 2,300 m a.s.l., are impaired by tourism and livestock. In order to protect these sites effectively against trampling and pollution by grazing cattle it is recommended to fence the most important water bodies." (Author)] Address: Malkmus, R., Schulstr. 4, 97859 Wiesthal, Germany. E-mail: rudolf.malkmus@sensckenberg.de

**18423.** Zou, P.-Y.; Lai, Y.-H.; Yang, J.-T. (2019): Effects of phase lag on the hovering flight of damselfly and dragonfly. *Physical Review E* 100(6): 14 pp. (in English) ["In this work we investigated the mechanisms of hovering flight of damselflies (*Matrona cyanoptera*) and dragonflies (*Neurothemis ramburii*) with different phase lag between fore- and hindwings. The flight motion of damselflies and dragonflies in hovering were first recorded with two high-speed cameras, and the difference between the hovering motions of both species were analyzed. Because of differences in evolution, damselflies and dragonflies normally fly with forewing or hindwing in the lead, respectively. The fore- and hindwings of dragonflies are different shapes. In contrast, those of damselflies are very similar in size and shape. Therefore, they use different hovering strategies to adapt to differences in body morphology. Comparing the differences of wing phases in hovering, this work shows that the interactions between fore- and hindwings greatly affect their vortex structure and flight performance. The wake of a damselfly sheds smoothly; a vertical force is generated steadily during the stage of wing translation. Damselflies hover with a longer translation phase and a larger flapping amplitude. In contrast, the root vortex of a dragonfly impedes the shedding of wake vortices in the up-stroke, which results in the loss of a vertical force; the dragonfly therefore hovers with a large amplitude of wing rotation.] Address: Yang, J.-T., Dept Engineering Science & Ocean Engineering, National Taiwan Univ., 10617 Taipei, Taiwan. E-mail: jtyang@ntu.edu.tw

## 2020

**18424.** Abdillah, M.M.; Lupiyaningdyah, P. (2020): Distribution, characteristic and behaviour of *Rhinocypha anisoptera* Selys, 1879 (Odonata: Zygoptera: Chlorocyphidae) in East Java. *Zoo Indonesia* 29(2): 94-102. (in English, with Indonesian summary) ["*Rhinocypha anisoptera* is distributed in Sumatra and Java. In Java, this species was previously recorded from Mount Wilis, Mount Arjuno, Mount Welirang, Mount Kawi, Nongkojajar, Mount Tengger, Mount Semeru, Ijen Crater and Baju-kidul, with most recent encounter at Mount Kelud. Despite the vast encounter localities, there was lack of specimens collected to reveal its typical characteristic and behavior. This study confirmed the existence of *R. anisoptera* at most localities in East Java as reported in 1934 by Lieftinck, with additional new distribution in Mount Anjasmoro. *R. anisoptera* is typically characterized by dark

coloration at the hind wing leaving transparent in the bases with metallic blue-tinged covering 4–5 % area in mid-section of the hindwing. Differ from other Chlorocyphidae, *R. anisoptera* perch on leaves more frequently compared to perching on twigs and rocks near waterways." (Authors)] Address: Lupiyaningdyah, P., Zoology Division - Museum Zoologicum Bogoriense, Research Center for Biology, Indonesian Institute of Sciences (LIPI), Gedung Widyasatwaloka, Jl. Jakarta Bogor Km. 46, Cibinong, 16911, Jawa Barat, Indonesia. E-mail: pungkilupi@gmail.com

**18425.** Bos-Groenendijk, G.I. (2020): Opzet monitoring gevlekte witsnuitlibel in Gelderland. N2000-gebieden Veluwe en Korenburgerveen. Rapport VS2020.027, De Vlinderstichting, Wageningen: 20 pp. (in Dutch) ["In Gelderland, *Leucorhinia pectoralis* is a designated species in the Natura 2000 areas of Veluwe and Korenburgerveen. As input for the N2000 management plans, insight is required into the occurrence, distribution, numbers and development of the species. To this end, new routes have been established in the areas in 2020, after first exploring whether the species actually had populations here. In the Veluwe N2000 area, *L. pectoralis* is found in the Mosterdveen and in the Leemputten near Staverden. In both areas, there are now two routes for counting the species. The species is vulnerable here. In such a large area, two small populations, which are also far apart, are very few. The population in the Mosterdveen seems to be doing reasonably well, with reasonable numbers and moreover several suitable pools. Since 2012 (with one observation during an SNL mapping) the species seems to have increased considerably, but what the population trend is at the moment is not known. This will have to be ascertained from the results of the NEM monitoring that will be running from now on. In the Leemputten near Staverden, *L. pectoralis*, also since 2012, first increased, but recently collapsed due to drying up of the ponds in 2018. Time will tell whether the current population will survive here. In the Natura 2000 area of Korenburgerveen, five routes have been set out at two different locations. The species established itself in Korenburgerveen in 2003 and has since grown into a stable population. The current trend is unknown, as the species has not been counted within the NEM. When the new routes are counted annually, the number developments of *L. pectoralis* can be followed well. The populations on the Veluwe are small and vulnerable. A small disturbance in the form of dehydration or an incorrect management intervention can lead to the disappearance of the population. It is therefore important to take *L. pectoralis* into account in the management of the areas. At the moment, all sites are well managed and no interventions are necessary. However, it is important to think about the water management of the areas in the long term, so that the fens also keep enough water in dry periods." (Author, DeepL)] Address: De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: info@vlinderstichting.nl

**18426.** Felker, A.S. (2020): New dragonflies of the family Permagoniidae (Odonata: Kennedyina) from Perm, European Russia. PALEOSTRAT-2020. Annual meeting (scientific

conference) of the paleontology section of the Moscow Society of Naturalists and the Moscow Branch of the Paleontological Society at the Russian Academy of Sciences. Moscow, January 27-29, 2020 Program & abstracts. Alekseev A.S. and Nazarov V.M. (ed.): Paleontological Institute im. A.A. Borisyaka RAN, 2020. 66 p.: 59. (in Russian) ["Verbatim: Permagnionidae Tillyard is classified as a fairly large extinct stalked dragonflies with markedly frequent transverse wing venation. The family itself is included in the infra-order Protozogyoptera, which in turn belongs to the suborder Kennedyina (Pritykina, 1989; Nel et al., 2012). Its first representative, Permagnion falklandicum Tillyard, was described from the Wuchapa (Lower Vyatka) deposits of the Bodie Grick Head locality (Falkland Islands) (Tillyard, 1928). Moreover, until the last revision of the protozogyopter (Nel et al., 2012), this family was considered monotypic. However, after re-studying the already described and identifying new material, the authors of the revision transferred to the Permagnionidae the taxa that previously belonged to the families Permolestidae Martynov and Solikamptilonidae Zalesky Nel et al., 2012). At the moment, the family includes 6 genera with 9 species, most of which are known from the Middle and Upper Permian deposits of Europe (Martynov, 1932, 1937; Nel et al., 1999, 2012; Fate et al., 2013). Most of the representatives of the family are known from the remnants of wings, therefore the main diagnostic features of permagnionids are: the presence of a "complete" nodule N) with thickened and noticeably inclined nodal (n) and subnodal (sn) veins; the presence of a pronounced prenodal vein (Asn), curvature of the main structures of the pedicle: arch (Arc), discoidal q) and subdiscoidal sq) cells, and the absence of a distinct anal vein (A), often accompanied by the formation of numerous additional cells at the posterior edge of the wing (Nel et al., New material is represented by 9 specimens of Permagnionids from the localities: Soyana (Kazan Stage; Arkhangelsk Prov.) 1 specimen, B. Kityak (Kazan I Russian; Kirov Prov.) 2 specimens, Kargala (Severodvinsk Stage; Orenburg Prov.) 1 specimens and Isady (Severodvinsk Stage; Vologda Prov.) 5 specimens Most of them belong to new species of already known genera Epilestes and Sushkinia from B. Kityak, Permolestes (2 new species, 5 specimens) from Isad, Scytolestes from Kargaly and Solikamptilon from Soyana The most interesting is a new species of the genus Solikamptilon from Soyana, which, in the presence of characters characteristic of Permagnionids, and undoubtedly belonging to this genus, has very specific features that make it with with small protozogyopters of the family Kennedyidae Tillyard, especially with the Middle Late Triassic species Kennedyia carpenter i Pritykina. This allows us to consider at a new level the question of the relationship between the Permagnionids and the Kennedyids. (google translate)] Address: Felker, A.S., Paleontological Institute. A.A. Borisyak RAS, Moscow, Russia. E-mail: lab@palaentomolog.ru

**18427.** Lu, S.; Qiu, R.; Hu, J.; Li, X.; Chen, Y.; Zhang, X.; Cao, C.; Shi, H.; Xie, B.; Wu, W.-M.; He, D. (2020): Prevalence of microplastics in animal-based traditional medicinal materials: Widespread pollution in terrestrial environments. *Science of The Total Environment* 709, 20 March 2020,

136214: 9 pp. (in English) ["Highlights: • 20 types of animal medicinal materials and 10 types of fresh animals were collected in China. • Microplastics (MPs) were found in all medicinal materials with average incidence rate of 94.67%. • The abundance of MPs was in the range of  $1.80 \pm 0.38$  to  $7.80 \pm 0.83$  items/individual. • Major MPs were microfibers (84.68%), or PET (40.45%), Rayon (30.64%) and PE (10.11%). • MPs show similar characteristics between medicinal materials and fresh animals. Abstract: Microplastics (MPs) pollution is an emerging environmental and health concern. MPs have been extensively observed in the aquatic environment, yet rarely investigated in the terrestrial ecosystem, especially in relation to health risks. To evaluate potential MPs pollution in land-dwelling animal medicine materials, we collected 20 types of small animal-based medicinal materials and 10 types of available fresh terrestrial animals from eight different regions in China. MPs were found in all medicinal materials with an average incidence rate of 94.67%. The abundance of MPs was in the range of  $1.80 \pm 0.38$  to  $7.80 \pm 0.83$  items/individual or  $1.59 \pm 0.33$  to  $43.56 \pm 9.22$  items/g (dry weight), with polymer distribution by polyethylene terephthalate (40.45%), rayon (30.64%), polyethylene (10.11%), nylon (7.35%), polypropylene (5.93%), and polyvinyl chloride (5.52%). The majority of MPs were microfibers (84.68%), with 15.32% of fragments. Moreover, MPs were directly observed in the intestine, detected in all ten types of fresh medicinal animals with the abundance of  $0.83 \pm 0.35$  to  $3.42 \pm 0.46$  items/individual. Furthermore, significant positive correlations ( $R: 0.32-0.99$ ,  $p < 0.05$ ) of MPs characteristics were found between medicinal materials and fresh animals, including shape, size, color, and polymer distribution of MPs. The results support that MPs in the medicinal materials were likely derived from living animals. This study demonstrates the prevalence of MPs in animal-based, traditional medicinal materials, and also suggests widespread MPs pollution in terrestrial environments and latent health risks." (Authors)] Address: Lu, S., School of Ecological & Environmental Sciences, Shanghai Key Lab. for Urban Ecological Processes & Eco-Restoration, East China Normal University, Shanghai 200241, China

**18428.** Lupiyaningdyah, P. (2020): The past, present and future of dragonfly research in Indonesia. *BIO Web Conf.* 19(00024): 4 pp. (in English) ["Up to present, Indonesia has 900 described species of dragonflies with around 70% are endemic; among them, the most diverse is in Papua. This data is collected based on 356 publications from scientific journals, bulletins, magazines, books, theses, and proceedings from 1773 to 2019. There is still a lack of information about what is the most and least popular topics and where is the most explored regions in Indonesia for Odonata research. I categorized the topics into biodiversity, taxonomy and systematics, biogeography, conservation, ecology, education, ethnozoology, history, and molecular. The result shows that the most popular topic is biodiversity by 139 publications and the least are history and molecular by only one publication. Most popular group to be observed is dragonflies in general (both suborders) by 200 publications and the least observed is Anisoptera by only 71 publications. Java is the

most explored island for about 160 publications in 250 years." (Authors)] Address: Lupianingdyah, P., Zoology Division - Museum Zoologicum Bogoriense, Research Center for Biology, Indonesian Inst. Sciences (LIPI), Gedung Widiasatwaloka, Jl. Jakarta Bogor Km. 46, Cibinong, 16911, Jawa Barat, Indonesia. E-mail: [pungkilupi@gmail.com](mailto:pungkilupi@gmail.com)

**18429.** Néraudeau, D.; Vullo, R.; Bénédice, P.; Breton, G.; Dépré, E.; Gaspard, D.; Girard, V.; Le Couls, M.; Moreauf, J.-D.; Nel, A.; Perrichot, V.; Solórzano-Kraemer, M.M.; Wappler, T. (2020): The paralic Albian–Cenomanian Puy-Puy Lagerstätte (Aquitaine Basin, France): An overview and new data. *Cretaceous Research* 111, July 2020, 104124: (in English) ["Highlights: • Stratigraphy, palaeontology and palaeoecology of the Puy-Puy Lagerstätte, France. • Mid-Cretaceous Konservat-Lagerstätte formed in a quiet paralic environment. • Rich plant assemblage with diverse insect damages on angiosperm leaves. • Lagerstätte with insects preserved in both amber and lignitic clay. • Co-occurrence of marine, brackish, freshwater and terrestrial organisms. The Puy-Puy quarry at Tonnay-Charente (Charente-Maritime, SW France) is a sand quarry exposing a 9-m-thick series of latest Albian–earliest Cenomanian (mid-Cretaceous) age. The uppermost Albian deposits consist of lignitic clay containing fossiliferous amber. The lowermost Cenomanian sand deposits alternate with clay intercalations containing plant remains. One of these clay levels, named P1, shows an outstanding accumulation of conifer and angiosperm macrofossils including delicate reproductive structures such as flowers. Plant remains are associated with invertebrates such as insects (Odonata, Dictyoptera, Diptera), crustaceans (*Mecochirus* sp.), putative brachiopods (aff. *Lingula* sp.), and worms. A few vertebrate remains such as shark egg capsules (*Palaeoxyris* sp.) and a feather are present in the fossil assemblage, as well as an enigmatic specimen tentatively interpreted as a cephalochordate or a petromyzontiform. Various ichnofossils occur in abundance, such as crustacean coprolites and burrows (*Ophiomorpha* isp.), insect coprolites (*Microcarpolites hexagonalis*), and leaves with grazing structures, galls and mines. The sediments have been deposited in a coastal, calm and brackish area." (Authors)] Address: Néraudeau, D., Univ Rennes, CNRS, Géosciences Rennes, UMR 6118, 263 avenue du Général Leclerc, 35000 Rennes, France

## 2021

**18430.** Felker, A.S. (2021): The first damselflies of the family Kennedyidae (Odonata: Protozygoptera) from the Permian–Triassic boundary deposits of the Kuznetsk Basin, Russia. *Paleontological Journal* (Russian Academy of Sciences (Moscow)) 2: 52-59. (in Russian, with English summary) ["Two new fossil damselfly species of the family Kennedyidae: *Kennedyia kedrovkensis* sp. nov. and *Progoneura kemerovensis* sp. nov. are described from presumably lower Triassic beds of the Permian–Triassic boundary sequence of the Babii Kamen' locality. The new species confidently differ from previously known species of *Kennedyia* and *Progoneura* according to the main characters of wing venation." (Authors)] Address: Felker, A.S., Paleontological

Institute. A.A. Borisyak RAS, Moscow, Russia. E-mail: [lab@palaeoentomolog.ru](mailto:lab@palaeoentomolog.ru)

**18431.** Felker, A.S. (2021): New Damselflies of the Family Kennedyidae (Odonata: Protozygoptera) from the Upper Permian of the Vologda Region. *Paleontological Journal* 55: 396-404. (in English) ["A new species of damselfly of the family Kennedyidae: *Kennedyia suchonensis* sp. nov. is described from the Upper Permian (Severodviniian) deposits of the Isady locality (Vologda Region, Velikoustyugsky District). Despite the continuity of the main features of wing venation, new species has an unusual structure of the stem's discoidal area. This structure is not typical of known Paleozoic damselflies, which allows us to re-consider the morphogenesis of this structure. The evolutionary relationships between damselflies of Isady and other kennedyids are discussed." (Author)] Address: Felker, A.S., Paleontological Institute. A.A. Borisyak RAS, Moscow, Russia. E-mail: [lab@palaeoentomolog.ru](mailto:lab@palaeoentomolog.ru)

**18432.** Fortunato, M.H.T.; Mendes, H.F.; Carmino Hayashi, C.; Rodrigues de Faria, L.; Lopes de Melo, C.; Carvalho Ananias, I.M. (2021): Survey of dragonfly immature (Insecta: Odonata) in excavated tanks of pisciculture in the mesoregion of Alfenas-MG. *Research, Society and Development* 10(11): 13 pp. (in Portuguese, with English and Spanish summaries) ["Dragonfly immatures are found in a vast number of freshwater aquatic environments, including excavated tanks of pisciculture. As they are predators during the aquatic phase, they end up causing great damage in the initial stages of production of freshwater aquaculture. However, studies on which dragonflies are most common in fish ponds are still scarce in Brazil, and this is the first step to think about an effective control. For this reason, we collected immature dragonfly (Odonata) with net "D" and macrophytes between October 2018 and March 2019. The physicochemical variables were measured with water quality kits, and they remained within the parameters for fish farming defined by CONAMA, with the exception of temperature. Of the 692 immatures collected, we found 12 genera distributed in the two suborders of Odonata, with *Miathyria* Kirby, 1889 and *Erythemis* Hagen, 1861 being the most abundant. After correspondence analysis and principal component analysis, we proved that rarer genera have a lower correlation with abundance, reinforcing the value attributed to the relative abundance of immatures." (Authors)] Address: Fortunato, M. H.T., Universidade José do Rosário Vellano, Brasil. E-mail: [mtank@live.com](mailto:mtank@live.com)

**18433.** Kamboj, N.; Kamboj, V. (2021): Sand-gravel mining as a threat to macro-benthic assemblage and habitat parameters: A case study of river Ganga, India. In: Siddiqui N.A., Bahukhandi K.D., Tauseef S.M., Koranga N. (eds) *Advances in Environment Engineering and Management*. Springer Proceedings in Earth and Environmental Sciences. Springer, Cham. <https://doi.org/10.1007/978-3-030-79065-335>: 463-476. (in English) ["The present study was conducted for assessing the impact of sand-gravel mining on the habitat parameters, diversity and abundance of macro-benthic species

in the mining impacted area of the Ganga river from April 2017 to March 2018. Samples were collected from four different zones i.e. zone A as reference zone while zones B, C and D are mining impacted area of Ganga river correspondingly. During the study, habitat parameters such as substratum type, pH, dissolved oxygen, biochemical oxygen demand, turbidity and TDS showed a significant difference at selected zones throughout the study. Besides, during the survey, a total of 29 macro-benthic species belonging to ten groups mainly Oligochaeta (2 species), Turbellaria (2 species), Hirudinea (3 Species), Odonata (2 species), Ephemeroptera (4 species), Trichoptera (3 species), Diptera (6 species), Gastropoda (3 species), Decapoda (1 species) and Coleoptera (3 species) were found respectively. The Diptera group was found a maximum of 30.77% throughout the study period at selected zones. Besides this, the other major groups were such as Coleoptera 12.73%, Gastropoda 10.80% and Ephemeroptera 9.65%. The result showed that the zone A contains the higher number 1205 ind./m<sup>2</sup> while zone B, zone C, and zone D contain 899 ind./m<sup>2</sup>, 714 ind./m<sup>2</sup> and 497 ind./m<sup>2</sup> respectively throughout the year. The canonical correspondence analysis (CCA) analysis showed a strong relationship with habitat parameters mainly substratum structure, pH, water temperature, dissolved oxygen with the macro-benthic species. Besides this, the reason for the decline in species number in respected zones (B, C & D) is the removal of the sand and gravel material. The removal of these materials causes habitat destruction in the form of increasing depth, slope, channelization of river and water quality." (Authors)] Address: Kamboj, V., Dept of Zoology & Environmental Sci., Haridwar, India

**18434.** Khan, M.A.; Padhy, C. (2021): Study on aerodynamic and structural analysis of bio-mimetic corrugated wing. *Research Trends and Challenges in Physical Science* 1: 90-100. (in English) ["The aerodynamic and static structural analysis of a newly developed bio-mimetic corrugated aerofoil inspired by dragonfly forewing is included in this work. The basal wing part of the dragonfly corrugated aerofoil structure used in this study was placed around the radius of the forewing. These corrugations define the stressed skin structure, which is made up of grider-like veins and a thin cuticle membrane that provides a sophisticated mechanical advantage for longitudinal bending resistance while allowing for wing camber and torsion. Dragonflies are recognised for their amazing flight abilities. They are designed to carry both aerodynamic and inertial loads. At a Reynolds number of 15000, a computational analysis of a newly designed dragonfly corrugated aerofoil is performed, with flow assumed to be laminar, steady, incompressible, and two dimensional. The project includes static structural analysis and aerodynamic flow analysis of a 2-D dragonfly corrugated aerofoil utilising Ansys Fluent and Ansys Mechanical APDL. It has been discovered that the design criteria employed, as well as simulations performed on a corrugated aerofoil, produce significantly better results than earlier studies. The structural analysis also demonstrates that it can withstand maximum pressure loads and provides high rigidity to the wing span. This discovery adds to our knowledge

of insect-inspired corrugated wing structure and facilitates the application for improved design of artificial wings for MAVs and UAVs." (Authors)] Address: Khan, M.A., GITAM Deemed to be University, Dept of Aerospace Engineering, Hyderabad, India

**18435.** Minot, M.; Besnard, A.; Husté, A. (2021): Habitat use and movements of a large dragonfly (Odonata: Anax imperator) in a pond network. *Freshwater Biology* 66(2): 241-255. (in English) ["1. Local movements of aquatic insects within the surroundings of waterbodies aim essentially to find food, mates, resting sites, or avoid predation. Distances moved are very variable among species and may also differ depending on sex or age at the intraspecific scale. Despite a large panel of studies on odonate activities near waterbodies, little is known about their movements and behaviour in the surrounding landscape matrix. This knowledge is, however, crucial to support management schemes of pond networks and allow improvement of connectivity between them. 2. In this study, 87 individuals of *Anax imperator* were identified with a unique code on the wings and monitored visually on five ponds during summers 2017 and 2018. Simultaneously, 54 individuals were equipped with radio transmitters and tracked for up to 15 days. 3. We built Cormack Jolly Seber models to test which factors are important for movement and survival of individuals, and calculated home ranges. Additionally, we performed a step selection analysis on the telemetry data to identify the terrestrial habitats selected by *A. imperator* at the interface between a rural area and a suburban area in north-western France. 4. A reduction of the survival rate was observed on the day immediately following capture regardless of the marking method. Individuals equipped with radio transmitters had a lower estimated daily survival (0.78; 95% confidence interval = 0.70–0.85) compared to wing-marked individuals (0.89; 95% confidence interval = 0.85–0.92). Wing loading and age were the main variables influencing dragonfly survival for both methods. 5. The probability of movement between ponds was similar for both sexes, but radiotracking data showed that females moved significantly further away in the landscape matrix than males, with one female detected up to 1,902 m away from the release pond. Females also had a larger home range (mean 95% kernel: 50 ha) than males (mean 95% kernel: 5 ha). Reproductive behaviour of males and flying behaviour of females were positively related to air temperature. Individuals of both sexes were present on ponds more often than in all other habitats whatever their activity. High trees were the preferred place to rest when air temperatures were low, especially for females. 6. Overall, this study highlights the importance of integrating neighbouring trees in management schemes of ponds. It also confirms that preservation of pond networks must include on several hectares of land around ponds to meet the aquatic and terrestrial needs of amphibious organisms such as odonates. Our radio-tracking data provide a basis for further studies on the persistence of odonate meta-populations in fragmented landscapes." (Authors)] Address: Minot, M., Université de Normandie, UNIROUEN, INRAE, ECODIV, Rouen, France. Email: m.minot@hotmail.fr



**18436.** Novelo-Gutiérrez, R.; Bota-Sierra, C.A. (2021): Primer registro del género *Racenaeschna* para Colombia (Anisoptera: Aeshnidae) y otras especies en la Reserva La Forzosa — First record of the genus *Racenaeschna* for Colombia and other species at Reserva La Forzosa. *Hetaerina* 3(2): 7-11. (in Spanish, with English summary) ["Cordillera Central. In a recent expedition to the Reserva La Forzosa (Anorí Municipality, Antioquia Department), two last instar female larvae were found inhabiting a small creek inside the primary forest. Besides, another 12 species were registered, among them five are Colombian endemics, highlighting the importance of this reserve for dragonflies and damselflies conservation. Finally, details of larval morphology are provided, as well as high-quality photos, and a map of the current distribution of the genus in South America." (Authors)] Address: Novelo-Gutiérrez, R., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Xalapa, México. Correo electrónico: rodolfo.novelo@inecol.mx

**18437.** Nugrahaningrum, A.; Soesilohadi, R.C.H. (2021): Variations of movement, dispersal, and morphometrics among subpopulations of Javan endemic damselfly, *Drepanosticta spatulifera* (Odonata: Platystictidae) in Petungkriyono Forest. *Journal of Tropical Biodiversity and Biotechnology* 6(3): 14 pp. (in English) ["*D. spatulifera* is a Javan endemic damselfly. The population is spread unevenly in the Petungkriyono Forest and is threatened due to environmental pressure. The aims of this research are to know the variation of the movement, dispersal, and morphometric among subpopulations of *D. spatulifera*. Movement and dispersal variation data collection was done using Mark Release Recapture (MRR) for six weeks from early August until mid-September 2020. The collection of morphometric samples was done during the last week of the MRR survey and 46 individuals were measured with 12 continuous characters. During the MRR survey, 596 males of *D. spatulifera* were marked and 302 were recaptured. *D. spatulifera* had short movement and dispersal thus no individuals were found across the subpopulations. The distance moved of successive capture and net lifetime movement were dominantly less or equal to five meters. The duration of the MRR survey had a low correlation with the dispersal distance of *D. spatulifera*. In the morphometric variations, closer subpopulations tended to have a similar cluster of morphometric characters. Variation of distance moved between successive capture and wing size from Mangli Stream was significantly different from other sites. The subpopulation of Mangli, the farthest and higher altitude of the sites, had the highest distance move, more disperse, and the largest wing size. Our study showed that *D. spatulifera* was extremely sedentary damselfly. It will enhance inbreeding and vulnerability to extinction. Therefore, the interaction between the subpopulations of *D. spatulifera* in the Petungkriyono Forest needs to be done more." (Authors)] Address: Soesilohadi, R.C.,H., Fac. Biology, Universitas Gadjah Mada, Teknika Selatan Street, Senolowo, Sinduadi, Mlati, Sleman, Yogyakarta 55281, Indonesia. E-mail: hidayat@ugm.ac.id

**18438.** Pérez, J.H.; Rocha-Gil, Z.E.; Pérez-Rubiano, C.C.;

Bernal-Figueroa, A.A. (2021): Biological quality in an aquatic system influenced by mining and agricultural activities: River Salitre, Boyacá (Colombia). *Tropical and Subtropical Agroecosystems* 24: 14 pp. (in Spanish, with English summary) ["Background. The study and monitoring of water quality is commonly carried out through the characterization of physicochemical and bacteriological parameters. However, the presence of point pollutants that are discharged at times when an exact record of their incidence may not be achieved, has led to the exploration of different methodologies in order to determine the quality of a body of water, one of which is the bioindication through the study of aquatic organisms. Objective. Analyze the biological quality of the Salitre river basin, Boyacá in areas of influence of mining and agricultural activity in the rainy season (April-May 2019) and dry season (September-October 2019). Methodology. The study was conducted by determining the diversity of aquatic macroinvertebrates present in three stations distributed in the upper (P1), middle (P2) and lower (P3) part of the river. Results. 3573 individuals distributed in eight orders, 28 families and 39 genera were observed, standing out in wealth and abundance: Diptera (79.54%), Ephemeroptera (9.51%) and Odonata (6.07%). Implications. The main limitation of this work was the transfer of the water samples to the laboratory for the physicochemical analysis, for the maintenance of the cold chain during all the samplings. Conclusions. Changes were registered in physicochemical and biological conditions of the system, mainly for the diversity in the three sampling points, which represents a low capacity of this system to take better and better use of nutrients and energy in areas of anthropogenic intervention, affecting self-purification of the river and the biological activities of the ecosystem." (Authors)] Address: Pérez, J.H., Grupo de Investigación Gestión Ambiental, Fac. Cien. e Ingen., Univ. de Boyacá, Carrera 2ª Este No. 64 – 169, Tunja-Boyacá, Colombia. E-mail: jhperez@uniboyaca.edu.co

**18439.** Schletterer, M.; Kurz, B.; Schönegger, A.; Egger, G.; Feistmantl, K. (2021): Transplantation of an alpine *Carex-fen* – a mitigation measure related to the construction of a reservoir in the Austrian Alps. *BIO Web of Conferences* 31, 00036 (2021): 7pp. (in English) ["Translocations are applied in the context of infrastructure projects to preserve certain vegetation types. Within the EIA of a large hydropower project in the Austrian Alps, manifold mitigation measures were defined. Among those, the transplantation of about 1.4 ha *Carex-fen* at an altitude of about 2000 m was defined. One year before the start of the construction works in 2021, basic infrastructure (roads) was established and different ecological measures were undertaken, e.g. translocation of amphibians to newly constructed habitats as well as the transplantation of the *Carex-fen*. The turf was cut from the initial area with an adjusted excavator shovel, delivered to a wheel loader which brought each single turf immediately to the target area, where another excavator mounted the turf in a pre-arranged area. At the donor site more than 1/2 of the area was based on wet gley, while especially areas in the vicinity of the river were based on fluvial gravel. With the 30 to 70 cm thick turfs also animals, e.g. Odonata, were transferred.

Before the translocation a monitoring of the donor sites was carried out. The monitoring concept foresees a detailed monitoring of the newly established sites for 10 years. Herein we provide insights in the applied technology and summarize first results of the monitoring. Overall, our project is unique regarding the vegetation type, the technology, the size and the intensity of monitoring... With this measure also larvae of Odonata were transferred with the substratum in their new habitat. Within the assessments for the EIA, three dragonfly species were detected by visual observation and net catches (adults and larvae) in the valley: *Enallagma cyathigerum*, *Aeshna juncea* and *Somatochlora alpestris*). During the pre-monitoring in 2020, also the occurrence of *Leucorhinia dubia* was confirmed by visual observations. All detected species are similar in terms of their larval habitat. The translocation of larvae by transplanting turf is the most effective method, which has also the advantage that the entire biotope is relocated. Beside the herein described measures, an additional measure related to the establishment." (Authors)] Address: Schletterer, M., TIWAG-Tiroler Wasserkraft AG, Innsbruck, Austria. E-mail: martin.schletterer@tiwag.at

**18440.** Singh, S.D.; Kaur, W.G. (2021): Cytological review and first cytogenetic report on three species of family Macromiidae (Odonata: Anisoptera) from India. *International Journal of Zoological Investigations* 7(2): 447-452. (in English) ["Cytological data of family Macromiidae based on chromosome number and sex determination has been reviewed and cytogenetic investigations on *Epophthalmia vittata*, *Macromia ellisoni* and *M. flavicincta* have been done using conventional staining, C- banding, silver nitrate staining and sequence specific staining. Macromiid species were captured from Maharashtra (Nagpur) and Kerala (Kuttiadi river and Vatakara) states of India. All the species possess  $2n (\sigma) = 25m$ , which is the type number of family with X0-XX type sex determination. All the autosomal bivalents including large bivalent present in *Epophthalmia vittata* and *Macromia ellisoni* show terminal C-bands and NORfs, while X chromosome is C- positive and NOR rich, whereas m bivalent is C- negative and NOR- negative. In the sequence specific staining, all autosomal bivalents including X chromosome possess overlapping DAPI/CMA<sub>3</sub> signals. Cytogenetically, all the three species have been studied for the first time." (Authors)] Address: Singh, S.D., Dept Zoology & Environmental Sciences, Punjabi Univ., Patiala 147002, Punjab, India

**18441.** Tamilselvan, R.; Kumar, K. (2021): Diversity of Coccinellidae and Odonata in Agri-Horti Ecosystems. *Indian Journal of entomology* 83(2): 273-275. (in English) ["Surveys were conducted during kharif and rabi season in the 2015–2016 in Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal (10°55' N and 79°52' E), Union Territory of Puducherry, to assess the species diversity and abundance of coccinellids and odonates in agricultural and horticultural ecosystems viz., rice, cotton, sugarcane, lablab, cassava, sweet potato, guava, mango, sapota, and curry leaf. Insect specimens were collected by sweeping and hand picking. Totally 19 species of Coleoptera and

Odonata under four families (Coccinellidae, Libellulidae, Coenagrionidae, and Lestidae) were observed. *Coccinella transversalis* F. (25.56%) was the most abundant followed by *Diplacodes trivialis* (Rambur) (22.22%) and *Cheilomenes sexmaculata* (F.) (20%) in agricultural ecosystems. While, *D. trivialis* (R) (21.80%) was the most abundant in horticultural ecosystems followed by *Ceriagrion coromandalianum* (Brauer) (20.30%) and *Brachythemis contaminata* (F.) (17.29%). Species richness was higher in the horticultural ecosystem and species evenness was almost the same in both the ecosystems. Simpson's diversity value was greater in the horticultural ecosystem." (Authors)] Address: Tamilselvan, R., Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore 641003, Tamil Nadu, India. Email: rstamil94@gmail.com

**18442.** Taylor, P.; Smallshire, D.; Parr, A.J.; Brooks, S.J.; Cham, S.A.; Colver, E.F.; Harvey, M.; Hepper, D.; Isaac, N. J.B.; Logie, M.W.; McFerran, D.; McKenna, F.; Nelson, B.; Roy, D.B. (2021): 2021. State of Dragonflies in Britain and Ireland 2021. British Dragonfly Society, Old Weston, Huntingdon: 83 pp. (in English) ["• The current British and Irish list of damselflies and dragonflies (Odonata) comprises 56 species, of which 46 are residents or regular migrants since 2000; a further ten species have occurred as rare vagrants. • Trend analyses carried out by the UK Centre for Ecology & Hydrology for this BDS report show that 19 of our resident and/or regular migrant species (41%) have significantly increased in occupancy since 1970. These included both common and/or widespread species and scarce and/or localised species, as well as five new colonists. • Just five (11%) of our resident and regular migrant species have shown significant declines overall. One of these is a widespread damselfly, two are predominantly upland and/or northern species, and two are specialists of seepages, pools and small streams. In addition, one scarcer migrant has shown some signs of a decline, though appearances have always been somewhat erratic. • The production of species trends does not reveal the underlying causes. There has been little scientific study to determine the precise causes and their relative impacts on dragonfly populations, although climate change and habitat quantity and quality are clearly important. Our assessment of the driving forces behind the observed trends in this report is therefore based principally on expert opinion using what is known of dragonfly biology and ecology. • Dragonfly species new to Britain and Ireland are arriving and colonising at a greater rate than ever before. No less than six species have colonised Britain since 1996, while a seventh has recolonised after an absence of almost 60 years. The new colonists are *Anax parthenope* (first record 1996), *Sympetrum fonscolombii* (breeding from 1996), Small Red-eyed Damselfly (first record 1999), *Lestes barbarus* (first record 2002), *Chalcolestes viridis* (colonisation from 2007) and *Aeshna affinis* (colonisation from 2010). *Coenagrion scitulum* became extinct in Britain during the coastal floods of early 1953, but successfully recolonised around 2010. • Species richness has increased over time, especially in the northern half of Britain, but also in the south as new species arrive and colonise; increased recording intensity in recent

years may explain some of these increases. • Trends for individual species in Britain and Ireland are often mirrored by those in Europe. For example *Anax imperator* is increasing in the Netherlands and Germany, as well as in Britain and Ireland, while *Lestes sponsa* has declined in all these areas. • Trends and responses to climate or habitat changes in dragonflies are often matched by other taxa. For example, there is evidence of northwards range shifts for several birds and butterflies, and it has recently been found that despite overall insect declines, more of our larger moth species are increasing in occupancy, than decreasing. Additionally, populations of freshwater invertebrates such as caddisflies and mayflies have recovered in recent decades, a result in line with that seen overall for dragonflies. • Climate change in the form of increased temperatures is behind many of the positive dragonfly species trends and new colonisations, but it should be remembered that climate change does not act in isolation. Increases in the availability of suitable habitats through restoration and creation projects have also played a significant role. Climate change may also have negative impacts for some species, especially in the future. It is important that we continue to record and assess all species, but especially those in northern, upland and specialised habitats, although much still needs to be discovered about the individual needs of dragonfly species, especially during the larval stage. • Species declines are harder to record and explain, but habitat losses and degradation through land drainage, afforestation, acidification and lack of appropriate management are strongly indicated as major factors. Changes in weather patterns, causing both flood and drought conditions, are also implicated, as are pesticides, fertilisers and other pollutants of a similar nature. It is also the case that increases in distribution may mask underlying declines in species abundance. • The 50-year occupancy trends in this report are based on 1.4 million records, collected by some 17,000 individual recorders during 1970-2019. ...." (Authors)] Address: www.british-dragonflies.org.uk

**18443.** Viitaniemi, H.M.; Leder, E.H.; Suhonen, J. (2021): Influence of interspecific interference competition on the genetic structure of *Calopteryx splendens* populations. *Ann. Zool. Fennici* 59: 35-45. (In English) ["Understanding the effects of interspecific competition on genetic diversity will deepen our knowledge on species evolution. In the case of *Calopteryx splendens* and *C. virgo*, sympatric damselfly species, interspecific interference competition by *C. virgo* has remarkable effects on territoriality of *C. splendens* resulting in reproductive character displacement. Since territoriality is correlated with phenotype and mating success, we investigated the effects of interspecific interference competition on genetic diversity of *C. splendens* populations. Using amplified fragment length polymorphisms (AFLP), we determined the population genetic structure of 12 *C. splendens* populations and used the genetic diversity information to relate heterozygosity of *C. splendens* to abundance of *C. virgo* in sympatric populations. We found that heterozygosity of *C. splendens* males decreased with increasing abundance of *C. virgo* males. This result most likely reflects changes in effective population size due to interspecific interference competition

and shows an effect on genetic structure in damselfly populations." (Authors)] Address: Viitaniemi, H.M., Dept Biol., 20014 University of Turku, Finland. E-mail: hmviit@utu.fi

**18444.** Wu, G.; Tang, S.; Han, J.; Li, C.; Liu, L.; Xu, X.; Xu, Z.; Chen, Z.; Wang, Y.; Qiu, G. 2021): Distributions of total mercury and methylmercury in dragonflies from a large abandoned mercury mining region in China. *Archives of Environmental Contamination and Toxicology* 81: 25-35. (In English) ["Odonata are often considered to be biosentinels of environmental contamination. Dragonflies (n = 439) belonging to 15 species of eight genera were collected from an abandoned mercury (Hg) mining region in China to investigate the bioaccumulation of total Hg (THg) and methylmercury (MeHg). The THg and MeHg concentrations in dragonflies varied widely within ranges of 0.06–19 mg/kg and 0.02–5.7 mg/kg, respectively. THg and MeHg were positively correlated with bodyweight (THg:  $r^2 = 0.10$ ,  $P = 0.000$ ; MeHg:  $r^2 = 0.09$ ,  $P = 0.000$ ). Significant variations were observed among species, with the highest MeHg value (in *Orthetrum triangulare*) being 5-fold higher than the lowest (in *Pantala flavescens*). These variations were consistent with those of nitrogen isotope ( $\delta^{15}N$ ) values. A health risk assessment found hazard quotients for specialist dragonfly-consuming birds of up to 7.2, which is 2.4 times greater than the permissible limit of 3, suggesting a potential health risk of exposure." (Authors)] Address: Qiu, G., State Key Laboratory of Environmental Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang, 550081, China. E-mail: qiuguangle@vip.skleg.cn

**18445.** Yamada, S.; Urabe, J. (2021): Role of sediment in determining the vulnerability of three littoral cladoceran species to odonate larvae predation. *Inland Waters* 11(898): 1-8. (In English) ["Small cladocerans, found abundantly on surfaces of macrophytes and sediments in the littoral zone, are important prey not only for small fish but also for various invertebrates such as larvae of odonates in freshwater habitats. However, no study has documented how habitat substrates affect their behavior and vulnerability to predators and predation. We conducted laboratory experiments to examine the movement of 3 littoral cladoceran species, *Chydorus sphaericus*, *Alona* sp., and *Ilyocryptus spinifer*, to determine if their vulnerabilities to predation by odonate larvae changed depending on the presence or absence of bottom sediment. We observed that when sediment was present, *Ilyocryptus* crawled in and ceased movement. However, in the containers without sediment, they continuously swam or crawled. Similarly, *Chydorus* also reduced frequency of movement in a container with sediment, but *Alona* movement did not change regardless of the presence or absence of sediment. In the predation experiments with 2 or 3 prey species, *Ilyocryptus* was the most vulnerable to predation by odonate larvae in the containers without sediment but least vulnerable in those with sediment. The vulnerability of *Chydorus* to the odonate larvae was as low as that of *Ilyocryptus* in the containers with sediment. *Alona* was less preyed upon by odonates in containers with sediment but highly vulnerable to predation when containers

had sediment with Chydorus and Ilyocryptus. These results indicate that behavior and vulnerability to predation of littoral cladocerans are species-specific and change depending on the presence of sediment and the existence of other species." (Authors)] Address: Yamada, S., Aquatic Ecology Lab, Graduate School of Life Sciences, Tohoku University, Aoba 6-3, Aramaki Aoba-ku, Sendai 980-8578, Japan. E-mail: sayumi.yamada127@gmail.com

**18446.** Yu, X. (2021): A survey of Odonata diversity in Zoige wetland, Sichuan Province, China. International Dragonfly Fund - Report 158: 1-22. (in English) ["At Zoige alpine Wetland, a total of 10 species belonging to 4 families and 6 genera were recorded. Obvious melanism in *Coenagrion lunulatum* and feigning death behaviour in *Enallagma cyathigerum* were observed. A preliminary trial on avoiding behaviour of *E. cyathigerum* confirmed that feigning death is one of the major strategies to protect themselves. All these new findings are discussed briefly." (Authors)] Address: Yu, X., College of Life Sciences, Chongqing Normal University, Chongqing, PR China. E-mail: lannysummer@163.com

**18447.** Zach, P. (2021): Libellen-Artengemeinschaften des Raabtales. M.Sc. thesis, Karl-Franzens-Universität Graz: 134 pp. (in German, with English summary) ["Dragonfly species community of the Raab Valley (Styria, Austria). The present study is dedicated to the Dragonfly species community of the Raab Valley, located in Eastern Styria, and the assessment of the ecological status of this river valley area, which was formerly characterised by floodplains. For this purpose, nine 500 m long transects were defined in the study area, representing the range of water body types in the Raab Valley. The - largely homogeneous - transects, represent the river Raab itself, a stream (Schwengentalbach), ditches located in the valley bottom, a spring stream, and a still water body. Based on the hydromorphological models and the postulated original state of the water bodies, a water body type-specific dragonfly community (reference fauna) was derived. In 2020, the dragonfly fauna of the Raab Valley was documented in course of five field surveys per transect from May to September. The autochthony status and the abundance of the species were documented. The current dragonfly fauna was compared with the reference fauna and the dragonfly ecological status was determined. In the study area, 24 dragonfly species were detected, 18 of which could be classified as autochthonous and seven of which are sensitive species. According to the Austrian Red List, two of the detected species are "endangered": *Somatochlora meridionalis*, that was spotted at the pond in Perlstein, and *Libellula fulva*, that was documented at one of the ditches. Despite these remarkable dragonfly records, the surveyed dragonfly species community is clearly impoverished compared to the model. In particular, there is a lack of still water habitats in the Raab Valley. There is a lack of reed beds, floating leaf vegetation and submerged vegetation, which leads to the lack of dragonfly species associated with these vegetation types. Thus, the Raab Valley was ranked with a "moderate to good ecological status", which represents the third- to second-best class in the 5-tiered classification scheme." (Author)]

Address: not stated

**18448.** Zawal, A.; Olechwir, T.; Stepień, E. (2021): Odonates (Insecta: Odonata) of the "Golczewskie Uroczysko" nature reserve (North-West Poland). *Ecologica Montenegrina* 43: 30-36. (in English) ["The „Golczewskie Uroczysko” nature reserve was established on 5 May 2004 to protect the raised peat bog and the dystrophic Lake Zabie with its surrounding transitional bog and adjacent forest complexes containing valuable plants. In May, July and October 2006 the research of odonates (Odonata) fauna has been conducted in this area. A total of 575 odonates individuals belonging to 29 species (366 imagines, 152 larvae, 57 exuviae) were collected and among these 489 specimens belonging to 28 species were collected in Lake Zabie, 26 specimens belonging to 7 species on the peat bog, 52 specimens belonging to 3 species in flooded alder forest and 8 specimens belonging to 2 species were collected in ditches in the forest. The eurytopic species were dominated with substantial parts of tyrophobic and tyrophilous species." (Authors)] Address: Zawal, A., Institute of Marine and Environmental Sciences, Center of Molecular Biology and Biotechnology, University of Szczecin, Waska 13, 71-415 Szczecin, Poland. E-mail: andrzej.zawal@usz.edu.pl

**18449.** Zheng, D.-R., Li, S.; Zhao, Y.-S.; Zhang, H.-C. (2021): A potential telephlebiid dragonfly (Odonata: Anisoptera: Aeshnoidea) from Miocene of Yunnan, southwestern China. *Palaeoentomology* 4(3): 237-242. ["A new aeshnoid dragonfly, *Jingguaeshna taoae* gen. et sp. nov., is described based on an incomplete hindwing from a new Miocene deposit in Jinggu, Yunnan Province, southwestern China. *Jingguaeshna* gen. nov. is most likely a member of the Telephlebiidae, sharing a number of typical characters of this family. *Jingguaeshna taoae* gen. et sp. nov. is the first aeshnoid dragonfly fossil found from Yunnan and probably the oldest-known telephlebiid dragonfly. This study also reveals a new entomofauna in southwestern China, contributing new information to the understanding of the Miocene ecosystems in this region." (Authors)] Address: Zheng, D.-R., Dept of Earth Sciences, Univ. Hong Kong, Hong Kong Special Administrative Region, China



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2011

**18450.** Bössneck, U.; Sparmberg, H. (2011): Die Schutzgebiete der Landeshauptstadt Erfurt (Thüringen). Teil XVIII: Flora und Fauna des GLB „Ermstedter Holz“ bei Ermstedt. *Vernate* 30: 117-142. (in German, with English summary) ["The nature reserves of the urban area of Erfurt (Thuringia) . Part XVIII: Flora and fauna of the reserve „Ermstedter Holz“ near Ermstedt The paper presents the results of floristic and faunistic surveys within the reserve „Ermstedter Holz“ near Ermstedt carried out in 2004 and 2005. In total, 668 species of plants and animals were recorded." (Authors), among them only two odonate species: *Aeshna cyanea* and *Sympetrum sanguineum*] Address: Bößneck, U., Stadtverwaltung Erfurt, Umwelt. und Naturschutzamt, Stauffenbergallee 18, D-99085 Erfurt, Germany. E-mail: ulrich.boessneck@erfurt.de

**18451.** Buczynski, P.; Mikolajczuk, P.; Tonczyk, G. (2011): New records of Norfolk Damselfly *Coenagrion armatum* (Charpentier, 1840) (Odonata: Coenagrionidae) on the south-western edge of its distribution area (Central and Eastern Poland). *Odonatrix* 7(2): 41-47. (in Polish, with English summary) ["*C. armatum* is a Siberian species whose south-western boundary of its distribution area goes through Poland. Formerly, it passed through the western part of the country. In the last 30–40 years it moped back ca. 300 km due to climatic and anthropogenic environmental changes. Currently, it runs through eastern regions – its putative form is shown on Fig. 1. The authors give five new sites of the species (Fig. 1). Breeding populations are probably at sites 1–3 (good habitat conditions, usually the large numbers of imagines) and less likely at site 5 (a water body partially dries out). In Pulawy (site 4) a single imago was recorded in an unusual environment (a river slope), however, the complexes of water bodies in the valleys of the River Kurówka and Wisla are located nearby. The sites 4 and 5 are the first known from over 10 years in Poland which are located to the west of 22°N. They confirm the hypothesis of Bernard et al. (2009) about the existence of scattered relict populations outside this line. Probably there are more of them but a short

and early flight period of *C. armatum* is the cause of its overlooking in faunistic studies. Nevertheless, the sites 1–3 are important because they confirm the form of the current species distribution area which was determined approximately due to the lack of precise data. The authors suggest the evaluation program as well as passive and active protection of *C. armatum*. It would be particularly important due to the regress and strong threats of the species in the neighbouring countries of Poland from the west and south – Poland is an important refugium of this species in Central Europe." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**18452.** Conze, K.-J.; Menke, N.; Olthoff, M. (2011): Libellen und Klimawandel in Nordrhein-Westfalen. Ergebnisse einer Studie zu Folgen des Klimawandels am Beispiel der Gestreiften Quelljungfer und der Arktischen Smaragdlibelle. *Natur in NRW* 4/11: 20-26. (in German) ["Within the framework of the study ... on the consequences of climate consequences of climate change, an analysis of possible effects of effects of climate change on the dragonfly fauna. Due to the broad data base that the Dragonfly The broad data base compiled by the Dragonfly Working Group NRW in recent years made it possible to conduct a state-specific analysis of the impacts of climate change. As the results of the sensitivity analysis show, a very dynamic development can be expected for this highly mobile species group, which is also bound to suitable water bodies. The examples of *Cordulegaster bidentata* and *Somatochlora arctica* are used to illustrate how climate change could affect and which measures can preserve and promote these highly vulnerable species. Rapid implementation and monitoring of these measures are just as important as continuous monitoring of the population development of all species in the sense of an early warning system. A species training programme is suggested for the particularly endangered damselfly." (Authors, DeepL)] Address: Conze, K.-J., Listerstr. 13, 45147 Essen, Germany. E-mail: Klaus-Juergen.Conze@t-online.de

**18453.** Cywinska, A.; Davies, R.W. (2011): Predation on the erpobdellid leech *Nepheleopsis obscura* in the laboratory.

Can. J. Zool. 67: 2689-2693. (in English) ["Six size classes of *Nephelopsis obscura* ranging from cocoons through hatchlings (2-4 mg) to mature individuals (150 mg) were exposed to a range of potential predators and also tested for cannibalism. Neither cannibalism nor interspecific leech predation was found, but nine species of Coleoptera, Amphipoda, Hemiptera, and Zygoptera (*Enallagma boreale*) consumed one or more size classes of *N. obscura*. In general, predation rates were highest on individuals < 10 mg and declined with increasing size of *N. obscura*. Larger predators (intra- and inter-specifically) usually had higher consumption rates than smaller ones. Because of the high abundance of the nine species of predators in prairie pothole lakes during the summer, it is speculated that predation on *N. obscura* hatchlings and cocoons is directly related to the recorded reductions in these size classes in the macrophyte zones during the summer." (Authors)] Address: Cywinska, A.; Division of Ecology (Aquatic Ecology Group), Dept Biological Sciences, Univ. of Calgary, Calgary, Alta., Canada T2N 1N4

**18454.** De Knijf, G. (2011): Massale aantallen van de Noordse witsnuitlibel. Libellenvereniging Vlaanderen . nieuwsbrief 5(2): 8. (in Dutch) [Massive numbers of Northern white-faced darter (*Leucorrhinia rubicunda*): In recent weeks, *L. rubicunda* was observed in different places in Belgium. Outside the traditional sites in the Kempen region, this was the case in the Ghent canal zone at St-Kruis-Winkel on May 8, 2011 (Ward Vercruysse), in the Hainaut sand region at Stamburges on May 18, 2011 (Luc & Dirk Verroken) and also in May in a limestone quarry near Tournai (Benoît Gauquie). From the same period, there is a sighting from the centre of Lille, Northern France (Cédric Vanappelghem). This is all the more remarkable as there are no populations of the species in France. The question of where these animals could have come from was always raised. In the Netherlands, very large numbers of *L. rubicunda* have been observed in recent weeks on several locations. Witness a few photos from the northern part of the Netherlands. Whether such numbers were also observed in the south of the Netherlands or in the Belgian Kempen is not known to me at the moment. It is to be expected that at least part of those numbers of animals do not stay at the breeding site, but start swarming out. These numbers combined with persistent dry, warm weather with predominantly winds from the east to north-east have apparently led to the sighting of the Northern whitefly in many places where it was never observed before. This phenomenon probably also occurred in 2001, when *L. rubicunda* was observed in the Kraaibos at Moen in South-West Flanders (De Knijf 2001). And who knows, maybe on some suitable locations females have ended up laying eggs and allowing the larvae to develop. We'll have to wait and see in the years to come whether the Northern white-beaked dragonfly will eventually be able to establish itself there or not. google translator: In recent weeks at various locations in Belgium Nordic white-faced darter (*Leucorrhinia rubicunda*) were observed. Beyond the traditional sites in the Kempen, this was particularly the case in the Ghent Canal to St-Kruis-Store on May 8, 2011 (Ward Vercruysse), sand in the Hainaut region Stamburges on May 18, 2011 (L. & Dirk Verroken)

and also in May in a limestone quarry near Tournai (Benoît Gauquie). From the same period was an observation from the center of Lille, northern France (Med. Cedric Vanappelghem). That is all the more remarkable because no populations of the species present in France. This was always the question of where that animals could come. In the Netherlands the last week in different locations very large numbers of white-faced darter Nordic observed. Witnessed by a few pictures from the north of the Netherlands. Whether any such numbers were observed in the south of the Netherlands or in Belgium Kempen me at this moment unknown. It is expected that at least some of the numbers of animals location on reproduction remain, but begin to swarms. These numbers combined with continued dry, warm weather with mostly wind from the east to Northeast has apparently led to the perception of *L. rubicunda* in many places where they previously was never observed. This phenomenon has probably occurred in 2001, when *L. rubicunda* was observed in the Kraaibos to Moen in southwest Flanders (De Knijf 2001). And who knows, there are a number of suitable locations also landed females who take eggs and larvae which can develop. But look out next year white-faced darter or the Norse are finally able to establish or not.] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**18455.** Dévai, G.; Miskolczi, M. (2011): Data on the dragonfly (Odonata) fauna of the landscape Hortobágy. *Studia odonotol. hung.* 12: 55-64. (in Hungarian, with English summary) ["This is the 18th paper of a series directed at communicating faunistical data of Hungary which had been unpublished until December 31, 1987 (cf. DÉVAI et al. 1993). The authors present faunistical data from 19 localities in 10 10×10 km UTM grid map cell (DT 95, 96, 97; ET 07, 08, 16, 17, 18, 26, 27) of the geographical microregion Hortobágy in the plain Tiszai-Alföld. The sampling sites are located in the area of the Hortobágy National Park. Collections were made in 6 years between 1982–1987 on 28 days, with the participation of 10 specialists. In the report information on 1809 adults (1156 males and 653 females) is given in detail, representing 378 faunistical data. In this study 40 species (16 Zygoptera and 24 Anisoptera) were found to occur in the area, out of which 1 belongs to the very frequent, 19 to the frequent, 12 to the less frequent, 4 to the rare and 4 to the sporadic class of country-wide occurrence frequency." (Authors)] Address: Dévai, G.Y., Dept Hydrobiology, Faculty of Science & Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary

**18456.** Devai, G.; Miskolczi, M. (2011): Adatok Bátorliget szitakötő-faunájához (Odonata) [Data on the dragonfly (Odonata) fauna in the surroundings of the settlement Bátorliget (NE-Hungary)]. *Studia odonotol. hung.* 13: 81-88. (in Hungarian, with English summary) [This is the 23th paper of a series directed at communicating faunistical data of Hungary which had been unpublished until December 31, 1987 (cf. DÉVAI, GY. et al. 1993). The authors present faunistical data from two sampling areas (the marshland Bátorligeti-láp and the canalized stream Pilis–Piricsei-folyás) in

the geographical region Nyírség in NE-Hungary, over the administrative area of the settlement Bátorliget. Collections were made in one year (1985), with the participation of 3 specialists on 4 days, in one 10×10 km UTM grid map cell (ET 99). In the report information on 256 adults (141 males and 115 females) is given in detail, representing 69 faunistic data. In this study 25 species (13 Zygoptera and 12 Anisoptera) were found to occur in the area, out of which 1 belongs to the very frequent, 15 to the frequent, 4 to the less frequent, 4 to the rare and 1 to the sporadic class of country-wide occurrence frequency." (Authors)] Address: Miskolczi, Margit, Dept Hydrobiology, Fac. Science & Technology, Univ. Debrecen, Egyetem tér 1, 4032 Debrecen, Hungary

**18457.** Devai, G.; Miskolczi, M. (2011): Adatok a Bereg–Szatmári-síkság szitakötő-faunájához (Odonata) [Data on the dragonfly (Odonata) fauna of the landscape Bereg–Szatmári-síkság (NE-Hungary)]. *Studia odonotol. hung.* 13: 55-61. (in Hungarian, with English summary) ["This is the 20th paper of a series directed at communicating faunistic data of Hungary which had been unpublished until December 31, 1987 (cf. DÉVAI, GY. et al. 1993). The authors present faunistic data from the geographical microregion-group Bereg–Szatmári-síkság in NE-Hungary, over the administrative area of 8 settlements (Csaroda, Gelénes, Kisar, Márokpapi, Nagyar, Szatmárcseke, Tivadar, Tiszakerecsény). Collections were made in 5 years between 1983–1987, with the participation of 5 specialists on 13 days and 11 localities, in 4 of the 10×10 km UTM grid map cells (FU 03, 04, 12, 13). In the report information on 473 adults (324 males and 149 females) is given in detail, representing 110 faunistic data. In this study 25 species (11 Zygoptera and 14 Anisoptera) were found to occur in the area, out of which 17 belong to the frequent, 6 to the less frequent, 1 to the rare and 1 to the sporadic class of country-wide occurrence frequency." (Authors)] Address: Miskolczi, Margit, Dept Hydrobiol., Fac. Science & Tech., Univ. Debrecen, Egyetem tér 1, 4032 Debrecen, Hungary

**18458.** Do, M.C.; Nguyen, V.K.; Bui, H.M. (2011): Dragonfly *Coellicia mingxiensis* Xu, 2006 (Odonata: Platynemiidae) from Tam Dao National Park, with additional notes on its morphology. *Proceedings of the 4th National Scientific Conference on Ecology and Biological Resources*, Hanoi, 21 October 2011: 68-69. (in English, with Vietnamese summary) [10 ♂, Vietnam, Vinh Phuc, Tam Dao National Park, Thac Bac Stream, 25.IV.2009 alt. 800m a.s.l.] Address: Do, M.C., Military Institute of Hygiene and Epidemiology, Vietnam

**18459.** Fernández-Bellon, D.; Luxby, J. (2011): The feeding ecology of Merlin Falco columbarius during the breeding season in Ireland, and an assessment of current diet analysis methods. *Irish Birds* 9: 159-164. (in English) [Prey items during the breeding season of 2010.: Odonata sp.: Number of specimens: 4; Percentage occurrence: 1.0; Percentage biomass: <0.1] Address: Luxby, J., BirdWatch Ireland, Midlands Office, Crank House, Banagher, Co. Offaly, Ireland. E-mail: dfernandezbellon@gmail.com

**18460.** Ficsor, M. (2011): Contribution to the occurrence of

riverine dragonfly species (Odonata: Gomphidae) in the north-eastern part of Hungary based on larval study. *Acta Biol. Debr. Oecol. Hung.* 26: 67-74. (in Hungarian, with English summary) [*Stylurus flavipes*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia* and *Onychogomphus forcipatus* are documented from 63 sampling sites] Address: Ficsor, M., North Hungarian Regional Environmental, Nature Conservation & Water Management Inspectorate, Laboratory, 4. Mindszent tér, 3530, Miskolc, Hungary. E-mail: ficsor.mark@emikofe.kvvm.hu

**18461.** Höpstein, G. (2011): Der Südliche Blaupfeil (*Orthetrum brunneum*) in der Sandgrube bei Remschütz. *Landchaftspflege und Naturschutz in Thüringen* 48(2): 95-98. (in German, with English summary) ["*O. brunneum*) could be observed in the sand pit near Remschuetz during 2008 and 2010. It is a rare species in Thuringia, The reproduction was recorded via exuviae in July 2010." (Author)] Address: Höpstein, G., Flecke 17, D-07422 Bad Blankenburg, Germany

**18462.** Hunger, H. (2011): Nachweise der Asiatischen Keiljungfer (*Gomphus flavipes*) am Restrhein unterhalb der Staustufe Markt/Kembs. *Mercuriale* 11: 31-34. (in German) [Baden-Württemberg, Germany. On 24.06.2011, a *G. flavipes* exuvium was found on the southern test stretch directly above the former Kander mouth (Rhine-km 175.2) and a just-hatched animal at the exuvium shortly below the former Kander mouth (Rhine-km 175.4). On 03.08.2011, another exuvium was found at Rhine-km 175.4. Both sites are located on the Messtischblatt-Quadrant (MTBQ) 8311 SW. This is the first record of *G. flavipes*) for the Restrhein between Basel and the cultural weir Breisach. In terms of substrate and bank morphology, the hatching sites did not show any clear differences to other areas of the test stretch. In 2010, a total of four exuviae of *O. cecilia* but none of *Gomphus flavipes* had been collected on the southern sample stretch. Address: Hunger, H. E-mail: holger.hunger@inula.de

**18463.** Johnston, T. (2011): Comparison of riparian willows and riprap as habitat for fish and invertebrates in the Waikato River. MSc thesis. University of Waikato: XI + 145 pp. (in English) ["Willows (*Salix* spp.) are an abundant alien tree and have been the mainstay of river bank protection throughout New Zealand. Riprap is another method of bank stabilisation consisting of rocks used to amour shorelines to protect against erosion. There is a trend for increasing use of riprap to replace willow along the banks of large rivers in New Zealand, but there is limited information on the ecological roles of these different bank types to support management. The objectives of this research were to determine the effects of different bank habitats on nearshore fish and invertebrate communities in the Waikato River as it passes through Hamilton city. The study involves three sites situated along the river. Each site has four bank types consisting of willow, riprap, a mixture of willow and riprap, and beach. Invertebrate sampling was carried out on three occasions to assess if there was a seasonal effect on community composition. Fish were sampled bimonthly determine differences in

community composition. Assessment of fish populations was carried out with using boat electrofishing, Gee minnow trapping and spotlighting, while invertebrate populations were sampled by kick netting. Few significant differences were detected in invertebrate diversity between willow, riprap and willow/riprap habitats. However, community composition based on relative abundance was different among contrasting habitats in most seasons and Pielou's evenness was greater for the more homogenous beach and riprap habitats. Riprap had consistently high alpha diversity but had lower species accumulation on two out of three dates suggesting there was a limited pool of taxa colonising the riprap compared to other habitats. Pairwise dissimilarity coefficients and PERMANOVA comparisons indicated that, although low in alpha diversity, beach habitats contributed significantly to macroinvertebrate beta diversity, and that willow and riprap habitats also supported different combinations of taxa due to different physical conditions. The combination of beach and willow habitats gave the highest gamma diversity. Willow habitats supported the highest number of both introduced and native fish, mainly reflecting abundances of common smelt, likely due to provision of cover, complex aquatic habitat, and riparian vegetation supplying detritus and invertebrate food resources. Riprap habitats supported the highest number of common bully. Common bully were also significantly larger in this habitat. Variations in water temperature, amount of shade, and river levels were possible factors contributing to temporal influences on biological patterns. The findings of this study indicate that, if all banks habitats in Hamilton City were composed of a single type, invertebrate biodiversity would be reduced. While the combination of beach and willow habitats may sustain high diversity for invertebrates and fish, the novel habitat provided by riprap may also favour some native fish and invertebrates over others. Therefore, a balance of different bank habitat types would perhaps be best to sustain present-day biodiversity levels in near shore macroinvertebrate and fish communities." (Author) The list of taxa includes *Aeshna*, *Hemicordulia australiae*, *Procordulia*, *Xanthocnemis zealandica*, and *Zygoptera* indet.] Address: not stated

**18464.** Kim, D.E. (2011): The study on the habitat change of *Nannophya pygmaea* Rambur in the abandoned paddy field Ulsan city and its management. *Korea Journal of Ecology* 25(6): 867-877. (in Korean, with English summary) [In order to provide basic data for the conservation and restoration of *N. pygmaea* habitat, habitat changes and insect fauna inhabiting the fallow land were examined for 4 years from June 2008 to July 2011 in Daun-dong, Jung-gu, Ulsan Metropolitan City. The flora was investigated. As a result, a total of 10 orders, 32 families, and 53 species were investigated, and the order Dragonflies, Hemiptera, and Coleoptera were dominant with a total of 18.9%. A total of 23 orders, 30 families, and 60 species of plants were investigated, and Cyperaceae (13.3%) and the Gramineae (11.7%) were dominant. As woody plants are introduced into the survey area, the transition is progressing rapidly, and the habitats of aquatic plants are encroached and turned into land. In addition, phytophagous insects and mountainous insects

are increasing in this area. As a result, the habitat of *N. pygmaea* was maintained at a constant depth of 2.5 to 9.5 cm and moved to a place where the water surface was open. Therefore, long-term monitoring and appropriate management are required to identify ecological characteristics for the continuous conservation and maintenance of *C. dragonfly* habitat in this area.] Address: Kim, D.E., Environmental Resources Research Department, National Institute of Environmental Research, Incheon (404-708), Korea. E-mail: un19781978@korea.kr

**18465.** Kosík, M.; Cadkova, Z.; Prikryl, I.; Seda, J.; Pechar, L.; Pecharová, E. (2011): Initial succession of zooplankton and zoobenthos assemblages in newly formed quarry lake medard (Sokolov, Czech Republic). "Mine Water – Managing the Challenges" IMWA 2011 (International Mine Water Association): 517-522. (in English) ["This paper gives the results of the initial observation period of the development of zooplankton and zoobenthos (including *Enallagma cyathigerum*, *Ischnura elegans*, *I. pumilio*, *Lestes sponsa*, *Chalcolestes viridis*, *Anax imperator*) during flooding of the residual brown coal mine pit Medard. Changes in the quantity and quality of water, flowing from different sources, and development of stratification in the lake water affect the composition of zooplankton and zoobenthos. Original sources of zooplankton inoculum, which are the reservoirs in the Lake Medard own catchment area, are monitored too. Another important source, that will significantly affect the formation of the newly formed lake, is the river Ohre (Eger), which will contribute with the greatest volume of water. At the same time, the hydrochemical water quality parameters and their influence on the formation of zooplankton and zoobentos communities are monitored." (Authors)] Address: Pecharova, Emile, Czech Univ. Life Science Prague, Fac. Environmental Sciences, Dept of Landscape Ecology, Czech Republic

**18466.** Loureiro, N. S. (2011): *Libélulas e Libelinhas (Odonata) no Algarve*. *Guias Digitais Biodiversidade e Natureza* nº 1: 134 pp. (in Portuguese, with English, Spanish and German summaries) ["This ebook is the first publication focused on the Algarve's Odonata Order. It shouldn't, however, be perceived as the definitive edition on the subject, published only after exhausting all knowledge about. In fact, there still will be much to add in future editions. At this moment, its divulgation is aiming to contribute to the satisfaction of a recognized demand and, simultaneously, to fill in a blank mentioned on the European Red List of Dragonflies (p. 17). Therefore, this Digital Guide not only synthesizes, in Portuguese, a large amount of data already available though scattered, but also adds new one. As main results of our efforts: i. The number of records was duplicated, providing new data to significantly improved cartographies on the regional distribution of the 51 species; ii. Six new species were added to the Algarve's most recent checklist. The large number of photographs in this ebook also contributes to the fact that it can be easily used by those who are not, neither wish to be, experts on the subject. This Digital Guide has been prepared to be used as an independent source of information. It can, however, be consulted in parallel with some European



field guides, such as the Field Guide to the Dragonflies of Britain and Europe, by K-D B Dijkstra & R Lewington, and/or The Dragonflies of Europe, by R R Askew. In the other hand, this ebook can be easily consulted by non Portuguese speakers, because the indispensable technical terms are translated to English, allowing the comprehension of fundamental contents. In this way, it is assumed that the international community interested in the Algarve's Odonata fauna will find this Digital Guide to be a reference work of great importance. At last, it is presented in this Abstract a new contribute, equally enriching for those who wish to discover the Algarve' Odonata fauna: the 10 hotspots to observe and photograph dragonflies and damselflies at Algarve. Fully enjoy this natural resource, respecting it carefully and avoiding its degradation and extinction.] Address: not stated

**18467.** McGeoch, M.A., Sithole, H., Samways, M.J., Simaika, J.P., Pryke, J.S., Picker, M.; Uys, C.; Armstrong, A.J.; Dippenaar-Schoeman, A.S.; Engelbrecht, I.A.; Braschler, B.; Hamer, M. (2011): Conservation and monitoring of invertebrates in terrestrial protected areas. *Koedoe* 53(2), Art. #1000; doi:10.4102/koedoe.v53i2.1000: 13 pp. (in English) ["Invertebrates constitute a substantial proportion of terrestrial and freshwater biodiversity and are critical to ecosystem function. However, their inclusion in biodiversity monitoring and conservation planning and management has lagged behind better-known, more widely appreciated taxa. Significant progress in invertebrate surveys, systematics and bioindication, both globally and locally, means that their use in biodiversity monitoring and conservation is becoming increasingly feasible. Here we outline challenges and solutions to the integration of invertebrates into biodiversity management objectives and monitoring in protected areas in South Africa. We show that such integration is relevant and possible, and assess the relative suitability of seven key taxa in this context. Finally, we outline a series of recommendations for mainstreaming invertebrates in conservation planning, surveys and monitoring in and around protected areas. Conservation implications: Invertebrates constitute a substantial and functionally significant component of terrestrial biodiversity and are valuable indicators of environmental condition. Although consideration of invertebrates has historically been neglected in conservation planning and management, substantial progress with surveys, systematics and bioindication means that it is now both feasible and advisable to incorporate them into protected area monitoring activities.... Odonata: Several freshwater monitoring schemes involving macroinvertebrates are well developed with a long history, for example the River Invertebrate Prediction Classification System used in the UK to monitor the pollution status of water courses (Wright et al. 2000) and the South African Scoring System (SASS) (Revenga et al. 2005). Good taxonomic and biological information, along with knowledge of species conservation status and responses to habitat quality are amongst the key suitability criteria in invertebrate monitoring (Table 3). The Odonata in South Africa perhaps best exemplify this with existing Red Data information and comprehensive field guides that make working with the group broadly accessible to biologists, the public and citizen

scientists (Samways 2006, 2008). South Africa's freshwater systems are under intense pressure (Nel et al. 2007) and the Odonata are sensitive indicators of the quality of these systems. This includes their response to pollution and invasive alien species impacts (Chovanec 2000), as well as their recovery after alien plant removal in rivers in PAs in South Africa (Samways & Sharratt 2010). In addition to the well-known and widely used SASS system (Dallas & Day 1993; Revenga et al. 2005), the Dragonfly Biotic Index (DBI) provides a measure of ecological integrity for freshwater systems. The DBI is a weighted index (see Table 4) based on the quantitative assessment of three subindices of species distribution, threat status and sensitivity to disturbance (Simaika & Samways 2008, 2009a). The total DBI of a water body (stream, river or pool) reflects the total odonate assemblage, thus allowing for water bodies to be compared and restoration success to be monitored (Simaika & Samways 2008). Every South African odonate species has been assigned a score (Samways 2008). The DBI has been tested and applied in biomonitoring (Simaika & Samways 2009a), 2011 to measure habitat recovery (Simaika & Samways 2008) and select sites for conservation (Simaika & Samways 2009b). Previous work has shown a strong correlation between adult dragonfly scores and macroinvertebrate scores (Simaika & Samways 2011; Smith, Samways & Taylor 2007). An advantage of the DBI over conventional macroinvertebrate indices is that it operates at the species level and is therefore highly sensitive to habitat condition. It, therefore, has good potential for environmental assessment and monitoring freshwater biodiversity and quality, alongside SASS (Simaika & Samways 2011). The low field effort required to obtain a DBI score for a site also makes this a low-cost and readily applied method. Odonata are therefore particularly useful for monitoring freshwater quality and landscape physiognomy around riverine and other aquatic habitats in South Africa's PAs (Samways 1993b)." (Authors)] Address: McGeoch, Melodie, PO Box 216, Steenberg 7947, South Africa. E-mail: melodiem@sanparks.org

**18468.** Neff, M.R. (2011): Abiotic conditions in contrasting environments: An examination of Precambrian Shield lotic communities. PhD thesis, Ecology and Evolutionary Biology, University of Toronto: XX, 175 pp. (in English) ["the inherent complexity of the natural world has long been a central theme in ecological research, as the patterns and processes that govern ecosystems can operate at multiple spatial and temporal scales. It is clear that to develop general ecological frameworks, we must consider many different factors at different scales, and incorporate ideas from other disciplines. This thesis touches on several of these ideas, first through an analysis of literature, and then with field research examining the role of broad-scale abiotic factors on lotic systems. To determine how integrated aquatic science is currently understood among different researchers, I provide an analysis on communication and exchange of ideas among various subfields in aquatic science. I show that there are clear divisions within the aquatic science literature, suggesting that there is progress to be made on the integration of methods and ideas. Next, I examine the impact of a

large-scale geological feature, the Canadian Precambrian Shield, on abiotic conditions in lotic systems, and how these conditions in turn influence the species assemblages of aquatic organisms. This is addressed with both historical survey data, as well as contemporary data, and as a whole, incorporates ideas concerning the relative influence of regional versus local factors, the importance of historical factors on species distributions, and the relationship between the abiotic environment and biological communities. These analyses show that there are distinct fish and macroinvertebrate communities in Shield lotic systems compared to those found in nearby off-Shield sites, indicating that the Shield is an important broad-scale factor influencing local biological communities. This finding, in conjunction with previous knowledge on the influence of historical factors, provides further insight on the structuring of lotic fish and macroinvertebrate communities in Ontario." (Author) Odonata are treated at family level.] Address: not stated

**18469.** Petzold, F.; Zimmermann, W. (2011): Rote Liste der Libellen (Insecta: Odonata) Thüringens 4. Fassung, Stand: 11/2009. Naturschutzreport 26: 74-78. (in German) [Annotated and commented Red List of 26 species in Thuringia (Germany)] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. E-Mail: petzold.falk@googlemail.com

**18470.** Pilon, J.-G. (2011): Phylogénie des Odonates: aperçu et réflexion. *Le naturaliste canadien* 135(2): 26-29. (in French) [There are several taxonomic problems in the Odonata that classical methods have not been able to solve. Molecular methods offer new avenues of investigation that, while taking into account classical methods, allow a better understanding of phylogeny in this group of insects. The author presents a few examples and some of their repercussions on the classification of the Quebec fauna.] Address: Pilon, J.-G. E-mail: pilon.jeanguy@videotron.ca

**18471.** Raio, C.B.; Espinoza, A.A.; Bennemann, S.T. (2011): Diversidade e similaridade entre populações de insetos aquáticos em riachos de primeira e segunda ordem, sul do Brasil similarity and diversity between aquatic insect populations in streams of first and second order, south of Brazil. *Semina: Ciências Biológicas e da Saúde, Londrina* 32(1): 69-76. (in Portuguese, with English summary) ["Aquatic communities of macroinvertebrates are influenced by rapid velocity, habitat heterogeneity and other characteristics. This study examined a relationship between aquatic insects diversity with hydrologic order of two streams. We tested following hypothesis: diversity of insects associated with the same substrate in equal parts of streams, classified in different orders, are similar. Samples of litter were collected in middle stretches of stream Cascatinha (first order) and stream João Pinheiro (second order), Tibagi river basin, Telêmaco Borba, Paraná, Brazil. Diversity of each stream was obtained by Shannon index. Diversity values were low for both streams (0.8 for the first order stream and 0.89 for the second order stream) with no statistical difference ( $t = -1.12$ ;  $p = 0.27$ ). Similarity between the streams was 0.51. These results allowed us to verify that, to studied streams,

hydrological order has no effect on aquatic insects diversity ( $F = 0.14$ ,  $p = 0.71$ ), so the hypothesis was accepted. The most abundant taxon in both streams was Chironomidae (Diptera), representing 82.7% of total collected. However when Chironomidae was removed from analysis, the hypothesis was refused. An high abundance of Chironomidae individuals had influenced values of local diversity." (Authors) Odonata are treated at the family level.] Address: Raio, Cibele, Aluna do Programa de Pós-Graduação em Ciências Biológicas (Zoologia) da Universidade Estadual de Londrina. Laboratório de Ecologia Trófica, Departamento de Ciências Animal e Vegetal, Centro de Ciências Biológicas, Brazil. E-mail: cibeles\_bio@hotmail.com

**18472.** Rehm, P.; Borner, J.; Meusemann, K.; von Reumont, B.M.; Simon, S.; Hadrys, H.; Misof, B.; Burmester, T. (2011): Dating the arthropod tree based on large-scale transcriptome data. *Molecular Phylogenetics and Evolution* 61(3): 880-887. (in English) ["Molecular sequences do not only allow the reconstruction of phylogenetic relationships among species, but also provide information on the approximate divergence times. Whereas the fossil record dates the origin of most multicellular animal phyla during the Cambrian explosion less than 540 million years ago (mya), molecular clock calculations usually suggest much older dates. Here we used a large multiple sequence alignment derived from Expressed Sequence Tags and genomes comprising 129 genes (37,476 amino acid positions) and 117 taxa, including 101 arthropods. We obtained consistent divergence time estimates applying relaxed Bayesian clock models with different priors and multiple calibration points. While the influence of substitution rates, missing data, and model priors were negligible, the clock model had significant effect. A log-normal autocorrelated model was selected on basis of cross-validation. We calculated that arthropods emerged ~600 mya. Onychophorans (velvet worms) and euarthropods split ~590 mya, Pancrustacea and Myriochelata ~560 mya, Myriapoda and Chelicerata ~555 mya, and 'Crustacea' and Hexapoda ~510 mya. Endopterygote insects appeared ~390 mya. These dates are considerably younger than most previous molecular clock estimates and in better agreement with the fossil record. Nevertheless, a Precambrian origin of arthropods and other metazoan phyla is still supported. Our results also demonstrate the applicability of large datasets of random nuclear sequences for approximating the timing of multicellular animal evolution... (1988). *Paleoptera–Neoptera* \*, 419, 325 (Archaeorthoptera), Béthoux and Nel (2005). *Odonata–Ephemeroptera*, 388, 318 (Odonata), (Brauckmann and Schneider (1996). *Hemiptera–other neopterans*, 397, 284 (Paleorrhyncha), Shcherbakov (2000). ... " (Authors)] Address: Burmester, T., Institute of Zoology & Zoological Museum, Biocenter Grindelmann Univ. of Hamburg, Martin-Luther-King-Platz 3, D-20146 Hamburg, Germany. E-mail: thorsten.burmester@uni-hamburg.de

**18473.** Rodríguez-Martínez, S.; Outomuro, D.; Ocharán, F.J. (2011): Odonatos de la cuenca baja del Porcia y alrededores (Asturias, norte de España). *Boletín de la S.E.A.* 48(1): 484-486. (in Spanish, with English summary) [22 odonate

species including *Coenagrion mercuriale* are documented from the lower basin of the river Porcía and adjoining localities is presented. Sampling and observations were carried out during July and August 2009.] Address: Outomuro, D., Depto de Biología de Organismos y Sistemas, Univ. de Oviedo. 33071 Oviedo, Spain. E-mail: outomuro.david@gmail.com

**18474.** Rozner, G. (2011): Adatok Magyarország szitakötő-faunájához (Odonata) az 1987. december 31-ig végzett szórványgyűjtéseim alapján [Data on the dragonfly (Odonata) fauna of Hungary according to my scatter-collections by December 31, 1987]. *Studia odonotol. hung.* 13: 49-54. (in Hungarian, with English summary) ["This is the 24th paper of a series directed at communicating faunistical data of Hungary which had been unpublished until December 31, 1987 (cf. DÉVAI, GY. et al. 1993). The author presents 58 faunistical data, results of a survey based on his own scatter-collections and other specimens collected by 3 colleagues. The adult dragonfly series is from 27 localities throughout the country, but mostly from the sampling sites of Transdanubia. The localities are situated in 24 cells according to the 10×10 km UTM grid map. Collections were made on 29 days in 5 years between 1977 and 1981. In all cases it was possible to provide the number of individuals as well, thus the paper is based on the study of 177 presented specimens (21 males, 17 females and 139 specimens with undecided sex). In conclusion, 35 species (14 Zygoptera and 21 Anisoptera) were recorded throughout the country, out of which 1 belongs to the very frequent, 16 to the frequent, 13 to the less frequent, 3 to the rare and 2 to the sporadic class of country-wide occurrence frequency." (Author)] Address: Rozner, G., Vasút u. 25, 8648 Balatonkeresztúr, Hungary

**18475.** Seifert, C. (2011): 10 Jahre Libellenmonitoring im FND „Kuhbergbruch“. *Landschaftspflege und Naturschutz in Thüringen* 48(2): 70-81. (in German, with English summary) ["Ten years of monitoring dragonflies at the nature protected site FND "Kuhbergbruch". Between 2002 and 2011 a monitoring program of true dragonflies (Anisoptera) was realized at a complex of small anthropogenous ponds in the administrative district of Greiz. Based on collecting exuviae on a regular basis, it was possible to provide evidence of reproduction of 16 indigenous species. Due to additional observations of imagines, including damselflies (Zygoptera), the number of species increased to 32 since 1992. Amongst indigenous Anisoptera *Leucorrhinia pectoralis* and *L. rubicunda* are two species of the category 1 in the Red List of Thuringia, furthermore *Aeshna juncea* and *L. dubia* are in category 3. This four important species were described in detail in view of nature conservation by means of phenology, colonization and population development." (Author)] Address: Seifert, C.L., Hafengasse 9, 1030 Wien, Austria. E-Mail: carlo\_seifert@web.de

**18476.** Staufer, M.; Schulze, C.H. (2011): Diversität und Struktur von Libellengemeinschaften an Augewässern in den March-Auen. *Wiss. Mitt. Niederösterreich. Landesmuseum* 22: 171-202. (in German, with English and Slovak summaries)

["Hydrological dynamics at the Morava underwent dramatic changes in the first half of the 20th century due to river regulations that prevented the formation of new backwaters and simultaneously supported silting up processes. Nevertheless, the Morava floodplains are still characterised by a wide range of water bodies providing important habitats for a rich dragonfly fauna. The Austrian part of the Morava floodplains is home to 48 species of dragonflies and damselflies. Within the whole trilateral area (including the Czech and Slovakian parts) of the Morava floodplains, a total of 54 species have been recorded. The Odonata fauna at backwaters from Hohenau to Marchegg was surveyed in 2008 and 2009. A total of 7,056 adult dragonflies belonging to 34 species were observed along 24 transects, each with a length of 50 meters. 29 species with 6,748 individuals were classified as autochthonous at any of the survey sites. Species richness of individual sites varied between three and 18 species and differed between water body types. Lowest species numbers were recorded for water bodies completely embedded in forest whilst sunny parts of larger, permanent water bodies showed the highest species richness. Our data indicate a tendency towards an increasing percentage of endangered species with increasing species richness at backwaters. Species assemblages proved to be significantly nested, although a clear deviation from maximum nestedness was evident. From all tested parameters, the water body type and the degree of desiccation had the strongest effect on species composition. A considerable proportion of all Odonata species and endangered species was represented by dragonflies and damselflies that favour standing waterbodies or ephemeral conditions, indicating that the entire species assemblage is strongly affected by the reduced hydrodynamic conditions within the floodplain system." (Authors) ] Address: Staufer, Martina, Dep. für Biodiversität der Tiere, Fakultät für Lebenswissenschaften, Universität Wien, Rennweg 14, 1030 Wien, Austria. E-mail: m\_staufer@web.de

**18477.** Thomas, M. (2011): Untersuchungen zum Vorkommen der Helm-Azurjungfer *Coenagrion mercuriale* in einem Kalkflachmoor bei Köln (NRW) als Grundlage für Pflege und Entwicklung. Thesis, Bachelor of Engineering (B. Eng.). Hochschule Osnabrück: 92 pp + Anhänge. (in German) [Nordrhein-Westfalen, Germany. "The calcareous low moor bog Katharinenkammer is presumably the last primary habitat of *C. mercuriale* in NRW. The studies in 2011 found *C. mercuriale* flying from May 3rd to August 1st, 2011. In the main flight season between May 20th and June 17th more than 35 individuals were observed at each survey. The highest number of imagines was recorded on June 2nd, 2011 at 60 individuals. Using vegetation and water mapping of the area and GPS based localities of capture of imagines and exuviae the species' land use in the annual phenological progress was analyzed. Additionally three daily phenological studies during the main flight season were implemented. Analysis of the land use has shown that the species in the Katharinenkammer mainly populated the southern areas of the tall sedge meadows. A preference for moister areas containing small streamlets with varying vegetation structures, a

vegetation height of 40 to 80 cm and a dominance of 40 to 80 % was noticed. Areas with dense and high mantle of vegetation and shade were avoided. In the other parts of the investigation area there was a considerably lower concentration of individuals. However they could be observed occasionally on sun exposed areas of the purple moor grass meadows which border the tall sedge meadows. In addition to *C. mercuriale* the study has provided evidence for 16 other dragonfly species in the Katharinenkammer, including autochthonous appearances of the rare species *Ceriagrion tenellum*, *Orthetrum coerulescens* and *Cordulegaster boltonii*." (Author)] Address: Thomas, Manuela, Bauerbankstr. 4, 50969 Köln, Germany

**18478.** Toth, S.; Csiby, M.; Ambrus, A. (2011): Adatok a Nyugat-magyarországi-peremvidék szitakötő-faunájához (Odonata) [Data on the dragonfly (Odonata) fauna of the landscape Nyugat-magyarországi-peremvidék (W-Hungary)]. *Studia odonatol. hung.* 13: 27-48. (in Hungarian, with English summary) ["This is the 19th paper of a series directed at communicating faunistical data of Hungary which had been unpublished until December 31, 1987 (cf. DÉVAI, GY. et al. 1993). The authors present faunistical data from 74 localities in 29 10×10 km UTM grid map cells (XM 07, 08, 09, 18, 19, 25, 37, 56; XN 10, 12, 14, 15, 17, 18, 21, 23, 24, 25, 27, 28, 34, 35, 36, 37, 41, 50, 51, 55; WM 99) of the geographical region Nyugat-magyarországi-peremvidék (W-Hungary), over the administrative area of 45 settlements. Collections were made in 16 years between 1971-1987 on 117 days, with the participation of 3 specialists. In the report information on 9406 adults (5399 males and 4007 females) is given in detail, representing 1589 faunistical data. In this study 55 species (20 Zygoptera and 35 Anisoptera) were found to occur in the area, out of which 1 belongs to the very frequent, 19 to the frequent, 16 to the less frequent, 8 to the rare and 11 to the sporadic class of country-wide occurrence frequency." (Authors)] Address: Tóth, S., Széchenyi u. 2, 8420 Zirc, Hungary – °Fertő –Hanság National Park Directorate, P.O.Box 4, H-9435 Sarród, Hungary

**18479.** Walia, G.K.; Kaur, J. (2011): Karyological study on ten odonate species from Mangalore (Karnataka), India. *Hislopia journal* 4(1): 83-88. (in English) ["Karyological investigations have been done on ten species belonging to six families of two suborders . Zygoptera and Anisoptera of order Odonata. These includes *Vestalis apicalis* of family Calopterygidae, *Ceriagrion cerinorubellum* and *Ischnura aurora* of family Coenagrionidae, *Lestes dorothea* of family Lestidae, *Copera annulata* of family Platycnemididae, *Gynacantha milliardi* of family Aeshnidae and *Diplacodes nebulosa*, *Diplacodes trivialis*, *Orthetrum sabina* and *Trithemis pallidinervis* of family Libellulidae. Majority of the species possess the type number of the families, 2n = 25m in Calopterygidae, Lestidae, Platycnemididae and Libellulidae, while 2n = 27m in Coenagrionidae and Aeshnidae. Three species show variations in chromosome number i.e. in *Ischnura aurora* 2n=25 (m chromosomes are lacking), *Lestes dorothea* (n=10-12m) and *Gynacantha milliardi* (2n=27m and 2n=25). *Vestalis apicalis* with 2n=25m of family Calopterygidae has

been reported for the first time in India." (Authors.)] Address: Walia, Miss Dr. G.K., Dept of Zoology, Punjabi University, Patiala . 147002, India

**18480.** Willigalla, C.; Fartmann, T. (2011): Einfluss der Bebauung auf die Libellendiversität (Odonata) in Städten. *Treffpunkt Biologische Vielfalt* 10: 145-149. (in German) [At 12 rainwater retention basins in the city of Mainz (Rheinland-Pfalz, Germany), 32 species were detected between 2006 and 2008, 84% of the 38 species known in the urban area of Mainz. The number of species depended on the size of the water body and its location in different urban zones. Significantly more species were found on the outskirts of the city than in the inner city area. The abundance of damselflies correlated negatively with the degree of development. Only low densities were found from a development level of 40 % and more within a radius of 200 m around the water body.] Address: Willigalla, C., Annastr. 1, 55124 Mainz, Germany. E-mail: christoph@willigalla.de

## 2012

**18481.** Huang, J.-s. (2012): Behavioural habits and habitat selection of adult odonates in Ban-ping lake. MSc thesis: IX + 117 pp. (in Chinese, with English summary) ["A total of 24 Odonata species (2 Zygoptera and 22 Anisoptera) under 19 genera and 5 families was identified in Ban-ping Lake during May 2010 to December 2011, and there are a total of 10 species (1 Zygoptera and 9 Anisoptera) under 9 genera and 5 families founded with exuviae. The activity patterns of these ten species were examined during June to December 2011. In territorial perch, 3 perchers (*Ischnura senegalensis* and *Brachythemis contaminata*) preferred area of marsh (55.6% of Variance; 66.7%); *Diplacodes trivialis* in Cement embankment; But one Flier (*Pantala flavescens*) preferred that pool of forest area (45.1%). In seeking flight, *Diplacodes trivialis* and *Pantala flavescens* preferred that open water side (90.8%; 32.7%). 4 fliers (*Anax panybeus*, *Anax parthenope julius*, *Ictinogomphus rapax* and *Tholymis tillarga*) were patrolling flight, preferred that open water side (55.5%). In parallel flying, *Pantala flavescens* and *Tholymis tillarga* preferred mudflat near open water side (70.4%). *Pantala flavescens* behaved mating, picked on marsh (39.4%). Otherwise, Scatter of pool or basin (Deep<0.3m, Water area is nearly 12m<sup>2</sup>) were important biotope in Ban-ping Lake, not only finding exuviae of *Ischnura senegalensis*, *Pantala flavescens*, *Tholymis tillarga* and *Zyxomma petiolatum*, but also male Odonates Adults of at least 9 species (*Ischnura senegalensis*, *Brachythemis contaminata*, *Crocothemis servilia servilia*, *Diplacodes trivialis*, *Neurothemis ramburii ramburii*, *Orthetrum pruinosum neglectum*, *Orthetrum sabina sabina*, *Tramea transmarina euryale* and *Trithemis aurora*) behaved territorial perch and seeking flight." (Author)] Address: Not stated

**18482.** Kipping, J. (2012): Southern African Regional Environmental Program (SAREP). First Biodiversity Field Survey. Upper Cubango (Okavango) catchment, Angola May 2012. Dragonflies & Damselflies (Insecta: Odonata). Expert



Report. December 2012: 108 pp. (in English) ["Conclusion and outlook: From the perspective of the Odonata expert the first SAREP biodiversity survey in May 2012 was very successful and gave a first insight in the Odonata fauna of the region, their habitats and potential threats. On Angolan territory altogether 30 sites were sampled for Odonata, 28 within the Okavango catchment, 2 outside in the Cuanza catchment. The first survey focused in the middle and upper sections of the tributaries. Altogether 88 dragonfly species could be recorded on the survey in May 2012. More than 600 specimens of Odonata were collected and DNA samples of all recorded species. The survey led to the discovery of 4 undescribed species. One *Chlorocypha* sp. nov. near aphrodite is close to the tropical *Chlorocypha* aphrodite but differs in some characters. A *Pseudagrion* sp. nov. is near the Zambian *Pseudagrion* fisheri but unique in morphological features and colour markings. *Mesocnemis* sp. nov. and *Zygonyx* sp. nov. nr. *flavicosta* were recorded before in neighbouring countries but are still undescribed. 20 of the species were recorded for the first time in Angola (incl. the undescribed four), 27 are new for the whole Okavango catchment and 54 species are new for the Angolan part of the Okavango catchment. This survey brings the total number of Odonata known from the Okavango catchment to 160 species. A complete preliminary checklist of this catchment is provided (see Table 3 on page 74). The number of Odonata species known from Angola increases from 164 to 184, an updated preliminary checklist of the Odonata of Angola is provided in Table 4 on page 82. The single sampling sites are characterized by their habitat and the species that they inhabit. Observed and potential threats to freshwater diversity and Odonata in special are discussed. For the forthcoming surveys there are the following recommendations. As shown in the map of the Okavango catchment in Fig. 7 there are large gaps that were not covered by any research yet. Especially the headwaters of the Cuchi might be highly diverse in Odonata species. It forms the watershed of Okavango, Cuanza, Zambezi and Congo which promises very diverse habitats and a species rich dragonfly fauna with highly specialized taxa and even undescribed species. Also worth to sample are the middle section of the Cuito and also the Kwando. As known from own surveys and those from partners the rainy season, especially the beginning rainy season in late November is the period with the most species to be found. Next surveys should orientate on this fact and be conducted in November or shortly after the rain in March." (Author)] Address: Kipping, J., BioCart Ökologische Gutachten, Taucha/Leipzig, Germany. E-mail: biocartkippping@email.de

## 2018

**18483.** Abbott, K.K.; Abbott, J.C.; Lozier, J.D.; Beasley, R.R. (2018): Development of polymorphic microsatellite markers for a rare dragonfly, *Cordulegaster sarracenia* (Odonata: Cordulegasteridae), with notes on population structure and genetic diversity. *International Journal of Odonatology* 21(3-4): 165-171. (in English) ["We isolated and characterized a total of 13 microsatellite loci from *C. sarracenia*. Loci were screened in 24 individuals from Louisiana and Texas. Within

*C. sarracenia*, the number of alleles per locus ranged from 0 to 5, and observed and expected heterozygosities ranged from 0.000 to 0.556 and 0.000 to 0.613, respectively. Overall differentiation among study populations was very high ( $F_{ST} = 0.423$ ), suggesting significant geographic population structure with low diversity within populations. Twelve of the 13 primers amplified in *C. sayi*, *C. diastatops*, *C. maculata*, and *C. obliqua* and polymorphism levels are reported. These new genetic markers will provide tools for addressing a number of population genetic and demographic questions relating to conservation of this rare dragonfly species." (Authors)] Address: Abbott, J.C., Alabama Mus. Natural History, Univ. of Alabama, Tuscaloosa, AL, USA. Email: jabbott1@ua.edu

**18484.** Agembe, S.; Yongo, E.; Masese, F.; Njiru, J.; Manjala, J.; Ojwang, W. (2018): Shifts in the food of Nile perch (*Lates niloticus*) in Lake Victoria. *Lakes & Reserv.* 2018;1-5. [wileyonlinelibrary.com/journal/lre](http://wileyonlinelibrary.com/journal/lre) © 2018 John Wiley & Sons Australia, Ltd | 1: 5 pp. (in English) ["The study investigated diet of Nile perch in Lake Victoria and compared results with past data from the same lake in order to analyse diet shifts over time. Fish samples (2020) were collected by seining and trawling from 2012 to 2016. In overall, *Caridina nilotica* (59%) was the dominant food item in the diet, while *Rastrineobola argentea* (5%) contributed the least. The diet of Nile perch of 1 cm was copepods, cladocerans and rotifers. The diet changed to only copepods and cladocerans at 2 cm. The proportion of the relatively large calanoids increased with Nile perch size in 1988/89, comprising between 35 and 80% of the diet of fishes of 3-4 cm. Nile perch of 6-25 cm TL fed more on *C. nilotica* in 2012/2016, compared to 1988/1989 and 2006/08. Haplochromines were fed on more in 2006/2008 than in 2012/2016 by Nile perch of 6-30 cm TL as fish size increased. The frequencies of occurrence of *R. argentea* in the diet were highest in 1988/1989, and lowest in 2006/2008, for fish size of up to 30 cm TL. The proportion of Odonata in the diet of size class 16-20 and 21-30 cm TL were highest in 2012/2016 and 1988/1989, respectively. Thus, shifts in Nile perch diet was observed from zooplankton to *C. nilotica*, then to haplochromines and finally to fish prey as size increased. Nile perch preferred haplochromines with *C. nilotica* as the substitute food. Cannibalism was observed to have decreased, only being evidenced in Nile perch above 35 cm TL, which could actually have a positive impact on the Nile perch fishery. The information on shifts in diet of Nile perch in Lake Victoria is of considerable ecological importance." (Authors)] Address: Agembe, S., Dept of Fisheries & Aquatic, Sci., Univ. of Eldoret, Eldoret, Kenya. Email: agembesimon@yahoo.com

**18485.** Amrullah, S.H. (2018): [Odonata diversity index (Insecta: Odonata) as measurement of environmental quality of river in the area of Taman Nasional Bantimurung Bulusaraung]. *Prosiding Seminar Hasil Penelitian (SNP2M) 2018*: 86-91. (in Indonesian, with English summary) ["Dragonflies (Insecta: Odonata) has important roles in the ecosystem. They act as a predator, control population, and indicator of environmental pollution. The research objectives are to inventory and calculate the species diversity of dragonflies in

Bantimurung Bulusaraung National Park (Babul NP) region and also measure the environment quality of rivers according to the Species Diversity Index (SDI). The study was conducted through exploration in the six resorts. Dragonflies specimens will be identified and confirmed to LIPI Cibinong, Bogor, West Java. SDI calculated by the Shannon-Wiener formula. The results showed that there are 27 species of Odonata (17 of Anisoptera and 10 of Zygoptera) in Babul NP region. SDI shows >2.41 means that environmental quality is in very good category. The conclusion of this research was that dragonflies in the Babul NP is very diverse with the discovery of 27 species in six working area resort." (Author)] Address: Amrullah, S.H., Dosen Program Studi Biologi Fakultas Sains, Universitas Cokroaminoto Palopo

**18486.** Anjos-Santos, D.; Neiss, U.G.; Pessacq, P. (2018): Chapter 14.4 . Superfamily Calopterygoidea. Thorp and Covich's Freshwater Invertebrates (Fourth Edition). Volume 3: Keys to Neotropical Hexapoda: 449-468. (in English) ["The superfamily Calopterygoidea has worldwide distribution, with 111 genera and 782 species known. Neotropical region has approximately 30 genera and 290 species, distributed in the families Amphipterygidae, Calopterygidae, Dicteriidae, Megapodagrionidae and Polythoridae. Several ordinal level keys exist that include larvae of Calopterygoidea, but they are limited to certain regions or countries. At generic level, the larvae knowledge of low diversity families is relatively good, but only a small portion of its species have been described. For the speciose and widely distributed genera Hetaerina and Mnesarete (Calopterygidae) separation of larvae is impossible. Larvae of Heteragrion and Oxystigma (Megapodagrionidae) and Euthore and Polythore (Polythoridae) are also very difficult to separate morphologically. Here we present a key to families and genera of Calopterygoidea." (Authors)] Address: Pessacq, P., Lab. de Investigaciones en Ecología y Sistemática Animal (LIESA), Univ. Nac. de la Patagonia San Juan Bosco, Sarmiento 849, 9200 Esquel, Chubut, Argentina. E-mail: pablopessacq@yahoo.com.ar

**18487.** Arrowsmith, J.; Nagaraju Shivaprakash, K.; Larrivé, M.; Turgeon, J.; Lessard, J.-P. (2018): Environmental filtering along a broad-scale acidity gradient shapes the structure of odonate communities. *Ecosphere* 9(12) . Article e02473: 16 pp. (in English) ["Historical, evolutionary, and ecological processes jointly shape the structure of communities, and the relative influence of such process may vary from one region to another. Nevertheless, much of community ecology focuses on one or several communities in a given region. To assess the relative importance and the context-dependency of processes shaping communities, studies in community ecology must be conducted across regions and along broad-scale environmental gradients. Regionally, historical colonization and extinction events, as well as diversification, can influence community structure by shaping the pool of potential community members (i.e., the regional species pool). Locally, a suite of deterministic and stochastic processes can influence community structure. We constructed a large time-calibrated phylogenetic tree for North American odonates and used analyses of phylogenetic community

structure with explicit species pool definitions to assess the predominant processes structuring assemblages along a north-south environmental gradient spanning two biomes and 8° of latitude in eastern Canada. Phylogenetic analyses of 39 lentic (i.e., lake) odonate communities revealed that co-occurring species were on average more closely related than expected by chance, but only in the temperate biome. In addition, site-to-site variation in phylogenetic structure across the temperate and boreal biomes was most strongly related to variation in water pH. The most alkaline lakes were in the temperate biome and were also the most phylogenetically clustered, suggesting that water pH acts as a main environmental filter of odonate communities. An alternative explanation was that the recent radiation of damselflies increased the diversity of this group relative to that of dragonflies in the temperate species pool, thereby leaving a signature of clustering in that biome. However, our comparative null model analyses with explicit species pool definitions at least partially ruled out this explanation. Somewhat contrary to previous hypotheses regarding the assembly of odonate communities, our results suggest that stochastic processes alone cannot account for community structure in odonates and that deterministic, niche-based processes have a strong influence." (Authors)] Address: Lessard, J.-P., Dept of Biology, Concordia University, Montreal, Qu ebec H4B 1R6 Canada. E-mail: jp.lessard@concordia.ca

**18488.** Aziz, M.A.A.A.; Mohamed, M. (2018): Diversity and species composition of odonates (Insecta: Odonata) of Hutan Lipur Soga Perdana, Batu Pahat, Johor, Malaysia: A green lung. *Journal of Science and Technology* 10(2): 1-9. (in English) ["In Malaysia, Odonates have been used widely in the assessment of water quality. This study is part of an effort to prepare a baseline data for the state of Johor, where development is happening at a fast rate which in turn could affect the water quality. Hutan Lipur Bukit Soga Perdana is a green lung for Batu Pahat which is considered as the second largest industrial town in Malaysia. Opportunistic sampling using sweep nets along 1 km line transect was conducted for a total of six days. 22 species of Odonata belonging to 17 genera and seven families were recorded. Among the seven families, the most species-rich were Libellulidae (12 species) followed by Coenagrionidae and Platycnemididae (3 species) while Gomphidae, Platystictidae, Devadattidae and Euphaeidae represented by single species. *Drepanosticta fontinalis*, a damselfly endemic to Peninsular Malaysia was collected. The abundance of the endemic *D. fontinalis* was 10.3% from a total of 126 individuals. *Tyriobapta torrida* (15.9%) was found to be the most abundant species found followed by *Prodasineura notostigma* (12.7%) and *Neurothemis fluctuans* (11.9%). The data were further analysed by using Shannon-Wiener Species Diversity Index giving a value of 2.63 indicating a moderate diversity. Simpson's Evenness is 0.91 indicating a high evenness in the distribution of Odonates. Since the forest gains high public interest in Batu Pahat and Odonates are visible and useful insects, more studies could be done, and the data could be transferred to the public as a model for biodiversity and conservation." (Authors)] Address: Mohamed, Maryati, Centre of Research for Sustainable Uses

of Natural Resources, Fac. Appl. Sci. & Tech., Universiti Tun Hussein Onn Malaysia, Bandar Universiti, 84500, Pagoh, Johor, Malaysia. E-mail: maryati@uthm.edu.my

**18489.** Babu, R.; Subramanian, K.A. (2018): Twenty-two new records of Odonata for Andhra Pradesh state, India (Lestidae, Calopterygidae, Coenagrionidae, Platycnemididae, Gomphidae, Libellulidae). *Notulae odonatologicae* 9(2): 67-71. (in English) ["Field surveys were carried out during 2011–2014 in the State of Andhra Pradesh by scientists of Zoological Survey of India, Southern Regional Centre, Chennai. Collected specimens deposited in the National Zoological Collections of Zoological Survey of India, Chennai, were studied and yielded 22 species new to the state of Andhra Pradesh. These new records increase the number of odonate taxa known from Andhra Pradesh to 69." (Authors)] Address: Babu, R., South. Regional Centre, Zool. Survey of India, Chennai-600028, India. E-mail: baburzi@gmail.com

**18490.** Balazs, A.; Holusa, O. (2018): Contribution to the knowledge on the dragonfly fauna (Insecta: Odonata) of Islamic Republic of Iran. *MendelNet* 25(1): 190-195. (in English) ["Intensive fieldworks were undertaken in northern parts of Islamic Republic of Iran during midsummer seasons in 2017 and 2018. Overall species richness reached 35 species at 21 visited localities. 13 species from 5 families from Zygoptera and 22 species from 4 families from Anisoptera were recorded in our study. The most valuable species caught were e. g., *Epallage fatime*, *Coenagrion pulchellum*, *C. lunulatum*, *Aeshna vercanica*, *Callaieschna microstigma*, *Cordulegaster vanbrinkae*, *C. nobilis*, *Sympetrum flaveolum*, *S. vulgatum decoloratum* or *Selysiothemis nigra*. First time *Aeshna vercanica* is documented from Gilan Province and *Cordulegaster nobilis* for Ardabil Province. Its habitat in this province is discussed." (Authors)] Address: Balazs, A., Dept of Zoology, Fisheries, Hydrobiology & Apiculture, Mendel University in Brno, Zemedelska 1, 613 00 Brno. Czech Republic. E-mail: balazsaeko@gmail.com

**18491.** Bode-Oke, A.T.; Zeyghami, S.; Dong, H. (2018): Flying in reverse: kinematics and aerodynamics of a dragonfly in backward free flight. *J. R. Soc. Interface* 15: 20180102. <http://dx.doi.org/10.1098/rsif.2018.0102>: 14 pp. (in English) ["In this study, we investigated the backward free flight of a dragonfly, accelerating in a flight path inclined to the horizontal. The wing and body kinematics were reconstructed from the output of three high-speed cameras using a template-based subdivision surface reconstruction method, and numerical simulations using an immersed boundary flow solver were conducted to compute the forces and visualize the flow features. During backward flight, the dragonfly maintained an upright body posture of approximately 90° relative to the horizon. The upright body posture was used to reorient the stroke plane and the flight force in the global frame; a mechanism known as 'force vectoring' which was previously observed in manoeuvres of other flying animals. In addition to force vectoring, we found that while flying backward, the dragonfly flaps its wings with larger angles of attack in the upstroke (US) when compared with forward

flight. Also, the backward velocity of the body in the upright position enhances the wings' net velocity in the US. The combined effect of the angle of attack and wing net velocity yields large aerodynamic force generation in the US, with the average magnitude of the force reaching values as high as two to three times the body weight. Corresponding to these large forces was the presence of a strong leading edge vortex (LEV) at the onset of US which remained attached up until wing reversal. Finally, wing–wing interaction was found to enhance the aerodynamic performance of the hindwings (HW) during backward flight. Vorticity from the forewings' trailing edge fed directly into the HW LEV to increase its circulation and enhance force production." (Authors)] Address: Bode-Oke, A.T., Mechanical & Aerospace Engineering, Univ. of Virginia, Charlottesville, VA 22903, USA

**18492.** Bowman, R.M.; Schmidt, S.; Weeks, C.; Clark, H.; Brown, C.; Latta IV, L.C.; Edgehouse, M. (2018): Phenotypic plasticity in a population of odonates. *Scientific Reports* 8, Article number: 8442: 6 pp. (in English) ["The maintenance of phenotypic plasticity within a species ensures survival through environmental flux. Plastic strategies are increasingly important given the number and magnitude of modern anthropogenic threats to the environment. We tested for phenotypic plasticity in the odonate *Argia vivida* in response to resource limitation. By limiting food availability, effectively inducing hunger, we were able to quantify shifts in agonistic behavior during intraspecific interactions. Scoring behavior in one-on-one combat trials after 1 and 4 days without food revealed phenotypic plasticity. Three classes of genotypes were identified, genotypes exhibiting either increased aggression, decreased aggression, or no phenotypic plasticity, in response to resource limitation. The variable plastic strategies in this population of odonates likely aids in maintaining fitness in fluctuating environments." (Authors)] Address: Edgehouse, M., Division of Natural Sciences & Mathematics, Lewis-Clark State College, Lewiston, Idaho, USA

**18493.** Bucciarelli, G.M.; Suh, D.; Davis, A.; Roberts, D.; Sharpton, D.; Shaffer, H.B.; Fisher, R.N.; Kats, L.B. (2018): Assessing effects of non-native crayfish on mosquito survival. *Conservation Biology* 33(1): 122-131. (in English) ["The introductions of non-native predators often reduce biodiversity and affect natural predator-prey relationships. However, non-native predators may increase the abundance of potential disease vectors (e.g. mosquitoes) indirectly through competition or predation cascades. The Santa Monica Mountains, situated in a global biodiversity hotspot, is an area of conservation concern due to climate change, urbanization, and the introduction of non-native species. We examined the effect that non-native crayfish (*Procambarus clarkii*) have on an existing native predator, dragonfly nymphs (*Aeshna* sp.) and their mosquito larvae (*Anopheles* sp.) prey. We used laboratory experiments to compare the predation efficiency of both predators, separately and together, and field data on counts of dragonfly nymphs and mosquito larvae sampled from 13 local streams. We predicted a lower predation efficiency of crayfish compared to native dragonfly nymphs as well as a reduced efficiency of dragonfly nymphs in the presence

of crayfish. Dragonfly nymphs were an order of magnitude more efficient mosquito predators compared to crayfish and dragonfly nymphs suffered reduced efficiency in the presence of crayfish. Analyses of field count data showed that populations of dragonfly nymphs and mosquito larvae were strongly correlated with crayfish presence in streams, such that sites with crayfish tended to have fewer dragonfly nymphs and more mosquito larvae. Under natural conditions, it is likely that crayfish reduce the abundance of dragonfly nymphs and their predation efficiency, and thereby, directly and indirectly, lead to higher mosquito populations and a loss of ecosystem services related to disease vector control." (Authors)] Address: Bucciarelli, G.M., UCLA La Kretz Center for California Conservation Science, Institute of the Environment and Sustainability, Los Angeles, CA, 90095 U.S.A. Email garyb@ucla.edu

**18494.** Cabaret, P. (2018): Présentation de la Réserve naturelle régionale de la haute vallée de la Vézère. *Annales Scientifiques du Limousin* 27: 72-81. (in French, with English summary) ["The Conservatoire d'espaces naturels du Limousin (CEN Limousin) was designated as responsible for managing the regional nature reserve (RNR) "Haute vallée de la Vézère" following his gazettement in November 2015. The site is located in the headwaters of the Vézère river, at the heart of Millevalles Plateau, on the communes of Saint-Merd-les-Oussines and Tarnac in the department of Corrèze. It covers a surface of 196 hectares. It is one of the last extensive and unspoiled network of heaths, dry grasslands and peatland in Limousin. The CEN Limousin has been involved in this space with local stock farmers for twenty years. The perimeter includes the pond of Chabannes with a quaking mire of exceptional vegetal diversity, and the pond of Oussines which is a local historical heritage. According to what we know, the large density of remarkable species (plants, birds, odonates in particular) as well as the substantial surface of habitats of community interest in good condition and the quality of aquatic environments, are the major conservation issues. The diagnostic of the management plan for the nature reserve is being currently written. It will clear this challenges issues and should set out the targets to be achieved. They will be the topic of dialogue and validation within the advisory committee of the RNR chaired by the President of Region "Nouvelle Aquitaine". Besides recognition of ecological and landscape site quality at regional level, the gazettement as RNR is a new action framework for experimental measures and pedagogical recovery of heritage." (Author) "The Odonata assemblage is the richest in Limousin, with 45 species recorded, i.e. 66% of the regional assemblage (75% of the known species in Corrèze). Amongst these species, 7 are included in the red list of threatened Odonata in Limousin (SLO, 2006): *Leucorrhinia dubia* is "critically endangered"; *Aeschna juncea*, *Coenagrion hastulatum*, *Somatochlora arctica*, *S. flavomaculata* and *Sympetrum flaveolum* are "endangered"; *Sympetrum danae* is "vulnerable". This exceptional diversity is largely attributed to the habitats of the Chabannes peat bog and its hydraulic annexes, the Oussines peat delta, and the Marcy stream, which is in very good ecological condition." Translated

with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: not stated

**18495.** Cabezas Castillo, M.B.; Grether, G.F. (2018): Why are female color polymorphisms rare in territorial damselflies? *Ethology* 124(9): 667-673. (in English) [Costa Rica "In nonterritorial damselflies, females often come in multiple color morphs, perhaps because females with rare colors experience reduced sexual harassment, and thus have a frequency-dependent fitness advantage, compared to females of the most common color morph, but such polymorphisms are rare in territorial species. We consider three hypotheses to explain the rarity of female color polymorphisms in territorial species: (a) misdirected male aggression, (b) poor male mate recognition, and (c) low mating harassment rates. The first hypothesis has some empirical support, and can account for the absence of andromorphs (i.e., females that resemble males), but does not explain the absence of multiple heteromorphs. We tested the second hypothesis by presenting females of two novel color morphs (green. or red-banded abdomens) to territorial male *Hetaerina capitalis*. Females of both novel color morphs elicited fewer sexual responses than control females, and the red morph occasionally elicited aggressive responses. These results indicate that novel female color morphs would experience reduced mating harassment in this species, contradicting the hypothesis that male mate recognition is too poorly developed to reduce harassment of novel female morphs. By process of elimination, the third hypothesis, that harassment rates are too low in territorial species to provide rare female morphs a fitness advantage, is favored, but remains untested. Our findings also suggest that the common practice of color-marking odonates for behavioral research is likely to interfere with mate choice, as has long been known to be the case in birds." (Authors)] Address: Grether, G.F., Dept Ecology & Evolutionary Biology, University of California Los Angeles, Los Angeles, CA, USA. Email: ggrether@ucla.edu

**18496.** Cao, L.Z.; Yuan, Y.G. (2018): Development of SSR markers based on the head transcriptome of *Pantala flavescens* (Fabricius, 1798) (Odonata: Libellulidae). *International Journal of Odonatology* 21(3-4): 1-7. (in English) ["*P. flavescens* is one of the most common species of dragonflies and has been found throughout from tropic to temperate zones worldwide. In this study, RNA-seq of *P. flavescens* was carried out through Illumina high-throughput sequencing technology. Approximately 37,868 unigenes and 47,188 transcripts were obtained. The average length of the assembled unigenes was 908.59 bp. We identified 1442 cDNA simple sequence repeats (SSRs) among the 37,868 unigenes, with 864 (59.91%) di-nucleotide repeats, 537 (37.32%) tri-nucleotide repeats, 32 (2.22%) complex-nucleotide repeats, and 9 (0.62%) with tetra-nucleotide repeats. Sixty microsatellite molecular markers were randomly selected to test amplification. Of the 60 markers, 32 (53.33%) produced clear amplicons of the expected size, 10 (16.67%) amplified nonspecific products, and 18 (30%) failed to amplify the DNA products. In order to assess their applicability, genetic diversity of the 32 SSR loci was tested



in 32 individuals from Nanchang in China. Of these loci, 14 markers were highly polymorphic, with the observed ( $H_o$ ) and expected ( $H_e$ ) heterozygosities ranged 0.69 to 0.88 and from 0.96 to 0.98 respectively. PIC ranged from 0.52 to 0.83. These highly polymorphic loci will be valuable for the genetic analysis of distinct populations of *P. flavescens*." (Authors)] Address: Cao, L.Z., College of Life Science, Jiangxi Normal University, Nanchang, PR China. Email: clzclz1011-@163.com

**18497.** Carvalho, A.; Pessacq, P. (2018): Chapter 14.1 . Superfamily Aeshnoidea. Thorp and Covich's Freshwater Invertebrates (Fourth Edition). Volume 3: Keys to Neotropical Hexapoda: 367-376. (in English) ["A new key to the identification of mature larvae of the 17 neotropical genera of Aeshnoidea (Insecta: Odonata), including in the families Aeshnidae (15) and Austroptelliidae (2), are proposed. High-resolution photographs are added for illustrate the characters used in all the steps." (Authors)] Address: Pessacq, P., Laboratorio de Investigaciones en Ecología y Sistemática Animal (LIESA), Universidad Nacional de la Patagonia San Juan Bosco, Sarmiento 849, 9200 Esquel, Chubut, Argentina. E-mail: pablopessacq@yahoo.com.ar

**18498.** Carvalho, A.L. (2018): The larval ontogeny of *Coryphaeschna perrensi* (McLachlan, 1887): Supporting monophyletic groups in Aeshnidae dragonflies (Insecta: Odonata: Anisoptera). *Journal of Morphology* 279(9): 1321-1335. (in English) ["The development of the larval external morphology of *C. perrensi* is reported based primarily on a comparison of successive exuviae of reared specimens, with the second stadium larvae first described separately. Accentuated changes observable throughout successive moltings occur in some structures, such as the head capsule, labium, and anal appendages, allowing for the definition of characters with naturally ordered, polarized, and linear states (transformation series) by ontogenetic evidence. The terminal (less general) and nonterminal (more general) states of the described transformation series correspond by primary homology to the conditions found in larvae of other dragonfly species. Consequently, as the result of a parsimony analysis and subsequently ontogenetic rooting, the disposition of the states of 17 characters in a sample of final-stadium larvae of 23 species, representatives of the six Aeshnidae tribes (21) and Austroptelliidae (2), results in a hierarchical network comprising six distinct taxonomic levels of inclusion of *C. perrensi*. The levels correspond to Aeshnidae, Aeshninae, Aeshnini (part) + Gynacanthini, *Coryphaeschna*?+?-*Remartinia*, *Coryphaeschna*, and *Coryphaeschna* except *C. adnexa*, which are groups previously recognized as monophyletic resulting from analyses considering adult morphology. Immature insect morphology coupled with ontogenetic observation presenting great potential to hypothesize phylogenetic relationships and investigate heterochronic events." (Authors)] Address: Carvalho, A.L., Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil.

**18499.** Cavallaro, M.C. (2018): Assessing the effects of

chronic neonicotinoid insecticide exposure on aquatic insects using multiple experimental approaches. PhD thesis. School of Environment and Sustainability, University of Saskatchewan, Saskatoon: XIV + 148 pp. (in English) ["Neonicotinoid insecticides are among the most widely used plant protection products in industrialized agriculture, and are hypothesized to be contributing to losses in non-target insect biodiversity. The lack of toxicological data evaluating the effects of neonicotinoids restricts the ability of regulators to adequately protect sensitive insects particularly those with aquatic larval stages. Many Prairie wetlands are in regions of intensive agriculture and are directly at risk of neonicotinoid contamination and require special considerations to best protect these ecologically important areas. Under laboratory conditions, I compared the effects of imidacloprid, clothianidin, thiamethoxam on the model aquatic insect, *Chironomus dilutus*. Reduced emergence success, advanced emergence timing, and male-biased sex ratios were observed across all compounds tested. Imidacloprid and clothianidin reduced emergence success at similar concentrations whereas thiamethoxam required a concentration an order of magnitude greater to observe similar toxicity. Normalizing the clothianidin and thiamethoxam toxic responses to imidacloprid, I calculated acute (lethality) 14-day toxic equivalency factors (TEFs) for imidacloprid, clothianidin and thiamethoxam as 1.00, 1.05 and 0.14, respectively, and chronic (emergence inhibition) 40-day TEFs as 1.00, 1.62 and 0.11, respectively. To expand upon these single-species laboratory assessments, in situ limnocorral were used to determine the chronic effects of the three neonicotinoids to emerging aquatic insect communities in a Prairie wetland. Imidacloprid and clothianidin treatments had similar community responses and non-biting midge (Diptera: Chironomidae) and damselfly emerged significantly earlier than the controls (18 to 25 days earlier). An additional limnocorral study with clothianidin was inconclusive. While laboratory and limnocorral studies were useful to isolate neonicotinoid effects, multiple anthropogenic stressors were hypothesized to cumulatively influence insect emergence from natural Prairie wetlands surrounded by neonicotinoid-treated canola fields. Multivariate analysis showed neonicotinoid concentration, turbidity, vegetation disturbance and continuity of grasses were significant factors modifying the abundance and composition of emerging insects. Total insect abundance was negatively affected by neonicotinoids ( $\beta \pm S.E. = -0.61 \pm 0.14$ ,  $P < 0.001$ ) but positively affected by vegetation disturbance ( $\beta \pm S.E. = 0.34 \pm 0.11$ ,  $P < 0.001$ ). Collectively, these data suggest more rigorous water quality guidelines and agricultural management strategies are needed to protect aquatic insects and the higher trophic organisms that rely on this important food source. ... *Lestes disjunctus* was the most negatively affected taxon with a species score of -0.34; the remaining odonate taxa species scores were negligible (range from *Enallagma annexum* - 0.02 to *Aeshna interrupta* 0.001)." (Author)] Address: not stated

**18500.** Chari, L.D.; Moyo, S.; Richoux, N.B.; (2018): Trophic ecology of adult male Odonata. II. Dietary contributions

of aquatic food sources. *Ecological Entomology* 43: 15-27. (in English) ["1. Insects that emerge from rivers provide nutritional subsidies to local riparian predators. Adult damselflies and dragonflies often benefit from aquatic resources, but their high mobility and evasiveness have made it difficult to monitor their diets. 2. A dual fatty acid and stable isotope analysis approach was used to investigate the links between Odonata size and behaviour with proportions of their aquatically derived nutritional sources. Additionally, the study investigated the variation in dietary contributions of aquatic food sources to Odonata between two sections of a river, each with different aquatic productivity rates. 3. Variations in body size and foraging method of Odonata in the Kowie River (South Africa) contributed to differences in the contributions of aquatic food sources to their diets. Large Odonata that consumed prey in flight had smaller proportions of aquatic indicator fatty acids and stable isotope-generated proportions of aquatic food sources than did the smaller Odonata that consumed prey from perches. 4. There was a considerable amount of interspecific variation in indicators of aquatic feeding, but Odonata at an upstream site had smaller proportions of aquatic indicators than those at a downstream site which had higher insect emergence rates. 5. The findings of this study contribute information on the dynamics of feeding ecology among adult Odonata, and the substantial contributions of aquatic prey (>80% of total diet in some cases) indicated that cross-boundary trophic linkages via odonates are strong in the Kowie River." (Authors)] Address: Chari, L.D., Dept of Zoology & Entomology, Rhodes University, African Street, Grahamstown, South Africa. E-mail: lenychari@gmail.com

**18501.** Chavez, M.Y. (2018): Wisconsin cranberry marshes support diverse communities of odonate biocontrol agents. MSc. thesis, Entomology and Agroecology, University of Wisconsin-Madison: III, 100 pp. (in English) ["Odonata are abundant generalist predators observed all summer on Wisconsin cranberry marshes and represent a potentially important group of biocontrol agents for a major moth pest of cranberries, *Acrobasis vaccinii*. The success of dragonflies as bio-control agents may be supported by on-site marsh habitats and the composition of the surrounding landscape. This landscape is composed of four major characteristics: cultivated cranberry marshes, forested areas, water bodies, and other (any non-cranberry agriculture, developed land, and wild marshes). We hypothesize that landscape patterns will vary by site, distance from field sites, and in composition of landscape characteristics. Given interspecific variation among odonate taxa, we hypothesize that dragonfly diversity will vary by month, site, and habitat type. We also expect that dragonfly abundance and diversity will be significantly influenced by on-marsh habitat types (cultivated cranberry beds, forest edges, or waterfront areas). Eight cranberry marshes were established as replicate tests of how landscape features may be influencing odonate abundance and diversity. Each marsh was characterized with USDA NASS cropland data layers at radii of 1 and 2 km from the marsh midpoint. Transects were established in each habitat type (i.e., bed, forest, waterfront) within these

sites during the summers of 2016 and 2017. Odonate populations were sampled within each habitat type. The eight surveyed marshes did not vary significantly in their respective proportions of surrounding landscape characteristics, but at both 1 and 2 km radii from the marshes, there was more forest and water habitat than cultivated cranberry acreage. On-site, dragonfly abundance and diversity were highest near water habitats. Dragonfly abundance was highest in June. A total of 6,577 dragonflies were observed, representing 11 taxa. The most common taxa were the following five species: *Epithea spinigera*, *Leucorrhinia frigida*, *L. intacta*, *Ladona julia*, and *Libellula quadrimaculata*. There appears to be no relationship between the surrounding landscape (at 1 or 2 km) and on-site odonate communities. To assess whether the five most abundant odonate species were consuming *A. vaccinii*, gutcontent analyses were conducted using real-time PCR. Consumption of *A. vaccinii* was consistently observed across all sites, sample dates, and among the five most abundant odonates. Thus, the dragonfly communities of Wisconsin cranberries appear to represent biocontrol agents for a major cranberry pest. Growers may benefit from this knowledge by promoting their land stewardship and sustainability practices in an environmentally conscious market." (Author)] Address: not stated

**18502.** Chovanec, A. (2018): Bewertung von Restrukturierungsmaßnahmen an der Ache (Oberösterreich) anhand von Libellen (Odonata) – Anwendung des Konzeptes der biozönotischen Regionen. *Libellula* 37(3/4): 135-160. (in German, with English summary) ["Assessment of regeneration measures at the river Ache (Upper Austria) based on Odonata – application of the Rhithron-Potamon-Concept – The Rhithron-Potamon-Concept explains the changes in species composition along a river's length. These longitudinal zonation patterns are described by biocoenotic regions. In the present paper, this concept is applied to the Austrian dragonfly fauna. Species-specific preferences for the biocoenotic regions are expressed by the allocation of ten valency points per species. A scheme for the assessment of the ecological status of rhithron sections was developed focusing on the definition of rivertype-specific reference Odonata species. In 2017, this method was applied at both a metarhithron stretch and a stretch in the transition zone of metarhithron and hyporhithron of the Ache, a river in Upper Austria. The methodological approach revealed as sensitive – also on a small scale – to detect and evaluate the impacts of regulation and rehabilitation measures as well as potamalisation effects due to impoundment." (Authors)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-Mail: andreas.chovanec@bmnt.gv.at

**18503.** Cordero-Rivera, A.; Vieira, V.; Utzeri, C. (2018): Clonal damselflies (*Ischnura hastata*) are not significantly affected by mite parasitism. *Entomologia Experimentalis et Applicata* 166(7): 583-591. (in English) ["We studied parasitism rate by the terrestrial mite *Leptus killingtoni* Turk (Acari: Erythraeidae) on asexual parthenogenetic damselflies, *Ischnura hastata*, and sexual *Ischnura pumilio* on Pico island (Azores, Portugal). We sampled 52 water bodies on the island

and recorded whether *Ischnura* specimens were parasitized. Half of the water bodies had either dried up or were almost dry or did not have *Ischnura* populations. In the remaining 23 ponds, mite parasitism was extremely low, with only 3.6% of *I. hastata* females bearing one or more mites. *Ischnura pumilio* was rare on the island (61 specimens examined) and had also very few parasites (9.8% parasitism). We examined the biology of the mite and its effects on the host, by studying mite attachment behavior and seasonal abundance, in an intensive study of one pond (Lagoa do Landroal). At this pond, mite prevalence peaked at the start of the sampling period, with 32% of females of *I. hastata* parasitized and decreased continuously until the end of the study, when only 2% were parasitized. The analysis of mark-recapture histories of 1 748 females of *I. hastata* indicates that mites did not affect female survival or recapture rate. Our results suggest that *L. killingtoni* is unlikely to represent a significant selective factor for odonates on the island of Pico, if its density is as low as during the period of our study, although it could be relevant when it is locally abundant or during periods of outbreak." (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Univ. de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**18504.** Díaz Flórez, B.; García, M.P.; Altamiranda-Saavedra, M.; Martínez-Hernández, N. (2018): Estructura poblacional de *Mecistogaster ornata* Rambur 1842 (Odonata: Pseudostigmatidae) en dos fragmentos de bosque seco tropical en el departamento del Atlántico, Colombia. *Bol. cient. mus. hist. nat.* 22(2): 107-131. (in Spanish, with English summary) ["Objective: The variation of the population structure of *M. ornata* was evaluated in two fragments (La Montana and Sarmiento) of Tropical Dry Forest in the Department of Atlántico, Colombia. Scope: To determinate the spatial and temporal variations of *M. ornata* abundance and its relationship with environmental variables, as well as the availability of phytotelmata and the structure of the vegetation. Methodology: 26 samplings were taken (13 per fragment) every 8 days between 8:00 a.m. and 5:00 p.m. (9 hours/man/fragment). A 600 m long and 30 m large area was established per fragment, where 10 points were marked 50 m apart from each other and in this way, 10 stretches with equal length were obtained. Odonata were captured with entomologic nets using a mark and recapture method. On the other hand, environmental temperature, relative moisture, and light intensity were measured in each stretch, as well as the number of phytotelmata and some of their characteristics (height, density, volume) and the structure of the vegetation (density of trees, vegetal cover, basal area and average height). Main results: A total of 90 individuals were captured in La Montana and released (35 ♂, 55 ♀), 40 of which were recaptured (15 ♂, 25 ♀) once or more times. The highest number of captures (19) occurred in sampling 2 carried out in March (7 ♂, 12 ♀). In Sarmiento, 31 individuals were captured and released (14 ♂, 17 ♀). In this fragment, the major number of captures was registered in event 1 carried out in March. Taking into account the sex proportions, in La Montana it was 2:1 (80 ♂, 50 ♀) with significant differences (X<sup>2</sup>=

23.403, p=0.02449), whereas in Sarmiento it was 27 ♂ and 29 ♀ (proportion 1:1) and without differences. With the principal component analysis (PCA), it was determined that the variation in the number of individuals between the places and fragments of sampling, can be explained in 59.76% because of vegetation variables as well as phytotelmata variables. Conclusions: it was established that temperature and light intensity are abiotic factors playing an important role in the temporal dynamics of the abundance of this species in the area of study. Additionally, the non random disposition of plant species and vegetation cover, as well as the height of phytotelmata influence the spatial variation of *M. ornata* in the area." (Authors)] Address: Martínez-Hernández, N., Estudiante de Doctorado en Ciencias-Biología, Univ. Nac. de Colombia-Sede Bogotá. Grupo de Investigación Biodiversidad del Caribe colombiano. Programa de Biología, Fac. de Ciencias Básicas, Univ. del Atlántico. Apartado 1890 Barranquilla, Colombia. E-mail: neyjoosemartinez@gmail.com

**18505.** Dorrington, G.E. (2018): On the scaling of dragonflies. 10th International Micro-Air Vehicles Conference, 22nd-23rd November 2018. Melbourne, Australia: 1-7. (in English) ["Anisopteran dragonfly allometry is discussed. Induced power during hover is found to scale with body mass raised to the ~7/6 power. The possible existence of an upper body mass limit is suggested and a scenario where the maximum load factor for flight manoeuvres decreases with size. Some brief comments are also made about Meganisoptera, bats and birds." (Author)] Address: Dorrington, G.E., School of Engineering, Royal Melbourne Inst. Tech., Bundoora, Australia. E-mail: graham.dorrington@rmit.edu.au

**18506.** Dudaniec, R.Y.; Yong, C.J.; Lancaster, L.T.; Svensson, E.I.; Hansson, B. (2018): Signatures of local adaptation along environmental gradients in a range-expanding damselfly (*Ischnura elegans*). *Molecular Ecology* 27: 2576-2593. (in English) ["Insect distributions are shifting rapidly in response to climate change and are undergoing rapid evolutionary change. We investigate the molecular signatures underlying local adaptation in the range-expanding damselfly, *Ischnura elegans*. Using a landscape genomic approach combined with generalized dissimilarity modelling (GDM), we detect selection signatures on loci via allelic frequency change along environmental gradients. We analyse 13,612 Single Nucleotide Polymorphisms (SNPs), derived from Restriction site-Associated DNA sequencing (RADseq), in 426 individuals from 25 sites spanning the *I. elegans* distribution in Sweden, including its expanding northern range edge. Environmental association analysis (EAA) and the magnitude of allele frequency change along the range expansion gradient revealed significant signatures of selection in relation to high maximum summer temperature, high mean annual precipitation, and low wind speeds at the range edge. SNP annotations with significant signatures of selection revealed gene functions associated with ongoing range expansion, including heat shock proteins (HSP40 and HSP70), ion transport (V-ATPase) and visual processes (long wavelength-sensitive opsin), which have implications for thermal stress response, salinity tolerance and mate discrimination,

respectively. We also identified environmental thresholds where climate-mediated selection is likely to be strong, and indicate that *I. elegans* is rapidly adapting to the climatic environment during its ongoing range expansion. Our findings empirically validate an integrative approach for detecting spatially explicit signatures of local adaptation along environmental gradients." (Authors)] Address: Dudaniec, Rachael, Dept of Biological Sciences, Macquarie Univ., Sydney, NSW, Australia. Email: rachael.dudaniec@mq.edu.au

**18507.** Dwari, S.; Mondal, A.K. (2018): Odonata (Dragonfly and Damselfly) diversity of Howrah District, West Bengal, India. *Advances in Bioresearch* 9(5): 54-65. (in English) ["Continuous survey was carried out on order Odonata of Howrah District, West Bengal, India as no previous exclusive study of District was available. We present a list of 54 Odonata species from this District which contains 35 species of Anisoptera from 4 families and 19 species of Zygoptera from 3 families. ... four species are newly recorded from the area, viz., *Macrogomphus annulatus*, *Orthetrum luzonicum*, *Mortonagrion aborense*, and *Lestes viridulus*. The most dominant family is Libellulidae followed by Coenagrionidae, Aeshnidae and Gomphidae, Lestidae, Platycnemididae and Macromiidae." (Authors)] Address: Dwari, S., Vidyasagar Univ., Plant Taxonomy, Biosystematics & Molecular Taxonomy Lab., Dept of Botany & Forestry, Midnapore-721 102, West Bengal, India. E-mail: saurav.dwari@gmail.com

**18508.** Evangelio Pinach, J.M.; Notario Maroto, C.; Alcaide Gil, M.I. (2018): Nueva localidad de *Oxygastra curtisii* (Dale, 1834) en Castilla-La Mancha (España). *Boletín Rola* n° 12, segundo semestre 2018: 13-18. (in Spanish, with English summary) ["A new locality of the endangered *O. curtisii* is presented from the region of Castilla-La Mancha, the second for the province of Cuenca (Spain)." (Authors)] Address: Evangelio Pinach, J.M., Parotets . Sociedad Odonatológica de la Comunitat Valenciana (Parotets-SOCV). C/ Padre Vicente Cabanes, 5, esc. 2, pta. 12 -46900 Torrent (Valencia), Spain. E-mail: jjevanach@hotmail.com

**18509.** Fischer, I.; Sittenthaler, M.; Traugott, M.; Thauger, B.; Zangl, L.; Koblmüller, S.; Kunz, G.; Chovanec, A.; Sattmann, H.; Randolf, S.; Haring, E. (2018): Extended Abstract: Monitoring and DNA barcoding of dragonflies (Insecta: Odonata) in Vienna, Austria. *Acta ZooBot Austria* 155/2: 39-42. (in bilingual in English and German) [Verbatim: Surveys of dragonfly communities have become an important instrument for characterizing aquatic systems and assessing their ecological state (Samways 1993» Bulankova 1997, Chovanec & Wvrincer 2001, Oertli 2008, McGeoch et al. 2011). »Although dragonflies colonize a wide range of aquatic habitats, many species have specific habitat requirements concerning the morphology, hydrological dynamics and plant communities of their breeding waters and the riparian zones (CORBET 1999, SCHINDLER et al. 2003, Kadoya et al. 2004). In addition to their role as bioindicators, dragonflies are of conservation concern; 56 % of the 78 »Austrian dragonfly species are classified as vulnerable, endangered or critically endangered (Raab 2006). On a Europe-wide scale,

11 of them are listed in the Fauna-Flora-Habitat (FFH) directive by the European Union (KALKMAN et al. 2010). Hence, knowledge on distribution and abundance of these species is of relevance for both water management and conservation issues. Molecular genetic methods have found their way into the field of biomonitoring: Environmental DNA (eDNA) for either single-species detection or for surveying whole species communities (metabarcoding) has proven to be a useful tool in biodiversity research to monitor aquatic organisms, e. g. fish and amphibians (THOMSEN et al. 2012, Valentini et al. 2016, Deiner et al. 2017). However, before setting up standardized protocols for the specific taxonomic group of interest, it is indispensable to evaluate the potential of such methods first (Goldberg et al. 2016). Moreover, the availability of extensive DNA reference databases based on correctly identified voucher specimens is crucial for the successful application of eDNA metabarcoding (TABERLET et al. 2018). In the light of this, a current study titled 'Dragonflies in Vienna; DNA barcoding and survey, with focus on FFH species' includes a combination of traditional fieldwork via observation of imagines and molecular methods. The overall objective of the project is a complete dragonfly species inventory in the rural areas of Vienna with a special focus on two FFH species: *Cordulegaster heros* and *Leucorrhinia pectoralis*. Within the project, species-specific DNA barcodes are generated of collected dragonflies. Further, collecting and barcoding of dragonflies is extended to whole »Austria, to setup a complete DNA reference database or »Austrian dragonfly species within the .Austrian Barcode of Life (.ABOL) initiative. All voucher specimens are stored at the Natural History Museum Vienna. Based on this reference database, a pilot study on eDNA using filtered water samples from four running and six standing water bodies will be carried out. Both, protocols of single-species detection for rare species as well as metabarcoding approaches will be set up. The combination of traditional field surveys and DNA-based methods will allow a direct comparison between species inventories obtained by observation of imagines and detected via eDNA. Within the first project year (2017), 47 species have been recorded in Vienna by observation so far, including both FFH species. »Additionally, the first record of *Leucorrhinia albifrons*, also listed as FFH species, was obtained for Vienna (Fischer et al. 2018). In total, 342 individuals of 51 »Austrian dragonfly species have been collected during the field season in 2017 by sampling in Vienna, Styria and Burgenland. For amplifying the whole DNA barcoding region of the mitochondrial cytochrome c oxidase subunit 1 (COI) gene as well as shorter sections of the gene a new set of Odonata primers has been designed. By now, 162 DNA barcodes have been generated for the .Austrian dragonfly DNA database and the subsequent pilot study on eDNA metabarcoding. The results of this study will contribute to the development and evaluation of eDNA approaches and will reveal their potential as an additional tool for monitoring aquatic macroinvertebrates in modern biodiversity research and habitat quality assessment.] Address: Fischer, Iris, Central Research Laboratories, Museum of Natural History Vienna, Burgring 7,1010 Vienna, Austria. E-mail: iris.fischer@nhm-wien.ac.at



**18510.** Girardin, V. (2018): Source origin of Polycyclic Aromatic Hydrocarbons (PAHs) in sediment, and fate of organic contaminants in dragonfly larvae (Aeshnidae) from highway sedimentation ponds and natural ponds. Master thesis in toxicology. University of Oslo. Department of Biosciences. Faculty of Mathematics and Natural Sciences: X + 87 pp. (in English) ["Road and tunnel wash runoff contain a mixture of organic and inorganic contaminants that threatens the quality of natural water bodies, and the health of the organisms dependent on these waters. A variety of treatment solutions can be established to reduce potential runoff impact. The most common mitigation adopted in Norway is the installation of nature-based sedimentation ponds. A variety of organisms migrate to these ponds over time, and are thus at risk of exposure to high levels of traffic-related contaminants. Dragonflies, with their aquatic life stage, can potentially transfer these substances back to the terrestrial environment. This aim of this study was to assess the source origin and fate of polycyclic aromatic hydrocarbons (PAHs), and two types of organobromine compounds used as flame retardants, polybrominated diphenyl ethers (PBDEs) and hexabromocyclododecane (HBCD) in three natural and seven highway sedimentation ponds in Norway. Sediment samples were used to determine source origin of PAHs. The concentrations of organic contaminants were analyzed in dragonfly larvae to investigate their potential role as pollutant vectors across ecosystems. Parent and alkylated PAHs in sediment were measured, and the results were used to characterize the source of PAHs. Distribution patterns of selected PAHs showed similar patterns in all sedimentation ponds, and distinct patterns in natural ponds. Specific PAH ratios indicated that sedimentation ponds are dominated by petrogenic PAHs, whereas natural ponds showed pyrogenic dominance. Moreover, the addition of alkylated PAHs resulted in significant changes in the environmental quality standard values related to sediment pollution. PAHs, PBDEs and HBCD were quantified in sediment, and larval exuvia and tissue. Haemolymph was also analyzed for PAH metabolites. The results indicated that dragonfly larvae accumulate PAHs in the exuvia, but not sufficiently enough to avoid bioaccumulation. 1-hydroxypyrene was detected only in some of the samples and at very low concentrations, and thus it is not clear whether larvae are able to metabolize PAHs at low levels or if the metabolite has come from others sources. Nevertheless, the results suggest that metabolites are not suitable biomarkers for PAH exposure in dragonfly larvae. Levels of BFRs were detected at very low concentrations, and the results were qualified. Overall, there was no indication of bioaccumulation of BFRs." (Author)] Address: not stated

**18511.** Golfieri, B.; Surian, N.; Hardersen, S. (2018): Towards a more comprehensive assessment of river corridor conditions: A comparison between the Morphological Quality Index and three biotic indices. *Ecological Indicators* 84: 525-534. (in English) ["River management and planning of restoration actions require a detailed analysis of stream conditions. However, most biotic and hydromorphological indices that have been developed for implementing the European Water Framework Directive (WFD) are characterized

by limited spatial and temporal scales of application. In addition, the indices based on the biological quality elements defined by the WFD are sensitive to water quality but not to hydromorphological alterations. To overcome these limitations, alternative hydromorphological and biotic indices have recently been developed. In this study we compared the results obtained with the Morphological Quality Index (MQI) to those of three biotic indices, the Odonate River Index (ORI) and two BQE-based indices, in seven rivers of northern Italy. MQI and ORI resulted highly and significantly correlated, and alterations of river functionality and continuity were the most relevant impacts affecting dragonfly assemblages. Conversely, no significant relationships were found between the MQI and both BQE-based indices and assemblages. The significant correlation between MQI and ORI can be explained by the correspondence of the spatial scale of application (i.e. the whole river corridor). In contrast, the lack of correlation between the BQE-based indices and MQI can probably be attributed to the different spatial scales at which the indices work. The results of this study underline the importance of evaluating the lateral dimension of the river corridor and the need to apply reach-scale indices to achieve a comprehensive evaluation of river corridor conditions and to define appropriate management actions." (Authors)] Address: Golfieri, B., Dept Geosci., Univ. Padova, Via Gradenigo 6, 35131 Padova, Italy. E-mail: bruno.golfieri@unipd.it

**18512.** Grotz, N.; Roß-Nickoll, M.; Schneider, S. (2018): Der Einfluss von Alter, Struktur und Umweltparametern auf Stillgewässer und ihre Besiedlung durch Amphibien und Libellen im Westen und Südwesten Luxemburgs. *Bulletin de la Société des naturalistes luxembourgeois* 120: 77-106. (in German, with English summary) ["Amphibians are among the most endangered animal classes worldwide. One of the major causes for their decline, besides various diseases, is the disappearance and deterioration of their aquatic habitats. To replace at least some of the lost habitats and to maintain and increase amphibian populations, nature conservation organisations create new semi natural ponds in Luxembourg. The aim of the following study was to evaluate the colonization process of ponds of various ages by amphibians as well as other species and to test for a number of variables that may influence colonization and could be important factors to help improve the design and choice of future ponds. The 36 study ponds were situated in the south-western and western parts of Luxembourg. At each site, a survey of the vegetation, amphibians and dragonflies was undertaken. Furthermore, a number of environmental parameters (e.g. age, shape, distance to nearest watercourse or forest, ...) and water analysis (pH, O<sub>2</sub>, temperature, conductivity) were recorded and statistically tested in order to determine the parameters with the most significant influence on the colonization process of the ponds. The study shows that pond age has an effect on a number of the environmental factors. Pond age also directly influences the colonization by dragonflies. Colonization by amphibians, however, was not explained by pond age alone, which in this case seems to be only one of many factors influencing the process. For plants, a clear succession from pioneer communities to more specialized

reed communities was observed. Overall, the study shows a great heterogeneity of the ponds. The heterogeneity is reflected by the colonisation of the ponds. Because of this it is important to create new ponds of different types and especially in groups so that different succession stages are available for the various species during the time." (Authors)] Address: Grotz, Nathalie, 12, rue du puits, L-7475 Schoos, Luxembourg. E-mail: grotz.n@gmail.com

**18513.** Günther, A.; Heise, S.; Held, M.; Jäger, N.; Kipping, J.; Moritz, R.; Schnabel, H.; Voigt, H.; Brockhaus, T. (2018): Neue Nachweise der Zierlichen Moosjungfer *Leucorrhinia caudalis* (Charpentier 1840) in Sachsen und einige Bemerkungen zur Ökologie der Art (Odonata: Libellulidae). Entomologische Nachrichten und Berichte 62(1): 19-25. (in German, with English summary) ["New records of the Dainty White-faced Darter *Leucorrhinia caudalis* (Charpentier 1840) in Saxony with some remarks on the ecology of the species (Odonata: Libellulidae). *Leucorrhinia caudalis* was recorded in Saxony (Germany) since 2005 to 2017 at 11 locations. Most of the records are from pits and ponds in the lower parts of Northern Saxony. The presence of winter green submerged vegetation is most likely essential for successful reproduction and continuous occurrence of the species at a site. The state of submerged vegetation should therefore be considered a relevant factor during the selection of monitoring areas for the species strictly protected under the Habitats Directive." (Authors)] Address: Kipping, J., BioCart Ökologische Gutachten, Taucha/Leipzig, Germany. E-mail: biocartkipping@email.de

**18514.** Hajdukiewicz, H.; Wyzga, B.; Amirowicz, A.; Oglecki, P.; Radecki-Pawlik, A.; Zawiejska, J.; Mikus, P. (2018): Ecological state of a mountain river before and after a large flood: Implications for river status assessment. *Science of the Total Environment* 610–611: 244-257. (in English) ["Assessment of the ecological status of rivers is key to monitoring the achievement of the environmental goal of the EU-Water Framework Directive and the success of restoration projects. In summer of 2009 and 2010, repeated assessments of physical habitat conditions and of fish and benthic invertebrate communities were performed at low-flow conditions in 10 unmanaged and 10 channelized cross-sections of the Bia³a River, Polish Carpathians. Between the two surveys, an 80-year flood occurred, significantly affecting habitat characteristics and river communities. In unmanaged cross-sections, active channel width increased, whereas the degree of cross-sectional variation of flow velocity decreased. In channelized cross-sections, the increase in active channel width and the cross-sectional variation of flow velocity was accompanied by a decrease in bed-material grain size. Before the flood, the unmanaged cross-sections hosted 2.3 times more benthic invertebrate taxa than the channelized ones, whereas after the flood, the number of taxa they supported was so reduced that the taxonomic richness of benthic invertebrate assemblages in both cross-section types became similar. In comparison to pre-flood conditions, the abundance of fish juveniles (YOY) in unmanaged cross-sections was reduced nearly by half;

before the flood they hosted 5 times more juvenile individuals than channelized cross-sections and only twice as many after the flood. Finally, a differing assessment of flood impact on the ecological river quality was obtained with the invertebrate-based BMWP-PL index and the European Fish Index, with the former indicating a significant reduction of the quality in unmanaged cross-sections and the latter pointing to no such change. The results indicate that assessments performed before or after a major flood may yield significantly different results for the quality of abiotic and biotic elements of the river ecosystem. Final assessment should thus be based on repeated surveys to balance the effect of extreme hydrological events." (Authors) *Calopteryx*, sp., *Aeshna* sp., *Cordulegaster* sp., *Corduliidae*, *Platynemis pennipes*] Address: Hajdukiewicz, Hanna, Inst. Nature Conservation, Polish Acad. Sciences, al. Mickiewicza 33, 32-120 Kraków, Poland. E-mail address: hajdukiewicz@iop.krakow.pl

**18515.** Halverson, T.G.; Gill, D.E. (2018): Annual patterns of production in a dragonfly community in western Virginia. *Banisteria* 51: 3-11. (in English) ["The number of dragonflies emerging from five mountain ponds over a four-year period was highly variable and independent for six species. Levels of adult activity were accurate indicators of relative reproductive input to the individual ponds. There was a general lack of concordance between reproductive input and subsequent adult emergence at a pond for three of four species studied, demonstrating the existence of differential egg or larval survival among ponds and years. Emergence and subsequent adult activity were not correlated for two of four species, indicating the existence of among-pond variability in factors affecting adult distributions. *Plathemis lydia* exhibited spatially and temporally stable populations and significant correlations between reproductive input and emergence, and between emergence and subsequent adult activity." (Authors)] Address: Halverson, T.G., Dept Zoology, Univ. of Maryland, College Park, Maryland 20742, USA

**18516.** Haubrock, P.J.; Balzani, P.; Johovic, I.; Inghilesi, A.F.; Nocita, A.; Tricarico, E. (2018): The diet of the alien channel catfish *Ictalurus punctatus* in the River Arno (Central Italy). *Aquatic Invasions* 13(4): 575-585. (in English) ["The North American channel catfish *Ictalurus punctatus* has been widely introduced to Europe, but no in-depth studies on its ecology and potential impacts in the introduced European range have been carried out. In 2016, 248 specimens of *I. punctatus* were collected from the Arno river, Florence (Central Italy), and analysed for their length, weight, size, sex, and stomach contents to assess their diet. Specimens < 30 cm total length (TL) represented the majority of the sampled population. Detritus and phytoplankton dominated the diet, while in larger fish ( $\geq 30$  cm TL) two invasive alien species, the topmouth gudgeon *Pseudorasbora parva* and the red swamp crayfish *Procambarus clarkii*, were dominant prey items. Diet composition of *I. punctatus* significantly varied among size classes, but not between sexes. The results indicate an opportunistic but gape size limited feeding behaviour, suggesting an intra-specific competition avoidance mechanism." (Authors) The diet includes "Odonata".]

Address: Haubrock, P.J., Department of Biology, University of Florence, Via Romana 17, 50125 Florence, Italy. E-mail: Phillip.Haubrock@hotmail.de

**18517.** Hefler, C.; Qiu, H.; Shyy, W. (2018): Aerodynamic characteristics along the wing span of a dragonfly *Pantala flavescens*. *Journal of Experimental Biology* 221 (19): jeb-171199: 14 pp. (in English) ["We investigate the characteristics of inter-wing aerodynamic interactions across the span of the high-aspect-ratio, flexible wings of dragonflies under tethered and free-flying conditions. The effects of the interactions on the hindwings vary across four spanwise regions. (I) Close to the wing root, a trailing-edge vortex (TEV) is formed by each stroke, while the formation of a leading-edge vortex (LEV) is limited by the short translational distance of the hindwing and suppressed by the forewing-induced flow. (II) In the region away from the wing root but not quite up to midspan, the formation of the hindwing LEV is influenced by that of the forewing LEV. This vortex synergy can increase the circulation of the hindwing LEV in the corresponding cross-section by 22% versus that the hindwing in isolation. (III) The region about half way between the wing root and wing tip is there is a transition dominated by downwash from the forewing resulting in flow attached to the hindwing. (IV) An LEV is developed in the remaining, outer region of the wing at the end of a stroke when the hindwing captures the vortex shed by the forewing. The interaction effects depend not only on the wing phasing, but also the flapping offset and flight direction. The aerodynamics of the hindwings vary substantially from the wing root to the wing tip. For a given phasing, this spanwise variation in the aerodynamics can be exploited in the design of artificial wings to achieve greater agility and higher efficiency." (Authors)] Address: Qiu, H., Dept of Mechanical & Aerospace Engineering, The Hong Kong Univ. Science & Technology, Clear Water Bay, Kowloon, Hong Kong SAR, China. E-mail: meqiu@ust.hk

**18518.** Heinloth, T.; Uhlhorn, J.; Wernet, M.F. (2018): Insect responses to linearly polarized reflections: Orphan behaviors without neural circuits. *Front. Cell. Neurosci.* | doi: 10.3389/fncel.2018.00050 : 13 pp. (in English) ["The e-vector orientation of linearly polarized light represents an important visual stimulus for many insects. Especially the detection of polarized skylight by a growing number of many navigating insect species is known to improve their orientation skills. While great progress has been made towards describing both the anatomy and function of neural circuit elements mediating behaviors related to navigation, relatively little is known about how insects perceive non-celestial polarized light stimuli, like reflections off water, leaves, or shiny body surfaces. Work on different species suggests that these behaviors are not mediated by the 'Dorsal Rim Area', a specialized region in the dorsal periphery of the adult compound eye, where ommatidia contain highly polarization-sensitive photoreceptor cells whose receptive fields point towards the sky. So far, only few cases of polarization-sensitive photoreceptors have been described in the ventral periphery of the insect retina. Furthermore, both the structure and function of those neural circuits connecting to these

photoreceptor inputs remain largely uncharacterized. Here we review the known data on non-celestial polarization vision from different insect species (dragonflies, butterflies, beetles, bugs, and flies) and present three well-characterized examples for functionally specialized non-DRA detectors from different insects that seem perfectly suited for mediating such behaviors. Finally, using recent advances from circuit dissection in *Drosophila melanogaster*, we discuss what types of potential candidate neurons could be involved in forming the underlying neural circuitry mediating non-celestial polarization vision." (Authors)] Address: Wernet, M.F.; Freie Universität Berlin, Biology, Fachbereich Biologie, Chemie & Pharmazie, Koenigin-Luise Str. 1-3, Berlin, 14195, Berlin, Germany. E-mail: mathias.wernet@fu-berlin.de

**18519.** Holtmann, L.; Juchem, M.; Brüggeshemke, J.; Möhlmeier, A.; Fartmann, T. (2018): Stormwater ponds promote dragonfly (Odonata) species richness and density in urban areas. *Ecological Engineering* 118: 1-11. (in English) ["Highlights: •Determine the importance of stormwater ponds for dragonflies in urban areas. •Strong differences in environmental conditions between stormwater and control ponds. •Overall species richness greater at stormwater ponds than at control ponds. •Higher species richness and densities of threatened species. •High habitat quality of stormwater ponds compensated for low landscape quality. Abstract: The loss of global biodiversity is one of the major challenges of our time and urbanisation is seen as a main cause of this. The aim of this study was to determine whether artificial stormwater ponds, designed to control water flow, can act as refuges for Odonata in urban areas. Moreover, we analysed the influence of habitat and landscape quality on dragonfly species richness and density of 35 stormwater ponds (STOPON) in comparison to 35 control ponds (CONTROL). Our study revealed significant differences in environmental conditions between STOPON and CONTROL. At the habitat level, STOPON were larger, had a warmer microclimate, and lower concentrations of phosphate. STOPON were predominantly situated in suburbs, while CONTROL occurred mostly in rural areas. Accordingly, at the landscape level, STOPON had greater cover of built-up area as well as a lower cover of arable land and woodland. In line with this, the dragonfly assemblages at STOPON and CONTROL differed. Overall species richness was greater at STOPON than at CONTROL, and indicator species were only identified for STOPON. Especially threatened species benefited from STOPON, having higher species richness as well as higher adult and exuviae densities than CONTROL. In conclusion, our study shows that stormwater ponds in urban areas play an important role in the conservation of dragonflies in general and threatened species in particular. At STOPON, as a result of regular management, the habitat quality was high and compensated for the low landscape quality stemming from significant urbanisation effects." (Authors)] Address: Joltmann, Lisa, Dept Biodiversity & Landscape Ecology, Osnabrück Univ., Barbarastr. 11, 49076 Osnabrück, Germany. E-mail address: liholtmann@uni-osnabrueck.de

**18520.** Honckar, H. Yu.; Verves, Yu. G.; Gaponova, L. P.;

Dubrovskiv, Yu. V.; Koniakiu, S. M.; Kostenko, O. G.; Kotenko, A. G.; Kumpanenko, O. S.; Stukaliuk, S. V. (2018): Preliminary list of invertebrates of the local landscape 'Theophania'. The Kharkov Entomol. Soc. 26(1): 11-49. (in Ukrainian, with Russian and English summaries) ["An annotated list of the 509 species of invertebrates known to occur on territory of the local landscape 'Theophania' and its park zone is provided. The list includes 9 species of ciliate (Ciliophora), 20 species of flatworms (Platyhelminthes), 10 species of mollusks (Mollusca), and 470 species of arthropods, of them 29 species of crustaceans and 441 species of insects. The most species-rich insect orders of the boundary are Hymenoptera (214 species), Diptera (117 species), Lepidoptera (54 species), and Coleoptera (32 species). Some characteristics (habitat, area of distribution within the local landscape boundaries) are given for each species. For the territory of the local landscape 'Theophania' 12 species of insects, included in the 'Red Book of Ukraine', were recorded: *Calopteryx virgo*, *Anax imperator*, ..."] (Authors)] Address: not stated

**18521.** Hossie, T.J.; MacFarlane, S.; Clement, A.; Murray, D.L. (2018): Threat of predation alters aggressive interactions among spotted salamander (*Ambystoma maculatum*) larvae. *Ecology and Evolution* 8(6): 3131-3138. (in English) ["Intraspecific aggression represents a major source of mortality for many animals and is often experienced alongside the threat of predation. The presence of predators can strongly influence ecological systems both directly by consuming prey and indirectly by altering prey behavior or habitat use. As such, the threat of attack by higher level predators may strongly influence agonistic interactions among conspecifics via non-consumptive (e.g., behaviorally mediated) predator effects. We sought to investigate these interactions experimentally using larval salamanders (*Ambystoma maculatum*) as prey and dragonfly nymphs (*Anax junius*) as predators. Specifically, we quantified salamander behavioral responses to perceived predation risk (PPR) from dragonfly nymphs and determined the degree to which PPR influenced intraspecific aggression (i.e., intraspecific biting and cannibalism) among prey. This included examining the effects of predator exposure on the magnitude of intraspecific biting (i.e., extent of tail damage) and the resulting change in performance (i.e., burst swim speed). Salamander larvae responded to PPR by reducing activity and feeding, but did not increase refuge use. Predator exposure did not significantly influence overall survival; however, the pattern of survival differed among treatments. Larvae exposed to PPR experienced less tail damage from conspecifics, and maximum burst swim speed declined as tail damage became more extensive. Thus, escape ability was more strongly compromised by intraspecific aggression occurring in the absence of predation risk. We conclude that multitrophic indirect effects may importantly modulate intraspecific aggression and should be considered when evaluating the effects of intraspecific competition."] (Authors)] Address: Hossie, T.J., Dept Biol., Trent Univ., Peterborough, ON, Canada. Email: thossie@trentu.ca

**18522.** Huang, D.; Cai, C.; Nel, A. (2018): New damsel-

dragonflies with "calopterygid"-like wing shape from the Middle Jurassic of China (Odonata: Isophlebioidea: Camptero-phlebiidae). *Geobios* 51(3): 181-186. (in English) ["The new damsel-dragonflies *Zygokaratawia incompleta* nov. sp. and *Parazygokaratawia azari* nov. gen., nov. sp., closely related to the camptero-phlebiid genus *Zygokaratawia*, are described from the Middle Jurassic locality of the Daohugou and Chentaizi villages, respectively (Ningcheng County, Inner Mongolia, NE China). *Parazygokaratawia* nov. gen. and *Zygokaratawia* share a narrowly reduced cubito-anal area, unique synapomorphy in the Isophlebioptera. Camptero-phlebiids with this character are only known from the Daohugou biota."] (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, 75005 Paris, France. Email: anel@cimrs1.mnhn.fr

**18523.** Husson, S.J.; Limin, S.H.; Adul, Boyd, N.S.; Brousseau, J.J.; Collier, S.; Cheyne, S.M.; D'Arcy, L.J.; Dow, R.A.; Dowds, N.W.; Dragiewicz, M.L.; Ehlers Smith, D.A.; Iwan, Hendri; Houlihan, P.R.; Jeffers, K.A.; Jarrett, B.J.M.; Kulu, I.P.; Morrogh-Bernard, H.C.; Page, S.E.; Perlett, E.D.; Purwanto, A.; Ripoll Capilla, B.; Salahuddin; Santiano; Schreven, S.J.J.; Struebig, M.J.; Thornton, S.A.; Tremlett, C.; Yeen, Z.; Harrison, M.E. (2018): Biodiversity of the Sebangau tropical peat swamp forest, Indonesian Borneo. *Mires and Peat* 22, Article 05: 1-50. (in English) ["The importance of Southeast Asia's tropical peat swamp forests for biodiversity is becoming increasingly recognised. Information on species presence within peatland areas is scant, however, limiting our ability to develop species conservation strategies and monitor responses to human activities. We compile species presence records for the Sebangau forest in Indonesian Borneo since 1993 and present the most complete Bornean PSF biodiversity inventory yet published. Including morpho-species that are likely to represent true species, this list comprises 215 tree, 92 non-tree flora, 73 ant, 66 butterfly, 297 spider, 41 Odonata, 55 fish, 11 amphibian, 46 reptile, 172 bird and 65 mammal taxa. Of these, 46 species are globally threatened and 59 are currently protected in Indonesia; 22 vertebrate species are Borneo endemics. Because our sampling is both biased and incomplete, the true number of species found at this site is likely to be much higher. Little is known about many of these taxa in Sebangau and peat swamp forests elsewhere. Many of these species are considered forest dependent, and the entire community is expected to be important for maintaining the resilience of the peat swamp forest ecosystem and the environmental services that it provides. This highlights the need for urgent conservation of Sebangau and its diverse biological community."] (Authors)] Address: Dow, R.A., 6 Bramley Av., Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**18524.** Ilich Mauseth, M (2018): Designs for dragonflies: Odonata diversity in Oslo, Norway. M.Sc. thesis, Science in Ecology, Environmental Sciences and Natural Resource Management, Norwegian University of Life Sciences, Ås : 94 pp. (in English) ["This study establishes that Odonata breed in freshwater habitats in the Oslo urban region. It also identifies elements that could be adjusted to support greater Odonata diversity in the municipality. This was grounded in



an awareness of the species conservation potential of cities, the "flagship" status of dragonflies as a species group, and a desire to enhance the quality of wildlife experiences of urban dwellers. It includes both pond habitat variables and human behaviour. An index tool was developed to evaluate the habitat variables of the surveyed ponds, and statistical analysis was conducted to ascertain if there was a correlation between habitat quality scores, and the presence of Odonata larvae." (Author)] Address: not stated

**18525.** Islam, S.U.; Qasim, M.; Ali, H.; Islam, W.; Arif, M.; Dash, C.K.; Lin, W.; Du, Z.; Wu, Z. (2018): Genetic diversity of the families Aeshnidae, Gomphidae and Libellulidae through COI gene from South China. *Acta Tropica* 185: 273-279. (in English) ["Highlights: • The present study had covered the region of South-China, which presented 16 species from three families. • Cytochrome oxidase subunit I (COI) was used to identify all species. • Trithemis genus presented maximum genetic divergence (18.69%) from all collected samples. • Maximum diversity was recorded from the sequences of Orthetrum genus. • Trithemis genus was dominated in the entire collection, with 28 sequences. Abstract: Adult dragonflies (Anisoptera) were collected from different localities of South China covering eight provinces. Representative sequences were sixty-one, including 16 species, 11 genera and three families (Aeshnidae, Gomphidae and Libellulidae), under cytochrome oxidase subunit I (COI) gene. After alignment of sequences by BioEdit v6, genetic interaction and divergence were computed by MEGA 7 whereas all the indices of genetic diversity were calculated by DnaSP v5 software. Phylogenetic trees were constructed through Neighbor-Joining method under Jukes-Cantor model, and all species of respective families were assembled with each other into individual groups. Maximum divergence was observed by Trithemis genus (18.69%), followed by Orthetrum genus (18.16%), whereas a minimum value of divergence was noted for Pantala genus (0.31%). On the other hand, maximum genetic diversity was recorded for Orthetrum genus up to 142 mutations, followed by Trithemis genus (126 mutations), while the minimum value (two mutations) was observed for Pantala genus. Genetic diversity for overall and Libellulidae family sequences was much higher, up to 404 mutations and 344 mutations, respectively. Current results suggest a high diversity of odonates in the South China region and results are valuable in gaining a total obligation of the diversity of Asian odonates and conservation measures of this insect group." (Authors)] Address: Islam, S.U., State Key Lab. of Ecol. Pest Control for Fujian & Taiwan Crops, Fuzhou, China

**18526.** Jankowska, B. (2018): Pierwsze stwierdzenie *Somatochlora alpestris* (Selys, 1840) (Odonata: Corduliidae) w Pieninach - First record of *S. alpestris* in Pieniny Mountains. *Odonatrix* 144 (2018): 2 pp. (in Polish, with English summary) ["One hunting imago of *S. alpestris* was observed on 10.07.2016 in the Szopczański Ravine (S Poland, Pieniny Mts., Pieniński National Park, UTM: DV57). It is the first record of this sp. in this mountain range. There are no habitats suitable for *S. alpestris* in this region that is why the observed specimen probably came from another area. Tatra Mts.

and their foot-hills are the most likely sources of the population of that species." (Author)] Address: Jankowska, Bogusława, ul. Przyjemna 8/1, 40-470 Katowice, Poland. E-mail: berta01@interia.pl

**18527.** Jinguji, H.; Ohtsu, K.; Ueda, T.; Goka, K. (2018): Effects of short-term, sublethal fipronil and its metabolite on dragonfly feeding activity. *PLoS ONE* 13(7): e0200299. 22 pp. (in English) ["Dragonflies, *Sympetrum* spp., are indispensable to agriculture and are a central element of culture in Japan. However, *S. frequens* populations in rice paddy fields have declined in recent decades. Dragonfly larvae are predatory aquatic insects that feed on other organisms found in habitats with slow-moving or standing water. The increasing use of fipronil and neonicotinoid insecticides in agriculture is also increasing exposure to *Sympetrum* spp. in larval stages through paddy soil and water. The role of fipronil insecticides in the decline of dragonflies is of concern, and we here examine the sublethal effects of this insecticide on the feeding behaviors of two *Sympetrum* spp. Based on the quantity of prey items consumed and the time to capture prey items, feeding inhibition was determined to be a potential mechanism of the decline of *Sympetrum* spp. following 48-h exposure to fipronil and fipronil sulfone. Prey consumption by *S. infuscatum* was significantly reduced for fipronil sulfone at all concentrations (0.01–1000 µg/L). *S. frequens* exposed to 1, 10, 100 and 1000 µg/L fipronil sulfone had significantly longer prey capture times. Fipronil sulfone was 2.8, 9.7 and 10.5 times more toxic to *S. infuscatum* than fipronil in terms of acute toxicity, feeding inhibition and delayed toxicity, respectively. In addition, fipronil sulfone was 6.6, 2.9 and 9.1 times more toxic, respectively, to *S. frequens* than fipronil. Our findings suggest that sublethal effects on feeding inhibition lead to severe mortality at realistic paddy soil and water concentrations. Our results provide the first demonstration that short-term exposure to fipronil and fipronil sulfone can consequently cause significant harm to dragonfly larvae survival due to feeding inhibition. These findings have implications for current pesticide risk assessment and dragonfly protection." (Authors)] Address: Jinguji, H., School of Food, Agricultural and Environmental Sciences, Miyagi University, Sendai, Miyagi, Japan. E-mail: Jinguji@myu.ac.jp

**18528.** Karlsson, T. (2018): Grön flodtrollsända *Ophiogomphus cecilia* i Pite älv – inventering inom biogeografisk uppföljning 2018. Länsstyrelsen Östergötland, rapport 2018:13: 30 pp. (in Swedish, with English summary) ["The member countries in the European Union are obliged to report the conservation status for species listed in the Habitat directive every 6th year. To gather information about population sizes and trends for the species in Sweden, the County Administrative Board of Östergötland has been assigned by the Swedish Environmental Protection Agency to coordinate monitoring of dragonflies (Odonata) and diving beetles (Dytiscidae) listed in the Habitat directive in Sweden. This report presents a survey of *O. cecilia* in the river Piteälven. *O. cecilia* is in Sweden restricted to a few rivers in the very northeastern part. It is red listed as "Near threatened" in Sweden due to small distribution area. *O. cecilia* was searched

for as exuviae and imago at 17 localities in Piteälven from the river mouth and 100 km upstream. The survey was performed during the period 1-2 August 2018. The species could for the first time ever be found in Piteälven. Exuviae of the species were observed at five localities between Sikfors in the south and Vidsel in the north. No imago were observed despite sunny and very warm weather. The survey demonstrates that searching for exuviae is the best method for detecting the species in Sweden. The difficulty to observe imagos of the species indicates that it has a wider distribution in Sweden than previously known. Some of the surveyed localities in Piteälven should be monitored continuously. The distribution in northern Sweden of other species in the family Gomphidae was studied. *Gomphus vulgatissimus* is not recorded in this area, while there are five records of *Onychogomphus forcipatus* as larvae. Furthermore, *O. forcipatus* is reported from the province Norrbotten in some literature. Four of records have been checked out, but showed to be misidentified larvae. The occurrence of *O. forcipatus* in Norrbotten could neither be confirmed nor denied." (Author)] Address: Karlsson, T., Opphems-gatan 2, 58237 Linköping, Sweden. E-mail: tommy.karlsson@e.lst.se

**18529.** Karlsson, T. (2018): Biogeografisk uppföljning av grön mosaikslända *Aeshna viridis* – inventering och metodiktest 2017. Report, Swedish Environmental Protection Agency: 14 pp. (in Swedish, with English summary) ["The member countries in the European Union are obliged to report the conservation status for species listed in the Habitat directive every 6th year. To gather information about population sizes and trends for the species in Sweden, the Swedish Environmental Protection Agency funds "Biogeographical monitoring". The County Administrative Board of Östergötland has been assigned to coordinate the biogeographical monitoring of Odonata and diving beetles (Dytiscidae) listed in the Habitat directive in Sweden. This report aims to function as a basis document for a national monitoring programme for the dragonfly *Aeshna viridis*. The species is mainly restricted to waters with the plant *Stratiotes aloides*, where it lays its eggs and where the larvae lives. It is red listed as "Near threatened" at the European and EU-level, and listed in the annex 4 in the Habitat directive. In Sweden it is red listed as "Least concerned", but is considered to have unfavourable conservation status. During 2017 a survey was performed which aimed to test netting for larvae as survey method and to search for the species at new potential sites. The species was surveyed at 20 sites with *S. aloides* along the northern Baltic coast and in the middle east Sweden. *A. viridis* was found at nine localities of which five were previously unknown. One of these is of special interest since it together with other recent observations indicates that the species have a wider distribution in northern Sweden than previously known. The survey shows that netting for larvae is an appropriate method for monitoring *A. viridis* in Sweden. The larva is quite easy to identify and big advantages with surveying larvae compared to adults is that it is not dependent of the weather and that records of larvae confirm reproduction of the species. A suitable sample design for biogeographical monitoring of *A. viridis* in Sweden would be to

select a number of localities from a previous study of the species (Anderson et. al. 2016) and survey these once every 6 year-period." (Author)] Address: Karlsson, T., Opphems-gatan 2, 58237 Linköping, Sweden. E-mail: tommy.karlsson@e.lst.se

**18530.** Kassner, Z.; Ribak, G. (2018): Role of side-slip flight in target pursuit: blue-tailed damselflies (*Ischnura elegans*) avoid body rotation while approaching a moving perch. *Journal of Comparative Physiology A* 204(6): 561-577. (in English) ["Visually guided flight control requires processing changes in the visual panorama (optic-flow) resulting from self-movement relative to stationary objects, as well as from moving objects passing through the field of view. We studied the ability of the blue-tailed damselfly, *Ischnura elegans*, to successfully land on a perch moving unpredictably. We tracked the insects landing on a vertical pole moved linearly 6 cm back and forth with sinusoidal changes in velocity. When the moving perch changed direction at frequencies higher than 1 Hz, the damselflies engaged in manoeuvres that typically involved sideways flight, with minimal changes in body orientation relative to the stationary environment. We show that these flight manoeuvres attempted to fix the target in the centre of the field of view when flying in any direction while keeping body rotation changes about the yaw axis to the minimum. We propose that this pursuit strategy allows the insect to obtain reliable information on self and target motion relative to the stationary environment from the translational optic-flow, while minimizing interference from the rotational optic-flow. The ability of damselflies to fly in any direction, irrespective of body orientation, underlines the superb flight control of these aerial predators." (Authors)] Address: Ribak, Gal, 2. Sagol School of Neuroscience, Tel Aviv University, Tel Aviv, Israel

**18531.** Khelifa, R.; Zebba, R. (2018): Rediscovery of the regionally critically endangered dragonfly *Lindenia tetraphylla* in Northeast Algeria after 170 years of apparent absence (Odonata: Gomphidae). *Notulae odonatologicae* 9(2): 50-54. (in English) ["In 2018 we rediscovered *L. tetraphylla* in the El Kala National Park, Northeast Algeria, after 170 years with no record. A total of ten individuals were observed in the Ramsar listed Lac Noir along with dense populations of the regionally threatened *Urothemis edwardsii* and *Acisoma inflatum*. These findings suggest that Lac Noir, which suffered from major fire almost 30 years ago, has relatively recovered." (Authors)] Address: Rassim Khelifa, R. Dept of Evolutionary Biology & Environmental Studies, University of Zürich, Winterthurerstr. 190, 8057 Zürich, Switzerland. E-Mail: rassimkhelifa@gmail.com

**18532.** Kipping, J.; Petzold, f., Ngoulou, C. (2018): Dragonfly and damselfly (Insects: Odonata) inventory of the Réserve Naturelle des Gorilles de Lésio-Louna (RNGLL) on the Batéké Plateau in the Republic of Congo. *International Dragonfly Fund-Report* 126: 1-36. (in English, with French summary) [We present records of 99 Odonata species from the Réserve Naturelle des Gorilles de Lésio-Louna (RNGLL) in the Republic of Congo (Congo-Brazzaville) collected during

a short survey from 14 January to 01 February 2017. It is the first systematic Odonata inventory for the RNgLL and for the Congolese part of the species-rich Batéké Plateau. A short introduction is given about the existing knowledge of dragonflies and damselflies from the country. Amongst the recorded species eight are new for the country list, raising it to at least 208 species. Some of the recorded species are endemic and characteristic for sandy streams and rivers of the Batéké Plateau. The potential diversity of the plateau in comparison to other regions of the country is discussed." (Authors)] Address: Kipping, J., BioCart Ökologische Gutachten, Albrecht-Dürer-Weg 8, 04425 Taucha/Leipzig, Germany. E-mail: biocartkippping@web.de

**18533.** Kisa Mencütekýn, Y.; Hacet, N. (2018): Diversity and distribution of Odonates of the Meriç delta wetland in Turkish Thrace, with a new record for the region. *J. Entomol. Res. Soc.* 20(3): 105-115. (in English) ["This study was performed in the Meriç Delta located in the Edirne province of the Turkish Thrace Region in order to reveal the diversity and distributions of odonates in the delta wetlands. Samplings were performed from spring to autumn in 2014 and 2015 in different wetland localities represented by lagoons, lakes and a river. A total of 30 Odonata species were recorded during the study, of which *Libellula quadrimaculata* is a new record for both the study area and Turkish Thrace. In addition, *Calopteryx splendens*, *Lestes dryas*, *L. macrostigma*, *Coenagrion puella*, *C. pulchellum*, *C. scitulum*, *Enallagma cyathigerum*, *Ischnura pumilio*, *Aeshna affinis*, *A. isocetes*, *Anax imperator*, *Lindenia tetraphylla*, *Libellula depressa*, *L. fulva*, *Orthetrum brunneum* and *Sympetrum meridionale* are the species determined to be new records for the Meriç Delta wetland. While the Odonata fauna of the Meriç Delta was represented so far by 14 species, this number increased to 31 with the addition of 17 new species during this study. The diversity of the Odonata species recorded in the delta and their conservation categories according to the Red List criteria of the World Conservation Union (IUCN) are also considered." (Authors)] Address: Kisa Mencütekýn, Yurdagül, Dept of Biology, Fac. Science, Trakya Univ., 22030 Edirne, Turkey. E-mail: yurda\_gul52@hotmail.com

**18534.** Klostermann, L. (2018): Kartierung von Libellen und Entwicklung eines Pflegekonzeptes zur optimalen Lebensraumentwicklung der neu angelegten Gewässer auf der Fläche der Deichrückverlegung Langenlonsheim. Mapping of dragonflies and elaboration of a management concept for optimal habitat development of the new created water bodies on the area of the dike relocating Langenlonsheim. BSc. thesis, Department 1 – Life Sciences & Engineering, Univ. of Applied Sciences Bingen: 92 pp. (in German, with English summary) ["In the course of flood protection on the Nahe river, a retention area was created 3 years ago on a former arable land as part of the dike relocating Langenlonsheim. New water bodies were created in order to promote habitat connectivity. The paper presented deals with the dragonfly colonisation of these waters. Small waters were completely scanned for dragonflies and their exuvias while larger ones were mapped by transects. The occurring dragonfly species and

their number of individuals were gathered by abundance classes. The investigations showed that all water bodies were populated by dragonflies. Silt up waters showed less numbers of individuals as waters of earlier successional stages. A high diversity of differently structured water bodies benefits a high diversity of dragonfly species, including species classified as near-threatened. Based on the habitat requirements of the occurring endangered dragonfly species, a management concept was developed for all water bodies. This includes the restoration of earlier successional stages as well as the creation of periodically water-bearing areas." (Author)] Address: Klostermann, Lisa, Rheinstr. 16, 55424 Münster-Sarmsheim, German

**18535.** Kömer, A.; Rieckh, C.; Holzinger, W.E. (2018): Die Vogelazurjungfer (*Coenagrion ornatum*) am Laabach (Grazer Feld, Steiermark): Bestandsgröße und Biologie einer EU-geschützten Libellenart. *Entomologica Austriaca* 25: 145-155. (in German) [The Laabach is an approx. 9.4 km long stream in the southern Graz field. It is the site of what is probably Austria's most important occurrence of the protected European species *C. ornatum*. As part of a Master's thesis, data on the biology of the species was collected at this water body in early summer 2017 and the population size was estimated. For this purpose, selected stretches of the watercourse were walked in a two-day rhythm from 11 May to 17 July and all individuals of *C. ornatum* encountered were individually marked and recorded. In addition, data on diurnal activity at the watercourse were recorded. In total, about 1,800 individuals were observed on 35 days and 732 individuals (538 males, 194 females) were marked. The total population amounts to several thousand individuals, although only relatively short sections of the stream are more densely populated. The occurrence of the species depends largely on the water flow of the stream and the presence of submerged vegetation. The phenomena known from the literature of the very short diurnal occurrence at the breeding site and the equally short flight time of the species could be confirmed. Translated with www.DeepL.com/Translator (free version)] Address: Rieckh, Christina, Institut für Zoologie der Karl-Franzens-Univ. Graz, Universitätsplatz 2, 8010 Graz, Austria. E-Mail: christina.rieckh@edu.uni-graz.at

**18536.** Korkeamäki, E.; Elo, M.; Sahlén, G.; Salmela, J. (2018): Regional variations in occupancy frequency distributions patterns between odonate assemblages in Fennoscandia. *Ecosphere* 9(4) e02192. doi:10.1002/ecs2.2192: 15 pp. (in English) ["Odonate (damselfly and dragonfly) species richness and species occupancy frequency distributions (SOFD) were analysed in relation to geographical location in standing waters (lakes and ponds) in Fennoscandia, from southern Sweden to central Finland. In total, 46 dragonfly and damselfly species were recorded from 292 waterbodies. Species richness decreased to the north and increased with waterbody area in central Finland, but not in southern Finland or in Sweden. Species occupancy ranged from 1 up to 209 lakes and ponds. Over 50% of the species occurred in < 10% of the waterbodies, although this proportion decreased to the north. In the southern lakes and ponds,

none of the species occurred in all lakes, whereas in the north many species were present in all of the studied waterbodies. The dispersal ability of the species did not explain the observed species occupancy frequencies, but generalist species with a large geographical range occurred in a higher percentage of the waterbodies. At Fennoscandian scale, we found that the unimodal satellite pattern was predominant. However, at smaller scale, we found geographical variations in odonate species SOFD patterns. The most southern communities followed the unimodal satellite-dominant pattern, whereas in other regions communities fitted best with the bimodal core- satellite patterns. It seems that the richer species pool in the southern locations, and the larger distribution range of the northern species, skewed the unimodal pattern into a bimodal satellite dominant pattern." (Authors)] Address: Korkeamäki, E., Karkunkatu 18 a 4 b, FIN-48600 Karhula, Finland.

**18537.** Kosterin, O.E.; Chartier, G. (2018): More Odonata found at the Cardamonean foothills in Koh Kong Province of Cambodia in 2014-2018. IDF-Report 123: 1-21. (in English) ["Still unpublished data on Odonata of the coastal foothills of the Cardamom Mts. in Koh Kong Province, SW Cambodia obtained in 2014-2018 are provided. *Tetrathemis flavescens* Kirby, 1889 is for the first time reported for Cambodia and *Risiphlebia guentheri* Kosterin, 2015 for SW Cambodia. The photographic records from this area of *Gynacantha basiguttata* Selys, 1882, *Gynacantha demeter* Ris, 1911, *Heliaeschna crassa* Krüger, 1899, *Amphithemis curvistyla* Selys, 1891 and *Pomothemis serrata* Krüger, 1902 have been confirmed by specimens. The known local faunas of two neighbouring rivulets in Koh Kong Province, rich in Odonata, are updated and summarised." (Authors)] Address: Chartier, G., Koh Andet Village, Tatai Commune, Koh Kong Province, Cambodia. Email: gee@tataiwildlife.info

**18538.** Langbroek, M. (2018): A new record of the damselfly *Palaiargia ernstmayri* (Odonata: Platycnemididae) in the Arfak mountains of New Guinea. *Notulae odonatologicae* 9(1): 1-5. (in English) ["This contribution reports and photographically documents a sighting of the little known damselfly *Palaiargia ernstmayri*. A mature male was seen and photographed by the author on 31-vii-2016 in the Arfak Mountains of Western New Guinea, Indonesia. To the author's knowledge this is only the fourth reported sighting of the species, and the second since its formal description by Lieftinck in 1972. All four reports since 1928 come from a 50 by 25 km area in the northeastern part of the Arfak mountains." (Author)] Address: Langbroek, M., Zusterhof 12, 2311 RK Leiden, the Netherlands; libellen@langbroek.org

**18539.** Lhundup, K.; Dorji, U. (2018): Macro-invertebrate diversity and its relationship with environmental variables in Adha Lake between monsoon and post-monsoon seasons. *Bhutan Journal of Natural Resources & Development* 5(1): 13-24. (in English) ["Lentic water bodies are amongst the most threatened wetland habitat types as anthropogenic disturbances have significantly influenced the structure and function of aquatic ecosystems. This study compared the

seasonal variations of macro-invertebrate diversity and analysed the physiochemical parameters to study the influence of surrounding land use on the lentic ecosystem of Adha Lake. Macro-invertebrate abundance in the lake was used as an indicator to assess the effect of surrounding land use. The lake was categorised into four major zones namely agriculture zone, forest east zone, catchment zone, and forest west zone. Sampling was carried out along the littoral zone of the lake. Physio-chemical variables were collected for both the seasons. Chironomidae and Baetidae families were the most dominant macro-invertebrates in the lake. The least families encountered were Acrididae, Aeshnidae, Tabanidae, Hydrophilidae, and Libellulidae during monsoon season, and Simuliidae and Culicidae for post-monsoon season. There was no significant difference in Shannon Wiener's Diversity Index for monsoon and post-monsoon seasons,  $p > .05$ . pH, salinity, conductivity, total dissolved solid, and water temperature had negative correlation with diversity and richness; however, total dissolved solid, water temperature, and pH had positive association with taxon evenness. The HKH-bios index and NHBL index indicated that the lake is polluted which could be attributed to discharge from the paddy fields. Restoration and protection of Adha Lake as White-bellied heron's habitat may need significant conservation and advocacy measures." (Author)] Address: Dorji, U., Dept Forestry, College of Natural Resources, Royal Univ. of Bhutan, Lobesa, Bhutan. E-mail: ugendojee@cnr.edu.bt

**18540.** Lin, C.-P.; Yang, I.H. (2018): Correlation between larger body mass, smaller wing and alternative reproductive tactics in *Psolodesmus mandarinus* damselflies. MSc. thesis, Faculty of Science, Dept of Life Sciences, Biological Agriculture, Biological Science, National Taiwan Normal University: 96 pp. (in English, with Chinese summary) ["Males of the many animal species use alternative reproductive tactics (ARTs) to obtain mating opportunity and reproductive success. In odonate species, adult males employ various genetically or conditionally based mating tactics (territoriality, non-territoriality/wandering/sneaking, or switching between the two). The evolution of different ARTs via sexual selection in recently diverged odonate species may have facilitated their speciation process. However, the relative effects of the ARTs between closely related but phenotypically divergent odonate species is poorly known. This study investigated the causes and consequences of the ARTs in two parapatrically distributed subspecies of Taiwanese *Psolodesmus mandarinus*, *P. m. mandarinus* and *P. m. dorothea*. The observations indicate that the males of both subspecies employ the same three mating tactics, including territorial, switching, and non-territorial. In *P. m. mandarinus* population of Fusan, an increase in body mass and decrease in hindwing area is associated with an increase in territoriality. Compared to non-territorial males, territorial and switching *P. m. mandarinus* males have higher mating opportunity (i.e. to engage in at least one mating). However, only switching but not territorial *P. m. mandarinus* males have higher mating success than non-territorial males. In contrast, none of the body size indicators are associated with territoriality in *P. m. dorothea* population of Lianhuachi. Only the switching



but not territorial *P. m. dorothea* males had higher mating opportunity than non-territorial males. The mating tactics of *P. m. dorothea* males had no significant effect on their mating success. In both *P. mandarinus* subspecies, the switching males instead of territorial males, appear to have the highest fitness. These results suggest that the ARTs of the two *P. mandarinus* subspecies were different in their associations of morphological traits and fitness consequences, which may be due to habitat differences or observer effects." (Author)] Address: not stated

**18541.** Lozano, F.; Muzón, J.; Anjos-Santos, D.; Pessacq, P. (2018): Chapter 14.6. Superfamily Coenagrionoidea. Thorp and Covich's Freshwater Invertebrates (Fourth Edition). Volume 3: Keys to Neotropical Hexapoda: 475-494. (in English) ["The superfamily Coenagrionoidea with approximately 170 genera and more than 1,700 species is the largest superfamily within the Zygoptera. Recent molecular studies and classificatory schemes suggest that it is composed of three families: Isostictidae, Platycnemididae, and Coenagrionidae; from these only the Coenagrionidae is represented within the Neotropics. Besides, these proposals imply the non monophyly of long recognized families such as Protoneuridae and Pseudostigmatidae which are now included within Coenagrionidae. The knowledge on Neotropical coenagrionid larvae is still very incomplete, currently it is restricted to 34 genera (48.57%) and approximately 210 species (31.81%). Few ordinal level keys exist that include larvae of Coenagrionoidea, and they are limited to certain regions or countries; this together with the fact that larval morphology is strikingly uniform makes larval identification very difficult. Here we present a key to the genera of final instar larvae of Coenagrionidae." (Authors)] Address: Pessacq, P., Laboratorio de Investigaciones en Ecología y Sistemática Animal (LIESA), Universidad Nacional de la Patagonia San Juan Bosco, Sarmiento 849, 9200 Esquel, Chubut, Argentina. E-mail: pablopessacq@yahoo.com.ar

**18542.** Maloney, E.M.; Liber, K.; Headley, J.V.; Peru, K.M.; Morrissey, C.A. (2018): Neonicotinoid insecticide mixtures: Evaluation of laboratory-based toxicity predictions under semi-controlled field conditions? *Environmental Pollution* 243, Part B: 1727-1739. (in English) ["Highlights: •Chronic toxicity of neonicotinoids and mixtures was evaluated for wetland insects. •Contrary to predictions, mixtures were not more toxic than single neonicotinoids. •Some neonicotinoids/mixtures had greater-than-predicted effects on emergence and biomass. •Lab-derived mixture models did not adequately predict field-based mixture effects. Abstract: Neonicotinoid insecticide mixtures are frequently detected in aquatic environments in agricultural regions. Recent laboratory studies have indicated that neonicotinoid mixtures can elicit greater-than-additive toxicity in sensitive aquatic insects (e.g. *Chironomus dilutus*). However, this has yet to be validated under field conditions. In this study, we compared the chronic (28. and 56-d) toxicity of three neonicotinoids (imidacloprid, clothianidin, and thiamethoxam) and their mixtures to natural aquatic insect communities. Using experimental in-situ enclosures (limnocorrals), we exposed wetland insects to

single-compounds and binary mixtures at equitoxic concentrations (1 Toxic Unit under the principle of Concentration Addition). We assessed the composition of all emerged insect taxa and cumulative Chironomidae emergence and biomass over time. In all treated limnocorrals there were subtle shifts in community composition, with greater proportions of emerged Trichoptera and Odonata. Cumulative emergence and biomass increased over time and there was a significant interaction between time and treatment. At 28 days, cumulative Chironomidae emergence and biomass were not significantly different between neonicotinoid treatments and controls. However, cumulative emergences in imidacloprid, clothianidin, and clothianidin-thiamethoxam treatments were 42%, 20%, and 44% lower than predicted from applied doses. At 56 days, imidacloprid, clothianidin, and the clothianidin-thiamethoxam mixture elicited significant declines in cumulative emergence and biomass. However, contrary to laboratory predictions, greater-than-additive mixture toxicity was not observed under semi-controlled field settings. Furthermore, only clothianidin significantly shifted sex-ratios towards female-dominated populations. Results showed that the responses of natural Chironomidae populations to neonicotinoids and their mixtures cannot be adequately predicted from laboratory-derived single-species models, and that reductions in Chironomidae emergence and biomass can occur at neonicotinoid concentrations below some current water quality guidelines (albeit effects may have been attenuated by occasional overdosing). Therefore, these neonicotinoid guidelines should be reviewed and amended to ensure that Chironomidae and other sensitive aquatic insects inhabiting agricultural wetlands are adequately protected." (Authors)] Address: Morrissey, C.A., School of Environment & Sustainability, Univ. of Saskatchewan, Saskatoon, Saskatchewan, Canada. E-mail: christy.morrissey@usask.ca

**18543.** Marques Pires, M.; Périco, E.; Renner, S.; Sahlén, G. (2018): Predicting the effects of future climate change on the distribution of an endemic damselfly (Odonata, Coenagrionidae) in subtropical South American grasslands. *Journal of Insect Conservation* 22: 303-319. (in English) ["Climate change is predicted to affect the distribution of freshwater taxa, and stronger impacts are expected on endemic species. However, the effects of future climates on freshwater insects from the Neotropical region have been generally overlooked. In this study, the distribution of *Cyanallagma bonariense* endemic to the subtropical South American grasslands (Pampa) was modelled in relation to future scenarios of high greenhouse gas emissions (RCP 8.5) for 2050 and 2070. For this purpose, ecological niche models were developed based on assumptions of limited dispersal and niche conservatism, and the projected distribution of *C. bonariense* was contrasted with the location of current protected areas (PAs) in the Pampa. A broad potential distribution of *C. bonariense* was indicated throughout the Pampa, and projections predicted a predominance of range contractions rather than range shifts in climatically suitable areas for *C. bonariense* in 2050 and 2070. Projections of suitable areas overlapped in central Argentina and southernmost Uruguay

in these periods. Our results indicated a potential resilience of *C. bonariense* to future climate change, which is likely related to the low restrictions in habitat use of *C. bonariense*. In every projection, however, most PAs were expected to lose effectiveness, as by 2070 most PAs fall outside the range of the predicted distribution of *C. bonariense*. Thus, the creation or enlargement of PAs in these areas is recommended and these results represent an important information for the conservation of endemic freshwater insects under global warming scenarios in an overlooked Neotropical landscape." (Authors)] Address: Sahlén, G., Systematic Zoology, Evolutionary Biol. Centre, Uppsala Univ., Norbyvägen 18D, 752 36 Uppsala, Sweden. E-mail: goran.sahlen@set.hh.se

**18544.** Marques Pires, M.M.; Stenert, C.; Maltchik, L. (2018): Drivers of beta diversity of Odonata along a forest–grassland transition in southern Brazilian coastal ponds. *Freshwater Science* 37(2): 357-366. (in English) ["Assessment of  $\beta$  diversity patterns in relation to environmental and spatial drivers can provide useful insights into the underlying mechanisms structuring communities (deterministic and dispersal limitation). However, the relative importance of each mechanism and driver of  $\beta$  diversity patterns in freshwater communities is assumed to change with ecosystem type, scale of observation, and among groups with different dispersal abilities. We assessed  $\beta$  diversity patterns of assemblages of odonate larvae in relation to geographical distances and scale-specific environmental drivers in southern Brazilian coastal ponds along a latitudinal gradient. We expected to find similar contributions of deterministic and dispersal limitation mechanisms to odonate assemblages and distinct patterns of  $\beta$  diversity between suborders Anisoptera and Zygoptera. We found low values of  $\beta$  diversity (probably related to distribution of generalist taxa and environmental conditions constituted by temporary ponds). Mantel and partial Mantel tests detected distinct relationships between dissimilarity in scale-specific drivers and geographical distances with  $\beta$  diversity of Odonata. Zygoptera was influenced by dissimilarity in local. (presence of riparian vegetation and connectivity) and regional-level (climate) variables, whereas Anisoptera was influenced by geographical distances. Our results supported our hypothesis that changes in the composition of assemblages of odonate larvae in temporary ponds were jointly driven by deterministic and dispersal limitation mechanisms. Furthermore, the similar contributions of nestedness and replacement components and the differing responses of Anisoptera and Zygoptera to local. and regional-level environmental drivers and geographical distances indicate that the relative importance of environmental and spatial drivers to  $\beta$  diversity patterns in ponds is scale-specific." (Authors)] Address: Marques Pires, M., Lab. Ecology & Conservation of Aquatic Ecosystems, Unisinos, Av. Unisinos, 950, 93.022-750 São Leopoldo, Rio Grande do Sul, Brazil. E-mail: marquespiresm@gmail.com

**18545.** Martínez-López, J.I.; Villeda-Callejas, M.; Lara-Vázquez, J.A.; Guedea-Fernandez, D.; Cervantes-Zamudio, O. (2018): Histology of the compound eyes of *Sympetrum illotum* (Hages, 1861) (Anisoptera: Libellulidae). *Entomologia*

*mexicana* 5: 552-558. (in Spanish, with English summary) ["The odonates are great air-ground predators, their vision presents a high spatial resolution due to their compound eyes which are highly developed, formed by approximately 30,000 ommatidia; these photoreceptors are able to adjust the changes in the visual scene. The objective of the present work was to describe the compound eyes of *Sympetrum illotum* at histological level. Histological technique was performed staining with hematoxylin-eosin and silver; for its observation phase contrast microscope was used with green and blue filters. Histologically it was found that the compound eyes have a wide cornea, the crystalline cones are of similar size and homogeneous arrangement, broad basal membrane and under this one tracheas of different diameter are observed. The use of the blue filter in phase contrast microscopy highlights the hematoxylin-eosin stain better." (Authors)] Address: Villeda-Callejas, Maria, Laboratorio de Microscopía. FES Iztacala UNAM. Av. de los Barrios #1, Los Reyes Iztacala, Tlalnepantla, Edo. de México. México C.P. 54090. E-mail: mapili\_villeda@yahoo.com.mx

**18546.** Maynou, X.; Martín, R. (2018): Timing of adult emergence and flight periods of the Odonata of the Gallecs Rural Area (Barcelona, Catalonia, NE Spain). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)* 62: 235-242. (in English, with Spanish summary) ["This article presents the results of a field study carried out in the Gallecs Rural Area (Barcelona, Catalonia, NE Spain) in 2015 in order to determine the emergence and flight periods of the dragonflies inhabiting a group of four small permanent and temporary man-made ponds set up through an amphibian breeding habitat project. In total fifteen taxa were recorded, most of which are common and well distributed throughout the Iberian territory. Exuviae collection provided valuable information on their life cycle, voltinism and sex ratios at emergence. In general, biotope characteristics influenced the timing of emergence and the composition of larval and adult communities, which differed between ponds, although less markedly in the case of the latter. There were also within-pond differences between larval and adult assemblages. While exuviae collection provided accurate information on the taxa breeding at each pond, records of adults reflected the diversity and composition of species at a broader landscape level due to dispersal movements between ponds." (Authors)] Address: Martín, R., Martí Julià, 19-23, 08911 Badalona, Spain. ricardo.martin@cllicenciats.cat

**18547.** Mendonça, F.Z.; Bernardy, J.V.; Oliveira, C.E.K.; Oliveira, P.B.G.; De Marco, P. (2018): Temperature effect on the development of tropical dragonfly eggs. *Neotropical Entomology* 47: 484-491. (in English) ["Physiological constraints in insects are related to several large-scale processes such as species distribution and thermal adaptation. Here, we fill an important gap in ecophysiology knowledge by accessing the relationship between temperature and embryonic development time in four dragonfly species. We evaluated two questions (1) what is the effect of temperature on the development time of Odonata eggs, and (2) considering a degree-day relationship, could a simple linear model

describe the dependence of embryonic development time on temperature or it is better described by a more complex non-linear relation. Egg development time of *Erythrodiplax fusca*, *Micrathyria hesperis*, *Perithemis mooma*, and *Micrathyria simplex* were evaluated. We put the eggs at different temperatures (15, 20, 25, and 30°C) and counted the number of hatched larvae daily. A nonlinear response of the development to the temperature was found, differing from the expected pattern for standard degree-day analysis. Furthermore, we observed that there is a similar process in the development time and hatching synchronization between species, with all species presenting faster egg development at high temperatures. Species-specific differences are more evident at lower temperatures (15°C), with no egg development in *M. simplex*. Only *E. fusca* was relatively insensitive to temperature changes with similar hatching rates in all treatments." (Authors)] Address: De Marco, P., Lab de Teoria, Metacomunidades e Ecologia de Paisagens, Depto de Ecologia, ICB, Campus Samambaia, Univ Federal de Goiás, Goiânia, Brasil

**18548.** Mitchell, F.L.; Lasswell, J.L. (2018): Population characteristics of the dragonfly *Pantala flavescens* (F.). colonizing small constructed ponds. *Southwestern Entomologist* 43(4): 833-839. (in English) ["A series of small ponds was constructed to determine whether dragonflies would oviposit in them. Four pond sizes . 0.3, 0.6, 0.9, and 1.2 m<sup>2</sup> . were replicated and randomized in each of six blocks. Ponds in three of the blocks were planted with cattail (*Typha* sp.) and three with spike rush (*Juncus* sp.). Sampling revealed that of 273 nymphs collected, 267 were *P. flavescens* and six were *Orthemis ferruginea*, although adults of 15 other dragonfly species were seen in the study area. Dragonfly nymphs were not found in any of the smallest size of pond. Significantly more nymphs were found in ponds planted with cattail than rush (215 vs 52), but the nymphs grew larger in ponds with rushes. The mean number of nymphs was larger in the 1.2-m<sup>2</sup> ponds (21.8) than in the 0.6-m<sup>2</sup> ponds (8.7), while 0.9 m<sup>2</sup> was intermediate (15.0). However, when the number of nymphs per unit area was compared, there were no differences between any of the pond sizes within a vegetation class -. cattail or rush. Between classes, more nymphs per unit area were in ponds planted with cattails. Because the one species of dominant dragonfly was not representative of distribution of dragonfly species in normal-sized ponds and probably was the only dragonfly found in any similar experiment, use of small reference ponds of these sizes was not feasible for assessing dragonfly diversity and abundance." (Authors)] Address: Mitchell, F.L., Texas A&M AgriLife Res., 1229 North Highway 281, Stephenville, TX 76401, USA

**18549.** Mitchell, Z. (2018): Dragonfly locomotion: Ecology, form and function. PhD thesis, Faculty of Biological Sciences, School of Biology, University of Leeds: XIX, 166 pp. (in English) ["The Odonata is a charismatic insect order remarked for their flight ability. They are a useful model system for ecological and evolutionary processes, but in particular their strong and unique flight abilities make them a model taxon

to study the biomechanics of flight. Movement is fundamental to a range of processes in biology, including population spatial dynamics. With increasingly urgent demands to understand and predict the impacts of climate change, uncovering the processes driving the movement of populations is paramount. Currently the macroecological patterns caused by climate change are reasonably well documented – particularly for the Odonata. However the mechanisms driving population movements are less clear. Despite considerable advances in our knowledge of the biomechanics of insect flight, little of this has been applied in an ecological context. This thesis aims to identify the gaps in our knowledge of macroecological processes and how biomechanical techniques can advance the field. I have set out a number of methods demonstrating how the biomechanics of flight in Odonata impacts ecological patterns. Range shifts are perhaps one of the best detailed impacts of climate change. At some level they must be driven by the movements of individuals, yet many studies have found little evidence to correlate flight ability and dispersal in insects. Using laboratory measures of flight performance I show that climate induced range shifts in the Odonata are limited by flight efficiency. This has important implications for conservation, as knowing how flight ability is able to restrict a species' range shift will aid reserve design and future ecosystem predictions. The possible reason behind the lack of evidence linking flight ability and dispersal is the use of proxies for flight performance, and the assumptions of the relationship between these measures and actual flight performance. Indeed, in the literature there are a host of different often mutually exclusive assumptions regarding the role of morphology in shaping flight ability. I provide empirical evidence of how wing morphology affects flight performance, showing that a large proportion of assumptions made within the literature are not supported, or are only weakly supported. This calls into question how prevalent the effects of flight performance on dispersal are, given the use of misleading assumptions. In many systems the state of adult organisms is strongly dependent on the experience of juveniles. For the Odonata, a number of mass and size carry-over effects exist between larva and adult forms, but whether locomotory performance is linked in this way is as yet unknown. Here I show that there is no correlation between larval and adult locomotory performance, suggesting that muscle development mechanisms are different for larvae and adults. Except for existing mass and size effects, flight performance should not be strongly affected by larval conditions. Finally, various behaviours have the capacity to affect dispersal in a species. One of the behaviours recently empirically confirmed in the Odonata is that of reversible polarotaxis: initial repulsion from polarised light sources as immature adults and the attraction back to polarised light as mature adults. I predicted that reversible polarotaxis would help aid dispersal, repelling insects from natal habitats and encouraging them to find new ones. However, the individual-based model of dispersal that I developed shows that reversible polarotaxis is more important in speeding up the progression through life stages, reducing the time taken to reach feeding habitats and to return to breeding sites. Individuals without polarotaxis would experience

higher mortality and lower rates of energy uptake (taking longer to find food) and also higher mortality rates taking longer to return to breeding sites (including lower reproductive success from potentially spending less time at breeding sites). All the work here is then synthesised to create a comprehensive description of Odonata flight morphology (form), its effects on flight performance (function) and the ecological patterns it generates (ecology). I demonstrate that biomechanics can provide important insights into ecological processes – in this case, that flight performance is an important limiting factor for range expansions, where other limitations are perhaps not present. In addition flight morphology is strongly linked with flight performance, suggesting that up to 74% of studies have used incorrect assumptions regarding the links between morphology and performance." (Author) 1.6 Thesis Outline: The purpose of this thesis is to provide a much-needed evidence base to link form, function, and ecology in a model insect taxon. In the following chapters I demonstrate methods to build this body of evidence and demonstrate how it advances our mechanistic understanding of species' movements: 1.6.1 – Chapter 2: In this chapter I measure quantitatively the flight mechanics of a range of UK Odonata species, comparing flight mechanics data to observed range shifts during a period of warming. This comparison will help to demonstrate that population level movements are affected by the flight ability of the species, and to ascertain what specific aspect of flight performance drives macroecological patterns. Alongside providing baseline descriptions of flight performance for several Odonata species, I demonstrate the function of flight performance in influencing ecological movements. 1.6.2 – Chapter 3: Our theoretical understanding of how wing morphology affects flight performance is good, but empirical evidence is lacking. Further, a host of often mutually exclusive assumptions regarding links between morphology and flight performance have been made in the literature. Here I demonstrate empirically the effect of different wing shapes across the same range of Odonata species as in chapter 2, on their flight performance. From describing the detailed form of wing morphology I can demonstrate its function in driving flight performance and following back up through chapter 2, driving ecological range shifts. 1.6.3 – Chapter 4: Odonata like many insects have a complex life cycle, so the adult is very much dependent on the larval stage. Several previous studies have found 'carry-over' effects from larva to adult, but few have looked for an effect in locomotory performance. In this chapter I look for 'carry-over' effects of locomotory performance in Odonata from larva to adult by measuring swimming performance and subsequent flight performance when the larva emerges. It is still not known exactly how the form of flight morphology is produced, so here I demonstrate the potential function of larval form in affecting adult flight morphology, and the ecological basis of larval variation in swimming performance. 1.6.4 – Chapter 5: The previous chapters aim to establish a mechanistic understanding of locomotory performance, relating form to function and understanding its effects on Odonata ecology. They do not take into account how behaviour might modulate this process. In this chapter I provide a spatially explicit individual based

model of Odonata movement to investigate the potential impact of reversible polarotaxis, a behaviour seen in Odonata, on dispersal. Through my work, I aim to demonstrate the emergent macroecological effects from individual behaviours, informed in part from the dispersal mechanisms outlined in the previous chapters. 1.6.5 – Chapter 6: Here I describe how the preceding chapters link to form a comprehensive explanation of the form and function of Odonata biomechanics and its effects on individual and population level ecological patterns, starting from potential larval influences through to adult flight morphology. I then compare the work here to our current understanding of biomechanics and ecology and how it amends or adds to current theory. Finally I suggest the best direction for future work, looking to improve and expand on the work I have carried out here. 1.7 Conclusion: The flight biomechanics and ecological patterns in the Odonata are well described within those two respective fields. However, the underlying processes are still unclear in some cases and links between the two areas of work are few and often tenuous, due to conflicting evidence and potentially poor proxies of the properties involved being used. In the following chapters I attempt to bring together biomechanics and macroecology to explain underlying processes. I will first look at the links between quantitative flight performance data and climate induced range shifts across a range of Odonata species, followed by an empirical demonstration of the effects of wing morphology on flight performance in the Odonata. I will also look for ontogenetic carry-over effects of biomechanical performance across the odonate life cycle, to see if larval performance has an impact on macroecological patterns seen in the adults. Finally using an individual based dispersal model I test the effect that certain behaviours might have on odonate dispersal. I will give a brief discussion in each of these chapters on the results obtained, followed by an in depth discussion and synthesis in chapter 6.] Address: not stated

**18550.** Moore, M.P.; Martin, R.A. (2018): Trade-offs between larval survival and adult ornament development depend on predator regime in a territorial dragonfly. *Oecologia* 188(1): 97-106. (in English) ["Trade-offs between juvenile survival and the development of sexually selected traits can cause ontogenetic conflict between life stages that constrains adaptive evolution. However, the potential for ecological interactions to alter the presence or strength of these trade-offs remains largely unexplored. Antagonistic selection over the accumulation and storage of resources could be one common cause of environment-specific trade-offs between life stages: higher condition may simultaneously enhance adult ornament development and increase juvenile vulnerability to predators. We tested this hypothesis in an ornamented dragonfly (*Pachydiplax longipennis*). Higher larval body condition indeed enhanced the initial development of its intrasexually selected wing coloration, but was opposed by viability selection in the presence of large aeshnid predators. In contrast, viability selection did not oppose larval body condition in pools when aeshnids were absent, and was not affected when we manipulated cannibalism risk. Trade-offs between larval survival and ornament



development, mediated through the conflicting effects of body condition, therefore occurred only under high predation risk. We additionally characterized how body condition influences several traits associated with predator avoidance. Although body condition did not affect burst distance, it did increase larval abdomen size, potentially making larvae easier targets for aeshnid predators. As high body condition similarly increases vulnerability to predators in many other animals, predator-mediated costs of juvenile resource accumulation could be a common, environment-specific limitation on the elaboration of sexually selected traits." (Authors)] Address: Moore, M.P., Dept of Biology, Case Western Reserve University, Cleveland, USA

**18551.** Móra, A.; Boda, P.; Mauchart, P.; Perneckner, B.; Csabai, Z. (2018): Hydrobiological state of Fehér-tó near Kardoskút based on the physico-chemical characteristics and the aquatic macroinvertebrate assemblages in 2015. *Crisicum* 10: 143-167. (in Hungarian, with English summary) [The Fehér-tó is one of the most important astatic soda pans in the Carpathian basin. The pond is separated by a dam to eastern and western basins, which are different in hydrological regime and extension of macrovegetation. In 2015 physico-chemical parameters were measured and quantitative and faunistic samplings of aquatic macroinvertebrate assemblages were carried out to reveal the potential differences in the hydrobiological state of the two basins. The chemical parameters (Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>2+</sup> ions, pH, conductivity, total dissolved solid) show that both basins are polyhalobous soda pans. Based on nutrient contents (N and P forms) the whole Fehér-tó is hypertrophic, especially the western basin. Altogether 6937 specimens belonging 60 aquatic macroinvertebrate taxa [including *Lestes macrostigma*] were collected. In the eastern basin 45, in the western basin 25 taxa were found, the number of taxa occurring in both basins was 20. Significantly higher number of species and specimens were found in the assemblages of the riparian zone (with vegetation cover) than in the open water areas in both basins. The differences between the basins were less obvious; although more species and specimens were collected in the eastern basin and the assemblages were more diverse here, the differences were not statistically significant. These results were confirmed by multivariate analyses (ANOSIM, NMDS) too. In both basins the chironomid *Cricotopus ornatus* was the dominant species, while the number of subdominant species were different (7 in the eastern and 3 in the western basin). The species composition (fewer species and specimens with the dominance of tolerant species) in the western basin suggests heavy organic matter load (the influence of aquatic birds) and regular dry periods. The more diverse macroinvertebrate fauna in the eastern basin might be due to the higher habitat heterogeneity, the more stable hydrological regime and the lower nutrient load." (Authors)] Address: Móra, A., Pécsi Tudományegyetem, TTK Hidrobiológiai Tanszék, H-7624 Pécs Ifjúság útja 6, Hungary. Email: mamold@gamma.ttk.pte.hu

**18552.** Moreno-Benítez, J.M. (2018): Odonatos de las lagunas del Lagar de Oliveros (Málaga, España). *Boletín*

Rola n° 12, segundo semestre 2018: 19-28. (in Spanish, with English summary) [The paper presents the results of an Odonata survey carried out at Lagar de Oliveros Lagoons (Málaga, Spain) during the years 2017 and 2018. A total of 21 species have been recorded and the reproduction of *Anax ephippiger* is confirmed for the first time in the province." (Author)] Address: Moreno-Benítez, J.M., C/ Larga del Palmar 34 . 29650 Mijas (Málaga), Spain. E-mail: cono-cenaturaeco@gmail.com

**18553.** Muzon, J. (2018): Chapter 14.5. Superfamily Lestoidea. Thorp and Covich's Freshwater Invertebrates (Fourth Edition). Volume 3: Keys to Neotropical Hexapoda: 469-473. (in English) [The Lestoidea, known also as Lestinoidea (Bybee et al., 2008; Rehn, 2003), is a small taxon composed of medium to large damselflies encompassing approximately 21 genera and 210 species distributed worldwide (Dijkstra et al., 2013). It includes four families: the monotypic and Australian endemic Hemiphlebiidae, the speciose and cosmopolitan Lestidae and Synlestidae, and the Neotropical endemic Perilestidae (Dijkstra et al., 2014). In the Neotropical region three families, five genera, and 62 species are reported, but this number is very likely to increase (Garrison et al., 2010). The Lestoidea has been proposed as the sister group of all the remaining Zygoptera (Bybee et al., 2008; Carle et al., 2008; Dumont et al., 2010; Davis et al., 2011). In this group, larval caudal appendages are lamellate and held in a vertical plane. Most species occupy fast to moderate streams, except *Lestes*, which prefer temporary lentic environments." (Author)] Address: Muzón, X., Lab. Biodiversidad y Genética Ambiental (BioGeA), Univ. Nac. Avelaneda (UNDAV), Buenos Aires, Buenos Aires, Argentina

**18554.** Neiss, U.G.; Fleck, G.; Pessacq, P.; Tennessen, K.J. (2018): Chapter 14.3 . Odonata: Superfamily Libelluloidea. Thorp and Covich's Freshwater Invertebrates (Fourth Edition). Volume 3: Keys to Neotropical Hexapoda: 399-447. (in English) [Libelluloidea is the second most diverse and speciose group of Odonata just behind the Coenagrionoidea. It includes almost 1,500 species in 195 genera, of which approximately 450 species and 58 genera are represented in the Neotropical region. The Libelluloidea have a cosmopolitan distribution and are present in all kind of environments. The monophyly of the superfamily is strongly supported but inner arrangement is still unresolved. In this work, four families are acknowledged: Synthemistidae (one genus in the Neotropical region: Gomphomacromia); Macromiidae (a broad genus not considered generally neotropical but present in northern Mexico: Macromia); Corduliidae (sensu stricto with six genera in the Neotropical region, but including also here for practical reasons the probable closely related incertae sedis *Lauromacromia* and *Neocordulia*), and Libellulidae (48 genera in the Neotropical region). Except for Libellulidae, with 40 genera with known larvae, all remaining genera larva are known. Here, we present a key to the families and genera of ultimate stadium larvae of Libelluloidea." (Authors)] Address: Neiss, U.G., Instituto de Criminalística, Departamento de Polícia Técnica-Científica, Manaus, Amazonas, Brazil. E-mail:ulisses.neiss@gmail

**18555.** Norling, U. (2018): Constant and shifting photoperiods as seasonal cues during larval development of the univoltine damselfly *Lestes sponsa* (Odonata: Lestidae). *International Journal of Odonatology* 21(2): 129 -150. (in English) ["Larvae were reared at 21.5°C from eggs from southernmost Sweden, and fed ad libitum to emergence in four different photoperiodic treatments, intended to represent increasing levels of time stress: constant LD 16:8, corresponding to late April (or August) conditions, a shift after about two weeks from LD 16:8 to 19.5:4.5, coarsely simulating late spring, constant LD 19.5:4.5, corresponding to the summer solstice, and a shift from LD 19.5:4.5 to 16:8, coarsely simulating late summer. Mean larval development time significantly decreased in this series: 47.5, 45.2, 43.0 and 39 days (n = 11–13 larvae), respectively. This suggests an ecologically relevant integration of absolute photoperiods and changes in photoperiod, allowing larvae to distinguish if LD 16:8 represented spring or late summer, depending on earlier experience. Thus, rapid development, a long day response during spring conditions, is further speeded up by shorter days during late summer. In early stadia, moulting intervals were uniform, but long days may to some extent have programmed young larvae to develop with fewer moults, thereby increasing development rate. In the last four stadia the principal effect was variation in moulting intervals. Adult size was little affected. Homogeneous conditions and low genetic diversity produced a remarkably synchronous development within treatments, with an emergence span of 5–10 days. Due to low numbers of larvae, derived from a single female, and problems with a switch, the generality of these results would need confirmation." (Author)] Address: Norling, N., Spårnsögatan 53, 22652 Lund, Sweden. Email: ulf.norling@comhem.se

**18556.** Novelo-Gutiérrez, R.; Ramírez, A.; González-Soriano, E. (2018): Chapter 14.2. Superfamily Gomphoidea. Thorp and Covich's *Freshwater Invertebrates* (Fourth Edition). Volume 3: Keys to Neotropical Hexapoda: 377-397. (in English) ["An illustrated key to the larvae of 27 out of 29 genera of Gomphidae of the Neotropical region is provided. Additional information on microhabitats and notes on the larval habits is also included. Larvae of *Brasiliogomphus* and *Cyanogomphus* are still unknown, and larva of *Diaphlebia* is keyed by supposition. Gomphidae represents between 34–35% of all known Neotropical anisopterans. Most Gomphidae species inhabit running waters and many of their larvae behave as shallow burrowers. Larvae of Gomphidae are characterized mainly by body abundantly setose; antennae 4-articulated with the third antennal article the largest, and the fourth segment minute or vestigial; prementum flat, ligula without median cleft, apical margin with piliform setae; molar crest of mandible movable; legs scarcely opposable, short, and setose, and female larva gonapophyses rudimentary or vestigial." (Authors)] Address: Novelo-Gutiérrez, R., Depto Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Aparatdo Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**18557.** Paillat, R.; Tabut, C. (2018): Cordulie à taches jaunes et Cordulie métallique à l'honneur en Eure-et-Loir. *Recherches*

*naturalistes* 6 N.S.: 7-14. (in French, with English summary) ["During field work involving a population census of dragonflies at the Moronville wetlands, Eure-et-Loir department, two Corduliidae species were observed: *Somatochlora metallica* and *S. flavomaculata*. Further research into the presence of the two species in July of the same year revealed 10 adults and 16 exuviae of *S. metallica*, which means that Moronville the only site where this species is known to breed in the department. However, only two adult *S. flavomaculata* were seen and no exuvia found. As far as is known this is the first time the species has been recorded in Eure-et-Loir. To date 28 dragonfly species have been recorded at Moronville." (Authors)] Address: Tabut, C., 39 rue des Huguenots 28320 Bailleau Armenonville, France. E-mail: cyril.tabut@gmx.fr

**18558.** Pessacq, P.; Muzón, J.; Neiss, U.G. (2018): Chapter 14. Order Odonata. Thorp and Covich's *Freshwater Invertebrates* (Fourth Edition). Volume 3: Keys to Neotropical Hexapoda: 355-366. (in English) ["Odonata is a cosmopolitan and ubiquitous order of insects, represented in most aquatic environments by approximately 6,000 species, of which more than 1,700 occur in the Neotropical region. It is considered a monophyletic group, but higher relationships within the order are not fully resolved yet. The larvae of only about 75% genera and 40% of the species are known, many larval descriptions are too brief or out of date, and the existing keys only involves certain regions or countries. Here, we present a glossary with morphological terms and a key to the families." (Authors)] Address: Pessacq, P., Centro de Investigaciones Esquel de Montana y Estepa Patagónicas (CIEMEP), Esquel, Chubut, Argentina

**18559.** Pestana, G.C.; Caromano, T.G.; Guillermo Ferreira, R. (2018): Sexual ornamentation triggers rival aggressiveness in the Neotropical damselfly *Hetaerina longipes* (Odonata: Calopterygidae). *Odonatologica* 47(1/2): 121-132. (in English) ["Coloration is associated with male quality in various animal species. These secondary sexual characters are a result of selective pressures that favor males able to cope with the physiological costs of production and maintenance of the ornament. Males of the Neotropical damselfly *Hetaerina longipes* exhibit red wing pigmentation, which is considered a sexual ornament. We tested the hypothesis that territorial males assess the quality of sexual ornamentation of rival males and respond with aggressive or neutral behaviors according to the quality of the opponent. Since wing pigmentation is an indicator of male quality, influencing contest outcome and territory acquisition, we expected that territorial males would decrease their aggressiveness when facing opponents with experimentally enhanced wing pigmentation, assuming that males should avoid conflicts with stronger males. The results suggest that territorial males are in fact more aggressive against rivals with increased pigmentation, contrary to our initial hypothesis. We discuss the cognitive ability of odonates in the assessment of opponents and suggest three hypotheses to explain the observed patterns." (Authors)] Address: Guillermo Ferreira, R., Laboratory of Ecological Studies on Ethology and Evolution (LES-TES), Department of Hydrobiology, Federal University of

São Carlos – UFSCar, São Carlos – Rodovia Washington Luís, km235, São Carlos, SP, 13565-905, Brazil. E-mail: rhainerguillermo@gmail.com

**18560.** Plan, L.; Stöger, T.; Draganits, E.; Gier, S. (2018): A Pleistocene landslide-dammed lake indicated by karren features (Eastern Alps, Austria). *Geomorphology* 321: 60-71. (in English) ["Highlights: •Documentation and morphometric measurements of rare röhrenkarren. •These karst features have formed due to water table fluctuation of a palaeolake. •A previously unknown palaeo-landslide body is identified. •A landslide dammed lake is reconstructed. Abstract: Numerous enigmatic tube-shaped holes in the limestone ceilings of overhangs and small caves in a restricted area north of the village St. Aegydt am Neuwalde (Lower Austria) have been known at least since 1933, but so far, no detailed study concerning their origin has been conducted. The vertical holes occur in Middle Triassic limestone and they are almost perfect cylinders tapering gently to a rounded apex. Their diameters are up to 5.5 cm and their depths reach 45 cm. They occur on both sides of the Unrechtraisen valley located in the north-eastern part of the Northern Calcareous Alps. Almost identical features were described from the shores of lakes in western Ireland and termed röhrenkarren or tube karren (Simms, 2002). According to Simms' model, they have formed by condensation corrosion within air pockets trapped in limestone overhangs by rising water levels during floods. The occurrence of these features is surprising, because presently, there is no lake and so far, no palaeolake has been known from this area. Based on high-resolution airborne laser scanning data and detailed field observations, a landslide deposit was identified in a narrow section of the valley, downstream of the röhrenkarren sites. Fine-grained, partly laminated sediments with abundant Anisoptera or flatworm (*Turbellaria*) eggs, indicative of lacustrine sediments, up to ca. 100 m above present river bed. These data indicate that a landslide had dammed the Unrechtraisen River resulting in a ca. 100 m deep lake. The röhrenkarren have formed due to fluctuations of the lake level, resulting from differences in river run-off and seepage through the landslide dam. Since <sup>230</sup>Th/U-dating of calcite crusts covering some röhrenkarren was not successful, the age is not well constrained." (Authors)] Address: Plan, L., Natural History Museum Vienna, Karst & Cave Group, Museumsplatz 1/10, 1070 Vienna, Austria. E-mail: lukas.plan@nhm-wien.ac.at

**18561.** Priyadarshana, T.S.; Wijewardhane, I.H.; Peabotuwage, I.; Jayasooriya, A.; Herath, B.E. (2018): A new species of *Ceylonosticta* Fraser, 1931 (Odonata: Zygoptera: Platystictidae) from Sri Lanka. *International Journal of Odonatology* 21(2): 105-114. (in English) [A new species of *Ceylonosticta* from the wet zone of Sri Lanka is described and illustrated, namely *Ceylonosticta goodalei* sp. nov. (Kuruwita-Erathana foot path, Seethagangula, Adam's Peak, Samanala Nature Reserve, Ratnapura, 6.8196°N, 80.4615°E, 1109 m asl). The species is described from male specimens only and the genital ligula is described and illustrated. Females are as yet unknown. A brief review of *Ceylonosticta*

"species-groups" is provided, provisionally incorporating three recently described species (*C. nancyae*, *C. rupasinghe*, *C. alwisi*) as well as *C. goodalei*. A determination key is updated by addition of these four newly described *Ceylonosticta* species and now covers 22 endemic species of the genus hereto known from the island." (Authors)] Address: Priyadarshana, T.S., College of Forestry, Guangxi Univ., Nanning, PR China. Email: tharakas.priyadarshana@gmail.com

**18562.** Purba, W.C.; Yulminarti (2018): Komposisi dan ke-*limpahan* capung (Ordo: Odonata) pada tiga tipe habitat di Desa Buluh Cina Kecamatan Siak Hulu Kabupaten Kampar Provinsi Riau. *Jurnal Riau Biologia* 3(1): 17-22. (in Indonesian, with English summary) ["This study aims to determine the level of abundance and diversity of Odonata in Buluh Cina village, Kampar District, Riau. This study was conducted from March to May 2017, using a sweeping technique applied to each habitat type (settlement, forest and forest). The result obtained are 671 individuals Odonata representing ...16 species. The six families found among them, Libellulidae (8 species), Gomphidae (1 species), Aeshnidae (1 species), Coenagrionidae (4 species), Chlorocyphidae (1 species) and Platycnemididae (1 species). The highest number Odonata were collected from the Libellulidae family with 340 individuals." (Authors)] Address: Purba, W.C., Jurusan Biol. Fak. Matematika dan Ilmu Pengetahuan Alam Kampus Bina Widya Pekanbaru 28293, Indonesia. E-mail: williamcowper.purba@yahoo.com

**18563.** Ramírez, Y.P.; Giraldo, L.P.; Zúñiga, M.; Ramos, B.C.; Chará, J. (2018): Influencia de la ganadería en la comunidad de macroinvertebrados acuáticos en microcuencas de los Andes centrales de Colombia. *Revista de Biología Tropical* 66(3): 1244-1257. (in Spanish, with English summary) ["Influence of cattle ranching on the community of aquatic macroinvertebrates in watersheds of central Andes, Colombia. In order to measure the impact of cattle ranching and riparian corridors on the composition and diversity of benthic macroinvertebrates in Andean watersheds, nine headwater streams were selected in the municipality of Villamaría (Caldas, Colombia), five of them with riparian corridors and four without protection. In July (2013) in each stream, macroinvertebrate samples were collected using D and Surber nets, and streams were characterized according to water quality, channel metrics and habitat quality score. In total 98 934 individuals were collected, distributed in nine classes, 17 orders, 56 families and 92 genera. Veneroidea was the most abundant order followed by Trichoptera, Diptera, Tubificida and Ephemeroptera. Coleoptera was the order with highest richness with 28 genera, followed by Diptera with 18, Trichoptera with 11, Ephemeroptera with 10 and Odonata with 8. Streams with riparian corridors were deeper, had higher proportion of coarse substrates and Habitat Quality Score and presented higher genus diversity than those unprotected ( $p < 0.05$ ). The genera *Ferrisia*, *Eurygerris*, *Heleobia* and *Pisidium*, total nitrogen, ammonia nitrogen and silt proportion on the streambed were correlated with unprotected streams, whilst the genus *Rhagovelia*, the subfamily Chironominae, the Habitat Quality Score and the proportion

of coarse substrates were correlated with streams with riparian corridors. This information confirms that riparian corridors help reducing the negative impact generated by cattle ranching practices and improve the provision of environmental services, and therefore it is recommended to maintain the strip of riparian vegetation in streams that possess it and allow the establishment of this in streams devoid of forest on its slopes." (Author)] Address: Ramírez, Yuly Paulina, Centro para la Investigación en Sistemas Sostenibles de Producción Agropecuaria -CIPAV, Carrera 25 No. 6-62, Cali, Colombia. E-mail: yulypaulinaramirez@gmail.com

**18564.** Rangel-Sánchez, L.; Nava-Bolaños, A.; Palacino-Rodríguez, F.; Córdoba-Aguilar, A. (2018): Estimating distribution area in six *Argia* damselflies (Insecta: Odonata: Coenagrionidae) including *A. garrisoni*, a threatened species. *Revista Mexicana de Biodiversidad* 89: 921-926. ["Odonata are currently facing a number of threats. One tool to provide a straightforward assessment of risk is distribution area. Here we have used ecological niche modeling to estimate distribution range for 6 species of *Argia* damselflies distributed in North America: *A. cuprea*, *A. funcki*, *A. garrisoni*, *A. harknessi*, *A. munda*, and *A. rhoadsi*. These species are not included in the International Union for the Conservation of Nature (IUCN) Red List, except for *A. garrisoni* which has been categorized as Least Concern. Our results indicated large distribution areas for all species, except for *A. garrisoni*, (8,038 km<sup>2</sup> after a refinement analysis looking for suitable habitat). Large distribution can be explained by similar niche properties shared by all study species. This is not the case for *A. garrisoni* whose situation seems worrying. This species was found in the Mexican state of San Luis Potosí in 1999 and there have been no further observations so it deserves further inspection to see whether populations are at risk. In the meantime, and according to the IUCN criteria, *A. garrisoni* should be placed under a vulnerable category." (Authors)] Address: Rangel-Sánchez, Laura, Grupo de Investigación en Odonatos de Colombia-Grupo de Investigación en Biología, Depto Biol., Univ. El Bosque, Av. Cra 9 No. 131A-02 Bogotá, Colombia

**18565.** Rathod, D.M.; Parasharya, B.M. (2018): Odonate diversity of Nalsarovar Bird Sanctuary - a Ramsar site in Gujarat, India. *Journal of Threatened Taxa* 10(8): 12117-12122. (in English) ["Odonate diversity of Nalsarovar Bird Sanctuary, a Ramsar site in Gujarat, was studied between January 2015 and July 2017. A total of 46 species belonging to six families, and 27 genera were recorded, which included 14 species of Zygoptera and 32 species of Anisoptera. Out of the 46 species, 40 species are new records for the Nalsarovar Bird Sanctuary. The record of *Enallagma cyathigerum* in Gujarat needs verification. Need to monitor changes taking place in Odonata species composition after influx from Narmada canal at Nalsarovar is emphasized." (Authors)] Address: Rathod, Darshana, AINP on Agricultural Ornithology, Anand Agricult. Univ., Anand, Gujarat 388110, India. E-mail: darshanarathod500@gmail.com

**18566.** Relyea, R.A. (2018): The interactive effects of predator stress, predation, and the herbicide Roundup. *Ecosphere*

9(11):e02476. 16 pp. (in English) ["As the number of studies examining the effects of contaminants grows, ecologists are becoming increasingly aware that contaminants can interact with natural stressors (e.g., competition and predator cues) in their effects on nontarget animals. In amphibians, predator cues can make contaminants more lethal under laboratory conditions, but the opposite outcome has been observed under more natural conditions with stratified water columns; stratification causes more pesticide to be present near the surface while predator cues scare spring-breeding amphibians down to the benthos. I examined whether this phenomenon also occurs in three species of summer-breeding amphibians (*Hyla versicolor*, *Rana clamitans*, and *Rana catesbeiana*) that were raised in outdoor mesocosms. Specifically, I asked how amphibian survival was affected by multiple concentrations of a common herbicide (glyphosate; commercial name: Roundup), the herbicide combined with chemical cues from predators (caged larval *Anax junius*), and the herbicide combined with lethal predators. Environmentally relevant concentrations of the herbicide caused high rates of tadpole mortality, but this outcome was substantially reversed by the addition of predator cues. With lethal predators, the tadpoles experienced such high mortality that the herbicide caused no additional effect. Roundup also induced morphological changes in *Hyla versicolor*, and the induced traits were different from those induced by predators. Collectively, these results suggest that while predator cues can make pesticides less lethal when thermal stratification occurs, highly lethal predators can overwhelm these effects. Thus, the impacts of such contaminants can be dramatically different in environments that do or do not contain high-risk predators." (Author)] Address: Relyea, R.A., Dept Biol. Sci., Darrin Fresh Water Inst., Rensselaer Polytechnic Inst., Troy, New York 12980 USA. E-mail: relyer@rpi.edu

**18567.** Remm, L.; Sushko, G. (2018): Dragonfly fauna in rewetted mires in Belarus: diverse but different from natural sites. *Wetlands Ecology and Management* 26(6): 1173-1180. (in English) ["Mire specialist species are under strong anthropogenic pressure. In areas where the exploitation of their habitat has been temporary or unsuccessful, restoration frequently has risen as an objective. The results of the restoration activities for habitat specialists, however, are unclear. In this work we investigated whether raising the water level ca. 10 years ago in degraded bogs has brought back a characteristic group of fauna, and mire specialists therein. Dip-netting for Odonata larvae, together with habitat description, was carried out in restored, unrestored, and natural sites. We found almost no larvae at unrestored sites. The restored sites provided habitat for diverse Odonata fauna, including lagg zone species. Bog specialists only occurred at a former pit-mining site. Based on the study, we suggest three means to support the biodiversity of mire Odonata: (i) protecting the remaining natural mires, (ii) using pit-mining instead of milling for peat extraction, and (iii) creating special pools in former milled sites that have been designated for mire restoration." (Authors)] Address: Remm, Liina, Department of Zoology, Institute of Ecology and Earth Sciences, University of Tartu, Tartu, Estonia



**18568.** Reyes-Hernández, J.L.; Escoto-Moreno, J.A.; González-Martínez, E.; Márquez, J.; Ocampo, G.; Rodríguez, J.C. (2018): Riqueza de Especies de Odonatos en el Área Natural Protegida Sierra del Laurel, Calvillo, Aguascalientes, México. Richness of Odonata Species in the Sierra del Laurel Natural Protected Area, Calvillo, Aguascalientes, Mexico. *Southwestern Entomologist* 43(4): 995-1002. ["Richness of odonate in the Sierra del Laurel Natural Protected Area, municipality of Calvillo, Aguascalientes, Mexico is reported here. In total, 31 species in 21 genera and six families were collected at 13 localities, representing approximately 50% of the species registered in Aguascalientes. *Rhionaeschna jalapensis* and *Dythemis nigrescens* are new records for the State of Aguascalientes, and eight species are new records for the municipality of Calvillo. The list of Odonata from Aguascalientes now includes 61 species, and the Sierra del Laurel is one of the richest sites of odonates in the state." (Authors)] Address: Márquez, J., Lab. de Sistemática Animal, Centro de Investigaciones Biológicas, Univ. Autó. del Estado de Hidalgo, km 4.5 carretera Pachuca-Tulancingo s/n, Ciudad del Conocimiento, Col. Carboneras, 42184 Mineral de la Reforma, Hidalgo, México. E-mail: marquezorum@gmail.com

**18569.** Riaz, M.A.; Riaz, A.; Ijaz, B.; Rasool, M.S.; Rahat, S.; Un Nisa, Z. (2018): Environment friendly management of mosquito: a short review. *Bangladesh Journal of Scientific and Industrial Research* 53(3): 169-178. (in English) ["Despite the large scale use of insecticides, capacity building, municipality, community and metropolis awareness, and preventive measures to counter vector borne diseases which are mounting day-by-day, new tools are now being introduced to prevent the spread of mosquito transmitted diseases. The low efficacy status of chemical pesticides have led to the interest of researchers in search of fresh and even more practicable vector control methodologies to be applied. In this regard, multiple alternatives have been monitored to develop control practice measures for the eradication, observation and control of mosquitoes at larval level by the use of a sustainable biological monitoring and control by an ordinary constructive predator, to exercise monitoring and practical control measures over parasites at larval stages in environmental and eco-friendly techniques. In particular, bio-control measures to monitor and control practical practices, context predatory larvivorous fish, dragonfly nymph, frogs, copepods, turtle, Entomopathogenic bacillus, *Bacillus sphaericus* and *Bacillus thuringiensis israelensis* are being tried in different regions of world. The available research on the subject recommends that there exist multiple direct and indirect growth factors that could play a dynamic role in prey and predator's survival. Species controphic that have an impact on concerned eco-relation reflect significant effect. In addition to this, certain eco-relations represent positive stimuli for the control of vector borne viral diseases. As a bio-control achieving feasible agent for vector monitoring, pointing, management and control predatory larvivorous fish, dragonfly nymph, frogs, copepods, turtle, Entomopathogenic bacillus, *Bacillus sphaericus* and *Bacillus thuringiensis israelensis* are not only considered as a liberated intervention for disease vector control of practices and mechanical

control cost deterrents as well. Further research has been suggested on the subject so as to find out even more practicable and effective mosquito monitoring and practical control practices." (Authors)] Address: Riaz, M.A., Dept Environmental Sciences & Engineering, Government College Univ. Faisalabad, Pakistan. E-mail: ahsanenv38@gmail.com

**18570.** Rieckh, C. (2018): Die Libellenfauna des Laabachs im Grazer Feld (Insecta: Odonata). MSc. thesis, Ökologie und Evolutionsbiologie, Karl-Franzens-Universität Graz: VIII, 121 pp. (in German, with English summary) [Austria; "For this Master's thesis, the Odonata fauna of the rivulet "Laabach" in the "Grazer Feld" south of Graz (Styria) was examined. The small stream has a length of 9,2 km and runs through predominantly agricultural landscape, but also partly through residential areas. For the survey of Odonata fauna it was divided in 59 widely homogeneous sections. All sections of the Laabach were surveyed at least four times in 2017, during the flying period of Odonata from May to September. In addition, in 2016 data were collected in some of the sections in August and September. Data collection was carried out on a semiquantitative basis, by observation of adult dragonflies and damselflies. To verify the impact of the surrounding habitat the rivulet sections were characterized by their morphology and by mapping the surrounding habitat at a distance of up to 30 m on both sides. Some sections of the Laabach were rich in structure, others were strongly anthropogenically affected (channelled) and/or dried out at least temporarily. A total of 27 Odonata species were identified, from which 14 species were considered autochthonous. 6 species showed a mass occurrence, among them the critically *Coenagrion ornatum*. The occurrence of *Somatochlora meridionalis* and *Lestes barbarus* are also remarkable records regarding nature conservation. Dried sections were significantly poorer in species diversity and population densities than sections with permanent water. The presence/absence of some species showed a significant dependence on the character of the surrounding landscape." (Author)] Address: Rieckh, Christina, Institut für Zoologie der Karl-Franzens-Universität Graz, Universitätsplatz 2, 8010 Graz, Austria. E-Mail: christina.rieckh@edu.uni-graz.at

**18571.** Ries, L.; Neupane, N.; Baum, K.A.; Zipkin, E.F. (2018): Flying through hurricane central: impacts of hurricanes on migrants with a focus on monarch butterflies. *Animal Migration* 5(1): 94-103. (in English) ["Hurricanes are becoming more frequent and intense, so understanding the consequences for biodiversity, including migratory species, has become critical. Studies suggest that migrants may avoid most of the direct harm of hurricanes by shifting their flight trajectories to less-impacted regions, but the majority of this research has focused on birds. We review the literature on migratory bird responses to hurricanes and also describe other taxa likely to be affected. We then focus on the monarch butterfly (*Danaus plexippus*), whose fall migratory pathway goes through Texas during hurricane season. Like birds, monarchs may be able to avoid direct damage from hurricanes. However, it may be more important to determine how they respond to shifts in availability of critical resources during migration. In

fall, when a storm-triggered flush of out-of-season vegetation growth is especially likely, hurricanes could reasonably cause indirect impacts that could be positive (increased nectar) or negative (out-of-season host plants that could disrupt migration), or both. The monarch butterfly is an especially good target for this research because of its distinct migratory phases, the importance of hurricane-impacted zones to its annual cycle, and the large quantity of data available through an extensive network of citizen science programs. ... There are also five species of migratory dragonflies (*Anax junius*, *Tramae lacerata*, *Sympetrum corruptum*, *Pantala flavescens*, and *P. hymenea*), which have both solely residential and solely migratory populations throughout their ranges [24]. Although little is known about their migration, the migratory timing of these species through Texas also coincides with peak hurricane season so there is potential for both direct and indirect effects." (Authors)] Address: Ries, Leslie, Georgetown Univ., Dept of Biology, USA. E-mail: leslie.ries@georgetown.edu

**18572.** Román-Heracleo, J.; Springer, M.; Ramírez, A. (2018): The larva of *Perissolestes remotus* (Williamson & Williamson, 1924) (Zygoptera: Perilestidae). *International Journal of Odonatology* 21(3-4): 173-179. (in English) ["The larva of *P. remotus* is described for the first time based on Costa Rican specimens collected in forested streams with abundant organic matter. It is characterized by a slender, elongated body, with lateral keels on abdominal segments 1–9, and a middorsal row of spines on segments 4–10. We also provide additional notes on the larvae of *P. magdalenae* using material from Panama. The larva is similar to the only other species of *Perissolestes* present in Mexico and Central America, *P. magdalenae*, but can be separated by the articulation of the prementum-postmentum reaching the metacoxa (reaching the mesocoxa in *P. magdalenae*) and the female gonapophyses exceeding past the posterior margin of S10 (just reaching posterior margin in *P. magdalenae*). At the generic level, *Perissolestes* can be differentiated from *Perilestes* by the presence of abdominal keels on segments 1–9 (from 4–9 in *Perilestes*) and by having caudal gills with small spines along the medial trachea (spines absent in *Perilestes*)."] (Authors)] Address: Ramírez, A., Dept Applied Ecology, North Carolina State Univ., Raleigh, NC 27603, USA. Email: aramirez@ramirezlab.net

**18573.** Rudolf, V.H.W.; Roman, A. (2018): Trophic structure alters consequences of environmental warming. *Oikos* 127(11): 1646-1656. (in English) ["Climate warming can directly affect traits and demographic rates of organisms. However, individuals are embedded in complex networks of ecological interactions with other members of the community, allowing for a range of direct and indirect effects that depend on the trophic structure of the community. Here we show that effects of warming (i.e. increase in mean temperature) on a given species can strongly depend on the community context and trophic complexity of the system. Specifically, we manipulated the presence/ absence of two competing tadpole species and their dragonfly predators to simulate different food webs of increasing complexity that

were exposed to ambient or warmed conditions. We found that warming dramatically reduced herbivore (tadpole) survival in the absence of strong interspecific competition and predation, but it had no measureable effect on demographic rates on the dominant competitor in more complex communities where it was exposed to interspecific competition and predation. Conversely, our results also indicate that warming reduced the strength of interspecific competition and predation in our system. These results suggest that trophic complexity could potentially buffer climate change effects on populations and emphasize that we often cannot predict the effects of changes in abiotic conditions on a given population without accounting for the community context." (Authors)] Address: Rudolf, V.H.W., Program in Ecology and Evolutionary Biology, Rice Univ., BioSciences, Houston, TX, USA. E-mail: volker.rudolf@rice.edu

**18574.** Rumrill, C.T.; Scott, D.E.; Lance, S.L. (2018): Delayed effects and complex life cycles: How the larval aquatic environment influences terrestrial performance and survival. *Environmental Toxicology and Chemistry* 37(10): 2660-2669. (in English) ["Species with complex life cycles are susceptible to environmental stressors across life stages, but the carryover and latent effects between stages remain understudied. For species with biphasic life histories, such as pond-breeding amphibians, delayed effects of aquatic conditions can influence terrestrial juveniles and adults directly or indirectly, usually mediated through fitness correlates such as body size. We collected adult southern toads (*Anaxyrus terrestris*) from two source populations – a natural reference wetland and a metal-contaminated industrial wetland – and exposed their offspring to two aquatic stressors – a metal contaminant, copper (Cu), and a dragonfly predator cue – in outdoor mesocosms (n = 24). We then reared metamorphs in terraria for five months to examine delayed effects of early life stage environmental conditions on juvenile performance, growth, and survival. Larval exposure to Cu, as well as having parents from a contaminated wetland, resulted in smaller size at metamorphosis – a response later negated by compensatory growth. Although Cu exposure and parental source did not affect larval survival, we observed latent effects of these stressors on juvenile survival, with elevated Cu conditions and metal-contaminated parents reducing post-metamorphic survival. Parental source and larval Cu exposure affected performance at metamorphosis through carryover effects on body size but, one month later, latent effects of parental source and larval predator exposure directly (i.e., not via body size) influenced performance. The carryover and latent effects of parental source population and aquatic Cu level on post-metamorphic survival and juvenile performance highlight the importance of conducting studies across life stages and generations." (Authors)] Address: Rumrill, C.T., Savannah River Ecol. Lab., Univ. of Georgia, Aiken, South Carolina, USA. E-mail: crumrill@gmail.com

**18575.** Rushbrook, B. (2018): Habitat enhancement opportunities for southern damselfly. Itchen Valley Country Park. Arcadian Ecology & Consulting Ltd, Curdridge.: 50 pp. (in English) ["Executive Summary: Arcadian Ecology was

appointed by Eastleigh Borough Council to conduct a walk over visit of Itchen Valley Country Park and, based on this and information provided by Kevin Young (formerly of Eastleigh Borough Council and who has an in-depth knowledge of the species at this site), identify habitat enhancement and creation opportunities for southern damselfly (*Coenagrion mercuriale*) at the site. The historic water meadow network at Itchen Valley Country Park forms part of the River Itchen Site of Special Scientific Interest (SSSI) / Special Area of Conservation (SAC), and supports a population of *C. mercuriale* considered to be of national importance. However, recent studies have indicated a potential decline in the strength of the population at Itchen Valley Country Park, and it is considered that urgent conservation action for this species is required at this site. It is therefore the specific intention of this report to outline habitat enhancement and creation opportunities identified at Itchen Valley Country Park and assess them in terms of their: a. relative or site-specific value in increasing the distribution, robustness and resilience of the *C. mercuriale* population at Itchen Valley Country Park, and b. habitat enhancement and creation potential in the context of the wider Itchen Valley metapopulation as set out in the recently published strategic conservation plan for *C. mercuriale* with in and adjacent to Eastleigh Borough boundary. Habitat enhancement opportunities were identified for 16 of the 26 watercourses assessed, with a further two infrastructure improvement opportunities identified, considered to provide benefits for both *C. mercuriale* and for the management / ecology of the wider Itchen Valley Country Park. It was not considered appropriate to make recommendations for habitat creation at Itchen Valley Country Park, due to the complexity of the historic network of floodplain meadow carrier streams and ditches. It is therefore considered that a detailed hydrological study would be necessary before any notable alterations are made to water level management at the site such as the re-connection of paleo-channels or defunct elements of the historic water meadow network. It was considered more appropriate and valuable to base the recommendations of potential implementation options on the results of the site-specific prioritisation assessment (rather than strategic assessment) since: \* there is no evidence of an imminent delivery of the recently published strategic conservation plan for southern damselfly with in and adjacent to Eastleigh Borough boundary; and \* there was limited variability between options in the strategic assessment with 16 of the 18 assessed to have a high current potential of being delivered. Four different options for the suite of opportunities that should be included in the future management of Itchen Valley Country Park are provided below, representing the preferred option, preferred (within site) option, an alternative sub-optimal option, and a strongly recommended 'minimum' option. It is emphasised that these recommendations are provided on the basis that they are delivered in parallel with the general management recommendations provided. Furthermore, irrespective of what programme of works is selected, its delivery must not be unduly rigid, but be subject to continual assessment and responsive to the current habitat characteristics of the relevant watercourse(s). Specifically, where cattle grazing is already creating suitable conditions, it is not

recommended that rotational clearance is undertaken, and could instead be re-assigned to another (sections of) watercourse where it is required at that time. Finally, it is considered that there would be three distinct, but not disconnected, elements of any programme of habitat enhancement and infrastructure improvement works in order to maximise the resulting increase in the distribution, robustness and resilience of the *C. mercuriale* population at Itchen Valley Country Park. Specifically this will include measures that: 1. maintain and strengthen *C. mercuriale* numbers in the important hub in the north of site; 2. provide two-fold benefits for the wider population through works in the centre of the site; and 3. maintain and strengthen *C. mercuriale* numbers supported in the south of the site. In conclusion, it is strongly recommended that any future programme of works is designed to encompass all three elements outlined above (i.e. as included within the two preferred options outlined in Section 4.2.1). However, where there are insufficient resources and / or it is not feasible to deliver a programme of works that meets all three of these criteria, the programme should be designed to include works that deliver in line with the three elements as prioritised above." (Author)] Address: Published by: Arcadian Ecology & Consulting Ltd., Beechcroft House, Vicarage Lane, Curdridge, Hampshire, SO32 2DP, UK

**18576.** Samanmali, C.; Udayanga, L.; Ranathunge, T.; Perera, S.J.; Hapugoda, M.; Welivitiya, C. (2018): Larvicidal potential of five selected dragonfly nymphs in Sri Lanka over *Aedes aegypti* (Linnaeus) larvae under laboratory settings. *BioMed Research International* Volume 2018, Article ID 8759459: 10 pp. (in English) ["Introduction. Limitations in breeding source reduction practices, development of insecticide resistance in mosquitoes, and ill effects of chemical controlling methods on human and ecosystem health have motivated Sri Lankan authorities working for dengue control to seek for alternative, ecofriendly, and sustainable approaches for controlling of *Aedes* vectors, to manage dengue epidemics. The present study attempted to investigate the predation efficiency of locally available dragonfly nymphs over *Aedes aegypti* under laboratory conditions, aiming to evaluate the potential of using dragonflies as biocontrol agents against dengue. Methods. Nymphal stages of five locally abundant dragonfly species were collected from different stagnated water bodies in Belihuloya area. After morphological identification, a well grown individual of each species was starved for 12 hours and introduced into a glass tank containing 1L of pond water with 200 larvae (4th instar) of *Aedes aegypti*. Number of larvae survived in the tank was enumerated hourly up to 48 hours. In case where >75% of larvae are consumed by dragonfly nymphs, additional *Ae. aegypti* larvae were introduced into such tanks. Experiment was repeated for five times. Same procedure was followed with different stages of growth of the dragonfly nymphs characterized by the highest predation rate. General Linear Model followed by Tukey's pairwise comparison was used for statistical analysis. Results. The predation rates of different dragonfly species varied significantly ( $p < 0.05$ ), whereby *Anax indicus* ( $110 \pm 7.14$  per day) indicated the highest, followed by *Pantala flavescens* ( $54.07 \pm 5.15$ ) and *Gynacantha*

dravida (49.00±11.89), while *Tholymis tillarga* (23.47±2.48) had the lowest. Further, significant variations in the larval predation were found among different maturity stages (10–20; 25–35; and 35–45 mm in body length) of *Ana. indicus* ( $p < 0.05$ ). Regardless of statistical significance, a relatively higher larvicidal activity was observed at dusk than in dawn. Conclusion. *Ana. indicus*, which is characterized by the highest predation rate, and *P. flavescens* that has the widest geographical distribution within Sri Lanka along with a notable predation efficacy could be recommended as potential candidates for field trials in biological control of dengue outbreaks via suppression of *Ae. aegypti* larvae." (Authors)] Address: Ranathunge, T., Dept of Biosystems Engineering, Fac. Agriculture & Plantation Management, Wayamba Univ. of Sri Lanka, Sri Lanka. E-mail: tharaka.ranathunge@gmail.com

**18577.** Sánchez Estrada, D.M. (2018): Odonatos (Insecta: Odonata) en dos localidades del Valle de Tulancingo-Acaxochitlán, Hidalgo, México. Tesis, Licenciada en Biología, Área Académica de Biología, Instituto de Ciencias Básicas e Ingeniería, Universidad autónoma del Estado de Hidalgo: 64 pp. (in Spanish) ["This thesis describes a list of the order Odonata, which was carried out from June 2015 to April 2016, in two localities of Acaxochitlán of the Tulancingo Valley in the state of Hidalgo, Mexico; in a lentic and lentic environment. In addition, the occurrence of the different species was related to the following physical-chemical variables of the water: temperature, pH, dissolved oxygen and turbidity. They were collected and/or censused by the 50-meter transect method. A total of 313 individuals from 20 species. The most common species for adults and naiads were those of the family Coenagrionidae. The species accumulation curves describe an almost complete sampling for both ages. The results indicated a low correlation of the occurrence of species with the variables physical-chemical properties of water. This study pays for the lack of faunistic works for the and for the state of Hidalgo. More samples are required at the local level to understand the total number of species, as well as their link with environmental variables. Translated with www.DeepL.com/Translator]] Address: not stated

**18578.** Schiesari, L.; Sgambatti Monteiro, A.; Ilha, P.; Pope, N.; Tadeu Corrêa, D. (2018): The ecology of a system of natural mesocosms: Rock pools in the Atlantic Forest. *Freshwater Biology* 63(9): 1077-1087. (in English) ["1. The methodological trade-off between the realism of natural systems and the tractability of artificial systems has led ecologists to praise the qualities of natural micro. and mesocosms as an ideal means for investigating the processes that organise biological communities. Among the different types of naturally occurring micro. and mesocosms, clusters of rock pools combine a global distribution with the simplicity, replicability, tractability and structural homogeneity that are desirable in model experimental systems. However, critical geographical data gaps in the study of rock pools must be filled if ecologists are to use these as global model systems in community ecology. 2. In a year-long study of a cluster of 181 rock pools in the Atlantic Forest of eastern Brazil, we conducted the first study on the ecology of freshwater rock

pool communities in the entire Neotropical region, to the best of our knowledge. Building on published descriptions of the factors that drive community assembly within rock pools, we tested the hypotheses (1) that the effects of environmental factors prevail over those of spatial factors and (2) that pool volume and secondarily species interactions between consumers (anuran larvae), resources (leaf litter) and predators (dragonfly larvae) have a dominant role in driving species patterns of occurrence and abundance. 3. Our hypotheses were generally supported as community structure was clearly influenced by the environmental characteristics of individual pools, and not to the spatial relations among them. Pool volume had a consistent, positive influence on the probability of occurrence of dragonflies and tadpoles of three anuran species, possibly through the influence of volume on hydroperiod. However, the species most strongly associated with larger pools were not those with longer times until metamorphosis, but those with larger egg clutches. In addition, species occurrences were positively associated with resource availability as measured by leaf litter mass (significantly so for *Rhinella* and dragonflies). These observations suggest that within these severely confined freshwater systems, indicators of environmental stability and reduced intraspecific competition could be important ultimate criteria for oviposition site selection. 4. The ease of sampling and manipulating the rock pools at our Atlantic Forest site combined with the observation that these pools are governed by some of the same factors influencing community organisation in other rock pool systems around the world reinforces the merit of the system as a means to conduct global comparative studies of the ecology of communities and meta-communities." (Authors)] Address: Schiesari, L., Escola de Artes, Ciências e Humanidades, Universidade de São Paulo, São Paulo, Brazil. Email: lschiesari@usp.br

**18579.** Schmidt Dalzochio, M.; Périco, E.; Renner, S.; Sah-lén, G. (2018): Effect of tree plantations on the functional composition of Odonata species in the highlands of southern Brazil. *Hydrobiologia* 808: 283-300. (in English) ["Changes in biodiversity have mainly been assessed using taxonomical diversity indices. Although these approaches contribute to the scientific understanding of species richness and composition patterns, trait-based metrics may be more useful for detecting responses to land use change. We used odonates as a model system to compare traits composition in mixed ombrophilous forest (MOF) and tree plantations: exotic species (*Pinus* sp.) and native species (*Araucaria angustifolia*). Our goal was to understand and compare how each vegetation type affects the selection of species traits, and which factors are responsible for the presence of the species in the environment. We recorded 36 Odonata species distributed across 14 functional groups. The functional composition varied between MOF and exotic tree plantations and was similar between these two habitats and native tree plantations. Native forest favoured specialist traits. Our results suggest that the conversion of MOF to tree plantations, especially exotic ones, results in a shift to less specialized Odonata communities with altered functional group composition. This result highlights the negative impact



associated with the conversion of native forests into exotic plantations. Our results show that odonates with specialist traits are limited to natural forest sites, which makes the conservation of such areas crucial." (Authors)] Address: Schmidt Dalzochio, Marina, Ecology and Evolution, University of Vale do Taquari, UNIVATES, Lajeado, Brazil

**18580.** Schmidt-Jeffris, R.A.; Nelson, J.C. (2018): Gotta Catch 'Em All!: Communicating Entomology with Pokémon? *American Entomologist* 64(3): 159-164. (in English) ["In 2012, an article was published in *American Entomologist* regarding the influence of rhinoceros beetles on Akihabara culture (Hoshina and Takada 2012). However, one critical game was missing from their discussion: Pokémon. With the advent of Pokémon GO, an augmented reality-based cell phone app released in the U.S. on 6 July 2016, the Pokémon craze is once again in the limelight, and this presents a unique opportunity for entomologists and science educators to increase student interest in natural history." (Authors)] Address: Schmidt-Jeffris, R.A., Coastal Research & Education Center, Clemson Univ., Charleston, SC 29414-5329, USA

**18581.** Schröder, R.; Linkem, C.N.; Rivera, J.A.; Butler, M.A. (2018): Should I stay or should I go? Perching damselfly use simple colour and size cues to trigger flight. *Animal Behaviour* 145: 29-37. (in English) ["Highlights: •We examined how flying insects respond to visual stimuli in a natural environment. •*Megalagrion xanthomelas* damselflies used colour and size cues to trigger pursuit. •They attacked small beads of socially relevant colours and avoided large beads. •The retina spatial resolution is  $0.82^\circ$ , but the object detection threshold is  $0.34^\circ$ . •The damselfly's stereopsis range is estimated to be  $\sim 17.5$  cm. Abstract: How do flying insects correctly respond to visual stimuli in complex natural environments? The spectacular coloration of some orders suggests that colour cues are important. Size may contain useful information as well, but insects are limited in resolving fine spatial detail due to the structure of their compound eyes. Although there have been many studies of experimentally altered body colour and pattern, we know surprisingly little about simple, isolated cues that insects use to take off after objects. Specifically, whether it is colour, size or some combination that triggers pursuit. We presented artificial bead stimuli of varying colours and sizes to perching males of the Hawaiian orangeblack damselfly *Megalagrion xanthomelas* in their natural forested stream habitat. Damselflies were most vigorously responsive to conspecific colours – attacking red (males) and tracking brown (females). Other colours with lesser biological relevance inspired lower response rates. Interestingly, size strongly modulated responses, whereby attack responses towards the smallest bead sizes transitioned to tracking or avoidance at the larger bead sizes. Although small beads are inherently more difficult to see, they triggered responses from greatest distances, even beyond the calculated stereopsis range of 17.5 cm. Damselflies had an object detection threshold of  $0.34^\circ$  within a high-resolution frontally directed acute zone with an interommatidial angle of  $0.82^\circ$ . We found evidence that size and colour serve as discrimination filters to efficiently identify

objects of interest while ignoring visual noise. Simple schemes for object discrimination may help to explain how insects can differentiate among prey and conspecifics, and why multiple species can exist in the same community despite being similar in colour. We discuss implications for visual capabilities, and how visual systems that can readily discriminate size and colour can contribute to extraordinary phenotypic diversity." (Authors)] Address: Butler, M.A., Dept of Biology, Univ. of Hawaii, 2538 McCarthy Mall, Honolulu, HI 96822, U.S.A. E-mail address: mbutler@hawaii.edu

**18582.** Seehausen, M. (2018): On collections of Odonata from the Lao People's Democratic Republic, with three new records. *Notulae odonatologicae* 9(2): 37-49. (in English) ["Collections of Odonata from the Lao PDR held at the Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main, Germany, the Museum Wiesbaden, Germany, and the Oberösterreichisches Landesmuseum Linz, Austria, were examined. Altogether 143 specimens of 47 species (26 Zygoptera, 21 Anisoptera) were examined. *Lestes dorothea*, *Nychogomphus lui* and *Tramea basilaris* are reported from the Lao PDR for the first time and their characters are briefly discussed. Records of *Caliphaea thailandica*, *Asiagomphus xanthenatus*, *Leptogomphus baolocensis* and *Macromia pinratani* are briefly discussed. Illustrations of the male appendages of *L. dorothea*, of the male appendages, secondary genitalia as well as the penis of *N. lui*, of the male secondary genitalia of *T. basilaris* and of the female valvula vulvae of *Macromia pinratani* are provided." (Author)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**18583.** Seehausen, M. (2018): Ergebnisse der Costa Rica-Expedition des Übersee-Museums Bremen im Jahr 1971. *Libellen (Insecta: Odonata). TenDenZen 2014 (2018), Jahrbuch XXII, Übersee-Museum Bremen: 98-102.* (in English) ["The Odonata collected during the expedition of the Übersee-Museum Bremen to Costa Rica in 1971 was just now determined and catalogued. Altogether 42 specimens could be assigned to 20 species. All of them are well known from Central America. *Ischnura capreolus*, *Cannaphila insularis* and two specimens of *Erythodiplax umbrata* at Barra del Colorado were collected during a light-trap sampling." (Author)] Address: Seehausen, M., Boddenweg 12, 18439 Stralsund, Germany. E-mail: m.seehausen@gmx.de

**18584.** Seehausen, M.; Pinto, R.M.; Trainor, C.R.; Potenzo Lopes, J. (2018): Further records of Odonata from Timor Island, with the first photographs of living *Nososticta impercepta* (Odonata: Platycnemididae) and additional records from Rote and Romang Islands. *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 25: 1-73. (in English) ["We present an annotated list of 28 Odonata species (19 Anisoptera, 9 Zygoptera) from Timor Island based on 464 records via photographs and 56 specimens held in collections at the Museum and Art Gallery of the Northern Territory, Darwin, Australia and the Museum Wiesbaden, Germany. Additionally 43 records of eight species (7 Anisoptera,

1 Zygoptera) from Rote Island and one record from Romang were reported. Most Timorese records are from Oecusse Special Administrative Region/Timor-Leste, a region which to date was "terra incognita". Further records from Timor-Leste are predominantly from Lautem Municipality and Baucau Municipality as well as from the Indonesian Kupang Regency. Four species are new records for Timor Island increasing the checklist to 40 species: *Brachythemis contaminata* (Fabricius, 1793), *Tholymis tillarga* (Fabricius, 1798), *Gynacantha* sp. cf. *dobsoni* Fraser, 1951 and *Ischnura aurora* (Brauer, 1865). We provide the first photographs of live *Nososticta impercepta* Seehausen & Theischinger, 2017 as well as some descriptions of habitats in Oecusse. At Rote Island five species were reported for the first time as well: *B. contaminata*, *Crocothemis servilia* (Drury, 1773), *Rhyothemis phyllis* (Sulzer, 1776), *Macrodiplax cora* (Brauer, 1867) and *Potamarcha* congener (Rambur, 1842). The record of *Orthetrum testaceum* (Burmeister, 1839) from Romang Island appears to be the first Odonata documented from this island. The status of *Rhyothemis phyllis* is discussed with regard to the ssp. *ixias* Lieftinck, 1953 from the islands of Sumba and Flores. We provide distribution maps of each species as well as suggestions for targeted field research in the future. All historical records of *Nososticta selysii* (Förster, 1896) from Timor are now assigned to *N. impercepta*." (Authors)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**18585.** Shaikh, J.; Baloch, N.; Bughio, B.A.; Ahmed, A.A.; Muntha, S. (2018): Morphometric study of Dragonflies inhabiting in district Matiari Sindh. University of Sindh Journal of Animal Sciences 2(4): 20-25. (in English) ["Research article should aim to observed morphometric study of dragonflies which inhabited in district Matiari. During study period many surveys were conducted from 02 talukas included (Saeedabad and Hala) district Matiari is an extravagant amount of minute district of Sindh that's why it is withal included in taluka as well. Survey were commenced from monsoon season which is commences from August up to mid of September. During survey total 381 specimens comprising 213 males and 168 females were amassed. All specimens exhibiting some key transmutations in their morphological description." (Authors)] Address: Shaikh, J., Dept of Zoology, University of Sindh, Jamshoro, Pakistan

**18586.** Shkëmbi, E.; Gerken, B.; Pepa, B.; Këçaj, H.; Misja, K.; Paparisto, A. (2018): Contribution to the knowledge of Odonata from Vjosa catchment. Acta Zoo.Bot. Austria 155: 239-250. (in English, with German summary) ["The Vjosa River in Albania carries pan-European and global significance. It represents one of the last intact large river systems in Europe, hosting many different types of ecosystems, from the narrow gorges in the upper part, to the wide, braided river sections in the middle part, to the near natural delta in the Adriatic Sea. These ecosystems include aquatic, semi-aquatic and semi-terrestrial habitats, and also include vital terrestrial foraging habitats near the river, in the still predominantly traditionally cultivated landscape. Imagines of

Odonata act as ecosystemconnecting faunal elements – a fact which enhances their meaning as bioindicators. Very few studies for the area exist so far, but these few underscore the importance of the river valley as Albania's biodiversity hotspot, providing ideal aquatic habitats for numerous species. Here, we will discuss the Odonata species based on the analysis of existing research data and on the results of our expeditions to the Vjosa habitats during 2015–2017. In total, 22 Odonata species were found, 9 belonging to the Zygoptera and 13 to the Anisoptera. The species were recorded both as imagines and partly as exuviae. 10 species (*Pyrrhosoma nymphula*, *Ceriagrion tenellum*, *Coenagrion ornatum*, *Sympecma fusca*, *Sympetrum fonscolombii*, *S. vulgatum*, *S. striolatum*, *Aeshna mixta*, *Crocothemis erythraea*, *Libellula quadrimaculata*) are reported for the first time in this area. Based also on data reported in the literature, the total checklist now increases to 28 species known for the Vjosa watershed so far; all 28 species belong to Annex II (IUCN, 2010); *Cordulegaster heros* is classified as NT (Near Threatened) according to the IUCN, the EU27 red list and the European red list, and as VU (Vulnerable) according to the Mediterranean red list. *Caliaeschna microstigma* and *C. ornatum* are classified as very rare and endangered at all current sites (according to Annex II they are considered strictly protected faunal elements, are listed as LC (Least Concern) according to the IUCN, but as NT according to the EU27 red list, European red list, and the Mediterranean red list. *Calopteryx splendens* is classified as VU according to Mediterranean red list and as LC according to the others. The total number of species recorded for the Vjosa watershed is nearly half of the Odonata species found in Albania (70 species based on our data). The Vjosa floodplain system is therefore one of the richest ecosystems regarding Odonata of Albania and the Balkan region." (Authors)] Address: Shkëmbi, Enilda, Tirana Univ., Fac. Nat. Sci., Dept of Biology, Albania. E-mail: enilda07@gmail.com

**18587.** Siepielski, A.M.; McPeck, S.J.; McPeck, M.A. (2018): Female mate preferences on high dimensional shape variation for male species recognition traits. Journal of Evolutionary Biology 31(8): 1239-1250. (in English) ["Females in many animal species must discriminate between conspecific and heterospecific males when choosing mates. Such mating preferences that discriminate against heterospecifics may inadvertently also affect the mating success of conspecific males, particularly those with more extreme phenotypes. From this expectation, we hypothesized that female mate choice should cause *Enallagma* females (Odonata: Coenagrionidae) to discriminate against conspecific males with more extreme phenotypes of the claspers males use to grasp females while mating – the main feature of species mate recognition in these species. To test this, we compared cerci sizes and shapes between males that were captured while mating with females to males that were captured at the same time but not mating in three *Enallagma* species. In contrast to our hypothesis, we found only one of forty comparisons of shape variation that was consistent with females discriminating against males with more extreme cerci shapes. Instead, differences in cerci shape

between mating and single males suggested that females displayed directional preferences on 1-4 aspects of cerci shape in two of the species in our samples. These results suggest that while some directional biases in mating based on cerci shape occur, the intraspecific phenotypic variation in male cerci size and shape is likely not large enough for females to express any significant incidental discrimination among conspecifics with more extreme shapes." (Authors) *Enallagma ebrium*, *E. geminatum*, *E. hagenij* Address: Mc-Peek, M.A., Dept Biol. Sci., Dartmouth College, Hanover, NH 03755, USA. E-mail: mark.mcpeek@dartmouth.edu

**18588.** Sigutova, H.; Sigut, M.; Dolny, A (2018): Phenotypic plasticity in specialists: How longspined larval *Sympetrum depressiusculum* (Odonata: Libellulidae) responds to combined predator cues. *PLoS ONE* 13(8): e0201406. 15 pp. (in English) ["Phenotypic plasticity is a common defensive strategy in species experiencing variable predation risk, such as habitat generalists. Larvae of generalist dragonflies can elongate their abdominal spines in environments with fish, but long spines render larvae susceptible to invertebrate predators. Long-spined specialists adapted to fish-heavy habitats are not expected to have phenotypic plasticity in this defence trait, but no empirical studies have been undertaken. Moreover, in comparison to prey responding to multiple predators that induce similar phenotypes, relatively little is known regarding how species react to combinations of predators that favour opposing traits. We examined plasticity of larval dragonfly *Sympetrum depressiusculum*, a long-spined habitat specialist. In a rearing experiment, larvae were exposed to four environments: (i) no predator control, (ii) fish cues (*Carassius auratus*), (iii) invertebrate cues (*Anax imperator*), as well as (iv) a combination of (ii) and (iii). Compared with the control, fish but not invertebrate cues resulted in longer spines for two (one lateral, one dorsal) of the six spines measured. Interestingly, the combined-cue treatment led to the elongation of all four dorsal spines compared with the fish treatment alone, whereas lateral spines showed no response. Our experiment provided evidence of morphological plasticity in a long-spined specialist dragonfly. We showed that nearly all spines can elongate, but also react differently under specific predator settings. Therefore, while spine plasticity evolved in direct response to a single predator type (fish), plasticity was maintained against invertebrate predators as long as fish were also present. Selective spine induction under the combined condition suggests that *S. depressiusculum* can successfully survive in environments with both predators. Therefore, phenotypic plasticity may be an effective strategy for habitat generalists and specialists. Although more studies are necessary to fully understand how selection shapes the evolution of phenotypic plasticity, we demonstrated that in dragonflies, presence or absence of a specific predator is not the only factor that determines plastic defence responses." (Authors)] Address: Sigutova, Hana, Institute of Environmental Technologies, Faculty of Science, Univ. of Ostrava, Ostrava, Czech Republic. E-mail: hana.sigutova@osu.cz

**18589.** Silva, L.; Machado, F.; Resede, D.; Neiss, U.G.

(2018): Immature Odonata community in streams: diversity, season variation and habitat preference in different levels of degradation. *North-Western Journal of Zoology* 14(2): 232-236. (in English) ["The immature Odonata community is used to diagnose and monitor impacts on aquatic environments. Degraded environments, with a wide range of environmental variables, usually present highly resilient species. Here we present a highly diverse immature Odonata community, collect with great sample effort. In doing so, we were able to show that these altered and natural environments have similar immature Odonata communities, and pH was the only abiotic variable affecting the system and the community. The community also changes with seasonal variation, because rains modify the river flow. Furthermore, the ecological integrity of the streams was influenced by anthropogenic activities, changing the dynamics of the Odonata communities. Two genera, *Brechmorhoga* and "Unidentified genus 1", are indicators of altered environments, so they can be used as bioindicator in others monitoring environmental evaluations." (Authors)] Address: Silva Larissa, Depto de Biol., Univ. Fed. de Lavras, Campus Universitário, Cep: 37.-200.000, MG, Brasil. E-mail: larissamg05@hotmail.com

**18590.** Silva Mendonça, S.; Alcântara Santos, A.C.; Marques Martins, M.; Gerson Araújo, F. (2018): Size-related and seasonal changes in the diet of the non-native *Cichla kelberi* Kullander & Ferreira, 2006 in a lowland reservoir in the southeastern Brazil. *Biota Neotropica* 18(3): 8pp. (in English, with Portuguese summary) ["We examined size-related and seasonal changes in the diet of the peacock bass *Cichla kelberi* in a tropical lowland reservoir in southeastern Brazil over three hydro-climatic seasons: summer (high rainfall and temperature), winter (low rainfall and temperature), and late spring (increasing rainfall and temperature) during two years (2006-2007). The tested hypothesis is that this non-native predator fish changes diet during the subadult and adult phases and among seasons to adapt in new colonized environment. Fishes of the families Clupeidae (*Platanichthys platana*), Characidae (*Astyanax* spp.) and Cichlidae (*Cichla kelberi*) were the most important food items, followed by insects of the order Odonata. Cannibalism was also recorded for the largest individuals. A significant size-related change in diet was found with the smallest individuals (Total Length, TL < 20 cm) preying mainly on fishes, whereas the larger individuals (TL > 30 cm) preyed mainly on Odonata. The niche breadth increased during growth, with the largest individuals having a diet more evenly distributed among the available resources. No significant seasonal differences in diet composition were found, but stomachs with higher degree of volume occupied by food were more frequent in late spring than in summer. Conversely, the highest niche breadth was found during the summer compared to the other seasons. Together, these observations suggest an efficient use of the available resources by this top predator in this new colonized system." (Authors)] Address: Alcântara Santos, A.C., Univ. Fed.I Rural do Rio de Janeiro, Rodovia BR 465, Km 07, Campus Universitário, 23890-000, Seropédica, RJ, Brasil

**18591.** Siregar, A.Z.; (2018): Ecological studies of Odonata

population in northern Sumatra, Indonesia. Conference Series: Agricultural & Natural Resources (ANR) 1(2): 34-41. (in English) ["Ten ha rice field plot in three sites in Manik Rambung Rice Field (MRRF), Simalungun District, North of Sumatera (latitude: 2°53' 52.8"N and longitude: 99° 00'24.4"E, about 90 km from Medan City at 594 . 602 masl) were recorded of Odonata population. The farmers have rice culture practices, combine with fish farming during season paddy planting. The comparison was conducted which nine stations of green Campus areas with purposive random sampling in a month (1. - 28. XI. 2011) using sweep net (400 im mesh, 60cm x 90cm) which six swings started from 0900 to 1200 for collection of Odonata. The results were collected 445 individuals from Zygopteran and 892 individuals from Anisoperan, 3 families, and 19 species of adults Odonata ... Coenagrionidae were dominant by *Agriocnemis femina*, *A. pygmaea*, and *Ischnura senegalensis*. Only *Ictinogomphus decoratus* recorded from Gomphidae and 11 species from Libellulidae. While two suborder, 4 families, 26 genera, 31 species and 436 individuals of Odonata identified in green campus, USU, Sumatera Utara, Indonesia. In MRRF, the ecological indices were calculated with score  $H'$  (0.88 . 2.50), Index Simpson (1-D) recorded were 0.49 until 0.99, while index Jaccard with 0.60-1.00. While Diversities indices Shannon and Evenness Pilon of Odonata in Campus USU was lower recorded in Station 7 and Station 1, while the highest were collected in Station 3 and Station 6. The diversities and evenness Odonata species were varied ( $H'$ =2.20-3.42 and  $E$ =0.55-0.78). Comparison to the evenness and richness of Odonata species in each stations were differences, which effected by natural habitat, heterogenous vegetations of plants, time and weather while taken sampling, biotic, physics, and chemicals factors in environmental system are varied." (Author)] Address: Siregar, Ameilia, Fac. Agrocotec., Univ. Sumatera Utara, Medan-20155, Indonesia. E-mail: zuliyanti@yahoo.com

**18592.** Starr, S.M. (2018): The effects of land use and climate change on Playa wetlands and their invertebrate communities. Ph.D.thesis, Biology, Dept Biological Sciences, Texas Tech University: XIII + 129 pp. (in English) ["Climate and land-use changes are the primary threats to playa wetlands and their invertebrate communities. Playas are ephemeral, depressional wetlands that are the primary form of surface water in the Southern High Plains of North America, an area that has experienced recent land-use changes that may affect playas. I used remotely sensed imagery to assess changes in land use in five categories (agriculture, rangeland/grassland, fallow, developed, and water) and playa inundation in Texas on six dates during the late growing season over 23 years. A decrease in the number of wet playas was observed over that span, and significant differences among land uses were found between and within years around dry and wet playas. Mean patch size and overall area of rangeland/grassland increased over time, possibly due in part to conservation efforts in the area. Other land-use types consequently decreased, but agriculture remained one of the dominant land-use types throughout. Because playas are crucial habitats, these changes have likely

affected regional biodiversity. Playa-associated biodiversity is largely comprised of birds, amphibians, and invertebrates. *Enallagma civile* was selected as a model organism to study the effects of environmental changes on playa invertebrates. Odonates are good model organisms to study ecological and evolutionary concepts because of their amphibious life history, which makes them sensitive to both aquatic and terrestrial environmental changes. *Enallagma civile* is a habitat generalist with a widespread distribution throughout the New World that has been underutilized in research. I summarized its life history and described lab husbandry techniques in an overview of the species as a potential model organism for studies on environmental subjects like climate change effects on elevated water temperature. Current climate change predictions estimate increased air temperatures across the Southern High Plains, putting many organisms at risk from environmental changes affecting nymph and adult life stages. Increased air temperatures can lead to elevated water temperatures, but experiments are lacking on responses in terms of development or survival. *Enallagma civile* was used to examine these effects. Eggs were collected and reared under four water temperature regimes (26, 32, 38, and 41°C). Nymph body measurements after molts, development rate, and deaths were recorded daily. Nymphs in the two hotter treatments were smaller and had lower survivorship whereas individuals in the cooler temperatures generally survived to adulthood and were larger. Individuals reared at 32°C emerged the quickest, going from egg to adult in 26 days. Elevated temperatures can thus be both advantageous and detrimental, causing concern for aquatic invertebrates in the future. In conclusion, these studies have demonstrated how land-use and climate changes are threats to playa wetlands and biota. With rangeland/grassland increasing over time, the frequency of playa wetland inundation may continue to decrease due to interactions between land use and overland water flow during precipitation events. With decreases in playa inundation frequencies and effects of climate change, playa invertebrate communities are threatened due to infrequent standing water and elevated water temperatures. By understanding how land-use and projected climate changes are currently effecting playa wetlands, it will allow for better comprehension and management of current and future alterations." (Author)] Address: Starr, S.M., Dept of Biological Sciences, Texas Tech University, Lubbock, TX 79409-3131, USA

**18593.** Start, D.; McCauley, S.; Gilbert, B. (2018): Physiology underlies the assembly of ecological communities. Proceedings of the National Academy of Sciences 115(23): 6016-6021. (in English) ["Significance: Ecology aims to understand the distribution of species and the processes that assemble communities. One common strategy is to use species traits to predict interaction with the abiotic and biotic environment, thus gaining an understanding of ecological communities. Here, we show that considering causal relationships among physiological and behavioral traits can help elucidate patterns of species distribution and community assembly in larval dragonflies across ponds differing in predation risk. Beyond a conceptual understanding of trait causality,



we also show a striking ecological pattern: the activity of two biomolecules accounts for >80% of the variation in community composition. Together, our conceptual framework and demonstration of a strong ecological pattern suggest that causal relationships are key to advancing trait-based community ecology. Abstract: Trait-based community ecology promises an understanding of the factors that determine species abundances and distributions across habitats. However, ecologists are often faced with large suites of potentially important traits, making generalizations across ecosystems and species difficult or even impossible. Here, we hypothesize that key traits structuring ecological communities may be causally dependent on common physiological mechanisms and that elucidating these mechanisms can help us understand the distributions of traits and species across habitats. We test this hypothesis by investigating putatively causal relationships between physiological and behavioral traits at the species and community levels in larvae of 17 species of dragonfly that co-occur at the landscape scale but segregate among lakes. We use tools borrowed from phenotypic selection analyses to show that physiological traits underlie activity rate, which has opposing effects on foraging and predator avoidance behaviors. The effect of activity on these behaviors ultimately shapes species distributions and community composition in habitats with either large-bodied fish or invertebrates as top predators. Remarkably, despite the inherent complexity of ecological communities, the expression of just two biomolecules accounts for a high proportion of the variation in behavioral traits and hence, dragonfly community composition between habitats. We suggest that causal relationships among traits can drive species distributions and community assembly." (Authors)] Address: Start, D., Dept of Ecology & Evolutionary Biology, University of Toronto, Toronto, ON, M5S3B2, Canada

**18594.** Stauer, M.; Pöchlacker-Florian, H. (2018): Erste aktuelle Reproduktionsnachweise der Östlichen Moosjungfer (*Leucorrhinia albifrons*) und der Zierlichen Moosjungfer (*Leucorrhinia caudalis*) aus Wien mit Beiträgen zur Phänologie in Ostösterreich (Odonata: Libellulidae). Beiträge zur Entomofaunistik 19: 95-110. (in German, with English summary) ["Since the turn of the millennium there have been single records of adult males of the Dark Whiteface *Leucorrhinia albifrons* (Burmeister, 1839) and the Lilypad Whiteface *Leucorrhinia caudalis* (Charpentier, 1840) in Eastern Austria. In May 2018 the reproduction of both species could be proved at an oxbow in the Lobau, the Viennese part of the Donau-Auen National Park (Natura 2000 Danube Floodplains). Earlier findings indicate that the first population of *L. caudalis* throughout Austria for about hundred years already colonized the Lobau in 2015. For *L. albifrons* the Mühl. and Tischwasser complex currently represents the only breeding site outside Carinthia. Furthermore the Yellow-spotted Whiteface *Leucorrhinia pectoralis* (Charpentier, 1825) has spread significantly in the area in recent years. From May 8th to June 23rd 2018, 97 exuviae of *L. albifrons*, two of *L. caudalis* and one of *L. pectoralis* were collected on a shore length of about 15 meters. Within the emergence of *L. albifrons* the sex ratio was female dominated with only 42.1 %

male exuviae. First adult imagines of *L. caudalis* and *L. pectoralis* appeared already on May 6th and May 7th, respectively, followed by *L. albifrons* from May 12th onwards at the reproduction site. The phenology of these species in Eastern Austria, possible migration routes and potential threats are discussed." (Authors)] Address: Pöchlacker-Florian, Helga, Arneithgasse 85, 1160 Wien, Austria. E-Mail: helga\_florian@hotmail.com

**18595.** Stewart, S.S. (2018): Phenotypic plasticity: temporal, spatial, and behavioral effects on wing morphology of damselflies in Central Texas. Ph.D. thesis, Baylor University. Dept. of Biology: XIV, 90 pp. (in English) ["In winged animals, flight morphology must be adapted for optimum behavioral efficiency. Behaviors such as foraging, predator avoidance, and mating are strongly influenced by wing morphology and influenced by environmental conditions in many species. Geometric morphometric methods analyze and visualize subtle variations in wing shape. This study examined environmental and behavioral effects on wing shape and wing size in both sexes of multiple damselfly species over several flight seasons in central Texas. Wing size is a proxy for body size of damselflies. For *Argia sedula*, comparisons were made 1) between adults collected early in the season versus those collected late in the season, 2) between adults collected at different locations, and 3) among adults collected during several flight seasons at the same locations. Significant differences in wing shape and size occurred between seasons and between years, but not between locations. Using these findings, I broadened this study to examine temporal effects on wing size and wing shape of both sexes in eight damselfly species. Analyses indicated significant differences in wing shape and wing size between early and late flight seasons in every comparison, including seven populations of four species. Damselflies emerging early in the flight season were significantly larger than those emerging later in the flight season. In contrast, significant shape and size differences between years occurred in only one of six species. Finally, I examined wing morphology associated with gender by comparing 1) mated and unmated damselflies of both sexes from three species, and 2) males and females from ten species. Significant differences in wing shape and size occurred between mated and unmated damselflies in one of nine populations sampled. As expected, significant differences in wing shape and wing size occurred between males and females in nineteen of the twenty comparisons made from ten species. These results suggest that differences in seasonal and annual environmental conditions frequently influence wing shape and body size in both sexes of multiple damselfly species. This work presents an original, comprehensive study of environmental and behavioral effects on wing morphology using geometric morphometric techniques." (Authors) *Hetaerina americana*, *Argia moesta*, *A. nahuana*, *A. sedula*, *Enallagma basidens*, *E. civile*, *Ischnura hastata*, *I. posita*] Address: not stated

**18596.** Stewart S.S.; Vodopich, D.S. (2018): Environmental effects on wing shape and wing size of *Argia sedula* (Odonata: Coenagrionidae). International Journal of Odonatology

21(3-4): 189-203. (in English) ["Well-adapted flight morphology must allow for efficient behavioral activities. Wing shape has been shown in a variety of species to be influenced by environmental conditions. Analysis of wing shape using geometric morphometrics provides a visualization of wing shape variations. This study examined the effects of varied environments on wing shape and wing size of the damselfly *Argia sedula* in central Texas. Comparisons were made (1) between populations collected early in the flight season versus those collected late in the flight season; (2) between populations collected at different locations, and (3) among populations collected from the same locations during several annual flight seasons. We found widespread differences in both wing shape and body size in males and females among most environments examined. Male and female damselflies collected early varied significantly from those collected late in the flight season for all locations and years sampled. Damselflies emerging early in the flight season were significantly larger than those emerging late in the season. Significant differences in wing shape and size occurred in comparisons of male and female damselflies collected in different years at the same location. In comparing damselflies collected at different locations, neither females nor males varied significantly in wing shape. Size varied in only one male comparison between locations. Our results suggest that differences in seasonal and year-to-year environmental conditions, but not geographical location, frequently influence wing shape and wing size in *A. sedula*, and quite possibly in other damselfly species." (Authors)] Address: Stewart, Sherry, Department of Biology, Baylor University, Waco, Texas 76798-7388, USA. E-mail: Sherry\_Stewart@baylor.edu

**18597.** Sugita, N.; Agemori, H.; Goka, K. (2018): Acute toxicity of neonicotinoids and some insecticides to first instar nymphs of a non-target damselfly, *Ischnura senegalensis* (Odonata: Coenagrionidae), in Japanese paddy fields. *Applied Entomology and Zoology* 53: 519-524. (in English) ["Systemic insecticides such as neonicotinoids and fipronil are widely applied in rice production. These insecticides have been suspected of reducing biodiversity in paddy ecosystems and reducing wild dragonfly populations in Japan. Conventional ecotoxicological risk assessment could not confirm this, as it has not considered interspecific variation in sensitivity to insecticides. We estimated the median effect concentration (EC50) of 15 systemic insecticides to first instar nymphs of a Japanese damselfly, *Ischnura senegalensis*, commonly found in rice paddy fields. Damselflies were found to be highly sensitive to pyrethroid pesticides, less so to phenylpyrazole, organophosphates, and carbamates, and least sensitive to neonicotinoids, nereistoxin, and diamide. Given the acute toxicity data, the sensitivity of the damselfly to neonicotinoids was considered to be lower than that of other aquatic insects, whereas the EC50 values of the damselfly were 2–3 orders lower than that of *Daphnia magna* Straus (Diplostraca: Daphniidae), which is a standard test species. These results indicate that the conventional ecological risk assessment based on acute toxicity data of *D. magna* would underestimate the impact of neonicotinoids on Odonata diversity in paddy ecosystems. We

therefore recommend using the paddy-dwelling damselfly as a new test species for insecticide bioassay." (Authors)] Address: Sugita, N., Center for Environmental Biology and Ecosystem Studies, National Institute for Environmental Studies, Tsukuba, Japan

**18598.** Sun, Z.; Brittain, J.E.; Sokolova, E.; Thygesen, H.; Saltveit, S.J.; Rauch, S.; Meland, S. (2018): Aquatic biodiversity in sedimentation ponds receiving road runoff – What are the key drivers? *Science of the Total Environment* 610–611: 1527-1535. (in English) ["Highlights: • Investigated the impact of environmental factors on aquatic biodiversity in ponds. • Used multivariate statistical methods on data collected in twelve ponds over a year • The most important factors were metals, chloride, phosphorus, and pond size. • Larger sedimentation ponds host more taxa than smaller ponds. • Sedimentation ponds have the potential to contribute to aquatic biodiversity. Abstract: Recently, increased attention has been paid to biodiversity conservation provided by blue-green solutions such as engineered ponds that are primarily established for water treatment and flood control. However, little research has been done to analyse the factors that affect biodiversity in such ponds. The purpose of this study was to evaluate the influence of environmental factors on aquatic biodiversity, mainly macroinvertebrate communities, in road sedimentation ponds in order to provide a foundation for recommendations on aquatic biodiversity conservation. Multivariate statistical methods, including unconstrained and constrained analysis, were applied to examine the relationships between organisms and the water quality as well as physical factors (including plant cover). Stepwise multiple regressions indicated that the most important variables governing the variation in the biological community composition were pond size, average annual daily traffic, metals, chloride, distance to the closest pond from study pond, dissolved oxygen, hydrocarbons, and phosphorus. The presence of most taxa was positively correlated with pond size and negatively correlated with metals. Small ponds with high pollutant loadings were associated with a low diversity and dominated by a few pollution tolerant taxa such as oligochaetes. A comprehensive understanding of impacts of various environmental factors on aquatic biodiversity is important to effectively promote and conserve aquatic biodiversity in such sedimentation ponds. Our results indicate that road sedimentation ponds should be designed large enough, because large ponds are likely to provide a more heterogeneous habitat and thus contain a species rich fauna. In addition, larger ponds seem to be less contaminated due to dilution compared to smaller ponds, thereby maintaining a higher biodiversity. Finally creating some additional ponds in the vicinity of the sedimentation ponds in areas with few water bodies would increase the connectivity that facilitates the movement of invertebrates between ponds." (Authors) Odonata were identified to family level.] Address: Meland, S., Norwegian Institute for Water Research (NIVA), Gaustadalléen 21, 0349 Oslo, Norway

**18599.** Takaki, Y. (2018): Influence on the organism forms cognition grade in early childhood course students by the

insectphobia. Research Bulletin of Kindai University Kyushu Junior College 48: 65-76. (in Japanese, with English summary) ["Influence on the grade of organism form cognition by the insectphobia was investigated in early childhood course students. The definite decline of the organism form cognition grade in the three insects (ant, dragonfly, spider) was not seen in five years. On the other hand, in same five years, the ratio of students of the insectphobia increased. The organism form cognition grades of the students of the insectphobia tended to lower, and it was shown that the grades of organism form cognition became higher so that the kinds of the insect to touch increased. To train childminders being able to do appropriate correspondences when a child met an insect, it is necessary to change the negative consciousness for the insect of the students and to let students acquire the power of observation to notice small points.] Address: not stated

**18600.** Tennesen, K. (2018): Dragonfly nymphs of North America . An identification guide. Springer: 816 pp. (in English) ["This monograph is the first of its kind devoted entirely to the dragonfly nymphs of North America north of Mexico, the focus being accurate identification of the 330 species of Anisoptera that occur in the region. Nymphal external morphology is described and illustrated in detail, and all terms needed to navigate the dichotomous keys are defined. Species are tabulated with references that provide the most detailed, accurate descriptions for each; species that are inadequately described are so indicated. The key separating the seven families in the region contains several new characters. The families are then covered separately: Aeshnidae (13 genera), Gomphidae (17 genera), Petaluridae (2 genera), Cordulegastridae (2 genera), Macromiidae (2 genera), Corduliidae (7 genera), and Libellulidae (29 genera). Each family is further characterized, followed by a generic key. A drawing of the habitus and diagnostic details for each genus are provided, along with additional diagnostic remarks and notes on habitat and life cycle; for each genus, a map shows its geographic distribution in North America. Full-grown nymphs of all known species of each genus are keyed and diagnosed; characters that apply to earlier instars are noted. Morphological variation in character states was analyzed in order to assess the reliability of previously utilized characters and to discover new characters. Most of the characters used to distinguish all levels of taxa are illustrated; a total of 702 figures, comprising 1,800 original drawings, along with selected photographs where necessary for clarity, accompany the keys. Measurements of total length, head width, and other variables for each species are provided in tables. Difficulties with past keys and descriptions, including errors, omissions and other shortcomings, are addressed. The importance of nymph characters in helping solve generic and specific distinctions and their role in phylogenetic studies is emphasized. Methods for collecting, rearing, and preserving dragonfly nymphs and exuviae are presented. The final chapter discusses research opportunities on North American Anisoptera nymphs, including taxonomic needs, studies on structure and function, life history and microhabitat, water quality indices and conservation efforts. The habitus

drawings of all genera are arranged according to family in five plates (Appendix I); although the book is intended as a lab manual, these plates conveniently allow for comparison based on nymph shape making field identification to genus possible in many cases. Appendix II contains a brief history of dragonfly nymph studies in North America. A glossary and an index to scientific names are included." (Publisher)] Address: Tennesen, K.J., Research Associate, Florida State Collection of Arthropods, PO Box 585, Wautoma, WI 54982, USA. E-mail: ktennesen@centurytel.net

**18601.** Thompson, A.L.; Strauss, A.L.; Oberhauser, K.S.; Koomen, M.H.; Andicoechea, J.; Blair, R.B. (2018): Driven to discover: Citizen Science Curriculum Guide: Dragonflies and Odonata Central. University of Minnesota Extension: Saint Paul, Minnesota: 140 pp. (in English) [Manual: <https://conservancy.umn.edu/handle/11299/198622>] Address: not stated

**18602.** Tippler, C.; Wright, I.A.; Davies, P.J.; Evans, C.R. (2018): Are Odonata nymph adversely affected by impaired water quality in urban streams. *Austral Ecology* 43(8): 890-902. (in English) ["Globally 10% of all dragonfly species are threatened by extinction that can be primarily attributed to a loss of natural habitat. Urban expansion and the associated urban stream syndrome has established that the extent and intensity of urban development is directly linked to a range of adverse physical, chemical and ecological changes. Urban waterways typically experience degraded water quality and are occupied by impaired communities of aquatic invertebrates which are mostly dominated by rapid colonizing insects. Odonata are a diverse insect group and their tolerance or sensitivity to urban waterway degradation is unclear. This research examined the response of aquatic macroinvertebrate communities and specifically the Odonata nymph community to impaired water quality and degraded riparian vegetation condition in streams of the Georges River catchment, Sydney, across an urban development gradient. Unlike the overall macroinvertebrate community, Odonata nymph species assemblages were not strongly linked to the urban development gradient nor the degree of degradation in water quality. This result diverges from many aquatic macroinvertebrate studies that have reported a correlation between the response of Odonata taxa to degraded water quality. Our findings conclude that Odonata nymph community alone are not a suitable indicator of urban stream degradation as measured by water quality or catchment imperviousness and that the conservation of urban dragonflies should place a greater focus on the conservation and creation of suitable habitats." (Authors)] Address: Tippler, C., Dept Environ. Sci., Fac. Science & Engineering, Macquarie Univ., Macquarie Park, NSW 2109, Australia. Email: [carl-john.tippler@students.mq.edu.au](mailto:carl-john.tippler@students.mq.edu.au)

**18603.** Tumilovich, O.A. (2018): Formation of odonata-fauna in a pond of the Kaliningrad region. *Scientific journal "News of KSTU"* 51: 35-42. (in Russian, with English summary) ["Dragonflies are amphibiotic insects. Their existence is closely connected with waterbodies suitable for their

reproduction. Newly created artificial ponds serve as new habitats for hydrobiontic and amphibiotic organisms that allow exploring their development dynamics. Dragonflies belong to those insects, which species diversity and abundance strongly depend on the appearance of new waterbodies. Dynamics of dragonflies' colonization in ponds can be considered in both faunistic and ecological aspects. In this way it becomes apparent that formation of the dragonfly fauna of this pond goes through three stages. The first stage is a pioneer. The second stage is stabilization. The third stage is the reduction of the fauna. By the frequency of occurrence within first two years the following three species dominate: *Enallagma cyathigerum*, *Erythromma najas* and *Lestes virens*. Within the third year, the occurrence of *E. cyathigerum* and *L. virens* declines with simultaneous appearance in waterbodies of *Libellula* dragonfly larvae. In addition, the frequency of occurrence of *Aeshna* dragonflies was increasing. Eight years later, we again found a sharp increase in the occurrence of dragonfly larvae *E. cyathigerum*, *L. quadrimaculata*, *Ae. cyanea* and *Ae. grandis* against the background of the phytocenosis that was greatly changed in the direction of simplifying the composition and an increase in aquatic vegetation coverage." (Authors)] Address: Tumilovich Olga Aleksandrovna – State autonomous institution of the Kaliningrad region for additional education of children "Kaliningrad Regional Children and Youth Center for Ecology, Local History and Tourism", Russia. E-mail: Levente@rambler.ru

**18604.** Ubhi, R.; Matthews, P.G.D. (2018): The transition from water to air in aeshnid dragonflies is associated with a change in ventilatory responses to hypoxia and hypercapnia. *Journal of Insect Physiology* 106(3): 172-178. (in English) ["Highlights: •Dragonflies transition from breathing water as nymphs to breathing air as imagoes. •Nymph ventilation is insensitive to aquatic hypercapnia up to 10% CO<sub>2</sub>. •Aquatic hypoxia elicits hyperventilation. •Air-breathing adults show ventilatory responses to both hypoxia and hypercapnia. Abstract: Dragonflies are amphibiotic, spending most of their lives as aquatic nymphs before metamorphosing into terrestrial, winged imagoes. Both the nymph and the adult use rhythmic abdominal pumping movements to ventilate their gas exchange systems: the nymph tidally ventilates its rectal gill with water, while the imago pumps air into its tracheal system through its abdominal spiracles. The transition from water to air is known to be associated with changes in both respiratory chemosensitivity and ventilatory control in vertebrates and crustaceans, but the changes experienced by amphibiotic insects have been poorly explored. In this study, dragonfly nymphs (*Anax junius*) and imagoes (*Anax junius* and *Aeshna multicolor*) were exposed to hypoxia and hypercapnia while their abdominal ventilation frequency and amplitude was recorded. Water-breathing nymphs showed a significant increase in abdominal pumping frequency when breathing hypoxic water (< 10 kPa O<sub>2</sub>), but no strong response to CO<sub>2</sub>, even in severe hypercapnia (up to 10 kPa CO<sub>2</sub>). In contrast, both species of air-breathing imago increased their abdominal pumping amplitude when exposed to either hypoxia or hypercapnia,

but did not show any significant increase in frequency. These results demonstrate that aquatic dragonfly nymphs possess a respiratory sensitivity that is more like other water breathing animals, being sensitive to hypoxia but not hypercapnia, while their air-breathing adult form responds to both respiratory challenges, like other terrestrial insects. Shifting from ventilating a rectal gill with water to ventilating a tracheal system with air is also associated with a change in how abdominal ventilation is controlled; nymphs regulate gas exchange by varying frequency while imagoes respond by varying amplitude." (Authors)] Address: Ubhi, Ramandeep, Department of Zoology, University of British Columbia, Vancouver, B.C., V6T 1Z4, Canada

**18605.** Underhill, L.; Lofie-Eaton, M.; Navarro, R. (2018): Odonata of the Kruger National Park. *Biodiversity Observations* 9.11: 1-16. (in English) ["The number of species of Odonata recorded in the Kruger National, South Africa, was 103 in April 2018. This figure was based on a database containing 2,817 records of Odonata, made since 1980, from the 52 quarter degree grid cells which intersect with the Kruger National Park. Records were available for 41 of the 52 grid cells. The most frequently recorded species were *Trithemis arteriosa* (167 records) and *T. kirbyi* (144 records), both recorded in 33 grid cells, and *Brachythemis leucosticta* (175 records) and *Broad Scarlet* (141 records) both in 29 grid cells. Based on records up to April 2018, the median date of the most recent record for species was September 2017, so that half of the 103 species had been recorded during summer 2017/18. This report could be used to motivate the proclamation of the river and wetland systems of the Kruger National Park as a "Wetland of International Importance" in terms of the Ramsar Convention. Two-thirds of the Odonata of South Africa, and one-eighth of the Odonata of Africa, have been recorded in the Kruger National Park." (Authors)] Address: Les G. Underhill Animal Demography Unit, Department of Biological Sciences, University of Cape Town, Rondebosch, 7701 South Africa

**18606.** Vajda, C.; Szabó, L.J.; Cserhádi, C.; Dévai, G. (2018): Analysing the European genera of family Lestidae (Odonata: Zygoptera) with special emphasis on the status of *Chalcolestes* based on the morphological characteristics of male adults. *International Journal of Odonatology* 21(3/4): 241-259. (in English) ["Lestidae is a heterogeneous family with more than 150 species worldwide. There are many debates concerning its resolution. One of them is whether the genus *Chalcolestes* should be recognized as a genus or considered as a synonym of *Lestes*. We compared male characteristics of eight Hungarian species of three genera (*Lestes*, *Chalcolestes* and *Sympecma*) of the family Lestidae to get closer to the answer. We analysed the morphometry of genital and non-genital characteristics and the morphology of the secondary genitalia, especially the ligula. The morphometric analyses showed that two *Chalcolestes* species were the biggest in the most of the cases while *Sympecma fusca* (Vander Linden, 1820) and *Lestes virens* (Charpentier, 1825) were the smallest. The genera were separated mainly by the genitalic traits in the morphometric analyses.



The differences in the secondary genitalia strengthen the generic status of *Chalcolestes*." (Authors)] Address: Vajda, Csilla, Department of Hydrobiology, Institute of Biology and Ecology, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary. Email: vajda.csilla@science.unideb.hu

**18607.** Valente-Neto, F.; Rodrigues, M.E.; Roque, F. (2018): Selecting indicators based on biodiversity surrogacy and environmental response in a riverine network: Bringing operationality to biomonitoring. *Ecological Indicators* 94(1): 198-206. (in English) ["Highlights: •We assessed cross-taxon congruence between adult dragonflies and groups of aquatic insects. •We evaluated groups responses to environmental and spatial predictors. •We developed a set of criteria that avoid arbitrariness in the selection of the best indicator group. •EPT was selected as the best indicator group for monitoring the effects of riparian vegetation loss. Abstract: An efficient indicator group should fulfill operational and performance-related criteria, including reasonable taxonomic knowledge, costs, response to environmental changes and strong proxy-capacity for biodiversity groups. However, in the real world many trade-offs are involved in the selection of an indicator group, and a single group rarely satisfies all criteria. We investigated cross-taxon congruence of assemblage composition patterns using both quantitative and qualitative data between adult dragonflies and aquatic insects (midges, Ephemeroptera-Plecoptera-Trichoptera (EPT), beetles and entire aquatic insects assemblage). Also, we tested whether environmental and spatial variables were important drivers for cross-taxon congruence. Finally, we developed a set of guiding criteria that avoid arbitrariness in the selection of the best indicator group. We sampled adult dragonflies and aquatic insects in 41 streams and rivers along a riparian vegetation loss gradient in a Neotropical riverine network. We used Procrustes analyses to verify surrogacy between groups and the association of each group with environmental and spatial predictors. The criteria used involves both operational and performance aspects to select an indicator group. Our results showed that adult dragonflies were weakly congruent with the entire aquatic insects assemblage and aquatic insect subgroups were moderate (beetles) to strongly (EPT and midges) congruent with the entire assemblage. Comparisons between EPT, midges and beetles were also weakly congruent, with the exception of midges-EPT. The association between assemblage patterns and overall environmental predictors was significant for all groups, while with spatial patterns, only midges and entire assemblage showed significant results. Numerical resolution slightly improved the congruence results. Incidence data could be used instead of abundance, due to higher congruence values compared to abundance data. Based on cost-benefit, EPT was selected as the best indicator group for monitoring the effects of riparian vegetation loss on aquatic biodiversity, and its use could be viable in biomonitoring programs." (Authors)] Address: Valente-Neto, F., Programa de Pós-Graduação em Ecologia e Conservação, Univ. Federal de Mato Grosso do Sul, Campo Grande, Mato Grosso do Sul CP 549, CEP 79070-900, Brazil. E-mail: fvalenteneto@gmail.com

**18608.** Van Swaay, C.A.M.; Bos-Groenendijk, G.I.; Deijk, J.R. van; Grunsven, R.H.A.; van, Kok, J.M.; Huskens, K.; Poot, M. (2018): Handleiding landelijke meetnetten vlinders, libellen en nachtvlinders. Rapport VS2018.011, De Vlinderstichting, Wageningen: 32 pp. (in Dutch) [Manual for national monitoring networks for butterflies, dragonflies and moths. Odonata are treated in chapters 4 and 5.] Address: De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: info@vlinderstichting.nl

**18609.** Vanacker, M.; Wezel, A.; Oertli, B.; Robin, J. (2018): Water quality parameters and tipping points of dragonfly diversity and abundance in fishponds. *Limnology* 19(3): 321-333. (in English) ["Fishponds are often enriched with nutrients in order to increase phytoplankton and zooplankton populations to support fish production. This eutrophication often leads to a global decrease of biodiversity. This biodiversity shift may be identified by a tipping point, the value of an environmental parameter above which a significant change of species richness and abundance occurs. A total of 110 eutrophic to highly eutrophic fishponds were studied in two areas in France to investigate parameters governing dragonfly species richness and species abundance by determining tipping points. Parameters investigated were chlorophyll a (CHL), water transparency, total N (TN), total P (TP), aquatic plant richness and coverage, adult dragonfly richness and abundance, and fish harvest. A high species richness of dragonflies was found in fishponds, with a total of 34 species, including six species of conservation concern. Dragonfly richness and abundance was shown to be negatively influenced by higher degrees of eutrophication. A high diversity of dragonflies occurred in the fishponds with CHL concentrations below 127 µg/l, water transparency above 67 cm, TN concentrations below 2.30 mg/l, and a fish harvest smaller than 253 kg/ha. A minimum of 5% of aquatic plant cover and the presence of a minimum 9 aquatic plant species seem to promote the richness and abundance of dragonflies. According to tipping points, 19 dragonfly species could be determined as indicator species for water quality in fishponds." (Authors)] Address: Oertli, B., Hepia Geneva Technology, Architecture & Landscape, Univ. of Applied Sciences Western Switzerland, Jussy, Switzerland

**18610.** Velasco-Villanueva, T.; Campos, F.; Norling, U.; Ferreras-Romero, M. (2018): The life cycles of *Boyeria irene* and *Onychogomphus uncatus* (Odonata: Aeshnidae, Gomphidae) in western Spain: A biometric study. *Eur. J. Entomol.* 115: 684-696. (in English) ["Co-occurrence of species with similar trophic requirements, such as odonates, seems to depend both on them occupying different microhabitats and differing in their life-cycles. The life cycles of the dragonflies *Boyeria irene* and *Onychogomphus uncatus* were studied in two consecutive years, mainly by systematic sampling of larvae in seven permanent head courses that constitute the upper basin of the River Águeda, western Spain, in the central part of the ranges of these two species. The size ranges of the last five larval stadia of both species were established based on biometric data. The eggs of the egg-overwintering aeshnid hatched in late spring and early

summer and for the gomphid hatching peaked in middle-late summer. Both species showed mixed voltinism with "cohort splitting". *B. irene* had a dominant three-year development (partivoltinism), with some developing in two years (semivoltinism). *O. uncatus* requires four, sometimes three years to complete development (all partivoltine). *B. irene* larvae spent the winter before emergence in the last three, maybe four stadia, as a "summer species". *O. uncatus* mainly behaved as a "spring species", most larvae spending the last winter in the final larval stadium." (Authors) ] Address: Velasco-Villanueva, Tatiana, Depto de Ciencias Experimentales, Universidad Europea Miguel de Cervantes, Calle Padre Julio Chevalier, 2, 47012 Valladolid, Spain. E-mail: tvelascovillanueva@gmail.com

**18611.** Villalobos-Jiménez, G.; Dunn, A.M.; Hassall, C. (2018): Environmental noise reduces predation rate in an aquatic invertebrate. *Journal of Insect Conservation* 21: 839–847. (in English) ["Noise is one of a wide range of disturbances associated with human activities that have been shown to have detrimental impacts on a wide range of species, from montane regions to the deep marine environment. Noise may also have community-level impacts via predator–prey interactions, thus jeopardising the stability of trophic networks. However, the impact of noise on freshwater ecosystems is largely unknown. Even more so is the case of insects, despite their crucial role in trophic networks. Here, we study the impact of underwater noise on the predatory functional response of damselfly larvae. We compared the feeding rates of larvae under anthropogenic noise, natural noise, and silent conditions. Our results suggest that underwater noise (pooling the effects of anthropogenic noise and natural noise) decreases the feeding rate of damselflies significantly compared to relatively silent conditions. In particular, natural noise increased the handling time significantly compared to the silent treatment, thus reducing the feeding rate. Unexpectedly, feeding rates under anthropogenic noise were not reduced significantly compared to silent conditions. This study suggests that noise per se may not necessarily have negative impacts on trophic interactions. Instead, the impact of noise on feeding rates may be explained by the presence of nonlinearities in acoustic signals, which may be more abundant in natural compared to anthropogenic noise. We conclude by highlighting the importance of studying a diversity of types of acoustic pollution, and encourage further work regarding trophic interactions with insects using a functional response approach." (Authors)] Address: Villalobos.Jimenez, Giovanna, School Biol., Univ. of Leeds, Woodhouse Lane, Leeds LS2 9JT, UK. E-mail: bsgdjv@leeds.ac.uk

**18612.** Villanueva, R.J.T.; Cahilog, H.; Jose, E.; van Beijnen, J. (2018): A brief odonatological survey in Palawan and in Cuyo Island, the Philippines. *International Dragonfly Fund . Report 119:* 1-12. (in English) ["An odonatological survey, based on sighting and photographic documenting, was conducted in Palawan and in Cuyo Island. Ten species were found in Cuyo Island raising the number of known species from five to eleven. There are six additions to the Cuyo

Island fauna: *Agriocnemis f. femina*, *Ischnura senegalensis*, *Pseudagrion microcephalum*, *Brachydiplax c. chalybea*, *Neurothemis fluctuans* and *Neurothemis t. terminata*. The occurrence of *Coeliccia boettcheri*, known from Cuyo, but not recorded during this survey, is discussed in some detail. Forty species were recorded in Palawan. Four new additions to the Palawan fauna were recorded: *Lestes p. praemorsus*, *Pseudagrion microcephalum*, *Xiphiagrion cyanomelas*, and *Anax guttatus*. *Neurobasis daviesi*, a rare calopterygid damselfly endemic in Palawan, was encountered at the northern side of Cleopatra Needle during the survey." (Authors)] Address: Villanueva, R.J.T., Forestal Healing Homes & Therapeutic Milieu, Forestal Road, Cabantian, Davao City, 8000 Philippines. E-mail: rjtvillanueva@gmail.com

**18613.** Walia, G.K.; Devi, M. (2018): Distribution of constitutive heterochromatin in four species of genus *Copera* of family Platycnemididae (Odonata: Zygoptera) from India. *Int. J. of Life Sciences* 6(2): 457-461. (in English) ["C-heterochromatin distribution in four species of genus *Copera* of family Platycnemididae have been described. *C. marginipes* and *C. vittata assamensis* were collected from Bilaspur and Renuka lake (Sirmour, Himachal Pradesh), respectively, while *C. annulata* and *C. vittata* were collected from Nongkhyllam (Meghalaya), India. All the species possess  $n=13m$  as haploid chromosome number, which is the type number of the family and X0-XX sex determining mechanism. In all the species, autosomal bivalents show dark/light terminal C-bands on chiasmatic/nonchiasmatic ends, while *m* bivalent and X chromosome possess variation in distribution of C-heterochromatin. *m* bivalent is C-negative in *C. marginipes*, while shows terminal C-bands in *C. annulata*, *C. vittata* and *C. vittata assamensis*. X chromosome possesses less amount of C-heterochromatin in *C. marginipes*, *C. annulata* and *C. vittata*, whereas X chromosome is bipartite and entirely C-negative in *C. vittata assamensis*. Chromosome complement of *C. vittata assamensis* has been studied for the first time." (Authors)] Address: Walia, Gurinder Kaur, Dept of Zoology & Environmental Sciences, Punjabi University, Patiala 147002, Punjab, India

**18614.** Wildermuth, H.; Borkenstein, A.; Jödicke, R. (2018): Verhaltensgesteuerte Thermoregulation bei *Leucorrhinia pectoralis* und *L. rubicunda* (Odonata: Libellulidae). *Libellula* 37(3/4): 97-134. (in German, with English summary) ["Behavioural thermoregulation in *Leucorrhinia pectoralis* and *L. rubicunda* (Odonata: Libellulidae). Libellulids are perchers that control their body temperature. in contrast to the endothermic fliers. during their activity periods at sunny sites mainly by perch selection and body posture. Hitherto, thermoregulation in Libellulidae was studied only in a few species applying an experimental-invasive method to measure the thoracic temperature. As to *Leucorrhinia* spp. nothing has been published in this respect. Aiming to learn more about the behavioural thermoadaptation of this cool and cold temperate Holarctic genus, we studied *Leucorrhinia pectoralis* and *L. rubicunda* in peat bogs of the Swiss Plateau and Lower Saxony in northwestern Germany. All data were collected by Observation, photo documentation and measures of

temperature without capture and Intervention. The breeding water and its terrestrial environment turned out to be a richly structured thermal landscape with vast differences varying up to 25°C between diverse sites, which were preferred or avoided by the dragonflies depending on the given Situation. For a spontaneous takeoff from a shaded roost, *L. rubicunda* needed a minimum temperature of ca 17°C. In the morning and after cloudy periods both species first flew to a sunlit site where they pressed their body with spread legs and wings against the Substrate ('dorsally exposed warm-up posture') and thus assimilated the direct and indirect radial heat as well as most probably also heat conduction from the Substrate. A 'warm-up obelisk posture' was seen rarely and only in *L. rubicunda*. The insects preferred light bark and deadwood but also flat parts from green herbs and bushes for basking. *L. rubicunda* preferentially basked directly on the ground in wind-sheltered grooves. With rising temperatures they gave up their close link to the ground but remained within the ground Vegetation. On sunny days mature males of *L. pectoralis* arrived at ca 17°C at the water, those of *L. rubicunda* at ca 14°C. Both species sat there at ambient temperatures between 20 and 30°C in a horizontal or oblique body posture on an elevated, sunlit perch above the water or on the water's edge, always with free view of the open water. From time to time they took off for a patrol flight and occasionally they flew ashore for basking. On hot days with an ambient temperature above 30°C most individuals left their sunlit sites to seek out shade, which was especially obvious in *L. rubicunda*. All males remaining at the water changed their posture and sun exposure for heat avoidance: They either directly faced the sun ('sun-facing heat posture') or they adopted the 'heat Obelisk posture', the abdominal tip pointing to the sun, the wings holded V-shaped and the legs stretched. In both postures the sunlit body surface was reduced to a minimum. For fine adjustment of the body temperature they controlled the heat input by turning the abdomen or the whole body in all three spatial axes. Heat release by convection resulted from wind effects on elevated, wind-exposed perches. In hot conditions *L. rubicunda* preferred frontal exposure to the sun and adopted the obelisk posture only in extremely hot periods when there was no compensating cooling by wind. All forms of behavioural thermoregulation are of great adaptive importance. The effective warm-up enables young *L. rubicunda* individuals optimal use of the hours of sunshine that may be scarce during cold April days. Thus, the species is able to feed, escape and disperse at low air temperatures. During hot conditions mature males of both species use behavioural heat avoidance to remain at water for reproductive activities instead of withdrawal into the shade of the terrestrial habitat. It remained unclear to what extent wing whirring and flapping played a role in warming up. Both *Leucorrhinia* species have demonstrated that they are able to apply it in extreme situations but we have never observed this to be performed systematically during diurnal hours." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**18615.** Willink Castro, B. (2018): The descent of damselflies and variation in relation to sex. PhD. Thesis, Evolutionary Biology, Lund University, Faculty of Science, Department of Biology: 84 pp. (in English) ["Sexual conflict over mating shapes the interactions between males and females in many animals and is also responsible for dramatic adaptations in both sexes. In some species of pond damselflies (Odonata: Coeangrionidae), sexual conflict maintains discrete female-limited colour morphs over multiple generations and within populations. One of the female morphs is typically male-coloured and considered a male mimic. This is because their male-like appearance provides a frequency-dependent advantage against excessive male mating attempts. In this thesis, I investigate three major questions regarding the evolutionary consequences of this pervasive sexual conflict. First, how is phenotypic variation in ecological traits distributed among heritable female colour morphs? Second, how does sexual conflict shape phenotypic variation within the lifespan of females? Finally, how, where and why do female-limited morphs arise in the first place? In *Ischnura elegans*, female morphs differ in multiple phenotypic traits. My results uncover further phenotypic associations between the two most common morphs of the Common Bluetail in Sweden. One morph is more resistant to infections by parasitic mites, whereas the other is instead more tolerant. These morphs also differ in their developmental sensitivity to temperature, which in turn influences how morph frequencies are distributed across European populations. Moreover, my findings provide some insights as to how these profound phenotypic differences are produced over the course of adult development, and suggest that male mimics and non-mimics differ in the regulation of important developmental processes. Females of the Common Bluetail undergo dramatic colour changes as they become sexually mature. My thesis shows that immature colour patterns in non-mimic female morphs reduce male pre-mating harassment, and may have evolved by co-opting male colour signals to be expressed as immature signals of reproductive unsuitability. These results suggest that female colour patterns might be highly evolutionarily labile. Yet, a large-scale phylogenetic framework is required to gain a full understanding of the macroevolutionary consequences of sexual conflict on the evolution of female-limited colour variation. I inferred a multi-locus phylogeny for the damselfly superfamily Coeangrionoidea. I then used this phylogeny to show that female-limited colour polymorphisms have arisen repeatedly in this clade, and in association with ecological conditions that foster sexual conflict over mating. Finally, my results uncover a stark contrast between the consequences of sexual conflict at micro and macroevolutionary scales. While sexual conflict promotes diversity within populations by maintaining alternative female morphs, the presence of these morphs is also associated with increased extinction risk and a fast lineage turnover. Together, my results reveal how sexual conflict can influence the origin, distribution and loss of diversity." (Author)] Address: Willink, Beatriz, Dept of Biology, Evolutionary Ecology Unit, Ecology Building, Lund University, Lund 223-62, Sweden. E-mail: beatriz.willink@ucr.ac.cr

**18616.** Worthen, W.B. (2018): Differences in male-male tandem formation in two species of *Micrathyria* (Odonata: Libellulidae). *Notulae odonatologicae* 9(2): 60-66. (in English) ["Male-male tandem formation in odonates is typically described as a mistaken sexual advance by one male on another. If so, male-male tandem formation should be less frequent in more sexually dimorphic species. In a small experiment designed to describe patterns of intra- and interspecific aggression by *Micrathyria atra* and *M. mengeri*, I placed live tethered male decoys of these species in the territories of territorial males. In the less sexually dimorphic *M. mengeri*, nine of 21 intraspecific interactions by three different males resulted in male-male tandem attempts. In the more sexually dimorphic *M. atra*, only one of 25 intraspecific interactions resulted in a male-male tandem attempt. The higher incidence of male-male tandem formation in *M. mengeri* may reflect a greater mistake rate by males in this less dimorphic species." (Author)] Address: Worthen, W.B., Biology Dept, Furman Univ., Greenville, SC, USA, 29613. E-Mail: wade.worthen@furman.edu

**18617.** Worthen, W.B. (2018): Confirming the relationship between body size and perch height in tropical odonates (Odonata: Libellulidae): wet-season contrasts and experimental tests. *International Journal of Odonatology* 21(3/4): 229-239. (in English) ["In a previous study conducted during the dry season at La Selva Biological Station, Costa Rica, mean perch height of libellulid dragonfly species (Odonata: Libellulidae) correlated with male body size, and interactions between species suggested a size-dependent competitive hierarchy. Here, I report on a wet-season study that examined whether seasonal changes in community composition affect these patterns. Males were captured, photographed, and marked, perch heights among individuals and species on natural and artificial perches (25, 50, and 100 cm) were compared, and the frequencies of aggressive interactions between species were analyzed. I also examined the responses of *Micrathyria atra* and *Micrathyria mengeri* males to decoys of these species placed in their territory at different heights (50 or 100 cm). Although the wet season community differed from the dry season community (Jaccard dissimilarity = 0.778), there was still a significant correlation between species perch height and body size, on both natural and artificial perches. Interspecific interactions supported the size-dependent competitive hierarchy hypothesis: smaller species that perched low avoided attacks by larger species. These patterns were confirmed in the decoy experiment. The larger *M. atra*, which perches at ~100 cm, attacked decoys at 100 cm almost exclusively, and attacked decoys of the smaller *M. mengeri* more than conspecifics. In contrast, *M. mengeri* (which perches at 50 cm) only attacked decoys placed at 50 cm. Although community membership changed, the correlation between body size and perch height was maintained by a size-dependent competitive hierarchy in both dry and rainy seasons." (Author)] Address: Worthen, W.B., Biology Dept, Furman Univ., Greenville, SC, USA. Email: wade.worthen@furman.edu

**18618.** Worthen, W.B.; Hoke, L. (2018): Pseudoreplication in species comparisons: do individual differences matter?

*Notulae odonatologicae* 9(1): 18-25. (in English) ["Pseudoreplication occurs in many behavioral studies of odonates, because a few unmarked individuals are sampled repeatedly and are used as estimators of the species' behavior. This can confound individual differences with species differences. Here, we tallied perches of marked and unmarked male libellulids on artificial perches of seven heights (10–120 cm). We estimated the effect of pseudoreplication on species-level contrasts of mean male perch height by comparing the results of four different analyses: 1) a nested ANOVA (analysis of variance) evaluating individual and species effects on perches by marked individuals; 2) a one-way ANOVA comparing species using mean perch heights of the same marked individuals; 3) a one-way ANOVA comparing species without regard to individuals (pseudoreplication of these marked individuals); and 4) a one-way ANOVA using perches by unmarked individuals observed at the same time (pooling across pseudoreplicated individuals in a larger independent data set). Species differences were qualitatively similar across all analyses, and mean perch heights computed on individual means, pooled (pseudoreplicated) data on marked individuals, and data on unmarked individuals were highly correlated. Pseudoreplication altered patterns slightly, but these effects were overcome in the larger data set on unmarked individuals." (Authors)] Address: Worthen, W.B., Biology Department, Furman University, Greenville, SC 29613, USA. E-mail: wade.worthen@furman.edu

## 2019

**18619.** Alves-Martins, F.; Brasil, L.S.; Juen, L.; De Marco Jr, P.; Stropp, J.; Hortal, J. (2019): Metacommunity patterns of Amazonian Odonata: the role of environmental gradients and major rivers. *PeerJ* 7:e6472. 26 pp. (in English) ["Background. We identified and classified Zygoptera and Anisoptera metacommunities in Brazilian Amazonia, relating species distribution patterns to known biological gradients and biogeographical history. We expected a random distribution of both Zygoptera and Anisoptera within interfluves. At the Amazonian scale, we expected Anisoptera metacommunities to be randomly distributed due to their higher dispersal ability and large environmental tolerance. In contrast, we expected Zygoptera communities to exhibit a Clementsian pattern, limited by the large Amazonia rivers due to their low dispersal ability. Methods. We used a dataset of 58 first-to-third order well-sampled streamlets in four Amazonian interfluves and applied an extension of the Elements of Metacommunity Structure (EMS) framework, in which we order Zygoptera and Anisoptera metacommunities by known spatial and biogeographic predictors. Results. At the Amazonian scale, both Zygoptera and Anisoptera presented a Clementsian pattern, driven by the same environmental and biogeographical predictors, namely biogeographic region (interfluve), annual mean temperature, habitat integrity and annual precipitation. At the interfluve scale, results were less consistent and only partially support our hypothesis. Zygoptera metacommunities at Guiana and Anisoptera metacommunities at Tapajós were classified as random, sugges-



ting that neutral processes gain importance at smaller spatial scales. Discussion. Our findings were consistent with previous studies showing that environmental gradients and major rivers limit the distribution of Odonata communities, supporting that larger Amazonian rivers act as barriers for the dispersal of this group. In addition, the importance of habitat integrity indicates that intactness of riparian vegetation is an important filter shaping metacommunity structure of Amazonian stream Odonata." (Authors)] Address: Alves-Martins, Fernanda, Dept Biogeography & Global Change, Museo Nacional de Ciencias Naturales (MNCN-CSIC), Madrid, Madrid, Spain

**18620.** Cherpitel, T.; Filipe, M. (2019): Observations de pontes de *Sympetrum striolatum* sur un estran rocheux atlantique (Odonata: Libellulidae). *Martinia* 34(1/2): 57-58. (in French) [Verbatim: *S. striolatum* is a eurytopian species whose larvae live in fresh, permanent, stagnant to slightly flowing water but can also live in temporary or brackish water (e.g. HEIDEMANN H. & SEIDENBUSCH R., 2002: Larvae and exuviae of dragonflies from France and Germany (except Corsica). *Société française d'odonatologie*, Bois-d'Arcy, 416 pp.) When laying eggs, the eggs of this species are deposited freely in the water or sometimes on the exposed banks (GRAND D. & BOUDOT J.-P., 2006: *Les Libellules de France, Belgique et Luxembourg*. Biotope [Coll. Parthénope], Mèze, 480 pp). During a low-water tide on 28-IX-2018, during a survey in search of continental invertebrates taking refuge in the diachases of the rocky foreshore of the Pointe de Penchâteau (Le Pouliguen [44]), our attention was drawn to the presence of numerous tandems of *S. striolatum*. We then observed, on about 15 occasions, spawning in the numerous tidal pools of the mediolittoral. Up to three tandems were noted laying eggs in one of them (Fig. 1). Spawning took place in open water, sometimes in the algal clusters that were outcropping on the surface (*Fucus* sp., *Ulva* sp., etc.). No copulatory hearts were observed that day. As this was seawater, these observations seem atypical. Most Odonata live in fresh to brackish water and their larvae are unable to perform hypo-osmotic regulation and thus to survive in water with too much salt. The only counter-example is the American Libellulidae *Erythrodiplax berenice* (Drury, 1773) whose larvae are able to live in water saltier than sea water, i.e. over 35 g/L (CORBET P.S., 2004: *Dragonflies: behaviour and ecology of Odonata* (Revised Edition). Harley books, Colchester, 829 pp.). The larvae of *S. striolatum* tolerate a salinity of 2 to 3 g/L (AGUESSE P., 1968: *Les Odonates de l'Europe Occidentale, du Nord de l'Afrique et des Îles Atlantiques*. Faune de l'Europe et du Bassin méditerranéen, 4. Masson, Paris, 258 pp.). These spawning sites observed in sea water therefore have no chance of allowing the larvae that might hatch to develop properly. However, this type of egg-laying behaviour, and others whose reproductive success is just as predictable, have already been cited for this species, notably at the level of "puddles of sea water at low tide, car windscreens or bonnets, paths, roads or tarmac car parks, puddles of diesel fuel in a petrol station, dog bowls or metal sheets" (JOURDE P. & MONTENOT J.-P., 2009.

*Sympetrum striolatum* (Charpentier, 1840). In: Poitou-Charentes Nature (ed.). *Libellules du Poitou-Charentes*. Poitou-Charentes Nature, Fontaine-le-Comte: 198-199). Many other examples are known, involving various species in egg-laying behaviour in a woollen jumper, a rubber boot, a carpet in a house, etc. (CORBET, 2004: op. cit.). The choice of an oviposition site in a tidal pool, like several other cases cited above, is probably due to the species' polarotaxis. Indeed, to find their oviposition sites, many Odonata are guided by horizontally polarised light (e.g. WILDERMUTH H., 1998: Dragonflies recognize the water of rendezvous and oviposition sites by horizontally polarized light: a behavioural field test. *Naturwissenschaften*, 85: 297-302). This visual response of species with exophytic oviposition is also assumed to be universal by CORBET (2004: op. cit.). Here, the ecological trap represented by oviposition in sea water is linked to the chemical properties of the water, which the females of *S. striolatum* do not seem to have detected. Odonates with endophytic oviposition have taste sensilla on the ovipositor (e.g. REBORA M. et al., 2013: The gustatory sensilla on the endophytic ovipositor of Odonata. *Arthropod Structure & Development*, 42: 127-134). If *S. striolatum* also possesses them, this would tend to show that these sensilla are totally inoperative in assessing the salinity of the water when the apex of the abdomen is in contact with it. However, it should be remembered that Libellulidae laying eggs at random in all potentially favourable areas are the Odonata with the widest distribution on the planet, while presenting important numbers (AGUESSE, 1968: op. cit.); an efficient strategy that accommodates some ecological traps. Acknowledgements: Thanks to Philippe Lambret for his suggestions and bibliographical help. Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Cherpitel, T., 1 Groupe d'Étude des Invertébrés Armoricaïns, 5, rue du Général Leclerc, 44390 Nort-sur-Erdre, France. E-mail: [t.cherpitel@gretia.org](mailto:t.cherpitel@gretia.org)

**18621.** de Vries, R.; Buesink, R.; Kloen, J.-F.; Achterkamp, J. (2019): Interesting observations of Odonata in Limburg, the Netherlands during the summer of 2018. *Brachytron* 20(1): 32-37. (in Dutch, with English summary) ["In July 2018, the Dutch youth nature organisations NJN and JNM investigated the region around Roermond in the province of Limburg, the Netherlands. Due to its large diversity of aquatic habitats, this region harbours a very high diversity of Odonata. Here we present the observations of scarce and rare species for the Netherlands that were observed by the nature camps in four areas: the Meinweg, the valleys of the rivers Roer and Swalm and the Vlootbeek. Of particular interest were the observations of 3 individuals of *Onychogomphus forcipatus* at the river Roer, and 10 individuals of *Aeshna affinis* at three locations in the Meinweg. These are two very rare species in the Netherlands, of which reproduction in this areas is plausible respectively possible." (Authors)] Address: de Vries, R.: E-mail: [vries.reinier@gmail.com](mailto:vries.reinier@gmail.com)

**18622.** Ehlert, J.; Pinto, A.P. (2019): Additions to the dragonfly genus *Lauromacromia*, with description of the female of *Lauromacromia luismoojeni* and new distributional re-

cords (Odonata: Corduliidae s.l.). *International Journal of Odonatology* 23(2) (issued: 2020): 79-91. (in English) ["Taxonomic, morphological and distributional data on three species of the rare South American corduliid genus *Lauromacromia* Geijskes, 1970 are updated based on specimens collected recently and old specimens deposited in natural history collections. The female of the poorly known *Lauromacromia luismoojeni* (Santos, 1967), an endemic species from the Brazilian Cerrado, is illustrated, described and diagnosed for the first time, based on a single specimen from the municipality of Mineiros, state of Goiás. This species was previously known from two males from two different localities: the original description from Distrito Federal, and an additional record from the state of Mato Grosso do Sul. New state records to Brazil are given for *L. dubitalis* (Fraser, 1939) (Amazonia domain of the state of Amapá), *L. luismoojeni* (Cerrado domain of the state of Goiás), and for *L. picinguaba* Carvalho et al., 2004 (Atlantic Forest domain of the state of Paraná). Finally, the current knowledge about the genus is discussed." (Authors)] Address: Ehler, Julia, Biological Sciences, Universidade Federal do Paraná, Curitiba, Paraná, Brazil. Email: juliana.ehler@ufpr.br

**18623.** Gainzarain, J.A. (2019): Fauna de odonatos (Insecta: Odonata) en los ríos del norte de Burgos (Castilla y León, España). *Boletín de la Sociedad Entomológica Aragonesa* 65: 207-217. (in Spanish, with English summary) ["In 2019, rivers in northern Burgos province were surveyed in search of adult odonata by means of 52 points prospected twice in June-July and August-September. 31 species (15 Zygoptera and 16 Anisoptera) were registered. The number of odonate species was negatively related to river slope, and positively to the presence of helophytes and submerged/floating vegetation. These relationships were basically due to the variation in generalist species richness, as the number of river specialists was only related to the presence of submerged/floating vegetation. *Ischnura pumilio* and *Gomphus vulgatissimus* were added as new species for Burgos, and the first records of *Coenagrion caerulescens* in the current century were obtained as well." (Authors)] Address: Gainzarain, J.A., Inst. Alavés de la Naturaleza. Apdo. de correos 2092 01080 Vitoria-Gasteiz, Spain. E-mail: j.gainzarain@gmail.com

**18624.** Gorb, S.N. (2019): Body temperatures in *Sympetma paedisca* (Zygoptera, Lestidae) in the autumn in the Central Ukraine. *International Journal of Odonatology* 22(2): 95-100. (in English) ["This short communication reports on the warming ability of the damselfly *S. paedisca*, which is known for its winter hibernation and tolerance to low temperatures. The data were collected using an infrared camera in late September on two sunny days (air temperature 15–17°C) in the vicinity of Kyiv, Central Ukraine. The obtained data show that the thorax was almost always the warmest part of the body (up to 21°C in comparison to 17–18°C of the substrates damselflies were resting on and surrounding living plants). This indicates that the animals, in addition to sun, use their thoracic musculature to warm their bodies up. There was a clear correlation between thorax temperature

and the temperature of both the head and abdomen, which means the warmed up thorax can transport part of its heat to other parts of the body by using their circulatory system." (Author)] Address: Gorb, S.N., Functional Morphology and Biomechanics, Zoological Institute, Christian-Albrecht Univ. of Kiel, 24098 Kiel, Germany. E-mail: sgorb@zoologie.uni-kiel.de

**18625.** Krieg-Jacquier, R.; Baux, V.; Cornuel-Willermoz, A. (2019): Mortalité importante à l'émergence chez *Libellula depressa*: impact du pâturage sur une pozzine de Corse (Odonata: Libellulidae). *Martinia* 34(1-2)(2020): 26-28. (in French) [Verbatim: The pozzine is a flat acidic peat bog dotted with water holes connected by channels and owes its name to the term pozzini (plural of pozzo) which means "well" in Corsica (BRIQUET J., 1910: *Prodrome de la flore corse: comprenant les résultats botaniques de six voyages exécutés en Corse sous les auspices de M. Emile Burnat*, tome I. Georg, Geneva, 656 + LVI pp). More precisely, it is a "set of hygrophilous or mesohygrophilous grasslands developed around glacial lakes or water holes which result from their fragmentation" (GAMISANS J., 2010. *Le paysage végétal de la Corse*. Albiana, 348 pp). The observation was made on 27 May 2017 at about 3 pm on a pozzo in the commune of Casamaccioli (42.25806°N | 8.93667°E [WGS84]) at an altitude of 1,745 m, on the Ninu pozzine in the immediate vicinity of the eponymous lake. This water body is vaguely kidney-shaped and its surface area is about 135 m<sup>2</sup> (20 × 10 m in its maximum dimensions). Like various pozzies on the site, it is not directly connected to the main stream, which flows 6 m from the nearest bank, but gives rise to a small tributary circulation that feeds 6-7 smaller pozzies. The depth was not probed, but the visible bottom areas did not appear to support macrophytes. Unlike other pozzos at the site, this pozzo did not have a steep bank and the water came into direct contact with the bank vegetation which is mainly Poaceae like the surrounding grassland. As the water levels and the connection between the different pozzini can fluctuate rapidly (Cyril Berquier, pers. com.), the configuration we describe here is variable over time, particularly according to the seasons. When we arrived at the edge of the pond, we spotted numerous *Libellula depressa* Linnaeus, 1758 teneral floating on the surface; they were in various stages of decomposition, indicating that some individuals had been dying for several days. Other specimens were observed completing their emergence, wings and abdomen in the water. About ten individuals managed to complete their emergence during our observation but sometimes had poorly developed wings. We estimate that we saw about 100 individuals (emergent, dead, exuviae) and it is likely that less than 5% of the emergences allowed an imago to fly. The only other odonate species we observed on the site today was an agonising female of *Sympetrum fonscolombii* (Selys, 1840). Three types of impact of grazing on emergence can be identified (THOMPSON D.J. et al. 1985. Horses as a major cause of mortality in *Coenagrion puella* (L.) (Zygoptera: Coenagrionidae). *Notul. Odonatol.* 2(6), pp. 104–105): (i) accidental consumption of emerging larvae and

adults during grazing or their eventual fall; excessive mowing of vegetation which (ii) reduces the number of supports on which larvae can climb to emerge (larvae then attempt to emerge on insufficiently high plant supports and fail to complete emergence) and (iii) allows greater accessibility of the emergence site to birds, predators of emerging larvae and individuals. In the case of the observation area under consideration, cattle and horses share the meadow and after prolonged grazing of the bank, there is no longer enough support on which the larvae can climb to emerge. As a result, emergence takes place on insufficiently high vegetation (about 10 cm). A significant number of individuals fail to complete emergence, either because they are exposed to wind-generated ripples, or because they remain partly in the water, or because they fall. It is possible that avian predation is also facilitated here, but we have not observed it. It seems to be negligible on the site, frequented only by a few *Spioncelle* Pipits *Anthus spinoletta*, Clumped Wheatears *Oenanthe oenanthe* and various passerines, mainly granivorous, such as the Corsican Venturon *Carduelis corsicana* or the Tree Finch *Fringilla coelebs* (Cyril Berquier, in litt. 29 November 2018). The presence of vegetation that is not very appealing to livestock, which generally surrounds water bodies (rushes, sedges, reeds), often preserves a ring of riparian vegetation that allows for emergence with less risk. Here, the absence of this ring encourages grazing right up to the water's edge. At some distance from the pozzo studied, Lake Ninu offers a more varied vegetation on its banks (helophytes and hydrophytes) which preserves more areas suitable for the emergence of Odonata. The consequences of pastoral practices on the pozzines of Corsica should be studied in greater depth and the mortality of other Odonata species should be assessed (the observation reported here being fairly early). These studies would make it possible to envisage measures for the conservation of Odonata that are consistent with traditional activities and respect for the landscape characteristics of pozzines. One of these measures could be the enclosure of part of their banks, which would maintain a riverine vegetation of sufficient height and structure that the larvae could select during emergence (e.g. WORTHEN W. B., 2010: Emergence-site selection by the dragonfly *Epitheca spinosa* (Hagen). *Southeastern Naturalist*, 9 (2): 251-258; GROF-TISZA P. et al., 2017: Plant structural complexity and mechanical defences mediate predator-prey interactions in an odonate-bird system. *Ecology and Evolution*, 7(5): 1650-1659) without prohibiting livestock access to drinking water. Acknowledgements: We would like to thank Cyril Berquier from the Office de l'Environnement de la Corse for his proofreading and additions.] Address: Krieg-Jacquier, R., 628 route de Marboz 01440 Viriat, France. E-mail: regis.krieg.jacquier@gmail.com

**18626.** Patten, M.A.; Barnard, A.A.; Smith, B.D. (2019): Geographic variation in a restricted-range endemic dragonfly *Gomphurus ozarkensis* (Odonata: Gomphidae), with description of a new subspecies. *Journal of Insect Biodiversity* 13(2): 15-26. (in English) ["The geographic distribution of *G. ozarkensis*, a species described to science only four de-

caes ago, is confined to a four-state area in the central United States: southeastern Kansas, eastern Oklahoma, western and northern Arkansas, and southern Missouri. Its small range has led some to classify it a species of conservation concern. We examined geographic variation in the species, which despite its small range exists in three distinct subpopulations: one in the Ouachita Mountains of western Arkansas and southeastern Oklahoma; one on the Ozark Plateau of northeastern Oklahoma, southeastern-most Kansas, southern Missouri, and northern Arkansas; and one in the Osage/Flint hills of southeastern Kansas and northeastern Oklahoma. Clinal variation is evident in the extent of yellow on the terminal abdominal segments and the extent to which certain thoracic stripes are fused. A population in a separate watershed basin in the southern Osage Hills of Oklahoma is taxonomically distinct, with some phenotypic characters tending toward *G. externus* (Hagen, 1858). We describe this population as a new subspecies of *G. ozarkensis*." (Authors)] Address: Patten, M.A., Oklahoma Biological Survey, Univ. Oklahoma, Norman, Oklahoma 73019, USA

**18627.** Payette, W.I.; Sullivan, A.M. (2019): The effect of predator kairomones on caudal regeneration by Allegheny Mountain dusky salamanders (*Desmognathus ochrophaeus*). *Canadian Journal of Zoology* 97(6): 502-509. (in English) ["Many prey utilize autotomy as an antipredator mechanism. Rapid regeneration of autotomized appendages is beneficial because forfeited tissues may serve as organs for energy storage, accessories for locomotion, or indicators of social status. We monitored levels of caudal regeneration by Allegheny Mountain dusky salamanders, *D. ochrophaeus* (Cope, 1859) exposed to kairomones from predatory eastern garter snakes, *Thamnophis sirtalis* (L., 1758). After the induction of autotomy, salamanders were exposed to one of three treatment regimens: blank (water), or an acute (30 min per week) or chronic (constant) exposure to predator kairomones during a 12-week study period. Overall, the average volume of regenerated tissue, as a percentage of original tail volume, was highest for individuals exposed to the blank versus predator kairomones. When the combined effects of time elapsed since the induction of caudal autotomy and the different treatment regimens were considered, we found that the average volume of regenerated tissue was significantly greater for control salamanders beginning eight weeks after autotomy. The mechanism contributing to the differential rates of regeneration among individuals in our treatment groups is unknown, but previous work suggests that elevated stress related to predation threat can have detrimental effects on wound healing and growth in amphibians." (Authors) The paper includes references to Odonata.] Address: Sullivan, A.M., Dept Biol., Houghton Coll., Houghton, NY 14744, USA. E-mail: aaron.sullivan@houghton.edu

**18628.** Rahaman, M.M.; Stout, M.J. (2019): Comparative efficacies of next-generation insecticides against yellow stem borer and their effects on natural enemies in a rice ecosystem. *Rice Science* 26(3): 157-166. (in English) ["The efficacies of some next-generation insecticides against the rice yellow stem borer (YSB), *Scirpophaga incertulas*

(Walk.), and their compatibilities with natural enemies were investigated during 2014 and 2015. Three newer insecticides, chlorantraniliprole 0.4%G, dinotefuran 20% SG, and methoxyfenozide 24% SC, and two older, commonly used insecticides, carbufuran 5G and quinalphos 25 EC, were evaluated in the field for their efficacies against YSB and their non-target effects on natural enemies. Application of chlorantraniliprole 0.4%G at 10.96 kg/ha resulted in the greatest reduction in YSB infestation (deadhearts and whiteheads) and greatest increase of yield over control, followed by methoxyfenozide 24% SC at 0.41L/ha, dinotefuran 20% SG at 0.15 kg/ha, carbufuran 5G at 10.96 kg/ha, and quinalphos 25EC at 1.5 L/ha. All the insecticides reduced the numbers of predators' viz., lady bird beetles, wolf spiders, carabid beetles, earwigs, green mirid bugs, damselflies. Numbers of adults of the egg parasitoids *Trichogramma* sp., *Telenomus* sp., and *Tetrastichus* sp. were significantly reduced in insecticide-treated plots compared to untreated control plots. In all field trials, chlorantraniliprole 0.4%G was found to be least harmful and quinalphos 25EC was found most harmful to natural enemies, with their harmful effects in the following rank order (least harmful to most harmful): chlorantraniliprole 0.4% G <carbufuran5G <dinotefuran 20% SG <methoxyfenozide 24% SC <quinalphos 25EC. On the basis of reduction in YSB infestation, increase in grain yield, and compatibility with natural enemies, chlorantraniliprole 0.4% G proved the best of all the insecticides for the YSB management system, although the study suggested minimizing its retail price for enhancement of cost effectiveness in farmers' fields." (Authors)] Address: Rahaman, M.M., Dept Agriculture, Pakutia College, Ghatail, Tangail-1982, Bangladesh

**18629.** Ryazanova, G.I. (2019): Odonata and anthropogenic salinization of inland waters. *Moscow University Biological Sciences Bulletin* 74(1): 33-39. (in English) ["The anthropogenic salinization of inland waters and its effect on freshwater biota are current environmental problems. This salinization leads to changes in the natural environment that are ecologically undesirable and not indifferent to humans. The widespread use of agents for road deicing has become one of the three most important factors of anthropogenic salinization of fresh water (along with agricultural activities and mining) in countries with temperate and cold climate. Today, the main components of these agents are Na and Ca chlorides—cheap and easily available natural materials. Their mixture with sand, used in deicing practice, is usually stored in bulk in special open-air areas all year round. The impact of atmospheric precipitation makes this mixture a source of salinization of the surrounding soils and waters. In 2015, 2016, and 2018, the salinity of inland waters was recorded near the long-term open storage of antiicing agents in Kaluga oblast. The anthropogenic nature of salinization of the investigated water bodies is established. The main components of salinization of water bodies in the study area are Na and Ca chlorides. The maximum degree of salinization in the studied conditions is 4‰ (ppm); the degree of salinity depends on the distance of the water body from the road-salt storage. The influence of anthropogenic salinity on dragonflies, mainly of the species *Coenagrion puella* L., is studied. It is found

that the negative effect of high water salinity is expressed only in the slowdown of the development of individuals with a high level of fluctuating asymmetry, the number of which in the population is not determined by water salinity. High water salinity leads to changes only in the timing of emergence of imagoes with high FA. It is assumed that dragonflies as a mass object of freshwater biota are obviously not significantly exposed to anthropogenic salinization. Russian Text © The Author(s), 2019, published in *Vestnik Moskovskogo Universiteta, Seriya 16: Biologiya*, 2019, Vol. 74, No. 1, pp. 42–49.] Address: Ryazanova, G.I., Dept of Biology, Moscow State University, Moscow, Russia. E-mail: ryazanovagi@mail.ru

**18630.** Serrano-Meneses, M.A.; López-García, K.; Carrillo-Muñoz, A.I. (2019): Assortative mating by size in the American Rubyspot Damselfly (*Hetaerina americana*). *Journal of Insect Behavior* 31(6): 585-598. (in English) ["Assortative mating refers to the non-random nature of mating patterns between certain males and females. Thus, males and females may associate negative. or positively, based on different traits. Amongst these associations, assortative mating by size is one of the most common patterns found in natural populations of animals. Two main hypotheses have been proposed to account for the occurrence of assortative mating by size. First, it may be the result of mechanical, temporal, or physiological constraints. Second, it may occur in response to direct or indirect selection on mating preferences. Here we investigate whether the American rubyspot damselfly exhibits true assortative mating by size. Males of this species exhibit high levels of male-male competition, as they compete over territories, to which females are attracted for copulation. There is a documented large male body size advantage: the largest males are better able to hold their territories and thus secure more copulations. Our major results show that i) mated males are more likely to be larger than unmated males, whereas mated and unmated females tend to have similar body sizes; ii) *H. americana* exhibits true assortative mating by size; as such, this pattern is not driven by seasonal changes in the body sizes of males and females. We suggest that this mating pattern occurs in this species given the advantages of large male size, and the advantages of large female body size (i.e. higher fecundity). We believe that males may be able to evaluate a female's reproductive value and exert mate choice." (Authors)] Address: Serrano-Meneses, M.A., Depto de Ciencias Químico-Biológicas, Univ. de las Américas Puebla, Puebla, Mexico

**18631.** Sniegula, S.; Golab, M.J.; Johansson, F. (2019): Size-mediated priority and temperature effects on intra-cohort competition and cannibalism in a damselfly. *Journal of animal ecology* 88(4): 637-648. (in English) ["1. A shift in the relative arrival of offspring, e.g., a shift in hatching time, can affect competition at the intraspecific level through size-mediated priority effects, where the larger individuals gain more resources. These priority effects are likely to be affected by climate warming and the rate of intraspecific predation, i.e., cannibalism. 2. In a laboratory experiment, we exa-



mined size-mediated priority effects in larvae of the univoltine damselfly, *Lestes sponsa*, at two different temperatures (21°C and 23°C). We created three size groups of larvae by manipulating hatching time: early hatched with a large size (extra-advanced), intermediate hatched with an intermediate size (advanced) and late hatched with a small size (non-advanced). Thereafter we reared the larvae from these groups in non-mixed and mixed groups of 12 larvae. 3. We found strong priority and temperature effects. First, extra-advanced larvae most often had higher survival, growth and development rates than non-advanced larvae in mixed groups, compared to groups that consisted of only extra-advanced larvae. Second, temperature increased growth and development rates and cannibalism. 4. However, the strength of priority effects did not differ between the two experimental temperatures, because there was no statistical interaction between temperature and treatments. That is, the mixed and non-mixed groups of non-advanced, advanced and extra-advanced larvae showed the same relative change in life history traits across the two temperatures. 5. Non-advanced and advanced larvae had similar or higher growth rate and mass in mixed groups compared to non-mixed groups, suggesting that predation from advanced larvae in the mixed group released resources for the non-advanced and advanced larvae that survived despite cannibalism risk. Thus, a thinning effect occurred due to cannibalism caused by priority effects. 6. The results suggest that a shift in the relative arrival of offspring can cause temperature-dependent priority effects, mediated through cannibalism, growth and development, which may change the size distribution and abundance of emerging aquatic insects." (Authors)] Address: Sniegula, S., Dept Ecosystem Conservation, Inst. Nature Conservation, Polish Acad. of Sciences, Krakow, Poland. E-mail: szymon.sniegula@gmail.com

**18632.** Trueman, J.W.H.; Rowe, R.J. (2019): The wing venation of Odonata. *International Journal of Odonatology* 22(1): 1-16. (in English) ["Existing nomenclatures for the venation of the odonate wing are inconsistent and inaccurate. We offer a new scheme, based on the evolution and ontogeny of the insect wing and on the physical structure of wing veins, in which the veins of dragonflies and damselflies are fully reconciled with those of the other winged orders. Our starting point is the body of evidence that the insect pleuron and sternum are foreshortened leg segments and that wings evolved from leg appendages. We find that all expected longitudinal veins are present. The costa is a short vein, extending only to the nodus, and the entire costal field is sclerotised. The so-called double radial stem of Odonatoidea is a triple vein comprising the radial stem, the medial stem and the anterior cubitus, the radial and medial fields from the base of the wing to the arculus having closed when the basal sclerites fused to form a single axillary plate. In the distal part of the wing the medial and cubital fields are secondarily expanded. In Anisoptera the remnant anal field also is expanded. The dense crossvenation of Odonata, interpreted by some as an archdictyon, is secondary venation to support these expanded fields. The evolution of the odonate wing from the palaeopteran ancestor – first to the odonatoid condition, from

there to the zygopteran wing in which a paddle-shaped blade is worked by two strong levers, and from there through grade Anisozygoptera to the anisopteran condition – can be simply explained." (Authors) ] Address: Trueman, J., Res. School Biol., Australian National Univ., Canberra, Australia

**18633.** Veselý, L.; Boukal, D.S.; Buric, M.; Kuklina, I.; Fort, M.; Yazicioglu, B.; Prchal, M.; Kozák, P.; Kouba, A.; Sentis, A. (2019): Temperature and prey density jointly influence trophic and non-trophic interactions in multiple predator communities. *Freshwater Biology* 64(11): 1984-1993. (in English) ["Environmental changes such as global warming can affect ecological communities by altering individual life histories and species interactions. Recent studies focusing on the consequences of environmental change on species interactions highlighted the need for a wider, multi-species context including both trophic and non-trophic interactions (e.g. predator interference). However, the effects of biotic and abiotic factors on trophic and non-trophic interactions remain largely unexplored. To fill this gap, we combined laboratory experiments and functional response modelling to investigate how temperature and prey density influence trophic and non-trophic interactions in multiple predator communities. The system under study consisted of predatory dragonfly larvae (*Aeshna cyanea*) and omnivorous marbled crayfish (*Procambarus virginalis*) preying on common carp fry (*Cyprinus carpio*). We estimated the functional response of each predator in single-predator experiments and used this information to disentangle the trophic and non-trophic interactions and their dependence on environmental conditions in multiple predator trials. We found that consumer identity, prey density, and temperature all affect the magnitude of trophic and non-trophic interactions. Non-trophic interactions mostly decreased predator feeding rates, corroborating previous observations that interference prevails in aquatic communities. Moreover, trophic interactions depended primarily on the environmental variables whereas non-trophic interactions depended mainly on consumer identity. Our results indicate that non-trophic interactions among true predators and omnivores can be substantial and that biotic and abiotic conditions further modify the magnitude and direction of these interactions, which can affect food web dynamics and stability." (Authors)] Address: Veselý, L., Fac. Fishery & Protection of Waters, South Bohemian Research Centre of Aquaculture & Biodiversity of Hydrocenoses, Univ. of South Bohemia in České Budejovice, Zátíší 728/II, 389 25, Vodňany, Czech Republic. E-mail: Email: veselyl@frov.jcu.cz

## 2020

**18634.** Hedlund, J.; Ehrnsten, E.; Hayward, C.; Lehmann, P.; Hayward, A. (2020): New records of the Paleotropical migrant *Hemianax ephippiger* in the Caribbean and a review of its status in the Neotropics. *International Journal of Odonatology* 23(4): 315-325. (in English) ["Tropical America is currently experiencing the establishment of a new apex insect predator, the Paleotropical dragonfly *H. ephippiger*. *H. ephippiger* is migratory and is suggested to have colo-

nised the eastern Neotropics by chance Trans-Atlantic displacement. We report the discovery of *H. ephippiger* at three new locations in the Caribbean, the islands of Bonaire, Isla de Coche (Venezuela), and Martinique, and we review its reported distribution across the Neotropics. We discuss the establishment of *H. ephippiger* as a new apex insect predator in the Americas, both in terms of ecological implications and the possible provision of ecosystem services. We also provide an additional new species record for Bonaire, *Pantala hymenaea* (Odonata: Libellulidae)." (Authors)] Address: Hedlung, Johanna, Dept of Biology, Centre for Animal Movement Research (CANMove), Lund University, Lund, Sweden. E-mail: johanna.hedlund@biol.lu.se

**18635.** Mendes, T.P.; Amado, L.L.; Barbosa Ribeiro, R.A.; Juen, L. (2020): Morphological diversity of Odonata larvae (Insecta) and abiotic variables in oil palm plantation areas in the Eastern Amazon. *Hydrobiologia* 847: 161-175. (in English) ["Our aim was to investigate whether there is a relationship between abiotic factors and the morphological diversity (MD) of Odonata larvae by building an ecomorphological index in oil palm plantation areas with riparian vegetation in the Eastern Amazon. We hypothesised that the MD of Odonata larvae might be affected by oil palm plantation since changes in the landscape might cause the loss of microhabitats that are essential for the larval life cycle. A total of 950 Odonata larvae were collected in 11 streams located in a continuous forest area (inside the legal reserve) and 18 streams located in oil palm streams surrounded by riparian vegetation. There was a significant difference in the MD of the larvae between the oil palm and forest areas. When we compared the results obtained using traditional measures of biodiversity (estimated species richness) with those obtained using the measure of MD, MD was more efficient. The RLQ tests showed a significant relationship between genus abundance and environmental variables, and between genera and morphological traits. We believe that the suppression or change in riparian vegetation might increase the sediment load input and decrease the amount of plant substrate available in the system, leading to the simplification of morphological traits. Therefore, such traits might be used as indicators of environmental impact." (Authors)] Address: Juen, L., Programa de Pós-graduação em Zoologia Instituto de Ciências Biológicas –Universidade Federal do Pará, Rua Augusto Correia, Belém, Brazil. E-mail: leandrojuen@ufpa.br

**18636.** Pinto, A.P.; de Araujo, B.R. (2020): A new damselfly of the genus *Forcepsioneura* from the Atlantic Forest of south-eastern Brazil (Odonata: Coenagrionidae). *Odonatologica* 49(1/2): 107-123. (in English) ["A new Brazilian Protoneurinae damselfly, *Forcepsioneura lopii* sp. nov. (holotype male deposited in DZUP: Brazil, São Paulo State, Cananéia, Ilha do Cardoso State Park) is described, and diagnosed based on two males and one female. This small dark yellow-orange *Forcepsioneura* Lencioni, 1999, inhabits typical restinga-like formations in southern Brazil. The coloration and short ventrobasal process of the male cercus of *Forcepsioneura lopii* sp. nov. make it similar to the larger

montane species of the orange-black group, i.e., *F. grossiorum* Machado, 2005, *F. itatiaiae* (Santos, 1970), *F. janeae* Pimenta et al., 2019, *F. lucia* Machado, 2000, and *F. serabonita* Pinto & Kompier, 2018. However it occurs in lowlands and the cercus is slender as in the light blue group, i.e., *F. gabriela* Pimenta et al., 2019, *F. garrisoni* Lencioni, 1999, *F. haerteli* Machado, 2001, *F. regua* Pinto & Kompier, 2018, and *F. sancta* (Hagen in Selys, 1860). The very acute, spur-like process on the mediobasal process of male cercus is unique. This is only one of several undescribed species recently discovered in *Forcepsioneura*, and it reaffirms the necessity for additional investigations to understand the richness and diversification of this genus." (Authors)] Address: Pinto, A.P., Lab. Systematics on Aquatic Insects (LABSIA), Depto de Zoologia, Universidade Federal do Paraná, P. O. Box 19020, 81531-980, Curitiba, PR, Brazil

**18637.** Schröder, N.M.; Rippel, C.G.; Walantus, L.H.; Zapata, P.D.; Pessacq, P. (2020): Odonata assemblages as indicators of stream condition – a test from northern Argentina. *North-Western Journal of Zoology* 16(2): 117-124. (in English) ["The increasing consumption of natural resources due to population growth, and the expansion of agricultural activity have a major impact on freshwater ecosystems. The aim of this study was to verify if possible changes in habitat condition and physical-chemical variables due to different land uses are reflected by changes in Odonata assemblages. In order to do that, we evaluated the conservation status of the riparian zone and the physicochemical parameters of stream waters affected by different degrees of anthropogenic impact, and assessed richness and variation in species composition, testing for potential indicator species of habitat quality. The riparian index allowed the differentiation of three habitat condition categories: conserved, intermediate and degraded. No significant differences were found in species richness between the three conservation states, but it was possible to discriminate between the communities present. Four species showed potential as habitat quality indicators that can serve as biomonitors in future strategies of stream management and conservation." (Authors)] Address: Schröder, Noelia, Molecular Biotechnology Laboratory, Institute of Biotechnology Misiones, FCEQyN, UNaM. Ruta 12 km 7.5. Posadas, Misiones, CP 3300, Argentina. E-mail: noeliaschroder@gmail.com

**18638.** Starr, S.M.; McIntyre, N.E. (2020): Effects of water temperature under projected climate change on the development and survival of *Enallagma civile* (Odonata: Coenagrionidae). *Environmental Entomology* 49(1): 230-237. (in English) ["Current climate projections for the Great Plains of North America indicate markedly increased air temperatures by the end of the current century. Because the Great Plains contains >80,000 intermittent wetlands that serve as irreplaceable wildlife habitat, this projected warming may have profound effects throughout a continental-scale trophic network. However, little research has been done to determine how projected warming may affect the growth, development, or survival of even common species in this region. We conducted laboratory warming experiments, using

an abundant amphibious predatory insect, *Enallagma civile* (Hagen, 1861), as a model organism, to determine whether projected warming may affect development or survival. Eggs were collected and reared under four water temperature regimes representing current (26°C) and projected future conditions (32, 38, and 41°C). Nymph body size after each molt, development rate, and deaths were recorded. Elevated water temperatures were found to significantly affect the survivorship of *E. civile* eggs and nymphs as well as adult body size at emergence: an increase in temperature incurred a decrease in survival and size. Nymphs in the two hotter treatments were smaller and had low survivorship whereas individuals in the cooler temperatures generally survived to adulthood and were larger. Nymphs reared at 32°C experienced accelerated ontogenetic development compared with the other temperatures, going from egg to adult in 26 d. Projected elevated temperatures may, thus, be both advantageous and detrimental, causing concern for aquatic invertebrates in this region in the future." (Authors) ] Address: McIntyre, Nancy, Dept Biological Sciences, Texas Tech University, Lubbock, TX 79409-3131, USA. E-mail: nancy.mcintyre@ttu.edu

## 2021

**18639.** Agnes Deepa, A.; Selvarasu, P.; Gunasekaran, C.; Shobana, G. (2021): Odonata fauna in adjoining areas of Amirthi Zoological Park in Vellore District, Tamilnadu, India. *Acta Entomology and Zoology* 2(1): 12-18. (in English) ["The objective of the present study is to explore the diversity of Odonata in Amirthi Forest Division, Vellore District. Dragonfly watching and recording has been done in each line transect during a week. A total of 37 species belonging to 29 genera and 6 families viz. Lestidae, Platycnemididae, Coenagrionidae and Libellulidae were recorded. The maximum number of Odonates were found in Libellulidae (n=20 species), followed by Coenagrionidae (n=11), Aeshnidae (n=2), Lestidae (n=3), Platycnemididae (n=1) and Gomphidae (n=1). Out of the Site -1 Urban areas, Site -2 Agricultural areas, Site -3 wet land areas and Site. 4 Amirthi park areas are selected study sites, the highest number of Odonate species (28) was recorded in S3 and S2 ranked second with 24 species. Species richness was comparatively low in the remaining Study sites: S4 with 21 species and S1 with 18 species. The result of high species richness in the particular study sites (S3 and S2) may be due to the intensity and duration of longer surveys, rather than true ecological species richness. Among the selected Sites the diversity of dragonflies was high in Agricultural areas and wet land areas. Out of the 37 Odonates recorded from the district, 35 species come under the IUCN Red List of Threatened Category. Among them 37 species comes under Least Concern (LC) Category, one species under Data Deficient (DD) and three species is not evaluated. The present study is to encourages the wide range conservation of dragonfly species in the study area." (Authors)] Address: Agnes Deepa A., Unit Conserv. Biol., Dept Zool., Bharathiyar Univ., Coimbatore, Tamil Nadu, India

**18640.** Archibald, S.B.; Cannings, R.A. (2021): The head

of Cephalozygoptera (Odonata). *Zootaxa* 5047(1): 97-100. (in English) ["Conclusions: We know of no force acting before or during diagenesis that might change the conservative zygoteran head shape to the diagnostic Cephalozygoptera shape. We conclude that the evidence from the specimens discussed by Nel & Zheng (2021), and those further examined and discussed here and by Archibald et al. (2021) supports the proposal that the head shape ascribed to the Cephalozygoptera by Archibald et al. (2021) is their actual shape, and that the Cephalozygoptera is a valid taxon. Note: We maintain that the Cretaceous genera *Palaeodysagrion* Zheng et al., *Electrodysagrion* Zheng et al., and *Burmadyagrion* Zheng et al. are not members of the Dysagrionidae and that the Paleocene genus *Valerea* Garrouste et al. is tentatively a member of the Dysagrionidae for reasons given by Archibald et al. (2021, pages 20 and 42)." (Authors)] Address: Archibald, S.B., Dept of Biological Sciences, Simon Fraser Univ., 8888 University Drive, Burnaby, British Columbia, V5A 1S6, Canada. E-mail: sba48@sfu.ca

**18641.** Busmachi, G. (2021): New record of *Leucorrhinia pectoralis* (Charpentier, 1825) (Insecta: Libellulidae) in the Republic of Moldova. Sustainable use and protection of animal world in the context of climate change. *Editia 10, 2021 Conferința "Sustainable use and protection of animal world in the context of climate change"*. Chisinau, Moldova, 16-17 septembrie 2021: 161-163. (in English) ["The paper includes new record of rare and protected species of Odonata – *L. pectoralis* in the Republic of Moldova. The species was cited firstly in 2009 from the Cioburciu village. In June, 2021 one adult male was identified on the palustral vegetation in the Plaiul Fagului Reserve. This is the second record of this species in the Republic of Moldova." (Author)] Address: Busmachi, Galina, Institute of Zoology, Chisinau, Republic of Moldova. E-mail: bushmakiu@yahoo.com

**18642.** Curtean-Bănăduc, A.; Burcea, A.; Mihub, C.-M.; Bănăduc, D. (2021): The benthic trophic corner stone compartment in POPs transfer from abiotic environment to higher trophic levels — Trichoptera and Ephemeroptera pre-alert indicator role. *Water* 2021, 13, 1778. 17 pp. (in English) ["Persistent organic pollutants (POPs) have been at the forefront of environmental contamination research even before their ban in 2001 at the Stockholm Convention. Their relation to different compartments of the environment (biotic and abiotic) has been thoroughly investigated. This article aims to identify whether the benthos could represent a reliable indicator of environmental contamination with POPs and to highlight its potential transfer role between abiotic and upper trophic compartments—benthos feeders. In this regard, we determined that the Ephemeroptera samples have higher concentrations ( $p < 0.05$ ) of  $\Sigma$ PCB,  $\Sigma$ HCH, and  $\Sigma$ DDT than sediment samples while Trichoptera samples have higher concentrations ( $p < 0.05$ ) only in the case of  $\Sigma$ PCB and  $\Sigma$ DDT. This, along with the fact that the frequency of detection for POPs is similar between the sample types (sediments, Trichoptera, and Ephemeroptera), makes the benthos samples valuable indicators of contamination with sediment samples working as complementary information about how recent the

contamination is." (Authors) At sampling point M14, Odonata contributed with 10,31% to the benthic macroinvertebrate community.] Address: Curtean-Bănăduc, Angela, Applied Ecology Res. Center, Lucian Blaga Univ. of Sibiu, 550012 Sibiu, Romania. E-mail: angela.banaduc@ulbsibiu.ro

**18643.** Dasrat, C.M.; Maharaj, G. (2021): Biological control of mosquitoes with odonates: A case study in Guyana. *Nusantara Bioscience* 13: 163-170. (in English) ["Mosquitoes have plagued the lives of tropical residents as pests. However, due to their role as vectors of life-threatening diseases, controlling their population is necessary, especially in areas of prevalence – the Caribbean and Equatorial regions. In Guyana, we employ chemical treatments sub-regionally to eradicate mosquitoes. However, this treatment has limited success and is harmful to the environment. Therefore, our study focused on an environmentally friendly method such as biological control. This study was conducted at the University of Guyana, Turkeyen campus, where we exploited Odonata; Anisoptera, and Zygoptera as natural predators of mosquitoes of the genus *Culex*. The feeding efficiency and behaviors of naiads from the families of Libellulidae and Coenagrionidae were assessed during April – May of 2018. Each naiad was fed three *Culex* pupae and larvae, then observed for 60 minutes. We found that both groups pursue soft-bodied larvae and Libellulidae naiads are more efficient predators due to the higher feeding rate than Coenagrionidae. This finding is related to a behavioral study where we observed Libellulidae as active hunters that masticate and consume faster than Coenagrionidae, which are lay and wait, opportunistic predators that swallow their prey. We concluded that Libellulidae is an efficient predator for mosquito larvae of the *Culex* genus, and we found that there is a link between morphologic characteristics and feeding behaviors. We hope to use these results as a baseline study to develop mosquito biological control in Guyana. These can be used to reduce mosquito populations and the occurrence of vector diseases as well as improve integrated pest and vector management." (Authors)] Address: Dasrat, Cindy, Dept Biol., Univ. Guyana. Turkeyen Campus, Turkeyen, Georgetown, Guyana. Email: cindrina@gmail.com

**18644.** De Almeida, M.V.O.; Pinto, Â.P.; Carvalho, A.L. (2021): Digitizing Primary Data on Biodiversity to Protect Natural History Collections Against Catastrophic Events: The type material of dragonflies (Insecta: Odonata) from Museu Nacional of Brazil. *Biodiversity Information Science and Standards* 5: e75284: 3 pp. (in English) ["Conference Abstract: Natural history collections (NHC) are guardians of biodiversity (Lane 1996) and essential to understand the natural world and its evolutionary processes. They hold samples of morphological and genetic heritages of living and extinct biotas, helping to reconstruct the timeline of life over the centuries (Gardner 2014). Primary data from specimens in NHC are crucial elements for research in many areas of biological sciences, considered the "bricks" of systematics and therefore one of the pillars for evolutionary studies (Troudet

2018). For this reason, studies carried out in NHC are essential for the development of the scientific knowledge and are pivotal for the scientific-technological progress of a nation (Camargo 2015). The digitization and availability of primary data on biodiversity from NHC represents a inexpensive, practical and secure means of exchanging information, allowing collaboration between institutions and researchers. In this sense, initiatives such as the Sistema de Informação sobre a Biodiversidade Brasileira (SiBBR), a country-level branch of the Global Biodiversity Information Facility (GBIF) platform, aim to encourage and establish ways for the informatization of biological collections and their type specimens. Known for housing one of the largest and oldest collections of insects in the world focused on Neotropical fauna, the Entomological Collection of the Museu Nacional of Federal University of Rio de Janeiro (MNRJ) had more than 3,000 primary types and approximately 12,005,000 specimens, of which about 96% were lost in the tragic fire occurred at the institution on September 2, 2018. The SiBBR project was active in that collection from 2016 to 2019 and enabled the digitization and preservation of data from the type material of many insect orders, including the charismatic order Odonata. Due to the end of the agreement between SiBBR and the Museu Nacional, most of the obtained primary data are pending full curation and, therefore, are not yet available to the public and researchers. The MNRJ housed the biggest and most important collection of dragonflies among all Central and South American institutions. It assembled most of the physical records of neotropical dragonfly fauna gathered over the last 80 years, many of which are of undescribed taxa. Unfortunately, almost all material was permanently lost. This study aims to gather, analyze and publicize primary data of the type material of dragonflies housed in the MNRJ, ensuring the preservation of its history, as well as providing data on the taxonomy and diversity of this marvelous group of insects. A total of 11 families, 50 genera and 131 species were recorded, belonging to the suborders Anisoptera and Zygoptera with distributional records widespread in South America. The MNRJ housed 105 holotypes of dragonflies' nomina representing 11.7% of the richness of the Brazilian Odonata fauna (901 spp.), a country with the highest number of species of the biosphere. The impact of the loss of this collection to studies of these insects is unprecedented, since some enigmatic and monotypic genera such as *Brasiliogomphus*, *Fluminagrion* and *Roppaneura* lost 100% of their type series, while others most diverse such as *Lauromacromia*, *Oxyagrion* and *Necordulia* lost 50%, 35% and 31% of their holotypes. Therefore, due to the registration and preservation of primary biodiversity data, this work reiterates the importance of curating and digitizing biological scientific collections. Furthermore, it shows extreme relevance for preserving information on existing biodiversity permanently and providing support for future research. Digitization and interconnecting digital extended specimen data proves to be one of the main and most effective ways to protect NHC heritage and their primary data against catastrophic events." (Authors)] Address: Pinto, Â.P. Lab. Systematics on Aquatic Insects, Depto de Zoologia, Univ. Federal do Paraná, Curitiba, Paraná, Brazil



**18645.** Ekpah, O.; Kemabonta, K.A.; Dijkstra, K-d.B.; Ogbogu, S.S.; Fomekong-Lontchi, J.; Omonun, C. (2021): Odonata from two western Nigeria rainforests, with a record of the rare *Ceriatrigon citrinum* Campion, 1914. International Dragonfly Fund - Report 162: 1-17. (in English) ["A survey of Odonata was carried out in two tropical rainforest habitats, in Omo Forest Reserve (OMO) and Igele Sunmoge village (ISV) in Ogun State, Nigeria with focus on the endangered damselfly *Ceriatrigon citrinum* Campion, 1914. A total of 163 individuals of Odonata representing 37 species and 5 families were recorded, including 12 individuals of *C. citrinum* at ISV. A brief note on the conservation status and ecology of the endangered *C. citrinum* in Nigeria is given. OMO is a protected forest managed by the government while ISV is heavily impacted by human activities. Conservation education focusing on the iconic *C. citrinum* was therefore provided to local residents. Dragonfly perception by the residents of Sunmoge village is briefly outlined." (Authors)] Address: Ekpah, O., Nigerian Conserv. Foundation, Km 19, Lekki-Epe Expressway, Lagos State, Nigeria. Email: davisugwa@gmail.com

**18646.** Ensaldo-Cárdenas, A.S.; Rocha-Ortega, M.; Schneider, D.; Robertson, B.A.; Córdoba-Aguilar, A. (2021): Ultraviolet polarized light and individual condition drive habitat selection in tropical damselflies and dragonflies. *Animal Behaviour* 180: 229-238. (in English) ["Highlights: • We examined effects of ultraviolet polarized light (UVPL) on aquatic insects. • We measured odonates' preference for UVPL vs visible range polarized light. • Sexual behaviours were performed in association with the UVPL. • UVPL-associated insects had reduced lipid reserves and body size. • UVPL is both a cue that animals use for habitat selection and an evolutionary trap. Abstract: Artificial objects can polarize ultraviolet light sources to a higher degree than natural objects like water bodies. This can induce a strong attraction response by insects that use such cues as proxies of habitat suitable for reproduction. Visible range polarized light (VRPL) can create evolutionary traps for aquatic insects, but it remains unclear whether insects can use ultraviolet polarized light (UVPL) as a habitat selection cue or if UVPL pollution can create evolutionary traps for aquatic insects like VRPL can. Odonate insects require an aquatic habitat to perform their mating and egg-laying behaviours yet they also perform such behaviours on artificial surfaces (i.e. metal pieces). We measured the preference for UVPL versus VRPL via exposing three species of odonates (*Enallagma praevarum*, *Ischnura denticollis* and *Sympetrum illotum*) to experimental test surfaces differing in these visual cues and assessing behavioural preference via differences in mating behaviour, body condition (i.e. lipid and protein content and body size) and visual acuity (based on eye width size). *Ischnura denticollis* performed more diverse mating behaviours in association with the VRPL treatment, while *S. illotum* preferentially exhibited these behaviours in association with the UVPL. *Ischnura denticollis* individuals associated with the preferred habitat had lower lipid reserves, smaller body size and larger eyes, while habitat preference was unrelated to individual condition and morphology in *E. praevarum* and *S. illotum*. These results suggest intra- and interspecific variation

in trap preferences, which are related to individual condition. They also show that UVPL is a cue that odonates use in habitat selection that has the potential to create evolutionary traps, suggesting conservation problems for aquatic insects that rely upon it to locate water bodies." (Authors)] Address: Córdoba-Aguilar, A., Depto de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Univ., 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

**18647.** Felker, A.; Vasilenko, D. (2021): A new species of the 'protozygopteran' damselfly (Odonata: Permagrionidae) from the Lower-Middle Permian of Russia. *Palaeoentomology* 4(5): 462-467. (in English) ["The small Paleozoic protozygopteran family Permagrionidae comprises 11 described species in 5 genera from the Lower Permian Chekarda and Solikamsk localities in Russia (Zalesky, 1948; Nel et al., 2012) and Salagou Formation in France (Nel et al., 1999; Fate et al., 2013), the Middle Permian Soyana and Kargala localities in Russia (Martynov, 1932; Martynov, 1937; Nel et al., 2012), and the Upper Permian Bodie Creek Head locality in Malvinas Tillyard (1928). Here we describe the new species, *Epilestes rasnitsyni* sp. nov. from the Ufimian of Perm Territory, which is characterized by specific arrangement of veins in the petiole and the unique preservation of body structures." (Authors)] Address: Felker, Anastasia, Borissiak Paleontol. Inst., Russian Acad. Sciences, Moscow, Russia

**18648.** Guliyeva, S.A. (2021): Generalized condition of dragonfly (Odonata) larvae of lakes around Kura. *Advances in Biology & Earth Sciences* 6(2): 184-190. (in English) ["The article provides information on the species composition and distribution of dragonfly larvae inhabiting the inland water basins of Azerbaijan (Aggol, Mehman, Nakhalkhchala, Hajigabul, Garaoglan, Yetim Kur, Marzli, Garkhun, Aynali). The article describes the species composition and distribution of dragonfly larvae inhabiting the inland water basins (Aggol, Mehman, Nakhalkhchala, Hajigabul lakes and Garaoglan, Yetim Kur, Marzli, Garkhun, Aynali) of Azerbaijan by seasons. Larvae are considered one of the most important tools for malaria prevention. At the same time, the larvae of dragonflies form the basis of the feed of fish and other aquatic animals." (Author) Regrettably, many of the records (e.g. *Coenagrion mercuriale*, *C. johanssoni*) are unlikely, and must be misidentifications.] Address: Guliyeva, Senuber, Azerbaijan State University of Economics (UNEC), Istiglaliyyat str 6, Baku, Azerbaijan. E-mail: sama2013@bk.ru

**18649.** Kosterin, O.E. (2021): *Burmagomphus williamsoni eddiei* subsp. nov. (Odonata, Gomphidae) from northern Cambodia. International Dragonfly Fund Report 161: 1-15. (in English) ["*B. williamsoni eddiei* is described from northern (holotype: Cambodia, Siem Reap Province, Sway Leu District, Phnom Kulen Mts, the waterfall 600 m NNW of Preah Ang Thom, 13.569°N, 104.108°E, 270 m a.s.l., 17.06.2018, RMNH), also occurring in Preah Vihear Province. The new subspecies differs from the nominotypical one by a very prominent subapical cercal tooth, the convex inner margin of the para-

proct arms and a trapezoid incision between them, the antehumeral stripe finely separated from that on the metinfraepisternum in males and strong singular spines at the sides of the occipital plate in females." (Author)] Address: Kosterin, O.E., Inst. Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia

**18650.** McLoughlin, S.; Prevec, R.; Slater, B. (2021): Arthropod interactions with the Permian Glossopteris flora. *Journal of Palaeosciences / The Palaeobotanist* 70: 43-133. (in English) ["An extensive survey of literature on the Permian floras of Gondwana reveals over 500 discrete arthropod–herbivory–damage/plant–taxon/stratigraphic–unit associations spanning all regions of the supercontinent from the earliest Asselian to the latest Changhsingian. Margin– and apex–feeding damage is the most common style of herbivory but hole– and surface–feeding, galling, and oviposition damage are locally well represented. Evidence for skeletonization and mucivory is sparse and that for leaf mining is equivocal. Wood and root boring is recognized widely but only where depositional conditions were conducive to the permineralization of plant axes. Wood boring and detritivory may have been especially favoured arthropod feeding strategies in Permian high latitudes where living foliage was scarce during the polar winters. Herbivory damage is most strongly apparent on glossopterid remains; other groups of broad–leafed gymnosperms and sphenopsids host moderate levels of damage. Damage features are under–represented on lycophytes, ferns and spine– and scale–leafed conifers. A survey of insect body fossils from the Gondwanan Permian reveals that most records are from a small number of rich assemblages that are dominated by Blattodea, Hemiptera, Grylloblattida, Mecoptera and Protelytroptera, accompanied by significant representations of Coleoptera, Glosselytrodeia, Miomoptera, Neuroptera, Odonata, Protorthoptera, Palaeodictyopteroidea, Paoliida, Paraplecoptera, Plecoptera, Psocoptera, Thysanoptera and Trichoptera, which collectively adopted a broad range of feeding styles. Oribatid mites and collembolans appear to have been important components of the wood–boring and detritivorous communities. Although temporal trends in herbivory styles and diversity are difficult to resolve from mostly incidental observations and illustrations of plant damage across Gondwana, the results of this study provide a baseline of qualitative data for future studies that should adopt a quantitative approach to the analysis of herbivory, spanning the shift from icehouse to hothouse conditions through the Permian of the Southern Hemisphere." (Authors)] Address: McLoughlin, S., Dept of Palaeobiology, Swedish Museum of Natural History, Stockholm, Sweden

**18651.** Outomuro, D.; Golab, M.J.; Johansson, F.; Sniegula, S. (2021): Body and wing size, but not wing shape, vary along a large-scale latitudinal gradient in a damselfly. *Scientific Reports* volume 11, Article number: 18642 (2021): 11pp. (in English) ["Large-scale latitudinal studies that include both north and south edge populations and address sex differences are needed to understand how selection has shaped trait variation. We quantified the variation of flight-related morphological traits (body size, wing size, ratio between

wing size and body size, and wing shape) along the whole latitudinal distribution of the damselfly *Lestes sponsa*, spanning over 2700 km. We tested predictions of geographic variation in the flight-related traits as a signature of: (1) stronger natural selection to improve dispersal in males and females at edge populations; (2) stronger sexual selection to improve reproduction (fecundity in females and sexual behaviors in males) at edge populations. We found that body size and wing size showed a U-shaped latitudinal pattern, while wing ratio showed the inverse shape. However, wing shape varied very little along the latitudinal gradient. We also detected sex-differences in the latitudinal patterns of variation. We discuss how latitudinal differences in natural and sexual selection regimes can lead to the observed quadratic patterns of variation in body and wing morphology via direct or indirect selection. We also discuss the lack of latitudinal variation in wing shape, possibly due to aerodynamic constraints." (Authors)] Address: Outomuro, D., Dept of Biol. Sciences, Univ. Cincinnati, Rieveschl Hall, Cincinnati, OH 45221, USA. Email: outomuro.david@gmail.com

**18652.** Pahari, P.R.; Jana, G.C.; Mandal, S., Maiti, S.; Bhattacharya, T. (2021): A study on the impact of brick embankment on aquatic entomofauna. *Uttar Pradesh Journal of Zoology* 42(19): 59-68. (in English) ["Shrinkage of the littoral zone due to brick embankment around a pond caused an adverse effect on the floral & faunal composition. A brick embanked pond (BEP) had lower number of macrophytes and entomofauna as compared to a natural pond (NP). Index of similarity suggests that both the ponds were strongly dissimilar in their floral and entomofaunal composition. Hemiptera was the most predominating insect order (96.73%) in BEP while Odonata (41.14%) and Coleoptera (39.02%) were the common orders in NP. Lower diversity, equitability, signal, ASPT, BMWP indices/scores and higher dominance & FBI indices in BEP as compared to NP indicates that BEP provided a less equitable habitat with poor quality of water for the existence of lower diversity of entomofauna." (Authors)] Address: Jana, G.C., PG Dept of Zoology, Tamralipta Mahavidyalaya, Tamluk, 721636, West Bengal, India

**18653.** Paulson, D.R.; Dunkle, W.W. (2021): A checklist of North American Odonata. Including English name, etymology, type Locality, and distribution. Originally published as Occasional Paper No. 56, Slater Museum of Natural History, University of Puget Sound, June 1999; completely revised March 2009; updated February 2011, February 2012, October 2016, November 2018, and February 2021: 92 pp. (in English) ["The checklist includes all 470 species of North American Odonata (Canada and the continental United States) considered valid at this time. For each species the original citation, English name, type locality, etymology of both scientific and English names, and approximate distribution are given. Literature citations for original descriptions of all species are given in the appended list of references." (Authors)] Address: Paulson, D.R., 1724 NE 98th Street, Seattle, WA 98115, USA. E-mail: dennispaulson@comcast.net

**18654.** Polizeli, L.; Pinto, A.P. (2021): Taxonomy and conservation concerns of the critically endangered *Roppaneura beckeri*, a phytotelm-breeding damselfly in the southern Brazilian Atlantic Forest. *Bulletin of Insectology* 74(1): 91-101. (in English) ["Phytotelm-breeding Odonata are rare: from the 6,300 known species of these charismatic freshwater organisms, only a small number of about 50 develop in phytotelmata habitats. Mainly members of the Zygoptera are dependent on this special type of environment. The small coenagrionid *R. beckeri*, a damselfly endemic to the Brazilian Atlantic Forest, is the only known Odonata breeding in the terrestrial umbellifers of *Eryngium floribundum* (Cham. et Schltdl.). This is a species-specific association with a host-plant unparalleled in the order. It also is the only species within the subfamily Protoneurinae to occupy phytotelmata habitats. Here, we report on a population of *R. beckeri* re-discovered after 42 years and recorded for the first time from the southern Atlantic Forest from the state of Paraná. The morphology and the distribution of this species is reviewed and based on these primary data future conservation strategies are discussed. We suggest including *R. beckeri* as a priority species for dragonfly conservation policies due to its exclusive biological characteristics, evolutionary relevance, and occurrence in urban to peri-urban landscapes." (Authors)] Address: Polizeli, L., Undergraduate course of Ciências Biológicas, Univ. Fed. Paraná, Curitiba, Paraná, Brazil

**18655.** Sabeder, N. (2021): Popis kačjih pastirjev in dvoživk ob avtocestnem odseku Šentjakob–Blagovica - Inventory of dragonflies and amphibians by the motorway section Šentjakob–Blagovica. M.Sc. thesis (Master Study Programmes – Ecology and Biodiversity, Biotechnical Faculty, Ecology and biodiversity studies, University of Ljubljana. VIII, 52 pp. (in Slovenian, with English summary) ["The primary objective of the thesis was to gather data on the presence of dragonflies (Odonata) and amphibians (Amphibia) along the highway section between Šentjakob and Blagovica on the A1 Šentilj-Koper. We compared the species richness of dragonflies and amphibians between the sampling sites with a direct influence of the highway and those without. We registered 33 species of dragonflies and 9 species of amphibians. We found that water bodies with the direct impact of the highway had a lower diversity of dragonflies and amphibians compared to those without direct impact, however the difference was not statistically significant. On the other hand, we recorded significantly more dragonfly species that completed their life cycle on water bodies without direct impact of the highway than on sites impacted by highway. We also found a positive correlation between the size of the water body and extent of riparian vegetation on the number of recorded dragonflies on sampling sites. We could not confirm the impact of closeness to the highway on dragonfly species richness. The role of water bodies with the direct impact of highways is not yet completely known. In any case, they likely perform an important connecting function between better preserved habitats and therefore require proper management." (Author)] Address: Šabeder, N., Biotechnical Faculty, Ecology & biodiversity studies, University of Ljubljana, Jamnikarjeva 101, SI-1000 Ljubljana, Slovenia

**18656.** Šigutová, H.; Harabiš, F.; Šigut, M.; Jiří Vojar, J.; Choleva, L.; Dolný, A. (2021): Specialization directs habitat selection responses to a top predator in semiaquatic but not aquatic taxa. *Scientific Reports* | (2021) 11:18928. 11pp. (in English) ["Habitat selectivity has become an increasingly acknowledged mechanism shaping the structure of freshwater communities; however, most studies have focused on the effect of predators and competitors, neglecting habitat complexity and specialization. In this study, we examined the habitat selection of semiaquatic (amphibians: Bufonidae; Libellulidae) and aquatic organisms (true bugs: Notonectidae; diving beetles: Dytiscidae). From each family, we selected one habitat generalist species able to coexist with fish (*Bufo bufo*, *Sympetrum sanguineum*, *Notonecta glauca*, *Dytiscus marginalis*) and one species specialized in fishless habitats (*Bufotes viridis*, *Sympetrum danae*, *Notonecta obliqua*, *Acilius sulcatus*). In a mesocosm experiment, we quantified habitat selection decisions in response to the non-consumptive presence of fish (*Carassius auratus*) and vegetation structure mimicking different successional stages of aquatic habitats (no macrophytes; submerged and floating macrophytes; submerged, floating, and littoral-emergent macrophytes). No congruence between habitat specialists and generalists was observed, but a similar response to fish and vegetation structure defined both semiaquatic and aquatic organisms. While semiaquatic generalists did not distinguish between fish and fishless pools, specialists avoided fish-occupied pools and had a preferred vegetation structure. In aquatic taxa, predator presence affected habitat selection only in combination with vegetation structure, and all species preferred fishless pools with floating and submerged macrophytes. Fish presence triggered avoidance only in the generalist bug *N. glauca*. Our results highlight the significance of habitat selectivity for structuring freshwater ecosystems and illustrate how habitat selection responses to a top predator are dictated by specialization and life history." (Authors)] Address: Šigutová, Hana, Dept Biol. & Ecol., Fac. Science, Univ. Ostrava, 71000 Ostrava, Czech Republic. Email: hana.sigutova@osu.cz

**18657.** Willink, B.; Blow, R.; Sparrow, D.J.; Sparrow, R.; Svensson, E.I. (2021): Population biology and phenology of the colour polymorphic damselfly *Ischnura elegans* at its southern range limit in Cyprus. *Ecological Entomology* 46(3): 601-613. (in English) ["1. Geographically widespread species provide excellent opportunities to investigate how phenotypes change across large-scale environmental gradients. Temperature is a fundamental environmental variable and an important determinant of insect fitness. However, field research is often geographically restricted, and typically concentrated in northern latitudes. Basic population biology and phenotypic clines in relation to temperature therefore remain poorly known across the entire geographic range, even in otherwise well-studied taxa. 2. We surveyed populations of the trimorphic damselfly *Ischnura elegans* in Cyprus, which is the southern range limit in Europe of this widespread insect species. Females of *I. elegans* occur in three discrete and heritable colour morphs, which vary in suites of phenotypic traits. One of these female morphs is a male-mimic that avoids excessive male-mating harassment

by its male-like appearance, and which is more cold-tolerant than the two other morphs. 3. In contrast to the situation in northern Europe, these male-mimicking females are the minority morph in Cyprus, representing only about 5% of all females. Male mimics also have lower mating rates than alternative female morphs. 4. Individuals in Cyprus are relatively small in comparison to the reported European range for body size, consistent with Bergman's rule. 5. Finally, populations of *I. elegans* on the island have the longest flight period known in Europe, and there is only partial evidence for seasonality in flight activity. 6. These results underscore the benefits of considering the entire range of environmental conditions encountered by insect species when conducting evolutionary ecology research." (Authors)] Address: Svensson, E., Evolutionary Ecology Unit, Dept of Biology, Lund Univ., 223 62 Lund, Sweden. E-mail: erik.svensson@biol.lu.se

**18658.** Wu, G.; Tang, S.; Han, J.; Li, C.; Liu, L.; Xu, X.; Xu, Z.; Chen, Z.; Wang, Y.; Qiu, G (2021): Distributions of total mercury and methylmercury in dragonflies from a large abandoned mercury mining region in China. *Archives of Environmental Contamination and Toxicology* 81: 25-35. (in English) ["Odonata are often considered to be biosentinels of environmental contamination. Dragonflies (n = 439) belonging to 15 species of eight genera were collected from an abandoned mercury (Hg) mining region in China to investigate the bioaccumulation of total Hg (THg) and methylmercury (MeHg). The THg and MeHg concentrations in dragonflies varied widely within ranges of 0.06–19 mg/kg and 0.02–5.7 mg/kg, respectively. THg and MeHg were positively correlated with bodyweight (THg:  $r^2 = 0.10$ ,  $P = 0.000$ ; MeHg:  $r^2 = 0.09$ ,  $P = 0.000$ ). Significant variations were observed among species, with the highest MeHg value (in *Orthetrum triangulare*) being 5-fold higher than the lowest (in *Pantala flavescens*). These variations were consistent with those of nitrogen isotope ( $\delta^{15}N$ ) values. A health risk assessment found hazard quotients for specialist dragonfly-consuming birds of up to 7.2, which is 2.4 times greater than the permissible limit of 3, suggesting a potential health risk of exposure." (Authors)] Address: Qiu, G., State Key Lab. Environmental Geochemistry, Inst. of Geochemistry, Chinese Acad. of Sci., Guiyang, 550081, China. E-mail: qiuguangle@vip.skleg.cn

**18659.** Zatkos, L.; Ivan Arismendi, William J. Gerth (2021): Diet of *Octogomphus specularis* (Hagen in Selys, 1859) (Odonata: Gomphidae) nymphs in western Oregon, U.S.A. with incidental information on the diet of *Cordulegaster dorsalis* Hagen in Selys, 1858 (Odonata: Cordulegastridae) nymphs. *The Pan-Pacific Entomologist* 97(2): 75-79. (in English) ["Of the 84 *O. specularis* specimens collected, 39 had empty guts or contained unidentifiable remains of prey and debris. However, stomachs of the remaining 45 contained a diverse composition of prey items. Because the prey in *O. specularis* guts were often damaged or partially digested, insects were mainly identified to order or family (53% identified to order, 45% to family, 2% to genus); non-insects were identified to order or coarser levels. Dipterans were the most common prey found in these specimens. In fall and spring, almost 90% and 70% of the stomachs contained Diptera, respectively

(and 30% in winter). Ephemeroptera (20% and 8%) and Trichoptera. Frequency of occurrence (%F) of prey items by season for *O. specularis* and *C. dorsalis*. (10% and 14%) were also common prey in winter and spring, respectively, whereas Coleoptera made up only 12% of diet contents in the fall. Incidental prey items occurred only in spring and included Coleoptera, Plecoptera, Acariformes, Ostracoda, Oligochaeta, and Psocodea. No statistically significant differences in the composition of individual diets existed among seasons. The results of the PERMANOVA support the null hypothesis that the stomach contents of these opportunistic predators do not vary significantly by season ( $p = 0.13$ ). Nevertheless, this is a relatively small p value, and a larger analysis with more specimens may illuminate seasonal trends not observed here. Because only three *C. dorsalis* specimens were collected, analyses could not be conducted." (Authors)] Address: Arismendi, I., Dept of Fisheries, Wildlife, and Conservation Sciences, Oregon State University, 104 Nash Hall, Corvallis, Oregon 97331, U.S.A. E-mail: ivan.arismendi@oregonstate.edu

**18660.** Zhang, H.; Ning, X.; Yu, X.; Bu, W.-J. (2021): Integrative species delimitation based on COI, ITS, and morphological evidence illustrates a unique evolutionary history of the genus *Paracercion* (Odonata: Coenagrionidae). *PeerJ* 9:e11459. DOI 10.7717/peerj.11459: 22 pp. (in English) ["*Paracercion* are common 'blue and black' colored damselflies. We explore the species boundaries of *Paracercion* (Odonata: Coenagrionidae) using ABGD, bPTP, GMYC and Distance-based clustering. We finally got the molecular data of all nine species of *Paracercion*. *P. hieroglyphicum* and *P. melanotum* were combined into one putative species based on cytochrome c oxidase I (COI). However, they were separated into two putative species based on the nuclear segment including ITS1-5.8S-ITS2 (ITS). This suggests the introgression of mtDNA in *Paracercion*. *Paracercion barbatum* and *Paracercion melanotum* can be separated into two species based on COI, whereas they were combined into one putative species based on ITS, which suggests a hybridization event between them. The lower interspecific divergence (COI: 0.49%) between *P. barbatum* and *Paracercion v-nigrum* indicates a recent speciation event in *Paracercion*. *Paracercion sieboldii* and *P. v-nigrum* can be separated into two putative species based on COI, while they were frequently merged into the same putative species based on ITS. This can be explained by incomplete lineage sorting in nDNA. Besides, *P. pendulum* and *P. malayanum* were synonymized as junior synonyms of *P. melanotum*. *P. luzonicum* was confirmed not to belong to *Paracercion*. The possibility of introgression, hybridization, recent speciation and incomplete lineage sorting makes species delimitation, based on molecular data, difficult and complicates understanding of the evolutionary history of *Paracercion*. The discordance in COI and ITS also indicates the value of using markers from different sources in species delimitation studies." (Authors)] Address: Yu, X., College of Life Sciences, Chongqing Normal University, Chongqing, China. E-mail: lannysummer@163.com



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2010

**18661.** Dow, R.A. (2010): Revision of the genus *Coeliccia* (Zygoptera: Platycnemididae) in Borneo. Part I: The borneensis group of species. *Zool. Med. Leiden* 84(7): 117-157. (in English) ["A revision of the borneensis-group of *Coeliccia* species from the SE Asian island of Borneo is presented. The group is characterised based on the form of the penis, the form of the posterior lobe of the female pronotum and the mesostigmal plates of the female. Six species are recognised as occurring in Borneo, of which one is described as new: *C. kenyah* spec. nov. *Coeliccia campioni*, often considered a junior synonym of *C. borneensis*, is shown to be a valid species and new records are provided. *C. coomansi* is shown to be a junior synonym of *C. flavostriata*. Redescriptions based on fresh material are provided for the female of *C. borneensis* and the male of *C. campioni*. The male of *C. borneensis* and the female of *C. campioni* are described for the first time. Variation in *C. arcuata* and *C. flavostriata* is discussed. Keys to both sexes and illustrations of important characters for all named species are given." (Author)] Address: Rory A. Dow, Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow230@yahoo.co.uk

**18662.** Gainzarain, J.A. (2010): Primeras citas de *Hemianax ephippiger* (Burmeister, 1839) (Odonata: Aeshnidae) y *Onychogomphus costae* (Selys, 1885) (Odonata: Gomphidae) para el País Vasco (norte de España). *Boletín de la S.E.A.* 46(1): 525-526. (in Spanish, with English summary) [The first records of *H. ephippiger* and *O. costae* from the Basque Country (Spain) are reported, including observations of reproductive activity by the first species.] Address: Gainzarain, J.A., Instituto Alavés de la Naturaleza Apdo. de Correos 2092 01080 Vitoria-Gasteiz, Spain. E-mail: j.a.gainzarain@euskalnet.net

**18663.** Huang, B.-y.; Liang, X.-f.; Shi, Y.-w.; Zan, Q.-t.; Xu, J.-c. (2010): Damselflies and its habitat selection in South China Botanical Garden. *Ecological Science* 29(5) : 444-450. (in Chinese, with English summary) ["The preliminary

studies on biological characteristics and unique habitat selection of damselflies in South China Botanical Garden is here reported. At the same time, we cultivated damselfly larvae under the conditions in the Laboratory. Through the research about water conditions, aquatic vegetation habitat, the distribution of different seasons of various types of damselflies, it found that as its sensitive habitat conditions, some damselflies can play the role in ecological indicators for wetland aquatic community structure changes and water quality pollution. This study has great significances for the biological monitoring of water pollution, damselflies habitat protection and the construction and transformation of wetlands in the city." (Authors)] Address: Huang, B.-y., Dept of Biotechnology, Jinnan Univ., Guangzhou 510632, China

**18664.** Sendra Perez, I.; Marin Palomares, G.; Lopez Alabau, A. (2010): De Monstruos y Prodigios (31): Deformacion abdominal en *Sympetrum striolatum* (Charpentier, 1840) (Odonata: Libellulidae). *Boletín de la S.E.A.* 47: 467-468. (in Spanish, with English summary) ["A *S. striolatum* teratological female is showed; the specimen presents a deformed, twisted abdomen. Individual was captured in the surrounding areas of the Cabriel River, in the province of Valencia (Spain)." (Authors)] Address: Sendra Pérez, I., C/Camino 14, 2º, 3ª. 46.300, Utiel (Valencia), Spain. E-mail: sendra\_ign@gva.es

**18665.** Shugart, M.M. (2010): In pursuit of dragonflies: protein sources in Balinese rice fields. MSc thesis, University of Colorado, Boulder, CO, USA: 98 pp. (in English) ["Agricultural systems can provide more to the farmers and their communities than simply the production of domesticated plants. This project considers how rice farms can also support a variety of edible insects and small wild animals that can be harvested for protein. In this thesis, I analyze the farmer knowledge, capturing techniques, and cooking methods for small animals and insects from organic rice fields in Bali, Indonesia. Information was gathered from formal surveys with farmers and participant observation. Considering the rich source of protein and fats found in these insects and animals, I argue that production and harvesting of small protein resources may provide a more sustainable approach

to dealing with global food shortages, particularly in places such as Africa, where livestock husbandry is not practical." (Author)] Address: not stated

**18666.** Stübing, S.; Hill, B.T.; Roland, H.-J. (2010): Jahresbericht Hessen 2009. Libellen in Hessen 3: 4-36. (in German) ["The Hessian dragonfly year 2009 was marked by several "records": Never before was the flight season so long, were so many data reported to us and were so many informative photos and manuscripts available as in 2009. For the third annual report on dragonflies, 11,191 data sets were reported by 83 observers from all Hessian districts. 7,924 reports were for the year 2009, which is an increase of about 60 % compared to the previous year's data collection, which was by far the most comprehensive to date. The other data is made up of highly welcome follow-up reports as well as miscellaneous registrations. All in all, the total data stock in Hesse has thus been increased by one third! For reasons of space, the reports of the more common species are therefore presented in tabular form. 26 new first and 24 last observation records are not only due to increased observer activity, but also a result of the climatic conditions in 2009. After the occasionally unusually cold winter of 2008/09 with lows around -26 °C, March and April were remarkably warm and sunny. Already on 1.4. the first winter dragonflies *Sympetma fusca* appeared at the water body and on 5.4. the first early *Pyrrhosoma nymphula* hatched. October and November were very mild, so that on 25.11. *Sympetrum striolatum*, *S. vulgatum* were still on the move. Unusually late flying were *Libellula depressa* and *Crocothemis erythraea*. Remarkable observations were made of the following species, among others: *Leucorrhinia caudalis* (proof of ground-level occurrences of nationwide importance), *Sympetrum meridionale* (large ground-level population for the first time), *Ophiogomphus cecilia* (numerous new water bodies, also among the other gomphids), *Somatochlora arctica*. (confirmation of both occurrences), *S. flavomaculata* (new discovery at two sites) and *Aeshna isocetes* as well as *Libellula fulva* (both remarkably frequent, as last year). *Brachytron pratense* also appeared remarkably often. On the other hand, *Erythromma viridulum* and *Ischnura pumilio* were conspicuously rare, as was probably also *Orthetrum brunneum*. The other southern species did not show any effects of the cold winter." (Authors; DeepL)] Address: Stübing, S., Im Feldchen 1a, 61209 Echzell, Germany. E-mail: stefan.stuebing@gmx.de

## 2014

**18667.** Afsar, A. (2014): Scanning Electron Microscopy (SEM) study of the caudal gills of *Ceriagrion coromandelianum* (Fabricius) of zygopteran larvae (Odonata: Zygoptera). International Journal of Technical Research and Applications 2(6): 159-165. (in English) [SEM study of the caudal gills of larvae of *C. coromandelianum* „greatly clarifies the orientation, structures and arrangement of trachea, its ramification, tracheoles, and chloride cells apart with the arrangement of complex cuticular components because of its depth of field and high resolving power." (Author)] Address: Afsar, A., Guest Fac., Dept of Zoology, J. R. S. College Jamalpur Munger,

T. M. B. Univ. Bhagalpur, Bhagalpur, Bihar, India

**18668.** Al-Asady, H.S.; Al-Hashmi, A.H. (2014): External morphological study of *Coenagrion* [sic] *lindenii* (Selys, 1840) (Odonata: Zygoptera: Coenagrionidae) in Iraq. Ibn Al-Haitham Jour. for Pure & Appl. Sci. 27(1): 14-23. (in Arabian, with English summary) ["The present study introduces detailed description of *erythromma lindenii*. External morphological characters of the three body region were used included male genitalia. Such characters were supported by illustration. Date and place of collection were recorded." (Authors)] Address: Al-Asady, H.S., Dept. Biology / College Education for Pure Science (Ibn Al-Haitham), Univ. of Baghdad, Iraq

**18669.** Bakhshi, Y.; Sadeghi, S. (2014): Odonata fauna of Khuzestan province (Iran) with a note on an Oriental species *Trithemis aurora* (Burmeister, 1839) as a new record for the south-west of Iran. Zoology in the Middle East 60(4): 372-374. (in English) ["We carried out our survey from 2010 to 2012. ... In total, 616 specimens have been collected belonging to 33 species. Nine species belong to Zygoptera and the remaining 24 species to Anisoptera (Table 1). This is about 30% of all dragonflies found so far in Iran. We could thus add 18 species to the previous list for Khuzestan which comprised 21 species (Sadeghi & Dumont, 2004; Heidari & Dumont, 2002). ... *Trithemis aurora* was collected in 3 ♂ and 1 ♀ from three sites in Khuzestan during July and August 2011 and August 2012." (Authors)] Address: Sadeghi, S., Biology Dept, Shiraz University, Shiraz, Iran

**18670.** Blaho, M.; Herczeg, T.; Kriska, G.; Egri, A.; Szaz, D.; Farkas, A.; Tarjanyi, N.; Czinke, L.; Barta, A.; Horvath, G. (2014): Unexpected attraction of polarotactic water-leaving insects to matt black car surfaces: Mattness of paintwork cannot eliminate the polarized light pollution of black cars. PLoS ONE 9(7): e103339. doi:10.1371/journal.pone.0103339: 12 pp. (in English) ["The horizontally polarizing surface parts of shiny black cars (the reflection-polarization characteristics of which are similar to those of water surfaces) attract water-leaving polarotactic insects. Thus, shiny black cars are typical sources of polarized light pollution endangering water-leaving insects. A new fashion fad is to make car-bodies matt black or grey. Since rough (matt) surfaces depolarize the reflected light, one of the ways of reducing polarized light pollution is to make matt the concerned surface. Consequently, matt black/grey cars may not induce polarized light pollution, which would be an advantageous feature for environmental protection. To test this idea, we performed field experiments with horizontal shiny and matt black car-body surfaces laid on the ground. Using imaging polarimetry, in multiple-choice field experiments we investigated the attractiveness of these test surfaces to various water-leaving polarotactic insects and obtained the following results: (i) The attractiveness of black car-bodies to polarotactic insects depends in complex manner on the surface roughness (shiny, matt) and species (mayflies, dolichopodids, tabanids). (ii) Non-expectedly, the matt dark grey car finish is much more attractive to mayflies (being endangered and protected in many countries) than matt black finish. (iii) The

polarized light pollution of shiny black cars usually cannot be reduced with the use of matt painting. On the basis of these, our two novel findings are that (a) matt car-paints are highly polarization reflecting, and (b) these matt paints are not suitable to repel polarotactic insects. Hence, the recent technology used to make matt the car-bodies cannot eliminate or even can enhance the attractiveness of black/grey cars to water-leaving insects. Thus, changing shiny black car painting to matt one is a disadvantageous fashion fad concerning the reduction of polarized light pollution of black vehicles." (Authors) The paper includes references to Odonata.] Address: Horvath, G., Environmental Optics Laboratory, Dept of Biological Physics, Physical Institute, Eötvös Univ., Budapest, Hungary. E-mail: gh@arago.elte.hu

**18671.** Boda, P.; Horváth, G.; Kriska, G.; Blahó, M.; Csabai, Z. (2014): Phototaxis and polarotaxis hand in hand: night dispersal flight of aquatic insects distracted synergistically by light intensity and reflection polarization. *Naturwissenschaften* 101: 385-395. (in English) ["Based on an earlier observation in the field, we hypothesized that light intensity and horizontally polarized reflected light may strongly influence the flight behaviour of night-active aquatic insects. We assumed that phototaxis and polarotaxis together have a more harmful effect on the dispersal flight of these insects than they would have separately. We tested this hypothesis in a multiple-choice field experiment using horizontal test surfaces laid on the ground. We offered simultaneously the following visual stimuli for aerial aquatic insects: (1) lamplit matte black canvas inducing phototaxis alone, (2) unlit shiny black plastic sheet eliciting polarotaxis alone, (3) lamplit shiny black plastic sheet inducing simultaneously phototaxis and polarotaxis, and (4) unlit matte black canvas as a visually unattractive control. The unlit matte black canvas trapped only a negligible number (13) of water insects. The sum (16,432) of the total numbers of water beetles and bugs captured on the lamplit matte black canvas (7,922) and the unlit shiny black plastic sheet (8,510) was much smaller than the total catch (29,682) caught on the lamplit shiny black plastic sheet. This provides experimental evidence for the synergistic interaction of phototaxis (elicited by the unpolarized direct lamplight) and polarotaxis (induced by the strongly and horizontally polarized plastic-reflected light) in the investigated aquatic insects. Thus, horizontally polarizing artificial lamplit surfaces can function as an effective ecological trap due to this synergism of optical cues, especially in the urban environment." (Authors) The paper includes references to Odonata.] Address: Horvath, G., Environmental Optics Lab., Dept of Biological Physics, Physical Inst., Eötvös Univ., Budapest, Hungary. E-mail: gh@arago.elte.hu

**18672.** Catil, J.-M. (2014): Une femelle de *Gomphus pulchellus* morte empalée sur une tige de *Juncus inflexus* (Odonata: Gomphidae). *Martinia* 30(2): 46. (in French) [Verbatim: On 14 June 2013, an odonate caught my attention at the edge of a small pond in the commune of Monfort (Gers [32]). This one, a female of *G. pulchellus*, was impaled on the top part of a stem of *Juncus inflexus* L., 1753 by the left forewing. The individual had obviously been dead for a relatively short

time, its relatively intact body not having been damaged by weather conditions or predators. Several cases of accidental capture by plants have been reported, one of which is quite similar (Lambret, P., 2010: Un mâle de *Lestes macrostigma* prisonnier de *Juncus maritimus*. *Martinia*, 26 (1): 49-51). Various hypotheses were put forward at the time. Amongst these, the influence of the wind is plausible, as there had been strong gusts of wind on the previous days (11 and 12 June). In addition, the individual in question had crumpled and still relatively shiny wings, suggesting that it had emerged shortly before the incident and that the wings were fragile. This factor, whether or not combined with the windy episode, could explain a flight accident. However, we cannot exclude other causes, although less likely, such as flight from a predator or from fellow birds (Lambret, op. cit.) and only direct observations, although unlikely, could shed light on this very unusual mortality. I would like to thank Pierre-Olivier Cochard for his help in determining *J. inflexus*. (DeepL)] Address: Catil, J.-M., CPIE Pays Gersois, Au Château, 32300 L'Isle-de-Noé, France. E-mail: jmcatil@yahoo.fr

**18673.** Cerny, M. (2014): First records for Czechia of *Forcipomyia paludis* (Diptera: Ceratopogonidae), a midge parasitizing dragonfly imagines (Odonata: Coenagrionidae, Aeshnidae). *Libellula* 33(3/4): 157-162. (in English, with German and Czech summaries) ["Three findings of *F. paludis* are reported, representing the first records of this biting midge for Czechia. On 23-VI-2013 one female attached to the wings of a female *Coenagrion puella* was photographically documented near Lysá nad Labem ca 30 km northeast of Prague. Two further specimens were discovered in the author's photographic archive, both attached to wings of male *Aeshna isocetes*. These records originated from West and South Bohemia on 3 June and 6 June 2011, respectively." (Author)] Address: Cerny, M., Dept Ecol., Charles Univ. in Prague, Viničná 7, Prague, 128 44, Czech Republic. E-mail: cerny@natur.cuni.cz

**18674.** Charashika, Z. (2014): An assessment of infestation by parasitic water mites on dragonflies at Marsh along Mwenje dam, Mazowe district, Zimbabwe. BSc. thesis, Bindura University of Science Education: 30 pp. (in English) ["This study was done to determine the infestation levels by water mites (Hydrachnidae) on dragonflies (Anisoptera) that are found at a marsh along Mwenje Dam in Mazowe District, Zimbabwe. A total of 111 dragonflies comprising Aeshnidae (31.5%) and Libellulidae (68.5%) were collected over a period of four months (January to April 2014). The total length and gender of each individual was recorded, as well as number and attachment sites of the parasitic mites. Overall, a total of 28.8% insects were infected. Among the Aeshnidae, the proportion of males that were infected were significantly greater than the females (Chisquare,  $x^2$ ,  $p < 0.05$ ). However, for Libellulidae there was no significant difference in the proportions of infected males and females (Chi-square,  $x^2$ ,  $p > 0.05$ ). A significantly greater proportion of Aeshnidae was parasitized as compared to Libellulidae (Chi-square,  $x^2$ ,  $p < 0.05$ ). For both taxa, the parasites were attached on either the thorax or abdomen, with no significant

difference in the number of parasites between the two attachment sites (ANOVA,  $p > 0.05$ ). (Author) Regrettably, all odonate taxa are misidentified.] Address: not stated

**18675.** Chovanec, A.; Waringer, J.; Wimmer, R.; Schindler, M. (2014): DRAGONFLY ASSOCIATION INDEX: Bewertung der Morphologie von Fließgewässern der Bioregion Östliche Flach- und Hügelländer durch libellenkundliche Untersuchungen. Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft Stubenring 1, 1010 Wien: 43 pp. (in German) ["The aim of this dragonfly study was to develop a water type-specific, index-based approach to assess the hydromorphology of small and medium-sized watercourses in the Eastern Plains and Hills bioregion. Based on the ecological requirements of 57 dragonfly species (potentially) occurring in the bioregion, seven dragonfly associations were described. The ecological requirements of these associations were correlated with the water typological characteristics. The result is the definition of water body type-specific associations. In the Dragonfly Association Index, any deviation of the respective status quo from these reference states is calculated and expressed in one of the five classes of ecological status according to the Water Act (WRG). The method is to be applied in particular to those water bodies and water body types where the informative value of the standard methods according to the WRG is limited or not given due to the water body typological characteristics. Furthermore, the use of the method is recommended for the evaluation of local hydraulic engineering interventions, in particular reconstruction measures." (Authors; DeepL) Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

**18676.** Chovanec, A.; Schindler, M.; Rubey, W. (2014): Assessing the success of lowland river restoration using dragonfly assemblages (Insecta: Odonata). *Acta ZooBot Austria* 150/151: 1-16. (in English, with German summary) ["The ecological status of straightened and restored stretches of a small river system ("Weidenbach") in the lowland areas of eastern Austria was assessed based on dragonfly surveys. Restoration measures were carried out to varying extent, ranging from measures aimed at the main channel (increasing sinuosity and in-stream habitat heterogeneity) to river-type-specific restoration (RTSR) focusing also on the lateral connectivity of the system (e.g., by river widening and constructing backwaters). The assessment, which is in compliance with the EU Water Framework Directive (WFD), is based on a comparison between the current situation ("status quo") and a river-type-specific reference condition. The key elements of the assessment are species composition and the Odonata Habitat Index (OHI). Stretches of the Weidenbach subjected to RTSR were characterised by higher species numbers and a broader range of OHIs than in the other areas of the same river, indicating a wider spectrum of relevant habitats. In RTSR areas, autochthonous populations of sensitive and threatened species such as *Coenagrion scitulum* and *Aeshna isosceles* were found. These areas were ranked as class II ("good dragonfly-related ecological status"), which represents the second best class and the quality

target in the 5-tiered WFD classification scheme." (Authors)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

**18677.** Coy, R. (2014): *Synlestes weyersii*: Observations of mating and oviposition. *Victorian Entomologist* 44(4) August 2014: 74-79. (in English) [Deer Vale, NSW, Australia, 6-1-2014] Address: not stated

**18678.** Deliry, C. (2014): Les libellules du marais de Lavours. *Bulletin mensuel de la Société linnéenne de Lyon, hors-série numéro 3*, 2014. Bilan de 30 ans d'études scientifiques dans le marais de Lavours (1984-2014): 219-228. (in French, with English summary) ["The dragonflies of the Lavours marsh. - Dragonflies are studied in the Lavours marsh since thirty years, leading to 44 species identified now. This high specific richness makes Lavours marsh one of the major odonatological area for Rhône-Alpes region. However, populations are often at low level even if several interesting places are still needing investigations. Some habitats deteriorated with likely loss of two species: *Leucorrhinia caudalis* and *Coenagrion pulchellum*. The evolution of other species populations and their heritage value are analyzed." (Author)] Address: Deliry, C., 1, place de la Poste, F-38200 Villefontaine, France. E-mail: cyrille@deliry.com

**18679.** Denis, A. (2014): Evaluation de l'état de conservation de la population de Gomphes à pattes jaunes *Gomphus flavipes* (Charpentier, 1825) sur le fleuve Adour. Rapport de stage de Master 2, Université de Toulouse: 38 pp, app. (in French) [*G. flavipes* is a relatively rare species of Odonate that is restricted to slow, undeveloped streams in the alluvial valleys of the plains. This species, protected in France and Europe, is classified as "Least Concern" on the Red List of European Odonates and "Endangered" on the provisional Red List of French Odonates. A priority species of the Regional Action Plan for Odonates (PRAO) in Aquitaine, effective since 2013, *Gomphus flavipes*, mainly present on the Adour river, benefits from an action dedicated to it. Indeed, the objective of action A.7 of the PRAO is to improve knowledge on the distribution and ecology of *G. flavipes* in order to assess the conservation status of the regional population. The results of this study made it possible to identify certain basic characteristics of the habitat favourable to larval emergence on the banks of the Adour, namely a wooded riparian vegetation and a rather steep slope. The presence of grass beds in beach areas seems to be a limiting factor for the emergence of this species on these sectors. The study also showed that the majority of emergences took place between 0 and 50 centimetres above the water level and that the most commonly used emergence supports are root hairs and roots plunging into the water. As the study took place under particular meteorological and hydrological conditions, only partial conclusions could be drawn as to the conservation status of the population of *G. stylurus* on the Adour River. However, the study did highlight the difficulties and limitations of the proposed protocol. Proposals for improving the protocol and suggestions for future studies were therefore submitted. In addition to these recommendations, this report highlights



the fact that the Adour River is a favourable environment for the species in ecological conditions that are poorly documented in the bibliography. Finally, the pressures and threats weighing on the population appear to be low. The regional population therefore does not seem to be threatened in the medium term. Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: not stated

**18680.** Dunk, von der K. (2014): Untersuchungen zur entomologischen Vielfalt in der Brucker Lache, einem seit über 50 Jahren geschützten besonderen Lebensraum in unmittelbarer Nähe zur Großstadt Erlangen. *galathea* 30: 5-48. (in German, with English summary) ["In 2012 and additional in 2013 members of the "Kreis Nürnberger Entomologen" investigated the insect fauna of the "Brucker Lache". The name of the area derives from a small suburb of the city of Erlangen (Middle Frankonia, Northern Bavaria) and the nearby growing wet forest. This kind of wood was drained by mankind so hard, that one must speak from an exception, that this forest still exists. As one of the first objects it was set under protection in 1964. The elder-grove (*Alnus glutinosa* with stilt roots) offers different life conditions compared with the ordinary pinetree forests, which grow all around. So it was exciting to look for specific insect species. We were able to discover 625 different insects. Among them 19 are mentioned in the Bavarian Red Data Book, and 11 in the new German Red Data Book. ..."] (Authors) *Aeshna cyanea*, *Ischnura elegans*, *Pyrhosoma nymphula*, *Sympecma fusca*, *Libellula depressa*, *Sympetrum danae*, *S. sanguineum*, *Platycnemis pennipes*] Address: v.d. Dunk, K., Ringstr. 62, 91334 Hemhofen, Germany. E-mail: [k.v.d.dunk@t-online.de](mailto:k.v.d.dunk@t-online.de)

**18681.** Evangelio Pinach, J.M.; Sendra Pérez, P.; Díaz Martínez, C. (2014): Primera cita de *Libellula quadrimaculata* Linnaeus, 1758 (Odonata: Libellulidae) y *Lestes sponsa* (Hansemann, 1823) (Odonata: Lestidae) para la provincia de Cuenca (este de España). *Boletín de la Sociedad Entomológica Aragonesa* 54: 425-426. (in Spanish, with English summary) [The first records of *L. quadrimaculata* [14-V-2011, laguna de Talayuelas (Serranía baja, Cuenca) (ETRS89, UTM 30SXXK5008, 895 m a.s.l.) and *L. sponsa* [15-VII-2013, ETRS89, UTM 30TXK3141, 1340 m.a.s.l.] from Cuenca province (eastern Spain) are reported.] Address: Jesús M. Evangelio Pinach, J.M., Agente Medioambiental. Servicios Periféricos de la Consejería de Agricultura en Cuenca. Junta de Comunidades de Castilla-La Mancha, Spain. E-mail: [jjevanach@hotmail.com](mailto:jjevanach@hotmail.com)

**18682.** Folz, H.-G. (2014): Positive Entwicklung von Vogel- und Libellenfauna durch Bachrenaturierungen im rheinhesischen Hügelland. *Fauna und Flora in Rheinland-Pfalz* 12(4): 1287-1313. (in German, with English summary) ["After their restoration, four stream sections have been surveyed for birds and dragonflies. The results are compared with data from before the restoration projects. It is shown that the measures to restore the habitat have resulted in a dramatic improvement for the birds and dragonflies of Rhineland, a region traditionally sparse of bodies of water. The surveyed stretches show a considerable improvement regarding

areas to breed or rest for water-dependent bird species. ... The number of dragonfly species has grown to at least 37, which means an increase of more than 120% in certain areas." (Authors)] Address: Folz, H.-G., Hausener Str. 8, 55270 Engelstadt, Germany. E-Mail: [folz-engelstadt@gmx.de](mailto:folz-engelstadt@gmx.de)

**18683.** Friebe, G. (2014): Libellen-Beobachtungen (Einzel-funde) aus Vorarlberg (Odonata / Österreich – Austria occ.). *inatura – Forschung online*, Nr. 9: 13 pp. (in German) [Austria "This paper lists observations by chance of dragonflies in recent years and at the same time continues the observations at the water garden in the inatura area in Dornbirn. At this artificial concrete basin in the city area, the number of reliably identified and documented species increased to 27 last year. From the Rhine delta, the first finding for Vorarlberg of *Aeshna affinis* from 2004 is published. The oviposition and thus the attempted reproduction of this species was documented in Lustenau in 2010. *Crocothemis erythraea*, which also likes warmth, was sighted several times in the Rhine Valley, with a freshly hatched animal documenting successful reproduction. With the occurrence of *Sympetrum fonscolombii* in the inatura area, another species flying in from the south is discussed. For some rarer dragonfly species, new locations in Vorarlberg are mentioned." (Author; DeepL)] Address: Friebe, G., inatura - Erlebnis Naturschau GmbH, Jahngasse 9, 6850 Dornbirn, Austria. E-Mail: [georg.friebe@inatura.at](mailto:georg.friebe@inatura.at)

**18684.** Haritonov, A.Yu.; Popova, O.N.; Lagunov, A.V. (2014): Zoological analysis of dragonflies (Odonata) of the Southern Urals. *Eurasian Entomological Journal* 13(4): 301-314. (in Russian, with English summary) ["For the first time one of methods of the zoological analysis, namely Saksonov-Rosenberg's matrix is applied to estimate of the current nature protection status of dragonflies and to form the list of protected species. The estimated matrix included 65 species of dragonflies authentically revealed for the Southern Urals. As a result of the analysis of this matrix it is revealed 25 species being under the threat of disappearance and also very rare species which were taken as a basis by drawing up the general recommendatory lists of protected species of dragonflies as a part of Red Lists of the Republic of Bashkortostan (21 spp.), the Chelyabinsk (23) and Orenburg (3) Provinces, and also in structure «red lists» of the Bashkir (6) and Ilmen (6) State Reserve, certain areas, the cities, etc." (Authors)] Address: Popova, Olga, Inst. of Systematics & Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091, Russia. E-mail: [popova-2012@yandex.ru](mailto:popova-2012@yandex.ru)

**18685.** Hunger, H.; Schiel, F.-J. (2014): *Sympetrum paedisca* am westlichen Bodensee – neue Beobachtungen zu Bestandsschwankungen und Fortpflanzungshabitaten (Odonata: Lestidae). *Libellula* 33(3/4): 195-209. (in German, with English summary) ["*S. paedisca* at the westerly Lake Constance: new findings on population fluctuations and reproduction habitats – Data from surveys carried out in seven years during the period from 2004 to 2013 indicate a correlation between the water level fluctuations of Lake

Constance between April and September, the period of oviposition, larval development and emergence, and the population sizes of the summer generation of *S. paedisca*. It can be assumed that falling water levels during the summer lead to the death of many larvae in their shallow water habitats. Knowledge regarding the larval habitats of *S. paedisca* is still insufficient. We observed reproductive activities at nearly natural shallow shore zones of Lake Constance within the nature reserve "Wollmatinger-Ried-Untersee-Gnadensee" and at an artificially created pond on the Mettnau peninsula. Only at the latter location *S. fusca* occurred syntopically." (Authors)] Address: Hunger, H., INULA, Wilhelmstr. 8, 79098 Freiburg, Germany. E-mail: holger.hunger@inula.de

**18686.** Jeanmougin, M.; Leprieur, F.; Loïs, G.; Clergeau, P. (2014): Fine-scale urbanization affects Odonata species diversity in ponds of a megacity (Paris, France). *Acta Oecologica* 59: 26-34. (in English) ["Highlights: •There was no influence of pond localization along the urban gradient on Odonata assemblages. •There was no influence of pond localization along the urban gradient on Odonata  $\alpha$ -diversity. •Fine-scale urbanization has negative effects on Odonata  $\alpha$ -diversity. •The environmental conditions were similar among the studied ponds. •Exuviae are important for understanding the response of Odonata to urbanization. Abstract: Current developments in urban ecology include very few studies focused on pond ecosystems, though ponds are recognized as biodiversity hotspots. Using Odonata as an indicator model, we explored changes in species composition in ponds localized along an urban gradient of a megacity (Paris, France). We then assessed the relative importance of local- and landscape-scale variables in shaping Odonata  $\alpha$ -diversity patterns using a model-averaging approach. Analyses were performed for adult (A) and adult plus exuviae (AE) census data. At 26 ponds, we recorded 657 adults and 815 exuviae belonging to 17 Odonata species. The results showed that the Odonata species assemblage composition was not determined by pond localization along the urban gradient. Similarly, pond characteristics were found to be similar among urban, suburban and periurban ponds. The analyses of AE census data revealed that fine-scale urbanization (i.e., increased density of buildings surrounding ponds) negatively affects Odonata  $\alpha$ -diversity. In contrast, pond localization along the urban gradient weakly explained the  $\alpha$ -diversity patterns. Several local-scale variables, such as the coverage of submerged macrophytes, were found to be significant drivers of Odonata  $\alpha$ -diversity. Together, these results show that the degree of urbanization around ponds must be considered instead of pond localization along the urban gradient when assessing the potential impacts of urbanization on Odonata species diversity. This work also indicates the importance of exuviae sampling in understanding the response of Odonata to urbanization." (Authors)] Address: Jeanmougin, M., MR 7204 (MNHN-CNRS-UPMC), Laboratoire Centre d'Ecologie et des Sciences de la Conservation, Muséum National d'Histoire Naturelle, CP 51, 55 rue Buffon, 75005 Paris, France

**18687.** Leuthold, W.; Wildermuth, H. (2014): Erstnachweis der an Libellen parasitierenden Gnitze *Forcipomyia paludis*

in Litauen (Diptera: Ceratopogonidae; Odonata: Coenagrionidae). *Libellula* 33(3/4): 153-155. (in German, with English summary) ["First record of *F. paludis* as a parasite of Odonata in Lithuania – On 15 June 2014, in the Aukštaitija National Park W of Ignalina, Utena district, a female of *F. paludis* was photographically documented attached to the wing of a male *Coenagrion hastulatum*. This is the first record of this biting midge in the Baltic States." (Authors)] Address: Leuthold, W., Kinkelstr. 61, 8006 Zürich, Switzerland. E-mail: wleuthold@bluewin.ch

**18688.** Mansoreha, S.; Doosti, S.; Bazrafkan, S.; Hosseini-Vasoukolaei, N.; Vatandoost, H. (2014): Prevalence of aquatic entomofauna, the predators of mosquitoes, in the Zayandeh River of Central Iran. *Asian Pacific Journal of Tropical Disease* 4, Supplement 1: S240-S245. ["Objective: To determine the fauna of aquatic insects in Zayandeh River of Isfahan carried out in Tehran University of Medical Sciences in 2011. Methods: This study was performed in Isfahan, central of Iran in Zayandeh River. This was a descriptive study. Having fulfilled sampling for several times, we collected nearly 76 samples from different parts of river. Then they were sealed in an individual jars containing some water obtained from their habitat. Next, the insects were put in jars containing 70% ethylic alcohol. Results: A total of 76 matured samples of aquatic insects from the Zayandeh River were obtained. Among them, the order of Hemiptera which were the most prevalent order including two families: Gerridae (n=27, 35.52%), and Notonectidae (n=11, 14.47%). Other order were found belonging to Odonata from the family of Coenagrionidae (n=12, 15.78%), Coleoptera from the family of Carabidae (n=15, 19.73%) and Prostigmata from the family of Hydrachnidae (n=11, 14.47%). This was the first faunistic study carried out in Zayandeh River of Isfahan of Iran. Conclusions: The results are appropriate for future researches to detect more ecological aspects of aquatic arthropods and their role for biological control of vectors which transmit disease to human and animals." (Authors)] Address: Corresponding author: Dr. Hassan Vatandoost, Dept of Medical Entomology & Vector Control, School of Public Health, Tehran University of Medical Science, Tehran, Iran. E-mail: hvatandoost1@yahoo.com

**18689.** Marques Pires, M.; Bender Kotzian, C.; Spies, M.R. (2014): Diversity and spatiotemporal distribution of larval odonate assemblages in temperate Neotropical farm ponds. *J. Insect Sci.* 14(275): 2014; DOI: 10.1093/jisesa/ieu137: 9 pp. (in English) ["Farm ponds help maintain diversity in altered landscapes. However, studies on the features that drive this type of property in the Neotropics are still lacking, especially for the insect fauna. We analyzed the spatial and temporal distribution of odonate larval assemblages in farm ponds. Odonates were sampled monthly at four farm ponds from March 2008 to February 2009 in a temperate montane region of southern Brazil. A small number of genera were frequent and accounted for most of the dominant fauna. The dominant genera composition differed among ponds. Local spatial drivers such as area, hydroperiod, and margin vegetation structure likely explain these results more than spatial

predictors due to the small size of the study area. Circular analysis detected seasonal effect on assemblage abundance but not on richness. Seasonality in abundance was related to the life cycles of a few dominant genera. This result was explained by temperature and not rainfall due to the temperate climate of the region studied. The persistence of dominant genera and the sparse occurrence of many taxa over time probably led to a lack in a seasonal pattern in assemblage richness." (Authors) Odonata are treated a genus level.] Address: Mateus Marques Pires, M., Programa de Pós-graduação em Biologia, Escola Politécnica, Universidade do Vale do Rio dos Sinos, Avenida Unisinos, 950, CEP 93022-000, Sao Leopoldo, Rio Grande do Sul, Brazil. E-mail: marquespiresm@gmail.com

**18690.** Mazzanco, ; Paulson, D.; Abbott, J. (2014): Backyard ponds. Guidelines for creating and managing habitat for dragonflies and damselflies. Portland, OR. Migratory dragonfly partnership: 22 pp. (in English) [[http://www.xerces.org/wp-content/uploads/2014/07/Pond\\_Habitat\\_Guidelines\\_Odonates\\_Final\\_Websec.pdf](http://www.xerces.org/wp-content/uploads/2014/07/Pond_Habitat_Guidelines_Odonates_Final_Websec.pdf)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dpaulson@pugetsound.edu

**18691.** Mercer, E.; Mercer, T.; Sayok, A.K. (2014): Effects of forest conversions to oil palm plantations on freshwater macroinvertebrates: A case study from Sarawak, Malaysia. *Journal of Land Use Science* 9(3): 260-277. (in English) ["Oil palm plantations in Malaysia are expanding rapidly due to global oil and biofuel demand. This is of particular concern, as the conversion process of forested land to oil palm plantations and the maintenance of a plantation can significantly alter freshwater ecosystems. This is a result of the initial loss of a forested catchment, particularly the riparian vegetation, changes to the bed and banks of streams, sedimentation and changes to detrital inputs. In addition, various chemicals used on the plantations leach into the nearest waterways and can potentially affect freshwater macroinvertebrates. In the Malaysian region, these are largely endemic and generally incompletely known. This study assesses the impact of oil palm plantations on stream macroinvertebrates, by comparing four streams flowing through undisturbed rainforest and four streams flowing through oil palm plantations in Sarawak, Malaysia. Freshwater macroinvertebrates were sampled using the standard three minute kick sample method with accompanying chemical measurements. Although there were no distinct differences between the control and oil palm streams in the chemical data, the invertebrate communities provided a different interpretation of stream quality. Invertebrates were more abundant, species rich and diverse in rainforest streams than in oil palm ones. Most noticeably, two whole orders of insecta, Coleoptera and Hemiptera, were absent from the oil palm streams. This may be the result of the disappearance of natural bank habitats, the sensitivity to the pesticides targeted at the Rhinoceros beetle (*Oryctes rhinoceros*), or a combination of both." (Authors) Odonata are treated at family level.] Address: Mercer, Edwina, School of Applied Sciences, Cranfield Water Science Inst., Cranfield Univ. UK

**18692.** Mousseau, T.A.; Møller, A.P. (2014): Genetic and ecological studies of animals in Chernobyl and Fukushima. *Journal of Heredity* 105(5): 704-709. (in English) ["Recent advances in genetic and ecological studies of wild animal populations in Chernobyl and Fukushima have demonstrated significant genetic, physiological, developmental, and fitness effects stemming from exposure to radioactive contaminants. The few genetic studies that have been conducted in Chernobyl generally show elevated rates of genetic damage and mutation rates. All major taxonomic groups investigated (i.e., birds, bees, butterflies, grasshoppers, dragonflies, spiders, mammals) displayed reduced population sizes in highly radioactive parts of the Chernobyl Exclusion Zone. In Fukushima, population censuses of birds, butterflies, and cicadas suggested that abundances were negatively impacted by exposure to radioactive contaminants, while other groups (e.g., dragonflies, grasshoppers, bees, spiders) showed no significant declines, at least during the first summer following the disaster. Insufficient information exists for groups other than insects and birds to assess effects on life history at this time. The differences observed between Fukushima and Chernobyl may reflect the different times of exposure and the significance of multigenerational mutation accumulation in Chernobyl compared to Fukushima. There was considerable variation among taxa in their apparent sensitivity to radiation and this reflects in part life history, physiology, behavior, and evolutionary history. Interestingly, for birds, population declines in Chernobyl can be predicted by historical mitochondrial DNA base-pair substitution rates that may reflect intrinsic DNA repair ability." (Authors)] Address: Mousseau, T.A., Dept Biol. Sciences & the Environment & Sustainability Program, Univ. of South Carolina, Columbia, SC 29208, USA. E-mail: mousseau@sc.edu

**18693.** Mugwenhi, E. (2014): The impact of gold panning to macroinvertebrate communities along the Nyazvidzi river. BSc. thesis, Dept of Biological Science, Fac. Science of Education, Bindura University of Science Education: 28 pp. (in English) ["Gold panning have affected negatively the diversity of macroinvertebrates along the Nyazvidzi river as evidenced by the results. The main objective of this research was to assess the impact of gold panning on the diversity of macroinvertebrates along the Nyazvidzi river. Site1 was up the stream and at this site panning was less because 3 to 5 were seen on daily basis. Site 2 was 2 kilometres down from Site 1 and panning at this site was medium. Site 3 was 2.5 kilometres from Site 2 and panning was more as 30 to 40 panners were seen on daily basis. Species richness was computed using the Shannon Weiner index and abundance was calculated using one way analysis of variance (ANOVA) and determine aquatic macroinvertebrates diversity. Results show that diversity decreased down the stream as more macroinvertebrates were seen at site 1 than site 3. A total of 26 families from 9 orders were recorded. The three main orders were the Odonata (40.8%), Ephemeroptera (26.3%) and the Trichoptera (14.8%). The order Odonata of class Hexapoda had the highest abundance (40.8% of total) and highest richness (9 families). Baetidae (9.8%) was the most persistent and the most abundant macroinvertebrate taxa

followed by Libellulidae (8.4%). Almost all taxa were represented in upper stations, except for Potamidae, which were limited to downstream station. Macroinvertebrate taxa richness, total abundance and diversity were significantly higher at Sites 1 and 2 compared to Site 3. Results show that gold panning have some negative impacts on the diversity, taxa richness and abundance of macroinvertebrates communities." (Author)] Address: not stated

**18694.** Myint, W.W. (2014): A study on some Odonate species in Hinthada University Campus. Hinthada University Research Journal 5(1): 38-47. (in English) ["This study was to identify the some Odonates and to add more information on damselflies and dragonflies. A total of 14 species of odonates from Hinthada University Campus, Myanmar were collected and identified. The study period lasted from September, 2011 to October, 2013. Zygoptera and Anisoptera, four families, 12 genera and 14 species of odonates were recorded. Among these 10 species of family Libellulidae is the large family in this study period. Detail morphological structures such as head, thorax, abdomen, body colour and measurements of high wings and abdomen length had also been described. The percentages of recorded odonate species were 71.42% family Libellulidae, 14.28% family Coenagrionidae and 7.15% of families Platynemididae and Aeshnidae. The Odonate species are beneficial to man as biological control agents and as food and traditional medicine in some countries." (Authors)] Address: Dept Zool., Hinthada University, Myanmar

**18695.** Onishko, V.V. (2014): The dragonflies (Odonata) species new to different regions of the Russia. Bulletin of the Moscow Society of Naturalists. Biological Division 119(5): 66-68. (in Russian, with English summary) ["The article provides information about the 24 new discoveries 22 species of dragonflies in the territory of European Russia, made from 1998 to 2011 and in six regions, Astrakhan, Moskow, Murmansk, Tver, Vladimir and Voronezh oblasts. (Author)] Address: E-mail: wervolf999@yandex.ru

**18696.** Parr, A. (2014): The Southern Darter *Sympetrum meridionale* (Selys) and its potential occurrence in Britain. *Atropos* 52: 49-52. (in English) ["S. meridionale has expanded its range well to the north over recent years, and its occurrence in Britain is to be anticipated in the near future. Observers are thus encouraged to be on the lookout for the species. Indeed, given its close similarity to resident species, it is conceivable that it has already occurred but gone unnoticed; perhaps further scrutiny of recent photographs of 'unusual' Common Darter individuals might prove enlightening." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**18697.** Pinach, J.M.; Ramos, J.M.; Perez, I.S.; Anton, V.B. (2014): Primeras citas de *Libellula quadrimaculata* Linnaeus, 1758 (Odonata, Libellulidae) para la provincia de Valencia (este de España). *Boln. Asoc. esp. Ent.*, 38(3-4): 351-355. (in Spanish, with English summary) [First records of L.

*quadrimaculata* from Valencia province (eastern Spain): 4-VI-2014, Castielfabib (Rincón de Ademuz, ETRS89 30T-XK4141, 1125 m a.s.l.) and 15-VI-2014, Parque Natural de la Puebla de San Miguel (Rincón de Ademuz, ETRS89 30TXK-5635, 1123 m a.s.l.) Address: Pinach, J.M., Junta de Comunidades de Castilla-La Mancha. Servicios Periféricos de la Consejería de Agricultura en Cuenca. C/ Colón, 2. 16071, Cuenca, Spain. E-mail: jjevanach@hotmail.com

**18698.** Renner, S. (2014): Composição de Libélulas (Odonata) em diferentes ambientes da floresta nacional de São Francisco de Paula, Rio Grande do Sul, Brasil. *Dissertação (Mestrado) – Curso de Ambiente e Desenvolvimento, Centro Universitário Univates, Lajeado: 59 pp.* (in Portuguese, with English summary) ["The human development brings several consequences to the environment, being the most remarkable the fragmentation of natural systems, resulting in ecological imbalance, biodiversity loss and degradation of the watershed. One of the richest biomes of this planet is the Atlantic Forest, which still poorly known in many animal groups, one example is the Odonata order. Actually this biome remains, under pressure in a fragmented mosaic. The forest formation occurring in the South of Brazil is the Mixed Ombrophilous Forest (MOF), a subtype of the Atlantic Forest. In the state of Rio Grande do Sul, this biome covered the high regions and the slopes of the Atlantic Ocean, occurring mostly in the northern half of the state. The MOF is remarkable by the presence of the Brazilian Pine (*Araucaria angustifolia*). Nowadays the remnants of the MOF are disperse in open fields, agriculture or urban matrix. In this context, the species inventory can play a key role in the conservation of these forest remnants. The present study was developed in a big forest fragment, in which exists an ecologic reserve: the Floresta Nacional de São Francisco de Paula, RS. The dragonfly species inventory was performed by sampling 30 aquatic sources distributed in 4 vegetation types and 3 types of aquatic systems. Were registered 47 species scattered in eight families. The Odonata assemblages found in all the types of water (rivers, lakes and swamps) and vegetation types (MOF, araucaria forest, pinus forest and open fields) were statistically compared. In the pinus areas was found the richest assemblage, being composed mainly by generalist species. Was applied and adapted a known methodology for the selection of potential indicator species. The poor knowledge of the Odonata order was improved in the Atlantic Forest/MOF, contributing for future conservation measures and definition of priority protection areas." (Author)] Address: Renner, S., Laboratório de Ecologia e Evolução, Universidade do Vale do Taquari – UNIVATES, Rua Avelino Tallini, 171 Bairro, Universitário, Lajeado RS 95900-00, Brazil. E-mail: samuelrenner@hotmail.com

**18699.** Sanyal, A.K.; Chattapadhyay, S.K.; Pal, T.K.; Karmakar, A.K. (2014): Faunal resources and assessment of the impact of mining activities on fauna of Chhotonagpur Coalfield Areas, Jharkhand. *Rec. zool. Surv. of India, Occasional Paper No. 361: 1-47.* (in English) [A total of 35 different localities were studied, resulting in 35 odonate taxa.] Address: not stated



**18700.** Schiel, F.-J. (2014): Eine Fang-Wiederfang-Studie an *Sympetrum depressiusculum* in Mittelbaden (Odonata: Libellulidae). *Libellula* 33(3/4): 217-231. (in German, with English summary) ["A mark-recapture study of *Sympetrum depressiusculum* in the Upper Rhine Valley, Germany (Odonata: Libellulidae) – In a mark-recapture-study conducted in 2007 at two surveyareas in the central part of the upper Rhine Valley (119-129 m a.s.l., MTB 7214, 7313, German federal state of Baden-Württemberg) all in all 713 specimens of *S. depressiusculum* were individually marked to find out if there is an exchange between the two selected survey areas and between the different breeding sites within each area. With 69 recaptures, the recapture rate amounted to 9.7 %. Both, recapture rates from males (14.4 %) and females (4.4 %) and those of mature (10.3 %) and immature marked (6.9 %) individuals differed significantly. 13 individuals (1.8 %) were recaptured on two dates, three on three dates and one on four dates. The median time span between marking and recapture was 14 days. Seven males and two females were recaptured 28-42 days after marking. Altogether 23 individuals (3.2 %) were recaptured 30-550 m away from the marking sites. 14 of these were movements between reproduction sites and foraging sites or resting sites, respectively. The results suggest a small activity range and a metapopulation structure in both survey areas. Even though an exchange between the two study areas, which are separated by a 14 km gap without records of *S. depressiusculum*, could not be evidenced by recapture dates, an exchange is nevertheless very probable. This may be assumed by own accidental observations of *S. depressiusculum* at unsuitable reproduction sites at distances up to 6 km away from the next known breeding site and by records in literature with observations at distances up to 40 km around reproduction sites.] Address: Schiel, F.J., INULA, Turenneweg 9, 77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@inula.de

**18701.** Stalder, G. (2014): Ein außergewöhnlich warmer Winter 2013/2014 mit den beiden Winterlibellen *Sympetma fusca* und *S. paedisca*. *Mercuriale* 14: 43-60. (in German, with English summary) ["Residence and activity patterns during hibernation of 27 adults of *S. fusca* were observed and controlled 62 times from late autumn, 2013, until late winter, 2014. Whereas autumn temperatures were near average, the winter was characterised by exceptionally high temperatures. The study was carried out in the nature reserve "Lengwiler Weiher" in the vicinity of the southern shore of Lake Constance, Switzerland. Five specimens of *S. fusca* were captured, marked and released in November, 2013. Three out of these five individuals could be recorded several times until mid-March, 2014. On 23 February 2014, a remarkable observation was done: under cloudy conditions a specimen undertook a short flight although the current temperature was only 6.6° C. After midday the same day an individual could be observed feeding. Furthermore, in the end of February, 2014, few specimens of *S. paedisca* could be recorded, partly in the same habitat." (Author)] Address: Stalder, G., Hueb 6, 8580 Sommeri, Switzerland. E-mail: gesta@gmx.ch

**18702.** Svensson, E.I.; Runemark, A.; Verzijden, M.N.;

Wellenreuther, M. (2014): Sex differences in developmental plasticity and canalization shape population divergence in mate preferences. *Proceedings of the Royal Society B: Biological Sciences* 281: 9 pp. (in English) ["Sexual selection of high-quality mates can conflict with species recognition if traits that govern intraspecific mate preferences also influence interspecific recognition. This conflict might be resolved by developmental plasticity and learned mate preferences, which could drive preference divergence in populations that differ in local species composition. We integrate field and laboratory experiments on two calopterygid damselfly species with population genetic data to investigate how sex differences in developmental plasticity affect population divergence in the face of gene flow. Whereas male species recognition is fixed at emergence, females instead learn to recognize heterospecifics. Females are therefore more plastic in their mate preferences than males. We suggest that this results from sex differences in the balance between sexual selection for high-quality mates and selection for species recognition. As a result of these sex differences, females develop more pronounced population divergence in their mate preferences compared with males. Local ecological community context and presence of heterospecifics in combination with sex differences in plasticity and canalization therefore shape population divergence in mate preferences. As ongoing environmental change and habitat fragmentation bring formerly allopatric species into secondary contact, developmental plasticity of mate preferences in either or both sexes might facilitate coexistence and prevent local species extinction." (Authors)] Address: Anna Runemark: E-mail: anna.runemark@biol.lu.se

**18703.** White, E.L.; Hunt, P.D.; Schlesinger, M.D.; Corser, J.D.; deMaynadier, P.G. (2014): A conservation status assessment of Odonata for the Northeastern United States. *New York Natural Heritage Program, Albany, NY: VI + 44 pp.* (in English) ["Executive Summary: Odonates are valuable biological indicators of freshwater ecosystem integrity and climate change. Approximately 18% of odonates in the US are considered rare and vulnerable to extirpation or extinction. Northeastern North America hosts a rich and ancient odonate fauna, especially for a temperate region. Recognition of northeastern North America as both a hotspot of odonate diversity, and a region of historical and growing threats to freshwater ecosystems, highlights the urgency of developing a comprehensive conservation assessment of the Northeast's resident odonate species. Here, we develop and apply a prioritization framework for 228 species of Odonata occurring in the northeastern US (Virginia to Maine). Specifically, we offer a modified version of NatureServe's methodology for assessing conservation status ranks by assigning a single, regional vulnerability metric (R-rank) reflecting each species' degree of relative extinction risk in the northeastern US. We combine this newly formulated vulnerability assessment with an updated analysis of the degree of endemism (% of the species' US and Canada range within the Northeast) as a proxy for regional responsibility, thereby deriving a list of species of combined vulnerability and regional management responsibility. In so doing our goals are two-fold:

a) to develop a credible list of odonate species of conservation concern in northeastern North America, and more generally, b) to invite scrutiny of a science-based species prioritization methodology that might be applied to assess other diverse taxa that have not yet received adequate conservation attention. We compiled all confirmed, county-level odonate data from all years. This dataset contained 248,059 records, with data from all NEAFWA states. We calculated a single vulnerability rank (R-rank) based on five factors: three rarity factors (range extent, area of occupancy, and habitat specificity), one threat factor (vulnerability of occupied habitats), and one trend factor (relative change in range size). This yielded a regional vulnerability rank (R-rank) for each species, ranging from R1 (most vulnerable) to R5 (least vulnerable). We calculated regional responsibility as the proportion of the US & Canadian range occurring within the Northeast US. Odonate species fell into three categories based on their responsibility calculation: „Primary“ responsibility species were those for which  $\geq 50\%$  of their range fell in the Northeast; „Significant“ responsibility species were those for which 25-50% of their range fell in the Northeast; and „Shared“ responsibility species were those for which  $< 25\%$  of their range fell in the Northeast. We created a matrix of species in three vulnerability categories (High: R1 and R2, Medium: R3, and Low: R4 and R5) and three responsibility categories (Primary, Significant, and Shared). We also present results on habitat associations for northeastern Odonata along with all metric components of our conservation assessment. Overall, 18% of our region's odonate fauna is imperiled (R1 and R2) and peatlands, low gradient streams and seeps, high gradient headwaters, and larger rivers that harbor a disproportionate number of these species should be considered as priority habitat types for conservation, monitoring, and management. We recommend that our assessment be used to inform the strategic allocation of limited state and federal conservation resources and help foster collaborations across state lines to implement similar goals for conserving regionally at-risk Odonata. We also anticipate our products will help guide and standardize conservation assessments of Odonata, and potentially other invertebrate taxa, at the statewide level in the Northeast. Finally, we recommend that a regional Odonata conservation working group be formed to help guide protocols for surveys, monitoring, research, habitat protection, and education, and thereby develop a framework for a coordinated comprehensive conservation plan for northeastern Odonata." (Authors)] Address: White, E.L., New York Natural Heritage Program, SUNY College of Environmental Science & Forestry, 625 Broadway 5th Floor, Albany, NY, US 12233-4757

**18704.** Wildermuth, H.; Schneider, B. (2014): Der Eisvogel *Alcedo atthis* als Libellenjäger (Aves: Alcedinidae; Odonata). *Libellula* 33(3/4): 127-148. (in German, with English summary) ["The Kingfisher *Alcedo atthis* as dragonfly hunter – The Common Kingfisher mainly feeds on small fish and to a lesser extent on aquatic arthropods caught by plunge-diving. As little is known about the Kingfisher's insect nutrition we investigated the captured prey on photos and video films and analysed the contents of pellets collected between March

and May in the years 2010-2014 at four riverine breeding sites along a 20 km stretch of the River Töss in the Swiss Plateau. Altogether we identified 273 insect prey items from more than 1,000 small cuticle fragments, comprising water bugs (Notonecta spp. and *Iliocoris cimicoides*, 62 %), Anisoptera (38.5 %) and Zygoptera (1.5 %). *Anax imperator* (mainly F0-stadia) constituted 49 %, *Orthetrum cancellatum* 31 % (mainly F1-stadia) and *Aeshna cyanea* 11.5 % (mainly F1-stadia) of the odonate prey, while *Calopteryx* sp., *Brachytron pratense*, *Onychogomphus forcipatus*, *Cordulegaster boltonii*, and *Libellula depressa* were only sporadically found. The number of odonate species and prey items differed greatly between the four sites, due to the availability of prey in the surroundings of the breeding burrows. The recorded insects mainly originated from ponds near the river (water bugs, five odonate spp.) and to a lesser extent from the river itself (*Calopteryx* sp., *O. forcipatus*, *C. boltonii*). The results are discussed with respect to the applied methods and identification problems as well as to the season and the local availability of food, the prey recognition of the Kingfisher, and the behaviour of the odonate larvae preyed on." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**18705.** Yen, A.L. (2014): Insects as food and feed in the Asia Pacific region: current perspectives and future directions. *Journal of Insects as Food and Feed* 1(1): 33-55. (in English) ["Western cultures currently struggle to have insects accepted as a human food. This barrier is not as high in many parts of the Asia Pacific region because entomophagy is (or was until recent times) a part of their accepted diets. The region is comprised of many different cultural groups and the degree to which they embraced entomophagy has been determined by dietary needs, cultural considerations, and the availability of insects. While entomophagy has decreased in westernised societies, the demand for edible insects has increased in parts of Asia in association with rising standards of living. An assessment of the use of insects as food and feed in the Asia Pacific region is provided and important knowledge gaps are identified. Edible insects are sourced by three main strategies: wild harvesting, semi-domestication of insects in the wild, and farming. Semi-domestication and farming have the potential to provide a more sustainable food supply, but globally 92% of species are wild harvested. The harvested insects come from all trophic levels, although most of the terrestrial edible insect species are herbivores and most species of edible aquatic species are predators. The increased demand for edible insects puts pressure on the source populations because new technologies are now used to harvest insects more efficiently and to store them safely for longer periods, facilitating the harvesting of greater amounts of insects. This, in combination with either loss of natural habitats or changes to the environment, puts even more pressure on insect populations. The over harvesting of edible insects from different trophic levels could have long term adverse implications for ecosystem processes in Asia Pacific and other regions. ... For example, fish can indirectly facilitate terrestrial plant reproduction by reducing larval dragonfly abundances in ponds, leading to

fewer adult dragonflies nearby. Adult dragonflies consume insect pollinators and alter their foraging behaviour. As a result, plants near ponds with fish have more pollinators than plants near fish-free ponds. There could also be subtle ecological interactions between human and wildlife use of insects. In Thailand," (Author)] Address: Yen, A.L., Dept Economic Development, Jobs, Transport & Resources, Biosciences Research Division, AgriBio, 5 Ring Road, Bundoora, Victoria 3083, Australia. E-mail: alan.yen@ecodev.vic.gov.au

## 2015

**18706.** Allen, B.T. (2015): Proximate behavioral and morphological mechanisms that may mediate intraguild predation stability in the Anisoptera. Ph.D., University of Texas at Arlington: 189 pp. (in English) ["Intraguild Predation (IGP) is a form of interference competition characterized by an intraguild predator consuming interspecific competitors, the intraguild prey. This interaction is extremely common in nature, but mechanistic and descriptive models usually predict that it is unstable with either the IG prey or IG predator becoming locally extinct, dependent on initial conditions. Only intermediate shared prey availability leads to IGP stability in these models, and this condition is not common. In this work, I used dragonfly nymphs to examine behavioural and morphological aspects of consumptive competition and predator avoidance that may act to stabilize IGP, particularly in systems with more than two predators. There are two primary hypotheses in this treatment. The first is that prey capture is morphologically mediated and that this leads to differences in diet composition that can promote IGP stability by allowing prey specialization. The second is that there is a behavioural tradeoff that leads to disproportionate feeding on competitively superior IG prey by an IG predator that may lead to IGP stability. This tradeoff was hypothesized to exist in terms of direct prey capture as well as movement and space use patterns. Both of these mechanisms were found to exist, with species variation in mortality being explained by their behaviour, in spite of morphological defenses compensating for the lack of behavioural defenses in some species. While effect of this possible mechanism on IGP stability was not directly examined, further long-term study should elucidate it." (Author) *Anax junius*, *Erythemis simplicicollis*, *Libellula lydia*, *Pachydiplax longipennis*, *Tamea lacerata*, *Sympetrum corruptum*, *Enallagma civile*; <https://rc.library.uta.edu/uta-ir/handle/10106/26728>] Address: not stated

**18707.** Andem, A.B.; Esenowo, I.K.; Bassey, D.O. (2015): Application of biotic indices and pollution Tolerance Index in assessing macro-invertebrate assemblage of Ediba River, Cross River State, Nigeria. *Environmental & Analytical Toxicology S7*: 007. doi:10.4172/2161-0525.S7-007: 5 pp. (in English) ["The study of the macro-invertebrates community of Ediba River in Cross River State was carried out from October to December, 2014 using Pollution Tolerance Index (PTI). Macro-invertebrate fauna were sampled with sweeping net using kick sampling methods. 16 genera, belonging to 9 orders and a total of 289 individuals were encountered. The dominant groups in the order were Oligochaeta

(29.1%)>Diptera (24.62%)>Odonata (20.3%), showing insignificant difference between the three stations at  $p>0.05$ . Taxa richness was highest in Station 1 (2.985) and least in Station 3 (1.008) showing insignificant differences across station ( $p>0.05$ ). Evenness ranges from 0.337 to 0.369 showing significant difference across stations ( $p<0.05$ ). Station 1 had a PTI value of 39 indicating good quality water status, while Stations 2 and Station 3 had PTI values of 6 and 4 respectively indicating poor quality water status. The abundance of pollution tolerance species of the orders, Odonata Zygoptera, Oligochaeta, Diptera and the absence of pollution sensitive species of the orders, Ephemeroptera and Trichoptera in Stations 2 and 3 indicated the poor waters quality, coupled with the low PTI values in both stations, hence need for proper management of the river." (Authors)] Address: Esenowo, I.K., Dept Zoology, Univ. of Uyo, Akwa Ibom State, Nigeria. E-mail: imehesenowo@yahoo.com

**18708.** Beadle, J.M.; Brown, L.E.; Holden, J. (2015): Biodiversity and ecosystem functioning in natural bog pools and those created by rewetting schemes. *WIREs Water* 2015. doi: 10.1002/wat2.1063: 20 pp. (in English) ["Anthropogenic drainage and cutting over of peatlands have historically occurred worldwide leading to erosion, issues with water quality, loss of biodiversity, and reduced rates of carbon accumulation. In recent years, rewetting measures have attempted to address these issues. Creating dams to block drainage ditches on peatlands is a common restoration tool, yet the ecological consequences of such management interventions are poorly understood. In particular, knowledge about the ecology of the thousands of pools created by drain blocking is limited even though they potentially provide valuable new habitat for aquatic species and food and water sources for terrestrial organisms. More research is needed to assess the suitability of these artificial pools as surrogates for naturally occurring peat pools with regard to the flora (e.g., bryophytes, algae, and macrophytes) and fauna (e.g., invertebrates and amphibians), which utilize them. Evidence suggests that (1) to maximize benefits to aquatic biota, land managers should consider creating an array of differently sized pools behind the dams as a broader size range would facilitate colonization by a wider range of taxa, (2) prioritizing landscapes close to existing water bodies would encourage faster colonization, and (3) even newly created pools with low macrophyte cover may be able to sustain substantial populations of larger fauna via algal primary production, consumption of detritus, and microbial processing of humic substances and methane. Ongoing programs of peatland restoration worldwide also afford unique opportunities to study how pool communities assemble and change over time." (Authors) The study includes references to Odonata.] Address: Beadle, Jeannie, School of Geography, University of Leeds, Leeds, UK, School of Geography, University of Leeds, Leeds, UK. e-mail: ill2jmb@leeds.ac.uk

**18709.** Bechly, G. (2015): Fossile Libellennachweise aus Deutschland (Odonoptera). *Libellula Supplement* 14: 423-464. (in German, with English summary) ["Fossil odonate records from Germany (Odonoptera) – A historical

sketch of the research on fossil dragonflies from Germany is provided, together with a commented list of all localities and discovered taxa, supplemented by a complete bibliography. The deposition of the fossil material is specified as well. The oldest fossils stem from the Carboniferous, and the youngest ones from the Pleistocene. The largest number of fossil dragonflies was found in Jurassic and Tertiary sediments. Only from the Cretaceous and the Paleocene have no fossils yet been discovered." (Author)] Address: Bechly, G., Staatliches Museum für Naturkunde Stuttgart, Rosenstein 1, 70191 Stuttgart, Germany. E-mail: guenter.bechly@smns-bw.de

**18710.** Biodrawersity (2015): Relicensing Study 3.3.10. Assess operational impacts on emergence of state-listed odonates in the Connecticut River. Interim Study Report. Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889). Prepared for: FirstLight: 26 pp. [3.1 Odonate Survey Results: 3.1.1 Species Assemblage: Table 3.1.1-1 lists the genera and species collected at each site. *Epithea princeps*, a species common in lentic habitats, was the most common species collected at Sites 1-3. These sites in the lowermost portion of the Turners Falls Impoundment (Barton Cove) contain mostly lentic habitat with submerged and emergent vegetation. Sites 4-8 were generally more lotic; dominant taxa in these samples included *Gomphus* sp. (mostly *G. vastus*), *Ophiogomphus* (mostly *G. rupinsulensis*), *N. yamaskenensis*, *Boyeria vinosa*, and *Macromia illinoensis*. There was very little variation in the odonate assemblage among sites 4-8. Species-level identification of some of the Gomphidae, especially *Gomphus* sp. and *Ophiogomphus* sp., is incomplete; this interim report will be updated when these data become available. Most of the target state-listed species for Sites 4-8 were in the genus *Gomphus*. Based on historic survey data, which were generally more complete for the Turners. 3.1.2 Emergence and Eclosure: Approximately 250 exuviae were collected across the eight survey sites. These were found on emergent aquatic vegetation only at sites 1 and 3, as this type of emergence substrate was not available at the other sites. Elsewhere, exuviae were found primarily on terrestrial herbaceous vegetation, soil, trees, coarse fallen wood, and rock (Table 3.1.2-1). They were found as high as nine feet above the water's surface (mean = 4.4) and as far as 42 ft from the edge of the water (mean = 12.7). Since these surveys were qualitative and only occurred during the month of June, these distances above the water and from the water's edge are biased, but do provide a range to consider in the next phase of work. 3.2 Habitat Characterization: Habitat parameters recorded at each site are provided in Table 3.2-1, and representative photographs are provided in Appendix A. The most common habitat feature of nearshore areas and streambanks was a muddy slope of varying steepness, with lesser and variable amounts of sand, gravel, or cobble. Upslope, this mud transitioned into the riparian zone that was typically vegetated with trees (especially silver maple), low terrestrial herbaceous vegetation, moss, and vines, and contained varying amounts of large woody debris and detritus. The odonate surveys were typically done during periods of low flow, therefore relatively large amounts of the

muddy bank were exposed and the distance from the water line to the interface between aquatic and terrestrial habitat was relatively great. Less common nearshore habitat types included aquatic emergent vegetation and rock. Aquatic emergent vegetation was prevalent only in the more lentic habitats of Barton Cove (Site 1) and on the other side of Campground Point (Site 3). Elsewhere, aquatic emergent vegetation was either absent, or existed as a very sparse fringe of species that can tolerate daily exposure. Submerged aquatic vegetation, especially *Vallisneria*, was common in some areas but typically only as a narrow band in deeper waters. Bare rock, an emergence substrate for odonates, is uncommon in the Connecticut River between the Deerfield River confluence and Route 116 Bridge. There are some isolated ledge outcrops, and the bridge abutments and areas near bridges often contained higher amounts of "unnatural" rock. The most "natural" rock is located in the Turners Falls bypass reach." (Author)] Address: not stated

**18711.** Blanckenhagen, B. von (2015): Die Arktische Smaragdlibelle *Somatochlora arctica* (Zetterstedt, 1840) im Burgwald: Verbreitung und Anmerkungen zur Ökologie. Libellen in Hessen 8: 39-52. (in German) [The distribution of *S. arctica* in the Burgwald (Hessen, Germany) was mapped in summer 2014 with the help of exuviae collections and supplementary larval surveys. The survey focused on six FFH sites and adjacent areas with fens and transitional bogs as well as dystrophic ponds and their siltation zones. Ten subpopulations were documented with a total of 125 exuviae. The Lange Grund, the Franzosenwiesen and the Christenberger Talgrund are the distribution centres of *S. arctica* in the Burgwald. In addition, the habitats occupied, the association with other dragonfly species and possible predators are described. The occurrence has a nationwide significance and a high value in the context of the disjunct Central European occurrences north of the Alps." (Author; DeepL)] Address: von Blanckenhagen, B., Kaffweg 8, 35039 Marburg, Germany. E-mail: benno.v.blanckenhagen@web.de

**18712.** Boudot, J.-P.; Kalkman, V. (2015): Atlas of the dragonflies and damselflies of Europe. KNNV uitgeverij, Netherlands: 384 pp. (in English) [This is the first detailed and complete overview of the distribution of the dragonflies and damselflies of Europe. An important reference work for professionals and amateurs alike. \* Covers the distribution and habitat selection of all 143 European species of dragonflies and damselflies. \* Gives a complete description of their global and European distribution, illustrated using over 200 distribution maps. \* Gives per species information on taxonomy, range, population trends, flight season, and habitat. \* Includes unique photos and flight season diagrams for virtually all European dragonflies. \* Contains extensive background information on taxonomy, conservation, and for each country an overview of the history of odonatological studies." (Publishers)

**18713.** Burmester, T. (2015): Evolution of respiratory proteins across the Pancrustacea. *Integrative and Comparative Biology* 55(5): 792-801. (in English) [Respiratory proteins enhance the capacity of the blood for oxygen transport and



support intracellular storage and delivery of oxygen. Hemocyanin and hemoglobin are the respiratory proteins that occur in the Pancrustacea. The copper-containing hemocyanins evolved from phenoloxidases in the stem lineage of arthropods. For a long time, hemocyanins had only been known from the malacostracan crustaceans but recent studies identified hemocyanin also in Remipedia, Ostracoda, and Branchiura. Hemoglobins are common in the Branchiopoda but have also been sporadically found in other crustacean classes (Malacostraca, Copepoda, Thecostraca). Respiratory proteins had long been considered unnecessary in the hexapods because of the tracheal system. Only chironomids, some backswimmers, and the horse botfly, which all live under hypoxic conditions, were known exceptions and possess hemoglobins. However, recent data suggest that hemocyanins occur in most ametabolous and hemimetabolous insects. Phylogenetic analysis showed the hemocyanins of insects and Remipedia to be similar, suggesting a close relationship of these taxa. Hemocyanin has been lost in dragonflies, mayflies, and Eumetabola (Hemiptera + Holometabola). In cockroaches and grasshoppers, hemocyanin expression is restricted to the developing embryo while in adults oxygen is supplied solely by the tracheal system. This pattern suggests that hemocyanin was the oxygen-transport protein in the hemolymph of the last common ancestor of the pancrustaceans. The loss was probably associated with miniaturization, a period of restricted availability of oxygen, a change in life-style, or morphological changes. Once lost, hemocyanin was not regained. Some pancrustaceans also possess cellular globin genes with uncertain functions, which are expressed at low levels. When a respiratory protein was again required, hemoglobins evolved several times independently from cellular globins. ... Hemocyanin has been lost in dragonflies, mayflies, and Eumetabola (Hemiptera + Holometabola). ... 2). No Hc was found in Protura, Diplura, Ephemeroptera (mayflies), Odonata (dragonflies and damselflies), or Eumetabola (Hemiptera and Holometabola)" (Author)] Address: Burmester, T., Inst. Zool., Biocenter Grindel, Univ. Hamburg, Martin-Luther-King-Platz 3, 20146 Hamburg, Germany. E-mail: thorsten.burmester@uni-hamburg.de

**18714.** Chavez, M.Y.; Mabry, K.E.; McCauley, S.J.; Hammond, J.I. (2015): Differential larval responses of two ecologically similar insects (Odonata) to temperature and resource variation. *International Journal of Odonatology* 18(4): 297-304. (in English) ["How species respond to shifting environmental conditions is a central question in ecology, especially because ecosystems are experiencing rapidly changing climatic conditions. However, predicting the responses of species interactions and community composition to changing conditions is often difficult. We examined the effects of rearing temperature and resource level on larval survival of two ecologically similar dragonflies, *Erythemis collocata* and *Pachydiplax longipennis*. Within high and low (26 and 21°C) temperatures, we crossed species and resource level and reared larvae individually. We predicted that warmer temperatures would reduce survival and increase growth rate, that higher resource availability would increase survival and growth rate, and that the two species would respond similarly. We

found that increased temperature reduced survival for both species. There was also an interaction between temperature and species: *E. collocata* had higher survival at the lower temperature, but lower survival at the higher temperature when compared to *P. longipennis*. Resource level did not affect survival. In general, *P. longipennis* grew more than *E. collocata*, with no effects of temperature or resource level. These results suggest that these species respond dissimilarly to changing thermal conditions, that increased food availability cannot always compensate for the negative effects of higher temperatures, and that climate change may affect interactions between these two sympatric, ecologically similar species, with potential consequences for community composition." (Authors)] Address: Hammond, J.I., Dept of Biology, University of New Mexico, Albuquerque, NM, USAEmail: jhammo02@unm.edu

**18715.** Chovanec, A. (2015): Bewertung der Renaturierungsmaßnahmen in den Mündungsbereichen von Leitenbach und Sandbach sowie an der Aschach (Oberösterreich) aus libellenkundlicher Sicht. Im Auftrag des Amtes der Oberösterreichischen Landesregierung, Abt. Oberflächengewässerswirtschaft: 73 pp. (in English) ["In the present study, the ecological status of the renaturalised estuary sections of the Leitenbach and Sandbach as well as the Aschach in this area was assessed from a dragonfly point of view, with special consideration of the morphological conditions. This was done on the basis of the Dragonfly Association Index and was based - in accordance with the requirements of the Water Framework Directive and the Water Act - on a comparison between a water body type-specific reference condition and the status quo. A total of 25 species were detected in the study area, which corresponds to 32 % of the spectrum of 78 species occurring in Austria; 21 species were native to the soil. On the Leitenbach 23 species were found (20 of them native), on the Sandbach 16 (14) and on the Aschach also 16 (11). The high number of rheobiont and rheophilous species (*Calopteryx splendens*, *Calopteryx virgo*, *Platycnemis pennipes*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Onychogomphus forcipatus*, *Orthetrum brunneum*) should be emphasised. *G. vulgatissimus*, *O. cecilia* and *O. forcipatus* are "endangered" according to the Red List for Austria. *O. cecilia* is listed in Annexes II and IV of the EU Habitats Directive. All three stretches of water were classified in class 1 "very good dragonfly ecological status". (Author) Translated with www.DeepL.com/Translator (free version)] Address: Chovanec, A., Umweltbundesamt, Abt. Oberflächengewässer, Spittelauer Lände 5, 1090 Wien, Austria

**18716.** Coccia, C. (2015): Invasion biology of *Trichocorixa verticalis* in Doñana, SW Spain . PhD dissertation, Univ. of Seville: 208 pp. (in English, with Spanish summary) ["Biological invasions are one of the top threats to biodiversity and ecosystem functioning worldwide, and fresh waters are among the most invaded ecosystems in the world. To be successful, an invader must possess qualities that allow invasion in the new habitat, but besides these qualities its success also depends on the interactions between its traits, the traits of the invaded community, and many other contingent

factors. A recent addition to the list of alien invertebrate species in European fresh waters is the North American *Trichocorixa verticalis* (Hemiptera: Corixidae). To date, *T. verticalis* is the only established alien waterbug in these ecosystems. In the 18 years since its first detection in the Iberian Peninsula, *T. verticalis* has increased its area of distribution in and around Doñana, in the Guadalquivir delta, and also in other areas of conservation interest including Ramsar wetlands and Nature Reserves in Andalucía. In general, it is highly dominant and abundant in permanent saline waters, where native Corixidae are rare, but it is rare in fresh waters, where native Corixidae dominate. This thesis focuses on four main determinants of successful invasions (plasticity, resource competition, parasites and facilitative interactions among invaders) to investigate why *T. verticalis* dominates in saline waters while it is rare in fresh waters. In addition, we explored the success of a restoration project for macroinvertebrates in new ponds where *T. verticalis* is known to be an abundant breeder. In addressing these topics, we apply an invasive-native comparative approach to both experimental and field data collected in Doñana. In Chapter 1 we show experimentally that *T. verticalis* possesses broader physiological plasticity than native corixids when exposed to different conditions of temperature and salinity, and its physiological tolerance to both heat and freezing increases following exposure to high conductivities. In Chapter 2 we investigate the niche partitioning between native and invasive corixids from different ecosystems by means of carbon (C) and nitrogen (N) stable isotopes. We reveal strong resource partitioning between species in permanent ponds, but also some degree of niche overlap in unstable temporary sites. In Chapter 3 we describe the role of parasite infections during the invasion. *T. verticalis* show higher total parasite (water mite) prevalence, mean total abundance infection and mean infection than native corixids in low salinity waters, whereas mites are not present in saline waters. In Chapter 4 we examine experimentally the role of facilitative interactions among invaders. *T. verticalis* invasion does not seem to be promoted by a lower predation rate by alien predators compared to native corixids. In contrast, owing its smaller size it suffers higher predation rates by Odonata larvae. Finally, in Chapter 5 we investigate the value of the Caracoles restoration project in supporting aquatic macroinvertebrates. *T. verticalis* is known to be an abundant breeder in these ponds. We find that, although new ponds differ from reference sites in abiotic conditions, they become representative and even surpass the levels of local invertebrate richness, diversity and abundance 6-7 years after restoration. However, differences in the abundance and distribution of invasive species between waterbody types and inundation periods may have strong effects on the patterns of species composition, especially for the Hemiptera. The integration of these results sheds light on the role of salinity for the invasion success of *T. verticalis*, and helps to elucidate why it is still rare in fresh waters. In addition, we also provide important insights on the potential impacts that *T. verticalis* may have on native Corixids in the future. ... Using laboratory experiments, we compared the predation rates by the two exotic fish and native Odonata larvae on *Trichocorixa* and the native *Sigara*

*lateralis*. We found no evidence to suggest that *T. verticalis* suffers lower predation rates. However, when both corixids were mixed together, predation of *T. verticalis* by Odonata larvae was higher. Odonata larvae were size-limited predators and the proportion of corixids ingested was positively correlated with mask length. Since *T. verticalis* is smaller than its native competitors, this may explain their higher susceptibility to predation by Odonata. This may be one of various factors explaining why *T. verticalis* is particularly dominant in saline habitats where Odonata are rare, while it is still scarce in fresh waters." (Author)] Address: not stated

**18717.** Crucitti, P.; Brocchieri, D.; Bubbico, F.; Castelluccio, P.; Emiliani, F.; Francioni, G.; Tringali, L. (2015): Check-list di gruppi selezionati dell'entomofauna dell'area "Arcipelago Mentanese-Comicolano" (Lazio). Bollettino della Società Entomologica Italiana 147(1): 3-29. (in Italian, with English summary) ["A check-list of the species of certain groups of insects - Odonata [26 species, including *Trithemis annulata*, *Sympetrum meridionale*, *Somatochlora meridionalis*, *Coenagrion castellani*], Mantodea, Orthopteroidea, Coleoptera and Lepidoptera - observed in the so called "Mentanese-Comicolano Archipelago" a district of the Roman Campagna, north-east from Rome city area (Latium, Central Italy), a relic of mesoxerophilous woods with cultivated land, urban and suburban areas penetrated by infrastructures, is presented. Typical physiographical aspects of the landscape are hilly areas with small valleys of clayey volcanic terrains or limestone rocks with karstic features. Notwithstanding conservation measures - two protected areas administered by the Province of Rome, the Natural Reserve "Nomentum" and the Natural Reserve "Macchia di Gattaceca and Macchia del Barco", exist - little is known about its invertebrate fauna, especially insects. Irregular observations lasted for over ten years followed by intensive researches between 2009 and 2013 with the utilization of many, direct and indirect, collecting tools - nets, aspirators, pitfall and aerial traps, light sheets - together with bibliographical data, allowed the authors to survey 422 species. Biogeographical analysis has been limited to Odonata and Coleoptera Carabidae well represented in the samples, especially in comparison with the insect fauna of the Rome city area restricted by the Grande Raccordo Anulare ring freeway. Species of particular interest from conservational viewpoints are discussed. This check-list is necessarily incomplete and lacking of quantitative analysis, notwithstanding the results of collecting efforts suggest that species richness has been strongly reduced in recent time. From conservational viewpoint, the situation of the Natural Reserve "Nomentum" may be considered middling while the situation of the Natural Reserve "Macchia di Gattaceca and Macchia del Barco" may be considered moderate (Macchia di Gattaceca) or fairly good (Macchia del Barco). The current inadequacy of protection measures is critical, considering the relevant entomological importance of some patches of this landscape." (Authors)] Address: Crucitti, P., Soc. Romana Scienze Naturali, Roma, Italia. [davidebrocchieri@hotmail.com](mailto:davidebrocchieri@hotmail.com)

**18718.** Davies, T. (2015): Dragonflies of Lundy – A summary of occurrence during the LFS years. Lundy Field

Society Annual Report 2015: 91-97. (in English) ["To date, 15 species (including *Sympetrum fonscolombii* and *Anax ephippiger* new to Lundy in 2015) have been recorded on the island, as summarised below, collated from LFS Annual Reports. In many instances the available information is at best sparse, but dates, locations and observers' names are included wherever they have been given in past reports." (Author)] Address: Davis, T., Harpers Mill, Berrynarbor, Ilfracombe, Devon EX34 9TB, UK. E-mail: gen@birdsoflundy.org.uk

**18719.** Flamant, N.; Sibley, S. (2015): Peuplement odonologique d'une mare pionnière en Bassée seine-et-marnaise en 2013 (Seine-et-Marne). *Bull. Ass. Natur. Vallée Loing*, 88(4) (2012): 164-171. (in French) ["The authors report on the results of an odonological survey carried out in 2013 on a pioneer pond of artificial origin in the commune of Bazoches-lès-Bray located in the heart of the Seine valley of the Seine-et-Marnaise called "la Bassée". The monitoring was based on a systematic collection of Anisoptera exuviae. The odonological diversity appears remarkable. Specific phenologies adapted to the pioneer context of the pond were observed, with particularly early emergence of certain species. The odonological interactions of the pond are briefly analysed. Finally, the prospects for monitoring to better understand the odonological dynamics of pioneer aquatic environments are specified. ... 19 species were recorded, 18 of which were breeding. 1,699 Anisoptera exuviae were collected between 15 May and 25 September 2013. The "productivity" at emergence of Anisoptera therefore reached a minimum of 113 exuviae/m<sup>2</sup>. The daily productivity of the pond for Anisoptera averages 11 exuviae/day. It reaches up to 38 exu/d in July." (Authors) Translated with www.DeepL.com/Translator (free version)] Address: Flamant, N., 6, Allée Frédégonde 77250 Écuellles, France. E-mail: flamant.nico@gmail.com

**18720.** Fulan, J.; Rodrigues dos Anjos, M. (2015): Predation by *Erythemis* nymphs (Odonata) on Chironomidae (Diptera) and Elmidae (Coleoptera) in different conditions of habitat complexity. *Acta Limnologica Brasiliensia* 27(4): 454-458. ["Aim: The goal of this study was to analyze the effects of predation by nymphs of *Erythemis* Hagen, 1861 on Elmidae and Chironomidae and to check if the presence and the architecture of aquatic macrophytes may mediate this interaction. Methods: All prey as well as nymphs were captured near macrophytes in a small lagoon alongside a highway near Humaitá, Amazonas, Brazil. Twelve buckets were used in three different treatments: with *Pistia stratiotes* Linnaeus, 1753, with *Salvinia auriculata* Aublet and without macrophytes. Results: We found a mortality rate of 100% of Chironomidae and Elmidae larvae in the treatment without macrophytes. There was a greater survival of Elmidae compared to Chironomidae in the treatments with *P. stratiotes* and *S. auriculata*; however, there was a greater survival of both preys on treatment with *P. stratiotes*. Conclusions: We conclude that the presence of macrophytes decreased the efficiency of predation of *Erythemis* nymphs under experimental conditions. The architecture of macrophytes affected

predation as macrophytes with longer roots and with greater habitat complexity promoted a greater survival of prey." (Authors)] Address: Fulan, J.A., Universidade Federal do Amazonas – UFAM, Rua 29 de agosto, 786, CEP 69800-000, Humaitá, AM, Brazil. E-mail: joaofulan@hotmail.com

**18721.** Girish, V.P.; Hegde, M.G.; Balikai, R.A. (2015): Population dynamics of insect predators under different planting methods of paddy ecosystem. *Journal of Experimental Zoology, India* 18(1): 249-251. (in English) ["The population of insect predators, Odonata, coccinellids, spiders and carabids were recorded on paddy under different planting methods viz., drill sowing, transplanting and aerobic cultivation during kharif 2010 at the Agricultural Research Station, Mugad, Karnataka, India. The average high population of Odonata was recorded in aerobic rice throughout the cropping period. However, their peak activity varied across the different rice planting methods. And found insignificant difference among the planting methods. There was significant coccinellid population difference in drill sown v/s aerobic, but no significant difference in drill v/s transplanting and transplanting v/s aerobic rice planting methods. The predatory spiders population increased slowly from the beginning up to reproductive phase of the crop in drill sown and transplanted rice. The predatory spider's population differed significantly when compared in transplanted v/s aerobic and aerobic v/s drill sowed planting methods. The population of carabid predator was noticed meagerly throughout the cropping period. The peak carabid population noticed in drill sown, transplanted and aerobic rice planting methods respectively. The mean carabid population recorded in different planting methods not differed statistically when compared between, using t test." (Authors)] Address: Girish, V.P., Dept of Agril. Entomology, Univ. Agricultural Sciences, Dharwad-580 005, India. E-mail: girishsomaraddy@gmail.com

**18722.** Gliwa, B.; Švitra, G. (2015): Lietuvos laumžirgiai - Odonata of Lithuania. ISBN 978-609-8135-05-3: 352 pp. (in Lithuanian, with English summary) ["The book describes all species of Odonata that have been observed in Lithuania or in the neighbouring regions – a total of 71. Except for a booklet with an identification key only, this is the first book on Odonata written in Lithuanian, thus serving as an introduction of the matter to the larger audience. For the international reader summaries of most chapters, including specific regional peculiarities, occurrence, habitats, flight period and conservation regularities are provided in English." (Authors)]

**18723.** Gomez-Anaya, J.A.; Novelo-Gutierrez, R. (2015): A case of successful restoration of a tropical wetland evaluated through its Odonata (Insecta) larval assemblage. *Rev. Biol. Trop.* 63(4): 1043-1058. (in English, with Spanish summary) ["Wetlands are important wildlife habitats that also provide vital services for human societies. Unfortunately, they have been disappearing due to human activities such as conversion to farmland, pollution, habitat fragmentation, invasion of alien species, and inappropriate management, resulting in declines in species diversity, wildlife habitat quality, and ecosystem functions and services. In some countries,

many programs and actions have been undertaken to reverse the rate of wetland loss by restoring, creating and constructing new wetlands. We report on the assessment of Odonata larvae from a tropical and putatively restored wetland located in the La Mancha Biological Station, CÍCOLMA (LM, Ramsar site #1336), Veracruz, Mexico. Larval surveys were performed during the 2010 and 2011 dry and rainy seasons in both LM and a reference site, Cansaburro (CB), located approximately 2 km South of LM. Twelve samples were collected during each survey using a D-frame aquatic net (0.2 mm mesh size), sweeping 1 m<sup>2</sup> areas along shorelines using a random design. The effect of site, season and year on Odonata larval abundance was explored and diversity and abundance patterns of the assemblages were compared. A total of 3 718 larvae from 25 species (five Zygoptera and 20 Anisoptera) in 14 genera and three families were collected from both wetlands. Species number was equal in both wetlands although abundance was significantly higher in LM. Renyi's diversity profiles and species abundance patterns (rank abundance curves) in both sites were similar, suggesting an apparent recovery at LM. Differences in species composition (sites shared 13 species), and species dominance between both assemblages were observed and were related to differences in the aquatic plant structure between both wetlands as a result of extensive plant management in LM and cattle grazing in CB. Most evidence derived from this work shows that the LM wetland may be recovered." (Authors)] Address: Novelo-Gutiérrez, R., Departamento de Entomología, Instituto de Ecología A.C., Km 2.5. antigua carretera a Coatepec, Apartado Postal 63, 91000 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**18724.** Happel, A.; Lafountain, J.; Creque, S.; Rinchard, J.; Höök, T.; Bootsma, H.; Janssen, J.; Jude, D.; Czesny, S. (2015): Spatio-temporal description of spottail shiner (*Notropis hudsonius*) fatty acid profiles in Lake Michigan's southern basin Austin. *Journal of Great Lakes Research* 41: 179-184. (in English) ["On-going ecosystem alterations within Lake Michigan have drastically transformed species interactions and food-web assembly. Description of trophic interactions across broad spatial regions is likely necessary to fully appreciate the structure of this emerging food web. Spottail shiners, *Notropis hudsonius*, are numerically abundant in the nearshore zone of Lake Michigan, but their trophic interactions are under-described. To that end, we described fatty acid profiles of spottail shiner through spring, summer, and fall across western and eastern shorelines of Lake Michigan's southern basin. Fatty acids, used as dietary tracers, suggested a shift from benthic-based diets in spring to more pelagic-associated diets in summer and a reversal in fall. When time lag of fatty acid accumulation is accounted for in interpretations, diets likely follow spring plankton and summer/fall benthic invertebrate maxima. Fatty acid profiles also indicated differences in diet composition based on geographic location, with benthic tracers more prevalent among spottail shiner inhabiting the western shoreline. These interpretations were generally supported by stomach content data, with high Chironomidae consumption in spottail shiners

from western waters. The presence of Coleoptera, Hymenoptera, and Odonata in spottail shiner stomach contents throughout the lake highlights its reliance on nearshore and potentially inshore areas. This study offers one of the most spatially broad depiction of spottail shiner foraging habits in Lake Michigan." (Authors)] Address: Happel, A., Illinois Natural History Survey, University of Illinois, 1816 South Oak Street, MC-652, Champaign, IL 61820, USA. E-mail: Happel2@illinois.edu

**18725.** Henel, A.; Taylor, J.R.E.; Krasjewski, N. (2015): First records of *Coenagrion armatum* (Charpentier, 1840) (Odonata: Coenagrionidae) in the Biebrza Valley. *Wiad Entomologiczne* 34(2): 59-60. [FE02 Osowiec-Twierdza; FE00 Szorce (N. (53°18'20"N / 22°38'41"E); FE00 Szorce: (53°18'20"N / 22°38'41"E); FEOO Bagno Lawki N. (53°17'8"N / 22°36'19"E – 53°17'13"N / 22°36'32"E); FE00 Krynica, (53°16'43"N / 22°38,31"E)

**18726.** Hou, D.; Yin, Y.; Zhong, Z.; Zhao, H. (2015): A new torsion control mechanism induced by blood circulation in dragonfly wings. *Bioinspiration & Biomimetics* 10 016020. doi:10.1088/1748-3190/10/1/016020: 10 pp. (in English) ["A new mechanism to generate the torque of flapping dragonfly wings is disclosed in this paper. The concept is inspired by blood circulation in insect wings. The blood flowing in veins induces Coriolis forces in the flapping wings. The Coriolis forces acting on veins are of opposite directions when blood flows in and out. The opposite Coriolis forces generate torsional moment to the wing, especially in the leading-edge part. To estimate the time-varying torque induced by the blood circulation, a simplified U-tube model is designed. A three-dimensional finite element model of the wing is developed to analyze the dynamic behaviors under this torque. The dragonfly wing is in favor of torsional deformation because the corrugated structure is of high flexural rigidity in the spanwise direction but is of low torsional rigidity in the chordwise direction. In both the downstroke and upstroke, the twist of the leading-edge part causes the sections to camber spontaneously. Such a kind of deformation is found to be of great importance to improve aerodynamic efficiency. In addition, it also compensates for the disadvantageous bending deformation caused by air pressure in flapping flight. These results are important for better understanding of the multifunctional structures of dragonfly wings and may give some inspiration to the bionics of flapping-wing micro air vehicles (FMAVs)." (Authors)] Address: Hou, D., School of Aerospace Engineering and Applied Mechanics, Tongji University, Shanghai 200092, People's Republic of China

**18727.** Ichter, J. (2015): *Paragomphus genei*, especie nueva para Avila y Castilla y León. *Boletín Rola*: 85-86. (in Spanish, with English translation of title) ["*Paragomphus genei*, species new to the province of Avila and to Castilla y León region: An adult female *P. genei* was photographed on 21-VIII-2015 at the municipal observatory "Las Tejoneras" at the Rosarito reservoir (T.M. Candeleda, Ávila). UTM coordinates: zone=30S; x=305300; y=4442850. Altitude: 330 m a.s.l.. Habitat: thickets of *Cistus ladanifer* and *Quercus*



ilex near a reservoir on the river Tiétar. The species is new for the province of Avila and the autonomous community of Castilla y León (Victor Salvador Vilarinho, personal communication).] Address: jean.ichter@gmail.com

**18728.** Iorio, E.; Mouquet, C. (2015): Déclinaison régionale du Plan National d'Actions en faveur des Odonates en Basse-Normandie. Bilan final des années 2012 à 2015. Rapport GREZIA pour la DREAL Basse-Normandie, l'Europe et l'Agence de l'Eau Seine-Normandie: 66 pp. (in French) [For a full version of the publication see: [http://odonates.pnaopie.fr/wp-content/uploads/2010/12/IORIO\\_PNA\\_Odonates\\_bilan\\_final\\_2012-2015.pdf](http://odonates.pnaopie.fr/wp-content/uploads/2010/12/IORIO_PNA_Odonates_bilan_final_2012-2015.pdf)] Address: Etienne IORIO & Claire MOUQUET, chargé d'études & directrice, animateurs de la déclinaison régionale du PNA odonates en Basse-Normandie au Groupe d'Etude des Invertébrés Armoricaïns (GREZIA) – Antenne Basse-Normandie – Entrée A, 4e étage – 320 quartier Le Val – 14 120 Hérouville-Saint-Clair.

**18729.** Jisha Krishnan, E.K.; Sebastian, C.D. (2015): Evolutionary divergence and phylogenetic relationships of selected dragonflies using cytochrome oxidase I gene. Proceedings of International Conference on Biodiversity & Evaluation: Perspectives and Paradigm shifts 2015: 227-229. (in English) ["Dragonflies are candidates among ancient flying insects existed in the carboniferous period. Libellulidae is the largest and cosmopolitan dragonfly family of the order Odonata. Here we assessed the phylogenetic relationships of 5 dragonfly members (*Rhyothemis variegata*, *Acisoma panorpoides*, *Orthetrum sabina*, *Anaciaeschna jaspidea* and *Trithemis pallidinervis*) using cytochrome oxidase I (COI) marker. The partial PCR product of this gene yielded 450bp, 479bp, 500bp, 591bp and 580bp DNA respectively. The nucleotide BLAST analysis confirmed the taxonomic identity of these entire species. Phylogenetic tree constructed by Neighbour joining method showed that Libellulidae members are having a monophyletic ancestry due to the divergence from a common ancestor. Among these members, *Orthetrum sabina* is sharing a sister clade relationship with *T. pallidinervis* which remained in the same clade and *R. variegata* with *A. jaspidea* in another clade. The average A+T content of all these species is 66.26% while G+C content is 33.74% showing a strong A+T bias. The nucleotide substitution analysis states that *A. panorpoides*, has the highest substitution rate followed by *R. variegata*, *A. jaspidea*, *O. sabina* and *T. pallidinervis*. The high A+T content along with second codon change reflects evolutionary divergence of all these species. Thus the present study concluded that cytochrome oxidase I is an effective tool for predicting phylogenetic relationships and evolutionary divergence of closely related species." (Authors)] Address: Sebastian, C.D., Molecular Biology Laboratory, Dept of Zoology, Univ. of Calicut, Kerala 673 635 India. E-mail: drcdsebastian@gmail.com

**18730.** Korichi, R.; Bouzid, A.; Zehani, A.; Hammadi, Z.; Korichi-Almi, A. (2015): La diversité de l'odonatofaune dans deux biotopes sahariens. 2eme Seminaire International sur la Biodiversite Faunistique en Zones Semi arides Et Arides, 29 & 30 Novembre 2015: 29-30. (in French) [Verbatim

translated to English: "The objective of research on biotic indicators is to provide tools that allow the characterisation of the evolution of the ecological state of ecosystems over time. At the ecosystem level, we can examine the structure of communities or look at processes, structures and the landscape. These are known as ecological indicators. Odonates are useful and usually protected ecological indicators and any attempt to address them should take this special status into account and therefore only take from nature what is strictly needed in a rational approach. However, few studies have taken this group of predatory insects into account, even fewer have taken the trouble to establish temporal monitoring in Saharan regions and in all seasons. The objective of the present study is to characterise the population of odonates (Insecta) in some Saharan biotopes. The draft addresses the specific inventory in a spatio-temporal context through several stations, disturbed or not, reflecting the wetland but especially the palm grove in two regions, Djamaa and Ouargla (northern Sahara) known for these two particular ecosystems. The survey and inventory continued for 11 months at a monthly rate in 6 stations including 2 wetlands (Chott d'Ain Beida in Ouargla and Lake Ayata in Djamaa), 4 palm groves (Chemora, Ain Choucha, Chriâa in Djemâa and the I.T.A.S. palm grove in Ouargla). The trapping of adults or imagos is done with a mowing net and similar tools, whereas the trapping of larvae is done with a net. In addition, the diet is analysed by recovering the faeces when the individuals are captured. Finally, some bioecological aspects are discussed. The inventory reveals the presence of 22 species of odonates in the two biotopes, the majority of which are found in the palm grove. The species inventoried are divided into two suborders: 15 Anisoptera (dragonflies) and 7 Zygoptera. The values of the Shannon-Weaver diversity index fluctuate between 1.52 bits and 2.58 bits and those of the equitability are close to 1. With regard to diet, it should be noted that the total richness of the prey species examined shows the presence of 14 orders of insects." (Authors; DeepL)] Address: Korichi, R., Dép. Agro., Faculté SNV, Univ. Ouargla, Algeria. E-mail: Korichkov@hotmail.fr

**18731.** Kovács, T.; Horváth, R.; Juhász, P. (2015): Study of dragonflies and caddisflies (Insecta: Odonata, Trichoptera) on Batanta Island (Indonesia, West Papua). *Annls Mus. hist.-nat. hung.* 107: 269-288. (in Bilingual in Hungarian and English) ["Research of water insects on Batanta Island of the Raja Ampat archipelago in Indonesia started in 2010 with UV light trapping of caddisflies. Soon it turned out that the fauna of the island is extremely rich and many species are still need to be described. In 2014 the research continued with new methods and the scope had been widened to mayflies and dragonflies. In this article the authors summarize their experience and results. The data confirm that Batanta Island is a unique area of freshwater endemism." (Authors)] Address: Kovács, T., Mátra Museum of the Hungarian Natural History Museum, Kossuth Lajos u. 40, 3200 Gyöngyös, Hungary, E-mail: koati@t-online.hu

**18732.** Lewis, T.L.; Lindberg, M.S.; Schmutz, J.A.; Bertram, M.R.; Dubour, A.J. (2015): Species richness and distributions

of boreal waterbird broods in relation to nesting and brood-rearing habitats. *The Journal of Wildlife Management* 79(2): 296-310. (in English) ["Identification of ecological factors that drive animal distributions allows us to understand why distributions vary temporally and spatially, and to develop models to predict future changes to populations—vital tools for effective wildlife management and conservation. For waterbird broods in the boreal forest, distributions are likely driven by factors affecting quality of nesting and brood-rearing habitats, and the influence of these factors may extend beyond single species, affecting the entire waterbird community. We used occupancy models to assess factors influencing species richness of waterbird broods on 72 boreal lakes, along with brood distributions of 3 species of conservation concern: lesser scaup (*Aythya affinis*), white-winged scoters (*Melanitta fusca*), and horned grebe (*Podiceps auritus*). Factors examined included abundance of invertebrate foods (Amphipoda, Diptera, Gastropoda, Hemiptera, Odonata), physical lake attributes (lake area, emergent vegetation), water chemistry (nitrogen, phosphorus, chlorophyll a concentrations), and nesting habitats (water edge, non-forest cover). Of the 5 invertebrates, only amphipod density was related to richness and occupancy, consistently having a large and positive relationship. Despite this importance to waterbirds, amphipods were the most patchily distributed invertebrate, with 17% of the study lakes containing 70% of collected amphipods. Lake area was the only other covariate that strongly and positively influenced species richness and occupancy of scaup, scoters, and grebes. All 3 water chemistry covariates, which provided alternative measures of lake productivity, were positively related to species richness but had little effect on scaup, scoter, and grebe occupancy. Conversely, emergent vegetation was negatively related to richness, reflecting avoidance of overgrown lakes by broods. Finally, nesting habitats had no influence on richness and occupancy, indicating that, at a broad spatial scale, brood distributions are largely driven by the presence of quality brood-rearing lakes, not nesting habitats. Our findings are relevant to generating conservation plans or management goals; specifically, boreal lakes with abundant amphipods and surface areas >25 ha are important habitat for waterbird broods and merit conservation, especially given the patchy distribution of amphipods. Moreover, these high quality brood-rearing lakes are much rarer, and thus more constraining, than are quality nesting habitats, which are likely abundant in the boreal." (Authors)] Address: Lewis, T.L., Dept of Biology and Wildlife, University of Alaska Fairbanks, Fairbanks, AK, USA. E-mail: [tlewis@alaska.edu](mailto:tlewis@alaska.edu)

**18733.** Li, Y.-y.; Zhang, D.-z. (2015): The species diversity and fauna of Odonata in Ningxia Lingwu Baijitan National Nature Reserve. *Journal of Environmental Entomology* 37(3): 492-497. (in Chinese, with English summary) ["From 2010 to 2013, the Odonata diversity were surveyed in Ningxia Lingwu Baijitan National Nature Reserve. A total of 305 specimens were collected. 13 species of 9 genera in 3 families were identified. 9 species of 6 genera in 2 families were belonged to Anisoptera and 4 species of 3 genera in one family were belonged to Zygoptera. Coenagrionidae (3 genera and

4 species) and Libellulidae (5 genera and 7 species) were dominant families. *Ischnura elegans*, *Sympetrum frequens* and *Pantala flavescens* were dominant species. The ratio of total genera and species was 0.692, monotypic genus accounted for 66.67% of total genera. Most species markedly presented the characters of Palaearctic Region in world geographical distribution. Palaearctic Region species accounted for 46.15% of total species and Polytopic species accounted for 30.77%. In the zoogeographic of China, the fauna can be divided into 8 distribution patterns. The seven type distribution was predominant type (accounted for 38.46%), followed by the four type distribution and five type distribution. The six type distribution had only one. The single type distribution, two type distribution and three type distribution were absent. It was showed that the relationship and composition of fauna of Odonata were more complicated in Ningxia Lingwu Baijitan National Nature Reserve." (Authors) *Anax nigrofasciatus*, *A. parthenope julius*, *Crocothemis servilia*, *Deielia phaon*, *Orthetrum albistylum*, *Pantala flavescens*, *Sympetrum frequens*, *S. uniforme*, *S. imitans*, *Coenagrion dyeri*, *Enallagma cyathigerum*, *Ischnura elegans*, *I. senegalensis*] Address: Li, Y.-y., School of Life Science, Ningxia University, Yinchuan 750021, China

**18734.** Lukashanets, D.A.; & Novik, I.V. (2015): Influence of Common Carp *Cyprinus carpio* Linnaeus, 1758 stocking on the macroinvertebrate community in lake ecosystems. *Doklady of the National Academy of Sciences of Belarus* 59(6): 79-85. (in Russian, with English summary) ["The article contains the research results of the common carp influence on macrozoobenthos in lake ecosystems. The reduction of the benthos abundance and its biomass in the littoral of the fish-stocking reservoir is established. It is found that the benthos structure – the increase in a relative abundance of Diptera (*Chironomidae* sp.) larvae changes due to the grazing of large larvae of Odonata [*Epitheca bimaculata*], Ephemeroptera, Megaloptera and Trichoptera by big carp." (Authors)] Address: Novik, I.V., Scientific and Practical Center for Bioresources of the National Academy of Sciences of Belarus, Minsk, Belarus. E-Mail: [lukashanetsdm@rambler.ru](mailto:lukashanetsdm@rambler.ru); [novik\\_igor@rambler.ru](mailto:novik_igor@rambler.ru)

**18735.** Merckx, V.S.F.T.; Hendriks, KP.; Beentjes, K.K.; Mennes, C.B.; Becking, L.E.; Peijnenburg, K.T.C.A.; Afendy, A.; Arumugam, N.; de Boer, H.; Biun, A.; Buang, M.M.; Chen, P.-p.; Chung, A.Y.C.; Dow, R.A.; Feijen, F.A.A.; Feijen, H.; Feijen-van Soest, C.; Geml, J.; Geurts, R.; Graven-deel, B.; Hovenkamp, P.; Imbun, P.; Ipor, I.; Janssens, S.B.; Jocque, M.J.; Kappes, H.; Khoo, E.; Koomen, P.; Lens, F.; Majapun, R.J.; Morgado, L.N.; Neupane, S.; Nieser, N.; Pereira, J.T.; Rahman, H.; Sabran, S.; Sawang, A.; Schwallier, R.M.; Shim, P.-s.; Smit, H.; Sol., N.; Spait, M.; Stech, M.; Stokvis, F.; Sugau, J.B.; Suleiman, M.; Sumail, S.; Thomas, D.C.; van Tol, J.; Tuh, F.Y.Y.; Yahya, B.E.; Nais, J.; Repin, R.; Lakim, M.; Schilthuizen, M. (2015): Evolution of endemism on a young tropical mountain. *Nature* 524: 347-350, Suppl.. (in English) ["Tropical mountains are hot spots of biodiversity and endemism1–3, but the evolutionary origins of their unique biotas are poorly understood4. In varying degrees,

local and regional extinction, long-distance colonization, and local recruitment may all contribute to the exceptional character of these communities<sup>5</sup>. Also, it is debated whether mountain endemics mostly originate from local lowland taxa, or from lineages that reach the mountain by longrange dispersal from cool localities elsewhere<sup>6</sup>. Here we investigate the evolutionary routes to endemism by sampling an entire tropical mountain biota on the 4,095-metre-high Mount Kinabalu in Sabah, East Malaysia. We discover that most of its unique biodiversity is younger than the mountain itself (6 million years), and comprises a mix of immigrant pre-adapted lineages and descendants from local lowland ancestors, although substantial shifts from lower to higher vegetation zones in this latter group were rare. These insights could improve forecasts of the likelihood of extinction and 'evolutionary rescue'<sup>7</sup> in montane biodiversity hot spots under climate change scenarios." (Authors) Figure 4 demonstrates a phylogenetic reconstructions for *Coelicia*.] Address: Dow, R.A., 6 Bramley Avenue, Coulsdon, Surrey, CR5 2DP, UK. E-mail: rory.dow@virgin.net

**18736.** Mikolajczuk, P. (2015): The next new sites and ecological data of *Nehalennia speciosa* (Charpentier, 1840) (Odonata: Coenagrionidae) from Central Eastern Poland. *Odonatrix* 11(1): 1-20. (in Polish, with English summary) ["The paper discusses the records of 10 new sites of *Nehalennia speciosa* in east-central Poland. Sites 4–6 and 7 are located in the landscape more or less agriculturally transformed converted and do not have continuous forest buffering zone. In Poland, the habitat of *N. speciosa* without the typical continuous forest buffering zone have been previously known only from a few sites so far. Data in this study indicates that their number is probably higher in Poland than previously thought. A relatively low trophy of peat bog and pools despite the agricultural use of their catchment area probably results from the presence of aeolian/poor fluvioglacial sands in the ground. Identified habitats of *N. speciosa* mostly refer to acidic fens with abundant *Sphagnum* (sites 1–3, 5, 7, 10), and acidic fens without or small amount of *Sphagnum* (sites 4, 6, 8, 9). Particular fragments of habitats occupied by *N. speciosa* were situated near open surface of water bodies (sites 1, 3, 4, and probably a few more) as well as far from the influence of water bodies, as a shallow flooded peat bog (sites 2, 5, 6–10 and probably at others at some places). Water bodies at sites 1–3, 6, 7 and probably 5 had peat excavation origins. Formations of helophytes inhabited by *N. speciosa* (with probable or confirmed larval development) can be divided into two groups – monospecies formations: *Juncus effusus* (sites 3, 4, 5, 10), *Carex rostrata* (sites 1, 4), *Carex elata* (sites 6, 9), *Carex lasiocarpa* (site 6), *Carex vesicaria* (site 9); and mixed ones (where space structure is formed by two helophyte species): *J. effusus* + *C. rostrata* (sites 2, 4), *J. effusus* + *C. vesicaria* (site 10), *C. elata* + *C. lasiocarpa* (sites 6, 9), *C. lasiocarpa* + *J. effusus* (site 7), *C. rostrata* + *C. lasiocarpa* (site 2), *C. lasiocarpa* + *Eriophorum angustifolium* (site 8). The formation of *J. effusus* with larval development has been found for the first time in Poland. *C. elata* as the leading plant element was known so far only from two sites discovered after 2009 as well as *C. vesicaria*.

Data in this paper and other recent records of *N. speciosa* in old glacial areas show that the elements different than *Carex limosa/lasiocarpa* are more often inhabited in Poland than it was given in older data. Secondary habitats as well seem to be inhabited more often. The occurrence of imagines was also found within shallow and temporarily flooded marginal zones of peat bogs; at site 3 also at land. Larval development was not found in those zones. Vegetation used by imagines at the discussed marginal zones consisted of *J. effusus*, *Eriophorum vaginatum*, *Carex canescens*, however, mainly: *Molinia caerulea*, *Glyceria fluitans* as well as short grass unidentified to the species level. At sites 1–3, 4, 9, imagines at marginal zones occurred at higher densities than in the zones of larval development (maximum: up to 20 individuals per 1 m<sup>2</sup> at site 3). Perhaps it is caused by favourable microclimatic conditions at temporarily flooded marginal zones as well as the presence of suitable structure of vegetation. Dispersion of imagines towards the marginal zones is in several cases certainly enhanced by the increase in water level, which causes thinning of vegetation on the actual surface of the peat bog (where larval development takes place) and shallow flooding of vegetation in the marginal zone. It is possible that the dispersion towards the marginal zones may be increased at sites 3 and 4 by not entirely suitable spatial structure of swamps of *J. effusus* in the development zones. Existence of imagines aside of larval habitats may occur more frequently than it was suggested by previous data, especially in habitats with greater fluctuations of water level." (Author)] Address: Mikolajczuk, P., ul. Partyzantów 59c/26, 21-560 Międzyrzec Podlaski, Poland. E-mail: gugapm@wp.pl

**18737.** Miriglu, A.; Demirtas, A. (2015): Situation of the genus *Cordulegaster* (Insecta: Odonata) in Turkey and variations in *Cordulegaster picta*. *Ordu Üniv. Bil. Tek. Derg. / Ordu Univ. J. Sci. Tech.* 5(1): 50-55. (in Turkish, with English summary) ["In this study, studies on the distribution and systematic status of the genus *Cordulegaster* in Turkey were discussed and *C. picta* samples from various localities were examined and their variations were revealed. In Turkey, this genus is represented by 3 species (*C. insignis*, *C. myzmtae* and *C. picta*). *C. picta* differs from that given in the original definition, especially in the patterning of the abdominal segment, and may lead to different definitions. Therefore, the detection of these variations is very important from a taxonomic point of view."] Address: Miriglu, A., Ordu Üniversitesi, Fatsa Deniz Bilimleri Fakültesi, Fatsa/Ordu, Turkey. E-mail: alimiroglu@odu.edu.tr

**18738.** Nico, L.G.; Englund, R.A.; Jelks, H.L. (2015): Evaluating the piscicide rotenone as an option for eradication of invasive Mozambique tilapia in a Hawaiian brackish-water wetland complex. *Management of Biological Invasions* 6: 83-104. (in English) ["Mozambique tilapia *Oreochromis mossambicus* were recently discovered in 'Aimakap. Fishpond, a 12-hectare brackish-water wetland complex in Kaloko-Honokohau National Historical Park, on the Island of Hawaii'. As a possible eradication method, we evaluated rotenone, a natural piscicide used in fish management and the active

ingredient in plants traditionally used by indigenous Hawaiians for capturing fish. To assess rotenone's efficacy in killing tilapia and effects on non-target species, laboratory toxicity tests involved exposing organisms to various concentrations of liquid CFT Legumine (5% rotenone) in static trials of 48-h to 72-h duration. Test organisms included: Mozambique tilapia, non-native guppy *Poecilia reticulata*, the non-native odonate *Ischnura ramburii*, native feeble shrimp  *Palaemon debilis*, and native *ōpae'ula* shrimp *Halocaridina rubra*. All organisms and water used in tests were obtained from 'Aimakap. (12.6 - 12.7 ppt salinity), or, for *H. rubra*, an anchialine pool (15.0 - 15.2 ppt salinity). Survival analyses indicated CFT Legumine concentrations  $\geq 3$  ppm ( $>0.15$  mg/L rotenone) achieved 100% mortality of tilapia and 93% of guppies within 24 h, with most tilapia killed by 6 h and most guppies by 2 h. Little or no mortality was observed among invertebrate exposed to 1 to 5 mg/L CFT Legumine: 0% mortality for *ōpae'ula* shrimp, 4% for feeble shrimp; and 16% for odonate larvae. The 48 h LC50 values for Mozambique tilapia and guppy were 0.06 and 0.11 mg/L rotenone, respectively. Results demonstrate rotenone's potential for non-native fish eradication in brackish-water habitats, with benefit of low mortality to certain macro-invertebrates. High rotenone tolerance displayed by *ōpae'ula* shrimp is noteworthy. Invasive fish are common in anchialine pools, threatening existence of shrimp and other invertebrate fauna. Although rotenone's effects on freshwater organisms have been well studied, our research represents one of only a few controlled laboratory experiments quantitatively assessing rotenone tolerance of brackish or marine fauna." (Authors)] Address: Nico, L.G., US Geological Survey, Southeast Ecological Science Center, 7920 NW 71st Street, Gainesville, Florida 32653 USA. E-mail: [lnico@usgs.gov](mailto:lnico@usgs.gov)

**18739.** Pamungkas, D.W.; Ridwan, M. (2015): Diversity of dragonfly and damselfly (Odonata) in some water springs in Magetan, East Java. *Pros. Sem. Nas. Masy. Biodiv. Indon.* 1: 1295-1301. (in Indonesian, with English summary) ["This study aims to determine the diversity of Odonata in some water springs of Panekan sub-District, Magetan, East Java, ... 19 species of Odonata was found including 10 species of Anisoptera and 9 species of Zygoptera. Diversity index (H') of Odonata obtained 2,28 and relative abundance (KR) species *Orthetrum sabina* was the highest (29.4%), while the lowest was *Orthetrum pruinatum* (0.3%). Odonata including aggregated distribution, except for *Diplacodes trivialis* and *O. pruinatum* that had regular distribution." (Authors)] Address: Pamungkas, D.W., Kelompok Studi Biodiversitas (KS Biodiv), Jurusan Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Sebelas Maret Surakarta. Jl. Ir. Sutami 36A Surakarta 57126, Jawa Tengah, Indonesia. E-mail: [diagal.wisnu@gmail.com](mailto:diagal.wisnu@gmail.com)

**18740.** Pessacq, P.; Lozano, F.; Muzón, J. (2015): A checklist of the dragonflies from the North-Western of Isiboro-Sécure Indian Country and National Park, Bolivia. *Agrion* 20(2): 64-66. (in English) [Isiboro-Sécure Indian Country and National Park, located in central-western Bolivia, in the departments of Beni and Cochabamba (Figure 1). The Park

includes about 12,363 km<sup>2</sup> of Yunga rainforest in the Bolivian Amazon.] Address: Pessacq, P., Laboratorio de Investigaciones en Ecología y Sistemática Animal (LIESA), Universidad Nacional de la Patagonia San Juan Bosco, Sarmiento 849, 9200 Esquel, Chubut, Argentina. E-mail: [pablopessacq@yahoo.com.ar](mailto:pablopessacq@yahoo.com.ar)

**18741.** Popova, O.N.; Matafonov, D.V. (2015): Materials on biology, ecology and systematics of larvae of some species of Odonata from water bodies of Buryatia (East Transbaikalia, Russia). *Proceedings of the Irkutsk State University* 13: 27-50. (in Russian, with English summary) ["Larvae of 9 species of Odonata from 12 water bodies of Buryatia are observed: *Enallagma cyathigerum*, *Coenagrion lunulatum*, *Erythromma najas*, *Aeshna crenata*, *Somatochlora exuberata*, *S. graeseri*, *S. sahlbergi*, *Epitheca bimaculata* and *Leucorrhinia orientalis*. All of founded species are not new to fauna of Buryatia, but the geography of their findings has significantly extended. The analysis of literary and our data has allowed to reveal the terms of flying of the studied species which are in general in range from the beginning of June to the end of August. It is established that the egg phase of *C. lunulatum*, *E. cyathigerum*, *E. najas* and *E. bimaculata* can have two parallel ways of development – with winter diapause and without it that, perhaps, is important adaptation to winter frost penetration in reservoirs. The analysis of seasonal age dynamics of larvae of *E. cyathigerum* has shown that the cycle of development of species in the Chivyrkuysky Bay of Baikal is one-year and implement in two independent generations – spring and summer. On the basis of the elicited new facts was confirmed that populations of *Erythromma najas* in Baikalian region belong to subspecies of *E. n. baicalensis* (Belyshev, 1964), but not to Far East one *E. n. humerale* (to Selys, 1887). The literary and original data, and also collection materials are allowed to form the list of 37 species of Odonata known so far for the territory of Buryatia." (Authors)] Address: Popova, Olga, Institute of Systematics & Ecology of Animals, Russian Acad. of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091, Russia. E-mail: [popova-2012@yandex.ru](mailto:popova-2012@yandex.ru)

**18742.** Rivas, A. (2015): Co-existence of calopterygid damselfly species: neutrality or negative frequency dependence? MSc. thesis, Department of Biology, Lund University. (in English) ["Closely related species often share the same local environment and use similar resources. Local diversity could then be maintained through some frequency-dependent species maintenance mechanism, fulfilling the inviability criterion. Alternatively, and according to the neutral theory of biodiversity, different species should randomly go extinct over time. Here, I studied two closely related and congeneric damselfly species (*Calopteryx splendens* and *C. virgo*) to investigate if, how and why species with similar ecology could coexist. Through an experimental investigation in large outdoor cages, I investigated if there was any evidence for either species neutrality or coexistence via negative frequency dependent survival advantages of rare species. I quantified the longevity of both species under several different density and frequency treatments, where the



number and species composition in the cages was manipulated in a fully factorial experimental design. My results suggest that longevity of these two species was similar over a large range of densities and frequency treatments, except when total male density was low and the frequency of *C. splendens* males was high. In this situation, *C. virgo* males showed evidence of a negative frequency-dependent survival advantage. I also present data on species-specific territoriality and discuss how territorial plasticity might contribute to coexistence between the two species. I found that *C. virgo* was significantly more likely to be territorial in two out of six density -and frequency treatments than was *C. splendens*. Overall, my results are consistent with species neutrality across most density and frequency-environments, although there is also evidence for negative frequency dependent fitness advantage of *C. virgo* at low density and when *C. splendens* was common. Therefore, different outcomes would be expected when these two ecologically similar and congeneric damselflies come in to contact with each other in nature, depending on environmental context." Popular Abstract: How two similar damselfly species can co-exist? Nowadays, one can not a priori assume that each and every species found together in a local community need to coexist in the long run. Instead, local community composition might follow a neutral community dynamics, whereby species are expected to randomly go to extinct. However, ecologically equivalent species cannot coexist infinitely, so there needs to exist some coexistence mechanism (-s) if two or more species are going to continue to coexist locally. The aim of my project was experimentally investigate and search for potential co-existence mechanisms between two ecologically similar damselfly species within the same genus (*C. splendens*, *C. virgo*). In particular, I investigated the importance of neutrality or coexistence through negative frequency dependence mechanisms (i.e. that a species does better when it is rare than when it is common). In addition, I also investigated how territoriality behaviour of these two species changed in relation to local community composition in the form of density and frequency of interacting species. In order to examine the coexistence mechanism (-s) I estimated longevity of individually marked damselflies of these two species in different density and frequency-environments in large outdoor cages, where the total number of individuals and damselfly species composition was experimentally manipulated. My study demonstrate experimental data suggesting that a mixture of neutrality and negative frequency dependent shape the coexistence of these two ecologically similar damselflies. These results also suggest that these two damselfly species use different degree of territoriality (i.e. more probability to holding a territory or less probability to holding a territory) depending on the other species territorial behavior. This study is one of few experimental studies of this kind, where species composition (frequency) and density (total number of individuals) are simultaneously manipulated with the aim to understand the roles of species neutrality vs. negative frequency-dependent coexistence mechanisms. To understand local species composition, these results can help us to get a better understanding about the ecological causes of global species distributions." (Author)] Available

at (<http://lup.lub.lu.se/student-papers/record/5152954>). Address: Rivas Torres, Anais, ECOEVO Lab, Univ. de Vigo, Escola de Enxeñaría Forestal, Campus A Xunqueira, 36005 Pontevedra, Spain

**18743.** Rodrigues, I.; 1, Reis Raposo Maciel, C.M.; Maciel Junior, A.; Almeida Diniz, A.; Neres Barbosa de Souza, L. (2015): Odonatas registered in Catolé Grande river, No Itapetinga county, BA. Enciclopédia Biospera, Centro Científico Conhecer - Goiânia 11(21): 2352-2364. (in Portuguese, with English summary) ["This study aimed to identify odonatas collected in the Catolé Grande river, in the urban area of Itapetinga, Bahia, in 2012. Samples were collected at four different points of the river, considering aspects of preservation and environmental deterioration. Specific keys were used to identify the copies until the last possible taxonomic level [genus]. Identified himself two suborders, Zygoptera and Anisoptera, six families and 10 genera. The distribution of Odonata differ between the collection points in the river and some species were more tolerant to environmental degradation. It can be inferred that the Catolé Grande river presents a significant diversity of insect species of Odonata order, but more studies are needed for a more detailed survey of this order, as well as the distribution of species in the river, for the preservation of habitats and, therefore, the retention of these species." (Authors)] Address: Silva Rodrigues, Ingrid Silva, UESB, Laboratório de Biologia. Universidade Estadual do Sudoeste da Bahia - UESB, Itapetinga, Bahia, Brazil. E-mail: [ingridbels@hotmail.com](mailto:ingridbels@hotmail.com)

**18744.** Rychla, A.; Sniegula, S.; Karasek, T.; Golab, M.J.; Zurek, R. (2015): Distribution and habitat characteristics of *Sympecma fusca* (Vander Linden, 1820) and *Sympecma paedisca* (Brauer, 1877) in oxbows of the upper Vistula River. *Odonatrix* 11(1): 21-30. (in Polish, with English summary) ["*Sympecma fusca* and *S. paedisca* occur in a wide spectrum of habitats within standing waters. However, the knowledge of these species distribution in oxbows is poor in Poland. In this study, new sites of *S. fusca* and *S. paedisca* along the Vistula River valley, between Jawiszowice and Otałęż in the Małopolska Region (the Lesser Poland), are presented and the importance of oxbows for the species distribution is discussed. Habitat conditions concerning hydrological and physico-chemical (12 parameters) water properties are analysed with a focus on nutrient contents (phosphate –  $\text{PO}_4^{3-}$ , ammonium –  $\text{NH}_4^+$ , and nitrate –  $\text{NO}_3^-$ ). A total of 22 UTM 10x10 km squares were investigated and *S. fusca* was recorded in 17, while *S. paedisca* in 11 UTM squares. In total, 51 and 25 new sites of *S. fusca* and *S. paedisca*, respectively, were recorded. The species coexisted at 22 (43%) sites. The reproductive behaviour was observed at 29 sites for *S. fusca* and at 16 ones for *S. paedisca*. Both species preferred oxbows that during high water periods were temporarily connected with the river, i.e. those situated inside rather than outside of the levees. Specifically, 63% sites of *S. fusca* and 76% sites of *S. paedisca* were located between the levees of the Vistula River. With respect to hydrochemical conditions, both species occurred in habitats with wide ranges of all measured water parameters and there

was no significant difference between their preferences in this matter. Regarding nutrients, both species were found at concentrations reaching  $1,5 \text{ mg L}^{-1} \text{ PO}_4^{3-}$  and  $1,6 \text{ mg L}^{-1} \text{ NH}_4^+$ . Nevertheless, a comparison between inhabited and uninhabited waters revealed preferences of both species to relatively low contents of phosphate and ammonium. With respect to nitrate, *S. paedisca* occurred at their low concentrations, whereas *S. fusca* did not show any pattern. We conclude that oxbows, particularly those seasonally flooded due to the river proximity, are important habitats for *S. fusca* and *S. paedisca*. Thus, special attention should be paid on biotopes situated in great river valleys in Poland. Although both species tolerate broad ranges of physico-chemical water parameters, oxbows with relatively low nutrient concentrations are preferred." (Authors)] Address: Rychla, Anna, ul. Osiedlowa 12, Płoty, 66-016 Czerwieńsk, Poland. E-mail: an.rychla@gmail.com

**18745.** Salazar Cespedes, S.A.; Castrillon Andrade, G.; Valenzuela-Rojas, J.C.; Amortegui Cedeno, E.F. (2015): Dragonfly (Insecta - Odonata) diversity in the Center for Environmental Research and Education "La Tribuna", Vereda Tamarindo (Neiva-Huila-Colombia). *Entomologia Mexicana* 2: 619-627. (in Spanish, with English summary) ["The main objective of this work was to analyse the composition of dragonflies in the Centro de Investigación y Educación Ambiental (CIEA) "La Tribuna" Vereda Tamarindo (Neiva-Huila-Colombia), in terms of richness and abundance of local communities, by lotic and lentic environment, in the dry and rainy seasons; in a sampling between 2013 and 2014. In total, 543 individuals were collected, including 57 Anisoptera and 486 Zygoptera; distributed in seven families and 19 genera. In Anisoptera, the only family collected was Libellulidae, while in the suborder Zygoptera, the most abundant family was Calopterygidae with 178 individuals. Sampling effort was 73.5%, a value that represents a valid sample of odonate biodiversity in the IARC; alpha diversity ( $\alpha$ ) was low, with dominance in the rainy season of 0.2274 and in the dry season of 0.1933, based on the Shannon-Wiener index which indicates that regardless of the season, the species are constant; for beta diversity ( $\beta$ ), the Jaccard Similarity index was used, this value was 41% which means that the two seasons are similar in terms of species richness." (Authors) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version).] Address: Salazar Cespedes, S.A., Universidad Surcolombiana (USCO), Facultad de Educacion, Programa Licenciatura en Ciencias Naturales: Fisica, Quimica y Biologia. Avenida Pastrana Borrero - Carrera 1, Neiva-Huila, Colombia. E-mail: checho8805@hotmail.com

**18746.** Sharma, G. (2015): Pictorial handbook on damselflies and dragonflies (Odonata: Insecta) of Rajasthan. *Zoological Survey of India*: 266 pp. [This monograph introduces the dragon- and damselflies of the Indian state of Rajasthan, and contain a sizeable introduction the study area, as well as an extensive selection of chapters on odonate biology. Contents: I. Study Area: Rajasthan. 1. Introduction. 2. Thar Desert or Great Indian Desert. 3. Aravalli hill ranges. 4. Geology. 5. River valley catchments. 6. Rainfall pattern.

7. Temperature regimes. 8. Forests. 9. Tropical thorn forests. 10. Tropical dry deciduous forests. 11. Central Indian Sub-tropical hill forests. 12. National parks and wildlife sanctuaries. References. II. Odonata. 1. Introduction. 2. Habitat. 3. Life cycle. 4. Aquatic stage. 5. Terrestrial stage. 6. Historical resume. 7. Behavioral patterns. 8. Feeding behaviour. 9. Reproductive behaviour. 10. Emergence. 11. Life history study. 12. Species diversity. 13. Discussion. 14. Role as biological control agent. 15. Need for conservation. 16. Economic value of odonates. 17. Summary. Some frequently asked questions (FAQs). Odonata Associations and Societies globally. Odonata information websites. Glossary. Bibliography. Photoplates.]

**18747.** Soler Monzo, E. (2015): Estructura de comunidades de Odonata en sistemas mediterráneos. Dissertation, Universitat de València: 193 pp. (in Spanish) ["In ecology, a community is an assemblage of species coexisting at the same time and place (Mittelbach 2012) but the way ecological communities have been conceptualised has changed over time. In the early 20th century, the community was seen as a discrete entity primarily regulated by environmental factors, leading to the debate between Clementsian and Gleasonian views of communities. Later, the debate focused on the mechanisms that allowed species to coexist depending on the way in which different species exploited available resources. This was the time when Hutchinson (1957) enunciated his niche theory. Along these lines, Diamond (1975) described the formation of a community as an "assemblage of species" that follows a series of rules, mainly determined by interspecific relationships (competition for resources), the differential response of species to exploit those resources and their respective dispersal rates. The community was considered a closed entity until McArthur & Wilson (1967) enunciated their Theory of Island Biogeography in which, in addition to possible interactions between species and environmental effect, they outlined the possibility that extinction and colonisation events were also involved in the formation of a community. In this new context in which a community is neither isolated nor closed, Ricklefs (1987) stressed the importance of explicitly recognising a regional scale and a local scale, in which different processes are at work in the assembly of a local community. A local community is now recognised as the result of the interaction of local and regional processes. Local processes are related to abiotic and biotic factors while regional processes are related to species dispersal capacity and their demographic processes. Consequently, the concept of metacommunity (communities that interact through the dispersal of at least part of the species that form them) has become the new scenario for approaching the study of communities and in the literature local processes are called deterministic processes while regional processes are assimilated to spatial processes. There are basically two approaches to the study of metacommunity structure. The first one focuses on the description of patterns while the second approach tries to unravel the processes underlying these patterns. In addition, communities change in their composition and/or structure. Discerning whether these patterns or changes in composition and structure

occur randomly or are driven by specific mechanisms is one of the current challenges in ecology. The underlying processes have been classified into two broad groups: deterministic processes and stochastic processes. Deterministic processes are those related to niche theory and act at the local level. Stochastic processes relate to mechanisms that are regional in scope and can be intrinsic to the organism (dispersal capacity, size, trophic position) or extrinsic (landscape configuration, extinction or colonisation phenomena). Within the study of metacommunities, freshwater ecosystems have received considerable attention. On the one hand, the hydroperiod represents a wide abiotic gradient which, in turn, conditions the biotic component of the sites. On the other hand, they provide an ideal framework for establishing the role of regional processes in the assembly of communities of organisms with different dispersal capacities. Furthermore, elucidating the mechanisms underlying their structure is no longer of mere theoretical interest, but of vital importance for their proper management and conservation, as these systems are among the most threatened by anthropogenic action. This is especially true in Mediterranean freshwater ecosystems, which not only have a great variety of endemic species, but some of these habitats are considered to be of priority protection. Odonata are an important group in inland water communities, as they need these ecosystems to complete their life cycle. They are a suitable group for the study of community assemblages, as many aspects of their distribution, biology and habitat requirements are known, and not all species have the same dispersal capacity. Due to the interest in restoring aquatic habitats, it has been used to assess the consequences of anthropogenic disturbances. Dragonfly communities have also been studied in a metacommunity context, although work in which this conceptual framework prevails is scarce. Moreover, larvae and adults have received uneven attention and this makes it difficult to agree on the prevailing patterns and dynamics. In Mediterranean ecosystems, despite being a well-studied group, Odonata communities have only been described in terms of the main abiotic factors influencing their assemblage structure. There is some knowledge of their dynamism but the only works in which they are studied from a metacommunity point of view are those in which they have been included as part of macroinvertebrate communities. Consequently, it is convenient to establish the metacommunity as a conceptual framework for Odonata communities, especially if we take into account that in the Mediterranean area, one out of five species is threatened with extinction at regional level. Thus, this PhD thesis aims to contribute to this change of perspective and to increase the knowledge of the patterns and dynamics associated with Odonata communities. This general objective is specified in four specific objectives: (1) to establish the factors that determine dragonfly species richness in temporary wetlands, (2) to establish the structure observed in dragonfly metacommunities and their stability over time, (3) to assess what is the temporal beta diversity of dragonfly communities and (4) to analyse how dragonfly community assembly occurs in newly created habitats. To achieve each objective, fieldwork was carried out in two very different study areas, the island

of Menorca (within the Balearic Islands archipelago) and the Banyoles wetland (Girona, Catalonia). In Menorca, the fieldwork included, on the one hand, the monitoring of adult communities in temporary pools and, on the other hand, the monitoring of larval communities in different types of habitats. In the Banyoles wetland, only adult communities linked to permanent and semi-permanent habitats were studied. The methodology used to monitor larvae included the capture, conservation and identification of specimens according to their size. Two different methodologies were used to monitor adults in Menorca (adaptive sampling) and in Banyoles (SLIC). In neither of them was the capture of individuals included, except in cases of doubtful identification. For fieldwork with adult communities, surveys consisted of sightings of adults (males and females) at or near water points. These surveys are carried out weekly or fortnightly in the central hours of preferably sunny and not too windy days in the period between approximately March and November. For the sampling carried out in temporary ponds, the observer walked along transects or used count points and for each new species recorded, an additional 20 minutes of survey time was added. This work was carried out in 2008. To survey the newly created ponds, the SLIC method (*Seguiment de Libèl·lues de Catalunya*), developed by the naturalist group *Oxygastra*, was used. In this case, observers make weekly counts of adult insects along a linear transect and when it is impossible to access some of the lake habitats, counting points consisting of 5-minute sessions from a fixed point are added. Counts of adults in the Banyoles wetland were made over seven years. For larval sampling, each site was visited twice to ensure that larvae of both spring and summer species were captured in their most advanced stages of development, so the sampling period began in late winter and ended in early summer. A methodology similar to that described by other authors was followed in which larvae are captured with a 1 mm light net for at least 3 minutes, trying to cover all existing mesohabitats. The larval sampling was a replica of the work carried out by García-Avilés et al. (1995) 22 years earlier. The environmental characterisation of the sites studied was done by including the variables most commonly measured in this type of study, i.e. physico-chemical parameters of the water, vegetation, connectivity or characteristics of the environment of the sites. The analysis methods used in this thesis included descriptive statistics, hypothesis testing and multivariate statistics. Specific programmes were also used to quantify beta diversity, establish metacommunity patterns and analyse community rarity and dynamics. In addition, the DBI (Dragonfly Biotic Index) was used to test whether the measure of creating new lagoons had improved the odonatological diversity of the Banyoles wetland. The most important results of this doctoral thesis can be grouped according to each objective. In the case of the adult communities of temporary ponds (Objective 1) it was found that regional factors such as area and connectivity played a relevant role in the species richness of the communities. These assemblages, consisting of generalist and rare species, contribute significantly to regional diversity despite the fact that only a low percentage (around 20%) have specific mechanisms to resist desiccation. Larval

communities showed a quasi-nested metacommunity pattern in 1988 and a random pattern in 2010 (Objective 2). These patterns could be caused by differences in dispersal ability and degree of habitat specialisation. Larval communities showed a high variability in composition in both 1988 and 2010 (Objective 3) and, although no direct relationship could be established, it was found that the different habitats included in the study represented an important environmental heterogeneity. In fact, together with distance to the sea and temperature, habitat type was the most influential variable in the differentiation of assemblages in both 1988 and 2010 (Objective 3). Odonata larval communities are highly dynamic and after 22 years, a variability in their composition of about 75% was recorded. This dynamism could not be related to the degree of environmental change and was negatively correlated with the species recorded at each station in 1988. Despite this, the number of species recorded at each locality remained more or less constant after this time period (Objective 3). In newly created habitats the adult Odonata communities did not follow successional but rather stochastic dynamics (Objective 4). This type of dynamics was also observed in assemblages of more mature habitats. In both types of assemblages, a spatial variability close to 50% was recorded. This percentage was very similar to their inter-annual variability, although species richness remained more or less constant (Objective 4). According to the DBI values, the newly created ponds seem to have improved the odonatological diversity of the area. The main conclusions of this PhD thesis show that Odonada communities can be influenced by both local and regional factors, especially in the case of highly fluctuating habitats. In larval communities, the observed metacommunity pattern may be related to the trade-off between dispersal ability and degree of habitat specialisation and is not stable over time. There is great variability in the composition of Odonata communities (adult and larval) at both local and regional scales, especially when different habitat types are taken into account. Odonata communities are highly dynamic at both the adult and larval stages, but the number of species within them remains stable. The mechanisms underlying these dynamics seem to have a strong stochastic component." (Author; DeepL)] Address: not stated

**18748.** Suhling, F.; Sahlén, G.; Gorb, S.; Kalkman, V.J.; Dijkstra, K-D.B.; van Tol, J., (2015): Order Odonata. In: Thorp, J., Rogers, D.C. (Eds.), *Ecology and General Biology: Thorp and Covich's Freshwater Invertebrates*, Academic Press. ISBN: 9780123850263: 893-932. (in English) [This handbook introduces in most aspects of Odonata biology as Chapter Outline; Introduction 894; Systematic and Phylogenetic Relationships 894; Zygoptera 894; Anisozygoptera 896; Anisoptera 896; Species Numbers 897; General Biology 899; External Features of the Larva 899; External Features of the Imago 900; Size 902; Egg Structure 902; Ultrastructures 903; Wing Structures 903; Coloration 904; Cuticula 904; Head Arrestor System 904; Genitalia 905; Perception: The Sensory Organs and Neural System 905; Compound Eyes and Ocelli 906; Tactile Sensory Organs 907; Respiration 908; Larval Gill Systems 908; Oxygen Demands 909;

Tracheal System of the Imago 909; Physical-Gill Respiration 909; Thermoregulation 910; Flight 910; Reproduction 911; Sexual Dimorphism 911; Mating Systems 911; The Mating Process 911; Oviposition 911; Life Cycle 913; Egg Development 913; Larval Development 913; Metamorphosis and Emergence 914; Seasonal Patterns 915; Pre-reproductive Period 915; Adult Life Span 915; Life Cycle Types and Voltinism 916; General Ecology and Behavior 917; Foraging 917; Larval Foraging 917; Adult Foraging Behavior 918; Dispersal and Migration 918; Habitats 918; Generalists versus Specialists 918; Habitat Selection 919; Microhabitat Occupancy by Larvae 919; Lotic Waters 921; Temporary Habitats: Coping with or Avoiding Drought 921; Acidic Ponds and Lakes 922; Saline Waters 922; Forest and Shade Habitats 922; Very Small Habitats 922; Terrestrial Habitats 922; Biotic Interactions 922; Predation 923; Intraspecific Interactions 924; Abiotic Limitations and Biotic Interactions 924; Parasitism and Other Interactions 925; Distribution and Diversity 925; Diversity Patterns 925; Range Shifts due to Climate Change 926; Conservation Status and Biotic Indicators 927; Collecting, Culturing, and Specimen Preparation 928; Collecting and Sampling 928; Culturing 929; Preservation 929; Acknowledgments 930; References 930] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, 38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**18749.** Takhelmayum, K.; Gupta, S. (2015): Aquatic insect diversity of a protected area, Keibul Lamjao National Park in Manipur, North East India. *Journal of Asia-Pacific Entomology* 18(2): 335-341. (in English) ["Highlights: •Presence of tolerant orders like Odonata, Hemiptera and Coleoptera. •Absence of sensitive orders of aquatic insects in all the sites of the floating park. •Shannon H' values are less than 1 in all the sites. •Very low DO concentration in water of the park. •Lead and mercury concentrations were found beyond the desirable level of WHO and BIS. Abstract: Keibul Lamjao National Park, only home of Brow-Antler Deer, (*Rucervus eldii eldii*) is the unique floating park of the world. It is a part of the Loktak Lake, Manipur (Ramsar site). The lake gets major share of water from seven feeder rivers. In this paper an attempt has been made to study aquatic insect diversity of the five sites of the national park area which will indicate the health of the unique but deteriorating ecosystem and at the same time reduce aquatic insect data deficiency of the area. The study recorded 3 orders, 12 families and 23 species of aquatic insects. Besides inventorying the aquatic insect taxa, their relationships with several environmental variables including heavy metals were also investigated. The low Shannon Weiner Diversity Index values of aquatic insects (Shannon H' less than 1 in all the sites) indicated perturbed condition of the water of the National Park area. The study revealed very low dissolved oxygen (DO) in all the sites. All the three heavy metals in most of the sites were found beyond the desirable level of BIS (IS 10500: 1991). Different biological monitoring scores and Canonical correspondence analysis (CCA) have been used for discussion and interpretation. This study found that although protected areas are meant for protecting biodiversity,



management of outside protected area particularly catchment area should be given priority for minimizing land use disturbance, altered hydrology and other related factors." (Authors) The following taxa (including probable misidentifications) are listed: *Sympetrum* sp., *Tramea* sp., *Rhodothemis* sp., *Orthetrum* sp., *Crocothemis servilia servilia*, *Potomarcha* sp., *Zyxomma petiolatum*, *Leucorrhinia* sp. [sic] (Libellulidae), *Aeshna* sp., *Anax* sp., (Aeshnidae); *Pseudagrion* sp., *Ischnura* sp., *Ceriagrion* sp. (Coenagriidae); *Neurobasis chinensis* (Calopterygidae), *Lestes* sp., (Lestidae)] Address: Gupta, Susmita, Department of Ecology and Environmental Science, Assam University, Silchar 788 011, India. E-mail: susmita.au@gmail.com

**18750.** Vilariño, V.S.; Rodríguez, M.S.R.; Flechoso del Cueto, M.F. (2015): Primeras citas de *Oxygastra curtisii* (Dale, 1834) (Odonata: Corduliidae) y de *Aeshna juncea* (Linnaeus, 1758) (Odonata: Aeshnidae) para la provincia de Segovia en el Parque Nacional de la Sierra de Guadarrama (España). Boletín de la Sociedad Entomológica Aragonesa 57: 425-428. (in Spanish, with English summary) ["We present the first records from Segovia province of *O. curtisii* [8-VII-2015, UTM 30TVL12, 1154 m.a.s.l.] and *A. juncea* [16-VII-2015, UTM 30TVL12, 1867 m.a.s.l.; 21-VII-2015, UTM 30TVL24, 1928 m.a.s.l.]. Also, we have confirmed the reproduction of *A. juncea* in the Sierra de Guadarrama National Park in the provinces of Segovia and Madrid. [20-VII-2015, UTM 30TVL-22, 2151 m.a.s.l.]"] (Authors)] Address: Salvador Vilariño, V.S., C/ San Francisco nº 57 5ºA. 09400 Aranda de Duero (Burgos), Spain. E-mail: visalvia@yahoo.es

**18751.** White, S.; Smith, S.P.H. (2015): Dragonflies of Lancashire and North Merseyside. Lancashire & Cheshire Fauna Society 118: 104 pp. (in English) ["Just published in full colour, the Dragonflies of Lancashire and North Merseyside provides a comprehensive of all 24 species seen there. The distribution and breeding status of each species are mapped and details of flight periods illustrated, with particular emphasis on changes brought about by climate change. Lancashire lies on the north-western edge of the breeding range of several British dragonflies but, presumably driven largely by climate change, it has been colonised by six new species within the past 20 years during which period the ranges of several established species have also shown dramatic northward shifts. Of the 24 species recorded (8 damselflies and 16 dragonflies), 19 now breed annually with one other, Red-veined Darter, now apparently lost after breeding successfully for several years. The current distribution and breeding status of each species is mapped together with the progression of colonisation by the recently-arrived species. In contrast to most other species groups in Lancashire, the county's dragonflies appear to be thriving, in part due to the creation of a number of large wetlands by the conservation bodies, but other environmental factors have also played a part. Climatic amelioration is undoubtedly the most important of these but improvements in water quality, due especially to the clean-up of industrial pollution, has also figured. The most dramatic example of this is the exponential spread of *Calopteryx splendens* which expanded its breeding range

from a single site in the mid-1990s to its present range covering 25% of the county; like several other species *C. splendens* have moved northwards but their main range change has been to the east along the previously polluted waterbodies of Lancashire's historic cotton-mill towns. Dates of annual first and last sightings have also changed significantly during the past 30 years with the flight period of several species increasing by three or more weeks. This is partly simply a result of the increased number of dragonfly recorders but there is little doubt that major changes in phenology have taken place. For example, the date when the first 25% of annual sightings of Common Darters have been recorded has advanced by a fortnight or more, while there is no evidence of a similar change at the other end of the year. Interestingly, these phenological changes appear to be confined to the lowlands - the flight periods of Lancashire's three predominantly upland species, Golden-ringed Dragonfly, Common Hawker and Black Darter have remained stable. The county supports a wide range of dragonfly habitats which are summarised in the book's introduction - from the sand dunes of the Sefton Coast in Merseyside, the swathe of arable land in the south-west and pastures in the centre of the county, to the uplands of the Pennines and the Forest of Bowland. All contain important dragonfly sites, some perhaps warranting SSSI status, but, perhaps surprisingly, the county's premier site is located on the ex-industrial land of Heysham and Middleton near Lancaster, where all but three of the county's 24 species have been recorded with 16 breeding in recent years."] Address: <https://www.northwestinvertebrates.org.uk/document/the-dragonflies-of-lancashire-and-north-merseyside/>

## 2016

**18752.** BioDrawversity (2016): Assess operational impacts on emergence of state-listed odonates in the Connecticut River: 2014–2016. Study report. Northfield Mountain Pumped Storage, Project No. 2485 and Turners Falls Hydroelectric Project No. 1889. Leverett, MA. 118 pp. (in English) ["Pumped Storage Project (Northfield Mountain Project, FERC No. 2485) and the Turners Falls Hydroelectric Project (Turners Falls Project, FERC No. 1889). FirstLight has initiated with the Federal Energy Regulatory Commission (FERC, the Commission) the process of relicensing the Northfield Mountain and Turners Falls Projects using FERC's Integrated Licensing Process (ILP). The current licenses for the Northfield Mountain and Turners Falls Projects were issued on May 14, 1968 and May 5, 1980, respectively, with both set to expire on April 30, 2018. This report documents the results of Study No. 3.3.10: Assess Operational Impacts on Emergence of State-Listed Odonates in the Connecticut River. The study goal was to assess potential effects of Project operations on emerging dragonflies (Insecta: Odonata; hereafter called "odonates") in the Connecticut River. To meet this goal, field surveys were conducted to characterize the habitat, assemblage structure, and emergence and eclosure behavior of odonates in the Project area. This information was compared with existing data on odonates and water surface elevation (WSEL) collected throughout the Project

area. Three phases of fieldwork were completed. Phase 1, completed in 2014, included qualitative surveys of odonate larvae and exuviae at eight sites in the Connecticut River to determine species assemblage structure and to collect habitat data. For teneral or exuviae, biologists recorded the vertical and lateral distance from the water's edge, and the substrate that each was collected on. Phase 2, completed in 2015, included quantitative odonate surveys, observations of emergence and eclosure behavior, and concurrent collection of WSEL and water temperature data. Surveys for emerging larvae, exuviae, and teneral were conducted at five sites, with six transects per site, during eight biweekly sampling periods from late May to early September. Biologists looked for larvae exiting the water or crawling on land, and attempted to track and record the time it took for individuals to complete eclosure and fly away. For each exuvia and teneral, the vertical height above the water's surface, the distance from the water's edge, and its eclosure substrate was recorded. Phase 3, completed in 2016, was intended to increase sample sizes for eclosure duration for state-listed odonates and to collect additional data on the vertical heights and horizontal distances traveled prior to eclosure. The speed for all or part of the eclosure process was recorded for 180 specimens, with nearly 90% of these observed in 2016. Surveys for emerging and eclosing larvae were conducted at eight sites in the Turners Falls Impoundment (TFI) and downstream from the Turners Falls Dam, on warm sunny days during peak emergence from late May through mid-July. A total of 17 species were collected from 2014 to 2016, including the state-listed *Gomphus abbreviatus*, *Gomphus vastus*, *Gomphus ventricosus*, *Neurocordulia yamaskanensis*, and *Stylurus amnicola*. Species found most frequently in the riverine environments in the bypass reach and downstream from Cabot Station in the Connecticut River included *Gomphus vastus*, *Boyeria vinosa*, *Stylurus spiniceps*, *Ophiogomphus rupinsulensis*, *Neurocordulia yamaskanensis*, *Dromogomphus spinosus*, *Gomphus abbreviatus*, and *Macromia illinoensis*. The lower TFI (Barton Cove) was inhabited by several species more tolerant of lentic conditions, such as *Epithea princeps*, *Perithemis tenera*, and *Libellula* sp. For all species combined, larvae crawled a median vertical height of 5.5 ft from the water's surface, and a median distance of 12.5 ft from the water's edge. Among the riverine species, crawl height was greatest for *Macromia illinoensis*, *Gomphus abbreviatus*, and *Gomphus vastus*; each of these species crawled a median height of near or above 7 ft. Riverine species that crawled the shortest height from the water's surface included *Stylurus amnicola* (median = 2.2 ft), *Stylurus spiniceps* (median = 3.4 ft), and *Ophiogomphus rupinsulensis* (median = 3.5 ft). The more lentic species collected in Barton Cove crawled shorter distances from the water's surface than the riverine species. Average horizontal crawl distance was usually 10-15 ft for most species, with maximum distances often 3-4 times greater than the average. Shortest crawl distance was for *Perithemis tenera* (a lentic species that prefers to emerge on aquatic vegetation) and *Stylurus amnicola*. Considering crawl height and crawl distance together, the riverine species that tended to

eclose closest to the water were *Stylurus amnicola*, *Stylurus spiniceps*, and *Ophiogomphus rupinsulensis*. In general, species eclosed on a wide variety of available substrates. The time elapsed from when a larva stopped to when it completed metamorphosis ("Start to Free") ranged from 7 to 30 minutes (average = 18 minutes). The time elapsed from completion of metamorphosis to flight ("Free to Flight") ranged from 7 to 96 minutes (average = 39 minutes). Together, these two time periods comprise the critical time period from when a larva stops to eclose to when it flies away ("Start to Flight"). A total of 170 specimens were observed for the entire critical time period. The average duration was 58 minutes and ranged from 24 to 126 minutes. In terms of understanding potential effects of water level fluctuations, the concern is for those species that tend to remain close to the water's edge, especially in areas of the river where water level fluctuations and rates of change are greatest. For the analysis, Critical Protective Rates (CPR) (ft/hr) were computed for species and species groups, using climbing height quantiles divided by a conservative eclosure duration of 2.0 hrs. CPR values were compared to the 95th percentile of the maximum hourly rates of change (MHR-95%) at several representative sites in the TFI and downstream from Cabot Station, derived from the hydraulic models for the daily period from 4am to 5pm, from May 15 to August 15. The hydraulic model for the TFI was based on data from 2000-2015 (excluding 2010 due to the extended outage at Northfield Mountain), and the hydraulic model for downstream was based on data from 2008-2015 (excluding 2010). For the bypass reach, empirical water level data from 2014-2015 was used. This provided a means of assessing the potential impacts to species or species groups, based on their behavior (climbing height and eclosure time) and the rate of water level changes at locations throughout the Project area. Water level fluctuations and rates of change may affect odonate emergence in areas of the Connecticut River closest to Cabot Station during the seasonal (May 15-August 15) and daily (4am to 5pm) periods evaluated, which correspond to peak emergence periods for odonates. State-listed odonate species documented in these areas include *Gomphus abbreviatus*, *Gomphus vastus*, *Neurocordulia yamaskanensis*, and *Stylurus amnicola*. Predicted effects were highest for *Stylurus amnicola*; at least 30% of the population, and closer to 50% near Cabot Station, were at risk of inundation based on the MHR-95%. Only a small percentage of the population of *N. yamaskanensis*, *G. vastus*, and the *Gomphus* Group were potentially affected by inundation based on MHR-95%, and these effects were most pronounced close to Cabot Station. Among co-occurring riverine species, *S. spiniceps*, *O. rupinsulensis* and *D. spinosus* were likely most affected by water level fluctuations, based on the tendency of these species to eclose closer to the water." (Authors) Address: Biodrawiversity LLC, Ethan Nedau, Leverett, MA 01054, 206 Pratt Corner Road, USA

**18753.** Kaya, M.; Sargin, I.; Al-jafa, I.; Erdogan, S.; Arslan, G. (2016): Characteristics of corneal lens chitin in dragonfly compound eyes. *International Journal of Biological Macromolecules* 89: 54-61. (in English) ["Highlights: •Chitin in the

corneal (ommatidial) lenses of dragonfly compound eyes was isolated. •The chitin content of the corneal lenses was determined to be quite high ( $0.85 \pm 20.3\%$ ). •The FT-IR analysis showed that corneal lens chitin was in the  $\alpha$ -form. •The maximum degradation temperature of the lens chitin was observed at  $369.2^\circ\text{C}$ . •Corneal lens chitin consist of nanofibrils. Abstract: Chitin in the compound eyes of arthropods serves as a part of the visual system. The quality of chitin in such highly specialised body parts deserves more detailed examination. Chitin in the corneal (ommatidial) lenses of dragonfly (*Sympetrum fonscolombii*) compound eyes was isolated by using the classical chemical method. The chitin content of the corneal lenses was determined to be quite high ( $20.3 \pm 0.85\%$ ). The FT-IR analysis showed that corneal lens chitin was in the  $\alpha$ -form as found in all arthropod species where mechanical strength is required. The surface morphology analysis by scanning electron microscopy revealed that the outer part of corneal lenses consisted of long chitin fibrils with regular arrays of papillary structures while the smoother inner part had concentric lamellated chitin formation with shorter chitin nanofibrils. Chitinase enzymatic digestion studies, elemental analysis results and the degree of acetylation value showed the purity of chitin samples from corneal lens. The maximum degradation temperature value of the corneal lens chitin was observed at  $369.2^\circ\text{C}$ . X-ray analysis revealed that corneal lens chitin has high crystallinity index; 96.4%. Identification of chitin found in ommatidia of insect compound eyes can provide insights into insect vision and chitin-based optical material design studies." (Authors)] Address: Kaya, M., Dept Biotechnology & Molecular Biology, Faculty of Science & Letters, Aksaray Univ., 68100, Aksaray, Turkey. E-mail: muratkaya3806@yahoo.com

**18754.** Kaya, M.; Baublys, V.; Sargin, I.; Šatkauskienė, I.; Paulauskas, A.; Akyuz, B.; Bulut, E.; Tubelyte, V.; Baran, T.; Seyyar, O.; Kabalak, M.; Yurtmen, H. (2016): How taxonomic relations affect the physicochemical properties of chitin. *Food Biophysics* 11: 10-19. (in English) ["Chitin specimens from 16 arthropod species (13 of Insecta and 3 of Arachnida) were isolated for the first time using the same method. Fourier Transform Infrared Spectrometry (FTIR), Thermogravimetric Analysis (TGA), X-ray diffraction (XRD), Scanning Electron Microscope (SEM) and elemental analysis have been applied to determine how physicochemical properties of chitin specimens are affected by taxonomic relationship. The characterisation studies revealed that physicochemical nature of the chitin specimens differed greatly and were found partially specific to taxa. Significant differences in the surface morphologies of chitin specimens were observed even in the same order. However, the chitin contents were recorded to be specific to the order in the class Insecta. The highest chitin content was observed in Coleoptera (18.2–25.2 %) followed by Hemiptera (10.6–14.5 %), Odonata (9.5–10.1 %), Hymenoptera (7.8–9.3 %), Diptera (8.1 %), Blattodea (4.7 %). In addition, the crystalline index (Crl) values of chitin specimens from Coleoptera were found to be higher than the other orders in Insecta. This study revealed that the chitin contents and Crl values can be related

to taxonomical relationships." (Authors) *Cordulia aenea*, *Libellula quadrimaculata* Village Puvoėiai (Dzukija national park, Lithuania) 15/17.05.2012] Address: Kaya, M., Department of Biotechnology and Molecular Biology, Faculty of Science and Letters, Aksaray University, 68100, Aksaray, Turkey. E-mail: muratkaya3806@gmail.com

**18755.** Tsubaki, Y.; Okuyama, H. (2016): Adaptive loss of color polymorphism and character displacements in sympatric *Mnais damselflies*. *Evolutionary Ecology* 30(5): 811-824. (in English) ["A geographical survey of two *Mnais damselfly* species in the Kinki area of Japan showed evidence for character displacements when the two species were found in sympatry. *Mnais costalis*, a species that has polymorphic male mating types of orange-winged territorial and clear-winged non-territorial morphs (hereafter abbreviated to orange and clear morphs respectively) in allopatry often shifted to having monomorphic orange morphs in sympatry. The mean body size of orange morphs was consistently larger than that of clear morph in allopatry. The mean body size of the sympatric orange morphs was even larger than that of allopatric orange morphs. By contrast, *Mnais pruinosa*, a species that also has two morphs of large orange and small clear morphs in allopatry, shifted to having monomorphic clear morphs in sympatry. The mean body size of the sympatric clear morphs was smaller than that of allopatric clear morphs. Divergence was also detected in the preference for habitat insolation conditions between sympatric *Mnais damselflies*. Both species in allopatric regions prefer half-light forest habitats, while in sympatric regions they showed diversified habitat preference: *M. costalis* preferred sunny habitats while *M. pruinosa* preferred shady habitats. Multiple character displacements in signal traits and habitat preference emerged in heterogeneous forest light environments are likely to have synergistic effects on the reproductive isolation of the two species." (Authors)] Address: Tsubaki, Y., Center Ecological Research, Kyoto Univ., Hirano 2-509-3, Otsu 520-2113, Japan. E-mail: mnais.pruinosa@me.com

## 2018

**18756.** Gomez-Llano, M.A.; Bensch, H.M.; Svensson, E.I. (2018): Sexual conflict and ecology: Species composition and male density interact to reduce male mating harassment and increase female survival. *Evolution* 72(4): 906-915. (in English) ["Sexual conflict is a pervasive evolutionary force that can reduce female fitness. Experimental evolution studies in the laboratory might overestimate the importance of sexual conflict because the ecological conditions in such settings typically include only a single species. Here, we experimentally manipulated conspecific male density (high or low) and species composition (sympatric or allopatric) to investigate how ecological conditions affect female survival in a sexually dimorphic insect, the banded demoiselle (*Calopteryx splendens*). Female survival was strongly influenced by an interaction between male density and species composition. Specifically, at low conspecific male density, female survival increased in the presence of heterospecific males

(*C. virgo*). Behavioral mating experiments showed that interspecific interference competition reduced conspecific male mating success with large females. These findings suggest that reproductive interference competition between con- and heterospecific males might indirectly facilitate female survival by reducing mating harassment from conspecific males. Hence, interspecific competitors can show contrasting effects on the two sexes thereby influencing sexual conflict dynamics. Our results call for incorporation of more ecological realism in sexual conflict research, particularly how local community context and reproductive interference competition between heterospecific males can affect female fitness." (Authors)] Address: Gomez-Llano, M.A., Evolutionary Ecology Unit, Dept of Biology, Lund University, Sweden. E-mail: miguel.gomez@biol.lu.se

**18757.** Svensson, E.I.; Gómez-Llano, M.A.; Torres, A.R.; Bensch, H.M. (2018): Frequency dependence and ecological drift shape coexistence of species with similar niches. *The American Naturalist* 191(6): 691-703. (in English) ["The coexistence of ecologically similar species might be counteracted by ecological drift and demographic stochasticity, both of which erode local diversity. With niche differentiation, species can be maintained through performance trade-offs between environments, but trade-offs are difficult to invoke for species with similar ecological niches. Such similar species might then go locally extinct due to stochastic ecological drift, but there is little empirical evidence for such processes. Previous studies have relied on biogeographical surveys and inferred process from pattern, while experimental field investigations of ecological drift are rare. Mechanisms preserving local species diversity, such as frequency dependence (e.g., rare-species advantages), can oppose local ecological drift, but the combined effects of ecological drift and such counteracting forces have seldom been investigated. Here, we investigate mechanisms between coexistence of ecologically similar but strongly sexually differentiated damselfly species (*Calopteryx virgo*, *C. splendens*). Combining field surveys, behavioral observations, experimental manipulations of species frequencies and densities, and simulation modeling, we demonstrate that species coexistence is shaped by the opposing forces of ecological drift and negative frequency dependence (rare-species advantage), generated by interference competition. Stochastic and deterministic processes therefore jointly shape coexistence. The role of negative frequency dependence in delaying the loss of ecologically similar species, such as those formed by sexual selection, should therefore be considered in community assembly, macroecology, macroevolution, and biogeography." (Authors)] Address: Svensson, E.I., Dept Biol, Lund Univ, 223 62 Lund, Sweden. E-mail: erik.svensson@biol.lu.se

## 2019

**18758.** Papazian, M.; Filippi, G. (2019): Contribution a la connaissance des odonates de l'archipel de Sao Tome-et-Principe 1. Presence de *Zygonyx torridus* (Kirby, 1889) (Odonata Libellulidae). *L'Entomologiste* 75(5): 265. (in French, with

English and Portuguese summaries) ["During a first expedition, carried out in February 2019 as part of the São Tomé-et-Príncipe «Archipel de la Biodiversité» project, *Z. torridus* was collected on the island of São Tomé, bringing to 16 the number of Odonates known to the archipelago." (Authors)] Address: Papazian, M., Opie Provence-Alpes-du-Sud, Muséum d'histoire naturelle de Marseille, palais Longchamp, 13233 Marseille cedex 20, France. E-mail: papazianmcm@wanadoo.fr

## 2020

**18759.** Acquah-Lampsey, D.; Brändle, M.; Brandl, R.; Pinkert, S. (2020): Temperature-driven color lightness and body size variation scale to local assemblages of European Odonata but are modified by propensity for dispersal. *Ecology and Evolution* 10(16): 8936-8948. (in English) ["Previous macrophysiological studies suggested that temperature-driven color lightness and body size variations strongly influence biogeographical patterns in ectotherms. However, these trait–environment relationships scale to local assemblages and the extent to which they can be modified by dispersal remains largely unexplored. We test whether the predictions of the thermal melanism hypothesis and the Bergmann's rule hold for local assemblages. We also assess whether these trait–environment relationships are more important for species adapted to less stable (lentic) habitats, due to their greater dispersal propensity compared to those adapted to stable (lotic) habitats. We quantified the color lightness and body volume of 99 European Odonata and combined these trait information with survey data for 518 local assemblages across Europe. Based on this continent-wide yet spatially explicit dataset, we tested for effects temperature and precipitation on the color lightness and body volume of local assemblages and assessed differences in their relative importance and strength between lentic and lotic assemblages, while accounting for spatial and phylogenetic autocorrelation. The color lightness of assemblages of odonates increased, and body size decreased with increasing temperature. Trait–environment relationships in the average and phylogenetic predicted component were equally important for assemblages of both habitat types but were stronger in lentic assemblages when accounting for phylogenetic autocorrelation. Our results show that the mechanism underlying color lightness and body size variations scale to local assemblages, indicating their general importance. These mechanisms were of equal evolutionary significance for lentic and lotic species, but higher dispersal ability seems to enable lentic species to cope better with historical climatic changes. The documented differences between lentic and lotic assemblages also highlight the importance of integrating interactions of thermal adaptations with proxies of the dispersal ability of species into trait-based models, for improving our understanding of climate-driven biological responses." (Authors)] Address: Acquah-Lampsey, D., Faculty of Biology, Dept of Ecology – Animal Ecology, Philipps-Universität Marburg, Karl-von-Frisch-Str. 8, 35043 Marburg, Germany. E-mail: dacquahlampsey@gmail.com



**18760.** Amann, G.; Puchta, A.; Burtscher, B. (2020): Monitoring im Hochmoor. Das Götzner Moos vor und nach seiner Renaturierung. *inatura – Forschung online* 75: 42 pp. (in German, with English summary) ["A drained and therefore partially disturbed bog with *Pinus uncinata* at the edge of the Rhine Valley in Vorarlberg (Austria), called Götzner Moos, was renaturalised in 2013. In the following six years we monitored the water balance and vegetation as well as selected insects (dragonflies, butterflies) in the bog and adjacent fens to evaluate the restoration measures (clearing shrubs and trees, installing plank dams and clay bunds, restart of the autumnal haymaking in the fens). The water table varied from near the surface to 20 cm under normal weather condition in summer, but fell well beyond 20 cm in dry periods. Cleared but otherwise undisturbed vegetation showed positive effects on special bog plants (e. g. *Vaccinium oxycoccus*), but also contrary effects on wetter and dryer places (e. g. increase or decrease of *Sphagnum magellanicum*, thinning or thickening of heath vegetation). *Molinia caerulea* increased and thereby reflects the still partially unfavorable water balance. As a result of restoration activities, open peat was densely overgrown within two years mainly by *Juncus effusus*, in little ponds mainly by *Carex rostrata*, where also rarer moss species (e. g. *Sphagnum cuspidatum*) flourished. Conspicuous mats of *S. magellanicum* developed later in the period on wet peat, or as small hummocks at the edge of the ponds. The moss flora as well as the vegetation as a whole today still points to a bog forest rather than to a raised bog with current peat growth. Yet it is unclear if *Pinus uncinata*, conveniently a protected property, or *Picea abies* will be the winner of this hypothetic competition. Compared with the studies before the restoration, the number of species of dragonflies has increased. After the restoration 15 species of dragonflies were registered. 6 species reproduced in the investigated area using the new ponds as reproduction site. Whereas most of the detected species are common, *Somatochlora arctica* is endangered and associated with bogs. 41 species of butterflies were found, none of them is especially associated with bogs. However, the adjacent fens and wet grassland are important habitats for butterflies - the clearing and the restart of the autumnal haymaking were a contribution to their conservation. It could be interesting to continue the monitoring to keep an eye on the development of the area, especially in view of climate change and the increase of unusual warm and dry periods." (Authors)] Address: Burtscher, Bianca, Naturschutzbund Vorarlberg, Schulgasse 7, 6850 Dornbirn, Austria. E-Mail: vorarlberg@naturschutzbund.at

**18761.** Ananian, V.; Schröter, A. (2020): *Aeshna juncea* (Odonata: Aeshnidae) new to Armenia. *Notulae odonatologicae* 9(5): 218-228. (in English) ["*Aeshna juncea* is reported from Armenia for the first time on the basis of voucher specimens and photographic records. On 30-vii-2018 a putative pair was photographed, and on 3- and 4-viii-2019 several specimens were photographed and examined in the hand. The occurrence of *A. juncea* in the Caucasus region as well as its puzzling regional distribution in relation to its congener *A. serrata* is summarized and discussed." (Authors)] Address: Ananian, V., 179 Bashinjaghyan St., apt. 23,

0078, Yerevan, Armenia. E-mail: gomphus@gmx.com

**18762.** Bakker, G. (2020): Zadellibellen in Rotterdam. *Stratgras* 32(1): 16-17. (in Dutch) [*Anax ephippiger*: "Back to Rotterdam After the sighting by Schrijvershof and Hak in 2013, it remained quiet for five years as far as saddle dragonflies in Rotterdam are concerned. Following the spectacular developments elsewhere in the Netherlands, Paul Schrijvershof travelled to Hoek van Holland on 10-X- 2018 and found and photographed Rotterdam's second saddle dragonfly. That was all that remained that year. On 14-VI- 2019, both Johan van 't Bosch and Jaap Engberts saw a male saddle dragonfly in - not entirely coincidentally - the dunes of Hoek van Holland. Johan managed to take photos. Because the observations were made at two different pools, the suspicion arose that there must be more specimens present. In the following days this proved to be the case. At a quickly drying pool, several dozen people reported up to six specimens at the same time. Mating and egg deposition were often observed. On 18 June the pool had almost dried up and only one specimen was seen. Until 25 June a few specimens were seen at the nearby dune pond. Meanwhile, elsewhere in the municipality of Rotterdam, some sightings were also made: on 17-VI- 2019, les Goedbloed saw one along the Schiedamseweg in Oud-Mathenesse ("While running, suddenly a saddle dragonfly!") and on 20 June Merijn Loeve saw one at the Veilingterrein in Crooswijk. Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Garry Bakker [ecoloog, Bureau Stadsnatuur; bakker@bureaustadsnatuur.nl]

**18763.** Batista Calvão, L.; Paiva, C.K.; Brito, J.; Fares, A.L.; Maia, C.; Michelan, T.S.; Montag, L.; Juen, L. (2020): Influence of biotic and abiotic factors on adult Odonata (Insecta) in Amazon streams. *Animal Biology* 71(1): 67-84. (in English) ["Abiotic and biotic factors play an essential role in the structuring of natural communities. Aquatic ecosystems have complex interaction networks, encompassing predator/prey relationships and structural support. Among aquatic organisms, the order Odonata is a model group for understanding those relationships since they can be both predators and prey. Our hypotheses were that Zygoptera are (i) influenced positively by Ephemeroptera, Plecoptera and Trichoptera (EPT) and the Habitat Integrity Index (HII), and negatively by fish and macrophytes; and (ii) Anisoptera are affected positively by EPT and macrophytes, and negatively by fish and HII. We found that Zygoptera were affected by the fish functional trophic groups, while Anisoptera were affected by macrophytes, EPT, fish and HII. Macrophytes affected anisopterans positively because they provide perching sites for adults. The results for EPT and HII may be related since these organisms are also sensitive to environmental changes. More open areas have lower HII values and the negative relationship with Anisoptera may be explained by physiological constraints. The negative relationship between EPT and Anisoptera could be explained by the low occurrence of EPT in open sites, which are the sites that were highly rich in Anisoptera. Finally, the dominance of specific functional trophic groups of fish influences Odonata

suborders in different ways. In conclusion, the results show the importance of ecological interactions for Odonata in Amazonian streams in both direct and indirect ways." (Authors)] Address: Juen, L., Programa de Pós-graduação em Ecologia, Universidade Federal do Pará-Ufpa, Rua Augusto Correia, No Bairro Guamá, Belém 66075-110, Brazil. E-mail: leandrojuen@ufpa.br

**18764.** Brockhaus, T.; Müller, O.; Nel, A.; Poschmann, M.J.; Wappler, T. (2020): Fossil dragonflies (Odonata: Anisoptera) from the late Oligocene Fossil-Lagerstätte Enspel (Rhine-land-Palatinate, SW Germany). *Palaeoentomology* 3(3): 284-300. (in English) ["Fossils of Anisoptera, three larvae and one isolated hind wing, are described from the late Oligocene crater lake of Enspel (Westerwald, Germany). The larvae are interpreted to belong to one species, although representing three different ontogenetic stages. Comparison to extant taxa shows that the larvae are to be assigned to the clubtails (Gomphidae), namely to the genera Gomphidia or Ictinogomphus, or, more unlikely, Diastomma in the subfamily Lindeniinae, and thus constitute the first record of larvae of this subfamily in the Oligocene. The venation pattern of the hind wing clearly shows that it belongs to a species in the family Macromiidae and thus constitutes the oldest record of this family." (Authors)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**18765.** Buffagni, A. (2020): The lentic and lotic characteristics of habitats determine the distribution of benthic macroinvertebrates in Mediterranean rivers. *Freshwater Biology* 66: 13-34. (in English) ["(1) The importance of flow-related factors to benthic organisms, as well as the role of habitat conditions in shaping aquatic communities during low-flow periods, have been recognised. Despite this, the preferences of macroinvertebrates to the ratio of lentic to lotic habitats at the reach scale have not been accurately quantified in most instances. (2) Aquatic invertebrates and habitat features in a range of temporary rivers in Sardinia were investigated. The investigation focused on the flow-related characteristics that contribute to defining the lentic-lotic condition of the river reaches. The relation of habitat features to benthic taxa distributions was assessed using multidimensional scaling. The main aim of the paper was to quantify the responses of taxa to the different lentic and lotic habitat conditions by applying hierarchical logistic regressions. Finally, taxon optima were aligned along the lentic-lotic gradient and the responses of different taxonomic groups compared. (3) Unbroken waves and imperceptible flow were correlated with benthic taxa variability, suggesting local hydraulics and turbulence have a major role in regulating community composition. The overall lentic-lotic character of the river reaches was also clearly related to the benthic taxa distribution. More than 80% of taxa were significantly related to the lentic-lotic gradient, and an asymmetrical response curve was the predominant model. (4) Benthic groups showed taxon optima clustered in different ranges of the lentic-lotic gradient. Odonata, Coleoptera, Hemiptera, and Mollusca preferred clearly lentic con-

ditions. Diptera mainly ranged on the lotic side of the gradient, while Trichoptera were relatively uniformly distributed across the gradient. Ephemeroptera taxa clustered in intermediate lentic-lotic conditions, with two species preferring extremely lentic habitats. In general, optima converged at intermediate and extremely lentic conditions, presumably due, respectively, to the coexistence of different lentic and lotic features and to the highly diverse environmental characteristics under extremely lentic situations. (5) These results support the conclusion that dissimilar ecological factors act on benthic taxa along the lentic-lotic range and species favouring different lentic-lotic conditions are subjected to pressures of different nature. This should not be ignored when defining species preferences and studying community structure or relationships between species in Mediterranean rivers, which cyclically vary their habitat composition. In addition, the uneven distribution of optima of different groups along the lentic-lotic gradient might affect macroinvertebrate metrics when assessing ecological status or establishing reference conditions under variable climatic conditions." (Author) Taxa are treated at family level.] Address: Buffagni, A., Water Res. Inst., Nat. Res. Council (CNR-IRSA), Via del Mullno, 19,1-20861, Brugherio (MB), Italy. Email: huffagnl@Irsa.cnr.it

**18766.** Chelli, A.; Moulai, R.; Djemai, A. (2020): Does the Tichi Haf dam construction affect dragonfly and damselfly (Odonata: Insecta) assemblages of the Boussellam watercourse (central north Algeria)? A preliminary study. *Zoology and Ecology* 30(1): 37-47. (in English) ["This paper reports a pioneer study dealing with the impact of dam construction on Odonata communities, because no similar study has been undertaken in Algeria and the consequences of this artificialization on the Odonata assemblages have rarely been studied elsewhere. The main purpose of this study was to determine if the Tichi Haf dam is really having a negative effect on the Odonata communities living on the Boussellam watercourse, as there has hitherto been a lack of knowledge about its odonatofauna and aquatic microinvertebrates. This study showed that changes due to the construction of this dam, involving riparian vegetation, bank aspect and water parameters, affected the Odonata assemblages inhabiting both sides of the dam wall. The richness and abundance of Odonata found upstream from the dam is quite different from those found downstream from the dam. The survey also identified four new species for the Bejaia region. Among these, we report on the rediscovery of the critically endangered (EN) *Calopteryx exul* in Algeria, recorded in the nineteenth century and deemed to have been extinct after an absence of more than a century. The presence of an extant population *C. exul* in this location does not correspond to any historical locality reported for this species." (Authors)] Address: Chelli, A., Lab. de Zoologie Appliquée et d'Ecophysiologie Animale, Fac. Sciences Nature et Vie, Univ. de Bejaia, 06000 Bejaia, Algeria. Email: mchelli70@yahoo.fr

**18767.** Chung, H.-Y.; Yeom, C.-M.; Kim, J.H.; Park, S.; Lee, Y.-W.; Pyo, G.; Kim, S.H. (2020): Species diversity and com-

munity characteristics of benthic macroinvertebrates from irrigation ponds in the western CCZ area, Korea. *Korean Journal of Ecology and Environment* 53(2): 173-184. (in Korean, with English summary) ["Irrigation ponds, 'dumbeong', which are artificially constructed water resources for traditional farming, serve as a biological shelter connecting seasonally created rice paddy fields to local freshwater ecosystems. This 2018 study surveyed 143 irrigation ponds in the western Civilian Control Zone (CCZ) area from August to September, revealing species diversity and community characteristics of benthic macroinvertebrates. A total of 13,454 individuals of macroinvertebrates were captured and classified into 3 phyla, 5 classes, 17 orders, 59 families, 192 species. Among Insecta, the most frequently recorded order was Odonata, 55 spp. (33.7%), followed by Coleoptera, 52 spp. (31.9%), Hemiptera, 34 spp. (20.8%), Diptera, 17 spp. (9.8%), Ephemeroptera, 3 spp. (2.4%), Trichoptera, 1 spp. (0.6%) and Lepidoptera, 1 spp. (0.6%). Taxon of non-Insecta consisted of Mollusca, 14 spp. (48.2%), Annelida, 11 spp. (37.9%) and Arthropoda, 4 spp. (3.4%). The analysis of Diversity Index (H'), Species Richness Index (RI), Dominance Index (DI) and Evenness Index (J') revealed the general stability of communities in the study sites. A total of 28 rare species were found in 98 study sites, including three endangered species designated by the Ministry of Environment. These results showed that the species diversity and rarity of macroinvertebrates in the study area were greater than those of previous research on lentic wetlands (lake, etc.) and national conserved wetlands (Upo-swamp, etc.) in Korea. A conservation planning of aquatic ecosystems in the western CCZ area, therefore, should focus on conservation of irrigation ponds." (Authors)] Address: Kim, S.H., DMZ Ecology Res. Inst., Paju 10881, Rep. Korea. E-mail: [ecodmz@dmz.or.kr](mailto:ecodmz@dmz.or.kr)

**18768.** Dias de Oliveira, F. (2020): Impact du castor sur les populations d'odonates en Ardenne belge. MSc. thesis, Faculté des sciences, Université catholique de Louvain: 103 pp. (in French, with English summary) ["The beaver is back in Belgium for a few years and today it is an integral part of the Belgian biodiversity. Many studies highlight the positive influence that the beaver can have on other groups of organisms, including dragonflies, by creating a dam that creates heterogeneity in the environment. Dragonflies are known to be insects that are highly dependent on aquatic environments. Consequently, a few studies have already linked the creation of a water retention by the dam to an increase in dragonfly populations. And that's what my work is based on. Throughout this work, I have tried to assess whether there is an apparent change in dragonfly populations since the appearance of the beaver in Wallonia. The first part of the work consisted of finding the year of construction of each dam in order to know the approximate time when a change in dragonflies could have been measured. In the second part I tried to evaluate a change in dragonfly richness and community by comparing dragonfly observations at two periods, namely before and after the appearance of the dam. This work has thus shown that the response of dragonflies is not obvious and that it depends strongly on the influence of the dam on the environment. In other words, not all dams seem

to impact dragonflies in the same way, which has an impact on the results of the analysis. In addition, the size of the impoundments created by the dams appears to be correlated with the size of the standing water present at the sites, which further complicates the assessment of dragonfly responses. Nevertheless, the positive effects of the beaver continue to make it a very useful organism in improving habitat for various organisms, and as a result, we must continue to pay attention to this rodent and its influence on the biodiversity. ... Conclusion: Unfortunately, this thesis could not show a clear-cut response of dragonfly populations to the appearance of dams in the Walloon territory. Nevertheless, I do not believe that this result is due to the fact that dams have no effect on dragonflies but rather to the limitations of the data and the methodology used. Nevertheless, it should be borne in mind that the presence of a beaver or even a dam at a site does not in all cases equate to an increase in the number of dragonfly species or the abundance of a specific species. The dam must clearly have special characteristics and above all have a fairly large effect on the environment (large water reservoir, abundant vegetation, abundant substrates, sunlight, etc.). In this case, not only dragonflies can benefit from the presence of this rodent but also many other species. Over the last 20 years, the beaver has managed to conquer a large part of Wallonia and has drastically changed the waterways. Whether we like it or not, the beaver has clearly become an integral part of Belgian biodiversity once again and I think we should accept this and try to make the most of the benefits to biodiversity. Indeed, it has been clearly proven that the beaver is very beneficial through its ability to create heterogeneity. However, in order to really benefit a large number of organisms, the various natural environments must always be present in the right quantity and distribution, which is unfortunately no longer the case in Wallonia. So I think that if we continue to create wetlands thanks to the various Life projects and if we let the beaver do what it does best, namely create wetlands, we may be able to see a reduction in the decline of dragonflies in certain regions of Belgium, and I hope so." (Author)] Address: not stated

**18769.** Dietrich, S.E. (2020): Habitat, diet, and foraging ecology of Willow Flycatcher in Sierra Nevada Meadows. M.Sc. thesis, Utah State University: XI + 60 pp. (in English) ["The last stronghold of the California Willow Flycatcher (*Empidonax traillii*) population, which exists in the Sierra Nevada, continues to decline, necessitating a clearer understanding of how meadows provide habitat for the species. To gain this understanding, we assessed vegetation type, saturation levels, and invertebrate species at 51 different sites within four meadows located in the Little Truckee River drainage. 17 of these sites were occupied by nesting Willow Flycatcher during the time of the study, 17 sites had been occupied by nesting Willow Flycatcher in annual surveys between 1997 and 2010 but are no longer used, and 17 sites had never been used by nesting Willow Flycatcher. We found that occupied sites were generally far wetter than unused sites. Total saturation varied from 88% to 100% and total inundation varied from 20% to 52%. Sedge vegetation coverage was also

much higher in occupied sites than unused sites and varied from 62% to 90%. Abandoned sites were found to not be suitable for breeding Willow Flycatcher because they were either too dry (low food abundance) or they were too wet (decreased shrub quality). Food items desired by Willow Flycatcher were found to be higher in abundance within wetter occupied sites compared to drier unused sites. In addition to evaluating vegetation coverage, saturation levels, and invertebrates, we examined Willow Flycatcher diet, foraging behavior, and food/habitat relationships by using video footage of nestlings being fed and field observations. Over 75% of the Willow Flycatcher diet was represented by Lepidoptera, Raphidioptera, Ephemeroptera, Odonata, and Hemiptera. Aquatic invertebrate food items composed 42% of the diet and aquatic habitat features such as stream channels and oxbow ponds were found to be important. Overall, gleaning and hawking foraging methods were used relatively equally, 49% and 51% of the time, respectively. Foraging often took place outside of territory boundaries and some food items, such as Raphidioptera, were caught outside of meadow boundaries. Diets and foraging behavior also varied throughout the day with some food items, such as Ephemeroptera and Lepidoptera, being targeted only during certain times of the day." (Author)] Address: not stated

**18770.** Dimitrov, D.; Bechev, D. (2020): Odonata (Zygoptera and Anisoptera) of the Samena Sredna Gora Mts. Zoo-Notes Supplement 9: 115-121. (in English) [Bulgaria "Checklist of the dragonflies (Order Odonata) of the Samena Sredna Gora and its adjacent areas contains 26 species from 7 families: Calopterygidae (2 sp.), Coenagrionidae (7 sp.), Lestidae (1 sp.), Platycnemididae (1 sp.), Aeshnidae (1 sp.), Gomphidae (4 sp.) and Libellulidae (10 sp.)." (Authors)] Address: Dimitrov, D., University of Plovdiv "Paisii Hilendarski", Department of Zoology, 24 Tzar Assen Str., BG-4000 Plovdiv, Bulgaria. E-mail: d.dymytrow@gmail.com

**18771.** Eagles-Smith, C.A.; Willacker, J.J.; Nelson, S.J.; Flanagan Pritz, C.M.; Krabbenhoft, D.P.; Chen, C.Y.; Ackerman, J.T. Campbell Grant, E.H.; Pilliod, D.S. (2020): A national-scale assessment of mercury bioaccumulation in United States National Parks using dragonfly larvae as biosentinels through a Citizen-Science Framework. *Environmental Science & Technology* 54(14): 8778-8790. (in English) ["We conducted a national-scale assessment of mercury (Hg) bioaccumulation in aquatic ecosystems, using dragonfly larvae as biosentinels, by developing a citizen-science network to facilitate biological sampling. Implementing a carefully designed sampling methodology for citizen scientists, we developed an effective framework for a landscape-level inquiry that might otherwise be resource limited. We assessed the variation in dragonfly Hg concentrations across >450 sites spanning 100 United States National Park Service units and examined intrinsic and extrinsic factors associated with the variation in Hg concentrations. Mercury concentrations ranged between 10.4 and 1411 ng/g dry weight across sites and varied among habitat types. Dragonfly total Hg (THg) concentrations were up to 1.8-fold higher in lotic

habitats than in lentic habitats and 37% higher in waterbodies with abundant wetlands along their margins than those without wetlands. Mercury concentrations in dragonflies differed among families but were correlated ( $r^2 > 0.80$ ) with each other, enabling adjustment to a consistent family to facilitate spatial comparisons among sampling units. Dragonfly THg concentrations were positively correlated with THg concentrations in both fish and amphibians from the same locations, indicating that dragonfly larvae are effective indicators of Hg bioavailability in aquatic food webs. We used these relationships to develop an integrated impairment index of Hg risk to aquatic ecosystems and found that 12% of site-years exceeded high or severe benchmarks of fish, wildlife, or human health risk. Collectively, this continental-scale study demonstrates the utility of dragonfly larvae for estimating the potential mercury risk to fish and wildlife in aquatic ecosystems and provides a framework for engaging citizen science as a component of landscape Hg monitoring programs." (Authors)] Address: Eagles-Smith, C.A., United States Geological Survey, Forest and Rangeland Ecosystem Science Center, Corvallis, Oregon 97330, United States. E-mail: ceagles-smith@usgs.gov

**18772.** Ekvall, M.T.; Sha, Y.; Palmér, T.; Bianco, G.; Bäckman, J.; Åström, K.; Hansson, L.-A. (2020): Behavioural responses to co-occurring threats of predation and ultraviolet radiation in *Daphnia*. *Freshwater Biology* 65(9): 1509-1517. (in English) ["(1) Organisms in the wild are faced with multiple threats and a common response is a change in behaviour. To disentangle responses to several threats, we exposed two differently sized species of the freshwater invertebrate *Daphnia* to solar ultraviolet radiation (UVR) and predation from either moving pelagic or benthic ambush predators. (2) Using an advanced nanotechnology-based method, we tracked the three-dimensional movements of those mm-sized animals at the individual level. Each behavioural trial was performed both under conditions resembling night (no UVR) and day (UVR) and we examined patterns of the depth distribution and swimming speed by *Daphnia* across three treatments: no predator (control); bottom-dwelling damselfly (*Calopteryx* sp.); and fish (stickleback, *Pungitius pungitius*) predators. We also quantified the actual predation rate by the two predators on the two *Daphnia* species, *D. magna* and *D. pulex*. (3) We show that individual *Daphnia* are able to identify predators with different feeding habitats, rank multiple and simultaneously occurring risks and respond in accordance with the actual threat; complex responses that are generally associated with larger animals. (4) In a broader context, our results highlight and quantify how a cocktail of everyday threats is perceived and handled by invertebrates, which advances our understanding of species distribution in space and time, and thereby of population dynamics and ecosystem function in natural ecosystems." (Authors)] Address: Hansson, L.-A., Aquatic Ecology, Dept of Biology, Ecology Building, Lund University SE-223 62 Lund, Sweden. Email: lars-anders.hansson@biol.lu.se

**18773.** Emiliyamma, K.G.; Palot, M.J.; Charesh, C. (2020): A new species of *Platylestes* Selys (Odonata: Zygoptera):



Lestidae) from the coastal area of Kannur District, Kerala, India. *Journal of Threatened Taxa* 12(13): 16854-16860. (in English) ["The genus *Platylestes* Selys, 1862 is known from India, by only one species, *P. platystylus* from eastern India, West Bengal, and recently from Kerala. Here, we describe a new species *Platylestes kirani* from the coastal tracts of the northern part of Kerala, southern India. The new species differs from all other known species of the genus by its unique coloration, distinct marking on synthorax, and the shape of anal appendages." (Authors)] Address: Emiliyamma, K.G., Zoological Survey of India, M- Block, New Alipore, Kolkata, West Bengal 700053, India. E-mail: kgemily@gmail.com

**18774.** Epp, L.J. (2020): Assessing the effect of *Bacillus thuringiensis* var. *israelensis* on nontarget Chironomidae emergence. MSc. thesis, Department of Biology, Faculty of Science, University of Ottawa: xvi + 220pp. (in English) ["*Bacillus*-derived larvicides, which selectively target mosquito (Diptera: Nematocera: Culicidae) populations to reduce nuisance and health risks, were applied in the South March Highlands Conservation Forest near residential neighbourhoods in Ottawa, Ontario. The objective was to assess effects of application on the nontarget mosquito relative, Chironomidae (Diptera: Nematocera: Chironomidae), and other nontarget aquatic taxa captured using emergence traps. A secondary objective was to assess physicochemical variables that influence Chironomidae emergence. Study ponds received an application of *Bacillus thuringiensis* var. *israelensis*, a subset also received an application of *Bacillus sphaericus*, and a group of control ponds were left untreated over 3 years (2016-2018). Weekly sampling included trap collections and measurements of water temperature, pH, water depth, conductivity, dissolved oxygen, ammonia, nitrate, and sulphate. Drought in 2016, high precipitation throughout 2017, and seasonal precipitation in 2018 influenced variable physicochemical conditions. Principal component analyses identified differences between sampling groups and between years. Redundancy analyses correlated insect emergence with pond pH, average water depth and water temperature and indicated a strong relationship between Chironomidae emergence and average water depth. Although significantly less Chironomidae annual emergence was observed at treated sites in 2017 and 2018, zero-inflated negative binomial generalized linear mixed modelling failed to detect a significant Bti treatment effect when controlling for within group variation. Rather, variations in pH, mean water depth and water temperature were identified as drivers of Chironomidae emergence. Culicidae emergence was reduced to zero briefly following treatment in 2017 and 2018. The model detected a marginal negative treatment effect on Culicidae in 2017 only, and a positive treatment effect in 2018 at the onset of a secondary hydroperiod, in the absence of treatment. Variations in pH and water temperature were also identified to be drivers of Culicidae emergence. Modelling failed to detect treatment effects on any of the nontarget taxa abundance, including Diptera, Lepidoptera, Ephemeroptera, Odonata, Coleoptera, Hymen-

optera, and Arachnida. An inverse relationship between insectivore and prey taxa abundance was observed. In 2018, taxa richness increased between years and trended higher at treated sites and a positive relationship between insectivore and prey taxa richness was observed. In 2017, Shannon-Weiner index and Simpson's index of diversity were higher at untreated sites, and in 2018 diversity indices were higher at treated sites, with taxa richness increasing between years and higher evenness trending at treated sites. Our data suggest that treatment effects were potentially shrouded by natural variability of physicochemical variables, especially due to the varying hydroperiod observed over the three years of sampling. Additional work is needed to capture average conditions and separate confounding variables from treatment effects. This study provides an inventory of the current wetland insect community in the South March Highlands Conservation Forest landscape that offers a reference for ongoing mosquito management." (Author)] Address: not stated

**18775.** Geary, M.; von Hardenberg, A. (2020): White-faced Darter distribution is associated with coniferous forests in Great Britain. *Insect Conservation and Diversity* 14(1): 15-25. (in English) ["Understanding of dragonfly distributions is often geographically comprehensive but less so in ecological terms. 2) White-faced darter (*Leucorrhinia dubia*) is a lowland peatbog specialist dragonfly which has experienced population declines in Great Britain. *L. dubia* are thought to rely on peat-rich pool complexes within woodland but this has not yet been empirically tested. 3) We used dragonfly recording data collected by volunteers of the British Dragonfly Society from 2005 to 2018 to model habitat preference for *L. dubia* using species distribution models across Great Britain and, with a more detailed landcover dataset, specifically in the North of Scotland. 4) Across the whole of Great Britain our models used the proportion of coniferous forest within 1km as the most important predictor of habitat suitability but were not able to predict all current populations in England. 5) In the North of Scotland our models were more successful and suggest that habitats characterised by native coniferous forest and areas high potential evapotranspiration represent the most suitable habitat for *L. dubia*. 6) We recommend that future *L. dubia* monitoring should be expanded to include areas currently poorly surveyed but with high suitability in the North of Scotland. 7) Our results also suggest that *L. dubia* management should concentrate on maintaining Sphagnum rich pool complexes and the maintenance and restoration of native forests in which these pool complexes occur." (Authors)] Address: Geary, M., Conservation Biology Research Group, Dept of Biological Sciences, Univ. of Chester, Chester, CH1 4BJ, UK. E-mail: m.geary@chester.ac.uk

**18776.** Gomes Viana, C.; Reis Campos, I.; Santana Lustosa, G.; Silas Veras, D. (2020): Environmental gradients as filters on the composition of aquatic insect of the Cerrado Caatinga, Brazil. *Acta Brasiliensis* 4(3): 142-148. (in English, with Portuguese summary) ["The patterns of aquatic in-

sect diversity are influenced by landscape structure and environmental gradients that can be altered significantly through changes in land use. The aim of the present study was to verify if the patterns of diversity of the orders Odonata and Trichoptera vary significantly between preserved and altered sites, along a gradient of environmental impact. Data were collected on the structural and environmental characteristics of the stream, and the assemblages of aquatic insects at seven sampling points in a Cerrado-Caatinga ecotone of northeastern Brazil, in the dry seasons of 2018 and 2019. The results indicated that altered streams had higher electrical conductivity and lowest HII (habitat integrity index) values in comparison with the preserved ones, being determinant in the distribution of genera, and low pH values increased genera richness, informations that can guide management strategies for biodiversity conservation. Which supports the conclusion that the diversity of aquatic insects is determined by the influence of environmental filters in the streams." (Authors)] Address: Gomes Viana, Carolina, Instituto Federal de Educagao, Ciencia e Tecnologia do Maranhao, Caxias, 65609-899, Maranhao, Brasil. E-mail: carolina.viana@acad.ifma.edu.br

**18777.** Hoffmann U (2020): Ein Leben im Verborgenen – Nachweise der Gestreiften Quelljungfer (*Cordulegaster bidentata*) im Kreis Lippe, NRW. Berichte des Naturwissenschaftlichen Verein für Bielefeld und Umgegend 57: 58-80. (in German) ["With the present work, an essential gap in the state of knowledge on the distribution and population situation of *C. bidentata* at the northern border of its European range could be closed by means of a targeted search from 2017 to 2019. The study shows that the northern Hessian and southern Lower Saxon occurrences find their northern continuation in the district of Lippe and represent a common settlement area. A colonisation via the Weser region can be assumed as very probable for the eastern Lippe source areas, whereas the western occurrences along the Osning chain could be associated with a colonisation from the Rhine catchment area. The well-founded assumption that two different populations meet in the Lippe district would have to be substantiated by genetic tests. Only 20 % of the 201 mapped, potentially suitable spring sites and spring streams were found. Despite the 62 individual sightings, the occurrences in the district must be considered rather poor in individuals. *C. bidentata* remains a rare species whose conservation status of RL 2 (critically endangered) is still justified, especially in view of the high responsibility we bear in Europe for this endemic species. According to various forecasts and observations, the influence that climate change will have on the habitat of springs and spring creeks must be assessed as quite serious (LANUV 2010, 2016). This concerns on the one hand the increase in average temperatures and on the other hand the changing precipitation amounts and their seasonal distribution. In addition, the forced forest conversion will change many of the spring habitats and thus their suitability for colonisation by *C. bidentata* in the future." (Authors; DeepL)] Address: Hoffmann, Ulrike, Prof.-Schacht-Str. 2, 32657 Lemgo, Germany. E-Mail: mahpa@web.de

**18778.** Holzinger, W.E.; Kerschbaumsteiner, H.; Brunner, H.; Komposch, B. (2020): Neue Nachweise des Zweifelflecks (*Epithea bimaculata* Charpentier, 1825) aus der Steiermark (Insecta: Odonata). *Joansea Zoologie* 18: 215-222. (in German, with English summary) ["New records of the Eurasian Dragonfly *E. bimaculata* from Styria. – Records of *E. bimaculata* from two sites in southern Styria, a protected ditch and swamp near Zwaring and a pond called „Neuteich“ near Wundschuh, protected as Natura-2000-site, represent first findings of this species in Styria after almost 50 years. A mass emergence of about 4,000 dragonflies was documented by extrapolation of exuviae numbers at the Neuteich end of April/beginning of May 2019. The ditch near Zwaring hosts at least 12 Odonata species, the Neuteich (including an adjacent creek called Poniglbach) at least 22, among them *Somatochlora meridionalis* and *S. metallica*." (Authors)] Address: Holzinger, W., Ökoteam, Bergmannsgasse 22, 8010 Graz, Austria. E-Mail: holzinger@oekoteam.at,

**18779.** Huber, E.; Sandra Aurenhammer, S.; Bauer, H.; Becker, J.; Borovsky, R.; Brugggraber, N.; Degasper, G.; Elsasser, H.; Frieß, T.; Fröhlich, D.; Gladitsch, J.; Gorfer, B.; Gunczy, J.; Gunczy, L.W.; Heimbürg, H.; Holzer, E.; Kirchmair, G.; Komposch, C.; Körner, A.; Kunz, G.; Lorber, L.; Moser, A.; Paill, W.; Schattaneck, P.; Volkmer, J.; Wagner, H.C.; Wiesmair, B.; Wolf, A.; Zangl, L.; Zechmeister, T.; Zweidick, O. (2020): Bericht über das sechste ÖEG-Insektencamp: Wirbellose Artenvielfalt rund um Güssing (Südburgenland). *Entomologica Austriaca* 27: 137-210. (in German, with English summary) ["Abstract: Report on the sixth "insect camp" of the Austrian Entomological Society: invertebrate diversity all around Güssing (Southern Burgenland, Austria): The sixth insect camp of the Austrian Entomological Society took place in the vicinity of Güssing ... from May 16th to May 19th, 2019. In total, 24 participants from Tyrol, Vienna, and Styria attended the field course and were accompanied and supported by 23 specialists for various taxonomic groups during the camp and/or at the postprocessing. During those four days, the participants studied and applied different trapping and preparation approaches, trained determination, gathered knowledge on various groups of arthropods and gastropods and were able to network with taxonomists. Five localities were investigated and in total 788 species were detected: 11 Odonata, ..." (Authors)] Address: Huber, Elisabeth, ÖKOTEAM, Bergmannsgasse 22, 8010 Graz, Austria. E-Mail: jugend@entomologie.org

**18780.** Ilahi, I.; Yousafzai, A.M.; Ul Haq, T.; Rahim, A.; Attaullah, M.; Naz, D. (2020): Toxicity to lead, cadmium and copper in nymphs of three odonate species. *Bioscience Research* 17(4): 2448-2464. (in English) ["The present research aimed to investigate the effect of seven days exposure to lead (Pb), cadmium (Cd) and copper (Cu) on survival and feeding rate of nymphs of three odonate species i.e., *Ischnura elegans*, *Trithemis aurora* and *Pantala flavescens*. During this study, the nymphs of all the three odonate species survived when exposed separately to 40 ppm each of Pb and Cd, and 10 ppm of Cu. Cu appeared most toxic. The

LC50 values of Cu against *I. elegans*, *T. aurora* and *P. flavescens* was 148.2, 101.8 and 173.6 ppm, respectively. The feeding rate of *I. elegans* and *T. aurora* nymphs when separately exposed to sublethal concentration of Pb and Cd (40 ppm each) was not different significantly ( $P>0.05$ ) from control nymphs. However, the feeding rate of *I. elegans* and *T. aurora* nymphs exposed to the sublethal concentration of Cu (10 ppm) was significantly lower ( $P<0.05$ ) from the control nymphs. The feeding rate of *P. flavescens* nymphs when exposure to the sublethal concentration of any of the three metals was significant lower ( $P<0.05$ ) than control nymphs. It is concluded that among Pb, Cd and Cu, the Cu is most toxic to *I. elegans*, *T. aurora* and *P. flavescens* nymphs. It is further concluded that among Pb, Cd and Cu, the sublethal concentration of Cu significantly reduces the feeding rate of *I. elegans*, *T. aurora* and *P. flavescens* nymphs." (Authors)] Address: Ilahi, I., Dept of Zoology, Univ. of Malakand, Chakdara, Dir Lower, Khyber Pakhtunkhwa, Pakistan. E-mail: ikramilahi@uom.edu.pk

**18781.** Jain, A.; Rasmussen, A.K.; Milla, K.A.; Richard, B.A.; Pescador, M.L. (2020): Water chemistry and aquatic insect assemblages of ephemeral ponds in the Munson Sand Hills region of the Apalachicola National Forest, Florida. *Southeastern Naturalist* 19(2): 205-232. (in English) ["Ephemeral ponds in the Munson Sand Hills region (MSH) of Apalachicola National Forest (ANF) are an essential resource in the life cycles of a variety of amphibian species, a number of which are threatened or endangered. Various types of human activities have disturbed some of these ponds threatening their survival. Although extensive research has been done on the biology of amphibians in the ponds, little is known of the invertebrates and to what extent the water quality may be affected by human impacts. We monitored 4 ponds, representing a spectrum of sizes, natural settings, and anthropogenic disturbance, in terms of water chemistry and aquatic insect assemblages seasonally for 2 years. Pond waters were characterized by acidic pH, low ionic strength, low buffering capacity, low nutrient concentrations, and phosphorus-limiting conditions. The water quality of studied ponds was similar to those reported for natural wetlands in west-central Florida. The chemistry, as compared to a nearby sinkhole, indicated that these ponds were mainly recharged with rain and had no connectivity to groundwater. Aquatic beetles (Coleoptera), Odonata, and aquatic bugs (Heteroptera) were the most diverse groups of aquatic insects recorded. Species collected included many common, predatory species adapted to exploit resources in fishless, temporary ponds. Water chemistry and aquatic insect composition showed minor spatial-temporal variations among ponds. The results of this study indicate that human disturbances have not had a significant effect on pond water quality, posing no threat to amphibian and other wildlife species, and the sampled ponds had abundant and diverse aquatic insect fauna. The aquatic insect assemblages documented in this study provide evidence that pond type and the top-down effects of aquatic insects as predators are important determinants of community structure, which is a common theme observed in temporary ponds found in other regions

within temperate biomes." (Authors)] Address: Jain, Amita, Center for Water Resources, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307, USA. E-mail: amita.jain@famou.edu

**18782.** Janra, M.N.; Herwina, H.; Gusman, D. (2020): Rumble in the stream: mating site preference in endemic *Euphaea aspasia* (Zygoptera: Euphaeidae). *Agrion* 24(3): 179-183. (in English) [Biological Research and Educational Forest, Andalas University, West Sumatra, Indonesia; "Euphaea aspasia, as with most of other members of the Oriental genus *Euphaea*, has poorly known reproductive biology. Here we report on the possible mating site for this species through observations of protracted agitation between two males over a prospective area, in addition to the subsequent guarding act from a male over the same area. The physical and environmental aspects of the prospective mating site are described." (Authors)] Address: Janra, M.N., The Biology Department, Andalas University, Jalan Kampus Unand Limau Manis Pauh, Padang, West Sumatra 25163, Indonesia. E-mail: mnjanra@sci.unand.ac.id

**18783.** Kawashima, I. (2020): The order Odonata illustrated in Heikuro (Takanori, Jyakuso-an) Yoshida's "Yoshida-O-Chifu (Part 1)" deposited in the Nagoya City Museum. *Tombo* 62: 77-90. (in English, with Japanese summary) ["The author investigated the Odonata illustrated in a manuscript by Goro Oshio (1830-1894) of Heikuro (Takanori, Jyakuso-an) Yoshida (1805—1869)'s "Yoshida-O-Chifu (Part 1)" housed in the Nagoya City Museum. Out of 65 figures, 27 species in 40 figures were identified as follows: Lestidae: *Lestes sponsa*; Calopterygidae: *Calopteryx Comelia*, *Atrocalopteryx atrata*; Coenagrionidae: *Ceragrion melanurum*, *C. nipponicum*; Aeshnidae: *Boyeria maclachlani*, *Aeschnophlebia longistigma*, *A. anisoptera*, *Gynacantha japonica*, *Polycanthygyna melanictera*, *Anax parthenope*, *A. nigrofasciatus*; Gomphidae: *Sinictinogomphus clavatus*; Corduliidae: *Epithea marginata*; Macromiidae: *Epophthalmia elegans*; Libellulidae: *Rhyothemis fuliginosa*, *Sympetrum darwinianum*, *S. maculatum*, *S. risi*, *S. croceolum*, *Pseudothemis zonata*, *Deielia phaon*, *Nannophya pygmaea*, *Crocothemis servilia*, *Pantala flavescens*, *Lyriothemis pachygastra* and *Orthetrum albistylum*. Of the remaining 25 figures the author could not be certain of the species identification as follows: Lestidae: *Sympetma paedisca* ?; *Lestes* spp. (*sponsa*, *temporalis* or *japonica*); Calopterygidae: *Mnais* spp. (*costalis* or *pruinosa* ?); Platycnemididae: *Pseudocopteryx annulata* ?; Coenagrionidae: gen. et sp. (*Ischnura asiatica* ?); Aeshnidae: *Gynacantha* sp. (*japonica* ?) or *Anax* sp. (*nigrofasciatus* ?); Gomphidae: *Asiagomphus* sp. (*melaenops* or *pryeri* ?); *Davidius fujijama* ?; *Trigomphus* sp. (*ogumai* ?); *Shoagomphus postocularis* ?; Macromiidae: *E. elegans* or *Macromia* spp. (*amphigena* or *daimoji* ?); Libellulidae: *Sympetrum* spp. (*parvulum*, *eroticum* or *kunckeli* ?); *Sympetrum* sp. (*risi*, *baccha*, or *eroticum* ?); *Sympetrum* sp. (*risi* ?); *Sympetrum* sp. (*frequens* ?). Many figures are of a quality that makes identification to generic or specific levels possible to be precise. On the other hand, the arrangement was not intended to be carried out from a phylogenetic viewpoint

which was how Western natural history was done at that time." (Author)] Address: Kawashima, I., Nagasawa 1-50-9, Yokosuka-shi, Kanagawa, 239-0842 Japan. Email: itsurok29-@jcom.home.ne.jp

**18784.** Kita, A.; Nakahara, M.; Tokuda, M. (2020): Changes in Odonata abundance between 2000 and 2015–2016 in Saga Plain, northern Kyushu, Japan. *Journal of Insect Conservation* 24: 575-583. (in English) ["The impacts of systemic pesticides on biodiversity are a major ecological concern. Rapid population declines of *Sympetrum* species (Odonata: Libellulidae) have been reported in various localities in Japan beginning in the 2000s. Several studies suggested that nursery box use of fipronil in paddy fields to prevent insect feeding on rice seedlings negatively impacts *Sympetrum* larvae. Although several other Odonata species are suspected to have declined significantly in recent decades, accurate evaluations of their population declines and identification of the causes are difficult due to limited data on population density prior to the declines. In addition, a recent study revealed that herbicide use negatively affects phytophilous species, but positively impacts benthic populations of lentic Odonata by reducing the prevalence of macrophytes. To evaluate the changes in the abundance of Odonata during recent decades, we conducted line transect observation of Odonata populations at one site along the Tafusegawa River in Saga Plain, northern Kyushu, Japan in 2000 and 2015–2016, before and after the use of fipronil in paddy fields in this area. We identified that *Sympetrum eroticum eroticum* (Selys) populations have significantly decreased in recent years. In addition, prevalence of a lotic benthic species, *Asiagomphus pryeri* (Selys), has significantly decreased in this time period. Other lotic benthic species have also declined in this area, suggesting that benthic environments might have degraded in recent years. In contrast to the decrease of the abovementioned species, prevalence of the lentic and benthic species *Orthetrum melania melania* (Selys) and *Rhyothemis fuliginosa* Selys significantly increased. The densities of lentic phytophilous species appear to have decreased, suggesting that reduction of macrophytes in surrounding lentic environments could be involved in these changes." (Authors)] Address: Tokuda, M., Lab. Systems Ecology, Fac. Agriculture, Saga Univ., Honjo 1, Saga 840.8502, Japan. E-mail: tokudam@cc.saga.u.ac.jp

**18785.** Kosterin, O.E. (2020): Odonata of the great Lake Tonle Sap of Cambodia, as examined in 2017/2019. *International Dragonfly Fund - Report 129*: 29-98. (in English) ["Lake Tonle Sap in NW Cambodia is the largest freshwater lake in Southeast Asia and one of the most productive freshwater ecosystems in the world, so its banks are a home for ca 1,5 million people. It serves as a natural reservoir of the excess water of the Mekong River and cyclically changes its area from 2,500 km<sup>2</sup> in May to 16,000 km<sup>2</sup> in October. Its banks are naturally occupied by temporarily inundated forest and scrub, at present mostly replaced by rice fields. The present day semiaquatic vegetation of the lake is to a large extent formed by invasive plant species. The hitherto existing data on Odonata of the lake are very scarce. The

author briefly examined the bank and floodplain at the NW part of the lake in February/March 2017, June and November 2018 and December 2019. Five main localities studied are described and illustrated in detail. In total 41 odonate species of four families (22 in Libellulidae) were found. Most of them are common and widespread lentic species but *Macrogomphus phalantus* is a species hitherto known only by few specimens from swamped forests of Borneo and Sumatra; its Tonle Sap population was earlier described by the author as the subspecies *M. phalantus jayavarman* Kosterin, 2019. The earlier published report by Seehausen et al. (2016) of *Sinictinogomphus clavatus* (not found by the author) was a considerable extension of the known species' range to the south. Six species were found in all main examined localities and ten only in one of them. At any season at the lake immediate bank (that is water front at the lowest level), *Brachythemis contaminata* predominates overwhelmingly, *Orthetrum sabina* and *Crocothemis servilia* are numerous, two damselfly species, *Pseudagrion microcephalum* and *P. rubriceps*, invariably occur at floating vegetation (mostly water hyacinth), and *Trithemis pallidinervis*, *Urothemis signata*, *Rhyothemis phyllis*, *R. variegata* and *Tholymis tillarga* are common at bushes. *Agriocnemis nana*, *Ceragrion praetermissum*, *Ischnura senegalensis*, *Macrogomphus phalantus*, and *Aethriamanta aethra* were occasionally met at the lake bank. Other 26 species were found, with different occurrence and quantity, on the lake floodplain. Variation of the male occiput coloration of *Amphiallagma parvum* is commented." (Author)] Address: Oleg E. Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia; Novosibirsk State University, Pirogova str. 2, Novosibirsk, 630090, Russia. Email: kosterin@bionet.nsc.ru

**18786.** Kosterin, O.E.; Smith, E. (2020): Odonata of Phnom Kulen Mts, Cambodia: a preliminary checklist. *International Dragonfly Fund - Report 129*: 99-183. (in English) ["Phnom Kulen is a small and low plateau in the northern Cambodia still partly covered with evergreen forests and isolated from similar habitats by the Cambodian Lowland at least for 60 km. A preliminary checklist of its Odonata is provided, including 97 species. *Burmagomphus* sp. cf. *willamsoni* and *Macromia callisto* are for the first time reported for Cambodia." (Authors)] Address: Oleg E. Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia; Novosibirsk State University, Pirogova str. 2, Novosibirsk, 630090, Russia. Email: kosterin@bionet.nsc.ru

**18787.** Kosterin, O.E. (2020): Miscellaneous faunal data on Odonata of Cambodia. *International Dragonfly Fund - Report 154*: 185-223. (in English) ["Miscellaneous faunal data on Odonata are presented from four parts of Cambodia: the Cambodian Plain around Siem Reap (2017/2019), a Phnom Tbeng foothill in Preah Vihear Province (19.06.2018), Monduliri Province (June 2018) and the O'Som village environs in Pursat Province (March 2019). *Macromia flavocolorata* is for the first time reported for Cambodia. Some remarks and interesting observations are provided." (Authors)] Address:



Oleg E. Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia; Novosibirsk State University, Pirogova str. 2, Novosibirsk, 630090, Russia. Email: kosterin@bionet.nsc.ru

**18788.** Kosterin, O.E. (2020): First data on Odonata of Prey Long Forest in Cambodian Lowland. International Dragonfly Fund - Report 129: 1-28. (in English) ["Prey Long (Prey Lang) Forest is the largest remaining lowland rainforest in Indochina, shared by Stung Treng, Preah Vihear, Kampong Thom and Kratie Provinces of Cambodia, which has been persisted until present because of the lack of roads. It includes patches of unique evergreen swamp forests. Odonata of Prey Long forest, including Cheum Takong forest swamp, was briefly examined in December 2019, while the already deforested area was examined in June 2018. The former examination resulted in 40 species, the latter in 34 species, 60 species in total. Two species, *Copera chantaburii* Asahina, 1984 and *Burmagomphus williamsoni* Förster, 1914, are for the first time reported for Cambodia from the deforested area (Chey Saen District of Preah Vihear Province). The swamped forest of Cheum Takong provided 17 species, 5 of which were not found elsewhere in the considered area, 3 are rare and 4 generally Sondaic. Prey Long Forest should be reexamined in the rainy season soon after the road to Spong village is constructed." (Author) ] Address: Kosterin, O.E., Institute of Cytology & Genetics, Siberian Branch, Russian Acad. Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**18789.** Kosuke, N.; Dai, K.; Hiroyuki, Y.; Taku, K.; Takehiko, I.H. (2020): Investigating effect of climate warming on the population declines of *Sympetrum frequens* during the 1990s in three regions in Japan. Scientific Reports 10(1): 9 pp. (in English) ["Climate warming is of concern as a key factor in the worldwide decline in insect populations. In Japan, numbers of a common dragonfly in rice paddy fields, *S. frequens*, decreased sharply in the 1990s. Because *S. frequens* migrates to cooler mountains in summer, climate warming has been suggested as one of the main causes of the population decline in addition to agronomic factors. Here, we analysed the relation between summer temperatures and population densities of *S. frequens* and the related *S. infuscatum*, which does not migrate to mountains in summer, using published population monitoring data and temperature data from three regions (Toyama, Ishikawa, and Shizuoka) in Japan. Decadal differences in summer temperatures lay within the range of fluctuations among years, suggesting that an increase in summer temperatures cannot explain the past sharp population declines. However, regression analyses using monitoring data from Toyama showed that the population dynamics of both species in autumn are negatively correlated with summer temperatures in the same year. These results suggest that high temperatures in summer directly affect adult mortality to an extent that results in a decrease in population growth." (Authors)] Address: Kosuke, N., National Institute for Environmental Studies, Onogawa 16.2, Tsukuba, Ibaraki 305.8506, Japan. E-mail: nakanishi.kosuke@nies.go.jp

**18790.** Krause, M.A.; Koster, T.; MacNeill, B.N.; Zydek, D.J.; Ogburn, N.T.; Sharpin, J.; Shell, R.; Lajeunesse, M.J. (2020): Diversity and abundance of dragonflies and damselflies in Tampa Bay, Florida. Florida Entomologist, 103(3): 392-396. (in English) ["Little is known about the community of Odonata in Tampa Bay, Florida, USA. To address this gap, we conducted 2 longitudinal surveys of adult odonates in a natural floodplain of the Hillsborough River in 2013 and 2017. Along with abundance and species diversity, we also measured intraspecific variation in body size, sexual dimorphism, wing-cell asymmetry, and water mite ectoparasitism. Our first weekly survey from Oct 2013 to Oct 2014 sampled 327 adults (230 female, 97 male) from 8 dragonfly species, with *Erythemis simplicicollis* Say representing 79% of captures, followed by the second most abundant (14%), the Florida non-native and neotropical *Miathyria marcella* Selys. Our second weekly survey from Sept to Dec 2017, which focused on both damselflies and dragonflies and captured 205 adults from 8 species, with *Ischnura posita* Hagen being the most abundant with 70% of captures. Female-biased sexual size dimorphism was found in both *E. simplicicollis* and *I. posita*; however, both sexes were equally variable in size and symmetric in a meristic trait. Female and male *M. marcella* were equally variable, monomorphic, and symmetric. Combining symmetry data from each sex, only *I. posita* damselflies were asymmetric overall. Finally, we did not observe any parasitism by larval water mites in either survey. We aim to continue surveys to track seasonal and climate-driven changes in dragonfly diversity and phenology in this region." (Authors)] Address: Krause, Meredith, University of South Florida, Department of Integrative biology, Tampa, Florida 33620, USA; E-mail: meredithk@mail.usf.edu

**18791.** La Porta, G.; Goretti, E. (2020): Movement and demography of Southern damselfly (*Coenagrion mercuriale*, Odonata) in a Mediterranean lotic ecosystem. Ethology Ecology & Evolution 32(2): 107-121. (in English) [*Coenagrion castellani*; "Home range, routine movement, and dispersal are key factors affecting the population distribution, thus playing a crucial role in spatial dynamics and gene flow. In this regard, detailed investigations on insects require the capture of the specimens and subsequent manipulation. The movement and the abundance of a population of the damselfly *Coenagrion mercuriale* were monitored using the mark-recapture method at a breeding site located in a Mediterranean watercourse in Central Italy. The study area was a transect of 250 m along a ditch, subdivided into five stretches varying from 40 to 70 m each. A total of 849 adults was captured and 210 specimens of them were recaptured on a 17-day survey (from mid-June to early July 2018), corresponding to an estimation of population size of 5,600 specimens. Recapture and survival probabilities revealed no significant effect ensuing from handling and marking with different colours. Specimens of different stretches showed different sedentary rate. The recaptured individuals had a low vagility, with a high proportion of individuals which are incline to philopatry." (Authors)] Address: La Porta, G., Dipto di Chimica, Biologia e Biotecnologie, Università degli Studi di Perugia, Via dell'Elce di Sotto 8, 06123 Perugia, Italy. E-mail:

**18792.** Lewis, J.H. (2020): Black Beach—not for the birds: The significance of Black Beach, New Brunswick, Canada, as a feeding and stopover site for migratory dragonflies. *Northeastern Naturalist* 27(3): N48-N52. (in English) ["Feeding swarms of dragonflies generally form during prey-accumulation events and can be very large (1000+ individuals), dense, composed of multiple species and both sexes, and persist for hours. In the first published account of such a site from Atlantic Canada, I report the regular, yearly occurrence of large, diverse dragonfly feeding swarms at Black Beach, NB, Canada, in September 2014, 2015, and 2019, and also present the species, sex, and relative ages of specimens collected in swarm surveys. I discuss the significance of Black Beach not only as a feeding site during prey-accumulation events, but also secondarily as a stopover site for migratory species." (Author) *Aeshna canadensis*, *A. clepsydra*, *A. constricta*, *A. interrupta*, *A. sitchensis*, *A. subarctica*, *A. tuberculifera*, *A. umbrosa*, *A. verticalis*, *Anax junius*, *Libellula pulchella*, *Pantala flavescens*, *Somatochlora incurvata*, *S. tenebrosa*, *S. walshii*] Address: Lewis, J.H., Canadian Museum of Nature, 1740 Pink Road, Gatineau, QC J9J 3N7, Canada, and New Brunswick Museum, 277 Douglas Avenue, Saint John, NB E2K 1E5, Canada. E-mail: jlewis3@unb.ca

**18793.** McLachlan, J.R.; Greig, H.S. (2020): The ecology and distribution of *Stylurus spiniceps* (Walsh, 1862) (Odonata: Gomphidae). *Northeastern Naturalist* 27(3): 434-445. (in English) ["Herein we synthesize the current understanding of the ecology and distribution of a rarely encountered but broadly distributed dragonfly, *S. spiniceps* (Arrow Clubtail), and provide new larval records for Maine. Using published and unpublished sources, we construct an account of the distribution, life history, reproductive ecology, and trophic ecology of the Arrow Clubtail, as well as review conservation concerns for the species. We provide new records for the Arrow Clubtail from an atypical habitat—tidal freshwater wetlands—and discuss the importance of these areas for the species. We highlight gaps in our basic natural history knowledge and provide suggestions for future enquiry that could inform conservation measures for this enigmatic dragonfly." (Authors)] Address: McLachlan, J.R., School Biol. & Ecol., Univ. Maine, ME, 04469, USA. E-mail: jack.mclachlan@maine.edu.

**18794.** Márquez-Rodríguez, J. (2020): Successful reproduction of dragonflies in an artistic water fountain in Versailles, France. *Revista Chilena de Entomología* 46(2): 329-332. (in English, with Spanish summary) ["Exuvian records of *Aeshna cyanea* and *Sympetrum striolatum* are presented in an urban setting of a megacity, Paris. This is the first record of successful breeding in standing water from a small, untreated fountain in the gardens of the Palace of Versailles (France)." (Author)] Address: Márquez-Rodríguez, J., Zoology. Dept of Physical, Chemical and Natural Systems, Faculty of Experimental Sciences, University of Pablo de Olavide, A-376, Km 1, 41013 Seville, Spain. E-mail: jmarrod1@upo.es

**18795.** Martynov, A.V. (2020): Some rare damselflies and

dragonflies (Odonata: Zygoptera and Anisoptera) in Ukraine: new records, notes on distribution, and habitat preferences. *Journal of Threatened Taxa* 12(10): 16279-16294. (in English) ["*Coenagrion scitulum*, *Ophiogomphus cecilia*, *Lindenia tetraphylla*, *Cordulegaster boltonii*, *Somatochlora arctica*, *Leucorrhinia albifrons*, *L. caudalis*, and *Selysiothemis nigra*] within Ukraine are given. Habitats and distribution of species within the country are briefly discussed. Breeding sites of *C. boltonii* within Ukraine is found for the first time and confirmed with larval material. *S. arctica* is recommended for inclusion in the next edition of the Red Data Book of Ukraine." (Author)] Address: Martynov, A.V., National Museum of Natural History, National Academy of Sciences of Ukraine, B. Khmelnytsky Str., 15, 01601, Kyiv, Ukraine. E-mail: martynov\_av@ukr.net, centroptilium@gmail.com

**18796.** Mogali, S.M.; Saidapur, S.K.; Shanbhag, B.A. (2020): Behavioral responses of tadpoles of *Duttaphrynus melanostictus* (Anura: Bufonidae) to cues of starved and fed dragonfly larvae. *Phyllomedusa* 19(1): 93-98. (in Defense behavior, dietary cues, kairomones, *Pantala flavescens*, predator-prey interactions, tadpoles, Wandering Glider.) ["Tadpoles of *Duttaphrynus melanostictus* use chemoreception to detect kairomonal cues and excretory metabolites from predatory anuran tadpoles (*Hoplobatrachus tigerinus*) that consume them. We describe here the behavioral responses of tadpoles of *D. melanostictus* to predatory dragonfly larvae (*Pantala flavescens*). The predator's kairomones (water conditioned by the starved predator) or its diet-derived metabolites released in excreta of predator after consumption of conspecific prey tadpoles were used to simulate predation risk. The tadpoles of *D. melanostictus* had no behavioral response to predator kairomones. However, the larvae reduced swimming movements and overall time spent in swimming, and had a higher burst speed/swimming velocity in response to water borne cues released from the excreta of predators fed conspecific prey. Thus, just the presence of dragonfly larvae does not elicit defense behaviors in tadpoles of *D. melanostictus*, but when predation risk is recognized as real (i.e., when tadpoles are exposed to excretory metabolites of predators fed conspecific tadpoles), defense behaviors are activated." (Authors)] Address: Mogali, S.M., Department of Zoology, Karnatak University, Dharwad-580 003, Karnataka State, India. E-mail: santoshmogali@rediffmail.com.

**18797.** Moon, M.Y.; Chang, W.J.; Lee, D.-S.; Lee, D.-Y.; Hwang, S.J.; Noh, S.-Y.; Kwak, I.-S.; Park, Y.-S. (2020): Characterizing responses of biological trait and functional diversity of benthic macroinvertebrates to environmental variables to develop aquatic ecosystem health assessment index. *Korean Journal of Ecology and Environment* 53(1): 31-45. (in Korean, with English summary) ["The biological indices based on the community structure with species richness and/or abundance are commonly used to assess aquatic ecosystem health. Meanwhile, recently functional traits-based approach is considered in ecosystem health assessment to reflect ecosystem functioning. In this study, we

developed a database of biological traits for 136 taxa consisting of major stream insects (Ephemeroptera, Plecoptera, Trichoptera, Coleoptera, and Odonata) collected at Korean streams on the nationwide scale. In addition, we obtained environmental variables in five categories (geography, climate, land use, hydrology and physicochemistry) measured at each sampling site. We evaluated the relationships between community indices based on taxonomic diversity and functional diversity estimated from biological traits. We classified sampling sites based on similarities of their environmental variables and evaluated relations between clusters of sampling sites and diversity indices and biological traits. Our results showed that functional diversity was highly correlated with Shannon diversity index and species richness. The six clusters of sampling sites defined by a hierarchical cluster analysis reflected differences of their environmental variables. Samples in cluster 1 were mostly from high altitude areas, whereas samples in cluster 6 were from lowland areas. Non-metric multidimensional scaling (NMDS) displayed similar patterns with cluster analysis and presented variation of taxonomic diversity and functional diversity. Based on NMDS and community-weighted mean trait value matrix, species in clusters 1-3 displayed the resistance strategy in the life history strategy to the environmental variables whereas species in clusters 4-6 presented the resilience strategy. These results suggest that functional diversity can complement the biological monitoring assessment based on taxonomic diversity and can be used as biological monitoring assessment tool reflecting changes of ecosystem functioning responding to environmental changes." (Authors)] Address: Park, Y.-S., Dept Life & Nanopharmaceutical Sciences, Kyung Hee University, Dongdaemun-gu, Seoul 02447, Republic of Korea

**18798.** Moroz, M.D.; Lipinskaya, T.P. (2020): Aboriginal and alien species of macrozoobenthos in watercourses of the Belarusian part of the Central European Invasive Corridor. *Hydrobiological Journal* 56(4): 19-32. (in English) ["The watercourses of the Central European Invasive Corridor were studied in 2016-2017. On the whole, 166 LIT (the lowest identified taxa) of macrozoobenthos of three types were found in the studied watercourses. Annelida were represented by 9 LIT, Mollusca - 34, whereas Arthropoda - by 123 LIT. Among them, 13 alien species included 3 representatives of Mollusca, 8 species of Amphipoda, 1 species of Mysidacea, and 1 species of Decapoda. The largest number of alien species was registered in the lower reaches of the Pripyat River, where they were most abundant. New localities of *Faxonius limosus* (Rafinesque, 1817), and also of *Anax imperator* Leach, 1815 and *Brachytron pratense* (Müller, 1764), belonging to the protected species within the territory of Belarus were found in the studied watercourses." (Authors)] Address: Moroz, M.D., Scientific & Practical Center on Bioresources National Academy of Sciences of Belarus Minsk, Belarus

**18799.** Motta, L.; Barrios-Garcia, M.N.; Ballari, S.A.; Rodriguez-Cabal, M.A. (2020): Cross-ecosystem impacts of non-

native ungulates on wetland communities. *Biological Invasions* 22: 3283-3291. (in English) ["Herbivory by non-native species can create strong direct and indirect effects on plant and arthropods communities that can potentially cross ecosystem boundaries. Yet, the cross-ecosystems impacts of non-native species are poorly understood. We took advantage of ongoing invasions by non-native ungulates in Patagonia, Argentina, to examine their cross-ecosystem impacts on water parameters, littoral vegetation and aquatic macroinvertebrate assemblages in wetlands. We found a gradient of invasion by non-native ungulates from intact (non-invaded) to highly invaded wetlands. These highly invaded wetlands had ~ 24% less vegetation cover, which was 72% shorter in height than vegetation in intact wetlands. As a result, the abundance of predatory macroinvertebrates such as Odonata was reduced by ~ 90%; while Diptera were ~ 170% more abundant, and Oligochaeta were recorded mostly at invaded sites. In contrast, we did not find evidence that non-native ungulates altered water parameters. Understanding the indirect consequences of invasive non-native species is crucial for quantifying the real impacts of global change. Our results show strong cross-ecosystem impacts of non-native ungulates on macroinvertebrate wetland communities, highlighting the importance of indirect interactions beyond ecosystem boundaries." (Authors)] Address: Motta, Luciana, Grupo de Ecología de Invasiones, INIBIOMA – CONICET, Universidad Nacional del Comahue, Av. de los Pioneros 2350, CP. 8400, Bariloche, Rio Negro, Argentina

**18800.** Mujumdar, N.; Sawant, D.; Sumanapala, A.; Rangnekar, P.; Koparde, P. (2020): Rapid multi-taxa assessment around Dhamapur Lake (Sindhudurg, Maharashtra, India) using citizen science reveals significant odonate records. *Journal of Threatened Taxa* 12(13): 16795-16818. (in English) ["In the present work, we discuss the results of a four-day long rapid survey around Dhamapur Lake and surrounding freshwater habitats in the Sindhudurg District of Maharashtra through public participation. In total, 61 odonates, 51 butterflies, 17 species of amphibians and reptiles, 90 birds, and four mammals are documented. Our observations taken over a brief time reflect the importance of citizen science in documenting local biodiversity. We report involvement of citizen scientists in recovering significant odonate records for the state." (Authors) The following taxa are discussed in detail: *Lestes praemorsus decipiens* Kirby, 1894, *Platylestes cf. platystylus* (Rambur, 1842), *Pseudagrion malabaricum* Fraser, 1924, *Gynacantha cf. khasiaca* and *Indothemis limbata* ssp. *campion*, 1923.] Address: Mujumdar, N., Bombay Natural History Society, Hornbill House, Opp. Lion Gate, Shaheed Bhagat Singh Road, Colaba, Mumbai, Maharashtra 400001, India. E-mail: n.mujumdar@bnhs.org

**18801.** Ngo, C.D.; Le, P.L.T.; Nguyen, H.D.; Truong, P.B.; Hoang, N.T.; Ngo B.V. (2020): Diet of the Bronze Skink *Eutropis macularius* (Reptilia: Squamata: Scincidae) from Thua Thien Hue Province, Central Vietnam. *Russian Journal of Herpetology* 27(4): 209-216. (in English) ["In this study, we examined the diet of 149 males and 147 females of *Eutropis macularius* from Thua Thien Hue Province, central Vietnam

using a nonlethal stomach-flushing technique. The prey items of *E. macularius* composed of Araneae, Insecta (Blattodea, Coleoptera, Hymenoptera, Isoptera, Odonata, and Orthoptera), Mollusca (Philomycidae), and plant materials. The most important prey items were insect larvae, hymenopterans (including ants), grasshoppers, and termites, for both sexes in three populations. Plant materials were also found in the stomach of *E. macularius* with an index of relative importance of 7.19%, suggesting that *E. macularius* is an omnivorous species. However, the dominant prey categories of *E. macularius* were insects, including insect larvae, hymenopterans, grasshoppers, and termites, with many small, sedentary, clumped prey items. Simpson's heterogeneity index of skinks from three populations from Bach Ma National Park as well as from Aluoi and Huong Tra districts were 10.07, 7.85, 3.94, respectively. *Eutropis macularius* showed significant positive correlations between mouth width (MW) and prey width ( $P = 0.001$ ) and between MW and prey volume ( $P < 0.0001$ ). There are significant positive correlations between snout-vent length (SVL) and prey sizes consumed: between SVL and prey length,  $P < 0.0001$ ; SVL and prey width,  $P < 0.0001$ ; and between SVL and prey volume,  $P < 0.0001$ . These results indicated that SVL and MW are the limiting factors on the size of prey consumed in this skink." (Authors)] Address: Ngo B.V., Dept of Biology, University of Education, Hue University, 34 Le Loi Road, Hue, Vietnam. E-mail: ngovanbinh@dhsphue.edu.vn

**18802.** Okude, G.; Fukatsu, T.; Futahashi, R. (2020): Interspecific crossing between blue-tailed damselflies *Ischnura elegans* and *I. senegalensis* in the laboratory. *Entomological Science* 23: 165-172. (in English) ["*Ischnura* species are among the most common damselflies in the world, which often exhibit female color polymorphisms. One morph, called androchrome, is similar to males in its color pattern, whereas the other morphs, generally referred to as gynochromes, exhibit female-specific colors. In several *Ischnura* species, the female polymorphism is heritable, although molecular and genetic mechanisms remain largely unknown. The dominant-recessive patterns of the female color morphs may differ between species. For example, androchromic females are dominant to gynochromic females in *Ischnura elegans*, whereas androchromic females are recessive in *Ischnura senegalensis*. Here we report a case of interspecific hybridization between a gynochrome female of *I. elegans* and a male of *I. senegalensis* in the laboratory. We obtained 61 hybrid adult offspring, of which all 31 females were of gynochrome morph. DNA analyses of the hybrids confirmed that nuclear DNA sequences were derived from both parent species, whereas mitochondrial DNA sequences were maternally inherited. In the hybrids, the postocular spots of female heads, the shape of male appendages, and the color of female's cerci resembled those of *I. elegans*, whereas the size of abdominal blue spots was similar to that of *I. senegalensis*. The shape of prothorax and basal abdominal markings were intermediate in females. The larval developmental traits and the morphological changes in the final larval instar of the hybrids were similar to those of *I. senegalensis*. To our knowledge, this is the first

report of hybrids between two damselfly species with different dominant-recessive patterns of female color morphs." (Authors)] Address: Futahashi, R., Bioproduction Res. Inst., National Institute of Advanced Industrial Science and Technology (AIST), Central building 6th, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8566, Japan. Email: ryo-futahashi@aist.go.jp

**18803.** Okur, Y. & Salur, A. (2020): A study on Odonata larvae inhabiting Burdur and Isparta provinces. *Munis Entomology & Zoology* 15(2): 565-571. (in English) ["In this study, 200 larvae samples collected from different localities and habitats in the provinces of Burdur and Isparta (Turkey) between 2000 and 2002 were identified. These specimens belonging to 7 families, 14 genera and 17 species and 3 subspecies. In addition, characteristic and habitat information of the identified species are given in the text." (Authors)] Address: Salur, A., Hitit University, Faculty of Arts and Sciences, Biology, Çorum, Turkey. E-mail: alisalur@hitit.edu.tr

**18804.** Palacino-Rodríguez, F.; Altamiranda-Saavedra, M.; Palacino, D.A.; Penagos, A.C. (2020): Ecology of *Mesamphiagrion laterale* (Odonata: Coenagrionidae): abundance, reproduction and interactions with co-occurring species. *International Journal of Odonatology* 23(2): 165-182. (in English) ["The behavior of *M. laterale* (Selys, 1876) is described based upon 2430 hours of observation. A total of 2820 individuals were observed for 270 days from 2014 to 2015 using mark-recapture. Probabilities of resight, highest reproductive activity, time-perch and time of perch-temperature were statistically analyzed. *Mesamphiagrion laterale* is not a territorial species, the individuals perch on grass, trees, garbage, ground, and rocks, they feed on hemipterans, mosquitoes, spiders and other damselflies, and are prey to spiders and birds. Conspecific siege and interspecific interactions by perch were observed. No courtship was observed. During tandem, which lasted for 3–90 min, the ventral side of the male's abdominal segment 2 was in contact with the female's abdominal segments 8–10 until a wheel was formed. We observed three tandem pair combinations: sexually mature males and females, immature males with mature females, and immature males and females. While copulation lasted from 7 to 20 min, oviposition lasted from 12 to 15 min. Irrespective of male presence, oviposition occurred in submerged or emerged areas of *Eichornia crassipes*. We recorded the highest reproductive activity between 12:00 and 12:35 (Colombia Time-COT, UTC-5). Above 20°C, a larger perching area close to the water allows more reproductive events. However, a more extensive canopy cover impedes achieving optimal reproductive temperatures. Species interactions within this community may be explained by temporal and spatial niche partitioning." (Authors)] Address: Palacino-Rodríguez, F., Biology Research Group (GRIB), Dept of Biology, Universidad El Bosque, Bogotá, Colombia. Email: palazinofredy@unbosque.edu.co

**18805.** Pawlak, S. (2020): Records of dragonflies (Odonata) in the vicinity of Wieruszów (Łódź Province) in 2017-2020. *Odonatrix* 1616 (2020): 34 pp. (in Polish, with English summary) ["The present report provides information on 53



species of dragonflies recorded in 2017-2020 at 69 sites near Wieruszów (Łódź Province). They include protected and/or endangered species such as *Nehalennia speciosa*, *Ophiogomphus cecilia*, *Aeshna viridis*, *Orthetrum coerulescens*, *Leucorrhinia dubia*, *L. pectoralis* and *Sympetrum depressiusculum*. Southern species were also recorded: *Aeshna affinis*, *Anax ephippiger*, *Orthetrum albistylum*, *Sympetrum fonscolombii*, *S. meridionale* and *Crocothemis erythraea*." (Author)] Address: Pawlak, S., ul. Konopnickiej 15, 98-400 Wieruszów, Poland. E-mail: slawieru@interia.pl

**18806.** Pierce, A.J.; Makbun, N. (2020): First record of *Gynacantha limbalis* Karsch, 1892 from Thailand (Odonata: Anisoptera: Aeshnidae). *Songklanakarin J. Sci. Technol.* 42(5): 965-966. (in English) ["*G. limbalis* is reported for the first time (7-IV- 2019) from Thailand based on photographs taken at San Kala Khiri National Park, Songkhla province. This extends the northern limit of the species and increases the number of *Gynacantha* species recorded in Thailand to nine." (Authors)] Address: Makbun, N., 211/5 Moo 4, Takhli, Nakhon Sawan, 60140 Thailand. E-mail: noppadon.makbun@gmail.com

**18807.** Pinkert, S.; Zeuss, D.; Dijkstra, K.-D. B.; Kipping, J.; Clausnitzer, V.; Brunzel, S.; Brandl, R. (2020): Climate–diversity relationships underlying cross-taxon diversity of the African fauna and their implications for conservation. *Diversity and Distributions* 26(10): 1330-1342. (in English) ["Many taxa show remarkable similarities in their diversity patterns, and these similarities are commonly used to define large-scale conservation priorities. Here, we investigated the relative importance of contemporary climate and climate change since the Last Glacial Maximum for determining the species richness and rarity patterns of four animal taxa. We assessed the extent to which diversity patterns are congruent across taxa because of similar responses to these climatic aspects, and we identify regions that are disproportionately diverse due to their palaeoclimatic stability. Location: Sub-Saharan Africa. Time period: LGM–contemporary. Major taxa studied: Mammal, bird, amphibian and dragonfly species. Methods: Diversity patterns were predicted based on their relationships with contemporary climate and Quaternary climate change, respectively. Climate–diversity relationships were modelled with and without accounting for spatial autocorrelation. For raw and predicted diversity patterns, cross-taxon congruence and the coverage of diversity hotspots by protected areas were determined. Results: Species richness and rarity of all taxa increased with increasing temperature and precipitation, but also with increasing palaeoclimatic stability. Cross-taxon congruence was higher for predictions based on contemporary climate than for predictions based on Quaternary climate change. Protected areas covered 17%–37% of the species richness and rarity hotspots and approximately 6% fewer hotspots of the underlying signatures of Quaternary climate change (i.e. biodiversity refugia). Main conclusions: Both contemporary climate and past climatic changes strongly affect species richness and rarity patterns. However, whereas contemporary climate–diversity relationships are largely congruent across

taxa, signatures of Quaternary climate change differ among taxa. Furthermore, protected areas emphasize regions with high species richness and rarity but fewer biodiversity refugia—even less than expected by random placement (<21%). Our results highlight the importance of historical factors for shaping large-scale diversity patterns and the potential of using palaeoclimatic stability–diversity relationships for identifying important conservation areas at the global scale." (Authors)] Address: Kipping, J., BioCart Ökologische Gutachten, Taucha/Leipzig, Germany. E-mail: biocartkiping@email.de

**18808.** Pires, A.; Drumm Müller, N.F.; Stenert, C.; Maltchik, L. (2020): Influence of different riparian vegetation widths and substrate types on the communities of larval Odonata (Insecta) in southern Brazilian streams. *Acta Limnologica Brasiliensia* 32 e301: 16 pp. (in English, with Portuguese summary) ["Aim: We assessed the influence of substrate type and categories of riparian vegetation widths on the community structure of Odonata (Insecta) in southern Brazilian streams. Methods: Sampling took place in twelve stream reaches differing in their riparian vegetation widths (from more than 40 m up to less than 5 m). Larval odonates were collected in inorganic (stone and gravel) and organic (leaf litter) substrates at each stream reach. Differences in Odonata composition among substrates and categories of riparian vegetation width were tested using PERMANOVA and visualized with ordination diagrams. In addition, we assessed the influence of riparian vegetation width taking into account two levels of resolutions: fine (four categories: > 40 m, 30-15 m, 15-5 m and < 5 m) and coarse (narrower and broader than 15 m). Results: Odonata composition differed more strongly according to substrate type regardless of the level of resolution. Organic substrate (litter) had different composition and higher richness than inorganic ones. Odonata composition significantly differed between riparian vegetation widths at the coarser level of resolution (narrower and broader than 15 m); at the coarser level, the interaction between substrate and riparian widths was significant, with the composition from litter substrate in broader widths differing from stone and gravel in narrower widths. Conclusions: The composition of odonate larvae responded to the major reductions in riparian widths (above > 15 m), indicating that reductions above this level are enough to affect the community structure of Odonata. Additionally, the different composition of Odonata in organic substrates in broader riparian vegetation widths compared to inorganic substrates in narrower widths indicate a complex relationship between riparian vegetation and substrate in the assembly of insect communities in southern Brazilian forest streams. The interaction between riparian vegetation widths and substrate suggests that the effects of reductions in riparian widths on Odonata composition are not similar across substrate types." (Authors)] Address: Pires, M.M., Laboratório de Ecologia e Conservação de Ecossistemas Aquáticos, Universidade do Vale do Rio dos Sinos – UNISINOS, Av. Unisinos, 950, CEP 93022-750, São Leopoldo, RS, Brasil

**18809.** Potapov, G.S.; Kolosova, Y.S.; Gofarov, M.Y.; Bolotov, I.N. (2020): Dragonflies and damselflies (Odonata) from Flores Island, Lesser Sunda Archipelago: New occurrences in extreme environments and an island-level checklist of this group. *Ecologica Montenegrina* 35: 5-25. (in English) ["Although the Odonata are common inhabitants of various extreme environments such as geothermal springs, brackish wetlands, mangroves, and volcanic lakes, the assemblages of this group associated with extreme habitats in Australasia are rather poorly known. Here, we combine museum collection data and published reports on Odonata from extreme habitats on Flores Island, Lesser Sunda Archipelago. The highly acidic Sano Nggoang Crater Lake (mean pH = 3.17) on Flores houses seven species as follows: *Agriocnemis pygmaea*, *Xiphiagrion cyanomelas*, *Neurothemis ramburii*, *Orthetrum pruinatum pruinatum*, *O. sabina*, *O. testaceum soembanum*, and *Anax gibbosulus*. A coastal marsh site with slightly brackish water on Flores harbors at least five dragonfly species as follows: *Diplacodes trivialis*, *Neurothemis intermedia excelsa*, *N. terminata*, *Pantala flavescens*, and *Rhyothemis phyllis ixias*. The migratory dragonfly *Pantala flavescens* was a single species recorded on the waterless Kanawa Island near the western edge of Flores. Our findings suggest that extreme habitats in eastern Indonesia primarily colonized by widespread generalist Odonata species. Finally, an updated checklist of Odonata species recorded from Flores Island was compiled. Our survey of museum specimens recovered two species not found on existing species lists for Flores: *N. intermedia excelsa* and *P. flavescens*." (Authors)] Address: Potapov, G.S., N. Laverov Federal Center for Integrated Arctic Research of the Ural Branch of the Russian Academy of Sciences Russian Federation

**18810.** Pouillon, J.-M.; Nel, A. (2020): The oldest representative of the modern clade Aeshnodea from the Lower Cretaceous Crato Formation, Araripe Basin, NE Brazil (Odonata: Anisoptera). *Cretaceous Research* 116, 104580: (in English) ["The hawker dragonfly *Primumaeshna britta* gen. et sp. nov., type genus and species of the new family *Primumaeshnidae*, is described from the Lower Cretaceous Crato Formation in Brazil, corresponding to the oldest record of the clade Aeshnodea. The previously described representatives of the Aeshnoptera from this formation belonged to extinct families or to the *Gomphaeschnidae*. Otherwise the oldest Aeshnodea were previously only known from the Cenomanian. This new discovery confirms that the diversification of the modern lineages of hawker dragonflies occurred during the Early Cretaceous." (Authors)] Address: Nel, A., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**18811.** Pramual, P.; Thane, I.; Uttaruk, Y.; Thajjarern, J.; & Wongpakam, K. (2020): Efficiency of DNA barcodes for identification and documenting aquatic insect diversity in rice fields. *Tropical Natural History* 20(2): 169-181. (in English) ["Rapid and accurate identifications are crucial for biodiversity assessment. Yet, traditional methods for species identification have some limitations. In this study, we tested

the efficiency of mitochondrial cytochrome c oxidase I barcoding sequences for species identification and documenting diversity of aquatic insects in the rice fields of Thailand. Considerable success rate (80%) for species identification was found among the species of the order Odonata. Unidentifiable specimens of immatures were successfully associated with conspecific adults or by matching with reference sequences in the public DNA barcoding library. However, some specimens were ambiguous, possibly due to incomplete lineage sorting of closely related species or erroneous identification of the sequences in the public database. The technique was less successful for other insect orders because a lack of reference sequences in the DNA barcode library limits the utility of DNA barcoding. The Poisson tree process and Automatic Barcode Gap Discovery species delimitations revealed that the number of species recognized is more than twice that based on morphological identification. Therefore, DNA barcoding has potential for use in species identification and biodiversity assessment of the aquatic insects in the rice field ecosystem." (Authors)] Address: Pramual, P., Department of Biology, Faculty of Science, Mahasarakham University, Maha Sarakham 44150, Thailand

**18812.** Prasad, P.K.; Shinad, K.; Sherin, C.; Arusha, K. (2020): Studies on the life cycle of *Pleurogenoides wayanadensis* Shinad & Prasad, 2018 (Digenea: Pleurogenidae) from the Western Ghats, India. *Journal of Helminthology* 94 e196: 10 pp. (in English) ["The life cycle of *Pleurogenoides wayanadensis* Shinad & Prasad, 2018, infecting the frogs *Hoplobatrachus tigerinus* and *Euphlyctis cyanophlyctis*, is elucidated in this study. All the life cycle stages from egg to egg-producing adults were elucidated under natural conditions and successfully established in the laboratory. The life cycle took about 58 to 65 days for completion. Miracidia were released by teasing the eggs with fine needles. Sporocysts were found in the freshwater snail, *Bithynia (Digoniostoma) pulchella*, collected from paddy fields at Payode, Western Ghats, Wayanad region, in the months of October and November 2019. Cercariae were of the virgulate xiphidiocercous type. Metacercariae were recovered from the eyes of the damselfly naiads of the species *Ischnura* sp. and *Copera* sp., and the thorax and abdomen of the dragonfly naiads, *Orthetrum* sp. The metacercariae showed progenetic development. The growth and development of the metacercariae in the naiads that were exposed to cercariae, and development of the trematode in frogs that were force-fed with encysted metacercariae, have been studied at regular intervals. The prepatent period is 14–19 days. The present life cycle study of a *Pleurogenoides* spp. forms the seventh report from the world, fourth report from India and the third from Kerala." (Authors)] Address: P.K. Prasad, E-mail: [prasadpank@kannuruniv.ac.in](mailto:prasadpank@kannuruniv.ac.in)

**18813.** Rafael, J.A.; Limeira-de-Oliveira, F.; Hutchings, R.W.; (74 authors) (2020): Insect (Hexapoda) diversity in the oceanic archipelago of Fernando de Noronha, Brazil: updated taxonomic checklist and new records. *Revista Brasileira de Entomologia* 64(3):e20200052, 2020: 27 pp. (in English) ["Hexapods, commonly known as insects, are a neglected

taxonomic group in the Fernando de Noronha archipelago, with unanswered questions about their species richness and the ecological processes in which they are involved (e.g., colonization, introduction, establishment, and extinction). Herein, we provide an updated Hexapod checklist with current nomenclatural combinations. The entomofauna of the Fernando de Noronha archipelago is currently composed of 453 species in 21 orders. The orders, and their respective number of species, are: Blattaria (9), Coleoptera (118), Collembola (29), Dermaptera (3), Diplura (1), Diptera (134), Embioptera (1), Hemiptera (29), Hymenoptera (59), Isoptera (2), Lepidoptera (25), Mantodea (1), Neuroptera (3), Odonata (5), Orthoptera (11), Phasmatodea (1), Phthiraptera (6), Psocoptera (3), Siphonaptera (1), Thysanoptera (10), and Zygentoma (2). The archipelago has 263 new taxon records (family + genera + species). Thirty-eight species (3.39%) were described from local specimens and most of them are likely endemic species. This study more than doubles our knowledge (from the previous 190 records) of the entomofauna in this large Brazilian archipelago. This study also provides a baseline for studies on its conservation status and for implementing future environmental management programs." (Authors) Odonata [Responsible: A.P. Pinto] are represented by *Ischnura capreolus* (Hagen, 1861), *Erythemis vesiculosa* (Fabricius, 1775), *Miathyria marcella* (Selys in Sagra, 1857), *Pantala flavescens* (Fabricius, 1798), *Tremea basalis* (Burmeister, 1839). "Remarks. *Libellula basalis* Burmeister, 1839 is currently considered a synonym of *Tremea abdominalis* (Rambur, 1842). The identity of the species cited by Kirby (1890) as *Tremea basalis* (Burmeister, 1839) and transcribed by Alvarenga (1962) cannot be ascertained without examination of specimens from Ridley's expedition housed in the NHMUK, due to nomenclatural confusion and ambiguities about the identity of at least three current valid species, i.e., *T. abdominalis*, *T. binotata* (Rambur, 1842) and *T. cophysa* Hagen, 1867 (Calvert, 1906a; Ris, 1913). They are all widespread species in the Western Hemisphere. Furthermore, a species described in the 19th century, *Libellula basalis* Burmeister, 1839, was a homonym of two other species, and later on *L. basalis* Burmeister was synonymized with *T. cophysa* (Calvert, 1906a; but see Calvert, 1906b). In his revision of Libellulidae, Ris (1913) synonymized *Libellula basalis* Burmeister with *T. abdominalis* and mentioned the material from Fernando de Noronha as a synonym for *T. cophysa* (due to a misidentification by W. Kirby) based on the study by Kirby (1897). Decades later, De Marmels and Racenis (1982) included Kirby's (1897) *T. basalis* in the synonymy of *Tremea calverti* Muttkowski, 1910. Therefore, because neither Ris (1913) or De Marmels and Racenis (1982) cited Kirby's (1890) original study, and it is unclear if they examined those specimens, this Fernando de Noronha record is left identified only to genus level until the original material can be studied." ] Address: Rafael, J.A., Instituto Nacional de Pesquisas da Amazônia, Coordenação de Biodiversidade, Manaus, AM, Brazil. E-mail: jarafael@inpa.gov.br

**18814.** Rehman, A.; Ahmad, S.; Zia, A.; Ali, A.; Shahjeer, K.; Latif, A.; Khan, T. (2020): Dragonflies (Anisoptera: Odonata)

fauna of district Swabi Khyber Pakhtunkhwa, Pakistan. *Sarhad Journal of Agriculture* 36(2): 675-684. (in English) ["Current study was conducted in order to explore the dragonflies fauna in District Swabi of Khyber Pakhtunkhwa, Pakistan. A comprehensive field survey was conducted to collect dragonfly adults using aerial nets. 19 sites of District Swabi were surveyed during summer seasons of 2015 and 2016. The study revealed 23 species from 15 genera under 3 families. Libellulidae comprised of 19 species belonging to 11 genera, Gomphidae included 3 species belonging to 3 genera and Aeshnidae included one species. Detailed description of each species, valid scientific names, their habitat, ecological observation, collection date and distributional range for all recorded species are provided. ... *Ictinogomphus angulosus*, *Burmogomphus sivalikensis*, *Zygomma petiolatum* were recorded for the first time from district Swabi as well as Khyber Pakhtunkhwa" (Authors)] Address: Rehman, A., Department of Entomology, Faculty of Crop Protection Sciences, Univ. of Agriculture Peshawar, Khyber Pakhtunkhwa, Pakistan

**18815.** Reis dos Santos, M.; Saito, V.S.; Zaitune Pamplin, P.A.; Pereira, A.A.; Fonseca-Gessner, A.A. (2020): Pollution tolerance, flight capacity and natural history explain meta-community structure in high-altitude stream insects. *Acta Limnologica Brasiliensia* 32: 14 pp. (in English, with Portuguese summary) ["Aim: To test how different taxonomic and functional groups of aquatic insects from high-altitude streams respond to environmental and spatial gradients at multiple scales in Southeast of Brazil. Methods: Specimens were collected in 26 high-altitude streams distributed over a gradient of previously defined environmental quality. The taxonomic identification was made at the genus level and the functional classification was based on traits of flight capacity and pollution tolerance compiled from specific literature. We obtained local in situ data (limnological, sediments, and organic matter), as well as calculated land use at the riparian and drainage basin scale. A variation partitioning approach was used to explain species composition based on different response matrices deconstructed by both taxonomic groups and functional traits. The explanatory matrices encompassed environmental variables at three spatial scales and spatial variables extracted from Principal Components of Neighbor Matrices analysis. A linear model was applied to verify the possible correlation between spatial and environmental components." (Authors)] Address: Reis dos Santos, Mireile, Programa de Pós-graduação em Ecologia e Recursos – PPGERN, Laboratório de Ecologia de Insetos Aquáticos, Universidade Federal de São Carlos – UFSCar, Rod. Washington Luís, Km 235, SP-310, CEP 13565-905, São Carlos, SP, Brasil

**18816.** Renjith, R.V.; Chandran, V. (2020): A record of gynandromorphism in the libellulid dragonfly *Crocothemis servilia* (Insecta: Odonata) from India. *Journal of Threatened Taxa* 12(9): 16183-16186. (in English) ["At Puzhakkal region of the Kole wetlands (10.5400N & 76.1720E), an individual of *Crocothemis servilia* that looked part male and part

female was photographed during the survey." (Authors)] Address: Chandran, V., Dept of Geology & Environmental Science, Christ College, Irinjalakuda, Thrissur, Kerala 680125, India. E-mail: avivekchandran@gmail.com

**18817.** Renner, S.; Schmidt Dalzochio, M.; Périco, E.; Sah-lén, G.; Suhonen, J. (2020): Odonate species occupancy frequency distribution and abundance–occupancy relationship patterns in temporal and permanent water bodies in a subtropical area. *Ecology & Evolution* 10(14): 7525-7536. (in English) ["This paper investigates species richness and species occupancy frequency distributions (SOFD) as well as patterns of abundance–occupancy relationship (SAOR) in Odonata (dragonflies and damselflies) in a subtropical area. A total of 82 species and 1983 individuals were noted from 73 permanent and temporal water bodies (lakes and ponds) in the Pampa biome in southern Brazil. Odonate species occupancy ranged from 1 to 54. There were few widely distributed generalist species and several specialist species with a restricted distribution. About 70% of the species occurred in <10% of the water bodies, yielding a surprisingly high number of rare species, often making up the majority of the communities. No difference in species richness was found between temporal and permanent water bodies. Both temporal and permanent water bodies had odonate assemblages that fitted best with the unimodal satellite SOFD pattern. It seems that unimodal satellite SOFD pattern frequently occurred in the aquatic habitats. The SAOR pattern was positive and did not differ between permanent and temporal water bodies. Our results are consistent with a niche-based model rather than a metapopulation dynamic model." (Authors)] Address: Renner, S., Lab. Ecol. e Evol., Univ. do Vale do Taquari – UNIVATES, Rua Avelino Tallini, 171 Bairro, Universitário, Lajeado RS 95900-00, Brazil. E-mail: samuelrenner@hotmail.com

**18818.** Rewicz, T.; Móra, A.; Tonczyk, G.; Szymczak, A.; Grabowski, M.; Calleja, E.J.; Perneck, B.; Csabai, Z. (2020): First records raise questions: DNA barcoding of Odonata in the middle of the Mediterranean. *Genome* 64(3): 196-206. (in English, with French summary) ["We present the results of the first-ever DNA barcoding study of odonates from the Maltese Islands. In total, ten morphologically identified species were collected during a two-week long expedition in 2018. 80 cytochrome c oxidase subunit I (COI) barcodes were obtained from the collected specimens. Intra- and interspecific distances ranged from 0% to 2.24% and 0.48% to 17.62%, respectively. Successful species identification based on ascribing a single morphological species to a single Barcode Index Number (BIN) was achieved for eight species (80%). In the case of two species, *Ischnura genei* and *Anax parthenope*, BINs were shared with other closely related species. The taxonomic status of *I. genei* is questionable and the phylogenetic relationship between *A. imperator*/*parthenope* is not clear. Further studies involving a series of adult specimens collected in a wide spatial range and nuclear markers are necessary to resolve these cases. Therefore, this dataset serves as an initial DNA barcode reference library

for Maltese odonates, within a larger project: Aquatic Macro-invertebrates DNA Barcode Library of Malta." (Authors)] Address: Rewicz, T., Univ. Guelph, Centre Biodiv. Genomics, Guelph, Ontario, Canada

**18819.** Riefani, M.K.; Badruzsaufari; Dharmono (2020): The practicality of Odonata handout in invertebrate zoology course. *Journal of Physics: Conf. Series* 1422: 9 pp. (in English) ["Wetlands around the University of Lambung Mangkurat (ULM) Banjarmasin has been the habitat for Odonata. It has the potential to be utilized as a learning resource. A handout is one of the effective learning resources to achieve learning goals. Researchers created a handout to facilitate students to learn about the diversity and activities of Odonata at the wetlands around ULM Banjarmasin. This study aims to describe practicality of the Odonata handout. Research and development of handouts are based on Borg and Gall development model. This research was conducted in ULM Banjarmasin. The research subjects included three expert validation, nine students for small readability tests, and 18 students for small-scale field trials. Data analysis uses descriptive categorical techniques. The practicality of handout is indicated by students' activity and students' responses after they use handouts. The handouts based on students' activity showed very high activity and showed a very strong positive response." (Authors)] Address: Riefani, M.K. Biology Education Dept, Fac. of Teacher & Training Education, Univ. Lambung Mangkurat, Jl. Brigjen Hasan Basry 87 Banjarmasin, South Kalimantan, Indonesia. E-mail: maulanakhalidriefani@gmail.com

**18820.** Rison, K.J.; Chandran, A.V. (2020): Observations of the damselfly *Platylestes cf. platystylus* Rambur, 1842 (Insecta: Odonata: Zygoptera: Lestidae) from peninsular India. *Journal of Threatened Taxa* 12(10): 16392-16395. (in English) [India, Thommana region (10.342°N & 76.250°E) of the Kole wetlands and Thumboor (10.297°N & 76.256°E) & Uppungal region (10.692°N & 75.997°E); morphological descriptions of male and female are given.] Address: Rison, K.J., Konkoth House, Thumboor P.O, Thrissur District, Kerala 680662, India. E-mail: risonkj@gmail.com

**18821.** Rohman, A.; Sulistyono, S.; Nuryati, W.; Arifandy, A.; Setiyanto, A. (2020): Dragonflies in Bawean Island Nature Reserve, Indonesia. *Borneo Journal of Resource Science and Technology* 10(1): 45-50. (in English) ["Bawean Island is known for its endemic Bawa deer and other vertebrate species of mammals, avians and reptiles. However, little is known about the invertebrates, especially the Odonata (dragonflies) group. The aim of this study was to examine the variety of dragonflies on the Bawean Island. The observation method was employed for data collection while the Shannon-Weinner Diversity Index was used for data analysis. A total of 23 dragonflies' species consisting of four families were collected throughout the study. These include Coenagrionidae (6 species), Libellulidae (13 species), Platycnemididae (2 species) and Aeshnidae (1 species). *Ischnura senegalensis* is the most dominant species. The diversity index (absolute H index) shows a moderate level of diversity in Bawean Island, with a value of 1,007." (Authors)] Address:



Rohman, A., Biology Education, Faculty of Teacher Training and Education, University of Jember, 68121, Indonesia. E-mail: abdu.fkip@unej.ac.id

**18822.** Ruiter, E.; Mulder-Milderij, G.; Bunskoek, M.; Huijzinga, A. (2020): *Libellen in Overijssel*. ISBN: 9789050117739. Uitgeverij Knv: 348 pp. (in Dutch) [Bohre, P. (2021): *Prachtig boek over libellen in Overijssel*. <https://www.rootsmagazine.nl/blog/dieren/prachtig-boek-over-libellen-in-overijssel/>: "Already in 2005 an overview of the dragonflies in Overijssel was published with preliminary distribution maps up to 2003. The prelude to the enormous book of 30×30 centimetres that is now before us. Evert Ruiter, main author of *Libellen van Overijssel*: "One of the reasons that this book was not published earlier, was the fact that almost every year a new species of dragonfly was discovered in Overijssel. *Erythromma lindenii*, *Leucorrhinia caudalis*, *Sympetrum depressiusculum*, *Leucorrhinia albifrons*, to name but a few. And of course, they had to be included in the book. In the end, we cut the Gordian knot and started writing. By now, 65 species have been identified within the provincial borders, from extremely rare to very common. "And that puts us in second place as a province behind Limburg. The species richness in Overijssel is mainly due to the exceptionally large diversity of wetlands," says Ruiter. "There are small streams here, but also large rivers, bogs, low moors, a range of other wetlands such as canals, ditches, fens, pools and sand drifts. And not forgetting the local height differences, such as the Salland Ridge and the lateral moraines in north-east Twente. They provide seepage-rich environments on the flanks. All ideal factors for a very diverse dragonfly fauna. Another important factor is the increased interest in observing dragonflies. "I remember well that about twenty years ago I first came to the Woldlake forest to make an inventory. I walked around all alone, the area was still totally undiscovered. And I was pleasantly surprised by the surprisingly large number of species that could be found here. Now thousands of dragonflies fly around here on a beautiful day and you come across photographers everywhere who want to capture these flying gems. The interest in dragonflies has grown enormously in the last twenty years. This is also thanks to *Waarneming.nl*, where dragonfly enthusiasts are increasingly posting their sightings and photos. Naturally, the Woldlake forest is therefore included in the book as a walking route." Critical species Dragonflies occupy an important place in wetland ecosystems. Their presence or absence says a lot about the quality of the biotope and the water in which they occur. This preference is therefore determined to a very large extent by the larvae, as they live in the water. "Some species only thrive in nutrient-poor water and disappear when acidification or enrichment occurs. Other, less critical species appear and are thus a direct indication of deteriorating water quality", explains Ruiter. Industrial discharges in the previous century had heavily polluted the Vecht and the Regge. Thanks to water purification and nature development, many vulnerable species such as the meadow creek juggernaut, blue broad-headed damselfly and brook hawk have fortunately returned. However, dragonflies also appreciate favourable conditions

around the water, such as shelter provided by riparian vegetation, upright trees and shrubs. All of this has led to the exceptionally rich dragonfly population in Overijssel. Magnificent book *Libellen in Overijssel* is a beautiful publication for every nature lover who wants to discover the dragonflies and the landscape while walking. This book, richly illustrated with brilliant photographs, highlights and describes all of the dragonfly species found in the 'garden of the Netherlands'. Distribution maps show where they occur. And by means of 8 special dragonfly routes, you can also find all that beauty yourself while walking. The book is intended for both beginners and experienced dragonfly lovers." (Author; DeepL)]

**18823.** Salami, E.; Ward, T.A.; Montazer, E.; Nik Ghazali, N.N. (2020): Nanoindentation analysis comparing dragonfly-inspired biomimetic micro-aerial vehicle (BMAV) wings. *International Journal of Bio-Inspired Computation* 16(2): 111-120. (in English) ["Biomimetic micro-aerial vehicle (BMAV) are micro-scaled, unmanned aircraft based on flying biological organisms, generating thrust and lift by flapping their wings. This study investigates and compares the nano mechanical mechanical properties of four sets of fabricated, dragonfly inspired BMAV wings and compares them to actual dragonfly wings used as a baseline reference. The BMAV wings were fabricated using a 3D printer, based on these simplified models. Different 3D printer filament materials were used for each of the four wing sets: acrylonitrile butadiene styrene (or ABS), polylactic acid (or PLA), high impact polystyrene (or HIPS) as well as Ultrat. Nanoindentation tests of the actual dragonfly wings and the BMAV wings were conducted to measure their hardness and Young's modulus. The test result demonstrates the feasibility solution in the development of strong, practical and low cost BMAV wings, this work is a stepping-stone on the path to flying robotic dragonfly." (Authors) ] Address: Salami, E., Dept Mech. Engineering, Univ. of Malaya, Kuala Lumpur, KL 50603, Malaysia

**18824.** Sánchez-Herrera, M.; Beatty, C.D.; Nunes, R.; Salazar, C.; Ware, J.L. (2020): An exploration of the complex biogeographical history of the Neotropical banner-wing damselflies (Odonata: Polythoridae). *BMC Evolutionary Biology* 20(74) (2020): 14 pp. (in English) ["Background: The New World Tropics has experienced a dynamic landscape across evolutionary history and harbors a high diversity of flora and fauna. While there are some studies addressing diversification in Neotropical vertebrates and plants, there is still a lack of knowledge in arthropods. Here we examine temporal and spatial diversification patterns in the Polythoridae, which comprises seven genera with a total of 58 species distributed across much of Central and South America. Results: Our time-calibrated phylogeny for 48 species suggests that this family radiated during the late Eocene (~ 33 Ma), diversifying during the Miocene. As with other neotropical groups, the Most Recent Common Ancestor (MRCA) of most of the Polythoridae genera has a primary origin in the Northern Andes though the MRCA of at least one genus may have appeared in the Amazon Basin. Our molecular clock suggests correlations with some major geographical events, and our biogeographical modeling (with BioGeoBEARS and RASP)

found a significant influence of the formation of the Pebas and Acre systems on the early diversification of these damselflies, though evidence for the influence of the rise of the different Andean ranges was mixed. Diversification rates have been uniform in all genera except one—Polythore—where a significant increase in the late Pliocene (~ 3 mya) may have been influenced by recent Andean uplift. Conclusion: The biogeographical models implemented here suggest that the Pebas and Acre Systems were significant geological events associated with the diversification of this damselfly family; while diversification in the tree shows some correlation with mountain building events, it is possible that other abiotic and biotic changes during our study period have influenced diversification as well. The high diversification rate observed in Polythore could be explained by the late uplift of the Northern Andes. However, it is possible that other intrinsic factors like sexual and natural selection acting on color patterns could be involved in the diversification of this genus." (Authors)] Address: Sánchez-Herrera, Melissa, Dept Biology, Faculty of Natural Sciences, Univ. del Rosario, Bogotá, DC, Colombia; Fed. Dept of Biol. Sciences. Rutgers, The State University of New Jersey, Newark, NJ, USA

**18825.** Santos, J.C.; Vilela, D.S.; Rejane de Almeida, W.; Santos, B. dos; Santos, A.E.; Bezerra, L.M.; Santos, L. dos; Neto, A.M.; Venâncio, H.; Cameiro, M.A.A. (2020): A rapid survey of dragonflies and damselflies (Insecta: Odonata) reveals 29 new records to Sergipe State, Brazil. *Heterocerina* 2(2): 29-34. (in English, with Spanish summary) ["The knowledge about the richness and composition of odonate species is still relatively scarce for Northeastern Brazil. Here we present the results from a rapid survey of Odonata species that was carried out in Sergipe State, Brazil. We provide 29 new species records, from a total of 182 collected specimens, belonging to 20 different genera. Thus, the Sergipe State has 34 species and 23 genera recorded at the present. Now, these species have their geographical distribution expanded from the southeastern to the northeastern Brazil in the Atlantic Forest." (Authors)] Address: Santos, J.C., Depto de Ecologia, Univ. Federal de Sergipe, São Cristóvão, Sergipe, Brazil. E-mail: jcsantosbio@gmail.com

**18826.** Sasamoto, A.; Lien, V.V. (2020): Description of a new species of *Periaeschna* (Odonata: Aeshnidae) from northern Vietnam. *Tombo* 62: 57-62. (in English, with Japanese summary) ["*Periaeschna yashiroi* sp. nov. from northern Vietnam (holotype ♂ from Ta Phin, Sapa, Lao Cai Province, N. Vietnam and a paratype ♀ from Hoang Lien NP, Lai Chau Province, N. Vietnam), is described and illustrated for both sexes. This species seems closely related to *Periaeschna zhangzhouensis* Xu, 2017 from southern China, but differs by body maculation and the morphology of the male anal appendages." (Authors)] Address: Sasamoto, A., Tawaramoto-cho, Shiki-gun, Nara Pref., Japan. E-mail: akssmt@sea.plala.or.jp

**18827.** Schmidt, K.J. (2020): Developing eDNA techniques for the endangered Hine's Emerald Dragonfly (*Somatochlora hineana*) and its symbiont the Devil Crayfish (Camba-

rus [=Lacunicambarus] diogenes): Mesocosm and field studies. M.Sc. thesis, Department of Biology, University of South Dakota: V, 18 pp. (in English) ["Detection of environmental DNA (eDNA) has become a commonly used surveillance method for threatened or invasive vertebrates in both aquatic and terrestrial environments. However, use of eDNA methodologies for the detection of aquatic invertebrates (e.g., crayfish and insects) has been limited. Environmental DNA protocols can be especially useful for endangered invertebrates such as *S. hineana* where conservation efforts have been greatly hindered by the training, time, overall costs, and environmental impacts associated with conducting surveys in the calcareous fens occupied by this species. An essential step in developing such a protocol is to evaluate the dynamics of eDNA concentration under controlled and field conditions. In this study we examined the persistence and accumulation of eDNA from captive *S. hineana* larvae in experimental mesocosms at temperatures (5.0°C and 16.0°C) that reflect seasonal variation in their natural habitat, and we evaluated the usefulness of eDNA protocols for studying the distribution and abundance of invertebrates by assessing patterns of eDNA distribution for the Hine's emerald dragonfly and its symbiont the devil crayfish, in the field over several months. In mesocosms, *S. hineana* eDNA persisted longer at 5.0°C but accumulated more readily at 16.0°C. In the field, life-history events affected seasonal variations in eDNA more significantly and consistently than temperature for both species. These data can be used to aid in conservation efforts for *S. hineana* and similar aquatic invertebrates." (Author)] Address: Schmidt, Kristie, Univ. of South Dakota, Vermillion, SD, USA. Email: Kristie.Schmidt@uky.edu

**18828.** Schmidt Dalzochio, M.; Périco, E.; Dametto, N.; Sahlén, G. (2020): Rapid functional traits turnover in boreal dragonfly communities (Odonata). *Scientific Reports* 10, (15411) (2020): 12 pp. (in English) ["All natural populations show fluctuations in space or time. This is fundamental for the maintenance of biodiversity, as it allows species to coexist. Long-term ecological studies are rare, mainly due to logistics, but studies like the one presented below recognize the dimensionality of temporal change and the ecological processes that lead to shifts in community composition over time. Here, we used three sampling occasions from a dataset spanning 20 years where dragonflies in central Sweden were monitored. Our aim was to investigate how the prevalence of ecological and biological species traits varied over time measured as Community-level Weighted Means of trait values (CWM). Most CWM values varied significantly between years. Most of the traits changed between the second and the last sampling occasion, but not between the two first ones. These changes could be linked to major changes in species abundance. Our work indicates that fundamental shifts in community structure can occur over a short time, providing environmental drivers act on species turnover. In our case, Climate change and pH levels in lakes are most likely the most important factors." (Authors)] Address: Sahlén, G., Rydberg Laboratory for Applied Sciences, RLAS, Halmstad University, P.O. Box 823, 30118 Halmstad, Sweden. Email: goran.sahlen@hh.se

**18829.** Shrimali, S.; Rathore, A.S. (2020): Efficacy of neem oil for the eradication of aquatic insects in fish nurseries. *Uttar Pradesh Journal of Zoology* 41(8): 104-112. (in English) ["Generally, the survival rate of carp spawn during the nursery phase is very low due to the presence of harmful aquatic insects in fish nursery pond, which prey heavily upon the spawn and early stages of fry. Insects usually found in large numbers in ponds over the greater part of the year especially during and after rains. They injure the spawn and some of them prey upon spawn. Insects should be eradicated prior to stocking to ensure maximum survival of the spawn. Aquatic insects and their larvae compete for food with the young fish and also cause large scale destruction of hatchlings in nurseries. A study was carried out by the authors to investigating the possible use of natural chemical Neem Oil for the control of aquatic insects in nursery ponds. Bioassay studies were conducted in 5 glass aquaria and using four concentration 0.003, 0.004, 0.005, 0.006 ppm of Neem Oil (natural chemical) on four experimental insects Notonecta (Backswimmer), Dragonfly nymph, Eretes (Small beetle), Nepa (Water Scorpion). The LC50 value of Neem Oil for the experimental insects ... ranged 0.0033 ppm for Eretes and Nepa at 6 hrs and 0.0040 for Notonecta at 5 hrs. Further, the results on toll rate showed that Backswimmer, Small beetle, Water Scorpion killed within 6hrs when exposed to a concentration of 0.004 ppm Neem oil. This was the lowest dose of Neem oil which killed the predatory insects within the desired period of 6 hrs and the death rate of fish seed at this dose is zero. Therefore, the use of Neem oil @0.004 ppm is recommended for the eradication of predatory insects from fish nursery ponds." (Authors)] Address: Shrimali, S., Wildlife Research Laboratory, Dept of Zoology, Bhupal Nobles' University, Udaipur, India

**18830.** Silva-Hurtado, J.D.; Márquez, J.; Escoto-Moreno, J.A.; Martínez-Falcónx, A.P. (2020): Odonate fauna (Insecta: Odonata) from a locality in San Marcos River in the Sierra Norte of Puebla, Mexico. *International Journal of Odonatology* 23(4): 327-336. (in English) ["Odonates have been recognized as an important group for evaluating ecosystems since they are used as bioindicators of the conservation status of the habitat they occupy, in addition to being generalist predators feeding on invertebrates and small vertebrates. In this work, the biodiversity of adult odonates from a locality near the San Marcos River, in Puebla, Mexico, is analyzed through systematic sampling performed during 2018. Species richness and composition patterns were analyzed and compared between the rainy and dry seasons; the results were also compared with those of similar studies at the regional level. There were six families, 21 genera and 37 species that represent about 40% of the 95 species registered in Puebla. Coenagrionidae, with *Argia*, was the best representative of the Zygoptera, and Libellulidae was the best for the Anisoptera. Three of the species collected in the San Marcos River increased the species number from 95 to 98 for Puebla, making it currently placed 14th of 32 Mexican states in terms of the species richness of odonates nationwide. According to the Chao2 and Bootstrap estimators, the completeness of the inventory varied from 61% to 67% in the

dry season, from 73% to 83% in the rainy season, and from 74% to 86% for the annual completeness. There were no significant differences in species richness and composition between the rainy and dry seasons. The species richness of odonates in this locality is the second highest known for Puebla and can still provide important data for this group." (Authors)] Address: Márquez, J., Laboratorio de Sistemática Animal, Centro de Investigaciones Biológicas, Univ. Autónoma del Estado de Hidalgo, Mineral de la Reforma, Hidalgo, Mexico. Email: marquezorum@gmail.com

**18831.** Simonsen, T.J.; Olsen, K.; Djernæs, M. (2020): The African-Iberian connection in Odonata: mtDNA and ncDNA based phylogeography of *Aeshna cyanea* (Müller, 1764) (Odonata: Aeshnidae) in Western Palaearctic. *Arthropod Structure & Development* 78(2): 309-320. (in English) ["We explore the phylogeography and inter-population relationships of *A. cyanea* in the Western Palaearctic region based on 603 bp Cytochrome Oxidase Subunit 1 (COI) mtDNA and 732 bp Internal Transcribed Spacer region (Internal Transcribed Spacer 1, 5.8S ribosomal RNA gene and Internal Transcribed Spacer 2, ITS region) ncDNA with an increased sampling from Europe compared to a previous study. Both DNA fragments recover a remarkable and compatible pattern: the recently described *Aeshna vercanica* Schneider et al. is the sister group of *A. cyanea*, which in turn comprises three distinct populations. These populations are: a population in the Caucasus region; a North African population; and a European population. When analysed alone, the ITS fragment recovered *A. vercanica* and the Caucasus *A. cyanea* population as separate units, but the North African and European *A. cyanea* populations were recovered as inter-mixed. FST population genetic analyses of COI data revealed high degrees of isolation between all populations as all inter-population values were between 0.818 (North Africa – Europe) and 0.944 (Europe – *A. vercanica*). Average pairwise distance in COI (uncorrected p) between populations followed this pattern and was lowest between Europe and North Africa and highest between North Africa and *A. vercanica*, and between Europe and *A. vercanica*. Within population pairwise distance values were approximately an order of magnitude lower. Pairwise distance values between populations for the ITS region were much lower than for COI, but followed the same pattern. Our results therefore support the full species status for *A. vercanica*, and clearly indicate that the current Western European *A. cyanea* population originated from a North African glacial refugium and dispersed to Europe (the Iberian Peninsula) prior to the Holsteinian interglacial period. While the North African and European populations likely remained in contact initially, the European population was probably isolated in the Iberian Peninsula during the Holsteinian interglacial period, and subsequently spread throughout Europe in late Pleistocene – early Holocene." (Authors)] Address: Simonsen, T.J., Natural History Museum Aarhus, Wilhelm Meyers Allé 10, DK-8000 Aarhus, Denmark. E-mail: t.simonsen@nathist.dk

**18832.** Sivaruban, T.; Barathy, S.; Srinivasan, P.; Isack, R. (2020): Diversity and distribution of odonates in Alagar Hills

of Southern India. *Indian Journal of Ecology* 47(3): 869-871. (in English) ["Order Odonata includes important aquatic insect groups such as dragonflies and damselflies. They help to assess the ecosystem health and serves as pollution indicators. Studies of Odonata were conducted in Alagar hills of South India state of Tamilnadu from August 2018 to January 2019. Odonate species abundance was high in October to November (7 to 8 species) and their abundance was low in the January and December (6 species.) Among all months, the abundance of libellulid species was comparatively high. Shannon index values were between 1.6094-1.9792 and it shows that these sites had critical position and they might have sensitive habitat status. The results of Simpson index complement with the results of Shannon index. Higher air and water temperature was in August and causes less diversity of organisms. DO was low in January (1.65) and it directly influences the abundance. This study interpreted that diversity of Odonates was directly and indirectly influenced by climatic change and anthropogenic impacts." (Authors)] Address: Sivaruban, T., Dept of Zoology, The American College (Autonomous), Madurai-625 002, India. E-mail: sivaruban270@gmail.com

**18833.** Svensson, E.I.; Willink, B.; Duryea, M.C.; Lancaster, L.T. (2020): Temperature drives pre-reproductive selection and shapes the biogeography of a female polymorphism. *Ecology Letters* 23(1): 149-159. (in English) ["Conflicts of interests between males and females over reproduction is a universal feature of sexually reproducing organisms and has driven the evolution of intersexual mimicry, mating behaviours and reproductive polymorphisms. Here, we show how temperature drives pre-reproductive selection in a female colour polymorphic insect that is subject to strong sexual conflict. These species have three female colour morphs, one of which is a male mimic. This polymorphism is maintained by frequency-dependent sexual conflict caused by male mating harassment. The frequency of female morphs varies geographically, with higher frequency of the male mimic at higher latitudes. We show that differential temperature sensitivity of the female morphs and faster sexual maturation of the male mimic increases the frequency of this morph in the north. These results suggest that sexual conflict during the adult stage is shaped by abiotic factors and frequency-independent pre-reproductive selection that operate earlier during ontogeny of these female morphs." (Authors)] Address: Willink, Beatriz, Dept of Biology, Evolutionary Ecology Unit, Ecology Building, Lund University, Lund 223-62, Sweden. E-mail: beatriz.willink@ucr.ac.cr

**18834.** Swaegers, J.; Spanier, K.I.; Stoks, R. (2020): Genetic compensation rather than genetic assimilation drives the evolution of plasticity in response to mild warming across latitudes in a damselfly. *Molecular ecology* 29(4): 4823-4834. (in English) ["Global warming is causing plastic and evolutionary changes in the phenotypes of ectotherms. Yet, we have limited knowledge on how the interplay between plasticity and evolution shapes thermal responses and underlying gene expression patterns. We assessed thermal

reaction norm patterns across the transcriptome and identified associated molecular pathways in northern and southern populations of *Ischnura elegans*. Larvae were reared in a common garden experiment at the mean summer water temperatures experienced at the northern (20°C) and southern (24°C) latitudes. This allowed a space-for-time substitution where the current gene expression levels at 24°C in southern larvae are a proxy for the expected responses of northern larvae under gradual thermal evolution to the predicted 4°C warming. Most differentially expressed genes showed fixed differences across temperatures between latitudes, suggesting that thermal genetic adaptation will mainly evolve through changes in constitutive gene expression. Northern populations also frequently showed plastic responses in gene expression to mild warming, while southern populations were much less responsive to temperature. Thermal responsive genes in northern populations showed to a large extent a pattern of genetic compensation, i.e. gene expression that was induced at 24°C in northern populations remained at a lower constant level in southern populations, and were associated with metabolic and translation pathways. There was instead little evidence for genetic assimilation of an initial plastic response to mild warming. Our data therefore suggest that genetic compensation rather than genetic assimilation may drive the evolution of plasticity in response to mild warming in this damselfly species." (Authors)] Address: Swaegers, J., Lab. of Evolutionary Stress Ecology and Ecotoxicology, University of Leuven, Leuven, Belgium. Email: janne.swaegers@kuleuven.be

**18835.** Tanczuk, A. (2020): Dragonflies (Odonata) observed at the small pond in Lędziny (Poland, Opole Region). *Odonatrix* 1613: 5 pp. (in Polish, with English summary) ["The observations were conducted at the small reservoir near Lędziny village in 2017-2019. In total, 35 dragonfly species were recorded. Among them, six southern species *Anax ephippiger*, *Orthetrum brunneum*, *O. coerulescens*, *Sympetrum meridionale*, (*S. fonscolombii* and *Crocothemis erythraea*) were observed. Further, some phenological data concerning the occurrence of imagines in late September, October and November were presented." (Author)] Address: Tanczuk, Agnieszka, ul. Przasniedzki 2/40, 20-838 Lublin, Poland. E-mail: atanczuk@gmail.com

**18836.** Triyanti, M.; Arisandy, D.A. (2020): Fauna Capung Di Bukit Cogong Kabupaten Musi Rawas. *Quagga: Jurnal Pendidikan dan Biologi* 12(2): 181-187. (in Indonesian, with English summary) ["This study was to determine the diversity index of dragonflies in Bukit Cogong Musi Rawas. This study uses exploratory methods and descriptions using techniques to explore transects. The observation station was determined to be 3 stations with 5 systematic transects with an area of 100m X 100m transect. Catching using net nets, identifying by observing dragonfly morphological characteristics. Based on the research, data obtained from 111 dragonfly individuals from 10 dragonfly species from Libellulidae, Aeshnidae, Euphaeidae, Protoneuridae, Platycnemididae and Lestidae. The lowest relative abundance were *Gynacantha bayadera* and *Nososticta insignis* at 1.8%,



while the highest relative abundance was *Orthetrum sabina* as big as 34.23%. The diversity index of dragonflies in Bukit Cogong, Musi Rawas was categorized as low with a value of 1.96. the uniformity index for all high-categorized stations, stable communities and dominance index (C) in all stations are categorized as low." (Authors) *Orthetrum sabina*, *Neurothemis fluctuans*, *Brachythemis contaminata*, *Rhodothemis rufa*, *Onychothemis culminicola*, *Gynacantha bayadera*, *Euphaea variegata*, *Nososticta insignis*, *Coeliccia membranipes*, *Lestes concinnus*] Address: Triyanti, M., Program Studi Pendidikan Biologi, STKIP PGRI Lubuklinggau, Lubuklinggau, Indonesia. Email: mertitriyanti28@gmail.com

**18837.** Twardochleb, L.A.; Treacle, T.C.; Zametske, P.L. (2020): Foraging strategy mediates ectotherm predator-prey responses to climate warming. *Ecology* 101(11). e03146: (in English) ["Climate warming and species traits interact to influence predator performance, including individual feeding and growth rates. However, the effects of an important trait—predator foraging strategy—are largely unknown. We investigated the interactions between predator foraging strategy and temperature on two ectotherm predators: an active predator, the backswimmer *Notonecta undulata*, and a sit-and-wait predator, the damselfly *Enallagma annexum*. In a series of predator-prey experiments across a temperature gradient, we measured predator feeding rates on an active prey species, zooplankton *Daphnia pulex*, predator growth rates, and mechanisms that influence predator feeding: body speed of predators and prey (here measured as swimming speed), prey encounter rates, capture success, attack rates, and handling time. Overall, warming led to increased feeding rates for both predators through changes to each component of the predator's functional response. We found that prey swimming speed strongly increased with temperature. The active predator's swimming speed also increased with temperature, and together, the increase in predator and prey swimming speed resulted in two-fold higher prey encounter rates for the active predator at warmer temperatures. By contrast, prey encounter rates of the sit-and-wait predator increased four-fold with rising temperatures as a result of increased prey swimming speed. Concurrently, increased prey swimming speed was associated with a decline in the active predator's capture success at high temperatures, whereas the sit-and-wait predator's capture success slightly increased with temperature. We provide some of the first evidence that foraging traits mediate the indirect effects of warming on predator performance. Understanding how traits influence species' responses to warming could clarify how climate change will affect entire functional groups of species." (Authors)] Address: Twardochleb, Laura, Dept of Fisheries & Wildlife, Michigan State Univ., East Lansing, MI, USA. E-mail: laura.twardochleb@water.ca.gov

**18838.** Udayanath, S.; Yashaswi, N. (2020): Impact of mining activities on odonates diversity in adjacent villages of Balaram open cast project, Talcher, Angul, Odisha, India. *Journal of Entomological Research* 44(3): 449-454. (in English) ["In the present study an attempt has been made to

study the regimen of Odonates in peripheral villages of Balaram Open Cast Project (OCP), Talcher, Angul, Odisha. A total number of 1604 Odonates belonging to 6 families and 34 species under two sub-orders (Anisoptera and Zygoptera) were recorded during the entire study period. Shannon-Weiner index ( $H'$ ) was 2.65 in Bhalugadia village, followed by 2.73 in Malibandha village, 2.62 in Natada village and 2.68 in Nakeipasi village. Margalef's richness ( $D_{mg}$ ) index found to be 3.62 in Bhalugadia, 3.52 in Malibandha, 4.43 in Natada and 2.68 in Nakeipasi village. The presence of Odonates is easily perceived from this study that shows that ecosystem health is proportionate to Odonate diversity. Swap nets and dragonfly traps were used for sampling in the revegetation and un-mined area, but the variation in abundance and diversity among the four areas was statistically insignificant. Hence revegetation can restore the biodiversity and also the population of Odonates belonging to various families. In toto, mined areas should be ecologically restored, so that rich diversity of these elegant insects can be conserved." (Authors)] Address: Yashaswi, N., Dept Zool., Centurion Univ. of Technology and Management, Khurda - 751 009, Odisha, India. E-mail: yashaswi@cutm.ac.in

**18839.** Vega-Sánchez, Y.M.; Lorenzo-Carballa, M.O.; Vilela, D.S.; Guillermo-Ferreira, R.; Koroiva, R. (2020): Comment on Islam et al. (2020) "Molecular identification of seven new Zygopteran genera from South China through partial cytochrome oxidase subunit I (COI) gene". *Meta Gene* 25, September 2020, 100759: (in English) ["This letter to the editor aims to address the issues that we have found in an article recently published in *Meta Gene* by Islam et al. (2020) on the molecular identification of Odonata specimens from eight provinces of southern China. We conducted a review on the literature regarding the distribution of *Hetaerina* (Calopterygidae) and *Nesobasis* (Coenagrionidae), and analyzed the genetic sequences deposited by Islam et al. (2020) in molecular data repositories. *Hetaerina* is a genus endemic to the New World, with most species confined to the Neotropical region. Islam et al. (2020) reported *H. vulnerata* Hagen in Selys, 1853, *H. titia* Drury, 1773 and *H. capitalis* Selys, 1873 for southern China. The genus *Nesobasis* is endemic to the Fiji Islands. The referred authors reported *N. longistyla* also in southern China. All these species had never been registered before by any other study conducted in Asia. The sequences of these species deposited by Islam et al. were analyzed by us and identified as dipteran DNA, fitting cytochrome oxidase I sequences of the Ephydriidae, Chironomidae and Drosophilidae families. Furthermore, few sequences deposited in data repositories matched with the molecular analyses made by Islam et al. (2020). We suggest that the authors must reassess the morphological and molecular identification of the specimens collected for their study. There might be morphological misidentifications of voucher specimens and/or sequences deposited as *Hetaerina* and *Nesobasis*. Aiming to clarify the results, we recommend the authors to include photographs of the species and redo their analyses. Considering the aforementioned problems, we strongly suggest the authors a review of their other results, which may also present flaws that we are not aware of at

the moment." (Authors)] Address: Vega-Sánchez, Yesenia Margarita, Inst. de Investigaciones en Ecosistemas y Sustentabilidad, Universidad Nacional Autónoma de México, Antigua carretera a Pátzcuaro #8701, Morelia, Michoacán 58190, Mexico. E-mail: yvega@cieco.unam.mx

**18840.** Veras, D.S.; Lustosa, G.S.; Moura, L.P.; Ribeiro Ferreira, M.F.; Juen, L. (2020): Differences in land use modify Odonata assemblages in the Cerrado-Caatinga ecotone. *Acta Limnologica Brasiliensia* 32, e15: 11 pp. (in English, with Portuguese summary) ["Aim: The present study tested the hypothesis that the composition of the odonate assemblages in environments with greater habitat integrity is significantly different from that of areas with reduced habitat integrity. Methods: The samples were collected between April 2017 and November 2017 in eight streams in Caxias, in the Brazilian state of Maranhao. The habitat integrity index was used to quantify habitat integrity. The odonate specimens were collected by the fixed area scanning method. Results: The habitat integrity index ranged from 0.265 to 0.915 at the different localities. A total of 229 specimens were collected, representing 19 odonate species. Species composition varied among streams that presented different degrees of conservation, with some species being typical of specific habitats. However, this variation had no effect on the number of taxa or the abundance of odonates, which may reflect the local substitution of extinct specialist species by generalists. Conclusions: Evidence indicates that the reduction of habitat integrity is an important predictor of changes in the biodiversity of aquatic insects in streams such as those of the Cerrado-Caatinga ecotone." (Authors)] Address: Veras, D.S., Lab. de Ecologia de Comunidades, Inst. Fed. do Maranhao, Campus Caxias, Rodovia MA-340, Km 02, Gleba Buriti do Paraíso, Povoado Lamego, Zona Rural, CEP 65600-000, Caxias, MA, Brasil. E-mail: daniel.veras@ifma.edu.br

**18841.** Wang, Y.; Yin, Y.; Zheng, G.; Yao, H. (2020): Driving mechanism of dragonfly's wing flapping pattern for liquid circulation inside wing. *Animal Biology* 71(1): 85-101. (in English) ["Flying animals can inspire practical approaches to a more advanced way of flying. Dragonflies demonstrate a special flapping pattern in which their wings perform torsional movement while flapping, which is different from that of birds. This flapping pattern is referred to as nonsynchronous flapping in this article. We present a hypothesis that nonsynchronous flapping provides a driving force for enhancing the haemolymph circulation inside dragonfly wings. To support this hypothesis, a controlled experiment was designed and conducted with living dragonflies. By observing the liquid motion inside the vein within free flapping wings and restricted wings of living dragonflies, this hypothesis was supported. A mathematical model of the flapping wing was built and numerically studied to further support the function of the nonsynchronous flapping pattern in driving the circulation. With these studies, a theoretical explanation for the mechanism of enhancing the haemolymph circulation by nonsynchronous flapping was provided." (Authors)] Address: Wang, Y., School of Aerospace Engineering, Tsinghua University, Beijing 100084, China

**18842.** Wildermuth, H. (2020): Als Larvenhabitate von *Orthemtrum coerulescens* (Odonata: Libellulidae) im Hinblick auf sporadische Sommertrockenheit optimierte Flachmoorgräben. *Entomo Helvetica* 13: 107-116. (in German, with English and French summaries) ["Larval habitats of *Orthemtrum coerulescens* (Fabricius, 1798) optimized in fenland ditches by counteracting sporadic aestival desiccation (Odonata: Libellulidae). - In 1981–82, 1.5 ha of overgrown fenland were cleared in a nature reserve on the eastern Swiss plateau. The drainage ditches at the site were rebuilt, thus converting the fenland back into a traditional litter meadow. In order to retain water, six controllable weirs were installed, slowing desiccation of the ditches during hot periods with low or no precipitation. Maintenance of ditches was staggered in both space and time. During systematic success monitoring from 2006 to 2019, a total of 26 species of Odonata were recorded, eleven of which were either permanently or temporally indigenous. The study focused specifically on *O. coerulescens*. Up to 150 territorial males were located simultaneously at the ditches and successful reproductions were recorded every year. Due to water retention by the weirs, the ditches did not dry out even during long, dry summer periods. In extreme cases, larvae survived in the moist layer of the peat mud." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**18843.** Worthen, W.B.; Chamlee, M.G. (2020): Determinants of adult odonate community structure at several spatial scales: effects of habitat type and landscape context. *International Journal of Odonatology* 23(4): 365-379. (in English) ["Odonata use both aquatic and terrestrial ecosystems, and the abundance and diversity of odonates should be good indicators of habitat integrity. To determine which environmental variables affect odonates, we sampled adult dragonflies three times at 12 sites in Pickens and Greenville Counties, SC, USA, in different habitats, at different spatial scales, across a landscape gradient from intact forest to urban locations. At each site, we established two 2 m × 20 m plots along the shoreline of each aquatic habitat. We sampled dragonflies in ten 2 m × 2 m subplots/plot, described the vegetation and substrate in these subplots and adjacent aquatic subplots, and measured the percent cover of different landforms within 500 m of each plot center. Using nested ANOVA and Akaike information criteria models, habitat type and correlating environmental variables (substrate type and bank vegetation) were the best predictors of community structure at all spatial scales. Streams and rivers had fewer individuals and species than lakes, and had a nested subset of species found in lake communities. Landscape elements were also important, with indices declining as barren land and grasslands increased. At the largest scale, anthropogenic changes to the landscape had mixed effects. Small habitats isolated in urban areas had a significantly depauperate, nested subset of species found in communities inhabiting larger natural areas. However, odonate abundance and diversity was highest at human-made lakes and ponds, suggesting that these anthropogenic features help maintain odonate communities." (Authors)] Address:

2021

**18844.** Alves, N.P.; Andrade da Silva, R.; Calvão Santos, L.B.; Barbosa de Oliveira Junior, J.M. (2021): Variação morfológica de caracteres em *Oligoclada walkeri* Geijskes, 1931 (Anisoptera: Libellulidae) em relação a integridade ambiental de Igarapés da Amazônia oriental. Tópicos Integrados de Zoologia 3: 58-70. (in Portuguese, with English summary). [ "Morphological variation of characters in *O. walkeri* in relation to the environmental integrity of eastern Amazonian streams: This work aims to evaluate the effect of environmental integrity on morphological characteristics in population samples of *O. walkeri*. The collections were carried out in the municipalities of Santarém, Mojuí dos Campos and Belterra, in the state of Pará, between 10 and 14 h, in 48 streams with 150 m sections, subdivided into 10 sections of 15 m, separated by margin to margin transections. The adult individuals of *O. walkeri* were collected with an entomological network (40 cm in diameter, 65 cm in depth and 90 cm in length) and 50 specimens were selected (25 of preserved areas and 25 of altered areas) to obtain the measures of the characters. With the use of digital caliper, the morphological characters CT (total length), CTA (anterior wing length), LAA (anterior wing width), CAP (anterior wing length), LAP (posterior wing width), LAPB posterior wing at the base), CA (abdomen length), CTO (chest length), LT (chest width) were measured and P (weight) was measured by means of an analytical balance with an accuracy of 0.00005g. To evaluate the effect of environmental integrity on the total length of the *O. walkeri* specimens, simple linear regression was performed. Among the morphological variables, only the posterior wing width at base height was affected by environmental integrity ( $r^2 = 0.075$ ;  $p = 0.050$ ), the result suggests that the more preserved the stream, the greater the Wing Width at Base Height. With the increase of 0.01 in integrity there is an increase of approximately 0.06 mm in the Rear Wing at Base Height. Odonata wing size may be affected by a combination of factors such as: sexual selection, agonistic interactions, intersex cut-offs, migration, and reproductive behavior. In addition, the increase in the width of the posterior wing at base height in *O. walkeri* specimens in the preserved environment may have been due to the main activities carried out by the species in these places, where they do not have to travel long distances to find food. corroborates with the study, because in preserved places the species tend to spend less energy, facilitating the maintenance of a flight with less energy expenditure." (Authors)] Address: Pinto Alves, N., Universidade Federal do Oeste do Pará (UFOPA), Santarém –PA, Brazil

**18845.** Batucan Jr, L.S.; Hsu, Y.-H.; Maliszewski, J.W.; Wang, L.-J.; Lin, C.-P. (2021): Novel wing display and divergent agonistic behaviors of two incipient *Psolodermus* damselflies. The Science of Nature 108, 49. (in English) [„Sexual selection via male competition is a strong evolutionary force

that can drive rapid changes in competitive traits and subsequently lead to population divergence and speciation. Territorial males of many odonates are known to use their colorful wings as visual signals and to perform agonistic displays toward intruders. *P. mandarinus dorothea* and *P. mandarinus mandarinus* are two parapatrically distributed sister damselflies that share similar ecological characteristics but differ markedly in wing coloration. The wings of *P. m. dorothea* are mostly clear, whereas those of *P. m. mandarinus* have a large area of black pigmentation and a central white patch. We investigated whether territorial males of the two damselflies at breeding sites display distinct agonistic behaviors associated with their respective wing colors. Behavioral interactions between territorial and intruder males and their wing kinematics were filmed and analyzed for *P. m. dorothea* in Lienhuachih of central Taiwan, and *P. m. mandarinus* in Tianxiyuan and Fusan of northern Taiwan. We observed that the *P. m. mandarinus* males exhibited a novel set of perched wing displays, which was not only absent in its sister *P. m. dorothea* but also previously unknown in Odonata. At breeding sites, perched rival males of *P. m. mandarinus* with pigmented wings exhibited escalating agonistic wing-flapping and wing-hitting displays toward each other. In contrast, territorial males of *P. m. dorothea* with clear wings engaged only in aerial chase or face-to-face hovering when intruder males approached from the air. These results indicate that the two sister *P. mandarinus* damselflies diverged behaviorally in territorial contests and support the hypothesis of coadaptation on the basis of wing colors and types of wing movement in Odonata. Our findings further suggest that divergent agonistic wing displays may play a pivotal role in the speciation mechanism of *P. mandarinus* damselflies. The sequential analyses of behavioral characteristics and progression suggest that *P. m. mandarinus* damselflies likely use mutual assessment of rivals in territorial contests." (Authors)] Address: Lin, C.-P., Dept of Life Science, National Taiwan Normal Univ., No. 88, Section 4, Tingzhou Road, Taipei, 11677, Taiwan

**18846.** Bobrek, R. (2021): Odonate phenology recorded in a Central European location in an extremely warm season. Biologia 76(6): 2957-2964. (in English) [“Life history of ectothermic organisms, including odonates, is greatly influenced by environmental temperature. Current increase in temperatures in many areas connected with global climate change may therefore affect many traits of natural populations, especially their phenology. In odonates, this includes, the timing of emergence, flight period and reproductive behaviour of adults. This study describes the phenology of odonates in a single, extremely warm year (2018) at a site located in a Central European city (Kraków, Poland), and compares it with the past data on odonate phenology across the country. 36 species were recorded in the studied site. Comparison with literature revealed that for a quarter of species, the dates of first records were 1–2 ten-day periods earlier than documented in the previous phenological data for the country. In contrast to existing data, in the current study there were summer, not spring species that showed an advanced

phenological pattern of occurrence. This study demonstrates that contemporary data on odonate phenology obtained in a single, extremely warm season, deviates from comparative long-term data from more than a decade ago, potentially as a result of rising temperatures brought on by climate change." (Author)] Address: Bobrek, R., Polish Society for the Protection of Birds, Odrowaza 24, 05–270, Marki, Poland

**18847.** Boudot, J.P.; Borisov, S.; De Knijf, G.; van Grunsven, R.H.A.; Schröter, A.; Kalkman, V.J. (2021): Atlas of the dragonflies and damselflies of West and Central Asia. *Brachytron* 22, Supplement: 3-248. (in English) ["This atlas presents, for the first time, a detailed overview of the distribution of the damselflies and dragonflies (Odonata) of West and Central Asia, an area covering nearly 8 million km<sup>2</sup>. The region is not only characterized by the presence of several vast arid deserts such as the Arabian desert, Syrian desert and the Karakum but also harbors extensive mountain chains rich in streams, rivers, marshes and lakes including the Caucasus, Zagros and Hindu Kush. These combination of strong geographic differences in combination with its position between the Afrotropical, Oriental and Palearctic realm result in an interesting and diverse odonate fauna. Dragonflies and damselflies are good indicators of the quality of freshwater habitats and are colorful ambassadors for the preservation of freshwater ecosystems. In West and Central Asia the combination of climate change and an ever increasing demand for freshwater for drinking and agriculture will result in increased desertification and habitat degradation. The future of some of the species occurring in the area is therefore gloomy and some might not make it to the end of the century. This Atlas deals with no less than 175 (sub)species, many of which are endemic to the region or occur just marginally outside the region. For each species a distribution map is presented showing its occurrence in the region and adjacent areas. Texts for each species give basic information on the distribution, habitat preferences and, in some cases, taxonomical information. Although this atlas is not an identification guide, it will definitely help to identify most of the species in the region as it contains images of nearly all species, many of which have seldom been depicted in books before. We hope that this book will help to raise local awareness about this group of freshwater species and will contribute in a better protection and management of freshwater ecosystems." (Authors)] Address: Knijf, G. de, Instituut voor Natuurbehoud, Kliniekstraat 25, B-1070 Brussel, Belgium. E-mail: geert.deknijf@inbo.be

**18848.** Gaenzle Schilling, E.; Kardynal, K.J.; Kundel, H.; Crews-Erjaveck, Z.; Zobitz, J.M.; Hobson, K.A. (2021): Phenological and isotopic evidence for migration as a life history strategy in *Aeshna canadensis* (family: Aeshnidae) dragonflies. *Ecological Entomology* 46(2): 209-219. (in English) ["1. Investigating dragonfly migration is important for understanding species' life history strategies, migratory connectivity, terrestrial-aquatic linkages, and for successful species conservation. While migration patterns are well-documented for some species (e.g., *Anax junius*), questions remain

about potential migratory behaviour of others. 2. We investigated the potential for migration of *Aeshna canadensis* (Walker, 1908; Canada damer) using phenological observations in three study ponds in central Minnesota, 2017–2019. We also conducted probabilistic assignment to natal origins by measuring stable hydrogen isotope values of wing tissue ( $\delta^2\text{H}_w$ ) of dragonflies collected in Minnesota and acquired through Canadian museum collections. 3. This species emerged May–June from study ponds in central Minnesota, with a 10–15 week lag after onset of emergence before mature adults were observed flying and ovipositing in late summer. The probabilistic assignment depictions of emerging teneral overlapped with the sampling location, confirming accuracy of isotopic assignments of natal origin. 4. Late-flying mature adults collected at our study ponds likely originated from southern Manitoba, suggesting a north–south migration pathway. We found further evidence for migration by analysing  $\delta^2\text{H}_w$  of adult dragonflies collected in northern Minnesota and south-central Canada. Their likely origins were farther north in central Canada (Manitoba/Quebec) or the northeastern reaches of this species' range in eastern Canada. 5. We provide the first conclusive evidence of *Aeshna* migration in North America and demonstrate a robust approach, combining field observations with probabilistic assignment to origin using stable isotope analysis, which can test for migration in other dragonfly populations." (Authors)] Address: Gaenzle Schilling, Emily, Dept Biology, Augsburg Univ., Riverside Ave., Minneapolis, Minnesota, 55454, USA. E-mail: schillin@augsb.org

**18849.** Kamarajan, B.P.; Ananthasubramanian, M.; Sriramajayam, L.; Boppe, A. (2021): Behavior of *Pseudomonas aeruginosa* strains on the nanopillar topography of dragonfly (*Pantala flavescens*) wing under flow conditions. *Biointerphases* 16, 051002: 9 pp. (in English) ["Bacterial associated infection is a threat in the medical field. *Pseudomonas aeruginosa*, one of the major causative agents for nosocomial infection, has developed resistance to almost all the classes of antibiotics. Recently, nanopillar-like structures were identified on the wings of insects such as cicada and dragonfly. Nanopillars both on natural surfaces and those mimicked on artificial surfaces were reported to possess bactericidal activity against a wide range of bacteria. An earlier study reported strain specific variation in the viability of *P. aeruginosa* on the nanopillar topography of a dragonfly wing under static condition. Here, we report the behavior of *P. aeruginosa* strains on a dragonfly wing under hydrodynamic conditions. The results of the study indicated that, under hydrodynamic conditions, *P. aeruginosa* PAO1 was attached in higher numbers to the wing surface than *P. aeruginosa* ATCC 9027 but killed in lower numbers. The plausible reason was identified to be the masking of nanopillars by the secreted extracellular polysaccharide. The shear rate of 1.0 s<sup>-1</sup> showed a relatively higher bactericidal effect among the three tested shear rates." (Authors)] Address: Ananthasubramanian, M., Dept of Biotechnology, PSG College of Technology, Coimbatore 641004, India. E-mail: biosubramanian@gmail.com

**18850.** Kawabe, H.; Aoki, Y.; Nakamura, T. (2021): Cross-



longitudinal reinforcement structure inspired by dragonfly wing. Proceedings of the American Society for Composites — 36th Technical Conference on Composite Materials, DOI 10.12783/asc36/35748. (in English) ["The aim of this study is to establish a novel aircraft design approach replacing the conventional airframe by utilizing biomimetics. This design approach particularly focused on the dragonfly wing, whose reinforcement structures are composed of cross- veins and longitudinal veins. The cross-veins have been emulated by weighted Centroidal Voronoi Tessellation (WCVT) following the out-of-plane displacement on the skin, while the longitudinal veins have been emulated by extracting a centerline from the topology optimization result on the skin to be reinforced, through image analysis of binarization and skeletonization. The longitudinal layout can reduce the compliance distributing the inner load with only essential reinforcement on the skin without increasing the mass. The weighted CVT layout can improve the effectiveness of the reinforced skin against buckling drastically. Thus, the skin reinforced along the cross- longitudinal layout by the topology optimization and weighted CVT pattern increased buckling load 2.7 times higher even with less mass than the conventional layout. (Authors)] Address: not stated

**18851.** Kosterin, O.E.; Onishko, V.V. (2021): Two newly recorded dragonfly species (Odonata: Libellulidae) for the Novosibirskaya Oblast of Russia. Eurasian Entomological Journal 20(4): 221-228. (in English, with Russian summary) ["In 2020, *Orthetrum brunneum* and *Sympetrum depressiusculum* were first recorded for Novosibirskaya Oblast as photographic observations in the iNaturalist internet platform. Their populations and habitats were examined in situ. The habitat of *O. brunneum* at the Eltsovka Vtoraya River in Zaltsovskiy Park in Novosibirsk lacked other lotic Odonata as a result of pollution. Supposedly the river inside the city limits is warm enough during winter to make possible its colonisation by *O. brunneum* far to the north of its main range. The record of *S. depressiusculum* at the Obskoe Water Reservoir is the northernmost in Siberia. A list of 57 Odonata species currently known from Novosibirskaya Oblast is also provided." (Authors)] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Academica Lavrentyeva Ave. 10, Novosibirsk 630090 Russia; Novosibirsk State University, Pirogova Str. 2, Novosibirsk 630090 Russia. E-mail: kosterin@bionet.nsc.ru.

**18852.** Madhukar, G.S. (2021): Faunal diversity of Odonata at Rankala Lake, Kolhapur, Maharashtra. Indian Journal of Entomology 83(1): 54-56. (in English) ["Odonates are excellent habitat indicators of present and past environmental conditions in aquatic habitats. The objective of the present study was to check out the diversity and abundance of Odonates around the lentic habitat, Rankala Lake. A total of 81 individuals was recorded from four localities around the Rankala Lake comprising of ten species (1 unidentified) of dragonflies and three species of damselflies. Family Libellulidae was the most represented (nine species) while family Coenagrionidae was represented by three species. Among

four selected sites, Choupati site has shown maximum diversity ( $H=2.187$ ); however, species abundance was found to be more at Padpath Udyan site. This latter site has plenty of aquatic vegetation dominated by *Sacciolepis indica* and *Alternanthera paronychioides* and shallow water. The Shannon-Weiner index ( $H$ ) was 2.187 at Rankala Choupati, followed by 1.858 at Tambat Kaman and Fish Seed Centre and 1.588 at Padpath Udyan. Margalef's richness ( $D_{mg}$ ) index was found to be 3.246, 1.443, 2.148 and 1.406 at localities 1, 2, 3 and 4 respectively. The present study indicates that the aquatic habitat with good vegetation is most suitable for Odonata life and open area is having the high species richness and  $H$  index than in a water body." (Author)] Address: Madhukar, G.S., Dept Zool., Shivaji Univ., Kolhapur 416004, Maharashtra, India. Email: smg\_zoo@unishivaji.ac.in

**18853.** Malikova, E.I.; Chistyakov, Yu.A. (2021): First record of *Anax nigrofasciatus* Oguma, 1915 (Odonata: Aeshnidae) from Russia. Far Eastern Entomologist 439: 24-28. (in English, with Russian summary) ["*A. nigrofasciatus* was collected on a small pond in the vicinity of Vityaz settlement, Gamov Peninsula, Primorsky Krai in 2021. It is the first record of this East Asian species from Russia. *A. nigrofasciatus* clearly differs from *A. parthenope julius* Brauer, 1865, more common in the south of the Russian Far East, by body coloration and by details of morphology." (Authors)] Address: Malikova, Elena, Blagoveshchensk State Pedagogical University, Blagoveshchensk, 675000, Russia. E-mail: e\_malikova@inbox.ru

**18854.** Mehmood, S.A.; Zia, A.; Ahmed, S.; Panhwar, W.A.; Khan, W.; Shah, M.; Ullah, I. (2021): Seasonal abundance and distribution of dragonflies in upper Siran valley of District Mansehra Pakistan. Brazilian Journal of Biology 81(3): 785-791. (in English, with Portuguese summary) ["Present study was conducted to study seasonal abundance and distribution of dragonflies in upper Siran valley district Mansehra Pakistan. To collect data, eleven localities were visited for three consecutive years (2016-2018). Results come up with a sum of 300 specimens identified under three families, eight genera and twenty species. Highest seasonal abundance recorded during summer and spring were 80.67% and 13.33% respectively while minimum 6.00% was recorded during early autumn. Dominant species observed were, *Orthetrum chrysis* (14.00%), followed by *O. glaucum* (12.00%), *Palpopleura sexmaculata sexmaculata* (11.33%) and *O. cancellatum cancellatum* (8.00%). However the highest population of dragonflies was found in Munda Gucha with a percentage of 11.33 followed by Jabbar (11.00%) and Sachan (9.67%). The lowest populations were recorded in Suham (6.00%), Dadar (7.67%) and Jabori (7.67%). The surveyed valley showed diverse anisopterous fauna and thus further extensive surveys are recommended that can come up with more important species from the area." (Authors)] Address: Mehmood, S.A., Hazara University Mansehra, Department of Zoology, Pakistan

**18855.** Miroglu, A. (2021): A suprising dragonfly record:

*Selysiotthemis nigra* (Insecta: Odonata) from Black Sea Region of Turkey. Turkish Journal of Biodiversity 4(2): 66-68. (in Turkish, with English summary) ["In this study, it was given regionally interesting record of *Selysiotthemis nigra* that its distribution known from Turkey. Two females were collected and observed many males and females from Samsun province in the Middle Black Sea Region of Turkey. This species is new record for the Black Sea Region. In addition, the present record are to provide new data on known distribution of the species in Turkey and to its migration route in the region." (Author)] Address: Miroglu, A., Ordu Üniversitesi, Fatsa Deniz Bilimleri Fakültesi, Balıkcıyık Teknolojisi Mühendisliği Bölümü, Ordu, Turkey. E-mail: alimiroglu@gmail.com

**18856.** Mocq, J.; Soukup, P.R.; Näslund, J.; Boukal, D.S. (2021): Disentangling the nonlinear effects of habitat complexity on functional responses. Journal of animal ecology 90(6): 1525-1537. (in English) ["1. Structural complexity of habitats modifies trophic interactions by providing refuges and altering predator and prey behaviour. Nonlinear effects on trophic interaction strengths driven by these mechanisms may alter food web dynamics and community structure in response to habitat modifications. However, changes in functional response, the relationship between prey density and feeding rate, along habitat complexity (HC) gradients are little understood. 2. We quantified functional responses along a HC gradient from an entirely unstructured to highly structured habitat in a freshwater system, using dragonfly larvae (*Aeshna cyanea*) preying on *Chaoborus obscuripes* larvae. To disentangle mechanisms by which changes in HC affect functional responses, we used two different approaches – a population-level and a behavioural experiment–, applied an information theoretic approach to identify plausible links between HC and functional response parameters, and compared our results to previous studies. 3. Functional response shape did not change, but we found strong evidence for nonlinear dependence of attack rate and handling time on HC in our study. Combined results from both experiments imply that attack rate increased stepwise between the unstructured and structured habitats in line with the threshold hypothesis, because the predators gained better access to the prey. Handling time was lowest at an intermediate HC level in the population-level experiment, while the direct estimate of handling time did not vary with HC in the behavioural experiment. These differences point toward HC-driven changes in foraging activity and other predator and prey behaviour. 4. Most previous studies reported stepwise decrease in attack rate in line with the threshold hypothesis or no change with increasing HC. Moreover, changes in the handling time parameter with HC appear to be relatively common but not conforming to the threshold hypothesis. Overall, increased HC appears to respectively weaken and strengthen trophic links in 2D and 3D predator-prey interactions. 5. We conclude that detailed understanding of HC effects on food webs requires complementary experimental approaches across HC gradients that consider predator foraging strategies and predator and

prey behaviour. Such studies can also help guide conservation efforts as addition of structural elements is frequently used for restoration of degraded aquatic habitats." (Authors)] Address: Mocq, J., Univ. of South Bohemia, Fac. of Science, Dept of Ecosystem Biology & Soil & Water Research Infrastructure, Branišovská, 1760, 37005 České Budějovice, Czech Republic. E-mail: julien.mocq@gmail.com

**18857.** Nava-Bolaños, A.; Vrech, D.E.; Peretti, A.V.; Córdoba-Aguilar, A. (2021): Argentinian odonates (dragonflies and damselflies): current and future distribution and discussion of their conservation. Journal of Threatened Taxa 13(11): 19448-19465. (in English, with Spanish summary) ["In terms of conservation, Argentinian odonates have not been assessed using a quantitative approach. One way to achieve this is by modelling their distribution to gather the extent of occurrence. Thus, we modelled the current and future (projected year, 2050) potential distribution of 44 odonate species that occur in Argentina as well as in neighboring countries. Our models of current times indicate a fairly wide distribution for most species but one exception is relevant for conservation purposes: *Lestes dichrostigma* has less than 30,000 km<sup>2</sup> and falls in the 'Near Threatened' category according to the IUCN Red List. Another seven species have less than or close to 100,000 km<sup>2</sup>: *Elasmothermis cannacrioides*, *Erythemis credula*, *E. paraguayensis*, *Heteragrion angustipenne*, *H. inca*, *Lestes forcifera*, and *Mecistogaster linearis*. Future distribution estimates suggest that: a) 12 species will lose or gain around 10%, four species will increase their distribution beyond 10% (up to 2,346%), and 28 species will lose more than 10% (up to 99%). Although current protected areas embrace most odonate species in Argentina, it is still premature to conclude whether this situation will remain in the future given the physiological tolerance and dispersal abilities of the study species among other drivers of distribution." (Authors)] Address: Vrech, D.E., Instituto de Diversidad y Ecología Animal, CONICET - Universidad Nacional de Córdoba, Vélez Sarsfield 299 (5000), Córdoba, Argentina. E-mail: dvrech@unc.edu.ar

**18858.** Nowak, M.; Weihrauch, F. (2021): *Orthetrum ransonnetii* has gained a foothold in the Canary Islands (Odonata: Libellulidae). Notulae odonologicae 9(7): 291-295. (in English) ["*Orthetrum ransonnetii* is a recent addition to the fauna of Fuerteventura, Canary Islands, but its status on the island has remained unclear. In this study evidence is provided that in the past few years the species has established a resident population there. Further expansion of the species in the Canarian archipelago can be expected." (Authors)] Address: Nowak, M., Fuchseckstr. 16/1, 73114 Schlat, Germany. E-mail: Nowak-Schlat@t-online.de

**18859.** Santos, A.A.; Sender, L.M.; Wappler, T.; Engel, M.S.; Diez, J.B. (2021): A Robinson Crusoe story in the fossil record: Plant-insect interactions from a Middle Jurassic ephemeral volcanic island (Eastern Spain). Palaeogeography, Palaeoclimatology, Palaeoecology 583: 12 pp. (in English) [Highlights: • First study of plant-insect interactions from the Ju-

Jurassic of the Iberian Peninsula. • Comparison with other mid-Jurassic plant-insect interactions. • Identification of possible culprits for the different damages. • Discussion on colonization strategies by insects during the Jurassic. Abstract: We present here the first record of plant-insect interactions from an ephemeral volcanic island that was placed 150 km away from the nearest continental mass. The island was formed and destroyed during the Aalenian (Middle Jurassic) in a shallow sea of the southwestern Tethyan realm corresponding today to a place located in eastern Spain. These plant-insect interactions were mainly documented in leaves of Cycadophytes (comprising both Cycads and Bennettitales), and they have been described and classified into different Damage Types (DTs) and Functional Feeding Groups (FFGs). The interactions were assigned to 11 different DTs including different types of hole feeding, margin feeding, surface feeding, piercing and sucking, mining(?), and some putative ovipositional scars. The presence of these interactions implies that the island was colonized by different groups of insects, including orders such as Coleoptera, Hemiptera, Odonata, or Lepidoptera. The low variety and incidence of interactions comparing with other Middle Jurassic plant-insect interactions assemblages indicate that the diversity of insects was not high, possibly due to the difficulty of reaching this island by various lineages, the small size of the landmass of the island, and the limited food availability (mainly Cycadophytes). Possible colonization strategies could be by atmospheric dispersion, using floating remains of plants or pterosaurs as vectors, by active flight for Lepidoptera, or by rafting and floating in marine currents for flightless or other insects." (Authors)] Address: Santos, A., Depto de Xeociencias Mariñas e Ordenación do Territorio, Facultade de Ciencias do Mar, Universidade de Vigo, 36310 Vigo, Spain. E-mail: [asantos@uvigo.es](mailto:asantos@uvigo.es)

**18860.** Sanz Sanz, T.; Montoya Jiménez, M. (2021): Primera cita de *Anax parthenope* (Selys, 1839) (Odonata, Aeshnidae) en la provincia de León (NO de España). *Archivos Entomológicos* 24: 99-101. (in Spanish, with English summary) [First record of *A. parthenope* from the province of León (NW Spain). The first record of *A. parthenope* from the province of León (NW Spain) is documented, which remained as the only one in the Castilla y León Autonomous Community from where its occurrence had not been so far reported: Embalse de Villameca, en Quintana del Castillo (León) el 26-VII-2019.] Address: Sanz Sanz, T., 1 c/ El Esguilo, 4. E-24878 Fresnedo de Valdellorma (León), Spain. E-mail: [donquillos@hotmail.com](mailto:donquillos@hotmail.com)

**18861.** Schmidt, K.J.; Soluk, D.A.; Mays Maestas, S.E.; Britten, H.B. (2021): Persistence and accumulation of environmental DNA from an endangered dragonfly. *Scientific Reports* 11(18987) (2021): 8 pp. (in English) ["Detection of environmental DNA (eDNA) has become a commonly used surveillance method for threatened or invasive vertebrates in both aquatic and terrestrial environments. However, most studies in this field favor vertebrate target species. Environmental DNA protocols can be especially useful for endangered invertebrates such as *Somatochlora hineana* where

conservation efforts have been greatly hindered by training, time, overall costs, and environmental impacts associated with conducting surveys in the calcareous fens occupied by this species. An essential step in developing such a protocol is to evaluate the dynamics of eDNA concentration under controlled conditions. We used the quantitative polymerase chain reaction (qPCR) to examine seasonal shifts in the persistence and net-accumulation of eDNA from captive *S. hineana* larvae in experimental mesocosms at temperatures corresponding with their overwintering (5.0 °C) and active (16.0 °C) seasons. Environmental DNA persisted longer at 5.0 °C but accumulated more readily at 16.0 °C. Differences in the accumulation and persistence of eDNA reflect differences in the longevity of eDNA at different temperatures and seasonal differences in larval *S. hineana* behavior. This study highlights the importance of considering how seasonal changes in temperature influence not only the speed of eDNA degradation but also the target species' eDNA shedding rates." (Authors)] Address: Schmidt, Kristie, Univ. South Dakota, Vermillion, SD, USA. Email: [Kristie.Schmidt@uky.edu](mailto:Kristie.Schmidt@uky.edu)

**18862.** Sergio, C.; Luca, R.; Olivier, F. (2021): Plasticity and flexibility in the anti-predator responses of treefrog tadpoles. *Behavioral Ecology and Sociobiology* (2021) 75:142: 14 pp. (in English) ["Tadpoles can respond to perceived predation risk by adjusting their life history, morphology, and behavior in an adaptive way. Adaptive phenotypic plasticity can evolve by natural selection only if there is variation in reaction norms and if this variation is, at least in part, heritable. To provide insights into the evolution of adaptive phenotypic plasticity, we analyzed the environmental and parental components of variation in predator-induced life history (age and size at metamorphosis), morphology (tail depth), and behavior of Italian treefrog tadpoles (*Hyla intermedia*). Using an incomplete factorial design, we raised tadpoles either with or without caged predators (dragonfly larvae, gen. *Aeshna*) and, successively, we tested them in experimental arenas either with or without caged predators. Results provided strong evidence for an environmental effect on all three sets of characters. Tadpoles raised with caged predators (dragonfly larvae, gen. *Aeshna*) metamorphosed earlier (but at a similar body size) and developed deeper tails than their fullsib siblings raised without predators. In the experimental arenas, all tadpoles, independent of their experience, flexibly changed their activity and position, depending on whether the cage was empty or contained the predator. Tadpoles of the two experimental groups, however, showed different responses: those raised with predators were always less active than their predator-naïve siblings and differences slightly increased in the presence of predators. Besides this strong environmental component of phenotypic variation, results provided evidence also for parental and parental-by-environment effects, which were strong on life-history, but weak on morphology and behavior. Interestingly, additive parental effects were explained mainly by dams. This supports the hypothesis that phenotypic plasticity might mainly depend on maternal effects and that it might be the expression of condition-dependent mechanisms." (Authors)] Address: Ser-

gio, C., Dept of Life Science and Systems Biology, University of Turin, Via Accademia Albertina 13, 10123 Turin, Italy. E-mail: sergio.castellano@unito.it

**18863.** Skevington, J.H.; Buck, M. (2021): The first documented migration of a potter wasp, *Ancistrocerus adiabatus* (Hymenoptera: Vespidae: Eumeninae). *The Canadian Field-Naturalist* 135(2): 117-119. (in English) ["Eumenine wasps are not known to be migratory and have never been proposed as migrants, let alone documented as such. We document a large-scale migration of a common eumenine, *Ancistrocerus adiabatus*, during which 44 000–68 000 wasps moved through a known migration corridor in southwestern Ontario, Canada, in less than an hour. Evidence for migration of another eumenine, *Pachodynerus erynnis*, six species of flower flies (Diptera, Syrphidae), and two Odonata is also provided. ... Other apparent insect migrants (all moving east to west), noted at Zion Road on 13 September, included: ... *Tramea lacerata* and *Anax junius*." (Authors)] Address: Skevington, J.H., Canadian National Collection of Insects, Arachnids and Nematodes, Agriculture & Agri-Food Canada, 960 Carling Avenue, Ottawa, Ontario K1A 0C6 Canada. E-mail: jhskevington@gmail.com

**18864.** Swain, P.K.; Dora, S.P.; Battula, S.M.; Barik, A.K. (2021): Numerical investigation of wing–wing interaction and its effect on the aerodynamic force of a hovering dragonfly. *Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering* 235(12): 1648-1663. (in English) ["The present research focuses on the timing of wing–wing interaction that benefits the aerodynamic force of a dragonfly in hovering flight at Reynolds number 1350. A 3-D numerical simulation method, called the system coupling, was utilised by implementing a two-way coupling between the transient structural and flow analysis. We further explore the aerodynamic forces produced at different phase angles on the forewing and hindwing during the hovering flight condition of a dragonfly. A pair of dragonfly wings is simulated to obtain the force generated during flapping at a 60° inclination stroke plane angle with respect to the horizontal. The hovering flight is simulated by varying the phase angle and the inter-distance between the two wings. We observe a significant enhancement in the lift (16%) of the hindwing when it flaps in-phase with the forewing and closer to the forewing, maintaining an inter-wing distance of 1.2 cm (where centimetre is the mean chord length). However, for the same condition, the lift of the hindwing reduces by 9% when the wings are out of phase/counterstroke flapping. These benefits and drawbacks are dependent on the timing of the interactions between the forewing and hindwing. The time of interaction of wake capture, wing–wing interaction, dipole structure and development of root vortex are examined by 2-D vorticity of the flow field and isosurface of the 3-D model dragonfly. From the isosurface, we found that the root vortex elicited at the root of the hindwing in counterflapping creates an obstacle for the shedding of wake vortices, which results in reduction of vertical lift during the upstroke of flapping. Hence, at the supination stage, a dragonfly uses a high rotation angle for the hovering flight mode. It

is observed that the system coupling method was found to be more efficient and exhibited better performance. The present numerical methodology shows a very close match to the previously reported results." (Authors)] Address: Swain, P.K., Dept of Mechanical Engineering, GIT, GITAM (Deemed to be University), Visakhapatnam, Andhra Pradesh, India

**18865.** Takemura, M.; Maoka, T.; Koyanagi, T.; Kawase, N.; Nishida, R.; Tsuchida, T.; Hironaka, M.; Ueda, T.; Misawa, N. (2021): Elucidation of the whole carotenoid biosynthetic pathway of aphids at the gene level and arthropodal food chain involving aphids and the red dragonfly. *BMC Zoology* 6(19). 13 pp. (in English) ["Background: Aphids can be positioned as robust pest insects in farming and as ones of the model organisms for arthropods in molecular biology. Carotenoids are pigments that protect organisms from photooxidative damage caused by excessive light. Aphids were shown to possess genes of fungal origin for carotenoid biosynthesis, whereas a little knowledge was available about the functions of the genes and the biosynthetic pathway. Even carotenoid species contained in aphids were not enough understood. Main purpose of this study is to clarify these insufficient findings. Results: The whole carotenoid biosynthetic pathway of the pea aphid (*Acyrtosiphon pisum*) was elucidated at the gene level, through comprehensive functional analysis of its carotenogenic genes, using *Escherichia coli* that synthesized carotenoid substrates, along with structural and quantitative analysis of carotenoids from various aphid species. Four genes were needed to synthesize all carotenoids accumulated in aphids from geranylgeranyl diphosphate. The *tor* gene mediated desaturation reaction from phytoene to 3,4-didehydrolycopene. It was revealed that a gene designated *ApCrYB3*, which was considered to have functionally evolved in aphids, can convert lycopene into uncommon carotenoids with the  $\gamma$ -ring such as (6'S)- $\beta,\gamma$ -carotene and  $\gamma,\gamma$ -carotene. We further demonstrated that the atypical carotenoids work as ecological indicators for estimating the food chain from aphids to predatory arthropods, and showed that aphids contributed with significant levels to the food chain from insect herbivores to several predatory arthropods, i.e., *Sympetrum frequens* (adults), seven-spotted ladybird (*Coccinella septempunctata*), and two spiders, *Oxyopes sertatus* and *Nephila clavata*. Gut microflora of the dragonfly (mature adults) was also found to include endosymbiotic bacteria such as *Serratia symbiotica* specific to the black bean aphid (*Aphis fabae*). Conclusions: We revealed the whole carotenoid biosynthetic pathway of aphids, including functional identification of the corresponding genes. Subsequently, we showed that arthropodal food chain can be estimated using the uncommon carotenoids of aphids as ecological indicators. This result indicated that aphids made significant contributions to the food chain of several predatory arthropods including the red-dragonfly adults. Aphids are likely to be positioned as an important "phytochemicals" source for some predatory insects and arachnids, which are often active under bright sunlight." (Authors)] Address: Misawa, N., Research Institute for Bioresources & Biotechnology, Ishikawa Prefectural Univ., 1-308 Suematsu, Nonouchi-shi, Ishikawa



**18866.** Thongprem, P. (2021): Torix Rickettsia: aspects of diversity, host range and symbiont-host interaction. PhD thesis, University of Liverpool. VII + 185pp. (in English) ["Rickettsia bacteria have traditionally been considered as the aetiologic agent of deadly arthropod-borne diseases in humans and livestock. However, more recent studies have discovered Rickettsia as non-vertebrate pathogens that are actually important to invertebrate evolution as symbionts. Recently, Rickettsia in the 'torix' clade were described from glossiphoniid leeches. This clade has since been observed to infect a wide range of invertebrate species and is thought to be most common in host species associated with freshwater habitats. This leads to a general hypothesis that torix Rickettsia are a common endosymbiont of freshwater taxa. However, this hypothesis is yet to be formally tested. To assess this hypothesis, I firstly investigated in-depth a freshwater-associated insect order, the Odonata, in which torix Rickettsia had not been previously recorded. This study revealed the first incidence of torix Rickettsia in odonates, present in roughly 10% of the screened species. Maternal transmission of this endosymbiont was observed in *Coenagrion puella*, and this strain has likely driven mtDNA introgression between the insect and its sister species (*C. pulchellum*). Then, I expanded the screen to test for torix Rickettsia in other invertebrate taxa and compared the infection frequency between freshwater and terrestrial communities. Fisher's exact test indicated that the proportions of infected species from freshwater community is significantly higher than the terrestrial group in three representative insect orders. In addition to this broad screen, torix Rickettsia in a few blood-feeding insects are recorded for the first time, including mosquitos (*Anopheles plumbeus*), black flies (*Simulium aureum*) and the common bed bug (*Cimex lectularius*). Bed bugs were then established as a model system to study biological impacts of torix Rickettsia carriage. Symbionts in the bed bug were transmitted via matriline only. There were no signs of reproductive parasitism, sex ratio distortion or cytoplasmic incompatibility phenotypes. Torix Rickettsia only express mild parasitic impacts on *C. lectularius* biology by slowing development time and reducing fecundity. Finally, this thesis raises three questions for onward study; i) why torix Rickettsia are abundant in freshwater biomes, ii) how do torix strains transition into terrestrial species and iii) how torix Rickettsia are associated with broad spectrum of eukaryotic hosts. Possible scenarios for these three questions are discussed for future study." (Author) Address: Thongprem, P., University of Liverpool Faculty of Health and Life Sciences, UK

**18867.** Triyanti, M.; Arisandy, D.A. (2021): Keanekaragaman Jenis Capung Famili Libellulidae di Bukit Cogong Kabupaten Musi Rawas - Diversity species of dragonflies family of Libellulidae in Bukit Cogong Musi Rawas. *Biota: Jurnal Ilmiah Ilmu-Ilmu Hayati* 6(1): 44-51. (in Indonesian, with English summary) ["There are many species of dragonflies in Cogong Hill, Musi Rawas Regency, but not yet well recor-

ded, so it is necessary to collect data on species of dragonflies and studies on diversity. Therefore, the research was conducted to study the diversity of dragonflies of the Libellulidae family in Cogong Hill, Musi Rawas Regency. This research uses the technique of exploring transects by determining 3 observation stations. Each station consists of 5 transects with a transect area of 100x100 m. The capture of the Libellulidae family in Bukit Cogong, Musi Rawas Regency using a net net, was identified by observing the morphological characteristics of the dragonflies of the libellulidae family. Five species of dragonflies from the Libellulidae family were found, namely: *Orthetrum sabina*, *Neurothemis fluctuans*, *Bracythemis contaminata*, *Rhodothemis rufa*, and *Onychothemis culminicola*. The highest species composition is *Orthetrum sabina* by 46.34%, while the lowest is *Onychothemis culminicola* by 6.09%. Uniformity index at all stations in high category, stable community, dominance index (C) in low category, and diversity index is low with a value is 1.61." (Authors) [Triyanti, M., Program Studi Pendidikan Biologi, STKIP PGRI Lubuklinggau Jl Mayor Toha, Kel. Air Kuti, Kec. Lubuk Linggau Timur I, Kota Lubuk Linggau, Sumatera Selatan, Indonesia. E-mail: mertitriyanti28@gmail.com

**18868.** Trong, K.H.; Thi, N.D.; Thi Nhu, Y.N.; Thi, H.V.; Thanh Ho, V.T. (2021): Impacts of climate change to the growth and development of the dragonflies of Tram Chim National Park, Tam Nong – Dong Thap, Vietnam. IOP Conference Series: Materials Science and Engineering, Volume 1092, The 2nd International Conference on Innovative Technology, Engineering and Sciences (iCITES 2020) 22nd-23rd December 2020, Pekan Pahang, Malaysia Citation K H Trong et al 2021 IOP Conf. Ser.: Mater. Sci. Eng. 1092 012090. 8 pp. (in English) ["Dragonflies are insects that have an association with wetland ecosystems and sensitive to changes in environmental factors. Therefore, under the increasingly strong impacts of climate change, they exhibit quite pronounced responses. Assessing the growth and development process of dragonflies can contribute positively to assessing and making strategies to cope with the impacts of climate change which is becoming increasingly complicated. The results of the current study showed that the Dragonfly species composition in Tram Chim National Park was remarkably diverse, including 11 species (2008) and 12 species (2019) of larvae belonging to 6 families in Zygoptera and Anisoptera. Based on information from field surveys, the results showed that the presence of dragonflies tended to be earlier than those recorded in the past, and it was often difficult to find them along the survey route, especially nearer to noon. Range, flight speed, and altitude were somewhat reduced, especially for Zygoptera. These environmental factors fluctuated greatly, which might cause pressing impacts on the growth and development of Dragonflies in the Tram Chim National Park area." (Authors) Address: Van Thi Thanh Ho, Hochiminh City Univ. of Natural Resources & Environment (HCMUMRE), Vietnam. E-mail: httvan@hcmunre.edu.vn

**18869.** Uyizeye, E.; Clausnitzer, V.; Kipping, J.; Dijkstra, K.-D.B.; Willey, L.; Kaplin, B.A. (2021): Developing an odonate-

based index for prioritizing conservation sites and monitoring restoration of freshwater ecosystems in Rwanda. *Ecological Indicators* 125 (2021) 107586. 18 pp. (in English) ["Land use changes and the ways that natural resources are extracted and used pose severe threats to freshwater ecosystems globally. This is particularly pronounced in developing and densely populated countries, such as Rwanda. In-depth understanding of how ecosystems respond to threats could guide their restoration, conservation, and better management. The advancement of ecological monitoring tools is crucial for freshwater conservation. We developed and implemented an odonate-based tool, the Rwanda Dragonfly Biotic Index (RDBI), tailored to freshwater ecosystems in Rwanda as a metric to identify conservation priority sites and to monitor their restoration. The RDBI is determined based on three sub-indices: Distribution-Based Score (DBS), Threat-Based Score (TBS) and Sensitivity-Based Score (SBS). Species level-DBS increases from those that are widespread across all ecological zones to those that are restricted to only one ecological zone; TBS for a species ranges from those that are of least concern to those that are critically endangered, as per IUCN Red List; Species' SBS increases from those thriving in a highly disturbed habitat to those occurring only in a relatively intact habitat. Using RDBI, we identified hotspot habitats for odonates in Rwanda and benchmark sites for restoration. Hotspots are defined based on species richness, presence of unique species, and RDBI scores. Benchmark sites for restoration are habitats with the highest RDBI in each ecological zone. The value of using RDBI in ecosystem monitoring rests on the fact that it can help identify priority sites for conservation, and it uses organisms that are charismatic and relatively easy to identify. This is essential for citizen engagement and drawing a long-term link between policymaking, on-the-ground practices, and impacts on freshwater ecosystems." (Authors)] Address: Uyizeye, E., Keene State College, 115 Winchester St, Keene, NH 03431, USA

**18870.** Vitasse, Y.; Ursenbacher, S.; Klein, G.; Bohnenstengel, T.; Chittaro, Y.; Delestrade, A.; Monnerat, C.; Rebetez, M.; Rixen, C.; Strebel, N.; Schmidt, B.R.; Wipf, S.; Wohlgenuth, T.; Yoccoz, N.G.; Lenoir, J. (2021): Phenological and elevational shifts of plants, animals and fungi under climate change in the European Alps. *Biological Reviews of the Cambridge Philosophical Society* 96(5): 1816-1835. (in English) ["Mountain areas are biodiversity hotspots and provide a multitude of ecosystem services of irreplaceable socio-economic value. In the European Alps, air temperature has increased at a rate of about  $0.36^{\circ}\text{C decade}^{-1}$  since 1970, leading to glacier retreat and significant snowpack reduction. Due to these rapid environmental changes, this mountainous region is undergoing marked changes in spring phenology and elevational distribution of animals, plants and fungi. Long-term monitoring in the European Alps offers an excellent natural laboratory to synthesize climate-related changes in spring phenology and elevational distribution for a large array of taxonomic groups. This review assesses the climatic changes that have occurred across the European Alps during recent decades, spring phenological changes and

upslope shifts of plants, animals and fungi from evidence in published papers and previously unpublished data. Our review provides evidence that spring phenology has been shifting earlier during the past four decades and distribution ranges show an upwards trend for most of the taxonomic groups for which there are sufficient data. The first observed activity of reptiles and terrestrial insects (e.g. butterflies) in spring has shifted significantly earlier, at an average rate of  $-5.7$  and  $-6.0$  days  $\text{decade}^{-1}$ , respectively. By contrast, the first observed spring activity of semi-aquatic insects (e.g. dragonflies and damselflies) and amphibians, as well as the singing activity or laying dates of resident birds, show smaller non-significant trends ranging from  $-1.0$  to  $+1.3$  days  $\text{decade}^{-1}$ . Leaf-out and flowering of woody and herbaceous plants showed intermediate trends with mean values of  $-2.4$  and  $-2.8$  days  $\text{decade}^{-1}$ , respectively. Regarding species distribution, plants, animals and fungi ( $N = 2133$  species) shifted the elevation of maximum abundance (optimum elevation) upslope at a similar pace (on average between  $+18$  and  $+25$  m  $\text{decade}^{-1}$ ) but with substantial differences among taxa. For example, the optimum elevation shifted upward by  $+36.2$  m  $\text{decade}^{-1}$  for terrestrial insects and  $+32.7$  m  $\text{decade}^{-1}$  for woody plants, whereas it was estimated to range between  $-1.0$  and  $+11$  m  $\text{decade}^{-1}$  for semi-aquatic insects, ferns, birds and wood-decaying fungi. The upper range limit (leading edge) of most species also shifted upslope with a rate clearly higher for animals (from  $+47$  to  $+91$  m  $\text{decade}^{-1}$ ) than for plants (from  $+17$  to  $+40$  m  $\text{decade}^{-1}$ ), except for semi-aquatic insects ( $-4.7$  m  $\text{decade}^{-1}$ ). Although regional land-use changes could partly explain some trends, the consistent upward shift found in almost all taxa all over the Alps is likely reflecting the strong warming and the receding of snow cover that has taken place across the European Alps over recent decades. However, with the possible exception of terrestrial insects, the upward shift of organisms seems currently too slow to track the pace of isotherm shifts induced by climate warming, estimated at about  $+62$  to  $+71$  m  $\text{decade}^{-1}$  since 1970. In the light of these results, species interactions are likely to change over multiple trophic levels through phenological and spatial mismatches. This nascent research field deserves greater attention to allow us to anticipate structural and functional changes better at the ecosystem level." (Authors)] Address: Vitasse, Y., WSL Swiss Federal Institute for Forest, Snow & Landscape Research, Zürcherstr. 111, 8903 Birmensdorf, Switzerland. E-mail: yann.vitasse@wsl.ch

**18871.** Walia, G.K.; Katnoria, N. (2021): Chromosome characterization of four calopterygid damselflies with cytogenetic review of family Calopterygidae (Odonata: Zygoptera). *J. Adv. Zool.* 42(1): 107-117. (in English) ["Taxonomically, in family Calopterygidae, 183 species under 21 genera have been reported worldwide. Out of these, cytogenetic data pertains to only 22 species which is only 12% of the known species. In India, 9 species under 6 genera are present, while only 2 species has been studied cytogenetically. The present study has been conducted to linearly characterize the chromosomes of 4 species (*Matrona nigripictus*, *Neurobasis chinensis*, *Vestalis apicalis* and *Vestalis gracilis*) of

family Calopterygidae by conventional staining, C-banding, silver nitrate staining and sequence-specific staining and also compiled the cytogenetic data of the family. The species were collected from Meghalaya, Goa, Kerala, Himachal Pradesh states of India. All the species possess  $2n=25m$  as the diploid chromosome number with XO-XX sex determination except *Neurobasis chinensis* with  $2n=23$ , characterized by the presence of two equal sized large autosomal bivalents originated by the autosome fusion. C-banding and silver nitrate staining results depict the presence of C-bands and NOR's on the terminal positions of autosomal bivalents, while X chromosome and m bivalent show variation in distribution of C-heterochromatin and NOR's. Sequence-specific staining represents the complement of all the species as AT-rich due to more DAPI bright signals. All the cytogenetically studied species have been catalogued including the presently studied species and the list has been updated to 23 species." (Authors)] Address: Walia, Gurinder Kaur, Dept of Zoology and Environmental Sciences, Punjabi University, Patiala 147002, Punjab, India

**18872.** Wallis de Vries, M.F.; Manger, R.; van Grunsven, R. (2021): Trends van Dagvlinders en Libellen in het Drentsche Aa-gebied. Rapport VS2021.010. De Vlinderstichting, Wageningen. 29 pp. (in Dutch) ["Discussion and conclusion: For the dragonflies, only changes after 1990 could be analysed. As with the butterflies, the number of species increased (13) and decreased (15). The decline was particularly marked for species from fens and cooler climates, which are also under pressure elsewhere in the region. The increase was mainly for species from running water and species that have benefited from climate warming. These trends are in line with nationally observed developments. This is also expected for dragonflies as they are generally much more mobile than butterflies and their populations show similar dynamics on a large spatial scale. Nevertheless, these changes also reflect the development in habitat quality within the Drentsche Aa area, where nutrient-poor environments are under pressure, but the oxygen richness of the flowing water seems to have increased (which does not necessarily mean that the water has become less nutrient-rich)." (Authors, DeepL)] Address: De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands. Email: info@vlinderstichting.nl

**18873.** Wang, Y.; Liu, J.-j.; Li, B.-l.; Liu, W.; Zuo, Y.-f.; Kong, D.-x.; Zhu, J.-l. (2021): Relationships between characteristics of macrobenthic assemblages and environmental variables in the Heihe River Basin, China. *AQUA — Water Infrastructure, Ecosystems and Society* 70(5): 710-729. (in English) ["To clarify the characteristics of macrobenthic assemblages and their response to the aquatic environment in the upper and middle reaches of the Heihe River, water quality, sediments and macrobenthos measurements were conducted in the summers of 2018 and 2019. The results showed that 50 species of macrobenthos were identified [including 8 odonate taxa not further detailed], belonging to 3 phyla, 7 classes, 15 orders and 32 families, mainly arthropods (37 species) and mollusks (11 species). *Argyroneta*

*aquatica*, *Chlaznius* sp., dragonfly nymphs, *Palaemon modestus*, *Radix auricularia*, *Cyraululus albus* and *Suecinea* sp. were the dominant species in the whole study region; most of these are pollution-tolerant and moderately tolerant species. The macrobenthos density and biomass ranged from 10 to 577 ind./m<sup>2</sup> and from 0.0907 to 50.0562 g/m<sup>2</sup>, respectively, showing high spatial heterogeneity. Predators were the main functional feeding group. One-way analysis of variance clarified that Margalef's index and the Shannon–Wiener index differed significantly among the spatial areas ( $P<0.05$ ). Canonical correspondence analysis showed that the spatial heterogeneity of the macrobenthos was affected by the water temperature and the total nitrogen and total phosphorus in sediments ( $P<0.05$ ). Highlights: • The spatial variation community structures and species diversity of microbenthic in the Heihe River Basin (HRB) of China were investigated. • Analyzed the intensive fluctuations along the way of macrobenthic assemblages and their response relationship with environmental parameters in the HRB. • Natural environment factors and anthropogenic activities maintained the diversity and stability of macrobenthic communities of the HRB." (Authors)] Address: Wang, Y., College of Energy & Power Engineering, Lanzhou Univ. of Technology, Lanzhou 730050, China. E-mail: wangyu-mike@163.com

**18874.** Wang, Y.-J.; Sentis, A.; Tüzün, N.; Stoks, R. (2021): Thermal evolution ameliorates the long-term plastic effects of warming, temperature fluctuations and heat waves on predator-prey interaction strength. *Functional Ecology* 35(7): 1538- 1549. (in English) ["(1) How thermal evolution may affect trophic interactions and its implications for trophic system stability remains unstudied. To advance insights in how global warming shapes trophic interactions, we need to consider besides increases in mean temperatures, also daily thermal fluctuations (DTF) and heat waves (HW), and how their effects are modulated by thermal evolution. (2) Using a common-garden approach we tested how each thermal factor affected predator metabolic rate and functional response parameters, and used these responses to predict long-term predator-prey interaction strength between larvae of the damselfly *Ischnura elegans* and the water flea *Daphnia magna*. By using high- and low-latitude predator populations with the latter being exposed to higher mean temperatures, higher DTF and more frequent HW, we assessed the potential impact of thermal evolution at the high latitude using a space-for-time substitution. (3) In line with thermal adaptation, growth rates were faster and handling times shorter in low-latitude compared to high-latitude larvae at 24°C, while the opposite was true at 20°C. Warming weakened the long-term interaction strength, except for the high-latitude trophic system at DTF and HW where plastic responses therefore may not stabilize the high-latitude system. This extends the emerging insight that temperature variation may make ectotherms more vulnerable to warming. The contributions of metabolic rate, search rate and handling time in shaping thermal effects on interaction strength differed between latitudes. A key finding was that thermal evolution may further weaken the long-term interaction strength of the high-latitude trophic system under increases

in mean temperatures, even at DTF and potentially also at HW. (4) Our results underscore the importance of daily thermal fluctuations and heat waves in shaping predator-prey interactions, and may suggest an overall stabilizing contribution of predator thermal evolution ameliorating thermal plastic effects on food web stability." (Authors)) Address: Wang, Ying-Jie, Evol. Stress Ecology & Ecotoxicology, Univ. Leuven, Leuven, Belgium. Email: yingjie.wang@kuleuven.be

**18875.** Wildermuth, H. (2021): Auswirkungen des trockenheissen Sommers 2018 auf die Libellenfauna eines Wiesenweihers im östlichen Schweizer Mittelland. *Entomo Helvetica* 14: 33-44. (in German, with English and French summaries) ["Impact of the hot, dry summer of 2018 on the Odonata fauna of a meadow pond in the eastern Swiss Midlands. - Dragonflies rely on freshwater for their development. If a pond goes dry for several weeks during hot summer periods, the larvae will die. This was the case in 2018 at numerous small bodies of water in the Swiss Midlands. Questions were raised regarding the impact of pond desiccation on the local dragonfly fauna. The problem was studied at a small meadow pond that was created in 2010. In 2017, 28 odonate species were recorded, 16 of them with observed reproduction activities and 10 with successful development. In 2018 there were 19, 9 and 8 species, respectively, and in the following year 28, 16 and 4 species. In the second year after the hot and dry summer, the values were 25, 13 and 12 species, respectively. Unexpectedly, 4 species successfully developed in 2019: *Ischnura elegans*, *Sympetrum fonscolombii*, *S. sanguineum*, and *S. striolatum*. Their success is explained by their species-specific life histories. Only two years after the extreme weather event, the local odonate community had more or less recovered. Thanks to the species present in adjacent water bodies, the pond was rapidly recolonized. The importance of metapopulations based on dense limnological networks for both conservation and the promotion of local dragonfly fauna is underlined." (Author)] Address: Wildermuth, H., Haltbergstrasse 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**18876.** Wonglersak, R. (2021): Insect size and shape responses to temperature: a case study of British Odonata and Chironomidae (Diptera). PhD thesis, University of Southampton. 169pp. (in English) ["This PhD project investigated the response of wing length (as a proxy of body size) of Odonata and Chironomidae, and wing shape of Odonata to temperature and latitude. Three complementary data sources were used: natural history collections, field data, and mesocosm experiments. While natural history collections are valuable resources of specimens collected over long historical time scales, field data provides a modern perspective and mesocosm experiments provide a window on the future, under a predicted climate warming scenario. This PhD project used 5,331 museum specimens of 14 British Odonata species representing different life cycle types to examine the potential drivers of body size and wing shape responses to latitude and temperature (Chapter II and V). To control for latitude a field survey was performed during

the summer of 2018 at Edington, Somerset to compare modern wing length of three species with historical data based on museum specimens of the same species collected at the same locality (Chapter III). Furthermore, to investigate body size responses of chironomids under a future temperature scenario, 1,976 adult specimens of six chironomid species were collected from mesocosm experiments which comprised ponds at ambient temperature and ponds maintained at 4°C higher than ambient (Chapter IV). The results of Chapters II, III and IV showed that species and suborder (within Odonata) were significant factors affecting the magnitude of the temperature-size responses in Odonata and Chironomidae. Wing lengths of Zygoptera and Chironomidae are more sensitive to temperature and collection date than Anisoptera. Zygoptera and Chironomidae tend to get smaller with increasing temperature, likely due to higher temperatures disproportionately increasing developmental rate, resulting in smaller adults. Anisoptera showed no significant correlation with temperature, possibly due to selection for larger individuals in Anisoptera which are strongly territorial species. Adults of Zygoptera and Chironomidae emerging towards the end of the summer tend to be smaller than those emerging earlier in the season, likely due to larval development being time-constrained later in the season and as a result, larvae accelerate their developmental rate which comes at the cost of a smaller adult body size. The results of Chapter V indicated non-significant correlations between environment and wing shape in Anisoptera, while there were significant influences of latitude and mean seasonal temperature on wing shape in Zygoptera species, with broader and shorter wings found at lower latitudes with warmer temperatures. This finding corresponds well with a result of Chapter II which found shorter wing length with increasing temperature in all zygopteran species in the study. Overall, the results of this PhD project show that there are different factors influencing the temperature-size responses of insects, including phylogenetic relationships, sex, behaviour and life cycle types. Although this study found no universal temperature size responses in the focal taxa, Zygoptera and Chironomidae tend to have stronger negative body size responses to warming temperature and emergence date than Anisoptera. In addition, the study shows that wing shape variation in Zygoptera is more sensitive and adaptive to latitude and temperature than in Anisoptera." (Author) *Brachytron pratense*, *Aeshna cyanea*, *A. grandis*, *A. mixta*, *Anax imperator*, *Libellula quadrimaculata*, *Somatochlora metallica*, *Sympetrum striolatum*, *Calopteryx splendens*, *C. virgo*, *Coenagrion puella*, *Ischnura elegans*, *Lestes sponsa*, *Pyrrhosoma nymphula*. Address: Wonglersak, Rungtip: not stated



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2010

**18877.** Dow, R.A.; Reels, G.T. (2010): The Odonata of three National Parks in Sarawak. *Agrion* 14(1): 14-19. (in English) [Checklist of the regional from Kubah, Similajau and Lambir Hills National Parks are presented and discussed.] Address: Reels, G., 31 St Anne's Close, Winchester SO22 4LQ, UK. E-mail: gtreels@gmail.com

**18878.** GRETIA (2010): Synthèse des connaissances préalable à la déclinaison régionale du Plan national d'actions Odonates en Basse-Normandie. Rapport pour la DREAL Basse-Normandie: 148 pp. (in French) [[http://odonates.pnaopie.fr/wp-content/uploads/2011/01/Synthesedesconnaissances\\_Odonates.pdf](http://odonates.pnaopie.fr/wp-content/uploads/2011/01/Synthesedesconnaissances_Odonates.pdf)] Address: not stated

**18879.** Hord, K. (2010): Numerical investigation of the aerodynamic and structural characteristics of a corrugated wing. MSc. thesis, J.B. Speed School of Engineering, Department of Mechanical Engineering, University of Louisville: 78 pp. (in English) ["Previous experimental studies on static, bio-inspired corrugated wings have shown that they produce favourable aerodynamic properties such as delayed stall compared to streamlined wings and flat plates at high Reynolds numbers ( $Re = 4 \times 10^4$ ). The majority of studies have been carried out with scaled models of dragonfly forewings from the *Aeshna cyanea* [cf.] in either wind tunnels or water channels. In this thesis, the aerodynamics of a corrugated airfoil was studied using computational fluid dynamics methods at a low Reynolds number of 1000. Structural analysis was also performed using the commercial software SolidWorks 2009. The flow field is described by solving the incompressible Navier-Stokes equations on an overlapping grid using the pressure-Poisson method. The equations are discretized in space with second-order accurate central differences. Time integration is achieved through the second-order Crank-Nicolson implicit method. The complex vortex structures that form in the corrugated airfoil valleys and around the corrugated airfoil are studied in detail. Comparisons are made with experimental measurements

from corrugated wings and also with simulations of a flat plate. Contrary to the studies at high Reynolds numbers, our study shows that at low Reynolds numbers the wing corrugation does not provide any aerodynamic benefit compared to a smoothed flat plate. Instead, the corrugated profile generates more pressure drag which is only partially offset by the reduction of friction drag, leading to more total drag than the flat plate. Structural analysis shows that the wing corrugation can increase the resistance to bending moments on the wing structure. A smoothed structure has to be three times thicker to provide the same stiffness. It was concluded the corrugated wing has the structural benefit to provide the same resistance to bending moments with a much reduced weight." (Author)] Address: not stated

**18880.** Schiel, H.-J.; Hunger, H. (2010): Libellen - Erfolgskontrollen an ausgewählten Gewässern im Projektgebiet. *Naturschutz-Spektrum* 98: 401-407. (in German) [The development of the dragonfly fauna is described for five water bodies (systems) where measures were carried out within the framework of the LIFE-Project Living Rhine Floodplains near Karlsruhe, Baden-Württemberg, Germany. All measures were extremely successful for the dragonfly fauna, whereby the rapid settlement and reproduction of *Leucorhinia caudalis* at the newly created water body near Karlsruhe for the promotion of the species and the strong increase of *Coenagrion mercuriale* after the redesign of ditches in the nature reserve Oberbruchwiesen near Graben-Neudorf were the highlights. The results of the success control and possibilities of promoting dragonflies through special species protection measures are discussed.] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

## 2012

**18881.** Baker, L.F.; Ciborowski, J.J.H.; MacKinnon, M.D. (2012): Petroleum coke and soft tailings sediment in constructed wetlands may contribute to the uptake of trace metals by algae and aquatic invertebrates. *Science of the*

Total Environment 414: 177-186. (in English) ["The fate of trace metals in pore water collected from wetland sediments and organisms exposed to petroleum coke were evaluated within in situ aquatic microcosms. Oil sands operators of Fort McMurray, Alberta, Canada produced 60 million tonnes of petroleum coke by 2008, containing elevated concentrations of sulphur and several trace metals commonly seen in oil sands materials. This material may be included in the construction of reclaimed wetlands. Microcosms were filled with a surface layer of petroleum coke over mine-waste sediments and embedded in a constructed wetland for three years to determine how these materials would affect the metal concentrations in the sediment pore water, colonizing wetland plants and benthic invertebrates. Petroleum coke treatments produced significantly elevated levels of Ni. We also found unexpectedly higher concentrations of metals in "consolidated tailings" waste materials, potentially due to the use of oil sands-produced gypsum, and higher background concentration of elements in the sediment used in the controls. A trend of higher concentrations of V, Ni, La, and Y was present in the tissues of the colonizing macrophytic alga *Chara* spp. Aeshnid dragonflies may also be accumulating V. These results indicate that the trace metals present in some oil sands waste materials could be taken up by aquatic macroalgae and some wetland invertebrates if these materials are included in reclaimed wetlands." (Authors)] Address: Baker, Leanne, Dept Biological Sciences, Univ. of Windsor, 401 Sunset Ave., Windsor, Ontario, Canada N9B 3P4. Email: leannebaker@hotmail.com

**18882.** Chovanec, A.; Wimmer, R. (2012): Beitrag zur Kenntnis der Verbreitung von *Coenagrion ornatum* (Selys, 1850) im Weinviertel, Niederösterreich (Odonata: Coenagrionidae). Beiträge zur Entomofaunistik 13: 108-112. (in German) [Note on the distribution of *C. ornatum* in the Weinviertel, Lower Austria including new records and habitat descriptions] Address: Wimmer, R., Lerchenfelderstr. 46/4/46, 1080 Wien, Austria

**18883.** Fiebrich, M. (2012): Die Libellen der Stillgewässer der Halbinsel Bodanrück - Ein Vergleich verschiedener Erfassungsmethoden. Diplomarbeit. Universität zu Trier: 165 pp. (in German) ["In the context of this diploma thesis, the dragonfly fauna of 17 stillwaters on the Bodanrück [Baden-Württemberg, Germany] peninsula was investigated. Different recording methods were used, which were compared with regard to their resulting species compositions. In the course of this study, 44 dragonfly species were recorded in 7 inspections, 28 of which are considered to be native on the basis of exuviae findings. The results were analysed for their similarity in terms of species composition, phenological differences and development trends over the last 25 years, in order to develop necessary management and protection measures at the end. The study showed that the recording methods are not equivalent and do not reflect the same species composition, which is why dragonfly mapping based on only one recording method is highly questionable. There is therefore no "best" method. This was also found by Raebel et al. (2010) and Giugliano et al. (2012) and supports this

hypothesis. A survey of dragonfly species should accordingly be linked to the goal of mapping. Recording the imagines provides the most representative results with regard to the species diversity of a water body. In order to obtain information on the water quality, it is also advisable to search specifically for exuviae, even if this method is associated with a higher workload. Adult individuals, on the other hand, do not necessarily provide information on aquatic conditions (water quality, presence of predators, etc.). The recording of indicators of ground conditions should still be integrated, but this does not always provide a reliable indication of ground conditions. Standardised methods are indispensable for future surveys. For this purpose, the duration, period, area, etc. of surveys must be standardised in the future in order to make the results spatially and temporally comparable." (Author/DeepL)] Address: not stated

**18884.** Geneste, G. (2012): Suivi d'un site d'émergence d'*Oxygastra curtisii* sur la Seine à Nogent-sur-Seine (Aube). <http://www.odonates-champagne-ardenne.fr/>: 6 pp. (in French) ["On 20 June 2010, during a Sunday odonatological survey on the banks of the Seine, in the commune of Nogent-sur-Seine, I discovered a high density of exuviae of the Thin-bodied *Cordulia Oxygastra curtisii*. Carefully identified afterwards, 105 exuviae were collected over a distance of approximately 7 metres from the river bank. I suspect that such a large number of exuviae in such a small area is linked to the fact that the exuviae collected represent an accumulation of the current year's and the previous year's emergence. After carefully checking for the presence of exuviae later in the summer, I decide to monitor this site frequently and rigorously the following year. Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Geneste, G. E-mail: guillaume.geneste@yahoo.fr

**18885.** Karlsson, T.; Gezelius, L. (2012): Tåkerns trollsländor. Vingspegeln 31: 76-82. (in Swedish) ["During 2008-2012, the Entomological Society of Östergötland has run an inventory project, Trollsländor i Östergötland, with the aim of mapping the county's dragonfly fauna. This past season was the last of the project, and in 2013 the results of the inventory are planned to be compiled in a book of the type landscape fauna, together with previous finding data. This article presents the results of the inventory, as well as older data, for Lake Tåkern. The data on which the article is based are observations of dragonflies reported to Artportalen and literature data on dragonflies at Tåkern." (Author/DeepL)] Address: Karlsson, T., Opphemsgatan 2, S-58237 Linköping, Sweden. E-mail: tommy.karlsson@e.lst.se

**18886.** Schmidlin, S.; Schmera, D.; Baur, B. (2012): Alien molluscs affect the composition and diversity of native macroinvertebrates in a sandy flat of Lake Neuchâtel, Switzerland. *Hydrobiologia* 679(1): 233-249. (in English) ["The spread of alien molluscs is a serious threat to native biodiversity in fresh waters. Alien freshwater molluscs may deplete the resources of native species and alter the physical structure of the habitat through their shell mass. These changes might have both positive and negative effects on

native community members. We investigated the native macroinvertebrate community in relation to the densities of four alien mollusc species (*Corbicula fluminea*, *Dreissena polymorpha*, *Potamopyrgus antipodarum* and *Lithoglyphus naticoides*) in a sandy flat of Lake Neuchâtel, Switzerland. The habitat examined was dominated by these alien mollusc species. The abundance of the alien molluscs did not directly impact the native community assembly. However, *C. fluminea* and *D. polymorpha* influenced the composition and diversity of native macroinvertebrates by transforming the sandy substratum into a partly hard substratum habitat. Substantial differences in community composition between shallow (<3.5 m) and (=5 m) deep sites were recorded. At shallow sites, the abundance of *D. polymorpha* was significantly reduced as a result of depth-selective feeding of ducks. A controlled shell decay study revealed that shells of alien molluscs (*C. fluminea*, *D. polymorpha*) persist for a longer period in the sediment than those of native molluscs. Consequently, shells of alien molluscs have a long-lasting impact by modifying the sandy habitat. This form of ecosystem engineering favours the occurrence of several native taxa, but is disadvantageous for other taxa with specific habitat requirements, and thus can be regarded as an indirect impact of competition." (Authors) The list of macrozoobenthos includes "Ischnura sp.".] Address: Schmidlin, Stephanie, Section of Conservation Biology, Dept of Environmental Sciences, University of Basel, St. Johanns-Vorstadt 10, 4056, Basel, Switzerland

#### 2014

**18887.** Dayaram, A (2014): Discovery of novel circular replication-associated protein encoding single-stranded DNA viruses in ecosystems using viral metagenomic approaches. PhD. thesis, School of Biological Sciences, University of Canterbury: 293 pp. (in English) ["The introduction of next-generation sequencing (NGS) technologies has dramatically changed the field of virology, with many significant discoveries of novel circular replication-associated protein (Rep) encoding single-stranded (CRESS) DNA viruses. Traditionally, most research into CRESS DNA viruses has often focused on investigating plant and animal pathogens that are of significant economic importance. This research has led to the discovery and establishment of three different CRESS DNA families including Geminiviridae, Nanoviridae and Circoviridae, which infect eukaryotes. CRESS DNA viruses can have single or multicomponent genomes, with the latter requiring all components for infection. CRESS DNA viruses have circular single-stranded DNA (ssDNA) genomes with at least one protein encoding a Rep which is responsible for viral replication. It has been shown that CRESS DNA viruses are able to evolve rapidly with nucleotide substitution rates that are similar to those observed in RNA viruses. The Rep gene has conserved regions known as motifs which are often used to determine relatedness between CRESS DNA virus. NGS has expanded our knowledge on the diversity of novel CRESS DNA viruses. Viral genomes are now routinely recovered from different sample types without any prior knowledge of the viral sequence.

This has led to the development of the field of viral ecology. This field places an emphasis on viruses being one of the most abundant organisms on earth, and are therefore likely to play a major role in ecosystems. Environmental metagenomic studies have isolated CRESS DNA viruses from sea water, freshwater, faecal matter from various animals, soil, the atmosphere, sediments and sewage; dramatically increasing the known CRESS DNA viral genomes in the public domain. These studies are shedding light on the distribution of CRESS DNA viruses, as well as providing baseline data for future studies to examine virus-host interactions, community structure and ultimately viral evolution. Vector enable metagenomics (VEM) is another novel approach utilising NGS techniques for discovering CRESS DNA viruses. As many plant-infecting CRESS DNA viruses such as geminiviruses and nanoviruses are vectored by insects, this approach exploits this mechanism by using insect vectors as a surveillance tool to monitor and survey these viruses circulating in ecosystems. Recent studies have used these methods to identify known viral plant pathogens as well as novel viruses circulating in insect vectors such as whiteflies and other higher order insects such as mosquitoes and dragonflies. These approaches successfully demonstrated that VEM can be used as a unique method, with the first mastrevirus discovered in the new world being recovered from dragonfly species *Erythrodiplax fusca* using this approach. The research in this thesis uses metagenomics to survey CRESS DNA viral diversity in different organisms and environments. Two hundred and sixty eight novel CRESS DNA viruses were recovered and verified in this study from a range of sample types (adult Odonata, Odonata larvae, Mollusca, benthic sediment, water, Oligochaeta and Chironomidae) collected in the United States of America, Australia and New Zealand. All viral genomes isolated had two major proteins encoding for a putative Rep and coat protein (CP), with major Rep motifs identified in most Reps. Phylogenetic analysis of the Reps encoded by the viral genomes highlighted that most were extremely diverse falling outside of the previously described ssDNA viral families. A top-down approach was implemented to recover CRESS DNA viruses and possible viral pathogens from Odonata and their larvae. Thirty six viral genomes were recovered from terrestrial adult dragonflies as well as the twenty four from aquatic larvae. Dragonfly cycloviruses were isolated from the some adult Odonata species which were closely related to the isolates previously described by Rosario et al. (2012). The viruses isolated in the aquatic and terrestrial ecosystems differed substantially indicating that different CRESS DNA viromes exist in both land and water. The diversity of CRESS DNA viruses in seven different mollusc species (*Amphibola crenata*, *Austrovenus stutchburyi*, *Paphies subtriangulata*, *Musculium novazelandiae*, *Potamopyrgus antipodarum*, *Physella acuta* and *Echyridella menziesi*) from Lake Sarah and the Avon-Heathcote estuary both in New Zealand, were also investigated. One hundred and forty nine novel viral genomes were recovered. Two CRESS DNA genomes were recovered from molluscs which have Rep-like sequences most closely

related to those found in some bacterial genomes. Sclerotinia sclerotiorum hypovirulence-associated DNA virus 1 (SsHADV-1) was originally isolated from fungal species Sclerotinia sclerotiorum in China and was later found in benthic sediments in New Zealand. As part of this study, SsHADV-1 was recovered from dragonflies (*Erythemis simplicicollis*, *Ischnura ramburii* and *Pantala hymenaea*) collected in Arizona and Oklahoma, USA suggesting a larger distribution of these viruses and not surprising given the near global distribution of *S. sclerotiorum*. Dragonfly larvae-associated circular DNA viruses (DfIaCVs) that were originally isolated in Odonata larvae samples from three New Zealand lakes were later recovered from water, benthic sediment, worms and molluscs from one of the lakes initially sampled, suggesting that these viruses are ubiquitous in freshwater environments. This study has attempted to generate baseline data of CRESS DNA viruses in certain environments using NGS-informed approaches. This data was used to try and establish whether viral distribution in different sample types can potentially be explained by the food web interactions between different sample types. Although the analysis did not show any significant relationships between sample type interactions and viral distribution a few common associations between Odonata larvae and benthic sediment were evident. This was expected as the larvae live within the sediment so it could be assumed that they potentially have similar CRESS DNA viral distribution. Although the distribution of viruses varied across sample types, molluscs proved the best sampling tool for isolating largest numbers of CRESS DNA viruses in an ecosystem with extensive diversity. Overall, this research demonstrates the applications of NGS for investigating the diversity of CRESS DNA viruses. It demonstrates that some sample types such as Odonata in terrestrial systems and molluscs in aquatic environments, can be used as effective sampling tool to determine the diversity of CRESS DNA viruses in different environments as well as detecting previously isolated viruses. The CRESS DNA viruses isolated in this body of work provides baseline data that can potentially be used in future research to investigate hosts of these viruses and their interactions with hosts and potential flow in their environments." (Author)] Address: not stated

**18888.** Garré, A. (2014): Biología de las larvas de *Cyanallagma interruptum* Selys (1876) (Odonata: Coenagrionidae). PhD thesis, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata: 251 pp. (in Spanish) ["The order Odonata is composed of small to large, cosmopolitan, predatory, exopterygous, palaeopterous insects with hemimetabolous development: mostly aquatic larvae (nymphs or naiads) and aerial adults. The suborder Zygoptera consists of gracile, small to large organisms with generally slow flight. The larvae are slender with three conspicuous caudal lamellae at the posterior end of the abdomen. The family Coenagrionidae is one of the most numerous families within the suborder. The genus *Cyanallagma* was established by Kennedy in 1920. In Argentina it is represented by only three species: *C. bonariense* (Ris, 1913), *C. interruptum* (Selys, 1876) and *C. nigrinuchale* (Selys, 1876).

*Cyanallagma interruptum* (Selys, 1876) is typical of Patagonia, generally inhabiting lentic environments of different types, temporary or permanent, (lagoons, ponds and mallines) in both forest and steppe areas. Post-embryonic development is little studied in Argentina and is important to better understand voltinism and seasonal regulation, as well as to identify species from early larval stages, which is a prerequisite for the study of larval ecology. On the other hand, the larval stage is highly specific to the water body it inhabits. The characteristics of the environment limit the survival of one species or another. The different larval stages are distributed differently within the water body, possibly due to the availability of food, the absence and/or presence of predators, or the preference for one or another substrate. The main objective of this thesis is to determine several biological aspects of natural (non-laboratory reared) larval populations of the species *Cyanallagma interruptum* (Selys, 1876) and their relationship with physical-chemical and biotic variables in two lagoons: El Trébol and Los Juncos in the Northern Region of Patagonia, Argentina. Nine larval stages of *Cyanallagma interruptum* (Selys, 1876) were obtained in El Trébol lagoon and 10 in Los Juncos lagoon. *Cyanallagma interruptum* is a summer species according to Corbet (1956, 1999, 2002) and no seasonal synchronisation was observed. In both lagoons the species showed univoltinism. The diapause phenomenon occurs in the winter months and in the large and intermediate size stages. The description of the last larval stage (F-0) differs from the description made by Bulla in 1973. There is sexual dimorphism in the larval stages of *C. interruptum* which is evident from F-4 to F-0 (last larval stage) by the presence of genitalic sketches. A significant difference in the spatial distribution of *C. interruptum* larval stages was observed from the coast towards the centre in both studied lagoons. Substrate preference was observed for the different larval stages of *C. interruptum*, with medium and larger larval stages selecting *Potamogeton* sp., small larval stages preferring *Myriophyllum* sp. and *Potamogeton* sp. Both lagoons exhibited oligotrophic characteristics during the period of this study. However, differences in the distribution and relative abundance of the associated faunal taxa and physico-chemical variables influenced the distribution of larval stages from the coast towards the centre of both studied lagoons. Ambient temperature and concentrations of P-PO<sub>4</sub>, N-NH<sub>4</sub>, N-NO<sub>2</sub> and N-NO<sub>3</sub> ions influenced the relative abundance of the associated fauna and thus the larval cycle of *C. interruptum*." (Authors/DeepL) The thesis can be downloaded at: <http://sedici.unlp.edu.ar/handle/10915/33331>] Address: not stated

**18889.** Perkin, E.K.; Hölker, F.; Tockner, K. (2014): The effects of artificial lighting on adult aquatic and terrestrial insects. *Freshwater biology* 59(2): 368-377. ["There is a growing concern that artificial light might affect local insect populations and disrupt their dispersal across the landscape. In this study, we investigated experimentally the effect of artificial light on flying insects in the field, with an emphasis on aquatic insects. We asked whether lights prevented the ability of insects to disperse across the landscape, a process



that is crucial in colonising restored habitats. We set up six, c. 3.5 m high downward facing high-pressure sodium street-lights along a permanently connected oxbow in the Spree River of eastern Germany. We collected insects using 12 flight intercept traps, each with trays at three different heights (0.5, 1.5 and 2.5 m), placed at distances 0, 3, 40 and 75 m from the lights and 5, 8 and 80 m from water. The number of emerging aquatic insects in the study area was measured with six emergence traps. We emptied the traps 22 times between June and September 2010; the lights were on for 11 of these nights and off for the other 11. In total, we caught almost 27 times as many insects at traps 0 m from the lights when the lights were on than when they were off. Most insects caught when the lights were on were aquatic, with Diptera being the most common order. Furthermore, the proportion of aquatic insects caught at traps 0, 3 and 40 m from the lights when they were on was significantly higher than when they were off. On lit nights, more aquatic insects were captured per hour and m<sup>2</sup> (area in which flying insects were intercepted) at traps 0 m from the lights than emerged from per square metre per hour from the Spree River. Our results suggest that adult aquatic insects can be negatively affected by artificial light and that city planners should take this into account when designing lighting systems along rivers." (Authors) The study includes a passing reference to odonata.] Address: Perkin, Elizabeth, IGB, Leibniz-Institute of Freshwater Ecology & Inland Fisheries, 12587 Berlin, Germany. E-mail: eperkin@mail-ubc.ca

**18890.** Berquier, C. (2015): Etude écologique et patrimoniale du peuplement des odonates de Corse appliquée à la conservation des espèces et des zones humides à enjeux. PhD thesis, Ecologie, Environnement, Université de Corse, Pascal Paoli: 311 pp. (in French, with English summary) ["Corsica [France] is home to a great diversity of wetland subject to anthropogenic pressures and threats which have continued to grow and diversify in recent decades. The conservation of these environments with high heritage value and of the original Odonata community that develops in it, today represents significant environmental and societal challenges in order to preserve essential ecological services provided by these key elements of aquatic and terrestrial ecosystems. The applied research project developed as part of this thesis is focused on improving the knowledge available on the corsican dragonfly's community, to propose concrete conservation and management measures for this group and its main insular natural habitats. In this objective, the first part of this work has sought to fill principal knowledge gaps identified by previous studies on the situation of listed species, including by greatly intensifying exploration effort at the regional level. The special features, distribution, habitat requirements and ecological of many dragonflies growing in Corsica have been described with great precision. The information available on some taxa with high heritage value increased particularly as illustrated by the comprehensive definition of eco-bio-geographical situation of *Chalcolestes parvidens*. The second part of this work has sought to evaluate and compare the effectiveness of the

main sampling methods commonly used for the study of dragonfly's populations. In this context, the extensive information collected on the spatial organization and dynamics of the populations studied were especially used to propose and recommend appropriate methods for evaluation and monitoring the species to high conservation issue to main managers of natural areas of the island (Country Councils, PNRC, PMIBB, municipalities ...), including the emblematic and threatened *Lestes macrostigma*. The third part of this work is devoted to the development of tools for monitoring the quality of the main Odonata habitats. It lead to the development of a whole new biological index adapted to assess the ecological status of corsican rivers: "Odonata Community Index – Corsica" (OCIC). This innovative tool, based on the study of characteristics of dragonflies community of watercourses, was particularly effective during its confrontation with other biological indicators (diatoms, macrophytes, benthic macroinvertebrates) currently used on the island. The OCIC index and the Odonata group today appear clearly as a potentially promising alternative solution to improve the efficiency of the ecological quality assessment system of the rivers of Corsica, given the representativeness vulnerabilities which have been highlighted by the tests performed. The fourth and final part of this thesis, based on heritage and environmental assessments of the insular dragonfly's community made with all the information produced, ended with the development and the proposal of several regional conservation devices whose implementation is encouraged by the state services: a first regional actions plan, a first red list of threatened species and an updated list of species determinative for natural areas of ecological, flora and fauna interest (ZNIEFF). These important features are intended to contribute to improve the overall state of conservation of Corsican dragonflies and main wetlands that support them. They should enable the implementation of truly operational management actions and ensure better consideration of the main regional conservation and valuation issues identified. In the end, this thesis work that increased more than triple the previously available data on dragonflies of Corsica, will provide a new framework to develop the insular odonatology." (Author) The study can be downloaded at. <https://tel.archives-ouvertes.fr/tel-01408080>] Address: Berquier, C., Office de l'Environnement de la Corse, Observatoire – Conservatoire des Insectes de Corse, Lieu-dit "Lergie", RN 200, 20250 Corte, France. E-mail: cyril.berquier@oec.fr

**18891.** Bruens, A.; Drews, A.; Haacks, M.; Winkler, C. (2015): Die Libellen Schleswig-Holsteins. Arbeitskreis Libellen in der Faunistisch-Ökologischen Arbeitsgemeinschaft e. V. (Hrsg.). ISBN: 9783942062190: 542 pp. (in German) ["Dragonflies have been flying around the Earth for 300 million years already, and at the time they reached wingspans of about 70 centimeters. While many other animal species have become extinct over the course of time, the iridescent insects have survived. They are not only pretty to look at, they are also bioindicators of the quality of waters and wetlands. Even today there are some 5,600 species of this largest insects, and nationwide in Germany there are about 80

species. From the northernmost state of Schleswig-Holstein 65 species are known. The Libellen Schleswig-Holsteins is a comprehensive description of the distribution, population status, and ecology of, and threats facing, the species in this state. The text is illustrated by numerous photographs, graphics and tables. It also deals with the dragonfly species that occur in neighboring regions and are expected to show up in the future in Schleswig-Holstein. In addition to the faunal part, the work contains detailed chapters on other aspects of odonatology such as morphology and biology, the importance of different types of water, long-term development of stocks, legal safeguards and measures put in place to conserve species. The book is aimed not only at professionals and those working professionally with dragonflies, but also at all interested laypeople who are fascinated by these often colourful flying acrobats." (Publisher)] Address: Email: chr.winkler@email.de

**18892.** Laister, G. (2015): Libellen im Botanischen Garten Linz. ÖKO-L 37/4: 3-9. (in German) [20 dragonfly species were recorded in the Botanical Garden Linz (Austria), 14 of them possibly or definitely native. The dominant species are those that can be expected in garden ponds. However, garden ponds also have different characteristics and therefore attract different species because of the unequal demands that dragonfly species make on the habitat. Therefore, the composition of the dragonfly fauna of the water bodies also differs. For example, the two largest ponds (Pond 10 and Pond 11) attracted the most dragonflies with 17 and 18 species respectively. Ten and 11 species were seen at pond 2 and 3 respectively. However, this does not take into account whether the dragonflies also developed at these ponds. As good flyers, dragonflies can also be found - even regularly - at water bodies where they have not grown up.] Address: Laister, G., Naturkundliche Station, Neues Rathaus, Hauptstr. 1-5, 4041 Linz, Austria. E-mail: Gerold.Laister@mag.linz.at

**18893.** Schneider, W.; Samraoui, B. (2015): Chapter 5. The status and distribution of dragonflies and damselflies (Odonata) in the Arabian Peninsula. In: García, N., Harrison, I., Cox, N. and Tognelli, M.F. (compilers). (2015). The Status and Distribution of Freshwater Biodiversity in the Arabian Peninsula. Gland, Switzerland, Cambridge, UK & Arlington, USA: IUCN. ISBN: 978-2-8317-1706-7: 39-55. (in English) ["The number of dragonflies and damselflies of the Arabian Peninsula and the Socotra Archipelago amounts to 59 taxa with 5 additional species, *Pseudagrion niloticum*, *Anax tristis*, *Sympetrum sinaiticum*, *Trithemis pallidinervis*, and *Tamea basilaris* not evaluated. *Pseudagrion niloticum* has not been assessed because it was only recently discovered in Wadi Hadhramout (Schneider and Nasher 2013). For *Sympetrum sinaiticum* there is only a single record in northern Saudi Arabia at the southernmost border of the species' distribution. Although a female was collected during oviposition, its true status is unknown. The same holds true for the remaining three species: *Anax tristis* and *Tamea basilaris* are common migrants often spotted in the desert plains or far offshore. In Arabia *Trithemis pallidinervis* is only known from a single specimen collected in northern

Oman. It is likely that the occurrence of this Indian species originated from a windborne migration. The species has obviously not established stable populations in Arabia. The validity of some taxa and their precise distribution deserves further investigation, with the larvae of several species insufficiently described or even unknown (Jödicke et al. 2004). The highest diversity of Odonata in the region is concentrated in the southern Arabian Peninsula, including parts of Yemen (67.2%), Saudi Arabia (64.1%) and Oman (64.1%) (Table 5.1, Fig. 5.1). The south-west of Saudi Arabia, a hot-spot of Odonata diversity in the region, contrasts sharply with the much drier rest of the country." (Authors)] Address: Samraoui, B., Laboratoire de Recherche des Zones Humides, Université d'Annaba, 4 rue Hassi-Beida, Annaba, Algeria. E-mail: bsamraoui@yahoo.fr

**18894.** Valeriano, W.W. (2015): Cores estruturais da asa da libélula: *Chalcopteryx rutilans*. MSc. thesis, Universidade Federal de Minas Gerais: 61 pp. (in Portuguese, with English summary) ["In dragonflies, color has many functions, the most important ones being sex recognition, courtship and territory defense behaviors. In *C. rutilans* - a dragonfly found in the Amazonian rain forest those functions are performed by displaying their strongly iridescent hind wings, whereas the hyaline forewings are used to maintain the flight. The phenomenon of iridescence results from physical optics effects such as diffraction and interference. The aim of this work is to study the structures responsible for the male wing iridescence in *Chalcopteryx*. Visible range reflectance was measured for each different colored region of the wings. In order to determine the internal microstructure of the region that exhibits the same color, Scanning Electron Microscopy SEM was performed in cross-sections of the wings, after cutting in situ by Focused-Ion Beam FIB. Transmission Electron Microscopy TEM images were obtained from ultrathin sections of osmium treated, resin embedded and uranyl-stained wing. The SEM and TEM images revealed that the wings have a multilayered structure alternating different electron density materials. The number and thicknesses of the layers change across the wing, correlating with the local color. The composition of the layers is considered as being of chitin with different levels of melanin pigmentation. The electron density of the SEM cross-section images was assumed as being directly proportional to the optical density, and was used to define the modulation of the refractive indexes in the multilayered structure. The optical reflectance resulting from a structure with such a modulated refractive index was calculated numerically, using the transfer matrix method. A good correlation is obtained between experiment and simulation, thus confirming that in *C. rutilans* male wings colors result from a multi-layer structure, i.e., these wings are natural one dimensional photonic crystals." (Author)] Address: Valeriano, W.W., Depto de Física, ICEx, Universidade Federal de Minas Gerais, Av. Antônio Carlos 6627, 31270-901 Belo Horizonte, Minas Gerais, Brazil. Email: wesleyvaleriano@gmail.com

Zimmermann, W. (2015): Besprechung: Die Libellen des Nationalparks Harz. Landschaftspflege und Naturschutz in

Thüringen 52(1): 47. (in German) Book review. Odonate fauna of Harz mountain National Park.] Address: Zimmermann, W., Thomas-Müntzer-Str. 5, D-99423 Weimar, Germany. e-mail: wolfgang.zimmermann.web@kabelmail.de

## 2016

**18895.** Aideo, S.N.; Mohanta, D. (2016): Limiting hydrophobic behavior and reflectance response of dragonfly and damselfly wings. *Applied Surface Science* 387: 609-616. (in English) ["In this work, through water contact angle (CA) measurements, we explore hydrophobic behavior of different parts of the hind wings of a dragonfly, *Gynacantha Dravida* and of a damselfly, *Pseudagrion Microcephalum*. As we move from the basal to distal region, the contact angle ( $\theta$ ) was found to vary in the range of 120–136° for both the species. Moreover, the wing of the dragonfly was seen to be more hydrophobic than that of the damselfly one. An attempt has also been made to link roughness factor ( $r_\phi$ ) and solid-water fraction ( $\phi$ ) through the simplified Wenzel and Cassie-Baxter models. We noticed that,  $r_\phi$  and  $\phi$  tend to follow a linear relation that gives  $r_\phi = 1.47$  in the limit,  $\Delta\theta < 10.1^\circ$ , latter being recognized as the difference in angle between the measured CA over a surface to that of the CA ( $\sim 105^\circ$ ) known for a smooth surface. Our experimental data, however, revealed empirical relations which predicted higher  $r_\phi$  values, particularly when  $\Delta\theta$  is large. While the overall reflectance response of the distal segment was believed to be stronger than that of the basal part, the edge parts of the dragonfly and damselfly wings exhibited exponential associated growing trends with increasing wavelength. The relative reflectance response, corresponding to  $\sim 494$  nm and 370 nm peaks, gets nearly doubled for the edge specimen as compared to the distal and basal parts. The edge- specimen, which comprises of rectangular shaped, periodic microstructures, displayed carotenoid based two broad peak maxima at  $\sim 422$  nm and  $\sim 494$  nm. The surface roughness which arises through the distribution of oblate-shaped nano-fibrils is believed to be the basis of sub-surface volume scattering. Interrelating nanostructure surface roughness based wettability and reflectance characteristics would provide new insights on structure-property relationship in naturally available soft matter systems including templates of biological origin.] (Authors)] Address: Mohanta, D., Nanoscience and Soft Matter Laboratory, Dept of Physics, Tezpur Univ., Napaam, Tezpur, Assam 784 028, India. E-mail: dmohanta1973@gmail.com

**18896.** Liu, X.; Chen, K.; Chen, Q.; Wang, M.; Wang, L. (2016): The community structure of macroinvertebrate and its relationship to the environmental factors in summer and autumn within typical reaches of Iluai River Basin. *Acta Scientiae Circumstantiae* 36(6): 1928-1938. (in Chinese, with English summary) ["Being an important component of river ecosystem, benthic invertebrate is sensitive to the changes of water environment and ecological status. The community structure characteristics of invertebrate can effectively indicate the status of water quality and river ecosystem condition. To assess the ecological health of Huai River system

which is under strong human disturbances, monitoring on water quality, sediment and benthic invertebrate were conducted at 27 sampling sites in summer and autumn of 2014 in Huaihe mainstream and tributaries. Multivariate analysis methods were used to analyze the composition dominant species, biodiversity, temporal and spatial characteristics of macroinvertebrate assemblages, as well as their relationships to environmental factors. The results showed that 4297 macroinvertebrates of 62 taxa collected within two investigations were mainly composed by Mollusca and Insecta. Insecta mainly consisted of Diptera, Ephemeroptera and Odonata, accounting for 33.33%, 21.21% and 18.18% of the total number in Insecta taxa, respectively. Additionally, the average abundance and biomass of macroinvertebrate were 74.21 ind·m<sup>-2</sup> and 7.89 g·m<sup>-2</sup> in summer with the dominant species of Caridina and Bellamya aeruginosa, and were 27.53 ind·m<sup>-2</sup> and 1.13 g·m<sup>-2</sup> in autumn with the dominant species of Caridina, Orthocladus, Baetis and Cricotopus. The results of t-test showed that there was no significant difference ( $p=0.135$ ) on spatial distribution of macroinvertebrate density between summer and autumn, while the spatial distribution of the biomass was significantly different ( $p=0.002$ ). Based on the comparison of two investigations, it was found that the difference in macroinvertebrate abundance was mainly contributed by Mollusca and Crustacea; the individual number of Insecta also appeared the seasonal difference as the number of Trichoptera in summer is significantly higher than that of in autumn, and the numbers of Diptera and Ephemeroptera were obviously lower than that of in autumn. The results of Redundancy analysis (RDA) indicated that the gradient changes of water temperature, pH, total nitrogen, and heavy metals (Hg, Cd, Pb) were the main driving factors for the changes of benthic macroinvertebrate community structure. Furthermore, dam operation, slope solidification, riparian vegetation, and sand mining were major disturbances to habitats and biodiversity of benthic macroinvertebrates." (Authors)] Address: Liu, X., Center of Eco-Environmental Res., Nanjing Hydraulic Res. Inst., Nanjing 210029, China. E-mail; golx\_2007@126.com

**18897.** Stauer, M. (2016): Erstnachweis der Kleinen Moosjungfer *Leucorrhinia dubia* (Vander Linden, 1825) für das Burgenland (Insecta: Odonata). *Biodiversität und Naturschutz in Ostösterreich - BCBEA 2/1*. BCBEA 2/1 (Oktober 2016): 97-101. (in German, with English summary) ["First record of *L. dubia* from Burgenland (Insecta: Odonata). On July 21, 2013 *L. dubia* was recorded in Burgenland for the first time. In Austria the species inhabits typically pools in raised and transition bogs in montane to subalpine altitudes. A possibly indigenous population of *L. dubia* in Burgenland is discussed." (Author)] Address: Stauer, Martina, Lindenbauer-gasse 13, 1110 Wien, Austria. Email: m\_stauer@web.de

**18898.** Tichanek, F. (2016): Ecology of endangered damselfly *Coenagrion ornatum* in post-mining streams in relation to their restoration. MSc. thesis, Faculty of Science, University of South Bohemia, Ěeské Budějovice, Czech Republic: 53 pp. (in English) ["Summary and synthesis: As the thesis results confirmed, the Radovesická spoil heap represents a

regionally important secondary habitat for endangered *C. ornatum*. Although the high conservation value of the post-mining streams was already suggested (Tichanek & Tropek 2015), various opponents have been sceptical about residency of the threatened headwater species in the post-industrial freshwater sites. According to our results on the population size, the larval occurrence, and the species' spatial ecology, the population is confirmed to be resident. This detailed study of the endangered species shows that at least some of the habitat most specialised species are able to create rich and relatively stable local populations in human-made sites. It also supports indication, that the most interesting and valuable odonate communities are being formed in reclaimed parts of spoil heaps, contrasting thus to threatened terrestrial biota. Similarly, both studying the spatial ecology and detailed habitat requirements revealed the huge importance of small-scaled microhabitats formed by fine-leaved emergent vegetation (*Eleocharis* spp. in our study). Such microhabitats are favoured by both life stages, both sexes, and on both studied spatial scales. The patches without the microhabitat are colonized by fewer specimens which tend to emigrate soon. Supporting such microhabitats is thus extremely useful for the species conservation and should represent one from the main tools in restoration of post-mining flowing freshwaters. Because the species is sedentary, mostly operating within 100 m long sections, all conservation action potentially degrading the habitat from short-term point of view should be provided in maximally 100 meters long sections. Even short-term damage of longer sections via management suggested by the species' habitat preferences (removing sediments or too grown vegetation) could lead to fragmentation of the local population. Moreover, it would be highly desirable to establish good microhabitats at least with the frequency one short section per 100 m long section. This will keep a higher connectivity and thus viability of the population. Our results confirmed that sampling of larvae is still optimal. Larval response slightly differ from adults, mainly because of requiring finer-scale habitat heterogeneity, whereas they are not influenced by the banks characteristics. However, despite this, *C. ornatum* females have still relatively narrow distribution restricted to specific microhabitats which are very important also for larvae. Females and juveniles thus can be monitored as a very accurate proxy of the larval development and species residency. Finally, as number of present juveniles is decreasing shortly after start of the season, sampling should be provided in early species flight period to record sufficient abundances of the generally hardly detectable juveniles." (Author)] Address: not stated

## 2017

**18899.** Amann, P. (2017): Über das Vorkommen der Helm-Azurjungfer und anderer Libellen im Raum Dornbirn - Hohenems - Lustenau (Vorarlberg, Österreich). *inatura – Forschung online* 36: 21 pp. (in German) ["The aim of the research assignment was to document the dragonfly fauna in the greater Hohenems, Lustenau and Dornbirn area along ditches. One focus of the work was to record the populations of *Coenagrion mercuriale*, which was first recorded in

the study area in 2007 (Hämmerle 2007: 313). In autumn 2015, the water bodies in the study area were surveyed and assessed as potential dragonfly habitats. 14 water bodies were selected for further investigation. From May 2016, the dragonfly fauna of the selected ditches could be examined. Five inspections were carried out per water body. A total of 28 dragonfly species were identified during this study; ten of the species found belong to an endangered category, two are considered to be threatened with extinction according to Hostettler (2001). In the course of the study, a previously unknown autochthonous occurrence of *C. mercuriale* was also discovered. This is the largest known population of this species in Vorarlberg. From a nature conservation perspective, the protection of this occurrence is of Europe-wide importance (*C. mercuriale* is listed in the Habitats Directive, Annex II)." (Authors/DeepL)] Address: Amann, P., Wiesenbachweg 8, 6824 Schlins, Austria. E-Mail: p.amann@aon.at

**18900.** Billqvist, M. (2017): Nya provinsfynd av trollsländor i Sverige 2009-2017 - New provincial records of Odonata in Sweden 2009-2017. *Entomologisk Tidskrift* 138(3-4): 209-225. (in Swedish, with English summary) ["The interest for dragonflies in Sweden have increased dramatically for more than a decade. This has brought on more knowledge and many new province records. Since year 2000 there has even been six new species for the country: *Sympecma padesca*, (in the year 2000), *Anax imperator* (2002), *Erythromma viridulum* (2004), *Aeshna affinis*, (2010), *Anax parthenope* (2010) and *Sympetrum pedemontanum* (2011). The Occurrence Catalogue (formerly known as the Landscape Catalogue) of dragonflies was last updated in March 2009. This article presents 128 new provincial findings made since then, most of them new records but also older reports that was not included in 2009. By 2017, 64 species of dragonflies have been found in Sweden. Out of these, 51 species have been reported from new provinces since 2009. With the sole exception of Lycksele lappmark, new species of dragonflies have been reported from every province." (Authors)] Address: Billqvist, M., Trollsländeföreningen / Swedish Dragonfly Society, Idrottsvägen 2, SE-243 72 Tjörnarp, Sweden. Email: magnus.billqvist@gmail.com

**18901.** Liechti, T. (2017): RKR2020 - Neukonzessionierung Kraftwerk Reckingen. Fachbericht Libellen. Anlage D 7.21. RKR2020 – Umweltplanung Modul 2: 21 pp. (in German) ["Five species of Gomphidae live on the High Rhine. Among them is *Gomphus simillimus*, which in Germany and Switzerland occurs almost exclusively on the Rhine between the outlet of Lake Constance and Breisach. *Ophiogomphus cecilia*, which occurs in low density on the Rhine, is listed in Annex 4 of the Habitats Directive and is thus strictly protected in Germany. Fauna databases of Switzerland and Germany were consulted and the results evaluated. In addition, five representative stretches were searched for exuviae in June 2015. The data and findings show that the Reckingen dam contains a large population of *G. simillimus* of probably several hundred individuals. Also common are *G. vulgatisimus* and *Onychogomphus f. forcipatus*. The latter prefers flowing stretches to backwater stretches with coarser bottom



substrate. *O. cecilia* is rare, but present in the area. On the High Rhine, exuviae of *G. simillimus* were found both on rapidly flowing and almost stagnant stretches. The highest hatching densities were found at sites with low flow velocity and accumulation of fine sediments, such as the boathouse at Rümikon (CH), which is located in a slightly wider section of the Rhine with large sand and silt deposits. The unchanged operation of the power plant is not expected to have any impact on the dragonfly species group. No valuable dragonfly habitats are affected by the construction of the fishway or replacement measures such as the creation of side channels." (Author; DeepL)] Address: Liechti, T., creato, Limmatauweg 9, 5408 Ennetbaden. Switzerland. E-mail: t.liechti@creato.ch

## 2018

**18902.** Cook, P.; Rasmussen, R.; Brown, J.M.; Cooper, I.A. (2018): Sexual conflict does not maintain female colour polymorphism in a territorial damselfly. *Animal Behaviour* 140: 171-176. (in English) ["Highlights: •We examined whether male damselflies discriminate between female colour morphs. •We used five populations that varied in male-like female morph frequency (0–86%). •Males approached, inspected and contacted both female morphs at similar rates. •Females experienced more tandem attempts and longer interaction duration than males. •In *Megalagrion calliphya*, there is little evidence of female harassment by males. Female-limited dimorphism is commonly hypothesized to be an adaptation resulting from male harassment or sexual conflict over female mating rate. We examined whether males discriminate between female colour morphs of the beautiful Hawaiian damselfly, *Megalagrion calliphya*, in order to evaluate whether male harassment could explain the existence and/or maintenance of this dimorphism. Previous studies of this species suggest that spatially varying ecological selection maintains the dimorphism, but these hypotheses are not mutually exclusive. Here, we used a common method of measuring male behaviour towards secured females at mating sites under naturally occurring conditions, using five populations that range in male-like female morph frequency from 0 to 0.86. We found very low rates of interaction in a total of 64 one-hour trials, and male behaviour towards females did not differ significantly between colour morphs. By comparing the populations that vary in female morph frequency, we found no evidence of frequency-dependent sexual selection on colour, suggesting that this polymorphism is maintained by selective forces other than sexual conflict." (Authors)] Address: Cooper, I., Biology Dept, James Madison University, 951 Carrier Dr., Harrisonburg, VA 22807, U.S.A. E-mail: cooperia@jmu.edu

**18903.** Miler, O.; Czarnicka, M.; Garcia, X.-F.; Jäger, A.; Pusch, M. (2018): Across-shore differences in lake benthic invertebrate communities within reed stands (*Phragmites australis* Trin. ex Steud.). *International Revue Hydrobiology* 103: 99-112. (in English) ["The spatial distribution of benthic macroinvertebrates along reed transects was studied in lakes with minimal human disturbances to enable a deeper

understanding of the functioning of reed macroinvertebrate communities and relations to biotic and abiotic environmental variables. The taxonomic and functional macroinvertebrate community composition significantly differed between outer margin, center, and shore locations. At shore locations, higher proportions of Gastropoda, Hydrachnidia and Coleoptera, mobile swimmers/skaters, predators, and shredders were found. However, outer margin locations were characterized by a higher proportion of sessile filter-feeding Bivalvia and mining Diptera. At the outer margins, also greater contributions of taxa preferring pelal habitats and r-strategists typical for more disturbed environments were observed. An indicator species analysis revealed *Asellus aquaticus* (Crustacea) and *Scirtidae* Gen sp. (Coleoptera) as significant indicator taxa for shore locations and *Valvata piscinalis* (Gastropoda), *Tinodes* sp. and *Orthotrichia* sp. (Trichoptera) as significant indicator taxa for outer margin locations. The taxonomic composition of macroinvertebrate communities was significantly related to higher water depth, oxygen content, and pH at outer margin locations. Shore locations were characterized by higher amounts of woody debris, leaf litter, and decaying plant material. In summary, the taxonomic and functional composition of macroinvertebrates varied strongly from shore to outer margin locations and could be related to spatial changes in hydrodynamical and food conditions along the transects." (Authors) The study includes "Odonata" and "Ischnura elegans".] Address: Miler, M., Leibniz Inst. Freshwater Ecology & Inland Fisheries (IGB), Müggelseedamm 301, 12587 Berlin, Germany. E-mail: oliver.miler@web.de

**18904.** Seidu, I.; Nsor, C.A.; Danquah, E.; Lancaster, L.T. (2018): Odonata assemblages along an anthropogenic disturbance gradient in Ghana's Eastern Region. *Odonatologica* 47(1/2): 73-100. (in English) ["We assessed the effects of different levels of anthropogenic disturbance on Odonata species richness and assemblage composition in four different habitats in Ghana: mining sites, agricultural fields, human settlements, and primary forest habitat. A total of 992 individual adult Odonata representing 51 species (20 Zygoptera, 31 Anisoptera) in six families were recorded from 16 sites across these habitats. A majority of species (75 %) recorded across all sites were previously classified as habitat generalists, while 20 % represented specialists. The human settlement habitat exhibited the overall highest Odonata abundance (302 individuals), whereas the greatest species diversity was observed in the mining sites ( $D = 4.59$ ). Agricultural fields had lowest abundance ( $n = 196$  individuals), while primary forest sites exhibited the lowest diversity ( $D = 2.75$ ), although these differences were not statistically significant. There was also no significant difference in adult Odonata richness  $D$  ( $F_{3,59.72} = 2.48$ ,  $p = 0.07$ ) among habitats. However, species composition differed significantly among the various habitats (ANOSIM: global  $R = 0.73$ ,  $p = 0.001$ ). A canonical correspondence analysis revealed that river flow rate, percentage of canopy cover and channel width were the key factors influencing Odonata assemblages. Generalist and heliophilic dragonflies dominated in human-altered habitats, while the matured forest habitat included

more specialists and stenotopic damselflies. The results suggest that specialist dragonflies can be used as freshwater habitat quality indicators, and their habitat requirements also support the need to maintain the remnant primary forest in the East Akim District." (Authors)] Address: Seidu, I., Dept Wildlife & Range Management, Fac. Renewable Nat. Resources, Kwame Nkrumah Univ. of Sci. & Tech., Kumasi, Ghana. E-mail: antwiseidu88@gmail.com

**18905.** Shapovalov, M.I.; Korotkov, E.A. (2018): Materials to the fauna of dragonflies (Odonata) of the botanical garden of Adyghe State University. *Ekosistemy* 16(46): 94-98. (in Russian, with English summary) ["The paper provides a list of dragonflies identified on the territory of the Botanical garden of the Adyghe State University (Republic of Adygeya). The list includes 21 species from 7 families: Calopterygidae: 1, Coenagrionidae: 3, Lestidae: 4, Platycnemididae: 2, Aeshnidae: 4, Gomphidae: 2, Libellulidae: 5. Gomphus schneiderii Selys, 1850 are recorded to Adygea and the North-Western Caucasus for the first time. Of the identified in the Botanical garden dragonflies, three species are protected: Anax imperator, Brachytron pratense, Chalcolestes parvidens." (Authors)] Address: Shapovalov, M.I., Lab. for Bioecological Monitoring of the Invertebrate Animals of Adygeya, Research Institute of Complex Problems, Adyghe State Univ., Gagarina str. 13, Maykop 385000, Adygeya Republic, Russia. E-mail: shapmaksim2017@yandex.ru

## 2019

**18906.** Archibald, S.B.; Cannings, R.A. (2019): Fossil dragonflies (Odonata: Anisoptera) from the early Eocene Okanagan Highlands, western North America. *Canadian Entomologist* 151(6): 783-816. (in English) ["We describe the first dragonflies (Odonata: Anisoptera) from the early Eocene Okanagan Highlands of far-western North America from nine fossils. Six are assigned to five species in four new, named genera of Aeshnidae: Antiquiala snyderaenew genus and species, Idemlinea versatilisnew genus and species, Ypshna brownleeinew genus and species, Ypshna lapennatanew genus and species, and Eoshna thompsonensis new genus and species; we treat one as Aeshnidae genus A, species A; one is assigned to Gomphidae: Auroradraco eosnew genus and species; and we treat a ninth, fragmentary fossil of unknown family affinity as Anisoptera indeterminate genus A, species A, which represents a seventh genus and eighth species. The dominance of Aeshnidae is consistent with other Paleocene and Eocene fossil localities. Auroradraco eos is the only fossil Gomphidae in the roughly 66-million-year gap between occurrences in mid-Cretaceous Burmese amber and the early Oligocene of France. Ypshna appears close to Parabaissaeshna ejerslevense from the early Eocene Fur Formation of Denmark; this is not surprising given Holarctic intercontinental connections at this time and a growing list of insect taxa shared between the Okanagan Highlands and the Fur Formation." (Authors)] Address: Archibald, S.B., Dept Biol. Sciences, Simon Fraser University, 8888 University Drive, Burnaby, British Columbia, V5A 1S6, Canadasba48@sfu.ca

**18907.** Bell, T.; Harriss, J.; Ruzaini, A.; Fernando, C.; Guay, P.J.; Weston, M.A. (2019): Flight initiation distance in dragonflies is species-specific, positively related to starting distance and sometimes body length. *International Journal of Odonatology* 22(3-4): 173-179. (in English) ["Predator escape behaviour is a critical component of dragonfly life history. Flight initiation distance is the distance at which escape commences, and is well studied in vertebrates, barely studied in invertebrates, and entirely unstudied in dragonflies. Here we test four principles regarding flight initiation distance as derived from studies of vertebrates to examine if they apply to dragonflies in Sri Lanka: (1) flight initiation distance is a species-specific trait; (2) flight initiation distance increases with starting distance (the distance at which the experimenter begins an approach); (3) larger individuals have longer flight initiation distances; and (4) flight initiation distance varies between the sexes in some species. We collected 105 flight initiation distances from 11 species (known sex and size). Flight initiation distances varied between species and positively with starting distance. In one of three data-rich species (n = 10), flight initiation distance was positively associated with body length. Flight initiation distance did not vary with sex in our sample. Escape responses evoked by standardised human approaches represent a fruitful methodology to study dragonfly escape behaviour in the wild." (Authors)] Address: Weston, M.A., Centre for Integrative Ecol., School of Life & Environmental Sciences, Fac. Science, Engineering & the Built Environment, Deakin Univ., Geelong, Australia. Email: mweston@deakin.edu.au

**18908.** Bielczynska, A. (2019): Wind exposure as a factor influencing the littoral macrozoobenthic community: a methodological approach and preliminary findings. *Limnol. Rev.* 19(3): 113-123. (in English) ["The aim of the work was to analyze the influence of wave activity on invertebrate fauna living in the littoral zone. For this purpose, an algorithm was developed to analyze spatial and meteorological data, calculating the values of fetch and wind exposure. The taxonomic composition of the fauna and the values of selected water quality indicators were analyzed against the background of varied wind exposure, trophy, and various habitats. A significant negative impact of wind exposure on the taxonomic variety of the macrozoobenthic community, the number of Coenagrionidae damselflies and Baetidae mayflies was found. It is difficult to separate the impact of waves on the fauna from the impact of other natural and anthropogenic factors, because those factors may also be affected by water movements. The tool produced as part of this work can also be used to further investigate the issue of impact of waves on all the communities living in the littoral zone." (Authors)] Address: Bielczyńska, Aleksandra, Dept Freshwater Protection, Institute of Environmental Protection – National Research Institute, Kolektorska 4, 01-692 Warsaw, Poland. Email: a.bielczynska@ios.edu.pl

**18909.** Brasil, L.S.; Silverio, D.V.; Cabette, H.S.R.; Batista, J.D.; Vieira, T.B.; Dias-Silva, K.; de Oliveira-Junior, J.M.B.; de Carvalho, F.G.; Calvao, L.B.; Macedo, M.N.; Juen, L. (2019): Net primary productivity and seasonality of temperature and

precipitation are predictors of the species richness of the Damselflies in the Amazon. *Basic and Applied Ecology* 35: 45-53. (in English) ["Several hypotheses have been proposed to explain the mechanisms that generate temporal and spatial species richness patterns. We tested four common hypotheses (water, energy, climatic heterogeneity and net primary productivity) to evaluate which factors best explain patterns of Zygoptera species richness. Of these, we predicted that climatic heterogeneity would be the most important predictor for Zygoptera richness patterns. We sampled communities of adult Zygoptera in 100 small Amazonian streams. Based on generalized linear mixed models (GLMM), we found that net primary productivity and climatic heterogeneity comprised the best model of Zygoptera species richness in Amazonian streams, with an pseudo  $r^2$  of 39.5%. Results indicate that species richness increases by one species per 1 kg of biomass per square meter in NPP, or with an increase of 2°C in air temperature variability. Our work corroborates a recent study with other taxa in Brazilian Bioms. This suggests that temporal variation in climate and net primary productivity are important predictors of the macroecological patterns of richness for aquatic organisms in tropical regions." (Authors)] Address: Brasil, L.S., Programa de Pós-Graduação em Zoologia - Universidade Federal do Pará e Museu Paraense Emílio Goeldi. Belém, Pará, Brasil. E-mail: brasil\_biologia@hotmail.com

**18910.** Buczynska, E.; Buczynski, P. (2019): Survival under anthropogenic impact: the response of dragonflies (Odonata), beetles (Coleoptera) and caddisflies (Trichoptera) to environmental disturbances in a two-way industrial canal system (central Poland). *PeerJ* 6:e6215: 31 pp. (in English) ["Ecological metrics and assemblages of three orders of aquatic insects (Odonata, Coleoptera and Trichoptera — OCT) in an industrial canal system affected by dredging were studied. Five sites (a river as a control site and canals) along the Vistula River in Central Poland were sampled during six sampling periods (2011 and 2013). Canonical correspondence analyses (CCA) was used to assess the influence of environmental variables on the distribution of 54 insect species in the following system of habitats—a river feeding the canals, river-fed inlet canals and outlet canals with cooling waters. Additionally, before and after control impact (BACI) was used to test for the impact of canal dredging in 2011 on the insect response metrics. Non-metric multidimensional scaling analysis differentiated insect assemblages of the three habitats and similarity percentage (SIMPER) indicated the species most responsible for the faunistic dissimilarities. Temperature was found to be a key factor governing the presence of insects in the outlet canals with cooling water. CCAs revealed that electrolytic conductivity (EC) and salinity had the greatest influence on the OCT fauna in the river and the inlet canals, whilst it was the dissolved oxygen and the level of development of aquatic plants that proved most important in the outlet canals. Modified ANOVAs showed that dredging significantly affected the mean species richness and the dominance in the canals. The changes in OCT species composition were highly informative. The comparison between tolerance patterns of the OCT orders

against the five parameters (temperature, EC, total dissolved solids (TDS), pH and current) revealed that caddisflies are the most sensitive group, followed by Coleoptera while Odonata proved the most resistant. Dragonflies have the greatest potential to serve as bioindicators of industrially heated waters. The OCT fauna responded specifically to different environmental factors and stressors, it is strongly recommended to track the responses on different levels, not only metrics, but above all, species." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**18911.** Buczynski, P.; Takowski, A. (2019): Wazki (Odonata) rezerwatu przyrody „Jeziro Obradowskie” (Polesie Zachodnie) - Dragonflies (Odonata) of the nature reserve “Lake Obradowskie” (West Polesie). *Parki Narodowe i Rezerwaty Przyrody National Parks and Nature Reserves (Parki nar. Rez. Przyr.)* 38(3-4): 17-30. (in Polish, with English summary) ["The nature reserve “Lake Obradowskie” near Parczew in the Lublin Region (Central-Eastern Poland) lies in a drainage depression and encompasses: a slightly hypertrophic polyhumic lake, high and transitional peat bogs surrounding the lake and the canal connected to the lake. In 2019, 27 dragonfly species were found here. The fauna of the lake was the qualitatively richest (22 spp.). An assemblage found in the lake was typical of a small eutrophic lake, but poorer in species: lacking species preferring transparent water and the elodeid zone, and with a very poor representation of the fauna typical of the nymphaeid zone. This correlated with very poor development of tall vegetation, constant bloom of cyanobacteria and low oxygen content in the water. In the canal 16 spp. occurred; this was a poorer variant of the lake's fauna with the addition of the habitat disturbance indicator, *Libellula depressa*, which resulted from the almost complete drying out of the canal in the summer. 6-11 species were found on three studied open peat bogs, but they were almost exclusively foraging individuals from other habitats, and regular reproductive behaviour was observed only in *Somatochlora flavomaculata*. The studied nature reserve proved to be of little importance for the protection of dragonflies. (1) Its fauna was not too rich in species, the small size of the populations of most species was also unfavourable, which may reduce their stability. (2) Assemblages of dragonflies in individual habitats were of little value, common eurytopes dominated. The only recorded typhophile is *S. flavomaculata*. Stenotopes of other habitats only flew over the study area. (3) Only one of 16 species of dragonflies protected in Poland (*Sympetma padesca*) was found, it was rare and showed no reproductive behaviour. (4) No species endangered in Poland and in the Lublin Province were found. The state of the fauna described above results from the high productivity of the lake and its dominance by algae but not macrophytes. However, this productivity is probably natural: in the geological base of West Polesie, limestone rocks dominate, which makes the pH of the lake waters high and there are good conditions for the development of bacteria that decompose organic matter. An important factor is also the lack of water bodies in the

peat bogs, which means that dragonflies do not develop on them (and probably valuable assemblages would be formed here, dominated by tyrphobionts and tyrphophiles), nor do they colonize lakes from them. Data from the nature reserve "Lake Obradowskie" indicates in particular that such colonization is crucial for the presence in the fertile lake of species associated with peat bogs. The authors suggest the protection of dragonflies in the studied reserve by manually digging small peat excavations in the peat bogs around the lake. This would create valuable habitats for hydrobionts associated with high and transitional peat bog waters without significantly interfering with water relationships. Such activities may soon be a sine qua non condition for the protection of this organisms in the case of rising air temperatures and drying out of peatlands." (Authors)] Address: Buczynski, P., Dept Zool., Maria Curie-Skłodowska Univ., Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**18912.** Cerini, F.; Stellati, L.; Luiselli, L.; Vignoli, L. (2019): Long-term shifts in the communities of Odonata: effect of chance or climate change? *North-western Journal of Zoology* 16(1): 1-6. (in English) ["Global climate change has been causing growing concern among conservationists for its strong implications on biodiversity alteration and loss at different levels of organization. Odonata occur in habitats threatened by global warming, thus they represent an ideal model organism to study the correlation patterns of climate change with taxonomic composition and the ecological functioning of communities. We carried out climate and diachronic faunistic analyses of Odonata community changes in three countries (Tunisia, Mauritania, Sweden) to test if the patterns uncovered for single assemblages as a response to local climate change may resist to the generalization across regions and latitudes. Clear climate warming occurred in the analysed regions during the last five decades. We found three main patterns of diachronic shifts in Odonata assemblage species composition based on correlative evidence: i) Generalists are likely advantaged from warming processes that cause the loss of specific habitats (i.e. temporary wetlands, cool lentic waters) and the formation of new or altered habitats suitable for pioneer species (i.e. warm and intermittent pools), whereas specialists are more likely to go toward local extinctions; ii) In Tunisia and Sweden new colonizers expanded northward from their southern distributions; iii) The Odonata communities inhabiting lentic waters are more prone to show species turnover than communities from standing waters. Our results provide new insights on the possible impact of climate change on Odonata fauna from large areas (i.e. countries) at different latitudes and represent an attempt of a generalization of the effects of climate change on Odonata range shifts and expansions. Despite that Odonata global assessment of conservation status has been completed, insufficient information is available to robustly assess all the main threats affecting their status, and extensive new field surveys are required to test if major changes in fauna composition have occurred during the last decades." (Authors)] Address: Cerini, F., Dept of Science, Univ.Roma Tre, Viale Marconi, 446, 00146 Rome, Italy. E-mail: francesco.cerini@uniroma3.it

**18913.** Chakravorty, J.; Jugli, S.; Boria, M.; Meyer-Rochow, V.B. (2019): Arunachal's Adi and Apatani tribes' traditional knowledge of harvesting and using edible insects. *Journal of Insects as Food and Feed* 5(2): 125-135. (in English) ["At least 65 insect species of 30 families and 9 orders, namely Orthoptera (15 species), Odonata (12), Coleoptera (11), Hymenoptera (10), Hemiptera (9), Lepidoptera (5) and one species each of Ephemeroptera, Isoptera and Mantodea find acceptance as food by Adi and Apatani tribals. Adi use overall more species than Apatani: 53 species of 24 families and 8 orders versus 49 species of 21 families and 8 orders. Odonata are highly appreciated by the Apatani whereas Adi consume more Orthopterans. Various harvesting systems exist and often methods like handpicking or using simple tools are involved with minimal environmental impact. However, depreciation of the environment, increased availability of conventional foodstuffs, rapid population growth and rising influence of westernisation collectively affect diversity, abundance and use of edible insects, leading to a decline of entomophagy among the tribal people." (Authors)] Address: Chakravorty, J., Dept of Zoology, Rajiv Gandhi University, Rono Hills 791112, Arunachal Pradesh, India. E-mail: jhamargu@gmail.com

**18914.** Chovanec, A. (2019): Bewertung von Oberflächen-gewässern anhand libellenkundlicher Untersuchungen (Odonata) – Methoden für stehende und fließende Gewässer sowie ihre beispielhafte Anwendung an der Mattig (Oberösterreich). *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen* 71: 13-45. (in German, with English summary) ["Assessment of surface waters based on odonatalogical investigations (Odonata) – methods for standing and running waters with an exemplary application at the river Mattig (Upper Austria). – In recent decades, the importance of odonatalogical studies in water management has greatly increased, since Odonata are good indicators of morphological and hydrological conditions of water bodies. The application of this guideline is intended to ensure the standardisation of dragonfly-based studies and thus the comparability of results. The aim of the field survey method described is to obtain as complete a picture as possible of the species spectrum reproducing at a given site by monitoring and recording adult dragonflies. Sightings of teneral, additional recording of exuviae, estimates of the number of individuals as well as observations of reproductive behaviour serve to determine whether or not species are autochthonous to the site. According to the legal requirements of the EU Water Framework Directive and the Austrian Water Law (Wasserrechtsgesetz, WRG), the assessment is based on a comparison of the water-type-specific dragonfly fauna with the status quo. In accordance with WRG, various methodological approaches have been developed for standing and running waters, to which reference is made in this paper. As an example, the restructuring measures at the hyporhithron stretch of the river Mattig (Upper Austria) near its mouth into the river Inn have been evaluated by means of a study on dragonflies carried out in 2019. The longitudinal classification of the Odonata represents the methodological basis for determining the Odonata reference



species and any deviations." (Authors)] Address: Chovanec, A., Bundesministerium für Nachhaltigkeit & Tourismus, Abteilung Nationale & Internationale Wasserwirtschaft, Marxergasse 2, 1030 Wien, Austria. Email: andreas.chovanec@bmnt.gv.at

**18915.** de Omena, P.M.; Srivastava, D.S.; Romero, G.Q. (2019): Consumptive effects and mismatch in predator-prey turnover rates cause inversion of biomass pyramids. *Oecologia* 190(1): 159-168. (in English) ["The mismatch between the turnover rates of predators and prey is one of the oldest explanations for the existence of inverted trophic pyramids. To date, the hypotheses regarding trophic pyramids have all been based on consumptive trophic links between predators and prey, and the relative contribution of non-consumptive effects is still unknown. In this study, we investigated if the inversion of pyramids in bromeliad ecosystems is driven by (i) a rapid colonization of organisms having short cohort interval production (CPI), and (ii) the prevalence of consumptive or non-consumptive effects of top predators. We used a manipulative experiment to investigate the patterns of prey colonization and to partition the net effects of the dominant predator (damselfly larvae) on biomass pyramids into consumptive (uncaged damselfly larvae) and non-consumptive effects (caged damselfly larvae). Consumptive effects of damselflies strengthened the inversion of trophic pyramids. Non-consumptive effects, however, did not affect the shape of biomass pyramids. Instead, the rapid colonization of organisms with predominantly short CPI sustained the large biomass of top predators found in natural bromeliad ecosystems. Prey colonized bromeliads rapidly, but this high production was never visible as standing stock because damselflies reduce prey densities by more than a magnitude through direct consumption. Our study adds to the growing evidence that there are a variety of possible ways that biomass can be trophically structured. Moreover, we suggest that the strength of biomass pyramids inversion may change with the time of ecological succession as prey communities become more equitable." (Authors)] Address: de Omena, Paula, Depto de Biol. Animal, Inst. Biologia, Univ. Estadual de Campinas (UNICAMP), CP 6109, Campinas, SP, 13083-970, Brazil. paulaomena@gmail.com

**18916.** Gray, A.; Wilkins, V.; Pryce, D.; Fowler, L.; Key, R.S.; Mendel, H.; Jervis, M.; Hochkirch, A.; Cairns-Wicks, R.; Dutton, A.-J.; Malan, L. (2019): The status of the invertebrate fauna on the South Atlantic island of St Helena: problems, analysis, and recommendations. *Biodiversity and Conservation* 28(2): 275-296. (in English) ["We present an analysis of the invertebrates of St Helena using an invertebrate conservation evaluation framework, to review invertebrate data, highlight knowledge gaps and prioritise invertebrate conservation needs that perhaps could be applied to other regions of the world. St Helena's invertebrate fauna has 891 genera and 1133 species. The fauna has a high level of endemism with 450 species (equal to 96% of all native species) but the total species richness now comprises many introduced species (664) with 93 species in 24 orders that are entirely novel to St Helena. The elevation ranges of

native species appear to be narrow, most being confined to higher elevations above 500 m. St Helena has had a large number of probable extinction events; 30 insects, and 19 molluscs, and the threat of further extinctions remains high. The cumulative invertebrate extinctions on St Helena exceed the global background extinction rate on an island barely covering 122 km<sup>2</sup>. We present actions and timelines to focus invertebrate conservation on St Helena; taxonomy, ecology, long term monitoring and invasive species control are priority areas to reduce extinction risk. ... Extinct species declared on the Red List include ... the St Helena darter dragonfly, *Sympetrum dilatatum* ..." (Authors)] Address: Gray, A., NERC Centre for Ecology and Hydrology, Penicuik, UK. E-mail: alangray@ceh.ac.uk

**18917.** Hoffmann, J.; Donoughe, S.; Li, K.; Salcedo, M.; Rycroft, C. (2019): A simple developmental model recapitulates complex insect wing venation patterns (A winkle in time). *Bulletin of the American Physical Society, APS March Meeting 2019, Monday–Friday, March 4–8, 2019; Boston, Massachusetts, Session A66: Morphogenesis I, 8:00 AM–11:00 AM, Monday, March 4, 2019, BCEC Room: 261:* (in English) [Verbatim: Geometric patterns in nature have long been a matter of fascination and intrigue. Veins bifurcate insect wings into a diverse and complicated menagerie of shapes. For many insect species, even the left and right wings from the same individual have veins with unique topological arrangements, and little is known about how these patterns form. We present a quantitative study of the fingerprint-like "secondary veins." We compile a dataset of wings from 232 species and 17 families from the order Odonata, a group with particularly elaborate vein patterns. We characterize the geometric arrangements of veins and develop a simple model of secondary vein patterning. Last, we show that our model is capable of recapitulating the vein geometries of species from other, distantly related winged insect clades.] Address: not stated

**18918.** Kärcher, O.; Hering, D.; Frank, K.; Markovic, D. (2019): Freshwater species distributions along thermal gradients. *Ecology and evolution* 9(1): 111-124. (in English) ["The distribution of a species along a thermal gradient is commonly approximated by a unimodal response curve, with a characteristic single optimum near the temperature where a species is most likely to be found, and a decreasing probability of occurrence away from the optimum. We aimed at identifying thermal response curves (TRCs) of European freshwater species and evaluating the potential impact of climate warming across species, taxonomic groups, and latitude. We first applied generalized additive models using catchment-scale global data on distribution ranges of 577 freshwater species native to Europe and four different temperature variables (the current annual mean air/water temperature and the maximum air/water temperature of the warmest month) to describe species TRCs. We then classified TRCs into one of eight curve types and identified spatial patterns in thermal responses. Finally, we integrated empirical TRCs and the projected geographic distribution of climate warming to evaluate the effect of rising temperatures

on species' distributions. For the different temperature variables, 390–463 of 577 species (67.6%–80.2%) were characterized by a unimodal TRC. The number of species with a unimodal TRC decreased from central toward northern and southern Europe. Warming tolerance (WT = maximum temperature of occurrence—preferred temperature) was higher at higher latitudes. Preferred temperature of many species is already exceeded. Rising temperatures will affect most Mediterranean species. We demonstrated that freshwater species' occurrence probabilities are most frequently unimodal. The impact of the global climate warming on species distributions is species and latitude dependent. Among the studied taxonomic groups, rising temperatures will be most detrimental to fish. Our findings support the efforts of catchment-based freshwater management and conservation in the face of global warming." (Authors) Modelling includes molluscs, fish, plants, odonates and crayfish] Address: Kärcher, O., Faculty of Business Management and Social Sciences, Osnabrück University of Applied Sciences, Osnabrück, Germany. E-mail: o.kaercher@hs-osnabrueck.de

**18919.** Khelifa, R. (2019): Female "assist" sneaker males to dupe dominant males in a rare endemic damselfly: Sexual conflict at its finest. *Bulletin of the Ecological Society of America* 100(4): 1-5. (in English) ["Study Description: One common view in sexual selection is that females select the fittest male. By investigating the reproductive behavior of an endemic damselfly, *Colopteryx exul*, in Northeast Algeria. I showed that this is not always the case. To avoid the costly repeated copulations, the female hosting the sneaker's sperm (low-quality male) tends to avoid the dominant male by landing near another female, which confuses the dominant male who ends up copulating with a different female. Hence, the female indirectly assists the sneaker male. This finding advances our view about the mechanisms underlying the maintenance of phenotypic and genetic variability." (Author)] Address: Khelifa, R., Biodiversity Res. Center, Univ. British Columbia, 2212 Main Mall, Vancouver. B.C. V6T1Z4, Canada. Email: rassimkhelifa@gmail.com

**18920.** Khelifa, R.; Zebba, R.; Amari, H.; Mellal, M.K.; Mahdjoub, H. (2019): Field estimates of fitness costs of the pace-of-life in an endangered damselfly. *Journal of evolutionary biology* 32(9): 943-954. (in English) ["Theory predicts that within-population differences in the pace-of-life can lead to cohort-splitting and produce marked intraspecific variation in body size. While many studies showed that body size is positively correlated with fitness, many argue that selection for the larger body is counterbalanced by opposing physiological and ecological selective mechanisms that favor smaller body. When a population split into cohorts with different paces-of-life (slow or fast cohort), one would expect to detect the fitness-size relationship among and within cohorts, that is, (1) slower-developing cohort has larger body size and higher fitness than faster-developing cohort, and (2) larger individuals within each cohort show higher fitness than smaller individuals. Here we test these hypotheses in capture-mark-recapture field surveys that assess body size, lifespan,

survival, and lifetime mating success in two consecutive generations of a partially bivoltine aquatic insect, *Coenagrion mercuriale*, where the spring cohort is slower-developing than the autumn cohort. As expected, body size was larger in the slow-developing cohort, which is consistent with the temperature-size rule and also with the duration of development. Body size seasonal variation was greater in slow-developing cohort most likely because of the higher variation in age at maturity. Concordant with theory, survival probability, lifespan, and lifetime mating success were higher in the slow-developing cohort. Moreover, individual body size was positively correlated with survival and mating success in both cohorts. Our study confirms the fitness costs of fast pace-of-life and the benefits of larger body size to adult fitness." (Authors)] Address: Khelifa, R., Biodiversity Res. Center, Univ. British Columbia, 2212 Main Mall, Vancouver. B.C. V6T1Z4, Canada. Email: rassimkhelifa@gmail.com

**18921.** Kosterin, O.E. (2019): On Odonata of Phnom Tumpor (Cambodia) in the late dry season (March 2019). *International Dragonfly Fund Report* 132: 1-26. (in English) ["Phnom Tumpor is a scarcely accessible basalt table mountain in the Cardamom Mts. in Pursat Province of Cambodia. On top surface it bears tall evergreen forest (ca 1100 m a.s.l.), concealing a slow rivulet, O'Gran, being a chain of deep pools. It was examined odonatologically on March 14-18th, 2019. Six common species were recorded in dry and burnt scrub on the Phnom Tumpor slopes and ten on the forested upper surface at O'Gran, among them *Polycanthagyna erythromelas* (Selys, 1891) and *Macromia* sp. cf. *pinratani* Asahina, 1987 for the first time in Cambodia. The peculiarities of the males of *Coeliccia kazukoae* Asahina, 1984 from Phnom Tumpor and the problem of distinguishing females of *M. pinratani* and *M. moorei* are discussed." (Author)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**18922.** Laschet, V.; Schneider, S.; Proess, R.; Rademacher, M. (2019): Vorkommen der Helm-Azurjungfer (*Coenagrion mercuriale* Charpentier, 1840) in Luxemburg: Untersuchungen zur Ökologie der Fortpflanzungshabitate. *Bulletin de la Société des naturalistes luxembourgeois* 121: 189-202. (in German, with English summary) ["*C. mercuriale* is a protected species with a single known population in Luxembourg, situated along the upper reaches of a stream named "Wollefsbaach". The aim of the present study is to develop a better understanding of the ecological parameters that govern the population at this specific site. To do so, the populated stream segment was surveyed botanically and a number of physico-chemical water parameters were measured. Over the course of seven site visits, damselflies were recorded and categorised according to behaviour (searching for food, mating, ovipositing) and abundance. For analysis, the populated stream segment was divided into five sections, which were then compared. The results confirm that suitable habitats for *C. mercuriale* are characterized by the presence of the preferred egg deposition plants (especially

*Berula erecta*), lots of light, a slow water velocity, open water areas and warm and alkaline water." (Authors)] Address: Laschet, Valérie, 79, route des 3 Cantons, 4790 Bettange-Mess, Luxembourg. E-mail: valerie.laschet@web.de

**18923.** Pacioglu, P.; Satmari, A.; Petrovici, M.; Pirvu, M.; Cimpean, M.; Battes, K.P.; Lele, S.F.; Curtean-Banaduc, A.; Parvulescu, L. (2019): Flash-floods influence macroinvertebrate communities distribution in lotic ecosystems. *Transylv. Rev. Syst. Ecol. Res.* 21.1: 45-56. (in English, with French and Romanian summaries) ["Stream dwelling invertebrate populations are facing an ample array of stressors including the habitat imbalance caused by important floods. In this research we used a novel way to estimate the impact of floods upon the substrate, by utilising a remote variable named "flash-flood potential" (FFP), which accounts for the site slope and the average slope of the upstream catchment. The results showed that certain groups are sensitive to the influence of the FFP whereas other are not. We propose this remote variable as a surrogate for assessing stress imposed by floods and sediment scouring for lotic macroinvertebrates." (Authors) Taxa - including Odonata - are treated at the order level.] Address: Pârulescu, L., "Lucian Blaga" University of Sibiu, Faculty of Sciences, Applied Ecology Research Center, Dr. Ion Rapiu Street 5-7, RO-550012 Sibiu, Romania. E-mail: ad.banaduc@yahoo.com

**18924.** Pattanayak, A.; Azad, N.D.; Pahari, P.R.; Deen, S.Y. (2019): Community structure of odonata naiads of a fish farming pond in costal area of West Bengal, India. *Journal of Pharmacognosy and Phytochemistry* 2019; SP5: 437-440. (in English) ["Community structure of Odonata larvae was investigated in a fish farming pond at Tamluk located in the coastal belt of West Bengal, India. In total 12 species under 3 families and 2 suborder were recorded during study period. Suborders Anisoptera was the most dominant (76.16%) group. Family Gomphidae had the lowest abundance (1.93%) and Family Libellulidae had highest abundance (76.66%). All the species were not found throughout the year. Some species such as *Pantala flavescens* ... was found only in rainy months thus behaving as species associated with rains. Species diversity, dominance index, equitability index and evenness indices during study period, suggest a moderately stressed and disturbed environment." (Authors)] Address: Pattanayak, A., PG Dept. Zool. Magadh University. Bodh-Gaya, Gaya, Bihar, India

**18925.** Rae, M.; Miró, A.; Hall, J.; O'Brien, K.; O'Brien, D. (2019): Evaluating the validity of a simple citizen science index for assessing the ecological status of urban drainage ponds. *Ecological Indicators* 98: 1-8. (in English) [oas 59 ; "•Simple citizen science tool as effective as complex assessments of ecological quality. •Assessment correlated with status established through five ecological indicators. •Assessment consistent across the entire range of scores, •Assessment tool consistent for different invertebrate groups involved. Abstract: Citizen science approaches are valuable tools for biodiversity management and conservation, particularly in urban areas. The OPAL Water Survey is a citizen

science approach to assessing water quality by recording the presence/absence of 13 easily identifiable freshwater invertebrate groups. The survey generates a score (the Pond Health Score) that can usefully inform urban freshwater wildlife conservation, as well as engaging urban residents with nature. The main aim of this study was to investigate the capability of the OPAL Pond Health Score to assess the overall ecological status of urban drainage ponds. We applied linear regression between the OPAL Score from 78 drainage ponds across Scotland and a measure of ecological status obtained by the dimension reduction (Principal Coordinate Analysis) of five widely-used ecological indicators: taxonomic richness of amphibians, macroinvertebrates and macrophytes, and adjacent terrestrial habitat richness and degree of urbanization. The OPAL Pond Health Score was strongly correlated with ponds' ecological status established using the five ecological indicators (Pearson's  $r = 0.86$ ,  $P < 0.0001$ ). Furthermore, this relationship was generally consistent, both across the entire range of OPAL Scores, and in relation to the different invertebrate groups involved. Thus, the OPAL Pond Health Score has great value as a quick stand-alone assessment method, and offers clear opportunities for collaboration between citizen scientists, government agencies and professional researchers." (Authors) Data are classified in the Odonata case at suborder level.] Address: O'Brien, K., Highland Council, Glenurquhart Road, Inverness IV3 5NX, UK. E-mail: David.O'Brien@nature.scot

**18926.** Rane, R.V.; Ghodke, A.B.; Hoffmann, A. A.; Edwards, O.R.; Walsh, T.K.; Oakeshott, J.G. (2019): Detoxifying enzyme complements and host use phenotypes in 160 insect species. *Current Opinion in Insect Science* 31: 131-138. (in English) ["Highlights: • 160 insect genomes screened for esterase, GST and cytochrome P450 genes. • Omnivores and herbivores eating chemically complex tissues have many of these genes. • Species using chemically simpler tissues like sap, nectar and blood have relatively few. • Polyphages have more than other species using the same tissue type. Abstract: We use the genomes of 160 insect species to test the hypothesis that the size of detoxifying enzyme families is greater in species using more chemically diverse food resources. Phylogenetically appropriate contrasts in subsamples of the data generally support the hypothesis. We find relatively high numbers of cytochrome P450, glutathione S-transferase and carboxyl/choline esterase genes in omnivores and herbivores feeding on chemically complex tissues and relatively low numbers of these genes in specialists on relatively simple diets, including plant sap, nectar and pollen, and blood. Among Lepidoptera feeding on green plant tissue and Condylognatha feeding on sap we also find more of these genes in highly polyphagous species, many of which are major agricultural pests. These genomic signatures of food resource use are consistent with the hypothesis that some taxa are preadapted for insecticide resistance evolution." (Authors) *Calopteryx splendens*] Address: Rane, R.V., CSIRO, Clunies Ross St, (GPO Box 1700), Acton, ACT 2601, Australia. E-mail: rahul.rane@csiro.au

**18927.** Rathod, P.P.; Raja, I.A.; Milind, K. (2019): Contrast behavior by female dragonfly, *Orthetrum sabina* while mating with its territorial male. *Bioscience Biotechnology Research Communications* 12(4): 927-933. (in English) ["There is variation in receptiveness of female dragonfly to male waiting in territorial ponds. The present study reported how a female of *Orthetrum sabina* agreed or not for mating with a male in different situations. In usual or first case after grasping female by male, female helped him for flying at perch and to make copulatory wheel the 'tandem'. But in the second case, a non receptive female denied territorial male for making tandem was also noted. It was observed that non receptive female was evasive to make tandem and appeared to be resisting the males grasp by her wing vibration. She got clung to male's abdomen remained inactive for 7 minutes in motionless pose and appeared like dead. Although she injured her wings by vibrating she tried to escape and got freed from the grasp of male without copulation. One failure of copulation added to account of that territorial male was seen. We conclude that in second case the female may be immature and not ready for mating, or the male was not of her choice, may be the eggs deposition by her would have already been accomplished for the day or female may already have carried the sperms so she rejected that territory owner. The significance of this study is to understand different ways for breeding behavior in selected species to save their future." (Authors)] Address: Raja, I.A., B.S. Patel College of Arts Commerce and Science, Pimpalgaon Kale 443403, India. Eemail: poneprince@gmail.com

**18928.** Ribeiro, S.M. (2019): Análise de metais potencialmente tóxicos em ambientes aquáticos (Da Água e dos insetos da ordem Odonata) para biomonitoramento ambiental. Ph.D. thesis, Universidade Federal de São Carlos: 83 pp. (in Portuguese, with English summary) [Analysis of potentially toxic metals in aquatic environments (from water and insects of the order Odonata) for environmental biomonitoring: "Analysis of potentially toxic metals in aquatic environments (Water and Odonata insects) for environmental biomonitoring. Potentially toxic metals are among the most common contaminants in waters and their origin may be both natural and anthropogenic. As soon as they come into contact with the aquatic ecosystem, the metals can be transported to the various compartments of the environment, such as soil, sediment, plants and animals, and may become bioaccumulative. With the increase of activities of anthropic origin and the degradation of water resources, biomonitoring becomes an effective way to expose various types of stress that may occur in the environment, serving as an alarm for declines in the quality of the environment and populations. With the determination of the adverse effects of the presence of contaminants in water bodies, it is becoming increasingly important to indicate environmental disturbances from possible contaminating sources such as agriculture. The objective of this study was to determine the levels of  $Zn^{2+}$ ,  $Cd^{2+}$ ,  $Cu^{2+}$ ,  $Co^{2+}$ ,  $Pb^{2+}$ ,  $Cr^{2+}$ ,  $Mn^{2+}$ ,  $Al^{3+}$  in the water and larvae of the order Odonata in dams 1 and 2, related to the conventional and organic planting of a plantation orange. The collected samples were previously digested

and subjected to the analysis of determination of the potentially toxic metals using the atomic emission spectrometry equipment with microwave plasma (MP-AES). The water samples indicated for some metals a concentration above the limit allowed by CONAMA Resolution n° 357/2005, in the following order  $Cu^{2+}$  >  $Pb^{2+}$  >  $Mn^{2+}$  in both dams near conventional and organic cultivation. Cr ions were observed only in dam 1 (close to conventional planting) and Al ions in dam 2 (close to organic planting). In the Odonata larvae, the presence of metals  $Zn^{2+}$  >  $Cu^{2+}$  >  $Pb^{2+}$  >  $Mn^{2+}$  was observed in both dams close to conventional and organic cultivation. All other metals were found in dams and larvae, even in small concentrations. It is concluded that the insects of the order Odonata absorb considerable concentrations of metals in the organism, the metals found in the Odonata resemble the metals found in the water, and it can be reinforced the concept that the Odonata are important indicators to monitor contaminations of metals in agricultural areas." (Author)] translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free Version)] Address: not stated

**18929.** Ruch, D.G.; Stoelting, T.; Simpson, B.; Brodman, R.; Cole, L.; Fisher, B.E.; Holland, J.D.; Jean, R.P.; Milne, M.; Namestnik, S.; Roth, K.; Russell, S.; Sterrenburg, L.; Strang, C.; Walters, B.; Whitaker, Jr. J.O.; Chamberlain, A. (2019): Results of the second (2016) Goose Pond fish and wildlife biodiversity survey, Green County, Indiana. *Proceedings of the Indiana Academy of Science* 128(1): 13-27. (in English) ["The Friends of Goose Pond, the Indiana Academy of Science, the Indiana Department of Natural Resources – Division of Fish and Wildlife, the Sassafras Audubon Society, and Duke Energy Foundation hosted the second biodiversity survey or bioblitz at Goose Pond Fish and Wildlife Area, Greene County, on 18–19 June 2016. Over 95 scientists, naturalists, students, and other volunteers on 17 different taxonomic teams observed and reported 883 taxa during the event. The 17 taxonomic teams included aquatic macroinvertebrates, bats, bees, beetles, birds, butterflies, fish, freshwater mussels, herpetofauna, small mammals, moths, fungi and slime molds, non-vascular plants, odonates, singing and non-singing insects, spiders, and vascular plants. State listed animal species included ... the state rare jade clubtail (*Arigomphus submedianus*). ... This manuscript presents both a brief history of the bioblitz sites and a summary overview of the results. Detailed results are available on the Indiana Academy of Science website." (Authors) "33 species of Odonates (22 dragonflies and 11 damselflies); 7 Greene County records plus a visual sighting of *Epiaeschnia heros* (swamp darner); 1 rare species in Indiana, *Arigomphus submedianus* (jade clubtail)." "Odonates (dragonflies and damselflies).— Odonates were surveyed using observation primarily with 83 binoculars and/or photography. This approach allowed the benefit of rapid assessment and more distance covered than collection would have afforded. The methods used in the 2016 bioblitz contrast with those of the 2010 Goose Pond bioblitz (Karns et al. 2012) which used insect nets and dip netting for aquatic larval specimens. Due to more distance covered in a short period of time during the 2016 survey, it is possible that



many Odonate species were not detected. Importantly, the 2016 survey might not include species which are primarily larval at the time of the survey, whereas dip netting may have detected some of these. Despite this impediment, the 2016 survey detected one more species of dragonfly and two more species of damselfly than the 2010 bioblitz. It should be noted that differences in the species counts should not be attributed only to survey methods, as many other differences, such as time of year and weather events, can affect Odonate abundance. Eleven species of damselfly (Zygoptera) and twenty-two species of dragonflies (Anisoptera) were observed during the bioblitz. Most of the common Odonates were ubiquitous throughout the Goose Pond habitat areas. While no endangered, threatened, or rare species were observed, eight potential Greene County records were noted, i.e., Swamp Darter (*Epiaeschna heros*), Illinois River Cruiser (*Macromia illinoensis*), Jade Clubtail (*Arigomphus submedianus*), Plains Clubtail (*Gomphus externus*), Common Sanddragon (*Progomphus obscurus*), Blue-faced Meadowhawk (*Sympetrum ambiguum*), Skimming Bluet (*Enallagma geminatum*), and Slender Bluet (*E. triviatum*) (Curry 2001; Abbott 2006–2016; Karns et al. 2012). In summary, GPFWA produced the diversity and abundance of Odonates that should be expected of a large area of such varied aquatic habitats. With only the two sampling events of the 2010 and 2016 bioblitzes, the Goose Pond complex has an odonate list that includes 28 dragonflies and 13 damselflies. This represents 26% of the Indiana's known dragonflies (Curry 2001; Mauffray 2008), and 30% of the state's known damselflies (Williamson 1917). Undoubtedly, additional odonate surveys, especially in August or September, would add to this list." Address: Ruch, D.G., Department of Biology, Ball State University, Muncie, IN 47306 USA Travis Stoelting: Property Manager, Goose Pond FWA, 13540 W County Road 400 S, Linton, IN 47441 USA. E-mail: druch@bsu.edu.

**18930.** Rychla, A.; Buczynski, P.; Czechowski, P.; Dumanski, J.; Kusal, K.; Lewandowska, E.; Lewandowski, K.; Michalczyk, W.; Niewolnik, J.; Orska, M.; Ostrowski, K.; Pielot, M.; Rauner-Bunczynska, E.; Swiata, D.; Swiata, M.; Tanczuk, A.; Tarkowski, A.; Tonczyk, G.; Wakulski, R.; Wasylk6w, E.; Wereniewicz, K.; Wiszniowska, M. (2019): The earliest records of dragonflies and damselflies (Odonata) in Poland in April and May 2018. *Odonatrix* 15\_4: 10 pp. (in Polish, with English summary) ["In the temperate zone, the beginning of emergence of adult dragonflies and damselflies depends largely on the weather conditions, principally air temperature. High temperatures are conducive to the earlier appearance of adults, while low ones can delay it. In spring 2018, Poland was constantly under the influence of hot, dry air masses arriving from the south, mainly from Africa. This resulted in positive air temperature anomalies throughout the country of as much as 3-6 °C in April and 3-5 °C in May, compared to the long-term average (1971-2000). As such warmer weather could have had affected the phenology of many odonates, we undertook to compile a list of the earliest emergence dates of dragonfly and damselfly species, recorded by a group of volunteers (professionals and amateurs) from the

beginning of the season until the end of May 2018. In addition, we compared our results with the hitherto known flight periods of odonates in Poland (Milaczewska 2010) to see whether any shifts in dates of emergence had occurred in response to climatic changes." (Authors)] Address: Rychla, Anna, ul. Osiedlowa 12, Płoty, 66-016 Czerwieńsk, Poland. Email: rychlan@op.pl.

**18931.** Start, D.; Gilbert, B. (2019): Trait variation across biological scales shapes community structure and ecosystem function. *Ecology* 100(9). e02769: 9 pp. (in English) ["Trait variation underlies our understanding of the patterns and importance of biodiversity, yet we have a poor understanding of how variation at different levels of biological organization structures communities and ecosystems. Here we use a mesocosm experiment to test for the effects of a larval dragonfly functional trait on community and ecosystem dynamics by creating artificial populations to mirror within- and between-population trait variation observed in our study area. Specifically, we manipulate variation in activity rate, a key functional trait shaping food webs, across three levels of biological organization: within-populations (differences in trait variation in a population), among-populations (differences in population mean trait values), and among-species (species-level differences of co-occurring dragonflies). We show that differences in activity rate alter prey communities, trophic cascades, and multiple ecosystem processes. However, trait variation among populations had much larger effects than differences between co-occurring species or even the presence of a predator, whereas within-population variation had a relatively minor impact. Interestingly, combined with earlier work in the same system, our study suggests that the relative importance of species versus individual level differences for ecosystem functioning will depend on the spatial scale considered. Ecological processes, including biodiversity-ecosystem functioning relationships, cannot be understood without accounting for trait variation across biological scales of organization, including at fine scales." (Authors)] Address: Start, D., Department of Ecology and Evolutionary Biology, University of Toronto, 25 Willcocks Street, Toronto, Ontario, M5S3B2 Canada. E-mail: denon.start@utoronto.ca

**18932.** Steinhoff, P.O.M.; Ahmad, R.; Butler, S.G.; Choong, C.Y.; Dow, R.A.; Reels, G.T. (2019): Odonata of Gunong Mulu National Park in Sarawak, Malaysian Borneo. *International Dragonfly Fund Report* 141: 1-50. (in English, with Bahasa Melayu summary) ["Records of Odonata collected in Gunong Mulu National Park in Sarawak are presented. Between 2005 and 2019, in 12 surveys that lasted between one week and five months, 163 species were collected. The collections from Gunong Mulu National Park are of importance for the taxonomic study of dragonflies and damselflies in Borneo; several species have been described based on material collected in the Park." (Authors)] Address: Steinhoff, P.O.M., General and Systematic Zoology, Zoological Institute and Museum, University of Greifswald, Loitzer Strasse 26, 17489 Greifswald, Germany. E-mail: philippsteinhoff@gmail.com

**18933.** Takahashi, M.; Takahashi, Y.; Kawata, M. (2019): Candidate genes associated with color morphs of female-limited polymorphisms of the damselfly *Ischnura senegalensis*. *Heredity* 122: 81-92. (in English) ["Many Odonata species exhibit female-limited polymorphisms, where one morph is similar to the conspecific male in body color and other traits (andromorph), whereas one or more other morphs differ from the male (gynomorphs). Here we investigated the differentially expressed transcripts (DETs) among males and two female morph groups (gynomorphs and andromorphs) using RNA-seq to identify candidate transcripts encoding female-limited polymorphisms in the damselfly *Ischnura senegalensis*. Seven DETs that had significantly different expression levels between males and gynomorphs, but not between males and andromorphs, were identified. The expression levels of four of these candidate genes, doublesex (*dsx*), black, ebony, and chaoptin (*chp*), were selected for further analysis using qRT-PCR. Sequence analysis of the *dsx* amplicons revealed that this gene produced at least three transcripts. Two short transcripts were mainly expressed in males and andromorphs, whereas the long transcript was specifically expressed in both morph female groups; that is, the expression pattern of the *dsx* splice variants in andromorphs was an intermediate between that of males and gynomorphs. Because the *dsx* gene functions as a transcription factor that regulates the sex-specific expression of multiple genes, its splice variants in *I. senegalensis* may explain why the andromorph is female but exhibits some masculinized traits. Because we did not detect different coding sequences of the candidate genes among the different morphs, a diallelic genomic region controlling alternative splicing of *dsx*, thus determining female-limited polymorphism in *I. senegalensis* most likely lies in a non-coding region of the *dsx* gene or in a gene upstream of it." (Authors)] Address: Takahashi, Y., Department of Biology, Faculty of Science, Chiba University, 1-33 Yayoi, Inage, Chiba, 263-8522, Japan

**18934.** Therry, L.; Cote, J.; Cucherousset, J.; Finn, F.; Buoro, Y.; Blanchet, S. (2019): Genetic and environmental contributions to the impact of a range-expanding predator on aquatic ecosystems. *Journal of Animal Ecology* 88: 35-46. (in English) ["1. Global change is altering biodiversity locally and globally and subsequently affecting the dynamics of communities and ecosystems. Biodiversity can be impacted both at the interspecific (i.e., species composition of communities) and at the intraspecific (evolutionary modification of phenotypic traits through selection or plasticity) levels. Changes in intraspecific diversity have been demonstrated to generate evolutionary feedbacks acting on ecological dynamics. Quantifying the role of intraspecific trait variation, global change and their interactions on ecological dynamics is of utmost importance. 2. Here, we used the range-expanding dragonfly *Crocothemis erythraea* as a model species to test the relative effects of intraspecific trait variation in larvae and thermal conditions on the dynamics of freshwater community and ecosystem functioning. Using experimental mesocosms, we manipulated intraspecific trait variation arising from genetic (G), early developmental

environment (Ee) and late developmental environment (EL) contributions in a full factorial design. 3. We showed that intraspecific trait variation arising from genetic effects has the strongest consequences on community and ecosystem dynamics relative to trait variation driven by the thermal environment (Ee and EL). Importantly, the ecological effects of trait variation due to genetic effects were partly modulated by thermal conditions (G \* EL, and to a lesser extent G \* Ee interactions) and varied among ecological response variables. For instance, the strongest G \* EL effects were observed on primary productivity and zooplankton dynamics. Trait variation driven by plasticity related to early or late developmental environments has an overall weak effect on ecological dynamics. 4. Intraspecific trait variation induced by genetic effects can affect ecological dynamics (evo-to-eco dynamics) more strongly than variation induced by the developmental environment. However, they likely interact to modulate the structure of communities and the functioning of ecosystems, highlighting the strong context (environmental) dependency of evo-to-eco dynamics." (Authors)] Address: Blanchet, S., Lab. Évolution et Diversité Biologique (EDB UMR 5174), Univ. de Toulouse, CNRS, IRD, UPS, Toulouse, France. E-mail: simon.blanchet@sete.cnrs.fr

**18935.** Van Dievel, M.; Janssens, L.; Stoks, R. (2019): Additive bioenergetic responses to a pesticide and predation risk in an aquatic insect. *Aquatic Toxicology* 212: 205-213. (in English) ["Highlights: • Effects of predation risk and chlorpyrifos on life history and physiology were tested. • Only chlorpyrifos was lethal, yet both stressors reduced growth. • Both stressors negatively affected the bioenergetics at organismal and cellular level. • Predation risk and chlorpyrifos consistently interacted in an additive way. Abstract: Ignoring natural stressors such as predation risk may contribute to the failure of ecological risk assessment of pesticides to protect freshwater biodiversity. To better understand combined effects of multiple stressors, bioenergetic responses are important as these inform about the balance between energy input and consumption, and provide a unifying mechanism to integrate the impact of multiple stressors with different modes of action. We studied in *Enallagma cyathigerum* damselfly larvae the single and combined effects of exposure to the pesticide chlorpyrifos and predation risk on life history (survival and growth rate) and bioenergetic response variables at the organismal level (assimilation and conversion efficiency) and the cellular level (cellular energy allocation CEA, energy storage  $E_a$ , and energy consumption  $E_c$ ). Chlorpyrifos exposure almost halved the survival of the damselfly larvae, while predation risk had no effect on survival. Both exposure to the pesticide and to predation risk reduced larval growth rates. This was caused by a reduced conversion efficiency under chlorpyrifos exposure, and by a reduced assimilation efficiency under predation risk. Both chlorpyrifos and predation risk reduced the CEA because of a decreased  $E_a$ , and for chlorpyrifos also an increased  $E_c$ . The lower  $E_a$  was driven by reductions in the fat and glycogen contents. Effects of the pesticide and predation risk were consistently additive and for most variables the strongest response was detected when

both stressors were present. The absence of any synergisms may be explained by the high mortality and hypometabolism caused by the pesticide. Our results indicate that CEA can be a sensitive biomarker to evaluate effects of not only contaminants but also natural stressors, such as predation risk, and their combined impact on organisms." (Authors)] Address: Van Dievel, Marie, Evolutionary Stress Ecology and Ecotoxicology, University of Leuven, Charles Deberiotstraat 32, B-3000 Leuven, Belgium. Email: vandievel@kuleuven.be

**18936.** Verheyen, J. (2019): Evolutionary-ecotoxicological study of the effects of daily temperature fluctuations on pesticide toxicity in damselfly larvae. PhD thesis, Department of Biology, Ecology, Evolution and Biodiversity Conservation, KU Leuven - University: (in English) ["In natural ecosystems animals encounter several environmental stressors that furthermore can interact with pollutants and potentially increase their toxicity. This is considered one of the underlying reasons why current ecological risk assessment is possibly failing to protect natural ecosystems as it may be lacking realism by being based on pesticide toxicity testing under standard laboratory conditions. While it is widely known that an increase in mean temperature increases the toxicity of pollutants, studies largely ignored the effects of daily temperature fluctuations (DTFs) on pesticide toxicity and never tested pollutant toxicity under both global warming stressors (the more realistic scenario in which both the mean temperature and the DTF increase). Furthermore, how DTFs shape pesticide toxicity is mostly unknown, which asks for an integrated approach including life history and physiology. In this thesis, I tested for the single and combined effects of exposure to the pesticide chlorpyrifos (CPF) and warming (+ 4 °C increase in mean temperature and a + 5 °C increase in DTF) in *Ischnura elegans* damselfly larvae by executing a series of common-garden experiments. I studied effects on life history traits, heat tolerance and candidate underlying physiological mechanisms. Thereby, I used damselfly larvae across a latitudinal gradient (European low- and high-latitude populations) to study the role of thermal adaptation in shaping the sensitivity to pesticides under global warming. The mean summer water temperatures and maximum summer DTFs in shallow freshwater ponds located in southern France (low latitude) are 24 °C with 10 °C DTF, and in southern Sweden (high latitude) are 20 °C with 5 °C DTF. This 4 °C difference in mean temperature and 5 °C difference in maximum DTF also matches the predicted increase in both factors by 2100 under the IPCC RCP 8.5 scenario, which allows for applying a space-for-time substitution to test if gradual thermal evolution in high-latitude populations may buffer for the increased pesticide toxicity under global warming (increase in both mean temperature and DTF). I reviewed the strengths and weaknesses of this approach in chapter I. In the second chapter, I studied the effects of global warming in the absence of the pesticide and I found that DTFs only had negative effects on growth rate under the 4 °C warming treatment. While 4 °C warming was beneficial for larvae of both latitudes, this changed in a negative effect in the presence

of high DTF. These negative effects of DTF were stronger in high-latitude larvae and already occurred at low DTF, indicating local thermal adaptation. This also suggests that if high-latitude populations are able to gradually thermally evolve into 'low-latitude' populations, they would no longer suffer a growth reduction in the presence of DTF under 4 °C warming. When studying the effects of DTFs on pesticide toxicity in chapter III, I found the striking result that while the used chlorpyrifos concentration was not affecting the damselfly larvae's life history at a constant temperature of 20 °C, it did strongly decrease survival and growth in the presence of DTFs around 20 °C. These results suggest that in standard pesticide toxicity tests, which are carried out by current risk assessment, this concentration would have been regarded as safe. Thereby, this highlights it is crucial to integrate DTFs in current risk assessment to reach more realistic predictions about pesticide toxicity in natural systems. In the last three chapters, I studied the effects of pesticides under global warming, thereby including the predicted increases in both mean temperature and DTF. The toxicity of chlorpyrifos was magnified by the increase in both mean temperature and DTF, but especially at their combination. Furthermore, I described in chapter V a novel, likely general mechanism that contributes to the higher chlorpyrifos toxicity under global warming by coupling two general principles: the widespread temperature-size rule and the size-pesticide sensitivity pattern. Larvae got smaller under DTFs, and these smaller larvae were more vulnerable to the pesticide, hence the higher chlorpyrifos toxicity under DTFs was partly mediated through DTF-induced reductions in body size. In terms of physiological variables, I found evidence of chlorpyrifos-induced effects being stronger under DTFs in terms of oxidative damage to lipids, which may contribute to the mortality patterns. Further, in my last chapter, I observed that the chlorpyrifos-induced reductions in bioenergetic response variables (energy availability and net energy budget) were stronger when the high mean temperature was combined with the high DTF. Moreover, I also showed that the bioenergetic responses contributed to the higher chlorpyrifos toxicity under global warming as treatment combinations with lower net energy budgets showed higher mortality and lower growth rates. Although I did not always find evidence that possible gradual thermal evolution in high-latitude damselflies would buffer for the increased chlorpyrifos toxicity under global warming, I did find a strong signal in chapter IV. Latitude-specific thermal adaptation to both mean temperature and DTF buffered for the chlorpyrifos-induced reduction in heat tolerance, meaning that possible gradual thermal evolution in high-latitude populations may buffer for the negative effects of chlorpyrifos on heat tolerance under warming, unless the DTF increase is taken into account. My results indicate that it is crucial to not only consider DTFs, but also their interaction with increasing mean temperatures, and to integrate gradual thermal evolution to make more realistic predictions of pesticide toxicity in the current climate and in a warming world." (Author)] Address: Verheyen, Julie, Ecology, Evolution & Biodiversity Conservation, Charles Deberiotstraat 32 - box 2439, 3000 Leuven, Belgium. Email: julie.verheyen@kuleuven.be

**18937.** Zheng, D.; Zhang, H.; Jarzembowski, A.; Wang, B. (2019): *Electrodysagrion neli* sp. nov., the second Cretaceous dysagrionine damselfly (Odonata: Zygoptera: Dysagrionidae) from Kachin amber, northern Myanmar. *Palaeontology* 2(6): 556-559. (in English) ["The dysagrionid damselflies, characterized by a broad quadrilateral discoidal cell, are widely recorded in the Lower Cretaceous–lower Oligocene, and frequently found in mid-Cretaceous Kachin amber (Zheng et al., 2016, 2017a, b, 2018a). Three genera and four species of Dysagrionidae have been described from Kachin amber, including *Burmadysagrion zhangi* Zheng, Wang & Nel, 2016, *Electrodysagrion lini* Zheng, Nel & Wang, 2017, *Palaeodysagrion cretacicus* Zheng et al., 2017 and *Palaeodysagrion youlini* Zheng, Chang & Wang, 2018 (Zheng et al., 2016, 2017a, b, 2018a). The dysagrionid damselflies have several types of discoidal cells seen in the Kachin amber species, contributing to evaluating the early evolution and diversification of the discoidal cell. For example, *Burmadysagrion* has the anterior and posterior sides of the discoidal cell not parallel, and the basal side longer than the distal side; *Electrodysagrion* has the anterior and posterior sides of the discoidal cell not parallel, and distal side longer than the basal side; and *Palaeodysagrion* has a long and narrow discoidal cell. In the present paper, a new dysagrionine damselfly is described representing the second dysagrionine in Kachin amber. The new damselfly allows for the revision of the generic characters of *Electrodysagrion* Zheng, Nel & Wang, 2017." (Authors)] Address: Zheng, D., State Key Laboratory of Palaeobiology & Stratigraphy, Nanjing Inst. of Geology & Palaeontology & Center for Excellence in Life & Palaeoenvironment, Chinese Acad. Sciences, 39 East Beijing Road, Nanjing 210008, China

**18938.** Zia, A.; Hussain, I.; Mehmood, S.A.; Ahmad, S.; Shah, M.; Bhatti, A.R. (2019): Richness and distribution of Odonata in Kurram District, Khyber Pakhtunkhwa. *Pakistan Journal of Agricultural Research* 32(4): 589-594. (in English) ["District Kurram represents an important geographical position. It shares its border with Afghanistan and possesses unlimited water resources. Due to prolonged uncertain ground conditions, this area remains unexplored for insect fauna. Present study was carried out in to record richness, abundance and species complex of Odonata. It revealed four families, fifteen genera and twenty-six species. Among recorded fauna, family Libellulidae appeared to be a dominant group representing 19 species, followed by family Coenagrionidae with 5 species and family Calopterygidae and Aeshnidae representing single species each. Being a flying insect group, seasonal surveys and temporal data collection for odonates in this ecologically rich area can surely bring forward important information for the migratory species between Afghanistan and Pakistan." (Authors)] Address: Zia, A., National Insect Museum, NARC, Islamabad, Pakistan.

**18939.** Zou, P.Y.; Lai, Y.-H.; Yang, J.-T. (2019): Effects of phase lag on the hovering flight of damselfly and dragonfly. *Phys. Rev. E* 100, 063102 – Published 4 December 2019: (in English) ["In this work we studied the differences in flight

kinematics and aerodynamics that could relate to differences in wing morphologies of a dragonfly and a damselfly. The damselflies and dragonflies normally fly with the fore wing or hind wing in the lead, respectively. The wing of the damselfly is petiolate, which means that the wing root is narrower than that of the dragonfly. The influence of the biological morphology between the damselfly and the dragonfly on their hovering strategies is worthy of clarification. The flight motions of damselflies and dragonflies in hovering were recorded with two high-speed cameras; we analyzed the differences between their hovering motions using computational fluid dynamics. The distinct mechanisms of the hovering flight of damselflies (*Matrona cyanoptera*) and dragonflies (*Neurothemis ramburii*) with different phase lags between fore and hind wings were deduced. The results of a comparison of the differences of wing phases in hovering showed that the rotational effect has an important role in the aerodynamics; the interactions between fore and hind wings greatly affect their vortex structure and flight performance. The wake of a damselfly sheds smoothly because of slender petiolation; a vertical force is generated steadily during the stage of wing translation. Damselflies hover with a longer translational phase and a larger flapping amplitude. In contrast, the root vortex of a dragonfly impedes the shedding of wake vortices in the upstroke, which results in the loss of a vertical force; the dragonfly hence hovers with a large amplitude of wing rotation. These species of Odonata insects developed varied hovering strategies to fit their distinct biological morphologies." (Authors)] Address: Yang, J.-T., Department of Engineering Science and Ocean Engineering, National Taiwan University, 10617 Taipei, Taiwan. Email: jtyang@ntu.edu.tw

## 2020

**18940.** Alves, A.F. (2020): Revisão sistemática de autotomia em larvas de Odonata: um método de defesa com alto custo na sobrevivência. BSc thesis, Entomologia – Laboratório de Ecologia Comportamental e Interações (LECI), Universidade Federal de Uberlândia: 41 pp. (in Portuguese, with English summary) ["Autotomy is a phenomenon of predetermined biological rupture, where an animal detaches a part of the body, with the function of defending itself. Thus, the autotomy occurs in response to a perceived threat, acting as a proximal defense strategy for the individual. Thus, the autotomy has evolved at different rates, as in the order Odonata. However, there are consequences caused by such a process, such as loss of mobility and additional energy expenditure. With that, this study carried out a systematic review of studies related to autotomy of caudal lamellae in nymphs of the order Odonata, in order to discuss what knowledge they have of this process, within the taxonomic group (Odonata) and understand what are the possible costs of this defensive process. This review will show that the autotomy of the caudal appendages is beneficial for the individual, as it allows survival, even with the high costs it represents." (Author)] Address: not stated

**18941.** Araujo, B.R. (2020): Taxonomia e diversidade das



libélulas (Insecta: Odonata) do Mananciais da Serra, Município de Piraquara, Estado do Paraná, Brasil. Dissertação (mestrado) - Universidade Federal do Paraná, Setor de Ciências Biológicas, Programa de Pós-Graduação em Ciências Biológicas (Entomologia): 70 pp. (in Portuguese, with English summary) ["Human activities alter the structure, dynamics and energy flow of aquatic environments. For example, damming rivers increases solar incidence, water permanence and temperature, interfering with dragonfly communities (order Odonata). The sensitivity of Odonata species to disturbances makes them model organisms of bioindicator of environmental quality, however, knowledge of dragonfly fauna in Brazil is concentrated close to institutions with specialists and most of the territory is undersampled. The objectives of this research were: (1) to present a comprehensive checklist of Odonata species for the protected area of Mananciais da Serra, (2) to provide taxonomic notes for rare or littleknown species and finally (3) to investigate the influence of the dam on the structure and composition of the Odonata community in a subtropical area. The research was conducted in the threatened Atlantic Forest domain, in the Serra do Mar mountain chain in a well-preserved area in the municipality of Piraquara, state of Paraná, Brazil. The sampling effort took place between 2017 and 2019, using different collection methods in different mesohabitats in which dragonflies occurs from bromeliads and small streams to large reservoirs. Two communities were considered, one from a forested area (local community, MS) and another from a reservoir (homogeneous landscape community, RP). The alpha and beta-diversity of MS and RP were investigated to infer about the homogenization of the landscape. In addition, two bioindicator tools for habitat quality were applied to our data. The amount of 1,627 specimens from 9 families, 42 genera and 83 species were sampled. A total of 53 new occurrence records were detected for Paraná, bringing to 113 the number of dragonfly species reported to the state, while *Micrathyria venezuelae* De Marmels, 1989 is registered for the first time in Brazil. The female from the original description of *Neocordulia mambucabensis* Costa & T.C. Santos 2000 is another species of *Neocordulia*. In addition, two females, four species not described and larvae of the last stage of development of four species were detected. Larvae sampling increased the abundance of rare species and females. Alpha diversity showed the RP community as the most diverse, a result related to the high occurrence of generalist species. The composition of species and typical species configure greater heterogeneity for MS. The high turnover characterizes a Clementsian pattern for the metacommunity, probably due to the conversion and homogenization of the aquatic system, therefore the reservoir has almost no capacity to maintain the local fauna. Finally, the habitat quality bioindication tools were efficient, considering MS as more preserved than RP, however, the Zygoptera / Anisoptera ratio was less accurate than the Libellulidae / other Anisoptera and Coenagrionidae / Zygoptera ratios, respectively. The estimated richness for Mananciais da Serra is over one hundred, corresponding to at least 60% of the species known for Paraná and 10% of Brazilian species, the country richest in species in the world.

The reservoir excludes local species, giving rise to a high diversity of more generalist species; however, its surrounding areas are preserved maintaining part of the natural habitat and local biodiversity, a positive aspect that mitigates the homogenization of the landscape." (Author)] Address: Araujo, B.R., Lab. de Sistemática de Insetos Aquáticos, Depto Zool., Univ. Federal do Paraná, Caixa Postal 19020, 81531-980 Curitiba, PR, Brazil. E-mail: breno.rda94@gmail.com

**18942.** Ayres, C.; Domínguez-Costas, M. (2020): Primeira cita de *Diplacodes lefebvrii* (Rambur, 1842) (Odonata: Libellulidae) en Galicia. *Braña* 18: 17-18. (in bilingual in Spanish and English) [14-VII-2020, wetland near the Miño river in the municipality of As Neves (29TNG55).] Address: Ayres, C., AHE-Galicia. Barcelona, 86-6C. 36211, Vigo (Pontevedra). Spain. E-mail: galicia@herpetologica.org

**18943.** Baaloudj, A. (2020): Aspects of life history of the Afrotropical endangered *Acisoma inflatum* (Selys, 1889) (Odonata: Libellulidae) in Northeast Algeria. *Annales de la Société entomologique de France* (N.S.) 56(2): 180-188. (in English, with French summary) ["*A. inflatum* is a threatened dragonfly in the Mediterranean, where only a few relict populations remain. It is listed as endangered in North Africa, where no data on its biology, behaviour or ecology are available. These latter are important to understand how this species is adapted to local environmental conditions and for establishing effective conservation plans. In this study, the life history of *A. inflatum* is investigated in a north-east Algerian population. By combining field and laboratory investigations on embryonic development and regular collection of exuviae during the emergence season, it is revealed that the species has direct and synchronous embryonic development, with 75% of all eggs hatching after 10 days of oviposition, and a hatching period ranging from 9 to 15 days. Emergences were asynchronous with half of the larval population (EM50) emerging within the first 25 days of a 64-day emergence season, which matches a typical 'summer species' emergence pattern. Sex ratio at emergence was not significantly different from unity. Body size of exuviae did not show a significant pattern across the season. Exuviae males and females did not differ in their vertical stratification. Height of exuviae fixation during emergence was not random, but was rather positively correlated with support height where the relationship was logarithmic. Apparent lifespan of adults was not significantly different between sexes with a mean of  $4.6 \pm 2.9$  days ( $\pm$  SD). Males and females reached their sexual maturity after two days of emergence. The information provided in this study has not been reported before and thus will be helpful in future conservation efforts." (Author)] Address: Baaloudj, Affef, Lab. LBEE: Biol., Water & Environment, Fac. SNV-STU, Univ. 8 May 1945 Guelma, BP 401 24000, Guelma, Algeria. Email: bafef@yahoo.fr

**18944.** Balázs, A.; Fric, Z.F.; Holuša, O. (2020): Flying activity and population dynamics of *Cordulegaster heros* Theischinger, 1979 (Insecta: Odonata: Cordulegasteridae) in Slovakia. *International Journal of Odonatology* 23(3): 1-9. (in English) ["In 2017, we investigated the population dynamics

and flying activity of the south-east European endemic *C. heros*. This research was conducted in the southern part of Central Slovakia in the Revúcka vrchovina Upland at a sub-mountainous stream called Drienok. The mark-release-recapture method was applied to study the population. *C. heros* was observed 775 times during the midsummer season. We found out that the species has bimodal diurnal activity pattern with a highest peak from 17:00 until 19:00 hours, but the species had a short peak before noon as well. The differences between sexes in the sense of entering new individuals to the population were low during the main flying period. Estimated population size for males surpassed the population size of females. Probability of capture decreased by the end of the flying season without differences in sexes. This article is the first on the flying activity and population dynamics of *C. heros*." (Authors)] Address: Balazs, A., Dept of Zoology, Fisheries, Hydrobiology & Apiculture, Faculty of AgriSciences, Mendel University in Brno, Brno, Czech Republic. Email: balazsaeko@gmail.com

**18945.** Baldo, F.; Cáceres, F.B.; Díaz-Martínez, C. (2020): Primeros registros de *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) de Guadalajara (Castilla-La Mancha, España). *Boletín de la Sociedad Entomológica Aragonesa* 67: 405-406. (in Spanish, with English summary) ["*Trithemis kirbyi* is recorded for the first time in Guadalajara province, extending the known range of the species in central Spain and taking the provisional Odonata checklist of the province to 48 species." (Authors) 2017: parque natural del Alto Tajo (balsa de incendios de Selas, 30T 573169 4528688, datum ETRS89, 1.205 m); 2018: parque natural (Río Ablanquejo en Huertahemando, 30T 558734 4521587, 1.160 m); 2020: canal artificial de agua del barranco del Alamin (30T 485462 4499 107, 640 m)] Address: Baldo, F., Sociedad Entomológica y Ambiental de Castilla-La Mancha. C/ Londres, 7. 45003 Toledo, Spain. fbravo@jccm.es

**18946.** Bandara, C.D.; Ballerín, G.; Leppänen, M.; Tesfamichael, T.; Ostrikov, K.; Whitchurch, C.B. (2020): Resolving bio-nano interactions of *E. coli* bacteria-dragonfly wing interface with Helium ion and 3D-structured illumination microscopy to understand bacterial death on nanotopography. *ACS Biomaterials Science & Engineering* 6(7): 3925-3932. (in English) ["Obtaining a comprehensive understanding of the bactericidal mechanisms of natural nanotextured surfaces is crucial for the development of fabricated nanotextured surfaces with efficient bactericidal activity. However, the scale, nature, and speed of bacteria-nanotextured surface interactions make the characterization of the interaction a challenging task. There are currently several different opinions regarding the possible mechanisms by which bacterial membrane damage occurs upon interacting with nanotextured surfaces. Advanced imaging methods could clarify this by enabling visualization of the interaction. Charged particle microscopes can achieve the required nanoscale resolution but are limited to dry samples. In contrast, light-based methods enable the characterization of living (hydrated) samples but are limited by the resolution achievable. Here we utilized both helium ion microscopy

(HIM) and 3D structured illumination microscopy (3D-SIM) techniques to understand the interaction of Gram-negative bacterial membranes with nanopillars such as those found on dragonfly wings. Helium ion microscopy enables cutting and imaging at nanoscale resolution while 3D-SIM is a super-resolution optical microscopy technique that allows visualization of live, unfixed bacteria at ~100 nm resolution. Upon bacteria-nanopillar interaction, the energy stored due to the bending of natural nanopillars was estimated and compared with fabricated vertically aligned carbon nanotubes. With the same deflection, shorter dragonfly wing nanopillars store slightly higher energy compared to carbon nanotubes. This indicates that fabricated surfaces may achieve similar bactericidal efficiency as dragonfly wings. This study reports in situ characterization of bacteria-nanopillar interactions in real-time close to its natural state. These microscopic approaches will help further understanding of bacterial membrane interactions with nanotextured surfaces and the bactericidal mechanisms of nanotopographies so that more efficient bactericidal nanotextured surfaces can be designed, fabricated, and their bacteria-nanotopography interactions can be assessed in situ." (Authors)] Address: Bandara, C.D., The ithree Institute, Univ. Technology Sydney, Ultimo, NSW 2007, Australia. Email: chaturangab@yahoo.com

**18947.** Bastos, R.C. (2020): Respostas ecológicas de espécies de Odonata (Insecta) a um gradiente de múltiplos usos do solo na Amazônia Oriental. Universidade Federal do Pará – UFPA Instituto de Ciências biológicas Embrapa Amazônia Oriental Programa de Pós-Graduação em Ecologia, Belém: 11 + 33 pp. (in Portuguese, with English summary) ["Ecological responses of Odonata species (Insecta) to multiples land uses gradient in the Oriental Amazon: Several factors can influence, jointly or separately, the communities structuration through space and time, such as niche, dispersal ability and evolutionary history of species. For this reason, environmental, morphological and phylogenetic factors are constantly focused in studies about community ecology. In this sense, the goal of this study is to evaluate the response pattern of Odonata adult species to an environmental change gradient in the Amazon, to identify species subgroups that respond to the environmental filter in a similar way. The study hypothesis is that the species subgroups would have similar responses to the environmental gradient will be structured phylogenetically and They will be morphologically similar among themselves than to the other species. The adult Odonata were collected in 98 amazon streams, where 48 streams in the Santarém and Belterra region and 50 in the Paragominas municipality, both in the state of Pará, Brazil. It was used distribution modeling methods jointly with statistical methods to identify the species subgroups that have similar responses, in other words it is the latent classes. Subsequently, it was analyzed the relationship between the structuring patterns of these latent classes and the communities' morphological and phylogenetic factors. Overall 3,588 adult Odonata individuals were sampled, representing 131 species distributed in 49 genera. Of the species sampled, 34 were classified as well-modeled

and formed four latent classes, for each of the regions. The findings show that phylogenetic and morphological factors may influence the latent classes structuring of Odonata species. However, the patterns were not the same for all classes and regions. Furthermore, it is likely that the classes structuring may be related to more complex and/or dynamic processes, not considered in this study, such as intra and/or interspecific relationships, adaptation ability or even differences in the land use historic between the regions studied. Therefore, these results show the importance of more detailed studies in the Amazon using that approach. Thus, it can help to understand better the distribution/response patterns of Odonata species in the face of environmental changes across landscapes in a scenario of multiple land uses." (Authors)] Address: not stated

**18948.** Beckstead, R.; Beckstead, R.B.; Anderson, K.; McDougald, L.R. (2020): Oviduct fluke (*Prostogonimus macrorchis*) found inside a chicken egg in North Carolina. *Avian Diseases* 64(3): 352-353. (in English) ["A video received by faculty at NC State University Department of Poultry Science revealed a live parasite inside a chicken egg. The parasite was identified as an oviduct fluke (*Prostogonimus macrorchis*), a trematode with a three host life cycle: the primary host, a galliform bird, then an aquatic snail, and finally a dragonfly larva or adult consumed by the infected bird. The egg was from a „backyard flock“ with access to a watercourse. No other instances of this parasite were seen in eggs from the flock. The presence of this parasite inside an egg suggests that the worms had migrated above the shell gland in the oviduct, to be incorporated inside the egg. Currently, the occurrence of an oviduct fluke inside an egg in the US is rare. Such parasites are not found in eggs from caged layers, as those birds do not have access to watercourses. This case reinforces the view that parasites requiring intermediate hosts may become more common in birds reared under „free range“ conditions." (Authors)] Address: Beckstead, R., University of North Carolina at Greensboro Associate Professor Department of Poultry Science 2711 Founders Drive 261 Scott Hall UNITED STATES Raleigh North Carolina

**18949.** Bender Kotzian, C.; Marques Pires, M.; Ubiratan Hepp, L. (2020): Effects of spatial distances on the assemblage dissimilarity of macroinvertebrates with different dispersal pathways and abilities in southern Brazilian streams. *Ecological Research* 35(5): 826-837. (in English) ["The magnitude of distance–decay relationships (DDRs) in stream macroinvertebrates can vary with their preferential dispersal pathways (overland and watercourse) and abilities as well as with environmental dissimilarity. We assessed DDRs in the compositional dissimilarity of macroinvertebrate assemblages in southern Brazilian streams using overland and watercourse distances (WD) as explanatory variables. We conducted additional separate assessments for taxonomic groups and according to a classification that took into account differences in the dispersal abilities and main pathways among macroinvertebrates. Assessments were conducted separately for (a) strong-flying insects with overland

dispersal (Anisoptera), (b) weak-flying insects dispersing preferably through riparian corridors (Chironomidae, Ephemeroptera, Plecoptera, Trichoptera and Zygoptera), and (c) watercourse dispersers (Mollusca, Psephenidae and Elmidae). The environmental dissimilarity associated with spatial extent was accounted for via partial Mantel tests. Overland and WD were positively correlated with the dissimilarity of the total macroinvertebrate assemblage, weak-flying insects, watercourse dispersers, and most taxonomic groups. DDRs were stronger with overland than WD. However, no consistent pattern emerged after accounting for environmental dissimilarity. Strong- and weak-flying insects were correlated with environment, while watercourse dispersers, with geographic distances. Additionally, taxonomic groups were differently related with environment and geographic distances. The distinct responses of each taxonomic group to the environmental specificities of the study area such as substrate composition and land use likely explain the observed results. Thus, our findings indicate that combining taxonomic and natural history information is an effective approach for comprehending the underlying mechanisms generating spatial structure in stream macroinvertebrate assemblages." (Authors)] Address: Marques Pires, M., Laboratory of Ecology and Conservation of Aquatic Ecosystems, University of Vale do Rio dos Sinos, Sao Leopoldo, Brazil. Email: marquespiresm@gmail.com

**18950.** Beukema, J.J. (2020): Is it wise to terminate counting along transects where Odonata can no longer be found? *Brachytron* 21: 3-11. (in Dutch, with English summary) ["Regular counts of the numbers of Odonata during 14 years (2007-2020) along several transects in the dune area Grafelijkheidsduinen near the town of Den Helder (northwest Netherlands) yielded significantly positive correlations between total numbers and numbers in several species as observed at different groups of transects, and with water levels. Significantly negative correlations were found with year numbers. At two transects (along the same lake), numbers declined to (close to) 0 in the course of the years and termination of counting along these transects was considered (but dismissed). From the above correlations, it is concluded that (1) monitoring of part of a large area would generally be sufficient to follow the fluctuations in population sizes in the entire area; (2) water level (resulting from the difference between rain fall and evaporation) is of decisive influence for the numbers of Odonata present; (3) total numbers and numbers in about half of the species showed a significantly declining long-term trend. Long-term local trends deduced from monitoring might be biased by decisions to terminate counting at transects when numbers there decline to very low levels. In the calculations of the national trend this is being corrected for." (Authors)] Address: Beukema, J.J. Email: jan.beukema@outlook.com

**18951.** Billqvist, M. (2020): Nya provinsfynd av trollsländor (Odonata) i Sverige 2018–2020. *Entomologisk Tidskrift* 141 (4): 173-189. (in Swedish, with English summary) ["During the last three years we have seen a further increase in submitted Odonata observations to the Species Observation

System (Artportalen). More than 15 000 observations have been submitted annually 2018–2020. This after the interest for and the knowledge of dragonflies in Sweden already had increased dramatically for more than a decade. The paper presents the 47 new provincial records of 23 species made in 2018-2020. Included is the first ever *Crocothemis erythraea* (Brullé, 1832) in Sweden, which increases the amount of species registered in Sweden to 65. With the sole exception of Lycksele lappmark, new provincial records of dragonflies have been made in every province since 2009. There are still gaps in our knowledge regarding the range of several species. In the northernmost provinces we yet lack observations of even some of the more common species. Since the interest still is on a rise and many dragonflies show a northern expansion shift, we should in the years to come continue to get more new provincial records." (Author)] Address: Billqvist, M., Trollsländeföreningen / Swedish Dragonfly Society, Idrottsvägen 2, SE-243 72 Tjörnarps, Sweden. Email: magnus.billqvist@gmail.com

**18952.** Bobrek, R. (2020): High biodiversity in a city centre: Odonatofauna in an abandoned limestone quarry. *European Journal of Environmental Sciences* 10(2): 107-114. (in English) ["Limestone quarries are known to be places where the diversity of xerothermophilic organisms is promoting diversity and in some, there are water bodies that potentially support the presence of hydrobionts. These include dragonflies (Insecta: Odonata), which, as amphibiotic insects, use both aquatic and terrestrial habitats. The purpose of this paper was to determine whether there was a high diversity of odonatofauna in an old limestone quarry with well-developed aquatic habitats, located in an urban environment in the Central-European city of Kraków (S Poland). For this purpose, dragonflies in the quarry were monitored regularly, focusing on the reproductive status and relative abundance of each species. In 2017–2018, 37 species belonging to seven families of Odonata were recorded in the quarry, which is 50% of the Poland's odonatofauna. Of these, 33 species were considered indigenous to the quarry. Among them, 30% were moderately urbanophobic or urbanophobic taxa. Habitat specialists made up 39% of the species. Some rare and declining species, i.e. *Leucorhinia pectoralis* and *L. rubicunda*, were abundant at this site. The study shows that a well-preserved secondary habitat, located in the centre of a city and not subject to urban management, can support a high diversity of odonates. Such limestone quarries in highly transformed urban environments can be valuable sites for this indicator group of organisms and should be identified, evaluated and conserved." (Author)] Address: Bobrek, R., Polish Society for the Protection of Birds, Odrowaza 24, 05-270 Marki, Poland. E-mail: rafal.bobrek@gmail.com

**18953.** Bobrov, V.V. (2020): Rare and endangered species of invertebrate animals of Mongolia: Current status, threats and measures of protection. *Environment and Human: Ecological Studies* 10(2): 121-132. (in Russian, with English summary) ["Based on the information provided in the 2nd and 3rd editions of the Red Book of Mongolia, the current

state of the rare and endangered species of mollusks, crustaceans and insects of Mongolia and the threat to their existence are analyzed: water pollution and accidental catch during fishing (for aquatic species); degradation of habitats (haymaking, draining of swamps); overgrazing; collecting. The effectiveness of protection measures has been identified: the habitats of some species are included in the boundaries of specially protected natural territories; some species are listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora which will establish strict control over the international trade of rare and endangered species of invertebrates in Mongolia. It is indicated that the conservation of certain species of mollusks, crustaceans and insects requires additional and more specific measures: prevention of habitat degradation, including overgrazing and pollution of water bodies; a ban on collecting; conducting research to identify the concentration of populations, as well as assess the resources of food plants." (Authors) Aeshna juncea] Address: Bobrov, V.V., A.N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Moscow, 117091, Russian Federation

**18954.** Borisov, S.N.; Iakovlev, I.K.; Borisov, A.S.; Ganin, M.Yu.; Tiunov, A.V. (2020): Seasonal migrations of *Pantala flavescens* (Odonata: Libellulidae) in Middle Asia and understanding of the migration model in the Afro-Asian region using Stable Isotopes of hydrogen. *Insects* 2020, 11, 890; doi:10.3390/insects11120890: 12 pp. ["Simple Summary: Large-distance migrations of insects have been recognized for many years, but many details of this behaviour remain unknown. The globe skimmer dragonfly has the most extensive cosmopolitan range among all dragonfly species. Migrations of these dragonflies are noted on all continents (except Antarctica), over both land and the oceans, but the patterns of their seasonal movements are still poorly understood. We aimed to confirm seasonal latitudinal migrations of the globe skimmer in Middle Asia and to clarify its migration pattern in extended areas. We used stable isotope composition of hydrogen in wings of dragonflies as an intrinsic marker of their places of origin. Combining phenological data and a comparison with published isotopic data on migratory insects, our results suggest that in spring, the already-mature dragonflies arrive in Middle Asia for reproduction from tropical parts of East Africa and/or the Arabian Peninsula, and, in autumn, summer-generation dragonflies migrate to the south. We conclude that in the Afro-Asian region there is an extensive migration circle of the globe skimmer covering East Africa, Central Asia and the Indian subcontinent with a total length of more than 14,000 km." Abstract: In Middle Asia, the dragonfly *Pantala flavescens* makes regular seasonal migrations. In spring, sexually mature dragonflies (immigrants) arrive in this region for reproduction. Dragonflies of the aboriginal generation (residents) develop in about two months, and migrate south in autumn. Residents of Middle Asia have significantly lower  $\delta\text{-H}$  values ( $-123.5$  (SD 17.2)‰,  $n = 53$ ) than immigrants ( $-64.4$  (9.7)‰,  $n = 12$ ), as well as aboriginal dragonfly species from Ethiopia ( $-47.9$  (10.8)‰,  $n = 4$ ) and the Sahel zone ( $-50.1$



(15.5)‰, n = 11). Phenological data on *P. flavescens* in the Afro-Asian region and a comparison with published isotopic data on migratory insects from this region suggest that (i) the probable area of origin of *P. flavescens* immigrants is located in tropical parts of East Africa and/or the Arabian Peninsula and (ii) the autumn migration of Middle Asian residents to the south may also pass through the Indian Ocean. We assume that in the Afro-Asian region, there is an extensive migration circle of *P. flavescens* covering East Africa, Central Asia and the Indian subcontinent with a total length of more than 14,000 km." (Authors)] Address: Borisov, S.N., Inst. of Systematics & Ecology of Animals, Siberian Branch of the Russian Academy of Sciences, Frunze str., 11, 630091 Novosibirsk, Russia. E-mail: borisov-s-n@yandex.ru

**18955.** Borisov, S.N.; Iakovlev, I.K.; Borisov, A.S.; Zuev, A.G.; Tiunov, A.V. (2020): Isotope evidence for latitudinal migrations of the dragonfly *Sympetrum fonscolombii* (Odonata: Libellulidae) in Middle Asia. *Ecological Entomology* 45(6): 1445-1456. (in English) ["1. *Sympetrum fonscolombii* dragonflies are believed to migrate seasonally. In the spring and early summer, the already-mature dragonflies arrive in Middle Asia for reproduction. In the late summer and autumn, summer-generation dragonflies migrate to the south. Their wintering places remain unknown. 2. Stable hydrogen ( $\delta^2\text{H}$ ) and oxygen ( $\delta^{18}\text{O}$ ) isotope analyses were conducted to confirm the migration of *S. fonscolombii* and determine the wintering area. Stable isotope composition of carbon ( $\delta^{13}\text{C}$ ) and nitrogen ( $\delta^{15}\text{N}$ ) in wings and legs was used to clarify the habitats in which dragonfly development took place. 3. Three cohorts of dragonflies collected in different regions of Middle Asia were used for analysis: (i) immigrants that arrived in the spring, (ii) residents that developed in Middle Asia, and (iii) transit dragonflies migrating to the south during autumn. 4. The average  $\delta^2\text{H}$  values in the wings were significantly higher in immigrants (-96‰) than in residents (-134‰) and transit individuals (-124‰). High  $\delta^{18}\text{O}$  and  $\delta\text{-N}$  values in the tissue of immigrants confirmed their southerly origin. 5. Based on the species range and the global distribution of annual averages of  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$  values in precipitation, the latitudinal migrations of *S. fonscolombii* were inferred to cover the area from the proposed natal regions of immigrants in South-West Asia (below  $\sim 36^\circ\text{N}$ ) to Southern Ural and the south of Western Siberia in the north ( $54\text{--}55^\circ\text{N}$ ) with a maximum migration distance of more than 4000 km." (Authors)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**18956.** Bos, F.; Faber, R. (2020): More Water Soldier (*Stratiotes aloides*) in the province of Utrecht. *Brachytron* 21: 20-30. (in Dutch, with English summary) ["At the beginning of this century, a large number of conservation plans for the Green Hawker (*Aeshna viridis*) were drawn up. Despite that, the Green Hawker and Water Soldier (*Stratiotes aloides*) have declined. In agricultural areas, Water Soldier has disappeared in many places. The reasons for this are the

deteriorated water quality, incorrect management and conditions of the Water boards. The province of Utrecht and the nature collective Rijn, Vecht and Venen have started a pilot to clarify the correct management of ditches with Water Soldier and to reintroduce the plant at a number of locations. The results of the pilot are presented." (Authors)] Address: Frank Bos. E-mail: Frank.bos@provincie-utrecht.nl

**18957.** Bota-Sierra, C.A.; Novelo-Gutierrez, R. (2020): Two new species of Colombian *Epigomphus* (Odonata: Gomphidae). *Zootaxa* 4896(2): 265-276. (in English) ["The Neotropical genus *Epigomphus* Hagen in Selys, 1854 groups 31 species distributed from Mexico to northern Argentina. Only two species have been recorded so far from Colombia. Here we present two new species found in the north of the Andean Colombian Cordillera Central, *Epigomphus rufus* sp. nov. and *Epigomphus brillantina* sp. nov. Full descriptions of adult male and female and adult male respectively, plus diagnoses, pictures of the diagnostic characteristics, natural history notes, and a distribution map are provided." (Authors)] Address: Bota-Sierra, C.A., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: comeliobota@gmail.com

**18958.** Boudot, J.-P.; Monnerat, C.; Juillerat, L.; Feulner, G.R.; Kunz, B.; Corso, A.; Vigano, M.; Brochard, C. (2020): Range, distribution, field identification, behaviour and exuvia description of *Orthetrum ransonnetii* (Odonata: Libellulidae). *Odonatologica* 49(3/4): 199-244. (in English) ["Based on numerous records of *Orthetrum ransonnetii* from south-eastern Arabia, the Middle East, the Maghreb and the Canary Islands in recent decades, the range of this species is characterised in relation to climate and habitat parameters. The species is mostly found in hot, arid, rocky environments. Its flight period extends year-round, with an apparent bivoltine cycle at lower elevations and in the southernmost part of its range. The range of its known distribution in certain areas, particularly in the mountains of central and western Morocco, is extended. There it was met with, sometimes as permanent reproductive populations, on the northern slopes of the Moroccan High Atlas, a montane area with a heavy winter snow cover, distinct from most of its previously known Saharo-Arabian-Iranian habitats. The absence of earlier records in some regions may be attributable to both difficulties in identification and confusion with the more common and widespread *O. chrysostigma* and *O. brunneum* and also with *O. brevistylum* and *O. taeniolum*, with which *O. ransonnetii* is sympatric in Central Sahara and part of Southwest Asia, respectively. Field identification criteria and the unique behaviour of the species are described. The combination of black antenodal subcostal cross-veins in dorsal view and fully hyaline hind wings is sufficient to differentiate *O. ransonnetii* from all other *Orthetrum* in the Palearctic area. The species can be distinguished in the field from sympatric congeners, particularly *O. chrysostigma*, if good views or photographs are available, on the basis of several readily observable visual characteristics. The identification of the exuviae is difficult but *O. ransonnetii* is unique

among its known West Palaearctic congeners in having more than 10 setae (instead of 3 to 8) at the base of the movable hook on each labial palp of the prementum." (Authors)] Address: Boudot, J.-P., Immeuble Orphée, Apt 703, F-54710 Ludres, France. E-mail: jean.pierre.boudot@numerical.fr

**18959.** Brasil, L.S.; Vieira, T.B.; Andrade, A.F.A.; Bastos, R.C.; Montag, L.F.; Juen, L. (2020): The importance of common and the irrelevance of rare species for partition the variation of community matrix: implications for sampling and conservation. *Scientific Reports* volume 10, Article number: 19777 (2020): 8 pp. (in English) ["In community ecology, it is important to understand the distribution of communities along environmental and spatial gradients. However, it is common for the residuals of models investigating those relationships to be very high (>50%). It is believed that species' intrinsic characteristics such as rarity can contribute to large residuals. The objective of this study is to test the relationship among communities and environmental and spatial predictors by evaluating the relative contribution of common and rare species to the explanatory power of models. Our hypothesis is that the residual of partition the variation of community matrix (varpart) models will decrease as rare species get removed. We used several environmental variables and spatial filters as varpart model predictors of fish and Zygoptera communities in 109 and 141 Amazonian streams, respectively. We built a repetition structure, in which we gradually removed common and rare species independently. After the repetitions and removal of species, our hypothesis was not corroborated. In all scenarios, removing up to 50% of rare species did not reduce model residuals. Common species are important and rare species are irrelevant for understanding the relationships among communities and environmental and spatial gradients using varpart. Therefore, our findings suggest that studies using varpart with single sampling events that do not detect rare species can efficiently assess general distributional patterns of communities along environmental and spatial gradients. However, when the objectives concern conservation of biodiversity and functional diversity, rare species must be carefully assessed by other complementary methods, since they are not well represented in varpart models." (Authors)] Address: Brasil, L.S., Programa de Pos.Graduacao em Zoologia, Universidade Federal do Para, Belem, Para, Brasil. E-mail: brasil\_biologia@hotmail.com

**18960.** Bried, J.; Ries, L.; Smith, B.; Patten, M.; Abbott, J.; Ball-Damerow, J.; Cannings, R.; Cordero-Rivera, A.; Córdoba-Aguilar, A.; De Marco, Jr, P.; Dijkstra, K.D.; Dolný, A.; van Grunsven, R.; Halstead, D.; Harabiš, F.; Hassall, C.; Jeanmougin, M.; Jones, C.; Juen, L.; Kalkman, V.; Kietzka, G.; Searles Mazzacano, C.; Orr, A.; Perron, M.A.; Rocha-Ortega, M.; Sahlén, G.; Samways, M.; Siepielski, A.; Simaika, J.; Suhling, F.; Underhill, L.; White, E. (2020): Towards global volunteer monitoring of Odonate abundance. *BioScience* 70(10): 914-923. (in English) ["Insects are reportedly experiencing widespread declines, but we generally have sparse data on their abundance. Correcting this shortfall will take

more effort than professional entomologists alone can manage. Volunteer nature enthusiasts can greatly help to monitor the abundance of Odonata, iconic freshwater sentinels and one of the few nonpollinator insect groups appreciated by the public and amenable to citizen science. Although counting individual odonates is common in some locations, current data will not enable a global perspective on odonate abundance patterns and trends. Borrowing insight from butterfly monitoring efforts, we outline basic plans for a global volunteer network to count odonates, including organizational structure, advertising and recruiting, and data collection, submission, and synthesis. We hope our proposal serves as a catalyst for richer coordinated efforts to understand population trends of odonates and other insects in the Anthropocene." (Authors)] Address: Hassall, C., School of Biology, Univ. of Leeds, Woodhouse Lane, LS2 9JT, Leeds, UK. E-mail: c.hassall@leeds.ac.uk

**18961.** Cerini, F.; Stellati, L.; Vignoli, L. (2020): Segregation structure in Odonata assemblages follows the latitudinal gradient. *Oecologia* 194: 15-25. (in English) ["Latitude is known to deeply affect life with effects generalizable into ecological rules; the increasing species diversity toward tropics is the most paradigmatic. Several hypotheses tested patterns of biotic interactions' intensity along latitude. Negative interactions (i.e. competition and predation) are expected to be among the processes that produce checkerboard distribution of species. However, no relationship between checkerboardness and latitude has been uncovered. We tested Odonata assemblages worldwide for segregation patterns using a faunistic dataset (395 species arranged in 386 natural communities) spanning a wide latitudinal range (87°). We used co-occurrence analyses (C-score index and Standardized Effect Size) as an estimate of checkerboardness then correlated the occurrence of segregation to latitude. Odonata followed the Latitudinal Diversity Gradient at the regional scale (i.e. country scale) within our analyzed assemblages spanning, whereas local richness (i.e. community scale) did not follow the same pattern. Odonata assemblages structured with segregation are more common going from high to low latitudes, and local species richness have no effect on the pattern. We summarized hypotheses on how biotic interactions or ecological and historical processes can influence the spatial patterns in the checkerboards of assemblages and presented promising ways to help to gain a better mechanistic understanding of the drivers of the Latitudinal Diversity Gradient." (Authors)] Address: Cerini, F., Dept of Science, Univ. Roma Tre, Viale Marconi, 446, 00146 Rome, Italy. E-mail: francesco.cerini@uniroma3.it

**18962.** Chazanah, N.; Muntalif, B.S.; Rahmayani, R.A.; Sudjono, P. (2020): Macrozoobentos distribution as a bioindicator of water quality in the upstream of the Citarum River. *Journal of Ecological Engineering* 21(3): 10-17. (in English) ["This study aims to prove the type and abundance of macrozoobenthos are affected by the physico-chemical condition of the habitat so that it can be used as a bioindicator in assessing river water quality with a case study in

the Upstream of Citarum River. The method used in this study consists of two stages, namely determining the status of river quality with pollution index and determining the components to see the relationship of the water quality parameters to the abundance of macrozoobenthos with principal component analysis. On the basis of these studies, the results were that at the location of the study status of the river quality is slightly polluted and mildly polluted. For the slightly polluted status *Corbicula* sp. was used as the dominant macrozoobenthos parameter with the parameters of dissolved oxygen, organic carbon and N-O in the clay-dominated sediments. In turn, for the river areas with mild pollution, *Enallagma* sp. [sic], *Tubifex* sp., and *Chironomus* sp. were used as bioindicators and they have a relationship with the parameters of nitrate, TSS, and P-total." (Authors)] Address: Chazanah, N., Faculty of Civil & Environmental Engineering, Bandung Institute of Technology, Indonesia. E-mail: nurul.chaza@yahoo.com

**18963.** Chelmick, D.; Lambret, P. (2020): *Lestes macrostigma* (Eversmann), the Dark Spreadwing. *J. Br. Dragonfly Society* 36(2): 84-108. (in English) ["*L. macrostigma* occurs across the southern Palearctic from the Atlantic coast as far east as Mongolia. It is locally common in the central part of its range, including Greece and Bulgaria, but becomes increasingly rare in the western parts of the region where, with notable exceptions, it is essentially coastal. It is very much associated with temporary, brackish and saline habitats and, very often, with *Bolboschoenus maritimus*. Many of its coastal habitats are under threat, especially from wetland transformation schemes of various types and, for that reason, the species is listed as Endangered in the European Red List." (Authors)] Address: Chelmick, D., *Macromia Scientific* 31 High Beech Lane, Haywards Heath West Sussex UK RH16 1SQ

**18964.** Chen, X.; Yu, X. (2020): A description of the final stadium larva of *Calicnemia gulinensis* Yu & Bu, 2008 (Odonata: Platycnemididae). *International Journal of Odonatology* 23(2): 191-197. (in English) ["The final stadium larva of *Calicnemia gulinensis* is described here for the first time. The larva can be distinguished from other known species of the genus *Calicnemia* by the arrangement of setae on premental edges and the number of setae on labial palpi. The important morphological characters of the caudal gills and the possible functional adaptation are discussed briefly." (Authors)] Address: Yu, X., College Life Sciences, Chongqing Normal Univ., Chongqing, PR China. Email: lannysummer@163.com

**18965.** Chitsaz, N.; Marian, R.; Chahl, J. (2020): Experimental method for 3D reconstruction of Odonata wings (methodology and dataset). *PLoS ONE* 15(4): e0232193: 18 pp. (in English) ["Insect wings are highly evolved structures with aerodynamic and structural properties that are not fully understood or systematically modeled. Most species in the insect order Odonata have permanently deployed high aspect ratio wings. Odonata have been documented to exhibit extraordinary flight performance and a

wide range of interesting flight behaviors that rely on agility and efficiency. The characteristic three-dimensional corrugated structures of these wings have been observed and modeled for a small number of species, with studies showing that corrugations can provide significant aerodynamic and structural advantages. Comprehensive museum collections are the most practical source of Odonata wing, despite the risk of adverse effects caused by dehydration and preservation of specimens. Museum specimens are not to be handled or damaged and are best left undisturbed in their display enclosures. We have undertaken a systematic process of scanning, modeling, and postprocessing the wings of over 80 Odonata species using a novel and accurate method and apparatus we developed for this purpose. The method allows the samples to stay inside their glass cases if necessary and is non-destructive. The measurements taken have been validated against micro-computed tomography scanning and against similar-sized objects with measured dimensions. The resulting publicly available dataset will allow aeronautical analysis of Odonata aerodynamics and structures, the study of the evolution of functional structures, and research into insect ecology. The technique is useable for other orders of insects and other fragile samples." (Authors)] Address: Chitsaz, N., School of Engineering, Univ. of South Australia, Adelaide, SA, Australia, 2 Joint & Operations Analysis Division, Defence Science & Technology Group, Melbourne VIC, Australia. Email: nasim.chitsaz@mymail.unisa.edu.au

**18966.** Choong, C.Y.; Dow, R.A.; Ng, Y.F. (2020): Additional records of Odonata from Kelantan and Terengganu, Malaysia. *International Dragonfly Fund Report* 144: 1-26. (in English, with Malaysian summary) ["We report here the results from field trips to collect Odonata in the northeastern parts of Kelantan state and the north of Terengganu state, Peninsular Malaysia. Eighty four species were collected, and four of these are new records for the state Kelantan and 10 are new records for the state of Terengganu. Notable records obtained from the field trips were *Euphaea masoni*, *Coeliccia sameerae*, *Pseudagrion ?alalakense*, *Leptogomphus tioman* and *Macromia cupricincta*. Checklists for Kelantan (140 species) and Terengganu (132 species) are given in an appendix." (Authors)] Address: Choong, C.Y., Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.edu.my

**18967.** Chovanec, A. (2020): Best Practice-Projekt im Rahmen der Kampagne Vielfaltleben IV „Die Blauflügel-Prachtlibelle“ – libellenkundliche Untersuchung an der Piesting 2019/2020 (Niederösterreich). im Auftrag des Naturschutzbund NÖ, Juli 2020: 55 pp. (in German) ["In 2019 and 2020, a total of six surveys were carried out on a metarhithral section of the Piesting River in the area of Gutenstein and Pernitz (Lower Austria) to survey the aspect-forming dragonfly fauna. The mapping aimed at recording newly hatched and adult dragonfly imagines as well as observations of reproductive behaviour. A total of 19 species were recorded, eleven of which were classified as definitely or probably native. Seven species were found on the Piesting itself and 17 on

a tributary connected to the main river. The near-natural state of the watercourse section is reflected in the detection of the two native aquatic species *Calopteryx virgo* ("potentially endangered" according to the Red List for Austria) and *Onychogomphus forcipatus* ("endangered"). *C. virgo* occurred in the highest abundance class ("massed"). Accompanying species specific to the water body type were also sighted. The dragonfly ecological status of the watercourse section is rated "very good". The observations of the two "endangered" species *Lestes virens* and *Coenagrion ornatum* (this species is listed in Annex II of the Habitats Directive) at the tributary are also worth mentioning." (Author/DeepL)] Address: Chovanec, A., Krotenbachgasse 68 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlrt.gv.at

**18968.** Codina Montiel, T.; Gomez Subarroca, A.; Rodríguez González, M. (2020): Aproximació a l'estudi faunístic i poblacional dels odonats de la Segarra. Sikarra. Revista del Centre d'Estudis Segarrencs 1 / 2020: 26-36. (in Catalan, with English summary) [Catalonia, Spain "The first dragonfly catalogue regarding la Segarra shire shows twenty-two species of these animals, twelve of which belong to the Zygoptera families and ten to the Anisoptera ones; the results also reveal five species which had never been mentioned before in this geographic region i.e. *Coenagrion caerule-scens*, *Pyrrhosoma nymphula*, *Aeshna affinis*, *Anax ephippiger* and *Anax parthenope*. The register, which lasted eight months, was carried out in 2014 and four locations were sampled: Peixera del riu Llobregós (Llobregós river pond), bassa de Puig-Amer (Puig-Amer pond), Patamolls de Granollers (Granollers wetland area) and bassa de la Morana (Morana pond). Furthermore, the flying period of these insects was also analyzed and the results obtained were compared with those of previous studies. The findings also reflect the high diversity of dragonflies in la Segarra shire, which displays a 31.88 % of the whole dragonfly biodiversity in Catalonia. However, some of these species show changes in their behaviour, the exact interpretation of which is still poorly-understood. Consequently, further studies on dragonflies are required in la Segarra in order to extend the existing knowledge." (Authors)] Address: Codina Montiel, Tània; E-mail: taniacodina22@gmail.com

**18969.** Conesa Garcia, M.A.; Bernal Sánchez, A.; Evangelio Pinach, J.M.; Teruel Montejano, S. (2020): Descripción de la larva F0 de *Onychogomphus cazuma* Barona, Cardo y Díaz, 2020 (Anisoptera, Gomphidae) y notas sobre su ecología y protección. Boln. Asoc. esp. Ent. 44(3-4): 429-449. (in Spanish, with English summary) [Description of the F0 larva of *O. cazuma* and notes on its ecology and protection. The F0 larva of *O. cazuma*, of which only the final exuvia was known, is described, and illustrated for the first time, from materials collected in two locations in the Valencian Community (Spain). The morphological characteristics of the larvae are analysed, and a key is built for the determination of the five species of the genus *Onychogomphus* present in the Iberian Peninsula and the Maghreb. A key is also provided to separate the genus *Gomphus* from the genus *Ony-*

*chogomphus*, without using the palp structure of the prementum. Additional data about the habitat of the species are provided and a protection figure is proposed at the regional level." (Authors)] Address: Conesa Garcia, M.A. E-mail: mconesa@libelulas.org

**18970.** Corso, A.; Penna, V.; Janni, O.; De Lisio, L.; Biscaccianti, A.; Holusa, O.; Mastropasqua, F. (2020): New data on the distribution of the Italian endemic *Cordulegaster trinacriae* (Odonata: Cordulegasteridae). *Odonatologica* 49(3/4): 259-287. (in English) ["Data on the northern and eastern limits of the distribution of the Italian endemic *C. trinacriae* are reported, together with further details on the first records for Abruzzo and Puglia, thereby re-defining its known range. The species is common in suitable habitats in central-southern Italy, extending further north along the Adriatic. In contrast to previous reports, along the central Tyrrhenian area *C. boltonii* and its hybrids replace *C. trinacriae* with phenotypically pure specimens only in southern Lazio and northern Campania. The flight period extends from late May to late September. The known altitudinal distribution ranges from 9 to 1 639 m a.s.l. We consider the possibility that former records of *C. boltonii* from Abruzzo, Molise and Campania resulted from confusion with *C. trinacriae*. In these regions *C. boltonii* either never occurred or has now been largely replaced by *C. trinacriae* and is extremely localised." (Authors) Holusa was promoted by IDF, never didn't submit any report nor acknowledged IDF nor reacted on any e-mail.] Address: Corso, A., Via Camastra, 10, 96100 Siracusa (SR), Italia. E-mail: zoologywp@gmail.com

**18971.** Cuellar-Cardozo, J.A.; Fonseca-Santanilla, E.B. (2020): Concentración letal (CL50 y CL95) de nitrógeno reactivo en larvas de *Hetaerina caja*. *Revista de toxicología* 37: 101-105. (in Spanish, with English summary) ["Lethal concentration (CL50 and CL95) of reactive nitrogen in larvae *H. caja*. In aquatic ecosystems, the nitrogen is a limiting element inside the environment where minimal variations in its concentration could cause strong alterations in the biodiversity. However, wastes from agricultural processes where is used agrochemicals and fertilizers rich in nitrogen, represent a huge increase in the amount of nitrogen into the water bodies causing alterations in the environment, especially the aquatic food web. In recent years, new researches have promoted the use of Odonata, focused on their aquatic larval growth, as bioindicators of environmental damage, especially in the Neotropical region. The larvae of *H. caja* are strongly associated with aquatic environmental characteristics, as well as being a taxon that has been well studied letting a better discussion on issues such as development and ecological importance. Therefore, our research aims to quantify the lethal concentrations of total nitrogen over *Hetaerina* individuals, facilitating the knowledge of the damages caused by the nitrogen additions. As result, nitrogen CL50 for *H. caja* specimens is 21.8 ppm and CL95 is 28,070.42 ppm until 72 hours after the exposition. Also, this research represents a first step in Colombia to develop the Odonata as an ecotoxicology tool and how this insect group responds to environmental changes." (Authors)] Address:



Cuéllar-Cardozo, J.A. Bioprospección y Biodiversidad Colombiana. Maestría en Recurso Hídrico Continental. Departamento de Ciencias Básicas. Universidad La Salle. Cra 2 # 10-70; Bogotá. Colombia

**18972.** Damm, A.; Bode-Oke, A.T.; Dong, H. (2020): Aerodynamics and wing-wing interaction during the pre-ovipository flight of the damselfly. American Institute of Aeronautics and Astronautics 2020-1780. Published Online: 5 Jan 2020. <https://doi.org/10.2514/6.2020-1780>: (in English) ["Damselflies have four wings that are controlled independently during flight. The fore and hindwings typically beat out of phase, and the interactions which enhance or attenuate flight forces of the wing pairs are phase-dependent. During oviposition, however, there exists a species (*Neurobasis chinensis*) that flies by beating only the forewings while the hindwings are kept outstretched and stationary. Using computational fluid dynamics simulations based on high-speed photography, we examined the aerodynamics of this unique flight behavior. We hypothesized that the hindwings passively benefit from the wake of the forewings without moving. Our findings elucidate the interactions between a flapping and stationary wing and add to our understanding of insect flight, which serves as an inspiration for micro-aerial vehicle design.] Address: Bode-Oke, A.T., Mechanical & Aerospace Engineering, Univ. of Virginia, Charlottesville, VA 22903, USA

**18973.** Deacon, C.; Samways, M.J.; Pryke, P.S. (2020): Determining drivers of dragonfly diversity patterns and the implications for conservation in South Africa. *Biological Conservation* 245 (2020) 108548: 10pp. (in English) ["Highlights: • Climate gradients drive the rich South African dragonfly fauna. • Assemblage composition varies substantially across the region. • Assemblage-turnover boundaries are gradual at the regional scale. • Turnover boundaries are determined by topography and spatial climatic variation. • The conservation network of South Africa represents dragonflies well. Abstract: Knowing where species occur is essential for conservation planning. In South Africa, regional climatic variation is subject to effects of oceanic current systems, which in turn, determine species diversity patterns. We hypothesize that regional climates and topography are important drivers of aquatic insect species richness, endemism, and assemblage composition, and expect strong assemblage-turnover boundaries to be concurrent with topographical features. We also expected that current conservation networks do not represent aquatic insect species richness and endemism. We used generalized linear mixed models and generalized dissimilarity models to determine drivers of South African Odonata species richness and assemblage-turnover, as well as to investigate the extent of assemblage-turnover boundaries. We found that climate gradients were significant drivers, and found significant variation in assemblages between sub-regions. Turnover boundaries were gradual but concurrent with topographical features and/or areas with spatial changes in sub-regional climate. Modern-day climate and topography partially explained dragonfly diversity patterns, but other local factors and past geological events likely both contribute to current dragonfly diversity

patterns. The existing conservation network in South Africa represents areas of high dragonfly species richness and endemism. We recommend additional conservation efforts in areas outside of protected areas with high species richness and endemism levels, but importantly also in areas with high assemblage-turnover rates to ensure protection of as many species as possible. We also propose further searches in areas with high endemism and high assemblage-turnover for possible discovery of unknown species, and further searches in under-represented areas to improve distribution data for known species." (Authors)] Address: Deacon, C., Room 3014, JS Marais Build., Victoria St., Stellenbosch, South Africa. E-mail: [chardeacon@sun.ac.za](mailto:chardeacon@sun.ac.za)

**18974.** Dennis, D.S. (2020): Ethology of *Proctacanthus gracilis* Bromley, 1928 (Diptera: Asilidae) in Northeastern Florida, U.S.A.. *Journal of the Entomological Research Society* 22(3): 255-273. (in English) ["*P. gracilis* forages primarily from vegetation, capturing prey in flight, and immobilizing them in flight or on the ground. Identified prey is in eight insect orders (Coleoptera, Diptera, Hemiptera, Hymenoptera, Lepidoptera, Neuroptera, Odonata, and Orthoptera), with Orthoptera making up 63.0%. Mating occurs in the tail-to-tail position and oviposition is in the ground. This species exhibits a distinct daily rhythm of activity for feeding and mating. Grooming behavior resembles that described for other species of robber flies. Morphology, habitats and distribution in Florida, resting behavior, and predators and parasites also are discussed." (Author) The list of prey includes *Erythrodiplax minuscula*, 24.07.2015 (1 ♀).] Address: Dennis, D.S., 1105 Myrtle Wood Dr., St. Augustine, Florida 32086-4838, USA. Email: [dstevedennis@msn.com](mailto:dstevedennis@msn.com)

**18975.** Díaz-Martínez, C.; Yela, J.L. (2020): Contribución al conocimiento histórico de la odonofauna de Trillo (Guadalajara, centro de España) (Odonata). *Boletín de la Sociedad Entomológica Aragonesa* 67: 403-404. (in Spanish, with English summary) ["22 unpublished records of 13 species of Odonata are reported, based on specimens collected in Trillo (Guadalajara, Spain) between 1970 and 1985. Among them is the first provincial record of *Anax ephippiger*." (Authors)] Address: Díaz-Martínez, Cecilia, Sociedad Entomológica y Ambiental de Castilla-La Mancha, c/Londres, 7, 45003 Toledo, Spain. E-mail: [cdiaz.cuenca@gmail.com](mailto:cdiaz.cuenca@gmail.com)

**18976.** Dickens, J.K.; Schoenberger, D.; VanCompernelle, M. (2020): Guide to the Odonata of central Ñeembucú, Paraguay: indicator species of wetland habitats. *International Journal of Odonatology* 23(3): 239-289. (in English) ["The department of Ñeembucú, in south-western Paraguay, is home to the virtually unexplored Ñeembucú Wetlands, the second largest wetland system in the country, representing a major gap in biodiversity knowledge. As organisms ubiquitous with wetlands, the Odonata ... have the potential to be effective indicators of wetland habitats in the face of increasing anthropogenic impacts in the region. We therefore comprehensively surveyed the Odonata in central Ñeembucú over a period of two years using a listing method. Here, we present an annotated checklist and identification

key to the species present in central Ñeembucú with details on their habitat preferences, phenology and behaviour. We found 60 species but estimate a total of between 62 and 90 species. Eleven (18%) are new records for Paraguay. Species composition is similar to the Argentine Humid Chaco, with four bioregional endemics, whilst representatives from the Andean-Patagonian subregion are present in open areas. Such partitioning of species from different bioregions into different habitats is typical of ecotonal regions. Two further species are endemic to the Paraná-Paraguay basin and three are highly localised, indicating the high conservation value of the Ñeembucú Wetlands. Eleven species have the potential to be effective indicators of the Paraguay River, large permanent wetlands, grassy temporary wetlands and wooded temporary wetlands, providing an effective tool to identify critical wetland ecosystems in the face of the growing threats from human activities. We also provide recommendations for the protection and management of wetlands in the region." (Authors) ]Address: Dickens, J.K., Fundación Para La Tierra, Centro IDEAL, Pilar, Paraguay. Email: jerdickens@gmail.com

**18977.** Ducotterd, C.; Crovadore, J.; Lefort, F.; Guisan, A.; Ursenbacher, S.; Rubin, J.-F. (2020): The feeding behaviour of the European pond turtle (*Emys orbicularis*, L. 1758) is not a threat for other endangered species. *Global Ecology and Conservation* 23 (2020) e01133: 13 pp. (in English) ["Molecular technologies, such as metabarcoding, have become powerful tools for conservation purposes. Here, we present a non-invasive study analyzing the diet of one population of *E. orbicularis* during its whole activity period and of four other populations during the same period, based on faecal sample, and using for the first time on this species, a long metabarcoding approach. *E. orbicularis* is an emblematic freshwater species of wetlands in Europe. In several countries, this species is endangered and, in Switzerland, *E. orbicularis* is ranked as critically endangered on the Swiss Red List. A national conservation program was created to reintroduce this species and raised the question if this reintroduced species could be a threat for other endangered species. We developed a new method of long metabarcoding analysis, using universal PCR primers to determine prey species occurrence in the faeces. The analysis conducted on 174 faeces collected on 142 individuals revealed 1153 preys from 270 species. *E. orbicularis* consumed plants throughout the year with a more diverse diet during the reproduction period (April-June). This study therefore not only determines precisely the omnivorous and opportunistic diet of the *E. orbicularis*, but also shows that this species is not a threat to its environment, as 85.5% of the consumed species were not list on the Swiss Red List. Moreover, it also demonstrated that the genetic analyses of faeces could be an efficient tool to determine trophic interaction with a high level of precision, yielding promising perspectives for food web ecology." (Authors) Prey items included one *Coenagrion pulchellum*.] Address: Ursenbacher, S., Info Fauna e Centre Suisse de Cartographie de la Faune (CSCF) and Centre de Coordination pour les Reptiles et les Amphibiens de Suisse (Karch), Bellevaux 51, CH-2000, Neuchâtel, Switzerland

**18978.** Ekpah, O.; Kemabonta, A.K.; Ogbogu, S.S.; Fomekong, L.-J. (2020): Records of lost and associated species of Odonata in Cross River National Park, Nigeria. *Odonatologica* 49(3/4): 245-258. (in English) ["A number of species of Odonata in south-eastern Nigeria have not been seen for decades, while others have not been recorded since their description. The Mango River in the Oban division of the Cross River National Park (CRNP) in eastern Nigeria was visited three times every month in September 2019, January and March 2020, to survey species of Odonata. The survey was carried out with a view to rediscovering lost species or species that are hitherto not known to occur in the study area. Micrographs of the thorax and wings of specimens suspected to be relict species of Odonata were taken and compared with data in literature to determine their actual identities. A total of 61 individuals of Odonata belonging to 34 species in nine families were collected. Of the 34 species, three, *Africocypha lacuselephantum* (Vulnerable), the relict *Pentaplebia stahli* (Vulnerable) and *Umma purpurea* (Endangered) are new records for Nigeria. This record of rare and common species provides a preliminary baseline data for a checklist of the Odonata fauna in Oban Hills for possible formulation of conservation strategies for threatened species in the area in particular and south-eastern Nigeria at large." (Authors)] Address: Ekpah, O., Nigerian Conservation Foundation, Nigeria. Email: davisugwa@gmail.com

**18979.** Ekpah, O.; Williams, A.B.; Kehinde, K.A. (2020): An inventory of Odonata in relation to water quality in Lekki Conservation Centre, Nigeria. *British Entomological and Natural History Society* 33: 367-382. (in English) ["A survey of the Odonata fauna of Lekki Conservation Centre, southwestern Nigeria was carried out from May to December 2019, to investigate how water quality affects species composition. Two study areas were identified and classified as forest swamp (sampling points SW1 to SW7) and forest grassland (G1 to G7). Adult Odonata were collected once a week throughout the study period using an aerial net. Twenty-five species in seven families were recorded of which *Chalcostephia flavifrons* and *Ceriagrion glabrum* were the most abundant species throughout the survey period. Five families were represented by a single species, namely: *Anax tristis*, *Phyllomacromia contumax*, *Phaon iridipennis*, *Chlorocypha* cf. *curta* and *Copera sikassoensis*. Data analyses revealed that the forest swamp was the marginally richer area with Shannon and Simpson indices of 0.88 and 2.4, respectively. Some species such as *Agriocnemis maclachlani* and *Copera sikassoensis* shared a similar microhabitat. The sum of the African Dragonfly Biotic Index (ADBI) scores for all species in the study was 16 with *Ceriagrion rubelloccerinum* Fraser with the highest ADBI score of 4. Lekki Conservation Centre should therefore be considered an important refuge for Odonata." (Authors)] Address: Ojonugwa, E., Nigerian Conservation Foundation, Lagos, Nigeria. E-mail: davisugwa@gmail.com

**18980.** Erasmus, J.H.; Malherbe, W.; Zimmermann, S.; Lorenz, A.W.; Nachev, M.; Wepener, V.; Sures, B.; Smit, N.J. (2020): Metal accumulation in riverine macroinvertebrates

from a platinum mining region. *Science of The Total Environment* 703 (2020) 134738: (in English) ["Highlights: • Quantification of Cr, Ni, Cu, Zn, Cd, Pt, Pb in water, sediment and macroinvertebrates. • Metal contamination increased in water and sediment downstream of mining activities. • Metal bioaccumulation was significant in macroinvertebrate families. • Macroinvertebrate families showed different grades of bioaccumulation. • Urban and informal settlements also contributed to metal pollution. Abstract: South Africa is the world's main supplier of Pt. The Bushveld Igneous Complex in South Africa contains 75% of the world's Pt resources. Mining of this precious metal requires large volumes of water for production and removal of waste products. Most of this wastewater is discharged into river systems. Although the source of contamination with Pt in aquatic systems due to mining activities is known, little to no information is available about the impact of Pt on aquatic organisms. Additionally, other metals are released as byproducts of Pt mining, which might also be discharged into the environment. Therefore, concentrations of Cr, Ni, Cu, Zn, Cd, Pt and Pb were determined in water, sediment and macroinvertebrate samples from a reference site (Site 1), a highly impacted site (Site 2) and a moderately impacted site (Site 3) along the Hex River, South Africa. Aquatic invertebrate families representing different functional feeding groups i.e. scraper-grazers (Lymnaeidae), collector-gatherers (Potamonautidae, Hydropsychidae, Tubificidae and Chironomidae), shredders (Baetidae) and predators (Coenagrionidae and Libellulidae) were studied. In the sediments, the concentrations of Cr and Pt were significantly higher at Site 2 than at Sites 1 and 3, respectively, whereas concentrations of Ni, Cu, Cd, and Pb showed no significant differences between the sites. Depending on the metal, the aquatic invertebrate families showed different grades of bioaccumulation. The results from especially Lymnaeidae, Baetidae, Tubificidae and Chironomidae showed great promise for the use of these taxa for biomonitoring of metal contaminations. The macroinvertebrates accumulated metals associated with Pt mining, with epi-benthic dwelling taxa (Tubificidae) accumulating higher concentrations of Pt and Cr than other families (e.g. Potamonautidae, Coenagrionidae and Lymnaeidae). These results provide valuable information on the behavior of metals related to Pt mining in aquatic ecosystems and therefore can contribute to the risk assessment of these intensive mining activities." (Authors)] Address: Lorenz, A.W., Dept of Aquatic Ecology & Centre for Water & Environmental Research, Univ. of Duisburg-Essen, Universitätsstr. 2, 45141 Essen, Germany. E-mail: armin.lorenz@uni-due.de

**18981.** Flechoso, F.; Morales, J.; Lizana, M. (2020): Comunidades de odonatos (Insecta: Odonata) en tramos de diferentes características hidrotérmicas en la cuenca de río Carrión. - Communities of odonata (Insecta: Odonata) along sections of the basin of the river Carrión with different hydrothermic characteristics.. *Munibe, Cienc. nat.* 68: 19-33. (in Spanish, with Euskara and English summaries) ["The diversity of Odonata in the area around Velilla del Río Carrión (NW of Palencia) was analyzed in relation to the water temperature and the modification of the water regime by the

Compuerto reservoir. The communities along the main axis of the Carrión river were compared in three sections with different dynamics with respect to a section of the Besandino river, not influenced by the presence of a large nearby reservoir. The results contributed the presence of 11 species (6 Zygoptera and 5 Anisoptera) in 23 records obtained between June and September during 2014 and 2015. Due to the release of water for irrigation in summer, the temperature and flow in the river Carrión were inverted below the reservoir and were associated with a decrease in the specific richness of Odonata showing evidence of reproduction, indicated by the presence of larvae and exuviae. Downstream from the Compuerto dam, despite being a long and varied section, only one species was found of a specimen observed in flight and with no evidence of reproduction, while in the rest of the areas a larger number of species appeared with signs of reproduction in all of them. The thermal effect of a smaller dam was attenuated and did not restrict the presence of Odonata in the same way." (Authors)] Address: Flechoso, F., Univ. de Salamanca, Dpto. Biología Animal, Campus Miguel de Unamuno, E-37007. Spain. E-mail: fabioflechoso@usal.es

**18982.** Fletcher, D.E.; Lindell, A.H.; Stankus, P.T.; Fletcher, N.D.; Lindell, B.E.; McArthur, J.V. (2020): Metal accumulation in dragonfly nymphs and crayfish as indicators of constructed wetland effectiveness?. *Environmental Pollution* 256, January 2020, 113387: (in English) ["Highlights: • Dragonfly genera differ in levels of metal accumulation, influenced by habitat use. • Dragonfly genera accumulating highest concentrations differ most among sites. • Biomonitor metal accumulation often not reduced downstream of constructed wetland. • Elevated metals in downstream biota despite wetlands reducing total and dissolved metal concentrations at base flow. Abstract: Constructed wetland effectiveness is often assessed by measuring reductions of contaminant concentrations in influent versus departing effluent, but this can be complicated by fluctuations in contaminant content/chemistry and hydrology. We assessed effectiveness of a constructed wetland at protecting downstream biota from accumulating elevated metal concentrations—particularly copper and zinc in effluents from a nuclear materials processing facility. Contaminants distributed throughout a constructed wetland system and two reference wetlands were assessed using six dragonfly nymph genera (*Anax*, *Erythemis*, *Libellula*, *Pachydiplax*, *Tamea*, and *Plathemis*) as biomonitors. Additionally, the crayfish, *Cambarus latimanus*, were analyzed from the receiving and two reference streams. Concentrations of Cu, Zn, Pb, Mn, Cr, Cd, and Al were evaluated in 597 dragonfly nymph and 149 crayfish whole-body composite samples. Dragonfly genera varied substantially in metal accumulation and the ability to identify elevated metal levels throughout components of the constructed wetland. Genera more closely associated with bottom sediments tended to accumulate higher levels of metals with *Libellula*, *Pachydiplax*, and *Erythemis* often accumulating highest concentrations and differing most among sites. This, combined with their abundance and broad distributions make the latter two species suitable candidates

as biomonitors for constructed wetlands. As expected, dragonfly nymphs accumulated higher metal concentrations in the constructed wetland than reference sites. However, dragonfly nymphs often accumulated as high of metal concentrations downstream as upstream of the water treatment cells. Moreover, crayfish from the receiving stream near the constructed wetland accumulated substantially higher Cu concentrations than from downstream locations or reference streams. Despite reducing metal concentrations at base flow and maintaining regulatory compliance, metal fluxes from the wetland were sufficient to increase accumulation in downstream biota. Future work should evaluate the causes of downstream accumulation as the next step necessary to develop plans to improve the metal sequestering efficiency of the wetland under variable flow regimes." (Authors)] Address: Fletcher, D.E., Savannah River Ecology Lab., Univ. of Georgia, P. O. Drawer E, Aiken, SC 29802, USA. Email: fletcher@srel.uga.edu

**18983.** Gärtner, F.; Joest, R. (2020): Quelljungfern im FFH-Gebiet Arnsberger Wald. Situation und Gefährdung nach dem Dürrejahr 2018. *Natur in NRW* 2/2020: 17-21. (in German) [Nordrhein-Westfalen, Germany "Cordulegastridae are typical representatives of the biocoenosis of near-natural springs and flowing waters. Larval mapping at 13 streams in the Arnsberg Forest FFH area showed that both species were still present here even after the extremely dry summer of 2018. However, in the early summer of 2019, 14 percent of the 223 100-metre segments surveyed, or even five of 13 streams surveyed, fell at least partially dry. With a continuing trend towards a negative water balance, a new hazard factor has thus emerged. In addition, the bark beetle mass reproduction as a result of the drought led to large-scale die-back of spruce stands in the Arnsberg Forest. In particular, the habitats of the rarer striped spring damselfly are strongly altered by the clearing of formerly shaded spring areas and sensitive sites are endangered by forestry work. As protective measures, the careful conversion of spruce forests in the stream valleys into site-appropriate deciduous trees and the renaturation of the watercourses as well as the dismantling of all melioration measures in the forest such as piping, fortifications and shortening of courses as well as the drainage into side ditches of the forest roads are recommended." (Authors(Deepl) Address: Joest, R., Arbeitsgemeinschaft Biologischer Umweltschutz – Biologische Station Soest, Bad Sassendorf-Lohne, Germany. E-mail: r.joest@abu-naturschutz.de

**18984.** Galimberti, A.; Assandri, G.; Maggioni, D.; Ramazzotti, F.; Baroni, D.; Bazzi, G.; Chiandetti, I.; Corso, A.; Ferri, V.; Galuppi, M.; Ilahiane, L.; La Porta, G.; Laddaga, L.; Landi, F.; Mastropasqua, F.; Ramellini, S.; Santinelli, R.; Soldato, G.; Surdo, S.; Casiraghi, M. (2020): Italian Odonates in the Pandora's Box: A comprehensive DNA barcoding inventory shows taxonomic warnings at the Holarctic scale. *Molecular Ecology Resources* 21: 183-200. (in English) ["The Odonata are considered among the most endangered freshwater faunal taxa. Their DNA-based monitoring relies on validated reference datasets that are often lacking or do not cover

important biogeographical centres of diversification. This study presents the results of a DNA barcoding campaign on Odonata, based on the standard 658 bp 5' end region of the mitochondrial COI gene, involving the collection of 812 specimens (409 of which barcoded) from peninsular Italy and its main islands (328 localities), belonging to all the 88 species (31 Zygoptera and 57 Anisoptera) known from the country. Additional BOLD and GenBank data from Holarctic samples expanded the dataset to 1294 DNA barcodes. A multi-approach species delimitation analysis involving two distance (OT and ABGD) and four tree-based (PTP, MPTP, GMYC, bGMYC) methods were used to explore these data. Of the 88 investigated morphospecies, 75 (85%) unequivocally corresponded to distinct Molecular Operational Units, whereas the remaining ones were classified as 'warnings' (i.e., showing a mismatch between morphospecies assignment and DNA-based species delimitation). These results are in contrast with other DNA barcoding studies on Odonata showing up to 95% of identification success. The species causing warnings were grouped in three categories depending on if they showed low, high, or mixed genetic divergence patterns. The analysis of haplotype networks revealed unexpected intraspecific complexity at the Italian, Palearctic, and Holarctic scale, possibly indicating the occurrence of cryptic species. Overall, this study provides new insights into the taxonomy of odonates and a valuable basis for future DNA and eDNA-based monitoring studies." (Authors)] Address: Galimberti, A., ZooPlantLab. Dept of Biotechnology & Biosciences. University of Milano - Bicocca, Pza Della Scienza 2, 20126-1 Milan. Italy. Email: andrea.galimberti@unimib.it

**18985.** Garzón-Salamanca, L.L.; Rivera-Rondón, C.A.; Aristizabal, H.; Forero, D. (2020): Exploring the ecology and indicator value of some larvae of Odonata genera in Colombia. *Environmental Entomology* 49(4): 829-837. (in English) ["Bioindication is a method to assess environmental conditions using indicator organisms. In Colombia, water quality evaluation is mostly performed following the Biological Monitoring Working Party/Colombia method (BMWP/Col), which uses aquatic macroinvertebrates at the taxonomic family level. Studies on potential bioindicators are important to produce comprehensive information on the requirements of macroinvertebrates and their value for water quality bioindication. We studied the larval ecology of several common genera of Odonata from Colombian freshwater ecosystems and assigned an indicator value to each genus. The physical and chemical water characteristics of 1,022 sites surveyed in Colombia from 2005 to 2016 were analyzed using a principal component analysis (PCA). The relationship between environmental conditions and Odonata genera found was studied using multiple logistic regressions between sample coordinates of the first three axes of the PCA and occurrence of the respective genus. We assigned an indicator value for each genus using the logistic regression and the water quality of samples. The highest indicator values were assigned to genera, which were mainly explained by the PCA axis associated with water quality, showed a high odds ratio to this axis, and were found in ecosystems with



excellent water quality. The indicator values suggested for each taxon are, *Brechmorhoga* Kirby, 1894, 8; *Macrothemis* Hagen, 1868, 4; *Micrathyría* Kirby, 1889, 4 (*Libellulidae*); *Progomphus* Selys, 1854, 7 (*Gomphidae*); *Acanthagrion* Selys, 1876, 4; and *Argia* Rambur, 1842, 7 (*Coenagrionidae*). Differences in water quality preferences in genera of the same family suggest that higher taxonomic resolution may allow more detailed environmental assessments." (Authors)] Address: Garzón-Salamanca, Laura L., Laboratorio de Limnología, UNESIS, Departamento de Biología, Pontificia Universidad Javeriana, Bogotá, Colombia. E-mail: lgarzons@javeriana.edu.co

**18986.** Genise, J.F.; Sánchez, V.; Poiré, D.G.; González, M.G. (2020): A fossorial petalurid trace fossil from the Albian of Patagonia. *Cretaceous Research* 116, December 2020, 104591: (in English) ["Highlights: • *Maichnus wetkaroae* igen. isp. nov. is a new trace fossil from the Albian of Patagonia. • It is the first trace fossil attributable to Odonata recorded from paleosols. • It is one of the oldest insect trace fossils recorded from paleosols. • It provides the first and unique evidence of ancestral burrowing behavior of petalurids. • This evidence supports some previous theoretical evolutionary scenarios for Odonata. Abstract: *Maichnus wetkaroae* igen. isp. nov., from the Albian of Patagonia, is composed of two or three ellipsoidal oblate chambers connected to shafts that show swellings and concentrically laminated linings. Such laminated linings are also present in chambers, and probably originated by radial backfilling and/or the successive discharges of liquid organic excretions. This unique morphology occurs in paleosols showing evidence of waterlogging. Trace fossil morphology and the occurrence of traces in clusters in waterlogged soils indicate that *M. wetkaroae* igen. isp. nov. represents larval burrows of fossorial petalurids. This is the first record of Odonatan trace fossils from paleosols and also the oldest one. *M. wetkaroae* igen. isp. nov. is one of the oldest insect trace fossils recorded from paleosols. It represents the first and unique paleontological evidence of the ancient origin of the burrowing behavior of petalurids postulated only theoretically until now in evolutionary scenarios of Odonata." (Authors)] Address: Genise, J.F., CONICET, División Icnología, Museo Argentino de Ciencias Naturales, Av. Ángel 7 Gallardo 470, Buenos Aires, Argentina. E-mail address: jgenise@macn.gov.ar

**18987.** Gezie, A.; Legesse Mulat, W.; Anteneh, W.; Dejen, E.; Kloos, H.; Mereta, S.T. (2020): Habitat suitability modelling of benthic macroinvertebrate community in wetlands of Lake Tana watershed, northwest Ethiopia. *Wetlands* 40: 853-864. (in English) ["Predictive modelling corroborates decision-making in the development of a standard habitat assessment protocol. In this study, we modelled environmental requirements of benthic macroinvertebrates. Classification and regression tree models (CART) and ordination analysis were performed to identify important variables affecting macroinvertebrate community pattern in the Lake Tana Watershed. A dataset of 95 samples was collected from eight wetlands. Among the modelled taxa, *Coenagrionidae* and *Libellulidae* had substantial predictive performance based

on Kappa statistic ( $\kappa > 0.6$ ) whereas *Baetidae*, *Physidae*, *Tipulidae* and *Hydrophilidae* had moderate predictive model performance ( $\kappa \geq 0.4$ ). Vegetation cover, leather tanning, vegetation clearance and nitrate ion were the topmost selected environmental variables influencing the occurrence of macroinvertebrate taxa. The conditional analysis depicted that the abundance of *Coenagrionidae* and *Libellulidae* increased with the increasing in vegetation cover. Overall, macroinvertebrate taxa have a clear habitat requirement within the habitat gradient studied and hence, could be a potential candidate for biomonitoring and provide valuable information in the development of a standard wetland assessment protocol." (Authors)] Address: Gezie, A., Dept of Biology, Bahir Dar University, Bahir Dar, Ethiopia

**18988.** Gómez-Llano, M.; Narasimhan, A.; Svensson, E. (2020): Male-male competition causes parasite-mediated sexual selection for local adaptation. *The American Naturalist* 196(3): 344-354. (in English) ["Sexual selection has been suggested to accelerate local adaptation and promote evolutionary rescue through several ecological and genetic mechanisms. Condition-dependent sexual selection has mainly been studied in laboratory settings, while data from natural populations are lacking. One ecological factor that can cause condition-dependent sexual selection is parasitism. Here, we quantified ectoparasite load (*Arrenurus* water mites) in a natural population of *Ischnura elegans* over 15 years. We quantified the strength of sexual selection against parasite load in both sexes and experimentally investigated the mechanisms behind such selection. Then we investigated how parasite resistance and tolerance changed over time to understand how they might influence population density. Parasites reduced mating success in both sexes, and sexual selection was stronger in males than in females. Experiments show that male-male competition is a strong force causing precopulatory sexual selection against parasite load. Although parasite resistance and male parasite tolerance increased over time, suggestive of increasing local adaptation against parasites, no signal of evolutionary rescue could be found. We suggest that condition-dependent sexual selection facilitates local adaptation against parasites and discuss its effects in evolutionary rescue." (Authors)] Address: Gómez-Llano, M., Dept of Biological Sciences, Univ. Arkansas, Fayetteville, Arkansas 72701, USA. Email: mgomezllano@gmail.com

**18989.** Grupo Ibérico de Odonatología (2020): Homenaje a Francisco J. Ocharan Larrondo (Bilbao 1946 - Oviedo 2019). *Grupo Ibérico de Odonatología (GIO). Boletín de la Sociedad Entomológica Aragonesa* 67: 326-335. (in Spanish) [Tribute to Francisco J. Ocharan Larrondo (Bilbao 1946-Oviedo 2019). The following authors contributed to this tribute: Marta I. Saloña, José Antonio Quirce, Adolfo Cordero Rivera, Rocío Ocharan, Rocío Rosa García, Antonio Torralba-Burrial, Cinta Quirce Vázquez, Ricard Martín, Iñaki Mezquita Aranburu & David Outomuro] Address: Grupo Ibérico de Odonatología (GIO). Email: gi.odonatologia@gmail.com

**18990.** Grupo Ibérico de Odonatología (2020): Una mirada

odonatológica a las publicaciones de Francisco J. Ocharan. Boletín de la Sociedad Entomológica Aragonesa 67: 326-335. (in Spanish) [Chronological and thematic analysis of the publications of the recently deceased (2019) professor of the University of Oviedo (Dept. of Biology of Organisms and Systems), from an odonatological perspective, within the tribute published by the Iberian Odonatology Group. Includes a thematic list of his publications.] Address: Grupo Ibérico de Odonatología (GIO); Email: gi.odonatologia@gmail.com

**18991.** Harabiš, F.; Jakubec, P.; Hronková, J. (2020): Catch them if you can! Do traits of individual European dragonfly species affect their detectability?. *Insect Conservation and Diversity* 13(3): 303-312. (in English) ["1. Odonates are an ancient group of freshwater invertebrates that have complex life cycles and highly variable phenotypes and behaviours. These traits make odonates a very attractive model group to study various aspects and phenomena in the fields of ecology, behaviour, and evolutionary biology. 2. Such variability in appearance and behaviour can influence the detectability of individual species under natural conditions; and this variability in detection rates, if not statistically treated, may lead to significant distortions of results and misleading conclusions. 3. In the present study, we used detectability models to predict the time to detection (TTD) of individual odonate species and generalised linear mixed models to analyse the effects of morphological and behavioural traits on the TTD of the first individual of a species. 4. We found that only abundance had a significant effect on the TTD of both Anisoptera and Zygoptera, while the larger Anisoptera were generally detected earlier. No such patterns were observed in Zygoptera; however, dispersal ability was found to have had some influence. 5. Surprisingly, coloration and activity were not found to influence the TTD of odonates. Therefore, although there are considerable differences between species, with the exception of abundance and size, we did not detect any easily measurable traits that would unequivocally explain the differences in the detection rates of individual species." (Authors)] Address: Harabiš, F., Department of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, Praha – Suchbátka 165 00, Czech Republic. E-mail: harabis@fzp.czu.cz

**18992.** Hashimoto, K.; Kasai, A.; Hayasaka, D.; Goka, K.; Hayashi, T.I. (2020): Long-term monitoring reveals among-year consistency in the ecological impacts of insecticides on animal communities in paddies. *Ecological Indicators* 113, June 2020, 106227: (in English) ["Highlights: • The effects of three insecticides on animals in paddies were assessed for three years. • Animal community composition significantly differed among years. • Some taxa were decreased by each insecticide irrespective of year. • These taxa can be used as robust indicators of the effects of each insecticide. • Long-term monitoring may be useful in identifying ecotoxicological effect indicators. Abstract: Semi-natural mesocosm experiments have been proposed as a powerful approach for evaluating the realised rather than potential

ecotoxicological effects of agrochemicals on biological communities. However, there is uncertainty in the results from such experiments due to spatio-temporal variability in various ecological factors, such as community composition. Therefore, long-term studies evaluating such variability are critical for assessing the utility of mesocosm experiments, although few studies have been conducted over multiple years. We conducted a multiple-year (i.e., three-year) mesocosm experiment to examine the effects of three systemic insecticides (clothianidin, fipronil, and chlorantraniliprole) on aquatic animal communities in experimental paddies, and we evaluated the among-year variability in these ecotoxicological effects. We found substantial variation in community composition among years. However, when we controlled for this variability by performing partial redundancy analysis (partial RDA), we found that paddy community composition was significantly different between the three insecticide treatments irrespective of year. Moreover, we identified some taxa that consistently decreased in abundance following exposure to each insecticide and may thus be regarded as indicator taxa of the environmental stress caused by the insecticides (e.g., clothianidin: *Gerris lacustris* (water striders), fipronil: *Orthetrum albistylum speciosum* (dragonflies), and chlorantraniliprole: *Hydroglyphus japonicus* (beetles)). Our study suggests the utility of multiple-year, semi-natural mesocosm experiments not only for evaluating the temporal variability in ecotoxicological effects but also for identifying potential robust indicator organisms that consistently decrease in abundance in response to specific agrochemicals irrespective of the variability in ecological factors under realistic conditions.] Address: Hashimoto, K., Faculty of Agriculture, KINDAI University, Nakamachi 3327-204, Nara 631-8505, Japan. Email: atrophaneura4@gmail.com

**18993.** Hasik, P. (2020): A macroevolutionary view on extinction risk in Aves, Chiroptera, and Odonata. MSc thesis Arkansas State University: 31 pp. (in English) ["A central goal of conservation biology is to identify and understand the factors that lead to extinction. The Earth is currently undergoing a 6th mass extinction event, in large part because of human activity. In the last century, rates of extinction have increased anywhere from 8-100 times the background rate of 2 extinctions per 10,000 species every 100 years. However, there remains a debate over whether certain species are predisposed to a higher extinction risk. In particular, it is not known if the macroevolutionary history of a lineage is a major contributor to the probability of extinction, nor is it clear whether the current rise in extinction rates is due strictly to anthropogenic activity. Using life history trait information and the International Union for Conservation of Nature (IUCN) Red List rankings for bats, birds, and odonates in combination with a novel diversification method, MiSSE (Missing State Speciation and Extinction), we test if there is an evolutionary signal of extinction susceptibility independent of the influence that traits can have on rates of diversification. Phylogenetic and non-phylogenetic regressions were run to determine if any specific traits correlated with extinction risk ranking. We find that there is no correlation between diversification rates and IUCN extinction risk. However, larger

clutch sizes and range sizes correlated with lower extinction risk and that longer generation lengths for birds did correlate with higher levels of extinction risk. We found no correlation of extinction risk and life history traits in bats and odonates. Our modeling suggests that other factors, such as human-mediated activities, better explain the increased extinction rates." (Author)] Address: not stated

**18994.** Herzog, R. (2020): Global change genomics: comparative genomic analyses on environmental associated speciation and adaptation processes in Odonata. Dissertation, Naturwissenschaftlichen Fakultät der Gottfried Wilhelm Leibniz Universität Hannover: XIX, 154 pp. (in English, with German summary) ["Proceeding global and local environmental changes require innovative conservation concepts and animal model systems which integrate empirical and genomic data. Odonata are a highly suitable model system for the evaluation of ecosystems and on top hold an evolutionary key position at the base of winged insects. The rapid (r)evolution of genetic methods in the last two decades has allowed the transition of traditional ecological field model systems (which cannot or only with difficulty be kept in the laboratory in contrast to traditional genetic model organisms) to model systems of integrative research. This raises the possibility of closing the gap between ecological factors and their genetic consequences and / or causes. Here, the order Odonata plays a prominent role based on the solid foundation of extensive ecological data and now numerous genetic research approaches for dragonflies. Consequently, the presented dissertation deals with two odonate species with very different ecological niches, almost opposing adaptation strategies and distributional dynamics. These are on the one hand *Lestes macrostigma*, an endangered, stenotopic damselfly adapted to temporary, brackish ecosystems with spatially very limited distribution. The other target species is the cosmopolitan, abundant and migratory *Pantala flavescens*, inhabiting all kinds of temporary waters created by local rains as an ecological generalist. Due to their temporary nature, both habitats are particularly prone to climate change, but they differ significantly in their spatio-temporal occurrence. The resulting different adaptation strategies and distributional dynamics of both species were therefore genetically characterized in this work on (i) temporal, (ii) local and (iii) global levels to compare potential "winners" and "losers" in terms of the current insect extinction and rapidly changing environmental conditions: A long-term local monitoring of a population of *L. macrostigma* in southern France revealed highly fluctuating population sizes resulting in genetic bottlenecks. These results were associated with fluctuating precipitation and drought periods and were compared to populations covering the entire distribution range of this species and are discussed in a geographic context. The global comparison approach reveals that the fragmented population structure is reflected in the genetics of this species and that populations are even genetically isolated. Furthermore, two conservation units were discovered in Spain and France requiring the re-evaluation of the conservation status of these populations by the relevant authorities. Finally, a new dispersal model of this species was

proposed, suggesting that this species originated in Asia with a subsequent westward expansion. A first global population study on the cosmopolitan dragonfly species *P. flavescens* surprisingly revealed contradicting geographic structuring based on mitochondrial and nuclear data. Despite their extraordinary migratory potential, island populations of *P. flavescens* show genetic signals of local adaptation processes, going along with phenotypic differences and behavioral adaptations. In particular, the investigated population on Easter Island is genetically isolated and depleted whereas all other populations show remarkably high intraspecific diversity. However, nucleotide and amino acid diversity indicate saturation of the CO1 barcode gene fragment, highlighting the limited suitability of marker for population genetic studies as local adaptations could not be detected. To complement single marker gene analyses and to pave the way for genomic studies on insect migration, the complete mitochondrial genome of an Easter Island individual of *P. flavescens* was characterized and compared to mitogenomes of the key odonate species *Anax imperator*, *Ischnura elegans*, and *Megalopterus caeruleus*. These new mitogenome data are a highly valuable resource for future comparative mitogenome studies on the population level and for insect migration. Migration of flying insects has so far only been studied in detail on two phylogenetically very derived model systems (*Danaus plexippus* and *Locusta migratoria*). Since dragonflies are phylogenetically placed on the base of winged insects, studies on *P. flavescens* open up the possibility of tackling the question of the evolution of migration and its genetic mechanisms." (Author)] Address: Herzog, Rebecca, ITZ, Ecology & Evolution, University of Veterinary Medicine Hannover, Hannover, Germany. E-mail: rebecca.herzog@ecolevol.de

**18995.** Houard, X. (coord.) (2020): 2020 – Plan national d'actions en faveur des « libellules » - Agir pour la préservation des odonates menacés et de leurs habitats 2020-2030. Office pour les insectes et leur environnement – DREAL Hauts-de-France - Ministère de la transition écologique: 66 pp. (in French, with English summary) ["12 actions implemented during 10 years for saving French dragonflies and damselflies endangered species National Action Plans (NAPs) are strategic tools from the French Ministry in charge of biodiversity issues. They are intended to ensure the maintenance or restoration of populations of endangered species or species of special interest in a favorable conservation status. In a legal framework, the NAPs then organize the preservation of these species by implementing a voluntary and structuring approach. The overall objective of this plan and its regional implementations is to safeguard the dragonflies and damselflies through specific measures to stop the direct causes of their disappearance (destruction of their habitat, drying, pollution, damage to dispersal abilities, climate change...) starting with the issues concerning the species considered as the most "patrimonial" (threatened and / or protected). This plan requires the mobilisation of all, both public authorities (State services, local authorities) and rural stakeholders (breeders, farmers, foresters ...), managers of spaces and / or natural resources (quarry operators, owners,

riparians ...) encouraging them to favor appropriate management for the conservation of the target species. Finally, considering the "bioindicator" qualities of dragonflies and damselflies, this plan targets all naturalist citizens wishing to contribute to a better collection of scientific information. Researchers should be also interested in better detailed assessment of practices related to wetlands preservation." (Author)] Address: Direction générale de l'aménagement, du logement et de la nature, Direction de l'eau et de la biodiversité, Sous-direction de la protection et de la restauration des écosystèmes terrestres, Tour Séquoia- 92055 La Défense cedex, France

**18996.** Huang, D.-Y.; Nel, A.; Ngo-Muller, V. (2020): The sixth species of the damselfly family *Burmacoenagrionidae* (Odonata) endemic to the mid-Cretaceous Burmese amber. *Palaeoentomology* 3(6): 564-568. (in English) ["*Burmagrion azari* sp. nov., sixth species of the small damselfly family *Burmacoenagrionidae*, is described and illustrated. This family is currently only recorded from the mid-Cretaceous Burmese amber and is possibly endemic to this isolated island of the Tethys Ocean at that time. The presence of slender, elongate legs with very long tarsi is a putative synapomorphy of the *Burmacoenagrionidae*, as present in *Burmagrion* and *Burmacoenagrion*. The type specimen of the new genus and species is dislocated together with several fragments of flies, suggesting that these fossils are possibly the result of a regurgitation by a small vertebrate passing aside the fresh resin. The female of *Burmagrion azari* sp. nov. was probably laying its eggs inside plant cuticles. Its ovipositor is described." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrns1.mnhn.fr

**18997.** Jooste, Mi.J.; Samways, M.J.; Deacon, C. (2020): Fluctuating pond water levels and aquatic insect persistence in a drought-prone Mediterranean-type climate. *Hydrobiologia* 847: 1315-1326. (in English) ["In dry areas, natural and artificial ponds experience frequent water level fluctuation, affecting conditions for some aquatic and amphibiotic taxa. Water beetles, bugs, and dragonflies make up much of pond diversity, and are responsive to changes in environmental conditions. Using a drought-prone pondscape within the Greater Cape Floristic Region biodiversity hotspot, we determine (1) the relative extent to which species richness, abundance, and composition are affected by pond water level fluctuation, (2) the effects of environmental variables and vegetation characteristics relative to fluctuating water levels, and (3) make recommendations to improve pondscape conservation. We found that the degree of fluctuation had a significant effect on beetle species richness, but had no significant effect on the other focal taxa. Water temperature, pH, and conductivity, and vegetation cover and composition were drivers of aquatic insect species richness, abundances, and assemblage structures. Habitat heterogeneity supported rich aquatic insect assemblages. We recommend that a range of ponds with various degrees of water level fluctuation should be maintained, along with naturally diverse marginal vegetation. Such

a dynamic pondscape can contribute greatly towards maintenance of local and regional aquatic insect diversity in drought-prone regions and should be considered as a main focus in conservation efforts." (Authors)] Address: Deacon, C., Dept of Conservation Ecol. & Ento., Stellenbosch Univ., South Africa. E-mail: charldeacon@sun.ac.za

**18998.** Kamnananda, H.T.A.R.; Gnnawardena, M.P. (2020): Diversity of Odonata at Ramsar City - Colombo, Sri Lanka. Symposium on Applied Sciences (SAS) 2020: 124-131. (in English) ["Urban wetlands are water-rich natural areas that lie within the boundaries of a city or town known to provide many valuable ecological benefits to urban ecosystems. Wetlands restore drinking water, reduce flooding, play a vital role in filtering waste and also provide urban green spaces. More importantly, the wetlands provide a good feeding and breeding habitat for urban wildlife. The present study investigated the effects of urbanization 011 the diversity of dragonflies and damselflies in major wetlands located in the Ramsar City, Colombo, Sri Lanka. The selected wetlands are 'Diyasanf Wetland Park. 'Baddagana' Wetland Park, 'Pelawatha' Wetland and 'Thalawathugoda' Wetland. Dragonflies and damselflies were used as an indicator species as they are found commonly in wetlands and are very sensitive to any change in the environment. Sampling was conducted at 3 points for a period of 10 minutes at each location. The type of species and the number of individuals observed within a 10m radius were recorded. Opportunistic observations were taken when a dragonfly was encountered in the field other than the time interval. The number of species and individuals recorded at 'Diyasanf, 'Baddagana'. 'Pelawatha' and 'Thalawathugoda' wetlands were 11/75, 8/43. 9/97 and 8/56 respectively. A total of 37 species were found in all four locations (opportunistic species) indicating that these wetlands still have a good diversity of dragonflies and damselflies. However, during the study, garbage and other sewage waste were dumped at all four study sites. These waste materials may increase the environmental pollution potential of the aquatic ecosystem and alter the habitat structure of wetland organisms. Further study is needed 011 communities of Odonata living in differently polluted habitats to understand the impact of pollution loads 011 their diversity and abundance." (Authors)] Address: Kamnananda H.T.A.R., Faculty of Science, Horizon Campus, Mabile, Sri Lanka. E-mail: htarkarananda@gmail.com

**18999.** Karube, H.; Terayama, H.; Kaga, R.; Sato, T.; Sakabe, K. (2020): Contamination implications of the neonicotinoid insecticide for the habitat of the endangered dragonfly *Sympetrum maculatum* in the Tonoh area, Gifu Prefecture. *Tombo* 62: 26-37. ["*S. maculatum* Oguma, 1915, which inhabits small reservoirs in hilly areas, is an endemic dragonfly of Japan and ranked as an endangered species in the Japanese Red List. Recently a serious decline in the species has been observed in the Tonoh area, in the southeast part of Gifu Prefecture. The reason for the decline is still not clear, but we presume the decline was initiated by Chemical pollution of neonicotinoid insecticide, and in the autumn of 2018 we reported that acetamiprid in the species habitat



had exceeded the allowable limits set by the Ministry of the Environment (Karube et al., 2019). In 2019, we investigated these insecticides in the habitat of *S. maculatum* in May and July, during the period of the larval stage. As a result, 8 substances of neonicotinoid insecticides were detected from almost all samples, which indicates Chemical pollution has spread widely in this area. Especially notable was the concentration of acetamiprid in the habitat that highly exceeded the allowable limits, in addition to thiacloprid, clothianidin and fipronil that also exceeded allowable limits. The values of the neonicotinoid insecticide were highest in May, compared to other seasons (e.g. imidacloprid: 13.94-41.34 times that of 2018 autumn data; acetamiprid: 11.47-1362.12 times as that of 2018 autumn data). These results suggest that neonicotinoid insecticide is one of the main factors for the dragonflies decline." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**19000.** Kaunisto, K.M.; Roslin, T.; Forbes, M.R.; Morrill, A.; Sääksjärvi, I.E.; Puisto, A.I.E.; Lilley, T.M.; Vesterinen, E.J. (2020): Threats from the air: Damselfly predation on diverse prey taxa. *Journal of Animal Ecology* 89(6): 1365-1374. (in English) ["1. To understand the diversity and strength of predation in natural communities, researchers must quantify the total amount of prey species in the diet of predators. Metabarcoding approaches have allowed widespread characterization of predator diets with high taxonomic resolution. To determine the wider impacts of predators, researchers should combine DNA techniques with estimates of population size of predators using mark–release–recapture (MRR) methods, and with accurate metrics of food consumption by individuals. 2. Herein, we estimate the scale of predation exerted by four damselfly species on diverse prey taxa within a well-defined 12-ha study area, resolving the prey species of individual damselflies, to what extent the diets of predatory species overlap, and which fraction of the main prey populations are consumed. 3. We identify the taxonomic composition of diets using DNA metabarcoding and quantify damselfly population sizes by MRR. We also use predator-specific estimates of consumption rates, and independent data on prey emergence rates to estimate the collective predation pressure summed over all prey taxa and specific to their main prey (non-biting midges or chironomids) of the four damselfly species. 4. The four damselfly species collectively consumed a prey mass equivalent to roughly 870 (95% CL 410–1,800) g, over 2 months. Each individual consumed 29%–66% (95% CL 9.4–123) of its body weight during its relatively short life span (2.1–4.7 days; 95% CL 0.74–7.9) in the focal population. This predation pressure was widely distributed across the local invertebrate prey community, including 4 classes, 19 orders and c. 140 genera. Different predator species showed extensive overlap in diets, with an average of 30% of prey shared by at least two predator species. 5. Of the available prey individuals in the widely consumed family Chironomidae, only a relatively small proportion (0.76%; 95% CL 0.35%–1.61%) were consumed. 6. Our synthesis of population sizes, per-capita consumption rates and taxonomic distribution of diets identifies

damselflies as a comparatively minor predator group of aerial insects. As the next step, we should add estimates of predation by larger odonate species, and experimental removal of odonates, thereby establishing the full impact of odonate predation on prey communities." (Authors)] Address: Kaunisto, K.M., Zoological Museum, Biodiversity Unit, University of Turku, Turku, Finland

**19001.** Kebede, G.; Mushi, D.; Linke, R.B.; Dereje, O.; Lakew, A.; Hayes, D.S.; Farnleitner, A.H.; Graf, W. (2020): Macroinvertebrate indices versus microbial fecal pollution characteristics for water quality monitoring reveals contrasting results for an Ethiopian river. *Ecological Indicators* 108 (2020) 105759: 10 pp. (in English) ["Awash River is one of the major surface water sources used by millions of people in the central Highlands of Ethiopia. However, numerous pollution sources exert significant pressure on the river. Different approaches for assessing the status of water quality exist, but few studies compared the performance of distinct methods. Therefore, this study aims to evaluate the consistency of fecal indicator bacteria for environmental health assessment of rivers by comparing them to assessments of physicochemical tests as well as newly developed macroinvertebrate indices. Physicochemical, biological (macroinvertebrates) and microbiological (*Escherichia coli* and Enterococci) parameters were assessed at five sites along the upper Awash River. For *E. coli* and Enterococci moderate to strong fecal pollution levels, ranging from  $7.9 \times 10^2$  to  $7.6 \times 10^3$  cfu/100 ml and  $7.6 \times 10^2$  to  $1.1 \times 10^4$  cfu/100 ml, were observed, respectively. The concentrations of both fecal indicator bacteria exceeded the standards set by the European Union and the World Health Organization for safe recreational water. Hence, all sites were categorized as poor for swimming and recreation. In contrast, three African benthic macroinvertebrate indices (South African Scoring System 5, Tanzanian River Scoring System, Ethiopian Biotic Score) indicated a natural or good water quality with slight ecological degradation at the upstream sites, and a moderate to poor ecological status at the downstream sites. While macroinvertebrate communities were able to reflect anthropogenic disturbances, mainly caused by different land uses, fecal indicator bacteria, most likely driven by the high pressure of extensive livestock fecal emission and overgrazing in the whole catchment, did not. This study underpins the necessity of combining different indicator systems to analyze human pressures in Africa in a holistic way, which can serve as a basis for management and sustainable use of fundamental resources such as water from freshwater ecosystems." (Authors) Odonata are treated at the family level.] Address: Kebede, G., Ambo University, Department of Biological Sciences, P.O. Box 95, Ambo, Ethiopia

**19002.** Keetapitchayakul, T.S.; Sripanya, J.; Phlai-Ngam, S.; Tungpairjwong, N. (2020): Description of the final stadium larva of *Bayadera serrata* Davies & Yang, 1996 (Odonata: Euphaeidae) from Thailand. *Zootaxa* 4894(1): 98-110. (in English) ["The damselfly genus *Bayadera* Selys, 1853 comprises 17 species, but the larvae of only four species have been described. Here we describe the final stadium

larva of another species—*Bayadera serrata* Davies & Yang, 1996. Larvae were collected from a headwater stream at Nam Nao National Park, Phetchabun Province, Thailand. The larva of *B. serrata* is distinguished from congener species following the presence of one to three distinct spines on the genae, two pairs of setae on the ligula, one pair of setae on the ventral side of prementum, the presence of three teeth of the distal end of the labial palp, the presence of a plate-like spine on the gonapophyses, the presence of a row of rod-like setae on the distal end of the tibial comb, the presence of a cluster of long simple setae on the abdominal terga S3–9, and the presence of short terminal filament of the caudal gills. The larvae of genus *Bayadera* have been compared with other known larvae from family Euphaeidae. Key is provided to the genera with known Southeast Asian euphaeid larvae: *Anisopleura*, *Bayadera*, and *Euphaea*." (Authors)] Address: Keetapitchayakul, T.S., 1225 moo 1, Viangkum Sub-district, Kumpawapi District, Udon-thani Province, Thailand 41110. E-mail: Keetapithchaya-kul.TS@gmail.com

**19003.** Khan, M.K.; Herberstein, M.E. (2020): Ontogenetic habitat shifts reduce costly male–male interactions. *Evolutionary Ecology* 34(5): 735-743. (in English) ["Ontogenetic habitat shifts are predicted to increase the fitness and survival of individuals by allowing effective utilization of spatially distributed resources. Evidence supports nutritional requirements and predation pressure as drivers of habitat shifts. Likewise, intraspecific interactions are thought to lead to ontogenetic habitat shifts, however, empirical evidence is lacking. Here, we test if intraspecific male–male interactions are responsible for ontogenetic habitat shifts in *Xanthagrion erythroneurum*, a damselfly that undergoes developmental colour change. The juvenile males are yellow and change colour to red with sexual maturity. Field observations showed that the proportion of juvenile males is higher in adjacent woods than in primary mating arenas by ponds. We measured male–male interactions by the pond and in the woods, predicting the habitat switch would reduce male antagonistic interactions such as male aggression and male–male mating attempts. We showed that juvenile males receive less aggression in woods than at the pond mating arena. We conclude that lower population density and lower male encounter rates in the woods reduce the cost of male aggression for juvenile males. Our study provides evidence that stage-dependent habitat choice resulting from intrasexual antagonistic interactions may drive ontogenetic habitat shifts." (Authors)] Address: Khan, M.K., Dept of Biological Sciences, Macquarie Univ., Sydney, NSW, 2109, Australia

**19004.** Khan, M.K. (2020): Female pre-reproductive colouration reduces mating harassment in damselflies. *Evolution* 74(10): 2293-2303. (in English) ["Conspicuous female colouration can evolve through male mate choice or via female-female competition thereby increasing female mating success. However, when mating is not beneficial, such as in pre-reproductive females, selection should favour cryptic rather than conspicuous colouration to avoid male detection and the associated harassment. Nevertheless, conspicuous

female colouration occurs in many pre-reproductive animals, and its evolution remains an enigma. Here, I studied conspicuous female colouration in *Agriocnemis femina*, in which the conspicuous red colour of the immature females changes to a less conspicuous green approximately a week after their emergence. I measured body size, weight and egg numbers of the female morphs and found that red females are smaller, lighter and do not carry developed eggs. Finally, I calculated the occurrence frequency and mating frequency of red and green females in several populations over a three-year period. The results demonstrate that red females mated less frequently than green females even when red females were the abundant morph in the populations. I concluded that conspicuous female colouration is likely to function as a warning signal of sexual unprofitability, thereby reducing sexual harassment for females and unprofitable mating for males." (Author)] Address: Khan, M.K., Dept Biol. Sciences, Macquarie Univ., Sydney, NSW, 2109 Australia. E-mail: bmbkawsar@gmail.com

**19005.** Korkeamäki, E. (2020): Local extinction risk and community structure of Odonata populations in Fennoscandia. *Annales Universitatis Turkuensis Ser. A II* 366: 46 pp. (in English, with Finnish summary) ["A key need in conservation biology is to identify the ecological traits of a species that make it vulnerable. This thesis focuses on population traits and extinction risk of dragonflies and damselflies (order Odonata) in Finland and Sweden. First, I examined whether species occupancy frequency distributions (SOFD) of odonates vary among the lakes and ponds of four geographical regions. Second, I determined the main habitats, species traits, and local population distributions of Odonata in Central Finland. I found that in the southern regions, the SOFD was dominated by species that occur at few sites, while in the northern regions the distribution was bimodal. In the northern parts of the range, rare species inhabited only high-quality sites. Size of the geographical range, breeding habitat requirements, and degree of generalism/specialism largely explained the observed variation in species occupancy frequency. Specialized species with limited distributions had a greater extinction risk than widely distributed generalist species. However, when the effect of species' geographical range sizes was controlled, I found that extinction risk was actually lower for specialist species than for generalist species, probably due to the fact that generalist species occur in both low- and high-quality habitats. In particular, an extremely high extinction rate was found for peatland-associated species and dynamic lotic headwater populations. Taken together, my results indicate that extinction risk is shaped by the relationship between species population size, distribution, specialization, and habitat quality. The results of this thesis are consistent with existing predictions of species vulnerability and source-sink theory. In conclusion, my research highlights the necessity for conservation biologists to study the quality of freshwater habitats, because this is likely to be an important factor affecting the likelihood of extinction for populations in aquatic environments." (Author)] Address: Korkeamäki, E., Karkunkatu 18 a 4 b, FIN-48600 Karhula, Finland.

**19006.** Kosterin, O.E. (2020): Erratum: OLEG E. KOSTERIN (2019) Amendments and updates to F.C. Fraser's key to Indian *Lestes* spp. (Odonata: Lestidae) to resolve confusion of *L. patricia* Fraser, 1924 and *L. nigriceps* Fraser, 1924, with notes on *L. nodalis* Selys 1891 and *L. garoensis* Lahiri, 1987. *Zootaxa*, 4671: 297–300.. *Zootaxa* 4885(4): 600- (in English) Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**19007.** Li, F.; Tokin, J.D.; Haase, P. (2020): Local contribution to beta diversity is negatively linked with community-wide dispersal capacity in stream invertebrate communities. *Ecological Indicators* 108: 9pp. (in English) ["It is increasingly well understood that stream communities are regulated by both local niche and regional dispersal processes, but comprehensive tests of these factors with datasets that cover extensive spatial and temporal scales are rare. Based on 1180 benthic invertebrate community samples from 2005 to 2012 in central low mountain streams of Germany, we tested the hypotheses that: 1) local contribution to beta diversity (LCBD: a measure of the uniqueness of communities) would decline with increasing average community dispersal capacity; and 2) owing to the relatively large spatial extent of the study region, regional dispersal processes would override local niche controls in structuring community composition. We found considerable temporal variation in LCBD and a negative correlation between LCBD and community dispersal capacity. However, no statistically significant correlation between species contribution to beta diversity (SCBD) and species dispersal capacity was observed. The large-scale spatial structure among locations (representative of dispersal limitation) was important in structuring benthic communities. Although much of the variation was explained by the shared effects of local processes and large-scale spatial variables, environmental controls were stronger than regional processes in few cases in the variance partitioning analysis, with the annual mean temperature and mean diurnal range of temperature being the important drivers. Given the highly varied correlates of beta diversity over time, we urge researchers to focus on not only spatial variation in diversity, but also the context of temporal variation." (Authors) The study includes "Odonata".] Address: Li, F., Dept River Ecology & Conservation, Senckenberg Research Inst. & Natural History Museum Frankfurt, 65371 Gelnhausen, Germany

**19008.** Li, X.; Li, Y.; Muzammil, I.; Lei, M. (2020): Antireflection and antiwetting functionalities of plasma-nanotextured polymer surfaces with biomimetic nanopillars. *Plasma Processes and Polymers* 17(11); e2000050: 14 pp. (in English) ["Inspired by the antireflection and antiwetting functionalities of dragonfly wings decorated with random nanopillars and a wax layer, a facile technique to endow the same functionalities has been devised. In this two-step plasma nanotexturing technique, first oxygen plasma treatment is implemented to grow the random nanopillars on the polymethyl methacrylate (PMMA) surfaces, and then C4F8 plasma polymer

deposition is carried out so that the thin fluorocarbon film with a low surface free energy and refraction index covers the random nanopillars. The biomimetic PMMA surfaces exhibit excellent broadband and omnidirectional antireflection properties and robust antiwetting properties under the water droplet impact. The superhydrophobicity at the slippery Cassie state was maintained under the natural oscillation of residual droplets." (Authors)] Address: Lei, M., Surface Engineering Laboratory, School of Materials Science and Engineering, Dalian University of Technology, 116024 Dalian, China. Email: surfeng@dlut.edu.cn

**19009.** Liu, C.; Zhang, Y.; Liu, X. (2020): Geographical fauna of Odonata in Xiangtoushan National Reserve, Guangdong province. *Forestry and Environmental Science*: 92-99. (in Chinese, with English summary) ["The field investigation of Odonata in Xiangtoushan national nature reserve was carried out from March 2017 to December 2019. The results showed that there were 122 species of Odonata, belonging to 14 families and 74 genera, in the reserve. The species number of Libellulidae (33 species) is the highest, followed by Gomphidae (28 species). The dominant species are *Neurobasis chinensis*, *Mnais mneme*, *Gomphidia kruegeri*, *Asiagomphus hainanensis*, *Macromia calliope*, *Orthetrum glaucum*, *Pantala flavescens* and *Triethemis festiva* etc. The world faunal characteristics of Odonata in this reserve showed that 92 species (occupied 75.41%) are oriental, 28 species (occupied 22.95%) are oriental-palearctic. Meanwhile, all these species construct 10 distribution groups in 7 Chinese Zoogeographic subregions. There are 50 (40.98%) species in South China subregion, 13 (10.66%) species in South and Southwestern subregions, 19 (15.77%) species in South and Central-China subregions, and 20 (16.39) species live in three subregions of South–Central–North China simultaneously. The results of Odonata fauna are consistent with the place of Xiangtoushan national reserve." (Authors)] Address: Liu, C., Administration of Guangdong Xiangtoushan National Nature Reserve, Huizhou Forestry Science Research Institute, China

**19010.** Lozano, F.; del Palacio, A.; Ramos, L.; Muzón, J. (2020): The Odonata of Argentina: state of knowledge and updated checklist. *International Journal of Odonatology* 23(2): 113-153. (in English) ["An updated checklist of the 282 species of Odonata known to occur in Argentina is presented along with distributional information by province and ecoregion. Ten new records for the country and 87 new provincial records are provided. At present, 17 species of Odonata are considered endemic to Argentina, and distribution maps for each of them are provided. Information on larvae and conservation status according to the IUCN Red List of Threatened species is also provided; there are still 98 larvae unknown and 169 species unassessed." (Authors)] Address: Lozano, F., Lab. de Biodiversidad y Genética Ambiental (BioGeA), Universidad Nacional de Avellaneda, Pineroyro, Argentina. Email: flozano@undav.edu.ar

**19011.** Mafuwe, K.; Moyo, S. (2020): Dragonfly (Odonata) community structure in the Eastern Highlands Biodiversity

Hotspot of Zimbabwe: potential threats of land use changes on freshwater invertebrates. *International Journal of Odonatology* 23(4): 291-304. (in English) ["We examined the diversity and potential drivers of dragonfly distribution in a biodiversity hotspot of Southern Africa (Eastern Highlands, Zimbabwe) by surveying 30 sites (13 lentic and 17 lotic habitats) located within this region. Additionally, we identified the anthropogenic factors that may threaten Odonata diversity and abundance. Our results revealed that 27 odonate species are associated with dams and ponds, one species is associated with streams and four species are associated with swamp forests. Considering odonate diversity between protected and unprotected areas, we found significantly higher diversity of odonates in streams in protected areas compared to non-protected areas. Broadly, we found anthropogenic activities (e.g. commercial exotic tree plantations, mining activities, vegetation clearing) possibly affect Odonata diversity (by decreasing abundance and diversity) compared to those within protected and undisturbed habitats. Our results reveal that several human activities like human encroachment into riverine habitats potentially threaten the existence of freshwater species in this biodiversity hotspot and biodiversity hotspots elsewhere." (Authors)] Address: Mafuwe, K., Dept Ento., Natural History Mus. of Zimbabwe, Bulawayo, Zimbabwe. Email: kudzimaffy@gmail.com

**19012.** Manasov, S.; Suhling, F. (2020): Hiding among traps? Mortality of early instar odonate larvae in the presence of bladderwort plants. *International Journal of Odonatology* 23(2): 103 -111. (in English) ["We investigated the effects of the presence of bladderwort plants on survival of early instar larvae of one coenagrionid and two libellulids in laboratory experiments. In all three species survival was reduced compared to treatments with a non-carnivorous submerged plant, with effective mortality that could be related to bladderwort being 19–45% dependent on the prey species. Individuals of all species were found in capture bladders. We also recorded the microhabitat use of the early instar larvae and found that the species with highest use of vegetation had highest mortality due to bladderwort. We conclude that bladderwort may have effects on odonate larvae that translate into natural conditions and we discuss factors that may affect predation by bladderwort on odonates in the field." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**19013.** Masius, P. (2020): Veränderung der Libellenfauna auf der Ostseeinsel Wollin (Polen) – eine Fallstudie. *Libellula* 39(1/2): 79-90. (in German, with English summary) ["Changes in the dragonfly fauna on the island of Wolin (Baltic Sea, Poland) – a case study – Changes in the dragonfly fauna of the Island of Wolin (Baltic Sea) are shown on the basis of two studies at ten selected waterbodies. The first study took place between 1970 and 1976, the second 2018 and 2019. The temporal comparison reveals the immigration of eleven new species, while three species could not be recorded anymore. For each water body the species-exchange-quota is rather high. The findings are discussed

mainly in the light of climatic changes." (Author)] Address: Masius, P., Talstr. 56, 35457 Lollar, Germany. E-mail: patrick\_masius@gmx.de

**19014.** Meijer, A. (2020): Voortplantingspoelen van de gevlekte witsnuitlibel in het duingebied van Kennemerland. Onderzoek naar de verspreiding en voortplantingslocatievoorkeur van de gevlekte witsnuitlibel (*Leucorrhinia pectoralis*) in de Amsterdamse Waterleidingduinen en het Noordhollands Duinreservaat [Reproduction pools of the large white-faced darter in the dune area of Kennemerland. Research on the distribution and reproductive site preferences of *Leucorrhinia pectoralis* in the Amsterdam Water Supply Dunes and the Noordhollands Duinreservaat]. BSc. thesis, Aeres Hogeschool Almere: 31 pp. (in Dutch, with English summary) ["In 2018, *L. pectoralis* was discovered at a number of new locations in the Dutch dunes. Despite the fact that *L. pectoralis* is appointed as a target species for the Noordhollands Duinreservaat area, under the Habitats Directive of the European Union (Natura 2000), not much is known about the habitat preferences of this dragonfly in coastal areas. In this study, it was examined in which specific bodies of water this species reproduced in 2018. Every dune pool with a known observation from 2018 was re-examined in 2020 to find out whether the dragonfly had reproduced. When the species was discovered at a pool in both 2018 and 2020, this pool was designated as a reproductive site. Twenty pools where the dragonfly was not observed in 2018 were also examined. If the dragonfly was not observed in 2020, the pool was designated as a non-reproductive site, and would thus function as a control pool. Subsequently, various characteristics of the reproductive and non-reproductive sites were compared, in order to answer the main question: What are the specific physical and botanical characteristics of the reproductive pools of *L. pectoralis*, in the Noordhollands Duinreservaat and the Amsterdamse Waterleidingduinen? Results indicate that *L. pectoralis* in the dunes of Kennemerland reproduce in, on average, larger pools that are largely sedimentized, and contain a well-developed submersed and riparian vegetation. All examined pools, reproductive and non-reproductive, contained submersed vegetation, with a coverage larger than 50%. Reproductive sites did however contain a higher percentage of riparian vegetation, with no upper limit restrictions, since the dragonfly reproduced in pools with banks covered with vegetation. The sedimentation percentage of the reproductive sites was, on average, greater than that of the non-sedimentized sites, 41.7% and 25% respectively. There was, however, an upper limit to the percentage of sedimentation of 60%. The dragonfly will not recognize a body of water if the percentage of sedimentation is over 60% and thus will not reproduce at this site. To take the dragonfly into account when performing management, it is advisable to make sure the pools are not too deep and to avoid rigorous cleaning, to stimulate sedimentation and the development of riparian vegetation. If the sedimentation process progresses beyond 60% sedimentation, it is advisable to clean the pool, leaving half of the riparian vegetation and a third of the submersed vegetation intact." (Author)] Address: not stated



**19015.** Miralles-Núñez, A.; Esteban-Resino, J.; García-Pozuelo Ramos, C.; Gómez, J.A. (2020): Nuevos registros de *Diplacodes lefebvrii* (Rambur, 1842) y *Orthetrum chrysostigma* (Burmeister, 1839) (Odonata: Libellulidae) en el centro de la península ibérica. *Boletín de la Sociedad Entomológica Aragonesa* 67: 396-398. (in Spanish, With English summary) ["*Diplacodes lefebvrii* (Rambur, 1842) is recorded for the first time from Toledo province (Castilla-La Mancha) and *Orthetrum chrysostigma* (Burmeister, 1839) from Toledo and Madrid provinces, contributing to the knowledge of these species in the centre of the Iberian Peninsula." (Authors)] Address: Miralles-Núñez, Adriá, Grup d'Estudi deis Odonats de Catalunya (Oxygastra-GEOC), Institució Catalana d'Història Natural, Barcelona Spain. Email: amirallesl0@gmail.com

**19016.** Mora, A.; Sebteoui, K. (2020): *Trithemis arteriosa* (Burmeister, 1839) (Odonata: Libellulidae) in Hungary: can aquarium trade speed up the area expansion of Mediterranean species?. *North-Western Journal of Zoology* 16(2): 237-238. (in English) ["At the end of October 2020, the authors received a photo of a dragonfly for identification. The photo was taken in August 2020 in a small private garden pond in the city of Pécs, Southwest Hungary. The specimen was identified ... as a teneral female of *T. arteriosa*, which species has never been recorded before in Hungary or in the Carpathian Basin biogeographical region. The new occurrence of *T. arteriosa* in Hungary is very far from the known distributional area, suggesting that the species did not appear naturally here. The eggs or larvae were possibly transported from Cyprus to Hungary with aquatic plants (water lilies, *Nymphaea 'Cypriana'*) in January 2020. After an approximately 13-hour long journey, the plants were placed in a garden pond where potential food sources (e.g. chironomid and culicid larvae) were available for larvae. Unfortunately, the exuvium of the emerged specimen was not taken. After the recognition of the species the pond was searched for dragonfly larvae, but only those of *Libellula depressa* Linnaeus, 1758, a common European and Hungarian species with large body size, were found." (Authors)] Address: Mora, A., Department of Hydrobiology, Faculty of Sciences, University of Pécs, H-7624 Pécs, Ifjúság útja 6., Pécs, Hungary. E-mail: marnold@gamma.ttk.pte.hu

**19017.** Nakanishi, K.; Koide, D.; Yokomizo, H.; Kadoya, T.; Hayashi, T.I. (2020): Investigating effect of climate warming on the population declines of *Sympetrum frequens* during the 1990s in three regions in Japan. *Scientific Reports* 10:12719: 10 pp. (in English) ["Climate warming is of concern as a key factor in the worldwide decline in insect populations. In Japan, numbers of a common dragonfly in rice paddy fields, *Sympetrum frequens*, decreased sharply in the 1990s. Because *S. frequens* migrates to cooler mountains in summer, climate warming has been suggested as one of the main causes of the population decline in addition to agronomic factors. Here, we analysed the relation between summer temperatures and population densities of *S. frequens* and the related *S. infuscatum*, which does not

migrate to mountains in summer, using published population monitoring data and temperature data from three regions (Toyama, Ishikawa, and Shizuoka) in Japan. Decadal differences in summer temperatures lay within the range of fluctuations among years, suggesting that an increase in summer temperatures cannot explain the past sharp population declines. However, regression analyses using monitoring data from Toyama showed that the population dynamics of both species in autumn are negatively correlated with summer temperatures in the same year. These results suggest that high temperatures in summer directly affect adult mortality to an extent that results in a decrease in population growth." (Authors)] Address: Nakanishi, K., National Institute for Environmental Studies, Onogawa 16.2, Tsukuba, Ibaraki 305.8506, Japan. E-mail: nakanishi.kosuke@nies.go.jp

**19018.** Nel, A.; Pouillon, J.-M. (2020): The second genus of the 'libelluloid' family Araripephlebiidae (Odonata, Clavilabiata). *Palaeoentomology* 3(3): 240-244. (in English) ["The Lower Cretaceous Crato Formation is a well-known Konservat Lagerstätte with a very rich entomofauna. The Odonata are especially very diverse and extensively studied (Bechly, 1998, 2000, 2007, 2010; Nel et al., 1998; Bechly et al., 2001; Bechly & Ueda, 2002) with representatives of all the extant anisopteran main subgroups. This fauna is especially interesting because it comprises some of the oldest and most 'basal' groups of the highly diverse extant 'libelluloid' dragonflies, or Clavilabiata Bechly, 1996. Among these, the monospecific family Araripephlebiidae Bechly, 1998 is remarkable in the highly specialized hind wing cubito-anal area that contains a curious supplementary longitudinal vein more or less parallel to AA and CuA, unique among the Odonata. Nevertheless, this family remained rather poorly known by three described specimens, only females." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: a-nel@cimrs1.mnhn.fr

**19019.** Nikolaus, R.; Matern, S.; Schafft, M.; Klefoth, T.; Maday, A.; Wolter, C.; Manfrin, A.; Lemm, J.U.; Arlinghaus, R. (2020): Einfluss anglerischer Bewirtschaftung auf die Biodiversität von Baggerseen: Eine vergleichende Studie verschiedener gewässergebundener Organismengruppen. *Lauterbornia* 87: 153-187. (in German, with English summary) ["Impact of recreational fisheries management on the biodiversity of gravel pit lakes: a comparative study involving several groups of aquatic and riparian organisms: We mapped all lakes in Lower Saxony and show that gravel pit lakes are the dominant lake type in the study region. Furthermore, we compared gravel pit lakes managed and not managed by recreational fisheries in terms of biodiversity across a range of aquatic and riparian taxa. Although the angling lakes were used more intensively for recreation, no differences in species richness and the Simpson diversity index were detected for plants, amphibians, Odonata, and birds. The only relevant biodiversity effect detected in response to fisheries management related to fish communities, which were found to be more species-rich in angler

managed lakes compared to unmanaged ones. We conclude that management by anglers promotes the water-type-specific fish species diversity in gravel pit lakes, and recreational angling is unlikely a relevant factor influencing the species richness under the social-ecological conditions of Lower Saxony." (Authors) The list of taxa includes 33 odonate species/taxa.] Address: Nikolaus, R., Leibniz-Institut für Gewässerökologie & Binnenfischerei, Müggelseedamm 310, 12587 Berlin, Germany

**19020.** Ocharan, F.J.; Ocharan, R. (2020): Los odonatos de la cuenca del río Segura (Sureste de España) (Odonata). *Boletín de la Sociedad Entomológica Aragonesa* 67: 375-385. (in Spanish, With English summary) ["The dragonflies and damselflies of the Segura river basin (south-eastern Spain) (Odonata) Abstract: Records of 43 species of Odonata, obtained between 1995 and 2005, from 66 sampling points in the Segura Basin, south-eastern Spain (provinces of Albacete, Alicante, Jaén and Murcia) are provided. The odonate fauna of this basin is reviewed, with remarks on *Coenagrion mercuriale*, *C. caerulescens*, *C. scitulum*, *Lestes macrostigma*, *Gomphus simillimus*, *Onychogomphus costae*, *Orthetrum nitidiverve* and *Zygonyx torridus*. *Onychogomphus cazuma* is recorded for the first time from the Murcia administrative region, thus extending its known distribution in the Iberian Peninsula." (Authors)] Address: Ocharan, R., Universidad de Santiago de Compostela, Spain. E-mail: rocio.lindenia@gmail.com

**19021.** Odume, O.N. (2020): Searching for urban pollution signature and sensitive macroinvertebrate traits and ecological preferences in a river in the Eastern Cape of South Africa. *Ecological Indicators* 108 (2020) 105759: 10 pp. (in English) ["Urbanisation of riverine landscapes is a major threat to river ecosystems because of the ecological consequences of the so called urban stream syndrome. Taxonomically, certain macroinvertebrate metrics such as the diversity of species of Ephemeroptera, Plecoptera and Trichoptera (EPT) are known to be sensitive to urban pollution, whereas chironomids and oligochaetes are relatively tolerant. Trait correlates of such taxonomic metrics are yet to be established even though traits are less constrained by geographical differences. Using the Swartkops as a case study of a river receiving urban pollution, the pattern of trait distribution in relation to a gradient of urban pollution was examined, and urban pollution signature and sensitive traits identified. Macroinvertebrates and physico-chemical analysis were undertaken over a period of three years between August 2009 and September 2012 at one control site and three impacted downstream sites. Seven traits resolved into 32 trait attributes including body size, respiration, body shape, mobility, biotope preference, preferred food, and feeding habits were fuzzy coded and analysed using RLQ and fourth-corner analyses. Of the 32 trait and ecological attributes, four, including large body size (> 20 to 40 mm), animal materials as preferred food, predation and a preference for vegetation biotope, which were associated with the impacted sites, and were also significantly positively correlated with at least one physico-chemical indicator of increasing

urban pollution were deemed signature traits. Three traits, swimming, fine particulate organic matter and grazing, associated with the control site, which showed significant negative correlations with at least one physico-chemical indicator of increasing urban pollution were identified as sensitive traits. The results indicate that urban pollution differentially influenced macroinvertebrate traits, with the identification of pollution signature and sensitive traits seen as an important step towards the development of trait-based indices for riverine monitoring of urban pollution effects." (Author) Odonata are treated at the family level.] Address: Odume, O.N., Unilever Centre for Environmental Water Quality, Institute for Water Research, Rhodes University, P.O. Box 94, Grahamstown, South Africa

**19022.** Orda-Dejtz, C. (2020): Besiedelung renaturierter Moorflächen durch Amphibien und Libellen in der Neumarkter Passlandschaft. MSc thesis, Karl-Franzens-Universität Graz: 276 pp. (in German, with English summary) ["This study deals with the Amphibians and Odonata of four revitalized and recultivated peat bog areas in the „Neumarkter Passlandschaft“ (near Murau, Styria, Austria) in 800-900m a.s.l. Field trips were conducted in the year 2016 for Amphibians (26 field days/nights from March to September) and dragonflies (5 visits per site from May to September) to get information about the recultivating success and the species composition and abundance of both groups within the four study sites. In context of this work a positive acceptance was documented for the studied water bodies both by amphibians and dragonflies. Species-specific preferences concerning vegetational cover, habitat structures and aquatic parameters were registered. In total 8 species of Amphibia and 23 of Odonata were detected. The species richness and the abundance of species increased in recultivated areas with increasing age of the sites. The number of aquatic habitats and the size of the water body are limiting factors at the sites. Semi-natural standing water bodies with a high occurrence of vegetational and structural elements are recorded as species rich, but size and depth of the water body do not seem to have great influence on the species composition of the two animal groups. The increasing diversity of vegetation and habitat structures according to increasing age of the peat bog areas has a positive influence on species diversity and abundance. By individual recognition of yellow-bellied toads (*Bombina variegata*), it was possible to document migratory behavior of single individuals. Photographs of 72 toads were made, 11 could be recaptured. A maximum migration distance of 110m was documented." (Author)] Address: not stated

**19023.** Osejos Merino, M.A.; Merino Conforme, M.C.; Merino Conforme, M.V.; Solis Barzola, J.L. (2020): Macroinvertebrados como bioindicadores de la calidad del agua de la parte céntrica del río Jipijapa - Ecuador. *Recimundo* 4(4): 454-467. (in Spanish, with English and Portuguese summaries) ["The following research was conducted in the city of Jipijapa with the use macroinvertebrates as bioindicators of the water quality of the central part of the Jipijapa river. One of the main problems of the River is the discharge

of untreated domestic wastewater, because it receives a high load of nutrients and organic matter, whose degradation is critical for the water quality that flows through its channel. In this research the evaluation was carried out using benthic macroinvertebrates as bioindicators of water quality, using the following methodology with the application of the Biological Monitoring Working Party (BIPA), the technique used in the study was the Surber to capture the individuals studied, the results showed that the only order found in the study area is Odonata, of which five families and six genera were identified with a total of 93 individuals analyzed, after the field study and laboratory was obtained a total of 34 points which is within the range (16-35), concluding that the water quality in the Jipijapa river is bad and very polluted according to the applied biological index, which evidences effects of contamination." (Authors)] Address: Osejos Merino, M.A., Magister en Docencia Mención Gestión en Desarrollo del Currículo; Doctor en Ciencias Ambientales; Diplomado en Autoevaluación y Acreditación Univ.; Biólogo Pesquero; Docente de la Universidad Estatal del Sur de Manabí; Jipijapa, Ecuador. E-mail: miguel.osejos@unesum.edu.ec

**19024.** Outomuro, D.; Utku Urhan, A.; Brodin, A.; Johansson, F. (2020): Preference for supernormal stimuli tends to override initially learned associations for conspicuous prey traits: implications from a laboratory study. *Journal of Ethology* 38: 365-371. (in English) ["How predators select on conspicuous prey traits is not well understood. We used a laboratory setup to investigate the role of learning in predator choice of conspicuous visual traits. We used a generalist predator, the great tit, and coloured wings of males of two species of damselflies as prey. Wing pigmentation differs between the species in colour (green [*Calopteryx virgo*] vs. blue [*Calopteryx splendens*]) and size (large vs. small). Wing pigmentation is a sexually selected trait that experiences negative selection by avian predators. Inexperienced great tits showed no preference for the colour or the size of wing pigmentation. Great tits were then repeatedly exposed to rewarded wings with either large or small wing patch size. When these experienced birds were exposed to both wing patch sizes for the first time, they tended to prefer the wings with the large patch, irrespective of their previous experience. Our results suggest that the choice of the predator was based on an initial association of the trait to a reward followed by a preference for a supernormal stimulus, probably due to a larger sensory stimulation. We discuss the implications of our laboratory results in the light of previous estimates of damselfly predation risk under field conditions." (Authors)] Address: Outomuro, D., Dept of Ecology and Genetics, Animal Ecology, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D, 75236 Uppsala, Sweden. E-mail: outomuro.david@gmail.com

**19025.** Pastorino, P.; Brizio, P.; Abete, M.C.; Bertoli, M.; Oss Noser, A.G.; Piazza, G.; Prearo, M.; Elia, A.C.; Pizzul, E.; Squadrone, S. (2020): Macroinvertebrates as tracers of rare earth elements in freshwater watercourses. *Science of the Total Environment* 698 (2020) 134282: 9 pp. (in English) [Highlights: • Rare earth elements were detected in

macroinvertebrates from six watercourses. • Higher concentrations were measured in sites affected by anthropogenic activities. • A positive correlation exists between La, Ce, Gd and collector-gatherer density. • Functional feeding guilds of macroinvertebrates influenced REE accumulation. • Macroinvertebrates appear to be good indicators of REEs. Abstract: Rare earth elements (REEs) are emergent contaminants in aquatic ecosystems in parallel with their growing use in science, technology, and industry. In this study we measured the concentration of 16 REEs in freshwater macroinvertebrates from 6 watercourses in northeast Italy to determine their potential use as ecological tracers of REEs in aquatic ecosystems. The total REE concentration at the sampling sites followed this order: site 6 (7.05 mg Kg<sup>-1</sup>) N site 3 (5.76 mg Kg<sup>-1</sup>) N site 4 (3.58 mg Kg<sup>-1</sup>) N site 1 (3.0mg Kg<sup>-1</sup>) N site 5 (2.36 mg Kg<sup>-1</sup>) N site 2 (1.95 mgKg<sup>-1</sup>). There were no significant differences in REE concentrations across the six samplings sites (Kruskal Wallis test, p=0.1773), but two (site 3 and 6) had higher amount of REEs and were classified with the ecological status "Moderate" sensu Water Framework Directive since affected by anthropogenic activities. Light REE were always greater than heavy REE concentrations at all six sites. A positive correlation was observed between certain REEs (La, Ce, Gd) and the density of genera *Caenis* and *Baetis* (Ephemeroptera, collectorgatherers) (pS range 0.795–0.812), suggesting that non-predatory macroinvertebrates accumulate more REEs than predatory organisms and that the intake of sediment is the most effective route of assimilation." (Authors) Odonata are represented by the genus *Calopteryx* and *Onychogomphus*.] Address: Dept Life Sci., Univ. of Trieste, via Giorgieri 10, 34127 Trieste, Italy

**19026.** Pearce-Higgins, J.W.; Chandler, D. (2020): Do surveys of adult dragonflies and damselflies yield repeatable data? Variation in monthly counts of abundance and species richness. *Journal of Insect Conservation* 24: 877-889. (in English) ["There is considerable debate over the most appropriate method for surveying dragonflies and damselflies (odonates). Using data from 62 survey locations nested within 26 waterbodies at 15 sites (discrete parcels of common ownership) in West Suffolk, UK, we show that short (20 m line transects or 3 min duration point counts), monthly counts of adults are repeatable. Correlations between predictions from models accounting for variation in ambient conditions and time of day and 52 separate counts used for validation equalled  $r = 0.87$  for total abundance and  $r = 0.75$  for species richness. Correlation coefficients between observed and modelled abundance exceeded 0.5 for eight of fourteen species modelled individually. Ambient temperature was the most important weather variable that influenced survey results, affecting the abundance of nine species, total abundance and species' richness. Most of the spatial variation in survey results was between waterbodies, rather than between sites or at individual survey locations, suggesting that adult counts may indicate aspects of waterbody quality, although differences in these patterns were observed between Anisoptera and Zygoptera. Encouraging relatively infrequent and rapid counts of flying adults may

therefore be used to increase volunteer participation in citizen (community) science odonate monitoring schemes whilst also providing repeatable abundance and species richness data that can contribute to research and monitoring programmes." (Authors)] Address: Pearce-Higgins, J.W., Cambridge Univ., The David Attenborough Building, Pembroke Street, Cambridge CB2 3QZ, UK. Email: james.pearce.higgins@bto.org

**19027.** Pella, C.; Nel, A. (2020): A hawkler dragonfly (Odonata: Liupanshaniidae) from the Lower Cretaceous Crato Formation, northeastern Brazil. *Cretaceous Research* 116, December 2020, 104559: (in English) ["The hawkler dragonfly *Cratoliupanshania magnifica* gen. et sp. nov. is described from the Lower Cretaceous Crato Formation in Brazil, corresponding to the third genus of this Mesozoic family from this formation. This family is otherwise known from the Lower to 'mid'-Cretaceous of China, Central Asia, and France. This new discovery shows that the Odonata from the Crato Formation, although extensively studied, can hold interesting surprises." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**19028.** Pérez, P.; Ruiz-Herrera, A.; SanLuis, A.M. (2020): Management guidelines in disturbance-prone populations: the importance of the intervention time. *Journal of Theoretical Biology* 486, 7 February 2020, 110075: (in English) ["Highlights: • There exists a broad range of management strategies to mitigate the possible damages after a natural catastrophe. However, their efficacy in real situations is not well understood. • We derive management guidelines in disturbance-prone populations regarding the external introduction of individuals and the ecological restoration. • The intervention time plays a critical role in the efficacy of most management strategies. • The presence of disturbance events produces many non-monotone and unexpected behaviours in the populations. • We illustrate our results with real data from three different species, mayfly, dragonfly and ostracod. Abstract: The use of conservation and management practices to buffer possible damages after disturbance events is growing to become popular worldwide. However, little is known about their efficacy in real-life situations. To fill this gap, we will derive management guidelines in disturbance-prone populations regarding the external introduction of individuals and the ecological restoration. We will also discuss the efficacy of these practices in the population dynamics of three species (a fast life-cycle mayfly, a slow life-cycle dragonfly and an ostracod) when their habitat suffers from periodic controlled flooding. One of the main messages of this paper is that the interplay between the inherited parameters of the population and disturbance events is a source of rich and unexpected behaviours. More importantly, intervention time plays a critical role in the performance of many management strategies." (Authors)] Address: Ruiz-Herrera, A., Dept of Mathematics, University of Oviedo, Oviedo 33001, Spain. Email: alfonsoruiz@dma.uvigo.es

**19029.** Pestana, G.C. (2020): Seleção sexual e a ordem

Odonata: uma abordagem teórica e experimental. *Dissertação Universidade Federal de São Carlos, Centro de Ciências Biológicas e da Saúde, Programa de Pós-Graduação em Ecologia e Recursos Naturais*: 73 pp. (in Portuguese, with English summary) ["Sexual Selection theory was proposed by Darwin in 1871 and, thenceforth, has been widely discussed and tested in several taxonomic groups. Complementary hypotheses were formulated by different researchers aiming to understand the mechanisms and evolutionary processes related to sexual secondary characters and reproductive behaviors. Insects of the order Odonata, also known as dragonflies and damselflies, are used as models due to the presence of coloring patterns on the body and wings that act as sexual ornaments, and the diversity of behaviors related to reproduction. Thus, studies on the use of sexual traits before and after copulation, in different mating systems, are carried out with different species in this group. In this context, the present dissertation is focused in evolutionary models of sexual selection in odonates as study models. The first part contains two chapters: the first is a review of the mechanisms, costs and some hypotheses related to sexual selection, mainly related to the presence and function of sexual ornaments in males; and the second chapter, a scientometric analysis of published studies on the role of male sexual ornamentation and the different sperm competition strategies. The results of the scientometric analysis showed a difference in pre- and post-mating studies, in relation to the years in which there is a greatest number of publications with these themes, countries where the studies were developed, species analyzed and main authors. In the second part of this dissertation an observational study was carried out in order to verify the relationship between pre- and post-mating sexual traits, analyzing wing pigmentation proportion, sperm viability, total number of sperm, muscle mass, fat reserve and body size in two species: *H. longipes* and *H. rosea*. The results were discussed based on two hypotheses of sexual selection: the sperm competition game, which proposes a trade-off between sexual traits; and the fertility-linked phenotype, which predicts that the male sexual ornament co-vary with the individual's fertility. The results obtained suggest that both hypotheses can be corroborated, since males of *H. longipes*, presented a trade-off between the traits evaluated, while males of *H. rosea* presented a positive relationship between these traits." (Author)] Address: Pestana, Gabrielle Cristina, Dept of Hydrobiology, Federal Univ. of São Carlos, São Carlos, Brazil. E-mail: jpestana@ua.pt

**19030.** Piersanti, S.; Rebora, M.; Salerno, G. (2020): The antennal pathway of dragonfly nymphs, from sensilla to the brain. *Insects* 11(12). 10.3390/insects11120886: 15 pp. (in English) ["Simple Summary: The study of the sensory biology in aquatic insects undergoing incomplete metamorphosis, passing from nymphal life in fresh water to adult aerial life, provide great opportunities to understand how Arthropod nervous systems can adapt in response to critical ecological challenges. Here we investigate the antennal sensilla, and the related sensory pathways in the brain, of nymphs of an evolutionarily ancient hemimetabolous aquatic insect,



the dragonfly *Libellula depressa*, and compare them with previous data on adults. While antennal sensilla are dramatically different between *L. depressa* nymphs and adults, responding to the need to perceive different cues in water and air, the general morphology of the brain and the sensory circuitry remain quite similar during development. That suggests that the same brain centers are able to process highly diverging information, provided through different sensory structures adapted to water and air. This is in agreement with developmental plasticity that serves as a mechanism to maintain functionality throughout ontogenesis, when the lack of a pupal stage does not allow metamorphic changes of the nervous system. The present data also advance the knowledge on the biology of Odonata, threatened insects in fragile ecosystems, and thus present important results from an evolutionary and conservation biology perspective. Abstract: Dragonflies are hemimetabolous insects, switching from an aquatic life style as nymphs to aerial life as adults, confronted to different environmental cues. How sensory structures on the antennae and the brain regions processing the incoming information are adapted to the reception of fundamentally different sensory cues has not been investigated in hemimetabolous insects. Here we describe the antennal sensilla, the general brain structure, and the antennal sensory pathways in the last six nymphal instars of *L. depressa*, in comparison with earlier published data from adults, using scanning electron microscopy, and antennal receptor neuron and antennal lobe output neuron mass-tracing with tetramethylrhodamin. Brain structure was visualized with an anti-synapsin antibody. Differently from adults, the nymphal antennal flagellum harbors many mechanoreceptive sensilla, one olfactory, and two thermo-hygroreceptive sensilla at all investigated instars. The nymphal brain is very similar to the adult brain throughout development, despite the considerable differences in antennal sensilla and habitat. Like in adults, nymphal brains contain mushroom bodies lacking calyces and small agglomerular antennal lobes. Antennal fibers innervate the antennal lobe similar to adult brains and the gnathal ganglion more prominently than in adults. Similar brain structures are thus used in *L. depressa* nymphs and adults to process diverging sensory information." (Authors)] Address: Piersanti, Silvana, Dipto di Chimica, Biologia e Biotecnologie, Univ. of Perugia, 06123 Perugia, Italy

**19031.** Pinach, J.M.E.; Notario Maroto, C.; Alcaide Gil, M.I.; Torres López, J.; Muñoz Escribano, J.; López, E.; Morales, L.F.; Morales de Campos, P.; Carro Redondo, J.A.; García-Pozuelo-Ramos, C.; Padilla, M.B.; González Hitos, M.J.; Chelmick, D.; Sánchez, J.R.; Álvarez, X.P. (2020): Nuevas aportaciones odonológicas (Odonata) para Castilla-La Mancha (centro-este de España). Jesús M. Evangelio. Boletín de la Sociedad Entomológica Aragonesa 67: 343-362. (in Spanish, with English summary) ["New contributions to the dragonfly fauna (Odonata) of Castilla-La Mancha (central-eastern Spain). Abstract: The first records of *Lestes dryas* and *Diplacodes lefebvrii* from Albacete province and *Trithemis annulata* from Guadalajara province are reported. The provisional list of Castilla-La Mancha dragonflies is updated

to 65 species and records of 54 species of dragonflies from 104 localities in the region are provided, which add some 10x10 km UTM grid squares to the known distribution of some taxa such as *Aeshna isoceles*, *Platycnemis acutipennis* or *Lestes sponsa*. All the species mentioned here are rare in the province where they are recorded from and/or in the Castilla-La Mancha administrative region (less than 20 provincial records and/or less than 50 regional published records); some of them are of African origin with a very restricted distribution in Europe (*Orthetrum trinacria*, *Paragomphus genei* or *Diplacodes lefebvrii*), of African origin and rapidly expanding throughout the Iberian Peninsula (*Trithemis kirbyi*), or appear in the Red List of the Invertebrates of Spain (e.g. *Lestes macrostigma*, *Onychogomphus costae* or *Sympetrum flaveolum*)." (Authors)] Address: Notario Maroto, C., Grupo de odonatos del Museo de Ciencias Naturales AVAN. Calle Real, 39.13770 Viso del Marqués (Ciudad Real, Castilla-La Mancha, Spain. Email: carlos.no-tario@gmail.com

**19032.** Pouillon, J.-M.; Nel, A. (2020): The third skimmer dragonfly species from the Lower Cretaceous (Aptian) Crato Formation in Brazil (Odonata, Cavilabiata, Araripebellulidae). *Cretaceous Research* 115, November 2020, 104565: (in English) ["*Araripebellula sennlaubi* sp. nov., third species of this genus, is described from the Lower Cretaceous Crato Formation Araripe Basin, NE Brazil. This genus was previously known by its type species *A. martinsnetoi* from the same Formation and *A. britannica* from the Lower Cretaceous of UK. The new species is the third representative of the Cretaceous family Araripebellulidae from Crato, and the ninth species of this family." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**19033.** Pregawati, O.; Ramadhan, T.H.; Syahputra, E. (2020): The study types of dragonflies (Odonata) in paddy fields. *Jurnal Sains Mahasiswa Pertanian* 9(4): 1-10. (in Indonesian, with English summary) ["The study was aimed to collect data on the types of dragonflies in the rice fields in the Village of Parit Keladi Sungai Kakap Sub-district Kubu Raya Regency. The type of this research is Descriptive research with survey methods, sampling was taken at 3 location points, namely; a) river banks, b) open areas on every irrigation system of rice fields, c) in rice paddy areas. The results of this study were found in 9 species, 8 species included in the Anisoptera sub-orde, the Libellulidae family, *Orthetrum sabina*, *Pantala flavescens*, *Tolymis tillarga*, *Brachythemis contaminata*, *Neurothemis ramburii*, *Lathrecista asiatica*, *Blue lilallula*, *Rhythemis phyllis* and 1 species included in the Zygoptera sub-family, the Coenagrionidae familial, *Ischnura senegalensis*. Dragonfly index value in the rice field area of Parit Keladi, Sungai Kakap Sub-district, Kubu Raya Regency is 0.91, including the low category and index value of dragonflies in 3 observation locations, location A; which is the riverbank 1.49, location B; irrigation 0.91, and location C; 0.31 paddy fields, all observations had a low level of dragonfly diversity." (Authors)] Address: Pregawati, O., Tanjungpura University Pontianak, Indonesia

**19034.** Ramos, K.A.M.; Nuñez, O.M.; Villanueva, R.J.T. (2020): Species diversity of Odonata in Mimbilisan Protected Landscape, Misamis Oriental, Philippines. *Asian Journal of Conservation Biology* 9(2): 280-289. (in English) ["The sensitivity of Odonata to changing ecological conditions makes this group an effective indicator of aquatic and terrestrial health. The present study aimed to determine the species diversity and endemism of Odonata in Mimbilisan Protected Landscape. Sampling activity was conducted on July 18 to 28, 2017, using sweep-netting and handpicking methods in two forested sites and one riparian site. 176 individuals comprising 27 species under 10 families and 18 genera of Odonata were documented. Overall, endemism was recorded at 62.96%, including five species exclusive to Mindanao Island. *Orthetrum prunosum* clelia and *Risicnemis appendiculata* were the most abundant dragonfly and damselfly species, respectively. Findings also revealed highest species richness ( $S=24$ ) and diversity ( $H'=2.732$ ) in the forest stream (riparian site). Even distribution of species was observed in all sampling sites. Human-made disturbances were observed in the area. High level of endemism and moderate diversity of Odonata indicate that Mimbilisan Protected Landscape is a healthy area and conservation measures need to be sustained." (Authors)] Address: Ramos, Kate Anne, Department of Biological Sciences, College of Science and Mathematics, MSU-Iligan Institute of Technology, Andres Bonifacio Avenue, Tibanga, Iligan City, 9200 Philippines. E-mail: olgamnuneza@yahoo.com

**19035.** Ripoll, J.; Becerra García, F.; Ruiz, J.C.; Carmona, M.; Moreno-Benítez, J.M.; Vázquez Toro, F.E.; Winter, P.D. (2020): Los odonatos (Odonata) de la Sierra de las Nieves (Málaga, sur de la Península Ibérica). *Boletín de la Sociedad Entomológica Aragonesa* 67: 363-374. (in Spanish, with English summary) ["The Odonata of Sierra de las Nieves (Málaga, southern Spain) Abstract: All the available information, both bibliographic and from the samplings carried out by the authors during 2017 and 2018, is compiled, providing data on the presence of 37 species of Odonata in the Sierra de las Nieves Natural Park, among which stand out the presence of three threatened, protected species - *Gomphus graslinii*, *Oxygastra curtisii* and *Macromia splendens*. The main aquatic ecosystems in the protected area are described." (Authors)] Address: Ripoll, J., C/ Ronda Poniente, 6. Villafranco del Guadalhorce (Málaga), Spain. E-mail: javier.ripoll.rodriquez@gmail.com

**19036.** Rodríguez-Tapia, G.; Rocha-Ortega, M.; Córdoba-Aguilar, A. (2020): An index to estimate the vulnerability of damselflies and dragonflies (Insecta: Odonata) to land use changes using niche modeling. *Aquatic Insects* 41(3): 254-272. (in English) ["We developed an index of vulnerability for odonates (IVO) that occurred predominantly in Mexico to assess land use change. Vulnerability was defined as a function of A) habits of the species and B) ecological niche models. Index validation was done by relating it to rate of vegetation cover change, with the habitat preferences of each species and with species' sensitivity to habitat deterioration. Thus, the most sensitive species would be found in

areas with no change in land use. IVO values ranged from a maximum of three (i.e., the most sensitive) to a minimum of one (i.e., the least sensitive). As it was demonstrated in other studies, odonates did not show a clear preference between conserved and perturbed land uses. Interestingly, the few sensitive species were clearly resilient and can be found in a wide range of land use types, thus they may be more generalist than previously thought." (Authors)] Address: Rodríguez-Tapia, G., Unidad de Geomática, Inst. Ecol., Univ. Nac. Autónoma México, México City, México

**19037.** Román-Heracleo, J.; Novelo-Gutiérrez, R.; Springer, M. (2020): First description of the larva of *Psaironeura*, based on specimens of *P. angeloi* from Costa Rica (Odonata: Coenagrionidae: Protoneurinae), with a key to the genera of Central American Protoneurinae. *International Journal of Odonatology* 23(2): 183-190. (in English) ["The larva of *Psaironeura* is formally described for the first time, based upon reared specimens of *Psaironeura angeloi* from the Tirimbina Biological Reserve, Sarapiquí, Heredia Province, Costa Rica. Detailed illustrations are also provided. The larva is characterized by a slender dark brown body, premental setae 2+1, six palpal setae, male cerci globose, and caudal lamellae markedly slender, 3.5–4 times longer than wide, with tips bi- or trilobated." (Authors)] Address: Román-Heracleo, J., Sistema de Estudios de Posgrado en Biología, Univ. de Costa Rica, San José, Costa Rica. Email: romanjareth@gmail.com

**19038.** Romero-Lebrón, E.; Gleiser, R.M.; Petrulevicius, J.F. (2020): Geometric morphometrics of endophytic oviposition traces of Odonata (Eocene, Argentina). *R. Soc. Open Sci.* 7(12): 201126: 14 pp. (in English) ["The insertion of the Odonata ovipositor in the plant tissue generates a scar that surrounds the eggs (trace). In insects, individual egg traces are known to vary in size, but their variation in individual shape is mostly unknown. 24 specimens were obtained from the Laguna del Hunco (Lower Eocene, Chubut) and Río Pichileufú (Middle Eocene, Río Negro), Argentina, which had 1346 oviposition traces (MEF Collection). For the first time, a study of the shape and size of a large number of individual Odonata endophytic egg traces was carried out using traditional (general and mixed linear models) and geometric morphometrics (Fourier elliptical series) to elucidate whether there are changes in size or shape of the individual endophytic egg traces associated with the substrate used at the time of oviposition, if the Lower Eocene traces have varied in relation to those of the Middle Eocene, and if the ichnological classification (*Paleoovoidus arcuatus*, *P. bifurcatus* and *P. rectus*) reflects such variations. We found differences in size ( $p < 0.05$ ), but not in shape, in relation to the variables studied. This could reflect that the shape of Odonata eggs (inferred from the traces), unlike their size, could have a strong evolutionary constraint already observed since the Eocene." (Authors)] Address: Romero-Lebrón, Eugenia, Centro de Relevamiento y Evaluación de Recursos Agrícolas y Naturales (IMBIV, UNC-CONICET), 5000 Córdoba, Argentina. E-mail: eugeniaromerolebron@gmail.com

- 19039.** Saetung, T.; Makbun, N.; Sartori, M.; Boonsoong, B. (2020): The subfamily Platycnemididae (Zygoptera: Platycnemididae) in Thailand, with description of the final stadium larva of *Copera chantaburii* Asahina, 1984. *International Journal of Odonatology* 23(3): 219 -237. (in English) ["Within the damselfly subfamily Platycnemidinae, eight species are currently recognized in South-East Asia. The final stadium larvae of only three of them have been so far described. The final stadium larva of *Copera chantaburii* is described and illustrated for the first time, based on reared specimens, and new provincial records both of larvae and adults of *C. chantaburii* are also provided. The larva of *C. chantaburii* can be distinguished from known species by the following combination of characters: square or almost horizontal rectangular shape of the outer lobe of the labial palp and fimbriated caudal lamellae that are stout at the base and narrow to an acute tip. The final stadium larva of *Pseudocopera ciliata* is redescribed with possibly diagnostic characters, such as the shape of the distal margin of the labial palp, the ratio of the length of caudal lamellae length and body length, setae on the margin of caudal lamellae and the setae on the terminal filament of the caudal lamellae." (Authors)] Address: Boonsoong, B., Animal Systematics & Ecology Speciality Research Unit (ASESRU), Dept of Zoology, Faculty of Science, Kasetsart University, Bangkok, Thailand. Email: fscibtb@ku.ac.th
- 19040.** Sajan, K.C.; Gurung, J.B. (2020): Records of dragonflies and damselflies (Insecta: Odonata) of Dipang Lake, with two new records to Nepal. *Journal of Threatened Taxa* 12(8): 15955-15961. (in English) [Nepal; during April and May of 2019, at Dipang Lake, Lekhnath, Kaski (28.1800N & 84.0660E, 670–700 m.a.s.l.) a total of 28 Odonata species was recorded including *Aciagrion approximans* (Selys, 1876) and *Ceriagrion cerinorubellum* (Brauer, 1865)] Address: Sajan, K.C., Independent Researcher, Pokhara-06, Lakeside, Nahar Marga, House No 126, Gandaki Province, Kaski 33700, Nepal. E-mail: sajankc143@gmail.com
- 19041.** Samways, M.J.; Deacon, C.; Kietzka, G.J.; Pryke, J.S.; Vorster, C.; Simaika, J.P. (2020): Value of artificial ponds for aquatic insects in drought-prone southern Africa: a review. *Biodiversity and Conservation* 29: 3131-3150. (in English) ["Artificial ponds assure continuous societal water supply, especially during droughts. Obligate aquatic and amphibiotic insects readily inhabit novel water bodies, as many possess mobility traits for opportunistic colonization. We review here the value of artificial ponds (<2 ha) (and reservoirs; >2 ha) for local aquatic insect diversity in mostly dry and drought-prone southern Africa. We compare these ponds to natural pools, wetlands, and stream deposition pools. The region has a highly varied topography and physiographical zones. Flat, arid areas largely support widespread insect generalists, while the mountainous orographic zones support an additional rich fauna of localized endemics. However, the many ponds (>0.5 million) have greatly changed the local distribution patterns of surface freshwater across the region, increasing the area of occupancy for many aquatic insect species, especially dragonflies. We focus on the extent to which aquatic insect assemblages have benefitted from new ponds and reservoirs. We conclude that these novel ecosystems benefit almost all lentic aquatic insect species, while also enabling population resilience during droughts. However, while these benefits are substantial, these ponds are not a substitute for natural still waters, which are still required to maintain all indigenous lentic aquatic insect diversity.] Address: Deacon, C., Dept of Conservation Ecology & Entomology, Stellenbosch University, South Africa. E-mail: charldeacon@sun.ac.za
- 19042.** Sánchez-Guillén, R.A.; Fadia-Ceccarelli, S.; Villalobos, F.; Neupane, S.; Rivas-Torres, A.; Sanmartín-Villar, I.; Wellenreuther, M.; Bybee, S.M.; Velásquez-Vélez, M.J.; Realpe, E.; Chávez-Ríos, J.R.; Dumont, H.J.; Cordero-Rivera, A. (2020): The evolutionary history of colour polymorphism in *Ischnura* damselflies (Odonata: Coenagrionidae). *Odonatologica* 49(3/4): 333-370. (in English) ["A major challenge in evolutionary biology concerns how genetic and phenotypic variation is created and maintained. In this study, we investigated the origin(s) and evolutionary patterns of the female-limited colour polymorphism in *Ischnura*. This involves the presence of one to three colour morphs: one androchrome morph with coloration that resembles that of the male, and two gynochrome morphs (*infuscans* and *aurantiaca*) with a female-specific coloration. We documented the colour of 44 and mating system of 36 of the 76 species within *Ischnura* to investigate the ancestral state of both traits and the correlated evolution and to infer directionality of trait-state transitions. The ancestral state reconstructions suggest that the most recent common ancestor of the *ischnuran* damselflies was most likely polymorphic and polyandrous. Our results give some support to the evolutionary correlation between female-limited colour polymorphism and mating system in *Ischnura*. That correlation is consistent with the idea that sexual selection through sexual conflict over the frequency of matings has selected for polymorphic females to reduce the overall intensity of male mating harassment, and our finding that the same phenotypic morphs have evolved multiple times (convergent evolution) suggests that several species in this genus might be experiencing similar selective pressures." (Authors)] Address: Sánchez-Guillén, Rosa, Biología Evolutiva, Inst. de Ecología A.C. (INECOL) C.P. 91073 Xalapa, Veracruz, México. Email: rosa.sanchez@inecol.mx
- 19043.** Santos, L.R.; Ribeiro, C.; Mariano, R.; Rodrigues, M.E. (2020): Description of the larva of *Leptagrion dispar* Selys, 1876 (Odonata: Coenagrionidae) with notes on distribution and ecology of the species. *Zootaxa* 4896(1): 131-139. (in English) ["The genus *Leptagrion* Selys, 1876 comprises 17 described species. Of these species, only eight have their immature stage described. In this work, we describe the last instar larva of *L. dispar*. The specimens were collected in areas of Atlantic Forest in three municipalities of the southern region of Bahia, Brazil, in phytotelmata habitats of bromeliads. Larvae were described based on the characteristics of the preserved F-0 larvae and exuviae of the emerged specimens in the laboratory. We added information about the habitats where the specimens were found.

We extended occurrence records to other regions of the state of Bahia and presented a comparative table with morphological characteristics of all Leptagrion larvae already described." (Authors)] Address: Rodrigues, M.E., Ciências Biológicas, Universidade Estadual de Santa Cruz (UESC), Ilhéus, BA, Brasil. E-mail: merodrigues@uesc.br

**19044.** Schmidt Furieri, K.; Dondoni Colombo, L. (2020): A contribuição da coleção entomológica da Reserva Natural Vale para Odonata (Insecta). *Tópicos Integrados de Zoologia* 2: 10-17. (in Portuguese, with English summary) ["The dragonflies and damselflies (Odonata) are predatory insects that need water to reproduce. The males, sexually active, seek to live near to aquatic environments, and females visit the water, usually for copulation (mating) and laying (egg release). Biological collections are important sources of information. So that collections can, for example, effectively contribute to the construction and updating of the lists of Threatened Species, the specimens deposited therein must be identified at the species level and their data organized in a digital repository of records. This work aims to analyze the information available in the repository of records of the Reserva Natural Vale (RNV) about the Order Odonata. We found 200 specimens of Odonata, of which 18 (9%) are Aeshnidae, seven (3.5%) are Calopterygidae, 15 (7.5%) are Coenagrionidae, one (0.5%) are Dictyodidae, 129 (64.5%) are Libellulidae, four (2%) are Heteragrionidae and 26 are (13%) specimens without any identification. Considering that 45 (21%) of the species registered in Espírito Santo (Brazil) do not have information about the locality of occurrence, identifying all the specimens and performing a biological survey for Odonata in the RNV may contribute significantly to the knowledge about this group of insects and to the analysis of the risk of extinction, as well as to the conservation of the species that inhabit there. Considering that there is no information on the place of occurrence for 21% (45) of the species recorded in Espírito Santo, the identification of the unidentified specimens and a specific survey for Odonata in the RNV may contribute significantly to the knowledge on this group of insects and for the analysis of the risk of extinction, as well as for the conservation of the species that live there. We suggest the increase in the collection of specimens from the RNV, since there is no systematized survey of these insects for this area. Even with few specimens of Odonata identified at the species level, the information available in the book of record of the Vale Natural Reserve (RNV) showed its relevance, because records of two species of dragonflies threatened with extinction were found. Therefore, the identification of the remaining dragonflies (85.5%) recorded in the yearbook may significantly contribute to the understanding of Odonata in Espírito Santo and consequently in Brazil." (Authors) (Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version))] Address: Schmidt Furieri, Karina, UFES, Campus São Mateus, Departamento de Ciências Agrárias e Biológicas, São Mateus – Espírito Santo, Brazil

**19045.** Schoten, H.H. (2020): Oostermaet, an unknown but rich dragonfly site. *Brachytron* 21: 12-19. (in Dutch, with

English summary) ["Systematic monitoring since 2019 at Oostermaet near Deventer, reveals the area has a relatively high diversity of Odonata species. A total of 32 species of damselflies and dragonflies has been observed on the monitoring routes at Oostermaet. The various landscapes and different types of water, specific site management and the influx of extra water in times of drought are plausible key factors. Some odonate species show a strong yearly variation in local population numbers. This can be coherent with natural factors, but may also result from the counting method used." (Authors)] Address: Schoten, H. Email: [hhschoten@hetnet.nl](mailto:hhschoten@hetnet.nl)

**19046.** Shah, R.D.T.; Sharma, S.; Bharati, L. (2020): Water diversion induced changes in aquatic biodiversity in monsoon-dominated rivers of Western Himalayas in Nepal: Implications for environmental flows. *Ecological Indicators* 108: 8 pp. (in English) ["Highlights: • Water diversions for irrigation, water mills, and micro-hydropower are prolific. • Effects of water diversions on the macroinvertebrate community composition are significant. • Macroinvertebrates abundance is sensitive metric rather than taxonomic richness. • Stream flow during baseflow season is critical for maintaining aquatic biodiversity. Abstract: Water diversion projects across the world, for drinking water, energy production and irrigation, have threatened riverine ecosystems and organisms inhabiting those systems. However, the impacts of such projects on aquatic biodiversity in monsoon-dominated river ecosystems are little known, particularly in Nepal. This study examines the effects of flow reduction due to water diversion projects on the macroinvertebrate communities in the rivers of the Karnali and Mahakali basins in the Western Himalayas in Nepal. Macroinvertebrates were sampled during post-monsoon (November), baseflow (February) and pre-monsoon (May) seasons during 2016 and 2017. Non-metric Multidimensional Scaling (NMDS) was performed to visualize clustering of sites according to percentage of water abstractions (extraction of water for various uses) and Redundancy Analysis (RDA) was used to explore environmental variables that explained variation in macroinvertebrate community composition. A significant pattern of macroinvertebrates across the water abstraction categories was only revealed for the baseflow season. NMDS clustered sites into three clumps: "none to slight water abstraction (<30% – Class 1)", "moderate water abstraction (>30% to <80% – Class 2)" and "heavy water abstraction (>80% – Class 3)". The study also showed that water abstraction varied seasonally in the region (Wilk's Lambda = 0.697,  $F_{(2, 28)} = 4.215$ ,  $P = 0.025$ ,  $\eta^2 = 0.23$ ). The RDA plot indicated that taxa such as Acentrella sp., Paragenetina sp., Hydropsyche sp., Glossosomatinae, Elmidae, Orthocladiinae and Dimesiinae were rheophilic i.e. positively correlated with water velocity. Taxa like Torleya sp., Caenis sp., Cinygmmina sp., Choroterpes sp., Limonidae and Ceratopogoniidae were found in sites with high proportion of pool sections and relative high temperature induced by flow reduction among the sites. Indicator taxonomic groups for Class 1, 2 and 3 water abstraction levels, measured through high relative abundance values, were Trichoptera, Coleoptera,



Odonata ["Gomphidae"] and Lepidoptera, respectively. Macroinvertebrate abundance was found to be the more sensitive metric than taxonomic richness in the abstracted sites. It is important to understand the relationship between flow alterations induced by water abstractions and changes in macroinvertebrates composition in order to determine sustainable and sound management strategies for river ecosystems." (Authors)] Address: Bharati, L., Intern. Water Management Institute, Nepal. E-mail: L.bharati@cgiar.org

**19047.** Sharma, P.; Kumar, D. (2020): Odonata diversity in and around Vadodara, Gujarat, India. *Entomon* 45(1): 43-51. (in English) ["Investigation on the diversity of Odonates revealed a total of 38 species belonging to two suborders, six families, and 24 genera in and around Vadodara, in Gujarat, which included 15 species of Zygoptera and 23 species of Anisoptera. Out of the 38 species, 10 species are new records for the Vadodara. Most number of species was found in water reservoirs as compared to urban ponds and area around Mahi River. Furthermore, it was observed that areas around the rivers were adversely affected because of nearby sand mining. Amongst damselflies and dragonflies the population of damselflies was richer. Renovation of urban ponds leads to decrease in their diversity due to loss of vegetation indicating anthropogenic pressure on species diversity." (Authors)] Address: Sharma, P., Division of Entomology, Department of Zoology, The Maharaja Sayajirao University of Baroda, Vadodara 390 002, Gujarat, India. E-mail: pankajshrm640@gmail.com

**19048.** Sigutova, H.; Šigut, M.; Kovalev, A.; Gorb, S.N. (2020): Wing wettability gradient in a damselfly *Lestes sponsa* (Odonata: Lestidae) reflects the submergence behaviour during underwater oviposition. *R. Soc. Open Sci.* 7: 201258: 11 pp. (in English) ["The phenomenon of hydrophobicity of insect cuticles has received great attention from technical fields due to its wide applicability to industry or medicine. However, in an ecological/evolutionary context such studies remain scarce. We measured spatial differences in wing wettability in *Lestes sponsa*, a damselfly species that can submerge during oviposition, and discussed the possible functional significance. Using dynamic contact angle (CA) measurements together with scanning electron microscopy (SEM), we investigated differences in wettability among distal, middle and proximal wing regions, and in surface nanostructures potentially responsible for observed differences. As we moved from distal towards more proximal parts, mean values of advancing and receding CAs gradually increased from 104° to 149°, and from 67° to 123°, respectively, indicating that wing tips were significantly less hydrophobic than more proximal parts. Moreover, values of CA hysteresis for the respective wing parts decreased from 38° to 26°, suggesting greater instability of the structure of the wing tips. Accordingly, compared with more proximal parts, SEM revealed higher damage of the wax nanostructures at the distal region. The observed wettability gradient is well explained by the submergence behaviour of *L. sponsa* during underwater oviposition. Our study thus proposed the existence of species-dependent hydrophobicity gradient on

odonate wings caused by different ovipositional strategies." (Authors)] Address: Šigutová, Hana, Department of Biology and Ecology/ENC, Faculty of Science, Univ. of Ostrava, Chittussiho 10, 71000 Ostrava, Czech Republic. E-mail: hana.sigutova@osu.cz

**19049.** Silva dos Anjos, C.; Milani, L.R.; Magalhães de Souza, M. (2020): Odonata (Insecta) species richness in the Parque Estadual do Ibitipoca, Southeast Brazil. *Revista Agrogeoambiental* 12(3): 79-90. ["There are few studies on Odonata communities in Brazil, even in its most deeply studied states, such as Minas Gerais. Therefore, it is proposed the presentation of results on the Odonata species richness of Parque Estadual do Ibitipoca (Ibitipoca State Park), located at the Zona da Mata region in the Minas Gerais state, Brazil. This Conservation Unit is considered a priority area for the conservation of the state's invertebrates. The objective of this study was to know the number of species within the area. 100 hours of sampling were carried out, distributed amongst five campaigns of four consecutive days between November 2016 and July 2017. There were recorded 20 different species, including a new record for the state and one potential new species. Species richness was low due to the sampling being focused exclusively on lotic systems, and also to the environment's homogeneity. Despite the low number of species, Parque Estadual do Ibitipoca is relevant to the conservation of the Minas Gerais state's Odonata." (Authors)] Address: Silva dos Anjos, C., Universidade Federal do Paraná, Setor de Zoologia, Programa de Pós-graduação em Entomologia. Discente. Laboratório de Sistemática de Insetos Aquáticos, Brasil. E-mail: caioanjos\_bd@hotmail.com

**19050.** So, K.Y.K.; Dudgeon, D. (2020): Conservation management of abandoned paddy fields in Asia: Semi-natural marshes with low-intensity bovid grazing have higher biodiversity. *Aquatic Conservation: Marine and Freshwater Ecosystems* 30(1): 1934-1944. (in English) ["1. Semi-natural marshland is becoming increasingly prevalent in Asia as a result of the continuing abandonment of rice cultivation. Although these marshes are important habitats for aquatic animals, they are susceptible to terrestrialization. Large mammalian herbivores that can retard terrestrialization are in decline globally, but domesticated bovids may serve as their surrogates, and could be used for managing semi-natural marshes. Relevant research in Asia is lacking, however. 2. Aquatic macroinvertebrates were sampled in both the wet and dry seasons from 26 freshwater marshes (abandoned paddy fields) across Hong Kong, encompassing 15 sites grazed by feral bovids (yellow cattle and water buffalo) and 11 ungrazed sites. The aim was to investigate seasonal variation in the effects of bovids on macroinvertebrate communities in monsoonal marshes. 3. Four decades after paddy cultivation had been abandoned, semi-natural marshes with low-intensity bovid grazing (0.06–0.14 cattle ha<sup>-1</sup>) had significantly higher (16%) site-scale  $\gamma$ -diversity. Macroinvertebrate communities at grazed sites had more Coleoptera and larval Odonata, and differed markedly from those at ungrazed sites. The effects of grazing on

diversity and composition were unaffected by season, but season itself was a significant predictor of  $\alpha$ - and  $\beta$ -diversity and species composition. 4. This study is the first to record the responses of aquatic macroinvertebrate diversity and composition to large-mammal grazing in Asian marshlands. Given that bovid grazing at low intensity can control plant growth, with concomitant benefits for wetland diversity, it is suggested that targeted grazing of short duration could be used for conservation management of abandoned paddy fields." (Authors) *Agriocnemis femina*, *Agriocnemis pygmaea*, *Anax guttatus*, *Ceriatagrion auranticum*, *Neurothemis tullia*] Address: Dudgeon, D., Division of Ecology & Biodiversity, School of Biological Sciences, Univ. of Hong Kong, Pok Fu Lam Road, Hong Kong. E-mail: ddudgeon@hku.hk

**19051.** Sowa, A.; Krodkiewska, M.; Halabowski, D. (2020): How does mining salinisation gradient affect the structure and functioning of macroinvertebrate communities?. *Water Air Soil Pollut* (2020) 231: 453: 19 pp. (in English) ["Elevated salinity creates degrading conditions for the development of aquatic biota in different regions of the world. There is a need for research on freshwater salinisation in order to understand how this stressor alters ecosystem function and to predict changes in biodiversity globally. Such data are missing from Central Europe, and therefore, the presented study was performed in inland anthropogenic ponds with different salinity levels located in the second largest European hard coal basin. The researcher indicated a positive correlation between water salinity and the biomass and density of macrozoobenthos as well as the percentage of shredders and the abundance of alien species, whereas there was a decrease in taxa diversity and richness and the abundance of filtering and gathering collectors and predators along with increasing salinity. The survey showed that a high level of nutrients and organic matter were also significantly correlated with the distribution of the macroinvertebrate taxa and functional feeding groups. The conducted research confirmed that mining salinisation acts as a strong filter that shapes the biodiversity because it affects the composition, abundance, biomass and functional traits of benthic macroinvertebrates and significantly contributes to the invasion of alien species." (Authors) Taxa - including Odonata - are treated family wise.] Address: Sowa, Agnieszka, Inst. Biol., Biotech. & Environmental Protection, Faculty of Natural Sciences, Univ. of Silesia in Katowice, Bankowa 9, 40-007 Katowice, Poland. E-mail: agsowa@us.edu.pl

**19052.** Sparrow, D.J.; De Knijf, G.; Smith, M.S.; Sparrow, R.; Michaelides, M.; Konis, D.; Siedle, K. (2020): The circumtropical *Pantala flavescens* is a regular visitor to Cyprus and reproducing on the island (Odonata: Libellulidae). *Odonatologica* 49(3/4): 289-311. (in English) ["Although considered one of the most widespread dragonflies in the world, *Pantala flavescens* is rarely recorded in Europe and only irregularly observed in the eastern Mediterranean. The first published records of *P. flavescens* from Cyprus date back to 1957. There are no further published records from Cyprus until 2010 when a single individual and a copula were observed. The latter is also the first record of reproductive

activity of the species in the eastern Mediterranean. Since the systematic monitoring of Odonata in Cyprus began in 2013, *P. flavescens* has been recorded on the island every year with one to 13 records each year from 2013 to 2017, 45 in 2018, and with a significant increase to 146 records in 2019, giving a total of 237 records. Reproductive behaviour of *P. flavescens* has been observed 19 times on Cyprus and in 2018 we found a larva and a teneral male. Oviposition mode showed high plasticity and was observed in five cases in non-contact guarding behaviour; five times females were ovipositing alone (unguarded oviposition) and oviposition in tandem was seen only once. Our observations are the first proof of successful reproduction of *P. flavescens* in the eastern Mediterranean." (Author)] Address: Sparrow, D.J., Cyprus Dragonfly Study Group, P.O. Box 62624, 8066, Paphos, Cyprus. E-mail: davidrosfpo@hotmail.com

**19053.** Su, X.; Zhang, K.; Zheng, J.; Zhao, Y.; Han, R.; Zhang, J. (2020): Investigation of high lift force generation of dragonfly wing by a novel advanced mode in hover. *Fluids* 2020, 5, 59: 16 pp. (in English) ["In the paper, a novel flapping mode is presented that can generate high lift force by a dragonfly wing in hover. The new mode, named partial advanced mode (PAM), starts pitching earlier than symmetric rotation during the downstroke cycle of the hovering motion. As a result, high lift force can be generated due to rapid pitching coupling with high flapping velocity in the stroke plane. Aerodynamic performance of the new mode is investigated thoroughly using numerical simulation. The results obtained show that the period-averaged lift coefficient,  $CL$ , increases up to 16% compared with that of the traditional symmetrical mode when an earlier pitching time is set to 8% of the flapping period. The reason for the high lift force generation mechanism is explained in detail using not only force investigation, but also by analyzing vortices produced around the wing. The proposed PAM is believed to lengthen the dynamic stall mechanism and enhance the LEV generated during the downstroke. The improvement of lift force could be considered as a result of a combination of the dynamic stall mechanism and rapid pitch mechanism. Finally, the energy expenditure of the new mode is also analyzed." (Authors)] Address: Su, X., School of Hydraulic Engineering, Dalian University of Technology, Dalian 116024, China. E-mail: sxh@dlut.edu.cn

**19054.** Svensson, E.I.; Gomez-Llano, M.; Waller, J.T. (2020): Selection on phenotypic plasticity favors thermal canalization. *Proc. Natl. Acad. Sci. U.S.A.* 117: 29767-29774. (in English) ["Climate change affects organisms worldwide with profound ecological and evolutionary consequences, often increasing population extinction risk. Climatic factors can increase the strength, variability, or direction of natural selection on phenotypic traits, potentially driving adaptive evolution. Phenotypic plasticity in relation to temperature can allow organisms to maintain fitness in response to increasing temperatures, thereby "buying time" for subsequent genetic adaptation and promoting evolutionary rescue. Although many studies have shown that organisms respond plastically to increasing temperatures, it is unclear

if such thermal plasticity is adaptive. Moreover, we know little about how natural and sexual selection operate on thermal reaction norms, reflecting such plasticity. Here, we investigate how natural and sexual selection shape phenotypic plasticity in two congeneric and phenotypically similar sympatric insect species. We show that the thermal optima for longevity and mating success differ, suggesting temperature-dependent trade-offs between survival and reproduction in both sexes. Males in these species have similar thermal reaction norm slopes but have diverged in baseline body temperature (intercepts), being higher for the more northern species. Natural selection favored reduced thermal reaction norm slopes at high ambient temperatures, suggesting that the current level of thermal plasticity is maladaptive in the context of anthropogenic climate change and that selection now promotes thermal canalization and robustness. Our results show that ectothermic animals also at high latitudes can suffer from overheating and challenge the common view of phenotypic plasticity as being beneficial in harsh and novel environments." (Authors)] Address: Svensson, E.I., Department of Biology, Lund University, SE-223 62 Lund, Sweden. E-mail: erik.svensson@biol.lu.se

**19055.** Tang, C.; Zhang, X.; Li, J.; Li, Z.; Huang, M.; Duan, H.; Lu, Z.; Li, Q.; Chen, Y. (2020): Diversity and bioindication of Odonata in the Qinghuahai National Wetland Park in Baoshan City. *Wetland Science* 18(6): 712-718. (in Chinese, with English summary) ["In order to understand the species diversity of Odonata in Baoshan Qinghuahai National Wetland Park, the field surveys were conducted on the adults and larva of Odonata insects in the ecological conservation area, restoration and reconstruction area, rational utilization area of Baoshan Qinghuahai National Wetland Park and Datianba wetlands restored naturally by sweep-net and dipnet methods in July17-27, 2018, October 13-17, 2018, August 7-14, 2019, and June 19-22, 2020. The 205 adult specimens and 670 larval specimens of Odonata were collected, and the diversity of Odonata in 4 different regions of Qinghuahai National Wetland Park was analyzed. The results showed that 205 adult specimens belong to 24 species in 6 families, 8 genera, and 670 larval specimens belong to 25 species (morphological species) in 4 families, including 10 species of Odonata recorded newly in Baoshan city. There was no significant difference in terms of abundance, species richness and adaptive coherence estimator value of adults of Odonata among ecological conservation area, reconstruction and restoration area and rational utilization area in the wetland park, but species richness and adaptive coherence estimator value of larvae of Odonata in the reconstruction and restoration area were significantly lower than those in ecological conservation area and rational utilization area. The community structure of adults of Odonata in ecological conservation area was significantly different from those in reconstruction and restoration area and rational utilization area, there were significant differences in the community structure of larvae of Odonata in the 4 areas. Totally, there were high level of Odonata diversity in ecological conservation area and rational utilization area, there was a low level of Odonata diversity in the reconstruction

and restoration area. The biological indicator effect of larvae of Odonata were better than that of the adults, and the identification of larvae at the morphological species level or the family level could meet the demand to indicate wetland environment quality." (Authors)] Address: Tang, C., Southwest Forestry University, Kunming 650224, Yunnan, P.R. China. E-mail: m15680711287@163.com

**19056.** Tang, Y.; Sun, H.; Qin, Z.; Yin, S.; Tian, L.; Liu, Z. (2020): Bioinspired photocatalytic ZnO/Au nanopillar-modified surface for enhanced antibacterial and antiadhesive property. *Chemical Engineering Journal* Volume 398, 15 October 2020, 125575: (in English) ["Highlights: • ZnO/Au nanopillars are fabricated by hydrothermal and photo-reduction. • PDMS-ZnO/Au shows a mechanical antimicrobial effect in the dark. • A two-fold antibacterial action occurs for PDMS-ZnO/Au under visible light. • The modified PDMS could also function as an antifouling surface. Abstract: Biological contamination of surfaces is a thorny issue that brings series of adverse factors to the daily life and industrial manufacture. A dragonfly-wing-mimicking nanopillar array of ZnO/Au on Polydimethylsiloxane (PDMS-ZnO/Au) with two-fold bactericidal activity as well as the antiadhesive property has been developed. In this process, ZnO nanopillar is obtained using a hydrothermal method followed by the introduction of plasmonic gold nanoparticles (AuNPs) via a photo-reduction protocol. The obtained PDMS-ZnO/Au surface demonstrates physical antibacterial performance, resulting in a killing rate of 65.5% in dark. Furthermore, the surface effectively inactivates bacteria under visible light irradiation, yielding a lethality >99.9% in 30 minutes. The advantages of high lethality rate and short action time are endowed to PDMS-ZnO/Au by a two-fold antibacterial action combining the enhanced photocatalysis upon the introduction of Au nanoparticles and the mechanical property of biomimetic nanostructure. Meanwhile, the nanopillar-modified PDMS can also function as a superhydrophobic surface and efficiently impede bacterial adhesion by over 99.9%. Therefore, the approach presented here holds a promising solution to tackle biological contamination for medical paint, catheter and implant equipment." (Authors)] Address: Sun, H., Key Laboratory of Bionic Engineering, College of Biol. & Agricultural Engineering, Jilin University, Changchun, Jilin Province 130022, PR China. Email: sunhang@jlu.edu.cn

**19057.** Theodoropoulos, C.; Karaouzas, I.; Vourka, A.; Skoulikidis, N. (2020): ELF – A benthic macroinvertebrate multi-metric index for the assessment and classification of hydrological alteration in rivers. *Ecological Indicators* 108: 11pp. (in English) ["Hydrological alteration prevents unpolluted rivers from reaching acceptable ecological conditions. In Europe, 40% of rivers are degraded due to hydrological alteration but the indices currently used in ecological monitoring cannot quantify the degree of hydrological alteration or discriminate between pollution and hydrological alteration. In this article, we demonstrate the development, calculation and validation of the Hellenic Flow Index (ELF), a new macroinvertebrate-based multi-metric index to assess, quantify and classify hydrological alteration in Greek

streams and rivers. 1351 samples collected throughout Greece were partitioned in reference and test datasets and were pre-classified in varying levels of pollution and hydrological alteration. Optimal flow ranges for benthic macroinvertebrates were calculated and flow sensitivity metrics were developed. We tested the predictive accuracy of 607 versions of the ELF index, that is, 607 combinations of seven hydrologically sensitive macroinvertebrate metrics. The developed index is a combination of two ELF versions that had the highest predictive accuracy on two validation datasets. The index developed can assess, quantify and classify hydrological alteration and is also capable of discriminating between pollution and hydrological alteration. The ELF's overall predictive accuracy was 75% and the index was equally accurate in discriminating between clean, polluted and hydrologically altered sites. Within the regular ecological monitoring, water agencies, managers and decision makers can now use a tool that will quickly flag watercourses that specifically need hydrological restoration instead of pollution mitigation measures and thus apply targeted actions towards the ecological restoration of rivers." (Authors) Odonata are treated at the family level.] Address: Hellenic Centre for Marine Research, Institute of Marine Biological Resources & Inland Waters, 46.7 km Athens – Sounio Ave., 19013 Anavyssos, Greece

**19058.** Tüzün, N.; Debecker, S.; Stoks, R. (2020): Strong species differences in life history do not predict oxidative stress physiology or sensitivity to an environmental oxidant. *Journal of Animal Ecology* 89(7): 1711-1721. (in English) ["Species typically align along a fast-slow life-history continuum, yet it is not clear to what extent oxidative stress physiology can be integrated with this continuum to form a 'pace-of-life syndrome', especially so in invertebrates. This is important, given the assumed role of oxidative stress in mediating life-history trade-offs, and the prediction that species with a faster pace should be more vulnerable to oxidative stress. We tested whether a species' life-history pace, here represented by its growth rate, can predict species-level differentiation in physiology and sensitivity to oxidative stress. Therefore, we exposed four species of *Ischnura* damselflies that strongly align along a fast-slow life-history continuum to different levels of ultraviolet (UV) radiation. We measured an extended set of physiological traits linked to the pace-of-life: standard metabolic rate (SMR), oxidative stress physiology (antioxidant enzymes and oxidative damage), and defence/condition traits (investment in immune function, energy storage, and structural defence). Despite strong species differences in growth rate and physiology, growth rate did not predict species-level differentiation in physiology. Hence there was no support for the integration of metabolic rate, oxidative stress physiology or defence/condition traits into a species-level syndrome. UV exposure affected nearly all traits: it reduced growth rate and increased metabolic rate, affected all oxidative stress physiology traits and increased the two defence traits (immune function, and melanin content). Nevertheless, the pace-of-life based on growth rate did not predict sensitivity to UV. Instead, the observed pattern of investment in structural UV defence (melanin)

might have reduced the need for enzymatic antioxidant defence, this way potentially decoupling the covariation between the life-history pace and oxidative stress physiology. The absence of an integrated axis of life-history and physiological variation indicates no major constraints for the evolution of these traits among the studied damselfly species. Our study highlights that ecological differences between species may decouple covariation between species' life-history pace and their physiology, as well as their sensitivity to environmental stressors." (Authors)] Address: Tüzün, N., Evolutionary Stress Ecology & Ecotoxicology, Univ. of Leuven, Leuven, Belgium. Email: nedim.tuzun@kuleuven.be

**19059.** Tüzün, N.; De Block, M.; Stoks, R. (2020): Live fast, die old: oxidative stress as a potential mediator of an unexpected life-history evolution. *Oikos* 129(9): 1330-1340. (in English) ["Intraspecific latitudinal patterns in life history are well documented, yet underlying mechanisms of such patterns are poorly understood. To advance our insights in the evolution of latitudinal differences in two key traits, growth rate and lifespan, we evaluated the potential costs of rapid growth in terms of reduced adult lifespan, and the mediatory role of oxidative stress. We studied latitudinal differentiation in routine and experimentally increased (compensatory) larval growth rates, and in adult lifespan under common garden conditions in low- and high-latitude populations of the damselfly *Ischnura elegans*. The low-latitude populations showed not only higher routine growth rates but also a stronger compensatory growth response after a transient food shortage compared to the high-latitude populations. In contrast with a tradeoff scenario, adults of the faster growing low-latitude populations lived longer, had higher levels of antioxidant enzymes, and tended to experience lower oxidative damage. Importantly, these latitudinal patterns were largely mirrored at the treatment level, where experimentally induced compensatory growth rates were associated with neither oxidative damage nor shorter adult lifespans. Moreover, individuals with a higher growth rate after the transient food shortage did not have shorter adult lifespans or higher oxidative damage, but instead showed a stronger antioxidant defense. Our data indicate that an overcompensatory, hormetic response in antioxidant defense, potentially induced by the higher routine growth rates, resulting in less oxidative damage may underlie these unexpected growth-lifespan patterns. Our results highlight the added value of incorporating oxidative stress physiology, and the need to consider multivariate trade-offs in which animals optimize multiple traits, when studying life-history evolution." (Authors)] Address: Stoks, R., Evolutionary Stress Ecology and Ecotoxicology, University of Leuven, Deberiotstraat 32, 6 3000 Leuven, Belgium. E-mail: robby.stoks@kuleuven.be

**19060.** Uboni, C.; Jugovic, J.; Tordoni, E.; Pizzul, E.; Riseriato, E.; Bacaro, G. (2020): Dragonfly (Odonata) diversity patterns in mixohaline coastal wetlands. *Estuaries and Coast* 43: 375-386. (in English) ["Salinity is a limiting factor for many invertebrates, especially for Odonata which are typically associated with freshwater ecosystems. In Europe, 15 Odonata species inhabit brackish wetlands and only few



detailed data on their tolerance towards salinity are available. We investigated Odonata fauna in 11 sampling stations situated in three estuarine areas (northern Adriatic coastline) which differed in salinity conditions (freshwater-polyhaline habitats) in order to assess affinity of Odonata species to brackish habitats and to describe their distribution pattern in coastal wetlands. Adults, exuviae (the remains of the exoskeleton after the last larval instar), and the main chemical and physical water parameters were sampled every 2 weeks for 1 year in each station. In total, 25 species were detected and 56% of them were able to complete their life cycle in brackish water environments. Our results showed that freshwater and oligohaline ponds were the most favorable for dragonflies, with an overall higher species richness. There was a high species turnover along the salinity gradient, with a strong differentiation among the communities along the gradient. Considering the exuviae, we observed a high specificity with respect to the habitat conditions (seven species exclusive of freshwater sites and six of oligohaline ones, respectively). Among the adults, four species were found exclusively in freshwater habitats and no species seemed to be strictly connected with oligohaline habitats. Coastal wetlands are composed by a mosaic of different habitats especially when freshwater and seawater are close together, supporting many Odonata species with different tolerance toward salinity conditions. They also provide useful insights for conservation and management actions. ... In total, we identified 4963 adults and 1907 exuviae belonging to 25 species of Odonata (Zygoptera: 7 spp., Anisoptera: 18 spp.). Considering the different habitat types (freshwater, oligohaline, mesohaline, and polyhaline water), 32% of species (*Coenagrion puella*, *C. scitulum*, *Aeshna isocetes*, *Orthetrum albistylum*, *Libellula depressa*, *Ischnura pumilio*, *Lindenia tetraphylla*, *Anax parthenope*) and 25% of species (*Aeshna cyanea*, *A. affinis*, *Lestes parvidens*, *L. depressa*, *C. scitulum*, *Hemianax ephippiger*, *Brachytron pratense*, *Orthetrum cancellatum*, *O. albistylum*, *Sympetrum fonscolombii*, *S. striolatum*, *S. vulgatum*, *I. pumilio*) were exclusive of only one habitat type for adults and exuviae, respectively. Moreover, 28% of adult species (*Anax imperator*, *O. cancellatum*, *Sympetrum meridionale*, *Erythromma viridulum*, *Ischnura elegans*, *Aeshna mixta*, *S. fusca*) were present in all habitat types, whereas none of all sampled species was breeding all along the gradient (Table S2 of supplementary material). We found a low share of rare species expressed as singletons and doubletons (namely the number of unique species represented by one or two individuals, respectively): one singleton (*L. tetraphylla*) and one doubleton (*A. isocetes*) for adults; for exuviae, four singletons (*I. pumilio*, *B. pratense*, *A. cyanea*, *H. ephippiger*) and no doubletons at all." (Authors)] Address: Uboni, Costanza, Dept Life Sciences, Univ. of Trieste, Via L. Giorgeri 10, Trieste, Italy. Email: costanza.uboni@gmail.com

**19061.** Uyizeye, E. (2020): Developing an odonate-based index for monitoring freshwater ecosystems in Rwanda: Towards linking policy to practice through integrated and adaptive management. Ph.D., Antioch University, Antioch New England: Environmental Studies: 179 pp. (in English)

["Worldwide, the decline of biodiversity in freshwater ecosystems is occurring at an alarming rate, due to anthropogenic threats, which directly impact humans in a variety of ways. Freshwater ecosystems occupy an integral part of political, socio-economic and ecological spheres. Integrated Watershed Management (IWM) and Adaptive Management (AM) conceptual frameworks provide an underpinning holistic platform from which to evaluate the performance of policies and actions on the ground in relation to freshwater ecosystem management. I investigate the extent to which environmental policies and practices embrace IWM and AM frameworks in Rwanda. Furthermore, this dissertation develops an odonate-based ecological monitoring tool, referred to as Dragonfly Biotic Index (DBI). The development of this tool involved surveying adult odonates, water physical-chemical variables, habitat characteristics and weather conditions across the six ecological zones of Rwanda. An average of 16 sites per each ecological zone were surveyed in a short rainy season and revisited in a short dry season. This countrywide survey added 25 new odonate species to the national check list, which increased it to 114 species. The abundance of odonates was significantly different between ecological zones and between seasons. The DBI developed here consists of three sub-indices: distribution-based score, sensitivity-based score and threat-based score as per IUCN Red List categories. To validate DBI, I examined its effectiveness in reflecting habitat integrity. This included using DBI to assess the relationship of land uses (agriculture and mining) and environmental, and physical-chemical variables of freshwater ecosystems. DBI values were significantly lower in agricultural and mining sites than their control sites. Also, significant changes in some environmental variables were associated with the two land uses. These included the degradation of riparian vegetation as associated with both agriculture and mining. While agriculture was significantly associated with higher conductivity, mining exhibited a significant relationship with higher water turbidity and higher sandy substrates than their control sites. In conclusion, not only will DBI enable deeper investigation of the extent to which land uses affect freshwater ecosystems, but also will be instrumental in prioritization for habitats that need crucial conservation. Additionally, this monitoring tool is meant to make data on ecosystem status readily available to facilitate analysis of ecological responses to socio-economic, political and pragmatic interventions. Thus, these data can be used to inform all spheres involved: ecological, political and socio-economic. The use of odonates, which are charismatic insects, will potentially engage and promote citizen-based monitoring. This will ultimately instill pro-environmental attitudes within local communities and set the stage for collaboration between stakeholders." (Author)] Address: not stated

**19062.** Valdivia, F.G.A.; Alves-Silva, E.; Del-Claro, K. (2020): Differences in size and energy content affect the territorial status and mating success of a neotropical dragonfly. *Austral Ecology* 45(6): 748-758. (in English) ["In male odonates, both size and fat content are related to territory defence and mating success. Males that are larger and have

higher energy reserves win relatively more disputes for territory and attract more females. Wing colour has also been regarded as a mechanism that influences agonistic behaviour between males, as wing pigmentation might be regarded as a sign of male quality. In this study, we analysed whether a set of male physical (body size and wing colour), physiological (body fat content) and behavioural (disputes between males) characteristics were involved in the territory defence and mating behaviour of the neotropical dragonfly *Zenithoptera lanei* Santos, 1941 (Anisoptera: Libellulidae). Males were characterised as territorial whenever they ward-off other males and remained in the same place within the pond for two consecutive days. In general, these territorial males were larger and had more abdominal and thoracic fat, engaged in pursuits more frequently, spent more time on sexual behaviour and female guarding, and mated more in comparison to subordinate males. By evaluating whether the percentage of wing area covered by black ink influenced male behaviour, we found that territorial males tended to act aggressively towards other males whose wings were partially painted, and sexually towards females irrespective of wing area painted. In *Z. lanei*, both body size and fat content play a role in defining territoriality. By subduing competitors and dominating preferred locations within high-quality sites, these males are likely to be visited by females and engage in mating." (Authors)] Address: Del-Claro, K.U. niversidade de São Paulo, Avenida Bandeirantes No. 3900, CEP 14040901 Ribeirão Preto, São Paulo, Brazil. Email: kdelclaro@gmail.com

**19063.** Verheyen, J.; Stoks, R. (2020): Negative bioenergetic responses to pesticides in damselfly larvae are more likely when it is hotter and when temperatures fluctuate. *Chemosphere* 243, March 2020, 125369: (in English) ["Highlights: • Chlorpyrifos (CPF) reduced cellular energy allocation (CEA) in *Ischnura elegans*. • CPF had little effect on CEA values under standard test conditions (constant 20°C). • CPF reduced CEA, mainly at the most stressful (hottest) thermal regime. • CPF reduced CEA, mainly by reducing energy availability (fat and sugar declines). • Testing at standard conditions would underestimate the bio-energetic impact of CPF. Abstract: To make more realistic predictions about the current and future effects of pesticides, we need to better understand physiological mechanisms associated with the widespread higher toxicity of many pesticides under increasing mean temperatures and daily temperature fluctuations (DTFs). One overlooked, yet insightful, mechanism are bioenergetic responses as these provide information about the balance between energy gains and costs. Therefore, we studied how the bioenergetic responses to the insecticide chlorpyrifos were affected by a higher mean temperature and a higher DTF in *Ischnura elegans* damselfly larvae. To quantify bioenergetic responses we measured energy availability (Ea), energy consumption (Ec) and total net energy budget (cellular energy allocation, CEA). Exposure to chlorpyrifos considerably reduced CEA values when a high mean temperature was combined with a high DTF (up to -18%). Notably, chlorpyrifos had little effect on CEA at a constant 20°C, meaning that the bioenergetic impact of

chlorpyrifos would have been underestimated if we had only tested under standard testing conditions. The chlorpyrifos-induced reductions in CEA under warming were driven by reductions in Ea (up to -16%, mainly through large reductions in sugar and fat contents) while Ec was unaffected by chlorpyrifos. Treatment groups with a lower CEA value showed a higher mortality and a lower growth rate, indicating bioenergetic responses are contributing to the higher toxicity of chlorpyrifos under warming. Our study highlights the importance of evaluating the effects of pesticides under an increase in both mean temperature and DTF to improve the ecological risk assessment of pesticides under global warming." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**19064.** Vinko, D.; Šalamun, A.; Tratnik, A.; Erbida, N.; Pirnat, A.; Bahor, M.; Kablar, D.; Kogovsek, P.; Šramel, N.; Hostnik, M.; Krelj, N.; Šabeder, N.; Tivadar, N.; Snoj, J.; Bedjanic, M.,3 (2020): Dragonfly fauna (Odonata) of the Ribniki v dolini Drage pri Igu Nature Reserve (Ljubljansko barje, Central Slovenia). *Natura Sloveniae* 22(2): 5-28. (in Slovene, with English summary) ["The current knowledge of the odonate fauna in the Ribniki v dolini Drage pri Igu Nature Reserve at the south-eastern outskirts of Ljubljansko barje is summarized, based on studies carried out in the 2018–2020 period and on older unpublished data of the authors and literature. Of the 72 species of Odonata known for Slovenia, 49 have been listed so far in the study area. Of these, 17 species are endangered, 5 protected and 2 listed in the appendices to the Habitats Directive, while 15 species are rare in the area. The local odonate fauna is compared with the odonate fauna of the wider area, with a list of 51 odonate species provided for the entire Ljubljansko barje, of which 7 have so far been found only in the area of Draga pri Igu. Nature conservation aspect is discussed with an emphasis on the species from the appendices of the Habitat Directive, *Leucorrhinia pectoralis*, which has recently not been recorded elsewhere in central Slovenia, and *Cordulegaster heros*. Furthermore, we provide recommendations for further management of the nature reserve. The main threat factors affecting the odonate fauna in the area are listed and the need for monitoring the threatened species and further research is highlighted. To protect the odonate fauna in this part of Slovenia, the introduction of adapted and to nature conservation subordinated extensive management of wetlands and fishponds in the nature reserve is implicit." (Authors)] Address: Bedjanic, M., Nac. inšt. biol., Veèna pot 111, 1000 Ljubljana, Slovenia. Email: matjaz.bedjanic@nib.si

**19065.** Vorster, C.; Samways, M.J.; Simaika, J.P.; Kipping, J.; Clausnitzer, V.; Suhling, F.; Dijkstra, K.-D.B. (2020): Development of a new continental-scale index for freshwater assessment based on dragonfly assemblages. *Ecological Indicators* Volume 109, February 2020, 105819: 12 pp. (in English) ["Highlights: • A new, continental-scale freshwater assessment tool, African Dragonfly Biotic Index. • 604 African dragonfly species are evaluated. • This index determines deterioration or recovery of a freshwater site. • It also

compares freshwater quality at different sites. • The index is a foundation for developing other national Dragonfly Biotic Indices. Abstract: African freshwater ecosystems are increasingly being impacted by humans, requiring an effective tool to assess these impacts for future conservation action. Such a tool, the Dragonfly Biotic Index (DBI), was earlier developed to assess the quality of South Africa's freshwater ecosystems and is based on combining the scores of three sub-indices (geographical distribution, threat status, and habitat sensitivity) for each South African dragonfly species. The sum of the DBI scores for all the species recorded at assessed sites indicates the relative quality of these sites. The International Union for the Conservation of Nature/Species Survival Commission (IUCN/SSC) has assessed the threat status of certain aquatic taxa in Africa, including dragonflies. These assessments, coupled with the latest information on the geographical distribution of each species, makes it possible here to geographically expand the South African DBI into a continental-scale assessment index (the African Dragonfly Biotic Index (ADBI)) by adapting the South African DBI sub-indices. We develop this continental index here. However, there are challenges when undertaking an assessment at the continental scale compared to a national scale. In particular, the habitat sensitivity sub-index of the South African DBI is a relative, quantitative measure based on numbers of individual dragonflies recorded from natural versus human-modified or artificial freshwater systems. While the data for the two sub-indices, species' geographical distribution and Red List threat statuses, are available across the continent, this is not the case for the habitat sensitivity sub-index at this large spatial scale. This meant that an alternative sub-index measure was required. We overcame this challenge by exploring an alternative sub-index, i.e. the 'species vulnerability sub-index', based on knowledge of the vulnerabilities of the species to certain types of landscape transformation. Then, the species vulnerability sub-index scores were calculated and combined with the geographical distribution and Red List threat status sub-index scores to develop ADBI scores for a core of 604 dragonfly species with adequate data across the African continent. These ADBI scores provide a workable framework and baseline for determining freshwater quality, both lotic and lentic, relative to human disturbance at a continental spatial scale. The ADBI enables the monitoring of quality changes, for better or worse, over the continent in years to come. Overall, the ADBI also has the potential to help identify threats to, and sensitivities of, African freshwater ecosystems, leading to conservation action.] Address: Kipping, J., BioCart Ökologische Gutachten, Taucha/Leipzig, Germany. E-mail: biocartkippling@email.de

**19066.** Waldhauser, M. (2020): Records of Dragonflies from the Dead Sea Basin (Israel, West Bank, Jordan) with the records of *Orthetrum abboti* and *Crocothemis sanguinolenta* (Odonata: Libellulidae). *Libellula* 39(1/2): 49-61. (in English, with German summary) ["25 species of Odonata were found on two short holiday trips to the southern part of the Dead Sea Basin in May 2018 and April 2019. Occurrence of *O. abboti* and *C. sanguinolenta* in Jordan was confirmed,

many new localities of *O. ransonnetii* in Israel and Jordan were discovered." (Author)] Address: Waldhauser, M., Petrovice 136, Jablonné v Podještědí, 471 25, Czech Republic. Email: martin.waldhauser@nature.cz

**19067.** Walia, G.K.; Devi, M. (2020): Cytogenetic characterization of five species of genus *Coeliccia* of family Platycnemididae (Odonata: Zygoptera) using C-banding, silver nitrate staining and sequence specific staining. *The Nucleus* 64(1): 1-6. (in English) ["Cytogenetic characterization of five species of genus *Coeliccia* of family Platycnemididae has been done by conventional staining, C-banding, silver nitrate staining and sequence specific staining. These species were collected from the localities present in Andretta, Bilaspur (Himachal Pradesh) and Nongkhyllem (Meghalaya), India. All the species possess  $n=13$  as haploid chromosome number, which is the type number of the family with X0-XX sex determining mechanism except *Coeliccia bimaculata* with  $n=12$ , originated by the fusion of two autosome pairs as complement is characterized by the presence of one large bivalent. m chromosomes are absent in all the species. Mostly, light/dark terminal C-bands and NOR's are seen on the autosomal bivalents, while X chromosome shows variations as large terminal C-band on one side of X chromosome is present in all the species except *C. renifera*, it is C-positive. Moreover, X chromosome possesses terminal NOR on one side in *C. chromothorax*, while NOR-positive in *C. renifera* and NOR-negative in *C. bimaculata*, *C. didyma* and *C. fraseri*. In sequence specific staining, autosomal bivalents are homogeneously stained with both DAPI and CMA3 dyes in *C. bimaculata*, *C. renifera* and *C. chromothorax*, while whole chromosome complement of *C. didyma* is CMA3 bright and *C. fraseri* is DAPI bright.] Address: Walia, G.K., Dept of Zoology & Environmental Sciences, Punjabi Univ., Patiala, Punjab, 147002, India

**19068.** Wan, L.; Long, Y.; Hui, J.; Zhang, H.; Hou, Z.; Tan, J.; Pan, Y.; Sun, S. (2020): Effect of norfloxacin on algae-cladoceran grazer-larval damselfly food chains: Algal morphology-mediated trophic cascades. *Chemosphere* 256 (2020) 127166: 11 pp. (in English) ["Highlights: • Without NOR, suppressed grazer density by damselflies promoted algal growth. • NOR increased the positive impacts of damselflies on *C. vulgaris* growth. • NOR reduced the positive impacts of damselflies on *S. quadricauda* growth. • NOR altered trophic cascades and showed species-specific differences. • The above differences depend on algal morphology-mediated indirect interactions. Abstract: Antibiotic norfloxacin (NOR) has recently been demonstrated to affect the swimming behavior of zooplankton species and phytoplankton-zooplankton interactions, which may further affect trophic cascades. To test this hypothesis, two food chains (*Scenedesmus quadricauda*-*Daphnia magna*-larval damselfly and *Chlorella vulgaris*-*D. magna*-larval damselfly) were used to examine the effect of NOR concentrations (0, 0.5, 5, and 25 mg L<sup>-1</sup>) on trophic cascades. In the absence of NOR, larval damselflies reduced grazer density and increased algal density, regardless of algal species. In the presence of NOR, increasing NOR concentration strengthened

the positive effect of larval damselflies on the growth of *C. vulgaris* because larval damselflies suppressed grazer density more efficiently resulting from reduced swimming ability in the grazers. Conversely, increasing NOR concentration reduced the positive effect on the growth of *S. quadricauda* due to inhibited grazer-induced colony formation in *S. quadricauda*. Therefore, exposure to NOR altered the direction and strength of trophic cascades and showed species-specific differences, depending on algal morphology-mediated indirect interactions. These findings provide novel insights into how NOR affects aquatic food chains and reveal the importance of algal traits in determining trophic cascades." (Authors)] Address: Pan Y., School Ecol. & Environ. Sci. & Yunnan Key Lab. for Plateau Mountain Ecol. & Restoration of Degraded Environments, Yunnan Univ., Kunming, Yunnan, 650091, China. E-mail: panying@ynu.edu.cn

**19069.** Wang, Y.-J.; Stoks, R.; Sentis, A.; Tüzün, N. (2020): Support for the climatic variability hypothesis depends on the type of thermal plasticity: lessons from predation rates. *Oikos* 129(7): 1040-1050. (in English) ["Plastic and evolutionary changes in traits related to biotic interactions are crucial for the local persistence of populations under global warming. Yet, how acute and developmental thermal plasticity evolve and shape predation rates has been poorly studied, especially in the context of latitude-driven thermal evolution. A powerful predictive framework is given by the climatic variability hypothesis (CVH) stating that thermal plasticity and acclimation capacity evolve to be higher in high-latitude populations because these are exposed to higher thermal seasonal variability. We tested the CVH for predation rates and evaluated if the support for the CVH depended on the type of plasticity and acclimation metric. We examined effects of developmental temperature (20 and 24°C) and acute changes in mean and extreme temperatures (20, 24 and 32°C) on the predation rates of high- and low-latitude populations of a predatory aquatic insect, the damselfly *Ischnura elegans*. We documented opposing and interactive effects between developmental and acute temperatures, which urges caution when using thermal performance curves to forecast the impact of global warming on biotic interactions. Predation rates were higher in low-latitude than high-latitude predators, especially at the warmer developmental and test temperatures, suggesting thermal adaptation to the higher low-latitude temperatures. The latitudinal patterns in acute and developmental plasticities differed, providing mixed support for the CVH. Moreover, there was no latitudinal pattern in post-acclimation thermal sensitivity, indicative of perfect thermal compensation in predators from both latitudes. Strikingly, the acclimation capacity leading to perfect thermal compensation was ~6 times higher in high-latitude than in low-latitude predators. Our study provides new insights into the climatic variability hypothesis (CVH) by documenting that its support is critically dependent on the type of plasticity and acclimation metric used." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**19070.** Ward, J. (2020): Predator-Prey Interactions between *Paranehrops zealandicus* and Odonata species in semi-natural aquaculture environments. MSc. thesis, University of Otago: 101 pp. (in English) ["Interactions between predator and prey contribute towards shaping food webs and can be responsible for the composition of species in an ecosystem. In semi-natural aquaculture ponds, interactions between predators and competitors can be unfavorable for farmed species as they might reduce biomass in ponds and therefore economic growth. Juvenile farmed species are significantly more vulnerable in pond aquaculture as size is usually the factor that dictates trophic levels in aquatic habitats. Odonata are a family of pond invertebrates that are considered opportunistic predators and are known to feed on the prey of many juvenile vertebrate and invertebrate ponds species. Their ability to successfully capture prey makes them top invertebrate predators and how they interact with farmed species, specifically juveniles in aquaculture pond systems has been speculated. In New Zealand (NZ), semi-natural aquaculture ponds are used to cultivate the freshwater water crayfish species *Paranehrops zealandicus* yet how this species interacts with other pond invertebrates, particularly odonate larvae has not been studied. It was therefore the aim of this thesis to further investigate the predator-prey interactions between NZ odonate larvae and the farmed species *P. zealandicus* in semi-natural aquaculture ponds. This thesis examines predator-prey interactions based on species spatial patterns and habitat use in ponds, as well as stomach content and stable isotope analysis on study species. Results indicate odonate larvae have no significant effect on the abundance of *P. zealandicus* in ponds. Vegetation and the densities of *P. zealandicus* in ponds are more likely to have a greater impact on odonate larvae and juvenile *P. zealandicus* abundance. Desirable habitat was occupied by larger *P. zealandicus* which forced juvenile *P. zealandicus* to seek refuge in areas of the pond that were not attractive for larger territorial individuals. Based on stomach content analysis, odonate larvae were found to primarily feed on small sedentary pond invertebrates such as Chironomidae. *P. zealandicus* tissue was exceptionally low in odonate larvae stomachs. Stable isotope analysis further showed all odonate larvae had lower trophic levels to juvenile *P. zealandicus* indicating odonate larvae are unlikely to be major predators of juveniles. *P. zealandicus* diets reflected their omnivorous nature feeding on both plant detritus and invertebrate tissue, however *P. zealandicus* were highly cannibalistic with adults found to have high volumes of *P. zealandicus* tissue in their stomachs. Stable isotope analysis showed between *P. zealandicus* and juvenile crayfish there was no significant difference in trophic levels. Year 1 crayfish represented much of the *P. zealandicus* sample used for stable isotope analysis and adults were poorly represented in the sample which could be the reason for this result. Therefore Year 1 *P. zealandicus* are unlikely to be feeding on juveniles, however more research needs to be carried out looking at the trophic interactions between adult *P. zealandicus* and year of young. Ultimately, odonate larvae are not likely to be major predators of juvenile *P. ze-*



alandicus, and cannibalism is more likely to be the main factor for low juvenile success in ponds. Future research investigating other pond invertebrates and ways to mitigate cannibalism in ponds is speculated." (Author)] Address: not stated

**19071.** Wildermuth, H.; Monnerat, C. (2020): Fakten und Indizien zum Besiedlungs- und Ausbreitungsverhalten von *Coenagrion scitulum* in der Schweiz (Odonata: Coenagrionidae). *Libellula* 39(3/4): 123-147. (in German, with English summary) ["Colonisation and dispersal behaviour of *C. scitulum* in Switzerland – facts and evidence – In Europe, *C. scitulum* is mainly distributed in the Mediterranean area. Since the 1990s the species has extended its range north- and eastwards successively. In Switzerland, it established itself since 2002. Based on comprehensive faunistic data we tried to reconstruct its immigration from France and dispersal routes in Switzerland. Accordingly, during a first advance through the Burgundy Gate it arrived at the Ajoie region and from there it reached the central and eastern Plateau. The second advance followed from the French Rhone Valley into the Geneva Basin and further on to the western Plateau. In the Valais and the Ticino it firstly appeared in 2020. The colonization of Switzerland proceeded dynamically, in short but occasionally also in long leaps. In many cases, the first newcomers at waters were single specimens or small groups of individuals. According to their behaviour it is inferred that single males and females intensively searched for mates. If they remained unsuccessful, they soon moved on. Frequently, small populations were formed that existed only temporarily. Large and permanent populations occurred very rarely. The dispersal of *C. scitulum* was especially promoted by the availability of suitable habitats, i.e. by freshly created or revitalized water bodies. In addition, the sp. would also have profited from climate warming." (Authors)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**19072.** Yu, Y.; Pu, G.; Jiang, T.; Jiang, K. (2020): A dragonfly wing inspired biomimetic aerodynamic thrust bearing for increased load capacity. *International Journal of Mechanical Sciences* 176(6): (in English) ["Highlights: • A novel biomimetic aerodynamic bearing is designed. • Five most representative surface structures of dragonfly wings are mimicked on the surface of thrust air bearings. • The load capacity of the five surface structures are compared under various velocity angles. • The optimal surface structure and velocity angle are taken to design the biomimetic bearing. • The designed biomimetic bearing achieves a 46.11% higher load capacity than the optimized conventional spiral grooved bearing, verified by experiments. Abstract: A novel biomimetic aerodynamic thrust bearing is developed and investigated. The surface structure of the bearing is evolved from the micro-grids of dragonfly wings, which presumably aid flying and maneuver ability of dragonflies. The topography of the micro-grids of dragonfly wings was studied and five most representative geometries were extracted before being put on thrust bearings for performance examination. A theoretical model, solved with finite different and finite

volume method, is developed to compare the static load capacity of the bearings under various velocities and flow angles, and the best geometry and velocity angle were selected and manufactured on the bearing surface for experimental tests. The dragonfly wing biomimetic bearing is found to increase load capacity by up to 46.11% in comparison with an optimized conventional spiral grooved bearing by experiments." (Authors)] Address: Yu, Y., Dept of Mech. Engineering, Univ. Birmingham, Birmingham B15 2TT, UK

## 2021

**19073.** Aguzzi, S.; Orioli, V. (2021): *Somatochlora arctica* (Odonata: Corduliidae) ovipositing at a "lower than usual" altitude for Italy and the Mediterranean Region and first observation for the Varese Province (Northern Italy). *Natural History Sciences. Atti Soc. it. Sci. nat. Museo civ. Stor. nat. Milano* 8(2): 79-82. (in English, with Italian summary) ["*S. arctica* is an endangered dragonfly with populations characterized by low density and scattered distribution. The presence of the species in the Varese Province, recorded during the specific monitoring operations for *Nehalennia speciosa*, is reported for the first time. The observation of an ovipositing female was carried out in a peat bog placed at 550 m a.s.l., the lowest altitude for the species in Italy and one of the most unusual for the Mediterranean Region. The peculiarities of this record are shown." (Authors)] Address: Stefano Aguzzi, Società Italiana per lo Studio e la Conservazione delle Libellule ODV, c/o Università degli Studi di Perugia; Fondazione Lombardia per l'Ambiente, Seveso (MB), Italy. Email: stefano.aguzzi@gmail.com

**19074.** Akindede, E.O.; Adedapo, A.M.; Adu, B.W.; Ogbogu, S.S. (2021): First report of the larva of a vulnerable damselfly in Nigeria, with some ecological notes: A case for umbrella species conservation approach. *Tropical Conservation Science* 14: 1-7. (in English) ["Background and Research: Lack of information on the distribution of threatened aquatic species impedes their conservation, thus predisposing them to extinction risk before being reported. Hence, this study reports in Nigeria, for the first time, the occurrence and habitat specificity of the larva of *Pentaplebia stahli* (Zygoptera: Pentaplebiidae) a vulnerable damselfly. Methods: Samples of *P. stahli* were collected in July and December 2020 from a rural stream situated at the Ekor Waterfalls in the Cross River State of Nigeria and very close to the Nigeria-Cameroon border. Some water quality parameters were also measured in each sampling period. Results: A total of 27 larvae of *P. stahli* and 1 teneral adult emerging from its exuvia were recorded in the two sampling periods. The habitat was a forested stream characterized by rapids, falls, and dark rock substrata. Water flows at a fast rate of 1min 3 or 4 seconds, thus characterizing a riffle and headwater stream. Dissolved oxygen concentration was between 8.05 and 8.09 mg/L, while dissolved oxygen saturation was ~ 98%. Biological oxygen demand was between 1.04 and 1.08 mg/L, while pH ranged from 7.28 and 7.56. Conclusion: The stream could be described as having high ecological integrity as evidenced in its optimum range of values

for the investigated water parameters and the presence of a threatened species. Implications for Conservation: Based on habitat specificity, *P. stahli* is considered an umbrella species required for conserving other co-occurring species in the tropical stream and its riparian forest." (Authors)] Address: Akindede, E.O., Room 1.07, Dept Zoology, Obafemi Awolowo Univ., Ile-Ife, Osun State, Nigeria. Email: eoakindele@oauife.edu.ng

**19075.** Bechly, G.; Garrouste, R.; Aase, A.; Karr, J.A.; Grande, L.; Nel, A. (2021): The damselfly palaeofauna from the Eocene of Wyoming and Colorado, USA (Insecta, Odonata, Zygoptera). *Papers in Palaeontology* 7(3): 1373-1402. (in English) ["A new family, five new genera, and nine new species of fossil damselflies (Insecta, Odonata, Zygoptera, Calopterygida) from the USA are described, seven from the Eocene Fossil Lake deposits and one from Lake Uinta deposits, both from the Green River Formation, and an additional specimen from the Wind River Formation of Wyoming and Colorado. Namely, *Carlea eocenica* gen. et sp. nov. (in Carleidae fam. nov.), *Labandeiraia riveri* sp. nov., *L. browni* sp. nov., *Eodysphaea magnifica* gen. et sp. nov., *Litheuphaea* sp. cf. *coloradensis* Petrulevicius et al., 2007, *Zacallites cockerelli* sp. nov., *Dysagrion integrum* sp. nov., *Tenebragrion shermani* gen. et sp. nov., *Tynskysagrion brookeae* gen. et sp. nov., and *Oreodysagrion tenebris* gen. et sp. nov. *Epallagoidea* and *Amphipterygoidea* are most common while *Calopterygoidea*, *Coenagrionoidae* and *Lestoidea* damselflies are less diverse. Genera of zygopteran *Dysagrionidae* are known from Europe and North America, further supporting the hypothesis of Palaeogene terrestrial interchange. Representatives of *Epallagoidea* and *Amphipterygoidea* in the Green River Formation confirm that warm conditions occurred at the time of deposition." (Authors)] Address: Bechly, G.B., iologic Institute, 16310 NE 80th Street, Redmond, WA, 98052 USA. Email: gbechly@biologicinstitute.org

**19076.** Brockhaus, T. (2021): Einige Libellenbeobachtungen am Czorneboh im Oberlausitzer Bergland (Odonata). *Mitteilungen Sächsischer Entomologen* 40(140): 154-155. (in German) [Sachsen, Germany. A locality, 120 years ago known as habitat of *Nehalennia speciosa*, was reexamined. Five excursions in 2006 and 2007 resulted in 15 odonate species, including *Coenagrion hastulatum* and *Lestes virens*, *Aeshna juncea*, *Leucorrhinia dubia*, *L. rubicunda*, *Sympetrum danae*, *N. speciosa* was not traced.] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**19077.** Choong, C.Y.; Mahadimenakbar, M.D. (2021): Dragonflies and Damselflies (Odonata) of Kadamaian, Kinabalu Park, Sabah. *Journal of Tropical Biology and Conservation* 18: 71-79. (in English) ["The Odonata fauna of Kadamaian was surveyed from 15th to 19th October, 2019 during the Borneo Geographic Expedition 2019 Kadamaian. The altitude of the survey area ranged from 400 m to 850 m above sea level, representing the lower part of Kinabalu Park. A total of 23 species in nine families were recorded – 10 species in *Libellulidae*, three species in *Platycnemididae*,

two species each in *Platystictidae*, *Calopterygidae* and *Coenagrionidae*, and one species each in *Chlorocyphidae*, *Devadattidae*, *Euphaeidae* and *Synthemistidae*. Of these, only one species is a new record for Kinabalu Park – *Pericnemis dowi*. The published Odonata records were compiled to produce a species list known from Kinabalu Park. The total number of species known to Kinabalu Park is now 71. Many more parts in Kinabalu Park need to be explored for a more comprehensive Odonata fauna of the park." (Authors)] Address: Choong, C.Y., Centre for Insect Systematics, Faculty Science & Technology, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. Email: cychoong@ukm.edu.my

**19078.** Chovanec, A. (2021): Libellenkundliche Bewertung von Restrukturierungsmaßnahmen an einem Fließgewässer in Österreich durch Prae- und Post-Monitoring (Trattnach, Oberösterreich) - Odonatological assessment of river rehabilitation by pre- and post-monitoring (River Trattnach, Upper-Austria). *International Dragonfly Fund - Report* 163: 1-43. (in German, with English summary) ["In 2019, a 500 m section of the River Trattnach, which is situated in the municipality Schlüßberg in the Austrian province Upper Austria, has been ecologically enhanced by restructuring the riverbed. The investigation of the Odonata carried out in 2016 (pre-monitoring) and 2021 (post-monitoring) aimed at the evaluation of the success of these measures. Five field trips at three 100 m stretches situated in this section were performed in both years. The regeneration measures at the river caused an increase of the total species number from five to ten and an increase of the number of the certainly, probably and possibly autochthonous species from four to eight. In 2021, four of the five rivertype-specific target reference species were detected: *Calopteryx splendens*, *Calopteryx virgo*, *Gomphus vulgatissimus*, and *Onychogomphus forcipatus*. The autochthonous occurrence of these rheophilous species and their abundances confirm the river-type specific biocoenotic region of this river section (transition between hyporhithron and epipotamon) and indicate the existence of riverbank vegetation as well as of heterogeneous morphological features causing the formation of a mosaic of different current and sediment conditions. The riverbed restructuring had only little influence on the general course of the river channel, which remained mainly straightened. Therefore, limnophilous accompanying reference species benefited only to a small extent from the regeneration measures. The detection of freshly emerged *G. vulgatissimus* and *O. forcipatus* two years after finishing the measures documented the early colonisation of the modified river section by these species. The assessment of the dragonfly-based ecological status of the whole section subjected to rehabilitation measures and of the individual stretches was based on comparing the current dragonfly fauna with a river-type-specific reference community. The Rhithron-Potamon Concept represented the methodological framework. Possible differences between the status quo of the dragonfly fauna and the reference were assessed by the Odonata-River-Zonation-Index and by a scheme of five classes of ecological status stipulated by the EU Water

Framework Directive: "high ecological status", which corresponds to the reference state, "good ecological status", "moderate ecological status", "poor ecological status" and "bad ecological status". The rehabilitation measures caused an improvement of the dragonfly-based ecological status: According to the results gained in the pre-monitoring, the dragonfly-based ecological status of the whole section was classified as "moderate". The three individual stretches investigated were ranked as "poor" and "moderate". The results of the post-monitoring revealed the "good dragonfly-based ecological status" for both, the whole section and the stretches. Even the ecological status of a regulated control-stretch, which was not subjected to rehabilitation measures, changed from "poor" to "moderate". "Spread effects" from the enhanced section to the still regulated section are assumed to be the reason for this improvement." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bmlrt.gv.at

**19079.** Coram, R.A.; Jarzembowski, E.A. (2021): Immature insect assemblages from the Early Cretaceous (Purbeck/Wealden) of Southern England. *Insects* 2021, 12(10), 942: 23 pp. (in English) ["Simple Summary: The non-marine Lower Cretaceous Purbeck and Wealden rocks of southern England provide an important record of insects that lived alongside the dinosaurs. Most fossil remains are those of adult insects from orders alive today, but immature insects and their trace fossils occur in the same deposits. Terrestrial immatures comprise mostly sessile nymphs of true bugs, whereas the aquatic immature fauna is represented by stoneflies and mayflies (rarely), dragonflies (uncommonly), true bugs and true flies (often common in the Purbeck), and the cases of caddisflies (locally common in the Wealden). These fossils help to shed light on the local palaeoenvironment, such as the salinity of water bodies, as well as on the processes that lead to the fossilization of generally fragile insect remains. Abstract: The record of immature insects from the non-marine Purbeck and Wealden groups (Lower Cretaceous) of southern England is reviewed and expanded. Fossils of adult terrestrial insects are locally common, but terrestrial immature remains are restricted to transported hemipterans, most of which are sessile nymphs or puparia resembling those of extant whiteflies (Aleyrodidae). Remains of immature aquatic insects are more diverse and comprise the extant orders Plecoptera, Ephemeroptera, Odonata, Trichoptera, Hemiptera and Diptera. The Trichoptera are represented by larval cases constructed from a variety of materials corresponding to several ichnogenera. The Wealden immature insects were preserved in predominantly freshwater fluvial settings, whereas the Purbeck ones occur in lagoonal palaeoenvironments, ranging in salinity from brackish to hypersaline. The composition of aquatic immature insect faunas in the latter offers potential for palaeosalinity analysis, although there are complicating factors relating to habitat stability. Uncommon trace fossils such as beetle borings in wood provide evidence of immature insects not represented by body fossils." (Authors)] Address: Coram, R.A., School Earth Sciences, Univ. of Bristol, Bristol BS8 1RJ, UK. Email: rob@britishfossils.co.uk

**19080.** Dej Vignesh, K.; Manivannan, S. (2021): Diversity of Odonata (Insecta) in Rural and Urban Wetlands of Coimbatore, Tamil Nadu, India. *The Indian Forester* 147(10): 992-999. (in English) ["A study was conducted to assess the diversity of Odonata in the rural and urban wetlands of Coimbatore, Tamil Nadu, India from August 2018 to January 2019. A total of 4 wetlands from rural and urban were surveyed with a total of 8 families of 32 genera and 45 species were recorded. Among them, 8 families of 21 genera and 26 species from Kallar a tributary stream and 4 families of 20 genera and 25 species from Ukkulam lake of rural whereas 4 families of 15 genera and 18 species from Singanallur lake and 3 families of 9 genera and 10 species from Kurichi lake of urban. Among the anisopterans, *Brachythemis contaminata* was abundant in the urban lakes, *Pantala flavescens* in the rural stream and *Diplacodes trivialis* in the rural lake whereas in the zygopterans, *Neurobasis chinensis* dominated in the rural stream, and *Ischnura aurora* dominated over the lakes." (Authors)] Address: Dej Vignesh, K., Zoological Survey of India, Southern Regional Centre, Chennai - 600028, India

**19081.** Dow, R.A.; Choong, C.Y. (2021): Previously unpublished Odonata records from Sarawak, Borneo, part VII: Odonata from Limbang Division. *Faunistic Studies in South-East Asian and Pacific Island Odonata* 37: 1-18. (in English) ["Records of Odonata from Limbang Division in Sarawak are presented, based on two surveys. The first survey was made in 2010 by the second author in the Paya Maga area at the border with Sabah. The second survey was made by the first author in 2020, mostly within the Ravenscourt Forest Management Unit, but with two days spent at Paya Maga. 54 species are listed from these two surveys. Several species were recorded from Sarawak for the first time during the surveys reported on: *Devadatta tanduk* Dow, Härmäläinen & Stokvis, 2015 and two as-yet-unnamed species of *Coeliccia*; all of these species were previously known from Sabah. Many of the other records are firsts for Limbang Division. Other particularly significant records include *Indolestes dajakanus*, *Protosticta joepani*, *Telosticta ulubaram*, *Euphaea basalis*, *Rhinoneura caerulea*, *Idionyx montana*, *Procordulia fusiformis*, *Hylaeothemis clementia* and *Orthetrum borneense*. *Xiphiagrion cyanomelas* (form B as discussed in Dow et al. (2021)) is reported using surface tension to perch on the surface of a pond. The identity of the unidentified *Devadatta* species recorded from the Long Seridan area in Miri Division by Dow et al. (2021) is discussed further. With the records presented here 123 species of Odonata have now been recorded from Limbang Division and 312 from Sarawak as a whole." (Authors)] Address: Dow, R.A., Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia. Email: rory.dow230@yahoo.co.uk

**19082.** DuBois, R.B.; Tennessen, K.J. (2021): The puzzling presence of *Lestes australis* (Odonata: Lestidae) in Wisconsin — Does this species migrate? *The Great Lakes Entomologist* 54(1&2): 67-73. (in English) ["*Lestes disjunctus australis* Walker, 1952 (Odonata: Lestidae) was described

as a subspecies of *Lestes disjunctus* Selys, 1862. In recent decades it has been considered deserving of full species status by most specialists. The core of its eastern North American range is south of Wisconsin, but during April through June of some years, mature individuals, and occasionally reproductive behavior, are observed at shallow ponds and wetlands mostly in the southern half of the state. Since first recorded in Wisconsin in 2002, it has been detected in 13 of Wisconsin's 72 counties. However, there has been no unequivocal documentation of successful reproduction in the state. Various possibilities regarding long-range dispersal or facultative migration of this species and other species of *Zygoptera* are discussed." (Authors)] Address: DuBois, R.B., Dept Natural Resources, Bureau Natural Heritage Conservation, 1701 North 4th Street, Superior, Wisconsin 54880, USA. Email: rbdubois@gmail.com

**19083.** Ertas, A., Yasartürk, M., Boz, T.; Kizilkaya, I.T.; (2021): Evaluation of the water quality of Karabal stream (Gediz River, Turkey) and comparative performance of the used indices. *Acta Aquatica Turcica* 17(3): 334-349. (in English, with Turkish abstract) ["We used seven biotic indices to determine the water quality of Karabal Stream (Gediz River) in West Anatolia, Turkey. The indices were based on benthic macroinvertebrate and physicochemical parameters: Saprobic Index (SI), Biological Monitoring Working Party (BMWP), Average Score per Taxon (ASPT), Family Biotic Index (FBI), Belgian Biotic Index (BBI), EPT-Taxa [%] were used as biotic indices and Shannon-Weaver index (SWDI), Simpsons index (SDI) and Margalef index (MDI) for diversity. Ten taxonomic groups were found in Karabal Stream consisting of Crustacea, Oligochaeta, Gastropoda, Ephemeroptera, Plecoptera, Trichoptera, Odonata, Coleoptera, Diptera, and Hemiptera. The water quality along the stream varied from good class in the upstream stations, to moderate in downstream stations according to the most suitable indices. According to canonic correspondence analysis (CCA), the distributions of Diptera, Oligochaeta, and Hemiptera species are positively correlated to EC, Cl, Turbidity, Temperature, NH<sub>4</sub>-N, NO<sub>2</sub>-N, and NO<sub>3</sub>-N while they are negatively correlated to DO, DOS and pH. The distributions of EPT species are positively correlated to DO, DOS and pH. According to Pearson's correlation, the BBI, BMWP (Original), BMWP (Spanish), and EPT-Taxa [%] metrics were sufficient in the estimation of water quality in the examined watercourse. Considering studies in surface waters of Turkey, the BMWP and EPT-Taxa [%] indices reflect the water quality as correctly in all studies we examined, however, BBI did not always show reliable results. Therefore there is a need for the establishment of a Turkish Biotic Index which takes into account country-specific macroinvertebrates, their abundance, biology, and ecology. ] Address: Ertas, A., Ege University, Faculty of Science, Dept of Biology, 35100 Bornova, Izmir, Turkey. Email: alperenertas@hotmail.com

**19084.** Ferreira, T. (2021): Odonata da Coleção Entomológica Adalberto Antônio Varela-Freire: inventário, identificação e curadoria. BSc. thesis, Centro de Biociências, Universidade Federal do Rio Grande do Norte, Natal: 31 pp.

(in Portuguese, with English summary) ["Odonata is an insect order with broad geographic distribution, popularly known as dragonflies and damselflies. They are predators associated with water ecosystems, and therefore they are often used for environmental quality studies. The objective of this study was to inventory the odonates from the Coleção Entomológica Adalberto Antônio Varela-Freire and their storage conditions, to identify the specimens and to indicate measures of curatorship to ensure their long term preservation in accordance to practices conventionally adopted by other entomological collections. A total of 3181 specimens was inventoried, most preserved dry, kept in envelopes in varying conditions (2319 specimens) or ethanol (860 specimens). The identified specimens belong to 2 families (Aeshnidae and Libellulidae) and 14 genera, some of which were recorded for the first time in Rio Grande do Norte. Two hundred specimens were curated, with the major changes being the use of polyethylene zipper lock envelopes and printed labels with data obtained through the process of inventory. This study increases to 18 the number of species/genera recorded from the state. Even though the number of localities represented in the collection was limited, it still constitutes an important record of the state's dragonfly fauna, which should be further studied and have its data uploaded to public biodiversity databases, so that it becomes more accessible to researchers and to the general population as well." (Author)] Address: not stated

**19085.** Joshi, V.; Mysa, R.C. (2021): Hydrodynamic analysis of tandem flapping hydrofoils. *International Conference on Ocean, Offshore, and Arctic Engineering (OMAE)*. Vol. 6. Paper No: OMAE2021-62191, V006T06A006: 12pp. (in English) ["Flapping hydrofoils in tandem configuration find applications in wave gliders, dragonfly, dorsal-tail fin interaction in fishes, among others. The flapping motion consists of a combination of heaving and pitching motion. This type of motion involves complex interaction of the vortices shed from the upstream hydrofoil with the downstream hydrofoil, thus influencing the performance of the downstream hydrofoil. A two-dimensional stabilized finite element moving mesh framework is utilized for the current study. The important parameters which influence the flow interactions are the chord size ratio and the gap between the hydrofoils. The size ratio is defined as the ratio of the chord of the upstream hydrofoil to that of the downstream hydrofoil. The size ratio is varied from 0.25 to 1. The gap is varied from one chord length to 3 chord lengths of the downstream foil. The study focuses on the effect of the size ratio, gap and flapping kinematics based on sinusoidal heaving and pitching motion on the detailed flow dynamics of the tandem hydrofoils. The effect on the thrust coefficient and hydrodynamic efficiency is explored and compared with that of an isolated hydrofoil. The results obtained from the study can pave way for a better understanding with regard to engineering designs based on biomimetics." (Authors)] Address: Vaibhav Joshi, V., Birla Institute of Technology & Science Pilani, Goa, India



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2004

**19086.** Futahashi, R.; Futahashi, H.; Araki, Y.; Negoro, H. (2004): The dragonflies and damselflies of Toyama prefecture, central Honshu, Japan. Spec. Publs Toyama Sci. Mus. 17: ii + 220 pp. (in Japanese, with english summary) ["We investigated the odonata fauna in Toyama Prefecture mainly in the last 10 years. Our investigations were carried out on the largest scale in Japan at the prefecture level for the times of survey, the number of places, and the amount of data. In this report, we listed up the data of the 9,671 specimens of 84 odonate species belonging to 11 families contributed to Toyama Science Museum by Ryo Futahashi, Hiroyuki Futahashi and Yoshimasa Araki. Other original data mostly in Futahashi and Araki's collections were also reported. Consequently, many new records of collection and localities were added for many species. Based on these data, we reported 86 species and 5 hybrids from 11 families recorded in Toyama Prefecture. The characters such as distribution, life cycle, habitat, morphology, behavior were commented for each species. The present condition of Odonata fauna of Toyama Prefecture was comprehensively revealed. Only the following two have not been found in this investigation (the last collection year in parenthesis); Gomphus postocularis (1972) and Onychogomphus viridicostus (1959). Here we show three tables; Habitat, distribution in neighbor prefecture and behavior of 86 species known in Toyama Prefecture (Table 1). All the collection data of Odonata species for every city, town and village in Toyama Prefecture (Table 2). Fluctuation in adult occurrence for each of 86 species and 5 hybrids known in Toyama Prefecture (Table 3). In addition, a map of the distribution in Toyama Prefecture and a graph showing the seasons of occurrence of the adult are presented for each species and hybrids." (Authors) Address: Futahashi, R., Fujiwara Lab., Univ. Tokyo, Biosci. Bldg 501, Kashiwa, Chiba, 377-8562, Japan

**19087.** Groenendijk, D. (2004): Mogelijkheden voor monitoring van de rivierrombout. Rapportnummer VS2004.038,

De Vlinderstichting, Wageningen: 14 pp. (in Dutch) ["Introduction and Purpose: Stylurus flavipes belongs to a special dragonfly family. They are often difficult to find as a dragonfly, but the larval skins are often in a conspicuous place. The current situation is therefore that they are not well represented in the National Monitoring Network for Dragonflies, and it is therefore not possible to calculate trends for these species. Yet this is important, because within the Netherlands, two species of dragonflies, *S. flavipes* and *Ophiogomphus cecilia*, are listed on the Habitat Directive. Therefore, the aim of this study was to investigate whether there is a method of using larval skin counts to include the *S. flavipes* and possibly other species of Gomphidae in the dragonfly monitoring network. Method: *S. flavipes* was found again in 1996, after an absence of many years. Since then the species has made a considerable advance and is found in most larger river systems in the Netherlands. In 2004 eight counting routes of about one kilometre were set out in the catchment of the Rhine and Waal in the direct vicinity of Wageningen. These routes were all walked twice between 28 June and 17 July, with all larval skins recorded per groene section. Results: In total, over 80 exuviae of the *S. flavipes* were found on the eight counting routes. Some imago were also found. Along the Rhine routes more larval skins were found in direct comparison to the routes along the Waal. Counting one counting route took on average over an hour. Conclusion: The results show that with a good choice of counting routes, counts of larval scales of the river scrub offer a good opportunity for inclusion in the NEM and then in the future counted by volunteer counters. This method of counting offers the best chance for *S. flavipes* and probably also for *Gomphus vulgatissimus*. It is important that the counting route is shortened to a maximum of 500 metres and that counting is not carried out at wind force 4B and above. About the necessary counting frequency no statements can be made yet." (Author/Deepl)] Address: De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: info@vlinderstichting.nl

**19088.** Lazaridou-Dimitriadou, M.; Koukoumides, C.; Lekka,

E.; Gaidagis, G. (2004): Integrative evaluation of the ecological quality of metalliferous streams (Chalkidiki, Macedonia, Hellas). *Environmental Monitoring and Assessment* 91: 59-86. (in English) ["The present study reports on a year-long (November 1997–November 1998) study of water quality in streams of the Olympias and Skouries areas of Chalkidiki (Hellas), subject to past and present mining activities. Benthic macroinvertebrates were collected from 18 sampling sites at five sampling intervals, while several physico-chemical parameters of the water (D.O., pH, temperature, nutrients etc.) were also measured. Five European biotic indices and scores and two multivariate statistical methods (CANOCO, FUZZY) were applied to the macroinvertebrate data. The concentration of various trace metals in the water, sediment, fish and crustaceans were also measured. Most sampling stations exhibited a highly diverse macroinvertebrate fauna during the whole year. However, a slight amelioration of water quality was observed during the high-flow period (winter and early spring), regarding diversity of several invertebrate groups, especially pollution-sensitive families, which decreased. The European biotic indices and scores proved to be relatively ineffective in describing water quality and it is suggested that an Hellenic biotic indice or score should be created. The bioaccumulation studies indicated variable effects of trace metals and organic load on macroinvertebrates according to the degree of load." (Authors) Odonata; "Gomphidae, Aeshna, Calopteryx, Cordulegaster spp."] Address: Lazaridou-Dimitriadou, M., Dept Zool., School of Biology, Fac. Sci., Aristotle Univ., Thessaloniki, Greece. E-mail: mLazarid@bio.auth.gr

**19089.** Lill, S. (2004): Die Libellenfauna im Einzugsgebiet der Pfrimm (Pfalz) unter besonderer Berücksichtigung der Indikatorqualitäten der Imagines von *Calopteryx virgo*, *Platycnemis pennipes*, *Orthetrum cancellatum* und *Crocothemis erythraea*. Diplomarbeit. Universität des Saarlandes: 164 pp. (in German) [Rheinland-Pfalz, Germany. "In the years 2001 to 2003 (with a focus on April to October 2003), the occurrence and distribution of the dragonfly fauna in the catchment area of the Pfrimm was investigated. The selected area lies between the source of the Pfrimm southwest of Sippersfeld and the eastern border of the Donnersberg district between Zellertal and Wachenheim. It includes parts of the natural areas Pfälzerwald, Nordpfälzer Bergland and Rheinhesisches Tafel- und Hügelland. The survey of odonates mainly focused on the observation of reproductive and hatching imagines. Dragonflies were searched for at selected flowing and still waters and their surroundings. In addition, larvae and exuviae were also observed. A total of 32 dragonfly species were found in the study area, 29 of which were considered to be native to the area. It is noteworthy that only 3 of the odonates recorded were purely running water species. Of the 32 dragonflies recorded, 21 (= 64 %) are considered endangered according to the Rhineland-Palatinate Red List (EISLÖFFEL et al. 1993), which means that 33 % of the "endangered species" in Rhineland-Palatinate occur in the study area. The detected dragonflies were briefly described with regard to their ecology, and possible reasons for their distribution in the area were discussed. An

essential part of this work was the investigation of the indicator suitability of the imagines of *C. virgo*, *P. pennipes*, *O. cancellatum* and *C. erythraea*. The following results were found for the study area: *C. virgo* is a good indicator for open, sunny stream sections with well-developed vegetation structures in the study area. Monotonous stream sections lined with gallery forest and thus shaded were avoided due to the lack of favourable vegetation conditions here. In the study area, *P. pennipes* is only suitable to a limited extent as an indicator for permanent, sunny still waters with structurally rich vegetation at the edge of the bank and in the direct vicinity of the water body, whereby a preference for ponds is obvious. At less diverse or less vegetated stillwaters, the species flew only in smaller numbers of individuals. *P. pennipes* occurred extremely rarely and in low abundance at the watercourses in the study area; the streams are not suitable or at best suboptimal for the species. *O. cancellatum* has only limited indicator qualities in the study area. All habitats had in common a continuous exposure to sunlight, the size of the water body played a rather subordinate role in the colonisation. A completely free water surface as well as shore areas free of or poor in vegetation could be found predominantly, but not at all water bodies surveyed. However, large abundances on the sparsely vegetated bank sections of the surveyed sampling sites suggest that a lack of vegetation played a corresponding role in the choice of habitat. In the study area, *Crocothemis erythraea* can be regarded as a good indicator for eutrophic, well-sunlit, wind-protected still waters with sufficient shallow water zones in climatically favourable locations. The occurrence of the fire dragonfly in the Pfrimm is probably promoted by the presence of habitat structures that provide wind protection and at the same time cause heat accumulation. The distribution focus of *C. erythraea* in the study area is in the climatically favoured Rheinhesische Tafel- und Hügelland. The findings at the sampling sites in the Pfälzerwald and Nordpfälzer Bergland indicate a possible spread of the dragonfly in these areas as well. Of the proportionate natural areas in the study area, the largest number of dragonfly species was recorded in the Rheinhesisches Tafel- und Hügelland. Due to the favourable climatic conditions of this area, most of the warmth-loving species were observed here, as expected, but the Euro-Siberian species also experienced their strongest distribution here. In the study area, protection and management measures are particularly appropriate along the watercourses. The partly complete shading of the streams by a uniform, monotonous gallery forest only allows colonisation by stream dragonflies in the few open areas. By thinning out sections of the wooded area, which also takes into account the requirements of other species groups, more favourable settlement opportunities could be created for dragonflies of flowing waters." (Author/DeepL) People interested in relationship between music and dragonflies will be interested in the current activities of Stefan Lill: <https://www.vandenplas.de/band/> Address: not stated

**19090.** Pagel, M. (2004): Maßnahmenkonzept zur Optimierung der Lebensräume von Amphibien und Libellen im

Zollhausried bei Blumberg. Diplomarbeit. Hochschule Nürtingen: 127 pp. (in German) [Baden-Württemberg, Germany. "In the present work, the amphibian and dragonfly species of the Zollhausried nature reserve are first presented and their population trends are shown on the basis of earlier mapping results and extensive current surveys. It becomes clear, especially in the case of amphibians, that a decline in species as well as a decrease in abundance can be observed in the area for all ten species studied. The Great Crested Newt (species of Community interest according to Annex II of the Habitats Directive), the Midwife Toad and the Natterjack Toad could no longer be detected in 2004. The dragonflies of the study area are less specially adapted, but here too a decline can be observed, especially in the Red List species. As a further basis, numerous structural and vegetation-typical features of all reproduction waters were recorded and described in a uniform and comparable manner using various evaluation matrices. The current habitat availability was then compared with the requirements of the amphibian and dragonfly species currently or formerly occurring there. The deficits that became apparent could be compiled in a catalogue, which forms the sound basis for numerous measures, all of which pursue a common goal: The enhancement of the amphibian and dragonfly habitats of the Zollhausried. A particular deficit was identified as the lack of dynamics of the former peat digging, which had a landscape-altering effect and created vegetation-free areas. It is precisely on these sites that the species of the former stream and river floodplains are dependent. By designing several measures, a careful attempt is being made to integrate some dynamic structures into the sensitive lowland moorland. The occurrence of the individual species and the redesign measures are also shown in maps." (Author/DeepL)] Address: not stated

**19091.** Polhemus, D.A.; Helgen, K. (2004): Preliminary studies on the biodiversity of mammals and aquatic insects in East Timor. Report to the Ministry of Environment, Dili, Timor-Leste: 35 pp. (in English) ["Seventeen sampling stations in East Timor, ranging in elevation from 0 to 1585 meters elevation, were sampled for aquatic insects from 11 to 21 November 2003. The sampling stations included sites on the Mt. Ramilau massif, the Baucau Plateau, and the limestone mountain ranges near Lospalos, in the far east. Sampling concentrated on three major groups that had been employed in previous aquatic biodiversity surveys in the Australasian region: Heteroptera (aquatic true bugs), Zygoptera (damselflies), and Gyrinidae (whirlygig beetles), with other aquatic insect taxa also collected on an opportunistic basis. Thirty-eight species in 26 genera of aquatic Heteroptera were collected, of which at least 7 are new to science, and 2 others are described species reported from Timor for the first time. In the Zygoptera, 5 species in 4 genera were collected, all representing species previously reported from the island. In the Gyrinidae, 4 species in 3 genera were collected, all once again representing previously reported species, although many of these had not been collected in over 70 years. Aquatic insect diversity in East Timor was moderately high by regional standards, and similar to that seen in

corresponding elevational zones in western Timor. The richest overall site sampled was the Tchino River south of Lospalos, which supported 17 species of aquatic Heteroptera, 2 species of Gyrinidae, and 2 species of Zygoptera. The richest individual site for Zygoptera was the Irasiquero River east of Lospalos, where 4 species were collected. The richest sites for Gyrinidae were the Tchino River near Lospalos and the upper Eralisau River south of Maubisse, both of which harbored completely different sets of 2 species each; the latter site was also the second richest site for aquatic Heteroptera, supporting 12 species. The site with the highest number of Timor-endemic taxa across these three groups combined was the Tchino River, which supported 11 Timor endemics out of the 21 taxa present, for an local endemism rate of over 50 percent. Throughout East Timor there was clear evidence of catchment degradation due to overgrazing by domesticated ungulates such as goats and banteng in the lowlands and water buffalo in the highlands, which have damaged riparian zones across all elevational ranges. The rivers in best overall condition were those of the far east, in the Lospalos area, where higher rainfall and some degree of local fencing serve to mitigate ungulate impacts. Due to poorly functioning water systems in East Timor at the present time, this catchment degradation has a direct effect on the quality of water supplies being used by local families, and it is suggested that a program of selective fencing around watercourses, coupled with construction of livestock watering troughs at some distance from streams, would benefit both stream ecology and public health." (Authors)] Address: Polhemus, D., Dept. of Natural Sciences, Bishop Museum, 1525 Bernice St., Honolulu, HI, 96817, USA. Email: bugman@bpbm.org

**19092.** Towers, N.M. (2004): Invertebrate community structure along a habitat-patch size gradient within a bog pool complex. Doctor of Philosophy thesis, University of Edinburgh: Vii, 152 pp. (in English) ["This thesis characterises species richness and community structure over a habitat patch size gradient of a typical bog-pool complex, investigating the effect of pool size on aquatic invertebrate communities. In this study, twenty-two pools were surveyed ranging in area from 8.6 m<sup>2</sup> to 280.9 m<sup>2</sup> within a single complex at Forsinard in the north of Scotland. Three different sampling methods were used: baited and unbaited activity traps and a sediment sampler. Univariate and multivariate methods were used to investigate the effects of pool size and pool location within the complex on species richness and community structure. The research expands our knowledge of peatland pool invertebrates by providing a comprehensive survey of the aquatic invertebrate fauna representative of the Flow Country of northern Scotland. Two IUCN British Red Data Book species were recorded: *Coenagrion hastulatum*, and the cased caddisfly, *Nemotaulius punctatolineatus* (Retzius). Three species of aquatic Coleoptera were collected that have Nationally Notable status according to Ball (1986): *Dytiscus lapponicus* Gyllenhal, *Ilybius aenescens* Thomson and *Gyrinus minutus* Fabricius. All these species are typical of, and often restricted to, this habitat type. The three different sampling methods differed in their sampling

efficiency and each gave a different species spectrum. A distinct seasonal change in the samples was also observed. The number of taxa caught per standardised sampling unit (taxon density) was investigated over the pool size gradient. Relationships between taxon density and area were weak or non-existent in both unbaited activity traps and sediment samples. However, the number of beetle species caught in baited activity traps increased significantly with pool size, indicating that the total number of beetle species per pool may also increase over the size gradient. Ratios of the number of predator taxa to prey (non-predator) taxa for each pool ranged from 0.34 to 0.78 with a mean of 0.49 and were not affected by pool area or total taxonomic richness. Taxa displayed a positive abundance-occupancy relationship and the possible underlying mechanisms involved in creating this pattern are discussed. Multivariate techniques showed that pool area, depth, and distance from the centre of the pool complex (periferality) all had a small but significant affect on community composition and that between certain taxa there were distinctly different optima along the pool size gradient. These results are discussed in the context of species area theory." (Author)] Address: not stated

## 2016

**19093.** Andersen, E.; Nilsson, B.; Sahlén, G. (2016): Survival possibilities of the dragonfly *Aeshna viridis* (Insecta, Odonata) in southern Sweden predicted from dispersal possibilities. *Journal of Insect Conservation* 20(2): 179-188. (in English) ["We use public records from 1980 to 2014 to analyse survival of the EU Annex IV species *Aeshna viridis* in Sweden, a dragonfly strongly associated with the plant *Stratiotes aloides*. We clustered localities with *S. aloides* based on assumed dispersal abilities of *A. viridis*, using a dispersing radius of 2–100 km, calculating the proportion of sites with *S. aloides* that *A. viridis* is able to reach. If mean dispersal capability is high (40 km or above) 92.6 % or more of the localities are connected. For a good disperser, the probability of long-time survival is good. We further analysed the species richness of other Odonata and aquatic plants at 98 localities from the dataset. *A. viridis* co-occurred with more Odonata in the presence of *S. aloides* and running water but not in lakes. *S. aloides* sites had a higher number of other aquatic plants. Area had no impact on the occurrence of the species. For the present situation we surveyed 32 localities with known occurrence of the species. Only half of the sites for *S. aloides* contained any specimens while *A. viridis* occurred in the same number of sites. The species co-occurred in only 8 of 32 sites. In four sites *A. viridis* larvae appeared among *Menyanthes trifoliata*, *Phragmites australis*, *Potamogeton natans* and *Sphagnum* spp., indicating that at high latitudes *A. viridis* breeds among other species. Indirect monitoring based only on *S. aloides* would underestimate the number of populations of the dragonfly." (Authors)] Address: Sahlén, G., Ecology and Environmental Sciences, School of Business, Engineering and Science, Halmstad University, P.O. Box 823, 30118, Halmstad, Sweden

**19094.** Banjo, F.M.; Sebiomo, A. (2016): Biodiversity and

seasonal variation of macro invertebrates in four water bodies in Odogbolu Local Government area of Ogun State. *African Journal of Science and Nature* 3: 57-61. ["The biodiversity and seasonal variation of aquatic macroinvertebrates in four different water bodies in Ijagun, Ijele, Odepo and Imaweje in Odogbolu Local Government Area of Ogun State were investigated using modified kick sampling technique between July and December 2014. The aquatic macroinvertebrates were sampled twice in a month using a scoop net (0.5mm mesh size with 0.4m diameter). The collected samples were preserved separately in 10% formalin and later identified. The physical properties (air and water temperature (oC), water current and water depth) of the water bodies were measured. Analysis of variance and spear man analytical tools were used to analyze the collected data. The different aquatic macro-invertebrates encountered belong to the super phylum Arthropoda, and three phylaviz: Mollusca, Annelida and Nematoda. The most abundant macro-invertebrate group was insects belonging to the orders Diptera (*Simulium* sp., *Chironomus* sp., *Anopheles* sp., and *Cricotopus* sp.), Odonata (*Agrocnemis femina*, *Macromia* sp and *Calopteryx* sp.), Coleoptera (*Dysticus marginalis* and *Hydrophilus* sp.), and Heteroptera (*Gerris lacustris*). The correlation coefficients (rho) of water depth, water current, water and air temperature in relation to frequency of occurrence of macro invertebrates were found to be -6.2, -4.2, -4.6 and -2.6 respectively. Water depth was the strongest factor that could determine the abundance of organisms. All physical properties showed inverse relationship with variation of aquatic macro invertebrates in the water bodies." (Authors)] Address: Banjo, Folake Mary, Department of Biology Education, Tai Solarin University of Education, Ijagun, Ogun State E-mail: flkmary@yahoo.com

**19095.** Beukema J.J.; Smit, H. (2016): Counts of Odonata in the Zwanenwater nature reserve. *Brachytron* 18(1): 30-37. (in Dutch, with English summary) ["Zwanenwater is a dune area in the northwestern part of the Netherlands. Most of the Odonata in the area occur at small (some tens to a few hundreds of m<sup>2</sup>) and shallow pools. In dry periods, part of these pools dry up completely. At 12 pools, numbers of Odonata were counted 4 to 8 times per year during the 9-year period 2007-2015. A second observer counted independently at the same pools. Due to a slight difference in counting method, he recorded about 15% more individuals. Nevertheless, highly similar long-term fluctuation patterns and local differences in Odonata abundance were found by the two observers. Particularly few Odonata were encountered in 2010 and 2011 after a serious drought at the end of the summer of 2009, causing complete drying up of several pools and serious reduction of the surface area in the remaining pools. Recovery of numbers was a slow process, in particular in Zygoptera. In 2010, individuals of these small-sized species were even fully absent at the pools that had been completely dry in 2009. Only by 2013 (deeper pools) or 2014 (shallower pools) had the numbers and species composition recovered to pre-drought levels. We recommend deepening of the central parts of some shallower pools by about 0.5 m to create more stability in Odonata



abundance." (Authors)] Address: Beukema, J.J. E-mail: Jan.beukema@nioz.nl

**19096.** Billqvist, M. (2016): Genomgång och digitalisering av trollsländor och dykarskalbaggar på Lunds Zoologiska museum. Naturvårdsverket 106 48 Stockholm: 9 pp. (in Swedish) ["The collections of previously unrecorded and in many cases unidentified dragonflies and divers at the Biological Museum, Lund University, have been reviewed, and from the material species occurring in the Habitats Directive have been sorted out. Five of the six species of dragonflies listed in the Directive were found in Sweden: green mosaic dragonfly *Aeshna viridis* (18 records), green river dragonfly *Ophiogomphus cecilia* (9), powdered dragonfly *Leucorrhinia albifrons* (69), broad dragonfly *Leucorrhinia caudalis* (21) and lemon-spotted dragonfly *Leucorrhinia pectoralis* (39). (The sixth species, the Siberian winter dragonfly *Sympetma paedisca*, is only found in Sweden occasionally and is therefore missing from the collections.) ... There is a very large amount of material available, so the mission has focused on recording the records of the species concerned from different localities and landscapes, and those not previously recorded by the Species Data Bank in 1998 (Ragnar Hall 1998). The collections consisted of different types of material; mounted dragonflies and divers, dragonflies in envelopes, animals in spirits, larvae and caterpillar skins. This study was limited to mounted material and material in envelopes. Animals in spirits, larvae and larval skins can be reviewed if necessary. All collections recorded were also individually tagged with museum labels." (Author/DeepL)] Address: Billqvist, M., Länsstyrelsen Östergötland, Postadress 581 86 Linköping, Sweden

**19097.** BioDrawversity (2016): Assess operational impacts on emergence of state-listed odonates in the Connecticut River: 2014–2016. Study report. Northfield Mountain Pumped Storage, Project No. 2485 and Turners Falls Hydroelectric Project No. 1889. Leverett, MA.: 118 pp. (in English) ["Pumped Storage Project (Northfield Mountain Project, FERC No. 2485) and the Turners Falls Hydroelectric Project (Turners Falls Project, FERC No. 1889). FirstLight has initiated with the Federal Energy Regulatory Commission (FERC, the Commission) the process of relicensing the Northfield Mountain and Turners Falls Projects using FERC's Integrated Licensing Process (ILP). The current licenses for the Northfield Mountain and Turners Falls Projects were issued on May 14, 1968 and May 5, 1980, respectively, with both set to expire on April 30, 2018. This report documents the results of Study No. 3.3.10: Assess Operational Impacts on Emergence of State-Listed Odonates in the Connecticut River. The study goal was to assess potential effects of Project operations on emerging dragonflies (Insecta: Odonata; hereafter called "odonates") in the Connecticut River. To meet this goal, field surveys were conducted to characterize the habitat, assemblage structure, and emergence and eclosure behavior of odonates in the Project area. This information was compared with existing data on odonates and water surface elevation (WSEL) collected throughout the Project area. Three phases of fieldwork

were completed. Phase 1, completed in 2014, included qualitative surveys of odonate larvae and exuviae at eight sites in the Connecticut River to determine species assemblage structure and to collect habitat data. For teneral or exuviae, biologists recorded the vertical and lateral distance from the water's edge, and the substrate that each was collected on. Phase 2, completed in 2015, included quantitative odonate surveys, observations of emergence and eclosure behavior, and concurrent collection of WSEL and water temperature data. Surveys for emerging larvae, exuviae, and teneral were conducted at five sites, with six transects per site, during eight biweekly sampling periods from late May to early September. Biologists looked for larvae exiting the water or crawling on land, and attempted to track and record the time it took for individuals to complete eclosure and fly away. For each exuvia and teneral, the vertical height above the water's surface, the distance from the water's edge, and its eclosure substrate was recorded. Phase 3, completed in 2016, was intended to increase sample sizes for eclosure duration for state-listed odonates and to collect additional data on the vertical heights and horizontal distances traveled prior to eclosure. The speed for all or part of the eclosure process was recorded for 180 specimens, with nearly 90% of these observed in 2016. Surveys for emerging and eclosing larvae were conducted at eight sites in the Turners Falls Impoundment (TFI) and downstream from the Turners Falls Dam, on warm sunny days during peak emergence from late May through mid-July. A total of 17 species were collected from 2014 to 2016, including the state-listed *Gomphus abbreviatus*, *Gomphus vastus*, *Gomphus ventricosus*, *Neurocordulia yamaskanensis*, and *Stylurus amnicola*. Species found most frequently in the riverine environments in the bypass reach and downstream from Cabot Station in the Connecticut River included *Gomphus vastus*, *Boyeria vinosa*, *Stylurus spiniceps*, *Ophiogomphus rupinsulensis*, *Neurocordulia yamaskanensis*, *Dromogomphus spinosus*, *Gomphus abbreviatus*, and *Macromia illinoensis*. The lower TFI (Barton Cove) was inhabited by several species more tolerant of lentic conditions, such as *Epithea princeps*, *Perithemis tenera*, and *Libellula* sp.

**19098.** For all species combined, larvae crawled a median vertical height of 5.5 ft from the water's surface, and a median distance of 12.5 ft from the water's edge. Among the riverine species, crawl height was greatest for *Macromia illinoensis*, *Gomphus abbreviatus*, and *Gomphus vastus*; each of these species crawled a median height of near or above 7 ft. Riverine species that crawled the shortest height from the water's surface included *Stylurus amnicola* (median = 2.2 ft), *Stylurus spiniceps* (median = 3.4 ft), and *Ophiogomphus rupinsulensis* (median = 3.5 ft). The more lentic species collected in Barton Cove crawled shorter distances from the water's surface than the riverine species. Average horizontal crawl distance was usually 10-15 ft for most species, with maximum distances often 3-4 times greater than the average. Shortest crawl distance was for *Perithemis tenera* (a lentic species that prefers to emerge on aquatic vegetation) and *Stylurus amnicola*. Considering

crawl height and crawl distance together, the riverine species that tended to eclose closest to the water were *Stylurus amnicola*, *Stylurus spiniceps*, and *Ophiogomphus rupin-sulensis*. In general, species eclosed on a wide variety of available substrates. The time elapsed from when a larva stopped to when it completed metamorphosis ("Start to Free") ranged from 7 to 30 minutes (average= 18 minutes). The time elapsed from completion of metamorphosis to flight ("Free to Flight") ranged from 7 to 96 minutes (average = 39 minutes). Together, these two time periods comprise the critical time period from when a larva stops to eclose to when it flies away ("Start to Flight"). A total of 170 specimens were observed for the entire critical time period. The average duration was 58 minutes and ranged from 24 to 126 minutes. In terms of understanding potential effects of water level fluctuations, the concern is for those species that tend to remain close to the water's edge, especially in areas of the river where water level fluctuations and rates of change are greatest. For the analysis, Critical Protective Rates (CPR) (ft/hr) were computed for species and species groups, using climbing height quantiles divided by a conservative eclosure duration of 2.0 hrs. CPR values were compared to the 95th percentile of the maximum hourly rates of change (MHR-95%) at several representative sites in the TFI and downstream from Cabot Station, derived from the hydraulic models for the daily period from 4am to 5pm, from May 15 to August 15. The hydraulic model for the TFI was based on data from 2000-2015 (excluding 2010 due to the extended outage at Northfield Mountain), and the hydraulic model for downstream was based on data from 2008-2015 (excluding 2010). For the bypass reach, empirical water level data from 2014-2015 was used. This provided a means of assessing the potential impacts to species or species groups, based on their behavior (climbing height and eclosure time) and the rate of water level changes at locations throughout the Project area. Water level fluctuations and rates of change may affect odonate emergence in areas of the Connecticut River closest to Cabot Station during the seasonal (May 15-August 15) and daily (4am to 5pm) periods evaluated, which correspond to peak emergence periods for odonates. State-listed odonate species documented in these areas include *Gomphus abbreviatus*, *Gomphus vastus*, *Neurocordulia yamaskanensis*, and *Stylurus amnicola*. Predicted effects were highest for *Stylurus amnicola*; at least 30% of the population, and closer to 50% near Cabot Station, were at risk of inundation based on the MHR-95%. Only a small percentage of the population of *N. yamaskanensis*, *G. vastus*, and the *Gomphus* Group were potentially affected by inundation based on MHR-95%, and these effects were most pronounced close to Cabot Station. Among co-occurring riverine species, *S. spiniceps*, *O. rupin-sulensis* and *D. spinosus* were likely most affected by water level fluctuations, based on the tendency of these species to eclose closer to the water." (Authors)] Address: Biodrawwersity LLC, Ethan Nedau, Leverett, MA 01054, 206 Pratt Corner Road, USA

**19099.** Caparoso, K.R.; Medina, M.N.D.; Jumawan, K.M.; Villanueva, R.J. (2016): Species composition and status of

Odonata in Malabog, Paquibato District Davao City, Philippines. Univ. of Min. Intl. Mult. Res. Jour. 1(2): 158-163. (in English) ["Despite series of Odonatological expeditions in Mindanao, there are still areas with no Odonata record. The present paper presents the list and status of Odonata fauna in Malabog, Paquibato District, Davao City Philippines. Odonates were captured using hand picking and hand net for illusive species in five (5) sampling sites: Malabog River, Macaduhong River and its tributaries, Malabog spring, and Maglipayan River. A total of 208 individuals collected comprising of 28 species under 19 genera and 9 families. Zygoptera is represented by seven families comprised of 15 species of which 12 (80%) are Philippine endemic and 5 species are found only in selected areas of Mindanao. Anisopteran record composed of 2 families, Gomphidae and Libellulidae where only 3 out of 13 species or 23% are Philippine endemic. Increase of sampling areas and period for further studies and an immediate conservation effort must be conducted to areas with high endemism is recommended."] Address: Medina, M., Research and Publication Center, University of Mindanao, Davao City Philippines, Email: mnd\_medina@umindanao.edu.ph

**19100.** Chelmick, D.; Seidenbusch, R.; Boudot, J.P.; Brochard, C. (2016): The exuviae of the Urothemistinae of the Arabian Peninsula including the first description of the exuvia and final instar larva of *Urothemis thomasi* Longfield 1932 (Odonata: Libellulidae). *Tribulus* 24: 97-108. (in English) ["The exuviae of all four species of Urothemistinae known from the Arabian Peninsula (*Macrodiplax cora*, *Selysiothemis nigra*, *Urothemis edwardsii* and *U. thomasi*) were collected on recent surveys in UAE and Oman. The exuvia of *Urothemis thomasi*, first discovered in 2013, is described here for the first time. This paper, when used in conjunction with Suhling et al. (2014), provides sufficient information for all species of Libellulidae currently known from Arabia to be identified from final instar larvae and/or exuviae. It is hoped that this will encourage local naturalists to collect and identify specimens, which will improve knowledge of this region of which large areas remain little known." (Authors)] Address: Brochard, C., Marsstraat 77, 9742EL Groningen, The Netherlands. E-mail: info@cbrochard.com

**19101.** Chen, G.; Jia, Q.; Hou, L.; Zhang, Y.; Zhao, Y.; Qin, B. (2016): Preliminary survey on the diversity of Odonata in Zhangye National Wetland Park. *Journal of Ningxia University (Natural Science Edition)* 37(4): 470-475. (in Chinese, with English summary) ["The article made field survey on odonata in Zhangye wetland with the method of combining net capturing with visual inspection to understand the species distribution situation of Odonata in Zhangye wetland and collected totally 834 specimens, which belong to, by authenticating, 5 families, 13 genus and 19 species, among which, Anisoptera is identified as 3 families, 9 genera and 14 species and Zygoptera, 2 families, 4 genera and 5 species. Of all the collected species, Libellulidae is richest in categories, the *Sympetrum pedemontanum* of which, has the maximum species individual amount 127 individuals, accounting for 15.23% of overall collected individuals. The

data investigated were under calculation and analysis with quantitative degree structural proportion relation between species, population diversity index and population growth and decline in different seasons. The population structure of Odonata in Zhangye wetland is comparatively stable, the quantitative distribution, however, varies in different living condition; the diversity of dragonfly population varies as the change of seasons, which conforms to the local climatic variation characteristic and the life history of dragonfly as well." (Authors)] Address: Maize Seed Safety Treatment & Research Center, Hexi Univ., School of Agriculture & Biotechnology, Hexi University, China

**19102.** Coulter, J.P.; Bartels-Hardege, H.; Gennard, D.E.; Mill, P.J.; Cowell, A.; John, E.A.; Hayes, W. (2016): *Aeshna grandis* larvae detect chemical cues derived from carrion: evidence of chemically-mediated food detection? (Odonata: Aeshnidae). *Odonatologica* 45(3/4): 191-212. (in English) ["Odonate larvae locate live, moving prey using a range of predominantly visual and mechanical cues. However, this does not explain observations of larval Odonata in association with submerged corpses, i.e., whether larvae are attracted by chemical cues emanating from submerged dead bodies. Hence the chemosensory capabilities of larval *Aeshna grandis* previously fed on living prey were tested under circumstances in which visual and mechanical perception was impossible, using model 'corpses', i.e., solid, homogenised, and dialysed tilapia, in link-tank test chambers. Results indicated that *A. grandis* larvae recognised cues emanating from the 'carrion' responding by moving in the source direction. Larval behavioral choice tests in link-tanks were also carried out on a selection of amino acids known to be released on tissue decomposition. Larvae responded positively to taurine, proline, L-glutamic acid, and glycine by moving in the direction of the source. These amino acid triggers were assessed electrophysiologically by recording from the antennal nerve. Responses depended on both the amino acid and its concentration. A positive electrophysiological response was noted for glycine at concentrations from 10<sup>-4</sup> to 10<sup>-8</sup> g g<sup>-1</sup> and for taurine, proline, and Lglutamic acid at a concentration of 10<sup>-5</sup> g g<sup>-1</sup>. No response was recorded for glutamate over a range of concentrations from 10<sup>-2</sup> to 10<sup>-6</sup> g g<sup>-1</sup>. Therefore *A. grandis* larvae are able to respond to non-visual cues, such as some of the chemicals released during tissue breakdown, suggesting that, in the absence of live prey, their search for food may be chemically-mediated." (Authors)] Address: Gennard, Dorothy, School Life Sciences, Joseph Banks Laboratories, University of Lincoln, Lincoln, UK, LN6 7DL, UK. E-mail: dgennard@lincoln.ac.uk

**19103.** Craves, J.; O'Brien, D. (2016): Common Baskettail, *Epitheca cynosura* (Odonata: Corduliidae), with extensive dark wing tips. *Argia* 28(3): 11-12. (in English) [18-VI-2016, Three Rivers State Game Area, Cass County, Michigan (41.861°, -85.763°).] Address: Craves, Julie, Rouge River Bird Observatory, University of Michigan-Dearborn, Dearborn, Michigan, USA. E-mail: jcraves@umich.edu

**19104.** Daemen, F.; Huysmans, M.; Munch, P.; De Knijf, G.

(2016): The Lilypad Whiteface (*Leucorrhinia caudalis*) back in Flanders (Belgium), after an absence of 100 years. *Brachytron* 18(1): 23-29. ["*L. caudalis* has been rediscovered in Flanders after an absence of more than a century. The first individual, a female, was observed on 28 May 2013 at Lommel, soon followed by a second observation of a female on 8 June at Den Diel in Mol. The next year, a male was noted on 12 and 13 June 2014 at the same locality in Mol. This was also the place where on 17 May 2015 a male could be photographed. All these observations over a period of three years, all situated around Den Diel in Mol make it very likely that a (small) population is locally present. The habitat of this locality seems to correspond well with the known habitat preferences of this species." (Authors)] Address: Knijf, G. de, Research Institute for Nature and Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. E-mail: geert.deknijf@inbo.be

**19105.** Deacon, C.; Samways, M.J. (2016): Conservation of a phenomenon: rapid, reversible colour change in both sexes of one of the world's most threatened damselflies. *Journal of Insect Conservation* 20(3): 497-504. (in English) ["Physiological colour change is rare in insects. Unusually, both the males and females of *Spesbona angusta* (Odonata: Platycnemididae), Red Listed as Endangered, are capable of rapid and reversible colour change. There is only one known population of this species, which occurs in a unique habitat in the Cape Floristic Region, South Africa. Appreciation of this unusual phenomenon of distinct physiological colour change helps us appreciate that we need to conserve phenomena in the insect world as well as the species themselves. Using controlled experiments, we evaluated the importance of ambient temperature as the possible primary cue for physiological colour change. We found that *S. angusta* responds rapidly to short-term changes in ambient temperature, even in the absence of additional environmental stimuli and without the body temperature matching the ambient temperature. Colour change is reversible when temperature returns to its earlier level. The reason why *S. angusta* shows this rapid and reversible colour change may be a combination of reproductive enhancement, competitive advantage and thermoregulation. This colour change appears to have strong selective advantage in a very particular habitat type, meaning that careful conservation of its habitat in all respects is important, and must be considered in any possible future translocations." (Authors)] Address: Deacon C., Dept Conservation Ecol. & Entom., Stellenbosch Univ., Matieland, South Africa. E-mail: charldeacon@sun.ac.za

**19106.** Duong, M.T.T.; McCauley, S.J. (2016): Predation risk increases immune response in a larval dragonfly (*Leucorrhinia intacta*). *Ecology* 97(6): 1605-1610. (in English) ["Predators often negatively affect prey performance through indirect, non-consumptive effects. We investigated the potential relationship between predator-induced stress and prey immune response. To test this, we administered a synthetic immune challenge into dragonfly larvae (*L. intacta*)

and assessed a key immune response (level of encapsulation) in the presence and absence of a caged predator (*Anax junius*) at two temperatures (22°C and 26°C). We hypothesized that immune response would be lowered when predators were present due to lowered allocation of resources to immune function and leading to reduced encapsulation of the synthetic immune challenge. Contrary to our expectations, larvae exposed to caged predators had encapsulated monofilaments significantly more than larvae not exposed to caged predators. Levels of encapsulation did not differ across temperatures, nor interact with predator exposure. Our results suggest that the previously observed increase in mortality of *L. intacta* exposed to caged predators is not driven by immune suppression. In situations of increased predation risk, the exposure to predator cues may induce higher levels of melanin production, which could lead to physiological damage and high energetic costs. However, the costs and risks of increased allocations to immune responses and interactions with predation stress remain unknown." (Authors)] Address: McCauley, Shannon, Dept of Biology, Univ. of Toronto Mississauga, 3359 Mississauga Road North, Mississauga, Ontario, L5L 1C6 Canada

**19107.** Ekena, G.; Isfendiyaroglu, S.; Yenyurt, C.; Levent Erkol, I.; Karatas, A.; Atal, M. (2016): Identifying key biodiversity areas in Turkey: a multi-taxon approach. *International Journal of Biodiversity Science, Ecosystem Services & Management* 12(3): 181-190. (in English) ["Key biodiversity areas (KBAs) are sites of global importance for biodiversity conservation. Their selection is based on standard criteria applied through a bottom-up, iterative process involving local stakeholders. This article presents the results of a study that applied the KBA methodology in Turkey. The KBA method uses four criteria: (1) globally threatened species; (2) restricted-range species; (3) congregations of species that concentrate at particular sites during some stage in their life cycle; and (4) biome-restricted species assemblages. In Turkey, we applied these criteria to 10,214 species of eight taxonomic groups: plants, dragonflies, butterflies, freshwater fish, amphibians, reptiles, birds and mammals. We identified 313 KBAs in Turkey, 303 of which trigger the KBA criteria for one or more taxonomic groups at the global scale. The remaining 10 sites trigger the KBA criteria at the regional scale only. These 303 globally important KBAs in Turkey cover 20,456,884 hectares, 26% of the country. Turkey's natural landscapes, holding globally important biodiversity, are under immense threat and declining rapidly, both in quality and quantity. The nationwide threat assessment of KBAs revealed that dams, irrigation and drainage projects (i.e. water policies) form the main threat to Turkey's biodiversity. Irrigation and drainage projects affect 225 KBAs and dams have an effect on at least 185 sites. KBAs raise attractive possibilities as being core areas where ecologically responsible governance models can be demonstrated, building on scientific and indigenous knowledge." (Authors)] Address: Eken, G., Seferihisar Doğa Okulu, Eski Orhanlı 664, Seferihisar, Izmir, Turkey. E-mail: eken@dogadermegi.org

**19108.** Environment Canada (2016): Recovery strategy for

the Rapids Clubtail (*Gomphus quadricolor*) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa: 21 pp. + Annexes- (in English) ["Executive summary: The Rapids Clubtail is a small, brightly coloured dragonfly which lives in clear, cool, medium to large rivers with wooded shorelines, gravel shallows, and muddy pools. Adult males perch on exposed rocks in the rapids. Adult females inhabit shoreline forests, moving to the rapids when ready to mate. Eggs are laid over the rapids and the nymphs live in quiet, muddy, downstream pools. This species is a globally rare to uncommon dragonfly found throughout Eastern North America, in a range extending from Maine to Minnesota, including southern Ontario. In Ontario it has been found in only four rivers: the Credit, the Thames, the Humber and the Mississippi. The population in the Credit River may be extirpated. The species is listed as endangered on the Species at Risk in Ontario (SARO) List under the Endangered Species Act, 2007. Threats to survival and recovery include dam construction, shoreline alteration, pollution, removal of shoreline forests, exotic predatory species, roadkill and climate change. Limiting factors include low population numbers, limited distribution and apparent sensitivity to specific habitat features. Knowledge gaps include a lack of understanding of the reasons for its limited distribution and for its habitat sensitivity. The recovery goal is to ensure the long-term survival of Rapids Clubtail in the province by protecting existing populations and by restoring populations in appropriate habitat where feasible. The recovery objectives are to: 1. protect, maintain and improve habitat in the four rivers in Ontario where Rapids Clubtail has been found; 2. implement a monitoring program for the locations where Rapids Clubtail is known to exist; 3. conduct additional inventory for Rapids Clubtail in suitable habitat; and, 4. initiate research to address knowledge gaps for Rapids Clubtail. It is important to ensure adequate protection of habitat and water quality for the species' survival and recovery. The locations where the species has been found in the Credit, Thames, Humber and Mississippi Rivers should all be prescribed as habitat in a habitat regulation. At each location, the area prescribed as habitat should include the section of the river containing the rapids and the pools below the rapids, plus the wooded shores on either side extending inland to include any forest which is within 800 metres of the shoreline." (Authors)] Address: not stated

**19109.** Galatowitsch, M.L.; McIntosh, A.R. (2016): Trait flexibility of generalist invertebrates exposed to contrasting predation and drying stressors. *Freshwater Biology* 61(6): 862-875. (in English) ["(1.) How different generalist species are able to exploit heterogeneous landscapes likely depends on whether their life-history strategies confer resilience to multiple environmental selection pressures. (2.) We investigated the life-history strategies of two generalist invertebrates, *Xanthocnemis zealandica* damselflies and *Sigara arguta* waterboatmen, which inhabit ponds varying in drying and predator presence. Using mesocosm experiments with temporary- and permanent-pond nymphs, we determined the flexibility of their predator avoidance and



drying resistance. (3.) *Xanthocnemis zealandica* was most susceptible to predatory fish regardless of natal habitat, with permanent-pond nymphs more likely to have reduced movement, higher refuge use and slower growth than temporary-pond nymphs; growth was, however, not influenced by predator presence. *Xanthocnemis zealandica* had a fixed response to drying stress, with high survival rates (80–90%) during short drying periods (2–8 days), regardless of natal habitat. (4.) In contrast to *X. zealandica*, *S. arguta* had a completely inflexible life-history with no differences in predator avoidance between permanent- and temporary-pond nymphs, and a complete inability to survive drying. (5.) Without flexible traits *S. arguta* may counter potentially high costs of predation in permanent ponds and drying mortality in temporary ponds through rapid development and terrestrial dispersal. *Xanthocnemis zealandica*'s flexible life-history is likely driven by longer nymphal development which requires adaptation to both predator and drying stressors to complete their life-cycle over the range of habitats they occupy. (6.) Overall, these two species exemplify how generalists can strongly differ in their life-history strategies but still persist across a similar range of habitats." (Authors)] Address: Galatowitsch, M.L., Department of Biology, Centre College, 600 West Walnut St., Danville, KY 40422, U.S.A. E-mail: mark.galatowitsch@centre.edu

**19110.** Ge, Y.; Cao, L. (2016): Transcriptome analysis of *Pantala flavescens* (Fabricius) based on ,qNA-seq. *Sichuan Journal of Zoology* 35(6): 852-859. (in Chinese, with English summary) ["The total transcripts of *Pantala flavescens* (Fabricius) were obtained by ,qNA-seq followed by functional analysis. The head total ,qNA of *P. flavescens* (Fabricius) was extracted and then sequenced by Illumina platform. A total of 47 039 040 reads containing 7 102 895 040 bp were generated. There were 34 406 502 unigenes with GC content of 44. 05% after de novo assembly. All the unigenes were annotated based on different databases and 44 499 unigenes were annotated. In this study all the assembled unigenes could be broadly divided into biological processes cellular components and molecular function categories of 60 branches by gene ontology including metabolic process binding catalytic activity and cellular process. Unigenes were further annotated based on COG category, which could be grouped into 26 functional categories. The results of KEGG prediction suggested that mitochondrial genes were the most abundant in the tested samples. And after KEGG O,qTHOLOGY annotation the most abundant genes were metabolic-related. The genes of mitochondria and metabolism were related with the migration mechanism of *P. flavescens* (Fabricius). (Authors)] Address: Ge, Yiqing, School of Life Sciences, Jiangxi Normal University, Nanchang 330000, China

**19111.** Gladyshev, M.I.; Popova, O.N.; Makhutova, O.N.; Zinchenko, T.D.; Golovatyuk, L.V.; Yurchenko, Yu.A.; Kalachova, G.S.; Krylov, A.V.; Sushchik, N.N. (2016): Comparison of fatty acid compositions in birds feeding in aquatic and terrestrial ecosystems. *Contemporary Problems of*

*Ecology* 9(4): 503-513. (in English) ["Fatty acid (FA) contents and compositions in the pectoral muscles of 18 bird species from Novosibirsk, Volgograd, and Yaroslavl oblasts were studied. Three groups of birds that had significantly different FA compositions were distinguished based on a multivariate statistical analysis: Passeriformes, Columbiformes, and a group of waterfowl and waterbird species (Charadriiformes, Anseriformes, Podicipediformes, and Ciconiiformes). The highest content of physiologically important docosahexaenoic acid (22:6n-3, DHA), which is considered a marker of aquatic food, was surprisingly found in the biomass of Passeriformes, which are terrestrial feeders, rather than in the biomass of waterfowls and waterbirds. It was suggested that Passeriformes species had the ability to synthesize large quantities of DHA from short-chain omega-3 FAs, which is rare among animals." (Authors)] Address: Popova, O.N., Institut Sistemati i Zkologii Zhivotnykh, 630091 Novosibirsk, Ul. Frunse 11, Russia. E-mail: pc@eco.nsc.ru

**19112.** Herrera, L.S. (2016): Identifying the impacts of excess fine sediment on benthic macroinvertebrate communities. MSc. thesis University of Minnesota: VI + 90 pp. (in English) ["Many streams throughout the United States are negatively impacted by excess fine sediments (sand, silt, and clay). Benthic macroinvertebrates are a commonly-used tool to assess stream condition; however, current methodologies typically are not able to distinguish among stressors. Previous studies have correlated macroinvertebrate communities and traits with excess fine sediments, demonstrating that aquatic macroinvertebrates are sensitive to deposited fine sediment and the assemblages will shift in response. Western Lake Superior streams have a wide range of fine sediment amounts due to clay and sand soils, but have low amounts of other stressors, and thus are a good region to investigate relationships between macroinvertebrate traits and fine sediments. Data were collected from 22 stream sites located along the north shore of Lake Superior in 2010. The data collected in 2010 did not have the desired gradient of fine sediment due to wet conditions that year; therefore, the data were supplemented with data collected by NRRRI personnel in earlier years (1997 – 2008). The five sediment stressors used in analyses included percent embeddedness, depth of fine sediments, total percent fine sediments, percent sand, and a combined sediment index created using normalized and transformed embeddedness, depth of fine sediments and total percent fine sediments. Fifty-seven specific taxonomic groups and macroinvertebrate physical and behavioral characteristics (traits) were tested as potential response metrics in linear regressions. In addition, TITAN analyses were used to look for thresholds or sediment stressor values at which a taxon increases greatly, decreases greatly, or disappears from a community. Both the linear regressions and TITAN analyses showed a change in the community structure under conditions of excess sediment in the form of embeddedness, total fines, depth of fines, and/or the combined sediment index. The TITAN analyses also showed a change in the community structure due to increasing proportion sand in the

streambed. Furthermore, the analyses identified potential characteristics that may specifically make a particular macroinvertebrate more or less vulnerable to excess fine sediments." (Author) Taxa - including Odonata - are treated at order-level.] Address: not stated

**19113.** Hesse, L.; Falk, F.; Koch, K. (2016): Inflexible versus flexible: the influence of temperature and photoperiod on pre- and post-eyespot development time in Libellulidae (Odonata). *Physiological Entomology* 41(3): 224-233. (in English) ["Temperature and photoperiod are important environmental parameters for organisms. The present study tests the hypothesis that, during embryogenesis, temperature and photoperiod influence pre- and post-eyespot development time in dragonflies of the family Libellulidae differently. Eggs are used from eight species (five different genera, from Africa/Europe, and lentic/lotic habitat preferences). The eggs are reared under different constant or fluctuating temperature and light conditions. There are no general species-specific degree-days for pre- or the post-eyespot development in these species. In all study species, the variance within and between the treatments of the duration in days and the degree-days of pre-eyespot development is lower than that of post-eyespot development. Pre-eyespot development appears to be less flexible in its reaction to environmental influences. By contrast, post-eyespot development appears to react more flexibly to environmental influences. All eight species show the same pattern. This indicates strongly that this flexibility is a general pattern in Libellulidae that might help the species within this family to cope successfully with variations in environmental conditions. Because eyespot development and katatrepsis occur close to each other, the above-described pattern might also appear in other odonates and in other insect groups that exhibit katatrepsis. For all of them, it is essential for survival to match the time of hatching with adequate external temperature and photoperiodic conditions." (Authors) *Crocothemis erythraea*; *Libellula quadrimaculata*; *Orthetrum cancellatum*; *Orthetrum coerulescens*; *Sympetrum striolatum*; *Trithemis arteriosa*; *Trithemis kirbyi*; *Trithemis stictica*] Address: Koch, Kamilla, Department of Evolutionary Ecology, Johannes Gutenberg-University Mainz, Becher-Weg 13, 55128 Mainz, Germany. E-mail: kochka@uni-mainz.de

**19114.** Holzinger, W.; Zimmermann, P. (2016): Die Vogel-Azurjungfer *Coenagrion ornatum* (Selys, 1850) in Niederösterreich: Ergebnisse einer Habitatmodellierung. Auftraggeber: Amt der Steiermärkischen Landesregierung, Abteilung 13 - Umwelt und Raumordnung, Referat Naturschutz, 8010 Graz, Stempfergasse 7, Austria. GZ: ABT13-56O-26/2013-2. Auftragnehmer: ÖKOTEAM - Institut für Tierökologie und Naturraumplanung, Bergmannngasse 22 • A-8010 Graz, Austria: 35 pp. (in German) [Due to ongoing infringement proceedings, the Republic of Austria and possibly also the province of Lower Austria are required to designate new protected areas for (among others) *Coenagrion ornatum*. In this context, the eco-team was commissioned to prepare the present expert report. The assignment comprises three questions: Are there nationally important populations of the

Common Azure Damselfly within the existing Natura 2000 area in Lower Austria? Is it necessary to expand existing sites and/or designate new sites for this species in Lower Austria? If so, how are the populations of the species to be assessed, what threats might these populations be exposed to and what form might protection and promotion measures take? *C. ornatum* has a ponto-mediterranean distribution and reaches the western limit of its closed range in the Pannonian part of Austria. At altitudes below 400 m, it inhabits fully sunlit, shallow, slow-flowing, silted small streams with relatively dense aquatic vegetation and predominantly herbaceous vegetation close to the banks. Their larvae develop among submerged plants and take 1-2 years to develop. Adults are found between mid-May and the end of June, they are not very migratory and are only flight-active on sunny, windless days. In Austria and in large parts of Central Europe the species is classified as "Critically Endangered", populations in the continental region of Austria are declining, the conservation status of the species is "U1x" ("probably unfavourable-insufficient"). The main threat to the species is the destruction of its habitats. In Lower Austria, the species was specifically searched for by Martina Stauer in 2014 in nine study areas between approx. 5 and 100 km<sup>2</sup> in size and actually detected in a total of 12 streams in the Weinviertel and west of the Leitha Mountains. The first aim of this study is to extrapolate or model the occurrence of the species for the whole of Lower Austria on the basis of these results. For this purpose, the presence data of the species are combined with a lot of other environmental information and the MaxEnt programme is used to estimate the probability of occurrence of the species in Lower Austria. The results show that there are large areas with very high occurrence potential in Lower Austria, although the province of Lower Austria only has concrete occurrence data for a small part of these water bodies. The Pulkau and its tributaries between Retz and Laa an der Thaya have the highest potential, other potentially high quality areas are located along the Zaya and Taschlbach as well as in the vicinity of the Thaya. In the Marchfeld, Weidenbach, Stempfelbach and Rußbach, and south of the Danube, areas along the Fische and Neue Leitha are classified as suitable in sections. In addition, an assessment algorithm for occurrences of the species, a monitoring concept as well as protection and promotion measures are presented.] Address: ÖKOTEAM, Institut für Tierökologie und Naturraumplanung, Bergmannngasse 22, A-8010 Graz, Austria, Austria

**19115.** Ichikawa, Y.; Watanabe, M. (2016): Daily egg production in *Pantala flavescens* in relation to food intake (Odonata: Libellulidae). *Odonatologica* 45(1/2): 107-116. (in English) ["The migratory dragonfly, *Pantala flavescens*, arrives in Japan from tropical regions every spring. Although the population increases as autumn nears, it dies in the winter cold. The adults often form foraging swarms above open grasslands when feeding on small insects, while oviposition occurs at diverse open water bodies throughout the day. Although oogenesis requires a daily intake of nutrition from prey, there has been little consideration of the relationship between food intake and the number of eggs produced. In

the early morning, females of reproductive age were captured from foraging swarms in grasslands. Immediately after capture, an artificial oviposition technique was applied to each female to release all mature eggs loaded. Then, the females were kept until death, up to 5 days, in envelopes in the laboratory. They were starved but hydrated daily, and the dry weight of faeces excreted during 24 h after capture was measured. Females excreted 8.4 mg of faeces within 24 h after capture. Then, they released about 840 mature eggs at 24 h after capture, suggesting that when females take in a sufficient amount of daily food, they can oviposit a large number of eggs every day. The rapid egg production might enable the population of *P. flavescens* to grow. A positive correlation was found between the food intake on the previous day and the number of eggs produced within a 24 h of capture. The act of ingesting fresh nutrients derived from the prey might promote rapid release of reserves in the female fat body, resulting in the oogenesis. Females able to encounter available foraging sites might produce a large number of mature eggs in the subsequent day to be laid." (Authors)] Address: Watanabe, M., Graduate School of Life and Environmental Sciences, Univ. of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan. E-mail: watanabe@kankyo.envr.tsukuba.ac.jp

**19116.** Iorio, E.; Noel, F (2016): Première année de suivi de la Grande Aesche *Aeshna grandis* (L., 1758) dans deux étangs du Perche (Orne). Rapport GRETIA réalisé grâce aux financements de l'Europe (fonds FEADER), de l'Agence de l'eau Loire-Bretagne et de l'Agence de l'eau Seine-Normandie, dans le cadre de la déclinaison régionale du PNAO: 19 pp. (in French) ["This report presents the results of the first year of monitoring the exuviae of the Great Aesche *Aeshna grandis* in the Cachot and Gré ponds (Brésolettes, Orne), carried out by means of three passes made on foot/by boat along the banks from the inside, on 27 July, 16 and 31 August 2016. A total of 28 exuviae of *A. grandis* were collected, but only on the Cachot, of which almost 90% were collected on the first pass (n = 25) and none on the third. According to these first data, August does not seem to be a productive month in terms of emergence, as this activity obviously takes place mainly in July; but this impression should be confirmed during the next two years of monitoring. Apart from *A. mixta*, the total absence of anisopteran exuviae at Le Gré is clearly explained by the combination of a prolonged dry spell in 2014-2015 and incomplete surveys due to the inaccessibility of part of the banks. In 2016, *A. grandis* was the best represented anisopteran species in terms of emergences at the Cachot, followed by *Orthetrum cancellatum*. The location of each of its exuviae is mapped. The species richness observed on the two ponds combined is 21, with 13 species recorded on the Cachot and 17 on the Gré. The main biotic and abiotic characteristics of the emergence stations and the conditions for observing the exuviae are described and illustrated by photographs. At the end of this first year, the emergence of *A. grandis* took place on almost half of the perimeter of the Cachot pond, without any habitat or micro-habitat appearing to be more favourable than the others at the current stage.

The eastern bank, however, revealed more than half of their numbers." (Authors/DeepL)] Address: Iorio, E., GRoupe d'ETude des Invertébrés Armoricaux (GRETIA) - Antenne Pays-de-la-Loire – 5 rue Général Leclerc – 44390 Nort-sur-Erdre, France. Email: e.iorio@gretia.org

**19117.** Iorio, E. (2016): Suivi du Leste dryade *Lestes dryas* Kirby, 1890 (2ème année) et du Leste verdoyant *Lestes virens* (Charpentier, 1825) (1ère année) dans les landes de Lessay (Manche). Rapport GRETIA réalisé grâce aux financements de l'Europe (fonds FEADER), de l'Agence de l'eau Loire-Bretagne et de l'Agence de l'eau Seine-Normandie, dans le cadre de la déclinaison régionale du PNAO: 51 pp. (in French) [*L. virens vestalis* de Lessay (50) ; à droite : *L. virens virens* du Var (83).

**19118.** France "This report presents the results of the second year of monitoring the imagoes of *Lestes dryas* and the first year of monitoring those of *Lestes virens* in the Lessay moors, on eleven pre-selected stations. They follow on from the report by GERMAIN (2015) on the same moors and stations. A total of 266 and 49 imagoes were counted for *L. dryas* and *L. virens* respectively, all belonging to the subspecies *vestalis* for the latter. The local phenology of *L. dryas* is thus refined in relation to regional and national knowledge. A synthesis of various biotic and abiotic characteristics common to the stations and habitats of probable autochthony is proposed, by cumulating the data of this year and of 2015. The preferential habitats are more precisely defined in the Lessay moors and more generally at regional level. However, all the data still needs to be confirmed by the third and final year of monitoring, in 2017, for *L. dryas*; and by the next two years of monitoring for *L. virens vestalis*, whose populations appear to be smaller in Lessay for the moment. The future global synthesis that will emanate from this will make it possible to complete or reinforce the recommendations of GERMAIN (2015) with regard to the management of habitats favourable to *L. dryas*, and then to propose some for *L. virens vestalis*, in the long term. Certain factors have already been identified as probably important, or even determining, to be taken into account, such as opening up the environment, sparingly (re)digging to promote late drying and maintaining a selection of appropriate heliophytes (particularly *Eleocharis*)." (Author/deepL)] Address: Iorio, E., GRoupe d'ETude des Invertébrés Armoricaux (GRETIA) - Antenne Pays-de-la-Loire – 5 rue Général Leclerc – 44390 Nort-sur-Erdre, France. Email: e.iorio@gretia.org

**19119.** Jin, L.; Zhang, Y.; Xu, X.; Xiao, X.; Zhang, X. (2016): Identification and phytotoxic activity of fungus QTYC-51 from the gut of *Pantala flavescens* larvae. *Acta Microbiologica Sinica* 56(12): 1869-1875. (in Chinese, with English summary) ["[Objective] To isolate the fungus with phytotoxic activity from the gut of *P. flavescens* larvae. [Methods] Strain QTYC-51 was identified by morphological observation and 5.8S rDNA-ITS sequence analysis. Petri dish bioassay was used to test the phytotoxic activity of fermentation broth and monomer compounds of strain QTYC-51 on *Echinochloa crusgalli* and *Amaranthus retroflexus*. Bioactive

components were isolated from ethyl acetate extracts via chromatographic methods, and the structures were determined by mass spectrum and nuclear magnetic resonance analyses. [Results] QTYC-51 was identified as *Paraconiothyrium* sp.. The fermentation broth had good phytotoxic activity on radical growth of *E. crusgalli* and *A. retroflexus* with the inhibition rates of 76.9% and 56.5%, respectively. Five monomer compounds were purified from the fermentation products, including 1,8-dihydroxyanthraquinone, 1-hydroxy-10-methoxy-dibenz[b,e]oxepin-6,11-dione, hydroxyvertexanthone, globosuxanthone and 1,3,6,8-tetrahydroxyanthraquinone. At the concentration of 100 µg/mL, compound globosuxanthone was found to possess obvious phytotoxic effects on radical growth of *E. crusgalli* and *A. retroflexus* with the inhibition rates of 94.1% and 79.0%, respectively, which were comparable to that of positive control 2,4-dichlorophenoxyacetic acid. Compound 1-hydroxy-10-methoxy-dibenz [b,e] oxepin-6,11-dione showed potent phytotoxic activity against *E. crusgalli* and *A. retroflexus* with inhibition rates of 50.3% and 58.6%, respectively. [Conclusion] Strain QTYC-51 could be potentially developed as a microbial herbicide." (Authors)] Address: Jin, L., College of Chemistry & Life Science, Zhejiang Normal University, Jinhua 321004, Zhejiang Province, China

**19120.** Kefford, B.J.; Buchwalter, D.; Cañedo-Argüelles, M.; Davis, J.; Duncan, R.P.; Hoffmann, A.; Thompson, R. (2016): Salinized rivers: degraded systems or new habitats for salt-tolerant faunas?. *Biology Letters* 12(3): 8 pp. (in English) ["Anthropogenic salinization of rivers is an emerging issue of global concern, with significant adverse effects on biodiversity and ecosystem functioning. Impacts of freshwater salinization on biota are strongly mediated by evolutionary history, as this is a major factor determining species physiological salinity tolerance. Freshwater insects dominate most flowing waters, and the common lotic insect orders Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) are particularly salt-sensitive. Tolerances of existing taxa, rapid adaptation, colonization by novel taxa (from naturally saline environments) and interactions between species will be key drivers of assemblages in saline lotic systems. Here we outline a conceptual framework predicting how communities may change in salinizing rivers. We envision that a relatively small number of taxa will be saline-tolerant and able to colonize salinized rivers (e.g. most naturally saline habitats are lentic; thus potential colonizers would need to adapt to lotic environments), leading to depauperate communities in these environments." (Authors) The paper includes a passing note to Odonata.] Address: Kefford, B.J., Institute for Applied Ecology, University of Canberra, Canberra, Australian Capital Territory 2601, Australia. E-mail: ben.kefford@canberra.edu.au

**19121.** Kjer, K.M.; Simon, C.; Yavorskaya, M.; Beutel, R.G. (2016): Progress, pitfalls and parallel universes: a history of insect phylogenetics. *J. R. Soc. Interface* 13: 20160363. <http://dx.doi.org/10.1098/rsif.2016.0363>: 29 pp. (in English) ["The phylogeny of insects has been both extensively studied and vigorously debated for over a century. A relatively

accurate deep phylogeny had been produced by 1904. It was not substantially improved in topology until recently when phylogenomics settled many long-standing controversies. Intervening advances came instead through methodological improvement. Early molecular phylogenetic studies (1985–2005), dominated by a few genes, provided datasets that were too small to resolve controversial phylogenetic problems. Adding to the lack of consensus, this period was characterized by a polarization of philosophies, with individuals belonging to either parsimony or maximum-likelihood camps; each largely ignoring the insights of the other. The result was an unfortunate detour in which the few perceived phylogenetic revolutions published by both sides of the philosophical divide were probably erroneous. The size of datasets has been growing exponentially since the mid-1980s accompanied by a wave of confidence that all relationships will soon be known. However, large datasets create new challenges, and a large number of genes does not guarantee reliable results. If history is a guide, then the quality of conclusions will be determined by an improved understanding of both molecular and morphological evolution, and not simply the number of genes analysed." (Authors) The study includes many references to Odonata.] Address: Kjer, K.M., Department of Entomology & Nematology, University of California-Davis, 1282 Academic Surge, Davis, CA 95616, USA. E-mail: karl.kjer@gmail.com

**19122.** Küry, D.; Krieg, R. (2016): Emergenz und Populationsgröße von *Gomphus pulchellus* im Kanton Basel-Stadt sowie Situation und Habitate in schweizerischen Gewässern (Odonata: Gomphidae). *Libellula* 35(1/2): 1-21. (in German, with English summary) ["Emergence and population size of *Gomphus pulchellus* in canton Basel-City plus situation and habitats in Swiss water bodies – *Gomphus pulchellus* is an endangered species of high conservation priority in Switzerland. A study on an isolated population in the Spittelmattponds in Riehen, canton Basel-City revealed a total of 121 exuviae between 22nd May and 24th July 2012. This corresponds to a density of 46 individuals per 100 m of shoreline or 0.6 individuals per m<sup>2</sup>. The adults emerged mainly on the sunlit southwest bank on *Carex* sp. and *Rubus* sp. By sampling the ground three larvae were found in a total of 36 samples. Immediately after the emergence adults were found in the nearby clover field. After maturation several males were found by sunlit places on *Rubus* in the riparian zone, on the adjacent country lane and on the Entenweiher ('duck-pond') 250 m away. *Gomphus pulchellus* developed together with ten other dragonfly species: *Calopteryx splendens*, *Chalcolestes viridis*, *Coenagrion puella*, *Erythromma lindenii*, *Ischnura elegans*, *Pyrrhosoma nymphula*, *Platynemis pennipes*, *Onychogomphus forcipatus*, *Cordulegaster boltonii*, and *Sympetrum striolatum*. A survey of 15 potential breeding sites in the surroundings showed that the species reproduced in the gravel pit Käppelin Weil am Rhein, Germany, (1.2 km distance) and probably in the gravel pit Wyhlen, Germany (7 km distance). A total of 66 known reproductive sites in Switzerland were examined by aerial photography. Of these, 61 % were ponds followed by lakes (23 %), running waters (12 %) and gravel pits (4 %).



The sites had an area between 550 m<sup>2</sup> and 14.5 km<sup>2</sup>. Approximately 50 % were larger than one hectare. Dominant vegetation types were: reeds, rushes, sedges, woody areas, or zones lacking any vegetation. Interviews with experts revealed over 90 % of the reproductive ponds being stocked by fish. The known populations will be monitored for four to six years and additional reproductive sites searched on a regional level. An action plan shall help to manage existing ponds, create new breeding sites and inform the public about the progress of the project." (Authors)] Address: Kury, D., Life Science AG, Greifengasse 7, 4058 Basel, Switzerland. E-mail: daniel.kuery@lifescience.ch

**19123.** Kuhn, W.R. (2016): Three approaches to automating taxonomy, with emphasis on the Odonata (dragonflies and damselflies). Ph.D. thesis, Rutgers, The State University of New Jersey: xi, 177 pp. (in English) ["Taxonomy-the field charged with naming and classifying organisms-forms a foundation for biological research. An understanding of the species on Earth is needed for informing biodiversity research, conservation efforts, management strategies, and global policy. In recent decades, a "taxonomic impediment" has arisen: there is an urgent need to know the millions of yet-undiscovered species, while funding for the science charged with this task, taxonomy, and the number of trained taxonomists are declining. This work aims to provide three software tools for taxonomists that allow them to work more efficiently and effectively, reducing this impediment. First, a system for automatically landmarking images of specimens for geometric morphometric studies was introduced, which could greatly reduce the time required to manually landmark images for these studies while also increasing the possible sample size of such studies. The system's landmarking error, however, was extremely variable on test images of the wings of dragonflies and damselflies (Odonata), and was ultimately too large (300-500 px) to compete with manual landmarking at this time. Second, a method was presented for automatically standardizing and extracting descriptive features from images of insect wings in order to quantify the appearance of the wings. The standardization method was successful in converting scans of odonate wings into consistently-formatted square images, automatically. Then, features describing the color, texture, and shape of the wings were able to be extracted, producing a small set of 663 coefficients that were able to distinguish between species. Finally, a system called Odomatic was presented and tested for automatically identifying Odonata to species from images of their wings, using the feature extraction method combined with machine learning techniques. Odomatic was able to make classifications between 32 species with expert-level (up to 92%) accuracy, making it useful for quickly identifying specimens. The tools presented here will be deployed for use by odonate researchers through the website OdonataCentral.org, but will also be released as open-sourced Python scripts so that they can be customized to be implemented on other taxonomic groups. This work will enable taxonomists and other interested parties to make easier morphological comparisons and faster identifications." (Author)] Address: not stated

**19124.** Labe, M.S.; Fernado, N.C.; Fiegalan, E.R. (2016): Insects associated with organic and inorganic rice farming. *International Journal of Agricultural Technology* 12(7.1): 1347-1367. (in English) ["A study was conducted in organic and inorganic ricefields to identify all insects present in both methods of farming. A total of 34, 957 insects and other arthropods were collected; 17, 549 in organic and 17, 408 in inorganic ricefield, respectively, through net sweeping. The orders of insects represented from the collection include the Odonata, Orthoptera, Thysanoptera, Hemiptera, Homoptera, Coleoptera, Strepsiptera, Diptera, Lepidoptera, and Hymenoptera. Spiders (Araneae) and mites (Acari) in the Class Arachnids were also collected. Among the insects, Diptera and Homoptera had the highest counts in both methods of farming. Both organic and inorganic ricefields had high counts of insect pests. Higher counts of natural enemies were observed in organic ricefield." (Authors)] Address: Labe, M.S., Dept of Crop Protection, College of Agriculture, Central Luzon State Univ., Science City of Munoz, Nueva Ecija 3120, Philippines. E-mail: mdsalabe@gmail.com

**19125.** Lutsch, M.; Koch, K. (2016): The probable function of abdominal contractions and liquid drops during the emergence of Zygoptera and Anisoptera (Odonata). *International Journal of Odonatology* 19(4): 199 -205. (in English) ["The transition between larval and adult stage in amphibious insects is called emergence. During emergence abdominal contractions and excretion of liquid drops can be observed in several insect orders. Since the function of these processes is not yet known in odonates, this study examines the probable function of abdominal contractions and excretion of liquid drops in Zygoptera and Anisoptera. By subdividing the emergence into 12 successive stages and counting abdominal contractions as well as the excreted liquid drops during these stages we set up a systematic data collection. In all investigated individuals, both processes began in the middle of the entire emergence. We found that abdominal contractions occurred more frequently at the beginning of the latter half of emergence. The number of excreted liquid drops, however, was higher in the end, shortly before the maiden flight. Concerning the number of excreted liquid drops, we found a significant difference between Zygoptera and Anisoptera. Our findings suggest that there might be a relationship between the two processes, probably explainable by the hemolymph circulation as seen in Lepidoptera. However, abdominal contractions and liquid drops seemed to be crucial for the emergence of Zygoptera and Anisoptera.... Under natural conditions we observed the emergence of *Coenagrion scitulum*: n = 11; *Enallagma cyathigerum* = 24; *Platycnemis pennipes*: n = 17) and *Cordulia aenea*: n = 21; *Libellula quadrimaculata*: n = 25; *Orthetrum cancellatum*: n = 20) in the period from beginning of May to mid-June 2015." (Authors) ] Address: Koch, Kamilla, Department of Evolutionary Ecology, Johannes Gutenberg-University of Mainz, Mainz, Germany

**19126.** Martín, R.; Maynou, X. (2016): Dragonflies (Insecta: Odonata) as indicators of habitat quality in Mediter-

anean streams and rivers in the province of Barcelona (Catalonia, Iberian Peninsula). *International Journal of Odonatology* 19(3): 1-18. (in English) ["In a field study carried out in 2011 and 2014 adult dragonflies were identified as a rapid and easy-to-use means of assessing habitat quality and biological integrity of Mediterranean streams and rivers in the province of Barcelona (Region Catalonia, Iberian Peninsula). The study included sampling sites from five different river catchments: Besòs, Foix, Llobregat, Ter and Tordera. Multivariate statistical procedures and indicator species analysis were used to investigate the relationship between river ecological status, study sites and dragonfly species or species assemblages' occurrence. The dragonfly association identified with western Mediterranean permanent streams, i.e. *Cordulegaster boltonii*, *Boyeria irene*, *Onychogomphus uncatus* and *Calopteryx virgo meridionalis*, was found only at the sites with the highest status. All these taxa were identified as indicator species of sites with the best scores for the macroinvertebrate based IBMWP index and for the combined IASPT index, which reflects the sensitivity of the macroinvertebrate families present to environmental changes; besides, *B. irene* and *C. virgo meridionalis* also proved to be indicator species of the riparian forest quality index and *C. boltonii* of the more inclusive ECOSTRIMED, which assesses the overall conservation status of the riverine habitats. The information obtained on habitat preferences and indicator value showed that adults of these taxa may constitute a valuable tool for preliminary or complementary cost-effective monitoring of river status and restoration practices as part of a broader set of indices reflecting biodiversity and ecosystem integrity." (Authors)] Address: Martín, R., Catalan Odonata Study Group, Institució Catalana d'Història Natural, Barcelona, Spain. Email: ricardo.martin@cllicenciats.cat

**19127.** Matushkina, N.; Lambret, P.; Gorb, S. (2016): Keeping the Golden Mean: Plant stiffness and anatomy as proximal factors driving endophytic oviposition site selection in a dragonfly. *Zoology* 119(6): 474-480. (in English) ["Highlights: •Ovipositor bending stiffness of *Lestes macrostigma* is one of the highest in damselflies. •Most preferred plant for oviposition has intermediate stiffness and specific anatomy characteristics. •Least preferred plants for oviposition have the highest stiffness or large aeriferous cavities. Abstract: Oviposition site selection is a crucial component of the habitat selection in dragonflies. The presence of appropriate oviposition plants at breeding waters is considered to be one of the key habitat determinants for species laying eggs endophytically. For example, *Lestes macrostigma*, a species which is regarded as threatened in Europe because of its highly fragmental distribution, typically prefers to lay eggs in the sea-club rush *Bolboschoenus maritimus*. However, little is known about how the anatomy and mechanical properties of plant tissues associated with their choice by *L. macrostigma* females. We examined green shoots of six plant species used by *L. macrostigma* for oviposition, either in the field (actual oviposition plants) or under experimental conditions (potential oviposition plants), to analyse anatomy and mechanical properties of shoots in a framework of

known preference of plant substrates for oviposition. As expected, anatomy of shoots differed between representatives of two plant families, Cyperaceae and Juncaceae, most essentially in distribution of supporting bundles and presence of large aeriferous cavities that may affect egg placing within a shoot. The puncture force of tested plant samples ranged from 360 to 3298 mN, and their local stiffness ranged from 777 to 3363 N/m. We showed that the most preferred by *L. macrostigma* plant, *B. maritimus*, had intermediate characteristics of both the stiffness and anatomy parameters of shoot. The bending stiffness of the ovipositor in *L. macrostigma* was estimated as 1414 N/m that is one of highest values recorded for zygopteran dragonflies so far. The ecological and behavioural implications of plant-choice mechanisms in *L. macrostigma* are discussed in the context of fragmented areal distribution of this species." A(uthors)] Address: Matushkina, Natalia, Institute of Biology, Department of Zoology, Taras Shevchenko National University of Kyiv, Vul. Volodymirs'ka, 64, 01033 Kyiv, Ukraine. Email: odonataly@gmail.com

**19128.** Mehmood, S.A.; Khan, M.S.; Zia, A.; Shaheen, F.A. (2016): Morphological evaluation of Gomphidae dragonflies of Hazara region Pakistan through principle component analysis. *Journal of Entomology and Zoology Studies* 4(3): 183-188. (in English) ["Current study was conducted on Gomphidae dragonflies in Hazara region of Pakistan. A total 125 specimens were collected and identified in to 8 species and 6 genera. Five morphometric parameters were based to evaluate the variations and similarities among species. The results were obtained using the principle component analysis. Components PC1 and PC2 were observed positive correlated with all variables. Highest Euclidean distance was observed (5.14) between *Platygomphus dolabratus* and *Anormogomphus kiritschenkoi*, while the lowest Euclidean distance was found (0.27) between *Onychogomphus biforceps* and *O. bistrigatus*. Cladogram was showed two groups I and II and result of Line plot highly support the cladogram. Case wise variability showed 6 (75%) and 2 (25%) species were conspired in the same region between (0 to +2.5) and (0 to -2.5) respectively. The component/factors variability plot was observed the cumulative share for PC1 (60.60%) and PC2 (36.82%) respectively. Morphometry and its findings are very important for identification purposes." (Authors)] Address: Mehmood, S.A., Department of Zoology, Hazara University - Mansehra

**19129.** Mikolajewski, D.J.; Scharnweber, K.; Jiang, B.; Leicht, S.; Mauersberger, R.; Johansson, F. (2016): Changing the habitat: the evolution of inter-correlated traits to escape from predators. *Journal of Evolutionary Biology* 29(7): 1394-1405. (in English) ["Burst escape speed is an effective and widely used behaviour for evading predators, with burst escape speed relying on several different morphological features. However, we know little about how behavioural and underlying morphological attributes change in concert as a response to changes in selective predation regime. We studied inter-correlated trait differentiation of body shape and burst-swim-mediating morphology in response to a habitat

shift related reduction in burst escape speed using larvae of the dragonfly genus *Leucorrhinia* [*L. albifrons*, *L. caudalis*, *L. dubia*, *L. pectoralis* and *L. rubicunda*]. Species in this genus underwent a well-known habitat shift from predatory fish lakes (fish-lakes) to predatory fish free lakes dominated by large predatory dragonflies (dragonfly-lakes) accompanied by relaxed selection on escape burst speed. Results revealed that species from fish-lakes that possess faster burst speed have evolved a suite of functionally inter-correlated traits, expressing a wider abdomen, a higher abdominal muscles mass and a larger branchial chamber compared to species from dragonfly-lakes. In contrast, populations within species did not show significant differences in muscle mass and branchial chamber size between lakes types in three of the species. High multi-collinearity among variables suggests that traits have evolved in concert rather than independently when *Leucorrhinia* shifted from fish lakes to dragonfly lakes. Thus, relaxed selection on burst escape speed in dragonfly-lake species resulted in a correlated reduction of abdominal muscles and a smaller branchial chamber, likely to save production and/or maintenance costs. Our results highlight the importance of studying integrated behavioural and morphological traits to fully understand the evolution of complex phenotypes." (Authors)] Address: Mikolajewski, D.J., Königin-Luise-Str. 1-3, 14195 Berlin, Germany. Email: d.mikolajewski@fu-berlin.de

**19130.** Mwedzi, T.; Bere, T.; Siziba, N.; Mangadze, T.; Bangira, C. (2016): Longitudinal macroinvertebrate assemblages in contrasting discontinuities: the effects of damming in tropical streams. *African Journal of Ecology* 54(2): 183-194. (in English) ["The study assessed the impact of damming on water quality and macroinvertebrate assemblages. It also assessed the response of macroinvertebrate-based indices of water quality to damming. Macroinvertebrate community and physicochemical variables data were collected from 86 sites. Twenty-nine sites downstream of dams were compared with 27 sites above impoundments and 30 sites on nearby unregulated streams. Of the downstream sites, 13 were situated <1 km from a dam while the other 16 were situated >1 km from a dam. A decrease in temperature, dissolved oxygen, conductivity and total dissolved solids was observed in sites immediately downstream of impoundments. Macroinvertebrate community structure and South African Scoring System (SASS) scores closely followed the damming-induced changes in water quality. However, water quality variables, macroinvertebrate community structure and SASS scores reverted back to typical upstream conditions in distances around 1 km from dams. Stream recovery from dam-induced changes was demonstrated with streams recovering at distances around 1 km from the point of regulation in corroboration with predictions of the serial discontinuity concept (SDC). These dam-induced changes also reflected themselves in SASS scores suggesting potential usefulness of SASS in monitoring ecological integrity of tropical rivers following disturbances like damming." (Authors) Taxa including Odonata are treated at family level.] Address: Mwedzi, T., School of Wildlife, Ecology and Conservation, Chinhoyi University of Technology, Off Harare-

Chirundu Rd, P. Bag 7724, Chinhoyi, Zimbabwe. E-mail: mrmwedzi@gmail.com

**19131.** Palacino-Rodríguez, F. (2016): Two decades of progress in over one hundred years of study: Present status of Odonata research in Colombia. *Odonatologica* 45(3/4): 327-334. (in English) ["This study documents the results of a bibliometric analysis of 135 indexed publications concerning Odonata research in Colombia. A database including publications since 1868 was built through reliable sources on the Web of Knowledge. The publications were classified by time frame, departments (geography), study categories, and origin. All other categories were sub-classified according to the origin of the researcher, except for geographical classification. Contingence tables were constructed and analysed with Pearson's chisquared test in the following analysis: i) number of papers per time frame according to the origin of the researcher; ii) separated number of papers for foreign researchers, network or Colombian authors over time; iii) number of papers per subject in accordance with the origin of the researcher; and iv) national or international publication according to the origin of the researcher. The number of documents per period, department, subject, and international or national publication were analysed by using chi square. The results showed the number of publications highest in Cundinamarca, Antioquia, Magdalena, Meta, and Valle. Departments least studied have been Arauca, Cesar, Guajira, Nariño, and San Andrés. The largest number of publications was taxonomic (83.7 %) and most studies (78.5 %) were published in international journals. The greatest progress in Odonata research in Colombia has been achieved since 2010. Current and future Odonata research in the country should cover more territory and prioritise research to provide information in order to generate conservation strategies in severely threatened Colombian ecosystems." (Author)] Address: Palacino-Rodríguez, F., Grupo de Investigación en Odonatos de Colombia (GINOCO), Grupo de Investigación en Biología (GRIB), Departamento de Biología, Universidad El Bosque Av. Cra. 9 No. 131A-02. Centro de Investigación en Acarología, Calle 152B # 55-45, Bogotá, Colombia. Email: odonata17@hotmail.com

**19132.** Panter, C.; Lake, S.; Liley, D. (2016): Southern Damselfly monitoring results 2015/16. *Natural England/ Footprint Ecology*: 48 pp. (in English) ["Natural England has commissioned this survey to provide up to date information on the status of Southern Damselfly *Coenagrion mercuriale* at its main populations in England in order to inform Article 17 reporting on the implementation of the Habitats Directive. This report presents the results of surveys carried out in 2015 and 2016 at sites known to support Southern Damselfly in Hampshire, Dorset and Devon. Single visits were made to 36 sites (nine sites in Dorset, twenty in Hampshire and seven sites in Devon), all of which had records of Southern Damselfly from 2007 or later. Four of the Dorset sites and all of the Hampshire sites were surveyed in 2015, the remainder of the Dorset sites and all six of the Devon sites were surveyed in 2016. At each site one or more transects were walked. The transects covered discrete

parts of the site such as stream branches, stretches of mire etc. In total, 140 transects were walked. Single visits were made to each location and visits were timed to coincide with peak flight periods and favourable weather conditions. In total, 2,267 male Southern Damselflies were recorded. No individuals were recorded at three (marginal) sites, two in Dorset and one in Devon. At four sites (two in Dorset and one each in Hampshire and Devon) only one male individual was recorded. However, most sites had much larger populations - the largest by quite some margin was 569 at Shipton Bottom. The highest density of individuals (males per meter of transect) was recorded at Tor View Moor, with 49 males per meter. The survey is intended to provide an overview and snapshot of the status. Some limited comparison is made to previous surveys. In the New Forest surveys in 2004 used the same transects and overall there was little correlation between the numbers recorded in 2004 and 2015. Numbers were higher in 2015 in 80% of sites, but were markedly lower at two sites. Data from regular Southern Damselfly monitoring was provided to us from surveys at the Devon sites for comparison to our results. These also differed markedly and counts from regular monitoring were consistently higher. This is not unexpected given the regular monitoring is conducted by surveyors that know each site very thoroughly and repeat visits will generate better count data." (Authors)] Address: footprint Ecology, Forest Office, Cold Harbour, Wareham, Dorset BH20 7PA, UK info@footprint-ecology.co.uk

**19133.** Rayan, S.; Chartchumni, B.; Rangsiwivat, A.; Papapim, Y.; Kumla, S. (2016): Diversity and distribution of Odonate larvae in Nam Oun reservoir. *Khon Kaen Agr. J.* 44(4): 623-630. (in Thai, with English summary) ["Diversity and Distribution of Odonate Larvae were investigated in Nam Oun reservoir, Sakon Nakhon province, Thailand. Random Samplings of Odonate Larvae had been conducted in 4 times, total of 6 stations consisted of 159 Odonate larvae from September 2014 to August 2015. These can be classified into 3 suborders with 8 families. The Family Libellulidae had found the most distribution in all time period and all stations. The highest of percentage frequency of occurrence (%F) was found in Family Libellulidae (50.00), Gomphidae (41.67) and Coenagrionidae and Amphiterygidae (8.33), respectively. The experimental of the differences between categories revealed that the species richness and shannon-wiener index of Odonate Larvae (station\*time period) were resulted no significance ( $p > 0.05$ ). The shannon-wiener index of each station was average  $0.41 \pm 0.18$  and the shannon-wiener index of Odonate larvae's time period of was average  $0.45 \pm 0.14$ . Average shannon-wiener index from each station and time period ranged from  $0.18 \pm 0.10$  and  $0.14 \pm 0.23$ . The main factor which has an influence on the distribution of the Odonate larvae in each station and time period was found in the Odonate larvae in Family Protonuridae Amphiterygidae and Chlorocyphidae in water outlet zone. The distribution was found in the water outlet zone particularly in the season changed from Rainy season to Dry season (T1). The Odonate larvae from family Coenagrionidae was found most distribution in the water outlet zone

during the season changed from Dry season to Rainy season (T3) while the Odonate larvae in Family Libellulidae was found the most distribution in the middle of the water zone when the climate changed from Dry season to Rainy season." (Authors)] Address: Rayan, S., Fac. Nat. Resources., Rajamangala Univ. Tech. Isan, Sakon Nakhon Champus 47160, Thailand. Email: somsakry@gmail.com

**19134.** Renner, S.; Périco, E.; Sahlén, G. (2016): Man-made lakes form species-rich dragonfly communities in the Brazilian Atlantic Forest (Odonata). *Odonatologica* 45(3/4): 135-154. (in English) ["One of the forest types occurring in Southern Brazil is the Mixed Ombrophilous Forest (MOF), a subtype of the Atlantic Forest and one of the biodiversity hotspots on Earth. We sampled adult Odonata at 30 locations in the Floresta Nacional de São Francisco de Paula (FLONA-SFP), Rio Grande do Sul, Brazil, a national reserve which is divided into several sectors of MOF, planted *Araucaria angustifolia*, *Pinus elliottii* used for sustainable and financial purposes, and open fields. There are three types of aquatic environments in the reserve: lakes, swamps, and rivers/streams. Our aim was to obtain an overview of the species' distribution patterns in the three types of aquatic environments and to evaluate the species occurring in lakes, an exclusively man-made habitat in this area. We recorded 46 species from seven odonate families; 25 species ( $x = 5.71 \pm 1.77$  SD) occurring in rivers/ streams, 24 in lakes ( $11.57 \pm 2.15$ ) and 21 in swamps ( $5.22 \pm 3.60$ ). Using Non-metric Multidimensional Scaling (NmDS), we showed that the species composition differed clearly between the three types of aquatic habitats. While swamps and rivers/streams had a relatively similar and uniform species composition, species in the lakes were more varied but the total species number was almost as high as that of the rivers/streams. The lake communities also differed distinctly from those of the other habitats, and we assume that the lake species originate from other degraded areas in the vicinity, indicating that the remains of the Atlantic Forest has already been strongly altered by humans. Given the poor knowledge of the Odonata in the Atlantic Forest/MOF, we hope that our study may increase the understanding of the communities, and contribute to the development of conservation measures for this fragmented biome." (Authors)] Address: Renner, S., Centro Universitário Univates, Rua Avelino Tallini, 171, Laboratório de Evolução e Ecologia, sala 104, Prédio 8, 95900-000, Lajeado, RS, Brazil

**19135.** Renner, S.; Périco, E.; Sahlén, G. (2016): Effects of exotic tree plantations on the richness of dragonflies (Odonata) in Atlantic Forest, Rio Grande do Sul, Brazil. *International Journal of Odonatology* 19(4): 207-219. (in English) ["One of the forest types occurring in Southern Brazil is the mixed ombrophilous forest (MOF), a subtype of the Atlantic Forest, which is one of the richest biomes on Earth. This biome currently remains as a highly fragmented mosaic, under pressure from human development. The diversity and ecology of most animal groups in this biome are poorly known. We studied Odonata in a large forest fragment, including an ecological reserve: the Floresta Nacional de São



Francisco de Paula (FLONA-SFP), in Rio Grande do Sul, administrated by the Brazilian government. The reserve is dominated by MOF with sectors of *Pinus elliottii* and *Araucaria angustifolia*. Three surveys of these forest sectors over one year yielded 42 species, with the highest species richness recorded in the *P. elliottii* sector. The odonate species recorded here are all generalist in terms of habitat preferences, but they appeared only in low numbers and were very particular in their occurrence pattern. We therefore assume that the introduction of an alien element in the Atlantic Forest has given rise to a new species assemblage, where the ecology of the species is adapted to the novel habitat of *Pinus* plantations. As expected, the species occurring in the MOF sectors were mainly habitat specialists. The *Araucaria* plantations had an intermediate species composition. Despite the differences observed in habitat preference between generalist and specialist species, such exotic plantation habitats may act as a temporary biodiversity reservoir for further habitat colonization." (Authors)] Address: Renner, S., Centro Universitário Univates, Rua Avelino Tallini, 171, Laboratório de Evolução e Ecologia, sala 104, Prédio 8, 95900-000, Lajeado, RS, Brazil

**19136.** Sanchez Herrera, M. (2016): Why so many colors?. Ph.D. thesis, Rutgers, The State University of New Jersey: XII, 125 pp. (in English) ["The Neotropics is a center of global diversity for many groups of organisms, including the dragonflies and damselflies (Odonata). While the number of biodiversity surveys and new species descriptions for neotropical odonates is increasing, diversity in this region is still under-explored, and very few studies have looked at the genetic and morphological diversity within taxa. Here, I will present an overview of the evolutionary history, species diversity and morphological diversity of the Neotropical damselfly genus *Polythore*. Species in *Polythore* are stunningly colorful; their wings display varying shades of orange, black and white in complex patterns. Despite this color diversity, they lack variation in classical reproductive traits (e.g. male genitalia) commonly used for species description. The genus comprises 21 described morphospecies distributed along the eastern slopes of the Andes cordillera and the Amazon basin, from Colombia to northern Bolivia; they dwell in small, fast flowing streams with highly oxygenated waters. I used novel morphological methods (geometric morphometrics, chromaticity analysis, and Gabor wavelet transformation) to analyze the complexity of the wing color patterns present in this genus. I explored species and population relationships through phylogenetic reconstructions and species delimitation analyses incorporating mitochondrial (COI, ND1, 16S) and nuclear (18S, 28S, PMRT) sequences. I was able to quantify the color polymorphism and detect that wing color is not due to common descent, i.e. not just result of phylogenetic history. I have discovered that the presence of four new cryptic species, which are new to science, are inflating the estimates species diversity within this genus. Furthermore, my phylogenetic reconstruction for the family Polythoridae suggests that *Polythore* has one common ancestor, however, other genera will need to be taxonomically revised. Finally, the divergence time calibration

analyses indicate that important geological events like the Andes Cordillera uplift may have had an impact on the diversification of these Neotropical damselflies." (Author)] Address: Sanchez Herrera, Melissa, Biology Program, Faculty of Natural Sciences and Mathematics, Universidad del Rosario, KR 24 63C-69, Bogota 11221, Colombia. E-mail: melsanc@gmail.com

**19137.** Schweighofer, W. (2016): Die Libellen- und Heuschreckenfauna des Leckermoores im Jahr 2015 – ein Monitoringbericht mit Besprechung der Erhebung von Ottmann (2015). *Silva Fera*, Bd. 5/April 2016: 72-77. (in German, with English summary) ["This monitoring report discusses the Odonata and Orthoptera species found at the peat bog "Leckermoor" (Hochreith/ Göstling an der Ybbs) in 2015. It reviews Ernst Ottmann's findings from 2014 published in *Silva Fera* 4, where some misidentifications of species occurred. In 2015, a total of 8 Odonata and 15 Orthoptera species could be identified. After 20 years, there is also new evidence of the highly specialized dragonfly *Aeshna subarctica elisabethae* from the Leckermoor, a species which is very rare in Lower Austria." (Author)] Address: Schweighofer, W., Ötscherblick 10, 3661 Artstetten, Austria. Email: wolfgang.schweighofer@schule.at

**19138.** Shao, M.; Jin, L.; Zhang, Y. (2016): Phytotoxic metabolite from QTYC01, a fungus residing in the gut of *Pantala flavescens* larvae. *Acta Microbiologica Sinica* 56(9): 1513-1520. (in Chinese, with English summary) ["[Objective] To isolate the fungus with phytotoxic activity from the gut of *Pantala flavescens* larvae and find the phytotoxic lead compound from the fungal metabolites. [Methods] QTYC01 was isolated from the gut of *P. flavescens* larvae by means of spread plate and identified by 5.8S rRNA sequence analysis and morphologic observation. Phytotoxic activities of the fermentation broth and ethyl acetate extracts against the radical growth of weeds as well as the safety of crude extract to the selected crops were tested by Petri dish bioassay. The herbicidal activity of QTYC01 against *Echinochloa crusgalli* seedlings was carried out by potted bioassay. Fermentation product was purified by recrystallization and identified by extensive spectroscopic analysis. [Results] QTYC01 was identified as *Curvularia crepinii*. The fermentation broth of QTYC01 significantly inhibited the radical growth of *E. crusgalli* and *Amaranthus retroflexus* with the inhibition rate of 95.0% and 90.1%, respectively. The fermented liquid showed significant inhibitory activity to the seedling of *E. crusgalli* with the victimization rate of 71.1%. Under the concentration of 100 ig/mL, ethyl acetate extracts exhibited significant phytotoxic activities against the radical growth of *E. crusgalli* and *A. retroflexus* with inhibitory rates of 56.8% and 71.2%, respectively, and showed good security to the selected common crops with the inhibition rate of lower than 33%. Therewith, a bioactive compound was isolated from the ethyl acetate extract and determined as (5Z)-7-oxozeaenol. The compound showed good phytotoxic activity against *A. retroflexus* with the IC<sub>50</sub> value of 4.8 ig/mL. [Conclusion] Strain QTYC01 could be potentially developed as a new microbial herbicide." A(uthors)] Address:

Shao, M., College of Chemistry and Life Science, Zhejiang Normal Univ., Jinhua 321004, Zhejiang Province, China

**19139.** Siregar, A.Z.; Rawi, C.S.M.; Ahmad, A.H.; Nasution, Z. (2016): *Agriocnemis femina* (Odonata: Coenagrionidae) and its significance in environmental parameters of rice pests in northern Sumatra-Indonesia. *Journal of Agriculture and Veterinary Science* 9(8): 71-76. (in English) ["The pattern movement and age structure influence of rice cultivation phases on *A. femina* aquatic organisms was investigated in the Manik Rambung rice field (MRRF) ecosystem in North Sumatra. *A. femina* collections of a butterfly net samples were collected in five cultivation phases (fallow, plough, transplanting young, tiller, mature atau preharvest). *Agriocnemis femina* adult, one of the rice pest predators in the adult stage, was dependent on its interactions with rice cultivation phases. There were three age classes of *A. femina*; teneral, juvenile and mature with sex ratio male and female is 1.7:1. It was important in regulating *Agriocnemis femina* population in MRRF which determined its successful emergence to a predatory adult. Rice cultivation managements that focus on enhancing the population of *Agriocnemis femina* would contribute to more effective biological control of rice pests." (Authors)] Address: Siregar, A.Z., School of Biological Sciences, Universiti Sains Malaysia, 11800 Penang, Malaysia

**19140.** Smith-Patten, B.; Patten, M.A. (2016): Status, distribution, and ecology of the Ozark Emerald (*Somatochlora ozarkensis*) and other springtime-emerging dragonflies of eastern Oklahoma. October 1, 2013 through September 30, 2016. Final Performance Report, Federal Aid Grant No. F13AF01188 (T-73-1): 31 pp. (in English) ["This project was focused on determining the status and distribution in Oklahoma of three species of Anisoptera that are regional endemics to the south-central United States, the Oklahoma Clubtail (*Gomphus oklahomensis*), Ozark Clubtail (*G. ozarkensis*), and Ozark Emerald (*Somatochlora ozarkensis*), with a special focus on the last of these species. We conducted a thorough review of extant museum specimens, published literature, and archived photographs to establish baseline information on distribution. We used this baseline to design a series of field surveys to a) confirm continued presence at sites where the species was known, b) obtain information on relative abundance, and c) detect species at sites where it had not been found previously. We effectively doubled the number of known records of the three target species, and we added dozens of localities of occurrence. We found the two clubtails in sufficiently large numbers to conclude that neither species is of high conservation concern in the state. The emerald proved to be rare in the state. Its scarcity, along with its regional endemism and habitat specificity, warrants a high conservation priority. Additional work on this last species, which may be declining range-wide, is needed. We provide information on five other species—the Ouachita Spiketail (*Cordulegaster talaria*), Atlantic Bluet (*Enallagma doubledayi*), Burgundy Bluet (*E. dubium*), Attenuated Bluet (*E. daeckii*), and Westfall's Snaketail (*Ophiogomphus westfalli*)—of conservation interest in

the region. We also make recommendations for future research for these and other species of conservation interest." (Authors)] Address: Patten, M.A., Oklahoma Biological Survey, University of Oklahoma, Norman, OK 73019, USA. E-mail: mpatten@ou.edu

**19141.** Sniegula, S.; Golab, M.J.; Johansson, F. (2016): A large-scale latitudinal pattern of life-history traits in a strictly univoltine damselfly. *Ecological Entomology* 41(4): 459-472. (in English) ["(1.) Variation in thermal conditions and season length along latitudinal gradients affect body size-related traits over different life stages. Selection is expected to optimise these size traits in response to the costs and benefits. (2.) Egg, hatchling, larval and adult size in males and females were estimated along a latitudinal gradient of 2730 km across Europe in the univoltine damselfly *Lestes sponsa*, using a combination of field-collection and laboratory-rearing experiments. In the laboratory, individuals were grown in temperatures and photoperiod simulating those at the latitude of origin, and in common-garden conditions. (3.) The size of adults sampled in nature was negatively correlated with latitude. In all populations the females were larger than the males. Results from simulated and common-garden rearing experiments supported this pattern of size difference across latitudes and between sexes, suggesting a genetic component for the latitudinal size trend and female-biased size dimorphism. In contrast, hatchling size showed a positive relationship with latitude, but egg size, although differing between latitudes, showed no such relationship. (4.) The results support a converse Bergmann cline, i.e. a negative body size cline towards the north. This negative cline in body size is probably driven by progressively stronger seasonal time and temperature constraints towards the higher latitudes and by the obligate univoltine life cycle of *L. sponsa*. As egg size showed no relationship with latitude, other environmental factors besides temperature, such as desiccation risk, probably affect this trait." (Authors)] Address: Sniegula, S., Institute of Nature Conservation, Polish Academy of Sciences, Mickiewicza 33, 31-120 Cracow, Poland. E-mail: szymon.sniegula@gmail.com

**19142.** Suvorov, A.; Jensen, N.O.; Sharkey, C.R.; Fujimoto, M.S.; Bodily, P.; Wightman, H.M.C.; Ogden, T.H.; Clement, M.J.; Bybee, S.M. (2016): Opsins have evolved under the permanent heterozygote model: insights from phylotranscriptomics of Odonata. *Molecular ecology* 26(5): 1306-1322. (in English) ["Gene duplication plays a central role in adaptation to novel environments by providing new genetic material for functional divergence and evolution of biological complexity. Several evolutionary models have been proposed for gene duplication to explain how new gene copies are preserved by natural selection but these models have rarely been tested using empirical data. Opsin proteins, when combined with a chromophore, form a photopigment that is responsible for the absorption of light, the first step in the phototransduction cascade. Adaptive gene duplications have occurred many times within the animal opsins gene family, leading to novel wavelength sensitivities. Consequently, opsins are an attractive choice for the study of gene

duplication evolutionary models. Odonata (dragonflies and damselflies) have the largest opsin repertoire of any insect currently known. Additionally, there is tremendous variation in opsin copy number between species, particularly in the long wavelength sensitive (LWS) class. Using comprehensive phylotranscriptomic and statistical approaches we tested various evolutionary models of gene duplication. Our results suggest that both the blue sensitive (BS) and LWS opsin classes were subjected to strong positive selection that greatly weakens after multiple duplication events, a pattern that is consistent with the permanent heterozygote model. Due to the immense interspecific variation and duplicability potential of opsin genes among odonates, they represent a unique model system to test hypotheses regarding opsin gene duplication and diversification at the molecular level." (Authors)] Address: Suvorov, A., Department of Biology, Brigham Young University, Provo, Utah 84602, USA. E-mail: antony.suvorov@byu.edu

**19143.** Tsubaki, Y.; Samejima, Y. (2016): Hot males live fast and die young: habitat segregation, reproductive output, and lifespan of sympatric *Mnais* damselflies. *Behavioral Ecology and Sociobiology* 70(5): 725-732. (in English) ["The Japanese damselflies *Mnais costalis* and *Mnais pruinosa* show microhabitat segregation in response to forest sunlight conditions in their sympatric habitat: *M. costalis* prefers sunny sites while *M. pruinosa* prefers semi-shady sites. We tested whether sunlight conditions at territorial sites influenced reproductive output, territory occupancy, and/or reproductive lifespan of males of the two species differently. Oviposition duration of females after copulation was used as the measure of reproductive output of individual males. We recorded illuminance at each territorial site on sunny days during the behavioral observation periods. *M. costalis* males at sites with higher illuminance had a higher reproductive output than other territorial males, while *M. pruinosa* males had a relatively lower reproductive output at such sites. During a reproductive season, we performed population censuses in a 500-m area of stream, which contained at least 112 potential territorial sites. Using a fish-eye converter, we took a hemispherical photograph to estimate canopy openness as a measure of insolation at each territorial site and examined whether males incur higher survival costs by holding territories at sunnier sites. Minimum reproductive lifespan, estimated as days between the first and the last sightings, showed that *M. costalis* males that occupied sunnier sites had a shorter lifespan than those occupying shadier sites, while *M. pruinosa* males did not show such a relationship. These results suggest that microhabitat segregation of these two *Mnais* damselflies reflects a species difference in the tradeoff between the benefit of mating rate and cost of survival in the sun. Significance statement: We report a field study on the relationships among thermal environment, temperature tolerance, reproductive success, and character displacement in the mating systems of two species of territorial *Mnais* damselflies. Allopatric populations of these two species are forest dwellers, and males of each species show wing color polymorphism linked to alternative mating behaviors. When these species are sympatric,

males lose their polymorphisms and change their habitat preferences: *M. pruinosa* prefers shady parts of a stream, while *M. costalis* prefers sunnier parts. We showed the costs and benefits of character displacement coupled to microhabitat preference shift. The findings of this study may highlight an underappreciated area of study, namely, the interplay between behavioral and physiological ecology in insects." (Authors)] Address: Tsubaki, Y., Center for Ecological Research, Kyoto University, Kyoto, Japan

**19144.** Tummylovich, O.A. (2016): Odonata larvae of Kaliningrad oblast: Species composition and distributional features. *Inland Water Biology* 9(4): 350-354. (in English) ["In this study, a total of 27 species of dragonfly and damselfly larvae were identified, including 14 species from suborder Anisoptera and 13 from Zygoptera. The dominant species are *Libellula quadrimaculata*, *Enallagma cyathigerum*, and *Erythromma najas*. Frequently occurring species are *Coenagrion hastulatum*, *C. lunulatum*, *C. pulchellum*, *Ischnura elegans*, *Platycnemis pennipes*, *Lestes virens*, and *Libellula depressa*. Rare species are *Lestes sponsa*, *Libellula fulva*, *Gomphus flavipes*, *Gomphus vulgatissimus*, *Sympetrum flaveolum*, *Aeshna viridis*, *A. cyanea*, *A. grandis*, *A. mixta*, *Calopteryx splendens*, *C. virgo*, and *Ophiogomphus cecilia*." (Authors) Original Russian Text © O.A. Tummylovich, 2016, published in *Biologiya Vnutrennykh Vod*, 2016, No. 4, pp. 18–22.] Address: Tummylovich Olga Aleksandrovna – State autonomous institution of the Kaliningrad region for additional education of children "Kaliningrad Regional Children and Youth Center for Ecology, Local History and Tourism"; teacher of additional education; E-mail: Levente@rambler.ru

**19145.** Turnhout, S.; Wasscher, M.; Termaat, T. (2016): The return of the River Clubtail (*Gomphus flavipes*) in the Netherlands. New insights in ecology and research. *Brachytron* 18(1): 38-49. (in Dutch, with English summary) ["After the rediscovery of the River Clubtail (*Gomphus flavipes*) in the Netherlands in 1996, insights in the occurrence and ecology of this rare and critically endangered species changed. In this article we show that new insights like these do not emerge spontaneously. In this case it required the intervention of a new type of actor (a fish researcher, with a sound knowledge of dragonflies) who applied new and unorthodox instruments (the water filter of a power plant) at an unusual place (private terrain, not open to the public) to find a first larva. Only after repeating his discovery two years later the new insights gained a foothold. The example of the River Clubtail shows that our constantly changing knowledge of species can be related to both ecological and social aspects. Besides the improvement of water quality in Dutch rivers at the end of the twentieth century, more people looked for dragonflies more often at more places, with new incentives and using more instruments and more information. Obviously new discoveries should be expected under these circumstances. It is a classical dilemma in ecological monitoring: does this trend show changes in the numbers or occurrence of the species, or does it merely reflect changes in the population of observers? The interconnectedness

of social and ecological aspects shows that biodiversity research is about more than just data. What more precisely, is to be investigated further." (Authors)] Address: Wasscher, M.: marcel.hilair@12move.nl

**19146.** Ubukata, H. (2016): Life history of *Sympetrum frequens* (Selys, 1883) in Hokkaido: are migration and reproductive diapause involved?. *Tombo* 58: 1-26. (in Japanese, with English summary) ["Life history events and spatio-temporal distribution of the imagines of *Sympetrum frequens* (Selys, 1883) in Hokkaido were reviewed and the possibilities of adopting (1) migration between lowland larval habitats and cooler mountainous areas and (2) reproductive diapause were discussed for Hokkaido population. Emergence began in late June in the district where air temperature sometimes exceeded 30°C even in May (i.e., Abashiri District) or in early August in the district with a cool spring (Nemuro District). Precocious adults showed reproductive behavior as early as late July (estimated to be ca. 20 days after emergence), and mass engagements in tandem flight began from late August until early September (estimated to be 40–50 days after emergence) in Ishikari and nearby districts. Individuals performing such a synchronous reproductive behavior 20 days or more after the dates of the earliest reproductive behavior might have undergone reproductive diapause, which could afford a safeguard for avoiding loss from part of their eggs hatching before winter. Many imagines, mostly immature adults, were observed at 400–2,100 m alt. on Mt. Daisetsu during July and early August. They were likely to be those which had emerged from paddy fields, ponds, etc. on the Kamikawa Basin and had flown toward the upper reaches of the mountainous area because the ponds at 1,300–1,700 m alt. were in a condition just after the snow thaws, which should have prevented the larvae from growing and becoming imagines before early August. Actually, no larva of this species was captured during surveys made at various ponds at 1,300–1,700 m alt. in July. Most of the populations emerged on the plains in central Hokkaido was likely to migrate or to move toward mountainous areas and then to fly further toward the upper reaches. But the portion of the Hokkaido population that remained on the plains without migrating to mountains were likely to be much higher than those of the central Honshu populations. As Uéda (1995) predicted, the altitudinal zones utilized by the Hokkaido populations during hot summers were much lower than those of central Honshu, having had no altitudinal gap with the subpopulations remaining on the lowlands. Nevertheless, part of the Hokkaido population is likely to migrate as a habit, if the following observations by Wataji et al. (1997b) in Sapporo city are taken into consideration: at least some imagines of *S. frequens* tended to perch high in the tree canopy around the emergence site on the lowland during the first few days after emergence and then fly rather steadily towards distant mountainous areas. This habit is likely to be an adaptation for long distance (e.g., 10 km) migration across the plain towards mountain areas. Actually Wataji et al. caught several individuals out of several thousands that had been marked at an emergence site, in the middle of the Ishikari Plain. Finally, genetic traits

of reproductive diapause and migration were discussed in the context of adjustments responding to climate and seasonality, followed by speculation on the evolutionary processes of these traits in Hokkaido." (Author)] Address: Ubukata, H., Hokkaido University of Education at Kushiro, Dept Science Education, Shiroyama 1-15-55, Kushiro, 085, Japan. E-mail: ubukata@kus.hokkyodai.ac.jp

**19147.** Westermann, K. (2016): Vorkommen und Schutz der Alpen-Smaragdlibelle (*Somatochlora alpestris*) und der Arktischen Smaragdlibelle (*Somatochlora arctica*) im Oberen Hotzenwald (Südschwarzwald). *Naturschutz südl. Oberrhein* 8: 166-186. (in German, with English summary) ["From 2011 to 2015 I tried to check places together with Elisabeth Westermann in the upper Hotzenwald (southern black Forest) where *Somatochlora arctica* und *S. alpestris* have been found in former times and also tried to find other water bodies where these dragonflies develop. All places where they were found were rated according to the approach described by Sternberg (1995) as stem habitat, secondary habitat or latency habitat based on the regularity and frequency of the recorded exuviae. We found populations of *S. arctica* in 18 bogs and fens; one was a stem habitat, four were secondary habitats and 13 latency habitats. Single populations consisted of observation sites which were at a distance of up to 250 m from each other. in one year the maximum number was 46 exuviae per moor and 103 exuviae in the whole area. *S. alpestris* was significantly less frequent. the populations in ten bogs and fens, one secondary habitat and nine latency habitats, yielded at maximum only ten exuviae per moor and 22 exuviae in the whole area. the lowest observation site of *S. alpestris* was at 878 m NN at the lower limit of the altitudinal distribution of the species in the southern black Forest. *S. arctica* also emerged at all observation sites of *S. alpestris*, sometimes in close spatial vicinity within the same small water body. Approximately two thirds of all exuviae were distributed over small silting gullies of diverse hanging moors which are the most important habitat for the development of both species in the upper Hotzenwald. the populations are highly endangered by long droughts, silting and overgrowth with groves. in the nature reserve „ennersbacher Moor“, one of the scarce stem habitats of both species in the southern and middle black Forest was destroyed within 20 to 30 years. A concept for the protection and optimization of existing stem habitats and secondary habitats as well as for the creation of further habitats for the development, which are effective for the population biology, was outlined." (Author)] Address: Westermann, K., Buchenweg 2, D-79365 Rheinauen., Germany

**19148.** Whispell, A.M. (2016): Physiological color change in the blue-fronted dancer damselfly. Ph.D. thesis, Rutgers, The State University of New Jersey: xi, 141 pp. (in English) ["Several studies have established the existence of temperature-controlled physiological color change (PCC) in Odonata species. Individuals capable of this PCC darken to "dark-phase" (DP) coloration below a temperature threshold and return to "bright-phase" (BP) coloration once above it.



The stimulus controlling PCC in *Argia apicalis* (Say) has been contentious since first studied in the 1960s, as BP and DP males are often present under seemingly identical conditions. In Chapter 1, my goal was to determine if the control of *A. apicalis* male PCC could be attributed to one specific variable or if it is dual-controlled. I first tested whether ambient temperature can be used to predict color phase and found that it is a significant predictor of DP coloration in solitary males only. I next looked for an association between DP coloration and mating status (mating or solitary) and found that DP is far more likely to be exhibited by mating males, thus PCC is also mating-controlled in *A. apicalis* males. Finally, I looked for a relationship between mating stage and color phase and established that mating-controlled PCC is initiated during copulation, further supporting the link between mating and PCC. Additionally, males were darkest during oviposition—the mating stage when males may be most vulnerable to predation. My results indicate that *A. apicalis* males possess dual-controlled PCC. In Chapter 2, my objective was to establish whether DP coloration could be operating as an anti-predator defense strategy in *A. apicalis* males. I first measured the reflectance spectra of DP and BP males and found that BP males are approximately 4.8 times brighter than DP males. I subsequently performed a binary choice experiment to determine whether BP males suffer higher levels of predation than DP males. I tested two predator groups for their color phase preference: avians, *Gallus gallus domesticus* (Linnaeus), and anurans, *Lithobates clamitans melanota* (Rafinesque) and *Lithobates catesbeianus* (Shaw). I found that both groups attacked significantly more BP than DP models, so it is plausible that the mating-controlled PCC exhibited by *A. apicalis* males could be functioning as an anti-predator defense strategy during oviposition." (Author)] Address: not stated

**19149.** Why, A.M.; Lara, J.R.; Walton, W.E. (2016): Oviposition of *Culex tarsalis* (Diptera: Culicidae) differs on water conditioned by potential fish and insect predators. *Journal of Medical Entomology* 53(5): 1093-1099. (in English) ["The response of egg-laying *Culex tarsalis* Coquillett (Diptera: Culicidae) to water conditioned by three fish species used for mosquito control and three predatory aquatic insect species was examined in laboratory binary choice experiments. Oviposition by *Cx. tarsalis* was 72% less on water conditioned with the arroyo chub, *Gila orcutti* (Eigenmann & Eigenmann) (Cypriniformes: Cyprinidae) relative to control cups containing aged tap water, but no significant difference was found in the numbers of egg rafts laid on water conditioned with the fathead minnow (*Pimephales promelas* (Rafinesque), Cypriniformes: Cyprinidae) and the control treatment (water aged 24h). Mosquito oviposition on water conditioned with the predominantly herbivorous/algivorous California Mozambique tilapia hybrid (*Oreochromis mossambicus* (Peters) × *Oreochromis urolepis hornorum* L. (Perciformes: Cichlidae)) or predatory insects (nymphs: *Sympetrum corruptum*; adults: *Thermonectus basillaris* (Harris) or *Cybister fimbriolatus* (Say) (Coleoptera: Dytiscidae)) did not differ significantly relative to that onto water aged for 24h. As compared with water aged 24h and water conditioned with diving

beetles, oviposition by *Cx. tarsalis* was significantly lower (=53%) when live predatory diving beetles were present in oviposition cups. Gravid *Cx. tarsalis* females do not respond equally to putative semiochemicals in water conditioned with the piscine or aquatic insect predators of immature mosquitoes tested here." (Authors)] Address: Why, Adena, Dept of Entomology, Univ. of California-Riverside, Riverside, CA 92521, USA. E-mail: adena.why@email.ucr.edu.

**19150.** Wildermuth, H.; Schneider, B. (2016): Seltene Libelle mit seltener Beute: Gelbe Keiljungfer *Gomphus simillimus* erbeutet Kleines Fünffleck-Widderchen und Gemeine Sichelschrecke (Odonata: Gomphidae; Lepidoptera: Zygaenidae; Orthoptera: Phaneropteridae). *Mercuriale* 16: 25-31. (in German, with English summary) ["Rare species with rare prey: *Gomphus simillimus* as predator of *Zygaena viciae* and *Phaneroptera falcata* – Two females of *G. simillimus* were photographically documented devouring a captured *Z. viciae* and a female sickle-bearing bush-cricket (*Phaneroptera falcata*), respectively, at the river Rhine near the Swiss-German border. It is discussed if especially the females of odonates prey upon large insects and if gomphids with long hind legs are advantaged to grasp large prey." (Authors)] Address: Schneider, B., Wolfbühlstrasse 34A, 8408 Winterthur, Switzerland. E-mail: beatsch@bluemail.ch

**19151.** Zhao, Q.; Pan, Y.; Griffin, J.N.; Sun, J.; Sun, S. (2016): Contrasting trophic-cascade effects driven by variation in morphology of the perches used by a larval damselfly. *Freshwater Biology* 61(5): 693-701. (in English) ["(1) The presence of habitat structures (e.g. caves, ledges, branches) has well-documented ecological effects. However, it remains largely unknown how variation in the morphology of particular habitat structures affects ecological interactions. (2) Using an algae-cladoceran grazer-larval damselfly food chain as a model in a series of microcosm experiments, we manipulated food-chain length and the length (long versus short) and diameter (thick versus thin) of vertically orientated damselfly perches (habitat structure) and examined the density of the grazers and algae. Because the larval damselflies are usually more flexible on thinner perches and have broader foraging domains on longer perches, we predicted that when on long and thin perches they would suppress grazer density more efficiently and hence confer a more positive trophic-cascade effect on algal growth. (3) As predicted, larval damselflies occupying long and thin perches most strongly reduced grazer density and increased algal density, illustrating a positive trophic cascade. In all other damselfly treatments, and despite reduced grazer density, algal density declined, showing a negative trophic cascade due to an elevation in grazer foraging efficiency under predation risk. This probably resulted from the increased activity of the grazers and their spatial shift to the lower water column where algal density was higher. (4) In conclusion, perch morphology affected the direction and strength of the trophic cascade by altering both density-mediated and behaviour-mediated indirect interactions. Considering that anthropogenic disturbance is dramatically changing the morphological diversity of habitat structures, we call

for more research into the ecological consequences of such physical diversity at community and ecosystem ." (Authors)] Address: Sun, S., Dept of Biology, College of Life Sciences, Nanjing University, 163 Xianlin Avenue, 210023 Nanjing, China. E-mail: shcs@nju.edu.cn

## 2018

**19152.** Brasil, L.S.; Olivira-Junior, J.M.; Calvao, L.B.; Carvalho, F.G.; Monteiro-Junior, C.S.; Dias-Silva, K.; Juen, L. (2018): Spatial, biogeographic and environmental predictors of diversity in Amazonian Zygoptera. *Insect Conservation and Diversity* 11: 174-184. (in English) ["1. Our objectives were to assess how turnover and nestedness contribute to beta-diversity patterns of the Zygoptera in Amazonian streams, and to relate these components of beta diversity to environmental, spatial and biogeographic predictors. Our first hypothesis is that the turnover is the most important component of beta-diversity patterns due to the historical isolation of all or part of the areas located in the interfluves of the major Amazonian rivers. Our second hypothesis is that the interaction between environmental conditions and the area of endemism (biogeography) would be the most important predictor of beta-diversity patterns. 2. To test these hypotheses, we compiled data on the Zygoptera communities from 172 Amazonian streams. We used three sets of predictor variables: (i) environmental variables, (ii) area of endemism (biogeographic) and (iii) spatial filters. 3. The turnover explained 99.36% of the beta diversity, corroborating our first hypothesis. Together, environmental and biogeographic variables were the best predictors of beta-diversity patterns. For turnover, however, the biogeographic variables were the best predictors, contrary to our second hypothesis. 4. We found high gamma diversity, but low alpha diversity in the Zygoptera communities. This paradox is explained by the high turnover among sites within the study landscape. This pattern of diversity is related to both historical biogeographic factors and the spatial structuring of environmental conditions in the Amazon region. In the light of our results (high turnover and beta diversity), and their correspondence with areas of endemism, adequate conservation of Amazonian Zygoptera diversity will depend on the establishment of so-called mega-reserves throughout the major Amazonian interfluves and, whenever possible, in the areas with adequate environmental conditions for the greatest possible number of species, otherwise, most species may be at a constant risk of extinction." (Authors)] Address: Brasil, L.S., Av. Perimetral, n 1901/1907 - Terra Firme, Belém, Pará, CEP 66017-970, Brazil. E-mail: brasil\_biolgia@hotmail.com

**19153.** Harabis, F.; Dolny, A. (2018): Military training areas as refuges for threatened dragonfly species: Effect of spatial isolation and military activity. *Biological Conservation* 217: 28-35. (in English) ["A long-term decline in habitat quality and freshwater species diversity has forced conservation managers to consider secondary habitats, such as military training areas (MTAs), that were previously overlooked but have conservation potential. Isolation from many negative

anthropogenic influences combined with disturbances associated with military activities can benefit the diversity of terrestrial species. However, little is known about the conservation potential of freshwater habitats that are an integral part of MTAs. In this study, we used Odonata as valuable indicators of habitat quality to compare the diversity of freshwater sites inside and outside MTAs. We randomly selected 16 sites inside four extensive MTAs and 16 reference sites outside MTAs and examined the differences in traits of species occurring inside and outside the MTAs. We found that the diversity and conservation value of dragonfly communities inside MTAs was comparable to that in the most valuable freshwater habitats outside MTAs. Inside MTAs, species were primarily those associated with habitats in the late successional stages, while species associated with early successional stages were absent. Undoubtedly, the conservation potential of MTAs for freshwater invertebrates is in the long-term isolation from negative anthropogenic influences. Paradoxically, the main potential problem in protecting freshwater habitats inside MTAs is the cessation of military activity." (Authors)] Address: Harabiš, F., Dept Ecol., Fac. Environmental Sciences, Czech Univ. Life Sciences Prague, Kamýcká 129, 165 21 Prague 6, Czech Republic

**19154.** Kim, M.J.; Wang, A.R.; Kim, S.S.; An, J.; Kim, I. (2018): Development and validation of microsatellite markers for the tiny dragonfly, *Nannophya pygmaea* (Odonata: Libellulidae), which is endangered in South Korea. *Applied Entomology and Zoology* 53(1): 151-156. (in English) ["The tiny dragonfly, *Nannophya pygmaea* (Odonata: Libellulidae), is listed as a second-degree endangered wild animal in South Korea. The application of molecular markers to assess genetic diversity and population relationships can provide information necessary to establish an effective conservation strategy. In this study, we developed 12 microsatellite markers specific to *N. pygmaea* using the NextSeq 500 platform. Forty individuals of *N. pygmaea* collected from three currently known localities in South Korea were genotyped to validate these markers and to preliminarily assess population genetic characteristics. The observed number of alleles, observed heterozygosity, and expected heterozygosity at a locus ranged from 2 to 9, 0.421–1.0, and 0.508–0.766 in a population with the largest sample size (20 individuals), respectively, thereby validating the suitability of the markers for population analysis. Five of 12 loci showed significant deviation from the Hardy–Weinberg equilibrium in the population. Our preliminary data indicate an absence of inbreeding in all populations and an absence of obvious genetic difference. The microsatellite markers developed in this study will be useful for studying the population genetics of *N. pygmaea* collected from other regions worldwide, including additional sites in South Korea." (Authors)] Address: Kim, Min Jee, Department of Applied Biology, College of Agriculture and Life Sciences, Chonnam National University, Gwangju, Republic of Korea

**19155.** Op de Beeck, L.; Verheyen, J.; Stokks, R. (2018): Strong differences between two congeneric species in sensitivity to pesticides in a warming world. *Science of The Total*

Environment 618: 60-69. (in English) ["Highlights: •Combined effects of warming and chlorpyrifos differed between two damselfly species. •Chlorpyrifos reduced survival and growth more in the large, slow growing species. •Chlorpyrifos reduced heat tolerance only in the more sensitive species. •Differences in sensitivity were not driven by size and life history but physiology. •Trait-based methods to predict sensitivity to pesticides need physiological traits. Abstract: To predict the impact of pesticides in a warming world we need to know how species differ in the interaction pathways between pesticides and warming. Trait-based approaches have been successful in identifying the 'pace of life' and body size as predictors of sensitivity to pesticides among distantly related species. However, it remains to be tested whether these traits allow predicting differences in sensitivity to pesticides between closely related species, and in the strength of the interaction pathways between pesticides and warming. We tested the effects of multiple pulses of chlorpyrifos (allowing accumulation) under warming on key life history traits, heat tolerance (CT<sub>max</sub>) and physiology of two congeneric damselfly species: the fast-paced (fast growth and development, high metabolic rate), small *Ischnura pumilio* and the slow-paced, large *I. elegans*. Chlorpyrifos reduced survival and growth, but contrary to current trait-based predictions *I. pumilio* was 8 × less sensitive than *I. elegans*. The lower sensitivity of *I. pumilio* could be explained by a higher fat content, and higher activities of acetylcholinesterase and of detoxifying and anti-oxidant enzymes. While for *I. pumilio* the effect of chlorpyrifos was small and did not depend on temperature, for *I. elegans* the impact was higher at 20 °C compared to 24 °C. This matches the higher pesticide accumulation in the water after multiple pulses at 20 °C than at 24 °C. The expected reduction in heat tolerance after pesticide exposure was present in *I. elegans* but not in *I. pumilio*. Our results demonstrate that closely related species can have very different sensitivities to a pesticide resulting in species-specific support for the "toxicant-induced climate change sensitivity" and the "climate-induced toxicant sensitivity" interaction pathways. Our results highlight that trait-based approaches can be strengthened by integrating physiological traits." (Authors)] Address: Verheyen, Julie, Evolutionary Stress Ecology & Ecotoxicology, University of Leuven, Charles Deberiotstraat 32, 3000 Leuven, Belgium. Email: julie.verheyen@kuleuven.be.

**19156.** Op de Beeck, L.; Verheyen, J.; Stoks, R. (2018): Competition magnifies the impact of a pesticide in a warming world by reducing heat tolerance and increasing autotomy? *Environmental Pollution* 233: 226-234. (in English) ["Highlights: •Competition made the pesticide chlorpyrifos (CPF) become lethal. •CPF exposure led to more autotomy but only at high density under warming. •At high density CPF reduced the heat tolerance (CT<sub>max</sub>). •Competition can increase the toxicity and impact of a pesticide under warming. Abstract: There is increasing concern that standard laboratory toxicity tests may be misleading when assessing the impact of toxicants, because they lack ecological realism. Both warming and biotic interactions have been identified to magnify the effects of toxicants. Moreover, while biotic interactions

may change the impact of toxicants, toxicants may also change the impact of biotic interactions. However, studies looking at the impact of biotic interactions on the toxicity of pesticides and vice versa under warming are very scarce. Therefore, we tested how warming (+4 °C), intraspecific competition (density treatment) and exposure to the pesticide chlorpyrifos, both in isolation and in combination, affected mortality, cannibalism, growth and heat tolerance of low- and high-latitude populations of *Ischnura elegans*. Moreover, we addressed whether toxicant exposure, potentially in interaction with competition and warming, increased the frequency of autotomy, a widespread antipredator mechanism. Competition increased the toxicity of chlorpyrifos and made it become lethal. Cannibalism was not affected by chlorpyrifos but increased at high density and under warming. Chlorpyrifos reduced heat tolerance but only when competition was high. This is the first demonstration that a biotic interaction can be a major determinant of 'toxicant-induced climate change sensitivity'. Competition enhanced the impact of chlorpyrifos under warming for high-latitude larvae, leading to an increase in autotomy which reduces fitness in the long term. This points to a novel pathway how transient pesticide pulses may cause delayed effects on populations in a warming world. Our results highlight that the interplay between biotic interactions and toxicants have a strong relevance for ecological risk assessment in a warming polluted world." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: robbystoks@bio.kuleuven.ac.be

**19157.** Tüzün, N.; Stoks, R. (2018): Carry-over effects across metamorphosis of a pesticide on female lifetime fitness strongly depend on egg hatching phenology: a longitudinal study under seminatural conditions. *Environ Sci Technol.* 51, 23: 13949-13956. (in English) ["Current ecological risk assessment of pesticides fails to protect aquatic biodiversity. For the first time, we tested two potential reasons for this failure with regard to carry-over effects across metamorphosis: their dependence on hatching period, and the lack of studies quantifying adult fitness under seminatural conditions. Using the damselfly *Coenagrion puella* sampled from six populations, we designed an outdoor longitudinal one-year study starting from the egg stage. We exposed the aquatic larvae to the pesticide esfenvalerate (0.11 µg/L) during the initial microcosm part. Next, we monitored the lifetime fitness of the terrestrial adults in an insectary. Exposure to the pesticide negatively impacted not only larval traits, but also drastically reduced lifetime mating success of adult females. The impact of this post-metamorphic effect of the pesticide on the population level was three times more important than the effects in the larval stage. Importantly, this carry-over effect was only present in females that hatched early in the season, and was not mediated by metamorphic traits (age and mass at emergence). We provide proof-of-principle under seminatural conditions for two potential pitfalls that need to be considered when improving risk assessment: carry-over effects on adult fitness can (i) be much more important than effects during the larval stage and may not be captured by metamorphic traits, and (ii) be

strongly modulated by egg hatching dates." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**19158.** White, III, H.B.; Moore, M.C. (2018): Forty-five-year record of the Odonata fauna of Lums Pond State Park, New Castle county, Delaware. *Bulletin of American Odonatology* 12(3): 21-33. (in English, with Spanish summary) ["We document the Odonata fauna of Lums Pond State Park in northern Delaware based on 45 years of observations with seasonal and yearly distributions for the 67 species observed. While the species composition has remained fairly stable, periods of drought have resulted in large decreases in the abundance or temporary absence of species associated with vernal pond habitats. Recolonization and population recovery often required several years to more than a decade. Various introduced fauna and flora (e.g. beaver, geese, carp, Phragmites) have altered permanent pond habitats and are associated with changes in the presence of certain Odonata species and their abundance. Disturbance of one shallow water impoundment by carp and beaver resulted in an abundance of cosmopolitan species associated with degraded habitats. Changes in shoreline vegetation resulting from the spread of Phragmites appeared to favor some damselfly species and reduced populations of others." (Authors)] Address: White, III, H.B., Dept Chem. & Biochem., Univ. Delaware, Newark, DE, 19716, USA. Email: halwhite@udel.edu

**19159.** Bartosova, M.; Schenková, J.; Polášková, V.; Bojková, J.; Šorfová, V.; Horsák, M. (2019): Macroinvertebrate assemblages of the post-mining calcareous stream habitats: Are they similar to those inhabiting the natural calcareous springs?. *Ecological Engineering* 136: 38-45. (in English) ["Highlights: • Post-mining brooks represent habitats similar to endangered natural spring brooks. • Post-mining brooks harboured spring specialists and red-listed species. • Species compositions of post-mining and natural brooks were distinct. • Differences were caused mainly by extreme environment related to post-mining brooks. Abstract: Surface coal mining severely affects natural ecosystems, though it might also result in an establishment of biologically unique anthropogenic habitats. We studied spontaneously created post-mining calcareous brooks located at the brown coal spoil heap in the Sokolov coal basin (Czechia). Despite their extreme water conditions, linked most to the ionic mixture of dissolved ions (mainly  $\text{SO}_4^{2-}$ ,  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$ ), and ferric hydroxide precipitations, we recorded unexpectedly species-rich assemblages there (150 species), including several spring fen specialists (31 species) and eight threatened red-listed species. Macroinvertebrate assemblages of post-mining calcareous habitats were compared with those reported from natural brooks draining Western Carpathians calcareous spring fens. The species richness found in the post-mining calcareous brooks was significantly lower than that of the natural calcareous spring brooks. Although we found 29% of species recorded in the two study systems in common (i.e. 80 species), species composition of their assemblages was systematically distinct. This suggests a

possible role of environmental filtering in the post-mining brooks and/or dispersal limitation of some species typical for natural calcareous spring brooks (e.g. *Trichodrilus strandi*, *Bythinella austriaca*). In contrast, many macroinvertebrates, particularly those of high dispersal capacities (i.e. Odonata, Coleoptera and Diptera), can recognize post-mining calcareous brooks as surrogate habitats for the natural calcareous spring brooks." (Authors)] Address: Bartošová, Martina, Dept Botany & Zoology, Masaryk Univ., Kotlářská 2, 611 37 Brno, Czech Republic

## 2019

**19160.** Borisov, S.N.; Malikova, E.I. (2019): Distribution and migration strategy of *Pantala flavescens* (Fabricius, 1798) (Odonata, Libellulidae) near the northern limit of its range in Transbaikalia and in the Far East of Russia. *Eurasian Entomological Journal* 18(3): 155-162. (in English, with Russian summary) ["Data on distribution and phenology of migratory dragonfly *P. flavescens* at the northern limit of the range in Transbaikalia and the Far East of Russia are summarized on the basis of literature sources and collection material. *P. flavescens* flies during May and June from southern territories to the north in order to breed a so-called summer «temperate» generation, and only occurs in that region during the summer and autumn. The northernmost breeding locality registered for the dragonfly is Blagoveshchensk, 50°17'11" N, 127°30'52" E. In September the progeny presumably migrate to the south into a usually warm part of the areal. Hypothetically such a strategy is typical of some individuals while the majority of the population visiting Far East of Russia temporarily do not breed there." (Authors)] Address: Malikova, Elena, Blagoveshchensk State Pedagogical University, Lenina str. 104, Blagoveshchensk, 675000, Russia. E-mail: e\_malikova@inbox.ru

**19161.** Dawn, P.; Chandra, K. (2019): On an account of Odonata including larval stages of selected species from three protected areas of North Chhattisgarh, India. *International Dragonfly Fund - Report 131*: 1-16. (in English) ["Survey in three protected areas of Chhattisgarh reveals the presence of 50 species of Odonata belonging to 34 genera and 9 families. Specimens were sampled from different lotic and lentic ecosystems. 17 species were exclusively found in or around running water. Larvae or exuviae of 23 species were found and photographed. Habitat availability, larval abundance, species composition and phenology are discussed." (Authors)] Address: Dawn, P., Department of Zoology, Shyampur Siddheswari Mahavidyalaya, Ajodhya, Howrah-711312, India. E-mail: prosenjit.dawn@gmail.com

**19162.** Devaud, M.; Lebouvier, M. (2019): First record of *Pantala flavescens* (Anisoptera: Libellulidae) from the remote Amsterdam Island, southern Indian Ocean. *Polar Biology* 42(5): 1041-1046. (in English) ["Natural colonization of macroinvertebrates into the Sub-Antarctic area is generally accepted to be a rare event. In February 2017, two live adults of *Pantala flavescens* (Libellulidae) were recorded on the isolated Amsterdam Island (37°50' S, 77°30' E), southern



Indian Ocean [French Southern and Antarctic Lands]. This circumtropical species, common name the Globe Skimmer, can fly several thousand kilometers. This paper analyzes the weather conditions in this sector of the Indian Ocean in February 2017 to assess the probability of arrival of the dragonflies by air from their known migration route at lower latitudes between India and East Africa. The probability that this species could establish and form a permanent population on Amsterdam Island is discussed. Some favorable habitats are present but temperatures are probably too low to allow the dragonflies to complete their development. Odonata have never been observed on Sub-Antarctic islands and reports of natural arrival of insects into these islands mainly concern Lepidoptera. Here we also report observations of *Vanessa cardui* (Nymphalidae) which has established a permanent population on Amsterdam Island and has been observed on several occasions in the Crozet Archipelago." (Authors)] Address: Lebouvier, M., CNRS UMR 6553, Université de Rennes, Paimpont, France, France. E-mail: marc.lebouvier@univ-rennes1.fr

**19163.** Garcia Junior, M.D.N.; Rakes, M.; Pazini, J. de B., Pasini, R.A.; Garcia, F.R.M. & Grützmacher, A.D. (2019): The diversity of Odonata adults's at Pampa Biome from Brazil. *Revista de Biología Tropical* 67(1): 107-117. (in English) ["The growth of humankind has brought with it several environmental problems that have worsened over time, including the loss of insect biodiversity. The Odonata order have been indicated by several authors as relevant bioindicators for assessing and monitoring environmental conditions of specific locations. The main objective of this study was to conduct an inventory of the Odonata diversity in the Pampa Biome, of the Southern region of the state of Rio Grande do Sul, Brazil. The species survey was conducted between November 2014 and October 2015. Adult insects were collected in Capão do Leão, Pelotas and Rio Grande cities. Each location was visited nine times, totalizing 54 samplings. Entomological nets were used for capturing adult insects, which were then kept in entomological envelopes. The identification of the specimens was carried out with taxonomic keys of Lencioni and Heckman. In addition, Chao-1, the Shannon-Wiener and Jackknife indexes were associated with the sampling areas. During the species survey a total of 2 680 Odonata specimens were collected, representing 45 species encompassed in 22 genera and six families. The Libellulidae and Coenagrionidae families were registered in 60 and 30 % of the specimens sampled, followed of the Aeshnidae, Calopterygidae, Gomphidae and Lestidae, of reduced occurrence. The genera *Erythrodiplax*, *Micrathyria* and *Ischnura* were found at least once in all the visited sites. The study resulted in the registration for the first time of the following species: *Progomphus complicatus* Selys, *Lestes minutus* Selys, *Homeoura ambigua* Ris, and *Tauriphila xiphea* Ris. These species were not previously reported in any Odonata study of the Brazilian state of Rio Grande do Sul. In regard to Odonata diversity in the Southern region of Rio Grande do Sul, Libellulidae and Coenagrionidae are the families more abundants. *Erythrodiplax* and *Micrathyria* are the most common genera. *Micrathyria marcella* represented

9.6 % of all collected libellulidae and was the most abundant specie. Capão do Leão has the largest species diversity (wealth), the largest number of collected specimens and more diversity than Pelotas and Rio Grande. However, the results showed that the Odonatofauna in the State are still little known, and new studies are needed to better describe this group in other regions." (Authors)] Address: Garcia, M., Dept of Ecology, Zoology, & Genetics, Inst. of Biology (IB), Federal Univ. of Pelotas, postcode 96010-900, Pelotas, Rio Grande do Sul, Brazil. E-mail: m.d.juniorbio@gmail.com

**19164.** Kemabonta, K.A.; Adu, B.W.; Akanni, N.; Olajide, J.P.; Uche-Dike, R. (2019): Studies on influence of human activities on the species diversity of Odonata in parts of Lagos metropolis. *Nigerian Annals of Pure and Applied Sciences* 1(1): 123-129. (in English) ["This study was conducted to determine dragonfly species diversity in a fish pond in Igbaga, Ikorodu (6.6671°N and 3.5983°E) and a large expanse of farm land in Ipaja (6.6044°N and 3.2660°E), southwestern Nigeria from January, 2016 to July, 2016 to as well as the effect of anthropogenic activities on the dragonflies at both sites. A total of 1002 dragonflies were collected belonging to 20 species, 15 genera, and two families (Libellulidae and Aeshnidae), were found at the two locations. The most dominant species in Site 1 (Ikorodu fish farm) was *Chalcostephia flavifrons* (36%) followed by *Palpopleura lucia* (15%) and the least were *Palpopleura albifrons*, *Gynacantha nigeriensis*, *Diplacodes lefebvrei* and *Trithemis grouti* which were one percent of the total numbers sampled. On the other hand, the most dominant species in Site 2 (Agricultural Farm in Ipaja) was *Pantala flavescens* (92%) and the least was *Urothemis assignata* (1%). Similarity test using Sorensen's quotient revealed a strong dissimilarity in the community structures of the two areas surveyed. The fish pond had a more even distribution of the dragonflies ( $e^H/S = 0.508$ ) and a higher concentration ( $H' = 1.808$ ) of dragonflies than Ipaja agricultural farm." (Authors)] Address: Kemabonta, K. A., Dept of Zoology, University of Lagos, Nigeria. E-mail: kkemabonta@unilag.edu.ng

**19165.** Kim, Y.-K.; Kwon, O.-C. (2019): Insect fauna of Mt. Chilbo in Gyeonggi-do. *Korean J. Nat. Conserv.* 18(1): 85-102. (in Korean, with English summary) ["A total of 109 terrestrial insect species recognized in Mt. Chilbo located in Gyeonggi-do is documented. Observed pollinating associations between flowering plants and hymenopteran species are specified. Discovery of the two hymenopteran species, i.e. *Ampulex kurarensis* and *A. satoi*, forgotten for a long time in Korea is reported and current status of the two dragonflies, i.e. *Nannophya pygmaea* and *Rhyothemis fuliginosa*, is discussed. In addition, tabulated information on three alien pests observed in this area are presented. However, it should be noted that the insect biodiversity provided in this study is considerably underestimated and many species are still masked due to short periods of surveys and difficulty in identification for the vast numbers of taxa. Aculeate hymenoptera is a comparatively well-studied group in this study. Further study especially on Coleoptera and moth presumably that are other major insect groups of this area

will supplement this study." (Authors)] Address: Kim, Y.-K., Yonjin University

**19166.** Kosterin, O.E. (2019): Update of 2017 - 2018 to Odonata of Kompong Saon Peninsula, Cambodia. International Dragonfly Fund Report 129: 1-24. (in English) ["March 2017 and November 2018 are presented. The presence of *Onychargia atrocyana* Selys, 1865 in Cambodia is confirmed. Twentyone species are added to the known fauna of the Kbal Chhay Waterfall environs, 19 species to that of Ream Peninsula and 4 to that of Koh Rong Island. The total number of species registered for Kampong Saom Peninsula amounts to 74. The presented data are rather of historical importance since most of the remaining forest has been quickly and irreversibly logged a few months ago. The validity of *Gynacantha demeter* Ris, 1911 as a species distinct from *G. dohmii* Krüger, 1899 is doubted." (Author)] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

**19167.** Malikova, E.I.; Kosterin, O.E. (2019): Check-list of Odonata of the Russian Federation. *Odonatologica* 48(1/2): 49-78. (in English) ["A check-list of 152 species and 168 subspecies of Odonata known from the territory of Russian Federation and their occurrence in its seven main eco-geographical regions (European part, Caucasus, Ural, West Siberian Lowland, South Siberia, North-East Asia and southern Far East) is presented in tabular form. First reliable reports of particular species for particular regions made after latest summarising monographic publications referring to those regions are referenced. Dubious reports are not mentioned. Taxonomically and otherwise complicated cases are commented. The highest diversity of 91 species (59.9 % of the fauna) is found in southern Far East of Russia; Caucasus, European part, South Siberia and Ural show moderately rich faunas of 81, 80, 75 and 74 species, respectively; the fauna of West Siberian Plain is poor (56 species) and that of North-East Asia very poor (39 species)." (Authors)] Address: Malikova, Elena, Blagoveshchensk State Pedagogical University, Lenina str. 104, Blagoveshchensk, 675000, Russia. E-mail: e\_malikova@inbox.ru

**19168.** Masius, P. (2019): Die Libellenfauna der Ostseeinseln Wollin (NW Polen) und Usedom (NO Deutschland) mit angrenzendem Festland – Frühjahrsaspekt 2018, und Anmerkungen zum Vorkommen von *Coenagrion armatum* (Charpentier, 1840). International Dragonfly Fund Report 130: 1-40. (in German, with English summary) ["In May 2018, 34 dragonfly species were recorded on Wollin (21), Usedom (30) and the adjacent mainland (21). The most frequent spring species in the area were *Coenagrion puella*, *Libellula quadrimaculata*, *C. pulchellum*, *Ischnura elegans*, *Erythromma najas*, *Brachytron pratense* and *Cordulia aenea*. *C. lunulatum* and *Calopteryx virgo* were recorded for the first time on Usedom, while *Anax parthenope*, *Libellula fulva* and *Leucorrhinia caudalis* were recorded for the first time on Wollin. The occurrence of *C. armatum*, which had been recorded in 2016 on Usedom, could not be confirmed. The

quantitative results of the survey are given for different types of water bodies (ditches, pools, ponds, lakes, bog lakes). The average number of species per water body was highest in bog lakes (7.5) and lowest (3.4) in temporary pools. In comparison to older studies from the area, the flight season started 13.7 days earlier in 2018 than in years documented prior to 1989. This might be explained by climatic changes. The species composition, however, has remained rather stable – at least on Usedom and the mainland. On Wollin, climatic factors as well as habitat loss and transformation have led to a species composition that is different from the one recorded in the first half of the 1970s." (Author)] Address: Masius, P., Burbacher Str. 150, 53129 Bonn, Germany. Email: Patrick\_Masius@gmx.de

**19169.** May, M.L. (2019): Odonata: Who they are and what they have done for us lately: Classification and ecosystem services of dragonflies. *Insects* 2019, 10(3), 62: 17pp. (in English) ["Odonata (dragonflies and damselflies) are well-known but often poorly understood insects. Their phylogeny and classification have proved difficult to understand but, through use of modern morphological and molecular techniques, is becoming better understood and is discussed here. Although not considered to be of high economic importance, they do provide esthetic/spiritual benefits to humans, and may have some impact as predators of disease vectors and agricultural pests. In addition, their larvae are very important as intermediate or top predators in many aquatic ecosystems. More recently, they have been the objects of study that have yielded new information on the mechanics and control of insect flight." (Author)] Address: May, M.L., Department of Entomology, Rutgers University, New Brunswick, NJ 08901, USA

**19170.** Outomuro, D.; Johansson, F. (2019): Wing morphology and migration status, but not body size, habitat or Rapoport's rule predict range size in North-American dragonflies (Odonata: Libellulidae). *Ecography* 42(2): 309-320. (in English) ["Understanding why species range sizes vary is important for predicting the impact of environmental change on biodiversity. Here we use a multi-variable approach in a phylogenetic comparative context to understand how four morphological, two ecological, and two eco-geographical variables are associated with range size, latitudinal range and longitudinal range in 81 species of North-American libellulid dragonflies. Our results show that: 1) migratory species and species with a more expanded basal hindwing lobe have a larger range size; 2) opposite to Rapoport's rule, latitudinal range is negatively correlated with mid-range latitude; 3) longitudinal range is predicted by wing morphology and migration; 4) body size and larval habitat are not correlated with range size, latitudinal range or longitudinal range. These results suggest that dispersal-related traits, such as wing shape and migratory status, are important factors in predicting the range size of libellulid dragonflies. In addition, the reverse Rapoport's rule suggests that more northern-centred species might be more specialized than more southern-centred species. We suggest that the variables predicting range size are likely imposed by taxon-specific

morphological, ecological, physiological and behavioural traits. Taxon-specific knowledge is thus necessary to understand the dynamics of range sizes and is important to implement successful restoration and conservation plans of threatened species." (Authors)] Address: Johansson, F., Dept of Ecology & Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**19171.** Rivas-Torres, A.; Sánchez-Guillén, R.A., Cordero-Rivera, A. (2019): Alternative reproductive strategies in black-winged territorial males of *Paraphlebia zoe* (Odonata, Thaumateuridae). PeerJ 7:e6489: 22 pp. (in English) ["Alternative reproductive strategies are commonly associated with male dimorphism. In *Paraphlebia zoe*, a species of damselfly whose males are dimorphic in wing coloration, black-and-white-winged (BW) males defend territories, while hyaline-winged (HW) males usually play the role of satellites. We found that several BW males can sometimes share a territory, and we hypothesized that within this morph there are two alternative tactics: submissive and dominant. We conducted an experiment to test whether dominant and submissive roles are plastic or stable and fixed on each individual. To this end, we manipulated black and white spots of BW males in four treatments: (i) painting over white and black spots without changing their size, (ii) erasing the white spot using black painting, (iii) increasing the black spot and moving the white spot maintaining its size and (iv) control males. Additionally, we investigated the correlation between some phenotypic variables (wing asymmetry, survival and recapture probabilities) and male behaviour (in terms of quality of the territory). We found that the two behavioural roles (submissive and dominant) were not affected by the manipulative experiments, therefore suggesting that they are stable and fixed. Additionally, we found a positive correlation between body size and survival in both sexes, and a positive effect of territory quality and lifespan on mating success. Moreover, the largest and youngest BW males were the most symmetrical. We conclude that *Paraphlebia zoe* holds high behavioural diversity, with two types of strategies in BW males, dominant and submissive. The occurrence of this intra-morph behavioural diversity might depend on demographic factors such as population density and/or the relative frequency of the different morphs." (Authors)] Address: Rivas-Torres, Anaïs, ECOEVO Lab, Depto de Ecología e Biología Animal, Univ. de Vigo, Pontevedra, Galiza, Spain

**19172.** Sakaris, P.C.; Galvez, J.; Callier IV, T.P.; Brown, A. (2019): Ontogenetic and temporal diet shifts of the invasive Asian Swamp Eel in South Florida. North American Journal of Fisheries Management 39(6): 1288-1300. (in English) ["The Asian Swamp Eel *Monopterus albus* is an introduced species in South Florida waters and is considered to be a potential threat to the native biota and ecosystems in the region. As a protogynous hermaphrodite that, under the right climatic conditions, can travel short distances over land and tolerate abrupt shifts in salinity, this species has strong invasive potential. In this study, our main goal was to evaluate the potential effects of the Asian Swamp Eel as a predator

on native fishes and other biota. Our specific objectives were to (1) analyze the stomach contents of introduced Asian Swamp Eels from canals located near Everglades National Park and (2) assess the ontogenetic and temporal shifts in their consumption of prey. We dissected 752 Asian Swamp Eels (107–833 mm TL), and 46.4% (N = 349) of the samples had stomach contents for the analyses. The analyses indicated that amphipods, fishes, dragonfly nymphs, Hemiptera insects, and grass shrimp *Palaemonetes* were the most important prey items for Swamp Eels. Swamp Darters *Etheostoma fusiforme*, juvenile Asian Swamp Eels, and centrarchids were the most common fishes eaten by Swamp Eels. Ontogenetic shifts in diet were apparent, with amphipods and dipteran larvae most often observed in the stomachs of small- to medium-sized Swamp Eels and fish, dragonfly nymphs, and Hemiptera insects more commonly identified in the stomachs of larger eels. The Swamp Eels also became increasingly piscivorous with size. Dragonfly nymphs and grass shrimp occurred more frequently in the Swamp Eel diets in May 2010, while the consumption of fish and amphipods increased in October 2010. Fish were the most important prey item that was consumed during the November–December 2009 period, although other prey items were relatively important during that collection period. As an opportunistic predator that consumes a wide range of prey, the Asian Swamp Eel likely has its greatest effects on native biota and ecosystems as a predator and competitor with native fishes for resources." (Authors)] Address: Sakaris, P.C., School of Science and Technology, Georgia Gwinnett College, 1000 University Center Lane, Lawrenceville, Georgia, 30043 USA. Email: psakaris@ggc.edu

**19173.** Seidu, I.; Nsor, C.A.; Danquah, E.; Tehoda, P.; Opong, S.K. (2019): Patterns of Odonata assemblages in lotic and lentic systems in the Ankasa Conservation Area, Ghana. International Journal of Zoology Volume 2019, Article ID 3094787: 14 pp. (in English) ["Our study examined Odonata assemblages distribution pattern and the predictive factors that accounted for this in the lotic and lentic water systems within the Ankasa Conservation Area (Ghana). A total of 23 sites with sampling protocol of 2 researchers per hour per sampling site were used to survey Odonata species over two seasons in the three water bodies (streams, rivers, and ponds). Broken stick model, individual-based rarefaction, and Renyi diversity ordering were employed to quantify community assemblages. Ordination technique was also used to determine the Odonata–environmental relationship. A total of 1403 individuals, belonging to 47 species (22 Zygoptera and 25 Anisoptera) in six families, were recorded. Species richness ( $H_c = 3.414$ ,  $p = 0.169$ ) and diversity ( $H_c = 1.661$ ,  $p = 0.44$ ) generally did not differ among the three water systems. However, from individual sites, ponds appeared mostly diverse ( $\alpha\text{-scale} = 0.04$ , Renyi index ( $r = 5.86$  to  $\alpha = 3.5$ ,  $r = 3.12$ ), in spite of their lowest species abundance and richness. At the suborder level, ponds equally exhibited the highest Anisoptera species richness ( $9.90 \pm SE 0.640$ ) compared with Zygopterans ( $0.80 \pm SE 0.291$ ). Overall, Anisopterans ( $K = 16.51$ ,  $p = 0.00026$ ) and Zygopterans richness ( $K = 16.39$ ,  $p = 0.00023$ ) differed

significantly among the three subsystems, while Odonata composition also differed significantly among the various water bodies (ANOSIM: global  $R=0.94$ ,  $p<0.001$ ). Flow rate, water temperature, channel width, and turbidity were the key predictive factors that influence the structure of Odonata species assemblages. The results highlight the need to improve the functional status of the lentic and lotic systems, with the ultimate goal of conserving diverse Odonata fauna and other sympatric freshwater biodiversity." (Authors)] Address: Seidu, I., Dept of Wildlife & Range Management, Fac. of Renewable Natural Resources, Kwame University of Science and Technology, Kumasi, Ghana. E-mail: antwiseidu88@gmail.com

**19174.** Suárez-Tovar, C.M.; Rocha-Ortega, M.; González-Voyer, A.; González-Tokman, D.; Córdoba-Aguilar, A. (2019): The larger the damselfly, the more likely to be threatened: a sexual selection approach. *Journal of Insect Conservation* 23(3): 535-545. (in English) ["In a changing world due to anthropogenic activities, it is increasingly urgent to identify the biological attributes that predispose species to extinction. Using phylogenetic comparative methods and International Union for Conservation of Nature Red List categories as a proxy for vulnerability to extinction, we evaluated whether body size, sexual size dimorphism and/or mating system (territorial or non-territorial) are linked to extinction risk in 139 damselfly (Zygoptera) species. Threatened species of damselflies were, on average, larger than non-threatened species. However, we did not find a relationship between sexual size dimorphism or mating system and extinction risk. Similar to vertebrates and other insects, a large size implies a higher viability costs for damselflies. Other evolutionary mechanisms and not only sexual selection may play an important role in selecting for large body size and rendering larger species more prone to extinction." (Authors)] Address: Suárez-Tovar, Catalina, Posgrado en Ciencias Biológicas, Universidad Nacional Autónoma de México, Mexico City, Mexico

**19175.** Zheng, D.; Nel, A.; Zhang, H.; Chang, S.-C.; Jarzembowski, E.A.; Zhuo, D.; Wang, B. (2019): A highly diverse coenagrionoid damselfly group (Odonata: Zygoptera: Burmacoenagrionidae fam. nov.) from mid-Cretaceous Burmese amber. *Journal of Systematic Palaeontology* 17(3): 239-253. (in English) ["The damselfly superfamily Coenagrionoidea is the largest zygopteran group, comprising three-fifths of all extant damselfly species. The Mesozoic fossil record of this superfamily is sparse, whilst it is relatively common in Burmese amber. A new coenagrionoid family, Burmacoenagrionidae Zheng et al., fam. nov., is established here based on four new species in three new genera: Burmacoenagrion pretiosus Zheng et al. gen. et sp. nov., Burmachistigma cheni Zheng et al. gen. et sp. nov., Electrocoenagrion elongatum Zheng et al. gen. et sp. nov. and Electrocoenagrion forficatum Zheng et al. gen. et sp. nov. The previously described damselfly genus, Burmagrion Möstel et al., 2017, is transferred to this family. Burmacoenagrionidae Zheng et al. fam. nov. has a long pterostigma covering 3–5 cells, pigmented wings and a sigmoidally curved RA and

RP1 distal of the pterostigma, differing from other coenagrionoid damselflies. Until now, this is the most diverse damselfly family reported from Burmese amber, showing that the Coenagrionoidea were already highly diversified 100 million years ago." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

## 2020

**19176.** Amado, L.L.; Juen, L. (2020): Glutathione S-transferase activity in *Mnesarete aenea* (Odonata), *Campylocia anceps* (Ephemeroptera), and *Cylindrostethus palmaris* (Hemiptera) from forest and oil palm plantation areas in the Eastern Amazon. *Ecological Indicators* 118, November 2020, 106770: (in English) ["Highlights: • Our results show that *M. aenea* had higher GST activity in oil palm areas. • The high GST activity in *C. anceps* shows the sensitivity of juvenile organisms in environments. • The difference in GST induction in *M. aenea* and *C. palmaris* shows can help the bio-monitoring. The use of aquatic insects in ecological studies of oil palm plantations provides an effective evaluation of biodiversity loss caused by changes in habitat. Approaches at the population or community level associated with biomarker analyses might help in the management and conservation of impacted habitats. Our aim was to assess detoxification responses (Glutathione S-transferase activity) of three aquatic invertebrates (*Mnesarete aenea*, *Cylindrostethus palmaris*, and *Campylocia anceps*) in oil palm plantations and forested areas in the Eastern Brazilian Amazon. A total of 20 streams were sampled during the dry season of 2017, in the municipality of Tailândia, Pará – Brazil. The response of this exposure biomarker was related with water temperature, pH, dissolved oxygen, canopy cover and habitat integrity index. The species *M. aenea* and *C. palmaris* showed differences in detoxification response induction, with higher specific activity in oil palm areas than in forest areas. The conversion of natural landscape and use of agrochemicals in oil palm plantations might affect the dynamics of organisms that are sensitive to changes in habitat quality. We suggest that differences in Habitat Integrity Index between oil palm and Amazon forest areas is a determining factor in increased GST induction in *M. aenea*. This result indicates that this organism might act as a sentinel for biomarker evaluations, providing an early warning signal via its biochemical responses that could help to prevent changes at the population and community levels." (Authors)] Address: Juen, L., Programa de Pós-graduação em Zoologia, Instituto de Ciências Biológicas, Universidade Federal do Pará, Rua Augusto Correia, N 1 Bairro Guamá, 66.075-110 Belém, Pará, Brazil. Email: leandrojuen@ufpa.br

**19177.** Bernard, R.; Bakowski, M. (2020): New data on dragonflies (Odonata) of Mozambique, with a new country record of *Phyllogomphus selysi* Schouteden, 1933. *African Invertebrates* 61(1): 17-28. (in English) ["30 dragonfly species were collected at 11 localities, mostly situated in central provinces of Mozambique, in the Gorongosa National Park, adjacent areas and the Chimanimani National Reserve buffer



zone. These data include a new country record of *Phyllogomphus selysi* and records of several other species that have rarely been recorded so far in relatively poorly-explored Mozambique, such as *Atoconeura biordinata*, *Hadrothemis scabrifrons*, *Gynacantha manderica*, *Gomphidia quarrei* and *Olpogastra lugubris*. Faunistic considerations are given with some remarks on morphological traits." (Authors)] Address: Bernard, R., Dept of Nature Education and Conservation, Faculty of Biology, Adam Mickiewicz University in Poznań, Uniwersytetu Poznańskiego 6, PL-61-614 Poznań, Poland. Email: rbernard@amu.edu.pl

**19178.** Bezmaternykh, D.M.; Vdovina, O.N. (2020): Composition and structure of macrozoobenthos of lakes in different natural zones and subzones of Western Siberia. *Limnology* 21: 3-13. (in English) ["In 2003–2016, the composition and structure of macrozoobenthic communities of 49 lakes in three natural zones (taiga, forest-steppe, and steppe) of Western Siberia were investigated. The benthic fauna of the research lakes includes 160 species of nine classes of invertebrates. The trophic structure was characterized, and six major trophic groups were identified. A spatial analysis of the macrozoobenthos of the research lakes showed that from the forest-steppe to the dry steppe subzone, the species diversity decreases on a considerable scale and also dominant taxa of macrozoobenthos change with increasing water salinity. Especially in the forest-steppe and steppe zones, high water salinity is probably a limiting factor in the development of macrozoobenthic communities. In the taiga zone, however, water salinity seems not to have such significance; rather the degree of humification (shown as dark-colored water due to waterlogging) should be taken into account." (Authors)] 12 odonate taxa are listed; most frequent species is *Coenagrion armatum* 13 of 49 lakes were investigated.] Address: Bezmaternykh, D.M., Insti. aquatic & ecological problems, Sibir Branch of the Russian Acad. Sciences, 656038 Barnaul, ul. Molodjeshnaja 1, Russia

**19179.** Bibi, S.; Khan, M.F.; Rehman, A. (2020): Dragonfly fauna of district Haripur, Khyber Pakhtunkhwa, Pakistan. *Arthropods* 9(3): 98-103. (in English) ["The present study was conducted from January to September 2018 in district Haripur, KP, Pakistan. A total of 200 specimens were collected and 2 families, 9 genera and 12 species were recorded. Dragonflies of family Libellulidae (170; 94.15%) were present in great abundance while the other two families were less distributed. Minimum number of dragonfly species belong to family Gomphidae (10; 5.85%). *Orthetrum chrysis* was recorded in greater number. We also measured their body length, and length of fore and hind wings. The highest length was found to be in *Pantala flavescens*, with 23.5±0.4, 17.5±0.4, and 16±2.0 mm length of body, fore and hind wings respectively. Further comprehensive study needed on their ecological role." (Authors)] Address: Bibi, Saira, Department of Zoology, Hazara University, Mansehra, KPK, Pakistan. E-mail: sairabibi333@hu.edu.pk

**19180.** Bouhala, Z.; Khemissa, C.; Márquez-Rodríguez, J.; Ferreras-Romero, M.; Samraoui, F.; Samraoui, B. (2020):

Ecological correlates of odonate assemblages of a Mediterranean stream, Wadi Cherf, northeastern Algeria: implications for conservation. *International Journal of Odonatology* 22(3/4): 181-197. (in English) ["We investigated the odonates of Wadi Cherf, a tributary of Wadi Seybouse, and explored the main environmental factors that may be important drivers of the abundance and diversity of Odonata assemblages. PCA analyses demonstrated a significant altitudinal gradient associated with water flow, temperature, vegetation cover, substrate and adjacent land use. Notably, pollution was a dominant structuring factor and the most widespread species, *Ischnura graellsii* and the North African endemic *Platycnemis subdilata*, were the most pollution-tolerant species. Similarly, co-inertia analysis indicated that environmental factors could account for 70% of the co-variation in shaping odonate assemblages. Equally important, threatened species were associated with less degraded but vulnerable habitats, most susceptible to anthropogenic impacts. There is thus a need to develop monitoring tools to assess the ecological integrity of North African rivers and implement a management plan that considers both connectivity and heterogeneity to ensure that Wadi Cherf, a sanctuary to three threatened species *Calopteryx exul* (EN), *Coenagrion mercuriale* (EN) and *Gomphus lucasii* (VU), continues to provide critical ecosystem functions." (Authors)] Address: Bouhala, Zineb, Laboratoire de Conservation des Zones Humides, Université 8 Mai 1945 Guelma, Guelma, Algeria. Email: bsamraoui@gmail.com

**19181.** Buczynski, P.; Michonski, G.; Zawal, A. (2020): New site of *Cordulegaster heros* Theischinger, 1979 in western Slovakia – the confirmation of its northern border of range of occurrence in Europe (Odonata: Cordulegasteridae). *Ecologica Montenegrina* 28: 20-22. (in English) [20.04.2017, 1 larva; Sampling site: Central Western Carpathians, Krnáň near Topoľčany, 48°32'09.4" N, 18°15'55.5" E, UTM: BU 97, ca. 230 m a.s.l. Habitat: unnamed small stream (left tributary of the River Nitra), backwater. Stream with a width of approximately 2 m, depth of approximately 0.3 m, bottom with gravel (80%) and stony (20%) sediments, with residual detritus in the hollows (30%), water flow 0.16 m s<sup>-1</sup>, oxygen saturation 94.9%, temperature 7.9°C, pH 7.67, conductivity 210 µS cm<sup>-1</sup>.] Address: Buczynski, P., Dept of Zoology and Nature Protection, Institute of Biological Sciences, Maria Curie-Skłodowska University, Akademicka Str. 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**19182.** Carrillo-Muñoz, A.I.; García-Miranda, O. (2020): New records for the Chimalapas-Uxpanapa Region, Mexico (Odonata: Calopterygidae, Heteragrionidae, Polythoridae, Thaumtoneuridae, Coenagrionidae, Gomphidae, Libellulidae). *Notulae odonatologicae* 9(5): 196-203. ["During a collecting trip to five tropical rainforest sites in the Chimalapas-Uxpanapa region in an altitudinal gradient of 155–499 m a.s.l., a total of 16 species of odonates new to the region were recorded. Poorly studied species such as *Erpetogomphus ophibolus* Calvert, 1905, *Hetaerina infecta* Calvert, 1901, *Heteragrion alienum* Williamson, 1919, and *H. tricellulare* Calvert, 1901, were recorded. *Ischnura demorsa* Hagen,

1861, and *Paraphlebia* sp. are discussed in greater detail. These records add to the knowledge of odonate distribution from Oaxaca and Veracruz." (Authors)] Address: Carrillo-Muñoz, A.I., Centro Tlaxcala Biol. de la Conducta, Univ. Autónoma de Tlaxcala, Carretera Tlaxcala-Puebla km 1.5, C.P. 90070 Tlaxcala, México. E-mail: aicarrillomz@gmail.com

**19183.** Cerini, F.; Bologna, M.A.; Vignoli, L. (2020): Nestedness-patterns of Odonata assemblages in artificial and natural aquatic habitats reveal the potential role of drinking troughs for aquatic insect conservation. *Journal of Insect Conservation* 24: 421-429. (in English) ["Nestedness patterns including both artificial and natural habitat may represent evidence of such habitats' importance in community assembly and conservation of animals inhabiting those sites. Odonata often colonize drinking troughs (artificial water reservoirs) and thus they are good study models as umbrella species. We investigated if a network of artificial (troughs) and natural (pools) aquatic habitats could create a nested subset pattern for Odonata assemblages. We surveyed all the troughs present in the Castelporziano Estate (Italy, Lazio). Odonata larvae have been collected and identified. Data of a previous paper on 18 natural pools and ponds, and our samplings of 16 troughs were organized into a presence-absence matrix. The Odonata assemblage within natural and artificial habitats is significantly nested with both NODF and T metrics. Odonata species found in the troughs represented 40% of the total species pool. Some troughs interspersed with the natural pools in the nested order: eight troughs were richer in species than some natural pools, despite the big difference in surface area. Pristine water bodies and their area may not represent major constraints for species to oviposit and for larvae to grow. Drinking troughs can be highly relevant for representing refuges in the absence or decline of natural ponds and pools: lacking in top-predators (fishes), they are small "island" habitats that support the generations of Odonata (or other aquatic macroinvertebrates) during dry periods of natural water bodies. The use and focused management of such habitats can be an effective practice for freshwater ecosystems management and Odonata conservation." (Authors)] Address: Cerini, F., Dipartimento di Scienze, Università Roma Tre, Viale Marconi 446, 00146 Rome, Italy. E-mail: francesco.cerini@uniroma3.it

**19184.** Chan, S.K.M. (2020): Spoon-tailed duskhawker dragonfly at Yishun Central. *Singapore Biodiversity Records* 2020: 22-23. (in English) [*Gynacantha basiguttata* Selys, 1882 "Location, date and time: Singapore Island, Yishun Central, Khoo Teck Puat Hospital, basement 1 of Tower A; 30-XII-2019; 1327 hrs. Habitat: Urban. Inside a concrete building, near a garden with a simulated forest on the same floor." (Author)] Address: Simon Kee Mun Chan: chan.kee.mun@ktph.com.sg

**19185.** Conniff, K.L.; Aryal, M.; KC, S.; van der Heijden, A. (2020): New additions to the checklist of dragonflies and damselflies of Nepal. *Agrion* 24(1): 21-23. (in English) ["Thirty years ago a comprehensive checklist of Nepal Odonata was published by Graham Vick (1989). Since that time

several new species have been found and described from Nepal bringing the list to 176 species. Here we publish details on another eight species new to the list of dragonflies and damselflies of Nepal (*Aciagrion approximans*, *Agriocnemis femina*, *Saraseaschna spec1*, *Saraseaschna spec2*, *Burmagomphus spec*, *Aethriamanta brevipennis*, *Onychothemis testacea*, *Rhodothemis rufa*)." (Authors)] Address: Conniff, Karen, ICIMOD GPO Box 3226 Kathmandu, Nepal. E-mail: karoconniff@gmail.com

**19186.** Deepthi, S.; Vengadesan, S. (2020): Role of dipole jet in inclined stroke plane kinematics of insect flight. *Journal of Bionic Engineering* 17: 161-173. (in English) ["The two-dimensional (2D) inclined stroke plane kinematics of insect wing is studied for various stroke plane angles using the Immersed Boundary (IB) solver. The numerical results revealed the dominant lift enhancement mechanisms for this class of flows. The generated dipole was analyzed to find the maximum velocity, inclination and spread. The analysis of these dipole characteristics for the different stroke plane angles exposed the alternate method to study the vertical force variation with the stroke plane angles. Lift enhancement mechanisms and dipole characteristics complement the high vertical force coefficient for the stroke plane angle of 60° commonly used by dragonflies during hover. The location of the dipole identified a region of influence around the wing and demonstrated the role of the dipole jet in multi-body dynamics and wall effects." (Authors)] Address: Vengadesan, S., Department of Mechanical Engineering, Virginia Tech, Blacksburg, VA, USA

**19187.** Dow, R.A.; Ng, Y.F. (2020): New records of Odonata from Selangor and Negeri Sembilan, Malaysia, with provisional checklists of species recorded from the states. *International Dragonfly Fund - Report* 146: 1-29. (in English) ["Previously unpublished records of Odonata from the states of Negeri Sembilan and Selangor in Peninsular Malaysia are presented. One hundred and eight species are listed, of which 77 were collected in Negeri Sembilan and 87 in Selangor. 15 of the species recorded from Negeri Sembilan and seven of those recorded from Selangor appear to be first records for the respective state. Notable records include *Drepanosticta* sp. cf *hamadryas* Laidlaw, 1931, *Rhincocypha pelops* Laidlaw, 1936, *Acrogomphus ?malayanus* Laidlaw, 1925, *Heliogomphus kelantanensis* (Laidlaw, 1902); *Onychogomphus duaricus* Fraser, 1924, *Macromia cupricincta* Fraser, 1924, *Idionyx montana* Karsch, 1891, *Chalybeothemis chini* Dow, Choong & Orr, 2007 and *Hylaeothemis clementia* Ris, 1909 Ris, 1909. Provisional checklists of the Odonata known from Selangor plus the Federal Territory of Kuala Lumpur (171 species) and for Negeri Sembilan (116 species) are given in appendices." (Authors)] Address: Ng, Y.F., Centre for Insects Systematics, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: ng\_yf@ukm.edu.my

**19188.** Dow, R.A.; Reels, G.T. (2010): The Odonata of three National Parks in Sarawak. *Agrion* 14(1): 14-19. (in English) [Checklist of the regional from Kubah, Similajau

and Lambir Hills National Parks are presented and discussed.] Address: Reels, G., 31 St Anne's Close, Winchester SO22 4LQ, UK. E-mail: gtreels@gmail.com

**19189.** Dumeier, A.C.; Lorenz, A.W.; Kiel, E (2020): Active reintroduction of benthic invertebrates to increase stream biodiversity. *Limnologica* 80 (2020) 125726: 9 pp. (in English) ["A large number of restoration projects aims to improve the ecological quality of streams and rivers by focusing on the stream structure. However, improved habitat heterogeneity often does not lead to natural recolonization by sensitive freshwater macroinvertebrate communities, particularly when the recolonization potential is low and source populations are absent. In preliminary studies we tested whether natural substrate exposures could be used to sample and transport benthic macroinvertebrates. In this pilot study we used these previously tested natural substrate exposures to sample freshwater invertebrates in a donor stream in order to actively (re-)colonize a recipient stream. In the course of three reintroduction campaigns, we were able to accumulate over 350,000 benthic invertebrates, including 25 indicator taxa of the orders Ephemeroptera, Plecoptera and Trichoptera and 30 taxa scoring positive in the German Fauna Index. In total, 45 taxa, which did not occur in the recipient stream before, were reintroduced. They were transported gently within natural substrate exposures and released on a stream bottom area of 500m<sup>2</sup> in the recipient stream. We intended to study if an increase of benthos fauna in a recipient stream is possible, and if this increase will eventually improve the ecological status. So far, the natural substrate exposure-method demonstrated to be an adequate tool to accumulate and transport benthic macroinvertebrates and, in general, has the potential to increase the biodiversity of streams when used as assisted migration measure." (Authors) The study includes a reference to *Calopteryx virgo*.] Address: Kiel, Ellen, Research Group Aquatic Ecology and Nature Conservation, Department of Ecology and Environmental Science, Carl von Ossietzky University of Oldenburg, Germany

**19190.** Ehmke, W. (2020): Der Hähnchesgrund bei Taunusstein – ein artenreiches Rekultivierungsgelände. *Jahrbücher des Nassauischen Vereins für Naturkunde* 141: 63-100. (in German) [Hessen, Germany. Without further specification, eight odonate species have been recorded. Namely outlined are *Libellula depressa*, *Sympetrum danae* and *S. sanguineum*, *Aeshna cyanea* and the very rare *Leucorrhinia caudalis*.] Address: Ehmke, W., Lindenstr. 2, 65232 Taunusstein, Germany. Email: wolfgangehmke@aol.com

**19191.** Escoto-Moreno, J. A.; Márquez, J.; Asiain, J. (2020): New records of Odonata from Central Eastern Mexico. *Proceedings of the Entomological Society of Washington* 122(1): 235-242. (in English) ["A total of 18 new records are provided for four states of central eastern Mexico. For Querétaro, six new records are added, including two species of Phyllogomphoides. According to Paulson & González-Soriano (2019) 61 species are reported from Querétaro but our additions increase that listing to 66 species and is ranked

23rd place for species richness of odonates known in Mexico. However, the position that each state occupies with respect to the richness of species of odonates is a fact that does not take into account the territorial extension or the variety of biogeographical provinces that make up each one, so this should be taken into account when making comparisons between states. In the case of the state of Hidalgo, five new records are added, including the genus *Nehalennia* that was not previously reported in the state. *Nehalennia* includes one species in Eurasia and five in America. The species reported in Mexico has been found mainly in the Gulf of Mexico watershed (Garrison et al. 2010). In Hidalgo, 129 species were reported, according to Escoto-Moreno et al. (2014, 2017a); subsequently, in the update of the Paulson and González-Soriano list (2019) four new records were added (133). The new record of *Megaloprepus caerulatus* (Drury, 1782) (Escoto-Moreno et al. 2018) brings this number to 134 species; adding the five records of our study gives a total of 139 known species for Hidalgo which places the state as seventh in the highest species richness of odonates of Mexico. For the state of Puebla, four new records are provided, including for the first time *Oplonaeschna*, which is a genus that is typical of the Mexican Transition Zone (sensu Halffter and Morrone 2017). The list of Paulson and González-Soriano (2019) reports 93 species; now, however, there are 97, which place the state as 14th in species richness in Mexico. The state of Veracruz had the highest species richness in Mexico with 219 (Paulson & González-Soriano 2019). Now three species of the genus *Argia* are found in an area with elevations greater than 1800 m so there are now 222 recognized species. Until now Veracruz is the only state that exceeds 200 species in Mexico. Finally, some records of precise localities for *Paraphlebia zoe* in Puebla were added when only two locations were known (Escoto-Moreno and Márquez 2013), also for *Rhionaeschna jalapensis* in Hidalgo, which had not been reported in the northwestern part (Escoto-Moreno et al. 2017b), and for *Cordulegaster diadema* in the state of Tlaxcala, where its presence is barely recognized (Paulson & González-Soriano 2019)."] Address: Escoto-Moreno, J., Colección Zoológica, Depto Biología, Centro de Cienc. Básicas, Univ. Autónoma de Aguascalientes. Avenida Universidad # 940 Ciudad Universitaria, 20131 Aguascalientes, Aguascalientes, México. E-mail: marquezorum@gmail.com

**19192.** Eslami Barzoki, Z.; Ebrahimi, M.; Sadeghi, S. (2020): Odonata diversity and species assemblages in the Northwest Central Plateau of Iran. *Journal of Insect Conservation* 24: 459-471. (in English) ["Central Iran has been faced with deterioration of water quality and quantity, but yet the biodiversity of freshwater-associated insects in this area remains uncertain and without this information the development of conservation strategies is not possible. Here we explore Odonata diversity patterns and species assemblages in three terrestrial ecoregions of Central Iran. We used the first three Hill numbers and phylogenetic generalizations of these indices to compare the species diversity between the ecoregions. To compare Odonata species composition a PERMANOVA analysis was performed. Alpha-diversity of each

water body was estimated by Hill numbers, taxonomic diversity, taxonomic distinctness and average taxonomic distinctness. The effects of habitat and environmental factors on Odonata diversity indices were modelled using a linear mixed model. About 42% of all Odonata that have been reported in Iran were found during this study. Species richness in the Desert and Steppe ecoregions were almost equal, the same pattern was observed for phylogenetic diversity indices. The Steppe ecoregion also had significantly different Odonata assemblage. Results of the linear mixed model showed that environmental factors have different effects on different diversity indices. Additionally different diversity indices resulted in different outcomes when comparing ecoregions, demonstrating that single measure cannot precisely assess the properties of an assemblage's diversity. The high diversity of Odonata observed in such an arid environment shows the importance of man-made water bodies, as well as the necessity of preparing a conservation plan for these ecosystems." (Authors)] Address: Eslami Barzoki, Zohreh, Dept Biology, Fac. Scien., Shiraz Univ., Shiraz, Iran

**19193.** Favret, C.; Moisan-De Serres, J.; Larrivé, M.; Lessard, J.-P. (2020): The Odonata of Quebec: Specimen data from seven collections. *Biodiversity Data Journal* 8: e49450: 26 pp. (in English) ["Background: The Odonata, dragonflies and damselflies, constitute one of the more charismatic and better-studied orders of insects. The approximately 6,000 extant species on Earth can be variously found on all continents, except Antarctica. A relatively stable taxonomy, a relative ease of species identification and an aquatic immature stage has made the Odonata a taxon of interest in documenting the symptoms of global environmental change, especially at higher latitudes. The Odonata fauna of the north-temperate Canadian province of Quebec includes 150 species, many of which are at the northern limits of their geographic distribution. New information: Quebec hosts multiple entomological specimen depositories, including seven publicly accessible research collections. One of these, the University of Montreal's Ouellet-Robert Entomological Collection, houses an exceptionally large collection of Odonata. An initial specimen data capture project for this collection gathered 31,595 Quebec Odonata occurrence records, but several Quebec species were missing and geographic coverage was biased towards the Montreal region. To complement this dataset, we undertook to digitise the Odonata records of six other public research collections. They are, in order of Quebec Odonata collection size, the Laval University Entomological Collection, McGill University's Lyman Entomological Museum, the Insectarium of Montreal Research Collection, the Quebec Government's Insect Collection, Bishop's University's Insect Collection and the Laurentian Forestry Centre's René-Martineau Insectarium. Of the 40,447 total specimen occurrence records, 36,951 are identified to the species level, including 137 of the 150 species officially-recorded in Quebec and 2 non-nomotypical subspecies. We here summarise the data and highlight the strengths and weaknesses of the datasets. The complete dataset is available with this publication (Suppl. material 1), whereas the specimen data associated with each collection

are available as Darwin Core archives at Canadensys.net and will be updated as appropriate." (Authors)] Address: Favret, C., University of Montreal, Montreal, Canada. E-mail: colinfavret@aphidnet.org)

**19194.** Fernandez, S.; Rodriguez-Martin, S.; Martinez, J.L.; Garcia-Vazquez, E.; Ardura, A. (2020): How can eDNA contribute in riverine macroinvertebrate assessment? A metabarcoding approach in the Nalon River (Asturias, Northern Spain). *Environmental DNA* 1(4): 385-401. (in English) ["Background: Bioassessment of rivers is a fundamental method to determine surface water quality. One of the groups most commonly employed as bioindicators of aquatic ecosystems are benthic macroinvertebrates. Their conventional assessment is based on morphological identification and entails several limitations, such as being time-consuming and requires trained experts for taxonomic identification. The use of genetic tools to solve these limitations offers an alternative way to evaluate rivers status. The use of environmental DNA (eDNA) metabarcoding has increased in recent years for different purposes, but its use in water quality evaluation is yet to be tested. Here, morphological and eDNA based inventories of macroinvertebrates were compared from the same seven sampling sites in the Upper Nalon River Basin (Asturias, Spain). Materials & Methods: High-Throughput Sequencing (HTS) of the cytochrome oxidase subunit 1 (COI) gene was carried out on DNA from water samples using an Ion Torrent platform. Biotic water quality indices were calculated from morphological and molecular data and compared with independent physicochemical habitat assessment to validate eDNA based approach. Results: Highly positive and significant correlation was found between eDNA metabarcoding and morphological methods (Morphological and eDNA indices,  $r = 0.798$ , 5 degrees of freedom d.f.,  $P = 0.031$ ;) and a highly significant negative correlation was found between molecular and habitat quality indices (Stress score & eDNA,  $\rho = -0.878$  and  $P = 0.009$ ; Stress score & Visual,  $\rho = 0.949$  and  $P = 0.0002$ ). Discussion: The similarity of results from the two approaches and the correlation of eDNA metabarcoding data with the habitat quality indices, suggest that eDNA performs as well as conventional methods for calculating biotic indices in this system, positioning eDNA metabarcoding of macroinvertebrate communities to transform how river bioassessment can be achieved. Conclusion: The usefulness of eDNA metabarcoding to assess rivers water quality based on macroinvertebrates assessment has been demonstrated in a dammed river basin." (Authors) "Calopterygidae" are mentioned.] Address: Fernandez, Sara, Dept of Functional Biology, Univ. of Oviedo, Oviedo, Spain. Email: sara\_ff9@msn.com

**19195.** Florencio, M.; Burraco, P.; Rendón, M.A.; Díaz-Paniagua, C.; Gomez-Mestre, I. (2020): Opposite and synergistic physiological responses to water acidity and predator cues in spadefoot toad tadpoles. *Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology* 242: (in English) ["Highlights: • Predator cue recognition occurred in both neutral and acidic water, as tadpoles developed anti-predator morphology even at pH = 4. • Predator



presence induced lower levels of plasma corticosterone in tadpoles whereas acidic water increased them. • Predator presence reduced the activity of some antioxidant enzymes, congruent with a decrease in metabolism. • The combination of predator cues and low pH had negative synergistic effects on the redox status of tadpoles. Abstract: Organisms are exposed to multiple environmental factors simultaneously to which they often respond behaviorally, morphologically and/or physiologically. Amphibian larvae are quite plastic and efficiently adjust their phenotype and physiology to the reigning local conditions. Here we tested whether the combination of predator presence and low water pH induces alterations in the morphology and physiology of spadefoot toad tadpoles. We raised *Pelobates cultripes* tadpoles in the laboratory in water at either pH4 or 7, and in the presence or absence of caged dragonfly nymphs, and determined their changes in shape through geometric morphometrics to assess whether predator recognition was impaired or not at low pH. We also measured levels of plasma corticosterone, activity of four antioxidant enzymes, as well as markers of oxidative damage and redox status. We found that tadpoles altered their body shape in response to predator cues even at low pH, indicating that predator recognition was not interfered by water acidity and developmental responses were robust even under abiotic stress. Water acidity was associated with increased corticosterone levels in tadpoles, whereas predator presence consistently reduced corticosterone levels. Predator presence was linked to reduced antioxidant enzyme activity, whereas the combination of both factors resulted in negative synergistic effects on lipid peroxidation and the antioxidant capacity of tadpoles. Here we show that tadpoles detect predators even at low pH but that the development of adaptive anti-predatory morphology can magnify physiological imbalances when other stressors co-occur. These results emphasize the need to understand how multiple environmental perturbations can affect animal homeostasis." (Authors)] Address: Gomez-Mestre, I., Ecology, Evolution & Development Group, Estación Biológica de Doñana, CSIC, Seville, Spain. Email: igmestre@ebd.csic.es

**19196.** Funnell, L.; Holmes, R.J.P.; Closs, G.P.; Matthaei, C.D. (2020): Short-term effects of instream habitat restoration on macroinvertebrates and a comparison of sampling approaches. *Limnologica* 80 (2020) 125726: 12 pp. (in English) ["Many streams and rivers worldwide are restored with the intention to mitigate degradation caused by human activities, but these rehabilitation projects often involve physical instream work with diggers or other heavy machinery. The short-term effects of such restoration works on stream ecosystems are rarely investigated. The primary aim of our study was to assess the short-term effects of physical instream restoration works (which likely increased instream fine sediment load temporarily) on the benthic macroinvertebrate community [including *Xanthocnemis zealandica*] in a lowland soft-bottomed stream, and our second aim was to compare the results of semi-quantitative kick-net and quantitative Surber sampling in this assessment. Invertebrates were collected using these two methods from three

Control and three Impact sites, before and two days after recontouring the stream banks and installing instream woody cover features. Three of seven macroinvertebrate community-level indexes suggested positive short-term effects of the restoration works, whereas none indicated negative effects. By contrast, seven of the 14 most common taxa were negatively affected by the restoration works, possibly due to increased fine sediment levels reducing habitat quality for these taxa. These differences imply that taxon-specific invertebrate responses may be more suitable for detecting short-term impacts of instream restoration works than community-level metrics. Community indexes and common taxa were also likely affected by a drought in the spring and summer before restoration, which may have obscured some effects of the restoration works. Finally, kick-net and Surber sampling methods yielded similar findings for the community-level metrics but differed more for the common taxa, probably because the two methods sampled different microhabitats within the stream. Consequently, we recommend that for routine monitoring of macroinvertebrate communities in lowland soft-bottomed streams, the semi-quantitative kick-net sampling method should be used." (Authors)] Address: Funnell, L., Department of Zoology, University of Otago, 340 Great King Street, Dunedin, New Zealand

**19197.** Gao, S.; Zhang, B.; Sun, J.; Liu, W. (2020): A designed method of the surface structure of suspended glass transport device based bionic structure of dragonfly wings. *Industrial Lubrication and Tribology* 72(1): 1245-1250. (in English) ["The purpose of this paper is to design a biomimetic surface structure for use in a glass transport device to enhance the suspension lift of a glass transport unit. Design/methodology/approach: This paper presents a surface structure of a suspended glass transport device based on the principle of bionics. First, a mapping model is constructed based on the wing structure. Second, the optimal structural parameters are given according to genetic algorithm optimization. Finally, the experimental comparison of the test bench verified the feasibility of the theory. Findings: Through experimental comparison, the biomimetic suspension glass transport device saves 20% of air pressure compared with the ordinary suspended glass transport device, which verifies the effectiveness of the theoretical method. Originality/value: This paper proposes a suspended glass transport device based on the principle of bionics, which saves the air pressure required for work. It is expected to be used in suspension glass transport devices." (Authors)] Address: Gao, S., School of Mechatronic Engineering, Changchun University of Technology, Changchun, China

**19198.** Grether, G.F.; Drury, J.P.; Okamoto, K.W.; McEachin, S.; Anderson, C.N. (2020): Predicting evolutionary responses to interspecific interference in the wild. *Ecology Letters* 23(2): 221-230. (in English) ["Many interspecifically territorial species interfere with each other reproductively, and in some cases, aggression towards heterospecifics may be an adaptive response to interspecific mate competition. This hypothesis was recently formalised in an agonistic character displacement (ACD) model which predicts that species

should evolve to defend territories against heterospecific rivals above a threshold level of reproductive interference. To test this prediction, we parameterised the model with field estimates of reproductive interference for 32 sympatric damselfly populations and ran evolutionary simulations. Asymmetries in reproductive interference made the outcome inherently unpredictable in some cases, but 80% of the model's stable outcomes matched levels of heterospecific aggression in the field, significantly exceeding chance expectations. In addition to bolstering the evidence for ACD, this paper introduces a new, predictive approach to testing character displacement theory that, if applied to other systems, could help in resolving long-standing questions about the importance of character displacement processes in nature." (Authors)] Address: Grether, G.F., Dept of Ecology & Evolutionary Biology, University of California Los Angeles, Los Angeles, CA, USA. E-mail: ggrether@g.ucla.edu

**19199.** Grung, M.; Meland, S.; Ruus, A.; Ranneklev, S.; Fjeld, E.; Kringstad, A.; Rundberget, J.T.; Del Cruz, M.; Christensen, J.H. (2020): Occurrence and trophic transport of organic compounds in sedimentation ponds for road runoff. *Science of The Total Environment* 751(Part A):141808: 11pp. (in English) ["Highlights: • Ecosystem in sedimentation ponds for road runoff receives several organic pollutants. • Water, sediment, plants, larvae and fish were analysed for 4 contaminant groups. • Higher levels of pollutants in sedimentation ponds vs. reference were observed. • Bioaccumulation observed for PACs and PBDEs, but all 4 groups detected in fish. • Biomagnification was documented for PBDEs, alkylated PACs important in road runoff. Abstract: Sedimentation ponds have been shown to accumulate several groups of contaminants, most importantly polycyclic aromatic compounds (PACs) and metals. But also, other urban organic pollutants have shown to be present, including polybrominated diphenyl ethers (PBDEs), organophosphate compounds (OPCs) and benzothiazoles (BTs). This investigation aimed at determining the occurrence of these four groups of contaminants in sedimentation ponds and determine their transport from water/sediment to organisms. PACs, including alkylated PACs, PBDEs; OPCs and BTs were determined in water, sediment, plants, dragonfly larvae and fish from two sedimentation ponds and one reference site. Fish were analysed for PAC metabolites. Overall, higher concentrations of all four pollutant groups were detected in water and sediment from sedimentation ponds compared to two natural lakes in rural environments (reference sites). The concentration difference was highest in sediments, and >20 higher concentration was measured in sedimentation ponds (3.6–4.4 ng/g ww) compared to reference (0.2 ng/g ww) for sum BDE6. For PACs and PBDEs a clear transport from water/sediment to organisms were observed. Fish were the highest trophic level organism (3.5–5) in our study, and all four pollutant groups were detected in fish. For PBDEs a trophic biomagnification (TMF) was found both in sedimentation ponds and reference, but higher concentrations in all matrices were measured in sedimentation ponds. TMF was not calculated for PACs since they are metabolised by vertebrates, but a transfer from water/sediment to

organisms was seen. For BTs and OPCs, no consistent transfer to plants and dragonfly larvae could be seen. One OPC and two BTs were detected in fish, but only in fish from sedimentation ponds. It is therefore concluded that sedimentation ponds are hotspots for urban and traffic related contaminants, of which especially PACs and PBDEs are transferred to organisms living there." (Authors)] Address: Grung, Merete, Norwegian Inst. Water Research (NIVA), Gaustadalléen 21, 0349 Oslo, Norway. Email: mgr@niva.no

**19200.** Hämäläinen, M.; Verspui, K.; Orr, A.G. (2020): An echo of Marguerite - Edmond de Selys Longchamps' heartfelt remembrances of his young daughter Marguerite (1848-1852) and its influence on the nomenclature of Odonata. *Agrion* 24(1): 24-33. (in English) ["In the calopterygid damselfly *Echo margarita* Selys, 1853, both the generic name *Echo* and the specific name *margarita*, are demonstrated to be eponyms given in memorium to Selys' lost daughter Marguerite (1848-1852), who died in early childhood. The binomial name signifies 'memory' of Marguerite. Previously the name *Echo* was thought to refer to a mythological character from antiquity, as in the many other classically based Selysian calopterygid genera. Selys' other allusions and private dedications to the memory of Marguerite, such as his diary notes and other private documents concerning her life and death, are also discussed. Information is provided on the imposing Selys family mausoleum, constructed soon after Marguerite's death and her final resting place." (Authors)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: libellago@gmail.com

**19201.** Halabowski, D.; Lewin, I.; Buczynski, P.; Krodkiewska, M.; Plaska &, W.; Sowa, A.; Buczynska, E. (2020): Impact of the discharge of salinised coal mine waters on the structure of the macroinvertebrate communities in an urban river (Central Europe). *Water Air Soil Pollut.* 231:5: 19 pp. (in English) ["The anthropogenic salinisation of rivers causes grave environmental problems that are responsible for the degradation of water quality on a worldwide scale as well as for biological changes in aquatic ecosystems. The objectives of the survey were to analyse the structure of the macroinvertebrate communities in the Bolina River, which is currently the second most anthropogenic salinised river in the world, in relation to various types of instream microhabitats and to determine the environmental factors that have a significant effect on the structure of the macroinvertebrate communities. The result of a canonical correspondence analysis (CCA) showed that electrical conductivity, the temperature of the water and the organic matter content in the bottom sediments were the most important factors (statistically significant) that influenced the macroinvertebrate communities in the anthropogenic salinised river. A total of 77 taxa of macroinvertebrates were recorded in the Bolina River. A Kruskal-Wallis one-way ANOVA and multiple comparison post hoc tests revealed statistically significant differences in the median number of taxa and the median density of macroinvertebrates between the various types of

microhabitats in the salinised river. The anthropogenic salinisation of a river can lead to a decrease in aquatic biodiversity that favours invasive species over native species. The Bolina River, which has a salinity of up to 33.6‰, is an example of a unique habitat for organisms that are salt tolerant (euhaline) or eurytopic. It is a route for the spread of alien and invasive invertebrate species including *Gammarus tigrinus*, *Potamopyrgus antipodarum*, and *Monopylephorus limosus*. ... Odonata, .... was represented by *Ischnura elegans* (density up to 116 individuals m<sup>-2</sup>), *Platycnemis pennipes* (density up to 112 individuals m<sup>-2</sup>), *Orthetrum cancellatum* (density up to 24 individuals m<sup>-2</sup>) and *Chalcolestes viridis* (density up to 16 individuals m<sup>-2</sup>)." (Authors)] Address: Halabowski, D., Institute of Biology, Biotechnology and Environmental Protection, Faculty of Natural Sciences, University of Silesia in Katowice, Bankowa 9, 40-007 Katowice, Poland. Email: dhalabowski@us.edu.pl

**19202.** Hendriks, J.A. (2020): A preliminary study of Odonata communities in a mixed-mosaic habitat structure in Central Kalimantan, Indonesia. BSc thesis, Science and Engineering, Maastricht University: 94 pp. (in English) ["Recent decades have seen an increase in deforestation and fragmentation of forests due to anthropogenic pressures. To assess impacts of degradation, there is an increasing interest in bio-indicator species such as odonates. However, they remain poorly studied in certain areas. Central Kalimantan, Indonesia is one such, where this is the first study investigating odonates in a kerangas dominated mixed-mosaic habitat structure. Line transect method was used to sample 250m – two transects in three habitat types, i.e. riverine/mixed-swamp (RM), kerangas (K), low-pole peat swamp (LP) in KHDTK. Habitat variables were recorded at capture sites and at 25m intervals on each transect. A total of 339 individuals representing 23 species were captured. Highest number of Odonata were captured in LP. Highest species diversity was observed in RM ( $H' = 2.00$ ), and lowest in LP ( $H' = 1.62$ ). Canopy cover had a strong influence on Odonata assemblages and they showed preference for areas with surface water. Anisoptera preferred forest pools and Zygoptera were inclined to flowing water. The greatest lengths in thorax and wing size were observed for Odonata in K. Eco-physiological requirements between sub-orders and habitat variations influenced their distribution and assemblages. This study further explores their potential as bio-indicators for the habitat types discussed." (Author)] Address: not stated

**19203.** Herlinda, S.; Alesia, M.; Susilawati; Irsan, C.; Hasbi; Suparman; Anggraini, E.; Arsi (2020): Impact of mycoinsecticides and abamectin applications on species diversity and abundance of aquatic insects in rice fields of freshwater swamps of South Sumatra, Indonesia. *Biodiversitas* 21(7): 3076-3083. (in English) ["Aquatic insects in rice fields generally are predators of rice insect pests. The application of insecticides may reduce the abundance and species diversity of these predators. This study aimed to determine the impact of mycoinsecticides and abamectin application on species diversity and abundance of aquatic insects in rice

fields. Mycoinsecticides were made from *Beauveria bassiana* s.l., *Metarhizium anisopliae* s.l. and *Cordyceps militaris* s.l. with carrier from shrimp shell flour compost extract, vegetable oil, and Tween®. The treatments were the mycoinsecticides and abamectin. The results showed there were eight aquatic insects species obtained in this study, i.e. unidentified Dytiscidae, *Micronecta* sp., *Mesovelgia* sp., *Ranatra* sp., *Anisops* sp., *Microvelia* sp., unidentified species of Veliidae, and *Orthetrum* sp. belong to 7 families (Dytiscidae, Corixidae, Mesoveliidae, Nepidae, Notonectidae, Veliidae, Libellulidae), and three orders (Coleoptera, Hemiptera, and Odonata). All of the species were predatory insects. The application of mycoinsecticides did not reduce the abundance and species diversity of the aquatic predatory insects, but the application of abamectin reduced the abundance and species diversity of the predators. The highest insect species diversity was in the plots applied with *C. militaris* s.l., followed by the *B. bassiana* s.l. and *M. anisopliae* s.l. plots and the lowest one was found in the abamectin plot. So, the application of mycoinsecticides from *B. bassiana* s.l., *M. anisopliae* s.l. and *C. militaris* s.l. is safe for the aquatic predatory insects and to control rice insect pests than that of abamectin." (Authors)] Address: Herlinda, S., Department of Plant Pests and Diseases, Faculty of Agriculture, Universitas Sriwijaya. Jl. Raya Palembang-Prabumulih Km 32, Indralaya, Ogan Ilir 30662, South Sumatra, Indonesia

**19204.** Hill, B.; Blanckenhagen, B. von; Adelman, J. (2020): Landesmonitoring 2018 zur Erfassung der Östlichen Moosjungfer (*Leucorrhinia albifrons*) (Art des Anhangs IV der FFH-Richtlinie) in Hessen. Projekt – Nr.: G 18 - 35. Auftraggeber: HLNUG (Hessisches Landesamt für Naturschutz, Umwelt und Geologie), Europastr. 10, 35394 Gießen: 42 pp. (in German) ["*L. albifrons* was recorded in Hesse (Germany) in 2012 after a 100-year hiatus (VON BLANCKENHAGEN 2013). In the following years, further single observations followed, before the first proof of its reproduction was found in the Gehspitzweiher nature reserve in 2015. So far, no nationwide survey of the species' distribution is available. Within the framework of the implementation of the FFH monitoring in Hesse, it was necessary to close this gap. The aim of the present report is to verify the ground stability of already proven occurrences and, if necessary, to localise new sites in the course of a data research. The results will be included in the report to the EU in 2025. The only confirmed and native occurrence within the scope of the state monitoring is located at the Gehspitzweiher near Neu-Isenburg (OF). 65 exuviae were collected, corresponding to a density of 1.3 exuviae/m bank. This justifies a rating of A (excellent) for the main criterion of population status. The habitat quality of the water body is also rated as excellent (value level A), mainly due to the sunlight, the high proportion of submerged vegetation and the location in a forest area. The impairment rating A is also achieved, as there are hardly any substantial threats. In the overall assessment, the Gehspitzweiher receives the value rating A (excellent). Mention should be made of the fact that in the course of the state monitoring of the ornamental damselfly, which was carried out at the same time, a native occurrence

of *Leucorrhinia albifrons* was found at the Langener Waldsee (Mittelgrube). This and the surrounding water bodies at Langener Waldsee should be integrated in the future investigations of the state monitoring." (Authors/DeepL.) Address: von Blanckenhagen, B., Weidenhäuser Str. 34, 35037 Marburg, Germany

**19205.** Hill, B.; Blanckenhagen, B. von; Rehnig, K.; Wurmitzer, C.; Malinger, A. (2020): Landesmonitoring 2018 zur Erfassung der Zierlichen Moosjungfer (*Leucorrhinia caudalis*) (Art des Anhangs II der FFH-Richtlinie) in Hessen. Projekt – Nr.: G 18 - 35. Auftraggeber: HLNUG (Hessisches Landesamt für Naturschutz, Umwelt und Geologie), EuroPastr. 10, 35394 Gießen: 76 pp. (in German) ["The state-wide distribution situation of the *Leucorrhinia caudalis* in Hesse (Germany) was last studied in 2009 (cf. STÜBING & HILL 2010). Within the framework of the implementation of the FFHM monitoring in Hesse, a new monitoring round had to be carried out. The aim of the present report is to check the ground stability of already existing finds and to locate new sites in the course of a data search, if necessary. The results will be included in the report to the EU in 2025. Within the scope of the investigations, the ground stability was determined on the basis of exuviae found at a total of eight water bodies in the Rhine-Main area and one water body in Central Hesse. In addition, there are two study areas with evidence of the Ornamental damselfly from the *L. albifrons* monitoring. The largest occurrence is still in the Gehspitzweiher Nature Conservation Site (OF). In second place comes the water body complex of the Langener Waldsee, where at least four different water bodies are successfully colonised. Of particular importance is the evidence of another native occurrence of *L. albifrons* at Langener Waldsee. Other small occurrences exist in Linden at the Fernie pit (GI), at Lake Linden near Rüsselsheim (GG) and at the Obertshausen fishing lake (OF). Only two exuviae were found in the Enkheimer Ried nature reserve, but the population is estimated to be much larger on the basis of the imagines observed. Observations of adults were made in two other areas. Whereas at the Walldorf bathing lake the presence on the ground is considered less probable, at the Nachtweidensee near Groß-Gerau, due to the larger number of individuals during the flight period, it can be assumed that the species is present on the ground. Overall, occurrences with a good overall rating (value level B) dominate. They make up about half of the water bodies studied. Only the situation at the Gehspitzweiher National Park (value level A) is better. In about one third of the areas with evidence of the species, only a rating of C (medium - poor) could be assigned." (Authors/DeepL.) Address: von Blanckenhagen, B., Weidenhäuser Str. 34, 35037 Marburg, Germany

**19206.** Huang, S.-T.; Wang, H.-R.; Yang, W.-Q.; Si, Y.-C.; Wang, Y.-T.; Sun, M.-L.; Qi, X.; Bai, Y. (2020): Phylogeny of Libellulidae (Odonata: Anisoptera): comparison of molecular and morphology-based phylogenies based on wing morphology and migration. *PeerJ* 8:e8567: 22 pp. ["Background. Establishing the species limits and resolving phylogenetic relationships are primary goals of taxonomists and

evolutionary biologists. At present, a controversial question is about interspecific phylogenetic information in morphological features. Are the interspecific relationships established based on genetic information consistent with the traditional classification system? To address these problems, this study analyzed the wing shape structure of 10 species of Libellulidae, explored the relationship between wing shape and dragonfly behavior and living habits, and established an interspecific morphological relationship tree based on wing shape data. By analyzing the sequences of mitochondrial COI gene and the nuclear genes 18S, 28S rRNA and ITS in 10 species of dragonflies, the interspecific relationship was established. Method. The wing shape information of the male forewings and hindwings was obtained by the geometric morphometrics method. The inter-species wing shape relationship was obtained by principal component analysis (PCA) in MorphoJ1.06 software. The inter-species wing shape relationship tree was obtained by cluster analysis (UPGMA) using Mesquite 3.2 software. The COI, 18S, ITS and 28S genes of 10 species dragonfly were blasted and processed by BioEdit v6 software. The Maximum Likelihood (ML) tree was established by raxmlGUI1.5b2 software. The Bayes inference (BI) tree was established by MrBayes 3.2.6 in Geneious software. Results. The main difference in forewings among the 10 species of dragonfly was the apical, radial and discoidal regions dominated by the wing nodus. In contrast, the main difference among the hindwings was the apical and anal regions dominated by the wing nodus. The change in wing shape was closely related to the ability of dragonfly to migrate. The interspecific relationship based on molecular data showed that the species of *Orthetrum* genus branched independently of the other species. Compared to the molecular tree of 10 species, the wing shape clustering showed some phylogenetic information on the forewing shape (with large differences on the forewing shape tree vs. molecular tree), and there was no interspecific phylogenetic information of the hindwing shape tree vs. molecular tree. Conclusion. The dragonfly wing shape characteristics are closely related to its migration ability. Species with strong ability to migrate have the forewing shape that is longer and narrower, and have larger anal region, whereas the species that prefer short-distance hovering or standing still for a long time have forewing that are wider and shorter, and the anal region is smaller. Integrating morphological and molecular data to evaluate the relationship among dragonfly species shows there is some interspecific phylogenetic information in the forewing shape and none in the hindwing shape. The forewing and hindwing of dragonflies exhibit an inconsistent pattern of morphological changes in different species." (Authors)] Address: Huang, S.-T., Zhejiang Provincial Key Laboratory of Plant Evolutionary Ecology and Conservation, Taizhou University, Taizhou, Zhejiang, China

**19207.** Huikkonen, I.-M.; Helle, I.; Elo, M. (2020): Heterogenic aquatic vegetation promotes abundance and species richness of Odonata (Insecta) in constructed agricultural wetlands. *Insect Conservation and Diversity* 13(4): 374-383. (in English) ["1. Natural wetlands are among the most



threatened habitat types worldwide. They contain a high diversity of macroinvertebrates, including dragonflies and damselflies (Insecta: Odonata). In agricultural landscapes, new wetlands have been constructed to filter nutrients and solid matter from agricultural runoff. These types of wetlands may also benefit Odonata as new breeding habitats. However, it is not yet clear what environmental characteristics of constructed wetlands are important for Odonata. 2. We studied 20 constructed agricultural wetlands in Central Finland and asked whether Odonata are able to use these wetlands as breeding habitats, and which environmental characteristics (aquatic vegetation, water area, shoreline length, bottom type diversity, water transparency, and pH) of the wetlands affect odonate abundance and species richness. 3. The constructed wetlands hosted altogether 17 odonate species. Odonate abundance was positively associated with the number of aquatic vegetation growth forms of the wetland. Odonate species richness was associated positively with abundance, floating-leaved vegetation, and water transparency. 4. Constructed agricultural wetlands support local diversity of common odonate species. Although protecting the remaining natural wetlands is of primary importance, constructed wetlands can add suitable wetland habitats in the agricultural landscape. From the perspective of Odonata, heterogenic aquatic vegetation and water quality are features worth promoting when constructing and managing agricultural wetlands." (Authors)] Address: Huikkonen, Ida-Maria, Dept of Biological & Environmental Science, University of Jyväskylä, P.O. Box 35, 40014 Univ. Jyväskylä, Finland. E-mail: imma.huikkonen@gmail.com

**19208.** Hunger, H.; Geigenbauer, K.; Fies, R.; Schiel, F.-J. (2020): Abschlussbericht Neubau der B31-West. Fachgutachten Libellen. Im Auftrag des Regierungspräsidiums Freiburg: 91 pp. (in German) ["A total of 40 dragonfly species were recorded at the surveyed water stretches, of which 34 species were certainly to very probably native to at least one survey stretch. Among the species detected, four are on the Baden-Württemberg and / or German list of species at risk, and three species are classified as "endangered" at the national and / or state level. *Coenagrion scitulum* and *Orthetrum albistylum* are considered extremely rare throughout Germany (category R). *Coenagrion mercuriale* is classified nationwide, *Aeshna isocetes* nationwide and *Sympetrum pedemontanum* both nationwide and statewide as critically endangered (RL 2). *Leucorrhinia caudalis* is classified as critically endangered nationwide (RL 1). The detection of *Coenagrion mercuriale*, which is strictly protected under the Federal Nature Conservation Act and listed in Annex II of the Habitats Directive, is relevant in terms of species protection. This species has been found in numerous sections of watercourses. Particularly noteworthy are the large native occurrences in the study sections at the "Riedkanal" (L 13 a-c), as well as at the "Wasenweiler Neugraben (L 12a-d, L 21, L 22)". But the species was also found in the "Merdinger Neugraben" (L 16, L 26), "Krebsbach" (L 31) and in some small ditches in the Wasenweiler Ried (L 08, L 10). In principle, the Helm's damselfly can be expected to occur in all sunny meadow ditches and streams in the study area. The

detection of *Leucorrhinia caudalis*, which is strictly protected under the Federal Nature Conservation Act and listed in Annex IV of the Habitats Directive, is also relevant for species conservation. This species has a native occurrence in the "Murr" fishing lake (L 05). This lake and parts of its surroundings are located within the FFH area "Freiburger Mooswälder", but outside the immediate area of intervention. The larger stillwaters within the study area are also of high importance for *Orthetrum albistylum*, which is strictly protected under Section 44 of the Federal Nature Conservation Act and only occurs in southern Baden and southeastern Bavaria throughout Germany; it has been found on the ground in the fishing lakes between Gottenheim and Wasenweiler." (Authors/DeepL) [https://rp.baden-wuerttemberg.de/fileadmin/RP-Internet/Freiburg/Abteilung\\_4/Referat\\_44/B31-West/19\\_01\\_U\\_VS\\_AnI\\_07-Libellen.pdf](https://rp.baden-wuerttemberg.de/fileadmin/RP-Internet/Freiburg/Abteilung_4/Referat_44/B31-West/19_01_U_VS_AnI_07-Libellen.pdf)] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), Wilhelmstraße 8, 79098 Freiburg, Germany. E-mail: holger.hunger@inula.de

**19209.** Hykel, M.; Ruzickova, J.; Dolný, A. (2020): Perch selection in *Sympetrum* species (Odonata: Libellulidae): importance of vegetation structure and composition. *Ecological Entomology* 45(1): 90-96. (in English) ["1. Perching dragonflies are closely associated with the physical structure of vegetation because adults utilise plants when foraging, thermoregulating, and mate-seeking. However, little attention has been given to which structural attribute of vegetation is playing a key role within foraging habitat use. 2. This study focused on the influence of different features of perches on their selection by adult dragonflies. As a model group, a typical percher behavioural guild of *Sympetrum* (*S. depressiusculum*, *S. fonscolombii*, *S. sanguineum*, *S. striolatum*, *S. vulgatum*) was used and experimental plots with artificial perches and different structural properties were established. 3. It was found that adults preferred perch sticks with a wider diameter and larger spacing. It is assumed that these perching sites are advantageous because their base is more stable, they provide the best view for successful foraging, and there is no interference among individuals. 4. This study also revealed significant differences between male and female preferences. Females used less structured vegetation formed by thin perches in high densities. It is suggested that female discrimination is influenced by the higher competitiveness of males, which is related to their agonistic behaviour. 5. These results suggest that the availability of perches in the foraging habitat might be an essential requirement for adults. However, within the terrestrial surroundings of breeding sites, the structure of vegetation providing conditions for perching may be associated only with certain habitats. In intensive landscapes, physically structured vegetation can be limited or completely absent." (Authors)] Address: Hykel, M., Dept of Biology and Ecology, Faculty of Science, Univ. Ostrava, Slezska Ostrava, Czech Republic

**19210.** Johansson, F.; Heino, J.; Coiffard, P.; Svanbäck, R.; Wester, J.; Bini, L.M. (2020): Can information from citizen science data be used to predict biodiversity in stormwater ponds? *Scientific Reports* volume 10, Article number: 9380

(2020): 10 pp. (in English) ["Citizen science data (CSD) have the potential to be a powerful scientific approach to assess, monitor and predict biodiversity. Here, we ask whether CSD could be used to predict biodiversity of recently constructed man-made habitats. Biodiversity data on adult dragonfly abundance from all kinds of aquatic habitats collected by citizen scientists (volunteers) were retrieved from the Swedish Species Observation System and were compared with dragonfly abundance in man-made stormwater ponds. The abundance data of dragonflies in the stormwater ponds were collected with a scientific, standardized design. Our results showed that the citizen science datasets differed significantly from datasets collected scientifically in stormwater ponds. Hence, we could not predict biodiversity in stormwater ponds from the data collected by citizen scientists. Using CSD from past versus recent years or from small versus large areas surrounding the stormwater ponds did not change the outcome of our tests. However, we found that biodiversity patterns obtained with CSD were similar to those from stormwater ponds when we restricted our analyses to rare species. We also found a higher beta diversity for the CSD compared to the stormwater dataset. Our results suggest that if CSD are to be used for estimating or predicting biodiversity, we need to develop methods that take into account or correct for the under-reporting of common species in CSD. ... 29 species of Odonata were found in the 18 studied stormwater ponds." (Authors)] Address: Johansson, F., Dept of Ecology and Genetics, Animal Ecology, Uppsala University, Norbyvägen 18D, 752 36, Uppsala, Sweden. E-mail: frank.johansson@ebc.uu.se

**19211.** Katayama, N.; Osada, Y.; Mashiko, M.; Baba, Y.G.; Tanaka, K.; Kusumoto, Y.; Okubo, S.; Ikeda, H.; Natuhara, Y. (2020): Organic farming and associated management practices benefit multiple wildlife taxa: A large-scale field study in rice paddy landscapes. *Journal of applied ecology* 56(8): 1970-1981. (in English) ["1. Organic farming has potential for the conservation of global biodiversity and associated ecosystem services. Despite this, knowledge of the effects of organic farming systems on farmland biodiversity is limited in Asia, the worldwide leader in rice production. 2. We conducted the first national-scale study to investigate the effects of three different rice farming systems (conventional, low-input, and organic) and specific management practices (e.g. herbicide and insecticide applications, crop rotation, and levee-vegetation management) on species richness and abundance of multiple taxonomic groups (plants, invertebrates, Pelophylax and Hyla japonica frogs, cobitid loaches, and birds) in Japan during 2013–2015. 3. Organic fields supported the highest richness and abundance of several taxonomic groups (native/Red List plants, Tetragnatha spiders, Sympetrum dragonflies, and Pelophylax frogs), followed by low-input and conventional fields. We also found taxon-specific responses to specific management practices. For instance, plant richness and Tetragnatha and Sympetrum abundance increased with reduced herbicide and/or insecticide applications. Sympetrum and Cobitid loach abundance increased in the absence of crop rotation, whereas H. japonica abundance increased with crop rotation. Pelophylax

abundance increased with an increased height of levee vegetation. 4. At spatial scales larger than single fields, waterbird richness and abundance were positively correlated with the proportion of organic rice fields, presumably due to increased prey abundance. Meanwhile, landbird richness and abundance were positively associated with annual precipitation and annual mean temperature, suggesting that such climate increases food availability. 5. Synthesis and applications. We highlight the positive effects of organic and low-input farming for biodiversity relative to conventional farming in rice-paddies. We also provide the scientific basis of the current agri-environmental schemes in Japan, subsidising organic and low-input farming for biodiversity. The taxon-specific associations with management practices indicate that avoiding crop rotation, maintaining levee vegetation, and organic farming at large spatial scales can also be wildlife-friendly. These practices may thus be incorporated into agri-environment schemes for effective biodiversity conservation." (Authors)] Address: Katayama, N., Biodiversity Division, Institute for Agro-Environmental Sciences NARO, Ibaraki, Japan. Email: katayama6@affrc.go.jp

**19212.** Kim, M.J.; Kim, J.S.; Kim, S.-S.; Kim, I. (2020): Development and validation of microsatellite markers for an endangered dragonfly, *Libellula angelina* (Odonata: Libellulidae), with notes on population structures and genetic diversity. *International Journal of Odonatology* 23(2): 93 -102. (in English) ["*L. angelina* is listed as an endangered species in South Korea, and is classified as a critically endangered species by the International Union for Conservation of Nature (IUCN). An assessment of the genetic diversity and population relationships of the species by molecular markers can provide the information necessary to establish effective conservation strategies. In this study, we developed 10 microsatellite markers specific to *L. angelina* using the Illumina NextSeq 500 platform. Forty-three samples of *L. angelina* collected from three localities in South Korea were genotyped to validate these markers and to preliminarily assess the population genetic characteristics. The 10 markers revealed 4–11 alleles, 0.211–0.950 observed heterozygosity (HO), and 0.659–0.871 expected heterozygosity (HE) in the population with the largest sample size ( $n = 20$ ), thereby validating the suitability of these markers for population analyses. Our preliminary assessment of the population genetic characteristics appears to indicate the following: presence of inbreeding in all populations, an isolation of the most geographically distant population (Seocheon), and a lower HO than HE. The microsatellite markers developed in this study will be useful for studying the population genetics of *L. angelina* collected from additional sites in South Korea and from other regions." (Authors)] Address: Kim, M.J., Dept Applied Biology, College of Agriculture & Life Sciences, Chonnam National Univ., Gwangju, Republic of Korea. Email: ikkim81@chonnam.ac.kr

**19213.** Kompier, T.; Dow, R.A.; Steinhoff, P.O.M. (2020): Five new species of *Coelliccia* Kirby, 1890 from Vietnam (Odonata: Platycnemididae), and information on several other species of the genus. *Zootaxa* 4766(4): 501-538. (in English)

["Five new species of *Coeliccia* (*Coeliccia caerulea* sp. nov. [holotype: Bao Loc, Lam Dong Prov., appr. 11.449N, 107.712E], *Coeliccia coronata* sp. nov. [holotype: Bao Loc, Lam Dong Prov., appr. 11.726N, 107.713E], *Coeliccia curua* sp. nov. [holotype: Ba Be National Park, Bac Kan Prov. appr. 22.413N, 105.610E], *Coeliccia diomedea* sp. nov. [holotype: Tai Giang, Quang Nam Prov., appr. 16.006N, 107.507E], and *Coeliccia pulchella* sp. nov. [holotype: Huu Lien Nature Reserve, Lang Son Prov., appr. 21.662N, 106.373E]) are described from Vietnam. The females of *C. galbina* Wilson & Reels, 2003, *C. hayashii* Phan & Kompier, 2016 and *C. suotia* Dow, 2016 are described. *Coeliccia montana* Fraser, 1933 is shown to be a junior synonym of *C. pyriformis* Laidlaw, 1932." (Authors)] Address: Kompier, T., Schoutenstraat 69, 2596 SK Den Haag, Netherlands. E-mail: kompierintokyo@yahoo.com

**19214.** Koneri, R.; Nangoy, M.; Maabuat, P.V. (2020): Composition and diversity of dragonflies (Insecta: Odonata) in Tunan waterfall area, North Minahasa, North Sulawesi, Indonesia. *Pakistan Journal of Zoology* 52(6): 2091-2100. (in English) ["Dragonflies play an important role in an ecosystem and can serve as control agents of agricultural insect pests. Dragonflies can be used as bioindicators for evaluating environmental changes in long-term studies (biogeography) and short-term studies (conservation biology). This research study was aimed to analyse the composition and diversity of dragonflies in Tunan Waterfall area, North Sulawesi, Indonesia. Sampling was conducted from March 2018 to May 2018 at three types of habitat, namely primary forest, secondary forest, and agricultural land. At each habitat type were laid four 300-metre-long transect lines. The lines were placed along the river of each habitat type, and sampling was carried out along the lines using sweep nets. From the research, 7 families, 20 species and 1,750 individuals belonging to 2 suborders, Anisoptera and Zygoptera, were identified. Libellulidae was the family with the most number of species and individuals being found. The species with the highest abundance was *Orthetrum pruinosum*, followed by *Libellago xanthocyana*. The highest dragonfly species abundance was found in the plantation land, while the lowest was found in the primary forest or around the waterfall. The highest dragonfly richness index, species diversity index ( $H'$ ), and species evenness index were found in the secondary forest, followed by the primary forest. The diversity of dragonflies at the observation site was influenced by vegetation cover and temperature." (Authors)] Address: Koneri, R., Department of Biology, Sam Ratulangi University, Indonesia. Email: ronicaniago@yahoo.com

**19215.** Kosterin, O.E. (2020): A misleading representation of the Asian distribution of a most intriguing dragonfly, *Somatochlora sahlbergi* Trybom, 1889: a critique of Kohli et al. (2018). *Odonatologica* 49(1/2): 51-56. (in English) ["Recently Kohli et al. (2018) published a phylogenetic analysis of *S. sahlbergi*, including extensive supplementary material listing global distribution records for the species. The compilation of literature data on records of *S. sahlbergi* in Siberia

includes an unacceptable level of false pseudo-data and incorrect statements." (Author)] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Academician Lavrentyev ave. 10, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

**19216.** Kvasniěák, R.; Bundzelova Minaroviěová, K. (2020): The communities of insects (Insecta, Pterygota) of the Flared Reed (*Phragmites* spp.) in the ornithological locality of Tmava Ponds (SW Slovakia). *Disputationes Scientificaе Universitatis Catholocae in Ruzomberok* 20(1): 111-134. (in Slovakian, with English summary) [During the vegetation period (april – october) in the year 2015 we observed the quantitative and qualitative representation of the insect community (Insecta) in the flared plain of reed (*Phragmites australis*) on the Tmava ponds. The ponds are situated near the recreational area Kamenný Mlyn – Tmava (SW Slovakia). The research was to compare the effect of anthropogenic of burning wetland vegetation in two selected habitats, how the site A (affected by fires) and the control site B (not affected by fire). We obtained a total of 1854 ex. insects by the method of sticky traps. insects. They belong to 53 different species originating from 36 different families and 13 ordos. The number of species in the sites was similar (site A 40 species and site B 42 species). The species spectrum consists mainly were the mesophilic insect species with the practical indicator value. We also record hygrophilic species, which are related to the wetland character of the area: *Aeschna cyanea*, *Sympetrum vulgatum*, *Chorthippus montanus*, *Gerris gibbifer*, *Sialis lutaria*, *Donacia semicuprea*, *Chrysomela coeruleans*, *Limnophilus rhombicus*, *Aedes vexans*, and *Simulium equinum*. The following xerophilic insect species include: *Melanogryllus desertus*, *Macrosteles laevis*, *Dictyophara europia* and *Sphex rufocinctus* preferring sunny habitat types and warm habitats. We used the standard index of dominance identity ( $ID = 90.8\%$ ), whose determined value indicates ecologically balanced environment and stability of the natural environment in the compared research plots (site A vs. control site B) affected by the burning of wetland vegetation *P. australis*." (Authors)] Address: Bundzelová, Katarína, Vysoká škola zdravotníctva a sociálnej práce sv. Alžbety v Bratislave Nám. 1. mája 1, 810 00 Bratislava, Slovakia

**19217.** Lewis-Phillips, J.; Brooks, S.J.; Sayer, C.D.; Patmore, I.R.; Hilton, G.M.; Harrison, A.; Robson, H.; Axmacher, J.C. (2020): Ponds as insect chimneys: Restoring overgrown farmland ponds benefits birds through elevated productivity of emerging aquatic insects. *Biological Conservation* 241, January 2020, 108253: 11pp. (in English) ["Highlights: •Farmland pond management strongly enhances emergent insect communities. •Emergent insects abundance increases 18 times following pond management. •Pond management leads to a 25-times increase in emergent insect biomass. •Day-to-day fluctuations in water temperature can predict insect emergences. •Local farmland bird communities are linked to emergent pond insect abundance. Abstract: Farmland bird populations have experienced severe declines across Europe and elsewhere. Ag-

ricultural intensification is believed to be a main factor behind these declines, with losses of non-cropped features, such as farmland ponds, identified as a key driver. Since the 1950s, many European farmland ponds have been in-filled or, through lack of management, become terrestrialised. Restoring terrestrialised farmland ponds has been shown to significantly increase the abundance and diversity of local farmland bird communities. It has been hypothesised that farmland birds are specifically attracted to open-canopy ponds due to increased emergent aquatic insect availability, but this link has hitherto been little explored. This study investigates how farmland pond management influences emergent aquatic insects [including "Odonata"], and how emergent insect abundance and biomass is linked to local bird assemblages. Insect emergences showed an 18-fold higher abundance and a 25-fold higher biomass at managed open-canopy ponds in comparison to their unmanaged overgrown counterparts, with day-to-day fluctuations in pond water temperature a key predictor of insect emergences. Species richness and abundance of birds at farmland ponds were strongly positively linked to the abundance of emergent insects. Furthermore, insect emergence peaks occurred on different days in different restored ponds such that the pond landscape afforded extended feeding opportunities for birds. Our findings suggest that restoring networks of terrestrialised farmland ponds to open-canopy macrophyte-dominated conditions could be a highly effective way of increasing the availability of aquatic insect prey for birds. This study highlights an urgent need to re-evaluate pond restoration and management within agri-environmental schemes in Europe and beyond." (Authors)] Address: Lewis-Phillips, J., Pond Restoration Research Group, Environmental Change Research Centre, Department of Geography, University College London, WC1E 6BT, UK. E-mail: jonathan.lewis.15@ucl.ac.uk

**19218.** Liu, C.; Zhang, Y.; Liu, X. (2020): Geographical fauna of Odonata in Xiangtoushan National Reserve, Guangdong province. *Forestry and Environmental Science*: 92-99. (in Chinese, with English summary) ["The field investigation of Odonata in Xiangtoushan national nature reserve was carried out from March 2017 to December 2019. The results showed that there were 122 species of Odonata, belonging to 14 families and 74 genera, in the reserve. The species number of Libellulidae (33 species) is the highest, followed by Gomphidae (28 species). The dominant species are *Neurobasis chinensis*, *Mnais mneme*, *Gomphidia kruegeri*, *Asiagomphus hainanensis*, *Macromia calliope*, *Orthetrum glaucum*, *Pantala flavescens* and *Trithemis festiva* etc. The world faunal characteristics of Odonata in this reserve showed that 92 species (occupied 75.41%) are oriental, 28 species (occupied 22.95%) are oriental-palaearctic. Meanwhile, all these species construct 10 distribution groups in 7 Chinese Zoogeographic subregions. There are 50 (40.98%) species in South China subregion, 13 (10.66%) species in South and Southwestern subregions, 19 (15.77%) species in South and Central-China subregions, and 20 (16.39) species live in three subregions of South-Central-North China simultaneously. The results of Odonata fauna are consistent

with the place of Xiangtoushan national reserve." (Authors)] Address: Liu, C., Administration of Guangdong Xiangtoushan National Nature Reserve; Huizhou Forestry Science Research Institute, China

**19219.** Luke, S.H.; Dwi Advento, A.; Dow, R.A.; Aryawan, A.A.K.; Barclay, H.; Eycott, A.E.; Hinsch, J.K.; Kurniawan, C.; Naim, M.; Mann, D.J.; Pujianto; Purnomo, D.; Rambe, T.D.S.; Slade, E.M.; Soeprapto; Ps, S.; Suhardi; Tarigan, R.S.; Wahyuningsih, R.; Widodo, R.H.; Caliman, J.-P.; Snaddon, J.L., Foster, W.A.; Turner, E.C. (2020): Complexity within an oil palm monoculture: The effects of habitat variability and rainfall on adult dragonfly (Odonata) communities. *Biotropica* 52(2): 366-378. (in English) ["Recent expansion of oil palm agriculture has resulted in loss of forest habitat and forest-dependent species. However, large numbers of species—particularly insects—can persist within plantations. This study focuses on Odonata (dragonflies and damselflies): a charismatic indicator taxon and a potentially valuable pest control agent. We surveyed adult Odonata populations biannually over three years within an industrial oil palm plantation in Sumatra, Indonesia. We assessed the effects of rainfall (including an El Niño Southern Oscillation-associated drought), the role of roadside ditches, and the importance of understory vegetation on Odonata populations. To assess the impacts of vegetation, we took advantage of a long-term vegetation management experiment that is part of the Biodiversity and Ecosystem Function in Tropical Agriculture (BEFTA) Programme. We found 41 Odonata species, and communities varied between plantation core and roadside edge microhabitats, and between seasons. Abundance was significantly related to rainfall levels four months before surveys, probably indicating the importance of high water levels in roadside ditches for successful larval development. We found no significant effect of the BEFTA understory vegetation treatments on Odonata abundance, and only limited effects on community composition, suggesting that local understory vegetation structure plays a relatively unimportant role in determining communities. Our findings highlight that there are large numbers of Odonata species present within oil palm plantations and suggest that their abundance could potentially be increased by maintaining or establishing waterbodies. As Odonata are predators, this could bring pest control benefits, in addition to enhancing biodiversity within intensive agricultural landscapes." (Authors)] Address: Luke, Sarah, Department of Zoology, University of Cambridge, Cambridge, UK

**19220.** Luttbeg, B.; Hammond, J.I.; Brodin, T.; Sih, A. (2020): Predator hunting modes and predator-prey space games. *Ethology* 126(4): 476-485. (in English) [nv; "Predators and prey are often engaged in a game where their expected fitnesses are affected by their relative spatial distributions. Game models generally predict that when predators and prey move at similar temporal and spatial scales that predators should distribute themselves to match the distribution of the prey's resources and that prey should be relatively uniformly distributed. These predictions should better apply to sit-and-pursue and sit-and-wait predators,



who must anticipate the spatial distributions of their prey, than active predators that search for their prey. We test this with an experiment observing the spatial distributions and estimating the causes of movements between patches for Pacific tree frog tadpoles (*Pseudacris regilla*), a sit-and-pursue dragonfly larvae predator (*Rhionaeschna multicolor*), and an active salamander larval predator (*Ambystoma tigrinum mavortium*) when a single species was in the arena and when the prey was with one of the predators. We find that the sit-and-pursue predator favors patches with more of the prey's algae resources when the prey is not in the experimental arena and that the prey, when in the arena with this predator, do not favor patches with more resources. We also find that the active predator does not favor patches with more algae and that prey, when with an active predator, continue to favor these higher resource patches. These results suggest that the hunting modes of predators impact their spatial distributions and the spatial distributions of their prey, which has potential to have cascading effects on lower trophic levels." (Authors)] Address: Luttbeg, B., Oklahoma State University, Stillwater, OK 74074, USA. Email: luttbeg@okstate.edu

**19221.** Maoka, T.; Kawase, N.; Ueda, T.; Nishida, R. (2020): Carotenoids of dragonflies, from the perspective of comparative biochemical and chemical ecological studies. *Biochemical Systematics and Ecology* Volume 89, April 2020, 104001: 7 pp. (in English) [<sup>13</sup>C carotenoids of 20 species of dragonflies (including 14 species of Anisoptera and six species of Zygoptera) were investigated from the viewpoints of comparative biochemistry and chemical ecology. In larvae,  $\beta$ -carotene,  $\beta$ -cryptoxanthin, lutein, and fucoxanthin were found to be major carotenoids in both Anisoptera and Zygoptera. These carotenoids were assumed to have originated from aquatic insects, water fleas, tadpoles, and small fish, which dragonfly larvae feed on. Furthermore,  $\beta$ -caroten-2-ol and echinenone were also found in all species of larvae investigated. In adult dragonflies,  $\beta$ -carotene was found to be a major carotenoid along with lutein, zeaxanthin,  $\beta$ -caroten-2-ol, and echinenone in both Anisoptera and Zygoptera. On the other hand, unique carotenoids,  $\beta$ -zeacarotene,  $\beta$ , $\psi$ -carotene ( $\gamma$ -carotene), torulene,  $\beta$ , $\gamma$ -carotene, and  $\gamma$ , $\gamma$ -carotene, were present in both Anisoptera and Zygoptera dragonflies. These carotenoids were not found in larvae. Food chain studies of dragonflies suggested that these carotenoids originated from aphids, and/or possibly from aphidophagous ladybird beetles and spiders, which dragonflies feed on. Lutein and zeaxanthin in adult dragonflies were also assumed to have originated from flying insects they feed on, such as flies, mosquitoes, butterflies, moths, and planthoppers, as well as spiders.  $\beta$ -Caroten-2-ol and echinenone were found in both dragonfly adults and larvae. They were assumed to be metabolites of  $\beta$ -carotene in dragonflies themselves. Carotenoids of dragonflies well reflect the food chain during their lifecycle." (Authors)] Address: Maoka, T., Research Inst. for Production Development, 15 Shimogamo-morimoto-cho, Sakyo-ku, Kyoto, 606-0805, Japan. Email: maoka@mbx.kyoto-inet.or.jp

**19222.** McKee, K.M.; Koprivnikar, J.; Johnson, P.T.J.; Arts, M.T. (2020): Parasite infectious stages provide essential fatty acids and lipid-rich resources to freshwater consumers. *Oecologia* 192(2): 477-488. (in English) ["Free-living parasite infectious stages, such as motile cercariae of trematodes (flatworms), can constitute substantial biomass within aquatic ecosystems and are frequently eaten by various consumers, potentially serving as an important source of nutrients and energy. However, quantitative data on their nutritional value (e.g., essential fatty acids [EFA]) are largely lacking. As EFA are leading indicators of nutritional quality and underpin aquatic ecosystem productivity, we performed fatty acid (FA) analysis on an aggregate of ~30,000 cercariae of the freshwater trematode, *Ribeiroia ondatrae*. Individual cercariae contained 15 ng of total FA, and considerable quantities of EFA, including eicosapentaenoic (EPA, at 0.79 ng cercaria<sup>-1</sup>) and docosahexaenoic (DHA, at 0.01 ng cercaria<sup>-1</sup>) acids. We estimated annual EFA production by *R. ondatrae* cercariae for a series of ponds in California to be 40.4–337.0  $\mu\text{g m}^{-2} \text{yr}^{-1}$  for EPA and 0.7–6.2  $\mu\text{g m}^{-2} \text{yr}^{-1}$  for DHA. To investigate viability of cercariae as prey, we also compared growth and FA profiles of dragonfly larvae (nymphs of *Leucorrhinia intacta*) fed equivalent masses of either *R. ondatrae* or zooplankton (*Daphnia* spp.) for 5 weeks. Nymphs raised on the two diets grew equally well, with no significant differences found in their EFA profiles. While zooplankton are widely recognized as a vital source of energy, and an important conduit for the movement of EFA between algae and higher trophic levels, we suggest a similar role for trematode cercariae by 'unlocking' EFA from the benthic environment, highlighting their potential importance as a nutrient source that supports animal health.] Address: Koprivnikar, Janet, Dept of Chemistry & Biology, Ryerson Univ., 350 Victoria Street, Toronto, ON, M5B 2K3, Canada

**19223.** Medupin, C. (2020): Spatial and temporal variation of benthic macroinvertebrate communities along an urban river in Greater Manchester, UK. *Environ Monit Assess* (2020) 192:84. (in English) ["Urban rivers face challenges of increased human activities which also affect river organisms. In order to enhance freshwater biodiversity in urban rivers, it is important to determine how the benthic macroinvertebrate communities are influenced by key abiotic factors. This was investigated in this paper through the study of the spatial and temporal variations of benthic macroinvertebrates and water quality variables at the urban River Medlock in Greater Manchester, UK. Samples were obtained from five sections of the catchment (S1 to S5) over a period of 14 months and the results were compared with the standard requirement of the European Union's Water Framework Directives. Multivariate tests including SIMPER (similarity percentages), PCA (principal component analysis) and BIOENV (biological and environmental) were carried out on the data in order to determine the environmental variables which most influenced the benthic macroinvertebrates. PCA of environmental variables indicated that 34% of the overall variance was heavily weighted on nutrients and catchment area (negatively on altitude and slope), 17% represented ri-

ver substrate and the 12% represented discharge. The BIO-ENV analysis also indicated altitude, slope, catchment area, discharge and conductivity as the variables which influenced the biological communities. SIMPER analysis showed a difference between the upper and lower sections of the river with some sensitive taxa at the upper sites and showed that more organisms are present during spring. Apart from the lowest section of the river, the EU Water Framework Directive classification showed that other sites achieved the 'good ecological status'. While 32 taxa groups [including "Odonata"] were identified, abundant Baetidae, Chironomidae and Oligochaeta were recorded at all sites and seasons. The scores for biotic indices Whalley Hawkes Paisley and Trigg (WHPT) and Biological Monitoring Working Party (BMWP) were found to be similar. By the application of surrogate variables such as percentage urban cover, catchment area and total number of organism, the influence of urbanisation could be seen in the abundance of organisms over time and space." (Author)] Address: Medupin, C., School of Earth & Environmental Sciences, The University of Manchester, Oxford Road, Manchester M13 9PL, UK. Email: cecilia.medupin@manchester.ac.uk

**19224.** Murray, R.L.; Tah, S.; Koprivnikar, J.; Rowe, L.; McCauley, S.J. (2020): Exposure to potentially cannibalistic conspecifics induces an increased immune response. *Ecological Entomology* 45(2): 355-363. (in English) ["1. Within-population infectious disease dynamics depend on multiple factors, including the ability of hosts to mount an effective immune response. These immune responses can be highly plastic, responding to pathogen risk, as well as the ecological context in which pathogens are encountered. 2. High conspecific density can stimulate immune activity, and recent research suggests that predators can cause indirect protective effects in their prey through the induction of increased immune responses. Comparatively little work, however, has investigated whether exposure to potentially cannibalistic conspecifics, representing both increased density and predatory pressures, will have similar effects on immune expression. 3. Using dragonfly larvae, the present study investigated whether exposure to potentially cannibalistic conspecifics altered the melanisation of simulated parasites. 4. Increased levels of melanisation were found in larvae regardless of whether that conspecific had recently engaged in cannibalism or not. Melanisation also increased as conspecific density increased, even if the conspecifics present were small, and therefore unlikely to pose a cannibalism threat. 5. The findings obtained in the present study indicate that conspecific presence is sufficient to affect immune responses in these insects even though they are relatively solitary compared with the phase-polyphenic taxa typically associated with density-dependent prophylaxis. Because melanisation is also important for wound healing, we suggest that the increased melanin response observed with increased conspecific density might act to induce heightened immunity when faced with potentially increased risk of infection, and also facilitate wound healing under threat of predation/cannibalism." (Authors)] Address: Murray, Rosalind, Biol. Dept., Univ. of Toronto Mississauga, 3359 Mississauga

Rd., Mississauga, ON, Canada L5L 1C6. E-mail: rosaling.murray@utoronto.ca

**19225.** Murria, C.; Väisänen, L.O.S.; Somma, S.; Wangenstein, O.S.; Arnedo, M.A.; Prat, N. (2020): Towards an Iberian DNA barcode reference library of freshwater macroinvertebrates and fishes. *Limnetica* 39(1): 73-92. (in English, with Spanish summary) ["Freshwater macroinvertebrates and fishes are focal groups in major ecosystem biomonitoring programs in the Iberian Peninsula. Yet, their use as bioindicators is sometimes constrained by the time and cost needed for sorting macroinvertebrates specimens and their challenging taxonomic identification, and the huge sampling procedures for capturing rare or incipient fish species, respectively. Given the increasing cost-effectiveness of metazoan identification based on metabarcoding [i.e., high-throughput sequencing (HTS) of DNA barcodes] and reliability of species-level identification and the high number of samples that can be processed, its use in biomonitoring of freshwater communities can provide an alternative to morphology-based approaches. However, the accuracy of species assignment in metabarcoding approaches relies on the availability of a comprehensive DNA barcode reference library. Because of the high level of endemism in the Iberian Peninsula, current public repositories for DNA barcodes may not be informative enough to identify the Iberian fauna to species level. Here, we compiled the Iberian freshwater macroinvertebrates and fishes taxonomic list (including indigenous and non-indigenous species) and the available molecular data for the cytochrome oxidase I DNA barcode (cox1, COI-5P) in public repositories to assess the extent of DNA barcode coverage. The DNA barcode coverage was reported for DNA fragments within the Folmer region (658 bp). Given that HTS platforms provide DNA sequence in the range of 50-400 bp in length, we also reported the second half of the DNA barcode (313 bp, Leray region) and the first part of the Leray region (285 bp, Leray-285), which are short DNA barcodes useful to assign metabarcoding cox1 data. For macroinvertebrates, the final taxonomic checklist comprises 3348 species including Mollusca (65 species), Crustacea (101 species) and Insecta (3182 species). We present an initial DNA barcode reference library, with an overall coverage of ~ 35 % of the Iberian taxa. Exploring this data, we find a strong taxonomic bias. Based on Leray-285, Odonata (43 of 79 species barcoded, 54.43 %) and Hemiptera (44 of 81 species barcoded, 54.32 %) were the best represented lineages. In contrast, Diptera (393 of 1693 species barcoded, 23.21 %), and Plecoptera (42 of 135 species barcoded, 31.11 %) were underrepresented. For fishes, the available DNA barcode data covered 98.11 % of the indigenous (76) and non-indigenous (30) species. By revealing and quantifying current gaps on the available data (~ 65 %), we aim to improve efficiency in designing the next steps towards the ambitious yet necessary goal of compiling a complete DNA barcode reference library for Iberian macroinvertebrates and fishes." (Authors)] Address: Múrria, C. Grup de Recerca Freshwater Ecology & Management, Dept de Biologia Evolutiva, Ecologia i Ciències Ambientals, Universitat de Barcelona, Catalonia, Spain. E-mail: cmurria@ub.edu

**19226.** Nakanishi, K.; Uéda, T.; Yokomizo, H.; Hayashi, T.I. (2020): Effects of systemic insecticides on the population dynamics of the dragonfly *Sympetrum frequens* in Japan: statistical analyses using field census data from 2009 to 2016. *Science of The Total Environment* 703, 134499: 8 pp. (in English) ["Highlights: • Dragonfly abundance in Japan's agricultural landscapes has decreased. • We monitored the population density of the dragonfly *Sympetrum frequens*. • We estimated systemic insecticide use and analyzed its effect on the dragonfly. • The results suggest a negative effect of systemic insecticide use on population size. • Some agronomic factors need to be further examined as potential confounders. Abstract: Since the mid-1990s, populations of the common Japanese dragonfly *Sympetrum frequens* in rice fields have declined severely. Application of systemic insecticides—especially fipronil—to nursery boxes of rice seedlings is suspected to be the main cause of the decline. However, until now there have been insufficient population data to test the causality. We conducted a dragonfly survey from 2009 to 2016 in four prefectures of Japan and compiled the data to enable the comparison of population growth rates along five main census routes over the years. We also estimated the use ratio of each insecticide applied to nursery boxes in rice fields (i.e., the area exposed to insecticide as a ratio of the total rice field area) by prefecture. We then statistically analyzed the effects of the insecticides on the dragonfly's population growth rates, taking into account the potential confounding factors based on current knowledge. There was a significant negative association between the annual increase in use ratio of the sum of systemic insecticides (e.g., fipronil, imidacloprid, and chlorantraniliprole) and the annual population growth rate of *S. frequens*. This association suggests that systemic insecticide use affected the decrease in population density of the dragonfly, although some agronomic factors need to be further examined as potential confounders." (Authors)] Address: Nakanishi, K., Nat. Inst. Environ. Studies, Onogawa 16-2, Tsukuba, Ibaraki 305-8506, Japan. E-mail: nakanishi.kosuke@nies.go.jp

**19227.** Nayak, A.K. (2020): Additions to the Odonata (Insecta) fauna of Asansol-Durgapur Industrial Area, West Bengal, India. *Journal of Threatened Taxa* 12(3): 15391-15153. (in English) ["Previously, a total of 57 species of Odonata were reported from the Asansol-Durgapur Industrial Area, India. In this present attempt the author reports an additional six species occurring from the same region. Among six of the species were found between January 2016 and September 2019, with one of them belonging to the Aeshnidae family, two to the Gomphidae family, two to the Libellulidae family, and only one damselfly from the Lestidae family. The species *Gomphidia leonora* Mitra, 1994 has been reported in this paper for the second time from West Bengal, India, after a gap of 23 years, from Durgapur Barrage, which is situated at the end point of the study area." (Author)] Address: Nayak, A.K., Searsole Junior Basic School, Searsole Rajbari, Paschim Bardhaman, West Bengal 713358, India

**19228.** Nel, A. (2020): The second genus of the extinct dragonfly family Urolibellulidae from the Eocene Green River

Formation (Odonata, Anisoptera: Cavilabiata). *Palaeontology* 3(1): 50-53. (in English) ["If the oldest record of the anisopteran 'libelluloid' group Anauriculida Bechly, 1996 goes to the Cretaceous (Fleck et al., 1999; Kohli et al., 2016), its extant families are scarce or even absent before the Eocene. Nevertheless, the Anauriculida were already rather diverse during Eocene with a Libellulidae in the earliest Eocene (Fleck et al., 2000), and the extinct monotypic family Urolibellulidae in the middle Eocene Green River Formation (Zeiri et al., 2015). Crown Libellulidae become more and more frequent and diverse during Oligocene, and even dominate the dragonfly fauna in some outcrops (Céreste, Rott, Aix-en-Provence, Bes-Konak) (Nel & Paicheler, 1993). Thus any discovery in the Paleocene–Eocene of a new fossil related to these families is welcome. Here we describe a complete hindwing of this kind from the Green River Formation in Colorado." (Author)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, 75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**19229.** Nelson, S.J.; Chen, C.Y.; Kahl, J.S. (2020): Dragonfly larvae as biosentinels of Hg bioaccumulation in Northeastern and Adirondack lakes: relationships to abiotic factors. *Ecotoxicology* 29: 1659-1672. (in English) ["Mercury (Hg) is a toxic pollutant, widespread in northeastern US ecosystems. Resource managers' efforts to develop fish consumption advisories for humans and to focus conservation efforts for fish-eating wildlife are hampered by spatial variability. Dragonfly larvae can serve as biosentinels for Hg given that they are widespread in freshwaters, long-lived, exhibit site fidelity, and bioaccumulate relatively high mercury concentrations, mostly as methylmercury (88%±11% MeHg in this study). We sampled lake water and dragonfly larvae in 74 northeastern US lakes that are part of the US EPA Long-Term Monitoring Network, including 45 lakes in New York, 43 of which are in the Adirondacks. Aqueous dissolved organic carbon (DOC) and total Hg (THg) were strongly related to MeHg in lake water. Dragonfly larvae total mercury ranged from 0.016–0.918 µg/g, dw across the study area; Adirondack lakes had the minimum and maximum concentrations. Aqueous MeHg and dragonfly THg were similar between the Adirondack and Northeast regions, but a majority of lakes within the highest quartile of dragonfly THg were in the Adirondacks. Using landscape, lake chemistry, and lake morphometry data, we evaluated relationships with MeHg in lake water and THg in dragonfly larvae. Lakewater DOC and lake volume were strong predictors for MeHg in water. Dragonfly THg Bioaccumulation Factors (BAFs, calculated as [dragonfly THg]:[aqueous MeHg]) increased as lake volume increased, suggesting that lake size influences Hg bioaccumulation or biomagnification. BAFs declined with increasing DOC, supporting a potential limiting effect for MeHg bioavailability with higher DOC." (Authors)] Address: Nelson, Sarah, School of Forest Resources, Univ. Maine, 5755 Nutting Hall, Orono, ME, 04469-5755, USA

**19230.** Ngô-Muller, V.; Garrouste, R.; Nel, A. (2020): Small but important: a piece of mid-Cretaceous Burmese amber with a new genus and two new insect species (Odonata:

Burmaphlebiidae & 'Psocoptera': Compsocidae). Cretaceous Research 110, June 2020, 104405: (in English) ["*Pouillonphlebia burmitica* gen. et sp. nov., second genus and species of the mid-Cretaceous damselfly family Burmaphlebiidae, is described from the Burmese amber. This discovery suggests that this family diversified during the Early Cretaceous in the 'Burmese' island that detached earlier from Gondwana and was isolated in the Tethys Ocean at that time. We also described from the same piece of amber a small 'Psocoptera' *Burmacompsocus pouilloni* sp. nov., third species of this compsocid genus, only known from this amber. This discovery confirms that the Compsocidae were certainly much more diverse during the Cretaceous than nowadays." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@cimrs1.mnhn.fr](mailto:anel@cimrs1.mnhn.fr)

**19231.** Nobles, S.; Jackson, C.R. (2020): Effects of life stage, site, and species on the dragonfly gut microbiome. *Microorganisms* 8(2), 183: 15 pp. (in English) ["Insects that undergo metamorphosis from juveniles to adults provide an intriguing opportunity to examine the effects of life stage, species, and the environment on their gut microbiome. In this study, we surveyed the gut microbiomes of 13 species of dragonfly collected from five different locations subject to different levels of human impact. Juveniles were collected as nymphs from aquatic habitats while airborne adults were caught at the same locations. The gut microbiome was characterized by next generation sequencing of the bacterial 16S rRNA gene. Life stage was an important factor, with the gut microbiomes of dragonfly nymphs differing from those of adult dragonflies. Gut microbiomes of nymphs were influenced by sample site and, to a lesser extent, host species. Neither sample location nor host species had a strong effect on the gut microbiome of dragonfly adults. Regardless of life stage, gut microbiomes were dominated by members of the Proteobacteria, with members of the Bacteroidetes (especially in adults), Firmicutes, and Acidobacteria (especially in nymphs) also being proportionally abundant. These results demonstrate that different life stages of metamorphosing insects can harbor very different gut microbiomes and differ in how this microbiome is influenced by the surrounding environment. ... The number of dragonfly species collected varied by site and life stage and finding a nymph species at a given site did not relate to the later collection of adults (Table 1). Eight different species of adults were collected, and 13 different species of nymphs. One of the more rural sites (Camp Lake Stephens) had the highest number of species collected (eight) with *Erythemis simplicicollis* and *Microorganisms* 2020, 8, 183 4 of 15 *Celithemis elisa* being the most common with four individuals of each collected. The Shelby Farms and former Treatment Pond sites yielded the lowest number of dragonfly species (five). Across all sites, *E. simplicicollis* was the most collected species (19 individuals) followed by *Libellula luctuosa* (15 individuals) and *Pachydiplax longipennis* (13 individuals). Only one individual was collected for each *Erythrodiplax fusca*, *Ladonna deplanata*, and *Tetragoneuria cynosura*." (Authors) The study includes *Anax imperator*, which

must be a misidentification.] Address: Nobles, Sarah, Department of Biology, University of Mississippi, University, MS 38677, USA

**19232.** Ožana, S.; Pyszek, P.; Dolný, A. (2020): Determination of suitable insect part for non-lethal DNA sampling: case study of DNA quality and regeneration capability of dragonflies. *Insect Conservation and Diversity* 13(4): 319-327. (in English) [nv; "1. Genetics has been widely used in insect ecology and conservation. To minimise the effect of DNA sampling on organisms as much as possible, it would be ideal to use non-invasive or non-lethal DNA sources. Therefore, it is also very important to determine the responses of organisms to DNA sampling. 2. In this study, the quality and quantity of genomic DNA samples from three types of insect tissues (exuvia, mid-legs and wings) were evaluated. As model organisms, we used two dragonfly species of different sizes (*Leucorrhinia dubia*, *Anax imperator*). We also tested the regenerative ability of dragonfly larvae as a repair mechanism after mid-leg cut-off, with respect to factors such as size and quantity of diet. 3. We found that DNA of sufficient quality for analyses was obtained from all tested tissues. Nonetheless, isolates from exuviae were conclusively less useful for sequencing than those from the mid-legs and wings. The highest quantity of DNA was obtained from the mid-legs. The survival of larvae is not affected by removing the legs, which can usually regenerate. 4. All the tested tissues could be a source of adequate DNA; however, we concluded that primarily the legs should be used because they provided the best DNA samples in terms of quantity and quality of DNA. Furthermore, their exploitation would not affect individuals seriously if young larvae with sufficient time (at least 6 months) for regeneration are sampled. The exuviae should be used for absolutely non-invasive studies involving endangered or protected species." (Authors)] Address: Dolný, A., Dept of Biology & Ecology, Faculty of Science, Univ. of Ostrava, Chittussiho 10, 710 00 Slezská Ostrava, Czech Republic. E-mail: [ales.dolny@osu.cz](mailto:ales.dolny@osu.cz)

**19233.** Pavithran, S.; Chitra, N.; Arulprakash, R. (2020): Checklist of odonata in the rice fields of India. *Indian Journal of Entomology* 82(1): 99-109. (in English) ["Odonata is one of the most important predators in the rice ecosystems and their occurrence in rice fields from different parts India was inventoried. Odonata diversity in the rice fields from India comprised of 127 species under 71 genera of 13 families. Anisoptera were dominant with 81 species and 52 genera under six families over Zygoptera (46 species, 19 genera under 7 families). Libellulidae (Anisoptera) was the most speciose family with 53 species and 32 genera followed by Coenagrionidae (Zygoptera) with 27 species and 7 genera. *Orthetrum sabina* (Drury, 1770) (Libellulidae) was observed to occur in all the rice fields studied across the country. Analysis of Odonata from rice fields in different biogeographical regions of India revealed that the order of dominance of species was: Gangetic Plain Zone (76 species) > Western Ghat Zone (57 species) > Deccan Plateau Zone (54 species) > Semi Arid Zone (39 species) > Northeast Zone (14 species) > Coastal Zone (10 species) > Himalayan Zone (1



species). Odonata in rice fields of the Western Ghat Zone and Deccan Plateau Zone were found to have a maximum of 50.48% similarity." (Authors)] Address: Chitra, N., Department of Agricultural Entomology, Directorate of Seed Center, Tamil Nadu Agricultural University, Coimbatore, 641003, India. E-mail: chitra.bookworm@gmail.com

**19234.** Perron, M.A.C.; Pick, F.R. (2020): Water quality effects on dragonfly and damselfly nymph communities: A comparison of urban and natural ponds?. *Environmental Pollution* 263, Part B, August 2020, 114472: 13 pp. (in English) ["Highlights: • Odonata nymph abundance was lower in stormwater ponds than natural ponds. • Contaminants in stormwater ponds were below guidelines, except for Cl<sup>-</sup>, Cu and TP. • Cl<sup>-</sup> (from road salts) affected dragonfly abundance and assemblages but not damselfly. • A common index of water quality was not useful in predicting habitat quality. • Stormwater ponds can provide suitable habitat for Odonata, if properly designed. Abstract: Cities are increasingly using constructed ponds to mitigate flooding and downstream water pollution from urban runoff. As a result, these stormwater ponds can have poor water quality, yet they can also attract wildlife. In this study, the effects of water quality on Odonata were determined in stormwater ponds (n = 41) and natural reference ponds (n = 10) of similar size across the National Capital Region of Canada. A total of 38 chemical/physical water quality variables along with Odonata nymph abundance and taxonomic composition were sampled at each pond. Chloride concentrations exceeded the guideline for the protection of aquatic life at over two-thirds of the stormwater ponds. Among all the metals tested, only Cu exceeded guidelines at many stormwater ponds. Both dragonfly and damselfly nymphs were on average less abundant in the stormwater ponds in comparison to the natural ponds. Ponds with high concentrations of chloride and metals typically had lower dragonfly abundance. Dragonfly community structure was significantly influenced by high chloride (or conductivity), which likely originates from winter road salting. In contrast, damselfly community structure in the stormwater ponds was similar to that found in natural ponds, with nutrients and metals explaining a small percent of variation in community structure. A water quality index developed to assess habitats for the protection of aquatic life did not significantly explain Odonata abundance or measures of diversity and may not be suitable in assessing pond habitat quality. To improve pond habitats within cities, efforts should be directed at reducing the amount of impervious surface and road salt usage within catchment basins." (Authors)] Address: Perron, M., Dept of Biology, University of Ottawa, 30 Marie Curie Private, Ottawa, Ontario, K1N 6N5, Canada. E-mail: mperr058@uottawa.ca

**19235.** Piñeiro Álvarez, X. (2020): High density of *Lestes macrostigma* (Eversmann, 1836) (Odonata: Lestidae) in a wetland of La Mancha Húmeda (Ciudad Real, Spain).. *Archivos entomológicos* 22: 17-22. (in Spanish, with English summary) ["High density of *L. macrostigma* in a wetland of La Mancha Húmeda (Ciudad Real, Spain). A high count of *L. macrostigma* in the restored wetland of Junta de los Ríos,

province of Ciudad Real, in June 2019, is reported. An assessment of the water conditions and vegetation associated with this species during the study period is provided. Information on the accompanying odonatofauna in the wetland is also included." (Author)] Address: Piñeiro Álvarez, X., Revolva 2, Noalla. E-36990 Sanxenxo (Pontevedra), Spain. E-mail: xurxolusitanica@gmail.com

**19236.** Pires, M.M.; Siegloch, A.E.; Medina Hernandez, M.I.; Petrucio, M.M. (2020): Environmental drivers and composition of assemblages of immature odonates (Insecta) in a subtropical island in southern Brazil. *Acta Limnologica Brasiliensia*, 2020, vol. 32, e2: 10 pp. (in English, with Portuguese summary) ["Aim: Describe the diversity of immature stages of Odonata (Insecta) in streams from a subtropical island in southern Brazil and investigate the influence of environmental variables on the composition of their assemblages. Methods: Eleven low-order streams (1st to 3rd order) were sampled in two conservation units located in the island of Santa Catarina (southern Brazil) between 2010 and 2012. Immature specimens of Odonata were collected using a Surber sampler. The influence of water abiotic parameters and habitat structure (mesohabitats: riffle vs. pool areas, microhabitats: litter vs. stone substrates) on the composition of Odonata was tested through the seasons using ordination diagrams and redundancy analysis. Results: Nine odonate genera from seven families were recorded in the study region. The genera *Desmogomphus*, *Epigomphus* (Gomphidae), *Heteragrion* (Heteragrionidae) and *Perilestes* (Perilestidae) have their first records described for the state of Santa Catarina. Additionally, biological notes are provided for other odonate genera concerning substrate use. The composition of Odonata communities changed over the seasons and they were influenced by water temperature and velocity. Additionally, odonate composition differed significantly between microhabitats (substrate type) and mesohabitats (riffle vs. pool areas) in the streams studied. Conclusions: The lower genera richness of Odonata recorded in the island of Santa Catarina in relation to other Brazilian subtropical streams is probably associated with the insular condition of the study region. This study also demonstrated that substrate (organic and inorganic) and mesohabitat (riffle and pool) types were important drivers of the composition of the fauna of immature odonates, evidencing the role of climate and habitat structure in influencing subtropical stream insect communities." (Authors)] Address: Marques Pires, M., Lab. de Ecologia e Conservação de Ecossistemas Aquáticos, Univ. do Vale do Rio dos Sinos - UNISINOS, Avenida Unisinos, 950, CEP 93022-750, Sao Leopoldo, RS, Brasil. E-mail: marquespiresm@gmail.com

**19237.** Raffard, A.; Therry, L.; Finn, F.; Koch, K.; Brodin, T.; Blanchet, S.; Cote, J. (2020): Does range expansion modify trait covariation? A study of a northward expanding dragonfly. *Oecologia* 192: 565-575. (in English) ["The adaptive value of correlations among phenotypic traits depends on the prevailing environmental conditions. Differences in selection pressures during species range expansions may there-

fore shape phenotypic integration. In this study, we assessed variation in behavioral and morphological traits, as well as their covariations, in replicated southern and northern European populations of the northward expanding dragonfly *Crocothemis erythraea*. Larvae from northern populations were, on average, darker in color, and therefore, better camouflaged than larvae from southern populations. However, there was no difference in activity level. Darkness and activity were positively correlated in larvae from northern populations, whereas this trait covariation was missing in southern populations. This suggests the emergence of alternative strategies in time-limited northern populations, a higher activity level that required better camouflage through darker coloration, while less active larvae benefited from an energy-saving strategy by reducing the investment in costly traits, such as body darkness. We further found that larger larvae emerged into larger adults, with a higher investment in flight morphology. Our findings imply that phenotypic integration is associated with the northward range shift, potentially differentially shaping fitness consequences, and ecological interactions in southern versus northern populations." (Authors)] Address: Raffard, A., Centre Nationale Pour la Recherche Scientifique (CNRS), Université Paul Sabatier (UPS), Station d'Écologie Théorique et Expérimentale, UMR 5321, 09200 Moulis, France. E-mail: allanraffard@outlook.com

**19238.** Reinhardt, K. (2020): Libellenbeobachtungen im Strandsha-Gebirge (Bulgarien) (Odonata). *Entomologische Nachrichten und Berichte* 64(1): 49-56. (in German, with English summary) ["During a short period in August 2017, 25 species of Odonata were recorded at 31 sites of mostly running water habitats. Noteworthy are an observation of *Aeshna cyanea*, two new records of *Somatochlora borisi* at very small and intermittent streams, and two records of *Corulegaster picta*. Data contributing to the small-scale distribution of *Chalcholestes parvidens* and *Ch. viridis*, to the oviposition behaviour of *Somatochlora meridionalis*, and to the size of exuviae of *Caliaeschna microstigma* are presented. *Platycnemis pennipes*, *Calopteryx virgo* and *S. meridionalis* were the most widely distributed species." (Author)] Address: Reinhardt, K., Angewandte Zoologie, Technische Universität Dresden, 01069 Dresden, Germany. Email: klaus.reinhardt@tu-dresden.de

**19239.** Rivas Torres, A. (2020): Etodiversidad: estudio de la variabilidad del comportamiento sexual en el orden Odonata. PhD. thesis, Departamento de Ecología e Biología Animal, Universidad de Vigo: 195 pp. (in Spanish) ["Nowadays, ethology or the study of animal behaviour seems to have lost the lustre it acquired during its golden age in the 20th century thanks to great naturalists and biologists such as Nikolaas Tinbergen and Konrad Lorenz, not forgetting the perhaps not so well known contribution to ethology of Charles Darwin, who gave value to animal behaviour and included it as another possible adaptation along with anatomical and physiological adaptations. According to Darwin, such adaptations would allow the survival of the individual and its subsequent reproductive success. Although for Dar-

win himself behaviour, together with natural and sexual selection, were fundamental pieces in understanding the adaptation of organisms, it seems that nowadays it seems that the most naturalistic aspect of a biologist, observation, has been lost. Most studies have shifted from a macroscopic to a more microscopic view, focusing on genomic and phylogenetic analysis of organisms. While it is important for the field of biology to move forward, we must not leave behind such important disciplines as ethology, which, together with other disciplines of a more molecular nature, allows us to establish more precise conclusions, hypotheses and theories. Both natural and sexual selection use diversity as a substrate for action, as long as these traits are transmitted through the genetic code. It is therefore important, before going into the objective of this thesis, to talk about biological diversity or biodiversity. The concept of biodiversity can actually be considered a meta-concept, as it encompasses several terms: the genetic diversity within species, the diversity of species in an ecosystem, the diversity of ecosystems of which these species form a part, and the landscape diversity where these ecosystems are found, including evolutionary and ecological processes. Conserving and respecting biodiversity has important social, political, economic and public health consequences: we benefit daily from everything that healthy and stable biodiversity provides, from medicines to food and clothing. In addition, biogeochemical cycles create fertile soil, recycle fresh water and purify the air. However, to complete the complex equation of the biodiversity concept, another variable is missing: ethological diversity, behavioural diversity or etodiversity. There are currently several studies that stress the importance of studying behavioural diversity and its consequences in the fields of ecology, environment and evolution (population dynamics, expansion or reduction of the distribution range of species, trophic cascades). We sometimes overlook the fact that it is not only diversity in physical or physiological traits that is the substrate and driver of evolution, but also behavioural diversity plays a role almost as important, if not more so, as reproductive isolation is often caused by some kind of pre-zygotic behaviour, such as the mating song of frogs. In addition, sexual conflict between males and females, which is just another form of sexual selection, most often uses behaviour as a substrate for reproductive adaptation. Throughout the five chapters that make up this thesis, the aim is to highlight the importance of the study of biodiversity and, in particular, of etodiversity or behavioural diversity, giving the latter an important role at all levels, not only ecosystemic, but also inter- and intraspecific. For this purpose, insects of the order Odonata (dragonflies and damselflies) are used as model organisms, paying special attention to their sexual behaviour. The order Odonata is relatively small in terms of the number of described species (around 6,000), which has facilitated its study and allowed us to obtain a broad knowledge of the distribution and taxonomy of the members of this group. The order is divided into three suborders: Zygoptera, Anisoptera and Anisozygoptera (the latter represented by a single genus, *Epiophlebia*). Anisoptera are usually larger and more robust than Zygoptera and, unlike Zygoptera, they spread their wings when at rest. Anisozygoptera, on

the other hand, are intermediate in appearance between the two previous suborders. Odonates are an ideal group for ethodiversity studies, as they possess a wide variety of behaviours associated with reproduction, each with intraspecific and interspecific variability. Among these behaviours, the encounter between individuals of both sexes and their location, interaction between males and territoriality, intraspecific recognition, tandem formation, copulation and oviposition form are of particular interest. Among these behaviours, the most important for study are encounters between individuals of both sexes and their location, interaction between males and territoriality, intraspecific recognition, tandem formation, copulation and oviposition. Judging from the fossil record, these winged insects have changed little since their origin, suggesting great adaptability of the group. Today, they remain an example of adaptability to their environment, as they are a cosmopolitan group of insects found almost everywhere on the planet, in multiple and varied environments associated with bodies of water. This ability to colonise diverse environments allows us to know the behavioural patterns of individuals at different latitudes, thus being able to establish patterns of ethological diversity in a similar way to the patterns of specific richness observed within the group, with an increase in the number of species from the poles towards the equator. The first chapter of this thesis focuses on the study of alternative reproductive strategies, using the Mexican endemic odonate *Paraphlebia zoe* as a study model. Alternative breeding strategies are commonly associated with male dimorphism and in the case of *P. zoe*, males are dimorphic in wing colour, with black and white-winged males defending territory and hyaline-winged males often acting as satellites. The study was carried out in a population of this species located in runoff habitats in Teocelo, Veracruz region. During the fieldwork period, hyaline-winged males were extremely rare to see, due to the time of year of the study (June-July), so the study focused on black-winged males. Some black-winged males were found to share the same territory, so it was hypothesised that within this morph there might be two territorial (or pre-copulatory) alternatives: dominant and submissive black-winged males. To test whether these two roles were plastic or stable in each individual, an experiment was carried out in which the black and white wing patches of some individuals were manipulated. This experiment included four different treatments: in the first, the black and white spots were painted without changing their size; in the second treatment, the white spot was erased using black paint; in the third treatment, the size of the black spot was increased and the white spot was moved while maintaining its size. Finally, a group of control individuals were included and no modifications were made to them. During a month and a half, focal observations of 10 min per individual were made daily (weather permitting), from 9:00 a.m. to 16:30 p.m., the time frame in which the maximum peak of activity in the individuals of this population took place. To carry out these focal observations, males and females were previously captured with an entomological net, individually marked with a number on the left anterior wing, the date and time of capture were noted, the body size was measured

with a caliper and the marked individuals were released again. An attempt was made to draw the number as far away from the spot as possible so that the marking of individuals did not interfere with the handling experiment. The results of the experiment suggest that the dominant and submissive roles are not affected by the treatment and would therefore be stable and fixed. Not only the plasticity of these roles was studied, but also the possible correlation between some phenotypic variables (wing symmetry, survival and recapture probability) and male behaviour (submissive or dominant) was investigated. In this case, a positive correlation was found between body size and survival in both sexes and roles of black-winged males. In addition, the largest and youngest black-winged males were the most symmetrical. *P. zoe* males possess a high behavioural diversity, with two types of strategies (dominant and submissive) in black-winged males. The occurrence of this behavioural diversity within the same morph could depend on demographic factors, such as population density and/or the relative frequency of different male morphs (hyaline and black-winged) at a given time of the year. Before copulation, male odonates transfer spermatozoa from the testes, located in the 9th abdominal segment, to the seminal vesicle located in the 2nd abdominal segment; a behaviour unique to this group of insects known as sperm translocation. The second chapter discusses how sperm translocation can affect the quality of sperm used by the male to produce sperm. The second chapter analyses how sperm translocation can affect the quality of the sperm used by the male to fertilise the female, and consequently the survival of the progeny (i.e. female fertility). In this case, a European zygopteran species, *Ischnura graellsii*, which is easy to find in Galicia, is used as a model for the study. Some published observations on this behaviour in odonates suggest that sometimes males do not translocate sperm before copulation. The aim of this chapter is to determine the circumstances under which males omit this behaviour and how this affects the viability of their sperm. For this purpose, *I. graellsii* males were allowed to perform a first sperm translocation (interrupting copulation at this time) and then the behaviour of these males in subsequent copulations was studied. Males were randomly assigned to four treatments consisting of allowing these individuals to copulate with a female after 15 minutes, 24 hours, 48 hours or 72 hours. Fertility of mated females was quantified as a proxy for male sperm viability. It was found that all *I. graellsii* males mated 15 minutes after the first sperm translocation used the sperm stored in the seminal vesicle, while the proportion of males repeating sperm translocation increased progressively from 6.7% for the group of males mated after 24 hours to 57.1% for males mated three days after the first translocation. In addition, information was available from field experiments with individuals of the genus *Calopteryx*, which showed that males of this genus also do not repeat sperm translocation less than 24 hours after mating. The fertility of *I. graellsii* females was diminished in cases where the mating males did not perform sperm translocation immediately prior to copulation, suggesting that sperm quality declines over time in *I. graellsii*. Males somehow determine when they can reuse the sperm

stored in the seminal vesicle or when they must discard it and perform a new sperm translocation. The important conclusion of this chapter is that the special anatomical arrangement of male odonates opens up selective pressures aimed at maximising sperm viability through plasticity and variety in sperm translocation behaviour. The third chapter focuses on the comparative study of the survival and behaviour of two populations of *Heteragrion cooki* located in Ecuadorian forest habitats in the locality of Piñas, El Oro region. These populations have been affected in recent years by the felling of riverbank trees. Although the genus *Heteragrion* is one of the most common in South American tropical forests, only 3 of the 46 species described in the genus have been studied by ethologists. The study of their behaviour is important to understand how tropical species are affected by the increasing human-induced deforestation in this region of the planet. For this study, capture, mark-recapture and focal observations of adults were used, similar to the study of *P. zoe* in Mexico. Two distinct stream types in which the target species was present were selected for the study. The first was a stream located next to a teak (*Tectona grandis*) plantation that retains small remnants of forest and riparian vegetation and is right on the border of a nature reserve. As it retains remnants of riparian forest, the environment was shadier in this population. The second stream was located 7.6 km from the first, and was located between crops of sugar cane (*Saccharum officinarum*), pineapples and other agricultural crops, so large areas of the stream were exposed and suffered from high insolation during the central hours of the day. As *H. cooki* is a shade-preferring species, the latter stream is expected to be of lower quality for *H. cooki* individuals. Similar densities of males (but not females) were found in both the less human-affected stream and the sunnier stream. Recapture rates were similar in both populations; higher for males (50%) than for females (20%). Body size was also affected, with individuals in the shady stream being significantly smaller than those in the sunnier stream. Males in the shady stream survived longer than females. Males in the shady stream survived longer than females, while in the sunnier stream daily survival was similar between sexes, but variable over time. Furthermore, in the sunny stream, body size was negatively correlated with survival. The study of *H. cooki* breeding behaviour revealed a peak of activity between 13:00 pm and 16:00 pm. Males arrived earlier than females at the stream and defended small patches of territory in the stream, exhibiting high territory fidelity and aggressive behaviour towards other males of the same species. Copulation duration is around 6 minutes and oviposition takes place in tandem male and female on roots and vines, and lasts an average of 45 minutes. Despite the loss of riparian vegetation in the sunniest population, similar densities of *H. cooki* individuals are maintained, probably due to small remnants of native forest found near the stream that may act as refuges for these individuals. The fourth chapter studies the function of an anatomical structure present in females of several odonate species, the vulvar spine. The European zygopteran *Enallagma cyathigerum* was selected as the target species for this chapter. The females of this species, like

many others within the family Coenagrionidae, possess a vulvar spine on the eighth abdominal segment, the function of which is unknown. This chapter tests three possible hypotheses to explain the presence of the vulvar spine: the first is that the vulvar spine serves as a structure to facilitate endophytic oviposition; the second hypothesis is that the vulvar spine is used by females as an organ to stimulate males to release sperm; and the third and final hypothesis is that the vulvar spine has evolved as part of male-female sexual conflict, to inflict damage on the male and shorten the duration of copulation. To test these hypotheses, a series of experiments were carried out using a colony of *E. cyathigerum* individuals captured in the field and subsequently maintained in the laboratory. To test whether the vulvar spine of the female is used to inflict damage on the male during copulation, 12 mature males were randomly selected. Four of these males copulated only once, 4 were allowed to copulate twice on consecutive days and the remaining 4 males were allowed to copulate 3 times, also on consecutive days. To examine whether the vulvar spine caused any effect on male survival, females were separated into two groups, one group where the vulvar spine was severed with dissecting scissors, and another group where the vulvar spine was left intact. Finally, to test whether the vulvar spine facilitates endophytic oviposition, females from the previous experiment (with and without vulvar spine) were placed inside glass jars with moist filter paper as artificial oviposition substrate. Each female was allowed to lay eggs for 15-20 minutes, a total of two times on different days. During oviposition, each time the female stopped laying, the timer was stopped. With these clutches we can also test whether the vulvar spine has a role as a stimulatory organ for the males (causing them to transfer more sperm or sperm-associated nutritional fluids), since in that case we would expect an increase in fertility in the case of males mated with spined females. The results of the experiments conducted did not support any of the hypotheses proposed for the existence of the vulvar spine, however, scanning electron microscopy analysis of the seminal vesicle of *E. cyathigerum* males showed a series of fold-like structures in their seminal vesicle, which were more or less pronounced depending on the degree of maturation of the male and which seem to correlate with the number of matings. Structures similar to these folds were found in other odonate species whose females have a vulvar spine, but were not observed in species whose females do not have a vulvar spine. In light folds may have evolved as a counter-adaptation to copulatory injury inflicted by females. Further research focusing on comparative morphological analyses of the size and shape of the vulvar spine and seminal vesicle folds is needed and should be correlated in case these structures evolved as a result of sexual conflict between males and females. If this hypothesis is proven, it would be the first case within this group of insects. In the last chapter, a review of the scientific literature was carried out to examine the variation in sperm translocation behaviour in the order Odonata and the evolutionary implications of this variation. In the second chapter, some of the important implications of this behaviour are already mentioned, but only one variant of this behaviour is



considered. In this chapter, information about sperm translocation in 176 species of Odonata is presented and the existence of a wide variety of sperm translocation types is highlighted. The variant of translocation performed once per mating and after tandem formation is the most common (66%), but other variants were found: sperm translocation with a previous genital touch (10%), sperm translocation performed by the male alone before tandem (16%) or after copulation (5%) and repeated translocation during the same copulation (3%). The information obtained from the literature review was used to investigate the evolution of this behaviour within the group through a comparative phylogenetic study. From this study it is possible to elucidate from which evolutionary scenarios the different variants of sperm translocation observed in odonates today originated. Thus, pre-copulation genital contact may have evolved to detect female receptivity; pre-tandem and solo male translocation may be favoured when mating opportunities are scarce and copulations are brief, while post-mating sperm translocation may be favoured in cases where males need to be ready to mate quickly. The possible origin of the characteristic mating behaviour of odonates, the so-called "copulatory wheel" and its relation to sperm translocation behaviour, is discussed. It is suggested that the most plausible scenario for the evolution of sperm translocation behaviour could be one in which odonate ancestors produced a spermatophore and attached it to the body. This would lead to the evolution of a secondary genitalia in males and thus to the formation of the "copulatory wheel". This chapter emphasises the role of behavioural diversity in understanding the evolution of both physical and behavioural traits associated with reproduction. Throughout the different chapters of this thesis, I have been able to demonstrate the importance of the study of animal behaviour and the implications of behavioural diversity or etodiversity for the conservation and study of biodiversity. It confirms the need for more integrative studies that bring together taxonomy, ecology, behaviour and molecular biology in order to establish more effective protocols to avoid species extinctions and thus contribute to the maintenance of biodiversity. I would like the general public reader, at the end of this thesis, to have realised the importance of the ecological processes occurring in our environment and how they affect us. I would also like all of us who are dedicated to basic science, evolutionary ecology and more specifically to ethology, to be aware of the potential that the study of animal behaviour has as a tool for empathising with the general public and transmitting knowledge of evolutionary ecology. In the case of the reader more closely linked to the area of research in evolutionary ecology, I would like them to begin to include the study of behaviour in their projects, in order to establish more complete conclusions, since, as has been seen throughout this thesis, the etodiversity or diversity of behaviour has a notable influence on the adaptation and evolution of species." (Author/DeepL)] Address: Rivas-Torres, Anaïs, ECOEVO Lab, Depto Ecología e Biología Animal, Univ. Vigo, Pontevedra, Galiza, Spain

**19240.** Sabagh, L.T.; Piccoli, G.C.; Viana, L.A.; Rocha, C.F.D. (2020): Predation and parasitism on bromeligenous

Snouted Treefrogs (*Oloolygon* spp.). *Herpetology Notes* 13: 271-279. (in English) ["Among the hypotheses as an advantage for the use of bromeliads by frogs both as refuge and breeding site, is that these plants would constitute a "safe place" and/or a "predator-free environment". Here we present some new records of antagonistic interactions involving bromeligenous Snouted Treefrog species of the genus *Oloolygon* in a coastal Brazilian Rainforest. We report records of predation on *Oloolygon* spp. tadpoles by damselfly larvae (*Leptagrion*) and by the spider *Corinna demersa*, and also predation on adults of the frog by a snake (*Bothrops jararaca*) and spiders. We also report the occurrence of parasitism of *O. perpusilla* adults by ticks (*Ornithodoros* sp.) and the register of a protozoan parasite (*Isospora cruzi*) in *O. littorea* faeces. We conclude that aside from the advantages for bromeligenous treefrogs to live in the bromeliads, living inside these plants does not result in a habitat free of predation and parasitism. Just as bromeligenous frogs evolved in association with bromeliads, so can other groups like predators and parasites. We still need consistent data on both predation and parasitism to better allow to infer to what extent bromeliads habitats are or not more or less safe for bromeligenous and/or bromeliculous amphibians." (Authors)] Address: Sabagh, L.T., Depto Ecol., Univ. Federal do Rio de Janeiro, Avenida Carlos Chagas 373, Prédio CCS – Bloco A, Sala A1-08, Rio de Janeiro, Rio de Janeiro 21941-902, Brazil. E-mail: leandro.sabagh@gmail.com

**19241.** Sarremejane, R.; Cid, N.; Stubbington, R.; Datry, T.; Alp, M.; Cañedo-Argüelles, M.; Cordero-Rivera, A.; Csabai, Z.; Gutiérrez-Cánovas, C.; Heino, J.; Forcellini, M.; Millán, A.; Paillex, A.; Paril, P.; Polášek, M.; Tierno de Figueroa, J.M.; Usseglio-Polatera, P.; Zamora-Muñoz, C.; Bonada, N. (2020): DISPERSE, a trait database to assess the dispersal potential of European aquatic macroinvertebrates. *Scientific Data* 7:386: 9 pp.- (in English) ["Dispersal is an essential process in population and community dynamics, but is difficult to measure in the field. In freshwater ecosystems, information on biological traits related to organisms' morphology, life history and behaviour provides useful dispersal proxies, but information remains scattered or unpublished for many taxa. We compiled information on multiple dispersal-related biological traits of European aquatic macroinvertebrates [including Odonata] in a unique resource, the DISPERSE database. DISPERSE includes nine dispersal-related traits subdivided into 39 trait categories for 480 taxa, including Annelida, Mollusca, Platyhelminthes, and Arthropoda such as Crustacea and Insecta, generally at the genus level. Information within DISPERSE can be used to address fundamental research questions in metapopulation ecology, metacommunity ecology, macroecology and evolutionary ecology. Information on dispersal proxies can be applied to improve predictions of ecological responses to global change, and to inform improvements to biomonitoring, conservation and management strategies. The diverse sources used in DISPERSE complement existing trait databases by providing new information on dispersal traits, most of which would not otherwise be accessible to the scientific community." (Authors)] Address: Sarremejane, R., School of Science &

Technology, Nottingham Trent University, Nottingham, NG11 8NS, UK. E-mail: romain.sarremejane@gmail.com

**19242.** Schlemmer Brasil, L.; Luiza-Andrade, A.; Calvão, L.B.; Dias-Silva, K.; Justino Faria, A.P.; Shimano, Y.; Oliveira-Junior, J.M.B.; Cardoso, M.N.; Juen, L. (2020): Aquatic insects and their environmental predictors: a scientometric study focused on environmental monitoring in lotic environmental. *Environmental Monitoring and Assessment* volume 192, Article number: 194 (2020): (in English) ["Since early studies about aquatic ecology, it has been found that changes in environmental conditions alter aquatic insect communities. Based on this, the combined study of environmental conditions and aquatic insect communities has become an important tool to monitor and manage freshwater systems. However, there is no consensus about which environmental predictors and facets of diversity are more useful for environmental monitoring. The objective of this work was to conduct a scientometric analysis to identify the main environmental predictors and biological groups used to monitor and manage lotic freshwater systems. We conducted a scientometric study on the Web of Science platform using the following words: stream, river, aquatic insect, Ephemeroptera, Plecoptera, Trichoptera, Odonata, Heteroptera, Chironomidae, bioindicator, environmental change, anthropic, and land use. Although most of the environmental predictors employed are local, intrinsic of freshwater systems using local environmental and associated landscape variables is a better strategy to predict aquatic insect communities. The facets of diversity most used are composition and richness of species and genera, which are not efficient at measuring the loss of ecosystem services and extinction of phylogenetic lineages. Although very important, these functional and phylogenetic facets are poorly explored for this purpose. Even though tropical regions are the most diverse globally and are experiencing major losses of native vegetation, these ecosystems are the least studied, a knowledge gap that needs addressing to better understand the effect of anthropogenic activities on the diversity of aquatic insects." (Authors)] Address: Brasil, L.S., Programa de Pós-Graduação em Zoologia, UFPA/MPEG, Inst. de Ciências Biológicas, Univ. Federal do Pará, Rua Augusto Corrêa, N° 1, Bairro Guamá, Belém, Pará, CEP 66075-110, Brazil

**19243.** Schneider, T.; Ikemeyer, D.; Dumont, H.J. (2020): Additions to the Odonata of Sudan and a revised checklist (Insecta: Odonata). *Entomologische Zeitschrift* 130(1): 23-28. (in English, with German summary) ["Sudan have been less well studied than those of most other African countries. The list of recorded species from Sudan based on a recent reference book for Eastern Africa (Dijkstra & Clausnitzer 2014) and two recent Sudanese papers (Elfaki 2015, Elfaki & Allam 2017) is only 56. During our short field trip to Sudan in 2019 (10 days in the field) 35 Odonata species were found. Nine of these are new for Sudan, increasing the total number of Sudanese Odonata to 65. The following Odonata are new species for Sudan: *Lestes tridens*, *Agriocnemis sania*, *Agriocnemis zerafica*, *Ceriagrion suave*, *Azuragrion nigridorsum*, *Paragomphus cognatus*, *Phyllomacromia*

*contumax*, *Acisoma inflatum* and *Aethriamanta rezia*. Thus, the true dragonfly fauna of Sudan is surely much richer, especially in the south, but this part of the country remains to be investigated." (Authors)] Address: Schneider, T., Arnold-Knoblach-Ring 76, 14109 Berlin-Wannsee, Germany. E-Mail: thomas.rs@gmx.de

**19244.** Seidu, I.; Saphianu, B.; Kusi Manu, M.; Amaning Kwarteng, D. (2020): Contribution to the knowledge of Odonata fauna of the Atewa Range Forest Reserve, Bobiri Forest Reserve, Owabi Wildlife Sanctuary and Ankasa Forest Reserve (southern Ghana). *International Dragonfly Fund Report* 143: 1-20. (in English) ["Using a qualitative sampling approach to survey for Odonata along water systems inside and outside of four major protected areas in Southern Ghana (viz: Atewa Range Forest Reserve, Ankasa Forest Reserve, Owabi Wildlife Sanctuary and Bobiri Forest Reserve), a total of 66 Odonata species in seven families encompassing 28 Zygoptera and 38 Anisoptera were recorded. Libellulidae (n= 36) exhibited the highest number of species, followed by Coenagrionidae (n= 10), and Calopterygidae (n= 5). In considering the observed number of species exhibited by each protected area, the Atewa Range Forest Reserve exhibited the highest number of species (n= 51), followed by the Ankasa Forest Reserve (n= 47), the Owabi Wildlife Sanctuary (n= 44) and Bobiri Forest Reserve (n= 43). Disturbance tolerance species dominated in habitats outside the various forest reserves, while forest specialists predominated inside the reserves, indicating the quality of the forest cover therein." (Authors)] Address: Seidu, I., Department of Wildlife & Range Management, Fac. Renewable Natural Resources, Kwame Univ. of Science & Tech., Kumasi, Ghana. E-mail: antwiseidu88@gmail.com

**19245.** Sharma, M.; Oli, B.R. (2020): Ectoparasites of dragonflies and damselflies in central Nepal. *Global Science Journal* 8(1): 2608-2614. (in English) ["Water mites as ectoparasites on odonata documented in this paper is first report of Nepal. this paper deals with parasitic association with odonata at Pravash local ponds and ponds of Ramgram Stupa observed during 2018 and 2019 respectively. We recorded 101 mites from 16 individuals of odonata. Both dragonflies (*Brachythemis contaminata*, *Crocothemis servilia*, *Orthetrum sabina*, *Trithemis pallidinervis*) and damselflies (*Ischnura aurora*, *Agriocnemis pygmaea*, *Ceriagrion falax*, *Ceriagrion coromandellianum*) were parasitized by *Arrenurus* spp. Maximum (23 mites) were reported from female *C. servilia*. The mites of three colours, orange, dark green and black were attached to the different sites of the thorax and abdomen. Mites were attached in scattered form except on male *C. servilia*, arranged in inverted V-shaped on ventral side of thorax and cluster form on thorax of *Agriocnemis pygmaea*. Mostly female odonates (11 individuals by 71 mites) were infested by mites than male (5 individual by 30 mites)." (Authors)] Address: Sharma, M., Central Dept of Zoology, Kirtipur, Kathmandu, Nepal; Email:munu.nepal50@gmail.com

**19246.** Sharma, S.; Shera, P.S.; Sangha, K.S. (2020): Species composition of parasitoids and predators in two rice

agro-farming systems—effect of ecological intensification. *International Journal of Tropical Insect Science* 40: 233-238. (in English) ["Ecological intensification through organic farming is known to have an influence on plant communities and diversity of insects associated with them. The comparative abundance of natural enemies was studied in organically as well as conventionally (chemical control) grown aromatic rice at farmer's field during 2015–2016 and 2016–2017. Different life stages, i.e., egg, larvae and pupae of rice stem borer, and leaf folder, were collected and brought to the laboratory to record natural parasitism in both organic and conventional fields. The population of predators was recorded through sweep nets. The population of spiders was recorded using pitfall traps and sweep net. A total of nine parasitoid species including 3 egg parasitoids (*T. chilonis*, *T. japonicum*, and *Telenomus* sp.), 3 larval parasitoids (*Stenobracon nicevillei*, *Bracon* sp., and *Cotesia* sp.), and 3 pupal parasitoids (*Tetrastichus* sp., *Brachymeria* sp., and *Xanthopimpla* sp.) were recorded. However, the natural parasitism by these parasitoids was significantly higher in organic than conventional rice. Similarly, the population of predators like spiders, *Pantala flavescens*, and *Agriocnemis femina* was significantly higher in organic fields than in conventional fields. The study highlights the significance of conservation of these natural enemies for a sustainable system of rice insect pest management." (Authors)] Address: Sharma, S., Dept of Entomology, Punjab Agricultural University, Ludhiana, India. Email: sudendhu@pau.edu

**19247.** Shende, B.; Masram, S. (2020): Histological and histochemical changes in oocytes during oogenesis in *Orthetrum sabina* (Drury 1770) (Anisoptera: Libellulidae). *Journal of Entomology and Zoology Studies* 8(2): 275-281. (in English) ["This study presents the oocyte development of *O. sabina* with the dynamics of histology and histochemistry. The ovary is panoistic type which contain many ovariole. Ovariole contain terminal filament, germarium, vitellarium. Five stages of oocytes were identified based on nature of cytoplasm, presence of germ vesicle, yolk granules and chorion. Spherical oval shaped oocyte I gradually increases in size and attained elliptical shaped oocyte V. Germinal vesicle is conspicuous in oocyte I and II but shifted towards one pole in oocyte III and completely disappear in oocyte IV. Chorion around plasma membrane manifested in oocyte IV. Proteins and carbohydrates entered in ooplasm from early stage while lipid appear late during oocyte development. Proteins, carbohydrates and lipid were demonstrated in oocytes by mercury bromophenol blue method, periodic acid Schiff method and Sudan black B method respectively." (Authors)] Address: Shende, B., PGTD of Zoology, Mahatma Jyotiba Phule Educational Campus RTM Nagpur University, Nagpur, Maharashtra, India

**19248.** Shumway, N.; Gabryszuk, M.; Laurence, S. (2020): The impact of dragonfly wing deformations on aerodynamic performance during forward flight. *Bioinspiration & Biomimetics* 15(2):026005: (in English) ["Bulk wing kinematics and wing deformations of free-flying dragonflies of the species *Pachydiplax longipennis* were measured in a controlled

environment. Both upright and inverted straight flights were recorded and analyzed. The inverted dragonflies exhibited similar bulk kinematics to the upright specimens in the global frame, but wing deformations were generally consistent in the body-relative frame. The deformations primarily comprised camber during the body-relative downstroke and twist during the body-relative upstroke. Based on these data, models were developed to incorporate the measured kinematics and deformations into computational fluid dynamics simulations. Both isolated and tandem wings were simulated (rigid and deforming in each case), allowing the effects of deformations and wing-wing interactions to be examined independently. During the upstroke the addition of deformation reduced flow separation on the outboard sections of the wing, whereas the impact of the deformation during the downstroke was found to be dependent on the wing kinematics. The simulations of tandem wings indicated that they produce more force than isolated wings, but the wing deformations reduced the impact of this wing-wing interaction. The changes in average lift and thrust induced by the wing deformations were relatively minor and dependent on the flight orientation, but the aerodynamic efficiency of the deforming wings was significantly higher than that of the rigid wings for all examined cases, including the inverted flights for which the deformations were in the opposite (global) sense to the upright flights." (Authors)] Address: Shumway, N., Dept Aerospace Engineering, Univ. of Maryland, College Park, MD, United States of America. Email: shumwanm@umd.edu

**19249.** Siepielski, A.M.; Hasik, A.Z.; Ping, T.; Serrano, M.; Strayhorn, K.; Tye, S.P. (2020): Predators weaken prey intraspecific competition through phenotypic selection. *Ecological Letters* 23(6): 951-961. (in English) ["Predators have a key role shaping competitor dynamics in food webs. Perhaps the most obvious way this occurs is when predators reduce competitor densities. However, consumption could also generate phenotypic selection on prey that determines the strength of competition, thus coupling consumptive and trait-based effects of predators. In a mesocosm experiment simulating fish predation on damselflies [*Enallagma signatum*], we found that selection against high damselfly activity rates – a phenotype mediating predation and competition – weakened the strength of density dependence in damselfly growth rates. A field experiment corroborated this finding and showed that increasing damselfly densities in lakes with high fish densities had limited effects on damselfly growth rates but generated a precipitous growth rate decline where fish densities were lower – a pattern expected because of spatial variation in selection imposed by predation. These results suggest that accounting for both consumption and selection is necessary to determine how predators regulate prey competitive interactions." (Authors)] Address: Siepielski, A.M., Dept Biol. Scien., Univ. Arkansas, Fayetteville, AR, 72701 USA. E-mail: amsiepie@uark.edu

**19250.** Smith, L.A.; Lancaster, L.T. (2020): Increased duration of extreme thermal events negatively affects cold acclimation ability in a high-latitude, freshwater ectotherm (*Ischnura elegans*; Odonata: Coenagrionidae). *Eur. J. Entomol.*

117: 93-100. (in English) ["Instances of heat waves and cold snaps are becoming more frequent and of increasing duration worldwide. It is well established that short exposure to high or low-temperatures, such as during extreme weather events, often results in adaptive (acclimation/hardening) or maladaptive plastic changes in tolerance of organisms to subsequent thermal stressors. However, little information is available about how the duration of a prior stressful thermal event mediates future organismal thermal responses. Understanding durational effects of thermal conditioning can help predict ectothermic survival in response to novel extreme weather patterns. We assessed the effect of stressful temperature duration on tolerance to subsequent cold exposure in a widespread freshwater invertebrate species in Britain. Following a week-long acclimation period at 15°C, wild-caught *Ischnura elegans* larvae were held at stressful thermal extreme (2°C or 30°C) temperatures for varying durations designed to mimic a range of extreme to plausible durations of heat waves or cold snaps in the wild (30 min, 2 h, or 24 h). After a period of re-equilibration to ambient temperatures (15°C), we then experimentally assessed CT<sub>min</sub>, the temperature which renders an individual unresponsive, as an index of cold tolerance. Prior exposure to 2°C, simulating a cold snap, improved future cold tolerance, but only when individuals experienced very brief prior exposures to these conditions (30 min up to 2 h), and this benefit was lost following 24 h prior exposure. Prior exposure to 30°C, simulating a heat wave, consistently worsened the subsequent cold tolerance of individuals, with the detrimental effect of prior heat exposure increasing linearly as a function of duration. The research indicates that cold snaps can provide beneficial hardening effects against future cold exposures, but only when these (priming) extreme weather events are of very short duration (here, 30 min or 2 h). Longer durations of exposure to either extreme heat or cold weather events can reduce the ability of individuals to beneficially react to subsequent cold stresses, and may have deleterious effects on future thermal tolerance. The results suggest that increasing durations of extreme temperature events will reduce cold hardening ability of freshwater invertebrates, and that the duration of extreme weather events, or durational changes in freshwater thermal regimes resulting from changes in snowmelt dynamics, is an important parameter to consider when studying organismal responses to climate change." (Authors)] Address: Smith, Lesley, Institute of Biological and Environmental Sciences, The University of Aberdeen, Zoology Building Tillydrone Ave, Aberdeen, AB24 2TZ, UK. E-mail: lesley.smith.13@aberdeen.ac.uk

**19251.** Start, D. (2020): Phenotypic plasticity and community composition interactively shape trophic interactions. *Oikos* 129(8): 1163-1173. (in English) [Epitheca Anax "Trait variation defines and underpins biodiversity, yet we are only beginning to understand how processes acting across biological scales (individuals to whole communities) interact to produce trait differences and their consequences, particularly over short time scales. First, species often differ widely in their mean phenotype, meaning that changes in community composition can alter average trait values of a guild.

Second, phenotypic plasticity alters the trait values of individuals, and the net effect of plasticity can also shift the average trait values of a specific species or of whole communities. However, community assembly, phenotypic plasticity, and their effects on biological patterns are not independent. The expression of phenotypic plasticity tends to be species-specific, meaning that differences in species' relative abundances will shape trait change and resulting ecological patterns and processes. I test this idea using mesocosms and simulations of communities of dragonfly larvae that differ in activity rate. Some but not all species reduced their activity rate in response to predation risk, causing larger trait-mediated changes in trophic interactions in experimental communities dominated by plastic versus astatic species. Using surveys and simulations of natural ponds, I demonstrate that community composition will shape patterns of phenotypic plasticity, with likely consequences for ecological dynamics in the wild. The interactive effects of trait differences across scales of biological organization necessitates an integrated view of diverse biological processes, including plasticity and community assembly, in order to understand ecological interactions." (Author)] Address: Start, D., Center for Population Biology, Univ. of California Davis, 1 Shields Avenue, Davis, CA, 95616 USA. Email: denon.start@utoronto.ca

**19252.** Sushko, G. (2020): Spatial variation in assemblages of Odonata (Insecta) within habitat gradients in large, pristine peat bogs in Belarus. *Biologia* 76: 575-583. (in English) ["The variation in environmental conditions in peat bogs can be expressed by odonate assemblage composition among habitats or by differences in species richness, abundance and diversity among study sites in a regional context. The adult Odonata of large, pristine peat bogs in Belarus were examined. Adult Odonata were counted along fixed transects in main peat bog habitats under favorable weather conditions. The odonate diversity showed clear differences, affected by distance to the water body, wind speed, and bog water level. The highest diversity was recorded along lakeshores. This study detected distinct odonate assemblage variations among habitats such as lagg zones, lakeshores and hollows. The large areas occupied by pine bogs and open bogs had a very similar species composition and lower diversity. On the other hand, the Shannon diversity index ( $H' = 1.433-2.295$ ) and Pielou's evenness index ( $J' = 0.468-0.507$ ) values were relatively high compared to those of terrestrial insects. The main differences among adult odonate assemblages were driven by cold-adapted, highly specialized species such as *Leucorrhinia albifrons*, *Leucorrhinia dubia*, *Sympetrum danae* and two abundant generalist species such as *Sympetrum sanguineum* and *Sympetrum vulgatum*. Peat bog specialists are among the most rapidly declining insects and, therefore, relatively intact Belarusian peat bogs are refuges for many threatened species and have considerable conservation potential." (Author)] Address: Sushko, G., Department of Ecology and Environmental Protection, Vitebsk State University P.M. Masherov, Moscovski Ave. 33, 21005, Vitebsk, Belarus



**19253.** Trapero-Quintana, A.; Torres-Cambas, Y.; Rivas-Torres, A.; Ferreira, S.; Cordero-Rivera, A. (2020): The Odonata of Zapata peninsula (Matanzas, Cuba), the largest wetland system of the Caribbean. *Odonatologica* 49(1/2): 15-28. (in English) ["This study describes the fauna of odonates of nine localities in the Zapata peninsula in the Southwest of Cuba, sampled in June 2017, January 2018, and September 2019. We failed to find *Enallagma trunctatum*, an endemic species of the area, even though we visited the type locality, Zarabanda, in June and January. We found 37 species in 25 genera and five families, including the first records of 11 taxa for the area: *Lestes forclicula*, *L. tenuatus*, *Leptobasis candelaria*, *Neoneura maria*, *Aphylla caraiba*, *Celithemis eponina*, *Crocothemis servilia*, *Erythemis plebeja*, *Erythrodiplax berenice naeva*, *Perithemis domitia* and *Tramea onusta*. A dichotomous key for the separation of the four species of females of Cuban *Lestes* is given." (Authors)] Address: Trapero-Quintana, A., Departamento de Biología Animal y Humana, Facultad de Biología, Universidad de La Habana, Cuba

**19254.** Trudelle, L.; Witté, I.; Happe, D.; Antonetti, P.; Lemarchand, C.; Lolive, N.; Gigot, G. (2020): Priorités de conservation des espèces en Auvergne: l'apport des Listes rouges régionales. *Naturae* 2020 (1): 1-29. (in French, with English summary) ["Species conservation priorities in Auvergne: the contribution of Subnational Red Lists Using subnational Red Lists from the former Auvergne region and available occurrence data, multigroup cross-analyses were carried out to provide a synthesis of the conservation status of species of Auvergne and to illustrate the main trends as well as the main issues for local biodiversity. The results show there are a large number of threatened and near threatened species, including more than half of amphibians, bryophytes and birds. The highest proportions of unknown species concern certain vertebrates (amphibians and mammals) and flora. There is a lack of public policy framework or regulatory statutes for more than 170 species listed under the 'Data Deficient' category and for as many endangered species. There is also strong geographic variation in the distribution of declining species and species 'Data Deficient' that focus on the Allier River axis and the mountain ranges. Moreover, there is a marked endemism in the area of the Dore Mountains, the Cantal Mountains and the Mezenc Massif. In the context of regional conservation strategies and knowledge priorities, special attention should be paid to the endemic species of Auvergne currently threatened and a series of remarkable species among vascular flora. Although other factors exist, the main threats are related to the deterioration of habitats. The development of subnational Red Lists, a decision-making tool, must be maintained in order to continue monitoring and conservation of the regional biodiversity." (Authors)] Address: Trudelle, Laurène, UMS Patrimoine naturel (« PatriNat »), AFB, CNRS, MNHN, 57 rue Cuvier, boîte postale 41, F-75231 Paris cedex 05, France. Email: laurene.trudelle@gmail.com

**19255.** Tseng, H.-Y.; Chien, C.-Y.; Chen, C.-H.; Chen, R.-Y.; Yang, H. (2020): Dragonfly-wing-inspired inclined irregular

conical structures for broadband omnidirectional antireflection coatings. *ACS Appl. Nano Mater.* 2020, 12, 9: 10883-10892. (in English) ["Orthetrum triangulare wings behave high transparency for wide viewing angles. The broadband omnidirectional antireflection behaviors result from randomly arrangement of inclined irregular conical structures on the surface of blue-tailed forest hawk dragonfly wings. In this study, a scalable colloidal lithography technique is developed for engineering antireflection coatings that biomimic blue-tailed forest hawk dragonfly wing structures. Spin-coated randomly packed silica colloids serve as structural templates for patterning subwavelength inclined conical structures on substrates directly. The dragonfly-wing-inspired structures feature omnidirectional antireflection performance over the whole visible spectral range, and generate superhydrophobic property by surface functionalization. The dependence of the inclination and height of conical structures on the antireflection performance and self-cleaning property is also systemically studied in this research." (Authors)] Address: Tseng, H.-Y., Department of Chemical Engineering, National Chung Hsing University, 145 Xingda Road, Taichung City 40227, Taiwan

**19256.** Tseng, H.-Y.; Chen, Y.-H.; Chen, R.-Y.; Yang, H. (2020): Reversibly erasable broadband omnidirectional antireflection coatings inspired by inclined conical structures on Blue-tailed forest hawk dragonfly wings. *ACS Appl. Mater. Interfaces* 12.9: 10883-10892. (in English) ["Blue-tailed forest hawk dragonfly (*Orthetrum triangulare*) wings, covered with inclined conical structures, are studying for their high transparency and low reflectance for large viewing angles. However, limited by existing technologies, the exquisite inclined structures are not replicated easily or applied adequately. Here, we combine a shear-induced self-assembly approach and a colloidal lithography technology to create omnidirectional antireflection structures that inspired by dragonfly wings. Non-close-packed colloid crystals are spin-coated and serve as structural templates in a plasma etching procedure to pattern subwavelength inclined conical structures directly on shape memory polymer-coated substrates. The dependence of the antireflection functionality on the shape and inclination of conical structures is systematically investigated in this research. Compared with a featureless substrate, the structure-covered substrate can display a approximately 8% higher average transmittance in the visible wavelength range at normal incidence and even approximately 23% higher average transmittance as the incident angle increases to 75°. Moreover, the reconfigurable structures composed of shape memory polymers can be repeatedly deformed and recovered as a result of external stimuli at ambient conditions, and the corresponding broadband omnidirectional antireflection functionality is therefore reversibly erased and restored." (Authors)] Address: Tseng, H.-Y., Dept of Chemical Engineering, Nat. Chung Hsing Univ., 145 Xingda Rd, Taichung City 40227, Taiwan

**19257.** Tüzün, N.; Stoks, R. (2020): Lower bioenergetic costs but similar immune responsiveness under a heat wave in urban compared to rural damselflies. *Evolutionary*

Applications 14(1): 24-35. (in English) ["There is mounting evidence that the widespread phenotypic changes in response to urbanization may reflect adaptations caused by rapid evolutionary processes driven by urban-related stressors. Compared to increased habitat fragmentation and pollution, adaptations towards another typical urban-related stressor, i.e. higher and longer lasting very high temperatures (heat waves), are much less studied. Notably, the sensitivities to heat waves of life history traits and important fitness-related physiological traits such as immune responsiveness and bioenergetic variables (energy availability, energy consumption, and their balance) have never been contrasted between urban and rural populations. By conducting a laboratory common-garden experiment, we compared effects of a simulated heat wave on life history (survival and growth rate), immune responsiveness, and bioenergetic variables between three urban and three rural populations of *Coenagrion puella*. Because energy-mediated trade-off patterns may only be detected under energetically costly manipulations, all larvae were immune-challenged by simulating ectoparasitism by water mites. As expected, the simulated heat wave caused negative effects on nearly all response variables. The immune responsiveness, on the other hand, increased under the heat wave, consistent with a trade-off pattern between immune function and growth, and this similarly between urban and rural populations. A key finding was that urban larvae suffered less from the simulated heat wave compared to the rural larvae in terms of a lower heat wave-induced depletion in energy availability. This suggests an adaptation of urban populations to better cope with the stronger and more frequent heat waves in cities. Notably, this urbanization-driven evolution in the bioenergetic variables was not apparent in the absence of a heat wave. Given that changes in energy budgets have strong fitness consequences, our findings suggest that the evolved higher ability to cope with heat waves is fundamental for the survival of urban damselfly populations." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**19258.** Tye, S.P.; Blaske, B.K.; Siepielski, A.M. (2020): Population-level variation of digestive physiology costs of mounting an immune response in damselflies. *Ecological Entomology* 45(3): 635-643. (in English) ["1. Trade-offs are often predicted to occur between energetically costly activities, such as somatic growth and eliciting immune responses to parasites. Although parasitism frequently reduces growth via lowered consumption, it remains unclear if the energetic demands of generating immune responses also affect the digestive physiological processes necessary for growth. Moreover, as local environmental conditions affect energetic investment towards growth and immune responses, the extent of any digestive-immune response trade-offs may vary among populations and not be fixed at the species-level. 2. To test these ideas, melanisation – a general innate immune response – was first induced in damselfly larvae (*Enallagma vesperum*) from two populations. The

study then quantified growth and consumption rates, assimilation and production efficiencies, and daily metabolic rates to determine if digestive-immune response trade-offs were present and, if so, whether they differed between populations. 3. There was no evidence of any trade-offs between immune responses and digestive physiology components in either population. However, the results did show that populations differentially allocated energy towards different digestive physiology components after an immune response was elicited: one population increased their relative consumption and daily metabolic rates, while the other population had lower assimilation efficiencies and consumption rates. 4. Although researchers lack a mechanistic understanding of the observed population-level differences, these results suggest that accounting for population-level variation in digestive physiology and immune responses is critical to inferences about how immunological defences to parasitism may affect the ability for organisms to both acquire and utilise resources." (Authors)] Address: Tye, S.P., Dept of Biological Sciences, University of Arkansas, Fayetteville, Arkansas, USA. E-mail: simontye@uark.edu

**19259.** Vaikre, M.; Remm, L.; Rannap, R. (2020): Forest ditch maintenance impoverishes the fauna of aquatic invertebrates: Opportunities for mitigation. *Journal of Environmental Management* 274, 15 November 2020, 111188: 9 pp. (in English) ["Highlights: • Ditch network maintenance (DNM) regularly disturbs local communities in ditches. • One of the first studies evaluating the effect of DNM on macroinvertebrates. • Mitigation pools were constructed in conjunction with DNM. • DNM reduces habitat availability, abundance and diversity of aquatic invertebrates. • Mitigation pools add new native species but do not replace natural forest pools. Abstract: One of the main factors causing biodiversity loss in wetlands is drainage, nevertheless, even drained areas may provide habitat for aquatic fauna in the form of drainage ditches. Assemblages in ditches are regularly disturbed by ditch maintenance, but the extent of these disturbances and mitigation possibilities are poorly documented. We conducted an experimental study in three commercially managed forest plots in eastern Estonia, aiming to find out how ditch network maintenance (DNM) affects the diversity and assemblages of aquatic macroinvertebrates in ditches and remnant pools, and whether this effect can be alleviated by constructing mitigation waterbodies. For comparison we also collected data from natural pools in three undrained forest plots. Before DNM, ditches supported greater number of higher taxa compared to remnant and natural pools and more strictly aquatic taxa, whereas natural pools in undrained plots supported more Trichoptera shredders. After DNM, the diversity in remnant pools decreased. Moreover, majority of the pools dried out, which resulted in further reduction of the richness and abundance of macroinvertebrates. In ditches the diversity dropped immediately after DNM, but recovered in two to three years. Nevertheless, plot-scale richness and abundance did not completely recover. Assemblage shift in ditches took place right after DNM and remained distinct after the four year survey pe-

riod. Mitigation pools provided habitat for several taxa (especially Odonata) uncommon in other waterbodies in drained and undrained plots. Our results show that DNM in forests substantially impoverishes habitat availability and reduces the abundance and diversity of aquatic macroinvertebrates. We recommend retaining uncleaned sections in ditches and constructing mitigation pools as tools for supporting wetland biodiversity in drained forests." (Authors)] Address: Vaikre, Maarja, Institute of Ecology and Earth Sciences, University of Tartu, Vanemuise 46, EE-51014, Tartu, Estonia. E-mail: vaikre@ut.ee

**19260.** Vallat, A.; Monnerat, C.; Tschanz-Godio, S.; Juillerat, L. (2020): Retablisement des communautés de libellules (Odonata) dans les tourbières du Jura neuchâtelois (Suisse). *Alpine Entomology* 4: 99-116. (in French, with English summary) ["Restoration of dragonfly communities (Odonata) in the peatlands of the Jura Mountains of Neuchâtel (Switzerland). Over the course of the 20th century, the peatlands of the valleys of La Brevine and Les Ponts-de-Martel lost over 90% of their surface area due to the industrial exploitation of peat. Restoration work undertaken between 1996 and 2018 increased the number of bodies of water in these areas from 240 to 341 and their surface area from 1.3 to 10.1 hectares. Odonates have been regularly monitored in several of these wetland areas since 2005. In 2017 and 2018, an intensive monitoring program identified 38 species. Observations made between 1938 and 2018 included a total of 52 species, or over two-thirds of Swiss Odonata fauna. Nine of these species are found on the national Red List. Species strictly associated with peatlands benefitted from restoration measures; their numbers have increased since 2005. *Leucorrhinia pectoralis* is now established in twelve peatlands out of fifteen and *L. albifrons*, one of the rarest dragonflies in Switzerland, currently reproduces in a peatland that was the subject of intensive restoration. Discoveries of *Aeshna subarctica* and *Ceriagrion tenellum* may hint at future colonization of this region by these species. Given such positive results, the canton of Neuchâtel will continue its restoration program for at least the next five years. Only the coordinated management of diverse types of wetland habitats will allow for the survival of the most demanding species." (Authors)] Address: Juillerat, L., Rue du Seu 25, CH-2054 Chezard-St-Martin, Switzerland. E-mail: juillerat.l@bluewin.ch

**19261.** Van Dievel, M.; Janssens, L.; Stoks, R. (2020): Effects of pesticide exposure and predation risk on nutrient cycling and primary production. *Science of The Total Environment* 705, 25 February 2020, 135880: (in English) ["Highlights: • Pesticide and predation risk are omnipresent in aquatic ecosystems. • Predation risk and chlorpyrifos additively shaped body and egesta stoichiometry. • The pesticide chlorpyrifos increased egestion of C, without an impact on algae growth. • Predation risk caused higher egestion of N, resulting in an increased algae growth. • This indicates predation risk can shape primary production via nutrient recycling. Abstract: Understanding how pesticides and natural stressors shape ecosystem functions remains

a major challenge. A largely overlooked way how stressors may affect nutrient cycling and primary production is through effects on body stoichiometry and the egestion of elements. We investigated how exposure to the pesticide chlorpyrifos and to predation risk, an abundant natural stressor in aquatic systems, altered the stoichiometry of the bodies and the egested faecal pellets of *Enallagma cyathigerum* damselfly larvae and how this further cascaded into effects on primary production (algae growth). Chlorpyrifos exposure reduced egestion rates while predation risk had no effect. Chlorpyrifos exposure and predation risk affected both elemental composition of bodies and faecal pellets, and this in an additive way. Chlorpyrifos exposure increased body C(carbon), N(nitrogen), and P(phosphorous) contents, and increased the C content of the faecal pellets. Predation risk induced an increase of the N content, resulting in a decreased C:N ratio, of both the bodies and faecal pellets. The changes in the composition of the faecal pellets caused by predation risk but not by chlorpyrifos exposure increased algae growth under control conditions. This indicated that algae growth was N limited. Our results provide an important proof-of-principle how a stressor may shape nutrient cycling and subsequently primary productivity." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**19262.** Vieira da Silva, C.; Henry, R. (2020): Aquatic macroinvertebrate assemblages associated with two floating macrophyte species of contrasting root systems in a tropical wetland. *Limnology* 21: 107-118. (in English) ["Aquatic macrophytes play an important role in structuring biotic communities. A comparative study of macroinvertebrate community structures associated with *Salvinia auriculata* Aublet and *Eichhornia crassipes* (Mart.) Solms was conducted in a Brazilian wetland (São Paulo State) during two periods. Our working hypothesis is that the aquatic macrophyte with the highest root system biomass and volume (*E. crassipes*) will result in the highest abundance and richness of associated macroinvertebrates. There were significant differences in the taxa richness and density of macroinvertebrates between macrophytes and sampling periods. The density of macroinvertebrates was higher in *S. auriculata* than in *E. crassipes* during both sampling periods, but there was little difference in mean taxa richness. Negative correlations between the macrophyte root biomass and volume and macroinvertebrate density were found. Insecta, Crustacea and Annelida were the most numerous groups of invertebrates sampled during the study, and Diptera (Insecta) dominated in the root systems of both macrophytes. Macroinvertebrates associated with *E. crassipes* roots may have undergone a vertical gradient of decreased oxygen concentration in the water, as well as of the available periphyton biomass, because of the low penetration of light in the region of the root system, which resulted in a lower density of macroinvertebrates." (Authors) Taxa are treated at the order level including Odonata.] Address: Vieira da Silva, Carolina, Institute of Biosciences, São Paulo State University (UNESP), Botucatu, SP, Brazil. E-mail: carollimno@gmail.com

**19263.** Vinko, D.; Kulijer, D.; Zhushi Etemi, F.; Hostnik, M.; Šalamun, A. (2020): The first systematic survey of the dragonfly fauna of Kosovo. *International Dragonfly Fund Report* 147: 1-50. (in English) ["This paper presents the faunistic results of three short field excursions conducted in spring and early summer of 2018 in Kosovo, considering dragonfly fauna one of the most understudied countries of Europe. This study presents first systematic dragonfly research in Kosovo. Within a total of 13 field days between end of April and end of June 2018, 60 sites were surveyed and 44 dragonfly species were found. Significant results include the first documented report of 15 species for Kosovo. New data on several other species with a broader European concern or generally rare on the West Balkan peninsula, i.e. *Coenagrion ornatum*, *Anax ephippiger*, *Caliaeschna microstigma*, *Cordulegaster heros*, *C. bidentata*, *Somatochlora flavomaculata*, and *Sympetrum flaveolum*, are also presented. The overview of all visited sites is included. Altogether, 47 dragonfly species are now reported for Kosovo." (Authors)] Address: Vinko, D., Slovene Dragonfly Society, Verovškova 56, 1000 Ljubljana, Slovenia

**19264.** Wagner, M.D.; Roberts, M.E. (2020): Analysis of Piebald Madtom (*Noturus gladiator*) diet. *Food Webs* 22, March 2020, e00136: (in English) ["The Piebald Madtom, *Noturus gladiator*, is found in tributaries of the Mississippi River from the Obion River in northern Tennessee to the Big Black River in central Mississippi. The species is currently petitioned for listing under the federal Endangered Species Act of 1973, and is of conservation concern in both Mississippi and Tennessee. Yet little is known about the feeding ecology of the species. To this end, diets were extracted from stomachs and intestinal tracts from available formalin-preserved museum specimens (n = 57). These specimens came from the Hatchie River, Wolf River, Yazoo River, and Big Black River of Mississippi or Tennessee. All diet items were identified to the lowest possible taxonomic level, and contribution characterized as percent composition by number, total number of prey items, proportion of diets containing a prey item, frequency of occurrence, and prey-specific abundance. Twenty-one different diet items included larval trichopterans with sand cases, teleost scales, ostracods, and larval odonates (primarily *Macromiidae*). The relationship between prey-specific abundance and frequency of occurrence was described using an Amundsen plot, and revealed that trichopteran larvae and larval odonates are of high importance, and suggesting the species may forages on both sandy substrates and leaf packs." (Authors)] Address: Wagner, M.D., Mississippi Department of Wildlife, Fisheries, and Parks, Mississippi Museum of Natural Science, 2148 Riverside Drive, Jackson, MS 39202-1353, USA. E-mail: Matthew.Wagner@mmns.ms.gov

**19265.** Walia, G.K.; Devi, M. (2020): Cytogenetic data of subfamily Disproneurinae (Odonata: Zygoptera: Platycnemididae) based on localization of C-heterochromatin, Ag-NOR's and AT-GC regions. *International Journal of Entomology Research* 5(2): 70-73. (in English) ["Cytogenetic analyses have been carried on *Disparoneura quadrimaculata*,

*Esme cyaneovittata*, *Esme longistyla*, *Prodasineura nigra* and *Prodasineura verticalis* of subfamily Disproneurinae by conventional staining, C-banding, silver nitrate staining and sequence specific staining. All the species possess n=13 as haploid chromosome number with X0-XX sex determining mechanism, while m chromosomes are present only in the two species of genus *Prodasineura*. Mostly, dark terminal C-bands are present on the autosomal bivalents of all the species, while 3 bivalents in *Disparoneura quadrimaculata* and 4 bivalents in *Esme cyaneovittata* possess light terminal C-bands. X chromosome shows terminal C-band on one side in *Disparoneura quadrimaculata*, while it is C-positive in *Esme cyaneovittata*, *Esme longistyla* and *Prodasineura verticalis*. Whereas in all the species, dark terminal NOR's are seen on the autosomal bivalents, while 1 bivalent of *Prodasineura verticalis* and 3 bivalents of *Disparoneura quadrimaculata* show dark terminal NOR only on one side. X chromosome possesses terminal NOR's in *Disparoneura quadrimaculata* and *Prodasineura verticalis* and it is NOR rich in both the species of genus *Esme*. Whole chromosome complement of *Esme longistyla* possesses both DAPI and CMA3 bright signals, while it is more DAPI bright than CMA3 in *Disparoneura quadrimaculata*, *Esme cyaneovittata* and *Prodasineura verticalis*." (Authors)] Address: Devi, Monika Devi, Dept of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab, India

**19266.** White III, H.B.; Moore, M.C.; White Jr., J.F.; Cheicante, R. (2020): Conservation by minimal intervention: Odonata refuge in Idylwild Wildlife Management Area, Caroline County, Maryland. *Northeastern Naturalist* 27(1): 1-24. (in English) ["Over the past decade, 84 species of Odonata have been found in an area <0.6 km<sup>2</sup> (<0.25 mi<sup>2</sup>) within Idylwild Wildlife Management Area in Caroline County, MD. 18 of these species are species of conservation concern in both Maryland and nearby Delaware. This high level of Odonata diversity exceeds that of any other known location on the Delmarva Peninsula. We attribute this to the presence of a variety of pond, marsh, and bog habitats resulting from the unimpeded natural succession of an abandoned sand- and gravel-mining operation. This site has provided a refuge for locally rare species in a heavily agricultural region where draining of swamps and channelization of streams destroyed otherwise suitable wetland habitats for many now rare and endangered Odonata species. Deliberate planning resulted in the decision not to interfere with the ongoing natural succession in the Idylwild Wildlife Management Area, enabling colonization and persistence of Odonata species of conservation concern." (Authors)] Address: White III, H.B., Dept Chem. & Biochemistry, Univ. Delaware, Newark, DE 19716, USA. E-mail: halwhite@udel.edu.

**19267.** Zhou, Y.; Wang, X.; Zhang, S.; Yang, Z. (2020): Spatio-temporal variations of benthic macroinvertebrates and the driving environmental variables in a shallow lake. *Ecological Indicators* 110, March 2020, 105948: (in English) ["Highlights: •Spatio-temporal variation of a shallow lake benthic community was investigated. •Correlations bet-



ween environmental variables and biotic metrics were determined. •Assemblages of disturbed habitat shifted to be less diverse and more tolerant. •Lestidae and Gammaridae were sensitive indicators for water pollution in the lake. Abstract: Shallow lakes widely distributed in middle and lower reaches of watershed are easily multi-stressed by natural forces and human activities. Here, spatio-temporal variations of macroinvertebrate community and their influential variables in a typical large macrophyte-dominated shallow lake—Baiyangdian Lake were studied, using three-year in-situ observational data of spring, summer, and autumn. In total, ten environmental variables and five biological indices were measured for the six sites from each of the two habitat types, semi-natural habitat and disturbed habitat divided by their different exposures to human activities. Disturbed habitat had deeper mean water depth, lower mean transparency, and higher mean concentrations of DO, TN, NH<sub>4</sub>-N, NO<sub>3</sub>-N, and COD than that of semi-natural habitat regardless of seasons. Biological metrics indicate lower family-level richness but higher community tolerance level in disturbed habitat in spring and summer, but the results were close in autumn. The present of Lestidae and Gammaridae was a significant determination of semi-natural habitat. Redundancy analyses showed community temporal distribution was mainly driven by temperature, water depth, and pH that greatly influenced by natural forces, while spatial distribution was mainly driven by TN and transparency that greatly influenced by human activity. Regarding averaged data over the same year, season, and habitat, richness and Shannon-Weiner index had significant Pearson linear correlation with transparency ( $r = 0.521$  and  $r = 0.541$ ,  $p < 0.05$ , respectively), family biotic index significantly correlated with TP ( $r = 0.495$ ,  $p < 0.05$ ), and NO<sub>3</sub>-N ( $r = 0.592$ ,  $p < 0.01$ ), and percentage of tolerant individuals significantly correlated with pH ( $r = 0.667$ ,  $p < 0.01$ ), temperature ( $r = -0.640$ ,  $p < 0.01$ ) and NO<sub>3</sub>-N ( $r = 0.522$ ,  $p < 0.05$ ). Those variables are likely responsible for the major variations of community characteristics. High concentrations of nitrogen and phosphorus nutrients probably encourage the thriving of tolerate assemblage in the lake. Our results reveal that the macroinvertebrate community can shift to be more monotonous and pollution-tolerant under the stress of eutrophication and organic pollution. Disturbance and pollution, in general, can diminish the benefit of habitat-scale protection in certain location." (Authors)] Address: Yi, Y., State Key Laboratory of Water Environment Simulation, School of Environment, Beijing Normal University, Beijing 100875, China

## 2021

**19268.** Deng, J., Assandri, G.; Chauhan, P.; Futahashi, R.; Galimberti, A.; Hansson, B.; Lancaster, L.T.; Takahashi, Y.; Svensson, E.I.; Duploux, A. (2021): Wolbachia-driven selective sweep in a range expanding insect species. *BMC Ecol Evo* (2021) 21:181: 17 pp. (in English) ["Background: Evolutionary processes can cause strong spatial genetic signatures, such as local loss of genetic diversity, or conflicting histories from mitochondrial versus nuclear markers. Invest-

igating these genetic patterns is important, as they may reveal obscured processes and players. The maternally inherited bacterium *Wolbachia* is among the most widespread symbionts in insects. *Wolbachia* typically spreads within host species by conferring direct fitness benefits, and/or by manipulating its host reproduction to favour infected over uninfected females. Under sufficient selective advantage, the mitochondrial haplotype associated with the favoured maternally-inherited symbiotic strains will spread (i.e. hitchhike), resulting in low mitochondrial genetic variation across the host species range. Method: *Ischnura elegans* has recently emerged as a model organism for genetics and genomic signatures of range expansion during climate change. Although there is accumulating data on the consequences of such expansion on the genetics of *I. elegans*, no study has screened for *Wolbachia* in the damselfly genus *Ischnura*. Here, we present the biogeographic variation in *Wolbachia* prevalence and penetrance across Europe and Japan (including samples from 17 populations), and from close relatives in the Mediterranean area (i.e. *I. genei*: Rambur, 1842; and *I. saharensis*: Aguesse, 1958). Results: Our data reveal (a) multiple *Wolbachia*-strains, (b) potential transfer of the symbiont through hybridization, (c) higher infection rates at higher latitudes, and (d) reduced mitochondrial diversity in the north-west populations, indicative of hitchhiking associated with the selective sweep of the most common strain. We found low mitochondrial haplotype diversity in the *Wolbachia*-infected north-western European populations (Sweden, Scotland, the Netherlands, Belgium, France and Italy) of *I. elegans*, and, conversely, higher mitochondrial diversity in populations with low penetrance of *Wolbachia* (Ukraine, Greece, Montenegro and Cyprus). The timing of the selective sweep associated with infected lineages was estimated between 20,000 and 44,000 years before present, which is consistent with the end of the last glacial period about 20,000 years. Conclusions: Our findings provide an example of how endosymbiont infections can shape spatial variation in their host evolutionary genetics during postglacial expansion. These results also challenge population genetic studies that do not consider the prevalence of symbionts in many insects, which we show can impact geographic patterns of mitochondrial genetic diversity." (Authors)] Address: Duploux, Anne, 1 Dept Biology, Lund Univ., Sölvegatan 37, 223 62 Lund, Sweden

**19269.** El-Harche, H.; Chavanon, G.; Fegrouche, R.; Berady, K.; Zouaki, N.; Dahmani, J.; Fadli, M. (2021): Comparative Study of Insect Biodiversity in Cultivated and Natural Steppes in the Region of Sidi Kacem of Northwest Morocco. *Tropical Journal of Natural Product Research*: 1766-1774. (in English) ["Insects represent the most species-rich taxa of the animal kingdom. They are extremely important ecosystem components and help to perform various activities which are necessary for an ecological balance. They play a major role in maintaining the structure and function of the ecosystems. In Morocco, no scientific exploitation of resources regarding insect fauna has taken place in the agroecosystems. This study was aimed at creating the first inventory of insects collected from both cultivated and natural

steppes in the region of Sidi Kacem of Northwest Morocco. An entomological investigation was carried out in 5 stations situated on 3 different soil types in the region of Sidi Kacem. Three stations were cultivated fields, and two were natural steppes. Sampling was done during spring and summer in 2020, using sweep net, sight hunting, and pitfall traps methods. Shannon-Weaver, Simpson, and equitability indexes along with Hill indexes were calculated. Seventy-eight species were identified which were distributed into 7 orders, belonging to 29 families. The results obtained showed a richness of Coleoptera by 44 species, Hemiptera by 9 species, Diptera by 6 species, Lepidoptera, Orthoptera, and Odonata [*Ischnura graellsii*, *Sympetrum fonscolombii*, *Trithemis annulata*, *T. kirbyi*, *Crocothemis erythraea*] by 5 species each, while Hymenoptera aggregating in the final place with 4 species. Furthermore, the diversity and abundance of insects were highest in Station 3 and lowest in Station 5. Soil texture and abundance of vegetation seemed to be the major drivers influencing species abundance and richness." (Authors)] Address: El-Harche, H., Laboratory of Plant, Animal and Agro-Industry Productions, Department of Biology, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco. Email: hanae.elharche@yahoo.com

**19270.** Eysemans, D. (2021): Vier jaar libellen en waterjuffers uit het Moer-Kerkmoer (2017-2020). Nieuwetbrief Het Merkske 8: 33-36. (in Dutch) ["In total, 45 odonate species have been recorded in the Moer-Kerkmoer, province of Antwerp, Belgium. Of these, 25 to 30 species are present in the area with a permanent or temporary (small or larger) population. Supplemented by a number of (in)regular migrants and wanderers. For more details see: [https://www.odonata.be/images/Publicaties/Nieuwsbrief\\_het-Merkske\\_mrt2021-web.pdf](https://www.odonata.be/images/Publicaties/Nieuwsbrief_het-Merkske_mrt2021-web.pdf)] Address: not stated

**19271.** Fliedner, H. (2021): The scientific names of Krüger's odonate taxa with annotations about his contribution to neuropterological taxonomy. International Dragonfly Fund - Report 167: 1-62. (in English, with German summary) ["This paper offers an explanation of each of the 44 scientific names given by Leopold Krüger (1861-1942) to odonate taxa together with that for the names of all the genera into which they are sorted now. But prior to that there is some information about the life and work of this scientist, and in the final part his preferences in odonatological nomenclature are compared with those in the names created by F.M. Brauer and F. Ris and some impressions of his studies on Neuroptera are presented and considerations about his aspirations in his work are given." (Author)] Address: Fliedner, H., Louis-Seegelken Str., 28717 Bremen, Germany. Email: H.Fliedner@t-online.de

**19272.** Gkenas, C.; Magalhães, M.F.; Campos-Martin, N.; Ribeiro, F.; Clavero, M. (2021): Desert pumpkinseed: diet composition and breadth in a Moroccan river. *Knowl. Mag. Aquat. Ecosyst.* 2021, 422, 34: 6 pp. (in English, with French summary) ["The widely invasive North American pumpkinseed sunfish, *Lepomis gibbosus*, is currently established in desert rivers in Morocco. The success of

pumpkinseed in novel ecosystems has been associated with its generalist diet, but this trait remains unevaluated in arid regions. Desert rivers are harsh environments with limited water and prey availability which may adversely constrain the diet of fish. Here we studied the diet of pumpkinseed across 4 sites in the Draa River, embracing a 450 m elevational gradient covering from extremely dry lowlands to relatively humid highlands. We described pumpkinseed diet through the analysis of stomach contents of 82 individuals, collected in the fall of 2013. Pumpkinseed diet was dominated by Chironomidae in dry lowlands, while Ephemeroptera, Heteroptera, Trichoptera and Odonata were relevant prey in more humid highlands. Population diet breadth expanded with elevation, but individual specialization in diet was low among all sites. Our results highlight considerable changes in diet composition and breadth with aridity, suggesting that feeding plasticity and use of exclusive, locally abundant prey rather than generalized feeding may be associated with the success of pumpkinseed in most arid areas in desert rivers." (Authors)] Address: Gkenas, C., MARE, Centro de Ciências do Mar e do Ambiente, Faculdade de Ciências, Universidade de Lisboa, Campo Grande, Lisboa, Portugal. Email: chrisgenas@gmail.com

**19273.** Higuera Gómez, M.; Gómez Pinzón, R. (2021): Comunidades de insectos acuáticos en el arroyo de Cabuyita, provincia de Panamá, Panamá. - Communities of aquatic insects in a stream in Cabuyita, province of Panama, Panama. *Revista Colón Ciencias, Tecnología y Negocios* 8(2): 105-113. (in Spanish, with English summary) ["Insects contribute to the conservation of ecosystems. They also have attributes who consider them as indicators of the quality of habitats. When they are in the development phase of larvae or nymph, they are shredders degrading the leaf, that favors other microorganisms, and that way collaborate with the food web. This work had the purpose to determine the dominance and spatial and temporal wealth of the community of aquatic insects associated with leaf, between January to June 2019 in the stream of Cabuyita, Tocumen county, province of Panama. Five sample stations were established, in each station 2 samples of leaf were collected one each month. The Margalef and Simpson indexes were then calculated. They collected 1645 individuals, 6 orders, 17 families and 24 genera. The most abundant orders in descending form are: Diptera, Ephemeroptera, Odonata [taxa are treated at genus level], Trichoptera, Coleoptera and Megaloptera. The most abundant subfamilies were Chironominae, Tanytopodinae, Orthoclaadiinae and Tanytarsini. The most abundant genera are *Caenis* sp, *Ischnura* sp, *Farrodes* sp, *Macrelmis* sp and *Phylloicus* sp. It concluded that the stream of Cabuyita has the appropriate conditions for the community of aquatic insects associated to leaf and there had more wealth of organisms in dry season, than in the rainy season." (Authors)] Address: Higuera Gómez, Marta, Universidad de Panamá, Panamá. Email: marta.higuera@up.ac.pa

**19274.** Kristensson, D. (2021): Wing shape variation in a damselfly: Effects of range margins and latitude. BSc. thesis, Uppsala University, Disciplinary Domain of Science and

Technology, Biology, Biology Education Centre: 17 pp. (in English) [nv; "An optimal wing shape is necessary for the survival of winged insects since it enables different survival strategies and is expected to vary between environments due to different selection pressures. However, few studies have explored wing shape variation across the whole range of a species. In this study, geographic variation in wing shape in male *Lestes sponsa* was examined from 14 localities along a latitudinal gradient in Europe. The wings were analyzed using a comparative geometric morphometric approach, where the different shapes were digitized, statistically analyzed, and visualized on thin spline deformation grids. The results showed significant differences in wing shape in both the fore- and hindwings between locations. Wings at some localities showed a slender appearance with a narrow tip, and wings from other localities showed a broader appearance with a convex tip. A significant trend in wing shape was found from the central populations to the northern one. However, no continuous trend in wing shape was found across the latitudinal range suggesting that local abiotic or biotic factors might drive the difference observed." (Author)] Address: Kristensson, Desirée, Uppsala University, Disciplinary Domain of Science and Technology, Biology, Biology Education Centre

**19275.** Lai, Y.-H.; Lin, Y.-J.; Chang, S.-K.; Yang, J.-T. (2021): Effect of wing-wing interaction coupled with morphology and kinematic features of damselflies. *Bioinspiration & Biomimetics* 16(1) 016017: (in English) ["We investigated the effect of the wing-wing interaction, which is one key aspect of flight control, of damselflies (*Matrona cyanoptera* and *Euphaea formosa*) in forward flight that relates closely to their body morphologies and wing kinematics. We used two high-speed cameras aligned orthogonally to measure the flight motions and adopted 3D numerical simulation to analyze the flow structures and aerodynamic efficiencies. The results clarify the effects of wing-wing interactions, which are complicated combinations of biological morphology, wing kinematics and fluid dynamics. As the amplitude of the hindwing of *Matrona cyanoptera* is larger than that of *Euphaea formosa*, the effect of the wing-wing interaction is more constructive. Restricted by the body morphology of *Euphaea formosa*, the flapping range of the hindwing is below the body. With the forewing in the lead, the hindwing is farther from the forewing, which is not susceptible to the wake of the forewing, and enables superior lift and thrust. Because of the varied rotational motions, the different shed direction of the wakes of the forewings causes the optimal thrust to occur in different wing phases. Because of its biological limitations, a damselfly can use an appropriate phase to fulfill the desired flight mode. The wing-wing interaction is a compromise between lift efficiency and thrust efficiency. The results reveal that a damselfly with the forewing in the lead can have an effective aerodynamic performance in flight. As an application, in the design concept of a micro-aircraft, increasing the amplitude of the hindwing might enhance the wing-wing interaction, thus controlling the flight modes." (Authors)] Address: Yang, J.-T. Dept Mech. Engineering, Nat. Taiwan Univ., Taipei, Taiwan. Email: jtyang@ntu.edu.tw

**19276.** Lencioni, F.A.A. (2021): A new *Idioneura* Selys, 1860 for the Brazilian fauna with analysis of the other species (Odonata: Protoneuridae). *Zootaxa* 5067(2): 237-248. (in English, with Spanish summary) ["*Idioneura* Selys, 1860 can be separated from the other Protoneuridae (sensu Tillyard 1917) by a set of characters: angulated frons, presence of the CuP&AA vein, absence of the two subapical teeth in the cercus (present in *Lamproneura* De Meillon, 2003), and first and second antenodal spaces subequal (first a little longer than second). Here is described a new species, *Idioneura furieriae* spec. nov., from two females and five males. The new species is compared with *I. ancilla* Selys, 1860 and *I. celioi* Lencioni, 2009. Diagnostic illustrations are presented. The major differences between *Idioneura* species are: in the females, the shape of the highly modified mesostigmal plates and posterior lobe of prothorax; in males, the shape of cerci and paraprocts." (Authors)] Address: Lencioni, F.A.A., Rua Anibal, 216, Jardim Coleginho, CEP 12310-780, Jacareí, SP, Brazil. Email: lencioni.odonata@gmail.com

**19277.** Lima, D.V.M.; Teixeira de Almeida, M.; Vicente, J.X. (2021): Effects of seasonality on the composition and richness of odonate larvae in urban lakes, Rio Branco (AC), Brazil. *Multidisciplinary Sciences Reports* 1(1): 1-16. (in Portuguese, with English summary) ["Odonata are insects with great ability to fly during adult, inhabiting places with the presence of water such as lakes and rivers or even small pool. During the larval stage, these organisms inhabit the aquatic environment, making up the important group of aquatic insects. The knowledge of the composition and richness of these insects is of fundamental importance for us to understand how they organize themselves in a community. The aim of this study was to analyze whether seasonality influences Odonata larvae assemblages. The work was carried out in the Piaba and Viveiro lakes of the Zoobotanic Park of the Federal University of Acre. Samples were taken in winter 2015 and summer 2016. Biological samples were identified down to the genus level. In this study we confirm the hypothesis of the influence of seasonality on the Odonata fauna and the importance of riparian vegetation for the preservation of aquatic species in urban areas." (Authors)] Address: Lima, D., Direção de Ensino, campus Rio Branco, Instituto Federal do Acre – IFAC, Rio Branco, Acre, Brazil. E-mail: diegovml@gmail.com

**19278.** Liu, Y.-E.; Luo, X.-J.; Liu, Y.; Zeng, Y.-H.; Mai, B.-X. (2021): Bioaccumulation of legacy and emerging organophosphorus flame retardants and plasticizers in insects during metamorphosis. *Journal of Hazardous Materials* 406(17): 8pp. (in English) [Aeshnidae "Highlights: • Different insect taxa showed different contaminant concentrations and patterns for PFRs and plasticizers. • Grasshopper larvae exhibited a greater biomagnification potential for PFRs than moth larvae. • Negative linear correlations were frequently observed between Ln(adult/larva) and log KOW. • Ecdysis was identified as an important pathway by which dragonflies remove contaminants. Abstract: Seven insect taxa belonging to five different orders were collected from a

former Chinese e-waste dumping site to investigate the occurrences of organophosphorus flame retardants (PFRs) and plasticizers. The total PFR and plasticizer concentrations were in the ranges of 2.3–91 ng/g ww (median: 20 ng/g ww) and 420–15600 ng/g ww (4040 ng/g ww), respectively. The contaminant patterns varied greatly among different insect taxa owing to their specific habitats and feeding habits. The larvae of litchi stinkbugs and grasshoppers exhibited significantly higher PFR concentrations than their adult counterparts. In contrast, the adults of butterflies, moths, and dragonflies exhibited significantly higher PFR concentrations than their larvae. Additionally, negative linear correlations were frequently observed between the ratios of PFR and plasticizer concentrations in adult to larva (A/L) and log KOW in the four studied insect taxa, which were different from those corresponding to persistent organic pollutants. Notably, the contaminant concentrations of dragonfly ecdysis were significantly higher than those of dragonfly larvae, indicating that ecdysis is an important pathway by which dragonflies remove PFRs and plasticizers." (Authors)] Address: Luo, X.-J., State Key Lab. Organic Geochemistry & Guangdong Key Laboratory of Environmental Resources Utilization & Protection, Guangzhou Institute of Geochemistry, Chinese Academy of Sciences, Guangzhou 510640, People's Republic of China. E-mail: luoxiao@igig.ac.cn

**19279.** Marinov, M. (2021): On the Fijian endemic genus *Nesobasis* Selys, 1891 with introduction of *N. martina* sp. nov. and *N. monika* sp. nov. (Odonata: Coenagrionidae). International Dragonfly Fund - Report 165: 1-15. (in English) ["Two new congeneric species endemic to Fiji are introduced: *Nesobasis martina* sp. nov. [holotype ♀, Viti Levu Is] and *N. monika* sp. nov. [holotype ♂, Taveuni Is]. The species are placed in the comosa- and erythropro groups respectively (grouping following Donnelly 1990). Diagnostic features are proposed, but not discussed. Further discussion is left for an ongoing revision of the genus (Donnelly & Marinov in prep.). The new species reported here are introduced ahead of this revision in a study which was made possible due to the International Dragonfly Fund offering the opportunity to pick a new species' name for a donation." (Author)] Address: Marinov, M., Biosecurity Surveillance & Incursion Investigation Plant Health Team, Ministry for Primary Industries, 14 Sir William Pickering Drive, Christchurch 8544, New Zealand. Email: milen.marinov@mpi.govt.nz

**19280.** McArtor, J.D.; Detmer, T.M., Porreca, A.P.; Parkos III, J.J.; Wahl, D.H. (2021): Do freshwater macroinvertebrates select for different substrates used in fisheries habitat enhancement?. Transactions of the Illinois State Academy of Science 114: 1-5. (in English) ["Habitat enhancement projects are commonly used for augmenting fisheries in lakes and reservoirs, but a dearth of research exists regarding how habitat enhancements influence lower trophic levels. Structures used for habitat enhancement may be comprised of a range of natural and artificial materials and thus present different substrates for macroinvertebrates. We examined whether motile, grazing macroinvertebrates from the genera *Baetis*, *Ischnura*, *Pachydiplax*, and *Trichocorixa*

exhibited different selection for substrates commonly used in fisheries habitat enhancement projects. Substrates evaluated included natural pine wood with bark, polyvinyl chloride plastic (PVC; a common frame material for artificial fish cribs), and the composite plastic of a commercial fish attractor. Counts of individuals on each substrate were recorded at one-minute intervals for 30 minutes in a common garden style aquarium experiment where all substrate types were equally available. Substrate selection differed among the macroinvertebrate taxa tested. Natural wood was not selected more often than artificial substrates. *Trichocorixa* rarely selected for the wood substrate over artificial substrates. *Ischnura* selected the light colored PVC substrate most often and *Pachydiplax* selected the darker artificial composite most often. Our results suggest that selection of different substrates may be taxon specific and not heavily influenced by material composition." (Authors)] Address: Porreca, A., Kaskaskia Biological Station, Illinois Natural History Survey, University of Illinois at Urbana-Champaign, 1235 CR 1000 N, Sullivan, IL 61951 USA. Email:porreca.ap@gmail.com

**19281.** Müller, O.; Kohl, S.; Suhling, F.; Wildermuth, H. (2021): Description of last instar larvae of *Ceratogomphus triceraticus* Balinsky, 1963 and *C. pictus* Hagen in Selys, 1854 (Odonata: Gomphidae). International Journal of Odonatology 24: 247-260. (in English) ["The final instar larvae of the two species of the southern African gomphid genus *Ceratogomphus*, the South African endemic *C. triceraticus* and the more widespread *C. pictus*, are compared based on exuviae. Main differences are the shapes of the prementum and of the last abdominal segments, giving *C. pictus* a more slender and pointed appearance. *Ceratogomphus triceraticus* is slightly larger and on average significantly so. The habitats of both species are described based on own observations in South Africa." (Authors)] Address: Müller, O., Birkenweg 6d, 15306 Libbenichen, Germany. EMail: mueller.ole@gmail.com

**19282.** Ngo, Q.P.; Nguyen, M.T. (2021): The genus *Ophiogomphus* Lieftinck, 1964 in Vietnam, with descriptions of the female of *O. minimus* Karube, 2014 and *O. phantoani* sp. nov. (Odonata: Gomphidae). Zootaxa 5061(1): 134-144. (in English) ["Description of *Ophiogomphus phantoani* sp. nov. (Holotype ♂: Dak Re Commune, Song Thanh National Park, Quang Nam Province, central Vietnam, 15.5080 N, 107.4720 E, altitude 1105 m) is based on both sexes. Three other species of *Ophiogomphus* in Vietnam are recorded with description of the female *O. minimus* Karube, 2014 for the first time. Keys to males and females of four species from Vietnam are also provided." (Authors)] Address: Ngo, Q.P., Center for Entomology & Parasitology Research, College of Medicine & Pharmacy, Duy Tan Univ., Da Nang 550000, Vietnam. Email: ngoquocphu@gmail.com;

**19283.** Wildermuth, H. (2021): Fliegnde Juwelen. Was brauchen Libellen? *Ornis* 2/21: 12-15. (in German) [Introduction in habitat ecology of Swiss Odonata.] Address: Wildermuth, H., Haltbergstrasse 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2016

**19284.** Casanueva, P.; Campos, F.; Santamaría, T.; Sánchez, L.F. (2016): Deformidad abdominal en una exuvia de *Cordulegaster boltonii* (Odonata, Cordulegasteridae). *Boletín de la Sociedad Entomológica Aragonesa* 58: 244. (in Spanish) ["Description of a body anomaly, in the ventral area of abdominal segments 6 and 7 in a female exuvia of *Cordulegaster boltonii*, showing a low frequency of 0.08% in the sampling performed." (Authors/DeepL)] Address: Casanueva, Patricia, Depto de Ciencias Experimentales, Universidad Europea Miguel de Cervantes, Calle Padre Julio Chevalier 2, E-47012 Valladolid, Spain

**19285.** Fischer, I. (2016): Neuer Nachweis der Zierlichen Moosjungfer, *Leucorrhinia caudalis* (Charpentier, 1840) (Odonata: Libellulidae), in Wien. New record of the lilypad whiteface, *Leucorrhinia caudalis* (Charpentier, 1840) (Odonata: Libellulidae), in Vienna. *Beiträge zur Entomofaunistik* 17: 127-129. (in German) [18-v-2015, Vienna, Austria (48°13' 35,5" N, 16°24' 41,1" E)] Address: Fischer, Iris, Vogtgasse 5/2/18, 1140 Wien, Austria. Email: Fischer.Iris89@gmx.at

**19286.** Karube, H.; Phan, Q.T. (2016): Discovery of *Chlorogomphus papilio* Ris, 1927 from northern Vietnam. *Tombo* 58: 49-51. (in English, with Japanese summary) ["*C. papilio* is newly recorded from Vietnam, with a brief description of wing maculation, compared with that of Chinese population. They inhabit rather broad river in lowland area." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**19287.** Karube, H. (2016): First larval record of *Indolestes boninensis* (Asahina, 1952) from Anmma-isiana, Ogasawara. *Tombo* 58: 73-74. (in Japanese, with English summary) ["*I. boninensis* is an endemic damselfly of Ogasawara Island. Distributional records of this species were limited to the Chichi-jima group. Karube & Kosaka (2009) confirmed

the presence of this species from NE Anijima island from photographs, as the previous records were doubtful. I discovered for the first time the larvae from the SW Anijima, which is the first reproductive evidence for this island." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**19288.** Karube, H. (2016): Additional records of Vietnamese Odonata II - Rediscovery of *Sieboldius gigas* (Martin, 1904) (Anisoptera: Gomphidae). *Tombo* 58: 46-48. (in English, with Japanese summary) ["*S. gigas* was rediscovered from N. Vietnam. In this paper, it is re-described with a brief discussion on relationship. The species is considered to be related to *S. maai* Chao, 1990." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**19289.** Kiauta, B.; Inoue, K. (2016): Obituary Professor N. W. Moore, the pioneer of Odonata Conservation. *Tombo* 58: 74-78. (in English or Japanese) [Obituary. Kiauta: "In memory of Professor Dr Norman Winfrid Moore, 3rd Baronet Hancox (1923 - 2015)"; Inoue: "Professor Moore's visits to Japan."] Address: Inoue, K., 5-9 Fuminosato 4-chome, Abeno-ku, Osaka 545, Japan. E-mail: ks-inoue@mx2.nisq.net

**19290.** Kolozsvári, I. (2016): Characterization of the dragonfly fauna of the Tisza in the section between Tiszaujálak and Huszt. PhD thesis, Debrecen: 169 pp. (in Hungarian) ["During my research, first of all I tried to collect and systematize the odonatologic, faunistic literatures referring to Transcarpathia, as well as I tried to get an overall picture of the dragonfly fauna's species composition, their occurrence and quantitative proportions in the Tisza section between Tiszaujálak and Huszt in main, side and dead channels based on the data of my larvae and exuviae collections. Besides I tried to compile a natural habitat survey field method in a form of a data sheet that can be helpful in the objective and targeted surveying of dragonfly habitat background variables.

My dragonfly larvae and exuviae field samplings were carried out at Tiszaújlak, Tiszaújhely, Tiszabökény, Nagyszolos and Huszt, altogether on 13 main, 2 side and 3 dead channel sampling sites, on 30 m long channel and riverside stretches between 2010 and 2012. According to my research results the specimen of *G. vulgatissimus* species are connected with the plant coverage of the river bank, the rate of foliage closure and the characteristics of the river bank; the specimen of *O. forcipatus* species are associated with water depth, channel deepening tendency, type of plant coverage on the river bank and water temperature; the exuviae data of *G. flavipes* and *O. cecilia* are related to the mosaic-like bottom of the channel, the intensity of water flow near the river banks, the rate of foliage closure, and the rate of plant coverage of the river bank. In the Tisza sections at Tiszaújlak, Tiszaújhely, Tiszabökény, Nagyszolos and Huszt 8 dragonfly species were identified (*G. vulgatissimus*, *G. flavipes*, *O. forcipatus*, *O. cecilia*, *S. metallica*, *C. splendens*, *P. pennipes*, *S. fusca*). In the sections of the main, side and dead channels of the Tisza at Tiszaújlak, Tiszaújhely, Tiszabökény, Nagyszolos and Huszt I found significant differences between the quantity and composition of the dragonfly fauna. The results of the statistical data processing based on the dragonfly assemblages showed clear characteristic signs between the main, side and dead channel habitat types. The dragonfly species composition data from the dead channels at Tiszaújlak and Nagyszolos are different from the similar data of the main and side channels. In case of the dead channels, contrary to the main and side channels' Anisoptera dominance, the larval data marked the presence of particular Zygoptera. In the main and side channel sections mostly the typical flowing water species appeared while in the dead channels the proportion of those species were prominent too, which are typical in slow-flowing water and in standing water." (Author) Address: Kolozsvári, I., Ferenc Rákóczi II. Transcarpathian Hungarian Institute, István Fodor Research Institute Kossuth square 6, Beregove 90202, Ukraine. E-mail: kolozsvaros@gmail.com

**19291.** Martina, S.; Höttinger, H. (2016): Die Libellen (Insecta: Odonata) eines Serpentinit-Steinbruches im Südburgenland, Österreich, unter besonderer Berücksichtigung ökologischer und naturschutzfachlicher Aspekte. Beiträge zur Entomofaunistik 17: 109-125. (in German, with English summary) ["Odonata of a serpentinite-quarry in southern Burgenland, Austria, with special focus on ecology and conservation. – Today secondary habitats like quarries, gravel-, sand-, and clay-pits are important refuges for many species of plants and animals. The abandoned serpentinite-quarry Bienenhütte, near Bernstein in southern Burgenland is inhabited by a species-rich flora and fauna and therefore has a very high value for nature conservation. 27 species of Odonata (45 % of all species listed for Burgenland) have been recorded there so far. Particularly notable among these are the first records of *Leucorrhinia dubia* from Burgenland and of *L. pectoralis* from southern Burgenland, some individuals of *Sympetrum danae*, which is very scarce in Burgenland, and a population of *Coenagrion scitulum* at an unusually high altitude. Serpentinite contains high concentrations of

specific heavy-metals, especially nickel, chromium, iron and cobalt. The potential influence on the development of Odonata larvae is discussed. The importance of this quarry from a nature conservational view is presented, and suggestions for further conservation and management options are given." (Authors)] Address: Staufer, Martina, Lindenbauer-gasse 13, 1110 Wien, Austria. Email: m\_staufer@web.de

**19292.** Matsuo, Y.; Naraoka, H. (2016): Discovery of *Paracercion melanotum* (Selys, 1876) (Coenagrionidae) in Aomori Prefecture. Tombo 58: 67-68. (in Japanese, with English summary) ["*P. melanotum* was recorded in Hachinohe-city, Aomori Prefecture, on August 6, 2015. This is the first record of this species from Aomori Prefecture. We observed reproductive behavior of this species at the same site on August 6, 9 and 17, 2015." (Authors)] Address: Naraoka, H., 36-71, Aza-Motoizumi, Fukunoda, Itayanagi-cho, Kita-gun, Aomori Prefecture, 038-3661, Japan

**19293.** Naraoka, H. (2016): Effects of weather conditions on the diurnal variation of perch height of adult *Ischnura elegans* (Vander Linden, 1820). Tombo 58: 61-66. (in Japanese, with English summary) ["The selection of perching site is important for reproduction, physiology and survival of Odonata. The author researched the diurnal change of perching height of *I. elegans*, in relation to weather conditions, which inhabits reed and sedge communities, at Obuchi-pond, in Aomori prefecture, Japan. Results showed that species perched lower in daytime, but sit higher from evening to next morning. On windy days, they generally perched lower, while on non windy days, they sit lower in the following order, rainy, cloudy to clear weather, and tend to perch lower according to higher temperature, lower humidity, and stronger sunshine. In addition, the height of perching was different between reed and sedge communities. Therefore, this species, which inhabits relatively uniform environment such as grassland, delicately changes the perching height according to time and weather condition, so that they may regulate their body temperature, prevent drying, escape from enemies and increase reproductive success." (Author)] Address: Naraoka, H., 36-71, Aza-Motoizumi, Fukunoda, Itayanagi-cho, Kita-gun, Aomori Pref., 038-3661, Japan

**19294.** Palatova, D.M.; Chertoprud, M.V.; Frolov, A.A. (2016): Fauna and types of soft-bottom macrozoobenthic assemblages in watercourses of mountainous regions on the eastern Black Sea coast. Inland Water Biology 9(2): 150-159. (in English) ["The species composition and communities of soft-bottom macrozoobenthos of the eastern Black Sea coast have been described based on an original collection of 132 quantitative and over 700 qualitative samples. More than 150 species and supraspecific taxa have been registered; 10 types of communities, each having a specific complex of dominants, have been singled out. Regional features of the pelophilic communities in mountainous regions on the eastern Black Sea coast and their altitude and temperature-dependent variability, as well as analogy with other Palaearctic regions, have been discussed.... The material of study involves 132 quantitative and >700

qualitative samples of pelophilic macrobenthos collected in watercourses of the eastern Black Sea region (Fig. 1) in 2003–2014. 86 quantitative samples were additionally collected in the watercourses of western Transcaucasia (including Abkhazia and West Georgia), 22 samples on the Armenian Highlands, 27 on the Anatolian Highlands, and 10 in the Talysh Mountains; single samples were collected from Crimea, as well as from republics of North Caucasus and Lowland Azerbaijan. ... 1. Odonata. Larvae of two dragonfly families on the eastern Black Sea coast are in some way connected with the soft grounds of watercourses. Gomphidae have burrowing and mainly rheophilic larvae-inhabiting pebbles, sand, and silt accumulations. We registered *Ophiogomphus cecilia* in the piedmont watercourses of the Black Sea coast of Asia Minor, *Gomphus schneiderii* in the lowland river of Adjara [Georgia] and North Turkey, *G. vulgatissimus* in piedmont rivers of Crimea, and *Onychogomphus forcipatus* in large rivers at the territory of the entire region (including highlands). Cordulegastridae are represented with five species indistinguishable based on larvae...; they inhabit the soft bottom of small brooks and forest springs. They were found throughout the region, except for Crimea." (Authors)] Address: Palatova, D.M., Moscow State Univ., Moscow, 119992 Russia. Email: ametropus@gmail.com

**19295.** Raab, B. (2016): Kieseintrag verbessert Paarungs- und Larvalhabitate der Grünen Keiljungfer. ANLiegen Natur 38(1): 49-58. (in German, with English summary) ["Gravel Improves Mating and Larval Habitats of the Green Club-tailed Dragonfly: The LIFE+-Project "Optimization of flowing waters in Middle Franconia for the Green Gomphid (*Ophiogomphus cecilia*)" was conducted by the Bavarian Society for the Protection of Birds (LBV) from 2010 to 2014. The project area is located in Bavaria, in the Central Franconian Basin. By dumping gravel into river beds hydromorphological processes should be initiated in order to increase the diversity of flow rates and bed structures, both important habitat prerequisites for *O. cecilia*. For this purpose an average of 70 tons of fine gravel were introduced at 14 river sections. More than 500 tons of gravel were introduced at a site at the river Rednitz. The gravel originated from nearby quarries and sand pits, to ensure geological autochthony. The introduction of gravel had varying effects: gradual drifting of gravel structures down the river, increased formation of rills and ridges and a high diversity of flow rates. At smaller rivers like the Aurach and Zenn, the gravel covered the whole cross section on a long stretch. At bigger rivers, for example at the Rednitz, this is only possible with enormous amounts of gravel. At sections with low flow rates (up to 0,75 m/s) the gravel remains in the river bed and reduces the flow rates even more. The gap system in the gravel body is clogged quickly by fine sediments. Therefore, gravel dumpings are recommended only for narrow river sections with high flow rates. The water depth should range between 20 and 50 cm. A success monitoring of the treatments could not be conducted so far. The monitoring results will be published in ANLiegen Natur as soon as they are available." (Author)] Address: Raab, B., Landesbund für Vogelschutz, Eisvogelweg 1, 91161 Hilpoltstein, Germany. Email: b-raab@lbv.de

**19296.** Rabitsch, W.; Genovesi, P.; Scalera, R.; Biala, K.; Josefsson, M.; Essl, F. (2016): Developing and testing alien species indicators for Europe. Journal for Nature Conservation 29: 89-96. (in English) ["Alien species indicators provide vital information to the biodiversity policy sector on the status-quo and trends of biological invasions and on the efficacy of response measures. Applicable at different geographical scales and organizational levels, alien species indicators struggle with data availability and quality. Based on policy needs and previous work on the global scale, we here present a set of six alien species indicators for Europe, which capture complementary facets of biological invasions in Europe: (a) an combined index of invasion trends, (b) an indicator on pathways of invasions, (c) the Red List Index of Invasive Alien Species (IAS), (d) an indicator of IAS impacts on ecosystem services, (e) trends in incidence of livestock diseases and (f) an indicator on costs for alien species management and research. Each of these indicators has its particular strengths and shortcomings, but combined they allow for a nuanced understanding of the status and trends of biological invasions in Europe. We found that the scale and impact of biological invasions are steadily increasing across all impact indicators, although societal response in recent years has increased. The Red List Index is fit-for-purpose and demonstrates that overall extinction risks (here shown for amphibians in Europe) are increasing. Introduction pathway dynamics have changed, with some pathways decreasing in relevance (e.g., biological control agents) and others increasing (e.g., horticultural trade) providing a leverage for targeted policy and stakeholder response. The IAS indicators presented here for the first time on a continental basis serve as a starting point for future improvements, and as a basis for monitoring the efficacy of the recent EU legislation of IAS. This will need a better work-flow for data collection and management. To achieve this, all main actors must work toward improving the interoperability among existing databases and between data holders." (Authors) Two out of 137 European odonate species are classified as threatened by Invasive alien species, but no details are given.] Address: Rabitsch, W., Environment Agency Austria, Spittelauer Lande 5, 1090 Vienna, Austria. E-mail: wolfgang.rabitsch@umweltbundesamt.at

**19297.** Sakai, S.; Eda, S. (2016): Two new records of sitting ovipositions into the mud by females of *Aeshna crenata* and *A. juncea*. Tombo 58: 69-70. (in Japanese, with English summary) ["Unusual oviposition behaviors were observed in *A. crenata* Hagen, 1856 and *A. juncea* (Linnaeus, 1758) in Nyukasa Plateau, Ina city, Nagano Prefecture, on August 12 and 23, 2015, respectively. Both species usually oviposit into plant tissues, however these females sat on the mud surface and laid eggs into it. It is not clear yet if such oviposition into the mud has any survival value or not." (Authors)] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**19298.** Sano, S. (2016): New record of *Sympetrum eroticum* Selys, 1883 and *Crocothemis servilia* (Drury, 1770) in Hegura Island, off Ishikawa Prefecture. Tombo 58: 71-72.

(in Japanese, with English summary) ["Dragonflies were collected on September 20 to 21, 2015, in Hegura Island, located about 50 km north of Wajima, Ishikawa Prefecture. Both *S. eroticum* and *C. servilia* are recorded for the first time from the same Island." (Author)] Address: Sano, S., 236-0015 Room 1 Ishii Terrace, 112 Kanazawa-cho, Kanazawa-ku, Yokohama, Japan

**19299.** Takeuchi, T.; Yabuta, S.; Tsubaki, Y. (2016): The erroneous courtship hypothesis: do insects really engage in aerial wars of attrition? *Biological Journal of the Linnean Society* 118(4): 970-981. (in English) ["Males of various flying insects perform conspicuous aerial interactions around their mating stations. The broadly accepted interpretation of their aerial interaction is a war of attrition, where two contestants perform costly displays, and the one that reaches its cost threshold earlier gives up. The implicit but important requirement in this model is that some forces that match the intensity of display of the two contestants are necessary, and failure to enforce matching allows foul contestants that delay or stop their display to avoid paying contest costs. In addition, wars of attrition require flying insects to distinguish the sex of flying conspecifics because their aerial interactions begin when intruders fly into the territory. We investigated past research on the behaviour of odonates and butterflies aiming to clarify whether the two prerequisites of wars of attrition are fulfilled: (1) contestants can inflict substantial costs on nondisplaying opponents and (2) contestants can discriminate the sex of flying conspecifics. In odonates, we found an abundance of evidence suggesting that contests involve physical attack and that the ability of sexual discrimination is sufficient. Therefore, wars of attrition may occur in territorial odonates. In butterflies, however, we could not find any evidence that the two prerequisites are filled. The aerial interactions of butterflies are better interpreted as courtship between sexually active males (the erroneous courtship hypothesis). Based on these results, we discuss future directions of research on the aerial contests of flying insects." (Authors)] Address: Takeuchi, T., Center for Ecological Research, Kyoto University, Hirano 2-509-3, Otsu 5202113, Japan

**19300.** Vannier, J.; Schoenemann, B.; Gillot, T.; Charbonnier, S.; Clarkson, E. (2016): Exceptional preservation of eye structure in arthropod visual predators from the Middle Jurassic. *Nature Communications* 7, Article number: 10320 9 pp. (in English) ["Vision has revolutionized the way animals explore their environment and interact with each other and rapidly became a major driving force in animal evolution. However, direct evidence of how ancient animals could perceive their environment is extremely difficult to obtain because internal eye structures are almost never fossilized. Here, we reconstruct with unprecedented resolution the three-dimensional structure of the huge compound eye of a 160-million-year-old thylacocephalan arthropod from the La Voulte exceptional fossil biota in SE France. This arthropod had about 18,000 lenses on each eye, which is a record among extinct and extant arthropods and is surpassed only by modern dragonflies. Combined information about its eyes,

internal organs and gut contents obtained by X-ray microtomography lead to the conclusion that this thylacocephalan arthropod was a visual hunter probably adapted to illuminated environments, thus contradicting the hypothesis that La Voulte was a deep-water environment." (Authors)] Address: Schoenemann, Brigitte, Dept of Neurobiology/Animal Physiology, Biocenter Cologne, Institute of Zoology, University of Cologne, Zùlpicherstr. 47b, 50674 Köln, Germany. Email: B.Schoenemann@uni-koeln.de

**19301.** Vlasanek, P.; Kolár, V.; Tájková, P. (2016): New records of *Gomphus pulchellus* on the eastern edge of its range in the Czech Republic (Odonata: Gomphidae). *Libellula* 35 (1/2): 93-98. (in English, with German summary) ["New records of *G. pulchellus* are reported. It was observed in four new localities in the Czech Republic during July 2015. Individuals were probably migrants from Germany. It seems that the species is spreading eastward due to climate change." (Authors)] Address: Vlašánek, P., Biology Centre CAS, v.v.i., Institute of Entomology, Branišovská 31, 370 05 Ěeské Budjovice, Czech Republic. Email: petisko@centrum.cz

**19302.** Yoshino, Y. (2016): Notes on measurement of flight speed or large size dragonfly (Aeshnidae etc.). *Tombo* 58: 53-60. (in Japanese, with English summary) ["In 2014 and 2015, concerning to 16 species of Aeshnidae, Gomphidae, Cordulegastriidae, Corduliidae & Macromiidae, the flight speeds were measured by continuous shooting (1/7 second interval) using digital camera. The highest of flight speeds measured was 7.6 m/s (27 km/h) for *Anaciaeschna martini* S in crepuscular flight. On the other hand, from the calculated top speed 7.2 m/s already reported for *Anax parthenope julius* male, the same for *Anaciaeschna martini* male was estimated as 7.5 ~ 8.2 m/s, by using equations derived from the definition of the drag coefficient in aeronautical engineering. And under windless, uniform motion and horizontal flight condition, it seems that the top flight speed of *Anaciaeschna martini* male, based on the available power to flight muscles, may be less than 10 m/s, although the top flight speed will be achieved for only the very limited and very short opportunity and it will be extremely difficult to be measured. This reported measurement method of the flight speed, using commercial digital cameras, is comparatively easy for the amateurs, because of the low cost of the measurement equipment." (Author)] Address: Yoshino, Y.: Email: chlorogomphus@gmail.com

## 2017

**19303.** Bagheri, Z.M.; Wiederman, S.D.; Cazzolato, B.S.; Grainger, S.; O'Carroll, D.C. (2017): Performance of an insect-inspired target tracker in natural conditions. *Bioinspiration & Biomimetics* 12(2):025006. (in English) ["Robust and efficient target-tracking algorithms embedded on moving platforms, are a requirement for many computer vision and robotic applications. However, deployment of a real-time system is challenging, even with the computational power of modern hardware. As inspiration, we look to biological lightweight solutions-lightweight and low-powered flying insects.



For example, dragonflies pursue prey and mates within cluttered, natural environments, deftly selecting their target amidst swarms. In our laboratory, we study the physiology and morphology of dragonfly 'small target motion detector' neurons likely to underlie this pursuit behaviour. Here we describe our insect-inspired tracking model derived from these data and compare its efficacy and efficiency with state-of-the-art engineering models. For model inputs, we use both publicly available video sequences, as well as our own task-specific dataset (small targets embedded within natural scenes). In the context of the tracking problem, we describe differences in object statistics within the video sequences. For the general dataset, our model often locks on to small components of larger objects, tracking these moving features. When input imagery includes small moving targets, for which our highly nonlinear filtering is matched, the robustness outperforms state-of-the-art trackers. In all scenarios, our insect-inspired tracker runs at least twice the speed of the comparison algorithms." (Authors)] Address: Bagheri, Zahra, Adelaide Medical School, The University of Adelaide, Adelaide, SA, 5005, Australia. Email: zahra.bagheri@adelaide.edu.au

**19304.** Buczynski, P.; Buczynska, E.; Kowalak, E.; Matuszak-Krupa, J.; Plaska, W.; Stryjecki, R. (2017): Dragonflies (Odonata) of the Poleski National Park and its buffer zone: data from the years 2004 – 2016. *Parki nar. Rez. Przyr.* 36(1): 59-86. (in Polish, with English summary) ["The paper sums up the data collected in Poleski National Park during different study projects in the years 2004 . 2016. Forty five sites were examined: 34 in the park and 11 in its buffer zone. Fifty five dragonfly species were recorded: 53 in the park and 39 in its buffer zone. There are 15 special care species. High or extremely high densities of territorial males of *Leucorrhinia pectoralis* were recorded in some sites (38, 50, 61, and 105 ♂♂ 100 m<sup>-1</sup>). The occurrence of particular species, habitat spectrum of ecological elements and valuable odonate assemblages, which are especially formed in lakes, fish ponds and fens and Sphagnum bogs, have been discussed. Considering earlier studies, 59 species of dragonflies have been recorded so far in the study area, which is 80% of the national fauna. This confirms the role of the Poleski National Park and its buffer zone in the protection of species richness of dragonflies and maintaining populations of many stenotopic species. In this area, a very large role is played by the traditional methods of land use and secondary, i.e. anthropogenic habitats. The most significant are fish ponds and fen/peat bog excavations. However, according to the authors, the approach of the park services to these water bodies is too passive. Especially peat excavations on Sphagnum bogs require active conservation, i.e. interference in the succession and deforestation of their marginal zones. Digging new excavations should also be considered, especially on peatlands free of natural water bodies. In comparison to earlier data the following species have not been found: *Ischnura pumilio*, *Coenagrion armatum*, *Gomphus vulgatissimus* and *Ophiogomphus cecilia*. Most of them occur ephemerally in the study area due to lack of suitable habitats, but *C. armatum* had been known from the

five sites and at least at two of them the populations were large and stable. Both sites were investigated after 2004 but the species was absent. This may result in the first case from the changes in vegetation, and, in the second case from the drying out of the habitats. However, it is quite difficult to detect the species and hence it is very likely still occurs in the study area. We need a special research focused on the problem of its occurrence. The species new for the study area are as follows: *Crocothemis erythraea*, *Sympetrum meridionale* and *S. pedemontanum*. This shows that the Poleski National Park is being covered by the ranges of growing number of thermophilous species recently. In the following years, we can expect the increase in the number of such species. However, *S. pedemontanum* can create small, probably ephemeral populations in some regulated rivers and canals in the study area." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**19305.** Dawn, P. (2017): DragonflyIndia Meet 2016. International Dragonfly Fund Report 102: 1-21. (in English) ["The third meeting of DragonflyIndia social group was organized this time in Tiyabon Ecoresort, Gorumara National Park, Jalpaiguri district of West Bengal, India. Activities in the framework of the meeting are briefly outlined. A list of 66 Odonata taxa recorded during the field work is added." (Authors)] Address: Dawn, P., Dept. of Zoology, Shyampur Siddheswari Mahavidyalaya, Howrah, India. Email: prosenjit.dawn@gmail.com

**19306.** Fletcher, D.E.; Lindell, A.H.; Stillings, G.K.; Blas, S.A.; McArthur, J.V. (2017): Trace element accumulation in lotic dragonfly nymphs: Genus matters. *PLoS ONE* 12(2): e0172016: 27 pp. (in English) ["Constituents of coal combustion waste (CCW) expose aquatic organisms to complex mixtures of potentially toxic metals and metalloids. Multi-element trace element analyses were used to distinguish patterns of accumulation among 8 genera of dragonfly nymphs collected from two sites on a CCW contaminated coastal plain stream. Dragonfly nymphs are exceptional for comparing trace element accumulation in syntopic macro-invertebrates that are all predators within the same order (Odonata) and suborder (Anisoptera), but differ vastly in habitat use and body form. Sixteen trace element (Be, V, Cr, Ni, Cu, Zn, As, Se, Sr, Cd, Sb, Cs, Ba, Hg, Tl, and Pb) were analyzed and trophic position and basal carbon sources assessed with stable isotope analyses (C and N). Trophic positions varied within relatively narrow ranges. Size did not appear to influence trophic position. Trophic position rarely influenced trace element accumulation within genera and did not consistently correlate with accumulation among genera. Patterns between  $\delta^{13}C$  and trace element accumulation were generally driven by differences between sites. An increase in trace element accumulation was associated with a divergence of carbon sources between sites in two genera. Higher trace element concentrations tended to accumulate in nymphs from the upstream site, closer to contaminant sources. Influences of factors such as body form

and habitat use appeared more influential on trace element accumulation than phylogeny for several elements (Ni, Ba, Sr, V, Be, Cd, and Cr) as higher concentrations accumulated in sprawler and the climber-sprawler genera, irrespective of family. In contrast, As and Se accumulated variably higher in burrowers, but accumulation in sprawlers differed between sites. Greater variation between genera than within genera suggests genus as an acceptable unit of comparison in dragonfly nymphs. Overall, taxonomic differences in trace element accumulation can be substantial, often exceeding variation between sites. Our results underscore the element and taxa specific nature of trace element accumulation, but we provide evidence of accumulation of some trace elements differing among dragonflies that differ in body form and utilize different sub-habitats within a stream reach." (Authors) Dromogomphus, Stylurus, Gomphus, Progomphus, Hagenius, Macromia, Epithea, Boyeria] Address: Fletcher, D.E., Savannah River Ecology Lab., Univ. of Georgia, Aiken, South Carolina, USA. Email: fletcher@srel.uga.edu

**19307.** Fukasawa, K.; Mishima, Y.; Sasaki, K.; Kadoya, T. (2017): Ecological dissimilarity among land-use/land-cover types improves a heterogeneity index for predicting biodiversity in agricultural landscapes. *Ambio* 46(8): 894-906. (in English) ["Land-use/land-cover heterogeneity is among the most important factors influencing biodiversity in agricultural landscapes and is the key to the conservation of multi-habitat dwellers that use both terrestrial and aquatic habitats. Heterogeneity indices based on land-use/land-cover maps typically do not integrate ecological dissimilarity between land-use/land-cover types. Here, we applied the concept of functional diversity to an existing land-use/land-cover diversity index (Satoyama index) to incorporate ecological dissimilarity and proposed a new index called the dissimilarity-based Satoyama index (DSI). Using Japan as a case study, we calculated the DSI for three land-use/land-cover maps with different spatial resolutions and derived similarity information from normalized difference vegetation index values. The DSI showed better performance in the prediction of Japanese damselfly species richness than that of the existing index, and a higher correlation between the index and species richness was obtained for higher resolution maps. Thus, our approach to improve the land-use/land-cover diversity index holds promise for future development and can be effective for conservation and monitoring efforts." (Authors)] Address: Fukasawa, K., Fukushima Branch, National Institute for Environmental Studies, Mihamu, Japan

**19308.** Hacet, N. (2017): Updated checklist of Odonata fauna in the Turkish Thrace Region, with additional records of new, rare, and threatened taxa. *Turkish Journal of Zoology* 41: 33-42. ["A new record for the Odonata from Turkish Thrace, *Lindenia tetraphylla*, and its heterofamilial heterosexual tandem with a female of *Orthetrum albistylum* are reported. This finding increases the species number in the region to 56. The current species list of the region based on unpublished records and available literature is presented. Five species are listed at subspecies levels in the region

and the controversial subspecies status of some species is summarized. Additional records of rare species based on specimens collected in the region between 2001 and 2015 are provided and their distributions and threat statuses in the European regional assessment are considered. *Soma-tochlora flavomaculata* is considered as a species whose presence in the region needs to be confirmed. The presence of *Gomphus schneiderii* is unclear in the region." (Author)] Address: Hacet, Nurten, Dept Biol., Fac. Science, Trakya Univ., Edirne, Turkey. E-mail: nhacet@hotmail.com

**19309.** Klaiber, J.; Altermatt, F.; Birrer, S.; Chittaro, Y.; Dziock, F.; Gonseth, Y.; Hoess, R.; Keller, D.; K uchler, H.; Luka, H.; Manzke, U.; M uller, A.; Pfeifer, M.A.; Roesti, C.; Schlegel, J.; Schneider, K.; Sonderegger, P.; Walter, T.; Holderegger, R.; Bergamini, A. (2017): *Fauna Indicativa*. WSL Berichte 54: 198 pp. (in German, with French and English summaries) ["The *Fauna Indicativa* characterizes ecological preferences and biological traits of all species of dragonflies, grasshoppers, ground beetles and butterflies of Switzerland in tables. In most cases, entries for preferences and traits are given as numbers and either specified as scaled values or Yes-No decisions. Other characteristics are specified as letters. The entries are specific to populations in Switzerland and are based mostly upon literature data and the assessment by experts. The *Fauna Indicativa* is a tool for the ecological evaluation of faunistic data and may form the base for developing indicators for monitoring. With the help of this tool, arthropod communities can be used in an easy way for the description of state and change of habitats in Switzerland. Examples for the applications of the *Fauna Indicativa* are given." (Authors)] Address: Gonseth, Y., info fauna - CSCF, Passage Maximilien-de-Meuron 6, 2000 Neuchatel, Switzerland. Email: yves.gonseth@unine.ch

**19310.** Sivasankaran, P.N.; Ward, T.A.; Salami, E.; Viyapuri, R.; Fearday, C.F.; Johan, M.R. (2017): An experimental study of the elastic properties of dragonfly-like flapping wings for use in Biomimetic Micro Air Vehicles (BMAV). *Chinese Journal of Aeronautics* 30(2): 726-737. (in English) ["This article studies the elastic properties of several Biomimetic Micro Air Vehicle (BMAV) wing structural designs that are based on a dragonfly wing. BMAVs are a new class of unmanned micro-sized air vehicles that mimic the flapping wing motion of flying biological organisms (e.g. insects, birds, or bats). Three structurally identical wings were fabricated using different materials: acrylonitrile butadiene styrene (ABS), polylactic acid (PLA) and acrylic. Simplified wing frame structures were fabricated from these materials and then a nanocomposite film was adhered to them which mimics the membrane of an actual dragonfly. These wings were then attached to an electromagnetic actuator and passively flapped at frequencies of 10–250 Hz. A three dimensional high frame rate imaging system was used to capture the flapping motion of these wings at a resolution of 320 × 240 pixels and 35,000 frames per second. The maximum bending angle, maximum wing tip deflection, maximum wing tip twist angle and wing tip twist speed of each wing were measured and compared to each other and an actual

dragonfly wing. The results show that the ABS wing has considerable flexibility in the chordwise direction, whereas the PLA and acrylic wings show better conformity to an actual dragonfly wing in the spanwise direction. Past studies have shown that the aerodynamic performance of a BMAV flapping wing is enhanced if its chordwise flexibility is increased and its spanwise flexibility is reduced. Therefore, the ABS wing (fabricated using a 3D printer) showed the most promising results for future applications." (Authors)] Address: Sivasankaran, P.N., Dept of Mechanical Engineering, University of Malaya, Kuala Lumpur 50603, Malaysia

**19311.** Zhang, H. (2017): Odonata fauna of Dai-Jingpo Autonomous Prefecture of Dehong in the western part of the Yunnan Province, China - a brief personal balance from seven years of surveys and workshop report on current studies. IDF-Report 103: 1-49. (in English) ["Between 2009 and 2016, a total of 174 Odonata species have been recorded in the Dehong Dai and Jingpo Autonomous Prefecture, China. 21 of these species are new records for China, and additional 26 taxa have to be described as new to science. Brief comments on selected species refer to morphological characters, distribution and seasonality." (Author)] Address: Zhang, H., Kunming Natural History Museum of Zoology, Kunming Institute of Zoology, Chinese Academy of Sciences, China. E-mail: zhanghaomiao@mail.kiz.ac.cn

## 2018

**19312.** Dolný, A.; Šigutová, H.; Ožana, S.; Choleva, L. (2018): How difficult is it to reintroduce a dragonfly? Fifteen years monitoring *Leucorrhinia dubia* at the receiving site. Biological Conservation 218: 110-117. (in English) ["Highlights: •Population reintroductions are potential effective tools for wildlife conservation. •*L. dubia* larvae were translocated to artificially created bog pools. •The population was monitored for 15 years after larvae release. •Population size increased over the monitoring period with high genetic variability. •Reintroductions are effective measures for dragonfly conservation. Abstract: Conservation translocations (including reintroductions) are potentially powerful tools for wildlife conservation, and their use has increased worldwide. However, most studies have focused on vertebrates, with the long-term impact and ecological progress of translocations being neglected. Moreover, such projects rarely target insects. The present study reports the long-term persistence of a population of *L. dubia* reintroduced to artificially created bog pools in the Czech Republic. Eighty (pen)ultimate instar *L. dubia* larvae were translocated in 2001, and the dragonfly assemblage at the reintroduction site was monitored for 15 years following larvae release. In 2015–2017, the capture-mark-recapture method, the Jolly-Seber model, and exuviae collection were used to evaluate the demography of the translocated population. Microsatellite analysis was performed to assess the genetic variability of source and reintroduced populations. Over the monitored period, population size increased (80 larvae released vs. 108–115 exuviae and 75 adults at the end of the study) and *L. dubia* became a dominant species, whereas the composition and

abundance of the local dragonfly assemblage were not substantially changed. These results indicate that reintroductions are effective measures for dragonfly conservation, as translocating a relatively small number of individuals led to the establishment of a self-sustaining population. Using (pen)ultimate instar larvae was optimal for dragonfly translocation, but the availability of a high-quality habitat and the active collaboration with nature conservation authorities were vital for the successful outcome. Genetic analysis suggested that the translocated population might serve as a source of genetic variation for the original population, if depleted." (Authors)] Address: Dolný, A., Dept of Biology and Ecology, Faculty of Science, University of Ostrava, Chittusihovo 10, CZ-710 00 Slezská Ostrava, Czech Republic. E-mail: ales.dolny@osu.cz

**19313.** Gauci, C. (2018): Dragonflies and Damselflies of the Maltese Islands. Birdlife Malta: 150 pp. (in English) ["This book describes each of the 19 species recorded in the Maltese Islands and each species is amply illustrated by photographs which, for the commoner species, illustrate most or all the stages in their life cycle. It is hoped that besides being of help and interest to nature lovers, it will also raise a much needed awareness among the general public about biodiversity and nature conservation." (Author)] Address: Gauci, C., 28, Triq il-Kissier, Mosta, Malta MST1822

**19314.** Hintner, R. (2018): Untersuchungen zur Libellenfauna des Naturschutzgebietes Egelsee, Bezirk Spittal an der Drau, Kärnten. Carinthia II 208./128: 437-444. (in German, with English summary) ["Between July 2016 and July 2017, the dragon- and damselfly fauna of the nature protection area Egelsee was investigated for possible changes and a total of 24 permanently occurring species were confirmed. Six of these species are endangered in Carinthia. The endangered species *Coenagrion hastulatum* and *Leucorrhinia dubia* and the critically endangered *Nehalennia speciosa* have a high number of individuals. *Erythromma viridulum* and *Libellula depressa* have been discovered for the first time in this investigation area." (Author)] Address: Hintner, R., Radlach 54, 9754 Steinfeld, Austria. Email: robinhintner@gmail.com

**19315.** Ren, H.; Cui, N.; Tang, Q.; Tong, Y.; Zhao, X.; Liu, Y. (2018): High-performance, ultrathin, ultraflexible organic thin-film transistor array via solution process. Small 14(33), August 16, 2018, 1801020: (in English) ["Ultrathin organic thin-film transistors (OTFTs) have received extensive attention due to their outstanding advantages, such as extreme flexibility, good conformability, ultralight weight, and compatibility with low-cost and large-area solution-processed techniques. However, compared with the rigid substrates, it still remains a challenge to fabricate high-performance ultrathin OTFTs. In this study, a high-performance ultrathin 2,7-dioctyl[1]benzothieno[3,2-b][1]benzothiophene (C8-BTBT) OTFT array is demonstrated via a simple spin-coating method, with mobility as high as  $11 \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$  (average mobility:  $7.22 \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$ ), on/off current ratio of over  $10^6$ , switching current of  $>1 \text{ mA}$ , and

a good yield ratio as high as 100%. The ultrathin thickness at  $\approx 380$  nm and the ultralight weight at  $\approx 0.89$  g m<sup>-2</sup> enable the free-standing OTFTs to imperceptibly adhere onto human skin, and even a damselfly wing without affecting its flying. More importantly, the OTFTs show good electrical characteristics and mechanical stability when conformed onto the curved surfaces and even folded in a book after 100 folding cycles. These results illustrate the broad application potential of this simply fabricated ultrathin OTFT in next-generation electronics such as foldable displays and wearable devices.. (Authors)] Address: Tang, Q., Centre for Advanced Optoelectronic Functional Materials Research & Key Lab. of UV-Emitting Materials & Tech., Ministry of Education, Northeast Normal Univ., Changchun, 130024 P. R. China. E-mail: tangqx@nenu.edu.cn

## 2019

- 19316.** Aziz, M.A.A.A.; Mohamed, M. (2019): Annotated checklist of odonates (Insecta: Odonata) in Sungai Bantang Recreational Forest, Bekok, Johor, Malaysia. IOP Conf. Series: Earth and Environmental Science 269 (2019) 012002: 15 pp. ["A total of 34 species of odonates, including 17 species of dragonflies (Anisoptera) belonging to 2 families, and 15 species of damselflies (Zygoptera) belonging to 8 families were collected and recorded from Hutan Lipur Sungai Bantang in January, May and July 2017. From Anisoptera, Libellulidae is the most dominant family with 15 species and from Zygoptera, the richest family were Chlorocyphidae, Euphaeidae and Platycnemididae, each with three species respectively. A detailed list of odonates recorded from Hutan Lipur Sungai Bantang is presented. The result forms a baseline data of odonate fauna in this forest reserve useful in the monitoring of water quality of rivers found in the forest reserves in the future." (Authors)] Address: Abdul Aziz, M., Centre of Research Sustainable Uses of Natural Resources, Fac. Applied Sciences & Technology, Univ. Tun Hussein Onn Malaysia, Kampus Pagoh, Jalan Panchor, 84000, Muar, Johor, Malaysia. E-mail: maryati@uthm.edu.my
- 19317.** Bakker, W.; Ruiters, E.J.; Bunschoek, M.; Bakker, W.; Milder-Mulderij, G.; Achterkamp, B. (2019): Dark Whiteface (*Leucorrhinia albifrons*) discovered in 2016 at Delden. *Brachytron* 20(2): 63-70. (in Dutch, with English summary) ["In 2016 *Leucorrhinia albifrons* was discovered at the Twickel estate near Delden, Overijssel, the Netherlands. During the year 2017, a systematic search in a wider area resulted in observations of at least six males and one female. In 2018 a single male was found. Because the species has been seen at this location during three consecutive years, it is very likely that a population has been present for a longer period of time. Indications of reproduction of *L. albifrons* were however not observed. In the summer of 2018 *L. albifrons* was also observed at other locations in the Netherlands, at several sites multiple individuals were seen." (Authors)] Address: Bakker, W.: spitskip@gmail.com
- 19318.** Bora, A. (2019): Odonate (Dragonflies and damselflies) diversity as a marker of water quality in Sivasagar, Assam, India. *International Journal on Emerging Technologies* 10(3): 51-54. (in English) ["The present study was conducted in four different wetlands of Sivasagar district, Assam to determine whether diversity and abundance of odonates have any relationship with water quality. The Water Quality Index, Shannon-Weiner diversity index, Simpson's diversity index and species abundance values were calculated. Highest species richness and abundance were recorded in the site with highest water quality index and status good. The area with lowest water quality index showed lowest species richness and abundance. *Brachydiplax chalybea*, *Camacinia gigantea*, *Diplacodes nebulosa*, *Agriocnemis kalinga* and *Ceriagrion olivaceum* prefer habitat with slightly acidic water, moderate conductivity and higher concentration of DO. While species like *Neurobasis chinensis*, *Orthetrum glaucum*, *Lathrecista asiatica* and *Palpopleura sexmaculata* prefer habitats with neutral water, higher conductivity and higher concentration of DO. Odonata surveys can be used widely to assess site quality, monitor restoration, and as incremental benchmarks of ecological quality." (Author)] Address: Bora, A., Dept of Life Science & Bioinformatics, Assam University, 788011 Silchar, (Assam), India
- 19319.** Buczynski, P.; Bielak-Bielec, P. (2019): Materials to the knowledge of dragonflies (Odonata) of rivers and lakes in Central Eastern Poland. *Notatki Entomologiczne* 4(2): 1-10. (in Polish, with English summary) ["The authors present and discuss a collection of dragonfly larvae from the years 2015–2018, obtained in central-eastern Poland (21°47'–24°08'E, 50°38'–51°43'N) in the rivers (28 sites) and lakes (three sites). Data from rivers, except for one site in the stagnant river's mouth section, is typical of species-poor assemblages characteristic for middle and lower reaches of rivers. Noteworthy are the occurrence sites of two species protected by law: *Gomphus flavipes* and *Ophiogomphus cecilia*. At the same time, a small number of records of *O. cecilia* may show a still insufficient water quality in a large part of the studied rivers. In the material from lakes, the most interesting is the presence of thermophilous *Orthetrum albistylum* and *Crocothemis erythraea*, which indicates the increasing water temperature in the lake littoral in the area of research and the associated change in the composition of the fauna of this habitat. The collection of the exuvia of *Erythromma viridulum* in the aquarium at the pet shop in Lublin is separately discussed: in most cases the material obtained in this way represents introduced exotic species. This is a valuable tip that native species can colonize aquariums in shops and that the identification of such individuals in aquariums should begin by checking whether it is not such a case." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com
- 19320.** Cao, L.; Hou, W.; Hu, C. (2019): The complete mitochondrial genome sequence of *Acisoma panorpoides* Rambur, 1842 (Odonate: Libellulidae). *Mitochondrial DNA Part B* 4(2): 3644-3645. (in English) ["The phylogenetic relationships of dragonflies have received great attention all the time. For a better understanding the phylogenies among



odonate insects, the paper presented the complete mitochondrial genome of *Acisoma panorpoides* based on next generation sequencing data of total genomic DNA. The total length comprised 15,249 bp and the 37 genes (2 rRNA genes, 13 protein coding genes and 22 tRNA genes). Gene content and gene arrangement were identical to other odonate mitogenomes. Phylogenetic analyses using the whole sequences of the mitochondrial genome placed *A. panorpoides* as a sister species to *Hydrobasileus croceus* in Libellulidae." (Authors)] Address: Cao, L., College of Life Science, Jiangxi Normal University, Nanchang 330022, China. E-mail: clzclz1011@163.com

**19321.** Celinski, D.; Wolcezka, M.; Kadej, M.; Smolis, A.; Tamawski, D. (2019): The first record of *Leucorrhinia pectoralis* (Charpentier, 1825) (Odonata: Libellulidae) in the "Stawy Milickie" Nature Reserve. *Przyroda Sudetów* 22: 73-78. (in Polish, with English summary) ["We describe observations (2.06.2018) of males of *Leucorrhinia pectoralis* in the nature reserve "Stawy Milickie". The observed individuals stayed close to the margins of reed beds and small fragments of open water table surrounded by reeds (the dominant hydrophyte in the site of observation was *Myriophyllum spicatum* L.). The locality found by us in the nature reserve "Stawy Milickie" (Stawno ponds) is among about a dozen records of *L. pectoralis* from Lower Silesia. The great majority of the known localities of the species is located in the south-western part of Lower Silesian province, while the above locality is situated in its north-eastern part, near the boundary of Lower Silesia and Wielkopolska." (Authors)] Address: Celinski, D., Pracownia Biologii Konserwatorskiej i Ochrony Bezkręgowców, Zakład Biologii, Ewolucji i Ochrony Bezkręgowców, Instytut Biologii Środowiskowej, Wydział Nauk Biologicznych, Uniwersytet Wrocławski, ul. Przybyszewskiego 65, 51-148 Wrocław, Poland. E-mail: damian.celinski@onet.pl

**19322.** Chelli, A.; Moulai, R. (2019): Ecological characterization of the odonatafauna in lotic and lentic waters of northeast Algeria. *Annales de la Société entomologique de France* (N.S.) 55(5): 430-445. (in English, with French summary) ["The purpose of this paper is to determine the Odonata fauna structure and composition in Bejaia's wetlands, which have been poorly sampled until now. This paper is a report of a pioneer study of dragonflies in the Bejaia area in northeastern Algeria, with the aim to improve the knowledge of the Odonata taxa present in this vast territory, which covers 3268 km<sup>2</sup>. This region is of major importance, and contains Wadi Soummam which is classified by the Ramsar Convention as of international importance. In addition, Lake Mezaia is included in the Gouraya National Park, and the area also contains high mountain forest ponds, which are unknown to both the general public and the scientific community due to their remote location and poor accessibility. Despite the anthropogenic pressures on these wetlands, this study recorded 33 Odonata species, which represented 52% of the species known in Algeria. None were new to the country. The recorded species included two Maghrebian endemic taxa, namely *Platycnemis subdilatata* and *Enallagma*

*deserti*." (Authors)] Address: Chelli, A., Laboratoire de Zoologie Appliquée et d'Écophysiologie Animale, Faculté des Sciences de la Nature et de la Vie, Université de Bejaia, Bejaia, Algeria

**19323.** Chovanec, A. (2019): Libellenkundliche Bewertung des restrukturierten Mündungsabschnitts der Mattig (Oberösterreich). im Auftrag des Amtes der Oberösterreichischen Landesregierung, Abt. Wasserwirtschaft: 37 pp. (in German) ["The lowest river kilometre of the Mattig in Braunau (Upper Austria) was the subject of a dragonfly study in 2019. Its aim was to evaluate the measures carried out in 2005-2007 for the ecological upgrading of this hyporhithral stretch of water. The restructuring measures favoured the colonisation of the river by dragonfly species specific to the water body type (especially *Calopteryx virgo*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*), which is expressed in the assessment "very good dragonfly ecological status". However, the low numbers of individuals, especially of sediment-bound species from the family Gomphidae, show that the supply of corresponding larval habitats in the studied section is rather low. Widening and the creation of flow-calming and flow-free zones promoted the abundance of individuals of *Calopteryx splendens*, a species with its longitudinal zonal focus in the Potamal, and of limnophilic species. This indicates potamalisation effects. The different characteristics of the five mapped study stretches in terms of water morphology, flow and bedload conditions as well as vegetation are reflected in differences in the dragonfly fauna." (Author/DeepL)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmnat.gv.at

**19324.** Chovanec, A. (2019): Restrukturierungsmaßnahmen an der Krems im Bereich Ansfelden / Oberaudorf (Oberösterreich): Bewertung aus libellenkundlicher Sicht im Jahr 2019. Im Auftrag des Amtes der Oberösterreichischen Landesregierung, Abt. Wasserwirtschaft: 59 pp. (in German) ["In the years 2006 - 2008, hydraulic engineering interventions were carried out on the approximately 1.5 km long section of the Krems in Ansfelden / Oberaudorf in order to increase flood safety and ecologically enhance the watercourse. Corrections were carried out in 2018. The aim of the present study, which was carried out in 2019, was to examine the ecological effectiveness of the measures in terms of dragonflies. At each of the six study stretches mapped six times, 28 dragonfly species were detected, of which 22 were classified as certain, probable or possibly native (reproducing). 21 species - 18 of them certainly, probably or possibly native - belong to the reference species spectrum specific to the water body type (indicator and accompanying species). In this area, the Krems is assigned to the transitional region Hyporhithral / Epipotamal of the bio-region Bavarian-Austrian Alpine Foothills. Four leading species (*Calopteryx splendens*, *Calopteryx virgo*, *Gomphus vulgatissimus* and *Onychogomphus forcipatus*) were certainly ground-dwelling, which could be confirmed by the finding of exuviae and newly hatched individuals. The high individual densities should be emphasised: 17 of the 22 ground-

dwelling species occurred frequently, very frequently or en masse in at least one study section. Based on the findings, the dragonfly ecological status of the entire watercourse section can be classified as "very good". The different water typological characteristics of sections in the study area are reflected in the dragonfly fauna: The free-flowing section of the Krems (study sections A and B) had a high structural diversity (gravel banks, helophytes, flow-calm zones with submerged macrophytes in the flow shadow of groynes) and was colonised in particular by the rheophilic and rheobiont (flow-loving) reference species. The dragonfly ecological condition of this section was assessed as "very good". As a result of the hydraulic engineering corrections carried out in 2018, the left-bank side channel connected on both sides (sections D and E) was doped and flowed through from the main channel of the Krems throughout 2019, which had a positive effect on the dragonfly fauna specific to the water body type. This section was also the habitat of rheophilic and rheobiont reference species in particular. The dragonfly ecological status of this section was classified as "good". (Author/DeepL)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmnt.gv.at

**19325.** Guilfoyle, M.P.; Philley, K.D.; Britzke, E.R.; Harrison, A.B.; Slack, W.T.; Schoppmann, N. (2019): Shale Barren mapping and threatened and endangered species surveys for Raystown Lake, PA: U.S. Army Corps of Engineers, Baltimore District. Technical Report. Project 122148: 192 pp. (in English) ["This study mapped and surveyed shale barren plant communities at Raystown Lake, Huntingdon County, Pennsylvania. The location and extent of the shale barren communities were assessed, and various botanical species, including state and federal listed species were identified. An acoustic bat survey was done to revise and update a prior bat survey completed in 2014. In addition, invertebrate surveys of aquatic insects and fresh water mussels were also performed. Finally, numerous nocturnal, xeric-habitat specialist moths were collected to assess the presence or absence of state listed, or other rare and sensitive species, on the shale barrens. A total of 73 potential shale barren areas were identified and mapped. All shale barren endemic species previously known from Huntingdon County were confirmed at Raystown Lake, with the exception of shale barren goldenrod (*Solidago arguta*). ... Aquatic invertebrate sampling yielded specimens of *Calopteryx dimidiata*, which was thought to be extirpated from Pennsylvania and represents a new county record. Some other additional rare, sensitive aquatic insects collected during this study include *Boyeria grafiana*, *Cordulegaster erronea*, ... Results of all these surveys are expected to update the knowledge and understanding of rare, sensitive, state or federal listed species on Raystown Lake. These results are discussed in relation to potential management actions that may assist with the conservation and protection of these species and their habitats. Further, these data can now be used to update the Raystown Lake Master Plan." (Authors)] Address: U.S. Army Engineer Research and Development Center (ERDC) Environmental Laboratory (EL) Waterways

Experiment Station, 3909 Halls Ferry Road Vicksburg, MS 39180-6199, USA

**19326.** Huang, D.; Fu, Y.; Nel, A. (2019): The first Chinese representative of the Jurassic damsel-dragonfly genus *Hypsothemis* (Odonata: Isophlebioidea: Camptero-phlebiidae). *Alcheringa* 44(1): 99-103. (in English) ["A new camptero-phlebiid damsel-dragonfly, *Hypsothemis sinensis* sp. nov., is described from the lowermost Upper Jurassic Haifanggou Formation at the Daohugou locality in the Ningcheng Basin, China. This is the first Chinese representative of this genus, previously known only from the coeval upper Karabastau Formation in Kazakhstan, reflecting strong palaeobiogeographic links between these two entomofaunas." (Authors)] Address: Nel, A., Institut de Systématique, Evolution, Biodiversité, ISYEB, UMR 7205, CNRS, MNHN, UPMC, EPHE, Muséum national d'Histoire naturelle, Sorbonne Universités, Université des Antilles, 57, rue Cuvier, CP 50, Entomologie 75005 Paris, France. Email: anel@mnhn.fr

**19327.** Ilahi, I.; Yousafzai, A.M.; Attaullah, M.; Haq, T.U.; Ali, H.; Rahim, A.; Sajad, M.A.; Najeel, S.; Zaman, S.; Ullah, S.; Ahmad, A.; Begum, R.; Waqas, Bibi, H.; Hussain, S.; Ahmad, B. (2019): The role of odonate nymphs in ecofriendly control of mosquitoes and sensitivity of odonate nymphs to inorganic nutrient pollutants. *Applied Ecology and Environmental Research* 17(3): 6171-6188. (in English) ["During the present research, the predatory efficiency of nymphs of six coexisting odonate species i.e., *I. elegans*, *T. aurora*, *P. flavescens*, *L. fulva*, *S. decoloratum* and *C. servilia* was studied by using the 3rd instar larvae of *Cx. quinquefasciatus* as prey. Among the odonate species, there was observed variation in the daily feeding rate. The highest number of mosquito larvae was ingested by the *P. flavescens* nymph ( $47.0 \pm 5.1$  mosquito larvae/day). The predation performance of the odonate nymph was also compared between the day and night times. The feeding rate of nymphs of most odonate species was significantly higher during the daytime as compared to night-time ( $P \geq 0.05$ ). During the present research, feeding rates of odonate nymphs on *Cx. quinquefasciatus* 3rd instar larvae were also studied under varied condition of prey and predator density and water volume. Feeding rate of nymphs of each odonate species was positively correlated with increase in predator and prey density but was negatively correlated with increase in water volume. During the present research, odonate nymphs i.e., *I. elegans*, *T. aurora* and *P. flavescens* were exposed to various concentration of  $NH_4^+$  and  $NO_3^-$  in the laboratory for seven days. Nymph of *P. flavescens* species was found least sensitive to both,  $NH_4^+$  and  $NO_3^-$ . From the findings of the present research it was concluded that *P. flavescens* species is more efficient predator of *Cx. quinquefasciatus* 3rd instar larvae and is highly resistant to increasing water level of  $NH_4^+$  and  $NO_3^-$ ." (Authors)] Address: Ilahi, I., Dept of Zoology, University of Malakand, Chakdara, Dir Lower, Khyber Pakhtunkhwa, Pakistan. Email: ikramilahi@uom.edu.pk

**19328.** Johansson, F.; Bini, L.M.; Coiffard, P.; Svanbäck, R.; Wester, J.; Heino, J. (2019): Environmental differences

drive differences in the beta diversity of dragonfly assemblages among urban stormwater ponds. Ecological indicators 106(12): 9 pp. (in English) ["Subject: Anisoptera (Odonata), adults, algae, environmental factors, environmental indicators, land use, landscapes, macrophytes, models, oviposition sites, pollutants, ponds, predators, species diversity, stormwater, urban areas, vegetation cover, vegetation types, Sweden Abstract: Stormwater ponds are beneficial to urban landscapes because these man-made systems can reduce the negative effects of flooding in urban areas and restrain the distribution of pollutants. In addition, these systems are especially important to maintain the biodiversity of urban landscapes. Here, we sampled a set of 18 stormwater ponds in the city of Uppsala in Sweden to test the relationship between beta diversity of adult dragonflies and environmental factors (local and land use variables). We analysed the total beta diversity and its two components: replacement and richness difference. We recorded 31 species of Odonata, comprising 61% of the Odonata species in the province of Uppland in Sweden. By itself, this result indicates the importance of stormwater ponds in contributing to biodiversity in urban areas. The richness difference component of beta diversity was higher than the replacement component. Results from generalized dissimilarity models indicated that the richness difference component was mainly related with pond area and total vegetation cover (aquatic vegetation plus vegetation surrounding ponds). Focusing on different vegetation variables separately, models indicated that the beta diversity components were significantly correlated with percentage cover of floating algae scums, emergent aquatic macrophytes and tall shore vegetation. These results are consistent with what is known about the ecology of dragonflies, including the importance of aerial plant structures for perching, shelter from terrestrial and aquatic predators, and for providing oviposition sites. We also found that the stormwater ponds harboured a large part of the regional species pool. These systems are therefore important havens of biodiversity in urban landscapes. Our results also indicate that the management of different types of vegetation is key to maximize the potential of these systems in maintaining regional biodiversity." (Authors)] Address: Johansson, F., Dept of Ecology & Environmental Science, Animal Ecology Group, Umea University, 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**19329.** Juracka, P.J.; Dobiáš, J.; Boukal, D.S.; Šorf, M.; Beran, L.; Cerný, M.; Petrušek, A. (2019): Spatial context strongly affects community composition of both passively and actively dispersing pool invertebrates in a highly heterogeneous landscape. *Freshwater Biology* 64(12): 2093-2106. (in English) ["1. The spatial distribution of suitable habitats and dispersal abilities of the constituent taxa jointly affect the structure of metacommunities in standing freshwaters. Most studies exploring spatial effects on aquatic metacommunities, however, focus on at most a few taxonomic groups. 2. Within two consecutive seasons, we studied spatial patterns in the species richness and composition of three passively dispersing and three actively flying freshwater invertebrate groups (rotifers, microcrustaceans and molluscs vs.

hemipterans, aquatic beetles and odonates) in a metacommunity system consisting of 42 newly or recently created fishless pools in a highly heterogeneous Central European sandstone landscape consisting of deep valleys and steep ridges. We hypothesized that the extent to which these dispersal barriers affect invertebrate groups depends on their dispersal mode, and that the ability of each group to colonize new habitats is affected by the landscape morphology. Moreover, we predicted that the history and age of the pools would play a major role in structuring of invertebrate communities. 3. Following the classical island biogeography pattern, habitat size (measured as pool surface area or depth) was the key characteristic influencing species richness for each of the six studied groups (range of explained variation: 10%–58.7%). The number of nearby aquatic habitats (i.e., potential colonization sources) was also an important determinant of species richness for molluscs (18.8%), crustaceans (36.4%) and aquatic beetles (27.2%). After pool size, the most important factor influencing species richness was the presence and functional composition of aquatic macrophytes in the pools, which affected the species richness of odonates (25.2%), aquatic beetles (12.2%), rotifers (11.1%), and crustaceans (8.3%). 4. Valley distances between localities, defined as the shortest distance that avoids crossing steep ridges, explained consistently slightly more variation in species composition (2.6%–12.6%) than did Euclidean distances (1.0%–10.1%) for all six groups. Spatial variables (the valley distance matrix, position of pools within clusters in the landscape, and the number of nearby aquatic habitats) explained more variation in species composition (3.4%–25.4%) than local pool characteristics (2.8%–9.4%) or temporal variation (0%–7.6%) in all taxa except hemipterans, whose species composition was almost equally affected by local (3.3%) and spatial factors (3.4%). 5. We conclude that landscape-level spatial structure in our study area affects the dispersal and metacommunity assembly of both actively and passively dispersing invertebrates more than studied pool characteristics or temporal variation. The observed congruence between groups with different dispersal modes is likely because flying insects follow similar dispersal routes as the key animal vectors of passive dispersers. Our study highlights the importance of including relevant topography features in studies of aquatic metacommunities in complex and heterogeneous landscapes, even for taxa considered to be efficient dispersers." (Authors) The study includes 24 odonate taxa.] Address: Juracka, P.J., Dept Ecol., Fac. Science, Charles Univ., Vinicná 7, Prague 2, 12844, Czech Republic. Email: juracka@natur.cuni.cz

**19330.** Khan, M.K.; Herberstein, M.E. (2019): Sexually dimorphic blue bands are intrasexual aposematic signals in nonterritorial damselflies. *Animal Behaviour* 156: 21-29. (in English) ["Highlights: • Dimorphic male colour evolves by female choice or by male-male interactions. • In damselflies, females did not prefer males with abdominal blue bands. • However, conspicuous blue bands reduced male mating attempts. • Conspicuous male colour here functions as an anti-harassment aposematic signal. Abstract: Sexually dimor-

phic traits in males are thought to evolve via female preference or male–male competition. Alternatively, in species without overt male displays or female mate choice, dimorphic coloration may function as a warning signal to conspecific males thereby avoiding costly harassment. We aimed to determine the function of sexual dimorphic coloration in the damselfly *Xanthagrion erythroneurum* in which males, but not females, have conspicuous blue bands on the tip of the abdomen. We show that the male blue bands and female black abdomen are chromatically and achromatically discriminable against their natural background. Moreover, the male blue bands and their adjacent abdominal segments generate higher internal contrast than female abdominal segments. We conducted two sets of experiments to test alternative hypotheses that the male blue bands are (1) the target of female mate choice, or (2) an intrasexual aposematic signal to avoid male mating harassment. We hid male blue bands by painting them black and measured female preference between the manipulated and the nonmanipulated (control) males. We found no difference in mating success between the control and manipulated males, thereby rejecting the female preference hypothesis. To test whether the blue bands function as a warning signal, we manipulated the females by painting male-like blue bands on their abdomen and measured the male response to those females relative to control females. Females with artificial blue bands on the terminal abdomen were mated less frequently than control females. However, when we painted blue bands on the anterior abdominal segments, the males did not discriminate between control and painted females. Our study demonstrates that dimorphic coloration advertises the males' unprofitability as mates to conspecifics thereby reducing intrasexual harassment." (Authors)] Address: Khan, M.K., Dept Biol. Sciences, Macquarie Univ., Sydney, NSW-2109, Australia. E-mail: bmbkawsar@gmail.com

**19331.** Luhring, T.M.; Vavra, J.M.; Cressler, C.E.; DeLong, J.P. (2019): Phenotypically plastic responses to predation risk are temperature dependent. *Oecologia* 191(3): 709-719. (in English) ["Predicting how organisms respond to climate change requires that we understand the temperature dependence of fitness in relevant ecological contexts (e.g., with or without predation risk). Predation risk often induces changes to life history traits that are themselves temperature dependent. We explore how perceived predation risk and temperature interact to determine fitness (indicated by the intrinsic rate of increase,  $r$ ) through changes to its underlying components (net reproductive rate, generation time, and survival) in *Daphnia magna*. We exposed *Daphnia* to predation cues from dragonfly naiads early, late, or throughout their ontogeny. Predation risk increased  $r$  differentially across temperatures and depending on the timing of exposure to predation cues. The timing of predation risk likewise altered the temperature-dependent response of  $T$  and  $R_0$ . *Daphnia* at hotter temperatures responded to predation risk by increasing  $r$  through a combination of increased  $R_0$  and decreased  $T$  that together countered an increase in mortality rate. However, only *D. magna* that experienced predation cues early in ontogeny showed elevated

$r$  at colder temperatures. These results highlight the fact that phenotypically plastic responses of life history traits to predation risk can be strongly temperature dependent." (Authors)] Address: Luhring, T.M., School Biological Sciences, University of Nebraska-Lincoln, 410 Manter Hall, Lincoln, NE, 68588, USA. Email: tomluhring@gmail.com.

**19332.** Martínez-Lendeck, N.; Osorio-Beristain, M.; Franco, B.; Pedraza-Reyes, M.; Obregón, A.; Contreras-Garduño, J. (2019): Does juvenile hormone prompt males to oxidative stress? *Journal of Experimental Biology* 222 (5): jeb194530: 4pp. (in English) ["In invertebrates, it has been recently reported that secondary sexual characteristics (SSC) reflect the antioxidant defense of their bearers, but it is not known what physiological link maintains the honesty of those signals. Here, we use the damselfly *Hetaerina americana* to test whether Juvenile Hormone plays such a role. First, we analyzed whether oxidative damage is a real threat in natural damselfly populations by examining the accumulation of oxidized guanines as a function of age in males. Then, we injected paraquat (a pro-oxidant agent) and added the Juvenile Hormone analog Methoprene (JHa) to the experimental group and the JHa vehicle (acetone) to the control group, to determine whether JHa increases the levels of pro-oxidants and antioxidants. We found that DNA oxidation increased with age, and levels of hydrogen peroxide and superoxide dismutase, but not catalase or glutathione, were elevated in the JHa group compared to the control group. We propose that Juvenile Hormone is a mediator of the relationship between SSC and antioxidant capacity and based on the literature, we know that JHa suppresses immune response. We therefore suggest that Juvenile Hormone is a molecular mediator of the general health of males, which is reflected in their SSC." A(uthors)] Address: Contreras-Garduño, J. Escuela Nacional de Estudios Superiores, Unidad Morelia, UNAM, Antigua Carretera a Pátzcuaro 8701, Ex-Hacienda de San José de La Huerta, 58190 Morelia, Michoacán, Mexico. Email: jcg@enesmorelia.unam.mx

**19333.** Morghad, F.; Samraoui, F.; Touati, L.; Samraoui, B. (2019): The times they are a changin': impact of landuse shift and climate on the community of a Mediterranean stream over a 25-year period. *Vie et milieu - Life and environment* 69(1): 25-33. ["We assessed the observed effects of land-use alterations and global warming by analyzing changes in the Odonata community of a Mediterranean stream in northeastern Algeria, sampled at a 25-year interval. Results indicate that species richness has increased from 13 to 21 species. However, the apparent increase in species richness seemed to mirror recent physical and chemical changes brought upon the stream. In particular, these anthropogenic environmental changes seemed to have been driving a large-scale shift in the composition of the Odonata community of Wadi Bouaroug with an influx of widespread, thermophilic species (*Paragomphus genei*, *Crocothemis erythraea*, *Sympetrum fonscolombii*, *Trithemis* spp.) at the expense of rare, stenotypic species (*Coenagrion puella*, *Gomphus lucasii*). In the light of impending and



challenging climatic scenarios, we urge that steps should be taken to set up more long-term monitoring schemes and research of North African streams that may provide insights into causal mechanisms of global changes." (Authors)] Address: Samraoui, B., Dept of Biology, University of Annaba, Annaba, Algeria. E-mail: bsamraoui@gmail.com

**19334.** Ning, X.; Cheng, C.; Yu, X.; Bu, W. (2019): A research of color pattern variation on thorax of *Coeliccia cyanomelas* (Odonata: Coenagrionoidea: Platycnemididae). *Journal of Environmental Entomology* 41(3): 566-573. (in Chinese, with English summary) ["The color pattern on thorax of male *Coeliccia cyanomelas* varied obviously between populations. This was mainly reflected in whether a pair of spots on the pronotum or not, as well as the size, shape and quantity of the marks on dorsal and lateral surface of synthorax. The geometric morphometrics, and observation of spots on the pronotum, were conducted based on 319 individuals of male *C. cyanomelas* from 34 populations. Almost all individuals from northwest region had a pair of spots on the pronotum, while those in the southeast were missing. The analyses of geometric morphometrics reflected that all samples can be divided into northwest and southeast types based on the shape of marks on lateral synthorax. Individuals of both types occurred in the overlapping area. Results from two methods in this study were coincident, which indicated a significant variation on color pattern of male *C. cyanomelas*. Geometric morphometric is very useful in analysis of the variation tendency of color pattern of Odonata, and can provide evidences for the evolutionary history and the formation of geographical pattern of species." (Authors)] Address: Yu, X., Coll. Life Sciences, Chongqing Normal Univ., Chongqing, PR China. E-mail: lannysummer@163.com

**19335.** Oliveira-Junior, J.M.B.; Juen, L. (2019): Structuring of dragonfly communities (Insecta: Odonata) in Eastern Amazon: Effects of environmental and spatial factors in preserved and altered streams. *Insects* 2019, 10, 322: 18 pp. (in English) ["The evaluation of the effects of environmental factors on natural communities has been one of the principal approaches in ecology; although, over the past decade, increasing importance has been given to spatial factors. In this context, we evaluated the relative importance of environmental and spatial factors for the structuring of the local odonate communities in preserved and altered streams. Adult Odonata were sampled in 98 streams in eastern Amazonia, Brazil. The physical features of each stream were evaluated and spatial variables were generated. Only environmental factors accounted for the variation in the Odonata community. The same pattern was observed in Zygoptera. For Anisoptera, environmental factors alone affect the variation in the community, considering all the environments together, and the altered areas on their own. As the two Odonata suborders presented distinct responses to environmental factors, this partitioning may contribute to an improvement in the precision of studies in biomonitoring. We thus suggest that studies would have a greater explanatory potential if additional variables are included, related to biotic

interactions (e.g., competition). This will require further investigation on a finer scale of environmental variation to determine how the Odonata fauna of Amazonian streams behaves under this analytical perspective." (Authors)] Address: Oliveira-Junior, J.M.B., Programa de Pós-Graduação em Zoologia, Programa de Pós-Graduação em Ecologia, Laboratório de Ecologia e Conservação, Universidade Federal do Pará, Rua Augusto Correia, Nº 1, Bairro Guamá, CEP: 66075-110, Belém, Pará, Brazil

**19336.** Pavel, A.B.; Selma Menabit, S. Skolka, M.; Lupascu, N.; Pop, I.-C.; Opreanu, G. Stanescu, I. Scriciu, A. (2019): New data regarding the presence of two insect larvae species – *Gomphus (Stylurus) flavipes* (Odonata) and *Palingenia longicauda* (Ephemeroptera) – in the lower sector of the Danube River. *Geo-Eco-Marina* 25/2019: 2019-140. (in English) ["The paper presents data regarding two larvae insect populations – *Stylurus flavipes* and *Palingenia longicauda* (Olivier, 1791), inhabiting in the communities existing at the water/sediment interface along the Danube River. *S. flavipes* is one of the most important indicator species, listed in Annex IV of the EU Habitats Directive (EU Directive 92/43/EEC) and included in the IUCN Red List of Threatened Species, 2014. This species of dragonfly has become an endangered species in most Western European countries due to water pollution and river regulation. The other important larvae species, mayfly *P. longicauda*, listed in Annex II of the Bern Convention, is considered critically endangered in Europe. Both require a specific habitat conditions in order to complete their life cycle. During the spring campaigns conducted during 2012-2015, the presence of the two species was reported in 26 profiles from the Lower Danube Sector, *S. flavipes* in 18 profiles, and *P. longicauda* in 10 profiles. The most abundant occurrences were recorded in 2015, at Km 4 – Măcin Arm (59.2 ind/m<sup>2</sup> for *S. flavipes*, respectively, in 2012, at Km 8 – Sf. Gheorghe) (125.8 ind/m<sup>2</sup>) for *P. longicauda*. The presence or absence of larvae in samples, as well as their abundance, are strictly dependent on ecological conditions, the type of substrate representing the decisive factor in the microdistribution of the two larvae." (Authors)] Address: Pavel, Ana Bianca, National Institute of Marine Geology and Geo-Ecology (GeoEcoMar), 23-25 Dimitrie Onciul St., 024053 Bucharest, Romania. Email: ariadnas30@yahoo.com

**19337.** Pires, M.M.; Bender Kotzian, C.; Sganzerla, C.; Prass, G.; Schmidt Dalzochio, M.; Périco, E. (2019): Diversity of Odonata (Insecta) in Seasonal Deciduous Forest fragments in southern Brazil (state of Rio Grande do Sul), with a new record for the state and comments on the seasonal distribution of the species. *Biota Neotrop.* 19(4) e20190769: 12 pp. (in English, with Portuguese summary) ["We present an Odonata (Insecta) check list of species occurring in a fragment of the Seasonal Deciduous Forest (Atlantic Forest biome) from the central region of the state of Rio Grande do Sul (RS), southern Brazil, along with a list of the odonate species recorded in this phytoecological region for the state. In addition, we provide comments on the seasonal distribution of the species occurring in the study area. Two streams

and seven farm ponds located in the middle course of the Jacuí River basin were surveyed between December 2007 and February 2009. Overall, we recorded 49 species from 21 genera and six families. *Argia serva* had its first occurrence record mentioned for the state, elevating to 183 the total number of Odonata species occurring in Rio Grande do Sul. The number of species recorded in the study area corresponds to ~26% of the known Odonata diversity in RS. Libellulidae was the most species-rich family (22 species, ~45% of the total), followed by Coenagrionidae (18 species, 37% of the total). The checklist for the Seasonal Deciduous Forest in RS indicated the occurrence of 83 species of Odonata in this phytoecological region (~45% of the known odonate species in the state). This elevated diversity could be related to the density of the vegetation structure. In the study area, 20 species were found in streams, and 45 in farm ponds. Species occurrence showed marked seasonal patterns in the study area, with 88% of the species recorded from summer to autumn, and no species detected in streams in the winter. Moreover, 70% of the species were recorded in either one or two seasons in farm ponds, while 65% occurred solely in one season in streams. This result indicates that the life cycle of Odonata in southern Brazil is strongly influenced by seasonal patterns in temperature." (Author) *A. serva* is recorded for the first time in RS.] Address: Pires, M.M., Univde do Vale do Rio dos Sinos, Lab. de Ecologia e Conservacao de Ecossistemas Aquaticos, Av. Unisinos, 950, 93022-750, Sao Leopoldo, RS, Brasil. E-mail: marquespiresm@gmail.com

**19338.** Prokop, J.; Krzeminska, E.; Krzeminski, W.; Rosova, K.; Pecharova, M.; Nel, A. (2019): Ecomorphological diversification of the Late Palaeozoic Palaeodictyoptera reveals different larval strategies and amphibious lifestyle in adults. *Soc. open sci.* 6: 190460: 10 pp. (in English) ["The Late Palaeozoic insect superorder Palaeodictyoptera exhibits a remarkable disparity of larval ecomorphotypes, enabling these animals to occupy diverse ecological niches. The widely accepted hypothesis presumed that their immature stages only occupied terrestrial habitats, although authors more than a century ago hypothesized they had specializations for amphibious or even aquatic life histories. Here, we show that different species had a disparity of semiaquatic or aquatic specializations in larvae and even the supposed retention of abdominal tracheal gills by some adults. While a majority of mature larvae in Palaeodictyoptera lack unambiguous lateral tracheal gills, some recently discovered early instars had terminal appendages with prominent lateral lamellae like in living damselflies, allowing support in locomotion along with respiratory function. These results demonstrate that some species of Palaeodictyoptera had aquatic or semiaquatic larvae during at least a brief period of their post-embryonic development. The retention of functional gills or gill sockets by adults indicates their amphibious lifestyle and habitats tightly connected with a water environment as is analogously known for some modern Ephemeroptera or Plecoptera. Our study refutes an entirely terrestrial lifestyle for all representatives of the early diverging pterygote group of Palaeodictyoptera, a greatly varied

and diverse lineage which probably encompassed many different biologies and life histories." (Authors) The paper includes references to Odonata.] Address: Prokop, J., Dept of Zoology, Faculty of Science, Charles University, Viničná 7, CZ-128 00, Praha 2, Czech Republic

**19339.** Sansault, E.; Baeta, R.; Rivière, T. (2019): Suivi odonologique des mardelles du Petit Eplin, saison 2018. Association Naturaliste d'Étude et de Protection des Écosystèmes CAUDALIS: 60 pp. (in French) [Indre-et-Loire, France; "Although the species range is significant, with 37 species observed in 2018 for 45 known historically, only three species are present on more than half of the mardelles (*Sympetrum sanguineum*, *Lestes dryas* and *Libellula quadrimaculata*). However, in terms of numbers and number of breeding sites, only *S. sanguineum* and *L. dryas* dominate the procession and together account for almost half of the Odonata numbers reported in 2018 (nearly 2,300 individuals observed). ... Conclusion: The Ruchard mardelles are a natural formation that appeared between 15,000 and 30,000 years ago through a phenomenon that is still poorly understood but which is known to be rare in our country. Their extensive use by pastoralists for thousands of years has, over the last forty years, given way to coniferous monocultures. This transformation of use has led to profound changes in the habitats present: the moors have been replaced by maritime pines and the mardelles have mostly been drained or filled in and are still under significant pressure. As far as Odonata are concerned, the sector remains one of the richest in the department, with 45 known species (of which 37 were observed during the 2018 season). The composition of the assemblage is quite unique, as it is dominated by a very common species, *Sympetrum sanguineum*, and by a fairly rare species, *Lestes dryas*. However, we note the absence of several very demanding heritage species such as *Leucorrhinia pectoralis* or *Sympetrum danae*. The latter, last observed on the site in 2013, is critically endangered in the Centre-Val de Loire region and could disappear rapidly if no measures are taken to conserve its breeding sites. A large-scale study on ways of conserving certain mardella habitats and restoring others could be carried out rapidly in conjunction with the State services (DDT, DREAL) and the owner (Groupement forestier de Cravant-Saint-Benoît). The conservation actions to be implemented could include the signing of a management agreement and the drafting of management plans, the carrying out of a hydrological study that could lead to work to modify the network of drains so that the area once again plays its role as a climatic and hydric buffer. All these measures could allow the mobilisation of European credits on the local territory via a large-scale LIFE-type project supported politically by the local authorities and technically by the associations. Such a project would be effective in restoring habitats considered to be priorities because of their poor state of conservation, while at the same time giving the local area an economic boost in the short term (involvement of local companies in the restoration work, setting up a sheep or cattle rearing project to supply local communities and schools with local meat, etc.) and in the long term (significant tourist value,

educational projects, return of ecosystem services provided free of charge by these natural habitats, fight against global warming, etc.)" (Authors/ DeepL)] Address: Sansault, E., Association Naturaliste d'Étude et de Protection des Écosystèmes CAUDALIS, 1, rue de la Mairie, 37520 La Riche, France. Email: eric.sansault@anepe-caudalis.fr

**19340.** Schilder, R.J.; Stewart, H. (2019): Parasitic gut infection in *Libellula pulchella* causes functional and molecular resemblance of dragonfly flight muscle to skeletal muscle of obese vertebrates. *Journal of Experimental Biology* 222: 10 pp. (in English) ["We previously demonstrated the existence of a naturally occurring metabolic disease phenotype in *Libellula pulchella* dragonflies that shows high similarity to vertebrate obesity and type II diabetes, and is caused by a protozoan gut parasite. To further mechanistic understanding of how this metabolic disease phenotype affects fitness of male *L. pulchella* in vivo, we examined infection effects on in situ muscle performance and molecular traits relevant to dragonfly flight performance in nature. Importantly, these traits were previously shown to be affected in obese vertebrates. Similarly to obesity effects in rat skeletal muscle, dragonfly gut infection caused a disruption of relationships between body mass, flight muscle power output and alternative pre-mRNA splicing of troponin T, which affects muscle calcium sensitivity and performance in insects and vertebrates. In addition, when simulated in situ to contract at cycle frequencies ranging from 20 to 45 Hz, flight muscles of infected individuals displayed a left shift in power–cycle frequency curves, indicating a significant reduction in their optimal cycle frequency. Interestingly, these power–cycle curves were similar to those produced by flight muscles of non-infected teneral (i.e. physiologically immature) adult *L. pulchella* males. Overall, our results indicate that the effects of metabolic disease on skeletal muscle physiology in natural insect systems are similar to those observed in vertebrates maintained in laboratory settings. More generally, they indicate that study of natural, host–parasite interactions can contribute important insight into how environmental factors other than diet and exercise may contribute to the development of metabolic disease phenotypes." (Authors)] Address: Schilder, R.J., Pennsylvania State University, Department of Entomology, 501 Ag Sciences & Industries Building, State College, PA 16802, USA. Email: rjs360@psu.edu

**19341.** Vršanský, P.; Sendi, H.; Aristov, D.; Bechly, G.; Müller, P.; Ellenberger, S.; Azar, D.; Ueda, K.; Barna, P.; Garcia, T. (2019): Ancient roaches further exemplify 'no land return' in aquatic insects. *Gondwana Research* 68: 22-33. (in English) ["Highlights: •No insects returned to land after adapting to aquatic habits. •Aquatic insect family/terrestrial insect family ratio stabilizes from Triassic. •Semiaquatic cockroaches were widespread since Jurassic to present. •Semiaquatic eoblattid roaches were present since Carboniferous. Abstract: Among insects, 236 families in 18 of 44 orders independently invaded water. We report living amphibiotic cockroaches from tropical streams of UNESCO BR Sumaco, Ecuador. We also describe the first fossil aquatic roach larvae (6 spp.; n = 44, 1, 1, 1, 1) from the most diverse tropical

Mesozoic sediments (Middle Jurassic Bakhar Fm in Mongolia, Kimmeridgian Karabastau Fm in Kazakhstan; Aptian Crato Fm in Brazil), and the Barremian Lebanese and Cenomanian Myanmar ambers. Tropic-limited occurrences are trophic- (biomass/litter-fall), structural- (diversity) and also abiotic-factor-dependent (high temperatures). Diverse Paleozoic aquatic eoblattids are here (re)described from the lower Permian sediments of Elmo, U.S.A. and Chekarda, Russia. They competed with true cockroaches to reach water prior to the Mesozoic. Due to different evolutionary rates or periodical changes in water characteristics, non-adapted terrestrial insects repeatedly invaded the aquatic realm with well adapted hydrobionts. Obscurely, most aquatic lineages still survive. In contrast with Crustacea, aquatic-terrestrial reversal is absent. A single principal lineage, namely of moths, ancestral to butterflies (origination of modern insects from ephemerals and dragonflies is questioned), evolved from insects with aquatic immature stages, and none from aquatic adults. The rest of the orders are terrestrial-derived. The proposed reason for the lack of land return is the character of numerous aquatic adaptations related to reductions, which are unlikely to be resuppressed. The aquatic insect family/terrestrial insect family ratio over time reveals a sharp rise from the Late Carboniferous to Late Triassic followed by lasting stability. Diversification of aquatic insects seems consistent with a  $62.05 \pm 0.02$  Ma periodicity." (Authors)] Address: Bechly, G., Biologic Institute, 16310 NE 80th Street, Redmond, WA 98052, USA. E-mail: gbechly@biologicinstitute.org

## 2020

**19342.** BDS (2020): Notes & Observations. *Dragonfly news* 77: 28-29. (in English) [UK; Scorpionfly feeding on *Aeshna grandis*; deformed eye of *A. mixta*; mixed pairing between *Sympetrum danae* and *S. striolatum*] Address: not stated

**19343.** Bruus, M.; Rasmussen, J.J.; Strandberg, M.; Strandberg, B.; Sørensen, P.B.; Larsen, S.E.; Kjær, C.; Lorenz, S.; Wiberg-Larsen, P. (2020): Terrestrial adult stages of freshwater insects are sensitive to insecticides. *Chemosphere* 239, January 2020, 124799: 9 pp. (in English) ["Highlights: • Five of the six tested species were more sensitive to imidacloprid than the honeybee, when considering LD50 per individual. • Three of the six species tested were more sensitive to imidacloprid than the honeybee, when LD50 per g dw was considered. • All test species were more sensitive to lambda-cyhalothrin than the honey bee, irrespective of how LD50 was calculated. • The ranking of juveniles and adults according to sensitivity to lambda-cyhalothrin was not identical. Abstract: Terrestrial adult stages of freshwater insects may be exposed to pesticides by wind drift, over-spray, contact or feeding. However, studies addressing insecticide effects on freshwater invertebrates focus primarily on the impact of pesticides reaching the streams and potentially harming the aquatic juvenile stages. This is also reflected in the current risk assessment procedures, which do not include testing of adult freshwater insects. In order to assess the potential impact of insecticides

on adult stages of freshwater insects, we exposed six common species to the insecticides Karate (lambda-cyhalothrin) and Confidor (imidacloprid). Dose-response relations were established, and LD50 estimates were compared to those of the honey bee, *Apis mellifera* L. (Hymenoptera: Apidae), which is the standard terrestrial test insect when pesticides are evaluated prior to commercial release. Generally, the tested species were more sensitive to the studied insecticides than the honey bee. In order to examine whether the sensitivity of adult stages of freshwater insects corresponds with the sensitivity of the juvenile stages of the same species, the ranking of the two life stages with respect to the toxicity of Karate was compared, revealing some correspondence, but also some dissimilarities. Our results strongly indicate that terrestrial adult stages of aquatic insects are not adequately protected by current risk assessment procedures." (Authors) The paper includes references to Odonata.] Address: Bruus, Marianne, Aarhus Univ., Dept of Bioscience, Vejlsvøvej 25, DK-8600, Silkeborg, Denmark

**19344.** Buczynski, P.; Buczyńska, E.; Jirak-Leszczynska, A. (2020): Dragonflies (Odonata) of the Ojców National Park. *Parki nar. Rez. Przyr.* 39(1): 43-71. (in Polish, with English summary) ["In 2017-2019, the dragonfly fauna was studied in the Ojców National Park (southern Poland). This small park (2145.62 ha) protects the nature of the Polish Uplands. Its main axes are the valleys of two streams (Prądnik and Sąsówka) with little standing water, which is almost exclusively artificial. One of the streams (Prądnik) is heavily loaded with inflows from three wastewater treatment plants. The field work covered 52 sites, of which 43 were studied systematically and 40 dragonfly species were found. The most prevalent were *Aeshna cyanea* and *Libellula depressa*, Red-listed and protected species were only *Ophiogomphus cecilia*, *Orthetrum coerulescens* and *Sympetrum depressiusculum*. The authors analysed the occurrence of these species and the fauna of individual aquatic habitats (springs, streams, fish ponds, small water bodies) and discussed them against the background of fragmentary historical data. The odonatofauna of the park was not very rich compared to other national parks of Poland, it was also characterized by low numbers of individuals and very small numbers of species recorded in most sites (average 3.3) – with 28.8% of the sites without any dragonflies and up to 48.1% of the sites had neither autochthonous nor probably autochthonous species. Dragonflies in the springs were extremely rare and not numerous, the stream fauna was also poor, and in Prądnik it was clearly degraded by sewage inflows. The few centres of dragonfly diversity were found at two fish ponds, two artificial small water bodies located in the open area and one beaver pond. Without artificial waters, the park's fauna would probably be at least half the species poorer. Based on the collected data, the Ojców National Park was assessed as an area of minor and local significance for the protection of dragonflies, with not very rich and surprisingly strongly transformed fauna. (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**19345.** Casanueva, P.; Santamaría, T.; Hernández, M.A. Sánchez-Sastre, L.F.; Teixeira, A.; D Bennis, D.; El Haisoufi, M.; Ferreras-Romero, M.; Campos, F (2020): Biometric differences between several populations of *Cordulegaster boltonii* (Odonata: Cordulegasteridae) in Ibero-Maghrebian area. *Eur. J. Entomol.* 117: 260-264. (in English) ["Biometric data of the exuviae of female larvae of the dragonfly *Cordulegaster boltonii* collected in Portugal, Spain and Morocco were analysed to determine whether the size of three exuvial structures measured differed depending on the geographic localities of the populations. Based on the results recorded for the 16 populations studied, head width was negatively correlated with latitude and the greatest length of the gonapophysis was recorded for the Iberian populations at the centre of this peninsula. Multivariate cluster analysis revealed a clear separation of the Moroccan population. A second cluster separated the southernmost population (Sierra Nevada) from the remaining Iberian populations. Four population groups were distinguished: those located in watercourses in the north and central area of the Iberian Peninsula, those in Iberian watercourses in the East and Middle South, the Sierra Nevada and North Morocco. Some of these results coincide with the results of genetic studies of other authors." (Authors)] Address: Casanueva, Patricia, Department of Experimental Sciences, European University Miguel de Cervantes, C/ Padre Julio Chevalier 2, 47012 Valladolid, Spain. E-mail: pcasanueva@uemc.es

**19346.** Cham, S. (2020): On the discovery of a 'new' population of *Orthetrum coerulescens* (Fabricius) (Keel Skimmer) in a chalk quarry and factors affecting its continued survival. *Journal of the British Dragonfly Society* 36(1): 11-21. (in English) ["*O. coerulescens* was first discovered at Sundon Quarry, Bedfordshire in 2017. This is a chalk quarry and hence is atypical of other sites where *O. coerulescens* is found. In 2018 and 2019, higher numbers of adults were recorded, along with larvae and exuviae, confirming the presence of a breeding population. The Sundon population is one of the more inland populations in Britain and is some distance from the next known breeding site. It is considered to be vulnerable due to the small-scale nature of the habitat. Shallow seepages and runnels in base-rich sites are a scarce type of habitat and may explain the under reporting of any association of *O. coerulescens* with such sites. The continued survival of this colony of *O. coerulescens* will depend on a number of factors including whether the site can be managed to maintain the open seepage habitat and water supply that the species requires." (Author)] Address: Cham, S., 2 Hillside Road, Lower Stondon, Henlow, Bedfordshire, SG16 6LQ, UK. Email: stevecham1@aol.com

**19347.** Chelmick, D. (2020): Some observations on the life history and behaviour of *Aeshna affinis* Vander Linden (Southern Migrant Hawker). *Journal of the British Dragonfly Society* 36(1): 22-36. (in English) ["*Aeshna affinis* (Southern Migrant Hawker) has become a regular breeding species in the UK in recent years. Much of its life cycle is little known. This paper details the author's field observations, in both Spain and the UK, of some aspects of its habitat, life cycle



and adult behaviour. It is hoped that this will encourage more field observations so that a full understanding of its life cycle can be used to help conserve this apparently expanding species." (Author)] Address: Chelmick, D., 31 High Beech Lane, Haywards Heath, West Sussex RH16 1SQ, UK. Email: David.chelmick@gmail.com

**19348.** Choong, C.Y.; Dg Fazrinah, A.D.; Muhamad Amirul Ashraf, A.A.; Chung, A.Y.C.; Maryati, M. (2020): Diversity of Odonata species at Kangkawat, Imbak Canyon, Sabah. *Journal of Tropical Biology and Conservation* 17: 1-10. (in English) ["The Odonata fauna of Kangkawat Research Station in Imbak Canyon was surveyed during the Borneo Biogeographic Expedition from 28 September to 9 October 2018. A total of 56 species in 12 families were recorded – 18 species in Libellulidae, eight species in Platycnemididae, six species in Coenagrionidae, five species in Calopterygidae, four species each in Chlorocyphidae and Platystictidae, three species each in Euphaeidae and Gomphidae, two species in Synthemitidae and one species each in Devadattidae, Philosinidae and Aeshnidae. Of these, 10 species are new records for Imbak Canyon. The total number of species known from Imbak Canyon is now 83. Generally, Imbak Canyon is rich in Odonata, and it is a refuge for many uncommon species. Nevertheless, many more parts of the area still need to be explored for a more comprehensive picture of the Odonata of Imbak Canyon." (Authors)] Address: Choong C.Y., Centre for Insect Systematics, Fac. Science & Tech., Univ. Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. Email: cychoong@ukm.edu.my

**19349.** Denis, A.; Azemar, F.; Compin, A.; Danflous, S.; Pelozuelo, L. (2020): Digital records of *Macromia splendens* larvae in natura and notes on their micro-habitat (Odonata: Macromiidae). *Odonatologica* 49(3/4): 313-321. (in English) ["*M. splendens* is a rare species, endemic to southern France and the Iberian Peninsula. Information about its larval ecology is still scarce. For the first time, we have obtained 30 photographic and video records of *M. splendens* larvae in natura from three small rivers in southern France and we comment on these observations. Our observations confirm that *M. splendens* larvae live in shady places and hide in a covering of brown detritus, consisting of leaves and sticks, as indicated by previous studies. However, our observations show that larvae are also present in open micro-habitats, exposing them to trampling by bathers or horses." (Authors)] Address: Pelozuelo, L., Laboratoire Ecologie Fonctionnelle et Environnement, CNRS, INPT, UPS, 118 route de Narbonne, Bâtiment 4R1, 31062 Toulouse Cedex 9, France. Email: laurent.pelozuelo@univ-tlse3.fr

**19350.** Dukic, A.; Bolesnikov, I. (2020): *Caliaeschna microstigma* (Schneider 1845) (Re)discovered in Serbia (Odonata: Aeshnidae). *Acta Entomologica Slovenica* 28: 21-28. (in English, with Slovene summary) ["The distribution of *C. microstigma* in Europe is restricted mostly to the Balkans. As its populations have been declining over the past years, the species is classified as near Threatened (nT) in the European and Mediterranean Red lists. In Serbia, this species

was reported earlier, but the data is incomplete. Precise location and the description of the record is missing. During the field trip in July 2018 in Pèinja River valley (southern Serbia) two individuals of *C. microstigma* were recorded. Based on this study, further faunistic research should be carried out in southern parts of the country to map the present distribution of this rheophile species and to take the most effective management measures for its conservation." (Authors)] Address: Dukic, A., HabiProt, Janka Èmelika 28a 3/25, 21000 novi sad, Serbia. Email: aleksandar.djukic042@gmail.com

**19351.** Gauci, C. (2020): First exuviae of *Anax ephippiger* (Burmeister) (Vagrant Emperor) found in the Maltese Islands. *Journal of the British Dragonfly Society* 36(1): 37-43. (in English) ["Despite several tandems of *A. ephippiger* having been regularly observed ovipositing in the autumn in the Maltese Islands in recent years, no evidence of a resulting generation had come to light. In November 2019, two exuviae belonging to this species were found, confirming the successful breeding of this species." (Author)] Address: Gauci, C., 28, Triq il-Kissier, Mosta, Malta, MST1822

**19352.** Hazra, M.; Hazra, T.; Sarkar, S.K.; Bera, S.; Khan, M.A. (2020): First fossil dragonfly from India. *Current Science* 119(7): 1204-1207. (in English) ["In the Indian wetland palaeoecosystem, no dragonfly has been reported from the Cenozoic sediments until now. Here, we report a well-preserved fossil dragonfly (Odonata: Anisoptera) recovered from the late Neogene sediments of the Chotanagpur plateau, Jharkhand, eastern India. It is characterized by well-preserved head, thorax and a long cylindrical abdomen with terminalia and four wings with longitudinal veins, cross-veins and characteristic small pterostigma at the apex. These significant morphological attributes reveal a close resemblance of the fossil specimen with modern dragonflies of the family Libellulidae (order: Odonata, sub-order: Anisoptera). To the best of our knowledge, there is no reliable occurrence of dragonfly in the Indian fossil record. The core distribution of the dragonfly, suggests that it thrived under a tropical, warm, humid climate during the depositional period. The fossil specimen was found associated with prolific and diversified tropical angiospermic plant remains, vertebrates and invertebrates that provided a suitable palaeo-ecological niche for the dragonfly to survive. In addition, the fossil material and associated angiospermic flora indicate the terrestrial as well as freshwater lacustrine environment in Chotanagpur plateau during the depositional period." (Authors) Günter Bechly wrote at 24-11-2021: "The fossil from India is certainly not a dragonfly and the reconstructed morphology is already downright ridiculously impossible. I am not even sure if it is a fossil insect at all and not rather a plant remnant."] Address: Khan M.A., Centre of Advanced Study, Dept of Botany, University of Calcutta, 35, B.C. Road, Kolkata 700 019, India. Email: khan.mahasinali@gmail.com

**19353.** Holzenthal, R.; Bueno-Soria, J. (2020): Oliver S. Flint, Jr. 1931-2019. *Braueria* 47: 5-26. (in English) [Obituary] Address: not stated

**19354.** Kiauta, B. (2020): Some personal recollections of the late Angelo Barbosa Monteiro Machado (1934-2020). *Odonatologica* 49(3/4): 191-198. (in English) ["Some personal recollections from 1963 to present are provided, with emphasis on ABMM's manifold work for *Odonatologica* and the SIO and on his research on human attitude towards jungle/forest in Brazil and in Europe." (Author)] Address: Kiauta, B., Callunastraat 6, 5853 GA Siebengewald, The Netherlands. Email: mbkiauta@gmail.com

**19355.** Liu, Y.; Luo, X.; Zeng, Y.; Deng, M.; Tu, W.; Wu, Y.; Mai, B. (2020): Bioaccumulation and biomagnification of hexabromocyclododecane (HBCDD) in insect-dominated food webs from a former e-waste recycling site in South China. *Chemosphere* 240, February 2020, 124813: (in English) ["Highlights: • Occurrence of HBCDD were investigated in insects and their predators. • BMF of  $\alpha$ -HBCDD >1 in poikilotherms while <1 in homeotherms. • Trophic magnification of  $\alpha$ -HBCDD was found in aquatic but not in terrestrial food web. Abstract: Hexabromocyclododecane (HBCDD) has frequently been detected in wildlife. However, there is limited research on its bioaccumulation and biomagnification in insect-dominated aquatic and terrestrial food webs. This study investigated the occurrence of HBCDD in insects and their predators collected from a former e-waste contaminated pond and its surrounding region. The concentrations of  $\Sigma$ HBCDD (sum concentrations of  $\alpha$ -,  $\beta$ -, and  $\gamma$ -HBCDDs) ranged from nd to 179 ng g<sup>-1</sup> lipid weight.  $\alpha$ -HBCDD was the predominant diastereoisomer in all biotic samples, and the contribution of  $\alpha$ -HBCDD was higher in predators than in prey insects. A significantly positive linear relationship was found between  $\Sigma$ HBCDD concentrations (lipid weight) and trophic levels based on  $\delta^{15}\text{N}$  in aquatic organisms ( $p < 0.05$ ), while trophic dilution was observed in the terrestrial food web. This result indicates an opposite trophic transfer tendency of HBCDD in terrestrial and aquatic ecosystems. The biomagnification factor (BMF) for  $\alpha$ -HBCDD was higher in terrestrial birds (2.03) than in frogs (0.29), toads (0.85), and lizards (0.63). This may be due to differences between poikilotherms and homeotherms in terrestrial ecosystems." (Authors) The authors included into their analysis odonate larvae (aquatic food web) and "Aeshnidae" and "Libellulidae" (terrestrial food web)] Address: Wu, Y., Research Institute of Poyang Lake, Jiangxi Acad. of Sciences, Nanchang, 330012, PR China. Email: wuyongming@jxas.ac.cn

**19356.** Meszaros, A. (2020): Black Pennant has reached the Carpathian Basin! The first occurrence of *Selysiothemis nigra* in Hungary (Odonata: Libellulidae). *Folia ent. hung.* 81, 2020: 11-16. (in English) ["A fresh, female specimen of *S. nigra* was found on a meadow at Káptalan-tóti, on the Balaton Uplands, Hungary. The species is a well-known migrant from Africa and Asia. In Europe, it is known from coastal areas of the Mediterranean and the Black Seas. The first record from Hungary as well as from the Carpathian Basin is presented." (Author)] Address: Mészáros, A., Eötvös Loránd University, Faculty of Science, Center of Environmental Sciences, H-1117 Budapest, Pázmány Péter sétány 1/A, Hungary. E-mail: meszaros.adam@ecolres.hu

**19357.** Michaelides, M. (2020): [The dragonflies of Cyprus]. Ithaki: 106 pp. (in Greek) [There is an introduction to the life cycle, tips on identification and how to use the guide. The guide covers the 32 species that may be seen in Cyprus. Each species has a page devoted to information on distribution, behaviour, phenology and preferred locations, as well as illustrations by Richard Lewington. For all but 4 species there is also at least one full-page colour photograph. Each species page shows the name of the species in Greek as well as the scientific name. In addition, the English common name is shown in the appendices along with the scientific and Greek names. (Dieter Prestel)] Address: to be ordered at: <https://nibuk.de/>

**19358.** Perron, M.A. (2020): The value of urban ponds for Odonata and plant biodiversity. Dissertation, Dept of Biology, University of Ottawa, Ottawa, Ontario, Canada. 242 pp. (in English) ["Urbanization involves the conversion of natural areas to impervious surfaces, which can lead to an increase in the frequency and severity of flood events in cities. To mitigate flood risk, stormwater ponds are constructed to manage urban runoff. Stormwater ponds can also be colonized by wildlife, but their suitability as habitat is disputed due to potential toxicological risks. This study assessed the suitability of stormwater ponds as habitat for the bioindicators Odonata (dragonflies and damselflies) and determined environmental factors that impact their community structure. Odonata (adults, nymphs and exuviae) were sampled at 41 stormwater ponds and 10 natural reference ponds across the National Capital Region of Canada, with a subset of ponds sampled over four years (2015-2018). Plant communities, water quality and surrounding land cover were analyzed at each pond to determine their impacts on Odonata community structure. Overall, stormwater ponds had lower Odonata abundance and a greater variation in species richness and community structure compared to natural ponds but had comparable dragonfly reproduction rates. Plants were the most significant driver of Odonata communities, as stormwater ponds with a high richness of native wetland plants had higher Odonata abundance and community structures similar to natural ponds. Water quality was the second most important driver of Odonata communities with dragonflies showing greater sensitivity to urban contaminants than damselflies. While stormwater ponds had higher concentrations of trace elements than natural ponds (e.g. Ni, V, As), concentrations were generally below toxic levels for all elements except copper and chloride, the latter likely an input from winter road salting. Surrounding land cover was the least important factor affecting Odonata communities. In conclusion, this research demonstrated the importance of local-scale factors related to plants and water quality in sustaining Odonata communities and specifies recommendations for stormwater pond design and maintenance that enhance urban biodiversity." (Author)] Address: Perron, Mary A., Dept Biol., Univ. of Ottawa, 20 Marie Curie Private, Ottawa, ON K1N 6N5, Canada. E-mail: mperr058@uottawa.ca

**19359.** Pinto, A.P.; Vaz-de-Mello, F.Z.; Grossi, P.C.; Drummond, G.M. (2020): A Zoologia brasileira se despede do

Professor Angelo Barbosa Monteiro Machado (1934–2020). *Informativo Sociedade Brasileira de Zoologia* XLII (132): 7–20. (in Portuguese) [obituary] Address: Pinto, A.P., Universidade Federal do Paraná, Departamento de Zoologia, Curitiba, PR, Brasil

**19360.** Redaktion (2020): Dr. Ollie Flint 1931 – 2019. *Perla* 38: 20–21. (in English) [Obituary] Address: not stated

**19361.** Ruppell, G.; Hilfert-Ruppell, D.; Schneider, B.; Dedenbach, H. (2020): On the firing line – interactions between hunting frogs and Odonata. *International Journal of Odonatology* 23(3): 199–217. (in English) ["Frogs are important predators of Odonata. We investigated frogs catching Odonata prey by means of slow-motion filming in the field in order to understand the prey–predator interactions. In particular, we aimed to analyse kinematics of captures, and of Odonata fleeing, through evaluation of frame-by-frame filming; 122 (20%) of 613 events were analysed. While dragonflies were ovipositing, frogs were sitting and waiting motionless, or they sneaked slowly towards the intended prey. The speed of the lashing tongue was much higher than the start and flight velocities of Odonata during escape attempts. The reaction time of Odonata was around  $45 \times 10^{-3}$  s, and it was not correlated to capture rate. The fleeing behaviour of Odonata cannot be considered to be stereotypical. The usual fleeing measure was to evade sideways to the jump direction of the frog, with the individual turning their body to one side and flying away from the frog. Perched odonates escaped by overturning to one side, sometimes falling into the water, or by flying in a loop. To escape, individuals were observed flying backward with the head down, in two cases. From the video clips, capture rates were counted. Large Anisoptera escaped more often than small Zygoptera. Anax imperator females mostly escaped after capture by fighting with strong wing beats, even when pulled under water by the frog." (Authors) *Calopteryx splendens*, *Enallagma cyathigerum*, *Coenagrion puella*, *Aeshna cyanea*, *Anax imperator*, *Libellula quadrimaculata*, *Sympetrum striolatum*] Address: Ruppell, G., An der Wasserfurche 32, Cremlingen, Germany. Email: g.rueppell@freenet.de

**19362.** Schepker, T.J.; Webb, E.B.; Tillitt, D.; LaGrange, T. (2020): Neonicotinoid insecticide concentrations in agricultural wetlands and associations with aquatic invertebrate communities. *Agriculture, Ecosystems and Environment* 287 (2020) 106678: 11 pp. (in English) ["Neonicotinoids are considered a superior insecticide for agricultural pest management, although their impacts on non-target insects is a rising concern. Aside from laboratory and mesocosm studies, limited research has been directed towards the role neonicotinoids may have in structuring aquatic invertebrate communities in field settings. Therefore, we simultaneously collected aquatic invertebrate and surface water samples from 26 wetlands within a highly modified agricultural landscape of Nebraska's Rainwater Basin during spring 2015. Water samples were tested for six different neonicotinoids, nutrients, and physical properties. Trace levels of clothianidin and imidacloprid were the only neonicotinoids detected,

occurring in 85% and 15%, respectively, of wetlands sampled. All measurements for clothianidin and imidacloprid were below chronic toxicity benchmarks set by the United States Environmental Protection Agency. Neonicotinoid concentrations were significantly lower ( $W_{26}, 0.05 = 42.5$ ) at wetlands with vegetative buffer strips >50m wide compared to wetlands with vegetative buffers strips <50 m. Although neonicotinoids were below benchmark concentrations proposed by government regulations, a significant negative association between neonicotinoid concentrations and aquatic invertebrate biomass was observed across all wetlands studied (Parameter Estimate = -0.031; SE = 0.014)." (Authors) Taxa are not specified.] Address: Schepker, T., United States Army Corps of Engineers, 100 Arsenal Street, Saint Louis, MO 63118, USA. Email: Travis.J.Schepker@usace.army.mil

**19363.** Schreiner, G.D.; Duffy, L.A.; Brown, J.M. (2020): Thermal response of two sexually dimorphic *Calopteryx* (Odonata) over an ambient temperature range. *Ecology and Evolution*. 2020; 10: 12341–12347. (in English) ["1. Organisms may internally or behaviorally regulate their body temperatures or conform to the ambient air temperatures. Previous evidence is mixed on whether wing pigmentation influences thermoregulation in various odonates. 2. We investigated the thermal response of sympatric North American *Calopteryx aequabilis* and *Calopteryx maculata* with a thermal imaging study across a 25°C ambient temperature range. 3. We found that regressions of thorax temperature on ambient temperature standardized by species had similar slopes for male and female *C. maculata*, but females were consistently 1.5°C warmer than males. In contrast, the sexes of *C. aequabilis* differed in slope, with *C. aequabilis* females having a slope less than 1.0 and males having a slope greater than 1.0. 4. We found that regressions of thorax temperature on ambient temperature standardized by sex had similar slopes for males and females of both species, but *C. maculata* females were consistently 2.1°C warmer than *C. aequabilis* females. 5. Given that *C. aequabilis* is strongly sexually dimorphic in pigment, but *C. maculata* is not, our findings suggest that wing pigmentation may influence thermal response rate in sympatric populations of both species." (Authors)] Address: Schreiner, Gretchen, 3103 Chestnut Street, Grand Forks, ND 58201-7531, USA. Email: schreiner@grinnell.edu

**19364.** Scribano, G.; Balestrieri, A.; Gazzola, A.; Pellitteri-Rosa, D. (2020): Strong behavioural defensive responses of endemic *Rana latastei* tadpoles induced by a native predator's odour. *Ethology* 126(9): 922–930. (in English) ["Prey species must constantly acquire information on predator identity, abundance and dangerousness from the environment. In aquatic habitats, this information is mainly propagated by water-borne chemical signals, either predator-specific odours or prey alarm cues. Anuran larvae innately respond to conspecific alarm cues and are able to associate them to predator cues during their lifetime. In this study, we investigated the anti-predatory responses of *R. latastei* tadpoles exposed to either conspecific or heterospecific alarm

cues and a native predator's (*Anax imperator* larvae) odour. Pre- and post-stimulus behaviours of each tadpole were recorded by a digital camera and analysed by a source executable software for image-based tracking. We found that Italian agile frog tadpoles responded to fasted dragonfly odour by strongly reducing their activity, both in terms of the amount of time they spent active and path length covered in comparison to control groups. Contrary to previous studies, predators' diet had a negligible effect on tadpole response and our experiment did not bring any evidence of the phylogenetic-relatedness hypothesis. The innate or early-in-development recognition of dragonfly larvae is clearly adaptive and may increase tadpole survival with relatively low costs, but, at the same time, may increase the risk of ignoring novel potential threats." (Authors)] Address: Scribano, G., Dept of Earth & Environmental Sciences, University of Pavia, 27100 Pavia, Italy. Email: giovanni.scribano01@universitadipavia.it

**19365.** Seehausen, M. (2020): *Agriocnemis lepida* sp. nov. from the Annamite Range in Lao PDR (Odonata: Coenagrionidae). *Odonatologica* 49(1/2): 177-190. (in English) ["*Agriocnemis lepida* sp. nov. is described and figured (holotype ♂: 20-ii-2003, Lao PDR, Khammouan Province, 2.5 km WNW Ban Tathot, Tham Kamouk, 17.6316 N 105.1250E, 200 m a.s.l., P. Jager leg.; deposited at the Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main, Germany). Additionally, illustrations of the male appendages and the posterior lobe of the prothorax of *A. clauseni*, *A. minima*, and *A. nana* as well as photographs and a Selys watercolour of the female holotype of *A. carmelita* are provided. *Agriocnemis carmelita* is shortly discussed with references to the genus *Mortonagrion*." (Author)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: malte.seehausen@museum-wiesbaden.de

**19366.** Selvamurugan, S. (2020): A rare observations and description of damselflies (Zygoptera; Coenagrionidae) in Coimbatore District, Tamilnadu State, India. *Roots International Journal of Multidisciplinary Researches* 7(2): 72-80. (in English) [Records of *Ceriagrion coromandelianum*, *Pseudagrion decorum* and *Ischnura rubilio* from Coimbatore district, Tamilnadu, India are presented.] Address: Selvamurugan, S.. Junior Research Fellow Division of Chemistry and Bioprospecting Institute of forest genetics and tree breeding Coimbatore, Tamil Nadu, India

**19367.** Späth, J.; Nording, M.; Lindberg, R.; Brodin, T.; Jansson, S.; Yang, J.; Wan, D.; Hammock, B.; Fick, J. (2020): Novel metabolomic method to assess the effect-based removal efficiency of advanced wastewater treatment techniques. *Environmental Chemistry* 17(1): 1-5. (in English) ["Unprecedented levels of chemicals of anthropogenic origin are currently released into surface waters globally. Wastewater treatment plant effluent has been identified as a major source, containing a broad mixture of pharmaceuticals and consumer chemicals. Therefore, there is a need for implementation of advanced wastewater treatment techniques,

such as ozonation and adsorption methods, to reduce the contamination. However, there are conflicting findings on the toxicity of treated effluent and only limited possibilities for assessing the effect-based removal efficiency (EBRE) of different treatment techniques. Here, we describe a metabolomics approach to detect perturbations in fatty acid catabolic pathways as a proxy for biological effects. Metabolites in three fatty acid pathways were analyzed in *Coenagrion hastulatum* larva by liquid chromatography coupled to mass spectrometry. The larvae were exposed for one week to either conventionally treated effluent (activated sludge treatment), effluent additionally treated with ozone or effluent additionally treated with biochar filtration and results were compared with those from tap water control exposure. Five lipoygenase-derived oxylipins (9,10,13-TriHOME, 9,12,13-TriHOME, 9-HODE, 9-HOTrE, and 13-HOTrE) decreased in response to conventionally treated effluent exposure. By using an additional treatment step, oxylipin levels were restored with exception of 9,10,13-TriHOME (ozonated effluent), and 9-HOTrE and 13-HOTrE (effluent filtered with biochar). In conclusion, exposure to wastewater effluent affected fatty acid metabolite levels in damselfly larvae, and a subset of the analyzed metabolites may serve as indicators for biological effects in biota in response to effluent exposure. To that effect, our findings suggest a new metabolomics protocol for assessing EBRE." (Authors)] Address: Späth, Jana, Dept of Chemistry, Umeå University, 90187 Umeå, Sweden. Email: jana.spath@umu.se

**19368.** Start, D. (2020): Abundance and traits link predator ontogeny to prey communities. *Ecology* 101(6) e03044. 7 pp. (in English) ["Function and abundances shape species interactions and thus ecological communities. While communities are often summarized as the mean function of each species, intraspecific variation in traits and thus function is an important driver of community composition. Ontogeny is a common source of intraspecific variation, but while age-related functional changes can alter species interactions, so too can the effects of those functions on the density of the focal organism. For instance, ontogenetic variation can trigger higher levels of cannibalism, reducing abundances and altering interspecific interactions. I manipulate ontogenetic variation in damselfly larvae [*Lestes congener*] to show that intraspecific variation can impact communities through two distinct mechanisms. First, within-species differences affect population sizes, and thus indirectly shape communities (indirect effect). In particular, ontogenetic variation resulted in smaller damselfly populations, likely because of increased cannibalism rates, and thus ontogenetically diverse populations had a smaller total effect on their prey. Second, trait variation can affect communities by creating differences in the strength of per capita species interactions (direct effect). In this case, damselfly populations with greater age variation had smaller per capita effects on prey communities. I conclude that ontogeny of a single species can directly and indirectly shape community composition." (Authors)] Address: Start, D., Center for Population Biology, University of California at Davis, Davis, California 95616 USA. E-mail: dstart@ucdavis.edu



**19369.** Stolbov, V.A.; Semerikov, F.I.; Tupitsyn, S.S. (2020): Parasitism of Odonata by Arrenurus water mites (Acariformes, Hydrachnidia, Arrenuridae) in Western Siberia. *Odonatologica* 49(3/4): 323-332. (in English) ["The infestation of odonate imagines by water mite larvae was studied in the south of Western Siberia. Data on the rate of infestation, parasite load and the distribution of larvae on the body of dragonflies is presented. Of 24 odonate species studied, parasites were found in 12 species, with Zygoptera and Sympetrum species being most affected. Very high parasite loads were observed on *Coenagrion pulchellum* and *Sympetrum flaveolum*, in which the infestation rates of mite larvae exceeded 75 %. *Erythromma najas* recorded the highest parasite loads (up to 299 larvae per host). In total, six species of parasitic mites were identified; their occurrence on different species of Odonata varied. *Arrenurus papillator* attacked only *Sympetrum* and *Lestes*, while five other species, among which *A. tricuspator* and *A. maculator* predominated, were found on species of *Coenagrionidae*." (Authors)] Address: Stolbov, V.A., Tyumen State Univ., Institute of Biology, Volodarskogo str. 6, Tyumen, 625003, Russia. Email: vitusstgu@mail.ru

**19370.** Streib, L.; Kattwinkel, M.; Heer, H.; Ruzik, S.; Schäfer, R.B. (2020): How does habitat connectivity influence the colonization success of a hemimetabolous aquatic insect? - A modeling approach. *Ecological Modelling* 416, 15 January 2020, 108909: 12 pp. (in English) [Highlights: • Process-based meta-population model for hemimetabolous freshwater insects. • Analysis of how habitat connectivity affects patch colonization. • ANOVA of key habitat parameters. • Patch colonization success strongly influenced by habitat connectivity. • Habitat patch number most important, followed by landscape permeability. Abstract: Climate and land-use change constitute major threats to biodiversity. Beside pure habitat loss, changing environmental conditions are likely to result in decreasing landscape permeability and increasing landscape fragmentation. This compromises habitat connectivity and, thereby increases threats to meta-population persistence. Comprehensive theoretical knowledge and general understanding of key parameters affecting habitat connectivity are therefore mandatory to assess risks of environmental change. However, related studies are scarce for hemimetabolous freshwater insects, which depend on both aquatic and terrestrial sites to complete their life cycle. We developed a process-based, spatially explicit meta-population model for a hemimetabolous freshwater insect, parameterized based on the traits of a damselfly [*Coenagrion mercuriale*], and analyzed the influence of varying landscape permeability on patch colonization for differently structured coextensive habitat networks. The in total 675,000 networks were set up by varying (1) landscape scenarios, representing different levels of permeability, (2) stream networks and (3) derived habitat patch assemblages, using least-cost path analysis. We found that habitat connectivity in general strongly determined the proportion of colonized habitat patches (Spearman's  $\rho = 0.64$ ). Moreover, a multi-factorial ANOVA of the parameters used for habitat network set up showed that the number of habitat patches had the

largest effects on the colonization success (18.6 % explained variance) followed by varying proportions of three landscape types incurring increasing dispersal costs (13.1 %) and the spatial arrangement of habitat patches (7.1 %). The introduced model generated theoretical knowledge how changing environmental conditions (e.g. landscape permeability) can influence the habitat connectivity of hemimetabolous freshwater species and, thus, has the potential to support conservation through habitat management within changing landscapes. Its design facilitates future adaptation to real hemimetabolous species and real-world habitats." (Authors)] Address: Streib, L., Institute for Environmental Sciences, University of Koblenz-Landau, 76829, Landau i. d. Pfalz, Germany. streib@uni-landau.de

**19371.** Su, G.; Dudley, R.; Pan, T.; Zheng, M.; Peng, L.; Li, Q. (2020): Maximum aerodynamic force production by the wandering glider dragonfly (*Pantala flavescens*, Libellulidae). *Journal of Experimental Biology* 223, jeb218552. 19 pp. (in English) ["Maximum whole-body force production can influence behavioral outcomes for volant taxa, and may also be relevant to aerodynamic optimization in microair vehicles. Here, we describe a new method for measuring maximum force production in free-flying animals, and present associated data for the wandering glider dragonfly. Flight trajectories were repeatedly acquired from pull-up responses by insects dropped in mid-air with submaximal loads attached beneath the center of body mass. Forces were estimated from calculations of the maximum time-averaged acceleration through time, and multiple estimates were obtained per individual so as to statistically facilitate approximation of maximum capacity through use of the Weibull distribution. On a group level, wandering glider dragonflies are here estimated to be capable of producing total aerodynamic force equal to ~4.3 times their own body weight, a value which significantly exceeds earlier estimates made for load-lifting dragonflies, and also for other volant taxa in sustained vertical load-lifting experiments. Maximum force production varied isometrically with body mass. Falling and recovery flight with submaximal load represents a new context for evaluating limits to force production by flying animals." (Authors)] Address: Pan, T., Nat. Key Lab. of Science & Tech. on Aero-Engine Aero-Thermodynamics, School of Energy & Power Engineering, Beihang University, Beijing 100191, China. Email: pantianyu@buaa.edu.cn

**19372.** Sugiman, U.; Atmowidi, T.; Priawandiputra, W. (2020): Community structure and habitat characteristics of dragonflies (Odonata) in tropical lowland forest of Ujung Kulon national park. *Journal of Entomology and Zoology Studies* 8(5): 251-258. (in English) ["Information about dragonflies and its habitat in Ujung Kulon National Park is poorly studied. The objective of this study was to inventory the dragonflies community structure in various habitats in the Ujung Kulon National Park and describe the contribution of habitat characteristics on the dragonfly communities structure. In this study, we surveyed the dragonfly communities in five locations, includes natural ponds, a shady small stream in the forest, and river habitat. We measured several

habitat characteristics and analyzed its contribution to the variation of the dragonfly communities structure using canonical correspondence analysis. 25 of dragonflies species (classified into 2 families of Anisoptera and 6 families of Zygoptera) were recorded in this study. Structure of the dragonfly community in among habitat type showed dissimilarity. Aquatic habitat type, conductivity, total dissolved solids, complexity of water substrate, the width of aquatic habitat, and canopy covering contributed to the variation of dragonfly communities structure. This study provided the new information about variation of the structure of dragonfly communities in various habitat types in this conservation area." (Authors)] Address: Sugiman, U., Dept of Biology, Faculty of Mathematics and Natural Sciences, IPB University, Bogor 16680, West Java, Indonesia

**19373.** Theischinger, G.; Richards, S.J. (2020): A new species of *Teinobasis* from Bougainville Island, Papua New Guinea, with a key to males of the genus from the Solomon Islands Archipelago (Odonata: Coenagrionidae). *Odonatologica* 49(3/4): 371-383. (in English) ["A new species of damselfly, *Teinobasis taripu* sp. nov., is described from Bougainville Island in the Solomon Islands Archipelago. The ♂ most closely resembles *T. bradleyi* Kimmins, 1957, which is known from several islands in the archipelago and occurs in sympatry with the new species on Bougainville. However, the new species can be distinguished from *T. bradleyi* by having a largely metallic black thorax speckled with yellowish brown (vs a more discrete pattern of metallic black and light blue), and by having a trilobed (vs unilobed) mid-dorsal appendix of abdominal segment 10. The new species is described, illustrated and diagnosed, and a key to the males of all *Teinobasis* species known from the Solomon Islands Archipelago is presented." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**19374.** Tyrrell, M. (2020): Thoracic spur variations in *Chalcolestes viridis* (Vander Linden) (Willow Emerald Damselfly) and their use in identifying territorial males. *Journal of the British Dragonfly Society* 36(1): 1-10. (in English) ["*C. viridis* is still a new and uncommon species in Northamptonshire, with low populations densities at all sites where it is found. Territorial males are very mobile, flying between several perching sites, which makes assessing colony size difficult. The maximum number of adults recorded at any one site in Northamptonshire is 25, but the real number is unclear due to the mobility of this species. In order to better measure colony size, variations in the thoracic spur markings were analysed to find a method of separating individuals as they move around territories. Measurements were taken of the light yellow/green area on the thorax and its associated spur. Calculations of the Root Mean Square variance of its shape and size were found to provide the best methodology for identifying individuals." (Author)] Address: Tyrrell, M., 8 Warwick Close, Raunds, Northants, NN9 6JH, UK

**19375.** Theischinger, G.; Marinov, M.; Bybee, S.; Jensen, C.; Theuerkauf, J.; Rashni, B. (2020): The genus *Gynacantha*

Rambur, 1842 in the South Pacific (Odonata: Anisoptera: Aeshnidae). *Zootaxa* 4778(1): 171-195. (in English). ["Available information on *Gynacantha* Rambur, 1842 species from the South Pacific is reviewed. Specimens were found to be sufficiently similar to *G. rosenbergi* Kaup in Brauer, 1867 to be placed in the same species group (*G. rosenbergi* group — established here) but also distinct enough to form a subgroup of its own (*G. rosenbergi* Pacific group). All species of the *G. rosenbergi* group are diagnosed, with three species, *Gynacantha vitiana* sp. n. (male and female) from Viti Levu, Fiji, *G. koroana* sp. n. (male) from Koro, Fiji and *G. vanuatu* sp. n. (male) from Malekula, Vanuatu being described as new to science. A key is presented for identification of the males." (Authors)] Address: Theischinger, G., Australian Museum, Entomology, 6 College Street, Sydney, NSW 2010, Australia. E-mail: theischingergunther@gmail.com

**19376.** Vilenica, M.; Pozojevic, I.; Vuckovic, N.; Mihaljevic, Z. (2020): How suitable are man-made water bodies as habitats for Odonata? *Knowl. Manag. Aquat. Ecosyst.* 2020, 421, 13. 10 pp. (in English, with French summary) ["Many studies have reported a negative impact of freshwater habitat modification on biota. Nevertheless, some man-made water bodies have proven to be valuable for biodiversity conservation as they can harbour many species. We investigated 36 man-made water bodies to determine their suitability as habitats for Odonata. Larvae were sampled in littoral, during the summer months of 2016 and 2017. At each sampling site, ten samples were collected using a benthos hand net. A total of 21 Odonata species was recorded. Odonata assemblages mainly consisted of common widespread species. Yet, at Vlaèine Reservoir, located in the Dinaric Western Balkan ecoregion, we also recorded a rare and endangered Mediterranean species, *Lindenia tetraphylla*. Aquatic and riparian vegetation, water level fluctuations and dissolved oxygen concentration had the highest influence on Odonata, showing that manmade water bodies with a well-developed riparian zone and aquatic vegetation, and with low daily and seasonal water level fluctuations, can provide suitable habitats for diverse Odonata species. Odonata are among the sensitive freshwater insects widely used as ecological indicators and umbrella species, therefore these results about their assemblages in heavily modified and man-made habitats could contribute to future conservation activities of freshwater biota and habitats." (Authors)] Address: Vilenica, Marina, Univ. of Zagreb, Fac. Teacher Education, Trg Matice hrvatske 12, Petrinja, Croatia

**19377.** von Ellenrieder, N.; Garrison, R.W.; Ramón C., G.M. (2020): Odonata collected in Napo province, Ecuador, in January of 2020. *International Dragonfly Fund Report* 150: 3-20. (in English) ["A ten day collecting trip to Napo province was conducted between January 13 and 23, 2020, visiting localities where W. C. Macintyre originally collected *Argia schneideri* Garrison & von Ellenrieder, 2017 between 1935 and 1942, with the intention of documenting its life habits and obtaining photographs in life. A total of 65 odonate species in 36 genera were collected, including four new records for Napo province, but the target species was not

found. A list of species recorded and color scans of species that have so far not been photographed are included. Color photographs and notes on the habitat of *A. schneideri* are made available through the courtesy of colleagues who found it elsewhere, and its current known distribution is discussed." (Authors)] Address: von Ellenrieder, Natalia, Plant Pest Diagnostic Center, California Dept of Food & Agriculture 3294 Meadowview Rd, Sacramento, CA 958321488, U.S.A. Email: natalia.ellenrieder@gmail.com

**19378.** Walia, G.K.; Chahal, S.S. (2020): Linear differentiation of chromosomes of *Anisogomphus bivittatus* selys, 1854 from India (Odonata: Anisoptera: Gomphidae). *International Journal of Entomology Research* 5(2): 120-122. (in English) [Live adult male specimens of *Anisogomphus bivittatus* of family Gomphidae have been collected from Andretta, Himachal Pradesh (India). Male germ cell chromosomes of the species have been described on the basis of conventional staining, Cbanding, silver nitrate staining and sequence specific staining. The species possesses  $2n$  ( $\sigma$ ) =23m, as the chromosome number and  $X0$  ( $\sigma$ )/ $XX$  ( $\rho$ ) type sex determination. Dark terminal C-bands are present on all the autosomal bivalents, while m bivalent is C-negative and X chromosome is C-positive throughout the length. Terminal light/dark NOR's are present on all autosomal bivalents including m bivalent, while X chromosome possesses terminal dark NOR on one side and light NOR on other side. During sequence specific staining, all the autosomal bivalents except m bivalent show more CMA3 bright signals than DAPI signals at chiasmatic ends and X chromosome is also more CMA3 bright than DAPI.] Address: Walia, G.K., Department of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab, India

**19379.** Zheng, D. (2020): Odonatans in lowermost Cenomanian Kachin amber: updated review and a new hemiphlebiid damselfly. *Cretaceous Research* 118, 104640. (in English) ["Odonatans are rare in amber deposits, and only four fragmentary specimens were recorded in Lebanese, Jordanian, Charentes and South Dakota ambers except for Kachin amber. This study reviewed the odonatans in lowermost Cenomanian Kachin amber and commented 11 odonatans, which were previously placed in the family level. Until now, over 350 odonatans have been found in Kachin amber, including 38 species of three extant suborders, and representing the most diverse and abundant dragonfly assemblage in amber inclusions. The dominated odonatans include the damselflies *Burmahemiphlebia zhangi* and *Mesomegaloprepus magnificus*, and the damsel-dragonfly *Burmaphlebia reifi*, accounting for ca. 79 % of all odonatans. The Kachin odonatans include the earliest records of the damselfly *Perilestidae*, *Platycnemididae* and *Platystictidae*, and the youngest records of the true dragonfly *Araripegomphidae* and *Stenophlebiidae*, contributing to exploring the origination and evolution of these families. Hemiphlebiidae is the dominant family in Kachin amber, represented by the species *Burmahemiphlebia zhangi* with ca. 160 species been recorded. It is surprising that the hemiphlebiid damselfly is abundant, but the diversity is very low with only two

species been previously reported. Herein, a new hemiphlebiid damselfly, *Kachinhemiphlebia lini* gen. et sp. nov., is described by the unique characters: Arc slightly distal of Ax2 in both fore- and hindwings; and a well-defined AA ending on posterior wing margin below Ax2. This is the second genus of the Hemiphlebiidae in Kachin amber." (Author)] Address: Zheng, D., State Key Laboratory of Palaeobiology & Stratigraphy, Nanjing Institute of Geology and Palaeontology and Center for Excellence in Life and Palaeoenvironment, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing, 210008, China. E-mail: dranzheng@gmail.com

## 2021

**19380.** Aliyev, S.; Mammadova, V.F.; Abdullayeva, L.R. (2021): Macrozoobenthos of Alijanchay river - the primary indicator of biodiversity within the Greater Caucasus in the territory of Azerbaijan. *Ukrainian Journal of Ecology* 11(6): 54-62. (in English) ["The article provides information on the biodiversity of the Alijanchay, one of the left tributaries of the Kura River, which originates in the highlands and is formed by inland waters and its main component macrozoobenthos, its species composition, biocenosis distribution, and ecological features. It is known that macrobenthic organisms are actively involved in forming the biological productivity of water bodies, the natural biofiltration of water. At the same time, biological indicators are organisms and form a link in the food chain in the ecosystem. Certain species are the first or second interim owners of parasites. It is worth mentioning some species, which prevent the regular operation of hydro-technical facilities. The river is mainly polluted by household waste. Recently, the development of agriculture and the increase in the number of fertilizers and various drugs applied to the soil have impacted the ecological stability of the river. Thus, the decrease in the species and number composition of fish formed in the river proves it again. The main task of the study is to assess the current state of biodiversity in the river, the general ecological status of the river, and determine the level of impact of natural and anthropogenic impacts on macrozoobenthos. The main focus here is done on macrobenthos, however, the forest and vegetation of riparian zones. During the study period, 154 species of organisms have been found, where 80 species of found organisms (52%) belong to river macrozoobenthos, 42 species (27%) to plants, and 32 species (21%) to vertebrates." (Authors) *Epallage fatime*, *Calopteryx virgo*, *C. splendens*, *Lestes virens*, *L. sponsa*, *L. dryas*, *Sympecma fusca*, *Platycnemis pennipes*, *Ischnura elegans*] Address: Mammadova, V.F., Ganja State Univ., Azerbaijan, Ganja Heydar Aliyev avenue 429 AZ 2001, Azerbaijan. E-mail: vefa.mamedova74@mail.ru

**19381.** Alvarez-Alvarez, K.L.; Bota-Sierra, C.A.; Vasquez-Ramos, J.M. (2021): New records of genera *Aphylla* and *Micrathyria* for Colombia (Odonata: Gomphidae, Libellulidae). *Notulae odonatologicae* 9(8): 358-366. (in English) ["We record *Aphylla theodorina* (Navas, 1933), *Micrathyria artemis* (Ris, 1911), and *Micrathyria dido* (Ris, 1911) for the first time for Colombia based on males taken on the

Barcelona Campus at the Universidad de Los Llanos, located in the foothills of the Colombian Eastern Andes in the Orinoco river basin. These collections extend the species' distribution hundreds of kilometres to the north-west." (Authors)] Address: Alvarez-Alvarez, Karen Lineke, Semillero de Investigación JIACACU, Grupo de Investigación Evaluación, Manejo y Conservación de Recursos Hidrobiológicos y Pesqueros (GIREHPES), Universidad de los Llanos, Meta, Colombia. Email: Karen.alvarez@unillanos.edu.co

**19382.** Antol, A.; Sniegula, S. (2021): Damselfly eggs alter their development rate in the presence of an invasive alien cue but not a native predator cue. *Ecology and Evolution* 11(14): 9361-9369. (in English) ["Biological invasions are a serious problem in natural ecosystems. Local species that are potential prey of invasive alien predators can be threatened by their inability to recognize invasive predator cues. Such an inability of prey to recognize the presence of the predator supports the naïve prey hypothesis. We exposed eggs of *Ischnura elegans*, to four treatments: water with no predator cue (control), water with a native predator cue (perch), water with an invasive alien predator cue (spinycheek crayfish) that is present in the damselfly sampling site, and water with an invasive alien predator cue (signal crayfish) that is absent in the damselfly sampling site but is expected to invade it. We measured egg development time, mortality between ovipositing and hatching, and hatching synchrony. Eggs took longer to develop in the signal crayfish group (however, in this group, we also observed high green algae growth), and there was a trend of shorter egg development time in the spinycheek crayfish group than in the control group. There was no difference in egg development time between the perch and the control group. Neither egg mortality nor hatching synchrony differed between groups. We suggest that egg response to signal crayfish could be a general stress reaction to an unfamiliar cue or an artifact due to algae development in this group. The egg response to the spinycheek crayfish cue could be caused by the predation of crayfish on damselfly eggs in nature. The lack of egg response to the perch cue could be caused by perch predation on damselfly larvae rather than on eggs. Such differences in egg responses to alternative predator cues can have important implications for understanding how this group of insects responds to biological invasions, starting from the egg stage." (Authors)] Address: Antol, A., Inst. of Nature Conserv., Polish Acad. Sciences, al. Adama Mickiewicza 33, 31-120 Kraków, Poland. E-mail: andrzejantol@gmail.com

**19383.** Antón-Tello, M.; Britto, V.O.; Gil-Delgado, J.A.; Rico, E.; Dies, J.I.; Monrós, J.S.; Vera, P. (2021): Unraveling diet composition and niche segregation of colonial waterbirds in a Mediterranean wetland using stable isotopes. *Ibis* 163(3): 913-927. (in English) ["Rice fields and waterbirds are an example of a synergy that can occur between agriculture and conservation. This connection is especially relevant during the farming period, when nesting waterbirds need to obtain resources to cover their energy requirements and that of their chicks in rice fields. However, new farming techniques may potentially put at risk the fulfilment of this

role. Studies on how species use rice fields to feed during this critical period, are essential to understand waterbird population dynamics and to optimize conservation measures. At present, several species of colonial birds in l'Albufera de València (Spain) that depend on trophic resources available in rice fields have declining populations and decreases in productivity. We therefore assessed trophic niche segregation in the diet of chicks, of a waterbird community composed of seven species through stable isotope analyses of carbon ( $\delta^{13}\text{C}$ ) and nitrogen ( $\delta^{15}\text{N}$ ) obtained from chick blood and tissue samples of potential prey. According to trophic niche widths, chicks of Black-headed Gull *Chroicocephalus ridibundus* and Gull-billed Tern *Gelochelidon nilotica* showed a similar diet, although Gull-billed Tern had a major trophic specialization. The Western Cattle Egret *Bubulcus ibis* fed its chicks in a wider range of different habitats, with organisms located at the base of the food chain and with a greater importance of terrestrial prey than other species. Conversely, the Glossy Ibis *Plegadis falcinellus* had a more differentiated diet, mostly in freshwater habitats and mainly consuming odonates. Grey Heron *Ardea cinerea*, Little Egret *Egretta garzetta* and Squacco Heron *Ardeola ralloides* showed overlap between their niches, largely explained by the presence and abundance of cyprinid fish and odonates in their diets. Our results suggest a less important role than expected of Red-swamp Crayfish *Procambarus clarkii*, and a more important role of odonates despite being a less energy-rich prey. In conclusion, the diet of generalistic species of waterbirds in this study suggests that their trophic niches can overlap when relative prey abundance is high." (Authors)] Address: Antón-Tello, M., Sociedad Española de Ornitología, Delegación de la Comunitat Valenciana, Alboraiá, Valencia, 46120 Spain. E-mail: manton@seo.org

**19384.** Aristizábal, H.; Garzón Salamanca, L.L.; Lasso Alcalá, C.A. (2021): Aquatic macroinvertebrates in endo- and exocarstic ecosystems of the department of Santander, Colombia. *Memorias II Congreso colombiano de espeleología 2021*: 146-156. (in Spanish, with English summary) ["Aquatic macroinvertebrates associated to endokarst and exokarst ecosystems have been little studied in Colombia. From 2016 to 2019, explorations have been carried out in Santander caves to recognize the fauna that live in these ecosystems. In other departments such as Cesar and Antioquia, studies are scarce, especially those that consider aquatic macroinvertebrates. In this study, 13 sampling points of endo and exokarst ecosystems of Santander. The samplings were carried out using hand nets, a Surber sampler and D-net, as a result, specimens of 50 species of aquatic macroinvertebrates were collected. The orders with the highest number of taxa were Diptera, Coleoptera, Hemiptera and Odonata. It is important to highlight the discovery of a new species of the genus *Telmatotrepes* (Hemiptera: Nepidae). 11 species with no bibliographic antecedents in caves were found. Therefore, the number of records of aquatic macroinvertebrates in endokarst and exokarst ecosystems of Santander has increased significantly." (Authors) Taxa are treated at genus level.] Address: Aristizábal, H.: E-mail: hernaris@equalambiental.com



**19385.** Arreaga Figueroa, L.L. (2021): Inventario de la entomofauna benéfica asociada al cultivo cacao (*Theobroma cacao* L.) en la estación experimental Litoral Sur del INIAP. B.Sc. thesis, Facultad de Ciencias Agrarias, Universidad de Guayaquil: xx + 65pp. (in Spanish, with English summary) [Ecuador "The following research seeks to observe the effect of the traps in two batches under study in Cacao (*Theobroma cacao* L), which was carried out at the south coast Experimental Station of INIAP, to develop the following objectives 1) Carry out assemblies of the entomofauna present in two agricultural production systems in cocoa cultivation, 2) Identify the main beneficial insects associated with cocoa cultivation, 3) Determine the population levels of insects found in two different crop production systems of cocoa. Two types of traps were used: a) Traps: yellow b) Trap with 3-liter plastic bottles. In the present test: it was possible to collect insects belonging to the following orders: Hymenoptera, Hemiptera, Diptera, Coleoptera, Lepidoptera, Blattodea, Odonata [= *Erythemis vesiculosa* (Fabricius, 1775)]. In the agroforestry lot, 296 individuals of the beneficial entomofauna and in the monoculture study lot, 832 individuals associated with the crop were captured" (Author).] Address: not stated

**19386.** Attaullah, M.; Ullah, I.; Ali, M.; Maula, F.; Ilahi, I.; Ahmad, B.; Khwaja, S (2021): Diversity of the Anisoptera & Zygoptera (Odonata: Insecta) of Swat, Pakistan. Brazilian Journal of Biology 83 • 2023: 8 pp. (in English, with Portuguese summary) ["Odonates are important biological control agents for the control of insect pests and insect disease vectors of medical and veterinary importance. The present study was conducted to evaluate the odonate fauna of Swat, Pakistan from March to October 2019. A total of 200 specimens of odonates were collected from diverse habitats. The collected specimens of the order Odonata belonged to 5 families, three families of Anisoptera namely Libellulidae, Gomphidae and Aeshnidae while two families of Zygoptera (Chlorocyphidae and Coenagrionidae). The specimens were categorized into 12 genera and 22 species. Libellulidae was the dominant family (n = 138) accounting for 69% of the odonate fauna. Orthetrum was the dominant genus (n = 73) of Anisoptera accounting for 36.5% of the odonate fauna. The least dominant genera were Anax, Paragomphus and Rhyothemis (n = 5 each) accounting each for 2.5% of the odonate fauna. In Zygoptera, the dominant genus was Ceryagrion (12.5%) and the least dominant genus was Ischnura (6%). *Pantala flavescens* was the most abundant odonate species in the study area recorded from all surveyed habitats. Shannon Diversity Index (H) was 2.988 and Simpson Diversity Index (D) was 0.95 for the collected odonate fauna. The highest abundance of Odonata was recorded in August, September and May while no odonate species were recorded in January, February, November and December. Lotic water bodies were the most suitable habitats with abundant odonate fauna. *Anax immaculifrons* was the largest sized odonate species having a wingspan of 53.2±1.63 mm and body length of 56.3 ± 0.4 mm. The present study shows the status of odonate fauna of Swat, Pakistan in diverse habitats and seasonal variation throughout the

year. Further work is recommended to bridge the gaps in the existing literature." (Authors)] Address: Ilahi, I., Dept Zoology, University of Malakand, Chakdara, Dir Lower, Khyber Pakhtunkhwa, Pakistan. E-mail: ikramilahi@uom.edu.pk

**19387.** Barmiento, S.H.; Schrama, M.; de Snoo, G.R.; van Bodegom, P.M.; van Nieuwenhuijzen, A.; Vijver, M.G. (2021): Experimental evidence for neonicotinoid driven decline in aquatic emerging insects. PNAS November 2, 2021 118 (44) e2105692118; 8 pp. (in English) ["Significance: Survey data show a large-scale decline in insects. This global decline is often linked to human actions in intensive agricultural areas. To investigate whether this decline has a causal relationship with neonicotinoid insecticides, we performed an outdoor experiment with representative surface water concentrations of the neonicotinoid thiacloprid. We exposed naturally formed aquatic communities to increasing neonicotinoid concentrations and monitored insect emergence during a 3-mo period. We show that increasing neonicotinoid concentrations strongly decreased the abundance and biomass of five major insect orders that together comprised >99% of the 55,574 collected insects as well as the diversity of the most species-rich freshwater family, thus showing a causal relation between insect decline and neonicotinoids. Abstract: There is an ongoing unprecedented loss in insects, both in terms of richness and biomass. The usage of pesticides, especially neonicotinoid insecticides, has been widely suggested to be a contributor to this decline. However, the risks of neonicotinoids to natural insect populations have remained largely unknown due to a lack of field-realistic experiments. Here, we used an outdoor experiment to determine effects of field-realistic concentrations of the commonly applied neonicotinoid thiacloprid on the emergence of naturally assembled aquatic insect populations. Following application, all major orders of emerging aquatic insects (Coleoptera, Diptera, Ephemeroptera, Odonata, and Trichoptera) declined strongly in both abundance and biomass. At the highest concentration (10 µg/L), emergence of most orders was nearly absent. Diversity of the most species-rich family, Chironomidae, decreased by 50% at more commonly observed concentrations (1 µg/L) and was generally reduced to a single species at the highest concentration. Our experimental findings thereby showcase a causal link of neonicotinoids and the ongoing insect decline. Given the urgency of the insect decline, our results highlight the need to reconsider the mass usage of neonicotinoids to preserve freshwater insects as well as the life and services depending on them." (Authors)] Address: Barmiento, S.H., Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, Science Park 904, 1090 GE Amsterdam, The Netherlands. Email: S.H.Barmiento@uva.nl.

**19388.** Bastos, R.C.; Brito, J.; Cunha, E.; Cruz, G.M.; Pereira, J.L.S.; Vieira, J.; Juen, L. (2021): Environmental impacts from human activities affect the diversity of the Odonata (Insecta) in the Eastern Amazon. International Journal of Odonatology 24: 300-315. (in English) ["Land use influences the biodiversity of stream systems by changing the chemical composition of the water and the physical structure of

the habitat. The present study evaluated the influence of these processes on the diversity metrics of Odonata at regional and local scales, testing the hypothesis that the two odonate suborders Anisoptera and Zygoptera will respond differently to habitat and landscape variables. The study focused on 13 sites in the municipality of Barcarena, Pará, Brazil. We found no significant impact from regional factors, although anisopterans were more affected by water temperature and Habitat Integrity Index (HII). The HII indicated that the local forest was stable, but anisopteran richness was negatively correlated with HII. It was indicating that these species favoured open areas with less riparian cover. Even though zygopterans did not exhibit a similar systematic pattern, the reduced abundance of *Chalcopteryx rutilans*, a species associated with better-preserved habitats, may indicate that some sites lack the habitat integrity necessary to establish populations of this species. These findings highlight the importance of preserving the riparian forest to maintain the health of the stream systems. We recommend more studies that focus on the broader geographic and temporal scales to account for factors such as the anthropogenic gradient and historical land use patterns." (Authors)] Address: Bastos, R.C., Graduate Program in Ecology, Federal Univ. Federal do Pará, Rua Augusto Correia, Nº 1, Bairro Guamá, CEP: 66.075-110, Belém, Pará, Brazil. Email: bastosrc.bio@gmail.com

**19389.** Belenguier, L. (2021): Suivi de *Leucorrhinia dubia* et *Somatochlora arctica* par relevé des exuvies: résultats sur trois tourbières Auvergnates en 2015 (Odonata: Libellulidae, Corduliidae). *Martinia* 35(4): 13-22. (in French, with English summary) ["A monitoring of the emergence of *L. dubia* and *S. arctica* over the 2015 season was carried out on three peat bogs in Auvergne: The results contribute to the knowledge of these two species by quantifying the populations, specify the phenology on the studied area and calculating the sex-ratio at emergence. The results confirm the presence of an important population of *L. dubia* on the peat bog of the Plaine Jacquot, even if the productivity (number of exuviae reported on the surface of the peat pits) is lower than that reported in the bibliography, which leads to propose hypotheses to explain this finding. For *S. arctica*, the population in the Vallat peat bog is large. The data collected confirm that the period of emergence of *L. dubia* in this zone is on average from May to July, with a peak generally between early and mid-June, and that the period of emergence of *S. arctica* is on average from May to July, with a peak generally between mid-May and mid-June. The sex ratio at emergence for both species is in favor of females. Additional perspective of study are proposed to improve our knowledge of these two heritage species." (Authors)] Address: Belenguier, L., 123 avenue Joseph Claussat 63400 Chamalières, France. E-mail: l.belenguier@gmail.com

**19390.** Bodas, A. (2021): Investigating the influence of educational media on children's views on conservation. MSc. thesis, Faculty of the Department of Psychological & Brain Sciences, Villanova University: 57 pp. (in English) ["Encouraging individuals, especially children, to decrease their use

of natural resources is critical to creating sustainable communities. I investigated whether children's environmental views can be positively influenced by watching educational media about conservation. I measured 4-and-5-year-olds' (N = 56) knowledge, self-efficacy and environmental worry before and after showing them an episode of the PBS show Nature Cat. Children who watched an episode about conservation did not learn significantly more about conservation strategies as compared to a Comparison condition, who watched an episode about dragonflies. There was also no difference between conditions in self-efficacy ratings. Notably, however, children in the Experimental condition were significantly more concerned for the environment at post-test. These findings suggest that exposure to nature-related educational media may increase children's awareness of environmental problems and concern for the environment." (Author)] Address: not stated

**19391.** Borsos, S. (2021): Exuvium adatok Somogy megye szitakötő faunájához (Insecta: Odonata). *Natura Somogyensis* 36: 25-34. [Data for the dragonfly fauna of Somogy county (Insecta: Odonata) based on samples of exuviae: "The 2168 exuviae found during the collections can be classified into 31 species, 56% of the 55 dragonfly species known so far from Somogy County. Among them, 8 are protected (*Aeshna isocetes*, *Gomphus flavipes*, *G. vulgatissimus*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Epithea bimaculata*, *Somatochlora flavomaculata*, *Libellula fulva*) and 1 is highly protected (*Cordulegaster heros*) according to the currently in force FM Decree 66/2015 (26.X.). In the Hungarian Red List (2017) 4 species are listed, Endangered (EN): *E. bimaculata*, Vulnerable (VU): *O. cecilia*, *C. heros*, *S. flavomaculata*. *C. heros* is a species classified as threatened (NT) in the European Red List (2010). Based on the exuviae found, the most species-rich habitats were found in Lake 9 (Barcs), the Red Bank (Barcs) and the Gyótapusztai fishpond (Marcali). It is noteworthy that at Barcs, all four river dragonfly exuviae were found in the Dráva, demonstrating that this stretch of the Dráva is also an ecologically valuable and diverse habitat." (DeepL.)] Address: Borsos, S., 7570 Barcs, Dohány utca 9., Hungary. E-mail: sborsos@index.hu

**19392.** Brasil, L.S.; Alves de Andrade, A.F.; Ribeiro, B.R.; Spigoloni, Z.A.; Juen, L.; De Marco Jr, P. (2021): A niche-based gap analysis for the conservation of odonate species in the Brazilian Amazon. *Aquatic Conservation* 31(5): 1150-1157. (in English) ["1. Despite the current rates of deforestation and the expected climatic changes, protecting species in their natural habitats is still the simplest, cheapest, and most effective way of safeguarding biodiversity. Here, the network of protected areas in the Brazilian Amazon was evaluated to assess its effectiveness in safeguarding species of Odonata. 2. Ecological niche models were built to assess the suitability of the habitat for 503 Amazonian odonate species. Then, the effectiveness for the protection of odonate species of three classes of protected areas (strictly protected area, sustainable use area, and indigenous territory) was evaluated. 3. Approximately 30% of the species

are protected within the network of protected areas. These findings highlight the importance of protected areas for safeguarding most odonate species in the Amazon. For under-represented or gap species, additional resources are still needed for effective management and protection on some private properties, which need to set aside land for conservation. In this way, it is possible to preserve habitats for odonate species and guarantee their conservation in the Amazon." (Authors)] Address: Brasil, L.S., Lab. de Ecologia e Conservação (LABECO), Universidade Federal do Pará, Belém, Pará, Brazil. Email: brasil\_biologia@hotmail.com

**19393.** Braumiller, C. (2021): Libellenfauna der südlichen Niederen Tauern. Diplomarbeit, Karl-Franzens-Universität Graz: 84 pp. (in German, with English summary) ["The dragonfly fauna of the southern Lower Tauern was investigated. The habitats and the occurrence of the species were surveyed. For this purpose, ten study sites were selected in the municipalities of Krakau, Schöder, St. Peter am Kammerberg and Oberwölz, each of which was visited on four dates between June and September 2020. The habitats were determined according to the guidelines for "biotope type mapping". Dragonflies could be detected at each water body. The numbers of individuals and species were discussed in relation to the ground level, lake level, seasonal occurrence, habitats and degree of endangerment. A total of 18 species were detected of which 14 were classified as native. The lowest area is located at 1059 m and the number of species and individuals decreases with increasing altitude" (Author) <https://unipub.uni-graz.at/obvugrhs/download/pdf/6434339?originalFilename=true>; *Calopteryx virgo*; *Coenagrion hastulatum*; *C. puella*; *Enallagma cyathigerum*; *Erythromma najas*; *Ischnura elegans*; *Lestes sponsa*; *Platycnemis pennipes*; *Pyrrhosoma nymphula*; *Aeshna cyanea*; *A. grandis*; *A. juncea*; *Cordulia aenea*; *Libellula depressa*; *L. quadrimaculata*; *Somatochlora metallica*; *Sympetrum danae*; *S. vulgatum*] Address: not stated

**19394.** Bried, J.T. (2021): Odonata species diversity, distributions, and status in a rare sand prairie-savanna wet-scape. *International Journal of Odonatology* 24: 197-214. (in English) ["Inland sand areas scattered across the North American eastern deciduous forest and western tallgrass prairie ecotone are known for supporting pyrogenic early-successional vegetation and specially adapted terrestrial faunas. Many of these globally and regionally rare systems contain functionally connected wetland networks ("wet-scapes") potentially important for aquatic insects. Sampling adults, nymphs, and exuviae in a remnant sand prairie-savanna wet-scape in Illinois, USA, I assessed odonate species diversity (alpha, gamma, beta), distributions (spatial, temporal, abundance), and rarity status. In one field season (12 sites, 12 visits) I found more than a third of Illinois odonate species and close to half of the state's lentic breeding odonates, including a new state record (*Erythemis vesiculosa*). Richness averaged 25.8 species per site, reducing to 12.4 species with removal of nonbreeding occurrences. Three sites including a shrub swamp, beaver pond, and forested vernal depressions complex made significant contributions

to beta diversity, dependent on general versus breeding occurrences. Majorities of Anisoptera species (70%) and Zygoptera species (53%) bred at three or fewer sites. Eight species flew during all or most of the study period (late May to early October) whereas 14 species were detected on a single survey. Status classification derived from the observed spatial, temporal, and abundance distributions resulted in 24 common or very common species, 20 uncommon or rare species, and 10 vagrants across the wet-scape. These context-specific classifications may be combined with diversity and breeding patterns and other information in wet-scape prioritization schemes." (Author)] Address: Bried, J.T., Illinois Natural History Survey, Prairie Research Institute, University of Illinois at Urbana-Champaign, Champaign, Illinois, USA. Email: bried@illinois.edu

**19395.** Carbonell, J.A.; Wang, Y.J.; Stoks, R. (2021): Evolution of cold tolerance and thermal plasticity in life history, behaviour and physiology during a poleward range expansion. *Journal of Animal Ecology* 90(7): 1666-1677. (in English) ["Many species that are moving polewards encounter novel thermal regimes to which they have to adapt. Therefore, rapid evolution of thermal tolerance and of thermal plasticity in fitness-related traits in edge populations can be crucial for the success and speed of range expansions. We tested for adaptation in cold tolerance and in life history, behavioural and physiological traits and their thermal plasticity during a poleward range expansion. We reconstructed the thermal performance curves of life history (survival, growth and development rates), behaviour (food intake) and cold tolerance (chill coma recovery time) in the aquatic larval stage of the damselfly *Ischnura elegans* that is currently showing a poleward range expansion in northern Europe. We studied larvae from three edge and three core populations using a common-garden experiment. Consistent with the colder annual temperatures, larvae at the expansion front evolved an improved cold tolerance. The edge populations showed no overall (across temperatures) evolution of a faster life history that would improve their range-shifting ability. Moreover, consistent with damselfly edge populations from colder latitudes, edge populations evolved at the highest rearing temperature (28 °C) a faster development rate, likely to better exploit the rare periods with higher temperatures. This was associated with a higher food intake and a lower metabolic rate. In conclusion, our results suggest that the edge populations rapidly evolved adaptive changes in trait means and thermal plasticity to the novel thermal conditions at the edge front. Our results highlight the importance of considering besides trait plasticity and the evolution of trait means, also the evolution of trait plasticity to improve forecasts of responses to climate change." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: robbystoks@bio.kuleuven.ac.be

**19396.** Carrillo-Lara, D.E.; Novelo-Gutiérrez, R. (2021): The life cycle of *Orthemis ferruginea* (Fabricius, 1775) (Odonata: Libellulidae). *International Journal of Odonatology* 24: 275-299. (in English) ["The complete life cycle of *O. ferruginea*

is described for the first time, represent the first complete life cycle described for an odonate in Mexico. The 17 larval instars obtained are described and illustrated in detail, from prolarva through F-0. Two egg batches of different females were obtained in the field and were subsequently reared in the laboratory. Eggs and larvae of the batches were raised under 26°C controlled temperature conditions until they reached instars F-6 and F-5. An extra collection of wild organisms was made in order to complete the life cycle from F-5. Only four of the wild larvae managed to complete the last five missing larval instars at 30°C. Larvae of the youngest instars (F-15 to F-8) were fed nauplii of *Artemia franciscana*, while F-7 to F-0 were fed larvae of Culicidae and Chironomidae. Larval life cycle from F-0 to F-16 lasted average of 186 days." (Authors)] Address: Carrillo-Lara, Diana, Inst. de Ecología A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91073 Xalapa, Veracruz, Mexico. Email: dpepper.1120@gmail.com

**19397.** Cezário, R.R.; Lopez, V.M.; Gorb, S.; Guillermo-Ferreira, R. (2021): Dynamic iridescent signals of male copperwing damselflies coupled with wing-clapping displays: the perspective of different receivers. *Biological Journal of the Linnean Society* 134(1): 229-239. (in English) ["Dynamic signals are a widespread phenomenon in several taxa, usually associated with intraspecific communication. In contrast, dynamic iridescent signals are detectable only at specific angles of illumination; hence, the animal can hide the signal to avoid detection when necessary. This structural coloration is mostly dependent on the illumination, the contrast against the background and the vision of the receiver. Complex behavioural displays can be coupled with structural coloration to create dynamic visual signals that enhance these functions. Here, we address whether iridescence of the males of a damselfly that inhabits dark rainforests, *Chalcopteryx scintillans*, can be considered a dynamic visual signal. We analyse whether coloration is perceived by conspecifics, while reducing detectability to eavesdroppers against three types of backgrounds. Our results suggest that the visual background affects the detectability of male hindwings by different receivers, mostly predators and prey. We discuss whether these results and the angle dependence of colour could indicate a mechanism to avoid unwanted intraspecific interactions or even to lure both predators and prey. We conclude that the main functions of the dynamic iridescent signal are to communicate with conspecifics while hindering the signal for prey, adding evidence of the multifunctionality of structural coloration coupled with behavioural displays in animals." (Authors)] Address: Guillermo-Ferreira, R., Lab. of Ecological Studies on Ethology & Evolution (LESTES Lab), Federal Univ. of São Carlos, São Carlos, SP, Brazil. Email: rhainerguillermo@gmail.com

**19398.** Chitsaz, N.; Siddiqui, K.; Mariana, R.; Chahlac, J. (2021): An experimental study of the aerodynamics of micro corrugated wings at low Reynolds number. *Experimental Thermal and Fluid Science* 121, 1 February 2021, 110286. (in English) ["Highlights: • PIV was used to study the flow over reconstructed micro-corrugated Odonata wings. • We

employed a non-destructive photogrammetry method to fabricate the wing. • The accuracy of corrugation patterns with fabricated wing was evaluated by Micro-CT. • Photogrammetry is advantageous to reconstruct the corrugated wing of MAVs. • The obtained aerodynamic results of corrugated wing benefit next generation of MAVs. Abstract: In this paper, an experimental study was performed to examine the flow characteristics of fabricated micro corrugated wings by fully mimicking the real 3D Odonata wing. For this purpose, a true scale hind wing from the *Orthetrum caledonicum* species with a semi span length of 60 mm was reconstructed by non-destructive close-range photogrammetry and fabricated with an advanced 3D printer. The accuracy of the proposed reconstruction technique was evaluated and compared with a 3D model of the same wing created using a Micro-Computed Tomography (CT) scanning technique to show that the close-range photogrammetry method was able to predict the pattern of micro corrugation of the wings with satisfactory fidelity. To do that, the corrugation patterns of both reconstructed wings were compared at different sections of the wings. Then, high-resolution Particle Image Velocimetry was used to investigate the flow field of the wing during gliding flight at three low Reynolds numbers  $Re=5\times 10^3$ ,  $Re=8\times 10^3$  and  $Re=12\times 10^3$ , and angle of attack  $10^\circ$ . The results include free stream velocity, vorticity distribution, boundary layer, and flow visualization. The velocity contour and vorticity boundary layer of both wings were compared experimentally. The flow behavior around the corrugated patterns reconstructed from both methods were compared with satisfactory agreement. The support the theory that the corrugations of the wing act as turbulators to generate unsteady vorticity to transition the boundary layer from laminar to turbulent quickly, leading to delayed stall and improved aerodynamic performance. Moreover, this study shows the application of the presented photogrammetry method for corrugated wing reconstruction, which is fast, low-cost, non-destructive, with high replication accuracy for the next generation of micro air vehicles." (Authors)] Address: Chitsaz, Nasim, UNISA STEM, Australian Research Centre for Interactive and Virtual Environments, University of South Australia, University Boulevard, Mawson Lakes, South Australia, 5095, Australia. E-mail: nasim.chitsaz@mymail.unisa.edu.au

**19399.** Choo, M.Z.J.; Low, B.W.; Ngiam, R.W.J.; Yeo, D.C.J. (2021): Predation of mosquitos by odonates in a tropical urban environment: insights from functional response and field mesocosm experiments. *Biological Control* 161, October 2021, 104702. (in English) ["Highlights: • Predation by urban odonates on *Aedes albopictus* larvae was evaluated. • Laboratory experiments showed high feeding response (Type II) at low prey density. • Field mesocosm experiments showed little predation impact on community composition. • Predation on naturally-colonizing mosquito larvae in mesocosms was size-selective. • Odonates can potentially be used as predators of mosquitoes in urban environments. Abstract: Mosquito borne diseases (e.g., dengue fever, Zika fever, chikungunya fever) are a recurring problem worldwide. Using the natural predators of mosquitoes, such as



odonates, provides an alternative, more sustainable approach towards vector control. We assessed the biological control potential of the larvae of three common urban odonates (*Crocothemis servilia*, *Ischnura senegalensis*, *Orthetrum sabina*) using laboratory-based functional response and field-based mesocosm experiments. Functional response experiments using fourth instar *Aedes albopictus* mosquito larvae as prey revealed Type II functional responses in all three odonate species, highlighting their predatory efficiencies at low prey densities and demonstrating that urban odonates can consume substantial numbers of mosquito larvae (up to 44 per day) under experimental conditions. Complementary field-based experiments, however, showed little impact of odonate larvae predation on the overall composition of naturally colonizing aquatic macroinvertebrate communities, but revealed substantial size-selective predation by odonate larvae on mosquito larvae. Our results provide the first assessment of the predation efficiencies of urban odonate larvae, and highlight their potential as biological control agents of mosquitoes and other aquatic insect pests in highly modified urban landscapes." (Authors)] Address: Yeo, D.C.J., Dept of Biological Sciences, National Univ. of Singapore, 16 Science Drive 4, 117558, Singapore. E-mail: dbsyeod@nus.edu.sg

**19400.** Córdoba-Aguilar, A.; San Miguel-Rodríguez, M.; Rocha-Ortega, M.; Lanz-Mendoza, H.; Cime-Castillo, J.; Benelli, G. (2021): Adult damselflies as possible regulators of mosquito populations in urban areas. *Pest Management Science* 77(10): 4274-4287. (in English) ["Background: Dragonfly and damselfly larvae have been considered as possible biocontrol agents against young instars of mosquito vectors in urban environments. Yet, our knowledge about adult odonate predation against mosquito adults is scarce. We quantified daily and annual predation rates, consumption rates and prey preferences of adult *Hetaerina vulnerata* male damselflies in an urban park. A focus on predation of mosquito species was provided, quantified their arbovirus (dengue, chikungunya and Zika) infection rates and biting activity. Results: Foraging times of *H. vulnerata* overlapped with those of maximum activity of hematophagous mosquitoes. The most consumed preys were Diptera and Hymenoptera and, in lower quantities, Hemiptera, Coleoptera, Trichoptera, Psocoptera, and Neuroptera. Of note, 7% of the diet was represented by hematophagous dipterans, with 2.4% being *Aedes aegypti* and *A. albopictus*. Prey abundance in the diet coincided with that of the same species in the environment. The arboviral infection rate (dengue, chikungunya and Zika) was 1.6% for *Ae. aegypti* and *Ae. albopictus*. The total biting rate of these mosquito vectors was 16 bites per person per day, while the annual rate of infectious bites was 93.4. Conclusion: Although 2.4% for both *Aedes* species seems a low consumption, considering the presence of 12 odonate species at the park, it can be argued that adult odonates may play a relevant role as mosquito vector regulators, therefore impacting the spread of mosquito-borne diseases. Our study outlines the need of further research on the topic on the possible role of adult odonates for mosquito biocontrol." (Authors)] Address: Córdoba-Aguilar, A., Depto

de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: a-cordoba@ecologia.unam.mx

**19401.** Chuirazzi, C.; Ocampo, M.; Takahashi, M.K. (2021): Influence of prey diet quality on predator-induced traits in wood frog tadpoles (*Lithobates sylvaticus*). *Amphibia-Reptilia* 42(3): 331-341. (in English) ["Diet quality and predation are two critical factors in determining the growth and development of organisms. Various anurans are susceptible to phenotypic changes influenced by these factors. Yet, few studies examined prey diet quality as potential influence over predator-induced traits. Using wood frog tadpoles (*Lithobates sylvaticus*) as a model species, we investigated the effects of three diet compositions (plant-based, animal-based, omnivorous) crossed with presence or absence of chemical cues from predatory dragonfly larvae (*Aeshnidae*). After 35 days, we recorded 11 morphological measurements, Gosner stage, and intestinal length of tadpoles to assess phenotypic changes under the six different experimental conditions. Our results showed the additive effects of both diet quality and predator chemical cue without detection of interactions between the two. Tadpoles receiving the omnivorous diet grew and developed faster with wider denticle rows than those receiving the plant or animal diets. The growth and development of tadpoles receiving only the animal diet were significantly hindered. These results emphasize the importance of diet quality in the growth and development of larval wood frogs. Chemical cues from predators significantly reduced tadpole body size but, in contrast to previous findings, did not affect tail size. Our experimental procedure of providing water containing predator and injured conspecific chemical cues on a weekly basis likely provided relatively weak predation risk perceived by tadpoles compared to previous studies using caged predators. The predator environment in our experiment, however, represents one ecologically relevant scenario in which predation risk is not urgent." (Authors)] Address: Chuirazzi, Catherine, Dept Biol., Bucknell Univ., Lewisburg, PA 17837-2005, USA

**19402.** Clarke, D. (2021): *Aeshna caerulea* (Strom) (Azure Hawker) in Galloway: a history. *J. Br. Dragonfly Society* 37(2): 87-103. (in English) ["The only breeding population of *Aeshna caerulea* in the UK south of the Scottish Highlands was discovered in 1949 at the Silver Flowe, Galloway but has declined since then and may now be lost. Studies at that site, especially in the 1980s and 1990s, revealed much about the species' natural history and enabled the hitherto little-known larval stages to be characterised and published. Its apparent extinction at this location during the present century is discussed and linked to the direct and indirect effects of changes in climate and weather patterns on the species and its habitat." (Author)] Address: Clarke, D., Bumfoot, Cumwhitton, Brampton CA8 9EX, UK

**19403.** Clement, R.A.; Saxton, N.A.; Standing, S.; Arnold, P.R.; Johnson, K.K.; Bybee, D.R.; Bybee, S.M. (2021): Phylogeny, migration and geographic range size evolution of

Anax dragonflies (Anisoptera: Aeshnidae). *Zoological Journal of the Linnean Society*, zlab046, <https://doi.org/10.1093/zoolinnear/zlab046>: (in English) ["The genus *Anax* is a group of cosmopolitan dragonflies noted for its conspicuous migratory behaviours and large size. Here we present the first dated, species-level, multigene, molecular phylogeny for the group to test generic and species-limits, as well as the evolution of migration and range size. Using five mitochondrial and nuclear gene regions (COI, COI/COII, CYTB/ND1, ITS1 and PRMT) from 20 species, we reconstructed a phylogeny of *Anax* using both a Bayesian and maximum likelihood approach. We found that *Anax* (including its hypothesized sister group *Hemianax*) forms a monophyletic group, and that 12 out of 20 species tested positive for monophyly were also monophyletic. The monophyly of several species of *Anax* is less clear. Migratory behaviour, which is known to occur in at least nine species, is recovered as the ancestral behaviour, which was lost and subsequently gained at least three times. Geographic range size seems to be tightly associated with migratory behaviour." (Authors)] Address: Clement, Rebecca, Computational Biol. Inst., The Milken Institute School of Public Health, The George Washington Univ., Washington, D.C., USA. E-mail: rebedem@gmail.com

**19404.** Deacon, C.; Samways, M.J. (2021): Urban threats and conservation measures relating to aquatic arthropods on the iconic Table Mountain, South Africa: a review. *Basic and Applied Ecology* 56: 192- 212. (in English) ["Highlights: • Mountainous areas are attractive for human colonization. • In South Africa, mountains host high levels of aquatic arthropod endemism. • There are often trade-offs between urbanization and biodiversity conservation. • Urbanization presents several novel threats to freshwater conservation. • Threats can and have been mitigated to encourage arthropods in urban spaces. Abstract: Mountains supply essential resources, making them attractive areas for human settlement. Variation in elevation in mountainous areas determines local and regional climates, leading to complex biodiversity patterns. Mountains in the Cape Floristic Region have high species richness and beta diversity, and very high levels of local endemism. Table Mountain is an iconic mountain in the region, and unusual, as it is in the centre of the city of Cape Town. It is exceedingly rich in biodiversity, including many localized endemic species. However, increasing urbanization in the area is adversely affecting the local biodiversity, especially in the lowlands. Climate change effects to date are minimal, but projected to interact with the impacts of urbanization. Here we review the biodiversity patterns of green and blue spaces in and around Cape Town, including Table Mountain, focusing on aquatic arthropods. We also review the major threats that lead to biotic impoverishment, and provide information on current conservation efforts aimed at protecting the rich biodiversity of Table Mountain and its surrounds. Finally, we focus on the shortcomings of existing conservation actions, and then provide conservation strategies to limit aquatic arthropod biodiversity losses, based on actions that have already worked well. To ensure protection of all arthropods, freshwater habitats across all elevations require further conservation

action. Education and creating awareness must continue to close the gaps between scientists, conservation practitioners and civil society as a crucial part of the conservation plan." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**19405.** Deacon, C.; Samways, M.J.; Pryke, J.S. (2021): Relative importance of ecological versus biological traits in driving range sizes of African dragonflies. *Journal of Biogeography* 48(6): 1309-1321. (in English) ["Aim: Ecological traits (e.g. biotope specialisation and habitat preference) and biological traits (e.g. mobility and life history) are highly variable among species. In insect conservation, considerable focus has been on ecological generalisation, with species occupying many biotope types (generalists) often assumed to be widely distributed, whereas species occupying few biotope types (specialists) are assumed as rare and localised. Although this may be valid in most cases, there is an increasing recognition that functional traits, such as insect mobility and life history, have similar importance as drivers of range size among species. Here, we investigate ecological and biological traits simultaneously to determine their relative importance as drivers of range size variation. We hypothesise that ecological traits are primary drivers, whereas biological traits related to mobility and life history are less important drivers of range size. Location: Sub-Saharan Africa. Taxon: 115 sub-Saharan dragonfly species. Methods: Five measures of species range size were obtained from the Odonata Database of Africa. Number of biotope types occupied by adults and larvae, larval habitat preference and adult biological trait information were collated from published sources. We explore the relationships between ecological and biological traits. Using linear mixed models and model averaging, we determine the relative importance of number of biotope types occupied, overall habitat preference and traits related to mobility and life history that drive dragonfly range size while accounting for phylogenetic relationships among focal species. Results: Dragonflies occupying more biotope types had wider ranges, although these relationships were overall weak. Dragonflies with longer and later breeding seasons had wider ranges. Overall habitat preference and mobility traits had low importance in our models. Main conclusions: Ecological versus biological traits are interactive in shaping the geographical ranges of dragonfly species across Africa. Single traits are weak predictors of species range sizes and we recommend investigating multiple traits simultaneously to improve the accuracy of predictions. In doing so, more informed decisions can be made to ensure effective large-scale conservation of dragonflies." (Authors)] Address: Deacon, C., Dept of Conservation Ecology and Entomology, Stellenbosch University, South Africa. E-mail: charldeacon@sun.ac.za

**19406.** Dinesh, V.; Leenamma, J.; Josekumar, V.S. (2021): Spatial variation of benthic Odonate (Odonata: Insecta) community structure in the urban River Killiyar in southern Kerala, India. *Journal of Aquatic Biology & Fisheries* 9: 99-108. (in English) ["The spatial variation of benthic odonate

community assemblage in various zones (upper, middle, and lower zones) of the urban river Killiyar was assessed using the tools of geographic information system (GIS) and investigated their interaction with select water quality parameters. Benthic odonate larvae collected during this study belong to predators–engulfers of the functional feeding groups. A total of 147 individuals of 12 genera across nine families of benthic odonate taxa were recorded in this study. Out of the total taxa observed, Gomphidae comprised 34% individuals, followed by Libellulidae (33%). The former taxa were the dominant family in all the zones except the lower zone. The spatial analysis demonstrated high diversity and richness in the stations of the middle zone while moderate diversity in the rest of the stations. The population density observed was high at station Idappazhanji (K10). The distribution of taxa was relatively higher in the middle zone than that of other zones. The taxa Libellulidae was observed in most stations and directly associated with water temperature, pH, and dissolved oxygen. The major drivers that govern benthic odonate community assemblages in Killiyar were pH and dissolved oxygen. Investigating the community assemblage using GIS tools is novel and provides a better understanding of the ecology of odonate larval communities and their association with water quality. The outcome of this study supports the formulation of management strategies to protect the odonate diversity and conservation of their habitats, the riverine ecosystems in the urban landscapes in particular." (Authors)] Address: Dinesh, V., Dept Zool., Mar Ivanios College, Res. Centre, Univ. Kerala, Thiruvananthapuram, Kerala, India, 615 015. E-mail: dinupipit@gmail.com

**19407.** Doniol-Valcroze, P.; De Ferrière, P.; Jourdain, B.; Cugno, A. (2021): Première preuve de reproduction de *Trithemis kirbyi* (Odonata: Libellulidae) en France. *Martinia* 35 (2): 5-9. (French, with English summary) ["First evidence of the breeding of *T. kirbyi* in France: The recent incursions of *T. kirbyi* reported on the French territory since 2017, in a context of northwards and westwards range expansion, suggested a future settlement of the species in France. Following the recent establishment of the species in northern Spain, the discovery of many imagos and exuviae of *T. kirbyi* on the domain of the Villa Arnaga (Edmond Rostand's home and Museum) in Cambo-les-Bains, in the Pyrénées-Atlantiques department, thus constitutes the first evidence of breeding of the species on the French territory. The date of settlement on the site and the sustainability of the site remain, however, uncertain. Future surveys on this site and in the surrounding areas will make it possible to confirm whether or not the short and long run establishment of the species at this locality." (Authors)] Address: Doniol-Valcroze, P., 567, route de Lesbouyries, 40390 Saint Martin-de-Seignanx, France. E-mail: pauldoniol-valcroze@orange.fr

**19408.** Dow, R.A.; Ahmad, R.; Butler, S.G.; Choong, C.Y.; Grinang, J.; Ng, Y.F.; Ngiam, R.W.J.; Reels, G.T.; Steinhoff, P.O.M.; Unggang, J. (2021): Previously unpublished Odonata records from Sarawak, Borneo, part VI: Miri Division including checklists for Niah, Lambir Hills, Loagan Bunut and Pulong Tau National Parks. *Faunistic Studies in Southeast*

*Asian and Pacific Island Odonata* 36: 1-94. (in English) ["Records of Odonata made from 2005 to 2020 in Miri Division in Sarawak are presented, including records from Lambir Hills, Loagan Bunut, Niah and Pulong Tau National Parks. Primary types of Odonata originating from Miri Division are listed. Surveys of more than one day duration in Miri Division and covered here are tabulated with the funding source where appropriate; four of the surveys covered here were funded by the International Dragonfly Fund. One hundred and eighty-eight species are listed based on surveys made by the authors, of which *Macromia jucunda* Lieftinck, 1955, had not been recorded from Borneo before, *Burmagomphus arthuri* Lieftinck, 1953 is a new record for Miri Division and *Camacinia gigantea* (Brauer, 1867) has only been recorded from the Division recently with the only published record in a difficult to access publication (Choong (2020)). At least 48 more of the species listed were recorded from Miri Division for the first time in surveys covered in this report, although the records have been published (in most cases with no details beyond division and district in Dow (2021)) before. Two forms of *Xiphiagrion cyanomelas* Selys, 1876 are recorded and the likelihood that they represent different species is discussed. A possibly new, large sized, species of *Macromia* allied to *M. westwoodii* Selys, 1874 is recorded and discussed. Other notable records not published with details before include *Rhinocypha stygia* Förster, 1897, *Rhynoneura caerulea* Kimmins, 1936, *Dysphaea lugens* (Selys, 1873), *Euphaea ameeke* van Tol & Norma-Rashid, 1995, *Euphaea basalis* (Laidlaw, 1915), *Amphicnemis new* sp. cf. *mariae* Lieftinck, 1940 (previously recorded from Usun Apau National Park), *Anaciaeschna jaspidea* (Burmeister, 1839), *Heliaeschna uninervulata* Martin, 1909, *Borneogomphus* sp., *Heliogomphus borneensis* Lieftinck, 1964, *Ictinogomphus acutus* (Laidlaw, 1914), *Chlorogomphus* sp., *Macromia corycia* Laidlaw, 1922, *Idionyx montana* Karsch, 1891, *Hylaeothemis clementia* Ris, 1909, *Orchithemis xanthosoma* Laidlaw, 1911, *Rhyothemis fulgens* Kirby, 1889, *Rhyothemis regia* (Brauer, 1867), *Tetrathemis* sp. cf. *platyptera* Selys, 1878, *Tramea phaeoneura* Lieftinck, 1953 and *Tramea* sp. cf. *virginia* (Rambur, 1842). The habitat preferences of *Dysphaea lugens* are discussed. A male-male tandem of *Coeliccia nigrohamata* Laidlaw, 1918 is reported. The somewhat peculiar distribution of *Argiocnemis rubescens rubeola* Selys, 1877 and *Pseudothemis jorina* Förster, 1904 in Sarawak is discussed. Activity of the apparently normally crepuscular *Heliaeschna uninervulata* in the middle of the day is reported. An interesting morphological detail of some female *Chlorogomphus* from Sarawak is discussed. The likelihood that *Macromia corycia* is a junior synonym of *M. gerstaeckeri* Krüger, 1899 is discussed. The possibility that the range of *Rhyothemis regia* is expanding in Sarawak is remarked upon. The identity of *Tramea* sp. cf. *virginia* is discussed. With the records presented here at least 222 species of Odonata are known from Miri Division and with the addition of *Macromia jucunda* to the known fauna, 309 species have now been recorded from Sarawak. More detailed specimen records are given in Appendix 1 and a revised checklist of Odonata from Lambir Hills National Park and the first checklists from Loagan Bunut, Niah and Pulong Tau

National Parks are given in Appendix 2." (Authors)] Address: Dow, R.A., Inst. Biodiversity & Environmental Conservation, Univ. Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia. E-mail: rory.dow230@yahoo.co.uk

**19409.** Dow, R.A.; Orr, A.G. (2021): On the identity of two species of *Tyriobapta* (Odonata: Libellulidae) from Sundaland. *Notulae odonologicae* 9(7): 296-305. (in English) ["The genus *Tyriobapta* Kirby, 1889, includes three species, all originally described from Borneo. The genotype, *T. torrida* is common in much of Sundaland where it inhabits a variety of standing and slowly flowing freshwater habitats in forest. The two other species, *T. kuekenthali* (Karsch, 1900) and *T. laidlawi* Ris, 1919, are much less often encountered. Recent literature has confused these two species, with their identities being reversed, as is clearly evinced by the original descriptions. This note remedies this misconception." (Author)] Address: Dow, R.A., Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: rory.dow@virgin.net

**19410.** Du, R.; Lu, S.; Gong, S. (2021): Research status of dragonfly flapping-wing Micro Air Vehicle. *Infrared*, 2021, 42(8):38, online publication: 2021-09-08: 38-46. (in Chinese, with English summary) ["Dragonflies are considered to be one of the insects with simple flying behavior and efficient mobility, so they have become the bionic design prototypes of many micro air vehicles (MAV). The excellent flight characteristics of dragonflies are inseparable from their wing characteristics. It can not only withstand a variety of loads during flight, but also maintain high-efficiency flight characteristics. The research status and latest research progress of dragonfly wing structure characteristics, flight characteristics and dragonfly flapping-wing MAV are summarized. The wing vein, wing membrane, wing knot, pterostigma, fold structure, body fluid flow, material characteristics, flight mechanism and infrared detection application of dragonfly wings are summarized. In addition, according to the miniaturization requirements of the bionic flapping-wing MAV, the future research directions are analyzed." (Authors)] Address: Du, R., The 11th Res. Inst. China Electronics Tech. Group Corporation, Beijing 100015, China

**19411.** Dumont, H.J.; Schneider, T.; Vierstraete, A.; Borisov, S.N. (2021): Biogeography and relationship of the Gomphidae of Europe, North Africa, and the Middle East (Odonata). *Odonatologica* 50(1/2): 17-42. (in English) ["Around 27 species of predominantly riverine Gomphidae occur in the vast region encompassing Europe as far as the Urals, the Maghreb, the Mediterranean Basin, and the Middle East up to the west side of the Indus valley, including Arabia, Iran, and Baluchistan. They are the remains of a pre-Pleistocene fauna that we estimate at twice the current number. We analyse the relationships, losses, and their causes at the molecular level and, not surprisingly, confirm the widely held opinion that the ice age is overwhelmingly responsible. Much extinction of European-West Asian and North American species took place in Beringia, presumably in an early phase of the glaciation. Recolonization between

glacial stages can be evaluated for the final stage, the Würm-Wisconsin glaciation. Differences in the orientation of mountain chains allowed more species to survive in North America than in Eurasia. They recolonized Canada, Europe, the Russian Far East, and Japan. From China, 16 additional gomphids are moving west through Siberia. Some reach the Ob valley but in others disjunctions persist. There are, for example, no *Stylurus* species in Pakistan, India, Bangladesh, and Thailand. Numerous preglacial survivors currently occur in Mediterranean and Middle Eastern refuges. Beside ice, aridity played a role in limiting the fauna. Oriental species advanced into the Middle East and Anatolia, but there was apparently never enough running water in Baluchistan to allow a large-scale movement of gomphids towards Europe. Rather to the contrary, the southeastern-most gomphid is *Gomphus amseli*, with type locality at the Heri Rud in Afghanistan, which forms a cline towards the west. Pakistan is even more impoverished in gomphids than Europe but is home to one small genus, *Anormogomphus*, that extends from northern India to eastern Anatolia. Africa also contributed little to the Palaearctic fauna. No *Gomphus* extends further south than the Maghreb, where several endemic species occur. *Paragomphus sinaicus* is a desert species that does not occur south of the Sahara. The richest populations are situated in Oman. Two colonies coincide with the position of the shores of Lake Megachad, in the foothills of the Sahara-Sahel mountains of Air, Tibesti and Ennedi. Perhaps biotic factors like interspecies competition explain its range better than environmental factors. Around 8500 BP, the most recent riverine contact with the Nile via the Wadi Howar facilitated contact and crossing of the Red Sea, but Saharan populations could be older. Arabia was presumably invaded via the Sinai Peninsula, terra typica of the species." (Authors) *Gomphus maroccanus* Lieftinck, 1966] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium. E-mail: Henri.Dumont@ugent.be

**19412.** Elsowayeb, A.A.; Aboshaala, F.; Ghaliow, M.; Samraoui, B. (2021): *Lindenia tetraphylla* new to Libya (Odonata: Gomphidae). *Notulae odonologicae* 9(8): 372-377. (in English) ["We report on the first record of *L. tetraphylla* in Libya. A total of 21 individuals of this species are the first documented records for this species in this country. All individuals were mature, observed in June in two non-consecutive years (2019 and 2021), suggesting local reproduction at two sites south of Misurata city. Habitats were man-made wetlands surrounded by lush vegetation. These observations and recent others from North Africa suggest that this species is progressively recovering parts of its western range lost during the 20th century, establishing itself now within a wide coastal and sub-coastal region in the countries bordering the southern Mediterranean. Further investigations are warranted to confirm the status, and to assess the life cycle and dispersal of *L. tetraphylla* in Libya." (Authors)] Address: Samraoui, B., Dept of Biology, University Badji Mokhtar Anaba, Algeria. Email: bsamraoui@gmail.com

**19413.** Escoto-Moreno, J.A.; Villalobos-Juárez, I.;



Hernández-Langford, D.G. (2021): New records of Odonata from central and Pacific Mexico. *The Pan-Pacific Entomologist* 97(1): 33-38. (in English) [Records of the following species are documented: *Lestes alacer*, *Argia lacrimans*, *Enallagma civile*, *Ischnura hastata*, *Ischnura ramburii*, *Anax junius*, *Triacantagyna septima*, *Rhionaeschna multicolor*, *Erythemis vesiculosa*, *Erythrodiplax basifusca*, *E. umbrata*, *Libellula croceipennis*, *Miathyria marcella*, *M. hagenii*, *Orthemis discolor*, *Pantala hymenaea*, *Perithemis intensa*, *Symptetrum corruptum*, *Tramea insularis*, *T. lacerata*, *T. onusta*.] Address: Hernandez-Langford, D.G., Colección Zoológica, Departamento de Biología, Centro de Ciencias Básicas, Universidad Autónoma de Aguascalientes, Avenida Universidad # 940 Ciudad Universitaria, 20131 Aguascalientes, Aguascalientes, Mexico. E-mail: digahela.87@gmail.com

**19414.** Faillace, C.A.; Sentis, A.; Montoya, J.M. (2021): Eco-evolutionary consequences of habitat warming and fragmentation in communities. *Biological Reviews* 96(5): 1933-1950 (in English) ["Eco-evolutionary dynamics can mediate species and community responses to habitat warming and fragmentation, two of the largest threats to biodiversity and ecosystems. The eco-evolutionary consequences of warming and fragmentation are typically studied independently, hindering our understanding of their simultaneous impacts. Here, we provide a new perspective rooted in trade-offs among traits for understanding their eco-evolutionary consequences. On the one hand, temperature influences traits related to metabolism, such as resource acquisition and activity levels. Such traits are also likely to have trade-offs with other energetically costly traits, like antipredator defences or dispersal. On the other hand, fragmentation can influence a variety of traits (e.g. dispersal) through its effects on the spatial environment experienced by individuals, as well as properties of populations, such as genetic structure. The combined effects of warming and fragmentation on communities should thus reflect their collective impact on traits of individuals and populations, as well as trade-offs at multiple trophic levels, leading to unexpected dynamics when effects are not additive and when evolutionary responses modulate them. Here, we provide a road map to navigate this complexity. First, we review single-species responses to warming and fragmentation. Second, we focus on consumer–resource interactions, considering how eco-evolutionary dynamics can arise in response to warming, fragmentation, and their interaction. Third, we illustrate our perspective with several example scenarios in which trait trade-offs could result in significant eco-evolutionary dynamics. Specifically, we consider the possible eco-evolutionary consequences of (i) evolution in thermal performance of a species involved in a consumer–resource interaction, (ii) ecological or evolutionary changes to encounter and attack rates of consumers, and (iii) changes to top consumer body size in tri-trophic food chains. In these scenarios, we present a number of novel, sometimes counter-intuitive, potential outcomes. Some of these expectations contrast with those solely based on ecological dynamics, for example, evolutionary responses in unexpected directions for resource species or unanticipated population declines in

top consumers. Finally, we identify several unanswered questions about the conditions most likely to yield strong eco-evolutionary dynamics, how better to incorporate the role of trade-offs among traits, and the role of eco-evolutionary dynamics in governing responses to warming in fragmented communities." (Authors) The publication includes many references to Odonata.] Address: Faillace, Clara, Theoretical and Experimental Ecology Station, French National Centre of Scientific Research (CNRS), 2 Route du CNRS, Moulis, 09200, France

**19415.** Faria, A.P.J.; Paiva, C.K.S.; Calvão, L.B.; Martins Cruz, G.; Juen, L. (2021): Response of aquatic insects to an environmental gradient in Amazonian streams. *Environmental Monitoring and Assessment* volume 193, Article number: 763 (2021): 12 pp. (in English) ["The increasing land use in the Amazon region has resulted in the widespread substitution of forest areas with pasture and bauxite mining. These land uses reduce the forest cover of streams and modify their characteristics, reducing the diversity of aquatic insect assemblages. In the present study, we aimed to identify the threshold of the assemblages of the larvae of insects of the orders Ephemeroptera, Plecoptera, and Trichoptera (collectively known as EPT), and adults of the order Odonata, along an environmental gradient of land use and land cover (LULC). We sampled 30 streams along an environmental gradient determined by the proportion of forest, pasture, and bauxite mining observed within the catchment of each stream. We identified 12 taxa associated with forest (nine positively and three negatively) and four negatively associated with pasture. However, no taxa were associated explicitly with the bauxite mining gradient. As forest is converted to pasture, the abundance and frequency of occurrence of the taxa sensitive to pasture are reduced, reflecting their environmental sensitivity and their potential as sentinels of preserved streams. The identification of the thresholds of the EPT and odonates taxa allowed us to determine which of these organisms are positively or negatively associated with the environmental gradient of LULC in Amazonian streams. We hope that the results of the present study can be applied in future biomonitoring programs, particularly for monitoring the response of aquatic insects to the degradation of streams." (Authors)] Address: Faria, Ana Paula Justino, Laboratório de Ecologia e Conservação, Instituto de Ciências Biológicas, Universidade Federal Do Pará, Rua Augusto Corrêa, Rua Augusto Corrêa, nº.1, Bairro Guamá, Belém, Pará, CEP 66.075-110, Brazil

**19416.** Fraleigh, D.C.; Heitmann, J.B.; Robertson, B.A. (2021): Ultraviolet polarized light pollution and evolutionary traps for aquatic insects. *Animal Behaviour* 180: 239-247. (in English) ["Highlights: • We document a new type of pollution, ultraviolet polarized light pollution (UVPLP). • UVPLP is created by artificial objects and occurs nocturnally and diurnally. • Of six families of aquatic insect field-tested, only one used UVPLP to locate water. • UVPLP can attract animals to artificial surfaces, creating evolutionary traps. Abstract: When animals are misguided by evolved behavioural cues to preferentially make mistakes, they are caught in an

evolutionary trap. Aquatic insects rely heavily on polarized light cues to locate bodies of water necessary for oviposition and mating. However, where artificial objects (e.g. asphalt, buildings) are at least as effective at polarizing light as natural water bodies, aquatic insects may instead prefer to oviposit on those surfaces where their eggs fail to hatch. These objects are known to create evolutionary traps by polarizing light in the visible range (390–700 nm), yet their potential for creating evolutionary traps via the reflection of ultraviolet (UV) wavelengths (<380 nm) remains largely unknown. We surveyed the natural and artificial environment to understand the properties of objects that can polarize natural and artificial sources of UV light and conducted a multiple-choice field experiment to test the importance of UV polarized light in guiding habitat selection behaviour in six families of aquatic insects. We found that UV polarized light was associated with natural water bodies, was a common component of the man-made environment created by sunlight reflecting off vehicles, buildings and solar panels during the day, and originating from lamplight with a UV component at night. One of the six families of aquatic insects we examined was preferentially attracted only to UV polarized light sources, indicating that UV polarized light is a cue used in habitat selection. These results highlight a quantitatively new type of ecological light pollution capable of creating evolutionary traps for polarotactic insects at night, or even during the day." (Authors) The study includes references to Odonata.] Address: Robertson, B.A., Division of Science, Mathematics and Computing, Bard College, Annandale-on-Hudson, NY, U.S.A. E-mail: broberts@bard.edu

**19417.** Galicia-Mendoza, D.I.; Sanmartín-Villar, I.; García-Miranda, O.; Cordero-Rivera, A. (2021): Territorial damselflies are larger and show negative allometry in their genitalia. *Biological Journal of the Linnean Society* 134(3): 697-706. (in English) ["The 'functional allometry' hypothesis proposes that the variation in allometric patterns of sexually selected traits is related to their function. We hypothesize that the allometric patterns for genitalia of aggressively territorial organisms are different from those in non-territorial organisms and predict that in aggressively territorial species, where body size is related directly to reproductive success, males must allocate more resources to body size than to genitalia. We studied 59 species of damselflies in 51 genera. Species were divided into three categories: highly territorial and aggressive; low aggressive; and not aggressive. We measured the length of the genital ligula, the width at the basis and its maximum width, and we used body length and wing length as descriptors of body size. The slope of allometric relationships was estimated using ordinary least squares and reduced major axis regressions. Our results indicated first, that territorial damselflies are larger and that body length and wing length are not equivalent as estimators of body size in odonates. Second, ordinary least squares and reduced major axis regressions provided different results in some of the analyses. Third, we found that aggressive species have less steep allometric slopes than non-aggressive species, both for the length of the ligula and for the width at its basis." (Authors)] Address: Cordero-Rivera, A.,

Laboratory of Evolutionary & Conservation Ecology, Universidade de Vigo, E.E. Forestal, Campus A Xunqueira, 36005 Pontevedra, Spain. E-mail: adolfo.cordero@uvigo.gal

**19418.** García-Monsalve, M.V.; Altamiranda-Saavedra, M.; Palacino Rodríguez, F.; Cordero-Rivera, A. (2021): Demographic traits and behavior of *Hetaerina cruentata* (Odonata: Calopterygidae) in ecosystems of the Andean region of Colombia. *International Journal of Odonatology* 24: 261-273. (in English) ["Demography and territorial behavior of *Hetaerina cruentata* was studied along three lowland streams located at Norte de Santander department in the Colombian Andean region. Adult damselflies (N: 278) were individually marked, and using their recapture histories we estimated survival, longevity, sex ratio, age groups and population size at each location. We found no evidence for survival differences between ages and sexes. However, the proportion of resighted individuals was lower for females, and the sex ratio was male-biased in all populations. Although we recorded few reproductive events, a high number of male-male agonistic interactions were registered around midday. During reproductive behavior, we observed brief wing displays as signals between males and females, and the formation of the tandem position, followed by the intramale sperm translocation and copulation (mean duration 11.3 min). After copulation, the pair in tandem looked for suitable sites to oviposit, and then the male broke tandem and perched on the vegetation while the female laid eggs partially or completely underwater. The recapture probability was time-dependent, which suggests that the alternation of rainy and sunny days during the study may be generating differences in the demography of the three *H. cruentata* populations." (Authors)] Address: Palacino Rodríguez, F., Research Group on Odonates and other arthropods of Colombia (GINOCO), Acarology Research Center, Bogotá, Colombia. Email: odonata107@gmail.com

**19419.** Garda-Miranda, O.; Carrillo-Munoz, A.I. (2021): New records for Puebla and Morelos, Mexico (Odonata: Aeshnidae, Coenagrionidae, Libellulidae). *Notulae odonologicae* 9(8): 331-334. (in English) ["Seven species of odonates new to Puebla and one to Morelos urban areas were identified from the entomological collection of the Universidad de las Americas Puebla (UDLAP), Mexico. Rarely observed species such as *Argia extranea* and *A. westfalli* were recorded in Puebla and Veracruz, respectively. *Argia fumipennis*, *Ischnura demorsa*, *I. ramburii*, *Anax junius*, and *Triacanthagyna septima* are discussed in detail. The ecological importance of the UDLAP campus, 'Flor del Bosque' State Park and Atlixco, is also noted. These records add to the knowledge of odonate distribution from Puebla, Morelos, and Veracruz." (Authors)] Address: Garda-Miranda, O., Departamento de Ciencias Químico-Biológicas, Universidad de las Americas Puebla, Ex-Hacienda Santa Catarina Martir, C. P. 72810 Puebla, Mexico. Email: oscar.garcia.miranda@outlook.com

**19420.** Gauci, C. (2021): First records of *Trithemis kirbyi* Selys, 1891 in the Maltese Islands (Odonata: Libellulidae).

Fragmenta entomologica 53(2): 423-425. (in English) ["In this contribution the author reports the first sightings of *T. kirbyi* in the Maltese Islands. Two single males were found at Imselliet Valley and Chadwick Lakes on 17 May 2020 and 13 Aug 2020 respectively." (Author)] Address: Gauci, C., 28 Triq il-Kissier, Mosta, Malta. Email: [cjgauci48@yahoo.com](mailto:cjgauci48@yahoo.com)

**19421.** Gauci, C. (2021): *Anax ephippiger* (Burmeister) (Vagrant Emperor) larvae surviving the winter and emerging in spring in the Maltese Islands. *J. Br. Dragonfly Society* 37(2): 82-86. (in English) ["Following the discovery of successful breeding of *A. ephippiger* in the Maltese Islands in late autumn 2019, three larvae of this species were confirmed to have emerged in spring 2020 clearly indicating that the larvae had managed to survive the winter. Another fresh exuvia was found at Imselliet Valley in May 2020. Four sightings of mature males in April were deemed to have been locally emerged individuals since there was no evidence of migration." (Author)] Address: Gauci, C., 28 Triq il-Kissier, Mosta, Malta MST1822

**19422.** Geraldo de Carvalho, F.; Duarte, L.; Nakamura, G.; Dubal dos Santos Seger, G.; Juen, L. (2021): Changes of phylogenetic and taxonomic diversity of Odonata (Insecta) in response to land use in Amazonia. *Forests* 2021, 12, 1061. <https://doi.org/10.3390/f12081061>: 15 pp. (in English) ["Changes in natural habitats for human use can alter the distribution of biodiversity, favoring species that are more tolerant to environmental disturbance. Usually, these species comprise clades of habitat generalists, which have biological mechanisms to colonize environments with different environmental conditions. However, such effects are still poorly understood for most biological groups, such as the Amazon odonates. Therefore, this study aims to evaluate the effects of land use along an environmental gradient on the phylogenetic and taxonomic diversity of Odonata in the Amazon. We tested the following hypotheses: In deforested areas (e.g., pasture for cattle, palm plantation, and logging), the Odonata community will be more taxonomically and phylogenetically impoverished than in forested areas. We assume that the modification of the natural habitat causes loss of specialist forest species and favors specialist species of open areas and/or habitat generalists. Data sampling was performed in 195 streams under different land-use types: livestock areas, palm monoculture, timber exploitation, and forest areas taken as reference sites. Our results showed that anthropogenic impacts affected the phylogenetic diversity of odonates and the increase in shrub vegetation was related to the increase in the phylogenetic diversity of communities. On the other hand, shrub vegetation is indicative of disturbed areas, where secondary vegetation predominates, with less canopy cover due to the absence or discontinuity of the native tree cover in these habitats. Nonetheless, species richness and abundance were not related to the effects of anthropogenic land use. Finally, our results suggest that the phylogenetic diversity of Amazonian odonates is related to riparian vegetation structure." (Authors)] Address: Juen, L., Programa de Pós-graduação em Ecologia, Universidade Federal do Pará-UFGPA, Rua

Augusto Correia, No Bairro Guamá, Belém 66075-110, Brazil. E-mail: [leandrojuen@ufpa.br](mailto:leandrojuen@ufpa.br)

**19423.** Guadin, B.; Gazzola, A.; Balestrieri, A.; Scribano, G.; Martín, J.; Pellitteri-Rosa, D. (2021): Effects of a group-living experience on the antipredator responses of individual tadpoles. *Animal Behaviour* 180: 90-99. (in English) ["Highlights: • Tadpoles reared alone were not very active even in predator-free tubs. • Predator-exposed tadpoles were bolder in the presence of conspecifics' cues. • However, this was observed only in tadpoles from the highest density treatment. Abstract: The tendency to aggregate during the larval stage is widespread and highly variable among anuran species. Several studies have highlighted the link between tadpole group density and their activity level, confirming that, usually, living in groups brings several antipredator benefits. However, nearly all studies have focused on the average behavioural responses of tadpoles tested in groups. In this study, we explored the effects of living in groups of three different sizes (1, 5 and 25 individuals per group) on the antipredator behaviour of individual green toad, *Bufo balearicus*, tadpoles. We first assessed their basal activity and then examined changes in mobility rate and total distance after exposure to the chemical cues of predatory dragonfly, *Aeshna cyanea*, larvae. For both the pre- and poststimulus activity levels, we also tested the effects of the presence of conspecifics' chemical cues in the experimental tub. Our results showed that (1) a previous brief (8 days) experience of group living is sufficient to affect the basal level of activity of individual tadpoles, which increased with group size; (2) tadpoles that were reared alone did not lower their activity further when exposed to predators' odour; (3) the antipredator response of high-density-reared tadpoles decreased in the presence of conspecifics' cues, supporting the so-called dilution effect, which, anyway, may need a minimum group size to be apparent. We conclude that both previous group-rearing experience and current perception of the surrounding environment may affect antipredator behaviour in individual tadpoles." (Authors)] Address: Guadin, Bianca, Dipartimento di Scienze della Terra e dell'Ambiente, Univ. di Pavia, Pavia, Italy. E-mail: [bianca.guadin01@universitadipavia.it](mailto:bianca.guadin01@universitadipavia.it)

**19424.** Guillermo, R.; Juen, L. (2021): Odonate ethodiversity as a bioindicator of anthropogenic impact. *International Journal of Odonatology* 24: 149-157. (in English) [Mnesarete pudica, harassment, courtship, contest, chase, patrol "The increasing use of dragonflies and damselflies as models in studies on biodiversity in the last decades has unraveled several features of natural processes and mechanisms for species conservation. Nevertheless, biodiversity is a polysemic concept that resolves multiple dimensions that, together, enroll what we observe as species and lineages diversity. One of these dimensions is Ethodiversity, which may represent the individual diversity of behavioral traits and higher organization levels. Hence, measures of Ethodiversity may be used as indicator tools to measure such dimensions of biodiversity. However, we still lack methods and protocols to measure this diversity. Therefore, here we addressed whether damselfly behaviors may act

as indicators of environmental impacts. We collected behavioral data of 120 males in two sites, one in an ecological reserve and another in an impacted habitat. Our results show differences in behavioral syndromes and behavioral integrity when comparing populations in impacted and conserved environments. In conclusion, we hope that these results stimulate future endeavors to create a methodological framework to assess behavioral diversity." (Authors)] Address: Guillermo, R., Lestes Lab, Univ. Federal do Triângulo Mineiro, Uberaba, MG, Brazil. rhainerguillermo@gmail.com

**19425.** Guillermo-Ferreira, R. (2021): Wing-clapping in the damselfly *Mnesarete pudica* - a mating call? (Odonata: Calopterygidae). *Odonatologica* 50(1/2): 43-54. (in English) ["Wing-clapping is a conspicuous and poorly understood behavioural trait in damselflies. Its function has long been debated and several hypotheses have been proposed to explain why damselflies clap their wings, even when there is no other damselfly nearby. Here, I outline the existing hypotheses: (i) the territorial declaration hypothesis, which suggests that wing-clapping is used by males to proclaim territorial ownership to rivals; (ii) the thermoregulation hypothesis, which suggests that wing-clapping cools the body; and (iii) the courtship hypothesis, which suggests that wing-clapping is integral to the courtship behaviour of males. To these I add a fourth hypothesis, the mating call effect, which states that males use wing-clapping as a conspicuous signal to attract mates, prior to courtship. I tested these hypotheses in the neotropical calopterygid *Mnesarete pudica*. The investigation was conducted in the field in Minas Gerais and São Paulo, Brazil, with frequencies of different behaviours being recorded by direct observation of marked individuals. The results show no support for the territorial, thermoregulation, or the courtship hypotheses. A strong association between wing-clapping and other potential signals such as brief flights and perch shifts is evident. I conclude that wing-clapping behaviour in *Mnesarete pudica*, and perhaps in other damselflies, may increase male conspicuousness to females and attract them to territories." (Author)] Address: Guillermo-Ferreira, R., Lestes Lab, Dept Hydrobiol., Fed. Univ. São Carlos - UFSCar, São Carlos, São Paulo, Brazil. Email: rhainerguillermo@gmail.com

**19426.** Gurung, M.M.; Kalkman, V.; Bhandari, G.S.; Dhimal, A. (2021): Nine new species of dragonfly and damselfly for Bhutan (Insect: Odonata) with a note on *Calicnemia mortoni*. *Agrion* 25(1): 22-28. (in English) ["Nine species mainly from three southern districts of the country (Samtse, Sarpang, and Samdrupjongkhar) are recorded as new to Bhutan. These records were largely collected during opportunistic sampling conducted between 20-vii-2018 and 10-vii-2020. In addition, records are also included based on photographs submitted to the Facebook page "Dragonflies and Damselflies of Bhutan-Eastern Himalayas". The species recorded as new to Bhutan are: *Anax ephippiger* Burmeister, 1839, *Agriocnemia pygmaea* Rambur, 1842, *Neurothemis intermedia* Rambur, 1842, *Bradinopyga geminata* Rambur, 1842, *Indothemis limbata* Selys, 1891, *Brachydiplox sobrina* Rambur, 1842, *Rhyothemis variegata* Linnaeus,

1763, *Orthetrum chrysis* Selys, 1891 and *Tramea basilaris* Palisot de Beauvois, 1817. These records bring the number of species known from Bhutan to 128. The first field pictures of *Calicnemia mortoni* (Laidlaw, 1917) are also presented and the characters of this poorly known species are discussed." (Authors)] Address: Gurung, M.M., College of Natural Resources, Royal University of Bhutan, Lobesa-Punakha, Bhutan. E-mail: merman.gurung93@gmail.com

**19427.** Hämäläinen, M. (2021): *Platycnemis sasakii* Asahina, 1949 - a distinct species, endemic to Japan (Odonata: Platycnemididae). *Odonatologica* 50(3/4): 251-260. (in English) ["The taxonomic status of the endemic Japanese damselfly taxon, *Platycnemis foliacea sasakii* Asahina, 1949 (type locality: Tokyo), is upgraded from subspecies to species, *P. sasakii*. Several clear structural differences (including the shape of wings, density of wing venation, ratio of wing and abdomen lengths, shape of middle and hind tibiae) between males of *P. sasakii* and the continental Chinese *P. foliacea* Selys, 1886 (type locality: Beijing) are presented to support this action." (Author)] Address: Hämäläinen, M., Naturalis Biodiversity Center, Leiden, The Netherlands. Email: matti.hamalainen@helsinki.fi

**19428.** Haug, J.T.; Müller, P.; Haug, C. (2021): Fossil dragonfly-type larva with lateral abdominal protrusions and implications on the early evolution of Pterygota. *iScience* 24, 103162, October 22, 2021: 10 pp. (in English) ["Highlights: - A new dragonfly-type larva was found in Kachin amber (Myanmar, 99 million years old). - The larva possesses a terminal filum, which is not known in modern dragonfly larvae. - It also exhibits lateral abdominal protrusions where in other lineages gills occur. - This find makes an aquatic larva in the ground pattern of Pterygota more likely. Summary: Aquatic larvae are known in three early branches of Pterygota: Ephemeroptera, Plecoptera and Odonata. A common origin of these larvae has been suggested, yet also counterarguments have been put forward, for example, the different position of larval gills: laterally on the abdomen in Ephemeroptera, terminally in Odonata, variably in Plecoptera. We discuss recent fossil findings and report a new dragonfly-type larva from Kachin amber (Myanmar), which possesses ancestral characters such as a terminal filum, maintained in ephemeropterans, but lost in modern odonatan larvae. The new larva possesses lateral protrusions on the abdominal segments where in other lineages gills occur. Together with other fossils, such as a plecopteran retaining lateral gills on the abdomen, this indicates that lateral protrusions on the abdomen might have well been an ancestral feature, removing one important argument against the idea of an aquatic larva in the ground pattern of Pterygota." (Authors)] Address: Haug, Caroline, Ludwig-Maximilians-Univ. München (LMU Munich), Biocenter, Großhaderner Str. 2, 82152 Planegg-Martinsried, Germany. Email: carolin.haug@palaeo-evo-devo.info

**19429.** Hayles, A.; Hasan, J.; Bright, R.; Palms, D.; Brown, T.; Barker, D.; Vasilev, K. (2021): Hydrothermally etched titanium: a review on a promising mechano-bactericidal



surface for implant applications. *Materials Today Chemistry* 22, December 2021, 100622: (in English) ["Highlights: • Mechano-bactericidal titanium can be easily and cheaply fabricated by hydrothermal etching. • Surface topographical features can be tuned based on defined fabrication parameters. • The bactericidal mechanism is due to mechanical interaction and downstream metabolic effects. • Efficacy is determined by surface morphology and biological characteristics of bacteria. • Hydrothermally etched titanium is permissive to host tissue and suitable for implantation. Abstract: The growing demand for titanium-based implants and the subsequent rise in implant-associated infections necessitate novel developments in anti-infective technologies. Recent research has drawn inspiration from nature to solve this problem. The nanoscale topography observed on cicada and dragonfly wings serves as a blueprint for synthetic analogs which seek to kill bacteria on contact through mechanical forces. This type of interaction has been dubbed the mechano-bactericidal effect. Various techniques have been utilized to mimic and improve upon these natural bactericidal surfaces. Alkaline hydrothermal etching is a simple and cost-effective technique to fabricate nanoscale protrusions on titanium and its alloys. This review aims to consolidate the current knowledge surrounding how fabrication parameters lead to varying surface topographies on titanium substrates, and subsequently, how surface topography and bacterial characteristics affect bactericidal activity. The bactericidal mechanism of hydrothermally etched titanium is inferred from comparisons with similar mechano-bactericidal biomaterials. The hostility of hydrothermally etched titanium toward bacteria is discussed in contrast to the observed host cell compatibility. Last, suggestions are made for the standardization of terminology in this emerging field.] Address: Vasilev, K., Academic Unit of STEM, Univ. of South Australia, Mawson Lakes, Adelaide, 5095, South Australia, Australia. Email: krasimir.vasilev@unisa.edu.au

**19430.** Hering, J.; Fischer, S.; Geiter, O.; Wobker, J.; Siegel, S.; Späth, L.; Grimm, H.; Habib, M. (2021): Breeding colonies of Gull-billed Tern *Gelochelidon nilotica* and Little Tern *Sternula albifrons* on Lake Nasser, Egypt. *Sandgrouse* 43: 194-215. (in English) ["Knowledge of the breeding of Gull-billed Tern *Gelochelidon nilotica* and Little Tern *Sternula albifrons* on Lake Nasser in southern Egypt is scarce. ... Diet analyses of 46 Gull-billed Tern pellets showed that dragonflies were the main food source for the species (83.7% of all animal food items)..."] (Authors)] Address: Hering, J., Wolkenburger Str. 11, 09212 Limbach-Oberfrohna, Germany. Email: jenshering.vso-bibliothek@t-online.de

**19431.** Hill, M.J.; Wood, P.J.; Fairchild, W.; Williams, P.; Nicolet, P.; Biggs, J. (2021): Garden pond diversity: opportunities for urban freshwater conservation. *Basic and Applied Ecology* 57: 28-40. (in English) ["Urbanisation is increasing globally, degrading terrestrial and freshwater habitats and reducing faunal and floral richness. Whilst the potential for garden ponds to serve as important biodiversity resources in urban areas has been documented in a limited number of studies, quantifying the contribution of garden

ponds to urban freshwater diversity has been largely neglected. This study aims to quantify the taxonomic richness, community composition and conservation value of aquatic macroinvertebrates in domestic garden and non-urban ponds. Taxonomic richness was significantly lower in garden ponds than non-urban ponds at an alpha and gamma scale. A greater richness of Odonata, Coleoptera, Gastropoda and Hemiptera were recorded in non-urban ponds. Garden ponds were found to support compositionally different macroinvertebrate communities compared to non-urban ponds, influenced by variation in water depth and conductivity. A total of 23 taxa were recorded from garden ponds only. Non-urban ponds had a significantly higher conservation value compared to garden ponds (87% of garden ponds were of low or moderate conservation value, while only 35% of non-urban ponds were in these categories). Although urban garden ponds currently support limited macroinvertebrate diversity and have lower conservation value, they contribute to the regional species pool and their potential to limit future urban biodiversity loss is significant. Given their high abundance and popularity within the urban landscape, clear guidance is required for pond-owners on how to best manage garden ponds to support and sustain biodiversity. For this to be achieved, research is required to increase fundamental understanding of urban pond ecology, and the development of evidence led garden pond management practices." (Authors)] Address: Hill, M.J., School of Applied Sciences University of Huddersfield, Queensgate, Huddersfield, HD1 3DH, UK. Email: m.hill@hud.ac.uk

**19432.** Ivanova, E.P.; Linklater, D.P.; Medina, A.A.; Le, P.; Baulin, V.A.; Nguyen, H.K.D.; Curtain, R.; Hanssen, E.; Gervinskas, G.; Ng, H.S.; Truong, V.K.; Luque, P.; Ramm, G.; Wösten, H.A.B.; Crawford, R.J.; Juodkazis, S.; Maclaughlin, S. (2021): Antifungal versus antibacterial defence of insect wings. *Journal of Colloid and Interface Science* 603: 886-897. (in English) ["Highlights: • We present a novel concept of dual defence against surface colonisation of insect wings by bacteria and fungi. • The antifouling and antibacterial properties of insect wings can be attributed to the unique combination of nanoscale structures on the wing surface. • The robust fungal-repelling properties of damselfly wing surfaces were demonstrated to arise from the presence of entrapped air, facilitated by the surface nano-topography. Abstract: Hypothesis: The ability exhibited by insect wings to resist microbial infestation is a unique feature developed over 400 million years of evolution in response to lifestyle and environmental pressures. The self-cleaning and antimicrobial properties of insect wings may be attributed to the unique combination of nanoscale structures found on the wing surface. Experiments: In this study, we characterised the wetting characteristics of superhydrophobic damselfly *Calopteryx haemorrhoidalis* wings. We revealed the details of air entrapment at the micro- and nano scales on damselfly wing surfaces using a combination of spectroscopic and electron microscopic techniques. Cryo-focused-ion-beam scanning electron microscopy was used to directly observe fungal spores and conidia that were unable to cross the air-liquid interface. By contrast, bacterial cells were able to

cross the air-water interface to be ruptured upon attachment to the nanopillar surface. The robustness of the air entrapment, and thus the wing antifungal behaviour, was demonstrated after 1-week of water immersion. A newly developed wetting model confirmed the strict Cassie-Baxter wetting regime when damselfly wings are immersed in water. Findings: We provide evidence that the surface nanopillar topography serves to resist both fungal and bacterial attachment via a dual action: repulsion of fungal conidia while simultaneously killing bacterial cells upon direct contact. These findings will play an important role in guiding the fabrication of biomimetic, anti-fouling surfaces that exhibit both bactericidal and anti-fungal properties." (Authors)] Address: Ivanova, Elena P., School of Science, College of Science, Engineering & Health, RMIT Univ., Melbourne, Victoria 3001, Australia. E-mail: elena.ivanova@mit.edu.au

**19433.** Jocque, M.; Sloomakers, D.; Wellens, S.; De Roland, L.-A.R.; Mittermeier, J.C.; Wright, D. (2021): Notes on some collections of dragonflies from northern Madagascar. *Notulae odonatologicae* 9(7): 306-313. (in English) ["The Madagascar dragonfly fauna remains poorly documented. We list dragonfly observations from two Rapid Biodiversity Surveys in Mahajanga Province, northern Madagascar. Surveyed sites include a coastal area with several lakes close to Mariarano sampled in 2016 and a montane forested area with isolated forest patches in the Mahimoborondro and Bemanevika protected areas in north-central Madagascar close to Bealalana sampled in 2019. A total of 40 species were collected with observations made on three species IUCN listed as data deficient: *Tatocnemis sinuatipennis*, *Neodythemis cf. trinervulata*, and *Pseudagrion simile*." (Authors)] Address: Jocque, M., Biodiversity Inventory for Conservation NPO (BINCO), Walmersumstraat 44, 3380 Glabbeek, Belgium. Email: merlijn.jocque@binco.eu

**19434.** Kaiser, A.; Parkinson, D. (2021): Projet LIFE Ardenne liégeoise: réponse des libellules et papillons de jour aux travaux de restauration. *Naturalistes Belges* 2021, *Les Naturalistes belges* 102(1): 1-29. (in French, with English summary) ["During the 20th century, human activities and the abandonment of traditional agricultural practices led to the degradation of natural habitats on the Belgian high plateaux of the Liège Ardennes. The goal of the Ardenne liégeoise LIFE project (2012-2020) was to restore these habitats and to improve ecological connectivity between the Plateau des Tailles and the Hautes Fagnes. The aim of this paper is to provide an overview of the responses of dragonflies and butterflies to restoration actions undertaken within the framework of the project. On the basis of standardised transects and data obtained from regional naturalist databases, we show a generally positive and rapid response of dragonflies. In particular, many peat bog specialists expanded their range within the perimeter of the project by its completion. Butterflies show a more contrasted response and species associated with wet grasslands show negative trends in the study region despite restoration actions. Dragonfly and butterfly monitoring should continue to confirm these trends and refine their evaluation....Increase in peatland specialist

species: All 8 typical bog species (*Aeshna juncea*, *A. subarctica*, *Coenagrion hastulatum*, *Leucorrhinia dubia*, *L. rubicunda*, *Orthetrum coerulescens*, *Somatochlora arctica* and *Sympetrum danae*) were recorded in the project area, both during the period 2006-2014 and 2015-2019. Fig. 7 shows the number of bog species observed per site for the periods 2006-2014 and 2015-2019, for the selection of 20 sites where water works were undertaken. In the period 2006-2014, seven of these sites had no peatland species and three had only one peatland species, showing that the majority of sites where waterworks were undertaken were initially (very) poor in peatland species. After the restoration work was completed, all sites had at least one peatland species, with the number varying between 1 and 8 (dominant value: 3). It was possible to observe all typical bog species on one site (Fagne de Malchamps) during the period 2015-2019. This increase in the number of sites in this selection of 20 sites is also visible on a more global scale: Table 5 shows the number of sites occupied by each peatland species at the scale of the project area (49 sites in total), for the two periods considered. Six species (*Aeshna juncea*, *Coenagrion hastulatum*, *Leucorrhinia dubia*, *L. rubicunda*, *Orthetrum coerulescens* and *Sympetrum danae*) were detected in a greater number of sites than in the reference period, while the number of sites occupied by the other two species (*Somatochlora arctica* and *Aeshna subarctica*) remained stable. For the majority of species, apparent local extinctions are nevertheless noted. Progression of pioneer species and the case of *Leucorrhinia pectoralis*: Pioneer species have also benefited greatly from the creation of new water bodies (on 24 of the 49 sites concerned by the project), as shown by the progress of *Libellula depressa* and *Ischnura pumilio*. The case of *Leucorrhinia pectoralis* is more complex. This species was first observed in 2010 at a site on the Plateau des Tailles (Grande Fange de Bihain), then again at the same location in 2012. In the following years, the number of sightings and the sites where the species is observed increases. Numbers vary greatly from one year to the next (maximum of seven individuals observed simultaneously at the same site) and observations are mainly concentrated in even-numbered years, especially in 2012 and 2018, years of leucorrhines influx. Of the 25 observations reported since 2010, 15 concerned single individuals and only one observation explicitly mentioned the presence of females. It should be noted that only two sites are frequented several years, which leads to a constant increase in the number of cumulative sites where the species is contacted. Thus, between 2010 and 2019, 14 sites had at least one record of *L. pectoralis*." (Authors) [http://naturalistesbelges.be/wp-content/uploads/2021/10/Natbelg102\\_2021\\_1.-pdf](http://naturalistesbelges.be/wp-content/uploads/2021/10/Natbelg102_2021_1.-pdf)] Address: Kaiser, Aurélien, Behavioural Ecology & Conservation Group, UC Louvain, Louvain-la-Neuve, Belgium. Email: kaiser.aurelien@gmail.com

**19435.** Kalkman, V.J. (2021): *Ophiogomphus caudoforcipus* Yousuf & Yunus, 1977, is a synonym of *Ophiogomphus reductus* Calvert, 1898. *Notulae odonatologicae* 9(7): 277-280. (in English) ["*O. caudoforcipus*, is only known from a single male collected on 04-viii-1966 at Mingora (Pakistan).

Based on a comparison between the description and material of *O. reductus* at the RMNH it is concluded that *O. caudoforcipus* is a junior synonym of *O. reductus*." (Authors)] Address: Kalkman, V.J., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Email: vincent.kalkman@naturalis.nl

**19436.** Kalkman, V.J.; Blagoderov, V. (2021): On the synonymy of *Pseudagrion bidentatum* Morton, 1907, with *P. hypermelas* Selys, 1876. *Notulae odonatologicae* 9(7): 281-284. (in English) ["No new information on *P. bidentatum* has been published since its original description by Morton in 1907 based on a single male from western India. Although this species was already regarded as a synonym of either *P. hypermelas* Selys, 1876, or *P. spencei* Fraser, 1922, by Fraser in 1933 it was still treated as a valid species on later checklists. Based on a study of the original description and the holotype held at the National Scottish Museum, Edinburgh, we conclude that *P. bidentatum* is a junior synonym of *P. hypermelas*." (Authors)] Address: Kalkman, V.J., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Email: vincent.kalkman@naturalis.nl

**19437.** Kalkman, V.J. (2021): On the synonymy of *Agriocnemis corbeti* Kumar & Prasad, 1978, with *Agriocnemis pygmaea* Rambur, 1842 (Odonata: Coenagrionidae). *Notulae odonatologicae* 9(8): 353-357. (in English) ["No new information on *Agriocnemis corbeti* has been published since its original description from 1978 based on a teneral male and five teneral females from Dehra Dun Valley, Uttarakhand, India. Based on a study of the original description it is concluded that the characters mentioned in the diagnosis are of little use as they can be found in the immature stages of several species of *Agriocnemis*. The characters mentioned in the description are difficult to interpret but the drawing of the appendages suggest that *A. corbeti* is conspecific with *A. pygmaea*. *Agriocnemis corbeti* is therefore considered a synonym of *A. pygmaea*. Records of *A. pieris* from Bangladesh are discussed and are all judged to belong to *A. lacteola*, with the former considered not to occur in Bangladesh." (Author)] Address: Kalkman, V.J., Naturalis Biodiversity Center, Leiden, The Netherlands. Email: vincent.kalkman@naturalis.nl

**19438.** Karube, H.; Kameda, H.; Kaga, R.: & Fujita, E. (2021): Contamination status on the neonicotinoid insecticide for the habitats of endangered dragonfly *Libellula angelina* Selys, 1883 in Japan). *Tombo* 63: 1-7. (in Japanese, with English summary) ["*Libellula angelina* Selys, 1883 has been designated as a critically endangered species on the Red List of the Japanese Ministry of the Environment. Amongst Japanese dragonfly species its decline is particularly strong. The authors publish the results of the analysis of the occurrence of neonicotinoid-type agricultural chemicals performed in April 2019 of almost all breeding locations of this species. The analysis of 14 samples of 6 locations found low concentrations of clothianidin in three samples from two locations. On the other hand it detected the presence of Fipronil, which is known to affect the larvae of

dragonflies strongly, in all samples. Moreover, in eight of the fourteen samples the pollution concentrations exceeded the environmental standard. It is possible that the recent decline of this species is caused by tins chemical substance." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**19439.** Kawata, N., Yoshida, M., Udono, K. & Sugimura, M. (2021): Behaviour and morphological characteristics of a gynandromorph individual of *Nannophya pygmaea* Rambur, 1842 (Libellulidae: Odonata). *Tombo* 63: 8-15. (Japanese, with English summary) ["A gynandromorph of *N. pygmaea* was observed in Toyota City, Aichi Prefecture. There is no detailed report on the behavior of gynandromorph individual of Odonata in Japan. Although no reproductive behavior was observed, the gynandromorph had mud on its distal abdomen, which implies ovipositional or oviposition-like behavior. In addition, no territorial behavior like males was performed. These observations suggest that the behavior of this specimen may be closer to that of females, rather than of males. In its morphology, female characteristics appear strongly, except for the left side of the head and thorax, suggesting its behavior may related." (Authors)] Address: Kawata, N.: Email: leo.gacchan@gmail.com

**19440.** Khan, M.K. (2021): *Gynacantha chaplini* sp. nov., a new dragonfly from Bangladesh (Odonata: Aeshnidae). *Odonatologica* 50(1/2): 95-105. (in English) ["*Gynacantha chaplini* sp. nov. is described based on a male collected from the north-eastern region of Bangladesh. Distinguishing features of the adult male are illustrated and discussed. *Gynacantha chaplini* sp. nov. is distinguished from its congeners by a dark brown trapezium-shaped mark on the postfrons. An updated key is provided to identify the males of the *Gynacantha* species known from South Asia (Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka)." (Author)] Address: Khan, M.K., Dept of Biochemistry & Molecular Biology, Shahjalal University of Science and Technology, Sylhet-3114, Bangladesh. Email: bmbkawsar@gmail.com

**19441.** Khan, M.K.; Hämäläinen, M. (2021): The rare and beautiful damselfly *Rhinocypha trimaculata* rediscovered in Bangladesh: With notes on earlier records, redescription of male and distinguishing characters from *R. ignipennis* (Odonata: Chlorocyphidae). *Notulae odonatologicae* 9(8): 315-330. (in English) ["*Rhinocypha trimaculata* Selys, 1853, is a very rare species, for which only four records have been previously published (twice in the 19th century and twice in the 20th century; most recently recorded in Assam in 1973). The species was rediscovered and photographically documented in Sylhet Division of Bangladesh in 2014. Later, in 2018, two male specimens were collected at the same site. All known earlier records of this species are documented and discussed. The male of *R. trimaculata* is redescribed and illustrated, including SEM photos of the penis. Diagnostic features, differentiating *R. trimaculata* and the related *R. ignipennis* Selys, 1879, a montane species from north-eastern India and western Burma, are provided together with

photographs of type specimens of both species. Habitats and behaviour of *R. trimaculata* are discussed. We note that this vulnerable or endangered species appears to be confined to small forest streams in lowland areas within a small range in northeastern India and Bangladesh and requires immediate conservation action to protect it." (Authors)] Address: Khan, M.K., Dept of Biochemistry & Molecular Biology, Shahjalal University of Science and Technology, Sylhet-3114, Bangladesh. Email: bmbkawsar@gmail.com

**19442.** Kietzka, G.J.; Pryke, J.S.; Gaigher, R.; Samways, M.J. (2021): 32 years of essential management to retain value of an urban dragonfly awareness pond. *Urban Ecosystems* 24: 1295-1304. (in English) ["Pond construction in urban areas can mitigate loss of aquatic insects by providing refuges. Urban ponds are also an interface between civil society and aquatic insects, especially via charismatic dragonflies. Ponds have therefore been constructed specifically for dragonfly conservation awareness in many countries. Yet they require regular management, especially when an inflow to a shallow pond supplies inorganic and organic material, leading to vegetation overgrowth and natural infilling, rendering a pond back into a stream, unsuitable for many lentic species. Here, we assess changes in dragonfly diversity over a 32-year period at a pond constructed for dragonfly conservation awareness, and which underwent system changes: stream->pond vegetation overgrowth and infilling and then following restoration from stream->pond. Adult male dragonflies and 13 environmental variables were recorded along 31 transects, and compared with previous data collected at the same sites before pond construction and then in the short- and medium-term after. Years when the system comprised a pond had higher dragonfly abundance and species richness than when a stream, and both increased after the pond was restored. Shortly after restoration, the dragonfly assemblage closely resembled that of the earlier pond. Vegetation cover and alien vegetation presence were significant drivers of dragonfly assemblage change and decreased dragonfly abundance and species richness. Lessons learned here for maintaining a dragonfly awareness pond include periodical dredging to remove excessive vegetation overgrowth and infilling from organic and inorganic matter, and aim for high microhabitat heterogeneity using selective management of marginal vegetation, alongside a range of flow regimes." (Authors)] Address: Kietzka, Gabriella, Dept of Conservation Ecology & Entomology, Stellenbosch Univ., Private Bag X1, Matieland 7602, South Africa. E-mail: gabikietzka@gmail.com

**19443.** Kobylecki, P. (2021): New records of dragonflies (Odonata) of Podlasie. *Odonatrix* 178 (2021): 4pp. (in Polish, with English summary) [ponds and rivers near Wyliny-Rucø village in 2021. In total, 30 dragonfly species were recorded, including *Leucorrhinia albifrons*.] Address: Kobylecki, P., ul. Liryczna 8, 04-410 Warszawa, Poland. Email: fario@poczta.fm

**19444.** Kolar, V.; Vlašánek, P.; Boukal, D.S. (2021): The influence of successional stage on local odonate communities

in man-made standing waters. *Ecological Engineering* 173, December 2021, 106440: 10 pp. (in English) ["Highlights: • We compared odonate communities in sandpit ponds and fishponds. • Community composition differed between habitat types despite similar diversity. • Aquatic vegetation, water depth and bottom substrate shaped local communities. • Diverse habitats beget diverse odonate communities in man-made standing waters. Abstract: Man-made freshwater habitats are an important part of the European landscape, especially in areas with mostly absent or degraded natural habitats. To assess the role of different man-made standing waters in anthropogenic landscapes, we surveyed adult odonate communities in a cluster of 20 water bodies including fishponds and sandpit ponds in early and ongoing successional stages. We found 35 odonate species (i.e., 47% of the fauna of the Czech Republic), but their presence differed significantly among the three habitat types. The highest species diversity, driven mainly by the presence of generalists, was found in fishponds. Sandpit ponds in an early successional stage hosted the least diverse communities dominated by pioneer and vagrant species. Specialist species occurred in both types of sandpit ponds, especially those in an ongoing successional stage, more than in fishponds. Although the dragonfly biotic index did not differ among the three types of localities, all four species from the national Red list recorded during the study occurred only in sandpit ponds. The main environmental drivers of local odonate communities included the coverage of shoreline by emergent vegetation, water depth and bottom substrate; the latter two characteristics largely corresponded to the distinction between sandpit ponds and fishponds. We conclude that both sandpit ponds and fishponds play an important role in maintaining freshwater biodiversity that requires a mosaic of habitats in different successional stages." (Authors)] Address: Kolar, V., University of South Bohemia, Faculty of Science, Department of Ecosystem Biology, Branišovská 1760, CZ-37005 České Budejovice, Czech Republic. E-mail: kolarvojta@seznam.cz

**19445.** Koperski, P. (2021): Linear and nonlinear effects of nutrient enrichments on the diversity of macrobenthos in lowland watercourses. *Aquatic Ecology* 55: 1011-1031. (in English) ["The study concerns the relationships between taxonomic, functional and phylogenetic diversity of benthic invertebrates inhabiting watercourses and abiotic parameters associated with excessive nutrients load (concentration of Kjejdahl nitrogen, nitrates, phosphorus, organic carbon and dissolved oxygen, values of BOD5 and electrolytic conductivity). The research used data on the species composition of leeches, molluscs and larval forms of odonates and chironomid dipterans. Their description using mathematical functions allowed to determine whether the diversity reaches maximal values at extreme or moderate values of nutrients enrichment. In most cases, statistically significant relationships were unimodal—the highest diversity was observed at intermediate values of nutrients content and associated parameters, however the different patterns of relationships, monotonic and inverse quadratic, were also observed. Indirect impacts of nutrients enrichment on diversity



were found as the most significant relationships. Significant responses of functional diversity were clearer and stronger than responses of taxonomic and phylogenetic diversity. The identification of fauna to the species level allowed for obtaining precise results that could enable selection of appropriate parameters for effective assessment of environmental degradation." (Author) "The most common and the most numerous species were: *Calopteryx splendens*, *C. virgo*, *Platycnemis pennipes* and *Gomphus vulgatissimus* ] Address: Koperski, P., Institute of Functional Biology & Ecology, Faculty of Biology, Univ. of Warsaw, Biological & Chemical Research Center, Zwirki i Wigury 101, 02-089 Warsaw, Poland. Email: p.t.koperski@uw.edu.pl

**19446.** Krieg-Jacquier, R. (2021): Capacités de dispersion chez *Leucorrhinia pectoralis* (Charpentier, 1825) erratum (Odonata: Libellulidae). *Martinia* 35(6): 27-30. (in French and English) [A literature reference (Ott (1989)) to a dispersal of beyond 100 km for a male *L. pectoralis* in Germany is quoted repeatedly in literature as proving the long-range movement of the species. As Ott never has written this but mentioned the nearest known to him locality with a record of *L. pectoralis* he never has claimed such an (active) dispersal of the species. In this note, the author points to the risk of quoting successively a reference being either erroneous or out of context and its aftermath on the way it is read, especially by non-specialists. Beyond this risk, authors must be urged to exercise caution and to adopt accurate writing in order to avoid any misinterpretation.] Address: Krieg-Jacquier, R., Opie-odonates, 628 route de Marboz 01440 Viriat, France. Email: regis.krieg.jacquier@gmail.com

**19447.** Laakso, L.K.; Ilvonen, J.J.; Suhonen, J. (2021): Phenotypic variation in male *Calopteryx splendens* damselflies: the role of wing pigmentation and body size in thermoregulation. *Biological Journal of the Linnean Society* 134(3): 685 - 696. (in English) ["For ectothermic insects, their colour and size are important determinants of body temperature: larger bodies require more heat to reach a certain temperature, and dark colours absorb heat more efficiently. These dark colours are expressed using melanin, which has been intimately linked with the thermoregulatory capabilities of insects. Melanin is also linked with immune defence and is often used as a secondary sexual character in insects. There is a potential trade-off situation between thermoregulatory capabilities, immune defence and secondary sexual characters, all of which use melanin. Some *Calopteryx* damselflies, such as *Calopteryx splendens*, have melanin-based wing pigmentation that is sexually selected and drives intra- and interspecific territorial aggression. Our goal was to study experimentally how the wing pigmentation and body size of *C. splendens* males affect their thermoregulation and, especially, their ability to become active (hereafter, 'activate') after being cooled down. Our results were in line with our hypotheses, showing that individuals with larger wing spots had significantly faster activation times than those with smaller wing spots, and that individuals with larger body size had significantly slower activation times than those with smaller body size. Both variables showed an interaction and are

therefore important in damselfly warm-up and activation. We discuss the role of wing pigmentation and thermoregulation in the behavioural patterns observed in *Calopteryx* species." (Authors)] Address: Laakso, Linda, Dept Biol., Univ. of Turku, FI-20014 Turku, Finland. E-mail: lklaak@utu.fi

**19448.** Landmann, M.; Schlick-Steiner, B.; Steiner, F.M.; Landmann, A. (2021): Connectivity within isolation: dispersal, population genetics, and conservation of the rarest European damselfly. *Insect Conservation and Diversity* 14(6): 800- 813. (in English) ["1. *Coenagrion hylas* (Trybom, 1899) has a very limited distribution in Europe, lives in very small, isolated populations, has rather specialised habitat demands, and is regarded as the rarest damselfly of Europe. 2. Using a combination of capture-mark-recapture and population genetics, we aimed to evaluate the state of the populations in the Tyrolean Lech valley and to test whether exuviae from this species are usable as a DNA source. DNA was extracted from midleg tibiae and exuviae and genotyped with species-specific microsatellite markers. The results from the capture-recapture and the genetic methods were congruent. 3. *C. hylas* has an unexpectedly high tendency to disperse within the valley, covering distances of up to 30 km, and lives longer than other damselflies, with an average longevity of 12 days and a maximum lifespan of at least 40 days. Low inbreeding coefficients and low ranges of genetic differentiation across sites provide evidence of panmixia, with no clear signs of inbreeding. The current population size is estimated at 1150 males based on the recapture data. 4. We further demonstrated that exuviae deliver a sufficient amount of DNA, which will be important for future monitoring. Although *C. hylas* currently shows appropriate viability at most Lech valley sites, our study indicates that management measurements, such as creating stepping stone habitats, are crucial to maintain the current population status. Given the high dispersal capability of the species, such management measurements seem promising." (Authors)] Address: Landmann, A., Institut für Naturkunde & Ökologie, Karl-Kapfererstr. 3, 6020 Innsbruck, Austria. Email: office@arminlandmann.at

**19449.** Lencioni, F.A.A.; Neiss, U.G.; Dutra, S.L.; Furieri, K.S.; Juen, L.; Batista, J.D.; Vilelam D.S. (2021): Synopsis of *Lestes* from Brazil with description of *Lestes demarcoi* sp. nov. (Zygoptera: Lestidae). *Zootaxa* 4990(3): 511-541. (in English) ["The Brazilian fauna of Lestidae contains two genera (*Archilestes* Selys, 1862 and *Lestes* Leach in Brewster, 1815) with 14 species, many of which are poorly defined and/or known only by primary literature. To improve the knowledge of the Brazilian species of the genus *Lestes* we examined 97 specimens pertaining to 11 of the 13 described species. Additionally, a new species is described here in honor to Prof. Dr. Paulo De Marco Júnior: *Lestes demarcoi* (Holotype and Allotype: Brazil: Amazonas, Manaus, Reserva Adolpho Ducke, Acará trail, 02°55'46" S & 59°58'22" W, 62 m, 13.iv.2009, collected in tandem, U.G. Neiss leg. and deposited in FAAL). Diagnostic illustrations of all species are provided. Color photographs of live individuals of *Lestes dichrostigma* Calvert, 1909, *Lestes forficula* Rambur,

1842 and *Lestes paulistus* Calvert, 1909 are also present." (Authors)] Address: Lencioni, F.A.A., Rua Anibal, 216, d. Coleginho, Vila Zezé, Jacareí, CEP (ZIP) 12310-780, São Paulo, Brazil. E-mail: lencioni.odonata@gmail.com

**19450.** Liberto, B.; Studinski, J. (2021): Abundance and habitat associations of disjunct and regionally rare populations of *Leucorrhinia glacialis* and *L. hudsonica* in the Appalachian Mountains (Odonata: Libellulidae). *Odonatologica* 50(3/4): 187-202 -202. (in English) ["*Leucorrhinia glacialis* and *L. hudsonica* are boreal anisopterans common in Canada and the north-eastern USA but are rare in central Appalachia, where they are isolated at the extreme southern edge of their range. Adult and larval anisopteran surveys were conducted at 24 wetlands in central Appalachia to determine the number of populations and habitat associations of *L. glacialis* and *L. hudsonica*. A mark-recapture study at wetlands containing either of the two target species was conducted to estimate the population size and daily survival. Cormack-Jolly-Seber (CJS) and Jolly-Seber analyses were conducted for the populations of *L. glacialis* and *L. hudsonica*, and multivariate techniques explored habitat and community associations. *L. hudsonica* were found in three wetlands, with the largest population estimated at 34 individuals. *Leucorrhinia glacialis* were found in two wetlands, with one population estimated at 351 and the other being too large (i.e., not enough recaptures) to apply CJS methods. All wetlands containing populations of *L. glacialis* and *L. hudsonica* were permanent, acidic, and fishless, and dispersal from their natal ponds was rarely observed. Most of the wetlands containing these species were created by beaver, with some ponds rapidly shrinking due to a lack of dam maintenance. The isolation and rarity of habitats supporting *L. glacialis* and *L. hudsonica* in this region, coupled with the species' poor dispersal abilities and apparent reliance on beaver, suggests an uncertain future for these locally rare anisopterans. The protection of these rare habitats and populations, along with possible translocation efforts and beaver management, may increase these species' chances of persistence." (Authors)] Address: Liberto, Bethany, Frostburg State Univ., Frostburg, MD, USA. Email: bpliberto@gmail.com

**19451.** Lima, J.C.; Moreira, R.A.; Neto, A.J.G.; Andrade, D.; Freitas, E.C.; Daam, M.A.; Rocha, O. (2021): Metal toxicity can affect dragonfly nymphs and ostracods predation rates and food selectivity: Ecological implications on food webs. *Water, Air, & Soil Pollution* 232, issue 7, id. 288. (in English) ["Predation is known to play a prominent role in maintaining ecosystem structure and functioning. Despite metals being known to potentially affect predation in aquatic ecosystems, few studies have been conducted, so far, with the aim of evaluating this interplay. In the present study, the effects of four metal salts (copper, cadmium, mercury, and manganese) on the feeding rates and food preference of *Tremea cophisa* and of the ostracod *Chlamydotheca* sp. were studied by performing laboratory ecotoxicity tests. Food preference was evaluated by offering four prey species to dragonfly nymphs and three to adult large ostracods. In general, the food preference of both predator species after

being exposed to metal salts was not altered, compared with controls, but the feeding rate of *T. cophisa* decreased in comparison with controls, after exposure to each metal salt, except manganese. Contrastingly, predation rates of *Chlamydotheca* sp. increased after metal salt exposure. This difference in response can be explained by differences in life-history traits of these two organisms. Both species individuals preferred soft-bodied prey (Oligochaeta, Chironomidae) over water-dwelling crustaceans that are likely to be more difficult to prey upon. Tests evaluating the effects of metals and other chemicals on predation behavior may lead to a better understanding of biotic interactions that can be restricted by chemical stress, improving our understanding of possible food web disruptions underlying chemical stress." (Authors)] Address: Lima, J.C., Post Graduate Program of Sciences of Environ. Engineering, São Carlos Engineering School, University of São Paulo, Avenida Do Trabalhador São-Carlense, 400, São Carlos, SP, 13560-970, Brazil

**19452.** Matthews, P.G.D. (2021): How insects transition from water to air: Respiratory insights from dragonflies. *Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology* 253, March 2021, 110859. (in English) ["Highlights: • Dragonfly nymphs reinvaded aquatic environment using tidally-ventilated rectal gill. • Nymphs hyperventilate in hypoxia but show no response to hypercapnia. • Nymphs maintain high hemolymph pCO<sub>2</sub> compared with other water-breathing animals. • Approaching metamorphosis nymphs breathe bimodally, increase pCO<sub>2</sub> and HCO<sub>3</sub><sup>-</sup>. • Dragonflies experience small rise in pCO<sub>2</sub> and HCO<sub>3</sub><sup>-</sup> as they move to breathing air. Abstract: The transition of animal life from water onto land is associated with well-documented changes in respiratory physiology and blood chemistry, including a dramatic increase in blood pCO<sub>2</sub> and bicarbonate, and changes in ventilatory control. However, these changes have primarily been documented among ancestrally aquatic animal lineages that have evolved to breathe air. In contrast, the physiological consequences of air-breathing animals secondarily adopting aquatic gas exchange are not well explored. Insects are arguably the most successful air-breathing animals, but they have also re-evolved the ability to breathe water multiple times. The juvenile life stages of many insect lineages possess tracheal gills for aquatic gas exchange, but all shift back to breathing air in their adult form. This makes these amphibiotic insects an instructive contrast to most other animal groups, being not only an ancestrally air-breathing group of animals that have re-adapted to life in water, but also a group that undergoes an ontogenetic shift from water back to air across their life cycle. This graphical review summarizes the current knowledge on how blood acid-base balance and ventilatory control change in the dragonfly during its water-to-air transition, and highlights some of the remaining gaps to be filled." (Author)] Address: Lee, D.J., Dept of Zoology, University of British Columbia, Vancouver, BC, V6T 1Z4, Canada. E-mail: danlee@zoology.ubc.ca

**19453.** Martin, R.; Maynou, X. (2021): *Paratanytarsus* sp. (Diptera: Chironomidae) as commensal on larval *Calopteryx*

(Odonata: Calopterygidae). *Notulae odonatologicae* 9(8): 367-371. (in English) ["We describe larval *Paratanytarsus* sp. as epibionts on larvae of *C. xanthostoma* and *C. haemorrhoidalis* in the Tordera River, NE Iberian Peninsula. Tubular cases were fixed to different body parts such as thorax, abdomen, legs, and wing sheaths." (Authors)] Address: Martin, R., Inst. Catalana d'Historia Natural, c/del Carme 47, 08001 Barcelona, Spain. Email: ricardo.martin@cllicenciats.cat

**19454.** Martin, R.L.; McCauley, S.J. (2021): Risks for overwintering eggs of the dragonfly *Sympetrum vicinum* in aquatic and terrestrial environments. *Hydrobiologia* 848: 4933-4944. (in English) ["Risk-spreading behaviour is often exhibited by animals as a response to unpredictably variable environments. Using field and laboratory studies, we tested the hypothesis that *Sympetrum vicinum* dragonflies spread the risks of winter environments by laying eggs across a terrestrial-aquatic gradient. *Sympetrum vicinum* eggs that overwintered in terrestrial and benthic-limnetic habitats had significantly higher hatching success compared with eggs that overwintered in littoral sites. Low success may have been caused by hypoxia due to excess sediment in the littoral samples in the lab. While hypoxia experienced under winter conditions (4°C) had no negative effect on hatching success, hatching in hypoxic and anoxic water significantly decreased hatching success. Opportunistic egg predation by a winter-active caddisfly significantly decreased egg hatching success. Because *S. vicinum* eggs have a relatively low supercooling point (-26.25°C), freezing may not be a significant source of mortality in terrestrial or aquatic sites. By ovipositing in both terrestrial and aquatic environments, female dragonflies may be balancing the unpredictable risks of both the failure to inundate the eggs and egg predation. Our research highlights the potential for biotic interactions during winter to shape the behaviour and life-history of aquatic invertebrates." (Authors)] Address: Martin, Rosemary, Univ. of Toronto Mississauga, Mississauga, ON, Canada

**19455.** Mategaonkar, M.S.; Sharma, P.; Inamdar, S.A. (2021): Diversity of odonates at Lohegaon, Pune, (MS). *Bioinfollet* 18(3): 329-333. (in English) ["During present study 16 species of odonates were recorded from Air Force Station, Lohegaon, Pune. Among them 10 species were from family Libellulidae, 3 from Coenagrionidae and one each from families Gomphidae, Aeshnidae and Euphaeidae." (Authors)] Address: Mategaonkar, M.S., Postgraduate Dept of Zoology, Modern College of Arts, Science & Commerce, Ganeshkhind, Pune411016 (M.S.), India

**19456.** Maynou, X.; Martin, R. (2021): *Hydra* sp. (Anthomedusae: Hydridae) as epibiont of larval *Calopteryx virgo* (Odonata: Calopterygidae). *Notulae odonatologicae* 9(8): 341-343. (in English) ["In a mountain river in the Montseny massif, Catalan Pre-Coastal Range, northeastern Iberian Peninsula, we found a *Hydra* sp. (Anthomedusae: Hydridae) attached to the abdomen of a larva of *Calopteryx virgo meridionalis*." (Authors)] Address: Maynou, X., Institutio Catalana d'Historia Natural, c/del Carme 47, 08001 Barcelona, Spain. Email: xavier.maynou@gmail.com

**19457.** McDevitt-Galles, T.; Carpenter, S.A.; Koprivnikar, J.; Johnson, P.T.J. (2021): How predator and parasite size interact to determine consumption of infectious stages. *Oecologia* 197(3): 551-564. (in English) ["Parasites are important players in ecological communities that can shape community structure and influence ecosystem energy flow. Yet beyond their effects on hosts, parasites can also function as an important prey resource for predators. Predators that consume infectious stages in the environment can benefit from a nutrient-rich prey item while concurrently reducing transmission to downstream hosts, highlighting the broad importance of this interaction. Less clear, however, are the specific characteristics of parasites and predators that increase the likelihood of consumption. Here, we determine what combination(s) of predator and parasite morphological traits lead to high parasite consumption. We exposed the infectious stages (cercariae) of five trematode (fluke) taxa to aquatic insect predators with varying foraging strategies and morphologies. Across the 19 predator-parasite combinations tested, damselfly predators in the family Coenagrionidae were, on average, the most effective predators of cercariae, consuming between 13 and 55% of administered cercariae. Large-bodied cercariae of *Ribeiroia ondatrae* had the highest average vulnerability to predation, with 37-48% of cercariae consumed. The interaction between predator head width and cercariae tail size strongly influenced the probability of consumption: small-bodied predators were the most effective consumers, particularly for larger tailed parasites. Thus, the likelihood of parasite consumption depended strongly on the relative size between predator and parasite. Our study helps establish that predation on free-living parasites largely follows a broader predator-prey framework. This will help to identify which predator and parasite combinations will likely have high consumptive interactions, potentially reducing parasite transmission in natural populations." (Authors) Aeshnidae, Libellulidae, Coenagrionidae and Lestidae.] Address: McDevitt-Galles, T., Ecology and Evolutionary Biology, University of Colorado, Boulder, CO, USA. Email: travis.mcdevittgalles@colorado.edu

**19458.** Mendoza-Penagos, C.C.; Batista Calvão, L.; Juen, L. (2021): A new biomonitoring method using taxonomic families as substitutes for the suborders of the Odonata (Insecta) in Amazonian streams. *Ecological Indicators* Volume 124, May 2021, 107388: 12 pp. (in English) ["Highlights: • The family-level provides an effective tool for the biomonitoring of streams using odonates. • The use of family-level keeps essential ecological information of the species-level community. • Aggregate measures such as abundance can be very useful when higher taxonomic levels are used in biomonitoring. • The use of family-level could be advantageous in terms of time and financial resources. Abstract: Odonata have been widely used as bioindicators of environmental quality in different types of ecological research. In general, the taxonomic level used is the species, but higher taxa, such as the family, have received less attention. Assuming that higher taxa can reproduce the impacts that occur at the species level, we use facets of diversity at the community to assess if Odonata families could be an efficient tool for the

assessment of environmental impact in Amazon streams. We first assessed to what extent each family retains ecological information from the ecological diversity of the species of the suborder (Anisoptera or Zygoptera). We then quantified the degree of congruence between different taxonomic levels in the Odonata. Next, we evaluated the effects of environmental integrity on the facets of diversity of the families. Finally, we evaluated whether ecological thresholds can be detected using a family-level approach. We sampled adult odonates in 98 streams in the eastern Amazon, in the municipalities of Paragominas, Santarém, and Belterra, in the Brazilian state of Pará. The habitat integrity index (HII) was used to assess the environmental integrity of each stream. The congruence between the different taxonomic levels was evaluated using a Procrustes analysis. The degree of correlation of diversity facets was evaluated between families and each suborder. Linear mixed models and matrix regressions were used to measure the influence of environmental integrity on the diversity facets of the families. Higher-level ecological thresholds were detected using the TITAN analysis. The results of the analyses indicated a high degree of congruence between species-level and higher levels (family and suborder). The ability of the families to represent the diversity facets of the suborder is influenced by the abundance of individuals and the number of species in the family. The environmental integrity of the streams affects the facets of diversity of the families systematically, although cumulative measurements, such as abundance, appeared to be more advantageous as biomonitoring tools. The similarity of the responses observed at species and family levels supports the use of odonate families for the detection of ecological thresholds in stream environments. The sum of the evidence indicates that a family-level approach is effective for the identification of alterations in the environmental integrity of streams, providing valuable insights into the facets of diversity of the odonate community. The adoption of a family-level approach in environmental monitoring programs could optimize the investment of resources, in particular through the identification of specimens by non-specialists, permitting a significant increase in sampling effort and replication." (Authors)] Address: Mendoza-Penagos, C.C., Lab. Ecol. & Conservation, Univ. Federal do Pará, Inst. Biol. Sciences, Rua Augusto Correia, No. 1 Bairro Guamá, CEP 66.075-110 Belém, Pará, Brazil. E-mail: cristian.penagos@icb.ufpa.br

**19459.** Mujumdar, N.; Deshpande, A.; Dawn, P.; Koparde, P. (2021): Notes on the oviposition behaviour of three *Elatoneura* damselflies from India (Odonata: Platycnemididae). *Notulae odonologicae* 9(8): 344-352. (in English) ["Oviposition behaviour of three Indian *Elatoneura* spp. is described and discussed. Endophytic oviposition in dry rigid substrates away from water by the endemic *E. nigerrima* and *E. tetrica* is recorded; this differs from the typical recorded use of submerged vegetation substrates in the genus. Contrasting behavioural observation of oviposition in *E. campioni* is also discussed." (Authors)] Address: Mujumdar, N., Bombay Natural History Society, Hornbill House, Shaheed Bhagat Singh Road, Colaba, Mumbai, Maharashtra 400001, India. Email: n.mujumdar@bnhs.org

**19460.** Nafisah, N.A.; Soesilohadi, R.C.H. (2021): Community structure of dragonfly (Ordo: Odonata) in natural forest and tourist sites Petungkriyono Forest, Central Java, Indonesia. *Journal of Tropical Biodiversity and Biotechnology* 6(3): 9 pp. (in English) ["Petungkriyono forest is a tropical rainforest with high biodiversity. The increasing tourism activities in Petungkriyono lead to land conversion. Dragonfly (order Odonata) is a good bioindicator for aquatic and terrestrial. This study aimed to compare the community structure of Odonata in natural forests and tourist sites. The method of collecting imago Odonata was done by direct searching, samples were captured using sweep netting. The results showed that the dragonflies found in all locations consisted of the same family, 2 families (Gomphidae and Libellulidae) from the suborder Anisoptera and 6 families (Calopterygidae, Chlorocyphidae, Coenagrionidae, Euphaidae Platycnemididae, and Platystictidae) from Zygoptera. The total species of dragonflies found in Sokokembang were 15 species with a total of 293 individuals, Tirta Muncar 13 species of 287 individuals, Karanggondang 17 species of 276 individuals, and Curug Lawe 14 species of 242 individuals. The highest relative abundance of individuals was in the natural forest of Sokokembang is *Drepanosticta spatulifera* (26.28%) and in Karanggondang *Vestalis luctuosa* (24.64%), while in the tourist forests of Tirta Muncar and Curug Lawe were *Euphaea variegata* (34.84% and 28.51%). The structure of the Odonata community is based on the Shannon-Wiener diversity index in the natural forests of Sokokembang (2.18) and Karanggondang (2.21) at the tourist sites of Tirta Muncar (1.84) and Curug Lawe (2.11). The results showed that the structure of the Odonata community based on the level of the diversity index value, evenness index, and dominance index in natural forests and tourist sites in Petungkriyono forest was not significantly different." (Authors)] Address: Nafisah, N.A., Faculty of Biology, Universitas Gadjah Mada, Jl. Teknik Selatan, Sekip Utara Bulaksumur, Yogyakarta, Indonesia, 55281. Email: hidayat@ugm.ac.id

**19461.** Nilsson-Örtman, V.; Rowe, L. (2021): The evolution of developmental thresholds and reaction norms for age and size at maturity. *PNAS* 118(7) e2017185118 (in English) ["Significance: Why most—but not all—organisms mature earlier in better growth conditions remains a mystery. Theory suggest that a solution may lie in the existence and evolution of critical size thresholds during development. The threshold model makes two unique predictions on the evolution of reaction norms between species and the effect of food reductions within species. We test this model experimentally using five damselfly species aligned along an ephemeral–permanent gradient, finding strong support for each prediction. Permanent habitats favor large thresholds and early maturation in better conditions, whereas ephemeral habitats favor small thresholds producing the rarer pattern with delayed maturation. The evolution of developmental thresholds is critical for understanding natural and human-induced variation in age and size at maturity. Developing organisms typically mature earlier and at larger sizes in favorable growth conditions, while in rarer cases, maturity is delayed. The rarer reaction norm is easily accommodated



by general life history models, whereas the common pattern is not. Theory suggests that a solution to this paradox lies in the existence of critical size thresholds at which maturation or metamorphosis can commence, and in the evolution of these threshold sizes in response to environmental variation. For example, ephemeral environments might favor the evolution of smaller thresholds, enabling earlier maturation. The threshold model makes two unique and untested predictions. First, reaction norms for age and size should steepen, and even change sign, with decreases in threshold size; second, food reductions at sizes below the threshold should delay maturation, while those occurring after the threshold should accelerate maturation. We test these predictions through food manipulations in five damselfly species that theory suggests should differ in threshold size. The results provide strong support for the threshold model's predictions. In all species, early food reductions delayed maturation, while late reductions accelerated maturation. Reaction norms were steeper, and the effect of food reductions changed from decelerating to accelerating at a much smaller size in species from ephemeral habitats. These results support the view that developmental thresholds can account for the widespread observation of negative correlations between age and size at maturity. Moreover, evolution of the threshold appears to be both predictable and central to the observed diversity of reaction norms for age and size at maturity." (Authors) *Ischnura ramburii*, *Enallagma doubledayi*, *Enallagma pollutum*, *Ischnura posita*, *I. hastata*] Address: Nilsson-Örtman, V., Dept of Ecology & Evolutionary Biology, Univ. of Toronto, Toronto, ON M5S 3B2, Canada

**19462.** Noor-Ul-Islam, H.; Khan, K.; Zia, S.A.; Naeem, M.; Shams, W.A. (2021): Heavy metals accumulation in dragonflies (Odonata) and their habitats in district Swabi, Khyber Pakhtunkhwa, Pakistan: Assessing dragonfly bionomics in the region. *Bulletin of Environmental Contamination and Toxicology* 107(5): 838-847. (in English) ["The current study aimed to examine the bionomics of dragonflies and heavy metal accumulation in their bodies and environment (sediments and water) from district Swabi, Khyber Pakhtunkhwa, Pakistan. A total of 1683 dragonflies were collected from May to September, 2018 in 4 tehsils (administrative subdivisions) of district. *Orthetrum prunosum neglectum* was the most abundant species followed by *O. anceps* and *O. chrysostigma luzonicum*. Highest abundance was observed in July and August corresponding to maximum temperature and rainfall. Dragonflies displayed preferable abundance within agricultural lands and on elevation ranging from 206 to 506 m. Heavy metal analysis of sediments and water samples from 4 tehsils showed significant differences in mean concentrations of Pb, Zn, Cu, and Fe. Abundance among districts was negatively associated with Fe levels in water while the species diversity had a significant positive relationship with Fe in sediments. Accumulation of metals in each body part significantly varied among species. *N. tullia tullia* and *O. anceps* specifically demonstrated their tolerance to high concentrations of heavy metals." (Authors)] Address: Noor-Ul-Islam, H., Dept of Zoology, Abdul Wali Khan Univ. Mardan, Mardan, Khyber Pakhtunkhwa, Pakistan

**19463.** Novelo-Gutiérrez, R.; Gomez-Anaya, J.A. (2021): Description of the larva of *Argia cuprea* (Hagen, 1861) with notes on its phylogenetic affinities (Odonata: Coenagrionidae). *Zootaxa* 5057(3): 437-445. (in English, with Spanish summary) ["The larva of *A. cuprea* is described and figured. It falls into the group of *Argia* larvae with prominent ligula and one palpal seta, but it differs from its closest relatives by a combination of features such as male gonapophyses reaching posterior ventral margin of S10; dorsal and ventral margin of paraproct with long, abundant, white, delicate setae on distal 0.40; tip of paraproct 20% its total length; lateral surface of paraproct with abundant spiniform setae restricted to the triangular, yellowish-brown, slightly sclerotized area along the inflated area. It appears closely related to *A. oenea* Hagen in Selys, 1865 and *A. orichalcea* Hagen in Selys, 1865 larvae." (Authors)] Address: Novelo-Gutiérrez, R., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera antigua a Coatepec 351, El Haya 91073 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@i-necol.edu.mx

**19464.** Nunes, L.; Casanueva, P.; Hernandez, M.A.; Sanchez-Sastre, L.F.; Santamaria, T.; Campos, F. (2021): Refining the identification criteria for forma typica and brachycerca in exuviae of *Boyeria irene* (Odonata: Aeshnidae). *Odonatologica* 50(3/4): 227-238. (in English) ["In female imagines of *Boyeria irene*, two forms are known according to the length of the cerci: forma brachycerca (short appendages) and f. typica (long appendages). Both forms are also recognisable in exuviae. Hitherto, no accurate measurements have been performed to distinguish between the two forms. Hence, we measured and analysed the absolute and relative length of the cerci in both sexes of exuviae from 11 populations originating from the centre and north of the Iberian Peninsula. We show that there are specimens intermediate between the two forms and that dimorphism is also present in males. The brachycerca form is more frequent in the north than in the centre of the Iberian Peninsula. Correct identification of both forms should always be based on accurate measurements of the length of the cerci." (Authors)] Address: Nunes, Luisa, Instituto Politécnico de Castelo Branco - Escola Superior Agrária, Qta Sra Mercúles, 6000-900 Castelo Branco, Portugal. Email: lfnunes@ipcb.pt

**19465.** Oldak, K.A. (2021): Proposal of the monitoring methodology of the Green Hawker *Aeshna viridis* Eversmann, 1836 (Odonata: Aeshnidae). *Folia Pomer. Univ. Technol. Stetin., Agric., Aliment., Pisc., Zootech.* 358(57): 15-28. (in English) ["*A. viridis*, ... is listed in Appendix II of the Bern Convention as well as Annex IV of the Habitats Directive. The decline in the range and abundance of *A. viridis* is associated with a strong dependence of this species on the presence of *Stratiotes aloides* in the water body and results from a decrease in the number of suitable habitats. So far, attempts to develop a monitoring methodology for this species have been made in several European countries, including Sweden, Denmark and the Netherlands. This article presents a proposal for a monitoring methodology based on the evaluation of indicators of population condition in the

form of exuviae density and number of adults, and indicators of habitat condition: the area of the water body covered by *S. aloides*, the presence of dense and undivided patches of *S. aloides*, succession in the water body and anthropopressure. The concept of population condition assessment methodology is based on observation of adult specimens and collecting exuviae, avoiding larvae sampling, which is invasive and associated with technical difficulties. The concept of the habitat condition assessment methodology, in turn, is based on strong association between *A. viridis* and *S. aloides*. It is proposed to monitoring *A. viridis* population on a minimum of several research areas within the country, on a two-year cycle. The presented proposal of the monitoring methodology requires pilot studies to be carried out within the *A. viridis* localities in order to determine the validity of assumptions made in the monitoring methodology." (Author)] Address: Oldak, K.A., Fac. of Animal Breeding, Bioengineering and Conservation, Warsaw University of Life Sciences – SGGW, Jana Ciszewskiego 8, 02-786 Warszawa, Poland. Email: odakkrystian@gmail.com

**19466.** Oliveira de Resende, B.; Santos Ferreira, V.R.; Juen, L.; Silvério, D.; Ramos Cabette, H.S. (2021): Seasonal fluctuations in the structure of the larval odonate community of a stream in the Cerrado–Amazon forest transition zone. *Aquatic Ecology* 55: 861-873. (in English) ["Climatic seasonality provokes considerable variability in the physical conditions of streams. Although few studies have assessed systematically the temporal effects of climate on aquatic communities, the diversity and structure of odonate larval assemblages (suborders Anisoptera and Zygoptera) are predicted to be influenced by seasonality. To evaluate this hypothesis, we tested the predictions that (1) the genera and abundance richness of zygopteran and anisopteran larvae will decrease during periods of high precipitation, (2) the genera richness and abundance of the two suborders will be associated inversely with temperature, and (3) the composition of the zygopteran assemblage will be more affected by seasonality, in particular precipitation, than that of the Anisoptera, whose composition will be influenced primarily by temperature. We collected odonate larvae every three months over a 6-year period at a stream located in the Cerrado–Amazon forest transition zone and compared these data with data on the local climate from the same period. Our results indicate that the seasonal variation in precipitation had a significant effect on the abundance of both odonate suborders, but that, while the anisopteran genera richness was affected by precipitation, the zygopteran richness was not. We showed that temperature affected the abundance of both suborders, but had no effect on genera richness. As we predicted, the composition of the zygopteran larval assemblage was affected more by the climatic variables than the Anisoptera. In addition, while the Zygoptera were affected primarily by precipitation, the Anisoptera were influenced most by temperature. The results indicate that the timing of the emergence of odonate larvae is synchronized with the months preceding the rainy season, when a high density of larvae are recorded, which may reflect a strategy for both the avoidance of the effects of fluctuations in water

levels and the exploitation of the relatively abundant food sources found in the terrestrial environment. Temperature also appears to contribute to this synchrony, by either accelerating or delaying the process of larval emergence." (Authors)] Address: Oliveira de Resende, Bethânia, Programa de Pós-Graduação em Ecologia e Conservação, Lab. de Entom. de Nova Xavantina, Univ. do Estado de Mato Grosso, Mato Grosso, Brazil, Programa de Pós-Graduação em Ecologia, Laboratório de Ecologia e Conservação, Universidade Federal Do Pará, Belém, Pará, Brazil

**19467.** Ott, J. (2021): Kalikokrebs (*Faxonius immunitus*) (Hagen, 1870) erobert den Bienwald – erste negative Auswirkungen auf gefährdete Libellenarten bereits erkennbar (Decapoda: Cambaridae). *Fauna Flora Rheinland-Pfalz* 14(3): 1103-1110. (in German, with English summary) ["Calico crayfish conquers the Bienwald – the first negative effects on endangered dragonfly species can already be seen. New records of the calico crayfish are reported, which is spreading further and further west in the Bienwald (southern Rhineland-Palatinate) via the local stream systems (Otterbach, Bruchbach, etc.). The species, which is very problematic for nature conservation, is already showing noticeable negative effects on nationally and internationally protected and endangered dragonfly species." (Author)] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**19468.** Oliveira-Junior, J.N.B.; Teodósio, M.A.; Juen, L. (2021): Patterns of co-occurrence and body size in dragonflies and damselflies (Insecta: Odonata) in preserved and altered Amazonian streams. *Austral Entomology* 60(2): 436-450. (in English) ["Interspecific interactions, such as competition, are among the key factors that determine the distribution, abundance and diversity of organisms in natural communities of aquatic ecosystems. However, a marked reduction in the environmental integrity of streams may lead to modifications of the natural dynamics of these communities, including co-occurrence patterns and body size. In the Amazon, the replacement of forests by production systems is one of the leading causes of alterations to riverine ecosystem. The insects of the order Odonata (dragonflies and damselflies) are predators known to compete for environmental resources but are also sensitive to environmental changes such as those caused by shifts in land use. In this scenario, the present study evaluated species co-occurrence and body size patterns in adult odonates found at preserved and altered Amazonian streams, to determine whether there are morphological differences among the species that enable their coexistence. During the study, 98 streams in the eastern Amazon region were sampled, and a habitat integrity index (HII) was used to evaluate the integrity of each stream (based on variables such as the condition of the riparian vegetation and channel, and land use). Ten male individuals were selected from each species, and nine morphometric measurements were taken from each individual. A total of 3588 specimens were collected and distributed in nine families, 49 genera and 134 species. We found a non-random pattern of co-occurrence in the species of the

odonate suborder Zygoptera and a random pattern in the Anisoptera, in both preserved and altered streams. We found morphological divergence between pairs of zygopteran species, in the whole sample and both categories of stream integrity separately. No such morphological divergence was found in the pairs of anisopteran species. The distribution patterns of odonate species are limited by specific environmental processes, especially in preserved environments and in specialists, such as most zygopterans. Zygopteran species have more specific microhabitat requirements, which could explain this pattern, whereas anisopterans prefer open environments, which usually have a greater supply of resources, although there tends to be less microhabitat heterogeneity, which leads to reduced competition. Given this, future studies should use limiting similarity (e.g. morphological attributes) in addition to environmental and spatial factors to better understand the factors structuring these communities. Among these mechanisms, the effects of common ancestry (phylogenetic inertia) and biogeography are important factors that should also be considered in future studies." (Authors)] Address: Oliveira-Junior, J.N.B., Inst. Water Sciences & Technology, Postgraduate Programs in: Society, Environment & Quality of Life; Biodiversity; Society, Nature & Development, Federal Univ. of Western Pará, Unidade Tapajós, Santarém, Pará, 68040-255 Brazil. E-mail: jose.mbo@ufopa.edu.br

**19469.** Papazian, M.; Rainon, B.; Coache, A. (2021): Présence d'*Orthetrum sabina* (Drury, 1773) dans le domaine Afrotropical occidental (Odonata, Libellulidae). Bulletin de la Société entomologique de France 126(3): 337-344. (in French, with English summary) ["Presence of *O. sabina* in the western Afrotropical realm: Surveys carried out over the past fifteen years on the entire Beninese territory, in order to update the local Odonata fauna, enabled the collection in 2013 of a female specimen of *O. sabina*. This capture is, to our knowledge, the first established in the Afrotropical realm of West Africa." (Authors)] Address: Papazian, M., Le Constellation bât. A, 72 avenue des Caillols, F – 13012 Marseille, France. Email: papazianmcm@wanadoo.fr

**19470.** Parr, A.J. (2021): Migrant and dispersive dragonflies in Britain during 2020. J. Br. Dragonfly Society 37(2): 69-81. (in English) ["Following a dramatic season in 2019, the year 2020 turned out to be a quieter one for migrant dragonflies in Britain, though there were still several highlights. A number of these probably relate to the legacy of past influxes, but significant fresh immigration also clearly took place. The migrant season started with a few mature *Sympetrum fonscolombii* arriving during mid-late May, but by early June several instances of local emergence by this species had also been reported. Successful overwintering of larvae resulting from breeding attempts made during the species' near record breaking year in 2019 had presumably been aided by the mild winter of 2019/20. *Anax parthenope* also started to appear in early June. In many ways, the highlight of spring was, however, the discovery of significant numbers of *Aeshna isoceles* in the Weymouth area of Dorset, almost 250 km from the nearest known UK breeding

population. Although the evidence is only circumstantial, it could well be that these sightings reflect a recently-established breeding population, perhaps initiated by migrants arriving during 2018 when *A. isoceles* was noted in the adjacent county of Devon. Late spring and summer saw further appearances of *S. fonscolombii* and *A. parthenope*, with the latter species going on to have an excellent year, with reports from some 75 sites. Although many individuals must have been immigrants, *A. parthenope* does now also seem to be becoming increasingly established as a resident in Britain. Another highlight of summer was the good showing by *Aeshna affinis*, which was reported not just from its Essex and Kent strongholds, but also from many other areas of southern Britain. This is the third year in a row that records have been quite widespread, and both the establishment of new breeding populations and an increase in immigration and/or internal dispersal seem to be involved. Finally, also of note during mid 2020 were several records of *Ischnura pumilio* well away from the species' core range. The later part of the season saw some large gatherings of *Aeshna mixta*, plus an unexpected series of records of this species caught overnight in moth traps, the exact significance of which currently remains uncertain though it may well reflect night-time migration. Also of interest were a scattering of records of locally-bred second-generation *S. fonscolombii*, though in unexceptional numbers. Mid September saw the start of a substantial influx of *Anax ephippiger* which went on until November. Once a great rarity in Britain, arrivals of *A. ephippiger* are now very much 'expected', particularly in autumn. It will be informative to see whether this trend is sustained." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St. Edmunds, Suffolk IP29 5BX, UK. E-mail: Adrian.parr@bbsrc.ac.uk

**19471.** Paulson, D.R. (2021): Nocturnal roosting of neotropical libellulid dragonflies: perhaps only *Orthemis* roosts in groups. Notulae odonatologicae 9(7): 285-290. (in English) ["Four species of *Orthemis* are now known to form nocturnal roosting aggregations in Costa Rica, Panama, and Ecuador. A survey of 2 764 observational records from Costa Rica and Panama in iNaturalist revealed 9 communal roosts among 388 records of *Orthemis* but no such roosts in 2 376 records of 26 other libellulid genera. Additional unpublished photos add three more communal roosts in *Orthemis*." (Author)] Address: Paulson, D.R., Slater Museum of Natural History, University of Puget Sound, Tacoma WA 98416, USA. Email: dennispaulson@comcast.net

**19472.** Pereira Mendes, T.; Montag, L.F.; Alvarado, S.T.; Juen, L. (2021): Assessing habitat quality on alpha and beta diversity of Odonata larvae (Insect) in logging areas in Amazon forest. Hydrobiologia 848: 1147-1161. (in English) ["The present study evaluated the effects of habitat quality on the alpha and beta diversity of odonate larvae under conditions of reduced impact and conventional logging. We hypothesized that the variation in the abiotic conditions found in areas of conventional logging would result in a greater loss of alpha and beta diversity in these areas in comparison with areas of reduced-impact logging and native forest. The

study area was located in northeastern Pará state, in northern Brazil. We analyzed data from 10 control streams, located in areas of preserved native forest, 11 streams in forest harvested by reduced-impact logging, and nine streams in areas that had been logged conventionally. Environmental factors such as dissolved oxygen, woody debris, water temperature, sediments, and canopy cover were the principal predictors of the diversity of the Odonata. Our results showed that turnover was the principal component structuring beta diversity in the three areas (native forest, reduced impact and conventional logging). The results of the present study indicate that management initiatives based on reduced-impact logging techniques could be adopted to guarantee socio-economic benefits while minimizing the impacts of logging on local biodiversity." (Authors)] Address: Mendes, T.P., Progr. Pós-Graduação em Agricultura e Ambiente, Univ. Estadual do Maranhão, Balsas, Maranhão, Brazil

**19473.** Phan, Q.T.; Yokoi, N.; Makbun, N.; Joshi, S.; Subramanian, K.A.; Ngo, Q.P.; Dow, R.A. (2021): *Drepanosticta hansruedii* Phan, 2021, a new replacement name for *Drepanosticta wildermuthi* Phan, 2021 (Odonata: Zygoptera: Platystictidae). *Zootaxa* 5072(2): 200- (in English) ["Phan et al. (2021) provided a review of the damselfly *Drepanosticta carmichaeli*-group with description of the species *D. wildermuthi* Phan, 2021 from the Central Highlands of Vietnam. However this name is already established by Villanueva & Schorr (2011) based on specimens from the Philippines. Therefore, a new replacement name for the junior homonym is proposed: *Drepanosticta hansruedii* nom. nov.; Replacement name for *Drepanosticta wildermuthi* Phan, 2021." (Authors)] Address: Phan, Q.T., Center for Entomology & Parasitology Research, Institute of Research & Training of Medicine, Biology & Pharmacy, Duy Tan University, Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

**19474.** Phan, Q.T.; Yokoi, N.; Makbun, N.; Joshi, S.; Subramanian, K.A.; Ngo, Q.P.; Dow, R.A. (2021): A review of the *Drepanosticta carmichaeli*-group, with the description of *D. wildermuthi* sp. nov. from the Central Highlands of Vietnam (Odonata: Zygoptera: Platystictidae). *Zootaxa* 5067(2): 187–210. (in English) ["A modified and expanded definition of the *Drepanosticta carmichaeli*-group is given. This includes the species: *D. annandalei* Fraser, 1924, *D. brownelli* Tinkham, 1938, *D. carmichaeli* (Laidlaw, 1915), *D. emtraï* Dow, Kompier & Phan, 2018, *D. hongkongensis* Wilson, 1997, *D. jurzitzai* Hämäläinen, 1999, *D. sumatrana* Sasamoto & Karube, 2007, *D. tenella* Lieftinck, 1935, *D. vietnamica* Asahina, 1997 and *D. wildermuthi* sp. nov. [For the replacement name *D. hansruedii*, see OAS No. 19473]. The species of the group are reviewed and in most cases illustrated, diagnostic notes are given wherever possible. *Drepanosticta polychromatica* Fraser, 1931 is considered to be a junior synonym of *D. carmichaeli* and variation in *D. carmichaeli* is discussed. *Drepanosticta wildermuthi* sp. nov. from the Central Highlands of Vietnam (holotype male from Bao Loc district, Lam Dong Province) is described. The female of *D. jurzitzai* Hämäläinen, 1999 is described for the first time. A key to the males of the *D. carmichaeli*-group is provided." (Authors)] Address:

Phan, Q.T., Center for Entomology & Parasitology Research, Institute of Research & Training of Medicine, Biology & Pharmacy, Duy Tan University, Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

**19475.** Pintanel, P.; Tejedo, M.; Salinas-Ivanenko, S.; Jervis, P.; Merino-Viteri, A. (2021): Predators like it hot: Thermal mismatch in a predator-prey system across an elevational tropical gradient. *Journal of Animal ecology* 90(8): 1985–1995. (in English) [Ecuador "Climate change may have dramatic consequences for communities through both direct effects of peak temperatures upon individual species and through interspecific mismatches in thermal sensitivities of interacting organisms which mediate changes in interspecific interactions (i.e. predation). Despite this, there is a paucity of information on the patterns of spatial physiological sensitivity of interacting species (at both landscape and local scales) which could ultimately influence geographical variation in the effects of climate change on community processes. In order to assess where these impacts may occur, we first need to evaluate the spatial heterogeneity in the degree of mismatch in thermal tolerances between interacting organisms. We quantify the magnitude of interspecific mismatch in maximum ( $CT_{max}$ ) and minimum ( $CT_{min}$ ) thermal tolerances among a predator-prey system of dragonfly and anuran larvae in tropical montane (242–3631 m) and habitat (ponds and streams) gradients. To compare thermal mismatches between predator and prey, we coined the parameters maximum and minimum predatory tolerance margins ( $PTM_{max}$  and  $PTM_{min}$ ), or difference in  $CT_{max}$  and  $CT_{min}$  of interacting organisms sampled across elevational and habitat gradients. Our analyses revealed that: (1) predators exhibit higher heat tolerances than prey ( $\sim 4$  °C), a trend which remained stable across habitats and elevations. In contrast, we found no differences in minimum thermal tolerances between these groups. (2) Maximum and minimum thermal tolerances of both predators and prey decreased with elevation, but only maximum thermal tolerance varied across habitats, with pond species exhibiting higher heat tolerance than stream species. (3) Pond-dwelling organisms from low elevations (0–1500 m a.s.l.) may be more susceptible to direct effects of warming than their highland counterparts because their maximum thermal tolerances are only slightly higher than their exposed maximum environmental temperatures. The greater relative thermal tolerance of dragonfly naiad predators may further increase the vulnerability of lowland tadpoles to warming due to potentially enhanced indirect effects of higher predation rates by more heat-tolerant dragonfly predators. However, further experimental work is required to establish the individual and population-level consequences of this thermal tolerance mismatch upon biotic interactions such as predator-prey." (Authors)] Address: Merino-Viteri, A., Laboratorio de Ecofisiología & Museo de Zoología (QCAZ), Escuela de Ciencias Biológicas, Pontificia Universidad Católica del Ecuador, Quito, Ecuador. Email: amerino@puce.edu.ec

**19476.** Pires, M.M.; Ely-Junior, G.L.; Schmidt Dalzochio, M.; Sahlén, G.; Périco, E. (2021): Intraspecific morphological



variation in the dragonfly *Erythrodiplax media* (Odonata: Libellulidae) among South American grassland physiognomies. *Neotropical Entomology* 50: 736-747 . (in English) ["We assessed the intraspecific morphological variation in *E. media* Borror 1942 among grassland physiognomies ("Coastal," "Highland," and "Steppic") in the South Brazilian Campos. We measured six morphological traits (total body length, thorax height, length, and width of the fore- and hindwings) from 90 specimens (60 males and 45 females). We tested the effect of the grassland type on the set of traits using one-way MANOVA and principal component analysis (PCA) (separately for each sex). Grassland physiognomy affected the morphology of males and females. In both sexes, the PCA mostly opposed the specimens of the Coastal from the Highland and Steppic grasslands. The first PCA axis separated specimens according to body lengths, thorax heights, and wing width, while the second PCA axis opposed specimens according to wing length and thorax height from specimens with broader wings and longer body lengths. Males from the Coastal had longer body lengths and shorter thorax heights than Highland and Steppic grasslands, while males from the Steppic had longer fore- and hindwings than specimens from the Coastal and Highland grasslands. Females from the Coastal had significantly shorter forewings than specimens from the Steppic grasslands and shorter hindwings than Highland grasslands. Our results are likely explained by the differences in climate and habitat complexity among grassland types and indicate that the processes driving odonate performance vary among grassland biotopes. This study potentially indicates that dragonflies are sensitive to changes in the vegetation structure in South American subtropical grasslands." (Authors)] Address: Pires, M.M., Lab de Evolução e Ecologia, Univ do Vale do Taquari (UNIVATES), Lajeado, (RS), Brazil

**19477.** Pluot-Sigwalt, D.; Perrin, H. (2021): In memoriam Jean Legrand (1944-2020). *Odonatologica* 50(1/2): 1-16. (in English) ["Personal recollections and memories of a life-long professional friendship with Jean Legrand are given. His odonatological bibliography and lists of species connected with his name are appended." (Authors)] Address: Pluot-Sigwalt, Dominique, Museum national d'Histoire naturelle, Entomologie, CP 50, 57, rue Cuvier, F-75231 Paris Cedex 05, France. Email: <dps@mnhn.fr

**19478.** Previsic, A.; Vilenica, M.; Vuckovic, N.; Petrovic, M.; Rozman, M. (2021): Aquatic insects transfer pharmaceuticals and endocrine disruptors from aquatic to terrestrial ecosystems. *Environmental Science & Technology* 55: 3736-3746. (in English) ["A wide range of pharmaceuticals and endocrine disrupting compounds enter freshwaters globally. As these contaminants are transported through aquatic food webs, understanding their impacts on both aquatic and terrestrial ecosystems remains a major challenge. Here, we provide the first direct evidence of the transfer of pharmaceuticals and endocrine disruptors through the aquatic-terrestrial habitat linkage by emerging aquatic insects. We also show that the type of insect metamorphosis and feeding behavior determine the bioaccumulation patterns of

these contaminants. Adult Trichoptera, an important food source for riparian predators, showed an increased body burden of pharmaceuticals and endocrine disruptors. This implies that terrestrial predators, such as spiders, birds, and bats, are exposed to mixtures of pharmaceuticals and endocrine disruptors of aquatic origin, which may impact their physiology and population dynamics. Overall, our study provides valuable insights into the bioaccumulation patterns and trophic cross-ecosystem transfer of these contaminants, from aquatic primary producers to terrestrial predators." (Authors)] Address: Rozman, M., Ruder Boskovic Institute, Bijenicka cesta 54, 10000, Zagreb, Croatia. E-mail address: marko.rozman@irb.hr

**19479.** Raczynski, M.; Stoks, R.; Johansson, F.; Sniegula, S. (2021): Size-mediated priority effects are trait-dependent and consistent across latitudes in a damselfly. *Oikos* 130(9): 1535-1547. (in English) ["Variation in hatching time (phenology) might cause size differences within populations resulting in size-mediated priority effects (SMPEs) shaping intraspecific interactions. These phenology-driven effects potentially can be strengthened by seasonal time constraints caused by a short growth season, and depend on latitude. Here the single and combined effects of phenology and latitude-associated time constraints on SMPEs in larvae of an aquatic insect, the damselfly *Lestes sponsa*, are studied. We did so by rearing larvae in groups of 16 individuals with different phenology (hatching date) thereby imposing strong intraspecific competition, resulting in cannibalism. We thereby manipulated in a fully crossed way time constraints (combination of temperature and photoperiod: thermo-photoperiod) in larvae from low-latitude and more time constrained high-latitude populations, and examined effects on life history (survival, development, growth) and physiology (fat and protein contents, and phenoloxidase activity as a measure of immune function). Phenology, time constraints and latitude of origin had strong effects on life history, but only the time constraint affected the physiology. We detected a SMPE for survival that, however, was not stronger under time constraints and was consistent in strength between latitudes. Phenology and time constraints interacted for development and growth in a direction suggesting adaptive responses to time constraints but these life history traits did not show SMPEs. We provided important insights in the study of SMPEs thereby showing these to be trait-dependent and not more pronounced under experimentally manipulated or latitude-associated time constraints. Our study thereby makes an important addition to geographic variation in SMPEs, a largely neglected topic." (Authors)] Address: Sniegula, S., Dept of Ecosystem Conservation, Inst. of Nature Conservation, Polish Academy of Sciences, Krakow, Poland. E-mail: szymon.sniegula@gmail.com

**19480.** Ramil, N.H.; Abdul Manaf, N.F. (2021): Species diversity of dragonfly (Arthropoda: Odonata) and its relationship with air parameters at SG. Muar, Kuala Pilah. *Journal of Academia* 9(2): 30-39. (in English) ["The study of diversity and distribution of dragonfly, and their relationship with air parameters including temperature (°C) and humidity

(%) at Sungai Muar, Kuala Pilah, Negeri Sembilan was carried out on 14 and 15 March 2020. The sampling of dragonfly was done in two parts of Sungai Muar, Kuala Pilah. For each site, the sampling was conducted in the morning and evening with the air temperature and humidity were recorded at the same time using hygrometer and digital thermometer clock humidity temperature HTC-1. Method that has been used for this study are net sweeping. The samples were collected, preserved and identified until species level. A total of 231 individuals were recorded with *Ischnura elegans* from Coenagrionidae family as a dominant species with 145 individuals, while the lowest abundance is *Pseudagrionidae* sp. of Coenagrionidae family with one individual only. For the relationship, there is no significant linear correlation between air parameters with individual number of dragonflies. As a recommendation, the other parameters including air and water parameters should be measured to increase our understanding on the abiotic parameters effects towards the survivability of dragonfly. This research give benefit to society and ecology where it provides knowledge and understanding about dragonfly species and the function of dragonfly as indication of environmental quality. Besides, this research can be used as guidelines for future research and update the checklist of dragonfly in Sungai Muar, Kuala Pilah." (Authors) As some European taxa are listed, species identification is not reliable.] Address: Ramil, N.H., School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA (UiTM), Cawangan Negeri Sembilan, Kampus Kuala Pilah, 72000 Kuala Pilah, Negeri Sembilan, Malaysia. Email: nurhasyimah@uitm.edu.my

**19481.** Ribeiro, C.; Firme, B.; Araujo, S.A.; de Sa, A.; Zander, F.; Teixeira, K.; Santos, L.R.; Rodrigues, M.E. (2021): Check-list of Odonata from the state of Bahia, Brazil: ecological information, distribution, and new state records. *Odonatologica* 50(3/4): 161-186. (in English) ["A check-list of the Odonata species of the state of Bahia, Brazil, including information on their ecology and distribution in this state, was compiled. The data was collected by consulting databases and from specimens deposited in the collection of the Laboratory of Aquatic Organisms (LOA) of the State University of Santa Cruz. Altogether, 174 species from 12 families and 63 genera were recorded. Of these, two families, 15 genera, and 69 species are new records for the state. Additional information on habitats, vegetation types, and the types of land uses where the species were found is also presented. This information is considered a milestone for the state of Bahia and emphasizes the great diversity of Odonata species in poorly sampled regions in Brazil." (Authors)] Address: Ribeiro, Cintia, Laboratorio de Organismos Aquaticos, Depto de Ciencias Biol., Univ. Estadual de Santa Cruz (UESC), Ilheus, BA, Brazil. Email: cintiaribeirods@hotmail.com

**19482.** Sánchez-Sastre, L.F.; Ramírez del Palacio, O.; Casanueva, P.; Campos, F. (2021): Ampliación de la distribución conocida de *Aeshna juncea*, *Sympetrum flaveolum* y *Coenagrion mercuriale* (Odonata: Aeshnidae, Libellulidae, Coenagrionidae) para la provincia de Palencia, norte de España. *Boletín de la Sociedad Entomológica Aragonesa*

68: 383-384. (in Spanish, with English summary) ["Extending the known distribution of *A. juncea*, *S. flaveolum* and *C. mercuriale* in Palencia province, northern Spain: New 10x10 km UTM grid cells are added to the known geographical distribution of these threatened species of dragonflies in the Montaña Palentina Natural Park (Palencia province).] Address: Casanueva, Patricia, Dept Experim. Sciences, European Univ. Miguel de Cervantes, CI Padre Julio Chevalier 2, 47012 Valladolid, Spain. E-mail: pcasanueva@uemc.es

**19483.** Santos, F.; Nicasio, K.; Silva, K.; Martins, J.; Périco, E.; Dalzochio, M.; Veras, D.; Cajaiba, R.L. (2021): Can artificial ponds retain dragonfly (Insecta: Odonata) biodiversity? A preliminary study in the Brazilian Amazon. *Austral Entomology* 60(4): 698-706. (in English) ["Although ponds are rich ecosystems for the maintenance of aquatic biodiversity, in many regions of the world, they have been adversely affected by anthropogenic changes in surrounding landscapes. Dragonflies (Insecta: Odonata) are characterized by larval phases that are closely associated with aquatic ecosystems and can accordingly serve as useful indicators of the quality of these environments. In this study, we evaluated the patterns of abundance, richness, and taxonomic composition of adult Odonata in artificial and natural ponds located in the Legal Amazon of Maranhão, which have been exposed to different levels of disturbance. We analysed how the composition of the Odonata assemblages varies between natural and artificial ponds and also assessed to what extent artificial ponds and degraded natural ponds are able to maintain Odonata biodiversity. Our results indicate that the abundance, richness, and composition of Odonata among the monitored ponds were adversely impacted by more disturbed landscapes, with greater abundance and richness being recorded in preserved natural ponds. Although the degraded artificial and natural ponds have Odonata diversities comparable to those of the preserved natural ponds, the latter tend to be characterized by unique and exclusive species, thereby indicating the urgent need for measures designed to protect these natural ecosystems." (Authors)] Address: Cajaiba, R.L., Laboratory of Ecology & Conservation, Federal Institute of Education, Science & Technology of Maranhão, Buriticupu, MA, Brazil. E-mail: reinaldocajaiba@hotmail.com

**19484.** Senouci, H.; Bounaceur, F. (2021): Contribution à la connaissance de l'odonatofaune du sous-bassin de la Haute Mina (Nord-Ouest algérien). *Bulletin de la Société Zoologique de France* 146(3): 103-110. (in French, with English summary) ["The present study was conducted to explore the Odonata of the upper Mina, located in the semi-arid bioclimatic zone. The investigations focused on the prospecting of 15 stations located in Tiaret region. The sampling produced 23 species divided into 7 families. The suborder Zygoptera is represented by 4 Families: Calopterygidae (1 species), Coenagrionidae (7 species), Platycnemididae (1 species) and Lestidae (1 species). The suborder Anisoptera is represented by 3 families: Libellulidae (9 species), Aeshnidae (2 species) and Gomphidae (2 species). Five species with limited geographical distributions

appear in the final inventory, including two Saharan species *Enallagma deserti* and *Ischnura saharensis* present at the northern limit of their distribution area. In terms of conservation biology, two species occupy the status (VU) on the global red list of IUCN: *Gomphus lucasii* and *Sympetrum sanguineum*." (Authors)] Address: Senouci, H., Lab. d'Agro-biotechnologie et de Nutrition en Zone Semi-aride. Faculté des sciences de la nature et de la vie. Université Ibn Khaldoun, Tiaret, Algeria. Email: ha-senouci@outlook.fr

**19485.** Siblova, Z.; David, S.; Moyzeova, M. (2021): Ecological and distribution traits of the large white-faced darter *Leucorrhinia pectoralis* (Charpentier, 1825) in Slovakia. *Ekológia (Bratislava)* 40(3): 248-257. (in English) ["*L. pectoralis* was recorded in Slovakia at 38 sites in 112 findings and there were 707 imagoes. Reproduction was confirmed in seven sites by finding of 35 larvae and exuviae. The highest number of sites with the occurrence of *L. pectoralis* is located in the Záhorská nížina lowland; most sites in Slovakia are located at an altitude of 213–351 m. *L. pectoralis* was recorded together with 49 species of dragonflies, and the average number of *L. pectoralis* was 9.56 individuals per site. It occurs in the communities as a dominant species (9.5%) together with eudominants *Coenagrion puella*, *C. hastulatum* and *Libellula quadrimaculata*. By non-metric multidimensional scaling (NMDS), we found a coenotic correlation to peat species *L. quadrimaculata*, *Leucorrhinia rubicunda*, *L. dubia* and *Sympetrum danae*. By redundancy linear analysis (RDA), we found a Monte Carlo permutation test to make a non-random contribution to the explained variability of seven factors ( $p = 0.012-0.034$ ). *L. pectoralis* statistically significantly prefers habitats in the forest landscape ( $r = 0.62$ ,  $p = 0.0063$ ), the presence of vegetation ( $r = 0.94$ ,  $p = 0.0003$ ) and peatbogs ( $r = 0.61$ ,  $p = 0.0058$ ). We did not confirm a significant correlation to altitude. Based on easy determination, territoriality (especially males) and bioindicative sensitivity of larvae, *L. pectoralis* is accepted as an umbrella species. *L. pectoralis* has a high dispersion potential and is suitable for creating the metapopulation character of local populations, which is important for the conservation management of the species." (Authors)] Address: Šíblková, Zuzana, Katedra ekológie a environmentalistiky, Fakulta prírodných vied, Univ. Konštantína Filozofa v Nitre, Trieda A. Hlinku 1, 949 74 Nitra, Slovakia. E-mail: zuzana.siblova@savba.sk

**19486.** Silva, L.F.R.; Castro, D.M.P.; Juen, L.; Callisto, M.; Hughes, R.M.; Hermes, M.G. (2021): Functional responses of Odonata larvae to human disturbances in neotropical savanna headwater streams. *Ecological Indicators* 133, December 2021, 108367: (in English) ["Highlights: • Trait-based approach for assessing Odonata larvae responses to anthropogenic impact. • Odonata larvae have different traits comparing least and highly disturbed streams. • Odonata larvae traits can be a useful tool for assessing anthropogenic impacts. Abstract: Headwater streams are facing increasing disturbances from human pressures worldwide, thus better knowledge about bioindicators, particularly aquatic insect responses to various pressures and stressors, are urgently needed. Multiple trait-based approaches consider

species attributes filtered by the environment, allowing them to persist in ecosystems under environmental pressures. Because this approach has been minimally explored in Odonata larvae, we aimed to understand how anthropogenic stressors structure Odonata larval assemblages in neotropical savanna streams by using multiple trait-based approaches. We hypothesized that a set of stressors—such as reduced substrate heterogeneity, poor water quality, natural land cover converted to pasture and agriculture, and reduced local riparian canopy cover—select Odonata functional traits. We collected 3209 Odonata larvae from 186 neotropical savanna headwater stream sites and used 39 environmental variables and seven traits in 23 categories related to their functional roles in Odonata genera. To assess associations between trait categories and environmental variables, we applied RLQ and fourth-corner statistical analyses. We found strong relationships between environmental variables and sets of Odonata biological traits that were separated into two main groups. Zygoptera genera (*Perilestes*, *Allopodagrion*, *Heliocharis*, *Argia*, *Epipleoneura*, *Mnesarete/Hetaerina*, *Psaironeura*) have elongated body shapes, caudal lamellae respiration, conforming thermoregulation, and endophytic oviposition. Such traits favor assemblages in conditions similar to reference streams, including denser riparian vegetation, good water quality, and diverse flows and substrate. Therefore, they are more sensitive to changes in those conditions. On the other hand, Anisoptera genera (*Gomphoides*, *Archaeogomphus*, *Macrothemis*, *Brechmorhoga*, *Gynothemis*, *Phyllocycla*) have cylindrical body shapes, internal gill respiration, endothermic thermoregulation, and burrowing behavior. Those traits facilitate their survival in intermediate or disturbed stream sites, characterized by riparian deforestation, increased erosion and siltation, and higher levels of total dissolved solids and conductivity. Therefore, using Odonata larval traits can be a valuable tool for assessing and monitoring anthropogenic impacts on neotropical savanna streams." (Authors)] Address: Silva, Larissa, Univ. Federal de Lavras, Setor de Zoologia Comparada, Depto de Biologia, Laboratório de Sistemática e Biologia de Insetos, CEP 37200-900 Lavras, Minas Gerais, Brazil. Email: larissa.silva9@estudante.ufla.brS

**19487.** Silva, L.F.R.; Castro, D.M.P.; Juen, L.; Callisto, M.; Hughes, R.M.; Hermes, M.G. (2021): A matter of suborder: are Zygoptera and Anisoptera larvae influenced by riparian vegetation in Neotropical Savanna streams? *Hydrobiologia* 848: 4433-4443. (in English) ["Initial Odonata larval distributions are primarily influenced by adult females at the moment of oviposition. However, after oviposition, the larvae are strongly associated with environmental conditions. In the case of both adults and larvae, anthropogenic disturbances that change these conditions may alter the composition and structure of Odonata assemblages. Therefore, based on the differing environmental requirements of Zygoptera and Anisoptera adults and larvae, together with their morphological and physiological differences, we suspected differing riparian preferences of larvae and adults for each suborder. We evaluated the richness and abundance of Odonata larvae. We hypothesized that Zygoptera larvae

would have greater richness and abundance in streams with canopy shading, lower temperature ranges, and high physical habitat heterogeneity. On the other hand, Anisoptera larvae would be more abundant in streams without canopy cover. We sampled 186 headwater stream sites in the Neotropical Savanna along an anthropogenic disturbance gradient and used a model selection approach to test our hypotheses, correlating environmental metrics with Odonata larval richness and abundance. We found higher richness of Zygoptera larvae in shaded sites with canopy cover >5 m high, whereas bare ground without riparian vegetation was important for Anisoptera richness and abundance. Our results indicated that Odonata larvae follow the same distribution, richness and abundance patterns as adults. Anthropogenic disturbances related to the removal or reduction of riparian vegetation can favor Anisoptera over Zygoptera larval assemblages in streams. Preserving riparian canopy cover is needed to maintain the richness of Zygoptera larvae in Neotropical Savanna streams." (Authors)] Address: Silva, Larissa, Laboratório de Sistemática e Biologia de Insetos, Setor de Zoologia Comparada, Departamento de Biologia, Universidade Federal de Lavras, CEP 37200-900, Lavras, Minas Gerais, Brazil

**19488.** Silva Vilela, D.; Stefani-Santos, G.; Avila Junior, W.F.; Magalhaes de Souza, M. (2021): *Brechmorhoga gonalvensis* sp. nov. from south-eastern Brazil (Odonata: Libellulidae). *Odonatologica* 50(1/2): 81-94. (in English) ["*B. gonalvensis* sp. nov. (♂ holotype: Brazil, Minas Gerais, Gonçalves, APA Fernão Dias, 22.7363 S, 45.8191 N, 1670 m a.s.l., 14-X-2019, deposited in coll. UFMG) is described and diagnosed based on specimens collected in Minas Gerais and Rio de Janeiro States, south-eastern Brazil. The new species can easily be separated from other congeners by the posterior hamule with a truncated base bearing two basal projections, cercus with a carina of 4-5 small denticles on the apical ventral margin, and its unique body coloration of double stripes on each side of the abdominal segments." (Authors)] Address: Silva Vilela, D., Rua Jaime Bilharinho, 575, Uberaba, Minas Gerais, Brazil. Email: deegoo@gmail.com

**19489.** Simonsen, T.J.; Djernæs, M.; Fogh Nielsen, O.; Olsen, K. (2021): A tale of two Skimmers: complex relationships between DNA barcodes, distributions and taxonomy in European *Orthetrum cancellatum* and *O. coerulescens*. *International Journal of Odonatology* 24: 316-331. (in English) ["We explore the genetic diversity and phylogeography of the dragonflies *Orthetrum cancellatum* and *O. coerulescens* in Europe based on mitochondrial and nuclear DNA. *Orthetrum cancellatum* has a clear division between a group comprising Maltese, Italian, and central and northern European populations, and a group comprising mainly populations from southwestern and southeastern Europe, as well as some northern European specimens. We propose that the two groups represent two different Glacial refugia, one in the Italian Peninsula and one in the Balkans where the species survived during the Weichsel Glaciation. *Orthetrum coerulescens* shows a more complex pattern, although it too

can be divided into two groups. One group comprise all the specimens we have identified as *O. coerulescens* anceps from their phenotype as well as specimens from Spain, Montenegro, and Pakistan, and some specimens from Italy, Poland and Bulgaria. The other group comprise all other specimens from central and northern Europe, almost all specimens from Italy and Bulgaria, and all specimens from Malta. We propose that the latter group represents an Italian Glacial refugium from which the species spread to both central Europe, Malta and southern Balkan (Bulgaria) after the end of the Weichsel Glaciation. As specimens from Spain and Bulgaria, which were identified as *O. coerulescens* *coerulescens* group with specimens identified as *O. coerulescens* *anceps* we conclude that the two subspecies mix more or less freely across the Mediterranean and question the validity of two subspecies." (Authors)] Address: Simonsen, T.J., Natural History Museum Aarhus, Wilhelm Meyers Allé 10, DK-8000 Aarhus C, Denmark. Email: t.simonsen@nathist.dk

**19490.** Sparrow, D.J.; De Knijf, G.; Sparrow, R.L. (2021): Diversity, status and phenology of the dragonflies and damselflies of Cyprus (Insecta: Odonata). *Diversity* 2021, 13, 532: 13pp. (in English) ["Based on literature data, unpublished material and the results of the year-round monitoring at selected sites island-wide by the Cyprus Dragonfly Study Group since 2013, we acquired an excellent knowledge of the diversity and status of the Odonata of Cyprus. Altogether, 37 species are on the island's checklist. *Ischnura pumilio*, *Aeshna affinis* and *Brachythemis impartita* were only very rarely recorded in the past but are considered to be no longer present. The single record of *Calopteryx virgo* from 1930 is in our opinion a misidentification and has been removed from the checklist. The island has a rather impoverished odonate fauna compared to neighbouring countries. There are no endemic species, but the island is home to some range of restricted species of which *Ischnura intermedia* is the most important. Flight seasons determined for the 31 species with sufficient data were generally found to be longer than reported for other countries in the Eastern Mediterranean. This may be due to intensive year-round monitoring but could also result from Cyprus' warmer climate. Very wide annual variations were found in the abundance of all species over the seven years and show an almost immediate response to the wide fluctuations in Cyprus' annual rainfall levels." (Authors)] Address: Sparrow, D.J., Cyprus Dragonfly Study Group, PO Box 62624, 8047 Paphos, Cyprus. E-mail: davidrospfo@hotmail.com

**19491.** Stand-Perez, M.A.; Montes-Fontalvo, J.; Perez-Gutierrez, L.A. (2021): Sixteen new records of Odonata for Colombia from the Araracuara Region (Perilestidae, Calopterygidae, Heteragrionidae, Megapodagrionidae, Polythoridae, Coenagrionidae, Aeshnidae, Gomphidae, Libellulidae). *Notulae odonatologicae* 9(8): 378-388. (in English) ["A field trip to collect Odonata was carried out in Southern Serranía de Chiribiquete National Natural Park, Araracuara Region, Colombia. A total of 40 species were collected, of which 17 are new records for the country: *Hetaerina charca*,



*Epipleoneura spatulata*, *Metaleptobasis gibbosa*, *Neoneura desana*, *N. luzmarina*, *N. fulvicollis*, *N. joana*, *Phoenicagrion paulsoni*, *Protoneura tenuis*, *Oxystigma petiolatum*, *Perisolestes romulus*, *Epigomphus paludosus*, *Zonophora regalis*, *Micrathyria hippolyte*, *Uracis ovipositrix*, and *Ypirangathemis calverti*. The genera *Schistolobos*, and *Ypirangathemis* are reported for the first time for Colombia. A map of localities, photographs of the species, and notes on dragonfly and damselfly conservation are provided." (Authors)] Address: Stand-Perez, M.A., Red de Biol. Evol., Instit. de Ecología A.C., Xalapa, Mexico. Email: mstand20@gmail.com

**19492.** Starnes, T.; Clausnitzer, V. (2021): Chapter 5: The status and distribution of freshwater odonates. In: Starnes, T. and Darwall, W.R.T. (eds.) (2021). Identification and validation of Western African freshwater Key Biodiversity Areas. Gland, Switzerland: IUCN: 53-61. (in English) ["At the time of publishing this report, the western Africa region included 307 species of freshwater odonates belonging to 13 families according to the Red List. Of these 307 species, 50 species are endemic to the region. These endemic species are largely forest dependent, either along streams or in swamp forests and are concentrated in the lower areas. Of the 307 species of odonate addressed in this work, five are Critically Endangered, seven are Endangered and two are Vulnerable, amounting to 14 globally threatened species (Table 5.1). Since the previous report on the western African Odonata in Dijkstra et al. (2009), 19 species have changed Red List category due to new information (nongenuine changes). There have been no genuine status changes during this time. Eight species have been moved from DD to LC, due to new information concerning their status and distributions, and one from DD to NT; *Phyllomacromia lamottei* is thought to be endemic to the Nimba Mts region. One species – *Trithemis dubia* – was moved from LC to DD due to unresolved taxonomy. *Azuragrion buchholzi* has moved from NT to LC due to a number of additional localities extending its known range in Cameroon and Gabon. Three species have been downlisted from VU to LC due to new records improving the prospects of these species; they are *Agrioncnemis angustirami*, *Nubiolestes diotima* and *Paragomphus sinaiticus*. Conversely, three species have been uplisted from VU to EN, citing new information on threats to these species; they are *Africocypha centripunctata*, *Ceragrion citrinum* and *Umma purpurea*. One species, *Neodythemis takamandensis*, has been downlisted from CR to LC due to several new records in Gabon significantly extending its range. The numbers in parentheses in Table 5.1 are taken from the previous regional report on western African freshwater biodiversity (Dijkstra et al., in Smith et al., 2009), and were based partly on regional assessments. Besides a number of new species being assessed since that time, the difference between the numbers reported is partly due to the use here of Global rather than Regional assessments e.g. *Afroaeschna scotias* is globally LC although it was assessed in 2006 as regionally VU, and partly due to status changes e.g. *Agrioncnemis angustirami* has undergone a nongenuine status change from VU to LC. One CR species *Pseudagrion mascagnii* was not included in this analysis

because its entire range is marked as 'Presence uncertain' in the Red List. However, the Red List assessment (Dijkstra, 2010c) states that the species is known from type pair collected at Regent in Sierra Leone, described in 2004 (Terzani & Marconi, 2004). A study on biodiversity hotspots and threatened dragonfly species in Africa did show that only 58% critically endangered and 60% endangered dragonfly species are found in formally protected areas, whereas 80% of species listed as vulnerable occur in protected areas (Simaika et al., 2013). Especially in western Africa there is a lack of protected areas in the biodiversity hotspots, especially of rare species (Pinkert et al., 2020)." (Authors)] Address: Clausnitzer, Viola, Heinzstr. 3, 02826 Görlitz, Germany. Viola.Clausnitzer@senckenberg.de

**19493.** Stefani-Santos, G.; Avila, W.F.; Clemente, M.A.; Henriques, N.R.; Souza, A.S.B.; Vilela, D.S.; Souza, M.M. (2021): Odonata (Insecta) communities along an elevational gradient in the Atlantic forest of southeastern Brazil, with the description of the female of *Heteragrion mantiqueirae* Machado, 2006. *International Journal of Odonatology* 24: 178-196. (in English) ["Despite the important role of the order Odonata in ecosystems, there is a lack of information about dragonfly communities in several regions, high elevation sites, and environmentally protected areas in Minas Gerais State, Brazil. Our objective was to assess the abundance and richness of dragonfly and damselfly communities along an elevational gradient in the Atlantic Forest, southeastern Brazil. This study was conducted in the Fernão Dias Environmental Protection Area, Mantiqueira Mountain region, Gonçalves, Minas Gerais State, in sites covered by Seasonal Semideciduous and mixed forests. This is the first study of Odonata communities in the region. Samplings were carried out on 17 days from October 2019 to March 2020 at three elevation ranges (low, mid, and high). A total of 293 specimens, distributed in 39 species and 9 families, were sampled. Elevation did not influence the richness or abundance of dragonflies but altered community composition. Some species were found to be exclusive to high-elevation sites, such as *Heteragrion mantiqueirae* Machado, 2006, which was recorded for the first time in Minas Gerais and we provide a description and diagnosis of the single female collected in tandem. A novel species of the genus *Brechmorhoga* was found to occur at mid and high elevations. The composition of dragonfly communities depends on the degree of preservation and extension of forest areas. Therefore, conservation of forests in Gonçalves is crucial for preserving Odonata diversity in Minas Gerais State." (Authors)] Address: Ávila Jr, W.F., Depto de Biodiversidade, Evolução e Meio Ambiente, Programa de Pós-Graduação em Ecologia de Biomas Tropicais. Univ. Federal de Ouro Preto, Ouro Preto, Brazil. Email: walterfaj88@gmail.com

**19494.** Steffani, G.S.; Vieira, L.R.; de Souza, M.M. (2021): Influência do grau de conservação florestal sobre as comunidades de borboletas (Lepidoptera) e libélulas (Odonata) na Área de Proteção Ambiental Fernão Dias. *Anais do Seminário Restaura Mantiqueira* 1(1): 4 pp. (in Portuguese) ["The Atlantic Forest is home to great biodiversity of insects,

such as dragonflies and butterflies, which perform several environmental services in terrestrial and aquatic ecosystems, however the increasing deforestation puts this richness at risk. Therefore, the aim of this study was to evaluate how the degree of forest conservation affects these insects. The study was conducted in the period from October 2019 to March 2020, in areas of mixed forest in the Fernão Dias Environmental Protection Area, municipality of Gonçalves, using traps and active search to sample the species. The vegetation cover associated with the conservation of the areas, when comparing degraded areas with conserved areas, positively influenced the composition of the dragonfly and butterfly communities in the Fernão Dias APA. ... For Odonata, 293 individuals of 39 species distributed in nine families were collected. In the area of greater forest cover the richness was greater than in areas of greater anthropic action, however there was no statistical difference between richness by the Kruskal-Wallis test, but there was a change in the communities. There are three odonata species restricted to areas of less anthropic pressure and greater forest cover, which also occurred in other studies in high elevations associated to conserved forests, *Bryoplatanon globifer*, which has a record in mixed forest 1600 m in Serra do Papagaio State Park, *Oxyagrion mimae* and *Heteragrion mantiqueirae* above 1500 m in Zona da Mata, the latter being an unprecedented record for Minas Gerais, until then described only for the state of São ...." (Authors/DeepL)] Address: Santos, Stefani, Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas-Inconfidentes MG. Email: glaucia.stefani@alunos.ifsuldeminas.edu.br

**19495.** Stryjecki, R.; Zawal, A.; Krepski, T.; Stępien, E.; Buczyńska, E.; Buczyński, P.; Czachorowski, S.; Jankowiak, L.; Pakulnicka, J.; Sulikowska-Drozd, A.; Pešič, V.; Michonski, G.; Grabowski, M.; Jabłońska, A.; Achrem, M.; Olechwir, T.; Pietrzak, L.; Szlauer-Lukaszewska, A. (2021): Anthropogenic transformations of river ecosystems are not always bad for the environment: Multi-taxa analyses of changes in aquatic and terrestrial environments after dredging of a small lowland river. *PeerJ* 9:e12224: 21 pp. (in English) ["Rivers are one of the most commonly transformed aquatic ecosystems. Most papers present significantly negative effects of activities such as dredging or channel regulation on the ecological status of rivers. The purpose of this work was to compare the response of various groups of invertebrates (Mollusca, Hydrachnidia, Odonata, Heteroptera, Coleoptera and Trichoptera) to an intervention involving dredging in conjunction with the removal of riparian vegetation. Habitat diversity increased after the dredging, and more individuals and species were caught than before the dredging. The increase in habitat diversity after the dredging translated into an increase in the species diversity of most investigated groups. Individual groups of invertebrates showed varied responses to the dredging, depending on the role of the terrestrial phase in their life cycle: the greater the role of the terrestrial phase in the life cycle, the more the group was affected by changes in the terrestrial environment following the intervention. In consequence, the intervention had the greatest negative impact on insects, and among these,

on adult Odonata. The following conclusions can be drawn: (1) Dredging can benefit a previously anthropogenically transformed river ecosystem by increasing habitat diversity; (2) Odonata are particularly useful for assessing the impact of this type of intervention on invertebrate communities. They can be considered good indicators of habitat disturbances in both aquatic and terrestrial ecosystems." (Authors)] Address: Stryjecki, R., Dept of Zoology and Animal Ecology, University of Life Sciences in Lublin, Lublin, Poland. E-mail: robert.stryjecki@up.lublin.pl

**19496.** Subrero, E.; Pellegrino, I.; Cucco, M. (2021): Different stress from parasites and mate choice in two female morphs of the blue-tailed damselfly. *Evolutionary Ecology* 35: 687-704. (in English) ["In Odonates, female colour polymorphism is common and implies the presence of two or more female types with different colours and behaviours. To explain this phenomenon, several hypotheses have been proposed that consider morph frequency, population density, the presence of parasites, and mating behaviour. We studied the blue-tailed damselfly *Ischnura elegans*, a species with a blue androchrome morph and two gynochrome morphs (the common green infuscans, and the rare orange rufescens-obsolata). The size of adult males and females, the presence of parasites, and pairing behaviour between males and the three female morphs was assessed in field conditions throughout the reproductive season in NW Italy. Moreover, growth and emergence success of larvae produced by the different morphs was analyzed in standardized conditions. In the field, males showed a preference for the gynochrome infuscans females, despite a similar frequency of androchrome females. In test conditions, male preference for the infuscans females was also observed. Paired males and paired androchrome females were larger than unpaired individuals, while there were no differences in size between paired and unpaired infuscans females. Males and androchrome females were more parasitized than infuscans females. The survival and emergence success of larvae produced by androchrome females was higher than those of offspring produced by the infuscans females. Our results suggest that a higher survival of progeny at the larval stage could counterbalance the higher parasitism and the lower pairing success of andromorph adult females and highlight the importance of considering the whole life-cycle in polymorphism studies." (Authros)] Address: Cucco, M., Univ. Piemonte Orientale, Alessandria, Italy. E-mail: marco.cucco@uniupo.it

**19497.** Susanto, M.A.; Bahri, S. (2021): Diversity and abundance dragonflies (Odonata) at Mount Sigogor Nature Reserve area, Ponorogo Regency, East Java, Indonesia. *Journal Biota* 7(2): 101-108. (in English) ["Mount Sigogor Nature Reserve area is a mountainous tropical rain forest, administratively located in Pupus Village, Ngebel District, Ponorogo Regency, East Java, Indonesia. One of the main functions of this nature reserve is as a water catchment area for the villages around the nature reserve area. Water sources and flows within the Mount Sigogor Nature Reserve area have the potential as natural habitat for dragonflies. This

study aims to determine the diversity and abundance of dragonflies in the Mount Sigogor Nature Reserve Area. The method of collecting dragonflies data used the Visual Day Flying method by recording the diversity of dragonflies species and counting the number of individuals from each observed dragonflies species. The data obtained were analyzed using the Relative abundance, Shannon-Wiener Heterogeneity Index and the frequency of Presence. The results of the research conducted showed that there were 14 species from 7 families with a total of 464 individuals. The Shannon-Wiener diversity index shows that the diversity value is  $H' = 1.81$ . Meanwhile, the presence frequency analysis showed that there were four species with a value of 100% which were classified as abundant Frequency of Presence, namely *Euphaea variegata*, *Vestalis luctuosa*, *Rhinocypha anisoptera* and *Coeliccia membranipes*." (Authors)] Address: Bahri, S., Biology Departement, Faculty of Science and Technology, UIN Sunan Ampel Surabaya

**19498.** Tandon, V.; Srivastava, A. (2021): Natural enemies of Rice White Stem Borer *Scirpophaga fusciflua* (Hampson) in Himachal Pradesh. Indian Journal of Entomology Online published Ref. No. e20421 DoI.: 10.5958/IJE.2021.27: 3 pp. (in English) ["Fortnightly surveys were made to study natural enemies of white stem borer (WSB) *Scirpophaga fusciflua* (Hampson) in rice. The surveys revealed that the predators of *S. fusciflua* first appeared in the second fortnight of July, with the peak during second fortnight of September during 2016 and 2017; and their relative proportion was- spiders (49.4% and 51.2%), dragonflies (22.2% and 22.6%) and damselflies (28.4% and 26.2%). Four species of parasitoids viz., egg- *Telenomus* sp. and *Tetrastichus* sp., larval- *Stenobracon* sp. and pupal parasitoids- *Xanthopimpla punctata* were observed from egg mass, larvae and pupae collected from Kangra valley of Himachal Pradesh. During 2016 and 2017, the % parasitization was observed to be maximum in the first fortnight of October (53.5 and 62.0%) followed by second fortnight of September (36.4 and 49.1%), respectively." (Authors)] Address: Tandon, V., Dept of Entomology, Rice and Wheat Research Centre, Malan 176047, Himachal Pradesh, India. Email: tandonvikas8763@gmail.com

**19499.** Teder, T.; Kaasik, A.; Tait, K.; Tammaru, T. (2021): Why do males emerge before females? Sexual size dimorphism drives sexual bimaturism in insects. *Biol. Rev.* 96(6): 2461-2475. (in English) ["Conspecific females and males often follow different development trajectories which leads to sex differences in age at maturity (sexual bimaturism, SBM). Whether SBM is typically selected for per se (direct selection hypothesis) or merely represents a side-effect of other sex-related adaptations (indirect selection hypothesis) is, however, still an open question. Substantial interspecific variation in the direction and degree of SBM, both in invertebrates and vertebrates, calls for multi-species studies to understand the relative importance of its evolutionary drivers. Here we use two complementary approaches to evaluate the evolutionary basis of SBM in insects. For this purpose, we assembled an extensive literature-derived data set

of sex-specific development times and body sizes for a taxonomically and ecologically wide range of species. We use these data in a meta-analytic framework to evaluate support for the direct and indirect selection hypotheses. Our results confirm that protandry – males emerging as adults before females – is the prevailing form of SBM in insects. Nevertheless, protandry is not as ubiquitous as often presumed: females emerged before males (= protogyny) in about 36% of the 192 species for which we had data. Moreover, in a considerable proportion of species, the sex difference in the timing of adult emergence was negligible. In search for the evolutionary basis of SBM, we found stronger support for the hypothesis that explains SBM by indirect selection. First, across species, the direction and degree of SBM appeared to be positively associated with the direction and degree of sexual size dimorphism (SSD). This is consistent with the view that SBM is a correlative by-product of evolution towards sexually dimorphic body sizes. Second, within protandrous species, the degree of protandry typically increased with plastic increase in development time, with females prolonging their development more than males in unfavourable conditions. This pattern is in conflict with the direct selection hypothesis, which predicts the degree of protandry to be insensitive to the quality of the juvenile environment. These converging lines of evidence support the idea that, in insects, SBM is generally a by-product of SSD rather than a result of selection on the two sexes to mature at different times. It appears plausible that selective pressures on maturation time per se generally cannot compete with viability- and fecundity-mediated selection on insect body sizes. Nevertheless, exceptions certainly exist: there are undeniable cases of SBM where this trait has evolved in response to direct selection. In such cases, either the advantage of sex difference in maturation time must have been particularly large, or fitness effects of body size have been unusually weak." (Authors) This meta study includes data of Odonata.] Address: Teder, T., Dept of Zoology, Institute of Ecology and Earth Sciences, University of Tartu, Vanemuise 46, Tartu, EE-51003, Estonia

**19500.** Theischinger, G.; Toko, P.S.; Richards, S.J. (2021): A remarkable new species of Papuagrion Ris, 1913 from New Guinea (Odonata: Coenagrionidae). *Odonatologica* 50(1/2): 131-141. (in English) ["A new species of the coenagrionid damselfly genus *Papuagrion* is described from the lowlands of the Purari River basin in Gulf Province, Papua New Guinea. *Papuagrion forceps* sp. nov. is a large (abdomen + appendages 46.5-47.2 mm) slender species with a pre-dominantly black and brown abdomen. The male is unique in the genus in having superior appendages that are minute in comparison to the inferior appendages, with lower branches that are not visible in profile. The new species is currently known only from the type locality, where a male and a female were perched among low foliage in a remnant patch of lowland rainforest." (Authors)] Address: Toko, P.S., New Guinea Binatang Research Centre, Madang, Papua New Guinea, and Faculty of Science, University of South Bohemia, Ceske Budejovice, Czech Republic. Email: pagi.si-one@gmail.com

**19501.** Theodoropoulos, C.; Karaouzas, I. (2021): Climate change and the future of Mediterranean freshwater macro-invertebrates: a model-based assessment. *Hydrobiologia* 848: 5033-5050. (in English) ["Mediterranean-climate rivers are projected to warm by 0.5–4°C and river flows to decline by 34% by 2071–2100. Using data from 191 Greek streams / rivers, we projected macroinvertebrate responses to 12 climate change scenarios for 2071–2100 to identify critical hydro-thermal limits beyond which irreversible responses are triggered and to assess the potential of environmental flows to mitigate the ecological impacts of climate change. Overall, macroinvertebrate assemblages will be less diverse, represented mostly by limnophilic, warm-dwelling taxa. Ephemeroptera, Plecoptera, Trichoptera and some Diptera will be replaced by Odonata, Amphipoda, Gastropoda and Heteroptera. Moderate average warming (1–1.8 °C) will not significantly affect assemblage abundance and richness but extreme warming (= 5 °C) will shift to limnophilic-type assemblages even in non-lentic hydrological conditions. Our models predict irreversible macroinvertebrate responses at = 3°C average warming combined with = 50% average flow decrease, or = 5°C warming regardless of flow decrease, or = 90% flow decrease regardless of warming. Beyond these limits, cold-dwelling taxa such as Limnephillidae and Potamanthidae will almost disappear (abundance: –87%), replaced by warm-dwelling Physidae (+100%) and Coenagrionidae (+97%). Environmental flows could mitigate the impacts of warming, compensating macroinvertebrates for up to 3°C when 50% decreased flows are provided, and for up to 5°C when flows within the 0–25% range are provided." (Authors)] Address: Theodoropoulos, C., Institute of Marine Biological Resources and Inland Waters, Hellenic Centre for Marine Research, 46.7 km Athens-Sounio Ave., 19013, Anavyssos, Greece

**19502.** Uboni, C.; Borsato, V.; Bacaro, G. (2021): Odonate fauna assemblages in the "Cansiglio Forest" (Insecta: Odonata). *Rendiconti Lincei. Science Fisiche e Natrali* 32: 899-910. (in English) ["Odonata is considered a "flagship" group of insects and its investigation is of primary importance especially for protected areas where freshwater ecosystems occur. In this study, we focused on Odonate fauna in the "Cansiglio Forest" (Veneto, Italy), a karst area where the only checklist available dates back more than 40 years ago. In order to update the Odonate adult distribution in the area, we selected 21 ponds that were sampled monthly, from May to August, during a 2-years survey. In total, 21 species (belonging to 14 genera and 5 families) have been recorded: we confirmed 15 species from the previous species list and we added to the whole species list 6 new species. Dominant families were represented by Libellulidae (33%) and Aeshnidae (23%), the most common genus was *Sympetrum* (19%), and the most frequent species was *Coenagrion puella* (63%). In term of patterns of species richness, highly grazed and pastured ponds exhibited the lower number of species and individuals, as a probable response to the high level of animal disturbance on the vegetation and due to the eutrophication processes. Our results are important also in terms of conservation and management of freshwater sites

belonging to Natura 2000 site. ... In detail, we confirmed the following species: *Lestes barbarus*, *Sympecma fusca*, *Enallagma cyathigerum*, *Coenagrion scitulum*, *C. puella*, *Aeshna cyanea*, *A. affinis*, *Anax imperator*, *Libellula depressa*, *L. quadrimaculata*, *Crocothemis erythraea*, *Sympetrum striolatum*, *S. meridionale*, *S. fonscolombii*, *S. sanguineum*. On the contrary, we did not confirm the following species: *Ischnura elegans*, *Aeshna mixta*, *Orthetrum cancellatum*, *O. brunneum*, *Sympetrum vulgatum*, *S. flaveolum*, *Leucorrhinia pectoralis*. Considering the last two species, their present lack in the study can be justified with the major threats connected with their ecology. It is known that *S. flaveolum* populations are in decline due to intensive grazing activity that damage pond banks especially during the reproductive period, and for grazing animal dejections that contribute to the phenomena of water eutrophication." (Authors)] Address: Uboni, Costanza, Dept Life Sciences, Univ. of Trieste, Via L. Giorgi 10, Trieste, Italy. Email: costanza.uboni@gmail.com

**19503.** Utseth, H. (2021): Insect community response to recent rewetting of drained bogs in Southeastern Norway. MSc thesis, Faculty of Environmental Sciences and Natural Resource Management: IV + 34 pp. (in English, with Norwegian summary) ["During the last five years, Norway has rewetted almost 80 drained mires to reduce climate emissions, limit the risk of natural disasters, and to prevent further loss of biodiversity. Even more mires are planned to be rewetted over the next five years despite limited knowledge on how mire fauna responds to the measures. Therefore, this study used insects to discover possible community alterations resulting from drainage and rewetting of ombrogenous mires, more commonly known as bogs, in the southeastern part of Norway. Changes in densities of insect orders and four target butterfly species were assessed through a transect study comparing seven newly rewetted bogs to adjacent and otherwise comparative drained and pristine areas. The findings revealed a general similarity in the overall composition of insect orders, butterflies, and water insects, despite some alterations within specific orders among the three treatments. Drained bogs generally had higher abundances of dipterans and hymenopterans compared to pristine areas, and lower abundances of orthopterans. These responses might derive from drainage favoring species preferring temporal water sources and forest development, rather than bog specialists. Insect communities in rewetted bogs were more similar to drained bogs than to pristine, with the exception of a reversing response in the order of hymenopterans. Additionally, rewetted bogs stood out in their high abundance of odonates, likely due to the increased access to artificial pools from dammed ditches. As the observations of target butterflies were few and the samplings were conducted shortly after rewetting, further assessments of lower taxa and long-term studies of responses are necessary to better understand the potential of bog rewetting for insect communities....In this study, the odonate abundance in pristine bogs resembled that of drained ones, while they were the most abundant in rewetted bogs. One explanation behind higher abundances in rewetted sites might be the increased access to open water and ponds



due to dammed ditches (Eian, 2021). Since odonates have a larval stage generally dependent upon water, these dams might increase the availability of suitable larval habitats for some species (Beadle et al., 2015; Strobl et al., 2020). Even though drained bogs also can contain some ditches filled with water, these shallow and narrow pools might not be suitable habitats for all species (Elo et al., 2015). Another explanation can be that the study design itself has affected the number of odonates recorded for the different treatments. Transects in rewetted bogs always crossed a minimum of one ditch perpendicularly. In pristine bogs with open waters, the transect were usually located next to the ponds due to unsafe ground surrounding the water. This have impacted how close and frequently transect counts were to open water and may also have influenced the results if some species of odonates prefer to stay closer to water. However, an American study of adult dragonflies' land use around open water found unaffected abundances of dragonflies up to 160 meters from the closest pond (Bried & Ervin, 2006), suggesting that at least several dragonflies should not be notably affected by transects crossing by or directly over open waters." (Author)] Address: not stated

**19504.** Valeriano, W.W.; Andrade, R.R.; Vasco, J.P.; Malachias, A.; Almeida Neves, B.R.; Soares Guimarães, P.S.; Rodrigues, W.N. (2021): Mapping the local dielectric constant of a biological nanostructured system. *Beilstein J. Nanotechnol.* 12: 139-150. (in English) ["The aim of this work is to determine the varying dielectric constant of a biological nanostructured system via electrostatic force microscopy (EFM) and to show how this method is useful to study natural photonic crystals. We mapped the dielectric constant of the cross section of the posterior wing of the damselfly *Chalcopteryx rutilans* with nanometric resolution. We obtained structural information on its constitutive nanolayers and the absolute values of their dielectric constant. By relating the measured profile of the static dielectric constant to the profile of the refractive index in the visible range, combined with optical reflectance measurements and simulation, we were able to describe the origin of the strongly iridescent wing colors of this Amazonian rainforest damselfly. The method we demonstrate here should be useful for the study of other biological nanostructured systems." (Authors)] Address: Valeriano, W.W., Depto Física, ICEx, Univ. Federal de Minas Gerais, Av. Antônio Carlos 6627, 31270-901 Belo Horizonte, Minas Gerais, Brazil. Email: wesclevaleriano@gmail.com

**19505.** Valeriano, W.W. (2021): Mapeamento da constante dielétrica local de um sistema biológico nanoestruturado: estudo da asa da libélula *Chalcopteryx rutilans*. PhD thesis, Instituto de Ciências Exatas da Universidade Federal de Minas Gerais: 117 pp. (in Portuguese, with English summary) ["The aim of this work is to determine the dielectric constant value of a bio-nanostructured system via Electrostatic Force Microscopy (EFM) and to show how this method is useful to study natural photonic crystals. We mapped the dielectric constant of the cross-section of the posterior hind wing of *C. rutilans* with nanometric resolution and obtained not only structural information on its constitutive nanolayers but also

on the absolute values of the dielectric constant variation in a nanometric scale. By relating the measured profile of the static dielectric constant to the profile of the refractive index in the visible range, combined with optical reflectance measurements and simulation, we were able to describe the origin of the strongly iridescent wing colors of this Amazonian rainforest damselfly. The method we demonstrated here may be useful for the study of other nanostructured biological systems." (Author)] Address: Valeriano, W.W., Depto de Física, ICEx, Universidade Federal de Minas Gerais, Av. Antônio Carlos 6627, 31270-901 Belo Horizonte, Minas Gerais, Brazil. Email: wesclevaleriano@gmail.com

**19506.** van der Schans, J. (2021): Waargenomen libellen 2020. *Nieuwewetbrief Het Merkske* 8: 30-32. (in Dutch) [Verbatim: "Last year's mild winter and a wet March made it look promising for the dragonflies in 2020. Ponds and pools filled with water and warm weather forecasts. But this will be a different story, because suddenly we have to deal with a large observer effect on our monitoring. As described in other articles of this newsletter, we suddenly had to deal with another exotic 'critter' which closed borders that did not normally exist and forced us to stay at home on the Belgian side of the border. As fellow observers talk about 'our front or backyard', there was no way to get there during the Lock-down. These areas are so close and yet suddenly so far away. The occasional sneak across the border via forest tracks and shortcuts in the hope of not being stopped. The observer effect, in this case not being able to go to the beautiful fens and pools, is therefore the reason that few species and low numbers were counted. Due to the lock-down and closing of the borders, some species have certainly been missed. Fortunately, in April and May it was fine (warm) dragonfly weather and *Pyrrhosoma nymphula* was observed first, followed by *Libellula depressa* and *L. quadrimaculata*. Remarkable was the frequently observed *Cordulia aenea*, which clearly enjoys life in the Merkske. Due to the great heat in the summer, there was, in contrast to last year, only a small influx of southern species. *Anax parthenope* knows to return to some popular pools every year and may reproduce in the area. *Sympetrum meridionale* was seen at three sites in Belgium and one site in the Netherlands where uncoloured dragonflies were observed, indicating local hatching and thus confirming a small population. *Leucorrhinia pectoralis* and *L. rubicunda* are still observed in small numbers. *L. dubia* was seen in 2020 at three locations in the Belgian part, two of which are new locations and one new location on the Dutch side. That is very promising. In contrast to last year, few *Sympetrum fonscolombii* and *Orthetrum coerulescens* was seen, but there were higher numbers of *S. sanguineum*. Of course, the observer effect mentioned above could be the cause. The large numbers of damselflies seen throughout the year were striking. Species like *Ischnura pumilio* and *Lestes virens* were common, together with *Lestes sponsa* and to a lesser extent *Coenagrion scitulum*. The populations of *Calopteryx virgo* and *C. splendens* seem stable but the low water level of the Merkske during the drought of last summer(s) is worrying. The life of the dragonfly larvae takes place under water. In the Dutch and Belgian part together

43 different species have been observed this year, 3 less than last year. *Sympetrum danae* and *Ceriagrion tenellum* are species that have almost disappeared. Even the heat-loving *Crocothemis erythraea* has only been observed in a few places. The national trend of declining dragonfly populations will certainly also apply to 't Merkske. The drought at the end of August and September also dried up deeper pools and fens, so 2021 will be an exciting year again. I would like to end with a quote that I ended with last year, "It even gives opportunities for new species". (Author/DeepL)] Address: not stated

**19507.** Van Eupen, C.; Maes, D.; Herremans, M.; Swinnen, K.R.R.; Somers, B.; Luca, S. (2021): The impact of data quality filtering of opportunistic citizen science data on species distribution model performance. *Ecological Modelling* 444: 11pp, Suppl. (in English) ["Highlights: • Stringent filtering of unstructured data should not be performed blindly. • Data quality is higher in verified or more detailed species records. • Both absolute and relative sample size are important in stringent filtering. • Decreasing sample size by filtering does not always decrease model performance. • Impact of stringent filtering on model performance differs among taxonomic groups. Abstract: Opportunistically collected species occurrence data are often used for species distribution models (SDMs) when high-quality data collected through standardized recording protocols are unavailable. While opportunistic data are abundant, uncertainty is usually high, e.g. due to observer effects or a lack of metadata. To increase data quality and improve model performance, we filtered species records based on record attributes that provide information on the observation process or post-entry data validation. Data filtering does not only increase the quality of species records, it simultaneously reduces sample size, a trade-off that remains relatively unexplored. By controlling for sample size in a dataset of 255 species, we were able to explore the combined impact of data quality and sample size on model performance. We applied three data quality filters based on observers' activity, the validation status of a record in the database and the detail of a submitted record, and analyzed changes in AUC, Sensitivity and Specificity using Maxent with and without filtering. The impact of stringent filtering on model performance depended on (1) the quality of the filtered data: records validated as correct and more detailed records lead to higher model performance, (2) the proportional reduction in sample size caused by filtering and the remaining absolute sample size: filters causing small reductions that lead to sample sizes of more than 100 presences generally benefitted model performance and (3) the taxonomic group: plant and dragonfly models benefitted more from data quality filtering compared to bird and butterfly models. Our results also indicate that recommendations for quality filtering depend on the goal of the study, e.g. increasing Sensitivity and/or Specificity. Further research must identify what drives species' sensitivity to data quality. Nonetheless, our study confirms that large quantities of volunteer generated and opportunistically collected data can make a valuable contribution to ecological research and species conservation." (Authors)] Address: Van

Eupen, C., Ghent Univ., Dept Data Analysis & Mathematical Modelling, Coupure Links 653, B-9000 Ghent, Belgium

**19508.** Viela, D.S.; Garcia Junior, M.D.N.; Furieri, K.S.; Lencioni, F.A.A. (2021): *Leptagrion jeromei* (Odonata: Coenagrionidae) spec. nov. from Brazil, with notes on *L. andromache* Hagen in Selys, 1876. *Zootaxa* 5068(2): 240-246. (in English, with Portuguese summary) ["A new species of *Leptagrion* Selys, 1876 is described and named in honor to Dr. Jerome Constant: *Leptagrion jeromei* (Holotype: Brazil: Bahia, Jussari, RPPN Serra do Teimoso, Jequitiba tree (*Cariniana legalis* (Mart.) Kuntze, 1898) at 32 m, 10.v.2005, K.S. Furieri leg and deposited in FAAL). This species was confused for a long time with *L. andromache* Hagen in Selys, 1876 its closest congener. Diagnostic illustrations of *L. andromache* (lectotype and specimens collected at Amapá—Brazil) and *L. jeromei* spec. nov. are presented. We also present the northernmost record for *L. andromache* in Amapá state, Northern Brazil." (Authors)] Address: Viela, D.S., Lab. Biol. Aquática, Depto de Ciências Biológicas, Fac. de Ciências e Letras de Assis, Universidade Estadual Paulista, Assis, São Paulo, Brazil. Email: deeogoo@gmail.com

**19509.** Vilela, D.S.; Venâncio, H.; Santos, J.C. (2021): Morphological description of the final instar larvae of *Argia reclusa* Selys, 1865 and *Tigriagrion aurantinigrum* Calvert, 1909 from Southeastern Brazil (Odonata: Coenagrionidae). *Zootaxa* 5060(3): 392-400. (in English, with Portuguese summary) ["The final instar larvae of *Argia reclusa* Selys, 1865 and *Tigriagrion aurantinigrum* Calvert, 1909 are described, diagnosed and illustrated. The larvae of *A. reclusa* has a very prominent premental ligula, shared with a single species in Brazil, from which it can be separated by a combination of characters. The larvae of *T. aurantinigrum* is similar to most *Oxyagrion* in regard to prementum and lamellae shape, and differs from those taxa in palpal and premental setation and number of teeth on the labial palp. Both larvae were collected in a small stream of the Cerrado biome, where both species are common." (Authors)] Address: Vilela, D.S., Rua Jaime Bilharinho, 575, CEP 38065-280, Uberaba, Minas Gerais, Brazil. Vilela, D.S., Rua Jaime Bilharinho, 575, CEP 38065-280, Uberaba, Minas Gerais, Brazil. Email: deeogoo@gmail.com

**19510.** Vilenica, M.; Kulijer, D.; Gligorovic, B.; Gligorovic, A.; De Knijf, G. (2021): Distribution, habitat requirements, and vulnerability of *Caliaeschna microstigma* at the north-western edge of its range (Odonata: Aeshnidae). *Odonatologica* 50(3/4): 203-225. (in English) ["More than a decade of field surveys of *Caliaeschna microstigma* (Schneider, 1845), at the north-western edge of species' distribution in Bosnia & Herzegovina, Croatia, and Montenegro recorded its presence at 135 localities, of which 107 were previously unknown. Our sampling located populations north-west of the species' previously known range limit. Literature and new data showed that the species was most frequently observed in karst springs (42 % of all known localities) and streams (34 %) and, to a lesser extent, also in rivers (24%). Although it was observed over a wide range of altitudes,

from sea level to mountainous regions (865 m a.s.l.), 72 % of the localities were below 200 m a.s.l., and 43 % below 50 m a.s.l. Reproduction attempts and/or successful reproduction was recorded at approximately half the localities (53%, n = 71), mostly in the Mediterranean but also in the Alpine bio-geographical region. Most of the localities with *C. microstigma* present are suffering from various anthropogenic threats, such as domestic and constructional waste disposal, capture of spring water, and urban and agricultural impacts. This study contributes to a better understanding of the species' distribution and provides new insight into its habitat and microhabitat preferences." (Authors)] Address: Vilenica, Marina, University of Zagreb, Faculty of Teacher Education, Trg Matice Hrvatske 12, 44250 Petrinja, Croatia. Email: marina.vilenica@ufzg.hr

**19511.** Walia, G.K.; Katnoria, N. (2021): Chromosome characterization of four calopterygid damselflies with cytogenetic review of family Calopterygidae (Odonata: Zygoptera). *J. Adv. Zool.* 42(1): 107-117. (in English) ["Taxonomically, in family Calopterygidae, 183 species under 21 genera have been reported worldwide. Out of these, cytogenetic data pertains to only 22 species which is only 12% of the known species. In India, 9 species under 6 genera are present, while only 2 species has been studied cytogenetically. The present study has been conducted to linearly characterize the chromosomes of 4 species (*Matrona nigripictus*, *Neurobasis chinensis*, *Vestalis apicalis* and *Vestalis gracilis*) of family Calopterygidae by conventional staining, C-banding, silver nitrate staining and sequence-specific staining and also compiled the cytogenetic data of the family. The species were collected from Meghalaya, Goa, Kerala, Himachal Pradesh states of India. All the species possesses  $2n=25m$  as the diploid chromosome number with XO-XX sex determination except *Neurobasis chinensis* with  $2n=23$ , characterized by the presence of two equal sized large autosomal bivalents originated by the autosome fusion. C-banding and silver nitrate staining results depict the presence of C-bands and NOR's on the terminal positions of autosomal bivalents, while X chromosome and m bivalent show variation in distribution of C-heterochromatin and NOR's. Sequence-specific staining represents the complement of all the species as AT-rich due to more DAPI bright signals. All the cytogenetically studied species have been catalogued including the presently studied species and the list has been updated to 23 species." (Authors)] Address: Katnoria, Neha, Dept of Zoology and Environmental Sciences, Punjabi University, Patiala, India. E-mail : neha29katnoria@gmail.com

**19512.** Worthen, W.B.; Fravel, R.K.; Home, C.P. (2021): Downstream changes in odonate (Insecta: Odonata) communities along a suburban to urban gradient: Untangling natural and anthropogenic effects. *Insects* 2021, 12(3), 201: 19 pp. (in English) ["Simple Summary: Dragonflies are sensitive to natural and human-caused variation in the aquatic and terrestrial habitats where their larvae and adults live. For example, a reduction in shady vegetation, as a consequence of increasing stream size or streamside deforestation, often causes a reduction in specialized forest species

and an increase in generalist species. We surveyed larvae and adults at 15 sites along the Reedy River in Greenville Co, SC, USA, from headwater sites in forested suburban landscapes through the urban core of the city of Greenville. We described the sediment characteristics and shoreline vegetation in two 4 m × 20 m plots at each site, and measured the percentage of developed land, forested land, grasslands, and wetlands within 500 m of each plot center. At a small scale, within plots, larval abundance and diversity increased with increasing amounts of dead debris that may provide a refuge from predators. Adult abundance and diversity correlated with the amount of aquatic and shoreline vegetation used as perches. At a large scale, diversity responded more to natural changes in habitat than urbanization: damselfly diversity increased downstream and dragonfly diversity was greatest in sunny, open habitats with fields, wetlands, and open water. Abstract: The community structure of lotic odonates changes downstream, but it is difficult to untangle natural and anthropogenic causes. We surveyed larvae and adults at 15 sites along the Reedy River in Greenville Co., SC, USA, from sites in forested suburban landscapes through the urban core of the city of Greenville. We used principal component analyses and Akaike information criteria models to describe the relationships between larval and adult community descriptors (abundance, richness, and diversity) and habitat characteristics at several spatial scales, including water chemistry, sediment and detritus, aquatic and streamside vegetation, and the percent cover of landforms in the surrounding landscape. At all scales, larval abundance, richness, and diversity correlated with the amount of detritus. At a small scale, adult indices correlated with the amount of sunlight and streamside vegetation. Zygopteran community composition was nested at a large scale; richness and diversity did not correlate with changes in the landscape but increased downstream. Anisopteran composition was also nested, but richness correlated with the percent cover of field, wetland, and open water in the habitat and was unrelated to downstream site position. Landscape transformation affected anisopterans more than zygopterans by opening habitats that facilitate these generalist heliotherms." (Authors)] Address: Worthen, W.B., Biology Dept, Furman Univ., Greenville, SC 29613, USA

**19513.** Xu, J.H.; Liu, T.; Zhang, Y.; Zhang, Y.-N.; Wu, K.; Lei, C.; Fu, Q.; Fu, J.-J. (2021): Dragonfly wing-inspired architecture makes a stiff yet tough healable material. *Matter* 4(7): 2474-2489. (in English) ["Highlights: •A universal fabrication methodology for the stiff yet tough healable material. •The fabricated nanocomposite shows exceptionally enhanced strength and toughness. •3D-interconnected MXene framework enables fast NIR laser responsive healing property. •The nanocomposite demonstrates great potential for high-temperature EMI shielding. Abstract: Progress and potential: Mechanical robust yet healable materials have many promising engineering applications from intelligent architecture to the auto industry. However, most of them possess ultralow fracture toughness that significantly limits their application because of the possible catastrophic fracture mode caused by small defects or cracks. In this work, we

propose a previously unreported strategy that imitates the microstructure of dragonfly wings to make stiff, brittle, and healable materials become a defect-tolerant nanocomposite with stable crack propagation behavior. Except for unprecedentedly mechanical enhancement, the dragonfly wing-inspired continuous MXene framework confers a nanocomposite with exceptional thermal stability, fast NIR-responsive healing performance, and excellent electromagnetic interference shielding capability. This unique and scale-up produced nanocomposite may find applications in harsh environments with superior mechanical, healable, and functional properties. Summary: Mechanically robust and healable polymers are in high demand for the intelligent architecture, aerospace engineering, and auto industry; however, most of them suffer from brittle fracture owing to the inherent conflict between stiffness and toughness within polymer systems. Inspired by the microstructure of dragonfly wings, we show how brittle, stiff, and healable materials can become defect tolerant by strategies ranging from molecular design to structural processing. Transition metal carbides/carbonitrides form an interconnected mechanical framework, similar to the rigid nervure in dragonfly wings, to stabilize the growth and slow down the extension of crack, while the initially glassy healing polymer closely bonds to rigid framework through powerful interfacial supramolecular interactions, playing a key role in the soft membrane dissipating stress energy. Compared with initial polymers, the obtained SP/MXene (SPM) nanocomposite exhibits an increase in fracture toughness and flexural strength (54.3- and 25.0-fold, respectively), exceptional thermal stability, mechanical and functional repairability, and good electromagnetic interference shielding." (Authors)] Address: Wu, K., College of Polymer Science & Engineering, State Key Lab. Polymer Materials Engineering, Sichuan Univ., Chengdu 610065, P. R. China. E-mail: kaiwu@scu.edu.cn

**19514.** Yamada, S.; Urabe, J. (2021): Death-feigning behaviours increase survival rate of littoral cladocerans under predation by odonate larvae. *Freshwater Biology* 66(11): 2030-2037. (in English) ["1. Because littoral cladocerans are common prey for odonate larvae, they are ideal organisms to examine prey and predator interactions in aquatic habitats. Although death-feigning behaviour observed in littoral cladocerans is viewed as a trait to reduce predation risk, no study has examined the effectiveness of death-feigning at reducing mortality. We studied the effectiveness of death-feigning behaviour by two littoral cladocerans, *Chydorus sphaericus* and *Oxyurella tenuicaudis*, against the odonate larvae of *Sympetrum frequens*. 2. We first examined how the odonate larvae detected the prey and found that the larvae consumed active cladocerans, even under dark conditions, but they did not consume anaesthetised cladocerans, indicating that the larvae detect the prey using mechanical cues such as vibrational currents created by the prey individuals. 3. We then observed behavioural events of odonate larvae and prey cladocerans using a video-recording system to count the number of cladocerans that showed death-feigning behaviours when odonate larvae attacked and those that were not consumed when they showed

death-feigning behaviours. 4. We observed a total of 1,099 behavioural events in prey-predator interactions. On average, the odonate larvae pursued 63% of the cladocerans encountered, attacked 89% of the cladocerans pursued, and successfully captured only 29% of the cladocerans with the first attack. Among the cladocerans that were not captured, 38% of the individuals continually swam, but 62% ceased to move and exhibited death-feigning behaviours. The odonate larvae's capture rate for cladocerans exhibiting the death-feigning behaviours fell significantly short of that for cladocerans that were continually swimming. 5. The experiments clearly showed that the littoral cladocerans' death-feigning behaviour effectively decreased predation rate by odonate larvae. The results suggest that the death feigning serves as an adaptive behaviour to reduce mortality risk in littoral cladocerans under predation by such predators that can detect prey using mechanical cues such as those of vibrational currents." (Authors)] Address: Yamada, S., Aquatic Ecology Lab, Graduate School of Life Sciences, Tohoku University, Aoba 6-3, Aramaki Aoba-ku, Sendai 980-8578 Japan. Email: sayumi.yamada127@gmail.com

**19515.** Zhou, X.; Tan, Y.; Yi, X.; Wu, S.; Zhang, L.; Guo, A. (2021): Communities of adults dragonflies in rice fields in tropic and subtropic region in Hainan, China. *Chinese Journal of Tropical Crops* 42(9): 2711-2716. (in Chinese, with English summary) ["Dragonflies are increasingly used as the biological indicators to evaluate environmental quality. There are also many species of dragonflies in rice fields in Hainan Province. In order to make clear the community composition of dragonflies in rice fields in Hainan Province, the adult dragonflies were sampled in first and second rice seasons in 2017 in Sanya and Wenchang. The dragonfly community (n = 18 species, Tab. 1) was stable in different growth stages of two rice seasons in Hainan, with 5-15 species and (3.7±0.67) - (14.0±0.57) dragonflies per hundred clusters. The diversity index of dragonfly community was 2.007-2.193, the evenness index was 0.786-0.808, and the dominant concentration index was 0.148-0.190. 15 species from 3 families of adult dragonflies were collected in rice ecosystem in tropic region and 17 species from 2 families in subtropic region respectively and 11 species were both in Sanya and Wenchang. The similarity of community species was 0.701, and the similarity of dominant species was 0.857. In the first and second seasons there were significant differences in the number of individuals at tillering, flowering and fruiting stages in Sanya, while there were no significant differences in Wenchang. *Agriocnemis femina*, *Ceriatogon auranticum* and *Neurothemis tullia* may be sensitive to the change of environmental pollution in rice fields." (Authors)] Address: Guo, A.: Email: guoanping@itbb.org.cn



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 1997

**19516.** Kaye Brewer, S.K. (1997): The foraging behavior of *Anax junius* (Odonata: Aeschnidae) and its potential as a behavioral endpoint in pesticide testing. PhD thesis, Iowa State University: VI + 86 pp. (in English) ["I examined the foraging behaviour of the green damer dragonfly nymph, *Anax Junius*, to assess the suitability of odonate foraging behaviour as a sensitive endpoint for monitoring contaminant exposure. Odonates are potentially excellent organisms for work in biomonitoring programs because: 1) they have complex foraging strategies that tightly couple sensory cues and mechanical responses: 2) their ecology is well-studied: and 3) they are often the dominant invertebrate predator in fishless systems. Thus they have the potential to structure communities through predation. I tested 1) the possibility that nymphs may regulate populations through frequency-dependent foraging and 2) the relationship between head capsule cholinesterase (ChE) levels in nymphs exposed to an organophosphorus insecticide and subsequent foraging behaviour. Functional response models were developed for nymphs fed exclusively midges or amphipods and for nymphs fed mixed prey. Nymphs fed only midges exhibited a sigmoidal type III response (a prerequisite for frequency-dependent foraging): nymphs fed only amphipods exhibited a hyperbolic type II response. These results were reversed in mixed prey trials. Regardless of densities of prey offered, a higher percentage of midges were eaten compared to amphipods. Dragonflies did follow a simplified optimal foraging model based on energy maximization but they did not consistently exhibit frequency-dependent selection. ChE levels were slightly elevated in treated nymphs and foraging behaviours between treated and control groups were not statistically significant, most likely because of high variability in ChE activities within the control group and across treated groups. My results suggest that certain animals may be unsuitable for routine pesticide monitoring and prior to incorporating any species into a biomonitoring program, careful consideration of the species' sensitivity to the contaminant needs to be considered. Further work is needed to determine other factors that may influence ChE levels in species as well." (Authors)] Address: not stated

**19517.** McNamara, D. (1997): Dragonfly Spotting. The Bulletin of the Amateur Entomologists 56: 251. (in English) [Verbatim: In the Denham area on the 9th September 1987 it

was a typical "quality" British summer's day - blue skies, fresh but warm, little wind, and plenty to look at. Denham has a series of waterways, the River Colne in particular, the Frays, Alderbourne, and Misbourne, lots of ponds and lakes - some natural and others the result of gravel extraction (which still goes on in parts), streams and drainage ditches. Even the Grand Union Canal contributes to the flora and fauna of the area, its sedentary flow being a much cleaned-up act compared to ten years ago. This is a splendid area for dragonflies. The main problem with identification is the variability of adult insects and in particular the various colour stages they go through - new emergers being in some cases quite unlike older ones. Also there are similarities between close relatives. However, with a novice's luck and a good guide book, four species were identified with reasonable confidence: *Calopteryx splendens*, *Enallagma cyathigerum*; *Aeshna mixta*, *Sympetrum striolatum*. [...] Reference: McGeeney, A. (1986). A Complete Guide to British Dragonflies. Jomthsin Cope.] Address: McNamara, D., 6 Fnlham Close, Hillingdon, Uxbridge, Middlesex UB8 3SU, UK

**19518.** Robinson, J.V.; Novak, K.L. (1997): The relationship between mating system and penis morphology in ischnuran damselflies (Odonata: Coenagrionidae). Biol. J. Linn. soc. 60(2): 187-200. (in English) ["Zygoptera belonging to the genus *Ischnura* are unusual amongst damselflies because of the variety of mate guarding techniques employed by males of different species. The lack of post-copulatory guarding combined with lengthy copulations in one group of ischnuran species suggest that these males guard females in copula. An examination of the accessory penes of species in this group indicates that all but one species have considerable microspination on the distal end (the flagella) of their penes that can function in sperm displacement. The flagella of these species are long and thin compared to those of other ischnurans. This is likely an adaptation to gain access to the spermatheca of the female. Two species tandem guard their mates during ovipositing. These species are the only ischnurans missing a stout pair of basal spines on the penultimate segments of their penes. They have considerable microspination over much of their penes but their flagella are of only moderate length and stout. Ischnurans that do not mate guard have short, stout flagella and most species examined from this group (5 of 7) have little microspination on their flagella tips. It is proposed that females of these species mate only once and therefore their males do not displace sperm. The relationship between mating system

and penis morphology in ischnuran damselflies (Odonata: Coenagrionidae)." (Authors)] Address: Robinson, J.V., Dept of Biology, Box 19498, I& Universi& of Texas at Arlington, Arlington, Texas 76019, USA

**19519.** Stoks, R.; Knijf, G. de; Jannis, G. (1997): De status van *Lestes barbarus* in België. *Gomphus* 13(1-2): 8-13. (in Dutch, with French summary) ["Before 1994 *Lestes barbarus* appeared very rarely and sporadically in our country. Since then the number of observations has increased dramatically (especially in 1995, with 100 contacts at 71 sites). The paper analyses the data by demonstrating breeding in several sites by the presence in consecutive years, by early periods of presence in sites known from the previous year (while in other sites the observations were made later in the season) and by direct evidence such as findings of larvae and neonates. With regard to the environments frequented, the almost constant presence of *Juncus effusus* and the drying out of many observation sites are noted; the diversity of physiognomy of the latter is however very high. The author concludes with a discussion on the chances of sustainability of these populations and the possible competition with *Lestes sponsa*." (Authors/DeepL) ] Address: Knijf, G. de, Research Institute for Nature and Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. E-mail: [geert.deknijf@inbo.be](mailto:geert.deknijf@inbo.be)

**19520.** Walia, G.K.; Sandhu, R. (1997): Karyotypic studies on five species of *Ischnura*. *Fraseria* (N.S.) 4: 9-12. (in English) ["Male germ cell complements of five species of genus *Ischnura* (Coenagrionidae) have been described and illustrated. *I. inarmata*, *I. senegalensis* and *I. rufostigma* possess the diploid numbers 27, while the remaining two species, *I. aurora aurora* and *I. forcipata* reveal diploid number 25. The m chromosomes are present only in *I. inarmata* and *I. senegalensis*. All these species possess XO-XX type sex-determining mechanism. *I. inarmata* has been studied cytologically for the first time." (Authors).] Address: Walia, Gurinder Kaur, Department of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab, India

## 1998

**19521.** Grell, H.; Grell, O.; Voß, K. (1998): Erfolgskontrolle von biotopgestaltenden Maßnahmen im Agrarbereich; Kleingewässer. Auftraggeber: Landesamt für Natur und Umwelt: 64 pp + Annex- (in German) [From April to October 1998, 100 shallow waters were studied in the north and east of Schleswig-Holstein. The waters are located in the outwash plains (22), in the young moraine (47) and on the Baltic Sea coast (31). Their bottom consists of clay, fen, anemic bog or sand. The size of the water bodies varies between 60 sqm and 9 ha. The water depth usually does not exceed one metre, and many water bodies have extensive alternating water zones. The small water bodies are mainly dug water bodies, while the large water bodies are almost exclusively the result of damming measures or rewetting. At least 85 of the water bodies are biotope creation measures carried out by various agencies. The vegetation and flora of the water bodies were studied, as well as the animal groups birds, reptiles, amphibians, grasshoppers, dragonflies and water beetles. Between 4 and 12 inspections of the water bodies were carried out. In addition, the loud calling amphibian species tree frog, fire-bellied toad, natterjack toad and green toad were surveyed in 7 areas. 204 specific plant species of the water bodies and banks were recorded, including 46 species of the Schleswig-Holstein Red List (hereafter "RL"). Furthermore, 36 breeding bird species (RL: 12), 4 reptile

species (RL: 3), 10 amphibian species (RL: 5), 5 specific grasshopper species (RL: 3), 32 dragonfly species (RL: 12) and 52 water beetle species (RL: 12) were recorded. All groups of organisms studied, with the exception of the water beetles which were only sampled at random, colonised the large water bodies significantly better than the small water bodies. The preference for large water bodies was particularly pronounced in the case of birds and reptiles. Furthermore, with the exception of the water beetles, all the organism groups studied showed a significantly higher species richness as well as a stronger occurrence of endangered species in the water bodies that were in an early to middle stage of succession. In contrast, species diversity was generally significantly lower in the more silted-up, shaded waters. In many older water bodies, extensive use, especially extensive riparian use, resulted in the long-term maintenance of early and intermediate successional stages. The water bodies showed marked natural differences with regard to their floristic and faunistic colonisation. Specific, often endangered species could be identified from several organism groups for all soil types or the corresponding natural areas. Even water bodies, which were heavily impaired by former intensive use and fertilisation, sometimes had a species-rich and/or rare colonisation, especially with regard to their bird, dragonfly and water beetle fauna. It is suggested that in future the creation of large, shallow backwaters with extensive alternating water zones should be promoted. To ensure the long-term preservation of early and middle succession stages, the water bodies should be extensively grazed." (Authors/DeepL)] Address: Landesamt für Natur & Umwelt, Hamburger Chaussee 25, 24220 Flintbek, Germany

**19522.** Oonk, M.M.A.; Giesen, T.G. (1998): Reproductietoets voor libellen in de Overasseltse en Hatertse Vennen. Opdrachtgever Staatsbosbeheer Regio Gelderland Arnhem. Giesen & Geurts, Ulf: 78 pp. (in Dutch) [Objective: In 1995 and 1996, commissioned by Staatsbosbeheer Regio Gelderland, it was investigated which of the dragonfly species, observed as exuvium in 1985 and 1986 in the Overasseltse en Hatertse Vennen, are still reproducing today. The aim of the study is to show whether the dragonfly population has been maintained since 1986. Possible changes in the population could be related to applied or neglected management, and possibly be translated into advice. In addition, the requirements of the present dragonflies (larvae) to the structure and vegetation of the banks as an ideal place for the larvae to hatch can be determined. For the management of ponds and banks it is also important to find out where on the bank the dragonflies hatch. Finally, by extrapolating the numbers of exuvia found in relation to the vegetation type, an overall estimate can be made of the quantities of dragonflies present. Method 64 permanent quadrats were set out in 17 fens to be studied in such a way that a sample area of the most important bank types was obtained. These PQs were thoroughly searched for exuviae a number of times. Results When ponds that were examined for exuviae in both '85/'86 and '95/'96 are compared, it appears that the number of species in five of the 13 ponds to be compared has increased. For the remaining ponds, there is a moderate to strong decrease in the number of species found. The most significant decline took place in Roelofsven, Oriolusven and Ketelven. Two species were not found, namely *Somatochlora metallica* and *Erythromma najas*. Strong decline was observed in *Leucorhinia dubia*, *L. rubicunda*, *Aeshna juncea* and *Pyrrosoma nymphula*. The data of each plot were extrapolated to exuviae per 10m<sup>2</sup> and plotted against the attractiveness of the plots (determined

on the basis of factors important to dragonflies). This gave rise to a significant correlation. Finally, for each species found, specific biotope requirements were described and related to the fens studied. Management in general it can be said that if the management in the fen area is aimed at maintaining stable dragonfly populations, it is essential to make the ponds as varied as possible without losing the characteristics of the individual ponds. Large-scale development measures, such as plowing, grubbing up and cleaning up after long periods of 'doing nothing', do not provide sufficient buffering or escape possibilities for species that do not benefit from these changes in the landscape in the short term. It would benefit most species if the management carried out was small-scale, with all ponds in the area being dealt with in a kind of rotation system in the longer term. This prevents every fen from having the same layout and being at the same stage of succession." (Authors/Deepl.) Address: Giesen & Geurts, Biologische Projekten, 't Goor 9, 7071 PC Ulf, The Netherlands

**19523.** Rambach, P.; Buchwald, R. (1998): Limnologische und vegetationskundliche Untersuchungen von Grundwasserbächen der südlichen Oberrheinebene. I. Riedkanal bei Wasenweiler (Freiburger Bucht, Südbaden). Mitt. bad. Landesver. Naturkunde u. Naturschutz N.F. 17(1): 59-84. (in German) ["The Riedkanal, a groundwater-influenced watercourse of the Upper Rhine Plain in Baden, runs in the channel system of the former East Rhine, which flowed through the low terrace between Kaiserstuhl and Tuniberg during the Würm Ice Age. As part of a diploma thesis at the Albert-Ludwigs-Universität Freiburg i.Br., the watercourse was investigated from May to October 1993 at four sites with regard to its physico-chemical factors and colonisation by macrozoobenthos; in addition, the Neugraben was analysed at two sites as a tributary polluted by wastewater. At the same time, the vegetation of these two watercourses was surveyed at a total of 18 sampling sites. Similarities and differences to typical lowland streams according to Braukmann (1987) were identified. The animal population largely consists of typical representatives of lowland streams such as *Asellus aquaticus*, *Gammarus pulex*, *G. roeseli*, *Polycelis ni gra*, *Polycelis tenuis*, *Dendrocoelum lacteum* and *Sialis lutaria*. Similarly, the strong dominance of crustaceans is characteristic of lowland streams. However, clear differences to lowland streams were also found, which can be attributed to the influence of groundwater. The cold stenothermy, which is not only limited to the narrow source area, and the constant oxygen deficit are unusual features for lowland streams. These milieu factors also characterise the animal and plant biocoenosis and distinguish the Riedkanal as a representative of the type "groundwater stream" according to Carbiener et al. (1987, 1990) or the "groundwater-dominated lowland stream" according to Timm (1994). Thus, groundwater macrophytes such as *Sium erectum*, *Nasturtium officinale*, *Veronica anagallis-aquatica* and *Callitriche obtusangula* colonise the entire longitudinal course of the watercourse studied. The occurrence of spring brook species such as *Arrenurus cylindratus*, *Hygrobatas prosiliens*, *Hygrobatas fluviatilis*, *Lebertia fimbriata*, *Lebertia sparsicapillata*, *Elmis aenea*, *Gammarus fossarum*, *Sericostoma personatum* and *Silo nigricornis* not only in the vicinity of the spring is a special feature of groundwater-dominated streams. The "dampening" influence of groundwater streams on the load of surface inflowing water is shown by the example of the tributary Neugraben. The study points to the necessity of typifying lowland streams not only according to geochemical conditions, but on a second level additionally with the help of the respective hydrological situation - e.g.

degree of groundwater influence. The macrophytes of the two study waters were related to a chain of plant communities which - following Carbiener et al. (1987, 1990) - was established for the natural area of the Upper Rhine Plain in southern Baden in a sequence of increasing trophic levels. While for the Riedkanal there was a slight shift from B-C to C in the longitudinal course, a sequence from (E-)D to (D-)C could be determined for the eutrophic Neugraben." (Authors/Deepl.) *Calopteryx virgo*, *Chalcolestes viridis*] Address: Buchwald, R., Institut für Biologie & Umweltwissenschaften, Carl von Ossietzky Univ. Oldenburg, Oldenburg, Germany

## 2000

**19524.** Dawson, M.J.; Hemmings, J. (2000): Sardinia 1999. Bulletin of the Amateur Entomologists' Society 59: 15-17. (in English) [Other insects seen: *Calopteryx splendens*, *C. virgo*, *C. haemorrhoidalis*, *Libellula fulva*, *Crocothemis erythraea*, *Sympetrum striolatum*] Address: Dawson, M.J., 66 Tivoli Crescent, Brighton BN1 5ND, UK.

**19525.** Hirose, Y. (2000): The molecular evolutionary genetic analysis of Japanese Odonata by mitochondrial DNA sequence. Tombo 42. 2-13. (in Japanese, with English summary) ["The classification of Insecta has been made mainly by the morphological differentiation. In the case of Odonata, the cadual appendages, the vein structure and the form of thorax and abdominal macula are assumed to be the important discernible characters. These morphological properties, however, could be subtly varied by their geographical and environmental conditions. So the detail classification between species and subspecies has been confusing by researcher's various opinions. Specially, the species classified in Cordulidae which inhabit in the area from Japan to Europe shared so many similarities in their morphologies that many of them could not be positioned clearly in terms of taxonomy. As to Cordulidae in Japan, the seven genera, twenty species and two subspecies are being recorded by Ishida (1988). According to him, the *Somatochlora graeseri aureola* and the *Somatochlora graeseri graeseri* which distribute in Hokkaido are classified in subspecies but there is no differentiation in their form of the cadual appendages which seemed to be the standard classificina points of Odonata. The differentiation in female abdominal macula and fulvid in the base of wing are the only differentiation. Moreover, according to past studies, both subspecies were collected in the same area so it was thought to be contradiction to divide them on subspecies in terms of taxonomy. In Ishida's classification, Asahina (1950) classified the *Macromiinae* which belongs to Cordulidae as an independent family. These studies shows the classification done is not adequate method and it is necessary to review the morphological classification with adding some supplementary technique in classifying Cordulidae. On the other hand, in Insecta, all base sequence of mitochondrial DNA of *Drosophila yakuba* was defined by Lansman (1985) from 1983 to 1985. Since Lansman's study, a series of studies seeking genetic distance by using the DNA base sequence came to be done. In the area of the fishes for which a lot of studies has done, Maya et al. (1996) defined the mt DNA 12 region and 866 base of 16 S rRNA region to clarify the relationship of interspecies for Cyclothone in which the relatives of the line had not been cleared. This ribosomal RNA region is higher in preservability than the other protein coding region of mtDNA so that it is recognized as the effective region as the genetic marker to study mass genetics and evolutionary researches (Nei, 1990) of interspecies. From the mutation comparison of the base sequence in this region, it is expected

to establish the adequate phylogenetic systematics. This study focused on Corduliidae to which a lot of problems were pointed out on the morphological classification and analyzed mt DNA 12 and 16S rRNA region. Moreover, the relationship between each group was clarified based on the obtained result to assume a new criterion of the morphological classification, and the problem in the classification was also clarified. In addition, it was tried to elucidate the process of speciation at the present age by adding ten genera and eleven species of Odonata from Japan and by using the base sequence of mtDNA 12..16 S rRNA region to estimate the divergence times. In analyzing the base sequence, after amplifying the both regions of mtDNA-12 and 16S rRNA by the PCR (Polymerase Chain Reaction) method then processing the direct sequence for the obtained PCR product by the Dye terminator method, the base sequence was defined. As a result, 355 bases for 12S rRNA region and 514 bases for 16S rRNA region were estimated as the base sequence, then the genetic distance and the phylogenetic tree were made by substituting the difference of the base among groups in the Kimura's genetic distance formula. [The Clustal W (Multiple alignment and molecular phylogenetic Tree-making software) in National Institute of Genetics was used.] Comparing the phylogenetic tree obtained by analyzing the base sequence of mtDNA, with the current morphological classification, the obtained findings of each problem were brought together and described as follows. 1) As to the classification of *Somatochlora graeseri aureola* and *S. graeseri graeseri* which was assumed to be in the relation of subspecies under the current morphological classification, the comparison of the base sequence of mtDNA, there was no difference at all between them so they were seemed to be in the identical species. 2) Considering the relationship of *Somatochlora graeseri aureola* and *Somatochlora uchidai* which was defined as different species, the base sequence of mtDNA was also so high compared with other species that it was presumed that they were species which had differentiated the most recently in the Cordulidae genus. 3) As for the relationship of Cordulidae and the Macromiinae in which the definition in the morphological classification differed by each researcher and was not clarified, it was found from the base sequence in mtDNA that the Macromiinae had diverged from the ancestral strain first then the Libellulidae diverged secondly. As a result, it seemed to be questionable to classify Macromiinae which had diverged before Libellulidae did as a subfamily and preferable to classify it as an independent family. It is uncertain why the result shown above was obtained at this point. In addition to the result above, to estimate the divergence time of Anisoptera from the ancestral strain, in which Cordulidae belongs, the amino acid substitution rate ( $2.0 \times 10^{-8}$ ) of 12 and 16S rRNA and the difference of the base between the both species were calculated by substituting these figures in Kimura's formula (1980). Consequently, it was found that the group from the Zygoptera average to Anisozygoptera diverged about two hundred and million years ago and the group from Anisozygoptera to the Anisoptera average about a hundred and seventy million years ago. Although the fossil *Epiphlebia superstes* of which the estimated time was three hundred and million years ago was found, the divergence times of Odonata after this was completely unknown. It seemed to be very meaningful to be able to presume the concrete divergence times. Finally, in this research, it was realized to reexamine the problems of the morphological classification as a traditional method by using the biochemical genetic index and show the clear relationship of the groups which had not been so clarified. Moreover, by analyzing the DNA base sequence, new findings which differed from the

traditional classification could be obtained." (Author)] Address: Email: ezotombo9@yahoo.co.jp

## 2002

**19526.** Suga, C.; Tsukiji, K., Takeda, S. (2002): Effects of pesticides on rate of emergence of dragonfly larva. Annual reports of the society of plant protection of north Japan 53: 155-157. (in Japanese) ["Results and discussion The first hatching of dragonflies was observed on 6 August, and the development of dragonfly hatching shells continued until the end of October. The number of dragonfly larvae in June and July is shown in Fig. 1. The number of dragonfly larvae in the insecticidal zone was lower than in the other zones, but the analysis of variance did not show any significant difference (5% risk rate). The number of dragonfly larvae in the herbicide and fungicide plots was lower than that in the other plots. The number of hatched eggs in the herbicide and fungicide plots was almost the same as that in the control plot (Fig. 2). This suggests that the herbicides and fungicides had no effect on dragonfly larvae, but the insecticides either indirectly reduced the number of dragonfly larvae by acting on their prey organisms or directly affected their growth. However, it was not possible to determine which of the two was the main cause in this study. In addition to dragonfly larvae, several other aquatic organisms were observed in the insecticide treatments (Table 2). The occurrence of dragonfly larvae in this study was about one month later than that in normal paddy fields. The reason for this delay is that the hatching of dragonflies was delayed because the waterlogging started later than the usual flooding of rice fields, and the growth of dragonflies was delayed because they were not fed with food. The density of adult dragonflies in the control site was 76.3 dragonflies/m<sup>2</sup>, which was much higher than the reported density of hatchlings (8 dragonflies/m<sup>2</sup>)(3) in untreated paddy fields. However, this value is considered to be reasonable because the test was conducted in paddy soils that were judged to have produced many eggs in the previous year. In the fungicide-treated area, the hatching period was later than in the control area (Fig. 3). Since dragonflies hatch in a uniform manner, we tested the emergence rate of hatching shells at the end of August and found  $61.7 \pm 12.6\%$  in the fungicide-treated plots, which was not significantly different from  $85.5 \pm 12.6\%$  in the control plots (risk rate 5%). Since only about 5 adults hatched very late and the experimental system was inadequate, it can be assumed that this is within the margin of error. However, unlike actual paddy fields, the present study was conducted under conditions where there was no water runoff or infiltration into the ground by waterways, etc., and no organisms that prey on dragonfly larvae were present." Translated with www.DeepL.com/Translator (free version)] Address: Suga, C., Iwate Agricultural Research Center, Narita, Kitakami, Iwate, 024-0003 Japan

**19527.** Wells, F.; Metzeling, L.; Newall, P. (2002): Macroinvertebrate regionalisation for use in the management of aquatic ecosystems in Victoria, Australia. Environmental Monitoring and Assessment 74(3): 271-294. (in English) ["The development of a broader, more holistic approach to aquatic ecosystem management has been called for in recent years. Physical and chemical objectives alone are no longer considered sufficient for the protection of aquatic ecosystems and should be supplemented with biological objectives. The ubiquitous and sedentary nature of macroinvertebrates [including Aeshnidae], combined with their measurable response to environmental conditions, favour their use as important indicators in environmental policies.



To establish biological objectives, there is a need for a regional framework to limit the variability between ecosystems. Past studies have demonstrated that an a posteriori regionalisation approach may be more useful than an a priori approach in explaining single component (e.g. macroinvertebrates) patterns across ecosystems. This is particularly important as aquatic resource management agencies often focus on one or two components of the ecosystem to assess environmental health. This study uses an a posteriori method to delineate and describe biological regions based on edge and riffle macroinvertebrate data. The regionalisation will provide a framework for setting biological objectives, based on the range of reference conditions measured within each separate region. The objectives will include regional checklists for taxa and biotic indices. Predictive modelling in the style of RIVPACS or AUSRIVAS will also be used within each region to develop objectives, incorporating local, regional and systematic features as predictor variables." (Authors)] Address: Wells, F., Dept of Geospatial Science, Royal Melbourne Institute of Technology, Melbourne, Victoria, Australia. E-mail: peter.newall@epa.vic.gov.au

## 2003

**19528.** Buchwald, R. (2003): Vegetationskundliche und ethologische Aspekte bei der Habitatwahl von Libellen, dargestellt am Beispiel der Glänzenden Binsenjungfer und der Gefleckten Heidelibelle in den Karst-Hochebenen Mittelitaliens. *Berichte der Reinhold-Tüxen-Gesellschaft* 15: 89-104. (in German, with English and Italian summaries) ["The present long-year study deals with investigations on habitat choice of two dragonfly species with special reference to the importance of floristic composition and vegetation structure. Some karst plateaus of Central Italy possess a large number of standing waters which differ predominantly in hydrological conditions and vegetation. Due to these differences I separated four vegetation types in the permanent and temporary waters. The Odonata species *Lestes dryas* and *Sympetrum flaveolum* showed marked differences in abundance and frequency in these four vegetation types. In particular, dragonflies of both species failed to appear or occurred only in low numbers when the waters dried up early in the reproductive season. Using a floristic-phytosociological and a hydrological-structural approach, more detailed analyses on some parameters of the vegetation, the morphology, the soil and the hydrological conditions of the waters pointed out that abundance and frequency of both species are correlated mainly with the following factors: aspect (physiognomy) of the vegetation, vegetation height in the peripheral and central parts of the waters, vegetation colour, and the degree of steepness at the margin of the aquatic habitat. The imagoes of both species preferred permanent or temporary waters with flat shore and vegetation which was dominated by green (to brown or yellow) stands of the growth forms "large sedge" and "rush(-like)"; the minimum height of the vegetation was (30-)35 cm (for *L. dryas*) respectively 20 cm (for *S. flaveolum*) in the peripheral parts and 35 cm (for *L. dryas*) respectively 25 cm (for *S. flaveolum*) in the central parts of the waters. The present study reveals that both the floristic-phytosociological and the hydrological structural approach give important information about the specific bond to vegetation and the habitat choice of the dragonfly species investigated here. Additional eco-behavioural studies should be carried out to verify and understand the present results by other approaches and methods." (Author)] Address: Buchwald, R., Institut für Biologie und Umweltwissenschaften, Carl von Ossietzky Universität Oldenburg, Oldenburg, Germany

**19529.** Burtch, M. (2008): The effects of algae leaf coverage and flow rate on oviposition choice in *Calopteryx maculata*. Report, UMBS Evolution 390, University of Michigan, Ann Arbor, MI: 16 pp. (in English) ["Female *Calopteryx maculata* are endophytic egg layers; they place their eggs within floating aquatic vegetation. In this study artificial oviposition leaf patches were created and placed in different sites along the Maple River near Pellston, MI. The varying flow rates were recorded and after 48 hours the leaf patches were collected. The egg number or oviposition sites were counted on each leaf along with the percent algae leaf coverage. The effect of algae leaf coverage and flow rate on oviposition preference were statistically measured; algae leaf coverage did not affect oviposition frequency ( $p > 0.05$ ) and intermediate stream flow was preferred over slower and faster flow rates as oviposition sites ( $p < 0.05$ ). The reason for this correlation is unknown, however, it could relate to the optimal conditions for egg growth and development. It is impossible to know whether oviposition flow/rate preference is the result of the male or female's choice. More research of egg development and observational data would provide more insights into the reasoning for intermediate flow oviposition preference." (Author)] Address: not stated

**19530.** Heitkamp, U. (2008): Zur Wirbellosenfauna des NSG „Denkershäuser Teich“ in Süd-Niedersachsen. Kommentierte Artenliste. *Naturkundliche Berrichte Fauna Flora Süd-Niedersachsen* 13: 65-107. (in German) ["The data material of this publication on the invertebrates of Denkershausen Pond was collected between 1984 and 1987 and between 1999 and 2005. The limnofauna with the macrobenthos fauna of the tributaries as well as the small crustaceans and the other invertebrates including the insects of the pond and ditches were recorded. Complete data are available on the turbellarians, molluscs and odonates, while those of the other groups had to remain more or less incomplete due to the survey methodology. As far as recorded, the current situation of the species is compared with that of the 1980s and KRUEL's (1940) results from the early 1930s. From the terrestrial area, especially the group of hay ticks is documented in detail. In addition, data material on the web spiders, isopods, short-winged beetles and day butterflies was evaluated. Altogether, the work represents a documentation of the faunistic state of the pond area from different historical periods. It completes previous publications on ground beetles, ground-dwelling spiders and weavers as well as vertebrates (excl. birds) of the Denkershausen pond. ... In the 2000s and 1984-86, 21 dragonfly species were recorded at the pond, 13 of which were indigenous species (Table 7). The most common species were the Great Skylark and the Horseshoe damselfly. KRUEL (1940) identified three further species, the Southern rush damselfly, the bat damselfly and the large pomegranate, which no longer occur at the pond. The 21 species correspond to approx. 31 % of the dragonfly species recorded so far in Lower Saxony." (Author/DeepL)] Address: Heitkamp, U. Bergstr. 17, 37130 Gleichen-Diemarden, Germany

**19531.** McMunn, M. (2008): Oviposition preference in the Dark-Winged Damselfly (*Calopteryx maculata*). Report, Joint project for Evolution and Natural History (BIO 390), University of Michigan, Ann Arbor, Michigan: 13 pp. (in English) ["Our study investigated preference of oviposition in *Calopteryx maculata*, the dark-winged damselfly. Artificial damselfly territories were created using several leaves of *Sparganium americanum* fixed in place in a river, at known

flow rates for 48 hours. On each leaf total eggs were counted and algal coverage was measured. We found that *C. maculata* oviposits more frequently in areas of intermediate flow rate, approximately 0.2-0.4 m/s. We also found that algal coverage was more common in this flow rate range, suggesting that damselflies oviposition choice is not affected by the presence of algae and that there is a relatively narrow window of optimum flow rate for oviposition." (Author)] Address: not stated

## 2009

**19532.** Bradley, T.J.; Briscoe, A.D.; Brady, S.G.; Contreras, H.L.; Danforth, B.N.; Dudley, R.; Grimaldi, D.; Harrison, J.F.; Kaiser, J.A.; Merlin, C.; Reppert, S.M.; VandenBrooks, J.M.; Yanoviak, S.P. (2009): Episodes in insect evolution. *Integrative and Comparative Biology* 49(5): 590-606. (in English) [oas 63; "Synopsis: This article derives from a society-wide symposium organized by Timothy Bradley and Adriana Briscoe and presented at the 2009 annual meeting of the Society for Integrative and Comparative Biology in Boston, Massachusetts. David Grimaldi provided the opening presentation in which he outlined the major evolutionary events in the formation and subsequent diversification of the insect clade. This presentation was followed by speakers who detailed the evolutionary history of specific physiological and/or behavioral traits that have caused insects to be both ecologically successful and fascinating as subjects for biological study. These include a review of the evolutionary history of the insects, the origins of flight, osmoregulation, the evolution of tracheal systems, the evolution of color vision, circadian clocks, and the evolution of eusociality. These topics, as covered by the speakers, provide an overview of the pattern and timing of evolutionary diversification and specialization in the group of animals we know as insects." (Authors) The paper includes references to Odonata.] Address: Bradley, T.J., Dept Ecology & Evolutionary Biology, University of California Irvine, Irvine, CA 92697-2525, USA. E-mail: tbradley@uci.edu

## 2012

**19533.** Aliyev, P.; Hajiyev, B.; Akhundov, M.A. (2012): The hydrofauna of the Sarysu Lake. 22(1): 159-162. (in Russian) ["Studies on the hydrofauna of the Sarysu Lake on the right bank of the Kura River were conducted in 2011. As a result of studies there are registered 33 species and 2 hybrids of fishes, 34 species of zooplankton and 84 species of macrobenthic organisms belonging to 11 taxonomic groups. Maximum development of organisms was recorded in spring and summer." (Authors) Odonata listed are: *Lestes sponsa*, *L. barbarus*, *L. dryas*, *Enallagma cyathigerum*, *Calopteryx virgo*, *Sympetma fusca*, *Platycnemis pennipes*, *Coenagrion puella*, *C. scitulum*, *Anax imperator*, *Sympetrum flaveolum*, *S. danae* and *S. striolatum*.] Address: Hajiyev, B., Ministry of Ecology and Natural Resources of Azerbaijan. E-mail: alisaleh@rambler.ru

**19534.** Mazza, G.; Aquiloni, L.; Bellavita, M.; Cianfanelli, S.; Cianferoni, F.; Orioli, G.; Palombi, A.; Piazzai, M.; Rpcchi, S.; Terzani, F.; Gherardi, F. (2012): Ricerche faunistiche negli habitat stagnatili (trosce) della Riserva Naturale Monte Rufeno (Lazio, Italia Centrale). *Studi Trent. Sci. Nat.* 92: 21-32. (in Italian, with English summary) [Faunistic researches in wetlands (known as "trosce") of Monte Rufeno Nature Reserve (Latium, Central Italy) - During 2010-2011, 13 wetlands, locally called "trosce", were investigated in Monte Rufeno Nature Reserve and surroundings. 14 odonate taxa

were recorded] Address: Mazza, G., Dipartimento di Biologia Evoluzionistica, Università degli Studi di Firenze, Via Romana 17, 50125 Firenze, Italia. Email: giuseppe.mazza@unifi.it

**19535.** Partridge, R. (2012): A swarming of Migrant Hawkers. *Bulletin of the Amateur Entomologists' Society* 71: 181. (in English) [Verbatim: On the evening of Sunday the 2nd of September 2012, after a long day in the garden, my wife and I decided to go for a walk around one of our local gravel pits in Block Fen, Cambridgeshire. It was a very fine evening, warm, calm and still sunny at 19-00 hours. Dragonflies were much in evidence, particularly Common Darters, *Sympetrum striolatum*, *S. sanguineum*, *Aeshna grandis* and *A. mixta*. As we rounded a corner in one of the most overgrown parts of the bank, we could see immediately some unusual behaviour amongst a group of dragonflies; they were very low to the ground, just a foot or two above the vegetation, and flying madly back and forth in the tightest of circles. When we approached for a closer look, they took no notice of us – we were able to stand within a yard of all the activity. A dozen or fifteen dragonflies were involved, all were *A. mixta* as far as I could tell, and all appeared to be males. We could now see what they were so intent upon. A large anthill was here and there were many flying ants coming up out of it, climbing the grass stems and taking off. These weakly-flying, and probably quite juicy, insects were an easy target for the Hawkers, and they must have taken hundreds of them if the feeding frenzy continued for any length of time. I am sure that this has been observed many times before but I have not yet come across an account of it in the literature that I have.] Address: Partridge, R., 11 New Rd, Mepal, Ely, Cambridgeshire CB6 2AP, UK. Email: rpartridge3@aol.com

**19536.** Probert, M. (2012): Damselfly with two abdomens (Odonata: Coenagrionidae) [sic]. *Bulletin of the Amateur Entomologists' Society* 71: 200-202, Plate 2. (in English) [An *Erythromma najas* female "with two abdomens is photographed. Two possibilities are considered: whether it was a mutant, or a pair in tandem attacked by a predator." (Author)] Address: Probert, M., 55 Higher Compton Road, Hartley, Plymouth PL3 5JA, UK

## 2013

**19537.** Lambertz, M.; Geissler, P. (2013): Zum Vorkommen des Großen Granatauges, *Erythromma najas* (Hansmann, 1823) (Zygoptera: Coenagrionidae), an Mittelrhein und Siegmündung bei Bonn. *Decheniana* 166: 73-77. (in German, with English summary) [*E. najas* "has not been documented in the Greater Bonn area (including the mouth of the Sieg) since 1959. During May and June 2012, two suitable breeding spots in the Rhine flood plain of Bonn ("Freizeitpark Rheinaue") and at the mouth of the Sieg have repeatedly been examined for this species. Both localities yielded specimens, including a freshly emerged one and adults in copula. This leads us to the conclusion that the large redeye today again is native to the Greater Bonn area." (Authors)] Address: Lambertz, M., Institut für Zoologie, Rheinische Friedrich-Wilhelms-Universität Bonn, Poppelsdorfer Schloss, 53115 Bonn, Germany. Email: lambertz@uni-bonn.de

## 2014

**19538.** Fan, T.; Zhang, R.; Fan, F.; Liu, Z.; Xiong, J. (2014): A water surface small target detection approach inspired by

dragonfly vision mechanism. *WIT Transactions on Engineering Sciences* 94: 151-157. (in English) [oas 63; "Weak and small target detection technique is widely used in military and industry applications. The targets are weak and small in the image when targets are far from the imaging system. Under this complex condition, the image has very low SNR and it is difficult to detect the targets On this situation, a weak and small target detection approach based on dragonfly compound eye is proposed in this paper. Dragonfly compound eye has obvious characteristics of polarized light, and it can detect the surface of water and the targets on water accurately The new method uses the polarization characteristics of dragonfly compound eye to get the polarization image of targets, and then completes the weak small target detection. The experimental data shows that this new target detection method has advantages of high precision and small false alarm rate." (Authors)] Address: Fan, T., School of Information Engineering, Natnchang Institute of Technology, Natnchang, China

**19539.** Winkler, C. (2014): Die Heuschrecken- und Libellenfauna im Umfeld des Winderatter Sees - Erfassungen in den Jahren 2013 und 2014. Auftraggeber: Winderatter See-Kielstau e.V., Förderverein für Natur und Umwelt, Willfried Janßen, Osterdorf 2, 24975 Ausacker. Auftragnehmer und Bearbeitung: Christian Winkler, Faunistische Gutachten, Bahnhofstr. 25, 24582 Bordesholm, Germany: 48 pp. (in German) [Schleswig-Holstein, Germany; "In 2013 and 2014, surveys of the dragonfly and grasshopper fauna were carried out in the area of Lake Winderatt. In addition to the lake, the approximately 100-hectare study area also included adjacent semi-open pasture landscapes belonging to the Schleswig-Holstein Foundation for Nature Conservation, a forest area, two wooded areas and the westernmost part of the Hadeby depression, which is characterised by wet grassland fallows. The dragonflies were recorded on the basis of the imagines at 11 shore sections of Lake Winderatt and at 23 small water bodies. All survey waters were checked on six dates between 20.06. and 01.10.2013 and on 26.05.2014. A total of 28 dragonfly species were recorded, 26 of which were classified as potentially native. *Lestes virens* and *Coenagrion lunulatum* (potentially native) are classified as "critically endangered" throughout the country. The latter is listed as "threatened with extinction" in the nationwide Red List. Furthermore, two "declining" species were found: *Aeshna juncea* and *Sympetrum flaveolum*. *Sympecma fusca* is another species that is very rare in the region. [...] Finally, from the point of view of dragonfly and grasshopper protection, deficits of the study waters and sample areas are pointed out and protection and development measures are presented (Tables 6 and 7). Deficits related to the current grazing management can only be identified at certain points and are not classified as serious at the level of the study area and its sub-areas." (Author/DeepL)] Address: Winkler, C., Faunistische Gutachten, Bahnhofstr. 25, 24582 Bordesholm, Germany

## 2015

**19540.** Adriaens, T.; van Grunsven, R. (2015): Schemerlibel. *Brachytron* 17(2): 126-129. (in Dutch) [Introduction into ecology and biology of *Boyeria irene*, including habitat photographs from its locality at the Oertze in Celle, Niedersachsen: "a river with a lot of structure, a substrate of gravel and sand, and a river bank with overhanging tree roots and branches, especially of alder."] Address: Adriaens, T., Research Institute for Nature and Forest (INBO), Kliniekstraat 25, B-1070 Brussels, Belgium. E-mail: im.adriaens@inbo.be

**19541.** Alygizakis, S. (2015): [Biology, ecology and evolution of the order Odonata of Crete]. MSc thesis, School of plant and food technology, Department of gene technology, Heraklion: 80 pp. (in Greece) [General introduction into dragonfly evolution and biology, with few remarks to the odonate fauna of Crete (Greece). <https://apothesis.lib.hmu.gr/handle/20.500.12688/31>] Address: not stated

**19542.** Bagheri, Z.M.; Wiederman, S.D.; Cazzolato, B.S.; Grainger, S.; O'Carroll, D.C. (2015): Robustness and real-time performance of an insect inspired target tracking algorithm under natural conditions. *Computational Intelligence, 2015 IEEE Symposium Series* : 97-102. (in English) ["Many computer vision tasks require the implementation of robust and efficient target tracking algorithms. Furthermore, in robotic applications these algorithms must perform whilst on a moving platform (ego motion). Despite the increase in computational processing power, many engineering algorithms are still challenged by real-time applications. In contrast, lightweight and low-power flying insects, such as dragonflies, can readily chase prey and mates within cluttered natural environments, deftly selecting their target amidst distractors (swarms). In our laboratory, we record from 'target-detecting' neurons in the dragonfly brain that underlie this pursuit behavior. We recently developed a closed-loop target detection and tracking algorithm based on key properties of these neurons. Here we test our insect-inspired tracking model in open-loop against a set of naturalistic sequences and compare its efficacy and efficiency with other state-of-the-art engineering models. In terms of tracking robustness, our model performs similarly to many of these trackers, yet is at least 3 times more efficient in terms of processing speed." (Authors)] Address: Wiederman, S.D., Adelaide Medical School, The University of Adelaide, Adelaide, SA 5005, Australia.

**19543.** Boda, R. (2015): A kétcsíkos hegyiszitaköto (*Cordulegaster heros* Theischinger, 1979) életciklusának vizsgálata hegyvidéki vízfolyásokban: lárvális fejlődés, élőhelypreferencia és kirepülési viselkedés. PhD thesis, School of Biology and Sports Biology, Ecology Program, University of Pécs: 126 pp. (in Hungarian, with English summary) ["Studies on the life history of the Balkan Goldenring (*Cordulegaster heros* Theischinger, 1979) in mountain streams: larval development, habitat preference and emergence behaviour. - The main aims of our work were to provide well-based basic information on life cycle (including larval development and emergence period), habitat preference, spatiotemporal microdistribution of the Balkan Goldenring, a charismatic dragonfly species with special importance for nature conservation, and to explore the role of the environmental factors determining all of these aspects, as detailed as possible. Our basic results may encourage the development of specific nature conservation action and successful species conservation programme. In order to explore the whole life cycle of the species, we used two different sampling procedures, which are both recommended for Odonates: 1) Quantitative samplings of larval assemblages were performed at eight sampling sites throughout a year with monthly intervals 2) Quantitative collection of exuviae were conducted at two sites in the emergence periods in two consecutive years. In parallel with samplings, morphometrical measurements were also performed on every captured individual, and local (water chemistry, streambed morphology, hydrology, habitat structure), vegetational (litoral vegetation types, naturalness, presence/absence of plant species, vegetation structure) and regional (climatic features and stream network position) factors were also measured

and/or determined. New scientific results have been achieved, as follows: 1. We provided new faunistic data for the species from 69 sampling sites. We detected the occurrence of the species from 19 streams for first time. Thus, we contributed significantly to the clarification of the Balkan Goldenring distribution in the South-Transdanubian region. 2. We determined the numbers of the last larval instars and the time which the larvae spent in each instar. Based on the spatiotemporal microdistribution of the larval stages we described larval development processes and determined the duration of the larval development: in the Mecsek Mountains, larval development of the species lasts at least three, but at last four years depending on the biotic and abiotic characteristics of the habitat and the weather conditions. 3. We explored the emergence dynamics and its schedule: the emergence period of the species in the Mecsek Mountains was prolonged and less synchronized. 4. We proved that beyond the differences among the streams the variation in the type and microhabitat structure of the mesohabitats plays important role in forming spatiotemporal microdistribution of the species. 5. We confirmed that the distribution of the larval stages within a stream section, because of the mesohabitat preference with different strength in different larval stages, is affected in different degree by the riffle-pool structure. This refined and supplemented our knowledge on the multilevel habitat preference of the species. 6. We described in detail the distances travelled by the larvae from the water margin to the emergence site. We found significant differences in these distances between streams and sides of a given stream. We clearly explained these differences with different composition and structure of the littoral vegetation of the habitats. We found that the larvae must leave the ground/water surface and climb vertically before the beginning of the emergence process, and emergence always happens in upright position. 7. We described in detail the emergence substrate selection process and proved that the most important emergence substrate is the tree trunk, regardless of its current cover. The variation in emergence substrate choice increases with increasing of the variation in available substrate types, but the domination of the tree trunks is remained throughout. The distribution of the available substrate resources affect, but not significantly define, the emergence-substrate selection.] Address: not stated

**19544.** Cserecsa, A.; Boz'ki, T.; Krasznai, E.A.; Ficsór, M.; Várbiro, G. (2015): Contribution to the aquatic macroinvertebrate fauna of the Eger-patak (Eger stream) in Northern Hungary. *Folia historico-naturalia Musei Matraensis* 39: 5-16. (in Hungarian, with English summary) ["During the quantitative sampling of the Eger-patak in 2014 altogether 99 taxa were identified which belong to 10 higher taxonomical groups: Bivalvia: 2, Coleoptera: 15, Crustacea: 6, Diptera: 7, Ephemeroptera: 11, Gastropoda: 15, Heteroptera: 2, Hirudinea: 4, Odonata: 9, Trichoptera: 28, among which 45 aquatic macroinvertebrate taxa were new to the fauna of the stream." (Authors) *Calopteryx splendens*, *Platynemis pennipes*, *Ischnura elegans*, *Gomphus flavipes*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Orthetrum brunneum*, *O. cancellatum*, *Orthetrum* sp.] Address: Cserecsa, A., Dept of Tisza River Research, MTA Centre for Ecological Research, Bem tér 18/c, 4026 Debrecen, Hungary. Email: cserecsa.andras@okologia.mta.hu

**19545.** El Souki, M.; Blanco-Belmonte, L.; Lasso, C.A.; Mora-Day, J.; Magalhães, C.; Pisapia, D.; Mora, A.; Lasso-Alcalá, O.F.M. (2015): Composición y distribución de la comunidad de insectos acuáticos en un gradiente espacial del alto río Cuyuní, Guayana venezolana. *Mem. de la Fund. La*

*Salle de Cienc. Nat.* 2015 ("2011"), 71(175–176): 79-103. (in Spanish, with English summary) ["Composition and distribution of the community of aquatic insects in a spatial gradient of the Cuyuní River, Venezuelan Guayana: Richness, composition and distribution of the communities of aquatic insects were estimated along a longitudinal gradient of the Cuyuní River and its tributary (Uey River), basin of the Essequibo. Samplings were carried out for 13 days in January 2008 in 36 sampling stations distributed in five focal areas (AF) to cover the heterogeneity of habitats. Species richness was higher in the high basin of the Uey, least disturbed area. The composition of species in the gradient appears to be related with changes in transparency, depth, temperature, and total solids in suspension. The higher and media basin of river Uey corresponded to black, transparent and less deep waters with the majority of the species belonging to the orders Plecoptera, Trichoptera and Ephemeroptera. In the low river Uey and Cuyuní River stations, the main species corresponded to the orders Odonata, Hemiptera and Coleoptera, associated with higher temperatures, deeper and less transparent waters and where this change in species composition was probably influenced by the disruption caused by the mining activity observed and reflected in the increase of dissolved and suspended material." (Authors)] Address: El Souki, M., Instituto de Zoología y Ecología Tropical. Facultad de Ciencias Universidad Central de Venezuela. Apartado Postal 47072, Caracas 1041-A. Venezuela. Email: mayidae.elsouki@ciens.ucv.ve

**19546.** Gies, M.; Sondermann, M.; Hering, D.; Feld, C.K. (2015): Are species distribution models based on broad-scale environmental variables transferable across adjacent watersheds? A case study with eleven macroinvertebrate species. *Fundam. Appl. Limnol.* 186/1–2: 63-97. (in English) ["Species distribution models (SDMs) allow the prediction of the spatially explicit presence and absence of species based on environmental predictors that reflect the species' habitat requirements. In river macroinvertebrates, the habitat is often defined at very fine scales spanning one to several tens of square meters (e.g., substrate preferences). Such habitat information, however, is usually not available for entire river networks at the large scale, which limits the application of SDMs in conservation ecology. In this study, we present SDMs of eleven lotic macroinvertebrate species based on two broad-scale environmental variable groups: land use (derived from ATKIS high resolution land cover map) and physical habitat structure (derived from regional surveys in Germany). The actual species distributions were scanned through a field survey at 225 sites in two adjacent watersheds in a mountainous region (river Ruhr and Lenne, Federal State of North Rhine-Westphalia, Germany). The aim of this study was, first, to test the usefulness of broad-scale variables in SDMs using measures of model goodness-of-fit and predictive power. Second, local habitat variables (physico-chemistry and meso-scale substrates) were included in SDMs to examine model improvement. Third, we tested the transferability of models of the same species between the two watersheds. Due to the similar environmental characteristics of both watersheds, we hypothesized concordant SDMs for both watersheds. Overall, we found a reliable performance and predictive power of models of *Dinocras cephalotes* in both watersheds. Models of several other species performed fair in the Ruhr (*Leuctra geniculata*, *Silo piceus*, *Siphonurus lacustris*) but not in the Lenne system or vice versa (*Hydropsyche instabilis*). Broad-scale SDMs included predictors on physical habitat quality as well as riparian land use at a similar extent. Only for five models the



SDMs including fine-scale predictors (e.g., physico-chemistry, microhabitat distribution) outperformed those models with broad-scale predictors only (AUC > 0.70). We suggest that species specifically distributed in upstream reaches explicitly respond to fine-scale variables due to stronger dependency of their occurrences on local conditions. Model transferability from one watershed to another was low (transferability index < 0.6), thus revealing SDMs not only to be species-specific but also variable across adjacent watersheds. We suggest that the transferability was limited not only by actual environmental differences between both watersheds, but also by legacy land use effects that may continue to affect the recent distribution of macroinvertebrates." (Authors) Calopteryx virgo] Address: Sondermann, M., Centre of Water & Environmental Research, University of Duisburg-Essen, Universitätsstr. 5, 45141 Essen, Germany. E-mail: martin.sondermann@uni-due.de

**19547.** Golfieri, B.; Surian, N.; Hardersen, S.; Maiolini, B. (2015): Towards a MORE comprehensive assessment of river ecological conditions: application of a new dragonfly-based index in northern Italy. REFORM. D7.5 Conference proceedings 'Novel approaches to assess and rehabilitate modified rivers': 109-115. (in English) ["In this study we analysed the relationships between the Morphological Quality Index (MQI) and three biotic indices that are based on different riverine organism groups (dragonflies, diatoms and benthic macroinvertebrates). The study was carried out in fifteen river reaches in the alluvial plains of northern Italy. Benthic macroinvertebrates and diatoms are good indicators of water quality, but seem not to be sensitive to hydro-morphological degradation, while dragonflies provide information about the ecological integrity and habitat heterogeneity of both the aquatic breeding sites and the surrounding terrestrial areas, due to their amphibious life cycle and their well known ecological requirements. Starting from a dragonfly-based assessment system proposed in Austria, we developed a multimetric index, the Odonate River Index (ORI), which assesses the conditions of the whole river corridor, because also secondary channels and ponds in the floodplain are sampled. MQI and ORI turned out to be highly correlated, while no significant relationships were found between MQI and the indices that are based on diatoms (i.e. ICMi) and benthic macroinvertebrates (i.e. STAR\_ICMi). These results suggest that dragonflies are good indicators of the ecological integrity of river corridors at reach scale, also reflecting morphological quality, and that the ORI provides information on the ecological condition of rivers not covered by the other bioindicators." (Authors)] Address: Golfieri, B., Dept of Geosciences, University of Padova, Via G. Gradenigo 6, Padova, 35131, Italy

**19548.** Ileperuma Arachchi, I.S.; Wickramasinghe, S. (2015): Resource partitioning and niche Overlap in three sympatric species of dragonflies (Anisoptera: Libellulidae) in Anuradhapura District, Sri Lanka. Proceedings of the International Forestry and Environment Symposium 2015 of the Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Sri Lanka: (in English) [Verbatim: "Resource partitioning in ecological communities bears profound connection with the coexistence of closely related species. As a mechanism, it assists species with similar characteristics to thrive in the environments where they can utilise resources in different levels in spatial and temporal scale via niche partitioning. As ecologically important insects, dragonflies are well-studied in many aspects globally but poorly assessed locally. The current study was conducted under the main objective of identifying the

mechanism of resource partitioning in three sympatric most common skimmer species; *Brachythemis contaminata*, *Crocothemis servilia servilia* and *Rhyothemis variegata* variegata in two tank ecosystems in Anuradhapura district, Sri Lanka. The study was conducted from May-August 2014 simultaneously in Nabadagaswewa tank (NW) and Mihintale tank (MT). Data collection was carried out 08:00 to 10:00 hrs in the morning and 13:00 to 15:00 hrs in the evening. Land-water interface at the tank was used for the study in both sites. Scan sampling was used to obtain data on resource utilisation by the three skimmer species. Randomly selected individuals were observed for 30 seconds in each observation point. Vegetation variables (bank vegetation density and height, aquatic vegetation density and height) were measured using two belt transects (25×1 m<sup>2</sup>) in both habitats. The three species were more active in the morning hours (08:00 to 10:00 hrs) and shows different levels of perch and fly heights in the morning and evening hours. *R.v. variegata* was recorded using heights of <100 cm in both habitats. *B. contaminata* and *C.s. servilia* showed high spatial niche overlap (Oij=0.716) in NW and in MT highest spatial niche overlap was observed between *C.s. servilia* and *R.v. variegata* (Oij=0.473). The broadest niche breadth was exhibited by *C.s. servilia* (B=0.46) in NW while *B. contaminata* showed the highest (B=0.23) in MT. *R.v. variegata* showed the lowest niche breadth in both habitats (NW: B = 0.39, MT: B=0.09). Relationship between the species abundance and vegetation heights and densities shows that vegetation height and bank vegetation densities were negatively correlated with the abundance of the three skimmer species. This study depicts ways of resource partitioning among the three sympatric skimmer species minimising interspecific competition and favoring their co-existence. Further, it highlights the extent of spatial niche overlap is influenced by the habitat characteristics especially the vegetation structure and resource availability." (Authors)] Address: Ileperuma Arachchi, Ilesha S., Dept of Biological Sciences, Rajarata University, Sri Lanka. Email: sandunikaileperuma@gmail.com

**19549.** Kolozsvári, I.; Szabo, L.J.; Dévai, G. (2015): Occurrence pattern analysis of dragonflies of dragonflies (Odonata) on the river Tisza between Vilkok and Huszt based on exuviae. Applied ecology and environmental research 13(4): 1183-1196. (in English) ["Dragonfly exuviae were collected between 2010 and 2013 in the following sections of River Tisza: Vilkok (Tiszaujlak), Nove Szelo (Tiszaujhely), Tiszobikeny (Tiszabokeny), Vinohragyiv (Nagysz.l.s) and Huszt (Huszt). Based on the examination of the 1965 exuviae, collected from 13 main channel sections, 6 dragonfly species were identified [*Gomphus vulgatissimus*, *G. flavipes*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Calopteryx splendens*, *Platycnemis pennipes*]. Summing up the collected exuviae, the two most frequent species were *G. vulgatissimus* (57.3%) and *O. forcipatus* (39.08%), however significant assemblages of *O. cecilia* (1.93%), *G. flavipes* (1.17%), *C. splendens* (0.36%) and *P. pennipes* (0.15%) could be found as well. In compliance with the Mantel test the channel and riverbank characteristics show a significant correlation with the composition of dragonfly assemblages (R=0.309, p=0.024). According to the canonical correspondence analysis (15 habitat characteristics) the exuviae data of *G. vulgatissimus* are connected with the extent of plant coverage, the closure of foliage and the characteristics of riverbanks; the exuviae data of *O. forcipatus* are associated with water depth, channel deepening tendency, water temperature and type of plant coverage on the river bank." (Authors)] Address: Kolozsvári, I., Ferenc Rákóczi II. Transcarpathian Hungarian Institute, István Fodor Research Institute

Kossuth square 6, Beregove 90202, Ukraine. E-mail: ko-  
lozsvaros@gmail.com

**19550.** Kloskowski, J.; Trembaczowski, A. (2015): Fish reduce habitat coupling by a waterbird: evidence from combined stable isotope and conventional dietary approaches. *Aquatic Ecology* 49: 21-31. (in English) ["Aquatic consumers can function as habitat couplers by using allochthonous subsidies of prey that migrate across ecosystem boundaries. We examined the relative use of allochthonous (invertebrates—terrestrial or living on littoral vegetation; immigrating amphibians) versus autochthonous (aquatic invertebrates, fish) resources by the red-necked grebe *Podiceps grisegena*, a generalist predator, on fishless ponds versus ponds stocked with common carp *Cyprinus carpio*. We combined conventional methods of diet estimation with stable carbon and nitrogen analyses of egg yolks and putative prey of grebes. Pre-laying grebes were observed to take mainly adult amphibians on fishless ponds and fish on stocked ponds. Alimentary tract analyses gave more weight to invertebrate prey, especially leaf beetles *Donaciinae*, apparently picked off water or emergent plants. Bayesian isotopic mixing models did not reveal predominance of a single food source but indicated that in the presence of fish grebes received relatively less energy for egg formation from amphibians and leaf beetles. Overall, our results show that grebes relied more on allochthonous resources (range of means 50–97 % of the biomass contribution estimated by different assessment methods) in the absence than in the presence of fish (8–23 %). We suggest that habitat coupling by waterbirds may be controlled by fish, which can suppress external prey subsidies, apart from being an attractive food for piscivorous birds." (Authors) The study includes "Odonata".] Address: Kloskowski, J., Dept of Nature Conserv., Institute Biol., Maria Curie-Skłodowska Univ., Akademicka 19, 20-033 Lublin, Poland. Email: januszkl@hektor.umcs.lublin.pl

**19551.** Kruse, A. (2015): Entwicklung von landesweiten Prioritäten zur Umsetzung von Erhaltungsmaßnahmen für Lebensräume und Arten mit besonderer Verantwortlichkeit Brandenburgs. *Naturschutz und Landschaftspflege in Brandenburg* 24(3-4): 34-49. (in German) [In a first step the natural habitat types with special responsibilities and high needs for action in Brandenburg (Germany) have been identified, leading to the identification of key areas for the implementation of conservational measures. Measures are supposed to be taken primarily in these key areas, to improve the conservation status of the species and natural habitats. The existent management plans have been analysed to identify concrete habitats for measures. Following a short introduction about methods, the results will be depicted exemplarily with one species and one habitat type, both in text and on map. In a forecast, further possibilities of use of the results for the planning of measures will be mentioned. This selection has been followed in 2014/2015 by some reports, which determined the core areas of management for reaching the aim of a favourable conservation status of these protected habitat types and species. Existing management plans were analysed to obtain precise and possible areas for measures. After a short introduction the methods of the reports are explained. The results are illustrated for one habitat type or species of each report. The future prospects of using the results for realising management measures are discussed." (Author) *Nehalennia speciosa*, *Aeshna viridis*, *Leucorrhinia albifrons*] Address: Kruse, Anne, Arten- und Biotopschutz, Seeburger Chaussee 2, 14476 Potsdam, Germany. E-mail: Anne.Kruse@lugv.brandenburg.de

**19552.** Le Naour, A. (2015): Etude de l'occupation de l'espace et des déplacements de deux espèces utilisées pour la cohérence nationale des Trames Verte et Bleue: *Leucorrhinia caudalis* et *Emys orbicularis*. Structure d'accueil, A.N.E.P.E. Caudalis, 9 Rue du Nouveau Calvaire, 37100 Tours: 41 pp. (in French, with English summary) ["Biodiversity is suffering a major crisis of extinction. The "Trames verte et bleue" policy aims to curb this erosion. In this context, displacement and site occupancy in two species associated with both aquatic and terrestrial environment: the lilypad whiteface (*Leucorrhinia caudalis*) and European pond turtle (*Emys orbicularis*). Both are considered as "national coherence" species and were studied in the south of Indre-et-Loire, France. The lilypad whitefaces were equipped and monitored using passive transponders (Recco System) during their maturation phase, and European pond turtles were equipped with i-GotU GT-120 GPS data loggers at the beginning of spring. The results show that lilypad whitefaces disperse more and more from their emergence site over time, and they are not found on water. During this period, they don't select any terrestrial habitat in particular. For the European pond turtle, home range includes several types of habitats, and areas with tussocks of sedge and willow flooded and marshy woodlands are selected by individuals. Crops areas are used as egg-laying habitat, which may cause conservation issues. Very few large dispersal events occurred in both species in this study, suggesting that such movements remain rare. Results suggest that *L. caudalis* progressively colonize the canopy, and then are undetectable with the Recco technology. For European pond turtle, marshy woodlands have been clearly identified as corridors. Thanks to innovative monitoring technologies, the study highlights the importance of habitat diversity for the life cycle and is therefore a challenge for the conservation of both species." (Author)] Address: Le Naour, A., Université d'Angers Faculté des Sciences, 2 boulevard Lavoisier, 49045 Angers, France

**19553.** Lehmann, A.W.; Nüß, J.H.; Nüß, R.I. (2015): Libellen. Bestimmungsschlüssel für Nord- und Mitteleuropa. *Deutscher Jugendbund für Naturbeobachtung*. 6. Auflage 2015: 202 pp. (in German) ["This identification key describes all dragonfly species in Northern and Central Europe. To reflect the spread of species due to climate warming, the key has been extended to northern Spain, northern Italy and the Istrian peninsula. It now comprises 115 species and subspecies, which are presented in short sections with their most important characteristics, distribution maps, flight times, habitat requirements, occurrence and endangerment status. For identification, preference is given to comparing morphological characteristics, including genitalia, which are constant over the entire life span. Thus, the key can be used in the field, in the collection and for the assessment of photographs. The number of illustrations has again been significantly increased for the 6th edition, most of the over 700 illustrations are drawn from live photographs. Also new are many illustrations showing the dragonflies in typical postures and life situations, as well as a scaled overview of the genera." (Authors)] Address: Deutscher Jugendbund für Naturbeobachtung, Geiststr. 2, 37073 Göttingen

**19554.** Li, K.-Q.; Wang, Y.-Z.; Dong, D.-Z.; Zhang, L.-K. (2015): Catalog of insect type specimens preserved at the Kunming Institute of Zoology, Chinese Academy of Science with corrections of some specimens. *Dongwuxue Yanjiu / Zoological Research* 36(5): 263-284. ["This article presents a list of insect types preserved in Kunming Natural History Museum of Zoology (KNHMZ). As of March, 2015, 3412

type specimens belonging to 266 species/subspecies of 37 families in 9 orders (Odonata, Isoptera, Mantodea, Orthoptera, Hemiptera, Coleoptera, Diptera, Hymenoptera and Lepidoptera) are included. Information corrections of some specimens are provided in this article." (Authors) (1) *Bayadera nephelopennis* Davies et Yang, 1996 (2) *Bayadera serrata* Davies et Yang, 1996 (3) *Bayadera strigata* Davies et Yang, 1996 (4) *Schmidtiphaea yunnanensis* Davies et Yang, 1996 (5) *Anisogomphus nitidus* Yang et Davies, 1993 (6) *Anisogomphus resortus* Yang et Davies, 1996 (7) *Davidius davidi yunnanensis* Yang et Davies, 1996 (8) *Lamelligomphus laetus* Yang et Davies, 1993 (9) *Merogomphus chaoi* Yang et Davies, 1993 (10) *Stylogomphus lawrenceae* Yang et Davies, 1996.] Address: Zhang, L.-K. , Kunming Natural History Museum of Zoology, Kunming Institute of Zoology, Chinese Academy of Sciences. Kunming Yunnan 650223, China. E-mail: lkzhang@mail.kiz.ac.cn

**19555.** Lin, Y.-q. (2015): Design of new vortex-based flow chips to capture particles. Department of Mechanical and Electrical and Mechanical Engineering Master Program Thesis Tamkang University; 2015 (2015/01/01), P1 - 78: (in English) ["This work presents the design of a new flow chip to capture particles. A dragonfly wing blocks along the centerline of a microchannel to generate multiple vortex in the corrugated grooves streamwisely. These multiple vortex in the dragonfly wing are used to capture more particles. Different from the conventional vortex-based flow chips with rectangular grooves along the both sides channel wall, the dragonfly wing grooves here in is designed to capture central -part particles novelly. The chord length of the dragonfly wing is 806  $\mu\text{m}$  and thickness ratio is 7.5 %. Through the CFD simulation result (by COMSOL or FEMLAB), the inlet velocity of 0.52m/s can induce obvious vortex pattern in the corrugated dragonfly wing inserted in a microchannel of 200 $\mu\text{m}$  wide. The inclined angle of 50° at the channel entrance can provide enough initial vorticity strength beneficial to the particle capture rate of 4% per dragonfly wing structure. This work also tried two dragonfly structure cascadedly connected together. When the thickness ratio of the dragonfly wing double, the cascaded two-wing case can increase the capture ratio up to 6%. These simulation message reveals the usefulness of increasing the particle capture ratio of flow array design. It's also good for the integration and application in tumor cell capture, sorting and separation in the future.] Address: not stated

**19556.** Maples, M.J. (2015): An investigation of the effect of malathion on adaptive plasticity of *Pseudacris sierra*. MSc thesis, Faculty of California Polytechnic State University, San Luis Obispo: XI + 56 pp. (in English) ["This thesis is composed of two chapters. Chapter one reviews what is known about adaptive plasticity in response to predators, describes the physiological systems involved in such plasticity, and outlines the evolutionary consequences of adaptive plasticity. Chapter two describes a scientific experiment that investigates how malathion may impact adaptive plasticity in the Sierran Treefrog, *Pseudacris sierra*. Anuran tadpoles suffer high mortality rates due to predation. In response to strong selective forces relating to these high predation rates, tadpoles evolved the ability to adaptively respond to predators through morphological and behavioral plasticity. The morphological and behavioral responses are varied and depend on the hunting strategy of the predator, and the adaptive responses may be influenced by other biotic and abiotic factors. Tadpoles detect alarm cues released from tadpoles being eaten and kairomones that are released by predators. Tadpoles respond to these signals by

changing tail and body shape along with a reduction of activity level, which enables tadpoles to escape predators more effectively. These changes in morphology can occur within a week, and behavioral changes can occur within 15 minutes. The adaptive responses are critical for increasing survival rates of tadpoles to metamorphosis and may have important evolutionary consequences for anurans. Amphibians are in decline worldwide, and pollutants are considered to be a major contributor to these declines. Every year 5.2 billion pounds of active ingredients of pesticides are applied worldwide, and these application rates have led to ubiquitous low-level contamination of aquatic ecosystems. How low-level contamination of pesticides directly and indirectly affect how tadpoles respond to their predators is poorly understood. One potential indirect effect of pesticides is the inhibition of adaptive plasticity. Pesticides have been shown to modulate corticosterone levels in tadpoles. Corticosterone is the most likely mediator of the physiological response that results in adaptive morphological change. If the physiological system of tadpoles relies on corticosterone as the mediator of adaptive response, and pesticides can modulate corticosterone levels, then pesticides may inhibit or negatively impact adaptive responses to important biotic factors, like predators. Pesticides have been shown to weaken immune systems, affect developmental and physiological pathways that lead to malformations, and cause direct mortality in anurans. Little research has investigated the effect of pesticides on adaptive morphological and behavioral plasticity in response to predators. Adaptive phenotypic responses to predators increase survival rates to metamorphosis and are important in stabilizing amphibian populations through time. If pesticides influence the ecological interactions of tadpoles and their predators, this could play a part in amphibian declines. In the experiment explained in Chapter two, I tested the hypothesis that malathion at a concentration of 0.1 mg/L inhibits anti-predator morphological and behavioral responses of *Pseudacris sierra* to the predatory dragonfly larvae *Anax junius*. The results of this experiment show that malathion alone caused the tail muscle depth to increase to the same magnitude as tadpoles that only experienced a predator's presence. Malathion also caused a significant increase in tail depth, demonstrating that malathion directly causes morphological change. The experiment did not support the hypothesis that malathion inhibits adaptive plasticity, and malathion had no impact on behavioral plasticity. The results from this experiment give evidence that an ecologically relevant concentration of malathion can influence morphological components that are critical in escaping depredation events, which could affect predator-prey interactions." (Author)] Address: not stated

**19557.** Mischiati, M.; Lin, H.-T.; Herold, P.; Imler, E.; Olberg, R.; Leonardo, A. (2015): Internal models direct dragonfly interception steering. *Nature* 517: 333-338. (in English) ["Sensorimotor control in vertebrates relies on internal models. When extending an arm to reach for an object, the brain uses predictive models of both limb dynamics and target properties. Whether invertebrates use such models remains unclear. Here we examine to what extent prey interception by dragonflies (*Plathemis lydia*), a behaviour analogous to targeted reaching, requires internal models. By simultaneously tracking the position and orientation of a dragonfly's head and body during flight, we provide evidence that interception steering is driven by forward and inverse models of dragonfly body dynamics and by models of prey motion. Predictive rotations of the dragonfly's head continuously track the prey's angular position. The head-body angles established by prey tracking appear to guide systematic rotations of the

dragonfly's body to align it with the prey's flight path. Model-driven control thus underlies the bulk of interception steering manoeuvres, while vision is used for reactions to unexpected prey movements. These findings illuminate the computational sophistication with which insects construct behaviour." (Authors)] Address: Mischiati, M., Janelia Research Campus, Howard Hughes Medical Institute; 19700 Helix Drive, Ashburn, Virginia 20147, USA.

**19558.** Murugan, K.; Sanoopa, C.P.; Madhiyazhagan, P.; Dinesh, D.; Subramaniam, J.; Panneerselvam, C.; Roni, M.; Suresh, U.; Nicoletti, M.; Alarfaj, A.A.; Munusamy, M.A.; Higuchi, A.; Kumar, S.; Perumalsamy, H.; Ahn, Y.-A.; Benelli, G. (2015): Rapid biosynthesis of silver nanoparticles using *Crotalaria verrucosa* leaves against the dengue vector *Aedes aegypti*: what happens around? An analysis of dragonfly predatory behaviour after exposure at ultra-low doses. *Natural Product Research: Formerly Natural Product Letters* 30(7): 826-833. (in English) ["*Aedes aegypti* is a primary vector of dengue, a mosquito-borne viral disease infecting 50–100 million people every year. Here, we biosynthesised mosquitocidal silver nanoparticles (AgNP) using the aqueous leaf extract of *Crotalaria verrucosa*. The green synthesis of AgNP was studied by UV–vis spectroscopy, SEM, EDX and FTIR. *C. verrucosa*-synthesised AgNPs were toxic against *A. aegypti* larvae and pupae. LC50 of AgNP ranged from 3.496 ppm (I instar larvae) to 17.700 ppm (pupae). Furthermore, we evaluated the predatory efficiency of dragonfly nymphs, *Brachydiplax sibirina*, against II and III instar larvae of *A. aegypti* in an aquatic environment contaminated with ultra-low doses of AgNP. Under standard laboratory conditions, predation after 24 h was 87.5% (II) and 54.7% (III). In an AgNP-contaminated environment, predation was 91 and 75.5%, respectively. Overall, *C. verrucosa*-synthesised AgNP could be employed at ultra-low doses to reduce larval population of dengue vectors enhancing predation rates of dragonfly nymphs." (Authors)] Address: Murugan, K., Division of Entomol., Dept of Zoology, School of Life Sciences, Bharathiar University, Coimbatore, India

**19559.** Muzón, J.; Lozano, F.; del Palacio, A.; Ramos, L.S.; Lutz, A. (2015): Odonata from the Lower Delta of the Paraná River, Argentina. *Agrion* 20(2): 68-72. (in English) ["During the past 20 years several field trips to Lower Delta of the Paraná River (DP) has increased the species inventory for this area to 43; the Libellulidae family with most new records. The biogeographical relationship of DP with Humid Chaco and Paranaense Forest is validated with these additions. In fact, except for six species, *Andinagrion saliceti*, *Cyanallagma bonariense*, *Staurophebia bosqui*, *Phyllocycla vesta*, *Erythrodiplax corallina* and *Erythrodiplax cf pallida*, the remaining 37 (90%) species have also been recorded from Paranaense Forest. Out of 25 genera recorded from DP (36%) *Telebasis*, *Peristicta*, *Staurophebia*, *Triacanthagyna*, *Aphylla*, *Progomphus*, *Diastatops*, *Nepheloptia*, and *Oligoclada* have not been recorded from the Pampas. There are several species that have not been recorded since Ris and Navás' papers, some probably due to chance (e.g., *Phyllocycla argentina*, *Erythrodiplax corallina*, and *Orthemis cultriformis*) or misidentifications (e.g. *Tauriphila argo*). *Andinagrion saliceti*, is a rare species known from very few records mainly from the Pampas eco-region; it was originally described by Ris from San Isidro, an area closely related to DP, but it has not been collected or seen in DP since Ris' description." (Authors)] Address: Muzón, J., Laboratorio de Biodiversidad y Genética Ambiental, Depto. Ciencias Ambientales, UNDAV, Mario Bravo 1460 esq. Isleta, Piñeyro, Buenos Aires, Argentina. E-mail: jmuzon@gmail.com

**19560.** Nitzany, E. (2015): Local motion signals - Prevalence, responses and interactions. Ph.D. thesis of Computational Biology, Cornell University: XI + 125 pp. (in English) ["Extraction of local motion signals is crucial for our survival. Lack of information from local motion signals will significantly reduce our ability to discriminate objects from background, avoid obstacles, and navigate. Despite the apparent effortlessness with which we perceive visual motion, there are indications that the underlying neural computations are complex. Three kinds of local motion signals have been distinguished, based on the kinds of spatiotemporal correlations that generate them: Fourier (F), based on 2-point correlations [1]; non-Fourier (NF), based on 4-point correlations [2]; and glider (G), based on 3-point correlations [3]. G signals have two subtypes, expansion and contraction, associated with objects that are looming and receding, respectively. Detection of isolated G and NF signals cannot be mediated by a purely multiplicative cross-correlator or a purely quadratic motion energy model. G signals have recently attracted substantial attention, following the demonstration that a wide range of species (human [3], macaque [4, 5], zebrafish [6], dragonfly [5], and fruitfly [7]) respond to them in similar ways suggesting that there are advantages to using these signals in visual tasks. This work expands the above lines of research in several respects. First, our computational work shows that these motion signals appear in natural scenes and characterizes the basic statistical relationships between them [8]. Second, we report neurophysiological recordings in two distinct visual-specialist species (macaques and dragonflies) that demonstrate that at the neuronal level, cells response in a similar manner to motion signals in many respects, although there are subtle differences in responses between the species. This convergence at the algorithmic and neural-implementation levels indicate the fundamental biological importance of using the many kinds of motion signals to guide behaviour. Finally, we carried out a psychophysical experiment to probe human ability to use multiple kinds of local motion signals simultaneously to solve simple directional task. We found that humans can combine different kinds of motion signals to solve this task, and, interestingly, that sensitivity to different kinds of motion signals is context-dependent." (Author)] Address: Nitzany, E., Department of Computational Biology and Statistics, Cornell University, Ithaca, NY, USA

**19561.** Noskovic, J.; Rakovská, A.; Porhajasová, J.; Babosová, M.; Ceryová, T. (2015): Assessment of impact of agroecosystems on macrozoobenthos communities of important protected areas in southwestern part of the Slovak Republic. *Research Journal of Agricultural Science* 47(1): 111-119. (in English) ["Macrozoobenthos as an important component of all aquatic habitats is very diverse community of aquatic invertebrates, which are either throughout its life, or during the developmental stages bound to the water. Representatives of this community are extremely sensitive to environmental conditions in which they live, but especially to the qualitative properties of water. They are suitable bio-indicators of any characteristics changes of their habitat. Therefore, permanent occurrence, but, for the majority of the representatives of the benthic fauna, relatively long development cycle conducted in water, can significantly influence not only natural factors, but also human activities. In this work we present results of the occurrence of macrozoobenthos communities in two nature reserves in southwestern part of the Slovak Republic: Žitavský luh and Alluvium Žitavy, while also evaluate the potential impacts of agricultural activities on the species and numerous representations in the monitored habitats. In 2006 and 2007, we are



on each monitored aquatic habitats, in six sampling sites at regular quarterly intervals collected total of 48 water samples, together with biological material. In Nature Reserve Žitavský luh we recorded in 24 taken samples 25, 966 individuals, determinate to be 135 species of benthic fauna. In Nature Reserve Alluvium Žitavy by collecting of 24 samples of water we obtained only 12, 708 individuals, 126 species of this ecological group of individuals. Determined species were included in the 15 systematic groups: Turbellaria, Gastropoda, Bivalvia, Oligochaeta, Hirudinea, Isopoda, Amphipoda, Ephemeroptera, Odonata, Heteroptera, Megaloptera, Coleoptera, Trichoptera, Diptera (without Chironomidae) and Chironomidae. Of these, the numerically and percentage the most involved on the structure of macrozoobenthos community Gastropoda, Isopoda, Ephemeroptera and individuals of families Chironomidae. The contrary, the lowest share in numerous, species and percentage representation had Megaloptera, Turbellaria and Odonata. From the total number of 177 determined species of benthic fauna in the territory of Slovakia is 23 species protected by law under the legislation of the State Nature and Landscape Conservation, included primarily to the species categories: VU - vulnerable and LR: nt - near threatened. In the monitored period were structure and biodiversity of macrozoobenthos communities of Nature Reserve Žitavský luh compared with structure and biodiversity of Nature Reserve Alluvium Žitavy richer and more balanced. Significant negative impact of agriculture on the macrozoobenthos community in that period in monitored aquatic habitats was not recorded." (Authors)] Address: Noskovic, J., Dept Environmental Science & Zool., Fac. Agrobiolgy & Food Resources, Slovak Univ. Agriculture in Nitra, Tr. A. Hlinku 2, 949 76 Nitra, Slovak Republic. Email: Jaroslav.Noskovic@uniag.sk

**19562.** Prunier, F.; Brotóns, M.; Cabana, M.; Campos, F.; Casanueva, P.; Chelmick, D.; Cordero Rivera, A.; Díaz Martínez, C.; Evangelio, J.M.; Gainzarain, J.A.; García-Moreno, J.; Lockwood, M.; Mañani, L.J.; Mezquita-Aramburu, I.; Muddeman, J.; Ocharan, F.J.; Pérez, F.O.; Prieto-Lillo, E.; Requena, C.; Ripoll, J.; Luque, F.R.; Rodríguez, P.; Romeo, A.; Salcedo, J.; Vilariño, V.S.; Sánchez Balibrea, J.; Gómez, R.T.; Torralba-Burrial, A.; Tovar, C.; Winter, P.; Zaldívar, R. (2015): Actualización del inventario provincial de Odonatos de España peninsular e Islas Baleares. Boletín Rola nº 6, segundo semestre 2015: 59-84. (in Spanish, with English summary) ["Checklists of dragonflies for each Spanish province (mainland and Balearics Islands) are updated through the revision of literature, the query of online biodiversity databases and inquiries to local specialists. The maps are based on the distribution information in an estimated 140.000 records gathered for 79 species." (Authors)] Address: E-mail: aeaebosqueanimado.info@gmail.com

**19563.** Rahaman, M.M.; Islam, K.S.; Jahan, M.; Mamun, M.A.A. (2015): Relative abundance of stem borer species and natural enemies in rice ecosystem at Madhupur, Tangail, Bangladesh. J. Bangladesh Agril. Univ. 12(2): 267-272. (in English) ["The relative abundance of different stem borer species and their natural enemies with interaction effects were studied at three growth stages of irrigated Boro rice at Madhupur under the district of Tangail, Bangladesh during January to April, 2013. Five stem borer species viz; Yellow stem borer (*Scirpophaga incertulas*), Pink stem borer (*Sesamia inferens*), Dark headed stem borer (*Chilo polyhrysus*), Stripped stem borer (*C. suppressalis*), White stem borer (*Scirpophaga innotata*), and nine different natural enemies were collected from the rice fields and recorded. The population of stem borers and natural enemies was highest

in tillering stage and lowest in seedling stage. The relative abundance of stem borer species under investigation showed ranking order; yellow stem borer >dark headed stem borer>pink borer>white borer>stripped stem borer and natural enemies as ladybird beetle >long jawed spider>wolf spider>damsselfly>carabid beetle>green mirid bug>lynx spider>dragon fly>ear wig. Populations of all five stem borers were positively correlated with ladybird beetle, wolf spider, long jawed spider, lynx spider, damsel fly, dragon fly, green mirid bug and negatively correlated with carabid beetle and earwig." (Authors)] Address: Rahaman, M. M., Department of Entomology, Bangladesh Agricultural Univ., Mymensingh-2202, Bangladesh. E-mail address: m\_rahaman06@yahoo.com

**19564.** Rezende, R.; Marques Leite, G.F.; De-Lima, A.K.S.; Filho, L.A.; Costa Chaves, C.V.; Holler Prette, A.C.; Spriger Freitas, J.; Gonçalves Júnior, J.F. (2015): Effects of density and predation risk on leaf litter processing by *Phylloicus* sp.. Austral Ecology 40(6): 693-700. (in English) ["The allochthonous detritus that accumulates in the substrate of streams is used by aquatic invertebrate shredders for shelter and food. Shredders are considered rare in tropical systems, and little information is available about the role of density effects and predation risk (associated with the perception of predators by prey) in relationship to the resources used by these organisms. The aim of this study was to examine experimentally the effects of increased predation risk and of the density of *Phylloicus* sp. [Trichoptera] (i.e. of two types of biological relationships) on the processing of the leaf litter of *Nectandra megapotamica* (Spreng.) Mez. *Phylloicus* sp. can use leaf litter for case building and as a food resource. The density effect was measured using four treatments that differed only in the number of individuals (one, two, three or four). A second experiment with five treatments was performed to test the risk of non-lethal predation on detritus consumption (shelter and food) by *Phylloicus* sp. (T1: Caddisfly; T2: Mayfly; T3: *Asytanax* sp./fish; T4: Damselflies; T5: Stonefly). A single *Phylloicus* and one other organism (a potential predator blocked with 0.5?mm fine mesh) were placed in each tank (0.002?m3 volume). We observed a negative effect of density on per capita litter consumption (experiment 1). The low density of *Phylloicus* may be a natural factor that decreases intraspecific competition. In the presence of fish, *Phylloicus* showed the lowest amount of litter processing observed in the experiment, indicating top-down control (experiment 2). In treatments that involved the presence of invertebrates (non-predatory and predatory), *Phylloicus* showed the highest amount and an intermediate amount of leaf litter processing, respectively (experiment 2). This observation also suggests that the predation effect is more probable for specific predator-prey pairs. Population density and predation risk in *Phylloicus* may be important factors controlling leaf litter processing." (Authors)] Address: De-Lima, A.K.S., Depto de Ecologia, Instituto de Biologia, Universidade de Brasília, 70910-900 Brasília, Brazil. Email: renanrezende30@gmail.com

**19565.** Rizal, S.; Hadi, M. (2015): Inventarisasi Jenis Cacing (Odonata) Pada Areal Persawahan Di Desa Pundenarum Kecamatan Karangawen Kabupaten Demak. Bioma 17(1): 16-20. (in Indonesian, with English summary) ["Paddy fields is one of the important ecosystem that support human life because here produced rice that is the main food to the human. Besides, paddy field ecosystem also have many diversity of insect, including dragonfly (Odonata). Odonata is one of the insect that used to be a predators to the pests in the paddy fields, such as *Chilo* sp and

Nilaparvata lugen. The study on dragonfly was conducted in Pundenarum village, Karangawen, Demak. The objectives of this study is to identify the odonata specieses that lived in paddy field. Inventory of Odonata species done with field by field method and direct catch using insect net. The result of this study is that 5 species of Odonata were identified in paddy field, i.e: Orthetrum sabina, Crocothemis servillia, Pantala flavescens, Agriocnemis femina and A. pygmea. The Odonata species that identified is part of 2 family, i.e: Libellulidae and Coenagrionidae. It is also found that all species is part of the suborder Anisoptera and Zygoptera." (Author)] Address: Rizal, S., Jurusan Biologi Universitas Diponegoro, Jl. Prof. Soedarto, SH, Kampus Tembalang, Semarang 50275, Indonesia. E-mail: rizalz1092@gmail.com

**19566.** Robin, J. (2015): Les libellules du Tarn-et-Garonne. Synthèse fin 2014. Bulletin de la Société des sciences naturelles de Tarn-et-Garonne N° Spécial 2: 146 pp. (in French) ["For a long time, the Tarn-et-Garonne was a department [France] that was little surveyed by odonatologists. Since 2005, several local naturalists have launched various inventory campaigns. They culminated in 2007 with the preliminary atlas of the odonates of Tarn-et-Garonne. This work had the advantage of presenting a departmental distribution of these insects for the first time and updating the list of known species in the department. This new summary is based on a larger number of observations and bibliographical sources, presents the location of the species more precisely and provides new information on the habitats used by these insects in our department. It allows us to conclude that 51 species are currently reproducing on a permanent basis, 2 are occasional migrants and at least 5 species need to be confirmed (doubtful indigenous species and/or old citations). Two taxa could still be discovered in our department. However, many surveys still need to be encouraged to ensure homogeneous coverage of the whole of our territory and to establish a more precise conservation status for each species." (Authors/DeepL)] Address: Robin, J., 3 Bis rue de la ville, 31620 Fronton. France. E-mail: robin-jerome@voila.fr

**19567.** Sokolov, L.V.; Shapowal, A.P. (2015): [Ornithological studies in the Curonian Spit]. In: Alekseev F.E., Sokolov L.V., Shapowal A.P., Kalina A.A., Poltavskaya L.G., Shiplovskaya Ju.A., Rilkov O.V., Bulgakov D.B., Sokolov A.A., Napreenko M.G. Nature of the Kaliningrad District. Key natural complexes. Istok, Kaliningrad: 110-125. (in Russian) ["Even more massive movements on the Curonian Spit are observed in dragonflies. The results of their capture by stationary traps are presented in the table. More than 225 thousand 52 species of dragonflies were caught during 2007-2013. Small dragonfly species that are poor flyers (Families Calopterygidae, Lestidae, Coenagrionidae) are caught relatively rarely (singly or up to a dozen individuals). Relatively large dragonflies (Aeshnidae (Aeshna grandis, A.junceae, A.mixta, A.viridis) and medium-sized ones (Libellulidae family). Libellulidae (genera Leucorrhinia, Sympetrum). One of the most common species on the Curonian Spit (as well as on the vast territory of Europe and Northern Asia) is the four-spotted dragonfly (Libellula quadrimaculata). It is caught every year in the thousands, and sometimes even tens of thousands. An unprecedented migration of this species on the spit took place in 2013 (over 75 thousand were caught during the season) and especially on 29 May (over 32 thousand dragonflies were caught)."] (Autors/DeepL)] Address: not stated

**19568.** Sonawane, A.; Khandagale, A. (2015): Taxonomy

and diversity of damselflies (Zygoptera) from Daund Tehsil Pune District (Maharashtra: India). Journal of Basic Sciences, 2015, Special Issue on BiolPPF: 1-9. (in English) ["The present study describes occurrence of damselfly species from Daund Taluka of Pune district from two lentic (stagnant water) and two lotic (flowing water) ecosystems. Survey was carried out from year 2012 to 2014. Collection was done in summer, winter and monsoon seasons. Insects were collected using insect collection net and given acetone treatment for prior preservation. Few specimens were sent to Zoological Survey of India (ZSI) at Kolkata & Pune (A-kurdi-44) for identification. All four sites displayed a good diversity and revealed some bio-geographically, important species. In overall studies 10 species of Damselflies belonging to 5 genera representing Family: Coenagrionidae were found in the study area. This family which showed higher occurrence of Pseudagrion decorum (Rambur, 1842), Ischnura senegalensis (Rambur, 1842) followed by Ceriagrion coromandelianum which again showed their finding in the large amount. In Daund Taluka Pseudagrion hypermelas Sely, 1876 which showed new occurrence newly occurred species with rare amount. Overall work based on the diversity based study." (Authors)] Address: Sonawane, A., Shri J.J.T. University, Rajasthan and Dept of Zoology, Subhash Baburao Kul Science College, Kedgaon-412003 (M.S.) India. E-mail: amolsonawane7139@gmail.com]

**19569.** Sonawane, A.; Khandagale, A. (2015): Taxonomy and diversity of Ceriagrion coromandelianum (Fabricius, 1798) (Zygoptera) of Pune district (Maharashtra: India). Journal of Basic Sciences, 2015, Special Issue on BiolPPF: 102-106. (in English) [Abdomen of males (n=12): length 28.5-30 mm and 29.5- 32 mm in females (n=8).] Address: Sonawane, A., Shri J.J.T. University, Rajasthan and Dept of Zoology, Subhash Baburao Kul Science College, Kedgaon-412003 (M.S.) India. E-mail: amolsonawane7139@gmail.com

**19570.** Swan, T.S. (2015): Distribution, occurrence, and identification of mosquito species in the Tongatapu Island Group, Kingdom of Tonga. MSc. thesis, Water Resource Management, University of Canterbury: 129 pp. (in English) ["Mosquitoes pose a serious threat to the economy, health status, and biosecurity of countries around the world. Mosquitoes kill an average of 700,000 people per year. The global expansion of air, sea, and land transport networks has greatly enhanced the spread of mosquitoes internationally. In the Pacific, the number of mosquito-borne diseases occurring has been on the rise in recent years, possibly as a result of human-mediated dispersal of larvae and adult mosquitoes. The Kingdom of Tonga has had numerous outbreaks of dengue fever and chikungunya virus in recent years. Previous research has catalogued species occurrences and distributions throughout Tonga. However, it is unknown whether new species have arrived in Tonga, and if distribution of previously found species has changed since the last comprehensive survey in 2006. Present research aims to update the literature by conducting a mosquito survey at 84 sites across the four islands of Tongatapu, Pangaimotu, 'Oneata, and 'Eua to record the distribution and occurrence of mosquito larvae. Nine mosquito species were collected: Aedes aegypti Linnaeus, A. albopictus Skuse, A. tongae Edwards, A. horrescens Edwards, A. vexans nocturnus Theobald, Culex annulirostris Skuse, C. albiverticillatus Edwards, C. quinquefasciatus Say and C. sitiens Wiedemann. The collection of A. albopictus is the second time that this species has been recorded in Tonga. Moreover, the spatial extent of this species throughout Tonga was

far greater than previously recorded. A major outcome of this survey has been the creation of an identification key for the mosquito larvae species of Tonga. This key should increase the accuracy of positive mosquito larvae identifications in Tonga. Mosquitoes were more frequently collected in artificial (e.g., used car tyres, fuel drums, containers) than natural (e.g., pools, ponds, tree holes) habitats. Car tyres, water containers, fuel drums, fridges, washing machines, and ponds were the most common habitats in which mosquito larvae were found. *Aedes aegypti*, *A. albopictus*, and *C. quinquefasciatus* were the three most common mosquito species collected, whereas *A. tongae*, *A. horrescens*, *A. vexans nocturnus*, *C. annulirostris*, *C. sitiens*, and *C. albinervis* were less frequently found. Multiple logistic regression analyses indicated that habitat volume had a significant positive effect on the presence of *A. albopictus* and *A. tongae*, whereas conductivity had a significant positive effect on the presence of *C. annulirostris*. Additionally, the volume by temperature interaction was a significant predictor of species presence for *A. aegypti*, *A. albopictus*, and *C. annulirostris* (as habitat volume increases, the effect of temperature went from neutral to negative). This suggests that larger, cooler habitats favour colonisation by these species. The number of artificial habitats (particularly used car tyres) present may have significantly increased since previous studies. Management should therefore focus on implementing community-run mosquito projects aimed at reducing the number of artificial habitats capable of being colonised by mosquito larvae. Covering, tipping out water, and infilling these habitats with soil to prevent mosquito oviposition is a pragmatic and straightforward mosquito control solution. This should immensely reduce the abundance of mosquitoes and help prevent disease outbreak in Tonga." (Author) The study includes references to Odonata.] Address: Swan, T.S., School Biol. Sciences & Waterways Centre for Freshwater Management, Univ. of Canterbury, Christchurch, New Zealand

**19571.** Vieira, V.; Cordero-Rivera, A. (2015): *As Libélulas dos Açores e Madeira*. Edição: Amigos dos Açores - Associação Ecológica: 122 pp. (in Spanish) [This book "Is a contribution to the knowledge of biodiversity of the Azores and Madeira, aimed at the general public, and focusing on the Odonata of the islands. The book provides comprehensive information, in an accessible but scientifically rigorous language, trying to be useful for a large audience, including amateur and professional odonatologists, but also any person with an interest on nature. The information provided includes the relationship between dragonflies and the freshwater ecosystems of the Azores and Madeira (lakes, ponds and rivers), and highlights the relevance of odonates for human society, as agents of biological control of insect pests, and its role in conservation biology and evolution. The damselfly *Ischnura hastata* is presented as a gemstone of the Azorean islands, because it is the only case known of parthenogenesis in the order Odonata. The book is richly illustrated with pictures and describes the different stages of development of dragonflies, and includes data about their habitat, their occurrence in the islands and geographic distribution. The authors transmit their enthusiasm for dragonflies, looking to attract young readers to the fascinating world of biodiversity and natural history of the two Atlantic archipelagos." (Publisher) *Ischnura hastata*, *I. pumilio*, *Anax ephippiger*, *A. imperator*, *A. parthenope*, *Sympetrum fonscolombii*, *Sympetrum nigrifemur*] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Univ. de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: [acordero@uvigo.es](mailto:acordero@uvigo.es)

**19572.** Wagner, H.C.; Komposch, C.; Volkmer, J.; Degasper, G.; Frei, B.; Korn, R.; Wiesmair, B.; Kerschbaumsteiner, H.; Kunz, G.; Schwab, J.; Aurenhammer, S.; Platz, A.; Pfeifer, J.; Arthofer, P.; Urach, K.; Lanzer, M.; Morchner, D.; Pass, T.; Holzer, E. (2015): Bericht über das erste ÖEG-Insektencamp: Faunistische Erfassungen im Lafnitztal (Oststeiermark, Südburgenland). *Entomologica Austriaca* 22: 185-233. (in German, with English summary) ["Report on the first insect camp of the ÖEG in the Lafnitz valley (Eastern Styria, Southern Burgenland): In order to counteract the loss of taxonomists and people with species-specific knowledge of the native invertebrate fauna, an "insect camp" was held by the Entomological Society of Austria from 21.-27.07.2014. All in all, 40 people with sincere interest(s) in nature and zoology took part. Nine recognized experts specializing on different groups of arthropods gave talks and guided the participants through 16 research areas. Taxonomic determination of the collected material was mostly done by the participants and experts during the event. A total of 472 species was identified and is presented here: 5 Ephemeroptera, 14 Odonata (including *Ophiogomphus cecilia*), 34 Auchenorrhyncha, 39 Heteroptera, 1 Mantodea, 22 Orthoptera, 148 Coleoptera, 100 Lepidoptera, 1 Diptera, 34 Hymenoptera, 1 Isopoda, 45 Araneae, 10 Opiliones, 1 Bivalvia and 17 Gastropoda species." (Authors)] Address: Wagner, C., Ökoteam – Institut für Tierökologie und Naturraumplanung, Bergmannsgasse 22, 8010 Graz, Austria. E-Mail: [heriwagner@yahoo.de](mailto:heriwagner@yahoo.de)

**19573.** Zeyghami, S.; Dong, H. (2015): Study of turning takeoff maneuver in free-flying dragonflies: effect of dynamic coupling. *Fluid Dynamics (physics.flu-dyn)* Cite as: arXiv:1502.06858 [physics.flu-dyn]: (in English) ["Turning takeoff flights of several dragonflies were recorded during which a dragonfly takes off while changing the flight direction at the same time. Center of mass was elevated about 1-2 body lengths. Five of these maneuvers were selected for 3D body surface reconstruction and the body orientation measurement. In oppose to conventional banked turn model, which neglects interactions between the rotational motions, in this study we investigated the strength of the dynamic coupling by dividing pitch, roll and yaw angular accelerations into two contributions: one from aerodynamic torque and one from dynamic coupling effect. The latter term is referred to as Dynamic Coupling Acceleration (DCA). The DCA term can be measured directly from instantaneous rotational velocities of the insect. We found a strong correlation between pitch and yaw velocities at the end of each wingbeat and the time integral of the corresponding DCA term. Generation of pitch, roll and yaw torques requires different aerodynamic mechanisms and is limited due to the other requirements of the flight. Our results suggest that employing DCA term gives the insect capability to perform a variety of maneuvers without fine adjustments in the aerodynamic torque." (Authors)] Address: Dong, H., Mechanical and Aerospace Engineering, University of Virginia, VA, 22902

**19574.** Zeyghami, S.; Dong, H. (2015): Coupling of the wings and the body dynamics enhances damselfly maneuverability. *Fluid Dynamics arXiv:1502.06835v1 [physics.flu-dyn]* : 10pp. (in English) ["In flapping flight, motion of the wings through the air generates the majority of the force and torque that controls the body motion. On the other hand, it is not clear how much effect the body motion imposes on the wings. We investigated this connection via analyzing fast yaw turns of three different species of damselfly. In this combined experimental and theoretical study, we show that

the dynamics of the wings and the body are coupled together in low frequency flapping flight. As a result, damselflies benefit from a passive mechanism for enhancing the bilateral wing pitch angle asymmetry to sustain the body rotation. A physics-based model derived from this mechanism is proved valid for linking morphology, kinematics and dynamics of the wing and the body of the flying insects in fast turning maneuvers." (Authors)] Address: Zeyghami, S., Mechanical and Aerospace Engineering, University of Virginia, Charlottesville, VA, 22904, USA

**19575.** Zhao, H.; Meng, Q.; Li, Y. (2015): On diversity of Odonata in the west of Jilin province. *Journal of Beihua University ( Natural Science)* 15(6): 821-825. (in Chinese, with English summary) ["The resources of Odonata in the west of Jilin Province were investigated randomly from May 2011 to September 2013. There were 47 species of dragonfly which belong to 9 families and 28 genera among which Gomphidae, Libellulidae, Coenagrionidae and Lestidae were dominant species in west of Jilin. The individuals and species number of Sympetrum were the most abundant in Libellulidae, Trigomphus are the most in Gomphidae Ischnura is the most in Coenagrionidae but the individuals and species number had no significant difference among genera in Lestidae. Diversity index of dragonfly showed an obvious rising trend with temperature rising and richness of nutrition levels in Spring and reached the peak in July and then diversity index decreased. Evenness index wasn't changed greatly the dominant concentration index was appeared in May and had a slight fluctuation later." (Authors)] Address: Zhao, H., College of Forest, Beihua Univ., Jilin 132013 China

**19576.** Zhao, H.; Meng, Q.; Zhao, H. (2015): Community structure and adult seasonal dynamics of Odonata in western Jilin. *Journal of Northeast Forestry University* 43(1): 107-109-113. (in Chinese, with English summary) ["A successive investigation on the resource of Odonata was conducted in western Jilin. There are 47 species of Odonata in the western region of Jilin, belonging to 9 families and 28 genera. Among them, the levels in the Anisoptera are significantly higher than those in the Zygoptera, the genus number and species number are maximum in Libellulidae, and Gomphidae, Libellulidae, Coenagrionidae and Silk Coenagrionidae are the dominant groups in the region. The evolution of Odonata adult communities in the western region of Jilin changes with the seasons. In May, the number of dragonfly communities increases slowly, significantly from June to July, and both the number of species and the number of individuals show a declining trend from August to September, and the dominant species is different in May to September." (Authors)] Address: Zhao, H., Beihua University, Songjianghe Experimental Primary School, China

**19577.** Zhou, Z.; Sorensen, S.; Zeng, H.; Hawrylycz, M.; Peng, H. (2015): Adaptive image enhancement for tracing 3D morphologies of neurons and brain vasculatures. *Neuroinformatics* 13: 153-166. (in English) ["It is important to digitally reconstruct the 3D morphology of [dragonfly] neurons and brain vasculatures. A number of previous methods have been proposed to automate the reconstruction process. However, in many cases, noise and low signal contrast with respect to the image background still hamper our ability to use automation methods directly. Here, we propose an adaptive image enhancement method specifically designed to improve the signal-to-noise ratio of several types of individual neurons and brain vasculature images. Our method is based on detecting the salient features of fibrous structures, e.g. the axon and dendrites combined with

adaptive estimation of the optimal context windows where such saliency would be detected. We tested this method for a range of brain image datasets and imaging modalities, including bright-field, confocal and multiphoton fluorescent images of neurons, and magnetic resonance angiograms. Applying our adaptive enhancement to these datasets led to improved accuracy and speed in automated tracing of complicated morphology of neurons and vasculatures. ... Particularly, as shown in Figure 7b, our enhanced image has captured and enhanced both dendrites and axons while other approaches failed. We tested 30 confocal images of dragonfly neurons which have smaller scales and better SNR (Gonzalez-Bellido et al. 2013)" (Authors)] Address: Peng, H., Janelia Farm Research Campus, Howard Hughes Medical Institute, Ashburn, Virginia 20147, USA. E-mail: hanchuanp@alleninstitute.org

## 2016

**19578.** Khan, J.; Saifullah; Zia, A. (2016): Biodiversity of dragonflies and their life threatening factors in Tehsil Chamla and Daggar of district Buner, Khyber Pakhtunkhwa, Pakistan. *Pakistan Journal of Zoology* 48(4): 1077-1082. (in English) ["The study was aimed at determining species composition, relative abundance and habitat preference of adult dragonflies in relation to increasing aquatic and air pollution in Tehsils Dagger and Chamla of district Buner, Khyber Pakhtunkhwa. For this, surveys were conducted during May to October, 2013 and eleven species with seven genera were recorded. Among these, three species (*Trithemis festiva*, *Orthetrum pruinosum neglectum* and *Trithemis aurora*) were found constant, while three (*Orthetrum anceps*, *Sympetrum commixta* and *Orthetrum triangulare*) were observed to be moderate and two (*Onychogomphus bistrigatus* and *Palpopleura sexmaculata*) were found to be infrequent in their occurrence. Perennial riverine habitats represented four species, seasonal streams with inhabiting three species and springs with only two dwelling species. Only one species was recorded from crop fields and ponds. For seasonal occurrence, 119 dragonflies were observed in July while seven in October. The aquatic and air pollution from huge number (n=600) of marble factories in Daggar and more use of pesticides in Chamla were observed to affect drastically the dragonfly population in the area. Present study therefore emphasizes conservation of Odonata fauna by implanting proper treatment plant for marble and pesticidal wastes." (Authors)] Address: Khan, J., Dept of Zoology, Abdul Wali Khan University, Mardan, Buner Campus, Khyber Pakhtunkhwa, Pakistan

**19579.** Wan, Y.-q.; Zhang, H.-j. (2016): Summary on the family Platycnemididae study (Odonata Zygoptera) in China. *Journal of Shaanxi University of Technology ( Natural Science Edition)* 32(2): 70-74. (in Chinese, with English summary) ["The family of Platycnemididae is a species relatively few in number. The researchers can only rely on identification and classification of the morphological features to conduct relevant studies. This paper has overviewed the research history and domestic research status of Platycnemididae as well as the classification errors or disputes. The paper proposed that *Platycnemis pierrati* Navas, *Copera tokyoensis* Asahina and *Platycnemis foliosa* Navas is the junior synonym of *Copera marginipes* Rambur, *Copera rubripes* Navas and *Platycnemis foliacea* Selys, respectively. The classification of *Coellicia cyanomelas* Ris, *Coellicia didyma* Selys, and *C. sexmaculatus* Wang should be promoted for further study." (Authors)] Address: not stated in English



**19580.** Zhao, Y.; Wang, D.; Tong, J.; Sun, J. (2016): Nano-mechanical behaviour of the membranous wings of dragonfly *Pantala flavescens* Fabricius. *Journal of Bionic Engineering* 13: 388-396. (in English) [The dragonfly has excellent flying capacity and its wings are typical 2-dimensional composite materials in micro-scale or nano-scale. The nanomechanical behavior of dragonfly membranous wings was investigated with a nanoindenter. It was shown that the maxima of the reduced modulus and nanohardness of the in-vivo and fresh dragonfly wings are about at position of 0.7L, where L is the wing length. It was found that the reduced modulus and nanohardness of radius of the wings of dragonfly are large. The reduced modulus and nanohardness of Costa, Radius and Postal veins of the in-vivo dragonfly wings are larger than those of the fresh ones. The deformation, stress and strain under the uniform load were analyzed with finite element simulation software ANSYS. The deformation is little and the distribution trend of the strain is probably in agreement with that of the stress. It is shown that the main veins have better stabilities and load-bearing capacities. The understanding of dragonfly wings' nanomechanical properties would provide some references for improving some properties of 2-dimensional composite materials through the biomimetic designs. The realization of nanomechanical properties of dragonfly wings will provide inspirations for designing some new structures and materials of mechanical parts." (Authors)] Address: Zhao, Y., The College of Mechanical and Power Engineering, Henan Polytechnic University, Jiaozuo 454000, China

**19581.** Zia, A. (2016): Zygoptera in Himalayan Foot Hills of Pakistan. IDF-Report 96: 1-60. (in English) ["In 2014, 56 localities in four provinces of Lesser Himalaya in Pakistan were studied. A total of 28 species have been recorded. A female of the data deficient, threatened species *Coelliccia vacca* was recorded from Charhaan. The record of *Drepanosticta carmichaeli* is a new addition to the list of Odonata of Pakistan, and expand the range of this species further to the west. The taxonomical status of *Ischnura aurora aurora* – considered common in Pakistan, following baseline literature of Fraser (1933) – now turns out to be *Ischnura aurora rubilio*." (Author)] Address: Zia, A., National Insect Museum, National Agriculture Research Centre, Islamabad – Pakistan. Email: saiyedahmed@gmail.com

## 2017

**19582.** Fischer, I.; Chavanec, A. (2017): Bewertung des Erhaltungszustandes der Großen Quelljungfer, *Cordulegaster heros* (Theischinger, 1979), im Natura-2000-Gebiet Lainzer Tiergarten. Land Wien: 23 pp. (in German) ["In 2017, 15 sites at six streams in the Natura 2000 site Lainzer Tiergarten were surveyed as part of the project: "The dragonfly fauna of Vienna: surveys and recording using DNA barcoding". *C. heros* was found at four of six streams and a total of eight of 15 sites. This means that it occurred in 53% of the water-course sections investigated. At six of these sites it was assessed as "probably" or "possibly" native. For the assessment of the conservation status of *C. heros*, in accordance with the requirements of the Habitats Directive according to the criteria "population status", "habitat quality" and "impairments", the assessment scheme developed by ÖKOTEAM (2016a) was modified and adapted. Based on the data, the conservation status of *C. heros* in the Lainzer Tiergarten was assessed as "B" and thus favourable." (Authors/ DeepL)] Address: Fischer, Iris, Naturhistorisches Museum Wien, Zentrale Forschungslaboratorien, Burgring 7, 1010 Wien, Austria. Email: iris.fischer@nhm-wien.ac.at

**19583.** Naraoka, H. (2017): Diurnal activity and reproductive behavior of *Platycnemis echigoana* Asahina, 1955 in Aomori prefecture (Odonata: Platycnemididae). *Tombo* 59: 85-95. (in Japanese, with English summary) ["Diurnal activity and reproductive behavior of a Japanese endemic damselfly, *Platycnemis echigoana* was observed at Rokkasho Village in Aomori Prefecture, Japan during 2011-2016, and was compared with the populations of central Honshu. The adult season of the Rokkasho population was from June to August. Adult were active in sunny areas on weeds of a forest floor during 8:00-18:00 h and most individuals rested on a tree at night. But, some individual spent the night on the forest floor. Mate searching flights were long (mean: 16.7s) by males that flew about in a wave-like pattern over weeds and shrubs, seen from 8:00-16:00 h with a peak from 9:00-12:00 h. On the other hand, the flights for feeding and shift were short (mean: 2.5s and 3.6s, respectively) and were seen all day. Copulation was seen from 8:00-15:00 and divided into three stages (Miller & Miller, 1981; mean duration I: 39m33s, II: 1m33s, III: 10s). Oviposition occurred from ca. 9:00-16:00 at pools, small ponds and water courses. Eggs were laid into the tissue of plant on and in the water. The adult season and most reproductive behavior of the Rokkasho population were almost the same as that of central Honshu. But, the long duration of mate searching flight by males and the resting on the forest floor at night were behavior that was seen in the Rokkasho population only." (Authors)] Address: Naraoka, H., 36-22, Motoizumi, Fukunoda, Itayanagi-cho, Kita-gun, Aomori Prefecture, 038-3661, Japan. E-mail: sbnkq127@ybb.ne.jp

**19584.** Ortega-Salas, H. (2017): Sistemática y distribución del género *Paraphlebia* Selys in Hagen (Odonata: Thaumatoeuridae) en México y Centroamérica. MSc thesis, Universidad Nacional Autónoma de México: 131 pp. (in Spanish) ["For more than a century the genus *Paraphlebia* has remained one of the least known in Mexico and Central America. The use of wing colouration and the relative position of the RP3 vein have been, until now, the only diagnostic characters available to separate the species of this genus. This paper provides a taxonomic revision of the genus including the redescription of *P. zoe*, *P. hialina*, *P. quinta* and *P. duodecima*; the formal synonymy of *P. abrogatata* with *P. quinta*; as well as the description of 10 new species distributed in Mexico, Guatemala, Honduras and Nicaragua. New diagnostic characters and a dichotomous key for the identification of males of the known species are proposed, maps with the known distributions of all species are presented, and finally, the first phylogenetic hypothesis for the genus is presented based on the 12S, 16S, 28S and CO1 genes, where two clades are differentiated and found to be congruent with the morphology of the fences." (Author/DeepL) Also see: Ortega-Salas, H.; Gonzalez-Soriano, E.; Jocque, M. (2022): Untangling the waterfall damselfly: a review of the Mesoamerican genus *Paraphlebia* Selys in Hagen, 1861 (Odonata: Thaumatoeuridae) with descriptions of 11 new species. *Zootaxa* 5089(1): 1-66.] Address: Ortega-Salas, H., Departamento de Zoología, Instituto de Biología, UNAM, Apartado Postal 70-153, México. E-mail: hector\_os@ciencias.unam.mx

**19585.** Sakai, M.; Suda, S.; Okeda, T.; Washitani, I. (2017): Identifying priority habitats and monitoring species for conservation and restoration of lentic Odonata habitats: assemblage nestedness on Amami-Oshima Island, Japan. *Ecological Research* 32(5): 693-702. (in English) ["We investigated Odonata faunal and habitat characteristics (fo-

rest cover, emergent, submerged, floating-leaved and floating plant covers, pond area, NO<sub>3</sub><sup>-</sup>, chemical oxygen demand, and presence/absence of a nonnative fish) in 10 ponds on Amami-Oshima Island. In total, 26 species of six odonate families were found, and we detected significant nestedness of species composition among the ponds (22 species in the most species-rich pond, and 8 species in the most species-poor pond). Species found only in the most species-rich ponds were: *Anax nigrofasciatus nigrofasciatus*, *Acisoma p. panorpoides*, *Agriocnemis famina oryzae*, *Rhyothemis severini*, *Anaciaeschna martini*, *Hemicordulia okinawaensis*, *Lyriothemis elegantissima*, and *Hydrobasis-leus croceus* (hereafter referred to as the rare species). These rare species are generally known to preferentially inhabit ponds with lush emergent plants and/or to prefer cooler habitats shaded by forest cover, such as *Anax nigrofasciatus nigrofasciatus*, *Anac. martini*, *He. okinawaensis*, and *L. elegantissima*. In contrast, the common species also found in species-poor ponds were: *Ischnura senegalensis*, *Pantala flavescens*, *Anax parthenope julius*, *Ictinogomphus pertinax*, and *Tramea virginia*, which are known to prefer an open water surface as spawning habitat. These differences in habitat preference between the rare and common species may be among the major reasons for the significant positive effects of percent forest cover and emergent plants on Odonata species richness. These results suggest that nestedness helped identify precise habitat characteristics and rare species that should be considered for conservation and restoration of lentic habitats on Amami-Oshima Island." (Authors)] Address: Sakai, M., Faculty of Science and Engineering, Chuo University, 1-13-27 Kasuga, Bunkyo-ku, Tokyo 112-8551, Japan. Email: boundary.0008@gmail.com

**19586.** Trapero-Quintana, A.; Reyes-Tur, B. (2017): Emergence patterns of Odonata (Insecta) from a lotic habitat in Eastern Cuba. *Revista de Biología Tropical* 65(2): 807-818. (in Spanish, with English summary) ["The emergence patterns of tropical odonates (dragonflies and damselflies) are scarcely known. We studied the emergence patterns of odonates in a freshwater lotic system in Giro, Northern Santiago de Cuba, between January and December 2008. We visited the locality between 09:00 and 14:00, on a weekly basis, and collected exuviae from a fixed section (8 x 1 m<sup>2</sup>) offshore, along the riparian vegetation. We collected data on species composition and, for each species, abundance, relative biomass and emergence pattern. We collected 443 exuviae belonging to 22 species: seven Zygoptera and 15 Anisoptera. Half of the annual Odonata emergence took place in the dry season (December to March) with the highest value in February (25 %). For species for which we found seven or more exuviae per month, *Enallagma coecum* and *Macrothemis celeno* tended to be a synchronal emergence. We also found temporal segregation of the emergence pattern between *M. celeno* and *Protoneura capillaris*, *Neoneura maria*, *Progomphus integer* and *Scapanea frontalis*. These differences were probably related to the highest annual fluctuations of temperature, relative humidity and number of rainy days per month. We concluded that there is an asynchrony and heterogeneity in Odonata emergence times in the studied freshwater lotic system." (Authors)] Address: Trapero-Quintana, A., Depto de Biología, Universidad de Oriente. Ave. Patricio Lumumba s/n. Santiago de Cuba 90500, Cuba. trapero76@gmail.com

**19587.** Vilaça, Z.A.S. (2017): Distribuição espacial da riqueza de Odonata (Fabricius, 1793) em relação às ecorregiões neotropicais: determinantes ambientais e restrições à

dispersão. Dissertação (Mestrado em Biodiversidade Animal) - Universidade Federal de Goiás, Goiânia: 214 pp. (in Portuguese, with English summary) ["The distribution of biological diversity is one of the major questions for science. Several theories were proposed in attempt to understand the patterns and process that regulate the richness of extant species: species-energy theory, metabolic theory of ecology, habitat heterogeneity, and tropics as museum, cradle or casino. Terrestrial ecoregions are land units that contain similar biotic and abiotic factors, what makes them more alluring and efficient for conservation planning and land use than using geopolitical divisions, still used by several conservation institutions and governments. Odonata is one of the oldest orders of insect, belonging to the clade Paleoptera. Those insects, for being tightly related to environmental conditions and vegetation structure, are widely utilized as bioindicators and in studies of spatial patterns. In this thesis, we evaluated the lack of knowledge around Odonata geographic distribution in the Neotropical region and the way that its species composition is affected by both climate and space." (Author) <https://repositorio.bc.ufg.br/tede/bitstream/tede/6983/5/Disserta%20a7%20a3o%20-%20Zander%20Augusto%20Spigoloni%20Vila%20a7a%20-%202017.pdf>] Address: not stated

**19588.** Vilenica, M. (2017): Ecological traits of dragonfly (Odonata) assemblages along an oligotrophic Dinaric karst hydrosystem. *Ann. Limnol. - Int. J. Limnol.* 53 : 377-389. (in English) ["Ecological traits of dragonfly larvae in tufa-depositing habitats of the Dinaric karst were studied monthly over a one-year period (2007–2008). The study encompassed various lotic karst habitats (springs, mountainous rivers, streams, tufa barriers) and microhabitats (angiosperms, mosses, cobbles, sand, silt with leaf litter). The aims of the study were to identify dragonfly composition, abundance and spatial distribution, their habitat and microhabitat preferences, and to determine the most important environmental factors explaining dragonfly assemblages in the studied hydrosystem. The dragonfly fauna was composed of eight species, *Onychogomphus forcipatus* (Linnaeus, 1758) was the most widespread and the most numerous. Water temperature, ammonium and oxygen concentrations had the highest influence on dragonfly assemblages. The most favorable habitat type were tufa barriers, less favorable were lower lotic habitats, while dragonflies were almost completely absent from upper lotic habitats and their springs. Dragonfly larvae preferred microhabitats with inorganic substrates (i.e. cobbles and sand) and slower water velocity, while they mostly avoided mosses associated with the strongest current. This study provides an important contribution to the knowledge of dragonfly ecology in lotic habitats of the Dinaric karst." (Author)] Address: Vilenica, Marina, Univ. of Zagreb, Faculty of Teacher Education, Trg Matice hrvatske 12, 44250 Petrinja, Croatia. E-mail: marina.vilenica@gmail.com

## 2018

**19589.** Baeta, R.; (ANEPE CAUDALIS) (2018): Suivi diachronique des populations ligériennes de *Stylurus flavipes* et d'*Ophiogomphus cecilia* en région Centre Val-de-Loire (Saison 2018 – Quatrième année de suivi à l'échelle régionale). Association Naturaliste d'Étude et de Protection des Écosystèmes CAUDALIS / Agence de l'Eau Loire Bretagne: 13 pp. (in French) ["In 2018, the 45 grids surveyed were spread over nearly 300 km of the Loire and corresponded to a cumulative length of 38 km of banks surveyed, all sessions combined. The regional database for the 2018 season thus contains information on 3,800 exuviae collected

and identified (Fig. 2). At the scale of the grids, *Onychogomphus forcipatus* was contacted on 42 of the 45 grids surveyed, *Ophiogomphus cecilia* on 38 and *Stylurus flavipes* on 12, i.e. a very clear decrease for the latter species compared to 2017. The differences between species are even more marked if we look at the transects. Thus, only 14 of 331 transects (4%) were validated for *Stylurus flavipes*, whereas 117 were validated for *Ophiogomphus cecilia* (35%) and 239 for *Onychogomphus forcipatus* (72%). However, these relative abundances vary between departments (Fig. 3) and depend on the upstream-downstream position of the surveyed grids (see maps in the appendix). A summary of the raw data collected by ANEPE Caudalis on the 8 grids monitored in Indre-et-Loire in 2018 is available in the appendix in the form of 2 tables (Tab. SI & SII). All the data have been transferred in SINP format to the DREAL Centre Val de Loire. In 2018, the Loire was relatively dry at the beginning of the season, with two small peaks in mid-May and mid-June. (Fig. 4). It was only from 17 June onwards that the levels of the Loire began to fall more steadily, reaching a low water level around mid-July. The absence of a particularly high flood and the random distribution of the 45 meshes monitored thus made it possible in 2018 to carry out the protocol on meshes with varied facies representative of the banks of the Loire River in our region (Fig. 5).

1. Phenologies of emergence: Although the first surveys were carried out slightly before 15 May (first pass on 30 April) and slightly after 15 August (last pass on 30 August), the surveys generally followed the dates defined in the protocol (Fig. 6). Harvesting was thus carried out on 100 different dates. The implementation of exuviae collections during this period allowed the peak of *Onychogomphus forcipatus* emergence to be well integrated, but it seems that the emergence of *Ophiogomphus cecilia* was already well underway during the first exuviae collections (Fig. 7). Finally, the very low number of *Stylurus flavipes* exuviae collected in 2018 does not allow us to model an emergence phenology. However, based on a direct visualization of the raw data, it seems that the peak of emergence was well taken into account and took place from mid-June to the end of July (Fig. 7).

2. Effects of biotic and abiotic variables: A global statistical analysis was carried out in 2017 on all the data collected in the Centre - Val de Loire since the monitoring protocol for the Loire gomphs (Baeta, 2017). It therefore does not seem appropriate to re-launch an analysis of this type this year with only one more year of data. An analysis of all the data produced over the first five years of deployment of this monitoring will be carried out in 2019. This will take into account all the data produced in the Loire basin and not just the data relating to the Centre - Val de Loire region.

IV. OUTLOOK: Deployed in the Centre - Val de Loire region for four years now and active in the four major regions through which the Loire flows, this protocol is one of the great successes of the National Action Plan for Odonates. With a clearly basin-oriented scope, the objective for the coming years will be to ensure the continuity of this monitoring on this scale as well as to optimise the analysis of the data produced and the exploitation of the results through presentations at various conferences related to the monitoring of biodiversity in the Loire and/or the implementation of monitoring protocols." (Authors/DeepL)] Address: Baeta, R., Association Naturaliste d'Etude et de Protection des Ecosystèmes (ANEPE) CAUDALIS 1, rue de la Mairie 37520 La Riche, France

**19590.** Heijden, A. van der; Vliegthart, A. (2018): A dragonfly trip report: Western Andalusia, June 2017. Boletín Rola nº 11, primer semestre 2018: 25-36. (in English, with Spanish summary) ["Odonata records collected during a

field trip to Western Andalusia in June 2017 are presented. In ten field days, 42 species of Odonata were observed, which represents two-thirds of the Andalusian odonata-fauna." (Authors)] Address: van der Heijden, A., Nederlandse Vereniging voor Libellenstudie. Email: Contact: odonatophilac@gmail.com

**19591.** Pitcher, K.A.; Soluk, D.A. (2018): Fish presence and inter-patch connectivity interactively alter the size of emergent insects in experimental enclosures. *Ecosphere* 9(3):e02118. 17 pp. (in English) ["Structural habitat complexity (SHC) and functional habitat connectivity (FHC) are the basic components that make up the physical architecture of an ecosystem, and can have substantial impacts on predator-prey interactions. These structural components influence animal behaviors such as inter-patch movement, foraging, and competition, and can impact community structure/dynamics in terrestrial and aquatic ecosystems. The effects of SHC and FHC on predator-prey dynamics within an ecosystem may also have important cascading effects on neighboring ecosystems by altering the movement of individuals across ecosystem boundaries. For example, when aquatic insects emerge as adults, they enter terrestrial ecosystems where they become an important food resource for terrestrial predators. Using a multiple patch, predator enclosure design in ponds, we tested whether altering intra-patch plant stem densities (SHC) and inter-patch distances (FHC) would influence the impact a predatory fish has on the biomass, quality, and trophic composition of emergent insects. As expected, fish significantly reduced emergent insect biomass (33%  $\pm$  7.6, mean  $\pm$  SE). Intra-patch stem densities (SHC) did not significantly alter fish effects; however, inter-patch distance (FHC) did significantly alter the impact of fish on the size of some emergent insects. Damselflies that emerged in treatments with fish present and shorter inter-patch distances were significantly larger, 4.1  $\pm$  0.1 mg/m<sup>2</sup> compared to 3.3 mg/m<sup>2</sup>  $\pm$  0.1 in the long/fish treatments. In fish treatments, this effect on damselfly size resulted in greater reductions in total emergent insect biomass in long inter-patch distance treatments (47.3%  $\pm$  6.9) compared to short inter-patch distance treatments (20.5%  $\pm$  12.4). Our results suggest that physical components of a habitat, such as inter-patch distances, have important impacts on predator-prey dynamics within habitats. These altered predator-prey dynamics can then have cascading effects on adjacent habitats by influencing the abundance, trophic composition, and quality of exported trophic subsidies." (Authors)] Address: Pitcher, K.A., Dept of Biology, Univ. of South Dakota, 414 E. Clark Street, Vermillion, South Dakota 57069 USA. E-mail: kristopher.pitcher@usd.edu

**19592.** Reiss, M.; Chiffard, P. (2018): Different forest cover and its impact on eco-hydrological traits, invertebrate fauna and biodiversity of spring habitats. *Nature Conservation* 27: 85-99. (in English) ["Headwater springs in the German Low Mountain Ranges are local ecotone habitats and biogeographical islands embedded in and interlinked with their adjacent landscape. The structure of forests reflects the eco-hydrological conditions in substrate type occurrence, micro-habitat richness and biodiversity in forest springs. This study considers effects from different forest land cover by comparing spring habitats in deciduous beech forests and coniferous spruce forests on eco-hydrological structures and biodiversity. Study areas include six different forest landscapes in the Low Mountain Ranges in Central Germany in Hesse and Thuringia. Hydro-morphological structure mapping and invertebrate sampling was executed within a multi-habitat

sampling regime, which involves sampling plots being allocated according to the cover ratio of the occurring substrata. Aquatic and terrestrial spring zones are considered with respect to an ecotone approach. Some in situ measurements were implemented, such as pH values, to assess the acidity of the spring water. Results show obvious differences in acidity, substrate type cover ratios and biodiversity in deciduous and coniferous forest springs. Conifer forest springs were found tending to acidification while deciduous forest springs were slightly alkaline. Deciduous forest springs had higher cover ratios of organic microhabitats as well as a higher biodiversity in species richness and total number of individuals. Although it was not possible to clearly distinguish one direct key factor of fauna assemblages, negative effects from forest management practices (e.g. monoculture plantations of conifer forest) on spring habitats can be concluded." (Authors)] Address: Reiss, M., Dept of Geography, Philipps-Universität Marburg, Deutschhausstr. 10, 35037 Marburg, Germany. Email: reissm@geo.uni-marburg.de

## 2019

**19593.** Adámek, Z.; Mikl, L.; Šlapanský, L.; Ludik, J.; Ha-lačka, K (2019): The diet of predatory fish in drinking water reservoirs – how can they contribute to biomanipulation efforts?. *Folia Zoologica* 68(4): 215-224. (in English) ["Efforts to positively influence ecological processes and water quality by manipulating the fish community (biomanipulation) are of particular importance in drinking water reservoirs. One of the principle measures employed is to increase the abundance of predatory fish species as a means of reducing planktonophagous and benthophagous cyprinids. However, there is little information available on the effectiveness of different predatory fish in biomanipulation exercises. We examined the diet of the five dominant predatory species (pike *Esox lucius*, zander *Sander lucioperca*, asp *Leuciscus aspius*, European catfish *Silurus glanis*, and perch *Perca fluviatilis*) in five representative reservoirs in the Morava River drainage basin (Czech Republic). Fish prey made up 75 % of total food intake, with undesirable small cyprinids dominant by biomass (40 %). European catfish and asp were not taken as prey and showed no sign of cannibalism. On the other hand, predation on conspecific predatory species (including cannibalism) was relatively high in perch, pike and zander, thereby reducing their net benefit overall. This little-considered aspect of predatory feeding needs to be taken into consideration in future biomanipulation stocking strategies. ... Invertebrate dietary items comprised zooplankton; water bugs; mayfly, Gomphidae nymphs; caddisfly and chironomid larvae; and water beetle (Dytiscidae) larvae." (Authors)] Address: Mikl, L., Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, Kvetná 8, 603 65 Brno, Czech Republic. E-mail: li-bor.mikl@seznam.cz

**19594.** Guliyeva, A.S. (2019): Species composition and quantitative distribution of larvae of dragonflies (Odonata) in the new ecological conditions of the lake Mehman. 37th International Scientific Conference on Economic and Social Development – "Socio Economic Problems of Sustainable Development" - Baku, 14-15 February 2019: 985-988. (in English) ["The paper presents new data on species composition, number and distribution of the larvae of dragonflies (Odonata) in new environmental conditions of the different habitats of in the lake Mehman. Field works conducted in 2015 - 2017 in the lake Mehman resulted in the rearings of 25 species and forms of dragonfly larvae. Seven of these L.

*dryas*, *S. fusca*, *E. viridulum*, *I. pumilio*, *O. cancellatum*, *L. depressa*, *L. quadrimaculata*, *Cordulia* sp. are new to the lake. Species *Lestes virens*, and *I.elegans*, were found in winter, spring and autumn of 2015 and winter and autumn of 2017; *C.scitulum* winter and autumn of 2015; *C.hastulatum* - winter, spring and autumn of 2017; *E. fatime* in winter and autumn of 2015 - 2017; in winter and spring of 2015 - 2017. Species *C. mercuriale*, *C. scitulum*, *L. virens*, *I. elegans*, *C. puella*, *E. najas*, *O. albistylum* are observed in the lake in all seasons and are dominated by widespread. It should be noted that the decrease in the number of larvae of dragonflies in the summer, especially at depths of up to 0.5 m is due to their intensive consumption by fish and water birds and emergence of adult dragonflies which leave the lake. On the other hand, in summer period, the volume of oxygen in shallow water of the lake Mehman greatly reduced, and as a result of evaporation of water, the amount of salts in water is increased. In such circumstances, the probability of occurrence of freshwater organisms in the benthos is naturally decreased. The study of the distribution of larvae of dragonflies on specific habitats of the lake revealed their maximum development on plant and silty habitats, and the minimum - on black silty sand. Changes in biomass of benthic organisms as well as larvae of dragonflies, which developed very poor is analyzed. Poor development of dragonfly larvae in the lake Mehman characterized, on the one hand with their intensive consumption by fish and water birds and on the other hand - the steady worsening of the environmental conditions of the lake." (Author) Some of the taxa are in need of re-examination.] Address: Guliyeva, Sanubar A., Azerbaijan State Univ. of Economics (UNEC), Azerbaijan. Email: Sama2013@bk.ru

**19595.** Hess, M. (2019): Mercury concentrations in aquatic insects of two Maine coastal streams: Temporal patterns of mercury in aquatic insect biosentinels and implications for methylmercury flux. MSc. thesis, Ecology and Environmental Sciences, The University of Maine: XIII + 111pp. (in English) ["Mercury (Hg) is a widespread water quality concern because it is a potent neurotoxin that biomagnifies through food webs, posing risk to biota higher in the food chain. Aquatic insects are effective for characterizing relative Hg risk in freshwater food webs because they live and forage in aquatic habitats where Hg is present and converted to its more toxic bioavailable form, methylmercury (MeHg). Specifically, dragonfly nymphs (Odonata) are increasingly being used as a Hg bioindicator. Therefore, I (Chapter 1) conducted a systematic review of the literature to evaluate the utility of dragonflies as biosentinels for Hg. Dragonfly nymphs have been used throughout the world to provide baseline Hg concentrations within waterbodies, analyze factors affecting bioaccumulation in invertebrates, and determine Hg concentrations within food webs. Dragonfly adults have been used for monitoring Hg concentrations as vectors into and among terrestrial habitats and food webs. There has been an increase in the use of dragonflies for Hg monitoring in the last 10 years, with more than half of the studies in the review conducted after 2009. However, research evaluating temporal Hg variability in dragonfly nymphs is limited, which can have important implications for monitoring programs and risk assessment because risk to wildlife may be under- or overestimated due to sample timing asynchrony with representative life-history events or body burden variation. Thus, I (Chapter 2) assessed the temporal variation in total mercury (THg) concentrations in similar aged cordulegastrid dragonfly nymphs from two coastal Maine streams over the course of one year. When we accounted for stream, there was no overall temporal pattern in dragonfly



THg concentrations throughout the year. We found that the two streams had similar annual mean THg concentrations; however, within stream variation of THg among months was high and differed among months. Therefore in temperate streams, multiple collections, ideally in different seasons, could be warranted to obtain a robust estimate of Hg concentrations within a lotic ecosystem. Besides dragonfly nymphs, other aquatic insects also serve as an important link in the MeHg pathway in that they transfer MeHg from single-celled organisms to larger predators in the aquatic environment. Additionally, emergent aquatic insects make up a substantial proportion of the diet of many riparian terrestrial consumers and are a primary mechanism by which MeHg is incorporated into terrestrial systems. Therefore, I (Chapter 3) aimed to determine taxonomic composition, biomass, temporal trends, MeHg concentrations, and MeHg flux of emerging aquatic insects in two coastal streams in Maine using weekly emergence trap collections. Different stream reaches harbored different aquatic insect communities and thus, yielded differences in cross-ecosystem subsidies biomass and temporal flux with respect to aquatic insect emergence. These differences shed light on which organisms were vectors for MeHg and the timing of MeHg pulses to the terrestrial environment in natural systems. My research indicate that remote protected natural streams, such as those in Acadia National Park, can yield high MeHg concentrations in biota and thus, large amounts of MeHg flux to the terrestrial environment and predators." (Author)] Address: not stated

**19596.** Kury, D. (2019): Libellen schützen, Libellen fördern im Kanton Basel-Landschaft. Kurzbericht 2019. Gewässerschutz Nordwestschweiz, Greifengasse 7 4058 Basel, Switzerland. <http://gewaesserschutz-nw.ch/index.php/aktivitaeten/libellen>: 9 pp. (in German) ["In the first phase of the project to protect and promote dragonflies in the Canton of Basel-Landschaft, a total of 20 and 89 water bodies were visited in 2018 and 2019 respectively. *Coenagrion puella*, *Anax imperator* and *Libellula quadrimaculata* were the most common species, as expected. Pleasant surprises were the detections of threatened and rare species such as *Epithea bimaculata*, *Gomphus pulchellus*, *Orthetrum albistylum* and *Sympetrum pedemontanum*. The results of the surveys are used to develop enhancement and maintenance measures for the upkeep of standing water bodies and watercourse stretches." (Author/DeepL)] Address: Kury, D., Life Science AG, Greifengasse 7, CH-4058 Basel, Switzerland. E-mail: [daniel.kuery@lifescience.ch](mailto:daniel.kuery@lifescience.ch)

**19597.** Oliveira-Junior, J.M.B.; Juen, L. (2019): The Zygoptera/Anisoptera ratio (Insecta: Odonata): a new tool for habitat alterations assessment in Amazonian streams. *Neotropical Entomology* 48(4): 552-560. (in English) ["The accumulation of scientific knowledge is far outstripped by the rate of environmental disturbance from human activities in aquatic habitats. This highlights the need to develop effective proxy measures of aquatic biodiversity that can demonstrate changes in communities associated with human activities. We evaluated whether the relative abundance and species richness of Anisoptera and Zygoptera can be used as a tool to measure environmental impacts on Amazonian streams. Adult of Anisoptera and Zygoptera were sampled in 50 Amazonian streams, in the municipality of Paragominas (Pará state), Brazil, using an entomological handnet. The physical features of each stream were evaluated using an index of environmental integrity (HII). We collected a total of 1769 Odonata specimens, representing 97 species (56 were Zygoptera and 41 were Anisoptera). Habitat

modification resulted in an inversion in the proportional abundance and species richness of Anisoptera and Zygoptera, where Zygoptera diversity decreased with the loss of habitat integrity, whereas Anisoptera diversity increased with habitat disturbance. A decline of 0.1 in the habitat integrity index score resulted in an increase of approximately 13 individuals and 11 species of Anisoptera, with the exact opposite effect observed for the Zygoptera. In summary, the Odonata proved to be a useful model for the assessment of Amazonian streams, with sites where more than 54% of the Odonata species were Zygoptera being classified as preserved, and those dominated by Anisoptera species (>?59%) being considered degraded. This approach has clear applications for environmental impact assessments, as it reduces the influence of sampling effort and collector experience on assessment outcomes, and does not rely upon specialist knowledge, given that members of the two suborders are easily distinguished from one and other in the field." (Authors)] Address: Juen, L., Lab de Ecologia e Conservação, Instituto de Ciências Biológicas, Univ Federal do Pará, Belém, Brasil

**19598.** Olthoff, M. (2019): Untersuchung der Libellenarten *Leucorrhinia pectoralis* (FFH Anh. II), *Aeshna subarctica* und *Somatochlora arctica* in Mooregebieten des Kreises Borken - Bewertung durchgeführter und geplanter Wiedervernässungsmaßnahmen in den NSG „Burlo-Vardingholter Venn“ und „Hündfelder Moor“ anhand ausgewählter Indikatorarten. Im Auftrag der Stiftung Natur und Landschaft Westmünsterland: 17 pp. (in German) ["In 2019, the nature reserves Burlo-Vardingholter Venn and Hündfelder Moor (district of Borken) were surveyed for selected species of Odonata (*Leucorrhinia pectoralis*, *Aeshna subarctica*, *Somatochlora arctica*) threatened with extinction in North Rhine-Westphalia. Fortunately, the FFH Annex II species *Leucorrhinia pectoralis* was found to be present on the ground in both bogs. With over 50 individuals, the Burlo Vardingholter Venn is one of the most numerous occurrences of this species in the country. In the Hündfelder Moor, the species was found on the ground for the first time. The species has benefited in particular from the rewetting measures in the fen edge areas, which have led to an increased supply of mesotrophic fen waters. While *S. arctica*, which has been known to occur on the ground for 20 years, was confirmed in the Burlo-Vardingholter Venn, (potential) evidence of its presence on the ground was found for the first time in the Hündfelder Moor. This species has also benefited from the rewetting measures carried out in both moor areas. The habitats preferred by *S. arctica* had sufficient water flow - despite the extreme (summer) drought in 2018 and 2019. The occurrence of *Aeshna subarctica* in the Hündfelder Moor, known since 2010, was confirmed in 2019. However, several bog waters where the species was recorded a few years ago could no longer be confirmed as habitats of the species due to insufficient water levels. The species was only observed at a few peat pits in the south of the Hündfelder Moor. In particular, the detection of the first two species in the rewetted areas of both moorlands is considered a success of the nature conservation measures implemented. Further rewetting measures planned in the Hündfelder Moor are welcomed from the point of view of dragonfly protection. In future measures, the known breeding waters should be preserved and under no circumstances filled in. Furthermore, it is recommended to create new water bodies in the area of dry peat bodies that are less important from a nature conservation point of view, following the example of old peat diggings. These should ideally be small-scale and have shallow banks and no contact with the mineral subsoil. In

addition to the species studied in this project, numerous other endangered damselflies (e.g. *Coenagrion lunulatum*, *Ceragrion tenellum*, *Aeshna juncea*, *Leucorrhinia rubicunda*, *L. dubia*) would benefit from this." (Author/DeepL.) Address: Olthoff, M., Waldweg 66, 48163 Münster, Germany

**19599.** Richter, R.; Endersby, I. (2019): Dragonflies and Damselflies of Victoria and Tasmania. Printed by: Impact Digital Pty Ltd, Unit 3-4, 306 Albert Street, Brunswick, VIC 3056: 174 pp. (in English) [Reiner Richter and Ian Endersby have put together a book of the 81 species of Dragonflies and Damselflies of Victoria and Tasmania. There are 81 species all up and each one has a double page spread. There are images of the male and female, distribution maps, flight time data with notes on habitat, behaviour and information on ID details. ISBN: 978-0-6483592-1-0] Address: Impact Digital Pty Ltd, Unit 3-4, 306 Albert Street, Brunswick, VIC 3056

**19600.** Schiedewitz, S. (2019): Untersuchungen zur Diversität der Tagfalter und Libellen in der Hägebachau nördlich von Samswegen. *Naturschutz im Land Sachsen-Anhalt* 56: 27-60. (in German) ["Between 2018 and 2020, 43 dragonfly species were recorded in the project area. The high total number of dragonfly species is due to the diverse biotope structures as well as the successful embedding of the water bodies in large-scale, insect-rich grasslands. The current mosaic of marshy alder swamp forest, large open water areas, dense and loose reed beds, sunny and shaded riparian zones with abundant deadwood, floating and diving leaf vegetation, silted-up and water-bearing ditch sections, strongly warmed shallow water areas and peat moss-covered marsh zones produces a variety of ecological niches so that dragonflies with a wide range of demands on their aquatic and terrestrial habitats can coexist. In total, eight of the nine endangered, rare or declining dragonfly species found in the area colonise the water bodies within the year-round pasture. The high species diversity along the dammed ditch system indicates that the integration of water body sections into near-natural grazing areas with low stocking density has a positive effect especially on those species that colonise open, sunny shallow waters with sparse riparian vegetation and would disappear from the water bodies as succession progresses. The cattle gently take over regular, spatially-temporally staggered mowing of lowland moorland ditches, as recommended in the literature, in order to counteract the decline of certain dragonfly species. The migration of *Coenagrion mercuriale* into the project area is an example of how the natural development of vegetation along watercourses, while at the same time gently keeping the riparian zones open by large grazing animals, can create new habitat structures that are being lost in many places through other practices. While intensive grazing of watercourse margins usually has a negative impact on existing biotope structures and thus also on existing populations, extensive grazing in the riparian zone creates valuable micro-biotopes that are warmed to varying degrees by the sun and can thus be important for the larval development of thermophilic dragonfly species. The shifting of soil material along the edges of the banks can also lead to the formation of fish-free margins, which reduces the predation pressure on dragonfly larvae. The occurrence of various, partly rare bog dragonflies indicates that the renaturation of the fen also promotes specialised species that have declined or disappeared elsewhere due to impairment or loss of important biotopes. The natural development of the marsh zones in the ditches particularly promotes species whose larvae develop in loose, moist peat moss cushions, protected

from enemies, where they can also survive temporary drying out of the water bodies. Since, in addition to the grazed riparian zones, there are also extensive stretches of water where the growth is only temporarily browsed or not browsed at all, sufficient habitat structures are preserved for the species that are bound to sunny reed belts and abundant riparian vegetation. The described deformation of certain watercourse margins by cattle footfall and browsing is distributed over several, mostly widely spaced watering points and is thus limited to only small-scale "disturbance points" in relation to the total bank length of all integrated ditches. The obviously positive effects of extensive grazing of riparian zones presented here are by no means a recommendation for the integration of water bodies into "conventional" standing pastures, which are intensively overgrazed in high stocking density due to a superficial economic benefit. On such areas, nutrient inputs (supplementary feeding), the complete loss of riparian vegetation and massive trampling damage usually lead to impairment of the aquatic and terrestrial habitats of dragonflies and other species." (Author/DeepL.) Address: Schiedewitz, Susen, Biodiversitätsanalysen, Pflege- und Entwicklungskonzepte, Öffentlichkeitsarbeit Fortuna 1, 38704 Liebenburg, Germany. E-Mail: natur@susenschiedewitz.de

## 2020

**19601.** Baaloudj, A.; Ouarab, S.; Kerfouf, A.; Bouriach, M.; Hussein, A.A.; Hammama, C.; Djénéba, H.N. (2020): Use of macro invertebrates to assess the quality of Seybouse River (North-East of Algeria). *Ukrainian Journal of Ecology* 10(4): 60-66. (in English) ["The theme is based on the determination and the impact of pollution on the aquatic fauna of Seybouse River in the Wilaya de Guelma. This study aimed to evaluate the physicochemical properties of water, to determine the macro-benthic invertebrates of this ecosystem. The money samples of water are taken (November - May) at three stations at different depths, including a very polluted one at downstream of the Wadi. Several physicochemical parameters were measured (pH, electrical conductivity, turbidity, BOD5 MES, water temperature and salinity). The Bi-monthly sampling of macro invertebrates revealed the existence of 40 taxa, divided into 4 branches (amphibians, molluscs, arthropods, and annelids), made up of 2344 identified individuals, and distributed according to the bathymetry, where the majority are Arthropods with 95.38%. The annelids represent 3.71%, collected mainly at the level of the strongly anthropized site C. Therefore, the distribution of the macrobenthic fauna depends on the physico-chemical parameters, on the geographical position. Maintaining a standard water quality in this aquatic ecosystem requires continuous monitoring of its physicochemical characteristics." (Authors) Taxa are treated family wise.] Address: Baaloudj, Affef, Laboratory of Biology, Water and Environment, Faculty SNV-STU, Univ. of Guelma, Guelma 24000, Algeria. Email: bafef@yahoo.fr

**19602.** Cham, S. (2020): Observations of male aggression in *Calopteryx splendens* (Harris) (Banded Demoiselle) and territorial behaviour at high population density. *J. Br. Dragonfly Society* 36(2): 44-66. (in English) ["*C. splendens* favours slow to medium flowing rivers and streams, where males can be observed defending territories in areas that are most likely to attract females. At high population densities, male territorial behaviour changes and becomes more aggressive, with biting used in an attempt to displace tandem males. This paper describes territorial behaviour and male strategy observed during the summer of 2018, when

high numbers of *C. splendens* were increasingly concentrated into small areas of a stream due to lowering water levels.] Address: Cham, S., 2 Hillside Road, Lower Stondon, Henlow, SG16 6LQ, UK. Email: [stevecham1@aol.com](mailto:stevecham1@aol.com)

**19603.** Chelmick, D.; Boudot, J.-P. (2020): An identification guide to the genus *Ischnura* (Insecta, Odonata, Zygoptera, Coenagrionidae) in the Middle East, with emphasis on the Arabian Peninsula. *Tribulus* 28: 4-18. (in English) ["Seven species of damselflies of the genus *Ischnura* are found in the Middle East. The species can be hard to identify and show considerable variation within individuals. The purpose of this paper is to provide identification for these species with particular reference to those from Oman and the United Arab Emirates. Simply relying upon colour patterning, which can be variable, is insufficient for accurate identification. The paper provides illustrations of all criteria that need to be examined. In addition to identification, this paper details variations, using photographs, that are likely to be encountered in Oman and the UAE, the most notable of which can be summarised: (1) *Ischnura senegalensis*, a common, essentially coastal insect, has specimens from Salalah (Oman) with a completely black abdominal segment 2. This has not been recorded from any other locality in this extremely widespread species; (2) *Ischnura evansi*, the region's second most common species, has a much wider range of colour forms than previously described.] Address: Jean-Pierre Boudot, J.-P., Immeuble Orphée, Apt 703, 78 rue de la Justice, 54710 Ludres, France. Email: [jeanpierreboudot54@gmail.com](mailto:jeanpierreboudot54@gmail.com)

**19604.** Chu, Y.J.; Ganesan, P.B.; Ali, M.A. (2020): Fluid-structure interaction simulation on flight performance of a dragonfly wing under different pterostigma weights. *Journal of Mechanics* 37: 216-229. (in English) ["The dragonfly wings provide insights for designing an efficient biomimetic micro air vehicle (BMAV). In this regard, this study focuses on investigating the effect of the pterostigma weight loading and its spatial location on the forewings of dragonfly by using the fluid-structure interaction simulation. This study also investigates the effect of change in the wing elasticity and density on the wing performance. The forewing, which mimics the real dragonfly wing, is flat with a 47.5mm span and a 0.4mm thickness. The wing was set to cruise at 3 m/s with a constant flapping motion at a frequency of 25 Hz. This study shows that a small increase of pterostigma loading (11% of wing weight) at the tip of the wing significantly improves the lift to drag ratio, CL/CD, which has 129.16% increment in comparison with no loading. The lift to drag ratio depends on the pterostigma location, pterostigma loading, elastic modulus and density. The results of this study can be used as a reference in future BMAV wing optimization design." (Authors)] Address: Chu, Y.J., Dept of Mechanical Engineering, Fac. of Engineering, University of Malaya, Kuala Lumpur, Malaysia. Email: [poo\\_ganesan@um.edu.my](mailto:poo_ganesan@um.edu.my)

**19605.** Derbuch, G. (2020): Folgekartierung der Libellenfauna im Nationalpark Gesäuse (Monitoring, EZ), Endbericht, November 2020. Auftraggeber: Nationalpark Gesäuse GmbH, Fachbereich Naturschutz & Forschung, Mag. Alexander Maringer, Weng 2, A-8913 Admont, Austria: 46 pp. (in German) ["In 2019 and 2020, the objective of this project was to map selected dragonfly species first recorded by Russ (2010) around 10 years ago at various water bodies in the Gesäuse National Park and just outside it. Russ was able to identify 30 species, whereas the present study identified 20. This considerable difference is due to the fact that two species-rich water bodies in the valley have either lost

a great deal of their value (Paltenspitz) or no longer exist (pond near Gstatterboden). The majority of species are widespread and common species. No species of the Annexes of the Habitats Directive were found. It is gratifying to note the presence of the endangered species *Leucorrhinia dubia* on the Gscheideggkogel, *Somatochlora flavomaculata* on the Paltenspitz and *Coenagrion hastulatum* in the Haselkar. In addition, the almost endangered *Somatochlora alpestris* is found on the bogs of the Drahbank, the Gscheideggkogel and the Neuburgmoos. With 11 species, the Life project pond on the Paltenspitz has proved to be the richest in species - 10 years ago, however, there were 24 there (!), and the qualitative decline is also evident. The pond must be rehabilitated, opened and dredged. The small water bodies on the Haselkaralm currently have 8 species, but only in water bodies that are protected from cattle and have natural siltation vegetation. Six species fly at Sulzkarsee, in significantly higher individual densities than 10 years ago - an indication that the control of minnows and nutrient input has been successful. The small peaty mire waters in the Neuburgmoos, the Drahbank and at the Gscheideggkogel are constant in terms of dragonfly fauna, with isolated occurrences of stenotopic and nature conservation-relevant species (*L. dubia*, *S. alpestris*). The pond at the Weidendom and the Hechtlacke also show no qualitatively or quantitatively relevant changes. change - they are generally species-poor. No dragonflies were found at three of the selected sites (Lettmairau, Brucksattel, Gstatterboden pond). There is an increased need for action at the Paltenspitz (dredging) and the Neuburgmoor (fencing). It has been shown that two surveys are not sufficient to provide a representative insight into the local dragonfly population. of the local dragonfly populations. In comparison, the RVS species protection for environmental planning issues provides for 4-6 inspections per year, depending on the type of water body." (Author/DeepL)] Address: Auftragnehmer & Bearbeitung: derbuchcoaching, Georg Derbuch, Jägerweg 29, A-8054 Seiersberg, Austria. [www.derbuchcoaching.at](http://www.derbuchcoaching.at)

**19606.** Enss, J., Joest, R.; Lorenz, A. (2020): Libellenzönsen renaturierter und nicht-renaturierter Abschnitte der Ruhr und der Lippe, zweier großer Fließgewässer in Nordrhein-Westfalen. *Libellula* 39(3/4): 149-171. (in German, with English summary) ["In this paper dragonfly and damselfly communities in restored and non-restored stretches of the rivers Ruhr and Lippe are compared. From May to September 2017 a total of 52 transects were visited monthly to record adult dragonflies and damselflies and to collect exuviae with a standardised protocol. The data set contains 3,248 records of 23 species from eight families (14 % Exuviae). Remarkable are records of *Onychogomphus forcipatus* at restored stretches of the Ruhr and *Ophiogomphus cecilia* mostly at restored stretches of the Lippe. Both species were on the verge of extinction in North-Rhine-Westphalia. At the lowland river Lippe the number of species and the number of individuals were higher compared to the lower mountain river Ruhr. Both species richness and number of individuals were generally, if not always significantly, higher in restored stretches compared to non-restored stretches of both rivers. The higher species richness is mostly due to a higher number of species typical of standing waterbodies which profit from this type of habitat in the floodplains created by the restoration measures. The number of explicitly riverine species did not differ in restored and non-restored stretches of the Lippe while there was one more riverine species in restored stretches of the Ruhr. However, the number of individuals of explicitly riverine species was higher in restored

stretches of both rivers. Due to low detection rate, the recording of exuviae only gave convincing results for the Lippe which correspond to observations from studies by other authors. River restoration measures lead to an increase in both number and abundance of dragonfly and damselfly species and therefore is judged favourably. Due to their positive reactions Odonata can therefore be used as indicators for river restoration measures." (Authors)] Address: Enss, J., Universität Duisburg-Essen, Fakultät für Biologie, Aquatische Ökologie, Universitätsstr. 5, 45141 Essen, Germany. Email: julian.enss@googlegmail.com

**19607.** Fait, P.; Demierre, E.; Ilg, C.; Oertli, B. (2020): Small mountain reservoirs in the Alps: New habitats for alpine freshwater biodiversity? *Aquatic Conservation: Marine and Freshwater Ecosystems* 30(4): 617-630. (in English) ["1. Today, aquatic biodiversity suffers from many pressures linked to human activities, including climate change, which particularly affects alpine areas. Many alpine freshwater species have shifted their geographical distribution to colder areas, but a reduced availability of suitable habitats is also forecasted. New artificial water bodies could provide habitat enhancement opportunities, including small mountain reservoirs built to overcome a lack of snow during winter. 2. To investigate the role of reservoirs as a habitat for freshwater invertebrates, a case study was conducted on eight reservoirs in the Swiss Alps. The study aimed to compare the water quality and freshwater biodiversity of the reservoirs with those of 39 natural and newly excavated ponds. Data were collected on physico-chemistry, freshwater habitat structure, and aquatic insects (dragonflies and aquatic beetles). 3. The study showed that the mountain reservoirs investigated did not differ from natural ponds in terms of surface area, conductivity, and trophic level. Similarly to natural ponds, reservoirs showed signs of impairment owing to surface runoff carrying pollutants linked to ski tourism. They presented a low diversity of mesohabitats, and in particular lacked vegetation. Compared with natural ponds, the species richness in reservoirs was lower for dragonflies but not for beetles. At the regional scale, the community from the reservoirs was a subset of the natural ponds community, supporting 38% of the regional species richness for these two insect groups. 4. The results suggest that mountain reservoirs are likely to be important for biodiversity in alpine areas, both as habitats and as stepping stones for species shifting their geographical range. These water bodies can be enhanced further by some nature-friendly measures to maximize benefits for biodiversity, including margin revegetation or the creation of adjacent ponds. Ecological engineering needs to be innovative and promote freshwater biodiversity in artificial reservoirs." (Authors)] Address: Oertli, B., HES-SO//GE, University of Applied Sciences and Arts Western Switzerland, 150 route de Presinge CH-1254 Jussy, Geneva, Switzerland. Email: beat.oertli@hesge.ch

**19608.** Gauci, C. (2020): Emergence of seven odonate species, based on exuviae collection, from four small artificial ponds at Ghadira Nature Reserve, Malta. *J. Br. Dragonfly Society* 36(2): 109-130. (in English) ["The Ghadira Nature Reserve, Malta is a saline marshland. The construction of three small fresh water ponds in the early nineteen nineties, together with the addition of a fourth in 2017, attracted a number of odonate species. Seven species reproduce regularly in them, with another two ovipositing sporadically. The regular collection and counting of exuviae provides an accurate count of the numbers and species emerging. For this purpose, in 2019, exuviae were collected twice weekly from mid-March to mid-December. The most numerous

species emerging from each of the four ponds was *Crocothemis erythraea*. Most, if not all, of the seven species had two (in some cases three) generations annually. Birds were the main predators of larvae, both during the growth period and at emergence, and of teneral; [a kingfisher - *Alcedo atthis* - is documented preying on a teneral *C. erythraea*]. Spiders and possibly Painted Frogs took what appeared to be an insignificant number of teneral." (Author)] Address: Gauci, C., 28 Triq il-Kissier, Mosta, Malta MST1822, Malta

**19609.** Kamarajan, B.P.; Muthusamy, A. (2020): Survival strategy of *Pseudomonas aeruginosa* on the nanopillar topography of dragonfly (*Pantala flavescens*) wing. *AMB Expr* (2020) 10:85: 12 pp. (in English) ["Discovery of nanopillars on the surface of the insect wings had led to the understanding of its bactericidal property. Nanopillar topography is deterrent to only those bacteria that are attached, or in close contact with the nanopillars. The present study investigated the variation in the viability of *Pseudomonas aeruginosa* strains PAO1 (virulent) and ATCC 9027 (avirulent) on the wing surface of dragonfly (*Pantala flavescens*). Viability study indicated that only 0.2% ATCC 9027 survived when incubated with wing for 48 h in Phosphate buffered saline, while under the same conditions 43.47% PAO1 survived. Enumeration of *Pseudomonas* attached to wing surface suggested that, the number of PAO1 attached on the wing surface was three times lesser than ATCC 9027. Propensity of attachment of *P. aeruginosa* strains PAO1 and ATCC 9027 on the wing surface investigated using scanning probe microscope indicated that *P. aeruginosa* ATCC 9027 showed adhesion to 88% of regions and, PAO1 showed adhesion to only 48% regions tested on wing surface. PAO1 survived the bactericidal effect of wing surface by evading attachment. Three clinical isolates tested which showed viability similar to PAO1 strain, also showed lower propensity to attach to wing surface. Transcriptional level analyses using RT-PCR suggested that flagellar genes (*fliE* and *fleS*) were downregulated and genes responsible for reversible to irreversible attachment (*gcbA* and *rsmZ*) were upregulated in ATCC 9027 than PAO1 on wing surface, indicating relatively higher attachment of ATCC 9027 on wing surface. The study suggests that virulent strains of *P. aeruginosa* may evade attachment on wing surface. The results gain significance as bioinspired surfaces are being created towards developing antibacterial medical implants and other antibacterial surface applications." (Authors)] Address: Muthusamy, A., Dept of Biotechnology, PSG College of Technology, Coimbatore, TamilNadu, India. Email: biosubramanian@gmail.com

**19610.** Lim-Franco, G.; Trapero-Quintana, A. (2020): Diversidad y patrón de emergencia de libélulas en un hábitat léntico del Jardín Botánico Nacional de Cuba. *Revista del Jardín Botánico Nacional* 4: 119-130. (in Spanish, with English summary) ["The transference of biomass to terrestrial ecosystems is carried out in part by the adults of aquatic insects after their emergence from water, as it is in the case of odonates. The aim of this study is to characterize the emergence pattern of an odonate assemblage in an artificial lentic habit at of the National Botanical Garden of Cuba, from the harvest of exuviae. Fifty two samplings were carried out with a frequency of once a week, and an interval of seven to nine days, in four transect of 8 m<sup>2</sup>. To characterize the emergence, the seasonal climate model was considered: rainy, poorly rainy and transition seasons. The change in climatic variables and habitat characteristics was registered, and was related to the emergence pattern. The variation in the use of resources during emergence was



described. The emergence with a constant volume of water turned out to be asynchronous, with a predominance of accidental species and unequal abundance distribution. The rainy period was the season with the highest percentage of emergence, in which rainfall and relative humidity were the factors that most influenced the emergence pattern. The plants were the most used emergence substrate, and the decrease in vegetation cover corresponded to the alternative use of other substrates." (Authors)] Address: Lim-Franco, Gabriela, Departamento Curatorial, Museo Nacional de Historia Natural, Calle Obispo # 61 entre Oficios y Baratillo, Habana Vieja, La Habana, Cuba. CP: 10100. E-mail: limi23773@gmail.com

**19611.** Moura, L.P.; Marques Couceiro, S.R.; Juen, L.; Silas Veras, D. (2020): Congruence of the composition of Odonata between dry and rainy seasons in the Maranhense Cerrado. *International Journal of Odonatology* 23(4): 305-314. (in English, with Spanish summary) ["In tropical streams, seasonality has a strong influence on heterogeneity, altering available resources and affecting the carrying of organisms, substrate and organic matter. This causes changes in the limnological variables, as well as in the species composition. The aim of our study was to evaluate the response of the congruence of the Odonata community in two seasons in streams of the transition between Cerrado and Caatinga. Ten tributary streams of the river Itapecuru in Caxias, in eastern of Maranhão, were sampled from July to December 2017 (lowest precipitation) and from January to June 2018 (highest precipitation). A total of 386 specimens were collected, 160 in the season with the lowest precipitation and 226 in the season with the highest precipitation. There was no congruence of response for the order Odonata between the seasons; however, if the suborders are treated separately, Zygoptera presented a high congruence of larvae, but not Anisoptera. Thus, in environments that face strong water stress and due to the ecophysiological differences of the suborders, the sampling of only one seasonal period does not provide consistent data on the species composition (Zygoptera showed similarity in the composition between drought and rainy seasons, but not Anisoptera), losing important information about local diversity. If the focus is on biodiversity, the use of suborders can establish patterns of diversity and adaptation between seasons, in view of the existing ecophysiological differences." (Authors)] Address: Moura, L., Programa de Pós-graduação em Biodiversidade (PPGBEES), Universidade Federal do Oeste do Pará, Laboratório de Ecologia e Taxonomia de Invertebrados Aquáticos, Santarém, Pará, Brazil. Email: lucas.moura@acad.ifma.edu.br

**19612.** Nardi, G.; Spada, L. (2020): Odonata, Libellulidae, *Brachythemis impartita* (Karsch, 1890). *Bollettino dell'Associazione Romana di Entomologia, Nuova Serie* 1(1-4): 173-177. (in Italian) [Sicilia, Italy. Siracusa, Isola di Ortigia, Piazzetta San Rocco, 13 m, 37°03'28"N; 15°17'36"E, 4.IX.2019, L. Spada & G. Nardi leg., 1 male (CLS).] Address: Nardi, G., Centro Nazionale Carabinieri Biodiversità "Bosco Fontana", Strada Mantova, 29 - I-46045 Marmirolo (Mantova), Italy. E-mail: l\_nardi@hotmail.com

**19613.** Parr, A.J. (2020): Migrant and dispersive dragonflies in Britain during 2019. *J. Br. Dragonfly Society* 36(2): 67-83. (in English) ["The year 2019 was a truly impressive one for migrant dragonflies in the UK, featuring alongside the heady days of 1995 and 2006. It was thus a record year for sightings of both *Anax ephippiger* and *A. parthenope*. The former species saw three separate influxes - during late

winter/early spring, during summer and again during the autumn. The summer influx was notable for the presence of multiple individuals at several sites, and breeding behaviour was reported on several occasions, though no progeny were positively identified later in the season. *Anax parthenope* appeared at over 80 sites in the UK during summer, these sightings including only the third-and fourth-ever records for Scotland. Although there was clearly a major influx, records were received from many sites that had also recorded the species over the previous few years, and it seems that breeding populations in Britain may now at last be becoming more widespread. In addition to the impressive arrivals of *A. ephippiger* and *A. parthenope*, *Sympetrum fonscolombii* also appeared in near-record numbers, with reports from almost 150 sites during the year. At Drift Reservoir in Cornwall, some 120 individuals were present during the second week of July, though most of these then rapidly moved on. Successful breeding was noted at a number of sites, with emergences occurring from late August onwards. However, given the size of the early season influxes, the number of such breeding sites seemed smaller than might perhaps have been expected. Other highlights of 2019 included the sighting of two male *Crocothemis erythraea* (Scarlet Darter) along the south coast during high summer. One site - Longham Lakes in Dorset - had also recorded the species in 2017, which could just be a coincidence, but might hint at the presence of an undiscovered breeding colony nearby. Good numbers of *Aeshna affinis* (Southern Migrant Hawker) were seen away from their Thames Estuary strongholds for the second year in succession, with records coming from many of the areas that had reported the species during 2018, as well as from new areas such as coastal south Wales. This species now seems to be becoming increasingly widespread in southern Britain. *Aeshna isocetes* (Norfolk Hawker) also continued its range expansion in south-east England, with a record even from Medmerry RSPB Reserve in West Sussex. The expansion of both *A. affinis* and *A. isocetes* may be linked to a combination of both internal dispersal and immigration from the Continent. Amongst our recent colonist damselflies, both *Chalcolestes viridis* and *Erythromma viridulum* showed substantial range expansion during 2019, particularly along the east coast. The most northerly site in Britain for *C. viridis* is now in North-east Yorkshire, while *E. viridulum* was recorded as far north as County Durham." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk, IP29 5BX, UK

**19614.** Riva-Murray, K.; Bradley, P.M.; Brigham, M.E. (2020): Methylmercury—total mercury ratios in predator and primary consumer insects from Adirondack streams (New York, USA). *Ecotoxicology* 29: 1644-1658. (in English) ["Mercury (Hg) is a global pollutant that affects biota in remote settings due to atmospheric deposition of inorganic Hg, and its conversion to methylmercury (MeHg), the bioaccumulating and toxic form. Characterizing biotic MeHg is important for evaluating aquatic ecosystem responses to changes in Hg inputs. Aquatic insects possess many qualities desired for MeHg biomonitoring, but are not widely used, largely because of limited information regarding percentages of total mercury (THg) composed of MeHg (i.e., MeHg%) in various taxa. Here, we examine taxonomic, spatial, and seasonal variation in MeHg% of stream-dwelling predator and primary-consumer insects from nine streams in the Adirondack region (NY, USA). Predator MeHg% was high (median 94%) and did not differ significantly among five taxa. MeHg% in selected dragonflies (the most abundant predators, Odonata: Aeshnidae and Libellulidae)

exhibited little seasonal and spatial variation, and THg concentration was strongly correlated with aqueous (filtered) MeHg (FMeHg;  $r_s = 0.76$ ). In contrast, MeHg% in primary consumers—shredders (northern caddisflies [Trichoptera: Limnephilidae]) and scrapers (flathead mayflies [Ephemeroptera: Heptageniidae]), were lower (medians 52% and 35%, respectively), and differed significantly between taxa, among sites, and seasonally. Correlations of THg with FMeHg were weak (shredders,  $r_s = 0.45$ ,  $p = 0.09$ ) or not significant (scrapers,  $p = 0.89$ ). The higher MeHg% of predators corresponded with their higher trophic positions (indicated by nitrogen stable isotopes). Results suggest obligate predators hold the most promise for the use of THg as a surrogate for MeHg biomonitoring with aquatic insects within the Adirondack region." (Authors)] Address: Riva-Murray, Karen, U.S. Geological Survey, 425 Jordan Road, Troy, NY 12180, USA. Email: krmurray@usgs.gov

**19615.** Röbelen, F.; Schütte, K. (2020): Atlas der Libellen Hamburgs. Arbestand, Verbreitung, Gefährdung, Schutz. Behörde für Umwelt, Klima, Energie und Agrarwirtschaft, Abteilung Naturschutz: 160 pp. (in German) [distribution atlas of the odonata fauna of the city of Hamburg, Germany. [https://www.hamburg.de/contentblob/14973706/075d3db15-61cbc97baadb4292b4c359d/data/atlas-libellen-20\\_20.pdf](https://www.hamburg.de/contentblob/14973706/075d3db15-61cbc97baadb4292b4c359d/data/atlas-libellen-20_20.pdf)] Address: Herausgeber: Freie und Hansestadt Hamburg, Behörde für Umwelt, Klima, Energie und Agrarwirtschaft, Amt für Naturschutz, Grünplanung & Energie, Abteilung Naturschutz, Neuenfelder Str. 19, 21109 Hamburg, Germany

**19616.** Satterfield, D.A.; Sillett, T.S.; Chapman, J.W.; Altizer, S.; Marra, P.P. (2020): Seasonal insect migrations: massive, influential, and overlooked. *Frontiers in Ecology and the Environment* 18(6): 335-344. (in English) ["During seasonal changes around the globe, trillions of insects are on the move. Many insect populations, including butterflies, moths, hoverflies, and dragonflies, make repeated seasonal migrations each year. It is only during the past century that biologists have come to accept the concept of insect migration, and new research using radar, citizen science, and stable isotopes has revealed unexpected insights about this phenomenon. Drawing on these findings, we demonstrate how seasonal insect movements are both massive and ecologically influential, with consequences for food webs, nutrient transport, pollination, and infectious disease. Responding to environmental changes, some mobile insect populations are declining or shifting the timing and extent of their journeys. We suggest research and policy priorities for investigating and protecting insect migrations. Outcomes from such work could transform strategies for agricultural pest control and wildlife conservation, and could help preserve the ecological functions performed by migratory insects." (Authors) The paper includes references to *Anax junius* and *Pantala flavescens*.] Address: Satterfield, Dara, Migratory Bird Center, Smithsonian Conservation Biology Institute, National Zoological Park, Washington, DC, USA. Email: dara.satterfield@gmail.com

**19617.** Thompson, D.J. (2020): Distinguishing early larval instars of Britain's two commonest damselflies, *Ischnura elegans* (Bluetailed Damselfly) (Vander Linden) and *Coenagrion puella* (Azure Damselfly) (Linn.). *J. Br. Dragonfly Society* 36(2): 131-134. (in English) ["A simple plot of hind tibia length against head width gives a clear distinction between the early larval instars of *I. elegans* and *C. puella*, Britain's two commonest damselflies." (Author)] Address: Thompson, D.J., Dept of Evolution, Ecology and Behaviour, Institute of Integrative Biology, Univ. of Liverpool, Liverpool,

L69 3BX, UK. Email: d.j.thompson@liv.ac.uk

**19618.** Wang, Z. (2020): Dragonflies and Damselflies of Northeastern China. China Forestry Publishing House: 242 pp. (in Chinese, Latin name) ["In order to raise awareness of their conservation and to provide basic information on dragonfly knowledge, the author presents the results of research on dragonflies in northeastern China in four chapters, using the natural landscape of northeastern China as a display surface. Chapter 1 deals with the status of dragonflies in biology, their biological and ecological characteristics (Chap. 2) and the significance of understanding dragonflies in general (Chap. 3). The fourth chapter is devoted to pictures of the ecology of adult damselflies, with textual notes. Of these, 26 species of damselflies, 20 species of flies and 38 species of dragonflies cover 80% of the known dragonfly species in the Northeast." (Publisher)]

## 2021

**19619.** Adedire, C.O.; Adeyemi, J.A.; Owokoniran, G.O.; Adu, B.W.; Ileke, K.D. (2021): Effects of application of copper-based fungicides in cocoa plantations on the abundance and diversity of macroinvertebrates in adjacent rivers in Southwestern Nigeria. *Ife Journal of Science* 23(2): 13 pp. (in English) ["This study investigated the relationship between the levels of fungicide pollution and the abundance and diversity of macroinvertebrate fauna in three river systems: Aponmu, Oruwo, and Owena in south-western Nigeria, which are in close proximity to cocoa plantations. For each river, three sites were selected for the collection of water and sediment samples from April to July, 2018. Prior to sample collection, the physicochemical parameters (electrical conductivity, total dissolved solutes, pH, temperature, and dissolved oxygen) were determined. Also, aquatic macroinvertebrates were collected, and were identified to generic level, where possible. The levels of copper and sulphate in the samples were determined following standard procedures. The range of mean values for the physicochemical parameters were: 0.07-0.20 mS/cm, 60.00 – 154.00 ppm, 24.60 – 28.13 °C, 6.97 – 7.43, and 0.87 – 2.87 mg/L for electrical conductivity, total dissolved solutes, temperature, pH, and dissolved oxygen respectively. The range of mean values for copper and sulphate in sediment samples were 30.58 – 56.63 mg/Kg and 787.12 – 978.33 mg/Kg respectively while those for the water samples were 2.86 – 6.93 mg/L and 476.6 – 685.58 mg/L respectively. A total of nineteen (19) macroinvertebrate genera comprising Insecta (14), Gastropoda (3), Crustacea (1), and Bivalvia (1) were recorded. Taxa richness and species diversity were higher in river Owena in comparison to rivers Aponmu and Oruwo. The high abundance of the taxa: Potamididae, Gerridae, Notonectidae, Libellulidae, and Platycnemididae in the sampled rivers notwithstanding the pollution levels is an indication that these taxa are capable of thriving in polluted aquatic systems." (Authors) Odonata identified are a mixture from American and Asian species.] Address: Adeyemi, J.A., Department of Biology, School of Sciences, Federal University of Technology, P.M.B. 704, Akure, Ondo State, Nigeria. E-mail: jaadeyemi@futa.edu.ng;

**19620.** Aguilera, V.; Silva, C. (2021): The names for dragonflies in the linguistic atlas of Brazil: A study on the motivation of signs. *Alfa: Revista de Linguística* 65 13455: 25 pp. (in English) ["The names attributed to the libélula (dragonfly) – long, thin body insect, with four transparent wings, which flies and hits the rear in the water –, Question 85 of the semantic-lexical questionnaire (QSL in Portuguese) of

the Linguistic Atlas of Brazil, exemplify the complex variational system of the lexicon of Brazilian Portuguese (BP), reflecting facts from the socio-history of each region and, even, each location and each individual. The variants registered in ALiB, in the state capitals, suggest that the insect's name is, in general, of metaphorical basis, motivated by its physical aspect, sound, movements and, equally, through mental associations/analogies with similar ones, resulting, in most cases, in transparent signs. In order to ratify or, perhaps, rectify the results of the capitals, in this work, we analyzed the data collected through the country's hinterlands from 900 informants, totaling 225 locations. With the support of this corpus, guided by the theoretical and methodological principles of Lexicography and Semantics, we aim to: (i) verify the dictionary entries of the forms obtained; (ii) describe the variants in terms of morphological aspects; and (iii) analyze these denominations from the perspective of motivational semantics." (Authors)] Address: Aguilera, V., Universidade Estadual de Londrina (UEL). Londrina – PR, Brazil. email: vanderci@uel.br

**19621.** Akhmedova, M.Sh.; Medetov, M.J.; Abdullayev, I.I. (2021): Fauna of dragonflies (Odonata: Anisoptera, Zygoptera) In Khorezm oasis, Uzbekistan. *Nat. Volatiles & Essential Oils* 8(6): 1792-1798. (in English) ["The article presents the results of odonatafauna of the Khorezm oasis in the north - western part of Uzbekistan for 2020-2021. Observations were made at seven points in different biotopes of the oasis. Observations were made in the spring-summer-autumn seasons, when the temperature rose above +20 C. According to the results, 23 species of odonatafauna belonging to 5 families and 8 subfamilies were identified. They are divided into three groups according to their dominance: D = dominant, SD = subdominant R = rare species. Accordingly, dominant species account for 17%, subdominant species for 22%, and rare species for 61%. There are 11 palearctic species (47.8%), 7 cosmopolitan species (30.4%), 2 holarctic and transpalearctic species each (8.7%), and 1 Australia-Asian species (4.3%)."] (Authors)] Address: Akhmedova M.Sh, Khorezm Mamun Academy, 220900, Khiva, Markaz Str., 1, Uzbekistan

**19622.** Al Mousa, M.A. (2021): Studies on the Odonata and Trichoptera of high-elevation lakes of northern Colorado and Southern Wyoming. MSc thesis, Colorado State University, Fort Collins, Colorado: VIII + 178 pp. (in English) ["Freshwater biodiversity loss is a major concern, and global warming is already causing a significant role in species extinctions. The main goal of this research was to provide a baseline for specific aquatic insect species distributions at high-elevation lentic habitats in Northcentral Colorado and Southern Wyoming. I provided occurrence records of the Hudsonian Emerald dragonfly (*Somatochlora hudsonica*, HED) in Northcentral Colorado and Southern Wyoming. The HED is the only Colorado dragonfly listed as threatened by the US Forest Service. It was ranked as critically imperiled in Colorado and vulnerable in Wyoming. I used Maxent (Maximum entropy), a machine learning program that uses species presence data and environmental variables to predict the potentially suitable habitat for species. Maxent was used to plot a map of the potentially suitable habitats of HED. Temperature seasonality, mean temperature of wettest quarter, precipitation of warmest quarter, precipitation of driest quarter, and precipitation seasonality were the key environmental factors for predicting the occurrence of HED in appropriate high-elevation lakes of Northcentral Colorado and Southern Wyoming with an accumulated contribution of 91%. Results of this study provided baseline data for the US

Forest Service to assist to evaluate the conservation status of HED and potentially initiate protection plans in two national forests (The Arapaho & Roosevelt National Forest and the Medicine Bow & Routt National Forest) in Colorado and Wyoming. I report adult caddisflies from 136 montane and alpine lentic habitats, primarily lakes, of seven northern Colorado counties for the first time. My objective was to provide species records of adult and larval caddisflies from high-altitude lentic habitats that are not generally well sampled. These lakes may be potentially impacted by current and future global climate change scenarios. Field collection of adults and rearing of larvae were included with available unpublished and published records, resulting in 541 confirmed records of caddisfly species. Forty-nine species, representing 24% of all known Colorado caddisflies are documented. Seven families and 24 genera are represented. The Limnephilidae comprised 76% of the 49 recorded species. The other six families were usually represented by only one to four species. Distribution maps are presented for the six families and the most common limnephilid species. Montane and alpine lakes are vulnerable ecosystems likely to be impacted by climate change. Comprehensive faunal surveys are key to understanding long-term biodiversity changes and establishing conservation needs and priorities. In addition, species lists of taxa are important to monitor future faunal biodiversity changes." (Author)] Address: not stated

**19623.** Augustine, B.; Eo, J.; Kim, M.-H.; Kim, M.-K.; Choi, S.-K.; Yeob, S.-J.; Bang, J.-H.; Danquah, O. (2021): Effects of temperature and water management in rice fields on larval growth of *Pantala flavescens* (Odonata: Libellulidae). *Korean Journal of Environmental Biology* 39(4): 536-541. (in English) ["*P. flavescens* is a dominant Odonata species in the rice fields in Korea. To determine the effects of different temperatures on its larval growth and emergence, field and laboratory experiments were conducted. Larval growth was also monitored in mono-cropping and double-cropping rice fields. The growth of larvae was monitored every week by measuring the head width. In the field experiment, no difference was found in larval growth and emergence between the control temperature and +1.9°C of the control temperature. The larval growth was greater at 23°C than at 20°C laboratory temperatures, and no emergence was recorded at either temperature after eight weeks of monitoring. There was a quadratic relationship between larval growth and temperature in an incubator at five temperature regimes of 15, 20, 25, 30, and 35°C. Midseason water drainage caused the extinction of the existing individuals and newly hatched larvae dominated after re-watering in the rice fields. Larval size was greater in double-cropping fields than in mono-cropping fields in late July but the tendency was reversed in early August. The results of this study suggest that temperature warming will directly promote the larval growth of *P. flavescens* and indirectly influence seasonal growth via changes in water management in rice fields." (Authors)] Address: Eo, J., National Institute of Agricultural Sciences, Wanju 55365, Republic of Korea. E-mail. eo.jiny@korea.kr

**19624.** Basooma, A.; Teunen, L.; Semwang, N.; Bervoets, L. (2021): Trace metal concentrations in the abiotic and biotic components of River Rwizi ecosystem in Western Uganda, and the risks to human health. *Heliyon* 7(11): e08327: 13 pp. (in English) ["Highlights: • Surface waters at Katenga and Kayanja were contaminated with gold and mercury. • Concerning metals the surface water was generally safe for human consumption at most sites. • The sediment trace metal levels posed no ecological risks to the benthic biota. • Arsenic and mercury concentrations in *Brycinus sadleri*

muscle posed a potential human health risk. Abstract: The distribution of metals in the Rwizi River ecosystem was investigated and human health risks were assessed. Samples of water, sediment, damselfly larvae (*Ceriatrigon glabrum*) and fish species (*Brycinus sadleri* and *Barbus altianalis*), were collected at six sites. In all samples the trace elements As, Al, Au, Cd, Co, Cu, Fe, Hg, Mn, Pb, Zn, were quantified. Sediment samples near the gold mine had significantly higher concentrations of Hg, Fe and Al although all the concentrations were below the probable effect concentrations (PEC). The dissolved concentrations of trace metals were within the European standards and WHO drinking water guidelines. However, Fe and Mn concentrations exceeded the standards at three sites. The damselfly larvae were good indicators of local metal pollution. The fish species accumulated metal levels in the order gills>liver>muscle for most metals except for Hg. Multiple regressions between accumulated metals in damselfly with environmental metal levels showed only for Au and Cd significant positive relationships. Relating environmental metal levels and physico-chemical characteristics to the levels in the invertebrates, only for Cu and Pb significant relationships were found. With respect to the measured metals, the fish were safe for human consumption in most cases although *Brycinus sadleri* posed a potential health risk due to a As hazard quotient (HQ) of 2.2 that exceeded the critical value of 1. Similarly, the maximum edible risk-free quantity (Q) for As in *Brycinus sadleri* was 1.5 g (95 % CI), less than the minimum risk free quantity of 31.5 g. In conclusion, the river water was safe for drinking but the extraction of gold using Hg should be replaced with an environmentally friendly method or an effective wastewater treatment should be instituted. People should be cautioned from consuming *Brycinus sadleri* to avoid potential health hazards." (Authors)] Address: Bervoets, L., Department of Biology, Laboratory of Systemic, Physiological and Ecotoxicological Research, University of Antwerp, Groenenborgerlaan, 171 2020, Antwerp, Belgium. Email: lieven.bervoets@uantwerpen.be

**19625.** Behr, H. (2021): Fotonachweis von *Stylurus flavipes* (Odonata: Gomphidae) in Schwerin. *Virgo* 24: 79. (in German) [On 15 August 2020, a photo record (Fig. 1) of a female of *S. flavipes* was made in the former Wüstmark gravel pit near Schwerin in Mecklenburg-Western Pomerania, Germany. This site is far away (at least 60 km) from the previously known larval habitats on the Elbe in this federal state. Especially female imagines of this stenotopic species were relatively rarely observed close to the breeding water. In the literature, records at distances of up to 25 km (Wildermuth & Martens 2019) or 35 km (Menke et al. 2016) from the nearest river have been described. Mauersberger (2013) also reports colonisation of suboptimal water bodies, smaller rivers and canals, as well as individual finds in Brandenburg that cannot be assigned to any reproductive habitat. Overall, the species, which is protected throughout Europe under Annex IV of the Habitats Directive, appears to have been recolonising suitable habitats at the western limit of its distribution since the 1990s, following considerable population declines on large rivers in Central and Western Europe (Wildermuth & Martens 2019). From Mecklenburg-Western Pomerania, observations of this stream valley species are so far only available from the Elbe region (Bönsel & Frank 2013)."] (Author/DeepL)] Address: Behr, H., Herrengrabenweg 57, 19061 Schwerin, Germany. Email: hauke-behr@web.de

**19626.** Beukema, J.J. (2021): Upstream and downstream movements in adults of stream-dwelling Odonata. *Odonatologica* 50(3/4): 239-250. (in English) ["Based on data from

the literature on along-stream movements of adult stages of Odonata, comparative preference for upstream or downstream movement is evaluated. The great majority of publications reported upstream movement. Upstream migration was reported particularly in species of Calopterygidae and Gomphidae. Upstream movements are potentially functional: they compensate for downstream larval drift. The mechanism behind the net directed movements, however, is unknown and controversial. Movements in general may be largely undirected, but, in the presence of downstream drift by larvae an innate tendency either to move upstream or to stay at upstream locations is expected." (Author)] Address: Beukema, J.J., Linieweg 19, NL 1783 BA Den Helder, The Netherlands. Email: jan.beukema@outlook.com

**19627.** Blow, R.; Willink, B.; Svensson, E.I. (2021): A molecular phylogeny of forktail damselflies (genus *Ischnura*) reveals a dynamic macroevolutionary history of female colour polymorphisms. *Molecular Phylogenetics and Evolution* 160 (2021) 107134: 12 pp. (in English) ["Colour polymorphisms are popular study systems among biologists interested in evolutionary dynamics, genomics, sexual selection and sexual conflict. In many damselfly groups, such as in the globally distributed genus *Ischnura* (forktails), sex-limited female colour polymorphisms occur in multiple species. Female-polymorphic species contain two or three female morphs, one of which phenotypically matches the male (androchrome or male mimic) and the other(s) which are phenotypically distinct from the male (heterochrome). These female colour polymorphisms are thought to be maintained by frequency-dependent sexual conflict, but their macroevolutionary histories are unknown, due to the lack of a robust molecular phylogeny. Here, we present the first time-calibrated phylogeny of *Ischnura*, using a multispecies coalescent approach (StarBEAST2) and incorporating both molecular and fossil data for 41 extant species (55% of the genus). We estimate the age of *Ischnura* to be between 13.8 and 23.4 millions of years, i.e. Miocene. We infer the ancestral state of this genus as female monomorphism with heterochrome females, with multiple gains and losses of female polymorphisms, evidence of trans-species female polymorphisms and a significant positive relationship between female polymorphism incidence and current geographic range size. Our study provides a robust phylogenetic framework for future research on the dynamic macroevolutionary history of this clade with its extraordinary diversity of sex-limited female polymorphisms." (Authors)] Address: Blow, Rachel, Department of Zoology, University of Cambridge, Cambridge, UK

**19628.** Bota-Sierra, C.A.; Flórez-V, C.; Escobar, F.; Sandoval-H., H.; Novelo-Gutiérrez, R.; Londoño, G.A.; Cordero-Rivera, A. (2021): The importance of tropical mountain forests for the conservation of dragonfly biodiversity: A case from the Colombian Western Andes. *International Journal of Odonatology* 24: 233-247. (in English) ["Forests have been widely recognized as key habitats for odonate (dragonflies and damselflies) biodiversity, but the importance of forests for holding odonate biodiversity remains understudied in tropical mountains, one of the most diverse ecosystems on the planet. Here we describe the odonate assemblage composition along the elevation gradient in the Tamá Mountains (Colombian Cordillera Occidental). We analyzed the effects of elevation, habitat, and suborder on species richness and endemism. We found that the richest assemblage occurred in the foothills between 300 and 600 m, where the biotas of the Chocó biogeographic region and



the Tropical Andes converge. Anisoptera richness was higher in open habitats, that of Zygoptera higher in forests. Richness and endemism decreased with elevation, and no relation between habitat and richness was found. However, the number of endemic species was strongly related to forests, which harbored 25 out of 28 endemic species. Also, forest odonates had narrower elevation ranges than open-habitat odonates. These patterns can be explained because tropical mountains were historically covered by forests, while open habitats derived from human activities (i.e., pastures) that have flourished in the past centuries. The forest odonate assemblages at different elevations have been evolving for millions of years, in relatively stable ecological conditions, which could promote the high number of forest endemics in the tropical mountains. Our results emphasize the role of tropical mountain forests in the conservation of Odonata diversity." (Authors)] Address: Bota-Sierra, C.A., Red de Biodiversidad y Sistemática, Instituto de Ecología, A.C., Xalapa, México, Email: corneliobota@gmail.com

**19629.** Brito, J.S.; Michelan, T.S.; Juen, L. (2021): Aquatic macrophytes are important substrates for Libellulidae (Odonata) larvae and adults. *Limnology* 22: 139-149. (in English) ["Understanding the role of abiotic and biotic factors on biological communities is a challenge for ecologists. Individuals of the order Odonata have a close connection with these factors, which can influence the establishment of each stages of life. This study evaluated the relationship between habitat complexity and limnological variables on the diversity of Libellulidae larvae and adults. Our hypotheses were that (i) limnological variables would have a greater influence than habitat complexity on larvae and (ii) habitat complexity would influence more adults. Forty-six sampling sites were evaluated in the Brazilian Amazon region. Our results indicated the effects of limnological variables and habitat complexity on both life stages, with higher influence of the first on larvae and the second on adults, mainly for species composition. The abundance of the *Eichhornia azurea*, which has enormous morphological plasticity, together with the presence of a range of other macrophyte species provides different habitat architectures, with more suitable microhabitats for different odonates. The habitat complexity metrics had combined effects on the larvae, presumably because of the greater availability of refuges from predators and food sources. In contrast, in the adults, the relationship with habitat complexity is associated with the availability of ovipositing sites and perches." (Authors)] Address: Brito, J.S., Lab. of Ecology & Conservation, Institute of Biological Sciences, Universidade Federal Do Pará, Belém, Pará, Brazil

**19630.** Brockstedt, M.; Joest, R.; Schukys, H.; Seehausen, M. (2021): Schlupf von *Neurothemis ramburii* in einem Göttinger Aquarium – erster Nachweis für Europa. *Libellula* 40 (3/4): 173-178. (in German, with English summary) ["On March 26th, 2020 (possibly also on the 25th) two individuals of *N. ramburii* (1 ♂, 1 ♀) emerged from an aquarium in Göttingen, Germany. The specimens were handed over to the natural history collections of the Museum Wiesbaden. This is the first record of this species in Germany and Europe. It increases the number of exotic dragonflies found in Germany to ten species. As with most of the exotic dragonfly species found in German aquariums so far, *N. ramburii* is an Asian species with a broad ecological amplitude." (Authors)] Address: Seehausen, M.; Fährhofstr. 11, 18439 Stralsund, Germany. Email: m.seehausen@gmx.de

**19631.** Büsse, S.; Tröger, H.-L.; Gorb, S.N. (2021): The toolkit of a hunter – functional morphology of larval mouthparts

in a dragonfly. *Journal of Zoology* 315(4): 247-260. (in English) ["The diversity of mouthpart specializations in insects is staggering. As a direct consequence thereof, the knowledge about the mouthpart geometry, muscle attachment and feeding kinematics is incomplete for the vast majority of insect taxa – as it is for dragonflies. The adult dragonflies catch their prey in flight, while the aquatic larvae prey under water – both life stages being key predators in their biotopes. To gain insights into the functional morphology of the biting-chewing mouthparts of larval *Anax imperator*, we combined results from micro computed tomography ( $\mu$ CT), confocal laser scanning microscopy (CLSM) and high-speed videography. *Anax imperator* larvae were filmed during the feeding process to describe the movement and coordination of the mouthparts. These results, together with  $\mu$ CT-data, allowing for a comprehensive visualization of the 3D-geometry and corresponding musculature of each mouthpart. The material composition of the cuticle strongly influences the strength, mobility and durability of the cuticular components of the mouthparts. With this paper, we elucidate the anatomy, geometry and material composition of *A. imperator*'s larval mouthparts in the light of the feeding process. Furthermore, we try to lay a foundation for functional morphological comparisons of mouthparts (1) between dragonfly species belonging to different eco-types according to their food preferences and feeding habits or even (2) between different insect groups." (Authors)] Address: Büsse, S., Dept of Functional Morphology & Biomechanics, Inst. Zool., Kiel University, Am Botanischen Garten 9, 24118 Kiel, Germany. E-mail: sbuesse@zoologie.uni-kiel.de

**19632.** Buskirk, J. van; Smith, D.C. (2021): Ecological causes of fluctuating natural selection on habitat choice in an amphibian. *Evolution* 75(7): 1862-1877. (in English) ["We estimated natural selection targeting three traits related to habitat choice in a frog (*Pseudacris maculata*) breeding in pools on the rocky shores of Isle Royale, Michigan, over 16 years. Our aim was to identify the form and ecological causes of annual variation in directional and correlational selection as expressed in the survival and growth of tadpoles. We found directional selection favoring early breeding, but pool choice was under weak stabilizing selection. However, the form of stabilizing selection and the position of the optimum trait value shifted among years with the severity of disturbance and the intensity of biotic interactions. In years when wave wash and pool desiccation were severe, selection shifted to favor tadpoles in habitats where these risks were less pronounced. If predatory dragonfly larvae [*Aeshna juncea*] were abundant, selection favored tadpoles in small pools where dragonflies did not occur. When intraspecific competition was strong, selection favored early broods within a broader range of pool types. The agents of selection in this study-biotic interactions and disturbance-are common to many ecological systems and frequently exhibit temporal variation; this suggests that fluctuating selection may be widespread in natural populations." (Authors)] Address: Buskirk, J. van, Institute of Zoology, Univ. of Zürich, 8057 Zürich, Switzerland. E-mail: jvb@zool.unizh.ch

**19633.** Cardo-Maeso, N.; Díaz-Martínez, C.; Requena-Valcuende, M. (2021): Nuevos registros de *Oxygastra curtisii* (Dale, 1834) (Odonata: incertae sedis) en Castilla-La Mancha (centro-este de España). Article in *Boletín de la Sociedad Entomológica Aragonesa* 69: 214-216. (in Spanish, with English summary) ["New records of *O. curtisii* in Castilla-La Mancha (east-center of Spain) Abstract: In Castilla-La Mancha, *O. curtisii* was only reported from two sites in the province of Cuenca. Here we communicate three new

localities that are the first records of this species for the provinces of Guadalajara, Toledo and Albacete; and allow us supposing that it could occur throughout the administrative region, since the lagoons of Ruidera, apart from Albacete, are also located in the province of Ciudad Real. The importance of the study of larvae in faunistics is highlighted." (Authors)] Address: Cardo-Maeso, Nuria, Sociedad Entomológica y Ambiental de Castilla-La Mancha, C/ Londres, 7, 45003 Toledo, Spain. Email: cmvega@gmail.com

**19634.** Chandran, R.; Chandran, A.V. (2021): Dragonflies and damselflies (Insecta: Odonata) of Aryanad Grama Panchayat, Kerala, India. *Journal of Threatened Taxa* 13(14): 20153-20166. (in English) ["A year-long study to document the diversity and seasonality of odonates was conducted at Aryanad Grama Panchayat, Thiruvananthapuram district, Kerala, southern India. A total of 93 species (56 dragonflies and 37 damselflies) belonging to 12 families were recorded. Twenty-four species of odonates recorded are endemic to the Western Ghats, three to peninsular India and one to India. Small streams showed the highest species richness, hosting 69 species and ponds the lowest with 59 species. Species richness showed a peak during the southwest monsoon season and a dip in winter. The study highlights the importance of biodiversity documentation at regional level." (Authors)] Address: Chandran, R., Society for Odonate Studies, Vellooparampil, Kuzhimattom PO, Kottayam, Kerala 686533, India

**19635.** Chen, Y.-H.; Chen, H.-Y.; Lai, C.-J.; hsu, J.-H.; Li, K.-Y.A.; Yang, H. (2021): Tunable omnidirectional antireflection coatings inspired by inclined irregular nanostructures on transparent Blue-Tailed Forest Hawk dragonfly wings. *Langmuir* 37(31): 9490-9503. (in English) ["Randomly arranged inclined irregular nanostructure-covered blue-tailed forest hawk dragonfly wings are highly transparent for wide viewing angles. Inspired by the dragonfly wings, monolayer silica colloids are self-assembled on shape memory polymer-coated substrates and utilized as plasma etching masks to pattern disorderly arranged inclined irregular conical structures. The structures build gradual refractive index transitions at various angles of incidences, resulting in omnidirectional antireflection performance over the whole visible wavelength region. In comparison with a bare substrate, the optimized structure-covered substrate presents 10% higher optical transmission at 0° and even 41% higher optical transmission at an angle of incidence of 75°. Importantly, by manipulating the structural configuration of the shape memory polymer-based structures, the corresponding antireflection characteristics can be instantaneously and reversibly eliminated and recovered after drying out of common household liquids or applying contact pressures in ambient environments. The tunable omnidirectional antireflection coatings are prospective candidates for realizing optical modulation, which exhibits an enormous application value in smart windows, intelligent display screens, optical components, and novel optoelectronic devices.] Address: Chen, Y.-H., Dept Chemical Engineering, Nat. Chung Hsing Univ., 145 Xingda Road, Taichung City 40227, Taiwan

**19636.** Cho, S. (2021): Korean Odonata - Adult and Larva. Kwangil Publishing Co. ISBN: 978-89-86752-76-2 96490: 404 pp. (in bilingual English/Korean) ["A detailed guide for those who want to look over and be able to identify the dragonflies of Korea and East Asia. This book contains photographs of all 94 South Korean species with high-resolution photos of adults in dorsal, lateral, and anterior view, together with caudal appendages, larvae, teneral (by in-house

breeding & emerging for the purpose of correctly identifying larva species), distribution maps, and distinction of adults & larvae in a family or a genus. The appendix includes dragonflies in the Northern half of the Korean peninsula as well as migration records.]

**19637.** Chovanec, A. (2021): Variationen der Bereifung beim Großen Blaupfeil, *Orthetrum cancellatum* (Linnaeus, 1758) (Odonata: Libellulidae). *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen* 73: 1-17. (in German, with English summary) ["Variations of pruinescence in the black-tailed skimmer, *Orthetrum cancellatum* (Linnaeus, 1758) (Odonata: Libellulidae). – The present paper deals with strong pruinescence in male and female *Orthetrum cancellatum* (Linnaeus, 1758) specimens documented in Lower Austria near Vienna in 2016. Even in middle-aged males, the thorax was wax-covered to a degree known particularly from the southern parts of the species' distribution range. Moreover, frontes, veins at the wing base, second abdominal segments and femora were also covered with wax. A mature middle-aged female was characterised by intense pruinescence on the ventral surface of the abdomen. The clinal phenotypic variation of this species is discussed for the first time on the basis of specimens recorded in Austria. Key word s: *Orthetrum cancellatum*, Libellulidae, pruinosity, thermoregulation, clinal variation." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-Mail: andreas.chovanec@bmlrt.gv.at

**19638.** De, K.; Sharma, S.; Singh, A.P.; Uniyal, M. (2021): Checklist of Odonata (Insecta) of Doon Valley, Uttarakhand, India. *Journal of Threatened Taxa* 13(14): 20167-20173. (in English) ["In this communication, we have collated a checklist of 97 species of odonates from Doon valley, Uttarakhand by reviewing the literature. These species are distributed across 13 families, 58 genera, and eight superfamilies. Of these species, 60 were Anisoptera and 37 were Zygoptera. Among the odonates reported from the Doon valley, three dragonflies namely *Anormogomphus heteropterus* Selys, 1854, *Burmogomphus sivalikensis* Laidlaw, 1922, and *Hylaeothemis gardeneri* Fraser, 1927 and two damselflies *Agriocnemis corbeti* Kumar & Prasad, 1978 and *Calicnemia doonensi* Sangal & Tyagi, 1984 are endemic to India. This checklist updates existing knowledge on insect diversity in the Doon valley and will aid conservation management of wetlands in the region." (Authors)] Address: De, K., Department of Life Sciences, Sri Sathya Sai University for Human Excellence, Navanihal, Karnataka 585313, India. Email: kritish.de@gmail.com

**19639.** De, K.; Sarkar, A.; Singh, K.; Uniyal, V.P.; Johnson, J.A.; Hussain, S.A. (2021): Diversity of aquatic insects and biomonitoring of water quality in the upper Ganga River, a Ramsar site: a preliminary assessment. *Journal of Threatened Taxa* 13(13): 20011-20018. (in English) ["Monitoring of freshwater habitats through aquatic insects is widely used. A study was carried out in March, 2019 at 14 sites in the Upper Ganga River between Brijghat and Narora, a riverine Ramsar site in India, to document the diversity of three major aquatic predatory insect groups—Odonata, Coleoptera, and Hemiptera—and determine their biomonitoring potential. The study recorded three species of Coleoptera, four Hemiptera, 14 dragonflies, and eight damselflies. The Shannon diversity index (H') ranged from 2.465 to 2.782, Pielou's Evenness index (J') from 0.841 to 0.894, and Berger-Parker index of dominance (d) from 0.122 to 0.243. Families Libellulidae (Odonata), Coenagrionidae (Odonata) and Gerridae (Hemiptera) had high relative abundance and

dominant status. The stream invertebrate grade number-average level (SIGNAL2) score (for family) ranged from 2.316 to 3.174, lying within quadrant 2 of the SIGNAL2 (family) quadrant diagram. This suggested that the water in the area is likely to have high levels of turbidity, salinity, or nutrients, caused naturally or by anthropogenic activities, and the water has low levels of most toxic chemicals." (Authors)] Address: De, K., Department of Life Sciences, Sri Sathya Sai University for Human Excellence, Navanihal, Okali Post, Kamalapur, Karnataka 585313, India

**19640.** De Knijf, G.; Wils, C.; Maes, D. (2021): IUCN Rode Lijst van de libellen (Odonata) in Vlaanderen. Rapporten van het Instituut voor Natuur- en Bosonderzoek 2021 (59): 58 pp. (in Dutch, with English summary) ["The Red List criteria of the International Union for Conservation of Nature (IUCN) are intended to be an easily and widely understood system for classifying species at high risk of extinction. However, while the Red List may focus attention on those taxa at the highest risk, it is not a means of setting priorities for conservation measures for their protection. These Red List criteria recommend revising Red Lists every ten years. The previous Red List dated from 2006. Because many new data have become available and the status of several species has changed since then, the current state of dragonflies in Flanders was assessed according to the international IUCN Red List criteria. For this, we used four of the five possible IUCN-criteria, namely changes in distribution (IUCN criterion A), the area size (IUCN criterion B) and the estimated population size (IUCN criteria C and D). In total, 59 species were evaluated against these criteria and then assigned to the corresponding IUCN Red List category. Some new species have recently colonised Flanders (*Coenagrion scitulum*, *Aeshna affinis*, *Anax parthenope* and *Sympetrum meridionale*) and are now classified as resident species, due to their rapid expansion. A total of: „\* 5 species are Regionally Extinct in Flanders: *Coenagrion mercuriale*, *Nehalennia speciosa*, *Aeshna subarctica*, *Epitheca bimaculata* and *Oxygastra curtisii*; „\* Seven species are Critically Endangered: *Coenagrion hastulatum*, *C. lunulatum*, *Somatochlora arctica*, *Leucorrhinia caudalis*, *L. pectoralis*, *Sympetrum depressiusculum* and *S. flaveolum*; „\* Four species are Endangered: *Aeshna juncea*, *Cordulegaster boltonii*, *Leucorrhinia rubicunda* and *Sympetrum danae*; „\* Four species are Vulnerable: *Gomphus vulgatissimus*, *Leucorrhinia dubia*, *Sympetrum pedemontanum* and *S. vulgatum*; „\* One species is Near Threatened: *Gomphus pulchellus*; „\* The remaining 43 species are of Least Concern. We discuss the IUCN-criteria used per species and compare the new Red List with the previous Red Lists by means of the so-called Red List Index. Overall, dragonflies and damselflies in Flanders are doing better than in previous decades. This is mainly due to species of nutrient-rich waterbodies that are doing markedly better than in the past as a result of habitat restoration, creation of new ponds (e.g. garden ponds) and waters in an urban or industrial context, and to species that benefit from climate warming. The group of 'southern' species enabled to successfully colonize Flanders also contributed to an increase in the number of Least Concern species. However, species from nutrient-poor waterbodies (fens, peatbogs and other oligotrophic waters) continue to perform poorly and deserve special attention in nature policy and nature management. Populations of several species decreased dramatically in the last 5 years. Those species are negatively affected by still too high nitrogen deposition in Flanders, increased warm weather and extreme drought events leading to (partially) desiccation of these kinds of waters, and in many cases from too intensive management of

their terrestrial habitat, resulting in the cutting of shrubs and trees near their reproductive biotopes. The drawing up of one or more Species Protection Plans is therefore more than urgently needed if we do not want to have these species disappear permanently from Flanders.] Address: Knijf, G. de, Research Institute for Nature and Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. E-mail: [geert.deknijf@inbo.be](mailto:geert.deknijf@inbo.be)

**19641.** de Vries, R.; Middelbos, R. (2021): A minor invasion of the Yellow-winged darter (*Sympetrum flaveolum*) in the Netherlands in 2020. *Brachytron* 22(1/2): 3-12. (in Dutch, with English summary) ["An invasion of *S. flaveolum* reached the Netherlands in August 2020. The first observation was made on 12 August, and on 14 August at least 40 individuals were observed on the island of Terschelling. Observations were made during August and September from 18 localities in the northern half of the Netherlands, including 37 individuals on 21 August in Eemshaven. Aggregations of dozens of individuals had not been observed in the Netherlands since 2008. Both recent aggregations were only seen on one day and consisted solely (Terschelling) or in large majority (Eemshaven) of males. The contemporary arrival of wandering individuals of *S. danae* at both locations corresponds with observations of this species during earlier influxes of *S. flaveolum* in Western Europe. Like earlier invasions, this influx occurred after persistent eastern winds coming from northern Germany, Poland and countries further eastwards. It is thus likely that the Dutch invasions of *S. flaveolum* originated in these countries. The number of *S. flaveolum* that reached the Netherlands in 2020 was only a fraction of the size of previous invasions. This strong decline is most probably a reflection of the strong decline of this species in Germany and Poland, and possibly even more countries in Central and Eastern Europe." (Authors)] Address: Reinier de Vries: [vries.reinier@gmail.com](mailto:vries.reinier@gmail.com)

**19642.** Dey, A.; Khan, P., Barik, S.; Mishra, A.K.; Sundi, P. (2021): Aquatic fauna of Suleipat reservoir, Mayurbhanj, Odisha, India. *e-planet* 19(2): 134-141. (in English) ["This survey was conducted to analyse the diversity of aquatic fauna at Suleipat reservoir. The distribution and diversity of aquatic fauna, and physical, parameters of Suleipat reservoir were studied in the latitude and longitude of 22.122541° N and 86.237750° E. In the study area 4 sites were sampled. Fauna and water variables were randomly collected 8-10 times. This study focused the diverse assemblage of both vertebrate and invertebrate indices. Overall, 87 species were recorded from the study site. Among the aquatic fauna collected from the reservoir, the order Odonata and Agnatha were the most dominant orders varies impressive numbers. The highest Simpson and Shannon index of diversity was 0.64325 and 1.382375, and the evenness index was 0.671875. The high species diversity and evenness in all the sites indicated a good quality of water. There was no back record found about the aquatic diversity of Suleipat reservoir near Bareservoiripahar, Rairangpur forest division in Mayurbhanj district, hence this study was undertaken." (Authors) Identifications of the Odonata should be treated with caution as some species are of European origin and don't occur in India.] Address: Sundi, P., Dept of Wildlife & Biodiversity Conservation, Maharaja Sri Ram Chandra Bhanja Deo University, Takatpur, Baripada, Odisha, India. Email: [prabhasinisundi123@gmail.com](mailto:prabhasinisundi123@gmail.com)

**19643.** Dossi, F.; Leitner, P.; Graf, W. (2021): Age matters: substrate-specific colonization patterns of benthic invertebrates on installed large wood. *Aquatic Ecology* 54: 741-

760. (in English) ["Large wood (LW) is an indispensable element in riverine ecosystems, especially in lower river parts. The presence of LW significantly shapes local hydraulics, morphology, the nutrient budget; promotes overall river dynamics; and additionally presents a unique habitat for numerous benthic invertebrate species. Therefore, LW is recognized as valuable asset for river restoration measures. Experiences from previous projects show that ecological responses on LW implementation measures vary greatly. That complicates comparisons and estimations on the success of planned measures. Methodological inconsistencies and thus reduced transferability of the results is one major issue. Additionally, wood quality aspects are suspected to be important factors affecting benthic invertebrate colonization patterns. The focus of this study is therefore to consistently assess the ecological significance of installed LW and concrete samples of similar size and shape in terms of benthic invertebrate colonization and to further test, if the condition of wood affects the benthic invertebrate colonization. Our results show that (1) installed LW serves as an abundantly and heterogeneously colonized habitat, (2) the state of decay of LW pieces significantly affects benthic invertebrate colonization in terms of density and diversity and (3) even rare or threatened taxa closely associated to LW were abundantly present on the installed logs, emphasizing the suitability of the chosen approach." (Authors) *Platycnemis pennipes*, *Calopteryx* sp., *Onychogomphus* sp., *Gomphus vulgatissimus*, *Ophiogomphus cecilia*] Address: Dossi, F., IHG – Inst. of Hydrobiology and Aquatic Ecosystem Management, BOKU - University of Natural Resources and Life Sciences, Gregor-Mendel-Str. 33, 1180 Vienna, Austria. Email: [florian.dossi@boku.ac.at](mailto:florian.dossi@boku.ac.at)

**19644.** Esposito, C.; Nardi, G. (2021): Primo caso di riproduzione di *Ischnura elegans* (Vander Linden, 1820) nelle Isole Ponziane (Odonata, Coenagrionidae). *Bollettino dell'Associazione Romana di Entomologia, Nuova Serie* 2(1-4): 1-13. (in Italian, with English summary) ["A successful breeding of *I. elegans* in the Pontine Islands (Odonata, Coenagrionidae). - The authors reports the first record of *I. elegans* successfully breeding in Ponza Island (Tyrrhenian Sea). They underline that the year of publication of its subspecies described by Erich Schmidt is 1939 and not 1938. They discuss a bibliographic record of *Anax imperator* for this island and, finally, summarize the current knowledge on the Odonata of the Ponziane Islands, where the presence of seven species of Anisoptera and one of Zygoptera has so far been ascertained." (Authors)] Address: Esposito, C., Via della Necchia est, 31 - 00049 Velletri (Roma), Italy. Email: [esposito-carm@tiscali.it](mailto:esposito-carm@tiscali.it)

**19645.** Florez-Abreu, S.; García, A.G.; Cuervo, A.M.G. (2021): Descripción histológica de la organización neuronal en el cerebro de *Argia* (Odonata: Coenagrionidae), *Stilpnochlora* (Orthoptera: Tettigoniidae) y *Pepsis* (Hymenoptera: Pompilidae). *Boletín de la SEA* 69: 106-110. (Spanish, with English summary) ["Histology is a tool that allows us to understand the tissue characteristics of organs, but its application goes beyond a simple description. Here we describe the histology of the brain of an odonate, an orthopteran and a hymenopteran, organisms with behavioral variation and differences in their evolutionary history, and compare their histological makeup. This research shows the relationship between neuronal characteristics and insect behaviour, showing the link between the morpho-neuronal aspects of hexapods and their phylogenetic origin." (Authors)] Address: Flórez-Abreu, S., Grupo de investigación en Biología evolutiva neotropical ECOBIT. Departamento de Biología,

Universidad Incca de Colombia, Bogotá, Colombia

**19646.** Fontenla, J.L.; Fontenla, Y. (2021): Mariposas (Papilionoidea) y libélulas (Odonata) de humedales al sur de las provincias de Artemisa y Mayabeque, Cuba. *Poeyana* 512: 1-12. (in Spanish, with English summary) ["Species composition and spatial patterns of butterflies and dragonflies are determined and interpreted in six areas of wetlands South of Artemisa and Mayabeque provinces, Western Central Cuba. Four sites were located along the South Dam. There were observed 41 butterflies and 20 dragonflies species. In relation to the total Cuban species in each group, local proportion was 22 % and 23 %, respectively. Butterflies exhibited spatial connectance (47 %) higher than the dragonflies' (35 %). Dissimilarity species composition among sites was high in both groups. The road to Mayabeque Beach was the most connected locality in butterflies and the stretch of the South Dam associated to Majana Beach was the most connected locality in dragonflies. The spatial pattern in butterflies was significant nested and in dragonflies did not differ from random. There was a distinct core in butterflies of habitat generalist species. The most abundant butterfly species were *Anartia jatrophae*, *Ascia monuste* y *Phoebis sennae*. It is worth to mention among dragonflies to *Pantala flavescens* and *Miathyria marcella* as abundant species, *Erythrodiplax berenice* as habitat specialist, and *Telebasis dominicana* as uncommon species." (Authors)] Address: Fontenla, J.L., Depto de Zool., Inst. de Ecología y Sistemática, Carretera de Varona No. 11835 entre Oriente y Lindero, Reparto Parajón, Municipio Boyeros, La Habana 19 C.P. 11900, Cuba. Email: [fontenla@ecologia.cu](mailto:fontenla@ecologia.cu)

**19647.** Garrido-González, C.; Navarrete-Medina, Y.; Vera-Sánchez, A. (2021): Descripción del último estadio larval de *Phyllopetalia apicalis* (Odonata: Austropetaliidae). *Revista Mexicana de Biodiversidad* 92 (2021): e923798: 12 pp. (in Spanish, with English summary) ["The last larval instar of *Phyllopetalia apicalis* (Selys, 1858) is described. Based on male and female specimens reared until emergence under laboratory conditions; the specimens were collected in the Andes mountains range of Central Chile. The morphological study has been made with optical microscopy and SEM. Additionally, a regional taxonomic key adaptation is proposed." (Authors)] Address: Vera-Sánchez, A., Universidad Metropolitana de Ciencias de la Educación, Facultad de Ciencias Básicas, Departamento de Biología, Avenida José Pedro Alessandri 774, Ñuñoa, Santiago de Chile, Chile. Email: [alejandro.vera@umce.cl](mailto:alejandro.vera@umce.cl)

**19648.** Gassmann, D. (2021): Libellenbeobachtungen am Bonner Rheinauensee. *Koenigia* 15(2): 53-63. (in German, with English summary) ["Miscellaneous observations on the dragonfly fauna of Rheinaue Lake, an inner-city artificial lake situated close to the Rhine River in Rheinaue Leisure Park and established 1979 in Bonn, Germany, are reported. 12 species in total were recorded, among them six Anisoptera (*Aeshna mixta*, *Anax imperator*, *Crocothemis erythraea*, *Libellula quadrimaculata*, *Orthetrum cancellatum*, *Sympetrum sanguineum*), and six Zygoptera (*Chalcolestes viridis*, *Enallagma cyathigerum*, *Erythromma najas*, *E. viridulum*, *Ischnura elegans*, *Lestes sponsa*). The records of *E. najas* and *L. quadrimaculata* originate from 2019 only. The biology and ecology of selected species is discussed. Both future systematic monitoring of local dragonfly species and environmental education of park visitors are recommended." (Author)] Address: Gassmann, D., Sektion Arachnida, Stiftung Zoologisches Forschungsmuseum Ale-



xander Koenig, Adenauerallee 160, D-53113 Bonn, Germany. EMail: d.gassmann@leibniz-zfmk.de

**19649.** Gefen, E.; Matthews, P.G.D. (2021): From chemoreception to regulation: filling the gaps in understanding how insects control gas exchange. *Current Opinion in Insect Science* 48: 1-6. (in English) ["The study of how insects control their gas exchange and ventilatory patterns has long been hampered by a general lack of information on the location and behavior of their central and peripheral respiratory chemoreceptors. However, the molecular insights gleaned from *Drosophila* larvae and their behavioral responses to ambient O<sub>2</sub> could provide a way forward. Firstly, whether td neurons do indeed function as peripheral respiratory chemoreceptors in *Drosophila* should be demonstrated directly through electrophysiological investigation. Identifying the same or similar neurons expressing aSGCs and/or Grs in the central and peripheral other insects, particularly locusts and cockroaches, would then allow the role of these putative chemoreceptors to be further investigated in a well-studied model for insect gas exchange regulation. In particular, determining how these respiratory chemoreceptors integrate with CPGs, and thus how they are involved in regulating episodic and continuous gas exchange patterns, will require investigations using insects known to display these patterns. But given the diverse neuroanatomy of different insect groups, the configuration in *Drosophila* is unlikely to be universal. Thus, the location and number of respiratory chemoreceptors is expected to differ between insect groups, just as vertebrates show a diversity of internally and externally oriented respiratory receptors. For example, the deaf-ferented thoracic ganglia of a locust can sense and respond to hypoxia and hypercapnia, indicating that, in these insects at least, peripheral td neurons are not necessary for respiratory chemoreception. While this could indicate that neurons expressing aSGCs and CO<sub>2</sub>-sensitive Gr receptors are present within the locust's thoracic ganglia, peripheral respiratory chemoreceptors are likely to still play a modulatory role in the intact insect. Moreover, the substantial developmental plasticity of neural elements associated with density-dependent polyphenism, bimodal breathing and holometabolous metamorphosis suggests that extrapolating the mechanistic underpinning of gas exchange in a specific life stage in one insect order to all insects in general may hinder the quest for a general explanation for the adaptive value of variation in gas exchange patterns in insects." (Authors) The paper includes a reference to Odonata.] Address: Gefen, E., Department of Biology and Environment, Faculty of Natural Sciences, University of Haifa- Oranim, Tivon, 3600600, Israel

**19650.** Gómez-Llano, M.; Germain, R.M.; Kyogoku, D.; McPeck, M.A.; Siepielski, A.M. (2021): When ecology fails: How reproductive interactions promote species coexistence. *Trends in Ecology & Evolution* 36(7): 610-622. (in English) ["That species must differ ecologically is often viewed as a fundamental condition for their stable coexistence in biological communities. Yet, recent work has shown that ecologically equivalent species can coexist when reproductive interactions and sexual selection regulate population growth. Here, we review theoretical models and highlight empirical studies supporting a role for reproductive interactions in maintaining species diversity. We place reproductive interactions research within a burgeoning conceptual framework of coexistence theory, identify four key mechanisms in intra- and interspecific interactions within and between sexes, speculate on novel mechanisms, and suggest future research. Given the preponderance of sexual reproduction

in nature, our review suggests that this is a neglected path towards explaining species diversity when traditional ecological explanations have failed." (Authors) The paper includes references to Calopteryx and Enallagma.] Address: Gómez-Llano, M., Department of Biological Sciences, University of Arkansas, Fayetteville, AR 72701, USA. Email: magomezl@uark.edu

**19651.** Guimarães, A.T.B.; Rodrigues, A.S.; Pereira, P.S.; Silva, F.G.; Malafaia, G. (2021): Toxicity of polystyrene nanoplastics in dragonfly larvae: An insight on how these pollutants can affect benthic macroinvertebrates. *Science of The Total Environment* 752, 141936: 8 pp. (in English) ["Highlights: • Polystyrene nanoplastic (PS NPs) represent an ecological risk to benthic macroinvertebrates. • PS NPs cause REDOX imbalance in *Aphylla williamsoni* larvae. • Larvae exposed to PS NPs show decreased acetylcholinesterase activity (neurotoxic effect). • PS NPs can accumulate in dragonfly larvae. Abstract: Although nanoplastics (NPs) are known to be toxic to several groups of animals, the effects of such a toxicity on freshwater benthic macroinvertebrate communities remain unknown. Thus, the aim of the current study is to test the hypothesis that polystyrene nanoplastics (PS NPs) (34µg/L - 48h of exposure) lead to biochemical damage in *Aphylla williamsoni* larvae. Data have evidenced high bioaccumulation factor in the analyzed individuals; this finding indicates that, similar to sediments, water is also part of aquatic systems and favors PS NPs retention in dragonfly larvae. Despite the lack of evidence about the interference of these pollutants in the nutritional status of the analyzed animals, their bioaccumulation was associated with REDOX imbalance featured by concomitant increase in the number of evaluated oxidative stress biomarkers (nitric oxide and lipid peroxidation) and antioxidants (antioxidant activity against the DPPH radical and the superoxide dismutase enzyme). On the other hand, the reduced acetylcholinesterase activity observed in larvae exposed to PS NPs has suggested the neurotoxic effect of these pollutants, with potential impact on their nerve and neuromuscular functions. Therefore, the current study is pioneer in showing that PS NPs can affect the health of the investigated larvae, even at small concentrations, for short exposure-time; this outcome reinforces the ecotoxicological risk of these pollutants for freshwater benthic macroinvertebrates." (Authors)] Address: Malafaia, G., Biological Research Laboratory, Goiáno Federal Institution, Urutaí Campus, Rodovia Geraldo Silva Nascimento, 2,5 km, Zona Rural, Urutaí, GO, Brazil. Email: guilhermeifgoiano@gmail.com

**19652.** Höttinger, H. (2021): Kartierung ausgewählter Schmetterlings- und Libellenarten der FFH-Richtlinie im Rahmen des Interreg-Projektes "Vogelwarte Madárvárta 2" im Neusiedler See-Gebiet, östliches Österreich (Insecta: Lepidoptera, Odonata). *Beiträge zur Entomofaunistik* 22: 227-257. (German, with English summary) ["Within the Interreg project "Vogelwarte Madárvárta" ten target species of butterflies and dragonflies were mapped on 33 days in the years 2018 and 2019 in the area of lake Neusiedl in Burgenland. Four species of dragonflies and six butterfly species were treated, all except *Phengaris alcon* mentioned in the Habitats Directive. Except *Gomphus flavipes* and *Parnassius mnemosyne* all species were found in the investigation period. [...] Dragonflies: The small populations of *Coenagrion ornatum* at a ditch in Podersdorf and at the Golser channel were confirmed. New records of some single specimens succeeded in Tadten (ditches near the wastewater treatment plant) and at the Parndorfer brook. Recom-

recommendations for maintaining ditches were elaborated. An until yet unknown population of *Ophiogomphus cecilia* has been found at a 1200 m long section at the Wulka river. The high nature conservation value of this section is strengthened by the presence of *Gomphus vulgatissimus* and *Oncyhogomphus forcipatus*. *Leucorrhinia pectoralis* was detected at seven sites at the eastern side and western side of lake Neusiedl as well. Population densities were generally small. 2019 no records were made because of desiccation of many waterbodies due to lack of rain. There is still limited information about the larval habitats of the species." (Author)] Address: Höttinger, H., Siebenbrunnengasse 46/1/4, 1050 Wien, Austria. E-Mail: helmut.hoettinger@gmail.com

**19653.** Höttinger, H. (2021): Kartierung ausgewählter Libellen- und Schmetterlingsarten der FFH-Richtlinie im Rahmen des Interreg-Projektes "WeCon" im mittleren und südlichen Burgenland, Österreich (Insecta: Odonata, Lepidoptera). Beiträge zur Entomofaunistik 22: 87-115. (German, with English summary) ["Within the Interreg project "WeCon" - development of the ecological network of wetlands in the Austrian-Hungarian border region - eleven target species of dragonflies and butterflies were mapped on 33 days in 2019 in middle and southern Burgenland near the border to Hungary. Four species of dragonflies and seven butterfly-species were treated, all mentioned in the Habitats Directive. Except *Leucorrhinia pectoralis* all species were found in the investigation period. 147 records of the target species from the years 2017-2019 were collected in a data bank and used for evaluation and GIS-application. Dragonflies: *Coenagrion ornatum* has been recorded in ditches and brooks in the area of ten villages in the district of Oberpullendorf. Recent findings in southern Burgenland are situated at the Neugraben (Unterbildein, Oberbildein, Holl and Deutsch Schutzen), Hoppachbach (Eitendorf), Limbach and Haselgraben near Urbersdorf and in the flooding area and at the Lahnbach in Heiligenkreuz. *Cordulegaster heros* has been found at brooks in woods in the area of eight villages in the district of Oberpullendorf and in the district of Jennersdorf (Neumarkt an der Raab). *Ophiogomphus cecilia* has been mapped in the area of eleven villages, besides Hammer and Glashütten near Langeck particularly at the rivers Rabinitz (Frankenau), Guns (Lockenhaus), Pinka (Woppendorf, Oberbildein, Gaas, Moschendorf) and Raab (Rax, Neumarkt an der Raab, Welten). [...] Recommendations concerning conservation and management of the habitats, monitoring and cross-border conservation corridors of the target-species are given." (Author)] Address: Höttinger, H., Siebenbrunnengasse 46/1/4, 1050 Wien, Austria. E-Mail: helmut.hoettinger@gmail.com

**19654.** Hu, F.-S.; Chen, S.-L.; Song, R.-B.; Yeh, W.-C. (2021): Variation in *Fukienogomphus prometheus* (Lief tinck, 1939) reveals *Stylurus takashii* (Asahina, 1966) as a junior synonym, with discussion on the status of *F. choifongae* Wilson & Tam, 2006 (Odonata: Gomphidae). Zootaxa 5072(1): 23-33. (in English) ["We investigate variation of body pattern in *Fukienogomphus prometheus* (Lief tinck, 1939) and notice the similarity of its female to *Stylurus takashii* (Asahina, 1966), an enigmatic species whose male is still unknown. We then review the taxonomic history of *S. takashii* and compare its holotype female with the female *F. prometheus*. Our results show *S. takashii* is a junior synonym to *F. prometheus*. We elucidate the intraspecific variation of *F. prometheus* and provide information for its ecology and distribution in Taiwan. We also discuss the similarities between the adults of *Fukienogomphus choifongae* Wilson & Tam, 2006 and *F. prometheus* which in future studies may

prove to be conspecific and will require to synonymise the two names. Finally, we confirm the genus *Stylurus* Needham, 1897 is not distributed in Taiwan." (Authors)] Address: Hu, F.S., Dept of Entomology, National Chung Hsing University, 145 Xingda Rd., Taichung, 40227, Taiwan. Email: fangshuo\_hu@smail.nchu.edu.tw

**19655.** Ishak, M.; Norhisham, A.R.; Thomas, S.M.; Nurhidayu, S.; Ghazali, A.; Azhar, B. (2021): Physicochemical properties as driver of Odonata diversity in oil palm waterways. *Frontiers in Forests and Global Change* 4:613064: 13 pp. (in English) ["Large-scale oil palm agriculture has caused deforestation in the tropics, but also degrades stream water quality and reduces aquatic biodiversity. Though the outcomes of industrial-scale oil palm plantations for biodiversity have been explored extensively, the consequences of small-scale oil palm agriculture for freshwater macroinvertebrate fauna are poorly understood. Here, we explored the impacts of small-scale oil palm agriculture on aerial adult Odonata, which, due to their inherent sensitivity to habitat degradation, represent useful indicators of wider ecosystem health. We surveyed riparian corridors of man-made waterways in natural habitats converted into agricultural lands in both peat swamp and mangrove forest, comprising a total of 60 sampling units across a region of Peninsular Malaysia where such small-scale agricultural practices are widespread. We hypothesized that physicochemical water quality of oil palm waterways together with riparian vegetation influence Odonata species richness and composition. Our results revealed that Odonata species richness increased with dissolved oxygen, water temperature and vegetation cover, but decreased with water level, pH, and total dissolved solids. Species composition was influenced by both dissolved oxygen and pH. The present study provides valuable insights into the effects of small-scale oil palm agriculture for water quality of associated aquatic habitats, and subsequent responses of adult Odonata. Therefore, smallholders should reduce the use of chemical pesticides and fertilizers to improve the conservation value of oil palm waterways for both Odonata and aquatic fauna more generally, in order to be certified as biodiversity-friendly agriculture." (Authors)] Address: Norhisham, A.R., Inst. of Tropical Forestry & Forest Products, Universiti Putra Malaysia, Serdang, Malaysia. Email: Norhisham\_razi@upm.edu.my

**19656.** Ivinskis, P.; Rimšaitė, J. (2021): Data on Odonata, Orthoptera and Mantodea from Lithuania, Report of 2021. *Bulletin of the Lithuanian Entomological Society* 5(33): 5-8. (in English, with Lithuanian summary) [New odonate data collected in 2021 in Lithuania are presented: *Chalcolestes viridis*, *Pyrrhosoma nymphula*, *Nehalennia speciosa*, *Anax parthenope*, *Ophiogomphus cecilia*, *Leucorrhinia albifrons*, *L. pectoralis*, *Orthetrum brunneum*.] Address: Ivinskis, P., Nature Research centre, Akademijos 2, Vilnius Lithuania, E-mail: entlab@gmail.com

**19657.** Japir, J.; Momin B.; John, L.Y.; Chung, A.Y.C. (2021): Insect diversity of Sungai Serudong Forest Reserve, Sabah, Malaysia. *Serangga* 26(2): 1-15. (in Malaysian, with English summary) ["Insect diversity of Sungai Serudong Forest Reserve in Sabah was investigated under the Heart of Borneo programme in Sabah. The nocturnal insect diversity was evaluated by using light-trap from 7:00 p.m. until 9:00 p.m. for three consecutive nights. Diurnal insects were sampled using sweep net. A total of nine insect orders were recorded namely Coleoptera, Hemiptera, Hymenoptera, Isoptera, Lepidoptera, Neuroptera, Odonata, and Phasmida. [...] The mean Shannon Index was 4.00,

Simpson Index was 47.76 and Fisher Alpha Index was 83.64. The diversity is considered high, however moderate when compared to other forest reserves in Sabah, Malaysia. This study was able to identify insect communities inside the reserve. It was also able to identify the potential threats affecting the insect diversity. The documented data can serve as baseline information to be used in forest management plan and other relevant research." (Authors)] Address: Japir, R., Forest Research Centre, Sabah Forestry Dept, P.O. Box 1407, 90715 Sandakan, Sabah, Malaysia. Email: razy.japir@sabah.gov.my

**19658.** Khelifa, R. (2021): Observations on the response of dragonflies to the British Columbia 2021 historic heat wave. *Argia* 33(3): 13-14. (in English) ["I studied dragonflies in 20 experimental ponds (15×25 m) at the University of British Columbia (UBC) in 2020 and 2021. My work in 2020 was quite extensive. I made daily visits to the site from late May to September, which helped me to have good knowledge of which species live there and how they commonly behave. I documented 17 species (12 dragonflies and five damselflies), including *Anax junius*, *Rhionaeschna multicolor*, *Aeshna interrupta*, *Libellula forensis*, *Libellula quadrimaculata*, *L. julia*, *Sympetrum illotum*, *S. corruptum*, *S. vicinum*, *Pachydiplax longipennis*, *Erythemis collocata*, *Pantala hymenaea*, *Enallagma carunculatum*, *E. boreale*, *Ischnura cervula*, *I. perparva*, and *Lestes disjunctus*. These species are quite common in the Vancouver region. In the early season of 2021, I saw a similar dragonfly assemblage to that of 2020 with comparable abundances and behavior, a sort of déjà vu situation. Up until the heat wave in late June 2021, I observed a few unexpected changes in the composition and the behavior of the assemblage. First, the diversity increased. I saw two new species that I had not seen at the ponds or within a 5 km radius — *Libellula julia* and *Pantala hymenaea*. While the first species exists in lower British Columbia, the latter has rarely been observed in the entirety of British Columbia. In fact, this is the third historical record of the species in British Columbia. The first record of *P. hymenaea* goes back to 1986 by Robert A. Cannings who wrote that, "with climate warming, the species will be observed more often (Cannings 2002)." Besides that, I noticed an abrupt decline in the flight activity of *Rhionaeschna multicolor* during midday; a species that used to stay active during the entire day. This species is probably the most abundant and one of the most visible dragonflies at the site (Khelifa 2021). So it was easily noticeable when it was not detected. Searching the surrounding bushes and trees, I found individuals perched in shaded areas during the hottest period of the day and they became active again later in the afternoon. Such behavior was not observed in 2020. Interestingly, I observed an increase in the frequency of bathing behavior in different species where individuals quickly drop on the water surface and splash their bodies a few times. This display allows dragonflies to cool down and drink water. Seeing this frequent bathing behavior reminded me of dragonflies in North Africa where temperatures are often extreme throughout the summer (Khelifa 2015). Additionally, there was an increase in the abundance of *Libellula quadrimaculata* and *Erythemis collocata* during the heatwave, probably due to the recent immigration from other sites." (Author)] Address: Khelifa, R., Biodiversity Research Center, University of British Columbia, 2212 Main Mall, Vancouver. B.C. V6T1Z4, Canada. Email: rassimkhelifa@gmail.com

**19659.** Khelifa, R.; Deacon, C.; Mahdjoub, H.; Suhling, F.; Simaika, J.P.; Samways, M.J. (2021): Dragonfly conservation in the increasingly stressed African Mediterranean type

ecosystems. *Front. Environ. Sci.* 9:660163. 16 pp. (in English) ["Freshwater habitats worldwide are experiencing many threats from environmental and anthropogenic sources, affecting biodiversity and ecosystem functioning. In Africa, particularly in Mediterranean climate zones, rapid human population growth is predicted to have great impact on natural habitats besides naturally occurring events such as unpredictable drought frequency and severity. Here, we analyze the potential correlation between odonate assemblage conservation priority (measured with the Dragonfly Biotic Index: DBI) and the magnitude of climate change and human perturbation in African regions with a dominant Mediterranean climate, namely Northern (NAR: Morocco, Algeria and Tunisia) and Southern African region (SAR: South Africa). Using a compilation of studies assessing odonate assemblages in lotic and lentic habitats of both regions (295 sites in NAR and 151 sites in SAR), we estimated DBI, temporal change in average annual temperature (T), annual precipitation (P), and human footprint index (HFI) in each site, then we tested whether sites with different levels of DBI were associated with different magnitudes of climatic and anthropogenic change. We estimated past (between 1980–1999 and 2000–2018) and future changes (between 1980–1999 and 2081–2100) in T and P based on three CMIP6 scenarios representing low (SSP126), moderate (SSP245), and high emission (SSP585), as well as the change in HFI from 1993 to 2009. We found that assemblages with higher DBI (i.e. higher conservation priority) encountered lower increase in T and slightly greater decrease in P than assemblages with lower DBI (i.e. lower conservation priority) in NAR during 1980–2018, but are projected to experience higher increase in T and lower decrease in P in future projections for 2081–2100. In SAR, the increase in T was mostly similar across assemblages but the decline in P was higher for assemblages with higher DBI during 1980–2018 and 2081–2100, suggesting that assemblages of higher conservation priority in SAR are threatened by drought. While HFI showed an overall increase in NAR but not in SAR, its temporal change showed only minor differences across assemblages with different DBI levels. We discuss the importance of management plans to mitigate the effects of climatic and anthropogenic threats, so improving conservation of odonate assemblages in these regions." (Authors)] Address: Khelifa, R., Biodiversity Research Center, University of British Columbia, 2212 Main Mall, Vancouver. B.C. V6T1Z4, Canada. Email: rassimkhelifa@gmail.com

**19660.** Khelifa, R.; Mahdjoub, M.; Samways, M.J. (2021): Combined climatic and anthropogenic stress threaten resilience of important wetland sites in an arid region. *Science of the Total Environment* 806, 150806: 11 pp. (in English) ["Highlights: • Protected wetlands are heavily affected by climate change and anthropogenic perturbation. • These changes are detrimental in regions where the climate is already extreme and variable. • North African Ramsar sites witnessed alarming changes in climate and human influence. • Climate change is projected to be severe in areas with high conservation value. Abstract: Climate change and anthropogenic perturbation threaten resilience of wetlands globally, particularly in regions where environmental conditions are already hot and dry, and human impacts are rapidly intensifying and expanding. Here we assess the vulnerability of Ramsar wetlands of six North African countries (Western Sahara, Morocco, Algeria, Tunisia, Libya, and Egypt) by asking three questions: (1) what are the recent anthropogenic changes that the wetlands experienced? (2) what are the projected future climatic changes? (3) how wetlands with different conservation priorities and globally

threatened species are impacted by anthropogenic pressures? We used climatic data (historical and future projections) from World Clim 2, drought index (SPEI), and human footprint index (HFI for 2000 and 2019) to estimate anthropogenic pressures, as well as waterbird conservation value (WCV: a metric indicating conservation priority of sites) and the breeding distribution of three threatened waterbird species (*Aythya nyroca*, *Marmaronetta angustirostris*, and *Oxyura leucocephala*) to understand how biodiversity is impacted by anthropogenic pressure. We found that temperature, precipitation, drought, and human footprint index (HFI) increased during earlier decades. Interestingly, areas with high HFI are projected to encounter lower warming but more severe drought. We also found that WCV was positively correlated with the magnitude of current HFI, indicating that sites of high conservation value for waterbirds encounter higher levels of anthropogenic pressure. The breeding range of the three threatened species of waterbirds showed a marked increase in HFI and is projected to experience a severe increase in temperature by 2081–2100, especially under the high emission scenario (SSP8.5) where environmental temperature becomes closer to the species critical maximum. Our results highlight the importance of integrating new conservation measures that increase the resilience of North African protected wetlands to reduce extinction risk to biodiversity." (Authors) The paper includes references to Odonata.] Address: Khelifa, R., Biodiversity Research Center, Univ. of British Columbia, 2212 Main Mall, Vancouver, B.C. V6T1Z4, Canada. Email: rassimkhelifa@gmail.com

**19661.** Korichi, R.; Almi, A.; Hammadi, Z.; Zehani, A.; Zinat, H.; Bouzid, A. (2021): Ecologie et diversité de la communauté d'odonates dans quelques habitats du Sahara Nord-Algérien. *Algerian journal of arid environment* 11(2): 22-40. (in French, with English summary) ["Odonata diversity is examined in the northeastern region of the Algerian Sahara by sampling 12 potential sites (one chott, 7 palm groves and 4 lakes) on a 470 km transect. This region of the lower Sahara is endowed with the most important oases and several wetlands, a geomorphology with a south-north slope involving a drainage network and an altitude gradient. A lack of updated studies in this region prompts a specific inventory and ecological analysis of the odonate stand over a 22 months period between 2012 and 2020 to determine the variables and scales that maintain this stand. The odonatafauna recorded corresponds to 21 species divided into 7 Zygoptera and 14 anisoptera (52.4% Libellulidae; 33.3% Coenagrionidae and 14.3% Aeshnidae). The distribution type indicates that accidental category represents 66.7% of the population. The accessory species correspond to 23.8% while 4.7% are ubiquitous and constant respectively. At low elevation sites (-100 m), the Shannon-Weaver diversity index shows its highest value (2.70 bits). The lowest value ( $H' = 1.35$  bits) is noted at altitude above 300 m. The spring migration of *Anax ephippiger* is observed in Ouargla (south-east of Algeria) towards the north. Spring and summer are the richest in species, with 2 and 15 species respectively. The breeding status indicates that for the most part the species are indigenous whose reproduction is probable to certain (*Crocothemis erythraea*) in the drains in palm groves. The IUCN status reveals that 2 species are endangered (*Coenagrion mercuriale* and *Acisoma panorpoides ascalaphoides*). The species *Enallagma deserti* is endemic to North Africa." (Authors)] Address: Korichi, R., Laboratoire Protection des écosystèmes en zones arides et semi-arides, Faculté des sciences de la nature et de la vie, Université Kasdi Merbah, Ouargla 30000, Algeria. Email: korichkov@hotmail.fr

**19662.** Korotkov, E.A.; Shapovalov, M.I.; Saprykin, M.A. (2021): Rare and protected species of dragonflies (Odonata) of the North-West Caucasus. Ministry of Science and higher Education, Russian Federation, Federal State Budgetary, educational institution of higher education, North Ossetian State University, named after Kosta Levanovna Khetagurov"; Problems water entomology Russia and related territories. Materials of the VIII All-Russian Scientific Symposium with international participation on amphibiotic and aquatic insects, dedicated to the 95th anniversary of the famous Russian scientist Lydia Andreevna Zhiltsova: 194-201. (in Russian, with English summary) ["For the territory of the North-Western Caucasus, 12 species of dragonflies are need of protection. A list of dragonflies recommended for inclusion in the third edition of the Red Book of the Republic of Adygea is given: *Chalcolestes parvidens*, *Pyrrhosoma nymphula*, *Onychogomphus flexuosus*, *Gomphus schneideri*, *Anax imperator*, *Brachytron pratense*." (Authors)] Address: Korotkov, E.A., Adyge State University, Maykop, Russia

**19663.** Landmann, M.; Schilling, M.; Landmann, A.; Steiner, F.M.; Schlick-Steiner, B.C. (2021): Isolation and characterization of 10 polymorphic microsatellite loci in the rarest European damselfly, *Coenagrion hylas* (Odonata: Coenagrionidae). *International Journal of Odonatology* 24: 227-232. (in English) ["Within Europe, the damselfly *Coenagrion hylas* has a very limited distribution and is regarded as a vulnerable species. For studying migration and population connectivity in the Central European populations, 10 microsatellite markers were developed for this species. The loci were screened on 24 individuals collected at Lech valley, Tyrol, Austria. The values for expected and observed heterozygosity ranged from 0.192 to 0.802 and from 0.208 to 0.917, respectively. All developed markers were polymorphic." (Authors)] Address: Landmann, Molinia, Molecular Ecology Group, Department of Ecology, University of Innsbruck, Technikerstrasse 25, Innsbruck, Austria. Email: molinia.landmann@chello.at

**19664.** Lee, D.J.L.; Matthews, P.G.D. (2021): How insects transition from water to air: Respiratory insights from dragonflies. *Comparative Biochemistry and Physiology, Part A* 253 (2021) 110859: 6 pp. (in English) ["The transition of animal life from water onto land is associated with well-documented changes in respiratory physiology and blood chemistry, including a dramatic increase in blood pCO<sub>2</sub> and bicarbonate, and changes in ventilatory control. However, these changes have primarily been documented among ancestrally aquatic animal lineages that have evolved to breathe air. In contrast, the physiological consequences of air-breathing animals secondarily adopting aquatic gas exchange are not well explored. Insects are arguably the most successful airbreathing animals, but they have also re-evolved the ability to breathe water multiple times. The juvenile life stages of many insect lineages possess tracheal gills for aquatic gas exchange, but all shift back to breathing air in their adult form. This makes these amphibiotic insects an instructive contrast to most other animal groups, being not only an ancestrally air-breathing group of animals that have re-adapted to life in water, but also a group that undergoes an ontogenetic shift from water back to air across their life cycle. This graphical review summarizes the current knowledge on how blood acid-base balance and ventilatory control change in the dragonfly during its water-to-air transition, and highlights some of the remaining gaps to be filled." (Authors)] Address: Lee, D.J., Dept of Zoology, Univ. of British Columbia, Vancouver, BC, V6T 1Z4, Canada



**19665.** Lee, S.-D.; Back, S.-J.; Kang, H.-K. (2021): Analysis of the correlation between ecological status and location environment by cultivated land restoration type of Geumgang riverine ecobelt. *J. People Plants Environ* 24(4): 389-401. (in English) ["Background and objective: The purpose of this study is to investigate the ecological status of six areas around Geumgang River that used to be farmlands before they were restored as a riverine ecobelt. This study aims to analyze the correlation between the location environment and ecological status of the sites to identify the environmental factors affecting them. Methods: The sites are classified into four types according to restoration: terraced paddy fields, flat paddy fields, artificial wetland, and landscape forest. The survey items were divided into land use status, plant ecology, and animal ecology. Results: In terms of plant ecology, terraced paddy fields showed favorable naturalness with the rate of native species above 90% and the naturalization index below 10%. In terms of animal ecology, the total number of species found in these areas was biggest in terraced paddy fields, followed by flat paddy fields, artificial wetland, and landscape forest. Regarding species diversity, terraced paddy fields also showed abundant species with an average of 1.05 to 1.09. The results of the correlation analysis showed that the forest area around the sites had the most significant effect on species diversity. The grassland and open water area showed a positive correlation with the total number of animal species and the number of dragonflies, confirming that the marshy grassland had a positive effect. As the cultivated land and urbanized area around the sites increased, it had a negative effect on the distribution of native species and the number of animal species that appeared, and a positive effect on the naturalization index. Conclusion: It is necessary to establish preemption and restoration plans for sites such as grasslands adjacent to the forest and terraced paddy fields in order to promote resilience of the diverse species returning to the purchased lands." (Authors)] Address: Kang, H.-K., Dept. of Green Smart City, Sangmyung University, Cheonan 31066, Korea. Email: hkkang@smu.ac.kr

**19666.** Lemke, M. (2021): Hinweise auf eine erfolgreiche Entwicklung von *Chalcolestes viridis* (Vander Linden, 1825) in der subalpinen Höhenstufe (Odonata: Lestidae). *Libellula* 40(3/4): 161-172. (in German, with English summary) ["Indication of a successful development of *Chalcolestes viridis* (Vander Linden, 1825) in subalpine terrain (Odonata: Lestidae) - In summer 2019, egg-clutches typical for *Chalcolestes viridis* were found on an alder bush in subalpine terrain, on a moor pond in the Allgäu at around 1,737 m a.s.l. At the same time, maiden flights of large Lestidae could be observed, which were identified as *Chalcolestes* cf. *viridis*. This constitutes one of the most significant pieces of evidence of the species in the German-speaking area, and it is the highest evidence indicating successful development of the species within its range. The record is discussed with regard to its recent northern expansion as well as its altitude distribution. This article is also intended to encourage the search for the species-typical egg-clutches on each water, through which an occurrence of the species can also be determined outside its flight period." (Authors)] Address: Lemke, M., Am Grüneberg 37, 66557 Illingen, Germany. Email: malemke@gmx.de

**19667.** Mamat, N.; Abu, A.; Yusoff, N. (2021): Classification and morphology of *Rhinocypha* spp. (Odonata): a comprehensive taxonomic study within the females. *Zoological Studies* 60:47. doi:10.6620/ZS.2021.60-47. 21 pp. (in English) ["Studies on Odonata have gained attention worldwide as

well as locally in Malaysia. Although there is a wealth of data available to be utilized for solving taxonomic problems, ecological and behavioural research areas are more favoured than taxonomy and systematics. Thus, there are confusions over how to correctly identify closely related and sympatric species, especially in female odonates. One such example is in the genus *Rhinocypha*. Consequently, the present study focuses on taxonomic work, employing multi-approaches in the form of morphological (morphological diagnostics, Field Emission Scanning Electron Microscope (FESEM) and geometric morphometric analysis), applying the molecular technique. Seventeen morphological characteristics were created to differentiate between the females of *Rhinocypha* spp. A FESEM was used on the female's ovipositor to focus on the anal appendages and sheathing valve (V3). Also, the phylogenetic patterns expressed by COI and 16S rRNA genes, and canonical variate analysis for the wing geometric morphometric revealed three clusters that supported the distinction of the *Rhinocypha* group. In summary, this study effectively developed an integrated approach of classic morphological and trendy molecular, combined with FESEM microscopy techniques, which provided corroborative evidence and resolved taxonomic uncertainties." (Authors)] Address: Mamat, N., Institute of Biological Science, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia. E-mail: nhidayahm@um.edu.my

**19668.** Marinov, M. (2021): A taxonomic and biogeographic discussion on *Rhyothemis regia* (Brauer, 1867) from Samoa and neighbouring islands with introduction of *Rhyothemis regia uveae* subsp. nov. (Odonata: Libellulidae). *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 35: 1-33. (in English) ["Records of *R. regia* from its eastern distribution range (Swains Island excluded) are reviewed and specimens compared morphologically and by wing colouration to congeners of newly obtained material collected in the field or deposited in entomological collections. The origin of the female holotype of *R. r. chalcoptilon* (Brauer, 1867) has been investigated with new hypotheses of the collector, locality and the probable sampling dates proposed. The holotype was probably mislabelled as from Samoa, while the most likely type locality was Niuafo'ou Island, Tonga. New nomenclature changes are suggested which: assigns *R. r. chalcoptilon* to the population from Niuafo'ou Island, reinstates *R. r. armstrongi* Fraser, 1956 for individuals from Samoan archipelago and introduces a new nomen *R. r. uveae* subsp. nov. for Wallis Island. Biogeography of the species within the investigated area is reviewed and the possible origin of current populations hypothesised. Future hypotheses testing is necessary involving a larger sample size from within the entire species range and comparing them morphologically and molecular to other congeneric from the region, such as *R. phyllis* (Sulzer, 1776) and *R. princeps* Kirby, 1894. The latter two species are briefly discussed in relation to the working hypotheses but due to lack of sufficient material final conclusions are not proposed." (Author)] Address: Marinov, M., Biosecurity Surveillance & Incursion Investigation Plant Health Team, Ministry for Primary Industries, 14 Sir William Pickering Drive, Christchurch 8544, New Zealand Email: milen.marinov@mpi.govt.nz

**19669.** Marinov, M.; Krieg-Jacquier, R.; Duvernay, J.-M.; Fleck, G.; Vincent-Gorlier, J.; Mary, M.; Doscher, C.; Le Bail, F.; Jourdan, H.; Theuerkauf, J. (2021): An update of the Odonata fauna of Wallis & Futuna (Insecta: Odonata). *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 35: 35-67. (in English, with French, Wallisian and

Futunan summaries) ["Odonata fauna of the islands of Wallis and Futuna has been investigated during a two week field trip in 2020 and occasional observations in 2007/2012. Updated species checklist and faunistic information following nomenclature changes, new taxonomic information and distribution data are proposed. Presently, 15 species are known from Wallis & Futuna. They are presented with photos of live individuals and exuviae (where available) which is hoped to facilitate easy identification in the field by professionals and general nature lovers." (Authors)] Address: Marinov, M., Biosecurity Surveillance & Incursion Investigation Plant Health Team, Ministry for Primary Industries, 14 Sir William Pickering Drive, Christchurch 8544, New Zealand Email: milen.marinov@mpi.govt.nz

**19670.** Medina Espinoza, E.F. (2021): Análisis del ensamblaje adulto de Odonata (Insecta) en cuerpos de agua de la estación biológica Los Amigos, Madre de Dios. Universidad Nacional Agraria La Molina. Facultad de Ciencias. Depto Acad. de Biología: IV + VI + 70 pp. (in Spanish, with English summary) ["Freshwater ecosystems are one of the most polluted environments worldwide. Madre de Dios is one of the Peruvian departments that harbors a great diversity of species and one of the main threats it faces is the loss of forests due to gold mining, which has negative effects on its water bodies. Little ecological information is known about Peruvian Odonata, which are freshwater insects. The present study analysed the adult odonate assemblage diversity in three aquatic environments within the Los Amigos biological station (a blackwater pond, an oxbow lake and a stream) in May and October of 2018. A total of 46 species were recorded, belonging to 25 genera and six families. The most represented families were Libellulidae and Coenagrionidae. The assessment sites showed similar diversity values using Hill numbers. However, differences were found in the species composition in the three water bodies assessed, including between lakes. This was because, although they shared a considerable number of species, the relative abundances of each species varied depending on the assessment site. Therefore, dragonfly assemblages in the Los Amigos biological station change according to the body of water where they are found. This highlights the importance of knowing the taxa that are part of the assemblages of the different types of freshwater environments in order to better understand the changes that might occur in these types of ecosystems." (Author)] Address: not stated

**19671.** Mey, W. (2021): Eine Eintagsfliege (Ephemeroptera) als Libellenbeute (Odonata). Entomologische Nachrichten und Berichte 65(2): 109. (in German) [Sachsen, Germany; 19. Juli 2017, Ephemera sp. as prey of *Calopteryx splendens*] Address: Wolfgang Mey, W., Großglockner Straße 3, 01279 Dresden, Germany

**19672.** Mola, L.M.; Fourastié, M.F., Agopian, S.S. (2021): High karyotypic variation in *Orthemis* Hagen, 1861 species, with insights about the neo-XY in *Orthemis ambinigra* Calvert, 1909 (Libellulidae, Odonata). *CompCytogen* 15(4): 355-374. (in English) ["The American dragonfly genus *Orthemis* Hagen, 1861 is mainly found in the Neotropical region. Seven of 28 taxonomically described species have been reported from Argentina. Chromosome studies performed on this genus showed a wide variation in chromosome number and a high frequency of the neoXY chromosomal sex-determination system, although the sexual pair was not observed in all cases. This work analyzes the spermatogenesis of *Orthemis discolor* (Burmeister, 1839), *O. nodiplaga* Karsch, 1891 and *O. ambinigra* Calvert, 1909 in individuals

from the provinces of Misiones and Buenos Aires, Argentina. *Orthemis discolor* has  $2n=23$ ,  $n=11+X$  and one larger bivalent. *Orthemis nodiplaga* exhibits the largest chromosome number of the order,  $2n=41$ ,  $n=20+X$  and small chromosomes. *Orthemis ambinigra* shows a reduced complement,  $2n=12$ ,  $n=5+neo-XY$ , large-sized chromosomes, and a homomorphic sex bivalent. Fusions and fragmentations are the main evolutionary mechanisms in Odonata, as well as in other organisms with holokinetic chromosomes. *Orthemis nodiplaga* would have originated by nine autosomal fragmentations from the ancestral karyotype of the genus ( $2n=22A+X$  in males). We argue that the diploid number 23 in *Orthemis* has a secondary origin from the ancestral karyotype of family Libellulidae ( $2n=25$ ). The complement of *O. ambinigra* would have arisen from five autosomal fusions and the insertion of the X chromosome into a fused autosome. C-banding and DAPI/CMA3 staining allowed the identification of the sexual bivalent, which revealed the presence of constitutive heterochromatin. We propose that the chromosome with intermediate C-staining intensity and three medial heterochromatic regions corresponds to the neo-Y and that the neo-system of this species has an ancient evolutionary origin. Moreover, we discuss on the mechanisms involved in the karyotypic evolution of this genus, the characteristics of the neo sex-determining systems and the patterns of heterochromatin distribution, quantity and base pair richness." (Authors)] Address: Mola, Liliana María, Lab. de Citogenética y Evolución – Depto de Ecología, Genética y Evolución, Inst. de Ecología, Genética y Evolución (CONICET-UBA), Fac. de Ciencias Exactas y Naturales, Univ. de Buenos Aires, Buenos Aires, Argentina. Email: lilimola@yahoo.com.ar

**19673.** Monnerat, C.; Wildermuth, H.; Gonseth, Y. (2021): Rote Liste der Libellen. Gefährdete Arten der Schweiz. Umwelt-Vollzug Nr. 2120: 70 pp. (in German, with French and Italian summaries) ["The Red List of dragonflies in Switzerland 2021 is based on the criteria and endangerment categories of the IUCN (2001, 2017). Of the 75 species assessed, 27 (36 %) are threatened: 3 (4 %) are extinct in Switzerland (RE), 4 (5 %) are Critically Endangered (CR), 9 (12 %) are Endangered (EN) and 11 (15 %) are Vulnerable (VU). 6 (8 %) species are potentially threatened (NT). Nearly half of the Red List species (13) inhabit fens and raised bogs, habitats that are threatened at all altitudes. The proportion of endangered species is lower in other habitat types: springs, small watercourses and ditches (4), rivers and lakeshores with wave action (6), small stillwaters (6). These three habitat types also each harboured a species that was already extinct in Switzerland. The present Red List replaces that of Gonseth & Monnerat (2002). The number of species in the endangerment categories (RE, CR, EN, VU) is very similar: the 2002 list contained 26, the revised version includes 27 species. In the meantime, a third species has become extinct in Switzerland. The situation of several species formerly threatened with extinction or highly endangered (CR, EN) has improved thanks to revitalisation measures of upland moors, rivers and streams. In addition, specific species promotion measures have contributed to the improvement of the situation. Thanks to these measures to promote dragonflies, the calculated Red List indices show a positive trend. For the non-endangered species, the balance is also positive, as their populations are mostly stable or have sometimes even increased. The species that depend mainly on fens and other habitats with naturally fluctuating water levels, or the boreoalpine species that depend on raised bogs and acidic fens, are suffering from the ongoing deteri-

oration of habitat quality. Moreover, prediction models suggest that their endangerment will continuously increase with climate change in the coming decades" (Authors/DeepL)] Address: Monnerat, C., Info fauna, Bellevaux 51, 2000 Neuchâtel, Switzerland. E-mail: christian.monnerat@unine.ch

**19674.** Morrill, A.; Kaunisto, K.M.; Mlynarek, J.J.; Sippola, E.; Vesterinen, E.J.; Forbes, M.R. (2021): Metabarcoding prey DNA from fecal samples of adult dragonflies shows no predicted sex differences, and substantial inter-individual variation, in diets. *PeerJ* 9:e12634 <https://doi.org/10.7717/peerj.126>: 20 pp. (in English) ["Sexes often differ in foraging and diet, which is associated with sex differences in size, trophic morphology, use of habitats, and/or life history tactics. Herein, strikingly similar diets were found for adult sexes of *Leucorrhinia intacta*, based on comparing 141 dietary taxa identified from the metabarcoding of mitochondrial DNA archived in feces. Arthropods in > 5% of samples included five species of dipterans, two hemipterans, two spider species and one parasitic mite. The mite was not traditional prey as its presence was likely due to DNA contamination of samples arising through parasitism or possibly via accidental consumption during grooming, and therefore the mite was excluded from diet characterizations. Common prey species were found with statistically indistinguishable frequencies in male and female diets, with one exception of an aphid more often found in male diets, although this pattern was not robust to corrections for multiple statistical tests. While rare prey species were often found in diets of only one sex, instances of this were more frequent in the more oft-sampled females, suggesting sampling artefact. Sexes did not differ in the mean prey species richness in their diets. Overall, sexes showed statistically indistinguishable diets both on a prey species-by-species basis and in terms of multivariate characterizations of diet composition, derived from presence-absence data of prey species analyzed via PERMANOVA and accumulation curves. Males and females may have similar diets by being both opportunistic and generalist predators of arthropods, using the same foraging habitats and having similar sizes and flight abilities. Notably, similarities in diet between sexes occur alongside large interindividual differences in diet, within sexes. Researchers intending on explaining adaptive sex differences in diet should consider characteristics of species whose sexes show similar diets." (Authors)] Address: Morrill, A., Department of Biology, Carleton University, Ottawa, Ontario, Canada. Email: andre\_morrill@carleton.ca

**19675.** Motte, G.; Dufrière, M.; Mayon, N.; Goffart, Ph.; Barbier, Y.; Cors, R.; Ghilain, B.; Kever, D.; Lafontaine, R.-M.; Patemoster, T.; Schaezen, R. de; Schott, O.; Smits, Q.; Vandevyvre, X. (2021): Liste rouge 2021 des Libellules de Wallonie. *Les Naturalistes belges* 102(3): 1-21. (in French, with German, English and Dutch summaries) ["This paper describes the update of the red list of dragonflies in Wallonia 20 years after the previous assessment. The analysis is based on a dataset of nearly 200,000 observations from more than 1700 observers as well as on trend analyses carried out in the framework of complementary studies. The revision of the status of the 67 Walloon dragonfly species shows that, among the assessed species, 2 are extinct (3.3%), no species is critically endangered, 5 are endangered (8.3%), 10 are vulnerable (16.7%), 4 are near threatened (6.7%) and 39 are currently not threatened (65%). In comparison with the previous red list, the status of dragonfly species in Wallonia is more favourable. However, this positive evolution may be uncertain in view of the ongoing climate changes." (Authors)] Address: Dufrière, M., Service Public Wallon

(SPW) - Direction Générale Opérationnelle (DG03) - Dépt de l'Etude du Milieu naturel et agricole (DEMna), Av. Maréchal Juin, 23, B-5030 Gembloux, Belgium. E-mail: Marc-Dufrene@spw.wallonie.be

**19676.** Müller, J. (2021): Endbericht Artenschutzprojekt „Biotop- und habitatgestaltende Maßnahmen am Platten- teich, Lebensraum der Mond-Azurjungfer“. <https://www.lpv-oberlausitz.de/5201/240734.html>: 11 pp. (in German) ["Over a three-year period, measures to promote the conservation of a dragonfly species were carried out. The focus was on mowing, reed removal and the removal of woody plants in the vicinity of the watercourse. In order to ensure long-term success against the invasive neophytes, it is absolutely necessary to continue the measures." (Author/DeepL)] Address: Jörg Müller. Email: JoergMueller78@web.de

**19677.** Mulyaningsih, B.; Ummiyati, S.R.; Hadisusanto, S.; Edyansyah, E. (2021): Fauna associated with Malayan filariasis transmission in Banyuasin, South Sumatra, Indonesia. *Veterinary World* 14(7): 1954-1959. (in English) ["Background and Aim: *Brugia malayi* is known to be zoonotically important because it can be transmitted from animals (mammals and primates) to humans or from humans to humans through mosquito vectors. This study was conducted to explore the fauna associated with Malayan filariasis transmission in Sedang village, Suak Tapeh District, Banyuasin Regency, South Sumatra Province, Indonesia. Materials and Methods: A cross-sectional research design with an observational and analytical approach was applied in this study, and it was conducted in May 2018. Mosquitoes were collected twice using human bait both inside and outside the house from 6:00 p.m. to 6:00 a.m. The presence of competitors, predators, and reservoir hosts in the areas of five breeding habitats of *Mansonia* spp. was observed. The presence of microfilaria was confirmed under a microscope in night blood samples of inhabitants and cats. The presence of infective larvae (L3) of *B. malayi* was identified microscopically and based on the polymerase chain reaction method in female *Mansonia* mosquitoes. Results: A total of 12 mosquito species were found, among which *Mansonia univittata* was the dominant mosquito, and the predominant competitor was *Mansonia annulifera*. Dragonflies, as predators were found in two breeding habitats and fish were found in one breeding habitat. The L3 of *B. malayi* were not identified in the mosquitoes, and the microfilariae of *B. malayi* were not found in the blood samples of inhabitants and cats. Conclusion: Although *Mansonia* mosquito population was abundant in Banyuasin Regency, the mosquito was not confirmed as an intermediate host of *B. malayi*, and the cat was not confirmed as a reservoir of *B. malayi* in the location." (Authors)] Address: Mulyaningsih, B., Department of Parasitology, Faculty of Medicine Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia. Email: Budi Mulyaningsih

**19678.** Nakanishi, K.; Yokomizo, H.; Hayashi, T.I. (2021): Population model analyses of the combined effects of insecticide use and habitat degradation on the past sharp declines of the dragonfly *Sympetrum frequens*. *Science of The Total Environment* 787, 147526: 10 pp. (in English) ["Highlights: • Populations of *Sympetrum frequens* in rice fields declined sharply in the late 1990s. • We analyzed causes of the declines by numerical simulations using a population model. • The model reproduced well the past sharp population declines. • Habitat degradation and highly toxic insecti-

cides greatly affected population decline. • Our results suggested the sharp declines were caused by the combined effects of both. Abstract: In recent decades, many dragonfly species have become threatened with extinction. For example, populations of *Sympetrum frequens*, one of the most common dragonflies in rice paddy fields in Japan, decreased sharply around the late 1990s in many regions. Although previous studies suggested that the use of systemic insecticides (particularly fipronil) was likely a major cause of the decline, agronomic factors other than insecticide use and the combined effects of both have been not examined. Here, we developed an *S. frequens* population model using survival rate parameters associated with the farmland consolidation rate, midsummer drainage, area of crop rotation and abandoned rice paddies, insecticide use, and summer temperature and analyzed the effects of each factor on population dynamics by numerical simulations. Our population models substantially reproduced the past sharp population declines of the dragonfly in three regions. Numerical simulations using hypothetical parameters did not always suggest that the use of systemic insecticides is a sufficient cause of the sharp population declines, as the declines did not occur if the farmland consolidation rate remained at lower levels (before the 1980s). On the other hand, our findings suggest that the use of insecticides with high toxicity is a necessary cause of the sharp population declines, as the declines did not occur when simulated toxicity levels were lower than those actually used. Overall, our numerical simulations suggest that the sharp population declines of *S. frequens* around the late 1990s were caused by the combined effects of insecticide use and farmland consolidation, in which rice paddies are converted to well-drained paddy fields. Conservation planning for dragonflies needs to account for the combined effects of habitat degradation and use of insecticides." (Authors)] Address: Nakanishi, K., National Institute for Environmental Studies, Onogawa 16-2, Tsukuba, Ibaraki 305-8506, Japan. Email: nakanishi.kosuke@nies.go.jp

**19679.** Noor, S.; Rafiq, N.; Akbar, P.; Zehri, S.; Wali, S.; Shahwani, F. (2021): A preliminary study on aquatic insect diversity and abundance in relation to fluctuating physiochemical parameters of an artificial pond. *Serangga* 26(4): 175-188. (in English) ["This preliminary study was conducted from April to October 2019, and hold the first account to outline the diversity of aquatic insects with influence to the fluctuating physiochemical parameters in the pond of Sardar Bahadur Khan Women's University Quetta, Pakistan. The collection of 722 individuals in total presented four orders (Hemiptera, Ephemeroptera, Diptera and Odonata) and seven families. These individuals were labeled to generic level as *Gerris* sp., *Notonecta* sp., *Anopheles* sp., *Thaumatococcus* sp., *Sympetrum* sp., *Orthetrum* sp. and *Heptagenia* sp. Shannon-Weininger diversity and Simpson's diversity index revealed greater values for backswimmers and mayflies (*Notonecta* and *Heptagenia* sp.). Additionally, Margalef's richness index was also recorded highest (1.163) for backswimmers. Amongst physiochemical parameters, water temperature was ordinated in Gaussian's species packing model. This ordination illustrated wider curve for *Notonecta* sp. and narrower curve for *Anopheles* sp., suggesting the maximum and minimum tolerance (temperature) range for these species in this specific pond community. Water pH of the pond also altered slightly and ranged from 9.13-10.3 during April to August. As of the total dissolve solids (TDS), this study observed a raised from 253.16 mg/L to 432.11 mg/L till the end. Since aquatic insects play vigorous role in the stability of aquatic ecosystems, more relevant studies

are required to be conducted to evaluate the broader range of these insects." (Authors)] Address: Noor, Sabina, Dept of Zoology, Sardar Bahadur Khan Women University, 87300 Quetta, Pakistan. Email: sabina.noor15@yahoo.com

**19680.** Onishko, V.V.; Kosterin, O.E.; Emelyanov, E.G. (2021): *Anax nigrofasciatus* Oguma, 1915 (Odonata, Aeschnidae): A new addition to the fauna of Russia. *Amurian Zoological Journal* 13(4): 516-519. (in English, with Russian summary) ["South East and East Asia. On 19 June 2021, its mature male was caught by E. Emelyanov in Nadezhdino District of Primorskiy Kray, Russia, at an artificial fire pond near the Sadko Garden Non-Commercial Fellowship (43.4171 N, 131.9327 E). This is the first record of this species in the Russian Federation, increasing the number of Odonata species currently known from Russia to 157." (Authors)] Address: Onishko, V.V., Moscow Zoo, 1 Bolshaya Gruzinskaya Str., 123242, Moscow, Russia. E-mail: werwolf999@yandex.ru

**19681.** Opie-odonates (2021): Liste de référence des Odonates de France métropolitaine. *Martinia* 35(5): 23–26, annex- (in French) [Odonatology, like all disciplines in the natural sciences, is in constant evolution. The discovery of new taxa or the observation of taxa in geographical areas where they were not previously known, progress in genetics and phylogeny require the regular updating of species lists. In this context, Opie-odonates has decided to update the previous reference list of Odonata of metropolitan France of the French Odonatological Society (Boudot & Dommanget, 2015). For the editors, it is neither a question of doing something new at all costs nor of remaining stuck in the past, but of making well-founded choices that follow the progress of knowledge such as changes in the geographical distribution of taxa or their phylogenetic position. Furthermore, the growing recognition of Odonata in environmental policies - as in the previous national action plan for Odonata (Dupont, 2010) and the new national action plan for dragonflies (Houard et al., 2020), as well as their better understanding by the general public through awareness-raising activities, for example - requires the establishment of common reference systems, which also requires the common use of a well-defined lexical field and vocabulary. We therefore felt it necessary to review the French names associated with scientific binoms. Taxa The updating or not of the name of certain taxa in the list is based on the relevance of the taxon. Some subspecies have been deleted (e.g. *Calopteryx splendens* and *Cordulegaster boltonii*) where there is a broad consensus in recent literature that they are invalid. Others, such as *Orthetrum coerulescens* *anceps*, have been retained because further studies are needed (Mauersberger, 1994). Species that have not been observed or rarely observed for a long period of time have nevertheless been retained, as they belong, according to the current state of knowledge, to the metropolitan Holocene fauna. For example, *Sympecma paedisca*, which has probably disappeared since 1962 from its only known site in Isère, is considered as "unrecorded" in mainland France since 1970, but remains on the list. Indeed, the rediscovery of *Nehalennia speciosa* in France in 2007 (Dehondt et al., 2009) or the return of certain species to geographical areas from which they were presumed to have disappeared, such as *Stylurus flavipes* and *Ophiogomphus cecilia* in the Rhône river basin for example (Grand et al, 2011; Lambert et al., 2012), encourage us to be cautious about the notion of extinction and to keep the record of presumed extinct species, in the light of our current knowledge. Of course, the arrival of new spe-



cies, such as *Trithemis kirbyi* or *Selysiothemis nigra* (San- nier, 2015; Polette et al., 2017; Lohr, 2021), also justified the updating of this list. French names The Opie-odonates, in the continuity of the French Society of Odonatology, underlines that the scientific names (governed by the International Code of Zoological Nomenclature) must be used as a priority by all odonatologists, be they professionals or amateurs, specialists, naturalists in all texts intended to be disseminated to interested persons or to be published. The use of French names is indicated in the context of awareness-raising and popularisation operations (essentially for the general public). There are no vernacular names (from the Latin *vernaculus*, "of the country, indigenous, national", names derived from popular tradition) in the proper sense in France for the various species of Odonata. There is also no list of standardised names as for ornithology (Lepage, 2021). All French names are taken from the literature and therefore vary from one author to another. Savard (1987) presents the differences between the names given to taxa outside the binominal scientific nomenclature, i.e. between vernacular names and vulgar names. The French names proposed here are, as far as possible and with minor modifications, those published by Robert (1958). This author was the first to use French names wisely in a 20th century publication, partly based on the writings of Selys-Longchamps (1850). We have chosen not to introduce new names, as these are likely to create new difficulties, except when the taxon had no French name, such as *Trithemis kirbyi*, or when we wished to simplify it, as with *Lestes macrostigma*, by retaining the epithet group "à grand stigmas", which is shorter and more in keeping with the binominal name. We also chose not to follow the translation of Philippe Jourde (Dijkstra & Lewington, 2007; Dijkstra, Schröter & Lewington, 2021) for the sake of consistency with previous publications of the French Odonatological Society. Furthermore, only taxa from mainland France are included in this list. The question of assigning a French name that could be superimposed on the binominal name arose during the drafting of this updated list. The binominal name is the reference for all writings of a scientific nature (publications, reports, studies, proceedings, etc.). As mentioned above, scientific names should be used as a priority. Consequently, the use of French names remains marginal and should be favoured in communication to the general public. In this context, the excessive complexity of French names, such as the systematic differentiation of genera, or the traceability of names according to the evolution of scientific names, does not seem very relevant for a name intended for neophytes. A similar logic can be found in other naturalist disciplines. For example, in botany, French names have retained their vernacular and folkloric character. For example, in botany, French names have retained their vernacular and folkloric character, as can be seen from the 24 different French names of plants of various species and families used in botany, including the word rose (Rose, 2021). Or, in ornithology and the French names of birds, it should be remembered that the swallows of mainland France are grouped together under the French name *Hirondelle* in different genera. On the other hand, between the different editions of the Guide Ornitho (Mullamey et al., 1999 and reissues) or on the Avibase website (Lepage, 2021), the French genus name of the different tits has not followed the changes in the genus of the scientific names. For this reason, we have not retained the differentiation or grouping of genera in French. Thus, the *Calopteryx* remain *Calopteryx* and most of the *Coenagrionidae* and *Platynemididae* remain *Agrionidae*. The only exception to this method is Vander Linden's *Agrion*, *Erythromma lindenii*, which we have renamed *Naiad* in

order to be consistent with the other two species of our metropolitan fauna of the genus *Erythromma*. This exception is explained by the evocation of an imaginary associated with the term *Naiad* (i.e. a female divinity of rivers and springs) which is interesting in the odonatological context and which may also resonate with the general public. On the other hand, the genus name *Dragonfly* has been used and reused for taxa that are not of the genus *Libellula*. It seemed to us that *Scarlet Dragonfly* and *Globetrotting Dragonfly* were more evocative names and easier to remember than *Crocothemis* or *Pantale* for the general public. The same reasoning was applied to the *Aeschnidae*, of which only the French genera *Aeschna* and *Anax* were retained. The successive revisions of the place of *Macromia* and *Oxygastra* (at one time in the *Libellulidae*, then in the *Corduliidae*, now in a separate family or *incertae sedis*) did not seem to us to require a different French genus from the widely used *Cordulie*. Perenniality of French names: As we mentioned in the introduction, the discovery of new taxa or the observation of taxa in geographical areas where they were not known, as well as progress in genetics and phylogeny, require the regular updating of species lists with their binominal names. What consequences can be drawn from this for French names? As mentioned above, a modification could be envisaged when a change occurs in the nomenclature, but it can be assumed that this continuous instability would only confuse the public for which these names are intended. The idea, let us remember, is not to propose a French name that replaces the scientific name, but a name that the general public (and thus outside naturalists) can appropriate, and ensure a certain durability. For example, on an information panel for river restoration work, the *Agrion de Mercure* will be easily adopted by the general public, without having to consider renaming it the day that, after a hypothetical scientific study, its binominal name changes. The French name would thus retain a status equivalent to the *nomen protectum* of taxonomy. Moreover, since French names are only to be used for popularisation, they are not intended to be given to species not present in territories where French is used. The example of Askew (2004), who, in his book on European fauna, only mentions English names for species present in the United Kingdom, should be noted. This seems to us to be a reasonable limit to the attribution of French names. One can only regret the Anglo-American tendency to attribute English names to all species of the globe<sup>1</sup> and to generalise their use in exchanges where the binomial name is not always mentioned. It even happens that the same English name covers several different species<sup>2</sup>. In essence, these elements become inaccessible to the reader who is not initiated into the odonatafauna of the geographical area in question." Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Opie-odonates, BP 30, 78041 Guyancourt, France; [odonates@insectes.org](mailto:odonates@insectes.org)

**19682.** Ostrowskii, A.M. (2021): Rare Insects of the Gomel region. Belarusian Entomological Society, National Academy of Sciences of Belarus State, Scientific and Production Association "Scientific Centre for Bioresources of the National Academy of Sciences of Belarus, Department of Biology Belarusian State University, Institute of Plant Protection, National Academy of Sciences of Belarus, State Nature Reserve "Berezinskiy Biosphere Reserve P. M. Masherov Vitsebsk, State University, Republic of Belarus P.M. Masherov State University Yanka Kupala State University of Grodno, the Republic of Belarus Yanka Kupala State University of Grodno. Results and Perspectives of Entomology Development in eastern Europe. Collection of papers

The IV International Scientific and Practical Conference dedicated to the memory Terioshkin Alexander Mikhailovich (1953-2020) December 1-3, 2021 Minsk Republic of Belarus Minsk Publisher A.N. Varaksin 2021: 245-259. (in Russian, with English summary) [During 2016-2021 monitoring of rare and protected insects on the territory of Gomel region [Belarus] was conducted to identify their habitats, as a result of which findings of 60 species belonging to 32 families and 7 orders were registered." (Author) The list includes *Sympecma paedisca*, *Anax imperator*, *Stylurus flavipes*, and *Ophiogomphus cecilia*.] Address: Ostrovsky, A.M., EE "Gomel State Medical University", Gomel, Belarus. Email: Arti301989@mail.ru

**19683.** Peng, X.; Gao, Y.; Song, X.; Du, Y. (2021): Characterization and phylogenetic analysis of the complete mitochondrial genome of *Neurothemis fulvia* (Odonata: Anisoptera: Libellulidae). *Mitochondrial DNA Part B* 2021 6(2): 620-621. (in English) ["*Neurothemis fulvia* is a dragonfly of wet forests and usually perches on fallen logs and shrubs. In this study, we sequenced and analyzed the complete mitochondrial genome (mitogenome) of *N. fulvia*. This mitogenome was 15,459bp long and encoded 13 protein-coding genes (PCGs), 22 transfer RNA genes (tRNAs), and 2 ribosomal RNA unit genes (rRNAs). The nucleotide composition of the mitogenome was biased toward A and T, with 70.5% of A + T content (A 38.8%, T 31.7%, C 16.6%, and G 12.9%). Gene order was conserved and identical to most other previously sequenced Libellulidae dragonflies. Most PCGs of *N. fulvia* have the conventional start codons ATN (six ATG, three ATT, and two ATC), with the exception of *cox1* and *nad1* (TTG). Except for four PCGs (*cox1*, *cox2*, *cox3*, and *nad5*) end with the incomplete stop codon T—, all other PCGs terminated with the stop codon TAA or TAG. Phylogenetic analysis showed that *N. fulvia* got together with *Tramea virginia* with high support value. Libellulidae had a close relationship with Corduliidae, the relationships ((*Hydrobasileus* + *Brachythemis*) + (*Orthetrum* + (*Acisoma* + (*Neurothemis* + *Tramea*)))) were supported in Libellulidae." (Authors)] Address: Yimin Du, Y., School Life Sciences, Gannan Normal Univ., Shiyuan South Rd 1, Ganzhou, Jiangxi 341000, PR China. Email: yimin28@126.com

**19684.** Pestana, G.C.; Mateus-Barros, E.; Brasil, L.S.; Guillermo-Ferreira, R. (2021): A scientometric analysis on pre- and post-copulatory traits in Odonata. *International Journal of Odonatology* 24: 215-226. (in English) ["In the last decades, studies on sexual selection in odonates have shown a relationship between mating success and costly sexual ornaments, mainly male characters. Here, we conducted a scientometric analysis to assess the state of art of studies on sexual selection in odonates, especially on the role of male ornamentation (pre-copulatory traits) and sperm competition (post-copulatory traits). We found 51 papers focused on sexual ornamentation and 34 on sperm competition. Only one study simultaneously addressed both pre- and post-copulatory traits, nevertheless without an integrative approach. Results show that calopterygids are extensively studied regarding pre-copulatory traits (i.e., male wing pigmentation), while libellulids are mostly studied in post-copulatory traits (e.g., sperm competition) focused research. These preferences seem to be related to characteristics like presence of ornamentation and territoriality, large body size, variation and complexity of sperm removal structures, respectively. For the post-copulatory traits, sperm removal is frequently addressed, but few other strategies, like the investment in sperm quality and quantity, are investigated. Finally, we demonstrate that it is necessary to conduct studies

focused on addressing the relationship between pre- and post- mating sexual traits." (Authors)] Address: Pestana, Gabrielle Cristina, Dept Hydrobiol., Federal Univ. of São Carlos, São Carlos, Brazil. E-mail: jpestana@ua.pt

**19685.** Petrulevičius, J.F. (2021): First coenagrionid damselfly (Odonata: Zygoptera) from the late Palaeocene of northwestern Argentina. *Life: The Excitement of Biology* 9(1): 6-15. (in English) ["A new coenagrionid zygopteran, *Marado marado* n. gen. and n. sp., is described from the late Palaeocene of Maíz Gordo Formation, Jujuy province, Northwest Argentina. The new genus is characterised by wing characters such as the subnodus aligned with the base of IR2; postnodal crossveins aligned with rows of crossveins below forming several pseudo-transverse veins; only two primary antenodal crossveins Ax1 and Ax2 retained; distal discoidal vein MAb very oblique, so that the anterior side of the discoidal cell is much shorter than the posterior one; very short petiole; RP2 nearly three cells distal to subnodus; and a RP3+4 two cells (and with one crossvein to MA) basal to subnodus. This is the first fossil for South America of the well represented family Coenagrionidae." (Author)] Address: Petrulevičius, J.F., Consejo Nacional de Investigaciones Científicas y Técnicas & División Paleozoología Invertebrados, FCNyM – Fac. de Ciencias Naturales y Museo, UNLP – Univ. Nacional de La Plata. Paseo del Bosque s/n, La Plata (1900), Argentina. Email: levicius@fcnym.unlp.edu.ar

**19686.** Petzold, F. (2021): Abschluss der Basiserfassungen für ein landesweites Libellenmonitoring in Thüringen. *Landschaftspflege und Naturschutz in Thüringen* 57(1): 11-18. (in German, with English summary) ["Between 2010 and 2018, the basic surveys for the establishment of a Thuringia-wide network of dragonfly monitoring waters were carried out. 700 water bodies were surveyed and 58 dragonfly species were detected. In total, more than 21,000 additional data sets were made available for the state's species recording programme. For the first time, up-to-date data collected according to a uniform methodology are now available for the entire area of Thuringia. The diversity of the dragonfly fauna in the individual districts is primarily determined by the landscape features, the availability of water bodies and the intensity of use. The most species-rich dragonfly fauna was found in the Altenburger Land district. Excavation waters, unused ponds and small reservoirs were the water body types with the highest species diversity. The results of the baseline surveys are an important basis for stock and endangerment assessments and thus form a sound basis for planning measures to conserve or improve biodiversity in the sense of the Thuringian Strategy for Biodiversity Conservation. In addition, they Supplement the data collected in the FFH monitoring sample plots and thus enable re-liable Statements to be made on the development of populations and the distribution of FFH appendage species over the entire area. In addition, they Supplement the data collected in the FFH monitoring sample plots and thus enable reliable Statements to be made on the development of populations and the distribution of species listed in the Appendix of the EU Habitats Directive over the entire area. By comparing the data with those of subsequent monitoring rounds, well-founded Statements can be made on population developments, which is of particular interest against the background of changes in climate and land use." (Author)] Address: Petzold, F., Lutherstr. 130, 07743 Jena, Germany. E-mail: falk\_petzold@web.de

**19687.** Pimenta, P.M.; Vilela, D.S.; Pelli, A. (2021): Urbanization promotes the local extinction of odonatas in veredas

from Minas Gerais/Brazil. *International Journal of Hydrology* 5(6): 296-300. (in English) ["The order Odonata is one of the most fascinating among insects, with an estimated 6,000 described species. Little is known about the Odonata fauna in many regions of Brazil; including Vereda's areas. This unique plant formations occur only in Brazil. Despite being considered a preservation area, for over 70 years; there are a continuous degradation of this unique formation. The aim of this study was to survey the species of Odonata that occur in four areas of Veredas, within the urban perimeter of Uberaba/Minas Gerais. Two points were selected in the central region and two peripheral points. Four collections were carried out on sunny days, with two people intercepting the flight with entomological nets in May, September, December 2018 and March 2019. The total number of adults captured was 163. In the central points of the city we find generalist species, while in the peripheral points we find individuals endemic to Veredas and indicators of preserved environments. Data indicate that the Veredas have been severely abandoned by the Government and damaged by urbanization, and that the Odonata are an appropriate group to monitor the integrity of this type of environment, which gives rise to several important rivers in the region." (Authors)] Address: Pelli, A., Instituto de Ciências Biológicas e Naturais. Universidade Federal do Triângulo Mineiro. Av. Frei Paulino, 30. Uberaba/MG CEP 38025-180, Brazil.

**19688.** Powell, E.C.; Painting, C.J.; Hickey, A.J.; Machado, G.; Holwell, G.I. (2021): Diet, predators, and defensive behaviors of New Zealand harvestmen (Opiliones: Neopilionidae). *The Journal of Arachnology* 49(1): 122-140. (in English) ["The Neopilionidae is a highly diversified harvestman family in New Zealand, comprising eight genera and 28 species. Although individuals of many species are abundant in the field, basic information on their natural history is absent. Here we describe the diet, predators, and defensive behaviors of 13 species across three genera, *Forsteropsalis* Taylor, 2013, *Mangatangi* Taylor, 2013, and *Pantopsalis* Simon, 1879. Using three years of field observations, we first identify food items for this family, finding that New Zealand neopilionids are opportunistic, generalist foragers with a diet composed of a wide variety of prey and scavenged soft-bodied invertebrates, including worms, amphipods, species from nine orders of insects [including Odonata, Anisoptera], and two orders of arachnids (including conspecifics). We then describe the first known invertebrate predators of New Zealand harvestmen, including seven spider species, and conduct a review of the literature to collate a list of 32 species of native and non-native vertebrates (frogs, lizards, fish, birds, and mammals) that prey on harvestmen, including neopilionids. Finally, we describe the defensive behaviors of neopilionids, providing the first reports of autotomy and thanatosis in the family. In general, the diet of New Zealand neopilionids is similar to other harvestman species, and the list of predators includes mostly insectivorous taxa known to feed on harvestmen elsewhere. The defensive repertoire of neopilionids includes behaviors recorded for other species of Eupnoi, such as leg autotomy, but also unique behaviors that are only known for species of Dyspnoi and Laniatores, such as thanatosis." (Authors)] Address: Powell, E.C., School of Biological Sciences, University of Auckland, 3a Symonds St. Auckland Central, New Zealand 1010. E-mail: erin.powell94@gmail.com

**19689.** Pruvot, Y.Z.M.; Rene de Roland, L.A. (2021): Food habits of the Malagasy Pond Heron (*Ardeola idae*) during the breeding season in northern Madagascar. *Journal of Heron Biology and Conservation* 6:1 [online]: 12 pp. (in

English) ["We studied the diet of the endangered Malagasy Pond Heron (*Ardeola idae*) at a monospecific colony in Sofia Lake, in northern Madagascar during one breeding season from November 2018 to March 2019. Two complementary methods were used: 1) the collection of pellets followed by a laboratory analyses and 2) the direct observation of prey taken by the species. Based on 4,062 identified prey items from the 193 pellets, the diet of the Malagasy Pond Heron was composed of invertebrates including insects (81.34%), spiders (4.68%), crustaceans (1.90%), gastropods (0.86%), and vertebrates such as fishes (5.59%), frogs (3.40%) and lizards (2.24%). A large variety of insect families was identified, of which Tenebrionidae (13.47%), Hydrophilidae (11.05%), Acrididae (9.35%), Libellulidae (8.39%) and Dytiscidae (6.92%) were the most dominant. Three species of fish (*Cyprinus carpio*, *Channa* sp. and *Tilapia* sp.) and two species of frogs (*Boophis* sp. and *Rana* sp.) were also identified. The main prey items varied significantly through the five months of the breeding season. Coleopterans (Tenebrionidae and Hydrophilidae) were the most abundant group in all months and their consumption was greatest in March. Orthopterans (Acrididae) and Odonatans (Libellulidae) were consumed mainly in November and February, respectively. The consumption of fish was greatest in February and March. Frogs were captured most frequently in February. These results confirm that the Malagasy Pond Heron is a generalist and opportunistic in its feeding habitats. Conservation measures for this endangered heron should not only take place at nesting sites, but also in foraging areas surrounding the nesting colonies." (Authors)] Address: Pruvot, Yverlin, The Peregrine Fund Madagascar Project, BP 4113, Antananarivo, Madagascar. Email: yverlinpruvot@yahoo.fr

**19690.** Rechulicz, R.; Plaska, W. (2021): The diet of non-indigenous *Ameiurus nebulosus* of varying size and its potential impact on native fish in shallow lakes. *Global Ecology and Conservation* 31, November 2021, e01881: 10 pp. (in English) ["The brown bullhead (*Ameiurus nebulosus*) is a non-native, invasive fish species in Europe, and since it is sometimes present in high numbers in aquatic ecosystems, it may affect their functioning. The aim of the study was to determine the composition of the diet of *A. nebulosus* depending on its body size; the body size at which the brown bullhead becomes a predator and what share of its diet consists of fish. We determined the diet composition, frequency, and biomass of individual food types for 260 *A. nebulosus* individuals belonging to three classes in two shallow lakes. Analysis of the diet of *A. nebulosus* showed that it was highly varied, which manifested as a wide range of food types (15 types) as well as changes in its composition depending on the size of the fish. The nature of the habitat may influence the composition of the diet of *A. nebulosus*, which was most evident in the smallest individuals (total length <135 mm). Our observations showed that in Central European conditions, *A. nebulosus* with a length of more than 135 mm is able to feed on fish, and the share of fish in the food biomass increased with its total length, reaching even an 80% share of the biomass. In newly invaded areas, *A. nebulosus* can affect various groups of organisms by feeding on them. It can also compete with native fish species for food, but its main effect may be predation." (Authors) The study includes "Odonata".] Address: Rechulicz, R., Dept of Hydrobiology and Protection of Ecosystems, University of Life Sciences in Lublin, Dobrzańskiego 37 str., 20-262 Lublin, Poland. Email: jacek.rechulicz@up.lublin.pl

**19691.** Ribeiro, C.; Juen, L.; Rodrigues, M.E. (2021): The

Zygoptera/Anisoptera ratio as a tool to assess anthropogenic changes in Atlantic Forest streams. *Biodiversity and Conservation* 30: 1315-1329. (in English) ["The changes in land use caused by human activities have directly impacted aquatic ecosystems, making these environments some of the most threatened places on the planet. It is increasingly necessary and urgent to develop tools to identify and assess the effects of human impacts on ecosystems and biodiversity. This study aimed to evaluate whether the Zygoptera/Anisoptera ratio can be an effective tool to measure ecological changes in Atlantic Forest streams. Adult Odonata were collected in 42 streams. An environmental integrity index was used as a measure of environmental change. The Zygoptera/Anisoptera ratio was efficient in classifying the state of preservation of streams; therefore, habitats with a proportion equal to or greater than 67 and 52% of richness and abundance of the suborder Anisoptera can be considered altered. Meanwhile, streams representing a proportion of 54 and 67% of richness and abundance of the suborder Zygoptera can be considered little altered or preserved. The proportions of responses were close to the proposals for streams in the Amazon rainforest region. The ease of identifying the specimens in the different suborders of Odonata is practical, enabling the implementation of participatory monitoring with quick responses for monitoring in the aquatic ecosystems assessed in the region. It is important to test the Zygoptera/Anisoptera ratio for a broader validation in biomes where this evaluation has not yet been carried out. In the future, this will enable the implementation of networks for monitoring the integrity of aquatic environments quickly, effectively and at a low cost." (Authors)] Address: Rodrigues, M.E., Laboratório de Organismos Aquáticos, Departamento de Ciências Biológicas, Universidade Estadual de Santa Cruz (UESC), Ilhéus, BA, Brazil

**19692.** Rivas-Torres, A.; Rashni, B.; Waqa-Sakiti, H.; Tuiwawa, M.; Lorenzo-Carballa, M.O.; Beatty, C.D.; Cordero-Rivera, A. (2021): *Nesobasis rito* sp. nov. (Zygoptera: Coenagrionidae), a new species of forest damselfly from Vanua Levu, Fiji. *Zootaxa* 5082(2): 101-117. (in English) ["*Nesobasis rito* sp. nov. (Holotype male, Fiji, Vanua Levu, Drawa, 31 v 2018, A. Rivas-Torres leg.) from the comosa group is here described, illustrated, diagnosed, and compared with morphologically close species of the genus. *Nesobasis rito* can be distinguished from its related congeners by the shape of the caudal appendages and the ligula. The most similar species are *N. comosa* and *N. heteroneura*, which, like *N. rito*, have the caudal appendages covered by dense setae (especially the first species), but the shape differs clearly in lateral view, with *N. rito* having longer and more slender appendages, and a basal tooth clearly seen in dorsal view, absent in other members of the comosa group. The specific status of the collected specimens is also supported by the results of genetic analyses, where *N. rito* appears as a well-supported monophyletic clade. *Nesobasis rito* also has a distinct distribution from its most similar congeners: it is found on Vanua Levu, while *N. comosa* is found on Viti Levu and the closely related *N. heteroneura* is found on Viti Levu and Ovalau. All species of this group are found in streams with native forest riparian vegetation on their respective islands." (Authors)] Address: Cordero-Rivera, A., Universidade de Vigo, ECOEVO Lab., Escola de Enxeñaría Forestal, Campus Universitario, 36005 Pontevedra, Spain. Email: adolfo.cordero@uvigo.gal;

**19693.** Sanpapao, P.; Ponza, S.; Tawong, W.; Phongchaisit, P.; Pongpadung, P. (2021): Diversity of macrobenthic fauna and its relationship with environmental factors in the

Yom River. *Wichcha Journal* 40(2): 118-132. (in Thai, with English summary) ["Studies on the diversity of macrobenthic fauna and environmental factors were carried out to assess the quality of water resources and investigate the correlation of environmental factors with macrobenthic fauna in the Yom River. The field surveys were conducted at 16 sampling stations. Samples were collected in the winter season (January 2018), summer season (April 2018), and the rainy season (July 2018). The results showed that 47 families from 3 phyla of macrobenthic fauna were identified. The dominant benthic fauna group were Unionidae (10.67%) Viviparidae (10.46%) Chironomidae (8.22%) and Tubificidae (7.44%). The Shannon-Wiener diversity index Magalef index and Evenness index were  $2.07 \pm 0.07$ ,  $0.67 \pm 0.09$ , and  $1.87 \pm 0.09$ , respectively. Canonical correspondence analysis revealed that Diptera, Haplotoxida, and Lumbriculida showed a positive correlation with some parameters such as pH, water temperature, turbidity, BOD, chlorophyll a, ammonia, nitrite, nitrate, and total organic matter, while Hemiptera, Odonata, Decapoda, Trichoptera, and Ephemeroptera showed the positive correlation with total dissolved solids, conductivity, alkalinity and transparency. After assessing the water quality using the ASPT value (mean value of  $5.11 \pm 0.85$ ) and comparing it with the standard index of surface water quality, it was concluded that water quality reached mesotrophic status and surface water quality CLASS 3. These results can be beneficial in monitoring water quality and controlling effluents from various activities to conserve the water resources in the Yom River." (Authors) Odonate taxa are treated at family level.] Address: Pongpadung, P.: Email: piyawatp@nu.ac.th

**19694.** Sarashina, M.; Yoshida, T. (2021): Diet composition of the invasive American Bullfrog (*Lithobates catesbeianus*) in Onuma Quasi-National Park, Hokkaido, Japan. *Current Herpetology* 40(1): 77-82. (in English) ["An invasive alien species American bullfrog (hereafter, 'bullfrog') is found in freshwater lakes in Onuma Quasi-National Park, Hokkaido, Japan. Bullfrog commonly feeds on red swamp crayfish in many areas. However, red swamp crayfish has not been confirmed in Komuna Lake, Onuma Quasi-National Park. The purpose of this study is to examine the trend of predation on native biomes in areas without crayfish presence. We detected the dietary composition of bullfrogs. The stomach contents of 469 individuals were analyzed and classified. The stomach contents of adult frogs accounted for 67.4% of volume were vertebrates including Actinopterygii and Amphibia such as Japanese crucian carp, topmouth gudgeon, bullfrog juveniles, bullfrog tadpoles and Japanese common toad. Further, aquatic animals were preyed more than terrestrial animals in volume (60.0%) and frequency (90.0%). From these results, bullfrogs in Onuma Quasi-National Park used most conspicuous alien aquatic species such as alien fish and frogs of the same species as food resources and further revealed that these alien aquatic species function as a substitute food for the crayfish. While the majority of bullfrog food resources are alien aquatic species, several rare aquatic animals were also preyed on. In the future, it will be necessary to investigate the predation pressure of bullfrogs on local biodiversity." (Authors) Taxa including Odonata are treated at order level.] Address: Sarashina, M., Link-us, 1-25, Toyohira 2-jo 7-chome, Toyohira, Sapporo, 062-0902, Japan

**19695.** Schneider, T.; Vierstraete, A.; Müller, O.; van Pelt, G.J.; Caspers, M.; Ikemeyer, D.; Snegovaya, N.; Dumont, H.J. (2021): Taxonomic revision of Eastern part of western Palearctic Cordulegaster using molecular phylogeny and



morphology, with the description of two new species (Odonata: Anisoptera: Cordulegasteridae). Diversity 2021, 13, 667. <https://doi.org/10.3390/d13120667>: 50 pp. (in English) ["Taxonomy of the genus Cordulegaster Leach in Brewster, 1815 in the Eastern part of the Western Palaearctic is poorly resolved. A two-step approach was applied: sequences of mitochondrial and nuclear DNA fragments were used to sort specimens; poorly known or new taxa with their phenotypic variation were described. The existence of two traditional groups (boltonii- and bidentata group) was confirmed. Cordulegaster coronata Morton, 1916, however, belongs to a different group. Molecular-analysis supported three known and one new species (C. heros Theischinger, 1979, C. picta Selys, 1854, C. vanbrinkae Lohmann, 1993, and C. kalkmani sp. nov.) in the boltonii-group. In the bidentata-group, all specimens from West-Turkey belonged to C. insignis Schneider, 1845, all specimens further east to a complex of four closely related species, which we name charpentieri complex (C. amasina Morton, 1916, stat. rev., C. mzymtae Bartenev, 1929 C. charpentieri (Kolenati, 1846), stat. rev. and C. cilicia sp. nov.). The following taxa: C. insignis nobilis Morton, 1916, syn. nov., C. nachitschevanica Skvortsov & Snegovaya, 2015, syn. nov. C. plagionyx Skvortsov & Snegovaya, 2015, syn. nov. and the Caucasian subspecies C. insignis lagodechica Bartenev, 1930, syn. nov., were synonymized with C. charpentieri. Finally, we provide a key for all Western Palaearctic Cordulegaster." (Authors)] Address: Schneider, T., Arnold-Knoblach-Ring 76, 14109 Wannsee, Germany. Email: thomas.rs@gmx.de

**19696.** Shin, S.; Jung, K.S.; Kang, H.G.; Dang, J.-H.; Kang, D.; Han, J.E.; Kim, J.H. (2021): Northward expansion trends and future potential distribution of a dragonfly *Ischnura senegalensis* Rambur under climate change using citizen science data in South Korea. Journal of Ecology and Environment 45(33): 15 pp. (in English) ["Citizen science is becoming a mainstream approach of baseline data collection to monitor biodiversity and climate change. Odonata have been ranked as the highest priority group in biodiversity monitoring for global warming. *I. senegalensis* has been designated a biological indicator of climate change and is being monitored by the citizen science project "Korean Biodiversity Observation Network." This study has been performed to understand changes in the distribution range of *I. senegalensis* in response to climate change using citizen science data in South Korea." (Authors)] Address: Kim, J.H., Department of Biological Resources Utilization, National Institute of Biological Resources, Incheon 22689, Republic of Korea. Email: birdkr@korea.kr

**19697.** Shivaraju; Venkateshwarlu, M (2021): Faunal diversity of Durgadahalli Lake of Tumakuru, Karnataka State, India. Journal of Environmental Studies 7(1): 6 pp. (in English) ["The aquatic organisms are the good indicators of health of an aquatic ecosystem and represent the balanced ecosystem. The present study was conducted to understand the current status of faunal diversity in Durgadahalli Lake, located in the North-East of Tumakuru district, at distance of 15 km from Tumakuru city in Karnataka. It lies at 13° 13' 56" N latitude and 77° 25' 30" E longitude. It receives water mainly from rain-fall with an average of 620 mm and from Jayamangalli river. The Lake comparatively smaller with rich aquatic faunal diversity and recorded 20 species of zooplankton, 9 species of aquatic insects belonging to Hemiptera, Coleoptera, Odonata and Diptera, One molluscan shell, 2 amphibia species (frog) and one reptilian species (turtle). The water collected and analyzed from five selective sampling stations of the Lake from 2016 to 2019. Not many

reports are available on Durgadahalli Lake with respect to faunal diversity. Keeping it in mind, we have selected Durgadahalli Lake for the present study on ecology and aquatic faunal diversity." (Authors) The following odonate species are said to occur: *Libellago andamanensis* (Fraser, 1924), *Gomphidia kodaguensis*, Fraser, 1923, and *Tramea transmarina*, Brauer, 1867] Address: Shivaraju, Dept of Studies and Research in Applied Zoology, Jnana sahyadri, Shankaraghatta, Kuvempu Univ., Shivamogga-577, 451, Karnataka, India; Email: 1993shivarajugiri@gmail.com

**19698.** Suchitra, G.; Chethan, B.K. (2021): Occurrence and relative abundance of dragonflies in Mysuru city, Karnataka, India. Journal of Entomology and Zoology Studies 9(6): 180-183. (in English) ["A field study was conducted to find out the status, occurrence and relative abundance of dragonflies in Mysuru city, Karnataka during April 2020 to May 2021. Sampling was done by line transect method, collected data from 4 study areas were subjected to estimate relative abundance of species. A total of 28 species under 3 families were recorded. Family Libellulidae was found to be most dominated with 26 species followed by Aeshnidae and Gomphidae with 1 species respectively. Based on the relative abundance 18% of species were very common while, 36% were common and 46% were uncommon. The study revealed occurrence of 5 very common species of dragonflies in all the study areas. The results of this study provide baseline data of dragonfly diversity of Mysuru city for research on their biology and conservation." (Authors)] Address: Suchitra, G., Dept of Zoology, Maharani's Science College for Women, Mysuru, Karnataka, India

**19699.** Takahashi, M.; Okude, G.; Futahashi, R.; Takahashi, Y.; Kawata, M. (2021): The effect of the doublesex gene in body colour masculinization of the damselfly *Ischnura senegalensis*. Biology Letters 17: 20200761. 6 pp. (in English) ["Odonata species display a remarkable diversity of colour patterns, including intrasexual polymorphisms. In the damselfly (*Ischnura senegalensis*), the expression of a sex-determining transcription factor, the doublesex (*Isdsx*) gene is reportedly associated with female colour polymorphism (CP) (gynomorph for female-specific colour and andromorph for male-mimicking colour). Here, the function of *Isdsx* in thoracic coloration was investigated by electroporation-mediated RNA interference (RNAi). RNAi of the *Isdsx* common region in males and andromorphic females reduced melanization and thus changed the colour pattern into that of gynomorphic females, while the gynomorphic colour pattern was not affected. By contrast, RNAi against the *Isdsx* long isoform produced no changes, suggesting that the *Isdsx* short isoform is important for body colour masculinization in both males and andromorphic females. When examining the expression levels of five genes with differences between sexes and female morphs, two melanin-suppressing genes, black and ebony, were expressed at higher levels in the *Isdsx* RNAi body area than a control area. Therefore, the *Isdsx* short isoform may induce thoracic colour differentiation by suppressing black and ebony, thereby generating female CP in *I. senegalensis*. These findings contribute to the understanding of the molecular and evolutionary mechanisms underlying female CP in Odonata." (Authors)] Address: Takahashi, M., Graduate School of Life Sciences, Tohoku University, 6-3 Aramaki, Aoba, Sendai 980-8578, Japan

**19700.** Tavakol, M.R.; Tooski, M.Y.; Jabbari, M.; Javadi, M. (2021): Effect of graphene nanoparticles on the strength of sandwich structure inspired by dragonfly wings under low-

velocity impact. *Polymer Composites* 42(10): 5249-5264. (in English) ["Dragonfly's wings are highly specialized flying organs that are well adapted to the flying behavior of each dragonfly, mainly consisting of veins and membrane. The effect of graphene nanoparticles on a novel foam-based sandwich panel structure inspired by microstructural features of dragonfly wings has been investigated under low-velocity impact. Composite and nanocomposite sandwich veins are made of E-glass/epoxy layers, in which different percentages of graphene nanoparticles are combined with its resin. Polyurethane foam was also used for its core. According to the performance of the samples made after testing and cutting the samples in transverse and longitudinal directions, the internal structure of the vein was examined. Sandwich panels with this type of structure under impact can prevent damage propagation in the vein. The sandwich structure with 0.3% nano indicated more stable behavior in energy absorption and impact resistance than other samples." (Authors)] Address: Mehdi Yarmohammad Tooski, Department of Mechanical Engineering, Islamic Azad University South Tehran Branch, Tehran, Iran. E-mail: m\_yarmohammadi@azad.ac.ir

**19701.** Thiele, V.; Blumrich, B.; Berlin, A.; Kasper, D. (2021): Erfassung und Bewertung der Libellen-, Heuschrecken- und Großschmetterlingsfauna des Siebendorfer Moores in Mecklenburg (Odonata, Orthoptera, Lepidoptera). *Virgo* 24: 3-16. (in German) ["In the year 2020, the Siebendorfer Moor was examined for the occurrence of dragonflies, butterflies and moths and grasshoppers. 10 species of damselflies and 17 species of dragonflies were found in the project area, including the FFH species large white-faced darter (*Leucorrhinia pectoralis*). The dragonfly fauna (n=27 species) of the study area was dominated by species whose larvae show a clear preference for stagnant to poorly flowing water (limnophilic), plant substrates, moor-like conditions and constantly water-bearing rivers. The most optimal settlement exists in the central fen area near the peat cuttings. The butterfly and moth fauna was relatively poor in species. 77 moths and 22 day-flying species were detected. The biocenosis was characterized by taxa from the swamp forests, reeds, herbaceous vegetation and mixed deciduous forests, with a gradient from east (peat cuttings) to west (grassland areas). Many species already reflect hygrophilic to mesophilic conditions, which can be seen as positive for the development of the fen. 14 species of grasshoppers have been identified. The currently detected grasshopper species mainly belong to the mesophilic to hygrophilic or hygrophilic taxa, which allows the conclusion that the habitats are already well suited for the typical wet meadow species. These associations can be found particularly on the areas adjacent to the peat cuttings and smaller bodies of water in the central area of the Siebendorfer Moor." (Authors)] Address: Thiele, V., biota – Institut für ökologische Forschung und Planung GmbH, Nebelring 15, 18246 Bützow, Germany. E-Mail: volker.thiele@institut-biota.de

**19702.** Tochiewa, F.T.; Tochiew, T.Y. (2021): Ecological and faunal analysis of dragonflies (Odonata) of suborders Zygoptera, Caloptera in Republic of Ingushetia. *E3S Web of Conferences* 265, 01033 (2021): 7 pp. (in English) ["In this work, we adhere to the systematics proposed by the school of odonatologists B.F.Belyshev, that is, the order is subdivided into three suborders: Anisoptera, Zygoptera and Caloptera. In this article, we first characterize the suborders Zygoptera, Caloptera. The article provides a systematic composition and an overview of taxa common in the RI. [one]. On the basis of literature sources, brief characteristics of

suborders, families and genera are given, and the problems of taxonomy and nomenclature of individual species and basic information on the distribution of taxa found in the study area are discussed. Analysis of the existing stream of literary information on dragonflies indicates that there are still problems, the solution of which requires close attention. First of all, this is the lack of research on the Caucasian regional odonatofaunas." (Authors)] Address: Tochiewa, Fatima, Ingush State University, Republic of Ingushetia, Magas, Russia. E-mail: fatimatociewa7@gmail.com

**19703.** Tochiewa, F.T.; Tochiew, T.Y.; Izmailova, M.A.; Dudarova, Kh.Yu. (2021): Influence of hydrological regimes on the ecological balance of the environment: case study of the Republic of Ingushetia. *IOP Conf. Ser.: Earth Environ. Sci.* 867 012111: 5 pp. (in English) ["Dragonflies are amphibious insects whose existence is associated with water bodies that are necessary for the development of larvae. Different types of dragonflies differ in the requirements for the choice of habitats. In mountain species, preferences depend on the height of the habitat. The analysis of the existing flow of literary information on dragonflies indicates that there are still problems that require close attention. First and foremost, this is insufficient study of Caucasian regional odonata faunas. Of all the unique Caucasian regions, the territories of the Dagestan and Chechen Republics were the least studied with regard to dragonflies. This is caused by the acute shortage of specialists and the difficulties of studying the group of animals of this original and unique region, which is located at the biogeographic crossroads of various faunas. Siberian, European, Mediterranean, Ethiopian, Central and East Asian dragonfly species fly together within these territories. A significant number of scientific articles are devoted to Caucasian dragonflies, testifying to the unique fauna of dragonflies in the region. At the same time, there are many unresolved issues of the taxonomic nature of some dragonfly species, their propagation, distribution over high-altitude zones, life cycles of ontogenesis, and some environmental issues, in particular, the phenology of the group in the peculiar and unique physical, geographical and landscape conditions of the Republic of Ingushetia. There is a relatively extensive literature on the dragonflies of the Caucasus, while there is no purposeful summary of the ecological-faunal, ecological-geographical and zoogeographic features of this group of insects in the Republic of Ingushetia. Another problem that has not yet been solved is the establishment of patterns of dragonfly propagation along the altitude gradient, as well as the peculiarities of the formation of odonotocomplexes in various high-altitude zones of the Republic of Ingushetia." (Authors)] Address: Tochiewa, Fatima, Ingush State University, Republic of Ingushetia, Magas, Russia. E-mail: fatimatociewa7@gmail.com

**19704.** Trapero-Quintana, A.; Casenave-Cambet, A.C.; Lim-Franco, G. (2021): Diversidad y patrones de emergencia de libélulas (Odonata: Insecta) en Chutines, Guantánamo, Cuba. *Boletín de la Sociedad Entomológica Aragonesa* 69: 217-226. (in Spanish, with English summary) ["Emergence is the process by which larvae of aquatic insects emerge from the water and enter the air as adults. Little is known about the emergence patterns for tropical odonates. The purpose of this study is to characterize the emergence pattern of an odonate assemblage in a permanent lentic habitat of Chutines, Guantánamo, from the collect of exuviae. 30 samplings were carried out with a frequency of once a week and seven to nine days apart, in four transects of 8m<sup>2</sup>. To characterize the emergence, the seasonal climate model of: rainy, dry and transitional periods

was considered. Changes in climate variables and habitat characteristics were recorded and related to the emergence pattern. The study shown that the emergence pattern in a constant water volume is asynchronous, with a predominance of accidental species and uneven abundance distribution. The stage with the highest percentage of emergence was the dry season, from which temperature and relative humidity were significantly correlated parameters." (Authors)] Address: Trapero-Quintana, A., Depto de Biología Animal y Humana, Facultad de Biología de la Univ. de la Habana, Calle 25 # 455 entre J e I, Vedado, La Habana, Cuba. CP: 10400. Email: trapero76@gmail.com,

**19705.** Van Passel, B.; Cornells, F.; De Beuckeleer, H.; De Buyzer, C.; Kiefer, M.; Vermeulen, T. (2021): The dragonfly and damselfly fauna of Stropersbos. *Brachytron* 22(1/2): 26-47. (in Dutch, with English summary) ["Intensive monitoring from 2016 to 2020 has provided a systematic overview of the Odonata fauna of the Stropersbos. This site has an Odonata fauna which more closely resembles that of the Kempen, rather than that of the more western areas on the Flemish sand ridge. After the restoration works of 2015, *Sympetrum vulgatum* and *Ischnura pumilio* showed pioneer behaviour. In the more sparse areas of the Stropersbos, high densities of *Lestes barbarus* and *Lestes dryas* were observed. In the more sheltered mixed-landscape areas, a stable population of *Lestes virens* was discovered. Due to the drying out of their reproductive waters in 2018-2020, relict populations of *Sympetrum danae* and *Ceriatrigon tenellum* have recently decreased strongly, while *Sympetrum meridionale* has expanded during the same period." (Authors)] Address: Email: Vermeulen, T.: tomvermeulen@proximus.be

**19706.** Vandamme, I. (2021): Predation of the robber fly *Eutolmus rufibarbis* on *Sympetrum danae*. *Brachytron* 22(1/2): 48-51. (in Dutch, with English summary) ["Robber flies are known predators of other Diptera, even those larger than themselves, but very little is known about their preying on dragonflies. On 5 July 2018, while on monitoring round in Grenspark de Kalmthoutse Heide, Belgium, I observed predation of *Eutolmus rufibarbis* on *Sympetrum danae*. A short inquiry provided only very few other images of Robber flies preying on dragonflies. It seems to be fairly rare." (Author)] Address: Email: igor.vandamme@skynet.be

**19707.** Vinko, D.; Salamun, A. (2021): First record of Violet Dropwing *Trithemis annulata* (Palisot de Beauvois, 1807) (Odonata: Libellulidae) in Slovenia. *Natura Sloveniae* 23(2): 25-37. (in English, with Slovene summary) ["One adult male *T. annulata* was recorded at Lake Vogršček in the Vipava Valley (W Slovenia) during the Biological Students Research Camp – Otlica 2021. This first record for the country is presented and the species' distribution in Europe outlined. Behavioural observations and data on the accompanying Odonata fauna are included. This widespread Afrotropical species has rapidly expanded its range in south and south-western Europe in the recent two decades, with global warming apparently being the main driver of this expansion. Hence, 73 Odonata species belonging to 29 genera and nine families are now reported for Slovenia. *Trithemis* is the seventh genus to be added to the family Libellulidae for the country. The discovery of *T. annulata* in the Vipava Valley in Slovenia is significant for the fact of being the northernmost observation on the Balkan Peninsula to date." (Authors)] Address: Vinko, D., Slovene Dragonfly Society, Verovškova 56, SI-1000 Ljubljana, Slovenia. E-mail: damjan.vinko@gmail.com

**19708.** Wasscher, M.; Dijkshoorn, D.; de Vries, R.; Kloen, J.-F. (2021): Does the dragonfly biting midge *Forcipomyia paludis* co-occur with the Great fen-sedge *Cladium mariscus* in the Netherlands and Belgium?. *Brachytron* 22(1/2): 13-25. (in Dutch, with English summary) ["An overview is given of the localities where the dragonfly midge (*Forcipomyia paludis*) has been found in the Netherlands and Belgium. Following the hypothesis that the distribution of this species corresponds with the occurrence of the Great fen-sedge (*Cladium mariscus*), we searched for new localities of the species by checking thousands of photos of dragonflies for the presence of the midge on their wing veins. This resulted in nine new locations in the Netherlands and one in Belgium, which brings the total numbers of locations of *F. paludis* to 24 (the Netherlands) and 7 (Belgium). *Cladium mariscus* occurs on 21 and 4 of these locations respectively. The most important locations of *F. paludis* in both countries are locations where *C. mariscus* grows extensively. Incidentally, *F. paludis* was found at locations where *C. mariscus* is not locally present but is found at a distance up to 25 km. These observations might refer to midges attached to the wings of their dispersing hosts. The larva of *F. paludis* has not yet been described, but might be found in the thick litter layer between *C. mariscus* plants." (Authors)] Address: Wasscher, M., Minstraat 15bis, 3582 CA Utrecht, The Netherlands. Email: marcel.hilair@12move.nl

**19709.** Wasscher, M.; de Vries, R.; Dijkshoorn, D.; Kloen, J.-F. (2021): Co-occurrence of the dragonfly biting midge *Forcipomyia paludis* and the Great fen-sedge *Cladium mariscus* in Europe. *Libellula* 40(1/2): 1-17. (in English, with German summary) ["The dragonfly biting midge *Forcipomyia paludis* (Diptera: Ceratopogonidae) has been found in many parts of Europe and adjacent countries such as Morocco, Turkey and Georgia, but has a remarkably scattered distribution, with at most a few dozen localities in the countries where it occurs. Its presence appears to be strongly concurrent with the presence of the Great fen-sedge *Cladium mariscus*, a marsh plant with a wide but scattered distribution within Europe. Both species co-occur across the entire known range of *F. paludis*. However, *F. paludis* was also found on a few localities where the Great fen-sedge has not been reported. In most cases these localities are within a limited distance of Great fen-sedge localities, or refer to incidental observations in which *F. paludis* might have been attached to dispersing dragonflies. A probable discrepancy between the two species was found in the southwest of Baden-Wuerttemberg. This overlap in distribution suggests that the presence of *F. paludis* is linked to that of the Great fen-sedge. It is therefore probable that the larvae of *F. paludis* develop in Great fen-sedge stands, where a humid litter layer of dead leaves is formed. This habitat presents similar conditions as those preferred by many other Ceratopogonid larvae. However, the concurrence that is described here does not prove a decisive ecological link while we did find a few exceptions. Additionally, first records for Estonia, Denmark, Portugal and Turkey are reported here." (Authors)] Address: Wasscher, M., Minstraat 15bis, 3582 CA Utrecht, The Netherlands. Email: marcel.hilair@12move.nl

**19710.** Yu, X.; Hämäläinen, M. (2021): Longinos Navās's Odonata species from China: Notes on three synonymies in Platycnemididae, including the synonymy of *Pseudocopera tokyoensis* (Asahina, 1948). *Odonatologica* 50(1/2): 115-129. (in English) ["Based on the study of the relevant type specimens and other material, the following synony-

mies in Platycnemididae are established: *Pseudocopera tokyoensis* (Asahina, 1948) is a junior synonym of *Pseudocopera rubripes* (Navās, 1934) (comb. nov.), *Platycnemis foliosa* Navās, 1932 is a junior synonym of *Platycnemis phyllopoda* Djakonov, 1926, and *Platycnemis pierrati* Navās, 1935, is a junior synonym of *Copera marginipes* (Rambur, 1842). The present taxonomic Status of the 30 new Odonata species and one variety described by Longinos Navās from China is presented in a table and briefly discussed, pointing out a few poorly known, or dubious taxa in need of further study." (Authors)] Address: Yu, X., College of Life Sciences, Chongqing Normal Univ., Chongqing, 401331, P.R. of China. Email: lannysummer@163.com

**19711.** Zayeid, Y.M.; Altaib, A.N. (2021): Taxonomic study on Libellulidae species (Odonata: Anisoptera) in Al-Marj region Libya. *Al-Mukhtar Journal of Sciences* 36(4): 353-362. (in Arabian, with English summary) ["The study was aimed to identify some species of Odonata on Al-Marj area in Aljabal Alakder. The study carried out from January 2018 to December 2019 in Al Jabal Al Akhdar region which aimed to identify the species of the suborder Anisoptera, family Libellulidae in twelve sites. Four species of this family were recorded, *Crocothemis erythraea* (Brulle, 1832), *Orthetrum anceps* (Schneider, 1845), *Sympetrum fonscolombii* (Selys, 1840), and *Trithemis arteriosa* (Burmeister, 1839), endemic to the study area. Their identification was based on the external morphology of the adults." (Authors)] Address: Zayeid, Y.M., Department of Plant Protection, Faculty of Agriculture, Omer Al-Mukhtar University, Al-Bayda, Libya. Email: ymzaied@yahoo.com ,

**19712.** Zia, A. (2021): Noteworthy records of damselflies (Odonata: Zygoptera) housed at National Insect Museum, Pakistan (Damselflies of Pakistan: Part II). *International Dragonfly Fund - Report 164*: 1-21. (in English) ["Damselflies recorded before the administrative partition of the Indian Subcontinent and now housed at National Insect Museum (NIM), Islamabad were reviewed and catalogued. This collection is the divided part of National PUSA Collection (NPC) transferred to the Pakistan during 1947. Data for this collection had never been available or published. A record of 104 taxa is reported herein. Few of the species were found double named, misidentified and not updated as per valid classification. Some of the specimens were found unidentified. All such issues were resolved by following regional literature." (Authors)] Address: Zia, A., National Insect Museum, NARC – Islamabad, Pakistan. Email: saiyedahmed@gmail.com

## 2022

**19713.** Archibald, S.B.; Cannings, R.A.; Greenwalt D.E. (2022): *Kishenehna prima*, a new genus and species of darner dragonfly (Odonata, Aeshnidae, Gomphaeschninae) from the early middle Eocene Kishenehn Formation of Montana, USA. *Zootaxa* 5099(4): 496-500. (in English) ["We describe the darner dragonfly *Kishenehna prima* n. gen. and sp. (Odonata, Aeshnidae, Gomphaeschninae) based on a well-preserved, nearly complete female hind wing from the Lutetian Coal Creek Member of the Kishenehn Formation, northwestern Montana, USA. *Kishenehna* is morphologically close to the late Paleocene genus *Alloaeschna* Wighton & Wilson of Alberta, Canada. This is the first dragonfly (Anisoptera) described from the Kishenehn Formation and the first from the Lutetian of the Western Hemisphere." (Authors)] Address: Archibald, S.B., Dept Biol. Sciences, Simon Fraser Univ., 8888 University Drive, Burnaby,

British Columbia, V5A 1S6, Canada. Email: sba48@sfu.ca

**19714.** Baaloudj, A.; De los Ríos-Escalante, P.R.; Esse, C. (2022): Benthic community ecology for Algerian river Seybouse. *Brazilian Journal of Biology* 84, e251566: 12 pp. (in English, with Portuguese summary) ["The Seybouse is the second largest river basin in Algeria, hosting an important biodiversity and providing various ecosystem services. This watershed is highly influenced by agricultural and industrial activities, which threaten its biodiversity and ecosystem integrity. The use of benthic macroinvertebrates as biological indicators has a long tradition in developed countries and integrated into all assessments of the ecological quality of river systems. However, the macroinvertebrates of many North African regions are still not well studied, including those of the Seybouse river. The aim of this study is to assess the inventory and ecological role of benthic macroinvertebrates in inland waters of the Seybouse River and determine the impact of pollution on their spatial distributions. We sampled the benthic macrofauna of Wadi Seybouse and its affluents using regular surveys in three sites, of which one was in the upper Seybouse Bouhamdane in Medjez Amar and two in the middle Seybouse. Between December 2019 and May 2020, 10 physico-chemical parameters (pH, EC, OD, water speed, NO<sub>3</sub>, Salinity, NO<sub>2</sub>, MES, turbidity, depth) were measured in order to establish a health state diagnosis of these aquatic ecosystems. The complementary biological approach by the analysis of populations of macroinvertebrates identified 7482 individuals and 40 taxa divided into five classes: Crustaceans which were the most dominant, insects with the main orders (Ephemeroptera, Diptera, Trichoptera, Heteroptera and Odonata), Molluscs, Nematodes and Annelids. The physico-chemical analyzes and the application of the organic pollution indices indicated a strong to excessive pollution for all sites, especially in Seybouse upstream." (Authors) Odonata are treated a sub-order level.] Address: Baaloudj, A., University of 8 May 1945 Guelma, Faculty SNV-STU, Laboratoire de Biologie, Eau et Environnement, Guelma, Algeria. Email: bafef@yahoo.fr

**19715.** Bowles, D.E.; Kleinsasser, L.J. (2022): Environmental determinates of distribution for dragonfly nymphs (Odonata: Anisoptera) in urban and non-urban East Texas streams, USA. *Hydrobiology* 1(1): 67-88. (in English) ["We collected environmental and habitat data for nymphs of 12 dragonfly species (Odonata: Anisoptera) from 91 stream sites throughout eastern Texas, including urban and non-urban locations. Understanding the relationship of dragonflies to habitat structure and other environmental variables is crucial for the purpose of conserving these insects and better using them as predictive tools for water quality assessments, and refining tolerance values. The objectives of this study were to determine the key environmental variables influencing the diversity and distribution of dragonflies in eastern Texas streams, and further determine if differences in those factors could be observed between urban and non-urban sites. We collected samples separately from benthic habitats and woody snag habitats. Significantly fewer sites were observed to have dragonfly species on snag habitat (mean = 1.25) compared to benthic samples (mean = 14.67) (t-test, p = 0.001). The number of dragonfly species collected among non-urban streams (mean = 9.83) was not significantly different than urban streams (mean = 6.08; t-test, p = 0.07). Detrended correspondence analysis of benthic and snag habitat data collected from non-urban and urban locations showed that most of the species are oriented most closely to benthic habitats in non-urban streams. Snag



habitat was shown to be poorly ordinated for all of the species. A canonical correspondence analysis of 29 water quality and habitat variables as environmental determinants of dragonfly diversity and distribution showed that distributional relationships among species are complex and often described by multiple environmental factors." (Authors)] Address: Bowles, D.E., Dept of Biology, Missouri State University, 901 South National Avenue, Springfield, MO 65897, USA. Email: davidbowles@missouristate.edu

**19716.** Buczynski, P.; Tonczyk, G. (2022): Polish and dedicated to Poland odonatological papers. 20. The year 2021 and additions to the years 2019-2020. *Odonatrix* 181 (2022): 5 pp. (in Polish, with English summary) ["The authors present a list of 33 Polish and dedicated to Poland odonatological publications that appeared in the year 2021, and two MSc theses. Six papers from 2020 and three papers from 2019 are also given to supplement the previous lists." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**19717.** Chen, R.-Y.; Lai, C.-L.; Chen, J.-C.; Wu, M.-X.; Yang, H. (2022): Omnidirectional / unidirectional antireflection-switchable structures inspired by dragonfly wings. *Journal of Colloid and Interface Science* 610: 246-257. (in English) ["Randomly arranged irregular inclined conical structure-covered dragonfly wings, distinguished from periodic conical structure-covered cicada wings, are with high optical transparency for wide viewing angles. Bioinspired by the antireflective structures, we develop a colloidal lithography approach for engineering randomly arranged irregular conical structures with shape memory polymer-based tips. The structures establish a gradual refractive index transition to suppresses optical reflection in the visible spectrum. By manipulating the configuration of structure tips through applying common solvent stimulations or contact pressures under ambient conditions, the resulting unidirectional antireflection and omnidirectional antireflection performances are able to be instantaneously and reversibly switched. The dependences of structure shape, structure inclination, structure arrangement, and structure composition on the switchable antireflection capability are also systematically investigated in this study." (Authors)] Address: Chen, R.-Y., Dept of Chemical Engineering, National Chung Hsing University, 145 Xingda Road, Taichung City 40227, Taiwan

**19718.** Chitsaz, N.; Siddiqui, K.; Marian, R.; Chahl, J.S. (2022): Numerical and experimental analysis of 3D Micro-Corrugated Wing in gliding flight. *Journal of Fluids Engineering* 144(1): 11 pp. (in English) ["In this study, computational fluid dynamics analysis was performed on a three-dimensional model of a Libellulidae wing to determine aerodynamic performance in gliding flight. The wing is comprised of various corrugated features alongside the spanwise and chordwise directions, as well as twist. The detailed features of real 3D dragonfly wing models, including all the corrugations through both span and chord, have not been considered in the past for a detailed aerodynamic analysis. The simulations were conducted by solving the Navier-Stokes equations to demonstrate gliding performance over a range of angles of attack at low Reynolds numbers. The numerical model was validated against experimental data obtained from a fabricated corrugated wing model using particle image velocimetry. The numerical results demonstrate that bio-inspired wings with corrugations compared to flat profile wings generate more lift with lower drag, trapping the vortices in the valleys of wing corrugation leading to

delayed flow separation and delayed stall. The experimental and numerical results demonstrate that the methodology presented in this study can be used to measure bio-inspired 3D wing flow characteristics, including the influence of complex corrugations on aerodynamic performance. These findings contribute to the advancement of knowledge required for designing an optimized bioinspired micro air vehicle." (Authors)] Address: Chitsaz, Nasim, UNISA STEM, Australian Research Centre for Interactive and Virtual Environments, University of South Australia, University Boulevard, Mawson Lakes, South Australia, 5095, Australia. E-mail: nasim.chitsaz@mymail.unisa.edu.au

**19719.** Dawn, P. (2022): Dragonflies and damselflies (Insecta: Odonata) of West Bengal, an annotated list of species. *Oriental Insects* 56(1): 81-117. (in English) ["An updated checklist of Odonata known so far from the state West Bengal is presented here consisting 239 species belonging to 114 genera and 17 families. Eight species viz. *Megalestes irma*, *Lestes garoensis*, *Calicnemia nipalica*, *Chlorogomphus mortoni*, *Somatochlora daviesi*, *Cephalaeschna viridifrons*, *C. triadica*, *Lyriothemis mortoni*, are recorded for the first time from the state; and last two species are recorded for the first time from India. This paper indicates a prominent rise in the number of species than the previous published checklist, as many isolated species distribution records were lying undocumented. This paper also reflects the data from citizen science platforms and social media groups. Reference for the original descriptions, type locality and information of specimen repository of the recorded species are provided. Some doubtful identification and distribution records are also discussed here." (Authors)] Address: Dawn, P., Dept Zool., Shyampur Siddheswari Mahavidyalaya, Howrah, India. Email: prosenjit.dawn@gmail.com

**19720.** Dow, R.A. (2022): Previously unpublished Odonata records from Sarawak, Borneo, part VIII: New records from Kapit Division. *International Dragonfly Fund Report* 169: 1-13. (in English) ["Odonata recorded during two brief sampling trips to the Kapit Town area in Kapit Division, Sarawak in 2020 are reported on. Seventy nine species were recorded, of which at least six (*Onychargia atrocyana* Selys, 1865, *Ischnura senegalensis* (Rambur, 1842), *Pseudagrion lalakense* Orr & van Tol, 2001, *Megalogramphus borneensis* (Laidlaw, 1914), *Agrionoptera insignis* (Rambur, 1842) and *Hydrobasileus croceus* (Brauer, 1867)) are first records for the division, bringing the total number of Odonata known from the division to 160. Notable records include *Coeliccia kenyah* Dow, 2010, *Teinobasis laidlawi* Kimmins, 1936, *Burmagomphus insularis* Laidlaw, 1914, *Leptogomphus* sp. cf. *coomansi* Laidlaw, 1936 and *Macromia callisto* Laidlaw, 1922. Remarks are made on the habitat preferences of *Agrionoptera insignis* and *Camacinia gigantea* (Brauer, 1867). A highly atypical population of *Neurothemis* Brauer, 1867 (species unclear at present) is reported." (Author)] Address: Dow, R.A., Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia. Email: rory.dow230@yahoo.co.uk

**19721.** Encarnación-Luévano, A.; Escoto-Moreno, J.A.; Villalobos-Jiménez, G. (2022): Evaluating potential distribution and niche divergence among populations of the world's largest living damselfly, *Megaloprepus caerulatus* (Drury, 1782). *Diversity* 2022, 14, 84. 16 pp. (in English) ["*M. caerulatus* is a Neotropical species with a highly specialised niche, found from Mexico to Bolivia, primarily in mature tropical forests lower than 1500 masl. It is also the damselfly with

the largest wingspan in the world. Recent studies found strong genetic isolation among populations of *M. caerulatus*. Further studies found genetic and morphological divergence, but ecological divergence was not tested. Here, we test for ecological divergence by evaluating niche differences among populations of *M. caerulatus* in Los Tuxtlas (Mexico), Corcovado (Costa Rica), Barro Colorado (Panama), and La Selva (Costa Rica). We used Ecological Niche Modelling (ENM) to compare potential distribution ranges, and we estimated the breadth and overlap of the ecological niche using equivalence and similarity tests. The potential distributions estimated with ENM were heavily fragmented and we found no geographic overlap of potential distributions among populations. However, we found geographic correspondence between populations with a close phylogenetic relationship. Even though all similarity tests were non-significant, the results of the equivalence tests suggest niche divergence between Corcovado and the other three populations, but also between Barro Colorado (Panama) and La Selva. These results show evidence of strong ecological divergence in Corcovado and Barro Colorado populations." (Authors)] Address: Villalobos-Jiménez, Giovanna, Colección Zoológica, Departamento de Biología, Centro de Ciencias Básicas, Universidad Autónoma de Aguascalientes, Av. Universidad #940, Ciudad Universitaria, Aguascalientes C.P. 20131, Ags., Mexico. Email: villalobos.giovanna@gmail.com

**19722.** Felker, A.S. (2022): Dragonflies of the family Kennedyidae (Odonata: Archizygoptera) from the mid-upper Triassic of Kyrgyzstan. *Paleontological Journal* 1/2022: 75-84. (in Russian, with English summary) ["Two new species of Kennedyidae: *Kennedyia madygensis* sp. nov. and *K. ferganensis* sp. nov. are described from the Middle-Upper Triassic deposits Dzhayloucho (Madygen) locality in Kyrgyzstan based on the new material collected 2007 and 2009. *K. carpenteri* Pritykina, 1981 is redescribed and variation in its discoidal and other structures is demonstrated. Structure and transformation of the Nodus in Kennedyidae is discussed." (Author)] Address: Felker, A.S., Borisyak Paleontological Institute, Russian Academy of Sciences, Moscow, Russia

**19723.** Fletcher, D.E.; Lindell, A.H.; Stankus, P.T.; Fulghum, C.M.; Spivey, E.A. (2022): Species- and element-specific patterns of metal flux from contaminated wetlands versus metals shed with exuviae in emerging dragonflies? *Environmental Pollution* 300, 118976. (in English) [Highlights: • 9 metals evaluated in emerging dragonflies and their exuviae from contaminated wetland. • Larger amounts of some metals (Cu, Zn, and Mg) were retained in the emergent dragonflies. • Some elements (Al, Fe, Mn, Pb) were largely shed with exuviae. • Metals shed in exuviae can moderate metal export from wetlands. • Importance of factors influencing metal flux differed among species. Abstract: Dragonfly adults and their aquatic immature stages are important parts of food webs and provide a link between aquatic and terrestrial components. During emergence, contaminants can be exported into terrestrial food webs as immature adults fly away or be shed with their exuviae and remain in the wetland. Our previous work established metals accumulating in dragonfly nymphs throughout a contaminated constructed wetland designed to regulate pH and sequester trace metals from an industrial effluent line. Here, we evaluated the concentration and mass of metals leaving the wetland in flying emergents versus remaining in the wetland with the shed exuviae in 10 species of dragonflies belonging to 8 genera. Nine elements (Cu, Zn, Cd, Mn, V, Mg, Fe, Al, Pb)

were evaluated that include essential and nonessential elements as well as trace and major metals. Metal concentrations in the emergent body and exuviae can differ by orders of magnitude. Aluminum, Fe, Mn, and Pb were largely shed in the exuviae. Vanadium and Cd were more variable among species but also tended to be shed with the exuviae. In contrast, Cu, Zn, and Mg showed a higher tendency to leave the wetland with an emerging dragonfly. Metals shed in dragonfly exuviae can moderate the transport of metals from contaminated wetlands. Taxonomic- and metal-specific variability in daily metal flux from the wetland depended upon concentration accumulated, individual body mass, and number of individuals emerging, with each factor's relative importance often differing among species. This illustrates the importance of evaluating the mass of metals in an individual and not only concentrations. Furthermore, differences in numbers of each species emerging will magnify differences in individual metal flux when calculating community metal flux. A better understanding of the variability of metal accumulation in nymphs/larvae and metal shedding during metamorphosis among both metals and species is needed." (Authors)] Address: Fletcher, D.E., Savannah River Ecology Laboratory, University of Georgia, P. O. Drawer E, Aiken, SC, 29802, USA. Email: fletcher@srel.uga.edu

**19724.** George, S.D.; Duffy, B.T.; Baldigo, B.P.; Skaros, D.; Smith, A.J. (2022): Condition of macroinvertebrate communities in the Buffalo River Area of concern following sediment remediation. *Journal of Great Lakes Research* 481: 183-194. (in English) ["The lower 10 km of the Buffalo River, a tributary to Lake Erie, was designated as an Area of Concern (AOC) in 1987 through the Great Lakes Water Quality Agreement because sediment contamination and habitat alteration from past industrialization caused several Beneficial Use Impairments (BUIs). Extensive remediation efforts conducted between 2011 and 2015 removed approximately 688,100 cubic meters of contaminated sediment from the Buffalo River AOC, and subsequent chemical analysis of sediments indicated that most remedial goals had been achieved. Benthic macroinvertebrate communities and sediment toxicity were evaluated in the AOC and an upstream reference area in 2017 and 2020 to determine whether remediation has improved benthic conditions sufficiently that the benthos BUI designation can be removed. Community condition was characterized using the New York State multi-metric index of biological integrity and bed sediments were used for 10-day toxicity tests with *Chironomus dilutus* and *Hyalella azteca*. Macroinvertebrate communities were classified as moderately to slightly impacted at most AOC sites compared to slightly impacted at most reference sites, but toxicity tests did not identify any evidence of toxicity in sediments from the AOC. A linear mixed effects model indicated that total organic carbon concentration in sediments, distance upstream from the river mouth, and the relative dominance of zebra mussels *Dreissena polymorpha* were the primary predictors of macroinvertebrate community condition. These findings are consistent with those from other AOCs in New York which indicate that contemporary benthic communities are generally shaped by legacy habitat alterations rather than AOC-specific sediment contamination and toxicity." (Authors) Taxa include Odonata, and are treated at order level.] Address: George, S.D., U.S. Geological Survey, New York Water Science Center, 425 Jordan Road, Troy, NY 12180, USA

**19725.** Goertzen, D.; Schneider, A.-K.; Eggers, T.O.; Suhling, F. (2022): Temporal changes of biodiversity in urban running waters – Results of a twelve-year monitoring

study. *Basic and Applied Ecology* 58: 74-87. (in English) ["Freshwater biodiversity underlies severe threats, mainly suffering from habitat degradation by anthropogenic land use, in particular by urbanisation. However, recent long-term studies indicate recovery of stream macroinvertebrate diversity due to improved water quality at least in North America and Europe. We monitored macroinvertebrates at 56 urban stream sites over a 12-year period (2009–2020) in Braunschweig, a German urban district. We utilised these data to investigate spatio-temporal changes in taxon richness and assemblage structure as well as factors potentially affecting the resulting patterns. Overall taxon richness was increasing over the study period, comprising both all taxa and taxa being indicators for healthy stream conditions. 53.6% of the sites had significant positive trends becoming most eminent since 2014, despite decelerating since 2018, the beginning of an extra-ordinary dry period. Only 10.7% of the study sites had negative trends. Assemblage structure was shaped by environmental factors like stream width and water quality. Over-average taxon richness including positive trends and higher numbers of indicator taxa of healthy stream conditions was found in streams with higher flow velocity, good saprobic conditions and more natural streambed structure. In contrast, low taxon richness and predominance of tolerant taxa were found in streams with more degraded conditions. Most of the environmental conditions having positive effects on taxon richness were improved by various programs set up by the environmental authorities. We therefore conclude, if urban stressors like organic pollution and structural degradation can be mitigated by revitalisation and water quality improvement, urban streams can have good potential for increasing biodiversity and improving ecological functioning." (Authors)] Address: Goertzen, Diana, Technische Universität Braunschweig, Institute of Geocology, Langer Kamp 19c, Braunschweig 38106, Germany. Email: d.goertzen@tu-braunschweig.de

**19726.** Hawke, T.; Bino, G.; Shackleton, M.E.; Ross, A.K.; Kingsford, R.T. (2022): Using DNA metabarcoding as a novel approach for analysis of platypus diet. *Scientific Reports* volume 12, Article number: 2247. 10 pp. ["Platypuses (*Ornithorhynchus anatinus*) forage for macroinvertebrate prey exclusively in freshwater habitats. Because food material in their faeces is well digested and mostly unidentifiable, previous dietary studies have relied on cheek pouch assessments and stable isotope analysis. Given DNA metabarcoding can identify species composition from only fragments of genetic material, we investigated its effectiveness in analysing the diet of platypuses, and to assess variation across seasons and sexes. Of the 18 orders and 60 families identified, Ephemeroptera and Diptera were the most prevalent orders, detected in 100% of samples, followed by Trichoptera, Pulmonata, and Odonata (86.21% of samples). Caenidae and Chironomidae were the most common families. Diptera had a high average DNA read, suggesting it is an important dietary component that may have been underestimated in previous studies. We found no variation in diet between sexes and only minimal changes between seasons. DNA metabarcoding proved to be a highly useful tool for assessing platypus diet, improving prey identification compared to cheek pouch analysis, which can underestimate soft-bodied organisms, and stable isotope analysis which cannot distinguish all taxa isotopically. This will be a useful tool for investigating how platypus prey diversity is impacted by habitat degradation as a result of anthropogenic stressors." (Authors)] Address: Hawke, T., Centre for Ecosystem Science, School of Biological, Earth & Environmental Sciences, UNSW, Sydney, NSW 2052, Australia.

Email: t.hawke@unsw.edu.au

**19727.** Herrmann, A.; Grabow, K.; Martens, A. (2022): The invasive crayfish *Faxonius immunitus* causes the collapse of macroinvertebrate communities in Central European ponds. *Aquatic Ecology*. (in English) ["The invasive crayfish *Faxonius immunitus* is regarded as a threat to amphibians and macroinvertebrates in the Upper Rhine Valley, Germany, eradicating macrophytes and establishing high-density populations in stagnant waters. This study investigates the macroinvertebrate community structure of five conservation ponds south of Karlsruhe, Germany, to identify effects caused by this invasive crayfish. Two of the ponds had a high population density of *F. immunitus*, two were expected to have lower crayfish densities as they had been habitat modified with gravelled water beds as a crayfish management approach, and one pond was known to be free of crayfish but contained fish. The macroinvertebrate communities were analyzed considering their species richness and composition. The relative density of *F. immunitus* within the samples was regarded as a representative indicator for crayfish population density and tested for its influence on the ordination along with habitat composition and abiotic factors using distance-based redundancy analysis. *F. immunitus* was identified as a driving factor of the macroinvertebrate communities of sampled ponds. Additionally, this study indicates that gravelling ground beds as a management method for invasive burrowing crayfish species does not significantly influence the community composition but can minimize indirect effects caused by *F. immunitus*." (Authors)]

**19728.** Hopkins, I.; Farahnak, A.; Gill, A.; Newman, L.P.; Danaher, J. (2022): Australians' experience, barriers and willingness towards consuming edible insects as an emerging protein source. *Appetite* 169, 1 February 2022, 105832: 9 pp. (in English) ["Increasing global populations and limitations on the natural resources required in food production such as land and water will place further pressure on an already strained food production system. To meet the future food production requirements, it is essential to find viable alternatives to current food sources, without the high resource challenges. Protein production is of particular concern and insects are a nutritious and sustainable source yet, despite a rich history in parts of the world, Australians have been reluctant to adopt the practice as a societal norm. This study aimed to explore Australian consumers' experiences with edible insects, identify barriers to consumption, and explore possible factors that may motivate Australians to consume insects. A total of 601 participants (23.8% male, 76.2% female), completed an online survey using a variety of open-ended questions; 5- or 7-point Likert scales and check-all-that-apply questions. Consumer willingness was measured through self-reporting willingness-to-try insects or insect-based foods. Results indicated 35.4% of participants had previously consumed insects, with Orthoptera (crickets, grasshoppers) the most commonly consumed order (60.1%). Participants with no previous experience consuming insects cited 'lack of opportunity' as the main reason (57.2%). 'Increased accessibility' (56.6%) and 'increased nutrition knowledge' (56.6%) were identified as major factors that may increase the likelihood of future insect consumption. Participants reporting that they were willing to try insects were most likely to accept 'insect-based flour' (65.6%) and 'chocolate-covered ants' (52.1%). By providing increased opportunity, accessibility and education of insect-based food products, a higher pro-

portion of Australians may be willing to eat insects, particularly if presented in indistinguishable forms (i.e. flour). This may lead to a greater acceptance of insects as an alternative, more sustainable protein source than previously anticipated....'Odonata (dragonflies)' were the least consumed with 1.4% of participants reporting previous consumption." (Authors)] Address: Danaher, Jessica, DINE Lab, School of Science, STEM College, RMIT University, Bundoora West Campus Victoria, 3083, Australia. Email: jessica.danaher@rmit.edu.au

**19729.** Itrac-Bruneau, R.; Doucet, G. (2022): Somatochlora arctica (Odonata: Corduliidae) dans le Massif du Morvan: découverte d'une station majeure pour la Bourgogne-Franche-Comté et comparaison avec d'autres stations. *Martinia* 36(1): 1-12. (in French, with English summary) ["S. arctica in Morvan Massif: discovery of a major station for Bourgogne-Franche-Comté region and comparison with other stations. - In 2021, eight stations (three of the four historical and five potential) were prospected searching for S. arctica in the Morvan Massif in Burgundy. The species was found in only two stations: a historical station, updating data of almost 30 years old located in Roussillon-en-Morvan (Saône-et-Loire department) and a second one, new, on a small bog of about 0,64 ha located in the town of Arleuf (Nièvre department). With 23 exuviae collected from the 492 m<sup>2</sup> of favorable larval habitat in two passages and a remarkable density for the region of 467/ha, the latter seems important in terms of taxon conservation. This synthesis also shows that only two stations shelter the species permanently (historic station of Saint-Agnan (Nièvre department) and the station discovered in 2021). Thus, at the scale of the Morvan Massif, only one station can be considered in good state of conservation and is home to a viable population. The others are either severely degraded requiring restoration actions or only support the species sporadically". (Authors)] Address: Itrac-Bruneau, R., 8F, rue Maurice Deslandres, 21000 Dijon, France. Email: r.itracbruneau@yahoo.fr

**19730.** Lozano, F.; del Palacio, A.; Ramos, L.S.; Granato, L.; Drozd, A.; Muzón, J. (2022): Recovery of local dragonfly diversity following restoration of an artificial lake in an urban area near Buenos Aires. *Basic and Applied Ecology* 58: 88-97. (in English) ["Urban lakes are environments prone to severe environmental deterioration if an effective management policy is not carried out by local governments. However, management aimed only at facilitating access and recreation for citizens can negatively affect the environmental health of these ecosystems since the pristine ecosystem structure is not recovered. In this paper we present early results of a governmental restoration program based on pond cleaning and native vegetation recovery at an artificial lake of the city of Avellaneda (Saladita Norte Reserve), part of the Metropolitan Area of Buenos Aires, one of the largest urban areas with the highest concentrations of inhabitants of the world. We used odonates as indicators because of their quick response to changes in environmental quality. Besides, we tested if the NDVI can be used as a surrogate to monitor changes in dragonfly diversity in managed areas. Since the intervention was carried out during the winter and there were no previous data on the richness or diversity of odonates, we analyzed their response to the intervention comparing it with a lake of similar origin and characteristics but with a different use and management (Saladita Sur Reserve). We recorded in Saladita Norte 81% of the regional diversity, including three newly recorded species, while the lake Saladita Sur, only amounted to 21% of the regional

diversity. The NDVI did not reflect the observed changes in the structural complexity of the vegetation and therefore could not be used as a surrogate. These early results indicate that management practices such as the increase of native vegetation on the banks (especially in grassland areas), keeping a diverse floating vegetation and the cleaning and removal of wastes from the water, promote a significant and rapid increase in the levels of biodiversity." (Authors)] Address: Muzón, J., Inst. Limnol. "Dr. R.A. Ringuelet", C.C. 712, AR-1900 La Plata, Argentina. E-mail: jmuzon@undav.edu.ar

**19731.** Maneechan, W.; Prommi, T.O. (2022): Occurrence of microplastics in edible aquatic insect *Pantala* sp. (Odonata: Libellulidae) from rice fields. *PeerJ* 10:e12902 <http://doi.org/10.7717/peerj.12902>: 13 pp. (in English) ["Background. Microplastic (MP) contamination has been discovered in aquatic systems throughout the world. They are well known as contaminants in aquatic species, but there is a gap in understanding about pathways of MP contamination into humans (i.e., through aquatic animals). The goal of this study is to assess MP contamination in an edible aquatic insect (*Pantala* sp.) living in rice fields. Methods. *Pantala* sp. was tested for MPs. The study concentrated on three distinct anatomical compartments (whole body, gastrointestinal tract, and body without gastrointestinal tract), each of which was examined separately. For the physical identification and chemical analysis of MPs, a stereomicroscope and a Fourier transformed infrared spectroscope (FT-IR) were used, respectively. Results and Discussion. The microplastics content was 121 in the whole body, 95 in the gastrointestinal tract, and 66 in the body without the gastrointestinal tract, with an average of 1.34 1.11, 1.06 0.77, and 0.73 0.51 abundance/ individual, respectively. The most common MPs discovered during this study were fragments, followed by fibers and rods. The chemical analysis by FT-IR confirmed three different polymers, including polymethyl methacrylate (PMMA), polyethylene terephthalate (PET), and polypropylene (PP). There was no significant difference in MP abundances among the sample types (Kruskal-Wallis chi-squared D 2.774, df D 2, p D 0:250). The findings suggest that eating an edible aquatic insect (Odonata: *Pantala* sp.) could be one way for humans to ingest MPs." (Authors)] Address: Prommi, T.O., Department of Science, Faculty of Liberal Arts and Science, Kasetsart University, Kamphaeng Saen Campus, Nakhon Pathom, Thailand

**19732.** Minot, M.; Husté, A. (2022): Genetic diversity and structure of *Anax imperator* Leach, 1815 populations (Odonata: Aeshnidae) in ponds at regional and European scales. *Diversity* 2022, 14, 68. <https://doi.org/10.3390/d14020068>: 17 pp. (in English) ["Anthropogenic activities cause loss and fragmentation of natural habitats and have strong effects on population maintenance by increasing their isolation. Pond ecosystems are scattered waterbodies that can interact as a network connected by dispersal events of freshwater organisms. Identifying local genetic differentiations and understanding how gene flow occurs across these networks is essential to prevent risks associated with environmental perturbations. This study aimed to investigate genetic diversity and structure of *Anax imperator* Leach, 1815 populations at both regional and European scales using seven microsatellites markers. Seven populations of *A. imperator* were sampled in northwestern France and four populations were sampled in Italy (Sicily), Czech Republic, Switzerland and United Kingdom (U.K.). French populations presented a low genetic differentiation indicating a high gene flow and



confirming dispersal events of this species between ponds at regional scale. No pattern of isolation by distance was found at the European scale. The populations presented a low genetic differentiation and no pattern of isolation by distance, suggesting historical or current movements of individuals. Only the U.K. population presented a significant genetic differentiation from other European populations, suggesting that the English Channel might act as a barrier to gene flow for *A. imperator*. However, Bayesian analysis showed that some dispersal events could occur between the U.K. and France (Normandy), probably facilitated by prevailing winds." (Authors)] Address: Minot, M., ECODIV-INRAE, Department of Biology, UFR Sciences et Techniques University of Rouen-Normandy, 76000 Rouen, France. Email: m.minot@hotmail.fr

**19733.** Morales, J.; Negro, A.I.; Lizana, M. (2022): Patterns of odonata assemblages in lotic and lentic systems in the Sanabria glacial lake complex in Sierra Segundera (NW Spain). Diversity and biogeographical analysis. Bol. R. Soc. Esp. Hist. Nat., 116: 23-39. (in Spanish, with English summary) ["We studied the community of odonates on the southern watershed of the Sierra Segundera glacial lake complex, from the valley area (Tera river and Sanabria lake, 1000 m.a.s.l.) to the high mountain lakes and peat bogs (>1500 m.a.s.l.). The maximum richness was detected at the source of the River Tera from the lake, while on the east coast and part of the south coast there are no Odonata populations or breeding and emergence habitats; this is due to the tourist pressures on the shoreline. Eighteen taxa were found to reproduce in the lake, including the endangered species *Macromia splendens*. Only *Sympetrum flaveolum*, *Aeshna juncea* and *Enallagma cyathigerum* were located exclusively at altitude mountain range. The specific turnover among ecosystems is from 30 to 14, in a 700 m gradient from the valley to the lake complex. Adults were captured in flight between weeks 18 and 44 of the calendar year. The circum-mediterranean biogeographical component dominates with species of mediterranean-western, franc-iberian and ibero-maghreb distribution, but with euro-siberian, holarctic and palaeartic species distribution; and all the holarctic chorotype species known in Spain were recorded. No African migratory dragonflies in meridional drift were found in the three summers sampled." (Authors)] Address: Morales, J., Áreas de Biología Animal y Ecología. Universidad de Salamanca. E-37007. Salamanca, Spain. mormarja@usal.es

**19734.** Nicolas, V. (2022): Description d'une nouvelle libellule de Mayotte: *Zygonyx constellatus* n. sp. (Odonata Libellulidae). Plume de Naturalistes 6: 15-26. (in French) ["*Zygonyx constellatus* n. sp. is described and illustrated on the basis of several dozen specimens and exuviae collected over the last fifteen years on the island of Mayotte (Comoros archipelago). It is a species close to the Malagasy endemic *Z. elisabethae* Lieftinck, to which it is compared. Its ecology and distribution are also detailed." (Author/DeepL)] Address: Nicolas, V.: Email: harmonia.coccinellidae@yahoo.fr

**19735.** Nitzsche, K.N.; Wakaki, S.; Yamashita, K.; Shin, K.-C.; Kato, Y.; Kamauchi, H.; Tayasu, I. (2022): Calcium and strontium stable isotopes reveal similar behaviors of essential Ca and nonessential Sr in stream food webs. Ecosphere 13(2) e3921. 19 pp. (in English) ["Recent studies showed the potential of stable isotopes of the macronutrient calcium ( $\delta^{44/40}\text{Ca}$ ) and nonessential strontium ( $\delta^{88/86}\text{Sr}$ ) as new trophic level indicators in terrestrial vertebrates and marine teleost fishes. In this study, we tested whether similar Ca and

Sr isotopic fractionation trends existed in macroinvertebrate-dominated stream food webs compared to vertebrates despite their physiological differences. We have determined the  $\delta^{44/40}\text{Ca}$  and  $\delta^{88/86}\text{Sr}$  values as well as the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios of stream macroinvertebrates and small gobies and their potential metal sources (stream water, periphyton, and terrestrial plant litter) in upper and lower reaches of two streams in the Lake Biwa catchment, central Japan. The  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios revealed that stonefly nymphs, crustacea, and gobies mostly relied on aquatic Sr sources. Higher  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios of some crane fly and caddisfly larvae, mayfly, dobsonfly, and dragonfly nymphs [Gomphidae] indicated greater terrestrial contributions via plant litter. Positive correlations between the  $\delta^{44/40}\text{Ca}$  and  $\delta^{88/86}\text{Sr}$  values implied that similar Ca and Sr sources existed, and that Ca and Sr stable isotopes underwent similar fractionation trends although Sr was not essential. The  $d^{44/40}\text{Ca}$  and partly the  $\delta^{88/86}\text{Sr}$  values were positively correlated with Sr/Ca ratios and negatively with  $\delta^{15}\text{N}$  values indicating trophic effects on Ca and Sr stable isotopes. The enrichment of  $^{44}\text{Ca}$  and  $^{88}\text{Sr}$  in large filter-feeding caddisfly larvae was a notable exception from these trophic trends. Our data confirm that the trophic  $^{44}\text{Ca}$  and  $^{88}\text{Sr}$  depletion observed for marine teleost fishes and terrestrial vertebrates also applied to macroinvertebrate-dominated stream food webs despite their different physiologies indicating that shared mechanisms of Ca and Sr isotopic fractionation may exist at the cellular or molecular level between these taxa." (Authors)] Address: Nitzsche, K.N., Biogeochemistry Research Center, Japan Agency for Marine-Earth Science and Technology (JAMSTEC), 2-15 Natsushima-cho, Yokosuka, Kanagawa 237-0061, Japan. Email: kai.nitzsche@jamstec.go.jp

**19736.** Ogunwa, T.; Abdullah, E.; Chahl, J. (2022): Modeling and control of an articulated multibody aircraft. Applied Sciences 2022, 12, 1162. 36 pp. (in English) [Hemicordulia australiae (Rambur 1842); "Insects use dynamic articulation and actuation of their abdomen and other appendages to augment aerodynamic flight control. These dynamic phenomena in flight serve many purposes, including maintaining balance, enhancing stability, and extending maneuverability. The behaviors have been observed and measured by biologists but have not been well modeled in a flight dynamics framework. Biological appendages are generally comparatively large, actuated in rotation, and serve multiple biological functions. Technological moving masses for flight control have tended to be compact, translational, internally mounted and dedicated to the task. Many flight characteristics of biological flyers far exceed any technological flyers on the same scale. Mathematical tools that support modern control techniques to explore and manage these actuator functions may unlock new opportunities to achieve agility. The compact tensor model of multibody aircraft flight dynamics developed here allows unified dynamic and aerodynamic simulation and control of bioinspired aircraft with wings and any number of idealized appendage masses. The demonstrated aircraft model was a dragonfly-like fixed-wing aircraft. The control effect of the moving abdomen was comparable to the control surfaces, with lateral abdominal motion substituting for an aerodynamic rudder to achieve coordinated turns. Vertical fuselage motion achieved the same effect as an elevator, and included potentially useful transient torque reactions both up and down. The best performance was achieved when both moving masses and control surfaces were employed in the control solution. An aircraft with fuselage actuation combined with conventional control surfaces could be managed with a modern optimal

controller designed using the multibody flight dynamics model presented here." (Authors)] Address: Ogunwa, T., UniSA STEM, University of South Australia, Adelaide 5095, Australia. Email: titilayo.ogunwa@mymail.unisa.edu.au

**19737.** Ortega-Salas, H.; Gonzalez-Soriano, E.; Jocque, M. (2022): Untangling the waterfall damselflies: a review of the Mesoamerican genus *Paraphlebia* Selys in Hagen, 1861 (Odonata: Thaumtoneuridae) with descriptions of 11 new species. *Zootaxa* 5089(1): 1-66. (in English) ["A review of the Mesoamerican genus *Paraphlebia* Selys in Hagen, 1861 is presented, including diagnoses, illustrations of diagnostic characters, and distribution maps for all species. A key to the known males and females is provided. Eleven new species are described: *P. akan* Ortega-Salas & González-Soriano sp. nov., *P. chaak* Ortega-Salas & González-Soriano sp. nov., *P. chiarae* Ortega-Salas sp. nov., *P. esperanza* Ortega-Salas & González-Soriano sp. nov., *P. flinti* Ortega-Salas & González-Soriano sp. nov., *P. hunnal* Ortega-Salas & González-Soriano sp. nov., *P. itzamna* Ortega-Salas, Jocque & González-Soriano sp. nov., *P. ixchel* Ortega-Salas & González-Soriano sp. nov., *P. kauil* Ortega-Salas & González-Soriano sp. nov., *P. kinich* Ortega-Salas & González-Soriano sp. nov., and *P. kukulkan* Jocque & Ortega-Salas sp. nov." (Authors)] Address: Ortega-Salas, H., Departamento de Zoología, Instituto de Biología, UNAM, Apartado Postal 70-153, México. Email: hector.ortegasalas@naturalis.nl

**19738.** Pan, Y.; Long, Y.; Hui, J.; Xiao, W.; Yin, J.; Ya, L.; Li, D.; Tian, X.; Chen, L. (2022): Microplastics can affect the trophic cascade strength and stability of plankton ecosystems via behavior-mediated indirect interactions. *Journal of Hazardous Materials*, Available online 4 February 2022, 128415: (in English) ["Highlights: • PE microplastics reduced heart rate and hopping frequency of grazers. • PE microplastics reduced grazing rate of grazers. • Microplastics increased the positive impacts of damselflies on algal growth. • PE microplastics reduced reproductive capacity for grazer species. • PE microplastics reduced the stability and persistence of a plankton ecosystem. Abstract: The negative effects of microplastics on the normal growth of aquatic organisms have been well studied, but relatively little is known about their potential adverse effects on the function and stability of aquatic ecosystems. We investigated here the effects of polyethylene (PE) microplastics on several aspects of plankton ecosystems, including *Daphnia magna* behavior, the grazing rate of *D. magna* on *Chlorella vulgaris* cells, trophic-cascade effects in the *C. vulgaris*-*D. magna*-larval damselfly food chain, the life-history of *D. magna*, and the stability and persistence of the *D. magna*-larval damselfly system. PE microplastics decreased the *D. magna* grazing rate as a result of reductions in their heart rate and hopping frequency. In the trophic-cascade experiment, PE microplastics increased the foraging success of larval damselflies on grazers due to hopping inhibition in grazers, which ultimately strengthened the trophic-cascade effect on algal growth. Long-term exposure to PE microplastics reduced the stability and persistence of the grazer population via increased predation risk and reduced reproductive capacity for grazer species. This study provides evidence that microplastics can affect the trophic cascade strength and stability of plankton ecosystems via behavior-mediated indirect interactions, suggesting that microplastics have more extensive impacts on aquatic ecosystems than presently recognized. Environmental implication: The massive production and environmental releasing of microplastics have become ubiquitous in the global environment. The

negative effects of microplastics on the normal growth of aquatic organisms have been well studied, but little is known about potential adverse effects on the function and stability of aquatic ecosystems. Here, we found that microplastics increased the positive impacts of larval damselflies on algal growth, and reduced the stability and persistence of plankton ecosystems via a behavior-mediated indirect interaction. To our knowledge, this is the first systematic study assessing the effects of microplastics on the community-level characteristics of a freshwater ecosystem. Synopsis: PE microplastics affect trophic cascade strength and reduce the stability and persistence of plankton ecosystems via behavior-mediated indirect interactions." (Authors)] Address: Chen, L., Institute of International Rivers and Eco-security, Yunnan Key Laboratory of International Rivers and Trans-Boundary Eco-security, Yunnan University, Kunming, 650091, People's Republic of China. Email: chenlq@ynu.edu.cn

**19739.** Pelealu, G.V.E.; Nangoy, M.J.; Tarore, D. (2022): Keanekaragaman capung di Sungai Rayow, Desa Kembes, Kecamatan Tombulu, Kabupaten Minahasa. *Zootec* 42(1): 25-32. (in Indonesian, with English summary) ["Dragonflies are a group of insects belonging to the phylum Arthropoda and belonging to the order Odonata. The diversity of dragonflies in the ecosystem has a big role, such as: as a component of biodiversity that plays an important role in the food chain, as natural enemies, and as an indicator of the quality of the aquatic environment. The Rayow River is one of the dragonfly habitats. This river is located in Kembes village, Minahasa regency, North Sulawesi province. This study aims to identify and analyze the diversity of dragonflies in the Ralow river, Kembes, Minahasa. The research procedure used includes surveying the research site, determining the point of sampling, taking samples, and identification in the laboratory using an identification book. The research in the field used purposive random sampling method. Data analysis includes abundance (N), species richness index (R), species diversity index (H'), and evenness index (E). species diversity index using the Shannon-Wiener index. The results of the study found an abundance of dragonflies found in the Rayow river as many as 1002 individuals, consisting of 2 sub orders, 6 families, 13 genera, and 21 species of dragonflies. The highest diversity index of dragonflies was found in rivers in secondary forest areas at 2.67, followed by rivers in plantation areas at 2.57, and the lowest diversity index was found in rivers in residential areas at 2.28. The conclusion is based on the research of dragonflies found in the Ralow river, Kembes, Minahasa consisting of 21 types of dragonflies. The highest dragonfly diversity index was found at station 1, namely in the secondary forest ecosystem river 2.67 followed by the plantation area river 2.57 and the lowest was found in the residential area river 2.28. The diversity index of dragonflies in the river Ralow, Kembes, Minahasa is categorized as moderate diversity." (Authors)] Address: Pelealu, G.V.E., Program Studi Entomologi, Universitas Sam Ratulangi, Manado, 95115, Indonesia. Email: vindapelealu@gmail.com

**19740.** Rattanachan, K.; Sangpradub, N.; Keetapithchaya-kul, T.S. (2022): Description of the larva of *Vestalis gracilis* (Rambur, 1842) (Zygoptera: Calopterygidae) from Thailand. *International Journal of Odonatology* 25: 1-6. (in English) ["*V. gracilis* is a forest stream damselfly belonging to the family Calopterygidae. Its last-stadium larvae and exuviae are described and illustrated based on laboratory-raised specimens from Thailand, and observations of agonistic behavior

are provided. The taxonomical characters of *V. gracilis* larvae are similar to those of *V. amoena*. They exhibit synapomorphic characters such as posterolaterally directed protuberances on the postocular lobes, posterior margin of median lamella obliquely truncate, and two setae on labial palps. *Vestalis gracilis* and *V. luctuosa* bear eight antennal segments whereas seven antennal segments are found in *V. amoena*. The most significant difference between *V. gracilis* and *V. luctuosa* is that *V. luctuosa* has posterolaterally directed protuberances on the postocular lobes and an obliquely truncate posterior margin of the median lamella." (Authors)] Address: Rattanachan, K., Forest and Plant Conservation Research Office, Department of National Parks, Wildlife and Plant Conservation, Bangkok 10900, Thailand. Email: Keetapithchayakul.TS@gmail.com

**19741.** Ribeiro-Brasil, D.R.G.; Brasil, L.S., Veloso, G.K.O.; Pio de Matos, T.; Silva de Lima, E.; Dias-Silva, K. (2022): The impacts of plastics on aquatic insects. *Science of the Total Environment* 813 (2022) 152436: 11 pp. (in English) ["Highlight: • Agriculture with black macroplastics is harmful to aquatic insects. • Aquatic insects contribute to the degradation of plastic during digestion. • Aquatic insects with abundant food consume less microplastic. • MPs accumulate in the Malpighian tubule excretory system. • Aquatic insects prefer to oviposit on plastic surfaces. Abstract: Environmental contamination by plastics and its negative effect on biodiversity have been well-documented in several types of organisms, especially in marine environments. Therefore, it is necessary to assess the impacts of plastic on other organisms such as aquatic insects, which predominantly inhabit freshwaters. It is widely known that these organisms are sensitive to environmental change, especially by contamination. Therefore, this study aimed at testing the hypothesis that aquatic insects are impacted by plastic contamination. We made a systematic search for international papers related to plastics and aquatic insects in databases such as Google Scholar, Web of Science, and Scopus. We obtained 1217 studies of which 40 discussed the impacts of contamination by plastics on aquatic insects. We identified two main impacts: the first one is caused by the use of black macroplastic to protect crops from contact with the soil in agriculture. These black macroplastics attract tons of adult aquatic insects (terrestrial stage) that mistake the plastic surface for water because they select oviposition sites through phototaxis or polarotaxis. The second one comes from water contamination that can originate from the inadequate disposal of plastics, which harms young aquatic insects (aquatic phase) when they feed, reproduce, and construct shelters. Our results show the negative impacts of plastics on both larvae and adult aquatic insects. Despite the large knowledge gap regarding the impacts of plastic on aquatic insects, the evidence above is sufficient to consider these organisms important in global discussions regarding the impacts of plastic on biodiversity." (Authors) Searching results in Odonata are poor, and omit relevant studies. ] Address: Ribeiro-Brasil, Danielle, Ecology & Conservation Lab. (LABECO), Institute of Biological Sciences (ICB), Federal Univ. of Pará (UFPA), Augusto Corrêa Street, n° 01, 66075-110, Guamá, Belém, PA, Brazil. Email: rgrdani@gmail.com

**19742.** Rochlin, I.; White, G.; Reissen, N.; Martheswaran, T.; Faraji, A. (2022): Effects of aerial adulticiding for mosquito management on nontarget insects: A Bayesian and community ecology approach. *Ecosphere* 13(1), e3896: 15 pp. (in English) ["Diseases transmitted by mosquitoes are emerging across the globe in a broad range of urbanized, rural, and natural environments inhabited by their vector

species. Because applications of insecticides remain the most effective, and often the only available tool to prevent or control mosquito-borne disease outbreaks, their use and scope continue to expand. However, the effects of multiple insecticide applications targeting adult mosquitoes on nontarget insect communities remain poorly characterized. To remedy this knowledge gap, we conducted an evaluation of five aerial insecticide applications on insect communities in a natural environment near Salt Lake City, Utah. Employing a before–after–control–impact approach, we assessed abundance and community composition changes over the study period utilizing Bayesian and community ecology analytical methods. We observed no discernible effects on most insect taxa, and there were no changes in the overall insect community composition. The abundance of Diptera, Coleoptera, and Hemiptera declined in control and treatment sites, Odonata increased over the period of the study, and Hymenoptera and Lepidoptera remained similar, suggesting seasonal trends rather than treatment effects. The only consistently detectable treatment effect was on nonbiting midges (Diptera: Chironomidae), that are closely related to mosquitoes taxonomically and have similar body size and diel activity. Midge abundance declined by 79.9% (95% credible interval: 58.4–91.9). Overall posttreatment abundance decline of 62.2% (95% credible interval: 22.5–87.8) was also detected for leafhoppers (Hemiptera: Cicadellidae), but, these declines were inconsistent and may be attributed to natural variability rather than the treatment effect. Treatment frequency, location, life-stage targeting, and application techniques may mitigate the effects of mosquito control on nontarget insects to allow protecting human health while limiting environmental impacts." (Authors)] Address: Faraji, A., Salt Lake City Mosquito Abatement District, Salt Lake City, Utah, USA. Email: ary@slcmad.org

**19743.** Rodríguez, C.; Jurado, Y.; Rodríguez, V. (2022): Structure of drifting aquatic insects and its relationship with the benthos aquatic insect community, in a section of the Zarati River, Province of Coclé, Panama. *Tecnociencia* 24(1): 45-71. (in Spanish, with English summary) ["Sampling was conducted to determine the numeric structure of drifting aquatic insects and their relationship with the benthic insect numeric structure, in a section of the Zarati River, Coclé, Panama. Field work took place once a week, during June to September 2019 for a total of 12 sampling campaigns in the selected river section. For collection of drifting insects, two traps with an area of 0,176 m<sup>2</sup> and 500 µm were used and placed against the current. Drifting traps remained submerged during the sampling period and were emptied every 12 hours from 06:00 to 18:00 h and 18:00 to 06:00 h, while D-Nets were used for benthic insect collection. A total of 3 984 aquatic insects were collected, where 1 387 belonged to the drifting and 2 597 to the benthic groups, respectively. The most abundant orders of the drifting group were Ephemeroptera, Trichopteran, Diptera and Coleoptera, whereas the benthic group most abundant orders were Trichopteran, Ephemeroptera, Odonata and Heteropteran. The highest aquatic insect abundance in the drifting group was recorded during nocturnal periods implying behavioral drifting, supporting the hypothesis that drifting as a predation escape mechanism. Jaccard similarity index between aquatic insect genera in the drifting group and benthic group was IJ = 52 %. This indicates that the largest part of taxa move through drifting and the fraction of drifting aquatic insects numeric structure is a reflex of the benthic numeric structure." (Authors)] Address: Rodríguez, Cristie, Universidad de Panamá, Centro Regional Universitario de Coclé, Panamá. Email: alisbeth26@hotmail.com

**19744.** Saha, I.; Dey, S.; Palit, S. (2022): Diversity study of Odonata in Chintamani Kar Bird Sanctuary, Kolkata, West Bengal, India. *International Journal of Animal Science and Technology Research and Development* 2(1): 1-12. (in English) ["Species records of protected areas by creating checklists and updating them is crucial to understand species distribution, dynamics and possible threats to them. Chintamani Kar Bird Sanctuary is a protected area famed for its wide variety of floral and faunal diversity, located in close proximity to the metropolis of Kolkata and Odonata is real flagship taxa of freshwater ecosystems, often used as indicator species to assess the quality of their close environment. [...] Species diversity indices like Simpson and Shannon are applied to analyze the odonatan population diversity in this protected area. Our study of Odonata populations has been made for the first time in this protected area. As far as species richness is concerned, the family Libellulidae is found to be dominant among Anisoptera whereas species of the family Coenagrionidae is dominant among Zygoptera. Our observations support the importance of this region in providing valuable habitats for Odonata." (Authors)] Address: Saha, I., Head, Assistant Professor, Stage-III (C.S.C.), Department of Zoology, Sarsuna College, West Bengal, India

**19745.** Sanmartín-Villar, I.; Lorenzo-Carballa, M.O.; Zhang, H.; Cordero-Rivera, A. (2022): *Ischnura praematura* sp. nov. (Odonata: Zygoptera: Coenagrionidae): a species from Yunnan (China) whose females mate in the teneral state. *Zootaxa* 5087(1): 59-74. (in English) ["*Ischnura praematura* sp. nov. (Holotype ♂, China, Yunnan, Lijiang, 26°31'03.54"N, 100°13'38.89"E, 2396 m, 04 xii 2015, I. Sanmartín-Villar & H. Zhang leg.) is morphologically described, illustrated and compared with close species of the genus. *Ischnura praematura* can be mainly distinguished from its congeners *I. aurora*, *I. rubilio* and *I. asiatica* by its abdominal and thoracic morphology and colouration. The posterior lobe of the prothorax is elevated in *I. praematura* and the mesostigmal plates possess dorsal triangular protuberances. *Ischnura praematura* shows pointed paraprocts, internalised wide cerci and lacks a dorsal tuberculum in the tenth abdominal segment. The blue abdominal colouration is present in the last three segments (incomplete for segment eight and ten in some individuals). No female polychromatism was detected and all females observed possessed different colouration than male (gynochrome). Morphological distinctiveness of the species is supported by genetic analyses, which show that *I. praematura* forms a well-supported, monophyletic clade, with *I. asiatica*, *I. ezoin* and *I. pumilio* as the most closely related species. In the field, mature females show strong reluctance to mate, and males were observed mating with newly emerged females." (Authors)] Address: Sanmartín-Villar, I., ECOEVO Lab, Univ. de Vigo, Escola de Enxeñaría Forestal, Campus A Xunqueira, Pontevedra, Spain. E-mail: sv.iago@gmail.com

**19746.** Santos, A.A.; Nel, A.; Rodríguez-Barreiro, I.; Sender, L.M.; Wappler, T.; Diez, J.B. (2022): Insect and plant diversity in hot-spring ecosystems during the Jurassic-Cretaceous boundary from Spain (Aguilar Fm., Palencia). *Biology* 2022, 11, 273. 19 pp. (in English) ["Simple Summary: In this study, we show and identify new plant and insect remains found in travertine deposits from the Jurassic-Cretaceous boundary of the Aguilar Formation (Palencia, North Spain). From this hot-spring palaeoenvironment, we have identified the presence of dragonflies of the families Cymatophlebiidae and Aktassiidae, representing the first report of these families for the Iberian Peninsula. In addition, we find

a flora dominated by Bennettitales and the presence of ferns that differ from other floras of the same age and geographical area. The unusual environmental and palaeoecological conditions of this hot-spring environment are also discussed, suggesting that this niche was an "ecological oasis" for some plants and insects. Abstract: Hydrothermal palaeoenvironments are very uncommon in Upper Jurassic and Lower Cretaceous deposits worldwide. We present new plant and insect remains from travertines formed during the Jurassic-Cretaceous boundary in northern Spain (Aguilar Fm., Palencia province). A total of 136 plant specimens and three insect wings were collected and studied. This entomofauna consists of dragonfly (Odonata) wings including Cymatophlebiidae and an undetermined new genus and species of Aktassiidae, representing the first report of these families for the Iberian Peninsula. The fossil flora shows different morphotypes of plants, which have been tentatively assigned to three different genera. The taphocoenosis of the flora was dominated by Bennettitales (98.5%) including cf. *Pterophyllum* sp., *Ptilophyllum* cf. *acutifolium*, *Ptilophyllum* cf. *pecten*, *Ptilophyllum* cf. *pectiniformis* and cf. *Ptilophyllum* sp., and the occasional presence of ferns (1.5%) represented by the taxon *Cladophlebis* cf. *denticulata*. The presence of the Anisoptera *Cymatophlebia* cf. *longialata* suggests a higher affinity for a Tithonian age of the studied site, and the anatomy and palaeogeographical distribution of this species suggest capacity to migrate for rather long distances. The floristic composition of the site differs remarkably from other Tithonian-Berriasian floras of the Iberian Peninsula. The presence of Odonata and the distinctive flora in (semi)arid conditions could be due to the hot-spring providing an environmental niche with constant conditions of warmth and humidity forming an "ecological oasis". (Authors)] Address: Diez, J.B., Depto de Xeociencias Mariñas e Ordenación do Territorio, Facultade de Ciencias do Mar, Universidade de Vigo, 36310 Vigo, Spain. Email: jbdiez@uvigo.es

**19747.** Schorr, M.; Snegovaya, N.Yu. (2022): On the occurrence of *Gomphus vulgatissimus* (Linnaeus, 1758) and *G. schneiderii* Selys, 1850 in Azerbaijan – a brief discussion of the known status quo. *International Dragonfly Fund - Report* 168: 25-32. (in English) [Boudot et al. (2021) removed "*G. vulgatissimus* from the list of Azerbaijan Odonata, subsuming all records of this taxon under *G. schneiderii*. This is contradictory to the fact that *G. vulgatissimus* was documented for Azerbaijan by Bartenef (1912). We discuss the current knowledge of the two taxa *G. vulgatissimus* and *G. schneiderii*, document a new record of *G. vulgatissimus* for Azerbaijan, and map all known findings of the two taxa that have been reported to date as well as the potential distribution (search area) of *G. vulgatissimus* in northern Azerbaijan." (Authors)] Address: Schorr, M., ÖSTLAP, Schulstr. 7B, 54314 Zerf, Germany. Email: bierschorr1@online.de

**19748.** Sherlock, C.; Femie, K.J.; Munno, K.; Provencher, J.; Rochman, C. (2022): The potential of aerial insectivores for monitoring microplastics in terrestrial environments. *Science of the Total Environment* 807 (2022) 150453: 10 pp. (in English) ["Highlight: . Microparticles (MP) found in tree swallows (.83%) at WWTP & reference sites. . At both sites, fecal sacs of chicks (90%) contained MPs and all were fibers. . Reference chicks had more MPs (feces) that were larger, more diverse in GI tracts. . Reference birds had more aquatic diet versus WWTP chicks had more terrestrial diet. MP numbers were not correlated between sample types or with chick condition and size. Abstract: Limited research has been conducted on microplastics in terrestrial ecosystems



and biota, despite being some of the most ubiquitous environmental pollutants. We investigated the presence of microplastics (over 125  $\mu\text{m}$ ) in tree swallow (*Tachycineta bicolor*) chicks (10 d. o.), an aerial insectivore whose diet involves terrestrial and/or freshwater sources. Swallows nested immediately downstream (300 m) of the discharge pipe of a large, urban wastewater treatment plant (WWTP) or at a rural conservation area (40 km apart). Anthropogenic microparticles (including microplastics) were identified in nearly all WWTP chicks (90%; N = 20) and reference chicks (83%; N = 20). All microparticles were fibers (100%) in the gastro-intestinal (GI) tracts of WWTP nestlings, whereas unexpectedly, they were more diverse in the GI tracts of reference chicks, with ~15% characterized as pre-production plastic pellets. The fecal sacs of most nestlings (90%) contained microparticles, and all were characterized as fibers suggesting their excretion by tree swallows. Compared to WWTP chicks, the reference chicks had more microparticles in their fecal sacs and larger particles (length, width) in their GI tracts, likely reflecting the more aquatic-based diet of the reference chicks fed insects caught adjacent to the nearby dam, compared to the more terrestrial-based diet of the WWTP chicks. The numbers of microparticles were not correlated between GI tracts and fecal sacs, nor with the chicks' condition or size (weight, organs, feathers). We commend sampling macroinvertebrate prey to permit stronger conclusions regarding WWTPs as possible sources of microplastics for swallows, and to determine if such macroinvertebrates may be a non-lethal method to characterize microparticle diversity ingested by birds as presently identified in chicks' GI tracts. We conclude that sampling fecal sacs only, while not indicative of the diversity of microplastics ingested by terrestrial passerines (e.g., tree swallows), is useful for determining their exposure to microparticles." (Authors)] Address: Sherlock, Cassandra, Dept of Ecology and Evolutionary Biology, Univ. of Toronto, 25 Willcocks St, Toronto, ON M5S 3B2, Canada

**19749.** Simonsen, T.J.; Glahder, M.; Pape, T.; Olsen, K.; Djernæs, M. (2022): Rhapsody in emerald: phylogenetic framework for Lestidae with reference to the systematic position of Chalcolestes Kennedy. *International Journal of Odonatology* 25: 16-21. (in English) ["We reconstruct a phylogenetic framework for the zygopteran family Lestidae based on a molecular dataset comprised of sequence data from the genes COI, 16S, 18S, 28S, and ITS1+2 from 41 ingroup taxa and 8 outgroup taxa with emphasis on the systematic position of the genus Chalcolestes Kennedy. We recover Lestidae as monophyletic with good statistical support. The family falls into two subequal clades. One, comprising the genus *Sympecma* Burmeister and *Lestes* Leach sensu lato (including the genus *Archilestes* Selys) is poorly to moderately supported. While the other, comprising the genera *Austrolestes* Tillyard, *Indolestes* Fraser, *Orolestes* McLachlan, and *Chalcolestes* is strongly supported. *Chalcolestes* is recovered as sister to the Oriental genus *Orolestes* with strong support. Our results thus support that *Chalcolestes* is a valid genus not closely related to *Lestes*. Monophyly of *Lestes* requires inclusion of the New World genus *Archilestes*, and our results support the need for a thorough revision of *Lestes*. ... Three main conclusions can be drawn from our results despite the somewhat limited taxon sampling. First, there is no phylogenetic support for dividing Lestidae into the subfamilies Lestinae and Sympecmatinae. Second, *Lestes* as currently defined is almost certainly not a monophyletic group, and we agree with Dijkstra and Kalkman (2012) that a phylogenetic revision of the genus is much needed. Third, *Chalcolestes* is a valid

genus that is not closely related to other European genera of Lestidae—neither *Lestes* nor *Sympecma*. Instead, the genus is most likely the sister group to *Orolestes* and placed in a clade with otherwise Oriental-Australian genera. Other than the much-needed revision of *Lestes* sensu lato, several high profile aspects of Lestidae phylogeny and systematics remain to be solved. The relationship and delimitation of *Austrolestes* and *Indolestes* remain unclear, and the two genera in combination should be the subject of a phylogenetic taxonomic revision. The higher-level phylogeny of Lestidae should be the subject of phylogenomic analyses in the mould of Bybee et al. (2021) and include also *Platylestes* and *Sinhalestes*. Such a study should address the phylogenetic position of *Sympecma*, identify natural divisions that can be used for a subfamily and tribal classification, and resolve the biogeography of the family including the geographical origin of *Chalcolestes*." (Authors)] Address: Simonsen, T.J., Natural History Museum Aarhus, 8000 Aarhus C, Denmark. Email: t.simonsen@nathist.dk

**19750.** Snegovaya, N.Yu. (2022): Odonata collected in 2021 in Azerbaijan, including new data on *Gomphus schneiderii* Selys, 1850 and *Libellula pontica* Selys, 1887. *International Dragonfly Fund - Report 168*: 1-23. (in English) ["This paper presents the results of a study on the odonate fauna in Azerbaijan. The survey was conducted in the summer of 2021 and covered 24 localities in twelve districts. A total of 34 species from 9 families was recorded. New localities for *Gomphus schneiderii* Selys, 1850 and *Libellula pontica* Selys, 1887 are reported. A formerly published record of *Gomphus vulgatissimus* from Khachmaz, Nabran village, has to be corrected into *G. schneiderii*." (Author)] Address: Snegovaya, Nataly Yu., Zoological Institute NAS of Azerbaijan, proezd 1128, kvartal 504, Baku, AZ 1073, Azerbaijan. Email: snegovaya@yahoo.com

**19751.** Späth, J.; Brodin, T.; McCallum, E.; Cervený, D.; Fick, J.; Nording, M.L. (2022): Metabolomics reveals changes in metabolite profiles due to growth and metamorphosis during the ontogeny of the northern damselfly. *Journal of Insect Physiology* Volume 136, January 2022, 104341: 8 pp. (in English) ["Highlights: • Baseline metabolism of damselflies at different ontogenetic stages. • 212 compounds annotated in three larval stages and adult damselflies. • Shift from protein catabolism to lipid catabolism across metamorphosis. • Metabolites affected by effluent exposure depend on ontogenetic stage. Abstract: Many insects have complex life cycles where a drastic ontogenetic change happens between the larval stages and the adult stage, i.e. metamorphosis. Damselflies are widely distributed and ecologically important semi-aquatic insects with a complex life cycle. Phenotypic changes over damselfly ontogeny have been documented, however, if and how metabolite profiles are also changing is currently unknown. Here we used a metabolomics methodology to gain insights into the metabolic changes during the life cycle of the *Coenagrion hastulatum*. Hatchlings of wild-caught damselflies were reared in the laboratory and metabolomics analyses using liquid chromatography and gas chromatography coupled to mass spectrometry were carried out at three larval stages and on adult damselflies. Additionally, a subset of larvae was exposed to wastewater effluent to assess how metabolite profiles responded to an environmental stressor. A total of 212 compounds belonging to several classes (e.g. amino acids, fatty acids, sugars) were annotated. Across metamorphosis, we found that damselflies shifted from protein catabolism to lipid catabolism. Wastewater effluent exposure resulted in ontogenetic stage-dependent changes of individual

metabolites, but not to a marked extent. Overall, our study is one of the first to describe changes of metabolite profiles during ontogeny of an insect, and it provides a first step towards a greater understanding of the physiological changes occurring during general insect—but especially damselfly—ontogeny." (Authors)] Address: Späth, Jana, Department of Chemistry, Umeå University, SE 90187 Umea, Sweden. E-mail address: jana.spath@umu.se

**19752.** Streib, L.; Juvigny-Khenafou, N.; Heer, H.; Kattwinkel, M.; Schäfer, R.B. (2022): Spatiotemporal dynamics drive synergism of land use and climatic extreme events in insect meta-populations. *Science of The Total Environment* 814, 25 March 2022, 152602: (in English) [nv; "Highlights: • Ecosystem risks often emerge from interactions of co-occurring stressors. • At higher spatiotemporal scales, research on stressor interactions is not very developed. • Scenarios of two global change stressors were simulated for insect meta-populations. • Interactions were driven by the continuous stressor, and changed over time. Abstract: Ecosystems are increasingly threatened by co-occurring stressors associated with anthropogenic global change. Spatial stressor patterns range from local to regional to global, and temporal stressor patterns from discrete to continuous. To date, most multiple stressor studies covered short periods and focused on local effects and interactions. However, it remains largely unknown how stressors with different spatiotemporal patterns interact in their effects over longer periods. In particular, at higher spatial scales, biotic dynamics in ecological networks complicate the understanding of stressor interactions. We used a spatially explicit meta-population model for a generic freshwater insect, parameterized based on traits of the European damselfly *Coenagrion mercuriale*, to simulate scenarios of discrete climatic extreme events and continuous land use-related stress. Climatic extreme events were modeled as recurring mortality in all patches, whereas land use permanently influenced meta-populations via patch qualities and network connectivity. We found that the risk of discrete climatic extreme events to meta-populations depended strongly on the proportion of land use types, with effects ranging from negligible to extinction. Land use-related stress limited recovery in meta-populations from effects of climatic extreme events, resulting in synergistic stressor interactions. Moreover, the spatial configuration of land use type influenced the combined stressor effects with clustered configurations resulting in lower effects compared to a random configuration. Finally, we found that combined stressor effects can vary with the time point at which they were determined, indicating that inconclusive results in multiple stressor research can partly be due to differences in the time of determination. We conclude that conservation should focus on regional landscape management to mitigate risks on meta-populations from future, intensified extreme climate events. Reducing land use effects, thus improving patch quality and network connectivity, can compensate for effects of additional discrete stressors and, in turn, synergistic interactions." (Authors)] Address: Streib, L., University of Koblenz-Landau, iES - Institute for Environmental Sciences, Quantitative Landscape Ecology, Herrenbergstr. 13, 76829 Landau / Pfalz, Germany. Email: streib@uni-landau.de

**19753.** Susanto, M.A.D. (2021): Inventory and identification dragonfly Family Libellulidae at Slamet Reservoir, Surabaya, East Java. *Journal of Biology and Instruction* 1(2): 40-50. (English, with Indonesian summary) ["Slamet Reservoir is an artificial reservoir located in the lowlands of urban areas. The existence of this reservoir with a stagnant

water habitat type has great potential to become a natural habitat for various types of dragonflies, especially the Libellulidae family. This study aims to inventory and identify the types of dragonflies in the family Libellulidae in the Slamet Reservoir. In this study, the Visual Encounter Survey (VES) method was modified by using the Belt Transect method. This method is an observation by following a predetermined circular line. Sampling was carried out by catching adult dragonflies using insect nets and then preserving them using 50% acetone. After preservation, the body part of the dragonfly was measured using a caliper. The results showed that in the Slamet Reservoir there were 12 species of dragonflies from the Libellulidae family with a total of 131 individuals. The species with the highest relative abundance value in the Slamet reservoir is *Brachythemis contaminata* with a value of 51.15%. While the species with the lowest relative abundance values were *Acisoma panorpoides*, *Dip-lacodes trivialis* and *Pantala flavescens* with a value of 0.76%." (Author)] Address: Susanto, M.A.D., Dept of Biol., Faculty of Science and Technology, Universitas Islam Negeri Sunan Ampel, Surabaya, Indonesia. Email: muhammadazmidwi@gmail.com

**19754.** Susanto, M.A.D.; Zulaikha, S.; Bahri, S.; Firdhausi, N.F.; Tyastirin, E. (2022): Community structure of dragonfly (insecta: Odonata) in pond habitat at Sumur Panguripan Cultural Reserve, Surabaya, Indonesia. *IOP Conference Series: Earth and Environmental Science*, Volume 976, 2nd International Conference on Tropical Wetland Biodiversity and Conservation 23-24th October 2021, Banjarbaru City, Indonesia Citation M A D Susanto et al 2022 IOP Conf. Ser.: Earth Environ. Sci. 976 012005. 11 pp. (in English) ["The Sumur Panguripan Cultural Reserve is an area of clean water wells in which there are two types of ponds, namely Canopied and Non-Canopied, with unspoiled environmental conditions. So, this area has potential as a natural habitat for the dragonfly community. The community of dragonflies at a location can be an environmental indicator, especially in waters, and also be used as a biological control for the terrestrial environment. This study aimed to report differences in the dragonfly's structure community from the two types of canopy in the pond area of the Sumur Panguripan Cultural Reserve. This study uses the Visual Encounter Survey (VES) method was modified using the Belt Transect method. The results of a study conducted in this location found that there were 20 species from 4 families, with 294 individuals. The value of species diversity of dragonflies at non-canopied locations is  $H' = 2.26$ , highest than the value of species diversity of dragonflies at locations with canopied that is  $H' = 1.87$ . At the canopied pond location, there were eight species with 48 individuals from 3 families. Meanwhile, at the Non-canopied pond location, there were 18 species with 246 individuals from 3 families." (Authors)] Address: Susanto, M.A.D., Dept of Biology, Fac. of Science & Technology, Universitas Islam Negeri Sunan Ampel, Surabaya, Indonesia. Email: nirmala\_firdhausi@yahoo.com

**19755.** Szabo, B.; Mangione, R.; Rath, M.; Pašukonis, A.; Reber, .A.; Oh, J.; Ringler, M.; Ringler, E. (2022): Naive Poison Frog tadpoles use bi-modal cues to avoid insect predators but not heterospecific predatory tadpoles. *Journal of Experimental Biology* (2021) 224, jeb243647: 9 pp. (in English) ["For animals to survive until reproduction, it is crucial that juveniles successfully detect potential predators and respond with appropriate behavior. The recognition of cues originating from predators can be innate or learned. Cues of various modalities might be used alone or in multi-modal

combinations to detect and distinguish predators but studies investigating multi-modal integration in predator avoidance are scarce. Here, we used wild, naive tadpoles of the Neotropical Poison Frog *Allobates femoralis* (Boulenger, 1884) to test their reaction to cues with two modalities from two different sympatrically occurring potential predators: heterospecific predatory *Dendrobates tinctorius* tadpoles and dragonfly larvae. We presented *A. femoralis* tadpoles with olfactory or visual cues, or a combination of both and compared their reaction to a water-control in a between-individual design. In our trials, *A. femoralis* tadpoles reacted to multimodal stimuli (a combination of visual and chemical information) originating from dragonfly larvae with avoidance but showed no reaction to uni-modal cues or cues from heterospecific tadpoles. In addition, visual cues from conspecifics increased swimming activity while cues from predators had no effect on tadpole activity. Our results show that *A. femoralis* tadpoles can innately recognize some predators and likely need both visual and chemical information to effectively avoid them. This is the first study looking at anti-predator behavior in Poison Frog tadpoles. We discuss how parental care might influence the expression of predator avoidance responses in tadpoles." (Authors)] Address: Ringler, Eva, Division of Behavioural Ecology, Institute of Ecology and Evolution, University of Bern, Bern, Switzerland; email: eva.ringler@iee.unibe.ch

**19756.** Tanczuk, A., Bojar, P. (2022): Confirmation of breeding of *Cordulegaster boltonii* (DONOVAN, 1807) in the River Czarna Hańcza (the Suwalki Landscape Park). *Wiadomości entomologiczne* 41(1): 1-3. (in Polish) [20 VI 2021, 54°14'06"N, 22°47'30"E, UTM: FF11.] Address: Tanczuk, Agnieszka, Katedra Zoologii i Ochrony Przyrody, Instytut Nauk Biologicznych, Uniwersytet Marii Curie-Skłodowskiej, ul. Akademicka 19; atanczuk@gmail.com

**19757.** Tazunoki, Y.; Tokuda, M.; Sakuma, A.; Nishimuta, K.; Oba, Y.; Kadokami, K.; Miyawaki, T.; Ikegami, M.; Ueno, D. (2022): Comprehensive analyses of agrochemicals affecting aquatic ecosystems: A case study of Odonata communities and macrophytes in Saga Plain, northern Kyushu, Japan? *Environmental Pollution* 292, Part A, 1 January 2022, 118334: 9 pp. (in English) ["Highlights: • Negative effect of pesticides to odonata populations was investigated. • Comprehensive analysis with AIQS was used to quantify pesticides in water samples. • Insecticides, fungicides, and herbicides were detected in water environment. • Negative relationships were found between insecticides and abundance of odonates. • Fungicides and herbicides were not related to abundance of odonates and macrophytes. Abstract: The negative influence of agrochemicals (pesticides: insecticide, fungicide, and herbicide) on biodiversity is a major ecological concern. In recent decades, many insect species are reported to have rapidly declined worldwide, and pesticides, including neonicotinoids and fipronil, are suspected to be partially responsible. In Japan, application of systemic insecticides to nursery boxes in rice paddies is considered to have caused rapid declines in *Sympetrum* (Odonata: Libellulidae) and other dragonfly and damselfly populations since the 1990s. In addition to the direct lethal effects of pesticides, agrochemicals indirectly affect Odonata populations through reductions in macrophytes, which provide a habitat, and prey organisms. Due to technical restrictions, most previous studies first selected target chemicals and then analyzed their influence on focal organisms at various levels, from the laboratory to the field. However, in natural and agricultural environments, various chemicals co-occur

and can act synergistically. Under such circumstances, targeted analyses might lead to spurious correlations between a target chemical and the abundance of organisms. To address such problems, in this study we adopted a novel technique, "Comprehensive Target Analysis with an Automated Identification and Quantification System (CTA-AIQS)" to detect wide range of agrochemicals in water environment. The relationships between a wide range of pesticides and lentic Odonata communities were surveyed in agricultural and non-agricultural areas in Saga Plain, Kyushu, Japan. We detected significant negative relationships between several insecticides, i.e., acephate, clothianidin, dinotefuran, flubendiamide, pymetrozine, and thiametoxam (marginal for benthic odonates) and the abundance of lentic Eiprocta and benthic Odonates. In contrast, the herbicides we detected were not significantly related to the abundance of aquatic macrophytes, suggesting a lower impact of herbicides on aquatic vegetation at the field level. These results highlight the need for further assessments of the influence of non-neonicotinoid insecticides on aquatic organisms." (Authors)] Address: Ueno, D., Faculty of Agriculture, Saga University, Honjo 1, Saga, 840-0027, Japan. E-mail: uenod@cc.saga-u.ac.jp

**19758.** Valente-Neto, F.; Piovezan-Borges, A.C.; Urbieta, G.L.; Samways, M.J.; Roque, F. (2022): Research networks should improve connectivity for halting freshwater insect extinctions. *Ecological Entomology* 47(1): 63-75. (in English) [1. Avoiding freshwater insect extinctions requires studies assessing causal links between a human pressure and biodiversity measures (threats), the state of biodiversity through time (status), and solutions to manage species loss. However, an imbalance between these different approaches on declines of freshwater insects and the distribution of the studies between countries may have implications for implementing conservation knowledge into practical conservation actions. 2. Here, we evaluate country co-authorship relationships through quantitative bibliometric analysis to identify networks of research collaboration on freshwater insects extinction, and how this overall network is modified by the type of studies (status, threats, and solutions). 3. We detected that authors from developed countries dominated the networks, and most studies assessed threats to freshwater insects, knowledge which is part of a research network involving multiple countries. The status network of research collaboration was clearly more disconnected in comparison with the network of all studies, whereas the solution network showed the greatest connectivity. 4. These results reveal that an increase in research collaboration is required for all approaches assessed here, because many megadiverse countries are not present in the networks. This is especially required for status and solution studies. Expansion of research collaboration should decrease inequalities between developed and developing countries, achieved by funding conservation studies in developing countries. Studies should also decrease classical inequalities, including those related to sexual orientation, gender identity, and ethnic minorities. These recommendations would benefit freshwater insect conservation science and practice." (Authors)] Address: Valente-Neto, F., Laboratório de Ecologia, Instituto de Biociências, Universidade Federal de Mato Grosso do Sul – UFMS, Cidade Universitária, Bairro Universitário, Campo Grande, MS CEP: 79070-900, Brazil. E-mail: fvalenteneto@gmail.com

**19759.** Vilenica, M.; Rebrina, F.; Matonickin Kepcija, R.; Šegota, V.; Rumišek, M.; Ružanovic, L.; Brigic, A. (2022): Aquatic macrophyte vegetation promotes taxonomic and

functional diversity of Odonata assemblages in intermittent Karst Rivers in the Mediterranean. *Diversity* 2022, 14(1), 31; <https://doi.org/10.3390/d14010031>: 21 pp. (in English) ["Assemblages of adult Odonata were studied in four intermittent karst rivers encompassing macrophyte-rich (MRH) and macrophyte-poor habitats (MPH) in southern Europe, where temporary lotic habitats are the predominant freshwater type but are still understudied. With a total of 25 recorded species, the studied habitats support species-rich Odonata assemblages, as already shown for intermittent rivers in the Mediterranean. Aquatic macrophyte abundance, conductivity, and water velocity are the most significant determinants of Odonata assemblages in the studied IRES. MRH promote higher Odonata abundance and the taxonomic and functional diversity of their assemblages compared to the MPH. Odonata assemblages in MRH are characterized by higher values of body size and a higher share of species preferring lentic and temporary hydrological conditions. Moreover, their assemblages are characterized by various patterns of nymphal development and drought resilience strategies. In contrast, MPH are preferred by lotic species, with nymphal development all year round and with no specific drought-resisting strategies. Our results contribute to the knowledge of diversity and ecological requirements of dragonflies and damselflies in IRES habitats, which could provide scientific background for future conservation activities and bioassessment protocols of such habitats and their biota. ... In total, 25 Odonata species were recorded (Table 3). Overall, the most numerous species was *Platynemesis pennipes* (Pallas, 1771), which was also most frequently recorded at MRH. *Calopteryx virgo* was the most numerous species at MPH (Table 3). Species recorded in low numbers (less than 20 individuals) were *Sympetrum fonscolombii*, *S. sanguineum*, *S. meridionale*, *Cordulegaster heros*, *Aeshna affinis*, *Crocothemis erythraea*, *Orthetrum cancellatum*, and *Somatochlora meridionalis* (Table 3)." (Authors)] Address: Vilenica, Marina, Department in Petrinja, Faculty of Teacher Education, University of Zagreb, 44250 Petrinja, Croatia. Email: [marina.vilenica@ufzg.hr](mailto:marina.vilenica@ufzg.hr)

**19760.** Xu, M.; Fincke, O.M. (2022): To harass or to respect: the economy of male persistence despite female refusal in a damselfly with scramble mate competition. *International Journal of Odonatology* 25: 7-15. (in English) ["In sexual conflict, males are often thought to gain fitness benefits from harassing females over mating. Yet when harassment itself incurs costs to males and if alternative, receptive females are available in a local population, theory predicts that when confronted with a female refusal, a male's choice of persisting or retreating is determined in part by the likelihood of achieving a mating. We tested that prediction in the damselfly *Enallagma hageni*, whose males compete by intense scramble competition, resulting in widespread mating harassment toward females, which have a high level of control over mating. Using captive individuals of *E. hageni* in outdoor insectaries, we quantified male persistence in mating after refusals by pre- and post-oviposition focal females whose egg content we quantified after observations. We documented a novel, context-dependent head-turning refusal signal of sexual non-receptivity, most often displayed in tandem pairs by post-oviposition females that typically carried few mature eggs for males to fertilize. Male persistence was less likely to result in mating with post-oviposition females compared with pre-oviposition females carrying a clutch of mature eggs. Accordingly, males were less likely to persist following refusal signals given by post-oviposition females, supporting the theoretical prediction. Compared with a re-

fusal signal known as wing spread, head-turning was significantly more effective in deterring harassing males. Our results suggest that despite on-going sexual conflict over mating, cooperation benefits both sexes when females use the honest signal of non-receptivity because they carry few mature eggs that males could fertilize." (Authors)] Address: Fincke, Ola, Dept of Biology, The University of Oklahoma, Norman OK, USA. Email: [fincke@ou.edu](mailto:fincke@ou.edu)

**19761.** Zouaïmia, A. Adjami, Y.; Zebba, R.; Youcefi, A.; Bensakhri, Z.; Bensouilah, S.; Amari, H.; Ouakid, M.-L.; Houhamdi, M.; Mahdjoub, H.; Khelifa, R. (2022): Phenology of the regionally Critically Endangered dragonfly *Urothemis edwardsii* in the National Park of El Kala, Northeast of Algeria. *Nature Conservation Research* 7(1): 9 pp. (in English, with Russian summary) ["In the Mediterranean, *Urothemis edwardsii* is one of the most threatened dragonfly species with a relict population restricted to the northeast of Algeria. Despite the recent subtle local expansion in the geographic distribution of the species during the past decade, studies on the life history of the species are still lacking. We carried out a study on the phenology of emergence and flight season on Lake Bleu, Northeast-Algeria. Using repeated sampling of exuviae and marking of adults during two seasons (2018 and 2019), we estimated the population size, sex ratio, and the temporal pattern of emergence and flight season. The first year (2018) was considerably drier than the second year (2019). We collected a total of 576 and 887 exuviae and 711 and 655 adults in 2018 and 2019, respectively. The sex ratio at emergence was slightly female-biased with 57.1% in the first year and equal to unity (50.5%) in the second year, respectively. The species started its emergence earlier in the dry year (2018). The emergence of the species was quite asynchronous where 50% of the population emerged after 11 days and 16 days in 2018 and 2019, respectively. The difference in population size (based on exuviae) and the temporal pattern of emergence and flight season were likely due to differences in weather between the two years. The current study provides useful information on the life history and plasticity of *U. edwardsii*, which could be used for the management of this locally Critically Endangered dragonfly." (Authors)] Address: Khelifa, R., Biodiversity Research Center, University of British Columbia, 2212 Main Mall, Vancouver. B.C. V6T1Z4, Canada. Email: [rassimkheif@gmail.com](mailto:rassimkheif@gmail.com)



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

**Editor:**

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 1998

**19762.** Arcas, J. (1998): Diet of Red-backed Shrikes (*Lanius collurio* L.) in Orense (Galicia, NW Spain). *Ardeola* 45(1): 69-71. (in Spanish, with English title) ["Intact specimens of dragonflies (Odonata) were also found, including the wings, contrary to what has been mentioned by other authors (Cramp & Perrins, 1993) that this species detaches these hard parts before ingesting them, although it is possible that these shrikes ingest whole dragonflies if they are small in size (Hernández, pers. comm.). One of the regurgitates contained two intact specimens of *Pyrrhosoma nymphula* (4.2 cm and 3.6 cm)." (Author/DeepL)] Address: Arcas, J., Laboratorio de Anatomía Animal. Depto de Ecología y Biología Animal. Facultad de Ciencias, Universidad de Vigo. Apdo. 874. E-36200 Vigo, Pontevedra, Spain.

**19763.** Leonard, N.J. (1998): Ectoparasitism of Odonata hosts: Host response to parasitism and host sex biases in parasitism. MSc thesis, Dept of Biology, Carleton Univ., Ottawa, Ontario: XIII + 91 pp. (in English) ["In the first chapter, I found that natural high levels of *Limnochares americana* (Lundblad) tend to negatively affect the survivorship and significantly reduce the time to female maturation of its damselfly host, *Enallagma ebrium* (Hagen). I observed that damselflies increase their grooming behaviours when they are being colonised by mite larvae. However, I did not observe any adaptive host response, i.e., an increase in reproductive effort, by adult males or females. In the second chapter, I investigated the causes of sex biases in parasitism by *L. americana* observed for field-caught *Nehalennia irene* (Hagen) and *Leucorrhinia frigida* (Selys). I also used *Enallagma ebrium* (Hagen), to test for the occurrence of a sex bias in engorgement size of *L. americana*. I found that *N. irene* showed no sex biases in parasitism in the laboratory whereas *L. frigida* females were more susceptible to mite colonisation than males. I also found that mites attained a larger size on *E. ebrium* females in the laboratory but not in the field." (Author)] Address: not stated

**19764.** Petitjeannin, M. (1998): Introduction aux élevages de larves aquatiques d'insectes Reunionais. Rapport de stage de fin de maîtrise. Observatoire Reunionais de l'eau, Parc de la Providence, 97489 Saint-Denis, France: 39 pp. (in French) ["Insects represent 80% of the world's fauna. Thanks to their tremendous adaptability, they have colonized all continental, equatorial and aquatic environments. In La Reunion, the ORE has identified 26 families of insects whose larvae are aquatic. In Europe in particular, the larvae of certain insects make it possible to assess the quality and

study running and lake water systems. These studies are based on the diversity and size of populations and therefore on a detailed knowledge of the insects and their development, i. e. larvae, nymphs and adults. They therefore require the master of systematics. The determination of larvae up to the species is often very difficult, even impossible. Indeed, the specific characteristics of the species are generally carried on the male genitalia of imago [imago = adult insect]. To overcome this difficulty, many authors recommend breeding larvae in order to obtain adults. Thus, in order to improve knowledge of Reunion Island insects, the ORE and Insectarium du Port have joined forces to carry out a breeding study of aquatic insect larvae. This project has started through an internship that took place during July and August 1998 to set up an eievage implementation method. For a first test, it is the order of Odonates which was retained, represented at the Reunion by 2 families of Dragonflies (Anisopteres) and 1 family of Demoiselles (Zygopteres). Indeed, it possessed three major assets: the larvae are sensitive to pollution, predators therefore easy to feed and rather easy to breed. Moreover, the adults are known by MM GUILLERMET C and COUTEYENS from the Insectarium. Larvae were collected from about ten sites and placed in aquanums at the Port Insectarium to allow them to continue their development. The difficulty consists in creating an artificial environment close to their natural environment. In parallel, in the ORE laboratory, the morphological characteristics of each individual were observed in order to try to identify and differentiate them. It was possible to establish the experimental conditions necessary for the development of larvae. Thanks to this work and the knowledge of the Insectarium staff, 8 different larvae were identified: 4 Coenagnonidae (Demoiselles) out of 6 described in Reunion Island, 1 Aeshnidae (Dragonflies) on 2, 3 Libellulidae (Libellules) out of 8. Of these eight, three are identified as *Anax imperator* (Aeshmidae), *Pantala flavescens* (Libellulidae) and *Ishnura senegalensis* (Coenagnonidae), following the success of the first stage of this project, it would be interesting to continue it in order to deepen the fine determination of Odonate larvae and to reschedule to other orders. The continuation of breeding is essential because it will make it possible to better understand the Reunionese insect fauna and therefore their ecology and their sensitivity to environmental degradation." (Author/DeepL)] Address: Petitjeannin, Mathilde, Observatoire Reunionais de l'eau, Parc de la Providence, 97489 Saint-Denis, France. E-mail: ore@runtel.fr

## 1999

**19765.** Abbott, J.C. (1999): Biodiversity of dragonflies and damselflies (Odonata) of the south-central nearctic and adjacent neotropical biotic provinces. Ph.D. Dissertation. Univ.

of North Texas, Denton, Texas: 911 pp. (in English) ["The south-central United States serves as an important biogeographical link and dispersal corridor between Nearctic and Neotropical elements of western hemisphere odonate faunas. Its species are reasonably well known because of substantial collections, but there has been no concerted effort to document the extent of biodiversity and possible geographic affinities of dragonflies and damselflies of this region. The recent discoveries of *Argia leonorae* Garrison, *Gomphus gonzalezi* Dunkle and *Erpetogomphus heterodon* Garrison from southern and western Texas and northern Mexico suggest that Odonata species remain to be discovered in this area, particularly from far south Texas and northern Mexico. I have documented a total of 12,515 records of Odonata found in 408 counties within the south-central U.S. A total of 73 species of damselflies and 160 species of dragonflies was revealed in the region. The 233 (197 in Texas) Odonata species are distributed among 10 families and 66 genera. Illustrated family, generic, and species-level keys are provided. Since the beginning of this work in the Fall of 1993, one species has been added each to the Louisiana and Oklahoma faunas, and 12 species have been added, previously unreported from Texas, including four new to the U.S. The area of highest Odonata biodiversity overall (161 spp.) is in the Austroriparian biotic province. The greatest degree of faunal similarity between the south-central U.S. and other intra-continental regions was observed for the eastern (64%) United States. Diversity is a function of area, and as expected, the numbers of breeding birds and Odonata, in each contiguous U.S. state are positively correlated ( $r=0.376$ ,  $n=33$ ,  $p=0.031$ ). There is, however, no strong correlation between land area and species diversity within the region, but those natural biotic provinces (Austroriparian, Texan, Balconian) where aquatic systems and topographic heterogeneity are the greatest provide a broader spectrum of potential Odonata habitats and thus support a greater number of Odonata species." (Author)] Address: Abbott, J.C., Alabama Mus. of Nat. History & UA Museums Dept of Res. & Collections, The Univ. of Alabama, Tuscaloosa, AL 35487, USA. Email: jabbott1@ua.edu

**19766.** Frey, J., (1999): Practical aspects of biotope mapping in cities: methods, problems and solutions. An example of Mainz, Germany. *Deinsea* 5: 41-56. (in English) ["Biotope mapping of Mainz" - this is the name of a research project commissioned by the City of Mainz and carried out by an interdisciplinary group of geographers, biologists and environmental planners at Mainz Univ. between 1993 and 1997. The project's goal was not only to gather, analyse and evaluate data relating to urban biotopes, but also to apply and - if necessary - modify the 'Basic program for biotope mapping in urban areas', which was set up by a working group at the German Federal Nature Conservancy in 1993. In conformity with the legal mandate, the work followed the strategy of integrated nature conservation, i.e. simultaneous protection of biotic, abiotic and aesthetic resources, which is considered as an inevitable component of sustainable development in urban areas. Some of the methodological aspects recommended in the 'Basic program' and completed in the 'Biotope mapping of Mainz' are: the application of a well-structured biotope type reference key, the elaboration of a microsite key with relevance to flora, fauna and aesthetics, very detailed mapping and description of biotope types, subtypes and variations, as well as mappings and descriptions of the phenomena of nature, recreational activities and environmental impacts related to biotope types. Further, the 'Biotope mapping of Mainz' supplemented some new spatial aspects and assessment procedures that

might eventually get planning authorities more adopted to the idea of sustainable land use in populated areas, such as the environmental zoning of the landscape within the city limits, the delimitation and description of 'urban landscape units' in detail (including climate, soil and water conditions, flora and fauna as well as historical and cultural features), the development of environmental quality targets and standards specified for each 'urban landscape unit', the assessment of the unit's biotope types with reference to the established environmental quality standards, and last, suggestions and recommendations for urban planning and environmental management. With the items mentioned, the research project 'Biotope mapping of Mainz' made its scientific outcome more accessible and understandable. As a consequence, it is reported that local planning authorities are applying the project's findings and giving a positive feedback of the results." (Author) In APPENDIX 1 the biotope subtype '5520 - Ponds with slightly disturbed embankments' and its fauna with bioindicative value is described. Odonata: *Aeshna cyanea*, *A. mixta*, *Calopteryx splendens*, *Coenagrion puella*, *Ischnura elegans*, *Lestes sponsa*, *Orthetrum cancellatum*, *Sympetrum sanguineum* / *S. vulgatum*.] Address: not stated

**19767.** Lahiri, A.R. (1999): New records of Odonata (Insecta) from Little Andaman Island. *Fraseria* (N. S.) 5(1/2): 57-59. (in English) ["Eleven odonate species viz., *Vestalis gracilis gracilis* (Rambur), (family Calopterygidae), *Prodasi-neura verticalis andamanensis* (Fraser) (family Protoneuridae), *Copera marginipes* (Rambur). (family Platycnemididae), *Ceragrion cerinorubellum* (Brauer) (family Coenagrionidae), *Crocothemis servilia servilia* (Drury), *Lathrecista asiatica asiatica* (Fabricius), *Neurothemis fluctuans* (Fabricius), *Pantala flavescens* (Fabricius), *Potamarcha congener* (Rambur), *Trithemis aurora* (Burmeister) and *T. festiva* (Rambur) (family Libellulidae) have been reported for the first time from Little Andaman Island." (Author)] Address: Lahiri, A.R., Zoological Survey of India, Calcutta, India

**19768.** Mitra, T.R. (1999): Biology and ecology of dragonflies (Insecta: Odonata) with notes on their adaptations in different ecosystems of India. *Rec. zool. Surv. India* 97(2): 173-188. (in English) ["The paper reviews biology of dragonflies in general on the basis of current information available on the subject. In addition to the above it contains summaries of ecological records of different ecological areas Viz. Gangetic Plain, Eastern and Western Himalaya, Chhota Nagpur Plateau, Arid zones, Eastern and Western Ghats including valleys of southern India." (Author)] Address: Mitra, T.R., Zoological Survey of India, M-Block, New Alipore-700053, India

2000

**19769.** Dawson, M.J.; Hemmings, J. (2000): Sardinia 1999. *Bulletin of the Amateur Entomologists' Society* 59: 15-17. (in English) [Other insects seen: *Calopteryx splendens*, *C. virgo*, *C. haemorrhoidalis*, *Libellula fulva*, *Crocothemis erythraea*, *Sympetrum striolatum*] Address: Dawson, M.J., 66 Tivoli Crescent, Brighton BN1 5ND, UK.

2001

**19770.** Schmidtke, S. (2001): *Schriftenverzeichnis Ferdinand Karsch(-Haack)s (1853-1936)*. *Capri: Zeitschrift für schwule Geschichte* 31: 13-32. (in German) [Bibliography.] Address: not stated

**19771.** Hunger, H.; Buchwald, R. (2003): Naturschutzorientierte Untersuchungen zur Bestandssituation dreier europaweit geschützter Libellenarten auf Metapopulationsniveau unter Einsatz eines Geographischen Informationssystems (GIS). Programm Lebensgrundlage Umwelt und ihre Sicherung. Abschlussbericht. Förderkennzeichen BWC 20001: 26 pp. (in German) ["All available data on the occurrence of the dragonfly species *Coenagrion mercuriale*, *Leucorrhinia pectoralis* and *Ophiogomphus cecilia* in Baden-Württemberg were compiled and entered into the GIS and database. For *Coenagrion mercuriale*, a habitat model was created that allows the selection of areas with particularly favourable conditions for the species in the Upper Rhine Plain. From digital data on land use (ATKIS) and a slope model (from the digital elevation model DHM 50), cost surfaces were generated and, taking into account the dispersal behaviour and the quality of the individual occurrences (patches), species-specific dispersal models were created, from which information on the degree of connectivity or isolation between the patches and thus on the structure of the metapopulations was obtained. The model also incorporated findings from marking experiments and other field trials conducted with *C. mercuriale*. By combining the dispersal model and the habitat model, areas were identified where planning and implementation of maintenance and development measures are both particularly urgent and have above-average prospects of sustainable success. For *Leucorrhinia pectoralis*, a cartographic documentation of the most important occurrence areas with a total area of a good 85 ha was carried out. This provides the basis for future detection and quantification of negative changes in the habitats of the species. An aerial photo analysis showed that serious negative habitat changes for the species can be detected within five years due to succession processes. Maintenance measures are therefore urgent and a permanent task. The project provided the impetus to design further research projects, for which funding has already been approved. Among other things, these serve to close the very clear knowledge gaps on the current distribution situation and habitat requirements of *Ophiogomphus cecilia* in southwest Germany. The methods developed in the project will thus find further use. At the same time, they represent a promising approach for similar questions in related fields. A synoptic evaluation of the results of the project will lead to concrete proposals for action for nature conservation administration, which are particularly needed for the fulfilment of the reporting obligation prescribed in the Habitats Directive (Article 17)."] (Authors/Deepl)] Address: Hunger, H., Institut für Naturschutz und Landschaftsanalyse (INULA), Wilhelmstraße 8, 79098 Freiburg, Germany. E-mail: holger.hunger@inula.de

**19772.** Russell, D.B. (2004): Numerical and experimental investigations into the aerodynamics of dragonfly flight. Ph.D. thesis, Cornell Univ.: XV + 137 pp. (in English) ["Dragonflies are one of the most maneuverable of the insect flyers. They are capable of sustained gliding flight as well as hovering, and are able to change direction very rapidly. Exactly how they use their wings to generate aerodynamic forces remains unknown. A new method was developed for solving 2D incompressible viscous flow problems [46] in order to numerically model the uid response and forces generated by multiple flapping wings. This nite difference scheme uses the streamfunctionvorticity formulation on a regular grid, and handles multiple moving irregular boundaries. To test the usefulness of this model, dragonflies were

tethered to a vertical force sensor and lmed using high-speed digital video. This allowed the correlation of specific wing kinematics to the vertical force generated, so that when these kinematics are modeled numerically the forces calculated can be compared with experiment. The results include detailed descriptions of two distinct wing kinematic patterns, out of four observed. These kinematics resemble motions described by previous researchers in free flight conditions except for the phase between the fore and hind wings. The forces calculated from applying the numeric method to a 2D approximation of these movements compare well to measured forces. The differences seen can be attributed to 3D effects and to the simplified wing cross-section used in the model. We show that wing inertia is a large component of the instantaneous forces experienced by a dragonfly, and that the dragon y generates productive force during both the downstroke and the upstroke. The counterstroking behavior seen in free flight is shown to require less power than the in-phase motion observed in the tethered dragonfly, while producing the same average vertical force. We also show evidence suggesting that during hovering flight wing rotation is passively driven by fluid forces, while during forward flight rotation at the end of the downstroke is actively driven by the dragonfly. Finally, the effectiveness of applying such a 2D model to the problem is examined, and suggestions are made for future research to improve modeling ability.] Address: Russell, D., Theoretical and Applied Mechanics, Cornell Univ., Ithaca, New York 14853, USA

## 2005

**19773.** Camier, T. (2005): Gemeine Winterlibelle *Sympecma fusca* und Gebänderte Heidelibelle *Sympectrum pedemontinum* im Kreis Wesermarsch. Beitr. Naturk. Niedersachsens 58: 41-42. (in German) [Niedersachsen, Germany, *S. fusca*: 15.9.1995; *S. pedemontanum*, female, 22.8.2002] Address: Camier, T., Haasenstr. 7, 26919 Brake, Germany

**19774.** Mitra, T.R. (2005): Evolutionary adaptations in morphology and ecology of *Tholymis tillarga* (Fabricius) and *Bradinopyga geminata* (Rambur) (Insecta: Odonata). Records of the Zoological Survey of India 104(1-2): 101-104. (in English) ["Experimental observations: Five examples of *Brachythemis contaminata* (Fabricius) were fixed on a white wall in a well illuminated room in the right. By the side of these specimens one example of *Tholymis tillarga* (Fabricius) was also fixed. The House gecko (*Hemidactylus brookii*) moving on the wall attacked the specimens of *Brachythemis contaminata* but not the *Tholymis tillarga*, since the opalescent white spot was glowing. Two examples of *Tholymis tillarga* were fixed on the black board and then the board was fixed on the wall. The room was illuminated. The opalescent white spot was distinct, and the gecko, moving about did not devour the dragonflies. But when the light was made dim, the spot was not very distinctly glowing and the gecko then attacked the dragonflies. One specimen of *Bradinopyga geminata* was fixed on the dirty portion of the wall and the light of the room was made dim, the gecko could not see the specimen. The last two specimens of *Bradinopyga geminata* were fixed on the black board and the board was fixed on the white wall in a well illuminated room. The gecko moving on the wall, walked over the board but did not attack the odonata specimen probably due to marginer of the body colour of the odonata specimen with the black background." (Author)] Address: Mitra, T.R., Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053, India

**19775.** Palot, M.J.; Radhakrishnan, C.; Soniya, V.P. (2005): Odonata (Insecta) diversity of rice field habitat in Palakkad District, Kerala. Records of the Zoological Survey of India 104(31-2): 71-77. (in English) ["Altogether 21 species under 18 genera of 5 families were recorded during the study. Of these, 6 species are additions to the odonate fauna of the rice-field habitats of India. 5 species were seen throughout the study. Maximum species richness was seen during the harvesting stage. Diversity and richness of species observed in three different stages of the paddy-crop are summarized in Table 1." (Authors)] Address: Palot, M.J., Western Ghats Field Research Station, Zoological Survey of India, Calicut-673 002, India

**19776.** Yamauchi, T. (2005): The research of dragonfly in city park in the Tamagawa River region. Toyama Biological Society, Yoshihama: 17 pp. [ "This survey was conducted over a short period of two years, and with a limited number of people and limited time, so there is still a sense of a general lack of information. There is an undeniable feeling that there is still a general lack of information. There are many other urban parks in the Tama River basin, and many smaller water bodies suitable for dragonflies exist, such as ponds in private gardens. There are many other urban parks in the Tama River basin, as well as many smaller water bodies suitable for dragonflies, such as ponds in private gardens. It is difficult to cover all such water bodies in a survey, and the findings obtained in this study are therefore intended to be positioned as a sample only. The survey was conducted in the same way as the survey of the other water bodies. However, we were able to identify more species of dragonflies than expected during this survey. In particular, large, highly migratory species, such as the Maltese dragonfly, [...] These dragonflies are thought to be migrating from one generation to the next in a network of small riparian areas scattered in densely populated residential areas. The dragonflies are thought to be migrating from one place to another, repeating generations. The reason why there have been fewer records of the yellow damselfly and the red damselfly compared to the red damselfly is that these damselflies are not active during the daytime. The reason why there have been fewer records of the Japanese oak and the Japanese oak may be that these are dusk-flying species that are not active during the daytime, and that surveys in the morning and evening at dusk have not been sufficient. Further scrutiny reveals that these dragonflies are not active during the daytime. Further examination would have increased the number of sites where these dragonflies have been recorded. Thus, this survey revealed the existence of dragonflies that make good use of the environment created by humans. However, they are However, their populations are still small and they are surviving in small numbers, barely clinging to the few remaining water bodies. The park environment used by local residents tends to prioritise convenience, and even if a pond or other water feature is built, it may not be safe for children to enter, or it may be infested with bowflies. Even if a pond or other water feature is built, it is not always managed in a way that it is protected by a concrete revetment, the water depth is kept very shallow and the sediments in the pond are constantly cleaned out. Many parks have adopted a management approach whereby the ponds are concrete-walled, the depth of the water is very shallow and the sediments are constantly cleaned. In fact, some of the parks surveyed were such water bodies. However, such water bodies can be described as barren environments from a biological point of view, as there is no food chain in the water. Even if a highly fecund species were to fly in and spawn in these waters, they would

not be able to reproduce. Even if a highly fecund species flies in and lays eggs, the larvae and larvae are removed if they are unlucky when they hatch. Very fast-growing cormorant dragonflies (from hatching). It is difficult for any but the very fast-growing *C. ubiculatus* (hatching to fledging in about 40 days) to breed in these water bodies. However, even if these water bodies were to be covered with fallen leaves and soil on the bottom and planted with water-parasitic plants such as gingerbread along the shore, the number of dragonflies that fly in and breed in shallow water would increase dramatically. The number of dragonflies that fly and breed, even at shallow depths, is thought to increase dramatically. Although pseudo, this would bring the area closer to the aforementioned water bodies with a rich dragonfly fauna. Furthermore, a park with such a modified water body can be created. The more parks with such modified water areas are created, the more small and medium-sized dragonfly species, which previously had difficulty in migrating over long distances, will increase. If the local government develops the area with these points in mind, not only dragonflies but also a rich biota will be formed, and local children will be provided with a place where they can easily come into contact with nature close at hand. The local community will be nurtured and enriched." ] <http://www.tokyuenvironment.or.jp/wp/wp-content/uploads/2011/02/5804c671e3-23fac4a4df619507c19c691.pdf>.

## 2006

**19777.** Emiliyamma, K.G.; Radhakrishnan, C. (2006): 7. Odonata (insecta) of the union territory of Pondicherry, India. Records of the Zoological Survey of India, Volume 106 (Part I): 55-61. (in English) ["The present paper deals with 15 species and subspecies of Odonata recorded for the first time from the Union Territory of Pondicherry, India." (Authors)] Address: Emiliyamma, K.G., Western Ghats Field Research Station, Zoological Survey of India, Calicut-670 002, Kerala, India

**19778.** Marczak, Laurie B., John S. Richardson, and Marie-Claire Classen (2006): Life history phenology and sediment size association of the dragonfly *Cordulegaster dorsalis* (Odonata: Cordulegasteridae) in an ephemeral habitat in southwestern British Columbia. Canadian Field Naturalist 120(3): 347-350. (in English) ["The life cycle of *C. dorsalis* was studied over one year by systematic sampling of larvae in three intermittent headwater streams in southwestern British Columbia, Canada. We determined that larvae normally take three years to reach maturity, emerging throughout July and August. There is limited evidence suggesting a split cohort development, with early emergence after two years. Additionally, we tested whether larval instars were distributed randomly or if they occupied different sediment microhabitats. Smaller animals tend to be associated with smaller grained organic sediments, although there was high variation between the streams." (Authors)] Address: Marczak, Laurie, Dept of Forest Sciences, Univ. of British Columbia, 3041-2424 Main Mall, Vancouver, British Columbia V6T 1Z4, Canada. Email: [laurie@interchange.ubc.ca](mailto:laurie@interchange.ubc.ca)

## 2007

**19779.** Heitkamp, U. (2007): Zur Fauna und Flora und zum naturschutzfachlichen Wert des „Erdpfuhls“, einer Doline im Gipskarst des Ravensberges bei Lüthorst (Landkreis Norderheide, Süd-Niedersachsen). Naturkundliche Berichte Fauna Flora Süd-Niedersachsen 12: 76-117. (in German) [21



odonate species recorded in the Erdpfuhl correspond to approx. 31 % of the dragonfly species recorded so far in Lower Saxony. Of the species found, 14 (= 66.7 %) have been proven to reproduce in the habitat. The most frequent zygopteran species were *Coenagrion puella*, followed by *Ischnura elegans*, among the anisopteran *Orthetrum cancellatum* and *Sympetrum vulgatum*.] Address: Heitkamp, U. Bergstr. 17, 37130 Gleichen-Diemarden, Germany

**19780.** Mikat, M. (2007): [Contribution to the ecology and ethology of Lestidae (Odonata, Lestidae)]. Støedoškolská odborná èinnost 2006/2007 obor 04 – Biologie: 63 pp. (in Czech) ["Conclusion: This paper summarizes the results of the study of populations using the mark-recapture method from 2006. The thesis deals mainly with the species *L. sponsa*, *L. virens*, *L. barbarus* and *S. fusca*. 2269 darters were tagged and 1154 recaptures were made. Approximately half of the tagged and recaptured individuals belonged to *L. sponsa*. The current abundance of individuals at the wetland was calculated using the Lincoln-Petersen index. This abundance has evolved over the study period. It is significantly (si 3-6 times) lower than the total population size Population size was calculated using the Schnabel index and in the Mark Program. The presence of the majority of females outside the wetland is likely to have the greatest influence on the skewed sex ratio at the wetland The probability of capturing individuals of all species was strongly dependent on time and the sex of the individual The observed population size is 4000 individuals for *L. sponsa*, around 700 individuals for *L. virens*, 500 individuals for *L. barbarus* and 400 individuals for *S. fusca*. Species of *Lestes* hornwort prefer generally dry wetlands. This preference is least pronounced in *L. sponsa*. *S. fusca* has been observed more in flooded wetlands. In *L. barbarus*, a preference for less overgrown sites was observed. Most of the recaptured individuals were caught at the marking site Some individuals, on the other hand, covered distances longer than 400 m. The most frequently migrating species was *S. fusca*, while the lowest proportion of migrations was found for *L. barbarus*. In the species *L. virens* and *L. sponsa*, females migrated more than males." (Author/DeepL)] Address: Mikát, M., Biskupské gymnázium Bohuslava Balbína, Sexta A, Orlické nábøží 356 / 1, 500 03 Hradec Králové 3, Czech Republic

**19781.** Ökologische Bildungsstätte Oberfranken (2007): Mögliche Auswirkungen des Klimawandels auf Moorbellen in Nordwestoberfranken (Wiederholungskartierung). Unveröffentlichtes Gutachten im Auftrag des Bundes Naturschutz, Nürnberg: 58 pp, maps. (in German) ["Extensive inventories of dragonfly species have been available from Northwest Upper Franconia since the end of the 1970s. In recent years, there have been increasing indications from various parts of the study area that the dragonfly species typical of north-western Upper Franconia in boggy waters and bogs (*Coenagrion hastulatum*, *Aeshna juncea*, *Somatochlora arctica*, *Leucorrhinia dubia*, *L. pectoralis*, *L. rubicunda*) have suffered severe population losses. The reasons for the population decline of the damselfly could also be climate change: Many studies already show that in recent years, due to the often unusually warm and dry weather, more Mediterranean dragonfly species have migrated to Germany and spread. Bog dragonflies, on the other hand, which have a boreal or Euro-Siberian distribution area, prefer a cooler climate and are therefore in principle threatened by climate change. The aim was to monitor the former and current occurrences of bog dragonfly species in northwest Upper Franconia, to check the condition of the habitats, to develop concrete protection measures for

the occurrences and to check whether a possible influence of climate change on bog dragonfly species is already detectable. The dragonfly population surveys of the Working Group Ecology Coburg of the German Nature Conservation Association, which started in the late 1970s, as well as numerous other dragonfly mappings in the Coburg, Kronach and Lichtenfels area, were evaluated in 2006 with regard to the occurrence of the bog dragonfly species *Aeshna juncea*, *Somatochlora arctica*, *Leucorrhinia dubia*, *L. pectoralis*, *L. rubicunda*. All current and former occurrences of these species as well as other peatland waters that appeared suitable (a total of 41 sample sites) were visited at least three times during the main flight period of the respective species in order to record imagines. The data from the new mapping of damselflies and their habitats were compared with the old data in order to identify population changes or range shifts. In 2006, 33 dragonfly species were recorded in the sample areas, including 13 Red List species. In total, at least one of the above-mentioned dragonfly species was found at 19 of the 41 sample sites investigated. The peat mosaic dragonfly was detected at 9 sites. Compared to the data from the period 1981 - 2003, the species has lost about 60 % of its sites. The sites where the species is found at altitudes up to 400 m above sea level are particularly affected by the decline. The Spear-throated damselfly was found in 16 sample plots in 2006. In comparison with the data from the period 1981 - 2003, a decline in the number of sites by approx. 50 % can be observed. The sites at altitudes of up to 350 m above sea level are particularly affected by the decline. There were 11 records of the damselfly. Half of the occurrences found since 1981 could no longer be confirmed. However, the loss of range was independent of altitude. The species could no longer be found at the 6 known sites of the Large Moss Damselfly, but one new record was found. The Northern damselfly was no longer found at the 5 known sites. The Arctic Emerald Damselfly was found away from one water body. *Crocothemis erythraea* was found for the first time at three ponds. At two typical peat ponds the damselfly was associated with the damselfly! At least for the Peat damselfly and Spear-spotted damselfly, there seems to be a connection with climate change, as the occurrences at climatically favoured altitudes below 400 m and 350 m a.s.l., respectively, were preferably no longer occupied. In the case of the other damselfly species, there is a strong suspicion that climate change plays a role in the sharp decline in occurrence. Concrete conservation measures were then proposed for the occurrences of the damselfly in order to stabilise the population and - if possible - also to enable dispersal or reintroduction." (Author/DeepL) [https://www.oekologische-bildungsstaette.de/medien/pdf/Moorlibellen\\_2007.pdf](https://www.oekologische-bildungsstaette.de/medien/pdf/Moorlibellen_2007.pdf)] Address: Ökologische Bildungsstätte Oberfranken, Beyer, S., Unteres Schloß, 96268 Mitwitz, Germany. Email: stefan.beyer@oekologische-bildungsstaette.de

**19782.** Sindaco, R. (2007): Le libellule del Piemonte occidentale tra i fiumi Po e Dora Riparia (Insecta: Odonata). In: Delmastro G.B., Gaggino A., Giachino P.M., Morisi A., Rastelli M. (eds). (2007): Ricerche sugli ambienti acquatici del Po Cuneese - Interreg IIIA "Aqua". Memorie dell'Associazione Naturalistica Piemontese 8: 65-74. (in Italian, with English summary) ["The dragonflies of the western Piedmont between the Po and the Dora Riparia rivers. The status of the knowledges on the Odonata of the northern Cottian Alps and the adjacent plain is presented. In the study area 52 species (36 species of dragonflies and 16 of damselflies) were found; this number represents more than the 80% of species known for the whole Piedmont administrative region. The past occurrence of 6 species (4 Zygoptera and

2Anisoptera) was not confirmed in recent years. The conservation of many localized species depends on the conservation of the main sites and the creation of new biotopes in highly anthropized areas." (Authors)] Address: Istituto per le Piante da Legno e l'Ambiente, corso Casale 476, I-10132 Torino. E-mail: sindaco@ipla.org

## 2008

**19783.** Blanckenhagen, B. von (2008): Nachuntersuchung 2008 zur Verbreitung der Großen Moosjungfer (*Leucorrhinia pectoralis*) in Hessen (Art der Anhänge II und IV der FFH-Richtlinie). Unveröffentlichtes Gutachten im Auftrag von Hessen-Forst FENA, AVENA: 31 pp. + Anhang- (in German) [As a species listed in Annexes II and IV of the Habitats Directive (92/43/EEC), *Leucorrhinia pectoralis* is of particular conservation and political interest. Thus, the state of Hessen (Germany) is also obliged to designate special protection areas for the dragonfly species and to monitor and document the status of the Hessian populations. The present species support concept provides an overview of the current population situation of *L. pectoralis* in Hessen as well as in the natural areas and districts of Hessen. The description of the ecology is followed by an explanation of general threats and the resulting general measures for the protection of the species. Within the framework of the report, surveys of the distribution of *L. pectoralis* were carried out in three regions in central and northern Hesse by means of field surveys. For the three occurrences - in the Burgwald, on the Lahnberge near Marburg and in the Reinhardswald - area-specific measures were finally proposed to improve the conservation status of the populations and to safeguard the population. Based on the studied water bodies and other suitable water bodies in the study areas, a regional network concept was developed to maintain as much habitat as possible for *L. pectoralis* and to enable the colonisation of new water bodies. In addition, the possibilities and limits of a supra-regional habitat network are presented and the importance of "stepping stone biotopes" is discussed. For the southern Hessian occurrences, some of which are located in FFH areas, the respective FFH baseline data collections were evaluated with regard to proposed measures for the conservation and development of *L. pectoralis*. Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: von Blanckenhagen, B., Kaffweg 8, 35039 Marburg, Germany. E-mail: benno.v.blanckenhagen@web.de

**19784.** Bui Huu Manh (2008): [Photographic checklist of damselflies and dragonflies of Phu Quoc] (Vietnamese). <http://wildlifeatrisk.org/upload/download/books.P10.%20PQ-Dragonfly-book.pdf>. (in Vietnamese) [<http://wildlifeatrisk.org/upload/download/books.P10.%20PQ-Dragonfly-book.pdf>]

**19785.** Franck, D. (2008): Eine Wissenschaft im Aufbruch. Chronik der Ethnologischen Gesellschaft 1949 - 2000. Verlag Niel & More: [Christiane Buchholtz (1926-), a leading researcher in the 1950-1970th of ethology of especially *Caopterygidae*, is introduced on pages 72-74. Buchholtz, C.; Sippel-Forck, M., Auf der Hofstatt 12, 35112 Fronhausen, Oberwalgern, Germany

**19786.** Schiel, F.-J. (2008): Die Libellenfauna der Kiesgrube Reiselfingen. Veränderungen zwischen 1993 und 2007. *Mercuriale* 8: 37-44. (in German) ["Species spectrum and population changes of the dragonfly fauna of the Reiselfingen gravel pit (MTB 8116) are presented for the period between 1993 and 2007. The Reiselfingen gravel pit, which

is operated on a large scale by dry mining, is located in the west of the Baar nature reserve at 730 m above sea level, on the northern edge of the Wutach gorge. Over a 15-year period of observation, the number of dragonfly species increased from 18 in 1993 to 30 in 2005-2007; the number of certain to probably native dragonfly species increased from 14 to 19 during this period. The increase in species numbers is attributed to a combination of three factors: (1) a very slow, successive saturation of the species range due to a low number of stillwaters in the surrounding area, (2) a spread of heat-loving species due to climate warming, and (3) the successive increase in the range of waters after 1993 due to the creation and maturation of conservation waters. The number of species records continued to rise between 2002 and 2007. At the same time, however, the continuities and population sizes of several marsh species in particular declined again significantly; this is attributed to the increasing shading of shallow riparian and alternating water zones as a result of woody growth." (Authors) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Schiel, F.-J., Inst. Naturschutz und Landschaftsanalyse, Turenweg 9, D-77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

## 2009

**19787.** Babu, R.; Sinha, C.; Prasad, M. (2009): New records of Odonata (Anisoptera) from Maharashtra. *Rec. zool. Surv. India* 108(4): 113-117. (in English) [Records of five odonate species are documented: *Anormogomphus heteropterus* Selys 1854, *Orthetrum testaceum* (Burmeister 1839), *Onychogomphus grammicus* (Rambur 1842), *Indothemis limbata* (Selys, 1891), and *Orthetrum japonicum internum* McLachlan, 1894.] Address: Prasad, M., Sajjan Apartments, 811A, Uma Kanta Sen Lane, Paikpara, Kolkata-700 030, India

**19788.** Behrens, M.; Fartmann, T.; Hölzel, N. (Red.) (2009): Auswirkungen von Klimaänderungen auf die Biologische Vielfalt: Pilotstudie zu den voraussichtlichen Auswirkungen des Klimawandels auf ausgewählte Tier- und Pflanzenarten in Nordrhein-Westfalen Teil 2: zweiter Schritt der Empfindlichkeitsanalyse – Wirkprognose. Auftragnehmer: Institut für Landschaftsökologie (ILÖK), Westfälische Wilhelms-Universität; Auftraggeber: Ministerium für Umwelt und Naturschutz, Landwirtschaft und Verbraucherschutz des Landes Nordrhein-Westfalen (MUNLV NRW). Münster und Düsseldorf: 364 pp. (in German) [In Chapter "2.2 Libellen" (pages: 49-71) Norbert Menke, Klaus-Jürgen Conze and Matthias Olthoff are treating the following odonate species which are considered sensitive to climate change: *Aeshna juncea*, *A. subarctica elisabethae*, *Coenagrion hastulatum*, *C. lunulatum*, *Cordulegaster bidentata*, *Lestes dryas*, *Leucorrhinia dubia*, *L. rubicunda*, *Nehalennia speciosa*, *Somatochlora arctica*, and *S. flavomaculata*.] Address: Conze, K.-J., Hamburger Straße 92, 45145 Essen, Germany. E-mail: [kjc@loekplan.de](mailto:kjc@loekplan.de)

**19789.** Bradley, T.J.; Briscoe, A.D.; Brady, S.G.; Contreras, H.L.; Danforth, B.N.; Dudley, R.; Grimaldi, D.; Harrison, J.F.; Kaiser, J.A.; Merlin, C.; Reppert, S.M.; VandenBrooksk, J.M.; Yanoviak, S.P. (2009): Episodes in insect evolution. *Integrative and Comparative Biology* 49(5): 590-606. (in English) ["Synopsis: This article derives from a society-wide symposium organized by Timothy Bradley and Adriana Briscoe and presented at the 2009 annual meeting of the Society for Integrative and Comparative Biology in Boston, Massachusetts. David Grimaldi provided the opening

presentation in which he outlined the major evolutionary events in the formation and subsequent diversification of the insect clade. This presentation was followed by speakers who detailed the evolutionary history of specific physiological and/or behavioral traits that have caused insects to be both ecologically successful and fascinating as subjects for biological study. These include a review of the evolutionary history of the insects, the origins of flight, osmoregulation, the evolution of tracheal systems, the evolution of color vision, circadian clocks, and the evolution of eusociality. These topics, as covered by the speakers, provide an overview of the pattern and timing of evolutionary diversification and specialization in the group of animals we know as insects." (Authors) The paper includes references to Odonata.] Address: Bradley, T.J., Dept of Ecology & Evolutionary Biology, Univ. of California Irvine, Irvine, CA 92697-2525, USA. E-mail: tbradley@uci.edu

**19790.** Cano-Villegas (2009): Expansión de *Trithemis kirbyi* Sélys, 1891 (Odonata: Libellulidae) en la provincia de Málaga (sur de la Península Ibérica). Boletín de la Sociedad Entomológica Aragonesa 44: 589-572. (in Spanish, with English summary) ["*T. kirbyi* is recorded, for the first time, from Ciudad Real (first record from Castilla La Mancha) and Huelva (Andalusia). The presence in the province of Badajoz (Extremadura) is also confirmed. The increment of its distribution range to inland and the Atlantic coast is shown with this new data." (Authors)] Address: Cano-Villegas, F.-J., C/ Montemayor, 4 1º-2; 14003 –Córdoba, Spain. Email: fjcanovi2@hotmail.com

**19791.** Koch, B.; Wildermuth, H.; Walter, T. (2009): Einfluss der Habitateigenschaften auf das Verbreitungsmuster von *Coenagrion mercuriale* an einem renaturierten Fließgewässer im Schweizer Mittelland (Odonata: Coenagrionidae). Libellula 28(3/4): 139-158. (in German, with English summary) ["Distribution pattern of *C. mercuriale* and habitat characteristics on a revitalized stream in the Swiss Midlands — Only few and isolated populations of the Southern Damselfly exist in Switzerland and the species is considered as critically endangered. The recent discovery of a hitherto unknown population of *C. mercuriale* on a revitalized stream in the Canton of Zurich caused a study to be made on the size and the distribution pattern of the population along a heterogeneously structured 2.15 km-stretch. In summer 2007, the abundance of *C. mercuriale* was recorded at 215 sections and data on physical parameters were collected. The results of statistical analyses showed that the distribution pattern of *C. mercuriale* was significantly affected by the width of the watercourse, depth of the water, cover of the water vegetation, cover and width of the riparian vegetation and cover by trees higher than three metres. The composition of the riparian vegetation that could be classified into six different groups using a cluster analysis also exhibited an effect on the distribution. *C. mercuriale* preferred sites with relatively wide and deep water, luxuriant aquatic vegetation, wide intermittent but jaggy riparian vegetation and little cover by trees shading the water surface. Riparian vegetation that was mainly composed of *Carex* spp., *Lythrum salicaria* or *Phalaris arundinacea* was most densely colonized by *C. mercuriale*. In contrast, sections overgrown predominantly by *Filipendula ulmaria* and *Epilobium hirsutum* were generally avoided. Additionally, data on the local dragonfly fauna were collected and 14 streams in the neighbourhood of the study site were examined for their suitability for colonization by *C. mercuriale*. In total 21 Odonata species were recorded. Maintenance of the habitat by patchy clearance of dense riparian vegetation, aiming at the promotion of the

local population, was conducted in the frame of a conservation programme in late 2007 and early 2008. Censuses carried out during the flying season 2008 showed that the measures adopted had a positive effect on *C. mercuriale*." (Authors)] Address: Koch, Bärbel, Via Grütti 21, 6855 Stabio, Switzerland. E-mail: baerbel.koch@hotmail.com

**19792.** Lockwood, M. (2009): Els odonats del PP.NN de l'Alt Pirineu 2009. Parc Natural de l'Alt Pirineu. Generalitat de Catalunya, Departament de Medi Ambient i Habitatge. Oxygastra, Grup d'estudi deis odonats de Catalunya: 40 pp. (in Catalan, with English summary) ["In 2009, the odontological surveys were repeated in the PP.NN of the Alt Pirineu, which had started in 2007 and continued in 2008. In 2008 it became clear that the set of ponds in the Baciver area Pudo-Garrabea has a high specific wealth of odonts; in 2009 it was possible to verify that this area really is exceptional within the framework of the central Pyrenees, since surveys in the central and eastern sectors of the PP.NN of the Alt Pyrenees at the headwaters of the rivers Noguera de Cardós and Noguera de Vallferrera have revealed that these last sectors harbor a very impoverished odontofauna. In the lakes of Guerosso and Flamicella no odonate was observed, while in Guiló, Romedo, Mariola and Montarenyó only detect *Aeshna juncea*, the only species that seems to be well distributed throughout the high area of the park. The explanation of this phenomenon is neither simple nor entirely clear. Obviously, the western sector of the natural park has a series of habitats very suitable for odonates – a profusion of small ponds with good growth of macrophytes and vertical vegetation (which the adults use as watchtowers and through which the larvae climb when metamorphosing). On the other hand, in the Aiguamoll de Guiló, as an example, there is only one pond/wetland, which is very enclosed between the mountains that surround it, while in the ponds of Romedo or Mariola there are few macrophytes and a general absence of the vertical vegetation. The grazing load seems to be greater outside the western sector: in Baciver there are flat meadows where cows and horses can freely roam, while in places like Guiló the cattle tend to congregate around the only pond there has And when the waters of the pond are not very deep, the animals can enter to graze the vegetation, muddying the water and trampling the vertical stems that many odonate species need. But we also think it is significant that the Baciver sector is very close to the Aran Valley, an excellent natural corridor through which Eurosiberian species such as *Leucorrhinia dubia* will have passed to colonize the nearest natural park areas ; the rest of the park, on the other hand, is much more isolated from this entrance route and on the south face of the great barrier of the axial Pyrenees. Possibly, however, *L. dubia* is on the way to expansion or regression, since there are no studies that confirm or deny if this taxon was present in the natural park previously or if in the past there were more diverse odonate communities in the central sectors and oriental However, during fieldwork in 2009, it was possible to establish what could be an oviposition site of *Cordulegaster bidentata* near Burg, and the presence of a total of 29 species in the natural park has been confirmed. However, it has not been possible to find *Leucorrhinia pectoralis*, cited once in 1992, and it is given as extinct in Catalonia. In addition, the counts of the Odonats Bioindicadors project were carried out in the Noguera de Cardós river, and it is expected to continue with these counts in the coming years." (Author/Google Translate)] Address: Lockwood, M., Grupo Oxygastra, Institució Catalana d'Història Natural, Carrer del Carme, 47; 08001 Barcelona, Spain. E-mail: mike@walkingcatalonia.net

**19793.** Maibach, A. (2009): Gestion intégrée des éléments naturels et de la biodiversité en forêt secondaire (forêts de la région de Suchy, canton de Vaud, Suisse). III. Suivi de la colonisation par les libellules (Insecta, Odonata) d'un bassin aménagé de crues aménagées de manière naturelle. Bulletin de la Société Vaudoise des Sciences Naturelle 91(3): 217-233. (in French, with English summary) ["This pond was dug at the beginning of 1992 near the village of Suchy, with the aim of buffering the flow of water coming from the surrounding forested area. The development of dragonfly populations was followed over 5 years (1993-1997) from the second season following the digging of the pond. Our study shows a very rapid development of populations with 27 species present at the end of the survey (the sixth season after digging). However, the proportion of the autochthonous species (those with complete development in the site) develops more slowly, from 43% during the second year post-creation until 81% during the sixth year. Colonisation follows in the classic manner with the quick appearance of pioneers (generalist species) and the progressive arrival of specialists, whose proportion reaches 45% at the end of the survey. Colonisation of the Suchy pond appears to be relatively quick in comparison to other ponds in the vicinity. Favourable factors for this colonisation and for the resulting biodiversity, particularly in terms their contribution to safeguarding rare or threatened species, are analysed and discussed." (Author)] Address: Maibach, A., Bureau d'études en environnement A. Maibach Sàrl, La Poya 10, CP 99, 1610 Oron-la-Ville, Switzerland. Email: alain.maibach@amaibach.ch

**19794.** Nandy, S.; Babu, R. (2009): On a collection of dragonflies (Odonata: Anisoptera) from Andaman and Nicobar islands. Rec. zool. Surv. India 109(4): 35-51. (in English) ["The paper deals with some collection of 15 species of Anisoptera from Andaman and Nicobar Islands. In this present study, *Neurothemis intermedia atlanta* Ris and *Tamea basilaris burmeisteri* Kirby have been recorded for the first time from Andaman & Nicobar Islands (South Andaman), Also *Orthetrum pruinatum neglectum* (Rambur) is recorded newly from Andaman Islands (North and South Andaman) and *Trithemis aurora* (Burmeister) is recorded newly from Nicobar Islands. Distributions of *Potamarcha congener* (Rambur) from North Andaman, four species [*Crocothemis servilia servilia* (Drury), *Diplacodes trivialis* (Rambur), *Lathrecista asiatica asiatica* (Fabricius) and *Orthetrum sabina sabina* (Drury)] from Middle Andaman and four species [*Diplacodes trivialis* (Rambur), *Orthetrum sabina sabina* (Drury), *Neurothemis fulvia* (Drury) and *Tholymis tillarga* (Fabricius)] from Little Andaman are newly recorded. A consolidated list of 44 species of Anisoptera, so far recorded from these Islands is provided along with distribution within Andaman & Nicobar Islands." (Authors)

**19795.** "The history of odonatological exploration of the archipelago is reviewed and the 44 known Anisoptera species are listed with reference to the islands where they occur (North Andaman, Middle Andaman, South Andaman, Little Andaman, Nicobar). *Neurothemis intermedia atlanta* and *Tamea basilaris burmeisteri* are new for the archipelago. *Orthetrum pruinatum neglectum* was known from Nicobar but it is new for N & S Andaman, whereas *Trithemis aurora* was known from all Andaman isls and it is for the first time recorded from Nicobar." (OA)] Address: Nandy, S., Zool. Surv. India, M-Block, New Alipore, Kolkata-700053, India

**19796.** Padilla, D.P.; Gonzalez-Castro, A.; Nieves, C.; Nogales, M. (2009): Trophic ecology of the Southern Grey

Shrike (*Lanius meridionalis*) in insular environments: the influence of altitude and seasonality. Journal of Ornithology 150: 557-568. (in English) ["The seasonal diet and prey selection of the Southern Grey Shrike (*Lanius meridionalis*) was studied in two different insular habitats: shrub environments of the Canary Islands in coastal and high mountain zones. We measured, in each season, food availability and prey size in order to determine prey size selection of shrikes along an altitudinal gradient. Moreover, we compared the diet patterns observed with those documented on the continent, to determine if Southern Grey Shrikes in the islands' high mountain zone (which has a continental climate) showed seasonal diet variation similar to those in northern continental areas. We analysed a total of 1,139 shrike pellets collected in 1 year and identified 10,179 prey items. Numerically arthropods (91%), and in terms of biomass lizards (70%) were the main prey consumed by the shrikes. The proportions of the main prey items differed significantly between seasons and habitats. Diet in the coastal areas was less variable than in the high mountain zone. The greater seasonal climatic variation in the high mountain zone was associated with diet patterns similar to those found in some northern continental areas, such as the Iberian Peninsula and southern France. Finally, shrikes selected the largest prey in the high mountain habitat. This suggests that foraging behaviour in this species is related to climatic conditions, as the biggest and most profitable prey were consumed in the most harsh habitats." (Authors) The diet includes "Odonata".] Address: Padilla, D.P., Island Ecology and Evolution Research Group (IPNA-CSIC), Avda. Astrofísico Francisco Sañchez 3, 38206 La Laguna, Tenerife, Canary Islands, Spain. E-mail: dpadilla@ipna.csic.es

**19797.** Rytuba, J.J.; Hothem, R.L.; May, J.T.; Kim, C.S.; Lawler, D.; Goldstein, D. (2009): Environmental impact of the Contact and Sonoma mercury mines on water, sediment, and biota in Anna Belcher and Little Sulphur Creek watersheds, Sonoma County, California. U.S. Geological Survey Open-File Report 2008-1381 [http://pubs.usgs.gov/of/2008/1381/]: 76 pp. (in English) ["Conclusions: Calcines and waste rock eroded from the Contact and Sonoma mines have contributed Hg-enriched sediment to Anna Belcher and Little Sulphur Creeks. A significant amount of calcines still remains at the Contact Mine, and natural cementation of calcines by magnesite only partially mitigates erosion of the calcines. The calcines have very high Mg concentration, 14-15 % because of the magnesite cement, but relatively low Hg concentrations, 3.7 to 65 ppm, (one sample with 200 ppm Hg exceeded the range). Mercury concentration in the calcines increases with decreasing grain size, resulting in about 350% higher Hg concentration in the finest grain-size fraction (<20 μm) as compared to the largest grain-size fraction (2,830 μm). Unusually high concentrations of tellurium, up to 2.8 ppm, are present in the calcines. The Sonoma Mine calcines are not cemented, but are covered by vegetation that serves to limit erosion and the release of Hg-enriched sediment. The Hg concentrations in the Sonoma Mine calcines are relatively low (14.8-91.4 ppm). Mercury concentration increases with decreasing grain size, but the highest Hg concentration occurs in the coarsest grain-size fraction, indicating that HgS remains encapsulated in the larger fragments. Calcines from both mines have elevated concentrations of Co, Cr, and Ni that reflect the serpentinite host rock. Concentrations of Hg T and MMeHg in waters sampled at and downstream from the Contact and Sonoma mine areas are dependent on flow conditions. Highest concentrations occur under high-flow conditions (104-13,900 ng/L for Hg T, and 0.046-17 ng/L for



unfiltered MMeHg). The highest concentrations of Hg T and MMeHg occurred in waters in a side tributary to Anna Belcher Creek that receives runoff from the Sonoma mine area. Below the mine area, Hg T concentrations in water samples from Anna Belcher and Little Sulphur Creeks were relatively low, meet the 50 ng/L USEPA criterion (USEPA, 1999), and are near or below the water-quality objective of 12 ng/L. The highest concentration of MMeHg occurs in pond water samples from above the Sonoma Mine workings. MMeHg concentration in samples from Anna Belcher and Little Sulphur Creek is relatively low. Methylation of mercury is highest in the pond, as indicated by the MMeHg in sediment, and relatively low in the lower reach of Anna Belcher Creek. Anna Belcher Creek flows through the north side of the Contact Mine calcine pile and, during storm events, Hg-enriched sediment is released into the creek. This release of Hg-enriched sediment results in variable but always-elevated concentrations of Hg (4.7 to >100 ppm) in the bed-load sediment downstream from the mine area. Hg-enriched sediment from Anna Belcher Creek increases the Hg concentration of sediment in Little Sulphur Creek for at least 2 km downstream from the confluence. The highest concentration of MMeHg in the invertebrate samples was in water boatmen (Corixidae) samples from the Sonoma Mine pond. The MMeHg concentration was 16 times higher than mean values found in a comparable taxon, water striders (Gerridae), from a reference site. The data for biota from the Sonoma pond are consistent with the high percentage of MMeHg found in the pond sediment, which indicates a high level of MMeHg production in the pond environment. In Anna Belcher Creek downstream from the mine area, MMeHg concentrations in dragonfly larvae (Aeshnidae, Libellulidae, and Cordulegastridae) samples were much higher than those in Aeshnidae samples from the reference site. The highest value recorded for the Cordulegastridae samples from the creek at the Twin Falls site was 13 times higher than the reference value. No statistical difference was noted between rainbow trout samples from the two Anna Belcher sites, but the concentrations from both sites were statistically higher than those in brown trout from a reference site. The biota data indicate that the Hg-enriched sediment released from the Contact and Sonoma mines and then methylated in both pond and stream environments is bioaccumulated in both invertebrates and fish." Address: Rytuba, J.J., U.S. Geol. Survey, Menlo Park, California, USA

## 2010

**19798.** Herrera Grao, T.; Gavira Romero, O.; Blanco Garrido, F. (2010): *Habitantes del agua, Odonatos*. Ed.: Agencia Andaluza del Agua. Consejería de Medio Ambiente. Junta de Andalucía. 2009: 271 pp. (in Spanish) [Andalucía, Spain; Chapter 1. Introduction 13 Chapter 2. How to use this guide 17 Chapter 3. Aquatic habitat typologies of Andalusia 25 Chapter 4. Taxonomy and systematics of odonates 57 Chapter 5. Morphology 71 Chapter 6. Biology 79 Chapter 7. Dragonflies and humans: myths, legends and facts 97 Odonates as indicators in Andalusian aquatic environments 105 Chapter 9. Chapter 9. Odonates in figures 109 Chapter 10. Species descriptions 113 Appendices 245 Glossary of terms 247 Index of species 251 Bibliography and recommended websites 255 Image credits.] Address: not stated

## 2011

**19799.** Dévai, G. (2011): Data on the dragonfly (Odonata) fauna collected by the staff of the Hungarian Natural History Museum in course of the Hortobágy National Park research

programme. *Studia odonatol. hung.* 12: 47-54. (in Hungarian, with English summary) ["This is the 17th paper of a series directed at communicating faunistical data of Hungary which had been unpublished until December 31, 1987 (cf. DÉVAI et al. 1993). The author presents faunistical data from 16 localities in 12 10×10 km UTM grid map cells (DT 85, 95, 97, 98; ET 07, 08, 09, 16, 17, 18, 26, 27) in the Hortobágy National Park and adjoining nature conservation areas. The total investigated area belongs to three geographical microregions (Hortobágy, Borsodiártér, Tiszafüred–Kunhegyesi-sík) of the plain Tiszai-Alföld. Collections were made between 1974–1976, with the participation of 14 specialists and one unidentified person in 3 years and 27 days. In the report information on 129 adults (52 males and 77 females) is given in detail, representing 61 faunistical data. In this study 23 species (11 Zygoptera and 12 Anisoptera) were found to occur in the area, out of which 1 belongs to the very frequent, 16 to the frequent, 5 to the less frequent and 1 to the rare class of country-wide occurrence frequency." (Authors)] Address: Dévai, G.Y., Dept of Hydrobiology, Faculty of Science and Technology, Univ. of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary

**19800.** Dijkstra, K.-D.B.; Boudot, J.-P.; Clausnitzer, V.; Kipping, J.; Kisakye, J.J.; Ogbogu, S.S.; Samraoui, B.; Samways, M.J.; Schütte, K.; Simaika, J.P.; Suhling, F.; Tchiboza, S.L. (2011): *Dragonflies and damselflies of Africa (Odonata): history, diversity, distribution, and conservation*. In: William Darwall, Kevin Smith, David Allen, Robert Holland, Ian Harrison and Emma Brooks (eds.): *The Diversity of life in African Freshwaters: Underwater, under threat. An analysis of the status and distribution of freshwater species throughout mainland Africa: 126-177,-325-330.* (in English) [[https://www.researchgate.net/publication/255969418\\_Dragonflies\\_and\\_damselflies\\_of\\_Africa\\_Odonata\\_history\\_diversity\\_distribution\\_and\\_conservation\\_Chap\\_5\\_pp\\_126-177\\_In\\_WRT\\_Darwall\\_KG\\_Smith\\_DJ\\_Allen\\_RA\\_Ho\\_lland\\_IJ\\_Harrison\\_EGE\\_Brooks\\_eds\\_The\\_Diversity\\_of\\_](https://www.researchgate.net/publication/255969418_Dragonflies_and_damselflies_of_Africa_Odonata_history_diversity_distribution_and_conservation_Chap_5_pp_126-177_In_WRT_Darwall_KG_Smith_DJ_Allen_RA_Ho_lland_IJ_Harrison_EGE_Brooks_eds_The_Diversity_of_)] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: [dijkstra@nrm.nl](mailto:dijkstra@nrm.nl)

**19801.** Donath, H. (2011): *Zur Wiederbesiedelung der Schrake-Dobra nach der Renaturierung am Beispiel der Libellen*. *Biologische Studien, Luckau* 40: 43-52. (in German) ["During lignite mining, the lowland streams Schrake and Dobra had been converted into a channel discoloured rusty brown with iron hydroxide sludge. In addition to the aesthetic impairment, biodiversity was also considerably restricted as a result. Four-year studies of the dragonfly fauna after completion of the renaturation measures show that the species diversity has increased significantly. Even Red List species such as *Orthetrum coerulescens*, which is highly endangered in Brandenburg and in Germany as a whole, have successfully settled. If it is possible to maintain a differentiation of sections with riparian woods as well as open areas - although in need of maintenance - for the further development of the watercourse, a species-rich dragonfly fauna would also be secured in the long term." (Author/DeepL)] Address: Donath, H., Caule Nr. 1, D-15926 Zieckau, Germany

**19802.** Verdú, J.R.; Numa, C.; Galante, E. (Eds) (2011): *Atlas y Libro Rojo de los Invertebrados amenazados de España (Especies Vulnerables)*. Dirección General de Medio Natural y Política Forestal, Ministerio de Medio Ambiente, Medio rural y Marino, Madrid: 1318 pp. (in Spanish) [The following odonate species are treated in detail: *Aeshna*

juncea, Coenagrion caerulescens, C. mercurial, C. scitulum, Cordulegaster bidentate, Gomphus simillimus simillimus, Gomphus vulgatissimus, Onychogomphus costae, Lestes macrostigma, Orthetrum nitidinerve, Sympetrum flavolum, Zygonyx torridus. [https://www.miteco.gob.es/es/biodiversidad/temas/inventarios-nacionales/inventario-especies-terrestres/inventario-nacional-de-biodiversidad/ieet\\_invert\\_vulne\\_atlas.aspx](https://www.miteco.gob.es/es/biodiversidad/temas/inventarios-nacionales/inventario-especies-terrestres/inventario-nacional-de-biodiversidad/ieet_invert_vulne_atlas.aspx)] Address: not stated

## 2012

**19803.** Mezquita Aranburu, I. (2012): Libélulas de Bizkaia. Colección BIZKAIKO GAIK - TEMAS VIZCAINOS editado por. ISBN: 978-84-8056-317-8: 179 pp. (in Baskian) [Dragonflies of Bizkaia: [https://www.researchgate.net/publication/283710329\\_Libelulas\\_de\\_Bizkaia](https://www.researchgate.net/publication/283710329_Libelulas_de_Bizkaia)]

**19804.** Wildermuth, H. (2012): Insekten im Mittelpunkt einer Naturschutzausstellung. Entomo Helvetica 5: 54-57. (in German) [The author reports on a nature conservation exhibition in Rüti, Switzerland, which was open to the public between June 2011 and January 2012. The focus of the information was on the habitats dry meadow, wet meadow and forest stream. Many examples were used to show the interactions and interconnections between the habitats. In particular, butterflies and dragonflies are dealt with.] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rüti, Switzerland. E-mail: [hansruedi@wildermuth.ch](mailto:hansruedi@wildermuth.ch)

**19805.** Wildermuth, H. (2012): SAGLS-Exkursionen zum Thema Neuschaffung und Regeneration von Libellengewässern. Entomo Helvetica 5: 175-177. (in German) [In 2010 and 2011, the Swiss Association for Dragonfly Conservation (SAGLS) organised two excursions on the promotion of dragonfly habitats. Both times, the excursion destinations were different biotopes in Suisse romande. On 26 June 2010, a group of interested experts led by Alain Maibach and Antoine Gander visited several water bodies in the Yverdon area that are particularly important for dragonflies. The excursion of 10 September 2011 led to the valley of La Brévine in the Neuchâtel Jura. Neuchâtel Jura, where remnants of the once extensive upland moors are being regenerated at altitudes of over 1000 m. The excursion of 10 September 2011 led to the valley of La Brévine in the Neuchâtel Jura.] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: [hansruedi@wildermuth.ch](mailto:hansruedi@wildermuth.ch)

## 2013

**19806.** Andor, L.; Előd, K.; Balázs, C.; Ildikó, S. (2013): Adatok a Koppány-patak makroszkopikus vízi gerinctelen faunájához. Natura Somogyiensis 23: 153-158. (in Hungarian, with English summary) ["The Koppány stream is a lowland stream in Southwestern Hungary. The aquatic macroinvertebrate fauna of the Koppány stream is poorly known. During the collections 71 aquatic macroinvertebrate species were collected (5 Ephemeroptera, 6 Odonata [Platycnemis pennipes, Ischnura elegans pontica, Calopteryx splendens, Anax imperator, Sympetrum striolatum, S. vulgatum], 16 Heteroptera, 4 Coleoptera and 4 Trichoptera) in 2010." (Authors)] Address: Andor, L., Balaton-felvidéki Nemzeti Park Igazgatóság, H-8903 Zalaegerszeg, Pf. 37., Hungary, [a.lokkos@gmail.com](mailto:a.lokkos@gmail.com)

**19807.** Chovanec, A. (2013): Bewertung der Renaturierungsmaßnahmen an der Krems (OÖ) im Bereich Ansfelden / Oberaudorf aus libellenkundlicher Sicht. Im Auftrag

des Amtes der Oberösterreichischen Landesregierung, Abt. Oberflächengewässernwirtschaft: 52 pp. (in German) ["Conclusions The measures carried out on the lower Krems in the Ansfelden / Oberaudorf area resulted in an increase of the habitat availability relevant from a dragonfly point of view. The species spectrum detected includes rhithral and potanal species of the water type-specific dragonfly associations, but the occurrence of the most indicative species is limited to only a few sections within the study area. The section (D) with the highest number of individuals also fell dry from August 2013 onwards. The study area has a high potential for dragonflies, and the following measures are recommended to stabilise and strengthen the populations of the water-type-specific species: Increase the structural offer in the main channel of the Krems: Demand the development of gravel banks (cf. e.g. WILDERMUTH & KURY 2009), such as upstream of the inflow area into the left bank tributary (Fig. 23). Increased dotation of the left-bank tributary and transformation into a permanently flowing tributary through hydraulic engineering measures (instead of two "water bodies" - a perennial backwater area and a temporarily flowing section)." (Author/SeepL)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: [andreas.chovanec@bmlfuw.gv.at](mailto:andreas.chovanec@bmlfuw.gv.at)

**19808.** Kang, S.R.; King, S.L. (2013): Effects of hydrologic connectivity on aquatic macroinvertebrate assemblages in different marsh types. Aquat. Biol. 18: 149-160. (in English) ["Hydrologic connectivity can be an important driver of aquatic macroinvertebrate assemblages. Its effects on aquatic macroinvertebrate assemblages in coastal marshes, however, are relatively poorly studied. We evaluated the effects of lateral hydrologic connectivity (permanently connected ponds: PCPs; temporary connected ponds: TCPs), and other environmental variables on aquatic macroinvertebrate assemblages and functional feeding groups (FFGs) in freshwater, brackish, and saline marshes in Louisiana, USA. We hypothesized that (1) aquatic macroinvertebrate assemblages in PCPs would have higher assemblage metric values (density, biomass, Shannon-Wiener diversity) than TCPs and (2) the density and proportional abundance of certain FFGs (i.e. scrapers, shredders, and collectors) would be greater in freshwater marsh than brackish and saline marshes. The data in our study only partially supported our first hypothesis: while freshwater marsh PCPs had higher density and biomass than TCPs, assemblage metric values in saline TCPs were greater than saline PCPs. In freshwater TCPs, long duration of isolation limited access of macroinvertebrates from adjacent water bodies, which may have reduced assemblage metric values. However, the relatively short duration of isolation in saline TCPs provided more stable or similar habitat conditions, facilitating higher assemblage metric values. As predicted by our second hypothesis, freshwater PCPs and TCPs supported a greater density of scrapers, shredders, and collectors than brackish and saline ponds. Aquatic macroinvertebrate assemblages seem to be structured by individual taxa responses to salinity as well as pond habitat attributes." (Authors) Odonate taxa are: Coryphaeschna, Enallagma, Ischnura, Erythemis, and Pachydiplax.] Address: Kang, S.R., School of Renewable Natural Resources, LSU AgCenter, Baton Rouge, Louisiana 70803-4301, USA. E-mail: [skang1@tigers.lsu.edu](mailto:skang1@tigers.lsu.edu)

## 2014

**19809.** Aland, S.R.; Mamlayya, A.B.; Bhawane, G.P. (2014): Economically important insect fauna of Amba Reserve Forest, Western Ghat, Kolhapur district, Maharashtra.

Avishkar – Solapur Univ. Research Journal 3: 102-119. (in English) ["The present study was carried out for three years (2007-2009). During the study period of three years, a total of 290 insect species were found economically important. 66 species belonging to orders Lepidoptera, Coleoptera, Orthoptera and Hymenoptera were leaf eaters. 2 species of the orders Lepidoptera and Coleoptera were leaf rollers. 13 species of the orders Lepidoptera, Coleoptera and Hemiptera were stem & root borers. 9 species of the orders Coleoptera, Isoptera and Lepidoptera were bark feeders. 28 species of the orders Heteroptera and Thysanoptera were sap suckers. The insects belonging to orders Coleoptera and Diptera were fruit destroyers. 105 species of the orders Diptera, Hymenoptera, Neuroptera, Coleoptera and Odonata [n = 64 taxa] were predators. 29 species of orders Hymenoptera and Diptera were parasites. 6 species of the orders Coleoptera and Hymenoptera were drug producers and 9 species belonging to the orders Orthoptera, Isoptera and Lepidoptera were nutritive insects. 11 species of insects of the orders Lepidoptera and Hymenoptera were pollinators and 9 species of the orders Homoptera, Lepidoptera and Hymenoptera were productive insects." (Authors)] Address: Aland, S.R., Dept of Zoology, Walchand College of Arts and Science, Solapur – 413 006, India

**19810.** Aprianti, R.; Jasmi, J.; Zeswita, A.L. (2014): Kepadatan populasi *Orthetrum sabina* (Odonata: Libellulidae) pada pertanaman padi sawah di Kanagarian air Bangis kecamatan Sungai Beremas kabupaten Pasaman Barat. *Beranda* 1(1): 5 pp. (in Indonesian, with English summary) [Population density of *Orthetrum sabina* (Odonata: Libellulidae) in rice paddy fields in Kanagarian air Bangis, Sungai Beremas sub-district, West Pasaman district. - In February 2014, the population of *O. sabina* in Kanagarian air Bangis, Sungai Beremas district, Pasaman Barat Regency was studied. "Sample of research done for 1 week with condition rice field that flooded and dry land are 3 days in the light months and 3 days in dark month. From the result of population *O. sabina* in Kanagarian Air Bangis found that characteristics of *O. sabina* average abdomen length 29-30 mm and body length 50-53 mm have compound eyes green colour with slender abdomen. Totally population of *O. sabina* in wet rice field (0,99 individuals/m<sup>2</sup>) higher than dry land rice (0,76 individuals/m<sup>2</sup>). Meanwhile, average population density in the light month (0,94 individuals/m<sup>2</sup>) higher than in the dark month (0,77 individuals/m<sup>2</sup>).] Address: Aprianti, R., Program Studi Pendidikan Biologi Sekolah Tinggi Keguruan Dan Ilmu Pendidikan (STKIP ) PGRI Sumatera Barat, Rizaaprianti22@gmail.com

**19811.** Cano-Villegas, F.J.; Carpintero, S. (2014): Libélulas Africanas en la Península Ibérica. *Quercus* 344: 34-44. (in Spanish) [Records and distribution of *Diplacodes lefebvrei*, *Brachythemis impartita*, *Paragomphus genei*, *Trithemis annulata*, *Trithemis kirbyi*, *Orthetrum trinacria*, and *Sympetrum sinaiticum* are discussed in detail.] Address: Cano-Villegas, F.J., Asociación Odonatológica de Andalucía. Isla de Mallorca, 2 P6 4ªA, 14011 Córdoba, Spain. E-mail: fjcanovi2@hotmail.com

**19812.** Conesa Garcia, M.A.; Bernal Sánchez, A.; Cano Villegas, F. (2014): New morphological data of the larvae F0 and exuviae of *Brachythemis impartita* (Karsch, 1890), (Odonata, Libellulidae). *Boletín de la Sociedad Odonatológica de Andalucía* 2: 2-11. (in Spanish) ["There is no original description of the larvae of *B. impartita*. The limited morphological data published in the literature about *Brachythemis leucosticta* (Burmeister, 1839) for the fauna in Europe

and North Africa must be ascribed to *B. impartita* (DIJKSTRA & MATUSKINA, 2009). Our study provides an analysis of 22 morphological parameters measured in F0 larvae and exuviae of samples which undoubtedly belong to *B. impartita*. Larval morphology is described in different stages and the results obtained are compared with those for known species of *Brachythemis lacustris* (Kirby, 1889) and *B. leucosticta*, both of African distribution." (Authors)] Address: Cano Villegas, F.J., Depto de Ciencias Ambientales, Área de Zoología, Universidad Pablo de Olavide, 41013 (Sevilla), Spain. E-mail: fjcanovi1@wanadoo.es

**19813.** Consatti, G.; Martins dos Santos, D.; Renner, S.; Périco, E. (2014): Presença de Odonata em áreas preservadas e não preservadas nas matas ciliares do Rio Taquari, RS. *Revista de Iniciação Científica da ULBRA* 12: 57-65. (in Portuguese, with English summary) ["In nature, the riparian forest acts as filters and protection against erosion, serving also as shelter for fauna. The Odonata order is composed by organisms which are sensitive to environment changes, its life cycle is aquatic and terrestrial, doing so, these insects can be potential bioindicators. The main goal of this project was to compare the odonate richness and abundance, in preserved and degraded riparian zones along the Taquari River margins. Were collected 81 specimens, belonging to 24 species. We found a significant difference in the abundance and richness, between the preserved and degraded areas. We suggest that such difference can be attributed to the better vegetation conditions found on the preserved areas, which consequently increases the biodiversity." (Authors)] Address: Périco, E., Coordenador do Setor de Ecologia e Sensoriamento Remoto/UNIVATES. E-mail: perico@univates.br

**19814.** Dalecky, V. (2014): The influence of forest management to forest populations of dragonflies *Cordulegaster* (Odonata: Cordulegastridae) in selected Moravia and Silesia region. *SilvaNet* 2014: 26-27. (in Czech) ["From the preliminary results [...] it can be concluded that, despite the often intensive management, the populations of forest rheophilic dragonflies are not extremely threatened. The most common risk arises from clear-cut mining or the processing of calamitous mining that directly connects to watercourses. If riparian vegetation with a minimum width of approx. 2 m is preserved, the biggest negative effect, the washing of the surface layer of soil into water courses, is prevented. The nature of the riparian vegetation is most suitable diverse with a mixture of trees, shrubs and herbaceous undergrowth of various ages, which prevents the aforementioned negative influence." (Author/Deepl)] Address: Dalecký, V., Mendelova univerzita v Brně / Lesnická a dřevářská fakulta, Czech Republic. E-mail: v.dalecky@gmail.com

**19815.** Ezquerro, C.Z.; Asso, T.L.; Rodríguez Saldaña, J.I.; Martínez, E.; López, R.Z.; Marín, A.C. (2014): Libélulas y Caballitos de Agua de La Rioja (Odonata). Colección: Ciencias de la Tierra, nº 33: 362 pp. (in Spanish) ["Odonata are a very ancient group, whose morphology has changed very little over time for more than 200 million years. Moreover, they form a worldwide assemblage of about 6,000 species. A tiny group compared to the specific richness of Lepidoptera (175,000) or Coleoptera (350,000). But curiously, odonates have become a group of animals of great interest due to their beauty, their harmlessness and for being one of the few orders of insects that does not include any pest species, and which, on the contrary, has very positive effects on humans, by ridding us of a large number of insects that come into conflict with us (mosquitoes, for example) or with our

agriculture and livestock. In La Rioja, 49 of the 77 species of odonates that inhabit the Iberian Peninsula have been found (23 damselflies and 26 dragonflies). The odonata-fauna of La Rioja is mainly Mediterranean, with a small component of Nordic species that live mainly in the Sierra, and another small number of elements of African origin that live in the Ebro Valley. With this monograph, magnificently illustrated with photographs of the species, our aim is to take a step forward in the knowledge of the biodiversity of La Rioja; to open a new door to more specific studies; and above all, to provide the first support to anyone interested in identifying, knowing where they live, when they fly and what problems the Odonata currently living in our region are experiencing." (Publisher/DeepL)] Address: <https://www.larioja.org/i-estudios-riojanos/es/publicaciones/novedades/monografias/libelulas-caballitos-agua-ri-oja-odonata>

**19816.** Fan, T.; Zhang, R.; Fan, F.; Liu, Z.; Xiong, J. (2014): A water surface small target detection approach inspired by dragonfly vision mechanism. *WIT Transactions on Engineering Sciences* 94: 151-157. (in English) ["Weak and small target detection technique is widely used in military and industry applications. The targets are weak and small in the image when targets are far from the imaging system. Under this complex condition, the image has very low SNR and it is difficult to detect the targets. On this situation, a weak and small target detection approach based on dragonfly compound eye is proposed in this paper. Dragonfly compound eye has obvious characteristics of polarized light, and it can detect the surface of water and the targets on water accurately. The new method uses the polarization characteristics of dragonfly compound eye to get the polarization image of targets, and then completes the weak small target detection. The experimental data shows that this new target detection method has advantages of high precision and small false alarm rate." (Authors)] Address: Fan, T., School of Information Engineering, Natnchang Institute of Technology, Natnchang, China

**19817.** Frutos Cuadrado, I.M.; Sanabria Hidalgo, A. (2014): *Trithemis kirbyi* (Sélys 1891) (Odonata: Libellulidae) en la comarca de La Serena, Extremadura (España). *Boletín de la Sociedad Odonatológica de Andalucía* 2: 41-43. (in Spanish) ["This note describes the observation of two (three) adult males of *Trithemis kirbyi* during the summer of 2012, in an abandoned granite quarry in the vicinity of the town of Quintana de la Serena, in the province of Badajoz, UTM coordinates (Huso 30, Datum WGS84): X 266,811.63 Y 4,292,667.32. The quarry is currently unexploited and was closed by the administration 10 years ago, as it is located practically inside the town centre, thus avoiding the danger to the nearby population that such exploitation entails. The quarry covers an area of approximately 2000 m<sup>2</sup> and has a maximum depth of 12 m. The predominant marsh vegetation is exclusively of bulrushes (*Typha latifolia*) and sedges (Fig. 1)." (Author/DeepL)] Address: Isidoro M. Frutos Cuadrado. I.M., Pza. de los Barcos, 3, 2º-A, 11100-San Fernando, Cádiz, Spain. Email: [muscaria17@hotmail.com](mailto:muscaria17@hotmail.com)

**19818.** Fulan, J.A.; Santos, L.R.; Ferreira, L. (2014): Observações sobre a criação de ninfas de *Brechmorhoga Kirby, 1894* (Insecta: Odonata) em condições artificiais. *Revista Brasileira de Biociências* 12(4): 206-209. ["Observations on rearing of *Brechmorhoga Kirby, 1894* (Insecta: Odonata) nymphs under artificial conditions). The goal of this work was to contribute to the improvement of a rearing method for *Brechmorhoga* that would allow a greater success in adult emergence. We sampled a total of 300

*Brechmorhoga* nymphs in association with a macrophyte in the Been stream, southern Amazonas state, Brazil. Out of the 300 sampled nymphs, only 60 were appropriate for rearing outside their natural habitat, as they were in the penultimate and last developmental stages. The tested methods for nymph rearing were: no substrate, artificial substrate (filter paper strips) and natural substrate (macrophyte). All methods were tested in laboratory and greenhouse. All adults obtained were recorded in the greenhouse vivaria with macrophyte. The results of the log-rank test showed a significant difference between treatment with natural substrate in laboratory and in greenhouse; and between treatments without substrate and with natural substrate in laboratory. We concluded that the rearing of *Brechmorhoga* under artificial conditions was more efficient in the presence of macrophytes in greenhouse vivaria." (Authors)] Address: Fulan, J.A., Instituto de Educação, Agricultura e Ambiente, Universidade Federal do Amazonas (UFAM). Rua 29 de Agosto 786, CEP 69800-000, Humaitá, AM, Brasil. Email: [joaofulan@ig.com.br](mailto:joaofulan@ig.com.br)

**19819.** Gustia, N.; Jasmi, J.; Pratiwi, P. (2014): Kepadatan populasi capung *Crocothemis servilia* (Odonata: Libellulidae) pada pertanaman padi sawah di kelurahan Anduring kecamatan Kuranji Padang Sumatera barat. *Beranda* 1(1): 5 pp. (in Indonesian, with English summary) [Population density of dragonflies *Crocothemis servilia* (Odonata: Libellulidae) in paddy rice fields in Anduring sub-district, Kuranji sub-district, Padang, West Sumatra - "Dragonflies can serve as an indicator to monitor the water quality of surrounding environment and predators on crop pests of rice, in addition to the dragonfly also play a role in health and agriculture. *C. servilia* is commonly found in rice crops. So far there are no data on the density of Odonata including dragonfly *C. servilia* in the District of Kuranji Anduring. The purpose of this study was to determine the population density of *C. servilia* on rice planting in Anduring Kuranji District of Padang in West Sumatra. This study was conducted in January-February 2014, with a descriptive survey method. It is by way of direct collection of the *C. servilia* existing research in the location. Field sampling done at night on dry rice and wet rice fields when the bright moon and new moon. Physical environmental factors measured are temperature and humidity. The area used as a place of research about + 1 Ha. The characteristics of *C. servilia* which are found are the average length of the male dragonfly *C. servilia* abdomen is 30 mm long and 27 mm in females. [...] The average of population density of *C. servilia* in the rice fields location of Anduring Kuranji District of Padang in West Sumatra on dry fields individuals/m<sup>2</sup> is 0.15, and the wet rice fields (aqueous) was 0.09 individuals/m<sup>2</sup>." (Authors)] Address: Gustia, N., Program Studi Pendidikan Biologi Sekolah Tinggi Keguruan Dan Ilmu Pendidikan (STKIP) PGRI Sumatera Barat. E-mail: [nuri.gustia@yahoo.com](mailto:nuri.gustia@yahoo.com)

**19820.** Itrac-Bruneau, R.; Louboutin, B.; Merlet, F. (2014): Première observation de *Coenagrion hastulatum* dans le département du Gard (Odonata: Coenagrionidae). *Martinia* 30(2): 64-65. (in French) [France; Lac des Pises et Montagne du Lingas, 14-VII-2013, 44,04467 N / 3,50798 E.] Address: Merlet, Florence, 78 rue de Cornouailles, F-78180 Montigny-le-Bretonneux, France. Email: [florence.merlet@gmail.com](mailto:florence.merlet@gmail.com)

**19821.** Kobayashi, J. (2014): Comparative morphology of the female internal reproductive organs in the Japanese Odonata (Preliminary report). *Jpn. J. Ent. (N.S.)* 17(1): 2-9. (in Japanese, with English summary) ["The ovaries of 15



species of adult Odonata are preliminarily described and illustrated anatomically. The ovaries extend from the anterior margin of the mesopostscutum under the apodeme to the 8th abdominal segment. Those occupy the greater part of the abdominal cavity, and unite at the gonopore in ventral side of the 8th segment. The ovarioles open dorsally and sequentially into each calyx, previously known as a part of the lateral oviduct. The calyces store many matured eggs, and the lateral oviducts open into the common oviduct at the posterior part of the 8th abdominal segment. Each entire ovary is covered with a thin membrane, which is probably presumed to be homologous with the peritoneal sheath as is known in adults of some dipteran species in structure. The ovarioles are counted one by one in 15 species based on fresh material. The numbers of ovarioles per individual is range from 166 to 256 in *Ischnura senegalensis* (Rambur, 1842) and 568 up to 1459 in *Orthetrum albistylum* (Brauer, 1848). The numbers also usually vary in each species, however, those are more stable in number in such groups as Zygoptera and Libellulidae than the others." (Author) *Mnais pruinosa*, *Calopteryx cornelia*, *Atrocalopteryx atrata*, *Ischnura senegalensis*, *Sinictinogomphus clavatus*, *Anax parthenope*, *Sympetrum darwinianum*, *S. frequens*, *S. eroticum*, *S. pedemontanum*, *S. speciosum*, *Crocothemis servilia*, *Pantala flavescens*, *Orthetrum albistylum*, *O. melania*] Address: Kobayashi, J., Lab. Entomology, Tokyo Univ. of Agriculture, 1737 Funako, Atsugi, Kanagawa, 243.0034 Japan

**19822.** Lorenzo-Carballa, M.O.; Cordero-Rivera, A. (2014): Odonates. Dragonflies and Damselflies. In: Pablo Vargas, Rafael Zardoya (Eds): The tree of life. Publisher: Sinauer Associates: 353-363. (in English) ["Odonates currently include about 30 families and almost 6000 species, found on all continents except Antarctica. The relationships between the families based on DNA sequences have in most cases proven to be inconsistent with previous classifications, such as the sister relationship between Zygoptera (damselflies) and Epirocta (primarily dragonflies). The results of the most recent phylogenetic analyses, based on both molecular and morphological characters, have helped to clarify some of these relationships, although debate continues over the position of certain groups, such as the Epiophlebiptera. The fossil record indicates the appearance of the Odonata in the Late Carboniferous, with a wide diversification in the Permian and finally the evolution of the groups extant today in the Jurassic and Cretaceous. Their body structure, as well as certain lifestyles observed in extant species, appear to have changed little since then. They present some morphological characteristics that are unique among insects, of which the most notable is the presence of secondary male genitalia separate from the testes, a feature that determines a unique reproductive behavior involving two points of contact between male and female during copulation, and makes them an appropriate group to test new theories on sexual conflict. One question of debate is whether the polychromatism observed in many species is an ancestral character, a question that will be answered with the development of robust phylogenies. Among the most successful speciation mechanisms in this group are those related to the selective pressures exerted by predatory ray-finned fishes, with very remarkable examples in some genera." (Authors)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: [acordero@uvigo.es](mailto:acordero@uvigo.es)

**19823.** Matushkina N.O. (2014): Dragonflies (Odonata) of the Kaniv nature reserve. Short determination key to larvae

and exuviae. Kiv: 16 pp.- (in Ukrainian) ["Dragonflies are amphibiotic insects, the larvae of which develop in various types of water bodies, from streams, rivers and marshes to man-made ponds and pits. Using the proposed key, it is possible to identify mature larvae that have clearly visible wing rudiments and larval skins (exuvia) remaining after winging. The younger larva is determined only to the family level. To determine the species, as well as some genera from the families Coenagrionidae and Libellulidae, it is necessary to use special markers (see the list of recommended literature), and the determination should be carried out at a high magnification of binoculars, making temporary preparations of individual parts of the body. The following key for identification does not include species whose distribution is limited to certain regions of Ukraine (mainly the Carpathians and the South), or which are rare or few in the Middle Dnieper region." (Author)] Address: Matushkina, Natalia A., Dept of Zoology, Biological Faculty, National Taras Shevchenko Univ. of Kyiv, vul. Volodymyrs'ka, 64, Kyiv UA-01033, Ukraine. E-mail: [odonataty@gmail.com](mailto:odonataty@gmail.com)

**19824.** Monzó, J.C. (2014): Primas citas de *Trithemis kirbyi* en la provincia de Alicante. *Quercus* 344: 43. (in Spanish) ["9-VIII-2012, around 12:00 p.m., Jacobo Ramos detected a male specimen, which he brought to the attention of the Municipal Area of the Environment of the Pinoso City Council. A week later, on August 16 and also around 12 noon, Jacobo Ramos, Ricardo Menor and José Carlos Monzó detected a female in the same area. At the time of sending this note, at the end of August 2014, three more males have appeared." (Author/Google Translate)] Address: Monzó, J.C., Área de Medio Ambiente, Ayuntamiento de Pinoso, Paseo de la Constitución, 44, 03650 Pinoso, Alicante, Spain. Email: [jc.monzo@medioambientepinoso.org](mailto:jc.monzo@medioambientepinoso.org)

**19825.** Riservato, E.; Festi, A.; Fabbri, R.; Grieco, C.; Hardersen, S.; la Porta, G.; Landi, F.; Siesa, E.; Utzeri, C. (2014): Odonata - atlante delle libellule Italiane. Società per lo Studio e la Conservazione dell Libellule. Edizioni Belvedere, Latina, "le scienze" (17): 224 pp. (in Italian) ["This volume, edited by the Italian Society for the Study and Conservation of Dragonflies - ODONATA.IT (Onlus) and published by Belvedere Editions, represents the first mapping of dragonfly species in Italy and offers an up-to-date and real picture of the knowledge on the composition and distribution of odonates in our country. The atlas is based on more than 71,000 data (2/3 of which are unpublished) and covers 92 species, for each of which there is a card containing the distribution map, a brief description of the global and Italian range, the phenology and habitats frequented by larvae and adults, as well as a colour photograph to illustrate the habitus of the species. Some general aspects are also briefly illustrated (generalities, biodiversity and conservation, ecology, zoogeography and taxonomy) and the common names of Italian odonates are introduced for the first time." Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)]

**19826.** Sánchez, A.M.; Regil, O.R. (2014): Hábitos alimentarios de *Gambusia yucatanensis* en la división académica de ciencias biológicas (UJAT). *Kukulab* 17(32): 43-48. (in Spanish) [Mexico "The aim of this study is to know the feeding habits of *Gambusia yucatanensis*, as this species has little commercial demand, but it is very important to use it as a biological control of some pests (mosquito larvae). A comparison was made between two study areas, the Tintal and the Herbarium. In this study, the digestive tracts of 136 individuals of *G. yucatanensis* were analysed. They were collected in the months of October and November 2010. It was found

that the overall diet consists of 7 food components that are of animal origin, recording that most of the components were insects, such as: Diptera (54%) as primary food, Os-tracods (18%), Gastropods (17%), and Hymenoptera (13%) as secondary food. The incidental ones were Chelicerates (4%), Odonata (3%) and Plecoptera (1%)." (Authors) Translated with www.DeepL.com/Translator (free version)] Address: América Mondragón Sánchez, División Académica de Ciencias Biol., Univ. Juárez Autónoma de Tabasco, Km 0.5 carretera Villahermosa - Cárdenas, Villahermosa, Tabasco, Mexico. Email: a\_my\_galaxy@hotmail.com

## 2015

**19827.** Jisha Krishnan, E. K.; Sebastian, C. D. (2015): Species authentication and taxonomic relationship assessment of Coenagrionidae) using the molecular marker Cytochrome oxidase. International Journal of Current Research 7(12): 23997-23999. (in English) ["Ceriagrion coromandelianum [...] is a widely distributed damselfly species in South Asia. It acts as a natural 'biocontrol' agent against paddy pests like leaf hopper, planthopper, midges and flies. The partial sequence of cytochrome oxidase I gene of C. coromandelianum was analysed by PCR and the result yielded a gene product of 573 bp length. Phylogenetic tree constructed by Maximum likelihood and Neighbour joining method supported with the bootstrap value, taxonomically confirmed the relationship of this species with other damselflies and depicted that it is closely related to C. nipponicum than other Ceriagrion members. Evolutionary divergence and tree reveals that all the Ceriagrion members are having a monophyletic ancestry originating from a common clade with maximum divergence for C. whellani followed by C. nipponicum, C. coromandelianum and C. glabrum and it occurred mainly due to the transitional change of nucleotides." (Authors) Chromagrion conditum, C. coromandelianum, C. glabrum, C. nipponicum, C. whellani, Teinobasis cryptica, Ischnura senegalensis, I. senegalensis] Address: Sebastian, C. D., Molecular Biology Laboratory, Dept Zool., Univ. of Calicut, Kerala, India. E-mail: drcdsebastian@gmail.com

**19828.** Medona, M.R.; Nirmala, T.; Rose, M.R.D. (2015): Diversity and distribution of aquatic insects in Sothuparai Reservoir, at Periyakulam, Theni district, Tamilnadu, India. Int. J. Cur. Res. Rev. 7(9): 10-15. (in English) ["The present study deals with the diversity and distribution of aquatic insects from Sothuparai Reservoir. It is located at the foothills of the Western Ghats. The aquatic entomofauna were sampled systematically and randomly using standard protocols. The aquatic insects act as an indicator species to monitor the environmental pollution. Ephemeropteran were most diverse and its presence indicative of good water quality. The abundance of organic pollution tolerant Baetis were found in downstream, nearer to human settlements. The physico chemical variations of water taken into account for the study were found to be influencing the distribution of aquatic insects. It is suggested that routine bio monitoring of the reservoir using aquatic insect indicators will facilitate better conservation and management. ... Odonata contributes 19 % of the total fauna. Libellulidae, Gomphidae and Euphaeidae were the families belonging to Odonata. The nymphs of this family remain attached to macrophytes. Crocothemis was the species of the Libellulidae, the naid of which is mud dwelling. 16 genera in Western Ghats have been collected by Subramanian and Sivaramakrishnan, (2005)." (Authors)] Address: Medona, Mary, Dept of Zoology, Jayaraj Annapackiam College for Women, Periyakulam, TN, India. E-mail: medonawilson@gmail.com

**19829.** Abdul Hamid, M.F. (2016): Aerodynamic models for insect flight. Ph.D. thesis, Univ. of Manchester: 164 pp. (in English) ["Numerical models of insect flapping flight have previously been developed and used to simulate the performance of insect flight. These models were commonly developed via Blade Element Theory, offering efficient computation, thus allowing them to be coupled with optimisation procedures for predicting optimal flight. However, the models have only been used for simulating hover flight, and often neglect the presence of the induced flow effect. Although some models account for the induced flow effect, the rapid changes of this effect on each local wing element have not been modelled. Crucially, this effect appears in both axial and radial directions, which influences the direction and magnitude of the incoming air, and hence the resulting aerodynamic forces. This thesis describes the development of flapping wing models aimed at advancing theoretical tools for simulating the optimum performance of insect flight. Two models are presented: single and tandem wing configurations for hawk moth and dragonfly, respectively. These models are designed by integrating a numerical design procedure to account for the induced flow effects. This approach facilitates the determination of the instantaneous relative velocity at any given spanwise location on the wing, following the changes of the axial and radial induced flow effects on the wing. For the dragonfly, both wings are coupled to account for the interaction of the flow, particularly the fact that the hindwing operates in the slipstream of the forewing. A heuristic optimisation procedure (particle swarming) is used to optimise the stroke or the wing kinematics at all flight conditions (hover, level, and accelerating flight). The cost function is the propulsive efficiency coupled with constraints for flight stability. The vector of the kinematic variables consists of up to 28 independent parameters (14 per wing for a dragonfly), each with a constrained range derived from the maximum available power, the flight muscle ratio, and the kinematics of real insects; this will prevent physically-unrealistic solutions of the wing motion. The model developed in this thesis accounts for the induced flow, and eliminates the dependency on the empirical translation lift coefficient. Validations are shown with numerical simulations for the hover case, and with experimental results for the forward flight case. From the results obtained, the effect of the induced velocity is found to be greatest in the middle of the stroke. The use of an optimisation process is shown to greatly improve the flapping kinematics, resulting in low power consumption in all flight conditions. In addition, a study on dragonfly flight has shown that the maximum acceleration is dependent on the size of the flight muscle." (Author)] Address: Abdul Hamid, M.F., School of Mechanical, Aerospace and Civil Engineering, Univ. of Manchester, UK.

**19830.** Adu, B.W.; Kemabonta, K.A.; Ogbogu, S.S. (2016): Composition and abundance of odonates at Alatori stream, south-west Nigeria. UNILAG Journal of Medicine, Science and Technology 4(1): 96-110. (in English) ["Odonata are sensitive to human disturbance both as adults that are on wings and as larvae that are aquatic. This attribute suggests their usage as assessment tool for determination of human disturbance within the ecosystem. Alatori stream in Akure Forest Reserve was studied from May 2008 to April 2010 in order to determine the water quality and abundance of Odonata species of the stream. Adults and larvae specimens were sampled throughout the sampling period. A total of 767 adult specimens and 108 larvae were collected. Only

45.4% of the penultimate and ultimate larvae collected eclosed (emerged) to teneral adults. The composition of Odonata families occurring at the stream showed that Libellulidae was the highest (281) followed by Chlorocyphidae (158) while the lowest was Megapodagrionidae (5). The occurrence of members of the families Megapodagrionidae, Chlorocyphidae and Calopterygidae indicates that the stream ecosystem can sustain species with narrow niches. Seven physico-chemical variables: temperature (water and ambient), pH, turbidity, electrical conductivity, dissolved oxygen, water current velocity and depth of the stream were examined and analysed. Analysis of variance (ANOVA) result revealed that conductivity, temperature and water depth played a major role in determining the community structure of odonate assemblage in the stream. The mean ( $\pm$ ) standard deviation of electrical conductivity ( $184.25 \pm 6.37 \mu\text{S/cm}$ ) of the water was indicative of an unpolluted freshwater system with stable habitat structure. The study suggests that the water quality of Alatori stream is healthy and can sustain Odonata and other fauna within the ecosystem." (Authors)] Address: Adu, B., Dept of Biology, Federal Univ. of Technology, Akure, Ondo State, Nigeria

**19831.** Adu, B.W.; Kehinde, K.K.A.; Ogbogu, S.S. (2016): Monitoring of environmental disturbance using abundance and distribution of red-vein and dark-vein species of genus *Trithemis* (Odonata: Libellulidae). *Zoologist (The)* 14: 31-36. (in English) ["Environmental changes as a result of human disturbance in Akure Forest Reserve were investigated for a period of twelve months using abundance and diversity of Red-vein and Dark-vein *Trithemis* species as an assessment tool. Four study sites (AGO, ALA, APO, and ROD), based on type of water bodies and landscapes, were identified and selected for this study. Diversity indices and Dragonfly Biotic Index (DBI) were used to compare the assemblages of the odonate species in the study-sites. A total of 199 specimens were collected out of which 121 and 78 were Red-vein and Dark-vein species respectively. Members of this genus differ in their dispersal capacities and coloration. Based on Dragonfly Biotic Index (DBI) used and the pattern of distribution of *Trithemis* (Red-vein and Dark-vein species), in the forest ROD and APO were the least disturbed site with the highest DBI value of 9. AGO with DBI value of 2 was the most disturbed site. The pattern of distribution of this species revealed that Akure Forest Reserve is degenerating, a situation that could lead to loss of biodiversity if urgent conservative measures were not put in place." (Authors) The study includes the following species: *Trithemis aenea*, *T. annulata*, *T. arteriosa*, *T. hecate*, *T. kirby*, *T. grouti*, *T. furva*, *T. imitata*] Address: Adu, B.W., Dept of Biol., Federal Univ. Technology, Akure, Ondo State, Nigeria. Email: williamsadubabs@yahoo.com

**19832.** Allison, S.E. (2016): Variation in female mating behavior and success in the damselfly, *Calopteryx maculata*. M.Sc. thesis, Dept of Biology, James Madison Univ.: VI, 25 pp. (in English) ["Traditionally, the study of sexual selection has focused on the evolution of elaborate male traits and how they enhance the ability to out-compete other males directly (access to females) and indirectly (access to desirable territories or resources). Female trait studies have focused most on evolved preferences for male traits. While we know much about how sexual selection acts on males, there is a deficit of equivalent study on females. In insects, including damselflies, male size and pigmentation are positively correlated with fat reserves and immune abilities, and therefore with male competitive ability. Here, we show that phenotypic variation that has been well-documented in

males of the Ebony jewelwing damselfly, *Calopteryx maculata*, is also present in females of the species. We measured female mating success and behaviour of *C. maculata* at Smith Creek in Rockingham County, Virginia. Males were marked with multiple colours of fluorescent powder that was transferred to females when mating. Uniquely-numbered females were digitally scanned and repeatedly observed throughout the summer. We determined that there is significant variation in female mating frequency, wing pigmentation, size, and shape. The study of trait variation within females, and thus the opportunity for selection to act on those traits, is essential in understanding how evolution on females may have contributed to sex differences, and may change the way we think about the role of females in sexual selection." (Author)] Address: not stated

**19833.** Arimoto, S.; Sakiko Ando, S.; Kmeil, A.; Nomura, T.; Hara, Y.; Nakashima, A. (2016): Changes of the diversity of dragonfly in the 1998–2015 in Mohko–Fudodani, Kainan City, Wakayama Prefecture, central Japan. [Nankin creatures] 58(1): 56-62. (in Japanese, with English title) ["The changes in the dragonfly fauna observed between 1998 and 2015 in the Menzhi Fudo Valley, where a small dragonfly pond was created in 1998, were summarised as follows The following is a summary of the changes in the dragonfly fauna observed between 1998 and 2015 in the Menzhi Fudo Valley, where a small dragonfly pond was created in 1998. (1) In the Mengzifudo Valley, 65 species of dragonflies in 9 families were observed during the period. (1) 65 species of dragonflies in nine families were observed in the Menzhi Fudo Valley. The number of these species increased rapidly after the construction of the dragonfly ponds, but they remained established. The number of dragonfly species increased rapidly after the construction of the dragonfly ponds. The number of dragonfly species observed in the study area was 65 in 9 families during the study period. Among the dragonfly species identified, eight species are on the national Red List and 15 species are from the Japanese Red List. (2) Among the dragonfly species identified, eight species on the national Red List and 15 species on the Wakayama Prefecture Red List were included. The number of dragonfly species identified included eight national Red List species and 15 Wakayama Prefecture Red List species. Some of these species were identified after the construction of the dragonfly ponds and became established. The number of dragonfly species included in the list was 8 national species and 15 species from the Wakayama Prefecture Red List. The majority of species that were present before the construction of the dragonfly ponds continued to be established in the area. However, overall, the list of species was not very large. However, overall, the number of confirmed species peaked in 2002. However, the number of confirmed species gradually decreased after peaking in 2002. This is due to canopy development and This was thought to be due to the progression of vegetation succession, such as canopy development and an increase in dragonfly pond plants. However, the factors that determined this were not within the scope of this study. However, the factors that determined this could not be identified within the scope of this survey." (Authors/Deepl.)] Address: Arimoto, S., NPO Association for Trying to Restore Nature, Biotope Mengji, 1064-2 Mengji, Kainan, Wakayama 640-0452

**19834.** Babu, R.; Srinivasan, G. (2016): On the distribution of *Aeshna petalura* Martin, 1908 (Odonata: Anisoptera: Aeshnidae) in the Indian subcontinent. *Journal of Threatened Taxa* 8(7): 9034-9037. (in English) [Records of *A. petalura* in India, Nepal and China are compiled and plotted

in a distribution map. Emphasis is given to altitudinal distribution.] Address: Babu, R., Southern Regional Centre, 2 Marine Biology Regional Centre, Zoological Survey of India, 130, Santhome High Road, Chennai, Tamil Nadu 600028, India. Email: baburzsi@gmail.com

**19835.** Balazs, A.; David, S.; Holusa, O. (2016): Dragonflies (Insecta: Odonata) of the Cerová vrchovina Uplands in Slovakia. *Acta Mus. Beskid.* 8: 25-40. (in Slovakian, with English summary) ["This work provides data of the systematic research on the dragonflies in the Cerová vrchovina Uplands in the southern Slovakia, realized in 2012–2014 investigating a total of 30 sites (8 habitat types). During investigation, 39 dragonfly species belonging to 9 families were confirmed. For fifteen of these recorded species larval development has been proved: *Aeshna cyanea*, *A. mixta*, *Anax imperator*, *Calopteryx virgo*, *Chalcolestes viridis*, *Coenagrion ornatum*, *Cordulegaster bidentata*, *Enallagma cyathigerum*, *Erythromma viridulum*, *Ischnura elegans*, *Orthetrum albistylum*, *O. brunneum*, *Platycnemis pennipes*, *Sympetrum sanguineum* and *S. vulgatum*. In the area, all dragonfly species which are evaluated and listed in the Carpathian Red List of Dragonflies have been found (35 of them Least Concern, Near Threatened *Coenagrion ornatum* and *Sympetrum pedemontanum* and Data Deficient *C. scitulum* and *Somatochlora flavomaculata*). The following species significant from faunistic point of view were recorded for the first time in the Cerová vrchovina Uplands: *Aeshna mixta*, *Coenagrion ornatum*, *C. scitulum*, *Cordulegaster bidentata*, *Cordulia aenea*, *Crocothemis erythraea*, *Erythromma viridulum*, *Orthetrum albistylum*, *O. coerulescens*, *Somatochlora flavomaculata*, *S. metallica*, *Sympetma fusca*, *Sympetrum fonscolombii*, *S. pedemontanum* and *S. striolatum*. Next nine faunistically significant dragonfly species have national importance: *Anax imperator*, *Coenagrion scitulum*, *Cordulegaster bidentata*, *Onychogomphus forcipatus*, *Orthetrum coerulescens*, *Somatochlora flavomaculata*, *S. metallica*, *Sympetma fusca*, *Sympetrum pedemontanum*; the species of *Coenagrion ornatum* is listed in Annex II (EU Habitat Directive) as species of Community importance." (Authors)] Address: Balázs, A., Ústav ochrany lesů a myslivosti, Lesnická a dřevařská fakulta, Mendelova Univerzita v Brně, Zemědělská 3, CZ-613 00 Brno, Czech Republic. E-mail: balazsaeko@gmail.com

**19836.** Bar-Zakay, D.; Boudot, J.-P.; Simon, D. (2016): Note on a population of *Pseudagrion torridum* from the Yarkon River catchment, Tel-Aviv, Israel (Odonata: Coenagrionidae). *Notulae odonatologicae* 8(8): 290-296. (in English) ["A new Israeli population of *Pseudagrion torridum*, discovered in summer 2013 near Tel-Aviv, Israel, is described. This population is highly heterogeneous, with individuals resembling the nominotypical subspecies and others, particularly females, resembling the subspecies *P. t. hulae*. The infraspecific taxonomy of *P. torridum* is critically discussed." (Authors)] Address: Bar-Zakay, Dorit, Mismhar Hagvul 13, Tel-Aviv 6969783, Israel. E-mail: dorit@doritbarzakay.com

**19837.** Boruah, B.; Gogoi, M.J.; Payra, A.; Das, G.N.; Bortamuly, M.; Sharma, R. (2016): Diversity and habitat preference of Odonata fauna (Insecta) in Kaziranga-Karbi hills, Central Assam, Northeast India. *Ambient Science* 3(2): 64-68. (in English) ["Diversity of Odonata and their habitat preference was studied in a landscape between Kaziranga National Park and Karbi Hills of Assam. During study period we recorded total 82 species of odonates from 51 genera and 10 families out of which, Anisoptera represented by 43 species and Zygoptera represented by 39 species. Family

Libellulidae was the most dominant family with 36 species among the Anisoptera than after family Coenagrionidae with 20 species among Zygoptera. Among the six selected habitats, stream and river sites hold highest species (45) and lowest species found in human habitations (21). Among the recorded species *Orthetrum pruinosum*, *Orthetrum sabina* and *Pantala flavescens* were found to be occupied in all types of habitats. Sørensen's Similarity index of all the six habitats for odonates species composition during study periods had maximum values CLWP (0.77) and lowest value FA-GL (0.26). A checklist of odonates for central Assam has also been forwarded." (Authors)] Address: Boruah, B., Dept of Wildlife and Biodiversity Conservation, North Orissa Univ., Odisha, India

**19838.** Buczyński, P.; Zawal, A.; Buczyńska, E.; Stępień, E.; Dabkowski, P.; Michoński, G.; Szlauer-Lukaszewska, A.; Pakulnicka, J.; Stryjecki, R.; Czachorowski, S. (2016): Early recolonization of a dredged lowland river by dragonflies (Insecta: Odonata). *Knowl. Manag. Aquat. Ecosyst.*, 417, 43: 11 pp. (in English, with French summary) ["The influence of dredging on the dragonfly assemblages of the small regulated lowland River Kr'piel (north-western Poland) was analyzed a short time after the dredging. Dragonfly assemblages were destroyed, but they began to recover rapidly. Many biocoenotic indices reached high values at just six months after the dredging. The recolonization first occurred as a result of larval drift, and then, via dispersion of adult dragonflies. This process took place in conditions different from the prevailing conditions in the period before dredging, in terms of microhabitat availability and physico-chemical conditions. Compared to the previous assemblage, the emerging assemblage was more typical of assemblages found in small, natural running waters. Therefore, dredging (carried out for economic reasons) could be regarded as a process that unintentionally had a positive influence on odonate assemblages. Currently, when most small watercourses are regulated, dredging that is properly planned and controlled has proven to protect the natural fauna. It is worthwhile to apply lessons learned from examples of active fauna protection to what is currently known as "the rotational model" for dredging." (Authors) *Calopteryx splendens*, *C. virgo*, *Platycnemis pennipes*, *Ischnura elegans*, *Erythromma najas*, *Aeshna cyanea*, *A. Aeshna mixta*, *Gomphus vulgatissimus*, *Somatochlora metallica*, *Sympetrum vulgatum*] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**19839.** Büsse, S. (2016): Morphological re-examination of *Epiophlebia laidlawi* (Insecta: Odonata) including remarks on taxonomy. *International Journal of Odonatology* 19(4): 221-238. (in English) ["*Epiophlebia* is the only known taxon of Odonata that is neither part of the Zygoptera nor Anisoptera. Previously, two species of *Epiophlebia* were recognized, restricted to areas in Japan (*E. superstes*) and the Himalayas (*E. laidlawi*). Recently, the group gained attention with the description of new species from China – *E. sinensis* and *E. diana* – while a subsequent genetic study suggested only one species of *Epiophlebia*. To clarify these conflicting hypotheses this study focused on the under-recorded *E. laidlawi*. This study elucidated the morphology of this species in comparison to *E. superstes*, representing the first comparative study of *Epiophlebia* species. Furthermore, it presents notes on the taxonomic conditions of this group. With this study, a first step is made to resolve the confusion regarding the taxonomic status of the described *Epiophlebia* species. A number of anatomical characters –



for example the different shape of the vertex of the head, the distinct colour patterns of the head, thorax and the abdomen or the differences in the shape of the hamulus anterior and posterior in the secondary male genitalia – confirmed the species status of *E. laidlawi* and underlined its distinctness from *E. superstes*. However, in the Chinese species *E. sinensis* and *E. diana* a re-examination is advised; especially in *E. diana* the species status is questionable." (Author)] Address: Büsse, S., Dept of Functional Morphology and Biomechanics, Institute of Zoology, Kiel Univ., Kiel, Germany. Email: sbuesse@zoologie.uni-kiel.de

**19840.** Bybee, S.; Córdoba-Aguilar, A.; Duryea, M.C.; Futahashi, R.; Hansson, B.; Lorenzo-Carballa, M.O.; Schilder, R.; Stoks, R.; Suvorov, A.; Svensson, E.I.; Swaegers, J.; Takahashi, Y.; Watts, P.C.; Wellenreuther, M. (2016): Odonata (dragonflies and damselflies) as a bridge between ecology and evolutionary genomics. *Frontiers in Zoology* 201613: 46: 20 pp. (in English) ["Odonata present an unparalleled insect model to integrate evolutionary genomics with ecology for the study of insect evolution. Key features of Odonata include their ancient phylogenetic position, extensive phenotypic and ecological diversity, several unique evolutionary innovations, ease of study in the wild and usefulness as bioindicators for freshwater ecosystems worldwide. In this review, we synthesize studies on the evolution, ecology and physiology of odonates, highlighting those areas where the integration of ecology with genomics would yield significant insights into the evolutionary processes that would not be gained easily by working on other animal groups. We argue that the unique features of this group combined with their complex life cycle, flight behaviour, diversity in ecological niches and their sensitivity to anthropogenic change make odonates a promising and fruitful taxon for genomics focused research. Future areas of research that deserve increased attention are also briefly outlined." (Authors) "Conclusions: Further development of genomic resources for Odonata could strongly improve research on microevolution driven by anthropogenic environmental changes. Integrating genomic data with the extensive field ecology knowledge of many species could be a major leap forward in the field of eco-evolutionary dynamics [207]. Phenotypic change can come about by adaptation, plasticity or an interaction of the two [207]. Disentangling contributions from these effects is important, as they are expected to be associated with different patterns, rates, limits and costs [207]. Moreover, population genomics could allow the prediction of hybridisation rates and improve the precision of demographic inferences by using dragonflies and damselflies as bioindicator species. This would allow us to plan conservation efforts best suited for Odonata itself, other co-occurring species and their environment. Transcriptomic analyses would allow the identification of genes and molecular processes likely to respond to selection due to climate change and habitat loss (which can be studied across a complex life cycle in Odonata), as recently done by Lancaster et al. [182]. Additionally, reduced representation sequencing approaches for genotyping (e.g. RAD, ddRAD, GBS) make it possible to develop and sequence many markers in nonmodel species [208], e.g. by sequencing large pools of individuals [209], and hence allow for the detection of outlier loci under selection. Such transcriptomic and genomic studies would benefit from the availability of reference transcriptomes and genomes so that annotation of differentially expressed genes and outlier loci is possible." ] Address: Bybee, S., Brigham Young Univ., Provo, UT 84606, USA. Email: seth.bybee@byu.edu

**19841.** Casallas-Mancipe, A.C. & Rache-Rodríguez, L. (2016): Migrating Odonata in the Colombian Andes. *Notulae odonatologicae* 8(8): 314-318. (in English) ["A migratory movement of Odonata at high elevations of the Colombian Andes, in the city of Bogotá at ca 2 600 m a.s.l., is reported for the first time. The species involved were *Anax amazili* and *Pantala hymenaea*." (Authors)] Address: Casallas-Mancipe, Adriana Carolina, Universidad Nacional de Colombia, Carrera 30 no. 45-03, A. A. 7495, Bogotá, D.C., Colombia. Email: accasallasm@unal.edu.co

**19842.** Chauhan, P.; Wellenreuther, M.; Hansson, B. (2016): Transcriptome profiling in the damselfly *Ischnura elegans* identifies genes with sex-biased expression. *BMC Genomics* 201617:985. DOI: 10.1186/s12864-016-3334-6: 12 pp. (in English) ["Background: Sexual dimorphism occurs widely across the animal kingdom and has profound effects on evolutionary trajectories. Here, we investigate sex-specific gene expression in *Ischnura elegans*, a species with pronounced sexual differences including a female-limited colour polymorphism with two female-like gynochrome morphs and one male-mimicking, androchrome morph. Whole-organism transcriptome profiling and sex-biased gene expression analysis was conducted on adults of both sexes (pooling all females as well as separating the three morphs) to gain insights into genes and pathways potentially associated with sexual development and sexual conflict. Results: The de novo transcriptome assembly was of high quality and completeness (54 k transcripts; 99.6% CEGMA score; 55% annotated). We identified transcripts of several relevant pathways, including transcripts involved in sex determination, hormone biosynthesis, pigmentation and innate immune signalling. A total of 1,683 genes were differentially expressed (DE) between males and all females (1,173 were female-biased; 510 male-biased). The DE genes were associated with sex-specific physiological and reproductive processes, olfaction, pigmentation (ommochrome and melanin), hormone (ecdysone) biosynthesis and innate immunity signalling pathways. Comparisons between males and each female morph category showed that the gynochromes differed more from males than the androchrome morph. Conclusions: This is the first study to characterize sex-biased gene expression in odonates, one of the most ancient extant insect orders. Comparison between *I. elegans* sexes revealed expression differences in several genes related to sexual differences in behaviour and development as well as morphology. The differential expression of several olfactory genes suggests interesting sexual components in the detection of odours, pheromones and environmental volatiles. Up-regulation of pigmentation pathways in females indicates a prominent role of ommochrome pigments in the formation of the genetically controlled female colour polymorphism. Finally, the female-biased expression of several immunity genes suggests a stronger immune response in females, possibly related to the high levels of male mating harassment and recurrent matings in this species, both of which have been shown to injure females and expose them to sexually transmitted diseases and toxins contained in seminal fluids." (Authors)] Address: Chauhan, P., Dept of Biology, Lund Univ., Lund, Sweden. Email: Pallavi.Chauhan@biol.lu.se

**19843.** Cheng, Y.-C.; Lin, C.-P. (2016): Dietary niche partitioning of *Euphaea formosa* and *Matrona cyanoptera* (Odonata: Zygoptera) on the basis of DNA barcoding of larval feces. *Journal of Insect Science* 16(1), 73: 1-5. (in English) ["Odonate larvae are commonly considered opportunistic general predators in freshwater ecosystems. However,

the dietary breadth of most odonate larvae in forest streams is still poorly documented. We characterized the prey species and estimated the level of dietary niche overlap of two damselflies, *Euphaea formosa* Hagen 1869 and *Matrona cyanoptera* Hämäläinen and Yeh, 2000 in a forest stream of central Taiwan on the basis of DNA barcoding of larval feces. A collection of 23 successfully identified cytochrome c oxidase 1 (CO1) barcoding sequences suggested that the mayflies (Ephemeroptera), caddisflies (Trichoptera), and midges (Diptera) comprise the majority (43%, 6/14) of prey species consumed by *E. formosa* larvae, whereas the identified prey for *M. cyanoptera* were mainly zooplankton (56%, 5/9). Statistical analysis of dietary overlap indicated that these two species occupy different dietary niches (Pianka's index = 0.219). DNA barcoding analysis of damselfly larval feces was effective in detecting less sclerotized prey such as vertebrates (fish and frog) and small zooplankton. However, a moderately successful rate (<70%) of PCR amplification by universal CO1 primers and a low percentage (<60%) of identifiable sequences in public databases indicate the limitations of naive DNA barcoding in fecal analysis." (Authors)] Address: Lin, C.-P., Dept of Life Science, National Taiwan Normal Univ., Taipei, 11610, Taiwan. Email: treehopper@ntnu.edu.tw

**19844.** Chovanec, A. (2016): Libellenkundliche Untersuchungen an der restrukturierten Pram (Riedau / Zell) und an der regulierten Trattnach (Schlüßberg) in Oberösterreich im Jahr 2016. Im Auftrag des Amtes der Oberösterreichischen Landesregierung, Abt. Oberflächengewässerswirtschaft: 67 pp. (in German) [Austria: "In the present study, the ecological status of the restructured section of the Pram River in the area from Riedau to Zell as well as of a regulated section of the Trattnach River in the area of Schlüßberg were assessed from the dragonfly point of view, with special consideration of the morphological conditions. This was done on the basis of the Dragonfly Association Index (DAI) and was based - in accordance with the requirements of the Water Framework Directive and the Water Act - on a comparison between a water body type-specific reference condition and the status quo. The method is based on an approach published by the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) (CHOVANEC et al. 2014), which has also been used in Upper Austria in recent years on the Krems and Aschach rivers as well as on the Leitenbach and Sandbach rivers. Pram: A total of 27 species were detected at the three restructured stretches of the Pram and at two mapped small water bodies. This corresponds to 35% of the Austrian species spectrum (78 species). 25 of the 27 species were native. According to the Red List for Austria, three species (all from the river damselfly family / Gomphidae) are "endangered", four species "potentially endangered". With *Ophiogomphus cecilia*, a species was found that is listed in Annexes II and IV of the EU Habitats Directive. A total of 16 species were sighted on the Pram itself, 14 of which were native. The assessment was based exclusively on the ground-dwelling species sighted on the Pram. The application of the DAI results in a very good dragonfly ecological status for the entire section, whereby it must be emphasised that the numbers of individuals of individual species of the guideline-compliant associations were very low. Trattnach: Six dragonfly species were recorded at the study section on the regulated Trattnach, which corresponds to 8% of the species inventory recorded for Austria. Of the 6 species, four were native. Two species are "potentially endangered" according to the Red List, one is "endangered". None of the species is listed in the Annexes of the Habitats Directive. The DAI calculation

results in moderate dragonfly ecological status for the entire section. This relatively good assessment can be explained primarily by the punctual occurrence of *Onychogomphus forcipatus* on a small gravel bank. An assessment of the dominant condition of the Trattnach without the gravel bank results in the unsatisfactory dragonfly ecological condition." (Author/DeepL)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

**19845.** Chuang, C.-J.; Liu, C.-D.; Patil, R.A.; Wu, C.-C.; Chang, Y.-C.; Peng, C.-W.; Chao, T.-W.; Liou, J.-W.; Liou, Y.; Ma, Y.-R. (2016): Impact of cuticle photoluminescence on the color morphism of a male damselfly *Ischnura senegalensis* (Rambur, 1842). *Scientific Reports* | 6:38051 | DOI: 10.1038/srep38051: 8 pp. (in English) ["In this study *I. senegalensis* was first found to produce strong photoluminescence (PL) emissions from various coloured-body portions, such as the eighth abdominal segment of the tail. The colours of the coloured-body portions can be enhanced or modified by the PL emissions for assistance in reducing intrasexual and male harassment, and improving mature mating and conspecific identity. Therefore, the PL emissions that contribute to the colour modification and coloration are involved in the cuticle evolution of the damselflies. The micro-PL confocal images verify that the PL emissions can strongly influence the surface colours of the cuticle, and demonstrate why *I. senegalensis* is called a bluetail. ... The Damselfly *Ischnura senegalensis* (Rambur, 1842) was first found to emit strong PL emissions from the various coloured-body portions of the compound eyes, thorax front, wings, and eighth abdominal segment of the tail. There is an obvious difference in appearance of the colours of the coloured-body portions in the PL image and those in the optical image, indicating that the PL emissions act as biological pigments and multilayer structures and can modify the colours or coloration of the coloured-body portions. This PL phenomenon is strongly related to cuticle evolution in the damselflies. The ultrathin histological sections of the various specific body portions of the damselfly *Ischnura senegalensis* were examined by confocal fluorescence microscopy and TEM. Micro-PL confocal and TEM images of the ultrathin histological sections of the various specific body portions show that The cuticle PL does impact on the colour morphism of a male damselfly *Ischnura senegalensis*, and it helps to reduce intrasexual and male harassment and to signal mature mating and conspecific identity." (Authors)] Address: Chuang, C.-J., Dept of Opto-Electronic Engineering, National Dong Hwa Univ., Hualien, 97401, Taiwan.

**19846.** Cicort-Lucaciu, A.-S.; Sas-Kovács, I.; Covaciu-Marcov, S.-D. (2016): Non road human influence upon road mortality on three secondary roads from the Vâlsan river protected area, Romania. *Muzeul Olteniei Craiova. Oltenia. Studii și comunicări. ătiințele Naturii* 32(2): 99-106. (in English, with Romanian summary) ["Human activities, unrelated to road, but taking place in its proximity, can modify the amplitude of road mortality in some animal groups. This is the case of bees, wasps and Coleoptera Geotrupidae on three secondary roads from the Vâlsan river basin, Romania. Black locust plantations near a road attract bees in the blooming period, increasing their chance of falling victim on the road. Coleoptera Geotrupidae are frequently killed on roads used by the local people's cows, being attracted by manure. Wasps come on the roads for feeding on the corpses of other road killed animals, while they are sometimes killed. Only in two days on the three secondary roads there were killed 899 individuals, from 50 taxa, mostly invertebrates.

The differences of the road mortality by roads and periods were not significant." (Authors) "Odonata" are harmed, but quite moderately.] Address: Covaciu-Marcov, S.-D., Univ. of Oradea, Faculty of Sciences, Dept of Biology; 1, Universităţii, Oradea 410087, Romania. E-mail: severcovaciu1@gmail.com

**19847.** Conesa Garcia, M.A.; Serrano Leon, J.P. (2016): La larva F0 y exuvia de *Calopteryx xanthostoma* (Charpentier, 1825), (Odonata: Calopterygidae). Boletín Asociación Odonatológica de Andalucía 4: 31-40. (in Spanish, with English summary) ["The F0 larval morphology and exuviae of *Calopteryx xanthostoma* (Charpentier, 1825), (Odonata: Calopterygidae). As a result of the genetic study of the genus *Calopteryx* Leach, 1815, in the palearctic fauna, *Calopteryx xanthostoma* (Charpentier, 1825) and *Calopteryx splendens* (Harris, 1782), have been separated. Both species can be easily distinguished in their adult specimens; however, the same does not apply to their larvae. There are few bibliographic references to *C. xanthostoma* larvae and, at present, no morphological criteria has been proposed to allow a clear separation between these two species in their larval level. In this paper a morphological study of larvae F0 and exuviae *C. xanthostoma* seeks to alleviate this lack of information." (Authors)] Address: Conesa García, M.A., Universidad Animal. Centro María Zambrano. UNED-Málaga. mconesa@malaga.uned.es

**19848.** Cottin, C.; Kronshage, A.; Kriger, D. (2016): Schätzung eines Libellenbestands im Naturschutzgebiet Heiliges Meer mit der Rückfangmethode der Biostatistik. Fachhochschule Bielefeld, Forschungsreihe des Fachbereichs Ingenieurwissenschaften und Mathematik 4: 1-17. (in German) ["*Lestes virens* lives in the nature reserve "Heiliges Meer" [Nordrhein-Westfalen, Germany]. Ecologists are interested in determining the approximate population size of these animals. of these animals. The specimens cannot be easily counted; however, it is known, that they rarely leave their relatively limited habitat. It is therefore a good idea to estimate the population size using the so-called recapture method. In this method dragonflies are captured and marked. Subsequently (for example, on the next day), dragonflies are caught again and an estimate of the size of the total population is determined from the ratio of marked dragonflies caught again to the total number of dragonflies caught. However, this method, which may seem relatively simple mathematically, has many aspects that are far from trivial when it comes to formulating statements about the quality of the estimated value. In detail, depending on the exact model assumptions, there are also different variants for calculating such estimators, with specific advantages and disadvantages. Using the dragonfly example, such modelling tasks in statistical ecology will be examined in more detail in this article - following on from the bachelor's thesis of the third author." (Authors/DeepL) (Authors)] Address: Cottin, Claudia, Fachbereich Ingenieurwissenschaften und Mathematik, FH Bielefeld, Germany. E-mail: claudia.cottin@fh-bielefeld.de

**19849.** DuBois, R.; Van den Broek, F. (2016): What is the incomparable *Anax longipes* (Comet Darner) doing in Wisconsin?. *Argia* 28(3): 16-18. (in English) ["In 2014, *A. longipes* was reported at four new sites. Repeated observations and photographs of males were made by Edgar Spalding and Karl Legler at a pond in Middleton Hills west of Madison in Dane County on 31 May, 2 June, and 8 June. An ovipositing female was photographed by Margo Dolan at Mystery Pond at the Schlitiz Audubon Center near Lake Michigan in

northern Milwaukee County on 16 June. A male was reported by Paul Sparks near the Milwaukee River, also in northern Milwaukee County, on 20 June. At least one male was seen and Pond (Fig. 2) at the Forest Beach Migratory Preserve near Lake Michigan in Ozaukee County on 30 June, 1 July, and 4 July. In 2015 Freda again photographed two males at the Clubhouse Pond on 21 June and continued to observe them there for several days. Also in the summer of 2015 Matt Berg observed a male flying with several *Anax junius* (Common Green Darner) males at Paradise Lake in Douglas County. No adults of *A. longipes* were seen at the Forest Beach Clubhouse Pond in 2016, but on 28 June Freda found a single exuvia of *A. longipes* while searching the entire perimeter of the pond (Fig. 3). Additional complete searches of the shoreline around the Clubhouse Pond and two other wetlands on the property on 7 July, and just at the Clubhouse Pond on 5 August, did not turn up any other exuviae of *A. longipes*, although many exuviae of *A. junius* and a variety of species of skimmers were found on these dates." (Authors)] Address: Robert DuBois: Email: robert.dubois@wisconsin.gov

**19850.** Foglini, C.; Falco, R.; Bergero, V. (2016): Indagine sull'odonatofauna del SIC IT20A0003 Palata Menasciutto e obiettivi di conservazione. Technical Report • January 2016. DOI: 10.13140/RG.2.2.22262.70726: 14 pp. (in Italian) [https://www.researchgate.net/publication/319393174\_Indagine\_sull%27odonatofauna\_del\_SIC\_IT20A0003\_Palata\_Menasciutto\_e\_obiettivi\_di\_conservazione?channel=doi&linkId=59a7d03daca272895c18be17&showFulltext=true] Address: not stated

**19851.** Garlet, J.; Corrêa Costa, E.; Boscardin, J. (2016): Survey of insect in Eucalyptus spp. plantation by light trap in Sao Francisco de Assis, RS. *Ciência Florestal*, Santa Maria 26(2): 365-374. (in Portuguese, with English summary) ["The cultivation of eucalyptus has become an important economic activity in Brazil. However, with the increase of the plantation areas, some entomological problems tend to increase in the same proportion. The constant monitoring of the insects associated with homogeneous planting systems is very important in order to seek the development of programs for integrated pest management. Thus, the purpose of this study was to perform a survey on the insect populations associated with *Eucalyptus* spp., in São Francisco de Assis, RS. The collects were carried out by light traps from July 2008 to August 2009 in three-year-old stands with the species: *Eucalyptus dunni*, *Eucalyptus grandis* and *Eucalyptus grandis* x *Eucalyptus urophylla*. The insects collected were analyzed using the faunistic indices, frequency, abundance, diversity, and constancy. The correlation between the pest species identified and the meteorological variables for the period were also performed. We collected 3623 individuals belonging to eight orders (Blattodea, Coleoptera, Dermaptera, Hemiptera, Hymenoptera, Lepidoptera, Mantodea and Odonata [Libellulidae]). Three species and three genus of Lepidoptera defoliators considered of economic importance were identified: *Automeris illustris*, *Eupseudosoma* sp., *Sabulodes* sp., *Sarsina* sp., *Thyrinteina amobia* and *Agrotis ipsilon* as well as the borer *Phoracantha semipunctata*. Our results show that there are important pest species of *Eucalyptus* already established in the region therefore some constant monitoring is required so that these species do not cause damage to plantations." (Authors)] Address: Garlet, Juliana, Engenharia Florestal, Dr<sup>a</sup>, Professora Adjunta da Faculdade Ciências Biológicas e Agrárias, Universidade do Estado de Mato Grosso, Campus II, Av. Perimetral Rogério Silva, s/n, Jardim Flamboyant,

CEP 78580-000, Alta Floresta (MT), Brasil. E-mail: juliana-garlet@yahoo.com.br

**19852.** Gupta, S.; Veeneela, R. (2016): A preliminary study on Odonata diversity in three diverse landscapes of Cachar district, Assam, India. *Current World Environment* 11(2): 477-485. (in English) ["Odonates are valuable as indicators of aquatic and terrestrial ecosystem health and also play a vital role as prey and predator to maintain the balance of trophic levels of food chain. Diversity and distribution of different species of Odonata and physico-chemical properties of water of their habitat in the rural (RA), urban (UA) and tea garden (TG) area of Cachar district of Assam was investigated. A total of fourteen (14) species (larva and adult) were recorded from the three areas. Six species were recorded in RA, four species in TG and six species in UA. Two species *Ischnura aurora aurora* and *Agriocnemis pygmaea pygmaea* were recorded common in TG and UA. In TG presence of only two tolerant families indicated that the water quality of the area is polluted. In RA, presence of Aeshnidae indicated relatively better condition of water quality." (Authors)] Address: Gupta, Susmita, Dept of Ecology and Environmental Science, Assam Univ., Silchar-788011, India

**19853.** Hafiane, M.; Hamzaoui, D.; Attou, F.; Bouchelouche, D.; Arab, A.; Alfarhan, A.H.; Samraoui, B. (2016): Anthropogenic impacts and their influence on the spatial distribution of the Odonata of Wadi El Harrach (North-central Algeria). *Revue d'Écologie* 71(3): 239-249. (in English, with French summary) ["In spite of a relatively good knowledge of the odonatafauna of the Maghreb, some large areas like the centre of Algeria have remained little explored. These areas have witnessed a demographic explosion and an agro-industrial development over the last century which have adversely impacted most natural ecosystems. Wadi El Harrach, an intermittent river that cuts through the Mitidja plain, near Algiers, is notorious for its pollution and represents a good model to investigate anthropogenic impacts on freshwater communities. In line with the increasing use of assessment methods developed to monitor and evaluate the ecological integrity of running waters, we sampled Odonata of Wadi El Harrach and measured various abiotic parameters representative of the water quality of the habitat. Both data sets were jointly used to analyse the correspondence between the two assessments. Results indicated congruence between both approaches and highlighted the potential of Odonata as reliable bioindicators of ecological conditions of lotic ecosystems." (Authors)]

**19854.** *Calopteryx haemorrhoidalis*, *Platycnemis subdilatata*, *Erythromma lindenii*, *Ischnura graellsii*, *Onychogomphus costae*, *O. forcipatus unguiculatus*, *Anax imperator*, *Orthetrum coerulescens anceps*, *O. chrysostigma*, *Sympetrum fonscolombii*, *Crocothemis erythraea*, *Trithemis annulata*, *Trithemis kirbyi*] Address: Hafiane, Mouna, Univ. of Sciences and Technology Houari Boumediène. Faculty of Science. Biological, Dynamic & Biodiversity Lab., BP 32, El Alia, Algiers, Algeria. E-mails: mounahafiane@yahoo.fr

**19855.** Holzinger, W.; Komposch, B. (2016): Bestandssituation der Großen Quelljungfer (*Cordulegaster heros* Theischinger, 1979) im Bezirk Mattersburg Große Quelljungfer: Larve und Lebensraum (Blumaugraben). Auftraggeber: Amt der Burgenländischen Landesregierung, Abteilung 5 – Anlagenrecht, Umweltschutz & Verkehr, Europaplatz 1, 7000 Eisenstadt, Austria. GZ: 5/N.A-10044-5-2015. Auftragnehmer: ÖKOTEAM - Institut für Tierökologie und Naturraumplanung, Bergmannsgasse 22, 8010 Graz, Austria: 44 pp. (in

German) ["Ökoteam was commissioned by the Office of the Provincial Government of Burgenland in August 2015 to prepare this expert report. The commission relates to the Large Spring Damselfly (*Cordulegaster heros* Theischinger, 1979), a dragonfly species native to Austria and listed in Annex II of the Habitats Directive (code: 4046), and includes the following questions: \* Are there such important occurrences of the Large Spring Damselfly (*Cordulegaster heros* Theischinger, 1979) in the district of Mattersburg that a listing in the Natura 2000 network of protected areas is recommended? \* Can these occurrences be covered by the existing European nature reserve AT 1123323 Mattersburger Hügelland or should additional areas be designated as protected areas for the species? \* How are the populations of the species in any protected areas to be classified (presence, conservation status)? \* What threats could these populations face and what protective measures could be taken for the species? \* How should further monitoring be carried out? According to the commission, the focus of the study was on the existing Natura 2000 site "Mattersburger Hügelland" (AT1123323). A total of 42 stretches of water were investigated for the occurrence of the damselfly. The majority of the sections are located in the Natura 2000 site. The mapping was carried out by searching for larvae directly in the water body. The field work was carried out on four dates in May 2016. A section of at least 50 m in length was defined at each of the water bodies surveyed, which is homogeneous with regard to the habitat parameters and impairments relevant to the assessment. The number of animals was recorded, differentiated according to large and small larvae. In addition, eight essential habitat parameters were recorded. The assessment of the conservation status of a species is carried out in accordance with the requirements of the Habitats Directive according to the criteria \*status of the population, \*habitat quality and \*impairments. For this purpose, the assessment scheme developed by Ökoteam (2016) for Styria was adopted with slight modifications. *Cordulegaster heros* was detected at 18 of the 42 water body sections investigated. A total of 124 larvae of the species were found, as well as several records of the two-striped damselfly (*Cordulegaster bidentata*). Seven of the breeding waters are at least partially located in the existing Natura 2000 site. Four of them (Marzer Bach-Zubringer I, Auwiesenbach, Auwiesenbach-Zubringer and Romersee-Zubringer) show an excellent conservation status of *C. heros*. Currently, the conservation status in the area is assessed as 'good', the population's share of the national stock in the continental region is in the category 'C'. In order to improve this assessment, it is recommended to extend the area to include the Blumaugraben, the Hochbergbach 1, the Auwiesenbach and/or the Kaltwasserbach. Proposals for the protection of stocks include the establishment of buffer strips (10 m on both sides of the watercourse) and a more natural watercourse design in the future. In addition, it is proposed to conduct future monitoring surveys according to the method applied here." (Authors) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Holzinger, W.E., ÖKOTEAM – Institut für Tierökologie und Naturraumplanung, Bergmannsgasse 22, 8010 Graz, Austria. EMail: [holzinger@oekoteam.at](mailto:holzinger@oekoteam.at)

**19856.** Holzinger, W.; Zimmermann, P.; Payandeh, R.; Payandeh, S. (2016): Bestandssituation der Großen Quelljungfer *Cordulegaster heros* Theischinger, 1979 in der Steiermark und Vorschläge zur Ausweisung von Schutzgebieten. Auftraggeber: Amt der Steiermärkischen Landesregierung, Abteilung 13 - Umwelt und Raumordnung, Referat Naturschutz, 8010 Graz, Stempfergasse 7, Austria. GZ: ABT13-



56O-26/2013-2. Auftragnehmer: ÖKOTEAM - Institut für Tierökologie und Naturraumplanung, Bergmannsgasse 22, A-8010 Graz, Austria: 42 pp. (in German) ["Due to ongoing infringement proceedings, the Republic of Austria and possibly also the Province of Styria are required to designate new protected areas for (among others) the dragonfly species *C. heros*. In this context, Ökoteam was commissioned in summer 2013 to prepare this expert report. The assignment includes the following questions: What is the distribution of *C. heros* in Styria? Where are the main areas of occurrence? Are there well-suited (nationally important) populations of the damselfly within the existing Natura 2000 sites in Styria, so that the species should be re-nominated in these areas to ensure its protection? Is it necessary from a technical point of view to expand existing areas and/or designate new areas in Styria in order to ensure the protection of the species in the Natura 2000 network of protected areas? How are the populations of the species in possible protected areas to be classified (information according to the standard data sheet)? What threats could these populations be exposed to and what protective measures could be taken for the species? The dragonfly is widespread in south-eastern Europe and reaches the north-western limit of its range in eastern Austria. Here, the range boundary runs across Carinthia (Villach area) along the eastern edge of the Alps to Lower Austria. It inhabits smaller, mostly shaded watercourses (preferably river classification number 2) in the planar to colline altitudinal zone. The larvae develop in sandy substrate in water depths below 20 cm and current velocities mostly below 6 cm/s and need three to five years for their development. Hatching occurs on land a few metres from the shore; the adults are the largest dragonflies in Europe and fly from early June to late August. Throughout Europe, the species is considered "Near Threatened" and its populations are declining. Its conservation status is good in the alpine and continental region, "favourable" in Austria, but in the Red Lists of Austria and Carinthia it is classified as critically endangered ("EN"), and in Lower Austria "endangerment is likely". The main cause of threat to the species is the destruction of its habitats by backfilling, piping and shoring. Before the start of this study, only few current distribution data on this species were available from Styria. Therefore, 100 grid squares in the potential distribution area (south-eastern Alpine foothills and Styrian foothills) were randomly selected and potentially suitable watercourse sections were then examined for the presence of larvae. Eight further sites were added due to chance findings and were also included in the data evaluation. Detections were made at a total of 31 water bodies, three of which are located in a Natura 2000 site. These data were used to model the probability of occurrence of the species for the whole of Styria using MaxEnt. Mapping and modelling showed that a relatively widespread distribution can be expected across the entire Alpine foothills of Styria, with the exception of the wider valley flats in the Grazer and Leibnitzer Feld and the flat lowlands of eastern Styria. The most important occurrences are in the hill country between the Grazer Bucht and the Raabtal, in the north-western Grazer Berg- und Hügel-land and in the Windische Büheln. Translated with www.DeepL.com/Translator (free version)] Address: Holzinger, W.E., ÖKOTEAM – Institut für Tierökologie und Naturraumplanung, Bergmannsgasse 22, 8010 Graz, Austria. EMail: holzinger@oekoteam.at

**19857.** Hughes, M.I.; Kaunisto, K.; Suhonen, J. (2016): Large males have fewer water mites (*Arrenurus* sp.) on the Variable Damselfly (*Coenagrion pulchellum*). *Canadian Journal of Zoology* 94(5): 339-343. (in English) ["Ectoparasitic

water mites *Arrenurus* sp. (Dugés, 1834) may affect damselflies in different ways resulting in lower longevity and reproduction success. We studied the variation of water mite occurrence on *C. pulchellum* in relation to the host's sex, location and wing length, and the amount of black pigment on the abdomens of males. In our study we found that water mite prevalence and abundance were higher on females. Location of the populations did not affect the prevalence of water mites, nor did the colouring of males. The prevalence and abundance of water mites was lower on larger males than on smaller ones. Our results suggest that females are likely to have more water mites due to different behaviour and life history strategies. According to our results male body size is a sign of good condition and, thus, of sufficient resources available to be directed to strengthening their immune systems." (Authors)] Address: Hughes, Maria, Section of Ecology, Dept of Biology, Univ. of Turku FI-20014 Turku, Finland. E-mail: mainhu@utu.fi

**19858.** Ilmi, N.; Abdullah, T.; Agus, N. (2016): Tanggapan fungsional *Agriconemis* sp. (Odonata: Libellulidae [sic!]) terhadap *leptocorisa acuta* t. (Hemiptera: Alydidae). *Beranda* 4(2): 35-41. (in Indonesian) ["*Agriconemis* sp. is one of the potential predators to control several types of pests on rice plants because of its polyphagous nature. One of its prey, namely walang sangu (*Leptocorisa acuta*) is an important pest in rice cultivation that can cause 50% yield loss. 20 individuals). All prey exposed to an image of *Agriconemis* sp. For 2 hours. Each experimental unit was repeated three times. Data were analyzed using Holling equation analysis and logistic regression to determine the type of predatory functional response. The results showed that the lowest predation rate was 0.888 fish/minute, namely the number of *L. acuta* provided ( $N_i$ ) was only 5 with a total time ( $T_t$ ) of predation that was 43 minutes, while the eggplant; ie 1.85 tails/minute on the number of prey provided ( $N_t$ ) IS tails with  $m_l$  time ( $T_t$ ) of predation 120 minutes. The results of the logarithmic regression show that the value of  $r$  is close to 1 ie 0.974, it can be concluded that the type of functional response *Agriconemis* sp. to *Lacuza* is type III or ugmord functional response, at first the increase in predation is slow, followed by a faster increase, then relatively constant." (Author) (Google translate)] Address: not stated

**19859.** Ilvonen, J.J.; Suhonen, J. (2016): Phylogeny affects host's weight, immune response and parasitism in damselflies and dragonflies. *R. Soc. open sci.* 3: 160421. <http://dx.doi.org/10.1098/rsos.160421>: 9 pp. (in English) ["Host-parasite interactions are an intriguing part of ecology, and understanding how hosts are able to withstand parasitic attacks, e.g. by allocating resources to immune defence, is important. Damselflies and dragonflies show a variety of parasitism patterns, but large-scale comparative immune defence studies are rare, and it is difficult to say what the interplay is between their immune defence and parasitism. The aim of this study was to find whether there are differences in immune response between different damselfly and dragonfly species and whether these could explain their levels of gregarine and water mite parasitism. Using an artificial pathogen, a piece of nylon filament, we measured the encapsulation response of 22 different damselfly and dragonfly species and found that (i) there are significant encapsulation differences between species, (ii) body mass has a strong association with encapsulation and parasite prevalences, (iii) body mass shows a strong phylogenetic signal, whereas encapsulation response and gregarine and water mite prevalences show weak signals, and (iv) associations between the traits are affected by phylogeny. We do not

know what the relationship is between these four traits, but it seems clear that phylogeny plays a role in determining parasitism levels of damselflies and dragonflies." (Authors)

**19860.** *Sympetrum vulgatum*, *S. flaveolum*, *S. danae*, *Leucorrhinia dubia*, *Libellula quadrimaculata*, *Somatochlora metallica*, *Cordulia aenea*, *Aeshna grandis*, *A. juncaea*, *A. subarctica*, *Ischnura elegans*, *Enallagma cyathigerum*, *Erythromma najas*, *Coenagrion hastulatum*, *C. pulchellum*, *C. armatum*, *C. johannsoni*, *Calopteryx virgo*, *C. splendens*, *Platycnemis pennipes*, *Pyrrhosoma nymphula*, *Lestes sponsa*] Address: Ilvonen, J.J., Section of Ecology, Dept of Biology, Univ. of Turku, 20014 Turku, Finland

**19861.** Jafer Palot, M. (2016): On a collection of Odonata (Insecta) from Lonar (Crater) Lake and its environs, Buldhana district, Maharashtra, India. *Bugs R All* 22: 6-9. (in English) ["Odonata were recorded from the Lonar Crater Lake and its environs. The suborder Zygoptera (Damselflies) represented by 5 species and the suborder Anisoptera (Dragonflies) with 16 species. The extreme salinity and high alkalinity (the pH higher than 10.5) of the Lake does not influence the odonata diversity of the area. The lake is known to support blue-green algae and certain micro-organisms. There is no previous record of higher aqua]c organisms and fishes inhab]ng this saline lake. The present report provides breeding records of 3 species of dragonflies (*Diplacodes trivialis*, *Orthetrum sabina*, *Brachythemis contaminata*) and two species of damselflies (*Ischnura senegalensis* and *Agriocnemis pygmaea*) within the Lonar Lake. *Tramea basiliaris* and *Trithemis pallidinervis* were sighted near Kalapaani and never within Lonar lake. The perennial stream flowing through the rim and marshes a]racted many of the hill stream - loving species such as *Trithemis fes,va*, *T. aurora* and *Orthetrum pruinosum*. The detailed species account and ecological observa]ons are given below." (Author)] Address: Jafer Palot, M., Western Ghats Regional Centre, Zoological Survey of India, Calicut 673 006, India. Email: palot.zsi@gmail.com

**19862.** Joshi, S. (2016): Odonata of India: a web-based resource. *Parthenos* (a newsletter of DiversityIndia) April 2016: 25-30. (in English) [Records of *Lyriothemis mortoni* Ris, 1919, *Protosticta ponmudiensis* Kiran, Kalesh & Kunte 2015, *Calicnemia nipalica* Kimmins, 1958, *Calicnemia erythromelas* Selys, 1891, and *Amphithemis vacillans* Selys, 1891 are documented.]

**19863.** Kemabonta, K.A.; Adu, B.W.; Ohadiwe, A.C. (2016): Impact of human disturbance on the abundance, diversity and distribution of Odonata in the Univ. of Lagos, Akoka, Lagos, Nigeria. *Applied Tropical Agriculture* 21(3): 143-150. (in English) ["Odonata fauna inhabiting Univ. of Lagos (Unilag), Akoka, Southwestern Nigeria was investigated for a period of 7 months (March to September) 2015. At the time of this study a portion of the Univ. forest was cut down and burnt. The three study sites investigated were: Distance Learning Institute (DLI), High Rise Area and Lagoon Front Area. Data collected from the study sites were subjected to diversity indices, descriptive statistics and diversity t-Test. A total of 787 individuals of dragonflies and damselflies from 13 genera, 3 families and 21 species were sampled. The three families include *Coenagrionidae* (62%), *Libellulidae* (36%) and *Platycnemididae* (2%). The most dominant species was *Ceragrion glabrum* (42%) followed by *Acisoma panoipoides* (10%). The DLI study site had the richest odonate fauna (Shannon Wiener index ( $H' = 1.94$ ), Simpson's Dominance index ( $C = 0.85$ ); while the least was

the High Rise study site (Shannon Wiener index ( $H' = 1.91$ ), Simpson's Dominance index ( $C = 0.85$ ). The distribution of the fauna was highest at DLI study site (Evenness = 0.99), followed by Lagoon front (0.98) and High rise (0.97). Degree of concentration at different study sites, was highest at DLI (0.85) and least at High rise (0.85). Most of the odonates sampled in this study are ubiquitous damselflies. When compared with the study on odonates at same study sites a year before, It is obvious that the human disturbance experienced at the study sites is detrimental to the assemblage of localized Odonata species of the forest. Hence, there is a strong need to preserve the Odonata community of the Univ. of Lagos." (Authors)] Address: Kemabonta, K.A., Dept of Zool., Fac. of Science, Univ. of Lagos, Akoka, Lagos State, Nigeria. E-mail: kennykemabonta@yahoo.com

**19864.** Ketenchiev, Kh.A.; Kharitonov A. Yu.; Kozminov, S.G. (2016): The Caucasus as one of Mediterranean centers of species diversity of dragonflies (Odonata). *Dagestan State Pedagogical Univ. Journal. Natural and Exact Sciences* 10(2): 46-51. (in Russian, with English summary) ["The paper considers the Caucasus as a province of Mediterranean region and dragonflies' biodiversity center, its limits and faunal composition, formed under the influence of the Holarctic and Paleosubtropic areas. In the fauna there are 86 species of dragonflies, which are distributed to 3 suborders, 11 families and 29 genera. The authors define a unique combination of regional climatic characteristics, landscapes, determined the faunal composition of dragonflies, its historical and original formation." (Authors)] Address: Ketenchiev, H.A., Institute of Chemistry and Biology (IChB), Kh. M. Berbekov KBSU, Nalchik, Russia. E-mail: h\_a\_k@mail.ru

**19865.** Khan, S.A. (2016): Odonata nymphs from Chakwal, Punjab, Pakistan. *International Journal of Zoology Studies* 182: 9-11. (in English) ["Odonata naiads were collected from different localities of the district Chakwal Punjab Pakistan. A series of collection was conducted during the year 2013 to explore the Odonata naiads. The specimens were collected from different aquatic habitats includes water filled holes, temporary ponds, and seasonal streams. As a whole 10 Zygoptera and 25 Anisoptera species were identified." (Authors) As the list of taxa includes North American species, some of the identifications can not be correct.] Address: Khan, S.A., Univ. College of Agriculture, Univ. of Sargodha, Pakistan

**19866.** Kittel, R.N.; Engels, W. (2016): Diversity of dragonflies (Odonata: Anisoptera) of Rio Grande do Sul, Brazil, with five new records for the state. *Notulae odonatologicae* 8(8): 284-289. (in English) ["During a survey of Odonata in the summer 2004/2005 at the Araucaria forest reserve Pró-Mata in the Serra Geral mountain range, Rio Grande do Sul, Brazil, five species of Anisoptera new to the state were recorded. These are *Erythrodiplax diversa* (Navás, 1916), *Erythrodiplax ochracea* (Burmeister, 1839), *Micrathyrria laevigata* Calvert, 1909, *Progomphus gracilis* Hagen in Selys, 1854 and *Rhionaeschna eduardoi* (Machado, 1984). These additions increase the number of dragonflies (Anisoptera) known from Rio Grande do Sul to 59 species." (Authors)] Address: Kittel, Rebecca, Lab. of Insect Biodiversity and Ecosystems Science, Graduate School of Agricultural Science, Kobe Univ., Rokkodai 1-1, Nada, Kobe, 657-8501 Japan. E-mail: rebecca.n.kittel@gmail.com

**19867.** Kozminov, S.G.; Ketenchiev, Kh.A. (2016): Preimaginal development dragonflies *Anax imperator* Leach,

1815 (Odonata). Proceedings of Gorsky State Agrarian Univ. 53(3): 164-170. (in Russian, with English summary) ["The preimaginal stage of dragonflies, entering into various biotic and abiotic relationships, being an integral component of aquatic biocenoses, makes the main or only contribution to the production processes of many water bodies. Studies of the preimaginal development of *Anax imperator* were carried out under the conditions of the Kabardino-Balkarian Republic. Preimaginal development is characterized by a change in morphology, a gradual linear increase in the size of the body and its individual parts. 14 age stages were determined, differing in a complex of morphometric, morphological parameters, distinctly combined into eight age groups. The definition of regional criteria for preimaginal development will allow studying the processes of dragonfly variability to changing environmental conditions, and can be used both in applied and theoretical fields of biology. Under experimental conditions, the preimaginal stages of development of dragonflies. *A. imperator* are described in detail, their morphological and morphometric parameters are revealed. In their preimaginal development, dragonflies of this species go through 14 age stages; after 28 days. With increasing age, the time between molts increases: stage 1 up to 4 molts after 3-4 days; 5-7 - 4-7; 9-10 - 8-10; 11-12 - 10-13; 12-13 - 15-16; 14 - final, hatched after 18-20 days. The complex of morphological and morphometric parameters makes it possible to accurately determine the preimaginal stage of development. All age stages are clearly grouped into eight age groups, which can be used in population monitoring, physiological, ethological and many other applied studies." (Authors)] Address: Khasan Alievich Ketenchiev, K.A., «Zoology & Botany» Dept, Kabardino-Balkarian State Univ. 360004, Republic of Kabardino-Balkaria, Nalchik, 173 Chernishevsky Str., Russia. E-mail: h\_a\_k@mail.ru

**19868.** Lagesson, A.; Fahlman, J.; Brodin, T.; Fick, J.; Jons-son, M.; Byström, P.; Klaminder, J. (2016): Bioaccumulation of five pharmaceuticals at multiple trophic levels in an aquatic food web - Insights from a field experiment. *Science of The Total Environment* 568: 208-215. (in English) ["Highlights: •A study of uptake of five pharmaceuticals by fish and four aquatic invertebrates. •There are inter-specific differences in uptake of pharmaceuticals. •Highest concentrations were found for the benthic species. •Important to not only consider waterborne exposure in risk assessments. •Important to include organisms from different trophic levels in risk assessments. Abstract: Pharmaceuticals derived from manufacturing and human consumption contaminate surface waters worldwide. To what extent such pharmaceutical contamination accumulates and disperses over time in different compartments of aquatic food webs is not well known. In this study we assess to what extent five pharmaceuticals (diphenhydramine, oxazepam, trimethoprim, diclofenac, and hydroxyzine) are taken up by fish (European perch) and four aquatic invertebrate taxa (damselfly larvae [*Coenagrion* sp.], mayfly larvae, waterlouse, and ramshorn snail), by tracing their bioconcentrations over several months in a semi-natural large-scale (pond) system. The results suggest both significant differences among drugs in their capacity to bioaccumulate and differences among species in uptake. While no support for in situ uptake of diclofenac and trimethoprim was found, oxazepam, diphenhydramine, and hydroxyzine were detected in all analyzed species. Here, the highest bioaccumulation factor (tissue:water ratio) was found for hydroxyzine. In the food web, the highest concentrations were found in the benthic species ramshorn snail and waterlouse, indicating that bottom-living organism at lower trophic posi-

tions are the prime receivers of the pharmaceuticals. In general, concentrations in the biota decreased over time in response to decreasing water concentrations. However, two interesting exceptions to this trend were noted. First, mayfly larvae (primarily grazers) showed peak concentrations (a fourfold increase) of oxazepam, diphenhydramine, and hydroxyzine about 30 days after initial addition of pharmaceuticals. Second, perch (top-predator) showed an increase in concentrations of oxazepam throughout the study period. Our results show that drugs can remain bioavailable for aquatic organism for long time periods (weeks to months) and even re-enter the food web at a later time. As such, for an understanding of accumulation and dispersion of pharmaceuticals in aquatic food webs, detailed ecological knowledge is required." (Authors)] Address: Lagesson, Annelie, Dept of Ecol. & Environmental Science, Umeå Univ., 90187 Umeå, Sweden. E-mail: annelie.lagesson@umu.se

**19869.** Lara-Contreras, J.-C. (2016): Ácaros ectoparásitos (Hydrachnidia) de las especies de libélulas (Odonata) presentes en diferentes humedales de la Sabana de Bogotá. MSc thesis, Universidad Nacional de Colombia, Facultad de Ciencias, Depto de Biología, Bogotá, Colombia: IX + 58 pp. (in Spanish, with English summary) ["This study was aimed to establish relationships between the disturbance associated to activities around the wetlands, physico-chemical variables of water, adult Odonata and larval water mites parasites on dragonflies and damselflies, in different wetlands from Bogotá Savanna located between 2.500 and 2.600 meters of altitude. Eight species of dragonflies and damselflies were found, two morfo-species of *Arrenurus* spp were affecting two species of Zygoptera. A relationship between the disturbance, pH, oxygen, conductivity, nitrites, nitrates, phosphates and water mites abundance was found." (Author)] Address: not stated

**19870.** Linnell, J. D. C., Kaltendorfer, B., Bredin, Y. & Gjershaug, J. O. (2016): Biodiversity assessment of the Fagaras Mountains, Romania. NINA Report 1236: 86 pp. (in English) ["This report aims to summarise the existing knowledge concerning the biodiversity of the Fagaras Mountains, in the southern Carpathians of Romania. It is intended to provide a basis for an assessment of the ecosystem services that are being provided, and that could be provided, by the area. The Fagaras Mountains consist of an uninterrupted 70-80 km long ridge that reaches to over 2500 m in altitude, with many side ridges branching off, creating a highly variable topography. As well as containing Romania's highest mountain, it also contains the largest area of continuous alpine zone habitat in Romania. The slopes are covered with spruce forests at higher altitudes and mixed deciduous forests at lower altitudes. At lower altitudes land-use gives way extensive low-intensity agriculture at the forest-farmland interface, and then more intensive agriculture where soils permit. Most of the mountain range is protected within two Natura 2000 sites that combine to an area of 2436 km<sup>2</sup>, and these adjoin several other Natura 2000 sites, and other Romanian protected areas. Our biodiversity assessment consisted of collecting existing data from published and unpublished sources. Over 72% of the area is forested, with the rest consisting of alpine grasslands (25%) and rock, scree and bogs. Some patches of virgin forest have been identified along the northern slopes of the mountain range, and many areas have not been surveyed. The biodiversity of the Fagaras Mountains has not been as well studied as in many of the neighbouring regions, however, it was still possible to build up a good preliminary species of species diversity for some species groups, including mammals (57

species), birds (130 species), amphibians (17 species), reptiles (13 species), fish (12 species), freshwater crayfish (2 species), butterflies and moths (563 species), beetles (125 species), dragonflies (15 species), spiders (40 species), water-bugs (22 species), water-mites (28 species), lichens (144 species) and plants (895 species). For other species groups such as fungi (19 species), snails (6 species) and crickets (2 species) there is clearly a lot more registration to do before these species lists will become complete. Of these species, a total of 107 are of EU community interest, being listed on either the Habitats Directive or the Birds Directive. Many of the species are also on the national Romanian red list. In terms of its size, species diversity, and ecological integrity the Fagaras Mountains are clearly an area with a very high biodiversity value. The majority of the records we found come from only two areas that have been comparatively well studied (Sinca Noua and the Upper Dambovită river basin). As a result, further studies of new areas and other species groups are clearly going to lead to an increase in the areas known diversity. Most of the area is subject to multiple human land uses, such as forestry, hunting, livestock grazing, the gathering of berries and mushrooms and low-intensity agriculture. These have formerly been conducted with low intensity and in ways that have been largely compatible with biodiversity conservation. However, recent trends have been towards an intensification of all human activities in recent years, most visibly shown by the introduction of poorly regulated clearcutting of forests. In addition, the area has been subject to a lot of poorly planned development, such as small scale hydro-electric plants, second homes and tourist infrastructure. There is therefore a desperate need to establish land-use zoning plans and guidelines for practices (forestry, hunting, livestock grazing, gathering of non-timber forest products, infrastructure development, agriculture) that are compatible with the conservation objectives of the Natura 2000 site. While the urgency of the situation requires that this work start at once to avoid irreversible changes, a great deal of further work to map habitats and species is needed in order to fine tune management guidelines for the specific human activities and land-uses." (Authors) *Aeshna mixta*, *Anax parthenope*, *Calopteryx splendens*, *C. virgo*, *Coenagrion ornatum*, *Ischnura pumilio*, *Somatochlora alpestris*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia*, *Lestes barbarus*, *Libellula depressa*, *L. quadrimaculata*, *Orthetrum brunneum*, *O. coerulescens*, *Platycnemis pennipes*] Address: John D. C. Linnell, Email: john.linnell@nina.no

**19871.** Maity, P.; Roy, S.; Chakraborti, U.; Biswas, O.; Ghosh, J.; Gayen, A.K.; Mitra, B. (2016): Insect faunal diversity of Salt Lake City – an urbanized area adjacent to Kolkata, India. *Bioscience Discovery* 7(2): 101-112. (in English) ["Salt Lake City or Bidhannagar, a part of East Kolkata Wetland, is an advanced township adjacent to Kolkata. A total of 266 insect species of 206 genera under 74 families belonging to the eleven order are reported in this communication. Of them, Lepidoptera shared maximum species (73 species), followed by Odonata (46 species), Diptera (44 species), Coleoptera (42 species), Hemiptera (25 species), Hymenoptera (17 species), Orthoptera (10 species) and Blattaria (06 species). The orders Ephemeroptera, Dermaptera and Mantodea shared single species respectively. Present work is the baseline data of insect faunal diversity of Salt Lake City, an urbanized area in the vicinity of Kolkata, West Bengal." (Authors) The list of Odonata refers to 'Dawn, P. (2014): Taxonomic study of Odonata [Insecta] in Kolkata and surroundings, West Bengal, India. *J. Entomol. Zool. Studies* 2(3): 147-152' and includes only six own records of

common dragonflies.] Address: Roy, S., Zoological Survey of India, Prani Vigyan Bhawan, M- Block, New Alipore, Kolkata, India. Email: sroy.zoology@gmail.com

**19872.** Matushkina, N.A. (2016): First record of extra-abdominal processes in adult Odonata. *International Journal of Odonatology* 19(1-2): 53-61. (in English) ["Paired extra-abdominal processes (ap) were found in the pleural region of abdominal segments 6–9 in adult Odonata for the first time. They are unsegmented bulge-like or rod-like structures of different size, degree of sclerotization and mobility. A short search across odonatan families has shown that ap are inherent for all studied Aeshnidae and for some other Anisoptera. A comparative study of final stadium larvae has shown that ap appear as remnants of larval lateral spines originally situated on larval tergites. This fact provides evidence about the complex nature of the pleural region in the Aeshnidae imago which includes part of the area of the larval tergite." (Author) *Aeshna affinis*, *A. cyanea*, *Amphibaeschna ampla*, *Coryphaeschna adnexa*, *Rhionaeschna absoluta*, *Anax imperator*, *Austroaeschna unicornis*, *Brachytron pratense*, *Epiaeschna heros*, *Basiaeschna janata*, *Boyeria vinosa*, *Gomphaeschna antilope*, *Telephlebia tillyardi*, *Gynacantha adela*, *Triacanthagyna septima*, *Phenes raptor*, *Cordulegaster bidentata*, *Epithea bimaculata*, *Gomphus vulgatissimus*, *Orthetrum cancellatum*, *Epiophlebia superstes*, *Epallage fatime*, *Hetaerina americana*, *Coenagrion pulchellum*] Address: Matushkina, Natalia, Dept of Zoology, Institute of Biology, Taras Shevchenko National Univ. of Kyiv, Kyiv, Ukraine. Email: odonataly@gmail.com

**19873.** Matúšová, Z.; Stašiov, S.; Antalová, K. (2016): Príspevok k poznaniu vážok Ondavskej vrchoviny. „Zoológia 2016“ 24.–26. November 2016, Univerzita Konštantína Filozofa v Nitre: 152-154. (in Slovakian, with English summary) ["In this study we summarize the data on the occurrence of dragonflies (Odonata) in Ondavská vrchovina highlands collected during the past 16 years. The data come from 12 sites including running and stagnant waters. Overall, we recorded 15 dragonfly species while 2 of them are of some conservation concern. The presence of *Onychogomphus forcipatus* in each of the studied rivers may indicate relatively favourable conditions of running waters in Ondavská vrchovina highlands." (Authors) *Calopteryx splendens*, *C. virgo*, *Lestes sponsa*, *Platycnemis pennipes*, *Coenagrion puella*, *Enallagma cyathigerum*, *Erythromma najas*, *Ischnura elegans*, *Aeshna cyanea*, *Anax imperator*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Libellula depressa*, *Orthetrum cancellatum*, *Sympetrum sanguineum*] Address: Matúšová, Zuzana, Katedra biológie a všeobecnej ekológie, Fakulta ekológie a environmentalistiky, Technická univerzita vo Zvolene, T. G. Masaryka 20, SK-960 53, Zvolen, Slovakia. E-mail: zuzana.matushova@gmail.com

**19874.** Merlet, F.; Itrac-Bruneau, R. (2016): Aborder la gestion conservatoire en faveur des Odonates. Guide technique. Office pour les insectes et leur environnement & Société française d'Odonatologie. Direction régionale de l'environnement, de l'aménagement et du logement Hauts de France: 96 pp. (in French) ["Conclusion: As Wildermuth & Küry said in their guide Protecting and promoting dragonflies, it is time to take action! This technical guide to conservation management in favour of Odonata is intended to unite the players around a single objective: to preserve dragonflies and their habitats. Prior to any intervention, a manager must ask himself the right questions: what species are present and what are their ecological requirements?



Given this diversity, what are the responsibilities of the site? What is the state of health of the habitats? How can the conservation management of the site be best understood by taking all these elements into account? In order to answer these questions, it is advisable to consult specialists in Odonata in order to better understand the problems of the site. This document should first help the manager to prioritise the steps to be taken. Once the conservation objectives have been defined, it is then necessary, in addition to internal technical skills and the local network, to use this guide to follow the steps listed and target the appropriate action(s). For their part, odonatologists can put their knowledge and naturalist skills to use in conservation. When they detect the presence of a species of heritage interest or a dysfunction of the environment (absence of species characteristic of the habitat, for example) on a site, they can approach the management bodies to alert them. If the site does not have any, the local structures in charge of nature conservation, the competent authorities or the owner can be contacted. They can then propose to become involved in the diagnosis prior to the action (inventory of Odonata, analysis of needs and degradation factors), orient the measures according to the ecological requirements of the species and continue this partnership to evaluate the effectiveness of the measures on Odonata. This guide also offers the odonatologist the possibility of being an actor in conservation by proposing the key elements of successful conservation management. These partnerships between managers and naturalists should enable operations to be implemented under the best possible conditions. More generally, conservation management must be the result of consultation between all the players in the area: cooperation, exchanges and sharing of experience are the guarantees of the success of the action undertaken." (Authors) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Merlet, Florence, 78 rue de Cornouailles, 78180 Montigny-le-Bretonneux, France. Email: [florence.merlet@gmail.com](mailto:florence.merlet@gmail.com)

**19875.** Michelson, C. (2016): Effects of agricultural land use on tree swallow (*Tachycineta bicolor*) reproduction, body condition and diet. MSc. thesis, Dept of Biology, Univ. of Saskatchewan: IX + 115 pp. (in English) ["Agricultural practices have intensified over the last 50 years, increasing crop production and altering the Canadian Prairie landscape by removing non-cropped habitats and wetlands. The productivity, trophic structure and diversity have changed through increased agrochemical inputs and reductions in yearly rotation and diversification of crop types. Most intensive agricultural practices have negative effects on invertebrate communities that can indirectly affect higher trophic organisms, such as birds. Many populations of aerial insectivorous bird species have been experiencing rapid declines in the last 30–40 years. Dependency on high abundances of aerial insects for reproduction and survival is a common link among all species of this guild. My thesis examined aerial insect abundance as a potential link between agricultural land use and the reproductive ecology, nestling body condition, and diet of an aerial insectivore species, the tree swallow (*Tachycineta bicolor*). My broad goal was to determine whether agriculture has deleterious effects on timing of breeding, reproductive investment and success, and nestling quality, as mediated by food supply and differences in diet. Aerial insect abundance and biomass estimates obtained from passive insect traps which capture primarily aquatic dipterans were similar between agricultural and reference sites during all stages of breeding. However, estimates derived from sweep-net sampling in terrestrial habitats in 2013 indicated higher abundances of aquatic

and terrestrial Diptera at a reference site relative to agricultural sites. Multiple measures of tree swallow productivity were not related to agriculture land use but nestling body condition was significantly lower on agricultural sites. Using stable isotope analysis ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ), I found site and age specific differences in swallow diets and isotopic niche widths but variation was not consistently related to agricultural land use. Aquatic insect prey (Diptera and Odonata) made up the majority of the diet of swallows but nestlings had a larger proportion of terrestrial Diptera which resulted in larger isotopic niche widths compared to adults. The assimilated isotopic diet of nestling and adult swallows were not strong predictors of body size, mass or condition, suggesting that site differences in the diet do not appreciably affect condition. Nestlings raised on agricultural sites had lower body condition that was not directly linked to their diet alone. This suggests other unmeasured factors related to agricultural land use may affect nestling tree swallows. This study tested responses in an aerial insectivore species to land use and potential shifts in the insect community, which may provide important information for conservation and management decisions for many species within the aerial insectivore guild." (Author)] Address: Michelson, Chantel Irene, Univ. of Saskatchewan, Saskatoon, Saskatchewan, S7N 5E2, Canada.

**19876.** Mikolajewski, D.J.; Conrad, A.; Leipelt, K.-G.; Mauersberger, R. (2016): Larvale Aktivität und Feindvermeidungsverhalten bei vier *Leucorrhinia*-Arten (Odonata: Libellulidae). *Libellula* 35(3/4): 195-206. (in German, with English summary) ["Larval activity and predator avoidance behaviour of four *Leucorrhinia* species (Odonata: Libellulidae) – An organisms' activity mediates food intake as well as the likelihood of being detected by predators. Larval odonates can plastically reduce their activity in response to predators as well as avoiding predators by increasing distance from them. Larvae of the European *Leucorrhinia* species express an overall low activity but comparative data are rare. Here we present data for larval activity as well as predator avoidance behaviour in *L. caudalis*, *L. dubia*, *L. pectoralis*, and *L. rubicunda* in the absence and presence of a predatory fish (perch *Perca fluviatilis*). All four species differ in their activity but only *L. dubia* plastically reduced its activity in response to predatory fish. However, larvae of all species tried to avoid predatory fish by increasing their distance from a compartment keeping predatory fish. We discuss our data with regards to developmental differences and predator related habitat preferences in *Leucorrhinia*-species." (Authors)] Address: Mikolajewski, D.J., Institut für Biologie, Freie Universität Berlin, Königin-Luise-Str. 1–3, 14195 Berlin, Germany. Email: [d.mikolajewski@gmx.de](mailto:d.mikolajewski@gmx.de)

**19877.** Miller, S. (2016): To investigate materials and the lifecycle of the dragonfly. Degree Programme in Fine Art, Calligraphy, Satakunnan ammattikorkeakoulu, Satakunta Univ. of Applied Sciences: 32 pp. (in English) ["The purpose of this thesis was to investigate materials and the lifecycle of the dragonfly. The idea was to demonstrate the three stages of the Dragonfly's life, the egg, the nymph and lastly the dragonfly. The script Cnut was analysed and studied, and a practice book produced. Versals were also analysed and studied, and a practice book produced. The colour systems were investigated in colour swatches, these were red, blue and yellow, cyan, yellow, magenta and black, and two red, two blues and two yellows. Different types of Vellum were also investigated and discussed. Different types of Gilding glues were also investigated on paper and vellum. These materials were investigated to be used in the pieces

of calligraphy. A Vellum piece was produced and three pieces illustrating the Lifecycle of the Dragonfly were produced. It was concluded that the two blues, two reds and two yellow colour system was the best one to use for calligraphy as it produced the widest range of colours, also in the use of painting other colours could be supplemented easily in the illustrate the Lifecycle of the Dragonfly. The result of the Gilding experiments was that Gesso and Gums were suited for Vellum and Paper use. Reindeer Vellum was found to be the most suitable for use with Calligraphy.] Address: not stated

**19878.** Mogali, S.; Saidapur, S.; Shanbhag, B. (2016): Influence of desiccation, predatory cues, and density on metamorphic traits of the bronze frog *Hylarana temporalis*. *Amphibia-Reptilia* 37(2): 199-205. (in English) ["We conducted an experiment to understand the influence of ecological factors (desiccation, predation threat and density) on two major metamorphic traits, larval period and size at metamorphosis, in the Indian bronze frog. Tadpoles were reared in groups of 15 (low), 30 (medium) and 60 (high) densities. We created the threat of desiccation by removing 0.5 l water at 10 days intervals until the water quantity reached 0.5 l. Caged dragonfly larvae (*Pantala flavescens*) provided the predation threat. Results show that each ecological factor independently influenced metamorphic traits but not in an interactive way. Under desiccation threat the tadpoles metamorphosed earlier and at smaller sizes compared to those reared in constant water (at corresponding densities) regardless of presence/absence of predator. In contrast, under predation threat, tadpoles metamorphosed early and at a bigger size than those reared without predator regardless of density of rearing, and desiccation threat. Alternatively, an increase in density of rearing delayed metamorphosis with smaller metamorphic size in constant water and also under threat of desiccation regardless of whether predation threat existed or not. Thus, our study revealed that *H. temporalis* tadpoles can modify their response to each ecological factor regardless of what other factors operate simultaneously; the threat of desiccation shortens larval period at the cost of growth. Whereas, predator pressure shortens larval period along with increased growth; while greater density increases larval period and slows down growth in *H. temporalis*."] (Authors)] Address: Shanbhag, B., Dept of Marine Biol., Karnatak Univ. Post-Graduate Centre, Kodibag, Karwar-581 303, Karnataka, India. Email: bhagyashrishanbhag@gmail.com

**19879.** Naka, H.; Ikari, K.; Narusawa, K.; Hashimoto, H. (2016): Experimental visualization of three-dimensional flow using flapping model mimicking free-flight of dragonfly by tomography. *Transactions of the Visualization Society of Japan* 36(12): 71-81. (in Japanese, with English summary) ["Dragonflies generate three-dimensional flow to gain aerodynamic forces. However, three-dimensional flow in free-flight of dragonfly is not clarified experimentally. In this study, experimental visualization and particle image velocimetry (PIV) analysis using tomography is carried out to clarify experimentally the three-dimensional flow. The flap simulator mimicking flapping motion of dragonfly is used for visualization because reproducible measurement is important for tomography. The flow is visualized with tomography from front and lateral side of the flap simulator. As a result, straight flight of dragonfly generates swift flow in a posterior direction in the center on the direction of wingspan. Moreover, it is confirmed that the flow is drawn to base-side of wings. It is suspected that the flow pulled by the flow in a posterior direction. Therefore, straight flight of dragonfly does not

generate the extra flow in the direction of wingspan and generates the swift flow in a posterior direction."] (Authors)] Address: Hashimoto, H., Dept of Mechanical Engineering, Faculty of Engineering, Tokai College of Human Sciences (?259-1292 Shimokane, Kanagawa) 4-1-1 Kitakanome, Tsuka City, Japan. Email: hiromu@keyaki.cc.u-tokai.ac.jp

**19880.** Naraoka, H. (2016): The factors influencing the length of the terrestrial period in the final instar larvae of *Epiophlebia superstes* (Selys, 1889) (Anisozygoptera: Epiophlebiidae). *International Journal of Odonatology* 19(3): 95-105. (in English) ["The terrestrial period before adult eclosion of the final instar larvae of *Epiophlebia superstes* was studied during spring 2008 to 2012, at a mountain stream in Nurukawa, Aomori prefecture, northern Japan. The average terrestrial period of larvae that left the water during early, middle and late April, estimated by mark-release-recapture and caging methods, was 45.3 days ( $\pm 1.3$  days,  $n = 8$ ), 35.8 days ( $\pm 1.8$  days,  $n = 9$ ) and 29.0 days ( $\pm 1.4$  days,  $n = 2$ ), respectively. The date on which a larva left the water was negatively correlated with the terrestrial period ( $r^2 = 0.80$ ,  $df = 17$ ,  $p < 0.01$ ). Also, indoors, the terrestrial period was negatively correlated to air temperature ( $r^2 = 0.76$ ,  $df = 7$ ,  $p < 0.01$ ."] (Author)] Address: Naraoka, H., 36-22, Motoizumi, Fukunoda, Itayanagi-cho, Kita-gun, Aomori Prefecture, 038-3661, Japan. E-mail: sbnkq127@ybb.ne.jp

**19881.** Ostrovsky, A. M. (2016): *Sympetrum meridionale* (Selys, 1841) (Odonata, Libellulidae) – a new kind of dragonfly for the fauna of Belarus. *Proceedings of the Francisk Scorina Gomel State Univ.* 6(99): 30-33. (in Russian, with English summary) ["*S. meridionale* was first discovered in the territory of Belarus, as an invasive element of the local fauna of dragonflies. The material was collected in 2016."] (Author) Gomel, floodplain meadow in the region of the railway bridge over the river. Sozh, net on dry stems, 31.VII. 2016 (1 male); Gomel, low wetland in the floodplain of the river. Sozh, densely overgrown with macrophytes, net on shore grass and shrub vegetation, 03.VIII.2016 (4 males, 2 females); Gomel, left bank of the river. Sozh in the section from the Novobelitsky automobile bridge to the rowing canal, with a net in the air and on coastal vegetation, 11.VIII. 2016 (1male, 3 females). A.M. Ostrovsky leg. et det. The material is stored in the collection of the author.] Address: not stated

**19882.** Palacio, A. del; Muzon, J. (2016): Redescription of *Erythrodiplax pallida* (Needham, 1904) (Odonata: Libellulidae). *International Journal of Odonatology* 19(1-2): 23-30. (in English) ["A redescription of both sexes of *E. pallida* is provided based on specimens collected in shallow wetlands associated with flood plains from small streams to large rivers in Corrientes and Buenos Aires provinces, Argentina. The vesica spermalis morphology resembles those of the *basalis* and *nigricans* groups due to the presence of median and posterior lobes and the lack of paired lobes. *E. pallida* is easily distinguished from the other congeners by the white frons."] (Authors)] Address: Palacio, A. del, Instituto de Limnología "DR RA Ringuélet" (CONICET – CCT La Plata), La Plata, Argentina. Email: adelpalacio87@gmail.com

**19883.** Patra, D.; Roy, S.; Chowdhury, S. (2016): Diversity and abundance of Odonata fauna in Midnapore and Surrounding areas, West Midnapore, West Bengal. *Journal of Entomology and Zoology Studies* 2016; 4(6): 553-558: 553-558. (in English) ["A study was conducted on the status and diversity of Odonata fauna in Midnapore, West Bengal and associated areas in various natural and anthropological

habitats from June 2013 to July 2015. Forty-one species of odonates belonging to the 29 Genera and 6 Families were recorded from the study area during study period. Suborder Zygoptera was represented by 2 families and Suborder Anisoptera represented 4 families. Among them 29 species were dragonflies under the families; Aeshnidae, Gomphidae, Libellulidae and Macromiidae whereas the other 12 species were damselflies under 2 families; Coenagrionidae, Platynemididae. Species composition was highest in the family Libellulidae (56%) followed by the family Coenagrionidae (22%). Their status has been assessed in that study area. Species have been classified based on their relative estimate of abundance. Such studies on monitoring the species diversity and abundance can give valuable information and insight on the population status of Odonates." (Authors)] Address: Patra, Debarun, Dept of Zool., Midnapore College, Midnapore, West Midnapore, West Bengal, India

**19884.** Phan, Q.T.; Kompier, T. (2016): A study of the genus *Protosticta* Selys, 1855, with descriptions of four new species from Vietnam (Odonata: Platystictidae). *Zootaxa* 4098(3): 529-544. (in English) ["The genus *Protosticta* Selys, 1855 from Vietnam is revised. Four new species, *P. ngoai* spec. nov., *P. socculus* spec. nov., *P. pseudocuriosa* spec. nov., and *P. spinosa* spec. nov. are described; detailed morphological structures of four species *P. beaumonti* Wilson, 1997 (dark form), *P. caroli* van Tol, 2008, *P. grandis* Asahina, 1995, and *P. satoi* Asahina, 1997, are provided. *P. beaumonti* is newly recorded for Vietnam. The female of *P. caroli* is described for the first time. *P. linnaei* van Tol, 2008, is also listed here, based on the original description and visual inspection of the type specimens. The occurrence of *P. khaosoidaoensis* Asahina, 1984, in Vietnam is reviewed and rejected. A total of nine *Protosticta* species have now been recorded for Vietnam." (Authors)] Address: Phan, Q.T., Dept of Biological Science, Tokyo Metropolitan Univ., Minami-Osawa 1-1, Hachioji, Tokyo 192-0397, Japan. E-mail: pqtoan84@gmail.com

**19885.** Polaskova, V.; Schenkova, J.; Bartosova, M.; Radkova, V. (2016): Aquatic invertebrates of calcareous wetlands in post - mining landscape: a comparison with natural calcareous fens. In 2nd Central European Symposium of Aquatic Macroinvertebrate Research. 2016: 39-[Verbatim: "Although many studies have dealt with vegetation and terrestrial fauna of post-industrial biotopes, comprehensive hydrobiological research on post-industrial wetlands is still rather rare. Due to specific bedrock chemistry of the Sokolov Coal Basin in the north-western Czech Republic, wetlands with calcium carbonate (tufa) precipitation, high conductivity and sulphate concentrations occur in this area. Within post-industrial wetlands, this combination of abiotic conditions is completely unique. Macroinvertebrate assemblages of nine wetlands in two spoil banks were studied in spring and autumn in 2014. In total, 159 taxa (mostly identified at the species level) of Mollusca, Clitellata, Ephemeroptera, Plecoptera, Odonata, Heteroptera, Trichoptera, Coleoptera and Diptera were found. Diptera with 85 taxa was the most diverse group comprising many rare and protected taxa closely associated with specific conditions of the post-industrial calcareous wetlands. Moreover, Diptera assemblages included a high number of spring fen specialists [...]. Despite extreme chemical conditions, calcareous wetlands in post-mining landscape provide important refuges for a high number of aquatic invertebrates, including rare and specialized taxa. Calcareous wetlands of the Sokolov spoil banks can be thus considered as unique biotopes with similar taxa richness as highly threatened and quickly disappearing

spring fens." (Authors)] Address: not stated

**19886.** Porter R.F. (2016): Odonata from Iraq, with three new records. *Notulae odonatologicae* 8(8): 254-260. (in English) ["Twenty-two taxa of Odonata were recorded between 2009 and 2013 in the Peramagroon Mountains (Zagros range) and the Central Marshes of Iraq. *Chalcolestes parvidens*, *Erythromma lindenii* and *Orthetrum chrysostigma* are new records for the country, bringing the national checklist to at least 44 species. The discovered population of *E. lindenii* showed characters transitory to ssp. *zernyi* Schmidt, 1939." (Author)] Address: Porter R.F., BirdLife International, The David Attenborough Building, Pembroke Street, Cambridge, CB2 3QZ, United Kingdom. Email: rforporter@talktalk.net

**19887.** Rajabi, H.; Ghoroubi, N.; Stamm, K.; Appel, E.; Gorb, S.N. (2016): Dragonfly wing nodus: a one-way hinge contributing to the asymmetric wing deformation. *Acta Biomaterialia* 60: 330-338. (in English) ["Dragonfly wings are highly specialized locomotor systems, which are formed by a combination of several structural components. The wing components, also known as structural elements, are responsible for the various aspects of the wing functionality. Considering the complex interactions between the wing components, modelling of the wings as a whole is only possible with inevitable huge oversimplifications. In order to overcome this difficulty, we have recently proposed a new approach to model individual components of complex wings comparatively. Here, we use this approach to study nodus, a structural element of dragonfly wings which has been less studied to date. Using a combination of several imaging techniques including scanning electron microscopy (SEM), wide-field fluorescence microscopy (WFM), confocal laser scanning microscopy (CLSM) and micro-computed tomography (micro-CT) scanning, we aim to characterize the spatial morphology and material composition of fore- and hindwing nodi of the dragonfly *Brachythemis contaminata*. The microscopy results show the presence of resilin in the nodi, which is expected to help the deformability of the wings. The computational results based on three-dimensional (3D) structural data suggest that the specific geometry of the nodus restrains its displacements when subjected to pressure on the ventral side. This effect, resulting from an interlocking mechanism, is expected to contribute to the dorso-ventral asymmetry of wing deformation and to provide a higher resistance to aerodynamic forces during the downstroke. Our results provide an important step towards better understanding of the structure-property-function relationship in dragonfly wings. Statement of significance: In this study, we investigate the wing nodus, a specialized wing component in dragonflies. Using a combination of modern imaging techniques, we demonstrate the presence of resilin in the nodus, which is expected to facilitate the wing deformability in flight. The specific geometry of the nodus, however, seems to restrain its displacements when subjected to pressure on the ventral side. This effect, resulting from an interlocking mechanism, is suggested to contribute to dorso-ventral asymmetry of wing deformations and to provide a higher resistance to aerodynamic forces during the downstroke. Our results provide an important step towards better understanding of the structure-property-function relationship in dragonfly wings and might help to design more efficient wings for biomimetic micro-air vehicles." (Authors)] Address: Rajabi, H., Institute of Zoology, Functional Morphology & Biomechanics, Kiel Univ., Kiel, Germany. Email: hrajabi@zoologie.uni-kiel.de

**19888.** Robinson, J. (2016): Mercury concentrations in invertebrates from a contaminated wetland, Montague Gold Mines, Dartmouth, Nova Scotia. B.Sc., Thesis, Saint Mary's Univ., Halifax, Nova Scotia: 44 pp. (in English) ["Mercury pollution has become a significant concern to environmentalists over the past several decades. With natural releases of mercury and increasing anthropogenic activities releasing larger quantities of mercury into the environment over the last several decades, harm to organisms and ecosystems is also on the rise. One anthropogenic activity that will be considered in this report is gold mining and its products' bioavailability, via mercury contaminated-tailing material, in aquatic invertebrates at a wetland located in the Montague Gold Mining District in Dartmouth, Nova Scotia. Sediment from the study wetland at Montague Mining District showed significantly elevated total mercury concentrations with all samples far above the Canadian Council of Ministers of the Environment freshwater sediment values. Focal invertebrates (Anisoptera, Zygoptera and Dolomedes) were collected from the study wetland as well and analyzed for total mercury content displaying significantly higher total mercury concentrations than invertebrates of the same sub-order and genus collected from a non-contaminated reference site. Additionally, Anisoptera total mercury levels far exceeded levels found at a similar study conducted at Kejimikujik National Park, indicating this site in particular is of high concern for mercury contamination, bioavailability and potential biomagnification through terrestrial and aquatic food chains. With respect to parental Hg transfer to young, our results suggest that Hg transfer from Dolomedes to their young within their egg sacs is likely. Due to the nature of the odonate and dolomedes lifecycles and their potential to spread contamination not only to terrestrial landscapes, but also to other aquatic habitats, it is clear that the impacts go beyond the boundaries of the Old Stamp Mill wetland." (Author)] Address: not stated

**19889.** Sanmartín-Villar, I.; Cordero-Rivera, A. (2016): Female colour polymorphism and unique reproductive behaviour in Polythore damselflies (Zygoptera: Polythoridae). *Neotropical Entomology* 45(6): 658-664. (in English) ["We studied Polythore damselflies by mark-recapture techniques in the Jatun Sacha Biological Reserve (Ecuador) for a period of 48 days in October–December 2014. Three species were found: Polythore mutata (MacLachlan) was the commonest species (111 individuals marked), Polythore derivata (MacLachlan) was rare (24 individuals) and Polythore concinna (MacLachlan) occasional (four individuals). In P. mutata, we found two phenotypes amongst females, one of them with a white band on the wings, very similar in colouration to the conspecific male (androchrome), and the other with an amber band (gynochrome). The recapture of marked females indicates that both phenotypes are maintained since emergence to maturation and are not age-related (i.e. polymorphism). Androchromes represent 40% of females observed. The colour of the wing band showed an age-dependent change in size with opposite trends between sexes, increasing in males and decreasing in females. Males and females were observed to return to the same forest locations in different days. Courtships and ovipositions involving androchrome females were not observed. No matings were observed in any morph. In contrast, we recorded two consecutive matings of one female P. derivata. We found that Polythore males grasp the mesothorax of females during mating instead of the prothorax as in other Zygoptera. We discuss the rarity of reproductive behaviour in this genus and how female morphs might be maintained." (Authors)] Address: Cordero Rivera, A., Depto

Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**19890.** Shahr, M.N.A.; Uddin, B.; Khan, M.K. (2016): OdoBD: An online database of ecological and genetic information of the Odonata of Bangladesh. FCRSD2016, Sylhet, Bangladesh: 48- (in English) [Verbatim: Odonata (dragonflies and damselflies) are carnivorous insects distributed in the diverse freshwater reservoirs throughout the world. Bangladesh situated in the South-east Asia, is gifted with the rich network of water resources like ponds, lakes, marshes, rivers, streams and mangrove swamps. This various range of water bodies along with many tropical forest patches has generated suitable habitat for many Odonata species. Till date, scanty of studies have been carried out to annotate the Odonata fauna of Bangladesh. Currently, nearly hundred species is known from Bangladesh, however there is no consolidated database of this taxa for this country, and information on these species remains elusive. The largely unconsolidated information makes large-scale analysis and researches involving Odonates particularly challenging. Thus, we have developed an online database of all the known Odonates from different locations of Bangladesh to generate an integrated and widely accessible source to facilitate studies of ecology, conservation, and genetic analysis. Currently, we have amassed information of 86 different species from all over the country. The database, -named Odonata of Bangladesh (www.Odobd.org), contains information on morphology, habitat, abundance, gene and protein sequences, worldwide distribution and conservation status of the Bangladeshi Odonates and is updated on a regular basis. We have included gender specified photographs with descriptions for better understanding for the novice researchers and naturalists. This database will spread the knowledge of the Bangladeshi Odonates as well as will enhance the opportunities for ecological and genetic research on those species. [http://www.rufford.org/projects/md\\_kawsar\\_khan](http://www.rufford.org/projects/md_kawsar_khan)] Address: Md Nur Ahad Shahr, Dept of Biochemistry & Molecular Biology, Shahjola! Univ. of Science & Technology, Sylhet, Bangladesh. E-mail: md.ahadshah@student.sust.edu

**19891.** Siregar, A.Z.; Bakti, D. (2016): Diversity and distribution of Odonata In Univ. Sumatera Utara, Medan, Indonesian. *International Journal of Scientific & Technology Research* 5(5): 229-234. (in English) ["A total of nine stations randomly selected study sites around the Univ. Sumatera Utara area conducted during a month (16 January 2016 until 16 February 2016) for identified of Odonata. Odonata are insect which function as bioindicator and conservation of an environment status in the area. The sampled were collected using a sweep net (400 pm mesh, 60 cm x 90 cm) with six times the swing starts at 0900 until 1200 noon hour and identified in the laboratory. Consist of two sub-orders, 4 families, 24 genera, 32 species and 156 individuals identified dragonfly, Orthetrum sabina, Pantala flavescens and Agrionemis femina are the kinds of dragonflies dominant, while two types of Vestalis/Arthystira amoena and Tholymis aurora is found only in the Station 3. As much as 54% relative abundance of family Coenagrionidae dominated, followed by Libellulidae (35%), Gomphidae (8%) and the smallest recorded from family Calopterygidae (35). The calculation of the value of the index is done, includes diversity Shannon, evenness and varied of Jaccard index (H=2.48-3.79, E=0.70-0.85, CJ=0.45 to 1.00). Based on the conservation status, calculated the percentage of attendance dragonfly, divided into four groups of species that are rare (6.28%),



there are species (54.24%), many species (24.78%) and very many species (14.70%). This study shows diversity and distribution of Odonata can be used as potential as predators and conservation status of ecosystem Univ. of Sumatera Utara areas." (Authors)] Address: Ameilia Zuliyanti Siregar, Departement Agroecotechnology, Faculty of Agriculture. E-mail: comazsyanti@gmail.com

**19892.** Soendjoto, M.A.; Riefani, M.K.; Perdana, Y.P. (2016): Odonata (casar dan carum) di Hutan Kota Tanjung Persada, Tanjung, Provinsi Kalimantan Selatan. Prosiding Seminar Nasional Lahan Basah, 2016 (1). Lambung Mangkurat Univ. Press, Banjarmasin, Indonesia: 146-149. (in English) ["There was no data on Odonata in Hutan Kota Tanjung Persada (HKTP, Urban Forest of Tanjung Persada), Tanjung, Data is important to show the existence and the condition of waters in the HKTP area. In addition, it can be used as environmental education materials for students in Tanjung (the city of Tabalong Regency) and its surrounding areas. The objectives of the research were to list Odonata species and to link the (dominant color) species to the area where it was found. Data was collected through survey in 4 consecutive days of September 2016. The area consisted of the exposed area and the shaded one. The identified Odonatas were noted directly, but the unidentified ones were documented as photographs before they were identified. Fourteen species were found in HKTP. There were 8 dragonfly species (2 families) and 6 damselfly species (2 families). The number of species in the exposed area was higher than that in the shaded area." (Authors)] Address: Mochamad, A.S., Fakultas Kehutanan, Universitas Lambung Mangkurat, Jalan Ahmad Yani Km 36 Banjarbaru, Indonesia

**19893.** Sonnenburg, H.; Garczorz, T. (2016): Die Libellenfauna des NSG "Donoper Teich - Hiddeser Bent" (Detmold) unter besonderer Berücksichtigung des Hochmoorlebensraumes (Insecta: Odonata). Mitteilungen der Arbeitsgemeinschaft ostwestfälisch-lippischer Entomologen 30(1): 1-17. (in German) ["The results of the dragonfly fauna survey carried out in the Donoper Teich - Hiddeser Bent nature reserve from 2011 to 2014 are presented, supplemented by data from previous years. The main focus of the survey was Hiddeser Bent. The Hiddeser Bent (here especially the eastern area) is characterised by a particular richness of dragonfly species. With the exception of the ubiquitous *Libellula quadrimaculata*, *Sympetrum striolatum* and *Coenagrion puella*, the species recorded mostly occurred in very low densities. Species specific to the high moors of the Hiddeser Bent include *Aeshna subarctica*, *Somatochlora arctica* and *Leucorrhinia dubia*. *Aeshna juncea*, *Orthetrum coerulescens* and *Lestes virens* occurred in small numbers as further species typical of the bog, but not exclusively bound to bog habitats. Despite the immigration of new species, a loss of importance of the Hiddeser Bent for the dragonfly fauna can be assumed, which particularly affects the more demanding species of the raised bogs and acidic, nutrient-poor waters. This is due to the progressive shrinkage process and the drying out of the bog depressions in summer." (Authors/DeepL)] Address: Sonnenburg, H., Biologischen Station Lippe, Domäne 2, 32816 Schieder-Schwabenberg, Germany. E-Mail: h.sonnenburg@biologischestationlippede

**19894.** Soomets, E.; Rannap, R.; Lõhmus, A. (2016): Patterns of assemblage structure indicate a broader conservation potential of focal amphibians for pond management. PLoS ONE 11(7): e0160012. doi:10.1371/journal.pone.

0160012: 16 pp. (in English) ["Small freshwater ponds host diverse and vulnerable biotic assemblages but relatively few conspicuous, specially protected taxa. In Europe, the amphibians *Triturus cristatus* and *Pelobates fuscus* are among a few species whose populations have been successfully restored using pond restoration and management activities at the landscape scale. In this study, we explored whether the ponds constructed for those two target species have wider conservation significance, particularly for other species of conservation concern. We recorded the occurrence of amphibians and selected aquatic macro-invertebrates (dragonflies; damselflies; diving beetles; water scavenger beetles) in 66 ponds specially constructed for amphibians (up to 8 years post construction) and, for comparison, in 100 man-made ponds (created by local people for cattle or garden watering, peat excavation, etc.) and 65 natural ponds in Estonia. We analysed nestedness of the species assemblages and its dependence on the environment, and described the co-occurrence patterns between the target amphibians and other aquatic species. The assemblages in all ponds were significantly nested, but the environmental determinants of nestedness and co-occurrence of particular species differed among pond types. Constructed ponds were most species-rich irrespective of the presence of the target species; however, *T. cristatus* was frequent in those ponds and rare elsewhere, and it showed nested patterns in every type of pond. We thus conclude that pond construction for the protected amphibians can serve broader habitat conservation aims in the short term. However, the heterogeneity and inconsistent presence of species of conservation concern observed in other types of ponds implies that long-term perspectives on pond management require more explicit consideration of different habitat and biodiversity values. We also highlight nestedness analysis as a tool that can be used for the practical task of selecting focal species for habitat conservation." (Authors) *Coenagrion armatum*, *C. hastulatum*, *C. puella*, *C. pulchellum*, *Cordulia aenea*, *Enallagma cyathigerum*, *Epitheca bimaculata*, *Erythromma najas*, *Leucorrhinia albifrons*, *L. caudalis*, *L. dubia*, *L. pectoralis*, *L. rubicunda*, *Libellula depressa*, *L. quadrimaculata*, *Orthetrum cancellatum*.] Address: Soomets, E., Inst. Ecol. & Earth Sciences, Univ. of Tartu, Tartu, Estonia. Email: elin.soomets@ut.ee

**19895.** Suhaila, A.H.; Che Salmah, M.R.; Nurul Huda, A. (2016): Composition and distribution of Odonata larvae and its relationship with physiochemical water quality in northern peninsular Malaysia. Malaysian Journal of Science 35(2): 198-209. (in English, with Malaysian summary) ["A study on composition and distribution for Odonata larvae and their relationship with physicochemical parameters was carried out in selected rivers of Gunung Jerai Forest Reserve, Kedah. Different river physicochemical parameters might influence or affect different type of Odonata composition. Therefore, Odonata larvae were sampled monthly at three selected rivers in Gunung Jerai Forest Reserve which were Teroi, Tupah, Batu Hampar rivers from August 2007 until January 2008 by using a D-frame aquatic net. A total of 253 individuals of 12 genera belonging to nine families of Odonata have been identified. Greatest number of Odonata individuals was recorded in Teroi River (112 individuals) with mean density recorded highest in January 2008 (6.6 ind/m<sup>2</sup>). The major families were Libellulidae, Euphaeidae and Gomphidae. Aeshnidae, Macromiidae, Calopterygidae, Coenagrionidae, Amphipterygidae and Chlorocyphidae represented the minority groups. Libellulidae reported the greatest number of individuals in all study areas, followed by Euphaeidae. Ranking from the highest to the lowest

number of genus collected were *Zygonyx*, *Euphaea*, *Macromia*, *Anax*, *Ophiogomphus*, *Libellago*, *Vestalis* and *Devadatta*, *Neurobasis*, *Cercion*, *Pseudagrion*, *Gomphidictinus*, and *Paragomphus*. The distribution of these genera were significant in different months studied (Kruskal Wallis,  $p < 0.05$ ) in all three rivers. The abundance of individuals collected was strongly influenced by velocity of water. Libellulid *Zygonyx* was the most affected by velocity and biochemical oxygen demand in all studied river. A *Euphaea* larva was influenced by temperature, depth, pH and biochemical oxygen demand. The ecological index (Richness, diversity and evenness index) exhibited poor Odonata communities in all studied rivers. In conclusion, water velocity, biochemical oxygen demand do have influenced on Libellulidae family while temperature, depth, pH and biochemical oxygen demand have influenced on Euphaeidae family." (Authors)] Address: Suhaila, A.H., School of Biological Sciences, Universiti Sains Malaysia, 11800 USM, Penang, Malaysia. Email: ahsuhaila@usm.my

**19896.** Svensson, E.; Nordén, A.; Waller, J.; Runemark, A. (2016): Linking intra- and interspecific assortative mating: consequences for asymmetric sexual isolation. *Evolution* 70(6): 1165-1179. (in English) ["Assortative mating is of interest because of its role in speciation and the maintenance of species boundaries. However, we know little about how within-species assortment is related to interspecific sexual isolation. Most previous studies of assortative mating have focused on a single trait in males and females, rather than utilizing multivariate trait information. Here we investigate how intraspecific assortative mating relates to sexual isolation in two sympatric and congeneric damselfly species (genus *Calopteryx*). We connect intraspecific assortment to interspecific sexual isolation by combining field observations, mate preference experiments and enforced copulation experiments. Using canonical correlation analysis, we demonstrate multivariate intraspecific assortment for body size and body shape. Males of the smaller species mate more frequently with heterospecific females than males of the larger species, which showed less attraction to small heterospecific females. Field experiments suggest that sexual isolation asymmetry is caused by male preferences for large heterospecific females, rather than by mechanical isolation due to interspecific size differences or female preferences for large males. Male preferences for large females and male-male competition for high quality females can therefore counteract sexual isolation. This sexual isolation asymmetry therefore indicates that sexual selection currently opposes a species boundary." (Authors)] Address: Svensson, E., Evolutionary Ecology Unit, Dept of Biology, Lund Univ., Lund, Sweden. E-mail: erik.svensson@biol.lu.se

**19897.** Takiya, D.; Santos, A.; Pinto, A.; Henriques-Oliveira, A.; Carvalho, A.; Sampaio, B.; Clarkson, B.; Moreira, F.; Avelino-Capistrano, F.; Gonçalves, I.; Cordeiro, I.; Câmara, J.; Barbosa, J.; de Souza, W.; Rafael, J. (2016): Aquatic insects from the Caatinga: checklists and diversity assessments of Ubajara (Ceará State) and Sete Cidades (Piauí State) National Parks, Northeastern Brazil. *Biodiversity Data Journal* 4: e8354. doi: 10.3897/BDJ.4.e8354: 195 pp. (in English) ["Background: Diversity and distribution of Neotropical aquatic insects is still poorly known, with many species to be recorded and many others to be described, due to the small number of taxonomists and sparse faunistic studies. This knowledge is especially poor in the Caatinga Domain in Northeastern Brazil, even though, this region may have played an important historical role in the spatial evolution of faunas of forested areas in northern South

America.

**19898.** New information: Aquatic insect checklists of 96 species from Parque Nacional de Ubajara (Ceará State, Brazil) and 112 species from Parque Nacional de Sete Cidades (Piauí State, Brazil) are presented, representing the following taxa: Elmidae, Epimetopidae, Hydrophilidae, and Torridincolidae (Coleoptera), Hemerodromiinae (Diptera: Empididae), Ephemeroptera, Gerromorpha and Nepomorpha (Hemiptera), Odonata, Plecoptera, and Trichoptera. Because of the scarce number of biological inventories in Northeastern Brazil, several new distributional records (of species, genera, and families) for Brazil, Northeastern Brazil, and Ceará and Piauí states are provided. In addition, several undescribed species were detected, being 26 from Ubajara and 20 from Sete Cidades. Results represent a significant increase to the known fauna of these states, ranging from 13%-70% increase for Ceará and 41% to 91% increase for Piauí. Although both parks are relatively close to each other and within the Caatinga domain, their aquatic fauna display a very high complementarity (89% species), possibly due to structural differences of water bodies sampled in each park. Rarefaction curves based on quantitative light trap samples suggest a much higher expected species richness of aquatic insects at Sete Cidades than at Ubajara National Park. Discussion on biogeographical affinities of this sample of the Caatinga fauna is provided." (Authors) Odonata on pages 144-156.] Address: Pinto, Â.P. Laboratory of Systematics on Aquatic Insects (LABSIA), Depto de Zoologia, Universidade Federal do Paraná, Curitiba, Paraná, Brazil

**19899.** Terek, J.; Brazda, J.; Obona, J.; Słmolak, R. (2016): Macrozoobenthos of two hydromelioration channels (Hran area, eastern Slovak lowland, Slovakia) in different time periods. *Folia Oecologica* 8(2): 52-59. (in English) ["In four profiles of two hydromelioration channels, relatively high diversity of macrozoobenthos species (100 taxa) was found. Samples taken from this channel consisted of the following higher taxonomical groups: Oligochaeta, Hirudinea (3 taxa), Amphipoda (2 taxa), Isopoda (1 taxa), Mollusca (13 taxa), Diptera (30 taxa), Odonata (17 taxa), Ephemeroptera (3 taxa), Trichoptera (8 taxa), Heteroptera (10), Megaloptera (1 taxa), Lepidoptera (2 taxa), and Coleoptera (9 taxa)." (Authors)

**19900.** *Platycnemis pennipes*, *Coenagrion puella*, *C. pulchellum*, *Coenagrion* / *Ischnura* indet, *Erythromma najas*, *E. viridulum*, *Pyrrhosoma nymphula*, *Ischnura elegans*, *Somatochlora* sp. cf., *Aeshna grandis*, *Anaciaeschna isosceles*, *Anax imperator*, *Brachytron pretense*, *Crocothemis erythraea*, *Libellula depressa*, *Orthetrum albistylum*, *Sympetrum vulgatum*] Address: Terek, J., Dept of Environmental Management, Faculty of Management, Univ. of Prešov, 17. novembra 1, 081 16 Prešov, Slovakia. Email: jozef.terek@unipo.sk

**19901.** Thein, P.P.; Choi, S.-W. (2016): Forest insect assemblages attracted to light trap on two high mountains (Mt. Jirisan and Mt. Hallasan) in South Korea. *Journal of Forestry Research* 27(5): 1203-1210. (in English) ["Assemblages of forest insects across two high mountains (Mt. Hallasan: JJ and Mt. Jirisan: JR) in South Korea were compared by collecting insects using an ultraviolet light trap at 20 sites (200–1700 m elevation ranges) from May to October 2013. A total of 2960 individuals, representing 481 species of 10 orders [including Odonata not further specified],

were collected on JJ, compared with 7080 individuals representing 769 species of 14 orders on JR. The estimated number of species on JJ was 667 compared with 952 on JR. The differentiation among habitats ( $\beta$ -diversity) was higher on JJ (4.95) than JR (4.33) because of the island characteristics of JJ. Six insect orders (Lepidoptera, Coleoptera, Diptera, Hymenoptera, Hemiptera and Trichoptera) were dominant on both mountains, suggesting that the light trap captures represented well the insect fauna and is an effective method for investigating forest insect diversity. We concluded that forest insect assemblages on mountains are mainly affected by the elevation and the dominant forest in each elevation. In addition, the insect fauna on each mountain was differentiated by the habitat, which could be correlated with geological history." (Authors) See Table 1 for site information. Col: Coleoptera, Dip: Diptera, Hem: Hemiptera, Hym: Hymenoptera, Lep: Lepidoptera and Others: Dermaptera, Ephemeroptera, Mecoptera, Neuroptera, Odonata, Orthoptera, Plecoptera and Psocoptera. Table 3...] Address: Choi, S.-W., Dept of Environ.I Education, Mokpo Nat.I Univ., Muan, Jeonnam, 58554, South Korea. E-mail: choisw@mokpo.ac.kr

**19902.** Therry, L.; Janne Swaegers, J.; Dinh, K.V.; Bonte, D.; Stoks, R. (2016): Low larval densities in northern populations reinforce range expansion by a Mediterranean damselfly. *Freshwater Biology* 61: 1430-1441. (in English) ["(1.) Contemporary climate change triggers a poleward range shift in many species. A growing number of studies document evolutionary changes in traits accelerating range expansion (such as growth rate and dispersal-related traits). In contrast, the direct impact of decreasing conspecific densities towards the very edge of the expansion front has been neglected. Density effects may, however, have a profound direct impact on traits involved in range expansion and influence range dynamics. (2.) In this study, we contrast the effects of high conspecific larval density typical for established populations and low larval density typical for newly founded populations at the edge of the expansion front on a set of larval traits that may affect the range dynamics in the poleward moving damselfly *Coenagrion scitulum*. We therefore ran an outdoor mesocosm experiment with a low- and high-density treatment close to the species' northern expansion front. Density effects on survival, growth rate and body size are scored both during the pre-winter growth period and during the subsequent winter period. Additionally, foraging activity was scored at the end of the pre-winter period and body condition [size-corrected body mass, fat content and activity of phenoloxidase (PO)] was scored at the end of the winter period. (3.) The low-density treatment had strong direct positive effects on survival, growth rate and body size of larvae before winter indicating relaxed competition. Lower foraging activity at the low-density treatment indicated higher food availability at low conspecific densities. Interestingly, the initial density treatment had stronger effect than densities experienced at the time of quantification on survival during the pre-freezing winter period and body condition estimates at the end of the experiment, indicating also delayed effects of the initial density treatment. Survival throughout a freezing period indicated extreme winter conditions are not likely a limiting factor in the range expansion of this Mediterranean species. (4.) The increased survival and individual growth rates (through causing shifts in voltinism) at low conspecific density will translate in increased population growth rates. Furthermore, nutritional advantages at low conspecific density may increase investment in dispersal ability. Together, these direct and delayed density-

dependent effects that gradually increase towards the expansion front are expected to accelerate range expansion." (Authors)] Address: Therry, L., Lab. of Aquatic Ecology, Evolution and Conservation, KU Leuven, Deberiotstraat 32, B-3000 Leuven, Belgium. Email: therry.lieven@gmail.com

**19903.** Tran, T.T.; Janssens, L.; Dinh, K.V.; Op de Beeck, L.; Stoks, R. (2016): Evolution determines how global warming and pesticide exposure will shape predator-prey interactions with vector mosquitoes. *Evolutionary Applications*: 13 pp. (in English) ["How evolution may mitigate the effects of global warming and pesticide exposure on predator-prey interactions is directly relevant for vector control. Using a space-for-time substitution approach, we addressed how 4°C warming and exposure to the pesticide endosulfan shape the predation on *Culex pipiens* mosquitoes by damselfly predators from replicated low- and high-latitude populations. Although warming was only lethal for the mosquitoes, it reduced predation rates on these prey. Possibly, under warming escape speeds of the mosquitoes increased more than the attack efficiency of the predators. Endosulfan imposed mortality and induced behavioral changes (including increased filtering and thrashing and a positional shift away from the bottom) in mosquito larvae. Although the pesticide was only lethal for the mosquitoes, it reduced predation rates by the low-latitude predators. This can be explained by the combination of the evolution of a faster life history and associated higher vulnerabilities to the pesticide (in terms of growth rate and lowered foraging activity) in the low-latitude predators and pesticide-induced survival selection in the mosquitoes. Our results suggest that predation rates on mosquitoes at the high latitude will be reduced under warming unless predators evolve toward the current low-latitude phenotype or low-latitude predators move poleward." (Authors)] Address: Tran, T.T., Inst. Aquaculture, Nha Trang Univ., No 2, Nguyen Dinh Chieu Street, Nha Trang, Vietnam. Email: thanhtam.ntu.edu@gmail.com

**19904.** Van Dievel, M.; Janssens, L.; Stoks, R. (2016): Short- and long-term behavioural, physiological and stoichiometric responses to predation risk indicate chronic stress and compensatory mechanisms. *Oecologia* 181(2): 347-357. (in English) ["Prey organisms are expected to use different short- and long-term responses to predation risk to avoid excessive costs. Contrasting both types of responses is important to identify chronic stress responses and possible compensatory mechanisms in order to better understand the full impact of predators on prey life history and population dynamics. Using larvae of the damselfly *Enallagma cyathigerum*, we contrasted the effects of short- and long-term predation risk, with special focus on consequences for body stoichiometry. Under short-term predation risk, larvae reduced growth rate, which was associated with a reduced food intake, increased metabolic rate and reduced glucose content. Under long-term predation risk, larvae showed chronic predator stress as indicated by persistent increases in metabolic rate and reduced food intake. Despite this, larvae were able to compensate for the short-term growth reduction under long-term predation risk by relying on physiological compensatory mechanisms, including reduced energy storage. Only under long-term predation risk did we observe an increase in body C:N ratio, as predicted under the general stress paradigm (GSP). Although this was caused by a predator-induced decrease in N content, there was no associated increase in C content. These stoichiometric changes could not be explained by GSP responses because, under chronic predation risk, there was no decrease in N-rich proteins or increase in C-

rich fat and sugars; instead glycogen decreased. Our results highlight the importance of compensatory mechanisms and the value of explicitly integrating physiological mechanisms to obtain insights into the temporal dynamics of non-consumptive effects, including effects on body stoichiometry." (Authors)] Address: Van Dievel, Marie, Lab. of Aquatic Ecology, Evolution & Conservation, Univ. Leuven, Belgium. E-mail: marie.vandieval@bio.kuleuven.be

**19905.** Van Dinh, K.; Janssens, L.; Therry, L.; Bervoets, L.; Bonte, D.; Stoks, R. (2016): Delayed effects of chlorpyrifos across metamorphosis on dispersal-related traits in a poleward moving damselfly?. *Environmental Pollution* 218: 634-643. (in English) ["Highlights: •We exposed edge & core larvae of a poleward moving damselfly to chlorpyrifos (CPF). •Chlorpyrifos had no direct effects in the larval exposure stage. •Delayed effects of CPF caused wing malformations and impaired adult immune response. •Delayed effects of CPF reduced flight muscles only in edge males. •CPF may slow down poleward range expansions under global warming. Abstract; How exposure to contaminants may interfere with the widespread poleward range expansions under global warming is largely unknown. Pesticide exposure may negatively affect traits shaping the speed of range expansion, including traits related to population growth rate and dispersal-related traits. Moreover, rapid evolution of growth rates during poleward range expansions may come at a cost of a reduced investment in detoxification and repair thereby increasing the vulnerability to contaminants at expanding range fronts. We tested effects of a sublethal concentration of the widespread pesticide chlorpyrifos on traits related to range expansion in replicated edge and core populations of the poleward moving damselfly *Coenagrion scitulum* reared at low and high food levels in a common garden experiment. Food limitation in the larval stage had strong negative effects both in the larval stage and across metamorphosis in the adult stage. Exposure to chlorpyrifos during the larval stage did not affect larval traits but caused delayed effects across metamorphosis by increasing the incidence of wing malformations during metamorphosis and by reducing a key component of the adult immune response. There was some support for an evolutionary trade-off scenario as the faster growing edge larvae suffered a higher mortality during metamorphosis. Instead, there was no clear support for the faster growing edge larvae being more vulnerable to chlorpyrifos. Our data indicate that sublethal delayed effects of pesticide exposure, partly in association with the rapid evolution of faster growth rates, may slow down range expansions." (Authors)] Address: Stoks, R., Lab. Aquati. Ecol., K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**19906.** van Grunsven, R.; De Knijf, G. (2016): Portret: Geelvlak heidelibel. *Brachytron* 18(1): 70-72. (in Dutch) ["The decline in Yellow-spotted Dragonflies (*Sympetrum flaveolum*) is obvious (Figure 2), but the absence of invasions does not necessarily mean that everything is fine. This could be pure coincidence, possibly 2016 is another invasion year and suddenly there are Yellow-spotted Dragonflies everywhere again. However, this does not seem likely to us. The invasions have to come from somewhere and for us that is mainly north-east Germany and northern Poland. However, the Yellow-spotted Dragonfly is listed as endangered on the German Red List (Ott et al. 2015) and in Poland the trend is less negative, but even there this species is declining significantly in large parts of the country (pers. med. R. Bernard). After invasions the animals can be found in all kinds of places, they seem to be little critical then. But for long-term

populations and large numbers, they depend on sedge and hollow-point vegetation, grassy marshes that flood in winter and run dry in summer, and on small, stagnant water bodies, such as cattle drinking pools, in agricultural areas. However, the hydrology and landscape in many areas of Central and Eastern Europe have changed significantly in recent decades. Drainage and groundwater extraction have caused many marshes and pools to disappear, and potential habitats to dry up too early in the year. In addition, intensification of agriculture leads to eutrophication, resulting in a compaction of the vegetation, which also makes it unsuitable for *S. flaveolum* (Bernard et al. 2002). Climate change may also cause pools and marshes to dry up too early in the year. Therefore, it is questionable whether the source populations are still large enough to ensure a large invasion and thus repopulate suitable areas in the Low Countries. Therefore, it seems unlikely that our Flemish and Dutch regions will be able to accommodate sustainable populations of *S. flaveolum* in the short term. In the meantime, *S. flaveolum* has become a real rarity here and is no longer a common part of the Dutch and Belgian dragonfly fauna. But you can still, with a lot of luck, come across them somewhere in late summer." (Author) Translated with www.DeepL.com/Translator (free version)] Address: Knijf, G. de, Research Institute for Nature and Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. E-mail: geert.deknijf@inbo.be

**19907.** Venter, H.J.; Bezuidenhout, C.C. (2016): DNA-based identification of aquatic invertebrates – useful in the South African context? *South Afr. Jour. Sci.* 112(5/6) (Art. #2015-0444): 4 pp. (in English) ["The concept of using specific regions of DNA to identify organisms – processes such as DNA barcoding – is not new to South African biologists. The African Centre for DNA Barcoding reports that 12 548 plant species and 1493 animal species had been barcoded in South Africa by July 2013, while the Barcode of Life Database (BOLD) contains 62 926 records for South Africa, 11 392 of which had species names (representing 4541 species). In light of this, it is surprising that aquatic macroinvertebrates of South Africa have not received much attention as potential barcoding projects thus far – barcoding of aquatic species has tended to focus on invasive species and fishes. Perusal of the BOLD records for South Africa indicates a noticeable absence of aquatic macroinvertebrates, including families used for biomonitoring strategies such as the South African Scoring System. Meanwhile, the approach of collecting specimens and isolating their DNA individually in order to identify them (as in the case of DNA barcoding), has been shifting towards making use of the DNA which organisms naturally shed into their environments (eDNA). Coupling environmental and bulk sample DNA with high-throughput sequencing technology has given rise to metabarcoding, which has the potential to characterise the whole community of organisms present in an environment. Harnessing barcoding and metabarcoding approaches with environmental DNA (eDNA) potentially offers a non-invasive means of measuring the biodiversity in an environment and has great potential for biomonitoring. Aquatic ecosystems are well suited to these approaches – but could they be useful in a South African context?" (Authors) The study includes a passing reference to "Odonata".] Address: Venter, Hermoine, Unit for Environmental Sciences and Management, School of Biological Sciences, North-West Univ., Private Bag X6001, Potchefstroom 2520, South Africa. Email: hermoine.venter@outlook.com

**19908.** Verspui, K.; Wasscher, M.T. (2016): The damselfly and dragonfly watercolour collection of Edmond de Selys



Longchamps: I Agrionines. International Journal of Odonatology 19(3): 1-32. (in English) ["In the nineteenth century Edmond de Selys Longchamps assembled a collection consisting of watercolours, drawings and notes on Odonata. Most illustrations were based on specimens from his extensive odonate collection and were mainly executed by Selys himself and by Guillaume Severin. These illustrations and notes are presently housed in the Royal Belgian Institute of Natural Sciences in Brussels. To make this unpublished information accessible, we digitised this material and it will be presented on the website of this Institute. This first article presents the part of the collection concerning Agrionines (all Zygoptera except Calopterygoidea). The Agrionines are represented by 506 sheets with watercolours, 90 sheets with drawings in ink or pencil and 150 sheets with text. To provide an overview of the collection, subject matter and characteristics of the sheets with illustrations and the text sheets are analysed. The majority (85%) of all sheets with illustrations have been associated with current species names by using references and expert opinions. This information should facilitate searching for various species in the watercolour collection. The rediscovery and documentation of this collection of Selys, that remained largely unknown for almost a century, will hopefully prove useful to those conducting research on the taxonomy of Odonata." (Authors)] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: marcel.hilair@12move.nl

**19909.** Wang, X.; Chu, Z.; Babacar D.; Huang, T.; Tang, Z.; He, Z.; Bao, H.; Zhao, B.; Gao, Y.; Hu, X.; Jia, X. (2016): Study on predatory effect of *Ischnura heterosticta* larvae on *Misgurnus anguillicaudatus* larvae. Journal of Fisheries of China 40(12): 1866-1873. (in Chinese, with English summary) ["To investigate the influence of the predator, *I. heterosticta* larvae on survival rate of *Misgurnus anguillicaudatus* larvae, we studied the predatory effect of *I. heterosticta* larvae on *M. anguillicaudatus* larva based on the predator-prey relationship theory. Results of experiments showed that: the predation functional response of *I. heterosticta* larvae to *M. anguillicaudatus* larvae belonged to type Holling-II. With the increase in daily age of *M. anguillicaudatus* larvae, the moment attack ( $a'$ ) and the largest preying amount per day ( $1/Th$ ) declined. The preying amount increased as prey density increased. The predatory function of different sizes of *I. heterosticta* larva to *M. anguillicaudatus* larva had significant differences. For *I. heterosticta* larvae with different body lengths ( $16.3 \pm 0.2$ ), ( $13.1 \pm 0.3$ ), ( $9.8 \pm 0.2$ ) and ( $5.8 \pm 0.3$ ) mm to 3-day-age larvae of *M. anguillicaudatus*, the moment attack and the largest preying amount per day were 0.8349, 0.5724, 0.2002, 0.0432, and 27.39, 18.99, 9.49, 3.14, respectively. With the density of *I. heterosticta* larvae increased, the mutual interference between the individuals led to reduction in the time of a single *I. heterosticta* larva looking for prey. Under intraspecific competition, predator effect rate (E) as a function of density (P) was  $E = 0.1403 \times P - 0.2361$ . With the increase of *M. anguillicaudatus* larvae and *I. heterosticta* larvae density, interference effect increases obviously, predatory efficiency rate (E) drops, but had little impact on preying amount, and the model of interspecific interference was  $Na =$  (Equation presented) The results demonstrated that *I. heterosticta* larva is important predator, which can remarkably reduce the survival rate of *M. anguillicaudatus* larvae." (Authors)] Address: Chu, Z., School of Fishery, Zhejiang Ocean Univ., Zhoushan 316022, China. E-mail: czj0501@sina.com

**19910.** Wang, X. (2016): Effects of *Ischnura heterosticta* larvae on predation and control of *Misgurnus anguillicaudatus*

larvae. M.Sc. thesis, Zhejiang Ocean Univ.: 57 pp. (in Diptera larvae *Trichosanthes* Predator-prey effect High-performance cyhalothrin *Chlorella acute* toxicity trapping device) ["After a large number of studies, it was found that the larvae of *I. heterosticta* affected the survival of larvae of loach larvae. However, there is no report on predatory effects of predators on loach. In this paper, we studied the predator-prey effect of Diptera larvae on the larvae of the loach, and established the predator-prey effect model to provide the theoretical basis for the prevention and control of the larvae of the mussel larvae. On this basis, Chrysanthemum, trichlorfon and other insecticides and homemade trapping device on the killing of the damn larvae, for the effective prevention and control of soymilk larvae to provide technical basis. The results of this study are as follows: 1. Predator-prey effect of Duck Soybean larvae on the larvae of the real loach The predation effect of the stellate larvae on the larvae of the larvae was studied by predator-prey method. The results showed that: (1) The predator-prey function of *Drosophila* larvae to Loach was Holling-?. The maximum predation rate  $1/Th$  of the larvae of the mongolica larvae decreased with the increase of the larval age, and the predation increased with the increase of the prey density. (2) The size of the larvae was different The larvae of the three kinds of Diptera larvae were significantly different from the larvae of  $16.3 \pm 0.2$ mm,  $13.1 \pm 0.3$ mm,  $9.8 \pm 0.2$ mm and  $5.8 \pm 0.3$ mm, respectively. The larvae and the maximum predation (3) With the increase of the density of Soybean larvae, the mutual interference between individuals, resulting in a single maiden larvae to find prey time to reduce the species within the species, The relationship between predator-prey (E) and self-density (P) is  $0.2361E - 0.1403P - (28)'$ . (4) With the increase of larvae and larvae density, the interference effect is obvious. And the predation rate E decreased, but it had little effect on its predation, and the inter-species interference reaction model was  $Na = (?)$ . 2, the effective effect of cyhalothrin and trichlorfon on the killing of Diptera larvae using hydrostatic biological test method to carry out the high efficacy of cyhalothrin and trichlorfon two commonly used fishery drugs on the acute toxicity of Diptera larvae Experiment and establish the logarithmic linear regression equation of corresponding mortality - drug mass concentration. The results showed that the sensitivity of the soymilk larvae to cyhalothrin was greater than that of trichlorfon. The half-lethal concentrations of the two drugs at 24h, 48h and 96h were  $6.44 \mu\text{g} / \text{L}$ ,  $5.31 \mu\text{g} / \text{L}$ ,  $4.57 \mu\text{g} / \text{L}$  and  $0.81 \text{mg} / \text{L}$ ,  $0.65 \text{mg} / \text{L}$ ,  $0.56 \text{mg} / \text{L}$ , the safety mass concentration was  $0.89 \mu\text{g} / \text{L}$ ,  $0.11 \text{mg} / \text{L}$ . The acute toxicity test of two commonly used fishery drugs on 5-day-old and 25-day-old loach larvae showed that the lethality of cyhalothrin was less than or equal to 5.8% As the soymilk larvae to kill the drug; and trichlorfon on the damn mother larvae have a significant killing effect, the mortality rate of up to 89.6% or more, can be used as a traditional medicine to kill the damn mothers to use. 3, self-made trapping device on the killing effect of *Dipterocarca* larvae found that Soybean larvae with phototaxis and the use of oil film can lead to suffocation death, in view of this, the use of oil film asphyxia design of the soymilk larvae trap device, and carried out The killing test of the larvae of. The results show that the trapping device has the advantages of simplicity, efficiency, economy, practicality and safety. The setting depth of the device and the setting of the water plants have the influence on the larvae of the suckling bean sores. The device is set at 30-40cm The larvae had significant killing effect on the larvae of *Soya japonica* larvae, and the lethality rate was about 20% -30% at 12h, while the larvae had no lethal effect on the larvae. Therefore, the trapping device can be used as the main technical means

to kill the soymilk larvae in the breeding base of loach.] Address: Wang, X., School of Fishery, Zhejiang Ocean Univ., Zhoushan 316022, China

**19911.** Wei, Y.; Zhu, Y.-y.; Wang, M.-I. (2016): A facile surface-enhanced Raman spectroscopy detection of pesticide residues with Au nanoparticles/dragonfly wing arrays. *Optik - International Journal for Light and Electron Optics* 127(22): 10735-10739. (in English) ["Recent studies have conclusively show that the surface-enhanced Raman spectroscopy (SERS) has been widely used for chemical and biomolecular sensing. In this work, a facile, low-cost, green and rapid method to detect the pesticide residues is presented by using Au nanoparticles/dragonfly wing (AuNPs/DW) arrays as SERS-active substrate. The AuNPs/DW substrate is prepared by decorating the AuNPs on the DW surface with a simple two-step method, meanwhile, the microstructure properties and SERS signal are characterized by the scanning electron microscopy (SEM) and confocal microprobe Raman system. The experimental results show that compared with the conventional Raman spectroscopy, the AuNPs/DW substrate can enhance the Raman signal dramatically due to the largescale nanosized protrusions on the DW surface. The detection limit for rhodamine 6G (R6G) could reach as low as 10<sup>-8</sup> M, which is important for the analysis of the most components and structures of samples. For the application of the three-dimensional AuNPs/DW, the micro-sample of thiram and carbaryl can also be detected quantitatively, and the detection limit both reach up to 10<sup>-7</sup> M. The above phenomenon indicate that three-dimensional nanostructure AuNPs/DW is a promising SERS substrate for the test of samples in low concentration. Hence, our study will provide an effective approach for the rapid, sensitive and stable trace detection of organic molecular species." (Authors)] Address: Zhu, Y.-y., College of Science, Yanshan Univ., Qinhuangdao 066004, China. Email: yyzhu@ysu.edu.cn

**19912.** Zebba, M.R. (2016): *Ecologie et statut des Gomphidae (Odonata) à Oued Seybouse. Doctorat 3ème cycle en Sciences Biologiques, Département d'écologie & génie de l'environnement, Faculté des Sciences de la nature et de la vie et des sciences de la terre et de l'univers: 139 pp.* (in French, with English summary) ["Our study on ecology of the two species of Gomphidae (*Gomphus lucasii*, *Onycomphus costae*) at the Seybouse River (Northeast Algeria), allowed us to follow: The emergence and habitat preference of (Larvae, Exuviae, Seasonal regulation, Site selection ...), Movement and dispersal of adults (Lifetime, Dispersal, Philopatry, Microhabitat). The emergence season of *G.lucasii* started (29 April to 30 May) with a peak on 8 May, however, for *O.costae* started in mid-May and lasted 68 and 58 days showing a peak in late May and early June in 2011 and 2012, respectively. The vertical stratification of exuviae of the two species on vegetation support during the emergence was influenced by support height, size (body, head) of exuviae, and daily population density. Mortality was caused mainly by ants and bird predation, and deformity of teneral 1,44% and 9,15% of the total emergent population of *G.lucasii* and *O. costae*, respectively. Movement and dispersal of adults, a total of 1316, 255 individuals were marked and the resighting rate along the watercourse were 8.13%, 2.66% and the females were significantly further from the water than males for *G.lucasii* and *O.costae*, respectively. Philopatry to reproductive sites had a mean of 1.11% while philopatry to emergence site was lower (0.4%) and noted only in males of *Gomphus lucasii*. The maximum observed lifespan of *G.lucasii* was 27 days for males and

21 days for females, and 31 days for males and 47 days for females for the *O.costae*." (Author)] Address: not stated

2017

**19913.** Acorn, J.H. (2017): Entomological citizen science in Canada. *Can. Entomol.* 149: 774-785. (in English) ["Citizen science involves voluntary participation in the scientific process, typically by gathering data in order to monitor some aspect of the natural world. Entomological citizen science, as an extension of traditional amateur entomology, is an active field in Canada, with online databases such as eButterfly and BugGuide attracting both contributors and database users. As well, traditional amateur entomology continues to be important in Canada, as do short-term insect-themed educational events, the involvement of amateurs in entomological societies, and online crowdsourcing initiatives. Success of citizen science projects can be measured in many ways. In terms of published papers that analyse trends in citizen science data, Canadian projects have only begun to deliver. More valuable are particular records that improve our knowledge of geographic ranges and phenology. In terms of the endurance of particular projects, and the willingness of volunteers to participate, citizen science entomology in Canada is clearly a success. However, quality control of citizen science data remains an issue for some projects. As well, challenges remain with respect to balancing the goals of researchers, participants, and supporting institutions." (Author) Citizen science projects also include Odonata.] Address: Acorn, J.H., Dept of Renewable Resources, Univ. of Alberta, Edmonton, Alberta, T6G 2H1, Canada. Email: jacorn@ualberta.ca

**19914.** Baleguel, N.P.; Che, J.N.; Baleguel, P.D. (2017): Efficacy of temephos and permethrin in black fly (*Simulium* spp) control and their effect on non-target entomofauna in a portion of Sanaga Valley in Cameroon. *Revue Scientifique et Technique Forêt et Environnement du Bassin du Congo* 8: 11-18. (in English, with French summary) ["The biodiversity in the Congo Basin can be at once a blessing and a curse. A good example of a curse is the abundance of insects that cause nuisance and morbidity in this area especially onchocerciasis transmitted by black fly (*Simulium* spp) which is a major problem in disturbed environments (climate change). Black fly bites reduce the duration a man can work and increase the likelihood of the transmission of onchocerciasis (river blindness) in the tropical rainforest area of Cameroon. In order to decrease nuisance and morbidity caused by black fly and improve farmers' productivity, a study was conducted between 2007 and 2009 in a portion of Sanaga Valley in Cameroon (Monatele (04° 09' N, 11° 01' E), Ossebe (04° 03' N, 10° 36' E), Songndong (03° 51' N, 10° 15' E), Batombe (03° 51' N, 10° 10' E) and Ka'a (04° 43' N, 12° 24' E)), one of the most infected zones of the country. Black fly and nontarget insects captured were identified using identification keys. Data recorded on sticky traps and artificial breeding sites were used to evaluate the efficacy of temephos and permethrin, and their impact on non-target associated entomofauna in the reproduction sites of *Simulium damnosum*. Both larvicides, temephos and permethrin, are effective in the control of black fly though permethrin caused limited undesirable effects on non-target species. Insects of the Order Odonata [*Brachythemis lacustris*] were more affected by permethrin than insects of the Orders Ephemeroptera, Plecoptera and Tricoptera (EPT), which are the most vulnerable orders. This means that it has limited environmental effects when sprayed as specified in this trial and can be used in the integrated vector management of black

fly." (Author)] Address: Baleguel, N.P., Yaounde Initiative Foundation-Cameroon; P.O. Box 3878 Messa-Yaounde, Cameroon. E-mail: baleguel2001@yahoo.fr

**19915.** Bandara, C.D.; Singh, S.; Afara, I.O.; Tesfamichael, T.; Wolff, A.; Ostrikov, K.; Oloyede, A. (2017): Bactericidal effects of natural nanotopography of dragonfly wing on *Escherichia coli*. *ACS Appl. Mater. Interfaces*, DOI: 10.1021/acscami.6b13666: 6746-6760. (in English) ["Nano-textured surfaces (NTS) are critical to organisms as self-adaptation and survival tools. These NTS have been actively mimicked in the process of developing bactericidal surfaces for diverse biomedical and hygiene applications. To design and fabricate bactericidal topographies effectively for various applications, understanding the bactericidal mechanism of NTS in nature is essential. The current mechanistic explanations on natural bactericidal activity of nanopillars have not utilized recent advances in microscopy to study the natural interaction. This research reveals the natural bactericidal interaction between *E.coli* and a dragonfly wing's NTS using advanced microscopy techniques and propose a model. Contrary to the existing mechanistic models, this experimental approach demonstrated that the NTS of dragonfly wings has two prominent nanopillar populations and the resolved interface shows membrane damage occurred without direct contact of the bacterial cell membrane with the nanopillars. We propose that the bacterial membrane damage is initiated by a combination of strong adhesion between nanopillars and bacterium EPS layer as well as shear force when immobilised bacterium attempt to move on the NTS. These findings could help guide the design of novel bio-mimetic nanomaterials by maximising the synergies between both biochemical and mechanical bactericidal effects." (Authors)] Address: Bandara, C.D., School of Chemistry, Physics and Mechanical Engineering, Science & Engineering Faculty, Queensland Univ. of Technology (QUT), Brisbane, Queensland 4001, Australia

**19916.** Berg, D. (2017): Untersuchungen zur Libellenfauna (Odonata) in der Haseaue bei Gehrde (Landkreis Osnabrück, Niedersachsen). Bc.S. thesis, Fakultät Agrarwissenschaften und Landschaftsarchitektur, Studiengang Landschaftsentwicklung (B.Eng.), Hochschule Osnabrück: V, 88 pp, Anhänge- (in German, with English summary) ["During the year 2016 the diversity of Odonata in the meadows of the river Hase near Gehrde in the district of Osnabrück (Lower Saxony) was analysed. Also the biotope types and the quality of the water body structure of the river Hase were mapped. The biotope mapping based on Drachenfels (2013), the mapping of the water body structure on Rasper (2001 a). 27 Odonata species were detected, of which 23 are indigenous, based on exuviae findings. Besides that, two species are probably indigenous because reproductive behaviour was observed. The two remaining species are possibly or possibly not indigenous. Most of the detected Odonata are considered as widespread. However, the species are differently distributed among the nine standing water bodies and the river Hase in the investigation area. In the case of two exuviae of the genus *Sympecma* the species could not be determined. No species of the family Gomphidae was found. A total of 114 biotope types were mapped in the 62,91 ha large investigation area. 69 biotope types are mapped as mixed biotope types. With a percentage of 17,32 % (10,89 ha) species-poor extensive grassland on dry mineral soil (GET - Artenarmes Extensivgrünland trockener Mineralböden) took the most of the area. The second largest biotope type was sandy farmland (AS - Sandacker), which took 14,52 % (9,13 ha) of the investigated area. 14,19 % (8,93

ha) are covered with grassland seedings (GA - Grünland-Einsaaten). Overall, the quality of the water body structure of the river Hase ranged from quality class 3 (moderately modified) to 7 (completely modified). All river sections featured a completely modified channel development and longitudinal profile, resulting in quality class 7. The quality classes of the cross profile ranged from 3 to 5 (strongly modified), the river bank structure from 5 to 7. With quality classes from 3 to 7, the water body environment showed the most structural differences. An assessing of the river bottom was not possible. Based on the results, notes on care and further development of the investigation area were given, which aim at the support of Odonata." (Author)] Address: Berg, D., Samlandstr. 17, 49545 Tecklenburg, Germany

**19917.** Boarman, M.J.S. (2017): Trade-offs and temporal variation in predator-mediated natural selection and sexual selection on the wings of the damselfly *Calopteryx splendens*. Master of Science (MS), Ohio Univ., Biological Sciences (Arts and Sciences): 63 pp. (in English) ["Evolutionary theory predicts a trade-off between sexual selection and natural selection on secondary sexual traits. Understanding the relationship between mating success and predation risk can give insight into the evolutionary dynamics that interact to promote or constrain phenotypic change, yet it has been little studied in the wild. I conducted a two-year cross-sectional field study on *C. splendens* to test for trade-offs between sexual selection and predation risk, and to assess variation in sexual and natural selection. At the study population, the White Wagtail (*Motacilla alba*) captures *C. splendens* in flight, then flies to feeding stations where it removes the wings and consumes the body. I used geometric morphometric techniques to quantify damselfly wing morphology, and compared wing shape and secondary sexual traits of wings from feeding stations to a random sample of wings from the population to quantify the strength, mode, and direction of natural selection on males. Simultaneously, I measured wing traits from individuals caught in the act of mating and compared them to a random sample of wings from the population to quantify the strength, mode, and direction of sexual selection on male wings. By comparing natural selection and sexual selection on wing traits simultaneously, I tested for trade-offs between types of selection. My results suggest that predator-mediated selection fluctuates through time, and is especially variable in how it operates on the size of secondary sexual traits displayed by males. Sexual selection operated almost exclusively on secondary sexual traits, and was consistent across years. Predator-mediated selection acted differently on fore- and hindwings, favoring males with long, narrow forewings and short, broad hindwings. A trade-off between natural and sexual selection was revealed on wing patch characteristics, with males possessing larger and darker wing patches experiencing higher predation rates, while achieving the highest mating success." (Author)] Address: not stated

**19918.** Braatz, E. (2017): Research proposal for odonate fitness in relation to Imidacloprid and varying pH. Retrieved from the Univ. of Minnesota Digital Conservancy, <http://hdl.handle.net/11299/189087>: 36 pp. (in English) ["Both neonicotinoids and varying pH levels affect odonate growth rates, which in turn can affect fitness. This proposal aims to assess how the combined stress of living in nonneutral water (pH = 5.0, 6.0, 8.0, and 9.0) and being exposed to a continuous, sublethal dose of 0.02 µg/L of the neonicotinoid imidacloprid will affect *Anax junius stadia* growth rates. Mortality rates will also be measured." (Author)] Address: not stated

**19919.** Casas, P.A.S.; Sing, K.-W.; Lee, P.-S.; Nuñez, O.M.; Villanueva, R.J.T.; Wilson, J.-J. (2017): DNA barcodes for dragonflies and damselflies (Odonata) of Mindanao, Philippines. Mitochondrial DNA Part A <http://dx.doi.org/10.1080/24701394.2016.1267157>: 9 pp. (in English) ["Reliable species identification provides a sounder basis for use of species in the order Odonata as biological indicators and for their conservation, an urgent concern as many species are threatened with imminent extinction. We generated 134 COI barcodes from 36 morphologically identified species of Odonata collected from Mindanao Island, representing 10 families and 19 genera. Intraspecific sequence divergences ranged from 0 to 6.7% with four species showing more than 2%, while interspecific sequence divergences ranged from 0.5 to 23.3% with seven species showing less than 2%. Consequently, no distinct gap was observed between intraspecific and interspecific DNA barcode divergences. The numerous islands of the Philippine archipelago may have facilitated rapid speciation in the Odonata and resulted in low interspecific sequence divergences among closely related groups of species. This study contributes DNA barcodes for 36 morphologically identified species of Odonata reported from Mindanao including 31 species with no previous DNA barcode records." (Authors) *Coelicia dinoceras*, *C. angustior*, *Devadatta podolestoides basilanensis*, *Diplacina bolivarii*, *D. centrosaurus*, *D. flavomaculata*, *D. krios*, *D. lymetta*, *Drepanosticta* sp.1, *Drepanosticta* sp.2, *Drepanosticta* sp.3, *Gynacantha* sp.1, *Gynacantha* sp.2, *Heteronaias heterodoxa*, *Orthetrum pruinosum*, *Pandanobasis cantuga*, *Pericnemis* sp. 1, *Pericnemis* sp. 2, *Prodasi-neura integra*, *Pseudagrion pilidorsum*, *Rhinagrion reinhardi*, *R. colorata*, *R. sanguinolenta*, *R. turconii*, *R. antoniae*, *R. appendiculata*, *R. atripes*, *R. erythrura*, *R. flammea*, *R. fulgiferons*, *R. tendipes*, *S. sp. cf. dentifer*, *S. dentifer*, *T. anamajiae*, *T. filiformis*, *T. samaritis*, *T. aurora*, *T. festiva*, *V. melania*] Address: Casas, Princess Angelie S., Dept of Biological Sciences, College of Science & Mathematics, Mindanao State Univ.-Iligan Institute of Technology, Iligan City, Philippines. E-mail: princessangeliecasas48@gmail.com

**19920.** Ceder, P.; Jönsson, C. (2017): Tillväxttakt hos sydvänska populationer av trollsländor (Odonata) i ett varmare klimat - en pilotstudie. Independent thesis Basic level (degree of Bachelor): 16 pp. (in Swedish, with English summary) ["In order to gain better understanding of climate change effects on ecosystems, it is necessary to study the response of different species to predicted climate change. Dragonflies are, due to their ecology, a suitable organism group for conducting such studies. In this pilot study we examined the response in growth- and mortality rate to increased ambient temperatures in an experimental set-up of three temperature levels (20°C, 22°C och 24°C) in larvae of three species from the Aeshnidae family (*Aeshna grandis*, *A. cyanea* and *Anax imperator*). *A. imperator* were, due to insufficient number of collected specimens, excluded in the 22°C temperature regime. The studied species are reproducing in Sweden, but *A. grandis* and *A. cyanea* are native, whereas *A. imperator* is considered newly established since it was first discovered in Sweden in the early 2000's. Our results show that *A. grandis* and *A. cyanea* reacted positively to an increased ambient temperature, in terms of growth rates. However, the response to increased temperatures differed between the two species as *A. grandis* showed both higher growth- and mortality rate, compared to *A. cyanea*. Thus, we assume that both species are likely to benefit from the ongoing climate change, but that interactions between them may change. Further studies are required to elucidate how the two species will be affected in

presence of newly established species, such as *A. imperator*. Although, based on our results, the competitiveness of both native species might increase with rising temperatures - which should be considered in future conservation planning." (Authors)] Address: not stated

**19921.** Chavez Landi, P.A. (2017): Fisiología térmica de un depredador *Dasythemis* sp. (Odonata: Libellulidae) y su presa *Hypsiboas pellucens* (Anura: Hylidae) y sus posibles implicaciones frente al cambio climático. Disertación previa a la obtención del título de Licenciada en Ciencias Biológicas: X, 55 pp. (in Spanish, with English summary) ["Temperature is considered one of the most important abiotic factors in the biology of the organisms. Constant temperature change as a consequence of climate change can influence the physiological responses of the communities' structure. The principal purpose of this study was to determine the variation of the physiological thermal parameters in are species (*Dasythemis* sp. and *Hypsiboas pellucens*), who coexist in the same pond near Mindo (Pichincha), and to evaluate their vulnerability to possible environmental temperature in the future. We used a temperature ramp protocol which increases or decreases the temperature at a gradual rate of 0.25°C min<sup>-1</sup>, the Maximum Critical Temperature (CT<sub>max</sub>) and the Minimal Critical Temperature (CT<sub>min</sub>) were determined, along with the thermal tolerance (CT<sub>max</sub> – CT<sub>min</sub>) for both species. To assess prey's performance, the maximum speed of scape was analyzed, at several temperatures and a temperature gradient was used to determine the preferred temperature of both species. To assess the vulnerability to potential temperature changes we compared micro environmental temperature of the collection ponds during the period March to December 2016 and was compared maximum value with the CT<sub>max</sub> for each specie. The maximum and minimum thermal tolerances were 45.5°C and 6.62°C for the predator 40.4°C and 8.1°C for the prey. The maximum temperature registered in the micro-environment was 38.6°C, and the minimum temperature was 15.9°C. The performance escape speed was 86.72 cm gr<sup>-1</sup> s<sup>-1</sup> at an optimal temperature of 28.1°C. The mean preferable temperature of the prey was 24.4°C and 23.4°C for the predator. In conclusion, there are significant differences in thermal tolerances between the predator and the prey and the prey's preferable temperatures is above the predator's temperature. The tadpoles had a WT (warming tolerance) lower (1.85°C) than dragonfly larvae (6.88°C) would be the most vulnerable to future environmental changes. However, the optimal temperature and temperature frequency in the microenvironment indicate that in the near future climate change could improve species performance." (Author)] Address: not stated

**19922.** Choong, C.Y.; Yasser, M.A.; Nurfarhana-Hizan, H. (2017): Ancient Creatures: Dragonflies and Damselflies of Malaysia. Ministry of Natural Resources and Environment, Putrajaya, Malaysia: 115 pp. (in Bilingual in Malay and English) [This book contains published data and information about the wealth of special dragonflies and damselflies in Malaysia that are presented in a clear and interesting way. The featured images have been selected to enhance the pages of this book, complete with QR codes for additional information from the Malaysia Biodiversity Information System (MyBIS) website. The purpose of the ml website is to establish a repository center that summarizes information on biological diversity in Malaysia. Almost 400 species of Odonata contained in 17 families can be found in Malaysia. At least 180 species are dragonflies and 210 species are damselflies. The biological diversity book 'Ancient Creatures:



Dragonflies and Damselflies of Malaysia' displays a total of 69 species of dragonflies and 73 species of damselflies, most of which can be found throughout Malaysia." (Publisher) The following species are documented in brilliant photographs: *Adagrion hisopa*, *Amphicnemis bebar*, *A. gracilis*, *Archibasis rebecca*, *Argiocnemis rubescens*, *Aristocypha fenestrella*, *Calicnemia chaseni*, *C. redangulata*, *Cenagrion auranticum*, *C. bellano*, *C. comorbellum*, *C. chaoi*, *Coeliccia albicauda*, *C. campioni*, *C. didyma*, *C. octogesima*, *Copera marginipes*, *C. vittata*, *Devadatta argyroides*, *Drepanosticta fontinalis*, *D. rufostigma*, *D. sharpi*, *D. versicolor*, *Dysphaea dimidiata*, *Elatoneura analis*, *E. aurantiaca*, *Euphaea impar*, *E. masoni*, *E. subnodalis*, *E. tricolor*, *Helioocypha biforata*, *H. perforata*, *Indolestes dajakanus*, *Ischnura senegalensis*, *Lestes dorothea*, *L. praemorosus*, *Libellago aurantiaca*, *L. hyalina*, *L. lineata*, *L. semiopaca*, *L. stigmatizans*, *Mortonagrion arthuri*, *Neurobasis chinensis*, *Orolestes wallacei*, *Pseudocopteryx ciliata*, *Podotestes buwaldai*, *P. orientalis*, *Prodasineura dorsalis*, *P. humeralis*, *P. laidlawii*, *P. notostigma*, *Pseudagrion australasiae*, *P. microcephalum*, *P. pilidorsum*, *P. pruinatum*, *P. rubriceps*, *P. willamsoni*, *Rhinagrion elopuriae*, *R. macrocephalum*, *R. viridatum*, *Rhinocypha aurofulgens*, *R. humeralis*, *R. spinifer*, *Stenagrion dubium*, *Sundacypha petiolata*, *Teinobasis laidlawii*, *T. ruficollis*, *Telosticta janeus*, *Vestalis amphystha*, *V. amoena*, *V. beryllae*, *V. gracilis*, *Adsoma panorpoides*, *Aethriamanta brevispenis*, *A. gracilis*, *Agrioptera insignis*, *A. sexlineata*, *Anax panybeus*, *Brachythemis contaminata*, *Brachydiplax chalybea*, *Burmagomphus insularis*, *Camacinia gigantea*, *Chalybeothemis chini*, *Cratilla lineata*, *C. metallica*, *Crocothemis servilia*, *Diplacodes nebulosa*, *D. trivialis*, *Epophthalmia vittigera*, *Gomphidictinus perakensis*, *Gynacantha basiguttata*, *G. limbalis*, *Heliaeschna idae*, *Ictinogomphus acutus*, *Ictinogomphus decoratus*, *Idionyx yolanda*, *Indaeschna grubaueri*, *Indothemis camatica*, *I. limbata*, *Lathrecista asiatica*, *Leptogomphus timan*, *Lyriothemis biappendiculata*, *Macrogomphus parallelogramma*, *Macromia cincta*, *M. moorei*, *Microgomphus chetifer*, *Nannophya pygmaea*, *Nesoxenia lineata*, *Neurothemis fluctuans*, *N. fulvia*, *N. ramburii*, *N. terminata*, *Onychogomphus thienemanni*, *Onychothemis coccinea*, *O. culminicola*, *O. testacea*, *Orchithemis pulcherrima*, *Orthetrum chrysis*, *O. glaucum*, *O. luzonicum*, *O. pruinatum*, *O. sabina*, *O. testaceum*, *O. triangulare*, *Pseudothemis jorina*, *Raphisoma bispina*, *Rhyothemis aterrima*, *R. obsolescens*, *R. phyllis*, *R. ptunia*, *R. triangularis*, *Tetrathemis irregularis*, *T. platyptera*, *Tholymis tillarga*, *Trithemis aurora*, *T. festiva*, *T. pallidinervis*, *Urothemis signata*, *Zygonyx ida*, *Z. iris*, *Zyxomma obtusum*.] Address: Choong, C.Y., Centre for Insect Systematics, Univ. Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. Email: cychoong@ukm.edu.my

**19923.** Chovanec, A. (2017): Die Libellenfauna (Insecta: Odonata) der Klosterneuburger Donau-Au (Niederösterreich): Bewertung, Entwicklungstendenzen und Managementempfehlungen. Wiss. Mitt. Niederösterreich. Landesmuseum 27: 39-68. (in German, with English summary) ["The dragonfly fauna (Insecta: Odonata) of the Danube floodplains in Klosterneuburg (Lower Austria): assessment, development trends and management recommendations The dragonfly fauna of the Danube floodplains in Klosterneuburg (Lower Austria) was investigated in 2015. A total of 31 species (30 of them autochthonous) were recorded at eight water bodies, which corresponds to 40 % of the Austrian inventory of Odonate species and 22 % of the European inventory. Five spp. are threatened according to the Austrian Red List. Remarkable is the record of *Coenagrion scitulum*

("critically endangered"). The values of the Odonata Habitat Indices, the species-specific habitat values and the analyses concerning dragonfly associations indicate, that all habitat types characteristic for floodplain areas are present, but hydrologically dynamic sections and temporary waters only to a limited extend. The Odonate fauna recorded is dominated by limnophilic species typical of open waters, submerged macrophytes and reed as well as riparian trees. The ecological status is classified as "good", but it has to be pointed out, that only few sites are existent serving as suitable habitats for floodplain-specific dragonfly communities. Some of these sites are influenced and endangered by shading, terrestrialisation processes and desiccation. The results obtained in 2015 are compared with surveys carried out in 1999 and 2000 and represent the basis of management recommendations." (Author)] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, A-1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

**19924.** Chovanec, A.; Waringer, J.; Holzinger, W.E.; Moog, O.; Janecek, B. (2017): Odonata. In Moog, O. & A. Hartmann (Eds.): Fauna Aquatica Austriaca, 3. Edition 2017. BMLFUW, Wien: 1-18. (in English) ["The catalogue of Odonata with ecological notes of Janecek et al. (2002) represents a reissue of the first edition from 1995. The species inventory of this revised version has been harmonised with the current status of the species occurring in Austria listed by Holzinger et al. (2015). Ecological classifications were based on literature published since 1995 containing detailed information on distribution and ecological requirements of the relevant species (...) Furthermore, regional information from Austria as well as studies dealing with the colonisation of near-pristine river stretches by dragonflies were included (...). Species traits defined as methodological framework for the calculation of the Dragonfly Association Index (Chovanec et al. 2014b, 2015) were also taken into account. Data on typological features of Austrian surface waters were taken from Muhar et al. (2004), Wildermuth & Küry (2009), Wimmer et al. (2012) und Wiesbauer & Denner (2013). The assignment of valency points for species appearing in the hypopotamon was carried out on the basis of the literature published (...). "Litoral" within the zonal distribution was defined as an isolated standing water body. Slowflowing sections or standing patches, particularly in the littoral areas of lowland rivers, were assigned to the respective biocoenotic region. In the case of the distribution of saprobic valency points 44 of the 78 species were classified for the first time, the classification of nine species remained unchanged. The saprobic values of 15 species are now higher due to the changes made in this study, in the case of ten species they are lower now. The revision of the classification of the longitudinal distribution revealed the following changes: three species were classified for the first time, 12 species remained unchanged. Sixty-three species were newly classified: in the case of 53 species the valency points now reflect a stronger preference for running waters in line with a stronger expansion towards the upper rhithral sections. A large portion of those changes concerned species formerly classified as +/- limnobiocenic (expressed by 10 valency points for the littoral), which now show a more split distribution of the points. This fact reflects the increased knowledge of the ecological plasticity of odonate species. Due to this increased knowledge on the ecology of many dragonfly species, we refrained from the usage of a "+" sign indicating lacking or scarce information. The order in the Species inventory follows Wildermuth & Martens (2014)."] (Authors)] Address: Chovanec, A., Umweltbundesamt, Spit-

telauer Lände 5, 1090 Wien, Austria. Email: andreas.-chovanec@bmlfuw.gv.at

**19925.** Chovanec, A. (2017): Libellenkundliche Untersuchungen an Waldzeller / Mühlheimer Ache sowie am Gurtenbach (Oberösterreich) im Jahr 2017. Im Auftrag des Amtes der Oberösterreichischen Landesregierung, Abt. Oberflächengewässerswirtschaft: 63 pp. (in German) [Austria; "The aim of the present study, carried out in 2017, was to evaluate restructuring measures in the upper and lower reaches of the Ach (Waldzeller and Mühlheimer Ache) and the Gurtenbach by means of dragonfly surveys. This was the first time that sections of the metarhithral (Waldzeller Ache, Gurten) and the transitional meta-/hyporhithral were the subject of the determination of the dragonfly ecological status according to the Water Act and the Water Framework Directive (WRG, WFD) in Upper Austria. Similar to fish, the number of dragonfly species is increasing along the stream continuum. The association approach, which had been used in studies conducted mainly on waters in the hyporhithral/epipotamal transition zone, could not be applied due to the lower number of species in the rhithral. Therefore, an assessment approach based on the study of reference species was developed within the framework of this work. The newly developed assessment method is based on the numerical classification of dragonfly species within the Fauna Aquatica Austriaca with regard to their occurrence within biocenotic regions (CHOVANEC et al. 2017). A system of leading and accompanying species was developed for the waters of the metarhithral and the transitional meta-/hyporhithral area of the bioregion "Bayerisch-Österreichisches Alpenvorland". Four study stretches of the Waldzeller Ache, three of the Mühlheimer Ache and four of the Gurtenbach, each 100 m long, were mapped five times. A total of 28 species were detected; this corresponds to 43% of the species spectrum detected for Upper Austria (65 spp.) and 36% of the species spectrum detected for Austria (78 spp.). Twelve species are listed in one of the endangerment categories of the Red List for Austria, two of which are "critically endangered" (*Erythromma lindenii*, *Somatochlora flavomaculata*), five "endangered". No species listed in any of the Annexes of the Habitats Directive or in the European Red List was detected. *Calopteryx virgo* ("potentially endangered"), flagship species in all three sections, was found on the ground in all eleven stretches surveyed. *Onychogomphus forcipatus* ("endangered"), also the leading species, was found on the ground in seven of the eleven stretches. It was absent from the hard-built stretch of the Gurtenbach, from those stretches characterised by strong potamalisation effects and from one - from a morphological point of view monotonous - stretch of the Mühlheimer Ache. The ecological status of all stretches where this species was detected was assessed as "good". The accompanying species *Orthetrum brunneum* ("potentially endangered") was sighted at six of the seven stretches along the Ach, but not at the Gurtenbach. The flagship species *Cordulegaster boltonii* ("endangered") was only found on the uppermost stretch of the Waldzeller Ache in Kraxenberg. Waldzeller Ache (Metarhithral): Good ecological status - despite the residual water situation - was achieved at three of the four stretches investigated. A total of eleven species were sighted here, six of which were native. The fourth stretch showed reduced flow conditions and thus potamalisation effects due to backwater conditions: Although the species inventory increased to 14 species (ten native), the ecological status was "moderate". Mühlheimer Ache (transition area meta-/hyporhithral): A total of 13 species were found on the three stretches, nine of them native. The ecological status of two

stretches was "good", of one "unsatisfactory": The reason for this is the reduced heterogeneity of water morphology, flow and substrate conditions at this stretch. On the lowest stretch ("good"), slight potamalisation effects could be detected. The increase in the number of species in the longitudinal course of the river is well documented in the stretches along the Ach: The stretches of the metarhithral of the Waldzell Ache in "good ecological status" showed a species spectrum of eleven species with six native species, those of the transitional meta-/hyporhithral of the Mühlheimer Ache showed an inventory of 13 species with nine native species. At the metarhithral of the Gurtenbach estuary section, a comparison was made between regulated and restructured sections. The ecological status of the regulated section was rated "unsatisfactory". The mapping revealed the presence of five species, three of which were native. The extremely low numbers of individuals were striking. The two immediately adjacent restructured stretches achieved "good ecological status". A slight potamalisation effect due to the widening of the riverbed in one of the two stretches was reflected in a comparatively high number of species (14, nine native); due to the detection of water body type-specific relevant indicator species, the prerequisite for the classification of "good" was nevertheless met. The fourth stretch had the highest number of species (17, eight native), but there were no indicator and associated species. The ecological status of this stretch was rated "unsatisfactory". As this stretch is hydrologically strongly influenced by backwater from the Inn-Schärding reservoir, it should be classified as "heavily modified" - just like the corresponding water body of the Inn. A total of 23 species were sighted on the Gurtenbach, twelve of them native." (Author/DeepL)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. E-mail: andreas.chovanec@bmlfuw.gv.at

**19926.** Collins, S.D.; Abbott, J.C.; McIntyre, N.E. (2017): Quantifying the degree of bias from using county-scale data in species distribution modeling: Can increasing sample size or using county-averaged environmental data reduce distributional overprediction? *Ecology and Evolution* 7(15): 6012-6022. (in English) ["Citizen-science databases have been used to develop species distribution models (SDMs), although many taxa may be only georeferenced to county. It is tacitly assumed that SDMs built from county-scale data should be less precise than those built with more accurate localities, but the extent of the bias is currently unknown. Our aims in this study were to illustrate the effects of using county-scale data on the spatial extent and accuracy of SDMs relative to true locality data and to compare potential compensatory methods (including increased sample size and using overall county environmental averages rather than point locality environmental data). To do so, we developed SDMs in maxent with PRISM-derived BIOCLIM parameters for 283 and 230 species of odonates (dragonflies and damselflies) and butterflies, respectively, for five subsets from the OdonataCentral and Butterflies and Moths of North America citizen-science databases: (1) a true locality dataset, (2) a corresponding sister dataset of county-centroid coordinates, (3) a dataset where the average environmental conditions within each county were assigned to each record, (4) a 50/50% mix of true localities and county-centroid coordinates, and (5) a 50/50% mix of true localities and records assigned the average environmental conditions within each county. These mixtures allowed us to quantify the degree of bias from county-scale data. Models developed with county centroids overpredicted the extent of suitable habitat by 15% on average compared to true locality

models, although larger sample sizes (>100 locality records) reduced this disparity. Assigning county-averaged environmental conditions did not offer consistent improvement, however. Because county-level data are of limited value for developing SDMs except for species that are widespread and well collected or that inhabit regions where small, climatically uniform counties predominate, three means of encouraging more accurate georeferencing in citizen-science databases are provided." (Authors)] Address: McIntyre, Nancy, Dept of Biological Sciences, Texas Tech Univ., Lubbock, TX, USA. E-mail: nancy.mcintyre@ttu.edu

**19927.** Cruz da Silva, E.; Silva da Rocha, T.; Barbosa de Oliveira Junior, J.M. (2017): Efeito de variações temporais e microclimáticas diárias sobre a riqueza de eúécies de Zygoptera (INSECTA: Odonata) em igarapés no município de Santarém-Pa. VIII Congresso Brasileiro de Gestão Ambiental Campo Grande/MS – 27 a 30/11/2017: 5 pp. (in Portuguese) [The physical conditions of the aquatic environment, such as air temperature and humidity, physical parameters of the water, rainfall and environmental luminosity are essential aspects in the distribution pattern of Odonata communities. In this context, the present work aimed to evaluate the effect of daily temporal and microclimatic variations on the species richness of Zygoptera in streams in the municipality of Santarém, Pará, Brazil. Zygoptera adults were sampled in four igarapés during 12 consecutive days (three times in each igarapé), between 06:00 and 18:00 h. In each igarapé, a 100-m stretch was marked, subdivided into 20 segments of five meters each. A Hobo Data Logger was used to measure air temperature, relative humidity and luminosity during 12 hours at five-minute intervals. A total of 383 individuals of Zygoptera were collected. Air temperature and luminosity had a positive effect on Zygoptera species richness ( $r = 0.546$ ;  $p = 0.054$ ;  $r = 0.831$ ;  $p = 0.001$  respectively), there was no effect of relative humidity on species richness ( $r = -0.34$ ;  $p = 0.28$ ). There was higher richness of the individuals in the hours between 10:00 and 14:00 ( $F(11, 132) = 5.565$  and  $p < 0.001$ ). The suborder Zygoptera showed great relationship with the environmental variables temperature and luminosity, possibly because they are thermal conformers. Zygoptera usually occurs in preserved environments. Therefore, it is important to maintain the integrity of the hydric systems for the conservation of the species." (Authors/DeepL)] Address: Cruz da Silva, E., Graduando no Curso de Bacharelado em Ciências Biológicas na Universidade Federal do Oeste do Pará (UFOPA). Email: evertonsilva856@gmail.com

**19928.** De Knijf, G. (2017): Country-based odonatological journals in Europe. *Agrion* 21(1): 37-44. (in English) [Journals from Finland, Poland, France, Germany, Slovenia, Spain, UK and Netherlands/Belgium are introduced.] Address: Knijf, G. de, Research Institute for Nature and Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. E-mail: geert.deknijf@inbo.be

**19929.** Denis, A.; Danflous, S.; Pélozuelo, L. (2017): État des lieux des connaissances sur trois odonates protégés de grands cours d'eau *Oxygastra curtisii* (Dale, 1834), la cordulie à corps fin, *Gomphus graslinii* Rambur, 1842, le gomphé de Graslin et *Macromia splendens* (Pictet, 1843), la cordulie splendide. Conference: Les invertébrés dans la conservation et la gestion des espaces naturels At: Toulouse, January 2017: 127-131. (in French, with English summary) ["*Oxygastra curtisii*, *Gomphus graslinii* and *Macromia splendens* are three protected species of dragonflies inhabiting the large rivers of Southern Europe. They are targeted

by the national Biodiversity Action Plan in favour of Dragonflies. The review of the literature available highlights a great lack in the knowledge of the biology and the ecology of these species. This limits our ability to assess the main factors threatening them." (Authors)] Address: Denis, Alice, Conservatoire d'Espaces Naturels Midi-Pyrenees, 75, France. E-mail: alice.denis@espaces.naturels.fr

**19930.** Dijkstra, K. D-B. (2017): Taxonomy: use the Red List as a registry. *Nature* 546: 599-600. (in English) [Verbatim: Taxonomy and conservation might seem to operate as separate bodies (S. T. Garnett and L. Christidis *Nature* 546, 25–27; 2017). In fact, they are joined at the hip. Taxonomists provide the language to plead conservation's case. And conservationists could be taxonomy's greatest allies — the record of what lives and what might be lost is the field's strongest justification today. The authors call for coordination between taxonomy and conservation, which is already happening informally. The International Union for Conservation of Nature (IUCN) has a huge stake in understanding species, with millions of organisms at risk but only 80,000 assessed so far. Its Red List of Threatened Species provides consistency in species' status. The IUCN also sets guidelines for predicting species' responses to climate change and for classifying the impact of invasive alien organisms. This interpretation of complex data underpins both policy and practice. The Red List is maintained by the IUCN's specialist groups, which include taxonomists. Although a species' taxonomic status is crucial to its conservation status and the data on populations and threats are assessed by strict criteria, no guidelines for species circumscription exist. By formalizing the updating and consistency of its list, the IUCN could provide a certified registry of the life worth conserving. More species could be 'pre-listed' as extant, valid and potentially under threat using the Red List's Not Evaluated status. This would stimulate conservation thinking in taxonomy and promote formation of specialist groups. Because Red List maintenance relies on volunteer input, new funding mechanisms would be needed to expand its structure.] Address: Dijkstra, K. D-B., Naturalis Biodiversity Center, Leiden, the Netherlands. E-mail: kd.dijkstra@naturalis.nl

**19931.** Ehikhamele, I.E.; Ogbogu, S.S. (2017): Assessment of the concentrations of some heavy metals and their effects on the macroinvertebrate composition in Igun southwestern Nigeria, using reference site approach. *Journal of Entomology and Zoology Studies* 5(1): 452-458. (in English) ["A survey was conducted from September 2014 to February 2015 to determine the resident aquatic macroinvertebrates and selected heavy metals of Igun and Osu Reservoirs, in Atakumosa West Local Government Area of Osun State, southwestern Nigeria. This was with a view to detecting the effects of gold mining activities on Igun Reservoir using Osu Reservoir as a reference site. Sampling for heavy metals and macroinvertebrate fauna was carried out fortnightly for six months. The collected aquatic macroinvertebrates were preserved in 70% ethanol and identified using appropriate identification keys. Water sample were collected for the determination of heavy metals which include, Cadmium (Cd), Gold (Au), Lead (Pb), Zinc (Zn) and Manganese (Mn), using (Atomic Absorption Spectroscopy) A total of 136 macroinvertebrate specimens representing 17 species in 12 families were collected from Igun Reservoir. Class Gastropoda had the highest number of specimens 61(44.85%), representing five species in three families (Planorbidae, Thiaridae and Physidae). A total of 408 macroinvertebrate specimens representing 32 species in 16

families were collected from Osu Reservoir. Ephemeroptera, represented by six species from two families (Caenidae and Baetidae) had the highest number of specimens, 136 (33.33%). Simpson Diversity Index (1-D) for Igun and Osu Reservoirs were 0.84 and 0.89 respectively. Cd correlated with Mn ( $r = 0.82$ ) while Pb correlated with Mn ( $r = 0.62$ ). Pb also negatively correlated with the abundance of Odonata ( $r = -0.77$ ) in Igun Reservoir while Cd correlated negatively with the abundance of Coleoptera ( $r = -0.58$ ) in Osu Reservoir. The concentration of zinc was within the WHO permissible limits for freshwater while other heavy metals were above the limits in both reservoirs." (Authors) Chlorolestes conspicuus, C. elegans, C. apicans, Chlorolestes sp., Lestes plagus, L. ictericus, Ophiogomphus sp. [?], Actinogomphus ferox, Ceratogomphus triceratus, Actinogomphus, Trithemis dorsalis, Trithemis, Diplacodes sp., Pseudagrion inopinatum, Ceriagrion bakeri, Allocnemis leucostita, Metacnemis leucostita] Address: Ehikhamele, I.E., Dept of Zoology, Faculty, of Science, Obafemi Awolowo, Univ., Ile-Ife, Osun State, Nigeria

**19932.** Fadilah, U.; Atmowidi, T.; Priawandiputra, W. (2017): Comparison of aquatic insect assemblages between managed and unmanaged artificial lakes in Indonesia. *Journal of Entomology and Zoology Studies* 5(2): 496-506. (in English) ["Aquatic insects are an example of organisms vulnerable to habitat alteration. Several artificial lakes were constructed with different maintenance pattern (managed and unmanaged) in Bekasi, which could impact development of aquatic insect community differently. Therefore, the present study examined the aquatic insect assemblages between managed and unmanaged artificial lakes in Indonesia from January to June 2016. Additionally, the influences of physico-chemical factors to the aquatic insect communities were assessed. The results showed that the abundance of insects were higher in managed (1059 individuals) than unmanaged lakes (426 individuals) ( $p < 0.05$ , T-test). Significance of the difference of species composition between managed and unmanaged lakes was illustrated by the separated groups in nMDS graph ( $p < 0.001$ , One-way ANOSIM). However, the same dominant species (*Orthetrum testaceum*) was found in both lakes. *O. testaceum* and *Desmopachria latissima* have strong correlation with all physico-chemical parameters. Different management of artificial lakes significantly changed the aquatic insect assemblages and unmanaged artificial lake decreased the abundance of aquatic insect." (Authors)] Address: Priawandiputra, W., Animal Biosystematics and Ecology Division, Dept of Biology, Faculty of Mathematics and Natural Sciences, Bogor Agricultural Univ., Bogor, Indonesia

**19933.** Gazzola, A.; Balestrieri, A.; Ghitti, M.; Paganelli, D.; Galeotti, P. (2017): Behavioural and life history responses to predation risk by common frog tadpoles exposed to two predators during ontogeny. *acta ethologica* 20(5): 235-241. (in English) ["The presence of predators can induce changes in both the morphology and behaviour of Anuran larvae, affecting both their size and developmental stage at metamorphosis and, consequently, the fitness of adult individuals. Tadpoles have been shown to be capable of finely tuning their defensive responses according to the actual risk perceived, which is expected to vary according to the prey-to-predator size ratio. In this study, we exposed common frog (*Rana temporaria*) tadpoles (Gosner stages 28-30), for a period of 2 weeks, to the non-lethal presence of dragonfly larvae (*Anax imperator*) and backswimmers (*Notonecta glauca*). In such a narrow window of time, we expected be-

havioural responses to be similar for both predators and exposure to predation risk to have negligible effects on tadpole development and weight. Overall, tadpoles increased hiding behaviour and were less active when predators were present in the experimental mesocosms, but behavioural responses were constrained to the early phase of the ontogeny and were no longer used when tadpoles reached a threshold size. Developmental rate slightly slowed down for predator treatments in comparison to controls, possibly as a consequence of energetic investment in unrecorded morphological defences. Although variation in laboratory conditions and protocols makes it hard to compare the results of different experiments, our results contribute to verify the consistency of behavioural responses in Anuran larvae." (Authors)] Address: Gazzola, A., Eco-Ethology Laboratory, DSTA- Dept of Earth and Environmental Sciences, Univ. of Pavia, Pavia, Italy

**19934.** Georgieva, G.; Radeva, K.L.; Uzunov, Y.I. (2017): New Data on bottom invertebrates of the Negovan marshes and the adjacent Lesnovska River. *Acta zool. bulg.* 69(1): 89-94. (in English) ["The current study presents recent data of the benthic macroinvertebrate fauna of two pit lakes (the Big Lake and the Small Lake) and the adjacent sector of the Lesnovska River near Negovan Village, western suburb area of the capital city of Sofia, western Bulgaria. The two pit lakes are under different degree of degradation. The Big Lake is still used for excavation of inert materials, while the Small Lake has been abandoned years ago and has slowly restored its quality of a natural wetland. Both lakes have never been studied hydrobiologically apart from several faunistic contributions. In the present study, parameters, indices and metrics indicating the cenotic structure of the benthic community and ecological state of the water bodies were used following the national regulations. The macrozoobenthos density in the Big Lake was lower in comparison to the Small Lake and the Lesnovska River. The river and the Small Lake had high level of faunistic similarity. Some non-indigenous and invasive species were registered in both lakes." (Authors)] Address: Georgieva, Galia, Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 2 Gagarin Street, 1113 Sofia, Bulgaria. E-mail: tsambi@abv.bg,

**19935.** Geraeds, R. (2017): Observations of dragonflies outside the immediate vicinity of water. The value of an abandoned field for dragonflies. *Brachytron* 19(2): 77-89. (in Odonata, maturation period, habitat, abandoned arable fields) ["Research on dragonflies generally takes place at their reproduction sites. However, the maturation period, between the moment the dragonflies emerge and the time they return to the water, is often spent away from the immediate vicinity of water. Detailed information about the habitats that are used during the maturation period is scarce. For this reason, observations of dragonflies were collected during a research project on reptiles in an abandoned field in the Driestruik Nature Reserve. During 90 days in the period between September 2011 until October 2016, 978 observations of 1242 dragonflies were collected. In total 34 dragonfly species were found: 11 species of damselflies and 23 species of dragonflies. All species with populations in the Driestruik Nature Reserve were found in the abandoned field. In addition, 11 species were found of which no populations are present in the area. These are predominantly species with a preference for flowing water like brooks and rivers. When the observations of the most frequently observed damselflies were examined, it appeared that the majority of the animals use the abandoned field mainly during



the maturation period. From the observations of dragonflies it can be deduced that the former field is used during the maturation period, but that most dragonfly species also frequently use the area during the breeding period. It is striking that most observations (48%) were made in the eastern part of the research area, which with its 0,3 hectare represents approximately 25% of the total investigated area. In contrast to the rest of the area, this part also borders on forest on the north side, making it more sheltered. In addition, the largest variation in vegetation structure is present in this part of the former field. These conditions are likely to result in a warmer microclimate, which is attractive for dragonflies." (Author)] Address: Geraeds, R.P.G., Rijksweg Noord 280, 6136 AH Sittard, Netherlands. E-mail: rob.geraeds@kpnplanet.nl

**19936.** Guerrero, L.S.C. (2017): El trabajo de campo con *Mesamphiagrion laterale* (Odonata: Coenagrionidae) como estrategia educativa para la enseñanza de ecología de poblaciones en el Humedal la Conejera, Bogotá D.C.. Bio – grafía. Escritos sobre la Biología y su Enseñanza . ISSN 2027-1034 Edición Extraordinaria. Memorias del IX Encuentro Nacional de Experiencias en Enseñanza de la Biología y la Educación Ambiental. IV Congreso Nacional de Investigación en Enseñanza de la Biología: 720-727. (in Spanish, with English summary) [oas 63 "The Following article is frame into a developed research as grade work of Biology teacher of Pedagógica Nacional Univ., to show there the main results of project, has a purpose to design a educative strategy to teaching and learning of population ecology from the field research with *Mesamphiagrion laterale* in the Conejera Wetland in Bogota D.C. Therefore to realice a research of three population attributes: Population size, sexual distribution and spacial distribution of Odonato *M. laterale* found in the Conejera Wetland, in this article the first and second attribute are present; the metodological procediments are to establish 10 areas to sampling in a different location of Wetland, and visiting in a 4 moments, the capture-recapture method was used. Similary for the education part, has development 10 class sessions in the Tibabuyes Universal school with 4º students of 9º to design a educative strategy to learn population ecology from the work and biological experience of Wetland. The Project propose 5 educational estrategy result of students and teacher research: Previous ideas, conceptual approach of population ecology, establishment of methodologies for working with populations, practical experiences and process of organization and systematization of population data." (Authors)] Address: Guerrero, Lynda, Licenciada en Biología, Universidad Pedagógica Nacional, línea de investigación: Enseñanza de la ecología, Grupo de investigación: CAS-CADA, Columbia. E-mail: lindasa95@hotmail.com.

**19937.** Gyulavári, H.A.; Tüzün, N.; Arambourou, H.; Therry, L.; Dévai, G.; Stoks, R. (2017): Within-season variation in sexual selection on flight performance and flight-related traits in a damselfly. *Evolutionary Ecology* 31: 21-36. (in English) ["While selection is a key mechanism of evolution, our understanding of within-season variation in sexual selection remains limited. Here, we studied within-season sexual selection on two key performance traits, flight speed and flight endurance, and a set of morphological and physiological phenotypic traits in a natural population of the territorial damselfly *Chalcolestes viridis*. We applied a path analysis approach to address whether the flight-related traits affected mating success directly or indirectly through their effect on the flight performance traits, and whether these selection patterns differed between the first and second half of the reproductive season. While some trait means did not

differ between both parts of the season (flight speed, wing loading and non-allometric wing shape), most traits showed within-season differences (flight endurance, fat content, flight muscle ratio, wing centroid size, body mass and the allometric wing shape). Despite the within-season temporal differences in flight endurance, sexual selection consistently favoured males with a higher flight endurance. None of the detected patterns of sexual selection on the flight-related traits were consistently significant in both periods: while we detected selection on wing loading and wing centroid size in the first half of the season, we detected selection on body mass in the second half of the season. More studies focusing on understudied traits such as performance traits are needed to refine our knowledge of the temporal dynamics of selection patterns in nature. This is important to arrive at a better understanding of the adaptive evolutionary dynamics of traits in natural populations." (Authors)] translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (kostenlose Version)] Address: Stoks, R., Lab. Aquat. Ecol., K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**19938.** Halimi, E., Papparisto, A. (2017): Data for Aquatic Insects (Odonata) with Environmental Impact on Aquatic Ecosystems in Albania. 1-st International Conference on Social and Natural Sciences Proceedings Vienna, 8-9 April: 80-86. (in English) ["Aquatic insects show a high interest due to their feature to serve like environmental bioindicators. In that study, by analyzing the biodiversity of dragonfly Odonata through the comparison of the data on quantity and quality related to these aquatic insects, we have evaluated the actual environmental situation of aquatic ecosystems for the Kavaja and Divjaka. The period of time when the biological material was collected was 2009-2011. By this study are defined for Odonata Order was 23 species, 17 genera and 8 families of. The most represented group was Anisoptera by 14 species and a frequency of 60.86%. The Libellulidae is the most represented family by 8 species and a frequency of 34.78%. The ecosystems around the Divjaka (Karavasta lagoon) are presented by a frequency slightly higher of species compared to these of Kavaja (Spille). The Odonata in the environment of Divjaka are more represented by 17 species and a frequency of 73.91% while the frequency were lower with 14 species and a frequency of 60.86% to Kavaja. It is an indicator of the quality considerably better of the Divjaka area. In both areas are encountered 8 common species and the "Jaccard index" of similarity coefficient" was 34.78%, which is an indication of small difference among the conditions of environmental quality for these bio-indicator species." (Authors)] Address: no details are given

**19939.** Harisha, M.N.; Hosetti, B.B. (2017): Conservation status, threats and diversity of Odonates in Kuvempu Univ. Campus, Mid-Western Ghats, Shivamogga district, Karnataka, India. *Journal of Entomology and Zoology Studies* 5(2): 389-393. (in English) ["Odonata sampling was carried out from October 2010 to September 2011.... A total of 32 species of Odonates in 24 genera belonging to 6 families have been reported. During the study, the Anisoptera were found to be more diverse and predominant with 23 species belonging to 3 families, contributed 72%, followed by the Zygoptera which were found to be less diverse with 9 species belonging to 3 families, contributed 28% composition of total odonates recorded from Kundavada Lake, Davanagere District, Karnataka." (Authors)] Address: MN Harisha, M.N., Dept of Post Graduate, Studies & Research in Wildlife and Management, Kuvempu Univ., Jnana Sahyadri, Shankaraghatta-577451, Shivamogga, Karnataka, India

**19940.** Haro, R.; Hess, M.; Rolffhus, K.; Sandheinrich, M.; Wiener, J. (2017): Why is mercury concentration in larval spiketail dragonflies (Family Cordulegastridae) consistently greater than in their burrowing relatives, the clubtail dragonflies (family Gomphidae)? 13th The International Conference on Mercury as a Global Pollutant: RP-075- (in English) [Verbatim: "In North America, larval dragonflies are increasingly used as biosentinels for monitoring mercury (Hg) contamination in freshwater food webs. For practical reasons, field studies and monitoring programs alike often do not identify larval dragonflies below the taxonomic level of family. Several studies, however, have recognized that differences in Hg concentration among coincidentally collected families do occur and may be associated with distinct family-level behavioral habits or guilds (e.g., burrowers vs. climbers). Understanding the consistency of these differences among guilds across habitats and water bodies will be important to the refinement of protocols using larval dragonflies as biosentinels. Apart from the implications for monitoring Hg, these guild differences generate basic questions about the intersection of environmental toxicology, behavioral ecology, and phylogeny. Two separate field studies conducted in the north-central states of Wisconsin and Michigan (USA) have shown consistent differences in total mercury (THg) concentration between two intraguild (burrower) families of late-instar larval dragonflies: the spiketails (Family Cordulegastridae) and the clubtails (Family Gomphidae). Across 5 of 6 water bodies, 3 streams and 3 lakes, THg concentration in spiketail larvae was significantly greater than in coincidentally collected clubtail larvae. Furthermore, spiketail THg concentration was often greater than all other co-occurring larvae belonging to non-burrowing guilds (i.e., sprawlers and climbers). Mean (SE) THg concentration across water bodies ranged from 170.9 10.0 497.8 136.2 ng/g dwt. and from 67.0 2.1 165.0 18.2 ng/g dwt. for spiketails and clubtails, respectively. In the 5 water bodies with significant differences, spiketail THg concentrations were between 189% and 558% greater than their clubtail counterparts. An explanation for these differences likely includes voltinism; in the north-central US, spiketails are merovoltine, spending 3 to 4 years as larvae, while clubtails are typically bivoltine, spending 2 years as larvae. However, other factors including the amount of body setae (surface area), differences in burrowing behavior, and the significance of their phylogenetic relationship are explored."] Address: Haro, R., River Studies Center, La Crosse, USA

**19941.** Hayat, M. (2017): Cycle de vie et écologie de Coenagrion mercuriale dans le bassin versant de la Seybouse (Nord-Est de l'Algérie). Doctorat du troisième cycle, Faculté des Sciences, Département de Biologie, Université Badji Mokhtar-Annaba: 75 pp. (in French, with English and Arabian summaries) ["C. mercuriale is a threatened damselfly in most parts of its geographic distribution. It is listed as endangered in North Africa, where no data on its biology or ecology are available. The purpose of this study was to determine the life history traits and demographic parameters of this species in the southern limit of its distribution, to compare of our results with those presented in the literature for the UK (the northern limit of the species distribution) and to determine the latitudinal adaptation of the species. The estimation of the population size showed a very high number with a total of 1765 individuals. The species did not show a winter diapause and produced two generations per year. The first generation was emerged mid spring and the second the late summer. After emergence, adults spent a period of maturation that lasted 3 to 4 days. Afterwards, they

returned to aquatic environments to breed. The reproduction period was positively correlated with male size. However, the rest period was positively correlated with the copulation period. Finally, a seasonal difference in the body size between generations was found with a decrease in the body size in the first generation and an increase the opposite was found in the second generation." (Author)] Address: not stated

**19942.** Herzog, R.; Hadrys, H. (2017): Long-term genetic monitoring of a riverine dragonfly, *Orthetrum coerulescens* (Odonata: Libellulidae): Direct anthropogenic impact versus climate change effects. PLoS ONE 12(5): e0178014. <https://doi.org/10.1371/journal.pone.0178014>: 13 pp. (in English) ["Modern conservationists call for long term genetic monitoring datasets to evaluate and understand the impact of human activities on natural ecosystems and species on a global but also local scale. However, long-term monitoring datasets are still rare but in high demand to correctly identify, evaluate and respond to environmental changes. In the presented study, a population of the riverine dragonfly, *Orthetrum coerulescens* (Odonata: Libellulidae), was monitored over a time period from 1989 to 2013. Study site was an artificial irrigation ditch in one of the last European stone steppes and "nature heritage", the Crau in Southern France. This artificial riverine habitat has an unusual high diversity of odonate species, prominent indicators for evaluating freshwater habitats. A clearing of the canal and destruction of the bank vegetation in 1996 was assumed to have great negative impact on the odonate larval and adult populations. Two mitochondrial markers (CO1 & ND1) and a panel of nuclear microsatellite loci were used to assess the genetic diversity. Over time they revealed a dramatic decline in diversity parameters between the years 2004 and 2007, however not between 1996 and 1997. From 2007 onwards the population shows a stabilizing trend but has not reached the amount of genetic variation found at the beginning of this survey. This decline cannot be referred to the clearing of the canal or any other direct anthropogenic impact. Instead, it is most likely that the populations' decay was due to by extreme weather conditions during the specific years. A severe drought was recorded for the summer months of these years, leading to reduced water levels in the canal causing also other water parameters to change, and therefore impacting temperature sensitive riverine habitat specialists like the *O. coerulescens* in a significant way. The data provide important insights into population genetic dynamics and metrics not always congruent with traditional monitoring data (e.g. abundance); a fact that should be regarded with caution when management plans for developed landscapes are designed." (Authors)] Address: Herzog, Rebecca, ITZ, Ecology & Evolution, Univ. of Veterinary Medicine Hannover, Hannover, Germany. E-mail: rebecca.herzog@ecolevol.de

**19943.** Hrdličková, E.; Bulánková, E. (2017): Ecological and hydromorphological evaluation of monitoring sites at the upper Myjava River. Folia faunistica Slovaca 22: 93-101. (in Slovak, with English summary) ["Since 2006 the upper part of the Myjava River has undergone strong changes. Above the monitoring site Myjava NAD (rkm 72.6) a water reservoir was rebuilt to a dry polder in 2006 and the stagnant water has changed into realined channel of the Myjava River. Because of benthic invertebrates has not been monitored at this locality since 2010 we would like to evaluate changes of macrozoobenthos communities at the sampling site Myjava NAD in present and compare them with the sampling site which is relatively undisturbed. This reference site

(hypocrenal) is situated in the beech forest at rkm 82. We assessed physico-chemical parameters, hydromorphology using River Habitat Survey at both localities in 2014 – 2015. Macrozoobenthos was sampled by kicking technique in spring and in autumn 2014 – 2015. The aim of our research was to: 1. Evaluate hydromorphology of selected stream sites; 2. Find out macrozoobenthos structure at these sampling sites 3. Compare changes in metrics found out during monitoring in 2003 – 2013 with our data from 2014. The PCA showed that the structure of macrozoobenthos is influenced first of all by the hydromorphological features of the Myjava River and the physico-chemicals parameters had less influence. Metrics calculated from macrozoobenthos abundance of the site Myjava NAD from the years 2003, 2014, 2015 showed that biological status is better but the site is hydromorphologically disturbed and therefore it belongs to the HMWB. According to the ecological evaluation we found out that the sampling site in the beech forest has a character of a reference site therefore it is unique in the Myjava River basin. Occurrence of the protected species *Cordulegaster heros*, sensitive species *Ibisia marginata* and *Ephemera danica* was threatened by the clearcutting in 2015. We suggest to minimize human impact in the vicinity of the stream at this valuable part of the Myjava River." (Authors)] Address: Bulánková, Eva., Dept of Ecology, Faculty of Natural Sciences, Comenius Univ., Ilkovičova 6, 842 15 Bratislava, Slovakia. Email: bulankova@fns.uniba.sk

**19944.** Irawan, F.; Hadi, M.; Tarwotjo, U. (2017): Struktur komunitas Odonata di Kawasan Wana Wisata Curug Semirang Kecamatan Ungaran Barat, Semarang. *Bioma : Berkala Ilmiah Biologi* 19(1): 69-75. (in Indonesian, with English summary) ["Dragonflies role as a predator in an ecosystem and become a healthy aquatic bio-indicators related to the life cycle. The diversity of habitat, food and predators affect community structure dragonfly. This study aims to determine the composition and community structure dragonfly morning and afternoon as well as the relationship with the physical environmental factors on four habitat in Semirang waterfall. Research using transect Point Count method. Statistically, the biodiversity of odonata in each habitat is significantly different. The results shows there are 15 species from 10 Family in morning observations and 12 species of 6 Family in afternoon observations, with a total of 17 species of 10 family of Odonata. Biodiversity in each station is low to moderately with high evenness. The highest abundance found in river habitat without the canopy during the afternoon that *Vestalis luctuosa* (61.29%), while the lowest abundance found in the the canopied river habitat when afternoon that is *Drepanosticta spatulifera* (1.33%). Common species at area of Semirang waterfall are *Euphaea variegata*, *Orthetrum sabina* and *Vestalis luctuosa*. Endemic species at area of Semirang waterfall are *Heliocypha fenestrata*, *Drepanosticta spatulifera* and *D. sundana*." (Authors)] Address: Irawan, F., Lab. Ekologi dan Biosistemik, Departemen Biol. Fak. Sains dan Matematika, Universitas Diponegoro, Semarang Jln. Prof. Soedarto, SH., Tembalang, Semarang, 50275, Indonesia. Email: frendi311@gmail.com

**19945.** Isaacson, J. (2017): Digest: Premating barriers drive reproductive isolation between two damselfly species. *Evolution* 71(10): 2541-2542. (in English) [This article corresponds to Barnard, A.A., O.M. Fincke, M.A. McPeck, & J.P. Masly. 2017. Mechanical and tactile incompatibilities cause reproductive isolation between two young damselfly species. *Evolution*. <https://doi.org/10.1111/evo.13315>. Abstract: "External reproductive structures play an important role in

reproductive isolation but are not thought to drive reproductive isolation between recently diverged species. Barnard et al. (2017) found that external reproductive structures cause strong premating isolation between two *Enallagma* species through mechanical and tactile isolation, and that premating barriers are stronger than postmating barriers for this species pair. Their results demonstrate that differences in external reproductive structures may contribute to speciation." (Author)] Address: Isaacson, J., Dept of Biology at Western Univ.. Email: jisaacso@uwo.ca

**19946.** Ito, K.; Sakuraba, N.; Yamaguchi, K. (2017): A control law for vehicle merging inspired by dragonfly behavior. *Artificial Life and Robotics* 22: 153-162. (in English) ["Autonomous control of vehicles has recently attracted considerable attention. In this sense, vehicle merging has become an important topic in this field of research. However, in conventional studies, the controlled vehicle must calculate the movement of other surrounding vehicles to complete the merge, requiring high computational costs. In this paper, we focus on dragonfly behaviour to solve this issue. Indeed, insects can behave adaptively in the complex real world in spite of the limited size of their brains. They reduce the computational requirements of their brain by relying on different properties of their surroundings, basing their intelligent behaviours on simple strategies. The behaviour of a dragonfly when chasing a prey is an example of these strategies. In this study, we address the vehicle merging maneuver by applying dragonfly's strategies to control the movement of the merging vehicle. We propose a simple control method inspired by the aforementioned strategies and, finally, we present simulation results that were conducted to demonstrate the effectiveness of this method." (Authors)] Address: Ito, K., Hosei Univ., Koganei, Japan

**19947.** Janssens, L.; Tüzün, N.; Stoks, R. (2017): Testing the time-scale dependence of delayed interactions: A heat wave during the egg stage shapes how a pesticide interacts with a successive heat wave in the larval stage?. *Environmental Pollution* 230: 351-359. (in English) ["Highlights: •An egg heat wave affected larval survival and oxidative damage in damselflies [*Chalcolestes viridis*]. •Also larval pesticide exposure had delayed effects on survival and oxidative damage. •An egg heat wave shaped the interaction between a pesticide and a heat wave in larvae. •Successive stressors have delayed effects and can thereby interact across life stages. Abstract: Under global change organisms are exposed to multiple, potentially interacting stressors. Especially interactions between successive stressors are poorly understood and recently suggested to depend on their timing of exposure. We particularly need studies assessing the impact of exposure to relevant stressors at various life stages and how these interact. We investigated the single and combined impacts of a heat wave (mild [25 °C] and extreme [30 °C]) during the egg stage, followed by successive exposure to esfenvalerate (ESF) and a heat wave during the larval stage in damselflies. Each stressor caused mortality. The egg heat wave and larval ESF exposure had delayed effects on survival, growth and lipid peroxidation (MDA). This resulted in deviations from the prediction that stressors separated by a long time interval would not interact: the egg heat wave modulated the interaction between the stressors in the larval stage. Firstly, ESF caused delayed mortality only in larvae that had been exposed to the extreme egg heat wave and this strongly depended upon the larval heat wave treatment. Secondly, ESF only increased MDA in larvae not exposed to the egg heat wave. We found little support for the prediction that when there is

limited time between stressors, synergistic interactions should occur. The intermediate ESF concentration only caused delayed mortality when combined with the larval heat wave, and the lowest ESF concentrations only increased oxidative damage when followed by the mild larval heat wave. Survival selection mitigated the interaction patterns between successive stressors that are individually lethal, and therefore should be included in a predictive framework for the time-scale dependence of the outcome of multistressor studies with pollutants. The egg heat wave shaping the interaction pattern between successive pesticide exposure and a larval heat wave highlights the connectivity between the concepts of 'heat-induced pesticide sensitivity' and 'pesticide-induced heat sensitivity'." (Authors)] Address: Janssens, Lizanne, Laboratory of Aquatic Ecology, Evolution and Conservation, Univ. of Leuven, Charles Deberiotstraat 32, B-3000 Leuven, Belgium. E-mail: Lizanne.janssens@kuleuven.be

**19948.** Janssens, L.; Op de Beeck, L.; Stoks, R. (2017): Stoichiometric responses to an agricultural pesticide are modified by predator cues. *Environ. Sci. Technol.* 51(1): 581-588. (in English) ["Current ecological risk assessment of pesticides fails to protect aquatic ecosystem health. To get better insight in how pesticides may affect aquatic ecosystems, we tested how sublethal pesticide concentrations modify body stoichiometry. Moreover, as interactions with natural stressors may cause underestimates of the impact of pesticides, we also tested whether this pathway depended on the presence of predator cues. Therefore, we exposed damselfly larvae to chlorpyrifos and cues from predatory dragonflies and focused on body stoichiometry and associated explanatory variables (growth rate, RNA : DNA and energy storage molecules). The way the predator cues modulated the pesticide effects strongly differed between endpoints. Exposure to chlorpyrifos affected the key body stoichiometric ratios: chlorpyrifos consistently increased N:P, while its effects on C:N (decrease with predator cues) and C:P (increase without predator cues) strongly depended upon the presence of the natural stressor. These stoichiometric responses could be explained by associated changes in growth, RNA:DNA and in C-rich fat and sugars and N-rich proteins. The observed changes in body stoichiometry may affect the damselflies' food quality, and have the potential to cascade through the food web and shape nutrient cycling." (Authors)] Address: Janssens, Lizanne, Lab. Aquat. Ecol., Evolution & Conservation, Univ. of Leuven, Charles Deberiotstraat 32, B-3000 Leuven, Belgium

**19949.** Janssens, L.; Stoks, R. (2017): Chlorpyrifos-induced oxidative damage is reduced under warming and predation risk: Explaining antagonistic interactions with a pesticide. *Environmental Pollution* 226: 79-88. (in English) ["Highlights: •Co-exposure to pesticides, warming and predators is common in nature. •Chlorpyrifos increased ROS and oxidative damage and decreased antioxidant defence. •Animals coped better with the pesticide when reared at higher temperatures. •The predator cues lowered the pesticide-induced increase in oxidative damage. •Cross-tolerance and maximum damage levels may explain antagonistic interactions. Interactions with pollutants and environmental factors are poorly studied for physiological traits. Yet physiological traits are important for explaining and predicting interactions at higher levels of organization. We investigated the single and combined impact of the pesticide chlorpyrifos, predation risk and warming on endpoints related to oxidative stress in *Enallagma cyathigerum*. We thereby integrated information on reactive oxygen species (ROS), antioxidant

enzymes and oxidative damage. All three treatments impacted the oxidative stress levels and for most traits the pesticide interacted antagonistically with warming or predation risk. Chlorpyrifos exposure resulted in increased ROS levels, decreased antioxidant defence and increased oxidative damage compared to the control situation. Under warming, the pesticide-induced increase in oxidative stress was less strong and the investment in antioxidant defence higher. Although both the pesticide and predation risk increased oxidative damage, the effects of the pesticide on oxidative damage were less strong in the presence of predator cues (at 20 °C). Despite the weaker pesticide-induced effects under predation risk, the combination of the pesticide and predator cues consistently caused the highest ROS levels, the lowest antioxidant defence and the highest oxidative damage, indicating the importance of cumulative stressor effects for impairing fitness. Our results provide the first evidence for antagonistic interactions of warming and predation risk with a pollutant for physiological traits. We identified two general mechanisms that may generate antagonistic interactions for oxidative stress: cross-tolerance and the maximum cumulative levels of damage." ] Address: Stoks, R., Lab. Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**19950.** Johansson, F.; Halvarsson, P., Mikolajewski, D.J.; Höglund, J. (2017): Genetic differentiation in the boreal dragonfly *Leucorrhinia dubia* in the Palearctic region. *Biological Journal of the Linnean Society* 121: 294-304. (in English) ["The last glacial period had a strong influence on the population genetic structure of boreal species in southern and central Europe. In addition, recent and current human impact on the boreal environment has led to habitat loss, which also has a large influence on population genetic structure of species. Here we present the spatial genetic structure of the boreal dragonfly *Leucorrhinia dubia* using ddRAD sequencing. We sampled individuals from nine locations in Europe, three in Asia (Russia and Japan) and one location of *L. intermedia* in Japan. Results showed three distinct genetic clusters in Europe. One genetic cluster consisted of individuals sampled from the locations in the Swiss Alps, a second consisted of individuals sampled in the United Kingdom, and a third cluster consisted of individuals from the rest of the seven sampled locations in Europe covering a latitudinal gradient from the French Pyrenees to the north of Finland. There was also a weak support that the French Pyrenees and Austrian Alps samples differentiated from the cluster of the five samples from central and north Europe. We suggest that these clusters reflect historical recolonization patterns since the last glaciation. The *L. dubia* individuals sampled from locations in Asia formed one cluster referring to *L. dubia orientalis* separated from the individuals sampled in European and from the *L. intermedia* locality sampled. Our result suggests that aquatic insects in the fragmented boreal landscape in south central Europe and United Kingdom need conservation consideration." (Authors)] Address: Mikolajewski, D.J., Institut für Biologie, Freie Universität Berlin, Königin-Luise-Straße 1-3, 14195 Berlin, Germany. Email: d.mikolajewski@gmx.de

**19951.** Junior dos Santos, J.; Kroth, N.; Breaux, J.A.; Albeny-Simões, D. (2017): Do container size and predator presence affect *Culex* (Diptera: Culicidae) oviposition preferences? *Revista Brasileira de Entomologia* 62(1): 40-45. ["Organisms with complex life cycles typically do not exhibit parental care. Hence, the ability of adult females to choose quality oviposition sites is critical for offspring success.



Gravid females of many insect taxa have the capability to detect environmental conditions in water-holding containers (e.g., resource level, presence of competitors or predators) and to choose the sites that are most suitable for offspring growth and development. Mosquitoes may also detect physical container characteristics related to water permanence such as surface area, volume, or container size, and some species such as those in the genus *Culex* have been shown to prefer larger containers. However, predators may also preferentially colonize larger containers; thus, ovipositing females may face decisions based on cues of site quality that balance the costs and benefits for offspring. We used a field experiment to evaluate the oviposition preferences of two *Culex* species in response to experimental container size and predator abundances within the containers. We found that both species avoided ovipositing in the largest containers, which have high abundances of *Chaoborus* sp. and dragonfly larvae (predators). However, the container size most commonly chosen for oviposition (15-L buckets) also had high mean abundance per liter of dragonfly larvae. These results suggest either prey naiveté or reduced vulnerability of these species to dragonflies compared to *Chaoborus* sp. Other potential mechanisms for the observed patterns are discussed." (Authors)] Address: Junior dos Santos, J., Universidade Comunitária da Região de Chapecó, UNOCHAPECO, Curso de Graduação em Ciências Biológicas, Chapecó, SC, Brazil

**19952.** Kappes, E.; Kappes, W. (2017): *Ceriatrigon georgifreyi* auf Lesbos, Griechenland (Odonata: Coenagrionidae). *Libellula* 36(1/2): 45-50. (in German, with English summary) [*C. georgifreyi* in Lesbos, Greece – Since 1992, it is known that members of the genus *Ceriatrigon* are to be found in Lesbos, however the identification of the species has hitherto been unclear. On 27-iv-2016, *C. georgifreyi* was recorded for the first time in Lesbos, 1.5 km northeast of the Gulf of Kalloni, where close to the Krioneri riverbed, a small pond was fed all year round by a strong artesian spring. A male specimen was caught, photographed and the tip of the abdomen studied with a hand lens. This is the first documented record of *C. georgifreyi* in Lesbos and the fourth recorded location in Greece." (Authors)] Address: Kappes, W., Eichenweg 27, D-22395 Hamburg, Germany. Email: eva.wulf.kappes@t-online.de

**19953.** Karlson, E. (2017): Temperature acclimation in dragonfly larvae: which species are more vulnerable to global warming? M.Sc. dissertation, Biology Education Centre & Dept of ecology and genetics/Animal ecology, Uppsala Univ.: 33pp. (in English) ["Climate change is affecting all known habitats on earth. Increased temperatures in aquatic habitats will not only heat the waters but will also cause larger variation in temperature fluctuation. Many animals in aquatic systems are adapted to specific habitats in these waters and may face disadvantages if temperatures changes too much. In my project. I have used larvae of dragonflies and damselflies to examine how they might be affected by changes in water temperature caused by climate change. I sampled damselfly and dragonfly Larvae in three lakes around Uppsala at two water depths, in order to examine whether these species differed in their depth distribution. Larvae exposed to thermal fluctuations should be better at adapting to the increase in temperature from global warming. In a laboratory experiment I tested the ability to acclimate to three temperatures (18, 21 and 24°C) in three species of damselfly larvae (*Ischnura elegans*, *Coenagrion pulchellum*, and *Erythromma najas*), over four different time intervals (1, 2, 12 and 24 hours) for *E. najas* and two time intervals for *I. elegans* and *C. pulchellum*. To measure acclimation. I introduced prey items in a laboratory experiment, and counted how many strikes and captures the larvae managed to do during a 10 mm interval after being acclimated to the four different time intervals. The results of the field sampling in the lakes showed species specific depth distribution differences in dragonfly and damselfly larvae, with the majority of species preferring the surface over the bottom. The results from the temperature acclimation experiments showed that species changed their strikes and capture success on prey over the different time intervals, and especially *E. najas* showed a clear trend that suggest adaptation to temperate changes. Species differed in prey capture behaviour, with *E. najas* having the highest and *C. pulchellum* the lowest number of strikes and capture success. Results also suggested that *E. najas* is able to acclimate to the temperatures over the time period tested. This species also had a wide depth distribution in the lakes, which might explain its faster acclimation, even though a similar depth distribution was found in the non acclimating *C. pulchellum*. The other two species (besides *E. najas*) showed less clear patterns with regard to acclimation and it was difficult to tell if they were able to acclimate to the tested temperatures. My results suggest that damselfly larvae species are able to acclimate in prey capture behaviour over relatively short time periods in response to temperature fluctuations, and they might therefore be able to adapt to increasing temperature fluctuations in the future." (Authors)] Address: not stated

**19954.** Khelifa, M.R. (2017): Bioécologie de *Platycnemis subdilata* (Odonata: Platycnemididae) dans le bassin versant de la Seybouse. PhD thesis, Département de Biologie animale et végétale, Faculté des Sciences Biologiques et des Sciences Agronomiques, Université Mouloud Mammeri de Tizi-Ouzou: 101 pp. (in French, with English and Arabian summaries) ["*P. subdilata* is endemic to North Africa (Tunisia, Algeria and Morocco) but it has not been studied since its description in 1849. This study aims to document the distribution, abundance, taxonomy, life history, adult behavior, senescence and demographic parameters of the species in the Seybouse watershed, Northeast Algeria. The results show that *P. subdilata* is the most abundant lotic species in the watershed, estimating a minimum population size of 50,000 mature individuals. The exuvia is easily identifiable compared to other zygopterans of the region because it has a tail-like filament at the end of the caudal gills. In addition, the species presents morphological criteria that differentiate it from *P. pennipes* which is widespread in Europe. *P. subdilata* is univoltine with direct embryonic development and a fairly asynchronous larval development followed by a relatively long emergence season and flight period. Adult behavior is typically non-territorial in which the males use two different techniques to acquire females; one is to wait at reproductive sites and another is to seek within foraging sites. Senescence was recorded in clutch size and the rate of egg deposition. Adult survival depended on age and movement between foraging sites (dispersal), but reproductive success depended on age and sex. This study represents the raw material for future studies on *P. subdilata*." (Author)] Address: Khelifa, R., Biodiversity Research Center, Univ. of British Columbia, 2212 Main Mall, Vancouver. B.C. V6T1Z4, Canada. Email: rassimkhalifa@gmail.com

**19955.** Kulijer, D. (2017): First survey of the dragonfly fauna (Insecta, Odonata) of northwestern Bosnia. *Natura Croatica: Periodicum Musei Historiae Naturalis Croatici*

26(1): 65-80. (in English, with Bosnian summary) ["The results of the first study of the dragonfly fauna in northwest Bosnia are presented. Field surveys were conducted in summer 2012 and 2013, resulting in the identification of 36 species. Out of these, 34 are new for the region. The present paper gives a detailed overview of the results and a comparison of the dragonfly fauna composition of the region studied with the neighboring areas within Bosnia and Herzegovina and Croatia is made. The most abundant species were: *Calopteryx virgo*, *Sympetrum sanguineum*, *Onychogomphus forcipatus*, *Somatochlora meridionalis*, *Calopteryx splendens* and *Platycnemis pennipes*. Noteworthy are the records of *Chalcolestes viridis* and *Coenagrion scitulum*, two species that are rare in Bosnia and Herzegovina, and also *Coenagrion ornatum* and *Cordulegaster heros*, species of European conservation concern. Distribution and the status of these species and the conservation of dragonfly species in the country are briefly discussed. The data collected represent an important contribution to the knowledge of the dragonfly fauna of the Una River basin and Bosnia and Herzegovina." (Author)] Address: Kulijer, D., National Museum of Bosnia and Herzegovina, Zmaja od Bosne 3, 71000 Sarajevo, Bosnia and Herzegovina

**19956.** Kuncce, W.; Stoks, R.; Johansson, F. (2017): Single and mixture impacts of two pyrethroids on damselfly predatory behavior and physiological biomarkers. *Aquatic Toxicology* 190: 70-77. (in English) ["Highlights: •Damselfly larvae [*Coenagrion puella*] exposed to sub-lethal combination of pyrethroid insecticides. •Exposure to deltamethrin reduces predatory ability. •Combined exposure to deltamethrin and esfenvalerate inhibits the GST detoxification pathway. •Observed effects can eventually result in lower emergence of adults from contaminated ponds. Abstract: Direct mortality due to toxicity of single pesticide exposure along a concentration gradient, while the most common, is only one important parameter for assessing the effects of pesticide contamination on aquatic ecosystems. Sub-lethal toxicity can induce changes in an organism's behavior and physiology that may have population-level ramifications and consequences for ecosystem health. Additionally, the simultaneous detection of multiple contaminants in monitored watersheds stresses the importance of gaining a greater understanding of the toxicities of combined exposures, particularly at low, environmentally relevant concentrations. Using larvae of *Coenagrion puella*, we conducted a combined exposure investigation of two widely-used pyrethroid insecticides presumed to share the same neurotoxic mechanism of action, and estimated their effect on predatory ability, mobility and three physiological biomarkers (Glutathione S-transferase; GST, respiratory electron transport system; ETS, and malondialdehyde; MDA). Deltamethrin exposure (0.065 µg/L and 0.13 µg/L) was found to reduce the predatory ability, but it did not affect the larvae's mobility. Esfenvalerate exposure (0.069 µg/L and 0.13 µg/L), on the other hand, induced no significant changes in predatory ability or mobility. The decrease in predatory ability after the combination exposure (0.067 µg/L deltamethrin and 0.12 µg/L esfenvalerate) did not significantly differ from the impact of the single deltamethrin exposures. Glutathione-S-transferase was induced after single esfenvalerate exposure and the lower deltamethrin concentration exposure, but seemingly inhibited after exposure to the higher concentration of deltamethrin as well as the combination of both pyrethroids. Our data indicate that sub-lethal exposure to deltamethrin reduces predatory ability and suggest that sub-lethal combined exposure to deltamethrin and esfenvalerate inhibits

the GST detoxification pathway. These effects can eventually result in a lower emergence of adults from contaminated ponds." (Authors)] Address: Kuncce, W., Dept of Ecology and Genetics, Animal ecology, Norbyvägen 18 D, Uppsala Univ., SE-752 36 Uppsala, Sweden

**19957.** Laister, G. (2017): Öfter mal was Neues – Saphirauge (*Erythromma lindenii*) neu für das Linzer Stadtgebiet. *ÖKO·L* 39/2: 23-24. (in German) ["The first record from the Linz area dates from early August 1965 (Theischinger 1966). At that time Günther Theischinger was able to find a single, freshly hatched male at a pond in the Pleschinger Au. After that, there were no encounters with this species for a long time. It was not until 2013 - and in almost every year since then - that I was able to detect *E. lindenii* at the Großer Weikersee, but only in single specimens (12. 8. 2013, 6. 9. 2013, 7. 7. 2014, 8. 7. 2016). This makes it the 55th dragonfly species on Linz city territory. There is also another record from Upper Austria from the Machland region in 2013 (Huber 2014)." (Author(DeepL))] Address: Laister, G., Roseggerstr. 20, 4020 Linz, Austria. E-mail: gerold.laister@mag.linz.at

**19958.** Leiza, L.P.; Conesa García, M.A.; Torralba Burrial, A. (2017): Contribución de la red de seguimiento de la calidad de los ríos guipuzcoanos al conocimiento de la distribución de los Odonata de Gipuzkoa (España). *Boletín de la Sociedad Entomológica Aragonesa* 61: 278-280. (in Spanish, with English summary) ["Data on the distribution of rheophilic Odonata are presented, extracted from the analysis of the larvae included in the samples of benthic macroinvertebrates collected in a series of river quality monitoring campaigns conducted in Gipuzkoa (Spain). Records of special interest are those of *Coenagrion mercuriale* (Charpentier, 1840), *Onychogomphus forcipatus forcipatus* (Linnaeus, 1758), *Onychogomphus forcipatus unguiculatus* (Vander Linden, 1820) and *Oxygastra curtisii* (Dale, 1834)." (Authors)] Address: Leiza, L.P., EKOLUR Asesoría Ambiental SLL, Camino de Astigarraga 2, Pl. 4ª dcha.-Of. 8. 20180 Oiartzun, Spain. E-mail: leire@ekolur.com

**19959.** Lin, H.-T.; Leonardo, A. (2017): Heuristic rules underlying dragonfly prey selection and interception. *Current Biology* 27(8): 1124-1137. (in English) ["Highlights: •Dragonflies use heuristic selection rules to determine which prey to pursue. •Prey angular size and speed, foveation error, and zenith crossing are evaluated. •These rules initialize takeoff for optimal interception flight conditions. •Prey that do not satisfy the rules are usually ignored or pursued unsuccessfully. Summary: Animals use rules to initiate behaviors. Such rules are often described as triggers that determine when behavior begins. However, although less explored, these selection rules are also an opportunity to establish sensorimotor constraints that influence how the behavior ends. These constraints may be particularly significant in influencing success in prey capture. Here we explore this in dragonfly prey interception. We found that in the moments leading up to takeoff, perched dragonflies employ a series of sensorimotor rules that determine the time of takeoff and increase the probability of successful capture. First, the dragonfly makes a head saccade followed by smooth pursuit movements to orient its direction-of-gaze at potential prey. Second, the dragonfly assesses whether the prey's angular size and speed co-vary within a privileged range. Finally, the dragonfly times the moment of its takeoff to a prediction of when the prey will cross the zenith. Each of these processes serves a purpose. The angular size-speed criteria biases interception flights to catchable prey, while

the head movements and the predictive takeoff ensure flights begin with the prey visually fixated and directly overhead—the key parameters that underlie interception steering. Prey that do not elicit takeoff generally fail at least one of the criterion, and the loss of prey fixation or overhead positioning during flight is strongly correlated with terminated flights. Thus from an abundance of potential targets, the dragonfly selects a stereotyped set of takeoff conditions based on the prey and body states most likely to end in successful capture." (Authors)] Address: Leonardo, A., Janelia Research Campus, Howard Hughes Medical Institute, 19700 Helix Drive, Ashburn, VA 20147, USA. E-mail: leonardo@janelia.hhmi.org

**19960.** Mabidi, A.; Bird, M.S.; Perissinotto, R. (2017): Distribution and diversity of aquatic macroinvertebrate assemblages in a semi-arid region earmarked for shale gas exploration (Eastern Cape Karoo, South Africa). *PLoS ONE* 12(6): e0178559. <https://doi.org/10.1371/journal.pone.0178559>. 27 pp. (in English) ["This study aims to investigate macroinvertebrate assemblage structure and composition across the three major waterbody types (temporary rivers, depression wetlands and semipermanent dams) of the Eastern Cape Karoo, and to identify important environmental and spatial correlates of macroinvertebrate assemblage composition in the region. A total of 33 waterbodies (9 dams, 13 depression wetlands and 11 rivers) were sampled. Altogether, 91 taxa were recorded in November 2014 and 82 in April 2015. Twenty-seven taxa were common to all three waterbody types (across both sampling occasions), with 17 of these observed in November and 19 in April. The ANOSIM tests revealed significant differences in assemblage composition between the depression wetlands and rivers for both sampling occasions, but dams did not differ from the other waterbody types. SIMPER analyses indicated that the notonectid *Anisops varia* and the corixid *Micronecta scutellaris* were abundant across all three waterbody types during both sampling occasions. The mayfly *Cloeon africanum* and the damselfly *Pseudagrion* sp. were abundant in river habitats during both sampling occasions, while the gastropod mollusc *Bulinus tropicus* and the copepod *Lovenula falcifera* best characterised depression wetlands on both occasions. Non-metric multidimensional scaling ordination highlighted a clear separation of assemblages between November and April, while distance-based Redundancy Analysis revealed that conductivity, altitude, turbidity and pH were the most important variables explaining the variation in macroinvertebrate assemblage patterns. These results provide baseline information which is important for future biological monitoring of impacts associated with hydraulic fracturing activities and climatic changes in the region." (Authors)] Address: Mabidi, Annah, DST/NRF Research Chair in Shallow Water Ecosystems, Nelson Mandela Metropolitan Univ., Port Elizabeth, South Africa. E-mail: annahanusa@gmail.com

**19961.** Masius, P. (2017): *Coenagrion mercuriale* an der Weende bei Göttingen. *Mitteilungen Nr. 3 der AG Libellen in Niedersachsen und Bremen*: 22-25. (in German) [Weende between Bovenden and Nörten-Hardenberg (Landkreis Göttingen, Niedersachsen, Germany); 5-VII-2016] Address: Masius, P., Auf dem Hagen 18, 37079 Göttingen, Germany. E-mail: Patrick\_masius@gmx.de

**19962.** Miriglu, A.; Demirtas, A. (2017): Ecological niche modelling of *Calopteryx splendens* (Harris, 1782) (Insecta: Odonata) subspecies in Turkey. *Süleyman Demirel Univ. Journal of Natural and Applied Sciences* 21(3): 935-941. (in

Turkish, with English summary) ["Turkey is an important region in terms of biodiversity because of its geographical location, topographical structure and the presence of various climate types. The emergence of new species and subspecies can be seen. In this study, we evaluated subspecies of *C. splendens* distributed in Turkey. 19 ecological parameters of the current known localities of these subspecies were analyzed. The potential habitats and new locations for the subspecies populations were investigated. Current distribution maps of *C. splendens* subspecies have been made using MaxEnt ecological niche modelling methods. According to these results, it was found that the distribution areas of *C. splendens* subspecies, whose distributions according to faunistic data are known, almost overlapped with the distribution areas of ecological data." (Authors)] Address: Demirtas, A., Ondokuz Mayıs Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 55105, Samsun, Turkey

**19963.** Mukherjee, P.; Khan, M.M.H. (2017): Abundance of arthropod insect pests and natural enemies in rice field as influenced by rice growth stages and neighboring crops. *Bangladesh J. Agril. Res.* 42(2): 309-319. (in English) ["Studies were conducted to record the abundance of arthropod insect pests and natural enemies in rice fields as influenced by rice growth stages and neighboring crops at the experimental farm of Patuakhali Science and Technology Univ. (PSTU), Dumki, Patuakhali during 2012 in Boro rice season following randomized complete block design. Results indicated that rice-tree habitat showed the highest abundance of leafhoppers (100.75) followed by cricket (16.50), grasshoppers (15.25) and stink bugs (15.25). The lowest abundance of all insect pests was in rice-sesame habitat. No significant differences were found on the abundance of rice bug, rice hispa and stem borer populations. At seedling stage, the highest abundance of leafhopper (94.25) was recorded followed by grasshopper (47.00) and stink bug (26.50) while the lowest was stem borer (0.57) and rice hispa (6.00). At early tillering stage, maximum number of grasshopper (17.25) was recorded followed by cricket (7.00). At maximum tillering stage, the highest abundance of leafhoppers (122.5) was obtained followed by rice bug (62.00) and the lowest was the stink bug (7.00). At panical initiation stage, the highest abundance of rice bug (334.00) was recorded which was followed by leafhoppers (65.25) and the lowest was the cricket (15.75). No population of rice hispa and stem borer was recorded at maximum tillering and panical initiation stages. In case of natural enemies, the highest abundance of lady bird beetle (45.27) and damselfly (16.73) was found in rice-rice habitat. The highest abundance of ichneumonid wasp (57.53) was in rice-tree habitat and ground beetle (28.80) was in rice-sesame habitat. No significant differences were observed on the abundance of dragonfly, spider and dipteran fly among different habitats. Among different growth stages of rice plant, significantly the highest abundance of lady bird beetle was recorded at maximum tillering stage. The highest abundance of ichneumonid wasp and ground beetle was recorded at seedling stage. The highest abundance of damselfly, spider and dipteran fly was at early tillering stage. No significant difference was observed on the abundance of dragonfly among different rice growth stages." "Dragonfly population did not differ significantly within rice habitats. The maximum number of dragonfly was observed in rice-maize habitat (1.50 dragonfly/40 sweeps) followed by rice-sesame and rice-maize habitats. The minimum number of dragonfly was observed in rice-tree habitat (0.42 dragonfly/40 sweeps) (Table 3). In case of different growth stages, dragonfly population also did not differ significantly (Table 4). The highest abundance

was at panicle initiation stage (2.25 dragonfly/40 sweeps) and the lowest was found at seedling stage. No dragonfly population was observed at early tillering stage." (Authors)] Address: Mukherjee, P., Dept Entomology, Patuakhali Science and Technology Univ., Dumki, Patuakhali, Bangladesh

**19964.** Mutlu, O.; Ulak, G.; Akar, F.; Erden, F.; Celikyurt, I.K.; Bektas, E.; Tanyeri, P.; Kaya, H. (2017): Effects of acute administration of adipokinetic hormone on depression, anxiety, pain, locomotion and memory in mice. *Chin J Physiol.* 60(2): 106-113. (in English) ["The neurosecretory cells in the corpus cardiacum of insects synthesize a set of hormones that are called adipokinetic, hypertrehalosemic or hyperprolinemic depending on the insect in question. They are the Adipokinetic Hormone/Red Pigment-Concentrating Hormone (AKH/RPCH) family of peptides. The present study investigated the effects of acute administration of *Locusta migratoria* (Locmi-AKHII) and *Anax imperator* (Anaim-AKH) on depression, anxiety, pain (analgesy), locomotion and memory in mice in forced swimming (FST), elevated plus maze (EPM), hot plate, locomotor activity and passive avoidance tests. Both Locmi-AKH-II (4 mg/kg) and Anaim-AKH (0.25 and 0.50 mg/kg) decreased immobility time (in sec, s) in the FST test. Anaim-AKH (0.5 and 1 mg/kg) increased the percentage of time spent in open arms/total time spent and the percentage of the number of open arm/total arm entries in the EPM test. Anaim-AKH (1 and 2 mg/kg) significantly increased latency (s) (initial time passed) for mice to lick their hind paws or jumping in the hot plate test. Anaim-AKH (4 mg/kg) significantly decreased the total distance (cm) moved, or the speed (cm/s) of movement of the animals in the locomotor activity test. Neither Locmi-AKH-II nor Anaim-AKH altered the retention latency (s) in the passive avoidance test. Both Locmi-AKH-II and Anaim-AKH exerted antidepressant effects, while only Anaim-AKH had anxiolytic and analgesic effects when administered acutely. Anaim-AKH diminished locomotion at higher doses while Locmi-AKH-II had no such effects. Neither Locmi-AKH-II nor Anaim-AKH disturbed learning and memory when acutely administered. Data of our studies suggest clinical potentials of AKH to be used in depression, anxiety and pain without disturbing memory." (Authors)] Address: Mutlu, O., Kocaeli Univ. Medical Faculty, Dept of Pharmacology, 41380, Kocaeli, Turkey

**19965.** Op de Beeck, L.; Verheyen, J.; Olsen, K.; Stoks, R. (2017): Negative effects of pesticides under global warming can be counteracted by a higher degradation rate and thermal adaptation. *Journal of Applied Ecology* 54(6): 1847-1855. (in English) ["1. An alarming finding for biodiversity is that global warming and pesticides often interact synergistically. Yet, this synergism may not capture the full picture because two counteracting processes may reduce the higher impact of pesticides under warming: higher pesticide degradation in the environment and thermal adaptation of populations. 2. We tested for the effects of warming and multiple pulses of the insecticide chlorpyrifos on life history and fitness-related physiological traits in the damselfly *Ischnura elegans*. To assess whether thermal adaptation is able to mitigate the impact of the pesticide under future warming, we exposed replicated populations from a colder, high latitude and from a warmer, low latitude in a common garden rearing experiment at 20 and 24°C (the respective mean summer water temperatures at both latitudes). 3. At the higher temperature pesticide degradation was higher, leading to less accumulation after multiple pulses compared to the lower temperature. Accordingly, the pesticide caused

less mortality and less oxidative damage at the higher temperature. This contradicts the general belief (based on studies that kept pesticide concentrations constant) of a higher impact of pesticides under warming. Furthermore, the reduction of the impact of the pesticide at the higher temperature was more pronounced in the warm-adapted low-latitude populations, indicating a counteracting role of thermal adaptation. 4. Policy implications. Our findings provide proof-of-principle for two key insights that will allow improving ecological risk assessment of pesticides under global warming: (i) higher pesticide degradation in the environment under warming may temper the impact of multiple pesticide pulses; (ii) gradual thermal evolution may further reduce the impact of pesticides at high latitudes under global warming. This knowledge can be very important for policy makers to arrive at a more realistic forecasting of the impacts of chemical pollution and climate change interactions on organisms." (Authors)] Address: Op de Beeck, Lin, Laboratory of Aquatic Ecology, Evolution and Conservation, Univ. of Leuven, Charles Deberiotstraat 32, B-3000 Leuven, Belgium. Email: lin.opdebeeck@kuleuven.be

**19966.** Ott, J. (2017): Libelle des Jahres 2017: Gemeine Keiljungfer. DATZ 1/2017: 11- (in German) [General introduction into the dragonfly of the year 2017 *Gomphus vulgaticissimus*.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**19967.** Outomuro, D.; Söderquist, L.; Johansson, F.; Ödeen, A.; Nordström, K. (2017): The price of looking sexy: visual ecology of a three level predator-prey system. *Functional Ecology* 31(3): 707-718. (in English) ["(1.) Colour signals and colour vision play a pivotal role in intraspecific communication and predator-prey interactions. However, the costs of expressing conspicuous sexual signals at multiple trophic levels have been largely overlooked. Sexual signals can also experience character displacement in sympatric populations of closely-related species, leading to potential changes in conspicuousness. (2.) We here investigate a bird-damselfly-fruit fly predator-prey system, where two closely related damselfly species have conspicuous, sexually selected wing coloration. The damselflies can occur in sympatry and allopatry and reproductive character displacement in the coloration size has been previously reported. (3.) We quantify the damselfly wing reflectance from replicated sympatric and allopatric populations, and use receptor noise models to investigate the visual discriminability of the wing coloration for the bird, damselfly and fly vision systems, against natural backgrounds. We perform electroretinograms to study damselfly eye sensitivity. We also estimate damselfly predation risk in natural populations. (4.) We find that the chromatic component of wing coloration makes males highly discriminable to the predator, but not to the prey. However, female wing coloration is predominantly cryptic for the predator and prey, and interestingly, also for male damselflies. A female being cryptic to conspecifics likely reduces male harassment. The estimates of predation risk partially support the discriminability results. We also show that there is no difference in colour vision sensitivity between the two damselfly species and sexes, and no difference in wing coloration or its discriminability between sympatric and allopatric populations. (5.) Our results suggest that sexually selected traits can be antagonistically selected by predators and prey, and that this antagonistic selection can be sex-dependent: males are paying a large cost in terms of conspicuousness, while females remain mostly cryptic. Our study thus emphasizes the need for investigating visual communication at multi-trophic levels since the



degree of colour discriminability can differ between predators, prey and the focal species." (Authors)] Address: Outomuro, D., Section for Animal Ecology, Dept of Ecology and Genetics, Evolutionary Biology Centre, Uppsala Univ., Norbyvägen 18D, 75236 Uppsala, Sweden. E-mail: outomuro.-david@gmail.com

**19968.** Owens, G.L.; Rennison, D.J. (2017): Evolutionary ecology of opsin gene sequence, expression and repertoire. *Molecular Ecology* 26: 1207-1210. (in English) ["Linking molecular evolution to biological function is a long-standing challenge in evolutionary biology. Some of the best examples of this involve opsins, the genes that encode the molecular basis of light reception. In this issue of *Molecular Ecology*, three studies examine opsin gene sequence, expression and repertoire to determine how natural selection has shaped the visual system. First, Escobar-Camacho et al. (2017) use opsin repertoire and expression in three Amazonian cichlid species to show that a shift in sensitivity towards longer wavelengths is coincident with the long-wavelength-dominated Amazon basin. Second, Stieb et al. (2017) explore opsin sequence and expression in reef-dwelling damselfish and find that UV- and long-wavelength vision are both important, but likely for different ecological functions. Lastly, Suvorov et al. (2017) study an expansive opsin repertoire in the insect order Odonata and find evidence that copy number expansion is consistent with the permanent heterozygote model of gene duplication. Together these studies emphasize the utility of opsin genes for studying both the local adaptation of sensory systems and, more generally, gene family evolution." (Authors)] Address: Owens, G.L., Dept of Botany and Biodiversity Research Centre, Univ. of British Columbia, Vancouver, BC, Canada E-mail: gregory.owens@alumni.ubc.ca

**19969.** Pereira, D.F.G. (2017): Filtros ambientais determinando caracteres funcionais de assembleias de Odonata. Dissertação (Mestrado) - Universidade Federal do Pará, Empresa Brasileira de Pesquisa Agropecuária, Instituto de Ciências Biológicas, Belém, 2017. Programa de Pós-Graduação em Ecologia: X + 28 pp. (in Portuguese, with English summary) ["Species distribution is affected by availability of habitats that fit within the limits of variation of their niche and by interaction with other species. Environmental modifications, especially those of anthropic origin, are increasingly common, and are considered major causes of species extinction during the Anthropocene. Aquatic ecosystems are considered among the most vulnerable on the planet because of its dependence on the surroundings and the drainage system. However, species responses to these changes are not random, and can follow patterns that are caused by the specific functionality or morphology of each taxon. This work's goal was to evaluate if environmental factors work as ecological filters for the establishment of Odonata species through selection of their functional and morphological characters, testing the hypotheses that a) the environment works as a filter over species, by facilitating or hindering characters and b) that due to their thermoregulatory and reproductive requirements, indispensable for colonization and population maintenance, thorax width and oviposition type will be the most affected biological variables. Considering that, we sampled 97 streams in the oriental side of the Brazilian Amazon Forest, distributed over an environmental gradient which covers areas ranging from untouched primary forest to areas extremely modified by agriculture and livestock. We used six functional traits (total body length, fore wing length, fore wing width, thorax width, abdominal

length and oviposition type) and seven environmental variables (habitat integrity index, dissolved oxygen, water temperature, canopy cover, macrophytes cover, pH and conductivity). To evaluate if the environmental variables affected the odonate communities, we used the combination of the RLQ and Fourth Corner analysis, with which we assessed the relation between each of the selected traits with each of the habitat descriptors. Among the studied environmental variables, habitat integrity index presented the largest effect over the community of Odonata, having a negative relation with fore wing width, thorax width and exophytic oviposition, and a positive relation with endophytic oviposition. Macrophytes cover showed a negative relation with abdominal length and a positive relation with thorax width and exophytic oviposition. No other environmental descriptor presented significant relations. The results show that poorly preserved habitats facilitate the occurrence of organisms with larger thorax and the substitution of the endophytic by the exophytic type of oviposition. Since environmental impacts usually do not change Odonata species richness, only community composition, these results point that there is favouritism towards groups of species with those characters, like the Libellulidae family, with detriment to other families or groups (specially of the Zygoptera suborder), what might result in community homogeneity and loss of functional and phylogenetic diversity. Thus, the preservation of primary forest is indispensable for the maintenance of Odonata, being the best way to conserve the different ecophysiological and behavioural groups in the order. The dragonfly communities' responses, directed by morphological and behavioural traits, enlightens ecological response patterns, and the addition of oviposition categories to conservation policies for the Odonata is critical in making them more effective, as they are absolutely necessary for population stability and colonizing new sites." (Author) "Conclusion The results of this study allow us to identify a clear influence of environmental factors on the composition of Odonata assemblages, confirming the hypotheses that the environment works as an environmental filter for certain characters and that thorax width and oviposition would be the characters most influenced. The quality of the environment, measured by the environmental integrity index, in particular, has a marked effect on the composition of the assembly, affecting both morphological and behavioural characters. The morphophysiological/behavioural approach used in this study sheds new light on Odonata distribution patterns (and their determinants), in contrast to traditional approaches, commonly working with suborders independently or with thermoregulatory categories. Therefore, the integration of morphological and behavioral data in Odonata studies (especially on oviposition) is necessary for a better understanding of the processes that determine the occurrence of the species." Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Pereira, D., Laboratório de Sistemática e Ecologia de Insetos – Centro Universitário do Norte do Espírito Santo, Brasil. E-mail: pereira.dfg@gmail.com

**19970.** Pfeifer, E.; Markow, T.A. (2017): Population connectivity and genetic diversity in long-distance migrating insects: divergent patterns in representative butterflies and dragonflies. *Biological Journal of the Linnean Society* 122 (2): 479-486. (in English) ["A number of insect species undergo annual and strikingly long-distance migrations. While the census sizes appear to be very large in many of these species, our understanding of their population genetics and interpopulation connectivity remains elusive. Here, we summarize the utility and limitations of mitochondrial DNA barcodes to assess migratory patterns and genetic connectivity

among populations of four well-known species of long-distance, multigenerational insect migrants, *Danaus plexippus* and *Vanessa cardui*, and *Pantala flavescens* and *Anax junius*. We contrast the differences between the two butterfly species, which show low genetic diversity and little or no phylogeographic structuring, with the two dragonfly species which show an intriguing pattern of high genetic diversity and no apparent phylogeographic structure. Although a recent population genetic study of *P. flavescens* reported high gene flow and reduced (or diminished) COI genetic diversity across widely separated geographic regions, suggesting global panmixia, reanalysis of the data from that study revealed high genetic diversity in agreement with other studies on both *P. flavescens* and *A. junius*. The presence of isolated populations of *P. flavescens*, such as found on Easter Island that appear non-migratory, as well as evidence for significant structure among some migratory populations, suggest that concluding global panmixia in *P. flavescens* may be premature. We also suggest that cost-effective barcode analyses would be the method of choice for preliminary analyses of large data sets required to assess migratory routes and connectivity among populations on a global scale." (Authors)] Address: Pfeiler, E., Centro de Investigación & Alimentación y Desarrollo, A.C., Unidad Guaymas, Apartado Postal 284, Guaymas, Sonora C.P. 85480, México. Email: pfeiler@ciad.mx

**19971.** Phillips, I.D.; Prestie, K.S. (2017): Evidence for substrate influence on artificial substrate invertebrate communities. *Environmental Entomology* 46(4): 926-930. (in English) ["Cobble baskets are frequently used as a tool to measure differences in benthic macroinvertebrate communities between waterbodies; however, underlying differences in substrate type may influence the resultant colonization of baskets, misrepresenting communities. This study tests the hypothesis that cobble basket placement influences the resulting benthic macroinvertebrate community. Cobble basket arrays (n=74) were deployed in Dog Lake, Saskatchewan, in 2011 (97 d) and 2012 (95 d) on cobble habitats and soft or sandy substrates ~100 m apart. Baskets placed on cobble substrate had significantly higher Shannon-Weaver diversity relative to those placed on soft substrate in both years, and higher % EPT (Ephemeroptera Plecoptera Trichoptera) in 2011, but total density was not significantly different. Nonmetric multidimensional scaling revealed that the community was different between both treatments, characterized by higher densities of *Gammarus lacustris* Sars in baskets placed on soft sediment in both years, higher densities of *Aeshna* sp. and *Mystacides* sp. on cobble substrate in 2011, and higher densities of *Helobdella stagnalis* (L.) and *Glossophinia complanata* (L.) on cobble substrate in 2012. The results were consistent with the hypothesis that baskets placed on cobble substrate versus soft substrate will result in differing community colonization. The resulting recommendation for monitoring and assessment using cobble baskets in lakes is that baskets be placed on comparable substrate type when comparing between lakes, and that cobble beds be chosen as a more appropriate substrate for deployment, as the added habitat complexity of baskets on soft sediment may act as an attractant and not reflect the true community composition of that habitat." (Authors)] Address: Phillips, I.D., Water Quality and Habitat Assessment Services, Water Security Agency, 101-108 Research Dr., Saskatoon, Saskatchewan, S7N 3R3, Canada. Email: iain.phillips@wsask.ca

**19972.** Pinkert, S.; Brandl, R.; Zeuss, D. (2017): Colour lightness of dragonfly assemblages across North America and

Europe. *Ecography* 39: 1-8. (in English) ["Dark-coloured ectotherms absorb energy from the environment at higher rates than light-coloured ectotherms. The thermal melanism hypothesis (TMH) states that this physical mechanism links the colour lightness of the body surfaces of ectotherms to their thermal environment and hence to their geographical distribution. Studies on different insect taxa in Europe found support for this prediction of the TMH. However, whether these results hold also for other biogeographical regions remains unclear. Here, we quantify and map the colour lightness of dragonfly species in North America and directly compare our results to previously published findings for Europe. We estimated the colour lightness of 152 North American dragonfly species from published illustrations, compiled their distribution data from the literature and combined all these data with six biologically relevant environmental variables. We evaluated the importance of phylogenetic autocorrelation for the spatial variation of mean colour lightness of dragonfly assemblages (grid cells of approximately 50 km × 50 km size) by repeating all analyses also for the phylogenetically predicted component of the colour lightness of species and the species-specific deviation from this prediction. We also accounted for spatial autocorrelation with autoregressive error models. All statistical approaches showed that dragonfly assemblages from both continents consistently tended to be darker coloured in regions with cold climates and lighter coloured in regions with warm climates. Regression slopes, however, were significantly less steep, and the amount of variance explained by environmental variables was lower for North America than for Europe. Our results highlight the importance of colour lightness for the distribution of dragonfly species, but they also indicate that idiosyncrasies of the continents modify the general pattern." (Authors)] Address: Pinkert, S., Dept of Ecology – Animal Ecology, Philipps-Universität Marburg, Karl-von-Frisch-Strasse 8, 35043 Marburg, Germany. E-mail: stefanpinkert@posteo.de

**19973.** Pinkert, S.; Dijkstra, K.-D.B.; Zeuss, D.; Reudenbach, C.; Brandl, R.; Hof, C. (2017): Evolutionary processes, dispersal limitation and climatic history shape current diversity patterns of European dragonflies. *Ecography* 41(5): 795-804. (in English) ["We investigated the effects of contemporary and historical factors on the spatial variation of European dragonfly diversity. Specifically, we tested to what extent patterns of endemism and phylogenetic diversity of European dragonfly assemblages are structured by (i) phylogenetic conservatism of thermal adaptations and (ii) differences in the ability of post-glacial recolonization by species adapted to running waters (lotic) and still waters (lentic). We investigated patterns of dragonfly diversity using digital distribution maps and a phylogeny of 122 European dragonfly species, which we constructed by combining taxonomic and molecular data. We calculated total taxonomic distinctiveness and mean pairwise distances across 4,192 50 km × 50 km equal-area grid cells as measures of phylogenetic diversity. We compared species richness with corrected weighted endemism and standardized effect sizes of mean pairwise distances or residuals of total taxonomic distinctiveness to identify areas with higher or lower phylogenetic diversity than expected by chance. Broken-line regression was used to detect breakpoints in diversity-latitude relationships. Dragonfly species richness peaked in central Europe, whereas endemism and phylogenetic diversity decreased from warm areas in the south-west to cold areas in the north-east and with an increasing proportion of lentic species. Except for species richness, all measures of diversity were consistently higher in formerly unglaciated areas

south of the 0°C isotherm during the Last Glacial Maximum than in formerly glaciated areas. These results indicate that the distributions of dragonfly species in Europe were shaped by both phylogenetic conservatism of thermal adaptations and differences between lentic and lotic species in the ability of post-glacial recolonization/dispersal in concert with the climatic history of the continent. The complex diversity patterns of European dragonflies provide an example of how integrating climatic and evolutionary history with contemporary ecological data can improve our understanding of the processes driving the geographical variation of biological diversity." (Authors)] Address: Pinkert, S., Dept of Ecology – Animal Ecology, Philipps-Universität Marburg, Karl-Von-Frisch-Strasse 8, 35043 Marburg, Germany. E-mail: stefanpinkert@posteo.de

**19974.** Rach, J.; Bergmann, T.; Paknia, O.; DeSalle, R.; Schierwater, B.; Hadrys, H. (2017): The marker choice: Unexpected resolving power of an unexplored CO1 region for layered DNA barcoding approaches. *PLoS ONE* 12(4): e0174842. <https://doi.org/10.1371/journal.pone.0174842>: 14 pp. (in English) ["The potential of DNA barcoding approaches to identify single species and characterize species compositions strongly depends on the marker choice. The prominent "Folmer region", a 648 basepair fragment at the 5' end of the mitochondrial CO1 gene, has been traditionally applied as a universal DNA barcoding region for metazoans. In order to find a suitable marker for biomonitoring odonates (dragonflies and damselflies), we here explore a new region of the CO1 gene (CO1B) for DNA barcoding in 51 populations of 23 dragonfly and damselfly species. We compare the "Folmer region", the mitochondrial ND1 gene (NADH dehydrogenase 1) and the new CO1 region with regard to (i) speed and reproducibility of sequence generation, (ii) levels of homoplasy and (iii) numbers of diagnostic characters for discriminating closely related sister taxa and populations. The performances of the gene regions regarding these criteria were quite different. Both, the amplification of CO1B and ND1 was highly reproducible and CO1B showed the highest potential for discriminating sister taxa at different taxonomic levels. In contrast, the amplification of the "Folmer region" using the universal primers was difficult and the third codon positions of this fragment have experienced nucleotide substitution saturation. Most important, exploring this new barcode region of the CO1 gene identified a higher discriminating power between closely related sister taxa. Together with the design of layered barcode approaches adapted to the specific taxonomic "environment", this new marker will further enhance the discrimination power at the species level." (Authors)] *Aeshna cyanea*, *A. grandis*, *A. mixta*, *A. rileyi*, *Anaciaeschna triangulifera*, *Anax imperator*, *A. speratus*, *Brachytron pratense*, *Gynacantha villosa*, *Paragomphus genei*, *Crocothemis erythraea*, *C. sanguinolenta*, *Orthetrum julia falsum*, *O. trinacria*, *Trithemis morrisoni*, *T. s. palustris*, *Pseudagrion acaciae*, *P. bicoerulans*, *P. kersteni*, *P. massaicum*, *P. niloticum*, *Chlorocnemis abbotti*, *Coryphagrion grandis*] Address: Rach, Jessica, ITZ, Ecology & Evolution, TiHo Hannover, Hannover, D-30559, Germany

**19975.** Razeng, E.; Smith, A.E.; Harrison, K.A.; Pavlova, A.; Nguyen, T.; Pinder, A.; Suter, P.; Webb, J.; Gardner, M.G.; Box, J.B.; Thompson, R.; Davis, J.; Sunnucks, P. (2017): Evolutionary divergence in freshwater insects with contrasting dispersal capacity across a sea of desert. *Freshwater Biology* 62(8): 1443-1459. (in English) ["1. Arid landscapes pose arguably one of the greatest challenges to dispersal of aquatic insects, and may drive speciation in taxa

with low dispersal potential. We investigated genetic divergence in aquatic insects with high and low dispersal potential between two regions within the Australian arid zone. We used two dragonfly species [*Diplacodes haematodes*, *Orthetrum caledonicum*] to infer patterns for strong-dispersing species, and mayfly species from two genera to represent weak-dispersing species. Based on dispersal-related traits of the taxa, we predicted that dragonflies would show little divergence between and within the two geographical regions, while mayflies would show evidence of genetic isolation, with divergence timing associated with aridification in Australia. 2. Samples were collected from perennial pools in ephemeral stream networks in central and western Australia. The two study regions are separated by approximately 1,500 km of predominantly dune desert. Collected insects were sequenced for one mitochondrial and one nuclear marker. We investigated spatial distribution of haplotypes, estimated divergence dates for identified mayfly lineages, and performed phylogenetic reconstruction to investigate relationships with known congeners. 3. Both dragonfly species showed evidence of recent or ongoing gene flow between the central and western Australian study regions. In contrast, mayflies showed evidence of ancient, but not recent, gene flow between regions, with species-level CO1 divergence within regions. We found 11 previously unknown putative mayfly species, that if confirmed could double the known diversity within these genera in Australia. Timing of divergence events for mayflies coincided with the development of the Australian arid zone, and phylogenetic relationships are similar to divergence patterns found in other Australian arid taxa. 4. The findings of this study suggest that aridification is more likely to be a driver of diversification in taxa with low dispersal potential than in those with high dispersal potential. This is because effective aerial dispersal is integral for maintaining gene flow when aquatic connections are lost between distant populations, and reduced gene flow can promote genetic divergence." (Authors)] Address: Razeng, Emma, School of Biological Sciences, Monash Univ., Clayton, VIC 3800 Australia. Email: emma.razeng@monash.edu

**19976.** Rivas-Torres, A., Sanmartín-Villar, I.; Gabela-Flores, M.V.; Cordero-Rivera, A. (2017): Demographics and behaviour of *Heteragrion cooki*, a forest damselfly endemic to Ecuador (Odonata). *International Journal of Odonatology* 20(2): 123-135. (in English) ["Damselflies adapted to forest habitats are expected to be negatively affected by the disturbance of riparian forests, due to the change in insolation when trees are cleared. In this paper, we compare survivorship and behaviour of two populations of *Heteragrion cooki* by means of mark-recapture methods and focal observations of adults. We found similar densities of males (but not of females) in both streams, and similar recapture rates, higher for males (50%) than for females (20%). Body size was also significantly different between populations, with smaller individuals in the shadiest stream. The analysis of daily survival rates indicated that in the shaded stream, males survived better than females, whereas in the sunnier stream survival was similar between sexes, but varied over time. Furthermore, in the sunny stream, body size was negatively correlated with survival. Males arrived earlier than females to the stream, with a maximum activity between 13 and 16 hours. They defended small patches of the stream, exhibiting high site fidelity and aggressive behaviour against conspecific males. Copulation, which was very rarely seen in the stream, lasted about six minutes. Pairs in tandem remained for an average of 45 minutes laying eggs on roots

and lianas. We found that *H. cooki* was not drastically affected by the loss of riparian vegetation, maintaining similar densities of males in both streams, probably because small remnants of native forests were still found near to the stream." (Authors)] Address: Rivas-Torres, A., ECOEVO Lab, Unie de Vigo, EUE Forestal, Pontevedra, Spain. Email: arivasto@gmail.com

**19977.** Roh, C. (2017): Hydrodynamics of insects. Part 1. Jetting of the dragonfly larvae. Part 2. Honeybee at the air-water interface: Surfing with the capillary wave. Ph.D. thesis, California Institute of Technology. doi:10.7907/Z97P8-WFW. <http://resolver.caltech.edu/CaltechTHESIS:060820-17-183218154> : 103 pp. (in English) ["This thesis presents the study on the hydrodynamics of two insects commonly known for their aerial adaptation: the dragonfly and the honeybee. Part 1: Anisopteran dragonflies live underwater in their larval stages. The key factor for their aquatic adaptation is the modified hindgut chamber that is used as a pump. The two main functions of this biological pump are jet propulsion and respiration. Both functions involve jetting and refilling of the chamber through an orifice guard by a tri-leaflet anal valve. Despite it being a unique machinery among insects, associated hydrodynamic studies are limited thus far. In the first part of this thesis, various aspects of the hydrodynamics of the dragonfly larvae's ventilatory flow are studied. The flow visualization showed that the respiratory flow is laminar but the propulsion flow is turbulent. The hydrodynamic force analysis showed that jetting and refilling phase forces are dominated by quasi-steady momentum flux and unsteady acceleration, respectively. Finally, simultaneous measurement of the anal valve kinematics and jet flow showed that the larvae could influence the direction and magnitude of the jet by controlling the anal valve leaflets. Part 2: Water-collecting honeybees often fall onto water surfaces. However, bees trapped by the "stickiness" of the water can propel by vibrating their wings, often making it to shore. In the second part of this thesis, the honeybee's propulsion mechanisms at the air-water interface is studied. The result shows that the bees can achieve three body-lengths per second propulsion speed. High-speed video of their wing motion shows that honeybee's propulsion involves pulling blobs of water with the underside of the wing, while pushing on a surface wave with its trailing edge. This propulsion mechanism resembles surfing on a self-generated capillary wave. Moreover, their wing vibration generates complicated surface waves and flows, below which the deeper water flow shows a single jet stream. From the wave and flow field measurements, the average force imparted to the surrounding fluid is estimated and compared to the average force calculated from the bee's body motion. The resulting average forces are of the same order of magnitude, which means that generating wave and flow are both important for the bee's propulsion." (Author)] Address: not stated

**19978.** Rossi, C. (2017): *Selysiotemis nigra*, especie nueva en la provincia de Jaén. Boletín Rola nº 10, segundo semestre 2017: 7-12. (in Spanish, with English summary) [2017; records of *S. nigra* from four localities in Jaén province, Spain are documented.] Address: E-mail: scarmiglione@hotmail.com

**19979.** Sánchez-Guillén, R.A.; Wellenreuther, M.; Chávez-Ríos, J.R.; Beatty, C.D.; Rivas-Torres, A.; Velasquez-Velez, M.; Cordero-Rivera, A. (2017): Alternative reproductive strategies and the maintenance of female color polymorphism

in damselflies. *Ecol Evol.* 2017; 11pp. <https://doi.org/10.1002/ece3.3083>: 11 pp. (in English) ["Genetic polymorphisms are powerful model systems to study the maintenance of diversity in nature. In some systems, polymorphisms are limited to female coloration; these are thought to have arisen as a consequence of reducing male mating harassment, commonly resulting in negative frequency-dependent selection on female color morphs. One example is the damselfly *Ischnura elegans*, which shows three female color morphs and strong sexual conflict over mating rates. Here, we present research integrating male tactics, and female evolutionary strategies (female mating behavior and morph-specific female fecundity) in populations with different morph-specific mating frequencies, to obtain an understanding of mating rates in nature that goes beyond the mere measure of color frequencies. We found that female morph behavior differed significantly among but not within morphs (i.e., female morph behavior was fixed). In contrast, male tactics were strongly affected by the female morph frequency in the population. Laboratory work comparing morph-specific female fecundity revealed that androchrome females have lower fecundity than both of the gynochrome female morphs in the short term (3-days), but over a 10-day period one of the gynochrome female morphs became more fecund than either of the other morphs. In summary, our study found sex-specific dynamics in response to different morph frequencies and also highlights the importance of studying morph-specific fecundities across different time frames to gain a better understanding of the role of alternative reproductive strategies in the maintenance of female-limited color polymorphism" (Authors)] Address: Sánchez-Guillén, Rosa, Depto de Ecología e Biología Animal, E. U. E. T. Forestal, Universidade de Vigo, Pontevedra, Spain. E-mail: rguillen@uvigo.es

**19980.** Schneider, T.; Ikemeyer, D. (2017): Late summer observations on Odonata from the Armenian Highland to the Talysh Mountains in north-west Iran. *Entomologist's Monthly Magazine* 153: 1-10. (in English) ["In August 2016, 32 Odonata species were recorded from north-west Iran. A poorly-known central Asian species *Sympetrum haritonovi*, which has its western outposts in the Taurus Mountains, Turkey was found in a new location on the Armenian Highland in Iran further filling the geographical gap between its terra typica in Tadjikistan and its western outposts. The newly detected population with over 1000 individuals may be the largest so far known. *Lestes dryas* and *Coenagrion puella*, both Euro-Siberian faunal elements and new for Iran, were detected in the Armenian Highland; *L. dryas* also in the Talysh Mountains. *Platycnemis kervillei* is regarded as a Levantine endemic and an early summer species; however, we found large populations by some mountain brooks in Azarbāyejān-e-Sharqi Province and Ardabil Province, extending its range significantly to the north-east and its flight season significantly into late summer." (Authors)] Address: Schneider, T., Arnold-Knoblauchring 76, D-14109 Berlin, Germany. E-mail: thomas.rs@gmx.de

**19981.** Seidu, I.; Danquah, E.; Nsor, C.A.; Kwarteng, D.A.; Lancaster, L. (2017): Odonata community structure and patterns of land use in the Atewa Range Forest Reserve, Eastern Region (Ghana). *International Journal of Odonatology* 20(3/4): 173-189. (in English) ["Recent studies have indicated that frequent anthropogenic disturbances in tropical developing countries are primary drivers of reduction in community diversity and local extinction of many arthropods, including dragonflies. We assessed the impact of anthropogenic disturbances on odonate assemblages across



three different land use types, in a biodiverse nature reserve in Ghana. A total of 37 transects (100 x 10 m) were used to survey odonate species over two seasons and three rivers which pass through agricultural, matured forest and forest margin habitats. A total of 6940 individuals, belonging to 53 species (23 Zygoptera and 30 Anisoptera) in eight families, were recorded. *Sapho ciliata* (15% relative abundance) was the most abundant zygopteran, whereas *Orthetrum julia* (4.8% Relative abundance) was the dominant anisopteran. Rarer species like *Umma cincta*, *Chlorocnemis* sp. and *Elatoneura* sp. were represented by < 50 individuals. The effective number of species was affected by the surrounding terrestrial habitat type and this most strongly reflected the difference between agricultural habitats (8.09 ± s.e. 0.41) and matured forests (5.0 ± s.e. 0.24). A canonical correspondence analysis revealed that turbidity, surface water temperature, canopy cover and channel width were the key factors that influenced odonate assemblages. Degraded habitats were dominated by generalist and heliophilic dragonflies, while matured forest habitat included more stenotopic damselflies and dragonflies. These findings improve our understanding of the drivers of odonata distributions and diversity and will help river managers use odonates to monitor riverine health, as part of conservation activities." (Authors)] Address: Seidua, I., Dept of Wildlife and Range Management, Faculty of Renewable Natural Resources, Kwame Nkrumah Univ. of Science and Technology, Kumasi, Ghana. Email: antwiseidu88@gmail.com

**19982.** Setyawati, S.M.; Purwowidodo; Huda, M.M.; Dewi, B.A. (2017): The diversity of the dragonfly of *Orthetrum* genus in protected area of Mount Prau, Central Java Indonesia. *J. Nat. Scien. & Math. Res.* 3(1): 228-235. (in English) ["Dragonfly of the genus *Orthetrum* is a dragonfly of the Libellulidae family. This dragonfly has a variety of types of morphological structure, body color, distribution and habitat. Habitat dragonfly of the genus *Orthetrum* is quite extensive, especially around lowland to upland waters. Protected Forest Mount Prau Central Java, is a rainforest that has a water flow appropriate for life dragonflies. It allows the Dragonflies of all kinds to live and thrive in the environment, including *Orthetrum*. This research was conducted to find out the types of *Orthetrum* that can be found in Protected Forest Area of Mount Prau, Central Java. Determination of sampling is done along the river flow at 3 stations with total sub plot of sample as much as 12 point, starting from near settlement flow up to 2100 m toward waterfall source. The results of the sample analysis showed morphological variations in the structure of the thorax and abdomen as well as the color variations and patterns on the thorax, abdomen, and wings. Identification of the dragonfly obtained four types of dragonfly *Orthetrum* with variations on the sex, the male and female sabina *Orthetrum*, *Orthetrum cafferum* males. *Orthetrum testaceum* male, male and female *pruinatum* *Orthetrum*, and *Orthetrum* male and female *glaucum*. ©2017 JNSMR UIN Walisongo. All rights reserved." (Authors) ] Address: Setyawati, S.M., Biology Education Dept, Faculty of Sciences and Technology Universitas Islam Negeri Walisongo Semarang, Central Java Indonesia. E-mail: siti.mukhlisoh@walisongo.ac.id

**19983.** Shkëmbi, E.; Qirinxhi, X.; Misja, K.; Papparisto, A. (2017): Contribution to the knowledge of Odonata in Shkodra Lake, Albania. 1-st International Conference on Social and Natural Sciences Proceedings Vienna, 8-9 April: 231-236. ["Shkodra Lake is located in the northwest part of Albania. It lies on the border of Albania and Montenegro, approximately two-third (229 km<sup>2</sup>) of its surface belongs to

Montenegro and about one-third (142 km<sup>2</sup>) belongs to Albania. The aim of our research is to complete the list of Odonata for Albania. In term of its Odonata fauna, the Albanian part of Shkodra Lake, is insufficiently known, with some sporadic data. Expeditions were conducted along the coast of the Albanian part of the lake, during spring-summer 2015 and 2016. 94 specimens have been classified into 16 species, 6 of them are Zygoptera and 10 are Anisoptera. *Erythromma lindenii* is reported for the first time in this area while *Lindenia tetraphylla* is mentioned as Vulnerable on the European Red List (Kalkman et al., 2010). Discussions on the need for further research and possible future additions to the fauna of Shkodra lake are still in progress." (Authors)] Address: Shkëmbi, Enilda, Univ. of Tirana, Faculty of Natural Science, Dept of Biology, Albania

**19984.** Silva Filho, E. (2017): Efficiency of dragonfly nymphs (Odonata) as potential predators of *Aedes aegypti* larvae, under laboratory conditions in São Cristóvão, Sergipe. *Trabalho de Conclusão de Curso (Graduação de Tecnólogo em Agroecologia) - Instituto Federal de Sergipe, São Cristóvão: 24 pp.* (in Portuguese, with English summary) ["Studies to combat the *A. aegypti* vector are important to reduce the incidence of Dengue, Zika, Chikungunya and yellow fever, responsible for thousands of deaths worldwide. The objective of this work is to evaluate the efficiency of Odonatas nymphs as predators of *Aedes aegypti* larvae under laboratory conditions. 30 Odonata nymphs, from different families, were collected with D network, in the Poxim Agu river stretch (IFS), then transported to the laboratory in thermal boxes. In this, the nymphs were individualized in 20 cm diameter plastic pots containing river water and kept at room temperature, totaling 30 trials. To verify the potential predation of *A. aegypti* larvae by the Odonata nymphs, 30 mosquito larvae were added to each pot. Predation was evaluated daily by counting the number of predated larvae. The Odonata nymphs had an average predation efficiency of 6.08 mosquito larvae per day and could predate about 2189 larvae in a year. The families Aeshnidae (9.28), Libellulidae (8.37) obtained the highest averages of predation per day. All odonata families predated 25 to 30 larvae in one day, except Cordulidae, with a maximum of 8 prey larvae. The conditions of this experiment resemble the conditions domiciled found in water storage containers. Therefore, odonata nymphs (Aeshnidae and Libellulidae) are effective for the reduction or even extinction of the *Aedes aegypti* population and should be used in all municipalities in Brazil to reduce and / or eradicate Zika, Dengue, Chikungunya and yellow fever." (Author)] Address: not stated

**19985.** Subramanian, K.A.; Babu, R. (2017): Checklist of Odonata (Insecta) of India. Version 3.0. *www.zsi.gov.in. Zoological Survey of India: 54 pp.* (in English) ["Odonata of India is represented by 487 species and 27 subspecies in 152 genera and 18 families. Zygoptera comprise of 210 species under 57 genera and 9 families; Anisozygoptera one species under one genera and one family; Anisoptera 276 species under 94 genera and 8 families. One species in Zygoptera is considered as incenae sedis. High diversity and endemism is found in the hill streams and rivers of Western Ghats and eastern Himalaya. The taxonomy of adult is well worked out. however the descriptions of larva and their ecology remains as a major gap area, especially for several elusive hill stream breeding species. Geographically, the central India, eastern ghats, eastern Himalaya and Andaman Nicobar islands remains under explored where new species and records are still awaiting formal scientific description. In the current checklist, with reference to Version 2.0 (2014),

there are 58 nomenclatural changes, 29 new additions, 10 deletions and 7 species are kept under doubtful status." (Authors)] Address: Subramanian, K.A. and Babu, R., Zoological Survey of India, Southern Regional Centre, 130, Santhome High Road, Chennai-600 0028, India. E-mail: subbukilZsi@gmail.com, baburzsi@gmail.com

**19986.** Sumanapala, A.P. (2017): A Field Guide to the Dragonflies and Damselflies of Sri Lanka. Dilmah Conservation: 174 pp. (in English) ["A Field Guide to the Dragonflies and Damselflies of Sri Lanka covers 105 of the odonate species known from Sri Lanka with photographs and description on identification, habits, habitats and distribution. The introductory chapters cover morphology, biology, ecology, diversity and conservation of Odonata with special references to Sri Lankan species." (Publisher) [https://www.researchgate.net/publication/317238127\\_A\\_Field\\_Guide\\_to\\_the\\_Dragonflies\\_and\\_Damselflies\\_of\\_Sri\\_Lanka](https://www.researchgate.net/publication/317238127_A_Field_Guide_to_the_Dragonflies_and_Damselflies_of_Sri_Lanka)] Address: Ceylon Tea Services PLC, MJF Group, 111, Negombo Road, Peliyagoda, Sri Lanka. Email: info@dilmahconservation.org

**19987.** Tüzün, N.; Op de Beeck, L.; Brans, K.I.; Janssens, L.; Stoks R. (2017): Microgeographic differentiation in thermal performance curves between rural and urban populations of an aquatic insect. *Evolutionary Applications* 10(10): 1067-1075. (in English) ["The rapidly increasing rate of urbanization has a major impact on the ecology and evolution of species. While increased temperatures are a key aspect of urbanization ("urban heat islands"), we have very limited knowledge whether this generates differentiation in thermal responses between rural and urban populations. In a common garden experiment, we compared the thermal performance curves (TPCs) for growth rate and mortality in larvae of the damselfly *Coenagrion puella* from three urban and three rural populations. TPCs for growth rate shifted vertically, consistent with the faster-slower theoretical model whereby the cold-adapted rural larvae grew faster than the warm-adapted urban larvae across temperatures. In line with costs of rapid growth, rural larvae showed lower survival than urban larvae across temperatures. The relatively lower temperatures, hence expected shorter growing seasons in rural populations compared to the populations in the urban heat islands likely impose stronger time constraints to reach a certain developmental stage before winter, thereby selecting for faster growth rates. In addition, higher predation rates at higher temperature may have contributed to the growth rate differences between urban and rural ponds. A faster-slower differentiation in TPCs may be a widespread pattern along the urbanization gradient. The observed microgeographic differentiation in TPCs supports the view that urbanization may drive life history evolution. Moreover, because of the urban heat island effect, urban environments have the potential to aid in developing predictions on the impact of climate change on rural populations." (Authors)] Address: Tüzün, N., Evolutionary Stress Ecology & Ecotoxicology, Univ. of Leuven, Leuven, Belgium. Email: nedim.tuzun@kuleuven.be

**19988.** Wang, P.-L.; Ciou, J.-S.; Yang, L.-J.; Chung, Y.-C.; Kapri, N.; Esakki, B. (2017): A new vortex-based device using dragonfly wing to reduce the chip size. *Nano/Micro Engineered and Molecular Systems (NEMS)*, 2017 IEEE 12th International Conference, 9-12 April 2017. doi: 10.1109/NEMS.2017.8016979: 81-84. (in English) ["This work presents a new vortex-based flow device. A corrugated dragonfly wing blocks in a microchannel of 250 µm wide good to

capture particles and to reduce the chip size. Two conclusions have been found. The new flow chips made of PDMS and their microbes filling experiments firstly revealed that only one dragonfly wing in the channel works in particle capture but without choking. Secondly, COMSOL-Multiphysics simulation of the new design using dragonfly wing predicted that the reduced entrance channel length by 50% was achieved by adding a dragonfly wing to the previous design by Sollier. This new design of vortex-based devices is good for the integration and application for tumor cell collection, capture and sorting in the future." (Authors)] Address: Wang, P.-L., Tamkang Univ., Tamsui, Taiwan

**19989.** Wasscher, M. (2017): The surroundings of Zanderij, the best-studied area for the dragonflies of Suriname. *Agria* 29(1): 23-26. (in English) [A total of 188 odonate taxa is listed. The list includes 7 species with their type localities in Suriname. 75 species are rather rare. 21 rare and 7 very rare. The author concludes: "The Zanderij area has a very high number of Odonata species. On one hand, this is because the savannah creeks in the area seem to be different from many other creeks in the country, with a sandy bottom and sometimes rich water vegetation. On the other hand, the high number of species is to some extent due simply to the fact that the area has been visited very often over many years." ] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: marcel.hilair@12move.nl

**19990.** Winfrey, C.; Fincke, O.M. (2017): Role of visual and non-visual cues in damselfly mate recognition. *International Journal of Odonatology* 20(1): 43-53. (in English) ["In many species of damselflies, sexual conflict in the form of male harassment is thought to explain the widespread existence of female-limited color polymorphisms. With a few exceptions, the majority of investigations into these mating systems have assumed that male damselflies primarily use visual cues to detect and recognize their mates. Recently, laboratory studies have demonstrated that damselflies orient to olfactory signals from prey and that males orient to chemical cues from conspecific females. However, to date there are no field experiments which explicitly test the role that chemical cues play in sex recognition. Here we used a field experiment on *Enallagma civile* damselflies to test if free flying males detect and recognize females in the absence of visual cues through the use of non-visual signals. In the absence of visual cues males did not exhibit positive responses toward female conspecifics, whereas when both visual and non-visual cues were present, males readily detected females and often tried to mate with them. Although it is possible that non-visual cues may be involved during close contact, our results emphasized that visual cues take center stage in damselfly mate recognition in the field environment. Because the field environment is the context in which selection acts on natural populations, results of this study have implications for our understanding of how selection on visual cues acts to maintain female-limited color polymorphism in damselflies whose males must search for potential mates." (Authors)] Address: Fincke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**19991.** Winterholler, M.; Burbach, K.; Krach, J.E.; Sachtelben, J.; Schlumprecht, H.; Suttner, G.; Voith, J.; Weihrauch, F. (2017): Rote Liste und Gesamtartenliste der Libellen (Odonata) Bayerns. Stand 2017. Herausgeber: Bayerisches Landesamt für Umwelt (LfU), Bürgermeister-Ulrich-Straße 160, 86179 Augsburg: 15 pp. (in German) [Red List

of threatened Odonata of the federal state Bayern, Germany, and checklist of Bavarian Odonata.

**19992.** Zimová, K. (2017): Dragonflies (Odonata) of selected ponds in the Zbiroh area. *Bakalářská Práce, Biologie se zaměřením na vzdělávání, Plzeň: IV + 56 pp.* (in Czech, with English summary) ["The inventory research was done from April to September 2016 in selected ponds near Kaøez village (four ponds) and near Jableèno village (two ponds) in the Zbiroh area. The main aim of the research was observation of species diversity. In total, 21 species of dragonflies was observed, of them 11 species of the suborder Anisoptera and 10 of the suborder Zygoptera. Thirteen genera was observed (number of species is in brackets): Calopteryx (2), Ischnura (1), Coenagrion (2), Pyrrhosoma (1), Enallagma (1), Platycnemis (1), Lestes (2), Cordulia (1), Aeshna (4), Anax (1), Libellula (2), Orthetrum (1), and Symptetrum (2). Detail illustration of observed species are presented. The result indicates that despite intensive economic exploitation of ponds, the dragonflies diversity is rather high. The presence of littoral vegetation is likely the important factor controlling diversity of dragonflies. This is a contribution to mapping of the dragonflies distribution in the territory of the Czech Republic." (Author)] Address: not stated

## 2020

**19993.** Palacino-Rodríguez, F.; Altamiranda-Saavedra, M.; Palacino, D.A.; Penagos, A.C. (2020): Effects of seasonality and environmental change on an Andean damselfly *Mesamphiagrion laterale* (Odonata: Coenagrionidae). *Journal of Insect Conservation* 24: 499-511. (in English) ["Land use change, notably the conversion of natural habitats into agriculture, has strong negative effects on wild animal populations. Effects of disturbance and seasonality on demographic parameters of the damselfly *Mesamphiagrion laterale* Selys, 1876 were assessed to investigate how individual survival probability and over population size changed according to season and anthropogenic disturbance (agricultural habitat vs. forested habitat). For each habitat type, forest cover, area covered by vegetation, percentage of macrophytes and water physicochemical attributes were measured. Likewise, population parameters such as sex ratio, population size, life expectancy, survival and recapture rates were estimated using Cormack-Jolly-Seber (CJ-S) models. Life expectancy of the total population was lower during the rainy season, while population size and survival in males were lower in agricultural habitats during this same season. Human activities related to agriculture and livestock production in the Colombian Andes threaten the long-term viability of odonate populations through degradation of aquatic habitats. Contrary to our initially proposed hypotheses, these effects were more intense for males due to their closer association with riparian vegetation and thus greater exposure to aquatic pollutants." (Authors)] Address: Palacino-Rodríguez, F., Grupo de Investigación en Biología (GRIB), Depto de Biología, Universidad El Bosque, Av. Cra. 9 No. 131A-02, Bogotá, Colombia

## 2021

**19994.** Hemnani, M.; Campos Guimarães, I.S.; Kaefer, I.L. (2021): First record of leucism in a tadpole of the cane toad *Rhinella marina* (Anura: Bufonidae). *Herpetology Notes* 14: 859-861. (in English) ["In May 2018, in the morning, we collected parts of several egg strings of *Rhinella* attached to emergent vegetation in a fish farming

pond of the Experimental Farm of the Universidade Federal do Amazonas, Manaus, Brazilian Amazon. ... One of the main predators of *R. marina* tadpoles are dragonfly larvae, also known as naiads (Magnusson et al., 1991). They are known as ambush predators, slowly approaching the prey through visual and mechanical perception (Touchon et al., 2014). Along with them, other predators such as snakes (Kaefer and Montanarin, 2011) are also visually oriented predators of *R. marina* tadpoles. Similar as suggested for albino *Rhinella ornata*, depigmented tadpoles may suffer higher predation pressure due to the absence of aposematism, which is typical of bufonid larvae (Brassaloti and Bertoluci, 2009)." (Author)] Address: Hemnani, Mahima, Universidade Federal do Amazonas, Instituto de Ciências Biológicas, Programa de Pós-graduação em Zoologia, Av. General Rodrigo Otávio Jordão Ramos, 6200, 69077-000 Manaus, Amazonas, Brazil. E-mail: hemnanimahi@gmail.com

**19995.** Holzinger, W.E.; Kerschbaumsteiner, H.; Komposch, B. (2021): Die Libellenfauna des Attemsmoores (Steiermark, Österreich). *Joannea Zoologie* 19: 229-240 (German, with English summary) ["The dragonfly fauna of the Attemsmoor (Styria, Austria). – The dragonfly fauna of the Attemsmoor, a nationally important bog in southeastern Austria, is described. It comprises 27 species. The most remarkable discovery is an isolated small population of *Leucorrhinia pectoralis*. Other Red List species are *Coenagrion ornatum*, *Libellula fulva* and *Aeshna isosceles*. Measures to preserve the last open bog pond are urgently needed as it is in danger of being overgrown with reed." (Authors)] Address: Holzinger, W.E., ÖKOTEAM – Institut für Tierökologie und Naturlandschaftsplanung, Bergmannsgasse 22, 8010 Graz, Austria. EMail: holzinger@oekoteam.at

**19996.** Hemnani, M.; Campos Guimarães, I.S.; Kaefer, I.L. (2021): First record of leucism in a tadpole of the cane toad *Rhinella marina* (Anura: Bufonidae). *Herpetology Notes* 14: 859-861. (in English) ["In May 2018, in the morning, we collected parts of several egg strings of *Rhinella* attached to emergent vegetation in a fish farming pond of the Experimental Farm of the Universidade Federal do Amazonas, Manaus, Brazilian Amazon. ... One of the main predators of *R. marina* tadpoles are dragonfly larvae, also known as naiads (Magnusson et al., 1991). They are known as ambush predators, slowly approaching the prey through visual and mechanical perception (Touchon et al., 2014). Along with them, other predators such as snakes (Kaefer and Montanarin, 2011) are also visually oriented predators of *R. marina* tadpoles. Similar as suggested for albino *Rhinella ornata*, depigmented tadpoles may suffer higher predation pressure due to the absence of aposematism, which is typical of bufonid larvae (Brassaloti and Bertoluci, 2009)." (Author)] Address: Hemnani, Mahima, Universidade Federal do Amazonas, Instituto de Ciências Biológicas, Programa de Pós-graduação em Zoologia, Av. General Rodrigo Otávio Jordão Ramos, 6200, 69077-000 Manaus, Amazonas, Brazil. E-mail: hemnanimahi@gmail.com

**19997.** Iregui, D.A.O. (2021): Fortalecimiento de la colección de referencia Odonata del Museo de Ciencias de la Universidad el Bosque. *Universidad El Bosque, Facultad de Ciencias, Programa de Biología, Bogotá D.C.*: 118 pp. (in Spanish) [Colombia; "Biological collections housed in museums have been essential for the conservation of biological heritage and knowledge of the biodiversity of a territory. The Museo de Ciencias de la Universidad El Bosque (MC-

UB) has reference collections in six areas, including the Arthropods and Invertebrates of the continent where the Odonata Reference Collection is located, in which this internship was developed, carrying out the process of diagnosis, curation and generation of dissemination elements. Initially the collection had 463 specimens, later 464 were entered for a total of 927 records distributed in 12 families, 32 genera and 48 species, which presented a Completeness Index in the data set (Cc) of 72.04% and a Collections Health Index (ISC) of 9.71%, indicating that the collection was about to be optimised. After the internship, the Cc improved to 96.33%, the CSI to 68.29%, demonstrating the strengthening of the physical and documentary aspects of the collection. Additionally, taxonomic identifications of the 927 specimens were corrected and taxonomic identifications were made, and the results obtained were used to generate material for dissemination to the scientific community." (Author(DeepL) Address: not stated

**19998.** IUCN (2021): The conservation status of species and habitat in freshwater Key Biodiversity Areas (KBAs) and key additional sites from the Sebou Basin. Project WAMAN (Water Management) Sebou Project, Málaga: 57 pages + annexes- (in English) ["This report presents the results of a broad assessment of the freshwater diversity in four Key Biodiversity Areas (KBAs) and some key additional sites in the Sebou river basin in Morocco. The Sebou river basin houses a large proportion of the Moroccan human population that depends on the river for their livelihood. The basin has important ecosystems for threatened species that are currently being recognized as Ramsar sites or national parks. Additionally, four sites have been identified as Key Biodiversity Areas (KBAs) for the persistence of freshwater biodiversity. Assessments were made on the effectiveness of the existing Key Biodiversity Areas (KBAs) in containing important populations of trigger species. During the summers of 2018 and 2019, biodiversity surveys of the taxa used to identify freshwater KBAs (fishes, molluscs, dragonflies and damselflies, crabs and aquatic plants) were undertaken by a team of experts in 39 sampling points, of which 29 were located in KBAs, and the remaining 10 were located in surrounding areas. A total of 192 species was recorded: 17 fish, 6 bivalve, 17 gastropod, 44 dragonfly and damselfly, 2 crayfish/crab species and 106 aquatic plant species. Twenty-one of these species are classified as threatened with extinction in the IUCN Red List of Threatened Species™ (7 aquatic plant species, 2 fish species, 1 damselfly species, 1 crayfish species, 4 bivalve species, and 6 gastropod species). The highest native freshwater biodiversity was recorded in the South and East of KBA Oued Imouzzar Kandar. Also, in the central-east of KBA Oued Tizguite & Oued Ouaslane a high number of native species were found, especially aquatic plants. On the other hand, the number of threatened species was especially high in the KBA Oued Bouhlou and the KBA Oued Tigrigra. KBA Oued Bouhlou and its surroundings hosted a high number of threatened fish and a total of 7 threatened molluscs, including the Critically Endangered *Pseudunio maroccanus* (assessed as *Margaritifera marocana* in the IUCN Red List) and *Unio foucauldianus*. Many threatened molluscs species were also found in the surroundings of the KBA Oued Tigrigra, as well as the Endangered damselfly species *Calopteryx exul* and several threatened aquatic plants. For the surrounding areas, high freshwater biodiversity was found in the main channel of Oued Sebou, especially a high number of fish and dragonfly species. A major threat to the survival of the freshwater biodiversity is the introduction of non-native species that might outcompete the native species. A

total of 11 non-native fish species were found in this study. High numbers of non-native fish were found in KBA Oued Tizguite & Oued Ouaslane and KBA Oued Tigrigra, as well as in the lakes' region (Dayat Iffer/ Dayat Yfrah/ Dayat Afourgah) and the sites in Aguelmam n'Tifounassine and Sidi Ali. Habitat Quality Assessments (HQA) produced high values for KBAs and surrounding areas, but the Habitat Modification scores (HMS) were neither clearly negative nor positive. The region around the KBA Oued Tizguite & Oued Ouaslane is especially affected by human activity, and management plans have to be implemented to properly protect the biodiversity in the area. Other important threats are the construction of dams that are hindering the environmental flow required by many threatened species, soil erosion and siltation of river substrate and wastewater/solid waste disposal in the rivers. The Sebou basin has a high socio-economic importance for the Moroccan population, and is extensively used both for agriculture and industry. The effluents from agricultural or industrial activities have caused high contamination levels, that are harmful to humans, their livestock and the biodiversity. Another issue is the water shortage due to the water extraction for agricultural and urban uses, causing extreme droughts in some sites, especially in KBA Imouzzar Kandar. This intensive water extraction causes soil saline extrusion and increased water conductivity, as has been witnessed in the sites Aguelmam n'Tifounassine & Sidi Ali. Lastly, many of the springs and lakes are becoming unsustainable tourism destinations and have been completely altered and polluted, with the risk of a complete destruction of the freshwater biodiversity in the near future. The inclusion of freshwater biodiversity into the management plan for the Sebou basin, with the involvement of local authorities and communities, is necessary in order to preserve these high valued freshwater ecosystems. In the river Bouhlou crossing the Tazekka natural park, one of the best recruiting populations of the freshwater mussel *Pseudunio maroccanus* (assessed as *Margaritifera marocana* in the IUCN Red List), one of the world's 100 most threatened species, was detected. In order to protect this precious freshwater biodiversity, several measures should be taken to adjust the agricultural and industrial sector: inclusion of freshwater biodiversity into the water management plans and the increase of riparian buffers, wastewater treatment plans, the prevention of cattle overgrazing and bank destruction by trampling near the river banks. Campaigns on the correct management of the channels and the control of recreational activities by local authorities, could aid to manage the environmental flow necessary for many native species. For the rivers/lakes suffering from droughts, it will be necessary to setup an aquifer management plan covering the catchment of the aquifer on which the rivers/lakes depend, and develop artificial reservoirs to enable the reduction of exploitation of ground water. Finally, measures should be taken to stop the active re-stocking of fish in order to avoid non-native species outcompeting the native species. Further studies should be conducted to have a better understanding on the freshwater biodiversity in the Sebou basin. It is necessary to re-evaluate some of the KBAs to assess the presence of their trigger species and other threatened species. Finally, many of the additional sites that were studied here could be included as extension of the KBA, or a new KBA should be created to help focusing conservation efforts and promoting management actions that allow the persistence of the biodiversity elements present in there." (Authors)] Address: <https://portals.iucn.org/library/sites/library/files/documents/2022-028-En.pdf>

**19999.** Janra, M.N.; Herwina, H. (2021): How to reclaim



your dragons? A retrospective review on odonatology in West Sumatra, Indonesia. IOP Conference Series: Earth and Environmental Science, Volume 757 012086: 9 pp. (in English) ["Dragonflies and damselflies (Odonata) were not really popular subjects for biological studies at least until a decade ago in West Sumatra. In many scientific publications published by Lieftinck, a colonial era odonatologist, not many localities in West Sumatra mentioned as the origin of his Odonata specimens. In this study, we intend to review the extent of current odonatological works in West Sumatra to gain perspective on the ongoing scientific aspects of this taxon. We used literature study method to compile data from historical and recent bibliographies, published works and other resources regarding dragonflies in West Sumatra. As result, from around 294 odonate species ever recorded in Sumatra Island, 98 species have been recognized from within the borders of West Sumatra Province with more than half recently reobserved. Albeit most publications are taxonomical and inventorial in their nature, further survey works are still needed to gain thorough insight on West Sumatran odonates. Meanwhile, the current studies and researches indicate the possibilities that dragonflies can also be integrated into the wider aspects, such as ecotourism, pest management, landscaping, environmental impact assessment, aesthetic and many others. Hence, introducing odonates as fascinating study object to the new generation of biologists can help furthering the advance and diversification of odonatological study in West Sumatra." (Authors)] Address: Janra, M.N., Biology Dept, Faculty of Mathematics and Natural Sciences, Universitas Andalas, Padang, Indonesia. Email: mnjanra@sci.unand.ac.id

**20000.** Karube, H. (2021): *Asahinagomphus* gen. nov., a new gomphid genus separated from *Burmagomphus* Williamson, 1907 (Odonata: Gomphidae). Tombo 63: 16-20. (in English) ["A new gomphid genus *Asahinagomphus* gen. nov. is described. The new genus is monotypic for *A. insolitus* first described and so far placed in *Burmagomphus* Selys, 1858. The genus is including *Gomphus* (s. lato), and characterized mainly by a peculiar male cerci and wing venation especially reduced anal triangle." (Author)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**20001.** Kopetz, A.; Krebs, D.; Weigel, A. (2021): Bericht zur Gemeinschaftsexkursion des Thüringer Entomologenverbandes e.V. (TEV) im Sommer 2021 in den Landkris Sonneberg (Südthüringen). Mitteilungen des Thüringer Entomologenverbandes 28(2): 78-194. (in German) [Germany; On page 123, Dr. Jochen Müller lists records of *Coenagrion puella*, *Enallagma cyathigerum*, *Ischnura elegans*, and *Platycnemis pennipes*.] Address: not stated

**20002.** Lang, X.; Song, B.; Yang, W. (2021): Numerical simulation of pitching motion effects on the aerodynamic performance of a dragonfly-like flapping wing. 32nd Congress of the International Council of the Aeronautical Sciences, September 6-10, 2021, Pudong Shangri-La, Shanghai, China: 9 pp. (in English) ["Dragonflies have remarkable flight skills and their excellent flight performance has attracted persistent attention. The multi-degree-of-freedom flapping kinematics and interaction of the tandem wings might account for their extraordinary flight skills. In this paper, the effects of pitching motion on the aerodynamic performance of a dragonfly-like flapping wing have been numerically studied. A transient numerical method based on the overset mesh technique is used to simulate the flapping

and pitching movements. Different pitching amplitudes have been evaluated as the forewing and hindwing flap in counter-stroking during the hovering process. It is found that the pitching motion has an obvious influence on the tandem wings' aerodynamic performance, and there is a reasonable pitching amplitude to make the hovering vertical force optimal. Additionally, the interaction of the tandem configuration will lead to an obvious fluctuation in the aerodynamic force. The research in this paper is helpful to understand the flight mechanism of dragonflies flight." (Authors)] Address: Lang, X., School of Aeronautics, Northwestern Polytechnical University, Xi'an 710072, China

**20003.** Membere, O.; Bawo, D.D.S.; Onwuteaka, J.; Ugbohome, A.P.; Nwosu, O.R. (2021): Abundance and diversity of insects associated with *Rhizophora* mangle and *Avicennia germinans* in Bundu-Ama mangrove ecosystem of the Niger Delta, Nigeria. *Scientific African* 14(7):e01058: 11 pp. (in English) ["Mangrove species diversity is well known for larger animals and plant, but little is known about mangrove insects and their significance and yet they perform important roles in the ecology of the habitat. The present study was conducted to determine the diversity of insects associated with *Rhizophora* mangle and *Avicennia germinans* in Bundu-Ama mangrove habitats, a tributary of the Bonny River in the Niger Delta. Two stations were established based on the abundance of the mangroves. A total of 18 mangrove trees (nine each) for both species were randomly selected and insect samples collected bi-weekly between 7 am and 11 am between April and June 2017, making a total of 108 trees within the study period. Each tree was sampled for 10 minutes using sweep net, hand net and handpicking methods. A total of 8 insect orders (Diptera, Coleoptera, Hymenoptera, Homoptera, Rhopalocera, Odonata [one species, 15 specimens; not identified], Phasmida and Heterocera), 20 families and 35 species were identified. Hymenoptera (49.1%) was the highest insect order recorded, followed by Diptera and Homoptera. *Avicennia* had more insect orders, families and species. Coleoptera, diptera and Hymenoptera were found on both plants while others were on *Avicennia* only. Formicidae was the most abundant family (37.1%) while Lagiidae was the least (0.2%). The most abundant species was *Camponotus acvapimenis*. The highest species diversity was observed in the Diptera with Shannon H' of 2.00 for *Avicennia* and 2.13 for *Rhizophora*. The richness index was 2.43 for *Avicennia* and 2.62 for *Rhizophora*, and the highest species evenness ( $E' = 0.40$ ) was observed in the Diptera indicating that the insects were not evenly distributed. Two insect associations were identified: a specialist group of 23 species on *Avicennia*, and 6 species on *Rhizophora*, while the second group were the generalist made up of 3 species *Anopheles squamosus*, *Musca domestica* and *Fannia* sp. Insect families (Muscidae, Calliphoridae, Syrphidae, Ceratopogonidae, Culicidae, Tabanidae) are of medical, veterinary and ecological importance as pollinators, bioindicators, predators, parasitoid, agricultural pest and detritivores. Insect diversity was found to be higher in *Avicennia* than in *Rhizophora*. This study has shown that the mangroves of Bundu-Ama have a vast array of insects which will contribute to their biodiversity data and subsequent conservation and management of ecosystem in the Niger Delta." (Authors)] Address: Ugbohome, A.P., Dept of Animal and Environmental Biology, Faculty of Science, Rivers State University Nkpolu-Oroworukwo, Port Harcourt, Nigeria. Email: ugbohome.adaobi@ust.edu.ng

**20004.** Mezquita, I. (2021): Euskal Herriko Odonatuen identifikaziorako gakoa. Clave para la identificación de los

Odonatos del País Vasco. 2ª edición, corregida y aumentada. 2. ed. hand. eta zuz. Aranzadi Zientzia Elkartea: 42 pp. (in Basque and Spanish versions) [<https://www.researchgate.net/profile/Inaki-Mezquita>] Address: Mezquita, I., 1Sociedad de Ciencias Aranzadi, Zorroagagaina 11, 20014 Donostia, Spain

**20005.** Nhi, P.T.; Tru, H.V.; Phu, P.V. Quynh Nga, C.T.; Hiep, N.D.; Cuong, N.Q.; Dac, L.X.; Phuong, P.M.; Duy, V.D. (2021): First study of insects from the Truong Sa archipelago, Khanh Hoa province, Vietnam. *Journal of Forestry Science and Technology* 12: 98-105. (in English, with Vietnamese summary) ["On the basis of the recent field surveys conducted during 2020–2021 [...] a total of 54 species in 49 genera, 26 families of nine orders have been recorded from eight islands namely Nam Yet, Phan Vinh, Son Ca, Sinh Ton Dong, Sinh Ton, Song Tu Tay, Truong Sa Dong and Truong Sa Lon. Among nine insect orders, Lepidoptera is the most diverse from Truong Sa archipelago with 19 recorded species, followed by Coleoptera with 17 species, Hemiptera with five species, Orthoptera with four species, Blattodea with three species, Diptera and Odonata with two species [*Pantala flavescens*, *Tramea virginia*], each, Dermaptera and Hymenoptera with one species, each. [...]" (Authors)] Address: Nhi, P.T., Inst. of Ecology & Biological Resources, Vietnam Academy of Science & Technology, Vietnam

**20006.** Petrovicová, K.; Langraf, V.; David, S.; Krumpálová, Z.; Schlarmanová, J. (2021): Distinct Odonata assemblage variations in lentic reservoirs in Slovakia (Central Europe). *Biologia* 76: 3727-3741. (in English) ["The effects of various aquatic habitats on the abundance, species richness, diversity and taxonomic distinctness of Odonata were studied. The impact of environmental factors and living conditions in lentic habitats were expressed by the composition of coenoses, on the evaluation we used the Dragonfly Biotic Index. The positive effects of habitat heterogeneity on biodiversity are well known, but it is not clear how the diversity of studied and ecologically important taxa, such as odonates, may vary in different water reservoirs. We investigated how Odonata community metrics (composition, abundance, diversity and environmental compatibility) differ in lentic water: ponds, fishponds, excavation of mineral material and in marshlands, where biodiversity plays an important role. Using an entomological mesh, we took samples in the southwestern part of Slovakia in six geo-morphological units at 54 study sites during four years. This study detected distinct odonates assemblage variations among habitats and heterogeneity among gradients. Wide ranges of microhabitats with different environmental properties create appropriate conditions for living span of them. Surprisingly, the highest species richness was recorded in the excavation of mineral materials habitats. Stagnicolous Odonata species correlated (CCA) with the habitats of excavation of mineral material and marshlands; showed links to the littoral vegetation and dense vegetation cover. While the euryecious species have been linked to the ponds and fishponds; and correlated with the water body size. It seems to be degraded habitats are not so much suitable for rare and endangered species, but to preserve the biological value of the environment and for the existence of the high abundance and species richness of odonates." (Author)] Address: Petrovicová, Kornélia, Dept Environment & Biology, Fac. Agrobiology & Food Resources, Slovak University of Agriculture in Nitra, Nitra, Slovakia. Email: kornelia.petrovicova@gmail.com

**20007.** Petzold, F. (2021): Zum Vorkommen von *Coenagrion ornatum* in Brandenburg (Odonata: Coenagrionidae).

*Libellula* 40(1/2): 93-106. (in German, with English summary) ["The occurrence of *Coenagrion ornatum* in Brandenburg (Odonata: Coenagrionidae) – In 2016, *C. ornatum* was verified at a ditch in the Special Area of Conservation (SAC) "Löcknitz". In 2019 and 2020, the occurrence could be confirmed again and the successful reproduction and settlement of new sections in the ditch system could be proven. The species is thus considered to be established in Brandenburg. The occurrence is to be seen in the context of the individual-rich occurrences in the Landgrabenniederung in the border area between Saxony-Anhalt and Lower Saxony, only 30 to 40 km away. The results of the surveys conducted between 2016 and 2020 are briefly presented. The occurrence described is currently the only known of the species in Brandenburg." (Author)] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. Email: petzold.falk@googlemail.com

**20008.** Phan, Q.T.; Karube, H. (2021): Description of two new species of the genus *Chlorogomphus* Selys, 1854 (Odonata: Chlorogomphidae) and a new record of *Chlorogomphus gracilis* Wilson & Reels, 2001 from the Central Highlands of Vietnam. *European Journal of Taxonomy* 794: 91-110. (in English) ["Two new species of the genus *Chlorogomphus* are described based on both sexes collected from the Central Highlands of Vietnam. These species are *C. hoaian* sp. nov. (holotype male from Kon Ka Kinh National Park, 14.3672° N, 108.5368° E, alt. 1000 m) and *C. vani* sp. nov. (holotype male from Chu Yang Sin National Park, 12.4780° N, 108.4617° E, alt. 749 m). Furthermore, *C. gracilis* Wilson & Reels, 2001 is recorded from Vietnam for the first time, with notes on its morphology and detailed illustrations of male and female structures." (Authors)] Address: Phan, Q.T., Center for Entomology & Parasitology Res., Institute of Research & Training of Medicine, Biology & Pharmacy, Duy Tan University, Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

**20009.** Priyadarshana, T.S. (2021): Do predatory adult odonates estimate their adult prey odonates' body size and dispersal ability to proceed with a successful attack? *J. of Threatened Taxa* 13(7): 18949-18952. (in English) ["The results of the analysis showed strong evidence that the predatory odonates performing the attack had larger body size and greater hind-wing length than their prey odonates across all three predation types. This indicates that predatory adult odonates may estimate the body size and dispersal ability of the adult prey odonates to execute a successful attack even when both groups belong to the same taxonomic group. *Orthetrum sabina* had the highest percentage with 70 % (n= 47) of attacks on both Anisoptera and Zygoptera species, including *O. sabina*-*O. sabina* attacks. It is also important to note that the attacks of the predatory odonates were mostly on the head or thorax of their prey odonates."] Address: Priyadarshana, T.S., Asian School of the Environment, Nanyang Tech.I Univ., 50 Nanyang Avenue, 639798, Singapore. Email: tharakas001@e.ntu.edu.sg

**20010.** Rychla, A. (2021): New data on the abundance and phenology of the Broad Scarlet *Crocothemis erythraea* (BRULLÉ, 1832) (Odonata: Libellulidae) on example of a site at lake Plaw (Lubuskie district). *Odonatrix* 174 (2021): 8 pp. (in Polish, with English summary) ["*C. erythraea* is a Mediterranean dragonfly species, constantly expanding its range northwards. Although it is already widespread in Poland, little is known about its ecology in the country. Therefore, the purpose of this study was to provide new infor-

mation on the abundance and phenology of an autochthonous population inhabiting shallow, eutrophic lake Plaw in western Poland. During 20 visits, which lasted from April 29th to August 16th, 2020, all Anisoptera exuviae were collected from a 20-meter-long transect along shoreline of the lake. In total, 436 exuviae representing 13 Anisoptera species were collected. Out of it, 244 exuviae belonged to *C. erythraea*, which made 56 % of the entire sample and was evidence for absolute dominance of this species in the investigated odonatological community. First exuviae of *C. erythraea* were found on May 19th, 2020 and the last ones on August 1th, 2020. Thereby, the entire emergence period lasted for 74 days. The highest exuviae abundances were recorded from Mid-June to the beginning of July, thus indicating asynchronous emergence of one generation. The results show that *C. erythraea* has been much more abundant in the dragonfly community as assumed by now. However, it is not clear whether this is a long-term trend or an effect of high air temperatures in recent years. As the species may interact with other native species, more attention should be paid for gathering data on the quantitative status of *C. erythraea* in the whole community of Odonata in Poland." (Author)] Address: Rychla, Anna, Sekcja Odonatologiczna Polskiego Towarzystwa Entomologicznego. E-mail: rychlan@op.pl

**20011.** Schiel, F.-J.; Martens, A. (2021): Dritter Aquariennachweis von *Orthetrum sabina* (Drury) in Deutschland. *Mercuriale* 21: 57-59. (in German, with English summary) ["Third record of *O. sabina* in Germany. – In August 2021 a male *O. sabina* emerged from an aquarium in Tomerdingen, Baden-Württemberg, Germany. The circumstances are described and shortly discussed." (Authors)] Address: Schiel, F.-J., INULA – Institut für Naturschutz und Landschaftsanalyse, Turenneweg 9, D-77880 Sasbach, Germany. Email: franz-josef.schiel@inula.de

**20012.** Schiel, F.-J. (2021): Wiederfund der Östlichen Moosjungfer (*Leucorrhinia albifrons*) in der baden-württembergischen Oberrheinebene (Odonata: Libellulidae). *Mercuriale* 21: 47-55. (in German, with English summary) ["Rediscovery of *Leucorrhinia albifrons* in the Upper Rhine Valley in the German federal state of Baden-Württemberg (Odonata: Libellulidae). - On June 26 and 28, 2021, I observed at least two males of *Leucorrhinia albifrons* in a gravel pit about 10 km south of Karlsruhe. This is the first record on the right bank of the Rhine within the Upper Rhine Valley since the records of Fischer (1850). The circumstances of the record as well as the habitat are described and status and possible migration routes are discussed." (Author)] Address: Schiel, F.-J., INULA – Institut für Naturschutz und Landschaftsanalyse, Turenneweg 9, D-77880 Sasbach, Germany. Email: franz-josef.schiel@inula.de

**20013.** Singh, A.P.; De, K.; Uniyal, V.P.; Sathyakumar, S. (2021): A preliminary assessment of odonate diversity along the river Tirthan, Great Himalayan National Park Conservation Area, India with reference to the impact of climate change. *Journal of Threatened Taxa* 13(11): 19611-19615. (in English) ["A total of 19 species of odonates, including eight species of Anisoptera (dragonflies) and 11 species of Zygoptera (damselflies), were recorded along the Tirthan River, Great Himalayan National Park Conservation Area (GHNPCA), Himachal Pradesh. Among these species, 17 were reported from the area for the first time. With the addition of these new records the number of odonates known from the GHNPCA is increased to 23 species representing

18 genera and eight families. *Indothemis carnatica*, *Agriocnemis femina*, and *Argiocnemis rubescens* are reported for the first time from the western Himalayan region. The study found a significant change in the species composition of odonates over a period of 18 years in the area, which may be due to changes in microhabitat conditions associated with climate change." (Authors)] Address: Amar Paul Singh, A.P., Wildlife Institute of India, Post Box #18, Chandrabani, Dehradun Uttarakhand 248001, India. E-mail: amarpaulsingh4@gmail.com

**20014.** Soder, E.A.; Wildermuth, H. (2021): Baumfalke (*Falco subbuteo*) erbeutet *Anax parthenope* "(Odonata: Aeshnidae). *Mercuriale* 21: 81-84. (in German) [Documentation of a hunting flight of the hobby in Rottenschwil, Aargau, Switzerland, 20-V-2021, preying on *A. parthenope*.] Address: Soder, E.A., Sulzbacherstr. 71, CH-8610 Uster, Switzerland. Email: eric.soder@topics.ch

**20015.** Susanto, M.A.D; Zulaikha, S. (2021): Diversity and community structure of dragonfly and damselfly (Odonata) at the Selorejo waterfall area, Ponorogo Regency, East Java Indonesia. *Jurnal Riset Biologi dan Aplikasinya* 3(1): 30-37. (in English) ["Selorejo Waterfall is a natural tourism area that is quite far from downtown Ponorogo and directly adjacent to the Gunung Sigogor Nature Reserve. Hence, this area has the potential as a natural habitat for dragonfly and damselfly. The presence of dragonfly and damselfly species is determined by the type of habitat, canopy conditions, vegetation diversity, and the microclimate that exists in a location. This study aimed to determine the diversity of dragonfly and damselfly and to determine the community structure of dragonflies in Selorejo Waterfall. The sampling method was Visual Day Flying. The results of research conducted in two streams showed that there were 12 species from 6 families with a total of 230 individuals. The value of species diversity at this location is  $H' = 2.05$ . In the community structure at the Selorejo Waterfall dragonfly, there are differences in the number of species and individuals in the two streams in Selorejo Waterfall Area. The large stream, eight species from four families, 151 individuals in total. Meanwhile, in small stream, there were nine species from six families, 79 individuals in total. The differences in the number of species and individual dragonflies in the two streams at Selorejo Waterfall can be used to describe the diversity and structure of the Odonata community in the area." (Authors)] Address: Susanto, M.A.D., Biology Department, Faculty of Science and Technology, UIN Sunan Ampel Surabaya Jln. Ahmad Yani No.117, Jemur Wonosari, Wonocolo District, Surabaya 60237, East Java, Indonesia. E-mail: Muhammadazmidwi@gmail.com

**20016.** Tamm, J.; Dressler, B. (2021): Nachweise des Bachwechselflers bei *Cordulegaster bidentata* und weitere Beobachtungen zu Raumnutzung und Verhalten bei einer Metapopulation im Taunus (Odonata: Cordulegasteridae). *Libellula* 40(1/2): 19-46. (in German, with English summary) ["Evidence of stream hopping and further observations on special performance and behaviour in a metapopulation of *C. bidentata* living at forest streams in Taunus mountains, Germany - At 8 small forest streams in the Taunus mountains, Hesse, Central Germany, the spatial performance of a metapopulation of *Cordulegaster bidentata* was studied by 7 observers using 16 colour marked adult males. After marking, 969 individuals passing above 7 streams were counted during 9 counting days, among them 47 marked ones (5 %). In spite of sparse appearance of marked males, 7 ones were observed again after marking. 4 of them did not appear

on the stream, where they had been marked, but on other streams in the surroundings. Maximum range between the places of marking and reobserving was 1,125 m. Most marked males only occurred sporadically at the streams. One can conclude that in general a remarkable part of male *C. bidentata* do not take part in patrolling flight activities along the streams regularly. Moreover, male *C. boltonii* were common along two streams together with *C. bidentata*. This uncommon phenomenon is described and discussed." (Authors)] Address: Tamm, J., 34131 Kassel, Germany. E-Mail: jochen.tamm@t-online.de

**20017.** Theischinger, G.; Hawking, J. (2021): The complete field guide to dragonflies of Australia. Second Edition. CSIRO Publishing: 406 pp. (in English) ["Dragonflies and damselflies are conspicuous insects: many are large and brightly coloured. They are also valuable indicators of environmental wellbeing. A detailed knowledge of the dragonfly fauna is therefore an important basis for decisions about environmental protection and management. This comprehensive guide to the Australian dragonfly fauna covers eight families of dragonflies and 10 families of damselflies, comprising the 113 genera and 333 species found in Australia. It has been updated with newly identified species and revised family names to reflect new world consensus systematics. Stunning full-colour images and distribution maps are accompanied by identification keys for adults as well as larvae, which are often used as bait for freshwater fish. This second edition of The Complete Field Guide to Dragonflies of Australia also includes illustrations by Albert Orr, one of the most renowned dragonfly illustrators. The extraordinary diversity of dragonflies will interest entomologists and amateur naturalists alike." (Publisher)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**20018.** Vdovina, O.N.; Bezmaternykh, O.M.; Krylova, E.N. (2021): Macrozoobenthos of Lake Pryatel'skoye (Altai Krai, Russia) after its watering. Bulletin of the Altai Branch of the Russian Geographical Society 4(63): 88-100. (in Russian, with English summary) ["Lake Pryatel'skoye is located in the south of West Siberia. The composition and structure of benthic invertebrates communities of the newly filled (after a long drying out) lake were studied in August 2019. The zoobenthos includes 23 species of benthic invertebrates from 5 classes [including *Coenagrion lunulatum*]). The lake is characterized by low numbers and small biomass of macrozoobenthos, the productivity class is "lowest", which corresponded to the ultraoligotrophic type of the lakes. The state of benthic invertebrates communities corresponds to the first stage of succession in artificially created lakes." (Authors)] Address: Vdovina, Olga, Laboratory of Hydrobiology of the Institute for Water & Environmental Problems SB RAS (IWEPSB RAS), 1, Molodezhnaya St., 656038 Barnaul, Russia. E-mail: olgazhukova1984@yandex.ru

**20019.** Villanueva, R.J.T.; van Beijnen, J. (2021): *Onychothemis yvonneae* spec. nov. (Odonata: Libellulidae), a new dragonfly from a lowland riverine forest in northern Palawan, Philippines. Philippine Journal of Systematic Biology 15(1): 1-4. (in English) ["The Cleopatra's Needle Mountain Range (CNMR) in northern Palawan includes one of the largest remaining patches of primary forest in the Philippines and has a high conservation value. To provide scientific baseline information to recognize the CNMR as a protected area, biologists mapped its biodiversity during fieldwork conducted from October to December 2014. The present study proposes a new species of Odonata discovered

during the survey. *Onychothemis yvonneae* spec. nov. is described, illustrated, and compared with its nearest allies. The new species is the second member of the genus *Onychothemis* in the Philippines and is the seventh known overall. *Onychothemis yvonneae* appears to be most closely related to *O. testacea* and *O. tonkinensis*." (Authors)] Address: Villanueva, R.J.T., College of Arts and Sciences Education, University of Mindanao, Matina, 8000 Davao City, Philippines. Email: rjtvillanueva@gmail.com

**20020.** Wildermuth, H. (2021): Sitzwarten als multifunktionale Habitat-Elemente für Großlibellen (Odonata: Libellulidae, Gomphidae). Mercuriale 21: 61-74. (in German, with English summary) ["Perches as multifunctional habitat elements for Odonata. - For dragonflies, perching stations serve as vantage points from which they can monitor their surroundings and take off without obstacles at lightning speed. As obligatory habitat elements they fulfill their function in the context of different behavioural ranges. With selected examples from the literature and on the basis of own photographically documented observations of some libellulids and gomphids, it is presented which substrates they use in terrestrial and aquatic habitats in connection with food acquisition, reproduction and thermoregulation." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**20021.** Yapo, M.L.; Gogbé, Z.M.; Kakpu, A.A.J.P.; Diomandé, D. (2021): Seasonal variations of Odonata diversity around Napié Dam Lake, northern Côte d'Ivoire, west Africa. Rev. Ivoir. Sci. Technol. 38: 1-9. (in English, with French summary) ["A seasonal diversity of Odonata species are studied in the north of Côte d'Ivoire. The study was carried out during two seasons (rainy and dry seasons). Odonata species were collected using Sweep-net technique between 9:00 am to 02:00 pm. Thirty three species belonging to 2 suborders (Anisoptera and Zygoptera) and 4 families were recorded. A total of 436 individuals and 365 individuals of Odonata encountered during rainy season and dry season respectively. Significant differences in Odonata specific richness and abundance occurred between rainy and dry seasons. *Brachythemis leucosticta*, *B. impartita*, *Crocothemis erythraea* and *Palpopleura lucia* recorded the highest abundance in rainy season however [sic] *B. leucosticta*, *B. impartita* and *C. erythraea* encountered the most abundance in dry season. Shannon diversity index indicated that rainy season is relatively diverse than dry season." (Author)] Address: Yapo, M.L., UFR Sciences Biologiques, Université Peleforo Gon Coulibaly, BP 1328 Korhogo, Côte d'Ivoire. Email: yapomilaur@gmail.com

**20022.** Zessin, W.; Brauckmann, C.; Gröning, E. (2021): A new insect (probably basal Odonatoptera) from the Pennsylvanian (Late Carboniferous) of the Piesberg Fossil-Lagerstätte, Osnabrück, Germany. Palaeoentomology 4(6): 532-536. (in English) ["The rich Pennsylvanian (Late Carboniferous; Moscovian, Westphalian D/Asturian) insect fauna of the large Piesberg quarry N Osnabrück, Lower Saxony, Germany with hitherto more than 1,300 registered specimens shows a great diversity. It includes palaeopterous (more than 20 specimens of Odonatoptera, and a number of Palaeodictyoptera) as well as neopterous insects (far more than 1,000 specimens). Only a smaller part has already been described, and the research is still continuing." (Authors)] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

---

## 2022

**20023.** Abbott, J.C.; Bota-Sierra, C.A.; Guralnick, R.; Kalkman, V.; González-Soriano, E.; Novelo-Gutiérrez, R.; Bybee, S.; Ware, J.; Belitz, M.W. (2022): Diversity of Nearctic dragonflies and damselflies (Odonata). *Diversity* 2022, 14, 575: 18 pp. (in English) ["Rarely have studies assessed Odonata diversity for the entire Nearctic realm by including Canada, USA, and Mexico. For the first time, we explored Odonata diversity in this region according to a definition of natural community assemblages and generated species distribution models (SDMs). Species occurrence data were assembled by reviewing databases of specimens held by significant Odonata repositories and through an extensive search of literature references. Species were categorized as forest-dependent or non-forest-dependent, as lentic or lotic-dependent, and according to conservation status. Predicted distributions were stacked for all species across their entire ranges, including areas outside of the Nearctic. Species richness and corrected weighted endemism (CWE) were then calculated for each grid cell. We found a pattern of greater species richness in the eastern portion of the Nearctic, which can be explained by the higher aquatic habitat diversity at micro and macroscales east of the Rocky Mountains, promoting niche partitioning and specialization. In the Nearctic region, the southeastern US has the highest number of endemic species of Odonata; this degree of endemism is likely due to glacial refuges providing a foundation for the evolution of a rich and unique biota." (Authors)] Address: Abbott, J.C., Alabama Mus. Nat. Hist. & UA Museums Dept Res. & Collections, Univ. Alabama, Tuscaloosa, AL 35487, USA. Email: jabbott1@ua.edu

**20024.** Adelmann, J. (2022): Im Fokus: Kleiner Blaupfeil (*Orthetrum coerulescens*) - Status und Verbreitung in Hessen (Odonata: Libellulidae). *Libellen in Hessen* 15: 79-96. (in German) ["*O. coerulescens* is an ecologically demanding species that occurs preferably in spring channels, meadow streams and ponds influenced by groundwater. In Hessen (Germany), *O. coerulescens* is widespread, but rare overall. The species is generally regarded as a "climate winner", and recently an increase in annual reports has been recorded, as in other federal states. In many cases, this involves the observation of only a single individual and the number of continuously reproducing localities is still low. The most important areas in terms of the number of individuals observed and the continuity of detections are presented and discussed." (Author/DeepL)] Address: Adelmann, J., Potsdamer Str. 70, 64372 Ober-Ramstadt, Germany. Email: jadelmann@web.de

**20025.** Adelmann, J. (2022): Fortschritte bei der Libellenkartierung in Hessen in den Jahren 2019 bis 2021. *Libellen in Hessen* 15: 49-58. (in German) ["Last year, the mapping initiative 2019 to 2021, which was launched with the aim of improving the recording of dragonfly fauna in the under-mapped regions in Hesse, came to an end. As of December 2021, the state of knowledge has increased in many map sheets compared to December 2018, both in terms of the number of species detected and in the index value for assessing the state of data. This progress is presented and discussed using maps. In many cases, the progress also concerns regions that were previously well studied. On the other hand, there are still MTB quadrants in the Schwalm-Eder district, for example, where up to 25 of the species recorded in the period from 1980 to 2005 have yet to be confirmed by more recent observations. Therefore, the working group continues to support the mapping of these regions." (Author/DeepL)] Address: Adelmann, J., Potsdamer Str. 70, 64372 Ober-Ramstadt, Germany. Email: jadelmann@web.de

**20026.** Aghade, J.B.; Saraf, S.A.; Shinde, A.M. (2022): A review on odonate diversity and habitat in India. *Journal of Entomology and Zoology Studies* 10(2): 129-134. (in English) ["The current review examines 24 research articles about Odonata Diversity and Habitat, which were previously collected from all over India, and includes an update on their systematic account, sighting period, diagnostic features, measurements, distribution, and perching behavior, conservation status, and threats. If the habitats are saved and safeguarded, this is favorable for their survival." (Authors)] Address: Aghade, J.B., Dept of Zoology, Government College of Arts and Science, Dr. B. A. M. University, Aurangabad, Maharashtra, India

**20027.** Aguilera, E.; Busto, B.; Ramo, C. (2022): Diet and food resource partitioning among six Ibis species in the Venezuelan Llanos. *Ornitología Neotropical* 33: 124-132. (in English, with Spanish summary) ["This work is the first study to provide simultaneous information on the diet of all six ibis species inhabiting the Venezuelan Llanos, which was obtained by analyzing gizzard contents of birds collected in 1979-1982 (between 59 and 11 per species). The percentage of prey number for the ibis species was determined: for the Scarlet/White ibis (*Eudocimus ruber/E. albus*), the main prey were Coleoptera, Diptera, and Heteroptera in the dry season, and Coleoptera and Odonata ["Anisoptera"] in the wet season. For the Barefaced Ibis (*Phimosus infuscatus*), main prey included Coleoptera and Ephemeroptera in the dry season, and Oligochaeta, Ephemeroptera, and Coleoptera

in the wet season. For the Glossy Ibis (*Plegadis falcinellus*), Spinicaudata, Coleoptera, and plant material were the main items consumed in the dry season, and Coleoptera, Decapoda, Odonata, and Heteroptera in the wet season. For the Sharptailed Ibis (*Cercibis oxycerca*), Pisces, Lepidoptera, Coleoptera, and Orthoptera were mainly consumed in the dry season, and Coleoptera, Orthoptera, and Oligochaeta in the wet season. For the Buff-necked Ibis (*Theristicus caudatus*), main prey were Coleoptera, Orthoptera, Arachnida, and Lepidoptera in the dry season, and Coleoptera and Orthoptera in the wet season. Finally, for Green Ibis (*Mesimbrinibis cayennensis*), we found that Coleoptera, Gastropoda, and Orthoptera were the most consumed in the dry season, without data for the wet season. We also found that rainfall seasonality has a great influence on the prey eaten by the ibises: diet overlap between the dry and wet season varied between 0.07 and 0.45 (Schoener's index), depending on the species. Moreover, diet overlap between pairs of species showed extremely low to medium values (0.13-0.44 in the dry season, 0.03-0.60 in the wet season, according to Schoener's index), which suggests that the coexistence of these species is largely facilitated by food resource partitioning." (Authors)] Address: Ramo, Cristina, Dpto. Ecología de Humedales, Estación Biológica de Doñana (EBD-CSIC), Sevilla, Spain. E-mail: cristina@ebd.csic.es

**20028.** Aguilar-Baldosea, W.; López- Ramírez, I.C.; Chávez-Mosquera, L.Y.; Murillo, L.R.; Halaby-Guerrero, J.C. (2022): Efecto de la minería en macro invertebrados acuáticos de la ciénaga plaza seca, Atrato, Chocó. *Revista Politécnica* 18(35): 9-23. (in Spanish, with English summary) [oas 64a; "The wetland ecosystems of the middle Atrato basin have been affected by factors such as mining, which interrupt the natural ecological dynamics of these aquatic communities, including the assemblage of aquatic macroinvertebrates. The effect of gold mining contamination in the Plaza Seca marsh, Middle Atrato basin, Chocó, Colombia, was determined. The structure and dynamics were analyzed. Macroinvertebrate specimens were collected from substrates such as macrophytes, sediment and riparian vegetation, fixed with 70% alcohol; physicochemical and hydrological parameters were measured. A total of 175 organisms were collected, distributed in 2 classes, 7 orders, 22 families and 27 genera. The order Odonata was the most representative (34%), followed by Coleoptera (28%). The Shannon-Wiener diversity index showed low values (1.92 bits/ind). The physicochemical variables were influenced by mining activity in the areas surrounding the marsh." (Authors)] Address: Murillo, L.R., Maestrante en Gerencia y Prácticas de Desarrollo. Investigador, Contratista Vicerrectoría de Investigaciones UTCH. Grupo de Investigación Sistemas Productivos, Colombia. Email: leyserrengifo123@gmail.com

**20029.** Ahire, D.K. (2022): Diversity of Odonates in Agricultural Field's of Satana (Baglan) Taluka, Nashik District, Maharashtra, India. *YMER* 21(6): 1086-1093. (in English) ["The present survey has been carried out on Odonata of agricultural field, Satana (Baglan) Nashik district, Maharashtra because it is now clear that agricultural fields are unique ecosystem that provides several services to Odonates. So, the different Odonates depend on these fields and their diversity also signs of good health of agroecosystems. But now-a-days agricultural land are gradually decreasing due to the rapid growth of highways, housing and factories. So, Odonates of these fields are also under risk. This side of the agricultural area is less highlighted so the main aim of this

study to prepare a list of those odonates which use these fields. There is the study was carried out for a period of two years i.e. July 2019 to July 2021. There are total of 21 species of Odonates were recorded during the period of the study. Maximum of 9 species falls under family Libellulidae followed by 6 species falls under Coenagrionidae and followed by 4 species fall under Platycnemididae and Lestidae and Aeshnidae showed less species diversity and represented by only one species. There are the maximum species richness reported from Monsoon and post-Monsoon season." (Authors)] Address: Ahire, D.K., Dept of Zoology, P.V. P. College, Pravaranagar, At- Loni- 413713, Ahmednagar, MS, India. Email: dilipahire7272@gmail.com

**20030.** Alkhatay, F.A.; Ahmad, A.H.; Rahim, J.; Imran, M.; Sheikh, U.A.A. (2022): Distribution and diversity of aquatic insects in different water bodies of Qatar. *Brazilian Journal of Biology* 84, e255950: 10pp. (in English, with Portuguese summary) ["Aquatic insect fauna remains an important tool for bio indication of environmental disturbance, while maintaining a healthy aquatic system. The purpose of the study was to document and to identify the diversity and distribution patterns of aquatic insect, a highly ignored aspect from the Qatar. Following the standard procedures, the samples were collected from aquatic habitats during the period October 2015 to May 2017 on monthly basis. A total of 11,287 individuals, belonging to 6 orders were captured. Dipterans were the abundant with the percentages of 71.01 (n=8,015), while the lowest percentage was observed for Coleoptera 0.04 (n=05). Twelve insects families were identified, among these five were reported under Diptera, followed by Hemiptera (03), while Coleoptera, Trichoptera, Odonata [exclusively: Orthetrum sabina], and Ephemeroptera were represented by single families. Among the selected localities, Dipterans were collected from 10 stations, followed by Hemiptera (9), Coleoptera (4), Odonata (4), Ephemeroptera (3) and Trichoptera (1) respectively. Among the water bodies samples, streams were the most preferred habitats (n=2,767), while drinking water pools were the least (27). Moreover, the highest Simpson diversity index of 1.48 and lowest of 0.47 was recorded for flooded sewage pool and plastic containers respectively, while the low evenness values were observed for ponds, and less than 1 Margalef's diversity values were seen for all habitats. This study documents the patterns of the diversity and distribution of aquatic insects, and provides a baseline for the future studies from Qatar." (Authors)] Address: Alkhatay, F.A., Universiti Sains Malaysia, School of Biological Sciences, Penang, Malaysia

**20031.** Alvarez-Alvarez, K.L.; Bota-Sierra, C.A.; Vásquez-Ramos, J.M. (2022): New species records in Acanthagrion, Nehalennia, and Perilestes (Odonata: Zygoptera) for Colombia - Nuevos registros de especies en Acanthagrion, Nehalennia y Perilestes (Odonata: Zygoptera) para Colombia. *Biota Colombiana* 23(2): 1-8. (in English, with Spanish summary) ["We record for the first time Acanthagrion jessei, Nehalennia minuta, and Perilestes solutus in Colombia, based on males and females taken at the campus Barcelona at the Universidad de Los Llanos, located in the foothills of the Colombian Eastern Andes in the Orinoco river basin." (Authors)] Address: Álvarez-Álvarez, Karen Lineke

**20032.** An, C.-H.; Cheon, K.-S.; Jang, J.-E.; Choi, J.-K.; Lee, H.-G. (2022): Complete mitochondrial genome of large dragonfly (*Macromia amphigena*). *Mitochondrial DNA Part B*, 7:2: 377-378. (in English) ["The complete mitochondrial genome of *M. amphigena* (Odonata: Macromiidae; Macromia) was sequenced and found to be 15,594 bp in length

including 37 genes (thirteen protein-coding genes (PCGs), 22 transfer RNAs (tRNAs) and two ribosomal RNAs (rRNAs) and a non-coding region). The overall GC content of the mitochondrial genome for *M. amphigena* was 28.4%. A phylogenetic analysis conducted for 13 species within the order Odonata suggested that *Macromia daimoji* is the most closely related to *M. amphigena*." (Authors)] Address: Lee, H.-G., Dept of Biological Science, Sangji University, Wonju, Korea. Email: morningdew@sangji.ac.kr

**20033.** Anand, K.; Dash, S.M.M.; Armanini, S. (2022): A numerical study on three-dimensional flapping dragonfly wings with optimized input kinematics for hovering and forward flight. Bulletin of the American Physical Society, 75th Annual Meeting of the Division of Fluid Dynamics. Sunday–Tuesday, November 20–22, 2022; Indiana Convention Center, Indianapolis, Indiana. Session L04: Animal Flight: Flying Insects I. 8:00 AM–9:57 AM, Sunday, November 20, 2022. Room: 133: (in English) [Verbatim: Dragonflies are capable of hover, glide, forward flight, quick turning, etc., with substantial flight times. Previous studies found that dragonfly wings require distinctive input kinematics for different flight modes. For instance, in hovering/forward flight, the wings flap out-of-phase, whereas during quick maneuvers, the wings flap in-phase. In this study, we performed numerical simulation using a dynamic mesh to analyze the wake structure over a pair of tandem dragonfly wings and further optimized their aerodynamic performance with novel flapping kinematics. The wing geometries are based on structural studies. The input kinematics are selected as the mix of pure sinusoidal and periodic Eldredge functions. The design parameters are taken similar to those of Berman and Wang (2007) and Geherke et al. (2019). Our study found that both wings' combined vertical lift coefficient is 1.56 times more than their individual lift coefficients when summed up. Moreover, the hindwing experiences most of the enhancement in lift resulting from the vortex synergy interaction. It was found the downwash-upwash wake interactions are insignificant in the in-phase flapping, which agrees with the results of Lua et al. (2018). The detailed flow physics will be discussed in the presentation.] Address: Indian Institute of Technology Kharagpur, India

**20034.** Antol, A.; Labecka, A.M.; Larsson, R.; Sniegula, S. (2022): First record of Microsporidia infection in the damselfly *Ischnura elegans* larvae: Temperature and predator cue effects on the host's life. Diversity 2022, 14, 428. <https://doi.org/10.3390/d14060428>: 10 pp. (in English) ["Here, we report, for the first time, a microsporidian infection in laboratory-reared larvae of *I. elegans*. Infected larvae originated from field-collected adult females, which were caught in southern Poland in August 2020 (the second half of the flight season). Higher rearing temperatures and the presence of predator cues from the invasive alien signal crayfish (*Pacifastacus leniusculus*) increased the number of infected larvae. Infected larvae had distorted wing development, and all individuals died before emergence. Hence, microsporidian infection in *I. elegans* larvae impacted damselfly morphology and life history. We propose that warming temperature and stress caused by nonconsumptive effects triggered by invasive alien predators are possible factors that produce negative fitness consequences from microsporidian infection in a key amphibious ectotherm." (Authors)] Address: Antol, A., Institute of Nature Conservation, Polish Academy of Sciences, al. Adama Mickiewicza 33, 31-120 Kraków, Poland. Email: andrzejantol@gmail.com

**20035.** Arase, C. (2022): Design and Kinematics of a Dielectric Elastomer Actuated Micro Dragonfly Robot. BSc thesis, Mechanical Engineering, Massachusetts Institute of Technology: 32 pp. (in English) ["Dragonflies fly in a unique way compared to other hovering insects. Soft robotics are used to learn more about their flapping motion. An at-scale dragonfly robot is designed around Dielectric Elastomer Actuators that compress and expand 0.5mm. With this knowledge, MATLAB was used to predict the linkage sizes that control the wing stroke movement. Using the values calculated in MATLAB, Solidworks was used to design a soft robot that mimics a dragonfly's flight. Motion analysis was then used to map the movements of the robot. This analysis showed an angular wing displacement of 93° in the  $\phi$  direction. The wing hinge ( $f$  direction) moves 90° on the upstroke and is stopped by a limiting piece to 40° on the downstroke." (Author)] Address: Cathleen Arase; not stated

**20036.** Archibald, S.B.; Cannings, R.A. (2022): The first Odonata from the early Eocene Allenby Formation of the Okanagan Highlands, British Columbia, Canada (Anisoptera, Aeshnidae and cf. Cephalozygoptera, Dysagrionidae). The Canadian Entomologist 154, e29: 1-8. (in English) ["Fossil insects have been collected and described from the early Eocene Allenby Formation of southern British Columbia, Canada for over a century, but these have never included Odonata. We describe the first members of that order from the formation: *Allenbya holmesae*, new genus and species, most likely belonging to the Dysagrionidae (suborder Cephalozygoptera), and a torn, folded, and incomplete wing assigned to the Aeshnidae (suborder Anisoptera) that cannot be identified below family level. In other regional deposits of the early Eocene Okanagan Highlands series of lacustrine shales, the Dysagrionidae is by far the most common odonate family, followed by the Aeshnidae." (Authors)] Address: Archibald, S.B., Beaty Biodiversity Museum, University of British Columbia, 2212 Main Mall, Vancouver, British Columbia, V6T 1Z4, Canada. Email: sba48@sfu.ca

**20037.** Arguel, L.; Denis, A.S.; Danflous, S.; Gouix, N.; Santoul, F.; Buisson, L.; Pelozuelo, L. (2022): Detection and monitoring of riverine dragonfly of community interest (Insecta: Odonata): Proposal for a standardised protocol based on exuviae collection. Diversity 2022, 14(9), 728; <https://doi.org/10.3390/d14090728>: 17 pp. (in English) ["Collecting quantitative data on insect species occurrence and abundance is a major concern to document population trends. This is especially the case to assess the conservation status of species listed in the European Habitats Directive and to assess the efficiency of mitigation measures with a view to achieve the "no net loss of biodiversity" goal for protected species. However, at present, populations of riverine dragonflies listed in the Habitats Directive and protected under French national law are poorly quantified and monitored. Exuviae collection could be used for such monitoring but a standardised protocol is lacking. We here proposed and tested such a protocol to monitor riverine dragonfly populations through exhaustive exuviae collection along river bank transects. To define the optimal transect size and number of visits, ninety-eight 100 m-long transects divided into 10 m-long plots were monitored on three rivers in southern France. Each transect was visited three times over the emergence period. In the course of each visit, all the exuviae along transects were collected and identified. From our results, we recommend collecting exuviae along 100 m of river bank in the course of two visits in order to both maximise the species detection and minimise the monitoring cost." (Authors)] Address: Pelozuelo, L., Laboratoire d'Ecologie Fonctionnelle

et Environnement, CNRS—INPT-UPS, Univ. Paul Sabatier, Bâtiment 4R1, 118 Route de Narbonne, CEDEX 09, 31062 Toulouse, France. Email: laurent.pelozuelo@univ-tlse3.fr

**20038.** Assandri, G.; Bazzi, G. (2022): Natural and anthropogenic determinants of peatland dragonfly assemblages: Implications for management and conservation. *Biodiversity and Conservation* 31: 703-722. (in English) ["Peatlands are unique ecosystems of global importance for biodiversity, though are severely threatened by human activities. Dragonflies are valuable ecological indicators, but comprehensive studies on the species inhabiting peatlands are limited. To fill this knowledge gap, we investigated the determinants of peatland odonate assemblages in the Italian Alps along the bog-poor fen-rich fen series, a vegetation gradient influenced by pH. The ultimate goal was to distil management recommendations to inform peatland dragonfly conservation. Species richness, bog specialist richness, and community composition were assessed at both pristine and human-impacted sites and then related to environmental and anthropogenic drivers. We showed that bog and poor fen assemblages were significantly distinct from those of intermediate and rich fens, which, in turn, displayed the highest species richness, but the lowest number of specialists, whilst being also the most degraded. Excavated sites, compared to non-excavated ones, harboured a higher number of species, although this effect was not significant for bog specialists. Drainage and abandonment of mowing/ grazing practices determined reed and shrub/tree invasion, negatively impacting fen species. Water availability and heterogeneous spatial arrangements of water pools within the peatland positively affected most species, with bog specialists only favoured by the latter. Peatland dragonfly conservation should primarily rely on the preservation of pristine sites, as they harbour unique dragonfly assemblages. Impacted sites could benefit from restoration actions; specifically, reed control, and the creation of pools of different sizes and depths within the more terrestriated peatlands are likely the most effective measures to support peatland Odonata communities." (Authors)] Address: Assandri, G., Area Per L'Avifauna Migratrice (BIO.AVM), Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA), Via Caf Fornacetta 9, 40064 Ozzano dell'Emilia Italy. Email: giacomo.assandri@gmail.com

**20039.** Astuti, A.; Nayasilana, I.N.; Sugiyarto; Budiharjo, A. (2022): Community structure of dragonflies (Odonata) in Gunung Bromo's Forest Area with Special Purpose (FASP), Karanganyar, Central Java, Indonesia. *Biodiversitas* 23(5): 2493-2501. (in English) ["Dragonflies are one component of biodiversity in Indonesia, which function both as predators and bioindicators of water quality. Dragonfly habitat is widespread ranging from highland forest areas, lowland forests, reservoirs, lakes, rivers, swamps, and rice fields to settlements. One location that becomes dragonfly habitat is in the Gunung Bromo's Forest Area with Special Purpose (FASP), Karanganyar, Central Java, Indonesia. This study aims to determine the community structure and habitat preferences of dragonflies in Gunung Bromo's FASP. Data resulting from this study is expected used as a database for Gunung Bromo's FASP managing. The study was conducted along the Bamban river which is located in the Gunung Bromofs FASP area, in June-July 2019. Dragonflies were collected in 14 observation stations. At each observation, station transects were 100 m in length and 10 m in width. Data collection included the dragonflies species, the individual numbers, and environmental factors both abiotic and biotic factors. Data analysis included the diversity, evenness, dominance and

similarity of dragonfly species. Principal Component Analysis (PCA) was applied to determine the dragonfly abundance pattern and Canonical Correspondence Analysis (CCA) was applied to determine the relationship between dragonflies and their environmental factors. The results showed there were 23 species of dragonflies in the Gunung Bromo's FASP with a diversity index of 1.96. PCA results indicate the abundance of dragonflies is not much different in each species. Meanwhile, CCA results show almost of the dragonflies in the Gunung Bromofs FASP are influenced by abiotic and biotic factors, except on *Orthetrum sabina* and *Copera marginipes*. They are assumed have unspecific habitat preferences." (Authors)] Address: Astuti, A., Biodiversitas Study Club, Dept of Biology, Fac. of Mathematic and Natural Science, Universitas Sebelas Maret. Jl. Ir. Sutami No.36, Kentingan, Jebres, Surakarta 57126, Central Java, Indonesia. Email: ayuastuti1709@gmail.com

**20040.** Azmiera, N.; Krasilnikova, A.; Sahudin, S.; Al-Talib, H.; Heo, C.C. (2022): Antimicrobial peptides isolated from insects and their potential applications. *Journal of Asia-Pacific Entomology* 25(2), June 2022, 101892: (in English) ["Highlights: • The recent advances of antimicrobial peptides isolated from insects were reviewed. Characterization and mechanisms of AMPs from various insect Orders were summarized. The most studied insect Orders were Hymenoptera, followed by Diptera and Coleoptera. A list of AMPs, methods for characterization, and bacteria tested were catalogued. A pictorial summary of the procedures for AMPs extraction and isolation was provided. Abstract: Antimicrobial peptides (AMPs) in insects have the potential to be developed as chemotherapy agents against numerous microbial species. This article reviewed the existing knowledge of what have been focused so far on published materials related to AMPs isolated from insects. Previous studies were focused on peptide characterization and the mechanism pathways of different AMPs from a variety of insect Orders. Most studied insect Orders are as follows: Hymenoptera (50%), Diptera (17%), Coleoptera (13%), Lepidoptera (10%), Hemiptera (5%), Blattodea (3%) and Odonata (2%). Dozens of new AMPs have been extracted from insects recently. However, more studies in vivo and in vitro are necessary to fully understand their effect and the mechanisms of antimicrobial action to utilize their promising potential in cosmetic and pharmaceutical industries." (Authors)] Address: Heo, C.C., Dept of Medical Microbiology and Parasitology, Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh Campus, Jalan Hospital, 47000 Sungai Buloh, Selangor, Malaysia. Email: chin@uitm.edu.my

**20041.** Basaula, R.; Prasad, H.; Sapkota, K. (2022): The invasion of Water Hyacinth and its impact on diversity of macro-invertebrates in the lake cluster of Pokhara valley, Nepal. *Prithvi Academic Journal* 5: 1-16. (in English) [oas 64a; "Invasion of Alien Invasive Plant species (IAPs) is one of the major drivers for the wetland ecosystem degradation and aquatic biodiversity loss. Among the wetland ecosystems, the freshwater habitats including lakes and streams are more susceptible to species extinction. In the Lake Cluster of Pokhara Valley (LCPV), many aquatic species have been threatened by an abundant occurrence of water hyacinth (*Eichhornia crassipes*). Thus, this study aims to identify an association of the water hyacinth with different water parameters, diversity and abundance of macro-invertebrates. Water hyacinth is not only correlated with depth, transparency, pH and dissolved oxygen negatively, it is also correlated with temperature and free carbon dioxide positively. A total of



29 species and 26 genera from 21 families and 15 orders of macro-invertebrates were recorded. Among the macro-invertebrates, haplotaxida and diptera were found to be less abundant in the water hyacinth presence (HP) habitat than the water hyacinth absence (HA) habitat. However, the macro-invertebrates were found more abundant and diverse in the HP habitat than the HA habitat (Ranged: HP: 177 to 666; HA: 46 to 483). The abundance of orders like ephemeroptera, odonata, coleoptera, sphaeriida and caenogastropoda was significantly higher in the HP habitats. The direct and indirect effect of water hyacinth on the occurrence of macro-invertebrates and abundance can change the faunal structure of LCPV. Therefore, it is recommended to develop a plan of LCPV to manage the water hyacinth." (Authors)] Address: Basaula, R., Department of Zoology, Prithvi Narayan Campus, Pokhara, Nepal; Central Department of Zoology, Tribhuvan University, Kirtipur, Nepal

**20042.** Bae, S.-W.; Hwang, T.-W.; Yoon, C.-S.; Hong, S.-J.; Cheong, S.-W. (2022): Distribution characteristics of and ecological information on benthic macroinvertebrates in the Hwapocheon stream. *Journal of Environmental Science* 31(2): 149-169. (in Korean, with English summary) ["Hwapocheon stream is located in Gimhae-si, Gyeongsangnam-do, and a part was declared a protected wetland area in 2017. In 2020 and 2021, we investigated the community structure of benthic macroinvertebrates of the Hwapocheon stream to provide ecological information for the management of the wetland. As a result, 4 phyla, 6 classes, 20 orders, 51 families, 83 species, and 2,621 individuals of benthic macroinvertebrates were identified. The average indices of diversity, richness, and evenness were the highest in the midstream area, whereas the highest average index of dominance was observed upstream. Seven biological water quality evaluations based on the distribution of benthic macroinvertebrates showed that the Biological Monitoring Working Party was an extremely suitable method for environmental evaluation of the Hwapocheon stream. Regarding functional feeding groups, the number of species of predators and gathering-collectors was the highest, and considering habitual dwelling groups, the number of species of clingers and sprawlers was the highest. The species number of Odonata, Hemiptera, and Coleoptera increased toward the downstream area, whereas the community loss index was the highest upstream. We also investigated relative resistance and resilience based on the distribution of aquatic insects and found that community stability was the highest downstream, whereas the lowest upstream." (Authors)] Address: Cheong, S.-W., Dept Biology & Chemistry, Changwon National University, Changwon 51140, Korea. E-mail: swcheong@changwon.ac.kr

**20043.** Barbosa Ribeiro, R.A.; Juen, L.; Brasil, L.S. (2022): Habitat conditions in streams influence Odonata larval assemblages in the eastern Amazon. *International Journal of Odonatology* 25: 22-30. (in English) ["The growth of agricultural and mining activities in the Amazon has impacted land-use and caused significant changes in the local environmental conditions of streams. In the face of these changes, our study aimed at assessing how environmental changes affect Odonata larval assemblages in streams in the eastern Amazon. We hypothesized that habitat conditions in streams are strong predictors of Odonata larval assemblages. We sampled 30 headwater streams (1st through 3rd order) in the eastern Amazon. We corroborated our hypothesis that regional- and local-scale environmental changes are important predictors of the Odonata larval assemblage

structure. These results indicate that environmental conditions within the stream channel are important to maintain Odonata larval assemblages, as they provide important resources for larval development. For new studies, we recommend the assessment of temporal dynamics to evaluate whether these patterns are stable across time. Finally, evaluating various environmental scales of the original impact is extremely relevant for preventing the deterioration of or recuperating aquatic assemblages in Amazonian streams, considering the ongoing rapid environmental changes and deforestation in the region. Here we demonstrate that in-stream environmental conditions are important to assemblage structure and this must be considered in environmental restoration plans." (Authors)] Address: Barbosa Ribeiro, R.A., Programa de Pós Graduação em Ecologia Aquática e Pesca, Universidade Federal do Pará, Belém, Pará, Brazil. Email: rodrigoarison@hotmail.com

**20044.** Basaula, R.; Prasad, H.; Sapkota, K. (2022): The invasion of Water Hyacinth and its impact on diversity of macro-invertebrates in the lake cluster of Pokhara valley, Nepal. *Prithvi Academic Journal* 5: 1-16. (in English) ["Invasion of Alien Invasive Plant species (IAPs) is one of the major drivers for the wetland ecosystem degradation and aquatic biodiversity loss. Among the wetland ecosystems, the freshwater habitats including lakes and streams are more susceptible to species extinction. In the Lake Cluster of Pokhara Valley (LCPV), many aquatic species have been threatened by an abundant occurrence of water hyacinth (*Eichhornia crassipes*). Thus, this study aims to identify an association of the water hyacinth with different water parameters, diversity and abundance of macro-invertebrates. Water hyacinth is not only correlated with depth, transparency, pH and dissolved oxygen negatively, it is also correlated with temperature and free carbon dioxide positively. A total of 29 species and 26 genera from 21 families and 15 orders of macro-invertebrates were recorded. Among the macro-invertebrates, haplotaxida and diptera were found to be less abundant in the water hyacinth presence (HP) habitat than the water hyacinth absence (HA) habitat. However, the macro-invertebrates were found more abundant and diverse in the HP habitat than the HA habitat (Ranged: HP: 177 to 666; HA: 46 to 483). The abundance of orders like ephemeroptera, odonata, coleoptera, sphaeriida and caenogastropoda was significantly higher in the HP habitats. The direct and indirect effect of water hyacinth on the occurrence of macro-invertebrates and abundance can change the faunal structure of LCPV. Therefore, it is recommended to develop a plan of LCPV to manage the water hyacinth." (Authors)] Address: Basaula, R., Dept Zoology, Prithvi Narayan Campus, Pokhara, Nepal; Central Dept Zoology, Tribhuvan University, Kirtipur, Nepal

**20045.** Batty, P. (2022): The Status of *Somatochlora metallica* (Vander Linden) (Brilliant Emerald) in Scotland. *Journal of the British Dragonfly Society* 38(1): 1-26. (in English) ["The distribution of *S. metallica* in Scotland is restricted to two well separated areas where it breeds primarily in upland lochs and lochans. It was formerly considered to be present in three separate areas but, since 2012, the number of known sites for *S. metallica* in Scotland has doubled, resulting in an expansion of its known range in this country. A number of these sites link the former main breeding areas of Loch Bran and Loch Affric in Inverness-shire. The other cluster of sites is in Argyll. Also, as a result of increased recorder effort, further observations on habitat preferences and breeding behaviour are presented." (Author)] Address:

Batty, Pat, Kirman Farm, Kilmichael Glen, lochgilthead, Argyll, PA31 8QL, UK. E-mail: battypatm@hotmail.com

**20046.** Bedjanic, M. (2022): Odonata records from Perhentian Islands, Malaysia. *Notulae odonatologicae* 9(9): 404-413. (in English) ["A checklist of 19 Odonata species observed between 30.vi. and 04.vii.2019 on the hitherto odonatologically unexplored island Pulau Perhentian Besar, Terengganu State, Malaysia, is given. Most notable is the record of the recently described *Leptogomphus tioman* Choong, 2016, for which the currently known distribution is extended and the variability in coloration details based on photographs of adult males is briefly discussed. *Orthetrum pruinosum schneideri* Förster, 1903, is new to Terengganu, bringing the total recorded odonates from the state to 133 species." (Authors)] Address: Bedjanic, M., National Institute of Biology, Vecna pot 111, 1000 Ljubljana, Slovenia. E-mail: matjaz.bedjanic@nib.si

**20047.** Behr, H. (2022): Notizen zur Libellenfauna (2013-2021) einiger Seeufer im Stadtgebiet Schwerin (Mecklenburg-Vorpommern) (Odonata). *Virgo* 25: 3-10. (in German) ["In 726 records, a total of 5441 individuals were recorded from 2013 to 2021 at the lakes studied with their tributaries. On most of the lakeshores in the urban area, only relatively low numbers of species were observed, with 11 to 17 dragonfly species. At the more intensively studied, elongated and structurally rich Neumühler Lake 26 dragonfly species were recorded. In the small, structurally rich tributary waters studied, which are connected to the main waters (especially: Small lakes, bays were home to many other typical stillwater species. On all shores of the larger lakes, which were predominantly overgrown with reeds, these three large dragonfly species were found with high dominance values (eudominant and dominant) for their group: *Anax parthenope*, *Orthetrum cancellatum*, *Libellula fulva*. The damselfly reached the relatively highest dominance values within the above-mentioned group C "Anisoptera without Libellulidae" at almost all investigated lakeshore sections. Only at the southern outlet of the Schwerin Inner Lake into the Störkanal several records of the dominant *Gomphus vulgatissimus* have been found as visual evidence of imagines and exuviae on the largely reed-free shore. Among the damselfly species, these species with relatively high dominance values occurred more frequently on typical lake shores: *Erythromma najas*, *Ischnura elegans*) and *Enallagma cyathigerum*. Among the accompanying species, the hitherto unique finding of *Epitheca bimaculata* hatching on the Common Crucian Carp stands out in particular. *Leucorhinia caudalis* and *L. pectoralis*, which are strictly protected in the urban area, occur at 3-4 smaller pond-like, near-natural sites. Sightings of the fire dragonfly (*Crocothemis erythraea*) have become increasingly frequent in the recent past at a wide variety of stillwater habitats." (Author) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Behr, H., Herrengartenweg 57, 19061 Schwerin, Germany. EMail: hauke-behr@web.de

**20048.** Bernard, R.; Daraz, B. (2022): Rift valley-driven species richness, composition and phenology of Odonata in central Zambia. *International Dragonfly Fund - Report* 171: 1-71. (in English) ["One hundred and seven species of damselflies and dragonflies were recorded at 66 localities in central Zambia during three expeditions between 2013 and 2017, with 104 species at 62 localities in the main study area, in broad environs of Chingombe. The relatively great richness and composition of the odonate fauna in this small remote area was a consequence of the close proximity of

three quite different geomorphological units - the flat bottom of the rift valley, the steep mountainous slopes bordering it, and undulating uplands, with a combination of their climatic and hydrological conditions. An odonatalogical 'river-continuum' sequence was studied, from the upper and lower reaches of the mountain stream, through submontane streams and rivers down to the large river draining the rift valley. This spatial sequence was characterised by large-scale interpenetration of the odonate assemblages, with more specific fauna of the mountain stream and large river, and rich, but less specific that of submontane watercourses. Fluent replacement of some species with their related counterparts was recorded, i.e. more upland species of closed habitats by species related to semi-open lower-elevated watercourses. The range of species well adapted to temporary waters was rich, but differed between the small waters of the tropical savannah bottom of the rift valley and larger and longer existing water bodies in seasonally inundated dambos in more subtropical uplands. The phenological pattern was generally well-structured due to two distinct peaks, the first in the first phase of the wet season, both in the large river and temporary waters, and the second at the end of the wet season, in the latter. Phenology of odonate assemblages in the temporary waters was based on two consecutive aspects dominated respectively by adults reproductively active in the early-mid season and generals emerging at the end of it. At the beginning of the wet season, the reaction of adult odonates to first heavier rains was extremely rapid and even preceded the formation of the seasonal water body. In the large river, the phenological shift towards the early wet season with a low-water phase and favourable habitat conditions was clearly discernible. In turn, the odonate fauna in another low-water phase, at the end of the wet season and before a cool phase of the dry season, was dramatically poor. In the smaller permanent watercourses, phenology of the odonate assemblages during the wet season was generally less patterned, without a dramatic change of generations and with the emergence more dispersed in time, though centred on the first half of the season. As an effect of replacing individuals and the prolonged occurrence of many species, the odonate assemblages, while richer in the first half of the rainy season, appeared more stable and continuous than those of the temporary waters and the large river." (Authors)] Address: Bernard, R., Lab. of Nature Education & Conservation, Fac. Biology, Adam Mickiewicz University in Poznan, Uniwersytetu Poznanskiego 6, PL-61-614 Poznan, Poland. Email: rbernard@amu.edu.pl

**20049.** Bharathi, D.; Koparde, P. (2022): Records of Dragonflies & Damselflies (Insecta: Odonata) from Gondia district, Maharashtra, India. *Journal of Insect Biodiversity and Systematics* 8(3): 379-387. (in English) ["The Vidarbha region of India harbours a significant amount of biodiversity. However, the region still severely lacks data on lesser-known taxa such as odonates. To partially fill in the knowledge gap on odonates, opportunistic surveys were conducted across nine sites in the Gondia district of Vidarbha between 2019 and 2021. In this report, the presence of 35 species from the study area, representing around 1/4th of the total odonate diversity of Maharashtra is recorded. The results are indicative of the need for consistent sampling efforts in the region. Further systematic and long-term monitoring studies on odonates in Vidarbha Region are proposed." (Authors) *Lestes cf malabaricus*] Address: Koparde, P., School of Sustainable Development, Fac. of Sustainability Studies, Dr. Vishwanath Karad MIT World Peace University, Pune, Maharashtra, India. Email: pankaj.koparde@mitwpu.edu.in

**20050.** Bidy, A.R.; McIntyre, N.E. (2022): Parasitism of *Enallagma civile* Hagen in Selys, 1853 (Zygoptera: Coenagrionidae) by *Arrenurus* water mites. *International Journal of Odonatology* 25: 98-95. (in English) ["We compared the prevalence and intensity of *Arrenurus* sensu stricto water mite parasites on *E. civile* from 10 freshwater wetlands (playas) in two different land-cover contexts in western Texas from 2006-2007. Vulnerability to parasitism may be a consequence of disturbance, so we predicted that the more natural form of regional land cover (grasslands) surrounding playas should be associated with a lower water mite load than more disturbed land cover (tilled croplands). Additionally, we examined *Arrenurus* occurrence and intensity of infection by host sex. Overall prevalence was 38.46% of 130 damselflies sampled having mites; this varied by land-cover type but with opposite trends between years. Overall average parasite load was ~11 water mites per infected host (range: 1-40 mites); intensity was significantly higher in hosts from cropland playas in 2006, but there was no difference by surrounding land cover in 2007. Although there were consistent trends in both years of more males being parasitized than females, the highly uneven distribution of parasites on hosts and differences in average mite load between years generated variability that obscured any statistically significant patterns. Thus, land-cover context surrounding playas, but not host sex, had an impact on parasite load in one of the two years of our study. Future work is needed to identify the mechanisms by which land cover may affect water mite-odonate host-parasite relationships as well as the role of the odonate assemblage as a whole in dispersal of parasites in a temporally dynamic wetland network." (Authors)] Address: McIntyre, Nancy, Dept of Biological Sciences, Texas Tech University, Lubbock, TX 79409-3131 USA. Email: nancy.mcintyre@ttu.edu

**20051.** Bidy, A.R. (2022): Using species distribution models to predict genomic isolation: A case study with a high-altitude, stream-specialist damselfly (Odonata, Calopterygidae: *Hetaerina vulnerata* Hagen in Selys, 1853) in Arizona, New Mexico, and Utah. M.Sc. thesis, Texas Tech University, Austin: VII + 46 pp. (in English) ["Aquatic animals in high-elevation streams of the arid southwestern U.S. are potentially isolated by distance (IBD) or environment (IBE). *H. vulnerata* is an insect that inhabits mountain streams in the American southwest. Spatial separation of streams and limited dispersal capacity of *H. vulnerata* may cause population isolation and genomic structuring, and projected climate change may exacerbate isolation by restricting distribution and movement. MaxEnt was used to construct a species distribution model (SDM) based on environmental variables and occurrences of *H. vulnerata*; this model indicated seven potential population clusters isolated by intervening unsuitable habitat. Projecting to future climate conditions, an overall gain of suitable habitat (0.8% increase) was identified, but current suitable habitat in southern Utah and northern New Mexico was lost. I collected 124 *H. vulnerata* from eight localities at six of the seven clusters; DNA was extracted from 78 individuals for ddRADseq genotyping. A suite of population and landscape genomic analyses were used: Admixture, IBD, FST, and a genotype-environment association (GEA). Admixture analyses determined six sub-populations, partially corroborating the SDM. IBD was not significant; IBE was only significant when considering two ecological variables. FST values were low (< 0.07). GEA determined that 20 SNPs were locally adapted to tree canopy coverage. These results indicate that *H. vulnerata* populations are likely recently separated but undergoing genomic isolation and local adaptation. Integrating SDMs with

landscape genomics combines techniques to indicate populations that are separated by distance and unsuitable habitat, providing explanations for patterns in genomic structuring." (Author)] Address: not stated

**20052.** Borisov, S.N.; Kazenas, V.L.; Borisov, A.S. (2022): Dragonflies (Odonata) of the Syrdarya Karatau and the Arys River valley (southern Kazakhstan) with notes on seasonal latitudinal and altitudinal migrations. *Euroasian Entomological Journal* 22(1): 78-90. (in English, with Russian summary) ["45 dragonfly species are presented for Syrdarya Karatau Range and Arys River valley in Southern Kazakhstan, with 19 species newly registered, and *Somatochlora arctica* given on the basis of literature data. Doubtful registrations of *Calopteryx samarcandica* and *S. arctica* are discussed. Seasonal latitudinal migrations of the four species, *Anax ephippiger*, *A. parthenope*, *Pantala flavescens* and *Sympetrum fonscolombii* are determined from Chokpak Pass by means of ornithological traps. Seasonal altitudinal migrations are registered for seven species, *Aeshna mixta*, *Sympetrum arenicolor*, *S. meridionale*, *S. striolatum pallidum* Selys, 1887, *Sympecma fusca*, *S. gobica* and *S. paeidisca*. In mountainous biocenoses the immigrant dragonfly species flight from plains for aestivation are represented in high numbers." (Authors)] Address: Borisov, S.N., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunze Str. 11, Novosibirsk 630091, Russia. E-mail: borisov-s-n@yandex.ru

**20053.** Borkenstein, A.; Jödicke, R. (2022): Färbungsvielfalt niedersächsischer *Coenagrion lunulatum* (Odonata: Coenagrionidae). *Mitteilungen der AG Libellen in Niedersachsen und Bremen* 4: 3-18. (in German, with English summary) ["Variety of coloration in *C. lunulatum* from Lower Saxony, NW Germany - We describe two female colour morphs of *C. lunulatum* in Lower Saxony, northwestern Germany. Morph I has brown postocular spots, a basic body coloration with brown and green, and some variable blue at the abdomen, mainly at its tip. Morph II is similar but has blue postocular spots and more blue at the base and tip of the abdomen. A possible morph III was represented by a single female only, which resembles morph II but has blue thorax sites and even more blue at the abdomen. Photographs of males and females with their teneral and juvenile stages are added. The shortcoming of the notion of androchromatism is discussed." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: reinhard.joedicke@ewetel.net

**20054.** Borkenstein, A.; Jödicke, R. (2022): Thermoregulatory behaviour of *Sympetrum striolatum* at low temperatures with special reference to the role of direct sunlight (Odonata: Libellulidae). *Odonatologica* 51(1-2): 83-109. (in English) ["The thermoregulatory behaviour of the autumnal *Sympetrum striolatum* was studied and analysed at the end of its flying season in November from 2011 to 2021. Only on days with intense solar radiation did it leave its roosting sites in the treetops and became active at and around breeding ponds. We describe the perch site selection and body posture for basking, avoiding wind, feeding, and reproductive activities after warm-up. Ectothermic thermoregulation enabled flight largely independent of air temperature; we saw a male flying at 3.7°C and a tandem ovipositing at 6.0°C. In the afternoon all individuals returned to their roosting sites. If they were too cold for immediate take-off, they wing-whirred and flew after 2-3 minutes. Wing-whirring was performed at ambient temperatures between 3.8 and 13.6°C.

We suppose that this behaviour is obligatory when insolation is insufficient, especially when the sun is blocked by clouds. The combination of ecto- and endothermic thermoregulation is considered the main key factor for this species' exceptionally effective adaptation to cold." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. E-mail: reinhard.joedicke@ewetel.net

**20055.** Bota-Sierra, C.A.; Sandoval-H.; Perez-Gutierrez, L. (2022): Two new Telebasis Selys, 1865 species (Odonata: Zygoptera: Coenagrionidae) from Western Colombia. *Zootaxa* 5138(1): 54-66. (in English, with Spanish summary) ["Telebasis Selys, 1865 is a genus well represented in Colombia, with 18 species distributed throughout the territory, one of them being endemic to the country. One of the most underexplored biogeographic regions of the country is the Chocó, where we found the two new endemic species of Telebasis here described, *Telebasis blasi* sp. nov. and *Telebasis noveloi* sp. nov. In the description of both species, we provide detailed information about their distribution, diagnostic characteristics for males and females, pictures of living specimens and diagnostic characteristics, and a map showing the localities where each species was found. Finally, remarks on the conservation status of these species are presented; we consider that they are probably endangered, since they occupy small ranges and are threatened by several human activities." (Authors)] Address: Bota-Sierra, C.A., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera Antigua a Coatepec 351, El Haya, 91070 Xalapa, Veracruz, Mexico. E-mail: corneliobota@gmail.com

**20056.** Bowler, D.; Eichenberg, D.; Conze, K.-J.; Suhling, F.; Baumann, K.; Benken, T.; Bönsel, A.; Bittner, T.; Drews, A.; Günther, A.; Isaac, N.; Petzold, F.; Seyring, M.; Spengler, T.; Trockur, B.; Vedder, D.; Willigalla, C.; Bruelheide, H.; Jansen, F.; Bonn, A. (2022): Gewinner und Verlierer in der Libellenfauna: Veränderung der Verbreitung in Deutschland zwischen 1980 und 2016. *Libellula* 41(1/2): 25-45. (in German, with English summary) ["Recent studies suggest insect declines in parts of Europe; however, the generality of these trends across different taxa and regions remains unclear. Standardized data are not available to assess large-scale, long-term changes for most insect groups but opportunistic citizen science data is widespread for some. Here, we took advantage of 'citizen science' data to investigate distributional changes of Odonata. We compiled over 1 million occurrence records from different regional databases. We used occupancy detection models to account for imperfect detection and estimate annual distributions for each species during 1980–2016 within 5 x 5 km quadrants. We also compiled data on species attributes that were hypothesized to affect species' sensitivity to different drivers and related them to the changes in species' distributions. We further developed a novel approach to cluster groups of species with similar patterns of distributional change to represent multi-species indicators. More species increased (45%) than decreased (29%) or remained stable (26%) in their distribution (i.e., number of occupied quadrants). Species showing increases were generally warm-adapted species and/or running water species, while species showing decreases were cold-adapted species using standing water habitats such as bogs. Time-series clustering defined five main patterns of change – each associated with a specific combination of species attributes, and confirming the key roles of species' temperature and habitat preferences. Trends in Odonata provide mixed news – improved water quality, coupled with positive impacts of climate change, could explain the positive

trends of many species. At the same time, declining species point to conservation challenges associated with habitat loss and degradation. Our study demonstrates the great value of 'citizen science' and the work of natural history societies for assessing large-scale distributional change." (Authors)] Address: Bowler, Diana, Deutsche Zentrum für integrative Biodiversitätsforschung Halle-Jena-Leipzig, Puschstr., 04103 Leipzig, Germany. Email: diana.bowler@idiv.de

**20057.** Bozóki, T.; Móra, A.; Berta J. B.; Perneckner B.; Deák, Cs.; Málnás, K.; Boda, P. (2022): Contribution to the knowledge of the aquatic macroinvertebrate fauna of Bükkösvíz (Mecsek Mountain, SW Hungary). *Natura Somogyensis* 38: 29-42. (in English) ["In 2018 and 2019, quantitative aquatic macroinvertebrate samplings were carried out in the river network of the Bükkösvíz (Mecsek Mountain). The identification of 325,865 macroinvertebrate specimens originated from 40 sampling sites resulted in the occurrences of 125 different species belonging to 12 higher taxa (Gastropoda – 9, Bivalvia – 1, Hirudinea – 4, Malacostraca – 6, Ephemeroptera – 16, Odonata – 12, Plecoptera – 3, Heteroptera – 19, Coleoptera – 23, Megaloptera – 3, Neuroptera – 1, Trichoptera – 28), including 8 protected (Bivalvia: *Unio crassus*, Odonata: *Calopteryx virgo*, *Coenagrion ornatum*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus*, *Orthetrum brunneum*, Heteroptera: *Aquarius najas*, Neuroptera: *Osmylus fulvicephalus*) and 1 strictly protected species (Odonata: *Cordulegaster heros*)." (Authors)] Address: Bozóki, T., Doctoral Program in Biology & Sport Biology, Faculty of Science, University of Pécs, Pécs, Hungary

**20058.** Brockhaus, T. (2022): The Palearctic dragonfly (Insecta: Odonata) fauna of the lands north of the Arctic Circle – a critical synopsis. *Eurasian entomological journal* 21(3): 142-152. (in English, with Russian and German summaries) ["40 Odonata species have been found north of the Arctic Circle between the Lofoten archipelago in the West and the Chukchi peninsula in the Russian Far East. This analysis is based on a critical evaluation of the available literature, data bases as well as my own observations in northern Fennoscandia and in the Polar Urals. *Aeshna caerulea*, *A. subarctica*, *A. juncea* and *Cordulia aenea* were found in all regions. *Somatochlora arctica* and *S. sahlbergi* are also widespread throughout the northern Palearctic. Only observations from the East Siberian mountain region and the East Siberian lowlands are missing. *Coenagrion johanssoni* and *Enallagma cyathigerum* occur north of the Arctic Circle in both the western and the eastern Palearctic. The present analysis is a basis for the recording of potential changes in fauna because of climate change." (Author)] Address: Brockhaus, T., An der Morgensonne 5, 09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**20059.** Brockhaus, T. (2022): Ausbreitungsmechanismus der Federlibelle *Platycnemis pennipes* (Pallas) am Beispiel des Chemnitzflusses (Sachsen) (Insecta: Odonata: Zygoptera: Platycnemididae) und weitere Ausbreitungsformen bei Libellen. *Artenschutzreport* 46: 63-72. (in German, with English summary) ["Mechanism of expansion in *P. pennipes* using the example of the Chemnitz river (Saxony) and other forms of expansion in Odonata. – The reasons of the expansion of *P. pennipes* along the Chemnitz river since the early 1990s has been studied. After evaluating determined morphometric data (head width, total length, wing dimensions, mass, wing loading) of 109 males and 41 females on six places along the river valley and population dynamic processes (abundance estimates in this places), the dispersal behavior can be described by individually different fitness



of specimens. In a reproductive population, large adults emerge first, originating from a two-year development cycle. Subsequently, smaller imagines emerge over a longer period of time, which originate from a one-year larval development. If the number of individuals is high, displacement occurs, with the smaller specimens with less wing loading leaving the habitat. In this way, new habitats are gradually being settled, with the specimens orienting themselves on terrain markings in the river valley. In addition to intraspecific displacement, further expansion strategies such as those based on habitat selection in metapopulations and those based on large-scale migration are briefly described. It has been proven for a few species that they have an extremely low potential for expansion. In the context of species protection, these species, as well as those species that are strongly bound to specific habitats, must be given special attention." (Author)] Address: Brockhaus, T., An der Morgensonne 5, 09387 Jahnsdorf/Erzgebirge, Germany. E-Mail: t.brockhaus@t-online.de

**20060.** Bruno, C.G.C.; Gonçalves, R.C.; dos Santos, A.; Facure, K.G.; Corbi, J.J.; Jacobucci, G.B. (2022): The relationship between sediment metal concentration and Odonata (Insecta) larvae assemblage structure in Cerrado streams. *Limnetica* 41(1): 27-41. (in English, with Portuguese summary) ["Metals can be incorporated into stream sediment affecting benthic invertebrate assemblages in different ways. Odonata larvae have variable tolerances to metals; sublethal levels accumulated in larval tissue can indirectly influence assemblage structure in environments with differences in types and concentrations of metals in the sediment. This research evaluated the relationship between Odonata larvae assemblages and sediment metal content in Cerrado streams. We evaluated genus composition, abundance, richness, Shannon-Wiener (H') diversity index and Pielou's evenness index (J') of the assemblages from 12 streams. Cluster analysis was used to identify groups of streams according to sediment concentrations of Cu (copper), Zn (zinc), Ni (nickel), Fe (iron) and Mn (manganese). Canonical Redundancy Analysis (RDA) and Canonical Correspondence Analysis (CCA) were performed to determine how metals influence Odonata assemblage metrics. Cluster analysis revealed three distinct groups of streams according to metal concentration in the sediment. RDA showed a negative relation between Pielou evenness (J') and the concentration of Ni, Cu, Zn and Mn, while abundance, genus richness and Shannon-Wiener diversity were positively related with Fe. CCA indicated that some taxa showed an opposite relation with metal concentration, but others were more abundant in streams subjected to high metal concentrations. Although the increase in iron concentration in streams can lead to an increase in the abundance of Odonata larvae, high concentrations of copper, zinc and manganese can lead to a reduction in taxon evenness." (Authors)] Address: Jacobucci, G.B., Instituto de Biologia, Universidade Federal de Uberlândia, Rua Ceara, 38400-902, Uberlândia, Minas Gerais, Brazil. E-mail: jacobucci@ufu.br

**20061.** Buczynski, P.; Walczyk, K.; Tanczuk, A.; Buczynska, E.; Bojar, P.; Góral, N. (2022): Structural and physical factors as predictors of the species distribution and diversity of dragonflies and damselflies (Odonata) in an upland storage reservoir. *Folia Biologica (Kraków)* 70(2): 67-78. (in English) ["The negative impact of storage reservoirs on the environment has been well documented, but it appears that under certain circumstances these reservoirs can also help to protect biodiversity. The distribution of adult dragonflies and damselflies was studied in relation to eight environmental

variables, in an upland storage reservoir and its feeder rivers located in South-East Poland (East-Central Europe). A total of 25 species were recorded, including 22 in the reservoir. Submerged and floating plants, width of the shallow littoral zone and the water movement/current were found to be the key drivers of the species distribution (pCCA, NMDS). Five species (*Ischnura elegans*, *Sympetrum sanguineum*, *Platycnemis pennipes*, *Calopteryx splendens* and *Erythromma viridulum*) were responsible for over 70% of the dissimilarities between the riverine and reservoir sites (SIMPER). In addition, *I. elegans*, *Orthetrum albistylum* and *Calopteryx virgo* were distinguished as the indicator species (IndVal analysis) for the upland river-reservoir hydrological system. Our results highlight some design features of reservoirs that may help to maintain the diversity of odonates, as well as many other groups of aquatic organisms, as the former are well-known indicators of general biodiversity." (Authors)] Address: Tanczuk, Agnieszka, Dept of Zoology and Nature Protection, Institute of Biological Sciences, Maria Curie-Skłodowska University, Akademicka 19, 20-033 Lublin, Poland. E-mail: atanczuk@gmail.com

**20062.** Casanueva, P.; Hernández, M.A.; Nunes, L.; Sánchez-Sastre, F.L.; Campos, F. (2022): Variation of larval size and adult emergence period of *Boyeria irene* (Fonscolombe, 1838) (Odonata: Aeshnidae) in the Francia River of western Spain. *Aquatic Insects* 43(1): 41-50. (in English) ["*B. irene* is a large dragonfly common in rivers and streams in southern Europe, but it is little known about the biometrical variations of their populations. In this paper, we test whether the time of the emergence period of this species differs in the same river, whether the larval size varies during the emergence period, and whether the distinct size variations are associated with the different river sections. Results have revealed that 1) female exuviae are larger than those of males, 2) except for the paraproct length, the exuviae have similar size across the entire river length, 3) size of the exuviae is larger in the first period of emergence than in the second one. A difference in emergence duration across the three river sections has been recorded." (Authors)] Address: Casanueva, Patricia, Depto de Ciencias Experimentales, Universidad Europea Miguel de Cervantes, 47012 Valladolid, Spain. Email: pcasanueva@uemc.es

**20063.** Cham, S. (2022): Observations of behaviour and activity patterns of *Somatochlora metallica* (Vander Linden) (Brilliant Emerald) at sites in England. *Journal of the British Dragonfly Society* 38(1): 27-46. (in English) ["Observations of *Somatochlora metallica* (Vander Linden) (Brilliant Emerald) at sites in England show behaviour and activity patterns that differ from those described in UK field guides and other publications. During periods of favourable weather, males start patrolling territories earlier in the day than previously reported. Digital photography provides a means to identify the species in flight and differentiate between different individual males. The durations of patrolling and hovering flight and the causes of changes in male territorial behaviour are discussed." (Author)] Address: Cham, S., 2 Hillside Road, Lower Standon, Bedfordshire, SG16 6LQ, UK. Email: stevecham1@aol.com

**20064.** Chandra, K.; Gupta, D. (2022): Biodiversity issues and challenges: Non-agricultural insects. Shalinder Kaur, D.R. Batish, H.P. Singh, Ravinder Kohli (Eds.): *Biodiversity in India: Status, Issues and Challenges*. Springer: 285-324. (in English) ["With more than one million named species, insects are the most diverse terrestrial creatures on the planet, representing around 75% of the global fauna. They

contribute to invaluable ecosystem functions such as nutrient cycling, pollination, and seed dispersals and serve as a significant food source, aid in biocontrol of other organisms (such as predators, parasites), and maintain soil structure and fertility. Meantime, they are profoundly beneficial as pollinators. They often compete with humans, as pests of agriculture and stored products and as vectors of life-threatening diseases. Owing to four of the globally recognised biodiversity hotspots—Himalaya, Indo Burma, Western Ghats and Sri Lanka, and Sundaland—India is represented by 67,111 insect species in four classes of subphylum Hexapoda: Collembola (345 species), Protura (20 species), Diplura (18 species), and Insecta (66,728 species), 64.8% of the overall faunal diversity of the country. Eight insect orders — Coleoptera, Lepidoptera, Hymenoptera, Diptera, Hemiptera, Orthoptera, Thysanoptera, and Odonata — form the majority (94%) of the insects in the country. This chapter further updates India's known insect diversity, emphasising its diversity in ecosystems (such as aquatic, mangroves, soil, and forests) and biogeographic zones (Himalaya, Trans-Himalaya, Desert, and Islands). Additionally, information has been provided on the potential of insects in food security, pollination, forest pests, and their significance to medical and veterinary in context with Indian fauna. The chapter also includes a list of 27 insect species identified as invasive aliens in India and reports 22 species as threatened in the IUCN Red List from India." (Authors)] Address: Chandra, K., Zoological Survey of India, Kolkata, West Bengal, India

**20065.** Chandran, A.V. (2022): Observations of dragonflies and damselflies from an urban backyard in central Kerala. *Zoo's Print* 37(2): 9-15. (in English) ["A total of 131 individual odonates belonging to 22 species and three families were recorded from 78 observations. Odonate sightings showed a peak in the month of October. No odonate could be observed in the months of July, January, and February. While *Pantala flavescens* and *Rhyothemis variegata* were the most abundant species and could be observed in five months, 10 of the 22 species reported were seen only once during the study. Out of the 80 individuals that could be sexed, 50 were males and 30 females. Among the males, eight individuals could be identified as immature from their pigmentation. This included three individuals of *Orthetrum chrysis* and one individual each of *Diplacodes trivialis*, *Aethriamanta brevipennis*, *Pseudagrion malabaricum*, *Urothemis signata*, and *Brachydiplax sobrina*. *Bradinopyga geminata* was the only species that displayed sexual behaviour at the study site, a pair of which was seen mating and egg laying in one of the synthetic tanks during the month of April. Three exuviae and five nymphs were seen in the tank. The study recorded 12% of the total odonate species recorded from Kerala till date (Society for Odonate Studies 2020). It can be assumed that except for *Bradinopyga geminata* which was observed to complete its life cycle at the site, most other odonates visited the site in their pre-reproductive adult stage when their primary activity is foraging. Observations of males with incomplete adult pigmentation and absence of post-reproductive adults (old individuals with pruinescence/ broken wings) support to this assumption. Maximum number of individuals was detected in October. This is mostly due to the influx of large numbers of the migratory dragonfly, *Pantala flavescens* in this month. Number of species recorded was also maximum (10) in October, consistent with earlier studies that show detection of maximum number of odonate species in the post monsoon period (Kulkarni & Subramanian 2013). Since the behaviour of adult males and females differs greatly, it can be nearly impossible to obtain precise measures of sex ratio during the

adult stage. The excess number of males detected (62.5% of the sexed individuals) in this study could be because of variability in dispersal of the sexes or their differential detectability, most female odonates being cryptic and males more colourful. Although urban sites host an abundance of generalist species of odonates, there are some specialist species that can also find refuge in urban habitats. *Pseudagrion malabaricum* is a species known to breed in small lakes in submontane and montane areas (Fraser 1933). Sighting of such species deserves special mention as it highlights the importance of the freshwater-woodland matrices in urban areas in the conservation of odonates." (Author)] Address: Chandran, A.V., Dept Geol. & Environmental Science, Christ College (Autonomous), Irinjalakuda, Thrissur, Kerala, India. Email: avivekchandran2@gmail.com

**20066.** Cheng, S.; Lin, H.; Li, M.; Li Y. (2022): Study on the relationship between environmental changes and breeding sites of *Larus relictus* in Hongjiannao Lake. *Quaternary Sciences* 42(4): 1201-1212. (in Chinese, with English summary) ["Hongjiannao Lake(38°59'59"~39°10'01"N, 109°45'16"~109°59'58"E) is located at the main route of migrant birds in China and is the main spot for resting and reproduction of many types of rare waterfowl, such as *Larus relictus*, at the junction of Shenmu City, Shaanxi Province and Ordos City, Inner Mongolia Autonomous Region. In this study, in order to further improve the protection of *Larus relictus*, using the Modified Normalized Differential Water Index (MN-DWI), 20 Landsat remote sensing images during the breeding period between 1987 and 2006 were used to extract Hongjiannao Lake island area and water area. Secondly, in 2015, 2016, and 2020, we came to Shenmu City, Shaanxi Province Nature Reserve for field research and data collection, and we sampled the water quality and benthic animals in the lake center and lakeside, which the water quality monitoring indicators is including pH, total nitrogen, total phosphorus, permanganate index, total alkalinity, salinity, etc. This research analyzes the changes of the ecological environment of Hongjiannao Lake, breeding conditions, and the change of *Larus relictus* breeding sites in the past 30 years, and explores why *Larus relictus* choose Hongjiannao Lake as a breeding site since 2001. The results show that: (1) Since the 1980s, with the shrinkage of water surface area, the pH, salinity, total nitrogen and total phosphorus of Hongjiannao Lake have increased, continuously salinized and eutrophicated. The fish in the lake disappeared after 2003 and improved slightly with the increase of water surface area after 2016; (2) Since 2001, *Larus relictus* has taken Hongjiannao Lake as a new breeding ground, which is closely related to the sharp decline and gradual disappearance of fish production in Hongjiannao Lake, which has liberated the *Larus relictus* food such as *Ischnura heterosticta* larvae and *Chironomidae* larvae from the grazing pressure; (3) Hongjiannao Lake is located in the distribution area of *Larus relictus* in Ordos. The parent birds of *Larus relictus* first moved out and scattered in the distribution area of *Larus relictus* in late July, which is qualified for the discovery of Hongjiannao Lake; (4) Since 2001, Hongjiannao Lake has had the conditions for the reproduction and survival of *Larus relictus*, which can provide suitable lake-center island and main food source for the whole breeding season, so it has been selected as a breeding site. These studies can better explain the reasons why *Larus relictus* inhabits in desert saline-alkaline lakes, which can provide technical support for its habitat management, and are of great significance to further protect *Larus relictus*." (Authors)] Address: Cheng, S., School of Earth Science and Resources, Chang'an University, Xi'an 710054, Shaanxi, China

**20067.** Chovanec, A. (2022): Populationsdynamische Prozesse bei der Großen Heidelibelle *Sympetrum striolatum* (CHARPENTIER, 1840) an einem kleinen, schnell zuwachsenden Feuchtgebiet in Niederösterreich (Odonata: Libellulidae). Naturkundliche Mitteilungen aus den Landessammlungen Niederösterreich 32: 21–40. (in German, with English summary) ["Population dynamics in *S. striolatum* at a small, quickly becoming overgrown wetland in Lower Austria): A small permanent wetland, unintentionally created in 2014, was subject of a study on the succession of the Odonata fauna carried out from 2016 to 2021. In 2016, with approximately 150 individuals, *S. striolatum* was the most abundant anisopteran species within the odonate community. Teneral and/or exuviae of this species were detected from 2016 to 2020. The rapid development of dense helophyte stands led to the complete loss of open water areas and to a decline of the numbers of individuals of the Common Darter (maximum yearly numbers: 2017 – 25; 2018 – 25; 2019 – 20; 2020 – 13; 2021 – 6). Although occurring in significantly lower numbers of individuals, also in 2017–2020, *Sympetrum striolatum* was the most abundant anisopteran species. In the years 2020 and 2021, *S. striolatum* was present at the wetland during a shorter time compared to the years before and to the species-specific flight period: 2016 – 24 weeks; 2017 – 19.5 weeks.; 2018 – 19 weeks; 2019 – 17.5 weeks, 2020 – 10 weeks; 2021 – 4 weeks. In 2019 and 2020, a decline in the frequency of egg deposition behaviour following preceding copulation was obvious. In 2021, only pairing behaviour, but no egg deposition behaviour was observed. Key stimuli inducing and factors limiting egg deposition behaviour in *S. striolatum* are discussed." (Author)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bmlrt.gv.at

**20068.** Crabot, J.; Mauchamp, A.; Bergerot, B.; Bonis, A.; Gore, O.; Rossignol, N.; Paillisson, J.-M. (2022): How hydrology and landscape shape Odonata assemblages in marshlands crossed by ditches. *Freshwater Biology* 67(7): 1228–1241. (in English) ["1. One of the major current ecological challenges is to understand how to reconcile human activities with biodiversity conservation concerns. This issue is particularly relevant in freshwater ecosystems where biodiversity is globally under severe threat. Artificial waterbodies, such as ditch networks, are part of the few remaining wetlands in agricultural landscapes and hence play a crucial role in maintaining aquatic biodiversity in these landscapes. 2. We investigated the responses of adult Odonata assemblages at different spatial scales in a marshland crossed by ditches to two factors expected to be pivotal influences on assemblages. At the local scale, this was mainly the water regime in ditches and, at a broader scale, the composition of the landscape. Both taxonomic alpha and beta diversity, and functional trait composition were considered as response variables. 3. Significant differences were found between the responses of the two Odonata suborders. We showed that Zygoptera species richness decreased and species turnover increased with the duration of drying episodes in ditches. Geographical distances between local assemblages as well as landscape characteristics, notably woodland cover, meadow cover and ditch network length, also significantly shaped the distribution of Zygoptera. For Anisoptera, species richness was not explained by environmental variables and beta diversity was associated only with local conditions; it increased with increasing dissimilarity in water quality and riparian vegetation. We also found evidence of functional trait syndromes (combinations of correlated traits) in Odonata assemblages, but without clear relationships to environmental gradients. 4. This study reveals

the structuring role of water regime for Odonata in ditch networks and demonstrates the need to jointly consider environmental variables at different spatial scales to properly understand the distribution of Odonata. 5. Our findings have important conservation implications as the water regime is heavily managed in such ecosystems. Even though the relationship between functional composition and environmental gradients was found to be of limited extent in this study, we discuss how it might provide new insights for Odonata assemblage structure and be useful, locally, for stakeholders and managers. Lastly, we call for further multiscale investigations considering both the taxonomic and functional responses of Odonata assemblages (functional analyses with multiple traits and several species being scarce in this taxonomic group) in other anthropogenic freshwater ecosystems to gather more lessons for their conservation." (Authors)] Address: Crabot, Julie, Univ. Clermont Auvergne, CNRS, UMR GEOLAB, 63000 Clermont-Ferrand, France. Email: julie.crabot@gmx.fr

**20069.** Craves, J.A.; Cognato, A.I.; O'Brien, D.; Mahoney, M.J. (2022): A new locality and unexpected haplotypes of the federally-endangered Hine's Emerald dragonfly, *Somatochlora hineana* (Odonata: Corduliidae). *Bulletin of American Odonatology* 13(2): 7–17. (in English, with Spanish summary) ["In June 2021, two female *S. hineana* (Hines Emerald) were collected in Oceana County, Michigan, a location >100 km from the nearest known populations. This is a region apparently lacking sizable areas of characteristic *S. hineana* habitat: fens or similar calcareous wetlands with shallow soils over dolomite or limestone bedrock. Phylogenetic analyses of mitochondrial haplotypes confirmed species identity and revealed that each individual represented a different haplotype. Neither haplotype had been previously represented in Michigan, northern Wisconsin, or Ontario populations, and one was new. Our finding of these two haplotypes suggests a *S. hineana* population occurs in west-central Michigan which may genetically link southern and northern Great Lakes populations. Continued surveys for *S. hineana* are needed to confirm the presence of an established population in this region. If discovered, it will provide valuable data that will further our understanding of the genetic diversity and population dynamics of this species." (Authors)] Address: Craves, Julie, 2200 Centennial Ln., Ann Arbor, MI, 48103 USA. Email: jcraves@umich.edu

**20070.** da Silva-Méndez, G.; Riso, S.; Lorenzo-Carballa, M.O.; Cordero-Rivera, A. (2022): Sampling larvae, exuviae or adults of Odonata for ecological studies: a test of methods in permanent rivers in the Iberian Peninsula. *Odonatologica* 51(1-2): 63–81. (in English) ["To assess the suitability of a habitat for breeding by odonates, the best strategy is to search for exuviae or final instar larvae. However, due to their low detectability and the difficulty of sampling these stages, most studies in applied ecological research have targeted adult odonates, even though adults may be found in places unsuitable for successful breeding. Here, we tested odonate sampling methods in permanent rivers in the north-western Iberian Peninsula, focusing on three main objectives: (i) to study the degree of concordance of species lists obtained from sampling larvae, exuviae and adults; (ii) to estimate how long exuviae are available for sampling and how this time affects the results; and (iii) to analyse potential observer biases, due to the different ability of researchers to detect exuviae. We found that the time exuviae remain in place varies with taxon but is generally short (7–8 days), which could lead to under-detection. We also found that adult odonates may be found in parts of the river that have

no suitable habitat for their larvae. Furthermore, we were able to find more species as exuviae than by sampling adults or larvae and some taxa, such as gomphids, were difficult to find as adults but exuviae were very commonly observed. We did not find significant differences between observers in their ability to detect and identify exuviae. Altogether, our results suggest that in some systems, recording only adults could lead to inaccurate survey results, making it essential to include exuviae to avoid sampling bias." (Authors) Supplement: [https://www.odonatologica.com/wp-content/uploads/2022/06/10.5281\\_odon.v51i1-2.s1-Silva-Mendez\\_et\\_al.pdf](https://www.odonatologica.com/wp-content/uploads/2022/06/10.5281_odon.v51i1-2.s1-Silva-Mendez_et_al.pdf) Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: [acordero@uvigo.es](mailto:acordero@uvigo.es)

**20071.** Dalvi, A.; Koli, Y. (2022): New records of odonates (Insecta: Odonata), *Archibasis oscillans* Selys, 1877 and *Merogomphus tamaracherriensis* Fraser, 1931 from Maharashtra, India. *Journal of Threatened Taxa* 14(2): 20648-20653. (in English) ["*Archibasis oscillans* Selys, 1877 is reported for the first time from Maharashtra, India; and first record of *Merogomphus tamaracherriensis* Fraser, 1931, based on photographic evidence taken from Sindhudurg, Maharashtra. We report the range extension of both the species in the northern Western Ghats." (Authors)] Address: Dalvi, A., Dept of Zoology, Sant Rawool Maharaj College Kudal, Sindhudurg, Maharashtra 416520, India. Email: [adalvi25@gmail.com](mailto:adalvi25@gmail.com)

**20072.** Das, S.M.; Gogoi, T.; Phukon, M. (2022): A checklist of Odonata (Insecta) of Dibrugarh district of Assam, India. *Journal of Entomology and Zoology Studies* 10(4): 155-164. (in English) ["Dibrugarh district of Assam is situated to proximity to the junction of Eastern Himalayas and Indo-Burma Biodiversity Hotspots. Climatic conditions of the district support a very rich biodiversity, where Odonata are an important component. The present study was carried out in Dibrugarh district to document the status and distribution of odonates from April, 2019 to May, 2022. A total number of 81 species of odonates representing 54 genera and 11 families have been recorded in this study. Conservation status of the recorded species indicates that 69 species were under the category of Least Concern (LC), 7 species were Data Deficient (DD) and 1 species was Not Evaluated (NE). However, habitat destruction due to lack of awareness among the local people is the potential threat to the conservation of odonates in the district." (Authors)] Address: Das, S.M., Dept of Biology, Guru Teg Bahadur Academy, Tinsukia, Assam, India

**20073.** Datto-Liberato, F.H.; Guillermo-Ferreira, R. (2022): A new species of Gomphoides Selys, 1854 (Odonata: Gomphidae) from the Environmental Protection Area of the Uberaba River, Brazil. *Zootaxa* 5165(2): 287 -293. (in English) ["A new species of the Neotropical dragonfly genus Gomphoides Selys, 1854 (Odonata: Gomphidae) is erected from the Cerrado of central Brazil, distinguished by epiproct morphology, body coloration and wing venation. *Gomphoides davi* Datto-Liberato & Guillermo-Ferreira sp. nov. resembles *G. perdita* (Förster, 1914), but is distinguished from it by the S10 black, while it is yellow in *G. perdita*; four cells in the subtriangle of Fw while there are three cells in *G. perdita* and epiproct shorter than half of the length of cerci while epiproct is more than half the length of the cerci in *G. perdita*. We also provide additional information for other Gomphoides species. The discovery of a new species in the Environmental Protection Area of the Uberaba River, Minas

Gerais, raises concern for the conservation of the biodiversity of the area, mainly because of recent threats due to cattle herding and agriculture." (Authors)] Address: Datto-Liberato, F.H., Graduate Program in Entomology, Dept Biol., Univ. São Paulo (USP), Ribeirão Preto, Brazil. Lestes Lab., Federal Univ. of Triângulo Mineiro, Uberaba, MG, Brazil

**20074.** Datto-Liberato, F.; Cezário, R.; Guillermo-Ferreira, R. (2022): Final instar larva of *Neocordulia volxemi* (Selys, 1874) (Odonata, Libelluloidea) from southeastern Brazil. *Animal Biodiversity and Conservation* 45.2: 281-285. (in English, with Spanish summary) ["Only seven larvae of this genus have been described. Here we describe the final instar larva of *N. volxemi*, collected in the Environmental Protection Area of the Uberaba River Basin in the State of Minas Gerais, Brazil. The metallic-green adults were found flying in a forested area in a Conservation Unit, while the larvae were found in a waterfall and surrounding rocky walls. The Cerrado remnant area is currently threatened by degraded pastures and increasing areas of monoculture agriculture." (Authors)] Address: Guillermo-Ferreira, R., Graduate Program in Entomology, Dept of Biology, University of São Paulo-USP, Ribeirão Preto, Brazil Email: [rhainer.ferreira@uftm.edu.br](mailto:rhainer.ferreira@uftm.edu.br)

**20075.** De Knijf, G.; Lambrechts, J.; Maes, D. (2022): A new Red List of the dragonflies and damselflies in Flanders. A dramatic decline of Odonata species of bogs and heathland ponds. *Natuurfocus* 21(2): 52-61. (in Dutch, with English summary) ["The IUCN Red List criteria are intended to be an easily and widely understood system for classifying species the extinction risk of species in a given region. Because many new data of Odonata in Flanders have become available and the status of several species has changed since the previous Red List from 2006, we assessed the current state of dragonflies according to the IUCN Red List criteria. Of the 59 evaluated species, 15 species are Threatened and 1 is Near Threatened in Flanders, 5 species are Regionally Extinct and 43 species are of Least Concern. Overall dragonflies and damselflies in Flanders are doing better than in previous decades. This is mainly due to species of nutrient-rich waterbodies that are doing markedly better as a result of habitat restoration, creation of new ponds (e.g. garden ponds) and waters in an urban or industrial context, and to southerly species that benefit from climate warming. However, species from nutrient-poor waterbodies (fens, peatbogs and other oligotrophic waters) continue to perform poorly and deserve special attention in nature policy and nature management. Populations of several species decreased dramatically in the last five years. They are negatively affected by very high nitrogen depositions, the presence of invasive fish species, increased warm weather and extreme drought events leading to (partial) desiccation of these kinds of waters, and in many cases from too intensive management of their terrestrial habitat, resulting in the cutting of shrubs and trees near their reproductive biotopes. The drawing up of one or more Species Action Plans is therefore more than urgently needed to prevent the extinction of these species in Flanders." (Authors)] Address: Knijf, G. de, Research Institute for Nature and Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. E-mail: [geert.deknijf@inbo.be](mailto:geert.deknijf@inbo.be)

**20076.** De Lisle, S.P.; Mäenpää, M.I.; Svensson, E.I. (2022): Phenotypic plasticity is aligned with phenological adaptation on both micro-and macroevolutionary timescales. *Ecology*



Letters 25(4): 790-801. (in English) ["In seasonally variable environments, phenotypic plasticity in phenology may be critical for adaptation to fluctuating environmental conditions. Using an 18-generation longitudinal dataset from natural damselfly populations, we show that phenology has strongly advanced. Individual fitness data suggest this is likely an adaptive response towards a temperature-dependent optimum. A laboratory experiment revealed that developmental plasticity qualitatively matches the temperature dependence of selection, partially explaining observed advance in phenology. Expanding our analysis to the macroevolutionary level, we use a database of over 1-million occurrence records and spatiotemporally matched temperature data from 49 Swedish Odonate species to infer macroevolutionary dynamics of phenology. Phenological plasticity was more closely aligned with adaptation for species that have recently colonised northern latitudes, but with higher phenological mismatch at lower latitudes. Our results show that phenological plasticity plays a key role in microevolutionary dynamics within a single species, and such plasticity may have facilitated post-Pleistocene range expansion in this insect clade." (Authors)] Address: De Lisle, S.P., Evolutionary Ecology Unit, Dept of Biology, Lund University, Lund, Sweden. Email: [stephen.de\\_lisle@biol.lu.se](mailto:stephen.de_lisle@biol.lu.se)

**20077.** de Souza, M.M.; de Gouvêa, T.P.; de Deus, G.L.; de Ávila Júnior, W.F. (2022): Depredación de *Allopodagrion contortum* (Hagen en Selys, 1862) por *Heliiocharis amazona* Selys 1853 (Odonata) en un ambiente de Cerrado, Minas Gerais, Brasil. Hetaerina. Boletín de la Sociedad de Odonatología Latinoamericana 4(2): 12-15. (in Spanish, with Portuguese summary) ["Dragonflies are predatory insects in both juvenile and adult stages of their life cycle. However, records of predation among adults of different species are hampered by their flight mobility, which makes such records relevant. The aim of this paper is to report the predation behaviour of *Heliiocharis amazona* Selys, 1853 on the adult stage of the species *A. contortum* in a Cerrado area in the State of Minas Gerais, being the first record for these species, presenting similarity with a previously reported pattern." (Authors)] Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: de Souza, M.M., Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas Gerais, Campus Inconfidentes, Inconfidentes, Brasil

**20078.** Deitsch, J.; O'Grady, P. (2022): A catalog of Odonata material in the Cornell University Insect Collection. Technical report. Datum: 2022-09-27: 265 pp. (in English) ["Museum collections are important to document historical and present-day species distributions and abundance. Tracking insect declines and assessing ecosystem health using insect biomonitoring requires accurate species identifications, up-to-date species catalogs, and digitization and georeferencing of label data. We present a comprehensive, updated catalog of Odonata species present in the Cornell University Insect Collection. We also provide digitized and georeferenced records for seven widespread odonate species to demonstrate the value of historical museum collections." (Authors) [https://ecommons.cornell.edu/bitstream/handle/1813/111854/Deitsch%26OGrady\\_CeCom.pdf?sequence=4&isAllowed=y](https://ecommons.cornell.edu/bitstream/handle/1813/111854/Deitsch%26OGrady_CeCom.pdf?sequence=4&isAllowed=y)] Address: not stated

**20079.** del Palacio, A.; Lozano, F.; Ramos, L.S.; Navarro, M.; Muzón, J. (2022): Odonata from Iberá wetland system (Corrientes, Argentina) are regional biogeographic schemes useful to assess Odonata biodiversity and its conservation? *Diversity* 2022, 14(10), 842; <https://doi.org/10.3390/d141-00842>: 15 pp. (in English) ["Regionalization schemes reflect

different macroscale distribution patterns and show large areas characterized by a common natural history, resulting in similar associations of biotic and abiotic features. Freshwater biota and terrestrial biota do not respond in the same way to environmental variables. The Iberá Depression, one of the largest wetlands in South America, is recognized in many schemes either as a functional unit or as an area with an ecotonal character. We used the distributional data of 128 species of Odonata, from a total of 103 collection sites from Corrientes and Misiones provinces, to test if Iberá functions as an ecological and functional unit, based on the Odonata distribution patterns. In addition, we tested if their distribution patterns fit into the most widespread regionalization schemes (hydrological basins, biogeographical provinces and ecoregions) used in Argentina. The Iberá Depression was not recovered as a functional unit; its sub-basins are more related to external basins than to each other. Neither the ecoregion nor the biogeographical schemes are suitable to explain the distribution patterns of the Odonata. The Odonata seem to respond to the availability of particular wetlands (e.g., ponds, streams, rivers, swamps, etc.), or to specific physical characteristics, such as the type of sediment, the availability of oxygen, etc., instead of to biogeographical or ecoregional schemes." (Authors)] Address: Muzón, J., Laboratorio de Biodiversidad y Genética Ambiental—BioGeA, Universidad Nacional de Avellaneda, Avellaneda B1870, Argentina. Email: [jmuzon@undav.edu.ar](mailto:jmuzon@undav.edu.ar)

**20080.** Deliry, C. (2022): Odonates en France. *Histoires Naturelles* 65: 388 pp. (in French) [<https://deliry.net/pdf/HN-65.pdf>] Address: Deliry, C.; Email [cyrille.deliry@orange.fr](mailto:cyrille.deliry@orange.fr)

**20081.** Dey, A.; Dey, D. (2022): Odonata richness in RAMSAR site, Deepor Beel, Assam, India. *Bione* 20: 17 pp. (in English) ["The study was conducted in the Deepor beel wetland for 18 months from January 2015 to mid June 2016. The Deepor beel is a RAMSAR site located (longitude 91° 38' 35" E and latitude 26° 07' 30" N) in the Kamrup district of Assam and is owned by the State Fisheries Dept. Odonates are boon for the environment. They act as a biological indicator of a healthy aquatic ecosystem and also act as a bio-control agent, as adult odonates prey on flies and mosquitoes which are parasites and pests of men and animals. During the present study, eight Anisopteran (Family: Libellulidae) and three Zygopteran (Family: Coenagrionidae) species could be found in and around the Deepor beel wetland site. Shrub land found to be the most favourable habitat for the odonates. The present findings showed that the study area is biologically active to contain divergent species of odonate fauna. However, a detailed environmental study is necessary so that the habitat of the odonates could be protected and conserved in situ against the increasing level of pollution, as less number of divergent species were recorded in the present study compared to previous surveys." (Authors) Anisoptera: *Trithemis pallidinervis*, *Orthetrum sabina*, *Diplacodes trivialis*, *Brachydiplax chalybea*, *Brachythemis contaminata*, *Rhodothemis rufa*, *Neurothemis fulvia*, *Brachydiplax sobrina*. Zygoptera: *Agriocnemis lacteola*, *Cerriagrion cerinorubellum*, *Onychargia atrocyana*] Address: Dey, A., Dept of Microbiology, Assam University, Silchar - 788011 Assam, India. Email: [dey\\_ankita@outlook.com](mailto:dey_ankita@outlook.com)

**20082.** Dijkstra, K.-D.; Cohen, C. (2022): Dragonflies and damselflies of Madagascar and the western Indian Ocean islands. Association Vahatra in Antananarivo: 194 pp. (in Bilingual in French and English) ["A highly illustrated guide to the spectacular dragonflies and damselflies of the Malagasy Region. This is the first book on the spectacular dragonflies

and damselflies of the Malagasy Region, covering over 190 species known from Madagascar, as well as thirty-six additional species found in the archipelagos of the Comoros, Mascarenes, and Seychelles. About 180 species, four of every five present, live nowhere else on Earth. Over 205 photographs illustrate 138 species, many in print for the first time." (Publisher) Contents: Table of contents; Acknowledgements; Part 1. An overview of the regional Odonata fauna; Introduction; Diversity and endemism; History; Conservation; Finding Odonata; Collecting adults; Collecting larvae and their skins; Identification; Glossary of terms; Part 2. The Odonata of the Malagasy Region; Introduction; Damselflies - Zygoptera; True dragonflies – Anisoptera; References; Index.] Address: Orders: Natur in Buch und Kunst, Verlag und Versand, Dieter Prestel, Beiert 11a, 53809 Ruppichteroth, Germany. Email: Prestel-Dieter@web.de

**20083.** Dijkstra, K.-D.B.; Tate, R.B.; Papazian, M. (2022): Chapter 14 Dragonflies and Damselflies (Odonata) of Príncipe, São Tomé, and Annobón. In: L.M. Pires Ceriaco et al. (eds.), Biodiversity of the Gulf of Guinea Oceanic Islands, [https://doi.org/10.1007/978-3-031-06153-0\\_14](https://doi.org/10.1007/978-3-031-06153-0_14). 371-381. (in English) ["The Odonata fauna of the oceanic islands of the Gulf of Guinea is impoverished, even compared to other Afrotropical archipelagoes, with a combined total of 22 species recorded with certainty on São Tomé, Príncipe, and Annobón. *Trithemis nigra* Longfield, 1936 from Príncipe is the only known endemic, although two reported but unidentified species may still prove to be endemic too. Most recorded species occur widely across and beyond Africa, and 27 equally widespread species are listed as potential additions. Several hypotheses for the fauna's impoverishment are briefly discussed." (Authors)] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: kd.dijkstra@naturalis.nl

**20084.** Dinning, J.; Stockan, J.A.; Fielding, D.A.; Young, M.R. (2022): Habitat suitability for *Coenagrion hastulatum* (Charpentier) (Northern Damselfly) in North-east Scotland. *J. Br. Dragonfly Society* 38(1): 47-64. (in English) ["*C. hastulatum* is a widespread and abundant species in northern Eurasia but in Great Britain it is classed as Endangered with a distribution restricted to north-east Scotland. Even within north-east Scotland, populations remain small and scattered. There has been no long-term monitoring for *C. hastulatum* but there are concerns that it may have been lost from some historic locations. Similarly, there have been no quantitative studies into the habitat preferences of *C. hastulatum* in Great Britain. An extensive survey was made of ponds in Aberdeenshire in 2016 and the presence or absence of *C. hastulatum* was analysed in relation to a wide range of habitat variables. The results showed that *C. hastulatum* was associated with eight habitat variables: positively correlated with water and silt depth, *Juncus acutiflorus*, *Carex rostrata* and Sphagnum, and negatively correlated with *J. bulbosus* and floating and emergent vegetation cover. These results provide a preliminary indication of *C. hastulatum*'s preferences in north-east Scotland which will aid further investigations, including the current British Dragonfly Society project on *C. hastulatum* (British Dragonfly Society, 2019)." (Authors)] Address: Dinning, Juliette, 143 Gairn Terrace, Aberdeen AB10 6AY, 2 Ecological Sciences, James Hutton Institute, Craigiebuckler, Aberdeen AB15 8QH, 3 Meiklepark, Oldmeldrum, Aberdeenshire AB51 0DL

**20085.** Devi, M.; Walia, G.K. (2022): DNA barcoding based on mitochondrial COI gene on some species of family

Platycnemididae (Odonata: Zygoptera) from India. *International Journal of Multidisciplinary and Current Research* 10: 19-28. (in English) ["Taxonomically, family Platycnemididae comprises 455 species referable to 43 genera all over the world, while 52 species of 14 genera are present in India. COI gene analysis of 11 species under 6 genera of family Platycnemididae from the states of Himachal Pradesh, Jammu and Kashmir, Kerala, Maharashtra and Meghalaya (India) has been done. The overall data has been used to calculate the sequence divergence at different taxonomic levels in the family Platycnemididae, which shows the hierarchical increase in the K2P values. In the present study, maximum intraspecific distance has been observed as 1.7% in *C. marginipes*, while the only exception is *Coeliccia didyma*, which shows intraspecific distance of 5.2%. Minimum interspecific distance has been observed as 3.4% in *Coeliccia cyaneothorax* and *Coeliccia nemoricola*, while maximum average interspecific distance has been recorded as 18.6±0% in *Calicnemia chaseni* and *Calicnemia eximia*, the only exception with very less distance (0.4±0.1%) in *Coeliccia chromothorax* and *Coeliccia renifera*. Intergeneric divergence has been calculated for all the 6 genera based on K2P distances. The most distant genera have been found to be *Calicnemia* and *Disparoneura* with average K2P distance of 24.2±1.2%, while *Calicnemia* and *Coeliccia* are the closest genera with K2P distance of 17.5±3.5%." (Authors) *Calicnemia eximia*, *Coeliccia chromothorax*, *C. didyma*, *C. fraseri*, *C. renifera*, *Copera marginipes*, *C. vittata*, *Disparoneura quadrimaculata*, *Esmé cyaneovittata*, *E. longistyla*, *Prodasineura verticalis*} Address: Devi, Monika, Assistant Professor, Trinity College Jalandhar, Punjab-144009, India

**20086.** Dissanayaka, H.M.S. (2022): Geo-spatial Analysis about Habitat Preferences of Odonata within the Diyasaru Wetland Park, Sri Jayawardenepura Kotte, Sri Lanka. *Proceedings of the 26th International Forestry and Environment Symposium / Biodiversity Conservation and Management 26: 33-* (in English) [Verbatim: "The Odonata (dragonflies and damselflies) have both aquatic and terrestrial life cycle and are considered good bio indicators. Diyasaru Wetland Park was selected as the study site is located in Sri Jayawardenepura Kotte and the main objective of this study was to identify the distribution of Odonata habitats in the Diyasaru Wetland Park. It was determined to identify the best suitable parts of urbanized area to increase their habitats using the developed distribution map. Line transect surveys were used to encounter species within the sampling areas. All Odonata species observed directly were recorded. The data collection was carried out from 0600 h to 1200 h, 1500 h to 1800 h. Field work was conducted from 11th February 2020 to 20th January 2021. Endeavor ED binoculars (10.5×45), DSLR cameras (Canon EOS 155D/EFS 18-55 mm F/3.5-5.6), Garmin GPS etrex 10 machine were used for closure observations, spotting locations and obtaining photographs. Odonata habitats have been identified, analyzed to identify their distributions within the park premises from using Geographic Information system (ArcGIS 10.8), and Odonata checklist was developed. Hotspot analysis was used to determine the clustering of Odonata, Kernel Density was calculated to identify the density of Odonata's distribution, and Inverse Distance Weighted (IDW) was used to measure values surrounding the prediction locations maps within the park. According to the developed maps, high level distribution or favorable areas were near the bank sides and channels, but some individual species distributed in another areas within the premises as they prefer the most suitable habitat for their living activities. A total

of 33 Odonata species were recorded belong in to five (5) families. This number includes one (1) endemic species, two (2) endemic sub species, also one migratory species. The threatened are Endangered (EN) one (1) species, Vulnerable (VU) two (2) species and Near Threatened (NT) nine (9) species were observed in the area. The wandering glider (*Pantala flavescens*) which has both migratory and resident population has been recorded throughout the year. Indicating the presents of resident population. The findings of this study could be used as preliminary information for further developments and maintenance of the Diyasaru wetland park by Sri Lanka Land Development Corporation." (Author)] Address: Dissanayaka H.M.S., Dept of Geography, Univ. of Sri Jayewardenepura, Nugegoda, Sri Lanka

**20087.** Doucet, G.; Jacquot, P.; Gayet, P. (2022): *Lestes barbarus* en Bourgogne-Franche-Comté: dynamique spatio-temporelle de l'espèce entre 2001 et 2020 et premières mentions d'émergence. *Martinia* 36(3): 22-33. (in French, with English summary) ["*L. barbarus* in Bourgogne-Franche-Comté: spatio-temporal dynamics of the species between 2001 and 2020 and first records of emergence. Observations of *L. barbarus* are more and more numerous in Bourgogne-Franche-Comté with, on some stations, data recorded for several consecutive years which suggests that the species has settled down in the region. The observation of emergences and the collection of exuviae in two Depts (Saône-et-Loire and Côte-d'Or) reinforce the impression of a perennial installation of the species in this area." (Authors)] Address: Gayet, P., 3 route de Perrigny, 71620 Guerfand, France. Email: gayet-philippe@orange.fr

**20088.** Duffus, N.E.; Morimoto, J. (2022): Current conservation policies in the UK and Ireland overlook endangered insects and are taxonomically biased towards Lepidoptera. *Biological Conservation* 266: 11 pp. (in English) ["Highlights: • UK policies show biases toward Lepidoptera over other large insect orders. Policy protection of mammals shows greater uniformity between orders than insects. Policies in Ireland lack protection for any insect species. UK priority lists do not prioritise all insects assessed as at risk of extinction. Abstract: Insects provide key ecosystem services for our sustainable future, which rely upon effective conservation policies to protect insect biodiversity. To date, however, we still do not know how effective current conservation policies are for protecting insect biodiversity, opening up the possibility that policies are unfit-for-purpose. Given the considerable debate and public awareness on the potential global decline of insect species, it is important to understand whether or not current policies can protect insect biodiversity. Here, we used IUCN listing of species status and developed a quantitative framework to analyse the potential effectiveness and coverage of current conservation policies pertaining to insect biodiversity in the UK and Ireland. We contrasted this against coverage for a well-known group – mammals – as a benchmark, to find that while the vast majority of the UK mammalian species in the European IUCN red list are directly protected by current policies, insects remain largely unprotected. Moreover, for those insect species that are explicitly protected by current policies, there is a taxonomic bias whereby the majority (>50%) of insect species are Lepidopterans (moths and butterflies), while a minority are Coleopterans (beetles), and none are Hymenopterans (bees, ants, wasps). Similar trends were observed in the UK priority biodiversity lists. Based on our data, we conclude that current biodiversity policies in the UK and Ireland have significant gaps in their protection of insect biodiversity and, there is a taxonomic bias that may skew

some conservation efforts toward butterflies and moths. We anticipate that our findings are likely to occur worldwide, highlighting the need for more directive policies to manage and protect insect biodiversity for the sustainability of ecosystem services." (Authors)] Address: Morimoto, J., School of Biological Sciences, University of Aberdeen, Zoology Building, Tillydrone Ave, Aberdeen AB24 2TZ, United Kingdom. Email: juliano.morimoto@abdn.ac.uk

**20089.** Dwita, U.R.; Ansori, I.; Rahman, A.; Jumiarni, D.; Ruyani, A. (2022): Pengembangan LKPD Berdasarkan Keragaman Capung Di Kawasan Danau Dendam Tak Sudah. *Diklabio: Jurnal Pendidikan dan Pembelajaran Biologi* 6(1): 1-6. (in Indonesian) ["This study aims to develop a valid LKPD for high school students based on the diversity of dragonflies in the Danau Dendam Tak Sudah area. This type of research is Research and Development which refers to the steps of research and development according to Sugiyono. The research steps are adjusted to the needs of researchers, namely potential and problems, data collection, product design, design validation, and design revision. Data collection techniques in this study were observation, questionnaire, and documentation. Data analysis techniques for dragonfly species diversity were analysed descriptively. LKPD validation test includes aspects of material, language, presentation and graphics. The results of the LKPD validation test by material experts 83.4%, media experts 90.6% and expert practitioners (biology teachers) 92.6%. Overall the average percentage of the three validators was 88.8% with the criteria "very valid". It is concluded that the design of the LKPD developed based on the diversity of dragonflies in the Dendam Tak Sudah Lake area, Bengkulu City is valid to be used as a learning resource." (Authors) Translated with www.DeepL.com/Translator (free version)] Address: Dwita, Uci Rahma, Program Studi S-1 Pendidikan Biologi, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Bengkulu, Indonesia. Email: ucirahmad-witaurhd@gmail.com

**20090.** El Bouhissi, M.; Chaib, S.; Houhamdi, M.; Khelifa, R. (2022): Checklist of Odonata of Sidi Bel Abbas, Northwest Algeria. *Hydrobiology* 1(4): 433-439. (in English) ["The odonates of Algeria have been studied for more than a century and a half, but the Northwestern part of the country has historically received little attention. A recent study in central North Algeria reported a species new to the country, suggesting that new investigations in unexplored areas are necessary to fully understand the local odonatofauna. We studied assemblages of odonates in 23 sites in Sidi Bel Abbas (Northwest Algeria) by bimonthly recording adults across a 200 m-transect from May to August of 2019–2022. Our sampling yielded 29 species (13 damselflies and 16 dragonflies) belonging to 19 genera and seven families. We recorded a new locality for the regionally endangered *Coenagrion mercuriale*, expanding the western range limit of the species in Algeria. We documented the occurrence of *Selysiotthemis nigra*, a species that has recently become more frequent in North Africa. *Ischnura pumilio* and *Onychogomphus forcipatus unguiculatus*, which are relatively rare in the region, were also recorded. The arid-dwelling *Trithemis kirbyi* and the Mediterranean endemic *Orthetrum nitidiverve* were quite common in the study area. This study fills an important gap of knowledge in our understanding of odonate geographic distribution in North Africa." (Authors)] Address: Khelifa, R., Biodiversity Research Center, University of British Columbia, 2212 Main Mall, Vancouver. B.C. V6T1Z4, Canada. Email: rassimkhelifa@gmail.com

**20091.** Elafri, A. (2022): New records of the endangered *Calopteryx exul* in a semi-arid territory of north-eastern Algeria (Odonata: Calopterygidae). *Notulae odonatologicae* 9(9): 451-454. (in English) ["A new locality for the endangered *C. exul* is reported from the Aurès mountains, Khenchela province, an eastern prolongation of the Sahara Atlas range. A total of 138 individuals of *C. exul* were recorded along a 20 km stretch of the Wadi Elhanna river from April to June 2021, suggesting that this species might penetrate deeper into semi-arid parts of the Atlas mountain system than currently known." (Authors)] Address: Elafri, A., Faculty of Natural and Life Sciences, Abbes Laghror University, Khenchela, Algeria. Email: alielafri@gmail.com

**20092.** Elmelech, L. (2022): On the role of the ventilatory wave in dragonfly larvae. *Bulletin of the American Physical Society, 75th Annual Meeting of the Division of Fluid Dynamics. Sunday–Tuesday, November 20–22, 2022; Indiana Convention Center, Indianapolis, Indiana. Session J05: Biological Fluid Dynamics: General. 4:35 PM–7:11 PM, Sunday, November 20, 2022. Room: 132: [Verbatim: Aquatic dragonfly larvae have various methods of ventilation in their modified hindgut chamber. One of these ventilations is chewing ventilation, which is a wavelike motion of the chamber wall. While this mode has been reported by multiple studies, its role remains unclear. In this study, we correlate the chamber wall motion with the internal and external flow to understand the role of the anteriorly propagating chamber wave in the larvae of *Libellula* sp. The transparency of the species allowed optical access to the internal flow and chamber kinematics. The particulates in the pond water visualized the flow inside the breathing chamber. We observed that soon after the wave motion ends, particles deep within the hindgut rapidly accelerates. This suggests that the function of the anteriorly propagating wave might be to pressurize the back end of the chamber in order to create pressure gradient within. In conjunction with the transmural pressure generated by compression of the abdomen, the axial pressure gradient deep within the chamber might assist in cleaning particulates lodged deep within the breathing chamber.]*

**20093.** Engelhardt, E.K.; Biber, M.F.; Dolek, M.; Fartmann, T.; Hochkirch, A.; Leiding, J.; Löffler, F.; Pinkert, S.; Poniatowski, D.; Voith, J.; Winterholler, M.; Zeuss, D.; Bowler, D.E.; Hof, C. (2022): Consistent signals of a warming climate in occupancy changes of three insect taxa over 40 years in central Europe. *Global Change Biology* 28: 3998-4012. (in English, with German summary) ["Recent climate and land-use changes are having substantial impacts on biodiversity, including population declines, range shifts, and changes in community composition. However, few studies have compared these impacts among multiple taxa, particularly because of a lack of standardized time series data over long periods. Existing data sets are typically of low resolution or poor coverage, both spatially and temporally, thereby limiting the inferences that can be drawn from such studies. Here, we compare climate and land-use driven occupancy changes in butterflies, grasshoppers, and dragonflies using an extensive data set of highly heterogeneous observation data collected in the central European region of Bavaria (Germany) over a 40-year period. Using occupancy models, we find occupancies (the proportion of sites occupied by a species in each year) of 37% of species have decreased, 30% have increased and 33% showed no significant trend. Butterflies and grasshoppers show strongest declines with 41% of species each. By contrast, 52% of dragonfly species increased. Temperature preference and habitat specificity appear as significant drivers of species trends.

We show that cold-adapted species across all taxa have declined, whereas warm-adapted species have increased. In butterflies, habitat specialists have decreased, while generalists increased or remained stable. The trends of habitat generalists and specialists both in grasshoppers and semi-aquatic dragonflies, however did not differ. Our findings indicate strong and consistent effects of climate warming across insect taxa. The decrease of butterfly specialists could hint towards a threat from land-use change, as especially butterfly specialists' occurrence depends mostly on habitat quality and area. Our study not only illustrates how these taxa showed differing trends in the past but also provides hints on how we might mitigate the detrimental effects of human development on their diversity in the future." (Authors)] Address: Engelhardt, Eva Katharina, Terrestrial Ecology Research Group, Dept Life Science Systems, School Life Sciences, Tech.I Univ. of Munich, Freising, Germany

**20094.** Fabian, J.; Siwanowicz, I.; Uhrhan, M.; Maeda, M.; Bompfrey, R.J.; Lin, H.-T. (2022): Systematic characterization of wing mechanosensors that monitor airflow and wing deformations. *iScience* 25, 104150: 23 pp. (in English) ["Highlights: • Dragonfly wings are innervated by an extensive collection of sensory neurons. Mechanosensors are spread across the whole span of the wing with consistent patterns. The axons of wing sensory neurons are scaled to compensate for transmission latencies. Anatomically accurate models reveal wing strain fields that inform sensor distribution. Summary: Animal wings deform during flight in ways that can enhance lift, facilitate flight control, and mitigate damage. Monitoring the structural and aerodynamic state of the wing is challenging because deformations are passive, and the flow fields are unsteady; it requires distributed mechanosensors that respond to local airflow and strain on the wing. Without a complete map of the sensor arrays, it is impossible to model control strategies underpinned by them. Here, we present the first systematic characterization of mechanosensors on the dragonfly's wings: morphology, distribution, and wiring. By combining a cross-species survey of sensor distribution with quantitative neuroanatomy and a high-fidelity finite element analysis, we show that the mechanosensors are well placed to perceive features of the wing dynamics relevant to flight. This work describes the wing sensory apparatus in its entirety and advances our understanding of the sensorimotor loop that facilitates exquisite flight control in animals with highly deformable wings." (Authors) *H. brevistylus*, *A. sieboldii*, *P. gigantea*, *A. junius*, *M. indica*, *P. flavescens*, *C. atkinsoni*, *S. plagiatus*, *H. tau*, *I. stevensi*, *S. striolatum*, *P. tenera*, *C. maculata*, *A. apicalis*, *I. verticalis*] Address: Lin, H.-T., Imperial College London, London, SW7 2AZ, UK. Email: h.lin@imperial.ac.uk

**20095.** Fahrenholz, A. (2022): Von einer Kanutour mit besonderem Highlight - *Somatochlora metallica* bei der Eiablage in Sand erwischt. *Mitteilungen der AG Libellen in Niedersachsen und Bremen* 4: 47-50. (in German, with English summary) ["*S. metallica* was observed laying eggs in sand at the bank of the Hunte river in northwestern Germany. A brief description of the observed behaviour and possible implications for larval mortality are discussed." (Author)] Address: Fahrenholz, A., Am Stadtrand 39b, 26127 Oldenburg, Germany. Email: arnefahrenzholz@posteo.de

**20096.** Farka, G.; Scharrer, S. (2022): Die Libellen des Landkreises Miltenberg. Herausgeber: BUND Naturschutz in Bayern e.V., Kreisgruppe Miltenberg, Römerstr. 41, 63785 Obernburg, Germany: 132 pp. (in German) [53 drag-



only species are known from the district (Landkreis) of Miltenberg. In this volume, the species are presented with short portraits and distribution maps. For each species, the most important habitats in the district as well as possible measures for their protection are mentioned. [https://www-researchgate.net/publication/361283638\\_Die\\_Libellen\\_des\\_Landkreises\\_Miltenberg](https://www-researchgate.net/publication/361283638_Die_Libellen_des_Landkreises_Miltenberg)] Address: BUND Naturschutz in Bayern e.V., Kreisgruppe Miltenberg, Römerstr. 41, 63785 Obernburg, Germany

**20097.** Fattorini, S. (2022): Odonate diversity patterns in Italy disclose intricate colonization pathways. *Biology* 2022, 11(6), 886; <https://doi.org/10.3390/biology11060886>: 17 pp. (in English) ["Simple Summary: During the last Ice Age, most European animals retreated into southern refuges (mainly the Iberian, Italian, and Balkan peninsulas) from which they recolonized central and northern countries after deglaciation. These medio-European territories may have subsequently acted as secondary centers of southward dispersion for many species. Acting both as a refuge and as an area of colonization from adjacent territories, Italy was the theater of complex biogeographical histories, as illustrated by current distributional patterns of odonates. These patterns are a result of historical factors and current ecological conditions. Odonates need freshwater for their development, and their richness in Italy decreases southwards, both because of a decrease in precipitation and because of increasing distance from the mainland (peninsula effect). Biogeographical composition of Italian regions is influenced by climate, geographical distances and historical factors. In particular, biogeographical similarities between Italian regions and adjacent areas revealed multiple colonization patterns. After serving as a glacial refuge from which odonates may have colonized medio-European areas, Italy was in turn subject to complex colonization processes, that made its fauna biogeographically very complex, albeit not particularly rich. Abstract: As a natural bridge between Europe and Africa, Italy occupies a prominent position to understand the biogeography of Europe. The influence of climatic, spatial, and historical factors on current patterns of species richness and turnover (i.e., inter-regional biogeographical differences) has been analyzed for 88 species occurring in 17 Italian natural regions. Use of multimodel inference showed that odonate richness decreased southwards in response to decreasing rainfall, as expected for animals that depend on freshwater for their development. Use of Mantel tests indicated that patterns of inter-regional similarities were influenced by both climate and geographical distances. These patterns, as highlighted using Non-Metric Multidimensional Scaling, indicate a role for historical factors. Biogeographical similarities between Italian regions and adjacent areas revealed multiple colonization pathways. These results, coupled with the overall southward decrease in species richness, suggest that, after serving as a Pleistocene refuge from which odonates may have colonized medio-European areas, Italy was in turn subject to colonization from north to south. This resulted in Italian odonate fauna being less species rich compared to faunas in the medio-European territories, but also being biogeographically very complex." (Author)] Address: Fattorini, Simone, Dept of Life, Health & Environ. Sciences, Univ. of L'Aquila, 67100 L'Aquila, Italy. Email: [simone.fattorini@univaq.it](mailto:simone.fattorini@univaq.it)

**20098.** Feindt, W.; Hardys, H. (2022): The damselfly genus *Megaloprepus* (Odonata: Pseudostigmatidae): Revalidation and delimitation of species-level taxa including the description of one new species. *Zootaxa* 5115(4): 487-510. (in English, with Spanish summary) ["As the longest-winged

odonate species of the extant world, *Megaloprepus caerulatus* (Drury, 1782) has received attention by many entomologists. While the behavior and ecology of this species has been subject of intense studies, biogeography and species status throughout its distributional range in old-growth Neotropical forests are less well known. For tropical forests, this information is a sine qua non when estimating the impact of degradation and climate change. Recent population genetic analyses, quantitative morphometric, and traditional taxonomic studies rediscovered a complex composed of cryptic species within the genus *Megaloprepus* Rambur, 1842—up until now still regarded as a monotypic genus. Here we introduce one new species *Megaloprepus diaboli* sp. nov. from the southern Pacific coast of Costa Rica and from the central Caribbean coast of Honduras and Guatemala. The holotype is from the Corcovado National Park, Costa Rica (N 8°28'55.62" W 83°35'13.92"), and was deposited at the National Museum of Costa Rica. Aside from *M. caerulatus*, two formerly described and later refused species within the genus were reevaluated and consequently raised to species status: *Megaloprepus latipennis* Selys, 1860 is found in the northeastern regions of Mesoamerica and *Megaloprepus brevistigma* Selys, 1860 in South America east of the Andes. Morphological descriptions of selected specimens (holotype of *M. diaboli*, lectotype of *M. latipennis*, and the mature males of *M. brevistigma* and *M. caerulatus*) are provided. Diagnostic features of the four species are illustrated, discussed, and summarized in a key to adult males." (Authors)] Address: Feindt, Wiebke, Univ. Veterinary Medicine Hannover, ITZ, Division Ecol. & Evol., Bünteweg 17d, 30559 Hannover, Germany. Email: [wiebke.feindt@ecolevol.de](mailto:wiebke.feindt@ecolevol.de)

**20099.** Felker, A.S. (2022): Damselflies of the Family Kennedyidae (Odonata: Archizygoptera) from the Middle–Upper Triassic of Kyrgyzstan. *Paleontological Journal* 56: 75-84. (in English) ["Two new species of Kennedyidae: *Kennedyia madygensis* sp. nov. and *K. ferganensis* sp. nov. are described from the Middle-Upper Triassic deposits of the Dzhayloucho (Madygen) locality in Kyrgyzstan based on new material collected in 2007 and 2009. *K. carpenteri* Pritykina, 1981 is redescribed and variation in its discoidal area and other vein structures is demonstrated. The structure and transformation of the nodus in Kennedyidae are discussed." (Author)] Address: Felker, A.S., Borissiak Paleontological Inst., Russian Academy of Sciences, 117647, Moscow, Russia

**20100.** Ferreira Aleixo, M.H.; Quirino, B.A.; Yofukujia, K.Y.; Cardozo, A.L.P.; Fugii, R. (2022): Macrophyte biomass mediates trophic relationships between congeneric fishes and invertebrate communities. *Limnologica* 93, March 2022, 125957: 12 pp. (in English) ["This study aimed to verify whether habitat complexity, assessed through macrophyte biomass, can mediate interactions between fish and invertebrate communities and help to explain the coexistence of congeneric fish species. Fish and invertebrates [including "Odonata"] were sampled in ten macrophyte stands of different biomass in the Upper Paraná River floodplain. The abundance and richness of invertebrates and the diet and trophic niche breadth of *Moenkhausia bonita* and *Moenkhausia forestii*, as well as the diet overlap between these two species, were evaluated. Invertebrate abundance increased with increased macrophyte biomass but richness was not significantly affected. The diet of both fish species differed between low and high biomass stands, with the main difference being a decrease in aquatic invertebrate consumption and an increase in plant consumption with increased macrophyte biomass. In addition, the consumption

of items relied on their profitability and accessibility in the environment. The trophic niche breadth of both fish species increased with increased macrophyte biomass, but there was no niche overlap. Our results indicate that even with an abundance of invertebrates, there was a decrease in the consumption of this resource, suggesting that more complex stands can be more effective refuges for aquatic invertebrates. These results highlight the role of habitat complexity in mediating interactions between fish and invertebrates and promoting their coexistence, which also helps to explain the coexistence of congeneric fish species." (Authors)] Address: Ferreira Aleixo, M.H., Programa de Pós-Graduação em Ecologia de Ambientes Aquáticos Continentais, Centro de Ciências Biológicas, Universidade Estadual de Maringá, Maringá, Brazil

**20101.** Fleck, G.; Haber, W.A. (2022): *Paracordulia calcarulata*, new species from Ecuador and notes on the genus *Paracordulia* Martin, 1907 (Odonata: Anisoptera: Corduliidae s. str.). *Zootaxa* 5124(5): 551-564. (in English) ["Based on two males from Ecuador (Sucumbios Province), *Paracordulia calcarulata* sp. nov. is the second described species of the genus. This new species is compared to *P. sericea* (Selys, 1871). The different shape of the anal appendages easily allows separation of the two. Generic diagnosis based on adults and larvae is amended. *Paracordulia* Martin, 1907 is a poorly known genus of the Amazonian biome, and its apparent rarity or absence of records is probably due to its secretive habits; considering the different forms of known females, its specific diversity has likely been significantly underestimated. Some structures of the vesica spermalis are briefly discussed." (Authors)] Address: Haber, W.A., Research Associate, Instituto Nacional de Biodiversidad, Quito, Ecuador, Correos de Costa Rica 5655, Monteverde, Costa Rica. Email: bill.haber01@gmail.com

**20102.** Galbiati, M.; Manenti, R.; Forlani, M.; Barzaghi, B.; Melotto, A.; Ficetola, F.G.; Lapadula, S. (2022): The roles of landscape of fear and light in allowing the exploitation of spring habitats by subterranean amphipods: an experimental and field approach. *ARPHA Conference Abstracts* 5: e87144. <https://doi.org/10.3897/aca.5.e87144>: 2 pp. (in English) ["Verbatim: Border habitats such as interfaces and ecotones promise research targets from an evolutionary and zoological point of view. Springs are typical ecotones that border two strongly distinct environments: surface and underground. They are exploited by both subterranean and surface species for which they may provide specific environmental pressures promoting phenotypic plasticity and local adaptations. The aim of this study is to understand how the landscape of fear (LOF) and physical constraints, like light occurrence, affect springs' exploitation by both a subterranean (*Niphargus thuringius*) and a surface crustacean amphipod species (*Echinogammarus stammeri*). From March to May 2021, we surveyed 15 springs, divided into 25 plots according to their distance to the border, and both day and night, we recorded amphipods activity and LOF levels for them. In a subterranean laboratory, we also reared 80 *N. thuringius* and 80 *E. stammeri* in safe and risky conditions with constant darkness and diel light variation assessing their activity and survival for 30 days. Risky conditions were represented by meso-predators (four fire salamander larvae) alone or with a top-predator (*Cordulegaster boltonii*). While in field conditions, the activity of *N. thuringius* seemed negatively affected by the number of active predators, in laboratory experiments, the main role was played by the light treatment; activity was significantly higher in constant darkness conditions. *E. stammeri* activity in the field

was higher in surface plots, while in laboratory conditions was affected by LOF. Predation risk negatively affected the survival of both amphipods. Our findings reveal that while light conditions seem to shape activity patterns of stygobionts strongly, predators have a lower effect on activity, even though predators have negative effects on survival. Moreover, physical constraints, such as light exposure, can affect antipredator responses of subterranean organisms, thus representing selective pressures for the exploitation of surface environments.] Address: Galbiati, M., Dipartimento di Scienze e Politiche ambientali, Università degli Studi di Milano, Via Celoria, 10 20133, Milano, Italy

**20103.** Garcia Junior, M.D.N.; Damasceno, M.T. dos S.; Vilela, D.S.; Souto, R.N.P. (2022): The Brazilian Legal Amazon Odonatofauna: a perspective of diversity and knowledge gaps. *EntomoBrasilis*. 15, (Feb. 2022), e977: 18 pp. (in English) ["The Brazilian legal Amazon occupies approximately 61% of its territory, covering a large part of Brazil's biodiversity. This large territorial dimension generates huge gaps in the animal diversity understanding, for example, the poor knowledge regarding the Odonata order. Worldwide, Odonata has almost 6,500 described species, with approximately 1,800 being recorded for the Neotropical region. Data on the Odonata order in the legal Amazon is still scarce, mainly due to its particularities, and little is known about the diversity of dragonflies in some of Brazilian states. Thus, the objective of this study is to present a list of species occurring in the states that make up the Brazilian legal Amazon. The list was made from the analysis of approximately 165 scientific papers, in addition to occurrence records contained in the SiBBR and GBIF databases. 641 species were found, which is equivalent to approximately 69% of the odonotofauna in Brazil. The states with the greatest diversity were Amazonas (n=364), Pará (n=310) and Mato Grosso (n=285). The study also indicated a low level of knowledge of the Odonata order in the states of Tocantins and Maranhão, in addition to the area of the Guianas shields, especially in the states of Amapá and Roraima. Carrying out new inventories and building catalogs is essential for understanding the biodiversity in this region, especially in areas with greater need." (Authors)] Address: Garcia Junior, M., Univde Federal do Amapá-UNIFAP, Macapá, Amapá, Brazil. Email: m.d.juniorbio@gmail.com

**20104.** Gassmann, D. (2022): Redescription of the male of *Tanymecosticta filiformis* (Ris, 1898) from New Britain, Papua New Guinea, including the first description of the female (Odonata: Isostictidae). *International Dragonfly Fund Report* 170: 1-14. (in English) ["The male of *Tanymecosticta filiformis* (Ris, 1898) from New Britain island, Papua New Guinea, previously known only from the incomplete male holotype specimen, is redescribed based on specimens collected during recent odonatological surveys, and the female is described for the first time. Comparative notes on *T. fisticollis* (Lieftinck, 1932) from mainland New Guinea are added." (Author)] Address: Gassmann, D., Arachnida Section, Zoological Research Museum Alexander Koenig, Bonn, Germany. Email: d.gassmann@leibniz-zfmk.de

**20105.** Gaur, P.; Pandey, P.; Kori, P.; Gaherwal, S. (2022): Study on diel variation and effect of anthropogenic activities on birds. *GSC Biological and Pharmaceutical Sciences* 11(1): 21-30. (in English) [Nehru Park, Indore city, India. The total of 24 insect species includes the following Odonata: *Tholymis tillarga*, *Lathrecista asiatica*, *Ictinogomphus rapax*, *Paragomphus lineatus*, *Brachythemis contaminata* and *Gynacantha bayadera*.] Address: Gaur, P., Institute of

**20106.** Geiger, M.; Koblmüller, S.; Assandri, G.; Chovanec, A.; Ekrem, T.; Fischer, I.; Galimberti, A.; Grabowski, M.; Har- ing, E.; Hausmann, A.; Hendrich, L.; Koch, S.; Mamos, T.; Rothe, U.; Rulik, B.; Rewicz, T.; Sittenthaler, M.; Stur, E.; Tonczyk, G.; Zangl, L.; Moriniere, J. (2022): Coverage and quality of DNA barcode references for Central and Northern European Odonata. *PeerJ* 9:e11192 DOI 10.7717/peerj.111922021: 31 pp. (in English) ["Background: Odo- nata are important components in biomonitoring due to their amphibiotic lifecycle and specific habitat requirements. They are charismatic and popular insects, but can be chal- lenging to identify despite large size and often distinct color- ation, especially the immature stages. DNA-based assess- ment tools rely on validated DNA barcode reference librar- ies evaluated in a supraregional context to minimize taxo- nomic incongruence and identification mismatches. Meth- ods: This study reports on findings from the analysis of the most comprehensive DNA barcode dataset for Central Eu- ropean Odonata to date, with 103 out of 145 recorded Eu- ropean species included and publicly deposited in the Bar- code of Life Data System (BOLD). The complete dataset includes 697 specimens (548 adults, 108 larvae) from 274 localities in 16 countries with a geographic emphasis on Central Europe. We used BOLD to generate sequence di- vergence metrics and to examine the taxonomic composi- tion of the DNA barcode clusters within the dataset and in comparison with all data on BOLD. Results: Over 88% of the species included can be readily identified using their DNA barcodes and the reference dataset provided. Consid- ering the complete European dataset, unambiguous identi- fication is hampered in 12 species due to weak mitochon- drial differentiation and partial haplotype sharing. However, considering the known species distributions only two groups of five species possibly co-occur, leading to an unambigu- ous identification of more than 95% of the analysed Odonata via DNA barcoding in real applications. The cases of small interspecific genetic distances and the observed deep intraspecific variation in *Cordulia aenea* (Linnaeus, 1758) are discussed in detail and the corresponding taxa in the public reference database are highlighted. They should be considered in future applications of DNA barcoding and metabarcoding and represent interesting evolutionary bio- logical questions, which call for in depth analyses of the in- volved taxa throughout their distribution ranges." (Authors)] Address: Geiger, M., Zoologisches Forschungsmuseum Al- exander Koenig (ZFMK) - Leibniz Institute for Animal Biodi- versity, Bonn, Germany. Email: m.geiger@leibniz-zfmk.de

**20107.** Gerull, S.; Apel, J. (2022): Stabilisierung der Helm- Azurjungferbestände *Coenagrion mercuriale* im Landkreis Sömmerda. *Landschaftspflege und Naturshchutz in Thür- ingen* 58(2): 79-83. (in German) ["In the course of the pro- ject, it became apparent that the habitat and population data on the Helmeted damselfly for the water bodies outside the FFH management planning and the state and federal moni- toring are outdated, especially in view of the precipitation deficit in recent years. In order to update this data, a total of 69 km of designated habitat stretches were examined for vegetation, structure and habitat suitability in 2018 as part of a project extension and the expansion of the project area to include the districts of Unstrut-Hainich-Kreis and Gotha. At water bodies without current population figures, the pop- ulations were recorded at the same time. These data were used to draw up habitat maps with proposals for manage- ment measures. The water bodies or water body sections

were divided into four categories: 1. habitat = currently col- onised area with relatively good quality, 2. potential habitat = not colonised, but of good quality, 3. with effort potential habitat = not colonised, intensive management measures necessary, 4. no habitat = not suitable for colonisation. The proportions of the corresponding categories can be found in Figure 6. These data formed the basis for another ENL pro- ject "Measures to secure and stabilise the populations of the Helm's Azure Damselfly in the Thuringian Basin", which runs from 2019 to 2022. In order to obtain further infor- mation on the Helm's Azure Damselfly habitats, 209 water samples were taken and analysed at 26 sites over a period of seven months. Relevant parameters for the analysis were water temperature, oxygen content, conductivity, pH- value as well as nitrate, phosphate and ammonium content. Figure 7 shows the positive influence of buffer strips and ri- parian strips on the chemical water quality classification (based on the LAWA quality classes, Länderarbeitsgemein- schaft Wasser 1998) and thus on the population of Helm- meted damselflies. The buffer strips were divided into three classes for this purpose. A buffer was rated as good if it was present on both sides of the watercourse, e.g. in the form of a green strip, copse border or path. A moderate buffer was only present on one side, or on both sides, but very narrow. The category "poor buffer" was assigned to water bodies where there was no buffer strip or only a narrow one on one side. As a result of the inventory carried out in 2018, it can be assumed that the measures implemented in the project in 2017 were successful. More individuals were recorded at all water bodies than in the reference year 2016 (PETZOLD 2018). As can be seen in Table 1, many times as many in- dividuals were recorded after the measures were imple- mented. However, some stretches of water, especially in the FFH area "Gräben im Großen Ried", partially dried out in the late summer months of 2018 and 2019. However, the species remained in other stretches of water and can mi- grate into these stretches again when conditions are more favourable. The goal of permanently maintaining the water bodies could not be achieved at all water body sections. Only one of the six water bodies continues to be maintained by a farm. In general, the farms have shown interest in con- tinued maintenance and have also willingly established 1.5 km of riparian strips, but were unable to offer gentle mainte- nance either technically or in terms of personnel. The mu- nicipalities also see the maintenance of water bodies as rel- evant for the conservation of the species, but here too the financial and personnel effort is not affordable." (Au- thors/Deepl)] Address: Gerull, Stephanie, Am Stausee 36E, 99439 Am Etterberg, Thüringen, Germany. Email: gerullpv- mittelthuerin.de

**20108.** Getnet, H.; Mengistou, S.; Warkineh, B. (2022): Macroinvertebrate community structure and diversity in re- lation to environmental factors in wetlands of the lower Gilgel Abay River catchment, Ethiopia. *African Journal of Aquatic Science* 47(1): 23 -35. (in English) ["The influence of environmental factors on the diversity of macroinverte- brates was studied in the wetlands of the Gilgel Abay River (GAR) catchment in Ethiopia. The study was done between September 2017 and March 2018, encompassing both wet and dry seasons. Six study wetlands from the GAR catch- ment were selected in a targeted manner based on the sur- rounding land use, exposure to anthropogenic disturbances and accessibility to conduct a quantitative study. The rela- tionships between biological and environmental variables were evaluated by using multivariate analyses. Altogether, 36 families of macroinvertebrates were identified. Macroin- vertebrate diversity indices were significantly higher at less

impaired sites, compared with more impaired sites. Several families of Ephemeroptera, Odonata and Trichoptera taxa, including Corduliidae, Calopterygidae, Baetidae, Aeshnidae, Polymitarcyidae, Hydropsychidae, Heptageniidae, Polycen-trapodidae, Hydroptilidae and Philopotamidae were negatively correlated with organic and inorganic pollutants and human disturbances and might be considered as potential indicators of less impaired sites. Conversely, the families Chironomidae, Hirudinidae and Libellulidae were positively correlated with biological oxygen demand, ammonium and human disturbance score and negatively correlated with dissolved oxygen. Generally, results of macroinvertebrate diversity and composition in this study indicate poor ecological condition of the wetlands, particularly those adjacent to agricultural and urban areas." (Authors)] Address: Getnet, H., Dept of Biology, Assosa University, Assosa, Ethiopia. Email: habtamugetnet@gmail.com

**20109.** Ghosh, K. (2022): Odonata diversity in the Gangetic plain of West Bengal. Indian Journal of Entomology Online published Ref. No. e21180: 5 pp. (in English) ["The diversity and abundance of the Odonata documented from the Gangetic plain of West Bengal covering two types of habitats revealed its primarily aquatic nature (Oxbow Lake, Purbasthali). The other sites were predominantly grasslands, with smaller water bodies around (RRS, Chinsurah and DVC canal, Baidyabati). A total of 40 species were documented belonging to 31 genera and 5 families, with dominant families under the suborders Anisoptera and Zygoptera being Libellulidae and Coenagrionidae, respectively. Shannon-Wiener diversity index indicates that Oxbow Lake, Purbasthali has the most diverse fauna, with a higher relative abundance for Anisoptera compared to the Zygoptera." (Author)] Address: Ghosh, K., Dept of Zoology, Bejoy Narayan Mahavidyalaya, Itachuna, Hooghly 712147, West Bengal, India. Email: tokausik@gmail.com

**20110.** Glännman, J.; Töttrup, K.S. (2022): En inventering av bottenfauna i Trönningeån med tvåbiflöden. Examensarbete, Naturvård och artmångfald, Halmstad 2022-05-25: 29 pp. (in Swedish, with English summary) ["Benthic macroinvertebrates are usually small animals living in our lentic and lotic ecosystems, they have been used as indicators of water quality and biodiversity for a long time. Dam removals have become one of the "go-to" conservation methods for restoring connectivity in lotic ecosystems and thereby enabling passage upstream for migrating species. In Sweden, a large part of rivers and streams have dams present which act as migration barriers. Hushållningssällskapet Halland runs a project, LIFE-Goodstream in which a dam considered a migration barrier was removed in the stream Trönningeån. This report has three focus areas 1) the ecological effects of the dam removal while 2) considering the effect on the species composition of the orders Ephemeroptera, Plecoptera, Trichoptera and Odonata [*Cordulegaster boltonii*] in the stream Trönningeån with two tributaries and finally 3) suggest appropriate conservation methods for the future. By examining the benthic macroinvertebrate community our study showed that a small dam removal can have a clear positive effect on water quality, changing the water status classification from low water quality to high. Although there was no effect on the species diversity by the dam removal, a turnover in species composition became obvious after the examination. Moreover, we learned that Trichoptera was the most present order in two out of the three streams while Odonata was the least represented order. Also, bottom substrate, velocity and riparian

zone have larger impact on species composition than adjacent environments. Re-meandering streams to further increase biodiversity while also ensuring water quality, is an essential method for a thriving conservation work in the future." (Authors)] Address: not stated

**20111.** Glushenkov, O.V. (2022): Proposals to include some dragonfly species to the new edition of the Red Book of the Chuvash Republic. Natural science research in Chuvashia and individual regions: materials of reports of the interregional scientific and practical conference (Cheboksary, February 28-April 2022). – Cheboksary: advertising and printing bureau "Plakat", 2022. - Issue 8. - 196 p: 103-111. (in the Red Book of the Chuvash Republic, dragonflies, Odonata, *Anax imperator* *Ophiogomphus cecilia*, *Aeshna serrata*, *Calopteryx virgo*, *Leucorrhinia albifrons*) ["The Chuvash Republic is updating the List of rare and endangered species of animals in order to include (or exclude) them in the new edition of the Red Book of the Chuvash Republic (animals).The article provides information on reliable encounters of extremely rare dragonfly species (Odonata) – *Anax imperator*, *Ophiogomphus cecilia* – in some protected areas of the republic and in Chuvashia. The necessity of including rare dragonflies in the new edition of the regional Red Book is substantiated. Proposals from other specialists are being considered to include *Aeshna serrata*, *Calopteryx virgo*, *Leucorrhinia albifrons* in the new edition of the Red Book of the Chuvash Republic." (Author) ] Address: Glushenkov, O.V., head of the scientific Dept, National Park Chavash Varmane, p. Shemursha, Leading Researcher, Go-state nature reserve "Prisursky", Cheboksary, Chuvashia, Russia. Email: totem-ardea63@yandex.ru

**20112.** Golab, M.J.; Sniegula, S.; Brodin, T. (2022): Cross-latitude behavioural axis in an adult damselfly *Calopteryx splendens* (Harris, 1780). *Insects* 2022, 13(4), 342; <https://doi.org/10.3390/insects13040342>: 11pp. (in English) ["Simple Summary: Animals adapt to the environment they live in. If the environment changes, animals usually adapt behaviourally as a first response. By studying behavioural profiles across long distances, we can detect environmental change reflected in shifts in behavioural profiles. This study examined variation in three behavioural axes: activity, courtship and boldness, and the association between these behaviours, i.e., behavioural syndromes, across three damselfly populations along a latitudinal gradient (i.e., climatic gradient). Our study organism was the temperate damselfly *Calopteryx splendens*. We predicted that behavioural expressions would gradually increase from southern to northern regions. This is because northern animals should compensate behaviourally for a brief and cold breeding season (i.e., time constraint). Activity was the only behaviour feature positively associated with latitudinal gradient. Courtship effort was highest in the central region, whereas boldness values were highest in the north but did not differ between central and south. In the southern region, an activity–boldness and a courtship—boldness syndrome were present, and in the northern region, only an activity–boldness syndrome was found. Our results confirm that environmental variability in biotic and abiotic factors across studied latitudes generates regional differences in behavioural profiles, which do not always follow latitudinal gradient. Abstract: Behavioural variation is important for evolutionary and ecological processes, but can also be useful when predicting consequences of climate change and effects on species ranges. Latitudinal differences in behaviour have received relatively limited research interest when compared to morphological,



life history and physiological traits. This study examined differences in expression of three behavioural axes: activity, courtship and boldness, and their correlations, along a European latitudinal gradient spanning ca. 1500 km. The study organism was the temperate damselfly *Calopteryx splendens* (Harris). We predicted that the expression of both behavioural traits and behavioural syndromes would be positively correlated to latitude, with the lowest values in the southern populations, followed by central and the highest in the north, because animals usually compensate behaviourally for increasing time constraints and declining environmental conditions. We found that behavioural expression varied along the latitudinal cline, although not always in the predicted direction. Activity was the only behaviour that followed our prediction and gradually increased northward. Whereas no south-to-north gradient was seen in any of the behavioural syndromes. The results, particularly for activity, suggest that climatic differences across latitudes change behavioural profiles. However, for other traits such as courtship and boldness, local factors might invoke stronger selection pressures, disrupting the predicted latitudinal pattern." (Authors)] Address: Golab, Maria J., Institute of Nature Conservation, Polish Academy of Sciences, 31-120 Krakow, Poland. Email: marysiagolab@gmail.com

**20113.** Gómez-Tolosa, M.; González-Soriano, E.; Mendoza-Cuenca, L.F.; Pérez-Munguía, R.M.; Rioja-Paradela, T.M.; Espinoza-Medinilla, E.E.; Ortega-Salas, H.; Rivera-Velázquez, G.; Penagos-García, F.E.; López, S. (2022): The use of highly diverse clades as a surrogate for habitat integrity analysis: *Argia* damselflies as a practical tool for rapid assessments. *Environmental Science and Pollution Research* 29(16): 24334-24347. (in English) ["Human activities have impacted many environments on earth, and thus several species are facing an increased risk of extinction. The environmental crisis requires rapid tools to assess the ecosystem health accurately. Studies have been conducted with visual indices that quantify habitat integrity by predicting species richness and diversity. However, whether a diverse clade can predict habitat integrity has not been used. The genus *Argia* (Rambur, 1842) is one of the most locally diverse groups in southeastern Mexico. In this context, we hypothesized that the occurrence, species richness, and diversity of adults *Argia* spp. could be a better predictor of the Visual-Based Habitat Assessment Score (VBHAS) than the other taxonomic levels or less diverse clades. We found that the richness and diversity of *Argia* spp. are positively correlated with VBHA scores, as same as taxonomic ratios. Simultaneously, VBHA scores increase to 23.51 times when *Argia* spp. diversity increases. We discuss the possible use of a diverse Odonata clade, as *Argia* spp. could surrogate habitat integrity for local long-term biomonitoring programs. This approach requires testing with other indices and verifying a reliable and consistent relationship between diverse clades and environmental assessment scores." (Authors)] Address: López, S., Ciudad Universitaria, Libramiento Norte Poniente 1150, Colonia Lajas Maciel C.P., 29039, Tuxtla Gutiérrez, Chiapas, México. Email: sergio.lopez@unicach.mx.

**20114.** Gopalan, S.V.; Sherif, M.; Chandran, V. (2022): A checklist of dragonflies & damselflies (Insecta: Odonata) of Kerala, India. *Journal of Threatened Taxa* 14(2): 20654-20665. (in English) ["A checklist of odonates of Kerala State is presented in this paper. Scientific binomen, vernacular names in Malayalam, IUCN Red List status, and endemism are also given. A total of 174 species of odonates have been recorded from Kerala till date, 65 of which are endemic to the Western Ghats, and 10 to India. Five species fall under

various threatened categories of IUCN. None of the odonates occurring in Kerala is listed in the schedules of the Indian Wildlife (Protection) Act or the appendices of CITES." (Authors)] Address: Chandran, V., Dept of Geology & Environmental Science, Christ College, Irinjalakuda, Thrissur, Kerala 680125, India. Email: avivekchandran2@gmail.com

**20115.** Guadalquiver, D.M.E.; Nuneza, O.M.; Tabugo, S.R.R.; Villanueva, R.J.T. (2022): Description of the larva of *Vestalis melania* (Selys, 1873) (Odonata: Calopterygidae) identified through DNA barcoding. *Journal of Threatened Taxa* 14(8): 21612-21618. (in English) ["The larva of *Vestalis melania* is described and illustrated for the first time, based on specimens collected from Malaybalay, Bukidnon, Philippines. The identity of the larva was confirmed by matching its mitochondrial COI sequence with the adult. The larva can be distinguished by the shape of the prementum and its median cleft, lateral gills, and posterolateral abdominal spines. Comparison with other known larvae in the genus is also provided. The significance of using DNA barcoding for identifying larvae of Philippine Odonata is emphasized." (Authors)] Address: Guadalquiver, D.M.E., Dept of Biological Sciences, College of Science & Mathematics, MSU-Iligan Institute of Technology, Andres Bonifacio Avenue, Tibanga, Iligan City, Philippines.

**20116.** Guadalquiver, D.M.E.; Nuneza, O.M.; Villanueva, R.J.T. (2022): Odonatofauna in the freshwater system of Kibalabag, Malaybalay City, Bukidnon, Philippines. *Biodiversitas* 23: 1857-1863. (in English) ["Despite the critical importance of freshwater ecosystems to human populations and biodiversity, many anthropogenic practices continue to imperil such habitats. An excellent way to monitor the integrity of these ecosystems is through bioindicator organisms like insects of order Odonata, which are highly sensitive to environmental changes. In Malaybalay City, Philippines, the freshwater system in barangay Kibalabag is the primary source of potable water. Thus, to gain insight into its integrity and health, the present study seeks to determine adult Odonata species composition and diversity in the area. Opportunistic sampling using sweep netting and handpicking was conducted in four sampling sites. Twenty-five species were identified, comprising 230 individuals under nine families and 21 genera. Endemism of 65% (17 species) was recorded, with five species exclusive to Mindanao Island and three species classified as threatened. A high ratio of Zygopterans to Anisopterans, indicative of pristine conditions, was observed. Computation of biodiversity indices revealed that Site 2 (Wetland) is the most diverse ( $H_1$ : 2.582) due to habitat variability. Cluster analysis also showed that Sites 1 (Kibalabag falls) and 2 were most similar. Species assemblage in these sites and high richness in Site 1 demonstrated high habitat integrity and good water quality, whereas the species assemblage in Sites 3 and 4 connotes habitat disturbance. The high endemism and moderate diversity showed that the area is a healthy and suitable habitat for Odonata, emphasizing the need for its conservation and proper management." (Authors)] Address: Guadalquiver, D.M.E., Dept of Biological Sciences, College of Science and Mathematics, Mindanao State University-Iligan Institute of Technology, Iligan City 9200, Philippines. Email: donmark.guadalquiver@g.msuit.edu.ph

**20117.** Gurung, M.M.; Dorji, C.; Sinchuri, A.M.; Rai, S.K.; Dendup, K.C.; Kalkman, V.J. (2022): New records of odonates from Trongsa and Zhemgang, central Bhutan with a checklist of Jigme Singye Wangchuck National Park. *Journal of Threatened Taxa* 14(9): 21836-21844. (in English)

["New records of 43 species of dragonflies and damselflies from Trongsa and Zhemgang districts in central Bhutan are provided. Two of these, *Watanabeopetalia atkinsoni* (Selys, 1878) and *Tetrathemis platyptera* (Selys, 1878), are new to Bhutan bringing the number of species known from Bhutan to 125. A checklist of the 60 species known from Trongsa district, Zhemgang district and the Jigme Singye Wangchuck National Park is provided." (Authors)] Address: Gurung, M.M., Dept of Forest Science, College of Natural Resources, Royal University of Bhutan, Punakha, P.O: 13003, Bhutan. Email: merman.gurung93@gmail.com

**20118.** Gutiérrez Uranga, I. (2022): Primera cita de *Aeshna isoceles* (Müller, 1767) (Odonata: Aeshnidae) para la provincia de Gipuzkoa. - First record of *Aeshna isoceles* (Müller, 1767) (Odonata: Aeshnidae) for the province of Gipuzkoa. *Munibe, Cienc. nat.* 70, 2022: 6 pp. (in Spanish, with English and Basque summaries) ["An adult male observed on June 18, 2019 at Parque Ecológico de Plaiaundi. With this record, the number of odonates described for the province reaches 49 species." (Author)] Address: Itziar Gutiérrez Uranga. itziguti@hotmail.com

**20119.** Gwos, N.S.R.; Foto, M.S.; Nyame, M.D.-O.; Biram, A.N.E.B.; Balzani, L. (2022): Physicochemical characterization of the waters of the Lep'oo river in Mbanda (Bot-Makak) and structuring of the benthic macroinvertebrate community. *World Journal of Advanced Research and Reviews* 13(3): 1-12. (in English) ["A study on the characterisation of the Lep'oo stream waters in Mbanda (BotMakak) by physicochemical parameters and benthic macroinvertebrates community was conducted from February to July 2016. Physicochemical parameters were measured according to Rodier's recommendations, while benthic macroinvertebrates were collected using the multihabitat approach. The physicochemical analysis showed that the waters of the Lep'oo stream were well oxygenated (71.16%), slightly acidic (6.36 UC), with low values of nitrogen and orthophosphates reflecting litter decomposition. A total of 2019 benthic macroinvertebrates were collected, divided into 4 phyla, 7 classes, 15 orders, 40 families and over 60 genera. The phylum Arthropoda was the most abundant with 98.61% relative abundance, followed by Molluscs (0.99%) and Annelids (0.29%). The greatest number of organisms collected belonged to the class Hexapoda, which represented 56.76% of relative abundance, followed by Malacostraca (41.75%). Within the Hexapoda class, the order Hemiptera predominated with 18.22% relative abundance and in the Malacostraca class, the order Decapoda predominated with 41.75% relative abundance. These two orders were dominated by the families Atyidae, Libellulidae, Gerridae, Leptophlebiidae and Hydroptilidae. In the upper part of the Lep'oo stream, the families Libellulidae and Belostomatidae were dominant. The station Lep2 was most colonised by the families Atyidae, Libellulidae, Belostomatidae, Hydrometridae, and Gerridae, while station Lep3 was dominated by the families Atyidae, Hydroptilidae and Leptophlebiidae. The Shannon and Weaver (H') and Pielou equitability (J) index showed a greater diversity of taxa downstream of the stream at station Lep3, where conditions seem more favourable to the development of benthic macroinvertebrates as indicated by the physicochemical results. The NGBI index characterized water quality from mediocre to excellent. Finally, the Lep'oo watercourse had a poor and diversified population of benthic macroinvertebrates, showing a relative good ecological quality of water." (Authors)] Address: Gwos, N.S.R., Lab. of Hydrobiol. & Environment (LHE), Fac. Sciences, Univ. of Yaounde I, P. O. Box: 812 Yaounde – Cameroon

**20120.** Hämäläinen, M.; Fliedner, H. (2022): Etymology of the scientific names of the extant demoiselle damselflies (Odonata: Calopterygidae). *International Dragonfly Fund - Report* 174: 1-175. (in English) ["This publication presents the etymology and other information of all available scientific names given to the extant members of the odonate family Calopterygidae. Of the 33 available genus-group and 329 available species-group names, 21 and 181 names are considered to represent valid genera and species, respectively. The historical development of knowledge of calopterygid diversity is discussed. A synonymic checklist of Calopterygidae is presented, with an annotated list of the author names. A grouping of taxon names according to the meaning of their roots is presented." (Authors)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: libellago@gmail.com

**20121.** Harahap, R.R.; Kurnia, I.; Widodo, G. (2022): Keanekaragaman Jenis Capung (Ordo Odonata) Pada Berbagai Tipe Habitat Di Kecamatan Leuwiliang Kabupaten Bogor. *Quagga: Jurnal Pendidikan dan Biologi* 14(2): 141-150. (in English) ["Dragonflies and damselflies (Odonata) are insects with an important role for biological control and environmental quality indicators. Odonata are scattered in various types of habitats, especially those associated with freshwater ecosystems. The aim of this research is to study the diversity of odonata in various habitat types in Leuwiliang District, Bogor Regency. The study was conducted on 10 habitat types with a total of 1289 observation lines. In total found 23 species of odonatan from eight families and two sub-orders. The highest species richness was found in stream water habitats (22 species) and the lowest in field habitats (five species). The chi-square test for the number of species and the number of individuals differed significantly between habitat types. The species diversity index ranged from 1.23-2.24 and the similarity index ranged from 0.39-0.71. The highest community similarity index was between lakes habitats and field habitats. The results of the MDS analysis resulted in three groups of odonata communities according to their habitat type." (Authors)] Address: Harahap, R.R.; Alumni, Program Studi Ekowisata Sekolah Vokasi IPB University, Indonesia. Email: rhamdany262@gmail.com

**20122.** Hartung, M. (2022): Description of the larva of *Micrathyria venezuelae* De Marmels, 1989 (Odonata: Libellulidae). *Odonatologica* 51(1-2): 147-156. (in English) ["*M. venezuelae* is a species of medium to high elevations in the Northern Cordilleras in Venezuela. The larva of *M. venezuelae* was hitherto unknown. Based on exuviae of reared specimens, the final instar larva of *M. venezuelae* is described. Exuviae of *M. venezuelae* have two parallel rows of dark spots on the dorsum of the abdomen, lack mid-dorsal hooks, and the lateral spines on S9 are short; the thorax, tibiae, and femora have three dark bands each; the prementum has 9–13 setae and the labial palps 8–11 setae. A modified differentiation to known larvae of *M. aequalis* from *M. venezuelae* is provided." (Author)] Address: Hartung, M., 16866 Kyritz, Germany

**20123.** Hastomo, S.O.E.; Muttaqin, Z.; Cita, K.D. (2022): Inventory and diversity of dragonflies (Odonata) at Kuningan Resort of Mount Ciremai National Park, West Java Province. *IOP Conference Series: Earth and Environmental Science* 959 (2022) 012019: 11 pp. (in English) ["The presence of dragonflies regarding the sensitivity of nymphs towards environmental changes is considered a bioindicator

that can indicate changes in water quality and the environment. The purpose of this study is to take inventory of the species and the diversity of dragonflies at the Kuningan Resort, Mount Ciremai National Park in several representative aquatic habitats. The dragonfly inventory technique used a modified line transect method with observation plots that are not limited by a certain distance or area but by a set time of 15 minutes for each plot observation. The results of the inventory obtained 24 species of dragonflies from 8 families, as many as 591 dragonflies consisting of 58.2% of common dragonflies including of suborder Anisoptera consists of Aeshnidae, Gomphidae, Libellulidae and 41.8% of needlet dragonflies including of suborder Zygoptera consist of Platystictidae, Calopterygidae, Chlorocyphidae, Euphaeidae, Coenagrionidae. The dragonfly diversity index ( $H' = 1.94 - 2.32$ ) (medium), the species richness index, or the values of Margalef's diversity index ( $D_{mg}$ ) ranged from 1.99 to 2.87 (low), the species evenness index ranges from 0.39 - 0.6 (low - medium)." (Authors)] Address: Muttaqin, Z., Faculty of Forestry, Universitas Nusa Bangsa, Jl. KH Sholeh Iskandar Km 04, Bogor 16161, Indonesia. Email: muttaqinznl@gmail.com

**20124.** Hernandez, M.A.; Casanueva, P.; Nunes, L.; Santamaría, T.; Sánchez-Sastre, L.F.; Ferreras-Romero, M.; Campos, F. (2022): Geographical variation of prementum size in Iberian *Cordulegaster boltonii* (Odonata: Cordulegasteridae) populations. *International Journal of Odonatology* 25: 56-61. (in English) ["Within wide geographical areas, Odonata populations can show biometric differences as a consequence of both biotic (e.g., predation, competition) and abiotic factors (mainly temperature). These differences can occur in the larval stage, although reliable characters are needed to detect differences. We analyzed whether *C. boltonii* larvae from 18 Iberian populations differ regarding head width and prementum size (maximum width, minimum width, and maximum length), using measurements taken on final stage exuviae. Prementum length was greater in southern populations than in northern ones. Geographic latitude and temperature were the variables that best explained this variation in females, whereas latitude and altitude above sea level offered the best explanation among males." (Authors)] Address: Hernández, M.A., Depto Biología Ambiental, Facultad de Ciencias, Unidv de Navarra, 31080 Pamplona, Spain. Email: mahermin@unav.es

**20125.** Högrevé, J.; Suhling, F. (2022): Development of two common dragonfly species with diverging occupancy trends. *Journal of Insect Conservation* 26: 571-581. (in English) ["The two sibling and syntopic odonate species *Sympetrum striolatum* and *S. vulgatum* are common and widespread in Central Europe. While *S. striolatum* has strong positive population trends, declines of *S. vulgatum* are observed. The aim of this study was to identify possible drivers of these diverging trends. We presumed that differences in egg development may lead to differences in survival until hatching. First, eggs laid in non-permanent or shrinking waterbodies may suffer of increasing drought periods. Second, differences in development may cause increased size-mediated intraguild predation, a common cause of reduced survival in odonate larvae. Egg development time and hatching rates were recorded of eleven egg clutches of *S. vulgatum* and ten clutches of *S. striolatum* under simulated drought vs. water and direct vs. delayed development treatments. Hatching rates were reduced under drought conditions, and particularly so in *S. vulgatum*. We did not observe obligate winter diapause in any of the egg clutches. But, *S. vulgatum* varied widely in development between clutches, while the

eggs of *S. striolatum* developed much faster and hatched highly synchronously. This would provide *S. striolatum* with a temporal advantage that may lead to a size-advantage over most *S. vulgatum*. We also found that *S. vulgatum* grew faster. Faster larval growth would only compensate for those *S. vulgatum* with fast egg development. The current population trends may be partly attributed to lowered survival of *S. vulgatum* under drought and by phenological and, thus, size benefits of *S. striolatum*. Implications for insect conservation: Our results show that population dynamics of two closely related dragonfly species can be explained by climatically induced changes in their interactions. Understanding the causes and processes of behavioural changes resulting in differing population trends is fundamental for the protection of species." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, 38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**20126.** Holusa, O. (2022): Description of the last instar larva of *Cordulegaster vanbrinkae* and emergence place from northern Iran (Odonata: Cordulegasteridae). *International Journal of Odonatology* 25: 72-79. (in English) ["The larva of *C. vanbrinkae* is described and illustrated based on fourteen final instar larvae and 49 exuviae that were collected in Gilan, Mazandaran and Golestan provinces, in northern Iran in July 2014, July 2017 and August 2018. Larvae of *Cordulegaster vanbrinkae* show signs of lateral spine on 8th segment missing, ratio of lateral spine on 9th segment/9th segment is 0.03–0.15 and 5 (rarely 6) long premental setae. The characters have a clear variability and there is a noticeable overlap of character values with related species—*Cordulegaster picta* and *Cordulegaster heros*. Emergence habitat are described and analysed." (Author)] Address: Holuša, O., Mendel University in Brno, Faculty of Regional Development and International Studies, Tr. Generála Píky 7, CZ-613 00 Brno, Czech Republic

**20127.** Holuša, O.; Holušová, K. (2022): Population density and abundance of the northernmost population of *Cordulegaster heros* (Anisoptera: Cordulegasteridae) in Europe (Czech Republic) with notes on its biogeographical range. *Diversity* 2022, 14, 854. <https://doi.org/10.3390/d14100854>: 16 pp. (in English) ["*C. heros* is a Balkan species with a disjunctive area extending into Central Europe. The population in the Chřibý Mts. in the southeastern Czech Republic is the northernmost population, and this population was intensively studied from 2010 to 2021 to establish basic data on its abundance. In the territory, the geomorphological characteristics of streams, characteristics of sediment in streams, habitat, emergence time, and period of flight were recorded, and population viability was evaluated. Larvae were recorded in 10 small forest streams (altitude of 235–426 m a.s.l.), with an average minimum width of 51.9 cm, an average maximum width of 177.7 cm, an average minimum depth of 6.5 cm, an average maximum depth (in pools) of 21 cm, and an average stream gradient of 1.9 grades. The sediments in each stream exhibited a grain size distribution with an average fraction less than 0.05 mm represented by 6.3%, a fraction of 0.05–0.1 mm represented by 21.1%, a fraction of 0.1–2 mm represented by 52.1%, a fraction of 2–5 mm represented by 12.1%, a fraction of 5–20 mm represented by 8%, and a fraction of 20+ mm represented by 0.3%. The larval abundance was 0.1–6.7 larvae per 1 m<sup>2</sup> of suitable sediment. The emergence period was recorded from 28 May to 1 July. The emergence site was categorized as larvae-dominated plant leave (57% of cases), plant stalks (21%), and tree trunks (17%). Exuviae occurred at an average of 154 cm at horizontal distance from the shore and

an average vertical height of 77 cm above the ground. The average total distance of larval movement was 205 cm. The flight period in 2021 was recorded from 15 June to 11 August with peak flight activity noted in the third week of June. The northernmost population of *C. heros* was evaluated as viable and stable." (Authors)] Address: Holuša, O., Mendel University in Brno, Fac. Regional Development & Intern. Studies, Tr. Generála Píky 7, 613 00 Brno, Czech Republic

**20128.** Holzmann, K.L. (2022): Challenges in a changing climate: The effect of temperature variation on growth and competition in damselflies. MSc thesis, Uppsala University, Disciplinary Domain of Science and Technology, Biology, Biology Education Centre. (Animal Ecology): 30 pp. (in English) ["Climate change is affecting biodiversity on multiple levels all over the world. Concomitant with a higher mean temperature, an increased amplitude of temperature variation is predicted. These fluctuations might be even more challenging for organisms than average temperature increases, as they have been demonstrated to decrease survival and physiological performance. However, little attention has been paid to the effects of thermal variation on species interactions. Temperature-dependence of interacting species might affect abundance and population dynamics of species and should be better understood to apply effective conservation measures. I experimentally investigated the influence of thermal variation on growth, cannibalism, and intraguild predation in larvae of two damselfly species: *Enallagma cyathigerum*, which is a common species in Northern Europe, and *Ischnura elegans*, which is expanding to the north in Europe. The temperature treatment in the experiment included three different levels of amplitude between 20–26°C (average 23°C) and a constant temperature at 23°C. There was no difference between the temperature variation treatments and also no difference between the constant and the variation treatments in growth, cannibalism and intraguild predation. Hence, at the temperature variation used in this experiment, plastic mechanisms may allow individuals to adjust to temperature fluctuations, or short-term effects in the cold and warm-exposure periods cancel each other out. There was a significant positive correlation between cannibalism/predation and body size variation at the start of the experiment. *E. cyathigerum* had higher growth rates than *I. elegans*, but the latter showed higher survival in interspecific treatments. Interestingly, cannibalism was higher than intraguild predation. This study is an important contribution to our understanding of climate change impacts on biotic dynamics, and thus, our ability of making predictions on biodiversity changes in the future." (Authors)] Address: Holzmann, Kim Lea, Uppsala University, Disciplinary Domain of Science & Technology, Biology, Biology Education Centre. (Animal Ecology)

**20129.** Holzmann, K.L.; Charrier, C.; Johansson, F. (2022): Weak effects on growth and cannibalism under fluctuating temperatures in damselfly larvae. Scientific Reports volume 12, Article number: 12910: 10 pp. (in English) ["The Earth's climate is changing with a trend towards higher mean temperatures and increased temperature fluctuations. Little attention has been paid to the effects of thermal variation on competition within species. Understanding the temperature-dependence of competition is important since it might affect dynamics within and between populations. In a laboratory experiment we investigated the effects of thermal variation on growth and cannibalism in larvae of a damselfly. The temperature treatments included three amplitudes between 20 and 26 °C with an average of 23 °C, and a constant con-

trol at 23 °C. Larvae were also raised at five constant temperatures for an estimation of the thermal performance curve, which showed that the thermal optimum for growth was 26.9 °C. Cannibalism was significantly positively correlated with initial body size variance. There was neither a difference among the temperature variation treatments, nor between the constant and the variation treatments in growth and cannibalism. Hence, positive and negative effects of temperature variation within the linear range of a species thermal performance curve might cancel each other out. Since our study mimicked natural temperature conditions, we suggest that the increase in temperature variation predicted by climate models will not necessarily differ from the effects without an increase in variation." (Authors)] Address: Holzmann, Kim Lea, Dept of Ecology & Genetics, Uppsala University, 75236 Uppsala, Sweden. Email: kim.holzmann@evobio.eu

**20130.** Huang, D.-Y.; Liu, Q.; Lian, X.-H.; Fu, Y.-Z.; Nel, A. (2022): A new calopterygid damselfly (Odonata, Zygoptera) from the Oligocene Ningming Basin, Guangxi, South China. *Palaeoentomology* 5.2.3 : 113-119. (in English) ["A new calopterygid genus and species, *Guangxicopteryx huashanensis* gen. et sp. nov., is described from the Oligocene of the Ningming Formation in Guangxi Zhuang Autonomous Region, South China. It probably belongs to the subfamily Calopteryginae, 'in-between' Caliphaea + Noguchiphaea and the other Calopteryginae. This new fossil strongly supports the current hypothesis of a humid subtropical climate for the area at this time." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**20131.** Huber, E.; Aurenhammer, S.; Bauer, H.; Borovsky, R.; Christof, K.; Degasperi, G.; Eckelt, A.; Friess, T.; Fröhlich, D.; Gartler, L.; Glatzhofer, E.; Gorfer, B.; Gunczy, J.; Gunczy, L.W.; Heimburg, H.; Kirchmair, G.; Koblmüller, S.; Komposch, C.; Kunz, G.; Messner, S.; Milek, C.; Oswald, T.; Paill, W.; Papenberg, E.; Rauch, A.; Schattaneck, P.; Staudinger, V.; Strohmriegel, K.; Tarog, A.; Trattnik, E.; Volkmer, J.; Weihs, A.; Wiesmair, B.; Witzmann, M.; Zweidick, O. (2022): Bericht über das siebte ÖEG-Insektencamp: Die bunte Biodiversität des Nationalparks Thayatal (Niederösterreich). *Entomologica Austriaca* 29: 87-181. (in German) ["Report on the seventh "Insect Camp" of the Austrian Entomological Society: colourful biodiversity of the National Park Thayatal (Lower Austria, Austria). The seventh Insect Camp of the Austrian Entomological Society took place in the National Park Thayatal from 18 to 21 June 2021. 24 specialists of entomology, malacology and arachnology and 21 students attended the Insect Camp and/or supported the post-processing of specimens. During the camp time, the participants gained hands-on experience in field research, different trapping, identification and preparation methods. The Insect Camp also provided opportunities to network with specialist entomologists and gather knowledge on scientific work. The study area included 16 different localities in the National Park with different habitats, from water bodies to dry grassland. In total, 1429 species of 19 orders were recorded: 3 species of Dermaptera, 4 of Blattodea, 6 of Odonata, 96 of Heteroptera, 99 of Auchenorrhyncha, 11 of Neuroptera, 3 of Raphidioptera, 1 of Megaloptera 3 of Mecoptera, 67 of Diptera, 26 of Trichoptera, 412 of Lepidoptera, 133 of Hymenoptera, 489 of Coleoptera, 40 of Araneae, 6 of Opiliones, 8 of Pseudoscorpiones, 21 of Pulmonata and 1 of Venerida. In addition, 147 plant species were documented. Worth mentioning are nine new records of different



orders for Lower Austria, like *Mallota cimbiciformis* and *Stenus oscillator*, and one new carabid record for Austria, *Paroponus hirsutulus*." (Authors)] Huber, Elisabeth, Ökoteam-Institut für Tierökologie und Naturraumplanung, Bergmann-gasse 22, A-8010 Graz, Austria.

**20132.** Iorio, E.; Dusoulier, F.; Soldati, F.; Noël, F.; Guil-loton, J.A.; Doucet, G.; Ponel, P.; Dupont, P.; Krieg-Jacquier, R.; Chemin, S.; Tillier, P.; Touroult, J. (2022): Terrestrial arthropods in impact studies: current limitations and proposals for better consideration of conservation issues. *Naturae, Publications scientifiques du Muséum*, 2022.10.5852/naturae2022a4: 58 pp. (in French, with English summary) ["Environmental impact studies are a regulatory process to assess projects that may have significant environmental impacts. It includes a "natural environments" section, where an ecological diagnosis gives an initial status of the site to be assessed, including its wildlife, botanical and habitat concerns, based on bibliographical references and dedicated surveys. The result is the proposal for "ERC" measures (avoid, reduce, compensate) to preserve the environmental issues identified prior to the project. Arthropods are by far the most diverse phylum of the animal kingdom, and should therefore have an important place in an environmental impact study. However, only four orders have species listed in the current regulations, and the phylum of arthropods is poorly represented compared to vertebrates. The review of 50 impact studies shows that only three main groups are studied, relatively related to existing protections: butterflies (*Zygaena* included), dragonflies and Orthoptera, and some protected saprophagous wood-boring beetles. A 'closed-loop' effect occurs, likely inherent in the regulations and many of the associated actions, as these groups are the ones on which knowledge is most advanced and which are the subject of most Red List assessments. This imbalance between the groups covered in the impact studies and the actual diversity of continental arthropods, their specialisations and ecological functions, and their particular distributional characteristics, means that the issues at stake are assessed unequally depending on the habitats and geographical sectors concerned. Thus, butterflies and Orthoptera primarily highlight species and conservation issues for grassland environments, followed secondarily by moors, thickets and scrubland; dragonflies for freshwater environments. Butterflies and dragonflies also include a significant number of species of concern that are associated with peat bogs and marshes. These groups are generally good indicators of the issues affecting these habitats. The beetles that appear most regularly in impact studies highlight isolated trees, hedgerows, tree lines and forest edges. On the other hand, these groups are very few valuable to highlight conservation issues for arthropods of the coastal and closed forest environments. Butterflies and dragonflies are among the arthropods with the lowest rates of endemism in metropolitan France, which means that this conservation issue is under-represented in the impact studies. Functional guilds such as coprophagous, necrophagous or litter predators and decomposers are virtually almost forgotten in impact studies. This article proposes six groups for which knowledge has progressed well over the last 10 to 20 years and which would provide an ecological and taxonomic complement to the species currently used in regulatory studies: centipedes (Chilopoda), woodlice (Isopoda, Oniscidea), long-horned beetles (Cerambycidae and Vesperidae), Scarabaeoidea and Tenebrionidae, and shield-bugs (Heteroptera, Pentatomoidea). Most of the species of high concern in these six groups are found on beaches or dunes, forests or environments such as caves, cliffs or screes.

Centipedes, woodlice and Tenebrionidae beetles have a large number of endemics and a high national responsibility. Beaches and coastal environments, from the shore to the dunes, are the most striking example of under-representation in protected species and current impact studies, with dozens of specialised species at risk and no umbrella species to protect them. To a lesser extent, the same applies to closed forests. Caves appear to be of less concern. However, the often narrow distribution of the endemic arthropods they house means that the stakes are not to be underestimated. The protection lists therefore need to be completed with groups other than those taken into account so far, but in a manner appropriate to continental arthropods. Protection should prioritise habitats and not specimens, in correlation with the particularities of their study and their biology. For butterflies, dragonflies and Orthoptera, although a large number of regulated species remain relevant, the lists need to be revised. This study proposes a list of 135 species with high conservation concerns in nine arthropod groups. If this list was taken into account by environmental agencies, landscape planners and environmental authorities, it would reflect the challenges for continental arthropods in impact studies and thus enable measures to be taken that are better suited to their conservation." (Authors)] Address: Iorio, É., ECOTER (Écologie & Territoires), 44 route de Montélimar, F-26110 Nyons, France

**20133.** Jakubiak, M.; Bojarski, B.; Bien, M.; Stonawski, B.; Oglecki, P. (2022): Influence of fish ponds on the benthic invertebrate composition in hydrological networks of selected fish farms in Southern Poland. *Folia Biologica (Kraków)* 70: 11-18. (in English) ["Fish production can generate high amounts of wastewater containing compounds such as suspended solids, nitrogen and phosphorus. On the other hand, fish ponds provide a range of ecological functions including biocenotic, physiocenotic, hydrological and microclimatic functions as well as landscape shaping. The aim of this study was to determine the taxonomic composition of the bottom invertebrate fauna in selected watercourses on chosen carp fish farms and to assess the influence of fish farming on the taxonomic composition of the zoobenthos of the watercourses associated with such ponds. The research was conducted in four channels on two semi-intensive aquaculture fish farms located in Zaborze and Kraków (Poland). Sampling of the benthic fauna was carried out once a month between May and September 2018. The results showed that the mean monthly number of zoobenthos families in the inflow canal in Zaborze was higher than those in the outflow canal. Moreover, a decrease of the BMWP-PL index in the aforementioned farm may indicate a deterioration of the water quality resulting from its flow through the ponds. It can therefore be concluded that semi-intensive carp farming may affect the diversity of benthic invertebrate fauna in the watercourses connected to these ponds." (Authors)] Address: Jakubiak, M., Dept of Environmental Management and Protection, Faculty of Mining Surveying and Environmental Engineering, AGH University of Science and Technology, Mickiewicza 30, 30-059 Kraków, Poland. Email: jakubiak@agh.edu.pl

**20134.** Jana, P.K.; Mallick, P.H.; Bhattacharya, T. (2022): Aspects of the reproductive behaviour of *Onychargia atrocyana* (Odonata: Platycnemididae). *Notulae odonatologicae* 9(9): 429-440. (in English) ["Reproductive behaviour of *Onychargia atrocyana* was investigated from tandem formation to post-ovipositional resting. No male territoriality, aggression or courtship display was observed at the mating

site. The species preferred to mate and oviposit on *Alternanthera philoxeroides* stems or *Colocasia esculenta* petioles. The duration of copulation was 212–568 sec. Copulation was accomplished in three stages involving abdominal flexions and wing flapping. The female oviposited while in tandem on submerged stems and petioles of macrophytes. Oviposition was endophytic in rows forming a zigzag pattern. There were distinct post-copulatory (8–92 sec.) and post-ovipositional resting phases (up to 225 sec.)." (Authors)] Address: Jana, P.K., Dept of Zoology, Vidyasagar University, Midnapore, Paschim Medinipur, West Bengal, 721102, India. Email: priyanka@mail.vidyasagar.ac.in

**20135.** Jana, P.K.; Mallick, P.H.; Bhattacharya, T. (2022): Triple connection and female takeover in *Copera marginipes* (Odonata: Platycnemididae). *Notulae odonologicae* 9(9): 461–468. (in English) ["A territorial male of *C. marginipes* established a triple connection with an intruding male and his female partner in tandem. Both the males exhibited intense prolonged agonistic interactions including biting various parts of the body. The fight lasted for 46 minutes. Eventually the territorial male was able to break the tandem linkage and took over the female from the intruding male, but he lost the tarsus of his right mid leg in the interaction." (Authors)] Address: Jana, P.K., Dept Zoology, Vidyasagar Univ., Midnapore, Paschim Medinipur, West Bengal, 721102, India. Email: priyanka@mail.vidyasagar.ac.in

**20136.** Jocque, M.; Garrison, R.W. (2022): Dragonflies of Cusuco National Park, Honduras; checklist, new country records and the description of a new species of *Palaemnema* Selys, 1860 (Odonata: Platystictidae). *Zootaxa* 5188(5): 453–476. (in English) ["The odonate fauna of Honduras is poorly documented. Based on 10 years of observations and collections we present an overview of dragonflies from cloud forests in Cusuco National Park, northwestern Honduras. A total of 44 species were reported including at least seven new country records for Honduras we include ecological observations for most species. A new species of Platystictidae (*Palaemnema lorae* Jocque & Garrison, n. sp. Holotype male: HONDURAS: Cortés Dept., CNP, Cantiles, Trail 5, small river close to camp, N15.513457 W88.241681; 1846m, 23 June 2012 collected by Merlijn Jocque, field code: BINCO\_HON\_12\_047, in RBINS) is described and illustrated." (Authors)] Address: Jocque, M., Aquatic and Terrestrial Ecology (ATECO), Royal Belgian Institute of Natural Sciences (RBINS) Vautierstraat 29, 1000 Brussels, Belgium. Email: merlijnjocque@gmail.com;

**20137.** Jödicke, R. (2022): On the validity of Vander Linden's name *Agrion viridis* (Odonata: Lestidae). *Notulae odonologicae* 9(9): 398–403. (in English) ["A few papers have questioned the validity of the name *Agrion viridis* Vander Linden, 1825 [= *Chalcolestes viridis*], arguing that it is preoccupied by a senior homonym *A. viridis* Vander Linden, 1820, itself a junior synonym of *A. barbara* Fabricius, 1798 [= *Lestes barbarus*]. I have designated a neotype of *A. viridis* Vander Linden, 1820, in line with *L. barbarus*. The prevailing usage of the specific name *viridis* Vander Linden, 1825, can be maintained by a reversal of precedence: The junior homonym should be considered a nomen protectum over its senior homonym *A. viridis* Vander Linden, 1820, now a nomen oblitum." (Author)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: reinhard.joedicke@ewetel.net

**20138.** Jödicke, R.; Borkenstein, A. (2022): *Sympetrum fonscolombii* in Niedersachsen: ein Modell zu Immigration

und Reproduktion am Nordrand des transalpinen Invasionsraums (Odonata: Libellulidae). *Libellula* 41(1/2): 1–24. ["*S. fonscolombii* in Lower Saxony, northwestern Germany: a model of immigration and reproduction at the northern edge of the transalpine invasion – Since the 1990s *S. fonscolombii* increasingly became a regular immigrant. It was annually present at many different places in Lower Saxony from 2005 onwards. A separation of the data into immigrants or their progeny was problematic because most observers did not report their data on imagines with a sufficient age specification. However, by means of special requests the following picture arose: Immigrants were on the wing from early May until August. They arrived in almost or completely mature colouration and oviposited from mid-May until mid-July. At one lake, in 2019, the immigrants stayed for at least 68 days. At many places the migrants' offspring emerged in the same year. The long emergence period started presumably in mid-July and continued until early November, demonstrating a short development cycle, even in the North. Emerged individuals left their breeding site in an immature stage. Six cases of spring emergence were documented. We therefore conclude that, in a proportion of the eggs laid, larvae were unable to develop and reach emergence within the same year. Those individuals hibernated in the larval stage and emerged between mid-May and early July in the subsequent year, thus representing a univoltine life cycle. Nothing is known about their destiny. The model presented here is based on the evidence-based assumption that immigrants establish only one subsequent generation, which predominantly emerges within the same year, but does not mature in the invasion area. Larvae which do not reach the ultimate stage until the autumn hibernate and emerge in the following spring, just in the period when the next immigrants appear. This model is broadly supported by further data from northwestern Europe, but there are controversial interpretations which are discussed. The contradictory issue could be solved if in future more observers pay attention to the age of imagines seen." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. Email: reinhard.joedicke@magenta.de

**20139.** Jöhnk, B.; Jödicke, R. (2022): Über ein immatures Weibchen von *Leucorrhinia rubicunda* mit keulenförmigem Abdomenende (Odonata: Libellulidae). *Mitteilungen der AG Libellen in Niedersachsen und Bremen* 4: 39–40. (in German) [Diepholzer Moor, Niedersachsen, Germany, 10-V-2022] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. Email: reinhard.joedicke@magenta.de

**20140.** Joshi, S. (2022): *Platygomphus benritarum* sp. nov. and rediscovery of *Anormogomphus heteropterus* Selys, 1854 (Odonata: Anisoptera: Gomphidae) from Tezpur, Assam, India. *International Journal of Odonatology* 25: 62–71. (in English) ["*A. heteropterus* is redescribed based upon a single male specimen. Discrepancies and inaccuracies in previous illustrations of this species that could cause confusion are pointed out. *Platygomphus benritarum* sp. nov. is described on the basis of a single male specimen collected at Tezpur, Sonitpur District, Assam, India. *Platygomphus benritarum* differs from its congeners and other, similar species such as *Asahinagomphus insolitus* (Asahina, 1986) by its thoracic markings and shape of the abdomen and cerci." (Authors)] Address: Joshi, A., Research Collections, National Centre for Biological Sciences, Bangalore, India; Southern Regional Centre, Zoological Survey of India,

Chennai 600028, India

**20141.** Joshi, S., Sawant, D.; Ogale, H., Kunte, K. (2022): *Burmagomphus chaukulensis*, a new species of dragonfly (Odonata: Anisoptera: Gomphidae) from the Western Ghats, Maharashtra, India. *Zootaxa* 5133(3): 413-430. (in English) ["We describe a new species of dragonfly, *Burmagomphus chaukulensis* sp. nov., based on four males and two females from Chaukul, Sindhudurg, Maharashtra located in the Western Ghats biodiversity hotspot of India. The newly described species is diagnosed from its congeners by a combination of following characters: the shape of male caudal appendages (prominent lateral spines on cerci) and the lateral thoracic markings (stripe on mesepisternum reduced and pointed anteriorly). Additionally, *B. chaukulensis* is unique in terms of the shape of hamuli, strongly angulated with spines at both sides. An updated identification key to Indian *Burmagomphus* spp. is also provided." (Authors)] Address: Joshi, S., Zoological Survey of India, Southern Regional Centre, Santhome High Road, Chennai 600028, Tamil Nadu, India. Email: shantanu@ifoundbutterflies.org

**20142.** Jouault, C.; Tischlinger, H.; Henrotay, M.; Nel, A. (2022): Wing coloration patterns in the Early Jurassic dragonflies as potential indicator of increasing predation pressure from insectivorous reptiles. *Palaeoentomology* 5(4): 305-318. (in English) ["Wing coloration is a very ancient feature among insects. Even the wings of the oldest known Pterygota showed transverse colored bands involved in a putative disruptive function. However, no evidence of wing coloration in the representatives of the superorder Odonoptera is recorded before the latest Triassic. These were the only insect flying-predators until the pterosaurs began their diversification. Here we argue that the situation dramatically changed in the Early Jurassic, with the simultaneous appearance of Odonata with patterns of coloration in phylogenetically distant clades. It is especially the case in the Heterophlebiidae, a small family closely related to the Anisoptera, in which we could record no less than five different patterns of coloration in the same rather small area of North-Western Europe. At the same time and in the same area, small potentially insectivorous pterosaurs greatly diversified. The increase of the predation pressure on the Odonata is the most probable cause of the appearance of patterns of colored spots and bands on the dragonfly wings at that time. In the period between the Middle Jurassic to Early Cretaceous, the number of Odonata with spots and bands of color on wings dramatically increased, we assume in relation to the predation pressure due to an increasing diversification of insectivorous pterosaurs, but also small feathered dinosaurs and birds." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**20143.** Kalejta, M.; Buczynski, P. (2022): New locality of Golden-ringed Dragonfly *Cordulegaster boltonii* (DONOVAN, 1807) (Odonata: Cordulegastridae) in its disjunct range in the Romincka Forest. *Odonatrix* 187: 3 pp. (in Polish, with English summary) ["*C. boltonii* was recorded on 11th August 2022 on the River Bludzia near the Bludzie forster's lodge (N 54.323489; E 22.575684) in north-eastern Poland. This is the fifth locality of the species in the Romincka Forest. These five localities (one in Russia and four in Poland), together with two other localities in the Suwalski Landscape Park, form a disjunct area of the species' distribution situated ca. 300 km east of its contiguous range. It is very likely that there are more localities inhabited by this species in north-eastern Poland." (Authors)] Address:

Kalejta, Mirosława, ul. Alfreda Wierusza-Kowalskiego 13/38, 16-400 Suwalki, Poland. Email: mira0512@onet.eu

**20144.** Kalkman, V.J. (2022): On the synonymy of *Cordulegaster orientalis* Van Pelt, 1994, with *Cordulegaster boltonii* (Donovan, 1807) (Odonata: Cordulegastridae). *Notulae odonatologicae* 9(9): 414-418. (in English) ["*C. orientalis*, which was described from a single male from Shandong Province, China, is concluded to be a mislabelled specimen of the European *C. boltonii*." (Author)] Address: Kalkman, V.J., Natural Biodiversity Center, naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**20145.** Kalkman, V.J.; Gurung, M.M.; Zhang, H.-m. (2022): On the Asian species of *Perissogomphus* Laidlaw, 1922, and *Ophiogomphus* Selys, 1854 (Odonata: Gomphidae). *Notulae odonatologicae* 9(9): 389-397. (in English) ["Based on larval and adult morphology *Perissogomphus* Laidlaw, 1922, is shown to be close to *Ophiogomphus* but is not synonymised due to conflicting molecular COI-data. *Perissogomphus asahinai* Zhu, Yang & Wu, 2007, is shown to be a synonym of *Perissogomphus stevensi*. *Ophiogomphus longihamulus* Karube, 2014, *O. minimus* Karube, 2014, *O. phantoani* Phu Ngo & Ty Nguyen, 2021, and *O. sinicus* (Chao, 1954), clearly do not belong to the genus *Ophiogomphus* and are placed in *Melligomphus*. By this analysis the number of species of *Ophiogomphus* is reduced to 25, of which four occur in the Palaearctic and 21 occur in the Nearctic." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**20146.** Karunarathna, D.S.; Gauder, S.I.; Rathnayake, R.R.M.U.N.B.; Dammini Premachandra, W.T.S. (2022): Diversity and abundance of odonates (Order: Odonata) in Gurudeniya, Kandy District, Sri Lanka. Vingnanam Research Conference, 21st of July 2022, Faculty of Science, University of Jaffna, Sri Lanka: 37- (in English) [Verbatim: The previously unexplored Gurudeniya region in Kandy district was surveyed for adult odonate diversity and abundance. Three habitats, i.e., along the "Thalathuoya" tributary, adjacent forest cover and a home garden, were selected for the study. Sampling was conducted twice a week, during 8 am - 9 am and 4 pm - 5 pm for three months from October to December 2021, along a 200 m × 4 m belt transect. Altogether, 1933 odonate individuals belonging to eight families and fourteen species were recorded and they represented 43 % of the suborder Anisoptera and 57 % of Zygoptera, respectively. We detected eight endemic, three endangered and four vulnerable species. The Libellulidae was found to be the most diverse family, comprised of four species inhabiting only the tributary area. Calopterygidae, Gomphidae and Platycnemididae had two species in each. *Vestalis apicalis nigrescens*, *Euphaea splendens* and *Ceylonosticta* bina, were recorded as common inhabitants at all the study sites. *Vestalis apicalis nigrescens* and *Trithemis festiva* were the dominant Zygopteran and Anisopteran species with 37 % and 30 % relative abundance, respectively. The tributary had the most diverse and abundant odonate community, comprising fourteen species and 70 % relative abundance with a Shannon-Wiener diversity index of 1.94. At all of the study sites, the family Calopterygidae was abundant in terms of tributary 44 %, woodland 78 % and residential garden 89 %, respectively. In the majority of the odonate species, males outnumbered females. The findings of this study elucidated the odonates at Gurudeniya within a short

period of time. An extensive study is underway to determine the larval and adult assemblages.] Address: Premachandra, Dammini, Dept of Zoology, Faculty of Science, University of Ruhuna, Sri Lanka. Email: dammini@zoo.ruh.ac.lk

**20147.** Keetapithchayakul, T.S.; Makbun, N.; Phan, Q.T.; Danaisawadi, P.; Wongkamhaeng, K. (2022): Description of the larva of *Indocnemis orang* (Förster in Laidlaw, 1907) (Odonata: Platycnemididae: Calicnemiinae) from Thailand, with larval key to the known genera of the family Platycnemididae in Asia. *Zootaxa* 5134(4): 504-520. (in English) ["The larval characters of the genus *Indocnemis* Laidlaw, 1917 are described based on larval specimens of *I. orang* (Förster in Laidlaw, 1907) from Thailand. The larvae are characterized by 5–6 pairs of premental setae, 8–9 palpal setae of the same length, and vertical lamella caudal gills. The habitats and new provincial records of *I. orang* in Thailand are also provided in addition to a key to the genera of the family Platycnemididae in Asia." (Authors)] Address: Keetapithchayakul, T.S., Dept Zool., Fac. Science, Kasetsart Univ., 50 Ngam Wong Wan Rd, Lat Yao Chatuchak Bangkok, Thailand. Email: Keetapithchayakul.TS@gmail.com

**20148.** Keith D.P. Wilson, K.D.P.; Reels, G.T. (eds.) (2022): New books. *Agrion* 26(2): 54-56. (in English) [A Photographic Field Guide to the Dragonflies & Damselflies of Singapore 54; Dragonflies and Damselflies of Madagascar and the Western Indian Ocean Islands/Libellules et Demoiselles de Madagascar et des Iles de l'Ouest de l'Océan Indien 55; Dragonflies of Russia: Illustrated Photo Guide 56.] Address: Wilson, K.D.P.; 18 Chatsworth Road, Brighton, BN1 5DB, UK. Email: kdpwilson@gmail.com

**20149.** Koneri, R.; Nangoy, M.J.; Elfidasari, D. (2022): Odonata diversity in the Laine Waterfall Area, Sangihe Islands, North Sulawesi, Indonesia. *AACL Bioflux* 15(3): 1083-1095. (in English) ["In the ecosystem, Odonata functions as a biological control agent and an indicator of the freshwater environment. Therefore, this research aims to analyze Odonata diversity in the Laine Waterfall Area, Sangihe Islands, North Sulawesi, Indonesia. The sampling was carried out in 3 types of aquatic habitats, namely waterfalls, secondary forests, and agricultural land. In each habitat, 3 line transects with a length of 100 m were constructed around the river flow and the sampling was conducted along the transect using a sweep net. The results obtained a total of 5 families, which consists of 25 species and 928 individuals of dragonflies. Among the families, Libellulidae was dominant, while the species with the highest abundance was *Nososticta flavipennis*. Furthermore, the highest abundance, richness, and species diversity index were discovered in waterfall habitats. This showed that the research location is suitable for dragonfly activity due to several factors, namely temperature, humidity, and light intensity, which were normal for the species' activity." (Authors)] Address: Koneri, R., Dept Biol., Fac. Mathematics & Natural Sciences, Sam Ratulangi University, Manado, North Sulawesi, Indonesia. Email: ronicaniago@unsrat.ac.id

**20150.** Koneri, R.; Nangoy, M.J.; Siahaan, P. (2022): Species diversity of dragonflies on the Sangihe Islands, North Sulawesi, Indonesia. *Applied Ecology and Environmental Research* 20(2): 1763-1780. (in English) ["The diversity of dragonflies on an island is strongly influenced by habitat degradation, as well as the size and distance from the mainland. Therefore, this study aims to analyze the species diversity of dragonflies in the Sangihe Islands, North Sulawesi, Indonesia. It was carried out in five types of habitats

namely forests, waterfalls, dams, agricultural land, and settlements. In each habitat, four-line transects with a length of 100 m each were made and placed around the river. The results showed 6 families which included 32 species and 3020 individuals. Libellulidae is the family with the highest number of species. Furthermore, the dominant species in the suborders Anisoptera and Zygoptera were *Orthetrum prunosum* and *Rhinocypha frontalis*, respectively. Forests, waterfalls, and dams tend to have the highest species richness and diversity index compared to other habitats. Based on the results, the diversity of dragonflies at the observation site is strongly influenced by the complexity of the vegetation and environmental factors, including temperature and humidity. The presence of the families Chlorocyphidae, Calopterygidae, and Platycnemididae in each of the studied habitats indicates that the water quality is still very good and supports the life of dragonflies." (Authors)] Address: Koneri, R., Dept Biol., Fac. Mathematics & Natural Sciences, Sam Ratulangi University, Manado, North Sulawesi, Indonesia. Email: ronicaniago@unsrat.ac.id

**20151.** Kownacki, A.; Szarek-Gwiazda, E. (2022): The impact of pollution on diversity and density of benthic macroinvertebrates in mountain and upland rivers. *Water* 2022, 14(9), 1349; <https://doi.org/10.3390/w14091349>: 14 pp. (in English) ["This article summarizes the studies concerning the impact of pollutants on benthic macroinvertebrate communities in the mountain and upland rivers of southern Poland. The Carpathian Raba River, which in the 1960s retained its natural character and had good water quality, was considered as a reference in terms of benthic macroinvertebrate communities. The other two analyzed rivers were polluted to different degrees. The Carpathian Dunajec River was contaminated mainly by sewage from small towns and treatment plant, while the upland Vistula River mainly by sewage from the Upper Silesian Industrial Region and saline waters from coal mines. In studied ecosystems in response to pollutions, a rapid increase in density of fauna caused mainly by the massive development of *Oligochaeta* was found. In the mountain river, the impact of contamination on macroinvertebrate diversity was negligible. There, taxa considered as indicators of clean water (Ephemeroptera, Plecoptera, and Trichoptera) were abundant and their diversity was similar to that of an uncontaminated river. In the heavily polluted upland Vistula River, the sites with a muddy bottom were dominated by *Oligochaeta* (99.4–99.9%), while at sites with stony bottoms, apart from *Oligochaeta*, there were also Chironomidae, Gastropoda, and Hirudinea. In comparison to the 1950s, all Ephemeroptera, Plecoptera, Odonata, Trichoptera, and Megaloptera were extinct." (Authors)] Address: Szarek-Gwiazda, Ewa, Institute of Nature Conservation PAS, av. Mickiewicza 33, 31-120 Kraków, Poland. E-mail: szarek@iop.krakow.pl

**20152.** Kumar, C.S.; George, B.S.; Anooj, S.S. (2022): Range extension and high altitudinal record of *Sympetrum meridionale* (Selys) (Odonata: Libellulidae). *Indian Journal of Entomology*, Online published Ref. No. e20353; <https://doi.org/10.55446/IJE.2021.301>: 4 pp. (in English) ["*S. meridionale* (Selys, 1841) occurs throughout Asia Minor to Persia and Kashmir. The earlier Indian records of *S. meridionale* are from Yusimarg, 2286 m, and from below Gulmarg, 2438 m, Kashmir valley. Herein, the range extension and high altitudinal record of this species is reported from the Indus riverine, Leh, Ladakh Union territory of India at an elevation of 3500 m. A note on the habitat, which is entirely different from that of Kashmir valley, its originally known habitat, is provided. Study of museum specimens reveals



the eastern most record of the species, from Sikkim and an additional new record from Srinagar. The species diagnosis including comparison of male genitalia, along with the need to validate the previous records from Rajasthan and further surveys along Himalaya and lower latitudes are discussed." (Authors)] Address: Anooj, S.S., Division of Entomology, ICAR-Indian Agricultural Research Institute, New Delhi 110012, India. Email: anooj227@gmail.com

**20153.** Kumar, K.; Singh, A.P., Singh, R. (2022): The diversity of Odonata (Insecta) in selected localities of Jammu and Kashmir. *Indian Forester* 148(5): 547-551. (in English) ["A total of 32 species of odonates were recorded from three different regions of Jammu during June 2019 to August 2020 (Table 2). All species were photographed and presented here in the study (Plate 1 and 2). Twenty two species of Anisoptera and ten species of Zygoptera consists of 7 families and 25 genera. Libellulidae was the dominant family (n=18), followed by Coenagrionidae with 4 species, Aeshnidae, Gomphidae, Calopterygidae, Platycnemididae with 2 species each and least Chlorocyphidae with 1 species (Fig. 1). In our knowledge 15 species of Anisoptera and 10 species of Zygoptera are addition to the fauna of Jammu and Kashmir. High diversity was recorded from the Kathua region followed by Rajouri and Poonch (Fig. 2)." (Authors) A *Gynacantha dravida* B. *Polycanthagyna erythromelas* C. *Ictinogomphus rapax* D. *Ophiogomphus reductus* E. *Orthetrum pruinosum* F. *Trithemis festiva* G. *Orthetrum sabina* H. *Diplacodes trivialis* I. *Rhyothemis variegata* J. *Zygomma petiolatum* K. *Trithemis aurora* L. *Acisoma panorpoides* M. *Brachythemis contaminata* N. *Orthetrum triangulare* O. *Crocothemis servilia* P. *Orthetrum glaucum* Q. *Trithemis festiva* R. *Neurothemis tullia* S. *Bradynopyga geminata*. *Sympetrum commixtum* B. *Tholymis tillarga* C. *Neurothemis fulvia* D. *Neurobasis chinensis* E. *Aristocypha quadrimaculata* F. *Libellago lineata* G. *Pseudagrion rubriceps* H. *Ceriagrion coromandelianum* I. *Enallagma cyathigerum* J. *Paracercion calamorum* K. *Copera marginipes* L. *Copera vittata* M. *Coeliccia renifera*] Address: Singh, A.P., Wildlife Institute of India, Post Box # 18, Chandrabani, Dehradun - 248001, India. Email: amarpaulsingh4@gmail.com

**20154.** Kumari, B.; Priya, A. (2022): Seasonal variation in insect biodiversity in a transitioning sub-urban area. *International Journal of Zoological and Entomological Letters* 2(1): 42-49. (in English) ["A survey was carried out on the species diversity of insects in the suburban transition area of Patna. The study was conducted over a one-year period of 2021 (January to December). A total of 41 species of insects have been identified in a small area (10 acre), with Lepidopteran order (20) are dominance over the Hemiptera (5), Hymenoptera (5), Coleoptera (4), Odonata (3), and Polydesmida, Mantodea, Diptera, and Orthoptera one species each. All of these species are found based on seasonal variation and vegetation as well as the presence of built-up areas. The highest number of insect species was in September, and the lowest were in May and December. Species of *Syntormoides imacon* and *Mylabris flexuosa* were captured during the mating conditions in the months of August and September (rainy season), respectively. These variation indicates the abundance of insect biodiversity and also provides evidence of the abundant food chain of ecosystems." (Authors) *Potamarcha congener*, *Diplacodes trivialis* and *Ceriagrion cerinorubellum* are listed.] Address: Kumari, Bibha, Dept of Zoology, Magadh Mahila College, Patna University Patna, Bihar, India

**20155.** Kusumaningrum, A.T.; Henri, H.; Saputra, H.M.

(2022): Odonata diversity at the Mount Permisan Natural Tourism Park South Bangka regency, Bangka Belitung. *Bi-Link: Jurnal Biologi Lingkungan, Industri dan Kesehatan* 9(1): 66-75. (in English) ["Mount Permisan Natural Tourism Park, South Bangka regency is a conservation area that contains flora and fauna. The diversity of fauna in conservation areas is important to note because fauna can maintain the balance of natural ecosystems. This study aims to analyze the diversity of species and the effect of habitat characteristics on the Odonata population. Odonata sampling was carried out using an insect net randomly at a predetermined point in the left and right directions of the 100 m transect line. Identification was carried out at the Entomology Laboratory, Agricultural Quarantine Center Pangkalpinang, and compared with a comparison sample at the Zoology Laboratory, Biology Dept, Universitas Bangka Belitung. Based on the research that has been done, found 14 species of Odonata from the sub-order Anisoptera and 11 species of damselfishes from the sub-order Zygoptera. The species diversity at that location was classified as moderate because H' was 1.56 to 2.05. The evenness value is high with a value of 0.62 to 0.90. The species of wealth (Margalef) is in the range of values from 2.55 to 2.75 which indicates the species richness of dragonflies in the Mount Permisan Natural Tourism Park index is classified as moderate." (Authors)] Address: Henri, H., Biology Dept, Faculty of Agriculture, Fisheries and Biology, Universitas Bangka Belitung, Indonesia. E-mail: biology.henry@gmail.com

**20156.** Kuziora, P. (2022): Confirmation of the occurrence of Golden-ringed Dragonfly *Cordulegaster boltonii* (DONOVAN, 1807) (Odonata: Cordulegasteridae) in the Janowskie Forests. *Odonatrix* 186: 2 pp. (in Polish, with English summary) ["*C. boltonii* was recorded on June 5th (1 exuvia) and 12 th June 2022 (at least 3 imagines) on the River Dêbowiec near Lipowiec (eastern part of the Janowskie Forests) (SE Poland). This is a new locality of this species in the Janowskie Forests." (Author)] Address: Kuziora, P.; Email: pawelkuziora1@gmail.com

**20157.** Lancer, B.H.; Evans, B.J.E.; Fabian, J.M.; O'Carroll, D.C.; Wiederman, S.D. (2022): Preattentive facilitation of target trajectories in a dragonfly visual neuron. *Communications Biology* 5(829): 13 pp. (in English) ["The ability to pursue targets in visually cluttered and distraction-rich environments is critical for predators such as dragonflies. Previously, we identified Centrifugal Small-Target Motion Detector 1 (CSTMD1), a dragonfly visual neuron likely involved in such target-tracking behaviour. CSTMD1 exhibits facilitated responses to targets moving along a continuous trajectory. Moreover, CSTMD1 competitively selects a single target out of a pair. Here, we conducted in vivo, intracellular recordings from CSTMD1 to examine the interplay between facilitation and selection, in response to the presentation of paired targets. We find that neuronal responses to both individual trajectories of simultaneous, paired targets are facilitated, rather than being constrained to the single, selected target. Additionally, switches in selection elicit suppression which is likely an important attribute underlying target pursuit. However, binocular experiments reveal these results are constrained to paired targets within the same visual hemifield, while selection of a target in one visual hemifield establishes ocular dominance that prevents facilitation or response to contralaterally presented targets. These results reveal that the dragonfly brain preattentively represents more than one target trajectory, to balance between attentional flexibility and resistance against distraction." (Authors)] Address: Lancer, B.H., School of Biomedicine, The

University of Adelaide, Adelaide, Australia. Email: benjamin.lancer@adelaide.edu.au

**20158.** Lechner, K. (2022): Erstnachweis von *Gomphus pulchellus* Selys, 1840 (Odonata: Gomphidae) in Tirol (Österreich) – Ein Vorstoß in den Alpennordrand. *Entomologica Austriaca* 29: 29-37. (in German, with English summary) ["First record of *Gomphus pulchellus* Selys, 1840 (Odonata: Gomphidae) in Tyrol (Austria) – an advance into the northern edge of the Alps. *Gomphus pulchellus* Selys, 1840, the Western Clubtail, is a Western European endemic dragonfly and has expanded its range over the last decades rapidly to the North and East. In Austria, the first specimens were discovered in 1985/1986 in Vorarlberg. In 2006, this dragonfly was found in Salzburg, and very recently, it reached the Upper Austrian-Bavarian border resp. Lower Austria. In 2020, the author observed a female of the Western Clubtail for the first time in Tyrol, which is reported in this article. This record represents probably the most extensive advance in the Alps until now. Its occurrence in the Tyrolean Lechtal is discussed in light of the species' recent spread and its known ecological demands in Central Europe." (Author)] Address: Lechner, M., Wiesenhofweg 22, 6133 Weerberg, Austria. Email: lechner.weerberg@gmail.com

**20159.** Lemke, M.; Hryniuk, P. (2022): First record of the dragonfly biting midge *Forcipomyia paludis* (Diptera: Ceratopogonidae) in Ukraine. *Ukrainska Entomofaunistyka* 13(1): 7-10. (in English, with Ukrainian summary) ["Based on unnoticed photograph of immature adult male *Cordulia aenea* with three females of the dragonfly biting midge *Forcipomyia* (*Pterobosca*) *paludis* (Macfie, 1936) parasitizing on it in the National Nature Park "Northern Podillya", Lviv Region, western Ukraine, the latter species is recorded from Ukraine for the first time. The photo was uploaded in the open natural history online database of the Ukrainian Biodiversity Information Network (UkrBIN) and was later discovered there. This record extends the known range of *F. paludis* to Eastern Europe." (Authors)] Address: Lemke, M., Am Grüneberg 37, 66557 Illingen, Germany. Email: malemke@gmx.de

**20160.** Li, Z.; Sun, L.; Wang, Z.; Zhao, S.; Duo, L. (2022): The Critically Endangered dragonfly *Libellula angelina* is losing its habitat to urbanization in East Asia. *Oryx* 56(2): 172- (in English) ["The Critically Endangered dragonfly *Libellula angelina*, known as the bekko tombo, of central and northern China, Japan, western South Korea, and North Korea, was common before 1970 but has declined dramatically as a result of habitat loss caused by urbanization. In China, natural ponds and wetland parks have facilitated the survival of this species in megacities such as Beijing and Tianjin, but habitat degeneration in some cities appears to be resulting in further decline of the species. The natural ponds around the Chentai Bridge in Beichen district, Tianjin, one of the historical habitats of the bekko tombo, suffered a severe drought from excessive pumping for irrigation in spring 2020, followed by excessive water supplementation that increased the original water level in autumn 2020. In Tianjin Water Park, another habitat of the bekko tombo, sediment was dredged and reeds mowed, destroying habitat for the species' nymphs and imagoes, respectively, in 2020. During 15 April–15 May 2021, we surveyed for the bekko tombo in these two habitats on 18 occasions, concentrating on their preferred microhabitats in reeds and open grassland, but failed to find the species. Prior to this, the bekko tombo was commonly seen in these two areas in spring. The prime habitat for the bekko tombo is unmodified, stable

and organic-rich ponds with open water and moderate growth of emergent plants. Urbanization and habitat degradation, accompanied by reclamation, drought, contamination, sediment dredging, mowing of reeds and shrinkage of wetlands, are driving the collapse of the remaining populations of the bekko tombo. Measures are required to maintain the integrity of the species' habitat by protecting wetlands from urbanization and anthropogenic modification, with a halt to inappropriate dredging and mowing." (Authors)] Address: Li, Z., College of Life Sciences, Tianjin Normal University, Tianjin, China, and Tianjin Key Laboratory of Animal and Plant Resistance, Tianjin, China duolian\_tjnu@163.com

**20161.** Liao, J.; Wang, H.; Xiao, S.; Guan, Z.; Zhang, H.; Dumont, H.J.; Han, B.-P. (2022): Modeling and prediction of the species' range of *Neurobasis chinensis* (Linnaeus, 1758) under climate change. *Biology* 2022, 11(6), 868; <https://doi.org/10.3390/biology11060868>: 14 pp. (in English) ["Simple Summary: Global climate change is accelerating and modifying the distribution of many extant species. Dragonflies, as a group, inhabit aquatic as well as terrestrial environments and are considered sensitive climate change indicators. In this study, we model and predict the range of a large, tropical damselfly *Neurobasis chinensis* L. under the last glacial maximum (LGM), the current, and four future warming scenarios. The models show that the species mainly occupies forest ecosystems below 1200 m (preferring 500 to 1200 m) and had two historic core distribution areas in LGM, one of which survived, namely south-central Vietnam. The future scenarios show that the core distribution, high suitable habitats, and even the whole species range of *N. chinensis* will extend northwards. Abstract: *Neurobasis chinensis* is widely distributed in eastern tropical Asia. Its only congener in China, the *N. anderssoni*, has not been observed for decades. To protect *N. chinensis*, it is necessary to understand the ecological properties of its habitats and species' range shift under climate change. In the present study, we modeled its potential distribution under one historical, current, and four future scenarios. We evaluated the importance of the factors that shape its distribution and habitats and predicted the historical and current core spatial distributions and their shifting in the future. Two historical core distribution areas were identified: the inland region of the Bay of Bengal and south-central Vietnam. The current potential distribution includes south China, Vietnam, Laos, Thailand, Myanmar, Luzon of Philippines, Malaysia, southwest and northeast India, Sri Lanka, Indonesia (Java, Sumatra), Bangladesh, Nepal, Bhutan, and foothills of the Himalayas, in total, ca.  $3.59 \times 10^6$  km<sup>2</sup>. Only one core distribution remained, concentrated in south-central Vietnam. In a warming future, the core distribution, high suitable habitats, and even the whole range of *N. chinensis* will expand and shift northwards. Currently, *N. chinensis* mainly resides in forest ecosystems below 1200 m above sea level (preferred 500 m to 1200 m a.s.l.). Annual precipitation, mean temperature of driest quarter, and seasonality of precipitation are important factors shaping the species distribution. Our study provides systematic information on habitats and geographical distribution, which is useful for the conservation of *N. chinensis*." (Authors)] Address: Liao, J., Dept of Ecology, Institute of Hydrobiology, Jinan University, Guangzhou 510632, China. Email: liaojian@stu2017.jnu.edu.cn

**20162.** Liu, H.; Jiang, F.; Wang, S.; Wang, H.; Wang, A.; Zhao, H.; Xu, D.; Yang, B.; Fan, W. (2022): Chromosome-level genome of the globe skimmer dragonfly (*Pantala flavescens*). *GigaScience* 11(1): 1-8. (in English) ["Background:

The globe skimmer dragonfly (*Pantala flavescens*) is a notable Odonata insect distributed in nature fields and farmlands worldwide, and it is commonly recognized as a natural enemy because it preys on agricultural pests and health pests. As one of the sister groups of winged insects, odonatan species are key to understanding the evolution of insect wings. Findings: We present a high-quality reference genome of *P. flavescens*, which is the first chromosome-level genome in the Palaeoptera (Odonata and Ephemeroptera). The assembled genome size was 662 Mb, with a contig N50 of 16.2 Mb. Via Hi-C scaffolding, 648 Mb (97.9%) of contig sequences were clustered, ordered, and assembled into 12 large scaffolds, each corresponding to a natural chromosome. The X chromosome was identified by sequence coverage depth. The repetitive sequences and gene density of the X chromosome are similar to those of autosomal sequences, but the X chromosome shows a much lower degree of heterozygosity. Our analysis shows that the effective population size experienced 3 declining events, which may have been caused by climate change and environmental pollution. Conclusions: The genome of *P. flavescens* provides more information on the biology and evolution of insects and will help for the use of this species in pest control." (Authors)] Address: Fan, W., Agricultural Genomics Institute at Shenzhen, Chinese Academy of Agricultural Sciences, 7 Pengfai Road, Shenzhen 518120, China. Email: fanwei@caas.cn

**20163.** Lockwood, M. (2022): Catàleg dels odonats de la Moixina i del Parc Nou. Consorci de Medi Ambient i Salut Pública de la Garrotxa, SIGMA; Ajuntament d'Olot; Parc Natural de la Zona Volcànica de la Garrotxa (Catàleg de biodiversitat dels paratges de la Moixina i del Parc Nou (Olot, la Garrotxa)). DOI: <https://doi.org/10.2436/10.8080.03.4>: 18 pp. (in Catalan, with English summary) ["Fieldwork and a literature review enabled a catalogue of the damselflies and dragonflies of La Moixina (Olot, Catalonia), and Parc Nou (Olot) to be compiled. In all, 40 species have been detected in this area, of which 19 are only occasional visitors. The remaining 21 species breed or are observed regularly in the area's three main habitats, the canals, the ponds and in the meadows and on woodland edges. Using an index of vulnerability for Catalan dragonflies (IVOC), it becomes clear that the most threatened species are all linked to the canals, of which *Calopteryx virgo* and *Boyeria irene* are good examples. By contrast, the species that breed in the ponds Basses d'en Broc are much more generalist and are not threatened." (Author)] Address: Lockwood, M., Grupo Oxygastra, Institució Catalana d'Història Natural, Carrer del Carme, 47; 08001 Barcelona, Spain. E-mail: mike@walkingcatalonia.net

**20164.** Lócse, F.; Lócse, E. (2022): Beitrag zur Libellenfauna (Odonata) und zur Aaskäferfauna (Coleoptera: Silphidae) am Herrnsdorf-Bräunsdorfer Bach im Landkreis Zwickau / Sachsen. Mitteilungen Sächsischer Entomologen 41(141): 35-43. (in German) ["Sachsen, Germany; seven odonate species are listed: *Aeshna cyanea*, *A. mixta*, *Calopteryx splendens*, *Ischnura elegans*, *Lestes sponsa*, *Sympetrum sanguineum*, *Platycnemis pennipes*] Address: Lócse, F., Am Ullersberg 3, 09212 Limbach-Oberfrohna, Germany

**20165.** Lohaka, J.D.; Kamb, J.-C.T.; Isumbiso, P.; Sisa, E.M.; Eume, T.L. (2022): Preliminary study of the structure of the aquatic macroinvertebrate stands in lake Mai Ndombe in the province of Mai Ndombe in the RDC. International Journal of Science and Research Archive 6(1): 125-138. (in

English) [Democratic Republic of the Congo; "The preliminary study of the structure of the macroinvertebrate stands of Lake Mai Ndombe in the DRC was carried out in February 2020. Six hundred and ten (610) aquatic macroinvertebrates were captured, divided into 7 orders and 28 families. The family of Corduliidae was the most abundant with 17.7% of the total specimens, it was followed by the Dystiscidae (14.1%), Naucoridae (12.7%), Limnebiidae (11.3%), Atyidae (7.7%), Coenagrionidae (6.5%) and Libellulidae (6.4%). The other families were poorly represented. The diversity indices calculated for the different stations varied between 1.67 (Ndom IV) and 2.8 (Ndom I) and the fairness between 0.93 (Ndom III and Ndom IV) and 0.96 (Ndom II). The IBGN calculation revealed that the biological and ecological quality of the waters of this lake ranges from fair quality with Polycentropodidae as the indicator group to poor quality with the oligochaetes as the indicator group." (Authors) As only European odonate families are listed, we may suppose wrong identifications.] Address: Sisa, E.M., Hydrobiology Laboratory, National Pedagogical University (NPU) B.P. 8815 Kinshasa I, Congo

**20166.** Ma, C.-H.; Chen, S.-L.; Lou, C.-M.; Lee, I.-L.; Hu, F.-S. (2022): The Genus *Sympetrum* Newman, 1833 (Odonata: Libellulidae) in Taiwan: Distribution, bionomics and a report of a newly recorded species. Taiwanese Journal of Entomological Studies 7(3): 27-42. (in English, with Chinese summary) ["We summarize the bionomics, distributional information, and habitus photos of all Taiwanese *Sympetrum*, including *S. bacha bacha*, *S. cordulegaster*, *S. darwinianum*, *S. depressiusculum*, *S. eroticum ardens*, *S. fonscolombii*, *S. infuscatum*, *S. kunkeli*, *S. nantouensis* and *S. speciosum*. *Sympetrum infuscatum* is reported from Taiwan for the first time, based on a photo taken on 7-X-2009 in Keelung City. A new record of *S. darwinianum* found on 09 October 2010 in New Taipei City is reported, representing the second record of the species in Taiwan. Distributional maps of all species and phenological graphs, based on 25 years of citizen science data of 6 selected species (*S. cordulegaster*, *S. depressiusculum*, *S. eroticum ardens*, *S. fonscolombii*, *S. nantouensis* and *S. speciosum*) are also provided." (Authors)] Address: Hu, F.-S., Dept Biol. Sciences, National Sun Yat-sen Univ., 70 Lienhai Rd., Kaohsiung 80424, Taiwan. Email: fangshuo\_hu@smail.nchu.edu.tw

**20167.** Macgregor, C.J.; Bunting, J.; Deutz, P.; Bourn, N.A.D.; Roy, D.B.; Mayes, W.M. (2022): Brownfield sites promote biodiversity at a landscape scale. Science of The Total Environment Volume 804, 15 January 2022, 150162: (in English) ["Highlights: • Species richness of birds, plants and insects is higher in landscapes containing ex-landfill sites. Birds also have higher assemblage rarity in landscapes containing ex-landfill sites. For birds, plants and insects, species richness increases with increasing area of ex-landfill sites. For birds and insects, species richness declines over time after landfill site closure. For plants, species richness increases over time after landfill site closure. Abstract: Repurposing of brownfield sites is often promoted, because it is perceived that protecting the "green belt" limits damage to biodiversity; yet brownfield sites provide scarce habitats with limited disturbance, so conversely are also perceived to be ecologically valuable. Combining data from three national-scale UK biological monitoring schemes with location data on historical landfill sites, we show that species richness is positively associated with both the presence and increasing area of ex-landfill sites for birds, plants and several insect taxa. Assemblage rarity of birds is also positively associated with presence of ex-landfill sites. Species richness

associated with ex-landfill sites declined over time for birds and insects but increased over time for plants. These findings suggest that development of brownfield sites may have unintended negative consequences for biodiversity, and imply that to minimise loss of biodiversity, brownfield site repurposing could be targeted towards smaller sites, or sites in areas with a high density of other brownfield sites." (Authors)] Address: Macgregor, Callum, Energy and Environment Institute, University of Hull, Cottingham Road, Kingston upon Hull, 7 HU6 7RX, UK. Email: callumjmacgregor@gmail.com

**20168.** Makbun, N. (2022): *Macromia siamensis*, a new species from North Thailand (Odonata: Anisoptera: Macromiidae). *Zootaxa* 5133(3): 346-354. (in English) ["*Macromia siamensis* sp. nov., is described and illustrated based on male specimens collected from Ban Luang, Chom Thong, Chiang Mai province, Thailand. *Macromia siamensis* sp. nov. shares the hammer-shaped tip of posterior hamulus with *M. amphigena*, *M. sombui*, *M. cydippe*, *M. vangviengensis*, *M. clio*, *M. malleifera* and *M. macula*, but it differs from all of the mentioned species by a set of coloration characters including antehumeral stripe, abdominal pattern and facial markings." (Author)] Address: Makbun, N., 211/5 Moo 4, Takhli, Nakhon Sawan, 60140, Thailand. Email: noppadon.makbun@gmail.com

**20169.** Maldonado-Benitez, N.; Mariani-Ríos, A.; Ramírez, A. (2022): Effects of urbanization on Odonata assemblages in tropical island streams in San Juan, Puerto Rico. *International Journal of Odonatology* 25: 31-42. (in English) ["Urbanization has considerable impacts on stream ecosystems. Streams in urban settings are affected by multiple stressors such as flow modifications and loss of riparian vegetation. The richness and abundance of aquatic insects, such as odonates, directly reflect these alterations and can be used to assess urban impacts on streams. The effects of urbanization on odonate richness and abundance on tropical islands is as yet poorly understood. The objective of this study is to identify the effects of urbanization on stream habitat quality and associated odonate assemblages in Puerto Rico. We sampled 16 streams along a rural to urban gradient in the San Juan Metropolitan Area, where each stream was characterized using the Stream Visual Assessment Protocol (SVAP) for Puerto Rico and by analyzing their surrounding land cover. A 100-m segment of each stream was surveyed to assess adult odonate richness and abundance during the rainy and dry seasons. Adults were identified visually, and their abundance was recorded. Favorable local scale factors, like improved habitat quality, as measured with the SVAP, resulted in higher abundances of odonates. However, regional factors such as percent urban cover did not appear to significantly affect richness and abundances of odonates. Overall, our study indicates that odonate assemblages are affected by the loss of habitat integrity, and conservation of tropical odonates may benefit from focusing on local scale factors." (Authors)] Address: Maldonado-Benitez, N., Dept of Environmental Sciences, University of Puerto Rico, Río Piedras Campus, San Juan, Puerto Rico. Email: nmb.957@gmail.com

**20170.** Mariani-Ríos, A.; Maldonado-Benitez, N.; Ramírez, A. (2022): Natural history of Odonata assemblages in tropical streams in Puerto Rico. *Neotropical Biodiversity* 8(1): 112-123. (in English) ["Freshwater macroinvertebrates play an important role in maintaining stream food webs. Odonata are important top predators in these communities and serve as indicators of stream health. Our understanding of odonate

assemblages is limited in the Caribbean and the natural history of most odonate species in the region remains unknown. The focus of this research is to study the natural history of odonate species in headwater montane streams following major hurricane impacts in Puerto Rico. We monitored assemblages from August 2018 to July 2019 in two headwater streams within El Yunque National Forest, Puerto Rico. The study streams drain a protected forest, with aseasonal precipitation patterns, relatively constant water temperature, and flashy hydrographs that quickly respond to rain events. We sampled 226 adults and 550 larvae, dominated by three Caribbean endemics: *Scapanea frontalis*, *Macrothemis celeno*, and *Telebasis vulnerata*. Only *S. frontalis* and *M. celeno* were abundant enough to assess the temporal patterns and their natural history. Larval density fluctuated throughout the year with short peaks in abundance during different times of the year, according to the species. Small individuals (=10 mm body length) were more abundant than the large ones. However, all size classes were present during the year. The dominant species, *S. frontalis* and *M. celeno*, had continuous development patterns, without identifiable size classes and multiple overlapping generations. The exception was the last stadium that formed a separate group in the body length vs head width plots. Species had clear habitat preferences; *S. frontalis* was abundant in riffles and preferred areas with high amounts of cobble. *Macrothemis celeno* prefers pool habitats with fine substrates. While we found trends for negative relations between abundance and discharge, canopy cover, water temperature, and rainfall, none was statistically significant. Observed patterns suggest a lack of strong temporal seasonality in the natural history of Odonata, which coincides with the aseasonal environment of streams draining our study area. Overall, our study is the first to assess temporal variability of Odonata assemblages in montane streams of Puerto Rico and provides information on Caribbean endemic species." (Authors)] Address: Maldonado-Benitez, N., Dept of Environmental Sciences, University of Puerto Rico, Río Piedras Campus, San Juan, Puerto Rico. Email: nmb.957@gmail.com

**20171.** Marinov, M. (2022): On two unjustified rankings of Pacific Odonata (Insecta). *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 38: 1-10. (in English) ["Modifications of nomina proposed for two Pacific Odonata taxa are found to be unsubstantiated. Each has been proposed without the support of taxonomic studies. Herein, it is demonstrated that the raising of the subgenus *Adversaeschna* Watson, 1992 to genus rank and subsuming the genus *Amorphostigma* Fraser, 1925 to *Ischnura* Charpentier, 1840 are not justified. The first, *Adversaeschna*, was a mistake introduced and multiplied widely in nomenclature lists adopted by online databases and other studies. The second, *Amorphostigma*, was based on premature information to propose a plausible taxonomy of a diverse Pacific clade which most likely consists of several taxa deserving of separate generic ranks, supported by preliminary phylogenetic work. Therefore, these nomina should be reverted to reflect current taxonomic revisions. *Adversaeschna* should be considered as a subgenus of *Aeshna* Fabricius, 1775 and *Amorphostigma* as a nomen of generic rank." (Author)] Address: Marinov, M., Biosecurity Surveillance & Incursion Investigation Plant Health Team, Ministry for Primary Industries, 14 Sir William Pickering Drive, Christchurch 8544, New Zealand. Email: milen.marinov@mpi.govt.nz

**20172.** Marinov, M. (2022): *Amorphostigma kessleri*, sp. nov. from American Samoa (Odonata: Coenagrionidae).



Faunistic Studies in SE Asian and Pacific Island Odonata 40: 1-14. (in English) ["This study describes *Amorphostigma kessleri*, a new species [...] from Tutuila Island, American Samoa. Specimens of both sexes are compared with the two species presently included in the genus: *A. armstrongi* Fraser, 1925 and *A. auricolor* Fraser, 1927. The study mentions the preferred generic status of *Amorphostigma* as discussed in Marinov (2022)."] (Author)] Address: Marinov, M., Biosecurity Surveillance & Incursion Investigation Plant Health Team, Ministry for Primary Industries, 14 Sir William Pickering Drive, Christchurch 8544, New Zealand. Email: milen.marinov@mpi.govt.nz

**20173.** Medeiros Chaviel, B.; Silveira Mascarenhas, C.; Corrêa, F.; Costa Silveira, E.; Afonso Coimbra, M.A.; Müller, G. (2022): Diet of *Acanthochelys spixii* and *Hydromedusa tectifera* (Chelidae) in the southern Brazil. *Caldasia* 44(1): 178-183. (in English, with Spanish summary) ["Data about the diet of the freshwater turtles *Acanthochelys spixii* and *Hydromedusa tectifera* from southern Brazil populations remain little known. In this context, the digestive tract of 21 *A. spixii* and 20 of *H. tectifera* individuals from three municipalities in the state of Rio Grande do Sul, Brazil were examined. The food items were identified at the lowest possible taxonomic level, quantified, and conserved in ethanol 70°GL. The frequency of occurrence (F %) and volume percentage (V %) were estimated, as well as the food importance index (IAi %). The range of the trophic niche and the feeding strategy of both species were analyzed. The diet of *A. spixii* and *H. tectifera* was compared through the Mann-Whitney test ( $P < 0.05$ ). Both species presented a generalist food strategy, consuming mainly insects, represented by Hemiptera, Odonata, Coleoptera, and Diptera. There was no significant difference in the volume of items consumed by both species (Mann-Whitney test,  $z = -0.387$ ,  $P = 0.69$ ). Concerning the trophic niche range, we observed low values for both species, it was of 0.41 for *A. spixii* and 0.39 for *H. tectifera* suggesting a more restricted diet with uniformity in food consumption, however, we highlight that a more restricted diet does not suggest a trophic specialization, because the availability of food items have variation in time and space. The study contributed information on the diet of species in the region, generating data that can be used in programs for the conservation of species and their habitats."] (Authors)] Address: Medeiros Chaviel, Bruna, Laboratório de Parasitologia de Animais Silvestres, Instituto de Biologia, Depto de Microbiologia e Parasitologia, Universidade Federal de Pelotas, Caixa Postal: 354, CEP 96010-900, Pelotas, RS, Brazil. brunachaviel@gmail.com

**20174.** Medina-Espinoza, E.F. (2022): Abundance of Odonata in different microhabitats at an oxbow lake in the Peruvian Amazon. *Acta Amazonica* 52(3): 236-240. (in English, with Spanish summary) ["The relationship between Odonata and vegetation in Amazonia has been studied primarily in streams. In this study, I examined the abundance of adult Odonata in two vegetation types (shrubs and herbs) surrounding an oxbow lake in the Peruvian Amazon. Daytime visual samplings of Odonata were carried out in time blocks along transects in each habitat. Thirteen taxa were identified. Five species were similarly abundant in both habitats, three used mainly herbs, and one mainly shrubs, with no variation among time blocks. The results suggest that most Anisoptera and Zygoptera are adapted to unshaded areas of the lake. Some Odonata also were observed during sunless days with light rainfall, suggesting they are adapted to rainy conditions in tropical climate."] (Author)] Address: Medina-Espinoza, Emmy Fiorella, Univ. Nacional Mayor de

San Marcos, Museo de Historia Natural, Depto de Entomología, Avenida Arenales 1256, Jesús María, Lima 15072, Peru. Email: efme.04@gmail.com

**20175.** Mendoza-Penagos, C.C.; Juen, L.; Vilela, D.S. (2022): *Heteragrion calafatiensis* (Odonata: Heteragrionidae) sp. nov. from Northern Brazil. *Zootaxa* 5124(2): 223-229. (in English, with Portuguese summary) ["The Neotropical genus *Heteragrion* Selys, 1862 is the second most speciose among the Neotropical Zygoptera. However, most of its species are poorly known regarding their biology, distribution, and taxonomy, especially those from undersampled areas like Northern Brazil. Here we describe *Heteragrion calafatiensis* sp. nov. from the coastal environments of the Brazilian Amazon of Para state (Holotype male, Brazil, Para, municipality of Magalhaes Barata, near the Marapanim River, (-0.863291, -47.668058, 20 m, 26.ix.2021), C.C. Mendoza-Penagos leg, in UFPA). This is the ninth *Heteragrion* species recorded for the Northern region of Brazil. The new species can be separated from congeners by cercal morphology and thoracic coloration pattern."] (Authors)] Address: Mendoza-Penagos, C.C., Post-Graduate Program in Zoology-PPGZOO, Univerde Federal do Pará, Belém, Brazil. Email: cristian.penagos@icb.ufpa.br;

**20176.** Mendoza-Penagos, C.C.; Bota-Sierra, C.A. (2022): Primera localidad confirmada para *Telebasis isthmica* Calvert, 1902 en Colombia y algunos datos sobre su historia natural. - First confirmed locality for *Telebasis isthmica* Calvert, 1902 in Colombia and notes about its natural history. *Heteragrion* 4(2): 6-11. (in Spanish, with English summary) ["The species *Telebasis isthmica* has a wide distribution through tropical dry forests from western Mexico in Nayarit to the state of Falcón in Venezuela. Although its presence in Colombia has been previously reported, not a specific locality for the species in the country is known. Furthermore, its natural history is poorly understood. In this note, we present some data on its natural history and assign the first locality, thus confirming its presence in the tropical dry forests of the Magdalena River (Cundinamarca, Colombia)."] (Authors)] Address: Mendoza-Penagos, C.C., Post-Graduate Program in Zoology-PPGZOO, Universidade Federal do Pará, Belém, Brazil. Email: cristian.penagos@icb.ufpa.br;

**20177.** Merchant, M.; McClure, M.R. (2022): Phenoloxidase and melanization innate immune activities in Green Darner dragonfly nymphs (*Anax junius*). *Advances in Biological Chemistry* 12(4): 130-141. (in English) ["Odonata are highly subject to infection by gregarine parasites. However, despite the important ecological roles that insects play in every ecosystem in which they exist, little research has been devoted to the description of insect immunity. Insects rely heavily on the rapid actions of innate immune mechanisms to prevent infection. We characterized the melanization response in the hemolymph of *A. junius* nymphs. Incubation of chymotrypsin-activated hemolymph with L-DOPA resulted in volume- and time-dependent production of dopaquinone via the phenoloxidase (PO) enzyme, with biphasic accumulation of product. The PO activity was temperature-dependent, with a stepwise increase from 20° - 35° and maximum activity measured at 35° - 40°. The formation of product was also inhibited in a concentration-dependent manner by diethylcarbonate, a specific inhibitor of PO activity, which indicated that the observed activity was due to the presence of PO enzyme. The rate of formation and quantity of melanin was dependent on exposure to different titers of bacteria. This is the first characterization of both PO activity and melanization response in *A. junius*."] (Authors)] Address:

Merchant, M., Dept Chemistry, McNeese State Univ., Lake Charles, USA. Email: mmerchant@mcneese.edu

**20178.** Min, J.-K.; Lee, H.; Kong, D. (2022): Development of a benthic macroinvertebrate predictive model based on the physical and chemical variables of rivers in the Republic of Korea. *Journal of Freshwater Ecology* 37(1): 425-453. (in English) ["Predictive models for the benthic macroinvertebrate community based on environmental variables facilitate the identification of the organisms expected to inhabit an area according to the target environmental conditions when restoring rivers. In this investigation, a biotic community predictive model was developed using benthic macroinvertebrate and environmental variable data collected from 1,210 sites in the Republic of Korea from 2010 to 2020. The sites were classified into six groups according to Two Way Indicator Species Analysis (TWINSpan) and based on their individual abundance/m<sup>2</sup> of benthic macroinvertebrates. The TWINSpan groups were related to 14 variables by stepwise multi-discriminant analysis. The relative importance of the environmental variables that classified each TWINSpan group was in the order of mean diameter of particle size, catchment area, altitude, velocity, total phosphorus, latitude, pH, longitude, conductivity, water depth, suspended solids, biochemical oxygen demand, stream order, and total nitrogen. Discriminant functions 1–4 showed statistically significant and a predictive model was developed using functions 1 and 2 based on Wilks' lambda values. The fit of the derived model was confirmed using Sørensen similarity (number of taxa) and Bray–Curtis dissimilarity (individual abundance/m<sup>2</sup>) analyses between the predicted organisms and those observed at the sites. The distributions of similarity and dissimilarity that were confirmed by stream type ranged from 0.60 to 0.72 and 0.46–0.56, respectively, based on the mean. Based on the predicted and observed values, the ratio of shredders and scrapers to collectors showed similar results overall for each stream type. The predictive model derived using nationally managed available data is expected to be applicable to stream and river restorations in the future, as it provides a statistical assessment of the biotic communities that are expected to inhabit a given environment." (Authors) (Odonate) taxa are treated at the family level.] Address: Kong, D., Dept of Life Science, Kyonggi University, Suwon-si, 16227, Gyeonggi-do Province, Republic of Korea. Email: dskong@kgu.ac.kr

**20179.** Miranda Filho, J.M.; Mendoza Penagos, C.C.; Calvão, L.B.; Miguel, T.B.; Bastos, R.C.; Ferreira, V.R.S.; Lima, D.V.M.; Vieira, L.J.S.; Brasil, L.S.; Juen, L. (2022): Checklist of damselflies and dragonflies (Odonata) from Acre state, and the first record of *Drepanoneura loutoni* von Ellenrieder & Garrison, 2008 for Brazil. *Biota Neotropica* 22(2): e2021-1320, 2022: 22 pp. (in English, with Portuguese summary) ["Here we present the first Odonata (Insecta) species list for the state of Acre, Northern Brazil, adding ecological aspects and notes on its taxonomy and conservation status. Regarding Odonata samplings, Acre is one of the least explored states in the northern region of Brazil and an area of geographic importance, as it is a transition between the Andean and Amazon regions. Collections were carried out in 35 streams, distributed in nine municipalities. We also supplemented our database from the review of secondary literature and data from biological collections. We recorded 140 species, distributed in 55 genera, of which 16 species are new records for the state, making Acre state the second in the number of recorded species in northern Brazil. Of the recorded species, 113 are classified within some threat category of the IUCN red list and 110 in the ICMBio national

list. Analyzing the taxonomic information on each recorded species, knowledge of females and larvae is still very limited and, most of the time, only available to adult males. For the first time, the occurrence of *Drepanoneura loutoni* is reported for Brazil, and we also present photos of its main morphological characters, with comments on its biology. Our study shows the importance of conducting biodiversity research in poorly studied areas; such as the state of Acre, and serves as a basis for future expeditions in the region." (Authors)] Address: Mendoza Penagos, C.C., Inst. de Ciências Biológicas, Laboratório de Ecologia e Conservação, Rua Augusto Corrêa, n° 1, Guamá, CEP 66.075-110, Belém, PA, Brasil. Email: cristian.penagos@icb.ufpa.br

**20180.** Mogali, S.M.; Shanbhag, B.A.; Saidapur, S.K. (2022): Predatory influence of dragonfly larvae and water scorpions on eggs and tadpoles of *Indosylvirana temporalis* (Anura: Ranidae). *Phyllomedusa* 21(1): 51-57. (in English, with Portuguese summary) ["We assessed in the laboratory the vulnerability of Bronzed frog (*Indosylvirana temporalis*) eggs and tadpoles to two potential sit-and-wait insect predators, larvae of *Pantala flavescens* and adult water scorpions (*Laccotrephes* sp.; Hemiptera: Nepidae). We exposed a series of different developmental stages of *I. temporalis* (from eggs to metamorphic climax stage) to these two predators. The results of this study showed that larvae of *P. flavescens* preyed on eggs and tadpoles of *I. temporalis* but only to stage 36. *Laccotrephes* sp. did not prey on eggs of *I. temporalis* but on tadpoles of all stages (22 to 42). This difference in predation rate was likely due to the gape size of the predators. The larvae of *P. flavescens* are gape-limited and cannot prey on larger tadpoles (above stage 36). Adults *Laccotrephes* sp. are non-gape-limited predators, using a segmented beak to pierce *I. temporalis* and suck the body fluids. They captured small to large tadpoles by quickly grabbing and immobilizing them using the front pair of raptorial legs. The present study shows that both predatory insects are a threat to *I. temporalis* at early and later stages of larval development." (Authors)] Address: Mogali, S.M., Dept Zool., Karnatak Univ., Dharwad-580 003, Karnataka State, India. E-mail: santoshmogali@rediffmail.com.

**20181.** Mohammed, I.; Wondie, A.; Mengist, M. (2022): The environmental quality and macroinvertebrate community structures of wetlands found in the Lake Tana Watershed, Ethiopia. *Journal of the Cameroon Academy of Sciences* 17(3): 183-203. (in English, with French summary) ["The present study was conducted to assess the environmental quality status and macroinvertebrate community structures of wetlands using macroinvertebrates as bioindicators. A multimetric biotic index approach was used for the study. The findings revealed 3,367 macroinvertebrates belonging to 37 families. The percentages of Ephemeroptera, Odonata, and Trichoptera (%EOT), percent Diptera, percent filterercollectors, the ratio of Ephemeroptera, Plecoptera, and Trichoptera to Chironomid (EPT/C), the Biological Monitoring Working Party Score, and the Shannon–Wiener diversity index were all significantly related to human disturbance and could be used to assess water quality. Based on the macroinvertebrate index, human disturbance had a significant impact on Shesher wetland, a relatively lower impact on Avaji and Yitamot, and a moderate impact on Chimba, while Dena and Wonjeta had good habitat quality. Their water quality was very poor, poor, moderate, and very good, in that order. Farming, leather tanning, waste dumping, and effluent discharges were responsible for the poor habitat quality of impacted wetlands. Therefore, unless managed properly, human disturbance activities in the wetlands

catchment were threatening macroinvertebrates and the wetlands ecosystem. Hence, implementation of catchment-based management together with continuous health status monitoring and a standalone wetland policy should be established." (Authors)] Address: Mohammed, I., College of Agriculture & Environ. Science, Dept of Fisheries & Aquatic Science, Bahir Dar Univ., PO Box 79, Bahir Dar, Ethiopia

**20182.** Mohammed, S.H.; Eltaly, R.I.; Salem, H.H. (2022): Toxicological and biochemical studies for chlorpyrifos insecticide on some mosquito larvae and their associated predators. *Egyptian Journal of Basic and Applied Sciences* 9(1): 254-263. (in English) ["Use of chemical insecticide with natural enemies could be more effective in mosquito control strategy. This study examined the toxicity of chlorpyrifos insecticide against three field-collected mosquito species, *Culex pipiens*, *Anopheles pharoensis* and *Ochlerotatus caspius* and their associated predators (*Pantala flavescens*) and mayfly (*Caenis stephens*) naiads as non-target insect for chlorpyrifos. The predation potential of *Pa. flavescens* and *Ca. stephens* against tested mosquito larvae was also investigated. Additional biochemical assays were carried out to detect the effect of chlorpyrifos on some detoxifying enzymes of tested mosquito larvae and their associated predators. The results showed that (*Pa. flavescens*) have higher predation potential than (*Ca. stephens*). The toxicological results recorded high toxic effect of chlorpyrifos on *Ca. stephens* followed by *An. pharoensis* and *Oc. caspius* with percent mortality 100, 90 and 85% respectively, while *Pa. flavescens* exhibited high resistance followed by *Cx. pipiens* with percent mortality 20 and 40% respectively. Moreover, Acetylcholinesterase and glutathione S-transferase were significantly increased only in *Cx. pipiens* and *Pa. flavescens*. It could be concluded that, chlorpyrifos have different toxicological effect on the tested mosquito larvae and associated predators. So, the side effect of chlorpyrifos must be taken in consideration before using it in control programs." (Authors)] Address: Mohammed, Shaimaa, Zoology Dept, Faculty of Science, Al-Azhar University (Girls Branch), Cairo, Egypt

**20183.** Monnerat, C.; Juillerat, L. (2022): The Antoine Senglet collection: a major contribution to the knowledge of the odonates of Morocco from the 1960s (Odonata). *Odonatologica* 51(1-2): 41-62. (in English) ["Odonata collected by Antoine Senglet in Morocco from 12.vi. to 13.vii.1967 in 28 localities are deposited in the Muséum d'histoire naturelle in Geneva (MHNG, Switzerland). The collection includes 453 imagines of 46 species and 326 exuviae of 24 species, corresponding to 73 % of the presently known Moroccan Odonata fauna. It is one of the largest collections of Odonata ever made in Morocco and includes the first known evidence for *Erythromma viridulum*, *Orthetrum brunneum*, *O. cancellatum*, *Selysiotthemis nigra*, and *Sympetrum sinaiticum* for Morocco. Reproduction is proven by the presence of exuviae for all these species except *E. viridulum*. The collection, which has remained undocumented for more than half a century, is comparable in scope to the contributions presented by the first two syntheses on the dragonflies of Morocco published by Lieftinck (1966) and Dumont (1972). A chronological check-list of the odonate fauna of Morocco details the increase in knowledge from 1850 to the present day." (Authors)] Address: Monnerat, C., Info fauna, Bellevaux 51, CH-2000 Neuchâtel, Switzerland. E-mail: christian.monnerat@unine.ch

**20184.** Mühlenhaupt, M.; Jiang, B.; Brauner, O.; Mikola-

jewski, D.J. (2022): Inter- and intraspecific trait compensation of behavioural and morphological defences in a damselfly genus. *Front. Ecol. Evol.* 10:874276. doi: 10.3389/fevo.2022.874276: 10 pp. (in English) ["Predation is a key driver of phenotypic diversification with prey having evolved sets of correlated anti-predator traits. Changes in anti-predator traits can be studied on an evolutionary as well as on a developmental timescale. Using a common garden setup, we studied inter- and intraspecific correlations of behavioural and morphological defences in four damselfly species that either occur in habitats dominated by predatory fish (fish habitats) or fishless habitats by raising larvae either with predatory fish or in a control treatment. We found inter- as well as intraspecific trait compensation (negative correlations) between behavioural and morphological defences. Compared to fishless habitat species, fish habitat species invested more in behavioural defences and less in morphological defences. This was mirrored by fish habitat species investing more in behavioural defences and less in morphological defences when reared with predatory fish whereas fishless habitat species invested less in morphological defences only. Our results emphasise the role of context-specific combinations of defensive traits to avoid predation. We suggest, considering changes in multiple correlated traits on different timescales when studying the evolution of anti-predator traits." (Authors)] Address: Mühlenhaupt, M., Institut für Biologie, Freie Universität Berlin, Berlin, Germany

**20185.** Mukherjee, A.; Sardar, S.; Mandal, B.; Chandra Saha, N.; Mitra, B. (2022): First insect faunal inventory from the recently declared Raimona National Park, Assam, India. *International Journal of Entomology Research* 7(3): 26-30. (in English) ["Protected areas which are essential for biodiversity conservation often provide habitat and protection from other anthropogenic activities threatened to the pristine wildlife. Therefore, establishment of new protected areas like sanctuaries, biosphere reserve and national parks relieve the wildlife a lot from risk. Before starting conservation and management of the protected areas, one need to know which species are endangered or threatened and what we must conserve. Raimona National Park was declared as the National Park by the Government of Assam on the World Environment Day, 2021. A visit of six days to this national park enumerates 62 species of insects. These includes 41 species of butterflies and 5 species of moths, 3 species of dragonflies, 7 species of grasshoppers and crickets, 3 species of bugs and 3 species of bees and wasps. Only 4 species of butterflies are found here under WPAACT (1972). This paper presents the first insect inventory from the 6th national park of Assam and the last declared national parks in India." (Authors) Three Odonata species are checklisted: *Crocothemis servilia*, *Orthetrum sabina*, *Potamarcha congener*.] Address: Mandal, B., Dept of Zoology, Jogesh Chandra Chaudhuri College, Kolkata, West Bengal, India. Email: bananimandal50@gmail.com

**20186.** Mzungu, E.; Yakub, S.; Anyimba, E.S: (2022): Macroinvertebrates as bio-indicators of water quality in Omubira Stream, in Kakamega County, Kenya. *International Journal of Fisheries and Aquatic Studies* 10(4): 70-77. (in English) ["Human-induced environmental stress can impair freshwater ecosystems by destroying them or altering them in negativeways. Laws and ordinances that stress Kenya's water resources' correct management and utilization were prompted by worries about the management of freshwater bodies. Therefore, understanding of the health status of aquatic environments, particularly their biodiversity, is crucial in order to comprehend the status of water

quality and limit the rate of pollution in our streams and rivers. Several well-known biological markers of water quality can be used for this. Bio-indicators are species or groups of species that can quickly reveal the abiotic or biotic condition of an environment, show how environmental change has affected a habitat or ecosystem. In many industrialized nations, including those in Europe and North America, macroinvertebrates are widely utilized as bio-indicators and are part of their national and technical standards for water quality monitoring. Their use is still relatively restricted in developing nations like Kenya. Furthermore, the use of aquatic macroinvertebrates as bio-indicators of water quality to assess the condition of aquatic ecosystems is not stressed by Kenyan environmental laws and regulatory bodies. This can be because the nation doesn't have a well-known and established biomonitoring system. However, only a small number of studies have begun utilizing macroinvertebrate species as bio-indicators at this time. A greater comprehension of the macroinvertebrate variety of the Omubira River could help in the stream management due to continued municipal and agricultural activities along this river. As a result, this study examined the use of macroinvertebrates as bio-indicators of river water quality and determined how they reacted to water quality in the various region of the stream. Macroinvertebrates and selected physicochemical variables were sampled monthly in four sites for a period of four months. On each sampling sites at every sampling episode physicochemical variables including temperature, conductivity, salinity, turbidity, pH, dissolved oxygen and percentage saturation oxygen were measured using a Hydrolab Quanta Multi-Probe Meter. A Surber sampler of an area 1200 cm<sup>2</sup> and corer sampler were used with catching area of 20.83 cm<sup>2</sup> to capture macroinvertebrates. There was a general decrease of Temperature, turbidity, salinity, conductivity and pH from the town area to the forested area. However, dissolved oxygen increased from the town area to forested area. A general variation of macroinvertebrates species from municipal area to forested area in the river was observed. The highest abundance of Belostomatidae (16.87), Chironomidae (16.77), Naididae (14.07) and Gomphidae (18.67) were found in the municipal reach of the river. The highest abundance of Elmidae (20.49) and Notonectidae (19.87) were found in the agricultural reach while the highest abundance of Gerridae (10.53), Hydropsychidae (28.65) and Perlidae (33.92) were found at the forested reach. From the diverse makeup of the macroinvertebrates, Omubira stream's water quality can be described as moderately clean. This could be harmful to aquatic life and communities living along, which depends on highly clean water to exist. This study therefore recommends continuous monitoring and proper management of pollution sources into the stream by the pertinent authorities as well as embracing bio-indicators." (Authors)] Address: Mzungu, E., Dept Biol. Sciences, Masinde Muliro Univ. Science & Technology, Kakamega, Kenya Fisheries Service, North Rift Uasin Gishu, Eldoret, Kenya

**20187.** Nair, V.P.; Samuel, K.A.; Palot, M.J.; Sadasivan, K. (2022): An updated checklist of Dragonflies and Damselflies (Odonata) of Kerala with their Malayalam names. *Malabar Trogon* 20(1): 19-27. (in English) ["An updated checklist of odonates of Kerala with their common English and Malayalam names are provided. A total of 181 species of odonates with 68 Western Ghats endemics are confirmed in the state." (Authors)] Address: Nair, V.P., XV/44<sup>th</sup> Ai, Netliji Housing Colony, Trichambaram, Taliparamba P.O., Kannur, Kerala, India. Email: vmayanpnair@gmail.com

**20188.** Navarrete-Heredia, J.L. (2022): Homenaje am. en C. Enrique González Soriano. *Dugesiana* 29(2): 215-216. (in Spanish and English) [Verbatim: Editorial: As istradition, the Centro de Estudios en Zoology of the Universidad de Guadalajara pays on this occasion a well-deserved tribute to the M. in C. Enrique González Soriano, an outstanding specialist in Odonata and founder in Mexico of this line of research. Some Mexican specialists join this tribute and dedicate their work to Master Enrique. We appreciate your collaboration, as well as those who served as reviewers of these works and all those published in this issue. Thank you very much. Your collaboration is essential for the growth and quality of the journal. With admiration and respect, Enrique you have well deserved this tribute. Congratulations. Your friend "Pepe".] Address: Navarrete-Heredia, J.L., Centro de Estudios en Zoología, Centro Universitario de Ciencias Biológicas y Agropecuarias, Universidad de Guadalajara. Apartado Postal 234, C.P. 45100, Zapopan, Jalisco, Mexico. Email: glenusmx@yahoo.com.mx

**20189.** Nazneen (2022): *Tamea limbata* from Delhi-National capital region. *Bradinopyga* 6(9): 116-118. (in English) ["*Tamea limbata* is the second new addition to Delhi's dragonfly species-list after *Urothemis signata*, from the India Gate Canal, Delhi-NCR (28°61'–40°30' N, 77°22'–42°67' E)" (Author)] Address: Nazneen, 208-C, Prakash Mohalla, East of Kailash, New Delhi - 110065, India. Email: nazneen@gmail.com

**20190.** Nel, A.; Jouault, C. (2022): The odonatan insects from the Paleocene of Menat, central France. *Acta Palaeontologica Polonica* 67: 631-648. (in English) ["The current knowledge on the Paleocene Odonata is rather limited despite the fact that it is a crucial period for the history of this order. An overview of the fossil odonatan from the Paleocene of Menat (France) is provided. We describe the anisopteran *Macrogomphus menatensis* sp. nov., first fossil representative of the family Epigomphidae, together with two zygopteran, viz. the dysagrionid *Menatagrimon hervetiae* gen. et sp. nov., and the new family *Menatlestidae* fam. nov., with its type species *Menatlestes palaeocenicus* gen. et sp. nov. The genus *Menatagrimon* gen. nov. is the first Paleocene record of the Dysagrionidae, otherwise known by a putative Cretaceous genus and several Eocene to Miocene genera. *Menatlestes* gen. nov., putatively attributed to the stem-group of the Lestinoidea (Megalestidae and Lestidae), would correspond to the oldest record of this clade. With these three new taxa, and the previously described *Thanetophilosina menatensis*, *Valerea multicellulata*, "*Lestes*" *zaleskyi*, and an Aeshna species indet., the total number of Odonata from Menat goes up to seven species in total; two Anisoptera and five Zygoptera. Furthermore, we propose new evidences showing that the head characters defining the putative suborder Cephalozygoptera are due to deformations, very frequent among the fossil Odonoptera. We treat the Cephalozygoptera as a junior synonym of Zygoptera." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**20191.** Ngiam, R.W.J.; Foo, V.T.F.; Lim, K.K.; Lim, H.X. (2022): Biodiversity Record: New Singapore record of the dragonfly, *Heliaeschna simplicia*. *Nature in Singapore* 15: e2022020: 3 pp. (in English) [Singapore Island, Kranji Marshes, Core Conservation Area; 3 September 2021; 0935 hrs. Young secondary forest dominated by exotic vegetation, beside a freshwater marsh.] Address: Ngiam, R.W.J., Ang Mo Kio Avenue 10, Singapore 560539. Email:



**20192.** Novello-Gutiérrez, R.; Bota-Sierra, C.A. (2022): Description of the final larval stadium of *Miocora aurea* (Ris, 1918) (Odonata: Polythoridae). *Zootaxa* 5182(3): 279-287. (in English, with Spanish summary) ["The larva of *Miocora aurea* (Ris, 1918) was found in first and second order forested streams at the Tatamá National Park in the Colombian Western Andes. Here it is described and figured the final larval stadium. It differs from the larva of *M. chirripa* (Calvert, 1917) by a combination of features such as antennal pedicel (0.25x longer than 3rd antennomere), prementum (0.20x longer than its widest part), and posterior margin of tergite 10 with a moderate incision." (Authors)] Address: Novello-Gutiérrez, R., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera antigua a Coatepec 351, El Haya 91073 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**20193.** Nur Zaman, M.; Fuadi, B.F.; Luthfika, M. (2022): Struktur Komunitas Capung Dan Capung Jarum Di Sungai Gajah Wong Segmen Perkotaan Daerah Istimewa Yogyakarta. *Bioveritas Journal of Biology* 1(1): 31-36. (in Indonesian, with English summary) ["Dragonflies play an important role in controlling other insect populations in nature, and are also natural indicators of environmental cleanliness. This study aims to reveal the population of dragonflies in the Gajah Wong river in urban areas in Yogyakarta. The method of determining the research area is to use transects following the river flow, and dividing the research area into 8 locations. The length of each observation site is adjusted to the distance between the large bridges that cross the top of the river. The results showed that there were 16 types of ordinary dragonflies and 9 types of dragonflies found there. The species with the highest number was *Pseudagrion rubriceps* as many as 255. and the least species was *Gynacantha subinterrupta*, *Onycothemis culminicola*, *Ischnura senegalensis*, *Pseudagrion microcephalum*, each found only 1 individual. An interesting finding was the presence of 2 types of Javan endemic dragonflies that were recorded along the research site." (Authors)] Address: Nur Zaman, M., Anggota Waterforum Kalijogo dan Mahasiswa Prodi Biologi UIN Sunan Kalijaga Yogyakarta Ambarukmo Desa Catur Tunggal, Depok, Sleman, Indonesia. Email: azamavicenna@gmail.com

**20194.** Oldak, K. (2022): Dragonflies (Odonata) of retention ponds situated near the Mińsk Mazowiecki motorway bypass (east-central Poland). *Odonatrix* 183 (2022): 17 pp. (in Polish, with English summary) ["The aim of this study was to determine the species composition of Odonata of 8 motorway retention ponds situated in the Mińsk Mazowiecki district (Province of Mazovia). A total of 36 species were found (48.6% of the Polish odonate fauna), 24 of which were classified as autochthonous or probably autochthonous. The most abundant species in the ponds were *Coenagrion puella*, *Erythromma viridulum* and *Ischnura elegans*. Two species protected in Poland were recorded – *Leucorhinia albifrons* and *Sympecma paedisca*. The records of *Sympetrum depressiusculum*, *S. meridionale* and *Crocothemis erythraea* were the first from the Mińsk Mazowiecki district. The ponds exhibited a considerable qualitative faunistic similarity. As the odonate fauna of the individual ponds was qualitatively poor, these offered suitable habitats for only a small number of dragonfly species. This was due, among other things, to the small surface areas of the ponds and the inappropriate management of the plant succession in them. As the species found were mostly eurytopes and

common ones, the ponds are unlikely to enhance the regional dragonfly diversity. To date, there have been no published records of the odonate fauna of motorway retention ponds in Poland, so the present paper provides a comparative background for further research in this field. In addition, these results add to our knowledge of the dragonfly fauna of both the Mińsk Mazowiecki district and two hitherto poorly studied UTM squares (EC38, EC48), within which many species were found for the first time." (Author)] Address: Oldak, K., Ziemowita 14, 05-300 Mińsk Mazowiecki, Poland. Email: krystian.adam.oldak@gmail.com

**20195.** Oldak, K.A. (2022): Dragonflies (Odonata) in spider webs – cases from motorway retention ponds in the Mińsk Mazowiecki district (east-central Poland). *Odonatrix* 184 (2022): 6 pp. (in Polish, with English summary) ["Instances of dragonflies (Odonata) caught in spider webs were documented as part of a study of the odonate fauna of motorway retention ponds conducted in 2020. Identification of the dragonfly and spider (Araneae) species was based on photographs taken in the field. 46 cases of dragonflies caught in spider webs were recorded. Zygopterans made up 87.0% of all these prey items. In 46.7% of the cases where the dragonfly species was identifiable, the prey was *Ischnura elegans*. This was most likely due to the ubiquity and abundance of this species on these retention ponds. The quite characteristic appearance of the terminal abdominal segments of *I. elegans* sometimes enabled identification of this species even if the victim had been partially consumed. Fourteen spiders from two families – Araneidae and Tetragnathidae – were recorded, the former being somewhat more abundant (57.1%). Water bodies are the typical habitat for three of the five identified spider species – *Tetragnatha extensa*, *T. striata* and *Larinioides cornutus*; the other two – *Argiope bruennichi* and *Araneus quadratus* – inhabit more diverse habitats. *T. extensa* was the spider species found in the greatest number of cases." (Author)] Address: Oldak, K.A., Ziemowita 14, 05-300 Mińsk Mazowiecki, Poland. Email: krystian.adam.oldak@gmail.com

**20196.** Olsen, K.; Svenning, J.-C.; Balslev, H. (2022): Niche breadth predicts geographical range size and northern range shift in European dragonfly species (Odonata). *Diversity* 2022, 14(9), 719; <https://doi.org/10.3390/d14090719>: 14 pp. (in English) ["We studied how range sizes and shifts in species ranges depend on niche breadth in European dragonflies. We measured range sizes and shifts over a 22-year period (1988–2010) and grouped species into those reproducing in permanent running (perennial lotic) water, permanent standing (perennial lentic) water, and temporary (running or standing) water. Running water species are more specialized and have narrower niches with a more fixed niche position than standing water species. Temporary water species are more generalist and have broader niches without a fixed niche position as clear as permanent water species because they may utilize both temporary and permanent habitats. Running water species have smaller ranges, and some of them have contracted their ranges more than species reproducing in standing or temporary waters; that is, they are especially at risk of habitat loss and climate change because of the joint effects of their narrow niches and small range sizes. Temporary water species track climate changes better than permanent water species. This suggests that ecological specialization may cause contemporary range shifts to lag behind changes in climate and resources. Furthermore, it indicates that recent changes in climate and human land use cause biotic homogenization,

where specialists are outperformed and replaced by generalists." (Authors)] Address: Olsen, K., Research and Collections, Natural History Museum Aarhus, Wilhelm Meyers Allé 10, DK-8000 Aarhus, Denmark. Email: kent@nathist.dk

**20197.** Onah, I.E.; Ajanwachukwu, O.J.; Ubachukwu, P.O. (2022): Comparison of physico-chemical parameters with macroinvertebrate and vertebrate fauna of Lake Ogelube and Lake Ojii, Opi-Agu, south-eastern Nigeria. *African Journal of Aquatic Science*: (in English) ["The physico-chemical parameters of water provide crucial information on the condition of a waterbody at a point in time. Physico-chemical parameters determine the primary and secondary productivity of an aquatic ecosystem. Data on water temperature, pH, turbidity, water depth, total dissolved solids, total hardness, biochemical oxygen demand, dissolved oxygen, chloride, nitrate and phosphate, together with information on the aquatic macroinvertebrate and vertebrate species composition and abundance were collected for two Nigerian lakes, Lake Ogelube and Lake Ojii at Opi-Agu. The physico-chemical parameters were analysed using standard methods. Macroinvertebrate and vertebrate (Actinopterygii and Amphibia) species composition and abundance in the lakes were correlated with the physico-chemical parameters. Temperature, depth, biochemical oxygen demand and phosphate were significantly higher in Lake Ojii than in Lake Ogelube, while pH, turbidity and nitrate were significantly higher in Lake Ogelube ( $p < 0.05$ ). In total, 1 442 animals were collected from the lakes of which 1 101 were macroinvertebrates and 341 vertebrates. The family Libellulidae (Order: Odonata) and the species *Coptodon zillii* (synonym: *Tilapia zillii*) (Gervais, 1848) (Perciformes: Cichlidae) were the most abundant macroinvertebrate and vertebrate taxa, respectively. Libellulidae were negatively associated with biochemical oxygen demand, temperature, turbidity, phosphate and chloride and *Coptodon zillii* was positively associated with dissolved oxygen." (Authors)] Address: Onah, I.E., Dept of Zoology and Environmental Biology, University of Nigeria. Email: ikechukwu.onah@unn.edu.ng

**20198.** Onishko, V.V.; Koterin, O.E. (2022): *Ischnura elegans malikovae* subspecies nova (Odonata, Coenagrionidae) from the Far East of Eurasia, with discussion of other possible subspecies. *Zootaxa* 5120(4): 573-585. (in English) ["*Ischnura elegans malikovae* ssp. n. is described from the southern Far East of Russia (type locality: Russia, Primorskiy Krai, Pozharskiy District, Luchegorsk Town, the Luchegorsk Reservoir). Reconsideration of literature suggested it to broadly range in East Asia including Korea, Japan (Hokkaido and northernmost Honshu), north and north-east China and to be hitherto mistaken for *Ischnura elegans elegans* (Vander Linden, 1820) in Japan. The main difference of the new subspecies from *I. e. elegans* is the male paraprocts that are about 1.5 times shorter and scarcely diverging in dorsal view and directed obliquely upward in lateral view. *Ischnura elegans ebneri* Schmidt, 1938 is reconsidered as the presumably Anterior Asian subspecies characterised by scarcely or not diverging male paraprocts in dorsal view, versus strongly diverging in *I. e. elegans*. Based on scarce information in the literature, *I. elegans marquardtii* Schmidt, 1938 is supposed to be a junior synonym of *I. elegans ordosi* Bartenev, 1912 stat. rev., which is suggested to be an eastern Central Asian subspecies characterised by an incised prothoracic process in males." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**20199.** Onishko, V.V.; Kosterin, O.E.; Blinov, A.G.; Sukhikh, I.S.; Ogunleye, A.T.; Schröter, A. (2022): *Aeshna soneharai* Asahina, 1988, stat. rev., bona species – an overlooked member of the European fauna? (Odonata: Aeshnidae). *Odonatologica* 51(1-2): 111-145. (in English) ["Specimens and observations of *Aeshna mixta* Latreille, 1805, obtained in 2021 from Moscow and Moscow Province, Russia, lead us to the conclusion that what used to be regarded as this well-known Palaearctic species in fact represented two species. They differ in details of the abdominal maculation, including the conspicuous dorsal mark on the second segment, the relative length of the male epiproct, and some other characters. In addition, they also differ in the mitochondrial COI and COII gene sequences (with one odd specimen of *A. mixta* from Balkan Peninsula), but not in the ITS2 sequence. A potential hybrid male was observed. Analysis of photographic observations on the website "iNaturalist.org" suggests that the true *A. mixta* ranges in North Africa, Europe, the Caucasus, and West Asia, and extends north-east to South Ural and south-eastern Kazakhstan and east to Kashmir. The name available for the second species is *Aeshna soneharai* Asahina, 1988 stat. rev., bona species, described from Japan in subspecies rank. This species ranges in East Europe west to the longitude of Moscow and Voronezh, in Ural, Kazakhstan, Siberia, West China, Mongolia, the Far East including Russia, Northeast China, Korea, and Japan. Both species co-occur in Russia between the Don River and South Ural, in Kyrgyzstan and in south-eastern Kazakhstan. The iNaturalist photographs suggest that outside their contact zone, both species (especially *A. mixta* in southern Europe) exhibit some variation with respect to almost all characters that are diagnostic in Moscow Province but, on the other hand, are still identifiable using most of these characters. *Aeshna soneharai* seems not to share the swarming behaviour and the migratory abilities of *A. mixta*. The enigmatic *Aeshna lucia* Needham, 1930, is reconsidered a doubtful species rather than a synonym of *A. mixta*." (Authors)] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**20200.** Orłowska, A.B. (2022): Study of biocompatibility of nanostructured materials on in vitro and in vivo models. PhD thesis, Departament de Química Física i Inorgànica, Universitat Rovira i Virgili, Tarragona: 361 pp. (in English) ["Biomaterials play a substantial role in the health care industry. Each year, the number of medical devices used in humans is estimated to be around 1.5 million individual devices, according to the World Health Organization, with about 10 000 types of generic device groups available worldwide. As new devices emerge, the topic of the biocompatibility of these materials becomes more relevant. This thesis studies biocompatibility of biomaterials and their interaction with tissues and cells combining in vitro and in vivo models. The studied biomaterials are classified in synthetic (polymers, silicon, titanium, and alloys) and nature-derived biomaterials, which in turn, classify in xenogenic, derived from natural materials but foreign for the organism and autologous biomaterials, derived from the tissues of the same organism. In the case of synthetic materials, it was shown how different functionalization strategies of surfaces (in particular, the effect of protein coating and surface topography) affect mammalian cell response. Autologous biomaterials were represented by platelet rich fibrin (PRF), derived from the blood of the patient. Their potential as implantable system was studied in vitro and in vivo. PRF matrixes were characterized by growth factors storage capacity and release as

well as their cellular retention. In regard to xenogenic biomaterials, cell permeation and liquid absorption into different collagen membranes were studied *in vitro*, while evaluation of the host's tissue response was studied with *in vivo* implantation model. Results show that all tested collagen membranes were biocompatible, showcasing the formation of new blood vessels regardless of the presence of multinucleated giant cells." (Author) The study includes references to Odonata.] Address: Orłowska, Anna Barbara, Departament de Química Física i Inorgànica, C/ Marcel·lí Domingo s/n, Edifici N4, 43007 Tarragona, Spain

**20201.** Orr, A.G.; Pricexy, B.W. (2022): A description of the larva of *Matronoides cyaneipennis* Förster, 1897 from northern Borneo (Odonata: Calopterygidae). *Odonatologica* 51(1-2): 157-165. (in English) ["We describe the larva of *Matronoides cyaneipennis* Förster, 1897, based on an incomplete, dried F0 specimen collected at Mt Kinabalu, Sabah, in 1964, and held at the Natural History Museum, London. Since its collection nearly 60 years ago no other specimen has come to light despite considerable searching of its habitat. Identification is by supposition, but given its provenance the identity of the specimen is not in doubt. All diagnostic features remain intact. The larva is compared with those of the related genus *Neurobasis*, especially the potentially syntopic *N. longipes* from which it differs markedly." (Authors)] Address: Orr, A.G., Environmental Futures Research Institute, Griffith University, Nathan, QLD, Australia. Email: agorr@bigpond.com

**20202.** Pacioglu, O.; Dutu, L.; Dutu, F.; Pavel, A.B. (2022): Habitat preferences and trophic interactions of the benthic invertebrate communities inhabiting depositional and erosional banks of a meander from Danube Delta (Romania). *Global Ecology and Conservation* 38 e02213: 15 pp. (in English) ["River restoration and biodiversity conservation programs require an in-depth knowledge of the influence that sediment composition and hydraulic stress have on invertebrate fauna composition and spatial distribution, as well as on nutrients cycling and food webs structure and functionality. Compared to low-order streams, the traditional focus of river ecology, the knowledge of these ecosystem properties of the meanders developed along large, lowland watercourses, is currently insufficient. The present study assessed the ecological preferences and the trophic interactions of the benthic invertebrate communities inhabiting erosional and depositional banks developed within a meander of the River Danube flowing through its delta (Danube Delta, Romania). The invertebrates from two mesohabitats, the concave (i.e. erosional) and convex (i.e. depositional) banks developed in the apex region of the meander were sampled quantitatively and qualitatively, along with sediment samples for assessing the grain-size characteristics and hydrodynamic parameters (i.e., critical shear stress, the Reynolds number, the critical velocity and Shields parameter). For assessing their mesohabitat preferences, quantitative samples were taken from both banks, whereas for inferring the trophic interactions, stable isotopes of  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  were measured from qualitative samples, comprising both invertebrates and basal resources. The results showed that increased siltation with fine sediments in the depositional bank led to a community dominated by chironomids, oligochaetes and bivalves, whereas the opposite bank comprised crayfish, caddis fly larvae and amphipods with a preference for coarser sediments. The  $\delta^{13}\text{C}$  of most consumers revealed that the dominant forms of carbon entries in the analysed food webs were photosynthetic based, whereas certain snails, chironomids and basal resources from the

depositional bank were  $\delta^{13}\text{C}$  depleted ( $\delta^{13}\text{C}$ : -35 to -39 ‰). Such low ratios for  $\delta^{13}\text{C}$  (mean  $<-35$  ‰) reflected the potential of carbon entry through the base of depositional food web as a result of methane oxidation at sediment-water interface (i.e. chemosynthesis), induced by the fine sediments deposition that could have favoured the methane production. Grazing methaneoxidising bacteria in the depositional meander bank could have provided the primary consumers with up to 50 % and the omnivores and predatory invertebrates with up to 30 % of their carbon, which could represent an important subsidy from an additional, chemosynthetic source. The impact of a supplementary carbon input was further reflected in increasing depositional food web basal niche diversity, which led to distinct trophic niches and lower interspecific competition of consumers compared to the erosional bank of the meander." (Authors)] Address: Pacioglu, O., National Institute of Research & Development for Biological Sciences, Splaiul Independenței 296, 060031 Bucharest, Romania. Email: octavian.pacioglu@incdsb.ro

Padilla-Morales, B.; Comejo-Páramo, P.; García-Miranda, O.; Carrillo Muñoz, A.I.; Lopez, A.N.; Castillo-Morales, D.L.; Barragán, G.W.; Urrutia, A.O.; Serrano-Meneses, M.A. (2022): Fast species diversification among dragonflies (Anisoptera: Odonata: Insecta) inhabiting lentic environments regardless of wing pigmentation. *Ecological Entomology* 47(3): 314-322. (in English) ["1. In dragonflies, species richness shows a marked variation between lineages. Species diversification in this lineage has been linked with habitat variation, but the role of other factors, such as wing pigmentation, arguably one of the most conspicuous traits in dragonflies, have not yet been explored. 2. In this study, using novel methodology that takes into account state-dependent speciation, extinction models, and ancestral reconstruction, we investigate the role of wing pigmentation (present/absent) in conjunction with habitat variation (lentic/lotic), to unveil the drivers of species diversification in dragonflies. 3. We found that wing pigmentation is associated with a marginal increase in diversification compared to unpigmented lineages. Inhabiting a lentic habitat is associated with higher diversification rates. When considering both factors in a single model, lentic environments are associated with higher diversification compared to lotic habitats regardless of pigmentation status. In contrast with results across the whole tree, in lotic environments, wing pigmentation is associated with marginally higher diversification rates compared to non-pigmented species. Ancestral state reconstruction revealed that the last common ancestor of dragonflies was most likely non-pigmented and lived in lotic habitats. 4. Our study provides evidence that wing pigmentation in conjunction with habitat has an important influence on dragonfly species diversification, with habitat being a better differentiator than wing pigmentation." (Authors)] Address: Padilla-Morales, B., Milner Centre for Evolution, Department of Biology and Biochemistry, University of Bath, Bath BA2 7AY, UK. Email: bpm29@bath.ac.uk and a.urrutia@bath.ac.uk

**20203.** Papazian, M.; Filippi, G.; Coache, A.; Deffontaines, J.-B. (2022): Contribution a la connaissance des Odonates de l'archipel de São Tomé-et-Príncipe. 3. Presence de *Ischnura senegalensis* (Rambur, 1842), de *Tamea limbata* (Desjardins, 1835) et de *Rhyothemis notata* (F., 1787) (Odonata: Coenagrionidae, Libellulidae). *L'Entomologiste* 78(2): 115-119. (in French, with English and Portuguese summaries) ["The first two expeditions carried out in 2019, as part of the Sao Tome and Principe - Archipelago of Biodiversity" project, enabled the collection of *Zygonyx torridus* (Kirby, 1889) and *Agriocnemis zerafica* Le Roi, 1915, new

species for Sao Tome and Principe. It was only in October 2021 that a third expedition could be organized, allowing the discovery of *Ischnura senegalensis* (Rambur, 1842), *Tra-mea limbata* (Desjardins, 1835) and *Rhyothemis notata* (F., 1787), bringing to 20 the number of Odonata currently known from the archipelago." (Authors)] Address: Papazian, M., Le Constellation Bât. A, 72 avenue des Caillols, F-13012 Marseille, France. E-mail: mpapazian@ecologie.re

**20204.** Papazian, M., Filippi, G.; Coache, A. (2022): Contribution à la connaissance des Odonates de l'archipel de São Tomé-et-Príncipe 4. Presence de *Gynacantha cylindrata* Karsch, 1891 (Odonata Aeshnidae). *L'Entomologiste* 78(4): 279-283. ["A new expedition to Sao Tome, in March 2022 as part of the Sao Tome and Principe "Archipelago of Biodiversity" project, allowed the collection of *Gynacantha cylindrata* Karsch, 1891 during a night hunt, at the using a light trap." (Authors)] Address: Papazian, M., Opie Provence . Alpes-du-Sud. Museum d'histoire naturelle de Marseille, palais Longchamp, f-13233 Marseille cedex 20, France. Email: papazianmichel@orange.fr

**20205.** Park, J.S.; Kim, M.J.; Kim, S.S.; Kim, I. (2022): Complete mitochondrial genome of *Asiagomphus coreanus* (Odonata: Gomphidae), which is endemic to South Korea. *Mitochondrial DNA Part B Resources* 7(5): 791-793. (in English) ["*Asiagomphus coreanus* (Doi & Okumura, 1937) [...] has been listed as an endemic species in South Korea. Here, we assembled its complete mitochondrial genome (mitogenome) which is 15,649 base pairs (bp) in length. The *A. coreanus* mitogenome consists of a typical set of genes [13 protein-coding genes (PCGs), 2 ribosomal RNA (rRNA) genes, and 22 transfer RNA (tRNA) genes] and one major non-coding A + T-rich region which is 846 bp long. The gene arrangement of the species was identical to that of commonly found in the majority of the insects. Phylogenetic analyses using the concatenated sequences of 13 PCGs and two rRNA genes of the representative odonate mitogenomes by Bayesian inference method revealed that *A. coreanus* belongs to the Gomphidae family with a strong nodal support (Bayesian posterior probabilities = 1). Unlike previous phylogenetic analyses (with regards to suborder relationships) the suborder Anisozygoptera — which was represented by a single species, *Epiophlebia superstes* — was placed as the sister to Zygoptera." (Authors)] Address: Kim, I., Coll. Agriculture & Life Sciences, Chonnam National Univ., Gwangju, Republic of Korea. Email: ikkim81@chonnam.ac.kr

**20206.** Payra, A.; Deshpande, A.; Koparde, P. (2022): Up and above: Northernmost records of *Macromidia donaldi* donaldi (Fraser, 1924) and *Merogomphus longistigma* (Fraser, 1922) from the Western Ghats of India (Odonata: Synthemistidae: Gomphidae). *Revista de la Sociedad Entomológica Argentina* 81(2): 63-69. (in English, with Spanish summary) ["The occurrences of *Macromidia donaldi* donaldi (Fraser, 1924) and *Merogomphus longistigma* (Fraser, 1922) are reported for the first time in the northern Western Ghats of India. The observations are the northernmost records of these species. Detailed descriptions, diagnostic characters and a comparison on with closely related species are provided." (Authors)] Address: Payra, A., School of Ecology & Environmental Management, Faculty of Sustainability Studies, Dr. Vishwanath Karad MIT World Peace University, Kothrud, Pune, Maharashtra , 411038 India. Email: arapayra@gmail.com

**20207.** Peng, L.; Pan, T.; Zheng, M.; Song, S.; Su, G.; Li,

Q. (2022): Kinematics and aerodynamics of dragonflies (*Pantala flavescens*, Libellulidae) in climbing flight. *Frontiers in Bioengineering and Biotechnology* 10:795063. doi: 10.3389/fbioe.2022.795063: 14 pp. (in English) ["This study presents a detailed analysis of dragonflies' climbing flight by integrating highspeed photogrammetry, three-dimensional reconstruction, and computational fluid dynamics. In this study, a dragonfly's climbing flight is captured by two high-speed cameras with orthogonal optical axes. Through feature point matching and threedimensional reconstruction, the body kinematics and wing kinematics of 22 dragonflies in climbing flight are accurately captured. Experimental results show that the climbing angles ( $\zeta$ ) are distributed from 10° to 80° and are concentrated within two ranges, 60°–70° (36%) and 20°–30° (32%), which are defined as large angle climb (LAC) and small angle climb (SAC), respectively. In order to study the aerodynamic mechanism of the climbing flight based on the biological observation results, the kinematic parameters of the dragonfly during LAC and SAC are selected for analysis and numerical simulation. The results show that the climbing angle  $\zeta$  and wing kinematics are related. There are considerable differences in wing kinematics during climbing with different  $\zeta$ , while the wing kinematics are unchanged during climbing with similar  $\zeta$ . With the increase in  $\zeta$ , the phase difference ( $\dot{\epsilon}$ ) between the forewing and the hind wing decreases and the amplitude of the positional angle ( $\epsilon_{\text{mean}}$ ) of the hind wing increases, while  $\epsilon_{\text{mean}}$  of the forewing remains almost unchanged. Through numerical simulation of LAC and SAC, it can be found that during the climb with different  $\zeta$ , the different wing kinematics have a significant influence on aerodynamic performance. During SAC, the increase in  $\dot{\epsilon}$  and the decrease in  $\epsilon_{\text{mean}}$  of the hind wing weaken the aerodynamic disturbance of the forewing by the vortex wing of the hind wing, thus improving the flight efficiency." (Authors)] Address: Zheng, M., Reserach Inst. Aero-Engine, Beihang University, Beijing, China. Email: zhengmengzong@buaa.edu.cn

**20208.** Pérez-Hernández, C.X. (2022): Enrique González Soriano, entomólogo de formación y naturalista de vocación. Enrique González Soriano, entomologist by training and naturalist by vocation. *Dugesiana* 29(2): 217-224. (in Spanish, with English summary) ["A brief review of the life and work of the entomologist and naturalist Enrique González Soriano is presented, as well as comments on the impact of almost 45 years of research on Mexican and Latin American odonatology. Key words: Odonata, taxonomy, natural history, National Insect Collection, Latin American Odonatology." (Author)] Address: Pérez-Hernández, C.X., Laboratorio de Ecología de la Conducta, Facultad de Biología, Universidad Michoacana de San Nicolás de Hidalgo, Morelia, Michoacán, México. Email: cxinum@gmail.com

**20209.** Phan, Q.T.M Yokoi, N.; Ngo, Q.P.; Nguyen, M.T. (2022): Taxonomic and faunistic notes on the genus *Protosticta* Selys, 1885 in Laos (Odonata: Zygoptera: Platystictidae). *Aquatic Insects* 43(3): 236-245. (in English) ["A re-examination and discussion of the records of the genus *Protosticta* Selys, 1885 of Laos is provided. *Protosticta ngoai* Phan & Kompier, 2016 and *P. spinosa* Phan & Kompier, 2016 are reported for the first time from Laos. *Protosticta curiosa* Fraser, 2009 [sic!, must be Fraser, 1934] is assigned as junior synonym of *P. trilobata* Fraser, 1933. The *Protosticta curiosa*-group should henceforth be referred to as the *Protosticta trilobata*-group." (Authors)] Address: Phan, Q.T., Center for Ento. & Parasit. Res., Inst. Res. & Training of Medicine, Biology & Pharmacy, Duy Tan University, Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com



**20210.** Phan, Q.T.; Keetapithchayakul, T.S.; Ngo, Q.P. (2022): New additions to the Vietnamese Odonata fauna: Records of *Podolestes pandanus* Wilson & Reels, 2001a: Zygoptera: Argiolestidae) and *Risioptlebia guentheri* Kosterin, 2015 (Anisoptera: Libellulidae) from a swamp cypress nature reserve in the Central Highlands of Vietnam. International Dragonfly Fund - Report 172: 1-7. (in English) ["*Podolestes pandanus* Wilson & Reels, 2001, is recorded for the Vietnamese fauna and the occurrence of *Risioptlebia guentheri* Kosterin, 2015 in the Central Highlands of Vietnam is confirmed." (Authors)] Address: Phan, Q.T., Center for Entomology & Parasitology, Institute of Research and Training of Medicine, Biology & Pharmacy, Duy Tan University, Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

**20211.** Phattanakorn, C.; Boonsoong, B. (2022): Diversity of dragonfly larvae in some parts of northern Thailand. Agriculture and Technology Journal 3(2): 63-75. (in Thai, with English summary) ["Diversity of dragonfly larvae (Order Odonata, Suborder Anisoptera) were investigated at stream and wadeable river of Chiang Mai, Nan and Chiang Rai provinces. Eighteen sampling sites were sampled during October 2020 to March 2021. Dragonfly larvae were collected using D-frame net and fully-grown larvae were reared in laboratory. Unidentified larvae were associated using DNA barcoding (COI). A total of 291 specimens of dragonfly larvae were identified into 23 species, 17 genera and 5 families (Aeshnidae, Gomphidae, Libellulidae, Macromiidae and Synthemistidae). The family Gomphidae (13 species) is the most diverse species richness followed by Libellulidae and Aeshnidae, respectively. The association of larvae and adult succeed in 3 species (*Idionyx selysi*, *Paragomphus capricornis* and *Tetracanthagyna plagiata*). The similarity analysis (Blastn) found that 3 species which *Heliogomphus selysi*, *Pantala flavescens* and *Trithemis festiva* presented in GenBank and BOLD database. Principal Component Analysis (PCA) analysis revealed that dragonfly larvae were correlated with each provincial region, which *Megalogomphus* sp., *Stylogomphus* sp. and *Idionyx* sp. associated with Chiang Rai Province. Undisturbed and headwater stream sites scatter more than disturbed and wadeable river sites." (Authors)] Address: Boonsoong, B., Animal Systematics and Ecology Speciality Research Unit (ASESRU), Dept of Zoology, Faculty of Science, Kasetsart University, Bangkok, Thailand 10900. E-mail: fscibtb@ku.ac.th

**20212.** Pires, M.M.; Sahlén, G.; Périco, E. (2022): Agricultural land use affects the heterogeneity of Odonata communities in the Brazilian Pampa. Journal of Insect Conservation 26: 503-514. (in English) ["Farming expansion has negative impacts on freshwater biodiversity. However, the effects of agricultural land use are not similar across taxa and depend on local context. For instance, the impacts of agricultural expansion are understudied in the Neotropics (one of the leading regions in cropland expansion). Knowledge of the effects of agricultural land use on aquatic insects from South American subtropical grasslands (Pampa) is even more incipient. We tested whether landscape modification related to increased agricultural land use was associated with taxonomic homogenization in odonate communities in waterbodies in the Brazilian Pampa. Odonates were collected in waterbodies differing in the main land-use class in their surroundings (cropland or grassland). Cropland and grassland sites differed with respect to their abiotic conditions (water chemistry) and species composition of Odonata. Additionally, we found higher variation in the composition of Odonata (and suborders Anisoptera and Zygoptera separately) in grassland than cropland sites. We found an

interplay between agricultural and grassland land uses and the variation in the composition of odonate communities in the Brazilian Pampa. Specifically, landscape modification by agriculture modified the abiotic conditions in the waterbodies, which may have favored species able to establish as larvae under harsher environmental conditions. Implications for insect conservation: We suggest that the maintenance of mixed-grassland and cropland land uses in the fields adjacent to waterbodies can limit the negative effects of agricultural encroachment on Odonata communities with respect to biotic homogenization in the Brazilian Pampa." (Authors)] Address: Pires, M.M., Ecology and Evolution Lab, Universidade do Vale do Taquari (UNIVATES), Avelino Talini Av. 171, 95914-014, Lajeado, RS, Brazil

**20213.** Prieto-Merino, C.; Martínez-Gonzaga, F. (2022): Estudio de la calidad de agua con macroinvertebrados en el sector turístico Pailas Rotas, Cantón Gonzanamá Provincia de Loja. Study of the quality of water with macroinvertebrates in the tourist sector Pailas Rotas, Canton Gonzanamá Province of Loja. Estudo da qualidade da água com macroinvertebrados no setor turístico Pailas Rotas, Cantão Gonzanamá Província de Loja. Polo del Conocimiento 7(7) (Edición núm. 70): 735-751. (in Spanish, with English and Portuguese summaries) [Ecuador; "The objective of the present study was to evaluate the water quality of the Pailas Rotas tourist sector of the Changaimina parish, Gonzanamá sector through analysis of aquatic macroinvertebrates, for this investigation a surber network and a kick network were used, establishing three monitoring points, it was achieved collect a total of 79 specimens of aquatic macroinvertebrates, of which taxonomically correspond to 9 orders and a total of 15 families. The order with the largest number of macroinvertebrates was obtained by the order Hemiptera with 40 individuals (51%), the order Ephemeroptera with 17 individuals (21%), the order Trichoptera and Odonata with 7 individuals each (9%) [Aeshnidae, Corduliidae, Libellulidae], the order Coleoptera, Diptera and Haplotaenidia 2 individuals each (3%), the order Lepidoptera and Pulmonata with 1 individual (1%), the EPT and BMWP/Col indices were determined, obtaining as a result good quality in the upper part, in the middle part where it is found Regular tourist activity and poor quality in the lower part. The results of this study indicate that anthropogenic activities influence the quality of the waters." (Authors)] Address: Prieto-Merino, C., Tecnología Superior en Desarrollo Ambiental, Instituto Superior Tecnológico Sudamericano Loja, Ecuador. Email: cfprieto@tecnologicosudamericano.edu.ec

**20214.** Priyadarshana, T.S.; Lee, M.-B.; Ascher, J.S.; Qiu, L.; Goodale, E. (2022): Crop heterogeneity is positively associated with beneficial insect diversity in subtropical farmlands. Journal of Applied ecology 58(12): 2747-2759. (in English) ["1. Increasing crop configurational heterogeneity – smaller crop fields with more field margins – has been repeatedly found to support farmland biodiversity. But research on compositional crop heterogeneity – the number and evenness of crop types – has usually shown only weak effects. However, much of this research has been conducted in large-scale temperate agroecosystems. 2. We examined smallholder subtropical agroecosystems in southern China to assess the effects of crop heterogeneity on beneficial insect biodiversity. In addition to pollinators (bees, apid and vespid wasps, butterflies), we studied dung beetles and dragonflies/damselflies, which are not usually considered in cropland heterogeneity studies, but are abundant in these multi-functional agroecosystems. We sampled these taxa in 468 transects placed inside 52 farms across

three seasons (summer, spring, winter), collecting data on 27,245 insects belonging to 160 species. 3. We found a strong positive effect of crop compositional heterogeneity (measured by Shannon-Wiener index) on dung beetle and dragonfly/damselfly diversity. Bees/wasps and butterflies, conversely, were positively affected by crop configurational heterogeneity (measured by cumulative field margin length). 4. Field margin type, categorized by the structure of the dominant crop types, was consistently an important explanatory variable, with weedy margins having high insect diversity. The presence of a vegetable crop on one side of the field margin, compared to non-vegetable monocultures on both sides, increased diversity in 3/4 taxon-season comparisons made for rice, and 6/9 comparisons made for sugarcane or corn. 5. Synthesis and applications. We demonstrate that crop compositional heterogeneity can support insects that respond to differences among crop types, including taxa that play a key role in nutrient cycling (dung beetles) and natural pest control (dragonflies/damselflies). Incorporating structurally diverse crops into monoculture Asian agroecosystems can reduce the adverse effects these intensive systems have on beneficial insects, and increase crucial ecosystem services." (Authors) Odonate taxa are not specified.] Address: Goodale, E., Guangxi Key Lab. Forest Ecology & Conservation, College of Forestry, Guangxi University, 100 DaXue Rd. Nanning, Guangxi, 530004 China. E-mail: ebengoodale@gxu.edu.cn

**20215.** Priyadi, S.; Setiawan, L.A.; Utami, D.S.; Azies, A.F.; Haryuni (2022): Impact of carbofurans on sweet corn pest predators: A study of good agroecosystem practices. *Jurnal Ilmiah Agrineca* 22(2): 49-57. (in English) ["Sweet corn (*Zea mays* var. *Saccharata*, Sturt) is a horticultural crop with high economic value. Sweet corn plants are susceptible to attack by plant pest organisms, reducing production yields. Using synthetic chemical pesticides of the carbamate group can reduce the diversity of predatory insects as biological controllers. Many farmers do not know about the role of predatory insects in agriculture, so there is often a mistarget in control. This study aimed to determine the diversity of predatory insects on sweet corn. The research was conducted in Cabeyan, Sukoharjo district, using the descriptive observation method. Data collection is done directly. In this study, several types of predatory insects were found, including 3 species from the Araneae order, 2 from the Odonata [*Agriocnemis femina*, *Orthetrum sabina*], one from the Hymenoptera, one from the Diptera, and one species from the Coleoptera." (Authors)] Address: Priyadi, S., Agrotechnology Dept, Agriculture Fac., Tunas Pembangunan Univ., Surakarta, Indonesia. Email: haryuni@lecture.utp.ac.id

**20216.** Raczynski, M.; Stoks, R.; Johansson, F.; Barton, K.; Sniegula, S. (2022): Phenological shifts in a warming world affect physiology and life history in a damselfly. *Insects* 2022, 13, 622. <https://doi.org/10.3390/insects13070622>: 13 pp. (in English) ["Simple Summary: Climate warming affects phenological events of cold-blooded organisms. In this analysis we studied, in laboratory conditions, the impact of warming and hatching dates on key life history and physiological traits in a cannibalistic damselfly, *Ischnura elegans*. Larvae were reared in groups from hatching to emergence through one or two growth seasons, depending on the voltinism. Larvae were equally divided by hatching dates (early and late) and temperature treatment (current and warming). Early and late hatched groups were not mixed. Despite no difference in cannibalism rate between different hatching dates and temperatures, early hatched larvae reared under warming had elevated immune function

measured as phenoloxidase (PO) activity. This increased PO activity was not traded off with life history traits. Instead, age and mass at emergence, and growth rate were mainly affected by temperature and voltinism. Our results confirm the importance of phenological shifts in a warming world for shaping physiology and life history in a freshwater insect. Abstract: Under climate warming, temperate ectotherms are expected to hatch earlier and grow faster, increase the number of generations per season, i.e., voltinism. Here, we studied, under laboratory conditions, the impact of artificial warming and manipulated hatching dates on life history (voltinism, age and mass at emergence and growth rate) and physiological traits (phenoloxidase (PO) activity at emergence, as an indicator of investment in immune function) and larval survival rate in high-latitude populations of the damselfly *Ischnura elegans*. Larvae were divided into four groups based on crossing two treatments: early versus late hatching dates and warmer versus control rearing temperature. Damselflies were reared in groups over the course of one (univoltine) or two (semivoltine) growth seasons, depending on the voltinism. Warming temperature did not affect survival rate. However, warming increased the number of univoltine larvae compared to semivoltine larvae. There was no effect of hatching phenology on voltinism. Early hatched larvae reared under warming had elevated PO activity, regardless of their voltinism, indicating increased investment in immune function against pathogens. Increased PO activity was not associated with effects on age or mass at emergence or growth rate. Instead, life history traits were mainly affected by temperature and voltinism. Warming decreased development time and increased growth rate in univoltine females, yet decreased growth rate in univoltine males. This indicates a stronger direct impact of warming and voltinism compared to impacts of hatching phenology on life history traits. The results strengthen the evidence that phenological shifts in a warming world may affect physiology and life history in freshwater insects." (Authors)] Address: Raczynski, M., Institute of Nature Conservation, Polish Academy of Sciences, 31-120 Krakow, Poland; kbarton@iop.krakow.pl

**20217.** Raczyński, M.; Stoks, R.; Sniegula, S. (2022): Warming and predation risk only weakly shape size-mediated priority effects in a cannibalistic damselfly. *Scientific Reports* 12(17324): 12 pp. (in English) ["1. Differences in hatching dates can shape intraspecific interactions through size-mediated priority effects (SMPE), a phenomenon where bigger, early hatched individuals gain advantage over smaller, late hatched ones. While SMPE may be important for population dynamics, to what extent and how these are affected by key environmental factors such as warming and predation risk imposed by top predators remains unclear. 2. In a laboratory experiment, we studied effects of warming (low and high temperature) and predation risk (presence and absence of predator cues of perch) on SMPE in life history and physiological traits in the cannibalistic damselfly *Ischnura elegans*. We induced SMPE by manipulating hatching dates, thereby creating four groups: non-mixed phenology early (E) and late (L) hatchers, and mixed phenology early (E+L) and late (L+E) hatchers. 3. We found strong SMPE for survival and emergence success, with the highest values in E+L larvae and the lowest values in L+E larvae. Neither temperature nor predator cues affected SMPE for these two life history traits. The other life history traits (development rate and mass at emergence) did not show SMPE, but were affected by temperature and predator cues. 4. SMPE was found for protein content, but only in the high temperature treatment. The other physiological

traits (immune function measured as phenoloxidase activity and fat content) showed fixed expressions across treatments, indicating decoupling between physiology and life history. 5. The results underline that SMPEs are trait-dependent, and only weakly affected by temperature and predation risk." (Authors)] Address: Sniegula, S., Inst. Ochrony Przyrody Polskiej Akademii Nauk, al. Adama Mickiewicza 33, 31-120 Kraków, e-mail: sniegula@iop.krakow.pl

**20218.** Radanovich, S.B.; Vladimirovich, Y.K. (2022): [The use of the macro-photography method in the classification of taxonomical groups of the order Odonata on the example of *Aeshna grandis* and *Lestes sponsa*]. Research Institute of Pedagogy and Psychology: 29-33: 29-33. (in Russian) ["The authors of this scientific article consider the morphological criteria for the larvae of dragonflies *Lestes sponsa* and *Aeshna grandis*, obtained as a result of the macrophotography method. The morphological criteria depicted in the work are subsequently used for species identification of Odonata larvae using the example of 2 dragonfly species of different suborders. The article describes the possibilities of using dragonfly larvae by humans in the bioindication of the aquatic environment; the equipment used, as a result of which high-quality macrophotographs of morphological criteria were obtained. The scope of the studied material included the determinant "Dragonfly larvae of the fauna of the USSR (Odonata)", a descriptive and evidential base of the taxonomic belonging of individuals to certain species presented in the photographs was formed." (Google translate)] Address: Radanovich, S.B., Karaganda University named after E.A. Buketov, Karaganda, Kazakhstan

**20219.** Rashid, M.; Ridoy, M.K.; Rahman, M.M.; Rahman, M.M.; Mondal, M.F. (2022): Does solar light trap reduce the cost of pesticides used in rice field? Effect of solar light trap in rice field. SAARC Journal of Agriculture 20(1): 171-183. (in English) ["Pesticide application against insect pest infestation is environmentally unsafe and costly. An attempt was taken to evaluate the solar light trap as ecofriendly and cost-effective approach in Transplanted Aman rice (BRRI dhan32) field at Barhatta Upazila (Sub-district) in Netrokona district of Bangladesh. It was found that rice pest like Rice yellow stem borer, Rice leaf roller, Green leaf hopper, Brown plant hopper, Rice leaf miner, Rice gall midge, White leafhopper, Rice bug, Rice ear cutting caterpillar, White-backed planthopper, Rice caseworm, Grasshopper, Rice skipper and Rice beetle were the major insects that captured under the solar light traps. Some beneficial insects were also attracted by the trap these were Ladybird beetle, Water scavenger, Giant water bug, Ground beetle, Rove beetle, Damselfly. All the harmful and the beneficial insects were belonging the order of Lepidoptera, Hemiptera, Orthoptera, Coleoptera, Diptera and Odonata ["*Nehalennia gracilis*"]. Though the mean yield of rice was statistically insignificant in both fields, the light trap installed fields required the less frequency of pesticides than the control fields which ultimately rendered the low pesticides cost in a great extent. On an average 1,034 BDT was reduced in per hectare." (Authors)] Address: Mondal, M.F., Dept of Agricultural Extension, Ministry of Agriculture, Bangladesh. Email: mondalmf.entom@sau.ac.bd

**20220.** Rengifo-Correa, L.; Rocha-Ortega, M.; Córdoba-Aguilar, A. (2022): Modeling mosquitoes and their potential odonate predators under different land uses. EcoHealth 19(3): 417-426. (in English) ["To efficiently face the accelerated landscape transformation and its consequences in restructuring biotic communities and ecosystem services, one

first question is which regional systems deserve prioritization for empirical assessments and interventive strategies. For the particular case of vector-borne disease control, we should consider generalist predators exhibiting differential responses to land-use change, as is the case of odonate insects. Thus, our aim was to infer land uses in Mexico where odonates (i.e., damselflies and dragonflies) might have some potential to predate mosquitoes of medical relevance. The study area included the hydrological basins of central Mexico. We modelled 167 species of odonates, four species of mosquitoes, and 51 land-use categories. Inferring spatial co-occurrence patterns from data mining and complex networks, we identified: (1) the ecological network of odonates and mosquitoes and (2) the land uses shared by these two groups. We inferred that 34% of odonate species co-occur with mosquitoes of medical relevance mainly in some preserved—mountain mesophyll cloud forest, high evergreen rainforest, and low tropical dry forest—but also in highly modified—human settlements, irrigation-based and pastures crop fields—land uses with strong human presence. Our findings highlight the relevance of community-regional studies for understanding the public health consequences of landscape change." (Authors)] Address: Córdoba-Aguilar, A., Depto de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

**20221.** Renner, S.; Périco, E.; Schmidt Dalzochio, M.; Sahlén, G. (2022): The balance of common vs. rare: a study of dragonfly (Insecta: Odonata) assemblages in the Brazilian Pampa biome. Neotropical Biodiversity 8(1): 188-199. (in English) ["We surveyed dragonflies (Odonata) at 87 sites in the anthropologically modified Pampa biome of southern Brazil to evaluate how regionally rare and common species form species assemblages in habitats with different water physiochemistry, habitat structures, and other environmental variables. We classified 9 out of the 90 species encountered as regionally common and 59 as regionally rare. A discriminant analysis confirmed that localities with only a few common species were characteristic in the set of rare species present, while localities housing more common species showed no clear pattern. A PCA revealed that a subset of the common species were strongly positively associated with water temperature, turbidity, dissolved O<sub>2</sub> and pH but negatively associated with desertification. In contrast, rare species were positively associated with grassland habitat, but negatively with agriculture, salinity, and conductivity. In general, the associations of the rare species were weaker than those of common species. Finally, a correlation suggested that sites with six or more common species present had a reduced number of rare species compared to sites with fewer common species. It is possible that common species reduce the available niche space for weaker competitors among the rare species. We conclude that the original species assemblages in the biome may have been species poor with few regionally common species. Current anthropogenic change has increased the number of common species, which in turn has negative effects on the survival possibilities of rare species." (Authors)] Address: Renner, S., Univde do Vale do Taquari, Lab. de Ecologia e Evolução, Univates, Brazil. Email: samuelrenner@hotmail.com

**20222.** Richardson, T.W. (2022): First Record of Autumn Meadowhawk, *Sympetrum vicinum*, for Nevada. Argia 34(1): 16-17. (in English) [20-X-2021, Jennings Pond, Rabe Meadows in Douglas County, Nevada, USA] Address: Richardson, T.W., Tahoe Institute for Natural Science, P.O. 4289

Truckee, CA 96160, USA. E-mail: will@tinsweb.org

**20223.** Ritter, A. (2022): *Onychogomphus forcipatus* (Linnaeus, 1758) Kleine Zangenlibelle - Rückkehr an die Wilde Weißeritz nach 222 Jahren. *Mitteilungen Sächsischer Entomologen* 41(142): 73-75. (in German) [Tharandt, Sachsen, Germany; two males of *O. forcipatus* along the river Weißeritz, 12-VII-2021.] Address: Ritter, Anje, Eutschützer Str. 14, 01217 Dresden, Germany. Email: gunilla@t-online.de

**20224.** Rodrigues, M.; Nayakkan, A.; Nair, V.P.; Rowther B, E.; Roshnath, R. (2022): Odonata of Kattampally wetland, Kerala state, India. *Notulae odonatologicae* 9(9): 441-450. (in English) ["Kattampally wetland is a large swamp on the floodplains of the Valapattanam River in Kannur District of Kerala previously nominated as a Ramsar site. By systemic sampling in different seasons and sites within the wetland, we recorded the diversity of adult odonates. The area was found to be rich in odonate diversity with greater species richness than other wetlands in Kerala. We found a total of 66 species of odonates from 42 genera including four species endemic to the Western Ghats, namely: *Ceragrion chromothorax*, *Caconeura cf. risi*, *Pseudagrion indicum*, and *Platylestes kirani*. Land usage and habitat alteration were found to be the main threats to odonate diversity. National and international recognition for the wetland would help in future conservation of the site and its biodiversity." (Authors)] Address: Rodrigues, M., Malabar Awareness and Rescue Centre for Wildlife (MARC), Kannur, Kerala, India. Email: roshnath@gmail.com

**20225.** Rodríguez-Tapia, G.; Prieto-Amparán, J.A.; Córdoba-Aguilar, A. (2022): Linking potential habitats of Odonata (Insecta) with changes in land use/land cover in Mexico. *Eur. J. Entomol.* 119: 272-284. (in English) ["Land use/land cover change (LULCC) is a major threat that affects the viability of insect populations worldwide yet our estimates of such effects are usually poor. We analysed how LULCC affected the distribution of 49 species of dragonflies and damselflies in the south-central zone in Mexico during the period 2006-2012. For this, we mapped the potential species richness using ecological niche models in order to analyse predicted future changes and determined the effect of LULCC on the current and future habitats of Odonata. We also estimated current incidence of deforestation and projected its effect to 2050 using the Dinamica-EGO program. Having predicted the level of deforestation in the year 2050, we then compared current vs. expected species richness and the factors that determine it. First, roads and urban areas turned out to be the most important drivers of LULCC in our analysis. Second, deterioration occurred at all sites, but species richness remained high despite considerable habitat fragmentation. Third, there is likely to be a high species turnover rate (i.e. a high species richness, but composed of different species) even in areas where there are significant changes in the vegetation. Our work illustrates both a resilience of Odonata to LULCC and provides a useful method for measuring the effects of LULCC on insects." (Authors)] Address: Rodríguez-Tapia, G., Unidad de Geomática, Instituto de Ecología, Universidad Nacional Autónoma de México, 04510 México, México; e-mail: gerardo@iecologia.unam.mx

**20226.** Ryu, S.; Zhang, H.; Salcedo, M.K.; Socha, J.J.; Pass, G. (2022): Transient perfusion through a microfluidic dragonfly wing vein model. *Bulletin of the American Physical Society*, 75th Annual Meeting of the Division of Fluid Dynamics. Sunday–Tuesday, November 20–22, 2022; Indiana

Convention Center, Indianapolis, Indiana. Session L04: Animal Flight: Flying Insects II. 8:00 AM–9:57 AM, Monday, November 21, 2022. Room: 131: (in English) [Verbatim: Insect wings include a network of tubular veins through which hemolymph (blood) flows to provide the sensory organs and other tissues with water and nutrients and to remove waste products. Thus, hemolymph flow through veins is important for stability and functionality of the fragile wing blade. However, the perfusion through wing venation has been poorly studied because tracing hemocytes (blood cells) in veins of living specimen provides limited information about flow patterns. To characterize transient perfusion through complex wing venation, we created a microfluidic wing vein model of the dragonfly, *Anax junius*. Hemolymph flow was simulated by injecting red dye into the device filled with water at a range of flow rates. Visualized perfusion patterns suggested that the perfused area in the device logarithmically increased with time. When water was injected into the device filled with the dye, perfusion occurred slower with different patterns, and the time dependence of the perfused area was not logarithmic. The observed difference suggests that perfusion does not occur uniformly throughout the wing vein network.] Address: not stated

**20227.** Sadasivan, K.; Nair, V.P.; Samuel, K.A. (2022): The dragonflies and damselflies (Insecta: Odonata) of Shendurney Wildlife Sanctuary, southern Western Ghats, India. *Journal of Threatened Taxa* 14(6): 21213-21226. (in English) ["The odonate diversity of Shendurney Wildlife Sanctuary, southern Western Ghats (WG) of Kerala state, is discussed in this paper. A total of 181 species belonging to 87 genera and 14 families have been compiled for Kerala and this includes 68 Western Ghats endemics. A total of 116 species of odonates including 33 endemics were recorded for the region. A total of 41 damselflies (Zygoptera) and 75 dragonflies (Anisoptera) were recorded for the sanctuary. Shendurney thus harbours 56.04 % of WG and 64.08 % of the odonate diversity of Kerala. In addition, this includes 48.52% of Kerala and 41.25 % of endemic odonates of Western Ghats. About 29% of all the species recorded for the Shendurney are endemic to WG. With respect to IUCN Red List of Threatened Species, one species is 'Endangered', three 'Vulnerable', two 'Near Threatened', 84 'Least Concern', 20 'Data Deficient', and six species whose IUCN Red List status was not assessed. Family Libellulidae (41 species) dominated the odonate diversity, followed by Coenagrionidae (15 species) and Gomphidae (13 species). Regarding the occurrence status, we found that 11 species were Very Common, 42 species were found to be Common, 34 species Not Rare, 10 species were Rare, and 19 species were Very Rare inside the sanctuary. None of the species listed is protected under the Indian Wildlife Protection Act 1972." (Authors)] Address: Sadasivan, K., Greeshmam, BN439, Bapuji Nagar, Medical College Post, Trivandrum, Kerala 695011, India. Email: kaleshs2002in@gmail.com

**20228.** Sadasivan, K.; Nair, V.P.; Samuel, K.A. (2022): A new species of *Protosticta* Selys, 1885 (Odonata: Zygoptera: Platystictidae) from Western Ghats, India. *Journal of Threatened Taxa* 14(7): 21421-21431. (in English) ["A new species of *Protosticta* Selys, 1885 is described from Anamalai Hills of southern Western Ghats in peninsular India. The new species is distinguished from its regional congeners by the posterior lobe of the prothorax being devoid of spines; anterior 1/3rd of S8 pale yellow, the marking not connected dorsally; S9 completely black; caudal appendages short, sinuous, and only twice the length of S10, cerci with a small blunt basal tooth; the tip of the superior lobe of



cerci not bilobed but straight, paraprocts beveled at the tip, not clubbed; pterostigma of both wings trapezoidal with maximum length less than twice the breadth, forewing with nine & hindwing with eight postnodals, and the structure of male genital ligula. The new species is described from Peechi Wildlife Sanctuary on the northwestern flanks of the Anamalai hills. A key to the identification of Protosticta of the Western Ghats is provided based on mature males." (Authors)] Address: Sadasivan, K., Greeshmam, BN 439, Bapuji Nagar, Medical College P.O., Thiruvananthapuram, Kerala 695011, India. Email: kaleshs2002in@gmail.com

**20229.** Sadler, D.; Chelmick, D. (2022): Observations on a new colony of *Ischnura pumilio* (Charpentier) (Scarce Blue-tailed Damselfly): the first record for West Sussex. *Journal of the British Dragonfly Society* 38(1): 65-83. (in English) ["In June 2020 *Ischnura pumilio* (Scarce Blue-tailed Damselfly) was recorded for the first time in West Sussex. This was not an isolated record; a colony had become established on a recently cleared wetland habitat near Sompting. This paper describes the find and provides observations of the colony over the summers of 2020 and 2021. The habitat has been shown to have exceptionally high mid-day water temperatures compared to surrounding habitat. The management regime for the habitat has meant that the area has proved to be transitional for the species. Particular features of this transitional population are: The population appears to have two generations. The female numbers are much lower than in permanent sites especially in the second year, 2021. The androchrome female, which is rare in Europe, has been observed frequently. Males appear to be much more loyal to the site and remain even when the females have mostly disappeared. Males can be individually recognised by the patterning on the tailight. Is this a factor in sexual attraction? There was one Observation of oviposition underwater, which is extremely rare in this genus." (Authors)] Address: Sadler, D., 135 Gordon Road, Shoreham-by-Sea, West Sussex BN43 6WF, UK. Email: dlsadler@yahoo.co.uk

**20230.** Sajan, K.C.; Sapkota, A. (2022): First Record of *Mortonagrion aborense* Laidlaw, 1914 (Odonata: Coenagrionidae) from Nepal. *Agrion* 26(1): 16-19. (in English) ["*M. aborense* is recorded for the first time from Chitwan, Nepal. One male individual was photographed at Agriculture and Forestry University (AFU), Rampur, Chitwan, 26 September 2021. The total number of Odonata species recorded from Nepal is raised to 181." (Authors)] Address: Sajan, K.C., Pokhara, Kaski-33700, Gandaki Province, Nepal. Email: Sajankc143@gmail.com

**20231.** Salsabiela, N.; Novitasari, A.; Windianingsih, A.C.; Alfian, R.B.; Setyaningrum, A.; Yudharta, B.E.; Safa'ah, O.A.; Sukirno, S. (2022): Effect of altitude on Odonata biodiversity in the paddy field of Sleman Regency, Special Region of Yogyakarta. *Advances in Biological Sciences Research. Proceedings of the 7th International Conference on Biological Science (ICBS 2021)*: 171-180. (in English) ["Odonata acts as a natural enemy in the paddy field ecosystem. The Odonata diversity is highly related to habitat condition. This research analyzed the effect of altitude on the diversity of Odonata in paddy field ecosystems in Sleman Regency, Special Region of Yogyakarta. This research was conducted in Palagan and Cangkringan at four different altitude levels: 160-250 masl, 260-350 masl, 360-450 masl, and 460-550 masl. The Odonata sample was obtained from purposive sampling and identified using the *Wendit Flying Dragon* reference book. The specimens obtained were 2,342 individuals, consisting of 13 species, 11

genera, three families, and two suborders. The Shannon-Wiener index showed the highest Odonata diversity index at an altitude of 360-450 masl. In contrast, the evenness index analysis showed that they varied in each altitude coordinate. Correlation analysis showed that the altitude coordinate of the paddy fields was positively correlated with the biodiversity index and evenness index of Odonata, with the correlation value obtained less than 0.5.] Address: Alfian, R.B., Faculty of Biology, Universitas Gadjah Mada, Jl. Teknik Selatan, Sekip Utara, Bulaksumur, Yogyakarta 55281, Indonesia. Email: reza.b.a@mail.ugm.ac.id

**20232.** Samanta, T.; Chatterjee, L.; Roy, A.B.; Sinha, S.; Besra, S. (2022): Importance of Ecopark, Kolkata in the context of sustainability, compare to Rajarhat grassland, as a habitat for Odonata (Dragonflies and Damselflies) diversity. *World News of Natural Sciences* 44: 165-175. (in English) ["The study was carried out from June 2021 to May 2022, to know the status and diversity of the Odonata fauna at Ecopark, West Bengal. They are essential for environmental monitoring and serve as biological indicators of the health of the ecosystem. During the study period, 34 species of odonates from 26 Genera and 5 Families were identified in the study area. Three families made up Suborder Anisoptera, while two families made up Suborder Zygoptera. Among them, 29 species of dragonflies belonged to the Aeshnidae, Gomphidae and Libellulidae families, while 11 species of damselflies belonged to the Coenagrionidae and Platycnemididae families. The family Libellulidae had the highest species composition (62%) followed by the family Coenagrionidae (29 %). Among all Odonates, 35% were very common (VC), 44% Common (C) 15% rare (R) and 6% were very rare (R) on the presence of their abundance. Such observation can provide insightful data on the status of Odonate populations in context to Rajarhat grassland." (Authors)] Address: Samanta, T., Nature Mates -Nature Club, 6/7, Bijoygarh, Kolkata 700032, West Bengal, India. Email: pakhibitan2019@gmail.com

**20233.** Sandall, E.L.; Pinkert, S.; Jetz, W. (2022): Country-level checklists and occurrences for the world's Odonata (dragonflies and damselflies). *Journal of Biogeography* 49(8): 1586-1598. (in English) ["Aim: Biogeographical inference and assessments of species' threat status and trends depend on comprehensive information on the current geographical distribution of species. Even country-level presences remain poorly known for many insect species and consistent global overviews for those species are missing. Here we integrate information from literature checklists, point occurrences, and identify potential species range gaps to provide a database of country-level checklists of dragonfly and damselfly species and a useful baseline for global biogeographical assessment and for assessing remaining gaps in taxonomic and spatial knowledge. Location: Global. Taxon: Odonata (damselflies and dragonflies). Methods: Our database of checklist information contains country-level species distribution information from 491 literature sources, with a focus on checklist data from 1990 to 2021 to reflect the present taxonomic and country boundaries. Additionally, we apply a novel method to interpolate potential species-country combinations missing from the literature and point data by generating a list of species present in >50% of the surrounding countries. Results: Of the 6,322 globally recognized odonate species, taxonomically harmonized literature checklist records and quality-controlled point occurrence data address 6,076 and 4,170 species, respectively. Our compilation provides a total of 31,569 unique species-country combinations, with 23,239 uniquely provided by

literature checklist and 2,031 point occurrence data, respectively. Main Conclusions: This odonate country checklist dataset provides a resource for scientists and conservation practitioners to examine questions related to baseline odonate species richness, distributions, regional conservation, and gaps in taxonomic and spatial data coverage. The combined literature and point occurrence country-level information provide the most comprehensive data available to date on the global distribution of Odonata. Our results show that checklist and point occurrences are concordant in well-studied regions and that literature data are of complementary value in tropical and species-rich countries." (Authors)] Address: Sandall, Emily, Center for Biodiversity and Global Change, Yale University, New Haven, Connecticut, USA. Email: sandall.emily@gmail.com

**20234.** Santos, L.R.; Rodrigues, M.E. (2022): Land uses for pasture and cacao cultivation modify the Odonata assemblages in Atlantic Forest Areas. *Diversity* 2022, 14, 672. <https://doi.org/10.3390/d14080672>: 14 pp. (in English) ["Tropical forests such as the Atlantic Forest are under constant threats from the impact of human activities, mostly being caused by the loss of native forest areas for other land uses. This study aimed to evaluate the effect of changes in land use for pasture and cacao cultivation on the richness and composition of Odonata assemblages in comparison to native forest areas. We also evaluated the species as possible indicators of these different land uses. In total, 64 streams were sampled in southern Bahia, Brazil. A total of 84 species were recorded. The results indicated that changes in land use modify the richness and composition of Odonata assemblages. Regarding composition, our results indicated a difference among the assemblages in the three land use areas and that the native areas maintain more stable assemblages. According to the indicator species analysis, 13 species were recorded as possible bioindicators for different land uses. Changes in aquatic ecosystems and their surroundings caused by different land uses a select group of different species groups, modifying Odonata diversity among these areas. Notably, land uses that maintain a certain integrity of the environment, as in the case of cacao cultivation, are the best alternatives for conserving Odonata biodiversity in comparison with pasture." (Authors)] Address: Rodrigues, M.E., Graduate Program in Tropical Aquatic Systems ("PPGSAT"), Dept of Biological Sciences, Santa Cruz State University (UESC), Ilheus 45662-900, Bahia, Brazil. Email: merodrigues@uesc.br

**20235.** Saul, A. (2022): Effects of PFOS on the behavior, growth, emergence, and predation susceptibility of larval mosquitoes (*Culex quinquefasciatus*). M.Sc. thesis, Bowling Green State University, Biological Sciences: 60 pp. (in English) ["Perfluorooctanesulfonic acid (PFOS) is a member of a group of synthetic chemicals called PFAS, or per-/polyfluoroalkyl substances. These chemicals are commonly used in the creation of non-stick cookware, fire-extinguishing foams, and waterproof coatings due to their heat, water, and oil resistance. PFAS chemicals are very persistent in the environment, but not much is known about their direct effects on aquatic invertebrates and their ecosystems. In this thesis, I examined the survival, behavior, development, and predation susceptibility of mosquito larvae *Culex quinquefasciatus* exposed to various concentrations of PFOS, ranging from 0 to 600 µg/L. PFOS exposure resulted in reduced larval survival, with 50% larval death in 48 hours occurring at a concentration of 310 µg/L PFOS. Mosquito larvae exposed to PFOS experienced significantly reduced developmental success and reached adulthood at a

slower rate compared to control larvae. Exposure to PFOS over time also resulted in delays in reaction to prodding stimuli, which were meant to simulate a predator attack. The durations of the subsequent reactions were significantly longer in mosquito larvae exposed to PFOS over time. Larvae exposed to PFOS also spent more time at the bottom of the water column, rather than at the surface where respiration takes place. Exposing mosquito larvae to PFOS prior to immersion with predators did not result in any differences in larval predation by unexposed damselfly naiads (genus *Ischnura*). Overall, PFOS does impact mosquito larvae survival, behavior, and development. This could be the case for other aquatic invertebrates as well, leading to significant food web implications." (Author)] Address: not stated

**20236.** Schifani, E. (2022): First report of underwater oviposition by the island bluetail damselfly, *Ischnura genei* (Zygoptera, Coenagrionidae). *Natural History Sciences, Milano*: 73-75. (in English) ["Among odonates that exhibit endophytic oviposition, a few, mostly damselflies, are known to be able to perform underwater oviposition. Among them, just a few species do so very frequently. Here I report the first observation of underwater oviposition for the damselfly *Ischnura genei*, which becomes the eighth species of its genus known to adopt this strategy after *I. asiatica*, *I. aurora*, *I. elegans*, *I. graellsii*, *I. hastata*, *I. nursei*, and *I. verticalis*. The reasons why these species or other odonates choose this particular mode of oviposition on rare occasions are not yet known, although a number of possible costs and benefits have been proposed." (Authors)] Address: Schifani, E., Dept of Chemistry, Life Sciences & Environmental Sustainability, University of Parma, Parco Area delle Scienze, 11/a, 43124 Parma, Italy. Email: enrico.schifani@unipr.it

**20237.** Sedvall, E.; Fick, J.; Pettersson, C.; Hedeland, M. (2022): Pharmaceuticals are identified in insects in River Fyris – A study with both tandem quadrupole and quadrupole-time-of-flight mass spectrometry. *Environmental Advances* 8, July 2022, 100194: 8 pp. (in English) ["Highlights: • 33 different pharmaceuticals were detected in insects in River Fyris, Uppsala, Sweden. The most common drug classes were antidepressants, psycholeptics and antihistamines. The determined internal concentrations were up to 260 ng/g. Both UHPLC-tandem quadrupole MS/MS and UHPLC-qToF-MS/MS were used. Abstract: The internal concentrations of active pharmaceutical compounds in insects/macrobenthos in River Fyris, Uppsala, Sweden, have for the first time been investigated. Specimen of backswimmer, caddisfly larva, damselfly larva, mayfly larva and water louse were caught in the river downstream a wastewater treatment plant. After homogenization and extraction, analysis was carried out with Ultra-High Performance Liquid Chromatography – Electrospray – Tandem Mass Spectrometry (UHPLC-ESI-MS/MS) using both a tandem quadrupole (QqQ) and a quadrupole-time-of-flight (qToF) mass spectrometer. A combined qualitative/quantitative screening method for 89 pharmaceutical compounds in the selective reaction monitoring mode was applied to the samples using the QqQ instrument. Thirty-three different drugs were detected and quantified in the macroinvertebrate samples, covering a wide range of pharmacological classes, the most common being antidepressants, psycholeptics and antihistamines. Drug concentrations up to 260 ng/g (for tetracycline) were determined. A subset of thirteen compounds were selected for a complementary qualitative UHPLC-qToF-MS/MS analysis. This way, the confidence in the substance identifications was significantly strengthened by the availability of full scan high-resolution spectra and accurate

mass measurements. This is the first study demonstrating the uptake of pharmaceuticals in water-living macroinvertebrates in Sweden. Since these organisms are in the lower part of the food chain, pharmaceuticals might accumulate in predators leading to ecotoxicological effect at higher trophic levels. Macroinvertebrates might be promising indicator organisms for pharmaceutical pollution. ...The invertebrates collected were backswimmers (*Notonecta* sp.), damselfly larvae (*Zygoptera* sp.), caddisfly larvae (*Trichoptera* sp.), mayfly larvae (*Ephemeroptera* sp.) and water louse (*Asellus* sp.)." (Authors)] Address: Hedeland, M., Uppsala Univ., Dept of Medicinal Chemistry, Analytical Pharmaceutical Chemistry, Uppsala, Sweden. Email: mikael.hedeland@ilk.uu.se

**20238.** Shapoval, N.A.; Shapoval, G.N.; Shapoval, A.P. (2022): New, rare and vagrant damselflies and dragonflies (Insecta: Odonata) in the Kaliningrad Oblast, north-western Russia. *Acta Biologica Sibirica* 8: 261-279. (in English) ["The paper presents new remarkable records of selected rare and uncommon Odonata species found in the Kaliningrad Oblast based primarily on our surveys conducted since 2007. Two species, *Erythromma viridulum* (Charpentier, 1840) and *Anax ephippiger* (Burmeister, 1839) are new to the region. The total number of Odonata species currently known for the territory of the Kaliningrad Oblast amounted to 66. Among them, 61 species have been recorded on the Courish (Curonian) Spit of the Baltic Sea." (Authors)] Address: Shapoval, N.A., Dept of Karyosystematics, Zoological Institute of the Russian Academy of Sciences, 1 Universitetskaya nab., 199034, St. Petersburg, Russia. Email: Nazar A. Shapoval (nazaret@bk.ru)

**20239.** Shela, S.; Athiyya, N.A.A.; Ratih, K.A.; Yaquta, M.J.; Dwi, A.R. (2022): Diversity and abundance of dragonflies (Odonata: Anisoptera) at Watu Gajah Tuban Field. *Bio Sains Jurnal Ilmiah Biologi* 1(2): 1-11. (in Indonesian, with English summary) ["Odonata is an order with the highest level of diversity and abundance among others Arthropoda phyla, but have not been identified. Dragonflies like green open area habitats, especially grass. This research aimed to analyze the diversity and abundance of dragonfly insects (Odonata: Anisoptera) in Watu Gajah Field, Semanding District, Tuban Regency. Watu Gajah Field is a green open space that supports the survival of insects, one of them is dragonflies. The climatic conditions of Watu Gajah Field with an average temperature of 29°C, an altitude of 40 meters above sea level, wind speed of 13 km/h, rainfall of 1.9 mm, humidity of 70.33%, and luminous intensity of 4259.33 lux. This research using the jelajah method (cruising methods) using insect nets and hand sampling technique at 3 point areas. Based on the research results were obtained 6 species of dragonflies. Data analysis was performed using the relative abundance formula, the Shannon-Winner diversity index, and the Simpson dominance index. The results of the calculation of the dragonfly diversity index are classified as low, namely 1.57 and the dominance index of 0.226 is included in the medium category. Watu Gajah Field is an ideal habitat suitable for the survival of dragonflies (Odonata: Anisoptera)." (Authors)] Address: Dwi Anggorowati Rahayu, Program Studi Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Negeri Surabaya Jl. Ketintang, Kec. Gayungan, Kota Surabaya, Jawa Timur, 60231, Indonesia. Email: dwirahayu@unesa.ac.id

**20240.** Shipley, R.; Twining, C.W.; Mathieu-Resuge, M.; Parmar P.T.; Kainz, M.; Martin-Creuzburg, D.; Weber, C.; Winkler, D.W.; Graham, C.H.; Matthews, B. (2022): Climate

change shifts the timing of nutritional flux from aquatic insects. *Current Biology* 32(6): 1342-1349. (in English) [oas 64a; "Highlights: • Aquatic insect emergence is advancing much more rapidly than bird breeding timing. • Aquatic insects have more n-3 LCPUFAs than terrestrial insects. • The seasonal availability of key fatty acids is thus shifting with climate change. • Birds are increasingly at risk of experiencing nutritional phenological mismatch. Summary: Climate change can decouple resource supply from consumer demand, with the potential to create phenological mismatches driving negative consequences on fitness. However, the underlying ecological mechanisms of phenological mismatches between consumers and their resources have not been fully explored. Here, we use long-term records of aquatic and terrestrial insect biomass and egg-hatching times of several co-occurring insectivorous species to investigate temporal mismatches between the availability of and demand for nutrients that are essential for offspring development. We found that insects with aquatic larvae reach peak biomass earlier in the season than those with terrestrial larvae and that the relative availability of omega-3 long-chain polyunsaturated fatty acids (n-3 LCPUFAs) to consumers is almost entirely dependent on the phenology of aquatic insect emergence. This is due to the 4- to 34-fold greater n-3 LCPUFA concentration difference in insects emerging from aquatic as opposed to terrestrial habitats. From a long-sampled site (25 years) undergoing minimal land use conversion, we found that both aquatic and terrestrial insect phenologies have advanced substantially faster than those of insectivorous birds, shifting the timing of peak availability of n-3 LCPUFAs for birds during reproduction. For species that require n-3 LCPUFAs directly from diet, highly nutritious aquatic insects cannot simply be replaced by terrestrial insects, creating nutritional phenological mismatches. Our research findings reveal and highlight the increasing necessity of specifically investigating how nutritional phenology, rather than only overall resource availability, is changing for consumers in response to climate change." (Authors)] Address: Shipley, R., Dept of Fish Ecology & Evolution, Swiss Federal Institute of Aquatic Science, Kastanienbaum, Switzerland

**20241.** Silva, G. (2022): Species diversity and barcoding of macroinvertebrates from the San Antonio River. *Student Research Symposium 2022*. 1. <https://digitalcommons.tamusa.edu/srs2022/1>: 19 pp. (in English) ["Macroinvertebrates are important biological indicators of health and ecological change within aquatic ecosystems. Macroinvertebrate diversity of the San Antonio (SA) River Watershed (Texas), which traverses rural and urban regions (Bexar County, TX), remains understudied compared to vertebrate counterparts of economic and conservation importance. The SA River hosts a diversity of crustaceans (crayfish), insects (beetles, dragonflies), annelids (leeches), and unidentified larvae at intermediate developmental stages. To improve ecological records of the SA River, an integrative approach is used to establish a reference macroinvertebrate species inventory and a genetic barcoding database (mitochondrial COI and/or 16S rRNA) for the SA River Mission Reach restored site. These data will improve the identification of (i) species of varying developmental stages to adult forms; (ii) cryptic species; and (iii) key biological indicators. Establishing baseline data will also facilitate the identification of not easily detectable changes in macroinvertebrate diversity potentially attributed to urban disturbance or climate change." (Author) ] Address: not stated

**20242.** Silva-Hurtado, J.S.; Márquez, J. (2022): Colección

de odonatos (Insecta: Odonata) del Centro de Investigaciones Biológicas de la Universidad Autónoma del Estado de Hidalgo, México (COD-UAEH). Dugesiana 29(2): 163-169. (in Spanish, with English summary) ["Odonates constitute an order of paleopteran insects important to ecosystems because their role as generalist predators and some of their species are considered bioindicators of the environmental quality. The establishment, maintenance and growth of scientific collections that include this group may encourage their research. To this end, we are making public the creation of the odonates collection (COD-UAEH) of the Biological Research Center of the Autonomous University of the State of Hidalgo is announced. This collection contains 1,180 adult individuals belonging to ten families, 43 genera and 104 species collected in different states of the country, but mainly in the states of Hidalgo and Puebla. The incorporation of immature states has not been undertaken yet. 54% of the specimens belong to the Anisoptera suborder, which is represented by the families Aeshnidae, Cordulegastridae, Gomphidae and Libellulidae, for 26 genera and 56 species. The remaining 46% belong to the suborder Zygoptera, which includes the families Calopterygidae, Coenagrionidae, Heteragrionidae, Lestidae, Thaumatonereidae and Platystictidae, with 17 genera and 48 species. Every specimen included in the collection has been identified to the taxonomic level of species. It is worth mentioning that the collection contains the record of a female belonging to the *Megaloprepus caerulatus* (Drury, 1782) species, as well as a montage in cardboard of the extended wings build to make an easier photograph taking and the wing venation comparison required for the identification of genera." (Authors)] Address: Silva-Hurtado, J.D., Laboratorio de Sistemática Animal, Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, km 4.5 carretera Pachuca-Tulancingo, s.n., Ciudad del Conocimiento, Col. Carboneras, 42184, Mineral de la Reforma, Hidalgo, México. Email: jodsilhur@gmail.com,

**20243.** Singh, A.; Chandra, G. (2022): Larvicidal, pupicidal, repellence and smoke toxic efficacies of *Nicotiana plumbaginifolia* leaves against *Culex vishnui* mosquito. International Journal of Tropical Insect Science 42: 1187-1195. (in English) ["Objectives of the study was to evaluate larvicidal, pupicidal, repellence activities of *Nicotiana plumbaginifolia* leaf extracts (crude and solvents) and toxicity of smoke originated from dry leaves against rice field mosquito, *Culex vishnui*, vector of Japanese encephalitis. Larvicidal property of most effective extract was evaluated against third instar *Cx. vishnui* larvae under simulated semi-field condition. Crude extract of leaves exhibited remarkable larvicidal property. Amongst three used solvent extractives of leaves, ethyl acetate extractive showed best result in larvicidal test. In larvicidal bioassay, ethyl acetate extractive exhibited lowest LC50 and LC90 values, which were 7.237 ppm and 18.964 ppm respectively against the 1st instar larvae after 72 h of exposure. In pupicidal bioassay, LC50 and LC90 values were 111.20 ppm and 176.96 ppm respectively after 24 h of exposure. Remarkable (99.33%) repellency was found in 6% concentration of ethyl acetate extractive after 150 min of exposure. Smoke of *N. plumbaginifolia* dry leaves exhibited significant toxicity. Results of semi-field condition depicted that ethyl acetate extract was also highly effective under semi-field condition having highest mortality rate of  $95.33 \pm 0.33\%$  at 500 ppm concentration against third instar *Cx. vishnui* larvae after 72 h exposure. The name of the isolated bioactive compound was "1-hexyl-2-nitrocyclohexane". However, the non-target organisms like, Damselfly nymph (*Ischnura* spp.: Odonata) and nymph of

Hemipteran bug, *Diplonychus* spp. were found to be least toxic to the extracts. *N. plumbaginifolia* leaf has remarkable larvicidal, pupicidal, repellency and smoke toxic potentialities against *Cx. vishnui*." (Authors)] Address: Chandra, G., Microbiology and Nanotechnology Research Units, Parasitology Laboratory, Dept of Zoology, The University of Burdwan, Golapbag, Burdwan, West Bengal, 713104, India

**20244.** Singh, D. (2022): Field Guide to the Dragonflies & Damselflies of Northwest India. Messrs Bishen Singh Mahendra Pal Singh, Publishers & Distributors of Scientific Books, 23 A Connaught Place, Dehra Dun 248001(Uttarakhand), India. Email: <bsmpsbooks@gmail.com>: x, 518 pp- ["The book is a first of its kind, lavishly illustrated, and beautifully designed field guide which provides the first comprehensive overview of Odonata of the northwestern part of India, comprising two main geographic regions: the Himalayan range and the Gangetic Plain, as well as the west the arid zones of the Great Indian Desert or the Thar Desert. This Field Guide covers the states of Jammu-Kashmir, Himachal Pradesh, Punjab, Uttarakhand, Haryana, Delhi, Uttar Pradesh, and Rajasthan. 162 species of damselflies (Zygoptera) and dragonflies (Anisoptera) are, described and illustrated in this Field Guide. The book includes in-depth details of general knowledge of dragonflies like anatomy, life history, behavior, habitat, and an outline of the geography, ecology, and biogeography of Northwest India. An illustrated identification key to the species has been provided and is kept as simple as possible to help find the right family, genus, and species, supported by numerous drawings to show the meaning of the technical terms mentioned in the text. The description of each family provides an introduction giving brief information about the worldwide distribution, and the status of that family within present Indian borders, followed by a basic overview of the general characteristics. The species account provides a general statement of a first impression of a species at a glance in the field, field characters; sometimes hand characters (illustrated in the identification keys), habits and behavior, and habitat followed by a distribution (range, India, Northwest India), status and flight period. Distribution maps are shown for all species based on studied literature and authors' field observations. Photographs show a male, female, and variations for most species and point out the main numbered characters to observe in the field. Illustrated throughout in color over 500 colorful photos are neatly placed in this book. Common English names for families and species and scientific names have been provided. Threats and Conservation of Indian Odonata have been addressed in detail, Dragonfly watching tips, an extensive Glossary, Literature, a Checklist of damselflies and dragonflies of Northwest India and an index to English and scientific names have also been provided in the field guide. This book is comprehensive yet easy to use by beginners and experts alike. The book would surely help in raising local awareness about this group of freshwater species and will contribute to better protection and management of freshwater ecosystems: x, 518 pp (with over 500 colorful photos), ISBN: 978-81-943323-2-9, Abhimanyu Gahlot" (Publisher)] Address: Messrs Bishen Singh Mahendra Pal Singh, Publishers & Distributors of Scientific Books, 23 A Connaught Place, Dehra Dun 248001(Uttarakhand), India. Email: <bsmpsbooks@gmail.com>

**20245.** Sivtseva, L.V.; Zykov, E.N. (2022): First record of the dragonfly *Leucorrhinia albifrons* (Burmeister, 1839) (Odonata: Libellulidae) in Yakutia. Amurian Zoological Journal 14(3): 389-392. (in Russian, with English summary) ["*L. albifrons*, the dragonfly species from the family Libellulidae



of the European and Baikal range, is recorded for the first time in Yakutia. E.N. Zykov collected the only male of this species on 7 July on the shore of Lake Schuchie in the northern outskirts of Lensk (60°44'11.24"N, 114°57'38.68"E). *L. albifrons* is a rare species with a mosaic distribution and ecological optimum in Europe. It occurs in forests of the European part of Russia and the Urals; in Siberia the range gradually narrows to the Baikal Lake. This paper provides a morphological description and illustrations of the general view, head, anal appendages, and secondary genitalia." (Authors)] Address: Sivtseva, Lena, Institute for Biological Problems of Cryolithozone SB RAS, Lenina Prospekt, 41, 677980, Yakutsk, Russia. E-mail: sivtseva\_I@mail.ru

**20246.** Sniegula, S.; Hnatyna, O. (2022): Record of *Cordulegaster bidentata* (SELYS, 1843) (Odonata: Cordulegasteridae) in the Magura National Park. *Odonatrix* 1810 (2022): 2 pp. (in Polish, with English summary) ["An adult female of *C. bidentata* was recorded on 30.07.2022 on the River Wisloka, a potential breeding site, near the village of Rozstajne in the western part of the Magura National Park (SE Poland). This is the first record of this species within the borders of this national park." (Authors)] Address: Sniegula, S., Instytut Ochrony Przyrody Polskiej Akademii Nauk, al. Adama Mickiewicza 33, 31-120 Kraków, Poland. Email: sniegula@iop.krakow.pl

**20247.** Sniegula, S.; Ryhla, A., Golab, M.J.; Antol, A.J.; Bernard, R.; Czechowski, P.; Daraz, B.; Dubicka, A.; Dumanski, J.; Goc, M.; Góral, N.; Jedro, G.; Jedro, M.; Mikolajczuk, P.; Miszta, A.; Orzechowski, R.; Raczyński, M.; Szymanski, J.; Tanczuk, A.; Tonczyk, G. (2022): Dragonflies (Odonata) of the former Soviet military training ground Borne Sulnowo and the 21st Central Air Force Training Range in Nadarzyce, found during the 17th Symposium of the Odonatological Section of the Polish Entomological Society (June 10-13, 2021). *Odonatrix* 182: 12 pp. (in Polish, with English summary) ["In June 2021, the participants of the 17th Symposium of the Odonatological Section of the Polish Entomological Society conducted field observations at the former Soviet military training ground Borne Sulnowo and the 21st Central Air Force Training Range in Nadarzyce. The area of the Soviet military training ground (ca. 18 000 ha) has been open to the public since 1992, whereas the Air Force Training Range could only be examined on the basis of an authorization. In total 11 sites, including lotic and lentic habitats, were visited. Within the time span of three days, 29 odonate species were recorded. Six of these species are protected by national law and/or placed on Polish and EU red lists. At least one of these protected and endangered species was observed in each of the studied sites. This indicates above-average odonofauna diversity as well as unfragmented, high natural quality of water bodies and wetland habitats in the studied area. The protected and/or endangered rheobiontic (*Ophiogomphus cecilia*), rheophilous (*Orthetrum coerulescens*), tyrophilous (*Nehalennia speciosa*, *Leucorrhinia pectoralis*) and limnophilous (*Leucorrhinia albifrons*, *L. caudalis*) species find favourable conditions here, this indicating a large variety of habitats. The presented records confirm the great potential of military areas as places characterized by high biodiversity." (Authors)] Address: Sniegula, S., Instytut Ochrony Przyrody Polskiej Akademii Nauk, al. Adama Mickiewicza 33, 31-120 Kraków, e-mail: sniegula@iop.krakow.pl

**20248.** Späth, J. (2022): Damsel in distress – metabolomics as a novel tool to investigate the effects of wastewater

exposure on damselfly larvae. Doctoral thesis, Umeå University: 52 pp. (in English, with Swedish summary) [oas 64a; "Aquatic organisms, such as aquatic invertebrates, are exposed to anthropogenic pollutants through their environment. These pollutants, despite their low levels, can adversely affect exposed individuals or even entire ecosystems, especially when present in complex mixtures. The aim of this thesis was to assess the effects of a specific group of complex mixtures of pollutants, wastewater effluent, on damselfly larvae, a common, ecologically relevant invertebrate species. Metabolomics, i.e., the comprehensive analysis of an organism's metabolites, was explored as a tool to show the sub-lethal effects of wastewater effluent exposure. A set of multi-platform mass spectrometry-based metabolomics methods was developed. These methods were used to measure and identify which damselfly metabolites are responsive to wastewater exposure and thus could potentially be used as early warning tools for anthropogenic pollution. In addition, key behavioural traits of damselfly larvae were assessed after wastewater exposure to investigate whether a change of metabolites would also be reflected at a higher level of biological organisation. The effects of wastewater effluents treated with different treatment methods on the fatty acid metabolites (oxylipins) of exposed damselfly larvae were assessed (paper I). Oxylipins were affected by wastewater exposure and these effects depended on the degree of wastewater treatment. Using a similar set-up, the effect-based removal of a conventional wastewater treatment plant and an additional ozonation step was evaluated on-site at a wastewater treatment facility (paper II). Oxylipins were affected by the exposure in this study, however fewer effects were observed when compared to the previous paper. In a separate series of experiments, damselflies were lab-reared to different developmental stages and a subset of the larvae were exposed to wastewater effluent. In these larvae, oxylipins (paper III) as well as other metabolites (paper IV) were measured to establish metabolite baseline levels and developmental variations as well as variation in their responses to the exposure. Metabolite variations as well as the metabolites affected by the exposure depended greatly on the life stage of the damselflies. In another study, damselfly larvae were exposed to dilutions of conventionally treated effluent and behavioural alterations and metabolite profiles were investigated in the larvae (paper V). Individual metabolites as well as behavioural traits important for damselfly survival and reproduction were altered by exposure to undiluted effluent; however, few effects were observed in the diluted effluents. In conclusion, both metabolomic endpoints and behavioural traits measured on the damselfly larvae were responsive to wastewater effluent exposure. The metabolites affected by exposure mainly play a role in fatty acid metabolism, including oxylipins, and in amino acid metabolism. The individual metabolites that were affected differed across the studies. These observed variations might be due to differences in exposure conditions or differences in larval stages across the studies. The studies presented in this thesis pave the way for metabolomics to be used as a novel tool to monitor sub-lethal effects of anthropogenic pollution in the environment. However, more research is needed on, for example, the ecological implications of the affected metabolites for both the individual and the population before it can be implemented in environmental risk assessments." (Author)] Address: Späth, Jana, Department of Chemistry, Umeå University, KB.C6, Linnaeus väg 10, 90187 Umeå, Sweden. Email: jana.spath@umu.se

**20249.** Späth, J.; Brodin, T.; Falås, P.; Niinipuu, M.; Lindberg, R.; Fick, J.-; Nording, M. (2022): Effects of conventionally treated and ozonated wastewater on the damselfly larva oxylipidome in response to on-site exposure. *Chemosphere* 309(1): 7 pp. (in English) ["Highlights: • Average ozonation removal efficiency of 67% at an ozone dose of 0.49 g O<sub>3</sub>/g DOC. Oxylipins 12(13)-EpODE and 15(16)-EpODE were reduced in larvae exposed to conventionally treated wastewater. 5(16)-EpODE was also reduced in larvae exposed to ozonated wastewater. Abstract: Pharmaceutical residues discharged through insufficiently treated or untreated wastewater enter aquatic environments, where they may adversely impact organisms such as aquatic invertebrates. Ozonation, an advanced wastewater treatment technique, has been successfully implemented to enhance the removal of a broad range of pharmaceuticals, however diverse byproducts and transformation products that are formed during the ozonation process make it difficult to predict how ozonated wastewater may affect aquatic biota. The aim of this study was to investigate effects on fatty acid metabolites, oxylipins, in a common invertebrate species, damselfly larvae, after on-site exposure to conventional wastewater treatment plant (WWTP) effluent and additionally ozonated effluent at a full-scale WWTP. Subsequent ozonation of the conventionally treated wastewater was assessed in terms of i) removal of pharmaceuticals and ii) potential sublethal effects on the oxylipidome. Northern damselfly (*Coenagrion hastulatum*) larvae were exposed for six days in the treatment plant facility to either conventional WWTP effluent or ozonated effluent and the effects on pharmaceutical levels and oxylipin levels were compared with those from tap water control exposure. Ozonation removed pharmaceuticals at an average removal efficiency of 67% (ozone dose of 0.49 g O<sub>3</sub>/g DOC). Of 38 pharmaceuticals detected in the effluent, 16 were removed to levels below the limit of quantification by ozonation. Levels of two oxylipins, 12(13)-EpODE and 15(16)-EpODE, were reduced in larvae exposed to the conventionally treated wastewater in comparison to the tap water control. 15(16)-EpODE was reduced in the larvae exposed to ozonated effluent in comparison to the tap water control. One oxylipin, 8-HETE, was significantly lower in larvae exposed to conventional WWTP effluent compared to ozonated effluent. In conclusion, the study provides proof-of-principle that damselfly larvae can be used on-site to test the impact of differentially treated wastewater." (Authors)] Address: Späth, Jana, Dept Chemistry, Umeå University, SE 90187, Umeå, Sweden. Email: jana\_spæth@live.de

**20250.** Spigolonía, Z.A.; Bernardy, J.V.; Brasil, L.S.; Dias-Silva, K.; Vieira, T.B.; De Marco, P. (2022): Odonata Concordance amongst aquatic taxa in Brazilian savanna streams. *International Journal of Odonatology* 25: 80-88. (in English) ["Environmental management is one of the most important activities in ecological conservation at present. Faced with various socioeconomic impacts (e.g., urbanization, agriculture, and logging), practical and effective ways to analyze and determine how biodiversity is affected by these anthropogenic activities are essential. Utilizing niche theory helps to understand how similar groups of organisms respond to environmental changes based on the assumption that organisms with some niche overlap (i.e., similar resources) will respond similarly to these changes. Members of the order Odonata are frequently used as biological indicators due to their low survey costs, relatively easy taxonomic identification, and sensibility to environmental changes. In this study, using the PROTEST method, we analyze the cross-taxon congruence between Odonata and two

aquatic organisms in Brazilian savanna streams: Gerromorpha and fishes. Although congruence was found between aquatic insects (~ 45%), this result changed when we only considered the species' genera: no congruence for the aquatic insects was found, but instead we found a congruence between Odonata and fishes (~ 44%). Since Odonata showed congruence with the other groups in different taxonomical resolutions and it is a relatively easy and cheap group to collect and identify, we suggest that Odonata could be used as an indicator of disturbance for this set of organisms and hence serve as an alternative method to traditional environmental management techniques." (Authors)] Address: Brasil, L.S., Instituto de Ciências Biológicas e da Saúde, Universidade Federal de Mato Grosso, Postal Code 78.698-000 – Pontal do Araguaia, Mato Grosso, Brazil. Email: leandro.brasil@ufmt.br

**20251.** Srayko, S.H. (2022): Seasonal migration of water boatmen (Hemiptera: Corixidae) as a wetland-river ecosystem linkage. Ph.D. thesis, Dept of Biology, University of Saskatchewan, Saskatoon: XVI + 187 pp. (in English) ["Organisms that undertake seasonal migrations can act as important ecosystem linkages by subsidizing food webs. Such transfers of material mean that even food webs which seem isolated may be closely connected. One such linkage that has largely gone unstudied is the seasonal migration of a family of aquatic insects, water boatmen, or corixids (Hemiptera: Corixidae) that fly from geographically isolated wetlands into large rivers in the Prairie Pothole Region (PPR) of North America every fall, to overwinter. This thesis provides further documentation of the phenomenon of corixid migration in the North American prairies, while also investigating the ecological importance and drivers of this movement across the landscape. First, I quantified and recorded the shifts in abundance and species composition of corixids in wetland and river ecosystems in different seasons. I found that these migrations can lead to drastically increased riverine corixid densities as high as ~3,000 individuals/m<sup>2</sup> within areas of standing or slow-moving water, with ~500 g of corixid material entering every meter of water immediately adjacent to the banks of rivers, where landings are concentrated. This movement shifts the corixid species assemblage in rivers to one dominated by wetland-breeding species, namely *Callicorixa audeni*, *Sigara bicoloripennis*, and *Sigara decoratella*. Stomach content analyses of riverine fishes revealed that goldeye (*Hiodon alosoides*), moon-eye (*Hiodon tergisus*), longnose sucker (*Catostomus commersoni*), and white sucker (*Catostomus commersoni*) make heavy use of this forage subsidy, with corixids occurring in 97% to 100% of these fishes and accounting for 38% to 97% of stomach contents by weight during the corixid migration period in fall. This could have implications for the productivity and overwintering survival of corixid feeding fish, with the potential for cascading effects in riverine food webs. Across the landscape, I estimated that seasonal migrations could result in ~1500 metric tons of corixids entering the North and South Saskatchewan rivers (~12,000 river km) within Saskatchewan, and ~12,000 tons of biomass moving between wetlands and rivers across the entire PPR. Next, by studying changing patterns in abundance and evidence of flight into rivers, I designated different corixid species from my study area as being predominantly migratory (62% of encountered species), acting as cyclic colonizers between wetlands and rivers, or non-migratory residents of either habitat type (27% of encountered species). This information allows for the identification of the corixid assemblage that is driving the seasonal flux between the two habitat types, and helps to fill a knowledge gap which exists on

the migratory abilities of corixids at the species level. Third, I examined the use of the stable isotope ratio of sulfur,  $\delta^{34}\text{S}$ , as a tracer of corixid movement and the incorporation of these insects as a dietary subsidy by riverine fish. I found that both corixids and other invertebrate taxa originating from wetland ecosystems exhibited lower  $\delta^{34}\text{S}$  values, with wetland taxa averaging  $-10.5 \pm 5.8\text{‰}$  overall, as opposed to riverine taxa at  $-4.1 \pm 4.1\text{‰}$ , allowing the use of  $\delta^{34}\text{S}$  as a tracer of insects out of wetlands. Specifically,  $\delta^{34}\text{S}$  values of invertebrates from the South Saskatchewan River ( $-5.1 \pm 4.1\text{‰}$ ) were more  $\delta^{34}\text{S}$  depleted than those from the North Saskatchewan River ( $-1.4 \pm 2.8\text{‰}$ ). In the fall season, the corixid-feeding fish species goldeye, mooneye, and longnose sucker exhibited lower  $\delta^{34}\text{S}$  values in fast-turnover liver tissue than non-corixid feeding species, shorthead redhorse, northern pike, and walleye, with mixing models indicating that ~17 to 94% of liver tissue may be derived from wetland sources during this season. However, goldeye was the only species to exhibit a significant seasonal reduction in liver  $\delta^{34}\text{S}$  values in fall compared to summer. These findings indicate that  $\delta^{34}\text{S}$  has utility in tracing flows of energy between wetland and riverine food webs. Finally, I examined the overwintering strategy of corixids that do not migrate to rivers in the fall, documenting the little understood ability of these insects to survive in wetlands that freeze solid. I found that while multiple corixid species were present in wetlands at ice-over, those embedded within the ice were almost entirely composed of two non-migratory species, *Cymatia americana* and *Dasycorixa hybrida*, of which only the former revived after thawing. These findings indicate that migratory species are likely incapable of survival within the ice, driving the need to leave shallow waters in fall. The percent of *C. americana* that revived after being experimentally thawed out from the ice ranged from 4% to 10% in both winters of this study. The majority of corixids were grouped together within air pockets, which could enable them to limit direct contact with the surrounding ice. Other invertebrate taxa were also found overwintering within the ice, including adults and larvae of crawling water beetles (Coleoptera: Haliplidae) and adults of predaceous diving beetles (Dytiscidae) within air pockets alongside the corixids or on their own, as well as damselfly nymphs (Odonata: Coenagrionidae), caddisfly larvae (Trichoptera: Phryganeidae, Leptoceridae), midge larvae (Diptera: Chironomidae), and snails (Gastropoda: Physidae, Planorbidae) that appeared to be encased in solid ice. Taken together, this thesis has demonstrated an extensive cross-boundary flux that occurs between spatially separated wetland and river ecosystems, highlighting a need for conservation to ensure that this connection is maintained. By examining migratory patterns, I have identified which species drive this flux, which may allow for increased protection of habitats that these corixids require.  $\delta^{34}\text{S}$  was shown to have the potential to trace insect movement and consumer use between isotopically distinct freshwater systems in the prairies. The study of corixids overwintering in ice represents a little understood survival mechanism of aquatic invertebrates in shallow wetlands, knowledge of which could help predict how the abundance of these organisms might change in the face of altered overwintering conditions due to global warming. The seasonal flights of corixids between wetlands and rivers may represent one of the world's great insect migrations, which has largely gone unnoticed, but could have important implications for ecosystem functioning and conservation in the North American prairies." (Author)] Address: not stated

**20252.** Stih, A.; Koren, T. (2022): Dragonfly fauna (Insecta:

Odonata) of the Brijuni National Park, Croatia. *Natura Croatica* 31(1): 19-30. (in English, with Croatian summary) ["The first systematic survey of the dragonfly fauna of the Brijuni National Park was carried out during the late spring and summer of 2016. A total of 13 species was recorded at two localities on the island of Veliki Brijun, 11 of them for the first time in the area. From the literature, one additional species was documented for the Park, amounting to a total of 14 Odonata species. The most common species was *Symptetrum meridionale* while the rarest was *Anax parthenope*. Zoogeographical analysis showed the domination of the Holo-Mediterranean zoogeographical element. Four recorded species are listed in the Red book of Croatian Dragonflies, indicating the conservation value of the investigated habitats. Both of the wetland habitats surveyed, Brijuni Pond, and the saline lakes, proved to be very important habitats for the island's Odonata. Therefore, it is essential to protect those habitats and their biota by planning and conducting restoration activities in the near future." (Authors)] Address: Štih, Ana, Association Hyla, Lipovac I no. 7, HR-10000 Zagreb, Croatia. Email: ana.stih2@gmail.com

**20253.** Suárez, B.; Barrios, M.; Teixeira de Mello, F. (2022): Macroinvertebrates' response to different land use in lowland streams from Uruguay: use of artificial substrates for biomonitoring. *Neotropical Biodiversity* 8(1): 136-146. (in English) ["The use of macroinvertebrates as indicators of water quality is an effective and low-cost tool, which is widely implemented in biomonitoring programmes. Certain taxa are characteristic of impaired watercourses (e.g. Oligochaeta, Chironomidae and Amphipoda), while others are characteristic of good-quality watercourses (e.g. Ephemeroptera, Plecoptera and Trichoptera; EPT). In this work, we evaluated the response of the macroinvertebrate assemblages to different land uses. For this purpose, artificial substrate colonization experiments were conducted in streams including urban (U, n = 3), intensive agriculture and dairy production (AD, n = 4) and extensive cattle ranching (CR, n = 4) land uses. Because in Uruguay pristine ecosystems are practically non-existent and streams of low order streams associated with extensive cattle production represent the lowest deterioration water quality condition, CR sites were used as control reference streams. Physicochemical water parameters were measured. For macroinvertebrate sampling, 10 artificial substrates were installed in each stream. A total of 110 artificial substrates were analysed. Each sample/site consisted of a plastic mesh bag of 1.2 cm opening, which were filled with 160 cm<sup>3</sup> (including 73.3 ± 5.8 cm<sup>3</sup> interstitial water) of stones sieved between 1.3 and 1.5 cm. During the summer of 2018 (February), devices were left in streams for 15 days for communities to colonize them. U and AD land use represented the stressors with the highest impact on the attributes and composition of the macroinvertebrate communities. Abundance of EPT was higher in CR, meanwhile Caenogastropoda dominated in AD, and Amphipoda in U sites. Macroinvertebrate groups to order level classification were able to effectively discriminate between different land uses. The use of artificial substrate also demonstrated to be efficient method for monitoring macroinvertebrate community. We did not find a correlation between the physicochemical water parameters and the macroinvertebrate community. In this context, we propose a rapid and cost-effective biomonitoring approach, capable of estimating the degree of impact of different land uses." (Authors)] Address: Teixeira de Mello, F. Depto de Ecología y Gestión Ambiental, Centro Universitario Regional del Este (CURE), Universidad de la República, Maldonado, Uruguay. Email: frantei@fcien.edu.uy

**20254.** Suárez-Tovar, C.M.; Guillermo-Ferreira, R.; Cooper, I.A.; Cezário, R.R.; Córdoba-Aguilar, A. (2022): Dragon colors: the nature and function of Odonata (dragonfly and damselfly) coloration. *Journal of Zoology* 317(1): 1-9. (in English) ["Adult odonates (dragonflies and damselflies) exhibit a great diversity of colors which vary remarkably between species, between individuals within species, and throughout the individual's lifetime in some species. Here, we provide a summary of what is known about color recognition, and production of color including pigmentary absorption, structural reflectance, and fluorescence, in odonates. We also review the current understanding of the function of color in adult odonates, such as in signals during mate choice, in species recognition, and in predator avoidance, as well as in physiological adaptations to abiotic conditions. Finally, we provide some directions for future research: eye and pterostigma color, coloration at different life stages, UV color, phylogenetic analysis of color evolution, color and hot climate patterns, and standardization of color recordings. Given how easily they can be marked and tracked, odonates are exemplary animals for field and laboratory research. Therefore, unraveling the physiology, evolution, and ecology of odonate color can provide significant advances, in general, to understand insect color." (Authors)] Address: Cezário, R.R., Lestes Lab, Federal University of Triângulo Mineiro, Uberaba, Brazil. Email: rcezario@igmail.com

**20255.** Suárez-Tovar, C.M.; Castillo-Pérez, U.; Sandoval-García, I.A.; Schondube, J.; Cano-Santana, Z.; Córdoba-Aguilar, A. (2022): Resilient dragons: Exploring Odonata communities in an urbanization gradient. *Ecological Indicators* 141, August 2022, 109134: 11 pp. (in English) ["Highlights: • Cities are novel ecosystems that generate selective pressure on living organisms. Dragonflies and damselflies inhabit cities all over the world. We studied dragonfly and damselfly communities along an urbanization gradient in Central Mexico. Damselfly species richness and abundance are affected by urbanization. Dragonflies seem resilient to urban conditions. Abstract: Cities function as ecological systems composed of a geosphere, a biosphere and an anthroposphere, interacting with each other and generating various selection pressures on urban organisms. Odonates (damselflies and dragonflies) are frequent inhabitants of urban areas, showing no clear or unique responses to urbanization. Thus, we defined an urbanization gradient using a habitat integrity index (HII) calculated for 19 sites in central Mexico, and investigated: a) changes in species richness and abundance along the urbanization gradient; and, b) the relationship between presence of waste of anthropic origin, chemical conditions of water, macrophyte cover, and odonate species richness, abundance and community composition. We analyzed the data for the whole odonate community, as well as for dragonfly and damselfly communities separately in each site. We found higher damselfly species richness and abundance in sites with low urbanization than in sites with high urbanization, and no differences in dragonfly communities along the gradient. We found a positive relationship between dragonfly species richness and abundance and waste percentage and macrophyte cover, and a negative relationship with dissolved solids in water. Our results indicated that odonate communities were fairly tolerant to urbanization and dragonflies were less affected than damselflies. However, we suggest that during design and restructuring of cities, the care and conservation of water bodies and all the life forms that inhabit there, be considered." (Authors)] Address: Córdoba-Aguilar, A., Depto Ecol. Evolutiva, Instituto de Ecología, Universidad Nacional

Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

**20256.** Suhonen, J.; Ilvonen, J.J.; Korkeamäki, E.; Nokkala, C.; Salmela, J. (2022): Using functional traits and phylogeny to understand local extinction risk in dragonflies and damselflies (Odonata). *Ecology & Evolution* 12(3) e8648: 12 pp. (in English) ["Understanding the risk of local extinction of a species is vital in conservation biology, especially now when anthropogenic disturbances and global warming are severely changing natural habitats. Local extinction risk depends on species traits, such as its geographical range size, fresh body mass, dispersal ability, length of flying period, life history variation, and how specialized it is regarding its breeding habitat. We used a phylogenetic approach because closely related species are not independent observations in the statistical tests. Our field data contained the local extinction risk of 31 odonate species from Central Finland. Species relatedness (i.e., phylogenetic signal) did not affect local extinction risk, length of flying period, nor the geographical range size of a species. However, we found that closely related species were similar in hind wing length, length of larval period, and habitat of larvae. Both phylogenetically corrected (PGLS) and uncorrected (GLM) analysis indicated that the geographical range size of species was negatively related to local extinction risk. Contrary to expectations, habitat specialist species did not have higher local extinction rates than habitat generalist species nor was it affected by the relatedness of species. As predicted, species' long larval period increased, and long wings decreased the local extinction risk when evolutionary relatedness was controlled. Our results suggest that a relatively narrow geographical range size is an accurate estimate for a local extinction risk of an odonate species, but the species with long life history and large habitat niche width of adults increased local extinction risk. Because the results were so similar between PGLS and GLM methods, it seems that using a phylogenetic approach does not improve predicting local extinctions." (Authors)] Address: Suhonen, J., Dept Biol., Univ. of Turku, FI-20014 Turku, Finland. Email: juksuh@utu.fi

**20257.** Suhonen, J.; Paasivirta, L.; Rantala, M.J.; Jukka, S.; Suutari, E. (2022): Macroinvertebrate species occupancy frequency distribution patterns in eutrophic lakes. *Aquatic Ecology* 56: 201-212. (in English) ["Metacommunity models describe species occupancy frequency distribution (hereinafter 'SOFD'). Our goal is to present how the differences in eight macroinvertebrate orders dispersal ability affect SOFD patterns. A total of 293 species from eight macroinvertebrate orders were observed in 14 eutrophic lakes in southern Finland. Species occupancy ranged from 1 to 14. About 30% (89 out of 293) of the species were found in only one lake, yielding a surprisingly high number of rare species. So, there were few widely distributed common species and numerous rare species with a restricted distribution. Combined data from eight macroinvertebrate orders supported the bimodal truncated SOFD pattern. Similarly, the low dispersal ability orders, watermites and mayflies, fitted the bimodal truncated SOFD pattern. However, bimodal symmetric SOFD pattern also fitted relatively well to Odonata with high dispersal ability. It seems that differences in dispersal ability among different macroinvertebrate orders may partly explain observed differences. Moreover, our results supported slightly more a niche-based model rather than a metapopulation dynamics model in eutrophic lakes littoral macroinvertebrate metacommunities. Our results highlight that the dispersal ability is important trait for



species conservation in patchily distributed habitat." (Authors)] Address: Suhonen, J., Dept of Biology, University of Turku, 20014 Turku, Finland. E-mail: juksuh@utu.fi

**20258.** Sumanapala, A.; Ranasinghe, T. (2022): First record of *Lestes concinnus* (Zygoptera: Lestidae) from Sri Lanka with observations on its natural history. *Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa"* 65 (1): 129-139. (in English) ["*Lestes concinnus* is a widespread species in tropical Asia and Oceania. It is a species known to have variable colour patterns ranging between pale and dark phenotypes which have earlier been recognized as distinct species. *Lestes concinnus* has never been known from Sri Lanka before. We report observations of both phenotypes of the species and intermediate morphs of *Lestes concinnus* from coastal habitats with dry reed patches in the northern part of the country, adding it to the Odonata fauna of Sri Lanka. With multiple field observations examined, we also provide comments on its identification and natural history in the country." (Authors)] Address: Sumanapala, A., Dept of Zoology and Environment Sciences, University of Colombo, Colombo, Sri Lanka. Email: apsumanapala@gmail.com

**20259.** Sumanapala, A.P.; Ranasinghe, T.; Pushpalal, M. G.S. (2022): Rediscovery of *Macromia flinti* with observations on the female and new locality records (Odonata: Macromiidae). *Notulae odonatologicae* 9(9): 419-428. (in English) ["*Macromia flinti* Lieftinck, 1977, is an endemic dragonfly in Sri Lanka and one of the rarest known odonates in the country. Originally described based on a single specimen collected in 1970, it had not been reported in the past 50 years and thus was considered a globally Critically Endangered Species (IUCN), possibly even extinct. Here we report the rediscovery of the species based on a female specimen observed in the hand and multiple other field observations recorded with photographs. We also provide a summary of all known observations, the first photographs of the species in life and a description of the female, as well as notes on the species identification, its distribution, and natural history." (Authors)] Address: Sumanapala, A., Dept of Zoology and Environment Sciences, University of Colombo, Colombo, Sri Lanka. Email: apsumanapala@gmail.com

**20260.** Sumanapala, A.P.; Ranasinghe, T.; Sumanapala, D. (2022): Rediscovery of *Anisogomphus ceylonicus* (Odonata: Gomphidae) based on its larva. *Taprobanica* 11: 35-37. (in English) ["*Anisogomphus ceylonicus* (Hagen in Selys, 1878) is one of the rarest of the Sri Lankan Odonata. It was first discovered from Ramboda over 140 years ago based on a female specimen, which was originally described as *Gomphus ceylonicus* and later assigned to the genus *Heliogomphus* by F. C. Fraser. Almost a century later, Lieftinck (1971) collected an immature male and its exuvia of a clubtail dragonfly from Rambukpath Oya, 10 miles northwest of Hatton in 1962 and described as *Anisogomphus solitaris*. However, Bedjanic & van der Poorten (2013) recognized that *H. ceylonicus* is conspecific with *A. solitaris*, and thus reassigned it to the genus *Anisogomphus*. Since the discovery of the species, only these two records have ever been documented, despite odonatological surveys and numerous biodiversity explorations conducted on the island." (Authors)] Address: Sumanapala, A.P., Dept of Zoology & Environment Sciences, University of Colombo, Sri Lanka. E-mail: apsumanapala@gmail.com

**20261.** Swain, P.K.; Dora, S.P.; Batulla, S.M.; Chintada, S.;

Barik, A.K. (2022): Effect of wing flexibility on the aerodynamic performance of a robotic dragonfly. *Archive of Applied Mechanics* 92: 1149-1156. (in English) ["To investigate the effect of wing covering and the wing rib over the aerodynamic efficiency, a micro aerial vehicle (MAV) like dragonfly with a two paired wing model is developed and tested in a wind-tunnel with various composite wings. Four different composite forms of wings, namely R-Rigid, SR-Semi Rigid, F-Flexible and HF-Highly Flexible are considered. Results demonstrated that the leading edge rib has an important role in the selection of wing than cord rib. Low aerodynamic performance is observed with R and HF wings, however, SR wing with leading edge rib of 0.8 mm and wing skin thickness of 127 µm exhibits greater aerodynamic efficiency." (Authors)] Address: Dora, S.P., Dept of Mechanical Engineering, GIT, GITAM (Deemed to be University), Vishakhapatnam, Andhra Pradesh, India

**20262.** Szabó, L.J.; Vajda, C.; Szalay, P.E.; Kis, O.; Miskolczi, M.; Dévai, G. (2022): Change of morphometric and allometric patterns on wings of banded demoiselle (*Calopteryx splendens*) males in case of ecologically different watercourse types. *Acta Zoologica Academiae Scientiarum Hungaricae* 68(1): 99-118. (in English) ["In the nature, larvae living in watercourses are exposed to a complex system of environmental influences. It is known that different watercourse types (creeks, brooks, streams, little rivers and medial rivers) provide different conditions for larval development (water depth, flow rate, temperature, oxygen content, substrate type, nutrient supply, etc.). These conditions can vary significantly between watercourse types, but be very similar within types. In this work, we examined the body sizes and wing morphometric characteristics of males of *Calopteryx splendens* reared from different watercourse types (brook, stream, creek, little river, medial river). Although there were no significant differences in body size among watercourse types, we found significant differences in the wing features. We found the most differences between the individuals reared from streams and creeks and between the individuals reared from stream and medial river. Our results show that the individuals reared from different watercourse types were clearly separated on the two wings. The results also suggest that there are significant differences in the number and pattern of allometric features on the wings of individuals reared from different watercourse types." (Authors)] Address: Szabó, L.J., Dept of Hydrobiology, University of Debrecen, H-4032 Debrecen, Egyetem tér 1, Hungary. E-mails: szlj55@gmail.com

**20263.** Taleb, L.A.; Zebbsa, R.; Khelifa, R. (2022): Discovery of *Pyrrhosoma cf. nymphula* (Odonata: Coenagrionidae) in Algeria. *Notulae odonatologicae* 9(9): 455-460. (in English) ["Although odonates of Algeria have been studied for more than 170 years, some habitats such as highland streams have been largely overlooked. Here, we report the first record of *Pyrrhosoma cf. nymphula* in the Kabylia region in a stream running through an oak forest at 1 200 m a.s.l., Algeria. The locality is 400 km from the nearest known population in Tunisia and 650 km from another population Morocco, suggesting a very patchy distribution at higher elevations for the species in North Africa. This new record increases the number of the Algerian odonates to 64 species. In addition, eight other species of Odonata were recorded, three of them range extensions. Further surveys of mountain streams in North Africa are needed to fully determine the distribution of rare odonates, including *P. cf. nymphula*." (Authors)] Address: Khelifa, R., Biodiversity Research Center, Univ. of British Columbia, 2212 Main Mall, Vancouver.

**20264.** Tamm, J. (2022): Weitere Beobachtungen zum Bachwechsel und Verhalten von *Cordulegaster bidentata* im Vordertaunus (Odonata: Cordulegastridae). *Libellen in Hessen* 15: 59-78. (in German, with English summary) ["Further observations on stream hopping and behaviour in a population of *C. bidentata* living at forest streams in Taunus mountains, Germany.- At 15 small forest streams in the Taunus mountains, Hesse, Central Germany, the spatial performance of a population of *C. bidentata* was studied in 2021 using 53 colour marked adult males. 711 males passing above 12 of these streams were counted during 9 counting days, among them 93 marked ones (13 %). In spite of sparse reappearance of marked males, 15 ones were observed again after marking (28 %). Five of them appeared on streams in the surroundings, where they had not been marked. Maximum range between the places of marking and reobserving was 635 m. Altogether 6 cases of stream hopping show that this behaviour may be regular in *C. bidentata* males. A considerable part of marked males only occurred sporadically at the streams. One can conclude that in general a remarkable share of male *C. bidentata* does not take part in patrolling flight activities along the streams regularly. Moreover, remarkable changes in abundance of the species were found at 3 streams compared to previous studies in the area." (Author)] Address: Tamm, J., 34131 Kassel, Germany. E-Mail: jochen.tamm@t-online.de

**20265.** ten Thoren, S.; Holtkamp, M.; ten Thoren, B. (2022): Faunistische Erfassung auf Schloss Ippenburg 2021 Avifauna, Libellen, Tagfalter. Auftraggeber: Freifrau Viktoria von dem Bussche, Schloss Ippenburg, Schlossstr. 1, 49152 Bad Essen: 62 pp. (in German) ["With 18 dragonfly species, a comparable number of species as in 2018 were recorded in the study area. The presence of 10 species on the ground is considered very probable. It is striking that only a small number of pairs were observed in 2021 (approx. 25) compared to the number of dragonfly pairs observed in 2018 (approx. 200). The reasons are mainly assumed to be changed, suboptimal weather conditions. The species spectrum reflects a richly structured water landscape, which presented itself in optimal "dragonfly" conditions in the study year. However, these are almost exclusively ubiquitous species, species that do not make any special demands on their habitat and can inhabit a wide variety of aquatic landscapes. Nevertheless, it remains to be said that there is a high diversity of species that colonise the water mosaic around Ippenburg Castle in particular. The diversity of dragonflies enriches the structurally rich habitat and as such is also dependent on it. Preserving this interplay should be one of the goals of conservation measures. Recommendations for stabilising the populations are given." (Authors/DeepL)] Address: BioConsult, Dulings Breite 6-10, 49191 Belm, Germany

**20266.** Theischinger, G.; Polhemus, D.A.; Richards, S.J. (2022): *Nososticta digimu* sp. nov., a new damselfly from Papua New Guinea (Odonata: Platycnemididae). *Odonatologica* 51(1-2): 167-174. (in English) ["*Nososticta digimu* sp. nov., is described from Southern Highlands Province, Papua New Guinea, and its affinities are discussed. It belongs to a group of *Nososticta* in which the male synthorax exhibits discrete patches of blue, and the tip of the male abdomen is blue. The new species differs from its congeners exhibiting these characters either by lacking a transverse blue frontal bar from eye to eye or by its much larger blue ante-

humeral patch that extends anterior to the mesokatepisternum. *Nososticta digimu* sp. nov. represents the 85th species of the genus and is currently known only from a single location in the Digimu River catchment. The supra-specific term *Nososticta conifera* complex is introduced." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**20267.** Tiple, A.; Bhende, R.; Dandge, P. (2022): Dragonflies and damselflies (Odonata: Insecta) of the Seloo city, Wardha, Maharashtra, Central India. *Arthropods* 11(1): 56-64. (in English) ["Odonata species diversity was studied in the Seloo city from 2011 to 2021. Its geographical location is 20083'73"N; 78070'70"E; 265 m. A total of 62 species of odonates belonging to 2 suborders and 8 families were recorded. The highest number of odonates belong to the family Libellulidae (30 species) followed by Coenagrionidae (13 species), Aeshnidae (5 species), Gomphidae (4 species), Platycnemididae (3 species) and Lestidae (4 species), Macromiidae (2 species) and Chlorocyphidae (1 species). Of the total, 30 species were abundant or very common, 16 were common, 6 were not rare, 7 rare and 3 very rare. Among all, 3 species were Data Deficient, *Indothemis carnatica* (Fabricius, 1798) are listed as Near Threatened and 57 were least concern in IUCN red-list of threatened species. The observations support the value of the Seloo city area in providing valuable resources for Odonata." (Authors)] Address: Tiple, A., PG Dept of Zoology, Vidyabharti College, Seloo, Wardha 442 104, India. Email: ashishd-tiple@gmail.com

**20268.** Tiple, A.D.; Sharma, V.; Padwad, S.V. (2022): Dragonflies and damselflies (Insecta: Odonata) of Jabalpur, Madhya Pradesh, India. *Journal of Threatened Taxa* 14(3): 20740-20746. (in English) ["The present study was carried out to reveal the odonate diversity in Jabalpur city and its surrounding area in Madhya Pradesh, central India. During the study period of 2008–2019 a total of 75 species of odonates belonging to two suborders and nine families were recorded. Twenty-one new species were recorded for Jabalpur district and four for Madhya Pradesh; 37% (28) species were abundant or very common, 19% (14) were common, 16% (12) were frequent, 24% (18) rare, and 4% (3) very rare. The maximum number of odonates were found in family Libellulidae (n = 32), followed by Coenagrionidae (n = 17), Gomphidae (n = 9), Platycnemididae (n = 6), Aeshnidae (n = 5), Lestidae (n = 3), Macromiidae (n = 2), and Chlorocyphidae (n = 1). Of 75 species recorded from Jabalpur city, 72 come under the IUCN Red List. Among them, *Indothemis carnatica* come under Near Threatened (NT) category, 65 species come under Least Concern (LC) Category, six species under Data Deficient (DD), and three species remain not assessed. The study supports the value of the city area in providing habitat for Odonata." (Authors)] Address: Tiple, A.D., P.G. Dept of Zoology, Vidyabharti College, Seloo, Wardha, Maharashtra 442104, India

**20269.** Tippet, R.; Underhill, L. G. (2022): Dragonflies and damselflies of the KhoiSan Karoo Conservancy. *Biodiversity Observations* 12: 54-59. (in English) ["This guide to the dragonflies and damselflies of the KhoiSan Karoo Conservancy provides a provisional list of the first 19 species to be recorded here. It is designed to be used as a guide for visitors. To help with the identification of species, it provides links to the species texts in the online atlas of the Dragonflies and Damselflies of South Africa, Lesotho and Eswatini,

where there is comprehensive information based on annotated photographs." (Authors)] Address: Tippet, R., Biodiversity and Development Institute, 25 Old Farm Road, Rondebosch 7700, South Africa

**20270.** Tippet, R.; Willemse, S.; Underhill, L.G. (2022): Dragonflies and damselflies of the Lower Olifants river valley: Citrusdal to the sea. *Biodiversity Observations* 12: 71-85. (in English) ["This paper contains a list of the 38 species of Odonata recorded to date on the section of the Olifants River between Citrusdal and the sea at Papendorp. It is designed to be used as a guide for residents and visitors. To help with the identification of species, links to the species texts in the online Atlas of the Dragonflies and Damselflies of South Africa, Lesotho and Eswatini are provided. These contain comprehensive species information and annotated photographs. We also set out priorities for further observations." (Authors)] Address: Tippet, R., Biodiversity & Development Institute, 25 Old Farm Road, Rondebosch 7700, South Africa

**20271.** Tituskin, J.R.; Waddell, S.M.; Mabry, K.E. (2022): Species-specific responses to warming alter community composition. *Ecological Entomology* 47(3): 284-295. (in English) ["1. Species are responding to global climate change in varied and nuanced ways. However, how species-specific responses to climate change= affect interactions among species remains poorly understood. It is important to understand species interactions under potential climate change scenarios because those interactions can in turn alter community dynamics. 2. In this study, we conducted two complementary experiments to examine how simulated warming might alter larval intraguild predation (IGP) rates and resulting adult assemblage composition in three species of North American dragonflies: *Pachydiplax longipennis*, *Plathemis lydia* and *Libellula luctuosa*. 3. First, using both *P. longipennis* and *L. luctuosa*, we isolated interspecific and intraspecific pairs of larval dragonflies of different size differentials to determine how the size and species identity might influence IGP rates. 4. In tandem, we conducted a year-long mesocosm experiment with all three species to assess how simulated warming and heat waves influenced the resulting adult dragonfly assemblages. 5. IGP trials revealed that *P. longipennis* individuals were much more likely to engage in IGP than *L. luctuosa*, regardless of size differential. In the mesocosm experiment, emerging adult assemblages were dominated by *P. longipennis* individuals, a pattern that was most pronounced in the control treatment. 6. Our results indicate that while *P. longipennis* may be the competitively dominant species under current ambient conditions, warming may alter this dynamic and lessen the dominance of this species on the resulting assemblage composition." (Authors)] Address: Tituskin, Julia, Dept of Biology, New Mexico State University, Las Cruces, NM 88003, USA. Email: tituskinjuliar@gmail.com

**20272.** Trapero Quintana, A.D.; Torres Cambas, Y.; Reyes Tur, B.; Cordero Rivera, A. (2022): Diversidad de las libélulas de Cuba. *Anales de la Academia de Ciencias de Cuba* 12(2): 5 pp. (in ASpanish, with English summary) ["Dragonflies are hemimetabolous predatory insects, which belong to the order Odonata with approximately 6,000 species, grouped into two suborders. The objectives of this study were to characterize and update the systematics of the order Odonata, its geographical and temporary distribution; to characterize, besides, their genetic diversity, ecology of populations, and both adult and larvae assemblies, emergency pattern from exuvias, as well as to describe aspects

of their reproductive ecology, in diverse habitats of the Cuban archipelago for conservation purposes. Specimens and data were collected in 50 locations in Cuba, from 1995 to the present with aerial and aquatic nets. Four sites in Santiago de Cuba were selected to study the larvae, exuviae and the emergency pattern. The climate variables were recorded during the low-rain and rainy periods. The specimens were processed in the laboratories of the universities of Havana and Oriente; the extraction of DNA was completed in Vigo. Tests of normality, Pearson correlation, principal components, Maximum Likelihood and estimation of ecological niche were used. The Cuban fauna of odonates includes 88 species, in six families, 41 genera and six of them are endemic. The larvae of three species are described and dichotomous keys were elaborated for larvae and adults from Cuba and the Antilles. The geographical distribution of dragonflies in Cuba was updated and, by using genetic data and population ecology, a proposal for conservation strategies for *Hypolestes* is presented. Permanent rivers and lagoons favor dragonfly assemblies with high equitability. To record the maximum number of species, it was estimated that 30 weekly samples of exuvia collection are needed. Five groups of larvae were created using morphology and functional attributes, and it was found that the emergence pattern was broad and unsynchronized, due to the presence of accidental and multivoltine species. The phylogenetic analyses revealed four Antillean lineages for *Hypolestes*, with inferences of the effect of climate change, flight period, longevity and environmental assessment as bioindicators of aquatic ecosystems." (Authors)] Address: Trapero Quintana, A.D., Depto de Biología Animal y Humana, Facultad de Biología, Universidad de La Habana. La Habana, Cuba. Email: adrian.trapero@fbio.uh.cu; trapero76@gmail.com

**20273.** Trapero Quintana, A.D.; Soto Borrero, M. (2022): Odonatos de la colección del Museo de Historia Natural Charles Ramsden de la Torre. *Revista Cubana de Ciencias Biológicas* 10(1): 1-9. (in Spanish, with English summary) ["Odonates are hemimetabolous insects that play an important role in aquatic ecosystems. They are an indispensable group in entomological collections, such as those of the Charles Ramsden de la Torre Museum of Natural History at the Universidad de Oriente. The objective of this work is to inventory the Cuban specimens of the Odonata order deposited in the collection of the Charles Ramsden Museum of Natural History, through the quantification and review of the total number of dragonfly individuals and the data on their labels. With this information, tables and graphs were made that illustrate the richness of said collection, which has a total of 530 specimens, belonging to 57 species of 33 genera and seven families of the Anisoptera and Zygoptera suborders. Libellulidae was the best represented family followed by Coenagrionidae, in correspondence with the diversity and abundance that they exhibit worldwide. Four of the six Cuban endemics are present. Pastor Alayo was the entomologist with the greatest contribution to the group's collection, being appointed curator of the museum and an active collector of all orders of insects in localities of the eastern region, fundamentally. The state of conservation of the collection is optimal and with a promising future." (Authors)] Address: Trapero Quintana, A., Depto de Biología de la Universidad de Oriente, Patricio s/n, Santiago, Cuba, CP 90500, Cuba. E-mail: atrapero@cnt.uo.edu.cu

**20274.** Trisna, P.A.W.; Watiniasih, N.L.; Ginantra, I.K. (2022): Diversity of dragonflies around the Ayung River. *Simbiosis X* (1): 64-74. (in Indonesian, with English summary) ["This research was conducted from february to April

2020 in three different areas, including in Penikit Village, Petang, Sayan Village, Ubud, and in Padang Galak Village, Sanur using sweeping techniques. This study aims to determine the diversity of dragonflies along the Ayung river. The analyzes carried out include analyzing the Shannon-Wiener diversity index ( $H'$ ), evenness index ( $E$ ), dominance index ( $D$ ) sympons, frequency of presence and water quality of the Ayung River. The results showed as many as 11 species of dragonflies. The most common individuals found were *Orthetrum Sabina* (23 individuals), while the lowest individuals were from the Libellulidae family as many as 5 individuals. Most species and individuals were found at the Sayan location with 11 species with a total of 124 individuals ( $H'=2.24$ ,  $E=0.93$ ,  $D=0.19$ ), followed by 6 species in the Petang location with a total of 27 individuals ( $H' =1.60$ ,  $E=0.89$ ,  $D=0.30$ ), while the lowest was the Sanur location with 4 species with a total of 15 individuals ( $H'=0.94$ ,  $E=0.69$ ,  $D=0.67$ ). Diversity of dragonflies in the Ayung River is classified as moderate ( $H'=2.36$ ), the evenness index of species at the Petang and Sayan locations is in the almost evenly distributed category. Petang (0.89) and Sayan (0.93), while the Sanur location was in the fairly even category (0.69). The highest frequency of presence in *Orthetrum sabina* species was 89% with frequent or absolute presence categories. The BOD and DO values in the Ayung River do not meet the requirements of water quality standards, while COD meets the requirements based on PP No. 82 of 2001." (Authors)] Address: Putu Ayu Wulan Trisna, Ni Luh Watiniasih dan I Ketut Ginantra, Program Studi Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Udayana, Bukit, Jimbaran, Kabupaten Badung – Bali. Email: putuwulan308@gmail.com

**20275.** Tyagi, B.K. (2022): Odonatological conferences/symposia. *Bradinopyga* 6(9): 118-122. (in English) [Announcements of symposia in Slovenia, Cyprus and India.] Address: Tyagi, B.K. Email: abktyagi@gmail.com

**20276.** Verma, P.; Thakkar, N.; Andrew, R. (2022): Hatching in Coromandel Marsh Dart Damselfly *Ceragrion coromandelianum* (Fabricius) (Zygoptera: Coenagrionidae): process and influence of the oviposition substrate. *Journal of Threatened Taxa* 14(4): 20840-20847. (in English) ["Coromandel Marsh Dart Damselfly *Ceragrion coromandelianum* (Fabricius) breeds in stagnant pools, small garden tanks and ornamental cement ponds containing submerged and/or floating vegetation. Eggs were collected to observe two aspects of larval development: (1) The hatching rate of eggs deposited in different vegetation (*Nymphaea nouchali*, *Lemna paucicostata*, *Hydrilla verticillata*). Although *C. coromandelianum* prefers to oviposit in the broad leaves of *N. nouchali*, the highest rate of hatching was found in *H. verticillata* (95.8%) followed by *N. nouchali* (87.6%) and *L. paucicostata* (81.3%). Hatching commenced on Day 5 and was completed by Day 9. Maximum hatching (56%) was recorded on the sixth day of oviposition followed by the seventh day (20%) in all three substrates. (2) To document the process of hatching as follows: Around three minutes prior to hatching, the embryo exhibits cyclic pumping and pushing movements of the head (caused by the peristaltic movement of the mid- and hind- gut) of low intensity followed by high intensity and long pumping movements interspaced with smaller pulsating movements. Swelling of the head forces the apical chorion to split along the micropylar chute and like a lid, the apical tip topples over as a conical cap. This allows the prolarva to exit the egg. As it does so, it twists and the thorax swells breaking the prolarval sheath and releasing the first instar larva." (Authors)] Address:

Verma, P., Centre for Higher Learning & Research in Zoology, Hislop College, Civil lines, Nagpur, Maharashtra 440 001, India. Email: payalverma@gmail.com

**20277.** Vilela, D.S.; Lencioni, F.A.A.; Schmidt Furieri, K.; Santos, J.C. (2022): The rediscovery of *Machadagrion garbei* (Santos, 1961) (Odonata: Coenagrionidae) with notes on the hitherto unknown female. *Zootaxa* 5124(3): 391-396. (in English, with Portuguese summary) ["*M. garbei* was only known by the male holotype from Vila Nova, Bahia state, Brazil, and one male from Junqueira, Alagoas state, Brazil, collected in 1963. Over 50 years of its original description we report its rediscovery with specimens collected in Barra do Jacuípe, Camaçari County, Bahia state, Brazil, and Serra de Itabaiana, Sergipe state, Brazil. We provide illustrations and diagnosis from both sexes, including the description of the female." (Authors)] Address: Vilela, D.S., Universidade Estadual Paulista, Depto de Ciências Biológicas, Fac. de Ciências e Letras de Assis, Lab. de Biologia Aquática, Assis, SP, Brazil. Email: deeogoo@gmail.com

**20278.** Vilela, D.S.; Souza, M.M. (2022): A new species of *Progomphus* Selys, 1854 (Odonata: Anisoptera: Gomphidae) from Minas Gerais state, Southeastern Brazil. *Zootaxa* 5124(1): 69-74. (in English, with Portuguese summary) ["*Progomphus teolitavius* sp. nov. is described and diagnosed based on a specimen collected in a gallery forest of Cerrado from Barroso municipality, Minas Gerais state, Brazil (-21.2238, -43.9895, 1033 m, 30.iii.2021, G.S. Santos leg.). The new species can be distinguished from congeners [*P. herrerae*, *P. basistictus*, *P. bidentatus*] by its enlarged basal externolateral dilatation of cerci (which bears large teeth), and epiproct morphology." (Authors)] Address: Vilela, D.S., Laboratório de Biologia Aquática, Depto de Ciências Biológicas, Faculdade de Ciências e Letras de Assis, Universidade Estadual Paulista, Assis, São Paulo, Brasil. Email: deeogoo@gmail.com

**20279.** Vilela, D.S.; Rodrigues, M.E., Lencioni, F.A.A. (2022): Revealing the Odonatofauna of Northeastern Brazil: new *Heteragrion* Selys, 1862 (Odonata: Heteragrionidae) species from Bahia state. *Zootaxa* 5178(5): 493-500. (in English) ["*Heteragrion roquei* sp. nov. (Brazil, Bahia state, Municipality of Una, Fazenda Araruna, (-15.3146, -39.1621), 40 m, 19.ix.2019, M.E. Rodrigues leg., UESC) is described based on two males recently collected in Bahia state, Brazil. The new species is illustrated, diagnosed and compared with morphologically close congeners [*Heteragrion triangulare*, *H. gracile*], being separated from them mainly by cercus characters, such as the medial portion and both ventrobasal / dorsobasal expansions." (Authors)] Address: Vilela, D.S., Universidade Estadual Paulista, Depto de Ciências Biológicas, Faculdade de Ciências e Letras de Assis, Laboratório de Biologia Aquática, Assis, SP, Brazil. Email: deeogoo@gmail.com

**20280.** Vilenica, M.; Rebrina, F.; Ružanovic, L.; Gulin, V.; Brigic, A. (2022): Odonata assemblages as a tool to assess the conservation value of intermittent rivers in the Mediterranean. *Insects* 2022, 13, 584. <https://doi.org/10.3390/insects13070584>: 16 pp. (in English) ["Simple Summary: Intermittent rivers and are an important source of water in arid regions such as the Mediterranean. Water resources and riparian habitats in the Mediterranean regions are under diverse anthropogenic pressures, including the land-use change. We studied Odonata adults at four intermittent Mediterranean rivers in the Dinaric Western Balkans ecoregion, with the aim of inspecting the conservation value of



these habitats based on Odonata assemblages and in the context of the surrounding land-cover heterogeneity. We analyzed several diversity and conservation indices and recorded significant differences in Odonata species richness and Croatian Conservation Odonatological index among the studied rivers. Our findings showed that land use, as a long-term moderate anthropogenic impact, can enhance land-cover heterogeneity and in some cases even lead to increased Odonata diversity in the intermittent rivers in the Mediterranean. Abstract: Intermittent rivers, lotic habitats that cease to flow during the dry periods of the year, make up a large proportion of the world's inland waters and are an important source of water in arid regions such as the Mediterranean. Yet, water resources and riparian habitats in the Mediterranean regions are under diverse anthropogenic pressures, including land-use change. Odonata are widely used as a valuable tool for assessing freshwater ecosystems. Hence, with the aim of inspecting the conservation value of intermittent rivers in the Mediterranean based on the assemblages they support, we studied Odonata adults at four intermittent Mediterranean rivers in the Dinaric Western Balkans ecoregion with respect to the surrounding land-cover heterogeneity. We analyzed several diversity and conservation indices and recorded significant differences in Odonata species richness and Croatian Conservation Odonatological index among the studied rivers. Our findings showed that land use, as a long-term moderate anthropogenic impact, can enhance land-cover heterogeneity and in some cases even lead to increased Odonata diversity in intermittent rivers in the Mediterranean. Intermittent rivers provide habitat for several threatened Odonata species, suggesting the importance of Odonata in planning the conservation activities in these vulnerable ecosystems." (Authors)] Address: Vilenica, Marina, Faculty of Teacher Education, University of Zagreb, Trg Matice hrvatske 12, 44250 Petrinja, Croatia. Email: marina.vilenica@ufzg.hr

**20281.** Vinko, D.; Šalamun, A.; Bedjanic, M. (2022): On the odonates, odonatology and odonatologists in Slovenia. 6th European Congress on Odonatology, 27-30th June 2022, Kamnik, Slovenia, Book of Abstracts: 9-22. (in English) ["brief overview of odonatological research in Slovenia from its origins in the second half of the 17th century to the present is provided. The importance of pioneer odonatological activities by Prof. Boštjan Kiauta and his mentorship as well as support to the work by younger Slovene odonatologists are highlighted. A checklist of 73 recorded dragonfly species for the country is given, together with their common Slovenian names. Diversity of dragonflies and their habitats in Slovenia is presented, with an overview map of 8,605 localities with dragonfly records, map of number of recorded Odonata species per 5x5 km squares and examples of currently known distributions of *Cordulegaster heros* Theischinger, 1979 and *Somatochlora meridionalis* Nielsen, 1935. Scope and activities of the Slovene Dragonfly Society, founded in 1992 with the aim to increase popularity of dragonflies and to connect dragonfly enthusiasts in Slovenia, are also presented, highlighting the importance of the national odonatological database, which contains over 61,500 faunistic data and is maintained jointly by the Slovene Dragonfly Society and the Centre for Cartography of Fauna and Flora. Although the protection of threatened dragonfly species in Slovenia is satisfactorily covered in legislative terms, some species experience, in reality, serious decline and ongoing encroachment upon their habitats, while systematic, state funded monitoring is not carried out. The beginning of the 6th European Congress on Odonatology (ECOO 2022), to be held between June 27th and 30th

June 2022 in Kamnik, Central Slovenia, is announced." (Authors)] Address: Vinko, D., Slovene Dragonfly Society, Verovškova 56, 1000 Ljubljana, SLOVENIA. Email: damjan.vinko@gmail.com

**20282.** Vitor, K.C.A.; Pagarigan, E.O.; Tagoon, M.D.T.; Garcia, M.M.; Bautista, M.G. (2022): Distribution and species richness of a dult Odonata in urban wetlands in Tagum City, Mindanao, Philippines. *Philippine Journal of Science* 151(6A): 2173-2182. (in English) ["Several studies on Philippine Odonata have focused mainly on the protected landscapes and forest reserves; however, little ecological research has been done in an urban setting. Species distribution, abundance, and diversity of Odonata in Tagum were conducted, where no previous records were available. Field sampling was conducted from July–October 2018 among various locations in Tagum City, Davao del Norte. Results showed a total of 1,239 individuals of identified Odonata composing nine species of Family Libellulidae and three species of Family Coenagrionidae. The dominant and most abundant species were *Pantala flavescens*, *Diplacodes trivialis*, and *Orthetrum sabina*. A relatively high Margalef's Index of species richness ( $R = 2.148$ ) and moderate species diversity ( $H' = 1.935$ ) were recorded in Botanical Park and a less even distribution was observed in all sites. Canonical correspondence analysis indicated that both temperature and humidity can affect the abundance of certain species within the community." (Authors)] Address: Vitor, Karyn, Dept of Arts and Sciences Education, University of Mindanao Tagum College, Tagum City, Davao del Norte 8100 Philippines. Email: iamkarynchrilene@gmail.com

**20283.** Vliegthart, A. (2022): *Opmerkelijk. Vlinders 1/2022: 32-* (in Dutch) [*Coenagrion scitulum* on its way to the Wadden Islands: After the forked damselfly became established in 2007, the species has been expanding since 2010. By now, the species is widespread below and even above the major rivers. Via the dunes, *C. scitulum* now seems to be spreading (quickly?) to the north. How long will it take before it arrives in Den Helder? And will the transfer to Texel succeed?]

**20284.** Walia, G.K.; Singh, H. (2022): The Journal of Basic and Applied Zoology 83:47. A review on intraspecific karyomorphological variations of m chromosomes in family Libellulidae (Anisoptera: Odonata): 11 pp. (in English) ["Background: Family Libellulidae is one of the largest families of suborder Anisoptera (Odonata) including 1035 species of 144 genera throughout the world. Libellulids are distributed all around the globe, while some are cosmopolitan and some are endemic. Cytogenetic data pertains to 258 libellulid species and chromosome number varies from  $2n = 6.47$ . Majority of the species possess  $2n$  (male) = 25, which is the modal number of the family. The m chromosomes are considered as the fragments of autosomes and are present in 78% of studied libellulid species. Main body: Presently, 29 libellulid species have been catalogued based on various research articles related to cytogenetic studies regarding intraspecific chromosomal variations especially due to the m chromosomes within the same or different geographical populations of the species. Conclusions: Odonata possess holokinetic chromosomes and m chromosomes are the fragments of autosome. The break can occur at any time, at any place, which is responsible for variations in the size of m chromosomes. These variations also depend on the geographical distribution of the species which persists over generations by the action of natural selection and also play role in speciation." (Authors)] Address: Walia, Gurinder

Kaur, Dept of Zoology and Environmental Sciences, Punjab University, Patiala, Punjab 147002, India. Email: gurinderkaur\_walia@yahoo.co.in

**20285.** Wang, Z.J.; Melfi Jr., J.; Leonardo, A. (2022): Recovery mechanisms in the dragonfly righting reflex. *Science* 376(6594): 754-758. (in English) ["Following formidable flyers: Flying involves complicated maneuvers, not the least of which is the process of returning to an upright flying position after being flipped over in midair. Wang et al. used a combination of experiments and biophysical models to understand this process in dragonflies, which are adept insect flyers. The authors reveal that righting involves a series of signals beginning with the visual system through to wing pitch muscles. This approach revealed connections between neural signals and physical processes that could be used to study flight mechanics across species. —SNV. Abstract: Insects have evolved sophisticated reflexes to right themselves in mid-air. Their recovery mechanisms involve complex interactions among the physical senses, muscles, body, and wings, and they must obey the laws of flight. We sought to understand the key mechanisms involved in dragonfly righting reflexes and to develop physics-based models for understanding the control strategies of flight maneuvers. Using kinematic analyses, physical modeling, and three-dimensional flight simulations, we found that a dragonfly uses left-right wing pitch asymmetry to roll its body 180 degrees to recover from falling upside down in ~200 milliseconds. Experiments of dragonflies with blocked vision further revealed that this rolling maneuver is initiated by their ocelli and compound eyes. These results suggest a pathway from the dragonfly's visual system to the muscles regulating wing pitch that underly the recovery. The methods developed here offer quantitative tools for inferring insects' internal actions from their acrobatics, and are applicable to a broad class of natural and robotic flying systems." (Authors)] Address: Wang, Z. Jane, Theoretical and Applied Mechanics, Cornell University, Ithaca, New York 14853, USA. E-mail: z.jane.wang@cornell.edu

**20286.** Ware, J.; Kohli, M.K.; Mendoza, C.M.; Troast, D.; Jinguji, H.; Hobson, K.A.; Sahlén, G.; Anderson, R.C.; Suhlin, F. (2022): Evidence for widespread gene flow and migration in the Globe Skimmer dragonfly *Pantala flavescens*. *International Journal of Odonatology* 25: 43-55. (in English) ["The global population structure and dispersal patterns of *P. flavescens* are evaluated using a geographically extensive mitochondrial DNA dataset, a more limited samples of nuclear markers, wing isotopic ( $d^2H$ ) data and a literature review. No spatial or temporal haplotype structure was recovered between the samples. Isotope data suggest that most samples were immigrants at the collection locations. A literature review of migration events for the species confirms regular inter-and intra-continental migrations occur (the majority reported from Asia, Africa and Australasia), with individuals and swarms dispersing thousands of kilometers over land and oceans. Migrations coincide with prevailing winds and seasonal rains, which points to a mechanism we name the "pantropical *Pantala* conveyor belt", suggesting widespread gene flow is possible for an aquatic insect with excellent flying ability linked to rapid larval development." (Authors)] Address: Ware, Jessica, Division of Invertebrate Zoology, American Museum of Natural History, USA. Email: jware@amnh.org

**20287.** Wasscher, M.T.; Orr, A.G.; Dumont, H.J. (2022): In memoriam Bastiaan Kiauta (20th January 1937 – 26th March 2022). *Odonatologica* 51(1-2): 1-9. (in English) ["We

provide recollections and memories connected with the life of Bastiaan Kiauta and his pivotal role in developing worldwide odonatology. Additions to his odonatalogical bibliography and to species named in his honour are appended." (Authors)] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: marcel.hilair@12move.nl

**20288.** Wilk, T. (2022): Scarce Chaser *Libellula fulva* (Odonata: Libellulidae): second record from the Polish part of the Carpathian Mountains. *Odonatrix* 1811: 3 pp. (in Polish, with English summary) [oas 64: "*L. fulva* is a moderately frequent species in Poland, its distribution being largely confined to the post-glacial landscape of northern Poland and the Lublin region. It becomes much scarcer and more localised towards the south and has hitherto been found just once in the mountainous regions of southern Poland. This paper discusses the second record of this species in the Polish part of the Carpathian Mountains: one general individual was observed in a gravel pit near the village of Podrzeczce in the Dunajec Valley. The record greatly extends the Scarce Chaser's known range in Poland, indicating that this may be slowly shifting southwards. Its presence in the mountainous areas of southern Poland could be linked with new artificial waterbodies that have formed in abandoned gravel or sand pits along Carpathian rivers." (Author)] Address: Wilk, T., Ogólnopolskie Towarzystwo Ochrony Ptaków, ul. Odrowłā 24, 05-270 Marki, Poland. E-mail: tomasz-wilk3@gmail.com

**20289.** Wilkinson (2022): Perching and roosting postures in adult *Pyrrhosoma nymphula* (Sulzer) (Large Red Damselfly). *Journal of the British Dragonfly Society* 38(1): 84-99. (in English) ["Although generally considered to be a species that rests with its wings held over its abdomen in a closedwing posture, the author has observed *Pyrrhosoma nymphula* with a diurnal propensity to rest with its wings spread in more half-open wing postures. Furthermore, in contrast to its daytime perching behaviour, late evening observations of roosting *P. nymphula* around a small urban garden pond have consistently revealed that adults habitually adopt 'openwing' roosting postures, either half-open or fully open. Forewings may be pulled forwards up to 110° and may be depressed to approximately 5° above the horizontal plane (Fig. 1); hindwings pulled forwards to between 70° and 130° and depressed by as much as 15° below the horizontal plane. When first settling to roost for the night both sexes may settle with a typically 'closedwing' posture or one of a range of commonly utilised daytime half-open postures. However, a significant number subsequently adjust their position and open their wings to orientations approximately at right angles to the body. There is some evidence that the half-open wing posture orientations are adopted in both males and females earlier in the year, when temperatures are lower; later in the year, as temperatures rise, their behavioural repertoire expands to include more fully open roosting postures. The various hypotheses that have been proposed to explain the significance and function of closedwing versus openwing behaviour are discussed." (Author)] Address: Wilkinson, Shaun, 21 Eastfield Road, Western Park, Leicester LE3 6FE, UK

**20290.** Won, C.-G.; So, K.-S.; Kim, H.-C. (2022): A new odonatan (*Stenophlebiidae*) from the Lower Cretaceous Sinuiju Formation of North Phyongan Province, the Democratic People's Republic of Korea. *Palaeoworld* 31(1): 116-120. (in English) ["A new fossil species, *Stenophlebia ryon-sangensis* n. sp. (*Stenophlebiidae*), collected from the

Lower Cretaceous non-marine Sinuiju Formation, North Phyongan Province, has the following forewing characters: preserved wing slender and longer than 47.1 mm; Cr long, with three cells below it, and well aligned with distal part of ScP; Sn shorter than Cr, one cell long; supplementary veinlet below Sn aligned with RP2 and about two cells long; base of IR1 five cells distal of base of RP2. This well preserved material is the first odonatan reported in the DPRK. Congeneric species has previously been found in the Lower Cretaceous Yixian Formation of western Liaoning Province, Northeast China, thus the new discovery of *Stenophlebia ryonsangensis* n. sp. may contribute to evaluating the distribution and migration of Stenophlebiidae and may further indicate the close relationship of the fossil layer with the famous Jehol Biota in Northeast China." (Authors)] Address: So, K.-S., Dept of Paleontology, Faculty of Geology, Kim Il Sung University, Pyongyang, Democratic People's Republic of Korea. Email: ks.so@ryongnamsan.edu.kp

**20291.** Xia, G.; Zheng, D.; Krieg-Jacquier, R.; Fan, Q.; Chen, Y.; Nel, A. (2022): The oldest-known Lestidae (Odonata) from the late Eocene of Tibet: palaeoclimatic implications. *Geological Magazine* 159(4): 511-518. (in English) ["Terrestrial fossils from the Palaeogene of Tibet could help us to better understand the past climate and environment in this area. We herein report a new late Eocene non-marine fossil site from southern Nima Basin, central Tibet, SW China, including abundant insects and fishes. These fossils are similar to those from the late Eocene (~39.5–37 Ma) Lunpola–Nima sediment depo-centres in sharing the dominating aquatic bug *Aquarius lunpolaensis* and cyprinid fishes. *Chalcolestes tibetensis* sp. nov., the oldest representative of the modern family Lestidae, is described. Lestidae were previously only recorded in Western Europe, and the oldest records were from the uppermost Eocene of France and the UK. The present discovery demonstrates that Lestidae already had a broad distribution during the Eocene and probably originated much earlier. The recent representatives of *Chalcolestes* occur in the low-altitude ponds or lakes of Western Palaeartic. Together with the other freshwater fossils in this site, this new discovery indicates a humid climate and low altitude for the Nima Basin and nearby basins in the middle part of the Bangong Nujiang suture zone." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**20292.** Xu, F.; Wang, J.; Hua, L. (2022): Multi-objective biomimetic optimization design of stiffeners for automotive door based on vein unit of dragonfly wing. *Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science* 236(9): 4551-4564. (in English) [oas 64a; "In this paper, a biomimetic optimizing design of the stiffeners layout of the automotive inner door panels is proposed based on vein unit of dragonfly wing. The distributions features of the dragonfly veins and similarity as stiffeners are analyzed, and then the excellent structural features of mechanical properties of the dragonfly veins are extracted to work as a biomimetic design. In order to research the distribution of the reinforced areas in the interior door panels under various operating conditions, the finite element model is established firstly. Secondly, gray relation theory combined with analytic hierarchy analysis are imposed to determine the weight value of each condition in multi-objective topology optimization to fully consider both objective and subjective factors, and topological optimization results indicate that the stiffeners of the inner door panel are biconically designed. Finally, the original finite element

results of the inner door panels are compared with that after optimized with biomimetic stiffeners under the same operating conditions, and the result of the comparison verify the effectiveness of the biomimetic topology design. Specifically, for the dent-resistant and sinking condition, the strength of new door increases by 20.2% and 14.3%, respectively. Therefore, doors with biomimetic stiffeners have an increased resistance to deformation and vibration, while the mass is reduced by 2.7%. The results can provide valuable new ideas for the optimal biomimetic design of automotive door inner panel stiffeners." (Authors)] Address: Xu, F., Hubei Key Laboratory of Advanced Technology of Automotive Components, Wuhan University of Technology, Wuhan, China

**20293.** Yan, S.; Pan, S.; Hu, J.; Zhang, S.; Yu, L.; Wang, S.; Fang, J.; Chen, Z. (2022): Two new records of dragonfly species (Odonata: Macromiidae) in Anhui Province. *Journal of Anhui University (Natural Science Edition)* 46(04): 102-104. (in Chinese, with English summary) ["According to the systematic field investigation on the insect resources in Mount Huangshan Scenic Area during April to October in 2020, two dragonfly species, namely the *Macromia malleifera* and *Macromia unca*, were identified to be the new records in Anhui Province. The morphological characteristics of these two species were briefly described, and furthermore, photographs for their male and female adults were illustrated in present study. The results would provide important information for the further study of Macromiidae dragonflies in Anhui Province." (Authors)] Address: Yan, S., School of Resources and Environment Engineering, Anhui University, China. Email: yanshaofei999@163.com

**20294.** Yang, G.-h.; Orr, A.G.; Zhang, H.-m. (2022): First description of the larva of *Archineura incarnata* (Karsch, 1891) with notes on the biology (Odonata: Calopterygidae). *Zootaxa* 5134(3): 441-447. (in English) ["The final instar larva of the genus *Archineura* Kirby, 1894 is described for the first time, based on a specimen of the Chinese endemic species *Archineura incarnata* (Karsch, 1892) collected from Mt. Nankunshan, Guangdong Province, China. The larva is distinguished by several characters, including its moderately slender build combined with the distinctive extremely long legs, long, narrow, uniquely spined outer caudal appendages, a mask strongly expanded anteriorly with a relatively small median cleft, and robust spines at the apex of the labial palp. The mask is most similar to larvae of *Echo Selys*, 1853, *Mnais Selys*, 1853 and *Psolodesmus McLachlan*, 1870 which are considered its nearest relatives based on molecular analysis, but from which it differs in other characters. The biology of *Archineura* larvae is discussed briefly." (Authors)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**20295.** Yang, G.-h.; Orr, A.G.; Zhang, H.-m. (2022): Descriptions of the larvae of *Huosoma Guan*, Dumont, Yu, Han & Vierstraete, 2013 from China (Odonata: Coenagrionidae). *Zootaxa* 5134(3): 426-434. (in English) ["The final stadium larvae of *Huosoma latiloba* (Yu, Yang & Bu, 2008) and *Huosoma tinctipenne* (McLachlan, 1894) from Yunnan Province, China are described and illustrated for the first time, with diagnostic differences between the two species identified. While no morphological characters separating the adults of this genus, and the closely related western Palaeartic *Pyrrhosoma* Charpentier, 1840 have been found, the larvae of these two genera do show differences which are

discussed here." (Authors)] Address: Orr, A.G., Cooperative Research Centre for Tropical Rainforest Ecology and Management, Environmental Sciences, Griffith University, Nathan, Q 4111, Australia. E-mail: agorr@universal.net.au

**20296.** Zaini, A.; Bunda, H.; Utami, N.H. (2022): Validitas dan keterbacaan booklet capung untuk mahasiswa pada mata kuliah zoologi invertebrata. *Jurnal Pendidikan dan Ilmu Sosial* 1(2): 63-73. (in Indonesian) ["The validity and readability of dragonfly booklets for students in invertebrate zoology course: Dragonfly is one type of insect which is a bioindicator in the environment. Insects can be found in rice fields, so that rice fields are one of the habitats for dragonflies to be found, so the presence of dragonflies in rice fields can increase an interesting learning resource for students to improve understanding of the diversity of the Odonatan order in invertebrate zoology courses. The aims of this study were (1) to analyze the diversity of dragonflies of the order Odonata found in the rice fields of Beringin Kencana village, Tabunganan sub-district. (2) Describe the validity of the booklet compiled from data on the diversity of dragonflies in the Beringin Kencana rice field area, Tabunganan Subdistrict as teaching material for invertebrate zoology courses. (3) Describe the readability test of a booklet compiled from data on the diversity of dragonflies in the Beringin Kencana rice field area, Tabunganan District as an invertebrate zoological enrichment. This research method uses the R&D model developed by Borg and Gall with the stages of development research using the steps, namely research and information collecting, planning, developing preliminary form of product, preliminary field testing, main product revision. Based on the research results, it is known that (1) there are 7 species of dragonflies, namely *Orthetrum sabina*, *Neurothemis fluctuans*, *Brachytemis contaminata*, *Agriocnemis pygmaea*, *Ceriagrion cerinorubellum*, *Tholymis tilarga*, and *Ischnura senegalensis*. (2) Based on the validity test the developed booklet was declared very valid by three expert lecturers with a validity score on the content aspect, namely 88.89%, in the language aspect, 88.89%, and in the presentation aspect, namely 94.44%. (3) The readability test by 6 students got a score of 86.76% so that the Booklet got very good criteria." (Authors) (Google translate)] Address: Zaini, A., Program Studi Pendidikan Biologi, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Lambung Mangkurat, Jalan Brigjen Hasan Basri, Banjarmasin, Indonesia

**20297.** Zajac, K.; Tamawski, D.; Smolis, A.; Kadej, M.; Struø, K.; Zajac, T. (2022): The green snaketail *Ophiogomphus cecilia* (Geoffroy in Fourcroy, 1785) in the Sudetes and new records of the species in Lower Silesia. *Przyroda Sudetów* 24: 95-102. (in Polish, with English summary) ["*Ophiogomphus cecilia* is a reobiont inhabiting mainly lowland and submontane rivers up to 400 m a.s.l. We present the first records of the species in the Polish part of the Sudetes, as well as new observations of the species from south-western Poland. In 2008-2018, the species was recorded at 11 localities in the Sudetes at an altitude of 335-740 m a.s.l.. In addition, 25 new localities were found in lower areas of Lower Silesia. The possible dispersal routes of the species into the mountain areas of the Sudetes are discussed." (Authors)] Address: Zajac, K., ul. Fabryczna 1a, 57-540 Ladek-Zdrój, Poland. Email: krzysiek.zajac3@gmail.com

**20298.** Zhang, V.M.; Martin, R.L.; Murray, R.L. (2022): Chronic road salt exposure across life stages and the interactive effects of warming and salinity in a semiaquatic in-

sect. *Environmental Entomology* 51(2): 313-321. (in English) ["The salinization of freshwater habitats from winter road salt application is a growing concern. Understanding how taxa exposed to road salt run-off respond to this salinity exposure across life history transitions will be important for predicting the impacts of increasing salinity. We show that *Leucorrhinia intacta* dragonflies are robust to environmentally relevant levels of salt pollution across intrinsically stressful life history transitions (hatching, growth, and metamorphosis). Additionally, we observed no carry-over effects into adult dragonfly morphology. However, in a multiple-stressor setting, we see negative interactive effects of warming and salinity on activity, and we found that chronically warmed dragonfly larvae consumed fewer mosquitoes. Despite showing relatively high tolerance to salinity individually, we expect that decreased dragonfly performance in multiple-stressor environments could limit dragonflies' contribution to ecosystem services such as mosquito pest control in urban freshwater environments." (Authors)] Address: Murray, Rosalind, Evolutionary Biology, University of Toronto, 25 Willcocks St. M5S 3B2, Toronto, Ontario, Canada. Email: rosalind.murray@utoronto.ca

**20299.** Zulhariadi, M.; Irawan, R.D.; Zulfaeda, A.; Hidayani, N. (2022): Dragonflies diversity and land cover changes in the Batubolong River, West Lombok District. *Biotropica* 29(2): 112-123. (in English) ["West Lombok District is the second largest district in Lombok Islands. The diversity of dragonflies (Order Odonata) as a bioindicator of environmental quality has not been widely studied in the West Lombok region. This study aimed to determine the species diversity of dragonflies (Order Odonata) found in Batubolong River, West Lombok District and its relation to the occurring land cover changes. This study was carried out by using a descriptive explorative method, where the sampling technique was done by means of line transects. Maps of study and sampling locations as well as land cover changes were made using ArcGIS 10.4.1 software based on primary and secondary data. The results showed that there were 11 species of dragonflies with a Shannon-Wiener diversity index value ( $H'$ ) of 2.212 (medium diversity), a population density index ( $C$ ) of 0.126 (low dominance), and a species evenness index ( $E$ ) of 0.923 (high uniformity). Our study also found two rare species of dragonfly in Lombok Island i.e., 3 individuals of *Nososticta emphylla* (Lieftinck, 1936) with 9% relative abundance and 1 individual of *Drepanosticta berlandi* (Lieftinck, 1939) with 3% relative abundance. The discovery of *D. berlandi* in Lombok is the third time after the findings in 1896 and the 19th century. Analysis of satellite data around the sampling area within the period 2013-2020 showed that there has been an increase in land cover of 6,149.29 m<sup>2</sup>. The increase in land cover changes may have caused the disappearance of several Odonata species in the sampling location." (Authors) *Euphaea lara lombokensis* (McLachlan, 1898), *Pseudagrion pilidorsum declaratum* (Lieftinck, 1936), *Nososticta emphylla* (Lieftinck, 1936), *Drepanosticta berlandi* (Lieftinck, 1939), *Orthetrum testaceum soembanum* (Foerster, 1903), *Neurothemis ramburii* (Brauer, 1866), *Trithemis festiva* (Rambur, 1842), *Orthetrum glaucum* (Brauer, 1865), *Agrioptera insignis insignis* (Rambur, 1842), *Orthetrum sabina* (Drury, 1773), *Diplacodes trivialis* (Rambur, 1842)] Address: Zulhariadi, M., Biology Education Dept, Faculty of Tarbiyah and Teaching, Universitas Islam Negeri Mataram, Mataram 83116, Indonesia. Email: zulhariadi@uinmataram.ac.id



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

## 2008

**20300.** Carron, G. (2008): Espèces particulièrement menacées de la région genevoise. Plans d'actions pour la conservation (phase 3). Agrion de Mercure *Coenagrion mercuriale* (Odonata: Coenagrionidae). Etat de Genève, Domaine Nature & Paysage: 55 pp. (in French) [*C. mercuriale* is the 8th insect species considered particularly threatened in the Geneva region (Switzerland) and is the subject of a specific regional action plan. Discovered only in 2006, after several decades of absence in the canton, this dragonfly has its only population on the Creuson, in the Geneva and especially the Vaud sectors, on both sides of the border. Doubts remain as to whether this is a recent colonisation or whether the species has gone unnoticed. There is no other known population within a 40 km radius, there is no other population in the canton of Vaud. *C. mercuriale* is threatened with extinction throughout the country and is protected at the Swiss and European levels. The agrionis requires very sunny and well oxygenated running water and is therefore very sensitive to organic pollution. The present study shows that the population (daily maximum of 700-800 individuals over 3 km) is concentrated in the Vaud sector of the Creuson, between the Bois des Dailles and the Bois de Portes. The Creuson is located in an open landscape, in a sunny situation, and the pollution is marked but not excessive since it is located upstream of the outlet of the Chavannes-Bois WWTP. The optimal habitat is composed of a clear runoff bordered by water cress (*Nasturtium officinale*) and beccabunga speedwell (*Veronica beccabunga*), plants in which the female agrion lays her eggs. The actions must be based on good information / consultation of the different services concerned (as well as the partners involved in the management of the site), on both sides of the border. This will involve limiting the arrival of chemical pollutants (nitrates and biocides from agriculture; copper, organic matter, etc. from the WWTP), modifying the maintenance of the grassy banks, and increasing the amount of sunlight in certain heavily overgrown sections." (Authors/DeepL)] Address: Bureau Gilles Carron, Bioindication\*Gestion\*Monitoring, CP90, 2002 Neuchâtel, Switzerland. E-mail: carron.bureau@vtx.ch

**20301.** Cheung, K.-w. (2008): Spatial and seasonal variations of freshwater macroinvertebrates, Odonata and waterbirds in Luk Keng marshland, Hong Kong. MSc. thesis, The Univ. of Hong Kong (Pokfulam, Hong Kong): V + 125 pp. (in English) [<sup>1</sup>The temporal and spatial distribution of macroinvertebrates, adult odonates and waterbirds in 26-ha Luk Keng marsh, the largest freshwater wetland in Hong Kong, were investigated between February 2005 and April 2006 to

provide information relevant to management of the marsh for biodiversity conservation. 2. A salinity gradient has been created in Luk Keng as a result of the presence of a sluice gate which allows sea water to intrude the marsh. Ten habitat zones were identified: a stand of mangroves (*Kandelia obovata*: Rhizophoraceae; M) on the seaward side, and – progressing landward – a reed bed (*Phragmites australis*: Poaceae) situated towards the western (WP) and north-eastern side (NEP) of Luk Keng; a tidal mudflat area on the western (WMudflat) and southern side (SMudflat) of Luk Keng; a portion of the marsh (W) dominated by water chestnut (*Eleocharis dulcis* and *E. spiralis*: Cyperaceae); two grass-dominated freshwater marshland zones (SS and ST); a stream flowing into Luk Keng with an associated marshy area (Ri); and, the junction between the stream and the marsh (H). 3. A total of 75 aquatic macroinvertebrate taxa in 38 families were recorded in 112 samples collected during the dry and wet seasons in the two freshwater marshland zones SS and ST, and is the highest thus far reported from such habitats in Hong Kong. Assemblage composition and richness at SS and ST were broadly similar. Diptera dominated in terms of richness and relative abundance, although Coleoptera and larval odonates were also important. In terms of functional organization, macroinvertebrate assemblages were dominated by predators while collector-gatherers were also numerous. 4. Significant seasonal variation of macroinvertebrate assemblage structure was detected in both SS and ST with odonates more abundant in the wet season and oligochaetes more numerous during the dry season. The proportion of predators was the highest during the wet season when similarity between areas was the greatest. Seasonal variations were more marked at SS due to the greater range of salinity recorded in that area. 5. Forty-two odonate species (15 Zygoptera and 27 Anisoptera) representing 38% of odonate species in Hong Kong, including the globally-vulnerable *Mortonagrion hirosei* and 10 species of local conservation concern, were recorded in M, WP, W, SS, ST and H during biweekly transect counts. The odonate assemblage was dominated by Libellulidae and Coenagrionidae, and *Agriocnemis femina*, *Ceragrion auranticum* and *Orthetrum luzonicum* were the most common species. 6. There was an obvious seasonal change in abundance and species richness of odonates with an increase from March until July then a decline through August to October and followed by a dry-season low. 7. Species richness of adult odonates decreased from the freshwater zones to the mangrove zone, although *M. hirosei* was mainly confined to reed bed, and salinity appeared to have an important influence on odonate assemblage structures, possibly by way of an effect on vegetation structure. 8. Thirty waterbird species, mainly Scolopacidae and Ardeidae were recorded in M, WP, NEP, WMudflat, SMudflat, W, SS, ST and Ri during monthly

point counts and transect counts. [...] 10. It is recommended that populations of globally-vulnerable *Mortonagrion hirosei* be monitored in Luk Keng each year by the Agriculture, Fisheries and Conservation Dept using line transects in reed beds; censuses should be made from April to June. Biweekly odonate surveys during the wet season, especially in July and August, are also recommended to monitor the ecological conditions at Luk Keng. Biweekly point counts should also be undertaken to record the abundance of globally-endangered Black-faced Spoonbills from November to May. Counts of Common Snipe, Pintail Snipe, Swinhoe's Snipe and Greater Painted Snipe which are threatened by the degradation of wet agricultural lands in Hong Kong should also be made. 11. A sluice gate which can be closed during spring tides should be built by the Home Affairs Dept to replace the present faulty gate so as to manage salinity levels in the marsh and prevent excessive saline intrusion. While some intrusion will be needed to maintain the reed bed and mangroves as habitats for *M. hirosei* and the Black-faced Spoonbill, investigation of the consequences of salinity intrusion should be initiated by AFCD. Designation of Luk Keng marsh as a Country Park or Special Area to protect the biodiversity it supports should be undertaken as a matter of urgency." (Author)] Address: not stated

**20302.** Cremona, F. (2008): Transfert de méthylmercure et structure des réseaux trophiques chez les macroinvertébrés littoraux. Thèse universitaire, Université du Québec à Montréal: XIV + 159 pp. (in French or English) ["In the context of the COMERN St. Lawrence River case study, the overall objective of the thesis was to determine the role of littoral macroinvertebrates in the transfer of methylmercury (MeHg) in the Lake St. Pierre ecosystem. The first chapter was devoted to the quantitative contribution of non-consumptive invertebrates ("trophic impasses") to the transfer of MeHg to fish. For this purpose, total mercury (THg) and MeHg concentrations in four functional groups of littoral macroinvertebrates (grazers, detritivores, consumable predators, non-consumable predators) were measured. The results showed that non-consumptive predators had the highest THg, MeHg and MeHg/THg concentrations of all functional groups. The MeHg load (concentration x biomass) of non-consumptive predators represented 10-36% of the MeHg pool of phytophilic invertebrates. This high proportion of MeHg sequestered in trophic impasses could help explain the low Hg concentrations measured in fish in Lake St Pierre. Our results show that non-consumptive organisms must be taken into account in predictive models of Hg contamination of ecosystems in order to avoid overestimating the quantities of MeHg bioavailable to fish. In the second chapter, the objective was to determine the links between the source of organic matter (OM) and MeHg contamination in primary consuming littoral macroinvertebrates. An isotope approach was applied to meet this objective. Indigenous sources (epiphytes and macrophytes) dominated the OM assimilated by primary consumers, with a lower proportion of allochthonous OM (suspended particulate matter in particular). MeHg/THg in macroinvertebrates was positively correlated with epiphyte proportions, whereas the latter were negatively correlated with the inorganic Hg fraction. This finding may suggest that the main pathway of MeHg into nearshore food webs is through epiphytes. Primary consumers could then modulate the transfer of MeHg to higher trophic levels depending on whether they feed on OM sources with high or low MeHg concentrations. The third chapter dealt with the influence of functional group (grazer, collector, fragmenter, omnivore, predator, predator-haematophagous, biting-sucking) and spatiotemporal variables

(year, month, sampling station) on the  $\delta^{15}\text{N}$  signature of littoral macroinvertebrates in Lake St Pierre. Station was the most important factor in explaining  $\delta^{15}\text{N}$  variations, followed by sampling month and functional group. Organisms from the south shore, which is heavily influenced by agricultural inorganic nitrogen inputs, had higher  $\delta^{15}\text{N}$  values than those from the north shore which receives inputs from the Canadian Shield. The  $\delta^{15}\text{N}$  signature of the organisms increased by about 3‰ during the sampling period from May to September, equivalent to one trophic level. The enrichment of  $\delta^{15}\text{N}$  from herbivores to predators averaged 1.6‰, which is lower than the 3.4‰ generally considered in pelagic organisms. Since isotopic fractionation is not homogeneous throughout the food web, we recommend using fractionation values specific to the trophic levels considered, in order to better reconstruct nearshore food webs. In the last chapter, the roles of macrophyte habitat and architecture on the biomass and abundance of phytophilic invertebrates were investigated. We also calculated a lake-wide estimate of the macroinvertebrate biomass associated with different macrophytic habitat types in order to estimate the quantitative effects of vegetation changes on macroinvertebrate communities. Biomass, abundance and richness of invertebrate communities were higher in submerged macrophyte habitats than in floating and emergent macrophyte habitats. Macrophytes with complex architecture did not harbour significantly more macroinvertebrate biomass than those with simpler architecture. In the case of a decrease in water level in Lake St. Pierre we predicted that the total biomass of phytophilic invertebrates would decrease by 16% at the lake scale. In nearshore food webs, it appears that energy and MeHg flows are not perfectly superimposed. Firstly, the lower trophic levels constituted by primary consumer macroinvertebrates are capable of modulating MeHg fluxes according to the nature of their OM sources. Secondly, among secondary consumers a significant proportion of the MeHg pool will be available for transfer to fish only to a limited extent or not at all. The small difference in  $\delta^{15}\text{N}$  between primary and secondary consumers makes us doubt the usefulness of this tool as a tracer of the trophic level of an organism in the littoral zone compared to  $\delta^{13}\text{C}$ ." (Author/DeepL)] Address: Not stated

**20303.** Ruppell, G.; Hilfert-Ruppell, D. (2008): Fliegende Spinnennetze: Erfolgsmodell Libelle. Biologie in unserer Zeit 38: 116-125. (in German) ["The thermal adaptations of damselflies, damselflies and damselflies are presented. *Ischnura* specimens are extremely successful and aggressive. They prey other dragonflies of the same size and even conspecifics. Damselflies fly with the greatest accelerations and are extremely agile. They specialise in small prey. In them, reproduction is largely ordered by a territorial system. Some large dragonflies also manage to become active at cool temperatures despite their highly developed flight apparatus. Thus, studies on dragonflies allow interesting insights into the mechanisms of evolution." (Authors/DeepL)] Address: Hilfert-Ruppell Dagmar, Zool. Inst. TU Braunschweig, Fasanenstr. 3, 38092 Braunschweig, Germany. E-mail: d.hilfert@tu-bs.de

## 2010

**20304.** Achoura, A.; Bellhamra, M. (2010): Aperçu sur la faune arthropodologique des palmeraies d'El-Kantara. *Courrier du Savoir* 10: 93-101. (in French, with English summary) [To study the arthropods in the area of Biskra, Algeria, two study plots in the zone of El-Kantara were chosen dif-

fering by two types of palm plantations, modern and traditional. "Our inventory reveals the presence of 48 species invertebrates, same ones observed in each site but with different manpower, always let us announce that the traditional palm plantation is most dominant with a total rate of 67,87%. The class of the insects is populated by 46 species, that is to say 95,84% of totality. It is followed by that of crustacean and that of Arachnida by only one species and a percentage of 2,08% each one. According to the systematic order the Orthoptera are classified in first position with a rate of 18,75 %, followed by the Coleoptera 16,67%, the Lepidoptera and the Hymenoptera with 14,58 % each one. According to the food mode we noted five groups whose phytophagous ones are represented with a rate of 56,25 %, followed by the predatory ones with 20,83 %, the saprophagous with 18,78 % and finally the parasites and the polyphagous ones with a rate of 2,08 % each one." (Authors)] Address: Achoura, A., Dépt d'Agronomie, Univ. Mohamed Khider Biskra, Algeria. E-mail: achouraammar@yahoo.fr

**20305.** Endersby, I. (2010): A revised, annotated checklist of Victorian dragonflies (Insecta: Odonata). *Proceedings of the Royal Society of Victoria* 122(1): 9-27. (in English) ["Seventy-six species of Odonata are known from Victoria (26 Zygoptera; 50 Anisoptera). In the last ten years one new species *Austroaeschna ingrid* Theischinger, 2008 has been described from the State; *Austroepigomphus praeruptus* (Selys, 1857) and *Pseudagrion microcephalum* (Rambur, 1842) have now been recorded; and records of *Rhadinosticta banksi* (Tillyard, 1913) and *Labidiosticta vallisii* (Fraser, 1955) are judged to be erroneous. Generic names of *Aeshna*, and *Trapezostigma* have been changed. Some changes in higher level names and relationships, based on recent phylogenetic analyses, have been incorporated. Distribution maps for all species, based on museum collections, are provided." (Authors)] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@pacific.net.au

## 2011

**20306.** Hilfert-Rüppell, D.; Rüppell, G. (2011): Mit Fangmaske und Stechrüssel - den Beutefang von Wasserjägern erforschen. *Praxis der Naturwissenschaften, Biologie in der Schule* 7/ 60: 13-21. (in German) ["Aquatic insects [including Odonata] offer very good opportunities for research and to work out facts in a new way. Unlike many land insects, they are easily visible and easy to keep. Simple observations and experiments, but also research with the slow-motion camera, should increase the pupils' motivation for independent, biological work and deepen their knowledge. Media competence is taught and the process-related competence communication is strengthened through group work." (Authors) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Hilfert-Rüppell Dagmar, Zool. Inst. TU Braunschweig, Fasanenstr. 3, 38092 Braunschweig, Germany. E-mail: d.hilfert@tu-bs.de

**20307.** van der Tol, M. (2011): Onderzoek naar de geschiktheid voor libellen van de duinpoelen Zuid-Kennemerland en de invloed van grote grazers hierop - [Study of the suitability for dragonflies of dune pools South-Kennemerland and the influence of large grazers on this]. BSc. thesis, Bos- en Natuurbeheer, Hogeschool Van Hall - Larenstein: 91 pp. (in Dutch) ["Zuid-kennemerland contains a large number of dune pools. The area is integrally grazed by Scottish Highlanders, Shetland ponies and Konik horses, in order to prevent grassification and encroachment and to

promote varied vegetation structures. The dune pools provide grazing and drinking opportunities for these animals. They are also important breeding grounds for dragonflies, among other things. Management company PWN wants to monitor the effect of the large grazers on the pools in general and on the dragonfly fauna in particular. The aim is to adapt the management for the benefit of the dragonflies if necessary. The assignment was carried out within the graduation phase of the course Forestry and Nature Management, Nature and Landscape Technology at the Van Hall - Larenstein Univ. of Applied Sciences in Velp (Gelderland). The research question is as follows: What is the suitability for the dragonfly fauna of the dune pools in South-Kennemerland, and what is the influence of the large grazers on this? Existing inventory data of various dune pool characteristics and of dragonflies were used for the analysis and converted into a usable dataset. The data were statistically processed with SPSS. The inventory data are not complete; important data of both dune pool characteristics and dragonflies are missing. This fact and the very limited time available for the research have led to research results that partially answer the research question. Moreover, the reliability of the results is limited. In the analysis, relationships between large grazers, dune pools and dragonflies were sought by determining Pearson correlations and by means of the Mann-Whitney U test, a distribution-free significance test. A negative relationship between the use of the pools by large grazers and the total number of reproducing species was found, but it is not a strong relationship. One species, the Flat-bellied Dragon, has been shown to benefit from trampled banks. The most important key factor for dragonfly reproduction in general in the dune pools is the presence of flab in summer. Further research, improvement and extension of inventory methods for dragonflies and dune pool characteristics are necessary in order to arrive at reliable results and useful management advice." (Author) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: not stated

## 2012

**20308.** Hilfert-Rüppell, D.; Rüppell, G. (2012): Blaue Luftkrobaten: Prachtlibellen als Modellorganismen für Verhaltensbeobachtungen. *PdN Biologie in der Schule* 61(6): 8-12. (in German) ["Behavioural observation; Secondary school I; Secondary school II; Courtship; Biology lessons; Flowing water; Wing beat; Dragonfly; Mating; Territorial behaviour; Animal behaviour; Germany. Abstract: Damselflies (*Calopteryx*) are typical inhabitants of flowing water. The blue males are immediately noticeable when they flutter around each other or approach the camouflaged females in buzzing flight. After only a short observation of the animals, it becomes clear that the males occupy certain areas, so-called territories, and drive other males out of them. They do this with very different flights: They fly side by side or behind each other in arcs up and down or back and forth. They circle each other or chase each other at top speed. The winner gets the reward later, usually in the midday and afternoon hours, mating with females. However, when a lot of males gather on the shore, chaos breaks out. Now the males can no longer defend territories and they all pounce on rivals and females. Pupils are given instructions on how to observe, but also how to film with a slow-motion camera to see the behaviour in detail. In doing so, they get to know the animals and their behaviour and thus gain the ability to independently draw conclusions about the order of behaviour, adaptation and evolution. The topic offers both material and content at entry level as well as for more demanding

processing in secondary school. It is possible to advance into modern areas such as genecology, female choice or integrative models by combining physiological (e.g. dual function of flight), ecological (e.g. qualities of the habitat) and evolutionary (e.g. sexual conflict) elements. The behaviour of damselflies is one of the model systems for the study of animal communication." (Authors)] Address: Hilfert-Rüppell, Dagmar, Technische Universität Braunschweig, Institut für Fachdidaktik der Naturwissenschaften, Abteilung Biologie & Biologiedidaktik, Bienroder Weg 82, 38106 Braunschweig, E-Mail: d.hilfert-ruempel@tu-bs.de

## 2013

**20309.** Kosterin, O.E. (2013): 20. New data on dragonfly (Odonata) of Akademgorodok and its surroundings. In: Dynamics of ecosystems of the Novosibirsk Akademgorodok / Ed. ed. I. F. Zhimulev; Ros. acad. Sciences, Sib. Dept, Institute of Molecular and Cellular Biology [and others]. - Novosibirsk: Publishing House of the Siberian Branch of the Russian Academy of Sciences, 2013. - 438 p. + 30 c. insert. : 204-208. (in Russian) [So, in 2008-2012. In the vicinity of Akademgorodok, three previously unrecorded species of dragonflies were found - *Coenagrion johannsoni*, *Ischnura pumilio* and *Somatochlora arctica*, and *Gomphus vulgatissimus* was added according to earlier collections, the find of the second of them is also the first in the Novosibirsk region. At the moment, 41 species of dragonflies are known from the vicinity of Akademgorodok. ] Address: Kosterin, O.E., Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, RUS-630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

## 2016

**20310.** Kaelin, K.; Altermatt, F. (2016): Landscape-level predictions of diversity in river networks reveal opposing patterns for different groups of macroinvertebrates. *Aquatic Ecology* 50(2): 283-295. (in English) ["Aquatic biodiversity in rivers and streams is threatened in many regions worldwide. As biodiversity loss has severe consequences on ecosystem functioning, it is important to understand the causes of decline and to predict biodiversity in space and time. In order to achieve this, the identification of the driving factors and the appropriate choice of indicator groups are needed. We developed a spatially explicit habitat distribution model for aquatic macroinvertebrates in Swiss watercourse networks using national biodiversity monitoring data from 410 randomly selected sampling sites. We specifically looked at two worldwide frequently used macroinvertebrate indicator groups. Using generalized linear models, we related firstly species richness of mayfly, stonefly and caddisfly (Ephemeroptera, Plecoptera, Trichoptera; EPT) and secondly richness of all macroinvertebrate families and higher-order taxa (macroinvertebrate family richness) to 38 nationwide available environmental variables. We then predicted richness of both indicator groups at the landscape scale, providing the first nationwide prediction of EPT species and macroinvertebrate family richness. Consistent with previous work, we found that variables describing land use and topology were most important for explaining richness at the landscape level. However, the two indicator groups showed opposing patterns of richness and a different sensitivity to land-use variables. This indicates that the sole use of one of these groups may be misleading with respect to water quality assessments and to the identification of overall diversity hotspots. We conclude that commonly used richness patterns derived from aggregated groups, such as

family-level macroinvertebrate richness, may be less appropriate for conservation strategies." (Authors)] Address: Altermatt, F., Dept of Aquatic Ecology, Eawag, Swiss Federal Inst. of Aquatic Science & Technology, Überlandstr. 133, 8600, Dübendorf, Switzerland. Email: Florian.Altermatt@eawag.ch

**20311.** Liebhold, A.M.; Yamanaka, T.; Roques, A.; Augustin, S.; Chown, S.L.; Brockerhoff, E.G.; Pysek, P. (2016): Global compositional variation among native and non-native regional insect assemblages emphasizes the importance of pathways. *Biological Invasions* 18: 893-905. (in English) ["Insects are among the world's most ecologically and economically important invasive species. Here we assemble inventories of native and non-native species from 20 world regions and contrast relative numbers among these species assemblages. Multivariate ordination indicates that the distribution of species among insect orders is completely different between native and non-native assemblages. Some orders, such as the Psocoptera, Dictyoptera, Siphonaptera, Thysanoptera, and Hemiptera, are always over-represented in the non-native compared to native assemblages. Other orders, such as the Plecoptera, Trichoptera, Ephemeroptera, Odonata, Mecoptera and Microcoryphila, are consistently under-represented in non-native assemblages. These patterns most likely arise both as a result of variation among taxa in their association with invasion pathways responsible for transporting species among world regions, as well as variation in life-history traits that affect establishment potential. However, our results indicate that species compositions associated with invasiveness are fundamentally different from compositions related to insularity, indicating that colonization of islands selects for a different group of insect taxa than does selection for successful invaders. Native and non-native assemblage compositions were also related, to a lesser extent, to latitude of the region sampled. Together, these results illustrate the dominant role of invasion pathways in shaping the composition of non-native insect assemblages. They also emphasize the difference between natural background colonization of islands and anthropogenic colonization events, and imply that biological invasions are not a simple subset of a long-standing ecological process." (Authors)] Address: Liebhold, A.M., US Forest Service Northern Res. Station, 180, Canfield St., Morgantown, WV 26505, USA. E-mail: aliebhold@fs.fed.us

## 2018

**20312.** Alvarez Fidalgo, M.; Miralles-Niunez, A.; Domech Fernandez, M. (2018): Primeros registros de *Symptetrum sinaiticum* Dumont, 1977 (Odonata, Libellulidae) en la provincia de Albacete (Castilla-La Mancha, SE España) y actualización de su distribución en España. *Boln. Asoc. esp. Ent.* 42(3-4): 333-349. (in Spanish, with English summary) ["First records of *S. sinaiticum* in the province of Albacete (Castilla-La Mancha, SE Spain) and an update of its distribution in Spain. The first records of *S. sinaiticum* in the province of Albacete are presented, which are among the few data of the species in the Autonomous Community of Castilla-La Mancha. Furthermore, its distribution in Spain is updated, using information extracted from public databases and citizen science platforms, thus increasing by 35,2 % the previously known distribution of the species, based on UTM squares of 10 x 10 km." (Authors)] Address: Alvarez Fidalgo, Marin, Depto de Química Orgánica e Inorgánica/IU-QOEM, Universidad de Oviedo, 33006 Oviedo, Asturias, Spain. E-mail: madamcoolpix@gmail.com



**20313.** Amundrud, S.L.; Videla, M.; Srivastava, D.S. (2018): Dispersal barriers and climate determine the geographic distribution of the helicopter damselfly *Mecistogaster modesta*. *Freshwater Biology* 63(2): 214-223. (in English) ["1. Species' ranges are typically constrained by the interplay of physical barriers to dispersal, environmental requirements such as suitable climatic conditions and biotic constraints such as from predation or competition. However, teasing apart the relative importance of these constraints in determining species distributions still represents a major challenge for ecologists. 2. The Neotropical damselfly *M. modesta* inhabits wet and moist forests in mainland Central America and north-western South America. This habitat specialist spends its larval development exclusively in tank bromeliads, where it acts as a keystone predator within the aquatic food web. Although tank-forming bromeliads occur from the southern United States throughout most of South America, *M. modesta* is absent from the Caribbean islands and South America south-east of the Andes mountain chain. 3. We employed species distribution models to explore the relative importance of physical barriers (Andes mountain range and oceanic barriers), climate (mean annual temperature and annual precipitation) and biotic interactions (competition from other bromeliad-dwelling odonates) in limiting the geographic distribution of *M. modesta*. 4. We found that dispersal barriers strongly limit the geographic distribution of *M. modesta*. In addition, its range is restricted by low temperatures and low precipitation. Competition from other bromeliad-dwelling odonates was not important in limiting the damselfly's range. Because of the physical barriers to dispersal, *M. modesta* does not occupy its full potential geographic range. Specifically, our model predicted suitable habitat on the Caribbean islands and throughout most of South America, where the species is currently absent. 5. These findings have important conservation implications, particularly as the aridification of rainforests and subsequent localised extinctions due to climate change continue. On the other hand, the species may respond to warming temperatures by tracking climate to higher elevations, with subsequent effects on naïve high-elevation bromeliad food webs. An upwards migration could also increase the probability of *M. modesta* overcoming the dispersal barrier presented by the Andes, enabling the damselfly to invade large areas of suitable habitat in South America." (Authors)] Address: Amundrud, Sarah, Dept Zool., Biodiversity Res. Centre, Univ. of British Columbia, Vancouver, BC, Canada. Email: amundrud@zoology.ubc.ca

**20314.** Andrew, R.J.; Thomas, S. (2018): Egg chorion of *Paragomphus lineatus* (Odonata: Gomphidae). *Odonatologica* 47(1/2): 133-144. (in English) ["The egg chorion of the exophytic dragonfly *Paragomphus lineatus* was examined using light and scanning electron microscopy. The egg is sub-spherical and possesses a very large conical but flat-top micropylar apparatus. The outer surface of the chorion is uniformly sculptured with strong hexagonal reticulations formed by the fusion of tiny low nodules on the chorion (3–4µm). The area lying inside the hexagonal reticulation is filled with 7–10 nodules. The chorion is formed of a uniformly thin endochorion and a multi-layered exochorion. The micropylar apparatus is composed of a central, tubular micropylar projection which terminates as a flat circular disc. This plate bears a central elevated knob around which 6–7 micropylar orifices are arranged in a circle. The micropylar projection is surrounded by a thick mass of sticky jelly. Development of the micropylar apparatus takes place during the late vitellogenic and choriogenic stages of egg maturation. The jelly mass is exochorionic in origin and is deposited

by the follicular epithelial cells of the oocyte. The micropylar projection is formed by the evagination and morphogenetic movement of the endochorion. The egg chorionic architecture of *P. lineatus* is discussed with respect to phylogeny and oviposition behaviour of the female." (Authors)] Address: Andrew, R.J., Centre for Higher Learning and Research in Zoology, Hislop College, Civil lines, Nagpur- 440 001 (MS), India. E-mail: rajuaudrew@yahoo.com

**20315.** Aziz, M.A.A.; Mohamed, M.; Tokiman, M.L. (2018): Faunistic studies of odonates (Insecta: Odonata) in Johor, Peninsular Malaysia. *Serangga* 23(2): 14-35. (in English, with Malay summary) ["The purpose of this research is to study the diversity and distribution of odonates in Johor, Peninsular Malaysia. The method used for odonate sampling was manual collection along 1 km line transect using aerial net. Overall, a total of 2222 individuals under 84 species from 13 families and 58 genera were recorded. Family Libellulidae was the most well-represented family. Shannon Diversity Index (H') and Evenness Index (E) were highest in Endau-Rompin Johor National Park (H'= 3.155; E= 0.733) and lowest in Soga Perdana Recreational Forest (H'= 2.444; E= 0.501). To determine the site with highest conservation priority, the ecological data and entomotourism criteria was further analyzed using grid analysis. The site with highest priority was Endau-Rompin Johor National Park with a score value of 52 while the lowest priority was recorded in Sungai Sayong with a score value of 35. All these data will be helpful in assisting towards a better management of the conservation areas in Johor." (Authors)] Address: Mohamed, M., Centre of Research for Sustainable Uses of Natural Resources Faculty of Applied Science and Technology Universiti Tun Hussein Onn Malaysia. Email: maryati@uthm.edu.my

**20316.** Bäumlér, F.; Gorb, S.N.; Büsse, S. (2018): Comparative morphology of the thorax musculature of adult Anisoptera (Insecta: Odonata): Functional aspects of the flight apparatus. *Arthropod Structure & Development* 47(4): 430-441. (in English) ["Due to their unique flight mechanism including a direct flight musculature, Odonata show impressive flight skills. Several publications addressed the details of this flight apparatus like: sclerites, wings, musculature, and flight aerodynamics. However, 3D-analysis of the thorax musculature of adult dragonflies was not studied before and this paper allows for a detailed insight. We therefore, focused on the thorax musculature of adult Anisoptera using micro-computed tomography. Herewith, we present a comparative morphological approach to identify differences within Anisoptera: Aeshnidae, Corduliidae, Gomphidae, and Libellulidae. In total, 54 muscles were identified: 16 prothoracic, 19 mesothoracic, and 19 metathoracic. Recorded differences were for example, the reduction of muscle Idlm4 and an additional muscle Ildm1 in *Aeshna cyanea*, previously described as rudimentary or missing. Muscle Iscm1, which was previously reported missing in all Odonata, was found in all investigated species. The attachment of muscle Ipcm2 in *Pantala flavescens* is interpreted as a probable adaptation to its long-distance migration behaviour. Furthermore, we present a review of functions of the odonatan flight muscles, considering previous publications. The data herein set a basis for functional and biomechanical studies of the flight apparatus and will therefore lay the foundation for a better understanding of the odonatan flight. ] Address: Bäumlér, F., Dept of Functional Morphology and Biomechanics Institute of Zoology, Kiel Univ., Am Botanischen Garten 9, 24118, Kiel, Germany

**20317.** Barnard, A. (2018): The role of divergent genital morphologies in reproductive isolation. PhD. thesis, Univ. of Oklahoma: XV + 145 pp. (in English) ["How a single ancestral species can give rise to new, separate species remains a major outstanding question in evolutionary biology. Understanding speciation requires identifying how reproductive isolation (RI) is initiated and maintained in the early stages of population divergence. External male reproductive structures have received considerable attention as an early-acting cause of RI, because the morphology of these structures often evolves rapidly between populations. My dissertation research used a pair of recently diverged damselfly species in the genus *Enallagma* (Odonata: Coenagrionidae) to understand the role of divergent genital morphologies in causing RI at early stages of the speciation process. Specifically, I investigated the mechanisms by which species-specific morphologies limit gene flow between species, and then explored the relationships between morphological differentiation and overall genomic differentiation between species. My research focused on *Enallagma anna* and *E. carunculatum*, two damselfly species that diverged within the past ~250,000 years and differ conspicuously in their reproductive structure morphology, yet currently hybridize in at least one sympatric region. In chapter 1, I tested the importance of mechanical and tactile incompatibilities in RI between *E. anna* and *E. carunculatum* by quantifying 19 potential prezygotic and postzygotic RI barriers, using both naturally occurring and lab-reared damselflies. I found that mechanical incompatibilities between heterospecific male and female reproductive structures limit but do not completely prevent heterospecific mating attempts. However, females were significantly less likely to mate with hybrid or heterospecific males compared to conspecific males, which suggests that tactile incompatibility between male and female morphologies forms an additional mechanism to limit gene flow between these species. Postmating RI barriers appeared weak or nonexistent, which indicates that premating isolation, mediated by divergence in genital morphologies, was the first type of reproductive barrier to evolve in this group. These results highlight the potential for rapidly evolving genitalia to cause RI via tactile mechanisms, which may be a more widespread RI mechanism than we are currently aware of. In chapter 2, I more closely examined the female structures presumed to be important in evaluating male tactile signals during premating contact and influencing *Enallagma* female mating decisions. I quantified and compared several mechanosensory sensilla phenotypes on the female thorax among multiple sympatric and allopatric populations to test for evidence of reproductive character displacement, which would indicate that sensilla phenotypes are important in species recognition. My results suggest that species-specific placement of female mechanoreceptors is sufficient for species recognition, but mechanosensor variation among females within species may be important for mate choice within species. This hypothesis requires additional study to test the relationships between female sensilla phenotypes and behavior. This experiment reveals *Enallagma*'s potential as a study system for elucidating the neurobiological basis of female mating decisions. In chapter 3, I explored the relationships between morphological divergence and genomic differentiation during speciation. Persistent gene flow between species as they diverge can homogenize some regions of the genome and make differentiated regions stand out in comparison. Some of these highly divergent loci are predicted to harbor genes responsible for reproductive isolation. However, patterns of genome diversification at this stage remain poorly understood, such as how such loci are arranged across the ge-

nome and whether such loci commonly contribute to reproductive isolation or are simply less subject to recombination. I generated a set of genome-wide variant loci in a large collection of samples from multiple populations, including both natural and lab-reared hybrids. I used these loci to quantify introgression patterns in nature, identify divergent loci, and test for associations between genomic ancestry and species-specific phenotypic variation. The results suggest ongoing gene flow between *E. anna* and *E. carunculatum* in nature, but also demonstrate the challenge of differentiating shared ancestral polymorphism from recent admixture when studying young species. Additionally, the results revealed that estimated ancestry proportions in hybrids were a reliable predictor of hybrid reproductive structure phenotype in most cases – but some individuals appeared to have a genome that mostly resembled one parental species, yet morphology more similar to that of the other parental species. Clarifying the relationships between genotypes and phenotypes will likely require more fine-scale genomic sequencing efforts than this study obtained. My dissertation research integrated behavioral studies in the field and lab with quantitative trait comparisons and genomics to investigate the importance of rapid evolution of reproductive structures in reproductive isolation. This work enhances our understanding of how morphological divergence affects mating behavior to cause RI, and in turn how RI and behavior shape differentiation of genomes. Together, these experiments contribute to our understanding of how biodiversity is generated and strengthen the role of damselflies as models for understanding evolution." (Author) <https://shareok.org/handle/11244/299884> Address: not stated

**20318.** Benchalel, W.; Bouziane, A.; Bouslama, Z.; Ramdani, M.; Elmsellem, H.; Flower, R.; Ramdani, M. (2018): Odonata of Wadi Bouarroug (northeastern Algeria) and environmental determinants of their distribution. Moroccan Journal of Chemistry 6(1): 78-91. (in English, with French summary) ["The present paper describes odonates recorded over an extended period at wadi Bouarroug, south of lake Mellah, in the national reserve of Brabtia (North-east Algeria). In all, 42 weekly visits were made to four stations at wadi Bouarroug between March 2015 and February 2016. 19 species of odonates comprising seven families was recorded. Among the 19 species, autochthonous status was confirmed for 12 species. Two Maghrebian endemics species, *Platycnemis subdilata*, *Gomphus lucasi* ("Data Deficient" species in the Mediterranean IUCN Red-List) were recorded. In the latest check-list of the odonates fauna of wadi Bouarroug, 11 species were reported, during 1993 and 1994. Eight species have been recently added of which *Paragomphus genei* was recorded for the first time in the reserve of Brabtia in 2014 and its autochthonous status is confirmed at wadi Bouarroug from June 2015. Species richness along the wadi Bouarroug is positively correlated with density of riverine vegetation and with weak to moderate water flow during all the year. By contrast, species richness varies negatively with habitat fragmentation and the destruction caused by urbanization and pollution. As a result of this study, we do not propose any change of the "Red List of the IUCN" classification of the recorded species recorded at wadi Bouarroug. However, the presence of some taxa like *Calopteryx haemorrhoidalis* and *Paragomphus genei* at wadi Bouarroug, testifies to the persistence of high-quality natural environments, which are able to still support an important diversity of aquatic species." (Authors) A total of 1810 individuals was counted during the sampling period. The total number of species was 19, assigned to nine families : Calopterygidae (*Calopteryx haemorrhoidalis*), Lestidae

(*Lestes virens*, *L. viridis*), Platycnemidae (*Platycnemis subdilatata*), Coenagrionidae (*Ischnura graellsii*, *Coenagrion puella*, *Erythromma lindinii*, *E. viridulum* and *Ceriagrion tenellum*), Aeshnidae (*Anax imperator*, *Boyeria irene*), Gomphidae (*Gomphus lucasii*, *Paragomphus geneii*, and *Onychogomphus uncatatus*), Libellulidae (*Orthetrum cancellatum anceps*, *Sympetrum striolatum*, *Crocothemis erythraea*, *Trithemis arteriosa* and *T. annulata*). Nine species belong to the suborder of willing zygoptera and 10 in Anisoptera. Autochthony is confirmed for 12 species out of the 19 inventoried species (*Calopteryx haemorrhoidalis*, *Lestes viridis*, *Platycnemis subdilatata*, *Ischnura graellsii*, *Coenagrion puella*, *Ceriagrion tenellum*, *Anax imperator*, *Boyeria irene*, *Gomphus lucasii*, *Paragomphus geneii*, *Onychogomphus uncatatus* and *Orthetrum cancellatum*) (Tab. II).] Address: Elmsellem, H., Lab. de chimie analytique appliquée, matériaux et environnement (LC2AME), Faculté des Sciences, B.P. 717, 60000 Oujda, Morocco. E-mail: h.elmsellem@gmail.com

**20319.** Berenbaum, M. (2018): Damsel flies in Distress? *American Entomologist* 64(1): 3-6. (in English) ["Whatever its other shortcomings might have been, 2017 was certainly a year for female empowerment—from the Women's March on Washington in January to "the Silence Breakers" as Time Magazine's People of the Year in December, it was a year of upending norms in interactions between the sexes. Although sexual harassment may have finally received long-overdue public attention in just about every dimension of human endeavor, it has been a focus for entomological research for decades, and the entomological literature in 2017 illustrated the point nicely. A Web of Science search revealed 484 citations in 2017 for articles with "insect" and "sexual harassment" as topics. That number is 484 times higher than the number of citations in 1965, the first year for publication of any articles on those topics ("Sexual aggressiveness of male...") Address: Berenbaum, May, Dept of Entomology, Univ. of Illinois, 320 Morrill Hall, 505 South Goodwin Avenue, Urbana, IL 61801, USA.

**20320.** Bergsten, J.; Göthberg, A.; Johansson, K.; Pettersson, A.; Burkart, W.; Burkart G. (2018): Entomologmötet på Gotland 2017: temaexkursion med fokus på vattenlevande skalbaggar, skinnbaggar och trollsländor i Åskåkersvät. [Entomology meeting on Gotland 2017: thematic excursion on aquatic beetles, bugs and dragonflies to the locality Åskåkersvät.]. *Entomologisk Tidskrift* 139(1): 39-49. (in Swedish, with English summary) ["The yearly Swedish entomology meeting 2017 was organized by the local entomology society of Gotland, on the northern part of the Baltic island Gotland near Bunge, 4-6 August. One thematic excursion was focused on aquatic insects, especially aquatic beetles, bugs and dragonflies. A shallow pond, Åskåkersvät, with Characeae in an open grazed landscape with high natural values was studied. Åskåkersvät lies just adjacent to the larger area around Lake Bästeträsk which is the focus of a pilot study evaluating its potential as a future national park. The pilot study is undertaken by Gotland County Administrative Board, the Swedish Environmental Protection Agency, Region Gotland and the Swedish Agency for Marine and Water Management. Here we give an annotated report of the 103 species found: 69 species of water beetles (out of which 34 were Dytiscidae), 20 species of aquatic or semiaquatic bugs (out of which 10 were Corixidae), and 14 species of dragonflies. [*Lestes sponsa*, *L. virens*, *Sympecma fusca*, *Enallagma cyathigerum*, *Coenagrion pulchellum*, *C. hastulatum*, *Ischnura elegans*, *Orthetrum cancellatum*, *Sympetrum sanguineum*, *Libellula quadrimaculata*, *Cordulia aenea*, *Anax imperator*, *Aeshna isosceles*, *A. sp.*] These

include *Hydrophilus piceus* and *H. aterrimus* redlisted in Sweden (both as NT), and *Dytiscus latissimus*, globally redlisted (VU). We also noted the noble crayfish, *Astacus astacus* (redlisted as CR in Sweden) and the European medicinal leech *Hirudo medicinalis* (redlisted as NT globally). *Anax imperator* was noted, a species first recorded from Gotland in 2002 and we present a graph on its increase and spreading on the island since. The number of species found in spite of a relatively modest collecting effort at a suboptimal time when many species may be in pupal stage out of water as witnessed by many general individuals, indicates a species rich locality with high natural value. The stoneworts (Characeae) vegetation certainly contributes to this, for instance vouched for by the occurrence of specialists as *Halipilus confinis* and *H. obliquus* whose larvae feed on stoneworts." (Authors)] Address: Bergsten, J., Naturhistoriska riksmuseet, Box 50007, 104 05 Stockholm, Sweden. E-mail: johannes.bergsten@nrm.se

**20321.** Bernard, R.; Daraz, B. (2018): New records of dragonflies (Odonata) in Zambia. *African Invertebrates* 52(9): 165-193. (in English) ["Zoogeographically important data on the occurrence of 22 dragonfly species in Zambia are presented, including at least seven species for the first time recorded or unambiguously confirmed in the country. They filled gaps in the previously known distribution ranges and showed that some of them reach further, especially to the south, but also west or north. Zoogeographical considerations are completed with some remarks on species' morphological traits and habitat selection and activity." (Authors)] *Lestes ictericus* Gerstäcker, 1869; *Allocnemis marshalli* (Ris, 1921); *Aciagrion africanum* Martin, 1908; *Africallagma pallidulum* Dijkstra, 2007; *Ceriagrion banditum* Kipping & Dijkstra, 2015; *Ceriagrion kordofanicum* Ris, 1924; *Pseudagrion commoniae* (Förster, 1902); *Gynacantha vesiculata* Karsch, 1891; *Gynacantha villosa* Grünberg, 1902; *Gynacantha immaculifrons* Fraser, 1956; *Heliaeschna fuliginosa* Selys, 1883; *Heliaeschna trinervulata* Fraser, 1955; *Mastigogomphus cf. dissimilis* (Cammaerts, 2004); *Notogomphus cf. zernyi* (St. Quentin, 1942); *Phyllomacromia monoceros* (Förster, 1906); *Notiothemis jonesi* Ris, 1919; *Tetrathemis poleni* (Selys, 1869); *Tramea limbata* (Desjardins, 1832); *Trithemis donaldsoni* (Calvert, 1899); *T. nuptialis* Karsch, 1894; *T. weneri* Ris, 1912] Address: Bernard, R., Dept of Nature Education and Conservation, Faculty of Biology, Adam Mickiewicz Univ. in Poznań, Umultowska 89, PL-61-614 Poznań, Poland. E-mail: rbernard@amu.edu.pl

**20322.** Blanke, A.; Pinheiro, M.; Watson, P.J.; Fagan, M.J. (2018): A biomechanical analysis of prognathous and orthognathous insect head capsules: Evidence for a many to one mapping of ridge strain to head strain. *Evolutionary Biology* 31(5): 665-674. (in English) ["Insect head shapes are remarkably variable but the influences of these changes on biomechanical performance are unclear. Among "basal" winged insects, such as dragonflies, mayflies, earwigs, and stoneflies, some of the most prominent anatomical changes are the general mouthpart orientation, eye size and the connection of the endoskeleton to the head. Here, we assess these variations as well as differing ridge and sclerite configurations using modern engineering methods including multibody dynamics modelling and finite element analysis in order to quantify and compare the influence of anatomical changes on strain in particular head regions and the whole head. We show that a range of peculiar structures such as the genal/subgenal, epistomal, and circumocular areas are consistently highly loaded in all species, despite drastically differing morphologies in species with forward projecting

(prognathous) and downwards projecting (orthognathous) mouthparts. Sensitivity analyses show that the presence of eyes has a negligible influence on head capsule strain if a circumocular ridge is present. In contrast, the connection of the dorsal endoskeletal arms to the head capsule especially affects overall head loading in species with downward projecting mouthparts. Analysis of the relative strains between species for each head region reveals that concerted changes in head substructures such as the subgenal area, the endoskeleton and the epistomal area lead to a consistent relative loading for the whole head capsule and vulnerable structures such as the eyes in prognathous and orthognathous insects. It appears that biting-chewing loads are managed by a system of strengthening ridges on the head capsule irrespective of the general mouthpart and head orientation. Concerted changes in ridge and endoskeleton configuration allow for more radical anatomical changes such as the general mouthpart orientation which could be an explanation for the variability of this trait among insects. In an evolutionary context, many to one mapping of strain patterns onto a relatively similar overall head loading indeed could have fostered the dynamic diversification processes seen in insects." (Authors)] Address: Blanke, A., Institute of Zoology, Biocenter Cologne, Univ. of Cologne, Cologne, Germany

**20323.** Boda, P.; Móra, A.; Várbiro, G.; Csabai, Z. (2018): Livin' on the edge: the importance of adjacent intermittent habitats in maintaining macroinvertebrate diversity of permanent freshwater marsh systems. *Inland Waters* 8(3): 312-321. (in English) ["Taxonomic and functional patterns of macroinvertebrate communities were investigated to reveal the importance of different habitat units within a marsh system in maintaining its macroinvertebrate diversity. Hydrogeomorphic units based on their functional characteristics were used to distinguish 3 types of aquatic habitats within the marsh system: (1) Core Unit (CU), a permanent inundation of a wetland in the central position of a marsh system; (2) Transitional Unit (TU), a seasonal to intermittent inundation of a wetland, with seasonal saturation; and (3) Satellite Unit (SU), seasonal depression wetlands with ephemeral to intermittent saturation. We hypothesized that communities in each Unit would have specific taxonomic and functional features. Species richness was highest in the TU, with unique community composition in the SU, and moderately high species richness characterized by a stable community with high taxonomic distinctness in the CU. The meta-community of the entire marsh was nearly random with a substantial equilibrium between beta-diversity features: replacement and dissimilarity. Our results suggest that the combination of directly connected or isolated waterbodies in close proximity to a large core waterbody is likely to maintain the highest level of diversity. Each Unit has unique characteristics and provides habitats for species with different ecological traits; thus, different aquatic habitats of a marsh system should be considered together as one meaningful ecological entity." (Authors)] Address: Boda, P., MTA Centre for Ecol. Res., Danube Res. Inst., Dept Tisza River Res., Debrecen, Hungary. Email: boda.pal@okologia.mta.hu

**20324.** Bota-Sierra, C.A.; Corso, A.; Janni, O.; Sandoval-H., J.; Viganò, M. (2018): Seventeen new dragonfly records from Colombia and the synonymy of the synonymy of *Philogenia monotis* and *P. tinalandia* (Insecta: Odonata). *International Journal of Odonatology* 21(2): 115-127. (in English) ["During 2.5 months of intensive fieldwork in Colombia (Depts of Cauca, Nariño, and Putumayo, South America) from January to March 2017, we visited 13 localities and

collected 291 specimens of 68 species of Odonata, including 17 new records for the country. We report range expansions for several species assessed as data deficient or under some degree of threat by the IUCN Red List. Furthermore, we confirmed that *Philogenia tinalandia* is a junior synonym of *P. monotis*, thus solving a longstanding enigma. We also report the rediscovery, after many decades, of *Philogenia raphaella*, *P. sucra* and *Stenocora percornuta*. The data we collected are an important contribution to the knowledge of the dragonfly diversity of the Colombian Andean region and its surroundings, including the nearby areas in Ecuador and Peru, countries with which the Depts visited share boundaries." (Authors)] Address: Bota-Sierra, C.A., Red de Biodiversidad y Sistemática, Inst. de Ecología, A.C. Xalapa, Mexico Email: corneliobota@gmail.com

**20325.** Boucenna, N.; Kahalerras, A.; Boukhemza-Zemmouri, N.; Houhamdi, M.; Khelifa, R. (2018): Niche partitioning at emergence of two sympatric top-predator dragonflies, *Anax imperator* and *A. parthenope* (Odonata: Aeshnidae). *Annales de la Société entomologique de France* (N.S.) 54(2): 1-8. (in English) ["In natural communities, closely related species are phenotypically similar but usually spatially and/or temporally isolated. In odonates, interspecific competition occurs not only at the larval or adult stage but also during emergence. We investigated the emergence of two sympatric *Anax* species, focusing on the temporal pattern, vertical stratification, and body size trend over time. *Anax imperator* started to emerge two weeks earlier than *A. parthenope* but most of the emergence season overlapped. Both species showed an asynchronous emergence and the median emergence date was 10.3 days earlier in *A. imperator*. Sex ratio at emergence was not significantly different from 1:1. Body size of both species increased significantly over time, which contrasts many previous studies. The height of exuvia fixation was not significantly different between species but the larger species *A. parthenope* selected longer supports." (Authors)] Address: Khelifa, R., Biodiversity Res. Center, Univ. British Columbia, 2212 Main Mall, Vancouver, B.C. V6T1Z4, Canada. Email: rassimkhalifa@gmail.com

**20326.** Bray, J.P.; Reich, J.; Nichols, S.J.; King, G.K.K.; Mac Nally, R.; Thompson, R.; O'Reilly-Nugent, A.; Kefford, B.J. (2018): Biological interactions mediate context and species-specific sensitivities to salinity. *Phil. Trans. R. Soc. B* 374: 20180020. <http://dx.doi.org/10.1098/rstb.2018.0020>: 10 pp. (in English) ["Toxicants have both sub-lethal and lethal effects on aquatic biota, influencing organism fitness and community composition. However, toxicant effects within ecosystems may be altered by interactions with abiotic and biotic ecosystem components, including biological interactions. Collectively, this generates the potential for toxicant sensitivity to be highly context dependent, with significantly different outcomes in ecosystems than laboratory toxicity tests predict. We experimentally manipulated stream macroinvertebrate communities in 32 mesocosms to examine how communities from a low-salinity site were influenced by interactions with those from a high-salinity site along a gradient of salinity. Relative to those from the low-salinity site, organisms from the high-salinity site were expected to have greater tolerance and fitness at higher salinities. This created the potential for both salinity and tolerant-sensitive organism interactions to influence communities. We found that community composition was influenced by both direct toxicity and tolerant-sensitive organism interactions. Taxon and context-dependent responses included: (i) direct toxicity effects, irrespective of biotic interactions; (ii)



effects that were owing to the addition of tolerant taxa, irrespective of salinity; (iii) toxicity dependent on sensitive-tolerant taxa interactions; and (iv) toxic effects that were increased by interactions. Our results reinforce that ecological processes require consideration when examining toxicant effects within ecosystems." (Authors) The paper includes a reference to "Gomphidae spp".] Address: Bray, J.P., Institute for Applied Ecology, Univ. of Canberra, Canberra, Australia. Email: jon.bray12@gmail.com

**20327.** Brito, G.G.; Martins, R.T.; Oliveira, V.C.; Hamada, N.; Nessimian, J.L.; Hughes, R.M.; Ferraz, S.F.B.; de Paula, F.R. (2018): Biological indicators of diversity in tropical streams: Congruence in the similarity of invertebrate assemblages. *Ecological Indicators* 85: 85-92. (in English) ["Highlights: •Trichoptera, EPT or families are surrogates for Amazon stream macroinvertebrate assemblage. •Functional and taxonomic groups congruence was lower than among only taxonomic groups. •Macroinvertebrate groups responded similarly to riparian forest loss and channel substrate. Abstract: Surrogate indicators are important alternatives to overcome the shortage of total biodiversity data for planning and implementing conservation measures. The most important premise of this approach is congruence among surrogate candidates and among different assemblages. The aim of this study was to evaluate abundance and incidence congruence between invertebrate assemblages at two taxonomic resolutions (genus and family), and between invertebrate assemblage (genus) and three groups of taxa (EPT, Odonata, and Trichoptera). We also evaluated the congruence between functional groups of EPT and the taxonomic groups listed above. Data were collected from 51 stream sites distributed along a disturbance gradient in the rural area of the Paragominas municipality of the state of Pará, Brazil. We used Procrustes analysis to test congruence between invertebrate assemblages at the multiple taxonomic resolutions listed previously. Family taxonomic level was a good substitute for similarity patterns measured at the genera level. EPT genus also were highly congruent with whole invertebrate assemblage (genus level) variation. Trichoptera had greater congruence with all macroinvertebrate genera than did Odonata. The congruence between EPT functional groups and groups of taxa was greater than  $r = 0.70$ . In general, taxonomic and functional metrics responded similarly to environmental conditions (water quality, channel morphology, substrate, riparian vegetation cover). Trichoptera (abundance), EPT (genera and functional groups), or invertebrate families appear to be reasonable surrogates for Amazon stream invertebrate assemblage as biological indicators for assessing and conserving streams influenced by agriculture." (Authors)] Address: Brito, Janaina, Coordenação de Biodiversidade, Instituto Nacional de Pesquisas da Amazônia – INPA, Av. André Araújo, 2936, Manaus, Amazonas, Brazil

**20328.** Brydegaard, M.; Jansson, S.; Schulz, M.; Runemark, A. (2018): Can the narrow red bands of dragonflies be used to perceive wing interference patterns?. *Ecology and Evolution* 8: 5369-5384. (in English) ["Despite numerous studies of selection on position and number of spectral vision bands, explanations to the function of narrow spectral bands are lacking. We investigate dragonflies (Odonata), which have the narrowest spectral bands reported, in order to investigate what features these narrow spectral bands may be used to perceive. We address whether it is likely that narrow red bands can be used to identify conspecifics by the optical signature from wing interference patterns (WIPs). We investigate the optical signatures of Odonata

wings using hyperspectral imaging, laser profiling, ellipsometry, polarimetric modulation spectroscopy, and laser radar experiments. Based on results, we estimate the prospects for Odonata perception of WIPs to identify conspecifics in the spectral, spatial, intensity, polarization, angular, and temporal domains. We find six lines of evidence consistent with an ability to perceive WIPs. First, the wing membrane thickness of the studied Odonata is 2.3  $\mu\text{m}$ , coinciding with the maximal thickness perceivable by the reported bandwidth. Second, flat wings imply that WIPs persist from whole wings, which can be seen at a distance. Third, WIPs constitute a major brightness in the visual environment only second after the solar disk. Fourth, WIPs exhibit high degree of polarization and polarization vision coincides with frontal narrow red bands in Odonata. Fifth, the angular light incidence on the Odonata composite eye provides all prerequisites for direct assessment of the refractive index which is associated with age. Sixth, WIPs from conspecifics in flight make a significant contribution even to the fundamental wingbeat frequency within the flicker fusion bandwidth of Odonata vision. We conclude that it is likely that WIPs can be perceived by the narrow red bands found in some Odonata species and propose future behavioral and electrophysiological tests of this hypothesis." (Authors)] Address: Brydegaard, M., Depts Physics & Biology, Lund Univ., Lund, Sweden. Email: Mikkel.brydegaard@fysik.lth.se

**20329.** Buden, D.W. (2018): Dragonflies and damselflies (Insecta: Odonata) of the Republic of the Marshall Islands. *Pacific Science* 72(3): 373-387. (in English) ["Seven species of Odonata are recorded from among the numerous atolls and mid-ocean reef islands that make up the Republic of the Marshall Islands (RMI). They include two Zygoptera (*Tanymecosticta* sp. and *Ischnura aurora*) and five Anisoptera (*Anax guttatus*, *Diplacodes bipunctata*, *Pantala flavescens*, *Tholymis tillarga*, and *Tamea transmarina*). *Tanymecosticta* sp. is known only from a single WW II-era extralimital record reported here for the first time. Breeding is confirmed for the six other species, which are widely distributed in the Pacific and often further afield. The frequently cited record of *Pantala flavescens* as being the first odonate and one of the first insects to colonize Bikini Atoll after cessation of nuclear testing requires verification. Additional surveys on many of the Marshall Islands not yet sampled for odonates will doubtless result in many new locality records. However, small island size, limited habitat diversity and water resources for breeding, and large distances from potential source populations contribute to an impoverished odonate fauna, and few, if any, species are likely to be added to the list. The six species known to inhabit the Marshall Islands make up the entire known odonate faunas of many other low, coralline islands in the west-central Pacific." (Author)] Address: Buden, D.W.; E-mail: don\_buden@comfsm.fm

**20330.** Cai, Y.; Ng, C.Y.; Ngiam, R.W.J. (2018): Diversity, distribution and habitat characteristics of dragonflies in Nee Soon freshwater swamp forest, Singapore. *Gardens' Bulletin Singapore* 70 (Suppl. 1): 123-153. (in English) ["Biodiversity baselines were established for dragonflies of Nee Soon freshwater swamp forest based on quantitative sampling across the eight sub-catchments. Surveys were conducted from December 2014 to April 2016. Hydrological, physiochemical parameters and habitats were analysed to identify the main drivers structuring the dragonfly community. A total of 1706 odonate specimens were recorded, comprising 49 species of 34 genera in 11 families. The species diversity in each sub-catchment was compared using the Shannon-Wiener Index ( $H'$ ). Hierarchical clustering and Detrended

Correspondence Analysis (DCA) indicated that three main groupings of sites existed, each with a distinct community of associated species. Further analysis by Canonical Correspondence Analysis (CCA) with 12 significant environmental variables showed that these groups were significantly associated with respective environmental variables. Principal Components Analysis (PCA) was performed to analyse the full 23 environmental variables. The first four principal components of the PCA explained 63% of the variation in all the environmental variables. These four axes were input as independent variables into an Ordinary Least Square (OLS) model to test the significance of the link between habitat characteristics and diversity of the dragonfly community. Threats to the odonate fauna of the freshwater swamp forest are identified and conservation management measures are discussed." (Authors)] Address: Cai, Y., Nat. Biodiversity Centre, National Parks Board, 1 Cluny Road, 259569 Singapore. E-mail: cai\_yixiong@nparks.gov.sg

**20331.** Carter, S.K.; Vodopich, D.; Crumrine, P.W. (2018): Heterogeneity in body size and habitat complexity influence community structure. *Journal of Freshwater Ecology* 33(1): 239-249. (in English) ["Food web studies commonly ignore individual variation within a population and variation in the environment and assume these factors have insignificant effects on community dynamics relative to interspecific interactions. However, variation in body sizes within a population (size structure) and the physical structure of habitats (habitat complexity) can both affect interspecific interactions independently, with possible interactive effects. Using experimental mesocosms, we examined effects of predator size structure and habitat complexity on predation by two common predators in fishless ponds: larval aquatic beetles (*Cybister fimbriolatus*) and larval dragonflies (*Anax junius*). Cannibalism, intraguild predation, and predation on shared prey were measured at two levels of habitat complexity crossed with six size-structured pairs of predators. We found that highly complex habitats sustain a higher prey density because prey can take refuge from predators. Additionally, size structure had direct (size better predicted predation rate than did species identity) and indirect (IGP and cannibalism lowered predation rates) effects on consumptive interactions, which changed the composition and density of the predator guild. The identified size- and habitat-mediated mechanisms can change the frequencies of intra-guild vs. interguild predation (a balance important in determining top-down control of predators), and therefore we argue that these sources of heterogeneity should be included in community ecology studies where possible." (Authors)] Address: Carter, Shannon, Dept of BioSciences, Program in Ecology and Evolutionary Biology, Rice Univ., Houston, TX, USA. E-mail: shannon.k.carter@rice.edu

**20332.** Chung, A.Y.C. (2018): A note on insect diversity of northern Gunung Rara forest in Sabah, with special reference to some Bornean endemic and iconic species. *Sabah Society Journal* 34: 39-54. (in English) ["An insect diversity survey was carried out from 9th to 14th of March, 2015 in the Northern Gunung Rara-Sustainable Forest Management (NGR-SFM) project area in south central Sabah. As there is no insect survey in the past in the NGRSFM project area, this pioneer data will serve as baseline information for other research work in future. Insect data recorded during the survey provides salient information to enhance the biodiversity conservation and for formulation of the forest management plan of this area. At least 12 Bornean endemic species were recorded from NGR during this survey. The endemics include beetle, moth, cicada, odonate species.

This information provides input towards recommendations on High Conservation Value Forest (HCVF) of the area. A few iconic and rare species were also recorded. The nocturnal insect species richness and abundance were moderate. This is not surprising because NGR was logged in the past and some of the surveyed sites were degraded. On average, 58 species and 70 individuals were recorded within a one-square-metre. The mean Shannon Index was 3.94 while Simpson Index was 128.81 and Fisher Alpha Index was 191.70. Monitoring, as well as enforcement according to the management plan in this area at a regular basis is important in ensuring that this project area is protected and conserved accordingly.... At least 20 Odonata species were recorded during the survey. Four damselfly and one dragonfly species are endemic to Borneo. There could be more because some of the damselflies were only identified up to the genus level, e.g. *Vestalis*. Most of the Odonata species were sampled along Sg. Imbok, Sg. Lanap, Sg. Katak in PSP1 and a river adjacent to the Batu Timbang F.R." (Authors) The following species are figured: *Heliocypha biseriata*, *Rhinocypha cucullata*, *R. aurofulgens*, *Rhinagrion elopuriae*, *Macromia corycia*.] Address: Chung, A.Y.C., Forest Research Centre, Sabah Forestry Dept, P.O. Box 1407, 90715 Sandakan, Sabah, Malaysia. E-mail: aycchung@gmail.com

**20333.** Claeson, S.M.; Crisafulli, C.M.; Gerth, W.J. (2018): Diversity of large-bodied macroinvertebrates in ponds created on the Debris-Avalanche Deposit following the 1980 eruption of Mount St. Helens. *Ecological Responses at Mount St. Helens: Revisited 35 years after the 1980 Eruption*: 235-249. (in English) ["The numerous ponds formed in the weeks following the 1980 eruption of Mount St. Helens provided a unique opportunity to investigate macroinvertebrate communities in young (23- to 25-year-old) fishless ponds following a large natural disturbance. Over a 3-year period, Large-bodied macroinvertebrates were sampled from 97 ponds with a range of hydroperiods and biophysical characteristics. Macroinvertebrate communities from these ponds were spatially and temporally variable in spite of their close geographical proximity, shared regional species pool, and similar creation history. We identified 110 taxa, many of which were observed at only one pond or in only one year. Community differences appeared to be influenced more by pond size and riparian tree development rather than by hydroperiod alone, and stochastic colonization events were likely an important factor determining community composition." (Authors) Odonata spp., Aeshnidae spp., Aeshna sp., Aeshna palmata, Anax junius, Coenagrionidae, Enallagma spp., Ischnura spp., I. cervula, I. perparva, Corduliidae, Somatochlora minor, Lestidae, Lestes spp., L. dryas, Libellulidae spp., Libellula forensis, Sympetrum spp.] Address: Claeson, Shannon, U.S. Dept of Agriculture, Forest Service, Pacific Northwest Research Station, Wenatchee Forestry Sciences Lab., 1133 North Western Avenue, Wenatchee, WA, 98801, USA

**20334.** Cordero Rivera, A.; Zhang, H. (2018): Ethological uniqueness of a damselfly with no near relatives: the relevance of behaviour as part of biodiversity. *Animal biodiversity and conservation* 41(1): 161-174. (in English) ["Taxonomically isolated species may contribute unique characters to biological diversity, particularly at the level of ethodiversity. To test this idea, we analysed the territorial and reproductive behaviour of *Pseudolestes mirabilis* (Zygoptera, Pseudolestidae), an endemic damselfly from Hainan Island, China, and the only representative of its family. Our hypothesis was that the uniqueness of this taxon would be evident

in its behaviour. We found that the agonistic encounters between males were usually very short (less than 2 min) and consisted of a face-to-face display with both males maintaining a close distance while flying using only the forewings. No other odonate flies with only two wings in territorial contests. Furthermore, a small proportion of fights were escalated and lasted about one hour, with clear exhibition of the coloured hindwings. Males also confronted wasps (*Eustenogaster nigra*) that used the same microhabitat in a similar way, albeit for short time. Females were found in low numbers. This limited copulatory frequency and most males did not mate in the whole day. Unexpectedly for a damselfly with coloured wings, precopulatory courtship was almost absent, suggesting that intrasexual selection is behind the evolution of coloured wings in this species. Copulation lasted an average of seven minutes, with a first stage of rivals' sperm removal (64% of sperm removed) and a second stage of insemination. In agreement with our initial hypothesis, copulatory behaviour was unique: males did not translocate sperm to their vesicle before each mating but translocated sperm after copulation, a behaviour that cannot be easily explained. These exclusive characteristics point to the relevance of this species as an exceptional taxon that merits high conservation priority." (Authors)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Univ. de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**20335.** Cowan, E.M.; Cowan, P.J. (2018): The Odonata (Insecta) of Dhofar, southern Oman. *Journal of Threatened Taxa* 10(11): 12499-12514. (in English) ["The Dhofar governorate of Oman ('Dhofar') is largely desert with a mainly arid climate. It contains an Afrotropical escarpment region influenced by monsoon precipitation. We summarise published records of odonates for Dhofar, organised by four natural regions, present our unpublished photographic records for 23 sites according to these regions and produce a Dhofar apparent-status statement for most odonate species. Records for the regionally Endangered *Urothemis thomasi* and regionally Endangered *Acisoma variegatum* and regionally Least Concern *Paragomphus sinaiticus* are discussed." (Authors)] Address: Cowan, Elaine, School of Education, Univ. of Aberdeen, AB24 3FX, Scotland, UK. Email: desertlarksgirl@hotmail.com

**20336.** Dann, T.J. (2018): Fast versus slow: differing life history strategies of two New Zealand damselfly (Odonata: Zygoptera) species. Thesis, Master of Science, Univ. of Otago: XIII, 86pp. (in English) ["Life history strategies are important for all organisms and are studied in large part to understand how an individual, population or species reacts to/lives in/survives in its environment and how it/they adapt to changes within that environment. No single strategy is optimal because environmental, morphological and physiological constraints lead to trade-offs between different traits, and how a species responds to these constraints determines their life history. Two variations of life history strategies are slow and fast, which are characterised by differences in activity, development, metabolism, behaviour and their environment. These differences can result in species divergent preference for different habitats, influencing species distribution. Around 90% of New Zealand's insects are endemic and most are not well represented in the literature. Their life histories often lack synchronicity, seasonality, and winter diapause, when compared to their Northern Hemisphere counterparts, traits which are often associated with a mild, maritime climate. Odonata are model insects for life history studies but their diversity in New Zealand is low. Two

species of damselfly are present in the South Island: *Austrolestes colenisonis* and *Xanthocnemis zealandica*. Both of these species were selected to study because they are easy to locate, abundant and widely distributed. They are well described, taxonomically distinct, and are easy to collect, and maintain in the lab. These two species also permit the study of two closely related, cohabitating, predator species that potentially differ in their life history strategies. The primary objective of this thesis was to determine if a fast-slow life history strategy dichotomy exists between *A. colenisonis* and *X. zealandica* by investigating aspects of their life history and distribution. A long term (two year) field study was used to investigate differences in life history characteristics between both species in six different populations over an altitudinal gradient. A survey of the lower half of the country was conducted to create a distribution map for each species and investigate any species-specific habitat preferences. Laboratory studies were conducted to investigate differences in metabolism, by measuring movement behaviour and ability to withstand starvation, as well as the likelihood of winter diapause occurring. *A. colenisonis* naiads were found to grow larger, move more, have a decreased starvation tolerance, and a preference for lower altitude. These characteristics are consistent with a life history at the fast end of the continuum. *X. zealandica*, on the other hand, display characteristics more in alignment with a slow life history, because naiads of this species are smaller, move less, and can survive longer periods of starvation. *X. zealandica* require permanent habitats; however, they can take advantage of low quality habitats, particularly those at high altitudes, which don't suit *A. colenisonis*. Therefore, a fast/slow life history strategy dichotomy is confirmed to be present and may influence how these species interact with the environment and each other. Additionally, like many other endemic New Zealand invertebrates, *A. colenisonis* and *X. zealandica* undergo quiescence rather than diapause when overwintering. This allows these species to opportunistically take advantage of a mild changeable climate and hence the periods when suitable conditions for growth prevail." (Author)] Address: Dann, Tanya; no further details

**20337.** Davidovich, H.; Ribak, G. (2018): Loaded flight in male *Ischnura elegans* and its relationship to copulatory flight. *Journal of Insect Physiology* 110: 44-56. (in English) ["Copulation in *Ischnura elegans* can last several hours, during which the pair may fly together in the 'wheel position' with both insects flapping their wings. Previous studies have suggested that during flight in copula, the male increases its power output while the female decreases it. Consequently, the male must support some of the female's body weight in the air. We tested the hypothesis that female body mass places a biomechanical constraint on the ability of smaller males to mate with larger females by attaching weights to male damselflies and analyzing their wing motion and force exerted using high-speed cameras. Males flying with an added load exerted extra forces equivalent to 157% of their body weight. Males flying in the mating wheel position with females whose wings were clipped bore a similar weight and were barely able to fly. To fly with an added load, males increased their wing-flapping frequency and amplitude, reaching values of mean wing tip flapping speed that were 1.9-fold higher than that in solitary flight. Our experiments indicate that although males would be able to fly briefly with the added weight of a non-responsive female, the flight performance of the pair would be severely compromised without the female contributing effort to the joint flight." (Authors)] Address: Davidovich, Hilla, School Zool., Fac. Life Sc., Tel Aviv Univ., POB 39040, Tel Aviv 6997801, Israel

**20338.** de Rezende, R.R.; Mar, T.B.; Páez, L.M.C.; Silva Xavier, A.D.; Xavier, C.A.D.; Navas-Castillo, J.; Zerbini, F.M.; Alfnas-Zerbini, P. (2018): Complete genome sequences of two gemycircularviruses associated with non-cultivated plants in Brazil. *Archives of Virology* 163(11): 3163-3166. (in English) ["Gemycircularviruses (genus Gemycircularvirus, family Genomoviridae) are single-stranded DNA viruses that are spread around the world in association with several organisms and environments. In this work, we identified two gemycircularviruses associated with two non-cultivated plants in Brazil, *Momordica charantia* and *Euphorbia heterophylla*. Both viruses display the general genome structure of gemycircularviruses. The virus isolated from *M. charantia* showed the highest nucleotide sequence identity with Pteropus associated gemycircularvirus 5, and an atypical structure consisting of a hairpin embedded in the major stem-loop was observed in the intergenic region. The virus from *E. heterophylla* showed the highest nucleotide sequence identity with Odonata associated gemycircularvirus 1. Phylogenetic analysis groups the two new viruses together with other genomoviruses of the genus Gemycircularvirus." (Authors)] Address: de Rezende, R.R., Depto Microbiologia, Inst. de Biotecnologia Aplicada à Agropecuária (BIOAGRO), Univ. Federal de Viçosa, Viçosa, Brazil

**20339.** Deacon, C.; Samways, M.J.; Pryke, J.S. (2018): Artificial reservoirs complement natural ponds to improve pondscape resilience in conservation corridors in a biodiversity hotspot. *PLoS ONE* 13(9): e0204148. <https://doi.org/10.1371/journal.pone.0204148>: 17 pp. (in English) ["Natural ponds are rich in biodiversity, contributing greatly to regional aquatic biodiversity. Artificial reservoirs used for irrigation can be significant additional features of the landscape. They infill the local natural pondscape, and are attractors for aquatic insects. Here, we determine the extent to which artificial reservoirs represent the local natural pond biota, and how they contribute to the pondscape in conservation corridors used to mitigate the impact of plantation forestry in a global biodiversity hotspot. We did this by: 1) identifying the environmental factors, including plants, that drive dragonfly, water beetle, and water bug species richness, diversity and composition, and 2) determining the value of natural ponds vs. artificial reservoirs for maintaining the population size and expanding the area of occupancy for dragonflies, beetles and bugs in conservation corridors. While vegetation cover was central for maintaining species richness and composition of the assemblages in general, many other environmental variables are necessary to encourage the full suite of local diversity. Artificial reservoirs are attractive habitats to many species, overall increasing area of occupancy for 75% of them (ranging from 62–84% for different taxa). These reservoirs provide complementary alternative habitats to natural ponds, leading to improved ecological resilience across the pondscape. We conclude that maintaining a diverse and heterogeneous pondscape is important for conserving local aquatic insect diversity, and that artificial reservoirs increase the local area of occupancy for a range of pond insects in conservation corridors, and improve the biodiversity value of these pondscapes." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**20340.** Díaz-Martínez, C.; Cardo-Maeso, N.; Toledo-Sevilla, B.; Simarro-Tórtola, J.; Brotóns-Padilla, M. (2018): Catálogo provisional de los odonatos (Insecta: Odonata) de Castilla-La Mancha (Centro de España). *Boln. S.E.A.* 63: 325-335. (in Spanish, with English summary) ["Provisional

checklist (Insecta: Odonata) of the Odonata of Castilla-La Mancha (central Spain) Abstract: The key intention of this paper is to gather all of the available information on Odonata in Castilla-La Mancha, as a starting point for future studies in this administrative region. A dataset of 8439 records of adults, larvae and exuviae from published (44.9%) and unpublished data (55.1%) were gathered, providing information about 34% of the regional territory, with large differences in data coverage between provinces. We present a provisional checklist with 64 species for Castilla-La Mancha, a region with a mainly Mediterranean fauna. It includes the first records of five species from Albacete, three from Toledo, two from Cuenca and two from Ciudad Real; some are threatened taxa, like *Lestes macrostigma* and *Gomphus similimus*." (Authors)] Address: Soc. Entomológica y Ambiental de Castilla-La Mancha (SEACAM), C/ Londres, 7. 45003 Toledo (España). Email: cdiaz.cuenca@gmail.com

**20341.** Dow, R.A.; Stokvis, F.A. (2018): Odonata from Gunung Melatai and two other locations in Kapit Division, Sarawak, with a review of the genus *Heliogomphus* in Borneo, Peninsular Malaysia and Singapore. *IDF-Report* 122: 1-25. (in English) ["Records of Odonata from Gunung Melatai, Nanga Gaat and the Kastima Logging area, all in Sarawak's Kapit Division, are presented. The most notable records are of *Matronoides cyaneipennis* Förster, 1897 and *Heliogomphus blandulus* Lieftinck, 1929. A distribution map for *Matronoides cyaneipennis* and updated distribution maps for three species from the *Coeliccia borneensis*-group are given. Tentative identifications to species of previously published records of *Idionyx* females are given. The genus *Heliogomphus* in Borneo, Peninsular Malaysia and Singapore is reviewed and a simple one marker molecular analysis is presented for the genus in this region. Based on reexamination of specimens from the genus and the molecular results, an additional member of the genus is reported from Borneo: *H. sp. cf. olivaceus* Lieftinck, 1961. Although both morphological and molecular results remain incomplete, it does appear likely that there is at least one more species of *Heliogomphus* present in Borneo than has been recognised until now, and that *H. borneensis* Lieftinck, 1964 may be a junior synonym of *H. kelantanensis* (Laidlaw, 1902)." (Authors)] Address: Dow, R.A., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Email: rory.dow230@yahoo.co.uk

**20342.** Dumont, H.J.; Borisov, S.N.; Schröter, A. (2018): On the nature and distribution of *Sympetrum tibiale*, a rare Central Asian species spilling over into Europe (Odonata: Libellulidae). *Odonatologica* 47(1/2): 23-42. (in English) ["Literature data, museum collections as well as fieldwork were used to produce an up-to-date distribution map and a list of records of *Sympetrum tibiale*, a species restricted to the semi-deserts of Russia, Kazakhstan, Uzbekistan, Mongolia and western China. The type locality is in Xinjiang province, China, and the type specimens are preserved in the Zoological Museum of Hamburg, Germany (ZMUH). Language barriers, publication in obscure journals and poor data exchange meant *S. tibiale* was little-known to non-Russian speaking odonatologists for a long time. Yet, it has been confirmed to breed in the steppes of the Kuma-Manych Depression on the western shore of the Caspian Sea, situated in the southern part of European Russia, making the species a genuine member of the European fauna. This article addresses these European sites, hitherto neglected in non-Russian language literature, and establishes the correct westernmost limit of the species' range. In addition, all currently certified records are mapped. Available



knowledge on the species' ecology – a summer species with a larval preference for brackish water – is summarized. Identification characters of adults and larvae are provided; its closest relative is identified as *Sympetrum depressiusculum*." (Authors)] Address: Dumont, H.J., Dept of Biology, Univ. of Gent, 9000 Gent, Belgium. E-mail: Henri.Dumont@UGent.be

**20343.** Frances, D.N.; McCauley, S.J. (2018): Warming drives higher rates of prey consumption and increases rates of intraguild predation. *Oecologia* 187(3): 585-596. (in English) ["Warming due to climate change is expected to alter species interactions. These interactions are shaped by components of individual behavior, particularly foraging behaviors. However, few studies consider species' behavioral responses to warming to predict how species interactions will be affected by warming. We chose two complementary approaches to examine how climate warming may affect the behavior and interactions of aquatic intraguild predators. First, we measured behavioral responses to warming in six larval dragonfly species, expecting that feeding rate and activity would increase with temperature. Secondly, we conducted intraguild predation (IGP) trials with three species to understand how temperature affects IGP, and if species' behavioral responses to warming are indicative of the outcome of IGP interactions. Warming increased feeding rates by 42% on average across species but had no effect on activity rate. The magnitude of change in feeding rate was positively correlated with the maximum temperatures species experience across their ranges. Lastly, warming increased rates of IGP twofold, however, species' behavioral responses alone were not predictive of their susceptibility to become IG prey of other larvae at warmer temperatures. Our results provide evidence that IGP interactions may be greatly affected by future increases in temperature; however, activity responses to warming alone are weak predictors of the outcomes of these interactions. Future studies should consider other species' traits when forecasting the effects of climate change on species interactions.... We used the following species in our experiments: *Erythemis simplicicollis*, *Epitheca canis*, *Libellula pulchella*, *Sympetrum vicinum*, *Leucorrhinia intacta*, and *Plathemis lydia*." (Authors)] Address: Frances, Dachin, Dept of Biology, Univ. of Toronto Mississauga, 3359 Mississauga Road, Mississauga, ON, L5L 1C6, Canada. dachin.frances@mail.utoronto.ca

**20344.** Goldyn, R.; Szapkowska, B.; Swierk, D.; Domek, P.; Buxakowski, J.; Dondajewska, R.; Baralkiewicz, D.; Sajnog, A. (2018): Influence of stormwater runoff on macroinvertebrates in a small urban river and a reservoir. *Science of the Total Environment* 625: 743-751. (in English) ["Highlights: • Stormwater caused marked transformation of benthic macroinvertebrates composition. • Abundance and biomass of benthic organisms were also strongly influenced. • Particularly sensitive were Ephemeroptera, Trichoptera and Mollusca. • Impact on macroinvertebrates in the reservoir was more pronounced than in the river. • Reservoirs improve water quality and composition of organisms in outflowing river. The impact of stormwater on benthic macroinvertebrates was studied in two annual cycles. Five small catchments drained by stormwater sewers to a small urban river and a small and shallow reservoir situated in its course were selected. These catchments were located in residential areas with single-family houses or blocks of flats as well as industrial areas, i.e., a car factory, a glassworks and showroom as well as the parking lots of a car dealer and servicing company. In addition to the five stations situated in the vicinity of the stormwater outlets, three stations not directly influenced

by stormwater were also established. Macroinvertebrates were sampled in every season, four times per year. Both abundance and biomass were assessed. Stormwater from industrial areas associated with cars, whose catchments showed a high percentage of impervious areas, had the greatest impact on benthic macroinvertebrates. This was due to a large amount of stormwater and its contamination, including heavy metals. Stormwater outflow from residential multi-family houses exerted the least influence. Macroinvertebrates in the water reservoir were found to undergo more extensive changes than those in the river. The cascade of four reservoirs resulted in a marked improvement of water quality in the river, which was confirmed by species composition, abundance and biomass of macroinvertebrates and indicators calculated on their basis for the stations below the cascade in comparison to the stations above and in the first reservoir. These reservoirs replaced constructed wetlands or other measures, which should be undertaken for stormwater management prior to its discharge into urban rivers and other water bodies. ... High concentrations of Zn, Ni and Al in water contributed to an increase in the biomass of Odonata (Fig. 5C)." (Authors)] Address: Goldyn, R., Dept of Water Protection, Faculty of Biology, Adam Mickiewicz Univ., Poland

**20345.** Guillemot, A.; Krieg-Jacquier, R. (2018): *Aeshna caerulea* en France, une espèce en limite d'aire et menacée par le changement climatique (Odonata: Aeshnidae). *Bourgogne-Franche-Comté Nature* 27: 265-272. (in French, with English summary) ["Extremely rare in France, *Aeshna caerulea* is a boreo-alpine species which trend is considered decreasing in Europe and is currently known from only 10 sites between 1,600 and 2,300 meters high in Haute-Savoie. Since its discovery in 1994, very little attention was paid to the species in the Dept. Its inclusion in the National plan of action on Odonates has encouraged the *Sympetrum* Group to carry out annual research since 2015 on propitious sites. No new breeding locations have been identified and autochthony has only been found on three wetlands of the surveyed area. The natural evolution of environments, human activities and climate change are the most obvious threats to French populations. The species is found on very small wetlands which increases the threat due to the lack of inventory on these environments and the lack of protection status of *A. caerulea* in France." (Authors)] Address: Guillemot, A., Asters, Conservatoire d'espaces naturels de Haute-Savoie / Groupe de recherches et de protection des libellules *Sympetrum*, 150 route de Chez Diannay - 74570 Groisy - alexandre.guillemot@asters.asso.fr

**20346.** Harisha, M.N.; Hosetti, B.B. (2018): Species richness, diversity and conservation threats of odonates in Dyamannana Lake (Kere), Bhadravathi Taluk, Shivamogga district, Karnataka, India. *International Journal of Zoology Studies* 3(1): 197-200. (in English) ["The study was conducted to find out the status, diversity and conservation threats of Odonata at Dyamannana Lake, Shivamogga District during October 2015 to September 2016. Sampling was done by direct counts method and collected data were statistically analyzed to work out the magnitude of Odonate diversity. A total of 470 individuals of odonates belonging to 41 species in 29 genera under 6 families were recorded. The order- Anisoptera was found to be the most dominant with 76% (n=31) species, belonging to 3 families, followed by order- Zygoptera with 24% (n=10) species, under 3 families respectively. Among the order- Anisoptera, the family wise, abundance, richness, diversity and evenness indices was found to be maximum in Libellulidae (340, 4.1, 2.9,

0.72) followed by the Aeshnidae (38, 0.8, 1.3, 0.93) and minimum in Gomphidae (26, 0.3, 0.7, 1.0) respectively (Table 2). Similarly, among the order: Zygoptera, it was found to be maximum in Coenagrionidae (42, 1.6, 1.9, 0.92) and minimum in Platynemididae (12, 0.5, 0.6, 0.94), however, it was least in Lestidae (12, but showed no significant indices value with only single species) respectively. The study revealed that, odonates and their habitats were under threat due to intensive anthropogenic activities, which are attributed to encroachment and loss of habitat. Also, addition of fertilizers and insecticides from the surrounding arecanut plantation lead to pollution and eutrophication of the lake, which not only affect the assemblage of Odonata population but also cause local extinctions." (Authors)] Address: Harisha, M.N., Dept of Post Graduate Studies and Research in Wildlife & Management, Kuvempu Univ., Jnana Sahyadri, Shankaraghatta, Shivamogga, Karnataka, India

**20347.** Herrmann, A.; Schnabler, A.; Martens, A. (2018): Phenology of overland dispersal in the invasive crayfish *Faxonius immunis* (Hagen) at the Upper Rhine River area. *Knowledge and Management of Aquatic Ecosystems* 2018, 419, 30: 6 pp. (in English, with French summary) ["The non-indigenous crayfish *Faxonius immunis* (Hagen) is the dominant crayfish species at the Upper Rhine River system since his detection in 1993. As an invasive alien species, it is one of the biggest threats to aquatic biodiversity in the area. By dispersing over land, the species has a high potential to colonize small ponds created for threatened amphibians and dragonflies. Shortly after invasion, the fast growing population of *F. immunis* is changing the habitat drastically. In June 2016, our team started a local information campaign including citizen science project where the local people south of Karlsruhe, Baden-Wuerttemberg, Germany, could contact us when they spot a crayfish migrating over land to assess the activity of overland dispersal on a regional scale. Until January 2018, we got a total of 98 responses. Thirty-nine include suitable information including 33 records of overland dispersal of *F. immunis*. The species was recorded on land throughout the year, except February and July. Additionally, single observations of overland dispersal of other invasive crayfish species, naming *Procambarus clarkii* (Girard), *Pacifastacus leniusculus* (Dana), *Procambarus virginalis* (Lyko) and *Faxonius limosus* (Rafinesque), were recorded." (Authors)] Address: Herrmann, A., Institute of Biology, Univ. of Education Karlsruhe, Bismarckstraße 10, 76133 Karlsruhe, Germany. E-mail: alexander.herrmann@ph-karlsruhe.de

**20348.** Hoffmann, J.; Donoughe, S.; Li, K.K.; Salcedo, M.K.; Rycroft, C.H. (2018): A simple developmental model recapitulates complex insect wing venation patterns. *PNAS* published ahead of print September 17, 2018 <https://doi.org/10.1073/pnas.1721248115>: 6 pp, App. 42 pp. (in English) ["Significance: The wing veins of the fruit fly *Drosophila melanogaster* have long been studied as an example of how signaling gradients in a growing tissue can generate precise, reproducible patterns. However, fruit fly wings represent only a small slice of wing diversity. In many insect species, wings are like human fingerprints: even the left and right wings of the same individual have unique vein patterns. We analyze wing geometry in many species and then present a minimal developmental model for how vein patterns can be formed. This model will serve as a hypothesis for future empirical work. Abstract: Insect wings are typically supported by thickened struts called veins. These veins form diverse geometric patterns across insects. For many insect species, even the left and right wings from the same

individual have veins with unique topological arrangements, and little is known about how these patterns form. We present a large-scale quantitative study of the fingerprint-like "secondary veins." We compile a dataset of wings from 232 species and 17 families from the order Odonata, a group with particularly elaborate vein patterns. We characterize the geometric arrangements of veins and develop a simple model of secondary vein patterning. We show that our model is capable of recapitulating the vein geometries of species from other, distantly related winged insect clades." (Authors)] Address: Hoffmann, J., Paulson School of Engineering & Appl. Sc., Harvard Univ., Cambridge, MA 02138, USA

**20349.** Houard, X.; Itrac-Bruneau, R.; Sueur, A. (2018): Partage du bilan concernant le premier Plan national d'actions (PNA) en faveur des Odonates menacés. *Revue scientifique Bourgogne-Franche-Comté Nature* 27: 149-164. (in French, with English summary) ["The first French National Action Plan (NAP) for Odonata was officially ended in December 2015. The year 2016 was devoted to the drafting of the balance sheet. For five years, the various stakeholders in the metropolitan area involved in the program – naturalists, wildlife managers and public services – have worked together to bring about numerous actions aimed at improving or consolidating the conservation status of the 18 "target species" and of their habitats. A national network has been created, with the sole objective of sustainable conservation of this group of insects well known for being emblematic of wetlands. This article is a review of the steps stone of the implementation of the NAP. It proposes some examples considered like good achievement then synthesizes technical and financial elements which prove the success of this conservation program." (Authors)] Address: Office pour les insectes et leur environnement - La Minière - BP30 - 78041 Guyancourt Cedex, France. Email: pna@insectes.org

**20350.** Ilhamdi, M.L. (2018): Pola penyebaran capung (Odonata) di kawasan taman wisata alam Suranadi Lombok Barat. *Jurnal Biologi Tropis* 18(1): 19-25. (in Indonesian, with English summary) ["The aim of this research is to analyze the distribution pattern of the dragonflies (Odonata) in the Area of Nature Park Suranadi. This is an explorative descriptive study conducted in May 2017. The method used in data collection is survey method with sweeping net technique following observation path (Left Edge, Right Edge, Central Line and Water Line). Data retrieval is done 2 times repetition within 1 month in the morning at 08.00 - 11.00 pm and afternoon at 15.00-17.00 pm. The pattern analysis of the distribution of dragonflies using the formula variance value of Southwood. The results showed that (1) the number of species of dragonflies found in Suranadi Nature Park Area consists of 19 species belonging to 5 families (2) distribution pattern of dragonflies are distributed in groups (15 species) and uniform distribution pattern (4 species)." (Authors)] Address: Ilhamdi, M.L., Dosen Pendidikan Biologi FKIP Universitas Mataram, Indonesia. E-mail: liwa\_ilhamdi@unram.ac.id

**20351.** Ilvonen, J.J. (2018): A comparative study of parasitism in insects: why some Odonata species have parasites and others do not? *Annales Universitatis Turkuensis Ser. A. II*, 344: 34 pp. (in English, with Finnish summary) ["Parasites are one of the most diverse groups of animals, capable of infecting virtually all other organisms on the planet. They are a strong evolutionary force, influencing genetic diversity and thereby affecting individuals, populations and entire species. Studies of host-parasite interactions have frequently examined how host individuals and their parasites interact,

but this focus on the host individual offers a very narrow perspective on the general dynamics of hosts and their parasites. To understand the dynamics of hosts and their parasites on an evolutionary scale, examination has to be moved beyond the individual, to include multiple host species, multiple parasites, and various host species traits. To this end, I decided to expand our knowledge by studying the host-parasite interactions of a large number of damselfly and dragonfly species and their endo- and ectoparasites. I evaluated specific physical, behavioral and distributional traits of the host species along with their parasitism in order to understand what traits affect parasitism. In addition, I examined these associations using the known evolutionary tree of the different damselfly and dragonfly hosts. Using this method I was able to get a deeper understanding on the co-evolution between Odonata and their endo- and ectoparasites. In paper I, I confirmed that there is huge variation in endo- and ectoparasitism between different damselfly and dragonfly species. I also found that damselfly females had more ectoparasites than males did, but there was no difference between sexes in dragonflies. In paper II, I found that there is significant variation between different damselfly and dragonfly species in their strength of immune response and body mass. Using the evolutionary tree of these host species I also discovered that closely related species are more similar in their parasitism and in their two evaluated traits than would be expected if the species were drawn at random. In paper III, I discovered that both endo- and ectoparasites tend to infect the same host species which are relative small, live in high density and are common. Paper IV continued my investigation and I found that territorial or large species have fewer ectoparasites than non-territorial or small species and I also found that northern species have more ectoparasites than southern ones. It seems that the larger size of odonate species lowers their susceptibility to parasitism. However, whether this is the cause of the host's physical traits or due to the infection mechanism and/or preference of the parasite, remains unknown. Further studies are required to understand how the size of the host influences other traits and subsequently co-evolution between damselflies, dragonflies and their endo- and ectoparasites." (Author) Address: Ilvonen, J.J., Dept of Biology, FI-20014 Univ. of Turku, Turku, Finland. E-mail: jjiivo@utu.fi

**20352.** Jaffe, B.D.; Ketterer, M.E.; Smith, D.S. (2018): An arsenic hyperaccumulating fern, *Pteris vittata* L. (Pteridaceae) broadly affects terrestrial invertebrate abundance. *Ecological Entomology* 43: 76-84. (in English) [Florida, USA "1. The Chinese brake fern (*Pteris vittata* L.; Pteridaceae) can accumulate up to 27 000 mg kg<sup>-1</sup> dry wt. of arsenic (As) from the soil into its above-ground biomass. They may use this As to deter invertebrate threats. 2. This study explored how As concentrations [As] in the fern, and in soil associated with the fern, influenced the abundance and composition of various invertebrates. 3. Populations of *P. vittata* were identified in the field. Soils from the base of the fern and from 3 m away of each plant were collected and pitfall traps were installed. Soil and fern arsenic concentrations ([As]) were measured via inductively coupled plasma mass spectrometry and invertebrates were identified to order and classified by feeding guild. 4. Increased [As] did not affect all feeding guilds and orders equally. For example, individual herbivore abundance did not decrease as [As] increased, but predator abundance did. In many cases, the impact of soil [As] on invertebrates depended on the distance from the fern. Fern [As] also influenced components of the community, but only at 3 m away from the fern. Furthermore, the abundances of many invertebrate groups

were higher beneath the fern, where [As] was higher. 5. These results suggest that hyperaccumulated As can impact the invertebrate community, but the defensive benefits of hyperaccumulation are more complex than have been previously described. The authors advocate that future studies examining the potential defensive benefits of hyperaccumulation should do so in a natural setting that incorporates this complexity and invertebrate richness." (Authors) "We collected invertebrates via pitfall traps for 10 consecutive days during two sampling periods in mid-June and late August of 2009": Odonata: Calopterygidae, Corduliidae] Address: Jaffe, B.D., Dept of Biol. Sciences, Northern Arizona Univ., Flagstaff, Arizona, USA. E-mail: jaffebd@gmail.com

**20353.** Janra, M.N. (2018): Inventory of dragonflies and damselflies (Odonata) in Andalas Univ.'s Limau Manis campus complex, Padang: Using photographic approach. *Jurnal Natural* 18(2): 89-96. (in English) ["Odonata, which consists of true dragonflies and damselflies, is considerably understudied in Sumatra, especially in West Sumatra region. While the campus area of Andalas Univ. in Limau Manis provides many suitable habitats for dragonflies and damselflies, the least has been done in learning these organisms. In this paper, we intend to conduct the inventory of Odonata in Limau Manis area by using photography approach (by taking decent pictures only, without sampling the animal). After spending 14 days of data collection which spanned from October 2017 until February 2018), we listed 27 Odonata species. [...] Libellulidae is a family under Anisoptera that was found with most species members. Photography approach promises an immense help in doing species inventory for this animal group for its reliability in determining species identification without harming species' population." (Author)] Address: Muhammad Nazri Janra, M.N., Biology Dept, Faculty of Mathematics and Natural Sciences, Andalas Univ.. Jalan Kampus Unand Limau Manis Pauh Padang, West Sumatra 25163 Indonesia. Email: mnjanra@gmail.com

**20354.** Janssens, L.; Verberk, W.; Stoks, R. (2018): A widespread morphological antipredator mechanism reduces the sensitivity to pesticides and increases the susceptibility to warming. *Science of the Total Environment* 626: 1230-1235. (in English) ["Pollution and predation are two omnipresent stressors in aquatic systems that can interact in multiple ways, thereby challenging accurate assessment of the effects of pollutants in natural systems. Despite the widespread occurrence of morphological antipredator mechanisms, no studies have tested how these can affect the sensitivity of prey to pesticides. Sensitivity to pesticides is typically measured via reductions in growth rates and survival, but also reductions in heat tolerance are to be expected and are becoming increasingly important in a warming world. We investigated how autotomy, a widespread morphological antipredator mechanism where animals sacrifice a body part (here the caudal lamellae) to escape when attacked by a predator, modified the sensitivity to the insecticide chlorpyrifos in larvae of *Coenagrion puella*. Exposure to chlorpyrifos reduced the growth rate and heat tolerance (measured as CTmax). A key finding was that the pesticide had a greater impact on growth rates of intact animals, i.e. those that retained their lamellae. This reduced sensitivity to chlorpyrifos in animals without lamellae can be explained by the reduced outer surface area which is expected to result in a lower uptake of the pesticide. Larvae that underwent autotomy exhibited a lower heat tolerance, which may also be explained by the reduced surface area and the associated reduction in oxygen uptake. There is a wide diversity

of morphological antipredator mechanisms, suggesting that there will be more examples where these mechanisms affect the vulnerability to pollutants. Given the importance of pollution and predation as structuring forces in aquatic food webs, exploring the potential interactions between morphological antipredator mechanisms and sensitivity to pollutants will be crucial for risk assessment of pollutants in aquatic systems." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. Email: [robby.stoks@bio.kuleuven.ac.be](mailto:robby.stoks@bio.kuleuven.ac.be)

**20355.** Janssens, L.; Stoks, R. (2018): Rapid larval development under time stress reduces adult life span through increasing oxidative damage. *Functional Ecology* 32(4): 1036-1045. (in English) ["1. While a trade-off between larval development and adult life span is key to understand why not all animals develop at their maximum rate and why life histories align along a fast-slow continuum, it has been rarely studied. More general, the physiological mechanisms underlying life-history trade-offs are poorly understood and there is ongoing debate about the mediatory role of oxidative stress. 2. We explicitly investigated the role of oxidative stress in mediating the trade-off between larval development and adult life span in the damselfly *Lestes viridis*. We exposed larvae to time stress (by manipulating photoperiods) and manipulated oxidative stress levels using the mitochondrial uncoupler 2,4-dinitrophenol (DNP) that causes a reduced production of reactive oxygen species. In addition, we considered other costs of an accelerated development in terms of reductions in immune function (the activity of phenoloxidase [PO]) and energy storage (fat content). 3. Larvae accelerated their development but not growth under time stress, allowing to identify costs of rapid development without confounding effects of rapid growth. Rapid development came at the cost of a much shorter life span, which was associated with an increase in oxidative damage to lipids, proteins and DNA. Other costs in the adult stage of a rapid larval development included a lower body mass and reduced immune function, while the fat and protein contents were not reduced. 4. Time-stressed animals exposed to DNP developed even faster and did not show the increase in oxidative damage. Notably, they did not suffer the costs of rapid development: they had no shorter life span, lower body mass or reduced PO activity. 5. Our results provide strong experimental support for a trade-off between rapid development and life span and for the mediatory role of oxidative stress in shaping this life-history trade-off. Our study highlights that manipulation of mitochondrial uncoupling may be a powerful method to study the mechanistic underpinnings of life-history trade-offs." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: [robby.stoks@bio.kuleuven.ac.be](mailto:robby.stoks@bio.kuleuven.ac.be)

**20356.** Jiang, B.; Mikolajewski, D.J. (2018): Shift in predation regime mediates diversification of foraging behaviour in a dragonfly genus. *Ecological Entomology* 43: 525-533. (in English) ["1. Behavioural adaptations to avoid and evade predators are common. Many studies have investigated population divergence in response to changes in predation regime within species, but studies exploring interspecific patterns are scant. Studies on interspecific divergence can infer common outcomes from evolutionary processes and highlight the role of environmental constraints in shaping species traits. 2. Species of the dragonfly genus *Leucorrhinia* underwent well-studied shifts from habitats being dominated by predatory fish (fish lakes) to habitat being dominated by predatory invertebrates (dragonfly lakes).

This change in top predators resulted in a set of adaptive trait modifications in response to the different hunting styles of both predator types: whereas predatory fish actively search and pursue prey, invertebrate predator follow a sit-and-wait strategy, not pursuing prey. 3. Here it is shown that the habitat shift-related change in selection regime on larval *Leucorrhinia* caused species in dragonfly lakes to evolve increased larval foraging and activity, and results suggest that they lost the ability to recognise predatory fish. 4. The results of the present study highlight the impact of predators on behavioural trait diversification with habitat-specific predation regimes selecting for distinct behavioural expression." (Authors)] Address: Jiang, B., Institut für Biologie, Freie Universität Berlin, Königin-Luise-Street 1–3, 14195 Berlin, Germany. E-mail: [bin.jiang@fu-berlin.de](mailto:bin.jiang@fu-berlin.de)

**20357.** Julaika, W.; Junardi; Kustiati (2018): Spesies capung (Ordo: Odonata) di Taman Nasional Gunung Palung Kalimantan Barat. *Protobiont* 7(2): 37-42. ["Dragonflies are one of the Odonata order insects used as predators and bioindicators. The existence of a dragonfly is influenced by various types of habitat. Cabang Panti Research Station is a research station located in area of Gunung Palung National Park which has an area of 2,100 ha and has different type of habitat. This research is to know types of dragonfly at Cabang Panti Research Station. This research was conducted in four habitat types is freshwater swamp, alluvial, lowland sandstone and lowland granite. The catching of samples was done by using insect net. Dragonflies found in Cabang Panti Research Station is 787 individuals, two sub-orders, eight families, 10 genera and 15 species. Two sub-orders found is Zygoptera and Anisoptera, the eight families is Aeshnidae, Calopterygidae, Coenagrionidae, Chlorocyphidae, Euphaeidae, Libellulidae, Megapodagrionidae, and Platycnemididae. The most commonly species found of dragonflies are *Euphaea subcostalis* (275 individuals or 34.94%), *Euphaea impar* (160 individuals or 20.33%) and *Rhinagrion borneense* (78 individuals or 9.91%) whereas species found are *Amphicnemis gracilis* (1 individual or 0.12%) and *Elatoneura analis* (2 individuals or 0.25%)."] (Authors)] Address: Weni Julaika, Program Studi Biologi, Fakultas MIPA, Univ. Tanjungpura, Prof. Dr. H. Hadari Nawawi, Pontianak, Indonesia. E-mail [kostiati@fmipa.untan.ac.id](mailto:kostiati@fmipa.untan.ac.id)

**20358.** Kalkman, V.J.; Dijkstra, K.-D.B.; Dow, R.A.; Stokvis, F.R.; van Tol, J. (2018): Out of Australia: the Argiolestidae reveal the Melanesian Arc System and East Papua Composite Terrane as possible ancient dispersal routes to the Indo-Australian Archipelago (Odonata: Argiolestidae)? *International Journal of Odonatology* 21(1): 1-14. (in English) ["Information on the origin of distribution patterns shown by freshwater invertebrates in the Indo-Australian Archipelago is poor. Here we present a molecular based hypothesis of the phylogenetic relationships of Argiolestidae, a family of damselflies found throughout the tropical parts of the Eastern Hemisphere. We use this to address the following questions: (1) did Argiolestidae colonize Wallacea and the Philippines from the Eurasian or from the Australian continent? (2) Is the presence of Argiolestidae in New Guinea the result of a single colonization event, i.e. are the Argiolestidae found in New Guinea monophyletic? The results show that clades occurring in the Philippines, Wallacea and New Guinea all originate from Australian ancestors. Representatives in Sundaland are most closely related to African genera and failed to reach the Philippines and Wallacea. The presence of Argiolestidae north of Australia is the result of at least



three colonization events from Australia to areas that presently compose New Guinea and probably a fourth from Australia to Sulawesi. The two most diverse lineages found north of Australia show different distribution patterns. One reaching north as far as Luzon, presumably facilitated by Late Oligocene to Miocene islands arcs (Melanesian Arc System). The other clade shows a diversification of two genera and numerous species in the eastern tail of New Guinea, an area largely corresponding with the East Papuan Composite Terrane (EPCT) followed by the expansion of one genus into the rest of New Guinea. The EPCT's importance as source area for the New Guinean fauna has been suggested on the basis of distribution patterns, but we present the first evidence based on phylogeny reconstruction of strong diversification on this formerly isolated landmass." (Authors)] Address: Kalkman, V.J., Natural Biodiversity Center, naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**20359.** Kikuhara, N.; Tanaka, Y. (2018): Study on the life cycle of *Anax nigrofasciatus nigrofasciatus* in the biotope. Proceedings of the Japan Society of Civil Engineers G (Environment) 74(6): 151-156. (in Japanese, with English summary) ["*A. n. nigrofasciatus* is a common species of dragonflies that appear even on the urban waterside. This dragonfly is considered as the index species for developing of waterside biotopes. However, the life cycle such as eclosion period and frequency of visiting has not been well studied yet. For the purpose of utilizing the understanding about the life cycle of the dragonfly to the planning of fixture waterside biotope, we carried out the surveys on eclosion and frequency of visiting of *Anax nigrofasciatus nigrofasciatus* in the biotope of PENTA-OCEAN OBSTRUCTION Institute of Technology. The live camera is also utilized for the investigation of the frequency of visiting. As the result, it was possible to understand the eclosion population and visiting frequency of the dragonfly." (Authors)] [https://www.jstage.jst.go.jp/article/jscej/74/6/74\\_IL\\_151/\\_pdf/-char/en](https://www.jstage.jst.go.jp/article/jscej/74/6/74_IL_151/_pdf/-char/en)] Address: Email: noriko.iyoda@mail.penta-ocean.co.jp

**20360.** Kolev, N.; Boudot, J.-P. (2018): Evidence of reproduction of *Lindenia tetrphylla* in Bulgaria (Odonata: Gomphidae). *Notulae odonatologicae* 9(1): 11-17. (in English) ["*L. tetrphylla* was found reproducing in a warm man-made lake strongly influenced by one of the nearby lignite-fired Maritsa Iztok thermoelectric power stations in the Thracian Bulgarian plain. The records included a great number of imagines and some exuviae. A significant number of adult individuals were also found in various smaller ponds around, part of them considered as individuals in search of new breeding habitats. The reasons for the species' establishment in this highly disturbed area are discussed." (Authors)] Address: Kolev, N., Zornitsa St, 6260 Radnevo, Bulgaria. E-mail: neochrom@abv.bg

**20361.** Kompier, T. (2018): *Protosticta curiosa* Fraser, 1934 and its synonyms in Vietnam and China (Odonata: Platystictidae). *Zootaxa* 4434(2): 373-376. (in English) ["*Protosticta zhengi* Yu & Bu, 2009 and *Protosticta albifrons* Kompier, 2016 are shown to be synonyms of *P. curiosa* Fraser, 1934. The general distribution of *P. curiosa* is discussed and the key to the *P. curiosa*-group of *Protosticta* species for Vietnam is updated." (Author) For more details on the taxonomic status of this taxon see Phan et al. (2022): Taxonomic and faunistic notes on the genus *Protosticta* Selys, 1885 in Laos (Odonata: Zygoptera: Platystictidae). *Aquatic Insects* 43(3): 36-45. *P. curiosa* is considered a synonym of *P. trilobata* Fraser, 1933.] Address: Kompier, T., Schoutenstraat

69, 2596 SK Den Haag, the Netherlands. Email [kompiertokyo@yahoo.com](mailto:kompiertokyo@yahoo.com)

**20362.** Koparde, P.; Dawn, P.; Sumanapala, A (2018): Islands are calling: short Expedition to the Andaman Islands reveals five new spatial records and research gaps. *Agrion* 22(1): 37-41. (in English) ["During our seven day visit (14-21 August 2017), we opportunistically sampled 23 localities in North and one locality in Middle and South Andaman Islands each.... Our intense sampling resulted in documenting 27 of 52 species (>50%) recorded from the Andaman Islands and adding five species, namely *Tetrathemis platyptera*, IUCN red-listed 'Endangered' *Libellago balus*, *Acia-grion occidentale*, *Mortonagrion aborense*, and *Ceriagrion auranticum* as new spatial records for the Andaman Islands." (Authors)] Address: Koparde, P., Indian Institute of Science, Education and Research, Tirupati, Andhra Pradesh, India. E-mail: [pankajkoparde@gmail.com](mailto:pankajkoparde@gmail.com)

**20363.** Kosewska, O.; Buczynski, P. (2018): New record of an autochthonic population of *Sympetrum depressiusculum* (SELYS, 1841) (Odonata: Libellulidae) in the north-eastern Poland. *Odonatrix* 149: 6 pp. (in Polish, with English summary) ["The autochthonic population of *Sympetrum depressiusculum* was found in the Che<sup>3</sup>mno-Dobrzyń Lake District in north-eastern Poland, in fish ponds in the village of Koszelewy near Lidzbark (53°19'N, 19°57'E, UTM: DE30). Juvenile imagines were caught here on July 2 and July 4, 2018. The new site, together with other sites in northern Poland located to a maximum of 54°18'N, form the northernmost belt in Central and Eastern Europe, where the regular development of this species is found, which determines the limits of the generative range. They are also probably the source of individuals colonizing the Baltic countries. The authors also discuss the vegetative range of the species, now reaching Latvia, and point to the role of the area of Poland as a refugium of *S. depressiusculum* in Central and Eastern Europe: in most neighbouring countries this species is endangered and in the regression, also in the whole Europe and the EU it was classified as VU threat category, while in Poland it is not threatened and in the southern regions and locally in central regions it is widespread. The habitats occupied by the species are varied in Poland, however, in the northern part of the country fish ponds are still predominant, whose change in management methods is one of the main factors threatening the species in other countries." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19, PL-20-033 Lublin, Poland. E-mail: [pawbucz@gmail.com](mailto:pawbucz@gmail.com)

**20364.** Le Gall, M.; Fournier, M.; Chaput-Bardy, A.; Husté, A. (2018): Determinant landscape-scale factors on pond odonate assemblages. *Freshwater Biology* 63(3): 306-317. (in English) ["1. Species assemblages are related to environmental factors acting at different landscape scales. Local habitat heterogeneity also contributes to maintain the regional species pool. Understanding factors determining species presence is therefore crucial for formulation of successful conservation and management strategies. 2. Odonates can reveal much about patterns of species assemblages since their presence at a site reflects both their dispersal ability and life cycle constraints. Odonate assemblages were studied at 31 ponds located in three different landscapes: forest, urban and field. The impact of pond geographical distribution and their local characteristics (i.e., vegetation, suspended matter, freshwater macroinvertebrates, pond area and temporariness) on odonate composition, species richness and larval presence were studied. 3. According to their

intrinsic requirements, Odonata presence on ponds depended on local characteristics. Some species of the two orders were only detected in field or forest ponds. Moreover, some species were never detected in urban ponds. Differences in odonate assemblages were mainly related to vegetation, freshwater macroinvertebrates and pond area. Species richness was related to predator abundance and pond area, especially for dragonflies. The presence and abundance of odonate larvae were both related to aquatic vegetation, and to contrasted aquatic variables of ponds. Therefore, this study confirms that vegetation within and around ponds determines odonate presence. Interestingly, in a pond, species detected at the adult stage were not always detected at the larval stage, highlighting the need to really consider both parts of the lifecycle when studying odonate assemblages. 4. Diversity of local habitats within and around ponds depends strongly on the surrounding landscape and influences the assembly of odonates. Forest and field ponds presented particularly dissimilar species assemblages. Urban ponds had no specific environmental habitats compared to the other contexts. Species present on these ponds are rather generalist and able to support human disturbances. Overall, this study confirms that pond heterogeneity may be a key factor in maintaining the regional pool of odonate species." (Authors)] Address: Husté, Aurélie, ECODIV URA/EA 1293, IRSTEA, FR CNRS 3730 SCALE, UFR Sciences et Techniques, Normandie Université, Université de Rouen, Mont-Saint-Aignan Cedex, France. E-mail: aurelie.huste@univ-rouen.fr

**20365.** Lecaplain, B. (2018): Seconde année de suivi de la Grande Aeshne *Aeshna grandis* (L., 1758) dans deux étangs du Perche (Orne). Rapport GRETIA réalisé grâce aux financements de l'Europe (fonds FEADER), de l'Agence de l'eau Loire-Bretagne et de l'Agence de l'eau Seine-Normandie, dans le cadre de la déclinaison régionale du PNAO: 9 pp. (in French) ["This report presents the results of the second year of monitoring the exuviae of *Aeshna grandis* in the Cachot and Gré ponds (Brésolettes, Orne), carried out by means of three passages made on foot/by boat along the banks from the inside, on 10, 25 August and 11 September 2017. Despite the presence of the species on the Gré pond, no exuviae were found." (Author/DeepL)] Address: not stated

**20366.** Leclerc, D. (2018): Ecosystèmes aquatiques du Salève. Enjeux écologiques et mesures en faveur de leurs espèces remarquables. Archives des Sciences 70: 171-180. (in French) ["Three years of inventories (from 2011 to 2013) have made it possible to draw up an ecological assessment of most of the aquatic ecosystems present on the Salève massif [Département Haute-Savoie, France]. Alpine pasture or forest ponds, marshes or even forest streams were investigated in order to record the diversity of odonates [n=21 species] and macrophytes present in these particular biotopes. This work has made it possible to identify remarkable species for the Salève; some ecosystems even host species that are almost absent from the Geneva basin. These inventories have also made it possible to highlight the ecological challenges and threats facing these fragile ecosystems. Conservation measures were thus proposed in order to maintain or restore them. A hierarchy of interventions was also proposed in order to intervene in the most degraded environments. Finally, only regular monitoring of the restored environments will make it possible to assess the positive or negative effects of the various works carried out in recent years and thus to review the management guidelines if necessary." (Author/DeepL)] Address:

Leclerc, D., 2130, route des Monts, 74560 La Muraz, France. E-mail: davidleclerc74930@gmail.com

**20367.** Liu, H.; He, G.; Ma, C.; Wang, Q.; Luo, Y. (2018): A computational study of the aerodynamic performance of a dragonfly forewing in gliding flight. MATEC Web Conf. Volume 151, 2018: 4 pp. (in English) ["Gliding flight is a common mode of flight for dragonfly, the objective of the current research is to use numerical simulations to explore whether the corrugations have positive effect on aerodynamic performance of the dragonfly wings in gliding flight. In order to compare aerodynamic performance of the dragonfly wing and flat plate, a three-dimensional model of the dragonfly forewing and a three-dimensional flat plate with the same shape of the dragonfly forewing are established. The flow fields around three-dimensional dragonfly forewing and flat plate are simulated for  $Re=10000$  and angles of attack changing from  $0^\circ$  to  $25^\circ$  (with an interval of  $5^\circ$ ), numerical simulation indicate that aerodynamic performance of the dragonfly wing is slightly better than the flat plate over the entire range of parameters tested, especially the effect of the corrugations on the flow is more evident at large angle of attack." (Authors)] Address: Liu, H., Nanchang Hangkong Univ. School of Aircraft Engineering, student, 2017, China

**20368.** Loftie-Eaton, M.; Underhill, L.; Navarro, R. (2018): OdonataMAP: Progress report on the Atlas of the Dragonflies and Damselflies of Africa: 2016/17 and 2017/18. Biodiversity Observations 9.13: 1-10. (in English) ["This paper reports progress with OdonataMAP, the Atlas of Dragonflies and Damselflies of Africa, for the two-year period 1 July 2016 to 30 June 2018. During the two-year review period, the database for the project grew by 30,423 records to 52,257, starting from 22,809 records collected between 2010 and June 2016. Submissions were made from 25 African countries. In six of the nine provinces of South Africa, the number of OdonataMAP records for the province more than doubled. The provinces in which the number of records were not doubled were Gauteng (44% of records made during reporting period), Free State and North West (both 46%). Five observers contributed more than 1000 records over the two-year period, and a further 10 between 500 and 999 records. The total number of observers for the two-year period was 529, compared with 295 in the 2010–16 period. One of the important success of OdonataMAP during the review period was to increase the number of observers, and to reduce the project's dependence on a small number of citizen scientists." (Authors)] Address: Loftie-Eaton, Megan, Animal Demography Unit, Dept Biological Sciences, Univ. of Cape Town, Rondebosch, 7701 South Africa; Biodiversity and Development Institute, 25 Old Farm Road, Rondebosch, 7700 South Africa

**20369.** Luna-León, C.; Domínguez-Márquez, V.M.; Catalán-Heverástico, C.; Pérez-Vargas, J.M. (2018): Dragons (Insecta: Odonata) of Tuxpan, Northern Region of the Guerrero State. Entomología mexicana 5: 587-592. (in Spanish, with English summary) ["This investigation was carried out in the locality of Tuxpan, Iguala de la Independencia, Guerrero, Mexico, with the purpose of knowing the odonatofauna and its seasonal fluctuation. The catches were made on the shores of the Tuxpan lagoon with entomological nets from February to April 2017. 319 specimens were captured, belonging to three families, 11 genera and 16 species. The most abundant family was Libellulidae with eleven species, and the species with the most specimens was *Orthemis ferruginea* (Fabricius, 1775). The highest value of abundance

occurred in the third week of March 2017." (Authors)] Address: Luna-León, C., Integrantes del Cuerpo Académico Sistemas de Producción Agropecuaria de la Facultad de Ciencias Agropecuarias y Ambientales, Universidad Autónoma de Guerrero, Periférico Poniente S/N, Colonia Villa de Guadalupe, Iguala de la Independencia, C. P. 40010, Guerrero, México. Email: cluna63@hotmail.com

**20370.** Marthelot, J.; Schleifer, J.; Brun, P.-T. (2018): Dragonfly wings-inspired deployable structures. *Bulletin of the American Physical Society Abstract: APS March Meeting 2018, Monday–Friday, March 5–9, 2018; Los Angeles, California H47.00005*: (in English) [Verbatim: Maintaining the overall shape of a flat structure while increasing its surface area is a nontrivial challenge when designing soft structures. When the wing of an emerging dragonfly deploys in a couple of minutes, the expansion is guided by a network of veins, in which hemolymph is injected and subsequently solidifies to generate rigidity. During the deployment stage, the looping patterns of the edge of the wings are characteristic of differential growth. Inspired by this insect, we build a model experiment of the inflatable deployable structure composed of a tubular network of the veins. We first characterize the response of a unique looping tubular structure under pressure. We then characterize the in-plane expansion of the structure and study its correlation to the network geometry and the pressure applied in the system. A systematic variation of the geometric and elastic parameters allows us to search for an optimal design and operational conditions for maximal extension, while minimizing the input pressure.] Address: not stated

**20371.** Mashkova, I.V.; Krupnova, T.G.; Kostryukova, A.M.; Vlasov, N.E. (2018): Distribution of dragonflies (Odonata: Insecta) in South Ural lakes, Russia. *Biodiversitas* 19: 202-207. (in English) ["This paper studies the diversity and distribution of Odonata (Insecta) in the South Urals region lakes such as Lake Large Miassovo, Lake Small Miassovo, Lake Ilmenskoe, Lake Savelkul and Lake Baraus. We revised dragonflies in five lakes during May–September 2014–2016. Dragonflies and larvae were identified up to the species. As results, 36 species (12 Zygoptera and 22 Anisoptera) belonging to 15 genera were recorded. To compare the similarities of dragonfly communities of different lakes we used the Canonical Correspondence Analysis (CCA) according the Jaccard index. Comparing the number of records of odonate species for selected lakes in our study, we found that the small richness of species was typical for lakes Savelkul and Baraus (22% and 25% of the total number of species, respectively) and the large values of the species richness was obtained for lakes Small Miassovo, Ilmenskoe and Large Miassovo (50%, 72% and 80% of the total number of species, respectively)." (Authors)] Address: Mashkova, Irina, Dept of Chemistry, South Ural State Univ.. 76 Lenin Prospect, 454080, Chelyabinsk, Russia

**20372.** Masterson, R. (2018): A survey of microplastics in invertebrates in the Lake Champlain basin. Poster; <https://soar.suny.edu/handle/20.500.12648/847>: (in English) ["The goal of this research was to determine whether microplastics (MP) were ingested by aquatic macroinvertebrates resident to Lake Champlain. We did so by quantifying and characterizing (e.g., fragment, fiber, film, foam, pellet) microplastic particulate. In more recent samples, we have dried and weighed invertebrates to better assess uptake. Preliminary wet peroxide oxidation digests were performed on aquatic invertebrates (n = 301). Invertebrate specimens were collected across two classes (Insecta, Malacostr)

and 7 orders including Coleoptera, Ephemeroptera, Hemiptera, Odonata, Trichoptera, Mysida, and Amphipodae. These representative organisms are an important part of the lake food web, serving as preferred food for higher vertebrates including fish and waterfowl. Aquatic macroinvertebrates in our sample possess unique feeding methods, such as filter feeding, scraping, piercing, shredding, scavenging, collecting/gathering, and predation. Our research indicated that fibers were the most common microplastic type uptaken by invertebrates. Preliminary results suggest that, *Hydropsyche*, a filter-feeding insect digested, the greatest mean number of MP's (n=3). Lake Champlain macroinvertebrates contained on average 0.36 microplastic particles. There are limited reports of microplastics uptaken in aquatic invertebrates and this research provides baseline information for a guild that will be involved in trophic transfer. Results from this research serve to inform residents of the Lake Champlain watershed, anglers, non-profit lake organizations, as well as public health and government officials of the risks microplastics pose to aquatic biota and ultimately humans." (Author)] Address: Center for Earth & Environmental Science, SUNY Plattsburgh, Plattsburgh, NY 12901

**20373.** Mayer, G. (2018): Die Kleine Zangenlibelle *Onychogomphus forcipatus* (L. 1758); Neue Funde im Paartal und an Seen im Lechtal. *Berichte des Naturwissenschaftlichen Vereins für Schwaben* 122: 56-59. (in German, with English summary) [Bavaria, Germany; "Since 2004-2005, the 110 km long stretch of the Paar River between the Aichach-Friedberg Rural District and its confluence with the Danube has been under protection according to European law. *Ophogomphus cecilia*, a guarantor of clean water, is also the reference species for the dragonfly fauna of the Paar valley. A first record of the *O. forcipatus* in the summer of 2017 confirms the significance of the Paar valley. Additional finds are reported for lakes in the Lech valley. *O. forcipatus* is increasing its range." (Author)] Address: Mayer, G., Am Harfenacker 10, 86316 Friedberg, Germany. Email: mayerfdb@t-online.de

**20374.** McDevitt-Galles, T.; Calhoun, D.M.; Johnson, P.T.J. (2018): Parasite richness and abundance within aquatic macroinvertebrates: testing the roles of host- and habitat-level factors. *Ecosphere* 9(4): 1-16. (in English) ["The importance of parasites as both members of biological communities and structuring agents of host communities has been increasingly emphasized. Yet parasites of aquatic macroinvertebrates and the environmental factors regulating their richness and abundance remain poorly studied. Here, we quantified parasite richness and abundance within 12 genera of odonate naiads and opportunistically sampled four additional orders of aquatic macroinvertebrates from 35 freshwater ponds in the San Francisco Bay Area of California, U.S.A. We also tested the relative contributions of host- and habitat-level factors in driving patterns of infection abundance for the most commonly encountered parasite (the trematode *Haematoloechus* sp.) in nymphal damselflies and dragonflies using hierarchical generalized linear mixed models. Over the course of two years, we quantified the presence and intensity of parasites from 1612 individuals. We identified six parasite taxa: two digenetic trematodes, one larval nematode, one larval acanthocephalan, one gregarine, and a mite, for which the highest infection prevalence (39%) occurred in the damselfly genus, *Ischnura* sp. Based on the hierarchical analysis of *Haematoloechus* sp. occurrence, infection prevalence and abundance were associated predominantly with site-level factors, including definitive host (frog) presence, nymphal odonate

density, water pH, and conductivity. In addition, host suborder interacted with the presence of fishes, such that damselflies had higher infection rates in sites with fish relative to those without, whereas the opposite was true for dragonfly nymphs. These findings offer insights into the potential interaction between host- and site-level factors in shaping parasite populations within macroinvertebrate taxa." (Authors) Odonata are treated at genus level.] Address: McDevitt-Galles, T., Ecology and Evolutionary Biology, Univ. of Colorado, Boulder, Colorado 80309 USA

**20375.** Melendez Quinto, J.M. (2018): Odonatofauna larval de ríos, humedales y otros sistemas acuáticos en Lima Metropolitana, Perú. Tesis para optar el título profesional de biólogo, Universidad Nacional Agraria la Molina, Facultad de Ciencias, Lima – Perú: X + 174 pp. (in Spanish, with English summary) ["Odonata (dragonflies and damselflies) is a little known taxon in South America, especially its larvae. I set out to complete this information for the Lima metropolitan area because the species level offers advantages in ecology. Larvae (almost always close to the last instar) were caught in the Lurin, Rimac and Chillón rivers, the Villa and Ventanilla wetlands, and in the UNALM. I reared these specimens to obtain imago and nominate their exuviae. I also checked the museum material from the main collections in Lima. Twenty-one species were recorded in the study area, six of them for the first time (two new species), three ones only as imago and two others known just by literature. I deleted three species (*Argia fissa*, *Ischnura ramburii* and *Phyllocyba unifirma*) from the record. I made identification keys for 20 species of all recorded ones (*Argia* spec. nov. larva is hitherto unknown) and for their mandibles. Here was included figures (illustrations and photographs) of all species too. In the taxonomic treatment, I described each species the most detailly possible and, as the case may be, I did comments about the differences among their phylogenetically closest congeneric ones in America and their conspecific ones which were described in other countries of the New World. In addition I included information regard to their bionomics (aquatic habitat and emergence time), distribution and conservation status. For all taxa, I put a diagnosis to local (species) and national (supraspecific taxa) scale. *Argia inculta*, l. aff. *ramburii*, *Rhionaeschna brevifrons* and *Erythrodiplax cleopatra* have been described for the first time; while my description of *Progomphus joergenseni* was noticeably different from the same species in Argentina." (Author) <https://docslib.org/doc/59-79760/odonatofauna-larval-de-r%C3%ADos-humedales-y-otros-sistemas-acu%C3%A1ticos-en-lima-metropolitana-per%C3%BA>] Address: not stated

**20376.** Mellal, M.K.; Zebba, R.; Bensouilah, M.; Houhamdi, M.; Khelifa, R. (2018): Aspects of the emergence ecology of the regionally endangered *Coenagrion mercuriale* (Odonata: Coenagrionidae) in Northeast Algeria. *Zoology and Ecology* 28(3): 224-230. (in English) ["Emergence is a critical phase in the life cycle of odonates because then they are highly susceptible to predation and damage. Thus the ecological understanding of this phenomenon is crucial, particularly for the conservation and management of threatened species. We studied the emergence ecology of the regionally endangered *C. mercuriale* in Northeast Algeria where the species produces two generations per year (spring and autumnal), focusing on the temporal emergence pattern, body size and vertical stratification of exuviae of the autumnal population. Emergence was synchronous with 50% of the population emerging within eight days. Sex ratio at emergence was slightly female biased. A seasonal decline

was observed in the body size of the autumnal population like in that of the spring population. Vertical stratification of exuviae at ecdysis depended on the height of the support and vegetation density. These data are expected to be important for the management and conservation of this threatened species in Northeast Algeria and elsewhere within the distribution range." (Authors)] Address: Khelifa, R., Institute of Evolutionary Biology and Environmental Studies, Univ. of Zürich, Winterthurerstr. 190, CH-8057, Zürich, Switzerland. E-mail: [rassimkhalifa@gmail.com](mailto:rassimkhalifa@gmail.com)

**20377.** Michelson, C.I.; Clark, R.G.; Morrissey, C.A. (2018): Agricultural land cover does not affect the diet of Tree Swallows in wetland-dominated habitats. *The Condor* 120(4): 751-764. (in English) ["Agricultural practices have intensified during the past 50 yr, increasing crop production and altering the Canadian prairie landscape by removing or degrading uncropped habitats, including wetlands. We predicted that agricultural practices would alter invertebrate communities and the diets of consumers such as insectivorous birds. Using stable isotope analysis ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ), we tested for differences in the assimilated diets and isotopic niche widths of adult and nestling Tree Swallows (*Tachycineta bicolor*) in grassland and cropland sites with similar wetland densities in Saskatchewan, Canada. We also assessed relationships between swallow diet and body size, mass, and condition. Dietary composition and niche width differed between years and age classes but were not consistently related to agricultural land cover. Aquatic insect prey (Diptera and Odonata) made up 75% of all swallow diets, but nestlings consumed a larger proportion of terrestrial Diptera, resulting in broader isotopic niche widths compared with adults. Age-specific dietary differences could have been related to temporal shifts in the insect community or distinct foraging by adults when feeding nestlings. The body mass and condition of adult and nestling swallows were unrelated to diet, but were higher on average in grassland than cropland habitat. Overall, Tree Swallows specialized in feeding on aquatic insects, regardless of agricultural land cover, at least in wetland-dominated habitats. Food resources originating from wetlands may play a critical role in supporting insectivorous bird populations in agricultural landscapes." (Authors)] Address: Morrissey, Christy, Dept Oceanography & Coastal Sciences, Louisiana State Univ., Baton Rouge, Louisiana, USA. Email: [christy.morrissey@usask.ca](mailto:christy.morrissey@usask.ca)

**20378.** Mocq, J.; Hare, L. (2018): Influence of acid mine drainage, and its remediation, on lakewater quality and benthic invertebrate communities. *Water, Air, & Soil Pollution* 229(2), <https://doi.org/10.1007/s11270-017-3671-3>: (in English) ["The abandoned Aldermac Mine in Québec, Canada, has been a source of acid mine drainage to Lake Arnoux since 1946. Restoration of the site was undertaken in 2008 and completed in 2010. We compared lakewater chemistry and benthic invertebrate communities in the spring of 2010, prior to complete restoration, and in spring 2011, when acid mine drainage was no longer entering the lake. Between these years, lakewater pH increased by about one unit and the concentrations of many trace metals declined substantially. In 2010, benthic taxonomic richness increased significantly with distance from the source of contamination, whereas after restoration, there was no longer a clear trend. Communities in highly contaminated stations tended to be dominated by burrowing taxa such as larvae of *Chironomus* (Chironomidae) and *Oligochaeta*, whereas less contaminated stations had taxonomic and functional communities that were more diverse. In the year following recovery, some new taxa appeared (Trichoptera, Odonata,



and the Ceratopogonidae Bezzia), whereas the populations of an acid-tolerant Chironomus species declined. However, only larger individuals exhibited a significant response to pH and metal contamination." (Authors) Taxa are treated at genus level: Somatochlora, Sympetrum, Leucorrhinia, Coenagrion/Enallagma] Address: Mocq, J., Fac. of Science, Dept of Ecosystems Ecology, Univ. of South Bohemia, České Budejovice, Czech Republic

**20379.** Mor, J.-R.; Ruhí, A.; Tornés, E.; Valcárcel, H.; Muñoz, I.; Sabater, S. (2018): Dam regulation and riverine food-web structure in a Mediterranean river. *Science of the Total Environment* 625: 301-310. (in English) ["Highlights: • Flow regulation increased flow stability in a highly-variable Mediterranean river. • The detritus-based food web shifted into an algae-based food web. • Changes in consumers and their interactions widened and lengthened the food chain. • Flow regime alteration may impact river food webs beyond their individual components. Flow regimes are a major driver of community composition and structure in riverine ecosystems, and flow regulation by dams often induces artificially-stable flow regimes downstream. This represents a major source of hydrological alteration, particularly in regions where biota is adapted to strong seasonal and interannual flow variability. We hypothesized that dam-induced hydrological stability should increase the availability of autochthonous resources at the base of the food web. This, in turn, should favour herbivorous over detritivorous strategies, increasing the diversity of primary consumers, and the food-web width and length. We tested this hypothesis by studying the longitudinal variation in food-web structure in a highly-seasonal Mediterranean river affected by an irrigation dam. We compared an unregulated reach to several reaches downstream of the dam. Hydrological and sedimentological stability increased downstream of the dam, and altered the type and quantity of available resources downstream, prompting a change from a detritus-based to an algae-based food web. The fraction of links between top and intermediate species also increased, and the food web became longer and wider at the intermediate trophic levels. Food-web structure did not recover 14 km downstream of the dam, despite a partial restitution of the flow regime. Our results advance the notion that hydrologic alteration affects riverine food webs via additions/deletions of taxa and variation in the strength and distribution of food-web interactions. Thus, flow regulation by dams may not only impact individual facets of biodiversity, but also food-web level properties across river networks." (Authors) The paper includes a reference to Odonata.] Address: Mor, J.-R., Dept of Evolutionary Biology, Ecology and Environmental Sciences, Universitat de Barcelona, Av. Diagonal, 643, 08028 Barcelona, Spain. Email: jrmor@icra.cat

**20380.** Muktitama, S.R.; Hari prayogo, Yulianti indrayani (2018): Species diversity of dragonflies in Univ. campus area of Tanjungpura in Pontianak. *Jurnal Hutan Lestari* 6(4): 752-764. ["Dragonfly is an indicator to environment and ecosystem in a particular area. It is also known as a balancing predator to another insects' population. Various types of dragonfly are affected by some factors such as habitat conditions and the foods. Various types of dragonfly can be found in swamland, rice fields, flooded area, and also some locations around Universitas Tanjungpura. This research aims to convey information about various types of dragonfly in the area of universitas tanjungpura and also to define the index of variety of dragonfly types (H), equalization index (e), domination index (D), and species similarity (IS). This research took two weeks of fieldwork by applying purposive

sampling, which was started from 5th – 15 th April, 2018. Where the researcher is free to down each location seen from the large number of dragonflies are found. Then each location specified each plot with a distance of 15 meters each point of view of forming a circle pattern diameter 30 meters. The researcher found that 16 type of dragonfly consist of 13 type categorized as Subordo Anisoptera and 3 type categorized as Subordo Zygoptera. The 13 Anisoptera consist of 12 in Libellulidae family and 1 in Gomphidae family. The other 3 Zygoptera are in the the category of Coenagrionidae. This research shows that the role of dragonfly as a bioindicator and the predator of particular environment. Ecologically, Universitas Tanjungpura is indicated to have deficient environment in terms of the population growth of dragonfly in ecological ecosystem." (Authors)] Address: Muktitama, S.R., Fakultas Kehutanan Universitas Tanjungpura Pontianak. Jl. Daya Nasional Pontianak 78124, Indonesia. E-mail: senja.rimbawan@gmail.com

**20381.** Mutlu, O.; Páleníček, T.; Pinterová, N.; Šíchová, K.; Horáček, J.; Kristina Holubová, K.; Höschl, C.; Stuchlík, A.; Erden, F.; Valeš, K. (2018): Effects of the adipokinetic hormone/red pigment-concentrating hormone (AKH/RPCH) family of peptides on MK-801-induced schizophrenia models. *Fundamental and Clinical Pharmacology* 32(6): 589-602. (in English) ["The adipokinetic and red pigment-concentrating hormone (AKH/RPCH) family of peptides controls fat, carbohydrate and protein metabolism in insects. In our previous study, we showed that AKH possesses antidepressant, anxiolytic, and analgesic effects, causes hyperlocomotion and exerts neuroprotective effects and increased brain neurotrophic factors in mice. The aim of this study is to investigate the effects of Anax imperator AKH (Ani-AKH), Libellula auripennis AKH (Lia-AKH) and Phormia-Terra hypertrehalosemic hormone (Pht-HrTH) on MK-801-induced memory deterioration in the active allothetic place avoidance test (AAPA) and MK-801-induced sensorimotor gating deficit in the prepulse inhibition test (PPI). In the AAPA task, Long Evans rats were treated with Ani-AKH (2 mg/kg), Lia-AKH (2 mg/kg), Pht-HrTH (2 mg/kg), MK-801 (0.15 mg/kg) and the combination of MK-801 with the hormones subchronically. In the prepulse inhibition test, Wistar-albino rats were treated with Ani-AKH (1 mg/kg), Lia-AKH (1 mg/kg), Pht-HrTH (1 mg/kg), MK-801 (0.1 mg/kg) or the combination of MK-801 with hormones acutely before the test. In our study, Ani-AKH (2 mg/kg), Lia-AKH (2 mg/kg) and Pht-HrTH (2 mg/kg) reversed MK-801 (0.15 mg/kg)-induced cognitive memory impairment effects in the AAPA task. Lia-AKH (1 mg/kg) significantly potentiated the MK-801-induced PPI disruption, while Ani-AKH (1 mg/kg) partially potentiated the impairment caused by MK-801, and Pht-HrTH did not modify the effect of MK-801. In conclusion, AKH had no effect in sensorimotor gating deficits in the PPI test in schizophrenia model while AKH improved memory in the schizophrenia model of MK-801." (Authors)] Address: Mutlu, O., Kocaeli Univ. Medical Faculty, Dept of Pharmacology, 41380, Kocaeli, Turkey

**20382.** Nasiruddin, M.; Barua, A. (2018): Odonate abundance and diversity in four selective spots of Chittagong Univ. campus. *J. biodivers. conserv. bioresour. manag.* 4(1): 55-62. (in English) ["The abundance and diversity of odonate fauna were studied in four selective spots of Chittagong Univ. Campus, Chittagong, Bangladesh from August 2016 to July 2017. A total of 928 individuals of odonates under three families was collected during the study period from the four sampling sites. Out of 25 species identified one belonged to Gomphidae, 13 belonged to Libellulidae and 11

belonged to Coenagriidae. The abundance of odonate species was highest in July'17 (13.04%) and was lowest in December'16 (4.96%). Spot 2 was a hotspot for odonates as highest number (370) was collected from this spot. A total of 196, 188 and 174 individuals were collected from Spot 4, Spot 3 and Spot 1, respectively. The members of Libellulidae (472) were dominant followed by Coenagrionidae (406) and lastly Gomphidae (50). Highest species richness (SR), species diversity (H') and species evenness (J') values were observed in the months of May'17 (1.56±0.08), May'17 (1.29±0.08) and December'16 (0.96±0.03), respectively. But lowest such values were observed in December'16 (0.96±0.05), November'16 (0.90±0.02) and May'17 (0.81±0.05), respectively. Amongst the spots, highest SR, H' and J', values were observed in Spot 4 (1.40±0.10), Spot 2 (1.22±0.05) and Spot 1 (0.93±0.02), respectively, whereas, lowest such values were observed in Spot 1 (1.02±0.08), Spot 1 (1.01±0.04) and Spot 4 (0.82±0.02), respectively. Ecological conditions and seasonal fluctuation had great impact on the abundance and diversity of odonates." (Authors)] Address: Barua, A., Dept of Zoology, Univ. of Chittagong, Chittagong 4331, Bangladesh

**20383.** Neto, M.V.B.; Campos Júnior, O.; Rodrigues, G.G. (2018): Influence of the reproductive behavior of *Neoneura sylvatica* (Odonata: Protoneuridae) on spermatid morphology. *MOJ Anat & Physiol.* 5(3): 192-193. (in English) ["The present study aimed to verify the behavioral effects on the spermatid morphology of *Neoneura sylvatica* Hagen in Selys, 1886. For this, males were analyzed behaviorally for intra-sexual competition and for morphology of spermatozoa. With the observation of the five labelled individuals it was possible to observe agonistic relationships between resident males and intruders. When an intruding male attempted to invade the territory of the resident male, there were aggressive contacts. In the reproductive behavior it was possible to observe mating and oviposition with guard after copula in all the couples and attempts of interruption of oviposition by the male intruder. Through the histological analysis individual spermatozoa were observed and not found in bundles. Spermatozoa dimorphism was found for *N. sylvatica* being the first record for Odonata. This dimorphism is presented as follows: morphotype 1 has a total length of 99µm, undifferentiated head of the flagellum, spiral body. Morphotype 2 has a total length of 118µm, and it is possible to differentiate the head (31µm) from the flagellum (86µm). The head showed a shape of hook and ripples in the flagellum. We conclude that the behavioral attributes of male intra-sexual competition of *N. sylvatica* can influence the morphological characteristics of spermatozoa generating dimorphism." (Authors)] Address: Neto, Millena Vieira Barbosa, Depto Embriologia e Histologia, Univ. Federal de Pernambuco, Brazil. Email: millenavieira16@gmail.com

**20384.** Nilén, S. (2018): Effects of frequency-dependence in maintaining diversity in coexisting ecologically similar species. BSc. thesis, Dept of Biology, Lund Univ.: (in English) ["Niche theory predicts that cooccurring species must differ in their use of environments in order to coexist, thereby diversity can be maintained in a community. However, ecologically similar species do frequently occur in nature, hence species inhabit similar physical environs and share single underlying resources. In coexisting species with a similar niche, ecological drift is thought to eventually cause all but one species to go extinct, assuming drift acts alone. As drift is likely to be present in a community, contracting forces are expected to be found. One of those forces could be selec-

tion where frequency-dependence that can maintain diversity through e.g. rare species advantages and is thus capable of maintaining stable coexistence. Here we investigate mechanisms that can maintain diversity in ecologically similar but evolutionary separated species *I. elegans* and *E. cyathigerum*. We regulated frequencies of both species in mesocosm experiments and mating trials and were able to experimentally demonstrate the importance of negative frequency-dependence (rare-species advantages) in maintaining diversity in ecologically similar species. The maintenance of diversity in a community have long been explained by how species differ in their use of their environment. However, there are many examples in nature where similar species do cooccur in nature. For example, in Barro Colorado Island approximately 300 tree species were found in only 50 ha. This inevitably raises the question: How can so many closely related species coexist? Interestingly, closely related species of damselflies inhabit similar physical environments and often share single underlying resources. The minor differences of damselflies challenge traditional models of species coexistence. Methods: We wanted to know how closely related species can be maintained in a community without outcompeting each other. As study organisms we used the two, co-occurring species of damselflies: *Ischnura elegans* and *Enallagma cyathigerum*. The two species were kept in big outdoor cages simulating natural conditions where we wanted to understand how survival were affected by interference competition within and between species. We also used smaller cages where we looked at how mating affected both species. In both experiments we manipulated the frequencies of both species in experiments in three frequencies, (Rare: 25 %, Common: 75 % and Allopatric: 100 %) for the Blue-tailed damselfly and the common blue damselfly. Results: We found that the Blue-tailed damselfly survived longer in all treatments compared to the common blue damselfly. As this species does better in all the treatments one would expect that this species will outcompete the common blue damselfly in their natural community. However, we also found that the Blue-tailed damselfly regulates its own abundance. When common the Blue-tailed damselfly will interact with itself more through interference competition which decreases its survival. When rare this species both survives longer and have a higher proportion of matings, which can affect population growth. I suggest that the combination of interference competition that can regulate the species abundance and through rare-species advantages, diversity can be maintained, even if differences between species are small." (Author)] Address: not stated

**20385.** Noorhidayah, M. (2018): Bio-ecological studies of Malaysian odonates and an integrated taxonomic study on the genus *Rhinocypha*. PhD thesis, Faculty of Science, Univ. of Malaya: XXIII + 218 pp. (in English) ["Studies on Odonata have gained worldwide attention as well as here, locally in Malaysia. Although there is a wealth of data available to be utilized for solving taxonomic problems but ecological and behavioural research areas are more favoured in contrast to taxonomy and systematics. Thus, there are existing confusions for correct identifications in closely related and sympatric species, especially in female odonates. One such example is in the genus *Rhinocypha*, in which one of the objectives of this study is to fill in this gap. Consequently, the research aims and study techniques were; to illuminate the nationwide distribution and diversity of Odonata from Peninsular Malaysia forest reserves and relate these to the environmental parameters. Secondly, applying the molecular technique to elucidate the phyloge-

graphic pattern of *Rhinocypha fenestrella* which a predominant species in this study. Thirdly, a focused taxonomic work was conducted on *Rhinocypha*, employing multi-approaches, in the form of morphological procedures (Field Emission Scanning Electron Microscope, FESEM and geometric morphometric analysis); bio-material property investigations by using Laser Scanning Confocal Microscopy (LSCM), Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM). Overall, 1193 individuals from 70 species were collected from the 22 sampling localities. Chlorocyphidae was the dominant family and *R. fenestrella*, *R. biforata*, and *Euphaea ochracea* were the most abundant species. The PCA analysis confirmed that higher species richness was associated with the lower water chemical characteristics (compositions of sulphate, ammonia, iron and nitrite). The genetic diversity, expressed by CO1 and 16S rRNA genes for *R. fenestrella* was high, with 26 and 10 unique haplotypes, while 33 haplotypes were recovered by both combined datasets. The TCS analysis revealed the common ancestor of *R. fenestrella* was from the state of Negeri Sembilan. For the taxonomic study, 17 morphological characteristics were created to differentiate between the females of *Rhinocypha* spp. The FESEM on the female's ovipositor was done to focus on the anal appendages and sheathing valve (V3). Also, the phylogenetic patterns and canonical variate analysis for the wing geomorphometry revealed three clusters that supported the distinction of the *Rhinocypha* group. Exploration on bio-material, illustrate a general widespread distribution of resilin patches and cuticular spikes along the longitudinal veins of the wings. A novel technique applied in this study, was on nanoindentation (AFM) clarified the presence of varying size of nanostructures for all sample sections (membranes, mobile and immobile joints), and the elasticity values differed between sections. In summary, this study had effectively developed an integrated approach of classic morphological and trendy molecular as well as biomaterial studies, combined with different microscopy techniques, LSCM, SEM and AFM which provided corroborative evidence in resolving taxonomic uncertainties." (Author)] Address: not stated

**20386.** Ohba, S.-y.; Honki, K. (2018): Note on odonates in artificial ponds around the Faculty of Education, Nagasaki Univ.. Bulletin of Faculty of Education, Nagasaki Univ. 4: 19-26. [In addition to the odonates reported previously, we have newly identified two aeshnids, one macromiid, and three libellulids, in the vicinity of the Faculty of Education building at Nagasaki Univ.. Of these, *Rhyothemis fuliginosa* is placed in the 'Red List' of Nagasaki City in Nagasaki Prefecture. Students who attended a Biological Experiment I program from ,Q,O,P,R to ,Q,O,P,V evaluated the abundance of damselfly nymphs among three ponds. As a result, the abundance of damselfly nymphs in the artificial pond situated between the Faculty of Environmental Science and Faculty of Education buildings was found to be the least among the three ponds evaluated. The mosquitofish, *Gambusia affinis*, in the pond feeds on all kinds of Odonata nymphs. These results confirm the presence of invasive species in our Univ. ponds, and managing the invasive species is important for conservation of the odonates." (Authors)] Address: Ohba, S.-y., Fac. Education, Biology Education, Nagasaki Univ., Japan

**20387.** Ousterhout, B.H.; Graham, S.R.; Hasik, A.Z.; Serano, M.; Siepielski, A.M. (2018): Past selection impacts the strength of an aquatic trophic cascade. Functional Ecology 32: 1554-1562. (in English) [1. In complex food webs, in-

teractions among species in different trophic levels can generate cascading indirect effects that couple top predators with primary producers, thereby affecting ecosystem functioning. Natural selection imposed by top predators on intermediate predators may play a role in shaping the strength of these trophic cascades, but this conjecture remains largely untested. 2. To determine the effects of natural selection on the strength of trophic cascades, we conducted a two-part experiment in a four-level aquatic trophic system involving a top predator (fish), an intermediate predator (damselflies [*Enallagma* sp.]), herbivores (zooplankton) and primary producers (algae). We first quantified how predation by fish generated selection on damselfly activity levels after controlling for phenotypic plasticity. We then measured the indirect effects of this selection on primary production (phytoplankton biomass). In both experiments, we varied the density of predators, allowing us to elucidate both trait-mediated and density-mediated indirect effects. 3. We found that as fish density increased, damselfly survivorship declined, which generated natural selection favouring less active damselflies. These results are robust after taking into account latent effects of plasticity in response to fish predator cues. The surviving damselflies likely foraged less, freeing herbivores from predation, which in turn reduced primary production. This selection-driven trait-mediated indirect effect was only apparent at low damselfly densities, because the consumptive effect of damselflies at high densities overwhelmed the effects of past selection. 4. These results demonstrate how the past action of natural selection imposed by predators affects the phenotypes of prey that consume herbivores, which ultimately influences primary productivity—a selective trophic cascade. Natural selection can therefore act as a mechanism coupling ecological dynamics across trophic levels, which ultimately influences ecosystem functioning." (Authors)] Address: Siepielski, A.M., Dept of Biological Sciences, Univ. of Arkansas, Fayetteville, AR, USA. E-mail: amsiepie@uark.edu

**20388.** Pander, J.; Mueller, M.; Geist, J. (2018): Habitat diversity and connectivity govern the conservation value of restored aquatic floodplain habitats. Biological Conservation 217: 1-10. (in English) [Floodplains have been strongly altered by human activities such as channelization and other river regulations. Globally, there is a growing interest in their restoration because of an increasing understanding of the ecological importance of these habitats for feeding, spawning, nursery or overwintering of aquatic species. In this study, a large floodplain restoration project of the upper Danube River was used to investigate colonization and succession patterns of fish, macroinvertebrates, macrophytes and periphyton in relation to abiotic habitat variables that can be restored through ecosystem management. Highest species diversity was detected near the contact zones of the floodplain channel to the main stem of the Danube, and in the transition zones of river sections (RS) and oxbow lakes (OS). The highest proportions of all taxa (82%) and of distinctive species (22%) were detected in RS, followed by OS (66% of all taxa, 8% distinctive species) and floodplain ponds (FP, 47% of all taxa, 5% distinctive species). The habitat types RS, OS and FP significantly differed in overall community composition and their colonization processes comprising fast colonization of current-adapted specialists in RS, and mostly generalist species in OS and FP. Our results indicate that restoration of floodplain habitats should not only consider the re-establishment of maximum connectivity, but also provide a mosaic of distinct habitat types with different degrees of connectivity and disturbance. Each habitat type in the floodplain supported a unique assemblage

of species, which suggests that such habitat mosaics can facilitate exceptionally diverse ecosystems." (Authors) *Orthetrum cancellatum*, *Libellula depressa*] Address: Geist, J., Aquatic Systems Biology Unit, School of Life & Food Sciences, Technical Univ. of Munich, Muehlenweg 22, D-85350 Freising, Germany. E-mail: [geist@wzw.tum.de](mailto:geist@wzw.tum.de)

**20389.** Patrick, B. (2018): Moths, butterflies, and other insects of the Christchurch Botanic Gardens. Prepared for: Christchurch Botanic Gardens and Friends of the Christchurch Botanic Gardens. Wildland Consultants Ltd. Contract Report No. 4482: 25 pp. (in English) ["Christchurch Botanic Gardens were established in 1863 and occupy a 120 hectare site in a central and prominent position within the South Island's largest and New Zealand's second largest city. For this reason, Otautahi/Christchurch is often called the garden city." The list of taxa includes *Xanthocnemis zealandicus* and *Austrolestes colenisonis*.] Address: Wildland Consultants, 99 Sala Street, PO Box 7137. TeNgae, Rotorua 3042, New Zealand-

**20390.** Phillips, P.; Swanson, B.J. (2018): A genetic analysis of dragonfly population structure. *Ecology and Evolution* 8: 7206-7215. (in English) ["Dragonflies reside in both aquatic and terrestrial environments, depending on their life stage, necessitating the conservation of drastically different habitats; however, little is understood about how nymph and adult dragonflies function as metapopulations within connected habitat. We used genetic techniques to examine nymphs and adults within a single metapopulation both spatially and temporally to better understand metapopulation structure and the processes that might influence said structure. We sampled 97 nymphs and 149 adult *Sympetrum obtrusum* from eight locations, four aquatic, and four terrestrial, at the Pierce Cedar Creek Institute in Southwest Michigan over two summers. We performed AFLP genetic analysis and used the Bayesian analysis program STRUCTURE to detect genetic clusters from sampled individuals. STRUCTURE detected  $k = 4$  populations, in which nymphs and adults from the same locations collected in different years did not necessarily fall into the same clusters. We also evaluated grouping using the statistical clustering analyses NMDS and MRPP. The results of these confirmed findings from STRUCTURE and emphasized differences between adults collected in 2012 and all other generations. These results suggest that both dispersal and a temporal cycle of emergence of nymphs from unique clusters every other year could be influential in structuring dragonfly populations, although our methods were not able to fully distinguish the influences of either force. This study provides a better understanding of local dragonfly metapopulation structure and provides a starting point for future studies to investigate the spatial and temporal mechanisms controlling metapopulation structure. The results of the study should prove informative for managers working to preserve genetic diversity in connected dragonfly metapopulations, especially in the face of increasing anthropogenic landscape changes." (Authors)] Address: Payton P., Dept of Biology, Central Michigan Univ., Mt. Pleasant, MI 48859, USA. E-mail: [phill3pm@cmich.edu](mailto:phill3pm@cmich.edu)

**20391.** Pirela Pérez, R.E. (2018): Libélulas (Insecta) como indicadores da qualidade do habitat de riachos de lavrado em Roraima, Brasil. Programa de Pós-Graduação em Recursos Naturais, Universidade Federal de Roraima, Boa Vista, R.R., Brazil: 43 pp. (in Portuguese, with English summary) ["Human activities can cause great changes in the

Landscape, affecting hydrological cycles and causing habitat degradation, which results in habitat homogenization. Bioindicator species can be used to assess change in ecosystems biological integrity, as they vary their composition and incidence on disturbed aquatic ecosystems. This study aims to evaluate the environmental integrity of Lavrado streams in Roraima using Odonates, in which we stipulated the following hypothesis: Odonata richness and abundance are positively associated with the best rate of environmental stream quality because of their thermoregulatory capacity, their capacity of dispersal and habitat specialization. We sampled 10 Lavrado Streams in Roraima, Brazil, searching for the biggest variation across the savannahs of the region, in the months of October, November, and December of 2017, and March of 2018, the dry season. For each stream, we calculated the Habitat Integrity Index (HII), and we also determined adult Odonata richness, physicochemical variables, and the streamflow. In Lavrado areas there was no relation between the HII and Odonata richness. However, some species were nested in areas with intermediate values of integrity close to 0.5, and we believe that it is necessary to adapt the index, by including variables that can determinate the rate of disturbance of riparian savannah ecosystems. Zygoptera richness and stream's environmental temperature were related negatively. This response in Zygoptera is explained by the fact that they are species with a low capacity of dispersal due to their small size, and therefore are specialists." (Author)] Address: not stated

**20392.** Pires, M.M.; Stenert, C.; Maltchik, L. (2018): Effects of wetland hydroperiod length on the functional structure of assemblages of Odonata. *Austral Entomology* 58(2): 354-360. (in English) ["The role of hydroperiod as an environmental filter in structuring wetland assemblages is usually associated with trait selection in invertebrates. However, the effects of changes in the hydroperiod of non-permanent wetlands on invertebrate assemblages are still unclear, and few studies have assessed the functional structure of insect assemblages along the hydroperiod gradient. In this study, we investigated the effects of different hydroperiod lengths on the functional structure of Odonata assemblages in non-permanent wetlands (posteriorly classified as 'short-', 'medium-' and 'long-hydroperiod') in southern Brazil in 2013 and 2014. Biological traits related to life-history strategies in temporary waters were assessed according to seasonal patterns of occurrence of nymphal and adult stages of odonates. Following the rationale of an environmental filter produced by hydroperiod, we expected to find (1) higher functional diversity in longer hydroperiods and (2) trait-convergence patterns in odonate assemblages in shorter hydroperiods. Patterns of functional diversity were detected along the hydroperiod gradient. More specifically, higher functional dispersion was found in long-hydroperiod wetlands and trait-convergence patterns occurred in wetlands with shorter hydroperiods, supporting our general hypothesis. Odonate taxa with life-history traits associated with shorter life cycles predominated in medium- and short-hydroperiod wetlands. Our results thus suggest that more pronounced reductions in wetland hydroperiod length should produce odonate assemblages functionally more similar, and these results gain special importance as climate change scenarios indicate that the hydrology of wetlands will be affected by variation in rainfall regimes." (Authors)] Address: Pires, M., Lab. Ecol. & Evolution, Vale do Taquari Univ., Lajeado, RS, Brazil. Email: [marquespiresm@gmail.com](mailto:marquespiresm@gmail.com)

**20393.** Popova, O.N.; Haritonov, A.Yu.; Erdakov, L.N.



(2018): Cyclicity of long-term population dynamics in dragonflies of the genus *Sympetrum* (Odonata, Anisoptera) in the basin of Lake Chany. *Contemporary Problems of Ecology* 11(6): 551-562. (in English) ["This work is directed at continuous studies of cyclicity of long-term (1980–2010) population dynamics of odonates in the basin of Lake Chany (in the south of Western Siberia). 4 sympatric species of the genus *Sympetrum* [*S. danae*, *S. flaveolum*, *S. sanguineum*, *S. vulgatum*) have been investigated by spectral analysis method. The cycle spectra of population dynamics have been constructed for each species; the basic parameters of these cycles (period, phase, and power) have been calculated. Special number cycles have been found for each species. Interspecies differences increased in the direction from high to low frequencies of the spectrum. In the cases of similar cycles, interspecies differences have been shown in the ratio of cycle powers and/or phases: identical phases can indicate the ability of species to increase their number synchronously with any of close species; different phases can indicate the possibility of a small-numbered species to reach its maximum number against the minimum number of numerous species. A comparison of sympatric species spectra of the genera *Coenagrion* and *Sympetrum* has led to the conclusion that, the more similarity there is in environmental standards among species inside a genus (as for *Sympetrum*), the more specific the species frequency spectra are. All species of the genus *Sympetrum* can synchronize their number fluctuations with 2- to 3 and 4- to 5-year fluctuations of the local climate. Also specific synchronization with important nature-climatic rhythms was found for each species: for *S. danae*, with an 18-year rhythm of the level of Lake Chany and with a 16-year rhythm of June temperatures; for *S. flaveolum*, with a 24-year Brickner cycle, with an 8-year cycle of rainfall, and with a 28-year cycle of April and May temperatures; for *S. vulgatum*, with a 40- to 42-year cycle of the level of Lake Chany, with 12-year cycle of rainfall, and with a 7-year cycle of April and June temperatures; and for *S. sanguineum*, with a 7-year cycle of April and June temperatures. Perhaps the adaptation mechanism of species to each other and to environments is enclosed in the cyclicity of long-term fluctuations of species number." (Authors)] Address: Popova, Olga, Institute of Systematics and Ecology of Animals, Siberian Branch, Russian Academy of Sciences, Novosibirsk, Russia

**20394.** Prunier, F. (2018): *Onychogomphus costae* in Andalusia, southern Spain – mapping an overlooked species (Odonata: Gomphidae). *Odonatologica* 47(1/2): 1-22. (in English) ["*O. costae* is an Ibero-Maghrebian endemic, which is rare in the Iberian Peninsula. This study updates its distribution in Andalusia, southern Spain, based on a targeted survey carried out in 2015–2017 and the compilation of all available records. The species appears to be more widespread than previously documented, with a core distribution along the river Guadalquivir and its tributaries in the province of Córdoba. The altitudinal distribution of *O. costae* reflects its general preferences for permanent, seasonally flooding, lowland rivers. The period of most observations of adults stretches over two months from mid-May to mid-July. Factors likely to explain why the species has been overlooked in past decades are discussed. These include recording effort, habitat features, adult behaviour, larval ecology and general water quality." (Author)] Address: Prunier, F., Benarrabá Field Station, 29490 Benarrabá, Spain. E-mail: aaelbosqueanimado.info@gmail.com

**20395.** Pulok, M.K.H.; Chakravarty, U.K. (2018): Experimental analysis of aerodynamic performances of dragonfly

wings. *AIP Conference Proceedings* 1980(1), 10.1063/1.5044311: (in English) ["Nature-inspired flying robots are beneficial than other multi-rotor or fixed wing analogs, in many aspects. As wings play the key role on the hovering and maneuvering conditions of flying insects, structural functions and aerodynamic performances of the insect wings are needed to be analyzed for designing more effective wings for insect-sized flying robots. This study describes the method for experimental analysis of aerodynamic and vibration characteristics of dragonfly (*Erythemis simplicicollis*) forewings and hindwings. Vibration testing of the dragonfly wings has been conducted to obtain natural frequencies and mode shapes of the wings. The wings have also been examined in a suction wind tunnel having pistol-grip sting balance to illustrate the vibration and aerodynamic characteristics. The structural aerodynamic response of the wing has been determined at different freestream velocities and at different angles of attack. From the experimental results, the deformation response and the coefficients of drag and lift of the insect wings have been obtained for different Reynolds numbers and angles of attack. The coefficient of lift of the wings increases with the Reynolds number and angle of attack. The coefficient of drag of the wings also increases with the Reynolds number and angle of attack." (Authors)] Address: Pulok, M.K.H., Univ. of New Orleans, 2000 Lakeshore Drive, New Orleans, Louisiana 70148, USA. E-mail: mpulok@uno.edu

**20396.** Quenta Herrera, E.; Casas, J.; Dangles, O.; Pincebourde, S. (2018): Temperature effects on ballistic prey capture by a dragonfly larva. *Ecology and Evolution* 8(8): 4303-4311. (in English) ["Understanding the effects of temperature on prey–predator interactions is a key issue to predict the response of natural communities to climate change. Higher temperatures are expected to induce an increase in predation rates. However, little is known on how temperature influences close-range encounter of prey–predator interactions, such as predator's attack velocities. Based on the speed–accuracy trade-off concept, we hypothesized that the increase in predator attack velocity by increasing temperature reduces the accuracy of the attack, leading to a lower probability of capture. We tested this hypothesis on the dragonfly larvae *Anax imperator* and the zooplankton prey *Daphnia magna*. The prey–predator encounters were video-recorded at high speed, and at three different temperatures. Overall, we found that (1) temperature had a strong effect on predator's attack velocities, (2) prey did not have the opportunity to move and/or escape due to the high velocity of the predator during the attack, and (3) neither velocity nor temperature had significant effects on the capture success. By contrast, the capture success mainly depended on the accuracy of the predator in capturing the prey. We found that (4) some 40% of mistakes were under-shooting and some 60% aimed below or above the target. No lateral mistake was observed. These results did not support the speed–accuracy trade-off hypothesis. Further studies on dragonfly larvae with different morphological labial masks and speeds of attacks, as well as on prey with different escape strategies, would provide new insights into the response to environmental changes in prey–predator interactions." (Authors)] Address: Quenta Herrera, Estefania, 1Institut de Recherche sur la Biologie de l'Insecte, UMR 7261, CNRS, Université de Tours, Tours, France

**20397.** Raby, M.; Nowierski, M.; Perlov, D.; Zhao, X.; Hao, C.; Poirier, D.G.; Sibley, P.K. (2018): Acute toxicity of six neonicotinoid insecticides to freshwater invertebrates. *Environmental Toxicology and Chemistry* 37(5): 1430-1445. (in

English) ["Neonicotinoids are a group of insecticides commonly used in agriculture. Due to their high water solubility, neonicotinoids can be transported to surface waters and have the potential to be toxic to aquatic life. The present study assessed and compared the acute (48 or 96h) toxicity of 6 neonicotinoids (acetamiprid, clothianidin, dinotefuran, imidacloprid, thiacloprid, and thiamethoxam) to 21 laboratory-cultured and field-collected aquatic invertebrates spanning 10 aquatic arthropod orders. Test conditions mimicked species' habitat, with lentic taxa exposed under static conditions, and lotic taxa using recirculating exposure systems. Lethal (LC50) and effective (immobility, EC50) concentrations were calculated and used to construct separate lethal and immobilization-derived species sensitivity distributions (SSDs) for each neonicotinoid, from which 5th percentile hazard concentrations (HC5s) were calculated. Results showed the most sensitive invertebrates were insects from the orders Ephemeroptera (e.g. *Neocloeon triangulifer*) and Diptera (*Chironomus dilutus*), while cladocerans (e.g. *Daphnia magna*, *Ceriodaphnia dubia*) were the least sensitive. HC5s were compared to neonicotinoid environmental concentrations from Ontario monitoring studies. For all neonicotinoids except imidacloprid, the resulting hazard quotients indicated little to no hazard in terms of acute toxicity to aquatic communities in Ontario freshwater streams. For the neonicotinoid imidacloprid, a moderate hazard was found when only invertebrate immobilization, and not lethality, data was considered." (Authors) Test organisms include "Coenagrion sp.".] Address: Raby, Melanie, School of Environmental Sciences, Univ. of Guelph, Guelph, Ontario, Canada. Email: mraby@uoguelph.ca

**20398.** Ramadan, D.M.; Katbeh-Bader, A. (2018): Diversity of aquatic and semi-aquatic insects in Wadi Al-Walah in Jordan. *Zoology and Ecology* 28(2): 117-138. (in English) ["The aquatic and semi-aquatic insects of Wadi Al-Walah, Jordan were collected biweekly from five sites from August 2015 to August 2016. A total of 24,176 specimens of aquatic and semi-aquatic insects representing at least 75 identified or putative species of 33 families and seven insect orders were collected. The most abundant insect order was the Ephemeroptera of the family Caenidae. The Diptera was the most diverse (43 species in 13 families), followed by Coleoptera (10 species in 3 families), Hemiptera (7 species in 6 families), Odonata (7 species in 5 families), Ephemeroptera (4 species in 3 families) and Trichoptera (3 species in 2 families). A total of 22 species were recorded for the first time from Jordan; 8 were identified to the species level. Larvae of all collected species are briefly described and color images are provided illustrating morphological structures useful for future identification, especially for the Diptera. The results of our study indicated an urgent need for identification manuals for aquatic insects to support freshwater quality assessments in developing regions of Jordan and other eastern Mediterranean countries." (Authors)] Address: Katbeh-Bader, A., Dept Plant Protection, Fac. Agriculture, the Univ. Jordan, Amman, Jordan. Email: Ahmadk@ju.edu.jo

**20399.** Reborá, M.; Frati, F.; Piersanti, S.; Salerno, G.; Selvaggini, R.; Fincke, O.M. (2018): Field tests of multiple sensory cues in sex recognition and harassment of a colour polymorphic damselfly. *Animal Behaviour* 136: 127-136. (in English) ["Highlights: •We examined whether free-flying male damselflies detect sex and morph via odour. •Male responses to nonvisual cues of live conspecifics and controls did not differ. •Males showed no preference for andromorphic or heteromorphic females. •Marked female morphs

were equally successful in resisting mating attempts. •Harassment responses of *Ischnura elegans* and *Enallagma* females appear similar. The use of multiple sensory modalities in mating decisions has prompted a reassessment of sexual selection in many species. Odonate males have long been assumed to use only visual cues in mate recognition. Using only airborne cues in the laboratory, a previous study of *Ischnura elegans* found that males discriminate between the sexes and exhibit an odour preference for male-like female colour morphs. In a field experiment that required free-flying males to detect and recognize potential mates, we scored nonsexual and sexual reactions of free-flying males to live conspecifics (andromorphic females, which mimic male body colour and pattern; heteromorphic females, which differ from males in body colour and pattern; and males) and empty control dowels positioned at ponds. 'Non-visual' treatments concealed under a muslin bag offered only olfactory cues, whereas the unbagged 'visual' treatments offered visual plus odour cues. Live conspecifics in the nonvisual treatments did not elicit more sexual reactions than control dowels. In contrast, live individuals in the visual treatment elicited more sexual responses than did controls, suggesting that odour alone was insufficient for detection of conspecifics. However, even with visual cues, males reacted sexually towards other males as often as they did towards either female morph, indicating a failure to discriminate between sex or morph. A second, more realistic visual treatment away from water, where 77% of the solitary mature individuals were males, produced similar results. Thus, we measured natural harassment rates of marked, free-flying females. Both female colour types used similar behaviours to evade males. We found no difference in harassment or mating rates between colour morphs. Our results suggest that visual cues of female *I. elegans* act similarly to the context-dependent signal apparency of *Enallagma* colour morphs, and emphasize the need for laboratory results to be validated by comparison of sensory abilities under natural conditions." (Authors)] Address: Fincke, Ola, Ecology & Evolutionary Biol. Graduate Program, Dept Biol., Univ. Oklahoma, Norman, OK 73019, USA. Email: fincke@ou.edu

**20400.** Renner, S.; Périco, E.; Schmidt Dalzochio, M.; Sahlén, G. (2018): Water body type and land cover shape the dragonfly communities (Odonata) in the Pampa biome, Rio Grande do Sul, Brazil. *Journal of Insect Conservation* 22(1): 113-125. (in English) ["The biogeographical region known as the Pampa biome in southern Brazil, was originally mainly covered with open fields or grassland, with areas of riparian forest surrounding the water bodies. Today this landscape appears highly fragmented due to agricultural activities such as rice cultivation, extensive cattle farming, and forest plantations. Studies have shown that the Pampa biome has high levels of biodiversity and endemism, but with regard to invertebrates, this biome is still one of the least known in Brazil. We therefore designed a study comparing the Odonata communities to environmental and landscape features in this area, measuring diversity by species richness, relative abundance and Shannon index. Our results showed that the Pampa is a biome very rich in odonates, and that the species communities are highly dependent on the environmental conditions of the area. Habitats such as Rivers/Streams, bordered by native grasslands and riparian forests, were shown to harbour communities that were ecologically more complex and sensitive than other habitat types. Man-made lakes and agricultural areas displayed lower levels of biodiversity and odonate communities dominated by generalist species. By combining data

on the communities of Odonata and other taxa, our analyses may be instrumental in determining priority areas for future conservation measures within the area." (Authors)] Address: Renner, S., Laboratório de Ecologia e Evolução, Univde do Vale do Taquari - UNIVATES, Lajeado, Brazil

**20401.** Rieckh, C.; Körner, A.; Holzinger, W.E. (2018): Die Libellenfauna des Laabachs im Grazer Feld. *Entomologica Austriaca* 25: 151- (in German) [Verbatim: In this study, the dragonfly fauna along the Laabach in the Graz field south of the Styrian capital was investigated. The stream, which is about 9.4 km long, runs partly through village and settlement areas, but mostly through agricultural land and is therefore mainly surrounded by fields. It was divided into 59 largely homogeneous sections from its source to its mouth in the Poniglach. Each section was walked at least four times during the flight season from May to September 2017 and the dragonfly fauna was recorded semi-quantitatively. In addition, data from random surveys in 2016 are available. In order to be able to record the influence of the habitat features of the surrounding area on the dragonfly fauna, the surrounding area was mapped up to a distance of 30 metres on both sides of the bank. A total of at least 25 species were recorded. While some sections of the stream were richly structured and had a high dragonfly diversity, other sections were heavily anthropogenically impaired (canalised) and/or temporarily dry. These sections were colonised by only a few species in low densities. Particularly noteworthy from a nature conservation point of view are the occurrences of *Coenagrion ornatum*, *Somatochlora meridionalis* and *Lestes barbarus* on the Laabach."] Address: Rieckh, Christina, Institut für Zoologie der Karl-Franzens-Universität Graz, Universitätsplatz 2, 8010 Graz, Austria. E-Mail: christina.rieckh@edu.uni-graz.at

**20402.** Rodrigues, A.C.M.; Bordalo, M.D.; Golovko, O.; Koba, O.; Barata, C.; Soares, A.M.V.M.; Pestana, J.L.T. (2018): Combined effects of insecticide exposure and predation risk on freshwater detritivores. *Ecotoxicology* 27: 794-802. (in English) ["Insecticides usually present in low concentrations in streams are known to impair behaviour and development of non-target freshwater invertebrates. Moreover, there is growing awareness that the presence of natural stressors, such as predation risk may magnify the negative effects of pesticides. This is because perception of predation risk can by itself lead to changes on behaviour and physiology of prey species. To evaluate the potential combined effects of both stressors on freshwater detritivores we studied the behavioural and developmental responses of *Chironomus riparius* to chlorantraniliprole (CAP) exposure under predation risk. Also, we tested whether the presence of a shredder species would alter collector responses under stress. Trials were conducted using a simplified trophic chain: *Alnus glutinosa* leaves as food resource, the shredder *Sericostoma vittatum* and the collector *C. riparius*. CAP toxicity was thus tested under two conditions, presence/absence of the predator *Cordulegaster boltonii*. CAP exposure decreased leaf decomposition. Despite the lack of significance for interactive effects, predation risk marginally modified shredder effect on leaf decomposition, decreasing this ecosystem process. Shredders presence increased leaf decomposition, but impaired chironomids performance, suggesting interspecific competition rather than facilitation. *C. riparius* growth rate was decreased independently by CAP exposure, presence of predator and shredder species. A marginal interaction between CAP and predation risk was observed regarding chironomids development. To better un-

derstand the effects of chemical pollution to natural freshwater populations, natural stressors and species interactions must be taken into consideration, since both vertical and horizontal species interactions play their role on response to stress." (authors)] Address: Pestana, J., Dept of Biology & CESAM, Univ. of Aveiro, Aveiro, Portugal. E-mail: jpestana@ua.pt

**20403.** Sasamoto, A.; Kawashima, I.; Kompier, T.; Futahashi, R. (2018): Consideration of the taxonomical relationship of *Sympetrum speciosum* and its subspecies *haematoneura* based on adult and larval morphology and genetic analyses, with a first record of *speciosum* from Vietnam and larval description of *haematoneura* (Anisoptera: Libellulidae). *Tombo* 60: 79-89. (in English) ["External morphology of adult and larva are compared among the populations of *S. speciosum* from Japan, Taiwan, continental China, Vietnam, Nepal (subsp. *haematoneura*), and their genetic analyses are performed. The record of Vietnamese *speciosum* and the larval morphology of *haematoneura* are described for the first time. Although the size of orange patch at the base of wings is diversified among the populations, the differences of other adult and larval external morphology are very small and genetic differences are also subtle, suggesting that they belong to the single species *S. speciosum*." (Authors)] Address: Sasamoto, A., Tawaramoto-cho, Shiki-gun, Nara Pref., Japan. E-mail: akssmt@sea.plala.or.jp

**20404.** Schlemmer, L. (2018): Padrões de diversidade e suas implicações para a conservação de Odonata (Insecta) em igarapés amazônicos. Belém,: X + 144 pp. (in Portuguese, with English summary) ["The distribution of species within a landscape and the mechanisms that determine this distribution are fundamental questions for the understanding of the ecology of biological communities. The understanding of these phenomena is essential for the management of ecosystems and decision-making on the conservation of biodiversity, environmental conditions, and ecosystem resources. In this dissertation, we focused on the communities of Zygoptera, found in streams in the Brazilian Amazon region to investigate their alpha diversity (Chapter 1), beta diversity (Chapter 2), and the elements that structure metacommunities (Chapters 3), as well as the spatial priorities for the conservation of Amazonian odonates (Chapter 4). We used environmental, biogeographic, and spatial predictors to investigate the mechanisms that structure the distribution of the communities analyzed in this dissertation. In the case of alpha diversity (Chapter 1), environmental heterogeneity (climate) and primary productivity were the most important determinants of zygopteran species richness. For beta diversity (Chapter 2), turnover was the most important component of changes in species composition within the landscape, together with the spatial distance between sites, and the biogeographic region (centers of endemism), which were the most important predictors of zygopteran beta diversity. In our analysis of metacommunity patterns (Chapter 3), we found a Clementsian pattern in well-preserved streams, with a major change in the configuration of the communities in streams with environmental alterations, which represented subsets of the better preserved areas. In Chapter 4, we show that the spatial distribution of the conservation units in the Amazon region is relatively ineffective for the conservation of most of the beta diversity of the region's odonates. As the priority areas are located predominantly in southern Amazonia, and most of these areas have already been deforested, given that they lie within the arc of deforestation, the priority areas were displaced toward the

forested environments located nearer the center of the Amazon region. Based on this analysis, we suggest the creation of new conservation units or the implementation of incentives for the establishment of activities that cause reduced environmental impacts in more central, priority areas, which are still forested, as well as the restoration of priority areas that have already been deforested. One possibility here would be the implementation of programs that pay for ecosystem services, such as carbon credits obtained through reforestation and/or the development of activities with a reduced impact on biodiversity, such as agroforestry. This study also makes a major contribution to the reduction of the Wallacean and Hutchinsonian shortfalls on the zygoptera of the Brazilian Amazon region." (Author)] Address: Schlemmer Brasil, L., Programa de Pós Graduação em Ecol. e Conservação, Univde do Estado de Mato Grosso – UNEMAT, CEP 78690-000, Nova Xavantina, MT, Brazil. E-mail: brasil\_biologia@hotmail.com

**20405.** Schmidt Dalzochio, M.; Périco, E.; Renner, S.; Sahlén, G. (2018): Description of the final stadium larva of *Erythrodiplax media* (Odonata: Libellulidae) with preliminary key to known South American larvae in the genus. *International Journal of Odonatology* 21(2): 93-104. (in English) ["The larva of *E. media* is described and illustrated based on two exuviae of reared larvae and one final stadium larva collected in Xangri-lá, State of Rio Grande do Sul, Brazil. The larva of *E. media* can be distinguished from other species of *Erythrodiplax* by the presence of lateral spines on S8 and S9, the number of premental setae ( $n = 22$ ), palpal setae ( $n = 7$ ) and by the mandibular formula. We also provide a preliminary key to known South American larvae in the genus." (Authors)] Address: Schmidt Dalzochio, Marina, Lab. Ecol. e Evol., Unive do Vale do Taquari – UNIVATES, Lajeado, RS, Brazil. Email: mahsdalzochio@gmail.com

**20406.** Schneider, T.; Ikemeyer, D.; Müller, O.; Dumont, H.J. (2018): Checklist of the dragonflies (Odonata) of Iran with new records and notes on distribution and taxonomy. *Zootaxa* 4394(1): 1-40. (in English) ["Iran has a complex dragonfly fauna influenced by contacts and overlaps of different geographical zones. Its fauna is dominated by Eurosiberian taxa. However, the SE Province Sistân-va-Baluchestân is rich in oriental species, many of which having their western distribution limit in Iran. In NE-Iran, Irano-Turanian elements live and in the S- and SW-Iran African species are found. The Iranian Odonata fauna seems well studied, however, a closer look reveals many uncertainties and confusion, some records coming clearly from misidentification whereas other, which were missing proofs of correct identification remains to be confirmed. Even today, every new collecting trip reveals species new for Iran whereas species new for science are still detected, although rarely. In this checklist we include seven taxa new for Iran: *Stylurus ubadschii* (although a male of uncertain origin is recorded in Schmidt (1954)), *Ischnura senegalensis* (although two uncertain records were published by Martin (1912) and Schmidt (1954)), *Coenagrion ponticum*, *C. lunulatum*, *C. pulchellum*, *Lestes macrostigma*, and *Calopteryx splendens tschaldirica*. We critically checked all available data, including all published records. Fourteen taxa have been rejected, or placed in the category for need of confirmation. Till the end of 2017, 100 autochthonous taxa of dragonflies and two migratory species could be confirmed to be or have been present in Iran. We provide distribution maps, created after evaluation of published data and containing our own data from 12 trips to Iran, travelling over 35000 km in the country. Over 200 new localities are integrated. Taxonomic confusion is reduced by

rejecting the following taxa for Iran: *C. splendens mingrellica*, *C. hyalina*, *Erythromma najas*, *Aeshna cyanea*, *Gomphus davidi*, and *Sympetrum sinaiticum*. We regard the taxa *Gomphus amseli* and *G. schneiderii transcaspicus* as synonyms of *G. schneiderii*, and *Onychogomphus forcipatus lucidostriatus* as a synonym of *O. f. albotibialis*." (Authors)] Address: Schneider, T., Arnold-Knoblach-Ring 76, 14109 Berlin-Wannsee, Germany. E-mail: thomas.rs@gmx.de

**20407.** Seehausen, M. (2018): Hessische Libellenfunde (Odonata) aus der Sammlung Alfred Schöttner. *Libellen in Hessen* 11: 49-55. (in German) ["178 Hessian specimens from the Alfred Schöttner collection were found in the State Zoological Collection in Munich. The animals were collected between 1946 and 1972 in the districts of Darmstadt-Dieburg, Fulda, Groß-Gerau and the Lahn-Dill district. The specimens from the LDK are currently the earliest known records from this region. A record of *Somatochlora arctica* from the Rote Moor/FD is currently the earliest known record for Hesse. *Gomphus vulgatissimus* and *Orthetrum coerulescens* have not yet been recorded from MTB 5316 (LDK), where they have now been found by Schöttner. There are records of the following species from previously unoccupied MTB quarters (all LDK): *Chalcolestes viridis* (MTB 5315/4), *Lestes barbarus* (MTB 5315/4), *Sympecma fusca* (MTB 5316/3), *Gomphus pulchellus* (5316/3), *Cordulegaster boltonii* (MTB 5316/3), *Somatochlora metallica* (MTB 5415/4) and *Sympetrum flaveolum* (MTB 5316/3). The potential and importance of scientific dragonfly collections for faunistics are explained, and the processing of further collections is recommended." (Author/DeepL)] Address: Seehausen, M., Museum Wiesbaden, Naturhistorische Sammlungen, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. Email: malte.seehausen@museum-wiesbaden.de

**20408.** Shapoval, A.P. (2018): Results of the 11 years monitoring of the dragonflies (Insecta: Odonata) in the Courish Spit in the Baltic Sea. Problems of explore and conservation natural and cultural heritage of the national park «Kurshskaya kosa» 14: 58-71. (in Russian, with English summary) ["The present study summarizes personal observations data of Odonata gathered in 2007-2017 of the Courish Spit in the Baltic Sea. In total, 57 dragonfly species were recorded (15 species belonging to Zygoptera and 42 species belonging to Anisoptera). The most numerous dragonflies were: 4 *Aeshna* species (*A. grandis*, *A. juncea*, *A. mixta*, *A. viridis*), *Somatochlora flavomaculata*, *Libellula quadrimaculata* and 4 *Sympetrum* species (*S. danae*, *S. flaveolum*, *S. sanguineum*, *S. vulgatum*). The most common species annually collected in Rybachy-type ornithological traps in large numbers (2001)-75000 specimens per year) was *L. quadrimaculata*." (Author) The paper includes also rare species as *Aeshna subarctica*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Epithea bimaculata*, *Somatochlora arctica*, *Crocothemis erythraea*, *Leucorrhinia albifrons*, *L. caudalis*, *L. peccoralis*, *Pantala flavescens*, *Orthetrum brunneum*, *O. coerulescens*, *Sympetrum pedemontanum*, *S. meridionale*, *Aeshna affinis* and *Sympecma paedisca*.] Address: Shapoval, A.P., Biological Station Rybachy, Russian Academy of Sciences, Zoological Institute, St. Petersburg, 199034 Russia. E-mail: apshap@mail.ru

**20409.** Shumway, N.; Gabryszuk, M.; Laurence, S.J. (2018): Flapping tandem-wing aerodynamics: dragonflies in steady forward flight. 2018 AIAA Aerospace Sciences Meeting, AIAA SciTech Forum, (AIAA 2018-1290): 15 pp. (in English) ["The study of tandem flapping wing aerodynamics of dragonflies in steady forward flight is presented here.



CFD simulations of one forewing-hindwing pair are run using wing kinematics measured in experiments with free flying dragonflies. Wing kinematics were acquired from tests of dragonflies flying through a confined space using multiple high speed cameras, placed such that they could record the dragonfly's motion. The test results contain videos of dragonflies flying inverted as well as upright, and wing kinematics have been extracted for three inverted and two upright flights. In the inverted flights the upstroke is longer than the downstroke and the pitch angle of the forewing is lower during the downstroke than similar upright flights. Three simulations were run based on this kinematic information: one simulating upright flight, one simulating inverted flight, and one looking at the effect of changing relative downstroke duration. The simulation results indicate that the dragonflies are controlling the orientation of their wing such that they have a similar orientation relative to their velocity during the halfstroke when the wing is flapping down in the lab reference frame. In addition, decreasing relative downstroke duration increases peak and average lift, making it unclear why dragonflies use a longer downstroke than upstroke while flying upright." (Authors)] Address: Shumway, N., Univ. of Maryland, College Park, MD, 20742, USA

**20410.** Simon, S.; Blanke, A.; Meusemann, K. (2018): Re-analyzing the Palaeoptera problem - The origin of insect flight remains obscure. *Arthropod Structure & Development* 47(4): 328-338. ["The phylogenetic relationships of the winged insect lineages - mayflies (Ephemeroptera), damselflies and dragonflies (Odonata), and all other winged insects (Neoptera) - are still controversial, with three hypotheses supported by different datasets: Palaeoptera, Metapterygota and Chiasmomyaria. Here, we reanalyze available phylogenomic data with a focus on detecting confounding and alternative signal. In this context, we provide a framework to quantitatively evaluate and assess incongruent molecular phylogenetic signal inherent in phylogenomic datasets. Despite overall support for the Palaeoptera hypothesis, we also found considerable signal for Chiasmomyaria, which is not easily detectable by standardized tree inference approaches. Analyses of the accumulation of signal across gene partitions showed that signal accumulates gradually. However, even in case signal only slightly supported one over the other hypothesis, topologies inferred from large datasets switch from statistically strongly supported Palaeoptera to strongly supported Chiasmomyaria. From a morphological point of view, Palaeoptera currently appears to be the best-supported hypothesis, however, recent analyses were restricted to head characters. Phylogenetic approaches covering all organ systems including analyses of potential functional or developmental convergence are still pending so that the Palaeoptera problem has to be considered an open question in insect systematics." (Authors)] Address: Email: [ablanke@evolution.uni-bonn.de](mailto:ablanke@evolution.uni-bonn.de)

**20411.** Smith, D.R. (2018): The aquatic ecology of Lake Rotokare. M.Sc. thesis, The Univ. of Waikato, Hamilton, New Zealand: 220 pp. (in English) ["The biology of three endemic and one exotic species of fish (banded kokopu, *Galaxias fasciatus*; shortfin eel, *Anguilla australis*; longfin eel, *Anguilla dieffenbachii*; and the European perch, *Perca fluviatilis*) was investigated in Lake Rotokare. Little is currently known regarding the local ecology of the lake. This study improves the understanding of the biological processes in Lake Rotokare and investigates the characteristics of the lake's water quality. Fish sampling occurred in the lake using a combination of boat electrofishing, gill netting, and fyke netting. The tributary was sampled using night time spotlighting. Fish

taken from the lake were used to determine length-weight relationships, size frequencies, CPUE, abundance estimations, fish biomass, stable isotope analyses, trophic levels, and perch diet. Water quality sampling was also undertaken to further build upon data from previous studies. The majority of fish sampled in Lake Rotokare were perch, with a mixture of size classes, but dominated by a large juvenile size class. Perch density was high (16.55 fish 100 m<sup>2</sup>). Longfin eels showed a cohort of large individuals with no evidence of recruitment occurring; while shortfin eels exhibited a distribution of size ranges with evidence of juvenile recruitment occurring. Electrofishing showed evidence of banded kokopu inhabiting the lake, even at distance from the tributary outlet, suggesting the possibility of a lake fringe population of kokopu. Spotlight sampling in June and December revealed a stable kokopu and koura population residing in the lakes' main tributary. Water quality data showed an overall decrease in total nitrogen and phosphorous loads within the lake since 1979. However, the lake has shown strong thermal stratification over summer over multiple years (1977, 2013, February 2017 and December 2017), and remains in poor condition, with a eutrophic TLI 4 rating of 4.1. Frequent cyanobacterial blooms continue to occur during the summer season, resulting in closure of the lake for contact recreation. Both dietary and stable isotope analyses showed indications that chironomid larvae and *Daphnia* sp. constituted the bulk of the primary production of the food web [also including "Odonata"]; juvenile perch were found to be the predominant food source of the three resident fish species. A three-end member mixing model was created to duplicate the theoretical food-web within the lake with chironomid larvae, dragonfly larvae, and juvenile perch at the base. Lipid treatment techniques were examined in this study for eel fin and muscle tissue. The results indicate that lipid treatment is needed for 13C isotope values for both longfin and shortfin muscle, and longfin fin tissue for accurate results. Mathematical equations were constructed to correct untreated fin tissue values into treated muscle values for 13C and 15N; avoiding the necessity for future lethal sampling methods." (Author)] Address: not stated

**20412.** Staentzel, C.; Arnaud, F.; Combroux, I.; Schmitt, L.; Tremolieres, M.; Grac, C.; Piegay, H.; Barillier, A.; Chardon, V.; Beisel, J.-N. (2018): How do instream flow increase and gravel augmentation impact biological communities in large rivers: A case study on the Upper Rhine River. *River Research and Applications* 34(2): 153-164. (in English) ["Actions are being developed to address the adverse consequences of engineering works on large European rivers by developing and implementing restoration activities in order to enhance the functionality and biodiversity of fluvial hydrosystems. However, as has frequently been mentioned in the scientific literature, quantitative and qualitative evaluation of the project benefits, if any, and their sustainability are hindered by the difficulty in assessing the responses of aquatic and riparian communities to the methods employed. A case study was conducted on a by-passed section of the Upper Rhine River (France and Germany) to investigate the effects of instream flow increase and gravel augmentation on selected aquatic and riparian communities (macroinvertebrates, macrophytes, and riparian plants). This paper presents the results of a 6-year interdisciplinary, before-after control-impact design monitoring study. The complexity of the study lies in carrying out a separate assessment of the cumulative effects on a site-based, project-specific basis. The results showed that (a) the instream flow increase resulted in greater richness of macrophyte species in the newly created backwaters, (b) the artificial gravel bar favoured the

recruitment of pioneer species, including invasive species, although gravel redistribution by floods prevented their development, and (c) gravel augmentation tended to promote the taxonomic richness of macroinvertebrate communities with the appearance of species adapted to the new substrate areas. These findings should help to fill the knowledge gaps in large-scale restoration and contribute key responses to the most frequently arising issues in this area, especially those concerning the efficiency and sustainability of river restoration projects." (Authors) Odonata species included *Gomphus vulgatissimus*, Coenagrionidae, *Cordulia aenea*, *Platycnemis* sp., and *Calopteryx* sp.] Address: Staentzel, Cybill, CNRS, LIVE UMR 7362, Univ. de Strasbourg, 67000 Strasbourg, France. E-mail: cybill.staentzel@live-cnrs.unistra.fr

**20413.** Stuhr, S.; Khanh, V.T.; Vongsvivut, J.; Senkbeil, T.M.; Yang, Y.; Al Kobaisi, M.; Baulin, V.A.; Werner, M.; Rubanov, S.; Tobin, M.J.; Cloetens, P.; Rosenhahn, A.; Lamb, R.N.; Luque, P.; Marchant, R.; Ivanova, E.P. (2018): Structure and chemical organization in damselfly *Calopteryx haemorrhoidalis* wings: A spatially resolved FTIR and XRF analysis with Synchrotron Radiation. *Scientific Reports* 8, Article number: 8413: 9 pp. (in English) ["Insects represent the majority of known animal species and exploit a variety of fascinating nanotechnological concepts. We investigated the wings of the damselfly *Calopteryx haemorrhoidalis*, whose males have dark pigmented wings and females have slightly pigmented wings. We used scanning electron microscopy (SEM) and nanoscale synchrotron X-ray fluorescence (XRF) microscopy analysis for characterizing the nanostructure and the elemental distribution of the wings, respectively. The spatially resolved distribution of the organic constituents was examined by synchrotron Fourier transform infrared (s-FTIR) microspectroscopy and subsequently analyzed using hierarchical cluster analysis. The chemical distribution across the wing was rather uniform with no evidence of melanin in female wings, but with a high content of melanin in male wings. Our data revealed a fiber-like structure of the hairs and confirmed the presence of voids close to its base connecting the hairs to the damselfly wings. Within these voids, all detected elements were found to be locally depleted. Structure and elemental contents varied between wing membranes, hairs and veins. The elemental distribution across the membrane was rather uniform, with higher Ca, Cu and Zn levels in the male damselfly wing membranes." (Authors)] Address: Ivanova, Elena, School of Science, RMIT Univ., Melbourne, Victoria, 3001, Australia. Email: elena.ivanova@rmit.edu.au

**20414.** Tamm, J. (2018): Zur Populationsökologie und Ethologie von *Cordulegaster bidentata* an einem Bach im Kaufunger Wald - eine Fallstudie (Odonata: Cordulegastridae). *Libellula* 37(3/4): 23-54. (in German, with English summary) ["About population ecology and ethology of *C. bidentata* living on a forest stream in Kaufunger Wald, Germany - A small forest stream in Kaufunger Wald, Central Germany, on Bunter Sandstone Substrate was populated by imagines of *C. bidentata* four months after removing a long solid layer of branch waste. One year after this removal 17 males were colour marked and both marked and unmarked individuals were counted during several days when passing the counting Station. Moreover, two unmarked males were observed simultaneously. Females were present too. Forty exuviae found in 2018 verified that the indigenous population is on this scale. In contrast to this result, only five larvae of *C. bidentata* could be found in this stream. In the surrounding forests no streams were found where other

large populations occurred. Individual flight behaviour of marked males was recorded both during season and days. One half of males could not be observed after marking any more. Among the other males few individuals dominated, others only occurred sporadically. One male belonging to the sporadic group occurred twice, in both cases just when a female was present along the stream. It happened to copulate in both cases. These copulations have been the only ones observed during this counting season." (Author)] Address: Tamm, J., Elgershäuser Straße 12, D-34131 Kassel, Germany. E-mail: jochen.tamm@t-online.de

**20415.** Torralba-Burrial, A. (2018): Comunidad Virtual de Aprendizaje (CVA) informal sobre los odonatos ibéricos: análisis de la lista de correo Odo-GIO (Odonata). *Boln. S.E.A.* 63: 357-361. (in Spanish, with English summary) ["The informal Virtual Learning Community (VLC) on Iberian Odonata: an analysis of the Odo-GIO mailing list Abstract: Virtual Learning Communities (VLC) are a reference for informal learning. The Odo-GIO mailing list, hosted by Rediris and linked to the Grupo Ibérico de Odonatología (GIO), is analysed according to the subject and aims of the messages shared by its members. Virtual learning community members' perceptions are evaluated through a questionnaire on both past and future developments of the mailing list. Community members who responded to the questionnaire manifested a high interest in dragonflies, and commented on positive learning experiences within the virtual community. The evaluation of its potential as a learning tool, issues related to odonate distribution, conservation or behaviour were highlighted." (Author)] Address: Torralba Burrial, A., Departamento de Biología de Organismos y Sistemas, Univ. de Oviedo, E-33071 Oviedo, Spain. Email: antoniob@hotmail.com

**20416.** Tsui, M.T.; Adams, E.M.; Jackson, A.K.; Evers, D.C.; Blum, J.D.; Balog, S.J. (2018): Understanding sources of Methylmercury in songbirds with stable mercury isotopes: Challenges and future directions. *Environmental Toxicology and Chemistry* 37(1): 166-174. (in English) ["Mercury (Hg) stable isotope analysis is an emerging technique that has contributed to a better understanding of many aspects of the biogeochemical cycling of Hg in the environment. However, no study has yet evaluated its usefulness in elucidating the sources of methylmercury (MeHg) in songbird species, a common organism for biomonitoring of Hg in forested ecosystems. In the present pilot study, we examined stable mercury isotope ratios in blood of 4 species of songbirds and the invertebrates they are likely foraging on in multiple habitats in a small watershed of mixed forest and wetlands in Acadia National Park in Maine (USA). We found distinct isotopic signatures of MeHg in invertebrates (both mass-dependent fractionation [as  $\delta^{202}\text{Hg}$ ] and mass-independent fractionation [as  $\Delta^{199}\text{Hg}$ ]) among 3 interconnected aquatic habitats. It appears that the Hg isotopic compositions in bird blood cannot be fully accounted for by the isotopic compositions of MeHg in lower trophic levels in each of the habitats examined. Furthermore, the bird blood isotope results cannot be simply explained by an isotopic offset as a result of metabolic fractionation of  $\delta^{202}\text{Hg}$  (e.g., internal demethylation). Our results suggest that many of the birds sampled obtain MeHg from sources outside the habitat they were captured in. Our findings also indicate that mass-independent fractionation is a more reliable and conservative tracer than mass-dependent fractionation for identifying sources of MeHg in bird blood. The results demonstrate the feasibility of Hg isotope studies of songbirds but suggest that larger numbers of samples and an expanded

geographic area of study may be required for conclusive interpretation." (Authors)] Address: Tsui, M., Dept of Biology, Univ. of North Carolina at Greensboro, Greensboro, North Carolina, USA

**20417.** Tüzün, N.; Stoks, R. (2018): Pathways to fitness: carry-over effects of late hatching and urbanisation on lifetime mating success. *Oikos* 127(7): 949-959. (in English) ["Life history theory and most empirical studies assume carry-over effects of larval conditions to shape adult fitness through their impact on metamorphic traits (age and mass at metamorphosis). Yet, very few formal tests of this connection across metamorphosis exist, because this entails longitudinal studies from the egg stage and requires measuring fitness in (semi)natural conditions. In a longitudinal one-year common-garden rearing experiment consisting of an outdoor microcosm part for the larval stage and a large outdoor insectary part for the adult stage, we studied the effects of two factors related to time constraints in the larval stage (egg hatching period and urbanisation) on life history traits and lifetime mating success in the males of the damselfly *Coenagrion puella*. We reared early- and late-hatched larvae from each of three rural and three urban populations from the egg stage throughout their adult life. Key findings were that both the hatching period and urbanisation shaped adult fitness, yet through different pathways. As expected, the more time-constrained late-hatched individuals accelerated their larval life history and this was associated with a lower lifetime mating success. A path analysis revealed this carry-over effect was mediated by the changes in the two metamorphic traits (reduced age and lower mass at emergence). Notably, urban males had a 50% lower lifetime mating success, which was not mediated by age and mass at emergence, and possibly driven by their shorter lifespan. Our results point to long-term carry-over effects of the usually ignored natural variation in egg hatching dates, and further contribute to the limited evidence showing fitness costs of adjusting to an urban lifestyle." (Authors)] Address: Tüzün, N., Evolutionary Stress Ecology & Ecotoxicology, Univ. of Leuven, Deberiotstraat 32, B-3000 Leuven, Belgium. E-mail: nedim.tuzun@kuleuven.be

**20418.** Turiault, M. (2018): A catalogue of the types of Protoneturinae and Disparoneurinae deposited in the Museum für Naturkunde in Berlin (Odonata). *International Dragonfly Fund - Report 118*: 1-10. (in English) ["A catalogue of all types of subfamilies Protoneturinae and Disparoneurinae currently housed in the entomological collection of the Museum für Naturkunde - Leibniz Institute for Evolution and Biodiversity Science in Berlin (Germany) is presented. It includes current status of the familygroup, genusgroup and speciesgroup names, transcriptions of data labels and references to the original descriptions." (Author)] Address: Turiault, Mélanie, Uhlenhorster Str. 23, 12555 Berlin, Germany. Email: melanieturiault@msn.com

**20419.** Turra, B.L.; Raimundi, E.R.; de Souza-Franco, G.M. (2018): Influência de variáveis ambientais em ambientes lóticos de Mata de Araucária sobre a taxocenose de Odonata. *Revista Ibero-Americana de Ciências Ambientais* 9(3): 289-305. (in Portuguese, with English summary) ["Influence of environmental variables in Araucaria Forest lotic environments on taxocenosis of Odonata - The size of the water bodies can be considered the main controller of the physical and chemical characteristics of the lotic environments. Therefore, the substrate type, river flow, organic and inorganic composition, and habitat heterogeneity are directly related to the size of the lotic environment. In turn,

these characteristics are determinant in the distribution and diversity of the immature fauna of Odonata. In this context, we test the hypothesis that different dimensions of lotic environments support similar diversity of Odonata immatures, however, differ in their composition. Thus, we evaluated the influence of water body size on abiotic factors and Odonata immature body taxocenosis. We carried out five seasonal samplings between 2011 and 2012, in the Araucarias National Park, Santa Catarina, in eight environments, through quantitative and qualitative methods. There were 520 Odonata individuals, distributed in eight families and 41 genera. The environments were evidently separated by the classification of the rivers. The highest values of diversity, richness and equitability were recorded in small streams, environments with greater habitat heterogeneity, higher percentage of organic matter and protected by ciliary forest. It was confirmed by this study that the high habitat heterogeneity in low order lotic environments influences the diversity, the abundance and the richness of the Odonata fauna. Another determining factor for the high indexes was the integrity of the study site, favoring the protection and cycling of nutrients in water bodies." (Authors)] Address: Turra, B.L., Universidade Comunitária da Região de Chapecó, Brasil. E-mail: bruninha.lais@gmail.com

**20420.** Walia, K.G.; Devi, M. (2018): Distribution of constitutive heterochromatin in four species of genus *Copera* of family Platycnemididae (Odonata: Zygoptera) from India. *Int. J. of. Life Sciences* 6(2): 457-461. (in English) ["C-heterochromatin distribution in four species of genus *Copera* of family Platycnemididae have been described. *Copera marginipes* and *Copera vittata assamensis* were collected from Bilaspur and Renuka lake (Sirmour, Himachal Pradesh), respectively, while *Copera annulata* and *Copera vittata* were collected from Nongkhyllem (Meghalaya), India. All the species possess  $n=13m$  as haploid chromosome number, which is the type number of the family and X0-XX sex determining mechanism. In all the species, autosomal bivalents show dark/light terminal C-bands on chiasmatic/non-chiasmatic ends, while m bivalent and X chromosome possess variation in distribution of C-heterochromatin. m bivalent is C-negative in *Copera marginipes*, while shows terminal C-bands in *Copera annulata*, *Copera vittata* and *Copera vittata assamensis*. X chromosome possesses less amount of C-heterochromatin in *Copera marginipes*, *Copera annulata* and *Copera vittata*, whereas X chromosome is bipartite and entirely C-negative in *Copera vittata assamensis*. Chromosome complement of *Copera vittata assamensis* has been studied for the first time." (Authors)] Address: Walia, Walia Gurinder, Dept of Zoology and Environmental Sciences, Punjabi Univ., Patiala- 147002. Punjab, India. Email: gurinderkaur\_walia@yahoo.co.in

**20421.** Wang, C.; Zhao, M.; Wang, J.; Jiang, Y.; He, Z.; Feng, Y. (2018): Molecular identification of a new species of edible dragonfly. *Biotic Resources* 40(2): 164-169. (in Chinese, with English summary) ["Some dragonflies are nutrient-rich edible insects with the value of health care. Currently, there are 12 species of edible dragonflies in the domestic market (*Crocothemis servilia*, *Orthetrum albistylum*, *O. triangulare melania*, *Pantala flavescens*, *Sympetrum uniforme*, *O. pruinatum neglectum*, *Epophthalmia elegans*, *Icetinogomphus rapax*, *Sinictinogomphus clavatus*, *Anax parthenope julius*, *Gomphus cuneatus*, *Lestes praemorsa*). We found a smaller species of edible dragonfly nymphs at Daping Township, Yuanyang County, Honghe State in Yunnan Province. This species of dragonfly does not belong to the

above 12 species based on the morphological characteristics. This edible dragonfly was identified with DNA barcoding method as *Sympetrum speciosum*." (Authors)] Address: Wang, C.; Email: cywang11@126.com

**20422.** Wang, J.; Han, P.; Zhu, R.; Liu, C.; Deng, X.; Dong, H. (2018): Wake capture and aerodynamics of passively pitching tandem flapping plates. 2018 Fluid Dynamics Conference. DOI: 10.2514/6.2018-3236: 13 pp. (in English) ["The passive pitching mechanism of insect wings during unsteady flapping flight is commonly observed in nature and has been extensively studied using single wing models. However, passive pitching in ipsilateral wings, which will be inevitably affected by the wing-wing interactions, remains unexplored. In this paper, the wake capture and aerodynamic performances of two passively pitching tandem flapping plates ( $AR = 3.0$ ) is numerically investigated with a torsional spring model. The computations are conducted using an immersed boundary method (IBM) based direct numerical simulation (DNS) solver. A constant incoming flow is introduced to model the flow condition of dragonfly takeoff flight. A parametric study on the phase difference ( $A\langle p$ ) between the downstream and upstream plate is performed at  $Aq\rangle$  between  $-90^\circ$  and  $+90^\circ$ . The simulation results show significant changes in the passive pitching of both plates, especially the plate in downstream, due to wing-wing interactions. Significant wake capture by the leading edge of the downstream plate is found at positive  $A\langle p$ , which helps the downstream plate maintain high passive pitching angle and results in high lift force generation. Wake capture by the trailing edge of the downstream plate is found at negative  $A\langle p$ , which suppresses the passive pitching of the downstream plate and leads to deterioration of its aerodynamic performance." (Authors)] Address: Wang, J., Dept of Mechanical & Aerospace Engineering, Univ. of Virginia Charlottesville, VA 22904, USA

**20423.** Wang, M.; Shi, G.; Zhu, Y.; Wang, Y.; Ma, W. (2018): Au-decorated dragonfly wing bioscaffold arrays as flexible Surface-Enhanced Raman Scattering (SERS) substrate for simultaneous determination of pesticide residues. *Nanomaterials* 2018, 8, 289: 14 pp. (in English) ["Rapid sampling and multicomponent analysis are vital in pesticide residue detection. In this work, we proposed a SERS platform to detect three kinds of pesticides on apple peels simultaneously by a straightforward "press and peel off" method. The flexible Au/dragonfly wing (Au/DW) substrate was obtained from sputtering Au nanoislands on DW bioscaffold arrays by a simple direct current (DC) magnetron sputtering system. The high-performance substrate exhibited a low limit of detection (LOD) to 4-aminothiophenol (4-ATP) ( $10.9 \text{ M}$ ), outstanding reproducibility (less than 12.15%), good stability and suitability in multifold pesticide residues detection. Considering its excellent sample collection efficiency, the Au/DW substrate was employed to solve critical pesticide residue problems for detection of acephate (APT), cypermethrin (CPT), tsumacide (MTMC) and their multiple components on apple peels. The results show that the LOD was  $10.3 \text{ ng/cm}^2$  for APT obtained on the apple surface with a calculation equation of  $y = 0.26x + 6.68$  and a determination coefficient ( $R^2$ ) of 0.970. Additionally, the LOD values for CPT and MTMC were  $10.3 \text{ ng/cm}^2$  and  $10.4 \text{ ng/cm}^2$ , respectively. The finding in this work may provide a promising biomimetic SERS platform for on-spot detection of other organic pollutants in the food industry and environmental protection." (Authors)] Address: Wang, M., Key Lab. Microstructural Material Physics of Hebei Province, School of Science, Yanshan Univ., Qinhuangdao, Hebei 066004, China. Email: wml@ysu.edu.cn

**20424.** Wellenreuther, M.; Muñoz, J.; Chávez-Ríos, J.R.; Hansson, B.; Cordero-Rivera, A.; Sánchez-Guillén, R.A. (2018): Molecular and ecological signatures of an expanding hybrid zone. *Ecology and Evolution* 8(10): 4793-4806. (in English) ["Many species are currently changing their distributions and subsequently form sympatric zones with hybridization between formerly allopatric species as one possible consequence. The damselfly *Ischnura elegans* has recently expanded south into the range of its ecologically and morphologically similar sister species *Ischnura graellsii*. Molecular work shows ongoing introgression between these species, but the extent to which this species mixing is modulated by ecological niche use is not known. Here, we (1) conduct a detailed population genetic analysis based on molecular markers and (2) model the ecological niche use of both species in allopatric and sympatric regions. Population genetic analyses showed chronic introgression between *I. elegans* and *I. graellsii* across a wide part of Spain, and admixture analysis corroborated this, showing that the majority of *I. elegans* from the sympatric zone could not be assigned to either the *I. elegans* or *I. graellsii* species cluster. Niche modeling demonstrated that *I. elegans* has modified its environmental niche following hybridization and genetic introgression with *I. graellsii*, making niche space of introgressed *I. elegans* populations more similar to *I. graellsii*. Taken together, this corroborates the view that adaptive introgression has moved genes from *I. graellsii* into *I. elegans* and that this process is enabling Spanish *I. elegans* to occupy a novel niche, further facilitating its expansion. Our results add to the growing evidence that hybridization can play an important and creative role in the adaptive evolution of animals." (Authors)] Address: Wellenreuther, Maren, Dept Biol., Lund Univ., Lund, Sweden. Email: maren.wellenreuther@plantandfood.co.nz

**20425.** Wiczorek, M.V.; Bakanov, N.; Bilancia, D.; Szöcs, E.; Stehle, S.; Bundschuh, M.; Schulz, R. (2018): Structural and functional effects of a short-term pyrethroid pulse exposure on invertebrates in outdoor stream mesocosms. *Science of the Total Environment* 610–611: 810-819. (in English) ["Agricultural land-use frequently results in short pulse exposures of insecticides such as pyrethroids in river systems, adversely affecting local invertebrate communities. In order to assess insecticide-induced effects, stream mesocosms are used within higher tier aquatic risk assessment. Regulatory acceptable concentrations (RACs) derived from those studies are often higher compared with tier 1 RACs. Hence, the present mesocosm study evaluates this aspect using a pulse exposure scenario typical for streams and the pyrethroid insecticide etofenprox. A 6-h pulse exposure with measured concentrations of  $0.04$ ,  $0.3$  and  $5.3 \mu\text{g L}^{-1}$  etofenprox was used. We considered abundance, drift and emergence of invertebrates as structural endpoints and the in situ-measured feeding rates of the isopod *Asellus aquaticus* as functional endpoint. Most prominent effects were visible at  $5.3 \mu\text{g L}^{-1}$  etofenprox which caused adverse effects of up to 100% at the individual and population level, as well as community structure alterations. Transient effects were observed for invertebrate drift (effect duration .24 h) and for the invertebrate community (9 days after exposure) at  $0.3 \mu\text{g L}^{-1}$  etofenprox. Furthermore,  $0.04 \mu\text{g L}^{-1}$  etofenprox affected the abundance of the mayfly *Cloeon simile* (decrease by 66%) and the feeding rate of *A. aquaticus* (decrease by 44%). Thus, implications for the functional endpoint leaf litter breakdown in heterotrophic ecosystems may be expected. A hypothetical RAC derived from the present mesocosm study ( $0.004 \mu\text{g L}^{-1}$ ) is in line with the official tier 1 RAC ( $0.0044 \mu\text{g L}^{-1}$ ) and thus shows that the



present mesocosm study did not result in a higher RAC." (Authors)] Address: Wieczorek, M., Inst. Environmental Sciences, Univ. of Koblenz-Landau, Fortstr. 7, 76829 Landau, Germany. Email: wieczorekm@uni-landau.de

**20426.** Wolfe, J.D.; Lane, O.P.; Brigham, R.M.; Hall, B.D. (2018): Mercury exposure to red-winged blackbirds (*Agelaius phoeniceus*) and dragonfly (Odonata: Aeshnidae) nymphs in Prairie Pothole wetlands. *FACETS* 3: 174-191. (in English) ["The Prairie Pothole Region (PPR) in the northern Great Plains is an area of ecological significance, serving as an important breeding site for avian wildlife. However, organisms feeding within the PPR may be at risk of mercury (Hg) exposure due to deposition of anthropogenic emissions and the high Hg methylation potential of PPR wetlands. We quantified Hg concentrations in red-winged blackbirds'; RWBLs) blood, feathers, and eggs in the spring and summer breeding season and compared our values with those from RWBLs sampled from ecoregions across North America. Hg concentrations in whole water, aeshnid dragonfly nymphs, and RWBL tissues varied by wetland and were below those considered to elicit acute effects in wildlife, and egg total Hg (THg) concentrations were significantly related to spring whole water methylmercury concentrations. Only RWBL blood THg concentrations showed a clear increase in summer compared with spring, resulting in decoupling of summer blood and feather THg concentrations. Moreover, blood THg concentrations varied by ecoregion, with those impacted by an industrial point source exhibiting high Hg levels. Our study emphasizes that tissue renewal time as well as ecological factors such as competition and diet shifts are important considerations when using RWBLs to assess biological Hg exposure." (Authors)] Address: Wolfe, J.D., Dept Biol., Univ. of Regina, 3737 Wascana Parkway, Regina, SK S4S 0A2, Canada. E-mail: jared.wolfe76@gmail.com

**20427.** Zia, Z.; Amad-Ud-Din; Azam, I.; Munir, A.; Afsheen, S. (2018): Effect of salinity gradients on species composition of Odonata naiads. *Arthropods* 7(1): 11-25. (in English) ["In present study the relationship between salinity gradients of various water bodies and inhabiting Odonata naiads was studied. Naiads, being a popular group of water pollution indicators, were studied. Totally 35 sites were surveyed for collection of naiads and water samples were taken from each positive site. Eight factors viz. Electrical Conductivity (Ec), Calcium +Magnesium (Ca+Mg), Sodium (Na+), Carbonates (Carb), Bicarbonates (Bc), Sodium Absorption Ratio (SAR) and Residual Sodium Carbonate (RSC) were studied for each water sample. Interesting results were obtained both for Anisoptera and Zygoptera species. Among dragonflies, genus *Crocothemis* of family Libellulidae appeared to be resistant while Genus *Gomphidia* and *Sympetrum* of families Gomphidae and Libellulidae were observed to be affected by variations in salinity gradients of waters of different sites. However in case of damselflies Genus *Ischnura* of family Ceonagrionidae and genus *Pseudagrion* of family Ceonagrionidae were observed to be adaptive followed by genus *Ceriagrion* of same family. As an overall conclusion, Anisopterous naiads were found more susceptible to salinity gradients than Zygoptera and thus can be better used in water salinity diagnoses studies." (Authors) *Libellula fulva*, *Ceriagrion pulchellum*] Address: Azam, Iqra, Dept of Zoology, Univ. of Gujrat, Pakistan. E-mail: iqra.azam@uog.edu.pk

**20428.** Zsoldos, A. (2018): Study on biomass in semiaquatic insects (Odonata) over a 20-year period in central, Sweden. B.Sc. thesis, Halmstad Univ., School of Business,

Engineering and Science: 11 pp. (in English) ["This study is about how biomass of dragonfly insects have changed over the past 20-years in a forested area of central Sweden. This was done by analysing previously collected Odonata larvae stored in ethanol where sampling effort corrects the weight per locality. The results display a small but significant biomass increase over past decades, going against the recently observed trend of biomass decline in insects. However, this biomass gain was not even between the families, the ones that increased the most was Aeshnidae and Libellulidae. The reasons for the observed increase are discussed, some possible suggestions are less disturbance in their environments and their ability to adapt due to their long evolution giving them a phenotypical advantage." (Author)] Address: not stated

**20429.** Šigutová, H.; Šigut, M.; Dolný, A. (2018): Phenotypic plasticity in specialists: How long-spined larval *Sympetrum depressiusculum* (Odonata: Libellulidae) responds to combined predator cues. *PLoS ONE* 13(8): e0201406: 15 pp. (in English) ["Phenotypic plasticity is a common defensive strategy in species experiencing variable predation risk, such as habitat generalists. Larvae of generalist dragonflies can elongate their abdominal spines in environments with fish, but long spines render larvae susceptible to invertebrate predators. Long-spined specialists adapted to fish-heavy habitats are not expected to have phenotypic plasticity in this defence trait, but no empirical studies have been undertaken. Moreover, in comparison to prey responding to multiple predators that induce similar phenotypes, relatively little is known regarding how species react to combinations of predators that favour opposing traits. We examined plasticity of larval dragonfly *Sympetrum depressiusculum*, a long-spined habitat specialist. In a rearing experiment, larvae were exposed to four environments: (i) no predator control, (ii) fish cues (*Carassius auratus*), (iii) invertebrate cues (*Anax imperator*), as well as (iv) a combination of (ii) and (iii). Compared with the control, fish but not invertebrate cues resulted in longer spines for two (one lateral, one dorsal) of the six spines measured. Interestingly, the combined-cue treatment led to the elongation of all four dorsal spines compared with the fish treatment alone, whereas lateral spines showed no response. Our experiment provided evidence of morphological plasticity in a long-spined specialist dragonfly. We showed that nearly all spines can elongate, but also react differently under specific predator settings. Therefore, while spine plasticity evolved in direct response to a single predator type (fish), plasticity was maintained against invertebrate predators as long as fish were also present. Selective spine induction under the combined condition suggests that *S. depressiusculum* can successfully survive in environments with both predators. Therefore, phenotypic plasticity may be an effective strategy for habitat generalists and specialists. Although more studies are necessary to fully understand how selection shapes the evolution of phenotypic plasticity, we demonstrated that in dragonflies, presence or absence of a specific predator is not the only factor that determines plastic defence responses] Address: Šigutová, Hana, Institute of Environmental Technologies, Faculty of Science, Univ. of Ostrava, Ostrava, Czech Republic. E-mail: hana.sigutova@osu.cz

**2019**

**20430.** Abdul Aziz, M.A.A.; Mohamed, M. (2019): Annotated checklist of odonates (Insecta: Odonata) in Sungai Bantang Recreational Forest, Bekok, Johor, Malaysia. *IOP Conference Series: Earth and Environmental Science* 269

012002: 15 pp. (in English) ["A total of 34 species of odonates, including 17 species of Anisoptera belonging to 2 families, and 15 species of Zygoptera belonging to 8 families were collected and recorded from Hutan Lipur Sungai Bantang in January, May and July 2017. Libellulidae is the most dominant family with 15 species and in Zygoptera, Chlorocyphidae, Euphaeidae and Platycnemididae, each with three species are represented. A detailed list of odonates [...] is presented. The result forms a baseline data of odonate fauna in this forest reserve useful in the monitoring of water quality of rivers found in the forest reserves in the future." (Authors)] Address: Mohamed, M., Centre of Research Sustainable Uses of Natural Resources, Faculty of Applied Sciences & Technology, Universiti Tun Hussein Onn Malaysia, Kampus Pagoh, Jalan Panchor, 84000, Muar, Johor, Malaysia. E-mail: maryati@uthm.edu.my

**20431.** Adelman, J. (2019): Seltene Segmentanomalie bei einer Imago von *Libellula depressa* (Odonata: Libellulidae). *Libellula* 38(1/2): 93-96. (in German, with English summary) ["Rare anomaly of segmentation in an adult *L. depressa* – A female of *L. depressa* photographed at a stream near Dillshofen [Hessen, Germany] on 29-IV-2018, showed an unusual segmentation of the abdomen. The helical anomaly has been extended over two segments and is to be classified as helicomorphism." (Author)] Address: Adelman, J., Potsdamer Str. 70, 64372 Ober-Ramstadt, Germany. Email: jadelmann@web.de

**20432.** Adu, B.W.; Oyeniyi, E.A. (2019): Water quality parameters and aquatic insect diversity in Aahoo stream, southwestern Nigeria. *The Journal of Basic and Applied Zoology* (2019) 80:15. <https://doi.org/10.1186/s41936-019-0085-3>: 9 pp. (in English) ["Background: The role of water in the maintenance of an aquatic ecosystem is indispensable. In this study, aquatic insect biodiversity and the physico-chemical parameters of Aahoo stream, in southwestern Nigeria, were investigated from March to August 2017. Seven physico-chemical parameters were examined in six study sites. Results: There were significant effects ( $p < 0.0001$ ) of flow rate (F5, 12 = 2221.9), electrical conductivity (F5, 12 = 276.3), air temperature (F5, 12 = 110.3), water temperature (F5, 12 = 55.5) and pH (F5, 12 = 31.45) on the quantity of aquatic insects at the study sites in Aahoo stream. Dissolved oxygen (F2, 12 = 7.82) also had a significant impact ( $p = 0.002$ ) on the quantity of aquatic insects at the stream. Three aquatic insect orders, Diptera (most dominant), Odonata (median dominant) and Hemiptera (least dominant), nine families and 12 genera were found occurring in the stream. Chironomus sp. (Chironomidae, 55.29%), *Brachythemis* sp. and *Orthetrum* sp. (Libellulidae, 21.84%) which are usually associated with polluted water showed the highest occurrence in the stream. Low values of diversity indices were observed across the six study sites, which suggest that the six sites were in unstable conditions. Site 5 has the richest (Simpson 1-D 0.77, Shannon H 1.81, Margalef 1.91) and best taxa distribution (Equitability J: 0.73), while site 3 was the poorest (Simpson 1-D 0.52 and Shannon H 1.31) and the least in taxa distribution (Equitability J 0.55). Conclusion: This study has provided information on the assemblage and copiousness of various aquatic insects as well as the physico-chemical parameters of Aahoo stream. It could therefore be concluded that the stream could be somewhat polluted and unsafe for human consumption without being properly treated." (Authors) *Lestiniogomphus*, *Brachythemis*, *Orthetrum*, *Ceriagrion*, *Pseudagrion*] Address: Adu, B.W., Dept of Biology, Federal Univ. of Technology, Akure, Nigeria

**20433.** Amari, H.; Zebsa, R.; Lazli, A.; Bensouilah, S.; Melal, M.K.; Mahdjoub, H.; Houhamdi, M.; Khelifa, R. (2019): Differential elevational cline in the phenology and demography of two temporally isolated populations of a damselfly: Not two but one taxon? *Ecological Entomology* 44(1): 93-104. (in English) ["1. Temporal isolation by cohort splitting is a life-history mechanism that has been reported in many temperate insects, including those inhabiting freshwater habitats. Although the cohorts seem to maintain separate temporal niches in a specific location, the temporal isolation may be disrupted across a geographic gradient due to constraints imposed by seasonality. 2. This prediction was tested on two temporally isolated populations of the obligatory univoltine *Lestes virens* in north-east Algeria. Although the two cohorts emerge at the same time in spring, one cohort reproduces in summer, while the second cohort estivates in summer and reproduces in autumn. A survey assessing the phenology and abundance was conducted on eight ponds across an elevational gradient (5–1012 m a.s.l.) using capture–mark–recapture and adult density sampling. 3. In all sites from low to high elevation, the species showed cohort splitting. The phenology of reproduction of both cohorts showed a delay with elevation, but the cline was 2.2 days for the summer cohort and 0.7 days for the autumn cohort per 100 m of elevation. Moreover, the density of adults in the autumn cohort was higher than that of summer cohort across the entire elevational range, and the difference increased with elevation. 4. These findings regarding the differential elevational cline in the phenology show that the temporal isolation of the two cohorts becomes narrower at high elevation, suggesting potential inter-cohort temporal overlap at higher elevations. 5. The claim that the two cohorts of *L. virens* are true temporally isolated species needs further investigation." (Authors)] Address: Khelifa, R., Biodiversity Research Center, Univ. of British Columbia, 2212 Main Mall, Vancouver. B.C. V6T1Z4, Canada. Email: rasimkhelifa@gmail.com

**20434.** Anjos-Santos, D. (2019): Colecciones científicas en Latinoamérica: Brasil La odonatología brasileña después del incendio del Museo Nacional. ¿Quiénes son y dónde están los odonatólogos de Brasil? *Hetaerina* 1(2): 8-11. (in Spanish) ["In 2018, Brazilian odontology suffered the loss of its most illustrious collection, which was housed in the Dept of Entomology of the National Museum of the Federal Univ. of Rio de Janeiro (MNRJ). This fateful fire also consumed other important collections, as well as historical holdings and exhibitions open to the general public. At present, the National Museum is carrying out an arduous search of the debris in search of pieces that may have survived the tragedy. The Odonata Collection of the MNRJ was the legacy of Dr. Newton Dias dos Santos (1916-1989). Many of the specimens were the fruit of his innumerable campaigns throughout Brazil and South America. Other researchers contemporary to Santos and after him also contributed to the growth of the collection. Of the thousands of specimens deposited in the collection, there were, in addition to the primary types, specimens from various Brazilian regions, which had not even been studied and which, perhaps, will never be found in the wild again. The few specimens of Odonata that escaped the fire were outside the institution and will be returned to the Museum as soon as possible. The good news is that, in recent months, the MNRJ's Entomology Dept has been receiving donations of insects of different orders and its researchers continue to work in the unaffected areas of the Museum. In addition to the MNRJ, there are other collections in Brazil (described below) that contain specimens of Odonata, mainly from the

Neotropics, and some even have primary types. In recent years, Brazilian odonatology has been growing and a new generation of researchers is focusing on the study of neotropical odonates, with collaborations in taxonomy, phylogeny, behaviour and ecology. To aid interaction between Latin American researchers, the following is a list of contact and basic data for the main research groups and collections in the country. The information was provided by their leaders or by members of the laboratories (Table 1)." (Author/DeepL)] Address: Anjos-Santos, Danielle, Laboratorio de Investigaciones en Sistemática y Ecología Animal (LIESA), Sarmiento 849, 9200, Esquel, Chubut, Argentina. E-mail: danielleanhos2@yahoo.com.br

**20435.** Ansari, M.I.; Siddique, M.H.; Samad, A.; Anwer, S.F. (2019): On the optimal morphology and performance of a modeled dragonfly airfoil in gliding mode. *Physics of Fluids* 31(5): 23 pp. (in English) ["Numerical investigation on the effect of wing morphology of the dragonfly *Aeshna cyanea* is carried out to understand its influence on the aerodynamic performance. The two-dimensional wing section has corrugation all over the surface along the chord length on both upper (suction side) and lower (pressure side) surfaces. By considering each corrugation separately on different airfoils at their different positions, 10 single corrugated airfoils were generated. Simulations are performed on these different airfoils to determine the effect of each corrugation on aerodynamic performance. The flow is modelled as incompressible, Newtonian, homogeneous, and unsteady. The angle of attack was varied from 0° to 20°, and the Reynolds number (Re) was varied from 150 to 10 000. The optimum morphology and angle of attack were predicted by using the surrogate-based optimization technique for a maximum gliding ratio at different Re. A fully corrugated pressure side gives the best performance at angles of attack of 9.79° and 14.83° at low Re. At high Re, corrugations on the pressure side which are in the middle and those near the trailing edge give a maximum gliding ratio at angles of attack 9.22° and 5.276°. The spatiotemporal dynamics indicate that corrugations near the leading edge on the upper surface and corrugations near the trailing edge for the lower surface and which are in the middle are beneficial. It is also found that shear drag due to corrugation decreases but pressure drag increases; therefore, the overall drag coefficient for a fully corrugated airfoil increases. Corrugations on the suction side have little influence, while those on the pressure side causes lift enhancement." (Authors)] Address: Anwer, S.F., Computational Aerodynamics Lab, Dept of Mechanical Engineering, ZHCET, Aligarh Muslim Univ., Aligarh 202002, India. Email: sfahadanwer@zhcet.ac.in

**20436.** Aromaa, S.; Ilvonen, J.J.; Suhonen, J. (2019): Body mass and territorial defence strategy affect the territory size of odonate species. *Proc. R. Soc. B* 286: 20192398: 8 pp. (in English) ["The territory is a distinct mating place that a male defends against intruding conspecific males. The size of a territory varies between species and most of the variation between species has been found to scale allometrically with body mass. The variation that could not be explained by body mass has been explained with several variables such as habitat productivity, trophic level, locomotion strategy and thermoregulation. All previous interspecific comparative studies have been done on vertebrate species such as birds, mammals, reptiles and fishes, meaning that studies using invertebrate species are missing. Here, we studied the relationship of a species's territory size with its fresh body mass (FBM) in addition to other ecologically relevant traits using 86 Odonata species. We found that territory size is strongly

affected by species FBM, following an allometric relationship similar to vertebrates. We also found that the territory size of a species was affected by its territorial defence strategy, constantly flying species having larger territories than species that mostly perch. Breeding habitat or the presence of sexual characters did not affect territory sizes, but lotic species and species without wing spots had steeper allometric slopes. It seems that an increase in a species's body mass increases its territory size and may force the species to shift its territory defence strategy from a perch to a flier." (Authors)] Address: Suhonen, J., Dept Biology, Univ. Turku, FI-20014 Turku, Finland. E-mail: juksuh@utu.fi

**20437.** Bach, A.E.T. (2019): Estudio de los Odonata (Insecta) de los edoststemas altoandinos de la región del Cusco. MSc thesis, Facultad de Ciencias, Escuela Profesional de Biología, Universidad Nacional de San Antonio Abad del Cusco: 152 pp. (in Spanish) ["Odonates from the high Andean ecosystems of the Cusco region were studied. Material previously collected and deposited in the Entomology Laboratory of the National Univ. of San Antonio Abad del Cusco and the Museum of Natural History of the Universidad Nacional Mayor de San Marcos was reviewed. Additionally, between January 2017 and October 2018, collections were made in 12 provinces of the Cusco Region, prioritising provincial capitals and localities where water bodies such as rivers, streams and lakes above 2800 m above sea level are found. The high Andean ecosystems are located from 3700 m above sea level and form a zoogeographic district located within the biogeographic province of the Yungas. In the high Andean ecosystems of the Cusco region, 6 species were identified: *Rhionaeschna fassifrons*, *R. machali*, *R. peralta*, *R. absoluta*, *Sympetrum gilvum* and *Protallagma titicacae*. In the Yungas biogeographic province, the species *Rhionaeschna obscura*, *R. diffinis* and *R. cornigera* were recorded. Finally, the highest species richness was found between the provinces of Calca, Urubamba and Cusco." (Author/DeepL)] Address: not stated

**20438.** Bäumlér, F.; Büsse, S. (2019): Resilin in the flight apparatus of Odonata (Insecta) — cap tendons and their biomechanical importance for flight. *Biol. Lett.* 15: 201901-27. <http://dx.doi.org/10.1098/rsbl.2019.0127>: 7 pp. (in English) ["In Odonata, a direct flight mechanism with specialized tendons evolved. One particular adaptation, the implementation of the rubber-like protein resilin in these cap tendons, might be of major importance. Although resilin was first described in one tendon of Odonata, to our knowledge no comprehensive study about the presence of resilin in the thorax exists yet. We investigated various species of Odonata, using  $\mu$ CT, dissection and fluorescence microscopy. Here we show a complete mapping of the odonatan pterothorax, regarding the presence of tendons and their properties. Thus, 20–21 cap tendons in the pterothorax of Odonata show the presence of resilin. While performing outstanding and often-aggressive flight manoeuvres, resilin can provide shock absorption against mechanical damage from strong impacts. It may further improve the wear and fatigue resistance owing to resilin's damping behaviour. Additionally, resilin in tendons can absorb and return kinetic energy to restore muscles to their original shape after contracting and help in maintaining self-oscillation of the flight muscles. Here, the material distribution within the direct flight system of Odonata and the biomechanical importance and possible function of resilin are discussed. These results are an important step towards the understanding of the complex form–material–function interplay of the insect cuticle." (Authors)] Adult Odonata studied: *Sympetrum striolatum*, *Anax*

imperator, *Calopteryx splendens*, *Lestes sponsa*, *Epiophlebia superstes*] Address: Büsse, S., Dept of Functional Morphology & Biomechanics, Institute of Zoology, Kiel Univ., Am Botanischen Garten 9, 24118 Kiel, Germany. Email: sbuesse@zoologie.uni-kiel.de

**20439.** Bailleux, G.; Duval, A.; Darblade, S.; Ducout, B. (2019): Émergence de *Stylurus flavipes* en milieu lentique. *Martinia* 34 (1/2): 59-60. (in French) [Emergence of *S. flavipes* in Bédorède Lake (city of Biarrotte, Landes Dept, France), 7-VI-2019.] Address: Bailleux, G., CEN Aquitaine, 45 rue Louis Barthou F-64110 Gelos, France. Email: bailleux-gilles@gmail.com

**20440.** Baird, I.R.C. (2019): Establishment of larval pits by *Tachopteryx thoreyi* (Odonata: Petaluridae): habitat modification by a non-burrowing petalurid. *International Journal of Odonatology* 22(2): 135-146. (in English) ["*Tachopteryx thoreyi* is one of only two species of petalurid dragonflies with a non-fossorial larval stage. In the context of questions related to the phylogenetics, historical biogeography and current distribution of the Petaluridae, the evolution of a burrowing larval stage in petalurids, which is unique in the Odonata, is of considerable interest. This paper reports observation of crypts, or shallow pits or depressions, established by some larvae of *Tachopteryx thoreyi*, and briefly discusses these observations in the context of the more typical burrowing habit in petalurids." (Author)] Address: Baird, R.C., 3 Waimea St, Katoomba, NSW 2780, Australia. Email: petalurids@gmail.com

**20441.** Bastos, R.C.; Schlemmer Brasil, L.; Carvalho, F.G.; Calvão, L.B.; Silva, J.O. (2019): Odonata of the state of Maranhão, Brazil: Wallacean shortfall and priority areas for faunistic inventories. - Odonata do estado do Maranhão, Brasil: Déficit wallaceano e áreas prioritárias para inventários faunísticos. *Biota Neotropica* 19(4): e20190734. <http://dx.doi.org/10.1590/1676-0611-BN-2019-0734>: 11 pp. (in English, with Portuguese summary) ["Environmental changes are worrying in a scenario with large knowledge gaps on species diversity and distribution. Many species may become extinct before they are known to science. Considering this scenario, the present study aims to evaluate the known distribution of the species recorded for Maranhão state in Brazilian northeast region and discuss knowledge gaps about Odonata indicating the priority areas for faunistic inventories. Using primary and secondary data together, we present convex minimum polygons of the distribution of all the species registered for the state. In addition, we created maps with the richness of species and number of records of Odonata in the Maranhão state. In primary data sample 269 specimens, represented by 17 genera and 30 species were collected. Of the 30 species collected, 17 are new records for the state of Maranhão; of these, 35.29% are geographically widespread species, occurring in practically all regions of Brazil. Considering the records in the literature, there was a 68% increase in the number of Odonata species known for Maranhão. The most unexplored region is the Cerrado of the state of Maranhão. Furthermore, the transition regions between Cerrado and Amazônia and between Cerrado and Caatinga are also unknown. All these areas are a priority for faunistic inventories." (Authors)] Address: Bastos, R.C., Univ. Federal do Pará, Programa de Pós-Graduação em Ecologia, Belém, PA, Brasil

**20442.** Bergmann, T. (2019): Character-based barcoding, a symbiosis and potential successor of traditional taxonomy

and modern DNA barcoding. Dissertation, Naturwissenschaftlichen Fakultät der Gottfried Wilhelm Leibniz Universität Hannover: VII + 155 pp. (in English) ["Classic taxonomy is a powerful tool for identifying animals based on morphology but has shown to be problematic on similar looking, cryptic species. A solution to this problem has been found within the bauplan of life, the DNA (deoxyribonucleic acid). DNA is used to create and regulate proteins. The structure of DNA has highly unique sections that are conserved within species, but diverse between species. One particular section, a 648 bp long fragment of the mitochondrial cytochrome c oxidase subunit 1 (CO1) gene, has become a popular barcode for species identification. Here, a new barcoding technique, character-based barcoding more similar to traditional approaches is tested. This thesis investigates whether CO1 is suitable as a single marker (a) or should be complemented by others (b). Performance of distance- and character-based barcoding (c) is evaluated and it is tested whether character-based barcoding can be used to identify cryptic species (d). In the first manuscript, CO1 sequences of endangered turtle species are compared (a). Having a reliable tool for species identification is an important asset in species protection surveillance. Variability within the barcode region is assessed and the utility of both distance- and character-based methods for species identification are evaluated (c). Odonata is an old order rich in species. As many species have evolved in a short time, it was observed that intra- and interspecific variety is overlapping in some sister groups. This observation made Odonata the ideal candidate for testing CO1 (a), ND1 (b), as well as distance- and character-based barcoding (c) in the second manuscript. Ants are prime examples for high degrees of cryptic biodiversity due to complex population differentiation, hybridization and speciation processes. As combinations of multiple marker regions seemed to be a better approach to barcoding, three markers (CO1, 28S rDNA, rhodopsin) are tested (b) in the third manuscript. A combined, layered approach to character-based barcoding is evaluated and unique diagnostics specific to geolocations are identified (d). The results of all three studies show that combining multiple markers improves identification success. The character-based approach provides better identification in the tested animal groups. This method can be used to estimate presence, absence or frequency of cryptic species." (Author)] Address: Bergmann, T., Untere Hauptallee 3, 31812 Bad Pyrmont, Germany

**20443.** Bernard, R.; Felska, M.; Makol, J. (2019): Erythraeid larvae parasitizing dragonflies in Zambia—description of *Leptus* (*Leptus*) *chingombensis* sp. nov. with data on biology and ecology of host-parasite interactions. *Systematic & Applied Acarology* 24(5): 790-813. (in English) ["A survey of odonate fauna in Zambia (Central Province, Luano District) resulted in discovery of ectoparasitic larvae of *Leptus* (*L.*) *chingombensis* sp. nov. (Trombidiformes: Parasitengona, Erythraeidae) on four species of dragonflies (Odonata) representing four different families assigned to Zygoptera and Anisoptera. The morphological characteristics of the new species is supported with DNA barcode sequence. Despite some intra-group variation related to relatively large sample, the morphological and genetic consistence confirm the common specific identity of the material. A brief comparison of *Leptus* spp. hitherto known from the Afrotropic as larvae is given. Supplementary data to the descriptions of *Leptus* (*L.*) *bicristatus* Fain et Elsen, 1987, *Leptus* (*L.*) *aldonae* Haitlinger, 1987 and *Leptus* (*L.*) *soddagus* Haitlinger, 1990, based on examination of type material, are provided. In the case of *L.* (*L.*) *chingombensis* sp. nov., the parasite load



reached high, previously not recorded for Odonata–terrestrial Parasitengona association values, attaining at 44 and 49 larvae. Clear topic preferences towards the ventral side of the host's body were recorded, with an additional tendency to distal parts of synthorax and the ventral depression of the abdomen. We hypothesize that the infestation did not take place synchronously at dragonflies emergence, but consisted in repeated infestation events during the recurrent appearance of dragonflies in the contact microhabitat occupied by *Leptus*. The very local character of the finding along with the regular appearance of larvae parasitizing dragonflies, obviously favoured by specific habitat conditions, no doubts confirms the non-accidental nature of the phenomenon." (Authors) *Pseudagrion spermatum* Selys 1881; *Heliaeschna fuliginosa* Karsch, 1893; *Paragomphus cognatus* (Rambur 1842); *Orthetrum julia* Kirby 1900.] Address: Bernard, R., Dept Nature Education and Conservation, Adam Mickiewicz Univ., Umultowska 89, 61-614 Pozna, Poland. E-mail: rbernard@amu.edu.pl

**20444.** Berquier, C.; Andrei-Ruiz, M.-C. (2019): Synthèse des connaissances et évaluation de l'état de conservation de *Lestes macrostigma* en Corse (Odonata: Lestidae). *Martinia* 34(1-2): 1-16. (in French, with English summary) ["State of knowledge and assessment of the conservation status of *L. macrostigma* in Corsica – Corsica hosts in France a large number of reproductive stations for *L. macrostigma*. During these last decades, the number of studies and data concerning this damselfly in the island has considerably increased. They allow a completion and an update of the knowledge provided in 2004 in the atlas of Odonata from Corsica. The purpose of our study was to do so focusing on *L. macrostigma* regional population in order to assess its conservation status and to identify the regional conservation management issues in relation to this species, as recommended by the National Action Plan for Odonata. The gathered data were analysed using baseline methodology, especially recommended by the European Habitats directive. Today, *L. macrostigma* appears widely distributed all along the island coastline, especially in the natural protected and managed sites network. In Corsica, *L. macrostigma* larvae can develop every year in different types of temporary waters ranging from brackish to fresh and mainly of natural origin. Among the types of wetlands in which reproduction is successful, the Mediterranean freshwater temporary ponds appear to be unusual for the species. In this strong conservation value habitat, the monitoring which has been carried out since 2014 highlights the great inter-annual variability in the phenology and the abundance of the species. Our assessment reveals an "Unfavourable-inadequate" conservation status for the species in Corsica, mostly because of the recent destruction of reproduction stations close to main island conurbations. Our analysis also demonstrates that the island has a major heritage responsibility for this specie relative to the national territory. Hence, with respect to these challenges, we strongly encourage to carry out ambitious regional conservation and management policies." (Authors)] Address: Berquier, C., Office de l'Environnement de la Corse, Observatoire - Conservatoire des Insectes de Corse, Avenue Jean Nicoli, 20250 Corte, France. Email: cyril.berquier@oec.fr

**20445.** Bried, J.T.; Siepielski, A.M. (2019): Predator driven niches vary spatially among co-occurring damselfly species. *Evolutionary Ecology* 33(2): 243-256. (in English) ["Determining how niche differences contribute to local species coexistence is a vexing problem. Previous work has shown that the ecological and evolutionary processes shaping niche

differentiation can vary among populations, suggesting that the strength of niche differences among species should likewise vary geographically. Most tests of this idea compare different species in different locations, not the same species in different locations. Thus, it is unclear whether niche differences vary spatially because of variation in community composition or because populations of the same species experience differences in the strength of niche effects. To test this latter hypothesis, we used field experiments to manipulate the relative abundances of the same pair of *Enallagma* damselfly species at two lakes. Manipulating relative abundances allowed us to quantify the demographic signature of niche differences that could stabilize coexistence, because if species are niche differentiated, they should experience lower mortality in response to their shared fish predator, and higher growth in the face of resource competition, when rare. We found that both species experienced lower mortality when rare in one location but not the other. No differences in growth were detected, indicating that competition for prey resources may not be a key factor affecting coexistence. These results suggest the species are ecologically differentiated among populations in ways shaping survivorship in response to a shared predator, which should promote their coexistence. We discuss several factors that could contribute to the differences we observed, focusing on the ideas that either (1) niche differentiation between species evolves locally, or that (2) spatial variation in environmental factors affects the manifestation of species niche differences. We therefore argue that the problem of 'species coexistence' is not a problem of species, but rather is one of understanding if species' populations coexist. Such results imply a role for microevolutionary processes in structuring communities." (Authors)] Address: Bried, J.T., Dept of Biological Sciences, Univ. of Arkansas, Fayetteville, USA

**20446.** Brown, T.A.; Fraker, M.E.; Ludsins, S.A. (2019): Space use of predatory larval dragonflies and tadpole prey in response to chemical cues of predation. *The American Midland Naturalist* 181(1): 53-62. (in English) ["Chemical cues are frequently a key source of information to aquatic organisms. Both predators (kairomones digestive metabolites) and prey (alarm and damage-released cues) may generate chemical cues during their interactions, and different cue types can have different informational values. How predators and prey use the information from chemical cues to make spatial movement decisions influences both their direct interaction rates and their interactions with other species. We measured the spatial response of predatory larval *Anax junius* and predator-naïve green frog (*Lithobates clamitans*) tadpoles exposed to several types of chemical cues using experimental mesocosms. We found tadpoles only responded with spatial avoidance when exposed to both *Anax* kairomones and conspecific alarm cues together, whereas *Anax* did not exhibit consistent spatial responses to any cue type. Our results suggest tadpole prey selectively respond to environmental information from chemical cues (possibly to minimize costly antipredator behavior due to responding to insufficient information or reflecting a need for associative learning). They also show predatory dragonflies may use nonchemical information to make space use decisions (possibly due to inability to detect the same chemical cues as tadpoles)." (Authors)] Address: Fraker, M. Email: mfraker2@gmail.com

**20447.** Buczynski, P.; Tonczyk, G. (2019): Polish and dedicated to Poland odonatological papers. 17. The year 2018. *Odonatrix* 157 (2019): 6 pp. (in Polish, with English summary) ["The authors present a list of Polish and dedicated

to Poland odonatalogical papers that were published in the year 2018. In the reported time period, 42 works of various kind were published, and one Ph.D. thesis was created. In addition, the list of publications from 2017 has been supplemented by three positions." (Authors)] Address: Tonczyk, G., Katedra Zoologii Bezkręgowców i Hydrobiologii, Uniwersytet Łódzki, ul. Banacha 12/16, 90-237 Łódź. E-mail: tonczyk.grzegorz@gmail.com

**20448.** Cavallaro, M.S.; Main, A.R.; Liber, K.; Phillips, I.D.; Headley, J.V.; Peru, K.,M.; Morrissey, C.A. (2019): Neonicotinoids and agricultural stressors collectively modify aquatic insect communities. *Chemosphere* 226: 945-955. (in English) ["Highlights: • Few field studies investigate how neonicotinoids interact with agricultural stressors. • Wetlands and aquatic insect emergence were monitored over 2 growing seasons. • Community affected by neonicotinoids, turbidity, vegetative variables. • Neonicotinoids associated with lower abundance and more tolerant insect taxa. • Intensive agricultural practices collectively degrade insect communities and abundance. Abstract; Threats to wetland water quality and aquatic insect secondary production in agricultural landscapes are multifaceted and are known to vary spatially and temporally. We designed this study with the aim to disentangle the effects of multiple stressors on emerging aquatic insects from wetlands impacted by intensive agricultural practices and receiving runoff from neonicotinoid-treated canola. In 2013, 2015, 22 semi-permanent wetlands were monitored over two growing seasons (11 different wetlands per year) in central Saskatchewan, Canada. Over the two sampling years, dipterans from the families Chironomidae (60–67%), Muscidae (13–15%) and Ceratopogonidae (7–13%) made up the majority of emergent taxa, representing 80–95% of the total emergence. Multivariate ordination analyses of eight water quality and nine wetland habitat variables revealed that neonicotinoid concentration, turbidity, vegetation disturbance, and continuity of a vegetative grass buffer zone were significant factors influencing the aquatic insect taxa composition. Generalized linear mixed effects models indicated that total insect emergence over time was significantly predicted by neonicotinoid concentrations (imidacloprid toxic equivalency, TEQ) and vegetation disturbance. Higher neonicotinoid concentrations negatively affected insect emergence over time, whereas vegetation disturbance increased total emergence, likely due to the abundance of taxa tolerant to habitat disturbance. Overall, we observed community-level responses driven by multiple indicators of wetland degradation (insecticides, turbidity, and vegetation disturbance). Collectively, these multivariate field data provide an in-depth understanding of how agricultural management practices, including neonicotinoid use, interact to shape wetland aquatic insect communities." (Authors) Lestidae, Coenagrionidae] Address: Cavallaro, M.S., School of Environment & Sustainability, Univ. of Saskatchewan, Saskatoon, Saskatchewan, Canada

**20449.** Cendrawati, M.A.; Rahmadhani, T.P.; Meilita, N.; Pujiastuti, Y. (2019): Identifikasi capung odonata pada vegetasi perairan, rerumputan dan tanaman perdu di kampus Indralaya Universitas Sriwijaya. In: Herlinda S et al. (Eds.), *Prosiding Seminar Nasional Lahan Suboptimal 2018*, Palembang 18-19 Oktober 2018. pp. 402-409. Palembang: Unsri Press: 402-409. (in English) ["Dragonflies (Odonata) play an important role of the food chain. Dragonflies are effective predators in the ecosystem, play a role as natural enemies that can reduce the population of food crop pests. This indicates the important position of the existence of dragonflies in ecological balance. Dragonflies can also act

as bioindicator in the ecosystem. Changes in dragonfly populations are a sign of the early stages of water pollution in addition to other signs in the form of water turbidity. This study aimed to determine the types and the behavior of Odonata on several traps in fresh water, grass and herbaceous vegetations in Indralaya Campus of Sriwijaya Univ.. This research was conducted at the Unsri Indralaya Campus area, on December 2016. The study was arranged in a completely Randomized Completed Block Design (RCBD) consisted of two observation time, morning and afternoon, and 3 types of trap, unbranched trap (P1), two branched trap (P2), and three branched trap (P3) with 5 replications. Each branch was used as a trap which smeared by jackfruit sap. The results showed that unbranched trap (P1) on 3 different vegetations were preferred by dragonflies to perch and dragonflies in the Libellulidae family, namely *Brachythemis contaminata* were easy and most common found in each research location." (Authors) Leimrute] Address: Pujiastuti, Y., Jurusan Hama dan Penyakit Tumbuhan, Fakultas Pertanian, Universitas Sriwijaya, Indralaya 30662. Email: ypujiastuti@unsri.ac.id

**20450.** Chance, F.S. (2019): Dragonfly-inspired algorithms for intercept trajectory planning. SANDIA Report SAND-2019-11695: 28 pp. (in English) ["Autonomous real-time trajectory calculations "inside the basket", or within "sight" of the target, remain a critical but unsolved problem. This LDRD was performed in support of the Autonomy for Hypersonics Mission Campaign, specifically to address challenges associated with engagements involving high-speed, highly-maneuverable vehicles with limited sensing capabilities. Algorithms that can dynamically and autonomously adjust intercept trajectories in response to a maneuvering target are critically needed to support our national security missions. Current state-of-the-art solutions rely upon proportional navigation, which requires an overmatch of speed and maneuverability to ensure success. The objective of this project was to develop a model of dragonfly interception, testing a specific hypothesis of how dragonflies use visual information to implement proportional navigation, with the longer-term goal of developing a novel neural-inspired interception algorithm that would decrease or eliminate the required overmatch for successful interception. Dragonflies are known to be highly successful hunters (achieving 90-95% success rate in nature) that implement a guidance law like proportional navigation to intercept their prey. This project tested the hypothesis that dragonflies implement proportional navigation using prey-image translation across their eyes. The model dragonfly presented here calculates changes in pitch and yaw to maintain the prey's image at a designated location (the fovea) on a two-dimensional screen (the model's eyes). When the model also uses self-knowledge of its own maneuvers as an error signal to correct the fovea's location, the resulting interception trajectory becomes guided by proportional navigation (verified using range vector correlation as a metric of proportional navigation). The fovea-adjustment and resulting modifications to interception trajectory can be performed in realtime and in response to prey maneuvers. While further work is required to evaluate the viability of this model for implementation on a manmade system, my results provide a proof-of-concept demonstration of the potential of using the dragonfly nervous system to design a robust interception algorithm for implementation on a manmade system." (Author)] Address: Chance, Frances, Sandia National Laboratories, Albuquerque, New Mexico, 87185 and Livermore, California 94550, USA

**20451.** Cheeseman, S.; Truong, V.K.; Walter, V.; Thalmann,

F.; Marques, C.M.; Hanssen, E.; Vongsvivut, J.; Tobin, M.; Baulin, V.A.; Juodkazis, S.; MacLaughlin, S.; Bryant, G.; Crawford, R.J.; Ivanova, E.P. (2019): The interaction of Giant Unilamellar Vesicles (GUVs) with the surface nanostructures on dragonfly wings. *Langmuir* 35(6): 2422-2430. (in English) ["The waxy epicuticle of dragonfly wings contains a unique nanostructured pattern that exhibits bactericidal properties. In light of emerging concerns of antibiotic resistance, these mechano-bactericidal surfaces represent a particularly novel solution by which bacterial colonization and the formation of biofilms on biomedical devices can be prevented. Pathogenic bacterial biofilms on medical implant surfaces cause a significant number of human deaths every year. The proposed mechanism of bactericidal activity is through mechanical cell rupture, however this is not yet well understood and has not been well characterized. In this study we used giant unilamellar vesicles (GUVs) as a simplified cell membrane model to investigate the nature of their interaction with the surface of the wings of two dragonfly species, *Austrothemis nigrescens* and *Trithemis annulata*, sourced from Victoria, Australia and the Baix Ebre and Terra Alta regions of Catalonia, Spain. Confocal laser scanning microscopy (CLSM) and cryo-scanning electron microscopy (Cryo-SEM) techniques were used to visualize the interactions between the GUVs and the wing surfaces. When exposed to both natural and gold-coated wing surfaces, the GUVs adsorbed on the surface, exhibiting significant deformation, in the process of membrane rupture. Differences between the tensile rupture limit of GUVs composed of DOPC and the isotropic tension generated from the internal osmotic pressure, were used to indirectly determine the membrane tensions, generated by the nanostructures present on the wing surfaces. These were estimated as being in excess of 6.75 mN m<sup>-1</sup>, the first experimental estimate of such mechano-bactericidal surfaces. This simple model provides a convenient bottom-up approach towards understanding and characterizing the bactericidal properties of nanostructured surfaces." (Authors)] Address: Cheeseman, S., School of Science, College of Science, Engineering & Health, RMIT Univ., GPO Box 2476, Melbourne, Victoria 3001, Australia

**20452.** Cunningham-Minnick, M.J.; Meyer, T.B.; Crist, T.O. (2019): Shifts in dragonfly community structure across aquatic ecotones. *International Journal of Odonatology* 22(2): 121-133. (in English) ["Anisoptera are often used as indicators of habitat type and quality due to their varied use of aquatic and terrestrial habitats. Species differ in their preferences for lotic and lentic waters, but community changes across ecotones, or transitional zones between distinct habitats (e.g. lotic and lentic), are not well understood. We quantified dragonfly species richness, abundance, and composition along a gradient of habitat types, including streams, stream mouths (ecotones), and open waters (lakes and ponds). We tested if dragonfly assemblages in aquatic ecotones differ from adjacent stream and open water habitats, and how species respond to riparian forest cover across these habitat types. Adult dragonflies were sampled in all habitat types at four sites in southwest Ohio during the summer of 2016. Riparian canopy cover and relative densities of algal mats and emergent vegetation were recorded. We sampled 157 individuals of 12 dragonfly species [*Pachydiplax longipennis*, *Libellula luctuosa*, *Plathemis lydia*, *Perithemis tenera*, *Epi-theca princeps*, *Dromogomphus spoliatus*, *Libellula pulchella*, *Pantala flavescens*, *Tamea lacerata*, *Anax longipes*, *Anax junius*] and found significant differences in community composition between stream and ecotone habitats, both forming subsets of the open water community. Canopy

cover explained 55% and 75% of abundance and species richness variance across habitat types, respectively, but these relationships were strongest at ecotones. Finally, the Odonata Index of Wetland Integrity (OIWI), which uses sensitivities of adult odonates to habitat disturbances to evaluate wetland conditions, showed that species composition at ecotones uniquely represents the ecological integrity of the entire wetland system. Thus, transition zones may provide an effective and more efficient alternative to rapidly assess wetland quality for conservation monitoring than sampling the entire wetland." (Authors)] Address: Cunningham-Minnick, M.J., Dept of Biology, Miami Univ., Oxford, OH, USA. Email: minnicmj@miamiOH.edu

**20453.** Dewan, S.; Darnal, N.; Acharya, B.K.; Subramanian, K.A.; Chettri, B.; Jins, V.J. (2019): Effectiveness of organic terrace rice cultivation in conservation of odonates in Sikkim, Eastern Himalaya, India. *International Journal of Odonatology* 22(3-4): 207-222. (in English) ["Conversion of natural habitat into agricultural landscape has been identified as one of the major drivers of habitat loss. Human-modified ecosystems, such as agricultural land, have gained significant attention in terms of the conservation of their native biodiversity. We studied the effectiveness of organic agroecosystems in conserving odonate diversity by comparing organic terrace rice cultivation with a nearby natural forest system with streams in Sikkim, Eastern Himalaya, India. We sampled adult odonates using a transect count method (laying six permanent transects) covering two villages (Lingmoo in South Sikkim and Dzongu in North Sikkim), making a total of 48 transect counts. A total of 881 individual odonates representing 31 species under two suborders (16 Anisoptera and 15 Zygoptera) and seven families were recorded during this study. Of these, 20 species representing three families and 18 species representing seven families were observed in terrace rice cultivation and the natural forest system, respectively. Beta diversity estimates showed that the community composition of the odonates differed qualitatively (incidence measure) and quantitatively (abundance measure) between the two land use types. Turnover component (abundance balance in case of abundance based beta diversity measure) had higher contribution in the overall beta diversity, suggesting that one assemblage of species is being replaced by another due to environmental sorting. The variation in community composition between the two habitats was statistically significant. Our results suggest that organic wetland habitats are important for conservation of odonates and associated biodiversity (especially herpetofauna) in the Himalaya and require urgent conservation attention." (Authors)] Address: Dewan, S., Dept Zool., School of Life Sciences, Sikkim Univ., Gangtok, Sikkim, India

**20454.** do Prado, A.V.; Rodrigues, M.E.; Aoki, C. (2019): Odonate fauna (INSECT: Odonata) of two ponds in the Cerrado-Pantanal ecotone, Aquidauana, MS. *Oecologia Australis* 23(4): 979-988. (in English) ["Knowing the biodiversity of a given site is the first step in establishing strategies for its conservation, monitoring and sustainable use. The objective of the present study was to catalogue the Odonata community of two ponds in the Cerrado-Pantanal ecotone area. Collections were carried out between October 2012 and September 2013, encompassing different hydrological seasons. This study presents the first systematized survey of Odonata for lentic environments in the region. A total of 347 individuals were recorded, distributed in 41 species, 22 genera and three families. The suborder Zygoptera was represented by the Coenagrionidae and Lestidae families,

while the suborder Anisoptera was represented by the Libellulidae family. The Acanthagrion, Erythemis and Erythrodiplax genera were the most representative. The results indicate that there is seasonality in the occurrence of the species. The wide diversity found in lentic environments emphasizes the importance of long-term monitoring of these ecosystems, in order to understand the effect of seasonality and of anthropic alterations to the surrounding environment on the Odonata community." (Authors)] Address: Rodrigues, M.E., Univde Estadual de Santa Cruz, Depto de Ciências Biológicas, Programa de Pós-graduação em Sistemas Aquáticos Tropicais, Lab. de Organismos Aquáticos, Rod. Jorge Amado, Km 16, CEP 45662-900, Ilhéus, BA, Brazil. E-mail: rodrigues.mbio@gmail.com

**20455.** Duangjit, S.; Aimraksa, S.; Khoomsab, K. (2019): Species diversity of odonates in Nong Naree Park, Amphoe Muang, Phetchabun province. PSRU Journal of Science and Technology 4(1): 61-72. (in Thai, with English summary) ["This research was mainly aimed to study the species diversity of odonates in Nong Naree Park, Amphoe Muang, Phetchabun province, Thailand. The odonate larvae and adults were investigated from study station during October to December 2018. The odonate samples were conducted for 2 times per month. The result found that 12 species from 11 genera under 3 odonate families including family Libellulidae (10 species), family Gomphidae (1 species) and family Aeshnidae (1 species) were observed. Additionally, four species of odonate larvae including Brachydiplax chalybea, Brachythemis contaminata, Crocothemis servilia and Urothemis signata could be linked with adults from rearing." (Authors)] Address: e-mail: sasithorn4521@gmail.com

**20456.** Frantz, B. (2019): Haematoleochus lung flukes in American Bullfrogs: Prevalence and associations of infection. Univ. Honors Theses. Paper 716. <https://pdxscholar.library.pdx.edu/honorstheses/716>: 25 pp. (in English) ["The prevalence and intensity of infection by lung flukes (Haematoleochus sp.) was examined by dissecting 1,590 American bullfrogs (Rana catesbeiana) collected between 2013 and 2018, from Conboy Lake National Wildlife Refuge, Washington. Overall infection, across all age classes, was 59.7% (n=1,580) and mean intensity was 17 (n=169; SD=19.3, range=1-166). A logistic regression model showed a significant relationship between infection and frog snout-to-vent length, gape, and collection year. Sex had a significant relationship to infection ( $\chi^2=7.31$ , df=1, P=0.007). Presence of odonates in the stomach was also significantly related to infection ( $\chi^2=22.49$ , df=1, P<0.001). This study expands on the current breadth of knowledge on this taxon in anurans into a previously unstudied region of the USA and emphasizes the use of odonates as secondary intermediate hosts....The aquatic cercariae are shed from the snail and proceed to enter the second intermediate host: principally Odonata." (Author)] Address: not stated

**20457.** Friesen, O.C.; Goellner, S.; Poulin, R.; Lagrue, C. (2019): Parasite infection reduces predation risk by dragonfly larvae in crustacean prey. Hydrobiologia 835: 63-70. (in English) [New Zealand, "Parasites can modify the phenotype of their hosts, altering host vulnerability to predation. Tropically-transmitted parasites often use host manipulation to increase their probability of transmission to the next host or reduce their chances of being consumed by the wrong species. However, phenotypic changes may actually increase the host's vulnerability to other predators that are 'dead-ends' for the parasite, reducing parasite fitness while

potentially impacting host populations. The isopod Austrodotea annectens serves as intermediate host to Maritrema poulini (trematode) and display behavioural changes when infected that may increase parasite transmission. We tested the role of parasite infection on predation risk of isopods by a dragonfly nymph [Hemicordulia australiae (Rambur 1842)], a 'dead-end' parasite host. Size-matched isopod pairs were exposed to nymphs and observed until one was captured; subsequently isopod parasite abundance was determined. Isopods with lower parasite abundance were significantly more likely to be caught. Several mechanisms may explain this; behavioural modification by the parasites may be altering isopod behaviour to avoid predation by dead-end hosts, or, alternatively, increased activity may allow heavily infected isopods to avoid predation by sit and wait predators. Assessing the effects of parasites on their host's ability to avoid predation is crucial in understanding how parasites may affect ecosystem dynamics and structure." (Authors)] Address: Friesen, O.C., Dept Zool., Univ. Otago, Dunedin, New Zealand. Email: olwynfriesen@gmail.com

**20458.** Fuentes, A. (2019): Effects of pH, dissolved O<sub>2</sub> and temperature of pond water on the richness of odonates at Indiana Dunes National Lakeshore. <https://opus.govst.edu/researchday/2019/posters/12/>: (in not stated) ["Odonates are valuable indicators for assessing impacts of human activities on aquatic habitats. The few studies that have examined the relationship between water quality and Odonate diversity have demonstrated a positive linear relationship between richness and the three water quality parameters: pH, dissolved oxygen and temperature. Previous research has mostly excluded the Odonate nymphs, which according to our hypothesis should be impacted the most by the water quality. To conduct this survey, DNA barcoding and sequence alignments were used to identify samples of nymph and adult Odonates from six different ponds at Indiana Dunes National Lakeshore. After the samples were identified, the total species richness for each location was correlated with three water quality parameters, pH, dissolved oxygen and temperature. Out of the 48 nymph samples identified, there were 16 unique species. The preliminary results show a positive linear relationship between pH, temperature, dissolved O<sub>2</sub> and adult richness, but no significant relationships have been found between any of these water quality variables and nymph richness. The sample size was small for the nymphs compared to the adults because only half of the nymph samples of that year have been identified so far. If further laboratory analysis demonstrates that there is a relationship between nymph richness and the water quality measures above, species indices could provide a more efficient means to determine the presence of particular species as well as overall species richness. This information could then be used to assess the overall health of aquatic habitats." (Authors)] Address: Governors State Univ.

**20459.** Gallardo, L.I.; Coronel, J.M.; Guadalupe Poi, A.S. (2019): Urban rain-fed lakes: macro-invertebrate assemblages associated with Egeria najas as indicators of biological integrity in wetlands of Corrientes Province (Argentina). Biodiversity and Conservation 28: 1549-1568. (in English) ["In northeast Corrientes Province, there are more than 50,000 semi-rounded shallow rain-fed lakes. Several lakes have been disturbed mainly because urbanization causes eutrophication due to the illegal discharge of wastewater. We compared 22 metrics based on the structural attributes of macro-invertebrates associated with Egeria najas across seasons between five lakes with different human disturbance levels. Sixty-six samples of E. najas and associated



invertebrates were collected seasonally using a net with an area of 962 cm<sup>2</sup>. A total of 17,737 macro-invertebrates of eight major groups, 35 families and 30 genera were recorded. The total macro-invertebrate abundance (number of individuals per plant dry weight) and the family richness were significantly higher in less disturbed lakes than those under human disturbance, but the differences between seasons were not significant. Non-metric multidimensional scaling analysis differentiated the macro-invertebrate abundances between the more and less disturbed lakes; instead, the diversity indices were not useful for measuring the changes in the studied lakes. Besides, total number of taxa, number of EOT (Ephemeroptera, Odonata, Trichoptera) taxa, abundance and proportion of Trichoptera and abundance of Chironomidae reflected significant differences between the more and less disturbed lakes. Our results suggest that 7 invertebrate metrics respond to urbanization, and they could be used to assess biological integrity of the studied lakes in complement of chemical monitoring of water quality. Management efforts should focus on the maintenance of macrophyte stands that provide high invertebrate diversity, which serve as food for a wide variety of fish." (Authors)] Address: Gallardo, Luciana, Centro de Ecología Aplicada del Litoral - CECOAL (CCT Nordeste - CONICET-UNNE) Corrientes, Argentina. E-mail: lucianaigallardo@gmail.com

**20460.** Garcia Junior, M.D.N.; Rakes, M.; Pazini, J.; Pasini, R.A.; Garcia, F.R.M.; Grützmacher, A.D. (2019): The diversity of Odonata adults's at Pampa Biome from Brazil. *Revista de Biología Tropical* 67(1): 107-117. (in English) ["The growth of humankind has brought with it several environmental problems that have worsened over time, including the loss of insect biodiversity. The Odonata order have been indicated by several authors as relevant bioindicators for assessing and monitoring environmental conditions of specific locations. The main objective of this study was to conduct an inventory of the Odonata diversity in the Pampa Biome, of the Southern region of the state of Rio Grande do Sul, Brazil. The species survey was conducted between November 2014 and October 2015. Adult insects were collected in Capão do Leão, Pelotas and Rio Grande cities. Each location was visited nine times, totalizing 54 samplings. Entomological nets were used for capturing adult insects, which were then kept in entomological envelopes. The identification of the specimens was carried out with taxonomic keys of Lencioni and Heckman. In addition, Chao-1, the Shannon-Wiener and Jackknife indexes were associated with the sampling areas. During the species survey a total of 2 680 Odonata specimens were collected, representing 45 species encompassed in 22 genera and six families. The Libellulidae and Coenagrionidae families were registered in 60 and 30 % of the specimens sampled, followed of the Aeshnidae, Calopterygidae, Gomphidae and Lestidae, of reduced occurrence. The genera Erythrodiplax, Micrathyria and Ischnura were found at least once in all the visited sites. The study resulted in the registration for the first time of the following species: Progomphus complicatus Selys, Lestes minutus Selys, Homeoura ambigua Ris, and Tauriphila xiphea Ris. These species were not previously reported in any Odonata study of the Brazilian state of Rio Grande do Sul. In regard to Odonata diversity in the Southern region of Rio Grande do Sul, Libellulidae and Coenagrionidae are the families more abundants. Erythrodiplax and Micrathyria are the most common genera. Miathyria marcella represented 9.6 % of all collected libellulidae and was the most abundant specie. Capão do Leão has the largest species diversity (wealth), the largest number of collected specimens and more diversity than Pelotas and Rio Grande.

However, the results showed that the Odonatofauna in the State are still little known, and new studies are needed to better describe this group in other regions." (Authors)] Address: Rakes, M., Dept Plant Protection, Fac. Agronomy "Eliseu Maciel" (FAEM), Federal Univ. of Pelotas, postcode 96010-900, Pelotas, Rio Grande do Sul, Brazil. Email: ma-theusrakes@hotmail.com

**20461.** Guan, D.-L.; Qian, Z.-Q.; Ma, L.-B.; Bai, Y.; Xu, S.-Q. (2019): Different mitogenomic codon usage patterns between damselflies and dragonflies and nine complete mitogenomes for odonates. *Scientific Reports* 9, Article number: 678: 9 pp. (in English) ["Odonata have distinct body plans and predatory abilities. Knowledge of their various evolutionary histories will allow for an understanding of the genetic and phenotypic evolution of insects. Mitogenomes are suitable materials to elucidate this, but the mitogenome of only a few odonates have been annotated. Herein, we report the complete mitogenome of nine odonates, including seven dragonflies and two damselflies, and a comprehensive analysis of the codon usage in 31 Odonata mitogenomes with the aim to estimate their evolutionary characteristics. Overall, a weak codon bias exists among odonate mitogenomes, although this favours AT-ending codons. Damselflies have a weaker codon usage bias than dragonflies, and 37 codons have significantly different usages. Both directional mutation and purifying selection shape damselfly and dragonfly mitogenomes. Although inevitable, directional mutation bias plays a minor role, whereas purifying selection pressure is the dominant evolutionary force. A higher selection pressure is observed in dragonflies than in damselflies, but it mainly acts on codon usage patterns rather than amino acid translation. Our findings suggest that dragonflies might have more efficient mitochondrial gene expression levels than damselflies, producing more proteins that support their locomotion and predatory abilities.... In the present study, we examined the mitogenome of nine odonates by next-generation sequencing. Furthermore, we reconstructed the complete mitogenome of seven Anisoptera dragonflies (*Tramea virginia*, *Orthetrum testaceum*, *O. sabinia*, *O. melania*, *Deielia phaon*, *Acisoma panorpoides*, *Trigomphus carus*, *Atrocalopteryx atratum* and *Platycnemis foliacea*. The mitogenome features of these two species have been described. The codon usage bias in protein coding genes within the mitogenome of dragonflies and damselflies was examined to reveal the evolutionary forces that contributed the most in shaping the mitogenomes and their codon usage patterns in dragonflies and damselflies." (Authors)] Address: Xu, S.-Q., College of life science, Shaanxi Normal Univ., Xi'an, 710119, P. R. China. Email: xushengquan@snnu.edu.cn)

**20462.** Hidayat, S.; Husnia, F.; Rohmah, E.; Mukhlisoh, S. (2019): Study on diversity of dragonfly (Odonata) as a bio-indicator of water quality in Mount Muria area, Central Java. *J. Nat. Scien. & Math. Res.* 5(2): 53-61. (in English) ["Water in the Mount Muria area is needed by the surrounding community to fulfill life. An indicator is needed to determine water quality. Dragonfly (Odonata) is one of the organisms as ecosystem controllers and bioindicators. This study aims to determine the diversity of dragonflies, determine water quality and describe the role of dragonflies as a bioindicator of water quality in the Mount Muria area. This type of research is descriptive quantitative research. The data collection technique used direct observation at 3 stations, namely the Colo Flower River, the Monthe Waterfall River and the River in the Rejenu Area. The results showed that there were 10 species of dragonflies consisting of 6 suborders

Anisoptera and 4 suborders Zygoptera with the highest abundance value being *Euphaea variegata* (51.39%), *Enallagma signatum* (28.47%), *Trithemis festiva* (6.94%), *Orthetrum glaucum* (5.56%), *O. chrysis* (2.78%), *O. pruinatum* (2.08%), *O. testaceum* (0.69%), *O. sabina* (0.69%), *Prodasineura autumnalis* (0.69%), and *Drepanosticta fontinalis* (0.69%). Based on water quality analysis and according to government regulation no. 82 of 2001, the water in the Muria river belongs to category 2. According to the analysis of the family biotic index, it can be seen that the FBI value of the river in the Muria area is 5.60 which means the condition of the river is fair with moderate pollution levels." (Authors)] Address: Hidayat, S., Dept Biology Education, Fac. Science and Technology, Univ. Islam Negeri Walisongo Semarang, Indonesia. Email: hidayatsaifullah@walisongo.ac.id

**20463.** Jacmenev, V. (2019): Importance of UV perception for dragonflies (Odonata). Faculty of Science, Ecological and Evolutionary Biology, Dept of Ecology, Karlova Univ., Praha: 24 pp. (in Czech, with English summary) ["It has long been known that some animals are able to perceive radiation at other wavelengths than perceive we humans. In dragonflies, UV sensitivity has been demonstrated in the 1974, however a recent study has unveiled an extraordinary diversity of genes of specific photoreceptor proteins known as opsins, including UV-sensitive opsin. In addition some dragonflies have coloration on their body and wings, which can reflect UV radiation at unchanged wavelength – UV reflectance. Very little is known about the use of UV in dragonfly life. My thesis summarizes the current knowledge of the importance of UV for dragonflies, focusing on interspecific and intraspecific communication." (Author)] Address: not stated

**20464.** Jäger, N. (2019): *Coenagrion mercuriale* am nordöstlichen Arealrand bei Leipzig, Sachsen (Odonata: Coenagrionidae). *Libellula* 38(3/4): 179-203. (in German, with English summary) ["Between May and September 2017, ten sections of streams and ditches west of Leipzig were studied on the abundance of *C. mercuriale* as well as the syntopic odonatan species. Furthermore, various habitat parameters were recorded and a mark-recapture study on *C. mercuriale* was carried out on four days. With the exception of one population, the study sections cover the sites with the highest abundance of all known occurrences in Saxony. The study sections correspond in many ways to the habitat spectrum known from literature. These are mostly perennial streams and ditches, which are narrow, shallow, sunny, do not freeze in winter and show occurrence of marsh plants (helophytes). Submerged herbs that are characteristic of the habitats of *C. mercuriale* are found in only one of the ten study sections with significant coverage. The hydrology seems to be less influenced by groundwater than by diverse discharges. This results in comparatively low water quality, with which the species apparently copes in many places. During the study, a total of 3,427 specimens of *C. mercuriale* were recorded. The highest abundance was 156.9 adults per 100 meters. The longest documented flight period lasted twelve weeks. During the mark-recapture study, a total of 372 specimens were marked at eleven sections. The median of the recapture rate was 18.0% (0.0–40.0%) two days after the markings, and 2.0% (0.0–11.1%) after five days. Outside the study sections no marked specimen were detected. The frequencies determined by the Petersen method are 2.5 to 50.0 times, on average 10.0 times higher than the number of adults counted." (Author)] Address: Jäger, N., Waldstr. 64, 04105 Leipzig, Germany. Email: nicolasjaeger@hotmail.com

**20465.** Jiang, B.; Johansson, F.; Stoks, R.; Mauersberger, R.; Mikolajewski, D.J. (2019): Predator species related adaptive changes in larval growth and digestive physiology. *Journal of Insect Physiology* 114: 23-29. (in English) ["Prey species are often non-randomly distributed along predator gradients but according to how they trade off growth against predation risk. The foraging-mediated growth/predation risk trade-off is well established, with increased foraging accelerating growth but also increasing predator induced mortality. While adaptations in digestive physiology may partly modify the relationship between foraging and growth in response to predation risk, studies exploring the impact of digestive physiology on growth in prey subjected to predation risk are still scarce. Larvae of the dragonfly genus *Leucorrhinia* segregate at the species level between lakes either being dominated by predatory fish (fish-lakes) or predatory invertebrates (dragonfly-lakes). Predators of these two lake types differ dramatically in their hunting style like searching and pursuing mode causing different selection pressure on prey traits including foraging. In a laboratory experiment we estimated growth rate, digestive physiology (ingested food, growth efficiency, assimilation efficiency, conversion efficiency) and metabolic rate (oxygen consumption) in the presence and absence of predator cues. Whereas fish-lake and dragonfly-lake *Leucorrhinia* species did not differ in growth rate, they evolved different pathways of digestive physiology to achieve similar growth rate. Because fish-lake species expressed a higher metabolic rate than dragonfly-lake species, we assume energy to be differently allocated and used for metabolic demands between species of both predator environments. Further, growth rate, but not digestive physiology was plastic in response to the presence of predator cues. Our results highlight the impact of digestive physiology in shaping the foraging-mediated growth/predation risk trade-off, with digestive physiology contributing to species distribution patterns along predator gradients." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**20466.** Kemalok, J.; Mohamed, M.; Rahman, A.A.A.; Ashikin Ismail, N. (2019): Biodiversity across boundary: Ethnoentomology among the Jakun of Kampung Peta, Mersing and the Malay, Chinese and Indian of Kahang, Kluang, Johor. *IOP Conference Series: Earth and Environmental Science* 269 012024: 9 pp. (in English) ["An ethnoentomological survey was carried out on the usage of insects in the culture of several ethnics: Orang Asli Jakun in Kampung Peta, Mersing; the Malay, Chinese and Indian in Kahang, Kluang. Responses from these four communities were compared to understand the uses of insects in their life as well as gauged their views on ethnoentomology. Insects were either part of their spiritual beliefs or used as food, medicine, and entertainment. Four groups of insects were considered, namely Lepidoptera, Homoptera, Odonata and Orthoptera. For example, *Dundubia vaginata* is used by Orang Asli as a source of food, by Malay as entertainment, by Chinese as medicine and by Indian as part of their beliefs. In terms of percentage of insect recognized per ethnicity, Orang Asli accounts for 44.44%, Malay 22.22%, Chinese 16.67% and Indian 16.67%. It was discovered that among the four communities, Orang Asli Jakun were more knowledgeable and open about using insects traditionally. Many insects were integrated in their folklore and myths. Orang Asli Jakun also had more variety of uses for insects in their day to day life compared to the other three communities. Based on this study, it indicated that much of the Malaysian diversity are known and familiar to Orang Asli. Throughout history, Orang

Asli plays important roles in maintaining and managing natural resources through traditional systems. The frequency of human interaction with insects has created a close culture between humans and insects." (Authors)] Address: Mohamed, M., Centre of Res. Sustainable Uses of Nat. Resources, Fac. Applied Sciences & Technology, Univ. Tun Hussein Onn Malaysia, Kampus Pagoh, Jalan Panchor, 84000, Muar, Johor, Malaysia. E-mail: maryati@uthm.edu.my

**20467.** La Porta, G.; Goretti, E. (2019): Investigation on the declining Southern Damselfly (*Coenagrion mercuriale*, Odonata) in a Mediterranean population: survival rate and population size. *Journal of Insect Conservation* 23: 667-675. (in English) [*C. mercuriale* classified as 'Near Threatened' by the Global IUCN Red List and as 'Endangered' in some parts of its range. The species is characterized by fragmented and declining populations with their core in the western Mediterranean and parts of western Europe. This study reported the first estimates of survival rate and population size for a southern European population of *C. mercuriale* living in central Italy. Surveys were carried out in 2017 in the peak of the flight period applying capture-recapture models. More than 1200 specimens were captured on 11 occasions and the sex ratio observed was male-biased (2.8:1). Daily survival probabilities ranged from  $0.662 \pm 0.059$  to  $0.868 \pm 0.045$ . Maximum longevity was 14 days for males. The maximum number of estimated individuals on any day was  $507.2 \pm 49.6$  for males, and  $219.8 \pm 27.7$  for females in mid-June. The estimate of the cumulative population size was about 4000 specimens, with a mean density of 1.2 individuals/m<sup>2</sup> at the breeding site. Our results pointed out that population ecology of *C. mercuriale* in central Italy is similar to that of the populations living in the northern limit of its range. The present study also indicated that monitoring plans, with seven marking occasions at least, can provide consistent estimations of population size, useful for evaluating the viability of populations and for assessing the species conservation status." (Authors) The species considered is *Coenagrion castellani* Robert, 1948 and not *C. mercuriale*.] Address: Goretti, E., Dipartimento di Chimica, Biologia e Biotecnologie, Università degli Studi di Perugia, Perugia, Italy

**20468.** Lee, D.J.; Matthews, P.G.D. (2019): Quantifying the acid-base status of dragonflies across their transition from breathing water to breathing air. *Journal of Experimental Biology* 222, jeb210294. doi:10.1242/jeb.210294: 9 pp. (in English) [*Amphibiotic* dragonflies show a significant increase in hemolymph total CO<sub>2</sub> (T<sub>CO2</sub>) as they transition from water-breathing to air-breathing. This study examines the hemolymph acid-base status of dragonflies from two families [*Anax junius*, *Rhionaeschna multicolor*, *Libellula forensis*, *L. quadrimaculata*] as they transition from water to air. CO<sub>2</sub> solubility (aCO<sub>2</sub>) and the apparent carbonic acid dissociation constant (pK<sub>app</sub>) were determined in vitro, and pH/bicarbonate [HCO<sub>3</sub><sup>-</sup>] plots were produced by equilibrating hemolymph samples with P<sub>CO2</sub> between 0.5-5 kPa in custom-built rotating microtonometers. Hemolymph aCO<sub>2</sub> varied little between families and across development (mean  $0.355 \pm 0.005$  mmol l<sup>-1</sup> kPa<sup>-1</sup>) while the pK<sub>app</sub> was between 6.23 to 6.27, similar to values determined for grasshopper hemolymph. However, the non-HCO<sub>3</sub><sup>-</sup> buffer capacity for dragonfly hemolymph was uniformly low relative to other insects (3.6 to 5.4 mmol l<sup>-1</sup> pH<sup>-1</sup>). While aeshnid dragonflies maintained this level as bimodally-breathing late-final instars and air-breathing adults, the buffer capacity of bimodally-breathing late-final instar *Libellula* nymphs increased substantially to 9.9 mmol l<sup>-1</sup> pH<sup>-1</sup>. Using the pH/[HCO<sub>3</sub><sup>-</sup>] plots and in vivo measurements of TCO<sub>2</sub> and PCO<sub>2</sub> from early-

final instar nymphs, it was calculated that the in vivo hemolymph pH was 7.8 for an aeshnid nymph and 7.9 for a libellulid nymph, respectively. The pH/[HCO<sub>3</sub><sup>-</sup>] plots show that the changes in acid-base status experienced by dragonflies across their development are more moderate than those seen in vertebrate amphibians. Whether these differences are due to dragonflies being secondarily aquatic, or arise from intrinsic differences between insect and vertebrate gas exchange and acid-base regulatory mechanisms, remains an open question." (Authors)] Address: Lee, D.J., Dept of Zoology, Univ. of British Columbia, Vancouver, BC, Canada V6T 1Z4. Email: danlee@zoology.ubc.ca

**20469.** Marinho, R.; Barbosa de Oliveira Junior, J.M.; Silva da Rocha, T.; Cruz da Silva, E.; Souza, L. (2019): Efeito da integridade ambiental sobre a abundância e riqueza de espécies de Zygoptera (Insecta: Odonata) em Igarapés no município de Santarém, Pará, Brasil. *Debate e Reflexão das Novas Tendências da Biologia*. Atena Editora: 1-8. (in Portuguese, with English summary) [*Effect of environmental integrity on the abundance and wealth of Zygoptera species (Insecta: Odonata) in Igarapés in the municipality of Santarém, Pará, Brasil. The monitoring of aquatic ecosystems with the use of dragonflies is indicated by the fact that these organisms inhabit all types of aquatic habitats; the stage larval of each species is specific, able to tolerate environmental disturbances; the males mature they are easily notable while patrolling near the habitat larval, thus facilitating their collection and observation in the field. The suborder Zygoptera is constituted by species that tend to be more sensitive to environmental changes and with it, suffer negative effects on their communities. About addition, this study aims to perform a survey of the diversity of Zygoptera in small creeks preserved and changed in the municipality of Santarém-PA, and to compare the abundance and richness of species of Zygoptera between creeks, preserved and changed. The study was developed in eight creeks in the municipality of Santarém, state of Pará, Brazil, being four located in urban area and four in the preserved areas. Were collected 606 specimens of Zygoptera, distributed in six families, 11 genera and 22 species. The streams classified as preserved were the environments with the greatest richness estimated species of Zygoptera, as this suborder is associated with the most integrity, with riparian vegetation preserved due to the biological requirements more specific. The creeks changed showed a lower species richness of Zygoptera. An explanation for the lower species richness of Zygoptera in environments that have changed is due to changes in riparian forests that have allowed greater entry of light and heat in the systems." (Authors)] Address: Souza, L., Univ. de Fed. do Oeste do Pará, Santarém – Pará, Brasil*

**20470.** Masbou, A.; Goret, T. (2019): Etude de la qualité de l'habitat et monitoring de la population d'Agrion de Mercure (*Coenagrion mercuriale*) dans la plaine de Focant (Beaurain) entre 2013 et 2019. *Natagora*: 32pp. (in French) [*General conclusion: C. mercuriale* is a critically endangered species in Wallonia. In the Focant plain, the population decreased from 696 to 357 individuals between 2013 and 2018. For conservation purposes, it was necessary to confirm our knowledge of the biological requirements of the species. At the end of this study, we can conclude that the abundance of *C. mercuriale* is positively correlated to the presence of headlands and the cover of the ditch by herbaceous vegetation (especially when the latter is higher than 80%). Conversely, factors such as the presence of continuous hedges and the covering of watercourses by bushes are unfavourable factors for the presence of the species. The summer of 2019 was

particularly hot: the average temperature for the months of June, July and August was 19.1°C compared to the normal seasonal temperature of 17.5°C\*. Although there was a surplus in June, the average rainfall was lower in quantity and frequency than the seasonal norms (33 days of rainfall instead of 43.8). Drought is therefore a factor to be taken into account in the results, particularly for the habitat quality maps. Finally, as the data were collected over several years and by multiple operators, it is preferable to remain cautious with regard to our results, particularly for comparative analyses. Management advice in favour of *C. mercuriale*: The management of watercourses and ditches on the Focant plain is a delicate issue. LIFE Bocageous Meadows can only make recommendations to the regional and communal authorities (Beauraing) who are in charge of the management of this biotope: 1) To fight against eutrophication by developing agricultural practices using a minimum of inputs (in particular: fertilisers and pesticides) as well as by restructuring the wastewater treatment system from the surrounding villages. 2) Removing the various logjams that impede the proper flow of water (Annex 6). 3) Planting of alders or other trees should be avoided along the drains, ditches and watercourses in the Focant Valley. Established plantations should ideally be thinned to limit shading of the stream bed. 4) Carry out light dredging in small sections and in rotation over several years as part of a new action plan to avoid the risk of destroying all larval populations of Mercury's Agrion. 5) Do not mow the edges of ditches between 1 April and 31 July. 6) Inform farmers about the Agro-environmental and Climatic Methods, in particular the MAEC "grassed headland", which provides a subsidy of €24 per 20 m long section (12 m wide), i.e. €1,000/ha. 7) Continue to search for other populations in the most favourable regions (Fagne-Famenne and Lorraine)." (Authors/DeepL)] Address: Goret, T., Natagora, Traverse des Muses 1, 5000 Namur, Belgium

**20471.** Messlinger, U.; Burbach, K.; Faltin, I.; Frobel, K.; Schloemer, S. (2019): Zum Einfluss des Europäischen Biber *Castor fiber* auf den Larvallebensraum von *Cordulegaster boltonii* (Odonata: Cordulegastridae). *Libellula* 38(3/4): 157-178. (in German, with English summary) ["In 2016 the effects of beaver activities on habitat quality of *C. boltonii* were studied in various regions of Bavaria and the northern Eifel. In almost all of the study sites the larvae of *C. boltonii* were found in sections influenced by beavers. The larvae also inhabited structures which only arise through beaver activities like dams; water filled cavities on the side and base of dams; beaver ponds and secondary streams with appropriate sandy sediments. In a fast-flowing stream in the Spessart region (Kalter Grund) every location with suitable sediments on a 200 m long stretch of the stream was surveyed. This study revealed, that well populated larval environments were principally provided by beaver damming activities. In stream sections influenced by beavers the density of *C. boltonii* larvae was more than six times higher as in sections not influenced by beavers. The results indicate that *C. boltonii* is both able to survive and benefit from the structures and micro-habitats that beavers typically provide. This applies particularly to streams which are anthropogenically poor in structures. The return of the beaver and the structures which result from their complex behavioural activity is of clear benefit to dragonflies which utilise running waters. It is apparent from our study that these species are from an evolutionary perspective well adapted to beavers and that beaver activities should where practicable be tolerated and supported in the habitat of *C. boltonii*. The prevention of beaver activity in these artificially modified water bodies is therefore a hindrance to their renaturation." (Authors)]

Address: Messlinger, U., Am Weiherholz 43, 91604 Flachslanden, u.messlinger@t-online.de

**20472.** Nattawut Sareein; Chitchol Phalaraksh; Panida Rahong; Chotiwiut Techakijve; Sangwoo Seok; Yeon Jae Bae (2019): Relationships between predatory aquatic insects and mosquito larvae in residential areas in northern Thailand. *Journal of Vector Ecology* 44(3): 223-232. (in English) ["In order to elucidate the poorly understood relationships between mosquito larvae and their predatory aquatic insects in urban and suburban areas of tropical Southeast Asia, where vector-borne diseases are prevalent, aquatic insects were sampled from 14 aquatic habitats in residential areas of Chiang Mai, northern Thailand, during the rainy season (July to November) in 2016. Correlations among biological variables, densities of major predatory aquatic insect groups (i.e., Odonata, Coleoptera, and Hemiptera: OCH group) in wetlands and artificial lentic habitats, and the density of mosquito larvae were analyzed. Among the sampled mosquito larvae, *Culex* spp. were the most abundant, and both OCH density and water quality were major determinants of *Culex* spp. density ( $r_s = -0.302$  and  $-0.396$ , respectively). Logistic regression analyses indicated that the probability of *Culex* spp. occurrence was significantly and negatively correlated with OCH density. Furthermore, high macrophyte abundance was associated with higher predator density, potentially reducing mosquito density. Hemipteran predators were most negatively correlated with *Culex* spp. density, regardless of whether macrophyte abundance was high or low ( $r_s = -0.547$  and  $-0.533$ , respectively). Therefore, hemipteran predators were the most important aquatic insect predators in the urban and suburban residential areas of Chiang Mai, Thailand, and OCH species, such as the hemipteran *Micronecta scutellaris*, could be used as biological control agents against mosquitoes in the region." (Authors)] Address: Yeon, J.B., Dept of Environmental Science & Ecological Engineering, Graduate School, Korea Univ., Seoul, South Korea. Email: yjbae@korea.ac.kr

**20473.** Nava-Bolaños, A.; Sánchez-Guillén, R.A.; Wellenreuther, M.; Muñoz, J.; Torres-Pachón, M.; Novelo-Gutiérrez, R.; Córdoba-Aguilar, A. (2019): Predicting hybridisation as a consequence of climate change in damselflies. *Insect Conservation and Diversity* 12: 427-436. (in English) ["(1) Climate change is a key stressor for species. Two major consequences of climate-induced range shifts are the formation of new areas of geographic overlap (i.e. sympatry) and an increased probability of hybridisation in the de novo created contact zones. (2) One method to effectively quantify the potential of hybridisation is to integrate ecological niche modelling and the propensity to hybridisation based on genetic divergence. In this paper, we have applied this methodology to predict hybridisation outcomes following different scenarios of climate change in 30 species of *Argia* damselflies. (3) We (i) investigated how climate change may affect species' distributions; (ii) quantified if changed distributions generate new areas of sympatry between species; (iii) calculated the propensity to hybridise based on genetic divergence between species; and (iv) integrated these data to predict the future potential of species to hybridise. (4) We found that the distribution of 29 of the 30 species was affected by a change in climate which led to a general increase in sympatric overlap among species. The degree of genetic divergence among the 108 species' combinations ranged from 0.06% to 0.36%. Based on the sympatric overlap and genetic divergence, it can be predicted that 97 of the species pairs are likely to hybridise in the future. (5) Our results are useful to forecast how highly diverse and closely



related groups, such as *Argia* damselflies, may respond to a change in climate and how this can impact the potential of species mixing under a scenario of increased global warming." (Authors)] Address: Sanchez-Guillen, Rosa, Instituto de Ecología A. C., Xalapa 91070, Veracruz, Mexico. E-mail: rosa.sanchez@inecol.mx

**20474.** Nel, A.; Garrouste, R.; Schubnel, T. (2019): Response to Trueman and Rowe (2019) 'The wing venation of Odonata. International Journal of Odonatology'. International Journal of Odonatology 22(2): 115-119. (in English) ["Trueman & Rowe (2019) claimed that they have finally solved the wing venation homologies for the Odonoptera, refuting the previous models, and especially that of Riek & Kukalová-Peck (1984). Nevertheless, their proposal has several failures, viz. nature of the distal part of their "anal vein", nature of the "MA", and incongruence with recent results obtained by Jacquelin et al. (2018) on the morphology of the extreme wing base. Currently the only pattern of venation in total accordance with the known data is that of Riek & Kukalová-Peck (1984), as modified in Nel et al. (1993) and Jacquelin et al. (2018)."] (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**20475.** Nel, A. (2019): A glance at the deep past history of insects. *Comptes Rendus Biologies* 342(7-8): 253-254. (in English) [Verbatim: With more than 1,100,000 described species, the insects are the most diverse clade of extant animals, far before all other groups. Nevertheless, they undergo a drastic decrease of their populations, due to the sixth extinction of human origin. Thus it is important to define when and how they became so diverse and if they were impacted by the major crises of biodiversity in the deep past to estimate the importance of the current one. Insects are generally among the best preserved terrestrial fossil organisms, much more complete than the vertebrates. They are also much more frequent. Thousands can be found in Konservat-Lagerstätten since the Carboniferous. They are preserved either in lacustrine sediments as compression fossils, or embedded in amber (fossil resins) (Fig. 1). The Hexapoda (or six-legged arthropods, viz., wingless Collembola, Diplura, Protura; wingless and winged Insecta) are among the oldest known terrestrial organisms, with first records dated from the Middle Devonian of Rhynie in Scotland. Recent molecular phylogenetic dating suggests that they appeared during the Silurian or even the Ordovician, with the first terrestrial plants. The Devonian hexapodan record is very scarce and disappointing, with less than six described fossils, all wingless [1]. The early Carboniferous one is even worse, without any fossil insects. But at the very end of this period and during the late Carboniferous, the insect diversity exploded, with a 'sudden appearance' of winged insects with very diverse feeding resources, e.g., carnivorous, plant suckers, leaf eaters, detritivorous, gall-makers, etc. The wingless clades remained a minority and the high diversification of the Carboniferous Hexapoda clearly concerned the winged forms. Wings and flight were probably the first crucial structures and function that allowed the first burst of diversification of the insects. Flight allows them to escape predators, find new resources, sexual partners, and travel to new environments. The most popular fossil insects are the Paleozoic 'giant' dragonflies Meganeuridae. These flying insects with very large wingspans (ca. 70 cm wide) had large bodies but comparable to those of some extant beetles. In fact, the unique really giant Carboniferous terrestrial arthropod was *Arthropleura*, a myriapod that was more than 1 m long. It is supposed that the great increase of oxygen

proportion in the air during the Late Carboniferous favored the gigantism among the terrestrial arthropods, due to their breathing via trachea. The question is in fact more complex, because the winged insects knew a unique situation during the late Paleozoic, as they had no flying vertebrates as predators. As they were the only flying animals, they probably knew a phenomenon of parallel increases of sizes of predators (the Meganeuridae) and preys, the Palaeodictyoptera that also became larger and larger [2]. At the end of the middle Permian, both clades are very diverse, with still very large taxa, while the oxygen proportion began to decrease. The first gliding 'lizard-like' vertebrates are also recorded at the same time, and certainly began to predate these giant insects, which became rarer during the late Permian and no longer existed in the Triassic. The late Carboniferous was also the time of the oldest known holometabolous insects, with complete metamorphosis (wasps, beetles, scorpionflies), and of the oldest bugs (Hemiptera). These were discovered very recently because they were very small insects [3]. They are now the most diverse animal clades, with the 'big five' (Hemiptera, Hymenoptera, Diptera, Lepidoptera, and Coleoptera). But during all the Paleozoic, these insects were clearly very few. Holometaboly in itself was not 'sufficient' to cause their diversification and each of these orders 'separately' diversified during the last 220 Ma. The exact impact on the insects of the most important Permian–Triassic crisis of diversity remains difficult to estimate because there are very few latest Permian and earliest Triassic outcrops with insects. Thus if we know that the Triassic entomofaunas are very different from the Permian ones, we cannot establish that the great changes that occurred between the two periods happened during this crisis or before, during the late Permian or even at the end of the middle Permian. Nevertheless, the Palaeodictyoptera and the Meganisoptera are no longer present in the Triassic, while all the Triassic entomofaunas are clearly 'dominated' by the beetles and other Holometabola. Beetles were still minority during all the Permian in the fossil record. The 'true' flies (Diptera) and crown group of Hymenoptera are also dated from the Middle Triassic. At the end of this period, all the extant orders were present, except, maybe the parasite groups such as fleas (Siphonaptera), whose oldest fossils are middle Jurassic. The 'modern' entomofauna is thus much older than the extant mammal orders. During the Jurassic, the insects continued their diversification, with the first parasitoid wasps (there is no record of parasitoid insects before). The Cretaceous was the second crucial period for the insect (especially the Holometabola) diversification, with the oldest eusocial taxa (termites, wasps, bees, ants). The Albian–Cenomanian (ca. 100 Ma.) was the time of replacement of the gymnosperms by the angiosperms in all the terrestrial biotas, and the time of appearance of nearly all the extant insect families (even some extant genera have this age). It is also an important time of extinctions of several older Jurassic clades, replaced by extant taxa. Only the insects that adapted to the new environments related to flowering plants could diversify. The modern insect–plant relationships were established during the late Cretaceous. The recent new studies of the extraordinarily rich and diverse entomofauna of the 'mid' Cretaceous Burmese amber allowed one to discover that the Cretaceous insect world was as complex, rich and diverse as the extant one. The Cretaceous–Cenozoic (K–T) crisis had clearly a very weak impact on insect diversity, at least at the family level [4]. In fact, there were more extinctions and appearances of new families during the Paleocene–early Eocene than during the K–T crisis. These were periods of global warming followed by global cooling. The entomofaunas suffered the successive periods of cool-

ing of the Oligocene, Miocene, and the Pliocene–Pleistocene glaciations, causing the extinctions of numerous widespread families that survived in small areas (the Australian mastotermitid termites or the Tasmanian hairy cicadid Tetigarctidae are the most spectacular examples). The deep past history of insects is unique, with bursts of diversification ca. 330 Ma, 220 Ma, and 100 Ma ago. The causes of the first one remain poorly known, those of the second one are probably linked to the renewal of the ecosystems during the early Triassic, and the third one to the great floristic change. At least the K–T crisis did not affect much insect diversity. Thus the current crisis of biodiversity that begins to greatly affect the insect biomass, is extremely alarming. It may be more important than the K–T one.] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimr1.mnhn.fr

**20476.** Nur Hikmah, A.; Subchan, W.; Prihatin, J. (2019): Diversity of Odonata species in the Wonoasri resort Meru Betiri National Park. *International Journal of Advanced Research* 7(1): 1183-1188. (in English) ["Meru Betiri National Park is part of Blambangan Biosphere located in East Java Indonesia that consisting of several zone, including core zone, wilderness zone, marine protection zone, utilization zone, traditional zone, rehabilitation zone, and special zone. Wonoasri Resort area included into the rehabilitation zone which consist of a converting forest land to agricultural land. This change of land function will effect on biodiversity included dragonfly. The level of biodiversity of dragonfly, Odonata orders can be used as indicator of quality of the environment. This research needs to be done to know the diversity of dragonfly in the rehabilitation area of Meru Betiri National Park. The results of this research revealed that the order of Odonata consist of 9 species that has been found, which consist of 4 species from Libellulidae, 1 species from Aeshnidae, 1 species from Platycnemididae, 1 species from Euphaeidae, and 1 species from Calopterygidae. The result of the research are expected to be preliminary data for the conservation of biodiversity in Meru Betiri National Park." (Authors)] Address: Nur Hikmah, A., Biology Education Study Program, Faculty of Teacher Training and Education, Univ. of Jember, Indonesia

**20477.** Pelli, A.; Pimenta, P.C. (2019): The life of dragonflies: order Odonata. *Ciencia e Natura*, Santa Maria 41, e43: 1-7. (in English) ["The Odonata Order has a wide geographical distribution. The life cycle is complex, with stage of aquatic nymph, the naiad and winged adults. The research was carried out in peer-reviewed journals at the PubMed and Capes databases, with the keyword Odonata "and" ecology, when the text was complete and available. The used books were researched with insects theme, entomology, available in the collection of the library of the Federal Univ. of the Triângulo Mineiro or private collection. The theoretical framework deals with biology, life cycle, sexual behavior and biodiversity. The Odonata order needs preserved places to reproduce and develop. Some authors mention that certain species of dragonflies can be considered good bioindicators of preserved environment, since they are sensitive to environmental changes. Finally, there is a need for further studies on taxonomy, physiology, and ethology to use this group as a bioindicator in quick works." (Authors)] Address: Pelli, A., Pós-doutora em Ecologia e Recursos Naturais; professora aposentada do Departamento de Biologia e Zootecnia da Universidade Estadual Paulista Júlio de Mesquita Filho. pesquisadora na Faculdade de Engenharia de Ilha Solteira, Brasil. Email: elizete.lima@unesp.br

**20478.** Pimenta, A.L.A.; Pinto, A.P.; Takiya, D.M. (2019): Integrative taxonomy and phylogeny of the damselfly genus *Forcepsioneura* Lencioni, 1999 (Odonata: Coenagrionidae: Protoneurinae) with description of two new species from the Brazilian Atlantic Forest. *Arthropod systematics & phylogeny* 77(3): 397-414. ["*Forcepsioneura* Lencioni, 1999 is a small genus of eight forest-dependent damselfly species endemic to the Brazilian Atlantic Forest domain. Some of its species are difficult to identify due to their strong morphological similarities. Thus, the use of DNA sequences for taxonomic purposes is warranted. This study examined the diversity among mitochondrial COI and 16S and nuclear PRMT markers in *Forcepsioneura*, identified discrete evolutionary units based on morphological and molecular characters, and described two new species using an integrative approach to propose species-level hypotheses. The first molecular phylogeny of *Forcepsioneura* species, including seven of the 10 valid species, is presented. *Forcepsioneura gabriela* sp.n. and *Forcepsioneura janeae* sp.n. are described and illustrated based on males. *Forcepsioneura gabriela* sp.n. is closely related to *F. garrisoni* Lencioni, 1999 and *F. regua* Pinto & Kompier, 2018 and was included in the light blue group, but was recovered with high K2P COI divergence values relative to *F. garrisoni*. PRMT and ribosomal 16S rDNA sequences were too conservative to distinguish this new species from others of the light blue group. Nevertheless, *F. gabriela* sp.n. can be distinguished from other *Forcepsioneura* by its coloration and shape and length of the ventrobasal process of cercus and MP vein. On the other hand, we were unable to get COI sequences for *F. janeae* sp.n., but morphological diagnostic characters, such as, coloration and shape of the posterior lobe of the prothorax and ventrobasal process of cercus supported its proposal as a new species. A concatenated Bayesian analysis of all markers supported the monophyly of both *Forcepsioneura* and the light blue group of species. This study affirmed the value of COI sequence variation for species-level studies but did not support the use of PRMT and 16S for this group of damselflies, as there was very little interspecific variation between some closely related species." (Authors)] Address: Pinto, A.P., Laboratório de Sistemática de Insetos Aquáticos (LABSIA), Departamento de Zoologia, Universidade Federal do Paraná, P.O. Box 19020, 81531-980 Curitiba, PR, Brazil. Email: appinto@ufpr.br

**20479.** Ramamonjisoa, N.; Oiiire, C.; Zheng, X.J.; Kimura, S. (2019): Predation decreases cohort foraging activity and growth, yet increases individual size variation in prey. *Evolutionary Ecology* 33(2): 233-242. (in English) ["There is increasing evidence that size variability within a cohort can have important consequences on community ecology and evolution. It is commonly assumed that the threat of predation can influence cohort size variability by homogenizing foraging behavior among members. We combined predictions of growth–defense models with those from models of genesis of size variation to test the non-lethal effects of size-selective newt and gape-unconstrained aeshnid dragonfly larva predators [*Anax* sp.] on the size structure of *Rhacophorus arboreus* tadpoles in a controlled laboratory experiment. We hypothesized that the predators would induce differential growth and behavioral responses in the tadpoles, and would decrease cohort size variation. The tadpoles reduced activity levels in the presence of the predators, but the responses were generally stronger in the presence of dragonfly larvae. Growth costs were commensurate with the levels of behavioral defense investments in the tadpoles. Despite strong reductions in activity levels and growth, cohort size variation increased in the presence of predators,

contrasting current models on relationship between foraging rates, growth, and cohort size variation in prey. The underlying mechanisms are unclear, but it is possible that reduced rates of movement limited access to food for some cohort members or that predation risk enhanced the expression of behavioral variation among individuals." (Authors)] Address: Ramamonjisoa, N., Ecology Group, Graduate School of Environmental Studies, Nagoya Univ., Nagoya, Japan. Email: noelikanto@d.mbox.nagoya.u.ac.jp

**20480.** Renner, S.; Périco, E.; Dalzochio, M.S.; Sahlén, G. (2019): Ecoregions within the Brazilian Pampa biome reflected in Odonata species assemblies. *Austral Ecology* 44(3): 461-472. (in English) ["Based on vegetation composition, previous studies of the Pampa biome in southern Brazil have defined seven ecoregions within the area. Here, we test this ecoregion approach studying the semi-aquatic insect group Odonata in five of these regions, aiming at comparing the ecoregions to the more traditional environmental predictors of water quality and land cover. Based on a data set of occupancy comprising 99 species distributed between 131 localities, a one-way Permutational Multivariate Analysis of Variance was used to compare differences in the species composition between the ecoregions, followed by a Principal Component Analysis to visualize the variation. The composition varied significantly between all groups tested, and the ordination explained 61.8% of the variance. A partial redundancy analysis of ecoregions, land cover and water quality variables explained 71% of the variance in Odonata community structure. Ecoregion was the most important predictor, followed by water quality and land cover. Within these species assemblies, we could select certain species that were representative of a given ecoregion, to which their distribution within the Pampa biome was entirely or mainly confined. Of 24 representative species 41.7% were rare, while the rest were more abundant and, hence, easier to detect. We suspect that the differences found between the Pampa ecoregions might be due to geology, as such factors may be strong determinants of biodiversity. Specific ecological requirements at the family and genus levels also seemed to act selectively on the species compositions within the ecoregions. Today, the Pampa is highly fragmented due to agricultural activities such as rice cultivation, extensive cattle farming and forest plantations. We suggest that an ecoregion-based approach to the implementation of conservation measures may be the best way to help these distinct species assemblies survive." (Authors)] Address: Renner, S., Laboratório de Ecologia e Evolução, Universidade do Vale do Taquari – UNIVATES, Rua Avelino Tallini, 171 Bairro, Universitário, Lajeado RS 95900-00, Brazil. E-mail: samuelrenner@hotmail.com

**20481.** Roman-Heracleo, J.; Novelo-Gutiérrez, R. (2019): Description of the final stadium larva of *Anisagrion allopteron* (Odonata: Coenagrionidae). *International Journal of Odonatology* 22(2): 147-154. (in English) ["The final stadium larva of *Anisagrion allopteron* is described for the first time for Middle America, based upon specimens reared and emerging in the field, from Cartago, Province, Costa Rica. Detailed illustrations are also provided. The larva of this species is characterized by a slender yellow body, premental setae 4+1, five palpal setae, male cerci globose, and caudal lamellae densely tracheate." (Authors)] Address: Novelo-Gutiérrez, R., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera antigua a Coatepec 351, El Haya 91073 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**20482.** Rüppell, G.; Hilfert-Rüppell, D. (2019): Touching water by males of *Calopteryx virgo* L. (Insecta: Odonata) in threatening display. *International Journal of Odonatology* 22(1): 31-36. (in English) ["For the first time water dipping behaviour of *Calopteryx* during threatening flight is reported. Four males of *C. virgo* in a small rivulet coming from a spring pool in SW France involved in threatening flights near an opponent dipped a wing into the water, producing conspicuous water rings. One male did this twice and additionally hit the water with its legs, splashing water drops forward. Possible interpretations are discussed." (Authors)] Address: Hilfert-Rüppell Dagmar, Zool. Inst. TU Braunschweig, Fasanenstr. 3, 38092 Braunschweig, Germany. E-mail: d.hilfert@tu-bs.de

**20483.** Russell, S. (2019): Variations in the dragonfly microbiome through life stages and its ability to harbor antibiotic resistant bacteria. M.Sc. thesis, Biological Science, Univ. of Mississippi: V + 45 pp. (in English) ["Juvenile dragonflies (nymphs) may possess the ability to pass their microbiome to the adult life stage through metamorphosis. If this is so, the environment in which the nymph develops may have an effect on the adult microbiome. In this study, the gut microbiomes of 13 species of dragonfly were compared across life stages and when collected from environments at different levels of urbanization. The gut of each dragonfly was removed, DNA extracted, and a portion of the bacterial 16S rRNA gene amplified and sequenced. Gut suspensions were also plated on antibiotic amended plates to determine the potential for dragonflies to contain antibiotic resistant bacteria. Gut microbiomes of dragonflies mainly separated by life stage, with nymphs further separating by the environment from which they were collected from. Dragonfly species was not a significant factor in the separation of either nymph or adult microbiomes. The microbiomes of nymphs and adults differed in levels of their dominant bacterial phyla, with Proteobacteria being dominant in adults, while nymphs showed a higher proportion of Acidobacteria and Bacteroidetes compared to adults. Nymphs also contained bacteria phyla that were not present in the adult microbiome. Both life stages contained antibiotic resistant bacteria, with the guts of dragonfly adults having higher counts of resistant bacteria than nymphs. The environment from which the dragonflies were collected had a significant influence on the counts of resistant bacteria for multiple antibiotics, as did dragonfly species. These results suggest that the gut microbiomes of dragonfly nymphs and adults are fundamentally different, and that both life stages have the potential to contain antibiotic resistant bacteria. The local environment influences both the numbers of these antibiotic resistant bacteria and the composition of the gut microbiome in general." (Author) *Libellula luctuosa*, *Erythemis simplicicollis*, *Pachydiplax longipennis*, *Anax junius*, *Celithemis elisa*, *Orthetrum glaucum*, *Plathemis lydia*, *L. quadrimaculata*, *Celithemis elisa*, *C. eponina*, *Tetragoneuria cynosura*, *Ladona deplanata*, *Sympetrum corruptum*, *Anax imperator*, *Neodythemis preussi*, *S. obtrusum*] Address: Russell, Sarah, Univ. Mississippi, USA. Email: Smruss3913@gmail.com

**20484.** Senn, P. (2019): New localities of southern darter *Sympetrum meridionale* (SELYS, 1841) and banded darter *S. pedemontanum* (MÜLLER in ALLIONI, 1766) (Odonata: Libellulidae) in northern Poland. *Odonatrix* 153: 6 pp. (in English, with Polish summary) [*Sympetrum meridionale*, 28.08.2018 at a pond in Gdynia Dabrowa (UTM: CF33) and two males and one female of *S. pedemontanum* from 14 to 29.09.2018 in three districts (and UTM squares: CF32, CF33, CF42) of Gdansk, Poland. *S. meridionale* is a Ponto-

Caspian/Ponto-Mediterranean species with a Palaearctic distribution extending from north-eastern China and Mongolia, across central Asia, and the Caspian and Black Seas, to Europe, where it is common in France, northern Italy, the Balkans and Greece (KALKMAN et al. 2015). There are increasing reports of sightings from Belgium and The Netherlands, where short-lived populations have been established: in 2018 nearly 400 individuals were sighted in Belgium (<https://waarnemingen.be>) and over 860 in The Netherlands (<https://waarneming.nl>). The species has been found in all of the German states except Schleswig-Holstein, Bremen and Berlin (ROLAND & STÜBING 2014). Although the southern darter is very likely to have reached the U.K. in the last few years, there have not yet been any definitive reports of it from there, probably because of the difficulty in distinguishing it in the field from other darter species (D. HEPPER (quoting from A. PARR), pers. comm.). In the eastern part of Europe, obviously migrating individuals of *S. meridionale* have been trapped on the Curonian Spit on the Baltic coast over a number of years (SHAPOVAL and SHAPOVAL 2017), but the species has not been found in the interior of the Kaliningrad region of Russia or in neighbouring Lithuania (GLIWA and ŠVITRA 2016) or Latvia (KALNINŠ 2017). In Poland, *S. meridionale* has a stable distribution in the south and south-east of the country (BERNARD et al. 2009), but this region lies at the northernmost edge of its known contiguous breeding range in eastern Europe. The species has been sighted in some numbers further north – in the province of Wielkopolska (URAWLEW et al. 2010, URAWLEW 2013) and in the province of Łódź (URAWLEW 2011). But further north still, on the Baltic coast, any southern darters encountered, like this one in Gdynia, must surely be vagrants or migrants, especially in the light of the data from the Curonian Spit (SHAPOVAL and SHAPOVAL 2017), which is only 160 km or so from Gdynia as the crow flies.] Address: Senn, P., ul. Kańskiego 7D/9,81-603 Gdynia, Poland. E-mail: [petersenn47@gmail.com](mailto:petersenn47@gmail.com)

**20485.** Shepard, D. (2019): Pretty Little Predators. Dragonflies are lovely to look at. Unless you're a mosquito or other prey. Montana Outdoors May–June 2019: 17–21. (in English) [<https://fwp.mt.gov/binaries/content/assets/fwp/montana-outdoors/dragonflies.pdf>] Address: not stated

**20486.** Soustelle, C.; Moisset, F.; Lereec le Bricquair, M.-L. (2019): Première mention documentée de *Pantala flavescens* en France métropolitaine (Odonata: Libellulidae). *Martinia* 34(1-2): 61–67. (in French, with English summary) ["First documented record of *P. flavescens* in metropolitan France. – We captured and photographed *P. flavescens* on 12-VIII-2019 in the Gard Dept. This is the first documented record of this migratory species in metropolitan France. We put this observation into the European context in 2019 and discuss the possible origin of the individual." (Authors)] Address: Soustelle, C., Département du Gard, 3 rue Guillemette, F-30044 Nîmes, France. Email: [cyril.soustelle@gard.fr](mailto:cyril.soustelle@gard.fr)

**20487.** Tarwotjo, U.; Rahadian, R.; Hadi, M. (2019): Abundance and diversity of insects on apple water tree during fruit season using different colours and different height placement of sticky trap. *Journal of Physics: Conference Series*, Volume 1217, conference 1: 5 pp. (in English) ["The objective of this research were to determine the abundance and diversity of insects on apple water tree and to measure the effectiveness of several colours and height placement of sticky trap on fruit flies and other insects on apple water tree during fruit season. Sampling of insects was conduct-

ing in an apple water field during fruit season in Demak Central Java Indonesia using sticky trap with methyl eugenol attractant. There were three different sticky trap colours i.e., yellow, white, and blue; and two height of trap placement i.e., one meter and three meter, were used. Parameters observed included the number of fruit flies in each colour, height placement of sticky trap, and the taxon of insects. The data was analysed into Shannon-Wiener diversity and abundances of insects on each colours and height placement of sticky traps. The results showed that the insects found consist of 5 orders (Diptera, Hymenoptera, Coleoptera, Lepidoptera, and Odonata), and 21 families. Most families are found in the order Diptera (8 families), Hymenoptera (4 families), and Coleoptera (3 families). The Diptera family consists of Tephritidae, Culicidae, Agromyzidae, Muscidae, Asilidae, Mycetophyllide, Drosophyllidae, Bombyllidae. In short, the insects on apple water tree were more abundant in 3 meter height and they tend to be attracted on yellow sticky trap." (Authors) Four Calopterygidae were captured at blue sticky traps at a height of three meters.] Address: Rahadian, R., Dept of Biology, Fac. of Sciences & Mathematics, Diponegoro Univ., Jl. Prof. Soedarto, SH, Tembalang, Semarang 50275, Indonesia. Email: [rully.rahadian@live.undip.aci.id](mailto:rully.rahadian@live.undip.aci.id)

**20488.** Taybi, A.F.; Mabrouki, Y.; Berrahou, A.; Sbaa, M.; Brochard, C. (2019): New data on the dragonfly fauna (Odonata) of the Moulouya River Basin and the Oriental Region, Morocco. *Arxius de Miscel·lània Zoològica* 17: 85–108. (in English, with Spanish and Portuguese summaries) ["New data on the dragonfly fauna (Odonata) of the Moulouya River Basin and the Oriental Region, Morocco. We present new faunistic and distributional data on dragonflies (Odonata) from the east of Morocco, comprising the administrative Oriental Region and the Moulouya River Basin and covering an area of 119,268 km<sup>2</sup>. A checklist of 47 species belonging to 19 genera and 7 families is provided. *Pseudagrion s. sublacteum* (Coenagrionidae), *Aeshna mixta* (Aeshnidae), *Sympetrum sinaicum* and *S. meridionale* (Libellulidae) are new for Eastern Morocco, while *Paragomphus genei* (Gomphidae) is new for the Moulouya watershed. Our surveys yield evidence of breeding of *Zygonyx torridus* in the Moulouya River, of *Sympetrum sinaicum* in the Oriental province, and also of *Boyeria Irene*, which remained unrecorded for more than three decades. We confirm the occurrence of *Brachythemis impartita* in the study area, by providing new sightings. Our results also revealed the range expansion of several other species whereas some previously known species in the region were not found. We found a clear dominance of the Palearctic elements, mainly Mediterranean, with a high proportion of Ibero–Maghrebian endemic species. This chorotype pattern is similar to patterns observed for other macroinvertebrate groups in the same study area." (Authors)] Address: Brochard, C., Marsstraat 77, 9742EL Groningen, The Netherlands. E-mail: [info@cbrochard.com](mailto:info@cbrochard.com)

**20489.** Wagner, H.C.; Wiesmair, B.; Paill, W.; Degasperi, G.; Komposch, C.; Schattaneck, P.; Schneider, M.; Aurenhammer, S.; Gunczy, L.W.; Rabitsch, W.; Heimburg, H.; Zweidick, O.; Volkmer, J.; Frei, B.; Kerschbaumsteiner, H.; Huber, E.; Netzberger, R.; Borovsky, R.; Kunz, G.; Zechmeister, T.; Ockermüller, E.; Preiml, S.; Papenberg, E.; Kirchmair, G.; Fröhlich, D.; Allspach, A.; Zittra, C.; Svetnik, I.; Bodner, M.; Vogtenhuber, P.; Körner, A.; Thieme, T.; Christian, E.; Seeber, J.; Baumann, J.; Gross, H.; Hittorf, M.; Rausch, H.; Burckhardt, D.; Graf, W.; Baumgartner, C. (2019): Be-



richt über das fünfte ÖEG-Insektencamp: Biodiversitätsforschung im Nationalpark Donau-Auen (Wien, Niederösterreich). *Entomologica Austriaca* 26: 25-113. (in German, with English summary) ["The fifth insect camp of the Entomological Society of Austria (ESA) was conducted from April 27 to May 2, 2018. Many of the 39 participants were recognized experts on different arthropod groups. Fifty-seven localities within and nearby the Donau-Auen National Park were investigated, and a total of 1265 invertebrate species identified: [...] 19 Odonata, [...]."] (Authors) *Aeshna isocetes*, *Brachytron pratense*, *Coenagrion puella*, *C. pulchellum*, *Erythromma najas*, *Ischnura elegans*, *Pyrrhosoma nymphula*, *Cordulia aenea*, *Epiteca bimaculata*, *Gomphus vulgatissimus*, *Sympecma fusca*, *Leucorrhinia caudalis*, *L. pectoralis*, *Libellula depressa*, *L. fulva*, *L. quadrimaculata*, *Orthetrum albistylum*, *O. cancellatum*, *Platycnemis pennipes*] Address: Borovsky, R., Krobathgasse 2, 9020 Klagenfurt, Austria. E-Mail: borovskyroman@gmail.com

**20490.** Wrynn, T.E.; Gall, B.G. (2019): Palatability and defense of Eastern Newt (*Notophthalmus viridescens*) larvae and metamorphic juveniles against predatory dragonfly nymphs. *Northeastern Naturalist* 26(4): 849-857. (in English) ["We examined the predator-prey relationship between nymphs of the predatory dragonfly *Anax junius* (Common Green Darner) and larval and metamorphic *Notophthalmus viridescens* (Eastern Newt), some of which may contain the potent neurotoxin, tetrodotoxin. First, we conducted a palatability study to determine which life-history stages were palatable to dragonflies. We also tested the metamorphosis and survival rates of larval newts when exposed to predatory dragonflies in small microcosms. Finally, we tested the predator avoidance behavior of larval newts in response to chemical cues from a control, food stimulus, and predatory dragonflies. All life-history stages (small and large larvae, and recent metamorphs) were palatable to dragonflies. In microcosm trials, we found that newt larvae had a lower chance of surviving and transforming when dragonflies were present compared to a control. Finally, newt larvae decreased movement significantly when exposed to predatory dragonfly stimulus compared to either a control or food stimulus. These results suggest dragonflies are effective predators of newts from hatching through metamorphosis. However, the larvae do possess behavioral avoidance mechanisms that likely reduce the risk of predation by dragonflies." (Authors)] Address: Gall, B.G., Hanover College, Hanover, IN 47243, USA

**20491.** Yamada, S.; Tsujino, R.; Takemon, Y.; Urabe, J. (2019): The role of spatial and temporal variations in habitat uses and food habits of larvae in persistent occurrence of multiple odonate species in Mizorogaike Pond, Kyoto, Japan. *Limnology* 20: 181-190. (in English) ["Larvae of many odonate species commonly appear within the same freshwater ecosystem. However, it remains unknown whether there is a dietary separation among the larvae of different species. In this study, we collected different species of odonate larvae in different seasons at various sites on the floating mat of Mizorogaike Pond in Kyoto, Japan, and examined the abundance and gut contents of the dominant species. Our analyses showed that habitat and seasonal abundance of the odonate larvae did not significantly overlap between most pairs of the dominant species. Moreover, the degree of dietary overlap was not related to larval biomass in microhabitats. These results suggest that, although larval food habits were similar among species, the existence of various vegetation types on the floating mat allowed many odonate species to inhabit Mizorogaike Pond." (Authors)]

*Ceriagrion melanurum*, *Libellula quadrimaculata*, *Nannophya pygmaea*, *Sympetrum darwinianum*] Address: Yamada, S., Graduate School of Life Sciences, Tohoku Univ., 6-3 Aramaki Ji Aoba, Sendai 980.8578, Japan. E-mail: sayumi.yamada127@gmail.com

**20492.** Zenteno Clemente, L.; Makoto Nakagaki, J.; Lima-Junior, S.E. (2019): Benthic macroinvertebrates as bioindicators of environmental quality in three streams of the Amambai River basin, Upper Paraná River, Brazil. *Oecologia Australis* 23(4): 951-960. (in English) ["The objective of this study was to evaluate the environmental integrity of three streams (along 13 sampling sites) of the Upper Paraná River Basin using the benthic macroinvertebrate fauna as bioindicators and to answer the following question: Is there spatial variation, related to environmental quality, in the composition of these taxa in the streams? The invertebrates were sampled with a surber collector and for habitat analysis were determined characteristics as stream depth and width, water velocity, dissolved oxygen, pH, temperature, turbidity, and electrical conductivity. The environmental variables were analyzed by Principal Component Analysis in order to synthesize the data and identify the most important variables for ordering the collection sites. For biological analysis, the BMWP index was used. A Canonical Correlation Analysis of the environmental and biotic data was also performed in order to identify correlations between these two sets of variables. The collected macroinvertebrates belonged to four phyla (Nematoda, Annelida, Mollusca and Arthropoda), with Arthropoda being the most representative (54.93%), with the predominance of the order Diptera (30.29%). The most sensitive orders (Ephemeroptera, Plecoptera and Trichoptera) occurred in four sampling sites, corresponding to less impacted ones. Tolerant organisms, mainly chironomids, were found in all streams, including the most impacted places. These results indicate a spatial variation in the composition of the macroinvertebrates taxa in the streams, in response to variation of environmental quality." (Authors) Taxa - including Odonata - are treated at family level.] Address: Zenteno Clemente, Leyzinara, Univ. Estadual de Mato Grosso do Sul, Centro de Estudos em Recursos Naturais, Lab. Ecol., Programa de Pós-Graduação em Recursos Naturais, Rod. Dourados-Itahum, km 12, CEP 79804-970, Dourados, MS, Brazil. Email: leyzinara@gmail.com

**20493.** Zhang, S.; Ochiai, M.; Sunami, Y.; Hashimoto, H. (2019): Influence of microstructures on aerodynamic characteristics for dragonfly wing in gliding flight. *Journal of Biomechanical Engineering* 16(3): 423-431. (in English) ["In this paper, the functionalities of microstructures for dragonfly wing during gliding flight are investigated. Three dragonfly-mimic airfoil-shaped wings with hybrid structures were designed and fabricated as: flat wing, zigzag-edged wing and zigzag-edged wing with pillar structure. Based on the wind tunnel experiments, the zigzag-edged wing structure significantly reduces the drag force in the gliding flight. Moreover, the drag reduction is more effective on the combination of the surface pillar and zigzag-edged structure. In addition, the zigzag-edged wing structure has less influence of Karman vortex street, and the surface pillars reduce the frictional drag and stabilized the streamline in the lower vortex region. Overall, the microstructure of the dragonfly wing is an important element in the aerodynamic study. These findings can enhance the knowledge of insect-mimic wing structure and facilitate the application of Micro Air Vehicle (MAV) in the gliding flight." (Authors)] Address: Sunami, Y., Micro/Nano Technology Center, Tokai Univ., 4-1-1 Kitakaname, Hiratsuka-city, Kanagawa, 259-1292, Japan

**20494.** Šigutová, H.; Šipoš, J.; Dolný, A. (2019): A novel approach involving the use of Odonata as indicators of tropical forest degradation: When family matters. *Ecological Indicators* 104: 229-236. (in English) ["Highlights: •Odonata can be effective and cost-efficient indicators of habitat status. • Coenagrionidae and Libellulidae as indicator groups. • Odonata adult-based bioassessment method is reliable. • The method may be easily applied in any tropical forest habitat worldwide. Abstract: Odonata have proven to be good indicators of freshwater as well as terrestrial habitat conditions. Several studies have shown changes in odonate species richness and/or community composition in response to deforestation, suggesting their potential as bioassessment tools in the tropics. However, former approaches using Odonata as an indicator group required comparative samples from differently disturbed sites and/or knowledge of the focal species environmental specificity. Here, we tested a robust, adult-based bioassessment method assuming that the level of tropical forest degradation reflects the proportional representation of the taxa above species. Based on Web of Science, ScienceDirect, and Scopus databases, we used data from previously published studies linking odonate assemblages to human-mediated disturbances in tropical forests. We hypothesized that along a disturbance gradient (from primary forest to non-forest), (i) the proportion of the suborder Zygoptera (mostly habitat specialists sensitive to deforestation) will decrease in favor of the suborder Anisoptera (high proportion of generalists); and (ii) the proportions of largely generalist families Coenagrionidae and Libellulidae will increase at the expense of other Zygoptera and Anisoptera, respectively. Our results revealed that a ratio of Zygoptera/Anisoptera is a poor indicator of tropical forest conditions, probably because of ecological diversity within these groups. However, the proportions of Coenagrionidae/other Zygoptera and Libellulidae/other Anisoptera significantly increased along a disturbance gradient, suggesting their potential to be a good indicator of well-preserved, altered, and heavily degraded forest habitats. Therefore, our results are in line with studies presenting the usefulness of adult Odonata as versatile indicators for assessing human-mediated changes in tropical forest environments, supporting the practical use of this group in biological monitoring." (Authors)] Address: Dolný, A., Dept of Biology & Ecology/Institute of Environmental Technologies, Faculty of Science, Univ. of Ostrava, Chittussiho 10, 71000 Ostrava, Czech Republic. Email: ales.dolny@osu.cz

**20495.** Adu, B.W.; Ogbogu, S.S. (2020): Odonata assemblages in Akure Forest Reserve, southwestern Nigeria. *Agrion* 24(3): 202-207. (in English) ["A survey of adult dragonflies and damselflies of Rivers Alatori, Aponmu and Owena in Akure Forest Reserve was undertaken with the aim of determining the species assemblage patterns in them. A total of 517 individuals of dragonflies (339) and damselflies (178) was collected, representing 48 species in three families of dragonfly and five families of damselfly. *Trithemis arteriosa* was the dominant dragonfly and well represented in the rivers. *Chlorocypha curta* dominated the damselflies with 21 individuals. Species diversity in River Owena was the richest (Margalef index  $d = 6.267$ , Simpson's dominance index  $— 0.7419$ , and Shannon Wiener IF  $— 2.446$ ). The distribution of species was best in River Alatori (Evenness  $E = 0.3511$  and Equitability  $= 0.6787$ ). Simpson diversity t-test indicated that there was no significant difference in the species diversity among the three rivers studied in Akure Forest Reserve at  $p < 0.05$  (P1: p-value 0.89592, P 2: p-value 0.89497, P 3: p-value 0.99972). Although the forest is under considerable human disturbance the ecosystem is

still conducive for a fairly large number of species of Odonata. Species of some interesting genera such as *Gynacantha*, *Sapho*, *Umma* and *Chlorocypha* were also encountered in the forest. However, a large percentage of species sampled at the forest are ubiquitous, indicating the effect of disturbed environment with altered ecosystem integrity." (Authors)] Address: Adu, B.W., Dept of Biology, Federal Univ. of Technology, Akure, Ondo State, Nigeria. E-mail: williamsadubabs@yahoo.com

## 2020

**20496.** Arenhövel, C.; Lüth, E.; Maul, L.C. (2020): Die Schutzgebiete der Stadt Weimar. Teil XI: Die Geschützten Landschaftsbestandteile "Papierbach - Erlengrund- Herzquelle" und "Wäldchen - Der neue Hof". *Thüringer Faunistische Abhandlungen* 25: 9-34. (in German) [Thüringen, Germany, records of the following taxa are noted: *Chalcolestes viridis*, *Orthetrum coerulescens*, *Libellula depressa*, *Sympetrum* sp.] Address: Arenhövel, C., Martin-Luther-Str. 17, 99425 Weimar, Germany

**20497.** Buczynski, P.; Karasek, T. (2020): Dragonflies (Odonata) of the peat bog Wielkie Bloto (Eastern Poland). *Rocznik Muzeum Górnoskalskiego w bytomiu Przyroda* 26: 1-13. (in Polish, with English summary) ["In 2009 and 2011, the Wielkie Błoto high and transitional peat bog in Zawieprzycze Kolonia was researched (51°22'26"N, 22°47'10"E, UTM: FB29, 13.5 km NE of Lublin). The peat bog with an area of 25.9 ha lies in a depression surrounded mainly by arable fields and buildings of the village of Zawieprzycze Kolonia. There are about 30 peat excavations on it, some of which are used as fish ponds or for fishing. 12 sites representing undisturbed peat bog and peat excavations of various types of usage were examined. 31 dragonfly species were found, including a number of peat bog specialists, some of which were very numerous (*Lestes virens*, *Coenagrion hastulatum*, *Nehalennia speciosa*, *Sympetrum danae*, *Leucorrhinia pectoralis*). Of key importance for their occurrence were: water reaction, its mineralization, water body morphology, the distance between the site and the peat bog border and the occurrence of some plant structures. The immediate vicinity of agrocenoses and the lack of a buffer zone caused that the outer part of the bog had partially transformed fauna, but the central part was well preserved. Particular attention was paid to the occurrence of *Nehalennia speciosa*, which was found in 9 sites. Its number on them was estimated at about 1000 individuals in general and on the entire peat bog – several thousand. The Wielkie Błoto marks the western border of a distribution island of this species, which includes mainly the Łęczna-Włodawa Plain. It is isolated (50-100 km from the nearest sites). At least four populations in this area are very large (several thousand individuals)." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**20498.** Burwell, C.J.; Hobson, R.G.; Hines, H.B.; Jefferies, M.G.; Power, N.P.; White, D. (2020): Dragonflies and damselflies (Odonata) of the Granite Belt Region, South-Eastern Queensland, Australia. *Australian Entomologist* 47(1): 1-24. (in English) ["Records of species of dragonflies and damselflies were collated from the Granite Belt region (more or less equivalent to the IBRA subregion of the Stant-horpe Plateau) in southeastern Queensland. The Granite Belt is the most northerly extent of the New England Tablelands bioregion and is an elevated region (mostly above

800 m) characterised by adamellite domes and tors. Records of odonate species were collated from our own observations, photographs and collecting activities, specimens in the Queensland Museum, and specimens from other Australian museum collections and observational records from the Atlas of Living Australia. To date, a total of 58 species of Odonata have been recorded from the Granite Belt, 19 species of damselflies from seven families and 39 species of dragonflies from six families. The odonate fauna of the Granite Belt has strong southern affinities with almost all of the region's species occurring in the southern half of the continent. In terms of their distributions in Queensland, a little over half the species recorded from the Granite Belt are widespread extending north into the tropics. Most of the remaining species are restricted to south-eastern Queensland with 13 species potentially restricted within Queensland to the Granite Belt which is the northernmost extent of their national ranges. Some of these restricted species are associated with riverine habitats but more are associated with swamps and wet heaths in the south-eastern parts of Girraween National Park. The long-term persistence of these species in Queensland is at risk due to rising temperatures, more severe and prolonged droughts and more severe and frequent fires due to climate change." (Authors)] Address: Burwell, C.J., Biodiversity Program, Queensland Museum, P.O. Box 3300, South Brisbane, Queensland 4101, Australia. E-mail: [chris.burwell@qm.qld.gov.au](mailto:chris.burwell@qm.qld.gov.au)

**20499.** Cheri, C.R. (2020): Dragonflies and damselflies (Insecta: Odonata) as indicators for riparian condition in Ozark Spring Streams. M.Sc. thesis, Missouri State Univ.: 97 pp. (in English) ["Odonata are often ineffectively sampled during standard stream bioassessments in North America. Subsequently, odonates are not frequently regarded as informative taxa for stream assessment, particularly when monitoring the ecological impacts of organic pollution. I hypothesized that stream-dwelling odonates should be more useful bioindicators for the assessment of riparian conditions surrounding streams because vegetation associated with streams is used for oviposition, roosting and to establish breeding territories. I selected 12 Ozark spring streams that satisfied a broad array of riparian conditions for study. I sampled each stream's odonate and total benthic community along with both instream and vegetation-specific environmental variables. Odonate and total benthic communities were compared across study sites to identify differences in community structure and identify sensitivity to different environmental variables. Odonate community structure alone was highly correlated with riparian-specific vegetation variables. Meanwhile, standard water-quality assessment metrics used by the Missouri Dept of Natural Resources were not useful to indicate riparian habitat condition, based on the total benthic community. I developed tolerance values for use in an odonate-oriented biotic index as a more appropriate metric for assessment of Ozark spring stream riparian conditions. I additionally examined two abundant damselfly species using occupancy modeling associated with riparian habitat. The two species showed different occupancy patterns in relation with the level of riparian impactedness around study sites. Overall, odonates showed greater sensitivity to riparian conditions than did total benthic communities, supporting the idea that this taxon alone is useful for biomonitoring associated with riparian structure around Ozark spring streams. The sensitivity of odonates to riparian conditions in stream ecosystems found in other Nearctic regions should be further studied to identify regional and species differences. Future studies can help land managers make informed decisions concerning riparian conservation

efforts around streams by employing biomonitoring practices that incorporate this apparently riparian-sensitive taxon." (Author) [https://bearworks.missouristate.edu/cgi-viewcontent.cgi?article=4515&context=theses](https://bearworks.missouristate.edu/cgi/viewcontent.cgi?article=4515&context=theses)] Address: Cameron, R.C., Dept of Biology, Missouri State Univ., 901 South National Avenue, Springfield Missouri, 65897, USA. Email: [Cameron205@live.missouristate.edu](mailto:Cameron205@live.missouristate.edu)

**20500.** Cho, S. (2020): Taxonomic and biological notes of the South Korean Odonata revised since 2000. *Odonatologica* 49(1/2): 155-175. ["This study provides annotated descriptions of six anisopteran species that were either recently recorded from South Korea or that were subject to taxonomic revision since 2000: (i) Details of *Boyeria karubei* specimens from South Korea are provided for the first time and they are compared with the congeneric *B. maclachlani*. The name *Boyeria jamjari* Jung, 2011, is an unavailable name and the same as *B. karubei*. (ii) *Nihonogomphus minor* Doi, 1943, is for the first time designated a junior synonym of *N. ruptus* (Selys, 1858). (iii) Anal appendages of *Stylurus annulatus* from Korea are compared with those of the Japanese population. (iv) A slight structural difference between *Orthetrum internum* from Korean Peninsula and Japan is highlighted. (v) New records of *Sarasaeschna pryeri* from Jeju Island are detailed and its habitat environment and behavioural ecology are described. (vi) *Brachydiplax chalybea*, a tropical/subtropical immigrant, has successfully colonised Jeju Island, expanding its range to the south-western region of the mainland." (Authors)] Address: Cho, S., Sogang Univ., MA605, 35 Baekbeom-ro, Mapo-gu, Seoul 04107, S. Korea. E-mail: [sungbincho@sogang.ac.kr](mailto:sungbincho@sogang.ac.kr)

**20501.** Choi, J.-Y.; Kim, S.-K.; Kim, J.-C.; Kwon, S.-J. (2020): Habitat preferences and trophic position of *Brachydiplax chalybea flavovittata* Ris, 1911 (Insecta: Odonata) larvae in Yeongsan River wetlands of South Korea. *Insects* 2020, 11, 273; doi:10.3390/insects11050273: 18 pp. (in English) ["In freshwater ecosystems, habitat heterogeneity supports high invertebrate density and diversity, and it contributes to the introduction and settlement of non-native species. In the present study, we identified the habitat preferences and trophic level of *Brachydiplax chalybea flavovittata* larvae, which were distributed in four of the 17 wetlands we examined in the Yeongsan River basin, South Korea. Larval density varied across four microhabitat types: open water area, and microhabitats dominated by *Myriophyllum aquaticum*, *Paspalum distichum*, and *Zizania latifolia*. Microhabitats dominated by *M. aquaticum* had the highest larval density, followed by those dominated by *P. distichum*. The larvae were more prevalent in silt sediments than in plant debris or sand. Stable isotope analysis showed that *B. chalybea flavovittata* is likely to consume, as a food source, other species of Odonata larvae. We conclude that successful settlement of *B. chalybea flavovittata* can be attributed to their habitat preferences. As temperature increases due to climate change, the likelihood of *B. chalybea flavovittata* spreading throughout South Korea increases. We, therefore, recommend continued monitoring of the spread and ecological impacts of *B. chalybea flavovittata*." (Authors)] Address: Choi, J.-Y., National Institute of Ecology, Seo-Cheon Gun 325-813, Chungcheongnam Province, Korea. E-mail: [jyc311@naver.com](mailto:jyc311@naver.com)

**20502.** Cordero-Rivera, A.; Rivas-Torres, A.; Yu, X. (2020): Who eats who: predation events involving *Boyeria irene* (Odonata: Aeshnidae), *Calopteryx haemorrhoidalis asturica* (Odonata: Calopterygidae) and *Vespa velutina* (Hymenop-

tera: Vespidae). Boletín de la Sociedad Entomológica Aragonesa 67: 415-417. (in English, with Spanish summary) ["During an intensive behavioural study of a population of the damselfly *Calopteryx haemorrhoidalis asturica*, we observed nine predation events by male *B. irene* on females and males of the damselfly. These cases are described, together with a case of predation of a male *B. irene* by the exotic invasive wasp *Vespa velutina*. The wasp was repeatedly attacking territorial males of *C. h. asturica*, but no case of effective predation was recorded." (Authors)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Univ. de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: [acordero@uvigo.es](mailto:acordero@uvigo.es)

**20503.** Cudera, R.B.; Razon, B.C.; Millondaga, K.J.I. (2020): Cultural and ecological significance of Odonata (Insecta) to the T'boli of Lake Sebu, Mindanao, Philippines. *Biodiversitas* 21: 2536-2554. (in English) ["Lake Sebu in Mindanao, Philippines, covered by the Allah Valley Protected Landscape, is home to the T'boli ethnolinguistic group. This study focuses on the cultural and ecological significance of the Odonata (insect order of dragonflies and damselflies) to the T'boli people who are known to have a close connection to their natural environment. According to the T'boli who participated in-depth interviews and focus group discussions, the Odonate larvae of Family Libellulidae and Aeshnidae known as Kmimi and Ogong El respectively are handpicked by the village members as a food source shared in the community when resources are scarce. The Odonata larvae are also used to cure illnesses and are locally believed to be important components for a love potion. In agriculture, T'boli farmers utilize the adult form of Odonata known as Klowong as natural biocontrol agents. Moreover, the Odonata larvae are prominent images in T'boli oral literature, specifically folklore and lullabies, teaching the children the importance of maintaining a harmonious relationship with nature. The results show that the presence of endemic species of Odonata indicates a healthy freshwater environment in the area; thus, studies on the sustainable use and conservation measures of the Odonata should be conducted." (Authors)] Address: Cudera, R.B., Sultan Kudarat State Univ. EJC Montilla, 9800 City of Tacurong, Sultan Kudarat, Mindanao, Philippines. E-mail: [rizalyn\\_borra@umindanao.edu.ph](mailto:rizalyn_borra@umindanao.edu.ph)

**20504.** Deacon, C. (2020): Abiotic and biotic drivers of African aquatic insect distribution. PhD thesis, Stellenbosch Univ.: XIII, 170 pp. (in English, with Dutch summary) ["Freshwater habitats are disproportionately rich in biodiversity, and are among the most threatened, yet poorly protected ecosystems. Aquatic insects make up much of the total freshwater fauna and contribute greatly to ecosystem functioning. At the broad-scale, aquatic insect distribution is driven by combinations of traits, as well as regional climate gradients and historical landscape context. Locally, both aquatic insect species richness and diversity are driven by various aspects related to vegetation and to physiochemical environments. Effective conservation requires thorough understanding of species distribution patterns at various spatial scales. My overall aim here is to combine broad-scale, theoretical biogeography, and local-scale empirical ecology to investigate drivers of aquatic insect distribution across Africa. Species are often binarily classified as 'widespread generalists' or 'narrow-range specialists' based on their ecological traits. Results in Chapter 2 show that ecological and biological traits are highly interactive among dragonflies, and inferring geographical range size based on ecological preference and/or biotope specialization alone should be

approached with caution. Biological traits related to phenology and mobility were also strong drivers of dragonfly range size, indicating that conservation efforts should include multiple species across all habitat types. Regional climates show considerable variation across latitudinal and longitudinal gradients, and determine areas of high species richness and diversity. In Chapter 3, I show strong latitudinal and longitudinal gradients for South-African dragonfly species richness and endemism. Dragonfly assemblage-turnover boundaries coincided with significant geographical features and/or areas where contemporary climate changed from one condition to another. However, these dragonfly assemblage turnover-boundaries were gradual rather than discrete throughout South Africa. At the local scale, natural and artificial ponds contribute greatly to overall biodiversity, especially when they are of high quality and occur in networks across the landscape. I show that ponds characterized by high heterogeneity support diverse aquatic insect assemblages (Chapters 4 and 5). Chapter 4 showed artificial reservoirs, occurring alongside natural ponds in ecological networks, to expand the area of occupancy for most widespread dragonflies, aquatic beetles and true bugs. Some species with specific habitat requirements were confined to natural ponds, suggesting the significance of natural ponds for conserving the full range of insects. Dragonflies, aquatic beetles and true bugs occupy low-quality artificial reservoirs at low abundance to survive the adverse effects of drought (Chapter 5). However, many insects exclusively occupied natural ponds, emphasizing the overall importance of naturalness, and suggests that there is merit in improving artificial reservoirs. This would most likely be by having macrophytes and vegetated banks similar to those of natural ponds. Investigating aquatic insect distribution patterns is important for conservation, and here, I demonstrate the value of dragonflies as model organisms for investigating the drivers of broad-scale distribution patterns. Studying other taxa is also appropriate, as I have demonstrated at the local scale, but not always possible due to limited distribution knowledge. I recommend broad-scale investigations of other complementary taxa to determine their added value for elucidating the drivers of overall insect distribution patterns, and so address our current shortfalls to improve insect conservation." (Author)] Address: Deacon, C., Dept of Conservation Ecology and Entomology, Stellenbosch Univ., South Africa. E-mail: [charldeacon@sun.ac.za](mailto:charldeacon@sun.ac.za)

**20505.** Deliry, C. (2020): Essai sur le genre *Somatochlora* dans le Paléarctique. *Histoires Naturelles* 64: 38 pp. (in French) [<http://deliry.net/pdf/hn64.pdf>]. The following *Somatochlora* taxa are treated: *alpestris*, *arctica*, *clavata*, *daviesi*, *dido*, *exuberata*, *flavomaculata*, *graeseri*, *lingyinensis*, *meridionalis*, *metallica*, *nepalensis*, *sahlbergi*, *shanxiensis*, *shennong*, *taiwana*, *uchidai*, *viridiaenae*] Address: Deliry, C.; Email [cyrille.deliry@orange.fr](mailto:cyrille.deliry@orange.fr)

**20506.** Dorji, T.; Nidup, T. (2020): Study of nymphs of Odonata (Anisoptera & Zygoptera) as a bio-indicator for aquatic ecosystem: A case study in Trashigang District. *Sherub Doenme: The Research Journal of Sherubtse College* 13(1): 16 pp. (in English) ["Nymphs of Odonata are useful indicator of ecosystem functioning and environmental impact in the aquatic system. In this study a total of 222 nymphs belonging to seven Odonata families were collected from four (2 lentic and 2 lotic) study sites. Family Coenagrionidae, Libellulidae and Lestidae were associated with lentic, while Gomphidae, Euphaeidae and Epiophlebiidae were associated with lotic habitat. Aeshnidae is found in both lentic and



lotic habitat but showed strong affinity to lentic habitat. Diversity (H), abundance and richness were compared between and within lentic and lotic habitats. Yonphula Lake is heavily affected by anthropogenic activity and had less abundance and diversity of Odonata Family. Bray-Curtis cluster dendrogram of four study sites based on physicochemical parameters grouped Yonphula Lake, Chiya Lake and two lotic streams (Bamridrang and Gomchu) in separate clades. PCA scatter plot revealed conductivity, total dissolved solids and turbidity as the three physicochemical parameters that characterized Yonphula Lake. A high abundance of Lestidae nymph were found in Yonphula Lake. Aeshnidae, Coenagrionidae and Libellulidae were found in Chiya Lake. Epiophlebia laidlawi and Euphaeidae were found in Gomchu and Bamridrang respectively. Gomphidae was found in both streams. Presence of Epiophlebia laidlawi, Euphaeidae and Gomphidae indicates that they are restricted to pristine streams. As revealed by this study the need for protection and conservation of Lakes and streams to prevent the global decline of Odonata fauna is highlighted." (Authors)] Address: Nidup, T., Dept of Environment and Life Sciences, Sherubtse College, Royal Univ. of Bhutan. E-mail: tsheringnidup.sherubtse@rub.edu.bt

**20507.** Fiebrich & Medinger, V. (2020): Nachweise der Schabracken-Königslibelle (*Anax ephippiger*) am Westlichen Bodensee 2019. *Mercuriale* 20: 33-41. (in German, with English summary) ["In 2019, a strong immigration of *Anax ephippiger* into central Europe was observed. At western Lake Constance, the species occurred in the nature conservation areas "Wollmatinger Ried", "Mettnau" and "Göldern" (Germany) as well as in Gottlieben (Switzerland). *Anax ephippiger* was observed mainly in June and July. A high number (over 50 specimens) were counted at the Wollmatinger Ried. These observations as well as evidence of reproduction in Baden-Württemberg are presented." (Authors)] Address: Fiebrich, M., Liggeringerstr. 15, 78315 Radolfzell, Germany. Email: fiebrich@posteo.de

**20508.** Gänßler, R. (2020): Versuchte Eiablage von *Aeshna cyanea* auf einem Lederschuh (Odonata: Aeshnidae). *Mercuriale* 20: 71-72. (in German) [The author reports an attempt of a female *A. cyanea* to oviposit in a leather shoe; 16-VIII-2020, former Grube Sophia, Baiersbronn-Friedrichstal, Baden-Württemberg, Germany.] Address: Gänßler, R., Talstraße 231, 72250 Freudenstadt, Germany. Email: roland@roland-gaenssler.de

**20509.** Gyeltshen, T. (2020): Eight new additional records of Odonata from Bhutan. *Covid-19 Special Issue Agrion* 24(2) - May 2020: 97-103. ["Findings of the Odonata expedition made between 20-v-2017 and 9-vi-2017 in the eastern districts of Bhutan are presented. Additional collections made by the author are also reported. Eight species: *Anisopleura* sp., *Bayadera longicauda*, *Agriocnemis lacteola*, *Ceragrion azureum*, *Nychogomphus duaricus*, *Idionyx stenseni*, *Sympetrum haematoneura* and *Tramea limbata* are new records for Bhutan." (Author)] Address: Gyeltshen, T., Dept of Environment and Life Sciences, Sherubtse College, Kanglung, Bhutan. Email: thinleytshen@gmail.com

**20510.** Hefler, C.; Noda, R.; Qiu, H.H.; Shyy, W. (2020): Aerodynamic performance of a free-flying dragonfly — A span-resolved investigation featured. *Physics of Fluids* 32(4): 18 pp. (in English) ["We present a quantitative characterization of the unsteady aerodynamic features of a live, free-flying dragonfly under a well-established flight condition. In particular, our investigations cover the span-wise

features of vortex interactions between the fore- and hind-pairs of wings that could be a distinctive feature of a high aspect ratio tandem flapping wing pair. Flapping kinematics and dynamic wing-shape deformation of a dragonfly were measured by tracking painted landmarks on the wings. Using it as the input, computational fluid dynamics analyses were conducted, complemented with time-resolved particle image velocimetry flow measurements to better understand the aerodynamics associated with a dragonfly. The results show that the flow structures around hindwing's inner region are influenced by forewing's leading edge vortex, while those around hindwing's outer region are more influenced by forewing's shed trailing edge vortex. Using a span-resolved approach, we found that the forewing-hindwing interactions affect the horizontal force (thrust) generation of the hindwing most prominently and the modulation of the force generation is distributed evenly around the midspan. Compared to operating in isolation, the thrust of the hindwing is largely increased during upstroke, albeit the drag is also slightly increased during the downstroke. The vertical force generation is moderately affected by the forewing-hindwing interactions and the modulation takes place in the outer 40% of the hindwing span during the downstroke and in the inner 60% of the span during the upstroke." (Authors)] Address: Qiu, H.H., Dept of Mechanical & Aerospace Engineering, The Hong Kong Univ. of Science & Tech., Clear Water Bay, Kowloon, Hong Kong. Email: meqiu@ust.hk.

**20511.** Henningsen, M.; Peitzner, G.; Peitzner, P.; Husemann, M. (2020): An updated checklist of type material of dragonflies and damselflies (Odonata) housed in the Zoological Museum Hamburg (ZMH), Germany. *Evolutionary Systematics* 4: 53-60. (in English) ["We present an updated checklist of type specimens of Anisoptera and Zygoptera housed in the collection of the Zoological Museum of Hamburg (ZMH), part of the Centrum für Naturkunde (CeNak), Germany. We list all types currently housed in the dry and wet collections of the museum and compare the current holdings to the previous catalogues provided by Weidner (1962, 1977). In total, the collection of the ZMH currently houses 84 type specimens belonging to 44 species (38 of which are still valid species); these include 17 holotypes, 7 syntypes, 4 lectotypes, 33 paratypes, and 23 paralectotypes. We here provide an updated list, which includes any changes in taxonomy and the holdings of the museum, but also corrects mistakes of previous catalogues." (Authors)] Address: Husemann, M., Centrum für Naturkunde (CeNak), Hamburg Univ., Martin-Luther-King-Platz 3, 20146, Hamburg, Germany. E-mail: martin.husemann@uni-hamburg.de

**20512.** Hooijmans, F. (2020): Libellen in Meijndel: aantalsverloop tussen 2010 en 2020 langs drie telroutes. *Holland's Duinen* 77: 56-74. (in Dutch) ["In early 2010, three dragonfly routes were set out in the outer dunes of Meijndel. During the period 2010-2020, the dragonflies along these routes were counted ten times a year in the months of May through September. In total, 26 species have been observed. For each species, the number of dragonflies along the three routes is compared to the national index that is derived from the counting results of a few hundred dragonfly routes throughout the Netherlands." (Author) <https://www.dunea.nl/duinen/-/media/bestanden/duinen/hollands-duinen/dunea---hollands-duinen-nummer-77.a.shx>] Address: not stated

**20513.** Hunger, H.; Wildermuth, H. (2020): Kleine Räuber mit großer Beute - *Calopteryx splendens* als Opfer zweier kleiner Spinnen-Arten. *Mercuriale* 20: 1-7. (in German, with

English summary) ["Two anecdotic observations are described where a female crab spider *Misumena vatia* and a female running crab spider *Tibellus oblongus* preyed upon a male *C. splendens*. These events are discussed with respect to camouflage of both ambush hunters, to the body part where they bit the victim and to their ability to hold on to the relatively large, freely hanging prey without falling from their perch." (Authors)] Address: Hunger, H., Institut für Naturschutz & Landschaftsanalyse, Wilhelmstr. 8, 79098 Freiburg, Germany. E-mail: holger.hunger@inula.de

**20514.** Ikemeyer, D.; Schneider, T. (2020): *Anormogomphus kiritshenkoi* Bartenev, 1913 (Odonata: Gomphidae) in Iran: some remarks on its biology, ecology and distribution. *Entomologist's Monthly Magazine* 156(2): 69-78. (in English) ["*A. kiritshenkoi* was found in Iran in 2019, with more than 20 individuals observed at the Karkheh and Shadegan rivers, Khuzestan Province in SW Iran. In 2019 the first floods for decades occurred in this region with high water levels in the floodplains of the lower Karkheh and Shadegan rivers. We believe that this flooding of the lowland plains promoted the appearance of *A. kiritshenkoi*, because the species had not been seen for decades in the region. Most of the specimens were resting on plants of *Suaeda aegyptiaca* growing on small dams close to the riverside, probably creating a favourable microclimate in this saline and hot environment. The region covered by the Karkheh and Shadegan rivers is geographically part of the Mesopotamian Marshes, and *A. kiritshenkoi* was recorded from the Iraqi part of the marshes in the 1920s." (Authors)] Address: Ikemeyer, D., Billerbecker Str. 6, 48329 Havixbeck, Germany; email: DKJlkemeyer@t-online.de

**20515.** Johansson, F.; Berger, D.; Höglund, J.; Meyer-Lucht, Y.; Rödin-Mörch, P.; Sniegula, S.; Watts, P.C. (2020): High variation in last male sperm precedence and genital morphology in the emerald damselfly, *Lestes sponsa*. *Biological Journal of the Linnean Society* 130(3): 497-506. (in English) ["In organisms in which individuals mate multiply, knowledge of the proportion of offspring sired by the last male to mate (P2) under field conditions is important for a thorough understanding of how sexual selection works in nature. In many insect groups, pronounced intraspecific variation in P2 is commonplace. Interestingly, however, in stark contrast to these observations, compilation of P2 data in dragonflies and damselflies (Odonata) indicates that a high P2, seldom below 0.95, is a feature of this taxon. Here we used double digest restriction-site associated DNA sequencing to generate a panel of single nucleotide polymorphisms (SNPs) with which we could determine paternity and estimate values of P2 in the offspring of 19 field-collected pairs of the emerald damselfly *Lestes sponsa*. We also estimated the relationship between P2 and male genital shape of 16 males using geometric morphometric analysis. P2 was variable (range = 0.0–1.0; mean = 0.5), and there was a marginally non-significant ( $P = 0.069$ ) relationship between genital shape and P2, suggesting that males with a high P2 had an aedeagus with a broader tip. We suggest that the high P2-values reported in past studies in Odonata are partly due to the methods used to infer paternity. Use of SNPs to determine patterns of paternity and P2 in odonates is needed for a better appraisal of fitness in odonates, and would open many future avenues for use of odonates as models of sexual selection." (Authors)] Address: Johansson, F., Dept Ecology & Genetics, Animal Ecology, Uppsala Univ., Uppsala, Sweden

**20516.** Kastner, F.; Buchwald, R. (2020): Die Sommerlibelle *Aeshna viridis* – Emergenzverlauf in Nordwest-Deutschland

(Odonata: Aeshnidae). *Libellula* 39(1/2): 63-78. (in German, with English summary) ["The summer dragonfly *A. viridis* – emergence patterns in northwestern Germany – Collecting exuviae from breeding sites is an important method of quantifying emergence patterns, the sex ratio and the approximate population size. In this study the emergence patterns of *A. viridis* in northwestern Germany are described for the three years 2011, 2012 and 2013. *A. viridis* is proved to be a typical summer species with an emergence beginning in the last ten days of June and peaking between the beginning and middle of July. The emergence period lasted six to nine weeks. Differences in the start of emergence between males and females were not detected, but EM50 (the time, when 50% of the population emerged) was not in the same week in 2012 and in 2013. Furthermore, it was possible to determine protandry. The detected sex ratio of *A. viridis* was significantly biased towards the female in all three years. Overall, our results matched existing data for *A. viridis* from other regions in the western distribution area." (Authors)] Address: Kastner, Friederike, AG Vegetationskunde & Naturschutz, IBU, Carl von Ossietzky Universität Oldenburg, 26111 Oldenburg, Germany. E-Mail: Friederike.Kastner@uni-oldenburg.de

**20517.** Kohli, M.K. (2020): Insect micro- and macroevolution through space and time. Rutgers, The State Univ. of New Jersey: VIII + 162 pp. (in English) ["This dissertation uses computational molecular phylogenetic methods to study macro- and micro-evolutionary processes that give rise to biodiversity. Insects, the most diverse group of organisms on earth, are an excellent group for studying and testing various evolutionary hypothesis. I used molecular phylogenetic methods to study the population structure of the northern most Arctic dragonfly species *Somatochlora sahlbergi*. Our results show that this species doesn't follow a common trend seen in evolutionary biology that is, large geographic distances and geographic barriers lead to increased genetic variation. Not only does *S. sahlbergi* appears to interbreed across its entire Holarctic range, there also seems to be almost no variation among European and North American populations in their COI gene fragment (the barcode gene), which is usually extremely variable. These findings seem to be unique to this particular species as none other Arctic dragonflies show such genetic patterns. Upon examining four other distantly related dragonfly species, *Aeshna juncea*, *A. subarctica*, *Sympetrum danae* and *Libellula quadrimaculata*, that have similar Holarctic distribution as *S. sahlbergi*, we find that these species indeed show a geographic structure across their range unlike *S. sahlbergi*. We find that North American and European populations show clear genetic distinction, and this split occurred ~ 400,000 ago, during the Quaternary Period. Lastly, I use the popular divergence time estimation methodology to study the evolutionary past of the Insects and explore how our use of fossil record can influence the outcome of such methods. The results show that fossils can be extremely influential depending on the age of the node (i.e. origin to two lineages). Deep nodes, that represent very old relationships in the evolutionary history, tend to be heavily impacted by the fossil calibrations compared to younger nodes. Older nodes suffer more in their age estimates and the precision around these age estimates in the absence of a fossil. Further, we find that certain groups of insects like flies and butterflies evolve at a much faster rate than most of the other groups of insects." (Author)] Address: Kohli, M., Dept of Invertebrate Zoology, American Museum of Natural History, New York, New York, USA. Email: mkohli@amnh.org

**20518.** Kruger, A.; Morin, P.J. (2020): Predators induce morphological changes in tadpoles of *Hyla andersonii*. *Copeia* 108(2): 316-325. (in English) ["Predators can affect the development, fitness, and behavior of prey species in myriad ways. In response to the threat of predation, tadpoles can alter growth rate, morphology, and foraging behavior. Changes to tadpole development have the potential to alter life history characteristics and are therefore of interest in species of conservation concern. Using experimental mesocosms, we explored how non-lethal predators affected the larval development of the Pine Barrens Treefrog, *Hyla andersonii*, a near-threatened species in the United States. We found that caged dragonflies (*Anax junius*) induced darker tail coloration and deeper tail fins in tadpoles of *H. andersonii*, but the dragonflies did not affect tadpole behavior, survival, or size at metamorphosis. Non-lethal predator presence also induced greater within population variation in the tail color trait compared to populations without predators. This result suggests that there may be underlying genetic variation in the ability to express phenotypically plastic traits, a concept that should be explored further because it has implications for the evolution of inducible defenses. These findings support the existence of an adaptive syndrome among hylid tadpoles, where tadpoles develop conspicuous tail morphology in response to larval dragonfly predators." (Authors)] Address: Kruger, A., Dept of Ecology, Evolution, and Natural Resources, Rutgers Univ., 14 College Farm Road, New Brunswick, New Jersey 08901, USA. E-mail: akruger90@gmail.com

**20519.** Kumar, D.; Shandilya, S.; Khare, V.; Kamle, S.; Chiang, C.-H. (2020): Insect-inspired micro air vehicle with nanocomposite flapping wings and flexure joints. *Proceedings of the SPIE* 11376, id. 1137616: 14 pp.- (in English) ["The biomimicking and understanding of the dynamics of insect flyers is important in developing agile and efficient MAVs. The present study is based on the development of dragonfly inspired MAV and investigation of its motion characteristics. Initially, a tethered two-winged MAV model is constructed, composing of two flapping wings, a flapping mechanism, a chassis, and an external power supply with a function generator. The wings are fabricated with composite stiffeners and membrane. The material of the wings consists of carbon nanotubes (CNTs)/polypropylene (PP) nanocomposite and low density polyethylene (LDPE). The wings are thus lightweight, thin, flexible, and can generate large amplitude bending-twisting motion. The flapping mechanism is constructed with a cantilever type piezoelectric actuator, a mediator mechanism having CNTs/PP nanocomposite flexure joints, and carbon fiber/epoxy composite linkages. The assembled two-winged MAV model has a total mass, body length, wingspan, and aspect ratio of 0.61g, 60.46mm, 90.14mm, and 10.06, respectively. The characteristic flapping frequency of the model is 20Hz, as compared to the wingbeats (or characteristic frequency) of 27.53Hz of an actual dragonfly species, i.e., the *Anax Parthenope Julius*. Measured via digital image correlation (DIC) technique, the fabricated wings exhibit a bending dominated motion during downstroke as well as upstroke. The combined design of flapping wings and flexure joint mechanism is also computationally studied for their structural dynamic characteristics (performed using ANSYS). The first resonance mode or the characteristic frequency, at which the wings have highest deflections, is 17.25Hz. The flexure mechanism is able to generate very large wing deflections (maximum deflection 22.7mm at wing tip) with a sinusoidal heaving input excitation of very small amplitude (0.1mm given at the actuator attachment location). This is useful to

generate higher aerodynamic forces and improve efficiency. The maximum stresses and strains are found at flexure-rigid link and wing stiffener attachment, respectively. Finally, a dragonfly-inspired four-winged MAV is developed. It consists of two pairs of nanocomposite wings with independently actuated flapping mechanisms. Like a natural dragonfly, the forewing and hindwing pairs can be controlled independently and operated at different characteristic frequencies as well as relative phase angles." (Authors)] Address: Kumar, D., Indian Institute of Technology, Kanpur, India

**20520.** Medinger, V.; Fiebrich, M. (2020): Wiederentdeckung der Östlichen Moosjungfer (*Leucorhina albifrons*) im westlichen Bodenseegebiet/Hegau 2019 und 2020. *Mercuriale* 20: 43-51. (in German, with English summary) ["In the Hegau Region, close to Lake Constance, one male individual of *L. albifrons* was observed on July 5 and another two males on July 7, 2019 in the Nature Conservation Area "Ehinger Ried". No further observations (females, couples) were made in 2019. On June 3, 2020, one single male of the species was recorded at the same pond, but was not observed in the following weeks. The last previous record of *L. albifrons* in the region dates back to 1994. The observations indicate that the species has not, as supposed, become extinct in Baden-Württemberg (southwestern Germany). Another possibility is that the observed individuals migrated from populations in Switzerland." (Authors)] Address: Medinger, Verena, Forsteistr.4, 78315 Radolfzell, Germany. Email: VerenaMedinger@gmx.net

**20521.** Palacino-Rodríguez, F.; Palacino-Penagos, D.A.; González-Neitha, A.A. (2020): Odonata from Bahia Solano, Colombian Pacific Region. *Check List* 16(6): 1561-1573. (in English) ["We present a checklist of Odonata species from Bahia Solano Municipality in the Pacific Region of Colombia. Sampling effort included 715 h between December 2018 and January 2020. We recorded 51 species in 27 genera and seven families. The most representative families were Libellulidae with 14 genera and 29 species and Coenagrionidae with 10 genera and 16 species. *Argia fulgida* Navás, 1934 and *Erythrodiplax funerea* (Hagen, 1861) are newly recorded from Chocó Dept. The richer localities in terms of species numbers are conservation areas which are little impacted by indigenous traditional agriculture." (Authors)] Address: Palacino-Rodríguez, F., Grupo de Investigación en Biología (GRIB), Depto de Biología, Universidad El Bosque Av. Cra. 9 No. 131A-02, Bogotá, Colombia. E-mail: odonata17@hotmail.com

**20522.** Palacino-Rodríguez, F. (2020): Larval development and foraging behavior of *Erythrodiplax abjecta* (Rambur) (Anisoptera: Libellulidae) in captivity. *Journal of Asia-Pacific Entomology* 23(4): 1030-1040. (in English) ["Highlights: • *Erythrodiplax abjecta* is univoltine and has a slow lifestyle. • Head width, metathoracic leg length, and total length serve to separate instars. • Total development time was 316 (SD  $\pm$ 6.6) days, with 13 instars. • Foraging behavior of this species includes active and sit-and-wait strategies. • Foraging strategies were not affected by time of the day or detritus cover. Abstract: Understanding the life cycle of Neotropical odonate species is essential given our scant knowledge of this region. In this paper, we examine growth ratio between instars, development patterns, and active/passive feeding behavior of the Andean dragonfly *Erythrodiplax abjecta* (Rambur, 1842). Larvae were obtained from eggs laid by two females in the laboratory and were maintained at 12–34 °C in individual containers until either their emergence or their death. Larvae hatched 26–57 days after laying, and

the total development time was determined as being 316 (SD  $\pm 6.6$ ) days, including 13 instars. Larval instars were characterized using six morphometric variables. The foraging behavior was analyzed considering the time of day and the percentage of the background covered by detritus. The growth ratios between successive instars averaged 1.9 for FW pad length, 1.6 for HW pad length and 1.2 for head width, head length, metathoracic leg length, and total length. Neither the active foraging nor the sit-and-wait foraging behavior were affected by either time of the day or the percentage of background covered by detritus. *Erythrodiplax abjecta* is univoltine and has a slow lifestyle associated with lentic perennial waters, where larval development and growth rates are low. We provide an equation to estimate the *E. abjecta* larval instars from field specimens." (Authors)] Address: Palacino-Rodríguez, F., Grupo de Investigación en Biología (GRIB), Departamento de Biología, Universidad El Bosque Av, Cra. 9 No, Bogotá 131A-02, Colombia. E-mail: palaznofredy@unbosque.edu.co

**20523.** Payra, A.; Subramanian, K.A.; Chandra, K.; Tripathy, B. (2020): A first record of *Camacinia harterti* Karsch, 1890 (Odonata: Libellulidae) from Arunachal Pradesh, India. *Journal of Threatened Taxa* 12(8): 15922-15926. (in English) ["The large forest dwelling libellulid dragonfly *Camacinia harterti* Karsch, 1890 is recorded from Arunachal Pradesh and India for the first time in 115 years. The present record is based on a single male specimen collected from Namdapha Tiger Reserve, Arunachal Pradesh, India. We provide detailed diagnostic characters in photographs and information on the global distribution of the species." (Authors)] Address: Payra, A., Zoological Survey of India, M Block, New Alipore, Kolkata, West Bengal, 700053 India. E-mail: arajushpayra@gmail.com

**20524.** Piney, B. (2020): Première mention de *Leucorrhinia caudalis* en Loire-Atlantique (Odonata: Libellulidae). *Martinia* 34 (1/2): 29-32. (in French, with English summary) ["First observation of *L. caudalis* in the Loire-Atlantique Dept – The first record of *L. caudalis* in the Loire-Atlantique Dept, as well as an overview of the observations of the species in a few Depts of western France, are mentioned." (Author)] Address: Piney, B., 3 rue de la Frégate, 44470 Thouaré-sur-Loire, France. Email: bertrand.piney@gmail.com

**20525.** Post, M. (2020): Beobachtungen an *Sympecma fusca* im Herbst (Odonata: Lestidae). *Mercuriale* 20: 9-13. (in German) ["In autumn 2020, *S. fusca* was observed near Heidelberg (Germany, Baden-Württemberg). Two females exhibited unusual behavior. A female sitting on a bent stem flexed its abdomen so that it followed the course of the stem. Another female sunbathing on a beech trunk, lifted and lowered single legs alternately. Possible reasons for this behaviour are discussed." (Author)] Address: Post, M., Baden-Badener Str. 5, 69126 Heidelberg, Germany. Email: mjphd@posteo.de

**20526.** Rocha-Ortega, M.; Rodríguez, P.; Bried, J.; Abbott, J.; Córdoba-Aguilar, A. (2020): Why do bugs perish? Range size and local vulnerability traits as surrogates of Odonata extinction risk. *Proc. R. Soc. B* 287: 20192645. <http://dx.doi.org/10.1098/rspb.2019.2645>: 9 pp. (in English) ["Despite claims of an insect decline worldwide, our understanding of extinction risk in insects is incomplete. Using bionomic data of all odonate (603 dragonflies and damselflies) North American species, we assessed (i) regional extinction risk and whether this is related to local extirpation; (ii) whether these two patterns are similar altitudinally and latitudinally;

and (iii) the areas of conservation concern. We used geographic range size as a predictor of regional extinction risk and body size, thermal limits and habitat association as predictors of local extirpation. We found that (i) greater regional extinction risk is related to narrow thermal limits, lotic habitat use and large body size (this in damselflies but not dragonflies); (ii) southern species are more climate tolerant but with more limited geographic range size than northern species; and (iii) two priority areas for odonate conservation are the cold temperate to sub-boreal northeastern USA and the transversal neo-volcanic system. Our approach can be used to estimate insect extinction risk as it compensates for the lack of abundance data." (Authors)] Address: Rodríguez, Pilar, Depto de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. P. 70-275, Circuito Exterior, Ciudad Universitaria, 04510 Coyoacán, Distrito Federal, Mexico. Email: prodrig@conabio.gob.mx

**20527.** Simonsen, T.J.; Archibald, S.B.; Rasmussen, J.A.; Sylvestersen, R.L.; Olsen, K.; Ware, J.L. (2020): *Danowhetaksa* gen. nov. with two species from the early Eocene Ølst Formation from Denmark, the first Palearctic Whetwhetaksidae (Odonata: Cephalozygoptera). *Zootaxa* 5099(5): 586-592. (in English) ["We propose *Danowhetaksa* n. gen. (Odonata: Whetwhetaksidae) with two new species: *D. birgitteae* n. gen. et sp. and *D. rusti* n. gen. et sp. from the earliest Ypresian Stolleklint clay of the Ølst Formation in northwestern Denmark. Whetwhetaksidae has previously been known only from the Ypresian Okanagan Highlands of far-western North America, the new records are, therefore, the first from the Palearctic Region." (Authors)] Address: Archibald, S.B., Dept of Biological Sciences, Simon Fraser Univ., 8888 Univ. Drive, Burnaby, British Columbia, V5A 1S6, Canada. Email: sba48@sfu.ca

**20528.** Tamm, J.; Dressler, B. (2020): Zur Populationsökologie und Ethologie der Imagines von *Cordulegaster bidentata* an einem Waldbach im Taunus (Odonata: Cordulegastriidae). *Libellula* 39(1/2): 1-25. (in German, with English summary) ["At a small forest stream in the Taunus mountains, Hesse, Central Germany, 16 adult males of *Cordulegaster bidentata* were colour marked and both marked and unmarked individuals were counted during five days when passing the counting station. 69% of the marked males were observed again after the day of capture. Appearing males – marked and unmarked ones – carried out 193 passing flights along the stream, 27% of them were done by marked individuals. One can conclude that the population size was remarkable for this tiny stream. Flight activities were strongest in late morning and late afternoon. Among the patrolling males few individuals were frequently observed, others only occurred sporadically. On the nearby forest streams some more populations of *C. bidentata* were present, but no marked individuals could be found there. Single males of *C. boltonii* occurred along the flight way of *C. bidentata*. This uncommon phenomenon is described and discussed. Moreover, methodological questions of marking and population size calculation are discussed." (Authors)] Address: Tamm, J., 34131 Kassel, Germany. E-Mail: jochen.tamm@t-online.de

**20529.** Tung, T.T.; Dung, L.T. (2020): Food components of the *Brachytarsophrys feae* (Boulenger, 1887) and *Megophrys major* (Boulenger, 1908) in Xuan Son National Park, Phu Tho province. *TNU Journal of Science and Technology* 225(08): 286-291. ["*B. feae* and *M. major* are two useful amphibian species in terrestrial and aquatic ecosystems. However, information on the nutritional characteristics of this



species in Vietnam is currently limited. We have used the method of gastric lavage to collect food samples from 62 stomachs, while simultaneously describing the morphological characteristics of these 2 species. The results showed that the snout-vent length (SVL) of the mature individual *Brachytarsophrys feae* (83 – 89 mm), *Megophrys major* (67.5 – 81 mm), the new distributional records of *Brachytarsophrys feae*. We have identified 18 types of food, in which *Brachytarsophrys feae* has 14 types, accounting for 77.77%; *Megophrys major* has 16 categories, accounting for 88.88%. The most important prey species of *Brachytarsophrys feae* include 5 types of food: (18.48%) of the Phasmatodea; Araneae (17.64%); Insect larvae (15.96%); Coleoptera (12.60%); Hemiptera (10.08%). *Megophrys major* has 4 types of food: Hemiptera (17.21%); Hymenoptera (15.89%); Opiliones (14.56%); Odonata (11.25%). In which, the halfwing set Hemiptera is used by both species." (Authors)] Address: Tung, T.T., Vinh Phuc College, Vietnam. Email: tungbiology3@gmail.com

**20530.** Villanueva, R.J.T.; Dow, R.A. (2020): Review of the Philippine taxa formerly assigned to the Genus *Amphicnemis* Selys. Part III. Genus *Pericnemis*: Bonita- and *Incallida*-groups with descriptions of four new species (Odonata: Coenagrionidae). *Philippine Journal of Systematic Biology* 13(1) (2019): 51-70. (in English) ["The species formerly assigned to the genus *Amphicnemis* Selys, 1863 in the Philippines are reviewed. The present paper is the third of a series and deals with the species transferred to the genus *Pericnemis* Hagen in Selys, 1863. Specimens used in the study are all deposited in museums collections. The bonita- and *incallida*-groups of *Pericnemis* from the Philippines are characterized. A key to species groups within *Pericnemis* is given, and also a key to the males of the bonita- and *incallida*-groups. The bonita-group includes five species: *P. bonita* Needham & Gyger, 1939, *P. flavicornis* Needham & Gyger, 1939, *P. bisaya* spec. nov., *P. gili* spec. nov. and *P. muragbonita* spec. nov. The *incallida*-group includes two species: *P. incallida* Needham & Gyger, 1939 and *P. yakal* spec. nov. Descriptions and illustrations are provided of both sexes of all species." (Authors)] Address: Villanueva, R.J.T., Coll. of Arts & Sciences Education, Univ. Mindanao, Matina, Davao City, 8000 Philippines. E-mail: rjtvillanueva@gmail.com

**20531.** Zuyderduyn, C. (2020): *Dagvlinders, libellen en sprinkhanen in Nationaal Park Hollandse Duinen*. *Holland's Duinen* 75: 32-37. (in Dutch) ["Butterflies, dragonflies and grasshoppers are among the best known and best studied insect groups in the Netherlands. This article provides an overview of more notable representatives from these species groups observed in Nationaal Park Hollandse Duinen during the 2018 "5000-species year", with a special focus on the status of Red List species." (Author/DeepL)] The following odonate species are briefly treated: *Anax ephippiger*, *Cordulia aenea*, *Leucorrhinia caudalis*, *L. dubia*, and *L. pectoralis*.] Address: Casper Zuyderduyn. Email: c.zuyderduyn@staatsbosbeheer.nl

## 2021

**20532.** Álvarez Fidalgo, M.; Miralles-Núñez, A.; Cabanillas, D. (2021): Lista preliminar de los odonatos (Insecta, Odonata) de las Lagunas de Ambroz, un espacio amenazado en el término municipal de Madrid (España). *Boln. Asoc. esp. Ent.* 45(3-4): 229-236. (in Spanish, with English summary) ["Given the need to make known the biodiversity of the Lagunas de Ambroz and its environment due to imminent threats compromising their conservation, a preliminary

checklist of Odonata species is provided. A total of 11 species are recorded, amongst which *Coenagrion scitulum* (Rambur, 1842) is remarkable for being classified as Vulnerable in the Atlas and Red Book of the Threatened Invertebrates of Spain and *Paragomphus genei* (Selys, 1841) for being a rare species in the Community of Madrid. Additionally, comments and proposals for the conservation of the aquatic macroinvertebrate fauna, which depends on the survival of this urban environment in the municipality of Madrid, are included." (Authors) *Anax imperator*, *C. scitulum*, *Enallagma cyathigerum*, *Ischnura graellsii*, *Paragomphus genei*, *Lestes virens*, *Crocothemis erythraea*, *Orthetrum cancellatum*, *Sympetrum fonscolombii*, *Sympetrum striolatum*, *Trithemis annulata*.] Address: Dpto. de Química Orgánica e Inorgánica, Universidad de Oviedo, Avda. Julián Clavería, 8. 33006 Oviedo, Asturias (España). <http://orcid.org/0000-0002-3313-1467>; [madamcoolpix@gmail.com](mailto:madamcoolpix@gmail.com)

**20533.** Basel, A.M.; Simaika, J.P.; Samways, M.J.; Midgeley, G.F.; MacFadyen, S.; Hui, C. (2021): Assemblage reorganization of South African dragonflies due to climate change. *Diversity and Distributions* 27(12): 2542-2558. (in English) ["Aim: Climate change is expected to cause large shifts in species assemblages such as Odonata. Here, we assess the influence of environmental drivers of turnover on Odonata assemblages. Secondly, we map the predicted spatial variation in species composition, first as a gradient of assemblage similarity, and then as discrete bioregions delineating major areas of odonate endemism. Finally, we map the magnitude of expected change in species turnover in response to climate change under two emission scenarios. Location: South Africa. Methods: We used a spatial database comprising of 164 species of odonates and 20 covariates, to explore changes in compositional turnover using generalized dissimilarity models. Bioregions were compiled through various clustering techniques. Results: Present-day odonate bioregions correspond to climatic zones and are clearly separated by transitional zones with rapid spatial turnover. Present odonate bioregions are projected to undergo extensive reorganization by 2050 and 2070. Temporal turnover in species composition is expected to reach up to 80% in the large arid interior and 64% along the coast. Half of all South Africa's protected areas are likely to experience climate induced changes to dragonfly bioregions in the near future. Main conclusions: Species assemblages are rapidly changing. This work highlights future shifts in climate will result in complex and nonlinear responses in Odonata communities. With ongoing climate change, current odonate bioregions are predicted to expand while others will contract considerably in size within the next 30 years. The current demarcated protected areas may be inadequate to protect dragonflies as climates change. Odonata can be used to track forefronts of climate change, which will likely affect a larger array of taxa as well." (Authors)] Address: Basel, Ashleigh, Biodiversity Informatics Unit, Dept Mathematical Sciences, Stellenbosch Univ., Matieland 7602, South Africa. Email: A.Basel@cgiar.org

**20534.** Bastos, R.C.; Brasil, L.S.; Oliveira-Junior, J.M.B.; Carvalho, F.G.; Lennox, D.D.; Barlow, J.; Juen, L. (2021): Morphological and phylogenetic factors structure the distribution of damselfly and dragonfly species (Odonata) along an environmental gradient in Amazonian streams. *Ecological Indicators* 122, March 2021, 107257: 13 pp. (in English) [oas 65: "Highlights: • Odonata order contains distinct species groups that share similar responses to environmental change. • Response patterns were related to phylogeny structure and morphology similarity. • The mentioned above

relationship appears to be complex and no clear. • We believe that other factors as land use historical can effect these Odonata. • Despite this the response patterns had presented some differences between the areas. Abstract: A range of factors may determine the structure of ecological communities in time and space, in particular niches, dispersal limits, and the evolutionary history of the species. In the last decades, the traditional focus of community ecology on species diversity and composition have been supplemented by approaches incorporating functional traits and phylogeny. Following this perspective, we evaluated the response pattern of adult damselflies and dragonflies (Odonata) along a gradient of environmental disturbance in Brazilian Amazonia, with the objective of identifying subgroups of species that respond in a similar manner to environmental filters. The study tested the hypothesis that the subgroups of species with similar responses to the environmental gradient are structured phylogenetically and will be morphologically more similar to one another than they are to the other species. Adult odonates were sampled in 98 Amazonian streams, 48 in the region of Santarém and Belterra and 50 in the municipality of Paragominas, both located in the Brazilian state of Pará. The study was based on an ecological niche modeling approach and statistical significance testing methods to identify groups of species. These species groups (latent classes) were then associated with their morphological characteristics (Abdomen Length and Thorax Length) and phylogenetic relationships. Four latent classes, containing 34 species, were generated for each region. The latent classes of the Odonata formed along the gradient of anthropogenic impact had effects of phylogenetic proximity and the species' morphological similarity. Therefore, species belonging to the same latent class are more morphologically similar and have greater similarities in evolutionary history. It seems likely, however, that other processes may be important for the understanding of the structuring of the latent classes, such as intra- and interspecific relationships, environmental plasticity, and the history of land use. Both morphology and phylogeny are important for understanding species' responses to environmental gradients." (Authors) *Argia tinctipennis* Selys, 1865, *Argyrothemis argentea* Ris, 1909, *Mnesarete aenea* Selys, 1853, *Psaironeura tenuissima* Selys, 1886, *Argia infumata* Selys, 1865, *Chalcopteryx rutilans* Rambur, 1842, *Epipleoneura capilliformis* Selys, 1886, *Perithemis lais* Perty, 1833, *Diastatops obscura* Fabricius, 1775, *Erythrodiplax basalis* Kirby, 1897, *Erythrodiplax fusca* Rambur, 1842, *Orthemis discolor* Burmeister, 1839, *Chalcopteryx radians* Ris, 1914, *Epipleoneura haroldoi* Santos, 1964, *Erythemis vesiculosa* Fabricius, 1775, *Hetaerina indepressa* (Garrison, 1990), *Micrathyria romani* Sjoestedt, 1918, *Mnesarete smaragdina* Selys, 1869, *Phasmonera exigua* Selys, 1886, *Dasythemis esmeralda* Ris, 1910, *Neoneura luzmarina* De Marmels, 1989, *Epipleoneura spatulata* Racenis, 1960, *Erythrodiplax nigricans* Rambur, 1842, *Micrathyria artemis* Ris, 1911, *Gynacantha membranalis* Karsch, 1891, *Heteragrion aurantiacum* Selys, 1862, *Perilestes kahli* Williamson & Williamson, 1924, *Protoneura tenuis* Selys, 1860, *Epipleoneura westfalli* Machado, 1986, *Tigriagrion aurantinigrum* Calvert, 1909, *Argia smithiana* Calvert, 1909, *Heliocharis amazona* Selys, 1853, *Acanthagrion adustum* Williamson, 1916, *Rhodopygia cardinalis* (Erichson in Schomburgk, 1848)] Address: Brasil, L.S., Av. Perimetral, n 1901/1907 - Terra Firme, Belém, Pará, CEP 66017-970, Brazil. E-mail: brasil\_biologia@hotmail.com

**20535.** Beaune, D.; Sellier, Y. (2021): Stream restorations with meanders increase dragonfly and damselfly diversity and abundance, including an endangered species. Journal

for Nature Conservation 60 (2021) 125950: 10 pp. (in English) ["Highlights: • Many streams were artificially linearized for human usage, but with probable negative effect on biodiversity. • Two streams were restored with meanders and diggings allowing water to run again. • On both restored streams, diversity and abundance of Odonata (dragonflies & damselflies) significantly increased. • The endangered southern damselfly (*Coenagrion mercuriale*) colonized both streams after restorations. Abstract: This study presents examples of successful restoration projects for biodiversity conservation. In West France, the Pinail National Nature Reserve is a protected wetland interspersed with more than 6000 ponds. This wetland is inhabited by 50 species of Odonata and thus is a key biodiversity area for damselflies and dragonflies conservation. In the past, when the limestone was exploited, the streams of the plateau were artificially channeled rectilinearly, running to the Vienne River. Eventually streams were blocked by biomass and sediments resulting in water flowing mainly underground. In 2011, two restoration projects dug and recreated lost habitats such as running streams and meanders by openly reconnecting bodies of standing water (two sites: Rivau (207m) and Hutte (400m) streams). The Odonata species diversity and abundance are annually monitored following transect inventories since 1995 and still ongoing. Diversity and abundance were compared before and after the restoration. The abundance and species diversity increased at both sites due to the addition of lotic habitats and consequently additional new species. The number of observed species almost doubled on the Rivau (from 5.4 observed species to 9.9 spp). By extrapolation the total species number on site increased from 15-18 spp to 29-37 spp. The abundance also greatly increased with 770% more individuals on the Rivau. Similarly, on the 400m Hutte stream, the extrapolated diversity increased from 31-38 spp to 35-43 spp; as well as the abundance with 475% more individuals. These restoration projects created new habitats leading to local biodiversity enrichment and conservation success. More specifically, *Coenagrion mercuriale* (Odonata: Zygoptera), one of Europe's most threatened damselflies and listed in the European Habitats directive, successfully recolonized the Rivau stream and colonized the Hutte stream." (Authors)] Address: Beaune, D., UMR CNRS/uB 6282 Biogéosciences Université de Bourgogne, 6 bd Gabriel, 21 000 Dijon, France. E-mail: david.beaune@u-bourgogne.fr

**20536.** Bekkouche, B. (2021): The neural mechanisms of selective attention. Investigation of insect selective attention during visual object tracking using neurophysiology, neuroanatomy, computational modelling. PhD thesis, Faculty Science, Lund Univ., Sweden: 101 pp. (in English) ["The brain simulates the world around us using sensory information and provides an estimation of reality in which actions can be executed. This estimation of reality is controlled by attention which decides which information is accepted, further processed and ignored. The process of attending a certain part of the sensory information while ignoring other parts is called selective attention. I have studied visual selective attention on a neuronal level in hoverflies and dragonflies. These insects are highly skilled at object tracking in behaviors related to defending territories, mating or hunting prey. They have very small brains with few neurons compared to mammals and yet execute object tracking tasks with impressive accuracy. In Paper 1 we compare insect brain tissue preparation techniques for optimizing the amount of neuronal morphology details that can be captured during microscopy imaging. We then use these techniques to acquire a highly detailed neuron morphology and further apply

the techniques in the other papers. In Paper 2 we captured the morphology of a hoverfly target-tracking neuron using techniques from Paper 1. I measured a type of short-term memory called response facilitation in a population of these hoverfly target-tracking neurons. This was measured by comparing the response of long (primed) versus short (unprimed) target traveling paths. In the next experiment I measured the neuronal response while distracting the neuron with another target moving outside the part of the visual field in which that neuron responds. Both primed and unprimed distractors reduced the response, indicating that the attention was sometimes moved to the distractor. This phenomenon could potentially be implemented using long range inhibition as part of an attention mechanism. Paper 3 & 4 involved computational modeling of target tracking neurons using a neuronal morphology from the dragonfly. We show that a receptor (N-methyl-D-aspartate receptor), known for its involvement in short term memory processing, have some of the properties required to generate facilitation. Altogether, the results of this thesis have improved our knowledge and understanding of the neural mechanisms of selective attention in hoverflies and dragonflies. It has also paved the way for future studies to further expand on this knowledge and understanding." (Author)] Address: not stated

**20537.** Benken, T.; Schwandner, J. (2021): Landesweite Artenkartierung Libellen – Aktueller Zwischenstand. *Mercuriale* 20: 13-22. (in German, with English summary) ["Species mapping of dragonflies in Baden-Württemberg, current interim status - The existing occurrences of the FFH-species [Coenagrion mercuriale, Stylurus flavipes, Ophiogomphus cecilia, Leucorrhinia pectoralis, Sympecma paedisca] are being checked for the current reporting period. For long-term monitoring, permanent areas in eight natural areas of the country are also designated. The current status of these programmes is presented." (Authors)] Address: Schwandner, Julia, LUBW – Landesanstalt für Umwelt Baden-Württemberg, Griesbachstr. 1-3, 76185 Karlsruhe, Germany. Email: julia.schwandner@lubw.bwl.de

**20538.** Benken, T. (2021): Vierzig Jahre SGL, zwanzig Jahre SGL e.V. – Ein Ausblick auf den nächsten Sammelbericht. *Mercuriale* 20: 1-11. (in German, with English summary) ["Forty years of SGL, twenty years of SGL e.V. - An outlook on the next status report. – In times of climate change it becomes more and more important to document the changes of fauna and flora. For the dragonflies of Baden-Württemberg, the data stock has doubled in the last 15 years, therefore the SGL plans to publish a new status report. The presentation will cover three periods with comparable data. Thereby, the aspects phenology, altitudinal distribution, and proof of development will be particularly considered." (Author)] Address: Benken, T., Lindenstr. 86, 77855 Achern, Germany. Email: theodor@benkenhome.de

**20539.** Bernal Sánchez, A.; Conesa García, M.A. (2021): First record of *Pantala flavescens* (Fabricius, 1789) (Odonata, Libellulidae) in the Iberian Peninsula. *Boln. Asoc. esp. Ent.* 45(3-4): 321-323. (in Spanish, with English title) ["On 29 August 2021, at 11:00 h (official time two hours ahead of UTC time, ROA), a male imago was sighted flying in a broom (*Retama sphaerocarpa* L.) (Fig. 1), UTM 30S 235639.4/4008713.6, datum WGS89, and it was seen again at 20:00 h. On 30 August, at 10:00 h. another specimen could be seen in the same area (it is possible that it was the same one observed in previous days). On this last occasion the imago perched and could be photographed in its natural position on the dry branches of a broom (Fig. 2)."

(Author/DeepL)] Address: Conesa García, M.A. Email: mconesa@malaga.uned.es

**20540.** Chacko, S.; Kandambeth, P.P. (2021): Studies on trematode metacercariae infecting libellulid larvae from the Western Ghats, Wayanad region. *Journal of Parasitic Diseases* 46: 159-165. (in English) ["Understanding the host specificity of trematode larvae is vital in predicting the mode of trophic level transfer of trematode parasites and their evolution. In this study, six species of trematode metacercariae, *Eumegacetes* sp., *Orthotremata monostomum*, *Ganeo tigrinus*, *Mehraorchis* sp., *Pleurogenoides* sp. and *Phyllodistomum* sp. infecting the larvae of the odonate family Libellulidae from the water bodies in the Wayanad region of the Western Ghats are recorded. The prevalence of infection of these metacercariae was 5.8%, 2.0%, 10.4%, 9.1%, 2.6% & 1.3%, respectively. Further, the mean intensity of infection was estimated to be 4.44, 1.67, 5.38, 6.21, 6.0 & 17.5 and the mean abundance 0.26, 0.03, 0.56, 0.56, 0.16 & 0.23 respectively." (Authors)] Address: Kandambeth, P.P., Ecological Parasitology and Tropical Biodiversity Laboratory, Dept of Zoology, Kannur Univ., Mananthavady Campus, Wayanad, Kerala, 670645, India

**20541.** Chovanec, A. (2021): Dokumentation der Eiablage von *Anax imperator* (Odonata: Aeshnidae) in einem strömenden Bereich. *Mercuriale* 21: 75-79. (in German, with English summary) ["Documentation of oviposition of *A. imperator* in a streaming area. – *A. imperator* was observed when depositing eggs in a small dead twig of *Fraxinus excelsior* situated in the current (25 cm/s) of a lowland river in Eastern Austria. The female preferred this sunny place in the middle of the river for egg deposition compared to shaded lentic riverbank areas." (Author)] Address: Chovanec, A., Krottenbachgasse 68, A-2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bmlrt.gv.at

**20542.** Collantes González, R.; Jerkovic, M.; Arteaga, A.B. (2021): Insectos y arañas asociados a plantas ornamentales en David, Chiriquí, Panamá. *Insects and spiders associated with ornamental plants in David, Chiriquí, Panama. Aporte Santiaguino* 14(1): 9-20. (in Spanish, with English summary) ["The purpose of this work was to know the insects and spiders associated with ornamental plants in David, Chiriquí, Panama. For this, five random samplings were carried out in four locations, randomly selecting 35 plants which belong to 15 families and 20 species. The soil, branches and foliage levels were reviewed, manually collecting the arthropods found. The identification of the specimens was made by consulting specialized documentation and a photographic record was kept. The results obtained indicated that three species of spiders and 15 species of insects were associated with nine plant species. The predominant spiders were *Argiope argentata* (Araneidae) and *Leucauge venusta* (Tetragnathidae). About defoliating insects, the Family Diapheromeridae (Phasmatodea) and *Oiketicus kirbyi* (Lepidoptera: Psychidae), were found in *Arecaceae*; three species of Orthoptera associated with Toro grass, of which *Taeniopoda varipennis* (Romaleidae) stood out; Scarabaeidae and Chrysomelidae (Coleoptera) in *schefflera*. The biting-sucking species were represented by nymphs of *Blissus* sp. (Hemiptera: Blissidae) on Toro grass; *Aphis* sp. (Hemiptera: Aphididae) and *Coccus* sp. (Hemiptera: Coccidae), associated with ants (Hymenoptera: Formicidae); nymphs and adults of *Membracis mexicana* (Hemiptera: Membracidae), in *schefflera* shoots and damage by *Gynai-kothrips uzeli* (Thysanoptera: Phlaeothripidae) in *Ficus*. The predatory insects were represented by eggs and larvae of

Chrysopidae (Neuroptera), found in *schefflera* and adults of *Orthemis ferruginea* in water surfaces. The absence of parasitoids, pollinators and the low number of taxa found could be due to the use of synthetic pesticides, which breaks the trophic balance; although the surrounding wild vegetation can serve as a biological corridor for the species survival." (Authors)] Address: Collantes González, R., Universidad de Panamá. Facultad de Ciencias Agropecuarias, Chiriquí, Panamá. Email: rdcg31@hotmail.com

**20543.** Costa Bastos, R.; Schlemmer Brasil, L.; Oliveira-Junior, J.M.B.; Geraldo Carvalho, F.; Lennox, G.D.; Barlow, J.; Juen, L. (2021): Morphological and phylogenetic factors structure the distribution of damselfly and dragonfly species (Odonata) along an environmental gradient in Amazonian streams. *Ecological Indicators*, 122: 13 pp. (in English) ["A range of factors may determine the structure of ecological communities in time and space, in particular niches, dispersal limits, and the evolutionary history of the species. In the last decades, the traditional focus of community ecology on species diversity and composition have been supplemented by approaches incorporating functional traits and phylogeny. Following this perspective, we evaluated the response pattern of adult damselflies and dragonflies (Odonata) along a gradient of environmental disturbance in Brazilian Amazonia, with the objective of identifying subgroups of species that respond in a similar manner to environmental filters. The study tested the hypothesis that the subgroups of species with similar responses to the environmental gradient are structured phylogenetically and will be morphologically more similar to one another than they are to the other species. Adult odonates were sampled in 98 Amazonian streams, 48 in the region of Santarém and Belterra and 50 in the municipality of Paragominas, both located in the Brazilian state of Pará. The study was based on an ecological niche modeling approach and statistical significance testing methods to identify groups of species. These species groups (latent classes) were then associated with their morphological characteristics (Abdomen Length and Thorax Length) and phylogenetic relationships. Four latent classes, containing 34 species, were generated for each region. The latent classes of the Odonata formed along the gradient of anthropogenic impact had effects of phylogenetic proximity and the species' morphological similarity. Therefore, species belonging to the same latent class are more morphologically similar and have greater similarities in evolutionary history. It seems likely, however, that other processes may be important for the understanding of the structuring of the latent classes, such as intra- and interspecific relationships, environmental plasticity, and the history of land use. Both morphology and phylogeny are important for understanding species' responses to environmental gradients." (Authors)] Address: Costa Bastos, R., Graduate Program in Ecology, Universidade Federal do Pará, Belém, Pará, Brazil. Email: bastosrc.bio@gmail.com

**20544.** de Resende, B.O.; Ferreira, V.R.S.; Brasil, L.S.; Calvão, L.B.; Mendes, T.P.; de Carvalho, F.G.; Mendoza-Penagos, C.C.; Bastos, R.C.; Brito, J.S.; Oliveira-Junior, J.M.B.; Dias-Silva, K.; Luiza-Andrade, A.; Guillermo, R.; Cordero-Rivera, A.; Juen, L. (2021): Impact of environmental changes on the behavioral diversity of the Odonata (Insecta) in the Amazon. *Scientific Reports* 11(1): 9742 (2021): 12 pp. (in English) ["The odonates are insects that have a wide range of reproductive, ritualized territorial, and aggressive behaviors. Changes in behavior are the first response of most odonate species to environmental alterations. In this con-

text, the primary objective of the present study was to assess the effects of environmental alterations resulting from shifts in land use on different aspects of the behavioral diversity of adult odonates. Fieldwork was conducted at 92 low-order streams in two different regions of the Brazilian Amazon. To address our main objective, we measured 29 abiotic variables at each stream, together with five morphological and five behavioral traits of the resident odonates. The results indicate a loss of behaviors at sites impacted by anthropogenic changes, as well as variation in some morphological/behavioral traits under specific environmental conditions. We highlight the importance of considering behavioral traits in the development of conservation strategies, given that species with a unique behavioral repertoire may suffer specific types of extinction pressure." (Authors)] Address: de Resende, Bethania, Lab. de Ecologia e Conservação, Instituto de Ciências Biológicas, Universidade Federal do Pará, Belém, Brazil. Eemail: bethania-nx@hotmail.com

**20545.** Dirisu, R.; El Surtasi, E.I. (2021): Bioindicators of lotic and lentic ecosystems in Agbede wetlands (Southern Nigeria), using macroinvertebrate tools. *Scientific African* 14, November 2021, e01000: 15 pp. (in English) ["Macroinvertebrates are globally acclaimed as essential tools for biological monitoring in freshwater ecosystems. The essence of this study was to establish bioindicators for Agbede wetlands located in Edo- North in southern Nigeria. Both lotic (stations 1 to 3) and lentic (stations 4 to 7) water bodies were sampled between December, 2012 and May, 2014. Standard methods were applied for macroinvertebrates collection from the littoral habitats. The results of physicochemical parameters indicated that; flow velocity influenced the lotic environments, while temperature, electrical conductivity and turbidity mostly influenced the lentic water bodies. Three major pollution indicator groups were realised across the ecotypes and they are; the pollution sensitive (Ephemeroptera, Coleoptera and Trichoptera), the facultative (Anisoptera, Zygoptera and Decapoda) and the pollution tolerant groups (aquatic snail, Oligochaete and Leech). Pollution tolerant group was preponderance across the study stations but was significantly predominant in the lentic stations, especially during the dry seasons (November to March). The performance of pollution tolerance index (PTI) model, biodiversity indices and Multivariate analyses; all showed high taxa abundance, species composition and diversity across the stations. Similarly, PTI model revealed moderate water quality particularly in the lentic stations (values between 17 and 18) indicating healthy ecosystems, which was also proven by the biodiversity indices. The implication of this work is that, it will remain a comprehensive guide on biomonitoring programmes of the water bodies and the catchment areas as the water bodies are not in a bad quality." (Authors) All odonate taxa are misidentified because they represent European or American taxa.] Address: Dirisu, R. Dept of Animal and Environmental Biology, Faculty of Life Sciences, Univ. of Benin, Benin City, Edo State, P.M.B. 1154, Nigeria. E-mail: dedonrahman10@yahoo.com



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de  
Published in Zerf, Germany  
ISSN 1438-0269

## 2004

**20546.** Suh, A.N. (2004): Dragonfly assemblage dynamics and conservation at small reservoirs in KwaZulu-Natal, South Africa. PhD thesis, School of Botany and Zoology, Faculty of Science and Agriculture, Univ. of KwaZulu-Natal, Pietermaritzburg: XX + 178 pp. (in English) ["A study of the odonate fauna was carried out at the edge of a major escarpment, in eastern South Africa, using the same methodology as has been used in the temperate regions to obtain a sub-tropical perspective. The study used the macroecology approach to compare patterns and responses of these animals (at the developmental stages of larva, teneral and adults) to seasonal, topographical and anthropogenic disturbances. The habitats used were small, but well-established reservoirs located at five elevational gradients: Stainbank Nature Reserve (100 m), Krantzklouf Nature Reserve (450 m), National Botanical Gardens Pietermaritzburg (790 m) Cedara (1050 m) and Mondi Goodhope Estate (1350 m). Although this is essentially a local component of a larger macroecological study, it is shown that even though species and identities differ between temperate, tropical and sub-tropical ecoregions, the general pattern of community response to these variables is similar. Odonate species phenologies in this sub-tropical study showed great similarity to their tropical counterparts by reason of their adults being highly elevation-tolerant, with long flight periods and overlapping generations. Yet they also show temperate characteristics by over-wintering principally as larvae and eggs. The Libellulidae, followed by the Coenagrionidae were the most abundant, elevation-tolerant families, with national endemics constituting only 6.5% of the total species sampled. Classification and ordination methods identified and characterised sub-sites to ecologically meaningful biotopes for odonates. This also allowed inferences as to how the various landscape disturbances at the five elevations affect species richness and abundance. Species that responded to these impacts were potential indicator groups that can assist in the planning and management of the landscape for conservation of biodiversity. Some management recommendations for these landscapes are given. Individual odonate species developmental stages and their environmental relations were investigated using both univariate and multivariate analyses. The solutions to these analyses were then used to describe how odonate species are distributed along major environmental gradients. It was shown that regional processes e.g. elevation and insolation alongside local variables e.g. pH, marginal grasses, percentage shade, exposed rock, marginal forest, marsh and flow greatly accounted for adult (aerial stage) assemblage variation and distribution. Turbidity, floating/submerged vegetation and water depth (also influenced by regional factors), highly explained larval (aquatic stage) variation. Elevation has therefore, an indirect effect in that it determines climate, which in turn, determines soil and vegetation types which then determine

species presence and absence. Also, although these artificial water bodies do not increase the 'extent of species occurrence', they are important in increasing their 'area of occupancy'. Dragonflies play a major role in conservation. The Japanese culture has strongly illustrated how dragonflies feature in everyday life more than any other country in the world. While many parks and Botanical Gardens feature dragonfly trails in their nature trails in Britain, this does not necessarily cater for threatened species. Conservation of invertebrates in urban environments in South Africa for example by ecological landscaping designed to encourage dragonflies has been particularly rewarding. A core of regularly occurring odonate species occupied the dragonfly trail at the National Botanical Gardens in Pietermaritzburg, while other species visited the study site at irregular periods. This is likely to be the case for a longer term, say ten years or more. Also, the trail, with updated information on species phenologies, variability and habitat preferences continues to play a valuable role in sensitising an increasingly urbanised population to biodiversity and conservation issues. Odonates remain a major component when assessing ecological components of aquatic biotopes, with the assemblage composition at anyone locality capable of changing over time. This has been extensively illustrated in the northern hemisphere. Medium to longer term changes in odonate population at established reservoirs as demonstrated in this study at the National Botanical Gardens in Pietermaritzburg, South Africa, makes it possible to determine whether a species in a conservation area is being given enough protection from local anthropogenic impacts and effects of unpredictable weather conditions. This in turn enables one to understand how concepts of residency and succession underpin conservation management decisions. In conclusion, this study has addressed some salient aspects of species inventory, monitoring and conservation practice at a local scale that also play a central role in conventional biodiversity conservation practice of a global nature. Information on species phenologies enhances their awareness-raising in addition to providing valuable insights into their population dynamics and conservation, especially for those under threat. In addition, baseline data from this study and similar ones is useful in conserving biodiversity (as subjects) or in multi-taxa studies (as tools) in conserving ecosystems and/or landscapes. Finally, the macroecological approach employed in this study has great potential for teasing apart local effects from regional and/or global ones, and can contribute to the conservation of biodiversity at both small and large scales." (Author)] Address: <https://researchspace.ukzn.ac.za/xmlui/handle/10413/5638>

## 2005

**20547.** Chakona, A. (2005): The macroinvertebrate communities of two upland streams in eastern Zimbabwe with reference to the impact of forestry. M.Sc. thesis, Tropical Hydrobiology & Fisheries, Biological Sciences Dept, Univ. of

Zimbabwe, Harare: VIII, 49 pp. (in English) ["Benthic macroinvertebrates and physico-chemical parameters of the water were examined from two fast flowing streams, the Nyahode River which drains a pine monoculture catchment and the Haruni River which drains an undisturbed deciduous forest catchment in the Chimanimani Mountains, Eastern Zimbabwe. Benthic samples and environmental data were collected in October 2004, December 2004 and January 2005. The water quality was similar in many respects but turbidity was significantly higher ( $p < 0.05$ ) in the Nyahode River compared to the Haruni River (mean 17.1 NTU and 6.0 NTU respectively). Conductivity was almost three times higher in the Nyahode ( $66 \mu\text{S cm}^{-1}$ ) than the Haruni ( $24 \mu\text{S cm}^{-1}$ ). The impact of forestry on faunal composition was evident on Ephemeroptera (Euthraulus, Afronurus and Diceromyzon), Plecoptera (Neoperla spio) and Trichoptera (Macrostemum capense) (EPT) richness. Absence of shredders from both streams is a result of the low retention of Course Particulate Organic Matter (CPOM) in the streams due to the rapid flows whilst dominance of filterers suggests that the retention of organic material seems to be limited to Fine Particulate Organic Matter (FPOM). These results indicate that unless reference conditions are established first, results from biotic indices could be completely misleading because absence of some taxa could not be due to human impact but is just a natural phenomenon. Many of the taxa collected from both rivers were sensitive to water quality change (ASPT, 5.6 to 7.8) indicating good water quality which is attributable to the currently underdeveloped nature of the catchment." (Author) <https://ir.uz.ac.zw/jspui/bitstream/10646/833/1/01-Chakona-Msc-Thesis.pdf>] Address: Chakona, A., Univ. of Zimbabwe Lake Kariba Res. Station, PO Box 48, Kariba, Zimbabwe. E-mail: achakona@yahoo.com

**20548.** Chovanec, A.; Waringer, J. (2005): Dragonflies (Insecta: Odonata) as indicators of the ecological health of wetland ecosystems. *Verh. Internat. Verein. Limnol.* 29: 422-425. (in English) ["Dragonflies play an essential role in the assessment of the ecological integrity of aquatic systems. They are reliable indicators of habitat heterogeneity, connectivity aspects and the ecological quality of the land-water interface. The key factors for understanding this indicator potential are highly specific sets of habitat requirements reflected by distinct patterns of niche differentiation. Bioindication by dragonfly surveys has been broadly discussed (SCHMIDT 1985, 1989, SAMWAYS 1993, CUOVANEC & WARINGER 2001). The aim of this paper is to describe a scheme for assessing the ecological status of river/floodplain systems by analysing dragonfly communities, a method that meets the requirements of the EU Water Framework Directive (WFD). The "Odonata Habitat Index", a key element of this approach, is designed to assess characteristic features of a river/floodplain system, such as connectivity aspects, flow dynamics and terrestrialisation processes. Application examples are presented." (Authors)] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, A-1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

**20549.** Chovanec, A.; Strait, M.; Waidbacher, H.; Schiemer, F.; Cabela, A.; Raab, R. (2005): Rehabilitation of an impounded section of the Danube in Vienna (Austria) - evaluation of inshore structures and habitat diversity. *Large Rivers* 15(1-4), *Arch. Hydrobiol. Suppl.* 155/1-4: 211-224. (in English) ["River regulation, urban development and the construction of a hydroelectric power plant have considerably changed the ecological condition of the Danube section in Vienna. In 1997. The previously straight shoreline of the Danube in this area was reconstructed by creating shallow water areas,

coves, gravel banks and side channels. These inshore structures were created to increase habitat diversity in this area and to establish, together with existing ponds, a system of stepping stone biotopes, which serve as migration linkage through the municipal area of Vienna. A monitoring programme (1998-2001) was established to assess the functional integrity of these structures. A multi-species-approach using odonates, amphibians and fish was developed to cover aquatic, amphibious and terrestrial habitat components. As demonstrated in this study, rehabilitation of heavily altered systems may play an important role in improving ecologically degraded areas and in reconnecting isolated lands-cape patches. A new metric (Floodplain Index) was applied for defining an ecological management objective, for characterizing the newly created structures and for assessing habitat heterogeneity." (Authors)] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, 1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

**20550.** Chovanec, A.; Waringer, J.; Strait, M.; Graf, W.; Reckendorfer, W.; Waringer-Loschenko, A.; Waidbacher, H.; Schultz, H. (2005): The Floodplain Index - a new approach for assessing the ecological status of river/floodplain-systems according to the EU Water Framework Directive. *Large Rivers* 15(1-4), *Arch. Hydrobiol. Suppl.* 155/1-4: 169-185. (in English) ["A new method was developed to assess the ecological status of river/floodplain-systems. The approach is based on the requirements of biological assessment laid down in the EU Water Framework Directive, and, therefore, focuses on water bodies and their environs while neglecting truly terrestrial floodplain sections. The following indicator groups have been integrated: molluscs, caddisflies, dragonflies, amphibians, and fish. These groups were chosen to describe species associations representative of all types of floodplain waters along the gradient of hydrological connectivity. Key element of the procedure is the Floodplain Index, which is calculated for each site investigated on the basis of species-specific habitat values expressing the species' habitat preferences. Since species compositions vary according to the hydrological conditions, the water bodies of an investigation area can be characterized according to the index values. The distribution of the index values shows if and to which extent the degree of lateral connectivity is disturbed in the floodplain area. The assessment of the ecological status is based on a comparison between a river-type-specific reference condition and the status quo. The method is presented with an example from a Danube floodplain area in the north of Vienna (Austria)." (Authors)] Address: Chovanec, A., Umweltbundesamt, Spittelauer Lände 5, 1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

## 2007

**20551.** Emiliyamma, K.G.; Radhakrishnan, C. (2007): Fauna Bannerghatta National Park (Karnataka): Insecta: Odonata. *Zoological Survey of India. Conservation Area series* 33: 39-41. (in English) [Only three species are documented: *Agriocnemis pygmaea*, *Trithemis festiva*, *Trithemis aurora*.] Address: Emiliyamma, K.G., Western Ghats Field Res. Station, Zoological Survey of India, Calicut 673 002

**20552.** Ramos, L.G.; Gapud, V.P. (2007): Survey of dragonflies and damselflies (Odonata) of Mount Makiling, Luzon, Philippines. *Philippine Entomologist* 21: 1-75. (in English) ["The Odonata of Mt. Makiling and vicinities were surveyed. A taxonomic treatment of all examined species is presented, together with a checklist of species of Mt. Makiling. Of the 41 dragonfly species, *Tetracanthagyna bakeri*,

*Heliogomphus bakeri*, *Ictinogomphus tenax*, *Heteronaias heterodoxa*, *Idionyx philippa*, *Diplacina bolivari*, and *D. braveri* are Philippine endemic, while *Idionyx salva* is Luzon endemic. Only *Agrionoptera bartola* is endemic to Mt. Makiling. Of the 24 damselfly species known from Mt. Makiling, 18 are endemic to the Philippines, with *Amphicnemis bonita*, *A. incallida*, *Risiochemis laguna* and *Drepanosticta makilingia* either confined to Mt. Makiling or shared with Mt. Bana-haw and Quezon. So far, *D. makilingia* is known only from Mt. Makiling. *Rhinocypha colorata*, *Risiochemis serata*, and *Euphaea refulgenes* are common in Mt. Makiling streams, while *Risiochemis atropurpurea* and *Neurobasis luzoniensis* are rare. The status of Odonata of Mt. Makiling is presented in relation to their endemism, importance to rice pest management, problems of the Makiling Forest Reserve and Odonata conservation." (Authors)] Address: Ramos, L.G., Philippines Univ. Los Banos, College, Laguna, Coll. of Agriculture, Philippines.

**20553.** Song, W.; Ma, L.; Wang, H.; Han, X. (2007): Diversity of insect communities by the lakeside in Zhalong Nature Reserve. *Journal of Northeast Forestry Univ.* 35(7): 80-81. (in Chinese, with English summary) ["A survey was conducted to study the insect fauna by the lakeside in Zhalong Nature Reserve during July-August 2005 and July-September 2006. A total of 104 species of insects belonging to 35 orders and 8 families are recorded. The heterotic groups are Odonata, Coleoptera, Lepidoptera and Hemiptera, accounting for 53.97%, 16.55%, 13.47% and 11.07%, respectively. The number of species and the number of individuals of the insects shows July>August>September. Statistical analysis indicates that the changing trends over time for diversity index(H'), evenness index(J) and richness index (E) are coincident, namely July>August>September, while dominance index (D) exhibits September>August>July." (Authors)] Address: Song, W., School of Forestry, Northeast Forestry Univ., Harbin 150040, P.R.China

## 2008

**20554.** Preiß, B. (2008): Die Gestreifte Quelljungfer *Cordulegaster bidentata* und der Feuersalamander *Salamandra salamandra* als Leitarten an ausgewählten Kalksinterquellen und -bächen im Naturpark Eichsfeld-Hainich-Werratal. Bachelorarbeit. Hochschule Anhalt (FH): 83 pp. (in German) [Thüringen, Germany; "For the preparation of this work, eight calcareous sinter springs in the Obereichsfeld (Eichsfeld-Hainich-Werratal Nature Park) were regularly visited between April and August 2007. Here, important structures and parameters of the respective spring run were recorded and described. A targeted search was carried out for exuviae of the striped damselfly *C. bidentata*, which were collected. Furthermore, flying striped damselflies were observed. The larvae of the Fire Salamander *Salamandra salamandra* were observed in the calm areas of the water bodies. The aim of the surveys was to record the ground population and population density of the two flagship species. The evaluation focused on the distribution of the species in the stream system and their seasonal behaviour. Furthermore, the influence of the water structures and parameters on the occurrence of the species was in the foreground." (Author/DeepL)] Address: not stated

**20555.** Torralba Burrial, A. (2008): Medidas de conservación para los Odonatos. I jornadas sobre la conservación de los artrópodos en Extremadura. Fondos LIFE-Proyecto LIFE 2003/NAT/E/000057 "Conservación de Artrópodos Amenazados de Extremadura", Junta de Extremadura.

Consejería de Industria, Energía y Medio Ambiente: 91-102. (in Spanish) ["Dragonflies, with its conspicuous color, size and habits have left their mark on many fields of human activity, being a fundamental part of the European natural heritage its scientific values, educational, cultural and intrinsic values. However, their role as predators agencies associated aquatic ecosystems affects the conservation problems they present, and that suitable habitats for dragonflies are being lost or degraded at all critically the world. Of the nearly 5600 known species worldwide, 176 have been included in any category of threat in the IUCN Red List 2006. In this paper we review various measures to improve the conservation status of communities of dragonflies. These can be structured according to four courses of action, all necessary and complementary development of lists red, including figures of legal protection measures for the effective protection of the media living and outreach and environmental awareness. Importantly, the synergies given to addressing the problem from the four paths, and that effective protection of the media, that is the way that ensures preservation depend heavily on the existence of a desire or need for society to protect biodiversity in general and dragonflies in particular, need on which attention is drawn to the development of red lists, which increased with the disclosure the magnitude of the problem and knowledge of the species affected and structured by the legal protections. Dragonflies, with its conspicuous color, size and habits have left their mark on many fields of human activity as the mythology, superstition, literature, music, painting, philately and personal adornment (Lucas, 2002). Although the major influences on humans are aesthetic and scientific, interact with them in various ways (Corbet, 1999). Indeed, they are a fundamental part of the European natural heritage for its scientific, educational, cultural, recreational, aesthetic and intrinsic (Council of Europe, 1987). However, the role of organisms associated predators affect aquatic ecosystems to the conservation problems they present, as the habitats Odonata suitable for being lost or degraded worldwide critically, and at an accelerated rate (Corbet, 1999). In addition to increasing knowledge about the biology and habitat of each species, the measures aimed at seeking the conservation of dragonflies can be structured according to four-way of action, all necessary and complementary development of red lists, including figures of legal protection measures for the effective protection of living resources and activities outreach and environmental awareness. The following are examples of conservation measures following each Odonata of these pathways." (Author) (google translator) [http://www.telecable.es/personales/antoniobt/2008Medidas\\_conservacion\\_odonatos.pdf](http://www.telecable.es/personales/antoniobt/2008Medidas_conservacion_odonatos.pdf); 27022011] Address: deceased

## 2009

**20556.** Duan, X.-h.; Wang, Z.-y. (2009): Experimental study on the effect of habitat isolation on river ecology. *Advances in Water Science* 20(1): 86-91. (in Chinese, with English summary) ["The field investigations and an experiment were conducted in the Juma river in the suburbs of Beijing to study the effect of habitat fragmentation on river ecology, using benthic macro-invertebrates as indicator species. Three experimental plots were isolated from a relatively undisturbed stream habitat with sheet iron. The benthic assemblages and water parameters were measured by sampling periodically. The results indicate that the abundance, taxa richness and bio-diversity of invertebrates significantly decrease in the experimental plots owing to the habitat isolation. The smaller the experimental habitat plot, the more significantly these biotic indices decrease. The

contents of the dissolved oxygen in the studied plots present the inconsistent variations. The comparison of the benthic communities shows that the relative abundances of Ephemeroptera and Diptera reduces significantly in the isolated plots, and that of the Odonata and Lamellibranchia increase significantly. It is also found that the benthic communities need some time to stabilize after isolation, and then present apparent variation over time. There is a relatively high degree of taxa turnover between isolated plots and the non-isolated reach, which can be attributed to the flight and dispersal of many aquatic insects in their adult stage. However, the benthic communities in isolated plots are not nested subsets in the natural non-isolated stream. This paper also gives some suggestions of the river restoration and the preservation of river ecological integrity based on the study and the present status of the rivers in China." (Authors)] Address: Duan, X.-h., State Key Lab. Hydroscience & Engineering, Tsinghua Univ., Beijing 100084, China

## 2010

**20557.** Darblade, S.; Ducout, B. (2010): Compte rendu de présentation de poster: Peuplements odonatologiques de différents types de zones humides du département des Landes (40): synthèse des travaux effectués entre 2001 et 2009 dans le cadre de suivis de sites et d'inventaires en zone Natura 2000. *Martinia* 26(3-4): 188-192. (in French) ["In the Landes Dept, between 2001 and 2009, 283 stations were sampled as part of Natura 2000 inventories and site monitoring in 3 geographical sectors: the coast, the Haute Lande and the Barthes de l'Adour. The lotic and lentic habitats surveyed were diverse and representative of the wetlands of the Landes. In terms of species, of the 56 odonates observed, 3 were new to the Dept: *Trithemis annulata*, *Somatochlora m. metallica* and *Calopteryx s. splendens*; and 5 were protected at national and European level: *Oxygastra curtisii*, *Coenagrion mercuriale*, *Gomphus flavipes*, *Leucorhinia albifrons* and *L. pectoralis*. A comparison of the species richness was then made according to the geographical sectors and habitats sampled. Finally, the analysis of the frequencies of occurrence made it possible to characterise the distribution of species by habitat." (Authors) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Darblade, Stéphanie, RNN Étang Noir / Association OS-MUNDA Réserve Naturelle de l'Étang Noir, Avenue du parc des sports, 40510 - Seignosse, France. E-mail: [m.etang-noir@libertysurf.fr](mailto:m.etang-noir@libertysurf.fr)

**20558.** Deliry, C. (2010): Expansion de la Libellule purpurine en France *Trithemis annulata* (De Palisot de Beauvois, 1805) - Décembre 2010 (Troisième édition). *Histoires Naturelles* n°1: 5 pp. (in French) [<https://deliry.net/pdf/hn1.pdf>] Address: Deliry, C., 20, rue de la Manine, F-38510 Morestel, France. E-mail: [president@sympetrum.org](mailto:president@sympetrum.org)

**20559.** Wellenreuther, M.; Tynkynen, K.; Svensson, E.I. (2010): Simulating range expansion: Male species recognition and loss of premating isolation in damselflies. *Evolution* 64(1): 242-252. (in English) ["Prolonged periods of allopatry might result in loss of the ability to discriminate against other formerly sympatric species, and can lead to heterospecific matings and hybridization upon secondary contact. Loss of premating isolation during prolonged allopatry can operate in the opposite direction of reinforcement, but has until now been little explored. We investigated how premating isolation between two closely related damselfly species, *Calopteryx splendens* and *C. virgo*, might be affected by the expected future northward range expansion of *C. splendens*

into the allopatric zone of *G. virgo* in northern Scandinavia. We simulated the expected secondary contact by presenting *C. splendens* females to *C. virgo* males in the northern allopatric populations in Finland. Premating isolation toward *C. splendens* in northern allopatric populations was compared to sympatric populations in southern Finland and southern Sweden. Male courtship responses of *G. virgo* toward conspecific females showed limited geographic variation, however, courtship attempts toward heterospecific *C. splendens* females increased significantly from sympatry to allopatry. Our results suggest that allopatric *C. virgo* males have partly lost their ability to discriminate against heterospecific females. Reduced premating isolation in allopatry might lead to increased heterospecific matings between taxa that are currently expanding and shifting their ranges in response to climate change." (Authors)] Address: Wellenreuther, Maren, Section for Animal Ecology Ecology Building, Lund Univ. SE-223 62 Lund, Sweden. Email: [Maren.wellenreuther@zooekol](mailto:Maren.wellenreuther@zooekol)

## 2011

**20560.** Alym, M.Z.Y.; Mohamed, I.E.E.; Bakry, S.M. (2011): Study the prey preference of some aquatic insects for different snails under the laboratory conditions. *Egypt. Acad. J. biolog. Sci.* 4(1): 91-101. (in English, with Arabian summary) ["The study of five aquatic insects (predators), adults of two hemipterous species, *Limnogeton fieberii* Mayr, *Sphaerodema urinator* Duf., and nymphs of *Anax imperator*, *Crocothemis erythraea* and *Ischnura pumilio* on four species of snails (preys) exist in its natural habitat at Qena, *Bulinus truncatus* Audouin, *Biomphalaria alexandrina* Ehrenb, *Cleopatra bulimoides* Olivier and *Melanoides tuberculata* Muller. in non choice experiment under laboratory conditions, the result indicated that the first preference for attack to all predators was directed towards *B. truncatus*. And the last preference was *B. alexandrina*. Except, *L. fieberii*, the last preference was *C. bulimoides*." (Authors)] Address: Alym, M.Z.Y., Zoology Department (Entomology), Faculty of Science (Qena), South Valley University, Egypt

**20561.** Devai, G.; Miskolczi, M. (2011): Adatok a Nyírség szitakötő-faunájához (Odonata) [Data on the dragonfly (Odonata) fauna of the landscape Nyírség (NE-Hungary)]. *Studia odonotol. hung.* 13: 71-80. (in Hungarian, with English summary) ["This is the 22th paper of a series directed at communicating faunistic data of Hungary which had been unpublished until December 31, 1987 (cf. DÉVAI, GY. et al. 1993). The authors present faunistic data on the geographical mesoregion Nyírség in NE-Hungary, from 13 localities in 11 10×10 km UTM grid map cells (EU 40, 41, 50, 51, 61, 71, 82; ET 46, 59, 66, 89), over the administrative area of 6 settlements (Debrecen, Érpatak, Levelek, Nyírbátor, Nyíregyháza, Nyírmada). Collections were made in 6 years between 1968 and 1987 on 26 days, with the participation of 6 specialists. In the report information on 2442 adults (1727 males and 715 females) is given in detail, representing 319 faunistic data. In this study 37 species (15 Zygoptera and 22 Anisoptera) were found to occur in the area, out of which 19 belong to the frequent, 12 to the less frequent, 2 to the rare and 4 to the sporadic class of country-wide occurrence frequency." (Authors)] Address: Devai, G., Dept of Ecology, Kossuth L. Univ., H-4010 Debrecen, P.O. Box 71, Hungary

**20562.** Nicoli Aldini, R.; Tabarroni, A. (2011): Contributo allo studio della distribuzione degli Odonati nel Piacentino. Abstract de XXIII Congresso Nazionale Italiano di Entomologia,



(Genova, 2011-06-13 -2011-06-16), erredi grafiche editoriali, Genova 2011: 72. (in Italian) ["The territory of Piacenza, the extreme western edge of Emilia bordered to the north by the course of the P river and to the south by the northern Apennine ridge, includes the catchment basins of a number of right-hand Padana tributaries (Tidone, Trebbia, Nure, Chiavenna, Arda). Among the wetlands, the riparian environments of the Po with the mouths of the aforementioned tributaries and, in the Po agricultural area, the network of irrigation canals stand out. In the hills and mountains there are also artificial basins (Lake Trebecco, Lake Mignano) and, higher up, other smaller lakes. In view of this hydrographic variety, which is undoubtedly important for research on amphibiotic entomofauna, it can be stated that current knowledge on the distribution of Odonates in the province of Piacenza is relatively scarce when compared with that available for some other provinces in the region or in neighbouring regions. In view of the importance of Odonates as bio-indicators and in order to obtain a more in-depth knowledge of their distribution in the territory and of any variations in the same over time, we identified the unpublished material from the Piacenza area kept in the collections of the Entomology Institute of the Catholic Univ.. The collection period of the approximately 200 specimens examined covers the last thirty years; there are about sixty localities, located mainly in the lowland and hilly areas of the province. The original geoneimical data concern the following 38 species: Calopteryx haemorrhoidalis, C. splendens, C. virgo, Sympecma fusca, Lestes dryas, L. sponsa, L. viridis, Platycnemis pennipes, Pyrrhosoma nymphula, Ischnura elegans, I. pumilio, Enallagma cyathigerum, Coenagrion puella, Ceriagrion tenellum, Aeshna affinis, A. cyanea, A. isosceles, A. mixta, Anax imperator, Hemianax ephippiger, Gomphus flavipes, G. vulgatissimus, Onychogomphus forcipatus, Somatochlora metallica, Libellula depressa, L. fulva, L. quadrimaculata, Orthetrum albistylum, O. brunneum, O. cancellatum, O. coerulescens, Crocothemis erythraea, Sympetrum depressiusculum, S. fonscolombii, S. meridionale, S. pedemontanum, S. sanguineum, S. striolatum. Some of these species had been reported several times for the area under study, while for others citations in the literature are very scarce or absent. For the Piacenza area, further bibliographic data exist for less than a dozen other species. It is probable that especially the mountainous Apennine environments, which have been less investigated, may provide other findings of some faunistic interest." Translated with www.DeepL.com/Translator (free version).] Address: Nicoli Aldini, R., Istituto di Entomologia e Patologia vegetale, Università Cattolica del Sacro Cuore, Via Emilia Parmense 84, 29122 Piacenza, Italy. E-mail: rinaldo.nicoli@unicatt.it

**20563.** Resende, D.C.; Meira, A.Q.; Campos, L.A.O.; Lino - Neto, J. (2011): Hipóteses evolutivas sobre a morfologia das asas de Libellulidae (Insecta, Odonata). X Congresso de Ecologia do Brasil, 16 a 22 de Setembro de 2011, Sao Lourenço - MG: 2 pp. (in Portuguese) ["The Continuous evaluates the evolution of a characteristic through three parameters, named,  $\delta$  e and  $\epsilon$  o. Of these, the parameter  $\delta$  is responsible for evaluating whether the shared evolutionary history (the  $\delta$ -logeny) explains the variability observed in the data ( $\delta=1$ ). The result of the comparative analyses showed that the features of interest in this work do not present a  $\delta$ -lognetic  $\delta$ -signal ( $\delta=0$ ), suggesting that traditional statistical analyses can be used. The PCA analysis, performed from the pairwise comparison data between the forewings and hindwings of the species, originated a main axis with 48.7% of the explained variance, which separated the species *T. binotata*, *P. avescens* and *M. marcela* from the other species

analyzed. The multiple regression showed that the differences between forewings and hindwings increase with the increase in body size of the species ( $R^2=0.88$ ;  $b= - 3.75$ ;  $t(8)= - 4.46$ ;  $p<0.01$ ). The change in wing shape also correlated with an increase in the anal area of the hind wing ( $b= - 3.75$ ;  $t(8)= - 4.46$ ;  $p<0.01$ ), a characteristic that Corbet (1962) suggested as important for flying species, facilitating the maintenance of a flight with less energy expenditure (gliding). Larger species, in fact, remained longer in flight during reproductive activities ( $R^2=0.48$ ;  $b=1.42$ ;  $t(7)=2.45$ ;  $p<0.05$ ). However, the change in shape between wings ( $R^2=0.48$ ;  $b=1.03$ ;  $t(7)=1.96$ ;  $p=0.09$ ) and the anal area of the hind wing ( $R^2=0.48$ ;  $b=1.05$ ;  $t(7)=2.22$ ;  $p=0.06$ ) did not correlate with the flight time of the species, reinforcing the idea that the dichotomy between fliers and landers seems, in fact, to exist, but would involve other flight activities than those related to reproductive behavior, as already argued by Corbet & May (2008). Conclusion: The morphological and behavioral characteristics of interest showed no  $\delta$ -lognetic signal, reinforcing the idea that Libellulidae may have undergone rapid adaptive radiation. The differences in wing shape are correlated with the body size of the species, but do not influence the flight time during reproductive activities. (This work was supported by FAPEMIG, through the funding of the project "Phylogeny and evolution of the family Libellulidae Rambur, 1842 (Odonata) based on molecular characters" and a Ph.D. grant to the first author). Translated with www.DeepL.com/Translator (free version)] Address: <http://www.seb-ecologia.org.br/xceb/resumos/1347.pdf>

**20564.** Sundermann, A.; Stoll, S.; Haase, P. (2011): River restoration success depends on the species pool of the immediate surroundings. *Ecological Applications* 21(6): 1962-1971. (in English) ["Previous studies evaluating the success of river restorations have rarely found any consistent effects on benthic invertebrate assemblages. In this study, we analyzed data from 24 river restoration projects in Germany dating back 1 to 12 years and 1231 data sets from adjacent river reaches that lie within 0-5, 5-10, and 10-15 km rings centered on the restored sites. We calculated restoration success and recolonization potential of adjacent river reaches based on stream-type-specific subsets of taxa indicative for good or bad habitat quality. On average, the restorations did not improve the benthic invertebrate community quality. However, we show that restoration success depends on the presence of source populations of desired taxa in the surrounding of restored sites. Only where source populations of additional desired taxa existed within a 0-5 km ring around the restored sites were benthic invertebrate assemblages improved by the restoration. Beyond the 5-km rings, this recolonization effect was no longer detected. We present here the first field results to support the debated argument that a lack of source populations in the areas surrounding restored sites may play an important role in the failure to establish desired invertebrate communities by the means of river restorations. In contrast, long-range dispersal of invertebrates seems to play a subordinate role in the recolonization of restored sites. However, because the surroundings of the restored sites were far from good ecological quality, the potential for improvement of restored sites was limited." (Authors)] Address: Stoll, S., Res. Inst. Senckenberg, Dept Limnology & Conservation, Clamecystr. 12, 63571 Gelnhausen, Germany. E-mail: stefan.stoll@senckenberg

**20565.** Wendzonka, J. (2011): Literatura i recenzje [Literature and reviews: - Recenzja. Boudot J.-P., Kalkman V. J., Azpilicueta Amorin M., Bogdanoviæ T., Cordero Rivera A., Degabriele G., Dommanget J.-L., Ferreira S., Garrigós B.,

Jovic, M., Kotarac M., Lopau W., Marinov M., Mihokoviæ N., Riservato E., Samraoui B., Schneider W. 2009. Atlas of the Odonata of the Mediterranean and North Africa. *Libellula*, Suppl. 9: 1–256. *Odonatrix* 7(1): 31-32. (in Polish, with English summary) ["Atlas of the Odonata of the Mediterranean and North Africa" is a distribution atlas of dragonflies in this region. It contains maps (based on 50x50 km UTM grid) for all of 179 recorded species. Additionally, almost all species presented in photographs are shortly described (biology, ecology, remarks on distribution, IUCN Red List Status). For Polish odonatologists it is not a "must have" book, but it is necessary for everyone who wants to get the wider view about the distribution of "our" dragonfly species." (Author)] Address: Wendzonka, J., ul. Graniczna 17, 63-800 Gostyn, Poland. E-mail: wendzonka@wp.pl

### 2013

**20566.** Buczyński, P. (2013): Two forgotten papers about dragonflies (Odonata) of Poland. *Odonatrix* 9(2): 65-71. (in Polish, with English summary) ["The author discusses two Russian papers with data from the vicinity of Pu.awy (eastern Poland) which have been omitted in odonatological literature so far including "A distribution atlas of dragonflies (Odonata) in Poland" (Bernard et al. 2009). Zaitsev (1908) gave on the margins of the paper about interesting insects of the vicinities of Pu.awy the information about the recording of *Caraphractus cinctus* (Hymenoptera: Mymaridae). Then it was wrongly regarded as a specialized parasite of the eggs of *Calopteryx virgo* therefore its presence was treated as an evidence for the occurrence of this dragonfly species (Kolosov 1916; Zaitsev 1908). However, *C. cinctus* parasitizes mainly *Dytiscidae* (Coleoptera), it is also found in the eggs of *Notonecta* spp. (Hemiptera: Heteroptera). Therefore this reasoning is unauthorized and the paper of Zaitsev (1908) should be excluded as a source of data on dragonflies of Poland. Kolosov was known as the author of the paper about the mass migration of *Libellula quadrimaculata* through Pu.awy (Kolosov 1915). His collection was partially preserved in the Museum and Institute of Zoology of the Polish Academy of Sciences (MIZ PAS). This data has been used by Bernard et al. (2009) and discussed in details by Buczynski (2012) who considered it in most as unpublished. However, it was published in *Zapiski Nowo-Aleksandriyskago Instituta Selskago Khozyaistva i Lesovodstva* (Memoires de Institute Agronomique et Forester a Nowo-Alexandriach) (Kolosov 1916) although this work has never been cited, not only in Poland but also in Russia and the Soviet Union. This probably resulted from a chain of unfortunate events. The paper was published during the war when the publishing institute was evacuated from Pu.awy to Kharkov where it stayed. Therefore this paper was absent in Polish libraries. However, for Russian authors the discussed paper was not interesting then for it was local and referred to a different country. Kolosov (1916) gave 41 dragonfly species: 40 from Pu.awy and its vicinity as well as 5 from fragmentary studied sites in other areas of Poland. At the same time *Orthetrum cancellatum* was wrongly recorded: the provided picture of copulatory apparatus of a male indicates *O. albistylum*. The analysis of data and the comparison with the preserved material (Buczyński 2012) show that the specimens in MIZ PAS were re-labelled which resulted in the loss of the detailed data about the sites: new unformed labels provided general site. *Novaya Aleksandriyach* (=Pu.awy). Moreover, the collection of MIZ PAS contains the species which were not given by Kolosov (1916): *Lestes virens*, *Enallagma cyathigerum*, *Anax imperator* and *A. parthenope*. Taking into consideration all of the data, in the

area of Pu.awy ca. 100 years ago 44 dragonfly species were recorded. That number was impressive in the light of contemporary standards of faunistic studies and such a small area. This shows the very high natural values of the valley of the middle River Vistula at that time. This data show the unique, almost complete picture of dragonfly assemblages of the valley of large lowland river in Central Europe during the period when such areas were still transformed in small degree by man." (Author)] Address: Buczynski, P., Dept Zool., Maria Curie-Skłodowska Univ., Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**20567.** Deliry, C. (2013): Liste chronologique des Libellules d'Europe. *Histoires Naturelles* n°18: 18 pp. [<https://deliry.net/pdf/hn18.pdf>]

**20568.** Deliry, C. (2013): Bibliographie d'Odonatologie Rhône-alpine & Hautes-Alpes, Deuxième édition. Août 2013. *Histoires Naturelles* n°21: 44 pp. (in French) [<http://deliry.net/pdf/hn21.pdf>] Address: Deliry, C., 20, rue de la Manine, 38510 Morestel, France. E-mail: president@sympetrum.org

**20569.** Elzerman, S. (2013): Zomer 2012: zwervende heidelibel breekt records op braakliggend terrein [Summer 2012: *Sympetrum fonscolombii* breaks records on wasteland]. *Straatgras* 25(1): 8-9. (in Dutch) [<https://natuurtijdschriften.nl/pub/538409/STGR2013025001005.pdf>] Address: ecoloog, Elzerman Ecologisch Advies; [info@elzermanecologischadvies.nl](mailto:info@elzermanecologischadvies.nl)

**20570.** Gliwa, B. (2013): Die Libellen der Moorgebiete "Praviršulio tyrelis" und "Didysis Tyrulis" in Litauen. *Pa-trauklios kaimo aplinkos išsaugojimas ir formavimas Sargeliai: Kruenta* 2013. ISBN 978-609-95323-1-8: 164-198. (in German, with English and Lithuanian summaries) ["Odonata of two nature reserve boglands in Lithuania: *Praviršulis* and *Didysis Tyrulis*. While *Didysis Tyrulis* has been largely destroyed due to peat cutting, *Praviršulis* remained healthy, however, with disorders of natural hydrological conditions in a large part. As a result *Praviršulis* contains still two natural lakes and plenty of raised bog and fen. By contrast, at *Didysis Tyrulis* one finds no natural water bodies at all but lots of secondary „lakes“ in the digged pools together with a dense set of ditches. *Praviršulis* is well researched in terms of dragonflies, 45 species have been recorded. Among them some species strongly specialized in bogland, e.g. *Nehalennia speciosa*, *Somatochlora arctica*. Due to still started research, only 27 species have been recorded at *Didysis Tyrulis*, among them rare species as *Coenagrion armatum* and *Coenagrion lunulatum*. As a surprise, a large of population of *N. speciosa* could be observed as well. This is the first report of this species in a renaturating habitat. Really large populations were recorded for *Leucorrhinia rubicunda* and *L. pectoralis* in 2012.] Address: Gliwa, B., Lithuanian Entomological Society, Akademijos 2, LT-08412 Vilnius, Lithuania. E-mail: [gliwa@sargeliai.org](mailto:gliwa@sargeliai.org)

**20571.** Koch, L.; Schuster, J.D. (2013): Nachweise der beiden Quelljungferarten *Cordulegaster bidentata* und *Cordulegaster boltonii* (Odonata: Cordulegastridae) im südlichen Ennepe-Ruhr-Kreis und Untersuchung ihrer Habitats. *Beiträge zur Heimatkunde der Stadt Schwelm und ihrer Umgebung N.F.* 62: 25-42. (in German) ["*Cordulegastridae* comprises only two species in Germany, both of which are considered "critically endangered" and "endangered" respectively according to the Red List of North Rhine-Westphalia (2010): *C. bidentata* and *C. boltonii*. Both forms in-

habit small and very small flowing waters: tiny clean water-courses and spring rivulets in siep valleys. Due to their low number of individuals even in populated stream sections, flying animals are rarely observed. Since dragonflies are hardly ever expected in their habitats, both species are often overlooked despite their size. In the previous dragonfly surveys, which refer to the surroundings of Schwelm, no clear evidence of damselflies could be found. In the meantime, however, both species have been documented by photos of flying specimens and one species by larvae. The sites are located in Breckerfeld in a tributary stream of the Selbecker Bach and in Ennepetal in the catchment area of the Heilenbecke." (Author)] Address: Koch, L., Heinrich-Heine-Str. 5, 58256 Ennepetal, Germany. E-Mail l-koch@t-online.de

**20572.** Martin, M. (2013): Eesti kiillide määraja [Estonian dragonflies Identified]. Environment Agency - LIFE08NAT/EE/000257 Dragonlife. Talin: 232 pp. (in Estonian) [The last publication that dealt with Estonian Odonata in depth was published half a century ago in 1963. In the intervening years, there have been many changes in the wedge fauna and new information has accumulated. The "Identification of Estonian dragonflies" covers all 57 species of Odonata found in Estonia so far, plus 2 species that could reach our area in the near future. The book gives an overview of the biology, structure and important characters of wedges, and includes identification tables for both adults and larvae. It is illustrated with 127 photographs and around 300 drawings. (Publisher/DeepL)]

**20573.** Nijs, G.; D'Haeseleer, J.; Jacobs, I.; Lambrechts, J.; Veraghtert, W. (2013): Inventarisatie van heiderelicten in Vlaams-Brabant. Rapport Natuurpunt Studie 2013/13, Mechelen: 172 pp. (in Dutch) [[https://www.researchgate.net/publication/273860912\\_Inventarisatie\\_van\\_heiderelicten\\_in\\_Vlaams-Brabant/link/55b5e41808ae9289a08a83d4/download](https://www.researchgate.net/publication/273860912_Inventarisatie_van_heiderelicten_in_Vlaams-Brabant/link/55b5e41808ae9289a08a83d4/download)]

**20574.** Omondi, R.; Yasindi A.W.; Magana A. M. (2013): Food and feeding habits of three main fish species in Lake Baringo, Kenya. *Journal of Ecology and the Natural Environment* 5(9): 224-230. (in English) ["The diets of three fish species of commercial importance in Lake Baringo, *Protopterus aethiopicus*, *Clarias gariepinus* and *Oreochromis niloticus*, were determined using frequency of occurrence and volumetric methods between April 2008 and March 2010. Seine and gill nets were used to catch a total of 430 fish specimens. The diet of *P. aethiopicus* was 94.3% molluscs with a frequency of occurrence of 98.6% of stomachs with food. Adult *C. gariepinus* fed mainly on fish with 75% of the stomachs with food containing fish remains and mean of 49.2% contribution by volume. *C. gariepinus* also fed on zooplankton, especially the cladoceran *Daphnia barbata*. The food items in the stomachs of *O. niloticus* consisted mainly of algae, detritus and zooplankton. Algae was consumed by *O. niloticus* of all length classes in proportions ranging from 26.5 to 88.1%. The importance of zooplankton as food for *O. niloticus* decreased with size of fish. The study reveals the importance of zooplankton as food for *O. niloticus* and *C. gariepinus* in Lake Baringo. There is need to rehabilitate the catchment of Lake Baringo so as to improve the water quality thus improve productivity." (Authors) The diet of *P. aethiopicus* included very few odonate specimens.] Address: Omondi, R., Kenya Marine & Fisheries Res. Inst., P O Box 31 Kisumu, Kenya. ail: reubenomondi@yahoo.com.

**20575.** Piper, M. (2013): Some Odonata Notes from Samos. *Atropos* 49: 91-93. (in English) ["During June 2010

with the help of Bower's *The Dragonflies of Lesbos* (2008) and *Field Guide to the Dragonflies of Britain and Europe* (Dijkstra & Lewington, 2006) I managed to find and identify a number of interesting dragonflies on Lesbos. The combination of sunshine, good food and abundant wildlife proved a big hit for me and my long suffering wife so we decided to try a different Aegean island in 2011. We settled upon Samos, some 125km to the south of Lesbos. I couldn't find any recent English references on the Odonata of this island (unlike birds, why are there so few trip lists for dragonflies and butterflies?). However, its close proximity to Turkey meant there must be some interesting species to see there and the lack of information was in some ways part of the appeal. What would I find there? The area of the island is 478km<sup>2</sup> and it is separated from Anatolia by the approximately 1.6km wide Mycale Strait. While largely mountainous, Samos has several relatively large and fertile plains. So during early June 2012, armed with a map (Samos 1: 50.000 Skai Map Hiking Terrain Cartography Group, map 331) I set forth, exploring the relatively few wetlands on the Island. We stayed in Pythagorio on the south-eastern coast, which proved a great base for getting around and had plenty of hotels and restaurants. The most interesting sites and species encountered are described briefly here. Alyki Wetlands (near Psili Ammos in the south-east) is a large shallow lake that dries out in the summer. A single visit here produced approximately 20 *Lestes macrostigma*. These were located on the seaward side of the lake, close to the ruined building. Very few other species were seen, perhaps not surprising given the extreme conditions of the site. Glyfada Wetlands (just west of Pythagorio by the Potokaki turnoff) consisted of two very small pools—one very artificial with concrete banks and one shallow and brackish. Only the brackish pool produced anything of note. Dark Spreadwing were seen on all three visits but only in small numbers of up to 10. A single *Orthetrum sabina* was the only one seen during the holiday. The reservoir near Ormos Marathokambou is a small stone-banked reservoir, approximately 2km north-east of the village on the south-west coast. Surrounded by high fencing, on inspection the padlock on the entrance gates was not locked and so I gained entry. How I love Greece! Good numbers of *Selysiothemis nigra* were seen along tracks around this site. The reservoir itself held very little, although *Trithemis annulata* was here in good numbers. The wonderfully named Valley of the Nightingales (the road to Vourliotes from the north coast main road) hosted a tumbling mountain stream running through woodland. The best species here were several *Cordulegaster insignis*, which were seen from the road along the most shaded sections of the river; they were very skittish and never settled. Quite often they left the stream area and flew along the road and into adjacent woodland. Other species seen here were typical Aegean fast-flowing stream species, such as *Caliaeschna microstigma* and *Epallage fatime*. Walking along the track from Vourliotes to Mandates I chanced across a *Gomphus schneiderii* perched on the ground and then in nearby trees. The River Imvressos in the south of the Island proved productive. The shadier upper stretches of the river between Myli and Agios Georghios again had the typical Aegean fast-flowing water species, *C. microstigma* and *E. fatime*. *Aeshna affinis* were observed feeding over nearby clearings. Where the river slowed near Myli Bridge typical species were *Orthetrum coerulescens* ssp. *anceps*, *Orthetrum brunneum* and *Onychogomphus forcipatus*. And south of here as the river trickled into the sea at Ireon, *Aeshna isosceles* were seen skirmishing with *Anax parthenope*. During the two weeks I found 26 species of dragonfly without trying too hard. So if you fancy the idea of sitting by the beach, cold Mythos in hand, a sparkling Aegean Sea, a content partner,

and a notebook and camera brimming full of dragonfly encounters you could do a lot worse than Samos." (Author)] Address: Piper, M., 83 Logan Street, Market Harborough, LE16 9AW, UK. E-mail: Mark.Piper@mercedes-amg-hpp.com

**20576.** Sanches, R.D.; Ribeiro, C. (2013): *Variação Lexical para Libélula no Atlas Linguístico do Amapá*. Web-Revista SOCIODIALETO • www.sociodialeto.com.br; Bacharelado e Licenciatura em Letras • UEMS/Campo Grande; Mestrado em Letras • UEMS / Campo Grande. ISSN: 2178-1486 • Volume 4 • Número 11 • Novembro 2013 : 435-449. (in Portuguese, with English summary) ["This article includes a sample of lexical research, leaving the focus on the study of the lexicon which currently has been a topic quite widespread in the variational-based studies. This study was based on data from the Linguistic Atlas of Amapá (ALAP), however, will address only those municipalities that have already been made all collections of data, in this case, we highlight the following municipalities: Amapá, Calçoene, Tartarugalzinho, Laranjal do Jari, Mazagão, Oiapoque Porto Grande, Pedra Branca do Amapari and Santana. The research is based on the theoretical and methodological assumptions adopted by the ALAP project. Therefore, we analyze the semantic field of fauna and flora of the lexical-semantic questionnaire in order to verify the uses made in this region for the lexical item dragonfly. It is noteworthy that the observed variation of this item considering the spatial and social, as recommended by the linguistic geography in a multidimensional perspective. Thus, it was found that the variants found in the state of Amapá were: libélula, jacinta, jacinto, cigarra, cigana, cinza, caba and gafanhoto. However, the most frequent variant is jacinta, since this term dictionaries. Data analysis also reports that the people who use this term are the municipality of Amapá. In relation to gender are the men of the second age group, from all points of inquiry, they have 100% occurrence of the term jacinta instead of dragonfly." (Authors)] Address: Romário Duarte Sanches (UNIFAP/UEPA). Email: duarte.romrio@gmail.com

**20577.** Shetty, S.; Sreepada, K.S. (2013): *Prey and nutritional analysis of Megaderma lyra Guano from the west coast of Karnataka, India*. *Advances in Bioresearch* 4(3): 1-7. (in English) ["Microchiropteran bats play a vital role in the ecosystem. They consume large volumes of insects many of which are agricultural pests and their droppings (guano) contain large amount of partly digested insect parts that form the resource base for other diverse form of consumers in the food chain including diverse microbes. These together make guano the best organic fertilizers. However, food habits of different species of bats vary depending on the species, locality, season and the ability of the bat to detect certain types of insects using morphological characteristics. Hence, an attempt is made in the present study to analyze the seasonal variations in the food habit of a microchiropteran bat, *Megaderma lyra*, so as to determine the insects on which they feed and also to do a nutritional analysis that include the moisture, carbohydrate, protein, lipid, ash, nitrogen, phosphorus and potassium content of their guano. The study was carried out during November 2009 to October 2010 in a maternity colony in an abandoned house which is mainly surrounded by coconut plantations and paddy fields. It is located at Karkala in D.K. district of Karnataka. To determine their insect prey, insect parts present in the bat guano were identified to ordinal level. The percent volume and percent frequency of food items present were also determined and were classified as basic food (>20%), constant food (5-20%), supplementary food (1-5%) and chance food (<1%). During the sampling period insects belonging

to 15 orders were identified. The scales of fishes, legs of frogs and hair, tooth and legs of rats recorded during pre monsoon, monsoon and post monsoon were all included under Vertebrates. Of the total insect orders identified, Coleopterans formed the major food items in all the three seasons (Premonsoon, monsoon and postmonsoon) and Vertebrates alongwith Coleopterans formed major food items during monsoon and postmonsoon. Whereas Hemipterans formed the constant food in all the three seasons and Lepidopterans formed the constant food along with Hemipterans during monsoon and postmonsoon. Other insect orders quantified included Dictyoptera, Trichoptera, Orthoptera, Diptera, Hymenoptera, Odonata, Ephemeroptera, Isoptera, Neuroptera, Dermaptera, Thysanoptera and spiders. The insect orders represented in the faecal pellets though not all indirectly reflect the occurrence of agricultural pests since their presence coincides with the type of vegetation surrounding the roosting site. Nutritional analysis of the guano revealed that the guano contained maximum carbohydrate (2.8%) during pre monsoon, lipid content (9.3%) during post monsoon and protein during pre monsoon and post monsoon (8.9%) period. N-P-K analysis revealed that guano is rich in phosphorus. Also phosphorus content was recorded highest in all the seasons (6-11%) and potassium during monsoon (1.3%) and post monsoon (1.2%). However, no significant variation in the nitrogen content was recorded. Therefore, the present study indicates that the Indian false vampire bat preys substantially on several insects injurious to crops, gardens and lawns and also on rodents. Further study is needed on the potential impacts of this and other insectivorous bats on these economic pests and also on organic enrichment of bat guano in the study area." (Authors)] Address: Shetty, Shrinidhi, Dept of Biotechnology, Alva's College, Moodbidri, Karnataka- 574 227, India. Email-srimicrotech@yahoo.com

**20578.** Tichánek, F. (2013): *Společenstva vážek odvodňovacích kanálů Radovesické výsypky*. [Dragonfly communities of drainage ditches in Radovesická spoil heap.]. BcS. thesis, Faculty of Science, Univ. of South Bohemia, České Budejovice, Czech Republic: 58 pp. (in Czech.) [Conclusion: Drainage channels Radovesice dump hosts endangered species of dragonfly, whose presence is within the Most dumps unique. Dragonfly communities that make up the canals, significantly enrich the Most odonatofauna dumps and their conservation value even exceed ponds, wetlands and retention basins the Most dumps. Channels that have for endangered dragonflies the Most dumps a unique position. to increase conservation potential drainage channels should primarily build and maintain channels heterogeneous and rugged. It is advisable to build channels with little inclination banks, prevent excessive water velocity and reduce uniform reed vegetation at the expense of finer and lower macrophyte beds vegetation. Such channels are likely to be attractive to both risk dragonfly species, as well as other valuable communities freshwater organisms, with the original function of drainage channels will not be affected." (Author) *Coenagrion omatum*, *Ischnura pumilio*, *Lestes barbarus*, *Cordulegaster boltonii*, *Orthetrum brunneum*, *O. coerulescens*, *Sympetrum pedemontanum*, *S. striolatum*.] Address: not stated

## 2014

**20579.** Carvalho, A. (2014): *Rock and Roll Dragonfly: A preliminary study on the symbolism of dragonflies (Odonata) in the lyrics of Western contemporary popular songs*. *Entomologia Cultural. Ecos do I Simpósio Brasileiro*



de Entomologia Cultural – 2013. 97-109. (in English) [[https://www.researchgate.net/publication/279194728\\_Rock\\_Roll\\_Dragonfly](https://www.researchgate.net/publication/279194728_Rock_Roll_Dragonfly). [https://www.researchgate.net/profile/Alcimar\\_Carvalho/publication/279194728\\_Rock\\_Roll\\_Dragonfly/links/558e016608ae47a3490bdd96.pdf](https://www.researchgate.net/profile/Alcimar_Carvalho/publication/279194728_Rock_Roll_Dragonfly/links/558e016608ae47a3490bdd96.pdf); 09082015] Address: Carvalho, A.L., Depto de Entomologia, Museu Nacional, Univ. Federal do Rio de Janeiro, Rio de Janeiro, Brazil.

**20580.** Farizawati, S.; Fauzi, M.; Ruslan, M.Y.; Norma-Rashid, Y.; Ng, Y.F.; Idris, A.G. (2014): The diversity of odonates in five islands within the west coast of peninsular Malaysia. *Academic Journal of Entomology* 7(3): 102-108. (in English) ["The odonate fauna of five islands within the west coast of Peninsular Malaysia, namely Besar Island (Melaka), Carey Island (Selangor), Pangkor Island (Perak), Penang Island (Penang) and Langkawi Island (Kedah) were surveyed. A total of 54 species belonging to 12 family groups were identified. The highlights of the collection is an endemic species of Pulau Langkawi (*Megalogomphus icterops*) and one new record for Peninsular Malaysia (Langkawi Island: *Ceragrion praetermissum*, ident. R. Dow). Although no other endemics were found in Besar Island, it was first record for the island." (Authors) [http://www.idosi.org/aje/7\(3\)14/3.pdf](http://www.idosi.org/aje/7(3)14/3.pdf); 29092014] Address: Idris, A.G., School of Environmental & Natural Resources Sciences, Faculty of Science & Technology, Universiti Kebangsaan Malaysia, 43600 UKM, Bangi Selangor Malaysia

**20581.** Hefler, C.; Qiu, H.; Shyy, W. (2014): The interaction of wings in different flight modes of a dragonfly. 17th International Symposium on Application of Laser Techniques to Fluid Mechanics, Lisbon, Portugal, July 07 – 10, 2014: 4.5.2. (in English) [Verbatim: considered in the targeted size region for Micro Air Vehicles MAVs. In a low Reynolds number region, where MAVs and natural flyers operate, viscous forces and unsteady aerodynamics must be considered and account for a number of unique phenomena. At such conditions traditional designs are disadvantaged over a flexible flapping wing which can extract additional aerodynamic forces through unsteady flow mechanisms (Shyy et al., 2008; Shyy et al., 2010). Bio inspired designs offer a viable solution to design MAVs. Among natural flyers dragonflies are unique. They possess 2 pairs of wings which they can move separately. The interaction between the fore and hind wing is a particularly interesting topic. Phase difference highly affect the force production of tandem configuration, and while highest force peaks achieved when wings flapping in phase, the efficiency increases if the hind wing leads with a certain phase difference (Lian et al., 2013). Downwash generated by the forewing as well as shed vortexes greatly affect hind wing performance, however this effect is depend on the studied flight mode as well as geometrical and environmental conditions (Maybury & Lehmann, 2004; Sun & Huang, 2007; Rival et al. 2011;). Our aim is to characterize the flow field around the wings of a tethered dragonfly. We have measured the flow field with PIV; expanded with high speed video recording and a novel smoke visualization experiment. All three experiments were executed in still air, so the recorded flow field and vortex shedding wasn't affected by a free stream velocity like in case of wind tunnel studies (Thomas et al., 2004; Tsuyuki et al., 2006). It is in our interest to see whether downwash and vortex shedding is a prominent feature of wing wake interaction of a living dragonfly under near hovering conditions. According to the generated flow stream, we identified three flight modes: vertical take off, emerging flight and forward flight. The dragonfly executed these flight modes with two different flapping modes; in phase flapping and out of phase flapping. The occurrences

of flapping modes for the distinguished flight modes shows that out of phase flapping can be generally used by the dragonfly for takeoff, cruising or emerging flight. The number of occurrences shows that it is not preferred mode for vertical takeoff. In phase flapping wasn't found for forward flight mode. In case of in phase flapping, the wings seemingly functions as one large wing, with no prominent interaction. In case of out of phase flapping hind wing TEV and forewing LEV formation were observed on most of the recorded cases. The position of the shed TEV was above the top side of the hind wing, and in every recorded case only one could be identified. Forewing TEV could not be identified clearly on any of the recorded cases, neither do forewing shed LEV appeared near to the hind wing. It seems that forewing wake and hind wing interaction for these conditions is limited to the downwash effect. The dragonfly is capable of generating two separate flow stream, in an out of phase flapping mode (Fig. 1). This supposedly adds extra stability for the dragonfly when it changes from taking off to forward flight] Address: Hefler, C., Dept Mechanical & Aerospace Engineering, Hong Kong Univ. of Science & Tech., Hong Kong SAR, China. E-mail: meqiu@ust.hk

**20582.** Horváth, G.; Kriska, G.; Robertson, B. (2014): Polarized light and polarization vision in animal sciences. *Springer Series in Vision Research* Volume 2: 443-513. (in English) ["In the last decade it has been recognized that the artificial polarization of light can have uniquely disruptive effects on animals capable of seeing it and has led to the identification of polarized light pollution (PLP) as a new kind of ecological photopollution. In this chapter we review some typical examples for PLP and the resulting polarized ecological traps. All such polarized-light-polluting artificial surfaces are characterized by strongly and horizontally polarized reflected light attracting positively polarotactic aquatic insects, the larvae of which develop in water or mud, such as aquatic beetles (Coleoptera), water bugs (Heteroptera), dragonflies, mayflies (Ephemeroptera), caddisflies (Trichoptera), stoneflies (Plecoptera) and tabanid flies (Tabanidae), for example. We survey here the PLP of asphalt surfaces, solar panels, agricultural black plastic sheets, glass surfaces, black gravestones and the paintwork of black-, red- and dark-coloured cars. We show how the maladaptive attractiveness (PLP) of certain artificial surfaces to polarotactic insects can be reduced or eliminated. We consider how birds, spiders and bats exploit polarotactic insects trapped by different sources of PLP. We deal with the phenomenon that the vertically polarized mirror image of bridges seen at the river surface can deceive swarming polarotactic mayflies, which is an atypical kind of PLP. We explain why strongly polarizing black burnt-up stubble fields do not attract aquatic insects, which is an example for a horizontal, black polarizing surface that does not induce PLP and thus is an exception proving the rule. Finally, we show that phototaxis and polarotaxis together have a more harmful effect on the dispersal flight of night-active aquatic insects than they would have separately. This provides experimental evidence for the synergistic interaction of phototaxis and polarotaxis in these insects." (Authors)] Address: Horváth, G., Environmental Optics Laboratory, Dept. Biological Physics, Eötvös Univ., Pázmány sétány 1, 1117, Budapest, Hungary. E-mail: gh@arago.elte.hu

**20583.** Kalniņš, M. (2014): *Resnvedera purvuspares* Leucorrhinia caudalis (Charpentier, 1840) sugas aizsardzības plans. Approved by the Minister for the Environment and Regional Development of the Minister of the Environment and Regional Development of 16 January 2015, Order No

15. Biedriba "Zala upe", Sigulda: 71 pp. (in Latvian, with English summary) ["*Leucorrhinia caudalis* is one of the species of dragonflies occurring in Latvia, which is considered to be endangered and is included in the regulatory enactments of different levels of conservation of the species. In accordance with the report of Article 17 [Article 17 – A report to the European Commission on the status of conservation measures of habitats and species in Latvia (assessment of the period 2007-2012).] the conservation status assessment of *L. caudalis* is adverse; and a negative trend of the conservation status has been found. The assessment of a number of parameters included in the report is based on the grounds of an opinion of an expert or there is no data at all (e.g. as to the hydro-chemical parameters of the micro-habitats and habitats of the species). The natural data management system "OZOLS" of Nature Conservation Agency contains only a few, including inaccurate entries on the fields of the species; therefore it is not possible to plan and carry out appropriate conservation of the fields of the species. When planning the measures of freshwater habitat management, the coastal habitat needs are not assessed in connection of the conservation of *L. caudalis* (and other specially protected species of dragonflies). *L. caudalis* most commonly is found in eutrophic lakes, less often in diseutrophic lakes and old riverbeds in Latvia. The vegetation in the fields of *L. caudalis* in eutrophic lakes and old riverbeds are usually visually moderately abundant to abundant, diverse and rich in species. Typically all zones of aquatic plants – the surface, floating-leaf and submerged – are well-developed. Currently *L. caudalis* is found throughout the territory of Latvia. Comparing the historical and contemporary data of the distribution of the species it can be concluded that the number of observations of the species has decreased, which could indicate the decrease of the population of the species in Latvia. The uneven distribution of the species is more referable to the uneven level of research than to the actual distribution of the species. The influencing factors of the population of *L. caudalis* are the following: their natural enemies and non-native species, collecting, extreme weather conditions, toxic substances in the environment and the minimum size of the population. However, all these factors hold an unknown or low to medium risk. The non-native species and the minimum size of the populations can be a high risk factor too. The loss of a habitat of the species is a medium risk factor, because it has been established only in some specific places. The fragmentation of habitats (isolation of fields), habitat management (cleaning of water bodies) and mismanagement of habitats of coastal zone (overgrowing) are assessed similarly. However, the combination of these factors can have a major impact on the status of the species' population in Latvia. The protection plan of the species contains a description of the conservation measures of *L. caudalis* in the following areas: legislation and conservation planning, conservation of the species and habitats of it, research and monitoring, as well as information and education. A part of the described measures are attributable to the protection of invertebrates or even species and habitats as a whole." (Author)] Address: Kalniņš, M., Nature Protection Board, Eksporta iela 5, Rīga, LV-1010, Latvia. E-mail: martins.kalnins@dap.gov.lv

## 2015

**20584.** Sivasankaran, P.N. (2015): Development of an optimal dragonfly-like flapping wing structure for use in biomimetic micro air vehicles. PhD thesis, Faculty of Engineering, Univ. of Malaya: XX, 118 pp. (in English, with Malaysian summary) ["Biomimetic Micro Air Vehicles (BMAV) are unmanned,

micro-scaled aircrafts that are bioinspired from flying organisms to achieve lift and thrust by flapping their wings. Micro Air Vehicles (MAV) are a relatively new and rapidly growing area of aerospace research. They were first defined by the US Defense Advanced Research Projects Agency (DARPA) in 1997 as unmanned aircraft that are less than 15 cm in any dimension. This allows BMAV to potentially be smaller and more lightweight than the other two types. These characteristics make BMAV ideally suited for flight missions in confined areas (e.g. around power lines, narrow streets, indoors, etc.). Therefore, BMAV structural components must be ultra-lightweight, compact, and flexible. Most past MAV research has focused on fixed wings, which are essentially scaled-down versions of wings on conventional fixed wing aircraft. These wings are unsuitable for BMAV due to their lack of flexibility. So a new type of structural wing design is required for BMAV. In this work, a dragonfly wing structure is mimicked to construct a new BMAV wing design. A dragonfly (Odonata) was selected for biomimicry, because they are highly maneuverable flyers, capable of hovering, rapid forward flight, or reverse flight. Therefore, structurally analyzing these wings could yield results that inspire the design of more effective wings for BMAVs. The overall objective of this research is to develop a simplified wing model for a BMAV, bioinspired from actual dragonfly wings. A simplified model was created using spatial network analysis, a topological optimization method. These simplified wing frame models were then fabricated using seven different types of materials. Stainless steel type 321, balsa wood, red pre-impregnated fiberglass, black graphite carbon fiber, polyvinyl acid, acrylic and acrylo-nitrile butadiene styrene. These wing frame structures were fabricated using laser cutting machine and a 3D printer. These wing frames were then immersed in a chitin-chitosan membrane by a casting method. These wing frames were subjected to mechanical testing's such as bending and tensile to study its suitability for use in a BMAV. A flapping mechanism was also created and used to produce flapping motion on these BMAV wings and an actual dragonfly wing (for comparison). The aero elastic properties of both the BMAV and actual dragonfly wings were examined using two high speed frame camera. The bending angle, displaced distance or deflection, wing tip angle, and the wing tip rotational twist speed were analyzed at the flapping frequencies of 10, 20, 30 Hz, 60 Hz and 120 Hz." (Author)] Address: not stated

## 2016

**20585.** Arrowsmith, J. (2016): Acidity gradients shape the phylogenetic structure of odonate communities across three biomes. M.Sc. thesis, Faculty of Arts and Science, Biology, Concordia Univ.: 58 pp. (in English) ["Environmental filtering and competitive exclusion can act simultaneously to shape the structure of communities, but disentangling them has proved difficult. Specifically, environmental filtering may restrict establishment at a site to a set of species sharing particular traits permitting local persistence. Mutual exclusion of ecologically similar or phylogenetically related species can also dictate community composition. Patterns of phylogenetic structure allow assessment of the relative influence of these processes. Using phylogenetic patterns of community structure, this study aims to assess the predominant processes structuring odonate communities along a broad-scale environmental gradient in Quebec. Phylogenetic analyses of forty lentic (i.e. lake) odonate communities revealed that co-occurring species in temperate regions were more related than expected by chance, suggesting a predominant role of environmental filtering. Site-to-site variation

in phylogenetic structure was related to pH. That is, the most alkaline lakes, found in temperate regions, were the most phylogenetically clustered, suggesting that pH acts as a main environmental filter of odonate communities. However, environmental filtering may not be the only important process. One alternative explanation is that temperate communities are phylogenetically clustered because damselflies are disproportionately diverse relative to dragonflies in this region. Specifically, the recent radiation of damselflies in temperate regions could have increased the diversity of this group in the temperate species pool, which could then shape local communities in that region. Nevertheless, further analyses suggested that environmental filtering along a pH gradient, rather than the evolutionary history of the species pool, shapes odonate communities in Quebec." (Author)] Address: Arrowsmith, Julie

**20586.** Arslan, N.; Salur, A.; Kalyoncu, H.; Mercan, D.; Barisik, B.; Odabasi, D.A. (2016): The use of BMWP and ASPT indices for evaluation of water quality according to macroinvertebrates in Küçük Menderes River (Turkey). *Biologia* 71(1): 49-57. (in English) ["This study was carried out in the Küçük Menderes River basin in order to determine the water quality and investigate the environmental quality and the applicability of both the Biological Monitoring Working Party (BMWP) and Average Score Per Taxon (ASPT). Monitoring took place in May, July and September 2014 at 10 stations (7 rivers and 3 lakes) according to the method of Intercalibration Common Metrics. Some metrics (BMWP, ASPT, Family Biotic Index, Simpson Diversity Index, Shannon-Wiener Diversity Index, Margalef Diversity Index, dominance, frequency and existence of sensitive species) were calculated. In total, 69 taxa comprising 5,814 individuals were detected. The taxa having the highest frequency rate were *Limnodrilus hoffmeisteri* (70%), *Chironomus (Camptochironomus) tentans* (70%), *Psammoryctides albicola* (60%), *Physella acuta* (60%), *Nais elinguis* (60%) and *Stylaria lacustris* (50%), which are alpha mesosaprobic and polysaprobic species, respectively. The presence and high dominance and frequency rate of these species have indicated basin pollution. Positive indicator species for water quality are *Gomphus schneideri*, *Trithemis annulata*, *Lindenia tetraphylla*, *Orthetrum cancellatum*, *Hydropsyche angustipennis*, *Cricotopus (Cricotopus) fuscus* and *Cricotopus (Cricotopus) annulator*, while negative indicator species are *Culex pipiens*, *Chironomus (Camptoch.) tentans*, *Chironomus thummi*, *Stylaria lacustris* and *Eristalis tenax*. Habitat quality of the Küçük Menderes River basin was not high (it was found to be heavily polluted/polluted/slightly polluted according to the physicochemical data, BMWP and ASPT) due to physical habitat degradation, urban waste waters, touristic, seasonal dwelling and agricultural activities." (Authors) file:///C:/Users/Martin%20Schorr/Downloads/Biologia.pdf] Address: Arslan, Naima, Dept of Biology, Faculty of Arts and Sciences, Eskişehir Osmangazi Univ., Eskişehir, Turkey. E-mail: oligo2009@gmail.com

**20587.** Balèiauskas, L.; Baranauskas, K.; Ferenc, R.; Gudžinskas, Z.; Gurskas, A.; Ivinskis, P.; Kesminas, V.; Ložys, L.; Rimšaite, J.; Sinkevièiene, Z.; Staponkus, R.; Steponevas, A.; Trakimas, G.; Virbickas, T. (2016): [Methodologies for monitoring species of European Community interest. Mammals, fish, amphibians, reptiles, molluscs, insects and plants.] ISBN 978-9986-443-85-8. Published by Nature Research Centre, State Service for Protected Territories under the Environment: 404 pp. (in Lithuanian) [Two odonate species are treated: 5.7. Šarvuotoji skete (*Leucorrhinia pectoralis*) (P. Ivinskis, J. Rimšaite), pages 263-274 and 5.8.

Pleištine skete (*Ophiogomphus cecilia*) (P. Ivinskis, J. Rimšaite) pages 275-283] Address: [https://www.researchgate.net/publication/301361893\\_Europos\\_Bendrijos\\_svarbos\\_rusiu\\_monitoringo\\_metodik\\_os\\_Zinduoliai\\_zuvys\\_varliagyviai\\_ropliai\\_moliuskai\\_vabzdziai\\_ir\\_augalai](https://www.researchgate.net/publication/301361893_Europos_Bendrijos_svarbos_rusiu_monitoringo_metodik_os_Zinduoliai_zuvys_varliagyviai_ropliai_moliuskai_vabzdziai_ir_augalai)

**20588.** Calvao, L.B.; Nogueira, D.S.; Montag, L.F.; Lopes, M.A.; Juen, L. (2016): Are Odonata communities impacted by conventional or reduced impact logging? *Forest Ecology and Management* 382: 143-150. (in English) ["Timber harvest is a prevailing economic activity in Amazonia, which contributes to forest degradation and biodiversity loss. However, Reduced-impact logging has been used to mitigate the loss of environmental integrity and biodiversity, since it has been assumed to be less detrimental than conventional logging practices. The objective of this study was to evaluate if environmental conditions, streams and Odonata communities in reduced-impact logging areas (RIL) are similar to those of unlogged areas (CONTROL), whilst all are modified in conventional logging areas (CL), as a consequence of vegetation removal from the margins of water bodies. Forty-nine streams in areas that differ in timber harvest practices were sampled in eastern Amazonia. As expected, aquatic systems in RIL areas showed environmental conditions and Odonata species composition similar to CONTROL areas while CL streams differed both from CONTROL and RIL. Odonata richness and abundance were not different between CONTROL, RIL and CL treatments, however. Despite the fact that species richness and abundance changes may be masked by the presence of remaining riparian vegetation in CL areas, the use of reduced-impact logging minimizes changes in Odonata species composition and environmental conditions, that remain similar to that of unlogged areas. This is possible due to the planning to reduce environmental impacts in RIL. Unlike RIL, most canopy cover in the proximity of the water bodies (<10 m distance) is lost in CL areas due to logging activities." (Authors)] Address: Calvao, L.B., Programa de Pós-Graduação em Zoologia, Museu Paraense Emílio Goeldi/Universidade Federal do Pará, Instituto de Ciências Biológicas, Laboratório de Ecologia e Conservação-LABECO, Rua Augusto Correa, N 1 Bairro Guama, CEP 66.075-110, Belém, Pará, Brazil. E-mail: lenizecalvao@gmail.com

**20589.** Garrouste, R.; Wedmann, S.; Pouillon, J.-M.; Nel, A. (2016): The oldest 'amphipterygid' damselfly of tropical affinities in the Paleocene of Menat (Zygoptera: Eucloptera). *Historical Biology* 29(6): 818-821. (in English) ["The new damselfly genus and species *Valerea multicellulata* is described from the Paleocene of Menat (France), a Lagerstätte with many fossil insects, plants and vertebrates with high paleontological value. Aquatic insects are very scarce in this outcrop, this damselfly being the fourth described Odonata. Its closest modern relatives belong to the Amphipterygidae or the Devadattidae, families with very narrow tropical extant distributions. This new fossil allows us to confirm the tropical affinities of the odonatan fauna of the Menat paleolake communities. It also shows that the amphipterygids were clearly more widespread during the Paleogene than today, probably in relation to the worldwide warm and equable climate in the Paleocene." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimrs1.mnhn.fr

**20590.** Ghani, W.M. H. W. A.; Rawi, C.S.M.; Hamid, S.A.; Al-Shami, S.A. (2016): Efficiency of different sampling tools for aquatic macroinvertebrate collections in Malaysian streams. *Tropical Life Sciences Research* 27(1): 115-133.

(in English, with Malaysian summary) ["This study analyses the sampling performance of three benthic sampling tools commonly used to collect freshwater macroinvertebrates. Efficiency of qualitative D-frame and square aquatic nets were compared to a quantitative Surber sampler in tropical Malaysian streams. The abundance and diversity of macroinvertebrates collected using each tool evaluated along with their relative variations (RVs). Each tool was used to sample macroinvertebrates from three streams draining different areas: a vegetable farm, a tea plantation and a forest reserve. High macroinvertebrate diversities were recorded using the square net and Surber sampler at the forested stream site; however, very low species abundance was recorded by the Surber sampler. Relatively large variations in the Surber sampler collections (RVs of 36% and 28%) were observed for the vegetable farm and tea plantation streams, respectively. Of the three sampling methods, the square net was the most efficient, collecting a greater diversity of macroinvertebrate taxa and a greater number of specimens (i.e., abundance) overall, particularly from the vegetable farm and the tea plantation streams (RV<25%). Fewer square net sample passes (<8 samples) were sufficient to perform a biological assessment of water quality, but each sample required a slightly longer processing time ( $\pm 20$  min) compared with those gathered via the other samplers. In conclusion, all three apparatuses were suitable for macroinvertebrate collection in Malaysian streams and gathered assemblages that resulted in the determination of similar biological water quality classes using the Family Biotic Index (FBI) and the Biological Monitoring Working Party (BMWP). However, despite a slightly longer processing time, the square net was more efficient (lowest RV) at collecting samples and more suitable for the collection of macroinvertebrates from deep, fast flowing, wadeable streams with coarse substrates." (Authors) Tholymis sp.] Address: Wan Mohd Hafezul Wan Abdul Ghani, School of Biological Sciences, Univ. Sains Malaysia, 11800 USM, Pulau Pinang, Malaysia

**20591.** Gros, P. (2016): *Coenagrion scitulum* (Rambur, 1842), eine für die Fauna Salzburgs neue Libellenart (Odonata: Coenagrionidae). Mitt. Haus der Natur 23: 32-34. (in German, with English summary) [Austria; *C. scitulum* is newly reported for the odonate fauna of the province of Salzburg, Austria. Details of this discovery are given]. 4-VI-2015, Adneter Moor, Guttrathberg (Gemeindegebiet Hallein), 575 m. a.s.l., 47,720°N / 13,050° E and 24-VI-2015, Adneter Moor (Gemeindegebiet Adnet), 475 m. a.s.l., 47,690°N / 13,133° E.] Address: Gros, P., Haus der Natur / Biodiversitätszentrum, Museumsplatz 5, 5020 Salzburg, Austria. EMail: patrick.gros@hausdernatur.at

**20592.** Grup d'Estudis dels Odonats de Catalunya (2016): *Les Libèl·lules de Catalunya*. Brau Edicions S L: 208 pp- ["The result of ten years field work - a compilation of current information on the dragonflies and damselflies of Catalonia. Introduction to the biology of the group, followed by 70 species accounts, each including a distribution map for Catalonia, detailed morphological description to aid identification, information on habitat, ecology, behaviour and conservation status. A chart for habitat type and phenology is also included for each species." (Publisher) "OXYGASTRA, Grup d'Estudi dels Odonats de Catalunya was born in 2003 and joined the Catalan Institute of Natural History, as a working group, in January 2005. From the moment of its constitution, the group propose two priority lines of work: to expand the knowledge of the odonatofauna of Catalonia and to bring the world of dragonflies closer to all those interested in the knowledge and observation of nature. With these objectives

in mind, the Oxygastra group set out to create the first monograph on odonates in Catalonia. Fieldwork began in 2003 and ended in 2012. To carry out this work, 348 grids of 10x10Km in the Catalan territory have been surveyed and almost 30,500 records of observations have been obtained. This, added to the bibliographic records, has made it possible to obtain more than 34,400 useful records. The book is structured in four sections. The first sets out the historical antecedents in the study of odonates in Catalonia, contains an introduction to the biology of the group and details the methodology used in the preparation of this work. The second part contains the files of the seventy cataloged species, which include distribution maps, morphological details to facilitate their identification and graphics illustrating the habitats, ecology and phenology of each species. The third part presents the distribution patterns of odontoids in Catalonia, the main areas of odontological interest and the state of conservation of the species. The last section contains a glossary with the terminology used in the book, a basic bibliography and a systematic list of taxa. It should be noted that this work has been possible thanks to the selfless work of the members of the Oxygastra group, who for more than ten years have spared no effort to finally see the publication *Les libèl·lules de Catalunya* see the light of day. We must also thank the support received throughout this long process by the Institut d'Estudis Catalans and by the Dept of Territory and Sustainability, the Mascort Foundation and other private sponsors when it comes to publishing the results of the work done. The book *les libèl·lules de Catalunya* has been published by Brau edicions." (<http://www.oxygastra.org/2017/03/les-libellules-de-catalunya.html>)

**20593.** Harabis, F. (2016): The value of terrestrial ecotones as refuges for winter damselflies (Odonata: Lestidae). *Journal of Insect Conservation* 20: 971-977. (in English) ["Habitat requirements of many species may vary significantly throughout the lifecycle. Species are often forced to exchange their habitats to meet requirements of different life stages. Due to the effect of human activities, however, there is a loss of habitat complexity and a consequent disappearance of species associated with multiple habitat types. This also applies to freshwater invertebrates occurring in temporary habitats. However, it appears that many species are able to meet their habitat requirements even in a human-altered landscape. The aim of this study was to analyze the habitat preferences of the damselfly *Sympecma fusca* in an area significantly influenced by human interventions. According to the results of a capture-mark-recapture study and generalized additive models, I found that, during a pre-reproductive period (in the autumn), imagoes utilize predominantly insolated ecotones, which constitute only a small fraction of the available terrestrial habitat. During the reproductive period (in spring), however, imagoes completely change their priorities in favour of reproductive success. At this time, males use ecotones only in adverse weather conditions. Ecotones allow the species to survive a long pre-reproductive period. However, suitable habitat conditions may be lost because of inappropriate interventions (e.g., mowing). These small-scale interventions often resemble natural disturbances and may not necessarily lead to the extinction of an entire population. Imagoes are able to move on to different habitat patches, but only if they have alternative habitats. This outcome indicates that maintaining a high heterogeneity of keystone structures is crucial for maintaining high levels of biodiversity." (Author)] Address: Harabiš, F., Dept of Ecology, Faculty of Environmental Sciences, Czech Univ. of Life Sciences Prague, 165 21 Prague 6, Czech Republic. E-mail: harabis.f@gmail.com



**20594.** Hefler, C.; Qiu, H.; Shyy, W. (2016): Dragonflies utilize flapping wings phasing and spanwise characteristics to achieve aerodynamic performance. arXiv:1612.05353v1 [physics.flu-dyn: 15 pp. (in English)] ["While dragonflies are highly agile flyers, some key aerodynamic mechanisms responsible for their flight performance remain inadequately understood. Based on forward flight conditions, we investigate dragonflies spanwise aerodynamic behaviors associated with flapping wings phasing relationship. Overall, the leading edge vortex (LEV) on the forewing forms without the influence of the hindwing. For hindwing, the wing root region prominently displays a trailing edge vortex (TEV). In the inner span region, the vortical flow structures around the hindwing is influenced by the forewings LEV when both wings are in close proximity and move in opposite directions. In the mid-span region, downwash following the forewing suppresses LEV formation on the hindwing. Finally the outer span region of the hindwing develops its LEV by wake capture at the end of a stroke cycle. In the inner region, the timing of shedding on both fore- and hind-wings is synchronized, which is not the case elsewhere. These varied flow structures suggest that the fore- and hind-wings, along their spanwise directions, play different roles in force generation." (Authors)] Address: Hefler, Csaba., Dept of Mechanical & Aerospace Engineering, Hong Kong Univ. of Science & Tech., Hong Kong SAR, China. E-mail: meqiu@ust.hk

**20595.** Herlambang, A.E.N.; Hadi, M.; Tarwotjo, U. (2016): Struktur Komunitas Capung di Kawasan Wisata Curug Lawe Benowo Ungaran Barat. Bioma 18(1): 70-78. (in Indonesian, with English summary) ["Dragonflies have an important role for the stability of the ecosystem that is as predator and prey at the same time. The availability of food resources and optimal environmental conditions affect the species richness of dragonflies in the habitats. Research on dragonfly community structure aims to find out the differences of community structure in each habitat type in the region of Curug Lawe Benowo. The research was conducted in 4 different stations which focus on species of dragonfly, amount of an individual species, habitats, environmental conditions, and the correlation between the variables. The method used is point count. The results showed that there are 19 dragonfly species which came from 7 different families. The total number of individuals encountered from 4 stations is 205. The common species that can be found in all of the stations is *Euphaea variegata*. The level of diversity are medium, the level of evenness is fairly even. Similarity of species in any habitat types indicate that the habitats has a three kind of similarity levels that is fairly equal, less equal and not equal. Data analysis shows that there is a correlations between environmental conditions, and dragonfly species, affecting abundance and distributions of a dragonfly in the habitats, and can be used to describe dragonflies community structure in the region." (Authors)] Address: Herlambang, A., Laboratorium Ekologi dan Biosistematik, Fakultas Sains dan Matematika, Universitas Diponegoro, Semarang, Jln Prof. Soedarto, SH, Semarang, 50275, Indonesia. Email: elangalamsyah@gmail.com

**20596.** Khelifa, R.; Zebba, R.; Amari, H.; Mellal, M.K.; Mahdjoub, H.; Kahalerras, A. (2016): A hotspot for threatened Mediterranean odonates in the Seybouse River (Northeast Algeria): are IUCN population sizes drastically underestimated? International Journal of Odonatology 19(1-2): 1-11. (in English) ["Several odonate species are threatened in the Mediterranean basin and some of them show alarming decreasing trends. The distribution and population estimations provided by the IUCN are based on occasional field sampling

or non-rigorous methodologies and could be erroneous and misleading. To obtain reliable estimations of the population size and distribution of three threatened species, *Calopteryx exul*, *Coenagrion mercuriale*, and *Gomphus lucasii*, we first conducted capture-mark-recapture in a natural population during one flight season, and second we carried out intensive sampling of adults, larvae and exuviae in the Seybouse watershed, Northeast Algeria. In addition, a revision of odonate occurrence and distribution in the watershed was done by pooling information collected over six years (2010–2015). Our results show that population estimations of the three species are much higher than what the IUCN presents; that is, 2208 individuals of *C. exul* (22.08% of the estimated global population), 1765 individuals of *C. mercuriale*, and 11,204 individuals of *Gomphus lucasii* (about 4.5 times as large as the estimated global population). Moreover, a total of 42 species were recorded in the study site, of which seven are new. The mean number of localities per species increased by a factor of 2.47, e.g. from six to 12 in *C. exul*, two to 12 in *Coenagrion mercuriale* and five to 14 in *Gomphus lucasii*. Our results suggest that the Seybouse watershed is one of the most important areas in North Africa and the Mediterranean basin for these three threatened species and requires particular attention and an urgent conservation plan to reduce anthropogenic effects and maintain populations." (Authors)] Address: Khelifa, R., Biodivers. Res. Center, Univ. British Columbia, 2212 Main Mall, Vancouver, B.C. V6T1Z4, Canada. Email: rassimkhelifa@gmail.com

**20597.** Nava-Bolaños, A.; Sánchez-Guillén, R.A.; Munguía-Steyer, R.; Córdoba-Aguilar, A. (2016): Isolation barriers and genetic divergence in non-territorial *Argia* damselflies. Biological Journal of the Linnean Society 120(4): 804-817. (in English) ["Isolation barriers work at different instances during the mating process in odonate insects. In territorial damselflies, heterospecific interactions are mainly precluded by sexual (visual) isolation, while in non-territorial damselflies, heterospecific interactions are mostly precluded by mechanical isolation and sexual (tactile) isolation. In this study we investigated the strength of three premating barriers (visual, mechanical and tactile), genetic divergence and degree of sympatry (on their entire distribution) between four non-territorial *Argia* damselflies (*A. anceps*, *A. extranea*, *A. oenea* and *A. tezpi*). Our results are explained in the light of learned mating preferences and Kaneshiro's hypothesis. We detected a strong reproductive isolation between all pairs of species by the joint action of the three studied barriers [visual (90.6%), mechanical (8.7%) and tactile (0.7%)]. Sexual (visual) isolation was the most important barrier, perhaps driven by learning mating preferences. One of the studied species, *A. extranea*, which is the most derived of the studied species, showed a highly asymmetric isolation in reciprocal crosses, which is consistent with Kaneshiro's hypothesis. Moreover, we detected a negligible ecological niche differentiation between the studied species (70% of shared distribution). Our results suggest that sexual (visual) selection may be an important force driving speciation in non-territorial species." (Authors)] Address: Nava-Bolaños, Angela, Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D.F., México

**20598.** Outomuro, D.; Söderquist, L.; Nilsson-Örtman, V.; Cortázar-Chinarro, M.; Lundgren, C.; Johansson, F. (2016): Antagonistic natural and sexual selection on wing shape in a scrambling damselfly. Evolution 70(7): 1582-1595. (in English) ["Wings are a key trait underlying the evolutionary

success of birds, bats and insects. For over a century, researchers have studied the form and function of wings to understand the determinants of flight performance. However, to understand the evolution of flight, we must comprehend not only how morphology affects performance, but how morphology and performance affects fitness. Natural and sexual selection can either reinforce or oppose each other, but their role in flight evolution remains poorly understood. Here we show that wing shape is under antagonistic selection with regard to sexual and natural selection in a scrambling damselfly. In a field setting, natural selection (survival) favored individuals with long and slender forewings and short and broad hindwings. In contrast, sexual selection (mating success) favored individuals with short and broad forewings and narrow-based hindwings. Both types of selection favored individuals of intermediate size. These results suggest that individuals face a trade-off between flight energetics and maneuverability and demonstrate how natural and sexual selection can operate in similar directions for some wing traits, i.e. wing size, but antagonistically for others, i.e. wing shape. Furthermore, they highlight the need to study flight evolution within the context of species' mating systems and mating behaviors." (Authors)] Address: Johansson, F., Dept of Ecology & Environmental Science, Animal Ecology Group, Umea Univ., 90187 Umea, Sweden. E-mail: frank.johansson@eg.umu.se

**20599.** Romero, G.Q.; Piccoli, G.C.O.; de Omena, P.M.; Gonçalves-Souza, T. (2016): Food web structure shaped by habitat size and climate across a latitudinal gradient. *Ecology* 97(10): 2705-2715. (in English) ["Habitat size and climate are known to affect the trophic structure and dynamics of communities, but their interactive effects are poorly understood. Organisms from different trophic levels vary in terms of metabolic requirements and heat dissipation. Indeed, larger species, such as keystone predators, require more stable climatic conditions than their prey. Likewise, habitat size disproportionately affects large-sized predators, which require larger home ranges, thus being restricted to larger habitats. Therefore, food web structure in patchy ecosystems is expected to be shaped by habitat size and climate variations. Here we investigate this prediction using natural aquatic microcosm (bromeliad phytotelmata) food webs comprised of litter resources (mainly detritus), detritivores, mesopredators, and top predators (damselflies). We surveyed 240 bromeliads of varying sizes (water retention capacity) across 12 open restingas in SE Brazil spread across a wide range of tropical latitudes (-12.6° to -27.6°, ca. 2.000 km) and climates ( $\Delta$  mean annual temperature = 5.3°C). We found a strong increase in predator-to-detritivore mass ratio with habitat size, representative of a typical inverted trophic pyramid in larger ecosystems. However, this relationship was contingent among the restingas; slopes of linear models were steeper in more stable and favorable climates, leading to inverted trophic pyramids (and top-down control) being more pronounced in environments with more favorable climatic conditions. By contrast, detritivore-resource and mesopredator-detritivore mass ratios were not affected by habitat size or climate variations across latitudes. Our results highlight that the combined effects of habitat size, climate and predator composition are pivotal to understanding the impacts of multiple environmental factors on food web structure and dynamics." (Authors)] Address: Romero, G.Q., Laboratory of Multitrophic Interactions and Biodiversity (LIMBIO), Dept of Animal Biology, Institute of Biology, Univ. of Campinas (UNICAMP), CP 6109, Campinas, SP 13083-970 Brazil. E-mail: gqromero@unicamp.br

**20600.** Roulin, A. (2016): Strong decline in the consumption of invertebrates by Barn Owls from 1860 to 2012 in Europe. *Bird Study* 63: 146-147. (in English) ["Capsule The analysis of 616 papers about the diet of the European Barn Owl *Tyto alba* showed that 9678 invertebrates were captured out of 3.13 million prey items (0.31%). The consumption of invertebrates strongly decreased between 1860 and 2012. This further demonstrates that the Barn Owl diet changed to a large extent during the last 150 years. ... Other families were less often consumed with 101 Dermaptera, 43 Mantodea, 43 Hemiptera, 32 Hymenoptera, 25 Diptera, 22 Lepidoptera, 8 Neuroptera, 4 Odonata and 4 Blattodea. The most frequently captured genera are *Gryllotalpa* (967 individuals), 829 *Gryllus*, 488 *Copris*, 380 *Melolontha* and 162 *Geotrupes*. Of note is the absence of any cicadas (Cicadidae) suggesting that Barn Owls capture most often insects that sing loudly at night and species that are abundant and easily detectable (Table S2)." (Author)] Address: Roulin, A., Dept of Ecology & Evolution, Univ. of Lausanne, Biophore, Lausanne 1015, Switzerland

**20601.** Stigge, H.A.; Bolek, M.G. (2016): Evaluating the biological and ecological factors influencing transmission of larval digenetic trematodes: A test of second intermediate host specificity of two North American *Haliipegus* species. *Journal of Parasitology* 102(6): 613-621. (in English) ["Host specificity of parasites is a basic principle in parasitology; however, it is not easily measured. Previously, host specificity was calculated as the number of species that a parasite infected, but this is not an accurate description of host usage because some species are capable of being infected but do not contribute to the completion of the life cycle. Instead, measures of host specificity should take into consideration interactions between a parasite and a potential host species as well as interactions between current and subsequent hosts in the life cycle. The objectives of this study were to track the development of 2 trematode species, *Haliipegus eccentricus* and *Haliipegus occidialis*, in 3 phylogenetically and ecologically distinct microcrustacean second intermediate hosts, and then, evaluate the extent to which each of these hosts contributed to transmission of each *Haliipegus* species to the next odonate host in the life cycle. All 3 microcrustacean species exposed became infected with both species of *Haliipegus*. The patterns of growth of *H. eccentricus* and *H. occidialis* were similar, but there were consistent differences in the rates of growth among the microcrustacean species in both *Haliipegus* species. Regardless of host species infected, all individuals of both species were considered to be developmentally infective to the next host in the life cycle by 19 days post exposure (DPE) when they lost their excretory bladder. Worms of varying sizes were capable of surviving without this structure suggesting that there is not a strong relationship between the rate of growth of the metacercariae and the development of their osmoregulatory system. Although *Haliipegus* species were capable of living without an excretory bladder at 19 DPE, there were differences in their size and rates in which the 3 microcrustaceans contributed to transmission of the parasites to subsequent odonate hosts. Collectively, under controlled laboratory conditions, there was an approximately 2-fold difference in the average percent of worms that established in odonates from the ostracod, *Cypridopsis* sp., than from the harpacticoid copepod, *Phyllognathopus* sp., and the difference was nearly 3-fold between *Cypridopsis* sp. and the cyclopoid copepod, *Thermocyclops* sp. Therefore, Powered by Editorial Manager® and ProduXion Manager® from Aries Systems Corporation despite all 3 microcrustacean species becoming infected, not all species were equally suited for

transmission and completion of the life cycle. Differences among the 3 microcrustacean species in cercaria ingestion, metacercarial growth and development, and odonate predation rates on infected microcrustacean species were important factors in determining transmission of the 2 *Halipegus* species to odonate hosts.] Address: Stigge, Heather, Dept of Integrative Biology, Oklahoma State Univ., Stillwater, Oklahoma 74078, USA

**20602.** Viyapuri, R. (2016): Development of chitosan based nanocomposite film for the wing membrane of biomimetic micro air vehicles (BMAV). PhD thesis, Faculty of Engineering, Univ. of Malaya: XXII, 135 pp. (in English) ["Biomimetic Micro Air Vehicles (BMAV) are unmanned, micro-scaled aircraft that are bioinspired from flying organisms to achieve lift and thrust by flapping their wings. There are still many technological challenges involved with the designing BMAV. One of these is designing ultra-lightweight materials and structures for the wings that have the mechanical strength to withstand continuous flapping at high frequencies (e.g. 30 Hz for a dragonfly). Insects achieve this by using chitin-based, wing frame structures that encompass a thin, film membrane. The overall objective of this research is to develop an innovative wing membrane for a BMAV, bioinspired from actual dragonfly wings. Chitosan was used as a polymer matrix. Chitin nanowhiskers (CNW) and nanocrystalline cellulose (NCC) were prepared in laboratory and used as reinforcement fillers in the design of two types of nanocomposite membranes. In each type, tannic acid was used as crosslinker for the chitosan matrix. Film samples with different ratios of nanomaterials and crosslinking agent were prepared. The chemical changes, structural properties, and mechanical performance of each sample was measured, analyzed, and compared. Following these initial studies, heat treatment was also investigated to assess its potential for improving the chitosan nanocomposite film. Transmission electron microscopy (TEM) and scanning electron microscope (SEM) confirms the nano-scaled size of nanomaterial produced and reveals the dispersion level of the nanomaterials in the chitosan matrix. Fourier-transform-infrared spectroscopy (FTIR) was used to investigate the molecular interaction of film. X-ray diffraction (XRD) results indicated that the nanocomposite films have a rigid structure. Performance analysis using a universal testing machine (UTM) and nanoindentation machine indicates that, the tensile strength and modulus increase significantly for the crosslinker nanocomposite films. Wettability, moisture content and solubility tests show that the film exhibits elevated water resistant when the additives and heat treatment are introduced. A dragonfly wing frame structure iv was also bio-mimicked and fabricated using a 3D printer. The membrane was applied to these BMAV wing frames by a casting method. A flapping generator was used to produce static, flapping motion on these BMAV wings and an actual dragonfly wing (for comparison). The aeroelastic properties of both the BMAV and actual dragonfly wings were examined using two high speed frame camera. Bending angle, wing tip deflection and wing tip twist angle were analyzed at the flapping frequencies of 30 Hz, 60 Hz and 120 Hz." (Author)] Address: not stated

**20603.** Wesner, J.S. (2016): Contrasting effects of fish predation on benthic versus emerging prey: a meta-analysis. *Oecologia* 180(4): 1205-1211. (in English) ["Predator-prey interactions are often studied entirely within the ecosystem of the predator. However, many prey transition between ecosystems during development, expanding the effects of predators across ecosystems. Prey are often vulnerable to

predation during this transition, facing a predator gauntlet as they leave their source ecosystem. As a result of predation during this transition, predators may have stronger effects on prey fluxes to the neighboring ecosystem than on prey densities in the predator's own ecosystem. I used meta-analysis of predator (fish) and prey (invertebrate) interactions in freshwater ecosystems to test the hypothesis that fish have stronger effects on prey flux to the terrestrial ecosystem, by reducing insect emergence biomass, than on prey densities in the aquatic ecosystem, by reducing benthic insect/invertebrate biomass. Fish reduced insect emergence by 39 % on average, more than twice as strong as their reductions of benthic prey (16 % reduction; averages are variance-weighted). In fact, fish effects on benthic prey were not significantly different from zero, but were significant for emergence. These results indicate that predator effects can not only cascade from one ecosystem to another but also that effects can be stronger outside than within the ecosystem of the predator. Failure to account for this may underestimate the effects of predators on prey." (Author)] Address: Wesner, J.S., Dept of Biology, Univ. of South Dakota, Vermillion, SD, USA. E-mail: jeff.wesner@usd.edu

**20604.** Zada, N.; Farid, A.; Zia, A.; Saeed, M.; Khan, S.M.; Khan, A.; Khan, I.A.; Fazlullah; Badshah, T. (2016): Damselflies (Odonata: Zygoptera) fauna of District Buner, Khyber Pakhtunkhwa, Pakistan. *Journal of Entomology and Zoology Studies* 4(1): 491-495. (in English) ["Damselfly fauna of district Buner (Khyber Pakhtunkhwa, Pakistan) was surveyed during 2013 and 2014. A total of 230 adult damselflies were collected from fifteen localities of the district during two successive summer seasons. Twelve species of damselflies under 8 genera of 5 families were found, harbouring in district Buner, including Calopterygidae: *Neurobasis chinensis chinensis*; Chlorocyphidae: *Libellago lineata lineata*, *Rhinocypha quadrimaculata*; Coenagrionidae: *Ceragrion coromandelianum*, *Pseudagrion ceylanicum*, *P. rubriceps*, *Ischnura aurora rubilio*, *I. elegans*, *I. forcipata*, *I. fontainei*; Protoneuridae: *Elatoneura campioni*; and Chlorolestidae: *Megalestes major*." (Authors)] Address: Zada, Naeem, Entomology section, Dept, of Agricultural Sciences, Univ., of Haripur, Haripur, Pakistan

## 2017

**20605.** Groupe Odonat'Auvergne (2017): Liste rouge des odonates d'Auvergne. Groupe Odonat'Auvergne / DREAL Auvergne Rhône-Alpes: 23 pp. (in French) [73 taxa were assessed. 11 species are considered as threatened with extinction (CR, EN and VU), i.e. 15% of the Auvergne odonotofauna] Address: [https://www.auvergne-rhone-alpes.developpement-durable.gouv.fr/IMG/pdf/lrrodonatesauvergne\\_goa\\_2017\\_vf-2.pdf](https://www.auvergne-rhone-alpes.developpement-durable.gouv.fr/IMG/pdf/lrrodonatesauvergne_goa_2017_vf-2.pdf)

**20606.** Hefler, C.; Noda, R.; Shyy, W.; Qiu, H. (2017): Unsteady vortex interactions for performance enhancement of a free flying dragonfly. ASME 2017 Fluids Engineering Division Summer Meeting Volume 1C, Symposia: Gas-Liquid Two-Phase Flows; Gas and Liquid-Solid Two-Phase Flows; Numerical Methods for Multiphase Flow; Turbulent Flows: Issues and Perspectives; Flow Applications in Aerospace; Fluid Power; Bio-Inspired Fluid Mechanics; Flow Manipulation and Active Control; Fundamental Issues and Perspectives in Fluid Mechanics; Transport Phenomena in Energy Conversion From Clean and Sustainable Resources; Transport Phenomena in Materials Processing and Manufacturing Processes. Waikoloa, Hawaii, USA, July 30–August 3, 2017, Conference Sponsors: Fluids Engineering Division.

ISBN: 978-0-7918-5806-6: 10 pp. (in English) ["Bioinspired designs offer a viable solution to the design challenges of micro air vehicles (MAVs) desired to operate in the same size region under similar conditions as flying vertebrates and insects. Inspired by our previous studies of tethered live dragonflies, here, a quantitative characterization of the unsteady aerodynamic features of a live, freely flying dragonfly under well-established level flight condition will be presented. In particular with regard of the span-wise features of vortex interactions between the fore- and hind-pairs of wings, that highly contributes to the flight agility and efficiency of dragonflies. Flow fields of free flying dragonflies in still air have been measured by time-resolved stereo particle image velocimetry (TRS\_PIV). A specifically designed dark flight chamber has been built, where hand hold dragonflies (*Pantala flavescens*) were released and made to fly nearly parallel to the measurement plane toward a guiding light. Realistic kinematics of the dragonfly wings in free flight were measured by filming with 2 synchronized high-speed video cameras. Using the recorded images, several dozens of landmarks on the fore- and hind-wing surfaces and several landmarks on the body were traced with high precision and the three-dimensional coordinates were then reconstructed with a direct linear transformation (DLT) method. Using the reconstructed wing-body model, Navier-Stokes-based computational fluid dynamics (CFD) analyses, with wing shapes prescribed based on the experimental measurement, dynamically moving multi blocked, and an over-set-grid system were conducted. The numerical results are in overall agreement with the PIV data, and the combined numerical and experimental approach offers valuable insight into aerodynamic analyses. The results show that the interaction with the forewing leading edge vortex (LEV) strongly influences the flow structures around the inner spanwise region of the hindwing, while aerodynamic enhancement via vortex capture in the outer span is observed. The interaction depends not solely on wing phasing, geometrical arrangement, but also the flight mission." (Authors)] Address: Hefler, Csaba, Dept of Mechanical and Aerospace Engineering, Hong Kong Univ. of Science and Technology, Hong Kong SAR, China. E-mail: meqiu@ust.hk

**20607.** McAlpine, D.F.; Makepeace, H.S.; Sabine, D.L.; Brunelle, P.M.; Bell, J.; Taylor, G. (2017): First occurrence of *Enallagma pictum* (Scarlet Bluet) (Odonata: Coenagrionidae) in Canada and additional records of *Celithemis martha* (Martha's Pennant) (Odonata: Libellulidae) in New Brunswick: possible climate-change induced range extensions of Atlantic Coastal Plain Odonata. *J. Acad. Entomol. Soc.* 13: 49-53. (in English) [Expansion in the geographic range of two Canadian Atlantic Coastal Plain Odonata is documented; *E. pictum* and *C. martha*. Comment on the significance of these records in the light of climate warming is provided. [https://academic.oup.com/journal/papers/mcalpine\\_17-5.pdf](https://academic.oup.com/journal/papers/mcalpine_17-5.pdf)] Address: McAlpine, D.F., NB Museum, 277 Douglas Avenue, Saint John, NB, Canada, E2K 1E5. E-mail: Donald.McAlpine@nbm-mnb.ca

**20608.** Njoroge, L.; Underhill, L.G.; Navarro, R.A. (2017): Kenyan dragonflies: Past, present and future. *Biodiversity Observations* 8.29: 1-17. (in English) ["As of May 2017, the database of the OdonataMAP project (including records from Odonata Database of Africa) had a total of 3376 dragonfly records from Kenya. Of these, 129 had been posted by citizen scientists while the remaining 3247 are mainly museum records. These records comprise of a total of 172 dragonfly species. These species belong to four families of what can be referred to as true dragonflies and five families

belonging to damselflies (Table 1). A detailed species list with number of records for each species is given in Appendix 1 to this publication."] Address: Njoroge, L., Section of Invertebrates Zoology, National Museums of Kenya, Nairobi, Kenya. Email: Lnjoroge@museums.or.ke

**20609.** Sasamoto, A.; Futahashi, R.; Kosterin, O.E.; Malikova, E.I. (2017): Note on *Orthetrum melania* (Anisoptera: Libellulidae) from Kunashir Island with a reference to its subspecific status. *Tombo* 59: 74-76. (in English, with Japanese summary) ["The markings of wing of male in Kunashir population clearly indicate the characters of nominotypical *melania* subspecies, i.e. the range of basal black marking on hindwing comparatively developed, extending to between third and fourth antenodal veins, almost wholly covered the median space, and blue tints on veins narrower (Figs. 2b & 3) (Sasamoto & Futahashi, 2013). The female (Fig. 4) implies also well the characteristics of nominotypical *melania*, i.e. the thorax occupied with broadly black markings and the basal marking of hindwing blackish brown. Therefore, we can identify the Kunashir population as *Orthetrum melania melania*. Moreover, here we point out that the record of "*Pseudothemis zonata* (Burmeister, 1839)" from Kunashir Island by Paulson et al. (1998) was misidentified with *Orthetrum melania* (Paulson & Ubukata, pers. comm.)." (Authors)] Address: Sasamoto, A., 531-3 Oh, Tawaramoto-cho, Shiki-gun, Nara pref. 636-0345 Japan. Email: aksmt@sea.plala.or.jp

**20610.** Volz, D. (2017): Biodiversity of larval and adult dragonflies and damselflies (Odonata) of interdunal wetlands at Saugatuck Harbor Natural Area. Honors Theses. 2924, Western Michigan Univ.: 34 pp. (in English) ["The effects of climate change on insects in the United States have yet to be fully understood. Research on the insect populations of Lake Michigan's interdunal wetlands has been particularly limited. As these vibrant habitats are already at risk of destruction due to increased development, it is vital to have a working knowledge of the species that are living in the habitat. However, to date, there have been no studies on assemblages of interdunal wetlands in Michigan. Examining community compositions is critical to understanding the ecological problems that could occur in the future. This study is the first to look at Odonata diversity in an interdunal wetland in Michigan. The research, done at Saugatuck Harbor Natural Area on populations of Odonate species, provides a base-level of awareness about which species are living and breeding in this wetland habitat. The written record of the specific species observed in the area as adult odonates contributes to the Michigan Odonata Survey. This survey helps scientists better understand what odonates are living in and migrating to Michigan. Species with complex life cycles, such as Odonata, are important to both aquatic and terrestrial habitats. As these populations experience changes in the future, this research will provide crucial data on which species change their habitats. Examining the richness, diversity, and evenness of adult and larval Odonata provides a better view of the species living in wetland habitats. Odonates are an important food source for many other species living in these wetlands. Alterations to the complex food web within a wetland can have cascading effects on many species that live in the habitat. Incorporating the information gained from this study into future studies of the same wetland area will increase awareness about the effects of climate change on interdunal wetlands in the Great Lakes region." (Author)] Address: Volz, D., Western Michigan Univ., [devonvolz@gmail.com](mailto:devonvolz@gmail.com)



**20611.** Zeyghami, S.; Bode-Oke, A.; Dong, H. (2017): Quantification of wing and body kinematics in connection to torque generation during damselfly yaw turn. *Science China Physics, Mechanics & Astronomy* volume 60, Article number: 014711: 13 pp. (in English) ["This study provides accurate measurements of the wing and body kinematics of three different species of damselflies in free yaw turn flights. The yaw turn is characterized by a short acceleration phase which is immediately followed by an elongated deceleration phase. Most of the heading change takes place during the latter stage of the flight. Our observations showed that yaw turns are executed via drastic rather than subtle changes in the kinematics of all four wings. The motion of the inner and the outer wings were found to be strongly linked through their orientation as well as their velocities with the inner wings moving faster than the outer wings. By controlling the pitch angle and wing velocity, a damselfly adjusts the angle of attack. The wing angle of attack exerted the strongest influence on the yaw torque, followed by the flapping and deviation velocities of the wings. Moreover, no evidence of active generation of counter torque was found in the flight data implying that deceleration and stopping of the maneuver is dominated by passive damping. The systematic analysis carried out on the free flight data advances our understanding of the mechanisms by which these insects achieve their observed maneuverability. In addition, the inspiration drawn from this study can be employed in the design of low frequency flapping wing Micro Air Vehicles (MAV's)." (Authors)] Address: Dong, H.B., Dept of Mechanical & Aerospace Engineering, Univ. Virginia, Charlottesville, 22903, USA

## 2018

**20612.** Al Basheer, A.; Parshad, R.D.; Quansah, E.; Yu, S.; Upadhyay, R.K. (2018): Exploring the dynamics of a Holling–Tanner model with cannibalism in both predator and prey population. *Int. J. Biomath.* 11, 1850010 (2018): 29 pp. (in English) ["Cannibalism is an intriguing life history trait, that has been considered primarily in the predator, in predator–prey population models. Recent experimental evidence shows that prey cannibalism can have a significant impact on predator–prey population dynamics in natural communities. Motivated by these experimental results, we investigate a ratio-dependent Holling–Tanner model, where cannibalism occurs simultaneously in both the predator and prey species. We show that depending on parameters, whilst prey or predator cannibalism acting alone leads to instability, their joint effect can actually stabilize the unstable interior equilibrium. Furthermore, in the spatially explicit model, we find that depending on parameters, prey and predator cannibalism acting jointly can cause spatial patterns to form, while not so acting individually. We discuss ecological consequences of these findings in light of food chain dynamics, invasive species control and climate change. [...] A dragonfly-larvae system consisting of *Anax junius* and *Plathemis lydia* (which are the prey for other predators such as tadpoles in a pond setting) is used to understand the effects of prey cannibalism on predator–prey interactions" (Authors)] Address: Al Basheer, A., Mathematics Dept, The Univ. of Georgia, 240A Riverbend Rd, Athens GA 30602, USA

**20613.** Beolens, R. (2018): *The Eponym Dictionary of Odonata*. Whittles Publishing: 352 pp. (in English) ["The Eponym Dictionary of Odonata is a comprehensive listing of all people after whom damselflies and dragonflies have been named in scientific or common names. Each entry provides details of the species and a brief biography of the person. It

is also cross-referenced so that the relationships between scientific authors, entomologists and others can be followed. Many entries have been contributed by the people so honoured who are not necessarily odonatologists, entomologists, zoologists or even great men of science. Many damselflies and dragonflies are named for the author's family members, friends and those who collected the species holotypes, while others are figures from myth or history. In fact, it could be anything from the author's mother to a favourite musician. Because entries may include details of dates, places, educational and work institutions, it is possible to discover information about each person and for a picture to be built of how the science sometimes follows groupings of colleagues or those significantly influenced by charismatic teachers. The Dictionary includes other names which might, at a glance, be thought to be eponyms yet are not in the truest sense. These may be species named after characteristics embodied in characters from literature, whole peoples, acronyms or toponyms, etc. To some extent it can read like a canon of the great women and men of science over the last several centuries. Interestingly there are species named after as many as three generations of the same family, veiled references to old lovers, sycophantic homage, financial patronage, etc., as well as all the more 'legitimate' reasons for naming species. Not surprisingly, odonatologists exhibit a range of opinion on the practice, from naming all species after people, to wanting all eponyms banned; they can be totally humourless and pedantic or full of fun and irreverence. Like all of us they have as many reasons for their namings as ordinary folk have for naming their children or pets. Underlying all this, however, is the value of Eponym Dictionary of Odonata in cataloguing this fascinating aspect of science for all users, whether scientists or interested lay readers." (Author)] Address: Whittles Publishing, Dunbeath, Caithness, Scotland KW6 6EG, UK

Guillemot, A.; Krieg-Jacquier, R.; Bal, B.; Lamouille-Hébert, M. (2018): A la recherche d'*Aeshna caerulea* sur la réserve naturelle nationale de Passy (Odonata: Aeschnidae). Document non publié (<http://files.biolovision.net/haute-savoie.-lpo.fr/userfiles/larecherchedAeshnacaeruleasurlarservenaturellenationaledPassy.pdf>): 13 pp. (in French) ["Within the framework of survey weekends and in association with the manager of the Passy national nature reserve (Asters), the Sympetrum group carried out a survey weekend on 6 and 7 August 2016 to search for *Aeshna caerulea* (Ström, 1783), a rare and threatened species discovered in 1994 in the vicinity of France. Thus, after having identified several wetlands favourable to the presence of the species in 2015, twelve people were gathered to search for this emblematic taxon of boreo-alpine ecosystems. Following these surveys, *A. caerulea* was not observed, despite the presence of the range of species generally associated with it. It is necessary to continue the surveys to refine the distribution of the species in the Dept and to identify possible connections between the different populations in Haute-Savoie." (AuthorsDeepL)] Address: Guillemot, A., Groupe de recherches et de protection des libellules Sympetrum, 150, route de Chez Diannay 74570 Groisy, France. E-mail: alexandre.guillemot@asters.asso.fr

**20614.** Gumpinger, C.; Höfler, S.; Pichler-Scheder, C.; Chovanec, A. (2018): *Ökologische Aufwertungsmaßnahmen in oberösterreichischen Gewässern. Planung, Umsetzung, Erfolge, Probleme.* Im Auftrag des Amtes der Oberösterreichischen Landesregierung Direktion Umwelt und Wasserwirtschaft, Abteilung Wasserwirtschaft, Wels: 109 pp. (in German) ["The identified success factors on the way

from technically completely over-formed water bodies to ecologically upgraded - in the best case renatured - water bodies are summarised again in Fig. 82. In summary, it can be stated that these conclusions do not contain any fundamentally new findings, but that the authors are in line with international literature. The measures implemented in Upper Austria show the same deficits and problems that occur again and again - at least throughout Europe - and are accordingly more or less of high ecological quality - in the majority of cases, however, they can only be assessed to a limited extent on the basis of analogies with other measures or other water bodies, because no monitoring was carried out. In the future, in order to implement measures as successfully as possible, it will be important to learn to understand watercourses as overall systems, and accordingly to align planning and implementation as closely as possible to the guiding principles, and in this way ultimately to actually renaturalise watercourses. Where this is not possible due to limited framework conditions, the focus should be on habitat diversity, the best possible connection to the surrounding area and a design that enables or even initiates dynamic processes. Special attention must be paid to the water ecological functionality of created or initiated structures. Sufficiently generous dimensioning plays a major role here, as these initial measures create the preconditions for the long-term self-development of the streams and rivers. A particular challenge in the future will be to bring the sediment balance of the water bodies closer to its natural state. With regard to the monitoring of success, a standardised integrative medium- to long-term monitoring approach of hydromorphology (incl. sediment) and aquatic and terrestrial ecology is desirable with regard to the overall system of water bodies including the surrounding area. If the monitoring results do not document the hoped-for effects, remedial work - if at all possible even several adaptation loops consisting of remedial work and monitoring - is urgently recommended. This is particularly important because even small mistakes can lead to bottleneck effects that can prevent or at least delay the achievement of the set goals in the long term. If watercourse restoration projects are planned and carried out in the future with these crucial points in mind, technicians and ecologists - provided they have the necessary will and vision - will be able to learn together how flowing waters function and what really matters in restoration projects. Ultimately, there is also justified hope that more intact watercourse habitats will develop again and thus not only will the objectives of the Water Framework Directive be achieved in the long term and permanently, but also that the population will be able to benefit from the added value of intact watercourse habitats." (Authors/DeepL)] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, A-1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

**20615.** Janssen, A.; Hunger, H.; Konold, W.; Pufal, G.; Staab, M. (2018): Simple pond restoration measures increase dragonfly (Insecta: Odonata) diversity. *Biodiversity and Conservation* 27: 2311-2328. (in English) ["Ponds are home to a diverse community of specialized plants and animals and are hence of great conservation concern. Through land-use changes, ponds have been disappearing rapidly and remaining ponds are often threatened by contamination and eutrophication, with negative consequences for pond-dependent taxa like amphibians or dragonflies (Odonata: Anisoptera and Zygoptera). Increasingly, restoration measures such as removal of shading terrestrial vegetation or submerged organic matter are implemented to counteract current threats, but how these measures affect the target taxa is rarely assessed. We tested if and how simple pond

restoration measures affectionate diversity. We propose that pond restoration influences the light regime, which promotes aquatic and riparian vegetation important for different dragonfly life stages, thus increasing their diversity. Additionally, we assume that this changes dragonfly species composition between restored and unrestored ponds. We surveyed exuviae in the riparian and aquatic vegetation along the shore of 29 (12 restored, 17 unrestored) man-made ponds in southwest Germany and assessed environmental variables known to affect dragonfly diversity. We identified the cover of tall sedges and submerged macrophytes as the driving biotic variables for dragonfly diversity and species composition, with restoration measures affecting submerged macrophyte cover directly but tall sedges indirectly via available sunlight. This study demonstrates that simple restoration measures not only have a positive effect on overall dragonfly diversity, but also increase habitat suitability for several species that would otherwise be absent. We therefore propose dragonflies as a suitable flagship group for pond conservation." (Authors)] Address: Janssen, Alina, Nature Conservation & Landscape Ecology, Faculty of Environment and Natural Resources, Univ. of Freiburg, Freiburg, Germany

**20616.** Mamat-Noorhidayah; Yazawa, K.; Numata, K.; Norma-Rashid, Y. (2018): Morphological and mechanical properties of flexible resilin joints on damselfly wings (*Rhincocypha* spp.). *PLoS One*. 2018 Mar 7;13(3):e0193147. doi: 10.1371/journal.pone.0193147. eCollection 2018: 17 pp. (in English) ["Resilin functions as an elastic spring that demonstrates extraordinary extensibility and elasticity. Here we use combined techniques, laser scanning confocal microscopy (LSCM) and scanning electron microscopy (SEM) to illuminate the structure and study the function of wing flexibility in damselflies, focusing on the genus *Rhincocypha*. Morphological studies using LSCM and SEM revealed that resilin patches and cuticular spikes were widespread along the longitudinal veins on both dorsal and ventral wing surfaces. Nanoindentation was performed by using atomic force microscopy (AFM), where the wing samples were divided into three sections (membrane of the wing, mobile and immobile joints). The resulting topographic images revealed the presence of various sizes of nanostructures for all sample sections. The elasticity range values were: membrane (0.04 to 0.16 GPa), mobile joint (1.1 to 2.0 GPa) and immobile joint (1.8 to 6.0 GPa). The elastomeric and glycine-rich biopolymer, resilin was shown to be an important protein responsible for the elasticity and wing flexibility." (Authors) <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0193147>] Address: Mamat-Noorhidayah, Institute of Biological Science, Fac. Science, Univ. of Malaya, Kuala Lumpur, Malaysia

**20617.** Mazzaglia, M.K.; Goldschalt, T. (2018): Eine Königslibelle in Neles Garten. *neunmalklug verlag GbR - Charlotte Stiefel & Sarah Roller*: 36 pp. (in German) ["Picture book, from 3 years. On a warm summer day, Nele discovers a strange little animal in the garden. "It is the larva of a damselfly," her father explains. Together they watch as the dragonfly first hatches from the larval skin, then dries its wings in the sun and finally takes its first flight. A story with interesting factual information about a fascinating animal species." (Publisher)] Address: neunmalklug verlag GbR, Charlotte Stiefel & Sarah Roller, Ölgasse 13, 77933 Lahr, Germany

**20618.** Medina, M.N.D.; Cabras, A.A.; Villanueva, R.J.T.; Colong, R. (2018): Odonata recorded in the buffer zone of Mt. Hamiguitan Range Wildlife Sanctuary with remarks on

the distribution of endangered *Risicnemis antoniae* in Davao Oriental Philippines. *Notulae Scientia Biologicae* 10(1): 14-20. (in English) ["Mt. Hamiguitan Range Wildlife Sanctuary is both a UNESCO and ASEAN recognised heritage site. There is a current move to expand the site by expanding the buffer zone. This area unfortunately is poorly studied in terms of its biodiversity. This paper explores the Odonata species found in the proposed buffer zone. Transect line along fluvial ecosystem was established in the two bordering municipalities. A total of 32 species from 22 genera and nine families were recorded in which eighteen species (18) belong to the suborder Zygoptera while 14 species are Anisoptera. High level of endemism was recorded for Zygoptera (94.44%) endemism while low endemism for Anisoptera (21.43%). Distribution of *Risicnemis antoniae* (Gassmann & Hämäläinen, 2002), an IUCN endangered damselfly was recorded in the creeks of Barangay Tandang Sora, Governor Generoso at relatively lower elevation between 100-300 meters above sea level. Due to its habitat's close proximity to human habitation and the encroaching anthropogenic disturbances, it should be declared as Local Conservation Area." (Authors)] Address: Medina, M.N.D., Univ. of Mindanao, Institute for Biodiversity & Environment, Research & Publication Center, Matina, Davao City, Philippines. E-mail: mnd\_medina@umindanao.edu.ph

**20619.** Moore, M.P.; Lis, C.; Martin, R.A. (2018): Larval body condition regulates predator-induced life-history variation in a dragonfly. *Ecology* 99(1): 224-230. (in English) ["Organisms with complex life cycles commonly exhibit adaptive plasticity in the timing of transitions between life stages. While the threat of predation is predicted to induce earlier transitions, empirical support has been equivocal. When predation risk affects both the propensity to transition to the next life stage and the ability to reach the energetic thresholds necessary to complete the transition, only those individuals in the best physiological condition may be able to accelerate development and emerge earlier. To test this hypothesis, we followed uniquely marked dragonfly larvae (*Pachydiplax longipennis*) through emergence in pools where we factorially manipulated the presence of a large heterospecific predator (*Anax junius*) and cannibalism risk via conspecific size variation. Consistent with our hypothesis, high-condition larvae were more likely to emerge in the presence of the heterospecific predator than in its absence, and low-condition larvae were more likely to emerge in its absence than in its presence. Moreover, high-condition larvae emerged earlier when cannibalism risk was high than when it was low. Predation risk therefore has condition-dependent effects on emergence. As predation risk frequently affects resource accumulation, similar mechanisms across taxa could commonly underlie the incongruence between empirical results and theoretical expectations for predator-induced life-history variation." (Authors)] Address: Moore, M.P., Dept of Biology, Case Western Reserve Univ., Cleveland, Ohio 44106 USA. Email: mpm116@case.edu

**20620.** Moreno-Benítez, J.M.; Ripoll, J. (2018): Dragonflies along the Málaga Great Path and in the Province. IDENTIFICATION GUIDE. Diputación de Málaga, 29004 Málaga, Spain: 188 pp. (in English) [The Identification Guide to the Dragonflies along the Great Málaga Path and in the Province' forms part of the above actions, and brings us nearer to these metallic coloured beautiful creatures, which make our river and lakes more colourful. This publication follows the one about 'The Birds along the Great Path' and 'The Identification Guide to the Diurnal Butterflies along the Great Málaga Path', which has recently been published. However,

their identification was not the only purpose of this edition. We also aim to present this fascinating world and participate in research into them and its protection. Dragonflies are real survivors as they existed in the same time as dinosaurs, but contrary to them, they survived the massive extinction of the great part of life on Earth from that period. Here they are, hundreds of millions of years later, with slight changes in their basic physical form and biological features. These winged insects achieved to adapt to all kinds of water, even with certain level of salinity and contamination. Dragonflies are rather necessary in the ecosystems where they live and of great importance for humans. What would happened to us if dragonflies did not exist? Well, no doubt, we would not be fine. While larvae in water and as adult insects, they feed on many insects which, among other negative aspects, can be harmful for humans. For instance, these are mosquitoes. Moreover, they are part of food chains in water ecosystems, together with other animals which live there like fish, amphibians, and birds. In the province of Málaga, 54 different species of the Odonata have been spotted. This is 69% of all the Odonata in the Iberian Peninsula (79 species) or 7 out of 10." (Authors)] Address: Diputación de Málaga (Málaga county council), great Málaga path team, Pacifico 54, Edificio A (Building A), 29004 Málaga, Spain. <https://www.grandesdemalaga.es/en/7346/dragonflies-along-great-malaga-path-province-identification-guide>

**20621.** Moyo, S.; Richoux, N.B. (2018): Fatty acids reveal the importance of autochthonous non-vascular plant inputs to an austral river food web. *Hydrobiologia* 806: 139-156. (in English) ["We hypothesised that the dominant organic source supporting macroinvertebrate consumers in a South African river is autochthonously produced non-vascular algae (regardless of season), and that the prevalence of autochthony increases with increasing distance from the headwaters. Fatty acid profiles of macroinvertebrates from six sites and four sample times were assessed to characterise the consumer diets and estimate the relative assimilation of autochthonous versus allochthonous-based sources in the food web. Fatty acid markers, ordination analyses and mixing models confirmed that the ultimate nutritional source for the invertebrate assemblages was autochthonous-produced carbon, with some contributions occurring from vascular plants (potentially of allochthonous and autochthonous origin, as some vascular plants were aquatic macrophytes). However, contrary to our second hypothesis, the prevalence of autochthony did not change predictably along the river. Such an autochthonous-based food web is consistent with many large rivers in well-researched regions of the world, although the complexity and variability that we observed in the fatty acid profiles of macroinvertebrate consumers in a small South African river should help stimulate renewed interest in investigations of carbon flow within small rivers from less-studied regions (particularly in arid climates)." (Authors)] Address: Moyo, S., Dept of Zoology & Entomology, Rhodes Univ., Grahamstown, South Africa

**20622.** Phan, Q.T.; Kompier, T.; Karube, H.; Hayashi, F. (2018): A synopsis of the Euphaeidae (Odonata: Zygoptera) of Vietnam, with descriptions of two new species of Euphaea. *Zootaxa* 4375(2): 151-190. (in English) ["23 species of Euphaeidae (Odonata: Zygoptera) are reported from Vietnam including two new species of Euphaea, *E. saola* Phan & Hayashi, sp. nov. and *E. sanguinea* Kompier & Hayashi, sp. nov., and four species not recorded previously, *Bayadera continentalis* Asahina, 1973, *B. hyalina* Selys, 1879, *B. nephelopennis* Davies & Yang, 1996 and *Euphaea pahyapi* Hämäläinen, 1985. The females of *Anisopleura bipugio*

Hämäläinen & Karube, 2013, *Bayadera serrata* Davies & Yang, 1996 and *Euphaea hirta* Hämäläinen & Karube, 2001 are described for the first time. The mutual taxonomic status of *Bayadera hyalina* and *B. strigata* Davies & Yang, 1996 is discussed. Distribution maps of all known Vietnamese species, with detailed distribution records, are provided." (Authors)] Address: Phan, Q.T., Entomology & Parasitology Laboratory, Center for Molecular Biology, Institute of Research and Development, Duy Tan Univ., 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

**20623.** Start, D. (2018): Ontogeny and consistent individual differences mediate trophic interactions. *The American Naturalist* 192(3): 301-310. (in English) ["Ecologists use species traits to predict responses to environmental change and, ultimately, to understand the composition of biological communities. However, this ignores known and substantial intraspecific variation that can have important consequences for species interactions and community composition. This within-species variation results from two distinct sources: ontogeny and consistent individual differences. Ontogeny and consistent differences interact to produce phenotypes, but the community-level consequences of this interaction have not been studied. Using larval dragonfly communities, I investigate patterns of intraguild predation by manipulating (1) consistent individual differences in activity rate and (2) the ontogeny of the focal and interacting species. I show that activity rate is a consistent individual trait but that the effect of activity rate on intraguild predation depends on the functional role of an organism in the community (predator or prey). An organism's functional role itself varies across ontogeny of both the focal and interacting individuals. I suggest that ontogeny and consistent individual differences interact to produce intraspecific variation, with consequences for species interactions, communities, and eco-evolutionary dynamics." (Authors)] Address: Start, D., Dept of Ecology and Evolutionary Biology, Univ. of Toronto, Toronto, Canada. E-mail: denon.start@mail.utoronto.ca

**20624.** Tschol, M. (2018): Role of natural and sexual selection in the evolution of a sexual trait in an old insect order. M.Sc. thesis, Dept of Biology, Lund: (in English) ["Wing pigmentation in dragonflies and damselflies (odonates) functions as a secondary sexual trait with a role in courtship and antagonistic male-male interactions. Recently, a thermoregulatory function of wing pigmentation has also been suggested. This study aimed to elucidate how both sexual and natural selection have influenced the evolution and global distribution of wing pigmentation in odonates. I examined the role of wing patch colour in intra- and inter-sexual selection in the banded demoiselle (*Calopteryx splendens*) utilizing manipulation experiments. While no clear effect of wing patch colour on female preference was found, male *C. splendens* showed reduced aggression towards males with red manipulated wing patches, suggesting that colour mediates information that is used in territorial male conflicts. Additionally, I reconstructed the evolutionary history of this sexual trait and tested for a macroevolutionary association between latitude zone and wing pigmentation, with the expectation that thermoregulatory benefits promote wing pigmentation in temperate regions. I found wing pigmentation evolved several times in multiple lineages of dragonflies and damselflies and a high number of secondary trait loss is in agreement with the view that this sexual trait is costly. Pigmented species were found to be more prevalent in the tropics and evolutionary rates of wing pigment loss were higher in the temperate region. Together, my results do not support the view that a thermoregulatory benefit at temperate

regions has promoted the emergence and maintenance of this trait. Instead, other unknown selective pressures in the tropical regions may have shaped the evolutionary trajectory of wing pigmentation. There may be a more important role of this visually appealing sexual signal in intra- and inter-specific interactions in the tropics compared to the temperate regions. Popular Abstract: Evolution of a Sexual Signal in Dragonflies and Damselflies. Animals often use visual signals to choose mates or communicate fighting ability between rivals. Some dragonfly and damselfly species exhibit colourful pigmentation patterns on their wings which females use as a cue while selecting a mate and males to determine if they want to get into a fight with another competing male. I conducted field experiments to learn more about the role of wing pigmentation in one species of damselfly (*Calopteryx splendens*) and additionally used phylogenetic comparative methods to look at the evolution of this sexual signal across many dragonfly and damselfly species. To better understand how abiotic and biotic factors contribute to the diversity of life, we often select specific traits that we study more closely. One prominent biotic factor is the interaction between the sexes. Some traits that are important in this interaction function as sexual signals, like in the case of wing pigmentation in dragonflies and damselflies. I conducted two field experiments where I manipulated the wing patch colour of male *C. splendens* and recorded the reactions of either free ranging females or resident territorial males. It turns out, while females did not prefer or discriminate more between different colours, resident males showed less aggression towards individuals with red coloured wings. This suggests a possible role of the wing patch in signalling information towards other competing males. In an evolutionary perspective, this signalling role might get lost over time because of other forces acting against it. So could potentially increased predation on individuals with wing pigmentation lead to the loss of the trait in the whole species and its ancestors. In my between species phylogenetic comparative study I found a pattern that fits this prediction. Wing pigmentation evolved several times in different lineages of Odonata, and was subsequently lost three times more often. Interestingly, my analyses also indicate a difference in the evolutionary history of wing pigmentation between tropical and temperate species, possibly indicating different selective pressures acting on this trait in both regions. This will have to be investigated more closely in the future!" (Author)] Address: not stated

**20625.** Ul Islam, S.; Lin, W.; Wu, R.; Lin, C.; Islan, W.; Arif, M. (2018): Complete genome sequences of three novel cycloviruses identified in a dragonfly (Odonata: Anisoptera) from China. *Archives of Virology* 163: 2569-2573. ["Three cycloviruses (genus *Cyclovirus*, family *Circoviridae*) were recovered from a dragonfly (Odonata: Anisoptera) captured in Fuzhou, China. The three cycloviruses, named dragonfly associated cyclovirus 9, 10 and 11 (DfCyV-9, -10, -11), respectively, show 56.1-79.6% genome-wide identity to known cycloviruses and 61.6-65.1% among themselves. Thus, according to the current species demarcation criteria, they represent three novel cycloviruses. Notably, DfCyV-10 has a predicted replication-associated protein (Rep) that is most similar to that of bat associated cyclovirus 2 (BatACyV-2), a cyclovirus discovered in China, with 79.4% amino acid sequence identity, but a putative capsid protein (Cp) most similar to that of BatACyV-10, a cyclovirus discovered in Brazil, with 71.7% amino acid sequence identity. These data are useful for understanding the diversity and evolution of cycloviruses, especially those found in insects." (Authors)] Address: Du, Z., State Key Laboratory of Ecological Pest



Control for Fujian & Taiwan Crops, Fuzhou 350002, China.  
Email: duzhenguo1228@163.com

**20626.** Vinko, D.; Tratnik, A.; Bahor, M.; Erbida, N.; Pirnat, A.; Šalamun, A. (2018): [An inventory of dragonflies (Odonata) in the area of the Ribniki Nature Reserve in the Draga Valley near Ig. Report. Client: Public Institution Landscape Park Ljubljansko barje, Inner Gorice. Slovenian Odonatological Society, Ljubljana, October 2018: 29 pp., 3 appendices- (in Slovenian) [Google translator: With 49 species of dragonflies recorded, the area of Ribniki Nature Reserve in the Draga valley near Ig is one of the richest areas in Slovenia. And yet, 15 species of dragonflies are rare here. The 17 species present here are rare in the rest of the Ljubljana Marshes, for 7 the nature reserve is the only known habitat on the Marshes. 17 species are endangered, 5 protected, two listed in the Annex to the Habitats Directive and one in the Annex to the Berne Convention. New localities of the *Cordulegaster heros* have been found in the area. This European protected species, listed in Annexes II and IV of the Habitats Directive, is relatively common in the nature reserve and rare in the rest of the Ljubljana Marshes due to the lack of suitable habitat for it. In 2017, the *Leucorrhinia pectoralis* was first recorded here and re-certified in 2018. The medium-sized pond where this internationally strictly protected species was listed in Annexes II and IV of the Habitats Directive and Appendix II of the Berne Convention, thus, it represents the only confirmed habitat of the species in central Slovenia today. Active conservation measures are urgently needed to improve the conservation status of the species, and are based on a thorough inventory of the current state of the field, and we therefore suggest that the species be investigated as soon as possible in the nature reserve area. Given that the species has been regularly present in the last two years, although in smaller numbers, and aquatic biotopes are subject to succession and management, it is important to identify sites of development as soon as possible. The requirements of the species and the findings of the research required must therefore be incorporated into further management plans for the site. Further monitoring of the state of the ecological situation and the population also needs to be made. We reaffirmed the presence of the *Lestes dryas*, which is only the second species of the reserve area, the first being from the 1950s. Similar is the case with the rare bush beast (*Lestes barbarus*) and the beast beast (*Lestes virens vestalis*), which were not recorded in the area between 1954 and 2017. Some of the area's most important natural resources include the *Coenagrion scitulum*, *Erythromma lindenii*, *Epiheca bimaiculata* and *Sympetrum meridionale*. In the nature reserve Ribniki in the Draga valley near Ig we find the richest water in Slovenia from the point of view of the fauna of dragonflies. Many species diversity is also achieved, for example. Mura river with 56 species (Šalamun et al., 2015), Vipava valley with 53 (Vinko, 2016), Bela krajina with 50 (Šalamun et al., 2012), Mirna valley with 47 (Bahor, 2017), all of which on the surface much larger than in this project task of the area under consideration. Since there are not many large standing waters in central Slovenia, the ponds in the Draga valley near Ig are all the more important in order to preserve the diversity of dragonflies, including the wider area. The entire Ljubljana Marshes, together with the finds over the past two years, boasts the appearance of 51 species of dragonflies. For comparison, 45 species of dragonflies are known for the nearby Ljubljana, Rožnik and Šišenski hrib Nature Parks (Šalamun, 2018); for the entire City of Ljubljana there are 52 species (Kiauta, 2014a, 2014b; Vrhovnik et al., 2015, 2016; Šalamun, 2018), but only 42 species have been listed

in the City of Ljubljana in recent years (Vrhovnik et al., 2016; Šalamun, 2018).] Address: Vinko, D., Slovenska 14, 1234 Mengeš, Slovenia; E-mail: damjan.vinko@gmail.com

## 2019

**20627.** Alfarisiy, A. (2019): Odonata survey on some of the outer islands of Belitung Regency, Belitung island, Indonesia. *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 29: 1-34. (in English) ["Another survey of Odonata on the Indonesian island of Belitung is reported. This survey was the second survey conducted in the Belitung area with International Dragonfly Fund support and was focused to Belitung Regency's outer islands. 72 species were recorded during the survey. Significant records from the surveyed islands include *Amphicnemis kuiperi*, *Mortonagrion arthuri*, *Mortonagrion appendiculatum*, *Teinobasis ruficollis*, *Platyllestes heterostylus*, *Pornothemis serrata*, *Pornothemis starrei* and *Tramea phaeoneura*. Almost all the records are new to the small islands surveyed, except for *Mendanau Island* for which there were already records of four species. A checklist of the odonate fauna of the outer islands is given in an appendix." (Author)] Address: Alfarisiy, A., Zoology Division, Belitung Biodiversity Observer Foundation, Belitung, Indonesia. E-mail: akbaral mulk@gmail.com

**20628.** Bahuguna, P.; Joshi, H.K.; Kumar, K. (2019): A report on drifting behaviour of odonata (aquatic insects), *Kyunja Gad*, a spring fed tributary of River Mandakani, Chamoli, Garhwal, Uttarakhand. *J. Mountain Res.* 14(2): 63-67. (in English) ["Odonata is an important group of macroinvertebrates which are highly sensitive to environmental changes and pollution. This is the reason why they are mostly studied as change in water quality pattern. The dial study of drifting behavior in such species also indicates towards the feeding behavior of fishes available in that habitat. In the present communication an attempt has been made to view the drifting patterns in a sensitive macro zoobenthic group Odonata in the *Kyunja Gad* which is a tributary of the snow-fed River Mandakani." (Authors)] Address: Bahuguna, P., Bio-diversity Lab, Dept of Zoology, A.P.B.Govt.P.G.College Agustyamuni, District Rudraprayag, Uttarakhand-246421, India. E-mail: pankajpaurii@gmail.com

**20629.** Borisova, N.V.; Karolinsky, E.A. (2019): First record of the white-tailed skimmer (*Orthetrum albistylum* (Selys, 1848) from the Chuvash Republic. *Natural Science Research in Chuvashia* 5: 55-56. (in Russian, with English summary) ["1 male, 17.VIII.2018, Yalchik district, okr. Eshmikeevo village, the Prisursky gas processing plant, Yalchiksky block (55°01'50"N, 47°55'10"E)." (Authors)] Address: Borisova N.V. Russia, Cheboksary, FSBI "Prisursky State Reserve", Chuvash Branch of the Russian Entomological Society. Email: natborisova18@yandex.ru

**20630.** Bose C., N.; Kakkassery, F.K. (2019): Study on the diversity and abundance of odonates in three different geographic divisions in Kerala. *Biodiversity of Kerala after Deluge-Concerns, Implications and Conservation Strategies* 22-23 February 2019: 74-78. (in English) ["Like all living organisms, odonate diversity is also susceptible to environmental factors. The objective of the present study was to analyse how different geographical features affect the distribution and diversity of odonates. For the present survey, 12 different locations of Thrissur and Ernakulam districts were selected and they were categorised under three geographical divisions- the eastern highlands, the central midlands and the western coastal plains. The observation was

carried out for 1 year from August 2017 to July 2018. A total of 61 species were encountered during the survey. Maximum species richness was observed in the eastern highlands, followed by central midlands and western coastal plains. Similarly, maximum values of diversity indices were recorded from eastern highlands, followed by central midlands and western coastal plains. Our observations indicate that Marotichal, Athirampilly, Vazhani and Malayatoor in the eastern highlands has a diverse odonate fauna." (Authors)] Address: Bose, Nitha, Research and Postgraduate Dept of Zoology, St. Thomas' College (Autonomous), Thrissur-680001, Kerala, India. Email.: nithabose123@gmail.com

**20631.** Csar, D.; Gumpinger, C.; Pichler-Scheder, C.; Höfler, S.; Chovanec, A. (2019): Sanierung der Morphologie kleiner und mittlerer Fließgewässer in Österreich Resultate und Erkenntnisse aus Best-Practice Projekten inkl. Empfehlungen für die Erfolgskontrolle. Im Auftrag des Bundesministeriums für Nachhaltigkeit und Tourismus. Forschungsprojekt Nr. 101291: 81 pp. (in German) ["As part of the implementation of the European Water Framework Directive (WFD), watercourses throughout Austria are being upgraded and renatured in order to achieve "good ecological status" or "good ecological potential". However, the effectiveness of the measures is often below the improvement that can be shown with the currently available assessment systems, the jump to a better ecological status class. If this jump in class does not occur after the implementation of a measure, the measure was not necessarily unsuccessful. In the present project, measures already completed throughout Austria to improve the ecological situation of water bodies were collected with accompanying monitoring studies and the data analysed in order to derive general recommendations for success monitoring. Since no such recommendations for the recording and evaluation of measure effects have been available so far, a methodological framework for effect documentation was developed, with which one can already present and evaluate small changes in the water ecological situation at measure level. The results of surveys of the quality elements in accordance with the guidelines of the EU Water Framework Directive, which can be supplemented as needed by various criteria that offer a higher resolution by considering additional aspects and thus enable improved interpretation of the results and the presentation of even small successes, essentially serve as the basis for monitoring the success of the measures. For data entry, calculation and presentation, the template of a calculation table was developed in the generally available software Microsoft Excel. The results are transferred to a summary data sheet, supplemented with characteristic data on the water body and the measure, and concluded with an expert assessment. This data sheet finally functions as a short report for the general documentation of the effect of the measure and guarantees the comparability of projects. In the coming years, this methodological framework will be tested, evaluated and further developed in practice." (Authors/DeepL)] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, A-1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

**20632.** Ferreira do Amaral, D.; Montalvão, M.F.; Mendes, B.; Araújo, A.P.; Rodrigues, A.S.; Malafaia, G. (2019): Sublethal effects induced by a mixture of different pharmaceutical drugs in predicted environmentally relevant concentrations on *Lithobates catesbeianus* (Shaw, 1802) (Anura, ranidae) tadpoles. *Environmental Science and Pollution Research* 26(1): 600-616. (in English) ["The increasing consumption of medications by humans has negative effects such as the increased disposal of these compounds in the

environment. Little is known about how the disposal of a "drug mix" (DM) in aquatic ecosystems can affect their biota. Thus, we evaluated whether the exposure of *Lithobates catesbeianus* tadpoles to a DM composed of different medication classes (antibiotic, anti-inflammatory, antidepressant, anxiolytic, analgesic, and antacid drugs)—at environmentally relevant concentrations—may change their oral morphology, trigger behavioral disorders, and have mutagenic effects on erythrocyte cells. Based on our data, animals exposed to the DM showed changes in mandibular sheath pigmentation, dentition, and swimming activity, as well as atypical behavior in the social aggregation test [with co-specific and interspecific (*Physalaemus cuvieri*) individuals] and antipredatory defensive response deficit (chemical stimulus from Odonata larvae), after 15 exposure days. The mutagenic analysis revealed higher frequency of nuclear abnormalities in the erythrocytes of tadpoles exposed to the DM (e.g., multilobulated, blebbed, kidney-shaped, notched nucleus, binuclear, and micronucleated erythrocytes). Given the chemical complexity of the DM, we assumed that several organic functions may have been affected, either by the isolated, synergistic, antagonistic, or additive action of DM compounds. Finally, our study confirms the toxicological potential of DM in *L. catesbeianus* tadpoles, with emphasis to impacts that can affect the fitness of individuals and their natural populations. Thus, we suggest that more attention should be given to the disposal of medications in the environment and reinforce the need of improving water and sewage treatment systems." (Authors)] Address: Ferreira do Amaral, D., Post-Graduation Program in Conservation of Cerrado Natural Resources – Biological Research Lab., Goiano Federal Institute—Urutaí Campus, Urutaí, Brazil

**20633.** Fraixedas, S.; Galewski, T.; Ribeiro-Lopes, S.; Loh, J.; Blondel, J.; Fontès, H.; Grillas, P.; Lambret, P.; Nicolas, D.; Olivier, A.; Geijzendorffer, I.R. (2019): Estimating biodiversity changes in the Camargue wetlands: An expert knowledge approach. *PLoS ONE* 14(10): e0224235. <https://doi.org/10.1371/journal.pone.0224235>: 18 pp. (in English) ["Mediterranean wetlands are critical strongholds for biodiversity and the provision of ecosystem functions and services; yet, they are being severely degraded by a number of socio-economic drivers and pressures, including climate change. Moreover, we still lack comprehensive understanding of the extent to which biodiversity loss in Mediterranean wetlands will accelerate change in ecosystem processes. Here, we evaluate how changes in biodiversity can alter the ecosystem of the Camargue (southern France). We collected data on species presence/absence, trends and abundance over a 40-year period by combining observations from the scholarly literature with insights derived from expert knowledge. In total, we gathered more than 1500 estimates of presence/absence, over 1400 estimates of species abundance, and about 1400 estimates of species trends for eight taxonomic groups, i.e. amphibians, reptiles, breeding birds, fish, mammals, dragonflies (odonates), orthopterans and vascular plants. Furthermore, we used information on recently arrived species and invasive species to identify compositional changes across multiple taxa. Complementing targeted literature searches with expert knowledge allowed filling important gaps regarding the status and trends of biodiversity in the Camargue. Species trend data revealed sharp population declines in amphibians, odonates and orthopterans, while birds and plants experienced an average increase in abundance between the 1970s and the 2010s. The general increasing trends of novel and invasive species is suggested as an explanation for the changing abundance of birds and

plants. While the observed declines in certain taxa reflect the relative failure of the protection measures established in the Camargue, the increasing exposure to novel and invasive species reveal major changes in the community structure of the different taxonomic groups. This study is the first attempt to assess changes in biodiversity in the Camargue using an expert knowledge approach, and can help manage the uncertainties and complexities associated with rapid social-ecological change in other Mediterranean wetlands. ... To compile the species lists for odonates and orthopterans, we consulted the management plan of the Tour du Valat Regional Nature Reserve written by Cohez et al. [15] and the MSc thesis about odonates and orthopterans by Merlet [16]. This gave us information on species presence/absence and their status (e.g. abundance, distribution, nativeness). For odonates, we also looked for quantitative data (number of individuals) from the National Odonata data collection programme (Complément à l'inventaire des libellules de France) known as «CILLIF» (French Odonatological Society, Société française d'odonatologie – SfO) for the period 2014-2016 to help complementing the species list, as well as the doctoral thesis from Aguesse [17] and the revision of the species red list for the Provence-Alpes-Côte d'Azur region by Lambret et al. [18]. As for orthopterans, the list was further elaborated with the doctoral thesis of Bigot [19], one of Bigot's works [20], and the red list for the Mediterranean region from Sardet and Defaut [21]. Both lists were checked and supplemented by an expert from the Tour du Valat. Lack of literature for the 1970s made difficult to obtain qualitative information for both groups (also for many orthopteran species we could not find information for their present status). However, for some species qualitative information on the species abundance and distribution could be added to the surveys." (Authors)] Address: Fraixedas, Sara, Tour du Valat, Research Institute for the conservation of Mediterranean Wetlands, Le Sambuc, Arles, France. E-mail: sara.fraixedas@helsinki.fi

**20634.** Jusys, V.; Eigirdas, V.; Gliwa, B. (2019): First records of *Pantala flavescens* and *Anax ephippiger* (Odonata, Libellulidae) in Lithuania. *Lietuvos Entomologu Draugijos Darbai* 3(31): 5-7. ["The bird traps of Ventes Ragas ornithological station along with birds and bats catch a large number of dragonflies and few damselflies as well. In September 2016 the author (V.J.) started to mark Odonata with a permanent marker and identify them. Marked dragonflies have always been released. Dragonflies of rare species or such with atypical colouring or markings have also been documented using an SLR digital camera. Birds are observed and ringed at other spots in Lithuania too. Whilst doing so, the author (V.E.) took a picture and video of a teneral dragonfly. List of localities: Ventes ragas, bird traps at the ornithological station, Šilute distr. Lat 55.341388, Long 21.-191666. Paupys, fish farm Raseiniai distr. Lat 55.339444, Long 22.950555. Results: A single male of *Pantala flavescens* (22-V-2019, Vytautas Jusys, Fig. 1) was captured in the bird traps in Ventes ragas, a teneral male of *Anax ephippiger* (23-VIII-2019, Vytautas Eigirdas) was observed in the fish farm in Paupys, a female of *A. ephippiger* (16-X-2019, Vytautas Jusys, Fig. 2) was captured in the bird traps of Ventes Ragas.] Address: Jusys, V., Ornithological Station Ventes Ragas, Mariu g. 24, LT-99361 Vente, Lithuania. E-mail: vrventragis@gmail.com

**20635.** Kamaruzaman K.; Rasdi, I. (2019): The role of mosquito predators in the ecosystem in reducing the incidence of Dengue. *Asian J Agric & Biol.* 2019; Special Issue:

131-137. ["The aim of this study was to show that the presence of mosquito predators in the ecosystem decreased the incidence of dengue cases. Data was obtained by daily inspection of 85 *Aedes* mosquito potential breeding point at 15 dengue outbreak hotspot localities with at least one mosquito predator present at the locality and the VEKPRO programme used in the monitoring of dengue cases in Malaysia. The mosquito predators identified were dragonfly, dragonfly nymph, gambusia fish, tadpole and frog. The study was done at the district of Petaling from 4th January, 2015 to 4th July 2015. The results show that the presence of mosquito predators hinder the breeding of *Aedes* mosquito in the ecosystem which is related to a decrease in dengue cases." (Authors)] Address: Kamaruzaman K, Dept of Environmental & Occupational Health, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

**20636.** Kathan, B. (2019): Die Libellenfauna (Insecta: Odonata) des Spitzbergs bei Tübingen unter besonderer Berücksichtigung der Arten *Sympecma fusca* (Lestidae) und *Cordulegaster bidentata* (Cordulegasteridae). Bachelorarbeit der Mathematisch-Naturwissenschaftlichen Fakultät der Eberhard Karls Universität Tübingen: 106 pp. (in German) ["Holistic mapping of the order Odonata is in itself an exceptional case. In this work, this intensive type of recording was additionally provided with a three-part focus. The study was carried out over the course of a whole year on the Spitzberg near Tübingen, a study area with little water, but nevertheless promising in terms of dragonflies. In addition to all ground-dwelling species, species that are often neglected in routine mapping and occur purely temporarily for hunting and maturing purposes were also recorded with the same intensity in the entire area. At the same time, comprehensive surveys of the species *Sympecma fusca* and *Cordulegaster bidentata* flying on the Spitzberg were carried out between March 2018 and February 2019. Both species are highly specialised and particularly complex to record, which is why their complex biology has still not been fully deciphered in detail. With regard to *S. fusca*, we investigated which areas of the Spitzberg the imagines use during the maturation period in spring and autumn, whether they overwinter in the study area and to what extent the habitat structures used during this part of the life cycle overlap. Concerning *C. bidentata*, an intensive sampling of the larval habitats, i.e. all spring rivulets in the blades of the Spitzberg, was carried out. In addition to the distribution of the larvae, their degree of association within all microhabitats of a spring rivulet was investigated. In addition, the different size classes into which all recorded individuals were divided were checked for any significant differences in their distances to the main sources of the respective streams. 19 of the total of 33 dragonfly species recorded at Spitzberg in 2018 as part of this work subjected the study area to purely temporary use, 14 species were classified as native. *S. fusca* was recorded in high abundance, numerous habitats used in autumn, winter and spring overlapped. Reproduction of the species took place both on the Spitzberg itself and in the nearby surrounding area. *C. bidentata* was recorded in high abundance in the larval stage in several sections of spring rivulets, partly syntopically with *Cordulegaster boltonii* and *Aeshna cyanea*. The majority of individuals were found living solitarily in a microhabitat, but many larvae were also associated in small groups within a microhabitat at the time of discovery. The 4 different size classes did not differ significantly in their distances from the main source." (Author/DeepL) <https://www.researchgate.net/publication/33853->

1877\_Die\_Libellenfauna\_Insecta\_Odonata\_des\_Spitzbergs\_unter\_besonderer\_Berucksichtigung\_der\_Arten\_-Sympecma\_fusca\_Lestidae\_und\_Cordulegaster\_bidentata\_Cordulegasteridae] Address: Kathan, B., Loenstr. 9/1, 88299 Leutkirch im Allgäu, Germany. Email: bastiankathan@web.de

**20637.** Kim, Y.j.; Kong, D.S. (2019): Benthic macroinvertebrates fauna of Mt. Chilbo. Korean J. Nat. Conserv. 18(1): 1-13. (in Korean, with English summary) ["Benthic macroinvertebrates fauna was investigated at the Mt. Chilbo, Gyeonggi-do, Korea, from June to October, 2019. 4 sites located around the Mt. Chilbo were selected for quantitative (surber net: 30×30cm, mesh size: 1mm) of benthic macroinvertebrates. Including qualitative sampling, total 39 species, 31 families, 12 orders, 6 classes in 4 phyla occurred. Insecta was composed of 6 species in Ephemeroptera, 4 species in Odonata [*Ischnura asiatica*, *Calopteryx atrata*, *Davidius lunatus*, *Sympetrum flaveolum*], 1 species in Hemiptera, 2 species in Coleoptera, 9 species in Diptera and 5 species in Trichoptera. Non-insecta was 12 species composed of 1 species in Platyhelminthes, 4 species in Mollusca and 2 species in Annelida 5 species in Crustacea. The dominant species and the subdominant species based on individual abundance were Chironomidae sp. and *Physa acuta* with 20.4% and 18.7% of dominance respectively. McNaughton's dominance indices, Shannon-Weaver's diversity indices, Margalef's species richness indices and Pileou's evenness indices, Kong's Benthic Macroinvertebrate indices of benthic macroinvertebrates (BMI) showed the range of 0.53~0.82, 1.27~2.76, 1.09~2.84, 0.68~0.81, and 26.6~57.9 respectively." (Authors)] Address: Kim, Ye Ji., Dept of Life Science, Kyonggi Univ., Korea

**20638.** Koszalka, J.; Jablonska-Bama, I. (2019): Aquatic macroinvertebrate biodiversity in freshwaters in northeastern Poland. In: The Handbook of Environmental Chemistry book series (HEC, volume 87): Polish River Basins and Lakes – Part II: 103-125. (in English) ["Biodiversity is a significant element that describes the ecological state of waterbodies. Eutrophication is a widespread problem that has an impact on water habitats and leads to the succession of sensitive species. Habitat degradation results in significant, predictable decreases in taxonomic diversity. We assessed benthic macroinvertebrate community structure (mainly families) in 9 rivers, 9 ponds, and 23 lakes in northeastern Poland. Mollusca, Annelida, Arthropoda, and Nematelminthes were the 4 phyla represented, and 76 Insecta families, 5 taxa of Crustacea, and 12 Mollusca families were identified. A total of 91 taxa (mainly families) were recorded in all of the waterbodies studied. Diptera, Trichoptera, Ephemeroptera, and Gastropoda were the major components of the benthic macroinvertebrate communities in the aquatic habitats studied. The biodiversity values of the macroinvertebrate assemblages in the rivers and lakes studied were similar. This likely resulted from the similar number of habitats in both types of waters. Differences in biodiversity among the various waterbodies could be evidence of the moderate, diversified anthropogenic pressure to which they are subjected. The analysis of similarities indicated that in terms of the benthic macroinvertebrate communities, the waterbodies studied formed three groups, which, with just one exception, consisted separately of rivers, ponds, and lakes." (Authors)] Address: Koszalka, J., Dept of Tourism, Recreation & Ecology, Faculty of Environmental Sciences Univ. of Warmia and Mazury in Olsztyn, Olsztyn, Poland

**20639.** Liu, Y.; Wang, Y.; Zhang, Z.; Bu, Y.; Niu, H. (2019):

Roost selection and ecology of *Stoliczka's* trident bat, *Aselliscus stoliczkanus* (Hipposideridae, Chiroptera) in China. Mammalian Biology 95: 143-149. (in English) ["Bats choose their habitats based on microclimate, structure, environment, human disturbance and availability. Selection of suitable roosts by bats can have fitness benefits by providing shelter and a place to rear young. To clarify the mechanism of habitat selection by *Stoliczka's* trident bat (*Aselliscus stoliczkanus*), roost selection, ecology and diet of this species were studied from December 2013 to September 2017 in mainland China. Ninety-six potential roosts were investigated. Of these, 73 roosts were occupied by bats, and 20 of these roosts were used by *A. stoliczkanus*. Eighteen variables related to habitat characteristics were measured, and *A. stoliczkanus* habitat preferences were evaluated using independent-samples t-tests and Chi-square tests. The major environmental factors affecting selection of roosts were determined by principal component analysis (PCA). Roosts used by *A. stoliczkanus* were significantly smaller in size than those used by other bat species, with more and narrower entrances. Hibernation roosts of *A. stoliczkanus* had relatively longer roost length, as well as lower entrances. Breeding roosts of *A. stoliczkanus* were close to the nearest water source and had more entrances, with more area covered by water. Disturbance levels were significantly higher in non-breeding roosts than that in breeding roosts, and disturbance levels were lower in hibernation roosts than non-hibernation roosts. Entrances of breeding roosts were more commonly located on sunny slopes, while entrances of hibernation roosts were more commonly located on shady slopes. Our results are the first to describe roost characteristics and habitat selection of *A. stoliczkanus*, and increase our understanding of the ecology and habitat of this species. The diet of *A. stoliczkanus* mainly includes five orders of insects, namely, Lepidoptera, Coleoptera, Hemiptera, Odonata, and Diptera, and showed clear seasonal variation from summer to autumn." (Authors)] Address: Liu, Yingying, College Life Science, Henan Normal Univ., Xinxiang, 453007, China

**20640.** Lounis, K. (2019): Inventaire et écologie des macroinvertébrés dans les mares temporaires de la région d'Oum El-Bouaghi (Nord-Est algérien). Thèse Présentée en vue de l'obtention du doctorat LMD, Université Larbi Ben M'hidi Oum El Bouaghi, Faculté Des Sciences Exactes et des Sciences de la Nature et de la Vie, Département des Sciences de la Nature et de la Vie: 117 pp. (in French, with English summary) ["This work aims to conduct a systematic study of the macroinvertebrate species of seventeen temporary pools south of Oum El Bouaghi, in order to bring a contribution to the knowledge of the entomofauna of these ephemeral ecosystems which is not well known and analyze their waters for better characterize their environment where 18 physicochemical parameters were analyzed. Faunal samples were harvested using a surgeon net. Identification of organisms was done using the determination keys (Dejoux et al., 1981; Tachet et al., 2002) and digital keys. The results of the physicochemical analyzes carried out on the 17 stations revealed that the temperature of the water varies between 12.6 °C and 20.3 °C, with an average of 17.36 ± 2.13 °C, the pH of the waters varies between 6.45 and 8.48, with an average of 7.34 ± 0.54. The dissolved oxygen showed an average of 5.81 ± 0.66mg / l and the electrical conductivity of the waters of the region is large and varies between 966 and 1055 µS.cm<sup>-1</sup>, with an average value of 1012.1 ± 20.17 µS.cm<sup>-1</sup>. For pollution elements, only nitrates can present a serious contamination. Faunistic analysis has identified 11 orders, 31 families and 47 species



of which 39 are constant, 7 ubiquitous and only one accessory. The number of benthic population showed that Beetles are the largest numerically important ecological group (41.94%), followed by odonates with 9.68%, followed by orders from Amphipods and Basommatophores with 6.45%, while other orders represent only 3.22% each." (Author)] <http://bib.univ-oeb.dz:8080/jspui/handle/123456789/9115>

**20641.** Mohamed, M.; Noor-Izwan, A.; Kemalok, J.; Zakaria, M.Z.; Aziz, M.A.A.A.; Hamdin, M.S.; Ismail, N.; Subadi, N.M. (2019): Insects of Taman Negara Johor Tanjung Piai: A Ramsar site. *Journal of Wildlife and Parks* 34: 53-62. (in English) ["Tanjung Piai, located in Pontian district, forms the southernmost point of mainland Asia. This wetland area has been classified as one of six RAMSAR sites in Malaysia. This study was performed to record the number of insect fauna that can be found in the area. The focus was on three main insect groups: ants, butterflies, and odonates. The collection was conducted using general collection methods, namely baited traps and sweep netting. Overall, 36 species of insects from the three main groups were recorded. Formicidae recorded the highest number of species (21), followed by Odonata with nine species and butterflies with six. The low number of insects collected was due to the comparatively low diversity of vegetation and poor accessibility. The conditions of the waterlogged area limited the sampling collection process. Nevertheless, this is the first attempt to record insect species at Taman Negara Johor Tanjung Piai.... The present assemblage of odonate species sampled from Tanjung Piai shows common flowing stream species; they could be using freshwater bodies around the park as their breeding and foraging ground, as no species are known to live in salty or brackish water. As Tanjung Piai is open to the sea, with relatively few freshwater bodies, the diversity among odonates was also poor. The most common species found in this area were *Orthetrum sabina* and *Orthetrum chrysis*, while there were no signs of damselflies in the area during the survey." (Authors)] Address: Mohamed, M., Centre of Research on Sustainable Uses of Natural Resources (CoR-SUNR), Faculty of Applied Science and Technology Universiti Tun Hussein Onn Malaysia, Pahang Campus, KM 1, Jalan Panchor, 84000 Muar, Johor. E-mail: maryati@uthm.edu.my

**20642.** Moratin, R.; Dabry, J.; Terno, V. (Coord.) (2019): Atlas préliminaire des Odonates du Grand Est. Faune Grand Est documents n°1: 93 pp. (in French) [The odonate fauna of northeastern France in the Lorraine and Alsace regions is mapped.] Address: [https://www.odonat-grandest.fr/telechargements/FauneGrandEst/FauneGrandEst\\_documents/FGEdoc1\\_atlas\\_odonata\\_GrandEst.pdf](https://www.odonat-grandest.fr/telechargements/FauneGrandEst/FauneGrandEst_documents/FGEdoc1_atlas_odonata_GrandEst.pdf)

**20643.** Müller, Z.; Szabó, T.; Gáspár, A.; Juhász, P.; Ludányi, M.; Málnás, K.; Mihaliczku, E.; Olajos, P.; Polyák, L.; Kiss, (2019): Contribution to the Hungarian dragonfly fauna, based on the nationwide surveys (Odonata: Anisoptera). *Folia Historico-Naturalia Musei Matraensis* 43: 33-80. (in English) ["Between 1996 and 2017 dragonfly larvae, exuviae and imagoes were collected from 1846 different sampling locations in Hungary. The published 38 species of Anisoptera belong to 5 families (10 Aeshnidae, 2 Cordulegasteridae, 4 Gomphidae, 4 Corduliidae and 18 Libellulidae). Larval data for the following species are the most important faunistic results: *Aeshna viridis*, *Anax ephippiger*, *Cordulegaster bidentata*, *C. heros*, *Leucorrhinia caudalis* and *L. pectoralis*." (Authors)] Address: Müller, Z., BioAqua Pro Ltd., 4032 Debrecen, Hungary, Soó Rezső u. 21. Email: mullerz@bioaquapro.hu

**20644.** Ramamonjisoa, N.; Nakanishi, K.; Natuhara, Y. (2019): The efficacy of a generalized antipredator defense against a novel predator depends on the source of induction in prey. *Hydrobiologia* 836: 197-205. (in English) ["Ecological naiveté or the failure to recognize a novel enemy is often put forward as a cause of extirpation of biodiversity in newly invaded systems. We tested the efficacy of a generalized antipredator defense, namely reduced activity level, in the tadpoles of *Rhacophorus arboreus* to the threat of the invasive predator red swamp crayfish *Procambarus clarkii* in simplified laboratory environments. We first investigated the behavioral responses of the tadpoles in the presence of caged fed predators (native: dragonfly larvae and newts, and novel *P. clarkii*), and subsequently tested the vulnerability of predator-induced tadpoles to free-ranging predators. The tadpoles reduced activity level in the presence of the native predators but did not recognize the crayfish. Reducing activity level increased survival in the presence of native predators. This behavior was still effective in the presence of crayfish, but survivorship varied with the identity of the native predator from which the tadpoles received induction cues: tadpoles that were previously exposed to dragonfly larvae noticeably survived better than those previously induced by newts. Our findings suggest that naive prey may exploit information from native predators to better resist the threat of novel predators, but not all sources of induction confer the same benefit." (Authors)] Address: Ramamonjisoa, N., Graduate School of Science, Kyoto Univ., Kyoto, 606-8501, Japan

**20645.** Rhainds, M. (2019): Ecology of female mating failure/lifelong virginity: a review of causal mechanisms in insects and arachnids. *Entomologia Experimentalis et Applicata* 167: 73-84. (in hermaphroditism, Lampyridae, mating cost, neoteny syndrome, population density effects, precopulatory cannibalism, scaling inversion, sex role reversal, Strepsiptera, wallflowers) ["Sexual reproduction implies binary outcomes of competitive interactions for access to male gametes: lifelong virgin females with null fitness vs. mated females with variable (generally nonzero) fitness. Female mating failure has long remained a dormant concept in sexual selection theory in part because it is acutely maladaptive (lifelong virgins that do not reproduce are strongly selected against) and also due to widespread acceptance of the Bateman–Trivers paradigm (anisogamy and correlated sex roles). Based on recent scientific output on lifelong virginity across multiple taxonomic groups in insects (Coleoptera, Diptera, Hemiptera, Lepidoptera, Odonata, Orthoptera, Strepsiptera), female mating failure has become a mainstay of sexual selection over the last decade. Lifelong virginity and senescence (death) are intertwined processes; old virgin females compensate for increased risk of lifelong virginity by becoming less choosy and increasing investment in mating-related activities. Low rates of female lifelong virginity (<5%) in most natural populations of insects indicate that sex generally 'works' due to selective pressures acting on both males and females to enhance lifetime fitness. Mating failures are most common in insects with female flightlessness; these pressures may lead in evolutionary time to transitional pathways from sexual reproduction to parthenogenesis. Female mating probability is affected by nonlinear density-dependent processes dependent upon the scale of observation (mate-encounter Allee effect at large spatial scales, mating interferences between females at small scales). Mate choice and sex role reversal (females being the active sexual partner) are ubiquitous in insects and arachnids with significant paternal investment, but consequences

in terms of female lifelong virginity remain unknown. Logistically, conceptual development of female mating failure in insects is most limited by the lack of broadly applicable methods to assess rates of lifetime virginity among flighted females." (Authors)] Address: Rhainds, M., Natural Resources Canada, Canadian Forest Service – Atlantic Forestry Centre, 1350 Regent St, PO Box 4000, Fredericton, New Brunswick, E3B 5PT, Canada. E-mail: marc.rhainds@canada.ca

**20646.** Rodrigues, M.E.; Moura, E.B.; Roque, F.O. (2019): Dragonflies as indicators of the environmental conditions of veredas in a region of Central-Western Brazil. *Oecologia Australis* 23(4): 969-978. (in English) ["Veredas (palm swamps) play a critical role in maintaining the hydrological system and they are considered the cradle of the waters of the Brazilian Cerrado. Currently, veredas are suffering intense human pressure due to the conversion of native landscapes for other land uses as agriculture, pasture and urban environments. Few studies have evaluated the biodiversity of veredas and the current effects of human impact, especially on aquatic communities. Odonata have excelled as bioindicators of environmental quality and they are increasingly used in environmental monitoring programs. In this study, we evaluate whether loss of riparian vegetation around the vereda areas alters the communities of Odonata and whether the species can be considered bioindicators of these environmental conditions. Our hypothesis is that eco-physiological and behavioral characteristics, such as thermoregulation capacity and oviposition behavior, influence the persistence of species in communities in natural or altered environments. We sampled 25 veredas and classified them into two groups, namely "preserved riparian vegetation" (VRP), when the riparian vegetation surrounding the sampled stretch was 30 meters or more, and "altered riparian vegetation" (VRA), when the vegetation extended for less than 30 meters from at least one of the banks. Our results showed that the composition of the communities in areas classified as VRP was more similar to each other and different from the communities found in the areas classified as VRA. Of the 52 species observed, 11 species responded as indicators for preserved or altered riparian vegetation. Of these species, four were indicative of areas with preserved riparian vegetation and seven were indicative of veredas with altered riparian vegetation. Our results show that the composition of dragonflies and damselflies, and some taxa in particular may be potential indicators of the condition of veredas, and may, therefore, be included in vereda monitoring programs in Central-Western Brazil." (Authors)] Address: Rodrigues, M.E., Univ. Estadual de Santa Cruz, Depto de Ciências Biológicas, Programa de Pós-graduação em Sistemas, Aquáticos Tropicais, Lab. de Organismos Aquáticos, Rod. Jorge Amado, Km 16, CEP 45662-900, Ilhéus, BA, Brazil. E-mail: rodrigues.mbio@gmail.com

**20647.** Sinaei, M.; Loghmani, M. (2019): Plankton and aquatic insect biodiversity in the Sarbaz River, Southeastern Iran. *Indian Journal of Geo Marine Sciences* 48(12): 1907-1915. (in English) ["Studying plankton community and determining the trends in river pollution are of great value and importance. In the present work, plankton and aquatic insect community were evaluated in 10 sites along the Sarbaz River in southeastern Iran. Among the species identified, *Navicula* has the highest incidence with five species. The highest frequency and density belongs to the ciliates group. Results indicate that the studied environment has a poor planktonic diversity and density. Results suggested that a decrease in plankton communities could be one of

the factors influencing reductions in mugger crocodile (*C. palustris*) hatchling survival. Moreover, it was found that dominant populations of aquatic insects are susceptible to organic pollutants with tolerating levels of 0 to 4 from Diptera, Ephemeroptera, Trichoptera, Ephemerehidae, Hemiptera, Odonata ["Aeshnidae, Calopterygidae"] orders. Moreover, an increase is noted in the Family Biotic Index (FBI) in downstream sites, suggesting a decrease in water quality compared with other sites." (Authors)] Address: Sinaei, M., Dept of fisheries, Chabahar branch, Islamic Azad Univ., Chabahar, Iran. E-mail: oceanography.sina@gmail.com

**20648.** Su, X.; Zhang, K.; Zheng, J.; Zhang, J.; Zhao, Y. (2019): Numerical investigations on high lift force generation of 3D dragonfly wing during hovering motions. *IOP Conf. Series: Materials Science and Engineering* 616 (2019) 012005. doi:10.1088/1757-899X/616/1/012005: (in English) ["In the paper, a novel numerical method is present to numerically investigate life force generation mechanisms of 3D dragonfly wing during hovering motions. The dynamic mesh which describes the motion of 3D wing and gird change in inner computational domain is generated by an ALE model we developed. Then the mesh is transferred at each time step into ANSYS CFX using Junction Box Routine. The simulation results show that a high lift force generated by implementing one specified advanced flapping action during hovering motion in which the translation time period of downstroke is shortened." (Authors)] Address: Su, X., School of Hydraulic Engineering, Dalian Univ. of Technology, Dalian 116024, China. Email: zcx@mail.dlut.edu.cn

**20649.** Svensson, E.I. (2019): Eco-evolutionary dynamics of sexual selection and sexual conflict. *Functional Ecology* 33: 60-72. (in English) ["1. The research framework of eco-evolutionary dynamics is increasing in popularity, as revealed by a steady stream of review articles and a recent and influential book, but primary empirical research is lagging behind. Moreover, the few empirical case studies demonstrating eco-evolutionary dynamics might not be entirely representative. 2. Much current research on eco-evolutionary dynamics is focused on how ecological interactions lead to natural selection on phenotypic traits "eco-evo", and in turn how the evolutionary change in such traits feed back on ecological dynamics ("evo-eco"). A key feature of eco-evolutionary dynamics is thus a feedback loop between ecology (e.g., population dynamics) and evolution (i.e., genetic change). 3. In contrast to previous research on eco-evolutionary dynamics driven by natural selection, the role of eco-evolutionary feedbacks in sexual selection and sexual conflict is largely unknown. Here, I review theory and the limited empirical evidence in this area and identify some promising future lines of research. 4. I update a past review on contemporary evolution of secondary sexual traits in natural populations and formulate six explicit and rigorous criteria for contemporary evolution of secondary sexual traits by natural or sexual selection or sexual conflict. I then discuss the other key prediction of eco-evolutionary dynamics (i.e., evolution by sexual selection or sexual conflict shapes ecological dynamics). My overview reveals that our current knowledge in this area is limited and mainly come from theoretical models and laboratory experiments. 5. A major challenge in eco-evolutionary dynamics is therefore to link ecological and population dynamics with sexual selection and sexual conflict. This is not an easy task but might be possible with carefully chosen study systems and methods." (Authors)] Address: Svensson, E.I., Evolutionary Ecology Unit, Dept of Biol., Lund Univ., Lund, Sweden. Email: erik.svensson@biol.lu.se

**20650.** Torralba Burrial, A. (2019): In Memoriam Francisco Javier Ocharan Larrondo (1946-2019). Boln. Asoc. esp. Ent. 43(3-4): V-XX. (in Spanish) [Obituary. [https://www.researchgate.net/publication/338854682\\_In\\_Memoriam\\_Francisco\\_Javier\\_Ocharan\\_Larrondo\\_19\\_46-2019](https://www.researchgate.net/publication/338854682_In_Memoriam_Francisco_Javier_Ocharan_Larrondo_19_46-2019)] Address: Torralba Burrial, A., Dpto. Ciencias de la Educación - Universidad de Oviedo - Oviedo, Spain. E-mail: torralbaantonio@uniovi.es

**20651.** Weathered, J.; Hammill, E. (2019): Adaptation to agricultural pesticides may allow mosquitoes to avoid predators and colonize novel ecosystems. *Oecologia* 190(1): 219-227. (in English) ["Human activities such as the application of agrochemicals may detrimentally disturb natural ecosystems, generating novel selection pressures. Here we examine how pesticides may influence community composition using the aquatic communities within bromeliad phytotelmata, and how adaptive responses to pesticides may influence community-level patterns. We first quantified the composition of macroinvertebrate communities from pesticide-free and pesticide-exposed locations. Complementary manipulative experiments where bromeliads were transplanted between pesticide-free and pesticide-exposed sites were then performed. Finally, pesticide bioassays on the most common predators (*Mecistogaster modesta* damselflies) and prey (*Wyeomyia abebela* mosquitoes) assessed a potential evolutionary mechanism that may influence community compositional differences. Our field survey revealed differences in *W. abebela* and *M. modesta* abundances between pesticide-free and pesticide-exposed areas. Our transplant experiment suggested compositional differences were not due to physical differences between bromeliads from different locations. Pesticide bioassays revealed that *M. modesta* from pesticide-free locations had higher innate pesticide tolerances than *W. abebela* from pesticide-free areas, but *M. modesta* larvae showed no evidence of adapted resistance as none were found where pesticides were used. Conversely, *W. abebela* larvae from pesticide-exposed locations had higher pesticide tolerances than individuals from pesticide-free sites, suggesting an adaptive response. This evolved resistance to pesticides may, therefore, allow *W. abebela* to colonize habitats free of the dominant predator in the system, explaining the higher *W. abebela* abundances in pesticide-exposed areas than in pesticide-free locations. We suggest that the total effect of novel stressors is driven by interactions between ecological and evolutionary processes." (Authors)] Address: Hammill, E., Dept Watershed Scienc. & Ecol. Center, Utah State Univ., Logan, Utah, 84341, USA. E-mail: edd.hammill@usu.edu

**20652.** Zou, P.-Y.; Lai, Y.-H.; Yang, J.-T. (2019): Effect of phase lag on hovering flight of damselflies and dragonflies. *Physical Review E* 100, 063102: 14 pp. (in English) ["In this work we studied the differences in flight kinematics and aerodynamics that could relate to differences in wing morphologies of a dragonfly and a damselfly. The damselflies and dragonflies normally fly with the fore wing or hind wing in the lead, respectively. The wing of the damselfly is petiolate, which means that the wing root is narrower than that of the dragonfly. The influence of the biological morphology between the damselfly and the dragonfly on their hovering strategies is worthy of clarification. The flight motions of damselflies and dragonflies in hovering were recorded with two high-speed cameras; we analyzed the differences between their hovering motions using computational fluid dynamics. The distinct mechanisms of the hovering flight of damselflies (*Matrona cyanoptera*) and dragonflies (*Neurothemis ramburii*) with different phase lags between fore and hind wings

were deduced. The results of a comparison of the differences of wing phases in hovering showed that the rotational effect has an important role in the aerodynamics; the interactions between fore and hind wings greatly affect their vortex structure and flight performance. The wake of a damselfly sheds smoothly because of slender petiolation; a vertical force is generated steadily during the stage of wing translation. Damselflies hover with a longer translational phase and a larger flapping amplitude. In contrast, the root vortex of a dragonfly impedes the shedding of wake vortices in the upstroke, which results in the loss of a vertical force; the dragonfly hence hovers with a large amplitude of wing rotation. These species of Odonata insects developed varied hovering strategies to fit their distinct biological morphologies." (Authors)] Address: Yang, J.-T., Dept of Engineering Science & Ocean Engineering, National Taiwan Univ., 10617 Taipei, Taiwan. Email: jtyang@ntu.edu.tw

## 2020

**20653.** Aksenova, O.V.; Potapov, G.S.; Bepalaya, Y.V.; Kolosova, Y.S.; Vikhrev, I.V.; Kondakov, A.V.; Gofarov, M. Yu.; Bolotov, I.N. (2020): Dragonflies from hot springs in Russia with a country-level checklist of species known to occur in geothermal environments. *Ecologica Montenegrina* 34: 49-63. (in English) ["Geothermal springs are known to harbor unusual assemblages of Odonata worldwide. A review of original records and the body of available literature revealed that 27 Odonata species were recorded from hot springs in Russia so far and that the successful larval development in geothermal environments was discovered for 17 species. Among them, four species exclusively inhabit hot springs, i.e. *Mnais costalis*, *Anotogaster sieboldii*, *Orthetrum melania* (Kunashir Island), and *O. albistylum* (Eastern Siberia). In Russia, these southern species are unable to develop beyond geothermally heated water bodies due to cold climate, and they exist as local geothermal populations there. Here, we report on several novel records of Odonata species from geothermal springs in eastern Russia. Four species were recorded on the Kunashir Island (Kurile Archipelago): *Mnais costalis* (adults), *Anotogaster sieboldii* (adults and larvae), *Orthetrum melania* (adults), and *Symphetrum pedemontanum elatum* (adults and larvae). Two species were found in the Kamchatka Peninsula, i.e. *Libellula quadrimaculata* (freshly emerged imago and exuvia) and *Aeshna juncea* (larvae). To explain the origin of isolated geothermal populations of Odonata, three alternative hypotheses can be proposed as follows: (1) pre-glacial relicts; (2) mid-Holocene relicts (since the Holocene Climate Optimum); and (3) recent (late Holocene) populations founded by long-distance dispersal events. These scenarios are yet to be tested by means of a molecular approach." (Authors)] Address: Potapov, G.S., N. Laverov Federal Center for Integrated Arctic Research of the Ural Branch of the Russian Academy of Sciences, Northern Dvina Emb. 23, 163000, Arkhangelsk, Russia. E-mail: grigorij-potapov@yandex.ru

**20654.** Allamuratovich, M.M.; Danabaevich, S.A.; Faizievich, I.K.; Azadovna, B.S.; Nurlibay, M. (2020): Macrozoobenthos of lakes of Uzbekistan. *National Association of Scientists (NAU)* 58: 9-13. (in English, with Russian summary) ["Species composition of macrozoobenthos of 6 lakes from different regions (north, center, south) of the republic have been studied. Total 111 species of bottom animals have been recorded. List of dominant species is presented. Using coefficient of Sørensen-Czekanowski similarity of species composition of macrozoobenthos of the lakes studied have been determined." (Authors)] The list of taxa includes *Anax*

imperator.] Address: Allamuratovich, M.M., Karakalpak State Univ., Nukus, Uzbekistan

**20655.** Baeta, R.; (ANEPE CAUDALIS) (2020): Suivi diachronique des populations ligériennes de *Stylurus flavipes* et d'*Ophiogomphus cecilia* en région Centre Val-de-Loire (Saison 2019 – Cinquième année de suivi à l'échelle régionale). Association Naturaliste d'Étude et de Protection des Écosystèmes CAUDALIS / DREAL Centre Val de Loire: 17 pp. (in French) ["In 2019, the 43 grids surveyed are spread over more than 300 km of the Loire and correspond to a cumulative surveyed length, all sessions combined, of 35 km of banks. The regional database for the 2019 season thus contains information on 6,501 exuviae collected and identified, of which 6,496 concern three species (Fig. 2). On the scale of the grids *Onychogomphus forcipatus* was contacted on 42 of the 43 grids surveyed, *Ophiogomphus cecilia* on 36 and *Stylurus flavipes* on 6. The very sharp decline observed in this species in 2018 (Baeta, 2018) has therefore continued in 2019. At this stage, it is becoming relatively worrying. The differences between species are even more marked if we look at the transects. Thus, only 8 out of 521 transects (1.5%) were validated for *Stylurus flavipes*, whereas 126 were validated for *Ophiogomphus cecilia* (24%) and 340 for *Onychogomphus forcipatus* (65%). However, these relative abundances vary between Depts (Fig. 3) and depend on the upstream-downstream position of the surveyed grids (see maps in the appendix). A summary of the raw data collected by ANEPE Caudalis on the 8 grids monitored in Indre-et-Loire in 2019 is presented in the appendix in the form of 2 tables (Tab. SI & SII). All the data have been transferred in SINP format to the DREAL Centre Val de Loire." (Author/DeepL)] Address: Baeta, R., Animateur du Plan régional d'actions en faveur des Odonates en Centre-Val de Loire, association naturaliste d'étude et de protection des écosystèmes "Caudalis", 1 rue de la Mairie 37520 La Riche - Courriel, France. Email: renaud.baeta@anepe-caudalis.fr

**20656.** Bogan, M.T.; Eppehimer, D.; Hamdhani, H.; Hollien, K. (2020): If you build it, they will come: rapid colonization by dragonflies in a new effluent-dependent river reach. PeerJ 8:e9856 <https://doi.org/10.7717/peerj.9856>: 19 pp. (in English) ["Background: Aquatic ecosystems are greatly altered by urban development, including the complete loss of natural habitat due to water diversions or channel burial. However, novel freshwater habitats also are created in cities, such as effluent-dependent streams that rely on treated wastewater for flow. It is unclear how diverse these novel ecosystems are, or how quickly aquatic species are able to colonize them. In this study, we (1) quantify odonate (Insecta, Odonata) colonization of a novel effluent-dependent river reach, (2) examine how drying events affect odonates in these novel habitats, and (3) explore whether effluent-dependent streams can support diverse odonate assemblages. Methods: We conducted monthly odonate surveys at three sites along the Santa Cruz River (Tucson, AZ, USA) between June 2019 and May 2020. One site was in a long-established effluent-dependent reach (flowing since the 1970s) that served as a reference site and two sites were in a newly-established reach that began flowing on June 24, 2019 (it was previously dry). We compared odonate species richness, assemblage composition, and colonization patterns across these reaches, and examined how these factors responded to flow cessation events in the new reach. Results: Seven odonate species were observed at the study sites in the new reach within hours of flow initiation, and species rapidly continued to arrive thereafter. Within 3

months, species richness and assemblage composition of adult odonates were indistinguishable in the new and reference reaches. However, drying events resulted in short-term and chronic reductions in species richness at one of the sites. Across all three sites, we found over 50 odonate species, which represent nearly 40% of species known from the state of Arizona. Discussion: Odonates were surprisingly diverse in the effluent-dependent Santa Cruz River and rapidly colonized a newly established reach. Richness levels remained high at study sites that did not experience drying events. These results suggest that consistent discharge of high-quality effluent into dry streambeds can be an important tool for promoting urban biodiversity. However, it remains to be seen how quickly and effectively less vagile taxa (e.g., mayflies, caddisflies) can colonize novel reaches. Effluent-dependent urban streams will always be highly managed systems, but collaboration between ecologists and urban planners could help to maximize aquatic biodiversity while still achieving goals of public safety and urban development." (Authors)] Address: Bogan, M.T., School of Natural Resources and the Environment, Univ. of Arizona, Tucson, AZ, USA. Email: mbogan@email.arizona.edu

**20657.** Bora, A.; Meitei, L.R.; Bhowmik, S. (2020): Odonate diversity of Nongkhyllem wildlife sanctuary, Ri-bhoi district, Meghalaya, India. Journal of Entomological Research 44(1): 125-130. (in English) ["During studies on Odonate diversity of Nongkhyllem Wildlife Sanctuary from 2016 to 2017 a total of 58 species belonging to two sub-orders, 10 families, and 37 genera were recorded. This included 35 species of Anisoptera and 23 species of Zygoptera. Three species (*Disparoneura apicalis*, *Agriocnemis kalinga* and *Calicnemia erythromelas*) are new additions to the odonate fauna of Meghalaya. The genus *Orthetrum* was found to be the most dominant genera contributing five species. Being legally protected under state legislation, the sanctuary faces low levels of human interference and anthropogenic activities." (Authors)] Address: Bora Atanu, 2 No. Sorupather, Bishnupur, Moranhat, P.O.: Moranhat, Charaideo-785 670, Assam, India, Email: atanubora47@vahoo.com

**20658.** Figueiró, R.; Silva dos Santos, S.; Docile, T.N.; Rodrigues da Costa, T.; Ferreira, C.; Gil-Azevedo, L.H. (2020): Preliminary observations on the patterns of co-occurrence of Black fly (Diptera: Simuliidae) larvae and some of their potential macroinvertebrate predators. Revista Brasileira de Entomologia 64(3) São Paulo 2020 Epub Sep 04, 2020: 6 pp. (in English) ["Biotic factors such as predation, although important drivers of the black fly community, are rarely investigated in the literature. This study aimed to test the hypothesis that the patterns of co-occurrence of black fly larvae and its potential predators is not random and that there is a correlation between its frequencies and Simuliidae larvae abundances. Larvae were sampled from two localities in the Pedra Branca State Park, Rio de Janeiro, Brazil, during the dry season in June 2018. We collected *Simulium pertinax* Kollar, 1832, *Simulium subpallidum* Lutz, 1910, *Simulium* (*Inaequalium*) sp., *Simulium* (*Psaroniocompsa*) sp. and *Simulium* (*Trichodagmia*) sp. The predators families present were Perlidae, Hydropsychidae, Leptoceridae, Libellulidae and Chironomidae. The null models showed that species co-occurred significantly more than expected by chance. The canonical correlation analyses for the Vargem Grande and Pau da Fome areas area showed a significant relationship between black fly abundances and predator abundances. In Vargem Grande the abundance of Chironomidae showed a highly significant positive correlation to *S.* (*Psaroniocompsa*) sp., while Hydropsychidae was significantly correlated to



Simulium sp. On the other hand, in Pau da Fome Libellulidae was significantly correlated to *S. (Psaroniocompsa)* sp. and Simulium sp. and Chironomidae correlated significantly to Simulium sp. The result is consistent with what would be expected of organisms that exercise mutual population regulation, although other factors than biotic interactions may be causing these patterns. However the lack of mechanistic evidences on the effect of biotic interactions on black fly populations pose a challenge on the understanding of these patterns." (Authors)] Address: Figueiró, R., Fundação Centro Univ. Estadual da Zona Oeste (UEZO), Rio de Janeiro, RJ, Brasil. E-mail: ronaldofigueiro@gmail.com

**20659.** Haring, E.; Fischer, I.; Sittenthaler, M.; Chovanec, A.; Szucsich, N.; Sattmann, H.; Wolf, P. (2020): Die Libellenfauna Wiens: Erhebungen und Erfassung mittels DNA-Barcoding unter besonderer Berücksichtigung der FFH-Arten Cordulegaster heros und Leucorrhinia pectoralis. Endbericht zum LE-Projekt: 63 pp. (in German) ["The subject of the project was the survey and recording of the dragonfly fauna in the rural areas of Vienna. Both traditional survey methods and molecular genetic methods (DNA barcoding, environmental DNA barcoding) were used. In the course of the surveys, a total of 95 sites at 42 water bodies were investigated. In the process, 48 dragonfly species were detected, which corresponds to 77% of the Viennese and 62% of the Austrian dragonfly fauna. Particularly noteworthy is the first record of *Leucorrhinia albifrons* for Vienna. The species is "threatened with extinction" in Austria and was detected in the Lobau. Of the 48 species, 26 are listed in endangerment categories according to the Austrian Red List. Five of the detected species are listed in the Annexes of the Habitats Directive. Special attention was paid to the two Habitats Directive species, *Cordulegaster heros* and *Leucorrhinia pectoralis*. *C. heros* was found at 15 of a total of 17 watercourses surveyed in the Lainzer Tiergarten and Wienerwald, *L. pectoralis* at three of 14 watercourses surveyed in the Lobau. In the course of the surveys, 198 individuals from 45 species were collected. Tissue samples of these animals were used to record species-specific gene segments, so-called DNA barcodes, for the creation of a DNA reference database. Based on this reference database, a molecular genetic identification method for dragonfly exuviae of all Central European dragonfly families was established within the framework of the project and tested with 85 exuviae. For 83 of them it was possible to determine them by means of species-specific DNA barcodes. For the eDNA pilot study, filtrates from 103 water samples served as DNA source. The method was established for the detection of a total of five dragonfly species (*C. heros*, *L. pectoralis*, *Calopteryx virgo*, *Erythromma viridulum* and *Sympetrum sanguineum*). At least one of the five species was detected via eDNA barcoding in 25 of 43 field samples processed in the project." (Authors)] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, A-1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

**20660.** Hastings, B.; Jackson, B. (2020): Analyzing the flight patterns and behavior of dragonflies engaged in aerial territory battles. <https://digitalcommons.longwood.edu/cgi/viewcontent.cgi?article=1175&context=springshowcase>: (in English) ["It has previously been determined that male dragonflies occupying the most suitable territory within a habitat have a higher flight-muscle ratio (FMR) than those occupying poor territories, but it is unknown how this increased FMR relates to their flight patterns. This study examined the flight patterns of dragonflies engaged in aerial territory battles to investigate differences in maneuverability between

winners and losers. 3D video data of dragonflies interacting in a natural habitat was analyzed for territorial flights. Winners showed a lower maximum angular velocity compared to losers." (Authors)] Address: Hastings, B., Longwood Univ., USA. Email: Brandon.hastings@live.longwood.edu

**20661.** Huda, K.A. & Dhia, K.K. (2020): Effect of some environmental factors on the density of Odonata naiads in the temporary ponds of Basrah Province, South of Iraq. *Journal of Basrah Researches (Sciences)* 46(1): 110-121. (in English, with Arabian summary) ["The environmental effects of some factors (temperature, salinity, pH and dissolve oxygen) were studied to determine the monthly changes on the density of Odonata naiads in three temporary ponds: St.1- Abu Gosra, St.2- Al-Masehab and St.3-Al-Jilal, in Basrah Province, South of Iraq, during the period from December 2017 to November 2018. The results show that the total density of naiads was significantly positive correlation ( $p < 0.01$ ) with temperature and salinity, whereas it significantly negative correlation ( $p < 0.01$ ) with pH and dissolve oxygen. The highest density 124 ind./ m<sup>3</sup> was recorded for Anisoptera in February at St.2 and 70 ind./ m<sup>3</sup> for Zygoptera in April at St.1, while the lowest density was 3 and 2 ind./m<sup>3</sup> were recorded for Anisoptera and Zygoptera in June at St.1 respectively. Temperature recorded a significant ( $P < 0.05$ ) variation, the air temperature ranged between 14- 46 ° C and the water temperature ranged between 12-38° C. The highest value of salinity reached 14 g / L in October at St.2, while the lowest values reached 1.2 g / l during November at St.3, pH values were ranged between 4.5 -8.2 in July at St.1 and in October at St.3 respectively, and the values of dissolved oxygen were ranged between 0.8- 10 mg / l in July at St.1 and January at St.3 respectively." (Authors)] Address: Huda, K.A., Dept of Marine Biology / Marine Science Center / Univ. Basrah, Iraq. Email: hudamcs@yahoo.com

**20662.** Janssens, L.; Stoks, R. (2020): Oxidative stress mediates rapid compensatory growth and its costs. *Functional Ecology* 34(10): 2087-2097. (in English) ["1. While oxidative stress has been hypothesized to function both as a constraint on and a cost of growth, its mediatory role in shaping life history is still highly debated. Empirical studies about the role of oxidative stress in shaping growth responses and the associated costs are scarce and the two hypotheses have never been combined in one study. 2. By directly manipulating oxidative stress we tested its role in determining compensatory growth responses and the associated costs in *Lestes viridis*. We reduced oxidative stress levels using the mitochondrial uncoupler 2,4-dinitrophenol (DNP). To induce a compensatory growth response, half of the larvae in each oxidant treatment was exposed to a transient starvation period, after which food was present ad libitum. 3. As expected, the transient starvation period induced a compensatory growth response, which was associated with increased oxidative damage and costs in terms of performance (reduced escape swimming speed) and physiology (reduced fat content). As expected, DNP exposure reduced oxidative stress and this resulted in the strongest compensatory growth response without any apparent costs and no increase in oxidative damage. 4. By directly downregulating oxidative stress, our results are consistent with the hypothesis that the level of oxidative stress predictably determines the degree of the compensatory growth response and its associated costs. Our data therefore suggest a mediatory role of oxidative stress in shaping life history." (Authors)] Address: Janssens, Lizanne, Debérotstraat 32, 3000 Leuven, Belgium. E-mail: lizanne.janssens@kuleuven.be

**20663.** Lamouille-Hébert, M. (coord.), (2020): Atlas des Odonates de Haute-Savoie. 53 pp. (in French) [[https://www-researchgate.net/publication/351483183\\_Atlas\\_of\\_the\\_Haute-Savoie\\_Dragonflies\\_and\\_Damselflies](https://www-researchgate.net/publication/351483183_Atlas_of_the_Haute-Savoie_Dragonflies_and_Damselflies)] Address: Lamouille-Hébert, Marie, EPHE - École pratique des hautes études, 4-14 Rue Ferrus, 75014 Paris, France. Email: [marie.hebert@frapna.org](mailto:marie.hebert@frapna.org)

**20664.** Lamouille-Hébert, M. (2020): Impact du changement climatique sur la future distribution des espèces d'Odonates boréo-alpins: exemple dans la région de Chamonix (Haute-Savoie). Ministère de l'enseignement supérieur et de la recherche École Pratique des Hautes Études, Sciences de la Vie et de la Terre, Mémoire: 113 pp. (in French) ["In the context of the current biodiversity crisis, many species are threatened with extinction or have disappeared due to the degradation or disappearance of their habitats as a result of direct or indirect anthropogenic pressures (developments, discharges). The most vulnerable species are specialists whose habitats are rare and threatened. This is the case for stenothermic species in high altitude wetlands. Climate change is a threat to these isolated species, which, with the displacement of competing eurothermic species, see their habitats colonised by other species and do not always have the capacity to move or the possibility of finding habitats that are favourable to them at higher altitudes. To better understand, anticipate and mitigate the impacts of climate change on specialised mountain species, we studied between 2017 and 2019 in the Chamonix region, the current and future potential distributions of six boreo-alpine Odonata species: *Aeshna caerulea*, *Aeshna juncea*, *Somatochlora alpestris*, *Somatochlora arctica*, *Leucorrhinia dubia* and *Coenagrion hastulatum* in 125 wetlands above 1900 meters. Before studying these distributions, using this sample of wetlands representative of the study area, we demonstrated that only 79% of the high altitude wetlands are known in the area: small wetlands are often missing. Secondly, in order to maximise the probability of detection of species in this sample, we set up and compared different detection methods: three based on morphological identification of species (larva, adult, exuviae) and metabarcoding (environmental DNA analysis method). Combinations of methods have allowed for some species to reach detection probabilities higher than 0.9 or even equal to 1. Based on the detection probabilities and the distribution of known wetlands, we have built models to predict the current and future distributions of the species and to identify areas of conservation concern: the species have the upper limit of their distribution range which potentially rises by an average of 288 metres in altitude between 2020 and 2100 (3.6m/year). The results obtained demonstrate the need for better knowledge and protection of the habitats of rare and threatened specialist species, in order to propose courses of action and monitoring programmes adapted to the species and to high altitude wetlands. Deploying this research by taking into account this group, but also different groups of species that respond differently to environmental constraints, on a larger scale than the Chamonix region, would be necessary for the effective preservation of wetlands and biodiversity at altitude." Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version) <https://hal-ephe.archives-ouvertes.fr/hal-03080122>] Address: Lamouille-Hébert, Marie, EPHE - École pratique des hautes études, 4-14 Rue Ferrus, 75014 Paris, France. Email: [marie.hebert@frapna.org](mailto:marie.hebert@frapna.org)

**20665.** Min, J.-K.; Kong, D.-S. (2020): Distribution patterns of benthic macroinvertebrate communities based on multispacial-scale environmental variables in the river systems

of Republic of Korea. *Journal of Freshwater Ecology* 35(1): 323-347. (in English) ["Understanding the relationship between benthic macroinvertebrates and environmental variables is the first step toward establishing sustainable freshwater ecosystems in terms of biodiversity, and this knowledge can be applied in river management. We analyzed major environmental variables that affect biotic communities on the national scale in the Republic of Korea. To achieve this goal, 2647 sampling stream sites were surveyed from 2016 to 2018 to collect benthic macroinvertebrates and measure 14 environmental variables. We identified a total of 359 taxa, belonging to 32 orders in 9 classes of 5 phyla, most of which were aquatic insects including Ephemeroptera, Odonata, Plecoptera, Coleoptera, Diptera and Trichoptera. Two-way indicator species analysis (TWINSPAN) based on biotic communities divided the sampling sites into six groups. Discriminant analysis identified gradient, streambed substrates, velocity, biological oxygen demand (BOD) and altitude as the major environmental variables that distinguished each TWINSPAN group. In addition, stream order and stream width also influenced aquatic macroinvertebrate communities, but the influence was low. The indicator taxa in each group were gradually changed from sensitive organisms preferring high altitudes, fast velocities and coarse substrates to tolerant organisms preferring low altitudes, slow velocities and fine substrates in each group from one to six. Canonical correspondence analysis confirmed that the composition of benthic macroinvertebrate communities in the Republic of Korea was dependent on stream gradient, microhabitat, organic pollution and geographical feature rather than on stream size or other water quality variables. Our study identified variables affecting the overall distribution patterns of biotic communities on a national scale and provides useful information for conservation and management of stream ecosystems in the Asian monsoon region." (Authors)] Address: Min, J.-K., Dept of Life Science, Kyonggi Univ., Suwon, Gyeonggi-do Province, Republic of Korea

**20666.** Nel, A.; Huang, D. (2020): A new genus and species of damsel-dragonfly from the Middle Jurassic of Inner Mongolia (Odonata: Campteroptelebiidae). *Palaeoentomology* 3(4): 357-360. (in English) ["The Campteroptelebiidae is the largest family of fossil damsel-dragonflies, containing more than 60 species described from Lower Jurassic–Lower Cretaceous strata of Europe and Asia. This group is especially diverse in the Middle–Late Jurassic strata in Inner Mongolia, northeastern China, with some very large species (Zhang et al., 2006, 2008, 2013; Nel et al., 2007, 2008, 2009; Petrulevicius et al., 2011; Li et al., 2013; Zhang et al., 2013; Zheng et al., 2016, 2017). Thus it is surprising that we found a new representative of these damsel-dragonflies, belonging to a group of genera characterized by a very particular shape of the forewing cubito-anal area. This fossil has a unique shape of the forewing median vein, allowing its attribution to a new genus and species. It increases our knowledge about the palaeobiodiversity of this impressive group of Odonata." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: [anel@mnhn.fr](mailto:anel@mnhn.fr)

**20667.** Pastorino, P.; Zaccaroni, A.; Doretto, A.; Falasco, E.; Silvi, M.; Dondo, A.; Elia, A.C.; Prearo, M.; Bona, F. (2020): Functional feeding groups of aquatic insects influence trace element accumulation: Findings for filterers, scrapers and predators from the Po basin. *Biology* 9(9), 288: 15 pp. (in English) ["For this study, we measured the concentrations of 23 trace elements (Al, As, Ba, Bi, Cd, Cr, Co, Cu, Fe, Ga, Hg, In, Li, Mn, Mo, Ni, Pb, Se, Sr, Ti, Tl, V, and Zn) in the

whole bodies of three functional feeding groups (FFG) (filterers—Hydropsychidae, scrapers—Heptageniidae, and predators—Odonata) of aquatic insects collected from two sites in the Po basin (Po Settimo and Malone Front, Northwest Italy) to determine: (a) how FFG influence trace element accumulations, (b) if scrapers accumulate higher elements compared to the other FFG, since they graze on periphyton, which represents one of the major sinks of metals, and (c) the potential use of macroinvertebrates to assess the bioavailability of trace elements in freshwater. The hierarchical clustering analysis generated three main groups based on trace element concentrations: the most abundant elements were Fe and Al, followed by Sr, In, Zn, V, Mo, and Cu. Ti was below the limit of detection (LOD) in all FFG. Ga was detected only in scrapers from both sites and Hg only in predators from Po Settimo. The principal component analysis showed that concentrations of Al, As, Bi, Cd, Co, Cr, Ga, Fe, In, Mn, Pb, Ni, and Sr were highest in scrapers, suggesting that trace elements accumulate from the ingestion of epilithic periphyton (biofilm). Odonata (predators) accumulate certain elements (Ba, Hg, Li, Se, V, Ti, and Zn) in higher concentrations by food ingestion composed of different aquatic organisms. Differently, Cu and Mo concentrations were the highest in filterers due to their bioavailability in the water column. Non-metric multidimensional scaling clearly differentiated the FFG based on their ability to accumulate trace elements. The findings from this study represent an important step toward the definition of an innovative approach based on trace element accumulation by macroinvertebrates." (Authors)] Address: Pastorino, P., Veterinary Medical Research Institute for Piemonte, Liguria & Valle d'Aosta, Via Bologna 148, 10154 Torino, Italy. E-mail: paolo.pastorino@izsto.it

**20668.** Pena-Firme, P.; Guillermo-Ferreira, R. (2020): Females of the red damselfly *Mnesarete pudica* are attracted to more ornamented males and attract rival males. *Scientific Reports* 10(14320): 7 pp. (in English) ["Male calopterygid damselflies often exhibit colourful wings used during aggressive contests and courtship displays. Evidence suggests that male wing coloration is a secondary sexual character assessed by males and females to identify male quality. In some species, males adopt a lekking strategy, where females visit exhibition arenas and choose the best mate. Here, we addressed whether the behaviour of *Mnesarete pudica* males is influenced by female visitation when gathering in leks. We hypothesized that female visitation would increase male investment in courtship and fighting, while reducing patrolling flights and harassment attempts. Moreover, we tested the hypothesis that more ornamented males attract more females to the territory, following the hotshot model of lek evolution. Our results suggest that, indeed, males with more pigmented wings attract more visiting females, independently of male size. Our results also show that the number of females in a territory attracts more males and elicits male contest behaviour, reducing male harassment. We conclude that male ornament and male clustering is a good predictor of female visitation rates, suggesting that females may exert mate choice." (Authors)] Address: Guillermo-Ferreira, R., Dept Hydrobiology, Federal Univ. of São Carlos – UFSCar, São Carlos, São Paulo, Brazil. Email: rhainerguillermo@gmail.com

**20669.** Ptatscheck, C.; Gansfort, B.; Majdi, N.; Traunspurger, W. (2020): The influence of environmental and spatial factors on benthic invertebrate metacommunities differing in size and dispersal mode. *Aquatic Ecology* 54: 447-461. (in English) ["Understanding the drivers of species distribution

is an important topic in conservation biology and ecology, pertaining to species traits like dispersal strategies and species–environment interactions. Here we examined the drivers of benthic species distribution at 20 sections of a second-order stream network. Environmental and spatial factors and the dispersal modes of the organisms were considered. We expected that species with aerial dispersal capabilities like insects would be less restrained by distance between sites and thus mostly affected by environmental factors. In contrast, we hypothesized that completely benthic species would mainly be affected by spatial factors due to limited dispersal. However, microscopic species like nematodes characterized by a high passive dispersal potential may be less limited by spatial factors. When using redundancy analyses and subsequent variance partitioning, the included variables explained 24% (insects), 24% (non-flying macrobenthos), and 32% (nematodes) of the variance in the respective community composition. Spatial factors mainly explained the species composition of all tested groups. In contrast with other larger species, nematodes were characterized by fine-scale patterns that might have been induced by random processes (e.g., random distribution and priority effects). Our study showed that dispersal processes are crucial in shaping benthic communities along streams albeit the relatively small sampling area (max. distance between sampling sites: 2 km). The demonstration of spatial factors as important drivers of the species distribution of passively dispersing benthic organismal groups highlights the role played by connectivity in determining species distribution patterns in river systems." (Authors)] Address: Ptatscheck, C., Dept of Animal Ecology, Bielefeld Univ., Konsequenz 45, 33615 Bielefeld, Germany. Email: christoph.ptatscheck@uni-bielefeld.de

**20670.** Potts, K.M. (2020): Survival and development of larval odonates (Anisoptera) and female oviposition site choice in response to predatory fish. MSc. thesis, Dept of Biology, Univ. of Mississippi: VII + 43pp. (in English) ["The reproductive success of many aquatic insects is highly dependent on where they deposit their eggs. Not all habitats are created equal. Some are more favorable than others for larval development. Therefore it would be evolutionarily advantageous for an ovipositing female to differentiate between them and choose the most suitable for her offspring's survival. Numerous studies have shown that many species with complex life-cycles representing a diverse array of taxonomic groups sort themselves non-randomly among habitat patches on the basis of perceived habitat quality. In the case of dragonflies, insufficient evidence exists to support the hypothesis that this group can assess relevant indicators of patch quality and use those cues to select habitat. I conducted a series of experiments to investigate what effects a predatory fish, the green sunfish (*Lepomis cyanellus*), had on larval dragonfly [*Erythemis simplicicollis*, *Pachydiplax longipennis*] performance and development and adult female habitat selection behavior. Developmental studies were performed to determine the degree of consumptive and non-consumptive effects of *L. cyanellus* and how they affect survival and other fitness correlates of larval dragonflies. I found that larval survival is significantly affected by the presence of uncaged *L. cyanellus*, but not affected by caged *L. cyanellus*. Caged *L. cyanellus* did not have an effect on fitness correlates, suggesting larvae are not capable of detecting fish. I examined whether female dragonflies actively avoid ovipositing in sites containing predatory fish which potentially inflict significant fitness costs via offspring predation. Results indicated that female adults of three common species of dragonflies did not discern between

habitat patches based on the presence or absence of fish predators. This suggests that members of this group either rely on a bet-hedging or risk-spreading strategy, utilize a form of philopatry, or the presence of fish predators may not be an important factor for odonates in oviposition site selection. There is a mismatch between the results of the oviposition and development experiments, suggesting there is much more to learn about how dragonflies select habitat for their offspring, how their decisions affect aquatic community assembly, and how these can be used to inform conservation efforts designed to protect threatened odonate species." (Author)] Address: not stated

**20671.** Senzaki, M.; Kadoya, T.; Francis, C.D. (2020): Direct and indirect effects of noise pollution alter biological communities in and near noise-exposed environments. *Proceedings of the Royal Society B Biological Sciences* 287(1923): 9 pp. (in English) ["Noise pollution is pervasive across every ecosystem on Earth. Although decades of research have documented a variety of negative impacts of noise to organisms, key gaps remain, such as how noise affects different taxa within a biological community and how effects of noise propagate across space. We experimentally applied traffic noise pollution to multiple roadless areas and quantified the impacts of noise on birds, grasshoppers and odonates. We show that acoustically oriented birds have reduced species richness and abundance and different community compositions in experimentally noise-exposed areas relative to comparable quiet locations. We also found both acoustically oriented grasshoppers and odonates without acoustic receptors to have reduced species richness and/or abundance in relatively quiet areas that about noise-exposed areas. These results suggest that noise pollution not only affects acoustically oriented animals, but that noise may reverberate through biological communities through indirect effects to those with no clear links to the acoustic realm, even in adjacent quiet environments." (Authors)] Address: Senzaki, M., Center for Environmental Biology and Ecosystem Studies, National Institute for Environmental Studies, Onogawa 16-2, Tsukuba City, Ibaraki 305-8506, Japan. Email: masayukisenzaki@gmail.com

**20672.** Smith, B.D.; Patten, M. (2020): Dragonflies at a biogeographical crossroads. *The Odonata of Oklahoma and complexities beyond its borders*. eBook Published 15 June 2020, Pub. location Boca Raton, Imprint CRC Press: 748 pp. (in English) ["This lavishly illustrated book examines the distribution, ecology, conservation status, and biogeography of 176 species of dragonflies in the southern plains of the United States, where twelve ecoregions converge. The topics discussed, such as phenotypic variation and ecology, are applicable and of interest across the United States and much of north America, and will appeal to researchers and dragonfly enthusiasts alike. A series of maps, including a distributional map by specific locality of occurrence, indicate level of documentation and allow the reader to visualize the biogeographical associations of a given species. These maps also encourage citizen scientists to contribute documentation wherever they spend time in the field. Context-driven chapters, including one on the region's rich paleontological history, blend environmental history and biogeography, giving the book a fresh perspective on the natural world while providing a rich summary of the odonates. This book will be sought out by dragonfly researchers and enthusiasts, entomologists, amateur naturalists, paleontologists, conservation biologists, educators, regional historians, and those seeking to meld the disciplines of cultural and environmental history with biology. It will also be readily accessible to

the lay public. Dragonflies combine the visually stunning with acrobatic fireworks in ways no other insect can hope to combine. Table of contents: Introduction. History of Oklahoma Odonatology. Oklahoma Geography and Habitats. Biogeography of Oklahoma Odonata. The Odonata Fossil History of Oklahoma and the Region. Environmental History of Oklahoma. Conservation of Oklahoma Odonata. Seasonality of Oklahoma Odonata. Introduction to Species Accounts. Species Accounts. Zygoptera – Damselflies. Calopterygidae – Broad-winged Damsels. Lestidae – Spreadwings. Coenagrionidae – Pond Damsels. Anisoptera – Dragonflies. Petaluridae – Petaltails. Aeshnidae – Darners. Gomphidae – Clubtails. Cordulegastridae – Spiketails. Macromiidae – Cruisers. Corduliidae – Emeralds. Libellulidae – Skimmers. Appendices. A. Synonyms, Dubious Records, and Hypothetical Species. B. List of Specimen Collections, Data Sources, and Record Contributors. C. Additional Resources. D. Oklahoma Odonata Species Totals by Era. E. First State Records of Oklahoma Odonata. F. Supplementary Tables. G. Species Distribution Models. Literature Cited. Endnotes. Index. (Publisher)] Address: Patten, M.A., Oklahoma Biological Survey, Univ. of Oklahoma, Norman, OK 73019, USA. E-mail: mpatten@ou.edu

**20673.** Srivastava, D.S.; Ware, J.L.; Ngai, J.T.; Starzomski, N.M.; Amundrud, S.L. (2020): Habitat size thresholds for predators: Why damselflies only occur in large bromeliads. *Biotropica* 52(6): 1030-1040. (in English) ["Predators are often more sensitive to habitat size than their prey and frequently occur in only the largest habitats. Four explanations have been proposed for this pattern: (a) Small habitats do not have enough energy to support higher trophic levels; (b) small habitats are less likely to contain particular prey required by specialist predators; (c) small habitats are risky for predators with slow life histories or large body sizes; and (d) small habitats are numerically unlikely to be colonized by regionally rare species, such as predators. We critically examine these four hypotheses in relation to the predatory damselfly larva, *Mecistogaster modesta* Selys. (Pseudostigmatidae), which occurs almost exclusively in bromeliads > 100ml in capacity. We synthesize multiple years of survey data and three manipulative experiments from the Área de Conservación Guanacaste, Costa Rica, to conclude that damselflies do not occur in small bromeliads due to their higher risk of desiccation—not because of energetic limitation, trophic specialization, risk of terrestrial predation, or pure numerical effects. These results suggest that recent and predicted declines in precipitation in northwestern Costa Rica may further restrict bromeliad occupancy by damselflies, with cascading consequences for the rest of the aquatic food web." (Authors)] Address: Srivastava, Diane, Dept of Zoology & Biodiversity Research Centre, Univ. of British Columbia, 6270 Univ. Blvd., Vancouver, BC Canada V6T 1Z4. Email: srivast@zoology.ubc.ca

**20674.** Subramanian, K.A.; Babu, R. (2020): 3. Dragonflies and Damselflies. In: S Ramani, Prashanth Mohanraj, Yeshwanth HM (eds.): *Indian Insects: Diversity and Science*: 29-46. (in English) ["Order Odonata, popularly known as dragonflies and damselflies, are primarily associated with wetlands and surrounding landscape. Dragonflies lay broad and elliptical eggs either in flight or by perching on an overhanging vegetation or rock. In dragonflies, the inner surface of the rectum is foliate and richly supplied by tracheae. Dragonflies are very popular in folklore and stories from time immemorial in different Indian cultures. Adult dragonflies are aerial predators and catch small insects like mosquitoes, midges, small butterflies, moths, and bees on wing. Dragonflies



capture their prey by perching at a vantage point and making short sallying flights or by flying continuously. The last abdominal segments of the male have claspers, which are used to hold the female by the posterior side of head in the case of dragonflies and by prothorax in damselflies. Dragonflies found at undisturbed habitats with good riparian vegetation were specialists with narrow distribution." (Authors)] Address: Subramanian, K.A., Zoological Survey of India, Southern Regional Centre 130, Santhome High Rd, Chennai-600 028, India. E-mail: subbuka.zsi@gmail.com

## 2021

**20675.** Aliyev, S.I. (2021): Species composition, distribution and ecology (Sanitary-hydrobiological characterisation of macrozoobenthos in Azerbaijan rivers. Research in: Agricultural & Veterinary Sciences 5(3): 102-116. (in English) ["The article studies samples of macrozoobenthos in the hydrobiological scheme of the rivers of Azerbaijan. During the study period, 431 species of macrobenthic organisms were recorded from rivers. 72% of the organisms found are aquatic insects. Of the registered species, 54 species belong to chironomid larvae, 45 species to Trichoptera, 36 species to Coleoptera and Odonata, larvae, and 30 species to mollusks. The maximum number of species on the rivers of the regions was recorded in the Kura River (172). The number of species in the rivers of other regions varied between 84-144 species." (Authors)] Address: Aliyev, S.I., Dept of Zoology & Physiology, Baku State Univ., 23, Zahid Khalilov, AZ1148, Baku, Azerbaijan. Email: alisaleh56@mail.ru

**20676.** Bancila, R.I.; Plaiasu, R.; Stanescu, F.; Schmidt, B.; Nae, I.; Denoël, M. (2021): Food level and light conditions affect the antipredator behavior in larvae of a stream-breeding amphibian. Behavioral Ecology and Sociobiology 75, Article number: 36 (2021): (in English) ["Understanding how long-term changes in environmental conditions influence the way that individuals cope with threats is essential in the context of behavioral adaptation to a rapidly changing world. However, little is known about the behavioral responses to predation risk for individuals that experienced different environmental conditions for extended periods of time, such as food levels and light conditions. In this experimental study, we tested whether previous long-term exposure to different food levels (low versus high) and light conditions (0-hour light versus 8-hour light) play a significant role in shaping the antipredator response (i.e., the probability of emerging from the refuge and the distance moved) to stimuli from caged larval dragonflies, in larvae of the fire salamander (*Salamandra salamandra*). Specifically, we quantified behavioral differences in the response to predation risk in larval salamanders that were reared in the laboratory for two months under controlled food and light conditions. The results of this study showed that the interaction between food level and light conditions affected the antipredator behavior of the larvae. Fire salamander larvae maintained at low food levels and in 8-hour light conditions emerged from the refuge with a higher probability (i.e., took more risk) than larvae maintained at high food levels and all other combinations of light conditions. Thus, our results highlight the complexity of antipredator responses, pointing attention to the fact that interactions among environmental factors are likely to determine the magnitude of antipredator response." (Authors)] Address: Plaiasu, Rodica, "Emil Racoviță" Institute of Speleology of Romanian Academy, 13 Septembrie Rd, 050711 Bucharest, Romania. E-mail: rodica\_plaiasu@yahoo.com

**20677.** Batista, J.D.; Ferreira, V.R.S.; Cabette, H.S.R.; de

Castro, L.A.; De Marco, P.; Juen, L. (2021): Sampling efficiency of a protocol to measure Odonata diversity in tropical streams. PLoS ONE 16(3): e0248216. <https://doi.org/10.1371/journal.pone.0248216>: 18pp. (in English) ["Odonata can be sampled following different types of protocols. In Brazil, the most used protocol is the scanning in fixed areas method, where a 100-meter transect is delimited in one of the stream margins, subdivided into 20 segments measuring 5 meters. Despite being universally used, the methodological efficiency or limitations of this protocol for Odonata has never been tested. In this scenario, our objective was to assess the efficiency of the sampling protocol to measure the richness and composition of Odonata in three fundamental aspects: the time of sampling and sampling effort over time and space. We show that the best sampling efficiency was achieved in collections performed at noon, in transects measuring 100 meters, requiring at least two samplings in the same location, supporting the procedures traditionally adopted by many studies with the group. While comparing species composition, we did not see any implication between the different treatments on the capture of the local species pool. However, we highlight and discuss some possible methodological flaws when using this protocol to sample specific Odonata groups. We believe the results obtained are fundamental in the inventory of species and to conduct future studies, as well as to aid conservative measures that use the order Odonata as a tool for environmental monitoring." (Authors)] Address: Ferreira, V.R.S., Entomology Laboratory of Nova Xavantina, Universidade do Estado de Mato Grosso, Nova Xavantina, Brazil. E-mail: victor\_rennan890@hotmail.com

**20678.** Bizarro, G.L.; Périco, E.; Dalzochio, M.; Liberato da Silva, G.; Ferla, N.J. (2021): Aquatic larval of the genus *Arrenurus* (Trombidiformes: Parasitengonina: Arrenuridae) associated with Odonata species from Pampa Biome, Brazil. Biota Neotropica 21(2). e20201157: 7 pp. (in English, with Portuguese summary) ["Many studies have reported that the interaction between water mite larvae and their Odonata hosts affects mating success, flight, and longevity. Males and females of Odonata species collected in the steppes and coastal plains (Pampa Biome) of Rio Grande do Sul were analyzed. Mites were removed when present and the prevalence and intensity of parasites was calculated. The aim of this study was to search and report new Odonata hosts species that are parasitized by water mite larvae and also to evaluate the prevalence and intensity rates; the differences in mite occurrence and frequency between males and females, and between thorax and abdomen of the dragonflies and damselflies in the southern Pampa biome located in Rio Grande do Sul. A total of 162 larval mites were found associated to two Odonata families: Coenagrionidae (*Acanthagrion lancea* Selys, 1876, *Ischnura capreolus* Hagen, 1861 and *Ischnura fluviatilis* Selys, 1876) and Libellulidae (*Micrathyrina ocellata* Martin, 1897 and *Perithemis mooma* Kirby, 1889). All mites were identified as *Arrenurus* (*Arrenurus*) sp. (*Arrenuridae*) and showed high numbers when attached to *I. capreolus* (55.5%), *I. fluviatilis* (33.3%), followed by low numbers on *M. ocellata* (6.1%), *A. lancea* (3.7%), and *P. mooma* (1.2%). Mites were found on males and females of *I. capreolus* and *I. fluviatilis*, females of *A. lancea* and *P. mooma* and in *M. ocellata* only in males. As the parasitized Odonata species are generalist and abundant in all water body types, traits associated with mating and oviposition or larval behavior are believed to explain the frequency of parasitism in these species." (Authors)] Address: Bizarro, G.L., Universidade do Vale do Taquari, Laboratório de Acarologia, Tecnovates, 95914-014, Lajeado, RS, Brasil

**20679.** Borisova, N.V.; Malikova, E.I. (2021): *Brachytron pratense* (Müller, 1764) (Odonata: Aeshnidae): a new species in the fauna of Chuvashia. *Amurian Zoological Journal* 13(1): 146-149. (in Russian, with English summary) ["*B. pratense* is a small Aeshnidae species widespread in the Western Palearctic and most common in Central and Northern Europe. Records from the southern and eastern outskirts of its range are scarce. In summer 2020, the dragonflies were observed and photographed by the first author in the vicinity of Cheboksary, 55°01'30"N, 47°54'19"E, at a pond with dense coastal vegetation. This is the first record of this species in Chuvashia and one of the few in the Middle Volga Region. Including the newly found *Brachytron pratense*, fauna of Chuvashia comprises 54 Odonata species. Adults were seen in flight from 8 June till 4 July; oviposition was recorded on 8 June." (Authors)] Address: Borisova, Natalia, State Nature Reserve Prisursky, Russian Entomological Society, Chuvash branch, Russia. E-mail: natborisova18@yandex.ru

**20680.** Brasil, L.S.; Ferreira, V.R.S.; Resende, B.O.; Juen, L.; Batista, J.D.; Castro, L.A.; Giehl, N.F.S. (2021): Dams change beta diversity of aquatic communities in the Veredas of the Brazilian Cerrado. *Front. Ecol. Evol.* 9:612642. doi: 10.3389/fevo.2021.612642: (in English) ["The veredas are wetland ecosystems responsible for supplying most of the water for rivers and streams in the Cerrado. The veredas' hydromorphic soils retain a large amount of rainwater, releasing it slowly during drier periods. Therefore, these habitats are often used to build dams for cattle raising. Here we assessed the environmental conditions and beta-diversity of Odonata and Heteroptera on veredas impacted by dams in the Brazilian Cerrado. We sampled biological communities and a set of environmental variables in 13 veredas, six with dams and seven without dams. One limnological variable [oxidation-reduction potential (ORP)] and one landscape metric (% of the altered area) differed among veredas with and without dams. These variables were important predictors of the beta-diversity of both Odonata ( $R^2 = 0.650$ ;  $p < 0.001$ ) and Heteroptera ( $R^2 = 0.740$ ;  $p < 0.001$ ). The veredas stand among the most sensitive wetland ecosystems of the Cerrado. In this study, we show, for the first time, that veredas with dams may lose environmental quality resulting in changes in biological communities, especially ecologically unique species. Because the Cerrado naturally goes through approximately 5 months of severe drought, the veredas are critical for the Cerrado's hydric safety. Therefore, we recommend that cattle-raising activities should rely on artificial water tanks instead of using dams for water storage since it affects ecologically unique species in this poorly known ecosystem." (Authors)] Address: Brasil, L.S., Laboratório de Ecologia e Conservação, Instituto de Ciências Biológicas, Universidade Federal do Pará, Belém, Brazil.

**20681.** Brito, J.P.; Carvalho, F.G.; Juen, L. (2021): Response of the zygopteran community (Odonata: Insecta) to change in environmental integrity driven by urbanization in eastern Amazonian streams. *Ecologies* 2021, 2(1): 150-163. ["The accelerated and disordered growth of large urban centers has caused a significant loss of biodiversity and the negative effects are more significant in aquatic environments. Thus, the objective of this study is to assess the effects of environmental change due to urbanization in the abundance and biomass patterns of species belonging to the Zygoptera suborder. We tested the hypothesis that, in altered streams, there will be a predominance of organisms with fast growth and small biomass (*r*-strategists), and intermediate streams will have an overlapping of *r* and *k*-strategists. In control streams, there will be a predominance of *k*-strategists, with

slow growth, decreased abundance, and high biomass. Urban expansion in Amazonian streams will cause loss of Zygoptera species richness. Streams draining urban areas will have higher air temperatures than control streams. Thus, small-sized and less abundant species will be favored. We sampled 15 streams in the metropolitan area of Belém. Sites were classified, using the index of physical habitat integrity, as control, intermediate and altered. Comparisons between biomass and abundance were analyzed using *W* Statistics. Our analyses showed that: the effects of urbanization cause loss of *k*-strategists and favors *r*-strategists, once abundance was placed above biomass; in intermediate environments, contrary to what we expected, there was no overlapping of strategies, once *r*-strategists were also placed above *k*-strategists; in control environments, biomass was placed above abundance, suggesting these environments have a predominance of *k*-strategist species, as we suggested; and we observed increased levels of temperature favor the most abundant species, the ones having generalist biological mechanisms; however, contrary to what we expected, there was no difference in richness. With these results, we reinforce the need for public policies to create or maintain the riparian forest along streams running through urban areas and create or maintain urban parks." (Authors)] Address: Brito, J.P., Lab. de Ecologia e Conservação, Instituto de Ciências Biológicas, Univ. Federal do Pará — UFPA, Rua Augusto Correia, Bairro Guamá, Belém, Pará 66.075-110, Brazil. E-mail: jhopb03@gmail.com

**20682.** Buczynski, P.; Buczynska, E. (2021): *Ordo: Odonata – wazki*. In: Klasa, Anna (ed): *Katalog fauny Ojcowskiego Parku Narodowego*, tom 1. – Catalogue of the fauna of Ojców National Park, volume 1. Publisher: Ojcowski Park Narodowy, Ojców. 75-79. (in Polish) [[https://www.researchgate.net/publication/361443091\\_Ordo\\_Odonata\\_-\\_wazki\\_-\\_Ordo\\_Odonata\\_-\\_dragonflies](https://www.researchgate.net/publication/361443091_Ordo_Odonata_-_wazki_-_Ordo_Odonata_-_dragonflies)] Address: Buczynski, P., Dept Zool., Maria Curie-Skłodowska Univ., Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**20683.** Castillo-Pérez, E.U.; Nava-Bolaños, A.; Rocha-Ortega, M.; Córdoba-Aguilar, A. (2021): Does heat tolerance explain female polymorphism in damselflies? *Journal of Insect Behavior* 34: 41-48. (in English) ["Morphological variation is widespread, and one case is that of female morphs in damselfly insects. Current knowledge indicates that these female morphs are maintained by a fitness balance whereby male-like, clear-colored females (i.e. andromorphs) are more likely to "escape" from male harassment given their male mimicking compared to dark females (i.e. gynomorph). However, males can learn to distinguish the more frequent morph, leading to a frequency-dependent selection. Alternative to frequency-dependent selection, we tested whether temperature plays a role in driving female morph activity and survival. We used *Ischnura denticollis* damselflies to test for differences between female morphs and males in: (a) daily activity; (b) time to resume activity following a chilling event (10°C); and, (c) survival at 30, 35 and 40°C. There was no difference in activity among groups after a chilling event. However, gynomorph females were more active early in the day (ca. 17°C) and less active by 1600 hrs (after reaching 32°C), and had lower thermal tolerance than andromorph females. Thus, high temperatures may act against gynomorph females. This implies a role for high temperatures in the maintenance of female polymorphism." (Authors)] Address: Nava-Bolaños, Angela, Biodiversity Inst., Univ. of Kansas, 1345 Jayhawk Boulevard, Lawrence, KS, 66045, USA

**20684.** Chandran, A.V.; Jose, S.K.; Gopalan, S.V. (2021):

Dragonflies and damselflies (Insecta: Odonata) of the Kole Wetlands, central Kerala, India. *The Journal of Threatened Taxa* 13(3): 17963-17971. (in English) ["A year-long study was conducted at the Kole Wetlands, a Ramsar site in central Kerala to document the diversity of dragonflies and damselflies and understand their seasonality. Checklist survey method was used to sample adult odonates in 30 randomly chosen locations. A total of 44 species (30 dragonflies and 14 damselflies) belonging to 33 genera and eight families were recorded in the study area. Species richness showed a peak in the post-monsoon season and a dip in the summer. The observations support the value of the Kole Wetlands in providing valuable resources for Odonata." (Authors)] Address: Chandran, A.V., Dept of Geology & Environmental Science, Christ College, Irinjalakuda, Thrissur, Kerala 680125, India.

**20685.** Chiriboga-Ortega, R.; Van der Heyden, C.; Sulen Burgos, M.E.; Ortega, S.; Oña, T.; Velarde, E.; Goethals, P.; Alfaro-Núñez, A. (2021): Molecular diversity of dragonflies in three high-elevation Andean tropical lakes through DNA barcoding. *Biotropica* 53(2): 354-358. (in English) ["Genetic and morphological identification of dragonflies' larvae species in three high-elevation Andean tropical lakes was done using DNA barcoding of the cytochrome oxidase 1 gene (COI). Phylogeny allowed inferring the evolutionary relationships of at least five species (from 74 samples) that belong to two different families within the Odonata order." (Authors) *Rhionaeschna marchali*, *Rhionaeschna elsia*, *Ischnura ramburii*, *Remartinia luteipennis*] Address: Chiriboga-Ortega, R., Laboratorio de Investigaciones Ambientales, Universidad Técnica del Norte, Ibarra, Ecuador

**20686.** Clausnitzer, V.; De Knijf, G. (2021): IUCN SSC Dragonfly Specialist Group. 2020 Report. IUCN Species Annual Report 2020: 162-165. (in English) [<https://portals.iucn.org/library/sites/library/files/documents/Species%20no.61.pdf>] Address: Clausnitzer, Viola, Heinzelstr. 3, 02826 Görlitz, Germany. E-mail: violacl@t-online.de

**20687.** Dawn, P. (2021): A new species of *Cephalaeschna* Selys, 1883 (Odonata: Anisoptera: Aeshnidae) from Neora Valley National Park, West Bengal, India, with notes on *C. acanthifrons* Joshi & Kunte, 2017 and *C. viridifrons* (Fraser, 1922). *Zootaxa* 4949(2): 371-380. (in English, with Bengali language) ["A new species *Cephalaeschna patrai* sp. nov. is described from Neora Valley National Park, Darjeeling Himalayas as the eighth species of the genus from India. This new species is characterized by bright green markings on overall black body color, black is replaced with brown in female. Anterolateral thoracic stripe separated in two patches connected with a narrow line. The cerci are uniformly broad towards end, without any constriction in the lateral view; tip of the same prominently curved upwards to form blunt tubercle which appears to be projected inwards in the dorsal view. An updated key for all the Indian species is provided here. A short note about the affinities among congeners distributed across Himalayas (particularly *C. acanthifrons* Joshi & Kunte, 2017 and *C. viridifrons* (Fraser, 1922)) is also included." (Authors)] Address: Dawn, P., Shyampur Siddheswari Mahavidyalaya, Ajodhya, Howrah – 711312, India. E-mail: prosenjit.dawn@gmail.com

**20688.** Deacon, C.; Samways, M.J. (2021): A review of the impacts and opportunities for African urban dragonflies. *Insects* 2021, 12(3), 190; <https://doi.org/10.3390/insects12-030190>: 15 pp. (in English) ["Simple Summary: The expansion of urban areas in combination with climate change places

great pressure on species found in freshwater habitats. Dragonflies are iconic freshwater organisms due to their large body sizes and striking coloration. They have been widely used to indicate the impacts of natural and human-mediated activities on freshwater communities, while also indicating the mitigation measures required to ensure their conservation. Here, we review the major threats to dragonflies in southern Africa, specifically those in urban areas. We also provide information on effective mitigation measures to protect dragonflies and other aquatic insects in urban spaces. Using three densely populated areas as case studies, we highlight some of the greatest challenges for dragonflies in South Africa. More importantly, we give a summary of current mitigation measures which have maintained dragonflies in urban spaces. In addition to these mitigation measures, public involvement and raising awareness contribute greatly to the common cause of protecting dragonflies around us. Abstract: Urban settlements range from small villages in rural areas to large metropolises with densely packed infrastructures. Urbanization presents many challenges to the maintenance of freshwater quality and conservation of freshwater biota, especially in Africa. There are many opportunities as well, particularly by fostering contributions from citizen scientists. We review the relationships between dragonflies and urbanization in southern Africa. Shifts in dragonfly assemblages indicate environmental change, as different species are variously sensitive to abiotic and biotic water and bank conditions. They are also conservation umbrellas for many other co-occurring species. Major threats to southern African dragonflies include increasing infrastructure densification, frequent droughts, habitat loss, pollution, and invasive alien vegetation. Mitigation measures include implementation of conservation corridors, maintenance of healthy permanent ponds, pollution reduction, and removal of invasive alien trees. Citizen science is now an important approach for supplementing and supporting professional scientific research." (Authors)] Address: Deacon, C., Dept of Conservation Ecology & Entomology, Stellenbosch Univ., South Africa. E-mail: charldeacon@sun.ac.za

**20689.** Díaz-Martínez, C.; Conesa García, M.A. (2021): First record of an unintentional introduction of a non-native damselfly in the Iberian Peninsula: *Pseudagrion microcephalum* (Rambur, 1842) (Odonata, Coenagrionidae). *Boln. Asoc. esp. Ent.* 45(3-4): 307-309. (in Spanish, with English title) ["A larva of *P. microcephalum* has been found in a shrimp tank in Valencia (Spain). This is the first record of an unintentional introduction of a non-native damselfly in the Iberian Peninsula." (authors)] Address: Díaz-Martínez, Cecilia, Sociedad Entomológica y Ambiental de Castilla-La Mancha, c/Londres, 7, 45003 Toledo, Spain. E-mail: cdiaz.cuenca@gmail.com

**20690.** Díaz-Martínez, C.; Cardo-Maeso, N.; Fernández, J.B.; López-Estrada, E.K. (2021): *Onychogomphus cazuma*: Un hallazgo inesperado. *Oleana* 36: 347-360. (in Spanish) ["This paper recounts the events that led to the description of a new dragonfly species in Europe: *Onychogomphus cazuma* Barona, Cardo & Díaz 2020, highlighting the relevant role of amateurs in branches of biology such as taxonomy, and how new technologies can be combined with traditional taxonomic methodology for the discovery of new species." (Authors/DeepL)] Address: Díaz-Martínez, Cecilia, Sociedad Entomológica y Ambiental de Castilla-La Mancha, c/Londres, 7, 45003 Toledo, Spain. E-mail: cdiaz.cuenca@gmail.com

**20691.** Dudaniec, R.Y.; Carey, A.R.; Svensson, E.I.; Hansson, B.; Yong, C.J.; Lancaster, L.T. (2021): Latitudinal clines in sexual selection, sexual size dimorphism, and sex-specific genetic dispersal during a poleward range expansion. *Journal of Animal Ecology* 91(6): 1104-1118. (in English) ["1. Range expansions can be shaped by sex differences in behaviours and other phenotypic traits affecting dispersal and reproduction. 2. Here, we investigate sex differences in morphology, behaviour and genomic population differentiation along a climate-mediated range expansion in *Isochnura elegans* in northern Europe. 3. We sampled 65 sites along a 583 km gradient spanning the *I. elegans* range in Sweden and quantified latitudinal gradients in site relative abundance, sex ratio and sex-specific shifts in body size and mating status (a measure of sexual selection). Using single nucleotide polymorphism (SNP) data for 426 individuals from 25 sites, we further investigated sex-specific landscape and climatic effects on neutral genetic connectivity and migration patterns. 4. We found evidence for sex differences associated with the *I. elegans* range expansion, namely (1) increased male body size with latitude, but no latitudinal effect on female body size, resulting in reduced sexual dimorphism towards the range limit, (2) a steeper decline in male genetic similarity with increasing geographic distance than in females, (3) male-biased genetic migration propensity, and (4) a latitudinal cline in migration distance (increasing migratory distances towards the range margin), which was stronger in males. Cooler mean annual temperatures towards the range limit were associated with increased resistance to gene flow in both sexes. Sex ratios became increasingly male-biased towards the range limit, and there was evidence for a changed sexual selection regime shifting from favouring larger males in the south, to favouring smaller males in the north. 5. Our findings suggest sex-specific spatial phenotype sorting at the range limit, where larger males disperse more under higher landscape resistance associated with cooler climates. The combination of latitudinal gradients in sex-biased dispersal, increasing male body size, and (reduced) sexual size dimorphism should have emergent consequences for sexual selection dynamics and the mating system at the expanding range front. Our study illustrates the importance of considering sex differences in the study of range expansions driven by ongoing climate change." (Authors)] Address: Dudaniec, R.Y., Dept of Biological Sciences, Macquarie Univ., Sydney, NSW, Australia. Email: rachael.dudaniec@mq.edu.au

**20692.** Eh Rak, A.; Salam, M.A.; Omar, S.A.S.; Daliman, S.; Mat Nazari, N.N.I.; Azlan, A. (2021): Benthic macroinvertebrates diversity and composition at Lata Janggut Recreational Area, Kelantan, Malaysia. *Serangga* 26(4): 30-41. (in English) ["Lata Janggut is a public-focused recreational area with a high possibility of changes in biodiversity involving benthic macroinvertebrates, reflecting the water quality and health of Lata Janggut itself. Therefore, this study was carried out to determine the river health and water quality of Lata Janggut using benthic macroinvertebrates through common biotic indices. Benthic macroinvertebrates were collected monthly at nine points from three stations, i.e. three points at down-stream (ST1), middle-stream (ST2) and up-stream (ST3), respectively. The sampling protocols have followed Karr's Aquatic Insect Stream Sampling Protocol. The benthic macroinvertebrates were identified based on key identification published by Thorp and Covich, Gooderham and Tsyrlin Mekong River Commission (MRC). Biological Monitoring Working Party (BMWP) index, Family Biotic Index (FBI), and Ephemeroptera, Plecoptera and Tri-

choptera (EPT Index) were used as biotic indices, and Mann-Whitney U was also used as a comparison test of macroinvertebrates compositions. A total of 4037 macroinvertebrates, comprising eight orders, 32 families, and 31 genus, were recorded. These include the order of Ephemeroptera, Plecoptera, Trichoptera, Coleoptera, Diptera, Hemiptera and Odonata. It shows that ST2 (U=73, P=0.05) and ST 3(U=88.5, P=0.02) were significantly higher in compositions than ST1. Apart from that, the benthic macroinvertebrate composition during March was significantly higher than compositions during April to July (U.10, P<0.05). Biotic indices indicate that ST1 has recorded Moderate BMWP (21.0-58.0), Excellent FBI (1.43-3.61) and Fair EPT Index (4-12), while ST2 has recorded Clean BMWP (31-67), Excellent FBI (1.69-3.69) and Fair EPT Index (5-13). Thus, ST2 has recorded a better biotic index value as compared to ST1. Nonetheless, ST3 has recorded Moderate BMWP (31-56), Excellent FBI (1.79-3.53) and Fair EPT Index (5-8). Overall, the biotic indices measured in Lata Janggut have indicated moderate disturbance, river health, and water quality, specifically downstream with high recreational activities." (Authors)] Address: Eh Rak, A., Fac. Earth Science, Univ. Malaysia Kelantan, No. 100, 17600 Jeli, Kelantan, Malaysia. Email: aweng@umk.edu.my

**20693.** Fekete, J.; Buchner, D.; Leese, F.; Padisák, J.; Várbiro, G. (2021): Application of eDNA method in the detection of *Cordulegaster* (Insecta: Odonata) species. *ARPHA Conference Abstracts 4: e65041: 1-2.* (in English) [Verbatim: The aim of this pilot study was to investigate the potential of eDNA techniques to detect the presence of the two dragonfly species *Cordulegaster heros* and *Cordulegaster bidentata*. Both species are classified as "near threatened" according to the IUCN Red List and are strictly protected in several countries. Monitoring these species with traditional sampling methods is often difficult, time-consuming and invasive. In this pilot study, we first collected tissue samples from *C. heros* and *C. bidentata* to sequence the traditional DNA-barcode gene fragment COI. We then collected further dragonfly COI sequences from BOLD to design species-specific primers. This, however, was impossible given the enormous variability of COI. Therefore, we refrained from species-specific eDNA assays and followed eDNA metabarcoding protocol using universal (BF2/BF2) and a newly designed dragonfly specific primer. For the evaluation of the method, we took water samples from places where *Cordulegaster* specimens are known to occur. After the extraction, we used two sequential PCR steps for obtaining the desired amplicon (two-step PCR) using universal primers in the first step, and group (dragonfly) specific primers or universal primers. Amplicons were sequenced on an Illumina MiSeq platform and then analysed the data with the JAMP pipeline. With the newly designed primers and we could effectively detect the targeted dragonfly species from tissue samples, and also from filtered environmental samples. The detection of the species with the traditional method is time consuming and involves the destruction of the specimens. In comparison, with the eDNA method we could easily detect these near threatened odonates and other dragonfly species in a noninvasive way.] Address: Fekete, Judit, Univ. of Pannonia, Veszprém, Hungary. E-mail: juditfekete-0307@gmail.com

**20694.** Ferreira, K.G.; Barbosa de Oliveira Junior, J.M.; Sousa, K.; Feitosa de Oliveira, P.A.; Ribeiro da Silva, R.A.; Dias Silva, K. (2021): Divulgação científica na escola: apresentando as libélulas (Odonata: Insecta) através de um projeto de extensão. *Nature and Conservation* 14(2): 9



pp. (in Portuguese with English summary) ["Extension activities are important for the exchange of scientific and popular knowledge, carried out with the aim of bringing the academic environment and society closer together, enabling the development of actions for the popularization of science and scientific dissemination. In this way, we aim to spread knowledge about aquatic insects, with a focus on dragonflies, and the importance of preserving streams and biological communities through the popularization of science. The work was developed as an action of an extension project carried out in a public school with the participation of students from the 2nd and 3rd years of high school in the municipality of Altamira (PA). Lectures and didactic games were presented using the themes "environment" and "dragonflies" in order to take knowledge to school in a playful way, in addition to a diagnostic questionnaire to assess which popular names of dragonflies and which characters in films or drawings with dragonflies the students knew. Through the activity it was possible to observe that some students had previous knowledge about dragonflies, but they did not know that they, in their larval phase, develop in the aquatic environment and what their ecological importance is, reinforcing the relevance of extension projects aimed at scientific dissemination of the group as a tool for environmental education." (Authors)] Address: Ferreira, Kesley Gadelha, Universidade Federal do Pará, Brasil. Email: kesleygadelha@gmail.com

**20695.** Fiebrich, M. (2021): Die Libellenfauna des Wollmatinger Rieds - ein hundertjähriger Rückblick. *Mercuriale* 21: 23-46. (in German, with English summary) ["The dragonfly fauna of the Wollmatinger Ried (State Baden-Württemberg, Southern Germany). A centennial review - In the Wollmatinger Ried nature reserve on Lake Constance, 58 dragonfly species have been recorded to date. Of particular importance are the dynamically fluctuating water levels, which submerge the extensive reed meadows and are essential for indigenous species such as *Sympecma paedisca* and *Sympetrum depressiusculum*, but also for migratory dragonfly species, such as *Anax ephippiger* and *Sympetrum fonscolombii*. Dragonflies have been recorded in this area for more than 100 years. This publication provides an overview of both historical findings and current observations from 2021." (Author)] Address: Fiebrich, M., Liggeringerstr. 15, 78315 Radolfzell, Germany. Email: fiebrich@posteo.de

**20696.** Frank, M.; Bruens, A. (2021): Die Libellen Deutschlands - Entdecken – Beobachten – Bestimmen. Quelle & Meyer. 380 pp. (in German) ["Dragonflies are acrobats of the air. Their diverse colour patterns and unusual development strategy in water and on land inspire researchers and nature lovers alike. With this novel photo identification book, all dragonflies in Germany can be identified using excellent image comparisons. The book precisely highlights the main features with enlargements, notes and arrows, making it perfect for use in the field. Each species is portrayed with information on habitat, characteristics, confusion species, behaviour and hatching. Up-to-date distribution maps provide an overview of the regions in which the species can be found." (Publisher/DeepL)] Address: Frank, M., Zur Traubenmühle 5A, 55268 Nieder-Olm, Germany. E-mail: mikel.frank@gmx.de

**20697.** Garcia Junior, M.D.N.; Damasceno, M.T.; Martins, M.J.L.; Silva da Costa, T.; Ferreira, R.M.; Pinçaço Souto, R.N. (2021): New records of *Forcipomyia* (*Pterobosca*) *incubans* Macfie (1937) (Diptera: Ceratopogonidae) parasitizing wings of Odonata in Brazil / Novos registros de *Forcipomyia*

(*Pterobosca*) *incubans* Macfie (1937) (Diptera: Ceratopogonidae) parasita de asas de Odonata no Brasil. *Brazilian Journal of Development* 7(3): 29996-30001. (in English, with Portuguese summary) ["This report presents the first record of *Forcipomyia* (*Pterobosca*) *incubans* Macfie (1937) (Diptera: Ceratopogonidae) in the states of Amapá and Pará, located in the North Region, and in Rio Grande do Sul and Santa Catarina, in the South Region of Brazil. Besides seven new records of species of Odonata parasitized in Latin America. Females of *F. (P.) incubans* were collected in the wings of 47 specimens of dragonflies. The species *Homoeoura chelifera* Selys, 1876 and *Telebasis willinki* Fraser, 1948 family Coenagrionidae, *Remartinia luteipennis* (Burmeister, 1839) family Aeshnidae, *Erythemis peruviana* (Rambur, 1842), *Erythemis vesiculosa* (F. 1775), *Erythrodiplax fusca* (Rambur, 1842), *E. umbrata* (L. 1758), *Miathyria marcella* (Selys in Sagra, 1857), *Orthemis concolor* Ris, 1919 and *O. nodiplaga* Karsch, 1891 representatives from family Libellulidae comprise the new records for the Brazil, thus increasing to 13 the number of species with parasitism *F. (P.) incubans* in the country." (Authors) ] Address: Manoel Daltro Nunes Garcia Junior Doutorando em Biodiversidade Tropical-PPGBio Universidade Federal do Amapá-UNIFAP, Rodovia Juscelino Kubitschek, KM-02 Jardim Marco Zero, Macapá, Amapá, Brasil. E-mail: m.d.juniorbio@gmail.com

**20698.** Ge, Y., X. Meng, J. Heino, J. Garc'ya-Gir'on, Y. Liu, Z. Li, and Z. Xie (2021): Stochasticity overrides deterministic processes in structuring macroinvertebrate communities in a plateau aquatic system. *Ecosphere* 12(7):e03675.: 19 pp. (in English) ["Deterministic and stochastic processes are two major factors shaping community dynamics, but their relative importance remains unknown for many aquatic systems, including those in the high-elevation Qinghai-Tibet Plateau. Here, we explored the causes of multidimensional beta diversity patterns (i.e., taxonomic, functional, and phylogenetic) of a macroinvertebrate metacommunity in this large aquatic system by using multiple approaches (i.e., null models, phylogenetic signal testing, and ordination-based approaches). To obtain insights into community assembly mechanisms, we also analyzed beta diversity in two deconstructed sub-metacommunities (e.g., different tributaries and the main lake body). We found that most functional traits showed significant phylogenetic signals, indicating that the functional traits were profoundly influenced by evolutionary history. The null models showed randomness of functional and phylogenetic beta diversities for the whole basin and its tributaries, confirming the importance of stochasticity over deterministic processes in controlling community structure. However, both phylogenetic and functional community structures were clustered in the Qinghai Lake, probably reflecting the importance of environmental filtering. Ordination-based approaches also revealed that both environmental factors and spatial processes accounted for variation in taxonomic, functional, and phylogenetic beta diversity. More specifically, environmental filtering was more important than spatial processes for the functional dimension, but the opposite was true for the taxonomic and phylogenetic dimensions. The paleogeographic history of the Qinghai Lake basin may have contributed substantially to the prevalence of stochastic processes. Overall, this study provides a better understanding of ecological patterns and assembly mechanisms of macroinvertebrate communities across this poorly known high-elevation aquatic system that is highly sensitive to climate warming." (Authors) *Enallagma cyathigerum*] Address: Xie, Y., The Key Lab. of Aquatic Biodiversity & Conservation, Inst. of Hydrobiology, Chinese Acad. Sciences, Wuhan, China E-mail: zhcxie@ihb.ac.cn

**20699.** Goldberg, R.; Balkenhol, B.; Gebert, J.; Haase, H.; Liebig, W.H.; Müller, J.; Natuschke, A.; Sander, B.; Scholz, A.; Trampenau, M.; Wünsche, A.E. (2021): Eine Momentaufnahme zur Artenvielfalt an der Neiße – Beobachtungsergebnisse vom GEO-Tag der Natur 2019. *Berichte der Naturforschenden Gesellschaft der Oberlausitz* 29: 207-223. (in German) [In June 2019, in the alluvium of Neiße River (Saxony, Germany), a total of 350 animal and plant species were recorded. The list of taxa includes 10 odonate species.] Address: Goldberg, R., Mittelstr. 13, 02730 Ebersbach-Neugersdorf, Germany. EMail: ronnsen@gmx.de

**20700.** G-Santoyo, I.; González-Tokman, D.; Tapia-Rodríguez, M.; Córdoba-Aguilar, A. (2021): What doesn't kill you makes you stronger: Detoxification ability as a mechanism of honesty in a sexually selected signal. *Functional Ecology* 35(8): 1666-1678. (in English) ["1. Sexual selection leads to the expression and maintenance of colourful signals. The metabolic pathways to produce such signals often involve toxic byproducts that can reduce survival. However, rather than discarding these otherwise harmful byproducts, animals may use them by integrating them into sexually selected traits. 2. We tested this using the damselfly *Hetaerina americana*, where males bear a red wing spot (RWS) that has evolved by intrasexual competition. 3. By using confocal microscopy and several biochemical techniques, we determined that the RWS are generated by ommochrome pigments derived from tryptophan metabolism. 4. Second, we injected a group of males with the toxic precursor of these ommochromes, 3-hydroxy-kynurenine(3-Hk), confirming the toxicity of this compound in adult males. 5. Finally, we showed that adult males injected with a median lethal concentration of 3-Hk had more ommochromes in their RWS than controls but similar survival, suggesting that the deposition of ommochrome pigment in the wing counteracts the 3-HK toxicity. 6. Thus, we report that sexually selected pigmented signals may involve the co-option of excreted compounds that could otherwise have lethal effects, a hypothesis we call 'detoxifying ability signalling'. Our results provide new insights about the evolution of sexual signals, elucidating a mechanism for the evolution of honest indicators of quality that could have arisen due to natural selection." (Authors)] Address: González-Santoyo, I., Neuroecology Lab, Facultad de Psicología, Universidad Nacional Autónoma de México, Ciudad Universitaria, Ciudad de México, México. Email: isantoyo.unam@gmail.com

**20701.** Guellaf, A.; Bennis, N.; El Haissofi, M.; L'Mohdi, O.; Kettani, K. (2021): New data on the biodiversity and chorology of aquatic insects (Odonata, Coleoptera and Hemiptera) of Martil Basin (Northwestern Morocco). *Graellsia* 77(2): e149: 24 pp. (in English, with Spanish summary) ["New records on aquatic insects (Coleoptera, Odonata and Hemiptera), collected seasonally from Autumn 2015 to Spring 2018 at a total of 20 sites in the Mediterranean Martil River basin in Northwestern Morocco are presented. An annotated list of 102 species identified from 6,596 individuals collected from recent investigations is provided. These species are grouped into 61 genera, 27 families and 102 species divided into 13 species of Odonata, 65 species of Coleoptera and 24 of Hemiptera. *Helophorus atlantis* is newly recorded from the Rif region, *Hydroporus memnonius* and *Hydroporus rifensis* are new to the Occidental Rif, while *Zygonyx torridus*, *Pelodytes caesus*, *Agabus conspersus*, *Hydroporus rifensis*, *Deronectes theyri*, *Hydrochus grandicollis*, *Hydroporus memnonius*, *Helochares punctatus*, *Hydrochus grandicollis*, *Gerris brasili*, *Hebrus pusillus*, *Parasigara rivularis* and *Notonecta obliqua* are cited for the first time in

Martil basin. Taxa richness and abundance were higher in spring and the beginning of summer compared to autumn and winter. A biogeographical analysis shows that the three aquatic insect orders of the Martil River basin are essentially Mediterranean (52%) and Palaearctic (31%) elements, while wide distribution elements are a minority (17%). Taxonomic composition exhibited strong variability among sites and seasons in response to the levels of intermittency and human pressures. These include agricultural, industrial and urban activities, construction of dams and rehabilitation projects operating at the level of the Martil River, altering its ecological status and creating good opportunities for the establishment of alien species such as *Trichocorixa verticalis*." (Authors)] Address: Guellaf, A., Dépt de Biologie, Faculté des Sciences de Tétouan, Université Abdelmalek Essaâdi. Tétouan, Maroc. Email: achraf1949@gmail.com

**20702.** Hossie, T.J.; Chan, K.; Murray, D.L. (2021): Increasing availability of palatable prey induces predator-dependence and increases predation on unpalatable prey. *Scientific Reports* volume 11, Article number: 6763: 12 pp. (in English) ["Understanding the factors governing predation remains a top priority in ecology. Using a dragonfly [*Aeshnidae*] nymph-tadpole system, we experimentally varied predator density, prey density, and prey species ratio to investigate: (i) whether predator interference varies between prey types that differ in palatability, (ii) whether adding alternate prey influences the magnitude of predator interference, and (iii) whether patterns of prey selection vary according to the predictions of optimal diet theory. In single-prey foraging trials, predation of palatable leopard frog tadpoles was limited by prey availability and predator interference, whereas predation of unpalatable toad tadpoles was limited by handling time. Adding unpalatable prey did not affect the predator's kill rate of palatable prey, but the presence of palatable prey increased the influence of predator density on the kill rate of unpalatable prey and reduced unpalatable prey handling time. Prey selection did not change with shifts in the relative abundance of prey types. Instead, predators selected easy-to-capture unpalatable prey at low total densities and harder-to-capture palatable prey at high densities. These results improve our understanding of generalist predation in communities with mobile prey, and illustrate that characteristics of the prey types involved govern the extent to which alternate prey influence the predator's kill rate." (Authors)] Address: Hossie, T.J., Dept Biology, Trent Univ., 2140 East Bank Drive, Peterborough, ON, K9J 7B8, USA

**20703.** Ilhamdi, M.L.; Idrus, A.A.; Santoso, D.; Hadiprayitno, G.; Syazali, M. (2021): Species richness and conservation priority of dragonflies in the Suranadi Ecotourism Area, Lombok, Indonesia. *Biodiversitas* 22(4): 1846-1852. (in English) ["Dragonflies are insects that have attractive colors and play an important role to balance ecosystems. They also act as bioindicators of the aquatic environment. The purpose of this study was to investigate the species richness and conservation priorities of dragonflies in the Suranadi Ecotourism Area, Lombok, Indonesia, expecting that the dragonflies will be used as charismatic species to support ecotourism. The research was conducted in August-December 2020 by surveying transect lines across 9 types of habitat. We then determined the conservation priority for each species found by referring to the Government Regulation using scoring method through a Focus Group Discussion (FGD) involving five experts. The score for each species was determined based on the percentage of the opinion from the experts. We found 18 dragonfly species from 2 suborders (Zygoptera and Anisoptera) and 5 families (Chlorocyphidae,

Coenagrionidae, Platycnemididae, Aeshnidae and Libellulidae). The habitat type that supports the highest species richness was the waterway and irrigation (16 species), while the lowest species richness was found in the areas inside the forest habitat (2 species). The species that had the highest conservation priority scores were *Pseudagrion pilidorsum declaratum*, *Libellago lineata*, and *Gynacantha subinterrupta*. These three species can be used as conservation priority species in the ecotourism area of Suranadi, Lombok, Indonesia." (Authors)] Address: Ilhamdi, M.L., Dept of Biology Education, Faculty of Teacher Training and Education Science, Universitas Mataram. Jl. Majapahit 62, Mataram 83125, West Nusa Tenggara, Indonesia. E-mail: liwa\_ilhamdi@unram.ac.id

**20704.** IUCN (2021): The conservation status of species and habitat in freshwater Key Biodiversity Areas (KBAs) and key additional sites from the Sebou Basin. Project WAMAN (Water MANagement) Sebou Project, Málaga: 57 pages + annexes- (in English) ["This report presents the results of a broad assessment of the freshwater diversity in four Key Biodiversity Areas (KBAs)1 and some key additional sites in the Sebou river basin in Morocco. The Sebou river basin houses a large proportion of the Moroccan human population that depends on the river for their livelihood. The basin has important ecosystems for threatened species that are currently being recognized as Ramsar sites or national parks. Additionally, four sites have been identified as Key Biodiversity Areas (KBAs) for the persistence of freshwater biodiversity. Assessments were made on the effectiveness of the existing Key Biodiversity Areas (KBAs) in containing important populations of trigger species. During the summers of 2018 and 2019, biodiversity surveys of the taxa used to identify freshwater KBAs (fishes, molluscs, dragonflies and damselflies, crabs and aquatic plants) were undertaken by a team of experts in 39 sampling points, of which 29 were located in KBAs, and the remaining 10 were located in surrounding areas. A total of 192 species was recorded: 17 fish, 6 bivalve, 17 gastropod, 44 Odonata, 2 crayfish/crab species and 106 aquatic plant species. Twenty-one of these species are classified as threatened with extinction in the IUCN Red List of Threatened SpeciesTM (7 aquatic plant species, 2 fish species, 1 damselfly species, 1 crayfish species, 4 bivalve species, and 6 gastropod species). The highest native freshwater biodiversity was recorded in the South and East of KBA Oued Imouzzar Kandar. Also, in the central-east of KBA Oued Tizguite & Oued Ouaslane a high number of native species were found, especially aquatic plants. On the other hand, the number of threatened species was especially high in the KBA Oued Bouhlou and the KBA Oued Tigrigra. KBA Oued Bouhlou and its surroundings hosted a high number of threatened fish and a total of 7 threatened molluscs, including the Critically Endangered *Pseudunio maroccanus* (assessed as *Margaritifera marocana* in the IUCN Red List) and *Unio foucauldianus*. Many threatened molluscs species were also found in the surroundings of the KBA Oued Tigrigra, as well as the Endangered damselfly species *Calopteryx exul* and several threatened aquatic plants. For the surrounding areas, high freshwater biodiversity was found in the main channel of Oued Sebou, especially a high number of fish and dragonfly species. A major threat to the survival of the freshwater biodiversity is the introduction of non-native species that might outcompete the native species. A total of 11 non-native fish species were found in this study. High numbers of non-native fish were found in KBA Oued Tizguite & Oued Ouaslane and KBA Oued Tigrigra, as well as in the lakes' region (Dayat Iffer/ Dayat Yfrah/ Dayat Afourgah) and the sites in

Aguelmam n'Tifounassine and Sidi Ali. Habitat Quality Assessments (HQA) produced high values for KBAs and surrounding areas, but the Habitat Modification scores (HMS) were neither clearly negative nor positive. The region around the KBA Oued Tizguite & Oued Ouaslane is especially affected by human activity, and management plans have to be implemented to properly protect the biodiversity in the area. Other important threats are the construction of dams that are hindering the environmental flow required by many threatened species, soil erosion and siltation of river substrate and wastewater/solid waste disposal in the rivers. The Sebou basin has a high socio-economic importance for the Moroccan population, and is extensively used both for agriculture and industry. The effluents from agricultural or industrial activities have caused high contamination levels, that are harmful to humans, their livestock and the biodiversity. Another issue is the water shortage due to the water extraction for agricultural and urban uses, causing extreme droughts in some sites, especially in KBA Imouzzar Kandar. This intensive water extraction causes soil saline extrusion and increased water conductivity, as has been witnessed in the sites Aguelmam n'Tifounassine & Sidi Ali. Lastly, many of the springs and lakes are becoming unsustainable tourism destinations and have been completely altered and polluted, with the risk of a complete destruction of the freshwater biodiversity in the near future. The inclusion of freshwater biodiversity into the management plan for the Sebou basin, with the involvement of local authorities and communities, is necessary in order to preserve these high valued freshwater ecosystems. In the river Bouhlou crossing the Tazekka natural park, one of the best recruiting populations of the freshwater mussel *Pseudunio maroccanus* (assessed as *Margaritifera marocana* in the IUCN Red List), one of the world's 100 most threatened species, was detected. In order to protect this precious freshwater biodiversity, several measures should be taken to adjust the agricultural and industrial sector: inclusion of freshwater biodiversity into the water management plans and the increase of riparian buffers, wastewater treatment plans, the prevention of cattle overgrazing and bank destruction by trampling near the river banks. Campaigns on the correct management of the channels and the control of recreational activities by local authorities, could aid to manage the environmental flow necessary for many native species. For the rivers/lakes suffering from droughts, it will be necessary to setup an aquifer management plan covering the catchment of the aquifer on which the rivers/lakes depend, and develop artificial reservoirs to enable the reduction of exploitation of ground water. Finally, measures should be taken to stop the active restocking of fish in order to avoid non-native species outcompeting the native species. Further studies should be conducted to have a better understanding on the freshwater biodiversity in the Sebou basin. It is necessary to re-evaluate some of the KBAs to assess the presence of their trigger species and other threatened species. Finally, many of the additional sites that were studied here could be included as extension of the KBA, or a new KBA should be created to help focusing conservation efforts and promoting management actions that allow the persistence of the biodiversity elements present in there." (Authors)] <https://portals.iucn.org/library/sites/library/files/documents/2022-028-En.pdf>

**20705.** Janssens, L.; Verberk, W.; Stoks, R. (2021): The pace-of life explains whether gills improve or exacerbate pesticide sensitivity in a damselfly larva? *Environmental Pollution* 282: (in English) ["Highlights; •Surface area and metabolic rate are important for pesticide uptake and elimination. •Slow-paced (low metabolic rate) animals are more

sensitive to pesticides. •Gill loss increases pesticide sensitivity at fast and decreases it at slow pace. •Importance of oxygen versus pesticide uptake determines effect of gill loss. •Traits predicting pesticide sensitivity can interact. Trait-based approaches are promising to make generalizations about the sensitivity of species and populations to pesticides. Two traits that may shape the sensitivity to pesticides are the surface area (related to pesticide uptake) and the metabolic rate (related to pesticide elimination). We compared the sensitivity of damselfly larvae to the pesticide chlorpyrifos and how this was modified by loss of external gills (autotomy, reducing the surface area) in both fast pace-of-life (high metabolic rate) and slow pace-of-life (low metabolic rate) populations of *Ischnura elegans*. The slow-paced populations were more sensitive to the pesticide than the fast-paced populations in terms of survival, growth and energy metabolism. This suggests the higher metabolic rate of fast-paced populations enabled a faster pesticide elimination. Pesticide exposure also reduced heat tolerance, especially in slow-paced larvae under hypoxia. Gill loss had opposite effects on pesticide sensitivity in slow- and fast-paced populations. In slow-paced larvae, gill loss lowered the sensitivity to the pesticide, while in fast-paced larvae, gill loss increased the sensitivity. This difference likely reflects the balance between the roles of the gills in pesticide uptake (more detrimental in slow-paced populations) and oxygen uptake (more important in fast-paced populations). Our results highlight the need to consider trait interactions when applying trait-based approaches to predict the sensitivity to pesticides." (Authors)] Address: Verberk, W., Animal Ecology and Physiology, Radboud Univ., Heyendaalseweg 135, 6525, AJ Nijmegen, the Netherlands. Email: w.verberk@science.ru.nl

**20706.** Jödicke, R.; Borkenstein, A. (2021): 100 Jahre *Aeshna subarctica* in Europa (Odonata: Aeshnidae). *Libellula Supplement* 16: 141–160: 141-160. (in German, with English summary) ["100 years of *A. subarctica* in Europe – In Europe, *Aeshna subarctica* became known only one hundred years ago. Its history of discovery of the Palaearctic population is traced on the basis of literature. We critically scrutinise its taxonomy, especially that of the European subspecies *elisabethae* and *interlineata*. The phenomenon of a light coloration variety in north-western Central Europe is discussed but not finally explained. The identification in the field is difficult. With comments on a reliable determination we will support a better differentiation between *subarctica* and *juncea*. The most important surveys on the biology of *A. subarctica* are reported on; the species can be regarded as well researched." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: reinhard.joedicke@magenta.de

**20707.** Klausnitzer, B.; Altmann, I. (2021): Zum 200. Geburtstag von Michael Rostock / Michal Rostok, nebst einer Übersicht zur Psocoptera-Fauna (Insecta). *Berichte der naturforschenden Gesellschaft der Oberlausitz* 29: 125-136. (in German, with English summary) ["The 200th birthday of Michael Rostock/Michal Rostok is an occasion to remember this important Sorbian entomologist. His work on the Psocoptera is discussed in some detail. Including the findings of Feurich (1896), 25 species from the Oberlausitz were reported. These are the only faunistic data from the period 1868–1896. For seven species, the data from Rostock and Feurich are uncertain, but four of them have been confirmed by other authors. An additional 19 species reported from the Oberlausitz by Roesler (1939, 1954), Günther (1974) and Schmidt (2016) are listed. Currently, 41 species

of Psocoptera are known from the Oberlausitz." (Authors)] Address: Altmann, Ingrid, Adlerweg 30, 93437 Furth im Wald, Germany

**20708.** Koyanagi, T.; Maoka, T.; Misawa, N. (2021): Fecal microflora from dragonflies and its microorganisms producing carotenoids. *Adv. Exp. Med. Biol.* 1261: 209-216. (in English) ["The intestines of insects are assumed to be the niche of various microbial groups, and a unique microflora could be formed under environmental conditions different from mammalian intestinal tracts. This chapter describes the bacterial flora formed in the intestines of two dragonfly species, "akatombo" (the red dragonfly; *Sympetrum frequens*) and "usubaki-tombo" (*Pantala flavescens*), which fly over a long distance, and carotenoid-producing microorganisms isolated from this flora. C30 carotenoids, which were produced by a bacterium *Kurthia gibsonii* isolated from *S. frequens*, were structurally determined." (Authors)] Address: Koyanagi, T., Dept of Food Science, Ishikawa Prefectural Univ., Nonouchi-shi, Ishikawa, Japan

**20709.** Kuznetsova, V.; Maryanska-Nadachowska, A.; Anokhin, B.; Shapoval, N.; Shapoval, A. (2021): Chromosomal analysis of eight species of dragonflies (Anisoptera) and damselflies (Zygoptera) using conventional cytogenetics and fluorescence in situ hybridization: Insights into the karyotype evolution of the ancient insect order Odonata. *Journal of Zoological Systematics and Evolutionary Research* 59(2): 387-399. (in English) ["All Odonata species studied to date using fluorescence in situ hybridization (FISH) belong to the dragonfly (Anisoptera) families Corduliidae and Libellulidae. It was shown that 18S rRNA gene loci locate on one of the largest pairs of autosomes in every species, whereas the "insect" telomere motif (TTAGG)<sub>n</sub> is absent in all but one species. For better understanding the chromosomal organization and evolution of Odonata, we used C-banding and FISH to study the karyotypes and map TTAGG sequences and major rRNA loci on chromosomes of three more dragonfly species from the families Corduliidae, Libellulidae, and Aeshnidae. Moreover, we obtained the first FISH-data on the suborder Zygoptera (damselflies) by analyzing five species of the families Coenagrionidae and Calopterygidae. We showed that all studied dragonfly species had 2n = 24A + X. The same karyotype was observed in the damselfly family Coenagrionidae, whereas in species of the Calopterygidae, the karyotype 2n = 26A + X was found. Both dragonfly and damselfly species had a pair of m-chromosomes; constitutive heterochromatin tended to be concentrated in the terminal regions of their chromosomes. The use of (TTAGG)<sub>n</sub> and 18S rRNA gene probes in dual-color FISH did not generate (TTAGG)<sub>n</sub> fluorescent signals in any species; major rRNA clusters were revealed on one of the largest pairs of autosomes in all Anisoptera species but on m-chromosomes in all Zygoptera species. Our results suggest that the former 18S location pattern was ancestral in the Odonata and the latter pattern had an ancient origin and could arise in a common ancestor of the damselfly superfamilies Calopterygoidea and Coenagrionoidea." (Authors)] Address: Kuznetsova, Valentina, Dept of Karyosystematics, Zoological Institute, Russian Academy of Sciences, St. Petersburg 199034, Russia. Email: valentina\_kuznetsova@yahoo.com

**20710.** Lai, Y.-H.; Ma, J.-F.; Yang, J.-T. (2021): Flight maneuver of a damselfly with phase modulation of the wings. *Integrative and Comparative Biology* 61(1): 20-36. (in English) ["We developed a numerical model for four-wing self-propulsion to calculate effectively the flight velocity generated



with varied wing motions, which satisfactorily verified biological experiments. Through this self-propulsion model, we analyzed the flight velocity of a damselfly (*Matrona cyanoptera*) at varied phases. The results show that after phase modulation of the wings, the aerodynamic performance of the forewing is affected by the incoming flow and an effective angle of attack, whereas that of the hindwing is dominated by the vortex interaction and induced flow generated by the shed vortex of the forewing. Cooperating with the flow interaction, in stable flight, the hindwing in the lead phase has a larger vertical velocity, whereas the forewing in the lead phase has a larger horizontal velocity. Regarding the aerodynamic efficiency, the forewing in the lead phase has greater horizontal efficiency, whereas the hindwing in the lead phase has greater vertical efficiency; the overall efficiency does not vary with the phase. This work interprets that a dragonfly adopts the hindwing in the lead phase to generate a larger lift, thus supporting the larger body weight, whereas a damselfly adopts the forewing in the lead phase to have a greater forward velocity, which can supplement the lack of flapping frequency." (Authors)] Address: Yang, J.-T., Dept of Mechanical Engineering, National Taiwan Univ., Taipei, Taiwan. Email: jyang@ntu.edu.tw

**20711.** Lima da Silva, J.R.; Lima da Silva, A.; Santiago, A.S.; da Silveira Júnior, A.M. (2021): Composition, abundance and diversity of immature Odonata (INSECTA) insects living in stretches of middle Araguari River, Amapá State, Amazonian Region, Brazil. *Nature and Conservation* 14(2): 11 pp. (in English, with Portuguese summary) ["Odonata order, popularly known as dragonflies, comprises insects belonging to group Palaeoptera and presents hemimetabolous development encompassing three life cycle stages: eggs, larvae and adults. Odonata order has three suborders, namely: Anisoptera, Zygoptera and Anisozygoptera - the last one is exclusively distributed in Asia. The aim of the current study is to investigate the composition, abundance and diversity of Odonata larvae in middle Araguari River (Amapá, Brazil) by evaluating space-seasonal fluctuations and their association with different substrates. Eight collection sites were set along the river. Quarterly samplings were performed within an annual cycle (April/2018 to April/2019) by positioning a trawl "D" net (Rapiché) on the riverbed and scraping the substrate to collect 2L of sample. Odonata richness, abundance and diversity indices were evaluated. Data were statistically treated based on simple descriptive analysis, means, medians and standard deviations, Kruskal-Wallis test (nonparametric data) and ANOVA (parametric data) in the R-statistics Software. 297 individuals were identified; Libellulidae was the most abundant family (80.13%). Diversity and equitability have shown variations between sampling sites ( $p < 0.05$ ) and collection campaigns ( $p < 0.05$ ). Only abundance was influenced by categorical variables such as downstream/upstream river and substrate type. Higher taxonomic resolution, in combination to environmental variables, could help establishing ecosystem relationships that were not identified in the current study." (Authors)] Address: Lima da Silva, J.R., Universidade Federal do Amapá, Brasil. Email: jho.rodrigues.1701@gmail.com

**20712.** Liu, X.; Hefler, C.; Shyy, W.; Qiu, H. (2021): The importance of flapping kinematic parameters in the facilitation of the different flight modes of dragonflies. *Journal of Bionic Engineering* 18: 419-427. (in English) ["To better understand dragonflies' remarkable flapping wing aerodynamic performance, we measured the kinematic parameters of the wings in two different flight modes (Normal Flight Mode (NFM) and Escape Flight Mode (EFM)). When the specimens

switched from normal to escape mode the flapping frequency was invariant, but the stroke plane of the wings was more horizontally inclined. The flapping of both wings was adjusted to be more ventral with a change of the pitching angle that resulted in a larger angle of attack during downstroke and smaller during upstroke to affect the flow directions and the added mass effect. Noticeably, the phasing between the fore and hind pair of wings varies between two flight modes, which affects the wing-wing interaction as well as body oscillations. It is found that the momentum stream in the wake of EFM is qualitatively different from that in NFM. The change of the stroke plane angle and the varied pitching angle of the wings diverts the momentum downwards, while the smaller flapping amplitude and less phase difference between the wings compresses the momentum stream. It seems that in order to achieve greater flight maneuverability a flight vehicle needs to actively control positional angle as well as the pitching angle of the flapping wings." (Authors)] Address: Qiu, H., Dept of Mechanical and Aerospace Engineering, The Hong Kong Univ. of Science and Technology, Hong Kong SAR, China

**20713.** Liu, X.; Hefler, C.; Fu, J.; Shyy, W.; Qiu, H. (2021): Implications of wing pitching and wing shape on the aerodynamics of a dragonfly? *Journal of Fluids and Structures* 101, February 2021, 103208: (in English) ["The forewing and the hindwing of a dragonfly have different geometry that could be an evolutionary specialization for better aerodynamic performance via sophisticated wing pitch control. Under different extent of wing pitching by the wing root musculature, the fore- and hindwings could exhibit different shape deformation and aerodynamic characteristics as a result of passive shape deformation. We measured the flow around the flapping wings using time-resolved particle image velocimetry (TR-PIV) to investigate the consequences of shape and the pitching mechanisms of the wings on the aerodynamics of dragonflies. The flow fields and pitching angle variations of the naturally actuated wing of the dragonfly were compared with that of the same wing artificially actuated only by flapping motion. We found that the trailing edge vortex dynamics and the wake were affected by the wing shape only for the in-vivo experiment with muscle induced pitching. Under the in-vivo with muscle induced pitching, the hindwing took more part in generating horizontal momentum with larger pitching magnitude, due to the larger chord length compared with forewing. Meanwhile, when there was only pitching due to the wing membrane deformation of artificially actuated flapping, a slight difference in the surrounding flow structures was found between the hindwing and the forewing, and the net flow in one period was reduced nearly to zero. These results provided quantified evidence to the extent and importance of the pitching motion of the wings in dragonfly flight. The results of this work can be useful for the design of wings, their actuation mechanism, and the in-flight kinematics control of flapping wing micro air vehicles (MAVs)." (Authors)] Address: Qiu, H., Dept of Mechanical and Aerospace Engineering, The Hong Kong Univ. of Science and Technology, Hong Kong Special Administrative Region of China. E-mail: meqiu@ust.hk

**20714.** Martens, A. (2021): Hansruedi Wildermuth: Facetten seiner Libellenstudien. *Libellula Supplement* 16: 13-18. (in German, with English summary) ["Hansruedi Wildermuth: Some highlights of his Odonata studies. Hansruedi Wildermuth is one of the most creative odonatologists in the present time. This paper focuses on two aspects: (1) his special contribution on midges as odonate parasites and (2) the development of his fundamental monography on European

Corduliidae." (Author)] Address: Martens, A., Institut für Biologie, PH Karlsruhe, Bismarckstrasse 10, D-76133 Karlsruhe, Germany. E-mail: martens@ph-karlsruhe.de

**20715.** Martins, R.T.; Brito, B.; Dias-Silva, K.; Leal, C.G.; Leitao, R.P.; Oliveira, V.C.; Oliveira-Júnior, J.M.B.; Ferraz, S.F.B.; de Paula, F.R.; Roque, F.O.; Hamada, N.; Juen, L.; Nessimian, J.L.; Pompeu, P.S.; Hughes, R.M. (2021): Low forest-loss thresholds threaten Amazonian fish and macroinvertebrate assemblage integrity. *Ecological Indicators* 127 (2021) 107773: 12 pp. (in English) ["Deforestation is a major threat globally, but especially in tropical regions because they are biodiversity strongholds and carbon storehouses. Some studies have reported changes in species richness and composition in lotic ecosystems with increased forest-loss in their catchment, presumably resulting from the replacement of sensitive taxa by more resistant or tolerant taxa. Also, sensitive taxa respond to deforestation in a non-linear manner and fish and macroinvertebrates have different sensitivities to landscape pressures. Therefore, it is useful to determine the effects of forest-loss on widespread sensitive or threshold taxa in aquatic ecosystems. We used Threshold Indicator Taxa Analysis (TITAN) to assess forest-loss and land use history impacts in 92 eastern Amazonian stream sites. We determined TITAN peak-change thresholds for fish at 1% and 6% of forest-loss at total-catchment and local-riparian spatial extents, respectively, and at 2% and 40% of land-use intensity change at total-catchment and local-riparian spatial extents, respectively. For macroinvertebrates, TITAN peak-change thresholds were 1% and 11% of forest loss at total-catchment and local-riparian spatial extents, respectively, and at 3% of land-use intensity change for both total-catchment and local-riparian spatial extents. Because of these thresholds, inherent ecoregional variability and key literature, we have three major recommendations. 1) Logging should be prohibited in riparian reserves that are at least 100-m wide on each side of headwater streams and in a network of catchments across all biomes and as many landscape types as possible. 2) An ecologically and statistically rigorous monitoring program with standard methods should be implemented to assess and regulate land uses better. 3) Conservation planning areas should consider aquatic biota as well as terrestrial biota." (Authors)] Address: Martins, R.T., Coordenação de Biodiversidade, Instituto Nacional de Pesquisas da Amazonia, Manaus, AM 69067-375, Brazil. E-mail address: martinsrt@gmail.com

**20716.** Mehmood, S.A.; Zia, A.; Ahmad, S.; Shah, M.; Ali, W.; Rababa; Irfanullah (2021): Distribution and abundance of odonates fauna of Tanawal region district Mansehra, Pakistan. *Journal of Animal & Plant Sciences* 31(6): 1848-1854. (in English) ["Throughout the present study a total of 425 specimens were collected to assess the distribution and abundance of Odonata fauna. [...]. They are environmental indicators and play important role in biological control of insect pests. Result revealed 19 species belonging to [...] under 6 families. Most abundant family recorded was Libellulidae (74%) followed by Chlorocyphidae and Calopterygidae (11%) and (7%) respectively. Whereas Aeshnidae were found least abundant (2%). Genus *Orthetrum* dominated with percentage (51%) followed by genera *Rhinocypha*, *Neurobasis* and *Pantala* 11%, (7%) and (7%) respectively. While least abundant genus was *Sympetrum* having percentage (2%). Highest richness is observed at locality Galli badral (12.47%) followed by Shungli (12.00%) and Phulra (11.29%) respectively. However lowest richness was recorded at locality Lassan (4.47%). Regarding species

abundance *Orthetrum triangulare triangulare* was dominated (18.11%) followed by *O. prunosum neglectum*, (16.47%), *Neurobasis chinensis chinensis*, (7.05%) and *Rhinocypha quadrimaculata*, (5.88%), respectively. While lowest abundance was observed for *Ictinogomphus rapax* (1.41%). The canonical correspondence analysis showed that all Odonata species were associated with submerged vegetation. Anisoptera and Zygoptera species were associated with sunny and shady biotypes. Two species; *O. triangulare triangulare* and *O. prunosum neglectum* showed positive association with temperature. A Zygoptera species *Megalestes major* was found in moist habitat. Relative humidity was found as an influencing factor for the population growth of Anisopteran and Zygopteran species. Cluster analysis showed that all species were clustered into two groups; genera *Anax*, *Ictinogomphus*, *Crocothemis*, *Neurothemis*, *Orthetrum Palpopleura*, *Pantala* and *Sympetrum* were clustered into group I. Whereas Group II comes up with all Zygoptera species. The current information/data base will be helpful in preservation of ecosystem management approaches of Odonata." (Authors)] Address: Mehmood, S.A., Dept of Zoology, Hazara Univ., Mansehra, Pakistan. Email: sardar.azhar@hu.edu.pk

**20717.** Miya, M.S.; Gautam, D.; Neupane, B.; Chhetri, A. (2021): Species diversity and abundance of Odonata in Sishaghat of Tanahun district, Nepal. *Journal of Animal Diversity* 3(3): 45-55. (in English) ["Odonates are one of the most ancient, well studied and fascinating insects considered as bio-indicators of aquatic ecosystems. Studies of Odonata have been carried out in many parts of Nepal, but no specific study has been performed in Tanahun. Hence, a study was conducted to determine the species diversity and abundance of Odonata in the Sishaghat region of Tanahun district, Nepal from June to August 2020. A transect survey method was used for data collection. A total of six transects, each with a length of 200 m: - (three in each habitat type: agricultural lands and forest streams) were laid out randomly and each transect was surveyed three times. Data were pooled and analyzed with SPSS. A total of 629 individuals of 26 Odonata species from 20 genera and 7 families were recorded. The overall Shannon-Wiener diversity index was  $H = 2.25$ , Shannon Equitability was  $E = 0.69$  and Margalefs' richness index was  $R = 3.88$ . Sub-order Anisoptera was more diverse ( $H = 1.94$ ) and more abundant ( $n = 545$ ) than Zygoptera ( $H = 1.31$ ,  $n = 84$ ). However, species richness was higher and evenness lower in Zygoptera ( $R = 2.26$ ,  $E = 0.55$ ) than Anisoptera ( $R = 2.22$ ,  $E = 0.72$ ). Anisoptera comprised 15 species under 10 genera from two families and Zygoptera comprised 11 species under seven genera from five families. The family Libellulidae represented the highest species richness ( $R = 1.75$ ). *Neurothemis fulvia* and *Orthetrum prunosum* were the most abundant species ( $RA = 23.21$  and  $21.78$  respectively). While considering the global context, among the recorded Odonata, 25 species are included under the least concern and one under the vulnerable category by IUCN. A higher number of species was found in agricultural lands (nine species); hence, the water bodies around should be preserved to conserve the Odonata." (Authors)] Address: Neupane, B., Tribhuvan Univ., Institute of Forestry, Pokhara Campus, Pokhara, Nepal. E-mail: bijneu@gmail.com

**20718.** Montalvão, M.F.; Guimarães, A.T.A.; Rodrigues, A.S.; Malafaia, G. (2021): Carbon nanofibers are bioaccumulated in *Aphylla williamsoni* (Odonata) larvae and cause REDOX imbalance and changes of acetylcholinesterase activity. *Science of The Total Environment* 756:143991: (in

English) ["Carbon-based materials have been considered very promising for the technological industry due to their unique physical and chemical properties, namely: ability to reduce production costs and to improve the efficiency of several products. However, there is little information on what is the level of exposure that leads to adverse effects and what kind of effects is expected in aquatic biota. Thus, the aim of the present study was to evaluate the toxicity of carbon nanofibers (CNFs) in dragonfly larvae (*Aphylla williamsoni*) based on predictive oxidative-stress biomarkers, antioxidant activity reduction and neurotoxicity. After ephemeral models' exposure to CNFs (48 h; at 500 µg/L), data have shown that these pollutants did not change larvae's nutritional status given the concentration of total soluble carbohydrates, total proteins and triglycerides in them. However, the levels of both nitric oxide and substances reactive to thiobarbituric acid (lipid peroxidation indicators) have increased and the antioxidant activity based on total thiol levels and on 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity (%) has reduced, and it suggests REDOX imbalance induction by CNFs. In addition, larvae exposed to these pollutants showed significant acetylcholinesterase activity reduction in comparison to the control group. Thus, the present study has brought further knowledge about how carbon-based materials can affect benthic macroinvertebrates and emphasized their ecotoxicological potential in freshwater environments." (Authors)] Address: Programa de Pós-Graduação em Ecologia e Conservação de Recursos Naturais, Universidade Federal de Uberlândia, Uberlândia, MG, Brazil; Lab. de Pesquisas Biológicas, Programa de Pós-Graduação em Conservação de Recursos Naturais do Cerrado, Inst. Federal Goiano, Urutaí, GO, Brazil; Programa de Pós-Graduação em Biotecnologia e Biodiversidade, Univ. Federal de Goiás, Goiânia, GO, Brazil

**20719.** Nakamura, H.; Kurimoto, N.; Imura, Y.; Hatakeyama, Y. (2021): The first isolation of microsporidia from dragonflies in Japan. *Jpn. J. Appl. Entomol. Zool.* 65: 29-34. (in Japanese, with English summary) ["Entomopathogenic microsporidia are pathogens of various arthropods and therefore cause disease in important host species ranging from agricultural pests to beneficial insects. Here, we investigated three genera of entomopathogenic microsporidia from dragonflies; these were isolated in Kanagawa, Japan, in 2014. In total, the infection rate was 0.85% (16 of the 1,886 surveyed dragonfly adults). Four strains of microsporidia selected from infected *Orthetrum albistylum speciosum* adults were measured for spore size and analyzed at the molecular level. According to spore size, the four strains were roughly divided into two groups. Analysis of small-subunit ribosomal RNA sequences indicated that the microsporidia strains belonged to the *Trachipleistophora*, *Vavraia*, and *Paranosema* clusters. Microsporidia species that are closely related to the strains isolated in this study have previously been reported to infect insects other than dragonflies. Therefore, we suggest the possibility that the microsporidian strains we isolated in *O. albistylum speciosum* may also infect other insect species." (Authors)] Address: Hatakeyama, Y., Laboratory of Applied Entomology, Dept of Agricultural Bioscience, College of Bioresource Science, Nihon Univ.; 1866 Kameino, Fujisawa, Kanagawa 252.0880, Japan. E-mail: hatakeyama.yoshinori@nihon-u.ac.jp

**20720.** Nakamura, Y.; Tominaga, A. (2021): Diet of the American Bullfrog *Lithobates catesbeianus* naturalized on Okinawajima, Ryukyu Archipelago, Japan. *Current Herpetology* 40(1): 40-53. (in English) ["The diet of the nonnative American Bullfrog *Lithobates catesbeianus* occurring in

Ogimi Village of Okinawajima, Ryukyu Archipelago, is investigated. Seventy two of 89 frogs (nine adults, five sub-adults, and 58 juveniles) captured had food items in its stomach. We identified a total of 64 taxa from 253 food items. Our analyses show that (1) the diet consists mainly of terrestrial prey, (2) mollusks and vertebrates are the essential prey groups for adults and subadults, and (3) odonates, mollusks, and arachnids are the main prey for juveniles. Such dietary habits are quite different from those of several conspecific nonnative populations in mainland Japan and other regions. Part of this is most likely related to the absence of the frog's favorite prey, nonnative American crayfish *Procambarus clarkii*, in the study area. We also confirm the predation of a poisonous newt *Cynops ensicauda popei* (Salamandridae) and several aquatic insects by this frog and present some implications for these results." (Authors)] Address: Nakamura, Y., Faculty of Education, Univ. of the Ryukyus, Senbaru 1, Nishihara, Okinawa 903-0213, Japan. Email: ynaka.riukiaria@gmail.com

**20721.** Nidup, T.; Tamang, D.T.; Tobgay, S.; Wangmo, S.; Wangchuck, K.; Rinzin, P.; Dorji, T. (2021): Nymphs of Odonata (Insecta) from Eastern Bhutan with identification keys to nymphs of the Odonata families known from Bhutan. *Sherub Doenme: The Research Journal of Sherubtse College* 14: 65-76. (in English) ["The nymphs of Odonata is least studied in Bhutan despite being the good indicator of aquatic ecosystem. Through the survey of streams and lakes in Trashigang and Trashi Yangtse districts, nymphs of four Zygoptera, one Anisozygoptera and six Anisoptera families are reported from eastern Bhutan. The identification key to the families of the nymphs of Odonata in Bhutan, recorded either through adult or nymphs provided to facilitate the future identification. However, further work is needed to document the nymphs of all the families of the adult Odonata found in Bhutan." (Authors)] Address: Nidup, T., Centre for Science & Environmental Research, Sherubtse College, Bhutan. E-mail: tsheringnidup.sherubtse@rub.edu.bt

**20722.** Norling, U. (2021): Growth, winter preparations and timing of emergence in temperate zone Odonata: control by a succession of larval response patterns. *International Journal of Odonatology* 24(1): 1-36. (in English) ["As warm-adapted insects of tropical origin, Odonata cope with cold periods by seasonal regulation and diapause. A model for larval-overwintering species is proposed with three response patterns related to the timing of emergence, which can be predicted from seasonal cues during the last few stadia. For emergence during the present season, there is an often time constrained preemergence development, accelerated by long days and higher temperatures. In regulatory development, emergence is postponed to the next season, and a complex of diapause-like delays controlled by photoperiod and temperature prevents premature emergence. Instead, development converges on a winter diapause in sizes suitable for emergence during the following year. Long days are particularly delaying, and thermal responses are variable, sometimes inverted. In early development, with rapid growth, emergence is usually not predicted to season, but short-day winter diapauses may occur, and precocious preparations for a penultimate winter may be predictive. Thermal responses are steep, extremely so if a short-day diapause is suppressed by higher temperatures. Other physiological and also behavioural properties may differ between response patterns. Changes in photoperiod and temperature control the timing of seasonal events, and the transition from regulatory to pre-emergence development follows the increase in temperature and photoperiod after winter,

which is an important time-setter. Interactions of larval size, photoperiod, temperature and previous changes affect development rate, and long-term constant conditions often end in regulatory diapause. Proximate mechanisms of cohort splitting and the implications of the model for design and interpretation of experiments are discussed." (Authors)] Address: Norling, U., Dept of Urban Studies, Malmö Univ., Malmö, Sweden, Spårnögratan 53, 22652 Lund, Sweden. E-mail: ulfg.norling@gmail.com, ulf.norling@mau.se

**20723.** Oki, D.S. (2021): Numerical simulation of the effects of groundwater withdrawal and injection of high-salinity water on salinity and groundwater discharge, Kaloko-Honokohau National Historical Park, Hawai'i. U.S. Geological Survey Scientific Investigations Report 2021-5004: 59 pp. (in English) ["Kaloko-Honokohau National Historical Park (KAHO) is located on the west coast of the island of Hawai'i and contains water resources exposed in fishponds, anchialine pools, and marine waters that are cultural resources and that provide habitat for threatened, endangered, and other culturally important native species. KAHO's water resources are sustained by and dependent on groundwater discharge. In 1978, the year of KAHO authorization, the lands immediately surrounding KAHO were undeveloped and zoned for conservation purposes; at present, most surrounding lands are either developed or zoned for industrial, commercial, or residential use. Urbanization of the North Kona District has increased the need for additional drinking and nonpotable (irrigation) water. Because KAHO's water resources may be affected by existing and proposed groundwater withdrawals and injections of high-salinity water in the surrounding area, the U.S. Geological Survey, in cooperation with the National Park Service, undertook this study to refine the understanding of how groundwater withdrawals and injection of high-salinity water may affect KAHO's water resources. Changes in KAHO water resources, in terms of changes in salinity and groundwater discharge, were modeled for selected scenarios of groundwater withdrawal and high-salinity water injection in the aquifer. The numerical model was developed using the model code SUTRA, which accounts for density-dependent flow and salinity transport, and included the coastal-confined groundwater system beneath the coastal freshwater-lens system. Model results indicate that withdrawal of additional groundwater from the coastal freshwater-lens system will affect the salinity of KAHO's anchialine pools, which provide habitat for the endangered orangeblack Hawaiian damselfly (*Megalagrion xanthomelas*). The magnitude of the effect is dependent on the amount and location of the withdrawal. Greater withdrawal rates cause greater increases in salinity in KAHO, other factors being equal. For a given withdrawal rate, the greatest increase in salinity in KAHO is associated with wells withdrawing groundwater in an area inland of KAHO and the least increase in salinity is associated with wells near the coast. Model results also indicate that withdrawal of additional groundwater from the coastal freshwater-lens system will affect the groundwater discharge, in terms of the freshwater component (water with zero salinity) of the discharge, through KAHO. Greater withdrawal rates cause greater reductions in freshwater discharge through KAHO. For a given withdrawal rate, the greatest reduction in freshwater discharge through KAHO is associated with wells near the north boundary of KAHO and the least reduction is associated with wells near the coast to the north and south of KAHO. Injection of high-salinity water that is denser than ocean water can affect the salinity of damselfly habitat in KAHO, with the magnitude of the effect dependent on the location of the injection. Model results indicate that salinity

may either increase or decrease in the anchialine pools that provide damselfly habitat in KAHO, depending on the site of injection. Injection inland of KAHO and at sites immediately north and south of KAHO causes a simulated decrease in salinity at the damselfly habitat, whereas injection farther north and south of KAHO causes an increase in salinity. Injection of high-salinity water also causes a reduction in freshwater discharge through KAHO, with the greatest reduction associated with distant injection wells to the north and south of KAHO and the least reduction associated with wells located near and immediately inland from KAHO. The numerical groundwater models developed for this study have a number of limitations. Lack of understanding of the subsurface geology constrains the ability to accurately model the groundwater-flow system. The models developed for this study are nonunique, cannot account for local-scale heterogeneities in the aquifer, and contain uncertainties related to recharge, boundary conditions, assigned parameter values in the model, and representations of the different hydrogeological features. Confidence in model results can be improved by addressing these and other limitations. In spite of these limitations, the three-dimensional numerical model developed for this study provides a useful conceptual understanding of the potential effects of additional withdrawals and injections on groundwater resources in KAHO. Further evaluation of the ecologic effects of the simulated changes in groundwater quality and quantity in KAHO is needed but is beyond the scope of this study." (Author)] Address: Pacific Islands Water Science Center, U.S. Geological Survey, Inouye Regional Center, 1845 Wasp Blvd., B176, Honolulu, HI 96818, USA

**20724.** Okude, G.; Fukatsu, T.; Futahashi, R. (2021): Electroporation-mediated RNA Interference Method in Odonata. *Journal of Visualized Experiments* (168), e61952: 20 pp. (in English) ["Odonata represent one of the most ancestral insects with metamorphosis, in which they change their habitat, morphology, and behavior drastically from aquatic larvae to terrestrial/aerial adults without pupal stage. Odonata adults have a well-developed color vision and show a remarkable diversity in body colors and patterns across sexes, stages, and species. While many ecological and behavioral studies on Odonata have been conducted, molecular genetic studies have been scarce mainly due to the difficulty in applying gene functional analysis to Odonata. For instance, RNA interference (RNAi) is less effective in the Odonata, as reported in the Lepidoptera. To overcome this problem, we successfully established an RNAi method combined with *in vivo* electroporation. Here we provide a detailed protocol including a video of the electroporation-mediated RNAi method as follows: preparation of larvae, species identification, preparation of dsRNA/siRNA solution and injection needles, ice-cold anesthesia of larvae, dsRNA/siRNA injection, *in vivo* electroporation, and individual rearing until adult emergence. The electroporation-mediated RNAi method is applicable to both damselflies (suborder Zygoptera) and dragonflies (suborder Anisoptera). In this protocol, we present the methods for the blue-tailed damselfly *Ischnura senegalensis* (Coenagrionidae) as an example of damselfly species and the pied skimmer dragonfly *Pseudothemis zonata* (Libellulidae) as another example of dragonfly species. As representative examples, we show the results of RNAi targeting the melanin synthesis gene multicopper oxidase 2. This RNAi method will facilitate understanding of various gene functions involved in metamorphosis, morphogenesis, color pattern formation, and other biological features of Odonata. Moreover, this protocol may be generally applicable to non-model organisms in which RNAi is less effective



in gene suppression due to the inefficiency and low penetrance." (Authors)] Address: Okude, G., Dept of Biological Sciences, Graduate School of Science, The Univ. of Tokyo; Bioproduction Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Japan. Email: gentaokude@gmail.com

**20725.** Okude, G.; Fukatsu, T.; Futahashi, R. (2021): Comprehensive comparative morphology and developmental staging of final instar larvae toward metamorphosis in the insect order Odonata. *Scientific Reports* volume 11, Article number: 5164: 13 pp. (in English) ["The order Odonata is among the most ancestral groups of winged insects with drastic morphological changes upon metamorphosis, and thus important for understanding evo-devo aspects of insects. However, basic developmental descriptions of Odonata have been scarce. In an attempt to establish the foundation of developmental and experimental biology of Odonata, we present an unprecedentedly comprehensive survey of dragonflies and damselflies, in total 158 larvae representing 49 species and 14 families, wherein morphological changes of all the final and/or penultimate instar larvae were photographed and monitored everyday. Although their morphology and development were diverse, we consistently identified two visually recognizable morphogenetic events in the final larval instar, namely start of wing expansion and onset of melanization on the wing sheaths, thereby categorizing the final instar into three stages. While the duration of the first stage ranged 4–66 days across diverse Odonata species, the second or third stages exhibited relatively small variation ranging 3–22 days or 1–8 days, respectively, probably reflecting the steady and irreversible metamorphosis process after stage 2. We also described other characteristic morphological changes during the larval development, although they were observed only in some Odonata species and lineages." (Authors)] Address: Okude, G., Dept of Biological Sciences, Graduate School of Science, The Univ. of Tokyo, Tokyo, Japan. E-mail: gentaokude@gmail.com

**20726.** Olthoff, M.; Hannig, K. (2021): Die Libellen (Insecta, Odonata) einer Sandabgrabung bei Haltern-Flaesheim (Kreis Recklinghausen, Nordrhein-Westfalen). *Abhandlungen aus dem Westfälischen Museum für Naturkunde* 94: 261-278. (in German, with English summary) ["Between 2015 and 2017, the dragonfly fauna of a sand pit next to Haltern-Flaesheim (Recklinghausen district, North Rhine-Westphalia) was investigated at ten sampling days. In addition to the actual water filled excavation site, a fire water pond was investigated. Altogether, 27 species of dragonflies could be recorded, one of which is listed in the German Red List of endangered species [*Orthetrum coerulescens*]. With 21 species, a comparatively high diversity could be recorded at the fire water pond. Only 14 species could be observed at the excavation site. The sand pit with its favourable climatic conditions offers habitat for many warmth-loving Mediterranean species [*Erythromma lindenii*], *E. viridulum*, *Anax parthenope*, *Gomphus pulchellus*, *Crocothemis erythraea*, *Sympetrum fonscolombii*. What is particularly remarkable here is the occurrence of *Gomphus vutgatissimus* at the water-filled excavation site, which is also its breeding site. Due to the absence of shallow water zones with riparian vegetation, no further dragonfly species that are a high priority for conservation were recorded." (Authors)] Address: Olthoff, M., Naturförderstation im Kreis Coesfeld, Borkener Str. 13, 48653 Coesfeld, Germany. Email: matthias.olthoff@naturfoerderstation.de

**20727.** Pianezze, S.; Perini, M.; Bontempo, L.; Piasentier, E.; Poma, G.; Covaci, A.; Camin, F. (2021): Stable isotope ratio analysis for the characterisation of edible insects. *Journal of Insects as Food and Feed* 7(6): 955-964. (in English) ["Entomophagy, or the act of eating insects, has been practiced since ancient times, but it started to gain more popularity, especially in Western countries, only recently. As sustainability is one of the current emerging themes, the inclusion of insects in our diet is a valid alternative that might help reduce the amount of water and land used for livestock and the associated emissions of greenhouse gasses. Moreover, insects are a source of protein, fibres, vitamins, minerals and fats. Edible insects are considered a novel food, for which no isotopic reference values are yet available. In the present work, samples of farmed edible insects (n=40) belonging to different orders (namely, Coleoptera, Hemiptera, Hymenoptera, Lepidoptera, Odonata and Orthoptera) and insect-based food items (n=4) for human consumption were analysed. The following isotopes, d13C, d15N, d34S, d18O and d2H of the defatted samples, together with the d13C of the fat, were investigated. The aim of the work was to provide the first reference isotopic ratios that can be used for future investigations in the food quality field. The variability of these parameters was dependent on the life stage and diet of insects, their geographical origin, and the addition of ingredients as seasoning." (Authors)] Address: Camin, Federica, Fondazione E. Mach, Via Mach 1, San Michele all'Adige, 38010 Trento, Italy. E-mail: federica.camin@fmach.it

**20728.** Piersanti, S.; Salerno, G.; Di Pietro, V.; Giontella, L.; Rebora, M.; Jones, A.; Fincke, O.M. (2021): Tests of search image and learning in the wild: Insights from sexual conflict in damselflies. *Ecology and Evolution* 11(9): 4399-4412. (in English) ["Search image formation, a proximal mechanism to maintain genetic polymorphisms by negative frequency-dependent selection, has rarely been tested under natural conditions. Females of many nonterritorial damselflies [*Ischnura elegans*] resemble either conspecific males or background vegetation. Mate-searching males are assumed to form search images of the majority female type, sexually harassing it at rates higher than expected from its frequency, thus selectively favoring the less common morph. We tested this and how morph coloration and behavior influenced male perception and intersexual encounters by following marked *I. elegans* and noting their reactions to conspecifics. Contrary to search image formation and associative learning hypotheses, although males encountered the minority, male-like morph more often, sexual harassment and clutch size were similar for both morphs. Prior mating attempts or copula with morphs did not affect a male's subsequent reaction to them; males rarely attempted matings with immature females or males. Females mated early in the day, reducing the opportunity for males to learn their identity beforehand. Once encountered, the male-like morph was more readily noticed by males than the alternative morph, which once noticed was more likely to receive mating attempts. Flexible behavior gave morphs considerable control over their apparency to males, influencing intersexual encounters. Results suggested a more subtle proximal mechanism than male learning maintains these color polymorphisms and call for inferences of learning to be validated by behavior of wild receivers and their signalers." (Authors)] Address: Fincke, Ola, Dept of Biology, Univ. of Oklahoma, Norman, OK, 73019 USA. E-mail: fincke@ou.edu

**20729.** Rivas-Torres, A.; Cordero-Rivera, A.; Luque-Pino, P. (2021): Evolució i diversitat de la translocació esperma-

tica intramasculina en odonats: comportament únic i essencial - Evolution and diversity of intramasculine sperm translocation in odonates: unique and essential behavior. *L'Atzer- vara* 31: 115-120. (in Catalan, with English summary) ["Evolution and diversity of intra-male sperm translocation in odonates: unique and essential behaviour. – The reproductive behaviour of Odonata is unique among insects and is conditioned by the anatomical separation between the male's reproductive organs and the intromittent organ. Prior to mating, males must translocate sperm from the ninth abdominal segment to the seminal vesicle located in the second abdominal segment. This behaviour, exclusive to odonates, is known as intra-male sperm translocation. In this brief review, we present the variants of this sperm translocation and propose a plausible explanation for how this behaviour may have evolved. We also present the intraspecific variability in this sperm translocation within the species *Ischnura graellsii* and the possible consequences within sperm fertility." (Authors)] Address: Rivas-Torres, A., Univ. de Vigo, Grupo ECOEVO, Escola de Enxeñaría Forestal, Campus Universitario A Xunqueira, 36005 Pontevedra, Spain

**20730.** Saefullah, A.A.; Latifah, L.; Sa'adah, M.; Salsabila, N.; & Muslimah, S. (2021): The inventory of dragonfly species in Kedung Kopong and Banyak Angkrem areas in Kali-rejo village, Salaman-Magelang. *Proceeding International Conference on Science and Engineering* 4: 41-47. (in Indonesian, with English summary) ["Dragonflies are classified into the Odonata order. The existence of dragonflies can be used as bioindicators of good water, related to their life cycle. The difference of habitats in the Kedung Kopong and Banyak Angkrem areas affects the diversity of dragonflies found in the location. The purpose of this research was to determine the types of dragonflies and their habitats in the Kedung Kopong and Banyak Angkrem areas. The method used in this research is the point count, which is by tracing the predetermined transects and divides it into some points. The distance between the points is 15 meters while the diameter of the points is 10 meters. The result of data collection of dragonflies in the Kedung Kopong and Banyak Angkrem areas as a whole obtained 19 species which is divided into 7 families, they are Aesnidae (2 species), Libellulidae (10 species), Calopterygidae (1 species), Cholorocyphidae (1 species), Coenagrionidae (2 species), Euphaeidae (1 species), and Platycnemidae (1 species). Habitats in the Kedung Kopong areas is the river. Meanwhile, in Banyak Angkrem are settlements and hills." (Authors)] Address: Latifah, L., Biology Dept, Faculty of Science & Technology, UIN Sunan Kalijaga, Jl. Marsda Adisucipto No 1 Yogyakarta 55281, Indonesia. E-mail hafitalala@gmail.com

**20731.** Shustov, Yu. A.; Lesonen, M.A. (2021): Food competition of roach and perch in the water bodies of the Republic of Karelia. *Hydrobiological Journal*: 17-25. (in English) ["A comparative analysis of the dietary competition between roach and perch in lakes and rivers of Karelia (Onega and Ladoga lakes basins) is presented. It was revealed that in summer competition occurs when fishes feed on aquatic invertebrates (zooplankton and zoobenthos), as well as aerial insects, flying at the water surface. Food competition, according to the diet similarity index, ranged from 39.0 to 49.5. First of all, fish competed for the benthic organisms (30.0-35.5) and zooplankton (5.0-16.5). It was found that there is practically no competition for the aquatic plants (higher plants, algae and detritus), which formed on average 35% of the roach diet. On average, 25% of the perch diet was made by fish. Thus, the perch, which has high physical strength, also feeds on other most mobile and large organisms

of zoobenthos - the waterlouse, lake gammarus and Odonata larvae." (Authors)] Address: Shustov, Yu.A., Petrozavodsk State Univ. Petrozavodsk, Russia North Research Institute of Fishery Petrozavodsk, Russia

**20732.** Steenken, S.; Kleinschmidt, M.; Remy, D. (2021): Erprobungs- und Entwicklungsvorhaben zur Auenrenaturierung – Erfolgskontrollen 20 Jahre später. *BfN-Skripten* 588: 445 pp. (in German) ["The success of four floodplain restoration projects was re-evaluated 10 to 20 years after the completion of the restoration measures. These are former E+E projects on the Berkel, Hase, Oster and Oberweser rivers, which were funded by the Federal Agency for Nature Conservation between 1988 and 2003. The aim of this success control was to evaluate the long-term effects of the implemented renaturation measures and to identify common development patterns that would enable the derivation of generally applicable recommendations for floodplain renaturation. For this purpose, the scientific accompanying studies from the original projects were partially resumed for two vegetation periods. The topics covered were hydrology and morphology, vegetation and use, and fauna. The focus of this success control was on the assessment of the development of the floodplain biocoenosis. In order to improve the comparability of the results from the different study areas, the catalogue of organism groups to be studied has been standardised as far as possible. In detail, vegetation, avifauna, amphibians, dragonflies, grasshoppers, ground beetles, macrozoobenthos (Oster only) and fish (Oster only) were investigated. For a better understanding of the projects, their framework conditions and socio-economic aspects, additional expert interviews were conducted with the former stakeholders. The evaluation was carried out in two basic steps, a longitudinal analysis, in which the projects were examined individually for their long-term effects, and a cross-sectional analysis, in which the results from the four study areas were compared to identify common development patterns. It turned out that all four D+E projects largely met the goals they had set for themselves. However, a closer look revealed that although the projects achieved a fundamental enhancement of the study areas and the investigated organism groups benefited from the renaturations as a whole, the promotion of floodplain-specific biotic communities was often only successful in a limited space or for a limited time. The necessary hydrodynamics and morphodynamics were often lacking in the study areas, even after restoration. A decisive, limiting factor in this context has turned out to be the demand for use of the watercourses as part of the infrastructure. This often prevented self-dynamic processes from being permitted to the extent that would have been necessary to allow the initial activating measures for the redynamisation of the floodplains to develop their potential. Thus, the few areas in which it was possible to give free rein to self-dynamic processes showed that the projects were in principle quite suitable for promoting typical floodplain communities. Furthermore, the comparison has shown that initial measures that use the self-dynamic forces of flowing waters to develop the floodplain are fundamentally more recommendable than engineering attempts to construct dynamic structures. The results of this success control confirm the necessity of a functional unity of floodplain and watercourse. In order to restore the ecological functionality of river floodplains, it is therefore essential that the deficits in the watercourses forming the floodplain are given more consideration in planning and, if necessary, that accompanying measures are planned to compensate for these deficits. In this context, synergies could be used with measures to implement the EU Water Framework Directive and the

federal programme "Blue Ribbon Germany". Translated with www.DeepL.com/Translator (free version)] Address: <https://www.bfn.de/sites/default/files/BfN/service/Dokumente/skripten/skript588.pdf>

**20733.** Susanto, M.A.D.; Arianti, O.F. (2021): Diversity and abundance of dragonfly (Anisoptera) and damselfly (Zygoptera) at Sabo Dam Complang, Kediri, East Java, Indonesia. *Biosfer* 12(2): 110-122. (in English, with Indonesian summary) ["Sabo Dam Complang is a dam area that is minimally polluted and disturbed so that it has the potential as a natural habitat for various types of dragonflies. Diversity and abundance of dragonflies in a location is one component of biodiversity that plays an important role as a predator to maintain the balance of the food chain in natural ecosystems and as a bioindicator of water quality. This study aims to identify and analyze the diversity and abundance of dragonflies species at Sabo Dam Complang. Samples were taken using the VES (Visual Ecounter Survey) method and 2 transect methods, namely line transects and belt transects. The data that has been obtained were analyzed using the Shannon-Wiener species diversity index (H') and the relative abundance of species (KR). The results of this study show the diversity index value of 2.59 which is included in the relatively medium category. There were 20 species of dragonflies that belonged to 6 families." (Authors)] Address: Susanto, M.A.S., Program Studi Biologi, Fakultas Sains dan Teknologi UIN Sunan Ampel Surabaya, Jalan A. Yani 117, Surabaya, Indonesia. E-mail: [muhammadazmidwi@gmail.com](mailto:muhammadazmidwi@gmail.com)

**20734.** Svenningsen, C.S.; Guldborg Frøslev, T.; Bladt, J.; Bruhn Pedersen, L.; Colling Larsen, J.; Ejrnæs, R.; Fløjgaard, C.; Hansen, A.J.; Heilmann-Clausen, J.; Dunn, R.R.; Tøttrup, A.P. (2021): Detecting flying insects using car nets and DNA metabarcoding. *Biol. Lett.* 17: 20200833. <https://doi.org/10.1098/rsbl.2020.0833>: 6 pp. (in English) ["Monitoring insects across space and time is challenging, due to their vast taxonomic and functional diversity. This study demonstrates how nets mounted on rooftops of cars (car nets) and DNA metabarcoding can be applied to sample flying insect richness and diversity across large spatial scales within a limited time period. During June 2018, 365 car net samples were collected by 151 volunteers during two daily time intervals on 218 routes in Denmark. Insect bulk samples were processed with a DNA metabarcoding protocol to estimate taxonomic composition, and the results were compared to known flying insect richness and occurrence data. Insect and hoverfly richness and diversity were assessed across biogeographic regions and dominant land cover types. We detected 15 out of 19 flying insect orders present in Denmark, with high proportions of especially Diptera compared to Danish estimates, and lower insect richness and diversity in urbanized areas. We detected 319 species not known for Denmark and 174 species assessed in the Danish Red List. Our results indicate that the methodology can assess the flying insect fauna at large spatial scales to a wide extent, but may be, like other methods, biased towards certain insect orders." (Authors) Odonata: relative proportion of individual species Denmark (%): 0.32; proportion of species detected in car nets compared to species in Denmark (%): 11.7.] Address: Tøttrup, A.P., Natural History Museum of Denmark. Email: [aptottrup@snm.ku.dk](mailto:aptottrup@snm.ku.dk)

**20735.** Vargas Merchán, D.L.; L-Botero, A.A.; Realpe Rebolledo, E.A. (2021): Extreme pools: ecological adaptations in the order Odonata at the inselbergs in the Colombian Guiana shield. BSc. thesis, Facultad de Ciencias, Departamento

de Biología, Universidad de los Andes: 10 pp. (in English) ["This study has been purposed to evaluate adaptation strategies in insects of the order Odonata from three main families allocated at the Colombian Guiana shield: Libellulidae, Aeshnidae, and Coenagrionidae. A controlled habitat was used to monitor some previously identified variables to evaluate if there is an environmental effect related to water conditions or quantity that may be responsible for inducing plasticity events, due to stress sensing. All individuals used in this experiment were in the larval stage. Also, we evaluated if there is a behavioral strategy for Odonata larvae to sense different environmental signals that may help them to allocate suitable places to settle. Due to extreme climate changes can make disappear a perfectly suitable place for this type of organism in a short period, it is valuable to know if they have behavioral and/or phenotypic plasticity mechanisms to cope with these demanding conditions. We found relevant information from the Libellulidae family, in which changes in water conductivity had significant effects on their life history. However, we did not find data that supported our main hypothesis about their behavioral mechanisms, but the findings showed some light about some interesting behavior related to the studied families." (Authors)] Address: no details stated.

**20736.** Vila-Verde, G.; Santos, C.R. dos; Bomfim, G.S. (2021): Insetos (Insecta: Hymenoptera, Lepidoptera e Odonata) e as mudanças climáticas. *Terræ Didactica* 17 (Publ. Continua), 1-11, e021054: 11 pp. ["The Earth's climate has been affected by human activities, triggering environmental changes that may affect biodiversity. Furthermore, climate change is related to a higher concentration of CO<sub>2</sub> in the atmosphere and a greater incidence of ultraviolet radiation. Combined with deforestation, agriculture, and urban sprawl, these changes disrupt the environment. Because insects are sensitive to disturbances they can be used as bioindicators, because the changes influence life cycle, geographical distribution limits, and nutrition of insects. This study is a literature review that has examined the effects of climate change on groups of aquatic insects (order Odonata) and terrestrial insects (orders Hymenoptera and Lepidoptera). Climate change has a significant impact on entomofauna, especially in its distribution." (Authors)] Address: Vila-Verde, G., Mestrando em Zoologia pela Universidade Estadual de Santa Cruz, Ilhéus, BA, Brasil. Email: [gabvilaverde@gmail.com](mailto:gabvilaverde@gmail.com)

**20737.** Zimmermann, F. (2021): 30 Jahre Naturschutz im Land Brandenburg - Eine Bilanz zur Situation der Biodiversität der Arten und Lebensräume. *Naturschutz und Landschaftspflege in Brandenburg* 30(2): 4-35. (in German) ["5.1 Dragonflies In the new Red List of dragonflies, Mauersberger et al. (2017) conclude that of 66 species assessed, 15 are to be assessed as threatened, but no species is considered extinct or missing. The reasons for changes from the previous to the current Red List include increases in knowledge and changes in the method of compiling the Red List. However, real population changes predominate, both for the species that have been upgraded and for those that have been downgraded or removed from the Red List. With 38% downlisting compared to 14% negative category changes, a cautiously positive picture of the current situation of dragonfly species in Brandenburg can be drawn overall. The "winners" are primarily species of flowing waters. On average, the conditions for dragonflies in flowing water habitats have improved significantly in Brandenburg and partly also across Germany. Reduced pollution caused by water pollution, but also renaturation measures have had

positive effects. Examples include *Calopteryx virgo*, *Gomphus vulgatissimus*, *G. flavipes*, *Ophiogomphus cecilia* and *Orthetrum coerulescens*. Species that were previously mainly distributed southwards, such as *Crocothemis erythraea* or more recently the wandering dragonfly (*Pantala flavescens*) - the dragonfly of the year 2021 - seem to benefit from the climatic changes. The latter species was recorded for the first time for Germany in 2019 with a male in the Lower Lusatian post-mining landscape in Brandenburg - apart from earlier displacements (Günther 2019). The "losers", on the other hand, are mainly species of the moors. *Aeshna juncea*, *A. subarctica*, *Leucorrhinia dubia* and *L. rubicunda* show a negative long-term and/or short-term trend. The current climate changes probably also play a not insignificant role in this." (Authors/DeepL)] Address: Zimmermann, F., Landesamt für Umwelt des Landes Brandenburg (LfU), Ref. N3/Grundlagen Natura 2000/Monitoring Seeburger Chaussee 2 14476 Potsdam, Germany. E-mail: Frank.Zimmermann@lfu.brandenburg.de

## 2022

**20738.** Abdizadeh, G.R.; Farokhinejad, M.; Ghasemloo, S. (2022): Numerical investigation on the aerodynamic efficiency of bio-inspired corrugated and cambered airfoils in ground effect. *Scientific Reports* volume 12, Article number: 19117: 19 pp. (in English) ["This research numerically investigates the flapping motion effect on the flow around two subsonic airfoils near a ground wall. Thus far, the aerodynamic efficiency of the dragonfly-inspired flapping airfoil has not been challenged by an asymmetric cambered airfoil considering the ground effect phenomenon, especially in the MAV flight range. The analysis is carried out on the basis of an unsteady Reynolds-averaged Navier-stokes (URANS) simulation, whereby the Transition SST turbulence model simulates the flow characteristics. Dragonfly-inspired and NACA4412 airfoils are selected in this research to assess the geometry effect on aerodynamic efficiency. Moreover, the impacts of Reynolds number ( $Re$ ), Strouhal number ( $St$ ), and average ground clearance of the flapping airfoil are investigated. The results indicate a direct relationship between the airfoil's aerodynamic performance ( $Cl/Cd$ ) and the ground effect. The  $Cl/Cd$  increases by reducing the airfoil and ground distance, especially at  $h_0=c$ . At  $Re=5 \times 10^4$ , by increasing the  $St$  from 0.2 to 0.6, the values of  $Cl/Cd$  decrease from 10.34 to 2.1 and 3.22 to 1.8 for NACA4412 and dragonfly airfoils, respectively. As a result, the  $Cl/Cd$  of the NACA4412 airfoil is better than that of the dragonfly airfoil, especially at low oscillation frequency. The efficiency difference between the two airfoils at  $St=0.6$  is approximately 14%, indicating that the  $Cl/Cd$  difference decreases substantially with increasing frequency. For  $Re=5 \times 10^3$ , the results show the dragonfly airfoil to have better  $Cl/Cd$  in all frequencies than the NACA4412 airfoil." (Authors)] Address: Abdizadeh, G.R., Aerospace Engineering Dept, Amirkabir Univ. of Technology, Tehran, Iran. Email: g.abdizadeh@aut.ac.ir

**20739.** Adu, B.; Dada, O.; Tunwase, V. (2022): An ecological study of freshwater ecosystem and its colligation to Odonates assemblages in Ipogun, Southwest Nigeria. *Bulletin of the National Research Centre* 46 (Art. No. 86): 12 pp. (in English) ["Background: Odonata (dragonfly and damselfly) are particularly good indicators of freshwater ecosystem health. The constant disturbance of freshwater habitats can result in the reduction of Odonata species diversity. Changes in Odonata biodiversity are influenced by several human activities, such as agriculture, urbanization,

input of pollutants in water and construction. This study was carried out to assess the abundance and diversity of Odonata, evaluate the physicochemical characteristics of water, and compare the community structure of Odonata at three selected sites along River Aponmu in Ipogun. Adult odonates were sampled and identified for 11 months using a sweep net, water samples were collected and some parameters were determined during the study period. Results: A total of 906 specimens representing sixty-four (64) species and sixteen genera in seven families (Coenagrionidae, Lestidae, Platycnemididae, Chlorocyphidae, Calopterygidae, Libellulidae, and Gomphidae) were collected and identified. Of the 906 specimens, Libellulidae had the highest percentage composition (44%) with 395 individuals out of which *Trithemis arteriosa* (a pollution tolerant species) had the highest number of individuals (225) and Gomphidae had the lowest percentage composition (0.03%) with 1 individual. Most of the species collected are known for their tolerance to disturbed environments. They include *Pseudagrion melanicterum*, *Paragomphus genei*, and *Orthetrum julia*. Aponmu area had the highest species diversity ( $H' = 2.312$ ) while Idi area had the least species diversity ( $H' = 2.021$ ). Alaasin area had the highest Simpson's  $d$  value (0.8557) and the best taxa distribution (Evenness = 0.524; Equitability $_J = 0.7764$ ) which makes the area more pristine than other sites while Aponmu area had the least distribution (Evenness = 0.3365; Equitability $_J = 0.6798$ ). Analysis of variance (ANOVA) result of physicochemical parameters revealed that temperature ( $^{\circ}C$ ), pH, Dissolved Oxygen (mg/L), turbidity (NTU), Biochemical Oxygen Demand (mg/L),  $NO_3$  (mg/L), and  $PO_4$  (mg/L) did not show significant difference at the three sites while EC ( $\mu S/cm$ ) and TDS (mg/L) which have moderately high mean values indicated significant difference at Aponmu area ( $p < 0.05$ ). *T. arteriosa* exhibited a weak negative correlation to both temperature and DO. Conclusions: This study has provided information on Odonata assemblage at River Aponmu and infers based on the assemblage that the river may be somewhat polluted at the period the research was carried out. It is therefore recommended that efforts should therefore be taken to discourage water pollution in order to preserve the diversity of these insects and the water quality." (Authors)] Address: Dada, O., Dept. Biol., Fed. Univ. Technology Akure, Akure, Ondo State, Nigeria. Email: omololacomfy@gmail.com

**20740.** Aghade, J.B.; Saraf, S.A. (2022): Diversity and abundance of Dragonflies in Harsul and Salim Ali Lake Region, in Aurangabad, Maharashtra (India). *Journal of Entomology and Zoology Studies* 10(5): 387-389. (in English) ["The current study aimed to investigate the variety and number of dragonflies (Phylum Arthropoda, class Insecta) in the Harsul and Salim Ali Lake regions. The region around the Harsul and Salim Ali Lakes was examined for diversity and abundance. Three families and a total of nine different species of dragonflies were identified. Libellulidae was the family with the greatest abundance in our study, followed by Gomphidae, while Coenagrionidae had the lowest abundance. Gomphidae and Coenagrionidae each have one species, while the Libellulidae family contains seven different species. We found that the dragonfly diversity is greatest in Area 1." (Authors) *Orthetrum sabina*, *O. glaucaum*, *Brachythemis contaminata*, *Aethriamanta brevipennis*, *Trithemis pallidinervis*, *Diplocodes trivialis*, *Crocothemis servilia*, *Ictinogomphus rapax*, *Acisoma panorpoides*.] Address: Aghade, J.B., Dept Zoology, Government College of Arts & Science, Dr. B. A. M. Univ., Aurangabad, Maharashtra, India

**20741.** Bota-Sierra, C.A.; García-Robledo, C.; Escobar, F.;



Novelo-Gutiérrez, R.; Londoño, G.A. (2022): Environment, taxonomy and morphology constrain insect thermal physiology along tropical mountains. *Functional Ecology* 36(10): 2685-2685. (in English) ["1. Tropical mountains display limited variation in monthly temperatures, but high spatial climatic variability. It is assumed this stability promotes ecological and physiological adaptations to local temperatures, which may preclude dispersal up or downslope. Determining how environmental, taxonomic, and morphological factors affect thermal limits is fundamental to understand biotic responses to global warming. 2. We selected 54 species of dragonflies and damselflies (Order Odonata) distributed from 300 to 2550 m along one of the most biodiverse regions on the planet, the Tatamá elevational gradient in the Andean - Choco region transition. We estimated for 846 individuals three thermal tolerance parameters: CTmax, the highest temperature preceding the loss of motor control, Tvol, the temperature at which individuals avoid heat, and CTmin, the minimum temperature required for wing movement. 3. For each thermal tolerance parameter, we evaluated associations between physiological and behavioral responses, species elevational distribution, and specialization to forests or open areas. We also evaluated the effect of autecological characteristics such as body mass, sex, and taxonomy on temperature regulation. 4. Temperatures prevalent at different elevations and habitats are associated with odonate upper thermal limits. However, tolerance to low temperatures is not associated with habitat use or elevation. Forest species display lower thermal tolerances. Small species are more tolerant to high temperatures than larger species. Dragonflies are more tolerant to high temperatures than damselflies with similar body mass. Females are more tolerant to high temperatures than males. 5. Our results highlight the importance of considering differences in morphology, life history and behavior when comparing thermal tolerances of organisms along elevational gradients. Only by incorporating such factors, it would be possible to generate accurate predictions on the impact of climate change on tropical organisms." (Authors)] Address: Bota-Sierra, C.A., Red de Biodiversidad y Sistemática, Instituto de Ecología (INECOLA.C.), Xalapa, Mexico. Email: cornelio.bota@posgrado.ecologia.edu.mx

**20742.** Bower, L.M.; Peoples, B.K.; Eddy, M.C.; Scott, M.C. (2022): Quantifying flow–ecology relationships across flow regime class and ecoregions in South Carolina. *Science of The Total Environment* 802, 149721: 14 pp. (in English) ["Highlights: • Quantifying flow-ecology relationships allow for the development of flow standards. • All flow regime components affected fish and benthic macroinvertebrate assemblages. • Aquatic organisms' response to flow varied across flow classes and ecoregions. • Single metric flow standards would underestimate the impacts of any flow alteration. Abstract: The natural flow regime (i.e. magnitude, frequency, duration, timing and rate of change of flow events) is crucial for maintaining freshwater biodiversity and ecosystem services. Protecting instream flow from anthropogenic alterations first requires an understanding of the relationship between aquatic organisms and the flow regime. In this study, we used a unique framework based on random forest modeling to quantify effects of natural flow regime metrics on fish and macroinvertebrate assemblages across ecoregions and flow regime types in the state of South Carolina, USA. We found that all components of the natural flow regime affected both fish and benthic macroinvertebrate assemblages, suggesting that maintaining natural aspects of all flow regime components is critical for protecting freshwater diversity. We identified hydrologic metrics and flow regime

components such as magnitude, frequency, and duration of flow events, that were associated with the greatest ecological responses for individual stream classes to help managers prioritize hydrologic and biological metrics of interest during environmental flow standard development. The response of aquatic organisms to hydrologic metrics varied across stream classifications and ecoregions, highlighting the importance of accounting for differences in flow regime and ecoregion when designing environmental flow standards. We provide a flexible framework based on statistical flow-ecology relationships that can be used to inform in-stream flow management and assess effects of flow alteration on riverine assemblages." (Authors)] Address: Bower, L.M., U.S. Geological Survey, South Carolina Cooperative Fish & Wildlife Res. Unit, 234 Lehotsky Hall, Clemson Univ., Clemson, SC 29634, USA. Email: lmbower@clemson.edu

**20743.** Brans, K.I.; Tüzün, N.; Sentis, A.; De Meester, L.; Stoks, R. (2022): Cryptic eco-evolutionary feedback in the city: urban evolution of prey dampens the effect of urban evolution of the predator. *Journal of Animal Ecology* 91(3): 514-526. (in English) ["Most research on eco-evolutionary feedbacks focuses on ecological consequences of evolution in a single species. This ignores the fact that evolution in response to a shared environmental factor in multiple species involved in interactions could alter the net cumulative effect of evolution on ecology. We empirically tested whether urbanization-driven evolution in a predator (nymphs of the damselfly *Ischnura elegans*) and its prey (the water flea *Daphnia magna*) jointly shape the outcome of predation under simulated heatwaves. Both interactors show genetic trait adaptation to urbanization, particularly to higher temperatures. We cross-exposed common-garden reared damselflies and *Daphnia* from replicated urban and rural populations, and quantified predation rates and functional response traits. Urban damselfly nymphs showed higher encounter and predation rates than rural damselflies when exposed to rural prey, but this difference disappeared when they preyed on urban *Daphnia*. This represents a case of a cryptic evo-to-eco feedback, where the evolution of one species dampens the effects of the evolution of another species on their interaction strength. The effects of evolution of each single species were strong: the scenario in which only the predator or prey was adapted to urbanization resulted in a ca. 250% increase in encounter rate and a ca. 25% increase in predation rate, compared to the rural predator - rural prey combination. Our results provide unique evidence for eco-evolutionary feedbacks in cities, and underscore the importance of a multi-species approach in eco-evolutionary dynamics research." (Authors)] Address: Tüzün, N., Lab. Evolutionary Stress Ecology & Ecotoxicology, KU Leuven, Charles Deberiotstr. 32, 3000, Leuven, Belgium

**20744.** Büsse, S.; Ware, J.L. (2022): Taxonomic note on the species status of *Epiophlebia diana* (Insecta, Odonata, Epiophlebiidae), including remarks on biogeography and possible species distribution. *ZooKeys* 1127: 79-90. (in English) ["The species included in the genus *Epiophlebia* Calvert, 1903 represent an exception within Recent lineages – they do not belong to either dragonflies (Anisoptera) nor damselflies (Zygoptera). Nowadays, the genus is solely known from the Asian continent. Due to their stenoecious lifestyle, representatives of *Epiophlebia* are found in often very small relict populations in Nepal, Bhutan, India, Vietnam, China, North Korea, and Japan. We here present a taxonomic re-evaluation on the species status of *Epiophlebia diana* Carle, 2012, known from the Sichuan province in China, supplemented with a morphological character mapping on a genetic

tree to highlight synapomorphies of *E. diana* and *E. laidlawi* Tillyard, 1921. We conclude that *E. diana* is a junior synonym of *E. laidlawi*. Furthermore, we discuss the Recent distribution of the group, allowing for predictions of new habitats of representatives of this group." (Authors)] Address: Büsse, S., Functional Morphology and Biomechanics, Institute of Zoology, Kiel University, Am Botanischen Garten 9, 24118 Kiel, Germany. Email: sbuesse@zoologie.uni-kiel.de

**20745.** Carvalho-Soares, A.A.; Ferreira, K.G.; Sousa, K.S.; Nascimento, A.C.L.; Mendoza-Penagos, C.C.; Vieira, T.B.; Salcedo, A.K.M.; Oliveira-Junior, J.M.B.; Calvão, L.B.; Dias-Silva, K. (2022): Checklist and new occurrences of Odonata (Insecta) from Volta Grande do Xingu, Pará, Brazil. *Hydrobiology* 1(2): 183-195. (in English) ["The order Odonata (Insecta) is composed of aquatic insects popularly known as dragonflies and damselflies. Members of this order are closely linked to the conservation status of their habitats; however, the Wallacean shortfall in some regions still remains high. The Volta Grande do Xingu region is known to have high endemism of some groups, such as Actinopterygii (fish), which can be applied to other groups that do not yet have their fauna known at the site, such as the order Odonata. The Wallacean shortfall and constant anthropic changes (for example, the construction of the Belo Monte Hydroelectric) have been obstacles in the preservation of these and other groups. In that regard, the main aim of this paper is to provide a checklist of Odonata (Insecta) adult species from the streams of Volta Grande do Xingu, Pará, Brazil. The collections were carried out in 19 streams in the Volta Grande do Xingu region in September 2019, corresponding to the drought period. A total of 526 specimens were collected, where two suborders, six families, 26 genera and 43 species were identified. Three species of Odonata were registered for the first time in the state of Pará: *Erythrodiplax famula* (Erichson in Schomburgk, 1848); *Acanthagrion chacoense* Calvert, 1909 and *Epipleoneura lamina* Williamson, 1915. These data allow us to help increase the knowledge of Odonata fauna in the streams of Volta Grande do Xingu, a region that is under intense anthropic pressure. This helps to reduce the Wallacean shortfall, with another area sampled for the state of Pará." (Authors)] Address: Carvalho-Soares, A.A., Fac.Ciências Biológicas (FCB), Univ. Federal do Pará (UFPA), Rua Coronel José Porfírio, N. 2515, Bairro São Sebastião, Altamira 68372-040, Brazil. Email: andersonxacs@gmail.com

**20746.** Chandran, A.V.; Sherif, K.M. (2022): Comments on "The Dragonflies and Damselflies (Odonata) of Kerala – Status and Distribution". *Journal of Threatened Taxa* 14(6): 21282-21284. (in English) ["This is a rejoinder to the article "The Dragonflies and Damselflies (Odonata) of Kerala – Status and Distribution". In the said paper, certain species are of doubtful occurrence in Kerala and the Western Ghats. First reports of certain species which were available in open-access biodiversity portals and published articles in peer-reviewed journals were ignored. Additions to the checklists have been made without conducting taxonomic investigations, or in one case, even presenting a photograph. These shortcomings will lead to confusion and misunderstanding among odonatologists and naturalists in the region." (Authors)] Address: Chandran, A.V., Charutha house, Ayyappa Nagar, Punkunnam, Thrissur, Kerala 680002, India. Email: avivekchandran2@gmail.com

**20747.** Detilleux, L.; Poligui, R.N.; Iannello, L.; Dogot, T.; Francis, F.; Caparros Megido, R. (2022): Entomophagy in Gabon across the African context. *Journal of Insects as Food*

and *Feed* 8(7): 711-720. (in English) ["Entomophagy is well established in the food habits of Africa; however, country-wide knowledge remains limited for several countries, including Gabon. Here, two surveys on entomophagy were conducted in Gabon through face-to-face interviews. The first survey collected information on insect eating habits from 169 potential consumers. Edible insects formed part of the diet of most Gabonese people, with more than 60% of consumers within participants, and were particularly common among the Teke ethnic group (93%). Familiarity with edible insects was influenced by culture and family, but not by gender or study level. The second survey focused on edible insect species and their host plants, by interviewing a sample of 113 both villagers and retailers. Seventy-five species of insects from six insect orders (Coleoptera, Hemiptera, Isoptera, Lepidoptera, Odonata and Orthoptera) were consumed in Gabon, and were collected from 48 species of host plant. Many insects were formerly reported in the literature related to entomophagy; however, 13 species were newly reported as edible in this study: *Bidessus batekensis*, *Bunaeopsis licharbas*, *Copelatus ateles*, *C. confinis*, *C. fizpaci*, *C. tondangoyei*, *Gonobombyx angulata*, *Gonometa titan*, *Hydrocyrius columbiae*, *Oxychirus semisericeus*, *Philobota* sp., *Psara* sp. and *Ptyelus flavescens*. Consequently, these surveys highlighted that entomophagy is common in Gabon. However, strategies to promote edible insects are needed to have a significant impact on food issues in Gabon (e.g. food insecurity and dependence on foreign food supplies). Additional researches on entomophagy in Gabon are required to further develop these strategies." (Authors)] Address: Detilleux, L., Economics & Rural Development, Gembloux Agro-Bio Tech, Univ. of Liège, Passage des déportés 2, 5030 Gembloux, Belgium. Email: loic.detilleux@uliege.be

**20748.** Franke, S.; Pinkert, S.; Brandl, R.; Thorn, S. (2022): Modeling the extinction risk of European butterflies and odonates. *Ecology and Evolution*. 2022;12:e9465. 9 pp. (in English) ["Insect populations have become increasingly threatened during the last decades due to climate change and landuse intensification. Species characteristics driving these threats remain poorly understood. Trait-based analyses provide a straight-forward approach to gain a mechanistic understanding of species' extinction risk, guiding the development of conservation strategies. We combined morphological traits and phylogenetic relationship for 332 European species of butterflies and 115 species of odonates (dragon and damselflies) to model their red list status via phylogenetically controlled ordered logistic regression. We hypothesized that extinction risk increases with increasing body volume and wing area, decreasing range size, and is larger for brighter species. All investigated traits exhibited a strong phylogenetic signal. When controlling for phylogenetic relationship, we found that extinction risk of butterflies increased with decreasing range size. The extinction risk of odonates showed no relationship with the selected traits. Our results show that there is no universal trait defining the extinction risk of our investigated insect taxa. Furthermore, evolutionary history, measured as the phylogenetically predicted part of our analyzed traits, poorly predicted extinction risk. Our study confirms the focus of conservation measures on European butterfly species with small range sizes." (Authors)] Address: Franke, Sophia, Dept of Animal Ecology, Faculty of Biology, Philipps-Universität Marburg, Karl-von-Frisch-Str. 8, 35032 Marburg, Germany. Email: sophia.franke@posteo.d

**20749.** Futahashi, R. (2022): Sexual differentiation in dragonflies and damselflies. In: Minoru Tanaka & Makoto Tachibana (eds.): *Spectrum of sex. The molecular bases that induce various sexual phenotypes*. Springer, Singapore: 13-35. (in English) ["As represented by gynandromorphs (sexually mosaic individuals), sexual differentiation in insects proceeds primarily cell autonomously depending on sex chromosomes. Insect sex determination systems, although dominated by male heterogamety, are highly diverse. Dragonflies and damselflies (the order Odonata) are the most ancestral winged insects and have male heterogametic sex determination systems. Some species (e.g., *Crocothemis servilia*) have intraspecific polymorphisms in their karyotypes, such as switching from X0 to neo-XY sex chromosome system by chromosome fusion. In dragonflies and damselflies, adults of many species exhibit sexual color dimorphism, color transition upon adult maturation, and intraspecific color polymorphisms within the same sex. Molecular mechanisms underlying sex determination and sexual differentiation in insects have been investigated extensively in the fruit fly *Drosophila melanogaster*, but recent studies have revealed that the upstream genes of insect sex determination cascade are highly diverse. Most insects have sex-specific isoforms for doublesex (*dsx*) gene, which is important for sexual differentiation, and *dsx* gene plays important roles in masculinization not only for males but also for androchrome females in the damselfly *Ischnura senegalensis*. In this review, current knowledge on sex determination and sexual differentiation of insects is summarized, with particular focus on the most ancestral winged insects, dragonflies and damselflies." (Author)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**20750.** Gómez-Tolosa, M.; Mendoza-Cuenca, L.F.; Rivera-Velázquez, G.; Rioja-Paradela, T.M.; Tejeda-Cruz, C.; Pérez-Farrera, M.A.; López, S. (2022): Using the ecological relationships of Odonata with a habitat integrity index to test the biodiversity ecosystem function framework. *Journal of Insect Conservation* 26: 191-203. (in English) ["As a result of human activities causing changes to their environments, many species are facing an increased risk of extinction. In order to determine such changes and their effects on species assemblages, rapid stream assessment techniques of environmental analysis and monitoring can be used. We determined the Habitat Integrity Index (HII) and its correlation with the composition and assemblage of adult odonates at different taxonomic levels in the region of the Selva Lacandona, Chiapas in southeastern Mexico. Both suborders Zygoptera and Anisoptera, the family Coenagrionidae, and the assemblage of 20 species of the genera *Argia*, *Cora*, *Hetaerina*, and *Heteragrion* (ACHH) were related with the HII. All taxonomic levels were included in the analyses as predictors of habitat integrity. However, we hypothesized that the abundance, species richness, and diversity of stenotopic species (ACHH) could be a better predictor of the HII than the other taxonomic levels. We found a positive and statistically significant relationship between the HII and the ACHH species, richness, and diversity. In contrast, we found a negative and significant relationship between HII and Anisoptera species, abundance, richness and diversity. Implications for insect conservation: in this case, the protected area hosts more specialist species than the surrounding zone. For example, Ejido El Tumbo, which presents a severe level of disturbance and is outside of protected natural areas, has the lowest species diversity of all sites. We recommend further

research to determine the link between disturbance and the prevalence of stenotopic species." (Authors)] Address: Gómez-Tolosa, María, Programa de Doctorado en Ciencias en Biodiversidad y Conservación de Ecosistemas Tropicales, Instituto de Ciencias Biológicas, Universidad de Ciencias y Artes de Chiapas, Libramiento Norte Poniente 1150, C.P. 29039, Tuxtla Gutiérrez, Chiapas, Mexico.

**20751.** Guedes, M.B.; Vilela, D.S.; Magalhães de Souza, M. (2022): Odonata (Insecta) community in the Environmental Protection Area of the Machado River hydrographic basin, southern Minas Gerais State, Brazil. *Papéis Avulsos de Zoologia* (São Paulo) 62:e202262061. 7 pp. (in English) ["Only 8% of the approximately 120 conservation units in Minas Gerais State collect information on the order Odonata, which motivated this study. We aimed to survey communities of this insect group in the Environmental Protection Area of the Machado River hydrographic basin, southern Minas Gerais State, Brazil. For this purpose, 12 areas were sampled by active searching from September 2018 to March 2019. Representatives of 71 Odonata species belonging to 8 families were collected. Seven species were found exclusively in this conservation unit, and two species were newly recorded for the state, namely *Erythrodiplax chromoptera* (Borror, 1942) and *Micrathyria venezuelae* De Marmels, 1989. This study surveyed the fifth richest odonata fauna in Minas Gerais State, underscoring the importance of the studied area for conservation of Odonata communities and necessitating actions for decreasing environmental impacts on this biological patrimony." (Authors)] Address: Guedes, Marcella, Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas (IFSULDEMINAS). Inconfidentes, MG, Brasil. E-mail: marcellabigoni22@gmail.com

**20752.** Halassi, I. (2022): Evaluation du métabolisme lipidique des Odonates bioindicatrices de la qualité de l'eau des écosystèmes aquatiques et étude de leur microflore au cours de leur cycle de développement. PhD thesis, Faculté Sciences de la Nature et de la Vie et Sciences de la Terre et de l'Univers, Département de Biologie, Laboratoire de domiciliation: Biologie, Eau et Environnement: 120 pp. (in French, with English and Arabian summaries) ["Odonates are one of the most important taxa in Algerian and North African wetlands. In this thesis, we aim to study several life history parameters of two populations of *Sympetrum meridionale*, coming from two different habitats across north-eastern Algeria. The first one is a RAMSAR wetland called 'Mekhada' (a perennial water body), and the second one is a temporary pond located at 'Maouna' Mountain (1400 m altitude). Moreover, the evolution of biochemical components was carried out during the larval stages, and MDA levels were evaluated after a chronic exposure to spirodicfen (ENVIDOR® 240 SC). Furthermore, to obtain a first overview of bacterial communities in the gut of odonates and to measure the effect of changes in environmental conditions including diet and water quality on the composition of these communities, microbiological analysis was carried out. The developmental patterns of the two dragonfly populations varied according to the type of habitat occupied by the parental generation of the species (factorial ANCOVA:  $p < 0.05$ ) (Low larval mortality, slow development and low weight in the dragonfly population inhabiting the RAMSAR wetland compared to those inhabiting the Maouna. For biochemical compounds, no significant difference is observed between the two populations. Exposure to Spirodiclofen was revealed insecticidal activity towards larvae with a significant dose response relationship; it induces an increase in MDA levels compared to controls groups We found that

the gut microbiota of the larvae was dominated by Proteobacteria, mainly of the genus *Enterobacter* and *Proteus*. In addition, the microbiota of reared larvae of both species was much richer in terms of taxonomic diversity and number of bacteria compared to the other stage. Such studies will add considerably to our understanding of the mechanisms that are responsible for the possible impacts of environmental changes on the life history traits of dragonflies in the southern part of their range." (Author)] Address: not stated

**20753.** Hasik, A.Z.; Siepielski, A.M. (2022): A role for the local environment in driving species-specific parasitism in a multi-host parasite system. *Freshwater Biology* 67: 1571-1583. (in English) ["(1) The extent and magnitude of parasitism often vary among closely related host species and across populations within species. Determining the ecological basis for this species and population-level variation in parasitism is critical for understanding infection dynamics in multi-host-parasite systems. To investigate such ecological underpinnings of variation in parasitism, we studied *Enallagma damselfly* host species and their water mite (*Arenurus* spp.) ectoparasites in lakes. (2) We first evaluated how host identity and density could shape parasitism. To test the effects of con- and heterospecific host density on parasitism, we used a field experiment with *Enallagma basidens* and *E. signatum*. We found that parasitism did not vary with con- or heterospecific density and was determined by host identity alone, with no spillover effects. (3) We also evaluated the potential role of local adaptation and resource availability in shaping parasitism. To do so, we used *E. signatum* in a reciprocal transplant experiment crossed with a prey resource-level manipulation. This experiment revealed that parasitism declined sharply for one host population in its non-local lake, but not the other source population, with no effects of prey levels. This asymmetry implies that damselflies express enhanced defences against parasitism that are neither population-specific nor dependent on resource abundance, or that mites developed heightened local host specificity. (4) The results of multivariate modeling from an observational study generally supported these experimental findings: neither host density nor resource abundance strongly explained among-population variation in parasitism. Instead, local abiotic conditions (pH) had the strongest relationship with parasitism, with minimal associations with predator density, temperature and a measure of immune function. (5) Collectively, our findings suggest a crucial role for the local environment in shaping host-parasite interactions within multi-host-parasite systems. More generally, these results show that research at the intersection of community ecology and disease ecology is critical for understanding host-parasite dynamics within natural communities." (Authors)] Address: Hasik, A.Z., Dept of Biological Sciences, Univ. of Arkansas, Fayetteville, Arkansas, U.S.A. Email: adamzhasik@gmail.com

**20754.** Heim, O.; Puisto, A.I.E.; Sääksjärvi, I.; Fukui, D.; Vesterinen, E.J. (2022): Dietary analysis reveals differences in the prey use of two sympatric bat species. *Ecology and Evolution* 11(24): 18651-18661. (in English) ["The two common, but understudied Japanese bat species *Murina ussuriensis* and *Myotis ikonnikovi* consumed prey from the orders Lepidoptera and Diptera most frequently. Furthermore, we found a higher prey diversity in the diet of *M. ikonnikovi* compared to that of *M. ussuriensis* that might indicate that the former is a more generalist predator than the latter. Our results also indicate that *M. ussuriensis* might switch between aerial-hawking and gleaning modes of foraging behavior, while *M. ikonnikovi* seems to use predominantly aerial

hawking." (Authors) Odonata contributed to the diet of *Murina ussuriensis*.] Address: Vesterinen, E.J., Dept Biol., Univ. of Turku, 20014 Turku, Finland. Email: ejvest@utu.fi

**20755.** Huang, D.-Y.; Corentin, J.; Nel, A. (2022): The second species of *Rudiaeschna* (Odonata, Rudiaeschnidae) discovered in the Lower Cretaceous of Inner Mongolia, Northeast China. *Palaeoentomology* 5(3): 240-245. (in English) ["*Rudiaeschna jarzembowskii* sp. nov., the second species of the small aeshnopteran family Rudiaeschnidae, is described from the Lower Cretaceous Yixian Formation at the Liutiaogou locality, Ningcheng County, Inner Mongolia, NE China. The new species differs from the type species of the family, namely *Rudiaeschna limnobia*, in possessing less cells and crossveins in nearly all parts of forewing. It also shows a distally forked vein RP2, a character that was previously only known in taxa of the much more recent and derived aeshnopteran family Aeshnidae." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**20756.** Janra, M.N.; Gusman, D.; Singkam, A.R.; Susanto, A.; Yatap, H.; Fahrudin, A.; Andriyansyah, F.; Prameswara, A.; Melian, M.; Herwina, H. (2022): Into the database of bencoolen Odonata: Synthesis of two years dragonfly survey in Bengkulu Province. 1st Lekantara Annual Conference on Natural Science and Environment (LeNS 2021), IOP Conf. Series: Earth and Environmental Science 1097 (2022) 012056: 181-190. (in English) [Bengkulu, as part of Sumatra, receives less attention for its odonatological aspect during the current advance of life science. Historical records on Odonata were contributed by many foreign researchers from Dutch colonial era, including accounts provided by Lieftinck and Ris. In order to compile Odonata database for Bengkulu, there have been conducted dragonfly surveys from two years ago at some representative sites in this province. Conservation area of Seluma in the southern Bengkulu was visited in 2019 for two weeks survey, while conservation area of Lemo Nakai was surveyed in 2020 for the same work duration. Random survey and continuous citizen science have been performed at Bengkulu City to further the database from human impacted area. Thirty-five species were recorded from Seluma, thirty-nine were from Lemo Nakai and ten species were observed to exist within the human impacted area in Bengkulu City. In total, there were total 52 dragonfly species recorded within the administrative boundary of Bengkulu Province which more than half of historical Odonata records for this province. Thirty-one species belonged to Anisoptera (true dragonflies) and twentyone species are grouped into Zygoptera (damselflies). Some noteworthy records are highlighted in this paper, such as the rare *Dysphaea dimidiata* (Euphaeidae), *Anax panybeus* (Aeshnidae) and *Orthetrum schneideri* (Libellulidae); Sumatran endemic *Heliocypha angusta angusta* (Chlorocyphidae) and *Megalogomphus sumatranus* (Gomphidae); as well as the observation of three aeshnid species within human settlement in Bengkulu City. Further details on prominent Odonata species were also outlined along with their significances." (Authors)] Address: Janra, M.N., Universitas Andalas, Padang, West Sumatra, Indonesia. Email: \*mjanra@sci.unand.ac.id

**20757.** Jeyasekhar, M.P.; Srinivas, G. (2022): Effect of different diets on the body indices of Granite Ghost Dragonfly nymph *Bradinopyga geminata*. *Journal of Xi'an Shiyou Univ., Natural Science Edition* 18(4): 377-384. (in English) ["The present experimental study was conducted on nymph



*Bradinopyga geminata*. The nymphs were fed with four different diets and their association with length and weight measurements was taken into account, before and after the experimental period of seven weeks. Diet of nymph consists of mosquito larva, chironomus larva, earthworm, mixed diet and control group was also maintained. The length of nymphs fed mosquito larva 1.6 cm, chironomus larva 1.6 cm rest of them earthworm, mixed diet and control group larval length reached 1.8 cm during the seventh week. The weight of nymph mosquito larva 0.17gm, chironomus larva 0.2 gm earthworm 0.24gm, control group 0.25 mixed diet 0.29 gm." (Authors)] Address: Jeyasekhar, M.P., Scott Christian College, Nagercoil, India. Email: jeyasekhar24@yahoo.com

**20758.** Kalkman, V.J.; Boudot, J.-P.; Futahashi, R.; Abbott, J.C.; Bota-Sierra, C.A.; Guralnick, R.; Bybee, S.M.; Ware, J.; Belitz, M.W. (2022): Diversity of Palaearctic Dragonflies and Damselflies (Odonata). *Diversity* 2022, 14, 966. <https://doi.org/10.3390/d14090966>. (in English) ["More than 1.2 million distribution records were used to create species distribution models for 402 Palaearctic species of dragonflies and damselflies. On the basis of these diversity maps of total, lentic and lotic diversity for the whole of the Palaearctic (excluding China and the Himalayan region) are presented. These maps show a clear pattern of decreasing diversity longitudinally, with species numbers dropping in the eastern half of Europe and remaining low throughout a large part of Russia, then increasing again towards Russia's Far East and Korea. There are clear differences in diversity patterns of lentic and lotic species, with lentic species being dominant in colder and more arid areas. Areas with a high diversity of species assessed as threatened on the IUCN red list are largely restricted to the Mediterranean, Southwest Asia, and Japan, with clear hotspots found in the Levant and the southern half of Japan. The diversity at species, generic, and family level is higher in the south of Japan than in areas at a similar latitude in the western Mediterranean. This is likely to be the result of the more humid climate of Japan resulting in a higher diversity of freshwater habitats and the stronger impact of the glacial periods in the Western Palaearctic in combination with the Sahara, preventing tropical African lineages dispersing northwards." (Authors)] Address: Kalkman, V.J., Naturalis Biodiversity Center, 2300 RA Leiden, The Netherlands. Email: vincent.kalkman@naturalis.nl

**20759.** Kalniņš, M.; Pipkaleja, Z. (2022): The Latvian Red List of dragonflies Odonata: preliminary results. 11th International Conference on Biodiversity Research (ICBR) to be held in the Daugavpils Univ., Latvia, on 20 – 22nd October, 2022. (<https://biodiversityconference.biology.lv/index.php/ICBR/ICBR2022/paper/view/248>): 1 p-[Verbatim: "The National Red List of dragonflies for Latvia is an extinction risk assessment of Latvian dragonfly species a made in accordance with the IUCN regional Red Listing guidelines. The redlisting process highlights those species that are threatened with extinction at the national level, so thereafter appropriate conservation actions can be undertaken to improve status of threatened species. There are 65 dragonfly species present in Latvia and all of them were assessed within the project framework. Two species were preliminary assessed Endangered (*Aeshna crenata*, *Stylurus flavipes*), five species assessed Vulnerable (*Coenagrion armatum*, *C. johanssoni*, *Cordulegaster boltonii*, *Ischnura pumilio*, *Somatoclora arctica*), and six species assessed Near Threatened (*Aeshna subarctica*, *A. viridis*, *Leucorrhinia albifrons*, *L. caudalis*, *Nehalennia speciosa*, *Ophiogomphus cecilia*). Other species assessed Least Concern, except one species,

which is assessed Data Deficient. The the most recent published recommendation recommendation for the Latvian national Red List of dragonflies contains 17 species. The difference between the number of species recently assessed as endangered/vulnerable/near threatened (13 in total) and the previously recommended number of species (17) can be explained by the category of species included in the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora, but not assessed threatened in Latvia. The main threats to dragonfly species in Latvia are related to the changes in boggy habitats resulting of anthropogenic activity and natural factors, the chance of construction of new, large hydroelectric power plants and ongoing eutrophication of natural flowing waters. The impact of the general insect decline phenomenon (mainly due to agricultural chemicals) on dragonfly populations in Latvia remains unclear. We consider insufficient human resource capacity the most significant factor impacting long term dragonfly protection and conservation in Latvia. There is a limited number of available qualified specialists, which automatically results in the underrepresentation of the dragonfly (and invertebrates' in general) interests in various aspects - from drafting legislative and planning documents to performing specific activities in field." (Authors)] Address: Kalniņš, M., Nature Protection Board, Eksporta iela 5, Riga, LV-1010, Latvia. E-mail: martins.kalnins@dap.gov.lv

**20760.** Kartini, J.; Syachruddin, S.; Ilhamdi, M.L. (2022): The diversity of dragonflies (Odonata) in the Joben Resort area, East Lombok. *Jurnal Biologi Tropis* 22(2): 675-688. (in Indonesian, with English summary) ["Dragonfly is a family of insects that are closely related to water. During their life cycle, especially when laying eggs and at the stage of dragonfly nymphs, they spend their lives in healthy water areas because dragonfly nymphs are very sensitive to polluted water quality. Therefore, dragonflies have an important role for the sustainability of the ecosystem, namely acting as predators and indicators of environmental pollution. The high diversity of dragonflies in an area indicates that the area is still not polluted because the environment supports the life of dragonflies. This study aims to determine the diversity of dragonflies (odonata) in the Joben Resort area of East Lombok. This research is an exploratory descriptive study conducted from November to December 2021. Data collection was carried out 4 times and was repeated within 1 month in the morning and evening (08.00-17.00 WITA). The method used is a survey method with a sweeping net technique following a 500 m research path on 3 research paths, namely lane 1 (the river that borders Joben Ecopark), lane 2 (thepath leading to the Resort Office and Joben Ecopark) and lane 3 (the river that flows through Joben Ecopark). Bordered by rice fields and Kokok Joben Brain Baths). The calculation of the diversity index of dragonflies uses the Shannon-Wiener formula (H'). The results showed that the types of dragonflies (odonata) found in the Joben Resort Area consisted of 20 species with a total number of individuals found from 3 lanes as many as 864 individuals. The diversity index of dragonflies in the Joben Resort area of East Lombok is 2,309. The conclusion is that the diversity of dragonflies in the Joben Resort area of East Lombok is in the medium category." (Authors)] Address: Kartini, J., Program Studi Pendidikan Biologi, FKIP, Universitas Mataram, Mataram, Indonesia. Email: junikartini12@gmail.com

**20761.** Knysh, K.M.; Saunders, M.D.; Macintyre, L.P.; Courtenay, S.C.; van den Heuvel, M.R. (2022): Sometimes you can add a bit of salt: Additional freshwater insect species in Canadian estuaries. *Northeastern Naturalist* 29(1):

N9-N17. (in English) ["Along the river–ocean transition, few freshwater species persist into polyhaline zones. Among those insect species capable of living in estuaries, it is unclear which Odonata, Trichoptera, and Coleoptera species can occur at intermittent or average salinities above 18 PSU. During surveys of fish and crustaceans in Prince Edward Island (PEI), we noted 3 unexpected insect species from within subtidal-channels. Multiple instars of Coenagrionidae n. det. and Enallagma civile were collected around marine macroalgae at 5 localities with 6–26 PSU salinities and observed emerging atop macroalgae. Also, collections of the larvae of the caddisfly *Limnephilus externus* (Limniphilidae), and adult *Haliplus cribrarius* (Haliplidae) beetles at sites with maxima of 23 and 20 PSU, respectively, suggest rare occurrences of these species within estuarine ecotones." (Authors)] Address: Knysht, Kyle, Canadian Rivers Inst., School of Environment, Resources & Sustainability, Univ. Waterloo, Waterloo, ON N2L 3G1, Canada. Email: kknysht@upei.ca

**20762.** Kumianto, A.S.; Purnomo, H.; Septiadi, L. (2022): The Influence of agrochemicals on macroinvertebrate community structure in various agricultural rivers in Jember regency. *Journal of Tropical Biodiversity and Biotechnology* 7(1): 15 pp. (in English) ["The intensive use of agrochemicals in agricultural areas of Jember's Regency presents a potential threat to the freshwater ecosystem's community. The use of the benthic macroinvertebrates community may provide a key to monitor the extent of agrochemical impact to maintain valuable ecosystem services. Macroinvertebrates community structure and environmental factors were studied from September–December 2020 in Jember Regency by comparing three different types of agricultural rivers (organic, semi-organic, and conventional). Five community indices (taxa, individuals, Simpson dominance index, Margalef species richness, and Shannon diversity index) were used to compare the macroinvertebrates community structure between sites. Using community composition and physicochemical properties (bare sediment, width, depth, water current, pH, conductivity, dissolved oxygen (DO), and temperature), we generated CCA triplot and correlogram plot to investigate the grouping and the correlation between variables and sites. Results on macroinvertebrate composition showed the importance of using sensitive taxa-group and community indices as an indicator of environmental changes. The family of Tipulidae, Naididae, Cysticidae, and Nereididae demonstrated relation to semi-organic agricultural rivers. Temperature and water current correlate to the presence of clean water indicator species such as Philorheitridae and Chironomidae, as observed in organic agricultural rivers. Conventional and semi-organic agricultural rivers were grouped and largely contributed by the 5 families including Ampullariidae, Pachychillidae, Baetidae, Enchytraidae, and Gomphidae. Correlogram plot suggests a complex interaction between macroinvertebrate community and environmental variables. It can be concluded that the intensive use of agrochemicals may lead to a detrimental change toward the diminished quality of freshwater community and environment." (Authors) "Telephlebiidae, Corduliidae, Gomphidae, Petaluridae, Platycnemididae"] Address: Kumianto, A.S., Agrotechnology Study Program, Fac.Agriculture, Jember Univ., Jember 68121, East Java, Indonesia. Email: agung.sih.kumianto@unej.ac.id

**20763.** Lashgari, A.M.; Naghash, B.A. (2022): Hover controller design and implementation for a dragonfly-like flapping wing. 13th International Micro Air Vehicle Conference, Delft, December 12–16, 2022: 183–192. (in English) ["The aim of this paper is modelling, simulating and designing a

controller for a micro aerial vehicle (MAV) as well as implementing an innovative scheme for it. The MAV scheme inspired by the dragonfly using clap and fling mechanism with an active rigid abdomen. The gearboxes are responsible for moving two pairs of four flying wings in front and back of the MAV. Also, change in the motors speed generates differential thrust to create a control pitch moment. The linearization about a hover point is performed to analyze the motion and design an LQR controller. Moreover, validity of the linearized equations is verified by comparing the responses of linear and nonlinear models. The theoretical results are experimented with a hardware-in-the-loop testbed. The experimental results demonstrate good agreement between theoretical and validated responses along with accurate and robust hovering at the desired point." (Authors)] Address: Lashgari, A.M., Amirkabir Univ. of Technology, Tehran

**20764.** Lencioni, F.A.A. (2022): A new species of *Forcepsioneura* Lencioni, 1999 in honor to Queen Elizabeth II (Odonata: Protoneuridae). *Zootaxa* 5200(2): 181–190. (in English) ["A new species of *Forcepsioneura* Lencioni, 1999 is described from seven males and three females (Holotype male (FAAL NC 4521), Brazil, São Paulo, Monteiro Lobato—SP, 22° 57' 19" S & 45° 50' 27" W, 653 m, 28.xi.2010). The new species is compared with *F. itatiaiae* (Santos, 1970) its closest congener. Diagnostic illustrations are presented. The main differences between *Forcepsioneura* species are: in females, the posterior lobe of the prothorax and in males the shape of cerci and the posterior lobe of the prothorax. The species is named *Forcepsioneura elizabethae* sp. nov. in honor of Her Majesty Queen Elizabeth II on the occasion of her platinum jubilee." (Author)] Address: Lencioni, F.A.A., Rua Anibal, 216, Jd. Coleginho, Vila Zezé, Jacaréi, CEP (ZIP) 12310–780 São Paulo, Brazil

**20765.** Lewinsohn, T.M.; Agostini, K.; Freitas, A.V.L.; Melo, A.S. (2022): Insect decline in Brazil: an appraisal of current evidence. *Biology Letters* 18: 20220219: 8 pp. (in English) ["Recent reviews of data on worldwide insect decline include almost no information on Brazil. We gathered evidence from literature searches and a survey sent to researchers, to which 96 replied and 56 provided information and publications. We present 75 instances of trends recorded over an average span of 11 years for aquatic and 22 years for terrestrial insects. These include time-replicated samples and expert opinion based on long-term local collections. Most terrestrial data are for butterflies, bees and scarab beetles. Aquatic studies include several insect orders, usually sorted to genus or family. Terrestrial insects showed significantly more cases of declines than increases, both in abundance (17 : 3) and in diversity (11 : 1). In aquatic cases, no tendency was detected in abundance (2 : 2) or diversity (3 : 4), not counting cases with no trend. Differences in these results among habitats may be due to the shorter span and less change in environmental conditions in the aquatic surveys, which included sites already degraded before sampling. We offer guidelines for future long-term assessments, including resampling of legacy collection sites." (Authors)] Address: Lewinsohn, T.M., Depto de Biologia Animal, Inst. Biol., Univ. of Campinas, 13083970 Campinas, São Paulo, Brazil. Email: thomasl@unicamp.br

**20766.** Lorenzo-Carballa, M.O.; Sanmartín-Villar, I.; Cordero-Rivera, A. (2022): Molecular and morphological analyses support different taxonomic units for Asian and Australo-Pacific forms of *Ischnura aurora* (Odonata, Coenagrionidae). *Diversity* 14(8), 606; <https://doi.org/10.3390/d14080606>.

30 pp. (in English) ["Despite the great technological progress that has aided taxonomical identification, taxonomical issues remain for certain species found in remote and/or understudied geographical areas. The damselfly species *Ischnura aurora* has been the subject of a long-standing taxonomical debate, focused mainly on the existence of morphological and behavioural differences between Asian and Australo-Pacific forms of this species that could justify their placement into two different species. Here, we carried out a comparative morphological analysis of specimens currently identified as *I. rubilio* from India and *I. aurora* from Asia and Oceania, combined with the analysis of mitochondrial and nuclear sequence data, both developed by us and available in public repositories. Our results split the Asian and Australo-Pacific forms of *I. aurora* into two well-differentiated taxonomic units and, hence, different (albeit closely related) species, and support the specific status of *I. rubilio*. The results of our genetic analyses suggest the existence of a third (and even fourth) taxonomic unit, stressing the need to revise all available material belonging to the different *I. aurora* subspecies that have been described. Finally, we have identified several questionable DNA sequences currently available in public repositories, upon which previous conclusions about the phylogenetic position of *I. rubilio* are based. Our study stresses the importance of being able to link available DNA sequence data with voucher specimens as well as to carry out a careful examination of DNA sequence data prior to their inclusion in taxonomical studies." (Authors)] Address: Lorenzo-Carballa, M. Olalla, ECOEVO Lab, Escola de Enxeñaría Forestal, Campus A Xunqueira, Univ. de Vigo, 36005 Pontevedra, Spain

**20767.** Lundyshv, D.S.; Kitel, D.A. (2022): Additional data on rare and protected species of arthropod (Arthropoda) of south of Belarus. Baranovich State Univ. - BarSU Herald. A scientific and practical journal Series "Biological Sciences (General biology). Agricultural Sciences (Agronomy)" 1(11): 41-47. ["Some findings on rare and protected species of arthropods (Arthropoda) collected in the south of Belarus are presented. Out of 17 listed rare and protected species of arthropods, 10 species are included in the Red Book of Belarus; 7 species are in the IUCN Red List; 9 species are in the Red Book of European saproxylic beetles; 6 species are classified as species-indicators of valuable forest habitats of the Republic of Latvia, and 3 species are included into Appendix II of the European Council Directive No. 92/43/EEC. The data obtained can be used for preparation of the next edition of the Red Data Book of Belarus, as well as for planning and implementation of other nature conservation measures." (Authors) Records of *Anax imperator*, *Sympecma paedisca*, and *Nehalennia speciosa* are documented.] Address: Kitel, D.A., Public organization "Birdlife Belarus", 11 Parnikovaya Str., 220050 Minsk, Belarus. Email: kitel\_apb@tut.by

**20768.** Manikandan, K.R.; Muthuswami, M.; Chitra, N.; Ananthan, M. (2022): Diversity of Odonata in a coffee ecosystem. Indian Journal of Entomology Online published Ref. No. e21238 DoI.: 10.55446/IJE.2022.439: 3 pp. (in English) ["A total of 419 individuals under 5 families, 10 genera and 10 species of Odonata were observed in the present study on the Odonata from a coffee ecosystem at the lower Palni Hills, Tamil Nadu, India. Among these, the family Libellulidae included six species followed by Euphaeidae (2), and Chlorocyphidae, Coenagrionidae and Aeshnidae (1 each). The dominant species were: *Pantala flavescens* (44.40%) > *Diplacodes trivialis* (22.70%) > *Orthetrum chrysis* (7.40%). *Pantala flavescens* was maximum during northeast monsoon

season (50.0%) followed by summer and winter (43.8% each). Margalef index of species richness was maximum (2.00) during winter, and that of Simpson index was maximum (0.75) during south west monsoon. Shannon-Wiener index of dominance was maximum (1.75) during summer. The species were evenly distributed during summer with Pielou's evenness index value of 0.76." (Authors)] Address: Manikandan, K.R., Dept of Agricultural Entomology; Directorate of Open and Distance Learning Tamil Nadu Agricultural Univ., Coimbatore, 641003, Tamil Nadu, India. Email: manibscagri@gmail.com

**20769.** Merrill, I. (2022): Status and distribution of Dragonflies and Damselflies of Leicestershire & Rutland Beautiful Demoiselle female, Ullesthorpe, Leicestershire, June 2021. Lesops 48: VC55 Odonata: 34 pp. (in English) [<https://www.naturespot.org.uk/sites/default/files/2022-06/LESOPS%2048%20Odonata%20of%20VC55.pdf>] Address: Merrill, I. Email: i.merrill@btopenworld.com

**20770.** Mola, L.M.; Rebagliati, P.J.; Fourastié, M.F.; Agopian, S.S. (2022): Meiotic analysis of Gomphidae species sheds light on the large X chromosome of the family (Anisoptera, Odonata). Diversity 14, 874. <https://doi.org/10.3390/d141-00874>: 17 pp. (in English) ["In most Anisoptera families, the modal diploid number is 25 in males (24 autosomes + X), and the X chromosome is one of the smallest elements of the complement. The family Gomphidae is an exception, as it has a modal diploid number of 23 (22 + X), and the X chromosome is the largest of the complement and of medium-to-large size in many species. We studied the meiosis of three gomphid species from Argentina: *Aphylla* cf. *distinguenda* (Campion, 1920), *Phyllocyca propinqua* Belle, 1972 and *Phyllocyca* sp. Chromosome number is  $2n = 23$ ,  $n = 11 + X$ , except for *Phyllocyca propinqua*, showing  $n = 10 + X$ . The X chromosome of these species is medium-sized and presents heteropyknotic blocks of different sizes. Despite the small number of gomphid species analysed, there is a clear trend of increasing size of the X chromosome with the increasing amount of heterochromatin. Our results, together with those from the literature, suggest that its large size might have been due to a progressive accumulation of repetitive DNA and heterochromatinisation and not to fusion, as previously suggested. This led us to propose that the ancestral number coincided with the modal number of Gomphidae. A revision of the derived sex-determining systems in Odonata is also provided." (Authors)] Address: Mola, Liliana, Laboratorio de Citogenética y Evolución, Depto de Ecología, Genética y Evolución, Instituto de Ecología, Genética y Evolución (CONICET-UBA), Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Intendente Güiraldes 2160, Ciudad Autónoma de Buenos Aires C1428EGA, Argentina. Email: lilimola@yahoo.com.ar

**20771.** Moreno Pallares, M.I.; Bonilla Gómez, M.A.; Guillot Monroy, G.H.; Torregroza-Espinosa, A.C. (2022): Distribution of *Miathyria marcella* larvae (Odonata: Libellulidae) and water quality of wetlands in Northern Colombia. Journal of Freshwater Ecology 37(1): 569-581. (in English) ["This study aims to assess the physicochemical characteristics regulating the distribution and abundance of *M. marcella* larvae in six wetlands in the northern Colombia. Standardized techniques for collecting invertebrate and physicochemical data were used in 29 sampling points in an intraannual period. Mean pH and temperature oscillated in narrow ranges within wetlands ( $7.7 \pm 0.09$ – $8.6 \pm 0.07$ ;  $28.1 \pm 0.29$ – $32.8 \pm 0.17$  C, respectively), whereas ammonium concentrations and conductivity exhibited a wide variation ( $0.2 \pm 0.03$ – $2.8$

$\pm 0.54$  mg NH<sub>4</sub> L<sup>-1</sup>;  $861 \pm 30.7$ – $19254 \pm 1706$  mS cm<sup>-1</sup>, respectively). A total of 2586 individual *M. marcella* larvae were collected. Abundance was greater in wetlands influenced by the Magdalena River, with  $19.4 \pm 1.7$  and  $9.3 \pm 1.4$  individuals; followed by wetlands hydrologically influenced by seasonal runoff, with  $8.1 \pm 0.4$  and  $6.4 \pm 0.4$  individuals; and lowest in wetlands with influence of the Caribbean Sea, with  $3.9 \pm 0.3$  and  $0.3 \pm 0.1$  individuals. Abundances of *M. marcella* larvae exhibited similar variations at different months during the sampling period. Abundance and distribution of *M. marcella* larvae in wetlands of northern Colombia is strongly dependent on water conductivity, transparency and alkalinity. This study evidence that Odonata larvae are a valuable tool as bioindicators for wetland assessment and monitoring." (Authors)] Address: Moreno Pallares, M.I., Depto de Biología, Univ. Nac. Colombia, Bogotá, Colombia. Email: mimorenop@unal.edu.co

**20772.** Nagdev, P.; Beerendra; Ganguli, J. (2022): Determination of insect faunal diversity through light trap catches at Raipur, Chhattisgarh during kharif 2018. The Pharma Innovation Journal SP-11(2): 373-375. (in English) ["The experiment on Determination of insect faunal diversity through light trap catches was conducted during the kharif, 2018-19, at the Instructional research farm of IGKV, Raipur, Chhattisgarh. Investigations were undertaken to know the species composition of insect fauna attracted towards the light trap. The most dominated order in the light trap catches during kharif season was Coleoptera followed by Hemiptera, Lepidoptera, Hymenoptera, Orthoptera, Dermaptera and Ephemeroptera. According to the percentage of insects collected, maximum number of Coleoptera 3185.96 (68%) which were recorded highest during the 35th SMW, followed by Hemiptera 867.14 (19%) being highest during the 46th SMW, Lepidoptera 316.63 (7%) with peak during the 40th SMW, Hymenoptera 156.36 (3%) highest in the 33th SMW, Orthoptera 66.00 (2%) highest in the 31st SMW and Dermaptera 55.30 (1%) highest during the 34th SMW, Odonata (5.61) highest during the 36th SMW and Ephemeroptera (5.16) highest in the 37th SMW." (Authors)] Address: Nagdev, P., Dept Entomology, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

**20773.** Öztürk, S.; Seçer, B.; Sungur, S.; Kökçü, C.A.; Çiçek, E. (2022): Benthic macroinvertebrate fauna of Karagöl and Çiniligöl (Bolkar Mountains, Niğde, Turkey). LIMNOFISH - Journal of Limnology and Freshwater Fisheries Research 8(1): 59-69. (in Turkish, with English summary) ["This study was carried out between June and September 2018 to identify the macrobenthic invertebrate fauna of Karagöl and Çiniligöl which are high altitude lakes in Bolkar Mountains (Niğde). As a result of the systematic examination of the collected benthic samples; macrobenthic fauna of Karagöl consist of 30 taxa belonging to 14 families out of 11 orders (Sphaeriida, Coleoptera, Diptera, Hygrophila, Hemiptera, Rhynchobdellida, Odonata ["Coenagrion sp."], Haplotaksida, Lumbriculida, Trichoptera, Amphipoda) and macrobenthic invertebrate fauna of Çiniligöl composed of 11 taxa belonging to 7 families out of 7 orders (Sphaeriida, Coleoptera, Diptera, Hemiptera, Rhynchobdellida, Haplotaksida, Trichoptera). Except for *Allogamus auricollis*, *Paranais frici* and *Potamothenis hammoniensis* species among the determined taxa, others are new records for these localities. Determining the relationship between diversity of habitats, dominance and population density index was used. According to the results of the Shannon- Wiener (H'), Simpson (S) and Margalef (DMg) indexes used in the calculation of the

species diversity and species richness in habitats, the highest diversity is the Karagöl coast station with values of 3.07, 0.94 and 5.54, respectively. According to the dominance (SD) index results, the highest value was determined as Çiniligöl bottom station with 0.23. According to the results of the Shannon (EH) and Simpson (ES) indexes used in the population density relationship, the highest value was calculated as Karagöl bottom with 0.87 and 0.13, and the lowest value as 0.72 and 0.03, respectively. Cluster analysis based on the Sorensen and Ward's analysis method was applied to show the similarities of the taxa and their distribution in the stations. Accordingly, the highest similarity was observed between the Karagöl coast and Çiniligöl coast stations (0.35), the lowest between the bottom and coast stations of Karagöl (0.15)." (Authors)] Address: Öztürk, S., Nevşehir Hacı Bektaş Veli Üniversitesi, Fen Edebiyat Fakültesi, Biyoloji Bölümü, 50300 Nevşehir, Turkey. Email: seldaozturkk50@gmail.com

**20774.** Onishko, V.V. (2022): A new habitat of rare species of dragonflies (Odonata) in the territory of Moscow and the first known population of *Ischnura pumilio* in the Moscow region. Amurian Zoological Journal 14(1): 139-155. (in Russian, with English summary) ["The article presents new data on dragonfly species rare in Moscow, which inhabit the reservoirs on a wasteland near the Scientific Library of Lomonosov Moscow State Univ., namely, *Sympecma fusca* (the second habitat within the city), *Coenagrion johanssoni* (the first habitat within the Moscow Ring Road), *Ischnura pumilio* (the first reliable habitat within the city and the first stable population in the Moscow region), *Aeshna affinis*, *A. juncea* (the first habitat within the Moscow Ring Road), *A. viridis* (the second habitat within the Moscow Ring Road), *Soma-tochlora flavomaculata* (the third habitat within the Moscow Ring Road), *Sympetrum fonscolombii* (the second place of development of the migrant species in Moscow)." (Author)] Address: Onishko, V., Moscow Zoo, 1 Bolshaya Gruzinskaya Str., 123242, Moscow, Russia. E-mail: wervolf999@yandex.ru

**20775.** Ožana, S.; Dolný, A.; Pánek, T. (2022): Nuclear copies of mitochondrial DNA as a potential problem for phylogenetic and population genetic studies of Odonata. Systematic Entomology 47(4): 591-602. (in English) ["The use of mitochondrial markers for taxonomic identification and biodiversity monitoring is not without risks or limitations. Most importantly, the natural transfer of DNA from the mitochondria to the nucleus generates nonfunctional nuclear copies of mitochondrial DNA (NUMTs). Their abundance and size vary significantly among taxa, and NUMTs have been reported to complicate molecular studies based on mitochondrial markers in several insect orders, most prominently in Orthoptera. The significance of this phenomenon in Odonata has not yet been properly addressed. Here, we present a complete mitochondrial genome and a draft nuclear genome of *Leucorrhinia albifrons*, as well as NUMT and *cox1* sequences from the related species *Leucorrhinia dubia*. We document the presence of NUMTs in the *L. albifrons* nuclear genome and in nuclear genomes of two other Odonata species available in public databases. Our results show that NUMTs can have a serious impact on barcoding, phylogenetic, population and phylogeographic studies of Odonata, especially when the barcode is located in the *cox1* gene, the most frequently used molecular marker for Odonata. We suggest that *nad1* should be used alone or in combination with *cox1* to minimize unintended confusion with NUMTs. Finally, we present a mitophylogenomic analysis of Odonata and document several cases of misidentified mitochon-



drial genomes belonging to species different from those indicated in public databases. In conclusion, our findings represent an important step for future metabarcoding studies of Odonata based on mitochondrial DNA markers." (Authors)] Address: Dolný, A., Dept Biology & Ecology, Faculty of Science, Univ. of Ostrava, Chittussiho 10, 710 00 Slezská Ostrava, Czech Republic. E-mail: ales.dolny@osu.cz

**20776.** Péliissié, M.; Johansson, F.; Hyseni, C. (2022): Pushed northward by climate change: Range shifts with a chance of co-occurrence reshuffling in the forecast for northern European odonates. *Environmental Entomology* 51(5): 910-921. (in English) ["Biodiversity is heavily influenced by ongoing climate change, which often results in species undergoing range shifts, either poleward or uphill. Range shifts can occur provided suitable habitats exist within reach. However, poleward latitudinal shifts might be limited by additional abiotic or biotic constraints, such as increased seasonality, photoperiod patterns, and species interactions. To gain insight into the dynamics of insect range shifts at high latitudes, we constructed ecological niche models (ENMs) for 57 Odonata species occurring in northern Europe. We used citizen science data from Sweden and present-day climatic variables covering a latitudinal range of 1,575 km. Then, to measure changes in range and interactions among Odonata species, we projected the ENMs up to the year 2080. We also estimated potential changes in species interactions using niche overlap and co-occurrence patterns. We found that most Odonata species are predicted to expand their range northward. The average latitudinal shift is expected to reach 1.83 and 3.25 km y<sup>-1</sup> under RCP4.5 and RCP8.5 scenarios, respectively, by 2061–2080. While the most warm-dwelling species may increase their range, our results indicate that cold-dwelling species will experience range contractions. The present-day niche overlap patterns among species will remain largely the same in the future. However, our results predict changes in co-occurrence patterns, with many species pairs showing increased co-occurrence, while others will no longer co-occur because of the range contractions. In sum, our ENM results suggest that species assemblages of Odonata—and perhaps insects in general—in northern latitudes will experience great compositional changes." (Authors)] Address: Péliissié, M., Dépt de Biologie, École Normale Supérieure de Lyon, Université Claude Bernard Lyon I, Université de Lyon, 69342 Lyon cedex 07, France. Email: mathieu.pelissie@ens-lyon.fr

**20777.** Ramlee, S.; Norma-Rashid, Y.; Mohd, S.-A. (2022): Odonata nymphs as potential biocontrol agent of mosquito larvae in Malaysia. *The Southeast Asian Journal of Tropical and Public Health* 53(4): 426-435. (in English) ["Biocontrol has been proposed as an effective approach in controlling mosquito population. In this study, three Odonata (dragonfly) nymphs (*Neurothemis fluctuans*, *Orthetrum chrysis* and *O. sabina*) were investigated for their feasibility as biocontrol agents against dengue virus vectors *Aedes aegypti*, *Ae. albopictus* and *Culex quinquefasciatus*. Each Odonata nymph species was separately fed each of the mosquito species IV instar larvae maintained at a fixed level by replenishing every three hours for 24 hours under controlled laboratory conditions and 12-hour light-dark period. *N. fluctuans* and *O. sabina* nymphs preferred *Ae. aegypti* as their prey, while *O. chrysis* favored *Cx. quinquefasciatus*. Amount of larval consumption is significantly higher during light compared to dark period ( $p$ -value <0.05). However, overall there are no significant differences in consumption rates of the three dragonfly nymph species for the test mosquito larvae.

Thus, Odonata nymphs are potential biocontrol agents against mosquito vectors of dengue disease." (Authors) *Neurothemis fluctuans*, *Orthetrum sabina*, *O. chrysis*] Address: Correspondence: Saleeza Ramlee, S., Fac. Defence Study & Management, National Univ. of Defence Malaysia, Kuala Lumpur 57000, Malaysia. Email: saleeza@upnm.edu.my

**20778.** Seehausen, M. (2022): Henry Walter Bates' manuscripts on the Amazon Odonata in the archive of Friedrich Ris. *Odonatologica* 51(1-2): 11-40. (in English) ["Manuscripts on the Amazon Odonata and four letters from Henry Walter Bates were found in the private papers of Friedrich Ris at the Senckenberg Museum Frankfurt, Germany. They contain descriptions as well as sketches and coloured illustrations of Odonata collected by Bates during his eleven years (1848–1859) on the Amazon. Bates recorded about 194 species-group names and proposed 13 new genera and subgenera of Odonata. Some of these taxa were subsequently described and published by Edmond de Selys Longchamps, René Martin, and Friedrich Ris. Annotations on the genera *Oxystigma* and *Aeschnosoma* are given, and several valid species are associated with species-group names used by Bates. An annotated list of species described from specimens of Bates manuscripts is provided and corresponding labels of type specimens are noted where possible. Type specimens of *Polythore batesii*, *P. inaequalis*, *P. vittata*, *Chalcopteryx scintillans*, *Triacanthagyna satyrus*, *Aphylla dentata*, and *Progomphus intricatus* are discussed in connection with Bates' manuscripts. In addition, specimens of *Neuraeschna dentigera*, *Staurophebia gigantula*, *S. reticulata*, and *Rhodopygia geijskesi* are discussed when associated with species names used by Bates." (Author)] Address: Seehausen, M.; Fährhofstr. 11, 18439 Stralsund, Germany. Email: m.seehausen@gmx.de

**20779.** Sisa, E.M.; Kamb, J.-C.T.; Pwema, V.K.; Mutambel, D.H.; Bunda, N.P.M. (2022): Structure of Odonata populations in the riparian strips of the Bumbu River watershed in Kinshasa /RD Congo. *International Journal of Science and Research Archive* 6(1): 28-39. (in English) ["The study of the structure of the Odonata populations was undertaken during the dry season 2021, in the watershed of the Bumbu River. After capture with an entomological net, identification and enumeration, 393 individuals were collected and are divided into 2 suborders and 8 families. Several biotic indices were used to study the structure of the population on the one hand, and its diversity on the other. Raw abundance, relative frequency, taxonomic richness, Shannon and Weaver diversity, Jaccard's similarity index, Pielou's equitability and riparian strip quality index were calculated. The evaluation of the biotic indices in the different stations showed that there is a parallelism between them. The Libellulidae family was the most represented with 161 individuals or 40.9% of the total abundance and 15 species. It is followed by the families Lestidae with 97 individuals and 4 species, Coenagrionidae with 87 individuals and 5 species, Corduliidae with 23 individuals and 3 species, Gomphidae with 15 individuals and 3 species, Platycnemidae with 9 individuals and 2 species, Chlorocyphidae with 6 individuals and 2 species and Calopterygidae with 1 individual and 1 species. The relative abundance of the species *Chalcostephia flavifrons*, *Ceriagrion corallinum*, *Lestes virgatus*, *L. ictericus* and *L.s. tridens* can be explained by the aquatic vegetation which serves them as perches and shelters." (Authors)] Address: Sisa, E.M., Hydrobiology Laboratory, National Pedagogical Univ. (NPU) B.P. 8815 Kinshasa I, DRC

**20780.** Šigutová, H.; Pyszko, P.; Valušák, J.; Dolný, A. (2022):

Highway stormwater ponds as islands of Odonata diversity in an agricultural landscape. *Science of The Total Environment* 837, 1 September 2022, 155774. (in English) ["Highlights: • Stormwater ponds have a higher Odonata richness and  $\beta$ -diversity. • Stormwater ponds have low taxonomic distinctness. • Stormwater ponds host more variable communities with higher conservation values. • Fish stocking intensity is the most important factor affecting the differences. • Management practices must enhance the biodiversity conservation of stormwater ponds. Abstract: Stormwater management ponds, which are constructed to retain excess runoff and pollutants from traffic, play an important role in the freshwater biodiversity in highly modified areas. However, their roles in agricultural and semi-natural landscapes remain largely unexplored. In this study, we used Odonata as a bioindicator to compare a set of highway stormwater ponds and surrounding ponds within an agricultural and semi-natural landscape to examine the extent to which stormwater ponds act as biodiversity refuges. We analyzed the differences in environmental parameters and the richness, compositions, and conservation values of the odonate communities of stormwater and surrounding ponds. We also examined the factors controlling the differences in the communities of both pond types. The stormwater ponds were smaller, less eutrophicated, less shaded by trees, less stocked with fish, and less connected with other waterbodies than the surrounding ponds. However, they had a higher plant diversity and pH values and were more densely overgrown with vegetation. Compared with surrounding ponds, stormwater ponds had a higher Odonata richness and  $\beta$ -diversity, but their taxonomic distinctness was significantly lower. Therefore, stormwater ponds hosted more variable communities but their assemblages were taxonomically similar. Indicator species were only identified in stormwater ponds. Furthermore, stormwater ponds harbored more species with higher conservation values. The most important factors affecting the differences between stormwater and surrounding ponds were the trophic state, relative tree shading, and fish stocking intensity. With their increase, the richness and rarity decreased. Our results highlight the potential of stormwater ponds to enhance the biodiversity outside urban areas by providing specific habitat conditions that are unique to the surrounding agricultural landscape. In addition, we suggest management practices that can be used to enhance their biodiversity conservation function." (Authors)] Address: Šigutová, Hana, Dept of Biology & Ecology, Faculty of Science, Univ. of Ostrava, Chittussiho 10, 71000 Ostrava, Czech Republic

**20781.** Soni, A.; Brightwell, G. (2022): Nature-inspired antimicrobial surfaces and their potential applications in food industries. *Foods* 2022, 11, 844. <https://doi.org/10.3390/foods11060844>: 15 pp. (in English) ["Antimicrobial resistance (AMR) is a growing global concern and has called for the integration of different areas of expertise for designing robust solutions. One such approach is the development of antimicrobial surfaces to combat the emerging resistance in microbes against drugs and disinfectants. This review is a compressive summary of the work done in the field of material science, chemistry, and microbiology in the development of antimicrobial materials and surfaces that are inspired by examples in nature. The focus includes examples of natural antimicrobial surfaces, such as cicada wings or nanopillars, dragonfly wings, shrimp shells, taro leaves, lotus leaves, sharkskin, gecko skin, and butterfly wings, along with their mechanism of action. Techniques, compositions, and combinations that have been developed to synthetically mimic these surfaces against bacterial/viral and fungal

growth in food-processing areas have also been discussed. The applications of synthetic mimics of natural antimicrobial surfaces in food-processing environments is still a naïve area of research. However, this review highlights the potential applications of natural antimicrobial surfaces in the food-processing environment as well as outlines the challenges that need mitigations." (Authors)] Address: Soni, A., Food Assurance, AgResearch, Palmerston North 4442, New Zealand. Email: [aswathi.soni@agresearch.co.nz](mailto:aswathi.soni@agresearch.co.nz)

**20782.** Späth, J.; Fick, J.; McCallum, E.; Cerveny, D.; Nording, M.L.; Brodin, T. (2022): Wastewater effluent affects behaviour and metabolomic endpoints in damselfly larvae. *Scientific Reports* 12:6830: 13 pp. (in English) ["Wastewater treatment plant effluents have been identified as a major contributor to increasing anthropogenic pollution in aquatic environments worldwide. Yet, little is known about the potentially adverse effects of wastewater treatment plant effluent on aquatic invertebrates. In this study, we assessed effects of wastewater effluent on the behaviour and metabolic profiles of damselfly larvae (*Coenagrion hastulatum*), a common aquatic invertebrate species. Four key behavioural traits: activity, boldness, escape response, and foraging (traits all linked tightly to individual fitness) were studied in larvae before and after one week of exposure to a range of effluent dilutions (0, 50, 75, 100%). Effluent exposure reduced activity and foraging, but generated faster escape response. Metabolomic analyses via targeted and non-targeted mass spectrometry methods revealed that exposure caused significant changes to 14 individual compounds (4 amino acids, 3 carnitines, 3 lysolipids, 1 peptide, 2 sugar acids, 1 sugar). Taken together, these compound changes indicate an increase in protein metabolism and oxidative stress. Our findings illustrate that wastewater effluent can affect both behavioural and physiological traits of aquatic invertebrates, and as such might pose an even greater threat to aquatic ecosystems than previously assumed. More long-term studies are now needed evaluate if these changes are linked to adverse effects on fitness. The combination of behavioural and metabolomic assessments provide a promising tool for detecting effects of wastewater effluent, on multiple biological levels of organisation, in aquatic ecosystems." (Authors)] Address: Späth, Jana, Dept of Chemistry, Umeå Univ., KB.C6, Linnaeus väg 10, 90187 Umeå, Sweden. Email: [jana.spath@umu.se](mailto:jana.spath@umu.se)

**20783.** Tongo, I.; Onokpasa, A.; Emerure, F.; Balogun, P.T.; Enuneku, A.A.; Erhunmwunse, N.; Asemota, O.; Ogbomida, E.; Ogbeide, O.; Ezemonye, L. (2022): Levels, bioaccumulation and biomagnification of pesticide residues in a tropical freshwater food web. *International Journal of Environmental Science and Technology* 19: 1467-1482. (in English) ["The study assessed pesticide contamination transfer in Ikpoba River, an important tropical freshwater ecosystem in Southern Nigeria. The study quantified concentrations, bioaccumulation and biomagnification of pesticides in Ikpoba River's food web, with emphasis on less frequently assessed lower trophic-level organisms. Concentrations of pesticides were quantified in water, sediment and biota (phytoplankton, green algae (*Cladophora*), macrophyte (*Comelina erecta*), macrobenthic invertebrates (*Lestes* species, *Caridina africana*, *Enallagma* species, *Gerris lacustris*, *Culex* species, *Pentaneura* species, *Sympetrum* species, *Argyroneta aquatica*, *Lecane* species (*Cladocera*) and pelagic fish (*Tilapia zilli*)). Samples were collected at two separate stations and were analyzed using gas chromatography equipped with electron capture detector. Aldrin was the dominant pesticide in the Ikpoba River food web with

concentrations accounting for 14.4% of the total pesticide residues in the assessed matrices. Sediment samples had significantly higher pesticide concentrations among the matrices assessed, with a total mean concentration of  $0.095 \pm 0.02 \mu\text{g}/\text{kg dw}$ . Among the biota samples, total pesticide levels were significantly higher ( $p < 0.05$ ) in *Commelina erecta*. BAF and BSAF values were also highest in this species indicating that *Commelina erecta* may represent a greater reservoir for pesticides and may be a principal factor in subsequent transfer of pesticides along the food web of Ikpoba River. The BMF values for  $\alpha$ -HCH,  $\gamma$ -HCH,  $\beta$ -HCH, glyphosate, heptachlor, aldrin, heptachlor epoxide, endosulfan I, endrin, carbofuran and diazinon showed that these pesticides have the potential to biomagnify along the trophic levels. The persistence of these pesticides in Ikpoba River supports the need for continuous monitoring." (Authors)] Address: Tongo, I., Laboratory for Ecotoxicology and Environmental Forensics, Dept of Animal & Environmental Biology, Fac. of Life Sciences, Univ. of Benin, Benin City, Nigeria

**20784.** Tüzün, N.; Stoks, R. (2022): A fast pace-of-life is traded off against a high thermal performance. *Proc. R. Soc. B* 289: 20212414. 10 pp. (in English) ["The integration of life-history, behavioural and physiological traits into a 'pace-of-life syndrome' is a powerful concept in understanding trait variation in nature. Yet, mechanisms maintaining variation in 'pace-of-life' are not well understood. We tested whether decreased thermal performance is an energetic cost of a faster pace-of-life. We characterized the pace-of-life of larvae of the damselfly *Ischnura elegans* from high-latitude and low-latitude regions when reared at  $20^\circ\text{C}$  or  $24^\circ\text{C}$  in a common-garden experiment, and estimated thermal performance curves for a set of behavioural, physiological and performance traits. Our results confirm a faster pace-of-life (i.e. faster growth and metabolic rate, more active and bold behaviour) in the low-latitude and in warm-reared larvae, and reveal increased maximum performance,  $R_{\text{max}}$ , but not thermal optimum  $T_{\text{opt}}$ , in low-latitude larvae. Besides a clear pace-of-life syndrome integration at the individual level, larvae also aligned along a 'cold-hot' axis. Importantly, a faster pace-of-life correlated negatively with a high thermal performance (i.e. higher  $T_{\text{opt}}$  for swimming speed, metabolic rate, activity and boldness), which was consistent across latitudes and rearing temperatures. This trade-off, potentially driven by the energetically costly maintenance of a fast pace-of-life, may be an alternative mechanism contributing to the maintenance of variation in pace-of-life within populations." (Authors) [Address: Tüzün, N., Lab. of Evolutionary Stress Ecology & Ecotoxicology, KU Leuven, Charles Deberiotstraat 32, 3000 Leuven, Belgium Email: ndmtzn@gmail.com

**20785.** van Ekström-Ahlby, M.; Svensson, S. (2022): Which ecological drivers affect species turnover? Odonata communities in 16 lakes and ponds in Southern Sweden over a twenty-year period. BcS thesis, Halmstad Univ., School of Business, Innovation and Sustainability: 15 pp- ["Long-term data sets are needed to understand what causes changes in species communities. Odonata communities provide a variety of ecosystem services, for example being biological indicators in freshwater environment to indicate the water quality. Therefore, it is important to understand what is contributing to the species turnover that occurring in lakes on the west coast of Sweden, Halland. We collected and obtained long data sets from 16 lakes in Halland during 2002 to 2022 has been collected and analyzed. Our result shows that the colonization rate is more abun-

dant than the disappearance rate and that there is an ongoing species turnover, where more generalists inhabit the chosen lakes. Due to increased temperature and precipitation as a result of climate change, but also anthropogenic factors, southern species move more northwards. Another result due to climate change is changes in habitat structures. This is some of the reasons that contribute to species turnover in the lakes in Halland. Another driver can be how well species adapt to change overall. In this report we have contributed with new environmental data from 2022, but also long-term data sets, which is highly recommended to use for future research to understand species turnover in Odonata communities and why species are moving northwards." (Authors)] Address: van Ekström-Ahlby, Marianne, Halmstad Univ., School of Business, Innovation & Sustainability

**20786.** Vilenica, M.; Mihaljevic, Z. (2022): Odonata assemblages in anthropogenically impacted habitats in the Drava River — A long-term study. *Water* 2022, 14(19), 3119; <https://doi.org/10.3390/w14193119>. 12 pp. (in English). ["Lotic freshwater ecosystems are among the most threatened ecosystems worldwide due to the effects of multiple stressors, such as intensive land use in their catchments, morphological alterations, flow regulation, pollution, and climate change. Odonata are often used as valuable indicators of ecological integrity and anthropogenic disturbance of freshwater habitats. Here, we present the results of a study on Odonata assemblages in anthropogenically impacted habitats (hydropower plant reservoirs, tailrace canals, drainage ditches, and old river channels) conducted over a nine-year period. The negative impacts of anthropogenic activities on inhabiting biota were confirmed—with only 11 species recorded, the Odonata assemblages were species-poor and had low population densities. Although most species recorded were generalists, some species of national conservation concern were detected. Among the physico-chemical water parameters, the concentrations of ammonium, orthophosphates, nitrates, and mineral oils in the water were found to be the most important determinants of Odonata assemblages. The preservation of near-natural sites in the vicinity of anthropogenically impacted and man-made habitats is important for maintaining the local Odonata fauna and for the preservation of rare species. Our results highlight the importance of long-term data for determining the occurrence of Odonata species and monitoring their population dynamics." (Authors)] Address: Vilenica, Marina, Fac. Teacher Education, Univ. of Zagreb, Trg Matice Hrvatske 12, 44250 Petrinja, Croatia. Email: marina.vilenica@ufzg.hr

**20787.** Watanabe, R.; Ohba, S.-y. (2022): Comparison of the community composition of aquatic insects between wetlands with and without the presence of *Procambarus clarkii*: a case study from Japanese wetlands. *Biological Invasions* 24: 1033-1047. (in English) ["The red swamp crayfish *Procambarus clarkii* (Cambaridae) has been introduced globally and has caused enormous biodiversity losses in freshwater ecosystems. Recently, this invasive species has been acknowledged as factor causing the decline of aquatic insect populations (Odonata, Hemiptera, and Coleoptera) in Japan. Although the negative impacts of *P. clarkii* on aquatic insect communities have been validated by observational studies and laboratory experiments, field studies have not yet been performed. In this study, we investigated whether the presence of *P. clarkii* was a significant factor influencing the community composition of aquatic insects and identified

vulnerable taxa by comparing the aquatic insect communities in wetlands invaded by *P. clarkii* and uninvaded wetlands. We recorded a total of 52 species and 2721 individuals: 50 species and 2405 individuals in non-invaded wetlands, and 23 species and 316 individuals in invaded wetlands. This indicates that the aquatic insect diversity of non-invaded wetlands was higher than that of invaded wetlands. The composition of aquatic insect communities differed between the invaded and non-invaded wetlands. The effect of *P. clarkii* on aquatic insects differed according to their habitat-related traits: species that utilize on the water surface and float near the water surface was less vulnerable than those that utilize aquatic plants as food, oviposition substrates, and perches and hide in the bottom substrate. The eradication of *P. clarkii* at the early stages of invasion, as well as the prevention of its spread in invaded ecosystems is essential to prevent negative impacts on aquatic insects." (Authors)] Address: Watanabe, R., Environmental Technology Division, Institute of Environmental Informatics, IDEA Consultants, Inc., 2-2-2 Hayabuchi, Tsuzuki-ku, Yokohama, Kanagawa 224-0025, Japan. E-mail: watanabe.reiya.sw@alumni.tsukuba.ac.jp

**20788.** Wijesooriya, M.M.; Jayalath, M.J.; Perera, S.J.; Samanmali, C. (2022): The Odonate fauna (Insecta: Odonata) of Belihuloya, Southern Intermediate zone of Sri Lanka: a preliminary assessment and conservation implications. *Journal of Asia-Pacific Biodiversity* 15(3): 311-328. (in English) ["Highlights: • Odonate fauna from Belihuloya, Sri Lanka includes 36 species (22 in Anisoptera and 14 in Zygoptera). • This includes 12 nationally threatened species (2 CR, 1 EN and 9 VU). • The larval morphology of *Anax indicus* and *Gynacantha dravida* are described for the first time in Sri Lanka. Abstract: Belihuloya situated in a biogeographical transition zone in south-central Sri Lanka is being threatened by land-use changes. Establishing baseline biodiversity knowledge of an indicator taxa within this lesser explored area, the present study systematically assessed Odonates fauna in different habitat types through a transect survey supplemented with incidental observations. Further, the morphology of larvae and exuvia of some Odonates were opportunistically documented from selected water bodies. Transect survey and opportunistic observations identified 36 species of Odonates (22 dragonflies and 14 damselflies) representing ten families, with ten Sri Lankan endemics. Four species of dragonflies and eight damselflies are nationally threatened, including critically endangered *Elattonera centralis* and endangered *Libellago greeni*. The calculated species richness (R), Shannon-Wiener diversity (H'), evenness (E) and Simpson's diversity (1/D) values were, 3.51, 2.40, 0.85 & 7.90, and 2.85, 2.36, 0.92 & 8.68 respectively for dragonflies and damselflies, while two groups show vertical niche segregation. Low Odonate community similarity coefficients among habitat types indicate they are complementary for conservation planning. Out of ten Odonate species for which larval stages were recorded, the larval morphology of *Anax indicus* and *Gynacantha dravida* are described for the first time in Sri Lanka. Baseline data herein are used for evidence-based conservation recommendations." (Authors)] Address: Perera, S.J., Department of Natural Resources, Faculty of Applied Sciences, Sabaragamuwa Univ., 8 P.O. Box 02, Belihuloya, 70140, Sri Lanka. Email: sandun.perera@appsc.sab.ac.lk

**20789.** Zaika, V.V.; Zabelin, V.I.; Archimaeva, T.P. (2022): Trophic relationship between populations of insects and birds of the River Uyuk (Tava Republic). *Natural Resources, Environment and Society* 3(15): 20-30. (in Russian, with

English summary) ["This paper discusses the interaction of the animal population of aquatic and terrestrial parts of the basin complexes of ecosystems of water flows, using the mountain-taiga river Uyuk, a tributary of the Bolshoi Yenisei, located on the southern macro slope of the Western Sayan. As a result of the studies, the species diversity and features of the distribution of the predominant groups of amphibious insects and birds of the wetland complex were revealed depending on the natural conditions of different parts of the river, and the amount of food resources presented along the river continuum. In total, 52 taxa of aquatic invertebrates were found in the Uyuk River basin, where 26 species of mayflies (Ephemeroptera), 24 species of stoneflies (Plecoptera), 17 species of caddis flies (Trichoptera), and 6 species of dragonflies (Odonata). Diptera species are represented by 6 families. Birds, related to amphibians, are represented by 47 species from 11 families. A small number of species of both was noted in the upper reaches and the mouth part, and the maximum biodiversity in the middle rithral zone. A clear correlation was revealed between the natural conditions of different zones of the river continuum, the number of species and the abundance of invertebrates, near-aquatic and waterfowl: low species diversity and population in the crenal and hyporythral and maximum biodiversity and abundance in the metarithral part of the river channel." (Authors) Coenagrion lanceolatum, Ischnura elegans, Lestes sponsa., Leucorrhinia intermedia., Ophiogomphus cecilia, Sympetrum flaveolum.] Address: Zaika, V.V., Tuviniyan Institute for Exploration of Natural Resources of SB RAS, Kyzyl, Russia

**20790.** Zouaimia, A.; Zebza, R.; Bensakhri, Z.; Youcefi, A.; Bensouilah, S.; Amari, H.; Ouakid, M.-L.; Houhamdi, M.; Khelifa, R. (2022): Update on the geographic distribution of the critically endangered *Urothemis edwardsii* (Selys, 1849) (Odonata: Libellulidae) in northeastern Algeria. *Annales de la Société entomologique de France (N.S.)* 58(4): 366-372. (in English, with French summary) ["Assessing temporal changes of the distribution of threatened species is paramount for effective management. Threatened species are sensitive to environmental changes and can be extirpated rapidly due to climatic and anthropogenic effects. Here, we monitor the distribution of the locally critically endangered *Urothemis edwardsii* in northeastern Algeria where the species has been recovering during the last decade after being restricted to a single locality since the 1990s. During the flight seasons in 2018, 2019, and 2021, we conducted field surveys recording the number of males, females, and breeding pairs across 15 sites in northeast Algeria (El Taref province). We found the species at seven sites; reproduction was confirmed at four. In two of the sites, the species was newly recorded but showed no signs of reproduction. We confirmed the maintenance of the reproductive populations that were recently discovered. While the local conservation status of the species is better than that in the 1990s, there are still different threats that need to be addressed and conservation measures that should be implemented or reinforced to ensure maintenance as well as future expansion of the species." (Authors)] Address: Zouaimia, A., Laboratory of Marine and Coastal Environments Ecobiology, Dept of Biology, Badji Mokhtar Univ., BP 12, 23000, Annaba, Algeria. Email: zouaimia.abdelheq@gmail.com



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de  
Published in Zerf, Germany  
ISSN 1438-0269

## 1997

**20791.** Feenstra, H. (2000): Succesvolle broedgevallen van Grauwe Vliegenvangers *Muscicapa striata* in kanariekastjes. Drentse Vogels: 89-92. (in Dutch) ["Successful breeding of Spotted Flycatchers *Muscicapa striata* in nest-boxes: In 2000, two pairs of *M. striata* were observed from arrival till after fledging at a farm in the province of Friesland (Netherlands). Nest-building took three days; egg-laying started one day after the nests were finished. Incubation lasted 13 days and nestlings fledged at ages between 15 and 16 days old (Table 2). The feeding frequency roughly doubled in the second part of the nestling stage (Table 1). Declines in feeding rate were apparently compensated by providing larger prey items. Of identified prey items, Diptera (n=213) were most common, followed by Odonata (n=45), Lepidoptera (n=27), Coleoptera (n=9) and caterpillars (n=4)." (Author)] Address: Feenstra, H., Fochtelooërveen 10, 8428 RR Fochteloo, Netherlands.

## 2006

**20792.** Ternois, V.; Gautier, C. (2006): L'évaluation du patrimoine entomologique des étangs piscicoles de Champagne humide (Odonates, Orthoptères et Lépidoptères rhopalocères). *Courrier Scientifique du Parc Naturel Regional de la Forêt d'Orient* 30: 47-62. (in French) ["Conclusion: With odonate 40 species contacted in 2004, including one new species for the Aube department, the odonatological study carried out on the 13 fish ponds of the PNRFO must be considered satisfactory even if it does not allow an exhaustive census for each of the sites studied. The protocol used nevertheless allows a comparison of the sites between them since the survey effort was more or less the same for all the ponds. It is therefore possible to rank the ponds according to their odonatological heritage. The diversity and richness of dragonflies vary greatly from one pond to another. Several elements have been put forward to explain this disparity, such as the general nature of the environment (forest pond, open pond, dry pond, etc.), the diversity and mosaic of the environments present, the impact of fish farming management, whether it be stocking, the nature of the population or the management of water levels. These elements are also at the origin of the patrimonial interest of fishponds for the conservation of dragonflies. Of the 63 known species in Champagne-Ardenne, the ponds of Champagne Humide are home to 54 species, of which thirty or so are remarkable because of their rarity, their degree of threat or their protected status. Some Odonata are dependent on fishponds and their conservation depends largely on the management in place. It would seem that for most owners, fish farming is the primary concern. They therefore allow the peripheral vegetation to develop naturally. However, this spontaneous development towards closed hygrophilous woodland is a limiting factor for the development of Odonata. These require

the presence of hygrophilic border vegetation (rushes and sedges) which allows the emergence of larvae and the maturation of imagos. Management of the entire water body is therefore essential to maintain sufficient biodiversity. Two parameters now seem to be essential to ensure the conservation of Odonata: extensive management of the fish population. This involves favouring the stocking of carnivorous fish while limiting burrowing fish such as carp and tench, in order to limit the turbidity of the water bodies, which is harmful to the larval development of odonates, but also to favour the development of aquatic grass beds, environments used for egg-laying or for the development of larvae. the management of the edges of the ponds to create a mosaic of environments, which is essential for the reproduction and development of the imagos. Floristic diversity will also be ensured by maintaining a natural summer tidal range, which is essential for the development of specific threatened species: *Lestes barbarus*, *L. virens vestalis*, etc." (Authors / DeepL) *Sympecma fusca*; *Lestes barbarus*; *L. dryas*; *L. virens vestalis*; *Coenagrion mercuriale*; *C. pulchellum*; *C. scitulum*; *Cercion lindenii*; *Ischnura pumilio*; *Anax parthenope*; *Brachytron pratense*; *Aeshna isoceles*; *A. affinis*; *A. grandis*; *Somatochlora metallica*; *S. flavomaculata*; *Oxygastra curtisii*; *Epithea bimaculata*; *Gomphus vulgatissimus*; *Onychogomphus forcipatus*; *Cordulegaster boltonii*; *Libellula fulva*; *Orthetrum albistylum*; *O. brunneum*; *O. coerulescens*; *Crocothemis erythraea*; *Sympetrum danae*; *S. fonscolombii*; *S. flaveolum*; *S. meridionale*; *S. vulgatum*; *Leucorrhinia caudalis*; *L. pectoralis*] Address: E-mail: [bonjour@pnrfo.org](mailto:bonjour@pnrfo.org). Site internet: [www.pnr-foret-orient.fr](http://www.pnr-foret-orient.fr)

**20793.** Karsch, A. (2006): Naturschutzfachliches Rahmenkonzept für das Westliche Dachauer Moos. Grundlagenplanung für ein Projekt im BayernNetz Natur. Diplomarbeit. Hochschule Anhalt (FH), Abteilung Bernburg: 204 pp. (in German) [Bayern, Germany; "In this diploma thesis, a nature conservation framework concept for the BayernNetz Nature Project "Westliches Dachauer Moos" is developed, which is understood as basic planning for the further implementation of the project. First of all, the planning basis is determined, which deals with the location, the natural classification, the abiotic conditions, the history and the current situation of the planning area. This is followed by a description of the status of the area in terms of nature conservation. It describes the stock of biotopes and species of selected animal groups and vascular plant species in the planning area. On this basis, a nature conservation assessment is carried out in which significant species and biotopes are identified. Subsequently, suitable areas for compensation measures are identified and existing and possible conflicts are explained. Finally, the concept of objectives and measures compiles proposals for the development of the area in terms of nature conservation .... The dragonfly findings (n=31 species) are mainly distributed among the still waters and ditches in Eschenrieder and Graßfinger Moos and the landscape lake at the Schinderkreppe. The most frequently

recorded species include common and undemanding species such as *Aeshna cyanea*, *Coenagrion puella*, *Platycnemis pennipes* and *Pyrrhosoma nymphula* (see Tab. 5). These are primarily stillwater species with low requirements for the quality of the water bodies and their environment. The only species inhabiting only flowing waters in the PG with relatively many records is *Calopteryx splendens*. There are only a few records or isolated findings of more demanding species such as *Aeshna juncea*, *Coenagrion mercuriale*, *Lestes barbarus* and *Sympetrum flaveolum*. The only more demanding species of which there are several records from different years is *Orthetrum coerulescens*. The species was observed at several ditches in the Eschenrieder Moos and at the landscape lake. At the landscape lake it is also insensitive to major fluctuations in environmental factors (cf.: DROSDOWSKI 1997, p. 240). The species is thus able to colonise a variety of different habitats." (Author/DeepL) Address: not stated

## 2077

**20794.** Brettfeld, R.; Bellstedt, R.; Nixdorf, F. (2007): Zur Gewässerfauna der Rodach in Südthüringen. Veröffentlichungen, Naturhistorisches Museum Schloss Bertholdsburg Schleusingen 22: 93-106. (in German) ["The Rodach in southern Thuringia runs through the hilly landscape of the Grabfeld between Thuringia and Upper Franconia. In its course, semi-natural and semi-natural, formerly developed sections alternate. Since 1989, the Thuringian section has been studied with regard to aquatic fauna. A total of 176 species of invertebrates, fish and aquatic bird species have been recorded. Above all, the occurrence of aquatic insects: Mayflies, stoneflies and caddisflies, dragonflies and water beetles. The special features of the Rodach are the close succession of rhithral and potamal biocoenoses of coarse and fine material-rich, carbonate streams and rivers on only about 25 km of course. The Rodach is a refuge of rare and endangered species of Thuringia's stream and river landscapes. A total of four species new to Thuringia were found in the Rodach. Another species lost in Thuringia was rediscovered in the Rodach. More than 35 animal species are listed in Thuringia's red lists (TLUG 2001)." (Authors) Translated with www.DeepL.com/Translator (free version)] Address: Brettfeld, R., Bockstadter Mühle/Werra, 98673 Bockstadt, Germany

**20795.** Xu, Q.-h. (2007): Studies on classification of Fujian odonates, China. Dissertation for Master Degree of Fujian Agriculture and Forestry University: III + 54 pp. (in Chinese, with English summary) ["All the odonate specimens collected from Fujian Province in recent years were studied and identified. 1 new species and 1 new subspecies were described and illustrated, and 14 species were firstly recorded in Fujian. The new species and new subspecies are *Periaeschna zhangzhouensis* sp.nov. and *Planaeschna ishigakiana fujianensis* subsp. nov. The newly recorded species are: *Rhinocypha chaoi* Wilson, *Agriomorpha fusca* May, *Rhipidolestes janetae* Wilson, *Aciagrion olympicum* Laidlaw, *Platycnemis foliacea* Selys, *Anax immaculifrons* Rambur, *Lamelligomphus hainanensis* (Chao), *Merogomphus paviei* Martin, *Phaenandrogomphus chaoi* Zhu et Liang, *Stylurus kreyenbergi* (Ris), *Macromia unca* Wilson, *Macromidia hangzhouensis* Zhou et Wei, *Onychothemis lestacea tonkinensis* Martin and *Zygonyx iris insignis* (Kirby). Based on all the literature records of Fujian odonates and Davies and Tobin system (1984, 1985) of Odonata classification, Fujian odonates were sorted out and revised thoroughly, 16 families, 102 genera and 247 species (subspecies) were

found, which included 233 known species (or subspecies) belonging to 101 genera, 16 families. In the checklist of Fujian odonates, every species was enumerated with relative literature records, amounts of specimens, collected locations and collected times, and distribution. Based on the current methods of entomo-geographical division and the distribution records of 233 known odonates, the faunal analysis of Fujian odonates was conducted. The result showed that the fauna of Fujian odonates belongs to typical Oriental Region, the elements of Oriental Region of Fujian odonate fauna arc dominated by the constituents of Southern Chinese origin. The faunal compositions of Fujian odonates reflect the region characteristics which are obviously discrepant between South-Eastern Fujian and North-Central Fujian which were divided according to entomo-geographical division of agriculture and forestry in Fujian. The gomphid dragonflies of Fujian have an obvious tendency to spread outwards from Indo-Chinese Subregion, which seems to be a center of abundance of the gomphid dragonfly fauna." (Author) Address: Xu, Qi-han, Zhangzhou Education College 363000, Fujian, China. E-mail: qihanx@yahoo.com.cn

**20796.** Xu, Q.-h. (2007): *Periaeschna zhangzhouensis* spec. nov. from Fujian, China (Anisoptera: Aeshnidae). *Odonatologica* 36(3): 315-318. In English. ["The new species is described, illustrated and compared with the congeners (holotype male, China, Fujian, Huaan co., 3-VIII-2004; deposited at Zhangzhou Education College, China). It is similar to *P. flinti* Asahina, from which it is distinguished by longer inferior appendages, an obtusely tipped dentigerous plate and by different colour patterns of the synthorax and abdomen." (Author)] Address: Xu, Qi-han, Zhangzhou Education College 363000, Fujian, China. E-mail: qihanx@yahoo.com.cn

## 2010

**20797.** Goergen, G.; Dupont, P.; Neuenschwander, P. (2010): Etat actuel de la biodiversité animale: 7.2 Biodiversité des insectes / Current state of animal biodiversity: 7.2 Insect biodiversity. In: Sinsin, B. & D., Kampmann (Eds) *Atlas de la Biodiversité de l'Afrique de l'Ouest (BIOTA)*, Tome I: Bénin / Biodiversity Atlas of West Africa, Volume I: Benin. Cotonou & Frankfurt/Main, ISBN 978-3-981-393330, 726 pp: 346-355. (in French) [The paper includes a figure and reference of *Ceragrion citrinum* Champion 1914.] Address: unknown

**20798.** Hense, J. (2010): *Phänologie der Libellen (Insecta, Odonata) an jungen Pioniergewässern*. Diplomarbeit. Universität Köln: 65 pp. + Anhang. (in German) ["In the context of this study, the phenology of dragonflies (Odonata, Insecta) was recorded in the first flight season at six newly created pioneer waters or waters that had been moved into an early succession stage by maintenance measures in the Kranenburger Bruch NSG on the Lower Rhine, Nordrhein-Westfalen, Germany. The waters were sampled eight times over a period of 14 months, during which, in addition to recording the Odonata imagines, the vegetation development and some water chemistry parameters were recorded, exuviae were collected and larvae were caught. A total of 2523 individuals from seven families and 26 species were recorded, which were used to illustrate the phenological distribution, as well as to evaluate the implemented conservation measures from an odonatological perspective. For most Zygoptera, a later maximum in the number of full insects was observed due to the emergence of the first larval generation developed in the water body in midsummer. Shifts in the

number of Anisoptera were mainly due to interspecific competition and the species-typical migration behaviour. In addition, under the special conditions in a pioneer water body." (Author/DeepL) Coenagrion puella, Enallagma cyathigerum, Ischnura elegans, I. pumilio, Erythromma najas, Aeshna grandis, A. cyanea, A. juncea, Anax imperator, Brachytron pratense, Cordulia aenea, Libellula depressa, Libellula quadrimaculata, Orthetrum cancellatum, Sympetrum sanguineum, S. vulgatum, S. striolatum, S. fonscolombii] Address: not stated

## 2011

**20799.** Haněková, B. (2011): Migration of dragonflies and damselflies (Odonata). Ekologická a evoluční biologie, Přírodovědecká fakulta, Univerzita Karlova v Praze: 37 pp. (in Czech, with English summary) ["This study is aimed at the phenomenon of migration, which is not still fully explored and which, by different circumstances, undergo several species of dragonflies (Odonata). Only for a few species from several tens of migrants generally, their migration route and strategies are explored. These case studies are described and I am also dealing with those species of dragonflies for which migration is not fully explored, and I am pointing out the other possible fields of research. One of the aims of my work is the comparison of different attributes and strategies of migration in dragonflies with other migrants from insect as well as the migratory birds." (Author)] Address: not stated

**20800.** Esch, A. (2011): Die Libellen der Fließgewässer und ihre Begleitfauna im FFH-Gebiet Kottenforst bei Bonn (Insecta: Odonata). Diplomarbeit. Rheinische Friedrich-Wilhelms-Universität Bonn: VIII + 62 pp + Anhang. (in German) ["Summary: In the context of this diploma thesis, the dragonfly fauna of the flowing waters of the FFH area Kottenforst southwest of Bonn was investigated with regard to its dragonfly spectrum and the accompanying aquatic fauna. The aim of the work was to obtain an overview of the frequency and distribution of the typical dragonfly species of smaller, natural flowing waters. The investigation of the aquatic accompanying fauna should provide information about possible predators, but also about the available food supply for dragonflies and their larvae. A comparison with historical data allowed a temporal overview of the spectrum of stream dragonflies in the Kottenforst and a classification in a longer period. From May to October 2010, six streams were examined for dragonfly occurrence and accompanying aquatic fauna at a total of ten survey points, each with six inspections. Both headwater regions, medium stream sections of large and small streams and a relatively newly constructed sand trap were selected as survey points. The inspections were equally distributed over the different times of day. Eleven species were detected during the surveys in 2010. The most species-rich spectrum of dragonflies was observed at the sand trap of the Annaberg stream. Nine of the eleven species recorded in this study were recorded here. Except for one record of Calopteryx splendens, these were dragonfly species typical of still waters. At the other study sites, an average of two dragonfly species were recorded at each stream. A negative exception was the Kluffer Bach, where no dragonflies were recorded between May and October 2010. With Cordulegaster bidentata, C. splendens and C. virgo, three of the four species of small streams occurring in this region could be detected. Only Cordulegaster boltonii was absent from the study area. Due to the known populations of this species in very similarly shaped forests in the area of the Rhine-Sieg district on the right

bank of the Rhine, the Rhine seems to be the current distribution limit of C. boltonii in this region as well. In contrast, Cordulegaster bidentata, which is rare in NRW and classified as critically endangered, was found to be present on the ground at several study sites. It can be regarded as a special feature of the streams in the Kottenforst. The historical data of the NRW dragonfly study group also prove stable occurrences of C. bidentata with simultaneous absence of C. boltonii. In the Kottenforst, the striped damselfly partially colonises stream sections which, compared to previous literature data, are more in line with the known larval habitats of C. boltonii. Whether there is therefore a direct competitive situation between the two damselfly species in the study region, in which C. bidentata has possibly displaced C. boltonii, or whether the Two-striped damselfly has simply not developed the Kottenforst as a habitat so far, remains open. The two damselfly species occurring in the Bonn urban area could only be proven for the Kottenforst through observations of male imagines. Historically, too, only isolated records have been found. This is partly due to the fact that the important requirements of both species for a breeding water, sunny shore sections and lush riparian vegetation, are usually lacking in a forest area. It is therefore not surprising that two of the three records were made outside the actual forest on adjacent streams. Nevertheless, the observations can be interpreted as indications of the occurrence of the two damselflies in the region around the Kottenforst. The accompanying aquatic fauna was mostly dominated by the crayfish Gammarus sp. A special feature was the detection of the crayfish Orconectes limosus in the Katzenloch, which is also a potential predator of dragonfly larvae." (Author)] Address: not stated

## 2014

**20801.** Billqvist, M (2014): Om exotiska trollsländor i Sverige. fauna & flora 109(1): 10-13. (in Swedish) ["That exotic dragonflies are found in various ways in connection with aquariums, greenhouses, fish farms and similar is known for a long time, and there are quite abundant finds of different species in almost Europe. But what is the situation in Sweden? Here are the three finds that I know of, but there is most likely a large number of unknowns: Agriocnemis pygmaea (Rambur, 1842), Crocothemis servilia (Drury, 1770) and an undetermined species which resembles the genus Ischnura but probably belongs to something of the genera Aciagrion, Xiphiagrion or Amphiallagma." (Author) [https://www.trollslandeforeningen.se/wp-content/uploads/2015/0-1/Exotiska\\_trollsl%c3%a4ndor.pdf](https://www.trollslandeforeningen.se/wp-content/uploads/2015/0-1/Exotiska_trollsl%c3%a4ndor.pdf)] Address: E-mail: magnus.billqvist@gmail.com

**20802.** Kalnins, M. (2014): Resnvedera purvuspares Leucorrhinia caudalis (Charpentier, 1840) sugas aizsardzibas plans. Biedriba "Zala upe", Sigulda. <http://www.slitere.gov.lv/upload/File/DOC/SAPResnvederaPurvuspare-14LV.pdf>: 1-71. (in Latvian, with English summary) ["Lilypad Whiteface (L. caudalis) is one of the species of dragonflies occurring in Latvia, which is considered to be endangered and is included in the regulatory enactments of different levels of conservation of the species. In accordance with the report of Article 17 (FFH Directive), the conservation status assessment of Lilypad Whiteface is adverse; and a negative trend of the conservation status has been found. The assessment of a number of parameters included in the report is based on the grounds of an opinion of an expert or there is no data at all (e.g. as to the hydro-chemical parameters of the microhabitats and habitats of the species). The natural data management system "OZOLS" of Nature Conservation Agency

contains only a few, including inaccurate entries on the fields of the species; therefore it is not possible to plan and carry out appropriate conservation of the fields of the species. When planning the measures of freshwater habitat management, the coastal habitat needs are not assessed in connection of the conservation of Lilypad Whiteface (and other specially protected species of dragonflies). Lilypad Whiteface most commonly is found in eutrophic lakes, less often in diseutrophic lakes and old riverbeds in Latvia. The vegetation in the fields of Lilypad Whiteface in eutrophic lakes and old riverbeds are usually visually moderately abundant to abundant, diverse and rich in species. Typically all zones of aquatic plants – the surface, floating-leaf and submerged – are well-developed. Currently Lilypad Whiteface is found throughout the territory of Latvia. Comparing the historical and contemporary data of the distribution of the species it can be concluded that the number of observations of the species has decreased, which could indicate the decrease of the population of the species in Latvia. The uneven distribution of the species is more referable to the uneven level of research than to the actual distribution of the species. The influencing factors of the population of Lilypad Whiteface are the following: their natural enemies and non-native species, collecting, extreme weather conditions, toxic substances in the environment and the minimum size of the population. However, all these factors hold an unknown or low to medium risk. The non-native species and the minimum size of the populations can be a high risk factor too. The loss of a habitat of the species is a medium risk factor, because it has been established only in some specific places. The fragmentation of habitats (isolation of fields), habitat management (cleaning of water bodies) and mismanagement of habitats of coastal zone (overgrowing) are assessed similarly. However, the combination of these factors can have a major impact on the status of the species' population in Latvia. The protection plan of the species contains a description of the conservation measures of Lilypad Whiteface in the following areas: legislation and conservation planning, conservation of the species and habitats of it, research and monitoring, as well as information and education. A part of the described measures are attributable to the protection of invertebrates or even species and habitats as a whole." (Author)] Address: Kalniņš, M., The Entomological Society of Latvia, Dzervenu iela 9-12, LV-2150, Sigulda, Latvia. E-mail: martins.kalnins@biology.lv

**20803.** Robin, K. (2014): Zwergtaucher erbeutet Anax-Larve. *Mercuriale* 14: 67. (in German) [Verbatim: In a harbour area in Schmerikon, at the eastern end of the Zurich Obersee/Switzerland, I spotted two Little Grebes (*Tachybaptus ruficollis*) next to a boathouse and in front of a thin fringe of reeds on 29.11.2013, about 12:30 CET, one of them diving repeatedly. This bird attracted my particular attention because it held a small prey in its beak, but it did not glisten like a wriggling little fish, but seemed immobile and resembled a small branch or piece of reed. The Little Grebe, with its head tilted, kept hitting the surface of the water as if to brush something off. As soon as it had removed this "something" from its beak, it immediately continued diving, and the whole thing was repeated. I managed to photograph the scene several times. I realised that the prey was a large dragonfly larva. After a few minutes and several recaptures, the Little Grebe finally managed to swallow the prey, obviously scratching its throat, because the bird had to gag violently while swallowing with its neck stretched vertically upwards. An analysis of the images showed that the dragonfly larva had temporarily clung to the upper beak. Because of this, the Little Grebe had repeatedly and very forcefully struck its

beak on the water surface. To identify the dragonfly larva, I asked H. Wildermuth and S. Kohl for their assessment. Both experts came up with *Anax* and added that it was most probably *Anax* imperator. Dragonfly larvae as prey of Little Grebes are known (Bandorf 1970: 50), but so far it has only rarely been possible to document this behaviour and to identify the prey with certainty down to the genus level." (Author) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Robin, K., Im Freudmoos 7, CH-8730 Uznach, Switzerland. Email: klaus.robin@robin-habitat.ch

**20804.** Robin, K. (2014): Graukranich erbeutet Vierfleck (*Libellula quadrimaculata*). *Mercuriale* 14: 68. (in German) [Verbatim: In the Linth Plain, between Lakes Zurich and Walen, lies the Kaltbrunner Riet, a Swiss fen, amphibian spawning area and waterbird and migratory bird reserve of national importance and in the international context of Ramsar Site CH-7. The area is considered an odonatological (Wildermuth et al. 2005) and ornithological (Geisser et al. 2010) hotspot. Among the more than 200 bird species that have been recorded here in recent years is the Grey Crane (*Grus g. grus*), which in the recent past has increasingly been resting in small groups, but then usually moves on. In exceptional cases, individual birds remain into the breeding season or appear for a few days and depart again, as in the present case. The adult bird appeared on 30 May 2014 in the immediate vicinity of the Kaltbrunner Riet on a former *Molinia*-meadow, which had been drained in the 1960s and is currently used as a mowing meadow. I spotted the bird there at 16:30 h CET and observed it foraging. Bending forward, it walked slowly through the tall vegetation, dipping its head low from time to time. When his head came up again, I could often see him holding an earthworm in his beak. A few times, however, I noticed that it paused for a moment and did not aim at the ground, but at an object on a stalk in the tall grass. The crane then snapped its head forward and grabbed the object with its beak. After snapping at it several times, it hurled it into its beak and finally swallowed it. I was able to document this process photographically. Already in the field I recognised that the crane was eating dragonflies. At maximum magnification, I identified the photographed prey as a four-spotted imago (*Libellula quadrimaculata*). It is well known that cranes eat invertebrates and insects (Makatsch 1970). In the present case, the crane's breeding season stay and the seasonal availability of the four-spotted as food for this individual are remarkable. Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Robin, K., Im Freudmoos 7, CH-8730 Uznach, Switzerland. Email: klaus.robin@robin-habitat.ch

**20805.** Sharma, G. (2014): Studies on Odonata and Lepidoptera fauna of foothills of Aravalli Range, Rajasthan. *Rec. zool. Surv. India, Occ. Paper* 353: 1-104. (in English) [2.3. Results: Species diversity: The studies on Odonata fauna of Aravalli Range of Rajasthan reveals that so far 46 species belongs to 8 families under 2 suborders were recorded, in which 12 species are new records from Rajasthan state i.e. *Pseudagrion microcephalum* (Rambur, 1842), *Disparoneura quadrimaculata* (Rambur, 1842), *Neurobasis chinensis* (Linnaeus, 1758), *Anax immaculifrons* Rambur, 1842, *A. parthenope* (Selys, 1839), *Neurothemis fulvia* (Drury, 1773), *N. tullia* (Drury, 1773), *Tholymis tillarga* (Fabricius, 1798), *Tramea basilaris burmeisteri* Kirby, 1889, *T. limbata* (Rambur, 1842), *T. virginia* (Rambur, 1842) and *Trithemis kirbyi* Selys, 1891 (Table 1). The study reveals that *Ceragrion coromandelianum* (Fabricius, 1798), *Brachythemis contaminata* (Fabricius, 1793), *Bradinopyga geminata* (Rambur, 1842), *Crocothemis servilia* (Drury, 1770), *Ischnura aurora* (Brauer,



1865), *Pseudagrion rubriceps* Selys, 1876, *Orthetrum glaucum* (Brauer, 1865), *O. prunosum neglectum* (Rambur, 1842), *O. sabina* (Drury, 1770), *Pantala flavescens* (Fabricius, 1798) and *Trithemis aurora* (Burmeister, 1839) were the dominant species of Odonates of Aravalli Range of Rajasthan. The mass emergence of *P. flavescens*, a migratory species was recorded from May to October in different localities of Aravalli Range of Rajasthan during 2008-11. Annotated checklist of Odonata of Aravalli Range of Rajasthan prepared, followed by detailed systematic account species wise (Table 1).] Address: Sharma, G., Zoological Survey of India, M-Block, New Alipore, Kolkata. 700 053, India

**20806.** Whatley, M.H.; van Loon, E.E.; Vonk, J.A.; van der Geest, G.; Admiraal, W. (2014): The role of emergent vegetation in structuring aquatic insect communities in peatland drainage ditches. *Aquatic Ecology* 48: 267-283. (in English) ["Availability of macrophyte habitat is recognized as an important driver of aquatic insect communities in peatland drainage ditches; however, eutrophication can lead to the decline of submerged vegetation. While emergent vegetation is able to persist in eutrophicated ditches, vegetation removal, carried out during ditch maintenance, can reduce the availability of this habitat. In this study, we applied the landscape filtering approach to determine whether the absence of emergent vegetation is a habitat filter which structures aquatic insect communities in peatland drainage ditches under different trophic conditions. To this end, a field study was carried out in one mesotrophic (Naardermeer) and one eutrophic (Wormer and Jisperveld) peatland in the province of North Holland, The Netherlands. We assigned life history strategies to insect species and applied linear mixed models and redundancy analyses to taxonomic and functional aquatic insect community data. Our results indicate that while differences between peatlands primarily determine the species pool within each wetland, emergent vegetation acted as a secondary filter by structuring functional community composition within ditches. The eutrophic peatland was dominated by insects adapted to abiotic extremes, while species with good dispersal abilities were strongly related to emergent vegetation cover. This study demonstrates the applicability of life history strategies to provide insight into the filtering of species due to availability of emergent macrophyte habitat. To ensure greater diversity of insect communities in ditch habitats, it is recommended that some vegetation be spared during maintenance to leave patches from which insect recolonization can occur." (Authors) The paper includes references to Odonata.] Address: Whatley, M.H., Aquatic Ecology & Ecotoxicology, Inst. for Biodiversity and Ecosystem Dynamics (IBED), Univ. of Amsterdam, P.O. Box 94248, 1090 GE Amsterdam, The Netherlands. E-mail: m.h.whatley@uva.nl

## 2016

**20807.** Amann, P. (2016): Die Libellenfauna am Stutzberg bei Frastanz (Odonata / Voralberg. Österreich). *inatura* – Forschung online, Nr. 29: 5 pp. (in German) ["Over a period of two years (2014-15), the dragonfly fauna at potential sites was recorded for the Frastanz Stutzberg. Bazora (Austria) nature monograph. The species occurring there are described, and special features are pointed out. Six dragonfly species (*Phyrrhosoma nymphula*, *Aeshna cyanea*, *Aeshna juncea*, *Anax imperator*, *Cordulegaster bidentata*; *Crocothemis erythraea*) were recorded in the study area, of which *Cordulegaster bidentata* is classified as critically endangered according to Hostettler (2001). Five dragonfly species were observed regularly and are therefore considered to be

native to the area. For the Stutzberg / Bazora area, the small-scale fens with their headwaters and rivulets are to be considered absolutely worth protecting from a dragonfly-specific point of view." (Author) Translated with www.DeepL.com/Translator (free version)] Address: Amann, P., Wiesenbachweg 8, 6824 Schlins, Austria. Email: p.amann@aon.at

**20808.** Borisova, N.V. (2016): About the finding of the White-Fronted Dragonfly (*Leucorrhinia albifrons* (Burmeister, 1839) (Odonata: Anisoptera: Libellulidae) in the Chuvash Republic. *Natural Science Research in Chuvashia* 3: 122-125. (in Russian) ["The message contains information about the discovery of a new for Chuvashia species – white-fronted dragonfly (*Leucorrhinia albifrons* (Burmeister, 1839). collection, proposed measures for the protection of the species on the territory of the Chuvash Republic. ... Material. Yalchik section of the state reserve "Prisursky" (near the village of Eshmikeevo, Yalchik district), 5.VI.2015, edge of poplar-birch planting, 1 female; lake "Two lakes" (near the village of Lutscoe, Komsomolsk region), 29.V.2016, 1 male, 2 females; 17.VI.2016, 2 males, 1 female; 4.VII.2016, 3 males. ... The main enemies of young, newly hatched dragonflies of this species are spiders (*Larinioides cornutus*), as well as larger four-spotted dragonflies (*Libellula quadrimaculata*)."] (Author)] Address: Borisova, N.V. Russia, Cheboksary, FSBI "Prisursky State Reserve", Chuvash Branch of the Russian Entomological Society, Russia. E-mail: nat-borisova18@yandex.ru

**20809.** Davidovich, H.; Ribak, G. (2016): Flying with eight wings: inter-sex differences in wingbeat kinematics and aerodynamics during the copulatory flight of damselflies (*Ischnura elegans*). *The Science of Nature* 103:65: 8 pp. (in English) ["Copulation in the blue-tailed damselfly, *Ischnura elegans*, can last over 5 hours, during which the pair may fly from place to place in the so-called "wheel position". We filmed copulatory free-flight and analyzed the wingbeat kinematics of males and females in order to understand the contribution of the two sexes to this cooperative flight form. Both sexes flapped their wings but at different flapping frequencies resulting in a lack of synchronization between the flapping of the two insects. Despite their unusual body posture, females flapped their wings in a stroke-plane not significantly different to that of the males (repeated-measures ANOVA,  $F_{1,7} = 0.154$ ,  $p = 0.71$ ). However, their flapping amplitudes were smaller by  $42 \pm 17$  %, compared to their male mates ( $t$  test,  $t_7 = 9.298$ ,  $p < 0.001$ ). This was mostly due to shortening of the amplitude at the ventral stroke reversal point. Compared to solitary flight, males flying in copula increased flapping frequency by 19 %, while females decreased flapping amplitude by 27 %. These findings suggest that although both sexes contribute to copulatory flight, females reduce their effort, while males increase their aerodynamic output in order to carry both their own weight and some of the female's weight. This increased investment by the male is amplified due to male *I. elegans* being typically smaller than females. The need by smaller males to fly while carrying some of the weight of their larger mates may pose a constraint on the ability of mating pairs to evade predators or counter interference from competing solitary males." (Authors)] Address: Ribak, G., Dept of Zoology, Room 228, Sherman Building, Tel Aviv University, Tel Aviv, Israel. E-mail: gribak@post.tau.ac.il

**20810.** Gangadoo, S.; Chandra, S.; Power, A.; Hellio, C.; Watson, G.S.; Watson, J.A.; Greend, D.W.; Chapman, J. (2016): Biomimetics for early stage biofouling prevention:

templates from insect cuticles. *Journal of Materials Chemistry B* 4: 5747-5754. (in English) ["A biomimetic antifouling material study was carried out utilising superhydrophobic cicada and dragonfly wings replicated with a polymer (epoxy resin). They were tested in a marine biofouling study for up to 1 week in addition to biofouling assays of protein, carbohydrate and DNA absorption. The materials were compared against a commercial antifouling paint and a polymeric smooth surface constituting a control sample. The replicated surfaces demonstrated superior antifouling properties in comparison to the control and similar efficiency in DNA (10% reduction), protein and carbohydrate adsorption (15%) to the commercial anti-fouling paint. As the fabricated surfaces have roughness at the nanometre scale it is probable that the low adsorption properties, at least in the early stages, may be related to air trapped at the surface. Interestingly the most disordered replicated surface (dragonfly wing replicate) demonstrated the lowest values of absorption." (Authors) *Rhyothemis graphiptera*, Australia] Address: Chapman, J., School of Medical & Applied Sciences, CQ Univ., Australia. E-mail: j.chapman@cqu.edu.au

**20811.** Huang, Y.-T.; He, C.-S.; Hsiao, W.-F. (2016): Survey of Lepidoptera and Odonata of Lantan reservoir trail. *Journal of Agriculture and Forestry, National Chiayi* 13(1): 51-61. (in Chinese, with English summary) ["Survey of Rhopalocera and Odonata insect of Lantan reservoir trail were conducted from September, 2011 to September, 2012. The purposes will to provide the basic information for leisure activities for parent and children. Five sampling sites were selected and each sampling site stayed for 30-40 minutes for counting. We used vision method and sweeping to record the numbers of encounter lepidopterans and Odonata insects. Results have indicated that the peak period of insects was from April to September. [...] Libellulidae (15 species), Platycnemididae (2 species), Coenagrionidae (2 species), Gomphidae (1 species) and Cordulegasteridae (1 species). [...] Among Odonata, *Orthetrum glaucum* (n=48) is dominant species and followed by *Trithemis aurora* (n=35) and *Pantala flavescens* (n=35), *Neurothemis ramburii* (n=33), and *Pseudothemis zonata* (n=28). The above results were able to provide basic information for ecotourism activity in the future." (Authors)] Address: Hsiao, W.-F., FUJI Environmental Service CO., LTD., Saitama, Japan. Email: wfhsiao@mail.ncvu.edu.tw

**20812.** Huda, N.; Anwer, S.F. (2016): The effects of leading edge orientation on the aerodynamic performance of dragon fly wing section in gliding flight. Chapter: *Fluid Mechanics and Fluid Power – Contemporary Research*. Part of the series *Lecture Notes in Mechanical Engineering*: 1433-1441. ["In this work, we investigate the aerodynamic characteristics and spatio-temporal dynamics of a wing cut section of dragon fly (*Aeshna cyanea* [sic]) at ultra-low Reynolds number corresponding to the gliding flight of this dragon fly. The simulations employ an unstructured triangular mesh based on finite volume discretization. A critical assessment of the computed results is performed. Numerical simulations are performed at ultra-low Reynolds number of 10,000 at different angles of attack. Three insect wing sections are modeled with different orientation of the leading edge. It is shown that among all profiles, Profile LEU has largest gliding ratio at higher angles of attack. The larger gliding ratio is due to the fact that the overall drag coefficient is smaller as compared to other Profiles LES and LED. The smaller drag coefficient is due to the presence of large negative shear regions present in the flow. The negative shear regions are because of vortices formed attached to the leading edge or

inside the pleats. The presence of vortices attached not only reduces the contribution of shear drag but pressure drag also." (Authors)] Address: Anwer, S.F., Department of Mechanical Engineering, ZHCET, AMU, Aligarh, India

**20813.** Hushtan, K.V. (2016): The methodological approaches for allocation of dragonfly's larvae ecomorphs categories (Insecta: Odonata). *Notes of the State Natural History Museum, Lviv* 32: 83-91. (in Ukrainian, with Russian and English summaries) ["We have proposed to use as the main – morphometric method for the allocation of dragonfly's larvae ecomorphs categories. Also, it is proposed to take into account environmental (spatial niche), ethological (type of movement, behavioral characteristics) and morphological criteria (overall shape of the body, the type of mouthparts, the structure of the sense organs and legs). Twenty dimensional characteristics for 15 genera of Ukrainian Carpathians dragonflies larvae [*Aeshna juncea*, *Anax parthenope*, *Brachytron pratense*, *Calopteryx splendens*, *Coenagrion puella*, *Cordulegaster bidentata*, *Cordulia aenea*, *Epitheca bimaculata*, *Gomphus vulgatissimus*, *Lestes barbarus*, *Libellula quadrimaculata*, *Ophiogomphus cecilia*, *Onychogomphus forcipatus*, *Platycnemis pennipes*, *Sympetrum flaveolum*] is studied. Of these, 17 characters are allocated indices reflecting the most complete contact between the larvae and environmental condition. On the basis of the proposed methods first developed a hierarchical classification of dragonfly larvae ecomorphs for the territory of the Ukrainian Carpathians. Were singled out: 3 types, 6 classes and 7 subclasses." (Author)] Address: Email: Katerina-an-tonyuk@yandex.ru

**20814.** Juslén, A.; Pykälä, J.; Kuusela, S.; Kaila, L.; Kullberg, J.; Mattila, J.; Muona, J.; Saari, S.; Cardoso, P (2016): Application of the Red List Index as an indicator of habitat change. *Biodiversity and Conservation* 25(3): 569-585. (in English) ["For the first time ever, the International Union for Conservation of Nature Red List Index for habitat types was calculated for an entire country, Finland. The RLIs were based on species threat assessments from 2000 and 2010 and included habitat definitions for all 10,131 species of 12 organism groups. The RLIs were bootstrapped to track statistically significant changes. The RLI changes of species grouped by habitats were negative for all habitat types except for forests and rural biotopes which showed a stable trend. Trends of beetles and true bugs were positive in rural and forest habitats. Other 16 observed trends of species group and habitat combinations were negative. Several trends observed were in accordance with studies focusing on particular taxa and habitats, and drivers for their change. This study demonstrates the usefulness of the RLI as a tool for observing habitat change based on species threat assessment data." (Authors) The paper includes references to Odonata.] Address: Juslén, A., Finnish Museum of Natural History, University of Helsinki, P.O. Box 17, 00014 Helsinki, Finland. E-mail: aino.juslen@helsinki.fi

**20815.** Kalkman, V.J.; Orr, A.G. (2016): A description of the larva and discussion of radiation in the phytotelm breeding damselfly genus *Papuagrion* in New Guinea (Odonata: Zygoptera: Coenagrionidae). *International Journal of Odonatology* 19(3): 169-182. (in English) ["The larva of *Papuagrion marijanmatoki* Orr & Richards, 2016 is described and illustrated for the first time based on two specimens collected near Goroka, Papua New Guinea. The larvae were identified by matching the mitochondrial marker COI with that of an adult specimen collected at the same locality. The larvae were found in the leaf axils of *Pandanus* trees which

agrees with earlier observations that adults are often encountered away from water, in the vicinity of Pandanus. Larvae collected from water pooled in the leaf bracts of several Pandanus trees in the Muller Range (PNG) are also thought to belong to the genus *Papuagrion*. Based on these records and further observations it is considered likely that all species of *Papuagrion* live in phytotelmata and that most or even all are found in Pandanus trees. *Papuagrion* is derived from a Papuan radiation of the genus *Teinobasis*, members of which inhabit standing or slow-flowing and often muddy waters, where the larvae probably develop, suggesting that the colonisation of phytotelmata offered by Pandanus trees has led to the radiation of *Papuagrion*, possibly because of the discrete and scattered nature of suitable habitats. The larvae show little difference morphologically from the few known *Teinobasis* larvae. The colonisation of phytotelmata as a larval habitat sometimes followed by an extensive radiation seems to have occurred independently several times within *Coenagrionidae*." (Authors)] Address: Kalkman, V.J., European Invertebrate Survey, Nederland, p/a Nationaal Natuurhistorisch Museum, naturalis, Postbus 9517, 2300 RA Leiden, Netherlands. E-mail: [kalkman@naturalis.nl](mailto:kalkman@naturalis.nl)

**20816.** Kiany, M.; Sadeghi, S. (2016): Odonata from south-west of central desert of Iran with occurrence notes on *Ischnura intermedia* Dumont, 1974. *Iranian Journal of Animal Biosystematics* 12(1): 67-76. (in English) ["Karizes (Qanat) prepare a part of fresh water sources in main desert of Iran. The arid regions in deserts have isolated suitable aquatic habitats as strong barriers, thus only a few places with surface waters have remained accessible for water. related insects. This paper represents the results of only study on dragonfly species of Karizes. We identified 10 species of typical desert dragonflies of four different families that were collected in summer 2013. Some traits allow Odonata to exist in deserts; hence they may reveal some differences with those in non-desert regions. No endemic species was found in this part of the desert. we concluded that there are typical opportunistic species with special adaptations that could colonize in Karizes as a type of aquatic habitats. We reported *Ischnura intermedia* here as a new record for Iran and noted some of its differences with the type specimen." (Authors)] Address: Kiany, M., Department of Biology, College of Sciences, Shiraz University, Shiraz, I.R. of Iran

**20817.** Kiany, M.; Sadeghi, S.; Ehteshami, F. (2016): New record of *Platynemis kervillei* and *Lestes dryas* (Odonata: Platynemididae & Lestidae) from Iran. 19th National and 7th International Congress of Biology, 30 Aug-1 Sep 2016, University of Tabriz, Iran: 94. (in bilingual in Farsi and English) [Verbatim: *Platynemis kervillei* (Martin, 1909) and *Lestes dryas* (Kirby, 1890) are reported for the first time from North-Western part of Iran. *P. kervillei* also has previously recorded in Iraq and Turkey countries. *L. dryas* is a holarctic widespread species. *P. kervillei* specimens where collected from warm spring near Sarein and river near Namin (Ardabil province) and *L. dryas* specimens where collected from Daylaman (Guilan province). Previous reports of *P. kervillei* from Turkey and Iraq is about 1000 and 500 km far from the Iranian collecting site respectively. With this report extends range of *P. kervillei* to the north. western part of Iran and we can propose that this species replaced with *P. dealbata* in the lowland parts of Caspian marginal zone. This species is distinguishable from other related species with blue pruinosity in the most part of body in fully adult males and no swollen tibia. *L. dryas* also is recognizable with lack of blue pruinosity in apical third of dorsal abdominal segment and more robust abdomen from similar species. Relative abundance

of this species distinctly was lower than other species of the genus in the locality.] Address: Email: [ssadeghi@shirazu.ac.ir](mailto:ssadeghi@shirazu.ac.ir)

**20818.** Kulshrestha, R.; Jain, N. (2016): A note on the biodiversity of insects collected from a college campus of Jhalawar District, Rajasthan. *Biosci. Biotech. Res. Comm.* 9(2): 327-330. (in English) ["The study of biodiversity of insects was conducted in the college campus which covers around half square kilometer area. One boundary of college campus is along NH12. The major vegetation of college campus is neem, banyan, Asoka and amalatas trees and some ornamental and medicinal plants. The main objective of the study was to determine the insect diversity and the relative abundance of the insect species in the campus. The collection of insects was carried out by using sweep nets, hand picking and beating tray in the month of Feb.-March and Sept-Oct in the year 2012. Species diversity and abundance of insects were investigated in college campus and we recorded insects belonging to 7 orders 16 families and 38 species. The largest number of insect identified were of Lepidoptera followed by Hymenoptera, Odonata, Hemiptera, Orthoptera, Coleoptera and Neuroptera. Anthropogenic activities influenced the abundance of insect orders. Thus, greater numbers of insects were observed in small gardens with a greater proportion of bare soil relative to concrete pathways and places with human interference. The study revealed the higher abundance of butterflies among the insects identified. A total 38 different insect species were recorded giving an indication of the species diversity of the college campus." (Authors) *Orthetrum taeniolatum*, *Neurothemis intermedia intermedia*, *Brachythemis contaminata*, *Ceriagrion coromandelianum*] Address: Kulshrestha, R., Department of Zoology, Government Post Graduate College, Jhalawar and Department of Zoology, Government Post Graduate College, Kota, Rajasthan India

**20819.** Lesch, V.; Kinoshita, A.; Shibata, Y.; Bouwman, H. (2016): Perfluorinated substances in dragonflies (Odonata): an aerial invertebrate predator. Conference: DIOXIN 2016: 1 p. (in English) ["Perfluoroalkyl substance (PFASs) residues have been found globally in both abiotic and biotic media. However, relatively little is known of these compounds in invertebrates, particularly in terrestrial invertebrates. We analysed dragonflies collected from six sites in South Africa, and analysed them individually for perfluorooctane sulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), perfluorodecanoic acid (PFDA), perfluoroundecanoic acid (PFUnA) and perfluorododecanoic acid (PFDoA). We found quantifiable PFOS in all individuals, with the other analytes occurring less frequently. The more remote (further away from industries) northern sites had significantly lower concentrations than the southern sites that were closer associated with industrial areas. The mean PFASs was 0.19 ng/g wet mass for the northern sites. The mean concentration was 9.0 ng/g wm for the southern sites. All PFASs except PFOS occurred at similar mean concentrations at all sites, but PFOS dominated the southern samples. One sample had a concentration of 20 ng/g wet mass. This is the same site where very high concentrations of PFOS were found in bird eggs. The effects of these concentrations and substances on invertebrate aerial predators are not well known, but it may affect aquatic and associated terrestrial ecosystems due to the predation of dragonflies on pollinators. More studies are needed to elucidate the distribution pattern and effects." (Authors) [https://www.researchgate.net/publication/307606682\\_Perfluorinated\\_substances\\_in\\_dragonflies\\_Odonata\\_an\\_aerial\\_invertebrate\\_predator](https://www.researchgate.net/publication/307606682_Perfluorinated_substances_in_dragonflies_Odonata_an_aerial_invertebrate_predator)]

Address: Lesch, Velesia, Research Unit for Environmental Sciences & Management, North-West University, Potchefstroom, South Africa. E-mail: velesialesch1@gmail.com

**20820.** Machado, A.B.M.; Lacerda, D.S.S. (2016): Redescription of the holotype of *Mecistogaster pronoti* Sjöstedt, 1918 (Zygoptera: Pseudostigmatidae). *International Journal of Odonatology* 19(1-2): 63-68. (in English) ["*M. pronoti* was described based on a female holotype deposited in the Naturhistoriska Riksmuseet, Stockholm, collected in the state of Espírito Santo, Brazil. The original description has no illustrations, which makes its identification very difficult. Herewith we redescribe and illustrate this holotype. The species is red listed and considerations regarding its conservation are made." (Author)] Address: Lacerda, Déborah, Depto de Zoologia, Pós-Graduação em Zoologia, Univde Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil

**20821.** Meadows, A.J. (2016): Lethal and non-lethal effects of predators on *Culex* mosquitoes: Implications for pathogen transmission. Ph.D. thesis, Department of Entomology, Washington State University: XI + 122 pp. (in English) ["Diversity loss, especially at higher trophic levels, can degrade critical ecosystem services such as disease regulation. Predators play pivotal roles in regulating ecosystem services by impacting the abundance, distribution, physiology, condition, and behaviour of their prey. Previous work shows the ecological consequences arising from single-predator nonconsumptive effects (NCEs) can be just as significant as those resulting from actual predation, yet the study of NCEs within naturally-diverse communities is relatively underdeveloped. This dissertation seeks to examine how larval-stage predator community structure influences mosquito (*Culex pipiens*) traits that are relevant to pathogen transmission. When developing mosquito larvae are exposed to predation risk, this stress may produce lasting effects throughout mosquito ontogeny that can influence such key traits as longevity and immune function. The work presented here provides several key findings. First, an examination of how naturally-diverse larval-stage predator communities influence mosquito condition throughout their ontogeny revealed that the presence of *Aeshna* dragonfly naiads, which were limited to the most diverse field predator communities, significantly muted the NCEs evident in mosquitoes. Mosquitoes emerging from *Aeshna* communities experienced increased survival through development, but decreased adult longevity compared to no-*Aeshna* communities. This trend occurred across natural variation in predator community composition, density, and evenness. We designed a follow-up experiment that exposed developing mosquitoes to factorial manipulations of predator diversity and tested adult mosquitoes for variation in phenoloxidase investment (an important component of arthropod innate immunity) and for susceptibility to the fungal pathogen *Beauveria bassiana*. We found that when presented with *Aeshna* cues, mosquitoes had lower phenoloxidase levels than mosquitoes reared in the presence of other predators; however, these negative impacts on mosquito immune investment were offset when mosquitoes were exposed to *Aeshna* in combination with other predators. These results imply that diverse predator communities, in addition to their capacity to suppress vector densities through predation, may lower disease risk by offsetting negative NCEs imposed by less-diverse communities that would otherwise increase vector competence. This dissertation ends with a review and synthesis paper that broadly explores the role of arthropod and mammalian predators in regulating other critical ecosystem services such as biodiversity maintenance." (Authors)] Address: not stated

**20822.** Minot, M. (2016): Étude des odonates de Saül. *Les cahiers scientifiques du Parc Amazonien de Guyane* 3(1): 21-38. (in French) ["The present study carried out in the town of Saül and its paths during the year 2014-2015 consists of a monitoring of 9 plots based on a precise inventory protocol. Seven visits to Saül were made from October to April, at a rate of one per month, with an additional visit in July. A total of 104 taxa were recorded as adults, using all methods, and 7 additional taxa were collected as larvae or exuviae. Of these species, 2 are new to science, 3 are new to French Guiana and 20 had never been recorded in Saül. The total odonatological diversity is estimated at 150 species and estimates for each plot have been made. A classification of the major types of environment studied was carried out and their associated species assemblages were identified. The study did not show a phenology of life cycles. An experiment on altitude preferences for egg-laying in Pseudostigmatidae was conducted using bamboo containers placed at different heights in the canopy. It collected 14 larvae and did not show any height preference for oviposition." (Author) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Minot, M., Société Entomologique Antilles-Guyane (SEAG), Cayenne, Guyane. E-mail: m.minot@hotmail.fr

**20823.** Mishra, Y. (2016): Studies on insect fauna collected in light trap during Kharif season at Jabalpur. M.Sc. thesis, Department of Entomology, College of Agriculture, Jabalpur 482004, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh, India: 89 pp. (in English) ["Rice (*Oryza sativa* L.) is an important cereal crop in the world provides a staple food for nearly half of the global population. Over 100 insect pest species attack paddy crop at various stages of its growth of which 20 species cause the economic damage (Pathak & Dhaliwal, 1981). In India average losses in paddy production due to insect pests are 25-30% (Dhaliwal and Arora, 2010) and in Madhya Pradesh about 40-100 % losses were observed (Dhamdhare, 1990). Light trap is an important tool for minimizing the insect pests damage without any toxic hazards (Sharma et al., 2004). Other than this light trap has been used to supplement the knowledge of pest fauna of given locality, geographical distribution and their seasonal activity etc. (Verma & Vaishampayan, 1983 and Sharma et al., 2010). Light trap is also useful to know the effect the weather factors on species abundance (Jonason et al 2014b). Therefore the present research work on "Studies on insect fauna collected in light trap during kharif season at Jabalpur" was under taken with following objectives. 1. Incidence and identification of insect fauna collected in light trap during kharif season at Jabalpur. 2. Study on seasonal incidence of insect pest species of paddy collected through light trap. For the taxonomic documentation, the light trap was operated every night and collection was observed on the next day morning. Total insect fauna was observed and sorted out on the basis of 3 major categories of economic importance: I) Harmful insects. as crop pests. II) Beneficial insects. as bio-control agents (Predators and parasites). III) Beneficial insects. as commercially important. Seasonal incidence study of insect pest species was done by operating the light trap during kharif season of 2015. A insect pest of paddy and predator & parasite was observed on daily basis. In order to study the seasonal incidence, daily trap catch was converted into weekly total and mean per day per week (weekly mean/day). 1. Incidence and identification of insect fauna collected in light trap during Kharif season at Jabalpur. Taxonomic analysis revealed that these 62 insect species belonging to 11 orders and 34 families were recorded throughout the season (kharif 2015).



Based on number of species collected, largest collection was represented by order Lepidoptera 19 species (30%) followed by order Coleoptera 13 species (21%), Hemiptera 12 species (20%), Orthoptera 5 species (8%) and Hymenoptera 5 species (8%) in descending order respectively. Orders of minor significance are represented by Odonata [2 taxa] and Neuroptera having 2 species each while Isoptera, Diptera, Dermaptera and Dictyoptera were represented by one species only. [...] (Author)] Address: Mishra, Y., Department of Entomology, College of Agriculture, Jabalpur 482004, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh, India

**20824.** Moratin, R. (Coord) (2016): Atlas préliminaire des Odonates d'Alsace. Faune-Alsace documents n°2: 95 pp. (in French) [[http://www.odonat-grandest.fr/telechargements/FauneAlsace/FAdocuments/FAdoc2\\_2016\\_atlas\\_odonata-.pdf](http://www.odonat-grandest.fr/telechargements/FauneAlsace/FAdocuments/FAdoc2_2016_atlas_odonata-.pdf)]

**20825.** Naka, H.; Hashimoto, H. (2016): E-1-1 Relationship between deformation of wings and feathering motion on dragonfly flight. Conference on Information, Intelligence and Precision Equipment: IIP 2016, "E-1-1-1"- "E-1-1-4", 2016-03-14: 4 pp. (in Japanese, with English summary) ["Dragonfly wing is passively deformed in the tip side from nodus flapping flight. Wing deformation is thought to correspond to feathering motion. However, dragonfly perform a feathering motion actively. In this study, the effect of passive deformation of the wing on aerodynamic force in flapping flight with feathering motions was investigated using fluid-structure interaction analysis. In this analysis, nodus wing models, which can deform passively, and rigid wing model, which cannot deform, are used. Feathering angle is three types: 0, 20, 40 deg. As a result, when the feathering angle is 20 deg or less, the nodus wings reduce drag force by deformation of Wing during downstroke. However, when the feathering angle is 20 deg or more, overlarge deformation of wing decreases lift force. Therefore, the wing with the appropriate level of flexibility can reduce drag force without wasting energy of feathering motion." (Authors)] Address: Naka, H., Graduate School of Science and Technology, Tokai University 4-1-1 Kitakaname, Hiratsuka-shi, Kanagawa 259-1292, Japan. E-mail: [hiromu@keyaki.cc.u-tokai.ac.jp](mailto:hiromu@keyaki.cc.u-tokai.ac.jp)

**20826.** Palita, S.K.; Jena, S.K.; Debata, S. (2016): Odonate diversity along different habitats of Koraput district, Odisha, India. *Journal of Entomology and Zoology Studies* 4(3): 40-47. (in English) ["Odonates are considered to be indicator of ecological balance. An inventory was carried out to document the over looked odonate diversity in four habitat types (hill stream, river, reservoir and pond) of Koraput district, southern Odisha, India. The study recorded 64 species representing 45 genera under 9 families. Family Libellulidae was the dominant group representing 32 species. Maximum species (n=58, 90.6%) were recorded along hill streams. Forty-one species were recorded from single habitat type, of which 37 species were confined to hill streams. A decreasing trend in species diversity was observed from the water bodies in the forested areas to human dominated landscapes indicating human impact on odonate species diversity. *Brachythemis contaminata* was most frequently sighted in the water bodies near human habitations, indicating highly polluted water not suitable for human consumption, whereas species like *Ictinogomphus rapax* and *Paragomphus lineatus* were only recorded along hill streams, indicating unpolluted water." (Authors)] Address: Palita, S.K., Dept of Biodiversity & Conservation of Natural Resources Central Univ. of Orissa, Koraput, Odisha. 764021, India

**20827.** Patel, R.K.; Ghetiya, L.V.; Patel, S.R. (2016): Odonates of South Gujarat: An Inventory. *Advances in Life Sciences* 5(21): 9952-9958. (in English) ["A study on general inventory of odonates in south Gujarat, India was carried out in south Gujarat by the Department of Entomology, N. M. College of Agriculture, Navsari Agricultural University, Navsari, Gujarat, India. Odonates are commonly found darting and dancing actively near pond, pool, river streams, seashore, plains, hills, agroecosystem, forest ecosystem, muddy places and also in sewage and effluents water. Some species of odonates were recorded perching at different height on plants and trees/buildings considerably away from the water and the dense forest. The survey was conducted in different localities of south Gujarat, which consist of seven districts i.e. Bharuch, Narmada, Surat, Tapi, The Dangs, Navsari and Valsad during 2014-15. Total 37 species of odonates belongs to 28 genera, from eight families of two sub-orders were recorded during study period. Among which 28 species were belongs to sub-order Anisoptera under the families Libellulidae (23), Aeshnidae (2), Gomphidae (2) and Macromiidae (1), whereas remaining 9 species were belongs to sub-order Zygoptera under families Coenagrionidae (6), Platycnemididae (1) Protoneuridae (1) and Lestidae (1). Out of total record, 20 species were reported for first time from south Gujarat. However, Four species namely, *Rhodothemis rufa*, *Tramea limbata*, *Zyxomma petiolatum* and *Gynacantha dravida* were reported first time from Gujarat state." (Authors)] Address: Patel, R.K., Dept of Agricultural Entomology N. M. College of Agriculture Navsari Agricultural Univ. Navsari, Gujarat, India. E-mail: [patelrk1692@gmail.com](mailto:patelrk1692@gmail.com)

**20828.** Poulouse, G.; Raki Radhakrishnan, J.P.J.; Pious, N. (2016): A study on the diversity of dragonflies of Irinjalakuda. *Vistas* 5(1): 29-43. (in English) ["Odonates are among the ideal taxon for the investigation of the impact of environmental warming and climate change due to its tropical evolutionary history and adaptations to temperate climates. The study identified 12 species of dragonflies in Irinjalakuda. Species diversity, which is the measure of the diversity within an ecological community that incorporates both species richness and the evenness of species' abundances, was found to be high for dragonflies. A high species diversity index points to the stability in the ecosystem. The identified Libellulidae, in the area can serve as an ecological indicator of the area. From the study, it was observed that the institution campus fulfils an environment favourable for dragonfly diversity." (Authors)] Address: Poulouse, G., Dept Zool., St. Joseph's College, Irinjalakuda, Thrissur-680121, India. E-mail: [gigijmj@gmail.com](mailto:gigijmj@gmail.com)

**20829.** Saito, V.S.; Valente-Neto, F.; Rodrigues, M.E.; Roque, F.; Siqueira, T. (2016): Phylogenetic clustering among aggressive competitors: evidence from odonate assemblages along a riverine gradient. *Oecologia* 182(1): 219-229. (in English) ["Studies on phylogenetic community ecology usually infer habitat filtering when communities are phylogenetically clustered or competitive exclusion when communities are overdispersed. This logic is based on strong competition and niche similarity among closely related species—a less common phenomenon than previously expected. Odonata are good models for testing predictions based on this logic because they behave aggressively towards related species due to mistaken identification of conspecifics. This behaviour may drive communities toward phylogenetic overdispersion if closely related species frequently exclude each other. However, phylogenetically clustered communities could also be observed if habitat filtering and/or competitive asymmetry among distantly related species are major

drivers of community assembling. We investigated the phylogenetic structure of odonate assemblages in central Brazil in a watershed characterized by variations in stream width, vegetation cover, aquatic vegetation, and luminosity. We observed general clustering in communities according to two indices of phylogenetic structure. Phylogenetic beta diversity coupled with Mantel tests and RLQ analysis evidenced a correlation between the riverine gradient and phylogenetic structure. Larger rivers with aquatic vegetation were characterized by anisopterans, while most zygopterans stayed in small and shaded streams. These results indicate niche conservatism in Odonata habitat occupancy, and that the environment is a major influence on the phylogenetic structure of these communities. We suggest that this is due to clade-specific ecophysiological requirements, and because closely related species may also have competitive advantages and dominate certain preferred habitats." (Authors)] Address: Victor S. Saito, V.S., Programa de Pós-Graduação em Ecologia e Recursos Naturais, Universidade Federal de São Carlos, Rod. Washington Luiz km 235, 13565-905, São Carlos, São Paulo, Brazil. E-mail: victor.saito@gmail.com

**20830.** Sanmartín-Villar, I.; Cordero-Rivera, A. (2016): The inheritance of female colour polymorphism in *Ischnura genei* (Zygoptera: Coenagrionidae), with observations on melanism under laboratory conditions. *PeerJ* 4: e2380 <https://doi.org/10.7717/peerj.2380>: 19 pp. (in English) ["Current research on female colour polymorphism in *Ischnura damselflies* suggests that a balanced fitness trade-off between morphotypes contributes to the maintenance of polymorphism inside populations. The genetic inheritance system constitutes a key factor to understand morph fluctuation and fitness. *Ischnura genei*, an endemic species of some Mediterranean islands, has three female colour morphs, including one androchrome (male-coloured) and two gynochromes. In this study, we reared two generations of *I. genei* under laboratory conditions and tested male behavioural responses to female colour morphs in the field. We recorded ontogenetic colour changes and studied morph frequency in three populations from Sardinia (Italy). Morph frequencies of laboratory crosses can be explained by a model based on an autosomal locus with three alleles and sex-restricted expression, except for one crossing of 42 families with unexpected offspring. The allelic dominance relationship was androchrome > infuscans > aurantiaca. Old individuals reared in the laboratory exhibited different levels of melanism in variable extent depending on sex and morph. Results of model presentations indicate a male preference for gynochrome females and the lack of recognition of androchromes as potential mates. *Aurantiaca* females were the most frequent morph in the field (63–87%). Further studies in other populations and islands are needed to understand the maintenance of this polymorphism." (Authors)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Unive de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**20831.** Santos, E.S.A.; Machado, G. (2016): Sexual dichromatism in wing pigmentation of New World dragonflies follows Rensch's rule. *Journal of Evolutionary Biology* 29(7): 1447-1454. (in English) ["Many animal taxa that display sexual size dimorphism (SSD) exhibit a positive allometric relationship in which the degree of dimorphism increases with body size. This macroevolutionary pattern is known as Rensch's rule. Although sexual selection is hypothesized to be the main mechanism causing this pattern, body size is influenced by several selective forces, including natural and

sexual selection. Therefore, by focusing exclusively on SSD one cannot ascertain which of these selective forces drives Rensch's rule. If sexual selection is indeed the main mechanism underlying Rensch's rule, we predict that other sexually selected traits, including colouration-based ornaments will also exhibit interspecific allometric scaling consistent with Rensch's rule. We tested this prediction using wing pigmentation of 89 species of dragonflies. Studies show that male wing pigmentation is generally under strong intra- and intersexual selection, so that sexual dichromatism in this trait should follow Rensch's rule. Conversely, the available evidence suggests that male body size is usually not sexually selected in dragonflies, so we do not expect SSD to follow Rensch's rule. First, we found that sexual dichromatism in wing pigmentation was consistent with Rensch's rule. The phylogenetic major axis regression slope was significantly greater than one. We also showed that the allometric slope for SSD was not different from unity, providing no support for Rensch's rule. Our results provide the first evidence that a trait which appears to be under strong sexual selection, exhibits a pattern consistent with Rensch's rule." (Authors)] Address: Santos, E.S.A., BECO do Departamento de Zoologia, Instituto de Biociências, Universidade de São Paulo, São Paulo, SP, Brazil.

**20832.** Schneider, T.; Ikemeyer, D. (2016): Dragonflies of Oman – a revised illustrated checklist (Odonata). *Entomologische Zeitschrift* 126(3): 137-147. (in English, with German summary) ["38 of the 44 dragonfly species known to Oman could be detected on two visits to the region; one to the North in April 2012, and another to the Southern region in March 2016. Two species, *Urothemis thomasi* and *Azuragrion somalicum* were found at new locations extending their distribution in Oman southward near to the border with Yemen. The status of *Acisoma panorpoides* complex was clarified for Oman as *Acisoma variegatum*. Breeding sites of *Macrodiplax cora*, *Urothemis edwardsii*, and *Rhyothemis semihyalina* were detected in different coastal areas in Dhofar including at sea lagoon near Mughsay (W-Dhofar). With this report we provide an illustrated check list of currently known species of Oman to facilitate determination." (Authors)] Address: Ikemeyer, D., Billerbecker Str. 6, 48329 Havixbeck, Germany. E-Mail: DKJlkemeyer@t-online.de

**20833.** Showalter, A.M. (2016): The impact of environmental conditions, food resources, and ecological stoichiometry in structured populations. Doctor of Philosophy, Miami University, Ecology, Evolution and Environmental Biology: XI + 140 pp. (in English) ["In this dissertation, I explore how population structure and the characteristics of individuals within structured populations respond to changes in environmental conditions that affect the quantity and quality of food resources. Chapter 1: For bluegill sunfish, individual size and population size-structure is affected by factors that alter prey availability, including primary productivity, sediment-feeding gizzard shad, and intraspecific competition. In a ten-month study, I manipulated productivity and gizzard shad in experimental ponds with bluegill populations that varied in density, and I used AIC model comparisons to identify the factors most associated with bluegill response variables. Density-dependence, probably driven by resource competition, was the most consistent factor associated with individual bluegill biomass. None of the models I examined were significant in explaining adult/juvenile density or the proportion of adults. Chapter 2: I investigated how elemental imbalance between an individual's diet and its needs varies with ontogenetic diet shifts. I examined ontogenetic changes in stoichiometry in the bluegill sunfish, which undergoes an

ontogenetic diet shift from zooplankton to benthic invertebrates, and I compared imbalance between diet elemental content and organism needs before and after diet shifts. Elemental imbalance estimates indicated potential carbon limitation in all size-classes of bluegill, and the diet shift tended to reduce C imbalance relative to P. My results provide stoichiometrically-explicit support for previous findings that energetics is an important driver of bluegill diet shifts. As a consequence of the need to satisfy carbon requirements, N:P imbalance is exacerbated. Thus, ontogenetic diet shifts can produce trade-offs in elemental imbalance between elemental ratios. Chapter 3: I examined how light and nutrient conditions experienced in larval stages of the damselfly *Enallagma aspersum* affected development time, mass at emergence, and adult body composition. I reared larval damselflies to adulthood in outdoor mesocosms under high and low light and nutrient conditions. Light level consistently affected damselflies by altering temperature and producing temporal changes in food availability. Damselflies reared in high light had faster development times, but did not differ in mass at emergence. In addition, temperature can explain most patterns adult elemental content, although male and female C:P differed in response to light. Overall, differences in light-driven temperature effects appear to be a major factor affecting damselfly life history traits and stoichiometry." (Author)] Address: not stated

**20834.** Sisson, M.S.; Santamaria, C.A.; Smith-Herron, A.J.; Cook, T.J.; Cook, J.L. (2016): Geographical color pattern of *Argia apicalis* (Odonata: Coenagrionidae) in the absence of molecular variation. *Florida Entomologist* 99(3): 355-362. (in English, with Spanish summary) ["*Argia apicalis* Say, is an ecologically vagile species inhabiting both pond and stream environments of the eastern United States. Variation in color pattern in *A. apicalis* occurs between a southeastern United States morph and a south Florida morph. Southeastern populations often are described as "typical" with a predominantly bright blue pterothorax and narrow black humeral stripe, whereas the southern Florida populations are "atypical," with a bright blue pterothorax and larger, wider black humeral stripes. Variability in color pattern has caused some researchers to question the true identity of the Florida morph. This study used color pattern and mitochondrial cytochrome b sequences to test the species identity of the 2 *A. apicalis* geographical color morphs. Mitochondrial cytochrome-b gene sequences showed that there is a single haplotype, showing no divergence between individuals, populations, or regions. This study is the first to test if color pattern variation is correlated with molecular characters within this species." (Authors)] Address: Sisson, Melissa, Texas Invasive Species Inst., Sam Houston State Univ., Huntsville, Texas 77341, USA. E-mail: melissa.sisson@und.edu

**20835.** Sivasankaran, P.N.; Ward, T.A.; Viyapuri, R.; Johhan, M.R. (2016): Static strength analysis of dragonfly inspired wings for biomimetic micro aerial vehicles. *Chinese Journal of Aeronautics* 29(2): 411-423. (in English) ["This article examines the suitability of fabricating artificial, dragonfly-like, wing frames from materials that are commonly used in unmanned aircraft (balsa wood, black graphite carbon fiber and red prepreg fiberglass). Wing frames made with Type 321 stainless steel are also examined for comparison. The purpose of these wings is for future use in biomimetic micro aerial vehicles (BMAV). BMAV are a new class of unmanned micro-sized aerial vehicles that mimic flying biological organisms (like flying insects). Insects, such as dragonflies, possess corrugated and complex vein structures that are

difficult to mimic. Simplified dragonfly-like wing frames were fabricated from these materials and then a nano-composite film was adhered to them, which mimics the membrane of an actual dragonfly. Finite element analysis simulations were also performed and compared to experimental results. The results showed good agreement (less than 10% difference for all cases). Analysis of these results shows that stainless steel is a poor choice for this wing configuration, primarily because of the aggressive oxidation observed. Steel, as well as balsa wood, also lacks flexibility. In comparison, black graphite carbon fiber and red prepreg fiberglass offer some structural advantages, making them more suitable for consideration in future BMAV applications." (Authors)] Address: Ward, T.A., Dept of Mechanical Engineering, Univ. Malaya, Kuala Lumpur 50603, Malaysia. Email: DrTomWard@um.edu.my

**20836.** Tichanek, F.; Tropek, R. (2016): The endangered damselfly *Coenagrion ornatum* in post-mining streams: population size, habitat requirements and restoration. *Journal of Insect Conservation* 20(4): 701-710. (in English) ["*C. ornatum* represents a threatened species of lowland headwater streams. Although the species is threatened in Western and Central Europe, it is known at a system of post-mining drainage ditches in the Radovesicka spoil heap (northwestern Bohemia, Czech Republic). This study aimed to estimate its population size in this post-mining stream system, and to explore habitat preferences of both its larvae and adults with respect to various environmental factors. The adults were captured-recaptured along 5.2 km of the ditches in June 2012; larvae were sampled in 64 study sites (i.e., 27-meter-long sections of the same ditches) in April 2012. The adult population size was estimated via log-linear models with the robust design on 4544 individuals (1560 ± 391 females and 2983 ± 298 males). Larvae were present in a third of the sections. GLMs revealed that both larvae and adults required emergent vegetation with a high proportion of *Eleocharis* spp. plants. The adults preferred the slow-flowing and shallow streams with 2-meter-high banksides covered by intermediately tall vegetation (~40 cm), whereas the larval abundance was supported by a high in-stream vegetation heterogeneity and a patchy cover of rocks on the streambeds. These results indicate that the post-mining streams could represent a valuable secondary habitat for the complete life cycle of this relatively large population of the endangered headwater specialist. Therefore, we recommend consideration of the conservation potential of such ditches during post-mining sites restoration and their subsequent management." (Authors)] Address: Tichanek, F., Institute of Entomology, Biology Centre, Czech Academy of Sciences, Branisovska 31, 370 05 Ceske Budejovice, Czech Republic. E-mail: f.tichanek@gmail.com

**20837.** Tsukamoto, T.; Kondo, H.; Shigehisa, S.; Nishimura, T.; Yamamoto, M. (2016): The verification of environmentally conscious rice farming on biodiversity conservation in Shiga Prefecture, Japan. *Annual Report of The Kansai Plant Protection Society* 58: 119-122. (in Japanese, with English summary) ["The aim of this survey was to evaluate the effects of environmentally conscious farming (ECF) on the conservation of biodiversity by comparison with conventional farming (CF) in rice plant fields. In this survey, biodiversity was measured by using environmental indicator organisms. Water beetles, pond frogs (*Pelophylax*) and wolf spiders (*Lycosidae*) were more abundant in the ECF fields. However, The abundance of damselflies and web spiders (*Tetragnatha*) were not clear differences between in the ECF fields and in

the CF field. In conclusion, it became clear that higher biodiversity was maintained in the ECF fields than in the CF field. This is the first verification that demonstrates the efficacy of ECF in Shiga Prefecture assessed using indicator organisms." (Authors)] Address: not stated

**20838.** Van Dinh, K.; Janssens, L.; Stoks, R. (2016): Exposure to a heat wave under food limitation makes an agricultural insecticide lethal: a mechanistic laboratory experiment. *Global Change Biology* 22(10): 3361-3372. (in English) ["Extreme temperatures and exposure to agricultural pesticides are becoming more frequent and intense under global change. Their combination may be especially problematic when animals suffer food limitation. We exposed *Coenagrion puella* larvae to a simulated heat wave combined with food limitation, and subsequently to a widespread agricultural pesticide (chlorpyrifos) in an indoor laboratory experiment designed to obtain mechanistic insights in the direct effects of these stressors in isolation and when combined. The heat wave reduced immune function (activity of phenoloxidase, PO) and metabolic rate (activity of the electron transport system, ETS). Starvation had both immediate and delayed negative sublethal effects on growth rate and physiology (reductions in Hsp70 levels, total fat content, and activity levels of PO and ETS). Exposure to chlorpyrifos negatively affected all response variables. While the immediate effects of the heat wave were subtle, our results indicate the importance of delayed effects in shaping the total fitness impact of a heat wave when followed by pesticide exposure. Firstly, the combination of delayed negative effects of the heat wave and starvation, and the immediate negative effect of chlorpyrifos considerably (71%) reduced larval growth rate. Secondly and more strikingly, chlorpyrifos only caused considerable (ca. 48%) mortality in larvae that were previously exposed to the combination of the heat wave and starvation. This strong delayed synergism for mortality could be explained by the cumulative metabolic depression caused by each of these stressors. Further studies with increased realism are needed to evaluate the consequences of the here identified delayed synergisms at the level of populations and communities. This is especially important as this synergism provides a novel explanation for the poorly understood potential of heat waves and of sublethal pesticide concentrations to cause mass mortality." (Authors)] Address: Stoks, R., Lab. Aquat. Ecol., K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**20839.** Wieczorek, M.V.; Bakanov, N.; Stang, C.; Bilancia, D.; Lagadic, L.; Bruns, E.; Schulz, R. (2016): Reference scenarios for exposure to plant protection products and invertebrate communities in stream mesocosms. *Science of The Total Environment* 545-546: 308-319. (in English) ["Highlights: •Using uranine to describe hydrological conditions during exposure scenarios •Mimicking of several realistic exposure scenarios (peak-, hour- and day-scale) •Establishment of invertebrate communities within stream mesocosms •Pre-experimental period and choice of macrophytes determine invertebrate abundance. •MDD classes III and IV were found for several sensitive invertebrate species. Abstract: Higher tier aquatic risk assessment for plant protection products (PPPs) is often based on pond-like mesocosm studies in which transient and dynamic PPP exposure scenarios as observed in lotic systems are hardly achievable. Thus, the present study presents dynamic PPP exposure scenarios at different time scales under flow-through conditions as typical for streams in agricultural landscapes. The stream mesocosm setup allows testing the influence of spatial gradients of exposure over the length of

the mesocosms. The use of the fluorescent tracer uranine revealed the hydraulic processes generally underlying peak- and hour-scale exposure scenarios and demonstrated an optimized application technique to achieve stable day-scale exposures. Furthermore, to account for potential reactions of invertebrates to PPP exposures in streams (e.g. avoidance behavior and drift), the present study thus aimed at a comprehensive evaluation on how PPP exposure and the establishment of invertebrates can be advanced within stream mesocosm testing. For both, peak- and hour-scale exposure as well as the experiments considering the establishment of invertebrates, the presented compilation of experiments was able to highlight the influence of aquatic macrophytes within stream mesocosms. Since the field relevance of the higher tier aquatic risk assessment for PPPs relies qualitatively on the presence of potentially sensitive or vulnerable species, those species were especially considered. Thus, the establishment of aquatic invertebrates in non-dosed streams was evaluated with respect to (i) the presence of different aquatic macrophytes and (ii) the duration of the pre-experimental period. The present study highlights the beneficial influence of complex-structured macrophytes and prolonged pre-experimental periods on the abundance of invertebrate taxa. Furthermore, population dynamics were evaluated statistically by simulating PPP-related declines of 30, 50 and 70%. Thereby, minimum detectable difference (MDD) classes of mostly = III were found for 12 out of 15 taxa for at least two consecutive sampling dates." (Authors) [*Ichnura elegans*] Address: Wieczorek, M., Inst.Environmental Sciences, Univ. Koblenz-Landau, Fortstr. 7, 76829 Landau, Germany. E-mail: wieczorekm@uni-landau.de

## 2017

**20840.** Bazzanti, M.; Mastrantuono, L.; Pilotto, F. (2017): Depth-related response of macroinvertebrates to the reversal of eutrophication in a Mediterranean lake: Implications for ecological assessment. *Science of the Total Environment* 579: 456-465. (in English) ["Highlights: • We studied macroinvertebrates of Lake Nemi during its recovery from eutrophication. • Communities inhabiting the different depth-zones responded differently. • Infralittoral community showed the largest taxonomic and functional responses. • The ecological status was correctly assessed by communities belonging to each zone. A better management of nutrient inflows into lakes has led to an improvement in their conditions (i.e. reversal of eutrophication) and the effects of this on macroinvertebrate communities that inhabit different lake-depth zones is largely unknown. This paper reports a comparison of macroinvertebrate communities living in the eulittoral, infralittoral and sublittoral/profundal zones of Lake Nemi (Central Italy) before and after its natural recovery from eutrophication following the deviation of domestic wastewater. The infralittoral zone responded more rapidly than the other two depth-zones to the improved ecological conditions, as shown by larger differences in community composition between the two periods. In the eulittoral sand, the combined effects of hydromorphological pressures and reversal of eutrophication hindered the biotic response. In the eulittoral and infralittoral zones, typical taxa of mesotrophic waters appeared or increased their abundances after the eutrophication reversal. Benthic invertebrate response was slower in the sublittoral/profundal zone due to deoxygenation that continued to prevail in the deepest area of the lake during summer. However, both tolerant and more sensitive taxa were collected there for the first time. After the reversal of eutrophication, the percentage of molluscan + large crustaceans increased in the infralittoral zone,



whereas the oligochaete/chironomid ratio decreased in both sublittoral/profundal and infralittoral zones. Functional feeding metrics (percentages of filter-feeders, collector-gatherers-miners and scrapers/grazers) differently tracked the reversal of eutrophication in the three depth-zones probably according to the effects of the reduction of nutrients on food-web structure influencing macroinvertebrates. Biological Monitoring Working Party (BMWP) and the Average Score Per Taxon (ASPT) seemed to respond to eutrophication reversal only in the sublittoral/profundal zone, where deoxygenation plays a major role as a structuring agent of the community. Our results suggest that the effects of reversal of eutrophication can be better assessed by examining the response of the communities belonging to each zone individually." (Authors) *Erythromma lindenii*, Anisoptera undet., *Trithemis annulata*, *Ischnura elegans*, *Coenagrion*.] Address: Bazzanti, M., Dept. of Environmental Biology "Sapienza", University of Rome, Viale dell'Università 32, 00185 Rome, Italy. E-mail: marcello.bazzanti@uniroma1.it

**20841.** Hämäläinen, M.; van Tol, J. (2017): Obituary: Roland A. Müller (1936-2016). *Agrion* 21(1): 10-15. (in English) ["Roland Albert Müller died in St Gallen, Switzerland on 17th July 2016 at the age of 80 years following a long illness. From 1985 to 1998 he made an outstanding contribution to the science of odonatology by amassing a very large collection of dragonflies from the Philippines. This collection has greatly increased our knowledge of the rich diversity of the Philippine odonate fauna with its high proportion of endemic species. Roland Müller also participated in publishing some of the results of his collecting work, authoring or co-authoring the descriptions of five of the numerous new odonate species present in his collections." (Authors)] Address: Matti [matti.hamalainen@helsinki.fi] & Jan van Tol [jan.vantol@naturalis.nl]

**20842.** Hatami, R.; Paul, W.; Soofianib, N.M.; Asadollah, S. (2017): Rapid bioassessment of macroinvertebrate communities is suitable for monitoring the impacts of fish farm effluents. *Aquaculture* 468(1): 19-25. (in English) ["Highlights: • Three methods for biomonitoring of fish farm effluents and receiving waters were compared, ranging from rapid qualitative methods to more time-consuming quantitative methods. • The study was conducted at four sites within each of three trout farms of varying production capacities, and across three seasons. • PERMANOVA was used to analyze the multivariate macroinvertebrate data, and all three biomonitoring methods detected statistically significant main effects and interactions among the farm, site, and season factors. • These results indicate that rapid bioassessment is an effective and cost efficient means for monitoring trout-farm process waters and effluent receiving waters, and as such can improve the economic and environmental sustainability of trout farms. Abstract: Development of the fish farming industry in Iran in an environmentally and economically sustainable manner requires an effective and low-cost means of regularly monitoring receiving environments. Biomonitoring using macroinvertebrates is known to be effective for assessing water quality. The problem, however, is that biomonitoring can be labour intensive and analyses can have a long turnaround time. Rapid bioassessment methods have been developed to overcome these limitations, but it is not known whether they are as sensitive to changes in water quality as are their more time-consuming counterparts. To answer this question, we compared three methods for sampling and measuring macroinvertebrates. We refer to these as the quantitative method, semi-quantitative method, and qualitative method respectively. The quantitative method

was a single habitat method with taxonomic identification of macroinvertebrates to genus level that counted all taxa. The semi-quantitative method involved multi-habitat sampling with identification to family level and quantification as relative abundance. The qualitative method was the same as the semi-quantitative method except that incidence (presence / absence) was recorded instead of abundance. The study was carried out at three fish farms in Iran with sampling done once per season for a year from the outfall of each farm as well as from the receiving rivers, with one sample taken upstream of the effluent discharge and two samples downstream. Analysis by permutational multivariate analysis of variance (PERMANOVA) revealed that the effects of three variables of season, farm, and site on macroinvertebrate communities were significant for all three methods. Qualitative sampling was the only method that showed a statistically significant interaction between farm and season as well as a difference among the sites within each farm. Although the results of a BEST (Bio-Bio) analysis showed that different families were responsible for the differences between the sites, all three methods were able to detect the differences between the sites within each farm. However, pairwise comparisons between sites within farms indicated some differences between the three methods. The quantitative method revealed fewer differences than did the other two methods. The qualitative method did not lose any important information and had the added advantage of saving considerable time and effort in sampling and enumerating. These results suggest that rapid bioassessment could be used to effectively monitor the receiving waters of fish farm effluents. Statement of relevance: This manuscript compares three methods of sampling which are quantitative, semi-quantitative and qualitative methods in order to find the most efficient and cost-effective method of sampling. There is no apparent consensus on the appropriate method of collecting and measuring macroinvertebrates, in particular for investigating the effect of fish farms on the rivers. Our manuscript revealed that rapid bioassessment method as a cost-efficient and effective method can be used in order to develop aquaculture in a sustainable manner, both environmentally and economically. Therefore, authors believe that this manuscript is appropriate for publication by the Journal of Aquaculture." (Authors) Gomphidae, Calopterygidae] Address: Hatami, R., Dept of Ecol., Environment & Evol., La Trobe Univ., Albury-Wodonga Campus, Victoria, Australia

**20843.** Hinchliffe, C.M.; Atwood, T.; Ollivier, Q.; Hammill, E. (2017): Presence of invasive *Gambusia* alters ecological communities and the functions they perform in lentic ecosystems. *Marine and Freshwater Research* 68: 1867-1876. (in English) ["By acting as novel competitors and predators, a single invasive species can detrimentally affect multiple native species in different trophic levels. Although quantifying invasive effects through single-species interactions is important, understanding their effect on ecosystems as a whole is vital to enable effective protection and management. This is particularly true in freshwater ecosystems, where invasive species constitute the single greatest threat to biodiversity. Poeciliid fishes of the genus *Gambusia* are among the most widespread invasive species on earth. In the present study of lentic ecosystems (i.e. lakes), we first showed that *Gambusia* alter zooplankton community composition and size distribution, likely through size-selective predation. Second, we demonstrate that benthic macroinvertebrate communities significantly differ between sites with and without invasive *Gambusia*. The presence of *Gambusia* appears to reduce leaf-litter decomposition rates, which is likely an indirect effect of reductions in detritivore abundances. Reductions in

decomposition rates found in the present study suggest that through trophic cascades, invasive *Gambusia* is able to indirectly alter ecosystem functions. The study has highlighted that the widespread effects of invasive aquatic species are able to permeate through entire ecosystems, being more pervasive than previously recognised." (Authors) Fig. 3. (a) demonstrates the abundance of odonates at sites with *Gambusia* present and *Gambusia* absent.] Address: Hammill, E., School of Life Sciences, Univ. Technology Sydney, Ultimo, NSW 2007, Australia. Email: edd\_hammill@hotmail.com

**20844.** Jones, D.K.; Hintz, W.D.; Schuler, M.S.; Yates, E.K.; Mattes, B.M.; Relyea, R.A. (2017): Inducible tolerance to agrochemicals was paved by evolutionary responses to predators. *Environ. Sci. Technol.* 51(23): 13913-13919. (in English) ["Recent research has reported increased tolerance to agrochemicals in target and non-target organisms following acute physiological changes induced through phenotypic plasticity. Moreover, the most inducible populations are those from more pristine locations, far from agrochemical use. We asked why do populations with no known history of pesticide exposure have the ability to induce adaptive responses to novel agrochemicals? We hypothesized that increased pesticide tolerance results from a generalized stressor response in organisms, and would be induced following sublethal exposure to natural and anthropogenic stressors. We exposed larval wood frogs (*Lithobates sylvaticus*) to one of seven natural or anthropogenic stressors (predator cue (*Anax* spp.), 0.5 or 1.0 mg carbaryl/L, road salt (200 or 1000 mg Cl-/L), ethanol-vehicle control, or no-stressor control) and subsequently tested their tolerance to a lethal carbaryl concentration using time-to-death assays. We observed induced carbaryl tolerance in tadpoles exposed to 0.5 mg/L carbaryl and also in tadpoles exposed to predator cues. Our results suggest that the ability to induce pesticide tolerance likely arose through evolved anti-predator responses. Given that anti-predator responses are widespread among species, many animals might possess inducible pesticide tolerance, buffering them from agrochemical exposure." (Authors)] Address: Jones, D.K., Dept of Biol. Sciences, Rensselaer Polytechnic Institute, 1W14 Jonsson-Rowland Science Center, 110 Eighth Street, Troy, NY 12180-3590, USA. Email: devin.k.jones@gmail.com

**20845.** Navas-Bolanos, A.; Sanchez-Guillien, R.; Munguía-Steyer, R.; Cordoba-Aguilar, A. (2017): Isolation barriers and genetic divergence in nonterritorial *Argia* damselflies. *Biological Journal of the Linnean Society* 120: 804-817. (in English) ["Isolation barriers work at different instances during the mating process in odonate insects. In territorial damselflies, heterospecific interactions are mainly precluded by sexual (visual) isolation, while in non-territorial damselflies, heterospecific interactions are mostly precluded by mechanical isolation and sexual (tactile) isolation. In this study we investigated the strength of three premating barriers (visual, mechanical and tactile), genetic divergence and degree of sympatry (on their entire distribution) between four non-territorial *Argia* damselflies (*A. anceps*, *A. extranea*, *A. oenea* and *A. tezpi*). Our results are explained in the light of learned mating preferences and Kaneshiro's hypothesis. We detected a strong reproductive isolation between all pairs of species by the joint action of the three studied barriers [visual (90.6%), mechanical (8.7%) and tactile (0.7%)]. Sexual (visual) isolation was the most important barrier, perhaps driven by learned mating preferences. One of the studied species, *A. extranea*, which is the most derived of the studied species, showed a highly asymmetric isolation in reciprocal crosses, which is consistent with Kaneshiro's hypothesis.

Moreover, we detected a negligible ecological niche differentiation between the studied species (70% of shared distribution). Our results suggest that sexual (visual) selection may be an important force driving speciation in non-territorial species." (Author).] Address: Navas-Bolanos, Angela, Departamento de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D.F., México

**20846.** Phan, Q.T.; Kompier, T.; Karube, H. (2017): Description of two new *Calicnemia* from Vietnam and central Laos with notes on their congeners in Vietnam (Odonata: Platycnemididae). *Zootaxa* 4232(3): 409-420. (in English) ["Descriptions are given of two new species of *Calicnemia*: *C. akahara* sp. nov. from central and southern Vietnam and *C. hamata* sp. nov. from central Laos. *C. soccifera* Yu & Chen, 2013, and *C. haksik* Wilson & Reels, 2003, are recorded for the first time from Vietnam; *C. uenoi* Asahina, 1997, is redescribed with new illustrations provided of its anal appendages and genital ligula; and the occurrence of *C. mortoni* (Laidlaw, 1917) in Vietnam is discussed." (Authors)] Address: Phan, Q.T., Entomology & Parasitology Lab., Center for Molecular Biology, Institute of Research and Development, Duy Tan University, K7/25 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

**20847.** Shkëmbi, E.; Pepa, B.; Misja, K.; Paparisto, A. (2017): *Calopteryx xanthostoma* (Odonata, Zygoptera) present in the southernwest areas of Albania. *Balkan Journal of Interdisciplinary Research* 3(2): 201-206. (in English) [This must be a misidentification as *C. xanthostoma* is not occurring in Albania. "The occurrence of *C. xanthostoma* is confirmed for the first time in Albania. Our findings represent a new Odonata specie for the odonatofauna of Albania. Our results add to the data of *C. xanthostoma* in Western and Southern European countries such as Spain, Portugal, France and Italy. In this way, the eastern boundary of this specie extends to Europe, to the eastern Adriatic coast. The lack of data for this specie until now can be explained by the introgression of *Calopteryx splendens* in the habitats where these two species are encountered together. Molecular investigation is needed for future evaluation of *C. xanthostoma* populations in Albania." (Authors)] Address: Shkëmbi, E., University of Tirana, Fac. Nat. Science, Dept Biology

**20848.** Zheng, D.; Nel, A.; Chang, S.-C. (2017): A well-preserved true dragonfly (Anisoptera: Gomphidae: Burmagomphidae fam. nov.) from Cretaceous Burmese amber. *Journal of Systematic Palaeontology* 16(10): 1-9. (in English) ["Amber inclusions have been studied for several centuries, but true dragonflies are extremely rare, with only several poorly preserved wings recorded. In Burmese amber, odonates are relatively diverse, but true dragonflies are still rare. An excellently preserved true dragonfly, *Burmagomphidae electronica* Zheng, Nel & Wang gen. et sp. nov., representing the new family Burmagomphidae Zheng, Nel & Wang fam. nov., is described here from Cretaceous Burmese amber. This is the first well-preserved true dragonfly with complete wings in this amber. It is attributed to the clade Oligophlebiata because it has symmetrical RP branches at the midfork and a well-developed trigonal planate as in the clade Hagenioidea, and the vein CuAa distinctly shortened with reduced pectinate branching as in *Brevicubitalia*; it differs, however, from the latter two in having a narrow hind wing base." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**20849.** Carvalho, F.G.; de Oliveira Roque, F.; Barbosa, L.; de Assis Montag, L.F.; Juen, L. (2018): Oil palm plantation is not a suitable environment for most forest specialist species of Odonata in Amazonia. *Animal Conservation* 21(6): 526-533. In English. ["Oil palm monoculture is the most rapidly increasing large-scale crop in Amazonia due to favourable environmental conditions and incentives from executives and governing authorities. In this study we assessed the effects of oil palm plantations on Odonata assemblages in Amazonia streams. We hypothesized that (1) the expansion of oil palm plantations over the natural landscape affects the habitat structure and physicochemical properties of streams at different scales (50 m, 500 m and 1000 m) and (2) oil palm plantations affect the species composition of Odonata assemblages, leading to the replacement of forest specialist species by non-forest specialists. A total of 22 streams were sampled which were distributed throughout a landscape comprising areas of oil palm plantations *Elaeis guineensis* Jacq. to streams located inside large forest remnants. The expansion of oil palm monoculture affected the physicochemical properties of the water and habitat of the streams. A larger amount of woody debris was observed within streams surrounded by a greater amount of forest, whereas streams with a greater area of surrounding oil palm had higher pH values and anthropogenic infrastructures (e.g. roads). As expected, the Odonata community was affected by a replacement of forest specialist species with non-forest specialist species. To mitigate this impact, we suggest increasing the area of native riparian corridors along streams that flow through oil palm plantations." (Authors)] Address: Carvalho, F.G., programa de Pós-graduação em Ecologia, Univde Federal do Pará - UFPA. Rua Augusto Correia, N 1 Bairro Guamã, Cep: 66.075-110, Belém, Pará, Brazil. Email: fernandogeraldocarvalho@gmail.com

**20850.** Tapetado, D.G.; López Collar, D.; Garcia, D.R. (2018): Primera cita de *Sympetrum sinaiticum* Dumont, 1977 (Odonata, Libellulidae) en la ciudad de Madrid y observaciones sobre su dispersión. *Boln. Asoc. esp. Ent.* 42(3-4): 467-473. (in Spanish, with English title) [First record of *S. sinaiticum* in the city of Madrid (Spain) and comments about its dispersion. (Authors) 8-IX-2016, Royal Botanical Garden Alfonso XIII, Moncloa Campus of the Complutense University of Madrid, Spain: 30N 438494.7E 4477594.6N (40.446732, -3.725288), altitud 636 m a.s.l.] Address: Tapetado, D.G., Universidad Complutense de Madrid, Depto Biodiversidad, Ecología y Evolución. Grupo de Seguimiento de Biodiversidad UCM. Calle José Antonio Novais, 12, 28040 Ciudad Universitaria, Madrid, Spain. E-mail: diego.gil@ucm.es

**20851.** Tüzün, N. (2018): Effects of urbanisation on the ecology and evolution of a damselfly. Dissertation presented in partial fulfilment of the requirements for the degree of Doctor of Science (PhD): Biology: 225 pp. (in English) ["The rate of urbanisation is increasing on a global scale. Compared to rural areas, cities are warmer, more polluted by chemicals, and more fragmented. Although biodiversity is clearly impacted by this anthropogenic activity, there are large gaps in our understanding on the effects of urbanisation at the population and individual levels. In this thesis, I tested whether urban and rural populations of *Coenagrion puella* differed in their responses to higher temperatures, increased contamination, and more intense habitat fragmentation. For this, I mostly applied a common garden experimental approach, either in the laboratory or in semi-natural outdoor conditions, allowing the identification of genetic adaptation.

To also test the outstanding question whether urbanisation influences sexual selection regimes, I additionally did an experiment with field-collected adult damselflies. All study populations were situated in Flanders, Belgium. I found strong divergence between urban and rural populations in responses to each of the three studied urbanisation-related stressors, suggesting evolutionary responses to urbanisation. The higher temperatures in urban areas influenced the life history of urban damselflies by altering growing season length, yet did not affect behavioural traits. With regard to contamination, damselfly larvae from urban habitats showed different behavioural responses to pesticides when compared to rural larvae. Furthermore, pesticide exposure differently affected behavioural correlations in urban and in rural larvae. Interestingly, several responses to urban-related stressors strongly depended on the sex of the damselfly, as well as the life stage at which they were exposed to the stressor. Finally, the more fragmented habitats in urban areas seem to have selected for better flyers by influencing the dispersal ecology of damselflies, which was further strengthened by sexual selection for a higher flight performance in urban populations. In conclusion, I found clear effects of urbanisation on the evolution and ecology of a damselfly. My findings suggest that differential selection was imposed by the here tested urbanisation-related stressors. Importantly, these stressors were acting in different life stages, highlighting the need for a full life cycle approach when studying the effects of urbanisation.] Address: Tüzün, N., Evolutionary Stress Ecology & Ecotoxicology, Univ. of Leuven, Deberiotstraat 32, 3000 Leuven, Belgium. E-mail: nedim.tuzun@kuleuven.be

**20852.** Gärtner, F. (2019): Qualitative Erfassung von Quelljungfern (*Cordulegaster boltonii* und *Cordulegaster bidentata*) an ausgewählten Gewässern im FFH-Gebiet Arnsberger Wald mit Hinweisen für Schutzmaßnahmen. Bachelorarbeit, Geographisches Institut, Stadt. und Landschaftsökologie, Ruhr-Universität Bochum: 79 pp. (in German) ["By examining streams in the Arnsberg Forest for *Cordulegaster* larvae and imagines, it could be shown that the two species (*C. boltonii* and *C. bidentata*) are widespread in the study area and have not become rarer compared to 2003/04. There were clearly more records of *C. boltonii* than *C. bidentata*. No larvae were found on 52 % of the segments examined. The study area is characterised by old spruce stands, with mixed and deciduous forests becoming more frequent, especially near the lower reaches. Potential disturbances such as forestry work, needle litter, forest roads, piping and drought were found on 38 % of the 223 stream segments surveyed. Drought accounted for the largest share of potential disturbances with 14 % of 223 stream segments. In total, five out of 13 streams showed dryness. *C. bidentata* in particular is threatened by habitat loss. The predicted negative water balance may lead to the drying out of springs, on which this species is highly specialised. No clear distribution could be established showing that the larvae of *C. bidentata* colonise the spring area or upper reaches and *C. boltonii* the stretch below. Compared to the 2003/04 survey, one or both species were newly detected on seven of the 13 streams. *C. bidentata* could only no longer be found on one stream. The calculation of habitat preferences showed that *C. bidentata* avoids open land, young forests, wildlife hollows, needle litter and piping, while the species prefers coniferous forests, fine sediment, disturbance by forestry operations and forest roads. Both *Cordulegaster* species prefer influences by forestry as well as the presence of stream fleas. A lot of needle litter and dryness were clearly avoided by both species.

Conservation measures such as the renaturation of water-courses are helpful for the preservation or improvement of the species population. Especially against the background that precipitation cannot be influenced, the (re)creation of near-natural flowing waters is particularly important. In order to be able to better record further population changes, it is recommended to set up monitoring, especially for *C. bidentata*." (Author) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Gärtner, F., Hasenbrede 12, 32689 Kalletal, Germany. Email: [gaertner.f@icloud.com](mailto:gaertner.f@icloud.com)

**20853.** Leeuwen, J. van (2019): Fotogids Libellen. Jeugdbondslijtgeverij 2019: 48 pp. (in Dutch) ["The water-rich Netherlands is a good country for dragonflies: some 70 species are found there! You can find them wherever there is fresh water. This photo guide makes it easier than ever before to recognise them. Most of the Dutch species -but not the very rare ones. are covered in very accessible descriptions, handy drawings and beautiful photos. This little guide is made especially for learning to recognise dragonflies in the field!" (Publisher/DeepL)]

**20854.** Louboutin, B.; Cherpitel, T. (2019): Utilisation de plantes invasives par des insectes aquatiques: les libellules à ponte endophytique (Odonata). *Martinia* 34(1/2): 35-55. (in French, with English summary) ["Invasive plants used by some aquatic insects: the dragonflies with endophytic oviposition (Odonata) – Alien plants, some of which are highly invasive, are increasingly found in natural aquatic habitats. Odonata are closely related to these habitats and their associated vegetation, and therefore frequently face these exotic species. Our study reviews some observations made in metropolitan France together with literature references to endophytic egg laying behaviours in alien plant species in Europe. Nine non-native plant species in Europe are used, likely successfully, by at least 15 species of Zygoptera and three species of Anisoptera: Aeshnidae. We dissected stem sections of *Ludwigia peploides* to check whether some eggs had been successfully inserted. We also checked with two different rearing experiments in aquarium that larval hatching and development of *Erythromma lindenii* and *Platynemis* sp. were possible from eggs laid in *L. grandiflora* and *L. peploides*. These observations show that endophytic dragonflies can use alien plants, which are sometimes the sole egg laying material at their disposal. This also shows that endophytic dragonflies are able to lay eggs in a wider diversity of aquatic plants than the literature suggested. We encourage launching more general studies on the effect of alien aquatic plant invasion on the dragonfly communities." (Authors)] Address: Cherpitel, T., Groupe d'Étude des Invertébrés Armoricaïns, antenne Pays de la Loire, 5, rue du Général Leclerc, F-44390 Nort-sur-Erdre, France. Email: [t.cherpitel@gretia.org](mailto:t.cherpitel@gretia.org)

**20855.** Rivière, T. (2019): Le Gomphe à pattes jaunes *Stylurus flavipes*, nouvelle espèce pour le département de la Gironde (Odonata: Gomphidae). *Martinia* 34(1/2): 33-34. (in French) [France, 21-VII-2016, Parc Floral, Bordeaux, Garonne, 44,89942 N; 0,54536°E.] Address: Rivière, T., 10, rue de la Petite Plaine, F-37230 Fondettes, France. Email: [river.thibaut@gmail.com](mailto:river.thibaut@gmail.com)

**20856.** Suartini, N.M.; Sudatri, N.W. (2019): Species of dragonflies (Odonata order) for rice plantations in some rice fields around Denpasar, Bali. *Simniosis VII*(1): 23-28. (in Indonesian, with English summary) ["Dragonfly is an insect which belongs to the Odonata order and consists of the Anisoptera suborder (dragonflies) and Zygoptera suborder

(damselflies). Its habitat is very wide including in the rice field. Dragonflies and Damselflies are predatory insects, both in the form of nymphs and adults, so their role is very important in maintaining the balance of the ecosystem. The research was conducted to finding out the dragonfly species found in rice plantations in rice fields around the Denpasar area. Sampling was done by catching using insect nets on rice plantations, in the morning from 08.00 to 11.00 WITA, and in the afternoon from 15.00 to 17.00 WITA. Dragonfly samples obtained were then preserved to be identified by observing the morphological characters based on Hanum et al. (2013), and Sigit et al. (2013). Dragonfly species found in rice plantations areas in several rice fields around Denpasar are as many as 8 species which are included in 2 suborder, namely Anisoptera suborder (5 species) and Zygoptera suborder (3 species), Species of Anisoptera suborder (*Potamarcha* congener) only found in rice plantations in East Denpasar." (Authors)] Address: Suartini, N.M., Laboratorium Taksonomi Hewan Jurusan Biologi Fakultas MIPA Universitas Udayana, Indonesia. Email: [made\\_suartini@unud.ac.id](mailto:made_suartini@unud.ac.id)

## 2020

**20857.** Assandri, G.; Bazzi, G.; Maggioni, D.; Galimberti, A.; Kunz, B. (2020): Distribution, autecology, genetic characterization, and conservation of the Western Mediterranean endemic dragonfly *Orthetrum nitidinerve* (Selys, 1841): insights from Italy. *International Journal of Odonatology* 23(4): 405-422. (in English) ["Aquatic macroinvertebrates are a primary component of freshwater ecosystems and one of the most threatened by anthropogenic pressures. Among them, dragonflies are a charismatic group of growing scientific and social interest. However, little is known about the natural history of several species. One paradigmatic example is the declining *Orthetrum nitidinerve*, a Western Mediterranean endemic anisopteran. We reviewed published and new data on this species, addressing distribution, autecology, and conservation (with a focus on Italy), and provide its first genetic characterization and phylogenetic placement within the genus. In Italy, the species is known from 50 sites so far (only 17 breeding populations) located in Sardinia and Sicily (1841–2019, only 22 from 1990 onward). Records from continental Italy are due to misidentification. The flight period in Italy spans between May and September. Habitat consists of permanent freshwater (mostly helocrene sources, seepages, and small brooks), slow-flowing, shallow, with muddy bottom deposits at elevation from the sea level up to 1000m asl. All the breeding populations are found in open and sunny landscapes, almost invariably in extensive pasturelands. The species has strongly declined in Sicily, whereas several large populations still occur in Sardinia. The major threats identified so far are agriculture and grazing intensification or abandonment and drought/source desiccation determined by water overexploitation and climate change. The first ever provided mitochondrial COI barcode and ITS nuclear sequences allowed a first tentative phylogenetic placement of the species as a sister group of the *O. brunneum*/*O. lineostigma* lineage." (Authors)] Address: Assandri, G., Area Per L'Avifauna Migratrice (BIO-AVM), Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA), Ozzano dell'Emilia, Italy. Email: [giacomo.assandri@gmail.com](mailto:giacomo.assandri@gmail.com)

**20858.** Assandri, G. (2020): Anthropogenic-driven transformations of dragonfly (Insecta: Odonata) communities of low elevation mountain wetlands during the last century. *Insect Conservation and Diversity* 14(1): 26-39. (in English) ["1.



Freshwater environments are experiencing high rates of species extinction due to human impacts, with aquatic insects thought to be strongly threatened by these changes; however, long-term research on this topic is scant. Among aquatic insects, dragonflies are considered valuable indicators of human disturbance at multiple scales. 2. This study addresses transformations of odonate communities of low elevation mountain wetlands in the Alps over the last century, comparing historical and present assemblages based on past records derived from scientific collections or literature and present data derived from site resurveys. 3. About 32.6% of species have been extirpated or strongly declined in the area (mostly temporary lentic and lotic water specialists, or cold-adapted species). Conversely, only 12.2% of species were new or considerably increased (mostly permanent lentic specialists and warm-adapted species). Nearly half of historical populations have been lost. The great majority of species which disappeared from all the study sites also disappeared (or strongly declined) at the regional scale. 4. Although gamma species richness was higher in the historical period compared with the present, mean alpha species richness does not significantly differ between the two, likely suggesting homogenisation of communities from historical to the present period. 5. Present communities of dragonflies show a significantly higher community temperature index compared with historical ones. 6. These patterns are putatively explained by the joint effects of land-use change (drainage and reclamation), land-use intensification or abandonment, environmental pollution, and anthropogenic-driven climate warming." (Author)] Address: Assandri, G., Area Per L'Avifauna Migratrice (BIO-AVM), Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA), Ozzano dell'Emilia, Italy. Email: giacomo.assandri@gmail.com

**20859.** Bauerheim, M.; Chapin, V. (2020): Route to chaos on a dragonfly wing cross section in gliding flight. *Physical Review E* 102(1): 1-6. (in English) ["The route from linear towards non-linear and chaotic aerodynamic regimes of a fixed dragonfly wing cross-section in gliding flight is investigated numerically using Direct Navier-Stokes simulations (DNS). The dragonfly wing consists in two corrugations combined with a rear arc, which is known to provide overall good aerodynamic mean performance at low Reynolds numbers. First, the three regimes (linear, non-linear and chaotic) are characterized, and validated using two different fluid solvers. In particular, a peculiar transition to chaos when changing the angle of attack is observed for both solvers: the system undergoes a sudden transition to chaos in less than  $0.1^\circ$ . Second, a physical insight is given on the flow interaction between the corrugations and the rear arc, which is shown as the key phenomenon controlling the unsteady vortex dynamics and the sudden transition to chaos. Additionally, aerodynamic performances in the three regimes are given, showing that optimal performances are closely connected to the transition to chaos." (Authors)] Address: Bauerheim, M., ISAE-Supáero, 10 avenue Edouard Belin, 31400 Toulouse, France. Email: michael.bauerheim@isae-supero.fr

**20860.** Bergmann, M.; Graça, M.A.S. (2020): Bioaccumulation and dispersion of Uranium by freshwater organisms. *Archives of Environmental Contamination and Toxicology* 78: 254-266. (in English) ["Uranium is the heaviest naturally occurring element on Earth. Uranium mining may result in ground and surface water contamination with potential bioaccumulation and dispersion by aquatic invertebrates with aerial stages. We investigated the effects of uranium contamination at community level in terms of abundance, richness,

the composition of invertebrate communities, and functional traits. We also investigated uranium mobility across aquatic food webs and its transfer to land via the emergence of aquatic insects. We sampled water, sediment, biofilm, macrophytes, aquatic invertebrates, adult insects, and spiders in the riparian zone across sites with a gradient of uranium concentrations in stream water (from 2.1 to 4.7  $\mu\text{g L}^{-1}$ ) and sediments (from 10.4 to 41.8  $\mu\text{g g}^{-1}$ ). Macroinvertebrate assemblages differed between sites with a higher diversity and predominance of Nemouridae and Baetidae at the reference site and low diversity and predominance of Chironomidae in sites with the highest uranium concentration. Uranium concentrations in producers and consumers increased linearly with uranium concentration in stream water and sediment ( $p < 0.05$ ). The highest accumulation was found in litter ( $83.76 \pm 5.42 \mu\text{g g}^{-1}$ ) and macrophytes ( $47.58 \pm 6.93 \mu\text{g g}^{-1}$ ) in the most contaminated site. Uranium was highest in scrapers ( $14.30 \pm 0.98 \mu\text{g g}^{-1}$ ), followed by shredders ( $12.96 \pm 0.81 \mu\text{g g}^{-1}$ ) and engulfer predators ( $7.01 \pm 1.3 \mu\text{g g}^{-1}$ ) [*Cordulegaster* sp.]. Uranium in adults of aquatic insects in the riparian zone in all sites ranged from 0.25 to 2.90  $\mu\text{g g}^{-1}$ , whereas in spiders it ranged from 0.96 to 1.73  $\mu\text{g g}^{-1}$ , with no differences between sites ( $p > 0.05$ ). There was a negative relationship between  $\delta^{15}\text{N}$  and uranium, suggesting there is no biomagnification along food webs. We concluded that uranium is accumulated by producers and consumers but not biomagnified nor dispersed to land with the emergence of aquatic insects." (Authors)] Address: Bergmann, Melissa, MARE – Marine and Environmental Sciences Centre, Dept Life Sci., Univ. Coimbra, 3001-456, Coimbra, Portugal. Email: mbergmann@student.uc.pt.

**20861.** Borisova, N.V.; Karolinsky, E.A. (2020): Annotated list of dragonflies (Insecta: Odonata) of the Prirsursky State Nature Reserve and its buffer zone. Part 2. Scientific proceedings of the Prirsursky State Nature Reserve 35: 104-109. (in Russian, with English summary) ["A list of 45 species of Odonata belonging to 8 families from the Prirsursky State Nature Reserve and its buffer zone based on original and literature data obtained in 2010-2020 is given. 7 species. *Ischnura pumilio*, *Aeshna juncea*, *Aeshna viridis*, *Ophiogomphus cecilia*, *Somatochlora flavomaculata*, *Leucorrhinia caudalis*, *Sympetrum pedemontanum*. are registered in this territory for the first time." (Authors)] Address: Karolinsky E.A., Ukraine, Kharkov, Kharkiv National University V.N. Karazin, Russia. Email: kharkov.but@gmail.com

**20862.** Chen, P.-Y.; Lin, C.-T.; Yam, R.S.W.; Yuan, H.-W. (2020): Influences of physical vegetation management on Odonata abundance in urbanized ecosystem: a case study in northern Taiwan. *Wetlands* 40: 2061-2070. (in English) ["Physical vegetation management has shown deep and diverse impacts on fauna diversity and abundance. However, it is still unclear to what degree management influences Odonata in urbanized ecosystems. In order to understand the crucial factors among Odonata (adults and larvae) and physical vegetation management in a highly urbanized environment, this study investigated the response of Odonata abundance and species richness to riparian and emergent aquatic vegetation management in artificial ponds. Our results showed that physical management of emergent macrophytes did have a significant effect on larval abundance. However, adult abundance and species richness did not show clear differences between different levels of riparian vegetation coverage. Water temperature, water pH value and the presence of emergent macrophytes were also crucial drivers of larval abundance though macrophytes had a stronger effect as compared to water quality. Overall, this

study highlights the importance of marginal vegetation, especially emergent macrophytes, in highly urbanized environments. Our study suggests key management considerations for plant management in urban ponds which, when implemented, would work to enhance Odonata population and overall ecological value of artificial wetlands in cities." (Authors)] Address: Yuan, H.-W., School of Forestry & Resource Conservation, National Taiwan University, No. 1, Sec. 4, Roosevelt Rd., Da'an Dist., Taipei, 10617, Taiwan

**20863.** Erickson, R.J. (2020): A morphological phylogeny of Odonatoptera: Examining missing data in a group with a lot of "Naturally" Missing Data". PhD, thesis, Department of Biology, Brigham Young University: VII + 79 pp. (in English) ["Odonatoptera exhibit a wide diversity of morphologies for an ancient group of winged insects. A morphological matrix of 463 characters is compiled for 347 extant and fossil representatives used in parsimony analyses, implemented in TNT, to document arrangements of taxonomic groups above the family level. Missing data and other challenges approaches implemented and interpretation of the results. We employ a novel approach to testing monophyly relative to quantities of missing data for each taxon. Phylogenetic reconstructions recover patterns of monophyly and trends based on missing data. We discuss the implications of our findings on missing data as well as limitations to systematics in general for Odonatoptera." (Author)] Address: not stated

**20864.** Liashenko, V.A. (2020): Water quality assessment in the Vorskla River within the Hetmanskyi national natural park in terms of macrozoobenthos organisms. Biodiversity, ecology and experimental biology, 2020(2): 53-59. (in Ukrainian, with English summary) ["The article considers the results of the first field study of the structural characteristics of macrozoobenthos in the Vorskla River within the Hetmanskyi national natural park at ten observation stations that was conducted for the first time in June 2020. Representatives of 36 lower identified taxa of benthic macroinvertebrates were identified in this nature conservation object. The Class Gastropoda (7 species) and the Order Odonata (6 species) predominated in the studied biota in terms of species richness and abundance. Representatives of the two leading taxonomic groups make up 36% of the total number of species and 56% of the total abundance at all observation stations. It is worth paying attention to the presence of *Anax parthenope* species in all of the Vorskla River studied areas. It is a common species of dragonflies in the south of Ukraine, which is gradually appearing in the northern regions. Based on the indicators of species richness and species diversity, a biological indication of surface water quality was conducted. The following widely used biotic indices were calculated: the Trent Biotic Index, the Belgian Biotic Index, the Biological Monitoring Working Party Index. To assess the level of organic pollution, the Zelinka-Marvan saprobity index was calculated. The species diversity of benthic invertebrates was assessed by the Shannon index, and the similarity of species composition was assessed by the Jacquard index with further cluster analysis. At most of the observation stations, biotic indicators point out the high water quality of the Vorskla River. The water quality classes are characterized mainly as 'good' and 'excellent'. Station 8, located near the village of Lutyshche, is characterized by the worst results in all indicators used. The worst values of the Shannon and Jacquard indices were also recorded at this station. It is also worth noting the decline in species richness between stations 9 and 10, separated by a dam across the Vorskla River. We assume that the decrease in species richness of the above-mentioned sections of the river is caused by the

anthropogenic influence. The calculated values of the Zelinka-Marvan saprobity index point out a low level of organic pollution of the Vorskla River. The predominance of oligotrophic (by number)  $\alpha$ -oligosaprobic and  $\beta$ -mesosaprobic waters was established at all observation stations." (Authors)] *Anax parthenope*, *Libellula fulva*, *Cordulia aenea*, *Symplocma fusca*, *Gomphus vulgatissimus*, *Calopteryx splendens*] Address: Lyashenko, V.A., Taras Shevchenko Nat. Univ. of Kyiv, Ukraine. E-mail: Liashenko@univ.net.ua

**20865.** LoScerbo, D.; Farrell, M.J.; Arrowsmith, J.; Mlynarek, J.; Lessard, J.-P. (2020): Phylogenetically conserved host traits and local abiotic conditions jointly drive the geography of parasite intensity. *Functional Ecology* 34(12): 2477-2487. (in English). ["1. The role of biotic interactions in shaping species distributions is a cornerstone of biogeographic theory; yet, it remains elusive. Such interactions are more likely to have an influence on organisms with obligate associations, such as hosts and their parasites. Whereas abiotic conditions may affect the abundance and distribution of parasites in ways similar to free-living species, attributes of the host could also play a part. 2. Here, we focus on parasitic water mites and their dragonfly and damselfly hosts, and use a hierarchical Bayesian model to examine the relative influence of the abiotic environment and biotic factors such as local host community structure and individual host characteristics on parasite intensity along a broad-scale environmental gradient. Specifically, we assessed how climate, surrounding vegetation, water chemistry, host community structure as well the relative abundance and body mass of host species affected the intensity of parasitism on individual hosts along a latitudinal gradient. 3. We found that water chemistry and body mass of the host were the best predictors of variation in parasite intensity among hosts. High parasite intensity was observed in hosts sampled from lakes with high pH, dissolved oxygen, and conductivity. Additionally, we found that the intensity of parasitism was strongly influenced by host species identity. In particular, body mass, which shows strong phylogenetic signal, was negatively related to parasite intensity. It may be that larger species, or individuals within species, are more immune to high level of parasitism and/or body mass is correlated with other traits of the host which relate to immunity. 4. Considering both the abiotic environment and attributes of host species is necessary to understand why certain host individuals and locations exhibit more intense parasitism. Amid widespread decline of insect populations worldwide, some of which are attributed to pathogens and parasites, models predicting rates of parasitism in space and time could become an essential tool for guiding management and conservation efforts." (Authors)] Address: Lessard, J.-P., Dept Biol., Concordia Univ., Montréal, QC, Canada. Email: jp.lessard@concordia.ca

**20866.** Minot, M. (2020): Biological traits and environmental factors shaping local movements and dispersal of dragonflies (Insecta, Odonata) in pond networks. PhD thesis, *Écologie, l'Université de Rouen Normandie*: XII + 231 pp. (in English) ["During the last decades, the number of ponds decreased by more than 50 % in European countries, occasionally reaching up to 90 % in some regions. Their decline in number has led to a strong loss of connectivity between waterbodies. Yet, these small and scattered ecosystems are essential for the life cycle of a high diversity of freshwater species. Land use policies like the creation of Greenways and Blueways in France aim to improve ecological continuities to allow maintenance of existent biological populations and exchanges between them. However, the connectivity between ponds must be considered according to

the dispersal abilities of freshwater species and this information often lacks to guide restoration measures. In the present work, we studied the dispersal abilities of dragonflies on several spatial scales and investigated the biological traits and environmental factors that shaped their movements. In the first part, we evaluated the colonization of 20 ponds in Normandy by dragonflies during three years after pond restoration or pond creation. The results highlight high colonization rates during the first year and no difference in species richness was found between newly created or restored ponds. This suggests that restoration of ponds after complete drought should not always be prioritized over pond creation in management strategies. We found that generalist species were more present in the first year after pond creation or restoration, whereas the occurrence of forest specialists increased with the age of the pond. The results also highlighted that the landscape context around ponds (i.e. forest vs. open lands) had an effect on the composition of dragonfly communities. Finally, the total abundance of odonate species was related to the density of other ponds in the surroundings. This result emphasizes that highly connected ponds can support larger populations than isolated ones and thus, be more resilient to perturbations. The second part provides insights into the larval development of *Anax imperator* and the relationship between morphological traits of larvae and adults. The results suggest that the survival of this species might depend on its body length during the maturation period. We also tried to study the natal dispersal by marking 87 individuals at emergence, but only two males were resighted after the maturation period. Finally, the effect of two water pollutants (i.e. Round-up and DEET) at different concentrations was also investigated on the larval development and adults of *Aeshna cyanea*. Larvae were reared under laboratory conditions and exposed to concentrations up to 30 mg L<sup>-1</sup> of the two pollutants. No effect of the pollutants was detected on the morphological conditions of larvae or teneral, suggesting that *A. cyanea* is tolerant to potential water pollution of ponds. The level of HSP70 stress protein was also similar according to the different treatments, but teneral adults presented higher levels of stress than larvae, suggesting that emergence induced a high stress in the individuals. The third part focuses on the dispersal of *A. imperator*. We first assessed the local movements within a pond network in the Normandy region. Several movements between ponds were recorded, showing that individuals were able to use several ponds during their lifetime. Especially, we found that females used a larger home range than males and were more mobile in the terrestrial surroundings of ponds. We also highlighted the importance of trees used as resting sites in the vicinity of the ponds. The genetic structure of *A. imperator* populations was also investigated at both the regional and the European scales. Results indicate a high gene flow between populations in Normandy, confirming the high movement rates of *A. imperator* at the regional scale. No isolation by distance was found at the European scale. However, a genetic structure was found and Bayesian clustering analyses showed three distinct clusters (i.e. UK, France, eastern European countries). Results suggest that the English Channel may act as a barrier to gene flow. Overall, this study provides quantifications of dragonfly dispersal abilities and insights into the biological traits and factors that could influence them at different scales. It also provides information on terrestrial habitat use by dragonflies. We finally give some recommendations for management policies to better sustain dragonfly populations in pond networks." (Author)] Address: Minot, M., UNIROUEN, INRAE, ECODIV, Normandie Univ, Rouen, France. Email: m.minot@hotmail.fr

**20867.** Paulson, D.R.; Landeira-Dabarca, A.; Haave-Audet, E. (2020): First nocturnal roosting aggregations of dragonflies reported from the New World tropics. *Notulae Odonatologicae* 9(6): 263-268. (in English) ["Two species of *Orthemis* (Libellulidae) were found in roosting aggregations in Costa Rica and Ecuador, the first such aggregations reported from tropical America. These observations provide information to facilitate further tests of hypotheses to explain such roosts." (Authors)] Address: Paulson, D.R., Slater Museum of Natural History University of Puget Sound Tacoma, WA 98416 USA. Email: dennispaulson@comcast.net

**20868.** Paulson, D.R. (2020): *Perithemis mooma* Kirby, 1889, is a synonym of *P. tenera* (Say, 1840). *Bulletin of American Odonatology* 13(1): 1-5. (in English, with Spanish summary) ["The two taxa are identical structurally and overlap widely in color-pattern characters that were said to distinguish them." (Author)] Address: Paulson, D.R., Slater Museum of Natural History University of Puget Sound Tacoma, WA 98416 USA. Email: dennispaulson@comcast.net

**20869.** Perneckner, B.; Mauchart, P.; Csabai, Z.; (2020): What to do if streams go dry? Behaviour of Balkan Goldenring (*Cordulegaster heros*, Odonata) larvae in a simulated drought experiment in SW Hungary. *Ecological Entomology* 45, 1457–1465. (in English) ["1. In case of dryings, the hyporheic zone is one of the most important refugia for stream macro-invertebrate communities, including the few Odonata species living in these habitats, such as *Cordulegaster* species. There is no information on the desiccation resistance strategies and methods of any members of the genus, including *C. heros*. 2. We hypothesised that the larvae use burrowing behaviour to survive droughts. In this study, beyond recording the survival rates of the larvae, we tested the effects of the sediment particle size and the body size of the larvae on burrowing behaviour in a 3-week-long simulated drought experiment in an indoor artificial stream system. 3. Eighty larvae were involved in the experiment, from which 60 were treated with drought, and 20 served as controls. Larvae were put into flowing water, into separate special compartments; 1 day later, the flow was ceased, and then, the water level was gradually decreased for 3 weeks. 4. Approximately 15% of larvae could survive the 3 weeks of drying. The survival probability of drought-treated larvae was significantly increased if animals burrowed into the sediment. In addition, the survival probability was higher in case of fine substrate material. Size of the larvae only affected the depth of the burrowing, not the survival rate. 5. However, two-thirds of the larvae did not dig into the sediment, which implies that surviving via burrowing is not the only mechanism of the species to withstand dry periods." (Authors)] Address: Perneckner, B., Dept of Hydrobiology, Institute of Biology, Faculty of Sciences, University of Pécs, Ifjúság útja 6, Pécs, 7624, Hungary. Email: perneckb@gamma.ttk.pte.hu

**20870.** Ruslan, H. (2020): Keanekaragaman capung (Odonata) di sekitar kawasan cagar biosfer Giam Siak Kecil. Bukit Batu Riau [Diversity of dragonflies (Odonata) around the Giam Siak Kecil biosphere reserve. Bukit Batu Riau]. *BIOMA* 16(1): 31-42. (in Indonesian, with English summary) ["Dragonflies are known as bioindicator of clean water. Aim of this study is to record dragonfly biodiversity in Reserve Biosphere of Giam Siak Kecil Bukit Batu Area Riau. This study was performed in May 5th -11th, 2018 with scan sampling using insect nets and camera. Study was done in core zone (secondary forest), industrial plant forest (IPF) and transition zone. We found as many as 48 individuals of 15 species from 3 families in core zone, 19 individuals of 4 species from 1

family in IPF and 31 individuals of 8 species from 2 families in transition zone. The same species were not found in three locations. Diversity index in core zone and transition zone was moderate while diversity index in IPF was low. Evenness index in three places are high. *Orthetrum sabina* was found to have the high index of importance value (IIV) among all three locations. *Rhyothemis phyllis* had the highest number in transition zone. Abiotic factors were similar in all locations, except light was higher in core zone. ... Conclusion: The composition of dragonflies in the core zone is 3 families composed of 15 species with a total of 48 individuals, in the HTI zone there is 1 family composed of 4 species with a total of 19 individuals, in the transition zone there are 2 families composed of 8 species with a total of 31 individuals. The similarity index at the HTI and Transitional locations showed a similarity in species composition (>50%), while the core and Transitional zones, and the core and HTI locations showed no similarity in species composition (<50%). The diversity index of dragonflies in the core and transition zones is moderate, while in the HTI zone it is low. Dragonflies in the secondary forest and HTI zone were found with a high number of individuals on *Orthetrum sabina*, while in the transition zone they were found on *Rhyothemis phyllis*. *Orthetrum sabina* was found to be dominant at all three locations based on IVI values. The abiotic factors at the three locations were almost the same, except that the brightness was higher in the secondary forest compared to the HTI and transition zones." (Author)] Address: Ruslan, H., Fakultas Biologi Universitas Nasional Jakarta, Indonesia. E-mail: hasni.ruslan@gmail.com

**20871.** Ul Islam, S.; Lin, W.; Islam, W.; Qasim, M.; Ali, H.; Ali, H.; Khan, K.A.; Ghramh, H.A.; Du, Z.; Wu, Z. (2020): Molecular identification of seven new Zygopteran genera from South China through partial cytochrome oxidase subunit I (COI) gene. *Meta Gene* 25, September 2020, 100739: (in English) ["Highlights: • There are 51 sequences of damselflies (Zygoptera), comprising four families, seven genera and ten species in the present study. \*Coenagrionidae family and genus *Ischnura* had dominated in the entire collection. \*Cytochrome oxidase subunit I (COI) gene was used for whole molecular work. Abstract: The study was carried out in eight provinces of China, with 16 different localities. A total of 150 adult damselflies were collected for the study from the area. Mitochondrial (COI) was the target gene to sequence from all 51 representative samples of the entire collection. From the resulted sequences, ten species belonging to seven genera and four families were identified. The families are Calopterygidae, Coenagrionidae, Chlorocyphidae and Devadattiade. After alignment through BioEdit v6, MEGA7 was used for phylogenetic tree construction as well as the calculation of genetic divergence, whereas genetic diversity was calculated by DnaSP v5. All species from the respective families had clustered together within the groups, but divided into sub-groups. Maximum genetic divergence (9.31%) was found in the genus *Rhinocypha*, followed by *Hetaerina* with (8.23%), while, minimum divergence was observed for the genus *Ceriagrion* (0.32%) followed by *Ischnura* (0.48%). However, significant genetic diversity was found for all sequences at 346 mutations confirmed by two tests, Tajima's D and Fu's Fs. Maximum genetic diversity among genera was also observed, the genus *Hetaerina* has maximum genetic diversity (181 mutations) followed by *Rhinocypha* (68 mutations) while minimum genetic diversity was observed for the genus *Ceriagrion* followed by *Ischnura*. The presented results showed a higher diversity of damselflies in the south China regions." (Authors) Address: Ul Islam, S., Fujian Province Key Lab. of Plant Virology, Plant Protection College,

Fujian Agriculture and Forestry University, Fuzhou 350002, PR China For a comment of this paper see: [https://www.researchgate.net/publication/342715393\\_Comment\\_on\\_Molecular\\_identification\\_of\\_seven\\_new\\_Zygopteran\\_genera\\_from\\_South\\_China\\_through\\_partial\\_cytochrome\\_oxidase\\_subunit\\_I\\_COI\\_gene](https://www.researchgate.net/publication/342715393_Comment_on_Molecular_identification_of_seven_new_Zygopteran_genera_from_South_China_through_partial_cytochrome_oxidase_subunit_I_COI_gene)]

**20872.** Valeriano, W.W.; Andrade, R.R.; Vasco, J.P.; Malachias, A.; Almeida Neves, B.R.; Guimarães, P.S.S.; Rodrigues, W.N. (2020): Mapping the local dielectric constant of a bio-nanostructured system. *Beilstein Journal of Nanotechnology* 12: 139-150. (in English) ["The aim of this work is to determine the varying dielectric constant of a biological nanostructured system via electrostatic force microscopy (EFM) and to show how this method is useful to study natural photonic crystals. We mapped the dielectric constant of the cross section of the posterior wing of the damselfly *Chalcopteryx rutilans* with nanometric resolution. We obtained structural information on its constitutive nanolayers and the absolute values of their dielectric constant. By relating the measured profile of the static dielectric constant to the profile of the refractive index in the visible range, combined with optical reflectance measurements and simulation, we were able to describe the origin of the strongly iridescent wing colors of this Amazonian rainforest damselfly. The method we demonstrate here should be useful for the study of other biological nanostructured systems." (Authors)] Address: Valeriano, W., Depto de Física, ICEx, Univde Federal de Minas Gerais, Av. Antônio Carlos 6627, 31270-901 Belo Horizonte, MG, Brazil. Email: wesclevaleriano@gmail.com

## 2021

**20873.** Al-Saffar, H.H.; Augul, R.S. (2021): Survey of insects in some southern Iraqi marshes. *Bull. Iraq nat. Hist. Mus.* 16(4): 571-621. (in English, with Arabian summary) ["This study included a survey and review of the scientific names of the marsh insects (aquatic and surrounding it) for the purpose of unifying and updating the database. The survey reveals 109 species under 77 genera that belong to 32 families and 7 orders as follow: Coleoptera (44 species), Diptera (7 species) Ephemeroptera (2 species), Hemiptera (14 species), Hymenoptera (11 species), Lepidoptera (2 species) and Odonata with 29 species. Information of specimens' collection for each species, synonyms and geographical distribution were provided." (Authors) Among others: *Lindenia tetraphylla*, *Brachythemis fuscopalliata*, *Diplacodes lefebvrei*, *Selysiotthemis nigra*, *Sympetrum arenicolor*, *Sympetma paedisca*, *Anormogomphus kiritshenkoi*, *Onychogomphus flexuosus*] Address: Augul, R.S., Iraq Natural History Research Center and Museum, University of Baghdad, Iraq. E-mail: razzaqshalan@gmail.com

**20874.** Arana Maestre, J.; Carrasco Badajoz, C.; Coayla Peñaloza, P.; Rayme Chalco, C.; Sánchez Peña, M. (2021): Aquatic macroinvertebrates of arid and semi-arid ecosystems of Peru. *Frontiers in Environmental Science* 9:658940. doi: 10.3389/fenvs.2021.658940: 14 pp. (in English) ["Peru is one of the megadiverse countries worldwide, displaying a great diversity of ecosystems due to its tropical location, marine currents, and complex relief, which jointly define environments differentiated by altitude and climatic conditions. The arid and semi-arid ecosystems comprising xeric and Andean shrublands, coastal deserts, and coastal hills, illustrate this diversity of ecosystems; these stretch over 177 358 km<sup>2</sup>, representing 13.8% of the Peruvian territory. Several studies on aquatic macroinvertebrates are being conducted in these ecosystems; although not so numerous



yet, have shown a rise in recent years. The objective of this work was to determine the composition and distribution of aquatic macroinvertebrates in the arid and semi-arid ecosystems of Peru. To this end, we conducted a literature survey; the articles and theses found were reviewed and analyzed. The following keywords were used: macroinvertebrates, macrozoobenthos, bioindicators, diversity of aquatic organisms, and water quality; we used the Google Academic search engine, Scopus, Web of Science, ResearchGate and the thesis repositories of Peruvian universities, additionally a thesis from the University of Barcelona. Of a total of 53 sources of information, 38 are theses and 15 are scientific articles conducted from 1992 to 2020, referring to studies conducted at elevations ranging from 0 to 3,831 m asl. Most studies were conducted at the Lima and La Libertad departments, resulting in 20 and 10 publications, respectively. The topics addressed most frequently were bioindication, biodiversity, taxonomy, and distribution. Most theses were carried in the Universidad Nacional de Trujillo and the Universidad Nacional Mayor de San Marcos, with 12 and 10 theses, respectively. The period 2011–2020 records the largest number of publications (40). According to the type of aquatic ecosystem, rivers (38) were the systems most intensively studied, followed by coastal wetlands (14) and lagoons (2); to note, one thesis studied two types of ecosystems. Specimens were collected mainly with the Surber and D nets; as a result, seven phyla, 10 classes, 39 orders, and 118 families were reported. The highest richness of families corresponds to rivers (110), followed by coastal wetlands (57), and lagoons (12). The western hydrographic slope recorded the highest richness at phylum, class, order, and family levels, likely because most investigations were conducted in this slope. On the other hand, the phyla Cnidaria, Nematoda, and Nematomorpha were not recorded in the eastern slope, which showed fewer orders (19) relative to the western slope (39). A similar trend is observed at the family level: of the 118 families recorded, 59 were reported for the eastern slope. The most common families at both sides were Chironomidae, Baetidae, Simuliidae, Elmidae, Hydrophilidae, Libellulidae, Physidae, Dytiscidae, Ceratopogonidae, Coenagrionidae, Hydroptilidae, Hydropsychidae, and Tipulidae. Separately, the most common families in all types of aquatic ecosystems were Chironomidae, Baetidae, and Dytiscidae. It is recommended to further promote studies on macroinvertebrates living in the eastern slope, addressing taxonomic, and ecological topics, as well as broadening the approach to an integral ecosystem view. Finally, the biotic indices should be calibrated and validated for the main hydrographic basins. This work is an initial effort to review, systematize, analyze, and gather the results of studies on aquatic macroinvertebrates in Peru, particularly in arid and semi-arid ecosystems." (Authors)] Address: Arana Maestre, J., Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Perú

**20875.** Bowler, D.E.; Eichenberg, D.; Conze, K.-J.; Suhling, F.; Baumann, K.; Benken, T.; Bönsel, A.; Bittner, T.; Drews, A.; Günther, A.; Isaac, N.J.B.; Petzold, F.; Seyring, M.; Spengler, T.; Trockur, B.; Willigalla, C.; Bruelheide, H.; Jansen, F.; Bonn, A. (2021): Winners and losers over 35 years of dragonfly and damselfly distributional change in Germany. *Diversity and Distributions* 27(8): 1353-1366. (in English) ["Aim: Recent studies suggest insect declines in parts of Europe; however, the generality of these trends across different taxa and regions remains unclear. Standardized data are not available to assess large-scale, long-term changes for most insect groups but opportunistic citizen science data are widespread for some. Here, we took

advantage of citizen science data to investigate distributional changes of Odonata. Location: Germany. Methods: We compiled over 1 million occurrence records from different regional databases. We used occupancy-detection models to account for imperfect detection and estimate annual distributions for each species during 1980–2016 within 5 × 5 km quadrants. We also compiled data on species attributes that were hypothesized to affect species' sensitivity to different drivers and related them to the changes in species' distributions. We further developed a novel approach to cluster groups of species with similar patterns of distributional change to represent multispecies indicators. Results: More species increased (45%) than decreased (29%) or remained stable (26%) in their distribution (i.e. number of occupied quadrants). Species showing increases were generally warm-adapted species and/or running water species, while species showing decreases were cold-adapted species using standing water habitats such as bogs. Time series clustering defined five main patterns of change—each associated with a specific combination of species attributes, and confirming the key roles of species' temperature and habitat preferences. Overall, our analysis predicted that mean quadrant-level species richness has increased over most of the time period. Main conclusions: Trends in Odonata provide mixed news—improved water quality, coupled with positive impacts of climate change, could explain the positive trends of many species. At the same time, declining species point to conservation challenges associated with habitat loss and degradation. Our study demonstrates the great value of citizen science and the work of natural history societies for assessing large-scale distributional change." (Authors)] Address: Bowler, Diana, German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig, Puschstraße, 04103 Leipzig, Germany. Email: diana.e.bowler@gmail.com

**20876.** Chuirazzi, C.; Ocampo, M.; Takahashi, M.K. (2021): Influence of prey diet quality on predator-induced traits in wood frog tadpoles (*Lithobates sylvaticus*). *Amphibia-Reptilia* 42(3): 331-341. (in English) ["Diet quality and predation are two critical factors in determining the growth and development of organisms. Various anurans are susceptible to phenotypic changes influenced by these factors. Yet, few studies examined prey diet quality as potential influence over predator-induced traits. Using wood frog tadpoles (*Lithobates sylvaticus*) as a model species, we investigated the effects of three diet compositions (plant-based, animal-based, omnivorous) crossed with presence or absence of chemical cues from predatory dragonfly larvae (Aeshnidae). After 35 days, we recorded 11 morphological measurements, Gosner stage, and intestinal length of tadpoles to assess phenotypic changes under the six different experimental conditions. Our results showed the additive effects of both diet quality and predator chemical cue without detection of interactions between the two. Tadpoles receiving the omnivorous diet grew and developed faster with wider denticle rows than those receiving the plant or animal diets. The growth and development of tadpoles receiving only the animal diet were significantly hindered. These results emphasize the importance of diet quality in the growth and development of larval wood frogs. Chemical cues from predators significantly reduced tadpole body size but, in contrast to previous findings, did not affect tail size. Our experimental procedure of providing water containing predator and injured conspecific chemical cues on a weekly basis likely provided relatively weak predation risk perceived by tadpoles compared to previous studies using caged predators. The predator environment in our experiment, however, represents

one ecologically relevant scenario in which predation risk is not urgent." (Authors)] Address: Chuirazz, Catherine, Dept Biology, Bucknell Univ., Lewisburg, PA 17837-2005, USA

**20877.** Cordero-Rivera, A. (2021): *Forcipomyia paludis* (Diptera: Ceratopogonidae) on the wings of *Ischnura elegans* (Odonata: Coenagrionidae) in Minorca (Balearic Islands). *Boletín de la Sociedad Entomológica Aragonesa* 69: 212-213. (in Spanish, with English summary) ["*Forcipomyia paludis* is reported for the first time for the island of Minorca, Spain, from two coastal wetland systems, parasitising imagines of *I. elegans* in summer 2021. Infestation rate was low (0.04-0.2%) and restricted to early summer." (Author)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Univde Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: acordero@uvigo.es

**20878.** Dar, S.A.; Bashir, F.; Sabha, I.; Bhat, S.U.; Ali, M.N.; Bhat, G.A.; Ali, A.; Gojree, B.A.S.; Bhat, M.A.; Ud Din Bhat, S.M.; Aziz, A.; Kattoo, P.A. (2021): Insect fauna with special emphasis on their abundance and diversity in different habitats of Kashmir Valley. *J. Himalayan Ecol. Sustain. Dev.* 16: 106-119, Appendix. (in English) ["An assessment of aerial entomofauna is of utmost significance which offers inputs as part of the understanding for conservation and management of biodiversity. This study provides insights into aerial entomofauna dynamics in different habitats of Kashmir Himalaya. A random sampling design over line transects of 100 m were used for entomofauna collection. Overall, 188 species were collected from 10 different habitats/ecosystems, belonging to 13 orders and 63 families. Among the species collected from the various ecosystems, the order Lepidoptera was the most diverse in number (60 species), followed by Hymenoptera (28 species), Coleoptera (25 species), Diptera (24 species), Odonata (18 species), Orthoptera (12 species), Hemiptera (10 species), Homoptera (3 species), Trichoptera (3 species), Neuroptera (2 species), Heteroptera (1 species), Phasmatodea (1 species), and Mantodea (1 species). The highest number of individuals was recorded in habitats like protected forest areas (127 in Dachigam), followed by aquatic ecosystems (126 in Nigeen and 73 in Dal Lake), and the lowest in high altitude forests (12 in Dhara). Cluster analysis revealed the formation of two main clusters with Gulmarg being a riparian/transitional ecosystem type forming a separate cluster I, while the other 9 habitats forming the II cluster. Shannon-Wiener's diversity indices showed highest diversity of 3.83 at Gulmarg and low diversity of 2.2 at Dhara. The ordination of the abundance data using non-metric multidimensional scaling (NMDS) at stress value 0.11 in 2D space resulted in a clear separation between the locations of the sampled habitats." (Authors) Some of the taxa are quite obscure] Address: Bhat, S.U., Dept of Environmental Science, University of Kashmir, Srinagar-190006, Jammu and Kashmir, India. Email: samiullahbhat11@gmail.com

**20879.** Delsinne, T. (2021): Inventaire et suivi des Lépidoptères, Odonates et Orthoptères du marais d'Ours (Puy-en-Velay, 43). Etude réalisée par la SHNAO pour le CEN Auvergne, avec le support financier de la DREAL AURA: 57 pp.+ annexes. (in French) ["The Ours marsh is a 13-hectare wetland acquired by the State as a compensatory site during the construction of the Puy-en-Velay eastern bypass on the RN88. Its management has been entrusted to the CEN Auvergne since 2011. Monitoring of lepidopterans, odonates and orthopterans was set up in 2012. Repeated in 2016 with an identical protocol, it has also been renewed in 2021 in order to assess the impact of restoration work and management practices on insect populations. Lepidoptera

are identified and counted along 7 transects totalling 1143 metres. Odonates were surveyed at 4 points and 1 transect (30 minutes/point). Orthopterans are identified by sight and hearing and an abundance index is assigned to the species detected. In 2021, this protocol was carried out during five survey days (10 and 26 June, 19 July, 26 August and 27 September). During the monitoring, 39 lepidopteran species were counted along the transects. Ten additional species were observed outside the protocol. Twelve of these are first records for the site. In total, 53 species (49 rhopalocerans and 4 zygens) have been reported at least once since 2010. The cumulative number of species is on average  $16 \pm 4$  per transect, double the values obtained in 2012 ( $8 \pm 3$ ). An increase of a more or less similar order of magnitude was obtained for the number of individuals counted in total (676 in 2021 vs. 372 in 2012), the average number of individuals per transect ( $75 \pm 41$  vs.  $33 \pm 20$ ), the average number of species per 100 linear metres ( $13 \pm 5$  vs.  $7 \pm 3$ ) and the average number of individuals per 100 linear metres ( $61 \pm 28$  vs.  $29 \pm 18$ ). The sectors where the number of species and individuals increased the most were those with flowers (hay meadows, megaphorbia, etc.). For odonates, 16 species were observed during the surveys, including 6 species mentioned for the first time. The inventory of dragonflies counts 19 species since 2010. The most attractive area is the northern pond, which has a sunny open water surface and is surrounded by, among other things, cattails. In 2021, 22-23 species of orthopterans were contacted, including at least 16-17 new ones, resulting in a list of 25-26 taxa for the site since 2012 (the uncertainty is caused by the delicate identification of *Tetrix* spp.) This high contribution of new taxa is partly explained by a targeted search for tree and hedgerow associated orthopterans, carried out for the first time. Similarly, the embankment of the RN88, which is now vegetated, was surveyed for the first time, which brought in species associated with dry herbaceous vegetation. Heritage species linked to wetlands were discovered: *Lycaena dispar* and *Satyrion w-album* for lepidopterans, *Aeshna isoceles* and *Aeshna mixta* for odonates and *Tetrix bolivari/ceperoi* for orthopterans. However, evidence of autochthony was only obtained for *Lycaena dispar* (egg laying). The results of the monitoring and inventories carried out in 2012, 2016 and 2021 unambiguously demonstrate the effectiveness of the restoration measures that were put in place when the site was acquired, with a gradual increase in the specific richness and abundance of the three insect groups studied. However, we believe that the situation can still improve, as some potential species for this type of environment have not been observed. Management recommendations and future studies are proposed." (Author/DeepL)] Address: Delsinne, T. c/o Société d'Histoire Naturelle Alcide-d'Orbigny – SHNAO, 57, rue de Gergovie, 63170 Aubière, France. Email: tdel-sinne@shnao.eu

**20880.** Evtimova, V.; Tyufekchieva, V.; Varadinova, E.; Vidinova, Y.; Ihtimanska, M.; Georgieva, G.; Todorov, M.; Soufi, R. (2021): Macroinvertebrate communities of sub-Mediterranean intermittent rivers in Bulgaria: Association with environmental parameters and ecological status. *Ecologia Balkanica, Special Edition* 4: 49-64. (in English) ["Intermittent rivers and ephemeral streams drain more than 50% of the land surface on Earth. Yet, their ecology remains insufficiently understood. In Bulgaria, temporary rivers are typically small, or medium-sized rivers (national type R14), flowing in areas with sub Mediterranean climate. We present the first data focused explicitly on macrozoobenthos from intermittent rivers in four Bulgarian river basins within the drainage of the Aegean Sea. We identified 114 taxa from

nine rivers (5±33 taxa/site), with abundance varying between 61 and 994 ind/m<sup>2</sup>. The most common were taxa of Ephemeroptera and Chironomidae, followed by the crab *Potamon ibericum*. There were considerable differences among macroinvertebrates at different sites at taxon level, with similarities among samples increasing when using lower taxonomic resolution. The distinctness of communities was likely a reflection of the high variability in environmental conditions and local human impacts. Redundancy analysis identified key groups for the sites with fast flow (e.g. Ephemeroptera, Trichoptera, Plecoptera, Coleoptera and Diptera *Varia*, taxa associated with altitude and the higher share of stone substrata). Most of the river sites were classified as having high ecological status according to the Bulgarian legislation. Only the sites in the Vrabcha and Dereorman Rivers were with moderate status; these were the sites with the lowest taxon richness. We could speculate that the structuring of the benthic community was affected by other factors that have not been accounted for in the present study, i.e. great annual fluctuations in river flow, characteristic for R14, or by loading with nutrients or other pollutants." (Authors) The following odonate taxa are listed: *Anax imperator*, *Calopteryx splendens*, *Calopteryx* sp., *Cordulegaster* sp., *Gomphus* sp., *Ophiogomphus* sp., *Onychogomphus* sp.] Address: Tyufekchieva, Violeta, Department of Aquatic Ecosystems, Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria. Email: vtyufekchieva@yahoo.com

**20881.** Golab, M.J.; Sniegula, S.; Antol, A.; Brodin, T. (2021): Adult insect personality in the wild — *Calopteryx splendens* as a model for field studies. *Ecology and Evolution*. 2021; 11: 18467-18476. (in English) ["Animal personality has received increasing interest and acknowledgement within ecological research over the past two decades. However, some areas are still poorly studied and need to be developed. For instance, field studies focused on invertebrates are currently highly underrepresented in the literature. More studies including a wider variety of traits measured and species tested are needed to improve our understanding of trait-correlation patterns and generalities. We studied nine behavioral traits, in *C. splendens*, from an array of three experiments: (i) courtship, (ii) aggressiveness, and (iii) boldness, and calculated their repeatability. The behaviors were measured twice in two different contexts: (i) undisturbed territory and (ii) partially deteriorated territory. Traits related to courtship and boldness were all repeatable across the two contexts. Among aggressive behaviors, only one trait (number of hits) was repeatable. This work demonstrates, for the first time, the presence of within-population personality differences in an adult damselfly in the wild. We further propose *C. splendens* as a promising model species for testing personality in the wild under highly controlled environmental conditions." (Authors)] Address: Brodin, T., Dept Wildlife, Fish & Environmental Studies, Swedish Univ. Agricultural Sciences, 901 83 Umeå, Sweden. Email: tomas.brodin@slu.se

**20882.** Hedges, B.A.; Austin, A.D.; Conran, J.G.; Taylor, G.S.; Madden, C.P.; Weinstein, P. (2021): A likely association of damselflies with the habitat heterogeneity provided by the freshwater swamp lily, *Ottelia ovalifolia*, in Eyre Peninsula granite rock-holes, with a review of potential threats to this ephemeral habitat. *Transactions of the Royal Society of South Australia* 145(8): 1-16. (in English) ["The granite rock-holes (sometimes called gnammas) across northern Eyre Peninsula (EP), South Australia, are a unique but poorly studied ephemeral freshwater habitat containing a complex invertebrate community. Macroinvertebrate predator occurrence

is often sporadic, both spatially and temporally. We aimed to determine if environmental conditions might predict predator occurrence in EP rock-holes. A total of 14 rock-holes were sampled across five granite outcrops along the Eyre Highway. Extensive dip-net sampling was undertaken and nymphs of three damselfly species were recorded from the rock-holes: *Austrolestes annulosus* (Lestidae), *Ischnura aurora*, and *Xanthagrion erythroneurum* (both Coenagrionidae), all in a single rock-hole at Pildappa Rock. This sole rock-hole contained a prominent floating-leaved, rooted aquatic macrophyte: the swamp lily, *Ottelia ovalifolia* (Hydrocharitaceae), which forms a complex, three-dimensional vegetative structure. Damselflies were hypothesised to be associated with the presence of *O. ovalifolia*, possibly as a result of the plant providing both suitable oviposition sites for the adults and habitat for nymphs throughout the water column, opportunities not afforded by the aquatic vegetation present in shallow rock-holes. Our findings contribute to the limited ecological information regarding EP rock-holes. We also briefly review potential threats to these ecosystems, an understanding of which will be critical to their management and conservation." (Authors)] Address: Hedges, B.A., Australian Centre for Evolutionary Biology and Biodiversity, School of Biological Sciences, The University of Adelaide, SA, Australia. Email: brock.hedges@adelaide.edu.au

**20883.** Hyseni, C.; Heino, J.; Bini, L.M.; Bjelke, U. Johansson, F. (2021): The importance of blue and green landscape connectivity for biodiversity in urban ponds. *Basic and Applied Ecology* 57: 129-145. (in English) [The negative impact of urbanization on biodiversity can be buffered by blue (e.g., rivers, ponds) and green (e.g., parks, forests) spaces. However, to prevent biodiversity loss and reduce the risk of local extinctions, blue and green spaces need to be connected by corridors, so that organisms may disperse between sites. Landscape connectivity affects local community composition and metacommunity dynamics by facilitating dispersal. The goal of this study was to test the relative roles of pond environmental properties, spatial structure, and functional landscape connectivity on differentiation of invertebrate metacommunities in urban ponds in the city of Stockholm, Sweden. We characterized functional connectivity as blue connectivity (distance to water bodies), green connectivity (land use), and combined blue-green connectivity. We estimated functional connectivity by using electrical circuit theory to identify dispersal corridors. Interestingly, while circuit theory is often used in single-taxon studies, this method has rarely been applied to multiple taxa forming a metacommunity, as we have done in this study. Indeed, our study contributes toward an increased focus on the role of dispersal at the metacommunity level. We determined that functional connectivity was the most important factor in explaining community differentiation, with the local environment contributing comparatively little, and spatial structure the least. Combined blue-green functional connectivity had a major influence on structuring urban pond communities, explaining 7.8% of the variance in community composition across ponds. Furthermore, we found that increased functional connectivity was associated with an increase in the number of species. In summary, our results suggest that to preserve biodiversity in urban ponds, it is important to enhance functional connectivity, and that open green spaces could augment blue corridors in maintaining functional connectivity in urban pond metacommunities. To generalize these findings, future urban biodiversity studies should compare how functional connectivity affects metacommunities across multiple major cities." (Authors)] Address: Hyseni, Chaz, Department of Ecology and Genetics, Animal Ecology, Uppsala

University, Norbyväagen 18D, SE 75236, Uppsala, Sweden. Email: chaz.hyseni@aya.yale.edu

**20884.** Kathan, B.; Willigalla, C. (2021): Terrestrische Habitatnutzung von *Sympecma fusca* über Jahreszeiten und Generationen hinweg (Odonata: Lestidae). *Libellula* 40 (3/4): 143-160. (in German, with English summary) ["Terrestrial habitat use of *Sympecma fusca* across seasons and generations (Odonata: Lestidae) – A capture-mark-recapture (CMR) study was conducted on *Sympecma fusca* at Spitzberg near Tübingen from 04 March 2018 to 15 February 2019. Further follow-up controls took place in 2020. Including the reproductively active specimens, 267 individuals of the 2017/18 generation were detected at Spitzberg, which used the entire area differentially in both spring and autumn. Of 105 individually marked specimens, 20 could be recaptured several times before the start of the reproductive phase over a maximum of three weeks, always at a short distance from the initial capture point. At a terrestrial habitat 730 m away from the nearest reproductive water body, several individuals were regularly encountered over the years. Out of 62 individuals observed between July and October 2018, only one (1.6%) was encountered at a distance of less than 10 m from a reproduction water body in the forest area of the Spitzberg, all other individuals (98.4%) were recorded further away from a water body. In principle, however, the distribution of the two generations on the Spitzberg differed little from each other, i.e. overlaps of the sites used in spring and summer or autumn were present except for the immediate vicinity of the water bodies and the southern slopes of the "Ödenburg" NSG. Rarely were only single animals found within a habitat structure in spring as well as in autumn, mostly small groups of two to more than ten animals were found in close spatial proximity to each other." (Authors)] Address: Kathan, B., Loysstr. 9/1, 88299 Leutkirch im Allgäu, Germany. Email: bastiankathan@web.de

**20885.** Kuhn, J.H.; et al. (2021): Taxonomic update of phylum Negamaviricota (Riboviria: Orthomavirae), including the large orders Bunyavirales and Mononegavirales. *Archives of Virology* 166: 3513-3566. (in English) ["In March 2021, following the annual International Committee on Taxonomy of Viruses (ICTV) ratification vote on newly proposed taxa, the phylum Negamaviricota was amended and emended. The phylum was expanded by four families (Aliusviridae, Crepuscuviridae, Myriaviridae, and Nataviridae), three subfamilies (Alpharhabdovirinae, Betarhabdovirinae, and Gamma-rhabdovirinae), 42 genera, and 200 species. 39 species were renamed and/ or moved and seven species were abolished. This article presents the updated taxonomy of Negamaviricota as now accepted by the ICTV.... Genus Odonatavirus was created for species Odonate mivirus, which was moved from Chuviridae: Mivirus and renamed Odonatavirus fabricii. Two new species were created: o Odonatavirus draconis for odonatan chu-related virus 137 (OCrV-137), discovered by HTS in Austroargiolestes icteromelas (Selys, 1862) sampled in Uriarra State Forest, Australian Capital Territory, Australia [49]; and o Odonatavirus odontis for odonatan chu-related virus 136 (OCrV-136), discovered by HTS in *Diphlebia lestoides* (Selys, 1853) sampled in Gibraltar Creek, Australian Capital Territory, Australia;"] (Authors) For additional details see: <https://pubmed.ncbi.nlm.nih.gov/34463877/> Address: Kuhn, J.H., Integrated Research Fac. Fort Detrick, Nat. Inst. Allergy & Infectious Diseases, National Institutes of Health, Frederick, MD, USA. kuhnjens@mail.nih.gov.

**20886.** Lubis, R.; Herlina, M.; Rahmi; Maharani, I. (2021): Diversity and distribution of dragonflies in the meadow area,

Bingin Rupit Ulu village, Rupit district. *Simbiosis* 10(1): 32-40. (in Indonesian, with English summary) [Indonesia; "Dragonflies have a very important function for the environment, because they can maintain the balance of the ecosystem, thus the diversity of dragonflies can be used as bioindicators of the health of an area. This study aims to determine the diversity and distribution of dragonflies in the grassland area in Bingin Rupit Ulu Village, Rupit District. This study uses a direct survey method to the research location with the roaming method. The area of the research site is  $\pm 1$  ha. Based on the results of the study found 12 species of dragonflies belonging to 5 families, [...] were found, namely: *Ictinogomphus decoratus*; *Lathrecista asiatica*, *Rhodothemis rufa*, *Diplacodes trivialis*, *Crocothemis servilia*, *Orthetrum sabina*, *Neurothemis ramburii*, *Orthetrum glaucum*; *Agriocnemis femina*, *Ceriagrion praetermissum*; *Prodasinieura autumnalis*; *Copera marginipes*. The dragonfly diversity index obtained a value of 0.884 and was included in the low category ( $H' > 1$ ). The distribution of dragonflies in grassland areas includes clusters (11 species) and uniform distribution patterns (1 species)." (Authors)] Address: Lubis, R., M.Pd., Program Studi Pendidikan Biologi, Universitas Muhammadiyah Bengkulu, Jalan Bali Kota Bengkulu, Indonesia. Email: rukiah2507@umb.ac.id

**20887.** Martynov, A.V.; Vasilenko, D.V.; Perkovsky, E. (2021): First Odonata from Upper Eocene Rovno amber (Ukraine). *Historical Biology* 34(11): 2182-2187. (in English) ["*Pulchrairina electra* gen. et sp. nov. is the first recorded Odonata in Upper Eocene Rovno amber (Ukraine). This new damselfly is described from Kovel (Ukraine) and is the fourth named fossil arthropod from Volyn Region. It is described mainly based on wing morphology. It belongs to Coenagrionoidea, but cannot be placed in any family because of incompletely preserved wings. Short comparisons with genus *Balticoagrion* known from Baltic amber are given. Both genera could belong to stem or crown groups of Coenagrionoidea." (Authors)] Address: Martynov, A.V., National Museum of Natural History, National Academy of Sciences of Ukraine, Kyiv, Ukraine. Email: martynov\_av@ukr.net

**20888.** Minot, M.; Aubert, M.; Husté, A. (2021): Pond creation and restoration: patterns of odonate colonization and community dynamics. *Biodiversity and Conservation* 30: 4379-4399. (in English) ["Ponds are lentic waterbodies with a high conservation value for biodiversity that have long been overlooked by management policies. Recent initiatives aimed to promote the conservation of these ecosystems by restoring or creating new ponds throughout Europe. Therefore, studying responses of aquatic invertebrates to local pond characteristics and connectivity between them is determinant to understand community dynamics and colonization processes of these scattered ecosystems. We studied larval communities of odonates in 20 created or restored ponds to assess their colonization during the first 2 or 3 years. Community dynamics in relation to pond vegetation, landscape context and connectivity with other ponds were also investigated. No difference in species richness was found between restored and created ponds. Most species colonized the ponds during the first year, but a different pattern in colonization was observed between Anisoptera and Zygoptera. Community composition was related to the landscape context of ponds and the time since pond creation or restoration. Abundances were positively related to pond connectivity, especially in the suborder Zygoptera. No relationship was found between vegetation and Anisopteran larvae, while Zygoptera seem more sensible to the vegetation structure due to their endophytic oviposition. This work



confirms the high colonization capacity of odonates and shows that creation of new ponds could be as efficient as pond restoration to enhance the conservation of freshwater species. It also highlights that landscape characteristics and connectivity between ponds are determinant to support higher abundances and a posteriori increase population viability at the landscape scale." (Authors)] Address: Minot, M., UNIROUEN, INRAE, ECODIV, Normandie Univ, Rouen, France. Email: m.minot@hotmail.fr

**20889.** Miya, M.S.; Gautam, D.; Neupane, B.; Chhetri, A. (2021): Species diversity and abundance of Odonata in Sishaghat of Tanahun district, Nepal. *Journal of Animal Diversity* 3(3): 45-55. (in English) ["Odonata are one of the most ancient, well studied and fascinating insect orders considered as bio-indicators of aquatic ecosystems. Studies on Odonata have been carried out in many parts of Nepal, but no specific study has been performed in Tanahun. Hence, a study was conducted to determine the species diversity and abundance of Odonata in the Sishaghat of Tanahun district, Nepal from June to August 2020. A transect survey method was used for data collection. A total of six transects (three in each habitat type: agricultural lands and forest streams), each with a length of 200 m were laid out randomly and each transect was surveyed three times. Data were pooled and analyzed with SPSS. A total of 629 individuals of 26 Odonata species from 20 genera and 7 families were recorded. The overall Shannon-Wiener diversity index was  $H = 2.25$ , Shannon Equitability was  $E = 0.69$  and Margalefs' richness index was  $R = 3.88$ . Anisoptera was more diverse ( $H = 1.94$ ) and more abundant ( $n = 545$ ) than Zygoptera ( $H = 1.31$ ,  $n = 84$ ). However, species richness was higher and evenness lower in Zygoptera ( $R = 2.26$ ,  $E = 0.55$ ) than Anisoptera ( $R = 2.22$ ,  $E = 0.72$ ). Anisoptera comprised 15 species within 10 genera from two families and Zygoptera comprised 11 species within seven genera from five families. The family Libellulidae represented the highest species richness ( $R = 1.75$ ). *Neurothemis fulvia* and *Orthetrum prunosum* were the most abundant species ( $RA = 23.21$  and  $21.78$  respectively). Of the recorded Odonata, 25 species are included under the least concern and one under the vulnerable category of the IUCN. A higher number of species was found in agricultural lands (nine species); hence, the water bodies around this habitat should be preserved to conserve the Odonata." (Authors)] Address: Neupane, B., Tribhuvan Univ., Institute of Forestry, Pokhara Campus, Pokhara, 33700, Nepal. Email: bneupane@iofpc.edu.np

**20890.** Moura de Souza, A.G.; Neto, V.; Pereira Júnior, A. (2021): Revisão integrativa sobre biologia, qualidade da água e a ordem Odonata. Integrative review on biology, water quality and the order Odonata. Revisión integrativa sobre biología, calidad del agua y orden Odonata. *Research, Society and Development* 10(9), e24910917605: 18 pp. (in Portuguese, with Apanish and English summaries) ["Sciences such as biology generate information about ecosystems, such as aquatic ecosystems, and promote integration with ethnic knowledge associated with botany. The objective of this work was to carry out an integrative review about the interrelationship of biology with various environmental areas, under two aspects, conservation, and balance, to investigate the relationship between biology and research on water quality and the use of the order Odonata as bioindicator of the environmental quality of water bodies. The research method was deductively associated with a quantitative and qualitative approach of a basic nature. The data obtained and analyzed indicated that the biological terms are present in most of the selected literature ( $n = 46.2\%$ );

regarding water quality, there was a small reduction ( $n = 30.8\%$ ); the use of the order Odonata as bioindicators of water quality is still scarce ( $n = 22.9\%$ ). As for the use of descriptors in the analyzed research, the following citations were identified: "Biological terms and water quality" ( $n = 65.8\%$ ); "Odonata and water quality" ( $n = 21.1\%$ ); "Biological terms and Odonata" ( $n = 13.2\%$ ). The order Odonata, as a bioindicator, is evolving ( $\Sigma = 33.3\%$ ) and with high frequency ( $fr > 50\%$ ) when compared to the application of Biological Terms and Water Quality. So, the application of biology is already effective in environmental areas such as water quality analysis. However, the use of Odonata as bioindicators of water quality is not used very often yet. Thus it is recommended that there is a greater appreciation by researchers of this relationship, which can contribute to the qualification and monitoring of this natural resource more comprehensively and effectively." (Authors)] Address: Pereira Júnior, A., Universidade do Estado do Pará, Brasil. E-mail: antonio.junior@uepa.br

**20891.** Mykitchak, T.; Kozlovskyy, V.; Mateleshko, O. (2021): Invertebrate hydrobiont fauna transformation in the Dombrovskiy pit lake during the period of 2014-2018. *Visnyk of the Lviv University. Series Biology* 84: 94-104. ["The aquatic invertebrate community of Dombrovskiy pit lake was investigated during 2014–2018. 25 species were recorded there. The only permanent component of plankton in the community is rotifer *Brachionus plicatilis* Müller, 1786; of benthos and neuston is hemipteran *Sigara lateralis* (Leach, 1817), beetle *Hydrobius fuscipes* (Linnaeus, 1758), flies *Aedes* sp., *Ochlerotatus lepidonotus* (Edwards, 1920), *Culicoides salinarius* Kieffer, 1914, *Ephydra glauca* Meigen, 1830 are permanent components of benthos and neuston. The main diversity of invertebrates is concentrated in littoral zone up to 2 m of depth. This is primarily due to the desalination of these areas by surface runoff. Over the last decade the mineralization of the surface water layer has decreased from 120–138 to 25–28 g/l. Combined with the desalination of water, the increase of species diversity of aquatic invertebrates was noticed in spring seasons (from 7 to 17 taxa). The freshwater taxa, which are not tolerant even to low water salinity, appeared in the community in 2018 (7–25 % of the species diversity), among them *Hydrometra stagnorum* (Linnaeus, 1758), *Rhyacophila tristis* Pictet, 1834, *Coelambus impressopunctatus* (Schaller, 1783), *Enochrus coarctatus* (Gredler, 1863), *Hydrophilus caraboides* (Linnaeus, 1758). The role of freshwater taxa, which are tolerant to low water salinity (up to 5 g/l), increased from 0–10 % of the species diversity in 2014–2015 to 22–35 % in 2018. Among them *Eucyclops serrulatus* (Fischer, 1851), *Candona* sp., *Cypris pubera* O. F. Müller, 1776, *Cloeon dipterum* (Linnaeus, 1760), *Libellula depressa*, *Sympecma fusca*, *Paracorixa concinna* (Fieber, 1848) was noted in 2018 for the first time. On the contrary, the number of saltwater taxa decreased from 20–29 % (2014–2015) to 5–14 % (2018). The saltwater aquatic invertebrate community of this pit lake has transformed into brakish-freshwater one over time. 83 % taxa of aquatic invertebrate communities from freshwater puddles near reservoir coast are noted in the Dombrovska reservoir. The introduction of species from protective canals of the reservoir is unlikely, as only 5 % of taxa from there are marked in it. The main way of the forming communities of invertebrates in this reservoir is the periodical flooding of freshwater coastal puddles." (Authors)] Address: Mykitchak, T., Institute of Ecology of the Carpathians, NAS of Ukraine, 4, Kozelnytska St., Lviv 79026, Ukraine. E-mail: tarasmykitchak@yahoo.com

**20892.** New, T.R. (2021): Book Review: Günther Theischinger and John Hawking: The complete field guide to dragonflies of Australia. 2nd edn (with colour illustrations by Albert Orr). CSIRO Publishing, Melbourne, 2021, Paperback, Au \$49.99, ISBN 9781486313747, 424 pp. *Journal of Insect Conservation* 25: 553-554. (in English) [Verbatim: The first edition of this pioneering field guide proved both useful and popular, as attested by several reprintings since it appeared in 2006. It was also a catalyst for further exploration of Australia's unique and remarkable odonate fauna, and these recent discoveries are here incorporated into this welcome second edition, so bringing the most recent practical perspective to what will assuredly be a wide and appreciative readership. Indeed, one recent discovery (the tiny Artesian Pygmyfly, *Nannophya fenshami*) was described only after the deadline for this revised text, and is treated in the introductory species guide rather than in the 'text proper'. Altogether, seven new species have been described, and several other additions to the Australian fauna recorded since 2006. Collectively, 333 species are treated, an increase from 324. Some anomalies and challenges remain: the Newaustralian Emerald (*Hemicordulia armstrongi*) has not been verified in Australia by adult specimens, with its identity based on photographs and larval features. Its relationship to the widespread *H. australiae* is still somewhat unclear, and is discussed by Rowe (2019). The first edition of this book (reviewed in this journal: New 2008) was heralded as the first major field guide to the regional fauna, and this revision follows closely on the very user-friendly format established there with text and illustrations integrated well. An introduction sets a perspective for the book, noting the high level of endemism among Australian Odonata, and summarising their life histories, ecology and major habitats. The brief mention of conservation has not been updated. As in the first edition, the major section of the book, the 'species guide' (pp. 11–315) has text on the left-opening page, providing recognition and diagnostic notes and habitat comments on two or three species, and including (where available) comments on the larva, together with line drawings of key structural features and colour pattern to aid identification, and a distribution map. The facing right-hand page presents colour photographs of adults and, when available, larvae. Many of the photographs of living adult insects have been replaced with new images, and will greatly aid recognition in the field. The systematic arrangement has been updated to reflect recent consensus over family limits in the Odonata and brings Australian family allocations ('for better or worse' as noted in the preface!) in line with those used elsewhere. Modifications are tabulated carefully but, in summary, the Australian Zygoptera now comprise representatives of 10 families (previously 12) and the dragonflies proper of eight families (previously 18) plus 11 genera that are treated as incertae sedis. Families and genera are also characterised succinctly within the main text, and non-specialists will welcome the informative illustrated glossary. This is followed by series of keys to families and some genera and species, as a valuable confirmation of identifications suggested by the main text. Similar illustrated keys to larvae, and several comparative plates of larval habitus drawings ensure that a high proportion of both adult and larval Odonata can be identified. As a field guide, this new edition succeeds admirably. It concludes with sections on 'studying dragonflies', a checklist of species, references and further reading, and indices to scientific and common names. A significant addition to this book is the series of magnificent colour paintings of 40 species prepared by Albert Orr, himself a leading dragonfly expert and entomological illustrator. These plates alone will help to increase appreciation of our remarkable and largely endemic Odonata, and endorse

awareness of their diversity and their values as flagship taxa and tools in evaluating the quality of Australia's inland water ecosystems.] Address: New, T.R., Dept of Ecology, Environment & Evolution, La Trobe University, Bundoora, VIC 3086, Australia. Email: T.New@latrobe.edu.au

**20893.** Reyes-Márquez, I.; Gómez-Vargas, S.; Carrillo-Muñoz, A.I.; López-García, K.; Serrano-Meneses, M.A. (2021): Patterns of sexual dimorphism in flight agility in territorial and non-territorial Odonata. *Journal of Ethology* 39: 129-134. (in English) ["Adult Odonata are amongst the most accomplished flying insects on the planet. The main functions of spatial displacement by flight in these insects are well understood (e.g., escape from predators, foraging, reproduction, thermoregulation), but whether males and females exhibit different degrees of flight agility across species—and why—is by contrast, poorly understood. This is important because flight agility may differ between males and females due to the costs imposed on females by the high levels of sexual selection and sexual conflict observed in certain species. Here we used a wing parameter to estimate sexual dimorphism in flight agility in 63 Odonata taxa. We then used a phylogenetic comparative method to investigate whether sexual dimorphism in flight agility differed between (i) Anisoptera and Zygoptera, and (ii) mating systems (non-territorial, territorial). Our results first show that the distribution of sexual dimorphism in flight agility between Odonata families is non-random. Second, our results suggest that whereas sexual dimorphism in flight agility is not different between non-territorial and territorial Anisoptera, in Zygoptera it is predominantly female-biased in non-territorial species, and male-biased in territorial ones. There may be important behavioural and mating differences between Anisoptera and Zygoptera which explain the different needs of agility observed between suborders and mating systems." (Authors)] Address: Serrano-Meneses, M.S., Depto de Ciencias Químico-Biológicas, Univ. de las Américas Puebla, San Andrés Cholula, C. P. 72810, Puebla, Mexico

**20894.** Shakya, M.; Silvester, E.; Rees, G.; Stitz, L.; Holland, A. (2021): Spatial variation in the amino acid profile of four macroinvertebrate taxa along a highly polluted river? *Environmental Pollution* Volume 284, 1 September 2021, 117536: 9 pp. (in English) ["Highlights: • River affected by acid mine drainage (AMD) from mine 30 years after closure. \*AMD altered community structure and amino acid (AA) profile of macroinvertebrates. \*Inter and Intra-specific variations in AA profiles were detected among four taxa. \*Strongest changes in AA profile were observed within the family Chironomidae. AA profiling offers a new tool for assessing the environmental impact of AMD. Abstract: Acid mine drainage (AMD) is one of the major environmental problems impacting aquatic ecosystems globally. We studied changes in the community composition of macroinvertebrates and amino acid (AA) profiles of dominant taxa along an AMD contamination gradient within the Dee River, Queensland, Australia to understand how AMD can affect the biomolecular composition of macroinvertebrates. Taxa richness and community composition of macroinvertebrates changed widely along the AMD gradient with significantly lower taxa richness recorded at the polluted sites compared to upstream and downstream sites. The Dipteran families: Chironomidae and Ceratopogonidae, the Odonata family Gomphidae, and the Coleoptera family Dytiscidae were the only families found at all sampling sites and were used here for AA analysis. There were significant variations in the AA profiles among the studied taxa. The AA profile of each taxon also varied among upstream, polluted and downstream sites

suggesting that contamination of a river system with acid mine drainage not only alters the overall macroinvertebrate community composition but also significantly influences the AA profile of organisms that are tolerant to AMD. This study highlights the potential of using AA profiling to study the response of aquatic organisms to contamination gradients such as those associated with AMD." (Authors)] Address: Shakya, Manisha, La Trobe Univ., School of Life Sciences, Dept Ecology, Environment & Evolution, Centre for Freshwater Ecosystems, Albury/Wodonga Campus, VIC, 3690, Australia. E-mail: M.Shakya@latrobe.edu.au

**20895.** Tsane, C.R.B.; Moanono, P.G.T.; Tang, B.N.; Dongmo, R.N.; Nangou, P.B.S.; Kayo, R.P.T.; Togouet, S.H.Z. (2021): Influence of the Mekin hydroelectric dam on the distribution of benthic macroinvertebrates of the Dja stream: South Cameroon region. *World Journal of Advanced Research and Reviews* 12(2): 63-77. (in English) ["This work was conducted with the aim of studying the biodiversity of benthic macroinvertebrates in the Dja River and determining the effect of the Mekin hydroelectric dam on their population in relation to the physico-chemical quality of the water. The study ran from May to October 2020 and samplings were carried out on a monthly basis in four different sampling stations located upstream and downstream of the dam. The physico-chemical analyses were done according to standard methods, while the benthic macrofauna was collected using a turbid net of 400 µm mesh size over a total area of about 6 m<sup>2</sup> per station. Physico-chemical analyses revealed a decreasing evolution from upstream to downstream of the dam of nitrogen forms (NO<sub>3</sub>. (1.67mg/L-0.41mg/L); NH<sub>4</sub><sup>+</sup> (0.31 mg/L-0.21 mg/L) with p>0.05); Electrical Conductivity (21.45µS/Cm-17.1µS/Cm with p<0.05) and Suspended Solids (11.10mg/L-6.57mg/L with p<0.05); while Dissolved Oxygen (49.82%-78.23% with p<0.05) and velocity (0.04m/s-0.23m/s) increased. Organic Pollution Index revealed that the water was moderately polluted (3-4). In total, 1894 individuals, of which 1044 belonging to 2 phyla, 2 classes, 6 orders, 27 families and 47 genera/species were collected upstream; and 850 belonging to 3 phyla, 4 classes, 8 orders, 28 families and 45 genera/species were collected downstream. Odonata was largely abundant and highly represented *Trithemis dorsalis* (96.05%); while downstream, *Heteroptera* was largely abundant and highly represented by *Poissonia* sp1. (79.78%). These results revealed that restoration of the upstream of the dam impacted by organic pollution and physical degradation of the environment is recommended." (Authors) The list of taxa includes European species, not occurring in Africa.] Address: Togouet, S.H.Z., Laboratory of Hydrobiology & Environment (LHE), Fac. Sciences, Univ. of Yaoundé I, P.O.Box: 812 Yaounde. Cameroon. Email: zebasehu@yahoo.fr

## 2022

**20896.** Adekolurejo, O.A.; Floyd, M.; Dunn, A.M.; Kay, P.; Dean, A.P.; Hassall, C. (2022): Combined effects of increased water temperature and cyanobacterial compounds exert heterogeneous effects on survival and ecological processes in key freshwater species. *Oecologia* 200: 515-528. (in English) ["Climate change is increasing water temperature and intensifying the incidence of cyanobacterial blooms worldwide. However, the combined effects of increased temperature and microcystin concentrations as co-stressors on survival and ecological processes in freshwater species are unclear. Here, using purified MC-LR and crude extract of toxigenic *Microcystis aeruginosa*, we tested the individual and combined effects of three water temperatures (15, 20,

25 °C) and a range of environmentally relevant concentrations of dissolved microcystin and crude extract (0.01–10 µg·L<sup>-1</sup>) on survival, growth inhibition, grazing and predation rates in three freshwater species: phytoplankton (*Scenedesmus quadricauda*), zooplankton (*Daphnia pulex*), and an invertebrate predator (*Ischnura elegans*). Purified MC-LR exerted a higher growth inhibitory effect on *S. quadricauda* compared to crude extract with the same concentration of MC-LR, while neither treatment affected its chlorophyll-a content or survival of *D. pulex*. Crude extract reduced grazing and survival of *D. pulex* and *I. elegans*, respectively. The combined effect of higher temperature and crude extract reduced *I. elegans* survival by 50%. Increased temperature reduced prey handling time in *I. elegans* by 49%, suggesting a higher predation rate. However, warming together with higher concentrations of crude extract jointly increased zooplankton grazing and reduced damselfly predation. Taken together, these results suggest crude extract, and not necessarily microcystin, can affect survival and productivity in freshwater species, although these effects may vary unevenly across trophic levels. Our findings highlight the importance of complex ecological mechanisms by which warming can exacerbate toxic effects of cyanobacterial bloom extracts on survival and functions among species in eutrophic freshwaters." (Authors)] Address: Hassall, C., School of Biology, Faculty of Biological Sciences, University of Leeds, Leeds LS2 9JT, UK. Email: c.hassall@leeds.ac.uk

**20897.** Amer, N.R.; Lawler, S.P.; Zohdy, N.M.; Younes, A.; ElSayed, W.L.; Wos, G.; Abdelrazek, S.; Omer, H.; Connon, R.E. (2022): Copper exposure affects anti-predatory behaviour and acetylcholinesterase levels in *Culex pipiens* (Diptera, Culicidae). *Insects* 2022, 13, 1151. <https://doi.org/10.3390/insects13121151>: 14 pp. (in English) ["Simple Summary: Interaction between natural and anthropogenic stressors, such as contaminants and predators, could jointly account for potential ecological risk to organisms. This study quantified the combined effect of copper and/or predation cues (non. consumptive predation) on the anti-predatory behaviour of *Culex pipiens* larvae (swimming distance and speed). As well, we tested the ability of mosquito larvae to escape predation by dragonfly larvae. We also measured the long-term effect of copper on an enzyme important to the nervous system, acetylcholine esterase (AChE) for two successive generations. Copper reduced the movement and velocity of *Cx. pipiens* larvae, even at levels regarded as environmentally safe. Interestingly, copper showed some stronger effects in the second generation than the first one. Copper acted as an AChE inhibitor at 500 µg L<sup>-1</sup>. There was no significant effect of copper on the ability of larvae to escape from the direct predation of dragonflies in the laboratory, where most were consumed rapidly. However, the behavioural and neurological changes documented could result in *Cx. pipiens* larvae being more vulnerable to predation in natural habitats. Copper likely bioaccumulated and was passed on in eggs, and/or had other maternal or gene expression effects, resulting in harmful effects on offspring. Abstract: Copper is an essential metal that occurs chronically in the environment and affects the development and physiology of aquatic insects. In excess amounts, it can impair their nervous system and behaviour. We tested the anti-predatory behaviour of *Cx. pipiens* larvae after seven days exposure with several concentrations of copper up to 500 mg L<sup>-1</sup>. We measured responses to non. consumptive (predation cues) and consumptive predation (dragonfly larvae) across two generations. We also tested the accumulated effect of copper on AChE enzyme activity. We exposed half of treated and control larvae to predation cues (water with

predator odour and crushed conspecifics) and the other half to water without predation cues. We evaluated total distance moved and velocity. Copper reduced the distance moved and velocity, with stronger effects in the second generation. Copper had no significant effect on larvae eaten by dragonflies. Copper inhibited the AChE enzyme across both generations at 500 µg L<sup>-1</sup>. Copper can affect the nervous system directly by inhibiting AChE activity, and possibly also by impairing the olfaction sensors of the larvae, resulting in larval inability to detect predation cues." (Authors)] Address: Amer, N.R., Entomology Department, Faculty of Science, Cairo University, Giza 12613, Egypt

**20898.** Appel, E.; Michels, J.; Gorb, S.N. (2022): Chapter 2: Native Resilin: Properties, Occurrence and Biological Functions of a Remarkable Bio-elastomer. In: Namita Roy Choudhury, Julie C Liu, Naba K Dutta (eds.): Biomimetic Protein Based Elastomers: Emerging Materials for the Future Editors: 8-44. (in English) ["Resilin is an elastomeric protein that occurs in arthropod exoskeletons and stands out for its almost perfect resilience of 92–97%, the reason why it is often called a rubber-like protein. It consists of long, randomly oriented proline- and glycine-rich polypeptide chains of high mobility and little secondary structure, which are covalently linked by dityrosine and trityrosine cross-links. This structure endows resilin with a low stiffness, high long-range deformability, and outstanding resilience. Resilin often forms composites with chitin via its chitin-binding domain and with other proteins. Based on the amount and purity of resilin, the direction of the embedded chitin fibres, the specific structure of resilin's polypeptide chains, and the ratio of di- and trityrosine cross-links, resilin shows divergent mechanical responses to different directions and types of applied force. So far, resilin has been found in various exoskeleton systems, including leg and wing joints, vein joints and membrane areas, tarsal setae, tendons, sensory organs, and specialised structures like food-pumps, sound production organs, extensible abdominal cuticles, and transparent optical elements. Amongst others, resilin serves the generation of deformability and flexibility, the elastic energy storage, the adaptability to uneven surfaces in contact, and the reduction of material fatigue in these exoskeleton systems. ... 2.3 Conclusion: Resilin occurs in a large variety of exoskeleton systems. This intrinsically disordered protein stands out for its high flexibility, resilience, and long-range deformability and exists in either virtually pure form or as a composite, the latter combining diverse properties and advantages of the involved materials. This allows resilin-supplemented systems to efficiently fulfil a broad range of different, highly specialised functions, ranging from the acceleration of catapult-like jumps and the increase in the transparency of compound eyes or the improvement of tarsal attachment ability to the sealing of wounds and the overall reduction of material fatigue and damage. The extraordinary properties of resilin and resilin composites have probably been the basis for the evolution of such highly diverse resilin-supplemented systems in arthropods and are nowadays the reason for the development of resilin-like polypeptide-based biomaterials and resilin-inspired engineering applications." (Authors)] Address: Michels, J., Dept Functional Morphology & Biomechanics, Institute of Zoology, Christian-Albrechts-Univ. zu Kiel, Am Botanischen Garten 1–9, 24118 Kiel, Germany. Email: jmichels@zoologie.uni-kiel.de

**20899.** Armadan, A.; Badrun, Y.; Gesriantuti, N. (2022): Analysis quality of the river environment on different land use based on macrozoobenthos diversity in Imbo Putui indigenous forest. *Simbiosis* 11(2): 101-109. (in Indonesian,

with English summary) ["River pollution is an environmental problem that often occurs. Community activities and different land uses are strongly suspected of causing pollution. The purpose of this study was to determine the diversity of macrozoobenthos in different land uses and the quality of the aquatic environment in the Petapahan River of the Imbo Putui Indigenous Forest based on the macrozoobenthos diversity index. This study uses 2 indicators, namely macrozoobenthos as a biological indicator and environmental indicators including temperature, brightness, pH, depth, and current velocity. Sampling was carried out at 4 stations with 2 repetitions using the Surber net. The results showed that the macrozoobenthos found came from the order Odonata with the families Gomphidae and Libellulidae and the order Coleoptera with the family Dytiscidae. The diversity index value obtained ranges from H' = 0.58-0.67, the index value shows the diversity of animals is classified as low with uneven or low uniformity (E = 0.53-0.61) and the dominance that occurs is classified as moderate (C = 0.52-0.61). The results of the measurement of environmental parameters showed that the temperature at each station was 28°C with a brightness to the bottom of the waters and a depth of 37-56 cm, current speed ranged from 6.56-12.25 m/s and water pH ranged from 4.9-7.9." (Authors)] Address: Armadan, A., Fakultas Matematika Ilmu Pengetahuan Alam dan Kesehatan, Universitas Muhammadiyah Riau, Indonesia. Email: 180202004@student.umri.ac.id

**20900.** Asensio, R. (2022): Primera cita de *Lestes dryas* Kirby, 1890 (Odonata, Lestidae) para Bizkaia (País Vasco, España). First record of *Lestes dryas* Kirby, 1890 (Odonata, Lestidae) from Bizkaia (Basque Country, Spain). *Munibe, Cienc. nat.* 70: 5 pp. (in Spanish, with English and Basque summaries) [Basque Country, Spain, "L. dryas is reported, at an unusual altitude for the species (< 200 m a.s.l.), in Güeñes (Enkarterri). With this first record, there are 47 species (21 Zygoptera and 26 Anisoptera) that make up the catalogue of Odonata in Bizkaia." (Author)] Address: Asensio, R., CUESTASENSIO S.C. Antonio de Trueba, 8-5º 48012, Bilbao, Spain. Email: cuestasensio@gmail.com

**20901.** Bacal, S.; Tuguleva (Hacina), C.; Busmachiu, G. (2022): Impactul antropoc asupra entomofaunei (Lepidoptera, Coleoptera, Odonata, Hemiptera) în municipiul Chisinau. In: Evaluarea și reglementarea impactului antropoc asupra stabilității ecosistemelor urbane și rurale din Regiunea de Dezvoltare Nord a Republicii Moldova. 7 noiembrie 2022, Chisinau. Chisinau, Republica Moldova: Institutul de Ecologie și Geografie, 2022, pp. 99-105. ISBN 978-9975-3586-0-6: 99-105. (in Romanian, with English summary) ["The paper includes the results of the study of the anthropogenic impact on the insect biodiversity of the green spaces of Chisinau Municipality. A total of 99 species of insects were identified in the urban ecosystems, between them 73 species of butterflies, 14 beetles, 9 dragonflies and 3 bedbugs, including 7 pest species and 10 rare species. The anthropogenic environment negatively influences the insect diversity, but is tolerant of harmful invasive species." (Authors) *Anax imperator*, *A. parthenope*, *Aeshna affinis*, *Calopteryx splendens*, *Ischnura elegans*, *Orthetrum albistylum*, *O. cancellatum*, *Sympetrum striolatum*, *S. sanguineum*] Address: not stated

**20902.** Balua, R.; Dutta, N.K.; Choudhury, N.R. (2022): Chapter 5: Resilin-mimetic polypeptides and elastomeric modular protein polymers: Amino acid sequence, conformational ensemble, and stimuli responsiveness. In: Namita Roy Choudhury, Julie C Liu, Naba K Dutta (eds.): Biomimetic



Protein Based Elastomers: Emerging Materials for the Future: 108-143. (in English) ["5.7 Conclusions: In summary, the largely unordered structure of RLPs originates from high glycine and proline amino acid content (430%) similar to that of elastomeric IDPs, and the presence of a large fraction (30%) of recurring P-X<sub>n</sub>-G motifs (where X is the other amino acid apart from P and G, and n varies from 0 to 4) repeating every 4 to 9 residues in the primary sequence. The intrinsically disordered structure of RLPs and RLP-based modular protein polymers has also been experimentally established using techniques, such as CD spectroscopy, FTIR, NMR, and SAS, which reveal an ensemble of random coil secondary structure with the coexistence of small fractions of turns and PPII conformation in equilibrium. The multistimuli responsiveness and self-assembly of RLPs originate from their unique amino acid sequence, hydrophilic composition, and dynamic architecture, where the dual-phase transition behavior comes from the fusion of a putative LCST motif (APGGGN) and a UCST motif (GRPSD-SYG) in the primary sequence. The critical solution temperature behavior of RLPs is related to unfavorable solvent entropy, where the polypeptides collapse into amorphous coacervates and their LCST can be modulated by either altering the hydrophobicity of amino acids or their charge. Moreover, the UCST behavior of RLPs is considered to originate from a set of sequence-specific features, such as the overall fraction of charged residues, arginine and aromatic residues, and net charge per residue. The self-assembly (soluble, micellar, fibrillar, and coacervates) of RLPs and RLP-based modular protein polymers are substantially influenced by the RLP chain length, sequence, and hydrophobicity of copolypeptides, their overall composition, and solvent pH. The highlighted key information shall provide fundamental knowledge and understanding of RLPs for improved rational design and development strategies of resilin protein-based smart biomaterials." (Authors) References to dragonflies are made.] Address: Balu, R., Chemical and Environmental Engineering, School of Engineering, RMIT University, Melbourne, Victoria 3000, Australia. Email: namita.choudhury@rmit.edu.au

**20903.** Barbosa, H.M.; Ferreira, H.L.M.; Virgilio, L.R. (2022): Insetos aquáticos bentônicos em ambientes florestados e não florestados em rios do Vale do Juruá. *Biotemas* 35(4): 1-13. (in Portuguese, with English summary) ["Benthic aquatic insects in forested and non-forested environments in rivers of the Juruá Valley. Fresh water ecosystems have been constantly threatened by anthropogenic stressors, placing a burden on benthic aquatic insect community structures. Hence, the aim of this study is to evaluate aquatic insect diversity in a gradient of forested and non-forested areas between the dry and rainy seasons in rivers of the Juruá Valley. 675 individuals were collected, 70.63% were collected during the dry season and 29.37% were collected during the rainy season, distributed among the orders Diptera, Ephemeroptera, Odonata e Trichopteran. There was greater abundance of the order Diptera when compared to the other taxons. Significant differences between the forested and non-forested environments in both seasonal periods were observed with greater diversity and equitability found in forested environments. Family richness and diversity presented a relation to oxygen levels dissolved in water and chlorophyll concentrations in forested environments during the dry season, and all environments sampled presented a slightly acidic pH, close to neutral. The study demonstrated there was a large incidence of generalist organisms whose characteristics are adaptive to negative changes, thus demonstrating that impacts caused to the localities

alter aquatic insect composition." (Authors) Taxa are treated at family level.] Address: Barbosa, Hilaritssa Moura, Universidade Federal do Acre, Campus Floresta, Laboratório de Ecologia Aquática CEP 69.980-000, Cruzeiro do Sul – AC, Brasil. Email: hilaritssa@gmail.com

**20904.** Belmont, J.; Miller, C.; Scott, M.; Wilkie, C. (2022): A new statistical approach for identifying rare species under imperfect detection. *Diversity and Distributions* 28(5): 882-893. (in English) ["Aim: Species rarity is often used as a measure to assess the risk of extinction of species, and thus, different methods have been developed to describe the composition of rare species in biological communities. These methods usually depend on species attributes that are not always available and very often ignore imperfect species detection. In this work, we developed a new method to characterize species rarity in a community when species are detected imperfectly. Our modelling framework is based on Bayesian occupancy models to estimate species distributions under imperfect detection using presence-absence data. Innovation: We propose a finite mixture occupancy model to identify rare species based on their occupancy and class-membership probabilities. Here, we explored a two-class finite mixture model to distinguish between rare and common species classes and presented the general modelling framework for a problem with more than two classes. By using simulations, we were able to compare our model results under different scenarios obtaining a high-classification performance across all of them. Additionally, we applied our model to a data set of Odonata occurrence records that were partially observed due to imperfect detection and quantified the proportion of rare species on a national scale across waterbodies in the United Kingdom. Main conclusions: Nowadays, biodiversity conservation involves monitoring programmes that target multiple species within a community where individual species responses may vary widely. This high variability makes the task of identifying the ecological processes that drive distributions of rare species difficult. Thus, our method represents a new approach to characterize the composition of a community in terms of species rarity while correcting for detectability bias. Our modelling framework also suggests lines of research and future developments for the understanding of how species rarity can be measured in a wide range of scenarios." (Authors)] Address: Belmont, J., School of Mathematics & Statistics, Univ. of Glasgow, University Place, G12 8QQ Glasgow, UK. Email: j.belmont-osuna.1@research.gla.ac.uk

**20905.** Bensakhri, Z.; Bensouilah, S.; Zebba, R.; Youcefi, A.; Amari, H.; Zouaimia, A.; Lazli, A.; Houhamdi, M.; Khelifa, R. (2022): Trends to adaptation of the Sahara frog (*Pelophylax saharicus*) larvae across an environmental gradient. *Biologia* 77: 2857-2866. (in English) ["Species adjust their behavior and life-history to adapt to local environmental conditions. Species with a broad ecological niche often show signatures of local adaptations to different environment, particularly in extreme ones. Here, we investigate local adaptation in different populations of the North African Sahara frog (*Pelophylax saharicus*) living in various environmental conditions that vary mostly in temperature, precipitation, and elevation by mean of common garden experiment aiming to estimate the growth rate under two predation treatments (absence or presence of non-lethal cues of dragonfly larvae). First, we found an elevational cline in the reproductive phenology where, from low to high elevation, the reproductive season shifts to later dates, whereas that in arid environment was later than all other populations. We suggest that geographic differences in temperature and rainfall

(in arid areas) explain this phenological pattern. Second, hatching success was overall high but showed a slight decline across elevation. Third, growth rate was generally faster in low and intermediate elevation populations, but slower in high elevation and arid environment populations. Populations in low and intermediate elevation responded to predation by reducing growth rate and the size at metamorphosis, but no predatory responses were recorded in high elevation and arid environment populations. Our study shows some life history signatures of local adaptation of *P. saharicus* in Northeast Algeria, which does not go in line with recent genetic analysis showing low population differentiation in the region." (Authors)] Address: Bensouilah, S., Dept Biol., Fac. Sciences, Amar Telidji Laghouat Univ., Laghouat, Algeria

**20906.** Brinet, A.; Ziar, A. (2022): Les macroinvertébrés benthiques bioindicateurs de la qualité écologique des milieux lotiques: cas d'Oued Cherf et affluents Nord. Est d'Algérie. MSc. thesis, Faculté des Sciences de la Nature et de la Vie, Sciences de la Terre et de l'Univers, Université 8 Mai 1945 Guelma: VIII + 68 pp. (in French, with English and Arabian summaries) ["This work focuses on the inventory and characterization of the diversity of benthic macroinvertebrates along the Cherf wadi, from samples taken monthly between February and May 2022. Five (5) stations carefully chosen on the longitudinal profile of the course of characterized by temporary to permanent flow regimes often affected by a very high inter-annual variability. The investigation of macroinvertebrates was made during the wet season according to the sampling protocol of the standardized global biological index (IBGN). Thus, a "Surber" with a unit surface of 1/20 m<sup>2</sup> and a mesh size of 100 µm was used at the level of the five stations for the harvesting of macroinvertebrates. Before sampling, ten (10) physico-chemical parameters (temperature, pH, conductivity, water salinity, redox potential, dissolved oxygen concentration, total dissolved solids, resistivity, atmospheric pressure, transparency and depth) were measured at each station. The fauna identified during this study consists of 2794 individuals corresponding to 14 Families belonging to 4 main faunal groups (insects, Molluscs, Annelids and crustaceans). The number of benthic populations showed that Diptera, Ephemeroptera and Trichoptera are the most numerically inventoried. Molluscs, Achètes, Odonates and Crustaceans constitute only a small fraction of the total fauna. The results of the index (IBGN) revealed that the waters of Cherf are of average quality. The preponderance of these three families of pollution-sensitive macroinvertebrates attests to the average quality of this watercourse. The diversity indices indicate that the macroinvertebrate community of Cherf is unbalanced and not very diversified. The intense human activities in this part have resulted in average organic pollution, which results in a proliferation of polluo-sensitive macroinvertebrates to the detriment of polluo-resistant ones. The purpose of this report is to give a first overview of the springtime diversity of benthic macroinvertebrates present, as well as the information they can provide as bioindicators of local contexts." (Authors)] Address: not stated

**20907.** Brockhaus, T. (2022): Die Verwandlung der Libellen. lange Zeit ein Mysterium in der Entomologie (Odonata). Teil 1. Entomologische Nachrichten und Berichte 66: 102-111. (in German, with English summary) ["The metamorphosis of dragonflies. a long-time mystery in entomology (Odonata). Part 1. Insect development cycles have been the focus of nature observation since ancient times. Initially, utility consideration were a driving force behind these observations. Aristotle developed the thesis of spontaneous

generation in many insects (genesis automates). The scientific knowledge of Aristotle and Pliny the Elder also shaped the world of thought in medieval scholasticism. Since dragonflies were of no direct benefit for humans, they were for a long time not in focus of observations. Although dragonflies were in early modern times known as flying insects (with more than one name), and their larvae as "water worms" but there was no evidence that these animals belonged together it was not until the 17th and the beginning of the 18th century that naturalists discovered the relationships between larval stages and adults through observation of nature and the use of the microscope. Worth mentioning here are Conrad Gessner, Johannes Goedaerd, Leonhard Baldner, Jan Swammerdam, Johann Leonhard Frisch, Maria Sibylle Merian, August Johann Rösel von Rosenhof and Rene-Antoine Ferchault de Reaumur. During this time dragonflies and damselflies and their larval stages were also included in collections of natural objects, and were listed in their catalogs. The work of Maria Sibylle Merian and August Johann Rösel von Rosenhof ensured the rapid dissemination of this knowledge. This was made possible by the rapid development of the art of printing and painting. Research on the development cycles of various species of dragonflies is still relevant to this day." (Author)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**20908.** Buczynski, P.; Buczynska, E.; Hunger, H.; Wildermuth, H. (2022): Ein ungewöhnlicher Schlupfunfall bei der Falkenlibelle *Cordulia aenea* (Odonata: Corduliidae). Mercuriale 22: 83-88. (in German, with English summary) ["An unusual emergence accident in *Cordulia aenea*. – In Mai 2022, a "sandwich" consisting of two exuviae and an incompletely emerged imago of *C. aenea* stuck between them was found and photographically documented near Lublin (Poland). Obviously, the abdominal tip of the emerging dragonfly remained stuck in the exuvia because a second larva, ready to emerge, climbed onto the incompletely emerged imago at the same moment. The imago was trapped and could therefore not finish its emergence procedure while the wings unfolded without hindrance. This is the first record of a previously undescribed cause of death in dragonflies during emergence." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, 20-033 Lublin, Poland. Email: pawbucz@gmail.com

**20909.** Büsse, S.; Wildermuth, H.; Gorb, S.N. (2022): Morphological adaptations of the mouthparts to the ectoparasitic lifestyle of the biting midge *Forcipomyia paludis* (Diptera: Ceratopogonidae), specialized in Odonata. Zoomorphology 141: 307-314. (in English) ["Damselflies and dragonflies are well-known hosts of the West Palearctic biting midge *Forcipomyia paludis*. Females of this ectoparasitic dipteran mainly cling to the host's wings, sucking hemolymph from the wing veins. The midges are firmly attached to the wing surface with specialized tarsi, thus not being flung away during the host's flight maneuvers. As for another ceratopogonid—*F. odonatophila* from New Guinea—had been suggested, we assumed that in *F. paludis*, the attachment would be reinforced by the mouthparts during the suction action. In the present study, we used behavioral field observations, scanning electron microscopy (SEM) and high-resolution micro-computed tomography (µCT), to study the mouthparts of *F. paludis*. We focused on the mouthpart configuration post sucking and thus on the contact with the host's wing as well as on the piercing process into the wing veins. We foster our understanding of *F.*

paludis being a parasite of Odonata by showing proof of the piercing and therefore the sucking of hemolymph from the wings. Additionally, the mouthparts clearly show contamination with odonate wing wax after the sucking procedure. Furthermore, we discuss probable additional functions of the piercing process for the firm attachment to the flying host of *F. paludis*." (Authors)] Address: Büsse, S., Dept Functional Morphology & Biomechanics, Inst. Zoology, Kiel University, Am Botanischen Garten 9, 24118, Kiel, Germany

**20910.** Cancellario, T.; Miranda, R.; Baquero, E.; Fontaneto, D.; Martínez, A.; Mammola, S. (2022): Climate change will redefine taxonomic, functional, and phylogenetic diversity of Odonata in space and time. *npj Biodiversity* (2022) 1:1; <https://doi.org/10.1038/s44185-022-00001-3>: 14 pp. (in English) ["Climate change is rearranging the mosaic of biodiversity worldwide. These broad-scale species re-distributions affect the structure and composition of communities with a ripple effect on multiple biodiversity facets. Using European Odonata, we asked: i) how climate change will redefine taxonomic, phylogenetic, and functional diversity at European scales; ii) which traits will mediate species' response to global change; iii) whether this response will be phylogenetically conserved. Using stacked species distribution models, we forecast widespread latitudinal and altitudinal rearrangements in Odonata community composition determining broad turnovers in traits and evolutionary lineages. According to our phylogenetic regression models, only body size and flight period can be partly correlated with observed range shifts. In considering all primary facets of biodiversity, our results support the design of inclusive conservation strategies able to account for the diversity of species, the ecosystem services they provide, and the phylogenetic heritage they carry in a target ecosystem." (Authors) Supplementary information: <https://www.nature.com/articles/s44185-022-00001-3#Sec25>] Address: Cancellario, T., University of Navarra, Biodiversity and Environment Institute BIOMA, Irunlarrea 1, 31080 Pamplona, Spain. Email: [tcancellari@alumni.unav.es](mailto:tcancellari@alumni.unav.es)

**20911.** Carvalho, F.G.; Duarte, L.; Seger, G.D.S.; Nakamura, G.; Guillermo-Ferreira, R.; Cordero-Rivera, A.; Juen, L. (2022): Detecting Darwinian shortfalls in the Amazonian Odonata. *Neotropical Entomology* 51: 404-412. (in English) ["Among the oldest winged insects, odonates are a monophyletic order that have become important models for ecological studies because of their highly diverse reproductive behaviors and their role as top predators and bioindicators. However, knowledge on evolutionary relationships within the order is still scarce compared to other taxa, and this situation is even more complicated in areas with high biodiversity, such as in the Amazon. Here, we sought to identify knowledge gaps on Amazonian Odonata regarding three main aspects: (i) how the inclusion of Amazonian taxa affects our interpretation of the evolutionary relationships of Zygoptera and Anisoptera; (ii) the position of Amazonian taxa in the existing supertree of the Odonata; (iii) dating evolutionary divergence between nodes using fossil records; (iv) assessing whether more species-rich basins (e.g., Amazon basin) have a larger phylogenetic gap when compared to basins with lower richness in South and Central America; and (v) in the light of our knowledge, we discuss diversification patterns found in the most predominant clades of Amazonian taxa. We built a supertree from currently available phylogenetic information of Odonata. The results show that there is no genetic information for 85% (n: 503) of the Amazonian species and that family level relationships are unknown for 17 genera. After compiling the data, we observed

that clades belonging to Neotropical lineages are the most poorly resolved, with large polytomies. This problem was identified in many Anisoptera genera, such as *Macrothemis*, *Dasythemis*, *Elasmothemis*, and *Erythrodiplax*. Our results also suggest that not always the richest basins have the greatest phylogenetic gaps. As expected, we found important gaps in the existing Odonata phylogenies, especially in clades that include Amazonian representatives, that are also those less known from ecological and conservation perspectives." (Authors)] Address: Carvalho, F.G., Lab de Ecologia e Conservação, Instituto de Ciências Biológicas, Univ Federal Do Pará. UFPA, Belém, Pará, Brazil. Email: [fernandogeraldocarvalho@gmail.com](mailto:fernandogeraldocarvalho@gmail.com)

**20912.** Cetinic, K.A.; Grgic, I.; Previšić, A.; Rožman, M. (2022): The curious case of methylparaben: Anthropogenic contaminant or natural origin? *Chemosphere* 294, May 2022, 133781: 9 pp. (in English) ["Highlights: • Methylparaben both endocrine disrupting compound and naturally produced metabolite. \*In situ and microcosm experiments assessed natural presence and transfer of methylparaben. \*Methylparaben was detected in all biota across sites unimpacted by contamination. \*Methylparaben may have a natural origin and function in moss and invertebrates. \*Our findings suggest methylparaben may not be solely a harmful anthropogenic contaminant. Abstract: The widespread use of methylparaben as a preservative has caused increased exposure to natural aquatic systems in recent decades. However, current studies have suggested that exposure to this compound can result in endocrine disrupting effects, raising much concern regarding its environmental impact. In contrast, methylparaben has also been found to be part of the metabolome of some organisms, prompting the question as to whether this compound may be more natural than previously assumed. Through a combination of field studies investigating the natural presence of methylparaben across different taxa, and a 54-day microcosm experiment examining the bioaccumulation and movement of methylparaben across different life stages of aquatic insects (order Trichoptera), our results offer evidence suggesting the natural origin of methylparaben in aquatic and terrestrial biota. This study improves our understanding of the role and impact this compound has on biota and challenges the current paradigm that methylparaben is exclusively a harmful anthropogenic contaminant. Our findings highlight the need for further research on this topic to fully understand the origin and role of parabens in the environment which will allow for a comprehensive understanding of the extent of environmental contamination and result in a representative assessment of the environmental risk that may pose." (Authors)] Address: Cetinic, Katarina, Ruder Bošković Institute, Zagreb, Croatia. Email: [kcetic@irb.hr](mailto:kcetic@irb.hr)

**20913.** Cezário, R.R.; Gorb, S.N.; Guillermo-Ferreira, R. (2022): Camouflage by counter-brightness: the blue wings of Morpho dragonflies *Zenithoptera lanei* (Anisoptera: Libellulidae) match the water background. *Journal of Zoology* 317(2): 92-100. (in English) ["Bright iridescent colours are widespread in several aquatic and terrestrial animal taxa and are usually involved in intraspecific communication and/or predator avoidance. Camouflage by iridescence may be one strategy to avoid predators when the animal exhibits bright colours that match the brightness of its surroundings. Hence, animal structural colouration may have a "brightness matching" or "counter-brightness" function when observed against bright or glossy backgrounds. Here, we addressed the role of such counter-brightness effect of the iridescent wings of the Morpho dragonfly *Zenithoptera lanei*

for avoiding detection. We hypothesized that the bright reflectance of the dragonfly wings is cryptic against the bright water surface and the glossy vegetation where they naturally occur, protecting the dragonfly from visually oriented predators, deceiving prey and signalling to conspecifics when desired. We addressed whether (1) the iridescent colours of *Z. lanei* wings function as a visual strategy to reduce their wing detectability by brightness matching the background and (2) the detectability of wings against vegetation and water varies according to the observer. For this, we modelled how conspecifics, dipteran prey and predatory birds see the odonate wings against the vegetation of the Neotropical Savannah and against the water surface where the dragonflies perch. Our results suggest that *Z. lanei* dragonflies can avoid detection by predators, prey and conspecifics when perched on their natural habitats (i.e., ponds) against the bright background of the water surface. Here, we add evidence to the multifunctionality of structural colours in animals and the function of iridescence in camouflage. The bright iridescence and ultraviolet reflective nanostructures of *Z. lanei* wings when coupled with striking behavioural displays may provide a dynamic and safe intraspecific communication channel." (Authors)] Address: Guillermo-Ferreira, R., Department of Biological Sciences, Universidade Federal do Triângulo Mineiro, Uberaba, MG, Brazil. E-mail: rhainerguillermo@gmail.com

**20914.** Chainthong, D.; Boonsoong, B. (2022): Taxonomy and distribution of the gomphid dragonfly *Orientogomphus minor* (Laidlaw, 1931) (Odonata: Gomphidae) in Thailand. *Diversity* 2022, 14(4), 291; <https://doi.org/10.3390/d14040291>: 12 pp. (in English) ["The taxonomy and distribution of *Orientogomphus minor* (Laidlaw, 1931) were investigated in Thailand. Gomphid nymphs were collected from 28 sampling sites in streams in eastern, western, and southern Thailand. The nymph of *O. minor* is described for the first time and the male is re-described and illustrated based on a reared specimen. The taxonomic characteristics of the nymphs of the genus *Orientogomphus* are discussed. The nymph of *O. minor* differs from that of *O. armatus* Chao & Xu, 1987, the only other *Orientogomphus* species with a described nymphal stage, by the presence of lateral spines on abdominal segments six to nine and by a slender, stick-shaped third antennal segment. Multivariate analyses revealed a strong correlation between the distribution of *O. minor* and other three gomphid species with restricted distribution in Thailand (*Nychogomphus duaricus* (Fraser, 1924), *Onychogomphus louissiriusi* Fleck, 2020 and *Stylogomphus thongphaphumensis* Chainthong, Sartori & Boonsoong, 2020). Those species were recorded solely in streams in the western part of the country. Nymphs of *O. minor* were predominantly associated with stony substrates." (Authors)] Address: Chainthong, D., Animal Systematics and Ecology Speciality Research Unit (ASESRU), Department of Zoology, Faculty of Science, Kasetsart University, Bangkok 10900, Thailand. Email: damrong.cha@ku.th

**20915.** Chakradhari, S.; Tiwari, R. (2022): Insect diversity of the Mukundpur Tiger reserve, Satna (M.P.). *Journal of Entomology and Zoology Studies* 10(2): 110-114. (in English) ["An inventory of species diversity of insects of the Mukundpur Tiger Reserve, Satna (M.P.). Small insects with soft body were collected by hand with the help of a fine camel hair brush and forceps, and then preserved in 70% alcohol by dipping the soft brush in to the medium. Sweeping nets were used to collect the insect from plants. A long stick was used for beating the plants harbouring insects. A big size cloth spread over the ground to collect the falling insects.

Total recorded aquatic insect sp. distribution was expressed in higher to lower order as Coleoptera (36), Hemiptera (22), Odonata (11), Diptera (6), Ephemeroptera (4), and Trichoptera (2). Aquatic insect Order as per the comparative evaluation Coleoptera was found in utmost count compared through Hemiptera, Odonata, Diptera, Ephemeroptera, and Trichoptera. The order Coleoptera consist (45%), Hemiptera (27.16%), Odonata (13.58%) [n=10 taxa], Diptera (7.40%), Ephemeroptera (4.90%), and Trichoptera (2.46%) from observed aquatic insect species. MKPTSR is a well-distinguished place intended for the affluence of coleopteran fauna." (Authors)] Address: Tiwari, R., Department of Zoology, Govt. P.G. College, Satna, Madhya Pradesh, India

**20916.** Chavez Cruz, R.A. (2022): Evaluación de la calidad del agua mediante la bioindicación de macroinvertebrados acuáticos, en un tramo del río Toribio, cienega Magdalena, Colombia. Water quality evaluation through bioindication of aquatic macroinvertebrates, in a section of the Toribio river, cienega Magdalena, Colombia. *Ciencia e Ingeniería* 9(2): 14 pp. (in Spanish, with English summary) ["The main purpose was to assess water quality by identification of aquatic macroinvertebrates in a stretch of the Toribio River. The macroinvertebrates collection was carried out with a Surber network at the points chosen from the Toribio River. A total of 1126 individuals were collected; 642 in the dry period and 484 in the rainy period; a total of 36 morphofamilies were observed (24 in the dry season and 26 in the rainy season). The insecta class was the most abundant 32 morphs; the Odonata order was the most representative with 7 morphs. Regarding the families, only four (4) registered more than one morph: Coenagrionidae (5) [Gomphidae, Libellulidae], Chironomidae (3), Leptophlebiidae (2) and Tricorythidae (2). According to the results of the BMWP and EPT indices, the quality of the water in the monitored section of the Toribio river varies between points and sampling times, establishing that the general condition of this section is "critical to doubtful". Based on the composition and structure of aquatic macroinvertebrates observed, we can say that the studied section of the Toribio River presents some degree of disturbance." (Authors) Taxa are treated at family level] Address: Chavez Cruz, R.A., Universidad Internacional Iberoamericana, Colombia, Ciencia e Ingeniería, Univd de La Guajira, Colombia. Email: richardchavezcruz@gmail.com

**20917.** Chovanec, A. (2022): Reaktion der Kleinen Pechlibelle, *Ischnura pumilio* (Charpentier, 1825) (Odonata: Coenagrionidae), auf sich verändernde Lebensraumbedingungen. *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen* 74: 21-54. (in German, with English summary) ["Response of the Scarce Blue-tailed Damselfly, *Ischnura pumilio* (Charpentier, 1825), to changing habitat conditions (Odonata: Coenagrionidae). – A groundwater-fed, sunny, and shallow wetland with a size of 1.200 m<sup>2</sup> in Maria Enzersdorf (Lower Austria) was subject of an odonatological study carried out from 2016 to 2021. The water body was situated in an overflow and seepage reservoir created in 2014. A high number of observation days (236) within the six years allowed analyses of phenological features, flight periods, etc. *Ischnura pumilio* was recorded at the study site from 2016 to 2019. In each year, teneral and juvenile specimens were found. In 2016, small open water areas and low amphibious vegetation characterised the wetland. In that year, *I. pumilio* was the most abundant species within the odonate community comprising 27 species. It was bivoltine with higher numbers of specimens in the second generation: The spring/early summer generation comprised about 100 individuals, the midsummer generation about



250. In the following years, the rapid expansion especially of *Typha latifolia* led to a complete and dense coverage of the water body. The response of *I. pumilio* to deteriorating habitat conditions was a significant decline in the number of individuals: 2016 – total number 350; 2017 – 30; 2018 – 18; 2019: 5. In contrast to the population structure in 2016, the second generation in 2017 was smaller than the first. In 2018 and 2019, *I. pumilio* was represented by only one generation. The second generation of 2017 and the single generations of 2018 and 2019 occurred during a shorter time compared to the species-specific flight period. Furthermore, a decline of reproduction behaviour was apparent: In 2016, at 23 of the 31 days with records of *I. pumilio* copulae and/or tandems were observed, which corresponds to 74 %. This percentage decreased to 55 % in 2017, and 10 % in 2018. In 2019, no reproduction behaviour was recorded at all." (Author)] Address: Chovanec, A., c/o Umweltbundesamt, Spittelauer Lände 5, 1090 Wien, Austria. E-mail: chovanec@ubavie.gv.at

**20918.** Cozzer, G.D.; Rezende, R. de S.; Lara, T.S.; Machado, G.H.; Magro, J.D.; Albeny-Simões, D. (2022): Predation risk effects on larval development and adult life of *Aedes aegypti* mosquito. *Bulletin of Entomological Research* 113(1): 29-36. (in English) ["Biological control is one of the methods available for control of *Aedes aegypti* populations. We used experimental microcosms to evaluate the effects of actual predation and predation risk by dragonfly larvae (Odonata) on larval development, adult longevity, and adult size of *Ae. aegypti*. We used six treatments: control, removal, variable density cues (Cues VD), fixed density cues (Cues FD), variable density predator (Predator VD), and fixed density predator (Predator FD) (n = 5 each). Predator treatments received one dragonfly larva. Cue treatments were composed of crushed *Ae. aegypti* larvae released into the microcosm. For the FD treatments, we maintained a larval density of 200 individuals. The average mortality of *Ae. aegypti* larvae in the Predator VD treatment was used as the standard mortality for the other treatments. Mosquitoes from the Predator VD and Cues VD treatments developed faster, and adults were larger and had greater longevity compared to all other treatments, likely due to the higher food availability from larval density reduction. High larval density negatively affected larval developmental time, adult size, and longevity. Males were less sensitive to density-dependent effects. Results from this study suggest that the presence of predators may lead to the emergence of adult mosquitoes with greater fitness, causing an overall positive effect on *Ae. aegypti* population growth rates." (Authors)] Address: Cozzer, G.D., Community Univ. of the Chapecó Region. Postgraduate Program in Environmental Sciences. Lab. of Ecol. Entomology, Chapecó, SC, Brazil.

**20919.** Czerniawska-Kusza, I. (2022): Assessing benthic macroinvertebrates in relations to environmental variables and revitalisation works. *Ecological Chemistry and Engineering S* 29(1): 99-110. (in English) ["Macroinvertebrates of two ex-manor ponds located in Chroscina, Opole Region (Poland) were studied from 2015 to 2018 to investigate their community composition and diversity and evaluate the heterogeneity of communities on spatial and temporal scale referring to environmental variables and revitalisation work. A total of 32 taxa were recorded (at the family level, except Oligochaeta), 13 of which were Ephemeroptera, Odonata and Trichoptera, recognised as sensitive groups in lentic ecosystems. Macroinvertebrate richness and diversity varied considerably, especially in spring and summer. It was found that habitat heterogeneity influenced benthic invertebrates

more than basic water parameters. However, the environmental variables together accounted for only 38 % of the observed variations. Thus, other factors, such as fish predation, may have played a leading role in community shaping. The distinct differences between pond communities, four years after the revitalisation works, resulted more from different habitat features than from the previous sediment removal." (Author) *Ischnura elegans*, *Coenagrion* sp., *Platycnemis pennipes*, *Aeshna cyanea*, *Orthetrum cancellatum*, and *Somatochlora metallica* are listed.] Address: Czerniawska-Kusza, Izabela, Institute of Biology, Faculty of Science and Technology, University of Opole, ul. Oleska 22, 45-052 Opole, Poland. Email: kuszaiz@uni.opole.pl

**20920.** De Knijf G. 2022. First records of Orange-winged Dropwing (*Trithemis kirbyi*) from Belgium. *Brachytron* 23: 28-32. In Dutch, with English summary. [T. kirbyi was observed twice in southern Belgium in the summer of 2022, being a new species for the Belgian fauna. This afro-tropical species was first observed in Europe in 2003. Since then in less than 10 years it colonized much of Spain and was first observed in France in 2017. On 22 July and 2 August 2022 two males of T. kirbyi were photographed at the river Semois in the villages of Chassepierre and Lacuisine (Forenville) in southern Belgium. These are the most northern records for this species. The occurrence of this species in Belgium coincides with the heat wave at the end of July, when temperatures as high as 38,1°C were recorded. Not only Belgium, but most of western Europe was hit by this heat wave. Most likely warm winds from the south helped the dispersal of some individuals of T. kirbyi so far north.]" (Author) Address: Knijf, G. de, Research Institute for Nature and Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. E-mail: geert.deknijf@inbo.be

**20921.** Deliry, C.; Noally, L.; Ulmer, A.; (coord.); Faton, J.M.; Gillard, A.; Kévin, M.-L.-H.; Souvignet, N.; Tailland, L. (2022): *Libellules et Demoiselles de la Loire. Atlas des Odonates du département de la Loire. Groupe Sympetrum et FNE Loire*: 256 pp. (in French) ["This Atlas of the Dragonflies and Damselflies of the Loiret is the result of a joint effort by two nature protection associations, France Nature Environnement Loire and the Groupe Sympetrum, the regional association for the study and protection of dragonflies in Rhône-Alpes. This work was only possible with the help of more than 320 observers who have collected more than 58,900 odonate observation data in more than 40 years. As a result, the Loire department is one of the best surveyed in France. Wild nature, our marshes, ponds and rivers, our ponds and peat bogs are more than ever threatened by pollution from agricultural pesticides and by the summer warming of almost 3°C in 60 years in the Loire. In wetlands that are sometimes dry all year round, damselflies are more vulnerable than ever. To save the environment, and to save ourselves at the same time, we hope that this book will help motivate citizens and decision-makers to protect and manage wetlands." (Publisher) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: <http://sympetrum.fr/?p=84>

**20922.** Dharmawan, D.P.R.; Subhan, W.; Rohman, A.; Prihatin, J.; Susilo, V.; Ariyunita, S.; Nurhara B. (2022): Diversity of Dragonflies (Odonata) at Pancur Resort Alas Purwo National Park, Indonesia. *Borneo Journal of Resource Science and Technology* 12(2): 57-62. (in English) ["Alas Purwo National Park is one of the conservation areas located in the east of the island of Java. Dragonflies are crucial to the ecosystem's equilibrium as predator, bioindicator, and vector for disease control. The sensitivity and presence

of dragonflies affect the diversity of dragonflies in a habitat. This inventory can assist the Alas Purwo National Park with additional data and be a basis for making conservation policies. The study aimed to determine the type and diversity index of the dragonflies in this park. The sample location was determined using purposive sampling, and the sample conducted utilised road sampling. This research observed seven species: *Orthetrum glaucum*, *O. chrysalis*, *Lathrecista asiatica*, *Potamarcha congener*, *Copera marginipes*, *Prodasineura autumnalis*, and *Nososticta insignis*. The Libellulidae family had the most species; on the other hand, the Protoneuridae family had the fewest Shannon-Wiener diversity index ( $H' = 1.6$ ). Based on the criteria, the diversity index demonstrated moderate results. Pancur Resort Alas Purwo National Park provided a good environment and supported the survival of dragonflies." (Authors)] Address: Rohman, A., logy Education, Faculty of Teacher Training & Education, University of Jember, 68121, Indonesia. Email: abdu.fkip@unej.ac.id

**20923.** Dimitrov, D.A.; Mollov, I.A. (2022): Effect of the urban heat island in Plovdiv city (Bulgaria) on the species composition and distribution of the dragonflies (Insecta: Odonata). *Ecologia Balkanica* 14(2): 113-121. (in English) ["the current paper researches the impact of the urban heat island effect on the species composition and distribution of dragonflies (Insecta: Odonata) along the Maritsa River in the city of Plovdiv, Bulgaria. The study was conducted on imaginal and larval forms of the species, and the studied area was divided into 3 sub-areas (urban, suburban and rural) according to the proximity to the city center. Along the urban gradient from the rural to the urban zone, an increase in air, water and soil temperature by  $\sim 1-2^{\circ}\text{C}$  was observed. Differences were found also in the dissolved oxygen in the water, which had the highest values in the rural area (10.70 mg/l) and decreased towards the urban area, where it was 9.03 mg/l. Four dragonfly species were confirmed for the study area, and 2 new species were recorded. The most species were found in the urban zone, probably due to the higher temperatures compared to the other two areas, while at the same time, no larvae were found there, due to the lower amount of dissolved oxygen in the water. The current paper gives a better understanding of the impact that the urban heat island effect has on dragonflies in cities and aims to contribute for timely measures and decisions for the management of wetlands around urban areas." (Authors)] Address: Dimitrov, D.A., Univ. Plovdiv "Paisii Hilendarski", Fac. Biol., Dept of Ecology & Environmental Conservation, 24 Tzar Assen Str., BG-4000 Plovdiv, Bulgaria. Email: d.dymytrow@gmail.com

**20924.** Doucet, G.; Itrac-Bruneau, R. (2022): Première mention d'*Aeshna isocles* (Odonata: Aeshnidae) dans le Territoire de Belfort. *Martinia* 36 (6): 44-48. (in French) [17-V-2022; first record of *A. isocles* in the Territoire de Belfort] Address: Doucet, G., 8F rue Maurice Deslandres, F-21000 Dijon, France. Email: guillaume.doucet@yahoo.fr

**20925.** Dow, R.A.; Singa, H. (2022): Previously unpublished Odonata records from Sarawak, Borneo, part IX: More Odonata from Limbang Division, including the first records from Gunung Buda National Park. *International Dragonfly Fund. Report* 173: 1-32. (in English) ["Records of Odonata made in Limbang Division in Sarawak during three surveys in 2021-2022 made possible by funding from the International Dragonfly Fund are reported. All locations surveyed are within Limbang District and are grouped into two categories: locations surveyed on day trips from Limbang Town and

locations in the Sungai Mendalam area further inland. All locations are in the lowlands of the division. The lowlands of Limbang Division had not been well studied for Odonata and the results presented here include 50 first records for Limbang Division, bring the total number of species known from the division to 173. In fact slightly more species were recorded during the 2021-2022 surveys than had been recorded from the division prior to 2021. Three of the new additions for Limbang are also first records for Sarawak (*Libellago phaethon*, *Rhinocypha humeralis* and *Oligoaeschna platyura*). The discovery of a large population of *Macrogomphus phalantus* not far from Limbang town is another significant result of the 2021-2022 surveys and is discussed in some detail. Other notable records include *Dysphaea lugens*, *Coeliccia kenyah*, the black form of *Copera vittata*, *Argioconemis rubescens rubeola*, *Teinobasis cryptica*, *Macrogomphus* sp., *Chlorogomphus* sp., the true *Pornothemis serrata* and *P. starrei*. This report includes the first records of Odonata from Gunung Buda NP (a checklist is given in the appendix), where 76 species have been found so far." (Authors)] Address: Dow, R.A., Institute of Biodiversity & Environmental Conservation, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia. Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Email: rory.dow230@yahoo.co.uk

**20926.** Dow, R.A.; Wahyudi, D.; Lupiyaningdyah, P. (2022): Odonata from the Loa Buluh Field Station area in East Kalimantan, Indonesia. *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 39: 1-17. (in English) ["The results of a survey of the Odonata in the Loa Buluh Field Station area in Kutai Kartanegara Regency, East Kalimantan, Indonesia, conducted in 2009, are reported. The history of odonatological activity in East Kalimantan is briefly summarised and the primary types of Odonata that originate from the province are listed. Details of the locations at which the 2009 survey took place are given. Sixty-six species were recorded during the survey but because it was not possible to export specimens, so that identifications were made with a hand lens in the field, there is uncertainty over the identity of some of the taxa concerned. Nevertheless, as far as we are aware there are no previously published records of six of the species recorded during the survey (*Elatoneura aurtiaca* (Selys, 1886), *Prodasineura dorsalis* (Selys, 1860), *Prodasineura verticalis* (Selys, 1860), *Archibasis incisura* Lief tinck, 1949, *Mortonagrion* sp. cf *aborensis* (Laidlaw, 1914) and *Macrogomphus decemlineatus* Selys, 1878) from East Kalimantan before. The need for further work on the Odonata of East Kalimantan to be conducted sooner rather than later, especially given the large changes that will occur in the province due to the planned construction of the new Indonesian capital there, is discussed briefly. Previously undocumented variation in *Prodasineura tenebricosa* Lief tinck, 1937 is discussed in the context of one of the species of uncertain identity found during the 2009 survey." (Authors)] Address: Dow, R.A., Institute of Biodiversity & Environmental Conservation, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia. Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Email: rory.dow230@yahoo.co.uk

**20927.** Ellenrieder, N. von (2022): *Metaleptobasis daiglei* sp. nov. from Panama (Odonata: Coenagrionidae). *Zootaxa* 5196(3): 433-442. (in English, with Spanish summary) ["*Metaleptobasis daiglei* sp. nov. (Holotype male: PANAMA, Colón Province, Portobelo District, palmetto/ banana swamp, west side of Río Piedras near town of María Chiquita, 10 am ( $9^{\circ}27'4''\text{N}$ ,  $79^{\circ}44'18''\text{W}$ , 10 m), 2 June 2022, Jerrell J.

Daigle leg., in FSCA) is described, figured, and distinguished from other species. Both male and female can be recognized from all congeners by the presence of a lateral pit rimmed by an external ridge between anterior and middle lobes of pronotum on each side, and the male also by the presence of a well-developed ventral spur on cercus, which supports the placement of the genus in the *Teinobasini* sensu De Marmels (2007)." (Author)] Address: Ellenrieder, Natalia von, Plant Pest Diagnostics Center, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA. Email: natalia.ellenrieder@gmail.com

**20928.** Eloranta, A.P.; Kjærstad, G.; Power, M.; Lakka, H.-K.; Arnekleiv, J.V.; Finstad, A.G. (2022): Impacts of piscicide-induced fish removal on resource use and trophic diversity of lake invertebrates. *Science of The Total Environment* 835: 12 pp. (in English) ["Highlights: • Lake benthic invertebrate taxa showed contrasting responses to rotenone treatment. \*Predatory invertebrates increased while grazers and collectors decreased in abundance. \*A partial niche expansion by benthic invertebrates in two out of three treated lakes. \*Holistic understanding of ecosystem impacts of chemical treatments are urgently needed. Abstract: Chemical eradication of non-native species has become a widely used method to mitigate the potential negative impacts of altered competitive or predatory dynamics on biodiversity and natural ecosystem processes. However, the responses of non-target species can vary from rapid full recovery to delayed or absent recolonization, and little is known about the potential shifts in resource use and trophic diversity of native species following chemical treatments. We used a before-after-control-impact approach to study the effects of rotenone piscicide treatment on abundance and trophic niche of benthic invertebrates in three untreated and three treated lakes in central Norway, the latter group hosting non-native roach (*Rutilus rutilus*) and pike (*Esox lucius*) prior to rotenone treatment. Based on community composition data, the relative abundance of invertebrate grazers and collectors decreased while that of predators increased following fish removal in the treated lakes. The stable isotope data indicated minor shifts in resource use of, and trophic diversity among, benthic invertebrate communities. While the predatory dragonfly larvae (Odonata) and grazer snails (Lymnaeidae) showed increased  $d^{13}C$  values indicating increased reliance on littoral benthic algae, the collector mayfly larvae (*Leptophlebia*) showed decreased  $d^{13}C$  values following fish removal in treated lakes. Grazer snails also showed a shift to a lower trophic position, while the predatory dragonflies and collector mayflies showed no changes in  $d^{15}N$  values following fish removal. The community-level isotopic niches of benthic invertebrates showed no consistent changes, although the sample-size corrected and Bayesian estimates of standard ellipse areas (SEAC and SEAB) slightly increased in two of the three treated lakes due to an increased range in  $d^{15}N$ . In conclusion, our study findings indicate some changes in species assemblages but minor shifts in the resource use and trophic diversity of benthic invertebrate communities following fish removal in rotenone treated lakes." (Authors)] Address: Eloranta, A.P., Department of Biological and Environmental Science, University of Jyväskylä, P.O. Box 35, FI-40014, Finland. Email: antti.p.eloranta@jyu.fi

**20929.** Eriksen, T.E.; Jacobsen, D.; Demars, B.O.L.; Brittain, J.E.; Søli, G.; Friberg, N. (2022): Effects of pollution-induced changes in oxygen conditions scaling up from individuals to ecosystems in a tropical river network. *Science of*

*the Total Environment* 814 (2022) 151958: 11 pp. (in English) ["Highlights: \*O<sub>2</sub> regulation capacity (ORC) of tropical aquatic ectotherms was studied in Myanmar. \*River reach diel O<sub>2</sub> deficits were investigated using oxygen loggers. \*Eutrophication/organic pollution induced O<sub>2</sub> deficits in rivers. \*Closed-chamber studies used to derive ORC for riverine macroinvertebrates (MI) \*Individual ORC scaled up to ecosystem MI composition mirroring O<sub>2</sub> deficits. Abstract: Anthropogenic inputs of nutrients and organic matter are common in tropical lowland rivers while little is known about the pollution-induced changes in oxygen availability and respiratory performance of ectotherms in these high temperature systems. We investigated the effects of agriculture and urban land-use on river water oxygen levels (diel measurements), decomposition rates (Wettex) and macroinvertebrate assemblages (field studies), as well as the oxy-regulatory capacity of eight riverine macroinvertebrate taxa (laboratory study) from a tropical lowland river network in Myanmar. The highest decomposition rates (0.1.5.5 mg Wettex degree day.<sup>-1</sup>) and oxygen stress (.91% saturation deficits) were found in reaches draining degraded catchments with elevated concentrations of nutrients. All individual macroinvertebrate taxa investigated were to some extent able to regulate their respiration when placed under oxygen stress in the laboratory (regulation value of 0.74.0.89). The oxy-regulation capacity of macroinvertebrate assemblages in the river network were, as predicted, inversely related to diel oxygen stress (maximum deficit;  $lm$ ,  $R^2 = 0.69$ ), where taxonomic richness and pollution sensitivity (ASPT metric) also declined sharply ( $lm$ ,  $R^2 = 0.79$ ). Our study shows that eutrophication and organic pollution induce oxygen deficits in tropical rivers but stimulate decomposition rates, which may further deplete oxygen levels. Furthermore, macroinvertebrate oxyregulatory capacity predicts assemblage composition along gradients in oxygen stress at the ecosystem-level. Our findings suggest that tropical lowland river systems could be highly sensitive to pollution by nutrients and organic matter leading to substantial impacts on ectotherm community composition and ecosystem functioning." (Authors)] Address: Eriksen, T.E., Norwegian Institute for Water Research (NIVA), Gaustadalléen 21, 0349 Oslo, Norway. Email: Tor.Erik.Eriksen@niva.no

**20930.** Everling, S.; Johansson, F. (2022): The effect of temperature and behaviour on the interaction between two dragonfly larvae species within the native and expanded range. *Ecological Entomology* 47(3): 460-474. (in English) ["\* Studies on interaction between species are needed to observe and predict the effects of climate change on species distributions. Here we studied intra- and interspecific competition and behaviour in larvae of a native and a northward expanding dragonfly species, *Sympetrum vulgatum* and *Sympetrum fonscolombii*, respectively. We estimated growth, mortality, and behaviour (prey capture success, activity, and boldness) at 20°C and 23°C. \*The northward expanding *S. fonscolombii* had a higher growth rate and a higher survival compared with the native *S. vulgatum* in interspecific competition. In intraspecific conditions, there was no significant difference between species in mortality and growth. Temperature had no significant effect on growth and survival of *S. fonscolombii*, but *S. vulgatum* showed both a higher growth rate and a higher mortality at 23°C under intraspecific conditions. There was a correlation between growth and mortality, suggesting that cannibalism and intraguild predation caused the growth differences between treatments in the competition experiments. \*Temperature had no significant effect on any of the behaviours. There were very few significant correlations between any of

the behaviours and the life-history traits survival and growth and there were also very few significant correlations between any of the behaviours. Repeatability of behaviours over ontogeny was low. \*The results of the present study suggest that the range expanding *S. fonscolombii* has the potential to outcompete the native species, but that this competition advantage does not seem to be driven by the temperature effects explored in this study." (Authors)] Address: Fohansson, F., Dept Ecology & Genetics, Animal Ecol., Evolutionary Biology Centre, Uppsala University, Uppsala, Sweden. Email: frank.johansson@ebc.uu.se

**20931.** Feindt, W.; Hadrys, H. (2022): The quality of sequence data affects biodiversity and conservation perspectives in the Neotropical damselfly *Megaloprepus caerulatus*. *Diversity* 14(12):1056: 19 pp. (in English) ["Ideally, the footprint of the evolutionary history of a species is drawn from integrative studies including quantitative and qualitative taxonomy, biogeography, ecology, and molecular genetics. In today's research, species delimitations and identification of conservation units is often accompanied by a set of — at minimum — two sequence markers appropriate for the systematic level under investigation. Two such studies re-evaluated the species status in the world's largest Odonata, the Neotropical damselfly *Megaloprepus caerulatus*. The species status of the genus *Megaloprepus* has long been debated. Despite applying a highly similar set of sequence markers, the two studies reached different conclusions concerning species status and population genetic relationships. In this study, we took the unique opportunity to compare the two datasets and analyzed the reasons for those incongruences. The two DNA sequence markers used (16S rDNA and CO1) were re-aligned using a strict conservative approach and the analyses used in both studies were repeated. Going step by step back to the first line of data handling, we show that a high number of unresolved characters in the sequence alignments as well as internal gaps are responsible for the different outcomes in terms of species delimitations and population genetic relationships. Overall, this study shows that high quality raw sequence data are an indispensable requirement, not only in odonate research." (Authors)] Address: Feindt, Wiebke, Division of Ecology & Evolution, Univ. Veterinary Medicine Hannover, Bünteweg 17d, 30559 Hannover, Germany. Email: wiebke.feindt@ecolevol.de

**20932.** Gänßler, R. (2022): Tandem aus *Pyrrhosoma nymphula* und *Platycnemis pennipes* (Odonata: Coenagrionidae, Platycnemididae). *Mercuriale* 22: 105-106. (in German, with English summary) [Germany, Baden-Württemberg "On 11 June 2022, a heterospecific tandem between *Pyrrhosoma nymphula* and *Platycnemis pennipes* was observed and photographed." (Author)] Address: Gänßler, R., Talstraße 231, 72250 Freudenstadt, Germany. Email: roland@roland-gaenssler.de

**20933.** Gärtner, F. (2022): Monitoring der Libellenfauna (Odonata) „Auf dem Mörth“ im FFH-Gebiet Schwalenberger Wald (Kreis Lippe, NRW). Masterarbeit, Geographisches Institut, Stadt- und Landschaftsökologie, Ruhr-Universität Bochum: 92 pp. (in German, with English summary) ["Monitoring of the Odonata fauna on the "Mörth" in the Special Area of Conservation (SAC) Schwalenberger Wald (Lippe, North Rhine-Westphalia) – In 2022, the dragonfly fauna was surveyed at eight peatland ponds in the "Mörth"-area in the Special Area of Conservation Schwalenberger Wald, district Lippe, North Rhine-Westphalia. The results were compared with a survey of the same ponds by Mathias Lohr from 2014.

A total of 24 dragonfly species were found, of which 18 are definitely or probably established. Except for *S. danae*, the peatland species *Coenagrion hastulatum*, *Lestes virens*, *Aeshna juncea*, *Leucorrhinia dubia*, *L. pectoralis* and *Symptetrum danae* were found to be definitely or probably established. *C. hastulatum* and *L. pectoralis* are "critically endangered" in North Rhine-Westphalia. Compared to 2014, five species could no longer be found. Seven species have been added. Despite this increase in dragonfly species overall, the peatland species *Aeshna subarctica* and *Leucorrhinia rubicunda* could no longer be observed in 2022. In both 2014 and 2022, two ponds had the highest dragonfly diversity in general and also most peatland species. For these ponds, a loss of four established peatland species could be determined. The changes in occurrences can be explained by global warming, the resulting change in vegetation, and biotic homogenization. In another pond, three peatland species could no longer be detected as established, for which the introduced Goldfish (*Carassius gibelio forma auratus*) could be responsible. While *C. hastulatum*, *L. dubia* and *S. danae* show a negative trend nationwide, these species could be observed in the study area in 2014 as well as in 2022. The occurrence of *L. pectoralis* in 2022 is to be rated as very positive, since one of the largest occurrences of the species in North Rhine-Westphalia was found in 2014 at a pond in the study area. It was shown that, despite a slight deterioration in the occurrence of peatland species since 2014, the ponds in the Mörth-area represent an important habitat for many of the endangered peatland dragonfly species for the Weserbergland and North Rhine-Westphalia." (Authors)] Address: Gärtner, F., Hasenbrede 12, 32689 Kalletal, Germany. Email: gaertner.f@icloud.com

**20934.** García-Ríos, R.; Moi, D.A.; Melo, A.S.; Mormul, R.P. (2022): Insect dispersal ability is crucial to overcome limitations in patch colonization of *Eichhornia crassipes* floating meadows. *Limnology* 23(2): 287-298. (in English) ["Dispersal is a pivotal process in ecology since it determines species presence across patches in landscapes. Therefore, understanding dispersal may be critical in light of current environmental changes. Here, we conducted an experiment to evaluate how richness, density, and beta-diversity of insects with strong and/or weak aquatic and aerial dispersal abilities are influenced by colonization limitation of aerial and aquatic patches of a floating macrophyte. We used nets to isolate the aquatic (by roots) and aerial (by leaves) routes by which insects may colonize floating macrophytes. We found that strong aquatic and aerial dispersers were not affected by colonization limitation, since the richness and density of these groups did not decrease with limited colonization. Conversely, limited colonization resulted in a strong decrease in the richness and density of weak aquatic and aerial dispersers. Also, the beta diversity of weak dispersers strongly increased with limited colonization, whereas strong dispersers produced more homogeneous communities (low beta diversity). Our findings illustrate that increasing habitat fragmentation and destruction should have stronger impacts on weak dispersers as they are not able to overcome the habitat scarcity. Consequently, only strong dispersers may persist, leading to high community similarity." (Authors) Odonata = 'Aeshnidae, Libellulidae, Coenagrionidae'] Address: García-Ríos, P., Graduate Program in Ecology of Inland Water Ecosystems (PEA), Dept Biology (DBI), Center Biological Sciences (CCB), State University of Maringá (UEM), Maringá, Brazil. Email: raul.dynamo@gmail.com

**20935.** Gomes, D. (2022): Non-consumptive killing of a con-specific dragonfly. *Frontiers in Ecology and the Environment*



20(9): 530. (in English) [Verbatim: Intraspecific competition for resources, such as food, mates, or territory, is widespread across the animal kingdom. Larval dragonflies (*Epithea cynosura*), for example, commonly cannibalize each other (Ecology 1996; doi.org/10.2307/2265668); however, larval damselflies (*Megaloprepes coerulatus*) are sometimes killed but not consumed by conspecifics (Oecologia 1994; doi.org/10.1007/bf00317138), which can reduce competition for food. Adult dragonflies, as in the case of *Perithemis tenera*, are known to defend breeding territories near water, whereby they fight off intruding conspecifics (Ethology 2004; doi.org/10.1046/j.1439-0310.2003.00942.x). On occasion, a territorial male may even catch a competitor, in which case that competitor would likely end up as food. Here, I observed a female western pondhawk (*Erythemis collocata*) chase and kill, but not consume, another female conspecific that had recently emerged. The attacking *E. collocata* chewed through the pronotum (a cover of the thorax) of the attacked *E. collocata*, which stopped moving immediately. The aggressor then departed to the shore of the pond, with no signs of returning to its victim. Occasionally predators kill "surplus" prey that they do not immediately eat, but may later consume (J Zool 1972; doi.org/10.1111/j.1469-7998.1972.tb04087.x). Yet certain taxa have been found to non-consumptively kill members of their own species, as observed with the black-capped chickadee (*Poecile atricapillus*) (J Field Ornithol 2012; doi.org/10.1111/j.1557-9263.2012.00377.x) and the Australian dingo (*Canis familiaris*) (Ethol Ecol Evol 2018; doi.org/10.1080/03949370.2017.1316522). It is unclear just how widespread non-consumptive killing of conspecifics is across the tree of life.] Address: Gomes, D., Cooperative Inst. for Marine Resources Studies, Oregon State Univ., Newport, OR, USA

**20936.** Gómez-Anaya, J.A.; Novelo-Gutiérrez, R. (2022): Richness and structure of an Odonata larval assemblage of a cloud forest stream in western Mexico. *Odonatologica* 51(3/4): 225-246. (in English) ["Cloud forest in Mexico is an ecosystem largely fragmented and reduced in recent decades by human influence. In this type of vegetation, ravine streams generally contain a particular odonate species composition. We describe the structure, composition, and temporal changes of the Odonata larval assemblage from El Colorín ravine stream in the cloud forest of Chinicuil-Coalcomán region, Michoacán, based on a bi-seasonal sampling 1-year cycle. The assemblage parameters were related to some physicochemical water properties. In total, 17 species were recorded (9 Zygoptera, 8 Anisoptera). Zygoptera was more diverse at supraspecific level with four families vs two of Anisoptera. Six species of Libellulidae were recorded with four species belonging to Brechmorhoga. However, the dominant species throughout the year was the calopterygid *Hetaerina capitalis*. Although there were changes in water temperature, pH, conductivity, and oxygen throughout the year, the structural changes of the odonate larval assemblage were more related to seasonality. Also, the Odonata adult assemblage of El Colorín was compared to other adult assemblages from eastern and central Mexico. We propose sub-assemblages of Brechmorhoga, Hetaerina, and Archilestes species as potential indicators of well-conserved conditions of mountain streams." (Authors)] Address: Novelo-Gutiérrez, R., Red de Biodiversidad y Sistemática, Inst. de Ecol., A.C., AP 63, 91073, Xalapa, Veracruz, México. Email: rodolfo.novelo@inecol.mx

**20937.** Gómez-Tolosa, M.; González-Soriano, E.; Penagos-García, F.E.; López, S. (2022): Odonata (Insecta) species list from two natural protected areas of state of Chiapas and

first state record of *Argia gaumeri*. *Revista Mexicana de Biodiversidad* 93 (2022): e934992: 8 pp. (in Spanish, with English summary) ["We carried out a study to know the fauna of adult odonates in 8 sites of 2 natural protected areas of the state of Chiapas, in rivers of the Lacandonia rainforest. This work was carried out in the localities of Puerto Bello Metzabok, and Naha, which are particular areas for flora and fauna conservation within the Mexican federal system. A total of 437 adult individuals belonging to 7 families were collected, corresponding to Coenagrionidae, Gomphidae, Heteragrionidae, Lestidae, Libellulidae, Protoneuridae, and Polythoridae; with 17 genera and 36 species. The highest species richness was obtained in Puerto Bello Metzabok. The dominant species was *Hetaerina occisa*, present at all sites. In addition, the species *Argia gaumeri* is registered for the first time in Chiapas." (Authors)] Address: Gómez-Tolosa, María, Universidad de Ciencias y Artes de Chiapas, Instituto de Ciencias Biológicas, Libramiento Norte-Poniente 1150, 29039 Tuxtla Gutiérrez, Chiapas, México. Email: malugomeztolosa@hotmail.com

**20938.** Gorb, S.N.; Wildermuth, H.; Kohl, S.; Büsse, S. (2022): Tarsal attachment structures of the biting midge *Forcipomyia paludis* (Diptera: Ceratopogonidae), a specialized ectoparasite of Odonata imagines. *Zoomorphology* 141: 297-306. (in English) [Switzerland "The female of the biting midge *Forcipomyia paludis* is a dipteran ectoparasite of West Palaearctic damselflies and dragonflies, sucking haemolymph mainly from wing veins of their hosts. This tiny midge remains firmly attached to the wings even during fast flight and aerial flight maneuvers as shown in the present paper by field studies of the large dragonfly, *Cordulegaster boltonii*. Since individuals of *F. paludis* firmly attach themselves to the challenging wing surface of their host and can successfully withstand drag and vibrations during flight, we assume that this midge species has specific microstructural adaptations on its legs for attaching to the wing surface. In our morphological study, we used scanning electron microscopy (SEM) and confocal laser scanning microscopy (CLSM), to study the structure of *F. paludis* tarsi, as well as the micro morphology of the wing surfaces of their host. Additionally, for the first time, we were able to show attachment devices of the midges dried out in contact with the host's surface. The spatulae of the plantar setae and especially the empodial setae, are capable of replicating nanoscale wax crystals of the super hydrophobic wing coverage of the dragonfly wing membrane, in order to increase an effective contact area and therefore adhesion. This ability requires extremely soft materials of the spatula, which seems to be rather unique even in comparison to the leg attachment devices of other dipterans and other insect taxa in general." (Authors)] Address: Büsse, S., Dept of Functional Morphology and Biomechanics, Institute of Zoology, Kiel University, Am Botanischen Garten 9, 24118, Kiel, Germany

**20939.** Grames, E.M.; Montgomery, G.A.; Boyes, D.H.; Dicks, L.V.; Forister, M.L.; Matson, T.A.; Nakagawa, S.; Prendergast, K.S.; Taylor, N.G.; Tingley, M.W.; Wagner, D.L.; White, T.E.; Woodcock, P.; Elphick, C.S. (2022): A framework and case study to systematically identify long-term insect abundance and diversity datasets. *Conservation Science and Practice* 2022:e12687: 19 pp. (in English) ["Biodiversity is in crisis, and insects are no exception. To understand insect population and community trends globally, it is necessary to identify and synthesize diverse datasets representing different taxa, regions, and habitats. The relevant literature is, however, vast and challenging to aggregate. The Entomological Global Evidence Map (EntoGEM)

project is a systematic effort to search for and catalogue studies with long-term data that can be used to understand changes in insect abundance and diversity. Here, we present the overall EntoGEM framework and results of the first completed subproject of the systematic map, which compiled sources of information about changes in dragonfly and damselfly (Odonata) occurrence, abundance, biomass, distribution, and diversity. We identified 45 multi-year odonate datasets, including 10 studies with data that span more than 10 years. If data from each study could be gathered or extracted, these studies could contribute to analyses of long-term population trends of this important group of indicator insects. The methods developed to support the EntoGEM project, and its framework for synthesizing a vast literature, have the potential to be applied not only to other broad topics in ecology and conservation, but also to other areas of research where data are widely distributed." (Authors)] Address: Elphick, C.S., Ecology and Evolutionary Biology, University of Connecticut, 75 North Eagleville Rd, Storrs, CT 06269, USA. Email: [chris.elphick@uconn.edu](mailto:chris.elphick@uconn.edu)

**20940.** Guignard, Q.; Allison, J.D.; Slippers, B. (2022): The evolution of insect visual opsin genes with specific consideration of the influence of ocelli and life history traits. *BMC Ecology and Evolution* (2022) 22:2: 9 pp. (in English) ["d: Visual opsins are expressed in the compound eyes and ocelli of insects and enable light detection. Three distinct phylogenetic groups of visual opsins are found in insects, named long (LW), short (SW) and ultraviolet (UV) wavelength sensitive opsins. Recently, the LW group was found to be duplicated into the LW2b and the LW2a opsins. The expression of LW2b opsins is ocelli specific in some insects (e.g., bees, cricket, scorpion flies), but the gene was not found in other orders possessing three or less ocelli (e.g., dragonflies, beetles, moths, bugs). In flies, two LW2b homologs have been characterised, with one expressed in the ocelli and the other in the compound eyes. To date, it remains unclear which evolutionary forces have driven gains and losses of LW opsins in insects. Here we take advantage of the recent rapid increase in available sequence data (i.e., from insect genomes, targeted PCR amplification, RNAseq) to characterize the phylogenetic relationships of 1000 opsin sequences in 18 orders of Insects. The resulting phylogeny discriminates between four main groups of opsins, and onto this phylogeny we mapped relevant morphological and life history traits. Results: Our results demonstrate a conserved LW2b opsin only present in insects with three ocelli. Only two groups (Brachycera and Odonata) possess more than one LW2b opsin, likely linked to their life history. In flies, we hypothesize that the duplication of the LW2b opsin occurred after the transition from aquatic to terrestrial larvae. During this transition, higher flies (Brachycera) lost a copy of the LW2a opsin, still expressed and duplicated in the compound eyes of lower flies (Nematocera). In higher flies, the LW2b opsin has been duplicated and expressed in the compound eyes while the ocelli and the LW2b opsin were lost in lower flies. In dragonflies, specialisation of flight capabilities likely drove the diversification of the LW2b visual opsins. Conclusion: The presence of the LW2b opsin in insects possessing three ocelli suggests a role in specific flight capabilities (e.g., stationary flight). This study provides the most complete view of the evolution of visual opsin genes in insects yet, and provides new insight into the influence of ocelli and life history traits on opsin evolution in insects." (Authors)] Address: Guignard, Q., Department of Zoology and Entomology, Forestry and Agricultural Biotechnology Institute, University of Pretoria, Pretoria 0002, South Africa. Email: [quentin.guignard@fab.up.ac.za](mailto:quentin.guignard@fab.up.ac.za)

**20941.** Hettige, N.D.; Hashim, R.; Kutty, A.A.; Ash'aari, Z.A.; Jamil, N.R. (2022): Using benthic macroinvertebrate distribution and water quality as organic pollution indicators for fish farming areas in Rawang Sub-basin, Selangor River, Malaysia: A correlation analysis. *Journal of fisheries and environment* 46(1): 180-197. (in English) ["Fish farming activities are essential to the economy of many countries. However, the discharge of fish farm effluents into nearby rivers can negatively impact benthic macroinvertebrates and water quality. In Malaysia, the correlation between water quality and benthic macroinvertebrates in areas impacted by fish farming has not been discussed comprehensively. Hence, this research investigated the connection between benthic communities and water quality in the Rawang sub-basin of the Selangor River using several statistical methods. Based on ease of accessibility and proximity to freshwater fish farms, and by using a random sampling method, seven sampling sites in six rivers were chosen including one reference site. Sampling of benthic macroinvertebrates and river water was carried out between April 2019 and March 2020. Principal Component Analysis (PCA) revealed that fish farming operations influence various water quality parameters such as dissolved oxygen (DO), biochemical oxygen demand (BOD5), chemical oxygen demand (COD), total suspended solids (TSS), pH, and ammonia-nitrogen. Canonical Correspondence Analysis (CCA) revealed that families Aeolosomatidae, Chironomidae, Lumbriculidae, Naididae, Planorbidae, and Tubificidae are tolerant to organic pollution. Their abundance was correlated with high BOD5, COD, turbidity, TSS, and ammonia-nitrogen. On the other hand, the families Caenidae, Gomphidae, Aytidae, Leptophlebiidae, Thiaridae, and Viviparidae are sensitive to organic pollution and were correlated with DO concentration. This research revealed that the correlation between benthic macroinvertebrate communities and water quality in the area is affected explicitly by fish farms." (Authors)] Address: Hashim, R., Faculty of Forestry and Environment, Department of Environment, Universiti Putra Malaysia, Selangor, Malaysia. Email: [rohasliney@upm.edu.my](mailto:rohasliney@upm.edu.my)

**20942.** Hlaing, N.; Htoo, H. (2022): Occurrence and species composition of some freshwater insects in Min Hla Lake, Thazi Township, Mandalay Region. *Yadanabon University Research Journal* 12(2): 247-256. (in English) ["A total of 284 individuals, representing 14 species from 14 genera, ten families and three orders were recorded from Min Hla Lake, Thazi Township. The species of freshwater insects were identified Odonata (five species), Hemiptera (seven species), Coleoptera (two species). Out of these the most abundance freshwater insect species was Order Hemiptera and the least species number was observed in order Coleoptera. In Order Odonata, ... *Anax junius* and *Ictinogomphus rapax* ... and ... *Orthetrum sabina*, *Pantala flavescens* and *Trithemis aurora* ...." (Authors)] Address: Htoo, H., Department of Zoology, Kalay University, Myanmar

**20943.** Hochkirch, A.; Casino, A.; Penev, L.; Allen, L.; Tilley, L.; Georgiev, T.; Gospodinov, K.; Barov, B. (2022): European Red List of Insect Taxonomists. Luxembourg: Publication Office of the European Union: 41 pp. (in English) ["Insects play a significant role in the functioning of healthy ecosystems and human well-being. By providing vital services such as pollination, matter decomposition, and bio-control, they greatly influence the living world. Our ability and expertise to recognise insect species and biodiversity are fundamental for their conservation. However, there is increasing concern regarding our capacity to identify insects and describe and name new insect species. This capacity has

traditionally been provided by taxonomists, working in museums, institutes or universities. This European Red List of Insect Taxonomists provides the first assessment of the status of taxonomic expertise capacity in Europe. Based upon a quantitative analysis of taxonomic papers published in scientific journals during the last decade as well as an online questionnaire, a detailed overview is given of the taxonomic capacity for each insect order and for each EU country. This European Red List of Insect Taxonomists is a call to the community of experts to bring their expertise into the public focus, and a call to society at large to acknowledge the role of taxonomy and support its sustainability in the long term. Overall, taxonomic capacity is threatened or eroded for 41.4% and 34.5% of the insect orders at the European and EU levels, respectively. The degree of erosion of taxonomic capacity is calculated as a Red List Index following Butchart et al. (2007), ranging between 0 (taxonomic capacity fully eroded) and 1 (all taxa covered by adequate capacity). There is substantial variation in the number of insect orders covered by taxonomists among countries: the highest Red List Index RLI is found in Czechia, followed by Germany and Russia. The lowest RLI is found in Albania, Azerbaijan and Belarus, and among the EU countries, Luxembourg, Latvia, Ireland and Malta. The number of insect orders covered by taxonomic expertise in each country correlates well with the Red List Index. The four largest insect orders (Coleoptera, Diptera, Lepidoptera, Hymenoptera) were all covered by >80% of the countries (in the case of Coleoptera and Lepidoptera even (by >90%)), but Adequate Capacity is only attained in 26% (Coleoptera) to 58% (Hymenoptera) of all countries. Three sets of recommendations – on strategic actions, science and societal engagement, are provided, with the aim of ensuring the long-term sustainability of taxonomic expertise in Europe. Strategic recommendations providing the framework to foster taxonomy: a. Provide targeted and sustainable funding specifically directed at increasing taxonomic capacity across Europe; b. Integrate the valuable role of taxonomists into policy formulation and implementation at the EU and national level. Science recommendations reinforcing the far-reaching impact of taxonomy: c. Ensure the continuous overview of the available taxonomic capacity, for example, by periodic reassessment of the Red List of Taxonomists. Expand the approach to other biodiversity groups. d. Increase the taxonomic capacity through dedicated knowledge exchange, education, training and development opportunities for professional taxonomists. e. Promote networking among taxonomists by maximising the use of modern technologies in research, publishing and knowledge exchange. Societal recommendations engaging society in taxonomy: f. Increase the recognition and awareness of the importance of taxonomic expertise by using effective means of communication with the public. g. Engage with citizen science initiatives to maximise the synergies between their efforts and taxonomic expertise in efficient research and monitoring of biodiversity." (Authors) In the case of Odonata each for Europe and European Community the situation is assessed as "Adequate Capacity".] Address: Pensoft Publishers, Prof. Georgi Zlatarski Street 12, 1700 Sofia, Bulgaria. Email: info@pensoft.net

**20944.** Housecroft, C.E. (2022): Dragonflies that change colour: Nature's hidden redox chemistry. *Chimia* 76(10): 869-870. (in English) ["The colour distinction between male and female, and between young and mature male dragonflies of the genera *Crocothemis* and *Sympetrum* arises from simple redox chemistry. This natural phenomenon has inspired the development of a class of electrochromic device]

Address: Housecroft, Catherine, Department of Chemistry, University of Basel, BPR 1096, Mattenstr. 24a, 4058 Basel, Switzerland. E-mail: catherine.housecroft@unibas.ch

**20945.** Isworo, S.; Oetari, P.S. (2022): Flora and fauna in the areas around artisanal gold mining in Selogiri Sub-district, Wonogiri, Indonesia. *Biodiversitas* 23: 6600-6618. (in English) ["Artisanal or small-scale gold mining has devastating impacts on the environment due to negligence of the principles of good environmental management. In particular, the mining activities often involve vegetation clearing and topsoil removal, which affect the biotic elements of the mined landscape. Selogiri Sub-district, Wonogiri District, Central Java Province, has a gold mineral resource that drives many traditional mining activities that have an indirect impact on the ecosystem's species diversity and community structure. This research aimed to investigate the diversity of flora and fauna in Selogiri Sub-district by comparing the area where the artisanal gold mining occurred (the inside area) and the areas surrounding the mining (the outside area). Six groups of taxa were observed in this study, including the plant group using the plot method, avifauna (birds) using Indices Ponctuels d'Abondance method, Odonata (dragonflies) and Lepidoptera (butterflies) both using visual encountering survey (VES) method, micromammals (Rodentia) using traps, VES, and camera traps and herpetofauna (amphibians and reptiles) using VES method. The diversity values of each taxa group in the inside and outside area were calculated and Sorensen's Coefficient Similarity Index formula was analyzed to see the community similarity between the two areas. A total of 243 species were found, consisting of Lepidoptera (35%), flora taxa (29%), avifauna (16%), herpetofauna (9%), Odonata (7%), and mammals (3%). The avifauna and Odonata had higher diversity values in the outside area than in the inside area. Similarly, the outside area had a higher diversity value for mammalian taxa documented using the VES method. Meanwhile, using the trap method, the taxa of Lepidoptera, herpetofauna, and mammals had higher diversity value in the inside area than in the outside. Nonetheless, the two areas had moderate similarity in the composition of flora and fauna species, with a community similarity value of less than 60% for all taxa studied. Conservation activities and off-site tree planting are solutions for restoring ecosystem structure and function to support ecological stability and biodiversity." (Authors)] Address: Isworo, S., Departement of Environmental Health, Universitas Dian Nuswantoro. Jl. Imam Bonjol 207, Semarang 50131, Central Java, Indonesia. Email: slametisworo512@gmail.com

**20946.** Jamil, M.; Noman Latif, Jaweria Gul, Muhammad Kashif, Arsalan Khan, Mubarik Ali, Norina Jabeen, Muhammad Shehzad Khan, Imran Qazi, & Namat Ullah. (2022): A review: An insight into the potential of biological control of ticks in domestic and wild Animals. *Abasyn Journal of Life Sciences* 5 (Issue 2): 51-67. (in English) ["Ticks are hematophagous arthropods that transmit pathogens to humans, animals and poultry birds, mostly in tropical and subtropical regions globally, causing considerable economic and health losses by serving infectious vectors. In endemic locations of the world, tick-borne diseases have become a public health issue. Ticks biting causes anemia in animals and also impair their hide quality. Therefore, the current review article focused on the biological control of ticks. Ticks, like any other creature, are susceptible to various infectious agents (*Anaplasma phagocytophilum*, *Babesia bigemina*, *B. gibsoni*, *Hepatozoon canis*, *H. americanum*, *Theileria annulate*, *T. taurotragi* etc). Ticks can become infected with rickettsia,

spirochetes, viruses, bacteria, and fungi. Some protozoans and worms infiltrate ticks and reproduce inside them, killing them. Fungus (*Metarhizium anisopliae*, *Verticillium lecanii*, *Beauveria bassiana*), bacteria (*Bacillus*), nematodes (*Steinernema glaseri*, *S. carpocapsae*), and parasitoids (*Ixodiphagus* species.) have proved effective biological agents to control ticks. Insects are also a type of natural tick enemy. Ticks that are engorged with blood and while moulting are the most vulnerable to insect predation and eaten by spiders, ants, beetles, dragonflies, and wasps (*Ixodiphagus*). Ticks are also preyed upon by amphibians and reptiles. Birds such as yellow-billed oxpecker (*Buphagus africanus*), helmeted guineafowl and Galliformes are good predators of ticks. Biological agents affect only target pests (ticks), do not destroy beneficial natural enemies and are safer for the ecosystem and humans. By keeping in view, the significance of biological agents, we highly recommend them in integrated tick management program that could minimize the tick population." (Authors) In spite the fact the authors name dragonflies as predators of ticks, I could not find any literature source where this behaviour is document.] Address: Jamil, M., PARC Arid Zone Research Centre, Dera Ismail Khan-29050-Pakistan. Email: jamilmatrah@parc.gov.pk

**20947.** Jödicke, R.; Borkenstein, A. (2022): Matutinal and vespertine reproductive behaviour in *Cordulia aenea* (Odonata: Corduliidae). *Notulae odonatologicae* 9(10): 473-481. (in English) ["A survey of crepuscular activities in *Cordulia aenea* was carried out at a site in north-western Germany (52.9° N) with an abundant population; this was during the optimal flight season, in favourable weather conditions under a clear sky. Diel activity commenced before sunrise and ceased after sunset. The species therefore belongs to the small group of species exhibiting both matutinal and vespertine activity. Activity during the diurnal period between dawn and dusk never ceased, resulting in a duration of daily flight activity of up to 17 h and 41 min in mid-June. In both twilight periods we predominantly saw patrolling males but also ovipositing females and formation of mating wheels. In the evening, males sometimes briefly interrupted their patrol flight for foraging and feeding. The primary utilization of dawn and dusk for reproductive activities, as occurred in *C. aenea*, is limited among European dragonflies to a small number of aeshnids and corduliids. A 24-hour rhythm of flight activity under the midnight sun, north of the Arctic Circle, is discussed." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, D-26655 Westerstede, Germany. E-mail: reinhard.joedicke@magenta.de

**20948.** Josten, B.; Gorb, S.N.; Büsse, S. (2022): The mouthparts of the adult dragonfly *Anax imperator* (Insecta: Odonata), functional morphology and feeding kinematics. *Journal of Morphology* 283(9): 1163-1181. (in English) ["Insects evolved differently specialized mouthparts. We study the mouthparts of adult *Anax imperator*, one of the largest odonates found in Central Europe. Like all adult dragonflies, *A. imperator* possesses carnivorous-type of biting-chewing mouthparts. To gain insights into the feeding process, behavior and kinematics, living specimens were filmed during feeding using synchronized high-speed videography. Additionally, the maximum angles of movement were measured using a measuring microscope and combined with data from micro-computed tomography ( $\mu$ CT). The resulting visualizations of the 3D-geometry of each mouthpart were used to study their anatomy and complement the existing descriptive knowledge of muscles in *A. imperator* to date. Furthermore, CLSM-projections allow for estimation of differences in the material composition of the mouthparts'

cuticle. By combining all methods, we analyze possible functions and underlying biomechanics of each mouthpart. We also analyzed the concerted movements of the mouthparts; unique behavior of the mouthparts during feeding is active participation by the labrum and distinct movement by the maxillary laciniae. We aim to elucidate the complex movements of the mouthparts and their functioning by combining detailed information on (1) in vivo movement behavior (supplemented with physiological angle approximations), (2) movement ability provided by morphology (morphological movement angles), (3) 3D-anatomy, and (4) cuticle composition estimates." (Authors)] Address: Büsse, S., Dept of Functional Morphology and Biomechanics, Institute of Zoology, Kiel University, Am Botanischen Garten 9, 24118 Kiel, Germany. Email: sbuesse@zoologie.uni-kiel.de

**20949.** Jouault, C.; Nel, A.; Perrichot, V.; Legendre, F.; Condamine, F.L. (2022): Multiple drivers and lineage-specific insect extinctions during the Permo-Triassic. *Nature Communications* | (2022) 13:7512: 17 pp. (in English) ["The Permo-Triassic interval encompasses three extinction events including the most dramatic biological crisis of the Phanerozoic, the latest Permian mass extinction. However, their drivers and outcomes are poorly quantified and understood for terrestrial invertebrates, which we assess here for insects. We find a pattern with three extinctions: the Roadian/Wordian (~266.9 Ma; extinction of 64.5% insect genera), the Permian/Triassic (~252 Ma; extinction of 82.6% insect genera), and the Ladinian/Carnian boundaries (~237 Ma; extinction of 74.8% insect genera). We also unveil a heterogeneous effect of these extinction events across the major insect clades. Because extinction events have impacted Permo-Triassic ecosystems, we investigate the influence of abiotic and biotic factors on insect diversification dynamics and find that changes in floral assemblages are likely the strongest drivers of insects' responses throughout the Permo-Triassic. We also assess the effect of diversity dependence between three insect guilds; an effect ubiquitously found in current ecosystems. We find that herbivores held a central position in the Permo-Triassic interaction network. Our study reveals high levels of insect extinction that profoundly shaped the evolutionary history of the most diverse non-microbial lineage." (Authors)] Address: Jouault, C., Inst. de Systématique, Évolution, Biodiversité (ISYEB), Muséum national d'Histoire naturelle, CNRS, Sorbonne Univ., EPHE, Université des Antilles, CP50, 57 rue Cuvier, 75005 Paris, France. Email: jouaultc0@gmail.com

**20950.** Kadadevaru, G.G.; Hosamani, M.B. (2022): Reproductive ecology of Narrow mouthed frog *Microhyla ornata*. *International Journal of Ecology and Environmental Sciences* 48(5): 597-602. (in English) ["Abstract: Reproductive ecology of Narrow mouthed frog *Microhyla ornata* was studied at selected breeding sites around Dharwad, Karnataka India during the wet periods between May 2017 and December 2018. The breeding activity varied depending upon the amount of rainfall. It was higher during monsoon when there was higher rainfall, whereas, when rainfall was scanty less activity was observed. Males begin the calling activity in the evening after the sunset at 1098min reaching its peak at around 1200min and extend till the early morning of the next day. Gravid females arrive at the breeding site one to one and half hour after the calling was initiated in the early pre-monsoon and monsoon period and amplexus took place soon after the arrival of females within one hour during peak calling days. Size assorted matting was observed in *M. ornata* and showed significant positive correlation. The female body size was positive correlation with clutch



size. However, there was no significant correlation between female body size and egg size. Breeding activity of *M. ornata* spanning for seven months suggest that, this species is a prolonged breeder. The eggs and larvae of *M. ornata* were under constant threat by the predatory larva of the aquatic insects like dragonfly and water beetle. Few clutches during non rainy period faced the risk of desiccation. The breeding sites of many anurans are affected by urbanization and habitat fragmentation. There is a need to adopt the strategy to conserve the habitats to protect the species." (Authors)] Address: Hosamani, M.B., Dept of Zoology, Karnatak University, Dharwad, Karnataka, India. E-mail: hosamanimb16@gmail.com

**20951.** Kesti, P.; Hiltunen, M.; Strandberg, U.; Vesterinen, J.; Taipale, S.; Kankaala, P. (2022): Lake browning impacts community structure and essential fatty acid content of littoral invertebrates in boreal lakes. *Hydrobiologia* 849: 967-984. (in English) ["Many lakes in the northern hemisphere are browning due to increasing concentrations of terrestrial dissolved organic carbon (DOC). The consequences of lake browning to littoral invertebrates, however, are not fully understood. We analyzed community structure and fatty acid (FA) profiles of littoral invertebrates in humic (DOC-rich) and clear-water lakes in Eastern Finland. We found higher abundance of chironomids (Diptera: Chironomidae) in humic compared to clear water lakes, whereas stoneflies (Plecoptera) and mayflies (Ephemeroptera: Baetidae) were more abundant in clear-water lakes. Taxon explained 65% of the differences in the FA composition of littoral invertebrates. However, the proportion and content of polyunsaturated FAs of several taxa were significantly higher in clear-water lakes compared to humic lakes. Our results reveal differences in both community structure and nutritional quality of littoral invertebrates for fish between humic and clear-water lakes." (Authors)] Address: Kesti, P., Department of Environmental and Biological Sciences, University of Eastern Finland, Joensuu, Finland

**20952.** Khan, M.K.; Herberstein, M.E. (2022): Parasite-mediated sexual selection in a damselfly. *Ethology* 128(8): 572-579. (in English) ["Sexual selection can improve population fitness and purge deleterious mutation from the gene pool by promoting condition-dependent mate selection. One ecological factor that reduces individual condition is parasitism. Parasitism tends to increase hosts' mutation load and likely indicates inferior host genetic quality. Parasite-mediated selection, therefore, should favour the mating success of parasite-resistant individuals over parasitised individuals. We tested this hypothesis in male *Agriocnemis pygmaea* damselflies, which are parasitised by *Arrenurus* water mites. We calculated frequency (i.e. the proportion of parasitism) and intensity (i.e. the number of parasites per parasitised individual) of parasitism in free-flying males and males in copula in seven natural populations. We predicted that males observed mating will be less likely to be parasitised than expected based on the frequency of parasitism in the population. We further predicted that parasite intensity would be lower in males caught in copula than single males. We found that parasitised males were significantly less likely to be found in copula than non-parasitised males, independent of their occurrence frequency. However, there was no difference in the average parasite load between males captured in copula or free-flying males. Our study shows that in addition to natural selection, sexual selection is a strong agent against parasitism and implies that it could promote local adaptation to counteract parasite driven extinction risks." (Authors)] Address: Khan, M.K., School of Natural

Sciences, Macquarie University, Macquarie Park, New South Wales, Australia. Email: bmbkawsar@gmail.com

**20953.** Khan, S.U.; Mehmood, S.A.; Ali, H.; Waqas, W.; Rahbar, B. (2022): The role of selected odonate nymphs in biological control of *Culex quinquefasciatus* larvae, and effect of glyphosate herbicide on their predatory performance. *Journal of Tropical Insect Science* 42(2): 1859-1864. (in English) ["Mosquitoes are potent vectors of many diseases such as malaria, dengue, yellow fever, and filariasis. Mosquitoes are controlled by various traditional methods including the widespread uses of synthetic chemicals. These applications have led to environmental degradation and loss of beneficial species. However, biological control, an ecofriendly control of mosquitoes through potential predators, is the key interest of today's researchers. During the current research, predatory performance of three selected odonatan nymphs (*Pantala flavescens*, *Trithemis aurora*, *Libellula fulva* [sic]) was investigated against mosquitoes' 3rd instar larvae. Furthermore, the effect of glyphosate herbicide on the predatory performance of these nymphs was also assessed. Results indicated higher larval consumption by *P. flavescens*, followed by *T. aurora* while less consumption by *L. fulva* during 24-h study. The difference among their predatory performance was not significant ( $p > 0.05$ ). The predatory performance of *P. flavescens* was significantly reduced compared to the control by 1.0, 2.5 and 5.0 ppm glyphosate, that of *T. aurora* by 2.5 and 5.0 ppm glyphosate while that of *L. fulva* by 5.0 ppm glyphosate. Thus, the performance of all the nymphs decreased with increasing glyphosate concentration. The study concluded that odonatan species play a vital role in control of mosquito larvae. However, anthropogenic activities such as excessive use of herbicides in agriculture pose a real threat to these natural predators." (Authors)] Address: Ali, H., Environmental Chem., Ecotoxicology & Applied Ecology Lab., Dept of Chemistry, Univ. of Malakand, 18800 Chakdara, Dir Lower, Khyber Pakhtunkhwa, Pakistan. Email: hazratiali@uom.edu.pk

**20954.** Koren, T.; Koller Šaric, K.; Kelava, L. (2022): The first records of *Trithemis annulata* (Palisot de Beauvois, 1807) (Odonata: Libellulidae) in Croatia. *Nat. Croat.* 31(2): 293-302. (in English, with Croatian summary) ["In August 2022 the first individuals of the dragonfly species Violet dropwing, *Trithemis annulata* (Palisot de Beauvois, 1807), were observed in Croatia, at three localities in southern Dalmatia. Two males were observed at the Peracko Blato lake, while both males and females were recorded at two localities at the Bacinska Lakes. At the Bacinska Lakes, more than 10 individuals were observed indicating a possible established population. The nearest known reproducing population is located about 160 km to the south, in Montenegro. Due to the species expansion in Europe, and recent records as north as Slovenia, additional records and established populations are to be expected in Croatia. As the species is now known from Croatia, we propose a vernacular name for this species, "ljubicasta skitnica" meaning purple tramp, referring to its coloration, wandering behavior and dispersal potential." (Authors)] Address: Koren, T., Ass. Hyla, Lipovac I, n. 7, 10 000 Zagreb, Croatia. Email: toni.koren@hhdhyla.hr

**20955.** Kosterin, O.E. (2022): Data on dragonflies and damselflies (Odonata) of the Katon-Karagai National Nature Park, Altai Mts, Kazakhstan. *Proceedings of Katon-Karagai State National Nature Park* 2: 175-187. (in English, with Russian and Kazakh summaries) ["Katon-Karagai State National Nature Park is situated in the most elevated part of the Altai Mts so its territory is in general hostile for

Odonata. Fifteen species of those were registered on three author's week-long trips to the Park in 1987, 2010 and 2012. Of them, findings of *Sympetrum meridionale* were remarkable as this species occurs in the most elevated part of Altai Mts but for some reason was not found in low levels, as well as on the plains of Siberia. Three more species are known from the park territory from literature, with the record of *Somatochlora exuberata* currently being the westernmost one of the species." (Author) (*Lestes barbarus*, *L. dryas*, *Sympetma paedisca*, *Coenagrion hastulatum*, *C. hylas*, *Enallagma cyathigerum* *risi*, *Ischnura pumilio*, *Aeshna caerulea*, *A. juncea*, *Cordulia aenea*, *Somatochlora arctica*, *S. exuberata*, *S. graeseri*, *Leucorrhinia orientalis*, *L. rubicunda*, *Sympetrum danae*, *S. flaveolum*, *S. meridionale*)] Address: Kosterin, O.E., Institute of Cytology & Genetics, Siberian Branch, Russian Acad. Scien., Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**20956.** Kozina, A. (2022): Distribution and potential endangerment of dragonflies and damselflies (Odonata) of the Bloke plateau. MSc. thesis, Univerza v Ljubljani, Biotehniška Fakulteta Studij Ekologije in Biodiverzitete: 72 pp. (in Slovene, with English summary) ["The Bloke Plateau is one of the better odontologically studied areas in Slovenia, however, most of the data were obtained at the end of the last century. The purpose of the master's thesis was to investigate the current distribution of dragonflies in the area and to check for their possible endangerment. We conducted 29 field days in 2021, which were planned to cover different parts of the adult dragonfly flight season. Larvae and exuvias were also sampled during the surveys. The presence of dragonflies was recorded at 48 study sites, of which 27 were surveyed first time during our survey. We recorded 35 species of dragonflies. We confirmed the reproduction of 26 dragonfly species at Bloke plateau. During the survey, Green emerald damselfly (*Chalcolestes viridis*) and Dainty bluet (*Coenagrion scitulum*) were recorded for the first time in the area. In total, we recorded six threatened and two protected species of dragonflies. Ornate bluet (*Coenagrion ornatum*) and Balkan goldenring (*Cordulegaster heros*) are listed in the Annexes of the Habitats Directive. The highest number of species (23) were recorded at the site Fishponds 500 m south of Godicevo. During the survey, we did not record the Common hawkler (*Aeshna juncea*), which was a common species at the Bloke plateau in the past, but today it seems to be endangered or even locally extinct. Dragonflies on the Bloke plateau are threatened by the loss of a suitable habitat due to the drying up and overgrowing of bog habitats, as well as the development of mass tourism and excessive introduction of fish into some water bodies." (Author)] Address: not stated

**20957.** Kroth, N.; Rezende, R.; Magro, J.D.; Albeny-Simões, D. (2022): Top-down effects on aquatic communities in subtropical lentic microhabitats. *Austral Ecology* 47(5): 1006-1015. (in English) ["Natural lentic microhabitats are important for aquatic invertebrate communities in subtropical aquatic systems, which are usually dominated by mosquitoes, predators and zooplankton. Subtropical lentic microhabitats might be strongly affected by top-down effects of predators. We evaluated the predator effects on aquatic macroinvertebrate and zooplankton communities by using black plastic buckets (10 L) to simulate lentic microhabitats, which were divided into four treatments: predator absence and presence, and initial (on experiment start) and final (on experiment end) community controls. Large top predators (Odonata) had a stronger effect on community structure by their sit-and-wait predatory behaviour. The richness of total

macroinvertebrates, *Culex* genus (most abundant organism), and zooplankton was highest in predators' absence. On the other hand, the sit-and-wait behaviour increased the density of organisms by selective predation on macroinvertebrates that feed in the bottom of the system. Also, the sit-and-wait behaviour increased the density of gathering and filtering collectors (top swimmers) by differences in space preference. We observed a positive species-specific relationship between *Culex* and predators. We concluded that predators' presence contributes to the balance of lentic microhabitat in subtropical lentic microhabitats by top-down control." (Authors)] Address: Kroth, Nádia, Laboratório de Entomologia Ecológica, Programa de Pós Graduação em Ciências Ambientais, Univ. Comunitária da Região de Chapecó, Servidão Anjo da Guarda, n° 295-D, Bairro Efapi, Chapecó, Brazil. Email: nadia.kroth@unochapeco.edu.br

**20958.** Lee, C.Y.; Kim, M.K.; Kim, D.-G. (2022): Ecological responses of *Nannophya koreana* (Odonata: Libellulidae) to temperature: Following converse Bergmann's Rule. *Biology* 2022, 11(6), 830; <https://doi.org/10.3390/biology-11060830>: 16 pp. (in English) ["Simple Summary: Bergmann's rule explains the phenomenon where populations and species of larger sizes are found at higher latitudes and colder environments, whereas populations and species of smaller size are found at lower latitudes and in warmer regions. In insects, adult sizes tend to be smaller in warmer environments than at cooler temperatures and higher latitudes; the response is called the temperature-size rule. *Nannophya koreana* is an endangered species in Korea and represents a flagship species for wetland conservation. We found that the body size of the larvae was smaller in a cold-water-temperature region than in a warm-water-temperature area, which is contrary to the rules mentioned above. The two regions were geographically close to each other, with no differences in air temperature and precipitation. We identified the reasons for the difference in water temperature between the two regions and established the relationship between temperature and body size in *N. koreana*. In addition, we analyzed how *N. koreana* compensated for low water temperature to maintain its life cycle, which is known as univoltine. Abstract: Ecological rules such as Bergmann's rule and the temperature-size rule state that body-size decline is a universal response to warm temperatures in both homeotherms and poikilotherms. In the present study, we investigated the biological responses of *Nannophya koreana*, an endangered dragonfly species in Korea, by comparing body size in two habitats with large differences in water temperature, Mungyong-si (MG, terraced paddy fields) and Muui-do (MU, a mountainous wetland). To conserve the dragonfly populations, the collected larvae were photographed and released, and their head widths and body lengths were measured. There was no difference in the annual mean air temperature and precipitation between the two sites; however, the annual mean water temperature was substantially lower in MU than in MG. There was little difference in larval head width between the two sites; however, body length in the MU population was smaller than that in the MG population. Larval growth rate per 100-degree-days was 0.75 mm for MG and 1.16 for MU. The relationship between temperature and body size of *N. koreana* larvae showed opposite trends to Bergmann's rule and the temperature-size rule. Since the larval growth period during a year in MU was shorter than that in MG, the MU population potentially exhibits a higher growth rate as a mechanism of compensating for the low water temperature. Our study established the relationship between temperature and body size of *N. koreana* in two wetlands that had

an obvious difference in water temperature despite being geographically close. The results highlight the importance of considering detailed factors such as habitat type when studying the temperature–size responses of organisms." (Authors)] Address: Lee, C.Y., Institute of Environmental Ecology, Sahmyook University, Seoul 01795, Korea. Email: ishursain@gmail.com

**20959.** Lehka, Z.; Hrivnak, M. (2022): Dragonfly research (Insecta, Odonata) in the Muránska Lehota fishponds. *Entomofauna carpathica* 34(2): 65-74. (in Slovakian, with English summary) ["The research of dragonflies was carried out in 2017 – 2022 in the Muránska Lehota fishponds. 19 species of dragonflies were Zygoptera. Endangered species at the locality were represented by were *Ischnura pumilio*, *Anaciaeschna isosceles*, *Anax parthenope* and *Crocothemis erythraea*. The results suggest high potential of the fishponds for occurrence and conservation of many dragonfly species. Anthropogenic water reservoirs increase the diversity of the landscape and provide a suitable habitat for a rich species spectrum of dragonflies." (Authors)] Address: Lehká, Zuzana, Výskumný ústav vodného hospodárstva, Nábřežie armádneho generála Ludvíka Svobodu 5, 812 49 Bratislava, Slovakia. Email: zuzana.lehka@vuvh.sk

**20960.** Leung, T.K.C.; So, K.Y.K.; Shum, B.T.W.; Hau, B.C.H. (2022): Optimal mowing regime in enhancing biodiversity in seasonal floodplains along engineered channels. *Sustainability* 2022, 14(7), 4002; <https://doi.org/10.3390/su14074002>: 16 pp. (in English) ["The vegetation grown on grasscretes along channelized rivers have been regularly mown in Hong Kong. However, no baseline information on the relationship between different mowing regimes and the biodiversity of such riverbed vegetation is available. We therefore carried out a manipulative experiment along a channelized river to test the effect of mowing frequency and intensity on the abundance and species richness of terrestrial biodiversity. We conducted point counts and transect counts to survey birds, butterflies and Odonates, night surveys for amphibians and reptiles, quadrat surveys for vegetation and sweep net and pan traps for other macroinvertebrates. The results from Generalized Linear Mixed Models (GLMMs) showed a taxon-specific effect of mowing regime. Bird species richness was significantly suppressed in plots mown with high frequency. Both butterfly abundance and species richness were greatly enhanced by low intensity and low frequency mowing. Odonate abundance, and the abundance and species richness of other macroinvertebrates remained high whenever a portion of vegetation was retained as refuge. Amphibians and reptiles did not prefer to utilize the vegetation grown on grasscretes, and thus showed no impact from different mowing regimes. The overall species richness of vegetation was not affected by mowing regimes, but the domination of tall invasive *Brachiaria mutica* was suppressed by any mowing activity. To cater for the need of most taxa, we propose a mosaic mowing regime, in which most parts along the channelized river could be mown infrequently to 600 mm tall while some of the patches remain unmown.... 3.4. The Effects of Mowing Regimes on Odonates A total of 501 individual Odonates were recorded from the point and transect count surveys. The monthly mean abundance for each treatment (including the control) ranged from 0 to 7.1, while that of the mean richness ranged from 0 to 2.2. The results of the GLMMs suggested that the abundance of Odonates was significantly higher for Treatment B, D and Control than Treatment A (GLMMs: A–B: t.ratio = –4.237,  $p < 0.001$ ; A–D: t.ratio = –4.296,  $p < 0.001$ ; A–Control: t.ratio = –4012,  $p < 0.001$ . Table 3). Species richness

of Treatment B and D were significantly higher than Treatment A (A–B: t.ratio = –3.693,  $p = 0.002$ ; A–D: t.ratio = –3.291,  $p = 0.010$ ), but were not significantly different from those of Control and Treatment C (Figure 2 and Table 3). No interaction was detected between the effects of treatment and season." (Authors)] Address: Leung, T.K.C., Division of Ecology & Biodiversity, School of Biological Sciences, Univ. of Hong Kong, Pok Fu Lam, Hong Kong. Email: u3527523-@connect.hku.hk

**20961.** Luan, S.; Cao, H.; Deng, H.; Zheng, G.; Song, Y.; Gui, C. (2022): Artificial hyper compound eyes enable variable-focus imaging on both curved and flat surfaces. *ACS Appl. Mater. Interfaces* 2022, 14, 40, <https://doi.org/10.1021/acsmi.2c15489>: 46112-46121. (in English) ["The artificial compound eye (ACE) with zoom imaging requires complex power sources. Meanwhile, its curved substrate makes it difficult for the ACE to realize the zoom imaging on flat surfaces. To realize a wide field of view and a zoom function on both curved and flat surfaces simultaneously, a novel ACE is proposed, which is a bionic design inspired by an ancient creature, trilobite. Compared with a dragonfly, photosensitive units of a trilobite's compound eye are composed of ommatidia with different focal lengths. By learning from this concept, an artificial hyper compound eye (AHCE) was fabricated. Its basic components are five microlenses with different curvatures, and they are capable of being treated as five ommatidia with different focal lengths. Five ommatidia form a photosensitive unit to realize a zoom function. AHCE is capable of variable-focus imaging on curved surfaces. With the information share function, we found that the AHCE not only images on curved surfaces but also has a zoom-imaging function on flat surfaces. The results confirm that the AHCE demonstrates an advanced imaging capability, a variable-focus imaging function on both curved and flat surfaces, which may open new opportunities in developing advanced micro-optical devices." (Authors)] Address: Luan, S., School of Power & Mechanical Engineering, Wuhan University, Wuhan 430072, China

**20962.** Ludányi, M.; Peeters, E.T.H.M.; Kiss, B.; Gáspár, A.; Roessink, I.; Magura, T.; Müller, Z. (2022): The current status of *Pacifastacus leniusculus* (Dana, 1852) and their effect on aquatic macroinvertebrate communities in Hungarian watercourses. *Aquatic Invasions* 17: (in English) ["The freshwater crayfish *Pacifastacus leniusculus* is among the most widespread invasive crayfish species in Europe. *Pacifastacus leniusculus* invaded Hungary around 1998 and here we investigated the recent expansion of this species and its impact on other aquatic macroinvertebrates. The colonization of watercourses throughout Europe by the signal crayfish resulted in negative impacts on the present aquatic communities. Our investigation (i.e. in Rába, Pinka, Gyöngyösstream, Répce, Arany-stream and Strém systems) revealed that the distribution range of signal crayfish is still in expansion in the western part of Hungary and in all likelihood impacting the aquatic communities in these watercourses. Our results obviously demonstrated that signal crayfish densities were highest in habitats with gravel or coarse particulate organic matter, which seems to reflect a species-specific habitat preference. Our investigation proved that the presence of *P. leniusculus* had negative effects on a number of protected species such as *Calopteryx virgo* and *Onychogomphus forcipatus* next to a significant negative effect on the Odonata and Trichoptera species richness as well as on the abundances of Ephemeroptera, Odonata and Trichoptera. Our study in Hungary supports the notion of the significant negative impact of signal crayfish on native freshwater invertebrate

communities throughout Europe. In order to assess whether these impacts are restricted to fast flowing waters only, an adequate monitoring plan providing more knowledge on this species with respect to biotic and abiotic preferences and aquatic macroinvertebrate composition is required.... Impact on protected species: In order to assess the potential impact of *P. leniusculus* on protected species, the occurrences of these species were compared between the invaded Gyöngyös-stream and the non-invaded Kerca stream. Despite the invasion of *P. leniusculus*, the Gyöngyös-stream still harboured many protected species comprising *Agnatina elegantula*, *Aquarius najas*, *Calopteryx virgo*, *Cordulegaster bidentata*, *C. heros*, *Gomphus vulgatissimus*, *Macronychus quadrituberculatus*, *Oligoneuriella rhenana*, *Onychogomphus forcipatus*, *Ophiogomphus cecilia* and *Unio crassus*. In the Gyöngyös-stream concerned, the relative abundance of *Calopteryx virgo* ( $2.94 \pm 1.08$  ind./m<sup>2</sup>  $\pm$  S.E.), *G. vulgatissimus* ( $4.32 \pm 1.66$  ind./m<sup>2</sup>  $\pm$  S.E.) and *O. cecilia* ( $5.58 \pm 1.57$  ind./m<sup>2</sup>  $\pm$  S.E.) was the highest. *C. virgo*, *C. heros*, *G. vulgatissimus*, *O. forcipatus*, *O. cecilia* and *U. crassus* occurred in the crayfish affected Gyöngyös and crayfish free Kerca as well. However, due to the low abundances of most of these protected species, a proper comparison was only possible for *C. virgo*, *G. vulgatissimus* and *O. forcipatus*. According to the GLM analysis, the relative abundance of *C. virgo* and *O. forcipatus* was significantly lower in the presence of *P. leniusculus*, while the relative abundance of *G. vulgatissimus* did not show significant relationship with the crayfish occurrence (Figure 4, Table 3).] " (Authors)] Address: Ludányi, Mercédesz, BioAqua Pro Ltd. 4032 Debrecen, Soó Rezső utca 21, Hungary. Email: ludanyimercedesz@gmail.com

**20963.** MacLeod, N.; Price, B.; Stevens, Z. (2022): What you sample is what you get: ecomorphological variation in *Trithemis* (Odonata, Libellulidae) dragonfly wings reconsidered. *BMC Ecology and Evolution* (2022) 22:43: 29 pp. (in English) ["Background: The phylogenetic ecology of the Afro-Asian dragonfly genus *Trithemis* has been investigated previously by Damm et al. (in *Mol Phylogenet Evol* 54:870–882, 2010) and wing ecomorphology by Outomuro et al. (in *J Evol Biol* 26:1866–1874, 2013). However, the latter investigation employed a somewhat coarse sampling of forewing and hindwing outlines and reported results that were at odds in some ways with expectations given the mapping of landscape and water-body preference over the *Trithemis* cladogram produced by Damm et al. (in *Mol Phylogenet Evol* 54:870–882, 2010). To further explore the link between species-specific wing shape variation and habitat we studied a new sample of 27 *Trithemis* species employing a more robust statistical test for phylogenetic covariation, more comprehensive representations of *Trithemis* wing morphology and a wider range of morphometric data-analysis procedures. Results: Contrary to the Outomuro et al. (in *J Evol Biol* 26:1866–1874, 2013) report, our results indicate that no statistically significant pattern of phylogenetic covariation exists in our *Trithemis* forewing and hindwing data and that both male and female wing datasets exhibit substantial shape differences between species that inhabit open and forested landscapes and species that hunt over temporary/standing or running water bodies. Among the morphometric analyses performed, landmark data and geometric morphometric data-analysis methods yielded the worst performance in identifying ecomorphometric shape distinctions between *Trithemis* habitat guilds. Direct analysis of wing images using an embedded convolution (deep learning) neural network delivered the best performance. Bootstrap and jackknife tests of group separations and discriminant-function stability confirm that our results are not artifacts of

overtrained discriminant systems or the “curse of dimensionality” despite the modest size of our sample. Conclusion: Our results suggest that *Trithemis* wing morphology reflects the environment’s “push” to a much greater extent than phylogeny’s “pull”. In addition, they indicate that close attention should be paid to the manner in which morphologies are sampled for morphometric analysis and, if no prior information is available to guide sampling strategy, the sample that most comprehensively represents the morphologies of interest should be obtained. In many cases this will be digital images (2D) or scans (3D) of the entire morphology or morphological feature rather than sparse sets of landmark/semilandmark point locations." (Authors)] Address: MacLeod, N., School of Earth Sciences & Engineering, Nanjing Univ., 163 Xianlin Avenue, Nanjing 210023, Jiangsu, China. Email: NMacLeod@nju.edu.cn

**20964.** Makbun, N.; Wongkamhaeng, K.; Keetapithchayakul, T.S. (2022): *Anax aurantiacus* sp. nov., a new dragonfly from mainland Southeast Asia (Odonata: Aeshnidae). *Odonatologica* 51(3/4): 301-339. (in English) ["A new species of the genus *Anax*, *A. aurantiacus*, is described and illustrated based on adults of both sexes and exuviae from Thailand. This new species was previously considered by several authors to be a form of *A. immaculifrons* Rambur, 1842, but was never officially described. *Anax aurantiacus* sp. nov. is differentiated from *A. immaculifrons* based on coloration and morphological differences in the adults and larvae. Two species delimitation analyses (ABGD and bPTP) were also carried out, from which can be inferred that *A. aurantiacus* and *A. immaculifrons* were different Molecular Operational Taxonomic Units. Material and images available on internet and literature show the species to be present in Cambodia, Laos, China, Hong Kong, Thailand, and Vietnam, with *A. immaculifrons* occurring in South Asia and further west. *A. immaculifrons* therefore needs to be deleted from the checklists from Cambodia, Laos, China, Hong Kong, Thailand, and Vietnam, replaced by *A. aurantiacus* sp. nov." (Authors)] Address: Tosaphol Saetung Keetapithchayakul, T.S., 2 Department of Zoology, Faculty of Science, Kasetsart University, 50 Ngam Wong Wan Rd, Lat Yao, Chatuchak, Bangkok, Thailand. Email: Keetapithchayakul.TS@gmail.com

**20965.** Maldonado, M.A.; Manara, E.; Martín, P.R. (2022): Macroinvertebrates in the diet of the Apple snail *Pomacea canaliculata* in its native range. *Malacologia* 65(1-2): 59-69. (in English) ["The study of diet and how a species obtains food is relevant to understand its role within natural environments. The apple snail *Pomacea canaliculata* (Lamarck, 1822) is a freshwater dweller that primarily consumes aquatic macrophytes and detritus but also incorporates resources of animal origin in its diet. Our aim was to investigate the ingestion of macroinvertebrates by *P. canaliculata* in four watercourses from its native range by analyzing its digestive contents. The frequency of occurrence of animal remains in the digestive contents of *P. canaliculata* snails was 68.50% across different seasons, with values of more than 50% in each of the watercourses studied. The spring-summer contents showed high frequencies of animal remains, whereas in autumn they were recorded only in 10% of the contents from one of the watercourses. The macroinvertebrates ingested belonged to six different insect orders, crustaceans, mites, bivalves, and gastropods. The frequencies of occurrence were higher for arthropods than for mollusks in two watercourses and similar in the other two. In two watercourses, the relative abundances of mollusks were higher than those of arthropods and the opposite was true in the other two. The number of individuals ingested by an average *P.*



canaliculata was highest for the snail *Heleobia parchappii*, followed by arthropods, *H. parchappii* eggs, and the snails *Physella acuta* and *Chilina parchappii*. Most ingested macroinvertebrates were small, slow or with little or no mobility, such as snails and case-bearing insects. Arthropods able to swim or to swiftly escape, such as Amphipoda and nymphs of Odonata and Ephemeroptera, were not detected at all in the digestive contents. Ingestion of macroinvertebrates appears to be opportunistic and even accidental and probably depends more on their microhabitats or behavior than on preferences of *P. canaliculata*. Notwithstanding, the high frequency of ingestion observed on some species of snails could have a significant negative effect on the abundance of their populations." (Authors)] Address: Martín, P.R., INBIOSUR (Univd Nacional del Sur – CONICET) & Lab. de Ecología, Departamento de Biología, Bioquímica y Farmacia (Univd Nacional del Sur), San Juan 670, (8000) Bahía Blanca, Argentina. Email: pablorafaelmartin@gmail.com

**20966.** Maneechan, W.; Vitheepradit, A.; Prommi, T.O. (2022): Nutritional compositions of aquatic insects living in rice fields, with a particular focus on odonate larvae. *Insects* 2022, 13, 1131. <https://doi.org/10.3390/insects13121131>: 13 pp. (in English) ["Simple Summary: Food security concerns are growing due to the rapid increase in the world population. From this perspective, insects are a possible sustainable food source because of their nutritional value and the sustainability of their production system. Although the human consumption of edible insects has been a culturally long-standing practice, the nutritional literature on aquatic insects is not complete. Thus, the aims of the present study were to: (1) confirm the nutritional characteristics of odonate larvae (*Libellulidae*: *Pantala* sp.), including quantifying the bioaccumulation; and (2) investigate the microplastic accumulation in odonate larvae living in rice fields. The results show that odonates such as *Pantala* sp. are a good source of protein, minerals, essential amino acids, and long-chain polyunsaturated fatty acids. However, although the odonates seem to be a good source of nutrition, they may typically contain bioaccumulation, including microplastics, from their diets and habitats. Abstract: Although the human consumption of aquatic insects is prevalent in many regions, the nutritional composition of the insects has not been comprehensively determined. The proximate composition of *Pantala* sp. was shown to be a good source of protein ( $49.45 \pm 0.32$  g/100 g DW), as well as of minerals such as sodium, calcium, potassium, phosphorus, zinc, and iron. All nine essential amino acids are present in this species, with valine being the most abundant. The major fatty acids are palmitic acid ( $1.19 \pm 0.02$  g/100 g DW), oleic acid ( $0.63 \pm 0.02$  g/100 g DW), and linoleic acid ( $0.55 \pm 0.01$  g/100 g DW). Lead (Pb), arsenic (As), and cadmium (Cd) showed a value of  $0.18 \pm 0.01$  mg·kg<sup>-1</sup>,  $3.51 \pm 0.12$  mg·kg<sup>-1</sup>, and  $0.17 \pm 0.00$  mg·kg<sup>-1</sup>, respectively. Furthermore, microplastic (MP) contamination in odonate larvae (419 individuals belonging to three identified families) was found in varying shapes, e.g., fibers, fragments, and rods. FTIR analysis revealed the following MP polymers, polyethylene terephthalate, polyvinyl acetate, bis(2-ethylhexyl), polybutadiene, poly(methyl methacrylate-co-methacrylic acid); P(MMA-co-MA), poly(ethylene glycol) tetrahydrofurfuryl ether, poly(acrylonitrile-co-butadiene), and polypropylene glycol. The results of this work could be a nutritional reference for food security and the risk of eating insects." (Authors)] Address: Prommi, T.O., Dept of Science, Faculty of Liberal Arts & Science, Kasetsart University, Kamphaeng Saen Campus, Nakhon Pathom 73140, Thailand. Email: faastop@ku.ac.th

**20967.** Manger R.; De Knijf, G. (2022): Mass reproduction of the Vagrant Emperor (*Anax ephippiger*) in Belgium and the Netherlands in the summer of 2019. *Brachytron* 23: 7-21. In Dutch, with English summary. ["From 7 June 2019 onwards, an invasion of *A. ephippiger* was observed in much of Belgium and the Netherlands with not less than 482 individuals and 1744 individuals being observed respectively. Ovipositing behavior was found at 31 locations. In August and September 2019 exuviae and freshly emerged imagoes were found at 1 site in Belgium and 6 sites in the Netherlands. More than 1000 exuviae or teneral were found in an urban city pond of Antwerp (Belgium) and at Millingerwaard, in the river valley of the river Waal near Nijmegen (the Netherlands), being the two most important sites. First emergences of *A. ephippiger* were noticed on 23 August in the Netherlands and on 29 August in Belgium, resulting in a larval development time of respectively 78 and 81 days. Reproduction habitat consisted mainly of partially drying ponds characterized by high water temperatures in the summer of 2019. Those habitats were situated in diverse landscape configurations such as an urban area, dune ecosystems, fens in heathland, and ponds in a river valley ecosystem. Emergence took place during the night and maiden flight only occurred just before the onset of the sun and lasted not much more than 10 minutes. Most of the exuviae were found on aquatic plant stems and leaves above the water. At 80% of the locations where ovipositing of *A. ephippiger* was observed in June 2019, successful reproduction of *Sympetrum fonscolombii* was found later summer." (Authors)] Address: Knijf, G. de, Research Institute for Nature & Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. E-mail: geert.deknijf@inbo.be

**20968.** Martynov, V.; Nikulina, T.; Shokhin, I.V.; Terskov, E.N. (2022): Contributions to Fauna of Invasive Insects of Astrakhan Region and Republic of Kalmykia. *Field Biologist Journal*, 4(4): 329–343: 329-343. (in Russian, with English summary) ["The paper presents results of field surveys conducted in 2022 in the territory of the Astrakhan region and the Republic of Kalmykia. In the course of our study, 13 species of invasive insects from 5 orders (Odonata, Mantodea, Hemiptera, Coleoptera, Diptera) were registered ... Verbatim (GoogleTranslate): "Order Dragonfly. Odonata Family Gomphidae 1. *Lindenia tetraphylla* Vander Linden, 1825. Material: 10, erik Shushay, 06/28/2022. A species of Mediterranean origin with a Mediterranean-Central Asian modern range. In recent decades, it has shown a tendency to expand its range. On the territory of Russia, it is known from Rostov, Volgograd, Astrakhan regions, Stavropol Territory, the Republics of Crimea, Kalmykia, Dagestan, Kabardino-Balkaria, Chechnya [Sobolev, Volkova, 2017], North Ossetia [Onishko, 2019] and Krasnodar Territory [Onishko, Kosterin, 2021]. On the territory of the Astrakhan region, it was first recorded in 2007 (Sobolev, Volkova, 2017). Currently common in Kalmykia and Astrakhan region [Sobolev, Volkova, 2017; Onishko and Kosterin, 2021]. Family Libellulidae 2. *Selysiothemis nigra* (Vander Linden, 1825). Material: 10, erik Shushai, 06/28/2022; 11, 07/03/2022. Distributed in all Mediterranean countries of Europe and North Africa, as well as in most countries of the Middle East, Transcaucasia and Central Asia, isolated populations are known in India and Pakistan [Skvortsov, 2010; Martynov et al., 2015]. In recent decades, it has shown a tendency to expand its range. In the European part of Russia, it was first recorded in 2000 in the Southern Urals, in 2005 it was recorded for the Central Caucasus [Zalikhonov, 2005], in 2007 it was identified in the Yashkulsky and Chernozemelsky regions of the Republic of Kalmykia [Skvortsov,

Kuvaev, 2007], it was recorded for the Astrakhan region [Onishko and Kosterin, 2021]. Currently, it is widely distributed in the Sea of Azov (Krasnodar Territory, Crimea) [Martyanov et al., 2015] and Ciscaucasia (Aldygea, Karachay-Cherkessia, Kabardino-Balkaria, North Ossetia, Dagestan [Onishko, 2019, 2021, Ketenchiev et al., 2020; Shapovalov, 2020]. In the Astrakhan region, the species is common on drying eriks and lakes (Fig. 2a: "– drying erik – a place of mass population of *Selysiotthemis nigra* (Astrakhan region, neighbourhood of Kurchenko village)".) Address: Nikulina, Tatyana, Donetsk Botanical Garden, 110 Illich Ave, Donetsk 283059, Donetsk People's Republic [sic!], Russia [sic!]. E-mail: nikulinatanya@mail.ru

**20969.** Masih, S.C.; Pathak, R.K. (2022): Odonate ecology and diversity. A review. *International Journal of Entomology Research* 7(12): 150-152. (in English) ["One of the most prevalent insects flying over forests, fields, meadows, lakes, and streams are dragonflies and damselflies, which are collectively known to as odonates. The number of living species worldwide is about 6,000. With more over 500 species currently known, India is very diversified. One of the oldest groups of insects is the Odonata. It first originated along with mayflies during the Carboniferous era, some 250 million years ago (Ephemeroptera). Monsters include up the Odonata group from the Carboniferous period; for instance, *Meganeprosis americana* from that time had wingspan of 71 cm, which is almost as long as a pigeon. Ancient insect species like dragonflies and mayflies were some of the first to acquire wings and take to the air. Dragonflies have perfected the art of flight and are still skilled acrobats. The order Odonata is divided into three categories depending on morphology: the Anisozygoptera, the Zygoptera, and the dragonflies (Anisoptera). *Epiophlebia laidlawi*, one of the two species mostly in suborder Anisozygoptera, is documented from Darjeeling. In the field, dragonflies and damselflies are easily distinguished. Although their morphologies are very different, they have similar overall life histories." (Authors)] Address: Masih, S.C, Dept of Zoology, Ewing Christian Post Graduate College, Allahabad, Uttar Pradesh, India

**20970.** Maslo, B.; Mau, R.L.; Kerwin, K.; McDonough, R.; McHale, E.; Foster, J.T. (2022): Bats provide a critical ecosystem service by consuming a large diversity of agricultural pest insects. *Agriculture, Ecosystems & Environment* Volume 324, 1 February 2022, 107722: 11pp. (in English) ["Highlights: • Bats consumed at least 160 known agricultural pests or disease vectors. \*Big brown bats greatly expand their consumption of pest species in late June. \*Bats serve as comprehensive samplers of flying insects. \*DNA metabarcoding of guano is equivalent to broad-spectrum, non-specific insect monitoring methods (i.e. blacklight traps). Abstract: Biodiversity directly influences the delivery of multiple ecosystem services, most notably within agriculture. Projected future global demands for food, fiber and bioenergy will require enhancement of agricultural productivity, but favoring biodiversity-based ecosystem services generally remains underutilized in agricultural practice. In addition, agricultural intensification is a key driver of biodiversity loss. A significant obstacle preventing the adoption of ecologically sensitive practices is a lack of knowledge of the species delivering the services. Insectivorous bats have long been suggested to regulate insect pest populations and may be a critical component of biodiversity-based ecosystem services. Bats may also serve as agents of insect pest surveillance through environmental DNA (eDNA) monitoring approaches. However, the biological and economic importance of bats to agriculture remains under-quantified.

Here we catalogued the dietary niche of two North American bats, little brown bat (*Myotis lucifugus*) and big brown bat (*Eptesicus fuscus*), through DNA metabarcoding of guano collected from seven roosting sites over a 26-week period. We measured the frequency of occurrence of known pest species in guano samples, compared interspecific differences in diet, and examined seasonal patterns in prey selection. Overall, we detected 653 unique prey species, 160 of which were known agricultural pests or disease vectors. Species diversity of prey species consumed varied by bat species and across the season, with big brown bats accounting for the majority of arthropod diversity detected. However, little brown bats consumed relatively more aquatic insects than big brown bats, suggesting that increased bat species richness in a landscape can amplify their net pest regulation service. Further, we hypothesized that detection probabilities of target insect pests would be higher in guano samples than in conventional survey methods. Multi-survey occupancy modeling revealed significantly lower detectability in bat guano than in conventional monitoring traps, however, highlighting important tradeoffs in selection of survey methods. Overall, the results presented here contribute to a growing evidence base supporting the role bats play in the provisioning of biodiversity-based ecosystem services." (Authors) Classification of taxonomically identified amplicon sequence variants (ASVs) in the diets of big brown bats (*Eptesicus fuscus*) and little brown bats (*Myotis lucifugus*) in New Jersey, 2017: only one species of "Odonata" was sampled] Address: Maslo, Brooke, Department of Ecology, Evolution and Natural Resources, Rutgers, The State University of New Jersey, New Brunswick, NJ, USA. Email: brooke.maslo@rutgers.edu

**20971.** McEachin, S.; Drury, J.; Anderson, C.; Grether, G. (2022): Mechanisms of reduced interspecific interference between territorial species. *Behavioural Ecology* 33(1): 126-136. (in English) ["Interspecific territoriality has complex ecological and evolutionary consequences. Species that interact aggressively often exhibit spatial or temporal shifts in activity that reduce the frequency of costly encounters. We analyzed data collected over a 13-year period on 50 populations of rubyspot damselflies (*Hetaerina* spp.) to examine how rates of interspecific fighting covary with fine-scale habitat partitioning and to test for agonistic character displacement in microhabitat preferences. In most sympatric species, interspecific fights occur less frequently than expected based on the species' relative densities. Incorporating measurements of spatial segregation and species discrimination into the calculation of expected frequencies accounted for most of the reduction in interspecific fighting (subtle differences in microhabitat preferences could account for the rest). In 23 of 25 sympatric population pairs, we found multivariate differences between species in territory microhabitat (perch height, stream width, current speed, and canopy cover). As predicted by the agonistic character displacement hypothesis, sympatric species that respond more aggressively to each other in direct encounters differ more in microhabitat use and have higher levels of spatial segregation. Previous work established that species with the lowest levels of interspecific fighting have diverged in territory signals and competitor recognition through agonistic character displacement. In the other species pairs, interspecific aggression appears to be maintained as an adaptive response to reproductive interference, but interspecific fighting is still costly. We now have robust evidence that evolved shifts in microhabitat preferences also reduce the frequency of interspecific fighting." (Authors) *Hetaerina americana*, *H. semproniana*, *H. vulnerata*, *H. cruentata*, *H. miniata*, *H. capitalis*, *H.*

occisa] Address: Grether, G.F., Department of Organismic Biology, Ecology and Evolution, University of California, 621 Charles E Young Drive South, Los Angeles, CA, 90095. USA. E-mail: ggrether@obee.ucla.edu

**20972.** Mendoza-Penagos, C.C.; Juen, L.; Muzon, J., Viela, D.S. (2022): *Psaironeura jeronimoi* (Odonata: Zygoptera: Coenagrionidae) sp. nov. from the Brazilian Amazon rainforest, with a key for species of tenuissima group, and discussion on the significance of the genital ligula to the taxonomy of the group. *Zootaxa* 5196(2): 291-300. (in English, with Spanish summary) ["*Psaironeura jeronimoi* sp. nov. is described based on seven males (Holotype: male (LABECO, N° 10002717), BRAZIL, Amazonas, Alto Maués Ecological Station, (-5.9852, -59.3182, 114 m asl, 12.v.2019) collected in the state of Amazonas (near Alto Maués Ecological Station) and Pará (municipality of Belterra). This new species fits into the tenuissima group but presents differences in color pattern and shape of the apex cerci. Main morphological characters are figured and compared with those of *P. tenuissima* (Selys, 1886) and *P. bifurcata* (Sjöstedt, 1918). Key to males and comments on genital ligula of the species of the group are provided. Finally, comments on the conservation status of the species are presented." (Authors)] Address: Mendoza-Penagos, C.C., Programa de Pós-graduação em Zoologia. PPGZOO, Univde Fed. do Pará, Belém, Brazil. Email: cristian.penagos@icb.ufpa.br

**20973.** Mendoza-Penagos, C.C.; Silva-Gonçalves, M.K.; Vilela, D.S. (2022): *Perilestes juveni* (Zygoptera: Perilestidae), new species from Amazonas State, Northern Brazil. *Zootaxa* 5219(6): 576-582. (in English, with Spanish summary) ["*Perilestes juveni* sp. nov. (Brazil, Amazonas State, São Gabriel da Cachoeira, Ponto 8 (0.165, -67.007, 92 m asl), 2.xii.2021, C.C. Mendoza-Penagos M. Silva-Gonçalves & S. Da Silva Ribeiro leg.) is described based on one male collected in a remote area of the Brazilian Amazon Forest. The new species is separated from congeners based on cercus morphology." (Authors)] Address: Mendoza-Penagos, C.C., Laboratorio de Ecología e Conservação. LABECO, Universidade Federal do Pará, Instituto de Ciências Biológicas, Rua Augusto Correia, No. 1 Bairro Guamá, CEP 66.075-110 Belém, Pará, Brazil. Email: cristian.penagos@icb.ufpa.br

**20974.** Mola, L.M.; Vrbová, I.; Tosto, D.S.; Zrzavá, M.; Marec, F. (2022): On the origin of neo-sex chromosomes in the Neotropical dragonflies *Rhionaeschna bonariensis* and *R. planaltica* (Aeshnidae, Odonata). *Insects* 2022, 13(12), 1159; <https://doi.org/10.3390/insects13121159>: 14 pp. (in English) ["Simple Summary: Odonata are very interesting insects from a cytogenetic point of view. Their chromosomes do not have a typical centromere and their meiosis process differs in some respects from the canonical meiosis process. Sex in Odonata is usually determined by two X chromosomes in females and only one X chromosome in males (a Y chromosome is not present). In this work, we studied sex chromosome evolution in two dragonfly species of the genus *Rhionaeschna* that have a derived sex chromosome system: neo-XX in females and neo-XY in males. This variation is the result of chromosome rearrangements. In *R. planaltica*, meiotic analysis and fluorescence in situ hybridization with a ribosomal DNA probe revealed that the original X chromosome was inserted into the smallest autosome, giving rise to the neo-X chromosome, while the homologous autosome became a neo-Y chromosome. In contrast, the neo-X chromosome in *R. bonariensis* evolved by a terminal fusion of the original X chromosome with the largest autosome, whose homolog became the neo-Y chromosome.

Our results suggest an independent origin of neo-sex chromosomes in these dragonfly species and contribute to our understanding of the distinct mechanisms of sex chromosome evolution. Abstract: Odonata have holokinetic chromosomes. About 95% of species have an XX/X0 sex chromosome system, with heterogametic males. There are species with neo-XX/neo-XY sex chromosomes resulting from an X chromosome/autosome fusion. The genus *Rhionaeschna* includes 42 species found in the Americas. We analyzed the distribution of the nucleolar organizer region (NOR) using FISH with rDNA probes in *Rhionaeschna bonariensis* ( $n = 12 + \text{neo-XY}$ ), *R. planaltica* ( $n = 7 + \text{neo-XY}$ ), and *Aeshna cyanea* ( $n = 13 + X0$ ). In *R. bonariensis* and *A. cyanea*, the NOR is located on a large pair of autosomes, which have a secondary constriction in the latter species. In *R. planaltica*, the NOR is located on the ancestral part of the neo-X chromosome. Meiotic analysis and FISH results in *R. planaltica* led to the conclusion that the neo-XY system arose by insertion of the ancestral X chromosome into an autosome. Genomic in situ hybridization, performed for the first time in Odonata, highlighted the entire neo-Y chromosome in meiosis of *R. bonariensis*, suggesting that it consists mainly of repetitive DNA. This feature and the terminal chiasma localization suggest an ancient origin of the neo-XY system. Our study provides new information on the origin and evolution of neo-sex chromosomes in Odonata, including new types of chromosomal rearrangements, NOR transposition, and heterochromatin accumulation." (Authors)] Address: Mola, Liliana, Laboratory of Cytogenetics and Evolution, Faculty of Exact and Natural Sciences, University of Buenos Aires, C1428EGA Buenos Aires, Argentina. Email: lilimola@yahoo.com.ar

**20975.** Molina Rodríguez, J.; Hernández Minguillón, A.; Ferreras-Romero, M. (2022): Biometric differences across three populations of *Boyeria irene* from the southern Iberian Peninsula (Odonata: Aeshnidae). *Odonatologica* 51(3/4): 247-262. (in English) ["*B. irene* is mainly a West Mediterranean species. The instar distribution during winter is that of a 'summer species' sensu Corbet (1964). Little is known about how the geographical location of the population may affect the biometric peculiarities of *B. irene* larvae. Eight biometric variables were studied in male and female larvae belonging to three southern Iberian populations, with the objective of ascertaining whether there are differences between populations. The southernmost population (Los Alcornocales) shows the largest sizes for most of the variables measured, while the northernmost population (Sierra Madrona) shows the smallest sizes for most of the variables. Winter water temperatures may be the cause of the size divergences, due to a longer arrest in time of larval growth in the northernmost population." (Authors)] Address: Molina Rodríguez, Jennifer, C/ La Cruz, 1, 04860 Olula del Río, Almería, Spain

**20976.** Mossioli de Souza, Y.C.; Annibale, F.S.; Carneiro, L.G.; Vasconcelos, T.S.; Rossa-Feres, D.C. (2022): Differential behavioral responses of benthic and nektonic tadpoles to predation at varying water depths. *Canadian Journal of Zoology* 100: 526-538. (in English) ["Predators influence microhabitat selection and activity level of tadpoles, but it is still unclear how such responses to predators differ among species and how water column's depth influences this predator-prey interaction. Here, we experimentally tested whether the presence of Odonata water-nymphs influenced spatial use and activity of benthic and nektonic tadpoles in different food availability contexts. Benthic tadpoles occupied and consumed more food at the bottom level, irrespective

of predator's presence. However, when predators were at bottom, benthic tadpoles remained close to the cages, suggesting a typical "stay-still" defensive behavior known for *Physalaemus nattereri* (Steindachner, 1863). Nektonic tadpoles occupied shallower depths on predator's presence, and they also consumed less food and avoided predator by selecting food sources far from it. When predator was at bottom level and food was available, the distance of tadpoles to the cage tended to be smaller. *Scinax fuscovarius* (Lutz, 1925) tadpoles were more active when food was absent regardless of predator's presence. When food was available, these tadpoles generally occupied and consumed more food at bottom level. Tadpoles' responses depended not only on predator's presence, but on a complex net of factors, which include tadpoles' habit, anti-predatory behavior, availability and location of food." (Authors)] Address: Mossioli de Souza, Yasmim Caroline, UNESP, 28108, Department of Biological Sciences, São José do Rio Preto, SP, Brazil. Email: mossioli.souza@unesp.br

**20977.** Muneer, P.K.; Madhavan, M.; Chandran, A.V. (2022): Report of *Euphaea pseudodispar* Sadasivan & Bhakare, 2021 (Insecta: Odonata) from Kerala, India. *Journal of Threatened Taxa* 14(6): 21327-21330. (in English) [Material examined: CC.G & ES.O12, 1 male, Thirunelly (11.911°N 75.993°E, 850 m), 31.x.2021, coll. Muneer P.K.] Address: Muneer, P.K., Ferns Nature Conservation Society, PB No. 28, Mananthavady, Wayanad, Kerala 670645, India. Email: muneerputhukudy@gmail.com,2

**20978.** Nakanishi, K.; Usio, N.; Yokomizo, H.; Takashima, T.; Hayashi, T.I. (2022): Chlorantraniliprole application differentially affects adult emergence of *Sympetrum* dragonflies in rice paddy fields. *Paddy and Water Environment* 20: 177-183. (in English) ["Rice paddy fields are important habitat for many dragonfly species. In Japan, populations of dragonflies inhabiting rice paddies, in particular *Sympetrum* (Odonata: Libellulidae), have decreased greatly in the last few decades. A major cause of the decline has been suggested to be the use of systemic insecticides (e.g., phenylpyrazole and neonicotinoid) in nursery boxes of rice seedlings. In this study, we examined the effects of chlorantraniliprole (CAP), a novel anthranilic diamide insecticide, on adult emergence of *Sympetrum* dragonflies in ten rice paddy fields by counting their exuviae remaining on the rice plants as an abundance index. Our results suggest that CAP is a potential factor that reduced the emergence rate of *S. infuscatum* but not of *S. frequens*. This difference may be due to differential sensitivity to CAP, different lengths of the nymphal stage, or different effects of bottom-up controls via reduction of prey organisms that are highly sensitive to CAP." (Authors) *Sympetrum infuscatum*, *Sympetrum frequens*] Address: Nakanishi, K., Health & Environmental Risk Division, National Institute for Environmental Studies, Onogawa 16-2, Tsukuba, Ibaraki 305-8506, Japan. Email: nakanishi.kosuke@nies.go.jp

**20979.** Neff, F.; Komer-Nievergelt, F.; Rey, E.; Albrecht, M.; Bollmann, K.; Cahenzli, F.; Chittaro, Y.; Gossner, M.M.; Martínez-Núñez, C.; Meier, E.S.; Monnerat, C.; Moretti, M.; Roth, T.; Herzog, F.; Knop, E. (2022): Different roles of concurring climate and regional land-use changes in past 40 years' insect trends. *Nature Communications* 13, 7611 (2022). <https://doi.org/10.1038/s41467-022-35223-3>: 12 pp. (in English) ["Climate and land-use changes are main drivers of insect declines, but their combined effects have not yet been quantified over large spatiotemporal scales. We analysed changes in the distribution (mean occupancy of

squares) of 390 insect species (butterflies, grasshoppers, dragonflies), using 1.45 million records from across bioclimatic gradients of Switzerland between 1980 and 2020. We found no overall decline, but strong increases and decreases in the distributions of different species. For species that showed strongest increases (25% quantile), the average proportion of occupied squares increased in 40 years by 0.128 (95% credible interval: 0.123–0.132), which equals an average increase in mean occupancy of 71.3% (95% CI: 67.4–75.1%) relative to their 40-year mean occupancy. For species that showed strongest declines (25% quantile), the average proportion decreased by 0.0660 (95% CI: 0.0613–0.0709), equalling an average decrease in mean occupancy of 58.3% (95% CI: 52.2–64.4%). Decreases were strongest for narrow-ranged, specialised, and cold-adapted species. Short-term distribution changes were associated to both climate changes and regional land-use changes. Moreover, interactive effects between climate and regional land-use changes confirm that the various drivers of global change can have even greater impacts on biodiversity in combination than alone. In contrast, 40-year distribution changes were not clearly related to regional land-use changes, potentially reflecting mixed changes in local land use after 1980. Climate warming however was strongly linked to 40-year changes, indicating its key role in driving insect trends of temperate regions in recent decades." (Authors)] Address: Neff, F., Agroecology and Environment, Agroscope, Reckenholzstr. 191, 8046 Zürich, Switzerland. Email: mail@felixneff.ch

**20980.** Nelsen, J.A.; Yee, D.A. (2022): Mosquito larvicides disrupt behavior and survival rates of aquatic insect predators. *Hydrobiologia* 849: 4823-4835. (in English) ["Understanding the environmental effects of chemicals used in pest control on aquatic systems is crucial to ensure the conservation of beneficial non-target organisms. Mosquito larvicides are commonly applied to aquatic habitats; however, their non-target effects are not well understood. Our goal was to determine lethal and behavioral effects of insect growth regulators (IGRs) and surface films (SFs) on predaceous diving beetle adults and larvae, and damselfly [*Ichnura* sp.] and dragonfly [*Pachydiplax longipennis*] nymphs in roadside ditch habitats. Behavioral effects were determined via bioassays quantifying predator movement, location, and larval mosquito predation. Using Principal Components Analyses, correlated behaviors were determined for each taxa, and compared within SF and IGR treatment levels. Surface films were lethal to beetle adults in the genus *Laccophilus* (Dytiscidae) at recommended and high concentrations. *Laccophilus* adult behavior changed in response to IGRs, those exposed to recommended and high concentrations were more active than controls. Larval *Laccophilus* mosquito consumption varied between SFs and IGRs. We conclude that SFs can harm aquatic organisms that require atmospheric oxygen, and both larvicides may have sublethal effects on hunting behaviors of aquatic insects. Future studies should focus on different larvicides, and a wider variety of aquatic taxa that interact with mosquito larvae." (Authors)] Address: Nelsen, J.A., Biology Department, Clark University, Worcester, MA, 01610, USA

**20981.** Ngiam, R.; Ng, M. (2022): A Photographic Field Guide to the Dragonflies & Damselflies of Singapore. John Beaufoy Publishing Ltd: 340 pp. (in English) ["Photographic Field Guide to the Dragonflies & Damselflies of Singapore is a fully comprehensive field guide to the 136 species of dragonfly and damselfly found in Singapore. With stunning, close-up photographs from the authors, each species is illustrated with multiple variants. The general introduction



provides a comprehensive overview of dragonfly anatomy, feeding habits, courtship and reproduction; also dragonfly research and conservation in Singapore, plus the best places for dragonfly watching in Singapore. Detailed coverage of every species includes key features for field identification; telling apart similar species; habitat and habits; presence in Singapore; etymology; wider distribution; national and IUCN conservation statuses; and larval features. Additionally, a QR code links to detailed larvae images from the Lee Kong Chian Natural History Museum website. The final section gives a checklist of the country status and conservation status of all of Singapore's odonates." (Authors)] Address: John Beaufoy Publishing Limited, 11 Blenheim Court, 316 Woodstock Road, Oxford, OX2 7NS, UK

**20982.** Niehuis, M. (2022): Gerd Reder (\*21. Oktober 1946) zum 75. Geburtstag. *Fauna und Flora in Rheinland-Pfalz* 14(4): 1637-1660. (in German) [Rheinland-Pfalz, Germany. Brief report on the vita of a very well known regional entomologist, including his odonatological activities and a bibliography.] Address: Niehuis, M., Im Vorderen Großthal 5, 76857 Albersweiler, Germany. Email: niehuis@t-online.de

**20983.** Ogidiaka, E.; Ikomi, R.B.; Akamagwuna, F.C.; Edegbene, A.O. (2022): Exploratory accounts of the increasing pollution gradients and macroinvertebrates structural assemblage in an afrotropical estuary. *Biologia* 77: 2103-2114. (in English) ["Forcados Estuary is a key water body in Delta State, Nigeria, serving various purposes such as fishing and oil exploration sites. However, the ecological health integrity of the estuary is seriously degrading due to crude oil and gas production, as well as run-off from surrounding communities. In this study, we investigated the structural assemblage of macroinvertebrates of the estuary to provide an exploratory account of the water quality status of the estuary. Physico-chemical variables and macroinvertebrates were sampled in five stations for 24 months between April 2012 and March 2014. Physico-chemical variables collected in the estuary classified the sampling stations into potential ecological categories, reflecting an increasing pollution gradient, with Stations 1 and 2 classified as heavily polluted stations. There was a relatively high mean concentration of iron ( $39.7 \pm 20.71 \text{ mg L}^{-1}$ ), copper ( $12.22 \pm 5.33 \text{ mg L}^{-1}$ ) and lead ( $2.97 \pm 1.98 \text{ mg L}^{-1}$ ) in Station 1 compared to the remaining four stations. Whereas the highest mean zinc concentration was recorded in Station 2 ( $23.12 \pm 11.96 \text{ mg L}^{-1}$ ). Principal Component Analysis (PCA) conducted for both wet and dry seasons showed that season played a key role in the pollution gradient of the estuary. A total of 14,685 macroinvertebrate individuals were recorded in the entire study period. *Pachymelania fusca* (freshwater snail) was the most preponderant taxa with 2,095 individuals recorded during the study period, followed by *Tympanotonus fuscatus* (brackish water snail) with 2,011 individuals. *Coenagrion pulchellum* (damselfly) was the least represented taxa, with only one taxon recorded throughout the study period. The non-metric multi-dimensional scaling (NMDS) showed no distinct cluster for macroinvertebrates collected in both wet and dry seasons. Canonical correspondence analysis (CCA) revealed differential responses of macroinvertebrates to physico-chemical variables, with species such as *Callinectes latimanus* and *Macra nitida* increasing the non-disturbed Stations 4 and 5, whereas *Corixa punctata* and *Thias callifera* dominated the disturbed Stations 1 and 2. Overall, the study provided useful information on the ecological pollution status of the Forcados Estuary and this will serve as a baseline for future research on the assessment of the ecological integrity of the estuary." (Authors)] *C. pulchellum* is an

European species not occurring in Africa.] Address: Edegbene, Augustine Ovie, Institute for Water Research, Rhodes University 6140, Makhanda (Grahamstown), South Africa

**20984.** Okude, G.; Moriyama, M.; Kawahara-Miki, R.; Yajima, S.; Fukatsua, T.; Futahashi, R. (2022): Molecular mechanisms underlying metamorphosis in the most-ancestral winged insect. *PNAS* 119(9), e2114773119: 12 pp. (in English) ["Significance: As caterpillars metamorphose to butterflies, insects change their appearance dramatically through metamorphosis. Some insects have an immobile pupal stage for morphological remodeling (homometaboly). Other insects, such as cockroaches, have no pupal stage, and the juveniles and adults are morphologically similar (hemimetaboly). Notably, among the most-ancestral hemimetabolous insects, dragonflies drastically alter their appearance from aquatic nymphs to aerial adults. In dragonflies, we showed that transcription factors Kr-h1 and E93 are essential for regulating metamorphosis as in other insects, while broad, the master gene for pupation in holometabolous insects, regulates a number of both nymph-specific genes and adult-specific genes, providing insight into what evolutionary trajectory the key transcription factor broad has experienced before ending up with governing pupation and holometaboly. Abstract: Insects comprise over half of the described species, and the acquisition of metamorphosis must have contributed to their diversity and prosperity. The order Odonata (dragonflies and damselflies) is among the most-ancestral insects with drastic morphological changes upon metamorphosis, in which understanding of the molecular mechanisms will provide insight into the evolution of incomplete and complete metamorphosis in insects. In order to identify metamorphosis-related genes in Odonata, we performed comprehensive RNA-sequencing of the blue-tailed damselfly *Ischnura senegalensis* at different developmental stages. Comparative RNA-sequencing analyses between nymphs and adults identified eight nymph-specific and seven adult-specific transcripts. RNA interference (RNAi) of these candidate genes demonstrated that three transcription factors, Krüppel homolog 1 (Kr-h1), broad, and E93 play important roles in metamorphosis of both *I. senegalensis* and a phylogenetically distant dragonfly, *Pseudothemis zonata*. E93 is essential for adult morphogenesis, and RNAi of Kr-h1 induced precocious metamorphosis in epidermis via up-regulation of E93. Precocious metamorphosis was also induced by RNAi of the juvenile hormone receptor Methoprene-tolerant (Met), confirming that the regulation of metamorphosis by the MEKRE93 (Met-Kr-h1-E93) pathway is conserved across diverse insects including the basal insect lineage Odonata. Notably, RNAi of broad produced unique grayish pigmentation on the nymphal abdominal epidermis. Survey of downstream genes for Kr-h1, broad, and E93 uncovered that unlike other insects, broad regulates a substantial number of nymph-specific and adult-specific genes independently of Kr-h1 and E93. These findings highlight the importance of functional changes and rewiring of the transcription factors Kr-h1, broad, and E93 in the evolution of insect metamorphosis." (Authors)] Address: Okude, G., Dept of Biological Sciences, Graduate School of Science, The University of Tokyo, Tokyo 113-0033, Japan. Email: orgentaokude@gmail.com

**20985.** Oliveira-Junior, J.M.B.; Rocha, T.S.; Vinagre, S.F.; Miranda-Filho, J.C.; Mendoza-Penagos, C.C.; Dias-Silva, K.; Juen, L.; Calvão, L.B. (2022): A bibliometric analysis of the global research in Odonata: Trends and gaps. *Diversity* 2022, 14, 1074. <https://doi.org/10.3390/d14121074>: 16 pp. (in English) ["Insects of the order Odonata have been used

as indicators of environmental quality in different aquatic systems around the world. In this context, we conducted a bibliometric analysis to understand the general patterns of research on Odonata published in the past decade (2012–2021). We extracted literature from the Web of Science (WoS) in the advanced search option and used search terms related to Odonata plus search strings for each term. A total of 2764 Odonata publications were identified. The journals with the most published articles on Odonata were *Zootaxa*, *International Journal of Odonatology* and *Odonatologica*. The countries with the most Odonata publications were the USA, Brazil and China. Most studies were conducted on streams, ponds and rivers. Ecology, taxonomy and behavior were the main study topics. Of the total articles on Odonata, 982 involved Zygoptera and 946 Anisoptera. Another 756 studies were focused on both suborders. The increase in ecological and taxonomic studies of Odonata reflects the dynamic characteristics of this order, and its relatively well-defined systematics, especially in the case of adults. Despite the recent increase in the number of publications, there are still many gaps related to topics such as biogeography, parasitism, competition within and between species, evolutionary and phylogenetic relationships, as well as studies of the eggs (e.g., their development) and larval exuviae (e.g., their morphological features)." (Authors) Frankly spoken: This publication has ignored the complete set of regional odonatological journals published in Europe such as *Libellula*, *Martinia*, *Brachytron*, *Gomphus*, and the journals of IDF...] Address: Oliveira-Junior, J.M.B., Programa de Pós-Graduação em Sociedade, Natureza e Desenvolvimento (PPGSND), Programa de Pós-Graduação em Sociedade, Ambiente e Qualidade de Vida (PPGSAQ), Programa de Pós-Graduação em Biodiversidade (PPGBEES), Instituto de Ciências e Tecnologia das Águas (ICTA), Universidade Federal do Oeste do Pará (UFOPA), Rua Vera Paz, s/n (Unidade Tapajós) Bairro Salé, Santarém 68040-255, Pará, Brazil. Email: jose.mbo@ufopa.edu.br

**20986.** Olsen, K.; Svenning, J.-C.; Balslev, H. (2022): Climate change is driving shifts in dragonfly species richness across Europe via differential dynamics of taxonomic and biogeographic groups. *Diversity* 2022, 14, 1066: 22 pp. (in English) ["Understanding how changes in species richness pattern correlate with range changes in different taxonomic and biogeographic groups is important for conservation because it allows for generalizations about which species are at greatest risk. Here, we assessed whether changes in species richness patterns result from generalized range shifts across taxonomic and biogeographic groups or from changes in specific subsets of species. Using data from 1988 and from 2010, we studied changes in distributional range of European dragonfly species, using outline distribution maps for all dragonflies combined and separately for taxonomic suborders (Zygoptera and Anisoptera) and biogeographic groups (Boreo-alpine, Eurasian, Mediterranean, and Tropical). The results demonstrated differing range dynamics for Zygoptera and Anisoptera, with Anisoptera driving local turnover in species richness to a greater extent than Zygoptera. The distributional range of Tropical and Mediterranean species had expanded to a much greater extent than that of Eurasian and Boreo-alpine species. Large-scale changes in species richness arose from several divergent, group-specific processes. Overall, local diversity especially declined in parts of southern and south-eastern Europe, reflecting local losses in multiple species rather than major range contractions among Mediterranean or Eurasian species. In fact, among the biogeographic groups, overall range declines were most prominent among Boreo-alpine species,

highlighting the particular threat from climate change to this group." (Authors)] Address: Olsen, K., Research & Collections, Natural History Museum Aarhus, Wilhelm Meyers Allé 10, DK-8000 Aarhus, Denmark. Email: kent@nathist.dk

**20987.** Oopath, S.V.; Baji, A.; Abtahi, M.; Luu, T.Q.; Vasilev, K.; Truong, V.K. (2022): Nature-inspired biomimetic surfaces for controlling bacterial attachment and biofilm development. *Advanced Materials Interfaces* 2022, 2201425: 17 pp. (in English) ["The use of antibacterial and antifouling materials is widely being investigated to combat the increasing risk associated with bacterial infections and the evolution of drug-resistant bacteria. Efficient antibacterial materials can be fabricated by mimicking the topography found on the surface of natural antibacterial materials. Natural materials such as the wings of cicadas and dragonflies have evolved to use the structural features on their surface to attain bactericidal properties. The nanopillars/nanospikes present on these natural materials physically damage the bacterial cells that settle on the nanostructures resulting in cell lysis and death. This article reviews the role of nanostructures found on the surface of some of these natural antibacterial and antifouling materials such as lotus leaf, cicadas and dragonflies wings, shark skin, and rose petals. These natural structures provide guidelines for the design of synthetic bio-inspired materials. This review article also presents some novel fabrication techniques used to produce biomimetic micro- and nano-structures on synthetic material surfaces. The role of size, shape, aspect ratio, and spacing between the micro/nano-structures on the bactericidal properties is also discussed. Finally, the review is finished with the author's view on the future of the field." (Authors)] Address: Oopath, S.V., Department of Engineering, La Trobe University, Bundoora, VIC 3086, Australia. Email: a.baji@latrobe.edu.au

**20988.** Palacino-Rodríguez, F.; Martínez-Falcón, A.P.; Córdoba-Aguilar, A. (2022): A country-scale species richness assessment suggests that the inventory of Colombian Odonata species is far from being complete. *International Journal of Tropical Insect Science* 42: 2035-2039. (in English) ["Although collections of odonate insects have increased in recent years in Colombia, it is unknown whether the inventory list is complete for this country. Thus, we have investigated whether odonate species richness for Colombian endemic and total species by department and natural region, are complete using sample- and coverage-based rarefaction curves. This analysis indicated rarefaction curve values of completeness of 99% for the whole country, 87% all departments, 73% for region, and 99% for endemic patterns. Collections are scarce for Arauca, Casanare, Guaviare, Vichada, Nariño, Guajira, Norte de Santander, San Andrés, Sucre and Vaupés departments. Conversely, the departments with more collections were Antioquia, Cundinamarca, Magdalena and Meta. Regionally, odonates have been more collected in the Andes and Orinoquia, followed by the Caribbean and Pacific. We encourage odonate sampling especially in protected areas and poorly sampled localities. This sampling should be accompanied by habitat management and conservation plans." (Authors)] Address: Córdoba-Aguilar, A., Depo de Ecología Evolutiva, Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Ciudad Universitaria, 04510, México, D. F., México. E-mail: acordoba@ecologia.unam.mx

**20989.** Parr, A.J. (2022): Migrant and dispersive dragonflies in Britain during 2021. *J. Br. Dragonfly Society* 38(2): 100-112. (in English) ["The 2021 reporting year was a relatively

eventful one for migrant and dispersive species in Britain. *Anax ephippiger* continued its recent run of autumn influxes, with well-documented records from nearly 20 localities between 9 September and 22 November, and with several 'possibles' also being reported. *Sympetrum fonscolombii* showed well during spring and early summer, with all but one individual being fully mature when first discovered, rather implying that most individuals were immigrants rather than locally bred. Perhaps surprisingly there were, however, few autumn records of the species, implying that both the emergence of a locally bred second generation and also any late season immigration had been limited. Of our other traditional migrant species, *Anax parthenope* and *Aeshna affinis* were both widely reported during the year, but the growing strength of local breeding populations that have become established over the last decade or so made detailed analysis of migration difficult, particularly in the case of *A. parthenope*. In addition to conventional migrants, *Aeshna isocetes* continued its recent range expansion, with a sighting at Wykeham Lakes in North Yorkshire on 20 July being of particular note. At least some of this expansion may be being driven by immigration from the Continent, but increased internal dispersal must be a major factor. During 2021 there was also evidence for significant mid- to long-distance dispersal within Britain by several other species. *Calopteryx virgo*, for example, appeared on the Isles of Scilly during late August, some 45 kilometres away from the nearest known breeding sites on the Cornish mainland. A male *Orthetrum cancellatum* was also recorded from Scilly during the year, this being only the second record for the islands. Finally, it is worth noting that *Chalcolestes viridis*, one of Britain's recent colonist damselflies, had yet another successful season with considerable range expansion, particularly in a north westerly direction. An individual seen near Wolverhampton on 23 September represents the new "most westerly" sighting for Britain while, further south, three records in the general area of the New Forest are also of note." (Author) Additional species treated: *Lestes barbarus*, *L. dryas*, *Coenagrion scitulum*, *Erythromma viridulum*, *Ischnura pumilio*, *Aeshna mixta*, *Sympetrum striolatum*, *S. danae*.] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk, IP29 5BX, UK

**20990.** Peck, R.; Nash, S. (2022): Characterization of a Small Population of the Orangeblack Hawaiian Damselfly (*Megalagrion xanthomelas*) in Anchialine Pools at Kaloko-Honokohau National Historical Park, Hawai'i Island. *Proceedings of the Hawaiian Entomological Society* 54: 93-109. (in English) ["The endangered *M. xanthomelas* is a lowland inhabitant of freshwater and brackish wetland environments. Formerly one of the most widely distributed native insects in Hawai'i, it now appears restricted to small populations on the islands of O'ahu, Moloka'i, Maui, and Hawai'i. On Hawai'i island, anchialine pools provide important habitat for *M. xanthomelas*, and Kaloko-Honokohau National Historical Park (Park) supports one of only a few documented populations on the western side of the island. This study aimed to estimate the population size of *M. xanthomelas* at this Park, characterize its habitat, and identify substrates on which females oviposit eggs. We conducted visual surveys for adult *M. xanthomelas* at anchialine pools during June 2016–August 2017. On average, the observed population was 10.7 individuals per month (range = 5–20; standard error = 1.3). Males were observed 6.1 times more frequently than females, likely reflecting the less cryptic nature of males compared to females. Females exhibited oviposition behavior on a variety of substrates, but small branches were used most frequently. Factors restricting this population are

poorly known, but invasive fish may limit its distribution across the Park. Removal of invasive fishes from anchialine pools and 'Aimakapa Fishpond may restore much habitat for this rare species in the Park." (Authors)] Address: Peck, R., Hawai'i Cooperative Studies Unit, University of Hawai'i at Hilo, P.O. Box 44, Hawai'i National Park, HI 96718, USA. Email: bwpeck@usgs.gov

**20991.** Pereira de Gouvêa, T.; Dias de Oliveira, T.M.; Ferreira, E.D.F.; Jacques, G.; Teófilo-Guedes, G.; Vilela, D.S.; Magalhães de Souza, M. (2022): Response of Odonata communities to dry season in a deciduous forest in the northern Minas Gerais, Brazil. *Entomobrasilia* 15: e1020: 9 pp. (in English) ["Odonata sampling effort in the state of Minas Gerais has intensified throughout the 21st century. However, research on these insects in some regions and ecosystems such as the Deciduous Forest are incipient, and the effect of prolonged dry periods over these insects is still unknown. This study thus aimed to assess changes in adult Odonata species composition over one year in a Brazilian Deciduous Forest and the Odonata species richness in the Mata Seca State Park in the Manga and Itacarambi municipalities in the Northern region of the state of Minas Gerais State, Brazil. Twenty-four days of sampling were distributed in February, May, July and November, adopting an active search through entomological nets close to lentic environments (Lagoa Angical, Lagoa Comprida, Lagoa Encantada, Lagoa da Prata and two wetlands of Lajedo da Lua); lotic environments (São Francisco river) and in associated terrestrial ecosystems. In total, 55 species were collected. Rainy and dry periods altered Odonata communities' composition but did not affect species richness and abundance due to the presence of permanent lagoons associated with the São Francisco river. This study shows the importance of the Mata Seca State Park for preserving Odonatofauna in the state of Minas Gerais and for protecting those permanent lagoons." (Authors)] Address: Pereira de Gouvêa, T., Instituto Federal de Educação Ciência e Tecnologia do Sul de Minas Gerais, Inconfidentes, Minas Gerais, Brazil. Email: taiguaragouvea.bio@gmail.com

**20992.** Phan, Q.T., Keetapithchayakul, T.S.; Ngo, Q.P. (2022): New records *Podolestes pandanus* Wilson & Reels, 2001 (Zygoptera: Argiolestidae) and notes on *Risiphlebia guentheri* Kosterin, 2015 (Anisoptera: Libellulidae) from the swamp cypress nature reserve in the Central Highlands of Vietnam. *International Dragonfly Fund. Report* 172: 1-7. (in English) ["New records of *Podolestes pandanus* Wilson & Reels, 2001 for Vietnamese fauna and confirms the occurrence of *Risiphlebia guentheri* Kosterin, 2015 in the Central Highlands of Vietnam." (Authors)] Address: Phan, Q.T., Center for Entomology & Parasitology Research, Institute of Research & Training of Medicine, Biology & Pharmacy, Duy Tan University, Da Nang, 550000, Vietnam. E-mail: pqtoan-84@gmail.com

**20993.** Piña, A.E.; Lougheed, V.L. (2022): Macroinvertebrate community composition in wetlands of the desert southwest is driven by wastewater-associated nutrient loading despite differences in salinity. *Wetlands* 42(128): 15 pp. (in English) ["The relatively rare freshwater ecosystems in the arid southwestern United States serve as biodiversity hotspots, yet they remain among the most threatened systems in the world due to human impacts and climate change. Globally, arid region wetlands remain understudied with respect to their ecology, making assessments of quality or restoration efforts challenging. To address these needs, this project aims to better understand the factors that drive

water quality and macroinvertebrate community composition of wetlands of the US desert Southwest. Water quality and macroinvertebrate data were collected over three years from 14 different wetland and riparian sites spanning across West Texas, New Mexico and Arizona. Principal Component Analysis (PCA) indicated that salinity related variables such as chloride, sulfate and conductivity were the greatest drivers of environmental variance (32%) among sampled desert wetlands. Nutrients such as nitrate and phosphate described a second axis, with 22% of variation in environmental data explained, where we found a clear distinction between wastewater and non-wastewater wetlands. Nutrients were shown to have the greatest impact on macroinvertebrate communities with wetlands receiving wastewater showing more uneven distribution of functional feeding groups and lower Simpson Index scores. These sites were dominated by filter feeders and had lower relative abundances of predator and collector-gatherer taxa. There was also a significant decrease in metrics related to diversity and environmental sensitivity such as % Ephemeroptera-Odonata-Trichoptera (EOT) within high nutrient sites. Increased salinity levels were also shown to correlate with lower Simpson Index scores indicating that increased salinity resulted in a decline in macroinvertebrate diversity and evenness. Overall, the nutrients within effluent water have shown to significantly alter community composition especially in desert wetlands where macroinvertebrates may be more adapted to high salinity. Though macroinvertebrate communities in wastewater sites may not fully resemble those of natural wetlands over time, creation of these sites can still benefit landscape level diversity." (Authors)] Address: Piña, Anna Elisa, Dept Biol. Sciences, Univ. of Texas at El Paso, 79968, TX El Paso, USA. Email: aepina@miners.utep.edu

**20994.** Ponomareva, N.M.; Popova, O.N.; Yurlova, N.I. (2022): Odonata (Insecta) larvae as the second intermediate hosts of the trematodes of genus *Plagiorchis* in the basin of Chany Lake, Western Siberia. *Contemporary Problems of Ecology* 15: 631-641. (in English) ["Trematodes of the genus *Plagiorchis* are widespread endoparasites with a life cycle involving several hosts. The second intermediate hosts of the trematodes of genus *Plagiorchis* are studied for the first time in the basin of Lake Chany in the forest-steppe zone of Western Siberia, which is crossed by the migration way of many species of aquatic and near-water birds—final hosts of these trematodes. This study was conducted in 2014–2015 in the reed beds of Lake Fadikha, which is a habitat of the first intermediate hosts of plagiorchids: snails. Invertebrates from classes Insecta, Malacostraca, and Gastropoda, as possible second intermediate hosts of the Plagiorchidae trematodes, are studied for the prevalence and intensity of trematode infection. Metacercariae (larvae inhabiting the second intermediate hosts) of genus *Plagiorchis* (*P. elegans* and *P. multiglandularis*) are found only in the insects from order Odonata. The largest portion among infected larvae is comprised of larvae of *Sympetrum vulgatum* (68%), followed by *S. flaveolum* (18%), *S. sanguineum* (9%), and *Aeshna serrata* (5%). The prevalence of the metacercariae of the detected trematode species for the four Odonata species during the study years varied from 3.3 to 45.5%; the intensity of infection varied from 2 to 4 trematodes per 1 odonate larva. Infection with metacercariae increases with the age of odonate larvae. A trend towards a positive correlation between the infection (prevalence) of the first (snails) and the second (odonate larvae) intermediate hosts is identified. A significant relationship is identified between the prevalence of metacercariae of the odonate larvae and their population density, which varies throughout

the season. Seasonal changes in the infection of odonates with metacercariae of the trematodes of genus *Plagiorchis* are associated with the phenology of these insects. Periods of increased infection are registered just prior to the mass emergence of odonates, when the abundance of odonate larvae in the water body is the highest, and vice versa, periods of decline in infection are registered after the mass metamorphosis of odonates." (Authors)] Address: Ponomareva, N.M., Institute of Systematics and Ecology of Animals, Siberian Branch, Russian Academy of Sciences, 630091, Novosibirsk, Russia

**20995.** Puniamoorthy, J, Hussin, SMB, Sani, MAB, Ang, Y, Pohl, S & Tan, EJ (2022): Biodiversity Record: First record of the damselfly, *Agriocnemis pygmaea*, on Sentosa. *Nature in Singapore*, 15: e2022143. DOI: 10.26107/NIS-2022-0143: 2 pp. (in English) ["2 males, white pan trap sample, Singapore, Sentosa Island, Tanjong Beach Road at 1°14'40.4"N 103°49'31.3"E; 17–18 March 2022.] Address: Puniamoorthy, J., Yale-NUS College, National University of Singapore, Singapore 138527, Republic of Singapore. Email: j.punia@nus.edu.sg

**20996.** Qian, P.; Quais, M.K.; Zhou, W.; Ye, J.; Wang, G.; Wu, M.; Zhong, J.; Chen, M.; Yuan, X.; Zhu, J.; Feng, J.; Zhu, Z.R. (2022): Effects of integrated rice-duck farming on weed pressure, herbivore-predator interactions and economic benefits. *Biocontrol Science and Technology* 32(6): 715-730. (in English) ["This study was conducted to evaluate whether conventional farming can be replaced by a lower chemical pollution farming system, integrated rice-duck farming in a suburban agricultural area in northern Zhejiang, Southeast China. We comprehensively assessed the impacts of integrated rice-duck farming on weeds and herbivorous insects along with their natural enemies during the rice-growing season. We found that the rice-duck system effectively controlled weeds within the paddy fields. Nevertheless, the abundance of herbivores, particularly planthoppers and leafhoppers was increased in the duck-roaming paddy fields compared to the control and conventional fields, indicating the inefficiency of the rice-duck system in the control of rice main herbivore pests. Rice-duck farming significantly reduced the abundance of predators, especially spiders and dragonflies, therefore an 'enemy-free space' was created for herbivores which might be responsible for the observed herbivore increase in the rice-duck fields. Despite the inefficiency of rice-duck farming in the control of rice main herbivore pests, the net income of the rice-duck treatment with an organic certification was 7.6 and 1.4 times higher compared to the conventional and control treatments, respectively. In the view of the favourable results obtained in this study, the integrated rice-duck farming system might be suggested as a high economic return organic farming method suitable for modern farmers." (Authors)] Address: Qian, P., Inst. Insect Sci., Zhejiang University, Hangzhou, China

**20997.** Qin, M. (2022): Design and research of dragonfly robot under the background of artificial intelligence. *Wireless Communications and Mobile Computing* Volume 2022, Article ID 1727965: 7 pp. (in English) ["Simulating the flight of dragonflies has always attracted scientists' interest. This paper studies the theory and method of the transmission mechanism of dragonfly robot, establishes the relationship function model between wing swing angle and geometric parameters, and designs a kind of gear and rod mechanism transmission chain, including a pair of wing angle turnover mechanism, so that the wings swing smoothly, no jam phenomenon occurs, and improves the lift ratio. In this paper,



the dynamic principle of Bionic Flapping Wing robot was analyzed, and the design scheme of driving mechanism is put forward; the project realizes the three-dimensional design of robot parts, the virtual digital prototype and simulation, and 3D printing of the prototype robot. During the design and manufacture, the lightweight design and processing of the fuselage and wings are carried out to reduce its weight. The drive circuit and algorithm are designed with 8051 chip as the CPU; the balance and attitude control methods are proposed." (Authors)] Address: Qin, M., Dept of Computer Science and Software Engineering, Xi'an Jiaotong-Liverpool University, Suzhou 215123, China. Email: minchuan.qin18@student.xjtlu.edu.cn

**20998.** Ranjana, S. (2022): A survey study on Odonata in Rabo Dam Area, Raigarh, Chhattisgarh, India. *IOSR Journal of Humanities and Social Science (IOSR-JHSS)* 27(6): 1-7. (in English) ["An extensive study provides current status, species richness and distribution pattern of Odonate diversity in Rabo dam area. Rabo Dam is constructed on the Kurkut River a tributary of the river mand in Bagbhara area, District Raigarh, (Chhattisgarh) India. The geographical location of the Rabo Dam area provides suitable environmental conditions for Odonatan's habitat and diversity. An observation on Odonata diversity was carried out during the period from March 2021 to February 2022. Three study sites were selected to assess the diversity of Odonatan species. A total 41 of Odonata species were identified [...]. Zygoptera contributed 18 species under 5 families and Anisoptera with 23 species under 3 families. Zygoptera and Libellulidae was most dominant family by contributing 18 species but Libellulidae was the most common species found in all three study sites. Chlorocyphidae was least common species which restricted to only one study site. In the present study 10 species of Coenagrionidae, 3 species of Gomphidae, 3 species of Protoneuridae, 2 species of Platycnemididae, 2 species of Lestidae, 2 species of Aeshnidae were recorded. The observation showed the interesting perching 'Obelisk pose, in species *Trithemis pallidinervis*. Observation also showed 'tandem position, in species *Copera marginipes*. In this area the odonate diversity is still unexplored hence the present study will provide the current status and base line data of Odonata diversity for further attention and research activities." (Author)] Address: Ranjana, S., Department of Zoology, K.G. Arts and Science College, Raigarh, India

**20999.** Rebassa, M.; Canyelles, X. (2022): Actualització de l'estatus dels odonats de les Illes Balears. Un repàs a la seva situació des de començaments del segle XX fins a l'actualitat. *Bolletí de la Societat d'Història Natural de les Balears* 65: 97-115. (in Catalan, with English summary) ["Update on the status of the Odonata of the Balearic Islands. A review of its situation from the beginning of the 20th century to the present day. This paper presents, for the first time, a complete catalogue of all species of Odonata (Zygoptera and Anisoptera) mentioned in the Balearic Islands since the beginning of the twentieth century, including those that today are considered the result of past identification errors. Data were collected from 41 species, 31 of which are considered valid. For each species, its status is indicated for each of the 4 islands (Mallorca, Menorca, Ibiza, Formentera), as well as its population trend. The Balearic catalogue is compared with other catalogues from nearby regions, discussing its main differences." (Authors)] Address: Rebassa, M., Societat d'Història Natural de les Balears, carrer Margalida Xirgu, 16, baixos, 07011, Palma, Spain. Email: escarbatdaurat@gmail.com

**21000.** Ribeiro, C.; Rodrigues, M.E.; Sahlén, G.; Roque, F. (2022): Dragonflies within and outside a protected area: a comparison revealing the role of well-preserved atlantic forests in the preservation of critically endangered, phytotelmatous species. *Journal of Insect Conservation* 26: 271-282. (in English) ["Understanding the interactions between protected areas and the surrounding landscape has become a central issue to conservation of biodiversity. The important role of protected areas in the preservation of biodiversity in tropical hotspots is widely recognized, but the role of the landscape surrounding those hotspots is poorly understood, particularly with regard to insects. In this study, we evaluated the species richness, composition, and beta diversity of Odonata assemblages inside and in the surroundings of a protected area in the Atlantic Forest hotspot. Sampling was carried out in the Private Reserve of Natural Heritage Veracel Station and its surroundings in the southern region of Bahia. Forty sites were sampled, 22 within the reserve and 18 in the surrounding areas. We found both a greater total species richness, and a greater richness with regard to the suborder Anisoptera in the surrounding areas. In addition, the species composition differed less between the sampling sites inside the protected area. Some of the species found inside the protected area did, however, make a greater contribution of the individual species to beta diversity (SCDB). Our study suggests that the surroundings of a protected area can contribute to the maintenance of regional diversity of dragonflies, but the protected areas play a vital role in supporting critically endangered species and populations of forest specialists, e.g., phytotelmatous species. Implications for insect conservation: Our results show that the composition of the odonate species assemblages may provide a means to assess the importance of protected areas to Odonata communities. Our study also highlights the importance of PAs to the maintenance of the regional Odonata species pool, especially to forest specialist species and to threatened species." (Authors)] Address: Ribeiro, Cintia, Laboratório de Organismos Aquáticos, Depto de Ciências Biológicas, Universidade Estadual de Santa Cruz (UESC), Ilhéus, BA, Brasil

**21001.** Rochas, P.; Minot, M.; Mézière, N.; Renoult, J.; Uriot, Q.; Uriot, S.; Foxonet, H.; Cerdan, A.; Juillerat, L. (2022): Check-list of Odonata from French Guiana with notes on their distribution, ecology, and new state records. *Odonatologica* 51(3/4): 175-224. (in English) ["This publication documents the diversity of odonates found in French Guiana and discusses their distribution and ecology. The check-list was created by compiling information from available publications and databases. A total of 292 species belonging to 14 families and 94 genera are listed from the territory. Of these, one family, three genera and 48 species are new records. Four species are considered endemic to French Guiana, and seven known species remain undescribed. For species listed, occurrence by municipality, ecoregion, and known aquatic and terrestrial habitats are noted." (Authors)] Address: Rochas, P., Kourou, French Guiana. Email: paul.rochas85@gmail.com

**21002.** Rodríguez Esteban, M.; Hernández Alonso, D.; Martín Diego, M. (2022): Nuevas citas y revisión de la distribución de *Macromia splendens* (Pictet, 1843) (Macromiidae), *Oxygastra curtisii* (Dale, 1834) (Inc. Sed.) y *Gomphus graslinii* (Rambur, 1842) (Gomphidae) en la provincia de Salamanca (centro-oeste ibérico) (Odonata). *Bolletín de la SEA* 70: 344-353. (in Spanish, with English summary) ["New data on distribution, abundance, and reproduction of Community interest species *Macromia splendens*

(Pictet, 1843), *Oxygastra curtisii* (Dale, 1834) and *Gomphus graslinii* (Rambur, 1842) is given for Salamanca's province (Castilla y León, Western Spain). Subsequently they are discussed together with bibliographic records to analyse their current situation and trend in this area." (Authors)] Address: Rodríguez Esteban, M., Avenida S. Agustín, 44. Portal 1.1° A. 37005. Salamanca (Salamanca), Spain. Email: elomitoblog@hotmail.com

**21003.** Romero, F. (2022): Inventario preliminar de insectos acuáticos en la provincia de San Juan, Argentina: distribución y ecología. *Acta zoológica lilloana* 66(1): 10-44. (in Spanish, with English summary) ["A preliminary inventory of the aquatic insects of the Province of San Juan (Argentina) is provided based on its own collections and previous bibliographic records of species belonging to the orders Plecoptera, Ephemeroptera, Trichoptera, Odonata, Hemiptera, Coleoptera, Lepidoptera and Diptera. Our objective was to obtain a list and distribution of the aquatic insects of a province with little information on the subject. For this, various types of environments, mainly rivers, were surveyed in 28 localities and 12 localities were also included from bibliographic records. A total of 46 families of insects, 107 genera and 148 species were recorded, of which 22 families, 65 genera and 82 species are new records, 17 new localities are also indicated for some species. Of the taxa recorded, 90% of the genera correspond to Neotropical distribution groups, 6% Cosmopolitan and American, while only 4% of the species have an Andean distribution." (Author) The following species are listed in table 2: *Rhionaeschna absoluta*, *R. bonariensis*, *R. pallipes*, *R. variegata*, *Andinagrion peterseni*, *Argia joergenseni*, *Ischnura fluviatilis*, *Oxyagrion rubidum*, *Progomphus joergenseni*, *Brechmorhoga vivax*, *Erythrodiplax atroterminata*, *E. connata*, *E. corallina*, *Macrothemis hanneli*, *Orthemis nodiplaga*.] Address: Romero, Fátima, Fundación Miguel Lillo, Miguel Lillo 251, T4000JFE. San Miguel de Tucumán, Tucumán, Argentina. Email: vfromero@lillo.org.ar

**21004.** Santamaria, T.; Torres, A.; Hernandez, A.; Casanueva, P.; Sanchez-Sastre, L.F.; Campos, F. (2022): Some characteristics of the wings of *Cordulegaster boltonii* (Donovan, 1807) (Odonata: Cordulegasteridae) from central Spain. *J. Br. Dragonfly Society* 38(2): 113-126. (in English) ["Wing characteristics in the Odonata have been widely analysed given their significance in the ecology of the species and their importance for flying patterns. However, until now very little is known about wing morphology in *C. boltonii*. In this work, six variables are examined in males of this species, in relation to fore-wing and hind-wing venation and their correlation to wing length, wing area and aspect ratio. The number of ante-nodal and post-nodal cross-veins and the number of cells in the anal triangle and anal loop are shown to be the more suitable variables for wing study in this species." (Authors)] Address: Hernandez, Maria Angeles, Univd Católica de Avila, Calle Canteros s/n, 05005 Avila, Spain, 2 Calle Jose M. Pereda 3, 1C, 28806 Alcalá de Henares, Madrid, Spain. Email: mahermin@unav.es

**21005.** Schneider, T.; Ikemeyer, D.; Müller, O.; van Pelt, G.J. (2022): Notes on *Cordulegaster kalkmani* in East Turkey (Odonata: Cordulegasteridae). *Odonatologica* 51(3/4): 289-300. (in English) ["Populations of *Cordulegaster kalkmani* Schneider et al., 2021 were found in the Kars and Bitlis provinces of East Turkey (i.e., western Armenian Highlands), in July 2022. This species was found at elevations from 1 800 to 2 200 m a.s.l. in six localities. One female, 15 males and one exuvia were collected for closer examination. The special feature of the inferior appendage, which is

broader than long so that the distal pointed lobes can be seen from above, was confirmed for all males. Variation in abdominal colour markings, some biometrical data and habitat features are reported. *Cordulegaster kalkmani* seems to be restricted to a geographic region limited by the Anatolian Diagonal in the west, the Pontic Mountains in the north, the Lesser Caucasus in the east, and is roughly confined to the western Armenian Highlands in the centre and the eastern Taurus in the south. This region is characterised by cold winters with significant snow cover." (Authors)] Address: Schneider, T., Arnold-Knoblach-Ring 76, 14109 Berlin-Wannsee, Germany. Email: thomas.rs@gmx.de

**21006.** Schneider, T.; Plyushch, I.G. (2022): *Rhyothemis variegata* (Odonata: Libellulidae) new to Afghanistan. *Notulae odonatologicae* 9(10): 469-472. (in English) ["In recent decades little has been added to the Odonata fauna of Afghanistan. This is mainly due to inaccessibility resulting from ongoing conflict in the country. Nevertheless, a few Ukrainian scientists have recently visited the country mainly to study Lepidoptera and Coleoptera. During one expedition in the Kabul valley near Jalalabad about a dozen individuals of *Rhyothemis variegata* were observed and three voucher specimens were captured." (Authors)] Address: Schneider, T., Arnold-Knoblach-Ring 76, 14109 Berlin-Wannsee, Germany. Email: thomas.rs@gmx.de

**21007.** Senadeera, G.K.A.T.; Weerakoon, K.C.; Ekanayake, E.M.S.H.K.; Lasxhman, B.Y.N. (2022): Abundance and diversity of adult Odonates in Dunumadalawa forest reserve, Kandy. *Proceedings of FARS2022*: 21. (in English) [Sri Lanka; Verbatim: Species richness and abundance of adult Odonates in Dunumadalawa forest reserve in Kandy, were observed. The samplings of Odonates were carried out by visual encounter surveys by walking within the area on hourly basis in a period of one year. A total of 91 Odonates species represented by 45 dragonfly and 46 damselfly with two endemic species, *Euphaea splendens* and *Paragomphus henryi* have identified. The suborder Anisoptera which comprises with 45 species belonging to two families contributed 49% of total odonates were recorded. Among the Zygoptera, the family Calopterygidae was widely distributed with high percentage 27% (n=14) while the family Platycnemididae and Lestidae both were equally distributed with a percentage composition of 11% (n=10). The observed distribution of the families of Coenagrionidae and Euphaeidae were 9% (n=8) and 4% (n=4) respectively. Highest relative abundance values showed 9% *Orthetrum triangulare* belongs to family Libellulidae in suborder Anisoptera followed by *Lestes elatus* belongs to family Lestidae with 7%. Highest Sorenson coefficient value (0.43) indicated locations near "Roseneath Tank" in the middle of the site and the fresh water streams nearby it have high overlapping of similarity of Odonates. The highest species diversity (Shannon index 0.85) is found in the locations near the "Dunumadalawa weva" area. The highest species richness observed in the same locations as with the highest Margalef's index (3.67). The lowest diversity was observed with a Shannon index (0.10) in the forest area with no water bodies.] Address: Senadeera, G.K.A.T., Dept Zool., The Open University of Sri Lanka, Sri Lanka. Email: ayeshasena9634@gmail.com

**21008.** Shapovalov, M.I.; Korotkov, E.A. (2022): Species composition of aquatic and amphibiotic insects in the Kuban River basin (Northwestern Caucasus). *Study of Water and Terrestrial Ecosystems: History and present*. Abstracts of

the II International scientific-practical conference. Sevastopol, 2022. Publisher: Federal State Budgetary Institution of Science Federal Research Center "Institute of Biology of the Southern Seas named after A.O. Kovalevsky RAS" (Sevastopol): 72. (in Russian) [Verbatim (Google translate): Order Odonata includes 8 families: Libellulidae (6 genera, 17 species), Coenagrionidae (6 genera, 12 species), Aeshnidae (4 genera, 9 species), Lestidae (3 genera, 8 species), Gomphidae (2 genera, 5 species), Calopterygidae (1 genus, 2 species), Corduliidae (2 genera, 2 species) Platycnemididae (1 genus, 1 species).] Address: Shapovalov M.I., Adyghe State University, Maikop, Russia. Email: shapmaksim2017@yandex.ru

**21009.** Shapovalov, M.I.; Korotkov, E.A.; Saprykin, M.A. (2022): Additions to dragonfly (Odonata) fauna of the Republic of Adygea (North-Western Caucasus). Russian Entomological Journal 31(3): 213-217. (in English, with Russian summary) ["The article provides data on new findings of 10 species of dragonflies on the territory of the Republic of Adygea. *Anax ephippiger*, *Pantala flavescens* and *Selysiothemis nigra* were recorded as new to the fauna of this region. For *Coenagrion ornatum*, *Ischnura pumilio*, *Pyrrhosoma nymphula*, *Anaciaeschna isoceles*, *Gomphus schneiderii*, *Libellula fulva*, and *Orthetrum cancellatum* that were previously known from single findings, we identified new collection points. The findings of exuviae of larvae of *S. nigra* in the coastal parts of the water bodies of the city of Maykop indicate the reproduction of this species in the region." (Authors)] Address: Shapovalov, M.I., Lab. Bioecological Monitoring of the Invertebrate Animals of Adyghya, Research Institute of Complex Problems, Adyghe State University, Gagarina str. 13, Maykop 385000, Adyghya Republic, Russia. E-mail: shapmaksim2017@yandex.ru

**21010.** Sharma, M.; Oli, B.R. (2022): Odonates (Insecta: Odonata) associated with rice ecosystems in Sunwal municipality, central Nepal. Journal of Natural History Museum 32(1): 35-48. (in English) ["This paper aims to list the odonates fauna associated with rice fields and to study their behaviour in Sunwal, Central Nepal. Research was conducted from June to November 2019 in a rice field by establishing three study plots of (50×50) m<sup>2</sup> each. A total of 33 Odonata species (11 damselflies and 22 dragonflies) from six families were recorded. Six of them were sporadic, while the rest were common. Territorial behaviour of Odonates was observed and the reproductive behavior of 11 species was thoroughly investigated. The copulatory period varied between species, ranging from two seconds to 49 minutes. Females attempted to mate up to three times. The second and third mating were both brief. Homing behaviour [dormitory] was observed in *Orthetrum sabina*. In this research, we noticed odonates to be predatory as well as prey species." (Authors)] Address: Oli, B.R., Central Department of Zoology, Tribhuvan University, Kirtipur, Kathmandu, Nepal. Email: buddhiramoli.2049@gmail.com

**21011.** Shin, I.-C.; Kim, M.-H.; Eo, J. (2022): Analysis of community stability and characteristics of macroinvertebrates in paddy fields by cultivation method. Ecology and Resilient Infrastructure 9(1): 15-23. (in Korean, with English summary) ["This study was conducted to investigate in relation to characteristic of macroinvertebrates in conventional and organic paddy fields. The investigation was conducted five times a year for Suwon, Ansong, Boeun, Gunsan, Gimje, Hamyang, divide into conventional paddy fields and organic paddy fields from 2009 to 2011. The macroinvertebrates collected from the surveyed between conventional

and organic paddy fields belonged to 84 species, 47 families, 16 orders, and 6 classes in 3 phyla. In the habitat oriented groups, climbers, swimmers and sprawlers were considerably occupied in conventional and organic paddy fields. In relation to the functional feeding groups, predators such as Odonata, Coleoptera, and Hemiptera were only the highest in paddy field ecosystem, regardless of cultivation method. As a result of community stability analysis, organic paddy fields has been identified much as species high resistance and resilience to environmental change in paddy field ecosystem. Species belonging to the I groups is considered to be important in organic paddy field such as *Stemolophus rufipes*, *Hydrochara affinis*, *Helochares nipponicus*, which has high mobility. In conclusion, it was found that the introduction of coleoptera as a food source was higher than that of conventional paddy fields in organic paddy field where primary consumers were abundant such as Chironomidae spp. and Dixidae sp.."] (Authors)] Address: Eo, J., Climate change Assessment Division, National Institute of Agricultural Science, Wanju 55365, Korea. Email: eojoy@korea.kr

**21012.** Shome, A.R.; Alam, M.M.; Roy, R.C.; Sultana, S.; Rabbe, M.F.; Naser, M.N.; Islam, M.M.; Biswas, D.; Jaman, M.F. (2022): First confined record of *Platygomphus dolabratus* Selys, 1854 (Odonata: Anisoptera) in Bangladesh. Bangladesh J. Zool. 50(1): 135-139. (in English) ["Jamalpur and Dinajpur district, Bangladesh (Fig. 1B). On 21 June 2020, a specimen of *Platygomphus dolabratus* spotted from a nearby ditch of Jamalpur and collected with an insect net. Other species of dragonflies observed around the ditch (e.g., *Crocothemis servilia*, *Orthetrum Sabina*, *Neurothemis fulvia*, *N. tullia* and *Brachythemis contaminata*). On 22nd June 2020, the second individual was sighted and collected from Birganj, Dinajpur. These specimens were observed and identified carefully using a literature available in Fraser (1934). Photographs of the specimens were taken using a SAMSUNG A50 mobile phone camera and deposited the photographic vouchers to Professor Md. Kazi Zaker Husain Museum at the Department of Zoology, University of Dhaka, Bangladesh." (Authors)] Address: Md. Mahabub Alam, Dept Zool., Univ. of Dhaka, Dhaka-1000, Bangladesh. Email: mahabub.zoo@du.ac.bd

**21013.** Sidra, S.; Mahmood, A.; Moavia, M.; Saadaat, H.B. (2022): Anisopteran diversity in two riverine habitats of southern Punjab, Pakistan. Inland Water Biology 15: 361-367. (in English) ["Dragonflies are an important indicator species for freshwater ecosystems. While their diversity in Pakistan has been well studied in the northern areas of the country, odonate diversity in the southern, warmer areas is still not well documented. The current study determined the Anisopteran diversity and abundance along two riverine tracts of Southern Punjab for a duration of five months. The collected specimens (n = 725) belonged to three families; Aeshnidae, Gomphidae, and Libellulidae. Anisopteran fauna was dominated by Libellulidae family represented by thirteen species out of total sixteen species identified from the study area. *Crocothemis erythraea* was the most abundant species (Relative Abundance – R.A = 14%) followed by *Braconopyga geminata* (R.A = 10%). The Shannon wiener diversity index value (H = 2.74) indicated a moderate level of Anisopteran biodiversity in the area. Since the dragonflies prefer warmer humid climates, species diversity was highest during the summer season with no odonates found during the colder month of December." (Authors)] Address: Sidra, S., Wildlife and Ecology, University of Veterinary and Animal Sciences, Lahore, Pakistan

**21014.** So, K.S.; Won, C.G. (2022): The first 'Megapodagrionidae' (Odonata, Zygoptera) from the Lower Cretaceous of Democratic People's Republic of Korea. *Cretaceous Research* 130, February 2022, 105054: (in English) ["Highlights: • *Phyonganpodagrion ryonsangae* sp. nov. is firstly described from the Sinuiju Formation, Sinuiju Group. \*The remarkable taxon belongs to the family 'Megapodagrionidae' (Insect: Odonata). \**Phyonganpodagrion* expands the geographic distribution of the family 'Megapodagrionidae'. Abstract: A new fossil genus and species, *Phyonganpodagrion ryonsangae* sp. nov. ('Megapodagrionidae') is described from the third member, the Sinuiju Formation, Barremian–Aptian, Lower Cretaceous, Ryonsang-dong, Sinuiju City, North Phyongan Province, DPRK. The new species distinctly differs from *Cretapodagrion sibelleae* Huang et al., 2018 in postnodal area with only 17 postnodal crossveins; a single row of cells (partly with two rows of cells) between IR1 and RP1; distal side of discoidal cell not oblique; base of RP3/4 well basad of subnodus; base of IR2 aligned with subnodus." (Authors)] Address: So, K.S., Dept Paleontology, Fac. of Geology, Kim Il Sung Univ., Pyongyang, Democratic People's Republic of Korea. E-mail: ks.so@ryongnamsan.edu.kp

**21015.** Susanto, M.A.D. (2022): Diversity and composition of dragonfly (Odonata) at the Punden Sumur Bumi area, Surabaya, East Java. *International Journal of Applied Biology* 6(2): 43-55. (in English) ["The Sumur Bumi Punden is a location used for spiritual tourism. The Punden Sumur Bumi area has a stagnant aquatic ecosystem type and a low level of disturbance and pollution. Therefore, the Punden Sumur Bumi area has the potential to be a natural habitat for dragonflies. This study aims to determine the diversity and composition of the dragonfly community in Sumur Bumi Punden. This study uses the visual day-flying observation technique modified by the transect method. The Punden Sumur Bumi area has a moderate diversity index value, with a value of  $H' = 2.57$ . In the Sumur Bumi Punden area, 17 species were found with a total of 124 individuals, including the species with the highest relative abundance, namely *Brachythemis contaminata*. Meanwhile, the species with the lowest relative abundance was *Diplacodes trivialis*. The composition of dragonflies showed that the swamp location had the highest species richness and abundance values, namely 16 species and a total of 79 individuals. Meanwhile, the grassland location has the lowest species richness, namely only 5 species." (Author)] Address: Susanto, M.A.D., Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Brawijaya, Malang, Indonesia. Email: muhammadazmidwi@gmail.com

**21016.** Tennessen, K.J. (2022): Nymph Cove: Identification to genus: Gomphidae (Part 2). *Argia* 34(4): 39-41. (in English) ["In this installment of Nymph Cove, we continue with gomphid genera that present greater challenges for identification than those we diagnosed in the last issue of ARGIA. These genera next up are *Arigomphus*, *Dromogomphus*, *Gomphurus*, *Hylgomphus*, *Phanogomphus*, *Phyllogomphoides*, *Stenogomphurus*, and *Stylurus*." (Author)] Address: Tennessen, K., 125 N. Oxford St, Wautoma, WI 54982, USA. E-mail: ktennessen@centurytel.net

**21017.** Thomas, C.N.; Gijo, A.H. (2022): Species composition and relative abundance of insects in Niger Delta University and environs of Amassoma community in Bayelsa State, Nigeria. *IIARD International Journal of Geography and Environmental Management* 8(1): 16-24. ["The composition and relative abundance of insects inhabiting the ecosystems of the Niger Delta University and surroundings of

Amassoma community was studied from May 15 – October 15, 2020 to have a baseline data for purposes of research and environmental impact assessment. Five (5) methods used to collect samples from four sites included the sweep nets, aerial nets, pit fall traps, light traps and direct collection by hand. A total of 7,225 individual species of insects were collected and identified into 8 orders, 24 families and 32 species. The most abundant insects were the *Anopheles* species (Diptera: Culicidae) constituted 58.74%; *Dorylus* species (Hymenoptera: Formicidae) constituted 26.12%. There were low numbers of six (6) species of insects which included *Libellula pulchella* [sic; a North-American species]; (...) ranged between 1.24%-1.68% in abundance. [...] This preliminary study confirmed the rich composition of insect species in the environs of Niger Delta University need there are threats factors in the environment that are driving the insects towards extinction were needed to be investigated." (Authors)] Address: Thomas, C. N., Dept Biol. Sciences, Niger Delta Univ., Wilberforce Island Bayelsa State, Nigeria

**21018.** Tsalkatis, A.; Martens, A. (2022): Reproductive behaviour, phenology, and reproductive lifespan of *Chalcolestes parvidens* at an intermittent stream on a Greek island (Odonata: Lestidae). *Odonatologica* 51(3/4): 263-287. (in English) ["At a summer-dry stream on the Aegean island of Lesbos, a population of *Chalcolestes parvidens* (Artobolevski, 1929) was studied during the reproductive period from late August to November 2018. Mediterranean intermittent streams display unique characteristics with a seasonal sequence of abiotic and biotic regulation and provide valuable habitats for *C. parvidens*. Abundance at the breeding water and perching positions on plants of males, females and pairs were recorded, and a mark-recapture study with 412 males was conducted. The damselflies perched mostly on dry plant parts of *Salix fragilis* and *Nerium oleander* that dominated the site. Males perched mainly on exposed twig tips near or over the water and some individuals were quite philopatric. A minimum adult male life span of 30 days after maturation was determined. Oviposition was observed exclusively in branches of *S. fragilis*. Differences in reproductive behaviour between *C. parvidens* and its sister species *C. viridis* appear to be very small or not distinguishable at all." (Authors)] Address: Tsalkatis, Annika, Institute of Biology, Univ. of Education Karlsruhe, Bismarckstr. 10, 76133 Karlsruhe, Germany. Email: tsalkatis@posteo.de

**21019.** van Nieuwenhoven, R.W. (2022): Mechanical bactericide by biomimetics of the nanopillars on insect wings. Diplomarbeit, Institut für Angewandte Physik, Fakultät für Physik der Technischen Universität Wien: 93 pp. (in English, with German summary) ["The antibacterial properties of cicada wings originate from hexagonal pillar-like nanostructures with species-dependent heights of approximately 330 nanometers and a tip spacing of about 188 nanometers. These multi functional nanostructures are also superhydrophobic and selfcleaning. This diploma thesis presents investigations of two New Zealand cicada species *Am. phipsalta cingulata* and *Kikihia scutellaris*, the Austrian dragonfly *Sympetrum striolatum* as well as an US American cicada species *Magiccicada septendecim* with various methods such as Atomic Force Microscopy, Scanning Electron Microscopy, and bacterial tests with live-dead staining. The surfaces investigated comprise the cicada wings themselves, negative replicas of the wings made with the molding material Polyvinyl siloxane and positive replicas in various resins. The main focus lies in establishing low-cost bioreplication techniques for the transfer of the antibacterial properties to man-made surfaces such as hospital surfaces, medical instruments,



smartphone displays and door handles. A recent publication of Senevirathne and co-workers support my findings where I see challenges in using the nanopillars as bactericides." (Author)] Address: not stated

**21020.** Vasconcelos, B.D.; Brandao, R.A. (2022): Predation on *Tamandua tetradactyla* (Pilosa: Myrmecophagidae) by *Caiman latirostris* (Crocodylia: Alligatoridae) in a highly seasonal habitat in Central Brazil. *North-Western Journal of Zoology* 18(2): 218-221. (in English) ["*Caiman latirostris* is an opportunistic predator found in rivers, mangroves, and wetlands throughout eastern South America. We report here the predation of *Tamandua tetradactyla* by *Caiman latirostris* in an old cattle dam in the Serra da Bodoquena National Park, Brazil. The adult caiman was accompanied by its hatchlings that fed on the lacerated parts of the Lesser anteater and possibly the insects attracted by the carcass. Although *Caiman latirostris* acts as a fundamental organism for the balance of ecosystems, most of the species' diet records are anecdotal, making this record relevant for understanding the ecology of the species." (Authors) In Table 1, prey items are compiled for *C. latirostris* from studies carried out in nature in South America and including Corduliidae and Libellulidae larvae.] Address: Vasconcelos, Beatriz, Laboratory of Fauna and Conservation Units, Department of Forestry Engineering, University of Brasilia, Brasilia, Brazil. Email: beatrizdiogov@gmail.com

**21021.** Vaughn, S.N.; Jackson, C.R. (2022): Evaluating methods of preserving aquatic invertebrates for microbiome analysis. *Microorganisms* 2022, 10, 811. <https://doi.org/10.3390/15pp>: 15 pp. (in English) ["Research on the microbiomes of animals has increased substantially within the past decades. More recently, microbial analyses of aquatic invertebrates have become of increased interest. The storage method used while collecting aquatic invertebrates has not been standardized throughout the scientific community, and the effects of common storage methods on the microbial composition of the organism is unknown. Using crayfish and dragonfly nymphs collected from a natural pond and crayfish maintained in an aquarium, the effects of two common storage methods, preserving in 95% ethanol and freezing at -20 °C, on the invertebrate bacterial microbiome was evaluated. We found that the bacterial community was conserved for two sample types (gut and exoskeleton) of field-collected crayfish stored either in ethanol or frozen, as was the gut microbiome of aquarium crayfish. However, there were significant differences between the bacterial communities found on the exoskeleton of aquarium crayfish stored in ethanol compared to those that were frozen. Dragonfly nymphs showed significant differences in gut microbial composition between species, but the microbiome was conserved between storage methods. These results demonstrate that preserving field-collected specimens of aquatic invertebrates in 95% ethanol is likely to be a simple and effective sample preservation method for subsequent gut microbiome analysis but is less reliable for the external microbiome." (Authors)] Address: Vaughn, Stephanie. Dept of Biology, Univ. of Mississippi, University, MS 38677, USA

**21022.** Voinov, I.O. (2022): The first record of *Orthetrum sabina* (Drury, 1770) (Odonata: Libellulidae) in Russian Federation. *Amurian Zoological Journal* 14(4): 616-619. (in English, with Russian summary) ["The paper reports the results of the odonatological examination of ponds in the Natural Ornithological Park in the Imeretinskaya Lowland in Adler (43°24'1"N; 39°58'22"E) carried out on 22 July 2020. In total, we found 12 Odonata species, including *Orthetrum*

*sabina* (Drury, 1770) that was recorded on the Russian territory for the first time. The found specimens correspond exactly to the subspecies *Orthetrum sabina nigrescens* (Bartenev 1929; Bartenev 1930) described by Bartenev from Lake Inkit. The current status of the subspecies is discussed. Including this discovery, the dragonfly fauna of the Russian Federation comprises 157 species." (Author)] Address: Voinov, I.O., 141707, Dolgoprudny, Russia. Email: djet.100@yandex.ru

**21023.** Wasahlan, A.; Kurnia, I. (2022): Keanekaragaman jenis capung pada berbagai tipe habitat di desa Cipeuteuy Kecamatan Kabandungan Kabupaten Sukabumi [The diversity of dragonfly species in various types of habitats in Cipeuteuy Village, Kabandungan District, Sukabumi Regency]. *Jurnal Biosolampari: Jurnal Biologi* 5(1): 67-80. (in Indonesian, with English summary) ["Dragonflies are insects that mostly live as nymphs and are related to aquatic habitats and act as bioindicators of environmental quality. The purpose of the study was to identify the diversity of dragonflies in various habitat types in Cipeuteuy Village. This study uses the line transect method measuring 100 meters with a width of 20 meters right and left and the duration of observation is 15 minutes per each observation line. The study was conducted in nite habitat types from 52 locations. The total dragonfly found were 13 species from four families. The highest dragonfly richness was found in the rice field habitat as many as 12 species and the lowest species was found in the citrus garden habitat as many as three species. The dominant species of dragonfly found in all habitat types is *Rhodothemis rufa*. The overall dragonfly diversity index was 2.56 and ranged from 1.10 to 2.48, and the evenness index ranged from 0.57 to 0.90." (Authors)] Address: Wasahlan, A., Alumni, Program Studi Ekowisata, Sekolah Vokasi, IPB Univ., Jl. Raya Pajajaran, Kota Bogor, Jawa Barat, 161282, Indonesia. Email: insankurnia@apps.ipb.ac.id

**21024.** Wildermuth, H. (2022): Libellenkadaver als Nahrungs- und Rendezvousplatz (Odonata). *Mercuriale* 22: 89-99. (in German, with English summary) ["Dragonfly carcasses as foraging and rendezvous sites. – Based on photographic documents it is shown how carcasses of dragonflies are used by scavengers. Dead dragonflies floating on the water surface are food for aquatic insects such as diving beetles (Dytiscidae) and water striders (Gerridae). Some terrestrial insects also use them as food, and in the case of scorpionflies, as mating sites. Museum specimens are often infected by bacon beetles thus being destroyed. A simplified diagram focusing on dragonflies shows the material cycle in living nature." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**21025.** Wildermuth, H. (2022): Zur Bedeutung des Teufelsabbiss *Succisa pratensis* Moench (Caprifoliaceae) für Insekten und Spinnen (Insecta, Arachnida). *Entomo Helvetica* 15: 73-90. (in German, with English and French summaries) ["Insects and spiders associated with the Devil's bit *Succisa pratensis* Moench. In litter meadows of the eastern Swiss Plateau, *S. pratensis* is the only plant species that blooms profusely in late summer and early autumn. At this time of year, it constitutes the only abundant source of food for many insects in the vicinity of intensely used agricultural land and dense forests. Based on this fact, all macroinvertebrates associated with *S. pratensis* found from late August to late September 2021 in selected litter meadows in the southeastern region of the canton of Zurich

were photographically documented. Altogether, 48 insect and 6 spider spp. were recorded. Flower and fruit heads were exploited by 9 bee spp., 13 fly spp., 9 butterfly spp. and 4 bug spp., whereas 8 orthopteran spp. mainly used the leaf rosette of the plant as a hiding place, for thermoregulation and food. The foliage served as an oviposition site and a source of larval nourishment for the oligophagous Marsh Fritillary *Euphydryas aurinia*. Spiders used the flower heads as a site to ambush their prey and employed the whole plant to fasten cobwebs and for shelter. The complex interactions between *S. pratensis* and their arthropod visitors are discussed and illustrated by a few examples. ... *Succisa* was used in two cases by a female *Sympetrum fonscolombii* as a perch for hunting flights. On several occasions, *S. sanguineum* males were observed flying erratically between stalks and stems in vegetation with dense *Succisa* stands in search of females, but they never sat down." (Deepl/Autor)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**21026.** Yavorskaya, N.M. (2022): Quantitative zoobenthos characteristics of the Udyl Lake basin (Udyl Nature Reserve, Khabarovsk Region). *Amurian Zoological Journal* 14(4): 594-615. (in Russian, with English summary) ["The article reports the results of the study on zoobenthos in the wetlands of Lake Udyl and its 12 tributaries (the Lower Amur, Udyl Nature Reserve) during the 2021 summer flood. Except for the Bichi River, benthic communities of the rivers and streams in the Lake Udyl basin were studied for the first time. The study found that the composition, structure and quantitative characteristics of the bottom communities of Udyl Lake and the Bichi salmon river differed from the previous results obtained in the 1930s–1940s and the 1990s. The results revealed a rich taxonomic composition of invertebrates (19 groups), low values of density and biomass in the water bodies of the reserve. The zoobenthos was dominated by amphibiotic insects (57% of the total density and 43% of the total biomass). We established that oligochaetes and chironomids in the Udyl Lake basin differed in the highest quantitative indicators. The quality of water was determined using classical (GW, TBI, IB, ND/Nex, NCh/Nex) and modified (IPM, TBIM) bioindicative indices and metrics. The results show that, in general, the ecosystem of Lake Udyl and the watercourses flowing into it is in a relatively satisfactory condition." (Author) The author considers Odonata at order level.] Address: Yavorskaya, Nadezhda M., Institute of Water & Ecology Problems, Far Eastern Branch of the Russian Acad. of Sciences, 56 Dikopoltseva Str., 680000, Khabarovsk, Russia. Email: yavorskaya@ivep.as.khb.ru

**21027.** Yu, X.; Li, L., Gu, H. (2022): *Ophiogomphus tibeticus* sp. nov. from Sichuan, China (Anisoptera: Gomphidae). *Zootaxa* 5213 (5): 569-577. (in English) ["A new gomphid species, *Ophiogomphus tibeticus* sp. nov., from Zoige alpine Wetland, Sichuan is described and illustrated. Assignment to the genus *Ophiogomphus* Selys, 1854 is based on both morphological and molecular analyses. This new species differs from other known *Ophiogomphus* mainly in the shape of the caudal appendages." (Authors)] Address: Yu, X., College of Life Sciences, Chongqing Normal Univ., Chongqing, 401331, China. Email: lannysummer@163.com

**21028.** Yuditaningtyas, M.; Hadi, M.; Tarwotjo, U. (2022): Struktur komunitas dan habitat Odonata di Kawasan Wisata Waduk Jatibarang Semarang. *Bioma: Berkala Ilmiah Biologi* 24(1): 73-79. (in Indonesian, with English summary) ["Jatibarang Reservoir is a freshwater dam in Semarang

which has different habitat types. The different of habitat types can affect biodiversity, including dragonflies (Odonata). Dragonflies are insects that have an important function as a bioindicator of water quality and play a role in maintaining the balances of tropic levels in the food chain. The study aims to determine the abundance, diversity, evenness, similarity and distribution of dragonflies and to determine the abiotic and biotic factors of each habitat type in Jatibarang Reservoir tourist area. The study used Point Count method. The results showed that there were 22 types of dragonflies consisting of 7 different families. The dragonfly which has the highest abundance in the total number of individuals is *Eupahea variegata* with an index of 16.77%. Diversity of dragonflies in low and medium categories. The evenness level of dragonfly species is evenly. The similarity of species has a low to high degree of similarity. The distribution of dragonflies are clumped and regular. The differences in abiotic and biotic conditions in each habitat affect the structure of dragonfly community." (Authors)] Address: Yuditaningtyas, M., Dept Biologi, Fak. Sains dan Matematika, Universitas Diponegoro, Indonesia. Email: megayudita@gmail.com

**21029.** Zebsa, R.; Mahdjoub, H.; Khelifa, R. (2022): Similar response of a range expanding dragonfly to low and high-elevation predators. *Diversity* 2022, 14, 302. <https://doi.org/10.3390/d14040302>: 12 pp. (in English) ["Recent range expansion of many species northward and upward in elevation suggests that the expanding species are able to cope with new biotic interactions in the leading edge. To test this hypothesis, we used a common garden experiment expanding the elevation range of an obligatorily univoltine dragonfly (*Sympetrum striolatum*) to investigate whether the growth, behavioral (food intake), and morphological (8th and 9th abdominal lateral spine) responses differed when confronted with dragonfly predators that dominate low-elevation (*Aeshna cyanea*) and high-elevation (*A. juncea*) lentic freshwater systems under two temperature treatments (20 °C and 24 °C). Growth rate and growth efficiency increased at higher temperature. Overall, low and high-elevation predators induced a similar increase in growth rate and growth efficiency but a decrease in food intake at 24 °C. Lateral abdominal spines were longer only in low-elevation dragonflies at 18 °C. Our study suggests that range-expanding species may have been successful in colonizing new areas at higher elevations because they respond to dominant high-elevation predators in a similar way to the more familiar low-elevation predators." (Authors)] Address: Zebsa, R., Laboratoire Biologie, Eau et Environnement (LBEE), Université 8 Mai 1945, Guelma 24000, Algeria

**21030.** Zhong, H.; Qiu, J.G.; Pan, Y.Q.; Yang, J., Lin, D.; Ouyang, B.; Jiang, K. (2022): Investigation of Odonata insect resources in Jिंगgangshan Nature Reserve. *Biotic Resources* 44(5): 461-466. (in Chinese, with English summary) ["In order to clarify the species resources and community characteristics of Odonata insects in Jिंगgangshan Nature Reserve, and provide a theoretical basis for the protection and rational utilization of Odonata resources, dragonfly resources were investigated in Changguling (470 m above sea level), Dajing (930 m above sea level) and Huangyangjie (1200 m above sea level) of Jिंगgangshan from 2018 to 2021. Shannon-Wiener diversity index, Pielou evenness index, Berger-Parker dominance index and Simpson dominance concentration index were used to analyze the diversity of dragonflies in three sampling sites. A total of 483 specimens were collected and identified, belonging to 23 species, 16 genera, 8 families, 2 suborders. Among them, Libellulidae occupied an absolute advantage,

and the numbers of genera and species accounted for 37.50% and 56.52% of the total, respectively. There was no significant difference in community structure index between Dajing and Huangyangjie ( $P > 0.05$ ). The diversity index and evenness index of Dajing and Huangyangjie were significantly higher than those of Changguling ( $P < 0.05$ ), while the dominance index and dominance concentration index were significantly lower than those of Changguling ( $P < 0.05$ ). This indicates that the diversity of Odonata community is low in Changguling, which is at a lower altitude in Jinggangshan Nature Reserve, but the dominant species are more prominent." (Authors)] Address: Jiang, K., School of Life Sciences, Jinggangshan University, Ji'an 343009, Jiangxi, China. Email: 9920180022@jgsu.edu.cn

**21031.** Zieritz, A.; Lee, P.S.; Eng, W.W.H.; Lim, S.Y.; Sing, K.W.; Chan, W.N.; Loo, J.S.; Mahadzir, F.N.; Ng, T.H.; Yeo, D.C.; Gan, L.X.; Gan, J.Y.; Gibbins, C.; Zoqratt, M.Z.H.; Wilson, J.-J. (2022): DNA metabarcoding unravels unknown diversity and distribution patterns of tropical freshwater invertebrates. *Freshwater Biology* 67(8): 1411-1427. (in English) ["1. Tropical freshwater invertebrate species are becoming extinct without being described, and effective conservation is hampered by a lack of taxonomic and distribution data. DNA metabarcoding is a promising tool for rapid biodiversity assessments that has never been applied to tropical freshwater invertebrates across large spatial and taxonomic scales. 2. Here we use DNA metabarcoding to comprehensively assess the benthic freshwater invertebrate fauna of the Perak River basin, Malaysia. Specific objectives were to: (1) assess performance of two DNA metabarcoding protocols; (2) identify gaps in reference databases; (3) generate new data on species diversity and distribution; and (4) draw conclusions regarding the potential value of DNA metabarcoding in tropical freshwater conservation. 3. Organisms were collected by hand and net at 34 sites and divided into small (retained in 0.5-mm but passing through 1-mm mesh) and large (retained in 1-mm mesh) fractions, and a 313-bp cytochrome c oxidase subunit I fragment amplified and sequenced using general Metazoa primers. 4. Bioinformatic analysis resulted in 468 operational taxonomic units (~species) from 12 phyla. Only 29% of species could be assigned binominal names through matches to public sequence libraries, indicating varying levels of library completeness across Orders. Extraction of small-fraction DNA with a soil kit resulted in a significantly higher species count than with a general kit, but this was not even across taxa. 5. Metabarcoding (amplification) success rate, estimated via comparison to morphological identifications of the large-fraction specimens, was high in most taxa analysed but low, for example, in ampullariid and viviparid gastropods. Conversely, a large proportion of species-site records for Decapoda and Bivalvia came from metabarcoding only. Species richness averaged  $29 \pm 16$  species per site, dominated by Diptera, Annelida, and Odonata, and was particularly high in tributaries of the mountainous Titiwangsa Range. At least eight species are new records for Malaysia, including the non-natives *Ferrissia fragilis* (Gastropoda) and *Dugesia notogaea* (Platyhelminthes). 6. Our study showed that DNA metabarcoding is generally more effective in detecting tropical freshwater invertebrate species than traditional morphological approaches, and can efficiently improve knowledge of distribution patterns and ranges of native and non-native species. However, current gaps in reference databases, particularly for bioindicator taxa, such as the Plecoptera, Ephemeroptera, and Coleoptera, need to be addressed urgently. tributaries of the mountainous Titiwangsa Range. At least eight species are new records for Malaysia,

including the non-natives *Ferrissia fragilis* (Gastropoda) and *Dugesia notogaea* (Platyhelminthes)." (Authors)] Address: Zieritz, Alexandra, Univ. of Nottingham, Sir Clive Granger Building, University Park, NG7 2RD Nottingham, UK. Email: alexandra.zieritz@nottingham.ac.uk

## 2023

**21032.** An, C.-H.; Cheon, K.-S.; Jang, J.-E.; Lee, H.-G. (2023): Complete mitochondrial genome of *Macromia manchurica* Asahina, 1964 (Odonata: Macromiidae). *Mitochondrial DNA Part B Resources* 8(1): 10-12. (in English) ["We describe the first time sequencing and assembly of the complete mitochondrial genome of *Macromia manchurica* Asahina, 1964 (Odonata; Macromiidae; *Macromia*). The mitochondrial genome of *M. manchurica* was found to be 15,560 bp. It contains thirteen protein-coding genes (PCGs), 22 transfer RNAs (tRNAs), two ribosomal RNAs (rRNAs), and AT-rich region. The overall base composition of *A. japonicus* is A-38.6%, C-17.0%, G-12.5%, and T-31.9%. A phylogenetic analysis of 14 species within the order Odonata and order Ephemeroptera suggested that *Macromia amphigena* is most closely related to *M. manchurica*." (Authors)] Address: Lee, H.-G., Dept Biological Science, Sangji Univ., Wonju, South Korea. Email: morningdew@sangji.ac.kr

**21033.** Culler, L.E.; Ohba, S.-y.; Crumrine, P. (2023): Predator-prey ecology of Dytiscids. In: Yee, D.A. (eds) *Ecology, Systematics, and the Natural History of Predaceous Diving Beetles (Coleoptera: Dytiscidae)*. Springer, Cham. [https://doi.org/10.1007/978-3-031-01245-78\\_373-399](https://doi.org/10.1007/978-3-031-01245-78_373-399). (in English) ["Dytiscids are top invertebrate predators in most freshwater habitats, particularly in lentic systems such as wetlands and ponds. Adult and larval dytiscids are often considered to be generalists, feeding on zooplankton, aquatic macroinvertebrates, larval amphibians, and fish; however, some species selectively feed on certain prey types relative to others and many engage in cannibalism and intraguild predation. These predator-prey interactions cause a variety of consumptive and non-consumptive effects on prey abundance and community composition in freshwater habitats. Dytiscids are also notable predators of mosquito larvae and thus explored as biological agents for mosquito suppression, particularly in areas where mosquitoes are vectors of diseases and in northern areas. Dragonfly nymphs, fish, amphibians, reptiles, birds, and mammals are known predators of dytiscids, although the extent to which these organisms rely on dytiscids for food remains unclear. Given the prominent role of dytiscids in freshwater food webs, future research should be aimed at improving basic knowledge of dytiscid feeding ecology, using dytiscids to test predator-prey and trophic theory, describing the potential for dytiscids in conservation biological control, and examining how environmental change affects the role of dytiscids as predators of vector and nuisance species." (Authors)] Address: Culler, Lauren E., Dartmouth College, Hanover, NH, USA

**21034.** Darshetkar, A.; Patwardhan, A.; Koparde, P. (2023): A comparison of four sampling techniques for assessing species richness of adult odonates at riverbanks. *Journal of Threatened Taxa* 15(1): 22471-22478. (in English, with Marathi summary) ["Members of the insect order Odonata are known as good ecological indicators. Many are sensitive to habitat modifications and are easily monitored for use in environmental assessment studies. Rapid assessments rely on efficient sampling techniques. However, there is limited information available on sampling techniques for adult odo-

nates, and protocols require evaluation. To do this, we standardized counting methods during sampling of odonates from August to November 2016 at the Mula River, Pune, India. We used four counting techniques; full-width belt transect (FWBT), full-circle point count (FCPC), half-width belt transect (HWBT), and half-circle point count (HCPC). For HWBT and HCPC areas facing the river were sampled, and for each technique we took multiple temporal replicates. We compared species detected per unit time, species detected per unit area, new species detected per unit time, and new species detected per unit area. Additionally, we compared species estimates. With HCPC we detected the maximum number of species and new species per unit area, whereas FWBT returned maximum coverage of recorded species. We recommend our proposed techniques be considered in the future across various habitats to decide the most suitable sampling strategy for the different habitats or situations." (Authors)] Address: Darshetkar, Apeksha, 230/12/4, Atharva Apartment, Shukrawar Peth, Pune, Maharashtra 411002, India. Email: adarshetkar25@gmail.com

**21035.** Gerstle, V.; Manfrin, A.; Kolbenschlag, S.; Gerken, M.; Mufachcheri Islama, A.S.M.; Entling, M.H.; Bundschuh, M.; Brühl, C.A. (2023): Benthic macroinvertebrate community shifts based on Bti-induced chironomid reduction also decrease Odonata emergence? *Environmental Pollution* 316 (2023) 120488: 8 pp. (in English) ["Highlights: • Bti ( $2.88 \times 10^9$  ITU/ha) was applied three times per year over two years. • In treated floodplain pond mesocosms (FPM), chironomid larvae were reduced by 41%. • Community shift was explained by fewer chironomid, Libellulidae and Coenagrionidae. • Emergence of Libellulidae was reduced by 53% in Bti-treated FPMs. • Aquatic effects may propagate to terrestrial food webs via reduced insect emergence. Abstract: Chironomid larvae often dominate aquatic macroinvertebrate communities and are a key food source for many aquatic predators, such as odonate larvae. Changes in aquatic macroinvertebrate communities may propagate through terrestrial food webs via altered insect emergence. *Bacillus thuringiensis israelensis* (Bti)-based larvicides are widely used in mosquito control but can also reduce the abundance of non-biting chironomid larvae (Diptera: Chironomidae). We applied the maximum field rate of Bti used in mosquito control three times to six mesocosms in a replicated floodplain pond mesocosm (FPM) system in spring for two consecutive years, while the remaining six FPMs were untreated. Three weeks after the third Bti application in the first year, we recorded on average a 41% reduction of chironomid larvae in Bti-treated FPMs compared to untreated FPMs and a shift in benthic macroinvertebrate community composition driven by the reduced number of chironomid, Libellulidae and Coenagrionidae larvae (Odonata). Additionally, the number of emerging Libellulidae (estimated by sampling of exuviae in the second year) was reduced by 54% in Bti-treated FPMs. Since Odonata larvae are not directly susceptible to Bti, our results suggest indirect effects due to reduced prey availability (i.e., chironomid larvae) or increased intraguild predation. As Libellulidae include species of conservation concern, the necessity of Bti applications to their habitats, e.g. floodplains, should be carefully evaluated." (Authors)] Address: Gerstle, Verena, Inst. Environmental Sciences, iES Landau, Univ. of Koblenz-Landau, Fortstraße 7, 76829, Landau, Germany. Email: gerstle@uni-landau.de

**21036.** Koch, W.; Hogeweg, L.; Nilsen, E.B.; O'Hara, R.B.; Finstad, A.G. (2023): Recognizability bias in citizen science photographs. *R. Soc. OpenSci.* 10: 221063. <https://doi.org/10.1098/rsos.221063>. 8 pp. In English. [„Citizen science

and automated collection methods increasingly depend on image recognition to provide the amounts of observational data research and management needs. Recognition models, meanwhile, also require large amounts of data from these sources, creating a feedback loop between the methods and tools. Species that are harder to recognize, both for humans and machine learning algorithms, are likely to be under-reported, and thus be less prevalent in the training data. As a result, the feedback loop may hamper training mostly for species that already pose the greatest challenge. In this study, we trained recognition models for various taxa [including Odonata], and found evidence for a 'recognizability bias', where species that are more readily identified by humans and recognition models alike are more prevalent in the available image data. This pattern is present across multiple taxa, and does not appear to relate to differences in picture quality, biological traits or data collection metrics other than recognizability. This has implications for the expected performance of future models trained with more data, including such challenging species." (Authors)] Address: Koch, W., Dept of Natural History, Norwegian Univ. of Science & Technology, 7491 Trondheim, Norway. Email: wouter.koch@artsdatabanken.no

**21037.** Kriska, G. (2023): Dragonflies and Damselflies: Odonata. A Field Guide. In: *Freshwater Invertebrates in Central Europe*: Springer, Cham. [https://doi.org/10.1007/978-3-030-95323-2\\_14](https://doi.org/10.1007/978-3-030-95323-2_14): 263-288. (in English) ["Odonata comprise one of the eldest orders of insects; moreover, their appearance remained almost unaltered for as many as 150 million years. They have about 5000 species inhabiting the terrestrial habitats all over the world except for the arctic regions. These insects play a significant role in the cycle of materials both in aquatic and terrestrial ecosystems. Feeding of these carnivorous animals is aided by their tough jaws and densely toothed maxillae, what is also reflected by their scientific name ('Odonata' = 'toothed') (Fig. 14.1)." (Publisher)] Address: Kriska, G., Group for Methodology in Biology Teaching, Biological Institute, Eötvös Loránd University, Budapest, Hungary

**21038.** La Porta, G.; Landi, F.; Leandri, F.; Assandri, G. (2023): The new Checklist of the Italian Fauna: Odonata. *Biogeographia – The Journal of Integrative Biogeography* 2023, 38 (1): ucl009: (in English) ["17 years after the publication of the last checklist of the Odonata found in Italy, an updated list has been compiled. This list reports 95 species belonging to 10 families and 38 genera and includes 2 national endemic and 1 sub-endemic species. Compared to the previous checklist, three species were removed, two subspecies were granted species status, and 10 species were added as new taxa for Italy. The checklist summarizes the current state of the knowledge on the geographical distribution of the Italian species with a regional detail. After the online publication of this dataset on the LifeWatch Italy website in 2021, some minor updates will be included in future releases. The newly discovered species are the result of increased exploration of the national territory combined with some possible range shifts, especially of Libellulidae species of Afro-Asiatic origin. This increased coverage of the country is the result of the efforts of many contributors. It stems from the rapidly growing interest in this zoological group, also enhanced by the activation of a nationwide citizen science project promoted by the Italian Society for the Study and Conservation of Dragonflies (Odonata.it)." (Authors)] Address: La Porta, G., Società Italiana per lo Studio e la Conservazione delle Libellule ODV, Via Elce di Sotto, 8, 06123 Perugia (PG), Italy. Email: gianandrea.laporta@unipg.it



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de  
Published in Zerf, Germany  
ISSN 1438-0269

## 2001

**21039.** Woodward, G. (2001): Book Review: Dragonflies: Behaviour and Ecology of Odonata P. S. CORBET (1999). Harley Books, Colchester, UK. Pp. 882. ISBN 0-946-58964-X. £62.50 (hardback). Freshwater Biology 46: 141-143. (in English) [Book review.] Address: Woodward, G., IERM, University of Edinburgh, Mayfield Road, Edinburgh, EH9 3JU: UK. E-mail: Guy.Woodward@ed.ac.uk

## 2006

**21040.** Beichle, U.; Fuhrmann, K. (2006): Die Libellen-Sammlung im Landesmuseum für Natur und Mensch Oldenburg: ein Modell für das Leitmotiv "Sammeln, bewahren, erforschen, ausstellen". Schriftenreihe des Landesmuseums Natur und Mensch Oldenburg 43: 68-72. (in German) [General introduction in the museum collection of Odonata at the Landesmuseum, with a focus on the regional species of Weser-Ems-region in Niedersachsen, Germany.] Address: Beichle, U., Landesmuseum für Natur und Mensch Oldenburg, Damm 38-44, 26135 Oldenburg, Germany. Email: ulf.beichle@web.de

**21041.** Rothfels, C.J. (2006): The dragonflies and damselflies (Odonata) of Halton Region, Ontario. Halton Natural Areas Inventory 2006: Volume 2 Species Checklists. Hamilton Naturalists' Club, Halton-North Peel Naturalists' Club, and South Peel Naturalists' Club. Hamilton, Ontario: 135-158. (in English) ["Key results: Diversity: Halton's tally of 80 species is impressive for an area of its size. Much of this diversity of odonates is due to the variety of habitats found within Halton, and to the north-south spread of the Region. Some species are typical of more "northern" habitats (e.g. *Libellula quadrimaculata*) and are absent or rare in Halton below the Escarpment, while others (e.g. *Pachydiplax*) are largely confined to the southern areas of the Region. Species: The two most significant results of the recent odonate investigations are the large local populations of Unicorn Club-tail (*Arigomphus villosipes*) and Arrowhead Spiketail (*Cordulegaster obliqua*). Prior to 2002, there were approximately 13 records of *Arigomphus villosipes* from Ontario, and it was extirpated at some of those (Rothfels, in press). Since 2002, this species has been discovered to be locally widespread (with five stations in Hamilton and eight in Halton). These 13 sites double the known Ontario records! Our current data suggest that western Lake Ontario is the centre of this species' distribution in Ontario (Rothfels, in press). *C. obliqua* is even rarer; by the end of 2003 there were only 11 records for the province, none from Halton (Bree 2004a). Unlike *A. villosipes*, *C. obliqua* is not confined to southern Ontario. Instead, its records are scattered thinly across the province from a historic Hamilton record in the south, east to the Ottawa area, and northwest to Sudbury. The Halton records are particularly significant in light of Bree's observation that

the previous recent records were confined to the Canadian Shield, and he was concerned that the Arrowhead Spiketail's "continued occurrence off of the Shield [is] doubtful" (Bree 2004a)." (Author)] Address: Rothfels, C., Dept of Biology, Duke University, Durham, NC 27707-0338 E-mail: rothfels@zoology.unc.edu

## 2007

**21042.** Fauchoux, M.J.; Meurgey, F. (2007): Sensilla chaetica and filiformia in *Uropetala chiltoni* Tillyard, 1930 larval antennae (Odonata, Anisoptera, Petaluridae). *Martinia* 23(4): 127-132. (in French, with English summary) ["Sensilla chaetica and filiformia in *Uropetala chiltoni* Tillyard, 1930 larval antennae (Odonata, Anisoptera, Petaluridae). The sensory equipment of the larval antenna of *U. chiltoni* is studied here using scanning electron microscopy. Two sensillum types (aporous curved sensilla chaetica and aporous sensilla filiformia classed in two subtypes) are present on all the segments, both on the scape and the pedicel and on the four flagellum segments. This equipment differs from that of Zygoptera and Anisoptera previously described, especially as regards the small number of sensillum types and the abundance of sensilla filiformia whose function is presumed to be vibroreceptive. These results are discussed in relation to the larval ecology." (Authors)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, 44000 Nantes, France. Email: Francois.Meurgey@mairie-nantes.fr

## 2008

**21043.** Lockwood, M. (2008): Los Odonatos de Cataluña. I jornadas sobre la conservación de los artrópodos en Extremadura. Centro de Educación Ambiental de Cuacos de Yuste 16, 17 y 18 de Junio de 2007. Edición: Fondos LIFE-Proyecto LIFE 2003/NAT/E/000057 "Conservación de Artrópodos Amenazados de Extremadura". Junta de Extremadura. Consejería de Industria, Energía y Medio Ambiente. Coordinación técnica: Javier Pérez Gordillo y Ángel Sánchez García. Depósito legal: BA-004-2008: 103-115. (in Spanish) ["Conclusions: Undoubtedly, the hobby in the Iberian Peninsula for dragonflies is booming without having even come close to reaching the levels of popularity that exist in other European countries, where the tradition of the amateur naturalist goes back literally centuries, and where there are dental societies that gather thousands of people. However, the advent of new digital technology in the imaging world, with near-professional performance cameras at pocket-friendly prices, has helped encourage a new crop of naturalists to head out into the countryside in search of spectacular images. And it has been the Odonata, insects with intense colors and intriguing behavior where they exist, that have captured the imagination of many of these amateur photographers. We hope that these new trends bear fruit, which we believe can complement the work of universities and, increasingly, the interest in this group of insects

that is palpable in certain regional administrations. The organization of the World Dentistry Congress in Vigo in 2005, the First Conference on Arthropods in Extremadura in June 2007 and the field work undertaken in Catalonia, Valencia and Extremadura could be the first firm steps towards a new respect for the Odonata and the arthropods in general in the Iberian Peninsula." (Author/Googletranslate)] Address: Lockwood, M., Grupo Oxygastra Institució Catalana d'Història Natural Carrer del Carne, 47; 08001 Barcelona, Spain. Email: info@oxygastra.org

**21044.** Manolis, T. (2008): Spiders residing in odonate exuviae — An update and request for information. *Argia* 20(3): 19- (in English) [ Verbatim: In early August, at the DSA annual meeting in Bend, Oregon, I gave a presentation on the use of dragonfly exuviae for roosting and nesting by a jumping Spider, *Sassacus vitis*. I have observed this behavior to be fairly common at a site along the American River near my home in Sacramento, California, but would like to get a better idea of just how widespread this practice might be (the Spider in question is common and wide-ranging in Western North America, from British Columbia to Panama). As luck would have it, the day after my presentation, Steve Krotzer told me he had found a small jumping spider in an exuvia of *Macromia magnifica* (Western River Cruiser) he had collected along the John Day River a few days prior. Steve graciously provided me with the spider, and lo and behold — it was a male *Sassacus vitis*! I know a lot of ARGIA readers collect exuviae, at least occasionally, and would love to hear from any of you about any Spiders, especially — but not limited to, jumping Spiders, you may find in them. You may even send me specimens (alive or dead) if you like.] Address: Manolis, T., 808 El Encino Way, Sacramento, CA, 95864, USA

**21045.** Mezquita, I. (2008): Primera cita de *Oxygastra curtisii* (Dale, 1834) (Odonata: Corduliidae) para la provincia de Bizkaia (País Vasco, España). *Boletín de la S.E.A.* 42(1): 438- (in Spanish) ["In the municipality of Ajangiz (a town close to Gernika) the Oca River (Oka in Basque) flows on its way to its mouth in the Urdaibai Biosphere Reserve. It is a medium-sized river with plenty of gallery trees and little current in this section. Bordering all this space there is a dense grove, mainly oak. It is within the perimeter belonging to the "Lurraska" School of Environmental Education. In a section of this river (30TWN258943) the wooded gallery that protects it has an open space of approximately a couple of hectares next to it, where groups of *Juncus* sp. precede a large mass of bramble (*Rubus fruticosus*). It is here that *O. curtisii* was located. On June 18, 2007, an anisopteran resembling *O. curtisii* was seen in a nearby pond, but its secure identification was not possible as it could not be captured. The next day the first contact takes place in which the species is perfectly identifiable. Three males are sighted at 08:10 solar time that are disputing a territory (the aforementioned stretch with *Juncus* sp. and *Rubus* sp.). The dispute between these males lasts from 08:10 in the morning until 14:30 in the afternoon, when they disappear. The temperature around 30° and the relative humidity above 90%, the sky is absolutely free of cloudiness. Pictures are taken of the males perched on the *Juncus* sp. The next day a single female is observed in the reed area, quite trusting and with fairly short flights after which she remains clinging to them, when she is photographed. Its activity ceases at 08:30, having started at 07:20 solar time. The sky gradually clouded over, until around 10:00 a.m. it began to rain with some intensity." (Author / google translate)] Address: Mezquita, I., Departamento de Entomología de la Sociedad de Ciencias

Aranzadi, Pseo de de Zorroaga 11, 20014 Donostia-San Sebastián, Spain. E-mail: mezquitaaranburu@gmail.com

**21046.** Norma-Rashid, Y.; Sofian-Azirun, M.; Rosli, R.; Rosli, H. (2008): Dragonflies on the Islands in the Straits of Malacca. *Malaysian Journal of Science* 27(3): 105-111. (in English, with Malaysian summary) ["The odonate fauna of Pulau Perak, Pulau Jarak and some islands of the Sembilan group of islands were surveyed. Although no endemics were found, fifteen species, all first records for the islands were documented. Various biological aspects of the dragonfly such as population, distribution and relative abundance were discussed. Morphometric aspects were also studied and possible explanations for the attributed differences between the island populations of Pulau Perak and Pulau Lalang are proposed." (Authors) *Agrionoptera insignis*, *Diplacodes trivialis*, *Macrodiplax cora*, *Neurothemis fluctuans*, *Orthetrum chrysis*, *O. glaucum*, *O. testaceum*, *Pantala flavescens*, *Rhyothemis phyllis phyllis*, *Rhodothemis rufa*, *Trithemis aurora*, *T. festiva*, *Tholymis tillarga*, *Agriocnemis femina femina*, *Ischnura senegalensis*] Address: Norma-Rashid, Y., Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia. E-mail: norma@zoology.um.edu.my

**21047.** Rodríguez, P.C. (2008): Primera cita de *Onychogomphus costae* Selys, 1885 (Odonata: Gomphidae) para La Rioja (España). *Boletín de la S.E.A.* 42(1): 404- (in Spanish) ["In the 2006 campaign, it was possible to collect a male of *O. costae* on July 9, which represents its first record for La Rioja (Spain). 2017, special attention has been paid to the exact location of this species. The dates and specimens observed They were the following: "Valparaíso": 23.VI.2007, 1male; "He Plano": 03.VIII.2007, 8males; Hillside south: 28.VIII.2007, 1 male. Due to its rarity, only one specimen was collected." (Author/google translate)] Address: Rodríguez, P.C., La Manzanera, 13 bajo. 26004, Logroño, La Rioja, Spain. Email: patekphi@yahoo.es

## 2010

**21048.** Forestry Bureau, Council of Agriculture (2010): Taiwan's special rare wildlife habitat use surveys and plans to create a co-ordination Four spot fine Featherlegs [*Mortona-giron hirosei*] habitat conservation and education promotion plan. Results report. Corp. Taiwan Society of Wilderness, Republic of China on December 31, 2010: 144 pp. (in Chinese) ["7.4 Designation of important habitats for wild animals *M. hirosei* is listed as vulnerable by the World Conservation Union (IUCN) and is only distributed in a few places such as Taiwan, Japan, and Hong Kong. In the water purification park planning and basic design entrusted technical service project, the relevant domestic and foreign literature was collected, and with the observation and survey results of volunteers, it was suggested that the existing habitat of the four-spotted weeter should be well protected, and the habitat range should be expanded. Relevant experiential education facilities can play the role of environmental education. At the same time, it is suggested that relevant government units should allocate funds as soon as possible to carry out investigation and research on the species and habitat of *M. hirosei*. The area is a protected area or an important habitat for wild animals, and a management plan for the habitat of the four-spotted weed is formulated to protect its habitat and avoid human interference. The survival crisis of the ethnic group, including habitat degradation and other factors, has caused a rapid decline in the distribution range and density of the ethnic group in the past five years. This

result shows that our efforts and progress in the conservation of the four-spotted species are far from enough, and related conservation work is urgent. In eyebrows, the local government and the agricultural committee and other competent authorities should face up to this problem, invest in the required conservation research and habitat management resources as soon as possible, and designate the Wugu wetland as a wild habitat. An important habitat for animals to effectively preserve their habitat. In Taiwan, the rare and beautiful habitat of *M. hirosei* is close to the two major metropolitan areas of New Taipei City and Taipei City. It is the blessing and pride of the residents of the two metropolitan areas. The best indicator of district health, quality of life for residents, and sustainable values. Based on a one-year investigation and research, this plan puts forward the above suggestions for the conservation work of *M. hirosei*." (Authors/Google translate)]

## 2011

**21049.** Costes, A. (2011): État des lieux des connaissances des populations de trois libellules d'intérêt communautaire en Midi-Pyrénées: *Macromia splendens*, *Oxygastra curtisii* et *Gomphus graslinii*. Conservatoire d'espaces naturels Midi Pyrénées: 33 pp. (in French) ["Three dragonflies species of community interest are attached to the large rivers of southern France. These three species are currently covered by the "National Odonate Action Plan". Although the Midi-Pyrénées has a significant conservation responsibility for these species, their distribution is currently poorly known. Numerous actions should eventually be envisaged at regional level for the preservation of these three species. Beforehand, it is necessary to draw up an inventory of their distribution. This report presents a synthesis of data collected from various structures and individuals in the Midi-Pyrénéan natural landscape, supplemented by the results of a survey in 2011 on regional waterways in search of new sites favourable to the development of these three dragonflies. The aim is to update and strengthen knowledge of *M. splendens*, *O. curtisii* and *G. graslinii* in the Midi-Pyrénées." (Authors/DeepL) [http://cen-mp.org/wp-content/uploads/2018/07/rapport\\_odonates\\_Costes2011\\_cenmp.pdf](http://cen-mp.org/wp-content/uploads/2018/07/rapport_odonates_Costes2011_cenmp.pdf)] Address: Conservatoire d'espaces naturels Midi Pyrénées, 75 Rue Luce Boyals, 31300 Toulouse, France

**21050.** Jones, J.I.; Murphy, J.F.; Collins, A.L.; Sear, D.A.; Naden, P.S. (2011): The impact of fine sediment on macro-invertebrates. *River Research and Applications* 28(8): 1055-1071. (in English) ["The sustainable use of water resources requires clear guidelines for the management of diffuse pollution inputs to rivers. Without informed guidelines, management decisions are unlikely to deliver cost-effective improvements in the quality of rivers as required by current water policy. Here, we review the evidence available for deriving improved guidelines on the loading of fine sediment to rivers based on the impact on macro-invertebrates. The relationship between macro-invertebrates and fine sediments is poorly defined. Studies of the impacts of fine sediment on macro-invertebrates have been undertaken at various scales, which has an influence on the range of responses displayed and the reliability of the results obtained; results obtained from investigations at smaller scales may not manifest at the scale required to manage rivers and vice versa. Many of the identified effects of increased loading of fine sediment on macro-invertebrates occur as a consequence of deposition on the river bed, yet many current management guidelines are based on suspended sediment targets. On this basis, existing water quality 2013 guidelines for sediment

management are unlikely to be appropriate." (Authors) *Xanthocnemis zealandica*, *Ischnura aurora*] Address: Jones, J.I., School of Biological and Chemical Sciences, Queen Mary University of London, Mile End Road, London, E1 4NS, UK. E-mail: [j.i.jones@qmul.ac.uk](mailto:j.i.jones@qmul.ac.uk)

**21051.** Leatherman, D. (2011): Dragonflies and Damselflies. *Colorado Birds* 45(3): 211-215. (in English) [General account on Odonata with focus of dragonflies as prey of birds.] Address: Leatherman, D., 612 Stover Street #7, Fort Collins, CO 80524, USA. E-mail: [daleatherman@msn.com](mailto:daleatherman@msn.com)

## 2012

**21052.** Hou, Y.; Wang, F. (2012): Vibration, structural engineering and measurement II. *Applied Mechanics and Materials* 226 - 228: 844-849. (in English) ["Flapping-wing flying is a kind of rhythmic movement with symmetry of time and space essentially, and this movement is generated and controlled by Central Pattern Generator (CPG). A 2-DOF flapping mechanism was designed according to the flapping-wing flying principle of insects, and the flapping-wing flying CPG model was constructed by nonlinear oscillators. The system responses were studied, and the influences of the model parameters to the system characteristics were analyzed. Through the engineering simulation of flapping-wing flying control model, the first modal vibration of the system was selected, and the different flying modes of bionic aircraft were realized by adjusting system parameters. This kind of bionic control strategy promoted the movement and control ability of flapping-wing flying, and provided a new method to the generation and control of flapping-wing rhythmic movement. ... According to the mass, wingspan of dragonfly wing, take the equation parameters as follows:  $m=20\text{mg}$ ,  $l_w=0.04\text{m}$ ,  $l_1=0.02\text{m}$ ,  $l_2=0.018\text{m}$ ,  $l_3=0.01\text{m}$ ,  $k_1=320\text{N/m}$ ,  $k_2=320\text{N/m}$ ,  $c_1=0.00005\text{Ns/m}$ ,  $c_2=0.00005\text{Ns/m}$ ,  $c_3=0.00001\text{Ns/m}$ . Through calculating, the two natural frequencies ..." (Authors)] Address: Hou, Y., College of Mechanical Automation, Wuhan University of Science and Technology, Wuhan, China. E-mail: [afjy\\_houyu@163.com](mailto:afjy_houyu@163.com)

**21053.** Seehausen, M.; Blanckenhagen, B. von (2012): *Pseudagrion microcephalum* (Rambur, 1842) und *Crocothemis servilia* (Drury, 1773) - zwei exotische Libellenarten in Hessen. *Libellen in Hessen* 5: 58-62. (in German) [A male *P. microcephalum* emerged from an aquarium of M. Seehausen on 24-VIII-2011. A larva of a female *C. servilia* was reared in March/April 2008 by Benno v. Blanckenhagen.] Address: Seehausen, M., Museum Wiesbaden Hessisches Landesmuseum für Kunst und Natur, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany. E-mail: [malte.seehausen@museum-wiesbaden.de](mailto:malte.seehausen@museum-wiesbaden.de)

**21054.** Soissons, A.; Martinant, S.; Barbarin, J.-P. (2012): Déclinaison régionale du plan national d'actions en faveur des Odonates - Auvergne - 2012-2016. Conservatoire d'espaces naturels d'Auvergne - Société d'histoire naturelle Alcide d'Orbigny - DREAL Auvergne: 116 pp. (in French) ["The first restoration plans were initiated by the Ministry of Ecology in 1996. More than forty national plans are currently being developed or implemented. The Office for Insects and their Environment (Opie) was responsible for drafting the National Action Plan for Odonates (PNA Odonates). It was drafted in collaboration with the French National Odonatology Society (Sfonat) during 2009. Its validation by the Conseil National de Protection de la Nature (CNP) has been effective since June 2010 (DUPONT, 2010). This plan has two main objectives: - to acquire quantitative data on

the conservation status of species, - to improve the conservation status of species and their habitats in France. In accordance with the provisions of the PNA Odonates, the operational phase involves the production of regional versions. The drafting of the regional version of this plan for the Auvergne region was entrusted to the Conservatoire d'espaces naturels d'Auvergne (Sylvie Martinant, coordinator & Aurélie Soissons, odonatologist) for the coordination and drafting of the plan, in collaboration with the Société d'Histoire Naturelle Alcide d'Orbigny (Jean-Philippe Barbarin, odonatologist expert) for the synthesis of knowledge and drafting of the naturalistic section. The actions selected in the framework of this first Regional Action Plan for Odonates (PRA Odonates) in the Auvergne region cover the period 2012-2016. The 15 species selected for Auvergne, including 10 from the PNA Odonates and 5 added, are all rare and threatened either at national level or in Auvergne. However, these 15 species should not in any way mask the interest of the entire odonatological suite present in Auvergne, which to date numbers 74 species. The 15 species selected, whose habitats are representative of the topographical and altitudinal diversity of Auvergne, are "flagship" species that should serve as a lever for preservation actions that could benefit all Odonata. Furthermore, the geographical position of the Auvergne in the heart of France and the Massif Central, at a climatic crossroads, makes it a privileged "sentinel" region for the evaluation of current or future climate changes. Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version) *Coenagrion lunulatum*, *C. mercuriale*, *C. ornatum*, *Cordulegaster bidentata*, *Epiheca bimaculata*, *Gomphus graslinii*, *G. flavipes* *Ophiogomphus cecilia*, *Somatochlora arctica*, *Leucorrhinia dubia*, *L. pectoralis*, *Oxygastra curtisii*, *Sympetrum depressiusculum*, *S. pedemontanum*, *Macromia splendens*] Address: Barbarin, J.-P., Société d'histoire naturelle Alcide d'Orbigny (SHNAO), France. E-mail: [jeanphilippe.barbarin@orange.fr](mailto:jeanphilippe.barbarin@orange.fr)

### 2013

**21055.** Hamill, S.E. (2013): Recovery Strategy for the Pygmy Snaketail (*Ophiogomphus howei*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario: v + 14 pp. (in English) ["Executive Summary: *O. howei* is a small, brightly-coloured dragonfly which lives in large rivers with steady flow. Adults are thought to forage in the canopy of forests surrounding the rivers. Eggs are laid into the water where they are carried downstream and eventually sink. During the day the larvae burrow into sand or gravel sediments. At night they come to the surface and prey on other invertebrates or small fish. This species is a globally rare dragonfly which occurs only in Eastern North America. In Canada it has been found in 11 locations in New Brunswick and at one site in Ontario. The Ontario location is on the Namakan River in the Rainy River district of northwestern Ontario. The species is listed as endangered on the Species at Risk in Ontario (SARO) List under Ontario's Endangered Species Act, 2007 (ESA). The greatest potential threat to *O. howei* in Ontario is the impoundment of running waters, but others include forest harvesting and invasive species. Other threats common to dragonflies, such as road-kill, recreational use of waters during the emergence period, construction and pollution, may be of lower concern due to the remote northern location. Limiting factors include a need for pristine conditions and the species' short travel distance. Knowledge gaps are many, but major ones are the complete lack of information on population size and the unknown precise egg-laying location in Ontario. The recovery goal is to ensure

the long-term survival of *O. howei* in Ontario by protecting the existing population. The protection and recovery objectives are to: \*protect and maintain the quality and quantity of habitat on the Namakan River in Ontario where Pygmy Snaketail occurs; \*implement a monitoring program at the location where Pygmy Snaketail is known to exist; \*conduct additional inventories for Pygmy Snaketail in suitable habitat. When adult Pygmy Snaketails and/or breeding sites are found, it is recommended that the protection provided by a habitat regulation should be applied to those areas, including the river and 200 metres of forested habitat on either side." (Author)] Address: not stated

**21056.** Heeffer, J. (2013): Libellen in De Kaaistoep. In: T. Peeters, A. van Eck & T. Cramer (red.), *Natuurstudie in De Kaaistoep. Verslag 2012, 18e onderzoeksjaar.* - TWM Gronden BV, Natuurmuseum Brabant & KNNV-afdeling Tilburg, 117 pp: 55-58. (in Dutch) [<https://knnv.nl/wp-content/uploads/sites/31/2020/12/2012-Kaaistoep-Jaarverslag.pdf>] Address: KNNV-afdeling Tilburg, Secretariaat: Marie-Cécile van de Wiel. Email: [secretaris@tilburg.knnv.nl](mailto:secretaris@tilburg.knnv.nl)

**21057.** Sharma, P.; Kangale, M.; Agase, D.M. (2013): Study of odonates diversity near Koradi Lake, Koradi, Nagpur, Maharashtra. *Journal of Entomology and Zoology Studies* 11(1): 126-130. (in English) ["The objective of the present study was to determine the diversity of odonates in the area around Nagpur's Koradi Lake, which is home to a wide variety of birds and insects. Twenty species of Odonates from 15 genera and three families were discovered during the monitoring in the marked areas near the lake. In total, 1071 individual odonates have been observed in the Koradi region. Libellulidae had the most species (12), followed by Coenagrionidae (7 species), and Aeshnidae (1 species). It was noted that urbanisation and pollution could have a negative impact on the diversity of odonates in the Koradi region." (Authors)] Address: Agase, D.M., Govt. J.S.T.P.G. College, Balaghat, Madhya Pradesh, India

**21058.** Shulze, C.D.; Semlitsch, R.D.; Trauth, K.M. (2013): Mosquitofish dominate amphibian and invertebrate community development in experimental wetlands. *Journal of Applied Ecology* 50: 1244-1256. (in English) ["1. Restored and constructed habitats can play important conservation roles. Predators help shape communities in these habitats through complex interactions with prey, other predators and biotic and abiotic characteristics of the environment. However, introduced predators can have dramatic effects that may be difficult to predict. 2. Using regression models, we compared influences of introduced invasive western mosquitofish *Gambusia affinis* to those of two naturally colonizing predators (crayfish and dragonflies), and vegetation, on three anuran species in experimentally constructed wetlands. Using analyses of covariance, we also examined influences of mosquitofish and vegetation on aquatic invertebrate communities. 3. We found that mosquitofish reduced abundances of grey treefrogs *Hyla versicolor* and *H. chrysoscelis* and boreal chorus frog *Pseudacris maculata*, but had no significant influence on green frog *Lithobates clamitans*. Mosquitofish also reduced invertebrate abundance, but their effect on richness was less clear. Vegetation cover did not significantly increase most anuran or invertebrate abundances. However, vegetation increased invertebrate richness. After fish removal, invertebrate abundance increased. Fish removal may have facilitated chorus frog recolonization into wetlands with low abundance of invertebrate predators. 4. Our results indicate that mosquitofish are detrimental to wetland communities, and we recommend that



managers avoid stocking mosquitofish. We also encourage temporary or drainable wetlands to prevent mosquitofish persistence if colonization occurs. Implementing these recommendations will improve the conservation potential of restored wetlands." (Authors) Address: Shulse, C.D., Missouri Dept Transportation, P.O. Box 270, Jefferson City, MO, 65102, USA. E-mail: Christopher.Shulse@modot.mo.gov

**21059.** van der Valk, J. (2013): Libellen op de dagvlinder-monitoringsroutes in De Kaaistoep. In: T. Peeters, A. van Eck & T. Cramer (red.), *Natuurstudie in De Kaaistoep. Verslag 2012, 18e onderzoeksjaar*. - TWM Gronden BV, Natuurmuseum Brabant & KNNV-afdeling Tilburg, 117: 59-62. (in Dutch) [<https://knnv.nl/wp-content/uploads/sites/31/2020-12/2012-Kaaistoep-Jaarverslag.pdf>] Address: not stated

## 2014

**21060.** Adve, N. (2014): Moving home. Global warming and the shifts in species' range in India. *Economic & Political Weekly* xlix no 39: 34-38. (in English) ["Global warming and changing rainfall patterns have resulted in shifts or extensions in species' range in every terrain, region and ecosystem in India. If it is indicative of a wider unfolding process related to climate change, it would suggest that a staggering number of species in India are moving home. This would adversely affect human habitat as well." (Author) The paper includes a reference to odonata.] Address: Adve, N.; Email: nagraj.adve@gmail.com

**21061.** Álvarez, X.P. (2014): *Aeshna mixta* atrapada nun fento *Pteridium aquilinum*. *Chioglossa* 4: 129-130. (in Spanish, with English summary) ["A rare observation of an *Aeshna mixta* accidentally trapped by the plant *Pteridium aquilinum* is reported. This plant lacks specific methods of capture or defense against insects. Other similar cases found in the literature are commented." (Author)] Address: Revolta, 2 - Noalla. 36990 Sanxenxo. Pontevedra, Spain. Email: xurxolusitanica@gmail.com

**21062.** Barry, M.J. (2014): The energetic cost of foraging explains growth anomalies in tadpoles exposed to predators. *Physiological and Biochemical Zoology* 87(6): 829-836. (in English) ["Theoretical models predict that predator-induced phenotypes should have lower fitness in the absence of predators. Tadpoles frequently respond to invertebrate predators by reducing activity levels and changing their body proportions. While some studies have shown that induced defenses in tadpoles reduce growth rates, others have found no effect. The aim of this study was to measure the effects of predator presence [*Anax imperator*] on energy expenditure in tadpoles. Predator exposure lowered overall metabolic rate by 19%, while specific dynamic action due to food consumption increased resting metabolism by 11%. Control tadpoles moved significantly more ( $93.6 \pm 3.9$  cm/min) than predator-exposed animals ( $50.1 \pm 7.5$  cm/min), and swimming increased metabolic rate by up to 400% compared to stationary tadpoles, indicating that activity can be energetically expensive and can consume as much as 37% of assimilated energy. These findings suggest that the costs of reduced foraging are context dependent and may even be beneficial in environments where high-quality resources are closely spaced but detrimental when extensive movement is required to obtain optimal resources for growth. ... The aim of this study was to measure the main components of energy expenditure in tadpoles of the Arabian toad (*Bufo arabicus*) in the presence and absence of predation cues from dragonfly larvae. ... The dragonfly larvae were fed two

$50 \pm 10$ -mg tadpoles daily." (Author)] Address: Barry, M.J., Biology Dept, Sultan Qaboos University, PO Box 36 AL Khoud, Muscat, 123, Oman. E-mail: mjbarry@squ.edu.om

**21063.** Bolshakov, L.V. (2014): [The first information on the dragonfly fauna (Insecta: Odonata) in the Ugra section of the Ugra National Park (Kaluga region)]. *Proceedings of the Mordovia State Nature Reserve named after P. G. Smidovich* 12: 414-418. (in Russian) [Google translate: "At least 43 species of dragonflies are currently recorded on the territory of the Kaluga region, without taking into account 5 species unusual for this region, previously indicated on the basis of definitions for larvae, the presence of which in the fauna of the region requires confirmation (Bolshakov, 2013). However, the territory of the region has been studied very unevenly in terms of odonatology. The vast majority of dragonfly species are known in the Zhizdrinsky section of the Ugra National Park, much less in some other areas. In particular, data on the fauna of dragonflies in the Ugorsky section of the national park have so far been practically absent in the literature, except for 13 eurytopic and numerous species recognized, taking into account data from adjacent areas, distributed throughout the territory of the Kaluga region (Bolshakov, 2013). In 2013, the author conducted entomological studies in the Dzerzhinsky district of the Kaluga region, mainly in the southern part of the Ugorsky site, related to the Galkinsky forestry of the national park. At the same time, for the first time in this part of the region, collections of dragonflies were held. This year, the first dragonflies were observed here on May 16, but after August 30, the research was interrupted due to prolonged rains. As a result, 28 species of dragonflies were identified in the Galkinsky forestry, of which 3 were new for the Kaluga region. The material is stored mainly in the collection of the author, partially (species new to the region) - in the Zoological Museum of Moscow State University. It should be noted that the area under consideration is located in the subzone of coniferous-deciduous forests. The river network is represented by the river Ugra and its tributaries. In the forests of the Galkinsky forest area there are numerous swamps, among which low-lying black briers and grass swamps predominate. However, most of the collections in the Galkino locality were carried out on the famous Galkinsky swamp, a unique and relict natural complex, including extensive sphagnum quagmire with specific taiga-boreal biota. Collections in the Gorbenki locality were carried out on the no less famous Zalidovsky meadows, where there are oxbow lakes and small grassy swamps, which partially dry up in summer. In the proposed list, the order system is adopted according to (Belyshev, Kharitonov. 1981), the nomenclature according to (Skvortsov. 2010). Species reported for the first time for the Kaluga Region are marked with an asterisk (\*). Annotations of species previously known in the area are limited to localities and frequency of occurrence during the research period, since the bibliography by species and their ecological characteristics were covered in detail (Bolshakov. 2013). More detailed comments are given on the most rare and new species of fauna." The list includes species as *Coenagrion johanssoni*, *Sympecma paedisca*, *Nehalennia speciosa*, *Aeshna cyanea*, *Gomphus vulgatissimus*, *Ophiogomphus cecilia*, *Cordulia aenea*, *Leucorrhinia dubia*, *L. rubicunda*, *L. pectoralis*] Address: Bolshakov, L.V., Russian Entomological Society (Tula branch), Russia. Email: l.bol2012@yandex.ru

**21064.** Cabana, M.; Romay, C.D.; 1,2, Anxos Romeo, A.; Martínez, E.; Sanmartín, P.; Reigada, X.R. (2014): Distribución de *Trithemis annulata* en Galicia (NW Peninsula

Ibérica). *Chioglossa* 4: 15-27. (in Spanish, with English summary) ["An updated distribution of *T. annulata* in Galicia (NW Iberian Peninsula, Spain) is presented. Data of this species in 24 UTM grids (10x10 km), of which 17 are new, are summarized. Most sightings were obtained during fieldwork carried out in 2010-2013 in SW Galicia, although sparse records in other parts of the country are described as well." (Authors)] Address: Cabana, M., Grupo de Investigación en Biología Evolutiva (GIBE), Centro de Investigaciones Científicas Avanzadas (CICA). As Carballeiras, s/n, Campus de Elviña, Universidade da Coruña. 15071 A Coruña (Galicia, Spain). Email: mcohyala@yahoo.es

**21065.** Ferreiro, R. (2014): Predación de *Passer domesticus* sobre *Cordulegaster boltonii*. *Chioglossa* 4: 1 p. (in Spanish, with English summary) [July 29, 2013, Elviña in A Coruña, Spain. The observation of handling and transportation of an imago of *C. boltonii* by a female of *P. domesticus* is reported.] Address: Ferreiro, R., Grupo Naturalista Hábitat, Rúa Camariñas 9 baixo. 15008 A Coruña, SpaiB. Email: ricardo.ferreiro@gnhabitat.org

**21066.** Herremans, M.; De Knijf, G.; Hansen, K.; Westra, T.; Vanreusel, W.; Martens, E.; Van Gossum, H.; Anselin, A.; Vermeersch, G.; Pollet, M. (2014): Monitoring van beleidsrelevante soorten in Vlaanderen met inzet van vrijwilligers. Rapporten van het Instituut voor Natuur- en Bosonderzoek 2014 (rapportnr. INBO.R.2014.1628917). Instituut voor Natuur- en Bosonderzoek, Brussel: 88 pp. (in Dutch) ["This final report sets out the framework for using volunteers to carry out structured monitoring networks. Chapters 1 and 2 provide basic information on the taxonomic scope and monitoring methods. Chapter 3 broadly describes the data used for the 2013 HRL/VRL reporting. The subsequent chapters (4-8) look in more detail at the individuality of the volunteer work. Specific focus here is on the significance of loose observations (Ch. 4), the blueprint review process (Ch. 5), specific concerns for (Ch. 6), and the dynamics of this operation (Ch. 7). It then outlines a conceptual framework for guiding and supporting volunteers in monitoring networks, and launches a concrete proposal (Ch. 8). Following this, the existing nature data systems in Flanders are mapped, as well as the existing and planned partnerships between Natuurpunt and the other volunteer organisations (Ch. 9). The future monitoring network application is also briefly explained here. Chapter 10 provides an overview of relevant aspects for the monitoring network budget. ... 5.2.6 BD-LIB - Dragonflies Volunteer organisation involved: Libellenvereniging Vlaanderen (LVV). Three monitoring network types are proposed for dragonflies: transect counts, area counts, and larval skin counts on a fixed route. LVV sees co-standardised monitoring of species as a goal of the association and wants to do its utmost to achieve this. However, it cannot do this alone, and there is an important demand for professional supervision (by guiding the volunteer organisation), and for finding and deploying volunteers from outside the association. Natuurpunt still sees significant opportunities for this in its fabric. Translated with www.DeepL.com/Translator (free version)" (Authors)] Address: Knijf, G. de, Research Institute for Nature and Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. Email: gert.deknijf@inbo.be

**21067.** Joest, R.; Jaworski, N.; Langenbach, A.; Rödel, A. (2014): Entwicklung der Libellenfauna in der renaturierten Lippeaue. *Natur in NRW* Nr. 1/2014: 28-31. (in German) ["Conclusion: In the Lippe floodplain in the area of the Klos-

termersch and the Hellinghauser Mersch (Nordrhein-Westfalen, Germany), a number of dragonfly species characteristic of lowland rivers and their floodplains occur. The dragonfly fauna shows great similarity to other floodplain areas of Westphalian lowland rivers, especially the Ems (ARTMEYER 2000, CONZE 2000). Similar species communities and their developments on regenerated floodplain waters were also observed by LOHR (2010) on the basis of long-term studies of the dragonfly fauna in the floodplains of the Upper Weser (Germany) and the Lower Allier (France). The results also correspond to experiences made, for example, after renaturation measures on the Main (SCHLUMPRECHT et al. 2004). The species diversity of dragonflies has increased since the beginning of the surveys in parallel with the renaturation measures carried out. For species of flowing waters, the creation of bank breaks with shallow water zones and flow-calmed sections has created favourable living conditions. Species of temporary water bodies and flood zones depend on near-natural flood dynamics. Their habitats could be improved by creating small water bodies and reactivating the floodplain by removing the embankment and creating flood channels that allow even smaller floods to enter the floodplain more quickly. In addition to these measures acting in the area, supra-regional factors such as climate warming have also contributed to the increase in the number of species. Species such as the firefly, which have expanded their range due to climatic changes, can only colonise the floodplains if suitable habitats are available. Thus, floodplain restoration is also a prerequisite for adaptation to climate change by enabling species to shift their range. The renaturation of floodplains in particular creates a great diversity of habitats and enables water storage during drier summers (STRÄTER et al. 2010). This also applies to the Lippe floodplain, where without renaturation measures even otherwise permanent water bodies would dry up in dry years." (Authors/DeepL)] Address: Joest, R., Arbeitsgemeinschaft Biologischer Umweltschutz, Biologische Station Soest, Teichstr. 19, 59505 Bad Sassendorf-Lohne, Germany. E-Mail: r.joest@abu-naturschutz.de

**21068.** Karima, B. (2014): Contribution à l'étude de la biologie des Odonates de la région d'Oued Djedi (Biskra). MSc thesis, République Algérienne Démocratique et Populaire, Ministère de l'Enseignement Supérieur et de la Recherche Scientifique, Université Mohamed Khider Biskra, Faculté des Sciences Exactes et des Sciences de la Nature et de la Vie, Département des Sciences de la Nature et de la Vie: 66 pp. (in French, with Arabian and English summaries) [Between January and May 2014, 12 odonate species were recorded in the area of Oued Djedi, Algeria. Abundance and phenology are documented from the following species: *Ischnura fountaineae*, *Coenagrion caeruleum*, *Anax ephippiger*, *Anax imperator*, *Anax parthenope*, *Orthetrum coerulescens*, *Orthetrum chrysostigma*, *Crocothemis erythraea*, *Sympetrum fonscolombii*, *Trithemis annulata*, *Trithemis arteriosa*, and *Trithemis kirbyi*.] Address: not stated

**21069.** Patrício, P.M.B. (2014): How does exposure to the fungus *Batrachochytrium dendrobatidis* affects the tadpoles of the common toad, *Bufo bufo*, under different stresses? Tese de mestrado. *Biologia (Biologia da Conservação)*, Faculdade de Ciências, Universidade de Lisboa: 49 pp. (in English, with Portuguese summary) ["The current global decline of amphibians is caused by multiple factors, and one of the most important is the spread of the fungus *Batrachochytrium dendrobatidis* (Bd) which is directly responsible for the infection of 350 amphibian species. The factors

that influence susceptibility to infection by Bd are not completely known, but it is known that factors such as density, intra- and inter-specific competition, and predation may have consequences for the development and possibly the immune system of larval amphibians. The effects of single stresses on anurans have been widely studied and documented, but studies examining the extent to which anurans can respond to multiple stresses are scarce. We tested the effect of stress-inducing factors, namely intraspecific competition, the existence of chemical and visual signals indicating the presence of a predator [*Aeshna cyanea*], and environmental exposure to Bd, in tadpoles of *Bufo bufo* (common toad), in a factorial experiment that tested all combinations of the three stress-inducing agents considered. Tadpole mortality was very low and not related with infection by Bd. In fact, all the tadpoles were cleared of Bd at the end of the experiment. However, our results demonstrated that the non-lethal infection by Bd can be a stressor and have impacts on larval life-history traits. The responses we found included reduced activity levels, shortened larval period, reduced ability to jump after metamorphosis, and differential use of the aquarium. So, the fungus does not directly affect *B. bufo* survivorship, but influences traits related to behavior, growth and development. Our study did not support the hypothesis that the exposure to natural stresses resulting from predation and/or competition increases susceptibility to *B. dendrobatidis*, and shows that a link between stress exposure and disease susceptibility cannot be assumed in all cases." (Author) [https://repositorio.ul.pt/bitstream/10451-1/16015/1/ulfc107584\\_tm\\_pedro\\_patricio.pdf](https://repositorio.ul.pt/bitstream/10451-1/16015/1/ulfc107584_tm_pedro_patricio.pdf) Address: not stated

**21070.** Shi, X.-j.; Yu, H.-y. (2014): Dragonfly wing structural stiffness of the finite element analysis. *Journal of Anhui Agricultural Sciences* 2014, (5): 1395-1397, 1400. (in Chinese) ["Objective: To explore the important role of arching in the space structure of dragonfly wings. Method: The finite element analysis software ANSYS was used to analyze the deformation of each model under different loads, and the arch structure of dragonfly wings was studied. The effect of stiffness. Result: Under the same load conditions, the structural stiffness of the two mesh models increases with the increase of the arching height. When the load and arching height are the same, the deformation of the mesh with membrane is smaller than that of the mesh without membrane. The stiffness of the hexagonal grid is significantly enhanced; under the same load conditions, the deformation of the hexagonal grid is always greater than that of the combined grid model. Provide new ideas." (Authors/Google translate)] Address: not stated

**21071.** Stockwell, M.P.; Srorrie, L.J.; Pollard, C.J.; Clulow, J.; Mahony, M.J. (2014): Effects of pond salinization on survival rate of amphibian hosts infected with the chytrid fungus. *Conservation Biology* 29(2): 391-399. (in English, with Spanish summary) ["The chytrid fungus *Batrachochytrium dendrobatidis* has been implicated in the decline and extinction of amphibian populations worldwide, but management options are limited. Recent studies show that sodium chloride (NaCl) has fungicidal properties that reduce the mortality rates of infected hosts in captivity. We investigated whether similar results can be obtained by adding salt to water bodies in the field. We increased the salinity of 8 water bodies to 2 or 4 ppt and left an additional 4 water bodies with close to 0 ppt and monitored salinity for 18 months. Captively bred tadpoles of green and golden bell frog (*Litoria aurea*) were released into each water body and their development, levels of *B. dendrobatidis* infection, and survival were

monitored at 1, 4, and 12 months. The effect of salt on the abundance of nontarget organisms was also investigated in before and after style analyses. Salinities remained constant over time with little intervention. Hosts in water bodies with 4 ppt salt had a significantly lower prevalence of chytrid infection and higher survival, following metamorphosis, than hosts in 0 ppt salt. Tadpoles in the 4 ppt group were smaller in length after 1 month in the release site than those in the 0 and 2 ppt groups, but after metamorphosis body size in all water bodies was similar. In water bodies with 4 ppt salt, the abundance of dwarf tree frogs (*Litoria fallax*), dragonfly larvae, and damselfly larvae was lower than in water bodies with 0 and 2 ppt salt, which could have knock-on effects for community structure. Based on our results, salt may be an effective field-based *B. dendrobatidis* mitigation tool for lentic amphibians that could contribute to the conservation of numerous susceptible species. However, as in all conservation efforts, these benefits need to be weighed against negative effects on both target and nontarget organisms." (Authors)] Address: Stockwell, Michelle, Conservation Biology Research Group, School of Environmental & Life Sciences, Univ. Newcastle, University Drive, Callaghan, NSW, Australia. E-mail: michelle.stockwell@newcastle.edu.au

**21072.** Suriana; Dwi Arinto Adi; dan Wa Ode Dian Hardiyanti (2014): Dragonfly (Odonata) stocktaking around river and Moramo swamp, Sumber Sari village, Moramo district, South Konawe Regency, southeast Sulawesi. *Bio-wallacea* 1(1): 49-62. (in Indonesian, with English summary) ["The aim of this research was to know the dragonfly (Odonata) species around River and Moramo Swamp, Sumber Sari Village, Moramo District, South Konawe Regency, South-East Sulawesi. Dragonfly captured on three site namely river, swamp I and swamp II/Moramo swamp. This research used descriptive method. There are 28 species of dragonfly which are include of 8 family namely Lindeniidae, Libellulidae, Megapodagrionidae, Lestidae, Coenagrionidae, Calopterygidae, Chlorocyphidae and Platycnemididae. Suborder Eiprocta found 13,33% family and 50% suborder Zygoptera of all families. There are 12 species in river, 15 species in swamp I and 13 species in swamp II/Moramo swamp. The Calopterygidae, Megapodagrionidae and Platycnemididae only found in river, whereas *Lestes concinnus* found in swamp only. The dragonfly species found in river were different from swamp I and swamp II/Moramo swamp." (Authors)] Address: Suriana, Jurusan Biologi, Fakultas MIPA Universitas Halu Oleo Kendari, Sulawesi Tenggara, Indonesia. Email: suriana0568@gmail.com

## 2015

**21073.** Lopes, A.S.P. (2015): Biodiversidade e ecologia de borboletas (Lepidoptera) e libélulas (Odonata) do planalto superior da Serra da Estrela. M.Sc. thesis, *Ecologia Aplicada*, Universidade de Aveiro: 73 pp. (in Portuguese, with English summary) [Portugal "Serra da Estrela has a high natural value due to the presence of rare habitats and a remarkable biodiversity. The aim of this study was to evaluate the importance of different areas of the upper plateau of Serra da Estrela for the conservation of nature through the study of two bio-indicators groups, Odonata and Lepidoptera. The sampling methodology was based on the count of adult individuals, using fixed transects with a length of 150 meters along four different habitats: natural ponds, small dams, large dams and inland areas (dry spots). In 2301 observed individuals, 55 Lepidoptera species were identified, and in 2580 individuals, 23 species of Odonata were identified. The presence of Lepidoptera species *Vanessa virginiensis*,

Cyaniris semiargus and Coenonympha iphioides, and Odonata species Aeshna juncea and Sympetrum flaveolum, is noteworthy, since they are considered rare or vulnerable in Portugal. Significant differences on the biodiversity of both orders were found between the different types of studied habitats. The biodiversity of butterflies was higher in large dams, mainly due to the existence of a greater richness and abundance of nectariferous plant species, while the diversity of Odonata species was higher in natural lakes and some small naturalized dams, where disturbance levels are low. In these habitats exists some stenotopic species, and also species very sensitive to disturbance. Due to the high diversity of species present in Serra da Estrela with the status of vulnerable, rare, endemic or protected by the law, appropriate management measures should be promoted, and the protection of habitats may be the one of greatest relevance." (Author)] Address: not stated

**21074.** Payandeh, R. (2015): Verbreitung und Ökologie der Vogel-Azurjungfer, *Coenagrion ornatum* (SELYS, 1850) in der Steiermark. MSc. thesis, Karl-Franzens-Universität Graz: 118 pp. (in German, with English summary) ["In a GIS-based randomized sampling procedure, 61 rivulets were pre-selected in the eastern, southern and western parts of Styria to study the distribution and ecology of the Ornate Bluet (*Coenagrion ornatum*). In May, June and July 2014, field trips were carried out and data on the Odonata fauna and several habitat parameters were collected. GIS and MaxEnt tools allowed us to estimate the likelihood of the occurrence of *C. ornatum* for whole Styria. Dragonflies could be recorded along 55 of the 61 water bodies, and *C. ornatum* was present along 14 rivulets. The analysis of habitat parameters showed that the presence of this species depends mainly on the altitude, flow velocity, width of the rivulet and on the water depth. *C. ornatum* utilizes lowland rivulets (200 to 450 meters) and prefers a stream velocity between 0 and 20 seconds per 5 meters. Furthermore, the rivulet width should not exceed 4.5 m and a depth of 50 cm. The inclination should not exceed 5 degrees. The presence of *C. ornatum* also correlates positive with e.g. a higher number of serene days, a larger drainage area of the rivulet and a total rainfall in spring of about 220 mm. *C. ornatum* localities are concentrated in the east and southeast parts of Styria with one exception in the district Voitsberg." (Author)] Address: not stated

## 2016

**21075.** Gottardo, M.; Dallai, R.; Mercati, D.; Hörschemeyer, T.; Beutel, R.G. (2016): The evolution of insect sperm - an unusual character system in a megadiverse group. *Journal of Zoological Systematics and Evolutionary Research* 54(4): 237-256. (in English) ["Spermatozoa provide an unusual character system, with a limited number of components organized in a single cell. Similar spermatozoa occur in groups widely separated in the phylogenetic tree of Metazoa. Nevertheless, the character system contains phylogenetic information. Hexapoda have acquired spermatophores along with the switch from aquatic to terrestrial habitats, and related to this, a multitude of different sperm types. The aim of this study is a formal evaluation of the phylogenetic information content of spermatozoa. For the first time, sperm characters are coded for formal phylogenetic analyses. Different approaches are used and compared. Mainly due to a high level of homoplasy, the evaluation of sperm characters alone is insufficient for a reconstruction of the phylogeny of the group. Yet, a reliable reconstruction of the evolution of insect sperm is possible when character transformations are

assessed using a phylogeny based on extensive molecular data. Important changes took place in the early evolution of Hexapoda. Sperm characters support some major clades (e.g. Hexapoda, Dicondylia, Polyneoptera, Psocodea), but important steps in the evolution are not reflected by transformations of spermatozoa, notably the rise of Pterygota or Holometabola. Important innovations are the formation of mitochondrial derivatives and the acquisition of accessory microtubules. Some features are conservative, whereas others evolved rapidly (e.g. presence or absence of the acrosome vesicle). Some groups are conservative in their sperm features (e.g. Odonata, Heteroptera), whereas the evolution of spermatozoa was distinctly accelerated in others (e.g. Ephemeroptera). The rate of evolution can change drastically in closely related groups. Profound changes in the morphologically uniform Zoraptera underline that sperm evolution can follow a pattern very different from the general somatic morphology. The mode of character reconstruction preferred here will be useful for the evaluation of specialized morphological character systems and strengthen the concept of evolutionary morphology." (Authors)] Address: Beutel, R.G., Institut für Spezielle Zoologie & Evolutionsbiologie mit Phyletischem Museum, Friedrich-Schiller-Universität Jena, Jena, Germany. Email: rolf.beutel@uni-jena.de

**21076.** Hushtan, K.V. (2016): The ecomorphological classification of dragonflies larvae (Insecta: Odonata) of the Ukrainian Carpathians. *The Kharkov Entomol. Soc. Gaz.* 24(1): 5-21. (in Russian, with Ukrainian and English summaries) ["The main classifications of the ecological and morpho-ecological types of dragonflies' larvae have been analyzed. The papers that could be the basis for creation the unified ecomorphological classification of Odonata are analyzed. Morphological method is suggested as the main for selecting the categories for ecomorphs of dragonflies' larvae. It is suggested to take into account ecological (spatial niche), ethological (the type of movement, behavioral characteristics) and morphological (body shape, type of mouthparts, structure of sense organs and legs) criteria. Twenty dimensional features have been analyzed for larvae of 15 genera of water dragonflies from the Ukrainian Carpathians. Seventeen indicators have been selected, which exactly characterize relations of larvae with environment. On the base of suggested approach, hierarchical classification for dragonflies' larvae from the Ukrainian Carpathians has been developed. It includes 3 types, 6 classes, and 10 subclasses." (Author)] Address: Hushtan, Kateryna, State Museum of Natural History of the National Academy of Sciences of Ukraine, Lviv, Ukraine. Email: katrinantonyuk@gmail.com

**21077.** Kolozsvary, M.B.; Holgerson, M.A. (2016): Creating temporary pools as wetland mitigation: How well do they function? *Wetlands* 36(2): 335-345. (in English) ["Temporary forested pools are an important ecological resource throughout northern and eastern North America, yet they are often destroyed or degraded. Pool creation offers a potential mitigation solution, but long-term monitoring to assess the functioning of created pools is scarce. Furthermore, studies rarely integrate multiple, interacting levels of the pool ecosystem, including physical, chemical, and biological parameters. To address this knowledge gap, we compared the physical habitat, water chemistry, productivity, and community composition of macroinvertebrates and amphibians from 7-year old created pools (n=77) to reference pools (n=6). Created pools were smaller in size, received more sunlight, had greater amounts of *Lemna*, *Typha*, and *Phragmites*, and were less likely to dry. Created pools had higher pH and conductivity, but algal biomass did



not differ. Macroinvertebrate richness was similar across pools, but composition starkly differed. Amphibian species richness and composition was similar between created and reference pools; however, created pools had fewer focal pool-breeding amphibians, including the spotted salamander and wood frog. By assessing the entire pool ecosystem, we found that the ability of created pools to mimic the physical conditions and ecological functions of natural temporary pools is suspect." (Authors) Aeshnidae, Coenagrionidae, Lestidae, Libellulidae.] Address: Kolozsvary, M.B., Dept of Environmental Studies & Sciences, Siena College, Loudonville, NY, 12211, USA

**21078.** Koparde, P. (2016): Damsels in distress – seasons, habitat structure and water pollution changes damselfly diversity and assemblage in urban wetlands. *Animal Biology* 66(3-4): 305-319. (in English) ["Odonates are considered to be good ecological indicators, hence, they are used in biological assessment of habitat quality. However, species responses may vary spatiotemporally and therefore, it is useful to establish species-habitat relationships at a regional level. To test if tropical urban odonates respond to seasons, and to explore species-habitat relationships with an emphasis on water pollution, I studied six wetlands in the city of Pune for a year. I also investigated whether combining data on dragonflies and damselflies, as is often done in many studies, skews the results. I recorded seasons, water pollution and habitat attributes as predictors of the odonate diversity and assemblage. I analyzed the data on dragonflies, damselflies and odonates (dragonfly-damselfly combined) separately for seasonal variation, and species-habitat relationships. I used multiple regression and canonical correspondence analyses. Forty-four species were recorded during the study. No seasonal variation was detected, except for damselflies, which showed an increase in the diversity and species number post-monsoon. Multiple regression analysis showed that damselfly and dragonfly diversity varied as a function of season and water pollution, and monsoon respectively. In pre-monsoon, damselfly diversity marginally increased with pollution. Both the analyses suggest that combining data on dragonflies and damselflies may skew the end results. Therefore, I recommend further intensive and long-term research using accurately sampled habitat and pollution attributes, as well as habitat restoration through conserving urban green spaces and promoting gardens with streams and ponds." (Author)] Address: Koparde, P., 107, Radhika Apartment, Survey no. 12/1/2, Anandnagar, Sinhgad road, Pune 411051, Maharashtra, India. E-mail: pankajkoparde@gmail.com

**21079.** Kosterin, O.E. (2016): A survey of Odonata of Mondulkiri, the elevated eastern province of Cambodia, for ten days in June 2014. IDF-Report 98: 1-85. (in English) ["Results of an odonatological survey of Mondulkiri Province of Cambodia, at the foothills and Central Plateau of the Annamese Mts. in June 8 - June 17, 2014 are presented. Of 106 Odonata species met (46 zygopterans, 60 anisopterans), 97 were identified to previously known named species, of which 17 are reported for the first time for Cambodia, namely *Mnais mneme* Ris, 1916, *Rhinocypha seducta* Hämäläinen et Karube, 2001, *Philoganga loringae* Fraser, 1927, *Rhinagrion hainanense* Wilson et Reels, 2001, *Amphiallagma parvum* (Selys, 1876), *Ceragrion chaoi* Asahina, 1967, *Paracercion malayanum* (Selys, 1876), *Prodasinieura doisuthensis* Hoess, 2007, *Protosticta grandis* Asahina, 1985, *Tetracanthagyna waterhousei* McLachlan, 1898, *Gomphidia kruegeri* Martin, 1904, *Heliogomphus chaoi* Karube, 2004, *Leptogomphus baolocensis* Karube, 2001, *Microgomphus*

*jurzitzi* Karube, 2000, *Onychothemis culminicola* Förster, 1904, and two species for which the specimens collected on this trip were described as new subspecies: *Indolestes gracilis* expressor Kosterin, 2015, *Coelicerca poungyi* dasha Kosterin, 2016. Five species collected on this trip have been described elsewhere as new to science, namely *Onychargia priyadak* Kosterin, 2015, *Prodasinieura hoffmanni* Kosterin, 2015, *Asiagomphus reinhardti* Kosterin et Yokoi, 2016, *Euthygomphus schorri* Kosterin, 2016 and *Risiophlebia guentheri* Kosterin, 2015. So the total number of the first country records of named species made on this trip is 22. Still five species found may be undescribed. The number of named species recorded in Cambodia has reached 179. Remarks on taxonomy and variation of *Euphaea masoni* Selys, 1879, *E. ochracea* Selys, 1859, *Aciagrion approximans* (Selys, 1876), and *Lamelligomphus castor* Lieftinck, 1941 are provided. Characters of mature males of *R. seducta* are updated. Notes on habitats and habits of some species are provided. *Onychothemis culminicola* and *O. testacea* Laidlaw, 1902 seem to exclude each other at rivers, the former occupying smaller and more elevated ones; a putative hybrid male was observed. General notes on the area and field impressions are briefly outlined." (Author)] Address: Oleg E. Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev ave. 10, Novosibirsk, 630090, Russia; Novosibirsk State Univ., Pirogova str. 2, Novosibirsk, 630090, Russia. E-mail: kosterin@bionet.nsc.ru

**21080.** Rohmare, V.B.; Rathod, D.M.; Parasharya, B.M. (2016): Diversity and population dynamics of Odonata (Insecta: Odonata) in rice growing area of central Gujarat. *Journal of Biological Control* 30(3): 129-137. (in English) ["Odonates diversity was studied in Paddy field of Central Gujarat during 2012 to 2015. Total 39 species belonging to 25 genera, under six families and two suborders were recorded. Total 17 species of Zygoptera and 22 species of Anisoptera were recorded. Community structure and population dynamics of adult odonates were studied at Lingda village during July to December, 2012 through monitoring their population by point count method on three microhabitats (paddy field, village pond and fish farm). Total seventeen species were encountered in the point count. Diversity index (H') was highest (2.13) for paddy fields followed by fish farm (2.07) and village pond (1.99). Evenness value of the odonates also ranged between 0.7 and 0.8. Total four species (Viz. Ditch Jewel (25.0%), Green Marsh Hawk (17%), Ruddy Marsh Skimmer and Coromandal Marsh Dart (16% each) were dominant species in all three microhabitats. Both suborders showed similar trend of population fluctuation during the study. Relative abundance was higher and remained constant during 4th week of September to 2nd week of October." (Authors)] Address: Rohmare, V.B., AINP on Agricultural Ornithology, Anand Agricultural University Anand - 388 110, Gujarat, India, India

**21081.** Sjöwall, P.; Lundström, R (2016): The environmental and anthropogenic impact on freshwater biodiversity in Lajeado, RS, Brazil.: A study of using dragonflies as indicators for the environmental status in freshwater biomes. Independent thesis Basic level (university diploma): 31 pp. (in English) ["Fragmentation of the Atlantic rainforest and alteration of waters due to agricultural expansion has greatly affected the species diversity in Brazil. In this study, we investigate how different environmental factors affect dragonfly communities and dragonfly species richness in sixteen different locations in Rio Grande do Sul, Brazil. A total of 328 individuals distributed among 46 species and eight families were collected. At each sampling location the water was

analyzed and the surrounding environment recorded and plotted. Our goal was to investigate if we could find species for use as bio indicators on water quality and if the fragmentation of the forests in Rio Grande do Sul affects the species richness negatively. Our data suggested that the amount of forest, pH level and water temperature have a strong correlation to the number of species. For the number of specimens we found that amount of forest, pH level, water temperature, conductivity, amount of dissolved solids in the water and amount of surrounding urban area affects the population. We found that still water holds more species as well as specimens than current water. *T. binotata*, *M. ocellata*, *Oxyagrion* sp., *L. pictus*, *M. stawiariskii*, *R. planaltica*, *L. auritus* and *L. dichrostigma* could possibly be used as indicators for pH level, and that *S. reticulata*, *L. bipupillatus*, *B. furcata*, *R. bonariensis*, *D. mincki* and *T. cophysa* possibly could be used as indicators for conductivity. Further studies has to be done in order to be certain about the use of these species as indicators." (Authors)] Address: not stated

**21082.** Staats, E.G.; Agosta, S.J.; Vonesh, J.R. (2016): Predator diversity reduces habitat colonization by mosquitoes and midges. *Biology Letters* 12(12): 4 pp. (in English) ["Changes in predator diversity via extinction and invasion are increasingly widespread and can have important ecological and socio-economic consequences. Anticipating and managing these consequences requires understanding how predators shape ecological communities. Previous predator biodiversity research has focused on post-colonization processes. However, predators can also shape communities by altering patterns of prey habitat selection during colonization. The sensitivity of this nonconsumptive top down mechanism to changes in predator diversity is largely unexamined. To address this gap, we examined patterns of dipteran oviposition habitat selection in experimental aquatic habitats in response to varied predator species richness while holding predator abundance constant. Caged predators [larval *Celithemis eponina*, larval *Enallagma* spp. and first-year *Procambarus* crayfish] were used in order to disentangle behavioural oviposition responses to predator cues from potential post-oviposition consumption of eggs and larvae. We hypothesized that because increases in predator richness often result in greater prey mortality than would be predicted from independent effects of predators, prey should avoid predator-rich habitats during colonization. Consistent with this hypothesis, predator-rich habitats received 48% fewer dipteran eggs than predicted, including 60% fewer mosquito eggs and 38% fewer midge eggs. Our findings highlight the potentially important links between predator biodiversity, prey habitat selection and the ecosystem service of pest regulation." (Authors)] Address: Staats, E.G., Dept of Biology, & Center for Environmental Sciences, Virginia Commonwealth University, Richmond, VA, USA. Email: egstaats6@msn.com

**21083.** van Strien, A.J.; Gmelig Meyling, A.W.; Herder, J.E.; Hollander, H.; Kalkman, V.J.; Poot, M.J.M.; Turnhout, S.; van der Hoorn, B.; van Strien-van Liempt, W.T.F.H.; van Swaay, C.A.M.; van Turnhout, C.A.M.; Verweij, R.J.T.; Oerlemans, N.J. (2016): Modest recovery of biodiversity in a western European country: The Living Planet Index for the Netherlands. *Biological Conservation* 200: 44-50. (in English) [oas 68; Highlights: •In line with the global Living Planet Index, we calculated a LPI for the Netherlands based on 361 animal species. •Overall, the state of biodiversity has slightly increased from 1990 to 2014. •This was mainly due to the growth of freshwater animal populations. •In farmland and in open semi-natural habitats animal populations have

been declining and in woodland they were stable. •The LPI enables us to monitor the state of biodiversity in a clear and consistent way. Abstract: We calculated a Living Planet Index (LPI) for the Netherlands, based on 361 animal species from seven taxonomic groups occurring in terrestrial and freshwater habitats. Our assessment is basically similar to the global LPI, but the latter includes vertebrate species and trends in population abundance only. To achieve inferences on trends in biodiversity more generally, we added two insect groups (butterflies and dragonflies) and added occupancy trends for species for which we had no abundance trends available. According to the LPI, the state of biodiversity has slightly increased from 1990 to 2014. However, large differences exist between habitat types. We found a considerable increase in freshwater animal populations, probably because of improvement of chemical water quality and rehabilitation of marshland habitats. We found no trend in the LPI for woodland populations. In contrast, populations in farmland and open semi-natural habitats (coastal dunes, heathland and semi-natural grassland) declined, which we attribute to intensive agricultural practices and nitrogen deposition, respectively. The LPI shows that, even in a densely populated western European country, ongoing loss of animal biodiversity is not inevitable and may even be reversed if adequate measures are taken. Our approach enabled us to produce summary statistics beyond the level of species groups to monitor the state of biodiversity in a clear and consistent way." (Authors)] Address: van Strien, A.J., Statistics Netherlands, P.O. Box 24500, 2490 HA The Hague, The Netherlands. Email: asin@cbs.nl

**21084.** Weihrauch, F.; Vieira, V.; Cordero-Rivera, A.; Loureiro, N. (2016): Update on the zoogeography of Odonata in the Macaronesian Islands. *Boletín Rola* n° 8: 9-22. (in English, with Spanish summary) ["Based on the comprehensive review by Weihrauch (2011), the checklists of all archipelagos of the Macaronesian Islands and the available literature on the distribution of their Odonata are brought up to date. *Pantala flavescens* is new to the Azores and the Canary Islands. The first record of *Ischnura hastata* from Graciosa Island confirms the species' breeding in all nine islands of the Azores. The presence of *Ischnura senegalensis* in the Canary Islands is confirmed. Single specimens of *Agriocnemis exilis*, *Anax rutherfordi*, and *Anax tristis* found in museum collections bring the checklist of Cape Verde to 17 species. No new species have been reported from Madeira or the Savage Islands. In summary, the checklist of Macaronesian Odonata now comprises acknowledged records of 23 species (8 Zygoptera, 15 Anisoptera)." (Authors)] Address: Weihrauch, F., Jägerstr. 21A, D-85283 Wolnzach, Germany. E-mail: Florian.Weihrauch@t-online.de

**21085.** Števo, B.; Kováč, V. (2016): Ontogenetic variations in the diet of two invasive gobies, *Neogobius melanostomus* (Pallas, 1814) and *Ponticola kessleri* (Günther, 1861), from the middle Danube (Slovakia) with notice on their potential impact on benthic invertebrate communities. *Science of The Total Environment* 557-558: 510-519. (in English) ["Highlights: •Bioinvasions can affect negatively native ecosystems through trophic interactions. •Diet and impact of two invasive gobies (fish) in the Danube were examined. •Both gobies preferred chironomids when small, bighead goby shifted to fish when large. •In contrast to round goby, invasive species predominated in the diet of bighead goby. •The impact of invasive gobies develops over time after the onset of the invasion. Abstract: In this study, ontogenetic variations in diet of invasive bighead goby *Ponticola kessleri* and round goby *Neogobius melanostomus* from the

middle Danube were analysed. Index of stomach fullness, Fulton's condition factor, index of food importance, frequency of occurrence, biomass, electivity, and proportions of invasive organisms in their diet were examined. Changes in the diet during ontogeny of both species emphasise the differences in their trophic niches. Our results combined with literary data suggest that bighead goby may threaten small native benthic fish species as a predator (especially in the invasion front), whereas round goby can potentially impact native fish species of all ontogenetic phases by competing for food. Round goby appear to have strong impact on bivalves, especially in the invasion front. High consumption of invasive organisms by bighead goby may help the native macroinvertebrate community. Thus, in contrast to round goby, bighead goby does not seem to be a hot candidate for being a nuisance invader." (Authors) The publication includes a passing reference to Odonata.] Address: Števo, B., Dept of Ecology, Faculty of Natural Sciences, Comenius University, Mlynská dolina, 842 15 Bratislava, Slovakia. E-mail: manonik@gmail.com

## 2017

**21086.** Bolshakov, L.V. (2017): New species of Odonata for the Tula Province. 2. *Eversmannia* 49: 51- (in Russian, with English title) [Verbatim (Google Translate): When studying the odonatofauna of the Tula region, 2 species of dragonflies new to the region were identified. The definition was made by the author. The material is stored in the museum-reserve "Kulikovo Pole" (Tula) and the Tula Regional Exotarium. Species annotations give arealogical characteristics based on [Belyshev and Kharitonov, 1981; Dijkstra, Lewington, 2006] and other cited sources, details of finds and ecological characteristics; the names of localities are accompanied by their numbers in the working list ["Consolidated...", 2007]. *Onychogomphus forcipatus* is a western Palearctic (to the Trans-Urals, Western Asia) temperate species. In our region, it was reliably known in the more northern subtaiga regions (cited after (Bol'shakov, 2003, 2013)), but relatively rare. Material: Pavlovskoe (36b), 29.08.2016, 1 female (leg. A. Evsyunin). According to the literature, rheophilic appearance. According to the latest observations in the Kaluga region (Yukhnovsky district, Papaev, 07/30/2014, 1 female, 3 specimens recorded, L. Bolshakov), dragonflies stay along the river banks and sit on coastal vegetation. *Aeshna isocetes* ... is a west-central Palearctic (to Central Asia) subboreal species. In our region, it was first noted at the very end of the 20th century. in the vicinity of Moscow [Matyukhin, 2000] and in the eastern regions of the Lipetsk region [Melnikov, 2000]. Probably, it settled more widely in the forest zone only in the 21st century. due to the softening of wintering conditions; recently found in the Kaluga region (Bol'shakov, 2014). Material: Tula (51), TsPKiO, July 8, 2011, 1 specimen noted; 06/6/2012, 2 specimens noted. (L. Bolshakov); Lupishki (129), 5.06.2013, 1 male (up to 6 specimens noted); 07/04/2013, 3 specimens noted; Krasnopolye (129a), 06/5/2013, 1 male, 2 specimens noted. (L. Bolshakov). The first sightings in Tula were not previously put into circulation, because before the capture of dragonflies in 2013, the identification of an unfamiliar species in flight did not seem reliable. A moderately eurytopic limnophilous species that develops in various stagnant water bodies and, probably, in backwaters of rivers. Dragonflies were noted only above water bodies and near them. After the publication of the latest addition (Bol'shakov, 2012), 45 species of dragonflies become known in the fauna of the Tula region. Thanks. The author thanks A.A. Evsyunin (Tula Regional Exotarium) for providing the collected material. The research was partly

funded by the Kulikovo Pole Museum-Reserve.] Address: Bolshakov, L.V., Russian Entomological Society (Tula branch), Russia. Email: l.bol2012@yandex.ru

**21087.** Brown, T. (2017): Predator-prey space use in response to chemical cues of predation. Undergraduate Research Theses, Ohio State University. Dept of Evolution, Ecology, & Organismal Biology: 22 pp. (in English) ["Interactions between predators and prey are a major component of ecosystems and have the potential to shape ecosystem dynamics. As predators and prey move together spatially and temporally throughout their habitat, each makes decisions to increase its own fitness. To make optimal movement decisions, individuals must accurately interpret their surroundings using available information. Two chemical cues are important for predator-prey interactions: predator kairomones and prey alarm cues, the chemical cue components of a typical predation event. How organisms use available information to make movement decisions and how their space use differs after chemical cue exposure is not yet fully understood. We measured space use within a system of predatory dragonfly larvae (*Anax junius*) and green frog tadpoles (*Rana* [=Lithobates] clamitans) exposed to chemical cues. To determine how predators and prey interpret predation events and make movement decisions, we conducted experiments using the components of a predation event: kairomones and alarm cues. We hypothesized that tadpoles would respond more strongly when exposed to a combination of chemical cues and that *Anax* would attempt to match prey distributions to increase its predation success rate. We found that tadpoles only responded with antipredator behaviours (i.e., spatially move away from perceived predation risk) when exposed to both *Anax* kairomones and conspecific alarm cues and that predatory *Anax* do not differ in their space use after chemical cue exposure. Our results suggest that tadpole prey minimize potentially costly antipredator behaviour by selectively responding to environmental information and that predators are behaviourally managing prey fear. Our research has shed insight into how predators and prey use different chemical cues when making movement decisions. Our results can be applied to aquatic and terrestrial systems where predator-prey species rely on chemical cues." (Author)] Address: not stated

**21088.** Harabis, F. (2017): Does the management of surrounding terrestrial habitats increase the tendency of odonates to leave aquatic habitats? *Biodiversity and Conservation* 26(9): 2155-2167. (in English) ["Generally, dragonflies and damselflies (odonates) are considered aquatic invertebrates. However, the ecological requirements of their adults are not different from those of fully, terrestrial insects. Surprisingly, there is a very little information on whether the management and structure of surrounding habitats has any influence on the diversity and seasonal dynamics of odonates. This is important to know because recently, a large proportion of freshwater habitats in Central Europe have become surrounded by intensively managed habitats. The aim of this study was to investigate the effects of different types of terrestrial habitats on their long-term utilization by dragonflies and damselflies. I assumed that this pattern varied over time; therefore, I used generalized additive mixed models to analyze the effects of management on seasonal changes in the abundance of individuals in terrestrial environments. From my results, it was evident that the management practices of surrounding terrestrial habitats had a significant impact on the population dynamics of dragonflies. The abundance of dragonfly adults in surrounding terrestrial habitats increased toward the end of the season. However,

this was only, when the natal aquatic habitat was not affected by fish farming and was able to supply surrounding terrestrial habitats with offspring. This was evidenced by the fact that, compared to areas with extensive water management, in sites with fish farming, seasonal increases in abundance was negligible. There is no doubt that the structure of surrounding terrestrial habitats has a significant influence on the diversity of terrestrial invertebrates. However, we must not forget that terrestrial habitats, regardless of their management, are not able to replace the poor quality of the aquatic (natal) habitat. Interestingly, the abundance of damselflies decreased toward the end of the season, regardless of the management practices of the surrounding areas. This indicates that their dynamics is more controlled by time stress or other similar mechanisms than that of dragonflies." (Author)] Address: Harabiš, F., Dept Ecol., Fac. Environmental Sciences, Czech University of Life Sciences Prague, Prague 6, Czech Republic

**21089.** Lee, D.-Y.; Lee, D.-S.; Park, Y.-S. (2017): Distribution patterns of Odonata communities in Korean streams. Proceedings of the Korean Society of Applied Entomology, 2017 Annual Meeting of the Korean Society of Applied Entomology and International Symposium, Emergence of Applied Insects: 68. (in English) ["Odonata are widely distributed in the global scale. Their distribution and abundance influenced by various environmental factors where they habit. Therefore, their distribution patterns reflect the differences of their habitat condition. In this study, we characterized the distribution patterns of Odonata in Korean streams by considering various environmental condition such as geographical, landscape, hydrological, and water quality factors. *Ischnura asiatica*, *Cercion calamorum*, and *Onychogomphus ringens* displayed the highest abundance and occurrence frequency in the dataset. Among various environmental factors altitude was the most contributing factors on the distribution of Odonata species, and the species richness was higher at low land than at high land." (Authors)] Address: Lee, D.-Y., Dept Biol., Kyung Hee Univ., Seoul 02447, Korea

**21090.** Miroglu, A.; Demirtas, S. (2017): Ecological niche modeling of *Calopteryx splendens* (Harris, 1782) (Insecta: Odonata) subspecies in Turkey. *Süleyman Demirel University Journal of Natural and Applied Sciences* 1(3): 935-941. (in Turkish, with English summary) ["Turkey is an important region in terms of biodiversity because of its geographical location, topographical structure and the presence of various climate types. The emergence of new species and sub-populations can be seen. In this study, we evaluated subspecies of *Calopteryx splendens* distributed in Turkey. 19 ecological parameters of the current known localities of these subspecies were analyzed. The potential habitats and new locations for the subspecies populations were investigated. Current distribution maps of *C. splendens* subspecies have been made using MaxEnt ecological niche modeling methods. According to these results, it was found that the distribution areas of *C. splendens* subspecies, whose distributions according to faunistic data are known, almost overlapped with the distribution areas of ecological data." (Authors)] Address: Miroglu, A., Ordu Univ., Fatsa Fac. Marine Sciences, Ordu/Turkey. E-mail: alimiroglu@gmail.com

**21091.** Quante, U. (2017): Aufgespießt - Libellen als Opfer von durch Pflanzen verursachten Unfällen. *Mitteilungen Nr. 3 der AG Libellen in Niedersachsen und Bremen*: 18-21. (in German) [*Anax imperator* accidentally victim of rush (*Juncus* sp.) is documented (11.06.2016, LK Harburg, Niedersachsen, Germany). In addition, some examples of specimens

trapped by Cyperaceae and Juncaceae from Gotland, Sweden (*Sympetrum vulgatum*, *Lestes dryas*) and from Internet-resources are documented.] Address: Quante, U., Fischteichchenweg 29, 21255 Dohren, Germany. Email: quante@aknaturschutz.de

**21092.** Rajabi, H.; Ghoroubi, N.; Stamm, K.; Appel, E.; Gorb, S.N. (2017): Dragonfly wing nodus: A one-way hinge contributing to the asymmetric wing deformation. *Acta Biomaterialia* 60: 330-338. (in English) ["Dragonfly wings are highly specialized locomotor systems, which are formed by a combination of several structural components. The wing components, also known as structural elements, are responsible for the various aspects of the wing functionality. Considering the complex interactions between the wing components, modelling of the wings as a whole is only possible with inevitable huge oversimplifications. In order to overcome this difficulty, we have recently proposed a new approach to model individual components of complex wings comparatively. Here, we use this approach to study nodus, a structural element of dragonfly wings which has been less studied to date. Using a combination of several imaging techniques including scanning electron microscopy (SEM), wide-field fluorescence microscopy (WFM), confocal laser scanning microscopy (CLSM) and micro-computed tomography (micro-CT) scanning, we aim to characterize the spatial morphology and material composition of fore- and hindwing nodi of the dragonfly *Brachythemis contaminata*. The microscopy results show the presence of resilin in the nodi, which is expected to help the deformability of the wings. The computational results based on three-dimensional (3D) structural data suggest that the specific geometry of the nodus restrains its displacements when subjected to pressure on the ventral side. This effect, resulting from an interlocking mechanism, is expected to contribute to the dorso-ventral asymmetry of wing deformation and to provide a higher resistance to aerodynamic forces during the downstroke. Our results provide an important step towards better understanding of the structure–property–function relationship in dragonfly wings. Statement of Significance: In this study, we investigate the wing nodus, a specialized wing component in dragonflies. Using a combination of modern imaging techniques, we demonstrate the presence of resilin in the nodus, which is expected to facilitate the wing deformability in flight. The specific geometry of the nodus, however, seems to restrain its displacements when subjected to pressure on the ventral side. This effect, resulting from an interlocking mechanism, is suggested to contribute to dorso-ventral asymmetry of wing deformations and to provide a higher resistance to aerodynamic forces during the downstroke. Our results provide an important step towards better understanding of the structure–property–function relationship in dragonfly wings and might help to design more efficient wings for biomimetic micro-air vehicles." (Authors)] Address: Rajabi, H., Institute of Zoology, Functional Morphology and Biomechanics, Kiel University, Kiel, Germany. Email: hrajabi@zoologie.uni-kiel.de

## 2018

**21093.** Alves Pereira, A.M.; Brito, S.; Filho, J.A.; Martins Teixeira, A.A.; Teles, D.A.; Santana, A.O.; Ferreira Lima, V.; Almeida, W. (2018): Diet and helminth parasites of freshwater turtles *Mesoclemmys tuberculata*, *Phrynops geoffroanus* (Pleurodira: Chelidae) and *Kinosternon scorpioides* (Cryptodira: Kinosternidae) in a semi-arid region, Northeast of Brazil. *Acta Herpetologica* 13(1): 21-32. (in English) ["In this study, the *Kinosternon scorpioides*, *Mesoclemmys tuberculata*



and *Phrynops geoffroanus* freshwater turtles collected in the Cariús River, State of Ceará, were analysed as to their diet composition and presence of helminths. Among the 63 examined turtles 55 (87.3%) were parasitized. We found three Nematoda species (*Physaloptera retusa*, *Serpinema monospiculatus* and *Spiroxys figueiredoi*) and one Trematoda species (*Gorgoderina* sp.). *Phrynops geoffroanus* had the highest indexes of prevalence (97.56%) and mean intensity of infection (33.5), followed by *M. tuberculata* (70% and 12.64, respectively) and *K. scorpioides* (50% and three, respectively). Host body size was positively related to helminths abundance in both male and female Chelidae species. A significant difference in helminths abundance between the sexes was found only in *P. geoffroanus*, where females had more parasites than males. Regarding diet, the main food items ingested by *M. tuberculata* were Odonata nymphs (Aeshnidae and Libellulidae), whilst *P. geoffroanus* feeds mainly on Diptera larvae (Chironomidae), Odonata nymph (Aeshnidae) and Notonectidae, and only seeds were found in the stomach contents of *K. scorpioides*. Here, we present the first record of *S. monospiculatus* parasitizing *K. scorpioides*, *Gorgoderina* sp. and *P. retusa* were reported for the first time in *P. geoffroanus*, and *M. tuberculata* represents a new host to *P. retusa* and *S. figueiredoi*." (Authors)] Address: Alves Pereira, A.M., Programa de Pós-graduação em Bioprospeção Molecular, Departamento de Química Biológica, Universidade Regional do Cariri – URCA, Rua Cel. Antônio Luiz 1161, Campus do Pimenta, 63105 –100 Crato, Ceará, Brazil. E-mail: marcosalvesp@outlook.com

**21094.** Belevich, O.; Yurchenko, Y.; Krivopalov, A.; Kryukov, V.; Glupov, V. (2018): Effects of *Metarhizium robertsii* on the bloodsucking mosquito *Aedes flavescens* and non-target predatory insects (Odonata). *Journal of Applied Entomology* 142(6): 632-635. (in English) ["The effects of different concentrations and methods of treatment with *Metarhizium robertsii* Bisch., Rehner & Humber conidia on the non-target aquatic dragonfly larvae *Lestes sponsa* Hanse- mann, *Lestes dryas* Kirby and *Aeshna affinis* Vander Linden and on the target bloodsucking mosquito larvae *Aedes* (O.) *flavescens* (Muller) were analysed. We found that dragonflies are significantly less susceptible than mosquitoes to the fungus. Larvae of *L. sponsa* larvae were more susceptible to wet conidia than dry conidia. However, the mortality of the air-breathing larvae of *A. affinis* was significantly higher after treatment with dry conidia relative to aqueous suspension. The results help to minimize the negative effects of entomopathogenic fungi on non-target predator insects under the control of mosquito larvae." (Authors)] Address: Yurchenko, Yu., Institute of Systematics and Ecology of Animals, Siberian Branch of Russian Academy of Science, Novosibirsk, Russia. Email: yurons@ngs.ru

**21095.** Bota-Sierra, C.A.; Sandoval-H., A.C.O.J.J.; Viganò, M. (2018): Seventeen new dragonfly records from Colombia and the confirmation of the synonymy of *Philogenia monotis* and *P. tinalandia* (Insecta: Odonata). *International Journal of Odonatology* 21(4): 115-127. (in English) ["During 2.5 months of intensive fieldwork in Colombia (Departments of Cauca, Nariño, and Putumayo, South America) from January to March 2017, we visited 13 localities and collected 291 specimens of 68 species of Odonata, including 17 new records for the country. We report range expansions for several species assessed as data deficient or under some degree of threat by the IUCN Red List. Furthermore, we confirmed that *Philogenia tinalandia* is a junior synonym of *P. monotis*, thus solving a longstanding enigma. We also report the rediscovery, after many decades, of *Philogenia*

*raphaella*, *P. sucra* and *Stenocora percomuta*. The data we collected are an important contribution to the knowledge of the dragonfly diversity of the Colombian Andean region and its surroundings, including the nearby areas in Ecuador and Peru, countries with which the Depts visited share boundaries." (Authors)] Address: Bota-Sierra, C.A., Red de Biodiversidad y Sistemática, Instituto de Ecología, A.C. Xalapa, Mexico. Email: corneliobota@gmail.com

**21096.** Buis, M. (ed.) (2018): Liste Rouge des libellules menacées du Limousin - Rapport d'évaluation - Méthode, démarche et résultat. Conservatoire d'espaces naturels, Limousin, Nouvelle-Aquitaine: 92 pp. (in French) ["In 2005, the Societe Limousine d'Odonatologie initiated a red list of threatened odonates in Limousin. This list is an essential tool for a better consideration of odonates by the managers of natural areas. The list is over 10 years old and needs to be updated for several reasons. First of all, the population dynamics of certain species such as *Lestes virens*, *Coenagrion scitulum* ... have changed in recent years. A new evaluation of their Conservation Status therefore seemed necessary. Finally, the International Union for Conservation of Nature proposes a new method adapted to the regions, which should be implemented in order to strengthen the weight of the red list. The update of the Limousin Odonata red list will be the means to complete the Aquitaine red list, published by the Aquitaine Wildlife Observatory in 2016. It will provide a better understanding of the odonatological conservation issues in the different territories of the Nouvelle-Aquitaine region." (Authors) Translated with www.DeepL.com/Translator (free version)] Address: not stated

**21097.** Hushtan, K.V. (2018): The diversity of amphibiotic insects (Insecta: Ephemeroptera, Plecoptera, Odonata) of Latorica river basins ecosystems. Research and development of the State-owned research and development Center 34: 69-74. (in Ukrainian, with English summary) ["The taxonomic and eco-morphological diversity of amphibiotic insects in the ecosystems of the Latoritsa River basin was studied. If all 52 species of amphibiotic insects have been identified (32 species of Ephemeroptera, 7 species of stoneflies, 13 species of dragonflies). The main of the number and biomass of the community in the studied localities of the Latoritsa River basin is the families Baetidae and Heptageniidae. The rarity components of this region are investigated. The 3 types of Odonata, 5 types of Ephemeroptera and 3 types of Plecoptera larvae for Latoritsa river basin are discovered. The ecomorphological structure of dragonflies is represented by the following classes: rheophilic drifting and rheophilic velox larvae with spoonlike labium. The largest species diversity of the Ephemeroptera was recorded in 4 types of eco-morphs: siphonuroides (47% from species diversity), plane-plots (32%), larvae with "tusks" (12%) and "kryshkovoziabrovi" larvae (9%). Among the Plecoptera there are 3 dominant types: lithophilous cryptobionts (42%), phytophilic cryptobionts (31%) and cryptobionts of gaps (27%)." (Author) *Calopteryx splendens*, *C. virgo*, *Platycnemis pennipes*, *Aeshna juncea*, *A. mixta*, *Lestes viridis*, *L. barbarus*, *L. sponsa*, *Orthetrum brunneum*, *Onychogomphus forcipatus*, *Cordulegaster bidentata*, *Libellula fulva*] Address: Hushtan, Kateryna, State Museum of Natural History of the National Academy of Sciences of Ukraine, Lviv, Ukraine. Email: katrinantonjuk@gmail.com

**21098.** Jiang, B.; Mikolajewski, D.J. (2018): Shift in predation regime mediates diversification of foraging behaviour in a dragonfly genus. *Ecological Entomology* 43: 525-533. (in English) ["1. Behavioural adaptations to avoid and evade

predators are common. Many studies have investigated population divergence in response to changes in predation regime within species, but studies exploring interspecific patterns are scant. Studies on interspecific divergence can infer common outcomes from evolutionary processes and highlight the role of environmental constraints in shaping species traits. 2. Species of the dragonfly genus *Leucorrhinia* underwent well-studied shifts from habitats being dominated by predatory fish (fish lakes) to habitat being dominated by predatory invertebrates (dragonfly lakes). This change in top predators resulted in a set of adaptive trait modifications in response to the different hunting styles of both predator types: whereas predatory fish actively search and pursue prey, invertebrate predator follow a sit-and-wait strategy, not pursuing prey. 3. Here it is shown that the habitat shift-related change in selection regime on larval *Leucorrhinia* caused species in dragonfly lakes to evolve increased larval foraging and activity, and results suggest that they lost the ability to recognise predatory fish. 4. The results of the present study highlight the impact of predators on behavioural trait diversification with habitat-specific predation regimes selecting for distinct behavioural expression." (Authors)] Address: Jiang, B., Institut für Biologie, Freie Universität Berlin, Königin-Luise-Str. 1–3, 14195 Berlin, Germany. E-mail: bin.jiang@fu-berlin.de

**21099.** Jiang, B. (2018): Predators promote trait diversification in prey. Ph.D. thesis, Dept of Biology, Chemistry and Pharmacy of Freie Universität Berlin: III, 132 pp. (in English) ["Predator-prey interactions have a major influence on species diversification. The performance and fitness of prey species are heavily dependent on their antipredator responses to specific predators. In nature, predators are distributed heterogeneously across different habitats. Because different predators vary in their predation strategies, a change in the top predators can dramatically alter preys' defensive traits. Larval *Leucorrhinia* ancestrally came from lakes dominated with predatory fish (fish lakes). However, they shifted their habitats from fish lakes into lakes with only large invertebrate predators (dragonfly lakes) several times. In this thesis, I examined a series of antipredator traits (burst-escape behavior related traits, behaviour, growth rate, ontogenetic pattern and morphological traits) in order to understand how different predation regimes drive prey trait diversification in European *Leucorrhinia* species. We found a clear diversification pattern in most antipredator traits. However, unique pattern of traits was also found in growth rate related physiological traits. Eventually, we got a full picture of antipredator traits in *Leucorrhinia* system. These research I have presented is critical for improving our understanding of adaptive trait plasticity and its widespread occurrence across species and community types. Moreover, the facts that the larval stage is restricted in its distribution and that the adults have a high dispersal ability make odonates as an important model bridging ecology and evolution. My results indicate that it might be possible to disentangle the forces behind natural selection (e.g. directional selection, stabilizing selection) by using *Leucorrhinia* species." (Author)] Address: Jiang, B., Institut für Biologie, Freie Universität Berlin, Königin-Luise-Street 1–3, 14195 Berlin, Germany. E-mail: bin.jiang@fu-berlin.de

**21100.** Kaulfuss, U.; Lee, D.E.; Wartho, J.-A.; Bowie, E.; Lindqvist, J.K.; Conran, J.C.; Bannister, J.M.; Mildenhall, D.C.; Kennedy, E.M.; Gorman, A.R. (2018): Geology and palaeontology of the Hindon Maar Complex: A Miocene terrestrial fossil Lagerstätte in southern New Zealand. *Palaeogeography, Palaeoclimatology, Palaeoecology* 500(1): 52-68. (in English)

["Highlights: • Hindon Maar Complex is a new mid-Miocene Fossil-Lagerstätte in New Zealand. • Anoxia in maar lakes allowed exquisite preservation of plant and animal fossils. • The biota is from a lake and *Nothofagus/podocarp*/mixed broadleaf forest ecosystem. • Fossils record high diversity at humid, warm Southern Hemisphere mid-latitudes. Abstract: This paper highlights the geology, biodiversity and palaeoecology of the Hindon Maar Complex, the second Miocene Konservat-Lagerstätte to be described from New Zealand. The Lagerstätte comprises four partly eroded maar-diatreme volcanoes, with three craters filled by biogenic and highly fossiliferous lacustrine sediments. The exceptionally well-preserved and diverse biota from the site is derived from a mid-latitude Southern Hemisphere lake-forest palaeoecosystem, including many fossil taxa not previously reported from the Southern Hemisphere. The most common macrofossils are leaves of *Nothofagus*, but the flora also includes conifers, cycads, monocots (such as *Ripogonum* and palms), together with Lauraceae, Myrtaceae and Araliaceae leaves and flowers. The small maar lakes were surrounded by *Nothofagus/podocarp*/mixed broadleaf forest growing under humid, warm temperate to subtropical conditions. The fossil fauna comprises insects in the orders Odonata, Hemiptera, Thysanoptera, Coleoptera, Diptera, Hymenoptera and Trichoptera, and the fish assemblage includes a non-migratory species of the Southern Hemisphere Galaxiidae (*Galaxiidae*) and a significant new record of the freshwater eel *Anguilla* (*Anguillidae*). The fossil assemblage also includes the first pre-Quaternary bird feathers from New Zealand and abundant coprolites derived from fish and volant birds, presumably waterfowl. Palynomorph analysis and a <sup>40</sup>Ar/<sup>39</sup>Ar age of 14.6 Ma obtained from basanite associated with the maar complex indicate that the Hindon Maar Complex is of mid-Miocene age (Langhian; New Zealand local stage: Lillburnian). It thus provides a new and unique perspective on Neogene terrestrial biodiversity and biogeography in the Australasian region, around the end of the mid-Miocene thermal optimum and prior to late Miocene–Pleistocene climate cooling episodes when many warm-temperate and subtropical forest components became extinct in New Zealand." (Authors)] Address: Kaulfuss, U., Dept of Geology, Univ. of Otago, PO Box 56, Dunedin 9054, New Zealand. Email: uwe.kaulfuss@otago.ac.nz

**21101.** Kim, J.-S.; Lee, S.-D.; Kim, D.-P. (2018): The relationship between the dragonfly diversity and the environmental factors in the Juam wetland. *Korean Journal of Environment and Ecology* 32(1): 66-76. (in Korean, with English) ["This study surveyed the species and population of dragonflies in 20 study sites in the Junam wetland in May and July 2015 to investigate the relationship between the dragonflies and the inhabited environment. We measured the environmental factors such as the area of emergent plants, the area of floating and floating-leaved plants, the area of water surface, the area of water plants, and the nearby land-use type and analyzed the relationship to the dragonfly species, population, and diversity index. We found 757 dragonflies belonging to 21 species of 6 families. The area of floating and floating-leaved plants and the area of water surface affected the species diversity. The area of floating and floating-leaved plants and the area of surface water, in particular, showed the positive correlation with the species richness and the dominance value, respectively. The area of water surface showed the negative correlations with Shannon's diversity index and evenness. Among the type of surrounding land-uses, the dry fields and orchards showed significantly lower average species richness than wetlands. Among the species, *Cercion calamorum* and *Crocothemis*

servilia were positively correlated with floating and floating-leaved plants. *Cercion v-nigrum* and *Ephthalmia elegans* were positively correlated with the area of water surface, and *Ischnura asiatica* and *Ceragrion nipponicum* were negatively correlated. The recent uncontrolled proliferation of lotus colony in the Junam wetland is likely to affect greatly the species composition of dragonflies which have a close relationship with plant species." (Authors)] Address: Lee, S.-D., Dept. of Landscape Architecture, Gyeongnam National Univ. of Science & Technology, 52725, Korea. E-mail: eco-plan@gntech.ac.kr

**21102.** Martínez Saura, C.M.; López Barquero, P.; Henarejos González, J.M.; Ibarra Marinas, D.; Sánchez Balibrea, J.; Fernández Sempere, M.; Jiménez Montero, J.; López Espinosa, F.J.; Martínez López, P.; Murcia Abellán, J.L.; Ramos, J.; Requena Aznar, C.; Terrer, P.; López Cañizares, C.; Arnaldos Giner, I.; Ballesteros, G.A. (2018): Primeros datos y expansión de *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) en la provincia de Murcia (SE España). *Boletín Rola* nº 12, segundo semestre 2018: 29-36. (in Spanish, with English summary) ["The colonization of the territory of Murcia by *T. kirbyi* between the years 2012 and 2017 is reported." (Authors)] Address: Martínez Saura, Carmen M., ANSE (Asociación de Naturalistas del Sureste), Plaza Pintor José María Párraga, 11, bajo, Spain. Email: c.martinez@asociacionanse.org

**21103.** Martínez-Lendeck, N.; Golab, M.J.; Osorio-Beristain, M.; Contreras-Garduño, J. (2018): Sexual signals reveal males' oxidative stress defenses: testing this hypothesis in an invertebrate. *Functional Ecology* 32(4): 937-947. (in English) ["1. The hypothesis that sexual traits reveal the oxidative stress resistance of their bearers has been widely tested in vertebrates but remains unexplored in invertebrates. Here, *Hetaerina americana* was used to test whether oxidative stress defenses are advertised by male wing spot size and color (a male sexual trait). To this end we asked (1) whether oxidative stress reduced survival, (2) whether wing spot size revealed males' antioxidant defenses, and (3) how wing spot size and color were affected by oxidative stress. 2. We elevated oxidative stress by injecting adult males with paraquat (a compound that favors the production of free radicals) and then examined how this affected male survival and wing spot size. We then related the expression of wing spot size to indicators of oxidative stress – H<sub>2</sub>O<sub>2</sub> and total Antioxidant Capacity (TAC), Super Oxide Dismutase (SOD) and Catalase (CAT) – in adult males (whose wing spot is fixed) injected with Paraquat (PQ). In teneral males, whose wing-spots are still forming, we compared wing-spot size, color (red and yellow chroma) and brightness in individuals injected with paraquat, or water as a control. 3. Oxidative stress reduced the survival of adult and teneral males. While the H<sub>2</sub>O<sub>2</sub> and TAC markers of antioxidant defenses were positively correlated with wing spot size, there was no correlation with CAT and a negative correlation with SOD. In teneral males, PQ increased the yellow chroma and brightness of wing spots, but did not affect spot size or red chroma. 4. Our results highlight the importance of measuring different markers as indicators of male oxidative stress defenses, and that the sexual signals of invertebrates may reveal the oxidative stress status of their bearers." (Authors)] Address: Martínez-Lendeck, Norma, Centro de Investigación en Biodiversidad y Conservación, Universidad Autónoma del Estado de Morelos, Cuernavaca, Mexico

**21104.** Nurminen, L.; Hellén, N.; Olin, M.; Tiainen, J.; Vinni, M.; Grönroos, M.; Estlander, S.; Horppila, J.; Rask, M. Lehtonen,

H. (2018): Fishing-induced changes in predation pressure by perch (*Perca fluviatilis*) regulate littoral benthic macroinvertebrate biomass, density, and community structure. *Aquatic Ecology* 52: 1-16. (in English) ["We aimed to study whether the varying changes in predation pressure by perch (*Perca fluviatilis*) reflect the biomass, density, and community structure of the benthic macroinvertebrates. Prey preference is size-dependent, and overall predation pressure is density dependent, and thus the size structure of the *P. fluviatilis* population should affect the structure of the macroinvertebrate community, and the population density of *P. fluviatilis* should reflect the overall density of benthic macroinvertebrates. We sampled the littoral benthic community in a boreal lake that had been divided into two parts that were subjected to two different fishing procedures during 2007–2012 period and analyzed the macroinvertebrate diet of fish. The benthic macroinvertebrate community reflected the predation pressure. Total macroinvertebrate biomass increased during the study period in the lake division with a non-size-selective fishing procedure (NSF), i.e., all invertivorous perch size-classes targeted, but decreased in the section with negatively size-selective fishing procedure (SSF), i.e., large invertivorous individuals = 16 cm were not targeted. This difference was a result of the increase in large-sized species, such as Odonata, for the NSF procedure and decrease in the SSF procedure. In contrast to total biomass, total macroinvertebrate density did not show a response to predator size structure but rather total macroinvertebrate density decreased with increasing fish density. The study demonstrates the effect of predation pressure of *P. fluviatilis* on benthic communities, thus highlighting the keystone predator role of the species in boreal lakes and gives more insight on the multiple effects of fish predation on littoral benthic communities." (Authors)] Address: Nurminen, L., Dept of Environmental Sciences, Univ. of Helsinki, Helsinki, Finland. E-mail: leena.nurminen@helsinki.fi

**21105.** Olsen, K.M. (2018): Søk etter storblålibelle *Orthetrum cancellatum* i Grenland, Telemark i 2018. *BioFokus-notat* 2018-50. ISBN 978-82-8209-686-7. Stiftelsen BioFokus. Oslo: 18 pp. (in Norwegian) [Google Translate: Summary / conclusion. (1) Gårdeemma nature reserve, where *O. cancellatum* was first discovered in Telemark, together with the nearby Hytterdøbukta, most likely constitutes a habitat with a stable population of the species. The stock in both bays seemed to be good at the time of the survey in 2018. (2) Other parts of Volls fjorden / Frierfjorden seem to be less suitable for *O. cancellatum*, possibly with the exception of the areas adjacent to Røraelva's outlet on the north side of Volls fjorden (but the species was not registered here on a slightly windy day in 2018). (3) Other investigated localities in both brackish water and fresh water seem to be unsuitable as breeding sites for the species, possibly with the exception of the groundwater areas in the innermost part of Fjærekielen. There is great uncertainty as to whether the two inland localities where the species has been proven may be relevant as breeding sites (only one of these was assessed in the field in 2018, as the other was not published at that time).] Address: BioFokus: Gaustadalléen 21, 0349 Oslo, Norway. Email: post@biofokus.no

**21106.** Pereira, J.M.; Otero, J.C. (2018): Nuevas citas de *Coenagrion mercuriale* (Charpentier, 1840) (Odonata, Coenagrionidae) en la Comunidad de Cantabria (norte de España) - New records of *Coenagrion mercuriale* (Charpentier, 1840) (Odonata, Coenagrionidae) in the Community of Cantabria (north of Spain). *Boletín de la Asociación española de Entomología* 42(1/2): 147-152. (in Spanish, with English caption)

["The selection of these localities is intended, on the one hand, to reach the greatest number of areas where the species is present and, on the other hand, to cover as representative a sample as possible of all the habitats favourable to the species. Eight localities have been selected, distributed among the Sites of Community Importance (SCI): Río Miera, Montaña Oriental, Dunas del Puntal and Estuario. Dunas del Puntal and Estuario del Miera, or in areas close to them. Sampling began in April and ended in August to cover most of their flight cycle. The methodology used is that proposed by TORRALBA-BURRIAL et al. (2012), consisting of 100 m longitudinal routes along the banks of the stream, pond, lagoon or river. The number of adults, pairs and clutches observed at a distance of up to 5 m along the sides of the route is assessed (15 min). (15 min). The visits were carried out on favourable days (sunny, temperature > 20 °C and between 11:00 h and 16:00 h) with a minimum fortnightly frequency, as weekly surveys can be complicated due to the long flight period of the species (TORRALBA-BURRIAL et al., 2012), which could generate errors in the census when counting the same individuals in different surveys. In addition, the average longevity of adults is usually 6-7 days (CORDERO-RIVERA & STOKS, 2008), which may also contribute to counting the same individuals. A total of 186 specimens of *C. mercuriale* were found in six of the eight localities sampled, representing six new populations for the Community of Cantabria. The localities with presence of the species were the following: (a) La Regata (huso 30T, 441510E-4803365N, Ceceñas, Medio Cudeyo, 39 m): 25.IV.2016, 3 ej.; 09.V.2016, 14 ej.; 25.V.2016, 7 ej.; 07.VI.2016, 8 ej.; 22.VI.2016, 8 ej.; 06.VII.2016, 3 ej. (b) Fuente del Francés (huso 30T, 442971E-4804658N, Entrambasaguas, 38 m): 25.IV.2016, 7 ej.; 09.V.2016, 14 ej.; 25.V.2016, 12 ej.; 07.VI.2016, 10 ej.; 22.VI.2016, 1 ej. (c) Molinos río Pontones (huso 30T, 443947E-4806607N, Ribamontán al Monte, 18 m): 25.IV.2016, 1 ej. (d) Arroyo Bucarrón (huso 30T, 444209E-4802042N, Entrambasaguas, 52 m): 28.IV.2016, 9 ej.; 10.V.2016, 14 ej.; 24.V.2016, 17 ej.; 07.VI.2016, 20 ej.; 21.VI.2016, 11 ej.; 04.VII.2016, 4 ej.; 21.VII.2016, 2 ej. (e) Palacio de Elsedo (huso 30T, 435442E-4800812N, Liérganes, 90 m): 11.V.2016, 5 ej.; 08.VI.2016, 3 ej.; 22.VI.2016, 2 ej.; 04.VII.2016, 3 ej. (f) Bucarrero (huso 30T, 438879E-4800384N, Liérganes, 84 m): 11.V.2016, 4 ej.; 25.V.2016, 3 ej.; 08.VI.2016, 3 ej.

**21107.** La Regata Park is made up of a shallow spring with a shallow depth and flow, with lentic waters and flowing, with lentic waters that tend to puddle and with a large with extensive emergent vegetation on the sides. The area in which the The area where the population was observed is practically free of arboreal vegetation, although with a high density of emergent macrophytes." (Authors/Deepl)] Address: Otero, J.C., Depto de Zoología y Antropología Física. Fac. de Biología. Universidad de Santiago de Compostela (USC), A Coruña (España). Email: josecarlos.otero@usc.es

**21108.** Sribal, U.; Paweenpermsuk, Y.; Thitiarchagul, T.; Atdhabhan, S.; Saengamron, C.; Thepphibalsathit, N.; Chaychum, S.; Behrstock, R.A.; Jadoonkittinan, P.; Ruangrong, R.; Ruangrong, J.; Thammasangwan, N.; Tersing, S.; Changong, S.; Makbun, N. (2018): New national records of Odonata from Thailand based mostly on photographs (Odonata: Argiolestidae, Philosinidae, Aeshnidae, Libellulidae). *Agrion* 22(1): 30-36. (in English) [Seven species of Odonata are recorded from Thailand for the first time from records mostly based on credible and authoritative photographs: *Podolestes orientalis*, *Rhinagrion hainanense*, *Heliaeschna simplicia*, *Atratothemis reelsi*, *Nannophyopsis clara*, *Risioptelebia*

*guentheri*, and *Zyxomma breviventre*. Biology and habitat of some species are briefly noted." (Authors)] Address: Makbun, N., 2211/5 Moo 4, Takhli, Nakhon Sawan, 60140, Thailand. E-mail: noppadon.makbun@gmail.com

**21109.** Tüzün, N.; Op de Beeck, L.; Oliarinony, R.; Van Dievel, M.; Stoks, R. (2018): Warming under seminatural outdoor conditions in the larval stage negatively affects insect flight performance. *Biology Letters* 14: 20180121. <http://dx.doi.org/10.1098/rsbl.2018.0121>: 5 pp. (in English) ["Laboratory studies indicate global warming may cause changes in locomotor performance directly relevant for fitness and dispersal. Yet, this remains to be tested under seminatural settings, and the connection with warming-induced alterations in the underlying traits has been rarely studied. In an outdoor mesocosm experiment with the damselfly *Ischnura elegans*, 4°C warming in the larval stage decreased the flight muscle mass, which correlated with a lower flight endurance. Warming did not affect body mass, size or wing morphology. This illustrates how carry-over effects of warming under seminatural conditions during early development bridge metamorphosis and negatively impact locomotor performance through changes in a key flight-related trait." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**21110.** Wang, S.C.; Liu, X.; Liu, Y.; Wang, H. (2018): Contrasting patterns of macroinvertebrates inshore vs. offshore in a plateau eutrophic lake: Implications for lake management. *Limnologica* 70: 10-19. (in English) ["Worldwide there has been deterioration of lakeshore habitat and increasing eutrophication. These stresses have impacted littoral macroinvertebrate communities. However, bioassessment and rehabilitation have been largely carried out offshore, and the inshore macroinvertebrates have received less attention especially in shallow plateau lakes. In this study, we compared inshore and offshore macroinvertebrate communities in a shallow plateau lake, Lake Dianchi, China. The environmental parameters determining the distribution of macroinvertebrates were analyzed with partial redundancy analysis. Our results showed that macroinvertebrate communities differed significantly between inshore and offshore. Taxonomic richness was much higher inshore than offshore, due to higher habitat heterogeneity. By contrast, both density and biomass inshore were significantly lower than those of offshore. Generally, vegetation and substrate type were the key environmental parameters shaping macroinvertebrate communities. Eutrophication exerted great effect on offshore communities, while its impacts on inshore communities varied spatially. Shoreline degradation and seasonal eutrophication effects resulted in the limited density and biomass of inshore communities. Our results emphasized the significance of inshore habitats for macroinvertebrates in Lake Dianchi, and provided important implications for bioassessment and ecological rehabilitation in shallow lakes." (Authors) *Megalestes* sp., *Megapodagrionidae*] Address: Wang, Shuran Cindy, State Key Lab. of Freshwater Ecology & Biotechnology, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan, 430072, China. Email: shuran.w@gmail.com

**21111.** Zhang, H.-m.; Hämäläinen, M.; Wang, W.-z. (2018): *Indocypha cyanicauda* sp. nov. from southern Yunnan, China (Odonata: Chlorocyphidae). *International Journal of Odonatology* 21(1): 1-10. (in English) ["*Indocypha cyanicauda* Zhang & Hämäläinen, spec. nov. (holotype male from Xishuangbanna, Yunnan, China; deposited at the Kunming Natural History Museum of Zoology) is described and illustrated



from both sexes and compared with its congener *I. vittata*. Brief notes on the ecology and behaviour of the new species are provided." (Authors)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, Netherlands. E-mail: libellago@gmail.com

## 2019

**21112.** Patten, M.A.; Hjalmarson, E.A.; Smith-Patten, B.D.; Bried, J.T. (2019): Breeding thresholds in opportunistic Odonata records. *Ecological Indicators* 106, November 2019, 105460: 6 pp. (in English) ["Highlights: • Breeding status can be deduced from opportunistic data, including from citizen science efforts. • Predictors of breeding vary across taxonomic groups—one size does not fit all. • Female counts, as opposed to unsexed adults only, greatly reduces threshold estimates. • Recording behavior also tends to reduce thresholds. Abstract: Numerous interacting abiotic and biotic factors shape an organism's spatial distribution, and these factors vary spatially and temporally, such that habitat used for breeding may differ from habitat used at other times of the life cycle. We address this complex issue in the context of citizen science and opportunistic species occurrence records, a valuable data source for biogeography and conservation. We focus on the insect order Odonata, the dragonflies and damselflies, which as adults are popular in citizen science programs. Our goal was to devise a means to estimate with high confidence whether a site supports a breeding population if only opportunistic data are available. Our approach fitted logistic curves from occupancy models of observations of teneral (newly emerged adults that cannot yet disperse from a natal site) against counts of all adults, adult females only, and incidence of breeding behaviors (ovipositing, mate guarding, tandem pairs). Models included median body size and abundance class as covariates of detectability. We subjected logistic curves to a Bayesian two-segment piecewise regression to obtain best estimates of the threshold (with associated credible intervals as an estimate of uncertainty) to assess if a given predictor (e.g., adult count) or combination of predictors was associated with breeding occurrence. We found that no single threshold fit all odonates: thresholds of varying precision were identified for the suborders (dragonflies, damselflies) and for families and select genera in each suborder. Counts of females greatly reduced the required threshold, whereas breeding behavior data reduced the threshold in some cases. Our study shows it is possible to identify breeding occurrences in opportunistic adult Odonata records. It also highlights how citizen scientists should record not only a sound species list with rudimentary counts of adults but also note the sex and breeding behavior. The identification of breeding occurrences in extensive opportunistic data is pertinent to understanding species' distributions and habitat requirements along with their ecological sensitivity and value as bioindicators." (Authors)] Address: Smith-Patten, Brenda, Sam Noble Oklahoma Mus. Natural History, Univ. Oklahoma, Norman, Oklahoma 73072, USA. E-mail: argia@ou.edu

**21113.** Pranoto, M.D.P.; Mardiono, D.; Widiyani, T.; Pertiwi, R.A.P.; Az Zhara, F.; Izzati, N. (2019): Diversity of dragonflies (Ordo: Odonata) on the natural reserve areas of Mt. Sigogor and Mt. Pisis, Ponorogo District, Indonesia. *Bonorowo Wetlands* 9(1): 27-31. (in English) ["The Mount Sigogor and Pisis Natural Reserves are the conservation areas in Ponorogo, East Java. Mount Sigogor and Pisis nature reserves have an ecosystem of tropical rain forests that are naturally protected, providing the reserve with a high potential for biodiversity. The preserved ecosystem conditions

are a good habitat for the dragonfly since some dragonfly species require a clean habitat and are sensitive to pollutants. The study was conducted from January to February 2019. The research site was carried out at 7 points, covering 5 points in the reserve and 2 points around Mount Sigogor Nature Reserve. Data retrieval was done using the explorative method. Qualitative and quantitative descriptions were used to analyze the results of dragonflies' biodiversity. The results have found 18 species of dragonflies with details of 6 species as Zygoptera and 12 species of common Anisoptera. There are 5 species of endemic dragonflies from Java Island, i.e., *Drepanosticta sundana*, *Euphaea variegata*, *Heliogomphus drescheri*, *Heliocypha fenestrata*, and *Vestalis luctuosa*. From the Shannon-Wiener discounting index, the value of index diversity on the entire research site is 1.466. The highest diversity value lies in the river's location leading to Toyo Marto's waterfall with a 2.02 diversity-index value. Obtained results that the *Euphaea variegata* has the most abundant with a 40.23% value." (Authors)] Address: Dept of Biol., Fac. Mathematics & Natural Scien., Universitas Sebelas Maret. Ir. Sutami 36 A, Surakarta 57126, Central Java, Indonesia. Email: malindaduta98@gmail.com

**21114.** Sage, W.; Blaschke, R. (2019): Die Libellen (Odonata) im Inn-Salzach-Gebiet, Südostbayern. *Mitteilungen der zoologischen Gesellschaft Braunau* 13(1): 1-43. (in German) [59 localities were studied. The distribution of 54 species is mapped.] Address: Sage, W., Seibendorfer Str. 88a, 84375 Kirchdorf am Inn, Germany. E-mail: WSLep@gmx.de

**21115.** Staentzel, C.; Combroux, I.; Barillier, A.; Grac, C.; Chanez, E.; Beisel, J.-N. (2019): Effects of a river restoration project along the Old Rhine River (France-Germany): Response of macroinvertebrate communities. *Ecological Engineering* 127: 114-124. (in English) ["Highlights: • New mesohabitats were characterized by low flow velocity and fine substrates. • The gain observed on the whole study site favoured burrowing taxa. • Inter-annual analysis showed a decrease in invasive populations, across all sections. • The sustainability of ecological effects is highly dependent of groynes maintenance. The rise of restoration projects on large rivers is a response to the increasing human-induced pressures on these ecosystems. Despite this, there is a relative lack of data documenting restoration success using macroinvertebrate communities in such environments, with those existing frequently producing contrasting results. Here, we examined post-restoration responses of macroinvertebrates following a unique experimental restoration approach based on controlled bank erosion and artificial groyne implementation, initiated in 2013 on the Old Rhine River (France-Germany). We investigated how macroinvertebrate communities have responded to restoration-induced variations in three main abiotic parameters, i.e. water depth, flow velocity and substrate type, by comparing the restored section with unrestored ones. The Eco-hydro-morphological index (EHMID), a modified version of a hydro-morphological diversity index, showed a gain in mesohabitat heterogeneity along the whole site. Newly created mesohabitats with low flow velocity and finer substrate were dissimilar to those along the rest of the Old Rhine channel, favouring burrowing taxa such as Odonata. The presence of such insect larvae was related to the post-restoration emergence of typical alluvial terrestrial-aquatic border connectivity, and the rise in macrophytes over time. On the whole site, changes in composition or in functional profile diversity were highly related to the high degree of mesohabitat heterogeneity from the restored section, which would persist as long as groynes remain. The main inter-annual effect concerned the decrease in invasive

taxa abundance that also varied according to any changes in fluvial forms. Our findings confirmed that macroinvertebrate responses are highly influenced by hydrological events and are dependent on the study-scale monitoring, clearly putting forward fine-scale hydromorphological gradients. Biological results from this restoration project should approach those obtained in smaller rivers restored using deflectors, suggesting a potential application of the hydraulic law of similarities. However, the accuracy of biological prediction using said application is limited by the distance from source populations, biological invasions and internal river dynamics.... Among new taxa observed in the restored section, we observed *Calopteryx splendens*, *G. vulgatisimus*, *Onychogomphus* sp., *Platycnemis* sp., and *Pyrrhosoma nymphula*. However, only a weak correlation was observed between richness in Odonata ( $R^2=0.22$ ,  $p = 0.005$ ) and the first NMDS axis, though just a few individuals ( $n < 10$ ) were recorded during campaigns apart from 2017 where 73 individuals were found in the restored section compared to UP ( $n=30$ ) and DOWN ( $n=31$ ) sections." (Authors)] Address: Staentzel, Cybill, Univ. de Strasbourg, UMR 7362 CNRS LIVE, 3, rue de l'Argonne, 67000 Strasbourg, France. E-mail: cybill.staentzel@live-cnrs.unistra.fr

## 2020

**21116.** Cranston, J. (2020): Drivers, consequences and perceptions of newly arriving range-shifters in the United Kingdom. PhD thesis, Dept Biological Sciences: 216 pp. (in English) ["Species distributions are rapidly altering in the 21st century. Climate change and other anthropogenic effects threaten historic ranges but also open up new regions for expansion. Distributional changes will create novel biotic interactions that may significantly affect ecosystems, and humanity, both positively and negatively. Range-shifters create conservation conundrums, which may require us to balance the conservation value of newly arriving species against their impacts on existing biodiversity. To tackle these conundrums we will have to understand why and how species are moving, be able to make predictions of what potential effects may be felt in the new range and recognise how species are perceived when they arrive there. APPROACHES: I explore three aspects of species redistribution: processes, consequences, and perceptions. To better understand the redistribution process, I investigate the importance of climate, habitat, and proximity to source populations in predicting 14 range-shifting birds' distributions in Britain. I explore consequences by estimating effects of a range-shifting damselfly on UK Odonata with dynamic multispecies occupancy (DMSO) models. Finally, I explore perceptions by surveying UK wildlife recorders' attitudes towards range-shifting species and their management. RESULTS: I found that climate did not predict most analysed range-shifters' British distributions effectively. Despite being comparatively better, neither habitat nor distance from European breeding sites were good absolute predictors. Counter-intuitively, our DMSO model predicted that 15/17 resident dragonflies were more likely to persist at sites where the range-shifting damselfly established. Survey responses revealed that recorders opposed efforts to either control or support range-shifters, instead favouring non-intervention. IMPLICATIONS: The poor predictive power of climate suggests that we should explicitly study the full potential suite of range-shift processes, including biotic interactions and constraints on species movement. The absence of a negative association between the range-shifting damselfly and most Odonata species should be welcomed, but cautiously as other factors (e.g. habitat) may confound the range-shifters' effect.

Recorders' averseness to interventions suggests that ecological research focused on the feasibility of both assisted colonisation and range-shifter threat should also seek to understand social contexts for successful conservation. Integrating these findings, I argue that we should use rapidly growing ecological datasets to not just detect but to test and refine theories of range-shift. Future model refinement alongside fuller understanding of stakeholder perspectives will help enable equitable – and ecologically beneficial – range-shift management." (Author)] Address: Cranston, J., Centre for Ecology & Conservation, Univ. of Exeter, Penryn Campus, Penryn, UK. <https://ore.exeter.ac.uk/repository/bitstream/handle/10871/126808/CranstonJ.pdf?sequence=2&isAllowed=y>

**21117.** de Pennart, A.; Matthews, P.G.D. (2020): The bimodal gas exchange strategies of dragonfly nymphs across development. *Journal of Insect Physiology* 120, January 2020, 103982: (in English) ["Highlights: • Aeshnid and libellulid dragonfly nymphs can breathe both water and air as late final instars. • They develop functional mesothoracic spiracles preceding metamorphosis. • Gas exchange is partitioned between air and water simultaneously when the nymph is half submerged. • Aeshnid nymphs of all instars use their rectal gill to breathe air in response to aquatic hypoxia. Abstract: Dragonfly nymphs are aquatic and breathe water using a rectal gill. However, it has long been known that the nymphs of many species appear to possess the ability to breathe air, either during their final instar when they leave the water prior to metamorphosis, or during periods of aquatic hypoxia. The aerial gas exchange associated with these activities has not been quantified. This study used flow-through respirometry to measure the rate of aerial CO<sub>2</sub> release (VCO<sub>2</sub>) of dragonfly nymphs as a proxy for their aerial gas exchange, both across development and in response to progressive aquatic hypoxia. It examined a total of four species from two families (Libellulidae, Aeshnidae). In both families, the late-final instar nymphs developed functional mesothoracic spiracles, allowing them to breathe air by positioning their head and thorax above the water's surface. While breathing air in this position, the nymphs could also ventilate their submerged rectal gill. Thus, during bimodal gas exchange in normoxic water, it was calculated that aeshnid nymphs expelled 39 % of their respiratory CO<sub>2</sub> into the air through their spiracles, while libellulid nymphs expelled 56 % into the air. Decreasing the aquatic PO<sub>2</sub> to 2.5 kPa and then below 1 kPa increased the proportion of respiratory CO<sub>2</sub> expelled into the air from 69 % to ~100 %, respectively. Thus, bimodally breathing late-final nymphs can vary how they partition gas exchange between their spiracles and their gill depending on aquatic PO<sub>2</sub>. Aeshnid nymphs of all developmental stages were also found to use their rectal gill as an air-breathing organ; pre-final nymphs performing 'surface skimming' while late final nymphs aspirated air bubbles directly into their gill's branchial basket. Mass-specific rates of aerial V CO<sub>2</sub> also increased as the nymphs approached metamorphosis. These findings indicate that aeshnid nymphs are capable of accessing aerial O<sub>2</sub> across development using their rectal gill as an air breathing organ, while the aquatic nymphs of both aeshnid and libellulid dragonflies undergo a progressive shift towards using the atmosphere for respiration as they approach metamorphosis." (Authors)] Address: Matthews, P.G.D., Dept Zool., Univ. British Columbia, Vancouver, BC V6T 1Z4, Canada. Email: pmatthews@zoology.ubc.ca

**21118.** Góral, N. (2020): Odonata in an human-engineered world: Potential and threats. In: H.A. KRETEK (red). [Implementation of the idea of the European Green Deal on the

basis of the social market economy as a determinant of management in the implementation of the assumptions of sustainable development]. Państwowa Wyższa Szkoła Zawodowa w Raciborzu, Racibórz: 151-160. (in English, with Polish summary) ["The article summarizes the role and status of Odonata in the world of growing anthropopressure. Human activity contributes to degradation of habitats, posing a threat for some Odonata species. Some artificial elements in environment and anthropogenic water reservoirs might act like ecological traps. Natural water bodies often vanish or periodically dry out due to climate change. Many restoration methods are designed to bring back the environment to its natural state. On the other hands, artificial and astatic water bodies may create refuges for pioneer species occurring on highly-disturbed sites. Some forms of human activity (like traditional fish farming) may be good for maintenance of mosaic of diverse microhabitats supporting species with different ecological niches. New restoration methods should therefore rely on thorough examination of ecological requirements of a target species." (Authors)] Address: Góral, Nikola, Uniwersytet Marii Curie-Skłodowskiej w Lublinie, Poland. E-mail: goral.nikola@gmail.com

**21119.** Kuznetsova, V.G.; Golub, N.V. (2020): A checklist of chromosome numbers and a review of karyotype variation in Odonata of the world. *CompCytogen* 14(4): 501-540. (in English) ["The ancient insect order Odonata is divided into three suborders: Anisoptera and Zygoptera with approximately 3000 species worldwide each, and Anisozygoptera with only four extant species in the relict family Epiophlebiidae. An updated list of Odonata species studied regarding chromosome number, sex chromosome mechanism and the occurrence of m-chromosomes (= microchromosomes) is given. Karyotypes of 607 species (198 genera, 23 families), covering approximately 10% of described species, are reported: 423 species (125 genera, 8 families) of the Anisoptera, 184 species (72 genera, 14 families) of the Zygoptera, and one species of the Anisozygoptera. Among the Odonata, sex determination mechanisms in males can be of X(0), XY and X1X2Y types, and diploid chromosome numbers can vary from 6 to 41, with a clear mode at  $2n = 25(60\%)$  and two more local modes at  $2n = 27(21\%)$  and  $2n = 23(13\%)$ . The karyotype  $2n = 25(24A + X)$  is found in each of the three suborders and is the most typical (modal) in many families, including the best-covered Libellulidae, Corduliidae (Anisoptera), Lestidae, Calopterygidae, and Platycnemididae (Zygoptera). This chromosome set is considered ancestral for the Odonata in general. Chromosome rearrangements, among which fusions and fissions most likely predominated, led to independent origins of similar karyotypes within different phylogenetic lineages of the order. The karyotype  $2n = 27(26A + X)$  prevails in Aeshnidae and Coenagrionidae, whereas the karyotype  $2n = 23(22A + X)$  is modal in Gomphidae and Chlorocyphidae, in both pairs of families ..."] (Authors)] Address: Kuznetsova, Valentina, Dept of Karyosystematics, Zool. Inst., Russian Acad. Sci., Universitetskaya emb. 1, St. Petersburg 199034, Russia. E-mail: valentina\_kuznetsova@yahoo.com

**21120.** Nel, A.; Poschmann, M.; Wedmann, S. (2020): New dragonflies and damselflies (Odonata) from the late Oligocene of Enspel (Rhineland-Palatinate, SW Germany). *Palaeontologia Electronica*, 23(3): a59. <https://doi.org/10.26879/1126>

**21121.** [palaeo-electronica.org/content/2020/3250-odonata-from-enspel](https://palaeo-electronica.org/content/2020/3250-odonata-from-enspel): 24 pp. (in English) ["We describe 10 fossils of dragonfly wings and one damselfly from bituminous pelites

of the late Oligocene crater lake of Enspel/Westerwald. These represent two species of Aeshnidae, one species of Gomphidae, one possible stem Libellulidae, and one species of stem Sieblosiidae. The presence of one further undetermined species of crown Libellulidae can be inferred from a well-preserved naiad. Together with an earlier described wing of Macromiidae and a naiad figured herein and possibly attributable to the family Lestidae, the Enspel biota at least comprised eight different morphotypes of Odonata. We propose three new species, *Epiaeschna wisseri* sp. nov. (Aeshnidae), *Ictinogomphus engelorum* sp. nov. (Gomphidae), and *Oligolestes stoeffelensis* sp. nov. (Sieblosiidae), based on wing venation. The lateral position of the body and the rotated head of the holotype of *Oligolestes stoeffelensis* sp. nov. confirm that the Sieblosiidae had zygopteran hammer-shaped heads. This quite diverse odonate fauna is typical of Oligocene European paleolakes and suggests a water oxygenation suitable for the development of the aquatic naiads that lasted for longer periods and niche partitioning among the adult animals in a well-structured palaeo-ecosystem." (Authors)] Address: Wedmann, Sonja, Forschungsstation Grube Messel, Forschungsinstitut Senckenberg, Markstr. 35, 64409 Messel, Germany. E-mail: Sonja.Wedmann@senckenberg.de

**21122.** O'Malley, Z.G.; Compson, Z.G.; Orlofske, J.M.; Baird, D.J.; Curry, R.A.; Monk, W.A. (2020): Riparian and in-channel habitat properties linked to dragonfly emergence. *Scientific Reports* 10:17665: 12 pp. (in English) ["In freshwater ecosystems, habitat alteration contributes directly to biodiversity loss. Dragonflies are sentinel species that are key invertebrate predators in both aquatic (as larvae) and terrestrial ecosystems (as adults). Understanding the habitat factors affecting dragonfly emergence can inform management practices to conserve habitats supporting these species and the functions they perform. Transitioning from larvae to adults, dragonflies leave behind larval exoskeletons (exuviae), which reveal information about the emergent population without the need for sacrificing living organisms. Capitalizing on Atlantic Canada's largest freshwater wetland, the Grand Lake Meadows (GLM) and the associated Saint John/Wolastoq River (SJWR), we studied the spatial (i.e., across the mainstem, tributary, and wetland sites) and temporal (across 3 years) variation in assemblages of emergent dragonflies (Anisoptera) and assessed the relative contribution of aquatic and terrestrial factors structuring these assemblages. The GLM complex, including the lotic SJWR and its tributaries and associated lentic wetlands, provided a range of riparian and aquatic habitat variability ideal for studying dragonfly emergence patterns across a relatively homogenous climatic region. Emergent dragonfly responses were associated with spatial, but not temporal, variation. Additionally, dragonfly communities were associated with both aquatic and terrestrial factors, while diversity was primarily associated with terrestrial factors. Specific terrestrial factors associated with the emergence of the dragonfly community included canopy cover and slope, while aquatic factors included water temperature, dissolved oxygen, and baseflow. Our results indicate that management of river habitats for dragonfly conservation should incorporate riparian habitat protection while maintaining aquatic habitat and habitat quality." (Authors)] Address: O'Malley, Z.G., Dept of Biology, Canadian Rivers Institute, University of New Brunswick, 10 Bailey Dr., P.O. Box 4400, Fredericton, NB E3B 5A3, Canada. Email: zacchaeus.greg.compson@gmail.com

**21123.** Rebecca, G.W. (2020): Merlin breeding season diet on Deeside, North-east Scotland, in relation to area and land-use change. *Scottish Birds* 40(3): 195-205. (in English)

["As part of a study of Merlin breeding ecology in North-east Scotland, diet was assessed from prey remains found at occupied breeding areas during 1980–2003. Small birds weighing 20–80 grams predominated, with five species - Meadow Pipit, Wheatear, Starling, Chaffinch and Skylark - making up around 80% of numbers and biomass (collective weight) from 10,657 bird items. A further nine bird species each accounted for at least 1% of numbers or biomass. In total, 59 bird species were recorded as prey, ... In addition, 547 moths and 21 other items were found, but these were unimportant in biomass terms. ... A total of 11,225 prey items was recorded during 1980–2003 (Table 2). This comprised 10,657 birds of 59 species, 547 moths, almost all from two species, and 21 other items covering small mammals, butterflies, dragonflies, ground beetles and a frog." (Author)] Address: Rebecca, G.W., RSPB, 10 Albyn Terrace, Aberdeen AB10 1YP, UK. Email: graham.rebecca@rspb.org.uk

**21124.** Saxton, N.A.; Powell, G.S.; Bybee, S.M. (2020): Prevalence of leg regeneration in damselflies reevaluated: A case study in Coenagrionidae. *Arthropod Structure & Development* Volume 59, November 2020, 100995: 6 pp. (in English) ["Highlights: • Odonates exhibit effective leg regeneration abilities that result in a fully functional limb. Prevalence of leg regeneration in Vanuatu basis reported as much higher than previously understood. Sex and species do not explain the extent of regeneration suggesting environmental factors may play a larger role. Abstract: The leg regeneration capabilities of damselflies are understudied. Here we present the first data of regenerated limbs across a genus of damselfly based on adult specimens collected in the field to illustrate the prevalence of limb loss among nymphs. We show that this phenomenon is much more prevalent than previously thought, as 42% of individuals were found with regenerated limbs. Furthermore, we test for patterns within these data to begin to unravel the potential causes of limb loss in nymphal damselflies, showing that intrinsic factors such as sex and species cannot explain the patterns of limb loss pointing to environmental factors as the probable cause. We argue that Odonata limb regeneration provides a potentially unique perspective into the nymphal stage of these organisms." (Authors)] Address: Saxton, N.A., Dept Biology, Brigham Young University, 4102 LSB, Provo, UT 84602, USA. Email: nsaxton55@gmail.com

**21125.** Souza, Y. C. Mossioli de (2020): Influência do predador sobre o uso do espaço e a atividade por girinos bentônicos e nectônicos - Predator influence over space use and activity by benthic and nektonic tadpoles. MSc. thesis, Universidade Estadual Paulista (UNESP): 66 pp. (in Portuguese, with English summary) ["Interactions between species influence community structure, population dynamics, morphology, physiology and species' behavior. Mortality is a direct effect caused by the interaction with a predator, but even the simple presence of predators can lead to other indirect effects such as alterations on prey's behavior. In aquatic environments, prey may detect predation risk by visual, mechanical, and chemical cues. When detecting a predator, the prey can use strategies to escape predation such as shoal formation, changes on habitat use pattern, and reduction on swimming activity. Despite decreasing predation rates, the antipredatory strategies have costs for the prey and set up a trade-off. For example, the same behavior that raises the prey's chance to escape from a predator, decreases its foraging activity, leading thus to a reduction in the prey's growth and survivorship. Among tadpoles, morphological and physiological aspects are important to determine water column occupation. But could predation also be

an important pressure that determines the way tadpoles occupy the water column? Understanding how predation influences tadpoles' behavior may elucidate populational dynamics and community structuring aspects, as well as the mechanisms that regulate anuran evolutionary patterns. In this sense, this dissertation presents a study, in a manuscript form, that tested experimentally the influence of an aquatic predator (Odonata water nymph; *Micrathyrta* sp.) on the use of space, activity and foraging behavior of benthic (*Physalaemus nattereri*) and nektonic (*Scinax fuscovarius*) tadpoles." (Author)] Address: not stated

**21126.** Tysoe, M.; Rebassa, M. (2020): Observacions d'odonates a les Illes Balears 2019. *Es Busqueret* 50: 48-60. (in Catalan) ["It is clear that the observation of odonates is becoming popular. Although until recently it was considered an exclusive activity of great specialists in this group of insects, in recent years both the observation of their behavior and their photography have been spreading among an ever-increasing number of fans. For this first issue, we have had the collaboration of 37 people, who have provided photographs or observations made in the different places of our Islands, and it is to be expected that this number will grow very noticeably in the coming years. Especially from islands where no (or very little) data was received in 2019, such as Ibiza or Formentera. This first issue, therefore, has possibly still partial information, both in the territorial and specific areas, but it is no less interesting for that. Of the 24 species that can be observed at some point in the year on one of our Islands, data has been received on 20. All we have to do is thank you for all the collaborations received!" (Authors /Google translate)] Address: Rebassa, M., Societat d'Història Natural de les Balears, carrer Margalida Xirgu, 16, baixos, 07011, Palma, Spain. Email: escarabatdaurat@gmail.com

**21127.** Wilk, T. (2020): New records of Subarctic Darner *Aeshna subarctica* Walker, 1908 and Pygmy Damselfly *Nehalennia speciosa* (Charpentier, 1840) (Odonata) in southern Poland. *Przeegląd Przyrodniczy* XXXI, 3 (2020): 91-97. (in Polish, with English summary) ["... During the investigations carried out in 2020 in western part of Sandomierz Forest new localities of those species were found – in Konskie Błota reserve and peatland excavations near Niwiska. These are just fourth known population of Subarctic Darner and ninth and tenth population of Pygmy Damselfly in Podkarpackie Province. Central part of Sandomierz Basin is very poorly investigated in terms of dragonfly diversity. The findings of this study prove that this region is inhabited by rare and threatened dragonflies species and complex odonatological survey should be carried out here, especially in peatland habitats." (Author)] Address: Wilk, T., Ogólnopolskie Towarzystwo Ochrony Ptaków, ul. Odrowąża 24, 05-270 Marki, Poland. E-mail: tomaszwilk3@gmail.com

## 2021

**21128.** Arimoro, F.O.; Abubakar, M.D.; Obi-Iyeye, G.E.; Keke, U.N. (2021): Achieving sustainable river water quality for rural dwellers by prioritizing the conservation of macroinvertebrates biodiversity in two Afrotropical streams. *Environmental and Sustainability Indicators* 28: 53444-53457. (in English) ["Motivated by the UN Global Sustainable Development Goals on achieving sustainable freshwater ecosystem, this study was undertaken to examine two important water bodies in north central Nigeria (Baka Jeba and Penyan Rivers) protected locally by the rural community and serving as sources of water supply, for biodiversity



conservation and protection. The status of macroinvertebrate biodiversity as important variable in assessing the environmental health and suitability of the water quality of the rivers was evaluated for a period of 8 months, between February and September, 2017 using standard methods. The mean values of Physicochemical variables recorded during the study period revealed that the nutrient loads (nitrites and phosphates levels) was relatively low for both streams as well as conductivity levels ( $<82\mu\text{S}/\text{cm}$ ). Dissolved oxygen values indicated that the water bodies were well aerated with values ranging between 5.21 and 7.83mg/l in both the dry and wet seasons. A total of 65 invertebrate taxa from 34 families in 10 orders were recorded during the study, dominated by aquatic insects with a few representation of decapods and gastropods, and Arachnids were sporadically present. The overall abundance of macroinvertebrates was not significantly different ( $p > 0.05$ ) among the sampling stations with number of individuals caught ranging between 1208 and 1728 per station. Of the major faunal groups, Ephemeroptera contributed the highest percentage of individuals ( $>29\%$ ) in both streams. Generally, Beka Jeba Stream contained more diverse taxa of macroinvertebrates compared to Penyan Stream. The Ephemeroptera-Trichoptera-Odonata (ETO) were the dominant groups collected in the river systems indicating fairly good water quality conditions. The Chironomids and other tolerant macroinvertebrate larvae were only sporadically present. Overall, the values of the physical and chemical parameters (low BOD, low nutrient levels and high dissolved oxygen) obtained for the two rivers and the wide diversity of sensitive macroinvertebrates portends the water body to be of good quality. Therefore utmost care should be taken to conserve and preserve these species as indicators of water quality by reducing the impact of key drivers of declines in macroinvertebrate biodiversity, including habitat degradation and pollution." (Authors) Taxa are treated at genus levels, and for Odonata some taxa are questionable (eg. *Cordulia* sp., *Calopteryx* sp.).] Address: Arimoro, F.O., Applied Hydrobiology Unit, Dept Animal Biol., Federal Univ. Tech., P.M.B, Minna 65, Nigeria. Email: francisarimoro@gmail.com

**21129.** Bertoli, M.; Piazza, G.; Pastorino, P.; Prearo, M.; Cozzoli, F.; Vignes, F.; Basset, A.; Pizzul, E. (2021): Macroinvertebrate energy densities and ecological status in freshwater watercourses (Friuli Venezia-Giulia, Northeast Italy). *Aquatic Ecology* 55: 501-518. (in English) ["The present study provides energy density (ED) data and models for four macroinvertebrate genera inhabiting freshwater lotic environments (*Baetis*, *Hydropsyche*, *Rhyacophila*, and *Onychogomphus*). Samples were collected in the hydrological freshwater network of the Region Friuli Venezia Giulia within different watercourse types (creeks, streams, rivers channels, and ditches), and energy density was directly measured using an adiabatic bomb calorimeter. Measured ED expressed in  $\text{Joule g}^{-1}$  wet weight was strongly and positively correlated with percentage of dry weight (DW%) for all genera investigated ( $r^2 > 0.9504$ ), allowing to obtain genus-specific predictive models based on the relationship between ED and DW%. Models were validated and showed good predictive power, as 90th percentile of observed percentage errors ranged between 4.23% and 5.18% while medians ranged between 1.32% and 2.83%. ANCOVA disclosed significant differences between the models, as those for *Rhyacophila* and *Onychogomphus* differed significantly from the others. The empirical models were used to build a dataset of estimated energy density, to assess the relationship between energy density and ecological status of the monitored riverine systems, assessed in

compliance with European and Italian law by the application of four different ecological indices (ICMi, RQE, IBMR, STAR, ICMi, and LIMeco). Information regarding ED levels for freshwater macrobenthic invertebrates is still neglected in biomonitoring programs, but it could be useful to interpret some ecological situations in the context of ecological status assessment, especially in relation to the trophic condition of the investigated riverine systems." (Authors)] Address: Pastorino, P., The Veterinary Medical Research Institute for Piemonte, Liguria and Valle d'Aosta, via Bologna 148, 10154 Torino, Italy. Email: paolo.pastorino@izsto.it

**21130.** Borges, L.R.; Barbosa, M.S.; Alves Carneiro, M.A.; Santos, J.C. (2021): Habitat integrity drives Odonata diversity in Eucalyptus-dominate. *Environmental Monitoring and Assessment* volume 193, Article number: 12 (2021): 14 pp. (in English) ["Silviculture can be considered a sustainable alternative to the extraction of wood from natural forests in Brazil. However, the high demand for wood products has decreased the area of natural Cerrado due to land transformation for forestry activities. This transformation could lead to the loss of species, including insects that cannot tolerate the new environment dominated by exotic plant species. This study aims to evaluate whether the presence of an extensive Eucalyptus silviculture in the Brazilian Cerrado decreases the integrity of nearby riparian environments and, consequently, decreases odonate diversity. Thirteen ponds were selected in patches of Cerrado embedded within a matrix of Eucalyptus silviculture in order to assess habitat integrity of ponds and their riparian zones and collect adult odonates. The physical integrity of the study sites was measured using a Habitat Integrity Index (HII) designed to determine the degree of conservation of aquatic environments. The HII of the study sites varied between 0.44 and 0.80, indicating differences in the degree of conservation. Therefore, a positive relationship was found between odonate richness and abundance and HII, and between the abundance of zygopterans and anisopterans and HII. These findings may be due to the fact that these insects are adapted to the natural resources maintained at the most conserved habitats, and which were lost in degraded riparian zones, such as the presence of aquatic vegetation and a diversity of organic debris on pond banks. We conclude that the conversion of natural areas to Eucalyptus silviculture can alter the integrity of nearby riparian zones and, consequently, odonate diversity. ... The collected odonates represented six families, 21 genera and 36 species. Some species with restricted distributions were found at study sites with higher HII values (S3, S5, S8, and S9), such as *Erythrodiplax ana*, *Acanthagrion gracile*, *Cyanallagma nigrinuchale*, *Oxyagrion santosi*, *Oxyagrion terminale*, and *Tigriagrion* sp. nov (Table 2). Others only appeared at areas with lower HII values (S4, S11, and S13), as *Ischnura fluviatilis*, *Homeoura chelifera*, and *Mnesarete pudica* showing that habitats with different degrees of conservation can present different species composition." (Authors)] Address: Santos, J.C., Depto de Ecologia, Universidade Federal de Sergipe, Campus São Cristóvão, Av. Marechal Rondon, s/n, Bairro Jardim Rosa Elze, São Cristóvão, Sergipe 49100-000, Brazil. E-mail: jcsantosbio@gmail.com

**21131.** Bos, G. (2021): Een boekje open over libellen herkennen. *Vlinders* 1/2021: 8-9. (in Dutch) [Brief introduction in anatomy of a dragonfly.] Address: not stated

**21132.** Chauhan, P.; Swaegers, J.; Sanchez-Guillen, R.A.; Svensson, E.I.; Wellenreuther, M.; Hansson, B. (2021): Genome

assembly, sex-biased gene expression and dosage compensation in the damselfly *Ischnura elegans*. *Genomics* 113(4): 1828-1837. (in English) ["The evolution of sex chromosomes, and patterns of sex-biased gene expression and dosage compensation, are poorly known among early winged insects such as odonates. We assembled and annotated the genome of *Ischnura elegans* (blue-tailed damselfly), which, like other odonates, has a male-hemigametic sex-determining system (X0 males, XX females). By identifying X-linked genes in *I. elegans* and their orthologs in other insect genomes, we found homologies between the X chromosome in odonates and chromosomes of other orders, including the X chromosome in Coleoptera. Next, we showed balanced expression of X-linked genes between sexes in adult *I. elegans*, i.e. evidence of dosage compensation. Finally, among the genes in the sex-determining pathway only fruitless was found to be X-linked, while only doublesex showed sex-biased expression. This study reveals partly conserved sex chromosome synteny and independent evolution of dosage compensation among insect orders separated by several hundred million years of evolutionary history." (Authors)] Address: Chauhan, P., Dept of Biology, Lund University, Ecology Building, 223 62 Lund, Sweden. Email: pallavi.chauhan@biol.lu.se

**21133.** Danflous, S. (2021): Rapport d'étude Inventaire & Suivi des Odonates d'intérêt communautaire sur le Barrage du Pinet – résultats 2021. EDF, voie du TOEC BP 57611 - 31076 - Toulouse cedex 3, France: 57 pp. (in French) ["5. Conclusion: Estimated impact of work on odonates: A lowering of the water level by 3 metres is planned as part of the work scheduled for 2023 on the Pinet reservoir. The targeted period would be weeks 21 to 23, i.e. between 23 May and 12 June. In the continuity of the previous report (Danflous, 2020), the above discussion elements aimed to try to understand the link between the local stationary conditions, the hydroelectric dam and the state of the current populations of *Macromia splendens*. The elements discussed above seem important for the understanding of the expected impact of the planned emptying of the dam in 2023. *Macromia splendens*: The inventories carried out in 2020 and 2021 on the Pinet dam show that the emptying of the dam by 7m in 2019 did not have a significant impact on *M. splendens*, which is the main local issue still present. This lowering took place at the same time as the one planned for 2023. It therefore appears that the works planned for 2023 should not have a massive impact on the population of *M. splendens* at the dam. This seems consistent with the late cycle of emergence at the site. However, precautions are necessary in view of the strong responsibility of this population, whose numbers are very important at the Deptal level, if not more. Monitoring The monitoring of this species begun in 2020 should be continued in order to specify the population numbers, its local dynamics and phenology in particular. This monitoring should therefore be repeated in 2022 (before the works), as well as in 2023 (year of the works) and in 2024 (post works). In view of the phenology observed on the site, it seems important to carry out three passes in June, July and August. The June pass during the 2022 campaign will be important for estimating the proportion of the population potentially more directly impacted by the works. The issues mentioned above (p.49) will have to be taken into account during the monitoring in order to improve our local and global understanding of the biology of this protected dragonfly. Sensitivity zone A mapping of the sensitivity zones on the reservoir was envisaged before the works, in order to put in place targeted measures to mitigate the effects of the lowering of the levels. This mapping is superfluous following

the results of the 2021 inventory. The protected species *M. splendens* breeds throughout the reservoir area. Only global reduction measures can therefore be considered. Reduction of the impact of the works Concerning the emptying in 2023, we recommend the following measures: \* a slow lowering of the water level, as slow as possible. This will facilitate the displacement of *Macromia* larvae, which would then be in the water level when the lowering takes place. \* Regular passages along the banks between the lowering phases to carry out "safeguard fishing" seems to be the most effective way of reducing possible larval mortality induced by the emptying. This action would consist of releasing directly into the water on the spot the dragonfly larvae, in particular *Macromia*, which would have been surprised by the lowering of the water and would have remained dry on the banks/partitions. This intervention would be superfluous if the larvae were observed descending to take refuge in the water or rising to emerge. Given the vast area to be covered for this action, it is recommended that priority be given to the known areas of highest density, i.e. Bouchouns, Grès and Nauq, as well as the left bank. We now consider that *Oxygastra curtisii* and *Gomphus graslinii* have disappeared from the same site, probably due to the cumulative effect of hydroelectric activity on the Tam valley. This does not appear to be reversible in the present state of knowledge." (Author/DeepL) [https://www.occitanie.developpement-durable.gouv.fr/IMG/pdf/annexe3\\_rapport\\_cen\\_odonates\\_pinet\\_2021.-pdf](https://www.occitanie.developpement-durable.gouv.fr/IMG/pdf/annexe3_rapport_cen_odonates_pinet_2021.-pdf)] Address: Danflous, S., Office pour les insectes et leur environnement-Midi-Pyrénées, France. Email: opiemp.insecte@gmail.com

**21134.** Ebert, G.; Trusch, R. (2021): Harald Heidemann † 1. September 1935 bis 8. Oktober 2021. *Carolinea* 79: 163-170. (in German) [Obituary for a well-known German odonatologist.] Address: Ebert, G., Hohe Eich 2, D-76297 Stutensee, Germany. E-Mail: guenter-stutensee@web.de

**21135.** Gao, Y.; Shi, S. (2021): Resource value of Odonata insects. *Biotic Resources* 43(3): 276-283. (in Chinese, with English summary) ["The resource value of Odonata was summarized and discussed from four levels of intrinsic value, ecological value, economic value and social value. Odonata insects are ancient and successfully evolved insects with rich genetic resources and indispensable consumers in the ecosystem. They are good indicators of ecological environment and suitable for water and land environmental assessment. As high-quality raw materials of edible insects, raw materials of traditional Chinese medicine, biological control resources of natural enemies and bionic objects of science and technology in the future, Odonata insects can create better economic value for human beings. Odonata insects are also closely related to the spiritual and cultural world of human beings, and gradually form a unique phenomenon of insect culture, which has realistic and potential resource value." (Authors)] Address: Gao, Y., Coll. of Plant Protection, Jilin Agricultural Univ., Changchun 130118, Jilin, China

**21136.** Garcia Junior, M.D.N.; Damasceno, M.; Souto, R.N.P. (2021): Levantamento de libélulas (Insecta: Odonata) associadas a tanques de Piscicultura no Amapá, Brasil - Survey dragonfly (Insecta: Odonata) associated with ponds in pisciculture in Amapá, Brazil. *Nature and Conservation* 14(3): 66-71. (in Portuguese, with English summary) ["The order Odonata comprises the insects commonly called dragonfly, which can be found all over the world. In Brazil, the odonatafauna has just over 900 species, dragonflies occupy a wide range of water bodies eg fish ponds, where they are often seen as causing harm to producers. Thereby,

the present study aimed to carry out a survey of odonatas associated with fish farming ponds located in the municipality of Macapá, Amapá. A total of 195 individuals were collected, representing 17 species inserted in two families. Libellulidae had the highest diversity with 16 identified species, *Erythemis peruviana* was the species with the highest frequency and abundance during the study. The diversity of Odonata found associated with fish ponds deserves more attention, especially in the state of Amapá, and the establishment of new collection points should further expand the list of species associated with these water bodies in the state." (Authors)] Address: Garcia Junior, M.D.N., Univde Federal do Amapá, Programa de Pós-Graduação em Biodiversidade Tropical, Macapá, AP, Brasil. E-mail: m.d.juniorbio@gmail.com

**21137.** Grunsven, R. van (2021): Het vangmasker: de kapuit van de libellenlarf. *Vlinders* 2/2021: 10-11. (in Dutch) [labium of dragonfly larvae; "Dragonflies are fascinating and often beautifully coloured animals; the larvae are less colourful, but no less interesting. Dragonfly larvae can do some very special things. They have jet propulsion, but also a unique fold-out catching mask. We have only recently begun to understand how that catch mask actually works." (Author/DeepL)] Address: De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands

**21138.** Khelifa, R. (2021): When sex becomes a wrestling game in a dragonfly: female refusal behavior to male harassers. *Ecology* 102(10), e03435 & *Bull. Ecol. Soc. Am.* 102(4): e01916. <https://doi.org/10.1002/bes2.1916>: 4 pp. (in English) ["In dragonflies, males typically harass females and force copulation, particularly when the female is not guarded by a male. In these species, females usually develop refusal displays and tactics to reduce the impact of coercion on their fitness. Here, we show in *Rhionaeschna multicolor*, that females use a series of behavioral displays, which include highjacking the pair on the water surface to break the copulatory wheel and stop male harassment. This highlights the role of the arms race between male–male competition for access to females and coercion avoidance by females to reduce fitness costs." (Author)] Address: Khelifa, R., Biodiversity Res. Center, Univ. British Columbia, 2212 Main Mall, Vancouver, B.C. V6T1Z4, Canada. Email: rassimkhefifa@gmail.com

**21139.** Kohli, M.; Letsch, H.; Greve, C.; Béthoux, O.; Derognaucourt, I.; Liu, S.; Zhou, X.; Donath, A.; Mayer, C.; Podsiadlowski, L.; Gunkel, S.; Machida, R.; Niehuis, O.; Rust, J.; Wappler, T.; Yu, X.; Misof, B.; Ware, J. (2021): Evolutionary history and divergence times of Odonata (dragonflies and damselflies) revealed through transcriptomics. *iScience* 24(11), 103324: 34 pp. (in English) ["Highlights: • Evolutionary relationships of Odonata are unraveled using transcriptomes. Earliest flying insects – dragonflies, damselflies, and their extinct ancient relatives – date back to Permian period. Both extant Odonata started diverging in the Triassic period. Summary: Odonata are among the earliest flying insects with extant representatives. However, unravelling details of their long evolutionary history, such as egg laying (oviposition) strategies, is impeded by unresolved phylogenetic relationships particularly in damselflies. Here we present a transcriptome-based phylogenetic reconstruction of Odonata, analyzing 2,980 protein-coding genes in 105 species representing nearly all the order's families. All damselfly and most dragonfly families are recovered as monophyletic. Our data suggest a sister relationship between dragonfly families of Gomphidae and Petaluridae. According to our divergence times estimates, both crown-Zygoptera and –Anisoptera arose during the late Triassic. Egg laying with a reduced

ovipositor apparently evolved in dragonflies during the late Jurassic/early Cretaceous. Lastly, we also test the impact of fossil choice and placement particularly of the extinct fossil species, †Triasolestodes asiaticus, and †Proterogomphus reneateae on divergence time estimates. We find placement of †Proterogomphus reneateae to be much more impactful than †Triasolestodes asiaticus." (Authors)] Address: Kohli, M., Dept Invertebrate Zool., American Mus. Natural History, New York, New York, USA. Email: mkohli@amnh.org

**21140.** Kranželic, D.; Schmidt, B. (2021): Pracenje stanja velikog vodenjaka, *Triturus carnifex* (Laurenti, 1768) na području Ekološke mreže Natura 2000 - Krbavsko polje (HR-2000632) [Monitoring the condition of *Triturus carnifex* (Laurenti, 1768) in the area of the Natura 2000 ecological network - Krbavsko polje (HR2000632)]. Krbavsko polje (HR-2000632). Završni izvještaj. Udruga Hyla. Zagreb, str. 26: 30 pp. ["In May 2021, the employees of the Hyla Association made two field trips to conduct monitoring and additional mapping of the Italian crested newts, *Triturus carnifex* (Laurenti, 1768), in the area of Krbavsko polje. Monitoring of the population was carried out at two locations: Laudonov gaj near the settlement of Bunic and Zvijezda spring in Podlapacko polje. At the Laudonov gaj locality, 29 newt adults were recorded, and 27 at Podlapacko polje. During mapping, newts were also recorded at an additional location in the area of Krbavsko polje, in the vicinity of the Bunic settlement. Ortmann traps have proven to be appropriate method for recording the presence of large newts and their further use in monitoring is recommended. A total of seven species of amphibians and three species of reptiles were recorded during the study, as well as two species of insects that are listed on Annex II of the Habitats Directive, the Marsh Fritillary *Euphydryas aurinia* (Rottemburg, 1775) and *Coenagrion ornatum* (Selys, 1850)." (Authors) [https://zop-lsz.hr/izv/Pra%C4%87enje%20stanja%20velikog%20vodenjaka%202021\\_Krbavsko%20polje.pdf](https://zop-lsz.hr/izv/Pra%C4%87enje%20stanja%20velikog%20vodenjaka%202021_Krbavsko%20polje.pdf)] Address: Schmidt, B., Udruga Hyla, Association Hyla, OIB:97526280302, Lipovac I br. 7, 10 000 Zagreb, Croatia. Email: bruno.schmidt@hhdhyla.hr

**21141.** Kundanati, L.; Das, P.; Pugno, N.M. (2021): Prey capturing dynamics and nanomechanically graded cutting apparatus of dragonfly nymph. *Materials* 14(3), 559; <https://doi.org/10.3390/ma14030559>: 13 pp. (in English) ["Aquatic predatory insects, like the nymphs of a dragonfly, use rapid movements to catch their prey and it presents challenges in terms of movements due to drag forces. Dragonfly nymphs are known to be voracious predators with structures and movements that are yet to be fully understood. Thus, we examine two main mouthparts of *Pantala flavescens* that are used in prey capturing and cutting the prey. To observe and analyze the preying mechanism under water, we used high-speed photography and, electron microscopy. The morphological details suggest that the prey-capturing labium is a complex grasping mechanism with additional sensory organs that serve some functionality. The time taken for the protraction and retraction of labium during prey capture was estimated to be  $187 \pm 54$  ms, suggesting that these nymphs have a rapid prey mechanism. The Young's modulus and hardness of the mandibles were estimated to be  $9.1 \pm 1.9$  GPa and  $0.85 \pm 0.13$  GPa, respectively. Such mechanical properties of the mandibles make them hard tools that can cut into the exoskeleton of the prey and also resistant to wear. Thus, studying such mechanisms with their sensory capabilities provides a unique opportunity to design and develop bio-inspired underwater deployable mechanisms." (Authors)] Address: Pungo, Nicola, Lab. of Bio-Inspired, Bionic, Nano, Meta Materials and Mechanics, Dept Civil, Environmental &

Mechanical Engineering, Univ. Trento, Via Mesiano 77, 38123 Trento, Italy. E-mail: nicola.pugno@unitn.it

**21142.** Li, B.; Su, Q.; Yu, L.; Liu, W.; Dong, S.; Ding, S.; Zhang, M.; Du, G.; Xu, B. (2021): Biomimetic PVDF/LLTO composite polymer electrolyte enables excellent interface contact and enhanced ionic conductivity. *Applied Surface Science* 541 1 March 2021, 148434: (in English) ["Highlights: • The bio-inspired PVDF/LLTO-CPEs are fabricated through simple evaporation strategy. • The special design creates cellular structures on the surface of PVDF/LLTO-CPE. • The ultrathin PVDF/LLTO-CPE shows a high mechanical strength of 10 Mpa. • The full battery delivers an excellent performance under folding and bending states. Abstract: Composite polymer electrolyte (CPE) with enhanced ionic conductivity, excellent flexibility and strong strength are urgently required for all-solid-state lithium metal batteries (LMBs). Inspired by the dragonfly wings that are super-lightweight and ultrathin but have excellent stability when subject to bending and twisting during flapping, we have constructed Li<sub>0.35</sub>La<sub>0.55</sub>TiO<sub>3</sub> (LLTO) nanowires-filled polyvinylidene fluoride (PVDF). In our design, the PVDF is used to construct the ultrathin membrane, the 1D LLTO nanowires are acted as the veins to give rise to a high mechanical strength of 10 Mpa. The special design creates cellular surface of PVDF/LLTO-CPE, which guarantees the excellent flexibility as well as a good interface contact between CPE and Li anode. When evaluated as electrolyte for LiFePO<sub>4</sub> | Li battery, the PVDF/LLTO-CPEs can suppress Li dendrites growth, and thus presents an excellent cycling stability of 140 mAh g<sup>-1</sup> after 200 cycles. Moreover, the flexible LiFePO<sub>4</sub> | PVDF/LLTO-CPE | Li<sub>4</sub>Ti<sub>5</sub>O<sub>12</sub> pouch cell delivers a satisfactory rate performance and cycle stability under folding and bending states. The excellent performances are attributed to the unique cellular structure and super mechanical strength of biomimetic PVDF/LLTO-CPE. All results show the PVDF/LLTO-CPE is a promising solid-state electrolyte for flexible electronic devices." (Authors)] Address: Li, B., School of Materials Science & Engineering, Shaanxi Univ. Sci. & Tech., Xi'an, Shaanxi 710021, China

**21143.** Mafuwe, K.; Broadley, S.; Moyo, S. (2021): Use of maximum entropy (Maxent) niche modelling to predict the occurrence of threatened freshwater species in a biodiversity hotspot of Zimbabwe. *African Journal of Ecology* 60(3): 557-565. (in English) ["Globally, freshwater species are under threat from human mediated stressors. Therefore, there is an urgent need for methods to estimate population and species occurrences for conservation purposes. Here, we used a predictive species distribution model to determine the occurrence of three endangered species (*Amietia inyangae*, *Chlorolestes elegans* and *Strongylopus rhodesianus*) in Southern Africa (Eastern Highlands of Zimbabwe). The study revealed that the probability of occurrences for the three species increase with an increase in elevation and annual precipitation and decrease with an increase in annual mean temperature. Our results indicated that the highest probability of occurrences for *A. inyangae*, *C. elegans* and *S. rhodesianus* is in the Nyanga, Stapleford and Chimanimani highland areas, with some probabilities of occurrence falling outside protected areas. Our findings suggest that the areas covered by protected areas may need to be reevaluated. Our findings will be useful for managing threatened species." (Authors)] Address: Mafuwe, K., Dept Biological Sciences, University of Zimbabwe, Mt Pleasant, Harare, Zimbabwe. Email: kudzimafuwe@gmail.com

**21144.** Marinissen, J.; de Vries, H. (2021): Het gedrag van

de groene glazenmaker. *Vlinders* 1/2021: 19-21. (in Dutch) [ groene glazenmaker = *Aeshna viridis*. "Overall results Much of the behaviour observed appeared to be linked to a landscape element. Different elements were distinguished: short-cut grassland ('Mono grass'), strip with grasses and rushes ('Multi Grass'), water, reed, crabgrass, forest, bushes and maize. The frequency with which behaviour occurred at different landscape elements varied. The following were evident at all four sites: - Most observations of green glassmakers were made around ditches with crabweed, i.e. close to the breeding site (e.g. Figures 1 and 3). - The high vegetation edges and reeds along the canals were mainly used for resting (shown in figures 2 and 4 in the 'Multi Grass' category). - Hunting was mainly over the cut grasses, by both males and females. - Males seemed to have a preference for hunting outside their demarcated territory and then picking up their patrol above the crabgrass again. - Males mainly showed territorial behaviour above water and crab beds, where females could also be expected. - Females were depositing eggs on crab beds for most of the observation time. For site management, the following points seem important. Firstly, the conservation of the crab shear fields is important, given the plant's crucial role in the reproduction of this dragonfly species. Second, the high vegetation and reed edges along the ditches are frequently used by the dragonflies for resting and, in Akmarijp, even for mating. Further research could be done to verify whether the presence of this landscape element positively affects survival and reproduction rates. Thus, if this is the case, the species would benefit if the tall vegetation is not mowed or only after the flight period. Besides results focusing on landscape use, another observation was made that could help optimise site management. Namely, in the Woldlake forest, swans at the time of the study unexpectedly had a major impact on the crab shrub fields by grazing away much of the plant. This thus had a direct effect on the dragonfly's habitat. Measures could be devised for this too. Sufficient reason therefore for a follow-up survey in the coming green glazier flying season." (Authors/DeepL)] Address: not stated

**21145.** Meng, Y.; Wu, H.-t.; Guan, Q.; Lu, K.-I. (2021): The ecological response of Odonata larvae to hydrologic connection blocking in riverside wetlands of the Wusuli River. *Chinese Journal of Ecology* 40(2): 453-459. (in Chinese, with English summary) ["The composition integrity of macrobenthos community can be used to indicate and predict the health and change trend of aquatic environment, as being widely verified in literature. However, the complexity of sampling at the community level retards their convenient application. Odonata larvae, with an extraordinary amphibious life cycle, are relatively easy to be sampled and recognized among the macrobenthos. The diversity of Odonata larvae and their sensitive reaction to changes of water properties make them a very broad and appropriate bio-indicator for wetlands. We analyzed the ecological impacts of the dyke barriers on riverside wetlands and evaluated the environmental indicator role of Odonata larvae on riverside wetlands by comparing the community composition of Odonata larvae in the riverside wetlands of different reaches on both sides of the artificial embankment of the Wusuli River. The results showed that the diversity of Odonata larvae in the riverside wetlands was increasing along the Wusuli River from the upstream to the downstream. Blocking hydrologic connection had a negative effect on the survival and breeding of Odonata larvae. The closer to the downstream, the more significantly the Odonata larvae were affected by artificial dykes. The density of different species on both sides of the dyke had limited variation, while the main difference existed in the



relatively large fluctuation range of diversity index value in the sampling sites directly connected with the river hydrology." (Authors)] Address: Wu, H.-t., Northeast Institute of Geography & Agroecology, Chinese Academy of Sciences, Changchun 130102, China. Email: wuhaitao@iga.ac.cn

**21146.** Misak, K. (2021): Faunistic study of the dragonfly fauna of Nagydobrony (Ungvár district). MSc. thesis, Transcarpathian Hungarian Institute named after Ferenpl Rakopy P, Dept of Biology and Chemistry, Berehovo: 47 pp. (in Hungarian, with Ukrainian summary) ["The following conclusions can be drawn from the summary of the faunistic data. Our field collections were carried out in the area of the Great Dobronyi Game Reserve in the autumn of 2019 and summer of 2020. A total of 10 collection areas were designated following the field survey. Two collection areas were located in the area of a lake (Lake 1 and Lake 2), which is sometimes filled by the Latorca River, while eight additional collection areas were designated along the channels built during the draining of the Szernye marsh (Cs1, Cs2, Cs3, Cs4, Cs5, Cs6, Cs7, Cs8). During our work we collected 264 dragonfly larvae and 32 exuviae (296 specimens in total). The larvae were collected using a hand scraper net. The collected specimens were stored in bottles containing 70% ethyl alcohol until identification. Exuviae were collected from vegetation along the water's edge. Species identification was carried out using a stereomicroscope according to the determination manuals BROCHARD (BROCHARD et al. 2012) et al., CHAM (CHAM, 2012) and GRAND (GRAND et al. 2014) et al. Reviewing the complete faunistic list, we can see that 15 dragonfly species were found as a result of our collection efforts in 2019-20. These species are *Ischnura elegans*, *Calopteryx splendens*, *Anax imperator*, *A. parthenope*, *Libellula quadrimaculata*, *Sympetrum sanguineum*, *S. vulgatum*, *Platycnemis pennipes*, *Lestes virens*, *L. sponsa*, *L. barbarus*, *L. viridis*, *Aeshna mixta*, *Coenagrion puella*, *Crocothemis erythraea*). The species are members of 6 different families, which are Coenagrionidae (31 specimens), Calopterygidae (57 specimens), Aeshnidae (86 specimens), Libellulidae (40 specimens), Platycnemididae (1 specimen), Lestidae (45 specimens). During the exuvium collection we added 2 new species to our species list, including *Aeshna cyanea* and *Hemianax ephippiger*. Previous surveys had been carried out in the Great Dobrony Game Reserve in 1997. In their work VI-ZSLÁN and HUBER described 17 species of dragonflies from the whole area of Great Dobrona, of which 10 species (6 Zygoptera, 4 Anisoptera) were found in the area of the Great Dobrona Game Reserve. During my work, I was able to detect 7 dragonfly species (4 Zygoptera, 3 Anisoptera). A further 8 species were detected in the reserve (*L. viridis*, *A. mixta*, *A. parthenope*, *L. barbarus*, *L. virens*, *S. sanguineum*, *P. pennipes*, *C. erythraea*). Of the 15 species described by me, the following species have also been described in the area of Kisdobrony: *L. virens*, *C. puella*, *A. imperator*, *S. sanguineum*. In the course of my research, I was the first to describe *Anax parthenope*. It was detected in the first section of the canal (Cs1) (1 specimen), but we also found specimens of it in exuviae (2 specimens). During our exuvium collection work, 32 specimens were found, including *Hemianax ephippiger*, *A. cyanea*, *A. mixta*, *A. imperator*, and *A. parthenope*. *Hemianax ephippiger* and *Aeshna cyanea* were the only species collected as exuvium only, not as larvae. No previous exuvium surveys have been conducted in the areas. Based on the ISOI index, a high habitat classification category (high) was defined based on the odonatological survey of the Great Draky Game Reserve, which indicates the species richness and habitat importance of the area. URI] Address: not stated

**21147.** Morra, T.; Bence, S.; Kapfer, G.; Delauge, T. (2021): Etude des zones humides littorales continentales du territoire élargi du Parc national de Port-Cros (Provence, France). *Volet entomologique*. *Sci. Rep. Port-Cros Natl. Park*, 35: 363-381. (in French, with English summary) ["Study of the mainland coastal wetlands of the enlarged territory of the Port-Cros National Park (Provence, France). Entomological aspects. An entomological study of the continental coastal wetlands of the Parc national de PortCros (Provence, France) territory was carried out. During the spring, summer and autumn 2019, inventory campaigns were conducted on 11 wetlands. Surveys were carried out, primarily targeted at wetland indicator species, taking into account mainly Orthoptera, but also Odonata and Heteroptera Hemiptera.

**21148.** Overall, the inventories revealed a low number of indicator species and a low gamma diversity. An exception is the Garonne/Bistagne sector in the commune of Ramatuelle, a rare sector that still presents true and extensive hygromesophile meadows as well as a beach and back-dune with some patches of preserved habitats. Similarly, several new stations of the sword-tail cricket *Trigonidium cicindeloides*, a species in danger of extinction (EN) on the Provence-Alpes-Cote d'Azur Orthoptera red list, were discovered. Some proposals aimed at ecological improvement of entomofauna environments are being put forward by simple management and consultation measures." (Authors) The following odonate species are listed: *Aeshna affinis*, *Aeshna isoceles*, *Aeshna mixta*, *Anax parthenope*, *Hemianax ephippiger*, *Lestes barbarus*, *Lestes virens virens*, *Ischnura pumilio*, *Coenagrion scitulum*, *Sympetrum meridionalis*, *Trithemis annulata*.] Address: CEN PACA, Pôle Biodiversité Régionale, 888 chemin des Costettes, 83340 Le Cannetdes-Maures, France. Email: thibault.morra@cen-paca.org

**21149.** Mubarak, Z. (2021): The diversity of dragonfly (Ordo: Odonata) various type, of habitat in Karangrejo village, Garum district, Blitar regency. Program studi biologi jurusan sains fakultas sains dan teknologi Universitas Islam Negeri Sunan Ampel Ssrabaya: 85 pp. (in Indonesian, with English summary) [oas 68 "Indonesia is a tropical country with megabiodiversity because it has a very high diversity of flora and fauna. The ecosystem that is widely studied and researched is the river water ecosystem area. The river water ecosystem contains various types of vegetation and biota, one of which is insects in the Order Odonata which can be used as bioindicators. The purpose of this study was to determine the Index of Biodiversity, Evenness and Dominance in Karangrejo Village, Garum District, Blitar Regency. The study was conducted in December 2020 - January 2021 by dividing the location into six plots with various habitat types, the data obtained were then analyzed and analyzed using the Shannon-Wiener index, evenness index (E) and dominance (D) using the Simpson formula. Based on observations, there were 29 species of Odonata with the three most species being *Pantala flavescens*, *Orthetrum sabina*, and *Vestalis luctuosa*. The highest level of odonata diversity was found in plot 3 of  $H' = 2.26$ . The highest dominance index in plot 3 is  $D=0.85$ ; and the highest evenness index in plot 5 is  $E = 0.36$ ." (Authors)] Address: not stated

**21150.** Nair, V.P.; Samuel, K.A.; Palot, M.J.; Sadasivan, K. (2021): The dragonflies and damselflies (Odonata) of Kerala – Status and distribution. *Entomon* 46 (3): 185-238. (in English) ["The odonate fauna of Kerala, their status and distribution are reviewed. Based on personal records from field work since 2010 and published literature, all the recent additions and range extensions to the region are critically

analyzed and a revised checklist of odonates of Western Ghats and Kerala is provided. The current checklist of odonates of the Western Ghats stands at 207 species, including 80 endemics. A total of 181 species of Odonates, including 68 Western Ghats endemics, belonging to 87 genera under two suborders and 14 families were recorded from the geographical boundary of Kerala. The suborder Zygoptera comprises 74 species of damselflies (30 genera in seven families) and the suborder Anisoptera has 107 species (57 genera in seven families). Endemic species and those in IUCN Red List categories are enlisted. None of the odonate species from the region are protected under the Indian Wildlife Protection Act (WPA) 1972. A detailed discussion on odonates occurring in Kerala has been provided in the systematic part." (Authors)] Address: Nair, V.P., 1XV/446 A1, Nethaji Housing Colony, Trichambaram, Taliparamba P.O, Kannur, Kerala, India. Email: vinayanpnair@gmail.com

**21151.** Nazari, V. (2021): Taxonomy at face value: An assessment of entomological postage stamps as effective teaching aids for science educators. *Research Ideas and Outcomes* 7: e68056: 12 pp. (in English) ["Entomological postage stamps are unique means of communication of science with the public and have been suggested as effective teaching tools in primary and secondary education. A survey of the taxonomic and other information contained on insect- and arachnid-themed stamps issued globally from 1891 to 2020 reveals that 30% of these stamps contain various errors and are scientifically unreliable. In addition, representations of insects are highly biased towards only two orders (Lepidoptera and Odonata), while other mega-diverse orders (e.g. Coleoptera, Diptera, Hymenoptera) are poorly represented or not represented at all. This phenomenon can negatively affect public perception of priorities in biodiversity and conservation. Standardization of taxonomic information on entomological stamps and implementation of rigorous quality control measures are encouraged to assure dissemination of accurate scientific information." (Author)] Address: Nazari, V., Independent Researcher, Ottawa, Ontario, Canada. Email: nva-zrick@yahoo.com

**21152.** Nisar, M.M.; Muhammad, K.; Mehmood, S.A.; Ahmed, S.; Murtaza, B.N.; Nadeem, M.S. (2021): Morphological and phylogenetic evaluation of Libellulidae dragonflies from district Attock, Punjab, Pakistan. *International Journal of Agruculture & Biology* 26: 393-400. (in English) ["Dragonflies under the family Libellulidae and order Odonata have included among the ecosystem friendly insects. In the present study, we aimed to evaluate the phylogenetics and evolutionary history of dragonflies at the cross junction of Punjab and Khyber Pakhtunkhwa provinces of Pakistan. The studies were principally based on the morphological characters of head and wing venation and phylogenetic analysis based on the nucleotide sequence of 12S rRNA gene. DNA was extracted using phenol-chloroform method and the DNA fragment was amplified through Polymerase Chain Reaction using 12S rRNA primers. A total of 233 collected specimens were identified into ten species from four genera (*Crocothemis*, *Orthetrum*, *Sympetrum* and *Zygonyx*) according to their morphological and morphometric characterization. The nucleotide sequence analysis of 12S rRNA gene had shown genetic affinities among the subject genera. The phylogenetic tree constructed by morphological data and 12S rRNA revolved two clades and supported the grouping of collected specimens. Further phylogenetic analysis based on nucleotide sequences of 12S rRNA from GenBank generated the phylogenetic tree with four clades of related species. On the basis of our findings, *Crocothemis*

*erythraea* were placed phylogenetically adjacent to *Orthetrum cancellatum*, *O. sabina* to *Libellula nodistica* (EF640400.1), *O. glaucum* to *Libellula saturata* (EU054935.1), *O. brunneum* to *O. brunneum* (DQ021416.1), *Sympetrum fonscolombii* to *Orthemis ferruginea* (EF640402.1), and *Zygonyx torridus* to *O. pruinatum* (EF640403.1) with minute differences in bootstrap values. The present report describes an aspect to record and catalogue the ecosystem friendly insects mostly being threatened." (Authors)] Address: Muhammad, K., Dept of Biotechnology and Genetic Engineering, Hazara University Mansehra 21300 Khyber Pakhtunkhwa, Pakistan. E-mail: Khushisbs@yahoo.com;

**21153.** Nogueira, J. G.; Sousa, R.; Benaissa, H.; De Knijf, G.; Ferreira, S.; Ghamizi, M.; Gonçalves, D.; Lansdown, R.; Numa, C.; Prié, V.; Riccardi, N.; Seddon, M.; Urbánka, M.; Valentini, A.; Vihrev, I.; Varandas, S.; Teixeira, A.; & Lopes-Lima, M. (2021): Alarming decline of freshwater trigger species in western Mediterranean key biodiversity areas. *Conservation Biology* 35: 1367-1379. (in English) ["The identification of key biodiversity areas (KBA) was initiated by the International Union for Conservation of Nature in 2004 to overcome taxonomic biases in the selection of important areas for conservation, including freshwater ecosystems. Since then, several KBAs have been identified mainly based on the presence of trigger species (i.e., species that trigger either the vulnerability and/or the irreplaceability criterion and thus identify a site as a KBA). However, to our knowledge, many of these KBAs have not been validated. Therefore, classical surveys of the taxa used to identify freshwater KBAs (fishes, molluscs, odonates, and aquatic plants) were conducted in Douro (Iberian Peninsula) and Sebou (Morocco) River basins in the Mediterranean Biodiversity Hotspot. Environmental DNA analyses were undertaken in the Moroccan KBAs. There was a mismatch between the supposed and actual presence of trigger species. None of the trigger species were found in 43% and 50% of all KBAs surveyed in the Douro and Sebou basins, respectively. Shortcomings of freshwater KBA identification relate to flawed or lack of distribution data for trigger species. This situation results from a misleading initial identification of KBAs based on poor (or even inaccurate) ecological information or due to increased human disturbance between initial KBA identification and the present. To improve identification of future freshwater KBAs, we suggest selecting trigger species with a more conservative approach; use of local expert knowledge and digital data (to assess habitat quality, species distribution, and potential threats); consideration of the subcatchment when delineating KBAs boundaries; thoughtful consideration of terrestrial special areas for conservation limits; and periodic field validation." (Authors)] Address: Nogueira, Joann, CIBIO/InBIO – Res. Center in Biodiversity & Genetic Resources, Univ. Porto, Campus Agrário de Vairão, Vairão, Portugal. Email: joanafgnogueira93@gmail.com

**21154.** Paparisto, A.; Shkëmbi, E.; Halimi, E.; Pepa, B.; Qirinxhi, X.; Misja, K. (2021): Odonatet e Shqipërisë. Shtypur në Republikën e Shqipërisë Shtypshkronja, Tiranë: 163 pp. (in Albanian, with English summary) ["The aim of this study, undertaken in entomology and extended from 2013-2018, has been the identification and updating of taxonomic data and ecological estimation of odonatofauna spread throughout the territory of Albania. Dragonflies are an important connecting link between freshwater and terrestrial habitats. These organisms play an important ecological role. The members of this group of insects are known as indicator of the status of biodiversity in freshwater ecosystems. The result of this study is the updated list of species of Odonata

Order for Albania, Insecta Class, Arthropoda Phylum. An important contribution of this work is also the first electronic database in Albania for Odonata Order, and the Key of Determination. These will serve as instruments to support further studies at the taxonomic level of Albania's odonata-fauna, but also ecological and environmental studies. The study has enriched the National Museum of Natural Sciences with a 1000 new individuals' collection." (Authors)] Address: Paparisto, Anila, Dept of Biology, Fac. Natural Sciences, Tirana Univ., Bulevardi Zogu i Parë, Tiranë, AL-1001, Albania. Email: anila.paparisto@yahoo.com

**21155.** Roy, G.C.; Chakraborty, K.; Banerjee, S. (2021): A study on the guild interaction of predator natural enemies in a rice field. *Eco. Env. & Cons.* 27 (February Suppl. Issue): S35-S39. (in English) ["The present study make known that intraguild and interguild antagonism have a number of baneful sound effects in moribund the major pest density in rice field. Study design: Random quadrat sampling was performed at the peak season (October 2016-December 2016 and October 2017-December 2017) for two successive kharif crop year (2016-2017) in the insecticide unprocessed regions of rice field for surveillance and assortment of samples. Results: *Agriocnemis pygmaea* (Rambur) is the leading species out of all Odonata samples. Three distinguished spider guilds were observed namely, orb-weaver, space-weber and hunting spider. Orb-weavers, *Tetragnatha mandibulata* Walck are especially copious. Most prevalence (21.78%) of *Lycosa pseudoannulata* Boes was observed. This was followed by *Atypena formosana* Oi (16.33%) and *Argiope catenulata* Dole (14.56%) in descending order. Quite a lot of predators are also usually found like, *Coccinella septempunctata*, *Menochilus sexmaculata* and *Micrapsis discolor* etc. Conclusion: Fortification of omnivore's results due to affluence of predator population in the rice field as bio-control agents." (Authors)] Address: Banerjee, S., Dept of Zoology, Burdwan Raj College, Purba Bardhaman 713 104, West Bengal, India

**21156.** Soares, D.M.; Borges, L.R.; Falcão da Silva, M.F.; Luche, L.D. (2021): Effect of substrates of native and exotic plant species on the initial period of colonization of benthic macroinvertebrates in the Cerrado biome. *Community Ecology* 22(2): 127-134. (in English) ["The introduction of exotic species can generate changes in the composition of organic debris of alien origin in aquatic ecosystems close to the places of introduction. This new debris can cause impacts at the level of communities and ecosystems. Therefore, the present work aims to answer the following question: are the macroinvertebrate communities present in substrates formed by leaves of the exotic species *Pinus caribaea* Morelet (Pinaceae) and *Eucalyptus grandis* Hill ex Maiden (Myrtaceae) similar to those found in substrates composed by the mix of these two species and substrates composed by a mix of native species? For the collection of macroinvertebrates, sets of four types of artificial substrates were submerged in a stream inside the Ecological Station of Panga (Uberlândia—MG, Brazil). The treatments were: leaves of *P. caribaea*, leaves of *E. grandis*, leaves of both exotic species and leaves of two native species. In the 20 sample units, about 250 individuals were found, belonging to the orders Coleoptera, Diptera, Ephemeroptera, Heteroptera, Megaloptera, Odonata, Plecoptera and Trichoptera. The effects of the treatments were observed in the exponential decay of the substrate mass and in the structure of the benthic macroinvertebrates communities. The composition of these communities differed among treatments, with high dissimilarity observed between *P. caribaea* treatments and the mix

of exotic species. Therefore, the results demonstrate the importance of substrate complexity for benthic macroinvertebrates, as well as the possible effects of biological invasion and co-invasion by species widely used in silviculture activities." (Authors)] Address: Soares, Danúbia, Laboratório de Restauração Ecológica, Instituto de Biologia, Univde Federal de Uberlândia, Campus Umuarama, Rua Ceará s/n, Bloco 2D, Sala 16, Uberlândia, Brazil

**21157.** Stand-Perez, M.A.; Montes-Fontalvo, J.; Pérez-Gutiérrez, L.A. (2021): Libélulas comunes del departamento del Atlántico, Colombia. *Hetaerina* 3(2): 25-29. (in Spanish) ["The Dept of Atlántico is located on the north coast of Colombia, in the Caribbean region, and has an area of 3,386 km<sup>2</sup>, which represents 0.29% of the country's surface. In the Dept, low and flat lands, swamps, mountain ranges and a coastal strip of desert and savanna areas predominate, with an average annual temperature of 26 °C, maximum recorded averages of 29.9 °C and minimum averages of 25 °C. C; Lastly, it presents a bimodal rainfall regime, with a rain peak between the months of April and June and a second rainfall peak between the months of September and November (Oyaga, 2013). For the Atlantic, a total of 52 species of odonates have been reported to date (Table 1) (Pérez-Gutiérrez & Palacino-Rodríguez, 2011), 15.5 % of the diversity of Colombia. With the aim of stimulating citizen science, as a fundamental tool to generate community support for conservation efforts of natural spaces, including urban ones, here is a photographic catalogue that can function as an introductory guide to the diversity of the most common species that inhabit wetlands and urban areas of the Dept of Atlántico (Fig. 1-3), highlighting the importance that these ecosystems represent in the conservation of the diversity of dragonflies and damselflies, and the habitats that these organisms occupy. In addition, we extend the invitation to share sightings, as well as comments and doubts with the Systematics and Autoecology of Aquatic Insects (SAIA) seedbed of the Universidad del Atlántico, a group with a long history in the study of odonates in the Dept of Atlántico and the rest of Colombia." (Authors)] Address: Stand-Pérez, M.A., Red de Biología Evolutiva, Instituto de Ecología, A.C., Xalapa, México. Sistemática y Autoecología de Insectos Acuáticos (SAIA), Universidad del Atlántico, Barranquilla, Colombia. E-mail: mstand20@gmail.com

**21158.** Yu, C.; Qin, H.; Shen, Q.; Yu, K.; Chen, C.; Wang, H.; Bai, Y. (2021): Effects of wetland environmental diversity on Odonata species diversity. *Journal of Taizhou University* 43(3): 42-47. (in Chinese, with English summary) ["In order to explore the impact of wetland environmental diversity on the species diversity of Odonata insects, the species diversity of Odonata in different wetland environments of Taizhou [Zhejiang province, China] was investigated from July to August in 2020. The dragonflies were collected by scanning net method, and the Shannon-Wiener Diversity Index and Correlation Index were used for the analysis. The results showed that the species of Odonata were the most abundant in all the plots. Among them, the *Pantala flavescens* had a large number of individuals in wetland environments with low vegetation, and the *Crocothemis servilia* was found in reservoirs and streams with more ponds. There were quantities of *Pseudothemis zonata* in the wetland environment with tall trees and intertwined ponds, and there were plenty of *Deilidia phaon* in places with better environments around the reservoir. Correlation analysis showed that there was a negative correlation between the species diversity of Odonata and the ratio of water area to land area. With the increase of water area, the species diversity of Odonata showed a

downward trend. However, as the proportion of land and water area ranging from 9% to 12%, the species diversity index of Odonata was the highest. The results provided biodiversity data support for wetland environmental protection and water quality assessment." (Authors)] Address: Yu, C., School of Life Science, Taizhou University, School of Teacher Education, Taizhou University, China

**21159.** Zhang, H.-m.; Cai, Q.-h. (2021): Biodiversity and fauna study of Odonata from Shennongjia Mountains. Resources and Environment in the Yangtze Basin 30(6): 1393-1399. (in Chinese, with English summary) ["From 2012 to 2015 surveys, 39 locations of dragonflies were investigated in Shennongjia mountains. 88 species of dragonflies belonging to 55 genera, 15 families and 2 suborders were obtained. Anisoptera species are dominant, with 34 genera and 61 species, occupied 61.82% and 69.32% of the total respectively. Libellulidae is the most abundant family, with 25 species, occupied 28.41% of the total species. Zygoptera with 21 genera and 27 species, occupied 38.18% and 30.68% of the total respectively, Calopterygidae, Platycnemididae and Coenagrionidae are dominant groups with 5 species each, occupied 5.68% of the total. The main characteristic of Shennongjia dragonfly fauna is the oriental species are dominant, with 49 species recorded, occupied 55.68% of the total species, including 4 distribution types; 39 species are the Palaearctic-Oriental distribution type, occupied 44.32% of the total species, including 9 distribution types. The results show that Shennongjia mountains is an important dragonfly habitat, and dragonfly resources have significant regional characteristics. In order to further protect the diversity of dragonflies, effective conservation strategies should be taken." (Authors)] Address: Zhang, H.-m., Kunming Natural History Museum of Zoology, Kunming Institute of Zoology, Chinese Academy of Sciences, Kunming, Yunnan 650223, China. Email: zhanghaomiao@mail.kiz.ac.cn

## 2022

**21160.** Adu, B.W. (2022): Assessment and inventory of Odonata (Insecta) and water quality parameters of the Abaa, Malaika, and Isokun rivers in south-western Nigeria. *Biologia 77*: 2563-2570. (in English) ["Odonata can be found in most inland waters except in Antarctica. Some species of this insect are habitat-specific partly due to their sensitivity and tolerance to changes in the environment. This study evaluated dragonflies and damselflies composition, and physico-chemical characteristics of three water bodies (Abaa, Malaika, and Isokun rivers) in Ondo State, Nigeria. The study span through a period of six months. Specimens of Odonata and water samples were collected at the three rivers for analyses once a month for six months (April-September, 2019). The mean values for the physicochemical parameters and diversity of species of Odonata were calculated. Analysis of data revealed that ambient temperature, water temperature, and flow rate were not significantly different ( $p > 0.05$ ) between the study sites. The pH value of the water sample from the three sites were fairly alkaline with mean values ranging from  $8.65 \pm 0.34$  to  $9.10 \pm 0.88$ . The dissolved oxygen (DO) values of the three study sites ranged from  $5.13 \pm 1.02$  to  $6.95 \pm 0.88$ , indicating little variability in the DO content of the water. The lowest values for Shannon-Weiner H' (2.247) and Simpson 1-D (0.8794) were recorded at Abaa, while the highest values for both indices (2.729 and 0.9191, respectively) were recorded for Isokun. The dominant dragonflies and damselflies at the three sites are the ubiquitous type associated with the disturbed environment, they include *Trithemis kirbyi*, *Palpopleura lucia*, *Pseudagrion*

*kersteni*, *P. melanicterum* and *Trithemis arteriosa*. This study revealed that the three water bodies investigated inhabited ubiquitous odonate fauna linked with both disturbed and moderately polluted environments. The Abaa River was the most disturbed with the least number of species due to the high rate of anthropogenic activities, the presence of some sensitive species at the Isokun River, and the outcome of biodiversity indices analysis revealed that the Isokun River was the most stable odonate community among the three rivers." (Author)] Address: Williams Adu, B., Dept of Biology, School of Life Sciences, Federal University of Technology, Akure, Ondo State, Nigeria

**21161.** Agdamar, S.; Sac, G. (2022): Growth and feeding ecology of a small-bodied freshwater fish species *Petroleuciscus borysthenicus* (Kessler, 1859) in an artificial water body of an island ecosystem (Gökçeada, Turkey). *Journal of Advanced Research in Natural and Applied Sciences 8*(1): 76-85. (in English) ["Bio-ecological studies and life-history traits of small-bodied fishes are critical for the understanding of their ecological role as well as the assessment of their position and continuity in the ecosystems. This study aims to present initial data on the growth and feeding habit of small-bodied *Petroleuciscus borysthenicus* inhabited in an island ecosystem (Gökçeada, Turkey). During the seasonally sampling surveys from May 2020 to January 2021, a total of 163 specimens were collected from Sahinkaya Reservoir using electrofishing. Standard length and body weight of fish samples varied between 2.6–10.0 cm and 0.32–25.68 g, respectively. Length-weight relationship and condition factor were calculated for all specimens as  $W=0.017 \times SL^{3.114}$  ( $r=0.988$ ) and  $2.04 (\pm 0.28)$ , respectively. F:M sex ratio was found to be 1:1.33 with no significant difference from the ratio of 1:1 ( $X^2=0.02$ ;  $p>0.05$ ). Diet of the species comprised of ten different food items. Plant (63.6%) was the most preferred food item in terms of frequency of occurrence (F%), followed by Diptera (31.8%) and Odonata (12.7%). According to the index of relative importance IRI (%) values of food items, Diptera was the dominant food item in all seasons. Levins' measure of niche breadth (B) and standardised niche breadth (BA) values were estimated as 3.18 and 0.24, respectively. The results showed that *P. borysthenicus* was more selective on conveniently accessible food materials in the environment and its food preference was affected by seasonal food supply." (Author)] Address: Saç, G., Gökçeada School of Applied Sciences, Çanakkale Onsekiz Mart University, Çanakkale, Turkey. Email: gulsahsac@gmail.com

**21162.** Augusto, F.G.; Graça, M.A.S.; Martinelli, L.A.; Caçador, I.; Arce-Funck, J. (2022): Do aquatic insects disperse metals from contaminated streams to land? *Hydrobiologia 849*: 1437-1451. (in English) ["Mining activities often produce large amounts of pollutants that lead to streams affecting aquatic biota. Aquatic insects have a key role in energy transference from streams to terrestrial systems since emergent insects contribute to the diet of riparian predators. If streams are polluted, emergent insects may act as pollutant conveyors from water to land. Our objective was to investigate if insects inhabiting streams contaminated by heavy metals accumulate, biomagnify, and transfer metals to land. We selected eight streams with different levels of pollution and three metallic pollutants: copper (Cu), manganese (Mn), and zinc (Zn). We sampled (i) water and sediments, (ii) organic matter, macrophytes, and biofilm, (iii) aquatic insects [including "Anisoptera, Zygoptera"], and (iv) riparian spiders (land predators). We classified the organisms in functional feeding groups (FFG) and used the nitrogen stable isotope ( $d^{15}N$ ) to determine the position of organisms in the food



web. We found that contaminants in the sediments, but not in the water, were related to contaminant concentrations in biological samples. Biomagnification processes were metal dependent: Cu was biomagnified, Mn underwent biodilution, and no tendency was observed for Zn. The emergence of aquatic insects from metal-polluted rivers is a potential way of Cu, not Mn or Zn, flux to land." (Authors)] Address: Augusto, F.G., Lab. Isotope Ecology, Center for Nuclear Energy in Agriculture, Univ. of São Paulo, Av. Pádua Dias, 330, São Dimas, Piracicaba, SP, CEP 13416-000, Brazil

**21163.** Balázs, A.; Šipoš, J.; Matúšová, Z.; Hamerlík, L.; Novikmec, M.; Svitok, M. (2022): Comparison of conservation values among man-made aquatic habitats using Odonata communities in Slovakia. *Biologia* 77: 2549-2561. (in English) ["Odonates are one of the best-known aquatic insect groups, with the renowned ability to reflect the quality of freshwater ecosystems. In the last few decades, major emphasis has been placed on the importance of secondary aquatic habitats as refugia for odonates. Biota of man-made habitats, especially dams, are burdened by countless negative anthropogenic impacts. Nevertheless, some habitat types appear to be able to support species with high conservation value. Here, we used generalised linear models to analyse the effects of several environmental characteristics, such as pH, conductivity, water area and perimeter of selected sites, to clarify the effects of drivers in terms of species richness of odonates. Water dams, flooded quarries, flooded gravel quarries and flooded sandpits have been compared based on the Dragonfly Biotic Index (DBI). We recorded 44 odonate species, including several red-listed ones, such as *Epithea bimaculata*, *Leucorrhinia caudalis* and *L. pectoralis*. Although the highest numbers of species were found at water dams, at such habitats, the lowest values of DBI were revealed. The fractional effect of habitat types on DBI was also proven to be significant. Increased conductivity resulted in a decrease of species richness. The positive correlation between habitat area and DBI was also proven to be significant. Our results indicate a high conservation value of different types of flooded quarries counter to water dams, based on the presence of several nationally threatened species with high values of DBI." (Authors)] Address: Balázs, A., Dept Zool., Fac. AgriSciences, Mendel Univ. Brno, Zemedelská 1, 613 00, Brno, Czech Republic

**21164.** Berlov, O.E.; Berlov, E.Ya.; Berlov, N.O.; Olovyannikova, N.M. (2022): First record of rare Damselfly Calopteryx japonica (Odonata, Calopterygidae) in the Baikal-Lena Nature Reserve. *Baikal Zoological Journal* 33(1): 145-146. (in Russian, with English summary) ["*C. japonica altaica* Belyshev, 1955. Material 1 ♀. Russia: Irkutsk Region, Olkhonsky District, Baikal-Lensky Nature Reserve, Cape Tyteri [53°59'55"N, E108°12'35"E], specimen found drowned in water of Lake Baikal, July 21, 2003 (leg. O.E. Berlov). Several specimens of ♂♂ and ♀♀. Russia: Irkutsk oblast, Olkhonsky district, Baikal-Lena Reserve, Cape Onkhohoy [53°47'33"N, 107°57'22"E], July 5–17, 2003, dragonflies were catching mosquitoes in the coastal meadow, 10–50 m from the shore of Lake Baikal (observer O.E. Berlov). 1 ♀. Russia: Irkutsk Region, Olkhonsky District, Baikal-Lensky Nature Reserve, Pokoiniki Cape [54°01'02"N, 108°14'47"E], Lake Baikal shore, July 19, 2005 (leg. N.M. Olovyannikova) 1 ♂. Russia: Irkutsk Region, Olkhonsky District, Baikal-Lensky Nature Reserve, Pokoiniki Cape [54°01'02"N, 108°14'47"E], Lake Baikal shore, July 10, 2017 (observer N.M. Olovyannikova), a photograph of this specimen is available on the Internet - <https://nature.baikal.ru/phs/ph.shtml?id=97388>." (Authors/-Google translate)] Address: Berlov, O.E., Irkutsk Anti-Plague

Research Institute of Siberia and Far East, Irkutsk, Russia. Email: blgz@mail.ru

i. Bertoli, M.; Pastorino, P.; Lesa, D.; Renzi, M.; Anselmi, S.; Prearo, M.; Pizzula, E. (2022): Microplastics accumulation in functional feeding guilds and functional habit groups of freshwater macrobenthic invertebrates: Novel insights in a riverine ecosystem. *Science of The Total Environment* 804, 15 January 2022, 150207: 10 pp. (in English) ["Highlights: • Microplastics contamination was assessed in a macrobenthic invertebrate community. • Cellulosic fibers associated to polyester were found in 48.5% of the taxa. • The highest microplastics amount was detected in the collector-gatherers. • There was no difference in microplastics amount among the functional habit groups. Abstract: Microplastics pose a major threat for aquatic ecosystems, but the contamination dynamics in organisms inhabiting freshwater ecosystems is still little studied. Largely used for biomonitoring, macrobenthic invertebrates provide a pivotal trophic resource for many fish and bird species. In this study, we investigated the microplastics contamination in a macrobenthic invertebrate community (2772 individuals belonging to 33 taxa identified) in a high-plain riverine ecosystem (Vipacco River, northeast Italy) and compared the amount of microplastics accumulated in functional feeding guilds/functional habit groups. Microplastics (cellulosic fibers associated with polyester) were found in 48.5% of the taxa, with the highest amount detected in the collector-gatherers, followed by predators. The collector-gatherers showed a significantly higher microplastic accumulation than the other functional feeding guilds, whereas there was no difference among the functional habit groups. The main source of microplastics pollution was most likely urban wastewater discharge points located along the river. Our study reports a novel approach about microplastic pollution assessment in lotic environments, as it focuses into the microplastic contamination dynamics in an entire macrobenthic invertebrate community perspective and underlines the need for further study." (Authors) Gomphidae, Calopteryx, Coenagrionidae] Address: Pastorino, P., The Veterinary Medical Research Institute for Piemonte, Liguria & Valle d'Aosta, via Bologna 148, 10154 Torino, Italy. Email: paolo.pastorino@izsto.it

**21165.** Brenkman, A.B. (2022): After 112 years, again an observation of an imago of *Zygonyx torridus* on Gran Canaria (Spain). *Brachytron* 23(1/2): 48-52. (in Dutch, with English summary) ["Ringed Cascader (*Zygonyx torridus*) has been reported from the Canary Islands from the islands of La Palma, La Gomera, Tenerife and Gran Canaria. On 11 August 2018 I observed an imago in the Barranco de Azuaje, in the north of Gran Canaria. This is the first observation of an imago in more than 100 years for Gran Canaria. A short description of the habitat is provided." (Author)]

**21166.** Buczyński, P.; Piwowarczyk, A.; Taficzuk, A.; Bojar, P.; Mikolajczuk, P.; Góral, N. (2022): Dragonflies (Odonata) of the Lake Orchowe Nature Reserve (Western Polesie). *Przegląd Przyrodniczy* XXXIII(2): 79-93. (in Polish, with English summary) ["In 2021 the fauna of dragonflies was studied in the Lake Orchowe Nature Reserve (Leczynsko-Włodawska Plain, Western Polesie, eastern Poland). Four sites were surveyed: the dystrophic Lake Orchowe (No. 2), a fen with a permanent water body (No. 4) and two peat bogs of a mainly transitional nature: open and permanently hydrated (No. 3) and overgrowing with young forest and mostly drying up in the summer season (No. 1). 40 species were recorded (54% of the national fauna). The most interesting were: *Nehalennia speciosa*, *Aeshna juncea*, *A. subarctica*,

*Orthetrum coerulescens*, *Leucorrhinia pectoralis*. Between 9 and 27 species occurred at particular sites. The fauna of Lake Orchowe was the richest, while the fauna of peatlands was moderately rich or poor. The lake was characterized by fauna of an intermediate nature between lake and peatland, indicating its low productivity. The fauna of peatlands was typical of these habitats, but on one site the impact of drying-up was noticeable. Six "special concern" species were recorded: three legally protected species in Poland; one from the IUCN Red List, one from the Red List of Europe, one from the Red List of the European Union, two from the Red List of dragonflies of Poland and four umbrella species for the studied habitats. Their occurrence and abundance as well as good preservation of the peatland fauna at most sites confirm the high natural value of the Lake Orchowe Nature Reserve for the protection of dragonflies and – indirectly – also for the protection of peatland habitats and their biota. There were no significant changes of the fauna, related to climate warming. The new data of *Nehalennia speciosa* and *Aeshna subarctica* is significant to the knowledge on their distribution in the Leczynsko-Wlodawska Plain and its vicinity. It is worth mentioning that individuals of *Nehalennia speciosa* were found not only in reedbeds with the domination of *Carex lasiocarpa*, but also *C. elata*, which is a more regular case now in Poland, yet still scarce. Both species have isolated distribution areas here, with 7 localities of *Nehalennia speciosa* and 4 of *Aeshna subarctica* known today. Due to this isolation, each population is important as part of a metapopulation within such an area." (Authors) *Nehalennia speciosa*, *Aeshna juncea*, *A. subarctica*, *Anax parthenope*, *Orthetrum coerulescens*, *Leucorrhinia pectoralis*] Address: Buczynski, P., Dept Zool., Maria Curie-Skłodowska Univ., Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**21167.** Cezario, R.R.; Therezio, E.M.; Marletta, A.; Gorb, S.N.; Guillermo-Ferreira, R. (2022): Ontogenetic colour change of a sexual ornament in males of a damselfly: female mimicry, crypsis or both? *Die Naturwissenschaften* 109(1):2: 9 pp. (in English) ["Female mimicry by males is a widespread phenomenon in several taxa and may be involved in aggression avoidance or facilitated access to resources. In early developmental stages, female mimicry may be a mechanism involved in signalling sexual immaturity or, when coupled with strategies related to visual camouflage, may be involved in the avoidance of male-male agonistic interactions. Here, we addressed whether the delayed colour maturation of a sexual ornament in males of *Mnesarete pudica* damselflies might be a case of crypsis, female mimicry or both. We analysed how conspecifics and predators perceive the pigmented wings of juvenile males by contrasting the wing spectra against a savannah background and the wings of both juvenile and sexually mature males and females. Our results based on the modelled visual system of conspecifics and predators suggest that the colour maturation of juvenile males may function as both crypsis and female mimicry. We discuss whether these results related to age- and sexual-dichromatism might be a mechanism to avoid unwanted intraspecific interactions or to avoid territorial and aggressive males. We conclude that the female mimicry and crypsis in juvenile males of *M. pudica* are mechanisms involved in avoidance of predators and unwanted intraspecific interactions, and the signalling of sexual maturity." (Authors)] Address: Guillermo-Ferreira, R., Lestes Lab, Univ. Federal do Triangulo Mineiro, Uberaba, MG, Brazil. Email: rhainerguilermo@gmail.com

**21168.** Chacko, S.; Kandambeth, P.P. (2022): Studies on

trematode metacercariae infecting libellulid larvae from the Western Ghats, Wayanad region. *Parasit. Dis.* 46(1): 159-165. (in English) ["Understanding the host specificity of trematode larvae is vital in predicting the mode of trophic level transfer of trematode parasites and their evolution. In this study, six species of trematode metacercariae, *Eumegacetes* sp., *Orthetrotrema monostomum*, *Ganeo tigrinus*, *Mehraorchis* sp., *Pleurogenoides* sp. and *Phyllodistomum* sp. infecting the larvae of the odonate family Libellulidae from the water bodies in the Wayanad region of the Western Ghats are recorded. ... A total of 198 anisopteran larvae were subjected for study of which the most abundant was that of the family Libellulidae (154). Family Gomphidae was represented by 24 larvae, Macromiidae with 10 and Aeshnidae with 10 larvae. Five species of libellulid larvae under three genera, *Orthetrum*, *Pantala* and *Trithemis* were recorded as second intermediate hosts, in the present study. The larvae of the family Libellulidae were infected with six species of trematode metacercariae: *Eumegacetes* sp., *Orthetrotrema monostomum*, *Ganeo tigrinus*, *Mehraorchis* sp., *Pleurogenoides* sp. and *Phyllodistomum* sp. (Table 1). Out of 154 libellulid larvae examined, 53 were infected with trematode metacercariae. The prevalence of infection were 5.8%, 2.0%, 10.4%, 9.1%, 2.6% & 1.3%, the mean intensity of infection 4.44, 1.67, 5.38, 6.21, 6.00 & 17.50 and the mean abundance were 0.26, 0.03, 0.56, 0.56, 0.16 & 0.23, respectively (Table 2). Of the 24 larvae under Gomphidae two were found infected with *Eumegacetes* sp. (prevalence 8.3%, mean intensity 6.5 and mean abundance 0.54) and one with *Phyllodistomum* sp. (prevalence 4.2%, mean intensity 12 and mean abundance 0.5). No metacercarial larvae were recorded from other two families of the insect larvae." (Authors)] Address: Kandambeth, P.P., Ecological Parasitology & Tropical Biodiversity Laboratory, Dept Zoology, Kannur Univ., Mananthavady Campus, Wayanad, Kerala 670645, India. mail: prasadanpk@kannuruniv.ac.in

**21169.** Choong, C.Y. (2022): Perkembangan larva *Tamea transmarina euryale* Selys, 1878 (Insecta: Odonata) - Larval development *Tamea transmarina euryale* Selys, 1878 (Insecta: Odonata). *Serangga* 27(3): 54-65. (in Malaysian, with English summary) ["The objective of the study was to record the larval development of *Tamea transmarina euryale*. The eggs of *T. transmarina euryale* were incubated until larval emergence in the laboratory. The eggs were collected from an egg-laying female at a pond in Universiti Kebangsaan Malaysia, Bangi Campus, Selangor, Malaysia. The fresh eggs were in yellow colour with a mean length of  $0.46 \pm 0.01$  mm and mean width of  $0.37 \pm 0.01$  mm. The egg incubation period needed at least seven days. The larval development of *T. transmarina euryale* consisted of 12–14 stadia. The rudimentary wing sheaths appeared at the 7th instar. The larvae turned into a greenish yellow colour in the last few instar stages. The whole larval development took 50–62 days to complete. The duration of larval development in *T. transmarina euryale* is generally short if compared to the other Libellulidae species. The information of larval development until adult stage of *T. transmarina euryale* is important for the breeding and conservation purposes, as well as its potential to be applied as biological control agent." (Author)] Address: Choong, C.Y., Pusat Sistemik Serangga, Fakulti Sains dan Teknologi, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor. Email: cychoong@ukm.edu.my

**21170.** Chovanec, A. (2022): Erstmalige Dokumentation eines Paarungsversuches zwischen einem Männchen von *Orthetrum brunneum* und einem Weibchen von *Orthetrum albistylum* (Odonata: Libellulidae). *Mercuriale* 22: 71-82.

["First record of a tandem linkage between a male *Orthetrum brunneum* and a female *O. albistylum* (Odonata: Libellulidae). – A heterospecific tandem between a male *Orthetrum brunneum* and a female *O. albistylum* was documented photographically at a stagnant water body in Lower Austria on 04th August 2022. The linkage lasted for about three minutes. Invitation movements to form a pairing wheel were carried out by the male during flights over short distances from one perching site to another situated on reed stems. The female's behaviour seemed a little "ambiguous": She refused to flex the abdomen in order to form the wheel, but she was not completely passive, grasping the male's abdomen throughout the duration of the linkage." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

**21171.** Chovanec, A. (2022): The assessment of the dragonfly fauna (Insecta: Odonata) as a tool for the detailed typological characterisation of running waters. *Acta ZooBot Austria* 158: 129-147. (in English, with German summary) ["Odonata play an increasing role as indicators in the assessment of the ecological status of running water systems in modern water management. In this connection, the application of the Rhithron-Potamon Concept dealing with the longitudinal distribution patterns of aquatic communities along biocoenotic regions has proven to be a sound approach. Central aspect of the assessment procedure is the comparison of the odonatological status quo with a river type-specific reference state, which focuses on the potential dragonfly community at the (near-)pristine character of the water body investigated. A more detailed method of defining reference species is required particularly with regard to special river types, as the exclusive assignment of the biocoenotic region may cause misleading results. This present paper deals with one of the last near-natural hyporhithron river sections in Austria, the lower course of the Antiesen. Taking into account the Antiesen's canyon-like geologic features with reduced availability of different habitat types for dragonflies in the riparian ecotones, the predetermined spectrum of hyporhithron reference Odonata species was adapted by discussing autecological requirements and river-morphology and revealed two river type-specific core reference species (*Calopteryx virgo* and *Onychogomphus forcipatus*) and five river type-specific accompanying reference species. The comparison of these reference species with the results of a comprehensive field study carried out in 2020 at the Antiesen confirmed the unique features of this river type and the dominating hyporhithron characteristics. It also revealed, however, a slight epipotamon influence indicated by the high abundance of *Calopteryx splendens*, one of the river type-specific accompanying reference species, probably due to increased water temperatures." (Author)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

**21172.** Delsinne, T. (2022): Amphibiens et libellules de l'évateur de crues du barrage de Pirot (Forêt domaniale de Tronçais, Isle-et-Bardais, 03). Etude réalisée par la Société d'Histoire Naturelle Alcide-d'Orbigny pour l'Office National des Forêts: 24 pp. (in French) ["France, Département Allier, Auvergne-Rhône-Alpes. 15 odonate species are documented: *Anax imperator*, *Libellula depressa*, *L. fulva*, *Orthetrum brunneum*, *O. coerulescens*, *Sympetrum striolatum*, *Calopteryx splendens*, *C. virgo*, *Ceragrion tenellum*, *Coenagrion puella*, *Coenagrion scitulum*, *Ischnura elegans*, *Ischnura pumilio*, *Pyrrhosoma nymphula*, *Platycnemis pennipes*] Address: Société d'Histoire Naturelle Alcide-d'Orbigny, 57 rue de Gergovie, F-63170 Aubiere, France

**21173.** Dilushika, P. (2022): Effects of neonicotinoid exposure on anti-predator behaviour and learned recognition of novel predator odour of larvae *Lestes* spp. (Odonata: Zygoptera). MSc thesis, Dept of Biology, University of Saskatchewan: X + 69 pp. (in English) ["Neonicotinoids are widely used water-soluble neurotoxic insecticides. The effects of these insecticides on non-target aquatic organisms have become a major environmental concern since they affect both pests and non-target insects. Along with lethal effects, these insecticides could cause visual and chemoreception impairment. This can lead to behavioural alterations in aquatic organisms by disrupting the sensory systems used for detecting predators, thereby affecting anti-predator behaviours. Therefore, in this thesis, I investigated the effect of imidacloprid, a neonicotinoid insecticide, on the anti-predator response and learned recognition of novel predator odour in damselfly larvae (*Lestes* sp). In the first experiment (chapter 2), damselfly larvae were exposed to water contaminated with a series of concentrations (0.0µg/L, 0.1µg/L, 1.0µg/L, and 10.0µg/L) of imidacloprid and the change in number of feeding bites performed after injecting a conspecific damage-released alarm cue solution and a predator kairomone solution was observed and recorded on day 2, 5, and 10. On days 2 and 5, both the control and 0.1µg/L groups showed appropriate anti-predator behaviour to alarm cues and predator odour, but this was not the case for damselflies exposed to 1.0µg/L. By day 10, larvae in the 1.0 and 10.0µg/L groups no longer responded to alarm cues and all exposure groups ceased responding to predator odour. In the second experiment (chapter 3), I investigated the effect of exposure to a series of concentrations of imidacloprid on learned recognition of predatory stimuli by damselfly larvae. Damselflies were conditioned to recognize risk by exposing them to zebrafish odour (a novel odour) combined with conspecific damage-released alarm cues or control of dechlorinated water. Larvae in the control group learned to respond to the predator odour based on their prior conditioning with alarm cues but not water. Learning of predator odour also occurred for larvae in the 0.1µg/L treatment group but failed for individuals exposed to the higher concentrations of 1.0µg/L and 10.0µg/L. In the third experiment (chapter 4), I exposed damselfly larvae to imidacloprid (at an initial pulse solution of 3.0µg/L and reaching a final concentration of 0.01µg/L) during the conditioning period and evaluated the effect on learned recognition of novel predatory stimuli. Damselflies were conditioned to recognize risk by exposing them to zebrafish odour with true conditioning (alarm cue + predator odour) with or without imidacloprid and another group was given sham conditioning (water + predator odour) with or without imidacloprid exposure. Larvae given true conditioning without imidacloprid exposure correctly learned to recognize the predator odour as a threat, while larvae given sham conditioning, and those exposed to imidacloprid, failed to learn to respond to the predator odour. Overall, this study highlights that acute and chronic exposure to imidacloprid at both environmental relevant and higher concentrations impairs the anti-predator response to conspecific alarm cues and predator odour by damselfly larvae. Further, this study demonstrates that imidacloprid affects learned recognition of novel predator odour by damselfly larvae with the interaction between chemical cues and imidacloprid potentially playing a key role in this impairment." (Author)] Address: not stated

**21174.** Ertas, A.; Yorulmaz, B.; Sukatar, A. (2022): Comparative analysis of biotic indices for assessment of water quality of Balaban Stream in West Anatolia, Turkey. *Biologia* 77: 721-730. (in English) ["Drinking water basins are freshwater

resources that need to be protected and sustained of water quality. However, these areas are lately facing pressures such as agricultural, industrial and urbanization activities. This study was carried out to determine water quality of Balaban Stream and to compare the performance of the indices. Five sampling stations were determined and the samplings were carried out seasonally. Biotic and diversity indices based on benthic macroinvertebrates have been applied using Asterics software. By using UPGMA analysis, the similarities between the stations were clustered based on benthic macroinvertebrates. Pearson's based correlations were applied to the indices in order to determine the proper biotic indices. A total of 62 taxa which belong to Ephemeroptera, Plecoptera, Trichoptera, Diptera, Odonata, Coleoptera, Arhynchobdellida, Haplotaxida, Basommatophora and Amphipoda were detected. The most dominant group between the benthic macroinvertebrates (51 taxa) was found among Insecta. The 4th and 5th stations were the most similar according to the benthic macroinvertebrates assemblages. As a result of this research, the water quality of Balaban Stream was determined as unpolluted-slightly polluted. BMWP- O, BMWP- S, BMWP- H, ASPT- O, ASPT- H and ASPT- C indices were more proper than SI, FBI and BBI indices to determine the water quality of Balaban stream." (Authors)] Address: Ertas, A., Fac. Science, Dept Biology, Ege Univ., Bornova, 35100, Izmir, Turkey

**21175.** Feenstra, M.; van Rhijn, F. (2022): Speared dragonflies by *Juncus*. *Brachytron* 23(1/2): 58-60. (in Dutch, with English summary) ["In 2021 in the Weerribben-Wieden, we found both *Cordulia aenea* and *Aeshna isocles* speared by the sharp points of *Juncus conglomeratus* and *Juncus effusus*. Most probably both individuals ended up there when flying or because of a sudden gust of wind." (Authors)] Address: Email: m.feenstra@protonmail.com

**21176.** Frank, K.D. (2022): 7. Dragonflies and Praying Mantises. In: *Sex in City Plants, Animals, Fungi, and More: A Guide to Reproductive Diversity*, New York Chichester, West Sussex: Columbia University Press. <https://doi.org/10.731-2/fran20606-011>: 57-64. (in English) ["Philadelphia has four species of praying mantis, including three introduced from abroad. It has 46 species of Odonata. Each species courts its own kind. Despite their success in recognizing mates, they exploit deception during sexual conflict. This chapter examines how female dragonflies and female mantises apply sexual mimicry both defensively and offensively. Sexual mimicry may benefit females, especially in cities." (Author)] Address: unknown

**21177.** García-Pozuelo-Ramos, C. (2022): Odonatofauna de La Sagra (norte de Toledo, Castilla-La Mancha, España central) Odonatofauna of La Sagra (north of Toledo, Castilla-La Mancha, central Spain). *Boln. Asoc. esp. Ent.* 46(3-4): 263-282. (in Spanish, with English summary) ["We present here the results of the odonate surveys carried out in the region of La Sagra (Toledo, Spain) between 2018 and 2021. The total number of records amounted to 832. The number of recognised species was 36. The 33 species seen more than once belong 57.58% to Anisoptera and 42.4% to Zygoptera. The most abundant chorotypes are European-Ethiopian (18.18%) and Western Pan-Palaeartic (18.18%). Three species are classified as vulnerable: *Coenagrion scitulum*, *C. mercuriale* and *Onychogomphus costae*. Biodiversity hotspots are squares 30SVK22, 30TVK23 and 30TVK24. The species *Ischnura graellsii* and *Ischnura elegans* are found syntopic in La Sagra. Hybridisation between the two is possible." (Author)] Address: García-Pozuelo-Ramos, C., Sociedad

Entomológica y Ambiental de Castilla-La Mancha, Spain. Email: pkymp@yahoo.es

**21178.** Gauci, C. (2022): An exceptional influx and successful breeding of *Pantala flavescens* on the Island of Malta (Maltese Archipelago) (Odonata: Libellulidae). *Fragmenta entomologica* 54(2): 247-256. (in English) ["*Pantala flavescens* (Fabricius 1798) appeared in unprecedented numbers in summer and autumn 2020 on the island of Malta. Several males were observed holding territory over largely bare, small bodies of water, mostly at Chadwick Lakes and Fiddien. Breeding activity was witnessed several times and 128 exuviae were found of which 124 were collected." (Author)] Address: Gauci, C., 28 Triq il-Kissier, Mosta, Malta. Email: cjgauci48@yahoo.com

**21179.** Grace, M.K.; Akçakaya, H.R.; Bennett, E.L. et al., (2022): Testing a global standard for quantifying species recovery and assessing conservation impact. *Conservation Biology* 35(6): 1833-1849. (in English, with Spanish summary) ["Recognizing the imperative to evaluate species recovery and conservation impact, in 2012 the International Union for Conservation of Nature (IUCN) called for development of a "Green List of Species" (now the IUCN Green Status of Species). A draft Green Status framework for assessing species' progress toward recovery, published in 2018, proposed 2 separate but interlinked components: a standardized method (i.e., measurement against benchmarks of species' viability, functionality, and preimpact distribution) to determine current species recovery status (herein species recovery score) and application of that method to estimate past and potential future impacts of conservation based on 4 metrics (conservation legacy, conservation dependence, conservation gain, and recovery potential). We tested the framework with 181 species representing diverse taxa, life histories, biomes, and IUCN Red List categories (extinction risk). Based on the observed distribution of species' recovery scores, we propose the following species recovery categories: fully recovered, slightly depleted, moderately depleted, largely depleted, critically depleted, extinct in the wild, and indeterminate. Fifty-nine percent of tested species were considered largely or critically depleted. Although there was a negative relationship between extinction risk and species recovery score, variation was considerable. Some species in lower risk categories were assessed as farther from recovery than those at higher risk. This emphasizes that species recovery is conceptually different from extinction risk and reinforces the utility of the IUCN Green Status of Species to more fully understand species conservation status. Although extinction risk did not predict conservation legacy, conservation dependence, or conservation gain, it was positively correlated with recovery potential. Only 1.7% of tested species were categorized as zero across all 4 of these conservation impact metrics, indicating that conservation has, or will, play a role in improving or maintaining species status for the vast majority of these species. Based on our results, we devised an updated assessment framework that introduces the option of using a dynamic baseline to assess future impacts of conservation over the short term to avoid misleading results which were generated in a small number of cases, and redefines short term as 10 years to better align with conservation planning. These changes are reflected in the IUCN Green Status of Species Standard." (Authors)] Address: Grace, Molly, Dept Zool., Univ. Oxford, Oxford, OX1 3SZ, UK. E-mail: molly.grace@zoo.ox.ac.uk

**21180.** Graham, Z.A.; Diehl, K.M.; Davis, D.; Loughman, Z.J. (2022): Death from below: Sit-and-wait predatory behavior



in a burrowing crayfish (*Lacunicambarus thomai*). Food Webs 31, e00225: 4 pp. (in English) ["The biology of burrowing crayfishes remains elusive to biologists, primarily because these animals spend a majority of their lives within the confines of their burrow. Scattered observations of burrowing crayfishes have suggested that burrowing crayfish may exhibit a greater degree of surface activity than previously thought. Surface behavior may be related to social interactions, predator defense, or prey capture. But documentation of these behaviors is rare, and few studies have been conducted on the predatory behaviors of burrowing crayfishes. Here, we report the findings of 24-h video recording surveys conducted on a burrowing crayfish species, the Little Brown Mudbug (*Lacunicambarus thomai*). In total, we recorded and watched 633 h of video. We observed *L. thomai* sitting atop their burrow engaging in sit-and-wait predatory behavior. This ambush predatory behavior was used on several different animal prey items, including spiders (Lycosidae), slugs (Philomycidae), and dragonfly nymphs (Aeshnidae). We also recorded crayfish cutting terrestrial vegetation near their burrow entrance and pulling it down into their burrow. Additionally, we analyzed the gut contents of 23 *L. thomai* from 4 populations to understand the generality of our foraging observations. Indeed, gut content analyses confirmed that all populations consumed both animal prey and vegetation. Overall, our recordings demonstrate that sit-and-wait predatory behavior may be a common foraging behavior among burrowing crayfishes. Further, our observations highlight the trophic role of burrowing crayfish species and emphasizes how these animals forage on both animal and plant communities in terrestrial habitats." (Authors)] Address: Graham, Z.A., West Liberty Univ., Dept Natural Sci. & Mathematics, 208 University Drive, West Liberty, WV 26074, USA. Email: Zackary.graham@westliberty.edu

**21181.** Grieve, A.; Broom, J. (2022): Range extension of an endangered Sydney Hawk Dragonfly *Austrocordulia leonardi* (Anisoptera, Libelluloidea incertae sedis) population in the Nepean River, near Sydney, Australia. *Agrion* 26(2): 49-53. (in English) ["A targeted survey for exuviae of the Sydney Hawk Dragonfly *Austrocordulia leonardi* Theischinger, 1973 was undertaken along the Nepean River and Cataract River in the Sydney basin, over four days in December 2021. The aim of the survey was to determine if the population of *A. leonardi* occupied riverine habitats upstream from its known location at Maldon Bridge and downstream to Menangle weir. Where accessible, riverine emergence structures were inspected using an inflatable boat as transport. However due to instream barriers several sections of river and habitats were navigable only by foot. A total of 324 *A. leonardi* exuviae were recovered from emergence habitats spanning 26km of the Nepean River, and seven *A. leonardi* exuviae were recovered from the lower reaches of the Cataract River, representing a new river system in which the species resides. Additional inspections undertaken in Kangaroo Creek in December 2019, 2020 and 2021, and the Woronora River in December 2019 indicate that the species is either present in other previously known locations in very small numbers or not at all." (Authors)] Address: Grieve, A., Marine Pollution Research Pty Ltd, PO Box 279 Church Pt, NSW, 2105, Australia. Email: adriangrieve@ozemail.com.au

**21182.** Hallan, H.K.; Walia, G.K.; Dhillon, G.K. (2022): A review on cytogenetically studied species of family Coenagrionidae (Odonata: Zygoptera). *Biosciences Biotechnology Research Asia* 19(4): 827-842. (in English) ["Cytotaxonomy is useful for separating sister and cryptic species as well as

for figuring out the evolutionary relationship between taxa. Family Coenagrionidae is considered as one of the largest zygopteran families under order Odonata. Globally, a lot of investigation has been undertaken on the family Coenagrionidae and significantly contributed by biologists throughout the world. Type number of the family Coenagrionidae is n=14 with XO-XX type of sex determining mechanism. Karyotypic variations within and between species are observed due to chromosome breaks and fusions, absence/presence of m chromosomes because of the holokinetic nature of chromosomes. Cytogenetically, 107 coenagrionid species have been studied all over the world which also includes 37 species from India. Among these, most of the species possesses n=14 haploid complement, while variation in chromosome number has been observed in 25% species." (Authors)] Address: Walia, Gurinder Kaur, Dept of Zoology and Environmental Sciences, Punjabi Univ. Patiala, Punjab, India. Email: gurinderkaur\_walia@yahoo.co.in

**21183.** Hoppenbrouwers, P. (2022): Ovipositing and larval development of Vagrant Emperor (*Anax ephippiger*) in the region of Nijmegen in 2019. *Brachytron* 23(1/2): 22-27. (in Dutch, with English summary) ["In 2019 an influx of *A. ephippiger* was observed in the Netherlands. This resulted in the first reproduction of the species at a few locations. In the area around Nijmegen, we found the species ovipositing at five localities, but reproduction was only successful at the Millingerwaard. At least 1098 exuviae were collected between 25 VIII and 28 IX. At the four other localities reproduction failed due to drying out of the habitat." (Author)] Address: Email: peter.hoppenbrouwers@planet.nl

**21184.** Hou, D.; Zhong, Z. (2022): Comparative analysis of deformation behaviors of dragonfly wing under aerodynamic and inertial forces. *Computers in Biology and Medicine* 145, June 2022, 105421: (in English) ["Highlights: • Aerodynamic and inertial forces on flapping dragonfly wing are computed and compared. • Dynamic responses of dragonfly wing under flapping and rotation velocities are simulated. • Passive deformation mechanisms of dragonfly wing are revealed. Abstract: Insect wings are typically deformed under aerodynamic and inertial forces. Both the forces are related to kinematic and morphology parameters of the wing. However, how the insects utilize complex wing morphologies and kinematics to generate the forces, and what the exact contributions of the two forces in wing deformation are still unclear. In the study, the aerodynamic and inertial forces produced by a dragonfly forewing are compared quantitatively. Then the dynamic deformation behaviors are studied with a three-dimensional finite element model. Finally, roles of the two forces in wing deformation are fully discussed. The two forces increase along the wingspan every moment and they reach maximal consistently near the pterostigma. Because of the asymmetry of angle of attack, the maximal resultant aerodynamic force is about 4 times of that in upstroke. By comparison, the normal component of aerodynamic force plays the leading role in downstroke while the inertial force works mainly in tangential in upstroke. The finite element simulation demonstrates the bending and twisting deformation behaviors of the wing considering both flapping and rotation. The average strain energy in one flapping cycle is  $1.23 \times 10^{-3}$  mJ under inertial force and  $0.43 \times 10^{-3}$  mJ under aerodynamics respectively. In addition, the rapid rotation can enhance inertial deformation by 6 times. As a result, deformation of dragonfly wing is dominated by its own inertia in flight. The deformation mechanism addressed could inspire the design of flexible flapping airfoils in morphology and kinematics." (Authors)] Address: Zhong, Z.,

School of Science, Harbin Institute of Technology, Shenzhen, 518055, PR China. Email: zhongzheng@hit.edu.cn

**21185.** Infante Álvarez, C. (2022): Las comunidades de odonatos y su relación con el hidroperiodo en lagunas temporales del LIC de Lagunas de los Oteros en la provincia de León. Trabajo de fin de Grado, Universidad de León: 32 pp. (in Spanish, with English summary) ["The odonate communities and their relationship with the hydroperiod in temporary ponds of the LIC of Lagunas de los Oteros in the province of León: It is intended to describe the odonate communities in the temporary ponds of the LIC of Lagunas de los Oteros in the Province of León. The study was based on two independently obtained data sets: exuviae and imagines. From a sampling of exuviae, an attempt was made to elucidate whether the hydroperiod is a determining factor for these communities, for which classification and correlation analyzes were used with the collected exuviae. The richness obtained for all the study ponds was twenty-one species, ten from the exuviae and nineteen in the case of adults, with *Lestes barbarus*, *Lestes dryas*, *Sympetrum sanguineum* and *Sympetrum striolatum* being the dominant species of the community. Using Whittaker's  $\beta$  diversity, it was found that the differences in taxonomic composition between hydroperiods were greater in the juvenile stages (exuviae) than in the imagines, something that is not surprising given the high dispersal capacity of the imagines. Finally, from the correlation analysis it was determined that there is a positive relationship between the increase in the hydroperiod and the increase in species richness, both exuviae and imagines." (Author)] Address: not stated

**21186.** Johansson, F.; Kollberg Hedström, T.; Anderson, R.C.; Divakaran, P.K.; Kakkassery, F.K. (2022): Wing shape differences along a migration route of the long-distance migrant Globe Skimmer Dragonfly *Pantala flavescens*. *Journal of Tropical Ecology* 38: 17-24. (in English) ["Animals which migrate by flying should be subject to selection for optimal wing characteristics that maximize energy efficiency during migration. We investigated wing shape and wing area variation in the Globe Skimmer Dragonfly *Pantala flavescens*, which has the longest known migration of any insect. Wing shape and wing area differences between individuals in southern Peninsular India, and migrating individuals at a stop-over site on the Maldives, were compared. Results suggest that individuals which successfully reached the Maldives, on their way from India to Africa, had a broader wing base and an overall more slender wing shape than individuals in southern India. Contrary to our expectations, wing area did not differ significantly in most of our comparisons between southern India and the Maldives, suggesting that wing shape is more important than wing area for successful migration in *P. flavescens*. The results provide indirect evidence of natural selection on wing shape in a migrating dragonfly." (Authors)] Address: Frank Johansson: Email: frank.johansson@ebc.uu.se

**21187.** Kalkman, V.J.; Boudot, J.-P.; Futahashi, R.; Abbott, J.C.; Bota-Sierra, C.A.; Guralnick, R.; Bybee, S.M.; Ware, J.; Belitz, M.W. (2022): Diversity of Palaearctic dragonflies and damselflies (Odonata). *Diversity* 2022, 14, 966. <https://doi.org/10.3390/d14030966>. 15 pp. (in English) ["More than 1.2 million distribution records were used to create species distribution models for 402 Palaearctic species of dragonflies and damselflies. On the basis of these diversity maps of total, lentic and lotic diversity for the whole of the Palaearctic (excluding China and the Himalayan region) are presented. These maps show a clear pattern of decreasing diversity longitudinally,

with species numbers dropping in the eastern half of Europe and remaining low throughout a large part of Russia, then increasing again towards Russia's Far East and Korea. There are clear differences in diversity patterns of lentic and lotic species, with lentic species being dominant in colder and more arid areas. Areas with a high diversity of species assessed as threatened on the IUCN red list are largely restricted to the Mediterranean, Southwest Asia, and Japan, with clear hotspots found in the Levant and the southern half of Japan. The diversity at species, generic, and family level is higher in the south of Japan than in areas at a similar latitude in the western Mediterranean. This is likely to be the result of the more humid climate of Japan resulting in a higher diversity of freshwater habitats and the stronger impact of the glacial periods in the Western Palaearctic in combination with the Sahara, preventing tropical African lineages dispersing northwards." (Authors)] Address: Kalkman, V.J., Naturalis Biodiversity Center, 2300 RA Leiden, The Netherlands. Email: vincent.kalkman@naturalis.nl

**21188.** Karunaratne, S.; Surendran, S.N. (2022): Mosquito control: A review on the past, present and future strategies. *Journal of the National Science Foundation of Sri Lanka* 2022 50 (Special): 277-292. (in English) ["Nearly half a million deaths occur worldwide annually due to mosquito-borne diseases. Mosquito control has become the major strategy in controlling these diseases, especially in the absence of effective vaccines for disease prevention. At the beginning of the last century, mosquito control was mainly done by personal protection methods and larval control by application of petroleum oil and Paris green powder to water bodies. A breakthrough in mosquito control came in the 1940s with the introduction of synthetic neurotoxic insecticides which could suppress mosquito populations rapidly throughout the globe. However, a resurgence of populations with resistance to these insecticides was witnessed within a decade after their introduction. Environmental pollution caused by synthetic insecticides also became a major concern. Novel personal protection methods, community-level operations on source reduction, insect growth regulators and polystyrene beads for larval control, and biological control were introduced as alternatives. Biological control was mainly by larval predators such as fish, dragonfly nymphs, microcrustaceans and *Toxorhynchites* larvae; bacterial larvicides such as Bti; plant-based mosquitocides; and green-fabricated nanoparticles. However, even today, mosquito control programmes heavily depend on synthetic neurotoxic insecticides applied through insecticide residual spraying (IRS), fogging, larviciding and impregnated bed nets. Increased detoxification and target site insensitivity, developed as major insecticide resistance mechanisms, have been extensively studied in mosquitoes assisting proper management of available insecticides for which not many alternatives are available. Despite all our efforts, an unprecedented global emergence of mosquito-borne diseases is evident demanding novel strategies for mosquito control. The introduction of transgenic strains of mosquitoes to suppress or replace mosquito populations reducing disease transmission has become the latest effort. Population reduction has been achieved via releasing mosquitoes with a dominant lethal gene (RIDL) and by combining the conventional sterile insect technique (SIT) with *Wolbachia* mediated incompatible insect technique (IIT). Population replacement has been successful via releasing *Wolbachia* infected mosquitoes that are refractory to pathogen development and transmission. Advancement of gene- and allelic- drive systems will soon allow us to effectively spread refractory genes and insecticide susceptible alleles into mosquito populations overriding normal inheritance." (Authors)] Address: Karunaratne,

S., Dept Zool., Fac. Science, Univ. of Peradeniya, Peradeniya, Sri Lanka. Email: shppk@pdn.ac.lk

**21189.** Katsman, J. (2022): Ten years of dragonfly monitoring in Leersumse veld. *Brachytron* 23(1/2): 33-47. (in Dutch, with English summary) ["During 2012-2021 dragonflies were monitored conform the monitoring protocol in Leersumse Veld, Utrecht, the Netherlands. A total number of 38 species was found during this period, of which 20 were present in eight out of ten years. In addition all available Odonata observations in the National Databank Flora and Fauna (NDFP) for the four decades in 1982-2021 were analysed. During this period 44 Odonata species were observed in Leersumse Veld. *Aeshna juncea* and *Coenagrion lunulatum* disappeared after the first two decades. During the monitoring period 2012-2021 *Enallagma cyathigerum*, *Lestes virens*, *Libellula quadrimaculata* and *Sympetrum striolatum* were the most numerous species. Species typical of fens strongly decreased during the monitoring period, *Leucorrhinia rubicunda*, *Leucorrhinia dubia*, *Sympetrum danae* and *Enallagma cyathigerum*. *Sympetrum vulgatum* also decreased, while *Sympetrum striolatum* and *Lestes virens* increased strongly. These two species probably benefit from the dry and warm weather in the last years of the monitoring period. A few southern species increased or appeared, such as *Crocothemis erythraea*, *Sympetrum meridionale*, *Anax parthenope* and *Aeshna affinis*. These findings correspond with national trends observed in the Dutch Dragonfly Monitoring Scheme." (Author)] Address: Email: jan.katsman@planet.nl

**21190.** Kemal, M.; Koçak, A.Ö. (2022): Revised synonymous list of the pterygot insects in Van Province (East Turkey). *Priamus* 17(1): 1-112. (in English) ["Present publication deals with the updated species list of 17 pterygot orders from Van Province (East Turkey). Totally 3072 species of 209 families are listed with their synonyms. Key words: Pterygota, Ephemeroptera, Plecoptera, Odonata, Blattodea, Mantodea, Dermaptera, Phasmida, Orthoptera, Hemiptera, Homoptera, Planipennia, Trichoptera, Mecoptera, Diptera, Hymenoptera, Coleoptera, Lepidoptera, list, fauna, Van, Turkey. Six years ago, the authors published the first list of the Pterygota, recorded from Van Province as two thousand species (Koçak & Kemal, 2012). In this last period, the number of the recorded species reached to 3072. The studies on this subject are still ongoing. Below, the scientific names of the species are given alphabetically under their orders in two parts. For further information, including bibliography on the Pterygota and Lepidoptera of Van Province, see Kemal & Koçak (2013a-b, 2014, 2016a-b, 2017a-c, 2018), Koçak & Kemal (2012, 2013, 2015a-c, 2016, 2018), and Koçak (2014)." (Author)] Address: Koçak, A.Ö., c/o Van Yüzüncü Yıl University, Faculty of Science, Dept. of Biology, Turkey. Email: cesa\_tr@yahoo.com.tr

**21191.** Ketelaar, R. (2022): Atlas der Libeller in Niedersachsen/Bremen. K. Baumann, R. Jodicke, F. Kastner, A. Borkenstein, W. Burkart, U. Quante & T. Spengler (Red.). 2021. NIBUK, Ruppichteröth. Mitteilungen der Arbeitsgemeinschaft Libellen in Niedersachsen und Bremen, Sonderband. 383 p. ISSN 2366-9764. Prijs 30 euro. *Brachytron*23(1/2): 61-62. (in Dutch) [Book review] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, NL-6700 AM Wageningen, The Netherlands. E-mail: ketelaar@vlinderstichting.nl

**21192.** Kim, H.G.; Jang, R.H.; Kim, S.; Tho, J.-H.; Jung, J.-W.; Cheong, S.; Yoon, Y.-J. (2022): Developing habitat suitability index for habitat evaluation of *Nannophya koreana*

(Odonata: Libellulidae). *Journal of Ecology and Environment* 46:33: 10 pp. (in English) ["Background: *N. koreana*, is an endangered dragonfly with an increasing risk of extinction owing to rapid climate changes and human activities. To prevent extinction, the *N. koreana* population and their habitat should be protected. Therefore, suitable habitat evaluation is important to build the *N. koreana* restoration project. The habitat suitability index model (HSI) has been widely used for habitat evaluation in diverse organisms. Results: To build a suitable HSI model for *N. koreana*, 16 factors were examined by seven experienced researchers. A field survey for *N. koreana* observed sites and spatial analysis were conducted to improve the model. Five factors were finally selected by this procedure (crown density, open water surface, water depth, pioneer plant cover, and type of water source). Finally, the *N. koreana* HSI model was generated with the five adjusted factors based on interview, field survey, and spatial analysis. This model was validated by a current *N. koreana* habitat in 2021. With this model, 46 sites in Uljin-gun, Korea, were surveyed for *N. koreana* habitats; five sites were identified as core habitats and seven as potential core habitats. Conclusions: This model will serve as a strong foundation for the *N. koreana* restoration project and as a reference for future studies on *N. koreana* and other endangered insect populations. Further analysis and long-term data will improve the efficacy of this model and restore endangered wildlife." (Authors)] Address: Yoon, Y.-J., Res. center for Endangered Species, National Inst. Ecology, Yeongyang 36531, Rep. of Korea. E-mail yjyoon@nie.re.kr

**21193.** Koroiva, R.; Nóbrega Gomes, V.G.; Vilela, D.S. (2022): DNA barcoding and new records of Odonates (Insecta: Odonata) from Paraíba State, Brazil. *Diversity* 2022, 14(3), 203: 14 pp. (in English) ["Odonates are important insects in the food chains of freshwater environments around the world, being used as a model species for areas of behavior and analysis of environmental quality. In Brazil, especially in the Northeastern region, both knowledge about the distribution and molecular information of odonate species found in the two main biomes of the region is still limited. Aiming to improve these issues, here, we carried out an Odonata survey in two locations and built a DNA barcode database for species from the state of Paraíba. In total, 15 first records were reported for this Brazilian state and 142 specimens from 27 genera and 45 species had their 'Former' cytochrome c oxidase subunit I (COI) fragment evaluated. The database we generated includes data for 70% of the Odonata species found in Paraíba state. For 16 species, this is the first DNA barcode available in public sequence repositories. Our results demonstrate that using the COI in the regional scale can help identify and delimit those evaluated. Eight species (17%) showed a low percentage of differentiation (<2%) compared to other species currently deposited in the GenBank or BOLD System; nevertheless, we present morphological traits that reaffirm our identifications. Barcode data provide new insights into Neotropical diversity and deliver basic information for taxonomic analyses... 3.1. Sampling: Our samples added 15 new species records to the odonatofauna of Paraíba: *Dasythemis venosa* (Burmeister, 1839), *Dythemis nigra* Martin, 1897, *Epipleoneura metallica* Rácenis, 1955, *Erythrodiplax cf. fervida* (Erichson in Schomburgk, 1848), *Idioneura ancilla* Selys, 1860, *Macrothemis imitans* Karsch, 1890, *Metaleptobasis bicomis* (Selys, 1877), *Micrathyria didyma* (Selys in Sagra, 1857), *Micrathyria mengeri* Ris, 1919, *Nephepeltia berlai* Santos, 1950, *Orthemis flavopicta* Kirby, 1889, *Perithemis lais* (Perty, 1834), *Tauriphila australis* (Hagen, 1867), *Telebasis griffinii* (Martin, 1896) and *Triacanthagyna septima* (Selys in Sagra, 1857).

After performing the morphological analysis, all specimens (including those deposited in the DSEC/UFPB) that had previously been identified as *Anatya guttata* (Erichson in Schomburgk, 1848) were now identified as *Anatya januaria* Ris, 1911." (Authors)] Address: Koroiva, R., Dept Sistemática e Ecol., Univ. Federal da Paraíba, João Pessoa 58051-900, Paraíba, Brazil. Email: ricardo.koroiva@insa.gov.br

**21194.** Kovacs, T.; Olajos, P.; Murányi, D.; Juhász, P. (2022): Contribution to the Odonata fauna of the Balkan Peninsula. *Folia historica naturalia musei Matraensis* 27: 11-22. ["The article contains Balkanian data for 47 Odonata species, their distribution by country: Albania 26, Bosnia and Herzegovina 4, Bulgaria 2, Croatia 2, Greece 11, Montenegro 5, North Macedonia 16, and Serbia 35 species. Larval data of *Epallage fatime* from southeastern North Macedonia and *Caliaeschna microstigma* from southern Serbia are the most remarkable. The following species are important from a nature conservation point of view at European and/or Mediterranean level: Vulnerable – *Cordulegaster heros*, *Lindenia tetraphylla*; Near Threatened – *Brachytron pratense*, *Caliaeschna microstigma*, *Coenagrion ornatum*, *C. pulchellum*, *Cordulegaster bidentata*, *C. heros*, *Cordulia aenea*, *Epallage fatime*, *Gomphus flavipes*, *Lindenia tetraphylla*." (Authors)] Address: Kovács, T., Mátra Museum of the Hungarian Natural History Museum, Kossuth Lajos u. 40, 3200 Gyöngyös, Hungary. Email: koati1965@gmail.com

**21195.** Krieg-Jacquier, R.; Schaming, Q. (2022): Reproduction d'*Oxygastra curtisii* (Odonata: incertae sedis) sur un étang de pêche de loisir en Bresse (Ain – France). *Martinia* 36(4): 34-38. (in French, with English summary) ["Evidence of reproduction of *Oxygastra curtisii* (Odonata: incertae sedis) on a fishing pond in Bresse (Ain - France). L'étang des Benonnières se situe sur la commune de Jasseron à l'est de Bourg-en-Bresse (Ain) (lat. 46,224905, long. 5,31638; 269 m.a.s.l.)] Address: Schaming, Q., Groupe de recherche et de protection des libellules *Sympetrum*, 39 rue du Château 01000 Saint-Denis-Lès-Bourg

**21196.** Laciak, M.; Zajac, T.; Adamski, P.; Bielanski, W.; Cmiel, A.; Laciak, T.; Lipinska, A. (2022): Small monsters: Insect predation limits reproduction of yellow-bellied toad *Bombina variegata* to ponds in their earliest successional stage. *Aquatic Conservation: Marine and Freshwater Ecosystems* 32(5): 817-831. (in English) ["The disappearance and deterioration of amphibian breeding habitats is a major cause of their global extinction. In Europe, this problem affects the yellow-bellied toad *Bombina variegata*, which inhabits small ponds in the early stages of succession, where no predatory invertebrate species normally occur. Nonetheless, as habitats, small temporary ponds are highly endangered, a situation that is intensifying with urban spread. A system of 13 pairs of artificial ponds was constructed in 2012 for the breeding of *B. variegata* with the aim of reconnecting disjunct populations. During the 2 years of the study, one of the twin ponds was regularly cleared of emergent vegetation and invertebrates. The survival rates of the tadpoles released in the cleared and uncleared ponds were analysed. The survival rate of the tadpoles released into the cleared ponds was higher than of those introduced into the uncleared ones. Tadpole survival rates were also higher in new, single ponds, constructed in 2013. The lower survival rates of the introduced tadpoles are best explained by the presence of predatory aquatic invertebrates, particularly the large diving beetle *Dytiscus marginalis*. Experimentally obtained consumption rates indicate that one *Dytiscus* larva is capable of destroying a typical clutch of *B. variegata* tadpoles

within a few hours, much faster than any of the other insect predators tested. The impact of freshwater invertebrates on tadpoles is frequently studied but rarely quantified. For conservation measures to be effective, quantitative standards need to be applied that describe the impact of predation in a predictable manner. Construction of artificial small ponds is broadly accepted as an important conservation measure compensating for the disappearance of natural amphibian breeding sites. This function of artificial ponds may be substantially enhanced by the periodic removal of invertebrate predators. ... The experiment was carried out in May–August 2015 and June–August 2016 in the laboratory. Specimens of presumed insect predators were collected from 39 ponds. They belonged to three orders: dragonflies (Odonata – Anisoptera: *Aeshna cyanea* (larvae), *Cordulia aenea* (larvae)); Zygoptera: *Coenagrionidae* (larvae)); bugs (Hemiptera – Heteroptera: *Notonecta glauca* (imagines), *Nepa cinerea* (imagines), *Corixidae* sp. (imagines); and beetles (Coleoptera – Dytiscidae: *Dytiscus marginalis* (larvae, imagines), *Ilybius* sp. (larvae, imagines))." (Authors)] Address: Laciak, Malgorzata, IOP PAN, Mickiewicza 33, 31-120 Kraków, Poland. Email: laciak@iop.krakow.pl

**21197.** Li, F.; Zhang, Y.; Altermatt, F.; Zhang, X.; Cai, Y.; Yang, Z. (2022): Gap analysis for DNA-based biomonitoring of aquatic ecosystems in China. *Ecological Indicators* 137, April 2022, 108732: 11 pp. (in English) ["Highlights: • COI records of freshwater fish, aquatic insects and molluscs in Chinese rivers are analyzed. • Gaps in barcode coverage of species in three aquatic animal groups of China is 40–70%. • Nearly 90% of the COI sequences of aquatic species in China come from other countries. • The pairwise genetic distance of local barcodes is 3 to 5 times lower than non-local barcodes. • Nearly 60% of aquatic species in each catchment in China have at least one barcode. Abstract: DNA-based taxon identification is improving the assessment and management of biodiversity in rivers. However, the lack of comprehensive DNA barcode reference libraries and globally highly unequal coverage are still hindering the application prospects of this method worldwide. Here, we analyzed the COI barcode gap in two reference libraries, Barcode of Life Data Systems (BOLD) and NCBI GenBank, with a focus on three aquatic animal groups (freshwater fish, aquatic insects and molluscs) in Chinese rivers. Our data show gaps in barcode coverage (e.g., organisms without barcodes) of ca. 40–70% of taxa in these groups in the BOLD or NCBI GenBank database, respectively. These gaps can rise even further if the barcode thresholds are set to contain at least five reference sequences per taxon. Furthermore, most barcodes are from non-local samples, and only 14.4% (BOLD) and 28.8% (NCBI GenBank) of reference sequences were from organisms sampled in China, respectively. The pairwise genetic distance of local barcodes is 3 to 5 times lower than non-local barcodes, indicating that the latter may not be a good substitute. When looking at individual catchments, ca. 60% of the potentially occurring aquatic species have one or more barcodes, yet the barcode coverage varies slightly across ten major river catchments, ranging from 54.3% (Liao River basin) to 68.2% (Huai River basin). The taxa Salmoniformes and Perciformes in freshwater fish, Odonata and Diptera in aquatic insects, and *Bivalvia* in molluscs have the best barcode coverage in most catchments (mean coverage >70%). This study gives the first overview and current status of barcode reference libraries of three major aquatic animal groups in Chinese rivers. Our results will help to better interpret current metabarcoding studies from China, and also provide a basis to develop a strategy of filling the gaps



in the reference libraries of aquatic species in China." (Authors)] Address: Zhang, Y., Institute of Environmental & Ecological Engineering, Guangdong Univ. Technology, Guangzhou 510006, China. E-mail: zhang.yuan@gdut.edu.cn

**21198.** Lienard, M.A.; Valencia-Montoya, W.A.; Pierce, N.E. (2022): Molecular advances to study the function, evolution and spectral tuning of arthropod visual opsins. *Philosophical Transactions B* 3772021027920210279 <http://doi.org/10.1098/rstb.2021.0279>: 14 pp. (in English) ["Visual opsins of vertebrates and invertebrates diversified independently and converged to detect ultraviolet to long wavelengths (LW) of green or red light. In both groups, colour vision largely derives from opsin number, expression patterns, and changes in amino acids interacting with the chromophore. Functional insights regarding invertebrate opsin evolution have lagged behind those for vertebrates because of the disparity in genomic resources and the lack of robust in vitro systems to characterize spectral sensitivities. Here we review bioinformatic approaches to identify and model functional variation in opsins as well as recently developed assays to measure spectral phenotypes. In particular, we discuss how transgenic lines, cAMP-spectroscopy, and sensitive heterologous expression platforms are starting to decouple genotype-phenotype relationships of LW opsins to complement the classical physiological-behavioral-phylogenetic toolbox of invertebrate visual sensory studies. We illustrate the utility of one heterologous method by characterizing novel LW Gq opsins from 10 species, including diurnal and nocturnal Lepidoptera, a terrestrial dragonfly and an aquatic crustacean, expressing them in HEK293T cells, and showing that their maximum absorbance spectra ( $\lambda_{max}$ ) range from 518 to 611 nm. We discuss the advantages of molecular approaches for arthropods with complications such as restricted availability, lateral filters, specialized photochemistry and/or electrophysiological constraints." (Authors)] Address: Liénard, Marjorie, Dept Biol., Lund Univ., 22362 Lund, Sweden. Email: marjorie.lienard@biol.lu.se

**21199.** Louboutin, B. (2022): Plus de 72 minutes: à propos d'une durée record de ponte immergée chez *Coenagrion mercuriale* (Odonata: Coenagrionidae). *Martinia* 36(5): 39-43. (in French, with English summary) [More than 72 minutes: About a record duration of underwater oviposition in *Coenagrion mercuriale* (Odonata: Coenagrionidae). "The site is a back channel ("contre-canal") located at Donzère, on the banks of the Rhône (44.41431°N, 4.70648°E, 54 m altitude). On this section (Fig. 1), the water is running, permanent and clear, mainly fed by phreatic resurgences. Observation: A male floating on the surface of the water spotted a female laying eggs just below (at 13 h 46' (t0)). The male quickly flew away and a female was discovered at a depth of 5 cm already laying eggs in a large foot of *Iris pseudacorus* (Fig. 2). She was therefore already immersed before the observation started, probably for several minutes. The observation continued to find out if she was really using the *Iris* as an oviposition support and then to time her immersion time. For more than an hour, she progressively descended along the stem to about 15 cm under water, the bottom being at a depth of 20 cm. At 14 h 58' (t + 72min) it suddenly rose like an air bubble to the surface (Fig. 3). At 15 h 00' (t + 74min) it flew away easily to land nearby on a leaf in the sun and clean its head. She appeared to be little harassed by males, perhaps because she was andromorphic. She was lost to view at 15 h 04' (t +78 min) when she flew away again." Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version).] Address: Louboutin, B., Office pour les insectes et leur environnement, antenne en Occitanie,

CBGP - 755, avenue du campus Agropolis - CS 30 016, F-34988 Montferrier-sur-Lez Cedex, France. Email: bas-tien.louboutin@insectes.org

**21200.** Mahfoufi, N.; Saib, C. (2022): La biodiversité des Odonates du sous-bassin versant de l'Oued Boubhir dans la région de Tizi-Ouzou. MSc. thesis, Université Mouloud Mammeri de Tizi-Ouzou, Faculté des sciences Biologiques et des sciences Agronomiques, Département de Biologie, En vue de l'obtention du diplôme de Master en Ecologie et Environnement. Spécialité: Biodiversité et Environnement: 90 pp. (in French, with English summary) ["The aim of this study is to determine the structure and composition of the odonatological fauna of wetlands in a lotic ecosystem in the Oued Boubhir sub-watershed (Tizi-Ouzou region) from March to June 2022. The results obtained identified a rate of 350 individuals captured, belonging to 15 species of odonates distributed over two suborders, including 11 species of Anisoptera and 4 of Zygoptera. The Anisoptera dominate in number of individuals and in number of species, particularly the family Gomphidae is the most represented with 4 species, that is to say more than 41% of the whole. The aim of this study is to determine the structure and composition of the odonatological fauna of the wetlands in a lotic ecosystem in the sub-catchment of the Oued Boubhir (Tizi-Ouzou region) from March to June 2022. The results obtained identified a rate of 350 individuals captured, belonging to 15 species of odonates distributed over two suborders, including 11 species of Anisoptera and 4 of Zygoptera. The Anisoptera dominate in number of individuals and in number of species, particularly the family Gomphidae is the most represented with 4 species, i.e. more than 41% of all the odonates recorded. The inventory of larvae and exuviae confirms the autochthony of species such as *Calopteryx haemorrhoidalis*, *Boyeria irene*, *Onychogomphus forcipatus*, *O. costae*, *O. uncutus*, *Gomphus lucasii* and *Orthetrum coerulescens*. Two Maghribian endemic species, *Platycnemis subdilata* and *Gomphus lucasii* were recorded. June seems to be the richest and most favourable month for the development of dragonflies. We also studied the phenology of these odonatological species with a comparison with the model of Samraoui & Corbet (2000) and we thus carried out a study on their ecology." (Authors/DeepL)] Address: not stated

**21201.** Mandape, S.M.; Kamdi, R.R. (2022): Diversity of aquatic insect as a bioindicator with water quality parameters of selected Wainganga River basin area of Pauni, district Bhandara, (M.S.). *International Journal of Researches in Biosciences, Agriculture and Technology (X)* Vol (II) May 2022: 80-86. (in English) ["A study was conducted on the diversity of aquatic insects in the area of Pauni which is the Kashi of Vidarbha (Latitude 20° 48' 17" and Longitude 79° 37' 51") is located in Maharashtra. This study is a part of biomonitoring research programme of the basin areas of Pauni using entomological indicator of lotic ecosystem during January-2021 to December-2021. The current study revealed 25 species of aquatic insect belonging to 5 different orders were recorded. At order level highest species of Hemiptera (7) were recorded Similarly, Coleoptera (5), Odonata (6), Diptera (4), Ephemeroptera (3) aquatic insect species was found in basin water ecosystem. Different diversity indices were recorded out in all seasons. Thus, water quality parameter included viz. Water temperature, Water pH, Dissolve oxygen, Biochemical oxygen demand, Water turbidity, and Total dissolve solid. Physiochemical data and biological data showed in the paper." (Authors) *Brachythemis contaminata*, *Crocothemis servilia*, *Ceriatagrion coromandelianum*, *Ischnura heterostricta*, *Acisoma* sp., *Pseudagrion*

sp.] Address: Mandape, S.M., Dept of Zoology, Institutions of Higher Learning Research & Specialized Studies, Anand Niketan College, Anandwan, Warora, Dist. Chandrapur (M.S.), India. Email: mandapeswapnil8@gmail.com

**21202.** Manger, R. (2022): Foraging swarms of Spotted darter (*Sympetrum depressiusculum*) in 2018 and 2019. *Brachytron* 23: 53-57. (in Dutch, with English summary) ["On three evenings of extremely hot days in July of 2018 and 2019 large groups of high-flying *S. depressiusculum* were encountered in the Woldlakebos in the northwest of Overijssel. These swarms were not migrating but stationary. They were foraging on little insects that under these weather conditions were able to fly high." (Author)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

**21203.** Manger, R.; De Knijf G. (2022): Mass reproduction of the Vagrant Emperor (*Anax ephippiger*) in Belgium and the Netherlands in the summer of 2019. *Brachytron* 23(1/2): 7-21. (in Dutch, with English summary) ["From 7 June 2019 onwards, an invasion of the Vagrant Emperor (*Anax ephippiger*) was observed in much of Belgium and the Netherlands with not less than 482 individuals and 1744 individuals being observed respectively. Ovipositing behavior was found at 31 locations. In August and September 2019 exuviae and freshly emerged imagoes were found at 1 site in Belgium and 6 sites in the Netherlands. More than 1000 exuviae or teneral were found in an urban city pond of Antwerp (Belgium) and at Millingerwaard, in the river valley of the river Waal near Nijmegen (the Netherlands), being the two most important sites. First emergences of *Anax ephippiger* were noticed on 23 August in the Netherlands and on 29 August in Belgium, resulting in a larval development time of respectively 78 and 81 days. Reproduction habitat consisted mainly of partially drying ponds characterized by high water temperatures in the summer of 2019. Those habitats were situated in diverse landscape configurations such as an urban area, dune ecosystems, fens in heathland, and ponds in a river valley ecosystem. Emergence took place during the night and maiden flight only occurred just before the onset of the sun and lasted not much more than 10 minutes. Most of the exuviae were found on aquatic plant stems and leaves above the water. At 80% of the locations where ovipositing of *Anax ephippiger* was observed in June 2019, successful reproduction of *Sympetrum fonscolombii* was found later summer."] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

**21204.** Manna, S.; Manna, S.; Roy, A. (2022): Habitat specificity of phyto-diversity in semiurban lotic system: A case study. *Indian Hydrobiology* 21(2): 103-112. (in English) ["Biological diversity plays pivotal role in maintaining the physico-chemical conditions vis-à-vis homeostasis of ecosystems. The unicellular to complex multicellular forms of different biodiversity components prove their importance by providing the security of ecological health of ecosystems especially the aquatic once. The objective of this study was to find out the habitat specificity of Phyto-diversity sustained throughout the different segments of Bariti Beel based on variation of some environmental factors. It is revealed that, there was significant alteration in planktonic population in zone-A and zone-B. The macrophyte vegetation with five distinct stands supports to sustain different insect communities especially Odonates, Hemipterans and Coleopteran beetles. Most predictable abiotic factors controlling growth and reproduction of different growth forms of algae were derived through

multiple regressions along with the prediction model with high significance level ( $p = 0.15$ ). Specificity in establishment and distribution of some floral species as a result of their response to the environmental factors of the habitats both in micro and macro level was noted. This study would be helpful in wetland management through biomonitoring and maintenance of water quality with necessary biotic community." (Authors)] Address: Roy, A., West Bengal Biodiversity Board, Prani Sampad Bhawan, LB-2 Block, Sector-III, Salt Lake City, Kolkata – 700 106, West Bengal, India. Email: aroy.wbbb@gmail.com

**21205.** Massote, C.; Almeida Pessoa, D.M.; Cardoso Peixoto, P.E. (2022): The conspicuousness contradiction: brighter males have lower mating chances in the damselfly *Argia hasemani* but not in *Argia croceipennis*. *Biological Journal of the Linnean Society* 137(1): 47-53. (in English) ["In odonates, male coloration is often more conspicuous than female coloration. This difference is frequently attributed to the role of male colour in male-male competition to access females. However, there are sexually dimorphic odonate species, such as the damselflies *Argia hasemani* and *Argia croceipennis*, in which male-male interactions are much less intense. In these species, it might be that male coloration affects male success directly when interacting with females. Therefore, we hypothesized that males with more intense coloration present higher copulation success. To investigate this hypothesis, we registered which males copulated in the field during 4 days and estimated the coloration of all observed males in the female visual spectrum. Surprisingly, we found that dull males had higher chances of copulation in *A. hasemani*, whereas in *A. croceipennis* male coloration did not influence the chances of copulation. Our data also indicated that brighter males of *A. hasemani* were also more conspicuous to potential avian predators, whereas this was not the case in *A. croceipennis*. We suggest that females of *A. hasemani* might avoid brighter males owing to increased risk of predation during copulation." (Authors)] Address: Massote, Clara, Laboratory of Agonistic Interactions and Sexual Selection, Federal University of Minas Gerais, Avenida Antônio Carlos, Belo Horizonte, MG, Brazil. E-mail: classote@gmail.com

**21206.** Miguel, T.B.; Calvão, L.B.; Alves-Martins, F.; Batista, J.D.; Rodrigues, M.E.; Guillermo-Ferreira, R.; De Marco Júnior, P.; Juen, L. (2022): Odonates in warm regions of south america largely do not follow Rapoport's rule. *Biodiversity and Conservation* 31: 565-584. (in English) ["One of the major challenges of ecologists and biogeographers is to understand how species are globally distributed. Two of the most well-studied large-scale patterns in species distributions are the Rapoport's rule and the Latitudinal Diversity Gradient (LDG). We aimed to address whether Neotropical odonates follow the Rapoport's rule and if there is a latitudinal gradient in species diversity. A total of 1076 records for 190 species, covering a large area from southeastern to the northern regions of Brazil that extends from 23°S (Cerrado) to 3°N (Amazon Rainforest). Generalized Linear Models were used to address whether Neotropical odonates follow the Rapoport's rule, and if there is a latitudinal gradient in species diversity, based on our predictions. We found a Rapoport effect in the Amazon biome and an inverse Rapoport effect in the Amazon-Cerrado Transition Forest and Cerrado biome. Regarding LDG, we found no significant effect of latitude on species richness patterns when we considered all the species, and a significant relationship between species richness and latitude for zygopteran. The spatial patterns of odonates geographic distribution may be

an outcome of geographical barriers, for instance, the continental geometry of South America, which is broader in the north and limits geographical expansion towards the south. Furthermore, species ecophysiological mechanisms may also hamper their expansion and drive the pattern observed in our study, mainly because of evolutionary thermoregulatory adaptations that each taxon exhibits along its environmental gradient." (Authors)] Address: Thiago Barros Miguel, T.B., Instituto Federal de Educação Ciência e Tecnologia de Mato Grosso - Campus Barra do Garças, Estrada de acesso a BR-158, Radial José Maurício Zampa, s/n, Bairro Industrial, Barra do Garças, MT, CEP: 78600-000, Brazil

**21207.** Mollier, S.; Kunstler, G.; Dupouey, J.-L.; Bergès L. (2022): Historical landscape matters for threatened species in French mountain forests. *Biological Conservation* 269, 109544: 19 pp. (in English) ["Ancient forests are known to host a biodiversity of high ecological distinctiveness and are likely to provide habitat for red-listed species. Yet, few studies have investigated the role of forest continuity for the conservation of threatened species. We used species-presence data on red-listed species from 12 taxonomic groups (Spermatophyta, Pteridophyta, Bryophyta, Lichens, Chiroptera, Aves, Squamata, Amphibia, Coleoptera, Lepidoptera, Odonata and Orthoptera) to ascertain if ancient forests are an important habitat for threatened species in five mountain and subalpine protected areas in France. We compared the effect of the amount of historical forest (1853–1860) with the effect of the amount of current forest on the distribution of red-listed species in six circular landscape buffers ranging in radius from 100 to 1500 m. We showed that the amount of historical forest in the landscape had a positive effect on forest Spermatophyta, Bryophyta, Coleoptera and edge forest Pteridophyta with a better predictive power than current forest area, highlighting a colonization credit in recent forests. Conversely, edge-forest lepidopterans were more negatively affected by historical than by current forest area, highlighting an extinction debt in recent forests. Our findings underline that implementing protective measures of ancient forests would be a better strategy than afforestation to preserve threatened forest species in mountain and subalpine forest landscapes." (Authors) In my opinion many of the bird and dragonfly taxa - I only checked these - are classified wrong in Appendix C to this publication. (Authors)] Address: Mollier, S., Université Grenoble Alpes, INRAE, LESSEM, 2 rue de la papeterie, F-38400 St-Martin d'Hères, France. Email: sylvain.mollier@inrae.fr

**21208.** Moreno-Pallares, M. I.; Lobo-Hernández, M.; Gutiérrez-Moreno, L.C.; Pérez-Gutiérrez, L. (2022): Relación de las larvas de Odonata con las raíces de *Eichhornia crassipes* en la ciénaga la Larga, Atlántico, Colombia. *Intropica* 17 (2): 10 pp. (in Spanish, with English summary) ["The purpose of this study was to evaluate the association of Odonata larvae with the roots of *Eichhornia crassipes* in La Larga wetland. For the capture of Odonata larvae, standardized sampling techniques for aquatic macroinvertebrates were used. Six samplings were carried out and in each sampling 100 individuals of *E. crassipes* were collected. The length and volume of each root were obtained. A total of 738 individuals and 10 species of Odonata were collected; *Miathyria marcella* presented the highest abundance, with 83 % of the total sampled. The percentage of occupation of the roots of *E. crassipes* by Odonata larvae was 58 % (346 of the 600 roots collected). The collected roots varied between 5 and 58 cm in length and between 5 and 450 ml in volume. Significant differences were found in the composition and structure of the larvae with respect to the volume of the roots.

Larval lengths ranged from 2.4 to 24.3 mm; most of the collected individuals were found in the length range between 5.1 and 10 mm. In conclusion, the size of the root is not a determinant for the distribution of odonates in the roots of *E. crassipes*, while the volume of the roots of *E. crassipes* does influence the composition of larvae." (Authors)] Address: Monero-Pallares, Maria, Grupo de investigación Biodiversidad del Caribe colombiano, Univ. del Atlántico, Barranquilla, Colombia. Email: mariainesmoreno@mail.uniatlantico.edu.co

**21209.** Naeem, M.; Sattar, S.; Zia, A.; Rehman, A.; Iqbal, T.; Mehmood, S.A.; Ahmed, S.; Shahjeer, K. (2022): Odonata (Dragonflies and damselflies) naiads in sub Himalayan foothills of Pakistan. *Journal of Animal & Plant Sciences* 32(6): 1616-1627. (in English) ["A series of surveys were conducted during two consecutive years (2014-15) to explore the Odonata naiads from the sub-Himalaya of Pakistan and it revealed 23 species. Sub-order Anisoptera was represented by 16 species under 13 genera, and suborder Zygoptera represented 7 species under 5 genera. In Anisoptera, the family Libellulidae, followed by Aeshnidae and Gomphidae, was recorded as dominant. While in Zygoptera, the dominant family was recorded as Coenagrionidae, followed by Chlorocyphidae. For each recorded species, individual diagnosis, details like date of collection, number of male/females recorded, coordinates of locality, prevalent air temperature at localities, water body temperature, global distribution, and habitat description are provided. In Pakistan, taxonomic and faunistic studies on Odonata nymphs are highly limited and thus, it was decided to enhance knowledge over this ignored and neglected group by thoroughly surveying sub-Himalaya in Pakistan, which is less explored for biological surveys, especially for class Insecta. The manuscript brought forward a record of five naiads species for the first time from Pakistan." (Authors)] Address: Rehman, A., School of Horticulture and Plant Protection and Institute of Applied Entomology, Yangzhou University, Yangzhou 225009, China. Email: rehman.ento@aup.edu.pk

**21210.** Nel, A. (2022): Revision of the damselfly *Hesperagrion praevolans* (Odonata, Zygoptera, Coenagrionidae) from the uppermost Eocene of Florissant (Colorado, USA). *Palaeoentomology* 5.6.2: 517-519. (in English) ["The damselfly family Coenagrionidae is rather frequently found in the Cenozoic fossil record (Nel & Paicheler, 1993), but it remains unknown in the Mesozoic. The known fossils are generally isolated wings, very difficult to accurately attribute to precise genera, to the point that many fossils can be only considered as 'genera and species undetermined' (Nel et al., 1997). The oldest described coenagrionid fossil is the late Palaeocene *Marado marado Petrulevicius*, 2021 (Maíz Gordo Formation, Argentina), a genus and species based on an isolated incomplete wing. Thus, other Eocene representatives of the family are important for future accurate dating of the occurrence of the family and its subdivisions, especially those that have been attributed to extant genera; a future step after the important work of Dijkstra et al. (2014) for the understanding of the evolution of these damselflies." (Author)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**21211.** Niwa, H.; Hirata, T. (2022): A new method for surveying the world's smallest class of dragonfly in wetlands using unoccupied aerial vehicles. *Drones* 2022, 6(12), 427; <https://doi.org/10.3390/drones6120427>: 6 pp. (in English) [„Field surveys in wetlands are limited by the difficulty in ac-

cessing the site, hazards during surveys, and the risk of disturbing the ecosystem. Thus, the use of unoccupied aerial vehicles (UAVs) can overcome these limiting factors and can assist in monitoring small organisms, such as plants and insects, that are unique to wetlands, aiding in wetland management and conservation. This study aimed to demonstrate the effectiveness of a survey method that uses a small drone equipped with a telephoto lens to monitor dragonflies, which are unique to wetlands and have been difficult to survey quantitatively, especially in large wetlands. In this study, the main target species of dragonflies was *Nannophya pygmaea*, which is the world's smallest dragonfly (about 20 mm long). The study area was Mizorogaike wetland (Kita Ward, Kyoto City, Japan). The UAV was flown at a low speed at an altitude of 4 m to 5 m, and images were taken using 7× telephoto lens on Mavic 3 (7× optical and 4× digital). A total of 107 dragonflies of seven species were identified from the photographs taken by the drone. *N. pygmaea*, about 20 mm long, was clearly identified. Eighty-five dragonflies belonging to *N. pygmaea* were identified from the images. Thus, by using a small drone equipped with a telephoto lens, the images of *N. pygmaea* were captured, and the effects of downwash and noise were reduced. The proposed research method can be applied to large wetlands that are difficult to survey in the field, and can thus provide new and important information pertaining to wetland management and conservation. This research method is highly useful for monitoring wetlands as it is non-invasive, does not require the surveyor to enter the wetland, requires little research effort, and can be repeated." (Authors)] Address: Niwa, H., Fac. Bioenvironmental Science, Kyoto University of Advanced Science, Kyoto 621-8555, Japan

**21212.** Nurmaisah; Septiawan, R.A. (2022): The diversity of insects found in polycultural land of green spinach (*Amaranthus* sp) in Sinar Harapan Farming Group, Tarakan. The 1st International Conference On Indigenous Knowledge For Sustainable Agriculture 2022. ISBN: 978-623-331-387-2: 1-7. (in English) ["The diversity of insect species has an important role in the ecosystem stability. The farming system in kampung enam village used a polyculture farming system. Polyculture farming can increase the ecosystem stability since providing a better environment for the predatory insects and parasitoids in controlling the natural pest population in a commodity. One horticultural commodity found in polyculture land in Sinar Harapan Farmer Group of Tarakan is spinach. The declining quality and production of spinach is caused by several plant-disturbing organisms, such as insects. This research aimed to figure out the diversity and dominance of insects in the polyculture land of green spinach (*Amaranthus* sp) in the Sinar Harapan Farmer Group of Tarakan. The data were collected using traps, such as yellow traps and pitfall traps. Furthermore, identification was conducted at the Plant Protection Laboratory, Faculty of Agriculture, Universitas Borneo Tarakan. The obtained data were analysed using the Shannon Wiener diversity index and Simpson dominance. The research results show that the obtained insects were included into 9 orders, 36 families, 58 species with a total number of 912 individuals. Based on the analysis results using the Shannon Wiener diversity index and Simpson dominance, the diversity of insects in polyculture land of green spinach (*Amaranthus* sp) was 3.12 (H') in which the diversity was categorised into high. Meanwhile, the value of insect dominance index was 0.02 with the dominant insect type of dragonfly (*Pantala flavescens*) with a total number of 115 individuals." (Authors) The list of odonate species includes *Neurothemis terminata*, *Orthetrum sabina*, *Pantala flavescens*, *Rhodothemis rufa*, *O. glaucum*,

*Rhyothemis phyllis*, *Agriocnemis pygmaea*, and *Ischnura senegalensis*.] Address: Nurmaisah, Departement of Agro-technology, Borneo Tarakan University, Indonesia. Email: nurmaisah626@gmail.com

**21213.** Oliveira, T.M.D. de; Renne, D.G.S.2; de Souza, M.M. (2022): Libélulas (Odonata) na música Brasileira. *JOSIFI* 2022. 14a Jornada Científica e tecnológica, 11° Simpósio de Pós-Graduação Instituto Federal Sul de Minas Gerais: 4 pp. (in Portuguese) ["Odonata have several popular names in Brazil, which has the greatest wealth of dragonflies in the world, and many of them occupy anthropized environments, which explains the presence of these insects in different cultural manifestations. Thus, the objective of this work is to report Brazilian songs about dragonflies, with the purpose of demonstrating how present these insects are in our culture. The study consisted in reviewing videos and articles in several platforms using terms like "dragonflies music; dragonfly music; dragonfly music; insect music; odonata music". With this, seven works citing these insects were found. It can be considered that Odonata is little present in Brazilian music by the amount of existing works, however, these few works explore or suggest biological and behavioral characteristics directly, such as their flight, oviposition behavior, voracity, besides also using different popular names of these animals." (Authors/DeepL)] Address: Oliveira, T.M.D. de; E-mail: tomas.dias@alunos.ifsuldeminas.edu.br

**21214.** Pacheco, J.P.; Calvo, C.; Aznarez, C.; Barrios, M.; Meerhoff, M.; Jeppesen, E.; Baatrup-Pedersen, A. (2022): Periphyton biomass and life-form responses to a gradient of discharge in contrasting light and nutrients scenarios in experimental lowland streams. *Science of the Total Environment* 806 (2022) 150505: 9 pp. (in English) ["Highlights: • We tested periphyton responses to discharge and different light and nutrient availability. • Light availability modulated contrasting periphyton responses to discharge. • High light and nutrients enhanced periphyton biomass with increased discharge. • Low light, induced periphyton loss and low profile dominance with higher discharges. • Discharge and nutrients, but not light drove changes in periphyton life-forms. Abstract: Climate-induced changes in precipitation and land-use intensification affect the discharge of streams worldwide, which, together with eutrophication and loss of riparian canopy, can affect periphyton biomass and composition, and therefore, ultimately the stream functioning. We investigated the responses of periphyton biomass and life-forms (i.e., high profile, low profile and motile) to these changes applying an experimental approach by modulating nutrients (nutrient diffusion substrates enriched with 0.5 M NH<sub>4</sub>NO<sub>3</sub> + 0.031 M KH<sub>2</sub>PO<sub>4</sub> and without nutrient enrichment) and light availability (50% shade and full light) along a gradient in discharge ranging from 0.46 to 3.89 L/s (0.7 to 6.5 cm/s) in twelve large-sized (12- m long) outdoor flumes resembling lowland streams. We also analysed the potential effects of other environmental variables including macro-invertebrates on the responses of periphyton to discharge, nutrients, and light. Light and nutrient availability drastically affected periphyton biomass and composition responses to discharge. Periphyton biomass decreased with increasing discharge when shaded but this did not happen when exposed to full light. Under full light conditions, nutrient enrichment mediated an increase in the periphyton biomass with increasing discharge, possibly reflecting an increased metabolism, but this did not happen under non-enriched conditions. Enrichment further affected the compositional responses of periphyton to discharge, with an increase in the biomass of motile, fast growing, small-sized flagellated at



low discharge conditions, and mitigating a loss of high profile periphyton under higher discharges. Light did not affect periphyton composition, and the abundance or feeding-group composition of the macroinvertebrates did not affect biomass or composition of the periphyton either. Our results suggest that nutrient enrichment and light play an important synergistic role in the responses of the periphyton biomass and composition to discharge and emphasize the relevance of riparian canopy conservation and eutrophication control to avoid periphyton growth under increased discharge scenarios in small lowland streams. ... Predator macroinvertebrates were the second most abundant group (Appendix S6), mainly represented by Coleoptera (Dytiscidae, Gyrinidae and Noteridae), Anisoptera, and Chironomidae (Tanyptodinae)." (Authors)] Address: Pacheco, J.P., Dept Bioscience, Aarhus University, Silkeborg 8600, Denmark

**21215.** Pcola, S.; Nutil, J.; Vlasáková, M.; Štofík, J. (2022): Contribution to the dragonflies (Insecta: Odonata) acquaintance in the north-eastern part of Slovakia. *Ochrana prírody, Banská Bystrica* 40: 23-37. (in Slovakian, with English summary) ["The article summarizes information on 49 species of dragonflies (70% of the known species in the Slovak Republic) found at 97 locations in north-eastern Slovakia, of which 24 species are included in the national red list and 17 are protected by law. The research increased the knowledge on the species composition in this part of the country with 14 species identified for the first time in this region. The occurrence of the species of European importance (*Coenagrion ornatum*), was confirmed at the site Mokrad pri Ciroche." (Authors)] Address: Nutil, J., Komenského 2660/10, 069 01 Snina, Slovakia

**21216.** Pessacq, P.; Anjos-Santos, D.; Carvalho, F.G.; Calvao, L.B.; Memdoza-Penagos, C.C.; Juen, L. (2022): A new Epipleoneura Williamson, 1915 (Zygoptera, Coenagrionidae) from northern Brazil and notes on *E. venezuelensis* Rácenis, 1955. *Zootaxa* 5219(2): 164-153. (in English, with Portuguese summary) ["Epipleoneura lencionii sp. nov. is erected based on specimens from Acre State (holotype: 10°7'38.5"S; 67°38'6.7"W, 12.ix.2017, Miguel, T.B. leg). Additional material collected in Minas Gerais was also studied, but subsequently was lost in a fire at the National Museum of Rio de Janeiro. We compared the new species with *E. venezuelensis* Rácenis, 1955. *Epipleoneura lencionii* differs from *E. venezuelensis* by the orientation of the lateral lobes on the male epiproct and by the shape of the posterior lobe of the prothorax of the female. The distribution of the species is analyzed and notes on the reproductive behavior of the genus are provided." (Authors)] Address: Pessacq, P., Laboratorio de Investigaciones en Ecología y Sistemática Animal, Centro de Investigación Esquel de Montaña y Estepa Patagónica (LIESA-CIEMEP-CONICET), Chubut, Argentina. 2Facultad de Ciencias Naturales y Ciencias de la Salud, Universidad Nacional de la Patagonia "San Juan Bosco", Chubut, Argentina.

**21217.** Portilla, G.; Rendón, A. (2022): Diseño de estudio del movimiento de microplásticos en la cadena trófica. Tesis de grado, Escuela Superior Politécnica del Litoral, Guayaquil: 49 pp. (in Spanish, with English summary) ["Microplastics biomagnification have been extensively studied in marine ecosystems. However, studies in freshwater ecosystems are less frequent. Many invertebrates, such as Diptera and Odonata [*Erythemis vesiculosa*], begin their life cycle in these ecosystems and are constantly exposed to microplastics and are constantly exposed to microplastics which facilitates MP transport to organisms at other trophic levels.

This study proposes a protocol to evaluate insects as vectors of microplastics using fluorescent particles to determine the risk of biomagnification and possible adverse effects on aquatic organisms. This project collected information on the effects of microplastics of different sizes at various concentrations and exposure times on dipterans, odonates, anurans, and arachnids. To determine the accumulation of microplastics in the internal organs, dissection, extraction and chemical digestion were chosen. While visualization of fluorescent particles was performed with epifluorescence microscopy to quantify the number of particles per individual. The results showed that the most prevalent particles were the smallest and the organ with the highest accumulation was the gastrointestinal tract. Likewise, the biomagnification factor was greater than 1 in all interactions except for anurans. This study demonstrates that the use of fluorescent particles plus chemical digestion allows determining the transfer of microplastics from mosquitoes to other organisms and that the smallest particles have a greater impact on the biomagnification of these particles in the internal organs of aquatic organisms.] Address: not stated

**21218.** Prat, N. (2022): A case of phoresis of midges on Zygoptera. *Chironomus* 35: 43. (in English) [Verbatim: Several midges live phoretically on different invertebrates, as was described by Thienemann in his book *Chironomus* (Thienemann 1974) and may be found in many papers published since. For example, I found some time ago a *Podonomus* living on the gastropod *Chilina dombeiana* (Prat et al. 2004). This is a classic topic in midge studies; I found the first revision of the topic in White et al. (1980). Phoresis between Chironomidae and Odonata was one of the most common phoretic associations. Last year, two colleagues working on Odonata sent me several larvae of midges living on Zygoptera larvae. In the first sample (Fig. 1), tubes of *Rheotanytarsus* larvae were attached to *Calopteryx virgo meridionalis*. Larvae of the midge inside the tubes were very small. In the second sample examined, cases were simple tubes, and the midges were from the genus *Paratanytarsus*, and were present on *Calopteryx haemorrhoidalis* and *Calopteryx xanthostoma* (R. Martin pers. comm.). Both samples are from the River Tordera, in Catalonia (NE Spain). More details of the sites and the number of larvae found, and the instar of the Odonata may be found in Martin and Maynou (2021). Although phoresis between Chironomidae and Odonata has been frequently described over many years, the picture of this occurrence may be of interest to people working on midges.] Address: Prat, N., Freshwater Ecology, Hydrology and Management group (F.E.H.M), Dept de Biologia Evolutiva, Ecologia i Ciències Ambientals, Univ. de Barcelona. Diagonal 643, 08028 Barcelona. E-mail: nprat@ub.edu

**21219.** Rafique, A.; Sarwar, Z.M.; Ahmad, N.; Shami, A.; Ali, R.; Mohamed, E.H.; Abd Al Galil, F.M.; Alam, P. (2022): Biodiversity and taxonomic study of order Odonata from district Multan, Punjab, Pakistan. *Ann. For. Res.* 65(1): 1046-1058. (in English) ["... For this purpose, the survey tours were conducted in different localities of district Multan. Data were collected daily using an aerial net. After collecting phase, specimens were killed in a potassium cyanide jar. Later on, specimens were spread and preserved in wooden boxes. The samples were identified up to species level with the help of taxonomic keys and available literature. As a result, 20 species were identified based on morphology and physiology. These were also cross-checked from National Agriculture Research Centre (NARC) Islamabad. The identification keys, Photography of adults, and wings were also provided." (Authors)] Address: Sarwar, Z.M., Dept Entom.,

FAST Bahauddin Zakariya University Multan. 60800, Pakistan. Email: zmsarwar@bzu.edu.pk

**21220.** Raimondo, D.; Young, B.E.; Brooks, T.M.; Cardoso, P.; van der Colff, D.; Dias, B.F.; Vercillo, U.; de Souza, E.; Juslén, A.; Hyvärinen, E. von Staden, L.; Tolley, K.; McGowan, P.J.K. (2022): Using Red List Indices to monitor extinction risk at national scales. *Conservation Science and Practice*. 2022; e12854: 12 pp. (in English) ["The Red List Index (RLI) measures change in the aggregate extinction risk of species. It is a key indicator for tracking progress toward nine of the Aichi and many proposed post-2020 Global Biodiversity Framework Targets. Here, we consider two formulations of the RLI used for reporting biodiversity trends at national scales. Disaggregated global RLIs measure changing national contributions to global extinction risk and are currently based on five taxonomic groups, while national RLIs measure changing national extinction risk and are based on taxonomic groups assessed multiple times in country. For 74% of nations, the disaggregated global RLI is currently based on three or fewer taxonomic groups. Meanwhile, national RLIs from selected pilot countries Finland, South Africa, and Brazil are computed from twelve, eight, and nine taxonomic groups, respectively. The national RLI and the disaggregated global RLI measure different aspects of biodiversity, in that the former detects national trends in populations of species for which each country is responsible while the latter provides standardized comparisons of nations' contributions to the global extinction risk of the same species groups. As governments commit to the post-2020 Global Biodiversity Framework, we encourage them to monitor a standard set of taxonomic groups representing different biomes using both RLI formulations to ensure effective target tracking and accurate feedback on their conservation investments." (Authors)] Address: Raimondo, Domitilla, Threatened Species Unit, Biodiversity Assessment & Monitoring Directorate of the South African National Biodiversity Institute, Private Bag X101, Pretoria, South Africa. Email: d.raimondo@sanbi.org.za

**21221.** Ranjith, M.; Bajya, D.R.; Ramya, R.S. (2022): Abundance and composition of arthropods in sugarcane (*Saccharum officinarum*) ecosystem. *Indian Journal of Agricultural Sciences* 92(11): 1386-1390. (in English) ["A short investigation was devised by Dept of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore in 2022 to document the arthropod composition in sugarcane (*Saccharum officinarum* L.) ecosystem. Arthropod fauna was collected from sugarcane ecosystem in farmers' field at Puthur of Coimbatore district, Tamil Nadu at weekly intervals. Totally, 2,310 individuals of the subclass Pterygota were collected and among them most of specimens belonged to Exopterygota. The exopterygota (1,029) were represented by 5 orders, viz. Hemiptera, Odonata, Orthoptera, Isoptera and Dermaptera. Majority of the individuals belonged to the family Aphididae (330) under the order Hemiptera. Under order Orthoptera, Gryllidae (46) was the dominant family closely followed by Acrididae (45). Among these, the dominant species was *Gryllus* spp. The order Odonata was represented by a single family Libellulidae (38) (*Orthetrum sabina* Drury, 1773). Under Endopterygota, 4 orders were identified and among these, Hymenoptera was the most common order with 740 numbers, followed by Diptera (237), Coleoptera (215) and Lepidoptera (89). Under the order Coleoptera, 3 families were recorded, with most of them falling under the family Coccinellidae (172) followed by Cicindelidae. Hymenopteran order comprised majorly of ants, belonging to the family Formicidae, of which 3 species were

identified. Lepidoptera consisted of single species *Ariadne merione* Cramer, 1779 belonging to family Nymphalidae. Majority of Arachnida was represented by order Araneae. Under the order Araneae most of them pertained to families Araneidae, Lycosidae and Thomisidae. *Neoscona* sp., *Hippasa* sp., *Pardosa* sp. and *Pardosa birmania* Simon were found to be common in sugarcane ecosystem." (Authors)] Address: Ranjith, M., Tamil Nadu Agricultural Univ., Coimbatore, Tamil Nadu, India. Email: entoranjith@gmail.com

**21222.** Rippel, C.A. (2022): Control biológico de culicidos: análisis de la capacidad predatoria de estadios inmaduros de insectos del orden Odonata. PhD thesis, Facultad de Ciencias Exactas, Químicas y Naturales, Universidad Nacional de Misiones, Posadas: 105pp. (in Spanish, with English summary) ["Mosquitoes are a major global health problem. The life cycle of these insects includes an aquatic stage, during which immature stages develop, and is the period during which many of the processes of population regulation occur. Predation is considered one of the most important biological interactions in aquatic environments. Given the need for ecological strategies to address the problem of mosquito proliferation vectors poses natural enemies as an attractive option. The order Odonata (Insecta) has immature aquatic states and flying adults. Although there are no ecological studies in the area on the predatory-prey relationship of odonates and mosquitoes, the capacity and efficiency of several Odonata species have been evaluated worldwide. For a sustainable biological control program, it is a prerequisite to characterize the trophic relationships between native species. Therefore, in the first place, we surveyed the fauna of Odonata present in the area. Larvae and adults were collected and raised in streams and drainage channels in the southern part of the province of Misiones. Sites from the Selva Paranaense ecoregion were also surveyed. Artificial breeding sites (swimming pools) were examined, where the composition of the accompanying entomofauna was determined at the highest possible taxonomic level, in addition to odonates and mosquitoes. After determining the distribution and partially the breeding conditions of insects of the order Odonata, we proceeded with the characterization of predatory activity. The predatory capacity of Odonata larvae on culicids was evaluated in laboratory and in swimming pools (artificial hatches used by both orders). Predation capacity and performance tests were performed on a gradient of conditions with varying difficulties. Functional response was evaluated for *Pantala flavescens* (Anisoptera: Libellulidae). Finally, different ways of observing the preys after intake were evaluated through dissections, fecal matter and extraction and amplification of the DNA prey of the digestive tract of odonates with markers of the mitochondrial gene Cytochrome Oxidase I. The results show that odonates are present in various environments in the province of Misiones, including those where urbanization is advancing. In artificial breeding sites, such as swimming pools, the immature stages of *Pantala flavescens* coexist with mosquito larvae and these are part of their diet. The presence of predators of the orders Hemiptera and Coleoptera is also recorded in these farms. The predatory capacity of the analyzed Odonata larvae shows that they are voracious predators with a functional response of type II. Post-intake analyses allowed the identification of the larvae consumed by *Culex quinquefasciatus*. The coexistence and regulation of Odonata and mosquitoes occurs naturally in favorable conditions. Then through protection of water and vegetation, biological control could occur spontaneously in biodiverse areas such as the province of Misiones." (Author)] Address: not stated

**21223.** Sadasivan, K.; Nair, V.P.; Palot, M.J.; Samuel, A.; Shereef, A. (2022): Taxonomic notes on the genus *Helio gomphus*, with a redescription of *H. kalarensis*. *International Journal of Odonatology* 25: 107-120. (in English) ["The taxonomy and distribution of dragonflies of the genus *Helio gomphus* from the Western Ghats of southern India are discussed. A morphological study of fresh male specimens from the field, as well as holotypes and lectotypes from repositories was undertaken. Contradicting statements in scientific literature, we found that the markings on the occiput and thorax are not dependable features in distinguishing sympatric *Helio gomphus promelas* (Selys, 1873) and *H. kalarensis* Fraser, 1934. The structure of the epiprocts and the male genitalia were key features for differentiating them. *H. pruinans*, Fraser, 1922 is removed from the synonymy of *H. promelas* and is synonymized with *H. kalarensis* instead based on the analysis of the structure of its epiproct. In accordance with the provisions of ICZN Article 23.9.1.2, in suppression of the unused senior synonym, the taxon name *H. kalarensis* is retained as a nomen protectum. *H. unifasciatus* is treated as nomen nudum. Taxonomic notes and updated distribution summaries of the two species from the Western Ghats with an identification key to the males are provided. *H. kalarensis* is redescribed from fresh field-collected specimens, including details of the male genitalia and anal appendages. Fieldwork in the Western Ghats revealed that *H. kalarensis* is the most common of the two *Helio gomphus* species in Kerala state. The published records of *H. promelas* and *H. kalarensis* from this region need to be revisited in light of the facts presented here." (Authors)] Address: Sadasivan, K., Travancore Nature History Society MBRRR, Mathrubhumi Rd, Vanchiyoor P.O., Thiruvananthapuram, Kerala, India. Email: kaleshs2002in@gmail.com

**21224.** Samways, M.J.; Deacon, C. (2022): Extinction re-trieve for the ancient and imperiled dragonflies at the southern tip of Africa. Imperiled: The Encyclopedia of Conservation. Publisher: Elsevier: 471-484. (in English) ["The ancient mountains of southern Africa are rich in local endemic species, including dragonflies. Despite the mountains experiencing hot and dry summers, the perennial mountain streams enable the dragonflies to survive the harshest of summers. This has continued for millions of years, with some species having an ancient phylogenetic history. Yet today, these insects are experiencing significant novel impacts from human activity, especially from invasive trees impacting the mountain streams. However, the tide of local extinction risk has turned around. A large-scale national project has successfully removed many of the alien trees. This timely conservation action has resulted in effective recovery of many of these ancient dragonflies with great success. Southern Africa is rich in localized biota. The ancient mountains create complex rainfall patterns and support many perennial streams, making them an evolutionary stage for many endemic dragonfly species. These mountain streams enable the dragonflies to survive the hot, dry summers characteristic of the region. However, these insects are now facing significant impacts from human activity, especially invasion from alien trees along the streams. But all is not lost. A strategic national project has already removed many of the alien trees with great success, showing how targeted conservation action can be highly effective for imperiled dragonflies, and as sentinels for recovery of entire freshwater ecosystems." (Authors)] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: samways@sun.ac.za

**21225.** Sawant, D.; Sanap, R. (2022): A checklist of odonates from Aarey milk colony, Mumbai suburban district, Maharashtra, India. *International Journal of Tropical Insect Science* volume 42: 3855-3868. (in English) ["Odonates are fresh-water insects that serve as indicators of the quality of fresh water resources. Aarey Milk Colony (AMC) harbors several seasonal wetlands, serving as an ideal habitat for dragonflies and damselflies. To date, however, odonate diversity in AMC remains understudied. Moreover, the region is currently facing immense anthropogenic pressure, which may result in the permanent destruction of some of the most important wetland habitats in Mumbai Suburban District. Therefore, to document odonate diversity in AMC, we conducted surveys during 2018–2019 and recorded 51 species belonging to 32 genera in 9 families of 2 suborders. Of these, 27 represent new records from the Mumbai Metropolitan Region. In the present article, we provide photographic documentation of odonate species and highlight the thriving diversity of these insects in urban habitats. Our findings will contribute to emphasizing the ecological importance of AMC and aid its protection." (Authors)] Address: SawantView, D., Seth G S Medical College and KEM Hospital, 400012, Mumbai, Maharashtra, India

**21226.** Sawant, D.; Ogale, H.; Deulkar, R.M. (2022): An annotated checklist of odonates of Amboli-Chaukul-Parpoli region showing new records for the Maharashtra State, India with updated state checklist. *Journal of Threatened Taxa* 14(11): 22164-22178. (in English) ["Amboli region, consisting Amboli, Chaukul, Nene, and Parpoli villages is one of the biodiversity rich areas in northern Western Ghats. We opportunistically surveyed odonates from the region and prepared an annotated checklist of 93 species belonging to 12 families. We report 15 Western Ghats endemic species and six new records for the State of Maharashtra. We further present an updated checklist of Odonata of Maharashtra state with a total of 144 species." (Authors)] Address: Sawant, D., Community Medicine, Seth GS Medical College and KEM Hospital, Mumbai, Maharashtra 400012, India. Email: dattaprasad.101@gmail.com

**21227.** Scribano, G.; Gazzola, A.; Winkler, A.; Balestrieri, A.; Grioni, A.; Lastrico, G.; Tremolada, P.; Pellitteri-Rosa, D. (2022): Antipredatory Behavioural Responses of Microplastic-Exposed Tadpoles of the Italian Agile Frog. *Environmental Science and Pollution Research* 30: 13688-13696. (in English) ["Microplastics (MPs) are nowadays abundant, persistent, and ubiquitous in the environment, representing a new threat for terrestrial, marine, and freshwater ecosystems. Although anuran populations and species are globally declining, the effect of MP exposure on this taxon has been poorly investigated. With the aim of assessing the effects of microplastic exposure on the defensive responses of Italian agile frog (*Rana latastei*) tadpoles, we exposed them to three different concentrations (1, 7, and 50 mg L<sup>-1</sup>) of a mixture of plastic polymers (HPDE, PVC, PS, and PES) for 2 weeks. Then, we measured the total distance covered by individual tadpoles before and after exposure to tadpole-fed dragonfly larvae (*Aeshna cyanea*) cues. As expected, predation risk sharply lowered the total distance travelled by tadpoles; however, MP concentration did not affect their defensive performances. We also collected data on tadpole development, activity, and mortality. In contrast with previous experiments, neither tadpole growth nor mortality varied with MP concentration. Our results indicate that the intensity of MP effects on growth and development may depend on tadpole size, with large tadpoles being less susceptible to the negative effects of MP exposure." (Authors)]

Address: Tremolada, P., Dept of Earth & Environ. Sci., Univ. Pavia, I.27100 Pavia, Italy. Email: paolo.tremolada@unimi.it

**21228.** Siepielski, A.M.; Gómez-Llano, M.; McPeck, M. (2022): Environmental conditions during development affect sexual selection through trait-fitness relationships. *American Naturalist* 199(1): 34-50. (in English) ["Sexual selection can be shaped by spatial variation in environmental features among populations. Differences in sexual selection among populations generated through the effects of the environment could be shaped via four paths: differences in mean absolute fitness, differences in the means or variances of phenotypes, or differences in the absolute fitness-trait function relationship. Because sexual selection occurs only during the adult life stage, most studies have focused on identifying environmental features that influence these metrics of fitness and trait distributions among adults. However, these adult features could also be affected by environmental factors experienced in early life stages that then shape the trajectory for sexual selection during the adult life stage. Here we investigated how among-population variation in environmental conditions during the juvenile (larval) stage of two species of *Enallagma* damselflies [*E. ebrium*, *E. geminatum*] shapes sexual selection on male body size. We found that environmental factors related to predation pressures, lake primary productivity, and habitat availability play a role in shaping spatial variation in sexual selection. This acts mainly through how the environment affects absolute fitness-body size associations, not spatial variation in mean fitness or body size means and variances. These results demonstrate that the underpinnings of sexual selection in the wild can arise from environmental conditions during prereproductive life stages." (Authors)] Address: Siepielski, A.M., Dept Biol. Sciences, Univ. Arkansas, Fayetteville, Arkansas 72701, USA. Email: amsiepie@uark.edu

**21229.** Sirois-Delisle, C.; Kerr, J.T. (2022): Climate change aggravates non-target effects of pesticides on dragonflies at macroecological scales. *Ecological Applications* 32(2), e2494: (in English) ["Critical gaps in understanding how species respond to environmental change limit our capacity to address conservation risks in a timely way. Here, we examine the direct and interactive effects of key global change drivers, including climate change, land use change, and pesticide use, on persistence of 104 odonate species between two time periods (1980-2002 and 2008-2018) within 100 X 100 km quadrats across the United States using phylogenetic mixed models. Non-target effects of pesticides interacted with higher maximum temperatures to contribute to odonate declines. Closely related species responded similarly to global change drivers, indicating a potential role of inherited traits in species' persistence or decline. Species shifting their range to higher latitudes were more robust to negative impacts of global change drivers generally. Inherited traits related to dispersal abilities and establishment in new places may govern both species' acclimation to global change and their abilities to expand their range limits, respectively. This work is among the first to assess effects of climate change, land use change, and land use intensification together on Odonata, a significant step that improves understanding of multi-species effects of global change on invertebrates, and further identifies conditions contributing to global insect loss." (Authors)] Address: Sirois-Delisle, Catherine, Canadian Facility for Ecoinformatics Research, Dept Biol., Univ. Ottawa, 30 Marie-Curie Private, Ottawa, ON, K1N 6N5, Canada. Email: E-mail: csiro098@uottawa.ca

**21230.** Solihah, E.E.; Utami, S.; Dewi, N.K. (2022): Penyusunan ensiklopedia Berbasis keanekaragaman capung (Odonata) di Kawasan Air Terjun Teleng Ngawi sebagai sumber belajar kelas X [Compilation of an encyclopedia based on the diversity of dragonflies (Odonata) in the Teleng Ngawi Waterfall Area as a learning resource for class X]. *Jurnal Edukasi Matematika dan Sains* 10(2): 424-430. (in Indonesian, with English summary) ["This study aims to compile a product in the form of an encyclopedia of learning resources for class X diversity of dragonflies (Odonata) in the Teleng Ngawi Waterfall area. This research is a qualitative research that identifies and processes data from observations in the teleng waterfall field in accordance with the facts, circumstances and data during the research. This study describes the situation that occurs with the relevant data. The identification of dragonflies (Odonata) was carried out from February to June 2022, and found 7 species, namely *Rhinocypha fenestrata*, *Vestalis luctuosa*, *Euphaea variegata*, *Copera marginipes*, *Orthetrum sabina*, *Crocothemis servilla*, and *Neurothemis terminata*. The findings of this study became the material for compiling an encyclopedia of dragonfly diversity (Odonata). The stages of compiling the encyclopedia include: (a) drafting of the encyclopedia, (b) validation of the encyclopedia, (c) revision of the validation result of the encyclopedia based on the validator's criticisms and suggestions, (d) printing of the encyclopedia product. Validation was carried out by 2 validators, namely the material expert validator and the media expert validator. An Encyclopedia was formed with the title: "The Encyclopedia of Odonata Diversity in the Teleng Ngawi Waterfall Area". The result of the calculation of the validation of the Encyclopedia is 79%, which means that the Encyclopedia is suitable to be used as a learning material for class X high school based on local wisdom." (Authors)] Address: Eno Erika Solihah, Universitas PGRI Madiun, Indonesia. Email: ennoerika@gmail.com

**21231.** Sophian, A.; Nasir, L.O. (2022): Analysis of purity and concentrations of DNA isolated in dragonfly (*Onychogomphus forcipatus*). *Wahana-Bio: Jurnal Biologi dan Pembelajarannya* 14(2): 130-136. (in English, with Indonesian summary) ["Analysis of the purity and concentration of DNA isolation results was carried out using samples of dragonflies (*Onychogomphus forcipatus*) species of insects. This research is important because there are many kinds of research in the molecular field that require good DNA isolation techniques to support the success of the research. The purpose of this paper is to provide information about the quality of the isolated DNA seen using the purity and concentration parameters. The extraction method uses the centrifuge column method. The isolated data were analyzed statistically using the average test. The results of DNA isolation showed that the average concentration value was in the range of 60.10 – 69.95. The analysis of the purity of the isolated DNA read at the A260/A280 ratio was in the range of 1.817 – 1.929, while the purity analysis at the A260/A230 ratio was in the range of 0.760 – 0.822. Based on the results of the study, it can be concluded that the analysis of the purity and concentration of DNA from the isolation of dragonfly samples was in a good category at the A260/A280 ratio, while the purity read at the A260/A230 ratio was below the value categorized as good." (Authors) The authors don't give any information where the studied material was sampled. *O. forcipatus* is a western Palaearctic faunal element, and is not occurring in Indonesia.] Address: Sophian, A., Pusat Pengembangan Pengujian Obat dan Makanan Nasional, Badan POM, Jl. Percetakan Negara, No. 23, Jakarta Pusat, 10560, Indonesia. Email: alfi.sophian@pom.go.id



**21232.** Souza, C.A.; Silva Cordeiro, I.; Magalhães, O.M.; Ferreira Grossi, P.; Queiroz, J.M. (2022): Conserving the invisible common: Advances and challenges of the insect conservation in Brazil. *Brazilian Archives of Biology and Technology* 65 (e22210699, 2022 [www.scielo.br/babt](http://www.scielo.br/babt)): 15 pp. (in English) ["In 2019, B. Jarvis paraphrased E. Wilson in that "insects are a case study in terms of the invisible importance of the common". However, threats to insect diversity are rapidly increasing worldwide, and there is a significant challenge to halt or reverse this process. This is especially true in tropical regions where insect diversity is large, but resources are scarce and conservation policy is poorly developed. In Brazil, studies into insect conservation have grown over the last 30 years and, in this contribution, we use available literature to ask: i) what advances have been made; ii) where are the major knowledge gaps and iii) what are the priorities for action? Brazilian studies into insect conservation reflect international trends with respect to levels of ecological organization and a focus on taxonomic conservation. In general, research is restricted to the main Brazilian hotspots and to the states with better infrastructure. Hymenoptera, Diptera, Coleoptera and Lepidoptera are the main orders studied. Work on Ephemeroptera, Plecoptera, Trichoptera and Odonata has increased in recent years and currently are the main insect orders covered by official management initiatives Highlights: • Most Brazilian entomology has focused on the Atlantic Forest biome. • Research on the Amazon and Pantanal biomes should be increased given their biodiversity. • The Hymenoptera is the most studied taxon in Brazil for conservation. • Aquatic insects are widely used in official monitoring and conservation programs. • Insect recovery programs should provide effective conservation. Abstract: In 2019, B. Jarvis paraphrased E. Wilson in that "insects are a case study in terms of the invisible importance of the common". However, threats to insect diversity are rapidly increasing worldwide, and there is a significant challenge to halt or reverse this process. This is especially true in tropical regions where insect diversity is large, but resources are scarce and conservation policy is poorly developed. In Brazil, studies into insect conservation have grown over the last 30 years and, in this contribution, we use available literature to ask: i) what advances have been made; ii) where are the major knowledge gaps and iii) what are the priorities for action? Brazilian studies into insect conservation reflect international trends with respect to levels of ecological organization and a focus on taxonomic conservation. In general, research is restricted to the main Brazilian hotspots and to the states with better infrastructure. Hymenoptera, Diptera, Coleoptera and Lepidoptera are the main orders studied. Work on Ephemeroptera, Plecoptera, Trichoptera and Odonata has increased in recent years and currently are the main insect orders covered by official management initiatives due to their role as indicators of water quality. Priority areas for future work include the promotion of species conservation and ways to increase resource contribution from the private sector through legal instruments that can support integrative public policies for insect species conservation." (Authors)] Address: Souza, C.A., Rural Univ. Rio de Janeiro, Inst. Forests, Dept Environ.Sci., Seropédica, Rio de Janeiro, Brazil. Email: [seteorus@yahoo.com.br](mailto:seteorus@yahoo.com.br)

**21233.** Stelzer, V.; Rütten, M. Krenkel, L. (2022): Numerical Investigation of a 3D Dragonfly Wing Captured with a High-Resolution Micro-CT. 8th European Congress on Computational Methods in Applied Sciences and Engineering, ECCOMAS Congress 2022, 5-9 June 2022, Oslo, Norway: (in English) [Verbatim: "The special wing geometry of dragonflies consisting of veins and a membrane forming a

corrugated profile leads to special aerodynamic characteristics. To capture the governing flow regimes of a dragonfly wing in detail, a realistic wing model has to be investigated. Therefore, this study aimed to analyze the aerodynamic characteristics of a 3D dragonfly wing reconstructed from a high-resolution micro-CT scan. Afterwards, a spatially high discretized mesh was generated using the mesh generator CENTAUR™ 14.5.0.2 (CentaurSoft, Austin, TX, US) to finally conduct Computational Fluid Dynamics (CFD) investigations in Fluent® 2020 R2 (ANSYS, Inc., Canonsburg, PA, US). Due to the small dimensions of the wing membrane, only the vein structure of a *Camacinia Gigantea* was captured at a micro-CT voxel size of 7 microns. The membrane was adapted and connected to the vein structure using a Boolean union operation. Occurring inconsistencies after combining the veins and the membrane were corrected using an adapted pymesh script [1]. As an initial study, only one quarter of the wing (outer wing section) was investigated to reduce the required computational effort. The resulting hybrid mesh consisting of 10 pseudo-structured prism layers along the wing surface and tetrahedra in the farfield area has 43 mio. nodes. The flow around the wing was considered to be incompressible and laminar using transient calculations. When the flow passes the vein structures, steady vortices occur in the corrugation valleys leading to recirculation zones. Therefore, the dragonfly wing resembles the profile of an airfoil. This leads to comparable lift coefficients of dragonfly wings and airfoil profiles at significantly reduced structural weight. The reconstructed geometry also included naturally occurring triangular prismlike serrated structures at the leading edge of the wing, which have comparable effects to micro vortex generators and might stabilize the recirculation zones. Further work aims to investigate the aerodynamic properties of a complete dragonfly wing during wing flapping." (Authors)] Address: Stelzer, Vera, Fak. Maschinenbau, Regensburg Center of Biomedical Engineering, Ostbayerischen Tech. Hochschule Regensburg, Germany

**21234.** Susanto, M.A.D.; Putri, N.M. (2022): Inventarisasi dan Studi Komposisi Capung (Odonata) pada Area Perumahan Kelurahan Warugunung, Surabaya, Jawa Timur. *Bio-Edu: Jurnal Pendidikan Biologi* 7(1): 33-43. (in Indonesian, with English summary) ["The rice field area of Warugunung Village is an agricultural area with a pond. In rice fields there are various kinds of insects and ponds which are aquatic habitat types with great potential as natural habitats for dragonflies (Odonata). Dragonflies are flying insects that have an important role in the ecosystem, namely maintaining the balance of the food chain by being a predator for insect pests. This study aims to inventory and determine the composition of dragonflies found in the rice fields of Warugunung Village, Surabaya. The research method used is the VES (Visual Ecounter Survey) method and belt transects, as well as data analysis using the Shannon-Wiener ( $H'$ ) species diversity index formula. The results obtained were 17 species from 3 families with a total of 139 individuals. The results of the diversity index analysis show that the lowest diversity index is found at the Vegetation Pond observation location with a value of  $H'= 2.41$  and the lowest diversity index is at the rice field observation location with a value of  $H'= 1.27$ ] Address: Susanto, M.A.D., Dept of Biology, Faculty of Science and Technology, Universitas Islam Negeri Sunan Ampel, Surabaya, Indonesia. Email: [muhammadazmidwi@gmail.com](mailto:muhammadazmidwi@gmail.com)

**21235.** Susanto, M.A.D. (2022): The diversity and community structure of dragonflies (Odonata) in various types of

habitat in Lakarsantri District, Surabaya. Program Studi Biologi, Fakultas Sains Dan Teknologi, Universitas Islam Negeri Sunan Ampel, Surabaya: 129 pp. (in Indonesian, with English summary) ["Lakarsantri District is one of the areas in the city of Surabaya that has various types of aquatic habitats so that it has a big role for the sustainability of various living things, especially dragonflies (Odonata). Dragonflies are flying insects that spend most of their life cycle in the water, so the existence of aquatic ecosystems is very important for the survival of dragonflies. Diversity and community structure of dragonflies have an important role in an ecosystem, including as a bioindicator of environmental quality and predators of insect pests and disease vectors. The purpose of this study was to determine the species diversity and community structure of dragonflies in various habitat types in Lakarsantri District. The data collection method in this study used the Visual Encounter Survey (VES) method, which is an observation method by tracing all predetermined observation locations by recording the diversity of dragonfly species and counting the number of individuals of each dragonflies species observed. The study was conducted at 6 observation locations during July, August and September 2021. The results of this study showed that there were 22 species with a total of 1028 individuals from 4 families. The diversity index value shows that the Open Pond location has the highest dragonflies diversity value with a value of  $H' = 2.23$  with 19 species of dragonflies found in 4 families with a total of 351 individuals. Meanwhile, the location with the lowest dragonflies diversity index was at the Unesa Reservoir with a value of  $H' = 0.55$  with 11 dragonfly species found with a total of 94 individuals." (Authors)] Address: Susanto, M.A.S., Program Studi Biologi, Fakultas Sains dan Teknologi UIN Sunan Ampel Surabaya, Jalan A. Yani 117, Surabaya, Indonesia. E-mail: muhammadzmidwi@gmail.com

**21236.** Tunturi, M.O. (2022): The rare libellulid *Urothemis abbotti* recorded and photographed in southern Thailand. *Agrion* 26(2): 34-38. (in English) [*U. abbotti* was recorded and photographed between 1 January and 1 February 2022 in the surroundings of the Thai Break Resort, Nayong district in Trang Province (WGS84 co-ordinates: 7.483026° N, 99.724994° E).] Address: Markku O. Tunturi. Email: markku.tunturi@iki.fi

**21237.** Vega-Sánchez, Y.M.; Mendoza-Cuenca, L.; González-Rodríguez, A. (2022): Morphological variation and reproductive isolation in the *Hetaerina americana* species complex. *Scientific Reports* 12, Article number: 10888: 10 pp. (in English) ["Incomplete premating barriers in closely related species may result in reproductive interference. This process has different fitness consequences and can lead to three scenarios: niche segregation, sexual exclusion, or reproductive character displacement. In morphologically cryptic species, isolation barriers can be difficult to recognize. Here, we analyzed the morphological, behavioral, and genetic differences between two sympatric cryptic species of the genus *Hetaerina* to determine the characters that contribute the most to reproductive isolation and the effect of the high rates of behavior interference between the species. We found complete genetic isolation and significant differences in the morphometry of caudal appendages and wing shape, as well as body size variation between species. In contrast, we did not find clear differences in the coloration of the wing spot and observed high rates of interspecific aggression. Our results suggest that divergence in the shape of the caudal appendages is the principal pre-mating barrier that prevents interspecific mating. Moreover, a scenario of

character displacement on body size was found. Nevertheless, size could play an important role in both inter- and intrasexual interactions and, therefore, we cannot differentiate if it has resulted from reproductive or aggressive interference." (Authors)] Address: Vega-Sánchez, Yesenia Margarita, Instituto de Investigaciones en Ecosistemas y Sustentabilidad, Universidad Nacional Autónoma de México, 58190 Morelia, Mexico. Email: yvega@cieco.unam.mx

**21238.** Ziter, C.D. (2022): Cryptic eco-evolutionary feedback in the city. *Journal of Animal Ecology* 91(3): 510-513. (in English) ["Research Highlight: Brans, K. I., Tüzün, N., Sentis, A., De Meester, L., & Stoks, R. (2021). Cryptic eco-evolutionary feedback in the city: Urban evolution of prey dampens the effect of urban evolution of the predator. *Journal of Animal Ecology*. <https://doi.org/10.1111/1365-2656-13601>. Despite the strength and ubiquity of urban stressors on multiple taxa, there have been minimal attempts to determine the ecological consequences of urban evolution on multiple species. Brans & Tüzün et al. use a well-known predator-prey system—damselfly nymphs *Ischnura elegans* and water fleas *Daphnia magna*—to test whether scenarios in which both species evolve in response to urbanization differ from scenarios in which only the predator or prey evolves. The authors show that urban damselflies showed higher encounter and predation rates when paired with rural prey, but that the advantages conferred by urbanization-driven adaptation disappeared when urban predators encountered urban prey. This represents a cryptic eco-evolutionary feedback, where evolution of both predator and prey concealed the effect of evolution in each partner individually. Results suggest that mismatches in the evolutionary responses of interacting species may have significant ecological consequences, and highlight the importance of a multi-species approach in eco-evolutionary dynamics research." (Author)] Address: Ziter, C.D., Dept Biol., Concordia Univ., Montreal, QC, Canada. Email: carly.ziter@concordia.ca

**21239.** Zoch, L.; Reich, M. (2022): Torfmooskultivierungsflächen als Lebensraum für Vögel, Amphibien, Libellen und Tagfalter. *Naturschutz und Landschaftsplanung* 54(11): 22-31. (in German, with English summary) ["Sphagnum paludiculture as a habitat for birds, amphibians, Odonata, and Lepidoptera – What habitat quality do sustainably managed raised bogs provide? - Peatland species are often highly endangered and isolated in their populations due to large-scale drainage-based use and destruction of their habitats. Current climate policy goals are leading to new approaches for a wet, sustainable use of peatland sites, so-called paludiculture. On raised bog soils, the cultivation of peat mosses ('Sphagnum farming') is suitable, which creates potential habitats for peatland species due to the wet conditions and the establishment of vegetation typical for raised bogs. This study investigated the extent to which this potential can be used by birds, amphibians, dragonflies, damselflies, butterflies and moths. In 2017 and 2018, comparative surveys were carried out at two Sphagnum farming sites (established from 2015 to 2016), two rewetted cut-over restoration sites, and two near-natural bogs in Lower Saxony (Germany). In particular, the Sphagnum farming sites showed high potential for characteristic peatland bird species and lowland breeders, as well as for characteristic Odonata species. For the moor frog, the only peatland amphibian species in this study, Sphagnum farming sites could serve as valuable connecting elements in habitat corridors. In contrast, the habitat quality for Lepidoptera was low due to site management and the lack of windbreak structures." (Authors)] Address: Zoch, Lotta., Institut für Umweltplanung,

2023

**21240.** Abhilash, H.R.; Mahadevaswamy, M.; Shashank, K.R.; Nagaraj, M.; Kumar, A. (2023): Biodiversity and abundance of aquatic insects in two freshwater lakes of Mysore district, Karnataka, India. *Arthropods* 12(1): 1-15. (in English) ["A study on aquatic insects biodiversity and abundance along with physicochemical parameters of two lentic water bodies (Varuna and Dalvoy) of Mysore district was carried out on monthly basis from October 2018 to March 2019. A total of 31 species belonging to 19 families and 6 orders were recorded during the study period. At order level, Coleoptera showed maximum relative abundance (57%) followed by Hemiptera (13%) in Varuna Lake, while in Dalvoy Lake, the order Hemiptera (66%) was most abundant, followed by Coleoptera (16%). Computation of dominant status of different species of aquatic insects in lakes based on Engelmann's scale revealed that *Canthydrus laetabilis* and *Gyrinus distinctus*, from the order Coleoptera, were dominant in Varuna Lake, while two Hemipteran species, *Diplonychus rusticus* and *Anisops* sp., were dominant in Dalvoy Lake. The highest Shannon diversity index (2.803) and evenness values (0.66) were recorded in Varuna Lake, which was slightly greater than Dalvoy Lake (2.028 and 0.45). Similarly, the Biological Working Party Score (BMWP) and Average Score Per Taxon (ASPT) values were 80 and 5.33 in Varuna Lake and 53 and 4.08 in Dalvoy Lake. This indicates Varuna Lake is less polluted and has higher species diversity than Dalvoy Lake. In terms of the physico-chemical properties of water, a significant difference was noted in electrical conductivity, total dissolved solids, free carbon dioxide, dissolved oxygen, total alkalinity, hardness, nitrate, sulphate, and chloride concentrations between Dalvoy Lake and Varuna Lake. The results of physicochemical analysis and diversity indices suggest stressed and disturbed water quality conditions at Dalvoy Lake." (Authors) The list of taxa includes *Diplocodes* sp. and *Ischnura* sp.] Address: Kumar, A., DOS in Sericulture Science, Manasagangotri, University of Mysore, Mysore-570006, Karnataka, India

**21241.** Alfieri, J.M.; Jonika, M.M.; Dulin, J.N.; Blackmon, H. (2023): Tempo and mode of genome structure evolution in insects. *Genes* 2023, 14, 336. <https://doi.org/10.3390/genes14020336>: 11 pp. (in English) ["The division of the genome into discrete chromosomes is a fundamental characteristic of eukaryotic life. Insect taxonomists' early adoption of cytogenetics has led to an incredible amount of data describing genome structure across insects. In this article, we synthesize data from thousands of species and use biologically realistic models to infer the tempo and mode of chromosome evolution among insect orders. Our results show that orders vary dramatically in the overall rate of chromosome number evolution (a proxy of genome structural stability) and the pattern of evolution (e.g., the balance between fusions and fissions). These findings have important implications for our understanding of likely modes of speciation and offer insight into the most informative clades for future genome sequencing. ... In Odonata, we had a total of 203 species present on our phylogeny and in our karyotype dataset. The species in our karyotype dataset had a haploid chromosome count range from 2 to 20. The species that could be included in the comparative analysis (species that were shared between the phylogeny and karyotype dataset) had a haploid chromosome count from 4 to 14. Using the simple two-parameter model, we estimated rates of

0.004 (95% HPD Interval: 0–0.01) and 0.001 (95% HPD Interval: 0–0.001) for fusions and fissions, respectively (Figure 2). Using the more complex model we estimated rates of 0.004 (95% HPD Interval: 0–0.005), 0.001 (95% HPD Interval: 0–0.001), and 0.035 (95% HPD Interval: 0.01–0.06) for fusion, fission, and polyploidy, respectively. We calculated the mean normalized rates ratio as 0.86 (95% HPD Interval: 0.77–0.95) (Figure 3)." (Authors)] Address: Blackmon, Heath, Dept of Biology, Texas A&M University, College Station, TX 77843, USA. Email: coleoguy@gmail.com

**21242.** Aristizabal-Botero, A. (2023): Ecological dynamics of macroinvertebrates from inselbergs of the Colombian Guiana Shield. PhD thesis, Sciences & Bioengineering Sciences, Facultad de Ciencias, Universidad de los Andes: 144 pp. (in English, with Spanish and Dutch summaries) ["Understanding ecological dynamics implies disentangling the connections and interactions between living and non-living components of an ecosystem. Here, we studied links between the unique physical environment of the granite outcrops of the Guiana Shield, one of the most ancient bedrock formations on Earth, and local biodiversity. On these outcrops – also known as inselbergs – there are eroded depressions that become rock pools that can periodically hold water from rain or river input, allowing for the development of a unique diversity of microorganisms, plants, and animals. Although the fauna of temporary rock pool systems on rocky outcrops has been documented in temperate, arid, and semi-arid regions, little is known about similar systems in the Neotropics. The first challenge was to characterize the complex three-dimensional (3D) structure of the habitat; for this, we used remote sensing via an unoccupied aerial vehicle (UAV). We concluded that drone imagery could help to reconstruct spatial variation in microhabitat structures that would be impossible to quantify using ground-level observations or satellite images. In addition, we managed to reconstruct relevant proxies for habitat quality, like photosynthetic activity and rock pool connectivity, via stream network modeling based on a digital elevation model. Even though inselberg ecosystems are renowned for their plant diversity, little was known about the aquatic fauna associated with this habitat, and certainly not in this region. In the second chapter, we explored the aquatic biodiversity of macroinvertebrates in the early and late phases of the rainy season. This section presents the first biodiversity survey and first characterization of the water properties of this ecosystem in the Neotropics. We found strong seasonality with both taxonomic and functional differences in communities. Early inundation communities were dominated by microcrustaceans and gathering collectors. At the same time, predators almost doubled their relative abundance and increased their contribution to community diversity from 40 % to 50 % later in the rainy season. However, the species pool also housed predators such as specialized dragonflies with adaptations that helped them to exploit resources from the beginning of inundations. Finally, in chapter three, we showed strong differentiation in Odonata communities between pools that differ in permanence. To help explain this variation in habitat use, we performed a large-scale life-history experiment with three Odonata families. Here, we tested whether slight variations in dissolved salt concentrations and water level are used by naiads as cues for impending pond drying and could stimulate them to accelerate development. The chapter illustrates how developmental plasticity triggered by different cues can help odonates avoid mortality and exploit prey in short-lived habitats. It also contributes to a better understanding of the requirements and flexibility of odonates in response to environmental conditions. Overall, this project

provides the first documentation of the inhabitants of this peculiar and unexplored aquatic microcosm system in South America. Using innovative technologies, faunistic inventories, multivariate analysis, and life-history experiments, we gained more insights into the fundamental ecological processes that determine the composition of local macroinvertebrate communities. This can facilitate their inclusion in informed land management and conservation initiatives. .... Abstract Chapter 3: Developmental plasticity can help organisms to survive in temporally variable environments. At the same time, heterogeneous environments can allow the coexistence of species with differences in their life-history traits. Our main goal was to evaluate to which extent life-history plasticity can help to explain the coexistence of a diverse assemblage of odonates in a peculiar tropical freshwater habitat characterized by substantial variation in pond permanence. Some dragonflies and damselflies (Odonata) can accelerate their development to leave the water before their temporary rock pool habitat dries. However, how they sense habitat drying is poorly understood. Here, we experimentally tested to what extent elevated concentrations of salts in water or reductions in water level can be used as cues for developmental acceleration in a Neotropical Odonata assemblage from granite rock pools. Libellulidae dragonflies were found along the pond permanence gradient and accelerated their growth in response to elevated dissolved salts (measured as conductivity). *Anax amazili* Burmeister, 1839 (Aeshnidae) was also found in all environments and did the same in response to lower water levels. On the contrary, larvae of *Telebasis simulata* (Coenagrionidae) were restricted to deeper long-lived pools and did not respond to the tested cues. The work illustrates how differentiation in life-history strategies can contribute to niche differentiation in this diverse predator assemblage and how developmental plasticity triggered by different cues can help them avoid mortality and exploit short-lived habitats. The global acceleration of freshwater salinization due to human activities might disrupt the delicate links between low levels of dissolved salts and life-history responses and represent a significant threat to these ecosystems and their biodiversity." (Author)] Address: not stated

**21243.** Bartkowska, A.; Mieczan, T.; Plaska, W. (2023): Colonization of artificial substrates by invertebrate macrofauna in a river ecosystem — Implications for forensic entomology. *International Journal of Environmental Research and Public Health* 20(4): 2834. <https://doi.org/10.3390/ijerph20042834>: 11 pp. (in English) ["Forensic entomology includes the analysis of organisms colonizing various parts of the body in order to determine the circumstances of an incident, mainly the time, place, and cause of death. The presence of insects and other arthropods on carcasses can be a source of knowledge for the judicial system. However, this type of research (on submerged bodies) is less published. The aim of our study was to analyse the qualitative and quantitative structure of macroinvertebrates colonizing potential evidence in an upland river. The experimental research involved an eight-week exposure to articles of clothing made of different materials: natural materials (bottom sediments with plants from a river), synthetic (socks), and cotton (t-shirts). Control samples of water after 2, 4, 6, and 8 weeks were taken from experiment locations in the River Bystrzyca with a tube apparatus and hand net. The results indicated that the abundance of organisms on a given substrate depended on the period of development of invertebrate macrofauna and the time of exposure of the substrates. The abundance of aquatic macrofauna on the exposed items increased in direct proportion to the duration of the experiment,

which may indicate the adaptability of these organisms to new habitat conditions. Among the taxonomic groups used in forensic entomology, Diptera, Coleoptera, and Odonata were the most abundant. The remaining taxa (including Heteroptera), though not widely used in judicial proceedings, can also provide valuable information about the circumstances of an incident." (Authors)] Address: Bartkowska, Aleksandra, Dept of Hydrobiology & Protection of Ecosystems, Univ. Life Sciences, Dobrzanskiiego 37, 20-262 Lublin, Poland. Email: [aleksandra.bartkowska@up.lublin.pl](mailto:aleksandra.bartkowska@up.lublin.pl)

**21244.** Boal, C.W. (2023): Scavenging of roadkill by Mississippi Kites (*Ictinia mississippiensis*). *Journal of Raptor Research* 57(1): 1-2. (in English) [Passing reference to Odonata as prey of Mississippi kites.] Address: Boal, C.W., US Geological Survey, Texas Cooperative Fish and Wildlife Research Unit and Dept of Natural Resources Management, Texas Tech University, Lubbock, TX 79409 USA. Email: [clint.boal@ttu.edu](mailto:clint.boal@ttu.edu)

**21245.** Carbonell, J.A.; Wang, Y.-J.; Sentis, A.; Stoks, R. (2023): Evolution of predator–prey interactions during range expansion in an aquatic insect predator. *Functional Ecology* 36: 3060-3072. (in English) ["1. Many ectotherms are shifting their distributions polewards, which has been associated with the evolution of phenotypic traits and their thermal plasticity. Trophic interactions may determine the dynamics and ecological impact of range expansions. However, it is largely unknown how trait evolution in edge populations shapes trophic interactions. 2. We studied evolutionary changes in the short-term (functional response) and long-term predator–prey interactions between an aquatic insect predator (the damselfly *Ischnura elegans*) and its prey (the water flea *Daphnia magna*) during the predator's ongoing poleward range expansion in northern Europe. 3. Using a common-garden warming experiment at 20 and 24°C we tested for differentiation between predator populations from edge and core regions in metabolic rate and functional response parameters, and used these empirical data to estimate the effects of range expansion on the short- and long-term predator–prey interaction strengths. 4. Metabolic rates did not differ between populations from edge and core regions nor between rearing temperatures. Functional response parameters and their thermal plasticity showed signals of evolution during the range expansion. Attack rates did not differ between predators from edge and core regions, but only decreased under warming in predators from the edge region. Handling times decreased under warming in predators from the edge region but increased under warming in predators from the core region. While handling times were shorter in predators from the core region at 20°C, these did not differ between regions at 24°C. As a result, the short-term interaction strength was higher for predators from the core region at 20°C, but not different between regions at 24°C. The predator–prey system from the edge region showed lower long-term system stability at 20°C, but this region difference disappeared under warming because the edge region stability then increased. 5. Our results suggest that rapid evolution of functional response parameters during a predator's range expansion reduced the direct feeding impact on its prey and made the predator–prey system from the edge region more unstable, but not under warming. This provides rare evidence that functional responses can rapidly evolve during range expansions, potentially destabilizing food web dynamics." (Authors)] Address: Carbonell, J.A., Evolutionary Stress Ecology & Ecotoxicology, University of Leuven, Leuven, Belgium. Email: [jacarboher@us.es](mailto:jacarboher@us.es)



**21246.** Ceia-Hasse, A.; Boieiro, M.; Soares, A.; Antunes, S.; Figueiredo, H.; Rego, C.; Borges, P.A.V.; Conde, J.; Serrano, A.R.M. (2023): Drivers of Insect Community Change along the Margins of Mountain Streams in Serra da Estrela Natural Park (Portugal). *Insects* 2023, 14(3), 243; <https://doi.org/10.3390/insects14030243>: 14 pp. (in English) ["Simple Summary: Mountain ecosystems are important biodiversity hotspots since they host many unique species and provide valuable services. In this study, we analyze the diversity patterns of butterflies and odonates in a mountainous area of high conservation value—Serra da Estrela Natural Park (Portugal)—and we assess which factors are responsible for insect community change between study sites. The insects were sampled along 150 m transects near the margins of three mountain streams, at three elevation levels (500, 1000, and 1500 m). Butterfly species richness was lowest at high altitudes, while odonate species richness did not differ between elevations. Interestingly, species replacement drove the changes between butterfly assemblages, while changes in odonate communities were mostly due to species richness differences. Climatic factors, namely temperature and precipitation, were the main drivers of community change between sites for the two insect groups. The study of mountain insect biodiversity is key to further our understanding on the community assembly processes and provides valuable information to help predict the impacts of environmental changes on mountain biodiversity. Abstract: Mountain ecosystems are important biodiversity hotspots and valuable natural laboratories to study community assembly processes. Here, we analyze the diversity patterns of butterflies and odonates in a mountainous area of high conservation value—Serra da Estrela Natural Park (Portugal)—and we assess the drivers of community change for each of the two insect groups. The butterflies and odonates were sampled along 150 m transects near the margins of three mountain streams, at three elevation levels (500, 1000, and 1500 m). We found no significant differences in odonate species richness between elevations, but marginal differences ( $p = 0.058$ ) were found for butterflies due to the lower number of species at high altitudes. Both insect groups showed significant differences in beta diversity ( $\beta_{total}$ ) between elevations, with species richness differences being the most important component for odonates ( $\beta_{rich} = 55.2\%$ ), while species replacement drove the changes between butterfly assemblages ( $\beta_{repl} = 60.3\%$ ). Climatic factors, particularly those depicting harsher conditions of temperature and precipitation, were the best predictors of total beta diversity ( $\beta_{total}$ ) and its components ( $\beta_{rich}$ ,  $\beta_{repl}$ ) for the two study groups. The study of insect biodiversity patterns in mountain ecosystems and of the role played by different predictors contribute to further our understanding on the community assembly processes and may help to better predict environmental change impacts on mountain biodiversity." (Authors)] Address: Ceia-Hasse, Ana, Centre for Ecology, Evolution & Environmental Changes, Azorean Biodiversity Group, CHANGE—Global Change & Sustainability Inst., Fac. Sci., Univ. Lisbon, 1749-016 Lisbon, Portugal

**21247.** Coayla-Peñalozza, P.; Cheneaux-Díaz, A.A.; Moreno-Salazar, C.V.; Cruz-Remache, C.E.; Colque-Rondón, E.W.; Damborenea, C. (2023): Benthic macroinvertebrate communities and water quality assessment in high Andean wetlands Callali-Oscollo, Arequipa-Cusco, Peru. *Revista Mexicana de Biodiversidad* 94 (2023): e944206: 13 pp. (in English, with Spanish summary) ["High Andean wetlands are fragile systems, vulnerable to human activity and climate change. In the Arequipa region (Peru), there are high Andean lotic and lentic systems currently affected by livestock

raising, fish farming, and dams. The aim of the study was to evaluate the aquatic invertebrate community in the Callali-Oscollo wetlands and the possible impact of human activities. Samples were taken from November 2017 to October 2018 at 4 sampling stations in lotic environments and 2 in lentic environments. Macroinvertebrates were identified to the family level. The following were determined to evaluate community structure: richness, relative abundance, Shannon-Wiener diversity, Simpson dominance, Pielou evenness, and true diversity. The indices ABI, BMWP/Bol and nPeBMWP were applied to evaluate the ecological quality of the environments sampled. Thirty families were recorded in lotic environments, the most abundant being Chironomidae, Naididae, Limnesiidae, Elmidae, Baetidae and Lumbriculidae. The ecological quality was good, except at the station associated to the dam, where it was doubtful. Twenty-six families were recorded in lentic environments, the most abundant being Cyprinidae, Naididae and Corixidae. The macroinvertebrate communities in high Andean environments reflect ecosystem conditions. Environments associated to human activity have lower ecological quality." (Authors) The list of taxa includes "Coenagrionidae".] Address: Damborenea, Cristina, Consejo Nacional de Investigaciones Científicas y Técnicas, División de Zoología de Invertebrados-Universidad Nacional de La Plata, FCNyM, Paseo del Bosque s/n -B1900FWA, La Plata, Argentina. Email: [cdambor@fcnym.unlp.edu.ar](mailto:cdambor@fcnym.unlp.edu.ar)

**21248.** Dash, S.S.; Nayak, S.K.; Dhal, A. (2023): Biodiversity of Insects in Black Gram [*Vigna mungo* (L.) Hepper] during Rabi in the western undulating zone of Odisha. *International Journal of Current Science* 13(1): 505-527. (in English) [This study „was conducted at Research farm, College of Agriculture, OUAT, Bhanuipatna to study about insect biodiversity, their succession and influence of climatic factors on the population growth of insects during rabi-21. During the study period twenty seven insects belong to seven orders and twenty two families were noticed during different growth stages of crop in an overlapping manner. Beside the insects twelve numbers of predators, three numbers of parasitoids and two pollinators were also recorded. The highest diversity index and evenness of insects were recorded at 42 SMW (0.902 and 1.000) followed by 50 SMW (0.833 and 0.710) respectively. The diversity of insects was almost uniform because of the evenness of the species. The insect order Homoptera and the insect white fly came under superdominant class of dominance during all the growth stages of crop, whereas Coleoptera and Hemiptera were categorized under sub-dominant class at vegetative stage and flowering to podding stage of crop growth respectively. The insect orders Hemiptera, Coleoptera, Diptera and Hymenoptera and the insects i.e. galerucid beetle, jassid, stem fly, aphids and thrips came under recedent class of dominance. The relative abundance and dominant status of insect's revealed that the maximum numbers of insects belonged to orders Homoptera (75.22%) followed by Hemiptera (7.92%), Coleoptera (6.30%), Diptera (4.62%), Hymenoptera (4.05%), Orthoptera (0.89%), Lepidoptera (0.86%) and Odonata [Aeshnidae] (0.09%)." (Authors)] Address: Dash, Suman Samilita, Dept of Entomology, College of Agriculture, Odisha University of Agriculture and Technology, Bhubaneswar, 751003 India

**21249.** Durand, E., (2023): Distribution et éléments d'écologie de *Sympetrum depressiusculum* (Libellulidae) dans le pays avignonnais (Vaucluse et Bouches-du Rhône). *Martinia* 37(1): 1-10. (in French, with English summary) ["Distribution and ecology of *S. depressiusculum* in the Avignon area

(Vaucluse and Bouches-du-Rhône). Results of *Sympetrum depressiusculum* specific fieldworks lead in part of the Rhone alluvial plain and downstream section of the Durance river are presented. Between 2014 and 2021, a total of 14 new localities with proven autochthony were discovered and underline the importance of this new population localized at midistance of two major national populations (Pierre-latte area and the plain of la Crau). The distribution of this new population is strongly linked to phreatic activity, traditional gravity irrigation system and the existence of a retention basin network which provide conditions required. As a result of degradation of its natural habitats, these man-made basins offer currently some kind of alternative. Nevertheless, severe threats could lead to a quick decline of this local population." (Author)] Address: Durand, E., Naturalia environnement: Site Agroparc, 60 rue Jean Dausset, 84911 Avignon cedex 9, France. Email e.durand@naturalia-environnement.fr

**21250.** Ferreras-Romero, M.; Márquez-Rodríguez, J. (2023): *Aeshna affinis* Vander Linden, 1820 (Odonata: Aeshnidae) in the Iberian Peninsula: A review of past and recent records, and a larval biometric study. *Revista Chilena de Entomología* 49: 93-100. (in English, with Spanish summary) ["*Aeshna affinis*, ... is a native odonate species uncommon in many areas of the Iberian Peninsula. Field observations in Andalusia, the southernmost peninsular region, are notably scarce. Several photographs of one larva of this species, as proof of its reproduction in southern Spain, are provided." (Authors)] Address: Joaquín Márquez-Rodríguez, J., Depto de Sistemas Físicos, Químicos y Naturales. Universidad Pablo de Olavide. A-376 km 1. 41013 Sevilla, Spain. Email: jmarrod1@admon.upo.es

**21251.** Florez, T.; Comoglio, L.; Pinzón, T.; Bota-Sierra, C.A.; Cano-Cobos, Y. (2023): A collecting trip to San José del Guaviare, Colombia, with the description of a new species of *Perissolestes* (Zygoptera: Perilestidae). *International Journal of Odonatology* 26: 7-17. (in English) ["This study aims to preliminary assess the taxonomic diversity of dragonflies and damselflies from San José del Guaviare, Guaviare Dept, Colombia. A total of 47 species were collected at five localities in different freshwater ecosystems during a field trip. We highlight three new species records for the country: *Erythrodiplax tenuis*, *Micrathyria spinifera*, and *Perithemis rubita*. Finally, a new species - *Perissolestes rupestris* Florez, Bota-Sierra & Cano-Cobos 2023 - is described from Guaviare and Casanare, Colombia." (Authors)] Address: Cano-Cobos, Yiselle, Laboratorio de Biodiversidad y Genética Ambiental (BioGeA), Univ. Nacional de Avellaneda, Piñeyro 1870, Avellaneda, Buenos Aires, Argentina. Email: yp.cano137@uniandes.edu.co

**21252.** Galbiati, M.; Lapadula, S.; Forlani, M.; Barzaghi, B.; Manenti, R. (2023): Both light stimuli and predation risk affect the adult behavior of a stygobiont crustacean. *Diversity* 2023, 15, 290. <https://doi.org/10.3390/d15020290>: 11 pp. (in English) ["Stygobiont species show common, typical traits derived from their adaptation to subterranean life. Due to the general absence of light in cave environments, the majority of them are eyeless. Although the absence of eyes generally does not allow them to perceive luminous stimuli, some stygobionts still present phototaxis. Previous studies determined that different species of the eyeless amphipod crustaceans of the genus *Niphargus* are able to react to light; this has been interpreted as an adaptation to avoid dangerous surface habitats, even if recent studies suggest that this could also be an adaptation to exploit them when a

situation is less dangerous (i.e., during the night). *Niphargus thuringius* is a stygobiont amphipod that can also be observed in spring environments despite possessing all the main morphological features of subterranean organisms, such as depigmentation and a lack of eyes. In the present study, we test how the species respond to light stimuli according to the light cycle and predation risk experienced during a conditioning period. We assessed the reactions to light stimuli of adult individuals of *N. thuringius* after 30 days of rearing in microcosms with different conditions of light occurrence (total darkness or a light/darkness daily cycle) and predation risk (without predators, with one predator, and with two predators). Both light stimuli during the test and rearing conditions affected the behavior of *Niphargus thuringius*. With light stimuli, individuals presented a strong photophobic response. Moreover, individuals reared in conditions of high predation risk preferred a more sheltered environment during behavioral tests than individuals reared in safe conditions. Our results add a new species to those of stygobiont amphipods known to display negative phototaxis, confirming that this pattern is widespread and conserved in the field. *N. thuringius* could be a good candidate model to perform further studies aiming to assess if differences occur between spring populations and populations present in deeper groundwater. ... The conditions representing risk of predation included the following: controls (no predator); meso-predators (four fire salamander larvae (*Salamandra salamandra*), permitted to wander across the microcosm); and meso-predators plus one top-predator (four salamander larvae wandering across the microcosm, plus one large dragonfly larva (*Cordulegaster boltonii*) placed in a small cage inside the microcosm; see below). Salamander larvae are considered to be meso-predators as, in nature, they are often preyed on by dragonfly larvae [32]. Fire salamanders were widespread in the study area [38] and often bred in springs and subterranean environments along with *Niphargus* amphipods [13,33]] Address: Lapadula, S., Laboratorio di Biologia Sotterranea "Enrico Pezzoli", Parco Regionale del Monte Barro, Località Eremo, 1, 23851 Galbiate, Italy. Email: stefano.lapadula.1999@gmail.com

**21253.** García-Pozuelo-Ramos, C. (2023): Primeras observaciones de *Ceriagrion tenellum* (de Villers, 1789) (Odonata: Coenagrionidae) en la provincia de Toledo (Castilla-La Mancha, España central). *Zootenia* 3: 18-23. (in Spanish, with English summary) ["We report the discovery of imagoes of the species *C. tenellum* in the province of Toledo. These could be two small populations." (Authors) UTM 30 429765/4438023, datum ETRS89, 30TVK23, 550 m.s.n.m.; 12-/06/2022) and UTM 30 428337/4434885, datum ETRS89, 30TVK23, 545 m.s.n.m.; 19/06/2022.] Address: García-Pozuelo-Ramos, Sociedad Entomológica y Ambiental de Castilla-La Mancha, Spain. Email: pkymp@yahoo.es

**21254.** Guillermo-Ferreira, R.; Cezário, R.R.; Datto-Liberato, F.H.; Lopez, V.M. (2023): A coloração em Odonata: o que é e como medir. *Hetaerina* 5(1): 6-16. (in Portuguese) ["Coloration in Odonata may mediate behaviors related to inter/intraspecific interactions and regulate physiological processes. However, understanding and analyzing the coloration of these animals depends on an interdisciplinary knowledge (biology, chemistry and physics), as well as the use of appropriate equipment and protocols. Therefore, in this essay, we seek to present the methodologies used to measure coloration in Odonata, and the possible problems of the techniques employed. Mainly, we present techniques of optical spectrometry, analysis of photographs and of the vision of the animals. These methods can be employed in

several ecological, evolutionary, physiological and behavioral analyses, which we discuss as possibilities for future studies." (Authors/DeepL)] Address: Guillermo-Ferreira, R., Lestes Lab, Universidade Federal do Triângulo Mineiro. Uberaba, Brasil. Email: rhainer.ferreira@uftm.edu.br

**21255.** Harabiš, F.; Hronková, J.; Holer, T.; Šípková, J. (2023): Selective effect of fish farming management on freshwater diversity. *Biodiversity and Conservation* 32: 735-753. (in English) ["In some European regions, ponds are the dominant freshwater habitat type. The ecological value of ponds is decreasing owing to human activities, including intensive fish farming involving predation pressure from fish, reduction of macrophytic vegetation, high nutrient loads, and turbidity. Studies have shown the negative effects of high fish stocks on the diversity of macroinvertebrates. Nevertheless, the effect of fish predation on invertebrate communities could be strongly influenced by other factors, such as the structural complexity of aquatic vegetation. Consequently, we aimed to analyze the effects of environmental-trait interactions on the responses of amphibians, odonates, aquatic true bugs, and diving beetles that are directly or indirectly related to pond management. Each monitored group reflected very different variables. Odonates were sensitive to variables reflecting the quality of the aquatic environment and the overall landscape structure, and accurately reflected differences in the management intensity of ponds. Amphibians reflected only the landscape structure, while diving beetles reflected the quality of the aquatic environment. The aquatic Heteroptera community structure was very indifferent to the management and habitat quality. With the exception of oviposition strategies, we were unable to identify functional traits that could present adaptive advantages or disadvantages in relation to management intensity. We deduced that fish farming management is a selective mechanism that operates with an enormously high intensity which fundamentally homogenizes the structure of assemblages and therefore there is no morphological or phenological variability among species. It is therefore difficult to implement appropriate management measures that would benefit species across taxonomic groups. The key is to maintain the variability of the ponds and surrounding landscape mosaic. Moreover, farm ponds are secondary habitats whose role in supporting biodiversity may be important but cannot be seen as an equal alternative to natural wetlands." (Authors)] Address: Harabiš, H., Dept Ecol., Fac. Environ. Sciences, Czech Univ. Life Sciences Prague, 16500 Prague, Czech Republic. Email: harabis@fzp.czu.cz

**21256.** Hartung, M. (2023): Description of the Larva of *Oxyallagma dissidens* (Selys, 1876) (Odonata: Coenagriidae, Ischnurinae). *American Journal of Entomology* 7(1): 9-12. (in English) ["*Oxyallagma dissidens* is a species of high elevations 2600-2700m in Ecuador and Peru. The larva of *O. dissidens* was hitherto unknown. Based on exuviae of reared specimens, the final instar larva of *O. dissidens* is described. Exuviae of *O. dissidens* have two parallel rows of dark spots on the dorsum of the abdomen, the prementum has 5-6 setae and the labial palps 6 setae. Antenna 7-segmented, distal margin of labial palp with four crenulations and a large spine. Head brownish and between the eyes at the front with a light band with three loops to behind. Pterothorax with parallel stripes on the wing bags at the inner side. Metathoracic femur length 2.75 mm. All femora with four darker edges with fine spines. Abdominal dorsum with fine punctuations and with a darker brownish distal half. *O. dissidens* has a comparable strong armation on the femurs. The gill lamellae have a medial broad dark brown vein, with

several veins at all sides to the border of gills. In one case a description on *O. dissidens* was not given, but a figure was published. *O. dissidens* was mentioned from Peru (Quito, La Granadilla) and from Ecuador (Lago San Pablo, Campos of Guayaquil). *O. dissidens* is the recent name in contrast to the alternative name *runtuni*. Bota-Sierra & Andrés described *Oxyallagma colombianum* as new species of the genus from Colombia." (Author)] Address: Hartung, M., Wehnerstr. 20A, 12277 Berlin, Germany. E-mail: AEH.-Matthias.Hartung@t-online.de

**21257.** Hasik, A.Z.; Tye, S.P.; Ping, T.; Siepielski, A.M. (2023): A common measure of prey immune function is not constrained by the cascading effects of predators. *Evolutionary Ecology* 37: 13-30. (in English) ["Simultaneously defending against predators, stymieing competitors, and generating immune responses can impose conflicting demands for host species caught in the entanglement of a food web. Host immunity is not only shaped by direct interactions among species, but also many indirect cascading effects. By reducing competition, predators in particular can affect resource acquisition necessary for hosts to mount energetically costly immune responses. However, identifying the links between predators and host immune responses determined by resource acquisition is a complex affair, because predators can (1) reduce host density and thus competition among hosts, (2) exert non-consumptive trait-mediated effects on host resource acquisition behavior, and (3) generate natural selection on host resource acquisition behavior. To examine the relative contributions of these potential predator driven density- and trait-mediated effects on a key aspect of immune function (total phenoloxidase activity, total PO), we conducted mesocosm and field experiments with larval damselflies (*Enallagma signatum*) and their dominant fish predator (*Lepomis macrochirus*). Although we expected to observe declines in total PO activity with increases in damselfly density, we found no relationship between density and total PO activity. We also found no support for the prediction that total PO activity would vary as a result of either non-consumptive trait-mediated effects or selection on damselfly foraging activity underlying resource acquisition. Despite the lack of trait- or density-mediated effects, we did find that total PO activity increased with damselfly prey density among lakes, implying resource limitation for this aspect of immune function. These unexpected results point to the need to better understand the ecological conditions whereby predators and competitors constrain immune functions necessary for species to defend themselves in complex food webs." (Authors)] Address: Hasik, A.Z., Dept of Biological Sciences, University of Arkansas, SCEN 601, 850 W. Dickson St., Fayetteville, AR, 72701, USA

**21258.** Hendriks, J.A.; Mariaty; Maimunah, S.; Anirudh, N.B.; Holly, B.A.; Erkens, R.H.J.; Harrison, M.E. (2023): Odonata (Insecta) communities in a lowland mixed mosaic forest in Central Kalimantan, Indonesia. *Ecologies* 2023, 4; <https://doi.org/10.3390/ecologies4010006>: 55-73. (in English) ["Assessing a taxon's response to change in environmental variables is fundamental knowledge to understanding trends in species diversity, abundance, and distribution patterns. This is particularly needed on Borneo, where knowledge on Odonata populations in different habitats is poor. To address this gap, we present the first study investigating the relationship between morphology and species distribution of Odonata communities in a heath (kerangas)-dominated mixed-mosaic lowland forest in southern Borneo. We sampled 250m line transects in three habitat types: mixed peat swamp, kerangas, and low-pole peat swamp,

with weekly surveys from December 2019 to February 2020. A total of 309 individuals were detected from 25 species. Anisoptera and Zygoptera diversity was the highest in mixed peat swamp and lowest in low pole, while abundance was the highest in low pole and lowest in kerangas; with kerangas notably harboring a very small sample size. Odonata community assemblages differed most between mixed peat swamp and low pole. Morphological data were compared between suborders and habitats. Anisoptera showed significantly larger thoraces, hindwings, and hindwing-to-body ratio than Zygoptera. Anisoptera in low pole were significantly smaller in body, thorax, and hindwing compared to both kerangas and mixed peat swamp. Anisoptera showed a strong association with pools and Zygoptera with flowing water. Heterogeneity, habitat characteristics, presence of specialists, body size, and the interaction between species' morphological traits and habitat characteristics likely explained the trends observed." (Authors)] Address: Harrison, M.E., School of Geography, Geology and Environment, University of Leicester, Leicester LE1 7RH, UK. Email: m.e.harrison@exeter.ac.uk

**21259.** Hettige, N.D.; Hashim, R.; Kutty, A.A.; Ashaari, Z.H. (2023): A new model for organic contamination assessments using benthic macroinvertebrates as biological indicators. *Turkish Journal of Fisheries and Aquatic Sciences* 23(8), TRJFAS22423. <https://doi.org/10.4194/TRJFAS22423>: 15 pp. (in English) ["The main goal of this study was to develop a model for organic pollution assessment. Seven sampling sites in six rivers in the Rawang sub-basin, Selangor River, Malaysia, were selected with one reference site. The sampling sites near the fish farm were used to develop the model. SR2 was used for the validation of the developed model. Benthic macroinvertebrates and water sampling were conducted from April 2019 to March 2020. The Principal Components Analysis (PCA) and regression were conducted to select the most representing benthic macroinvertebrates family. Based on the score value (variance coefficient) of each benthic macroinvertebrates family, the cumulative score value of each sampling site was calculated (i.e., 18=6 sampling sites x 3 replicates). The nine benthic macroinvertebrate families (Baetidae, Libellulidae, Protonuridae, Chironomidae, Curbicullidae, Hydropsychidae, Tubificidae, Lumbriculiade, and Naididae) were identified using PCA and regression. The cluster analysis and mean confidence intervals were used to classify water quality classes precisely. Finally, three different value scales were produced to represent the level of contamination (i.e., <0.69 as organically polluted, 0.69-0.87 as slightly organic polluted, and >0.87 as clean status). The newly developed model was validated. The results produced after validation were better than the water quality status from other studies based on the BMWP/BMWPThai score. This study concludes that the developed model can evaluate river organic contamination successfully. model can evaluate river organic contamination successfully" (Authors)] Address: Hashim, Rohasliney, Universiti Putra Malaysia, Faculty Forestry & Environmental Science, Dept Environment, 43400 UPM, Serdang, Selangor, Malaysia. Email: rohasliney@upm.edu.my

**21260.** Holuša, O.; Holušová, K.; Balázs, A. (2023): Is the current forest management to the northernmost population of *Cordulegaster heros* (Anisoptera: Cordulegastridae) in Central Europe (Czech Republic) threatening? *Forests* 14(2):228. DOI: 10.3390/f14020228: (in English) ["*C. heros* is included in the EN category on the IUCN Red List for the territory of the Czech Republic, where it inhabits an area of approximately 100 km<sup>2</sup>. All of the localities are located in

the forest complex in Chriby hills, and all of the forests fall into the category of management forests. Most of the forest stands have a high and very high degree of naturalness; they are natural forest stands. The predominant management units are Nutrient sites in middle elevations (78.2 % of the area) and Oligotrophic sites in middle elevations (2.1 % of the area), with stand types of *Fagus sylvatica* representing 92.5 % of the area, and forest stand types of *Quercus* sp. representing 5.7 % of the area. The wider alluvia in forest streams are classified as being in management unit alder and ash sites on waterlogged and floodplain soils (1.1 %), with the forest stand type of *Alnus glutinosa*. The forest stands are restored by regeneration under shelterwood (97.8 % of the area). The waterlogged alluvia, if a separate management unit is established for them, are restored by a regeneration by strip method. Realistically, seven factors were recorded in *C. heros* habitats, but they mostly have only point effects. Within forestry management, the factors of logging directly in the habitats and the subsequent transport of harvested timber in the habitat were recorded. The most intrusive effects were found on tractor logging roads, where fine soil washes into the stream and causes prolonged turbidity. Of the water management structures in the study area, logging roads with bridges and culverts are constructed, stream banks are reinforced with longitudinal walls at points, and stone steps in the channels are constructed only sporadically. The current forest management system can be described as a nature-friendly system, and therefore, it fully ensures the conditions for the survival of the *C. heros* population in the Czech Republic." (Authors)] Address: Holuša, O., Dept of Environmental Science & Natural Resources, Fac. Regional Development & International Studies, Mendel Univ. in Brno, Tr. Gen Píky 7, CZ-613 00 Brno, Czech Republic. Email: holusao@email.cz

**21261.** Huang, Q.; Tian, F.-B.; Young, J.; Lai, J.; Ravi, S. (2023): Numerical study of passively pitching tandem dragonfly wings for hovering flight. *AIAA 2023-1027*. Session: Bio-Inspired and Low-Reynolds Number Flows I. Published Online: 19 Jan 2023 <https://doi.org/10.2514/6.2023-1027>: 9 pp. (in English) ["Insect flapping-wing kinematics and aerodynamics have been studied extensively by researchers worldwide. Wing pitching motion in insect flapping flight has been recognized as a passive phenomenon induced by inertial and aerodynamic forces. The performance of passively pitching tandem dragonfly wings was investigated by varying the phase angle between the forewing and the hindwing. The simulations were conducted by a fluid-structure interaction solver based on an immersed boundary-lattice Boltzmann method. The primary performance metric of interest is the power economy (PE), which indicates the extent of lift generation of the wing concerning the power required to operate it. The flapping-wing system was rotated at a stroke plane angle that the total horizontal drag was precisely zero for each case. Results show that the variation of PE is small as the change of the phase angle. The stroke plane angle has a significant variation at phase angle -45° and 45°, while it is still in the range of the stroke plane angle reported in the literature. The effects of different material elasticities and corresponding power expenditures will be investigated and reported in future works." (Authors)] Address: Huang, Q., Univ. New South Wales, Canberra ACT 2610, Australia. Email: qjuxiang.huang@adfa.edu.au

**21262.** Hushtan, K.; Hushtan, H.H. (2023): The approbation of web resource «Biodiversity of Ukraine» on example of dragonflies (Insecta: Odonata) of Ukrainian Carpathians. *Proceedings of the State Natural History Museum* 38: 237-



244. (in Ukrainian, with English summary) ["The paper examines of individual possibilities of the "Biodiversity of Ukraine" web resource for the analysis of collections, observations and literary data on the example of dragonflies for the territory of Ukrainian Carpathians. The possibility of analyzing the spatial distribution of Odonata in terms of physical and geographical regions of the model territory was studied. Their faunal similarity was determined using the Sorensen and Jaccard indexes integrated into the web resource. Mountain massifs have been established, which are promising for further research into the fauna and ecology of dragonflies. Preliminary data on the spatial distribution of dragonflies for the territory of the Ukrainian Carpathians were obtained as a result of the approbation of the information capabilities of the "Biodiversity of Ukraine" web resource, in the context of administrative and physical-geographic regions. The most studied is the Ciscarpathians Upland (58 species). Territories that are the least studied and require thorough faunal studies of dragonflies have been identified, namely the Marmarosh-Chyvchyny region The perspective of the expediency of using the "Biodiversity of Ukraine" web resource to compare the dragonfly fauna of different administrative regions of the Ukrainian Carpathians has been established. It should be noted that the national biomonitoring system involves development on a pan-European basis, the use of modern methods of data collection, accumulation, analysis and information exchange, and the creation of conditions for free access to information by a wide range of interested. All these principles are provided by the Data Center "Biodiversity of Ukraine", as shown in this paper." (Authors)] Address: Hushtan, Kateryna, State Museum of Natural History of the National Academy of Sciences of Ukraine, Lviv, Ukraine. Email: katrinantonyuk@gmail.com

**21263.** Jeong, K.-Y.; Choi, J.-Y.; Joo, H.; Jeong, K.-S. (2023): Complete mitochondrial genome of *Ischnura asiatica* (Brauer, 1865) assembled from next-generation sequencing data. *Mitochondrial DNA. Part B: Resources* 8(3): 333-335. (in English) ["*I. asiatica* ... is distributed across most of Korea, primarily in areas with low water flow, such as ponds and wetlands. The complete mitochondrial genome of *I. asiatica* was sequenced by next-generation sequencing. The circular mitochondrial genome was found to be 15,769 bp long, with of 13 protein-coding, two ribosomal RNA, and 22 transfer RNA genes (GenBank accession no. OM310774). Maximum likelihood, phylogenetic analysis showed that this species clustered with other species belonging to the family Coenagrionidae. This study contributes to the phylogeny of damselflies and other members of the family Coenagrionidae." (Authors)] Address: Jeong, K.-Y., Dept Companion Animal Health, Dongju College, Busan, Republic of Korea

**21264.** Junaidi, F.A.; Soendjoto, M.A.; Dharmono, D. (2023): Practicality of popular scientific book on Odonata. *Jurnal Biologi-Inovasi Pendidikan* 5(1): 117-124. (in English, with Indonesian summary) ["The Popular Scientific Book (PSB) on Odonata that inhabits the Tabanio Coastal Forest, Tanah Laut Regency has been completed, but its practicality has yet to be determined. The aim of the research was to determine the practicality of the PSB. The determining parameters were readability, applicability, and student responses which in this case are undergraduate students of the Biology Education Study Program. Readability was tested by three students using the one-to-one method. The implementation was tested by five observers through a small group assessment (on five students using the PSB) to get the expected implementation value and field test assessment (on 10 students) so that the actual implementation

was obtained. Student responses were obtained from small groups (five students) and field tests (10 students). The result is that the readability of the book is categorized as Very Good, the implementation of expectations and actual implementation is categorized as Very Good, as well as the expected and actual responses from students Strongly Agree. With these categories, this PSB on Odonata is stated to be practical to use." (Authors)] Address: Soendjoto, M.A., Master Program of Biology Education, Postgraduate Program, Universitas Lambung Mangkurat, Banjarmasin City, South Kalimantan, Indonesia. Email: masoendjoto@ulm.ac.id

**21265.** Kaligis, K.H.; Pollo, H.N.; Tulung, M. (2023): Penilaian Sumberdaya Alam di Sekitar Danau Pulisan, Linow dan Tampusu, Kota Tomohon, Sulawesi Utara: Capung (Odonata) sebagai Biondikator. *Silvarum* 2(1): 13-19. (in Indonesian) ["...These factors will limit the spread of several dragonfly species, especially endemic dragonfly species that have specific physical factors. Optimal physical conditions of the habitat will affect the presence of dragonfly species. The purpose of this study was to count the number of dragonfly species, the number of plants, measure water temperature, air temperature, water turbidity, water pH, total TDS dissolved particles, analyze dragonfly species which act as bioindicators and determine water quality status based on the Family Biotic Index. FBI. The results of this study showed that there were 13 species of dragonflies obtained, including 8 species in Linow Lake and 5 species in Pulisan Lake. Constituent plants found in Lake Pulisan, Linow and tampusu are 21 species. The result of calculating the total number of families from the FBI is 7.94, very badly polluted by organic matter. Based on the FBI, Lake Linow contains 2 families Coenagrionidae and Libellulidae. The result of calculating the total number of families from the FBI is 7.84, the level of pollution is very bad with heavy pollution of organic matter." (Author/Google translate)] Address: Kaligis, K.H., Program Studi Kehutanan, Universitas Sam Ratulangi, Manado, Indonesia. Email: Kevinhiskiakaligis@gmail.com

**21266.** Kaunisto, K.M.; Suhonen, J. (2023): Territorial males have larger wing spots than non-territorial males in the damselfly *Calopteryx splendens* (Zygoptera: Calopterygidae). *International Journal of Odonatology* 26: 1-6. (in English) ["Males of *C. splendens* use two alternative mating tactics, territoriality, and non-territoriality. These different mating tactics are shown to vary between males within the same population and previous studies have shown that territorial males have considerably higher fitness than non-territorial males. In this paper, we tested whether the wing spot size as sexual ornament, wing length, relative wing spot size, asymmetry in wing length, asymmetry in wing spot size, or asymmetry in relative wing spot size differed between the territorial and non-territorial males. We sampled *C. splendens* males, representing both mating tactics, from a river system in south-west Finland. According to our results, territorial males have larger wing spot than non-territorial males. In contrast, there were no differences in the other tested traits between the territorial and non-territorial males. In conclusion, our data show that the size of pigmented wing spots may predict the alternative mating tactic of *C. splendens* males." (Authors)] Address: Kaunisto, K.M., Biodiversity Unit, University of Turku FI-20014, Turku, Finland

**21267.** Landmann, A.; Landmann, M. (2023): Habitat requirements, habitat variability, and altitudinal distribution of *Coenagrion hylas* (Odonata: Coenagrionidae) in the Lechr river valley and beyond (Tyrol, Austria). *Libellula* 41(3/4): 89-105. (in English, with German summary) ["*C. hylas* is the

rarest Central European odonate species and – at present – populations are exclusively known from an extremely limited area of occurrence of about 42 km<sup>2</sup> in the North-western Tyrol. Since 1973 the species has been recorded at 27 single sites in Tyrol whereof 15 (currently 10), and all sites with larger self-sustaining populations, are situated in the Lech valley, which thus can be regarded as the European stronghold of the species. The perception of the habitat niche breadth of *C. hylas* and the knowledge about the range of its altitudinal distribution are still somewhat superficial and biased in the literature. In particular, the “mountain lake myth” persists, stating that *C. hylas* in Europe is mostly bound to clear mountain lakes in the submontane to lower montane zone. Here, we therefore analyse and compare habitat characteristics of the 27 Tyrolean sites and, in addition, offer a pictorial overview of the habitats used by *C. hylas* in Tyrol. Our compilation indicates that *C. hylas* in Europe has a broader habitat niche than expected from its Siberian origin and as stated in literature. According to the chemistry, size, depth, sources of water, and the predominant vegetation we were able to distinguish six main types of *C. hylas* habitats. These comprise rather different waters including clear cold mountain lakes (3 cases only), dystrophic bog lakes, fishponds, spring water swamps, and shallow flood plain pioneer habitats. However, despite this wide spectrum of habitats used by *C. hylas*, a closer analysis of the data reveals that the few habitats constantly used by larger populations for reproduction have a combination of specific habitat features in common. The presence of waterbodies with very shallow water and stands of the sedge *Carex rostrata* along or near to incoming (or outgoing) small spring creeks with cold water or zones with cold groundwater entering seems to be required. Since such conditions currently mainly seem to be fulfilled at about a dozen sites in the Lech valley, the strict preservation and enhancement of these places via management measures as well as the creation of appropriate steppingstone habitats in between are the main issue to conserve the species. Such measures are already in progress as part of the current LIFE-Lech program Dynamic River System Lech." (Authors)] Address: Landmann, A., Institut für Naturkunde & Ökologie, Karl Kapfererstraße 3, 6020 Innsbruck, Austria. Email: office@arminlandmann.at

**21268.** Liao, J.; Wu, Z.; Wang, H.; Xiao, S.; Mo, P.; Cui, X. (2023): Projected effects of climate change on species range of *Pantala flavescens*, a wandering glider dragonfly. *Biology* 2023, 12, 226. <https://doi.org/10.3390/biology120-20226>: 17 pp. (in English) ["Simple Summary: In this study, we simulated the distribution range and its shift of *Pantala flavescens* in past, present, and future scenarios, and revealed its habitat properties. Except at high latitudes near the poles (e.g., Antarctica and near the Arctic Circle), it is found almost everywhere in the world, with the most suitable habitat mainly in East Asia and the United States. The max temperature of the warmest month and the precipitation of the wettest month are important factors affecting its distribution, and its suitability decreases with the increase of altitude. Climate warming promoted the shift of lowly and moderately suitable habitats into moderately and highly suitable habitats, especially in equatorial regions, which increased the total habitat area. This study provides a global dynamic distribution pattern of *P. flavescens* across large temporal and spatial scales, and provides a reference for further understanding of its biodiversity and conservation. Abstract: Dragonflies are sensitive to climate change due to their special habitat in aquatic and terrestrial environments, especially *Pantala flavescens*, which have extraordinary

migratory abilities in response to climate change on spatio-temporal scales. At present, there are major gaps in the documentation of insects and the effects of climatic changes on the habitat and species it supports. In this study, we model the global distribution of a wandering glider dragonfly, *P. flavescens*, and detected the important environmental factors shaping its range, as well as habitat shifts under historical and future warming scenarios. The results showed a global map of species ranges of *P. flavescens* currently, including southern North America, most of South America, south-central Africa, most of Europe, South, East and South-east Asia, and northern Oceania, in total, ca. 6581.667 × 104 km<sup>2</sup>. BIO5 (the max temperature of warmest month) and BIO13 (the precipitation of wettest month) greatly explained its species ranges. The historic refugia were identified around the Great Lakes in the north-central United States. Future warming will increase the total area of suitable habitat and shift the type of suitable habitat compared to the current distribution. The habitat suitability of *P. flavescens* decreased with elevation, global warming forced it to expand to higher elevations, and the habitat suitability of *P. flavescens* around the equator increased with global warming. Overall, our study provides a global dynamic pattern of suitable habitats for *P. flavescens* from the perspective of climate change, and provides a useful reference for biodiversity research and biological conservation." (Authors)] Address: Cui, X., Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan 430072, China. Email: cuixuefan@ihb.ac.cn

**21269.** Manthey, C. (2023): The evolution of complete metamorphosis in insects. PhD thesis, Dept of Biology, Chemistry, Pharmacy, Freie Universität Berlin: 232 pp. (in English) ["Metamorphosis, the change (meta) in form (morphé), is a common phenomenon in the animal kingdom, where it has evolved several times independently. The most dramatic metamorphic changes occur in the most successful group of animals: the insects, which comprise more than 60% of all living animals. Within the group of insects, the Holometabola (e.g. beetles, butterflies, flies and bees) comprise more than 80% of all insect species. Holometabolous insects undergo complete metamorphosis. In a non-feeding pupal life stage, intercalated between the larval and adult stages, their entire anatomy is radically remodelled, including the digestive tract, which undergoes apoptosis and proliferation. The second major group of insects, the Hemimetabola (e.g. grasshoppers, true bugs, and dragonflies), undergo incomplete metamorphosis. Compared to Holometabola, hemimetabolous insects metamorphose more gradually, less drastically and without a pupal stage. Holometaboly is one of the key evolutionary innovations explaining insects' enormous and unique biodiversity. However, how the evolution of the pupal stage is related to the success of insects is unknown. The remodelling of the larval gut poses a significant challenge to the gut microbiota, as the gut is replaced during pupation, which does not occur in Hemimetabola. It gives holometabolous insects the unique opportunity to drive a change between the larval and adult microbiota, facilitating niche shifts by allowing the insect to acquire specialised symbionts for a life-stage specific diet, ecology and physiology- one barely studied adaptive hypothesis explaining the evolution of the pupa. In chapter II, using 16S rRNA gene metabarcoding, I studied 18 different herbivorous insect species from five orders of holometabolous and three orders of hemimetabolous insects. Comparing larval and adult specimens, I found a much higher beta-diversity and hence microbiota turnover in holometabolous insects than in hemimetabolous insects. My results support

the idea that the pupa offers the opportunity to change the gut microbiota and hence facilitates niche shifts. This possible effect of niche shift facilitation could explain a selective advantage of the evolution of complete metamorphosis. The unique opportunity to change the microbial composition throughout insect development by gut remodelling during complete metamorphosis also puts holometabolous insects at a higher risk of infections. Holometabola must control their gut microbiota and initiate an immune response to avoid infectious diseases during metamorphosis. In chapter III, using RNAseq, I compared the expression of immune effector genes in the gut during metamorphosis in two holometabolous and a hemimetabolous insects. I found high read count abundances of differentially expressed immune effectors in the gut at the larval-pupal moult in the two Holometabola; no such high abundances were observed at the nymphal-adult moult in Hemimetabola. My findings confirm that only complete metamorphosis elicits a prophylactic immune response as an adaptive response in holometabolous insects, which controls the microbiota during gut replacement. Another barely studied and not mutually exclusive hypothesis explaining the success of holometabolous insects could be that intercalating the pupal stage decouples growth and differentiation. Most growth is confined to the larval stages in holometabolous insects, while most development occurs in the pupa, allowing for fast larval growth. In chapter IV, I conducted a literature review and calculated growth rates and ratios. I compared 33 species from three holo- and seven hemimetabolous insect orders. I found faster larval growth, higher growth ratios, and much higher variances for those traits in holometabolous than hemimetabolous insects. I also found much shorter growth periods of the larval stages in holometabolous than hemimetabolous insects. My results support the decoupling of the growth and differentiation hypothesis in holometabolous insects, allowing fast larval growth. In this thesis, I investigated two barely studied and not mutually exclusive hypotheses explaining the evolution of the pupa in holometabolous insects, which constitute the majority of animal diversity. I could show a microbiota turnover in holometabolous insects, which is also under the control of the host gut immunity and allows the Holometabola to occupy different niches throughout development. The second hypothesis, which proposes that decoupling growth and differentiation allows for fast larval growth, is supported by my findings of faster larval growth rates in holometabolous than hemimetabolous insects. The facilitation of niche shifts by changes in the gut microbiota could be considered an essential driver of the evolution of the pupa. The microbiota turnover could also be driven by other selective factors such as growth rate. Fast larval growth could be a selective factor for decoupling growth and differentiation, ultimately resulting in the evolution of the pupa in holometabolous insects." (Author) The thesis includes many references to Odonata.] Address: not stated.

**21270.** Mesaglio, T.; Callaghan, C.T.; Samonte, F.; Gorta, S.B.Z.; Cornwell, W.K. (2023): Recognition and completeness: two key metrics for judging the utility of citizen science data. *Frontiers in Ecology and the Environment* published: 8 pp. (in English) ["Biodiversity citizen science data are being collected at unprecedented scales, and are key for informing conservation and research. Species-level data typically provide the most valuable information, but recognition of specimens to species level from photographs varies among taxa. We examined a large dataset of Australian photographic observations of terrestrial invertebrates uploaded to iNaturalist to quantify recognition to species across different taxa. We also quantified the proportion of Australian

species that have been uploaded to iNaturalist. Across 1,013,171 observations covering 14,663 species (17.8% completeness), 617,045 (60.9%) were recognized to species. Dragonflies/damselflies and butterflies were the best-recognized and most complete taxa, and therefore represent the best groups for researchers and managers intending to use existing iNaturalist data at large spatial and temporal scales. The recruitment of additional experts to identify records, and enhanced support for accessible resources for hard-to-identify taxa, will likely increase recognition for other taxa." (Authors)] Address: Mesaglio, T., Centre for Ecosystem Science, School of Biological, Earth & Environmental Sciences, The Univ. of New South Wales, Sydney, Australia. Email: thomasmesaglio@gmail.com

**21271.** Miga, M.; Jahari, P.N.S.; Parimannan, S.; Rajandas, H.; Latiff, M.A.B.; Wei, Y.J.; Shamsir, M.S.; Salleh, F.M. (2023): Characterization of the nearly complete mitochondrial genome of ochraceous darkies, *Euphaea ochracea* Selys, 1859 (Odonata: Zygoptera: Euphaeidae) and phylogenetic analysis. *Mitochondrial DNA Part B Resources* 8(2): 292-296. (in English) ["In the present study, the nearly complete mitochondrial genome of *Euphaea ochracea* was described and its phylogenetic position in the family Euphaeidae was analyzed. Here, we recovered 13 protein-coding genes, 22 transfer RNAs, 2 ribosomal RNAs and a partial control region, resulting in a mitogenome length of 15,545bp. All protein-coding genes were initiated by the typical ATN codon except *nad3* and *nad1*, which utilizes the TTG codon. Four protein-coding genes (*cox1*, *cox2*, *cox3* and *nad5*) are terminated by an incomplete stop codon T, while others end with either a TAA or TAG codon. The intergenic spacer region, S5, is absent in this mitogenome, supporting the lack of this region as a specific character in damselflies. Phylogenetic analysis showed that the newly sequenced *E. ochracea* is phylogenetically closer to *E. ornata* with a high support value." (Authors)] Address: Salleh, F.M., Dept of Biosci., Fac. Sci., Univ. Tek. Malaysia, Johor, Malaysia Centre of Excellence for Omics-Driven Computational Biodiscovery (COMBio), Fac. of Applied Sciences, AIMST Univ., Bedong, Kedah, Malaysia. Email: faezah@utm.my

**21272.** Moreno Pallares, M.I.; Bonilla Gómez, M.A.; Guillot Monroy, G.H.; Torregroza-Espinosa, A.C. (2023): Macroinvertebrates composition as determinants of larval abundance in the dragonfly *Miathyria marcella* in tropical wetlands. *Global Journal of Environmental Science and Management*: 12 pp. (in English) ["Background and objectives: Odonate larvae play an important role in macroinvertebrate trophic networks and are excellent proxies for wetland quality. However, despite their ecological importance, research on odonates and how they interact with their environment is scarce. This study aims to assess macroinvertebrate composition as determinants of larval abundance in *Miathyria marcella*. Methods: 29 samples were collected from six wetlands with different hydrological influence using standardized invertebrate sampling techniques in the Dept of Atlántico, northern Colombia. Standardized invertebrate sampling techniques were used in 29 sampling points. Obtained data were used to analyze invertebrate abundance and a non-parametric multidimensional scaling analysis was applied. In addition, a correlation analysis was conducted between macroinvertebrate composition and *M. marcella* larval abundance. Findings: A total of 2586 larvae, and 12925 individual macroinvertebrates were collected, distributed in 25 orders and 58 families. The most abundant orders were Neotaenioglossa (26 percent), Odonata (15 percent) Calanoida (10 percent) and Diptera (8 percent). Heatmap and

scaling analysis indicated different macroinvertebrate compositions in the sampled wetlands. A high positive correlation between *Miathyria marcella* and the orders Odonata ( $R^2 = 0.84$ ,  $p$ -value = 0.05), Coleoptera ( $R^2 = 0.52$ ,  $p$ -value = 0.05), Basommatophora ( $R^2 = 0.60$ ,  $p$ -value = 0.05) and Hemiptera ( $R^2 = 0.50$ ,  $p$ -value = 0.05). Conclusion: The results suggest that the abundance of *Miathyria marcella* responds to the accompanying macroinvertebrates, the composition of which depends on the type of hydrological influence. Approaches focused on the relationships between macroinvertebrate taxa are important conservation tools for biodiversity assessment. Results from this study will serve as a baseline to propose monitoring and follow-up strategies on the environmental sustainability in wetlands in this region. Highlights: \*The hydrological influence of wetlands has an effect on the distribution of macroinvertebrates; \*The abundance of *marcella* responds to the accompanying macroinvertebrates; \*The nMDS indicated a difference in the composition of the macroinvertebrates according to the sampled wetlands; \*A high positive correlation was found between *marcella* and the orders Coleoptera, Basommatophora and Hemiptera." (Authors)] Address: Moreno Pallares, M.I., Depto de Biología, Universidad Nacional de Colombia, Bogotá, Colombia. Email: mimorenop@unal.edu.co

**21273.** Musinguzi, L.; Olokotum, M.; Nakiyende, H.; Egessa, R.; Kiggundu, V.; Pabire, G.W.; Bassa, S.; Nsega, M.; Kamya, A.; Rwezawula, P.; Lugya, J.; Magezi, G.; Nalwayiro, J.; Natugonza, V. (2023): Primary biodiversity data on zooplankton, macroinvertebrates, and fish from freshwater ecosystems of Uganda. *J. Limnol.* 2023; 82: 2117: 10 pp. (in English) ["Effective conservation requires reliable data and information on the status of biodiversity. The conservation of freshwater biodiversity lags behind terrestrial and marine biodiversity because data and information limitations are greatest in freshwater ecosystems. Given that freshwater ecosystems are inhabited by disproportionately more species than other ecosystems, the paucity of data and information is disadvantageous to many species and dependent ecosystem services. Data and information on freshwater biodiversity are limited mainly because few freshwater ecosystems are considered for regular monitoring. Existing data is also scattered and in non-user-friendly formats, limiting accessibility and use. It is desirable to make freshwater biodiversity data and information accessible everywhere to attain their full potential in guiding conservation. Here, we present 34 datasets, covering three major freshwater taxa (zooplankton, macroinvertebrates, and fish) in freshwater ecosystems in Uganda. The datasets provide occurrence records and corresponding abundance data, where applicable, for the three groups. The datasets which are available through the Global Biodiversity Information Facility (GBIF), cover many years (1971-2021) and have a total of 56,104 occurrence records. The datasets were mainly mobilized from archives of biodiversity surveys conducted at the National Fisheries Resources Research Institute (NaFIRRI) in Uganda. The surveys cover most of the water bodies in the country. The datasets are envisaged to increase accessibility to data for freshwater conservation research, decision making, and capacity building. Indeed, part of the data, especially on fish, has already been used to develop conservation tools and assess conservation status of species at both the global and national levels." (Authors) Anisoptera, Aeshnidae, Corduliidae, Gomphidae, Libellulidae, Phyllomacromia, Progomphus [sic], Trithemis.] Address: Musinguzi, L, National Fisheries Resources Research Institute (NaFIRRI), P.O. Box 343, Jinja, Uganda. Email: musinguzilaban@gmail.com

**21274.** Nel, A.; Piney, B. (2023): Odonatopteran approaches to the challenges of flight: Convergence of responses subject to a common set of morphological constraints. In: Bels, V.L. & A.P. Russell (Eds.): *Convergent Evolution. Animal Form and Function.* Springer Cham: 21-36. (in English) ["Effective flight capacity is a crucial survival attribute of volant animals. Several vertebrate clades have acquired gliding capabilities and at least three of them independently acquired powered flight. Contrastingly, wings were probably acquired only once by pterygotan insects. Despite this, insects have developed a great variety of structural approaches that have diversified their collective flight capacity. Flight was a key contributor to their diversification during the Late Carboniferous (at least 330 Ma), and flying insects have remained the most diverse animal clade since then. Among pterygotans, representatives of the superorder Odonatoptera, which includes the extant Odonata, have developed impressive performance associated with the highly complex morphological structure of their wing venation. Some venation patterns, such as the nodus, discoidal complex, and arculus, were acquired only once, whereas others have been convergently acquired several times. One example of a pattern acquired more than once is the sclerotized pterostigma, convergently appearing in the Permian Protanisoptera and its sister group, the Discoidalia, these comprising the modern Odonata. All odonatopterans with broad wings were confronted by a major problem, that of 'how to strengthen the basal third of the wing' to prevent it from breaking longitudinally. At least eight different convergent 'solutions' have been 'adopted' that have resulted in the incorporation of structures oriented perpendicular to the main axis of the wing. Additionally, several clades within the Odonatoptera have convergently developed petiolated wings, adapted for flying in cluttered environments. The width and length of the petiole can vary greatly, with the most impressive ones being those of the 'giant' Permian-Triassic Triadophlebiomorpha. This great morphological disparity represents 'variations on a theme' of the already complex wing venation established by the first Carboniferous odonatopterans. It is possible that some of the 'solutions' arrived at by extinct clades allowed for performance that was more effective than that of modern odonatans. Many of these groups flourished and co-existed with the ancestors of modern taxa for millions of years. Extant odonatans have been adopted as models for the bio-mimetic development of small drones. The wing patterns of extinct clades should also be investigated for their potential for bio-mimetic inspiration and application." (Authors)] Address: Nel, A., Lab. Ent., Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**21275.** Nieoczym, M.; Stryjecki, R.; Buczynski, P.; Plaska, W.; Kloskowski, J. (2023): Differential abundance, composition and mesohabitat use by aquatic macroinvertebrate taxa in ponds with and without fish. *Aquatic Sciences* (2023) 85:25 <https://doi.org/10.1007/s00027-022-00922-y>: 17 pp. (in English) ["Fish are known to pose strong effects on invertebrate abundance, species richness and assemblage structure. Littoral vegetation may play a crucial role as a refuge for invertebrates vulnerable to fish predation. We studied relative densities and taxonomic composition of water mites, aquatic beetles and bugs in large lake-like ponds with different fish status (fish-free and containing fish) and mesohabitats (emergent littoral vegetation and open water zone). The macroinvertebrate taxa differed in their responses to the fish presence and in mesohabitat preferences. The density and species richness of water mites were greater in fish-containing ponds, while no differences were



found between littoral and open-water habitats. In contrast, beetles were far more numerous and species-rich in fish-free ponds and in littoral vegetation. Total densities of aquatic bugs were non-significantly higher in fish-containing ponds, and they preferred littoral areas, but species richness was independent of fish presence and mesohabitat. No statistical interactions between fish presence and the densities of individual macroinvertebrate groups in the littoral habitat were detected, indicating that their use of emergent littoral vegetation was not an antipredator response to fish. The assemblages of the three macroinvertebrate taxa exhibited nested structures of a different order, consistent with their species richness patterns. Our research stresses the importance of littoral vegetation for the distribution and abundance of aquatic insects; however, high fish presence may not affect or may even benefit ecologically important macroinvertebrate groups, such as water mites or bugs." (Authors)] Address: Nieoczym, M., Dept of Zoology & Animal Ecology, University of Life Sciences, Lublin, Poland. Email: mnieoczy@wp.pl

**21276.** Novelo-Gutiérrez, R. (2023): Clave actualizada para la separación de familias y géneros de las larvas de Zygoptera de México (Insecta: Odonata) - Updated key to the families and genera of Zygoptera larvae of Mexico (Insecta: Odonata). *Dugesiana* 30(1): 3-10. (in Spanish, with English summary) ["An updated and illustrated key for the families and genera of odonate larvae inhabiting Mexico, is provided." (Author)] Address: Novelo-Gutiérrez, R., Red de Biodiversidad y Sistemática, Instituto de Ecología, A.C. Carretera Antigua a Coatepec 351, El Haya, 91073 Xalapa, Veracruz, México. Email: rodolfo.novelo@inecol.mx

**21277.** Onishko, V.V.; Kosterin, O.E.; Voinov, I.O. (2023): Results of odonatological studies in southern Primorye, Russia, in 2011-2020. *International Dragonfly Fund - Report 177: 1-59.* (in English) ["The odonatological results of five expeditions to two ecologically contrasted regions (forested foothills and coastal plains) in southern Primorsky Krai (or Primorye), Russia, undertaken from 2011 to 2020 are summarised. A total of 64 species have been recorded, including those with a limited presence in Russia, such as *Lestes temporalis*, *Paracerion calamorum*, *P. hieroglyphicum*, *P. plagiosum* (the 4th finding in Russia is reported here), *Trigomphus citimus*, *Macromia manchurica* (the 3rd finding in Russia), *Deilelia phaon*, *Lyriothemis pachygastra* (the 3rd finding in Russia), and *Sympetrum baccha*. *Aeshna caerulea* is for the first time reported to Primorskiy Krai, although by a visual observation only. Simultaneous occurrence of the closely related *Coenagrion hastulatum* and *C. lanceolatum* was observed. The differences between *Anax parthenope* and *A. julius*, assumed to be different species, are discussed and illustrated; systematics of *Coenagrion johanssoni*, *Aeshna juncea*, *Sympetrum depressiusculum* and *S. frequens* and dimorphism for the frons maculation in males of *Epophthalmia elegans* are briefly discussed, as well. A steady and profound decrease in number of Odonata for the period 2011-2020 was observed." (Authors)] Address: Kosterin, O.E., Institute of Cytology & Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**21278.** Ott, J.; Ott, N. (2023): Biodiversität über Kontinente verbinden. Von der Westpfalz bis nach Vietnam. *Deutsche Kaffeerösterei und vietnamesische Kaffeefarm gehen Kooperation ein.* *Naturschutz Magazin* 5(1): 64-69. (in German) [This is a brief report on a Vietnamese project to biologically produce coffee. The paper includes some accidental

observations of dragonflies living in the coffee plantation.] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**21279.** Papastavropoulou, K.; Xiao, J.; Proestos, C. (2023): Edible insects: Tendency or necessity (a review). *e-Food* 4(1) e58: 17 pp. (in English) ["Eating insects has been a widespread habit in many cultures for many years. Edible insects represent an innovative food source with many advantages that will help the problem of protein and energy shortages created by the rapid growth of the world population. Using insects as food can increase the economy and help protect the environment and the human survival. Their nutritional value is excellent, since according to many studies insects have high protein content, high concentrations of various essential amino acids, a well-balanced fatty acid profile, with a high content of monounsaturated, polyunsaturated fatty acids and many minerals, trace elements, and vitamins. However, there are several risks in the use of edible insects, which need to be researched more extensively. Main goals are to spread knowledge and change the process of obtaining edible insects in better and safer ways. So that the edible insect food industry can develop on a solid basis, through the expansion of the composition of the insects already used and the future legalization of new species of edible insects as well as the establishment of additional legislative frameworks for the breeding, development, processing, storage, and safety of these innovative new foods. ... The most commonly consumed insect orders and their consumption rates are: ... dragonflies and Zygoptera (Odonata, 3%)..." (Authors)] Address: Papastavropoulou, Konstantina, Laboratory of Food Chemistry, Dept of Chemistry, School of Sciences, National and Kapodistrian, University of Athens, Athens, Greece

**21280.** Phan, Q.T.; Ngo, Q.P. (2023): An updated the checklist of dragonflies and damselflies (Insecta: Odonata) of Phu Quoc National Park, southern Vietnam. *International Dragonfly Fund Report 175: 1-18.* (in English) ["A checklist of 93 dragonfly and damselfly species from Phu Quoc Island, southern Vietnam, is provided. It contains 7 species newly recorded to the Island and *Macromia cupricincta* Fraser, 1924 newly recorded for Vietnam. The taxonomic status and occurrences of some species in previous studies are discussed and re-assessed." (Authors)] Address: Quo Toan Phan, Q.T., The Center for Entomology & Parasitology Research, College of Medicine and Pharmacy, Duy Tan University, 120 Hoang Minh Thao, Lien Chieu, Da Nang, Vietnam. Email: pqtoan84@gmail.com

**21281.** Pinilla-Rosa, M.; Garcia-Sauco, E.G.; Santiago, E.A.; Ferrandis, P.; Men, E.M. (2023): Can botanic gardens serve as refuges for taxonomic and functional diversity of Odonata? The case of the botanic garden of Castilla-La Mancha (Spain). *Limnology* 24(1): 37-50. (in Damselfly Dragonfly Functional trait Insect conservation Urban) ["In a scenario with declining biodiversity and habitat loss, botanic gardens could serve as refuges for invertebrates, but the opportunities they offer for animal conservation are still poorly understood. Odonata is a good model group for conservation studies, because it includes threatened species and responses to habitat disturbance are well documented. In this study, we assessed the role of the botanic garden of Castilla-La Mancha in Spain as a refuge for members of Odonata by analysing their taxonomic and functional diversity. We explored if the small size of the botanic garden might constrain the taxonomic diversity of Odonata and if low habitat diversity might limit their functional diversity. We

sampled adult Odonata from five water bodies along a gradient of human impact and characterized the Odonata communities based on 12 functional traits in Odonata. We used a species-area relationship to control for differences in the size of water bodies. Compared with natural lakes, the Odonata communities contained less species and their functional diversity was lower in the botanic garden ponds, where generalist species were basically hosted. Despite these limitations, the botanic garden ponds hosted the number of species expected for natural water bodies with the moderate surface area and functional diversity, thereby demonstrating that they are a valuable habitat for Odonata in an urban environment. Appropriate management involving the removal of exotic fish and habitat diversification, including creating lotic environments, would increase the taxonomic and functional diversity of Odonata in this urban system." (Authors)] Address: Pinilla-Rosa, M., Univ. Rey Juan Carlos, C/ Tulipan s/n, 28933 Mostoles, Madrid, Spain. Email: man.pinilla96@gmail.com

**21282.** Rincón, V.; Velázquez, J.; Gülçin, D.; López-Sánchez, A.; Jiménez, C.; Özcan, A.U.; López-Almansa, J.C.; Santamaría, T.; Sánchez-Mata, D.; Çiçek, K. (2023): Mapping priority areas for connectivity of Yellow-winged darter (*Sympetrum flaveolum*, Linnaeus 1758) under climate change. *Land* 2023, 12, 298: 39 pp. (in English) ["*S. flaveolum*, which is associated with high mountain areas, can be considered a flagship species. Due to climate change, its natural range will be negatively affected. In this study, we propose global potential distributions for this species up to the year 2100, considering four time periods (2021-2040, 2041-2060, 2061-2080, and 2081-2100) and three shared socioeconomic pathways (optimistic-SSP245, middle of the road-SSP370, and worst-SSP585), by using an ecological niche model to produce two sets of distribution models (80% to 100% and 60% to 100%). It is foreseen that in the worst of the considered climate scenario (SSP585-2100 year), the distribution of this species could be reduced by almost half, which could pose a risk for the species and provoke the shift from vulnerable to endangered. An analysis of connectivity has also been carried out for all the studied scenarios by applying the MSPA and PC indices, showing that the core habitat of this species will become more important, which is consistent with the decrease in the distribution range. Over time, the importance of the most valuable connectors will increase, implying a greater risk of some populations becoming isolated." (Authors)] Address: Rincón, V., Faculty of Pharmacy, Dept of Pharmacology, Complutense Univ. of Madrid, Plaza de Ramón y Cajal, s/n, 28040 Madrid, Spain. Email: virincon@ucm.es

**21283.** Sánchez-Guillén, R.A.; Vega-Sánchez, Y.M.; Sánchez-Herrera, M. (2023): Genetic structure, cryptic species, and hybridization - causes and evolutionary consequences in Odonata. In: *Dragonflies and Damselflies*. Second Edition. Edited by Alex Córdoba-Aguilar, Christopher D. Beatty and Jason T. Bried, Oxford University Press. DOI: 10.1093/oso/9780192898623.003.0009: 115-128. (in English) ["The term gene flow describes the spatial movement of genes within or between populations within species or between closely related species (that are not completely reproductively isolated) and plays an important role in the evolutionary trajectories of populations by changing allele frequencies and affecting the genetic diversity of populations. This chapter reviews our contemporary understanding of population genetic structure, cryptic species, and hybridization in odonates, framing it within a conservation context. We highlight the most common markers used and suggest the direction

for future studies, including broadening research regions to collect data outside Europe, as genomic resources continue to advance." (Authors)] Address: Sánchez-Guillén, Rosa, Biología Evolutiva, Instituto de Ecología A.C. (INECOL) C.P. 91073 Xalapa, Veracruz, México. Email: rosa.sanchez@inecol.mx

**21284.** Sawant, D.; Kambli, A. (2023): *Gynacantha anandmati*, a new species of dragonfly (Odonata: Anisoptera: Aeshnidae) from Maharashtra, India. *Zootaxa* 5239(4): 537-550. (in English) ["We erect *Gynacantha anandmati* sp. nov. based on one male and one female specimens collected from Thane district of Maharashtra. The new species is distinguished from its congeners by long, straight and nearly flat cerci, distinct 'T-shaped mark' on postfrons and vividly marked abdomen. We also provide updated key to identification of males of South Asian *Gynacantha* spp. [*G. albistyla*; *G. anandmati*; *G. bayadera*; *G. chaplini*; *G. dravida*; *G. khasiaca*; *G. millardi*; *G. subinterrupta*]" (Authors)] Address: Kambli, A., 104, E wing, Mukta Heights, Valivali, Badlapur, Thane 421503, Maharashtra, India. Email: a.p.kambli@gmail.com

**21285.** Semiun, C.G.; Mamulak, Y.I.; Pani, E.; Stanis, S. (2023): The study of dragonfly (Odonata) diversity as bioindicator of water quality in Science Techno Park Spring-Beleknehe village. *Jurnal Biologi Tropis* 23(1): 174-178. (in English) ["Dragonflies are bioindicator insects for the quality of the aquatic environment, especially springs. This study aims to determine the types of dragonflies that live in the Science Techno Park (STP) spring, Beleknehe village, Nekemese sub-district, Kupang District. STP is owned by Widya Mandiri Catholic University. This research was conducted in September 2022. Data collection consisted of dragonfly samples and abiotic factors. Dragonfly samples were obtained using insect nets and hand sorting, while abiotic factor measurements included physical (Conductivity, TDS) and chemical (hardness, iron, sulfate, Mn, NO<sub>3</sub>, NO<sub>2</sub>) parameters. The results of the study revealed that there were four types of dragonflies namely *Neurothemis stigmatizans*, *Coenagrion lunulatum* [sic!], *Megalagrion* sp. [sic!], and *Orthetrum pruinosum*. The four dragonflies found showed that the quality of the Science Techno Park spring was still in good condition." (Authors)] Address: Semiun, Chatarina Gradiet, Biology Study Program Faculty of Science and Mathematics Widya Mandira Catholic University, Kupang, Indonesia. Email: gr4dict@gmail.com

**21286.** Silva Farias, A.B.; Castro Ventura, I.M.; Ribeiro Barão, K.; Silva Vilela, D.; Santos, J.C. (2023): Lista preliminar e novos registros de Libélulas e Donzelinhas (Insecta: Odonata) para o Sul do estado de Alagoas, Brasil. *Hetaerina* 5(1): 17-26. (in Portuguese) ["The Northeast region of Brazil is still considered little known in terms of Odonata diversity due to the few collection campaigns carried out there. For example, only three studies have recorded Odonata for the state of Alagoas. The lack of information on the local diversity becomes an obstacle for the management and conservation of these organisms. Therefore, the present study aimed to provide a preliminary list of Odonata species reporting new occurrences in the south of Alagoas State. For this purpose, collections were carried out in eight sampling points on the margins of water bodies in the Marituba do Peixe Environmental Protection Area and adjacent areas. We collected 14 species in eight genera and three families, with a total of 43 specimens, of which nine species were new records for the state of Alagoas. For Anisoptera, 37 specimens were collected, distributed among the families Gomphidae and Libellulidae. The suborder Zygoptera

was represented only by the family Coenagrionidae, with six specimens. This study contributes to increase the knowledge about the occurrence and distribution of Odonata in the state of Alagoas, which already has 56 recorded species. Ongoing and future studies in the area will allow a better knowledge of the odonatofauna of Alagoas." (Authors/DeepL)] Address: Silva Farias, A.B., Laboratório de Ecologia e Biodiversidade, Departamento de Ecologia, Universidade Federal de Sergipe. São Cristóvão, Brasil. E-mail: antoniobrunofarias@gmail.com

**21287.** Snegovaya, N.Yu. (2023): New data on the dragonflies of the Azerbaijan Republic – a progress study in 2022. International Dragonfly Fund Report 176: 1-30. (in English) ["A total of 35 odonate species from 8 families was recorded from 36 localities in 16 districts of Azerbaijan in 2022, of these, on the territory of the Kura-Araz lowland 21 species were noted, the Greater Caucasus - 27 species and the Middle Araz (Nakhichevn) - 7 species." (Author)] Address: Snegovaya, Nataly Yu., Zoological Institute NAS of Azerbaijan, proezd 1128, kvartal 504, Baku, AZ 1073, Azerbaijan. Email: snegovaya@yahoo.com

**21288.** Subramanian, K.A.; Sivaperuman, C.; Babu, R. (2023): Odonata of Great Nicobar Biosphere Reserve. In: Sivaperuman, C., Banerjee, D., Tripathy, B., Chandra, K. (eds) Faunal Ecology and Conservation of the Great Nicobar Biosphere Reserve. Springer, Singapore: 77-89. (in English) ["The odonate fauna of the Great Nicobar Island comprises of 24 species belonging to two suborders, five families and 21 genera. Three species are endemic to the Great Nicobar Islands, of which *Libellago balus* is assessed as endangered by IUCN. The significant finding of the present study was the rediscovery of populations of endemic and endangered *Libellago balus*, which was known earlier only from museum specimens. The fauna is dominated by Libellulidae, with 18 species. Species such as *Argioptera insignis*, *Camacinia gigantea*, *Nesoxenia lineata*, *Tamea transmarina* and the genus *Nososticta* show biogeographic affinity with Sundaland fauna. The present survey was carried out post rainy season, and extensive surveys are required to be carried out covering all seasons to comprehensively document the odonate fauna." (Authors)] Address: Subramanian, K.A., Zoological Survey of India, Southern Regional Centre, Chennai, India

**21289.** Sumah, A.S.W.; Banna, M. Z.A. (2023): Dragonfly diversity in a residential environment. Jurnal Biologi Tropis 23(1): 290-295. (in Indonesian, with English summary) ["...This study was to determine the diversity of dragonflies in three types of habitats and their correlation with environmental factors. The research was conducted in a residential area in Palembang City in November 2022 using the scan sampling method. The total number of dragonflies found was 18 species and 538 individuals ... *Orthetrum sabina* is the dominant dragonfly species found (136 sp). Meanwhile, *Ischnura verticalis* [sic!], *Pseudagrion microcephalum*, *Agriocnemis rubescens* and *Nososticta* sp. is the rarest species of dragonfly to be found. The diversity value of the Shannon-Wiener index indicates that dragonflies prefer open habitats. Habitat shape and plant vegetation affect the number of dragonflies found, but does not affect the abundance of these dragonflies. The results of the analysis show that wind speed and temperature affect the presence of dragonflies during the observation." (Authors)] Address: Sumah, Astrid Sri Wahyuni, Program Pascasarjana Pendidikan Biologi, Univ. Muhammadiyah Palembang, Kota Palembang, Indonesia. Email: astrid.sumah@gmail.com

**21290.** Svensson, E.I.; Gómez-Llano, M.; Waller, J.T. (2023): Out of the tropics: Macroevolutionary size trends in an old insect order are shaped by temperature and predators. Journal of Biogeography 50(3): 489-502. (in English) ["Aim: Global interspecific body size distributions have been suggested to be shaped by selection pressures arising from biotic and abiotic factors such as temperature, predation and parasitism. Here, we investigated the ecological and evolutionary drivers of global latitudinal size gradients in an old insect order. Location: Global. Taxon: Odonata (dragonflies and damselflies). Methods: We compiled data on interspecific variation in extant and extinct body sizes of Odonata, using an already existing database (The Odonate Phenotypic Database) and fossil data (The Paleobiology Database). We combined such body size data with latitudinal information and data on biotic and abiotic environmental variables across the globe to investigate and quantify interspecific latitudinal size-gradients ("Bergmann's Rule") and their environmental determinants. We used phylogenetic comparative methods and a global published phylogeny of Odonata to address these questions. Results: Phylogenetic comparative analyses revealed that global size variation of extant Odonata taxa is negatively influenced by both regional avian diversity and temperature, with larger-bodied species in the suborder Anisoptera (dragonflies) showing a steeper size-latitude relationship than smaller-bodied species in the suborder Zygoptera (damselflies). Interestingly, fossil data show that the relationship between wing size and latitude has shifted: latitudinal size trends had initially negative slopes but became shallower or positive following the evolutionary emergence and radiation of birds. Main Conclusions: The changing size-latitude trends over geological and macroevolutionary time were likely driven by a combination of predation from birds and maybe pterosaurs and high dispersal ability of large dragonflies. Our study reveals that a simple version of Bergmann's Rule based on temperature alone is not sufficient to explain interspecific size-latitude trends in Odonata. Our results instead suggest that latitudinal size gradients were shaped not only by temperature but also by avian predators, potentially driving the dispersal of large-sized clades out of the tropics and into the temperate zone." (Authors)] Address: Svensson, E.I., Dept of Biology, Lund Univ., 223 62 Lund, Sweden. Email: erik.svensson@biol.lu.se

**21291.** Tanczuk, A.; Tonczyk, G. (2023): Collecting data of late recordings of dragonflies in Poland in the period of 2013-2020, as an example of the citizen science. Studia Ecologiae et Bioethicae 21(1): 16 pp. (in English, with Polish summary) ["The group "Wazki (Odonata) w Polsce" is an excellent example of citizen science, understood as a cooperation between society and professionals in scientific activity. The goal of the present paper is to show the data concerning the very late appearances of dragonflies and damselflies in the years 2013 – 2020, to enrich the knowledge about the phenology of various species in comparison to published data, which is no longer valid, taking into consideration the climatic changes over the last decades. It would not have been possible to gather such a great amount of information, if not for the amateurs engaged into a project like that (ca. 100 people). The data was catalogued according to date, place, and species. The main methods used were: the visual observation and taking photos of adult dragonflies. After thoroughly studying the data collected in early, middle, and late autumn (October, November, December), and analysing it carefully, the records were divided into three groups. The information gathered enables us to show the differences in phenology of some of

the species. The project organised as a citizen science action, contributed to the increase of the knowledge concerning the late aspect of Polish odonatofauna." (Authors)] Address: Tanczuk, Agnieszka, Institute of Biological Sciences, Maria Curie-Skłodowska Univ., Poland. Email: atanczuk@gmail.com

**21292.** Torralba Burrial, A. (2023): Empleando las libélulas de Asturias en educación ambiental. *Iberae Monográfico Asturias*: 30-36. (in Spanish) ["Dragonflies, like beetles and butterflies, are among the most visible, colourful and striking insects that can be found in Asturias. In this paper we start with the species of dragonflies present in Asturias, discuss a selection made from the perspective of their inclusion as resources in environmental education due to their different characteristics and comment on the results observed in their application in different interventions in non-formal and informal environmental education." Translated with www-DeepL.com/Translator (free version)] Address: Torralba Burrial, A., Depto de Ciencias de la Educación e Instituto de Recursos Naturales y Ordenación del Territorio (Indurot) – Univ. de Oviedo, Spain. Email: torralbaantonio@uniovi.es

**21293.** van Strien, A.J.; van Grunsven, R.H.A. (2023): In the past 100 years dragonflies declined and recovered by habitat restoration and climate change. *Biological Conservation* 277 (2023) 109865: 7 pp. (in English) ["The availability of opportunistic dragonfly data in the Netherlands spanning >100 years gave us the opportunity to quantitatively assess long term changes in range size. We estimated changes in the number of occupied 5 km × 5 km sites by applying a modified List Length method, which takes into account changes in observation effort. Trends were assessed for nearly all Dutch dragonfly species and the trends were then summarised in Multi-Species Indicators by taking the geometric mean of the species indices. Overall, dragonflies severely declined in range size between the periods 1850–1950 and 1975–1990. In the period thereafter, strong increases happened, during which many species compensated their earlier losses. The factors driving the changes in dragonflies shifted over time. Until 1975 dragonfly species declined due to deterioration of water systems. After 1975 both climate change and habitat restoration contributed to the recovery of many species. Restoration of dragonfly communities was most successful in running water and least effective in moorland pools." (Authors)] Address: van Strien, A.J., a Statistics Netherlands, 24500, 2490 HA The Hague, the Netherlands

**21294.** Wei, Y.; Guo, H.; Zhang, S.; Li, J.; Wang, Y.; Liu, C. (2023): Bionic mechanical analysis of dragonfly wings: The feasibility of mesh combination to improve structural stiffness. *European Journal of Computational Mechanics* 31(4): 459-504. (in English) ["The nodes of the object will show different degrees of deformation and displacement or even damage over time. The mesh structure is flexible and different mesh shapes and arrangements will affect the structural stiffness of the object. The unique structure of dragonfly wing veins allows the dragonfly to withstand pressures several times higher than itself and to fly freely. This study is based on dragonfly wing bionics to disassemble the structure of dragonfly wing vein geometry. And it aims to investigate the deflection under different geometries and three-dimensional spatial structures by using the drawing software Auto CAD to draw dragonfly sample graphics, the finite element software Hyper mesh to build the model and the solver OptiStruct to analyze the structure of wrinkling, arching deflection, z-direction maximum displacement, y-direction maximum

rotation angle, combined displacement test under the different loads. The results show that: (1) The dragonfly wing vein mesh structure can enhance the stiffness under load. (2) In contrast, the displacement deformation of quadrilateral and combined hexagonal is smaller. (3) The structural stiffness of quadrilateral hexagon is enhanced as the height of wrinkling and arching increases. (4) The improvement of grid deflection with membrane structure is better than that without membrane structure. According to the above experimental results, the quadrilateral wrinkling and hexagonal arching structure has a significant improvement on the load bearing and deflection of the mesh, and has the potential to make structural optimization of the mesh series products, which is suitable for practical application and promotion." (Authors)] Address: Wei, Y., Architecture and Design College, Nanchang University, Nanchang 330031, China

**21295.** Wilson, K.D.P. (2023): A profile of Sha Lo Tung, a dragonfly hotspot in Hong Kong and case study in conservation planning. *Agrion* 27(1): 12-27. (in English) ["The Sha Lo Tung basin, located within the Pat Sin Leng Country Park in the north-east New Territories of Hong Kong, is renowned for its dragonflies. The basin is home to four small abandoned Hakka villages. From the early 1980s a succession of campaigns have been mounted against a series of proposed developments at Sha Lo Tung. The controversy is considered to be an outstanding example of green groups using legal means to block repeated and determined attempts to use a country park and abandoned ancestral village lands for private property development. The diverse ecology of the area, especially its odonate populations, are the principal reason for the planning authority's ultimate refusal to approve development at the site. A summary of the odonate communities, ecology and history of the Sha Lo Tung basin is provided here together with an account of the various development proposals and the planning process outcomes. The developer, villagers and the Administrations' mutual struggles that finally led to a solution acceptable to all parties and also allowed for the full protection of the basin's exceptional wildlife is documented." (Author)] Address: Keith D.P. Wilson [kdpwilson@gmail.com]

**21296.** Zayeid, Y.M.; AL-daikh, O.B.H.; Altaib, A.N. (2023): The activity and the abundance of some species belonging to (Odonata: Aeschnidae) in Al-Marj region, Libya. *Libyan Journal of Plant Protection* 13: 1-10. (in Arabian, with English summary) ["This study was carried out from January 2018 to December 2019 in Al Jabal Al Akhdar region which aimed to survey, describe and identify some distributed species belonging to the family Aeshnidae in twelve sites studied. The results indicated that the effect of temperature and relative humidity on the abundance of eight species, *Anax imperator*, *A. parthenope*, *A. ephippiger*, *Crocothemis erythraea*, *Sympetrum fonscolombii*, *Orthetrum anceps*, *Trithemis arteriosa*, *Ischnura* spp during five months: June, July, August, September and October in the two years of study, when temperature was between 21.5 - 27.4C° and the relative humidity was 50 - 65%, at the same time, when the temperature was below than 13C° and the relative humidity more than 68%, no species were recorded, while the species *Ischnura* spp were not recorded in low temperature." (Authors)] Address: Zayeid, Y.M.: E-mail: ymzaied@yahoo.com



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

## 1997

**21297.** Jehangir, Z. (1997): Taxonomic studies of Odonata of Gilgit and Baltistan areas. MSc. thesis, Fac. Agriculture, University of Agriculture Faisalabad. IV + 92 pp. In English [The adult Odonata collected during the summer months of 1994-95 from 24 different localities of Gilgit and Baltistan were identified into 27 species and subspecies belonging to 18 genera, 6 families and 2 suborders. Fourteen species, viz., *Anax nigrolineatus*, *Aeshna juncea*, *Cordulegaster brevistigma*, *Orthetrum chrysostigma luzonicum*, *O. sabina*, *Trithemis aurora*, *T. festiva*, *Tramea virginia*, *Palpopleura sexmaculata sexmaculata*, *Diplacodes lefebvrei*, *Ischnura aurora*, *I. senegalensis*, *Ceriagrion coromandelianum* and *Megalestes major* were recorded for the first time from this area. Of these, *Aeshna juncea* has been recorded for the first time from Pakistan. The characters of the taxa above the genus level have not been given in this manuscript because they are easily available in monographs, catalogues, faunal works and textbooks. The deviating characters of genera, species and subspecies have been given in this manuscript. *Libellula quadrimaculata*, *Ophiogomphus reductus* and 1st form of the female *Ischnura senegalensis* were described in detail, as they differ greatly from the published descriptions. A family Key, to the species, distribution of various species and measurements of various parts like abdomen, hindwing, forewing, pterostigma and anal appendages have been provided in this manuscript. Different statistics, such as range, mean and Standard deviation for measuring differences in various body parts have also been used. (Author)not stated

**21298.** Russell, R.W.; Wilson, J.W. (1997): Radar-observed "fine lines" in the optically clear boundary layer: Reflectivity contributions from aerial plankton and its predators. *Boundary-Layer Meteorology* 82(2): 235-262. In English ["Sensitive Doppler radars regularly detect fine lines of enhanced reflectivity in mesoscale boundary-layer convergence zones. Recent studies have concluded that these "fine lines" are attributable primarily to backscatter from concentrations of small, weakly flying insects ("aerial plankton") entrained in the convergence zones. Such concentrations are likely to be attractive to aerial predators that feed on small insects, raising the question of whether the presence of the predators themselves may contribute significantly to the radar-observed fine lines. In this paper, we examine the relative contributions of aerial plankton and its predators to fine-line reflectivity, using field data from visual and radar studies together with a compilation of literature data on radar cross sections of birds and insects. Visual counts of birds and dragonflies in convergence zones, together with simultaneous remote radar observations during the CaPE project in Florida, indicated that aerial predators usually contributed little to fine-line reflectivity (median contribution ss 2%). Assuming that the size distribution of insect targets was spatially invariant, the density of insects composing the aerial plankton was inferred to be on average, about one

order of magnitude higher inside convergence zones than in nearby areas. These results suggest that clear-air radar reflectivity may be a useful measure of the quantity of aerial plankton in boundary-layer convergence zones. This finding is relevant to biology because it indicates that remote sensing techniques can be usefully employed to document patterns and processes in the distribution of aerial plankton. The results presented here also have relevance for operational meteorology, because most of the organisms comprising the plankton probably serve as passive tracers of horizontal air motions, and are therefore ideal targets for remotely detecting wind patterns. In contrast, the aerial predators move actively and rapidly, rendering them less useful as tracers of wind fields in studies using Doppler radars. The influence of atmospheric structure on the ecology of aerial predators and their prey has received little attention, but we believe that sensitive radars with clear-air observational capabilities offer great potential as research platforms for future studies of aerial plankton and aerial planktivory. (Authors)] Address: Russel, R.W., Dept of Ecology & Evolutionary Biology, Univ. of California, Irvine, CA, 92717, USA

## 1999

**21299.** Walia, G.K.; Sandu, R. (1999): Autosomal fragmentation in five species of the family Coenagrionidae. *Fraseria* (N.S.) 6: 15-20. In English ["Karyological investigations have been carried out in five species belonging to family Coenagrionidae viz. *Argiocnemis obscura* (female) [= *Argiocnemis rubescens* Selys, 1877], *Ceriagrion coromandelianum* (male) *Coenagrion dyeri* (female) *Pseudagrion decorum* (male), *P. rubriceps* (male & female). Majority of plates possess the typical diploid number 27 in males and 28 in females with XO - XX sex determining mechanism. Numerous plates also show fragmentation of the autosomes and diploid number vary from 27-58. This is the first cytological report on *A. obscura* and *C. dyeri* and also on autosomal fragmentation in this family." (Authors)] Address: Walia, Gurinder Kaur, Dept. Zool. & Environmental Sciences, Punjabi Univ. Patiala, Punjab, India. Email: gurinderkaur\_walia@yahoo.co.in

## 2001

**21300.** Ketelaar, R. (2001): De speerwaterjuffer in Nederland: verspreiding, ecologie en bescherming. De Vlinderstichting, rapport VS2001.032, Wageningen. 75 pp. In Dutch [*Coenagrion hastulatum* is a highly endangered dragonfly species in the Netherlands. In 2001, it occurs at 16 locations in the Netherlands. Since 1980, *C. hastulatum* has disappeared from 7 locations. Two strongholds can be distinguished: the first in North Brabant south of Eindhoven and a second in the Achterhoek/Twente. Outside of that, *C. hastulatum* has completely disappeared except for two small populations on the Kampina and the Vressels Bos. From loose observations of floaters it can be deduced that *C. hastulatum* is not very mobile. In the Netherlands, *C. hastulatum* is only found on fens and in the edge zones of raised moors. There is one deviating population in weakly

flowing water. The habitats of the damselfly are characterized by the following aspects: • The vegetation of locations with damselflies is characterized by a species-poor deciduous vegetation with species that are minerotrafent for nutrient-poor systems and which indicate groundwater influence, such as Lesser Bladderwort, FieldRus and Knotweed Pondweed. • The vegetation is heterogeneous in character with both large and small floating leaf plants, emerge vegetation (sedges, reeds, mat rushes) and relatively few floating sphagnum mosses. • Peat formation and/or embankment landings occur on many fens. • *C. hastulatum* are small in size and usually no deeper than 1.5 metres. • *C. hastulatum* are quite acidic and have a fairly low ELV. Compared to other fens, the concentrations of potassium, iron, calcium and bicarbonate are relatively high. As with other fens, the ammonium content is sometimes quite high. • The habitats of the damselfly are weakly buffered by a slight influence of groundwater. The fens are generally located on an apparent water table in which the groundwater emerges for short periods, for example after heavy rainfall. The hydrological system that feeds the fens is local to at most supra-local (usually within 500 meters of the fen). • The water level is stable. • *Coenagrion puella* is a numerous species, and *Erythromma najas*, fire damselfly and emerald dragonfly are also guide species for the presence of *C. hastulatum*. High numbers of the water sniffer, on the other hand, are a bad signal. The disappearance of suitable habitat of the larvae and egg-laying substrate is the main reason for the disappearance of the damselfly damselfly from many fens and still poses a threat. The deterioration and disappearance of the specific heterogeneous vegetation structure is caused by: • acidification as a result of the loss of groundwater influence and increased ammonium deposition. • fluctuating water levels, so that the (cross) vegetation is dominated by pitrus • alkalization through intake of hard surface water • cleaning up fens • stocking herbivorous fish In addition, there are indications that internal acidification as a result of banks drying up poses a potential risk for the damselfly. Using a logistic regression, a model was made based on a habitat quality index that can be used to estimate the suitability of a fen for the damselfly damselfly. The model seems to work well in practice, but still needs to be validated. In the follow-up process, work must be done on the following aspects: • drawing up a protection plan for damselfly damselflies as soon as possible • informing managers • changes in management • restoration of groundwater influence and development of new habitat • expansion of monitoring. (Author / Google translate)] Address: Ketelaar, P., p/a De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: ketelaar@vlinderstichting.nl

**21301.** Machado Caballero, J.E. (2001): Inventario y estudio comparativo de la fauna de Odonata en tres áreas de Honduras. Tesis presentada como requisito parcial para optar al título de Ingeniero Agronomo en el grado académico de Licenciatura. Zamorano Carrera de Ciencia y Producción Agropecuaria. Zamorano. XI, 31pp. In Spanish [The odonate assemblages (84 species) of 3 areas in the departments of Atlantida and Francisco Morazan (Honduras) are described, and the odonate faunae of Honduras, Belize, Costa Rica and Nicaragua are briefly analysed and compared. „For the conservation of forests and the diversity they have, a better knowledge of the species that inhabit them, their distribution and classification is necessary. Most of this diversity is made up of insects. The group of odonata, by its nature, helps in the control of some pests and can be used as an ecological indicator of the quality of ecosystems. Currently there is little information on them in Honduras. The

objectives were: to carry out an inventory of the species of the Odonata order, create a database and compare the fauna found with that of Belize, Nicaragua and Costa Rica. Captures were made from February to October in the Zamorano Valley (Yeguaré) and in April and August in the Cuero y Salado Wildlife Refuge and the Pico Bonito National Park, complementing with specimens provided by parataxonomists and those existing in the ecological inventory of Zamorano. The trapped insects were laterally placed in paper envelopes and placed in acetone for 24 hours to prevent decomposition and color loss. Then they dried for one or two hours and were transferred to a transparent envelope with data on location, date and collector, as well as family, genus and species. A database was generated to compare the fauna of the three study areas with each other, and with the fauna of Belize, Nicaragua and Costa Rica. There are 84 species in the three study areas, belonging to 43 genera and 10 families. The families with the greatest richness of cspccics were Libellulidac, Cocragionidac and Aeshnidae, which together account for more than 83% of the total fauna found. Two species, *Mecistogaster linearis* and *Brechmorhoga nubecula*, reported in the Pico Bonito National Park, are new records for Honduras. Contrasting the odonatafauna of Honduras with that of Belize, 114 species (65%) were found in common of 174 reported in that country. Costa Rica. There are 84 species in the three study areas, belonging to 43 genera and 10 families. The families with the greatest richness of cspccics were Libellulidac, Cocragionidac and Aeshnidae, which together make up more than 83% of the total fauna found. Two species, *Mecistogaster linearis* and *Brechmorhoga nubecula*, reported in the Pico Bonito National Park, are new records for Honduras. Contrasting the odonatafauna of Honduras with that of Belize, sc found 114 cspccics (65%) in common of the 174 reported in sc country. Costa Rica shares with Honduras 132 (49%) of its 268 registered species, and Nicaragua coincides with 82 species (82%) of the 100 registered species. Despite having found a high diversity of Odonata species in Honduras, a good percentage is unknown. It is recommended to complete the information with collections in the departments of Ocotepeque, Lempira, Intibuca and La Paz that have not been studied.”] Address: <https://bdigital.zamorano.edu/server/api/core/bitstreams/4f21289a-a6f9-41e5-9cda-57e6b3-627e77/content>

**21302.** Obara, K.; O, Mishima, H.; Yodoe, K.-i. (2001): Insects fauna in the Sada-cho, Shimane Prefecture. Bull. Hoshizaki Green Found. 5: 139-160. In Japanese, with English summary [ "Insect fauna was surveyed in the Sada-cho, Shimane Prefecture, in 2000. From May to October, we surveyed in the area six times, and 647 species belonging to 13 orders were recorded. This faunal record contains 261 species of Lepidoptera (42. 9% of all faunal record), 133 species of Coleoptera (21. 1 % of all faunal record) and 104 species of Hemiptera (16. 5% of all faunal record). These three orders occupy 78. 9% of all faunal record. In this report, *Ethmia epitrocha* (Meyrick) and *Ilema nachiensis* (Marumo) are recorded from Shimane Prefecture for the first time. The fauna was characterized by species being common with those in lower mountains of eastern Japan." (Authors)] Address: Obara, K., Otsu 426-7, I-zumo City, Shimane Prefecture, 693-0011 Japan

## 2002

**21303.** Dolny, A.; Kraut, M.; Horcicko, I. (2002): Dragonflies (Odonata) of Natural Reserve Stepán (bioregion Poodri).

Cos. slez. Muz. Opava (A) 51: 259-269. In Czech, with English summary. ["The object of this work was based on an intensive research that lasted from 1998 to 2000. We were set to find and to value qualitative and quantitative pieces of information about the constitution of odonatofauna in Štěpán natural reserve (Czech Republic, Silesia, square 6175). The collections of material (adults and larvae) were realized in 49 days. During the research was valued habitat selection. There were found together five types of biotopes: surface area of the pond and contiguous (shore, waterside) parts, growths of reed, pool, contiguous meadows, contiguous part in a protected area on the banks of the Opava river. There were found 31 species of the order Odonata (31 presented species makes perhaps 44 % from the whole number of species in the Czech Republic), 11 species of the suborder Zygoptera, 20 species of the suborder Anisoptera. The developmental process was proved in 16 species when juvenile adult or larva was caught and we believe that other 13 species are likely to have undergone the same process. Natural reserve Štěpán makes acceptable habitat for any different odonatocoenoses with relation to their cenotop, including tyrofil representatives *Somatochlora flavomaculata*, *Sympetrum danae* and *Leucorrhinia pectoralis*. Two species of the Czechoslovak Red Data Book (Škapec 1992) were found – *Calopteryx splendens* and *Leucorrhinia pectoralis*." (Authors)] Address: Dolný, A., Katedra Biol. & Ekol., Ostravske Univ., ul. 30-dubna 22, 70103 Ostrava, Czech Republic

**21304.** Kitagawa, K.; Katatani, N. (2002): Notes on Thai Odonata, Part 1. The Odonata from Chantaburi in March 1998. *Aeschna* 39: 33-42. (in Japanese, with English summary) ["65 species of the dragonflies were taken in Chantaburi, where is located around the border with Thailand and Cambodia, by the authors in March, 1998. An unknown dragonfly of the genus *Idionyx*, probably new to science, was taken. Undescribed female figure of *Coeliccia yamasakii* is shown. *Merogomphus parvus* and *Aethriamanta gracilis* are the first records in this area. We report the list of the collected dragonflies and the observation records." (Authors)] Address: Kitagawa, K., Imai 1-11-6, Asahi-ku, Osaka C., Osaka, 535-0011, Japan

**21305.** Kuijter, A.A. (2002): Libellen en insecticiden. Een literatuuronderzoek naar en risicobeoordeling van de effecten van insectenbestrijdingsmiddelen op libellen in Nederland. Wetenschapswinkel Biologie, Universiteit Utrecht; Rapportnummer: P-UB-2002-01. 34 pp. In Dutch [For butterflies have shown that agricultural pesticides may pose a high risk. Dragonflies life during a vulnerable phase of life in the water. It is not unlikely that they were in contact can be dissolved in the water with pesticides from agriculture. The Butterfly Foundation therefore, the Science of Biology at Utrecht University the following questions: • How sensitive dragonflies to insecticides? • What are the risks in current use in the Netherlands? To answer these questions in this report, a risk assessment on the basis of data from the literature. First, an inventory of literature about the effects on dragonflies in field situations pesticide used in the Netherlands. In addition, toxicity data controlled toxicity studies published. From these eight pesticides for short-term toxicity data obtained for dragonflies. From these data the long-term toxicity data calculation necessary for the risk assessment. These short and long term toxicity data compared with the maximum tolerable concentrations (MACs) of these pesticides. This MTR values are derived from toxicity data for different species and by the government used to provide the environmental quality of surface fixed. In addition, the risk assessment in the most recent measurements of these

pesticides compared to toxicity data. In field studies with pesticides dragonflies seem no more or less bothered by pesticides than other insects. Any decreases in dragonfly populations in addition to the direct toxic effects sometimes attributed to indirect effects such as loss of prey. If the concentrations of pesticides in surface water equal to the MPR values the risk of these pesticides for dragonflies minimal. This shows the sensitivity of dragonflies to pesticides from controlled experiments. However, there are significant breaches of the MTRwaarde of some pesticides detected. It is not known how often and how long overruns occur. Such overruns may pose a significant risk for some dragonfly species. From this preliminary risk assessment can be concluded that pesticides, given the low risk for dragonflies, probably not a major cause of the decline in its position dragonfly. During peak loads may be local effects. The main causes of the decline should rather be sought in habitat alteration and destruction. (Author/Google translate)] Address: not stated

**21306.** Walia, G.K.; Sandu, R. (2002): Reduction in chromosome number in five libellulid species. *Fraseria* (N.S.) 7: 17-20. (in English) [Karyological investigations have been carried out on five species belonging to family Libellulidae viz. *Orthetrum luzonicum*, *Orthetrum japonicum* internum, *Potamarcha congener*, *Tholymis tillarga* and *Trithemis festiva*. All the species possess diploid chromosome number  $2n$  (male) = 23, with XO-XX sex determining mechanism. This type of reduction in chromosome number has been reported for the first time in these species." (Authors)] Address: Walia, Gurinder Kaur, Dept of Zoology & Environmental Sciences, Punjabi University Patiala, Punjab, India. Email: gurinderkaur\_walia@yahoo.co.in

**21307.** Walia, G.K.; Sandu, R. (2002): Cytogenetical data on *Neurobasis chinensis chinensis* (Zygoptera: Calopterygidae). *Fraseria* (N.S.) 7: 13-16. In English ["Male germ cell complement of *N.c. chinensis* ... has been studied and illustrated from Himachal Pradesh (India). Chromosomal investigations show diploid number  $23m$ , with XO sex determining mechanism. Relative length of chromosomes, total chromosome length (TCL), largest autosome: X (A:X) and m:X ratios have been calculated for the first time in this species. Variation in karyotype of *Neurobasis chinensis chinensis* from different localities has also been discussed." (Authors)] Address: Walia, Gurinder Kaur, Dept of Zoology and Environmental Sciences, Punjabi University Patiala, Punjab, India. Email: gurinderkaur\_walia@yahoo.co.in

## 2003

**21308.** Kalkman, V.J. (2003): Ongewervelde fauna van het Rijntakkegebied, met veldstudie in uiterwaarden rond Zaltbommel deelrapport libellen (Odonata). European Invertebrate Survey – Nederland. 33 pp. In Dutch ["In 2001 and 2002, EIS-Nederland carried out an inventory of terrestrial invertebrates in five floodplains along the Waal around Zaltbommel (Gelderland) on behalf of Rijkswaterstaat, Directie Oost. These are the Broomwaard, the Gamerensche Waard, the Heesseltsche Waard, the Hurwenensche Waard and the Rijswaard. This report discusses the results of this inventory with regard to dragonflies (Odonata). The first aim of the project was to obtain a frame of reference for the diversity of the floodplains of the Rhine tributaries. In addition, the results are related to the flooding regime of the river and indicator species are determined for biotope types in the floodplains. Each floodplain was examined twice in 2001 and 2002 for the presence of dragonflies. In addition, during fieldwork on the ecology of the river rump *Gomphus flavipes*,

each groyne section was specifically examined for the occurrence of this species. In order to place the results in a broader context, an overview of the species known from the floodplains of the Dutch Rhine branches has been compiled with the help of the national dragonfly database NVL/De Vlinderstichting/EIS-Nederland. Based on this overview, the species were determined with a preference for the Rhine branches. Since 1980, 45 species of dragonflies have been found in the Rhine branches area, of which 15 are rarely or never breeding in the Rhine branches area and have mainly been observed as vagrants. Of the 30 other species, 14 have a significant preference for the Rhine branches. Three species that are bound to running water occur in the Rhine tributaries area. Two of these (*Calopteryx splendens* and *Gomphus vulgatissimus*) are quite rare in the Rhine branch area and are much more common in streams in the east and south of the Netherlands. The third species, *Gomphus flavipes*, has a very strong preference for the Rhine branches area and the majority of the Dutch populations are located here. The majority of the species of the Rhine Branches area in the Netherlands are general species with little critical choice of biotope. A large proportion of the species with a preference for the Rhine branches area also fall into this category. An important exception to this are three species (*Aeshna isoceles*, *Brachytron pratense*, *Libellula fulva*) that occur in waters with land vegetation such as old oxbows. In the Netherlands, these species are mainly found in low peat bogs, but are quite scarce elsewhere. These species have probably declined in the river area but are still numerous locally. In addition to the above-mentioned types of land vegetation, the green glazier *Aeshna viridis* also occurred in the Rhine branches area at the beginning of the 20th century. This species only reproduces in extensive crab shaving fields, a vegetation type that is no longer found in the floodplains today. 26 species of dragonflies have been found in the floodplains of Zaltbommel. With the exception of the plasombout *Gomphus pulchellus*, all species with a preference for the Rhine branches area were found during the inventory. Species diversity increases as the distance from the river increases. Most species are found in areas with extensive water and riparian vegetation. These vegetations are mainly present in the channels against the winter dike. More frequent and more intensive flooding makes the emergence of this type of vegetation impossible. Shrubs and woods located on the upstream side seem to have a protective effect for the riparian vegetation and therefore lead to species-rich dragonfly biotopes." (Author/Google translate)] Address: Kalkman, V.J., European Invertebrate Survey - Nederland, p/a Nationaal Natuurhistorisch Museum - naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**21309.** Kitagawa, K.; Katatani, N. (2003): Notes on the Odonata of Thailand, Part 2. The Odonata from Trang Prefecture in March 1998. *Aeschna* 40: 13-23. (in Japanese, with English summary) ["Fifty six species of the dragonflies were taken in Trang, where is located in the base of Malay Peninsula and around the border with Thailand and Malaysia, by the authors. *Aethriamanta brevipennis*, *Aethriamanta gracilis*, *Indothemis limbata limbata* are the first records in this area." (Authors)] Address: Kitagawa, K., Imaiti 1-11-6, Asahi-ku, Osaka C., Osaka, 535-0011, Japan

**21310.** Kumar, A.; Sharma, G. (2003): Fauna of Asan Wetland. Odonata. Wetland Ecosystem Series 5: 11-13. In English [The study of Odonata diversity surrounding Asan reservoir area reveals 43 species spreading to 29 genera under seven families. Out of these, 16 species (37%) under

13 genera are Oriental, one species (2%) under one genus is Palaearctic, 16 species (37%) under six genera are Tropical, two species (5%), under two genera are Ethiopian four species (9%) under three genera are Australian and four species (9%) under four genera are Cosmopolitan in distribution. *Anax parthenope*, *Diplacodes lefebvrei* and *Urothemis s. signata* have been recorded for the first time from Dehra Dun valley where as the latter two are new records from the western Himalaya as well (Mitra, 1999). The most important ecological phenomenon is the presence of both stream species as well as the standing water species, which indicates that the both ecosystem are properly maintained. The running water breeding species like, *Calicnemia eximia*, *Neurobasis ch. chinensis* were much more abundant at the confluence of the river Asan with the reservoir. The inlet channel coming from Dakpathar barrage is deep and with unstable or altered ecological conditions that hardly any dragonfly species is able to breed there and, therefore, its surrounding remained somewhat barren except some species from the reservoir occasionally visiting the area. Classified list of 43 species of dragonflies, including 14 species of Zygoptera and 29 Anisoptera available at Asan reservoir is given below. The scientific name of each species is followed by the name of the authority and year of the original description of species. The habitat preference study revealed seven stream breeding species (160/0) and 13 reservoir (standing water) breeding species (30%) whereas 23 species (54%) were common in both the habitats. Interestingly all the 43 species are breeding residents at the Asan reservoir and contiguous areas." (Authors)] Address: Kumar, A., Zoological Survey of India, Northern Regional Station, Dehra Dun, India

**21311.** Swer, S.; Singh, O.P. (2003): Coal mining impacting water quality and aquatic biodiversity in Jaintia hills district of Meghalaya. ENVIS Bulletin Vol 11(2): Himalayan Ecology. 29-36. In English [The Jaintia hills, one of the seven districts of Meghalaya, lies between latitude 25°5'N to 25°4'N and longitude 91°51'E to 92°45'E. The district is bound by the state of Assam on the north and east, the East Khasi Hills on the west and Bangladesh in the south. The water bodies are badly affected by contamination of Acid Mines Drainage (AMD) originating from mines and spoils, leaching of heavy metals, organic enrichment and silting by coal and sand particles. Pollution of the water is evidenced by the colour of the water which in most of the rivers and streams in the mining area varies from brownish to reddish orange. Low pH (between 2-3), high conductivity, high concentration of sulphates, iron and toxic heavy metals, low dissolved oxygen (DO) and high BOD are some of the physico-chemical and biological parameters which characterize the degradation of water quality. Observations on physico-chemical and biological characteristics of water are discussed below and summarized in Tab. 1. Low pH, low DO, higher sulphate content and turbidity in water of coal mining areas are affecting the aquatic life. Study on benthic macroinvertebrates revealed presence of only a few tolerant species namely *Chironomus* larvae (Diptera), dragonfly larvae and water bugs (Hemiptera) in rivers and streams of the area. Analysis further revealed lower abundance and species diversity of macroinvertebrates. The presence of only a few tolerant species of benthic macroinvertebrates and the absence of most of the aquatic organisms particularly the sensitive species are most likely due to acidic water contaminated with AMD. Further, most of the river of the mining area lack commonly found aquatic organisms such as fish, frog and crustacean." (Authors)] Address: Swer, S., Centre for Environmental Studies, North-Eastern Hill Univ., Shillong – 793014



**21312.** Ubbelohe, R.G. (2003): Zur Biologie und Verbreitung der Späten Adonislibelle (*Ceragrion tenellum* de Villers) in der Fischbeker Heide. Diplomarbeit. Universität Hamburg. 36 pp. In German ["*C. tenellum* is a species that occurs frequently in Mediterranean latitudes. It also occurs in northern Europe, but here it is associated with bogs. Here it lives in small, sheltered and climatically favorable bodies of water. Their flight time usually begins in mid-June, but sometimes as early as the end of May and extends into September. Their extensive copulation can last for hours and takes place in vegetation in Water Mane. She then lays her eggs on aquatic plants such as *Sphagnum* or *Eriophorum angustifolium*. The latter does not appear to be present in other *C. tenellum* habitats, but this species shows a large tolerance in the choice of oviposition substrate. Due to the destruction of their habitat, bogs with small bodies of water in northern Germany are threatened with extinction." (Author)] Address: not stated

**21313.** Yokoi, N. (2003): A record of Odonata in central Laos. *Aeschna* 40: 33-35. (in Japanese, with English summary) ["The dragonflies collected in central Laos, Lak Sao and Sam Nua area, in 2002-2003 were listed. Eleven species were recorded from Laos for the first time. The following 6 Chinese and Vietnamese species; *Philoganga vetusta*, *Amphigomphus nakamurai*, *Davidius fruhstorferi*, *Microgomphus jurzitzi*, *Macromia katae* and *Idionyx carinata* were newly added to the Laos fauna. Total number of named Lao Dragonflies was 183 species." (Author)] Address: Yokoi, N., 2-37-11, Kaisei, Koriyama, Fukushima, 963-8851 Japan

#### 2004

**21314.** Gao, X.-T.; Liu, Y.; Wang, C.; Zhao, L.; Guo, D.-S.; Liu, D.-Z. (2004): Ecological distribution of damselflies in Beijing area. *Entomological Knowledge* 41(5): 426-430. In Chinese, with English summary ["A survey on the ecological distribution of Zygoptera and the influencing factors was carried out in Beijing area from March of 2002 to October of 2003. Ten species of damselflies, which belonged to 3 families and 7 genera, were found in our study. Among them, *Cercion calamorum* and *Ischnura asiatica* were dominant and widespread species. The results of Principal Components Analysis (PCA) indicated that the coverage of freely-floating aquatic plants, emergent aquatic plants, plants around the plots and the submergent aquatic plants were significant factors affecting the distribution of those two damselflies. They contributed 30.49, 24.14, 17.45 and 15.26%, of the total variation respectively. Moreover, *Calopteryx atratum*, and *Matrona basilaris* were merely recorded within the waters of the southwestern and northern parts in which the water flowed rapidly, with shallow depth and less pollution. *Cercion plagiosum*, *Ischnura elegans*, and *Platycnemis foliacea* were comparatively uncommon species of damselflies, which occurred only in the edges of rivers, lakes and reservoirs. *Mnais mnome*, *M. earnshawi* and *Copera annulata* were restricted-ranged species that were only found in the mountain areas of Beijing." (Authors)] Address: Gao, X.-T., Lab. Bio-div. Sci. & Ecol. Engineering, Inst. Ecol., Beijing Normal Univ., Beijing-100875, PRC

**21315.** McAbendroth, L. (2004): Ecology and conservation of Mediterranean temporary ponds in the UK. Ph.D. thesis, Faculty of Science and Technology, University of Plymouth: XV + 247 pp. (in English) ["Macroinvertebrate and plant assemblage composition and abiotic habitat characteristics were examined in 76 ponds, in the New Forest (Hampshire, UK) and on the Lizard Peninsula (Cornwall, UK), in order to

unravel the ecological processes influencing ponds at a range of spatial scales and provide a clear definition of Mediterranean Temporary Pond (MTP) habitat (92/43/EEC) in the UK. In addition, a set of newly created experimental ponds were monitored on the Lizard to examine patterns of colonisation and evaluate the use of habitat creation in temporary pond conservation. The findings are synthesised into a number of management recommendations for ponds in the regions, with a particular focus on MTPs. MTPs equated to ephemeral, winter-flooded ponds occurring in shallow depressions on the Lizard, which had some floristic similarities to other western Atlantic fringe sites. They were dominated by low growing grasses, rushes and rare annual species of the Nanocyperion alliance along with a depauperate macroinvertebrate assemblage comprising Coleoptera (including characteristic rare taxa), Trichoptera and Chironomidae. The strength of physicochemical and spatial pattern in assemblage composition varied between the regions. Lizard macroinvertebrate assemblage similarity was spatially autocorrelated and related to water chemistry and pond area but New Forest macroinvertebrate similarity was not related to any of the measured physicochemical parameters. Plant assemblage composition was only weakly related to wet phase physicochemistry. Pond vegetation structured macroinvertebrate assemblages in different ways at different spatial scales. At large-scales, macrophyte richness and composition affected macroinvertebrate assemblage composition in both regions, whereas, at smaller-scales, macrophyte structural complexity (measured using fractals) influenced body size scaling and overall biomass of macroinvertebrates. Assemblages in both regions were significantly nested, indicating that species-poor sites tended to be subsets of rich sites. Macroinvertebrate nesting, on the Lizard, was not due to passive sampling, and was best explained by pond area, with habitat parameters and isolation being of secondary importance. Nested and idiosyncratic taxa differed in their spatial response to factors which structured assemblage-level nestedness; idiosyncratic taxa tended to possess broad ecological tolerance and good dispersal capacity, whilst nested species had narrower tolerance or limited powers of dispersal. Experimental pond macroinvertebrate assemblage similarity converged with pond age, despite continued variation in physicochemistry, and the assemblages that developed were not significantly different from small natural ponds in the region. Augmentation of current MTP habitat could therefore be achieved by creating new sites in close proximity to existing water bodies." (Author) The only odonate taxa mentioned is "*Sympetrum* spp.".] Address: not stated

#### 2005

**21316.** Annon, M.R. (2005): Life history studies of the damselfly *Sympetma paedisca* BRULL [sic] (Odonata: Libellulidae) in a shallow pond in Garmat-Ali, Basraii. *Mesopotamian Journal of Marine Science* 20(2): 297-310. (in English) ["Life history of *S. paedisca* been investigated in a combined field and laboratory study. The field study is conducted at a shallow pond in Garmat-Ali, Basrah in the period from October 1997 to September 1998. Some environmental factors such as temp., D.O., pH. and salinity were measured. The field results indicate that the life cycle is univoltine, however this species is unique in that it does not enter nymphal diapause. Emergence is rather an unsynchronized and dispersed temporally. Sexual maturation requires four weeks. Oviposition site is Potamogeton. The laboratory study revealed that incubation period was 14 days at 27 °C. The nymphal stage includes twelve instars and requires 252.5 days for completion the development. The whole life cycle

requires 266.5 days." (Author)] Address: Annon, M.R., Dept of Biology, College of Education, University of Basrah, Iraq

**21317.** Briers, R.A.; Biggs, J. (2005): Spatial patterns in pond invertebrate communities: separating environmental and distance effects. *Aquatic Conserv: Mar. Freshw. Ecosyst.* 15: 549-557. In English ["(1.) The nature and extent of spatial pattern in communities has important implications for their dynamics and conservation. Previous studies of pond ecosystems, over relatively small spatial scales, have found little evidence of spatial autocorrelation of community composition. Patterns in community composition over greater spatial distances have not been documented. (2.) Here, data on macroinvertebrate communities [including 10 odonate species without further specification] and physico-chemical characteristics of 102 ponds over a 60 x 60 km area of Oxfordshire, UK, were used to examine evidence for spatial autocorrelation in community composition and to separate the effects of environmental similarity and physical distance on community similarity. (3.) Overall similarity between communities was low, but showed significant positive spatial autocorrelation. There was evidence for both environmental and physical distance effects on spatial autocorrelation of community similarity. Community similarity was negatively related to differences in environmental conditions, but effects were only significant for large environmental differences. (4.) When environmental effects were accounted for, there was significant positive spatial autocorrelation of community composition over inter-site distances of up to 13 km. These results suggest that interactions between pond sites, potentially through dispersal, are evident over larger spatial scales than has previously been appreciated, and emphasize the need to consider spatial issues when developing strategies for pond conservation." (Authors)] Address: Briers, R.A., School of Life Sciences, Napier Univ. Merchiston Campus, Edinburgh, EH10 5DT, UK. E-mail: r.briers@napier.ac.uk

**21318.** Chartier, A. (2005): Twin-spotted spiketail: new sight record for Wayne county and record late date. *Williamsonia* 9(1): 3. In English [Verbatim: (*Cordulegaster maculata*) has been recorded from most of the UP and northern LP counties in Michigan, and from about a third of the Southern LP counties (14), including six in the southeast (MOS website). On the cool morning (58° F, -9:00 AM EST) of 22 Aug 2004, while checking mist nets at my bird banding Station in a closed area of Lake Erie Metro Park, Wayne Co., I encountered a Twimspotted Spiketail hunting over an open grassy field surrounded by shrub, hedgerow, and woodland. Initially, I thought it was the Canada Damer (*Aeshna canadensis*) that I had seen a short time earlier. But, when it landed near me I immediately saw the paired yellow triangular spots on the abdomen and I suspected it was a *Cordulegaster* instead, but I wasn't sure which species. I got my digital cam out of the car and took a few photos, hoping to identify it when I got home, as I had no dragonfly references handy. Due to the temperature, it was very cooperative. I then turned my attention back to the bird I needed to band at that moment. I did not take the spiketail as a specimen because I had no way to keep it from getting damaged, and my purpose this day was bird banding, not dragonfly collecting. I determined the species once I got home, and also determined that it was a male. Color photos of this individual can be viewed on my website at: [www-amazih.net/images/Inverts/Odonata/Cordulegaster\\_maculata.htm](http://www-amazih.net/images/Inverts/Odonata/Cordulegaster_maculata.htm). The flight period for the Twimspotted Spiketail in our region is described as late May through the end of July (Holder 1996, Legier 1998, Mead 2003), and to early August

in New Hampshire (Dunkle 2000). This is likely a record late date in our region, and possibly within the entire range of the species. Mead (2003) describes the habitat for *C. maculata* as "clean, clear streams and smaU rivers in wooded areas..." To the west of the site (within 0.25 mile) is an area of freshwater marsh that drains south into the Huron River, and to the south of the site (also within 0.25 mile) is a wooded creek near the Pte. Mouülee State Game Area Headquarters which also drains southeast into the mouth of the Huron River. More freshwater marsh and a stream (not wooded) that drains into Lake Erie occurs to the east of the site. To the north is an open woodland, and a golf course is to the northwest. It seems possible that streams in this area could have provided breeding habitat for the species, though it seems equally possible that this individual was simply a very tardy vagrant.] Address: Email: amazial@comcast.net

**21319.** Kishida, O.; Nishimura, K. (2005): Multiple inducible defences against multiple predators in the anuran tadpole, *Rana pirica*. *Evolutionary Ecology Research* 7: 619-631. In English ["Question: What conditions are required for evolution of predator-specific inducible defences? Hypotheses: (1) Prey organisms distinguish among predators to which they are exposed. (2) Prey individuals with a predator-specific defence must attain higher survivorship than those with a mismatched defensive phenotype. Organisms: Prey, anuran tadpoles (*Rana pirica*); biting type predator, dragonfly larvae. (*Aeshna nigroflava* = *Aeshna serrata*); swallowing type predator, salamander larvae (*Hynobius retardatus*). Methods: *Rana pirica* tadpoles were exposed to the predator signal in close proximity to or remote from the dragonfly larvae or the salamander larvae to determine whether the tadpoles develop predator-specific morphologies and whether they utilize predator-specific signals in the induction process. We conducted predation trials to determine whether the tadpoles with induced phenotypes were more resistant to the attack in the corresponding predator environment. Results: *Rana pirica* tadpoles developed predator-specific morphologies in response to exposure to two different types of predator. The tadpoles discriminated between the predators – that is, different signals were required to develop the specific phenotypes in the induction process. The survival rate of tadpoles of specific phenotypes was higher than that of tadpoles of mismatched or non-induced phenotypes when exposed to predation by the corresponding predators." (Authors)] Address: Kishida, O., Graduate School of Fisheries Sciences, Hokkaido University, Hakodate 041-8611, Hokkaido, Japan. E-mail: kishida@fish.hokudai.ac.jp

**21320.** Niechoj, S. (2005): Die Libellenfauna des Naturschutzgebietes Krickenbecker Seen. Diplomarbeit. Westfälische Wilhelms-Universität Münster. 69 pp. + Anhang. In Geman [In 2004, the dragonfly fauna was examined in ten bodies of water in the NSG KS. The recording mainly took place in flowing waters, for which only few data are available up to now. With 33 proven dragonfly species, more than half of which are native, the NSG KS can be described as particularly species-rich. A third of the recorded species are on the red list of North Rhine-Westphalia (SCHMIDT & WOIKE 1999) and Germany (OTT & PIPER 1998). Considering the small number of water body types examined, the importance of this area for dragonflies becomes clear. If you add the data from other mappings in recent years, the total number of species and the number of proofs of indigeneity continue to increase. By recording the watercourses, *O. coerulescens* could be detected again in the NSG KS for the first time since 1990, and *S. metallica* was proven to be indigenous to a section of the Nette. The importance of the

area for *L. fulva* could be clarified, and the wide distribution within the NSG KS could be proven on the basis of the numerous finds of exuviae. The indices commonly used to compare the composition of species in the various bodies of water, such as the Sørensen quotient or the WAINSTEIN index, cannot be used appropriately for dragonfly zoenoses. The need to include not only the factors considered by Sørensen and WAINSTEIN, but also (potential) indigenoussness, abundance and relative find rates is discussed. The influence of the temperature increases in recent years could be documented in the phenological data for 2004 and the discovery of the Mediterranean species *C. erythraea*. The use of the term "ubiquist" appears premature for many species based on the literature and our own surveys and has been discussed. Since mapping always involves a certain degree of subjectivity, a method for the objective recording of horizontal vegetation density with the help of a computer program was presented. Due to the heterogeneous water body structures, many photographs of the vegetation have to be taken, so that the effort involved in digital post-processing is too high and this method becomes unprofitable. For low-growing, more homogeneous structures, however, this method is considered to be useful. It is established that those seeking relaxation in the NSG KS not only pose a threat to flora and fauna by entering the waterfront, but also create structures through this disruption that are used by some dragonfly species for hatching. The nutrient input into the waters is a serious problem in the NSG KS. This entry can be counteracted by simple measures such as removing the cuttings from the embankment. Measures such as the extensification of agricultural areas in the catchment area of Nette and Renne and the replacement of private small sewage treatment plants with connections to large sewage treatment plants are necessary to reduce the inputs themselves. The neozoa muskrat and coypu not only damage embankments and dams, but also decimate the natural aquatic vegetation with their food spectrum, which can have negative effects on the dragonfly fauna. (Author/Google translate)] Address: not stated

**21321.** Schmidt, C. (2005): Pflege und Bewirtschaftung von ausgewählten Gräben im LSG „Nassau und Elbwiesen bei Brockwitz“ unter besonderer Berücksichtigung der Libellenfauna. Diplomarbeit. Hochschule für Technik und Wirtschaft Dresden (FH). 78 pp + Anhang. In German ["In the course of this work, structural mapping was carried out on the ditches of the study area as a basis for the care and management concept. At the same time, the dragonflies occurring there were recorded. To characterize the sections of the ditch, different parameters were considered (e.g. information on the longitudinal and transverse profile, bed structure, vegetation and environment), which represent the current condition of the respective body of water. Since open water areas are necessary for most dragonfly species, a follow-up mapping was carried out in August, with a focus on vegetation. The existence of an optical profile-narrowing effect and the covering of the water surface by the embankment vegetation as well as the density of the emersed plants were recorded. A total of 22 dragonfly species were found in the study area. These include seven species that BROCKHAUS & FISCHER (2005) continue to propose for the red list based on the latest distribution findings, and one species for the early warning list. Target species among these particular species is *Coenagrion ornatum*, which is listed in Appendix II of the Habitats Directive. It is given special consideration within this concept. Other threatened species are *Calopteryx virgo*, *Coenagrion pulchellum*, *Lestes barbarus*, *Orthetrum brunneum*, *O. coerulescens*, *Sympetrum flaveolum*

and *S. pedemontanum*. Based on the evidence, the sections of the ditch were later divided into four maintenance zones: first sections with an occurrence of *C. ornatum*, then sections for the promotion of *C. ornatum*, then sections with the occurrence of other special dragonfly species and finally sections without direct earmarking to certain dragonfly species. Finally, specifications for necessary maintenance measures (slope mowing, weeding and clearing) were developed in terms of ditch management in line with nature conservation and taking into account the requirements of the various special dragonfly species. Furthermore, statements are made on flanking measures that serve to improve the habitat properties or to increase the structure in the study area. These are the construction of waterfront strips, the clearing of existing rows of trees, the leveling of the embankments, the removal of the river bed structures, the conversion of arable land to grassland and the disclosure of piped ditch sections. Finally, based on the existing structures, the individual maintenance and supplementary measures were summarized in action maps." (Author/Google translate)] Address: Schmidt, C., Louisenstr. 45, 01099 Dresden

**21322.** Schultz, H. (2005): Vergleichsstudie March im Abschnitt Marchegg (Fluss km 15,00 – 25,00): Odonata. Endbericht. Im Auftrag des Umweltbundesamtes Wien, Wien, Mai 2005: 49 pp. (in German) ["As part of the project "Bank and profile design measures and measures to connect the meanders for the March in the Marchegg section (river km 15.00-25.00)", 13 test sites were selected with a focus on the March to evaluate the design types. The biocenotic parameters total species inventory, proportion of autochthonous species, proportion of sensitive species, indigenoussness of the species and abundance (relative frequency) were determined for each sampling site. The maximum abundance is given, whereby the species are classified according to the inspection date with the largest number of individuals found at the individual sampling sites. This database also enables the dominant species, the dragonfly communities and a characterization of the examined locations based on the dragonfly fauna to be addressed. A total of 22 dragonfly species (8 Zygoptera and 14 Anisoptera) from 8 families were identified. Of these, 11 species are classified in the Red List of Lower Austria (RAAB & CHWALA, 1997). For 6 species, the indigenoussness could not be clearly confirmed. However, it can be assumed that the species in question are mostly native to the Marchauen. The autochthonous evidence of *Sympetrum meridionale* is to be emphasized as a special proof, since the species is considered "extinct or missing" in Lower Austria. In addition, the endangered dragonfly species *Gomphus flavipes* and *Epithea bimaculata* as well as the highly endangered species *Lestes barbarus* and *Ophiogomphus cecilia* could be detected. *O. cecilia* and *G. flavipes* are protected animal species throughout Europe according to the EU Habitats Directive, with *O. cecilia* as a protected object of the Natura 2000 area "March-Thaya-Auen" subject to the strict area protection according to Article 6 of the Habitats Directive subject. On the March in the investigation section, the running water community *Gomphus - Calopteryx splendens - coenosis* has dev2008eloped, which corresponds to the biotope type of the brisk to sluggishly flowing rivers of the plain. The indicator species are the rheophilic dragonfly species *Gomphus vulgatissimus*, *O. cecilia* and *Calopteryx splendens*, which are accompanied by *Platycnemis pennipes* (cf. JACOB, 1969; STARK, 1976; WARINGER, 1989). A total of 10 dragonfly species from 7 families could be identified as being sensitive. These are stenöke, i.e. narrowly niche, species that place special demands on their habitat and are

therefore particularly well suited as bioindicators. The occurrence of a total of 3 species out of 4 species of the family Gomphidae known for Lower Austria is remarkable. On the other hand, the sensitive species *L. barbarus*, *Aeshna affinis* and *S. meridionale* were detected at the two sampling sites away from the main river. The 13 sampling sites range from 1.09 to 3.95 on a scale from 1 for eu- and parapotamal permanent water bodies (habitat type H1) to 5 for temporary standing water bodies (habitat type H5). The surveyed AUI range of 2.86 can therefore be assessed as wide. The study sections along the March itself all correspond to habitat type H1. The results for sample site 8 in meander IV with 3.44 and for sample site 12 on the wet meadow with 3.95 are at the opposite ecological end of the spectrum of riverine and amphibious alluvial sites. The mean AUI of 1.73 shows the focus of the recordings on H1 habitat type sites. Tables 13 and 14 provide a summary of the evaluation of the sampling sites and the design types on the March based on the dragonfly fauna surveyed. The design types A2 (partial removal of the bank protection on the impact bank), B3 and B4 (accentuation of the transverse profile through measures on the slip bank), E2 (relocation of bed sediment) and E3 (installation of wooden structures) are rated positively. Sample site 11 with design type B4 represents an extremely valuable habitat for the dragonfly fauna on the March. At this site, by far the highest density of individuals of the endangered dragonfly species *G. flavipes* and most of the individuals of the very rare *O. cecilia* raised. Design type C1 (selective lowering of the bank edge) with the aim of improving or restoring the lateral surrounding area network cannot be confirmed based on the available results. Due to the inspections in 2004, the execution of the measures must be rated rather negatively, since the trenches were dry on all inspection dates with the exception of April and the local subsidence was well above the level of the March. Improved networking of the main river with the floodplains and their backwaters and wet meadows is essential for their existence in order to counteract silting up or complete drying out. A dynamization of the meander IV could not be determined in the inspection period 2004. For sampling point 8 along the former inflow opening, a value of 3.44 was created as part of the calculation of the floodplain index based on native dragonfly species. Thus, meander IV in the examined section corresponds to standing water with no connection to the main river at medium water levels, but with a strong tendency to silt up. The planned integration of the meanders is to be demanded in accordance with the model typical of the river. The connection to the main river also counteracts the progressive silting up of the meanders. When carrying out the design measures for the meander inflow area to connect the meander, an approach should be chosen with consideration for the rare and in some cases highly endangered dragonfly fauna. If the meanders are fully integrated into the course of the river with year-round flow, the preservation of areas protected from the current, separate sections of water or similar is a decisive compensatory measure. Based on the available ecological results on the dragonfly fauna, tendencies and comprehensible differences between built and unbuilt or demolished sections can be determined. Undeveloped or dismantled sites on the March (corresponding to natural conditions) clearly show the better values in terms of the species inventory recorded, the proportion of native and sensitive species and the abundances. They have a larger and more specific range of species. With one exception, all trial tillages with hard-built banks due to heaped heaps generally show poorer values. From a dragonfly point of view, preference should therefore be given to all measures that create or promote a near-natural and less disturbed state and increase the range of structures. The

strengthening of the bank with monotonous heaps of heaps is to be rejected. In general, the structural heterogeneity of the March has been improved by the design measures carried out, but there are long stretches of deficits in the area of water-land connectivity and the structural equipment, especially of the riparian bank." (Author/Google translate)] Address: not stated

**21323.** Torrejon, J.M.; Rerri, F.; Perez-Bote, J.L. (2005): Confirmación de la presencia de *Paragomphus genei* (Selys, 1841) en Extremadura (Odonata, Gomphidae). *Boletín de la S.E.A.* 37: 248. In Spanish ["This note graphically documents a Mauro male of this species, captured by F. Ferri in the Cáparra river (UTM: 29TQE 4608, Guijo de Granadilla, Cáceres) on 08.26.2005, which confirms the presence of *P. genei* in Extremadura." (Authors)] Address: Pérez-Bote, J.L., Área de Zoología, Facultad de Ciencias, Universidad de Extremadura, Avda. de Elvas s/n, 06071 Badajoz. Spain. Email: jlperez@unex.es

## 2006

**21324.** Ballentes, M.G.; Mohagan, A.B.; Gapud, V.P.; Espallardo, M.C.P.; Zarcilla, M.O. (2006): Arthropod faunal diversity and relevant interrelationships of critical resources in Mt. Malindang, Misamis Occidental. Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA). Biodiversity Research Programme for Development in Mindanao: Focus on Mt. Malindang and Environs. ISBN 971-560-125-1: 177 pp. (in English) [Philippines; An assessment of arthropod diversity and analysis of the interrelationships with other resources were conducted in 10 barangays in Oroquieta City, Don Victoriano, Lopez Jaena, and Calamba, Misamis Occidental from June 2003 to May 2005. The current inventory of Mt. Malindang arthropods includes 741 species in 340 genera, 135 families, 21 orders, and 5 classes. The most speciose orders, the Coleoptera, Hemiptera, Hymenoptera, Diptera, and Araneida account for 78.37 percent of all the species. Arthropod species diversity is generally higher in forest ecosystems than in agroecosystems. When treated per vegetation and per site, diversity is highest in the mixed dipterocarp forest of Peniel, Lopez Jaena, with 82 restricted species (60% beetles) out of 316 species. In terms of species composition, three major clusters of similarity among vegetation types are discernible: a) five agroecosystem sites in Gandawan, Mansawan, Lake Duminagat, Mamalad, and Mialen, with Gandawan and Mansawan having the most similar arthropods; b) montane-mossy forest and agrocereal grassdominated type and almaciga forest in Sebucal; and c) mixed lowland dipterocarp-plantation forests, agrocereal, agroforest, and mixed dipterocarp forest. Three vegetation types appeared to show little species similarities among each other or with any of the three clusters.] Address: Gapud, V.P., Univ. Philippines, Coll. Agr., Pest. Biol. and Biodivers. Div., Los Banos 4031, Philippines

**21325.** Groenendijk, D.; Bouwman, J. (2006): Ecologische status van de Hoogveenglanslibel in Noord-Brabant. Rapportnummer VS2006.035, Wageningen. 24 pp. In Dutch ["Introduction There is a population of *Somatochlora arctica* in the Reuselse Moeren in North Brabant. This is one of the five known populations of this endangered species in the Netherlands. The population in the Reuselse Moeren is relatively small (but viable) and therefore vulnerable. This project plan focuses on the protection of the moorland dragonfly in the province of North Brabant and is a result of the activities of the species protection plan moorland dragonfly



(Ketelaar et al., 2005). This report reports on the ecological inventory planned for 2006. Ecology The high moor shine dragonfly is a special species. It is one of the few species of dragonflies in Europe of which relatively little is known. Chapter 2 of this report devotes relatively extensive attention to ecology. This information can also largely be found in the species protection plan. Fieldwork 2006 The fieldwork in 2006 concentrated on the Reuselse Moeren. The main goal was to trace the exact breeding sites in this reserve. Secondly, 10 other possibly suitable peat remnants were searched for other populations in the province of Noord-Brabant. The areas where historical observations of the high moor shine dragonfly are known were also visited. Results: dissemination and management The high moor shine dragonfly is only found in the Reuselse Moeren. In the remaining areas, the presence of the species could not be established. The population in the Reuselse Moeren is located in the core of this area. The management of the Reuselse Moeren must be aimed at combating desiccation and maintaining small peat pits with sufficient peat mosses in the core. Bottlenecks and measures The peat pits in the Reuselse Moeren where the high moor shine dragonfly is located reproduces, contain very little open water and a large surface area of sphagnum moss. The current bottlenecks in the Reuselse Moeren mainly lie in the desiccation of the area. Measures should primarily be aimed at restoring the hydrology of the area. This is the main route. In addition to this first trajectory, Chapter 5 also proposes a second trajectory with measures for the short term." (Authors/Google translate)] Address: Groenendijk, D., De Vlinderstichting, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: dick.groenendijk@vlinderstichting.nl

**21326.** Schleicher, J. (2006): Les peuplements de lépidoptères rhopalocères et d'odonates du bassin versant de la Drôme. État des lieux et mise en place d'un suivi des rhopalocères, d'odonates et des macrophytes aquatiques comme descripteurs des milieux alluviaux et fontinaux du bassin versant. FRAPNA DROME 38 Avenue de Verdun 26000 Valence. 146 pp. In French ["The biodiversity observatory, set up as part of the SAGE de la Drôme, plans to monitor the populations of rhopaloceres, odonates and aquatic macrophytes linked to alluvial and fontinal environments. As part of this study, we have established an inventory of knowledge of the populations of rhopaloceres and odonates at the level of the watershed. This inventory is based on an analysis of existing data in various naturalist databases. We analyzed the observation pressure and the specific richness by municipality of the catchment area. To each known species in the study area, we assigned an abundance/rarity index (in relation to occurrences in the database), as well as an index that takes into account the abundance or rarity of stations of the species. According to the different natural environments and types of wetlands, we have identified processions of characteristic species. In the second part of the study, we explain the implementation and methodology of monitoring at the sampling sites. We present each sampling site as well as the monitoring plots. For the rhopalocere sites, we describe the natural habitats sampled (according to the CORINE biotope nomenclature). For odonate and macrophyte sites, we describe the environmental parameters and we present a simplified phytosociological analysis for each one. The phytosociological analysis is based on our macrophyte surveys. The third part reports the results of the sampling by site. We present the specific diversity, abundance / density of imagos as well as the abundance of heritage species. For each site, we also present diagrams of the species composition of the populations, grouped by

plot/transect. The results of the 2006 monitoring campaign represent the baseline for future monitoring. The results are analyzed in relation to the specific diversity and the balance of the populations of each site and for odonates in relation to the Global Quality Index (IQG) of odonatological value." (Author/Google translate)] Address: Schleicher, J., FRAPNA Drôme, 38 Avenue de Verdun 26000 Valence, France

## 2007

**21327.** Dinger, E.C.; Marks, J.C. (2007): Effects of high levels of Antimycin A on aquatic invertebrates in a warmwater Arizona stream. *North American Journal of Fisheries Management* 27: 1243-1256. (in English) ["Restoration of native fish to freshwater habitats often requires nonnative fish removal via chemicals such as antimycin A. Despite widespread use, there are limited field studies quantifying the effects of antimycin A on aquatic macroinvertebrates. We studied the immediate and short-term effects of antimycin A on macroinvertebrates during a fish renovation project in Fossil Creek, Arizona. We employed before-after control-impact (BACI) designs to measure the effects of antimycin A (at extraordinarily high levels of .54 and .100 lg/L) on macroinvertebrate drift, density, and species composition. We used the Hilsenhoff biotic index, a measure of invertebrate pollution tolerance, to study changes in species composition. At the highest dose (.100 lg/L), drift was five times the pretreatment drift level and invertebrate standing stocks in pools and riffles decreased immediately. Densities rebounded in riffles within 5 months but remained depressed in pools. At the lower concentration (.54 lg/L), macroinvertebrate mortality, measured as increased drift, was 24 times the pretreatment level. At this lower concentration, however, macroinvertebrate densities in the benthos were not reduced. Under both concentrations, species composition shifted toward more tolerant species. Although antimycin A effects were mostly short term, several species were locally extirpated. We found no explanation for the loss of some species over others. These results indicate that there is a high end concentration at which antimycin A can have deleterious effects on aquatic invertebrates. We caution managers contemplating the use of antimycin A in fish restoration to consider the risks to macroinvertebrates. We suggest the use of pretreatment surveys and bioassays at anticipated treatment levels to predict the effects upon macroinvertebrates, especially sensitive species. Where there are sensitive species, steps should be taken to mitigate effects." (Authors) At treatment site 1 *Hetaerina* sp. was extirpated. "By August 2006, five taxa had recolonized treatment site 1 (*Baetodes*, *Bezzia*, *Metrichia*, *Rhagovelia*, and *Tinodes*, whereas four taxa had not returned (*Chimarra*, *Hetaerina*, *Lutrochus*, and *Tricorythodes*)."] Address: Dinger, E.C., Merriam-Powell Center for Ecological Research, Dept of Biology, Northern Arizona Univ., Box 5640, Flagstaff, Arizona 86011, USA

**21328.** Walia, G.K. (2007): Chromosome variation in three libellulid species due to effect of pollutants in the aquatic ecosystem. *Journal, Punjab Academy Sciences* 4(1&2): 73-74. (in English) ["Chromosomal analyses have been carried out on three species belonging to family Libellulidae viz. *Brachythemis contaminata*, *Crocothemis servilla* and *Pantala flavescens*. All the species were collected from the vicinity of stagnant polluted water bodies affected with environmental pollution. Type number of the family Libellulidae is 2n= 25m and n=13m, shown by 30% of the cells. Majority of the cells (70%) possess variation in chromosome number due to autosomal fragmentations and fusions. The chromosome number varies from n= 11-18 in

*Brachythemis contaminata contaminata*, n= 10-19 in *Crocothermis servilia servilia* and n= 10-13 in *Pantala flavescens*. This type of autosomal fragmentations and fusions due to the effect of pollutants has been reported for the first time in the family." (Authors)] Address: Walia, Gurinder Kaur, Department of Zoology and Environmental Sciences, Punjabi University Patiala, Punjab, India. Email: gurinderkaur\_walia@yahoo.co.in

## 2008

**21329.** Anonymus (2008): Salamander, Prachtlibelle und Quelljungfer. Die Gemeinde Rüti verfügt über ein einzigartiges Tierinventar der grossen und kleinen Fließgewässer. Naturschutzverein Rüti ZH Rundbrief No. 63. 2 pp. In German ["Natural and near-natural streams are characterized by high water quality and a course rich in structure. They are equipped with various small habitats: with rock, gravel and sand bottoms, bank cavities and plant pads, calm pools and fast-flowing sections. The diversity of animal organisms increases with the number of different small habitats. The quality of small rivers as a habitat can be seen from selected animal species. In our region, the fire salamander and four types of dragonflies are suitable: banded and blue-winged demoiselle, two-striped and striped damson. All five species are protected, living as larvae in running water and as adults on land. The development of the larvae in the fire salamander takes three months, in the dragonfly one to two years and in the spring maiden around five years. During the entire larval period, they are continuously dependent on clean, relatively cool and oxygen-rich running water. However, the habitat requirements of the five species differ in detail. Their connection to certain structural properties of the small streams, their position in the food web and their conspicuousness make them excellent pointer organisms or bioindicators. As a retired biologist, our association member Hansruedi Wildermuth wanted to know specifically where fire salamanders, dragonflies and spring mermaids occur in the community. The aim of his project, which came about on his own initiative, was an inventory of running water with mapping of all occurrences of the five species in the municipal area of Rüti. The population sizes and spatial focal points of development should also be determined and the structural conditions of the streams and ditches should be recorded at the same time. In this way, over the course of two years, a complete overview of the distribution of the five animal species and their population situation in the community was created. The detailed report on the inventory has been available for a good six months. The maps clearly show that each of the five animal species has its own distribution pattern. While the occurrence of the fire salamander is limited to the eastern and southern parts of the municipality, *Calopteryx virgo* and the *Cordulegaster boltonii* are widespread outside the settlement area in suitable places. *Calopteryx splendens* probably only occurs as a guest in Rüti and *Cordulegaster bidentata* is extremely rare due to the lack of favorable larval waters. The fire salamander develops almost exclusively in small, fish-free spring waters with calmed current pools in the forest area between Weier and Batzberg. The two-striped spring damselfly also inhabits the larger streams, provided that there are calmed sections with fine sediments, and the blue-winged demoiselle needs additional sun and cushions from aquatic plants or fine-rooted nests floating freely in the water. The striped spring maiden only finds favorable development conditions in two small bodies of water close to the source on the southern flank of the Batzberg. For natural or man-made reasons, none of the five focus species are able to settle on

many stretches of stream in the community. Routes where three species occur together are rare. The Rütivaldbächli, Weierbächli/Feienbächli, Laufenbach im Tüfental, Dachseggbächli, Chüeweidbächli, Förholz bächli and Gubelbächli in certain sections as well as the two ditches in the Weierbachried and in the Gründ Ost Ried have proven to be the most valuable bodies of water for the focus species. For the fire salamander, all waters that are used for breeding brown trout are unavailable because they eat the salamander larvae. All 34 officially registered watercourses in the municipality and two additional reed ditches are briefly characterized together with their importance for the focus species. It is also shown to what extent the larval habitats of the five species overlap or separate. The positive and negative factors for colonization are also listed, as well as the possibilities for upgrading the water bodies, provided that this does not require a great deal of effort. Rüti is probably the only municipality in Switzerland with such a detailed animal inventory of all watercourses. The report is now available to the municipality (nature and environment agency, building authority, nature and environment commission). It should not only impart collected knowledge, but also have an effect: it forms an indispensable basis for nature conservation practice by clarifying where there is a need for improvement measures with regard to habitat optimization. At the instigation of René Gilgen, nature conservation officer for the canton and municipality in Rüti, some biotope upgrades were already implemented in the course of the inventory work: clearing of wooded stream edges and structural improvements to reed ditches. They are already having a positive impact." (Author)] Address: [http://www.nvr.ch/nvr\\_seiten/03verein/031archivrundbrief/rundbrief\\_63.pdf](http://www.nvr.ch/nvr_seiten/03verein/031archivrundbrief/rundbrief_63.pdf); 23082012

**21330.** Buschbeck, E.K.; Friedrich, M. (2008): Evolution of insect eyes: Tales of ancient heritage, deconstruction, reconstruction, remodeling, and recycling. *Evo. Edu. Outreach* 1: 448-462. In English ["The visual organs of insects are known for their impressive evolutionary conservation. Compound eyes built from ommatidia with four cone cells are now accepted to date back to the last common ancestor of insects and crustaceans. In species as different as fruit flies and tadpole shrimps, the stepwise cellular patterning steps of the early compound eye exhibit detailed similarities implying 500 million years of developmental conservation. Strikingly, there is also a cryptic diversity of insect visual organs, which gives proof to evolution's versatility in molding even the most tenacious structures into something new. We explore this fascinating aspect in regard to the structure and function of a variety of different insect eyes. This includes work on the unique compound-single-chamber combination eye of twistedwinged insects and the bizarre evolutionary trajectories of specialized larval eyes in endopterygote insects." (Authors) The paper includes references to Odonata. Address: Buschbeck, Elke, Dept of Biological Sciences, University of Cincinnati, 614 Rieveschl Hall, Cincinnati, OH 45221-0006, USA. E-mail: [elke.buschbeck@uc.edu](mailto:elke.buschbeck@uc.edu)

**21331.** Cordero Rivera, A. (2008): *Macromia splendens*: Estado de conservación y problemática de futuro. I jornadas sobre la conservación de los artrópodos en Extremadura. Centro de Educación Ambiental de Cuacos de Yuste 16, 17 y 18 de Junio de 2007. Edición: Fondos LIFE-Proyecto LIFE 2003/NAT/E/000057 "Conservación de Artrópodos Amenazados de Extremadura". Junta de Extremadura. Consejería de Industria, Energía y Medio Ambiente. Coordinación técnica: Javier Pérez Gordillo y Ángel Sánchez García. Depósito legal: BA-004-2008: 117-130. (in Spanish) ["The genus *Macromia* is eminently tropical, as of the 100

or so recognised species, only one (*splendens*) is found on the European continent, and only about 10 in North America. The lack of knowledge of the biology of *M. splendens* is undoubtedly due to its rarity (living in slow habitats in rivers), the difficulty of capture and the fact that its populations are usually found in areas that are difficult to access. In addition, the flight period does not seem to last more than 4-5 weeks. The detection of the populations of this species is greatly hindered by this fact, so in the future it would be advisable to carry out searches for exuviae. In recent years, new populations have been found in the northwest and central-west of the Iberian Peninsula (including Galicia, northern Portugal, Castilla y León and Extremadura), which suggests that the distribution of the species is somewhat wider than previously thought. The conservation of the populations of this species requires the maintenance of favourable microhabitats for larval development, which include areas of sand, leaf litter and roots in slow, deep sections of rivers, and feeding areas in forest clearings for adults." (Author) Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: Cordero Rivera, A., Depto de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: [acordero@uvigo.es](mailto:acordero@uvigo.es)

**21332.** Ferreira, S. (2008): Situación de la odonofauna en Portugal. I jornadas sobre la conservación de los artrópodos en Extremadura. Centro de Educación Ambiental de Cuacos de Yuste 16, 17 y 18 de Junio de 2007. Edición: Fondos LIFE-Proyecto LIFE 2003/NAT/E/000057 "Conservación de Artrópodos Amenazados de Extremadura". Junta de Extremadura. Consejería de Industria, Energía y Medio Ambiente. Coordinación técnica: Javier Pérez Gordillo y Ángel Sánchez García. Depósito legal: BA-004-2008: 149-152. (in Portuguese, with Spanish summary) ["The Odonata fauna of Portugal is one of the least studied in Europe, which is surprising if we take into account that the country is located on the Iberian Peninsula, a "hot spot" between the western Palearctic and Paleotropical fauna, constituting the western limit of Europe. Its study began more than two centuries ago, however the known distribution of the species is still clearly insufficient and distorted by the reduced sampling effort; at the same time, the catalogue of species has only recently been the target of a critical analysis. In the present work, a brief historical perspective of the study of Odonata in Portugal is presented, as well as the work carried out recently. An outline of the state of current knowledge will also be made, focusing on species distribution, information gaps and protected, rare and/or lesser known species." (Author/Googletranslate)] Address: Ferreira, Sónia, Centro de Investigação em Biodiversidade e Recursos Genéticos, Universidade do Porto, Campus Agrário de Vairão, 4485-661 Vairão, Portugal. Email: [hiporame@gmail.com](mailto:hiporame@gmail.com)

**21333.** Hofhansl, F.P.; Schneeweis, S. (2008): Banderillas: Effects of deforestation on dragonflies (Insecta, Odonata) in the Pacific lowland of Costa Rica. *Stapfia* 88: 237-247. (in English, with Spanish summary) ["Deforestation in the past is responsible for the loss of large forest areas in all tropical regions and this process is ongoing. The reclamation of cultivated land reinforces the disappearance of natural habitats and reproductive sites for many species typical for pristine forests. Lotic waters may remain when the trees are gone, but their characteristics will have changed dramatically and species tied to these water bodies face different challenges maintaining self-sustaining populations. This study contributes to the question of whether changes in land use affect species assemblages and their ability for recruitment, and

whether streams embedded in cultivated landscapes provide viable reproductive habitats for dragonflies. We surveyed dragonflies at four forest sites, two sites at forest margins and four sites at streams in an agricultural landscape. At each site, adult dragonflies were recorded twice along a 50 m transect in January and February 2007. We found significant differences in species richness, species assemblages and proportion and number of widespread species between forest and cultivated area. Only 3 of 11 species found in forests were also observed at streams in agricultural areas. Our results indicate that rivers in agricultural environment do not represent suitable reproductive habitats for the majority of 'forest species'. Therefore, deforestation poses an enormous threat for these species." (Authors)] Address: Hofhansl, F., Department of Chemical Ecology & Ecosystem Research, Univ. of Vienna, Althanstraße 14, A-1090 Vienna, Austria. E-mail: [florian.hofhansl@univie.ac.at](mailto:florian.hofhansl@univie.ac.at)

**21334.** Pérez Gordillo, J. (2008): El Proyecto LIFE "Conservación de Artrópodos Amenazados de Extremadura". I jornadas sobre la conservación de los artrópodos en Extremadura. Centro de Educación Ambiental de Cuacos de Yuste 16, 17 y 18 de Junio de 2007. Edición: Fondos LIFE-Proyecto LIFE 2003/NAT/E/000057 "Conservación de Artrópodos Amenazados de Extremadura". Junta de Extremadura. Consejería de Industria, Energía y Medio Ambiente. Coordinación técnica: Javier Pérez Gordillo y Ángel Sánchez García. Depósito legal: BA-004-2008: 27-34. (in Spanish) ["Conclusion: The LIFE Project "Conservation of Threatened Arthropods of Extremadura" will allow, on the one hand, to comply with the objectives proposed in the project, which is to know the distribution of the species, create tools that allow the protection of the species in an adequate way, dissemination and the implementation of management measures, and on the other hand, breaking a spear in favour of arthropods, opening the way for future studies with other species in Extremadura, either by the Administration or by scientific groups, also being an example for other Autonomous Communities. Thus, in the near future, the Autonomous Community of Extremadura will no longer appear blank on maps and different studies carried out at the national level and there will be proper management of the populations found therein." (Author/Googletranslate)] Address: Pérez Gordillo, J., Coordinador del Proyecto LIFE "Conservación de Artrópodos Amenazados de Extremadura". Servicio de Conservación de la Naturaleza y Áreas Protegidas. Junta de Extremadura, Spain.

**21335.** Walia, G.K. (2008): Comparative cytological data on twenty-six species of Libellulidae (Anisoptera: Odonata). *Fraseria* 8: 77-82. In English ["Chromosome studies have been performed on 26 species of family Libellulidae sampled from various localities of North & North-East and South & South-West India during pre-monsoon and post-monsoon seasons. Cytogenetical data pertains to 26 male species and 11 female species of 17 genera. Among these 21 male species reveal  $2n=25m$  as diploid chromosome number, while  $2n=26m$  is Present in all the female species. Remaining five male species possess  $2n=23$  as diploid chromosome number, m-chromosomes are absent. All the species have XO-XX type sex determining mechanism. Structure and behaviour of chromosomes during meiotic cycle have been studied and compared within the species and different species of the same genus or different genera. Diploid chromosome number, Total Complement Length, Relative length percentage of chromosomes." (Author)] Address: Walia, Gurinder Kaur, Dept Zoology & Environmental

## 2009

**21336.** Grand, D. (2009): Les Libellules et le réchauffement climatique. Rev. sci. Bourgogne-Nature 9/10: 124-133. (in French) [f tropical origin, dragonflies are insects very sensitive to thermal variations. Their promptness to react to this parameter and their exceptional ability to fly make them ideal indicators for detecting possible global warming. The scientific documentation published from 1950 to the present day makes it possible to verify the arrival of several Afro-tropical dragonflies on the Iberian Peninsula and then to follow their spread in Andalusia and the neighboring provinces, one of these species even reaching the south of France. The situation is a little more complicated for our country, but recent inventories highlight a northern migratory push of a majority of southern species which, to move over great distances, follow the Rhône-Saône axis to the east and, to the west, run along the Atlantic coast to the Loire Valley which serves as a springboard for them to go north. In recent years, several southern species have colonized Belgium and neighboring countries, some not hesitating to cross the Channel to spread to the British Isles, one of them seems to have established itself there permanently. If global warming promotes the diversification of dragonflies in all regions of our country, the worrying counterpart is a significant and recent scarcity of the most sensitive Euro-Siberian species." (Author/Google translate).] Address: deceased

## 2011

**21337.** OPIE, CEN-LR; Écologistes de l'Euzière (coord.) (2011): Déclinaison régionale du Plan National d'Actions Odonates en Languedoc-Roussillon (2011-2015). Rapport pour la DREAL Languedoc-Roussillon, Montpellier: 111 pp. (in French) [[http://odonates.pnaopie.fr/wp-content/uploads/2010/12/0\\_D%C3%A9clinaison-r%C3%A9gionale-du-PNA-Odonates-VERSION-FINALE.pdf](http://odonates.pnaopie.fr/wp-content/uploads/2010/12/0_D%C3%A9clinaison-r%C3%A9gionale-du-PNA-Odonates-VERSION-FINALE.pdf)] Address: Les Écologistes de l'Euzière, David Sautet, Domaine de Restinclières, 34730 Prades-le-Lez, France. Email: david.sautet@euziere.org

**21338.** Peters, G.; Theischinger, G. (2011): The genera of the Afrotropical "Aeshnini": *Afroaeschna* gen. nov., *Pinheyschna* gen. nov. and *Zosteraeschna* gen. nov., with the description of *Pinheyschna waterstoni* spec. nov. (Anisoptera: Aeshnidae). *Odonatologica* 40(3): 227-249. (in English) ["The generic names *Afroaeschna*, *Pinheyschna* and *Zosteraeschna* are introduced for 3 groups of Afrotropical dragonfly species, traditionally assigned to the paraphyletic taxon *Aeshna*. The phylogenetic relationships of these monophyla which are not immediately related to each other are discussed. The Ethiopian populations of *Pinheyschna* gen. n. are described and characterized as a new sp. (*Pinheyschna waterstoni*). *Zosteraeschna ellioti* (Kirby, 1896) and *Z. usambarica* (Förster, 1906) are regarded as distinct species. Only synonymy, information on status (if feasible) and distribution are given for the remaining species of the group, and a preliminary key to the adults of all but one species is presented." (Authors)] Address: Theischinger, G., Water Science, Office of Environment & Heritage, Dept of Premier & Cabinet, PO Box 29, Lidcombe NSW 1825, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

**21339.** Petzold, F.; Zimmermann, W. (2011): Rote Liste der Libellen (Insecta: Odonata) Thüringens. 4. Fassung, Stand:

11/2009. Naturschutzreport 26: 106-110. (in German) [Red List of Odonata, Thuringia, Germany] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. Email: petzold.falk@googlemail.com

## 2012

**21340.** Blondel, L. (coord.) (2012): Déclinaison régionale du plan national d'actions en faveur des Odonates - Limousin. 2012 - 2016. CEN Limousin/SLO/DREALLimousin: 90 pp + Annexes- (in French) [[https://www.conservatoirelimousin.com/tl\\_files/cen\\_limousin/contenus/Fichiers/PRAO/PRAO\\_Limousin\\_reduit.pdf](https://www.conservatoirelimousin.com/tl_files/cen_limousin/contenus/Fichiers/PRAO/PRAO_Limousin_reduit.pdf)]

**21341.** Heiser, M. (2012): Die Biogeographie der Libellen der Paläarktis und ihre Relevanz für die naturschutzrechtliche Normsetzung und Normanwendung. Dissertation, Fachbereich VI (Geographie/Geowissenschaften) der Universität Trier. 241 pp. In German and English ["The biogeography of the dragonflies of the Palaearctic and their relevance for conservation law setting and application. While the first nature scientists, such as von Humboldt and Darwin, in the field of classical biogeography studied especially the breakdown of the distribution of species, Wallace developed the recognition that there are causal reasons for the distribution of species. Wallace as well as de Lattin gained their findings by the fact that they projected distribution patterns of species over each other resulting in dispersal centres. In recent decades various possibilities of computer-based analysis offer special advantages for the analysis of distribution patterns, which are used in this thesis to write an interdisciplinary work at the intersection of nature science and conservation law. In five chapters various aspects of the field of classical biogeography are analysed and discussed. In the first chapter of this work, the biogeographic structure of dragonflies in the western Palaearctic is investigated by distribution analysis. The second contribution deepens the view with a regional analysis of the biogeography of Odonata and butterflies in Romania. A third paper concludes that West Palaearctic block with an analysis of island biogeography of the western Mediterranean region. In a second Eurasian block the fourth contribution, worked out the biogeographic pattern of Eurasia. Finally, the fifth article of the phylogeography of *Nehalennia speciosa* is offered as an example of trans-palaearctic distributed species. Besides their importance in basic research, these five chapters are a substantial basis for the elaboration of the legal treatise. In the legal treatise, with the aid of previous findings, various aspects are discussed that may have led the dragonflies underrepresented in the Habitats Directive. These aspects are a lack of uniform pan-European risk assessment, the lack of a protection criterion "dispersal ability" and a questionable approach when considering what species should be examined on their back for protection." (Author)] Address: <https://ubt-opus.hbz-nrw.de/frontdoor/index/index/docId/553>

## 2013

**21342.** Berquier, C. (2013): Plan Régional d'Actions en faveur des Odonates. Région Corse. - 2013 - 2017. Office de l'Environnement de la Corse - Direction Régionale de l'Environnement, de l'Aménagement et du Logement de Corse: 67pp. (in French) [<http://odonates.pnaopie.fr/wp-content/uploads/2010/12/PRA-Odonates-Corse-version-public1.pdf>; Korsika] Address: Berquier, C., Office de l'Environnement de la Corse - Observatoire Conservatoire des Insectes de Corse, F-20250 Corte, France. E-mail: berquier@oec.fr



**21343.** Daigle, J.J. (2013): *Orthemis discolor* (Carmine Skimmer), new for Cuba and the Caribbean. *Argia* 25(1): 2- (in English) ["Guantanamo Province, Camino a La Naza, Municipio Baracoa, 4 February 2008, 1 pair, Adrian Trapero; Santiago de Cuba Province, Rio Cauto, Municipio Palma Soriano, 23 February 2007, 1 male, Adrian Trapero and A. Cabrera. This is the first positive record of this species from Cuba and the Caribbean. It normally ranges from Texas to Bolivia." (Author)] Address: Daigle, J., 2166 Kimberley Lane, Tallahassee, FL 32311, USA. E-mail: jdaigle@net-tally.com

**21344.** Farkas, A. (2013): Emergence characteristics of riverine dragonflies (Odonata: Gomphidae). PhD thesis, Department of Hydrobiology, Centre of Arts, Humanities and Sciences, Faculty of Science and Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary: 170 pp. (in Hungarian, with English summary) ["Emergence characteristics of riverine dragonflies (Odonata: Gomphidae) were studied in details on the basis of the systematic collections of exuviae along Hungarian rivers. Our aims were to find out the species composition, abundance, phenology, emergence pattern, sex ratio at emergence, mortality during emergence as well as larval emergence behaviour of the riverine dragonflies at different sites. Systematic collections of exuviae were carried out during the whole emergence period in three years (2008, 2009 and 2011) at six different sites along the rivers Tisza, Szamos and Danube. At each sampling site exuviae were collected on standardised areas, 20 meter long stretches of the riverbanks. To study emergence behaviour, in the case of all exuviae found in situ, the distance travelled by the larvae from the water line to the emergence site and the type of the selected emergence support were recorded. Emergence behaviour was occasionally studied along the river Rába and several small watercourses too. To quantify the rates and the causes of mortality, dead and damaged specimens as well as dragonfly wings left behind by birds were collected and the causes of mortality were noted. In our study new data were given on the distribution and abundance of species. In the case of the Danube branches along the Szentendrei-sziget the co-occurrence of the four Hungarian gomphid species as well as data on the size of their populations were reported for the first time. Remarkable differences were found in species composition and abundances of gomphids between sites along the river Tisza, while the Tisza site upstream the mouth of the river Szamos and the Szamos site were similar. The Danube sites and the dammed Middle-Tisza site were similar in abundances but differed in species number. In this study we gave the first evidence of the negative influence of paving on the abundance of *G. flavipes*. The knowledge on the phenology of the studied species was supported by our new results. The described seasonal placement and separation of emergence periods of the studied species are most likely to be general in the rivers of the Carpathian basin. Our results support that the classification of species into 'spring' or 'summer' species based on the emergence pattern is not unambiguous in every case. Moreover, emergence pattern of a given species can be of either 'spring' or 'summer' type under different conditions. Up to date it was the first attempt to study the relationships between the daily numbers emerging and the actual water temperature and the actual water level in riverine dragonflies. In the former case positive, while in the latter case negative correlation was found. However, the influence of the two factors could not be clearly distinguished. Based on our results the temperature sums and the actual water temperatures jointly determine the onset of emergence, but it may also be influenced by

the temperature sum during the whole period of larval development. In all studied species the protandry, which is thought to be typical of riverine dragonflies, was confirmed by our results. The sex ratio at emergence showed no consistent bias toward one sex, but varied between sites and years. In the two *Gomphus* species the sex ratio at emergence was correlated with the water temperature in the year preceding emergence. We concluded that the effect of water temperature can be mediated through cohort-splitting; temperature-dependent development of minor cohorts, including unequal proportions of males and females due to the faster development of male larvae, affects the sex ratio at emergence. The distance travelled by the larvae from the water line to the emergence site proved to be typical of the species, but was influenced by local factors (e.g. water level, slope of the riverbank). Long distance climbed by *G. vulgatissimus* larvae (in which it takes a long time to complete the emergence) may reduce the risk of being washed away by rapid floods during emerging. Furthermore, the scattering of the specimens in a larger area may also decrease the risk of predation. In this study the gomphid larvae were not found to choose a given type of support in higher ratio than the other ones. Support-selection for emergence was dependent on the ratio of available structures within the distance the larvae crawled from the water line to the emergence site. Thus, not the type but the appropriate distance from the water line of the substrate is substantial for emergence. The mortality rate remarkably differed between the two *Gomphus* species, such as the factors contributing to mortality. The difference may be in association with the population size and the emergence strategy: mortality rate is higher in populations of individuals emerging in larger numbers close to the water line in a rather narrow stretch (*G. flavipes*), while mortality rate is lower in populations of individuals emerging in small numbers far from the water line and being scattered in a larger area (*G. vulgatissimus*). Higher mortality in dense populations is mainly attributed to higher predation pressure; on the other hand individuals emerging close to the water line suffer higher mortality caused by artificial waves. The latter should be considered as an important factor in point of view of nature protection." (Author)] Address: Farkas, Anna, Dept Hydrobiology, Centre of Arts, Humanities & Sciences, Faculty of Science & Technology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary. E-mail: flavipes@gmail.com

**21345.** Nirschl, R. (2013): *Erythrodiplax fervida* (Red-mantled Dragonlet), a new species for the United States. *Argia* 25(1): 9- (in English) [First record for USA; 18-XII-2012, National Butterfly Center in Mission, Texas. Hidalgo County] Address: Rick Nirschl. Email: ricknir@hotmail.com

Pinto, A.P. (2013): Análise cladística de Sympetrinae Tillyard, 1917 com ênfase no grupo de armadura femoral especializada: os gêneros de 'Erythemismorpha' (Insecta: Odonata: Libellulidae) - A cladistics analysis of Sympetrinae Tillyard, 1917 with an emphasis in the group of specialized femoral armature: the genera of 'Erythemismorpha' (Insecta: Odonata: Libellulidae). PhD. thesis, Instituto de Biociências da Universidade de Sao Paulo. Departamento de Zoologia: 187 pp. (in Portuguese, with English summary) ["Libellulidae comprises the largest family of Anisoptera with more than a thousand of species and one of the most abundant among dragonflies' families. Die investigations of its phylogenetic pattern of relationships, especially among their genera have been shown complex, with widely divergent hypotheses, and considered tricky. A first cladistic analysis of 'Sympetrinae' based on 171 characters from adults morphology, with an emphasis on the 'aimed leg group'

(Erythemismorpha) including the genera *Acisoma*, *Carajathemis*, *Cyanothemis*, *Erythemis*, *Poipax*, *Rhodopygia*, *Rhodothemis* and *Viidithemis* is presented here. Representatives of almost all Libellulidae subfamilies, as well as all genera of 'Sympetrinae' were also included, summing up a total of 69 terminal taxa. Diis broad sampling aimed to provide a strong test to hypothesis of monophyly of Erythemismorpha and identify monophyletic groups in 'Sympetrinae'. Two different analyzes were performed, each Fitch and Sankoff parsimony, both with distinct weighting schemes. The Sankoff parsimony was adopted to minimize the influence of 'gaps' on the results, but proved be inappropriate for to obtain stability indexes with resampling techniques, due to the high cost of computational requirements. Erythemismorpha was shown be monophyletic and further than to those genera previously cited, also includes, at least *Erythrodiplax castanea*. The genera *Acisoma*, *Rhodothemis*, and *Rhodopygia* were has each their hypotheses of monophyly also supported by the analyses performed here, however *Erythemis* showed be paraphyletic in almost all trees contradicting previous results. Almost all of the internal nodes of Erythemismorpha are inconclusive, however *Cyanothemis* + *Poipax*, as well as *Carajathemis* + *Rhodopygia* presents both high support. The entire composition of Erythemismorpha still open, pending the inclusion of other data sources. Also was discussed the misconceptions about homoplasy and its implications on venational characters of Anisoptera dragonflies. Is advocated the already discussed prevalence of pattern over process in cladistics paradigm. Homoplasy in cladistics is an error, more precisely an error of establishment of homologues (primary homology), thus convergence, reversal and similar terms are process tied ad hoc hypotheses over a pattern of inclusive hierarchy and not is concrete neither observable in real world." (Author)] Address: Pinto, A.P., Laboratório de Biologia e Sistemática de Odonata (LABIOSIS), Depto de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista s/n, São Cristóvão 20940-040 Rio de Janeiro-RJ, Brazil. Email: [odonata\\_angelo@hotmail.com](mailto:odonata_angelo@hotmail.com)

**21346.** Torralba Burrial, A.; Ocharan L.F.J.; Anadón Alvarez, M.A. (2013): La subcolección de Odonatos (BOS-Odo) de la Universidad de Oviedo: transfiriendo a la sociedad los datos del patrimonio natural albergado. XV Congreso Ibérico de Entomología - Universidad de Oviedo: 78- (in Spanish) [Verbatim: Biodiversity collections, whether of arthropods, other animals or herbaria, whether public or private, contain important data on the present and past distribution of these representatives of our natural heritage. Although the dissemination of said data is common in the form of publications or specific reports, the truth is that systems are needed that allow this knowledge to be transmitted quickly and easily to meet the needs of natural environment managers from public administrations, environmental service companies, the rest of the scientific community and society in general. In this sense, the dissemination of these biodiversity data stored through databases accessible on the Internet greatly facilitates this transfer of knowledge. It is precisely within the framework of the Global Biodiversity International Facility (GBIF), a set of interconnected and coherent international databases, that most of the Odonata subcollection (BOS-Odo) of the Collection of Arthropods of the Department of Biology of Organisms and Systems of the University of Oviedo, through projects of the National R&D Plan (MICINN-08-CGL2008-04614-E, PTA2010-4108-I) and co-financing PCTI Asturias (COF11- 38). In addition to facilitating access from the GBIF national and international portals to the biodiversity data associated with the

subcollection (more than 15,000 records), a web page has been developed that frames and puts the data of the BOS-Odo subcollection into perspective, facilitating its consultation individually by species or as a whole, in the same way that it compiles the publications in which funds housed in the subcollection have been treated or used. (Authors/Google translate)] Address: Torralba Burrial, A., Departamento de Ciencias de la Educación e Instituto de Recursos Naturales y Ordenación del Territorio (Indurot) – Univ. de Oviedo, Spain. Email: [torralbaantonio@uniovi.es](mailto:torralbaantonio@uniovi.es)

## 2014

**21347.** AK Libellen NRW; Conze, K.-J.; Joest, R. (2014): Die Grüne Flussjungfer etabliert sich wieder in NRW. Ergebnisse einer gezielten Suche nach der Grünen Flussjungfer (*Ophiogomphus cecilia*) an der Lippe im Kreis Soest. *Natur in NRW* 1/13: 28-31. In German [In recent years, there have been increasing numbers of observations of the *O. cecilia* in NRW, which had disappeared here for a long time. This is also of particular interest as it is given special protection under Appendix IV of the Habitats Directive and is one of the planning-relevant species in NRW. Due to its habitat requirements, including greater flow diversity, it is considered a good indicator of near-natural watercourses. After individual finds in previous years, a targeted search for the species was carried out on the Lippe in the district of Soest in the summer of 2012. As a result, there is a total of twenty records of one to five individuals, distributed over a 27 km stretch along the Lippe. Most of the finds come from the more intensively examined renatured Lippe sections. The current data situation suggests that the green river maiden will become firmly established again in NRW in the next few years. This development should be pursued further by means of a targeted search. Instructions are given for this. A new designation of special protection areas does not seem necessary at the moment, but planning measures should also be coordinated with their habitat requirements if necessary. Overall, the species benefits from the improvements made as part of the implementation of the Water Framework Directive and above all from the renaturation of floodplains on larger bodies of water in the state." (Authors/Google translate)] Address: AK Libellen NRW c/o K.-J. Conze, Listerstr. 13, 45147 Essen, Germany. E-Mail: [kjc@loekplan.de](mailto:kjc@loekplan.de)

**21348.** Hämäläinen, M.; Marinov, M. (2014): *Hivaagrion* nom. nov., a replacement name for the preoccupied genus-group name *Bedfordia* Mumford, 1942 (Odonata: Coenagrionidae). *Notulae odonatologicae* 8(4): 112-116. (in English) ["A replacement name *Hivaagrion* nom. nov. is introduced for the damselfly genus *Bedfordia* Mumford, 1942, which is preoccupied by the name *Bedfordia* Fahrenholz, 1936 in Phthiraptera. The type species of *Hivaagrion* is *Bedfordia halecarpenteri* Mumford, 1942." (Authors)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: [libellago@gmail.com](mailto:libellago@gmail.com)

**21349.** Horvath, G.; Csabai, Z. (2014): Polarization vision of aquatic insects. Polarized light and polarization vision in animal sciences (2014): 113-145. (in English) ["In this chapter we show that primary aquatic insects fly predominantly in mid-morning, and/or around noon and/or at nightfall. We describe the different types of their diurnal flight activity rhythm characterised by peaks at low and/or high solar elevations. We present here experimental evidence that the polarization visibility  $Q(0)$  of water surfaces is always maximal at the lowest (dawn and dusk) and highest (noon)

angles of solar elevation 6 for dark waters, while  $Q(\emptyset)$  is maximal at dawn and dusk (low solar elevations) for bright waters both under clear and partly cloudy skies. The  $\lambda$ -dependent reflection-polarization patterns, combined with an appropriate air temperature, clearly explain why polarotactic aquatic insects disperse to new habitats in mid-morning, and/or around noon and/or at dusk. This phenomenon is called the "polarization sundial" of dispersing aquatic insects. We also show that non-biting midges (Chironomidae, Diptera) are positively polarotactic and like many other aquatic insects, their females are attracted to horizontally polarized light. We present here measured thresholds (i.e., the minimum degrees of linear polarization of reflected light that can elicit positive polarotaxis) of the ventral polarization sensitivity in mayflies, dragonflies and tabanid flies. The mayflies *Palingenia longicauda* swarm exclusively over the river surface; thus, they need not search for water. It could be assumed that this species is not polarotactic. We show here that also *P. longicauda* has positive polarotaxis, which, however, can be observed only when the animals are displaced from the water and then released above artificial test surfaces. *P. longicauda* is the first species in which polarotactic water detection was demonstrated albeit it never leaves the water surface, and thus, a polarotactic water detection seems unnecessary for it. The yellow fever mosquito, *Aedes aegypti*, has been thought to locate its breeding habitats exclusively by chemical cues. We demonstrate here that horizontally polarized light can also attract ovipositing *A. aegypti* females when they are deprived of chemical cues. *Aedes aegypti* is the first known water-associated species in which polarotaxis exists, but does not play a dominant role in locating water bodies and can be constrained in the presence of chemical cues. Finally, we deal with the negative polarotaxis in the desert locust, *Schistocerca gregaria*, the ventral eye region of which detects the horizontally polarized water-reflected light, and thus can navigate towards or away from large water surfaces." (Authors)] Address: Horvath, G., Environmental Optics Laboratory, Dept Biological Physics, Physical Institute, Eötvös Univ., Pázmány sétány 1, 1117 Budapest, Hungary. Email: gh@arago.elte.hu

**21350.** Khandozhivska, A.; Krazhan, S.; Mruk, A.; Koba, S. (2014): Diet of European grayling (*Thymallus thymallus*) from rivers of Zakarpattia in current conditions. Fisheries science of Ukraine 2/2014: 22-30. (in Ukrainian, with Russian and English summaries) ["Goal. To determine the feeding spectrum, qualitative and quantitative composition of the food lump of different age groups (2+, 1+, 0+) of *T. thymallus* of the Teresva and Tereblya rivers of the Transcarpathian region. Method. Primary material in the amount of 28 specimens of European grayling of different ages were collected during fieldwork on Transcarpathian rivers with the assistance of "Zakarpatterzhrybohorona". Fish were removed from poaching nets and fixed in 10% formalin solution. Processing of the recorded material was carried out in laboratory conditions according to generally accepted methods. The results. The nutrition of different age groups (2+, 1+, 0+) of the European grayling of the Teresva and Tereblya rivers of the Transcarpathian region was studied. It has been established that grayling consumes, mainly, bottom invertebrates, giving preference to amphibious organisms of the Insecta class. Organisms of the genera Diptera, Trichoptera, Plecoptera, Coleoptera, Ephemeroptera, Odonata, Amphipoda were common in the feeding of three-, two- and one-year-old grayling. The index of stomach filling in this yearling grayling with an average weight of  $12.3 \pm 0.72$  g was on average  $384.54 \pm 114.01\text{‰}$ , in two-year-olds with an average weight of  $29.53 \pm 2.14$  g –  $177.75 \pm 16.41\text{‰}$ ,

three-year-olds with an average weight of  $91.4 \pm 11.42$  g –  $168.49 \pm 25.44\text{‰}$ . Scientific novelty. Information on the feeding of European grayling in the rivers of Transcarpathia in modern conditions is fragmentary and insufficiently studied, since the indicated fish species is included in the Red Book of Ukraine, which limits the obtaining of material for research. Practical significance. The obtained data will make it possible to scientifically determine the extent of introduction of young European grayling into the Transcarpathian rivers in order to preserve and replenish its natural populations. Key words: European grayling, nutrition, stomach filling index, Transcarpathian rivers." (Authors/Google translate)] Address: Khandozhivska, Anna, Institute of Fisheries of NAAS, Kyiv, Ukraine. Email: anna-nyrka@mail.ru

**21351.** Le Dù, P.; Lesparre, D. (2014): Guide Atlas des libellules des Côtes d'Armor. VivArmor Nature, Côtes d'Armor: 98 pp. (in French) [France, Brittany, Département Côtes d'Armor: 57 naturalists contributed to this inventory of odonates bringing together 10,514 data resulting in the records of 50 odonate species.] Address: <https://bretagne-environnement.fr/libellules-cotes-darmor-guide-atlas-odonates>

**21352.** Noskovi, J.; Rakovska, A.; Porhajasova, J.; Ceryova, T. (2014): Agroecosystems and their effects on the structure of benthic invertebrate communities in the Nature Reserve alluvium Zitavy. Research Journal of Agricultural Science 46(2): 249-257. (in English) ["Agricultural activity permanently affected ecosystems - agroecosystems are particularly in terms of ensuring of nutrition for human society, very important functional units of the biosphere. Represent economically important organisms and their environment. Very often are surrounded by natural ecosystems, which are usually very closely linked. Although their relationship is twosided, agroecosystems can induce not only reduce the heterogeneity of the country but also may affect the biodiversity of the surrounding terrestrial and aquatic habitats. In order to assess the impact of agricultural activities on the water quality characteristics, as well as on the biodiversity and the structure of communities of aquatic organisms, we carried out sampling of water from six sampling sites at regular quarterly intervals, 24 water samples was collected, in the year 2007 in the Nature reserve Alluvium Zitavy located in the southwestern part of Slovak Republic, in the geomorphologic unit of Podunajska rovina. As the basic biological material we used organisms of macrozoobenthos living at the bottom of the aquatic habitats. This group of individuals is an important indicator of water quality, based on their species and numerical representation can be evaluated the water quality of monitored biotopes. Analysis of samples of water we obtained 9920 individuals, deterministic as 110 species of fourteen systematic groups of invertebrates. Of them, the largest proportion in the structure of benthic macrozoobenthos had Gastropoda (24.01%), Isopoda (13.47%), Ephemeroptera (10.60%), Heteroptera (9.33%), Coleoptera (8.49%), individuals of family Chironomidae (8.25%) and Diptera (7.40%). The species with the smallest proportion in the structure of zoobenthos of monitored wetlands (ranging from 1.61% to 4.32%) included representatives of systematic groups Turbellaria, Odonata, Hirudinea, Trichoptera, Amphipoda, Bivalvia and Oligochaeta. The most of species that formed monitored community of aquatic organisms belongs to the good indicators of water quality. Therefore, not only based on the structure of community of macrozoobenthos but also based on the calculated saprobic index (Si), the water which is used by this community as their habitat corresponds to  $\beta$ -mezosaprobic zone, slightly polluted water. Between sampling sites the significant differences in

the quality and purity of water was recorded, even not only in the numerous represented of benthic fauna. Some differences in representation of species were observed, because each of the representatives of zoobenthos has different requirements for water quality characteristics. Despite this, agriculture fertilizer application, spillage of the oil substances and their floating could result in deterioration of water quality of monitoring wetlands and thus the structure and biodiversity of benthic invertebrates." (Authors)] Address: Noskovi, J., Department of Environmental Science & Zoology, Faculty of Agrobiological & Food Resources, Slovak University of Agriculture in Nitra, Tr. A. Hlinku 2, 949 76 Nitra, Slovak republic. E-mail: Jaroslav.Noskovic@uniag.sk

**21353.** Philippov, D.A.; Pestov, S.V. (2014): Preliminary checklist of insects of mire biotopes of the Vologda Region. *Instorfa Proceedings* 10(63): 3-19. (in Russian, with English summary) ["The paper presents current knowledge on insects of mires of the Vologda Region (Russia). Based on the analysis of the published materials preliminary checklist of insects related to mire biotopes was established. In total 334 species from 220 genera, 74 families, 12 orders: ... Odonata (18, 11, 7)... (Authors) The following odonate taxa are documented: *Aeshna cyanea*, *A. grandis*, *A. juncea*, *A. subarctica*, *Coenagrion hastulatum*, *Enallagma cyathigerum*, *Cordulegaster boltonii*, *Cordulia aenea*, *Somatochlora flavomaculata*, *Gomphus vulgatissimus*, *Lestes dryas*, *L. sponsa*, *Leucorrhinia dubia*, *L. rubicunda*, *Libellula depressa*, *L. quadrimaculata*, *Sympetrum danae*, *S. flaveolum*] Address: Pestov S.V., Animal Ecology, Dept of Institute of Biology of Komi Science, Centre of Ural Branch of the Russian Academy of Sciences. 167982, Syktyvkar, Kommunisticheskaya, 28, Russia: Email: pestov@ib.komisc.ru

**21354.** Sacha, D.; David, S.; Waldhauser, M.; Buczynski, P.; Tonczyk, G.; Juchiewicz, M.M.; Martynov, A.V.; Heltai, M.G.; Mancini, C.O.; Jovic, M. (2014): Draft Red List of dragonflies (Odonata) of the Carpathians. In: Kadlecik, J. (Ed.) *Carpathian Red List of Forest Habitats and Species, Carpathian List of Invasive Species (Draft)*. The State Nature Conservancy of the Slovak Republic, 234 pp: 172-185. (in English) ["There are 78 species of dragonflies ever reported from the Carpathians in total. Among them, two species are represented by dubious historical data only; no specimens exist which would confirm the identification. Four species are identified correctly and there is a material proving the identification, however they are vagrants or occasional occurrences (blown by the wind etc.) only and therefore cannot be considered permanent members of the Carpathian fauna. The rest 72 species are proven to have breeding populations in the region. Since Carpathians are a very diverse bioregion in terms of their north-south extent and altitude levels, the dragonfly fauna constitutes mainly of Eurasian elements, accompanied by a fair proportion of thermophilous (Mediterranean) and boreo-mountainous elements. Most species are stagnicolous, whereas rheophilous species represent only a minority. With respect to quality of data, there is a bit inconsistency in-between the individual countries. Whereas countries in the north of the range (PL, CZ, SK, HU) have relatively good and ample datasets, countries in the south and east (UA, RO, RS) show deficit of knowledge or even locally profound lack of data. This fact showed up most visibly in Serbia, where the species have been classified either LC, or DD, and no other categories came to use. There also seems to be some variability in interpretation of the IUCN methodology among individual experts, resulting in a rather different classification of the same species in the individual countries, that cannot be always

and fully explained only by differences of the species populations, trends, areas etc. Taking all this information into account, the submitted list can only be considered the very first version of the Carpathian Red List of Dragonflies. A lot of effort still has to be put into research, statistical analysis and providing and maintaining consistent set of data before the Red List, strictly following the IUCN rules, can be compiled. Overview of the status of dragonflies of the Carpathians is in Table 1." (Authors)] Address: Šácha, D., Podtatranského 31, SK – 031 01 Liptovský Mikuláš, Slovakia. E-mail: dusan.sacha@vazky.sk

**21355.** Voronova, N.V.; Vershinina, V.Y. (2014): The fauna of dragonflies on Khortytsia Island. *Current issues of biology, ecology and chemistry* 7(1): 5-15. (in Ukrainian, with Russian and English summaries) [Ukraine, Zaporizhzhya region. The following species were recorded: *Calopteryx splendens*, *Lestes sponsa*, *Ischnura elegans*, *Coenagrion pulchellum*, *Orthetrum cancellatum*, *Aeshna mixta*, *A. juncea*, *Libellula depressa*, *Sympetrum vulgatum*, *S. sanguineum*.] Address: Voronova N.V., Zaporizhzhya National Univ., 69600, Zaporizhzhya, Zhukovskogo Str. 66, Ukraine

## 2016

**21356.** Frati, F.; Piersanti, S.; Rebora, M.; Salerno, G. (2016): Volatile cues can drive the oviposition behavior in Odonata. *Journal of Insect Physiology* 91-92: 34-38. (in English) ["Highlights: •The role of olfactory cues during oviposition in Odonata is overlooked. •The use of olfaction in oviposition by *I. elegans* was tested in choice assays. •*elegans* prefers to oviposit in larval rearing water than in distilled water. •Female EAG response was stimulated by rearing water. •*elegans* may rely on conspecific or food odour for oviposition site selection. Abstract: Selection for the oviposition site represents the criterion for the behavioural process of habitat selection for the next generation. It is well known that in Odonata the most general cues are detected visually, but laboratory investigations on the coenagrionid *Ischnura elegans* showed through behavioural and electrophysiological assays that adults were attracted by olfactory cues emitted by prey and that males of the same species are attracted by female odour. The results of the present behavioural and electrophysiological investigations on *I. elegans* suggest the involvement of antennal olfactory sensilla in oviposition behaviour. In particular, *I. elegans* females laid in the laboratory significantly more eggs in water from larval rearing aquaria than in distilled or tap water. Moreover, the lack of preference between rearing water and tap water with plankton suggests a role of volatiles related to conspecific and plankton presence in the oviposition site choice. *I. elegans* may rely on food odour for oviposition site selection, thus supporting the predictions of the "mother knows best" theory. These behavioural data are partially supported by electroantennographic responses. These findings confirm a possible role of olfaction in crucial aspects of Odonata biology." (Authors)] Address: Piersanti, Silvana, Dipartimento di Chimica, Biologia e Biotechnologie, Univ. of Perugia, Via Elce di Sotto, 06123 Perugia, Italy. E-mail: silvanapiersanti@tiscali.it

**21357.** Futahashi, R. (2016): Color vision and color formation in dragonflies. *Current Opinion in Insect Science* 17: 32-39. (in English) ["Highlights: •Dragonflies have a remarkable number of opsin genes. •Opsin genes are differentially expressed between stages and regions in dragonflies. •Multilayer structure is widely detected among iridescent coloured dragonflies. •Wrinkles or wax crystals enhances multilayer structural colour in some dragonflies. •Colour change



in red dragonflies is regulated by redox states of ommochrome pigments. Dragonflies including damselflies are colourful and large-eyed insects, which show remarkable sexual dimorphism, colour transition, and color polymorphism. Recent comprehensive visual transcriptomics has unveiled an extraordinary diversity of opsin genes within the lineage of dragonflies. These opsin genes are differentially expressed between aquatic larvae and terrestrial adults, as well as between dorsal and ventral regions of adult compound eyes. Recent topics of colour formation in dragonflies are also outlined. Non-iridescent blue colour is caused by coherent light scattering from the quasiordered nanostructures, whereas iridescent colour is produced by multilayer structures. Wrinkles or wax crystals sometimes enhances multilayer structural colours. Sex-specific and stage-specific colour differences in red dragonflies is attributed to redox states of ommochrome pigments." (Author)] Address: Futahashi, R., Bioproduction Res. Institute, Nat. Inst. Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566, Japan. E-mail: ryo-futahashi@aist.go.jp

**21358.** Ichter, J.; Krieg-Jacquier, R.; de Knijf, G. (2016): The dragonfly fauna of the Aude department (France): contribution of the ECOO 2014 post-congress field trip. *Martinia* 32(1): 9-24. (in English, with French summary) ["After the third European Congress of Odonatology (ECOO) which took place from 11 to 17 July in Montpellier (France), 21 odonatologists from six countries participated in the week-long field trip that was organised in the Aude department. This area was chosen as it is undersurveyed and offered the participants the possibility to discover the Languedoc-Roussillon region and the dragonfly fauna of southern France. In summary, 43 sites were investigated involving 385 records and 45 dragonfly species. These records could be added to the regional database. No less than five species mentioned in the Habitats Directive (*Coenagrion mercuriale*, *Gomphus flavipes*, *G. graslinii*, *Macromia splendens* and *Oxygastra curtisii*) and three regionally important species (*G. simillimus*, *Onychogomphus uncatus* and *Cordulegaster bidentata*) could be observed and are discussed. Several populations of these species were discovered: *G. graslinii* and *M. splendens*, considered as very rare prior to our investigations, were especially found in the western Corbières and in the middle course of the Aude River. Furthermore many new populations of *Oxygastra curtisii* were detected. A small population of *C. mercuriale* was found in a drainage ditch in a peat land in the Montagne Noire at 850 m a.s.l. in the northern Aude. One of the most remarkable observations was the finding of an exuvia of *G. flavipes* along the Aude River, ca 30 km to the west from the hitherto only record of this species for the department, proving the extension of the range of this species to the southwest. Range extension was also highlighted for *Trithemis annulata*, another increasing species in Europe." (Authors)] Address: Ichter, J., 11, rue Michelet, F-94200 Ivry-sur-Seine, France. E-mail: jean.ichter@gmail.com

**21359.** Ilg, C.; Oertli, B. (2016): Effectiveness of amphibians as biodiversity surrogates in pond conservation. *Conservation Biology* 31(2): 437-445. (in English, with Spanish summary) ["Amphibian decline has led to worldwide conservation efforts, including the identification and designation of sites for their protection. These sites could also potentially play an important role in the conservation of other freshwater taxa. We assessed the effectiveness of amphibians as surrogate for a selection of four taxonomic groups representative of the same freshwater habitats (dragonflies, aquatic beetles, aquatic gastropods and aquatic plants), in 89 ponds

located in Switzerland, all characterized by their high value for amphibian conservation. We tested whether these ponds could also contribute to the conservation of other taxonomic groups. Amphibians showed a weak congruency with the other taxonomic groups for the three metrics of biodiversity assessed: species richness, conservation value and community composition. Paired comparisons for the five groups considered also showed that, for each metric, amphibians presented the lowest degree of congruence. These results imply that site designation for amphibian conservation do not necessarily provide protection for freshwater biodiversity as a whole. In order to provide adequate protection for freshwater species, we recommend that rather than using only amphibians as a surrogate group for site designation, other taxonomic groups should also be taken into account in the prioritization and site designation process." (Authors)] Address: Ilg, Christiane, Univ. Applied Sciences & Arts Western Switzerland, Hepia Geneva Technology, Architecture & Landscape, Jussy-Geneva, Switzerland. E-mail christiane.ilg@hesge.ch

**21360.** Martins, F.A (2016): Determinants of odonata diversity in Brazil: a multi-scale approach. Tese (Doutorado em Ecologia e Evolução), Instituto de Ciências Biológicas, Universidade Federal de Goiás, Goiânia: 176 pp. (in Portuguese, with English summary) ["The interactions between the organisms and their physical environment and among the organisms themselves occur at definite spatial scales, and give rise to spatial patterns that may be assessed to a better understanding of these relationships. Thus, in order to understand the variation in species diversity, it is necessary to link the scale in which the variation is measured to the scale in which the processes operate. The main objective of this work is thus to identify the factors that best explain the diversity of dragonflies' tropical assemblages and determine how they interact across scales. The work is based on the Community Assembly conceptual framework that relies on the idea that community assembly is affected by spatial processes hierarchically arranged. Dragonflies are good models because they comprise two distinct groups of species regarding to body size, thermoregulatory responses and dispersal ability. Due to their ecological differences, they may respond differently to local as well as to regional environmental conditions. Despite of their ecological differences, our results suggest that richness patterns for both groups are affected by the same factors, i.e., they respond in a similar fashion to the analysed factors. In regional scales, environmental filters, such as temperature seasonality, affect species richness. The abundance is the main predictor of local species richness. Nevertheless, the assemblages' compositional patterns are different. Comparatively, Zygoptera (low-dispersal group) assemblages are more affected by local scale processes than Anisoptera. Our results suggest a better integration of metacommunity theory (focused on the role of dispersal shaping different spatial dynamics in the assemblages) and community assembly theory. The fact that the dispersal processes is more important at smaller scales indicate the potential importance of occupancy dynamics at this scale, calling for explicitly incorporating dispersal, affecting the spatial dynamics at different spatial scales. Furthermore, our results suggest that rather than being mutually exclusive, neutral and deterministic processes acts jointly on community assembly." (Author)] Address: Martins, F.A., Lab. de Ecologia Comportamental e Interações, Inst. Biologia, Univde Federal de Uberlândia, Rua Ceará, s/nº Bloco 2D - Campus Umuarama, 38400-902, Uberlândia, MG - Brasil - Caixa Postal: 593. E-mail: fernandaalvesmartins@yahoo.com.br

**21361.** Pereira Martínez, J.M.; Otero, J.C. (2016): Nuevo registro del caballito del diablo protegido *Coenagrion scitulum* (Rambur, 1842) (Odonata, Coenagrionidae) en la Comunidad de Cantabria (España). *Boln. Asoc. esp. Ent.* 40(3-4): 507-510. (in Spanish, with English title) ["On June 8, 2016, a population of *C. scitulum* was located in the "Elsedo Palace" (huso 30, 435442E-4800812N, Cantabria). This new finding is of great interest since it is the second Cantabrian locality known to date with the presence of the species." (Authors)] Address: Pereira Martínez, J.M., Departamento de Zoología y Antropología Física. Facultad de Biología. Univ. de Santiago de Compostela (USC), A Coruña, Spain Email: josse33@hotmail.es

**21362.** Rajabi, H.; Ghoroubi, N.; Malaki, M.; Darvizeh, A.; Gorb, S.N. (2016): Basal complex and basal venation of Odonata wings: Structural diversity and potential role in the wing deformation. *PLoS ONE* 11(8): e0160610. doi: 10.1371/journal.pone.0160610: 17 pp. (in English) ["Odonata are known to be excellent fliers with versatile flight capabilities. The ability to fly over a wide range of speeds, high manoeuvrability and great agility are a few characteristics of their flight. The architecture of the wings and their structural elements have been found to play a major role in this regard. However, the precise influence of individual wing components on the flight performance of these insects remains unknown. The design of the wing basis (so called basal complex) and the venation of this part are responsible for particular deformability and specific shape of the wing blade. However, the wing bases are rather different in representatives of different odonate groups. This presumably reflects the dimensions of the wings on one hand, and different flight characteristics on the other hand. In this article, we develop the first three-dimensional (3D) finite element (FE) models of the proximal part of the wings of typical representatives of five dragonflies and damselflies families. Using a combination of the basic material properties of insect cuticle, a linear elastic material model and a nonlinear geometric analysis, we simulate the mechanical behaviour of the wing bases. The results reveal that although both the basal venation and the basal complex influence the structural stiffness of the wings, it is only the latter which significantly affects their deformation patterns. The use of numerical simulations enabled us to address the role of various wing components such as the arculus, discoidal cell and triangle on the camber formation in flight. Our study further provides a detailed representation of the stress concentration in the models. The numerical analysis presented in this study is not only of importance for understanding structure-function relationship of insect wings, but also might help to improve the design of the wings for biomimetic micro-air vehicles (MAVs)."] (Authors)] Address: Rajabi, H., Institute of Zoology, Functional Morphology and Biomechanics, Kiel University, Kiel, Germany. E-mail: hrajabi@zoologie.uni-kiel.de

**21363.** Reynolds, A.M.; Reynolds, D.R.; Sane, S.P.; Hu, G.; Chapman, J.W. (2016): Orientation in high-flying migrant insects in relation to flows: mechanisms and strategies. *Phil. Trans. R. Soc. B* 371: 20150392: 12 pp. (in English) ["High-flying insect migrants have been shown to display sophisticated flight orientations that can, for example, maximize distance travelled by exploiting tailwinds, and reduce drift from seasonally optimal directions. Here, we provide a comprehensive overview of the theoretical and empirical evidence for the mechanisms underlying the selection and maintenance of the observed flight headings, and the detection of wind direction and speed, for insects flying hundreds of metres above the ground. Different mechanisms may be used

— visual perception of the apparent ground movement or mechanosensory cues maintained by intrinsic features of the wind—depending on circumstances (e.g. day or night migrations). In addition to putative turbulence-induced velocity, acceleration and temperature cues, we present a new mathematical analysis which shows that 'jerks' (the time-derivative of accelerations) can provide indicators of wind direction at altitude. The adaptive benefits of the different orientation strategies are briefly discussed, and we place these new findings for insects within a wider context by comparisons with the latest research on other flying and swimming organisms." (Authors)] Address: Chapman, J.W., Environment & Sustainability Inst., Univ. Exeter, Penryn, Cornwall TR10 9EZ, UK. E-mail: jason.chapman@rothamsted.ac.uk

**21364.** Shanku, A.G. (2016): Insights Into evolution and adaptation using computational methods and next generation sequencing. Ph.D., Rutgers, The State University of New Jersey: xxxiv, 244 pp. (in English) ["Historically, much of the research in evolutionary biology and population genetics has involved analysis at the level of either a single locus or a few number thereof. However, Next Generation sequencing technology has opened the floodgates with respect to both the sheer volume and quality of sequence data that researchers have long needed to address and answer long-standing questions in their fields. Scientists are now, by and large, no longer hampered in their efforts by technological hurdles to obtain data, but are in fact facing the problem of how best to use the vast amount of data that are accumulating at an ever-increasing rate. This is a good problem to have. The following research described in this dissertation is an attempt to derive answers to questions in the fields of population genetics and evolutionary biology that, until recently, have been either intractable or, at best, extremely difficult to address. In the first chapter I provide an introduction and a brief historical look at the research efforts that have proceeded my own. In the second chapter I describe how modern sequencing methods and computational analysis can be used to study, analyze, and answer evolutionary questions about the non-model organism, *Enallagma hageni*, in order to 1) determine this organism's phylogenetic position within Arthropoda, 2) provide answers and insight into the evolutionary history of the protein-encoding genes in the *Enallagma* transcriptome, and 3) give functional annotation to these expressed proteins. In the third chapter I examine how natural selection acts on the genome and derive a method that can accurately determine the evolutionary cause of nucleotide fixations, having occurred either through positive selection or neutral processes. I then apply the methodology to North American populations of *Drosophila melanogaster*, providing further evidence as to how adaptive evolution proceeds in a newly established population. This is an important question, for though there have been multiple approaches devised to determine the targets and modes of evolution in the genome, to date there has not emerged a definitive method which can determine both the location and type of a selective process, and as a result, the picture of how and where adaptive evolution proceeds in the genome has remained opaque. In the fourth chapter I examine how levels of natural selection within the genome have the potential to inhibit the ability to accurately learn population demographic history. Using a number of modern algorithms and extensive simulations, I first examine whether or not demographic histories that are learned under simple biological assumptions will yield accurate results when the actual data itself does not adhere to these assumptions. Further, I go on to examine more complicated models of demographic history, looking specifically at how

positive selection biases inference, which directions these biases occur, and at what levels of selection do inference methods fail to be robust. Finally, I describe potential evolutionary scenarios where these inference methods may be more prone to fail, as well as methods which might mitigate positive selection's effects, thus allowing for more accurate histories to be inferred. The work contained in this dissertation, at the broadest scale, is an effort to marry state-of-the-art techniques in statistics, computer science, and machine learning algorithms to the technological advances of next generation sequencing; the potent combination of these technologies has provided a means with which to derive answers to multiple, long-standing questions in population genetics and evolutionary biology." (Author)] Address: unknown

**21365.** Slim, M.; Zouaki, N.; Lougraimzi, H.; Elghali, L.; Zidane, L.; Fadli, M. (2016): Diversity, composition and systematic structure of the terrestrial entomofauna of a Ramsar site: The biological reserve of Sidi Boughaba, Mehdiya (Morocco). *Journal of Entomology and Zoology Studies* 4(4): 975-982. (in English) ["The region of Sidi Boughaba which is an important biological reserve (Northwest of Mehdiya, Morocco) offers a favorable conditions for the development of diversity of the wildlife. It is characterized by a sub-humid bioclimate and a mild winter. The objective of the present study is to make an entomological inventory in five different areas of floristic cortege perspective (herbaceous, shrub) and other medium (soil, water). A statistical study was performed by environmental indices of composition and structure. Sampling was done from mid-April 2013 to December 2013. The analysis of the entomofauna revealed the existence of 73 species distributed in 7 systematic orders and 28 families. Beetles are represented by 19 species, Orthoptera by 13, Diptera by 12 species; Hemiptera, Hymenoptera and Lepidoptera are represented by 8 species for each; Odonata come in last place with 5 species [Anax parthenope, A. ephippiger, Orthetrum trinacria, Lestes virens, Ischnura graellsii]. Similarly, the results showed that the values of Shannon-Weaver diversity vary between 2.654 and 3.411 which express the diversity of the sampled population." (Authors)] Address: Slim, M., Lab. Nutrition, Health & Environ., Dept Biol., Fac. Sci., Univ. IbnTofail, Kenitra, Morocco

**21366.** Verzijden, M.N.; Svensson, E.I. (2016): Interspecific interactions and learning variability jointly drive geographic differences in mate preferences. *Evolution* 70(8): 1896-1903. (in English) ["Co-occurrence of closely related species can cause behavioral interference in mating and increase hybridization risk. Theoretically, this could lead to the evolution of more species-specific mate preferences and sexual signaling traits. Alternatively, females can learn to reject heterospecific males, to avoid male sexual interference from closely related species. Such learned mate discrimination could also affect conspecific mate preferences if females generalize from between species differences to prefer more species-specific mating signals. Female damselflies of *Calopteryx splendens* learn to reject heterospecific males of *C. virgo* through direct pre-mating interactions. These two species co-occur in a geographic mosaic of sympatric and microallopatric populations. Whereas *C. virgo* males have fully melanized wings, male *C. splendens* wings are partly melanized. We show that *C. splendens* females in sympatry with *C. virgo* prefer smaller male wing patches in conspecific males after learning to reject heterospecific males. In contrast, allopatric *C. splendens* females with experimentally induced experience with *C. virgo* males did not discriminate against larger male wing patches. Wing patch size might indicate conspecific male quality in allopatry. Co-occurrence

with *C. virgo* therefore causes females to prefer conspecific male traits that are more species-specific, contributing to population divergence and geographic variation in female mate preferences." (Authors)] Address: Verzijden, Machteld, Aarhus Institute of Advanced Studies, Aarhus Univ. 8000 Aarhus, Denmark. Email: Machteldverzijden@aias.au.dk

## 2017

**21367.** Bastos, R.C. (2017): Implicações das condições ambientais de riachos e déficit Wallaceano sobre Odonata no Nordeste, Brasil. Universidade Federal do Maranhão: 37 pp, Annex. (in Portuguese, with English summary) ["Implications of the environmental conditions of streams and Wallaceano deficit on Odonata in Northeast Brazil: Alterations in land use resulting from anthropogenic actions modify biotic and abiotic conditions due to loss of environmental quality. This is worrying in regions where knowledge of biodiversity is derisory. Considering this scenario, the present study's objectives were to evaluate the effects of anthropogenic alteration on the integrity of stream habitat in the eastern region of Maranhão, Northeast Brazil (i); to verify how these stream conditions affect Odonata species (ii); and to evaluate the known distribution of the species recorded in this study and discuss knowledge gaps on Odonata (iii). A total of 269 specimens, represented by 17 genera and 30 species were collected. Of the 30 species collected, 17 are new records for the state of Maranhão; of these, 47.05% are geographically widespread species, occurring in practically all regions of Brazil. Considering the records in the literature, there was a 68% increase in the number of Odonata species known for Maranhão. In addition to demonstrating the alteration of stream environmental quality, our work contributes to reducing the Wallacean shortfall in a transition area between the Cerrado-Caatinga biomes, an area severely threatened by the advance of the region's agricultural frontier." (Author)] Address: Bastos, R.C., Graduate Program in Ecology, Federal Univde Federal do Pará, Rua Augusto Correia, Nº 1, Bairro Guamá, CEP: 66.075-110, Belém, Pará, Brazil. Email: bastosrc.bio@gmail.com

**21368.** Bode-Oke, A.T.; Zeyghami, S. Dong, H. (2017): Aerodynamics and flow features of a damselfly in takeoff flight. *Bioinspiration & Biomimetics* 12(5). 056006. doi: 10.1088/1748-3190/aa7f52. PMID: 28699620. (in English) ["Flight initiation is fundamental for survival, escape from predators and lifting payload from one place to another in biological fliers and can be broadly classified into jumping and non-jumping takeoffs. During jumping takeoffs, the legs generate most of the initial impulse. Whereas the wings generate most of the forces in non-jumping takeoffs, which are usually voluntary, slow, and stable. It is of great interest to understand how these non-jumping takeoffs occur and what strategies insects use to generate large amount of forces required for this highly demanding flight initiation mode. Here, for the first time, we report accurate wing and body kinematics measurements of a damselfly during a non-jumping takeoff. Furthermore, using a high fidelity computational fluid dynamics simulation, we identify the 3D flow features and compute the wing aerodynamics forces to unravel the key mechanisms responsible for generating large flight forces. Our numerical results show that a damselfly generates about three times its body weight during the first half-stroke for liftoff. In generating these forces, the wings flap through a steeply inclined stroke plane with respect to the horizon, slicing through the air at high angles of attack (45°-50°). Consequently, a Leading Edge Vortex (LEV) is formed during both the downstroke and upstroke on all the four wings. The formation of

the LEV, however, is inhibited in the subsequent upstrokes following takeoff. Accordingly, we observe a drastic reduction in the magnitude of the aerodynamic force, signifying the importance of LEV in augmenting force production. Our analysis also shows that forewing-hindwing interaction plays a favorable role in enhancing both lift and thrust production during takeoff." (Authors)] Address: Bode-Oke, A.T., Mechanical and Aerospace Engineering, University of Virginia, Charlottesville, VA 22903, USA

**21369.** Catling, P.M., Kostiuk, B.; Kuja, S.; Kuja, A. (2017): Migrations and unidirectional movements of dragonflies in northeastern North America. Toronto Entomologists' Association, Occasional Publication: 69 pp. (in English) ["This guide addresses questions concerning dragonfly migration and movement in northeastern North America such as: (1) which dragonflies migrate? (2) when? (3) how can they be identified? (4) how many? (5) in what direction? and (6) under what conditions? It includes illustrations and information for: (1) 8 species of dragonflies known to be migratory including: *Anax junius*, *Epiaeschna heros* *Libellula pulchella*, *L. semifasciata*, *Pantala flavescens*, *P. hymenaea*, *Tamea carolina*, *T. lacerta*; (2) Other species for which unidirectional movements have been observed including: *Aeshna constricta*, *A. eremita*, *A. interrupta lineata*, *Celithemis elisa*, *Pachydiplax longipennis*, *Sympetrum corruptum*, *S. rubicundulum*, *S. vicinum*; and (3) Two species for which more information is needed including: *Aeshna sitchensis*, and *Sympetrum danae*. Information is provided for six excluded species. The term "migration" is used in the strict sense to refer to a regular and predictable mass movement of most members of a population in a particular direction from an emergence area to a reproductive area, followed by a return trip to the emergence area. The term "unidirectional movement" can be used for observations that do not quite fit the strict definition of migration. Sudden appearance of a species in the absence of a local adult population of that species is circumstantial evidence of migration. Migrations and other movements may occur to (1) to avoid mortality due to dry season or cold periods, (2) in response to a dense population, or (3) in response to parasites. Autumn migrations often follow the passage of a cold front (as in bird migration), and spring migrations have been associated with drought and long periods of winds from the south. The number of dragonfly individuals in a migration varies from less than a hundred to millions. Direction is partly governed by topography and coastlines but re-orientation may occur in the presence of obstacles such as large bodies of open water. There are approx. 200 species of dragonflies in northeastern North America and 17 are reported to migrate or undertake unidirectional flights. Dragonflies make good environmental monitors because they inhabit both aquatic and terrestrial habitats, but monitoring migrations is particularly useful because they represent large areas. Migration may be of much greater ecological significance than is currently imagined and much remains to be understood." (Authors)] Address: Catling, P.M., 170 Stanford Ave., Ottawa, Ontario K2C 0E9, Canada. E-mail: catinggp@agr.gc.ca

**21370.** Kalogianni, E.; Vourka, A.; Karaouzas, I.; Vardakas, L.; Laschou, S.; Skoulikidis, N.T. (2017): Combined effects of water stress and pollution on macroinvertebrate and fish assemblages in a Mediterranean intermittent river. *Science of the Total Environment* 603–604: 639–650. (in English) ["Highlights: • The effects of multiple stressors on aquatic biota are still poorly understood. • Intermittent rivers are highly susceptible to chemical stress and water scarcity. • We compared biotic responses to different levels of water

stress and pollution. • Combined stressors affect negatively macroinvertebrates and fish. • Future efforts should focus on untangling stressors interactions. Abstract: Water stress is a key stressor in Mediterranean intermittent rivers exacerbating the negative effects of other stressors, such as pollutants, with multiple effects on different river biota. The current study aimed to determine the response of macroinvertebrate and fish assemblages to in stream habitat and water chemistry, at the microhabitat scale and at different levels of water stress and pollution, in an intermittent Mediterranean river. Sampling was conducted at high and low summer discharge, at two consecutive years, and included four reaches that were targeted for their different levels of water stress and pollution. Overall, the macroinvertebrate fauna of Evrotas River indicated high resilience to intermittency, however, variation in community structure and composition occurred under acute water stress, due to habitat alteration and change in water physico-chemistry, i.e. water temperature increase. The combined effects of pollution and high water stress had, however, pronounced effects on species richness, abundance and community structure in the pollution impacted reach, where pollution sensitive taxa were almost extirpated. Fish response to drought, in reaches free of pollution, consisted of an increase in the abundance of the two small limnophilic species, coupled with their shift to faster flowing riffle habitats, and a reduction in the abundance of the larger, rheophilic species. In the pollution impacted reach, however, the combination of pollution and high water stress led to hypoxic conditions assumed to be the leading cause of the almost complete elimination of the fish assemblage. In contrast, the perennial Evrotas reaches with relatively stable physicochemical conditions, though affected hydrologically by drought, appear to function as refugia for fish during high water stress. When comparing the response of the two biotic groups to combined acute water stress and pollution, it is evident that macroinvertebrates were negatively impacted, but fish were virtually eliminated under the two combined stressors." (Authors) Taxa are treated at order level.] Address: Kalogianni, E., Institute of Inland Waters, Hellenic Centre for Marine Research, 46.7 km Athinon — Souniou Av., P.O. Box 712, 190 13 Anavissos, Greece. E-mail: ekalog@ath.hcmr.gr

**21371.** Katatani, N. (2017): Comparison of form of *I. rapax* (Rambur, 1842) and *Ictinogomphus pertinax* (Selys, 1854), and distribution of these species. *Aeschna* 53: 1–10. (in Japanese, with English summary) ["Comparison of the forms of *I. rapax* (Rambur, 1842) and *I. pertinax* (Selys, 1854) and their distribution were investigated. The author compared the forms of individuals of *I. pertinax* from Laos, Vietnam, Hong Kong, Taiwan and Japan, and *I. rapax* from Bangladesh. As a result, both species can be divided by the difference in the penile shape, the difference in yellow spots on the metepimeron of thorax and the eighth segment of abdomen. *I. pertinax* is distributed only in Laos, Vietnam, China, Taiwan and Japan. In Laos and Vietnam, the boundary line of the distribution between *I. pertinax* and *I. decoratus* *melanops* is thought to be along the Annan mountain range. On the other hand, according to the literature records, *I. rapax* is considered to be distributed in India, Sri Lanka, Bangladesh, Nepal, Myanmar and the northwest of Thailand." (Author)] Address: not stated

**21372.** Labat, F. (2017): A new method to estimate aquatic invertebrate diversity in French shallow lakes and ponds. *Ecological Indicators* 81: 401–408. (in English) ["Shallow lakes and ponds are valuable ecosystems for conservation



management. Aquatic invertebrates constitute a large proportion of diversity in these ecosystems, but their assessment is potentially time consuming and requires great expertise. The use of indicator taxa to estimate invertebrate diversity may resolve part of these difficulties. These indicators are rarely identified or their reliability is uncertain, i.e. they are based on partial inventories, neglecting groups with high diversity. In this study, invertebrate richness was assessed from 46 sites in France in various altitudinal, climatic, geological, human-impacted, and hydro-morphological contexts. Invertebrate identification was performed as accurately as possible in all taxonomic groups. Several potential indicators of diversity based on five key criteria were tested: strong direct correlation, identification facilities, strong cross-taxon congruence, low complementarity of the sampled habitats, and ubiquity for selected indicators. Three approaches were proposed to define these indicator groups: (1) a single taxonomic group as indicator, (2) a combination of targeted groups, and (3) a holistic inventory at low taxonomic resolution as a classical rapid assessment method for freshwater ecosystems. Results show that it is not recommended to use only one indicator group. The choice of several targeted groups could be a good intermediate solution but is not without bias. The rapid assessment inventory proposed is the most valuable method, and allows the estimation of invertebrate richness with a quasi-perfect correlation." (Author) Taxa are treated at order level.] Address: Labata, F., Research and Development Pole, Aquabio, rue Hector Guimard 63800 Courmon d'Auvergne, France. Email: frederic.labat@aquabio-conseil.fr.

**21373.** Leaute, J. (2017): Analyse de l'influence du paysage terrestre sur la composition des communautés d'Odonates de l'Indre-et-Loire. 2016-2017. Rapport de stage, Master 2 Mention Génie Ecologique, Université de Poitiers, U.F.R. Sciences Fondamentales et Appliquées: 51 pp. (in French, with English summary) ["This study takes its origins in the Od'Spot project, leaded by both Caudalis naturalistic association and the Research Institute for Insect Biology. This project includes the creation of an Odonata Atlas repartition in Indre-et-Loire department (France), and researches about this taxa's movements, landscapes' structure and territory occupancy. This study aims to: 1. Improve knowledges on links between Odonata and the terrestrial landscapes surrounding their home site, and highlight the interactions between the different landscapes components that have the greatest impact on these Damselflies' and Dragonflies' communities. 2. Suggest an analytic method that allows to use opportunistic data like Atlas's data, which are easy-to-collect and without constraints data. Results shows negative interactions between agricultural landscape (homogenous and heterogenous structure) and species richness under 800m radius near studied sites, and positive relationship of number of rivers on species richness under 400m. Effect of site quality on species richness is also found. Use of statistical models to analyse these non-protocolled data is successful, and could be improved by including some additional parameters like reproduction indicators." (Author)] Address: not stated

**21374.** van Grunsven, R.; De Knijf, G. (2017): Gaffellibel. *Brachytron* 19(2): 125-127. (in Dutch) ["Ophiogomphus cecilia recolonised the Netherlands but is now restricted to small rivers and does not occur in the river Meuse where it was found in the beginning of the last century." (Authors)] Address: Van Grunsven, J.R., De Vlinderstichting, Menno-nietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: roy.vangrunsvan@vlinderstichting.nl

**21375.** Chovanec, A. (2018): Libellenkundliche Untersuchungen am restrukturierten Unterlauf der Naarn (Oberösterreich) im Jahr 2018. im Auftrag des Amtes der Oberösterreichischen Landesregierung, Abt. Wasserwirtschaft: 46 pp. ["In 2018, the restructuring measures carried out between 2008 and 2016 on the 11.5 km long lower reaches of the Naarn were evaluated from a dragonfly perspective. The applied assessment approach is based on the length-zonal classification of the dragonflies according to biocenotic regions and on checking the occurrence of water body type-specific reference species (indicative and accompanying species). In accordance with the national water body management plan, the Naarn is assigned to the middle epipotamal water body (barbel region) in this area of the Bavarian-Austrian Alpine foothills bioregion, for which the following rheophilic and rheobiontic indicator species were defined as part of this study: *Calopteryx splendens*, *Gomphus vulgatissimus*, *Onychogomphus forcipatus* and *Ophiogomphus cecilia*. In addition, five first-order types of accompaniment and 18 second-order types of accompaniment were also defined. Eight test sections, each 100 m long, were mapped in five restructuring areas: Perg/Kickenau: 3 sections, Hauswiesen: 2, Naarn at the mouth of the Tobra Canal: 1, Labing/Kaindlau: 1 and mouth: 1. The number and selection of the routes were based on the type of hydraulic engineering design types realized and thus on the structural heterogeneity of the study areas. Another route was chosen in a regulated area of water (Haid). Between 10.5. and 29.8.2018 the nine routes were committed on five dates. The dragonfly ecological status of the investigation areas Hauswiesen, Naarn at the mouth of the Tobra Canal, Labing/Kaindlau and mouth was rated as "good", that of the Perg/Kickenau area as "very good", which proves the success of the measures. The radiation effect of the restructured areas led to a "good" dragonfly ecological status in the Haid area. The green river damsel, which is protected throughout Europe and listed in Annexes II and IV of the EU Fauna-Flora-Habitat Directive, was definitely or probably native to five of the six test sections located directly on the main channel of the Naarn. The results were also analyzed for each mapped habitat type: river: six stretches; side arm connected on two sides: one section, side arm connected on one side: one section; Bay: a stretch. The inspections of the investigation stretches located directly on the main channel (habitat type river) yielded the highest total number of species and the highest number of definitely and probably native species. Only in the bay habitat type were (possibly) native reference species sighted that were not observed on the river itself: *Libellula depressa* and *Orthetrum albistylum*. The creation of this habitat type is therefore a suitable measure to promote the accompanying limnophilic species. The side arm connected on two sides was the investigation section on which reliable native habitation of the common damsel damsel and the lesser pincer dragonfly was demonstrated in the Perg/Kickenau area. *Calopteryx virgo* is the indicator species of the hyporhithral and companion species of the epipotamal. The development of their abundances in the course of the entire lower reaches of the Naarn proves a rhithral aspect that reaches far into the lower reaches of the Naarn and thus a rhithral / potamal transitional character. The hydraulic rehabilitation measures in the Perg/Kickenau area were completed in 2016. The evidence of an exuvia of the common damsel damsel and a freshly hatched individual of the small pincer dragonfly on the tributary connected on both sides in the Perg/Kickenau area prove how quickly dragonflies ac-

cept newly created, suitable habitats. Both types have a development time of two to three years; This means that the area was already colonized by the two species in the year the construction work was completed and reproductive behavior took place. In addition to the specific ecological requirements, the rapid reaction of dragonflies to changed habitat conditions underpins their importance as indicators for typological characterization and for the assessment of the ecological status of water bodies." (Author/Google translate)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bmnat.gv.at

**21376.** Frank, M. (2018): Zwerglibelle (*Nehalennia speciosa* Charpentier, 1840) – Libelle des Jahres 2018 (Odonata: Coenagrionidae) und ihre Verbreitung in Mecklenburg-Vorpommern. *Virgo* 20(1): 65-66. (in German) [The distribution map of *N. speciosa* in the German federal state Mecklenburg-Vorpommern is presented basing on data up to 31-XII-2012.] Address: Frank, M., Zur Traubenmühle 5A, 55268 Nieder-Olm, Germany. E-mail: mikel.frank@gmx.de

**21377.** Hu, F.-S.; Ma, C.-H. (2018): Notes on communal roosting behavior in *Potamarcha congener* (Odonata: Libellulidae) in Taiwan. *Taiwanese Journal of Entomological Studies* 3(1): 27-31. (in Chinese, with English summary) ["The present study firstly reports the communal roosting behavior of *Potamarcha congener* (Rambur, 1842) in Taiwan. The information on the habitat, posture, and adult-instar are described as well. Meanwhile, this paper is also the first formal record of *P. congener* occurring in northern Taiwan." (Authors)] Address: Hu, F.-S., National Luodong Senior High School, No. 324, Zhongzheng Rd., Luodong Township 265, Taiwan. Email: allenhu199925@gmail.com

**21378.** Kleijn, D.; Bink, R.J.; ter Braak, C.J.F.; van Grunsven, R.; Ozinga, W.A.; Roessink, I.; Scheper, J.A.; Schmidt, A.M.; Wallis de Vries, M.F.; Wegman, R.; van der Zee, F.F.; Zeegers, T. (2018): Achteruitgang insectenpopulaties in Nederland: trends, oorzaken en kennislacunes. Wageningen Environmental Research, Rapport 2871. 86 blz.; 9 fig.; 8 tab.; 322 ref.: 86 pp. (in Dutch, with English summary) ["In October 2017, a scientific study showed that in nature reserves in Germany the total biomass of flying insects had declined by 76% in a 27 year period. This report assesses to what extent the results of the German study can be extrapolated to the Netherlands. Furthermore, insect (monitoring) studies that have been done or are being carried out in the Netherlands are reviewed and the main results are presented and discussed. Results of a literature review of the main factors driving changes in insect communities are presented. Finally knowledge gaps are identified and recommendations are made with respect to future research into insect trends." (Authors)] Address: Van Grunsven, J.R., De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: roy.vangrunsvan@vlinderstichting.nl

**21379.** Ouimette, S. (2018): Thermal limits across life stages do not predict contemporary geographic distributions. M.Sc. thesis, Faculty of Arts and Science, Biology, Concordia University: 45 pp. (in English) ["Rapid and ongoing climate change is causing a complete redistribution of life on Earth. To predict species' geographic responses to climate change, it is critical that we establish the role of species' thermal tolerances in shaping their climatic envelopes. Using experimentally-derived measures of thermal limits and a database of georeferenced occurrence records, we

test whether thermal limits can predict the hottest and coldest temperatures experienced within the geographic distributions of 13 North American odonate species. We measure thermal limits in both odonate larvae and adults to account for potential life stage-related differences. Lastly, we use a time-calibrated phylogeny of North American odonates to estimate the effects of evolutionary history on the relationship between species' thermal and climatic limits. We find that, even after accounting for ontogenetic differences and phylogeny, thermal limits do not translate into climatic limits. Further, we determine that species' thermal limits are constrained by phylogeny, while climatic limits appear to have evolved free from phylogenetic associations. This suggests that the evolvability of odonates' thermal limits is limited and that currently, species are in disequilibrium with their environment. Additionally, other traits or processes, such as biotic interactions, are potentially shaping odonates' geographic distributions. In the face of climate change, odonates are unlikely to adapt to novel environmental conditions and thus will likely have to continue to shift their geographic distributions in order to track their ancestral thermal niches. Further, purely climate-based models will likely be insufficient for predicting odonates' geographic responses to climate change." (Author) Figure 1: Geographic distributions of the 13 North American odonate species included in this study. Observations were used to estimate the heat and cold limits of species' climatic envelopes. (A) *Aeshna umbrosa*; (B) *A. canadensis*; (C) *A. interrupta* (D) *A. eremita*; (E) *Hagenius brevistylus*; (F) *Cordulia shurtleffii*; (G) *Ladona julia*; (H) *Leucorrhinia proxima*; (I) *Lestes congener*; (J) *L. disjunctus*; (K) *Enallagma boreale*; (L) *E. ebrium*; (M) *Ischnura verticalis*.] Address: not stated

**21380.** Ramamonjisoa, N.; Rakotoeloely, H.; Natuhara, Y. (2018): Defense investments and growth responses under different predation risks and gape-limitation predation threats in a tadpole prey. *Behavioral Ecology and Sociobiology* 72:144. (in English) "Theories on growth and defense investments in prey have typically revolved around predators' traits (gape and foraging tactics) and the level of predation risk in the environment, yet how these factors interact on prey responses remains poorly understood. We examined the phenotypic investments and growth rates of *Rhacophorus arboreus* tadpoles when exposed to "full cues" (predator present in aquaria) and to "chemical cues" (predator rearing water only) from gape-constrained newt and gape-unconstrained large *Anax* dragonfly larva predators at intermediate food level in a controlled laboratory experiment. Investments in behavioral defense were higher in the presence of dragonfly larvae although both predators were equally dangerous for the tadpoles. Predator identity interacted with cues level to affect defense investments but not growth in the tadpoles. Morphological changes were predator-specific: a larger tail fin in the presence of dragonfly larvae and a thicker tail muscle in the presence of newts. Investments in behavioral and morphological defenses increased from predator chemical cues to full cues. Our results provide weak support to prevailing theoretical predictions: no growth depression in the tadpoles despite strong investments in defense in the presence of dragonfly larvae and no evidence of growth acceleration in the presence of gape-limited newts. The tadpoles, however, accelerated growth when exposed to chemical cues from dragonfly larvae, but this trait disappeared in the full cues treatment when investments in defense increased. Our results indicate that predators' gape may not necessarily predict life-history responses in prey; instead, local selection regime and the level of

predation risk might modulate these responses. Significance statement: Multiple theories predict the evolution of growth and defense in prey in response to predator's gape and the level of risk in the environment. At high predation risk, an investment in defense at the cost of growth is anticipated in the presence of gape-unconstrained predators, whereas a rapid growth strategy could be advantageous in the presence of gape-limited predators. We exposed tadpole prey to different cue levels of gape-constrained newt and gape-unconstrained aeshnid dragonfly larva predators. Predator identity and cue level interacted on tadpole defensive phenotypes, but not on growth. The tadpoles accelerated growth when exposed to lower concentration cues of dragonfly larvae but prioritized defense at higher cue concentration, indicating that cue level can influence prey decision on whether to invest in growth or defense. Growth responses did not follow any theoretical predictions, but could be more related to the local selection regime than to predator's gape." (Authors)] Address: Ramamonjisoa, N., Graduate School of Environmental Studies, Nagoya University, Nagoya, Japan. E-mail: noelikanto@gmail.com

**21381.** Sánchez-Montoya, M.M.; von Schiller, D.; Barberá, G.G.; Diaz, A.M.; Arce, M.I.; del Campo, R.; Trockner, K. (2018): Understanding the effects of predictability, duration, and spatial pattern of drying on benthic invertebrate assemblages in two contrasting intermittent streams. *PLoS ONE* 13(3): e0193933. <https://doi.org/10.1371/journal.pone.0193933>: 17 pp. (in English) ["In the present study, we examined the effects of different drying conditions on the composition, structure and function of benthic invertebrate assemblages. We approached this objective by comparing invertebrate assemblages in perennial and intermittent sites along two intermittent Mediterranean streams with contrasting predictability, duration, and spatial patterns of drying: Fuirosos (high predictability, short duration, downstream drying pattern) and Rogativa (low predictability, long duration, patchy drying pattern). Specifically, we quantified the contribution of individual taxa to those differences, the degree of nestedness, and shifts in the composition, structure and function of benthic invertebrate assemblages along flow intermittence gradients. We observed greater effects of drying on the benthic invertebrate composition in Fuirosos than in Rogativa, resulting in a higher dissimilarity of assemblages between perennial and intermittent sites, as well as a lower degree of nestedness. Furthermore, a higher number of biotic metrics related to richness, abundance and biological traits were significantly different between perennial and intermittent sites in Fuirosos, despite a shorter dry period compared to Rogativa. At the same time, slightly different responses were detected during post-drying (autumn) than pre-drying (spring) conditions in this stream. In Rogativa, shifts in benthic invertebrate assemblages along increasing gradients of flow intermittence were found for three metrics (Ephemeroptera, Plecoptera and Trichoptera (EPT) and Odonata, Coleoptera and Heteroptera (OCH) abundances and aerial active dispersal. Furthermore, we demonstrated that combined gradients of dry period duration and distance to nearest perennial reach can generate complex, and different, responses of benthic invertebrate assemblages, depending on the flow intermittence metric. Our study advances the notion that special attention should be paid to the predictability, duration and spatial patterns of drying in intermittent streams in order to disentangle the effects of drying on benthic invertebrate assemblages, in particular in areas subject to high spatial heterogeneity and temporal variability in drying conditions." (Authors)] Address: Sánchez-Montoya, María Mar, Leibniz-Institute of Freshwater Ecology &

Inland Fisheries (IGB), Berlin, Germany. Email: marsanch@um.es

**21382.** Sriolpan, S.; Bumrungsri, S.; Jantarit, S. (2018): The wrinkle-lipped free-tailed bat (*Chaerephon plicatus* Buchannan, 1800) feeds mainly on brown planthoppers in rice fields of central Thailand. *Acta Chiropterologica* 20(1): 207-219. (in English) ["The brown planthopper (*Nilaparvata lugens*) is one of the major insect pests of rice fields in Southeast Asia. They have been widely acknowledged for causing significant rice yield losses. However, the wrinkle-lipped free-tailed bat (*Chaerephon plicatus* Buchannan, 1800) is a known agent of pest suppression for white-backed planthoppers (*Sogatella furcifera*), and may also suppress brown planthopper populations. Hence, it is important to investigate the diet of *C. plicatus* in areas where brown planthoppers are common to determine whether these bats feed on these insects. To accomplish this objective, we analyzed the diet of *C. plicatus* from two caves that differed in the percentage of surrounding land area occupied by rice fields (70% versus 22%). Bat fecal pellets were collected monthly for a year. A total of 720 fecal pellets were analyzed, and the results revealed that *C. plicatus* feeds on at least eight insect orders, including Coleoptera, Homoptera, Hemiptera, Diptera, Lepidoptera, Odonata, Hymenoptera and Orthoptera. Specifically, homopterans comprised the greatest diet volume in the rice growing season, whereas coleopterans were most abundant in the diet when rice fields were fallow. Moreover, most homopterans were identified as brown planthoppers. To estimate the relative numbers of brown planthoppers consumed during each month, the number of genitalia of male brown planthoppers was counted. We recorded the greatest numbers of genitalia during the rice planting period, with an average of four genitalia per fecal pellet. Examining both the percent volume and percent frequency of each insect order in the diet of *C. plicatus* revealed that the two study caves were no significantly different, even though the proportion of surrounding active rice fields was different. Our results suggest that tens of millions of brown planthoppers are consumed by this bat species each night. The similar diets of the two study colonies may be due to their high altitude foraging and preference for migratory insects. Our results indicate that the wrinkle-lipped free-tailed bat is an important biological suppression agent of brown planthoppers in rice fields." (Authors)] Address: Bumrungsri, S., Dept of Biology, Fac. Science, Prince of Songkla Univ., Hat Yai, Songkhla, Thailand. E-mail: sara.b@psu.ac.th

**21383.** Van Tol, J.; Günther, A. (2018): The Odonata of Sulawesi and adjacent islands. Part 8. Revision of the genus *Rhinocypha* Rambur, 1842 (Chlorocyphidae). *Odonatologica* 47(3/4): 299-386. (in English) ["All known species of the genus *Rhinocypha* Rambur (Odonata: Chlorocyphidae) from Sulawesi and adjacent islands are revised, with descriptions of both sexes, illustrations of key characters, distribution maps and a key to the species. This revision is mainly based on material held in Naturalis Biodiversity Center, Leiden. These specimens were collected from localities in many parts of Sulawesi by the authors during the 1980s and 1990s. Eight species are distinguished, of which five are new to science, namely, *Rhinocypha flavipoda* sp. nov. (Central Sulawesi), *R. pelengensis* sp. nov. (Peleng Islands), *R. sangihensis* sp. nov. (Sangihe Islands), *R. togeanensis* sp. nov. (Togian Islands) and *R. virgulata* sp. nov. (Central Sulawesi); and one new subspecies, *R. frontalis sulselensis* ssp. nov. (south-western Sulawesi). We also discuss the status, morphological variation and distribution of the previously described species and present a concise analysis of the

phylogenetic relationships of the Sulawesi clade within the so-called *R. tinctoria*-complex based partly on molecular characters." (Authors)] Address: van Tol, J., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail: jan.vantol@naturalis.nl

## 2019

**21384.** Chou, Y.-C. (2019): Notes on laying behavior of *Anisogomphus maacki* (Selys, 1872) (Odonata: Gomphidae) from Taiwan. *Taiwanese Journal of Entomological Studies* 4(4): 41-42. (in Chinese, with English summary) ["This paper reviews the observation records of *A. maacki* in Taiwan, and provides the first description of the egg-laying environment and behavior of this species in Taiwan." (Author)] Address: Chou, Y.-C., Taiwan Forestry Research Institute, Lienhuachih Research Center, No 43, Hualong Ln., Wucheng Vil., Yuchi Township, Nantou County 555, Taiwan (R.O.C.). Email: b01605031@gmail.com

**21385.** Garrison, R.W.; von Ellenrieder, N. (2019): An annotated list of the types of Odonata housed at the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA. *International Dragonfly Fund - Report* 134: 1-147. (in English) ["The Odonata collection deposited at the Museum of Comparative Zoology (MCZ) includes specimens of 634 taxa labeled as types. Fifteen of these have been incorrectly labeled as types (pseudotypes) and eight are apparently lost, leaving a total of 611 types currently deposited at MCZ. From these, 489 represent primary namebearing types (syntype/s, holotype, lectotype and neotype), 21 are probable primary types, and 101 are secondary types (paratype/s, paralectotype/s)."] (Authors)] Address: Garrison, R.W., California Dept of Food & Agriculture, 3294 Meadowview Road, Sacramento, California 95832, USA. Email: argjavi-vida@gmail.com

**21386.** Martínez Saura, C.; López Barquero, P.; Ferrández Sempere, M.; Sánchez-Balibrea, J. (Coord.) (2019): Atlas de Odonatos de la Región de Murcia. ANSE. Asociación de Naturalistas del Sureste: 132 pp. (in Spanish) [48 odonate species are recorded and documented: <https://odonatosdealmeria.com/blog/atlas-de-odonatos-de-la-region-de-murcia/>] Address: Martínez Saura, Carmen M., Asociación de Naturalistas del Sureste, Plaza Pintor José María Párraga, 11, bajo, Spain. Email: c.martinez@asociacionanse.org

**21387.** Nuraeni, S.; Budiawan; Yaspeta, S. (2019): Identification of dragonfly and damselfly species around Mahaka river, Hasanuddin university teaching forest. *IOP Conf. Series: Earth and Environmental Science* 343 (2019) 012052: 9 pp. (in English) ["This research was held in October 2018. Observation and retrieval of odonate data were carried out using the line transect and plot method. The samples were taken from 3 zones with the distance between zones is 15 meters. The results showed that there were 12 odonate species found, namely Libellulidae (n=8), Chlorocyphidae (n=1), and Coenagrionidae (n=3). The highest number of Odonata is founded zone I and sequently found in zone II and zone III. The most frequency of appearance is found in the morning observations, and sequently found in the afternoon and evening observations." (Authors) Some of the identifications must be wrong, including e.g. *Ischnura hastata*.] Address: Nuraeni, S., Forest Protection and Insect Laboratory, Faculty of Forestry, Hasanuddin University, Makassar, Indonesia. Email: nuraenisitti@gmail.com

**21388.** Phan, Q.T.; Ngo, Q.P. (2019): Checklist of damselflies (Odonata: Zygoptera) from Kon Ka Kinh National Park of the Central Highlands of Vietnam. *International Dragonfly Fund - Report* 133: 1-18. (in English) ["A checklist of 49 damselfly species from 12 families (Odonata: Zygoptera) recorded from Kon Ka Kinh National Park is provided. A first description of the female *Protosticta socculus* Phan & Kompier, 2016, is given. *Burmargiolestes* cf. *laidlawi* Lieftinck, 1960 and three apparently new species, two *Coeliccia* and one *Protosticta* species, are recorded, all of which are to be described in the future." (Authors)] Address: Phan, Q.T., Center for Entomology & Parasitology Research, Institute of Research and Training of Medicine, Biology & Pharmacy, Duy Tan University, 3 Quang Trung, Da Nang, Vietnam. E-mail: pqtoan84@gmail.com

**21389.** Radkova, K. (2019): Diverzita vodního hmyzu Nové Kaledonie. Diversity of aquatic insects in New Caledonia. MSc thesis, Faculty of Science, Masaryk University, Department of Botany and Zoology: 79 pp. (in Czech, with English summary) ["This thesis deals with the diversity of aquatic insects, with a special focus on mayflies (Ephemeroptera), on Pacific archipelago New Caledonia, mainly on the biggest island Grande Terre. New Caledonia belongs to 25 endangered regions with exceptional biodiversity connected with unique environmental diversity, specific geomorphological and geographical characteristics of the landscape. Literature research of the thesis was devoted to general introduction of New Caledonia and its tectonic history playing important role in high endemism of this archipelago. Further, history of settlement, exceptional biota, and anthropogenic influences changing the landscape of New Caledonia in an unprecedented way were described. Diversity and endemism of aquatic insects of New Caledonia, including Ephemeroptera, Odonata, Heteroptera, Trichoptera, Coleoptera, and Diptera, were summarized. Practical part of the thesis dealt with the mayflies of New Caledonia. A database of all published and available unpublished records of mayfly species from 1949, 1966, 1968, 1972, and 1997-2000 was prepared. In total, 643 records of 46 species belonging to 19 genera were assembled from Grande Terre and Île de Pins. They were collected by seven researchers and their teams: L. E. Cheesman, J. Ulies, F. Starmühlner and team, W. L. Peters and team, and N. Mary. Species richness of sites, species frequency and abundance, and distribution of all species were evaluated based on these data. Distribution of all species was shown on maps. ... 5.2 Odonata The first information about the dragonflies of New Caledonia comes from the first half of the last century (CAMPION 1921; SCHMIDT 1938), when 27 species were known from New Caledonia. New information about the diversity of dragonflies was brought in 1965 by prof. Starmühlner and the aforementioned expedition from 1972, when dragonflies were found in 34 locations. The list of species found expanded to 40, of which 18 species were from the suborder Zygoptera and 22 species from the suborder Anisoptera (LIEFTINCK 1975, 1976). Of the total, 14 species were found only on Grande Terre and 16 species were recorded from Grande Terre and the Loyauté Archipelago. In 2014, a key to the identification of all known species of adult dragonflies occurring in New Caledonia (Grande Terre and Île de Pins) and Wallis and Futuna was published, which also tabulated all known species and their distribution (GRAND et al. 2014). 55 species from 8 families are known from the island of Grande Terre and Île de Pins, of which Zygoptera include representatives of Lestidae (2 species), Argiolestidae (6), Isostictidae (5), Coenagrionidae (4) and among Anisoptera species of the following families: Aeshnidae (6), Corduliidae



(3), Libelluloidea (8) and Synthemistidae (8) (GRAND et al. 2014). There are a total of 55 species on the island of Grande Terre, 6 species on the island of Ouvéa, 7 species on the ile de Pins and 9 species on the Lifou (GRAND ET AL. 2014). Almost 45% of the representatives are locally or regionally endemic, with all representatives from the families in bold being endemic exclusively to Grande Terre. A total of 23 species are considered endemic to New Caledonia, for example: *Caledopteryx sarasini*, *Trineuragrion percostale*, *Caledopteryx maculata* (Argiolestidae), *Isosticta humilior*, *I. spinipes* (Isostictidae), *Ischnura pamela* (Coenagrionidae), *Aeshna brevistyla*, *Oreaeschna dominatrix* (Aeshnidae), *Metaphya elongata* (Corduliidae), *Synthemis miranda* and *S. pamela* (Synthemistidae)." (Author)] Address: not stated

**21390.** Smith-Patten, B.D. (2019): Odonate species richness in the United States and Canada. *Argia* 31(1): 12-17. (in English) ["This article is the first of a new series aimed at assessing odonate species richness in the United States and Canada. Each year I will present an updated accounting of the total number of species known from each U.S. state and the District of Columbia, as well as for the provinces and territories of Canada. A previous accounting for the U.S. (Smith-Patten & Patten, 2017) provided the impetus and foundation for the present effort." (Author)] Address: Brenda D. Smith-Patten, Oklahoma Natural Heritage Inventory, Oklahoma Biological Survey, University of Oklahoma <argia@ou.edu>

## 2020

**21391.** Arias, S.L.; Devorkin, J.; Spear, J.C.; Civantos, A.; Allain, J.P. (2020): Bacterial Envelope Damage Inflicted by Bioinspired Nanostructures Grown in a Hydrogel. *ACS Applied Bio Materials* 3(11): 7974-7988. (in English) ["Surface-associated bacterial communities, known as biofilms, are responsible for a broad spectrum of infections in humans. Recent studies have indicated that surfaces containing nanoscale protrusions, like those in dragonfly wings, create a hostile niche for bacterial colonization and biofilm growth. This functionality has been mimicked on metals and semiconductors by creating nanopillars and other high aspect ratio nanostructures at the interface of these materials. However, bactericidal topographies have not been reported on clinically relevant hydrogels and highly compliant polymers, mostly because of the complexity of fabricating nanopatterns in hydrogels with precise control of the size that can also resist aqueous immersion. Here, we report the fabrication of bioinspired bactericidal nanostructures in bacterial cellulose (BC) hydrogels using low-energy ion beam irradiation. By challenging the currently accepted view, we show that the nanostructures grown in BC affect preferentially stiff membranes like those of the Gram-positive bacteria *Bacillus subtilis* in a time-dependent manner and, to a lesser extent, the more deformable and softer membrane of *Escherichia coli*. Moreover, the nanostructures in BC did not affect the viability of murine preosteoblasts. Using single-cell analysis, we demonstrate that indeed *B. subtilis* requires less force than *E. coli* to be penetrated by nanopores with dimensions comparable to those of the nanostructured BC, providing the first direct experimental evidence validating a mechanical model of membrane rupture via a tension-induced mechanism within the activation energy theory. Our findings bridge the gap between mechano-bactericidal surfaces and low-dimensional materials, including single-walled carbon nanotubes and graphene nanosheets, in which a higher bactericidal activity toward Gram-positive bacteria

has been extensively reported. Our results also demonstrate the ability to confer bactericidal properties to a hydrogel by only altering its topography at the nanoscale and contribute to a better understanding of the bacterial mechanobiology, which is fundamental for the rational design of bactericidal topographies." (Authors) The publication includes references to "dragonflies".] Address: Arias, Sandra, Dept Bioengineering, Univ. of Illinois at Urbana-Champaign, Urbana, Illinois 61801, United States. Email: slarias@cornell.edu

**21392.** Futahashi, R. (2020): Diversity of UV reflection patterns in Odonata. *Front. Ecol. Evol.* 8(Article 201): 8 pp. (in English) ["Odonata are large-eyed diurnal insects that exhibit a variety of color patterns on their wings and/or bodies. Because Odonata can perceive light with wavelengths extending from ultraviolet (UV) to red, the color patterns with UV reflection can be visually recognized by each other. The UV reflection patterns of Odonata have been investigated by using a UV camera and optically measuring the reflectance of body and wing surfaces. The UV reflection of Odonata can be classified into three classes, namely, iridescent UV reflection, wax-based UV reflection, and UV reflection by epidermal granules. In this review, I present UV images of these three classes and representative examples of reflectance. Among the Odonata with colorful iridescent wings consisting of multilayer structures, some species (e.g., *Chalcopteryx scintillans*) predominantly reflect UV light, whereas other species (e.g., *Calopteryx japonica*) mostly reflect light at wavelengths above 400 nm. Whitish wax (called pruinescence) on the body and/or wing surface strongly reflects light including UV, due to the light-scattering fine structures produced by the wax. The chemical composition of the dragonfly's abdominal UV-reflective wax differs from previously identified waxes of other organisms. The *Ischnura* species exhibit immature-adult-specific UV reflection by the pteridine pigment-based selective light scattering and absorption. Iridescent coloration and wax-based color changes are generally important for mate recognition and male-male competition in Odonata, although the ecological importance of UV reflection remains largely unknown except for few examples in damselflies." (Author)] Address: Futahashi, R., Bioproduction Research Institute, National Inst. of Advanced Industrial Science & Technology (AIST), Tsukuba, Japan

**21393.** Green, E.A.; Klassen, J.L. (2020): Draft genome sequence of *Spiroplasma platyhelix* ATCC 51748, isolated from a dragonfly. *MicrobiologyResource Announcements* 9(47): e00422-20: 2 pp. (in English) ["*Spiroplasma platyhelix* is a helical bacterium belonging to the class Mollicutes. First isolated from a *Pachydiplax longipennis* dragonfly, it has the smallest reported *Spiroplasma* genome size of 740 kbp. Here, we report the genome sequence of *S. platyhelix* ATCC 51748." (Authors)] Address: Klassen, J.L., Dept of Molecular & Cell Biology, University of Connecticut, Storrs, Connecticut, USA. Email: jonathan.klassen@uconn.edu.

**21394.** Gutiérrez, D.E.B. (2020): Evaluación del estado ecológico de diez quebradas ubicadas en Tarrazú, zona de Los Santos, San José, Costa Rica, mediante la ecología de náyades de Odonata (Insecta) y uso del suelo. Tesis de Licenciatura, Universidad Nacional, Heredia, Costa Rica: VIII + 58 pp. (in Spanish) ["The Odonata larvae allow us to acquire a greater knowledge of the ecological state of the ten streams investigated. In addition, it is possible to evaluate to what extent the riparian forest and the shaded coffee have an important role in the preservation of the ecological integrity of streams surrounding the coffee plantations. The objective of this study was to evaluate the ecological status

of 10 streams located in Tarrazú, Los Santos area, San José, Costa Rica, by studying the ecology of dragonfly naiads, and land use, during April, July, and October 2015. The dragonfly naiads were collected in 10 streams at three points 30 m apart. Physical analyses were made of the water, maximum flow, and number of trees in the riparian forest in the streams, and for soil use two categories were taken: 1) forest patches, and 2) shaded coffee cultivation. The Visual Evaluation Protocol for Ravines was also used. A total of 527 dragonfly naiads were collected from 6 families and 12 genera. The genus *Hetaerina* was the most abundant (248 individuals); while *Archilestes*, *Brachymesia*?, *Cordulegaster*, and *Micrathyria* were the least abundant ( $n=1$ ). The highest values of diversity ( $H'=1.58$ ) and dominance ( $D=0.75$ ) were reported in Quebrada 1, with forest patches of 4% and shaded coffee cultivation of 15%. The number of streams that had wooded patches with low canopy cover was 7, and 5 streams had medium shade coffee cover. A PERMANOVA was carried out which determined significant differences between the months of sampling for all the streams. Based on the physical variables of the water evaluated, no values harmful to the development of the dragonfly populations were determined. As the percentage of wooded patches in the ravines increased, the total diversity decreased. The highest total dominance of dragonfly naiads occurred in those streams that had patches of forest with medium canopy cover. 20% of the streams had a "Poor" ecological status; only the Reference Stream presented an "Excellent" ecological status. Overall, it is important to implement actions that promote the conservation of the lotic aquatic environments investigated, such as proposing the maintenance of the average tree cover (=15-39%), both in the forest patches and in the shaded coffee cultivation." Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: not stated

**21395.** Jedro, G.; Jedro, M.; Goc, M. (2020): Current records of the "southern" insect species in the Slowinski National Park - dragonflies, damselflies (Odonata) and orthopterans (Orthoptera). *Odonatrix* 1619 (2020): 13 pp. (in Polish, with English summary) ["Climate warming in recent decades has brought about dramatic changes in insect populations, for example, in their geographical distributions. While the ranges of many vulnerable and stenotopic species are shrinking, those of thermophilic species are expanding beyond their native habitats. The Slowinski National Park is situated in the far north of Poland and increasing numbers of thermophilic insect species have been observed there in the last ten years. From 2016 to 2019, six "southern" dragonflies..."] (Authors) *Erythromma viridulum*, *Lestes barbarus*, *Orthetrum albistylum*, *O. brunneum*, *Crocothemis erythraea*, *Sympetrum fonscolombii*, *Phaneroptera falcata*] Address: Jedro, G., Slowinski Park Narodowy, ul. Bohaterow Warszawy 1A, 76-214 Smoldzino, Poland. E-mail: [rufinus@o2.pl](mailto:rufinus@o2.pl)

**21396.** Jolivet, S.; Lambret, P.; Vanappelghem, C. (2020): Création du groupe Opie-odonates. *insectes n°197* juin 2020: 37-38. (in French) ["A new Opie working group was created in 2019 following discussions between the Opie Board of Directors and that of the French Society of Odonatology (SfO), a long-standing partner of our association. After almost 30 years of exemplary actions in favor of odonatology, the SfO no longer found the necessary resources to manage its operations and pursue its missions in good conditions; it therefore declared its dissolution in March 2019, ensuring with Opie the sustainability of its main actions." (Authors/Google translate)] Address: Vanappelghem, C.,

14, rue Brûle Maison, 59000 Lille, France. E-mail: [cedvana@free.fr](mailto:cedvana@free.fr)

**21397.** Leong, C.-M.; Chang, K.; Wong, I.-K. (2020): Rediscovery of the smallest damselfly in Macao, *Agriocnemis pygmaea* (Odonata: Coenagrionidae). *Taiwanese Journal of Entomological Studies* 5(2): 31-35. In Chinese, with English summary ["*A. pygmaea* is the smallest species of Odonata in Macao. There are no further records of this species in Macao after 1993. The present study provides an account of the rediscovery of this species after 27 years, and discusses their literature records, distribution and seasonal activity in Macao." (Authors)] Address: Macao Entomological Society, R/C F, Ed. Kou Kio, 11-Aa Avenida, Coronel Mesquita, Macao. Email: [mo.ent.soc@gmail.com](mailto:mo.ent.soc@gmail.com)

**21398.** Leong, C.-M.; Chang, K.; Wong, I.-K. (2020): *Mortonagrion hirosei* (Odonata: Coenagrionidae): a damselfly on the IUCN Red List observed in Macao wetland. *Taiwanese Journal of Entomological Studies* 5(3): 38-40. In Chinese, with English summary ["*M. hirosei* is the one of only a few East Asian odonates on the International Union for Conservation of Nature (IUCN) Red List. Our study provides photographic evidence of *M. hirosei* in Macao, and we note its distribution within this territory." (Authors)] Address: Macao Entomological Society, R/C F, Ed. Kou Kio, 11-Aa Avenida, Coronel Mesquita, Macao. Email: [mo.ent.soc@gmail.com](mailto:mo.ent.soc@gmail.com)

**21399.** Murakami, H.; Hisamatsu, S.; Takechi, R.; Kurokawa, Y.; Matsui, H. (2020): Effects of water management of reservoirs on nymphal development in *Sympetrum uniforme* in Tyuyo, Ehime Prefecture, Japan. *Japanese Journal of Conservation Ecology* 25(1): 279-286. In Japanese, with English summary ["Some dragonflies in East Asia have adapted to traditional paddy cultivation by matching their phenology to the paddy growth cycle, water regime, and the forest and grassland landscapes surrounding the paddy fields. An endangered dragonfly, *Sympetrum uniforme*, lays eggs in reservoirs that supply water to paddy fields and is highly influenced by traditional water management regimes. Here, we studied the effects of water management of reservoirs on *S. uniforme* in Ehime Prefecture, Japan. The water-level management regimes and adult abundances (mature and immature) were surveyed at selected reservoirs. Samples of sand and gravel were collected at each reservoir just below the maximum water level. The samples were kept dry throughout the winter, watered the next spring, and larvae that hatched were counted. Many larvae hatched from the sand and gravel samples, which were collected from areas that dry out in winter. For one reservoir, although the water management regime and spawning rate were similar to those at other reservoirs, few larvae hatched, and the adult emergence rate was low." (Authors)] Address: Murakami, H., Ehime Prefectural Inst. of Public Health & Environmental Science, 8-234, Sanban-cho, Matsuyama, Ehime, 790-0003, Japan. E-mail: [Fmurakamihiroshi1@pref.ehime.lg.jp](mailto:Fmurakamihiroshi1@pref.ehime.lg.jp)

**21400.** Palacino-Rodríguez, F.; Brito, J.; Calvao, L.B.; Gonzalez, A.S.; Juen, L. (2020): In Neotropical savannas, altitude affects the diversity of the Anisoptera but not the Zygoptera (Insecta: Odonata). *Marine and Freshwater Research* 72(6): 766-773. (in English) ["Lentic and lotic habitats, combined with varying altitudes, may have differential effects on communities of the Order Odonata. We sampled adult odonates at 94 waterbodies of the Orinoquia region of eastern Colombia. Our hypothesis was that species composition and richness, as well as abundance, would be affected by

both altitude and habitat. Overall, 70 of the 100 species recorded in the study were sampled in both lotic and lentic environments, with 16 species (5 in the Suborder Zygoptera and 11 in the Suborder Anisoptera) occurring only in lentic habitats and 14 occurring exclusively in lotic habitats (13 Zygoptera, 1 Anisoptera). The results of the analysis indicated that the species richness and abundance of anisopterans were affected by altitude, whereas the diversity of zygopterans was not affected in any way. Despite these mixed findings, the results for anisopterans were consistent with the results of previous studies, which have indicated altitude as a primary determinant of the Odonata diversity through its effect on the dynamics of water flow and the shift from lentic to more lotic environments. Further studies over a more ample altitudinal gradient should provide more conclusive evidence, particularly regarding the role played by both altitude and habitat on the local diversity of odonates." (Authors)] Address: Palacino-Rodríguez, F., Grupo de Investigación en Biología, Departamento de Biología, Universidad El Bosque Avenida. Carrera 9 No. 131A-02, C.P. 110121 Bogotá, Colombia. E-mail: odonata17@hotmail.com

**21401.** Šupina, S.; Bojková, J.; Boukal, D.S. (2020): Warming erodes individual-level variability in life history responses to predation risk in larvae of the mayfly *Cloeon dipterum*. *Freshwater Biology* 65(12): 2211-2223. (in English) ["1. Warming and predation risk are ubiquitous environmental factors that can modify life histories and population dynamics of aquatic ectotherms. While separate responses to each of these factors are well understood, their joint effects on individual life histories and population dynamics remain largely unexplored. Current theory predicts that the magnitude of prey behavioural, physiological, and life history responses to predation risk should diminish with warming due to the reduced metabolic scope. However, empirical support for this prediction remains equivocal, and experiments covering a substantial proportion of individual prey ontogeny until maturation are lacking. 2. To fill these gaps, we ran a laboratory experiment to investigate how warming and non-consumptive predation risk influence life history responses in the larvae of the mayfly *Cloeon dipterum*, an aquatic insect with highly plastic development. We reared larvae of varying initial sizes at three temperatures (21, 24, and 27°C) in a risk-free environment and under predation risk signalled by chemical cues from dragonfly larvae (*Aeshna cyanea*), and followed their individual survival, growth, and development until emergence. 3. Some *C. dipterum* larvae substantially prolonged their development and the proportion of these slow individuals declined rapidly with temperature and increased with predation risk. We attribute this response to cohort splitting, a common life history strategy of aquatic insects and other taxa in unpredictable environment. 4. Growth, development, and maturation varied predictably with temperature in the fast larvae that did not prolong their development. They grew and developed faster but matured at smaller sizes with increasing temperature. Predation risk tended to slow down individual growth and development in line with the reduced metabolic scope hypothesis, but the differences were relatively minor and observable only at 21°C. 5. Survival to subimago increased with predation risk, possibly due to indirect effects mediated by dissolved micronutrients, but did not vary significantly with temperature. Survival also tended to be higher in the slow individuals. This partly compensated for a smaller final size relative to the fast individuals and made both strategies comparable in overall fitness. 6. Our results show that warming may erode individual-level variability in life history responses to predation risk. This implies that warming can synchronise

population dynamics and consequently make such populations more vulnerable to unpredictable disturbances." (Authors)] Address: Bojková, Jindřiška, Department of Botany and Zoology, Faculty of Science, Masaryk University, Brno, Czech Republic. E-mail: bojkova@sci.muni.cz

**21402.** van Grunsven, R.; Bos, G.; Poot, M. (2020): Strong changes in Dutch dragonfly fauna. *Covid-19 Special Issue - Agrion* 24(2): 134-138. (in English) ["Conclusion: The Dutch dragonfly fauna is very dynamic with winners and losers over the last 30 years. Unexpectedly, critical species such as *Leucorrhinia caudalis* come back while very common species suddenly decline. Overall we can see differences in trends of species from different habitats. The improved water quality in running waters and the recovery of the dragonfly species of this habitat is a clear, positive example. A major driver of changes in the dragonfly fauna is climate change and this will very likely continue to be so. This is most obvious through the increase of thermophilic species but likely also plays a role in the decline of species of moorlands that prefer lower temperatures. These impacts will not only be through changes in temperature itself but also increasing extremes, in particular droughts. Thanks to the large numbers of citizen scientists that record dragonflies in the Netherlands, we can at least track these changes and aim conservation efforts where they are needed most." (Authors)] Address: Van Grunsven, J.R., De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands. E-mail: roy.vangrunsvan@vlinderstichting.nl

**21403.** Vermeulen, T. (2020): Dragonflies along the river tides-Durme. *Brachytron* 21: 38-52. (in Dutch, with English summary) ["The Odonata fauna along the river tides-Durme (Belgium) has been studied by comparing historical with recent observations between 1979 and 2019. Noteworthy is the increase of *Libellula fulva* and *Platycnemis pennipes* along the tides-Durme. Also new species such as *Aeshna isocetes*, *Crocothemis erythraea*, *Cordulia aenea*, *Coenagrion pulchellum*, *Coenagrion scitulum* and *Sympecma fusca* have colonized the valley of the Durme. The presence of *Aeshna grandis* however remains limited to the flood plain of the river Scheldt." (Author)] Address: Tom Vermeulen: Email: tomvermeulen@proximus.be

**21404.** Zandigiaco, P.; Chiandetti, I.; Fiorenza, T.; Pontarini, R. (2020): Interesting records of Odonata in Friuli Venezia Giulia (North-eastern Italy) in the three-year period from 2016 to 2018. *Gortania* 42: 95-108. (in English, with Italian summary) ["Thanks to the surveys of B. Kiauta and I. Pecile, the Odonata fauna of Friuli Venezia Giulia was relatively well known until the mid 1980s. In recent years, an effort has been made to collect new information for the "Atlas of the Odonata of the Friuli Venezia Giulia region", a project established in 2009. In this paper, the most striking results of the 2016-2018 period are reported. Two species, *Coenagrion ornatum* and *Leucorrhinia pectoralis*, must be inserted in the new regional list (with data collected since 2009), which now includes 64 species representing 67% of the Odonata fauna currently known for Italy. In particular, both *C. ornatum* and *L. pectoralis* are listed in the Annexes of the Habitats Directive. In addition, records relating to another 15 species are reported, among which are rare and threatened species or those of faunistic interest. The main factors threatening the survival of some species are discussed and the need to implement conservation projects is affirmed, in particular concerning: i) *Nehalennia speciosa*; ii) *Cordulegaster heros*; and iii) some alpine species, including *Somatochlora alpestris* and *S. arctica*." (Authors)] Address:

Zandigiaco, P., Dipartimento di Scienze AgroAlimentari, Ambientali e Animali (Di4A) Entomologia, Università degli Studi di Udine, Via delle Scienze 206, I-33100 Udine, Italy. Email: [pietro.zandigiaco@uniud.it](mailto:pietro.zandigiaco@uniud.it)

## 2021

**21405.** Barling, N.T.; Heads, S.W.; Martill, D.M. (2021): Behavioural impacts on the taphonomy of dragonflies and damselflies (Odonata) from the Lower Cretaceous Crato Formation, Brazil. *Palaeoentomology* 4(2): 141-155. In English ["The relative completeness of Odonata fossils from the Crato Formation is investigated and compared to other fossil insect groups from the same formation. Tagma completeness is measured as present, partial, or absent, with some additional subdivision of body components (head, thorax, limbs, individual wings, anterior and posterior abdomen). These data are statistically explored for trends using principal coordinate analysis. While no definitive clustering is identified, most Crato Formation Odonata fossils plot positively on coordinate two, whereas the majority of non-odonatan insect fossils plot negatively on this coordinate. This shows that the Crato Formation odonates are less complete compared to other insect groups from the same beds. Specimens preserved as isolated wings and those preserved with damaged or lost abdomens are identified as contributing to this difference. The causes of these differences are discussed, highlighting collection bias, predation, carcass scavenging, physical conditions of the palaeoenvironment, as well as the autecology of odonates." (Authors)] Address: Barling, N.T., Camborne School of Mines, College of Engineering, Mathematics and Physical Sciences, University of Exeter, Penryn Campus, Treliever Road, Penryn, Cornwall, TR10 9EZ, UK. Email: [Nathan.t.barling@gmail.com](mailto:Nathan.t.barling@gmail.com)

**21406.** Bezerra, L.L.A.; Pereira da Cruz, R.; Roberto de Azevedo, F. (2021): Capacidade predatória de ninfas de libélulas (Odonata) em larvas de *Aedes aegypti* (Diptera: Culicidae). *Ciências agrárias, indicadores e sistemas de produção sustentáveis*: 228-236. (In Portuguese, with English summary) ["As a result of the persistence of dengue and other arboviruses in Brazil, the government has intensified actions to combat the *Aedes aegypti* mosquito vector. The use of chemical products, the most widely used control method today, has numerous disadvantages in its use, as in addition to impacting human health and the environment, it induces mosquito resistance. Thus, studies in search of sustainable methodologies and promising attributes to nature and society are necessary in the current situation. In view of this, the use of dragonfly nymphs in the biological control of *Aedes aegypti* larvae has important and favorable characteristics, since these are skilled and competitive predators, colonizing different types of aquatic environments, whether with a large or small amount of water, perennial or temporary, show patrolling behavior and territorial defense, has a long nymph stage, which depending on the species can last up to two years, is a more accessible method of control due to its low cost, in addition to *As* much in its nymph stage as in adulthood, the consumption of mosquito larvae is part of its diet, being considered excellent ecological traps." (Authors)] Address: Bezerra, L.L.A., Universidade Federal do Cariri, Crato – CE, Brazil

**21407.** Biologische Station Gütersloh / Bielefeld (2021): Faunistische und floristische Dokumentation zum Heckrindeprojekt in der Johannsbachau 2020. *Biologische Station Gütersloh / Bielefeld e.V.*: 130 pp. (in German) [Between 2011 and 2020, 12 odonate species were recorded,

including *Erythromma viridulum* and *Gomphus pulchellus*.] Address: <https://www.bielefeld.de/sites/default/files/datei/2021/Monitoring2000.pdf>

**21408.** Cerini, F.; Bombi, P.; Cannings, R.; Vignoli, L. (2021): Odonata metacommunity structure in northern ecosystems is driven by temperature and latitude. *Insect Conservation and Diversity* 14(5): 675-685. In English ["The metacommunity concept, defined as a set of local communities connected by species dispersal, provides deep understanding of large-scale ecological processes. The elements of the metacommunity structure (EMS) framework use occurrence data to differentiate among different patterns (i.e., checkerboard, nestedness, species turnover). Metacommunities of tropical Odonata show species turnover following latitude and temperature gradients but there are no such large-scale studies for other regions. We performed EMS analysis with data for the Odonata of British Columbia, Canada, testing the role of five environmental variables (temperature, latitude, precipitation, landcover typology) in structuring the metacommunities and their turnover. The suborder Anisoptera drives the general pattern, with the communities showing a Clementsian-type response (groups of species that replace each other along the environmental gradients) following temperature and latitude ordering. The Clementsian pattern determined by site temperatures reflects the turnover from a group of cold-adapted species to one of warm-adapted species, separated by many species with more generalised temperature requirements. Similarly, the Clementsian pattern associated with the latitude gradient indicates the substitution of a low-latitude group in the south with a high-latitude group in the north. The sites ordered by landcover did not show significant coherence and turnover. In a macro-scale framework, Odonata species assemblages seem to be sensitive to the climatic and geographic variables of local sites (i.e., temperature and latitude), regardless of the surrounding habitat typology. The role of such variables in shaping the assembly of Odonata communities should be considered in large-scale management and conservation projects." (Authors)] Address: Cerini, F., Dipartimento di Scienze, Università Roma Tre, Viale Marconi 446, Rome, Italy. E-mail: [francesco.cerini@uniroma3.it](mailto:francesco.cerini@uniroma3.it)

**21409.** Chovanec, A. (2021): Libellenkundliche Bewertung von Restrukturierungen der Trattnach in Schlüßberg (Oberösterreich): Vergleich des Prae-Monitorings 2016 mit dem Post-Monitoring 2021. Im Auftrag des Amtes der Oberösterreichischen Landesregierung, Abt. Wasserwirtschaft: 54 pp. (in German) ["In 2019, an approximately 500 m long section of the Trattnach in Schlüßberg (Upper Austria) was restructured. The aim of the dragonfly investigations in 2016 and 2021 was to evaluate this ecological improvement through pre- and post-monitoring. The improvement actions resulted in a doubling of the total number of species in the action section (from five to ten) and the number of certain, probable and possibly native species (from four to eight). In 2021, four of the five water body type-specific indicator species could be detected: *Calopteryx splendens*, *C. virgo*, *Gomphus vulgatissimus* and *Onychogomphus forcipatus*. The native occurrence of these species confirms the hyporhithral/epipotamal transitional character of the Trattnach in this area and indicates the development of suitable heterogeneous flow and substrate conditions as well as corresponding vegetation conditions in the bank area. The rheophilic species in particular were promoted by the hydraulic engineering interventions, water type-specific limnophilic accompanying species could only be detected in isolated cases. The finds of exuviae and sightings of freshly hatched



individuals of *Gomphus vulgatissimus* and *Onychogomphus forcipatus* prove that the entire section of the project was populated by these species with a development time of two years immediately after completion of the construction work. In 2016 only *O. forcipatus* was found on the downstream stretch; *G. vulgatissimus* was absent from the entire section. The restructuring led to an improvement in the dragonfly's ecological status: the affected section (formerly "moderate") was rated "good" in 2021, as were the three individual sections within it (formerly "unsatisfactory" and "moderate"). The dragonfly ecological status of a controlled stretch not affected by the upgrading measures and mapped in both years improved from "unsatisfactory" to "moderate". Radiation effects from the restructuring area are likely to be responsible for this." (Author/Google translate)] Address: Chovanec, A., Krotenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

**21410.** Deregnaucourt, I.; Bardin, J.; Anderson, J.M.; Béthoux, O. (2021): The wing venation of a new fossil species, reconstructed using geometric morphometrics, adds to the rare fossil record of Triassic Gondwanian Odonata. *Arthropod Structure & Development* 63(6):101056: (in English) ["Highlights: • New morphometric tool allowing reconstruction of incomplete fossil insect wing. • A new species of Triassic stem-Odonata displays an usual combination of traits. • Reconsideration of homology conjecture for the pillar, a particular wing structure. • A major group of Triassic Odonata proves to have been distributed worldwide. Abstract: Probably the most common rock-imprint fossil-insect remain is an incomplete isolated wing. This pitfall has been traditionally addressed by manually reconstructing missing parts, which is not ideal to comprehend long-term evolutionary trends in the group, in particular for morphological diversity (i.e., disparity) approaches. Herein we describe a new Triassic relative of dragon- and damselflies (Odonata), *Moltenophlebia lindae* gen. et sp. nov., from the Molteno Formation (Karoo Basin, South Africa), on the basis of three incomplete, isolated wings. In order to provide a reconstruction of the complete wing venation of the species, we formalized and applied a repeatable method aiming at inferring the missing parts of a given specimen. It is based on homologous veins automatically identified thanks to a standardized color-coding. The dedicated script can be applied broadly to the fossil record of insect wings. The species is identified as a member of the *Zygophlebiida*, within the *Triadophlebiomorpha*. This discovery, therefore, represents the first ascertained occurrence of the latter group in Gondwana, an area where the fossil record of Odonata is depauperate." (Authors)] Address: Deregnaucourt, Isabelle, Centre de Recherche en Paléontologie – Paris (CR2P), Sorbonne Université, MNHN, CNRS, 57 rue Cuvier, CP38, F-75005, Paris, France. E-mail: deregnaucourt.isa@gmail.com

**21411.** DiGiacopo, D.G.; Hua, J. (2021): The effects of novel leaf litter deposition on competitive, predator–prey and host–parasite interactions of American toad larvae. *Aquatic Ecology* 56(1): 59-73. (in English) ["Wetland plant communities are changing rapidly due to a wide range of human activities. The deposition of leaf litter from novel plant communities can alter both the chemical and physical habitat of aquatic ecosystems. Lesser understood are the ecological consequences of novel leaf litter inputs in aquatic communities. Toward this goal, we used two plant invasion scenarios (comparing native black huckleberry to exotic autumn olive and native swamp loosestrife to exotic purple loosestrife) to simulate a shift in wetland plant communities. In this study, we investigated the effects of novel leaf litter

leachates on three aquatic ecological interactions: intraspecific competition, predation and parasitism. We examined how leaf litter leachates influence the interactions of American toad larvae (*Anaxyrus americanus*) with their conspecifics, a dragonfly predator (*Anax* spp.) and a trematode parasite (*Echinostomatidae*). We found that leaf litter type influenced competitive interactions only for the huckleberry versus autumn olive comparison. We did not detect any effects of leaf litter type on predator–prey interactions. Finally, litter type strongly influenced host–parasite interactions for both leaf litter comparisons, altering host susceptibility, parasite survival and net infection rates. These results highlight the breadth of potential ecological repercussions of shifting wetland plant communities for native ecosystems." (Authors)] Address: DiGiacopo, D.G., Biological Sciences Dept, Binghamton Univ. (SUNY), 4400 Vestal Parkway East, PO Box 6000, Binghamton, NY, 13902, USA

**21412.** Eitschberger, U.; Leiling, K. (2021): Nachruf auf Harald Heidemann. \*1.IX.1935 - † 8.X.2021. *Atalanta* 52(4): 508-511. In German [Obituary for a well-known German odonatologist.] Address: Eitschberger, U., Humboldtstr. 13a, D-95168 Marktleuthen, Germany. Email: ulfei@t-online.de

**21413.** Evangelio Pinach, J.M. (2021): *Macromia splendens* (Pictet, 1843) (Odonata: Macromiidae): nueva especie para Castilla–La Mancha (centro–este de España). *Zoolentia* 1: 70-81. (in Spanish, with English summary) ["*M. splendens*: new species for Castilla–La Mancha region (central–eastern Spain). The discovery of the first breeding population of the Franco–Iberian endemism *M. splendens* in Castilla–La Mancha is reported, through the collection of exuviae and the finding of imagoes. It is considered one of the most endangered dragonflies of the European odonotofauna, whose peninsular populations are very dispersed. In addition, details about the behavior observed in adult individuals in the Cabriel River (Cuenca) are provided." (Author)] Address: Evangelio Pinach, J.M., Museu Valencià d'Història Natural e ìBiotaxa, l'Hort de Feliu–Alginet, Apto. 8460, E–46018 Valencia (España) y Sociedad Odonatológica de la Comunitat Valenciana, c/ Padre Vicente Cavanès, 5–12, E–46900 Torrent (Valencia), Spain. Email: jjevanach@hotmail.com

**21414.** Evangelio Pinach, J.M. (2021): Confirmación de la reproducción de *Paragomphus genei* (Selys, 1841) (Odonata: Gomphidae) en Castilla y León (España). *Zoolentia* 1: 89-94. (in Spanish, with English summary) ["Confirmation of the reproduction of *Paragomphus genei* (Selys, 1841) (Odonata: Gomphidae) in Castilla y León (Spain). The existence of the first breeding population of *P. genei* in Castilla y León is reported by observing adults and collecting exuviae. It is an African dragonfly whose known range of distribution has expanded in the Iberian Peninsula, having been cited in Castilla y León sporadically." (Author)] Address: Evangelio Pinach, J.M., Museu Valencià d'Història Natural e ìBiotaxa, l'Hort de Feliu–Alginet, Apto. 8460, E–46018 Valencia (España) y Sociedad Odonatológica de la Comunitat Valenciana, c/ Padre Vicente Cavanès, 5–12, E–46900 Torrent (Valencia), Spain. Email: jjevanach@hotmail.com

**21415.** Fabian, S.T.; Zhou, R.; Lin, H.-T. (2021): Dragon-drop: a novel passive mechanism for aerial righting in the dragonfly. *Proc. R. Soc. B* 288: 20202676: 8 pp. (in English) ["Dragonflies perform dramatic aerial manoeuvres when chasing targets but glide for periods during cruising flights. This makes dragonflies a great system to explore the role of passive stabilizing mechanisms that do not compromise manoeuvrability. We challenged dragonflies by dropping them from

selected inverted attitudes and collected 6-degrees-of-freedom aerial recovery kinematics via custom motion capture techniques. From these kinematic data, we performed rigid-body inverse dynamics to reconstruct the forces and torques involved in righting behaviour. We found that inverted dragonflies typically recover themselves with the shortest rotation from the initial body inclination. Additionally, they exhibited a strong tendency to pitch-up with their head leading out of the manoeuvre, despite the lower moment of inertia in the roll axis. Surprisingly, anaesthetized dragonflies could also complete aerial righting reliably. Such passive righting disappeared in recently dead dragonflies but could be partially recovered by waxing their wings to the anaesthetised posture. Our kinematics data, inverse dynamics model and wind-tunnel experiments suggest that the dragonfly's long abdomen and wing posture generate a rotational tendency and passive attitude recovery mechanism during falling. This work demonstrates an aerodynamically stable body configuration in a flying insect and raises new questions in sensorimotor control for small flying systems." (Authors)] Address: Lin, H.-T., Dept Bioengineering, Imperial College London, London SW7 2AZ, UK. E-mail: h.lin@imperial.ac.uk

**21416.** French, S.K.; Leite, L.M.S.N.; McCauley, S.J.; Searcy, C.A. (2021): Forest edges and their effects on the arrival of dragonflies at north-temperate experimental ponds. *International Journal of Odonatology* 24: 38-50. (in English) ["The matrix, an environment in the landscape that individuals move through but do not reside in, can affect species dispersal and the arrival of individuals at habitat patches. Elements around this matrix that provide refuge or resources may shape the arrival of animals at habitat patches, even when those patches are equivalent in quality. Adult Anisoptera frequently use open terrestrial environments during movement and dispersal in north-temperate regions; however, they can also roost along forest edges. Because of the potential value of forest edges to adult dragonflies, we tested whether pond proximity (i. e., connectivity) to multiple forest edges was positively related to the abundance or diversity of arriving dragonflies. We observed dragonflies arriving at 9 experimental pond sites located within an open field landscape in Ontario, Canada. Experimental ponds differed in their distance to source ponds and to forest edges, a potential refuge for dragonflies. We found no effect of connectivity to forest edges or distance to source ponds on the abundance or diversity of dragonflies arriving at a site. Dragonfly dispersal was therefore not limited at the spatial scale of our study (<305 m to source ponds). In addition, dragonflies did not seem to discriminate among sites based on the amount of nearby forest edge, although all sites within the generally open landscape had at least some forest edge in close proximity (10–79 m). Our results provide greater insight regarding the decisions that dragonflies make in response to landscape elements while dispersing to reproductive habitats." (Authors)] Address: French, Sarah, Dept Biology, York Univ., 4700 Keele Street, Toronto, Ontario, Canada M3J 1P3. E-mail: sarahkathrynfrrench@gmail.com

**21417.** Garrison, R.W. (2021): Preparation of preserved field collected dried damselfly specimens for character illustrations. *International Dragonfly Fund - Report 166*: 1-7. (in English) ["Describing new species of odonates almost always involves illustrating primary and secondary reproductive structures that may ordinarily be hidden in preserved field collected material. It is therefore important to illustrate these structures (pronotum, mesostigmal plates, genital ligula, male caudal appendages) so that all characters may be seen. In this paper, I outline procedures I use

to relax, manipulate and later preserve specimens for illustration or photographing purposes." (Author)] Address: Garrison, R.W., Plant Pest Diagnostic Center, California Dept of Food & Agriculture 3294 Meadowview Road, Sacramento, CA 958321488, U.S.A. Email: argiavivida@gmail.com

**21418.** Garrison, R.W. (2021): Imaging preserved damselflies for scientific publications. *International Dragonfly Fund - Report 166*: 9-20. (in English) ["Preserved Zygoptera are stick-like insects that do not normally render themselves for illustrating color details suitable for scientific publications. Many of the colours in life include shades of blue and green and suffer from postmortem preservation. Especially disappointing is the lack of preservation of the delicate eye colours that are seen in life. In this article, I will show how one can obtain images that mimic as close as possible the life-like colours of specimens that are suitable for publication in scientific papers." (Author)] Address: Garrison, R.W., Plant Pest Diagnostic Center, California Dept Food & Agriculture 3294 Meadowview Road, Sacramento, CA 958321488, U.S.A. Email: argiavivida@gmail.com

**21419.** Gómez-Tolosa, M.; Rivera-Velázquez, G.; Rioja-Paradela, T.M.; Mendoza-Cuenca, L.F.; Tejada-Cruz, C.; López, S. (2021): The use of Odonata species for environmental assessment: a meta-analysis for the Neotropical region. *Environmental Science and Pollution Research* 28: 1381-1396. (in English) ["The order Odonata has been regularly used as an indicator of the ecosystem's condition. The objective of this review was to analyze the importance of Odonata for environmental assessments (assessment types, statistical approach, life stages, and sampling method, or particular metric), summarizing the current state, the trends, and identifying related research issues in the Neotropical region. Therefore, we selected 62 articles from 2007 to 2018 based on published research to monitor Odonata assessments in the Neotropical region. We compiled a database and ran statistical analyses for the observed frequencies. We found that ecosystem health was the most frequent assessment type and quality the most used objective. In the case of statistical tests and metrics, multivariate analyses and species richness were most used in these papers. However, because there is a great diversity of habitats in this region, there is no unique monitoring protocol to assess the quality of ecosystem health and it is needed to create a proposal for a standard evaluation protocol. Consequently, guidelines for monitoring are presented, and we suggest three stages to establish a specific protocol for each site, which records the set of species most sensitive to the exchange rate evaluated, as well as the use of rarefaction methods, the index of diversity based on the area under the curve, and multivariate analysis, among other recommendations." (Authors)] Address: Gómez-Tolosa, María, Programa de Doctorado en Ciencias en Biodiversidad y Conservación de Ecosistemas Tropicales, Instituto de Ciencias Biológicas, Universidad de Ciencias y Artes de Chiapas, Libramiento Norte-Poniente 1150, 29018 Tuxtla Gutiérrez, Chiapas, México. Email: malugomeztolosa@gmail.com

**21420.** Gould, J. (2021): Hauling up a hefty meal: Long-Jawed spider (Araneae, Tetragnathidae) uses silk lines to transport large prey vertically through the air in the absence of a web. *Ethology* 127(5): 438-442. (in English) ["The most well-known use of silk among spiders is the formation of webs to capture flying prey. However, spiders have evolved many different foraging strategies involving silk, including the capture and subsequent manipulate of prey prior to consumption. Herein, I report on the use of silk lines by a long-

jawed spider from the Tetragnatha genus to move a large prey item vertically through the air. Field observations revealed a long-jawed spider attaching multiple silk lines across the body of an adult dragonfly that had recently emerged from its final moult and attaching these threads to overlying vegetation to incrementally haul the prey item from the surface of a waterbody. My observations suggest that some Tetragnatha spiders are able to move large prey items that are much heavier than themselves using a series of silk lines that allow lift to be accomplished in a gradual and controlled manner. This is an interesting finding, given that other individuals from the same population were using web structures to passively catch much smaller, flying prey. This indicates that some Tetragnatha spiders not only participate in the mobile pursuit of prey but that they possess multiple foraging strategies that may allow them to exploit a larger number of prey types." (Author)] Address: Gould, J., School of Environmental & Life Sci., Univ. of Newcastle, Callaghan, 2308 NSW, Australia. Email: john.gould@uon.edu.au

**21421.** Halassi, I.; Elafri, A.; Halassi, I.; Amari, H.; Houhamdi, M. (2021): Phenotypic plasticity and parental effect on rearing of two diverse habitat environment for laboratory reared *Sympetrum meridionale*. *Journal of Bioresource Management* 8 (2). DOI: <https://doi.org/10.35691/JBM.1202-0186>: 120-130. (in English) ["Laboratory observations on rearing experiment of Odonata serve to answer many evolutionary and ecological questions. In order to evidences the role of species parental habitat provenience in the development behaviour of their offspring, we surveyed several life history traits of two rearing populations of *S. meridionale*, coming from two different habitats across north-eastern Algeria. The first one is a RAMSAR wetland called 'Mekhada' (a perennial water body), and the second one is a temporary pond located at "Maouna" Mountain (1400 m altitude). Overall, the development patterns of the two populations of dragonflies vary with the type of habitat the parental generation of the species occupy (Factorial ANCOVA: all  $p < 0.05$ ). Firstly, egg mortality was very low in dragonfly population inhabiting the RAMSAR wetland compared of those belonging to Maouna Mountain. Secondly new-borne larvae stemming from females inhabiting the Mekhada wetland develop more slowly than did those coming from the "Maouna" Mountain pond. Finally, larvae of *S. meridionale* stemming from females inhabiting the temporary wetland were heavier than those inhabiting the perennial wetland. Such studies will ads considerably to our understanding of the mechanisms that are responsible for possible effects of environmental changes on life history traits of dragonflies across the southern part of their distribution range." (Authors)] Address: Halassi, I., Biology, Water & Environment Lab., Faculty SNV-STU, University 8 May 1945 Guelma, BO. 401 24000 Guelma, Algeria

**21422.** Hammel, S.; Hammel, U. (2021): Nachweis der Kleinen Zangenlibelle (*Onychogomphus forcipatus* Linnaeus 1758) an der Würm. *Jahreshefte der Gesellschaft für Naturkunde in Württemberg* 177: 399-402. (in German) ["*O. forcipatus* was newly found on the banks of the Würm near Weil der Stadt. This is the first record for the northern Upper Gäue and the district of Böblingen." (Authors/DeepL)] Address: unknown

**21423.** Harmon, J.J.; Smith, G.R. (2021): Invasive fish (*Gambusia affinis*) as an ecological filter for macroinvertebrate colonization of experimental ponds. *Freshwater Science* 40(1): 151-161. (in English) ["Invasive predators might serve as ecological filters for prey communities, either through non-

consumptive or consumptive effects. The Western Mosquitofish (*Gambusia affinis* [Baird & Girard, 1853]) is an invasive non-native fish that affects native aquatic communities, potentially because of effects on oviposition or initial colonization of habitats (non-consumptive effects), post-colonization effects (i.e., consumptive effects), or a combination of both non-consumptive and consumptive effects. We conducted a mesocosm experiment to examine non-consumptive and consumptive effects of *G. affinis* on colonization of experimental ponds by native macroinvertebrates. We predicted that, if *G. affinis* affects macroinvertebrates through non-consumptive effects, there would be lower abundances in both the non-lethal (caged *G. affinis*) and lethal (free-ranging *G. affinis*) treatments compared to the control (no *G. affinis*), whereas, if the effect of *G. affinis* is primarily due to consumptive effects, there would be lower abundances of macroinvertebrates in the lethal treatment compared to the non-lethal and control treatments. Most macroinvertebrate taxa (dytiscid beetles, baetid Ephemeroptera, corixid and gerrid hemipterans, libellulid odonates) were less abundant, or even absent, in the presence of *G. affinis* in the lethal treatment compared to their abundance in the non-lethal *G. affinis* treatment; however, notonectids were not affected by treatment. The invasive fish predator, *G. affinis*, therefore, can act as an ecological filter for macroinvertebrates in invaded aquatic habitats, primarily through lethal consumptive effects." (Authors)] Address: Harmon, Johaana; jharmon7@gmail.com

**21424.** Hauteclair, P.; Seleck, M.; Taymans, J.; Gauquie, B.; Mathelart, C.; Mahy, G. (2021): Rapport synthétique de suivi de la biodiversité du projet Life in Quarries - LIFE14 NAT/BE/000364. Université de Liège, Gembloux Agro-Bio Tech: 94 pp. (in French) ["This final report summarizes the LIFE project's biological monitoring in quarries. After the first inventories of the 27 participating quarries, mainly targeting 5 biological groups (Flora, Birds, Amphibians, Reptilians and Odonates), the biological surveillance focused on the 14 Phase I sites, which were the subject of new inventories, 2018 and then 2020, are aligned with LIFE measures and allow for the assessment of biodiversity development after these measures." (Google Translate) Information on Odonata focus on *Sympecma fusca*, *Ischnura pumilio*, *Orthetrum coerulescens* and *O. brunneum*.] Address: <https://orbi.uliege.be/handle/2268/266063>

**21425.** Hermans, J.T. (2021): The Dainty damselfly (*Coenagrion scitulum*) in the Dutch province of Limburg (Odonata: Coenagrionidae). The expansion of a southern damselfly. *Naturhist. maandbl.* 110(3): 39-49. (in Dutch, with English summary) ["*C. scitulum* has a disjunct, mainly southwestern Mediterranean distribution. To the east its distribution becomes more patchy. Since the 1990s it has shown a strong northward expansion and has colonised north-eastern France, south-eastern England, Belgium, Germany and the Netherlands. In 2003, the first male was observed in the Dutch province of Limburg, followed by the discovery of an established population in 2010 in the southern part. From then on it quickly colonised many places, mainly in the southern and central parts of the province. The present distribution in Limburg of this delicate blue damselfly has been thoroughly recorded, as has detailed information on its habitat and preferred vegetation structure. In most of the areas studied in central Limburg it is found around sunny, small and shallow water bodies rich in hydrophytes, where it seems to prefer bankside vegetation dominated by Common Spike-rush (*Eleocharis palustris*). In view of this successful expansion it is expected that it will spread further to the northernmost

parts of the province, which should be carefully followed and monitored." (Author)] Address: Hermans, J.T., Hertestraat 21, 6067 ER Linne, The Netherlands. Email: jthermans21@gmail.com

**21426.** Kanke, E.; Suzuki, K.; Sekiné, K.; Suzuki, T.; Hatta, K.; Yang, M.-M.; Tojo, K. (2021): Unexpected population genetic structure in two closely related euphaeid damselflies from the Yaeyama and Taiwan Islands (Odonata: Euphaeidae). *Biological Journal of the Linnean Society* 134(1): 214-228. (in English) ["In general, population genetics theory predicts that a fragmented smaller population will contain relatively less genetic diversity than a larger population, and so will have a higher rate of genetic fixation due to random genetic drift or inbreeding. However, in this study, having analysed the genetic structure of the mitochondrial DNA COI region between two closely related euphaeid damselflies, we obtained unexpected results which contradict the theoretically expected patterns. Despite their geographical proximity, *Euphaea yayeyamana* was clearly genetically isolated on Ishigaki and Iriomote Islands, and no haplotype crossovers were observed. Even within each island, several diverse haplotypes were observed, indicating a significantly high haplotype intra-island diversity. However, the genetic diversity within Taiwan's population of *Euphaea formosa* was significantly lower than that within either Ishigaki or Iriomote Island, even though Taiwan is significantly larger, with high mountain ranges that reach c. 4000 m a.s.l. and an abundance of habitats, all factors that should contribute to high genetic diversity. The current low diversity status for Taiwan's population may be due to genetic bottleneck effects. In contrast, despite the very small population sizes of Ishigaki and Iriomote Islands coupled with the effects of glacial and interglacial geological events, they have maintained markedly high genetic diversity." (Authors)] Address: Tojo, K., Dept Biol., Fac. Sci., Shinshu Univ., Asahi 3-1-1, Matsumoto, Nagano 390-8621, Japan. E-mail: ktojo@shinshu-u.ac.jp

**21427.** Kleinsteuber, W. (2021): Reproduktionsnachweise der Pokaljungfer *Erythromma lindenii* (Selys, 1840) in der Weißen Elster im südlichen Sachsen-Anhalt (Insecta: Odonata, Coenagrionidae). *Entomologische Mitteilungen Sachsen-Anhalt* 29(2): 78-85. (in German) ["*E. lindenii* could be observed on the White Elster River between 2017 and 2021 on a total flow length of about 23 km. Larval detections have demonstrated successful reproduction of the species for at least five years. Thus, *E. lindenii* currently reaches its southernmost and easternmost distribution limit in Saxony-Anhalt." (Author)] Address: Kleinsteuber, W., Hirtenweg 15, 04425 Taucha, Germany. E-mail: aquahet@gmx.net

**21428.** Kring, T. (2021): Die Bestandserhebung der Libellenfauna im Naturschutzgroßprojekt Baar. *Naturschutz und Landschaftspflege Baden-Württemberg* 80: 3-14. (in German) ["As part of the creation of the management plan for the Baar Nature Conservation Project (NGP Baar), studies of the dragonfly fauna were carried out at 31 sample waters in nine of the 17 funded areas. A total of 35 of the 75 dragonfly species found in Baden-Württemberg (Germany) were detected. Of the mapped species, nine dragonflies are on the Red Lists and Forewarned Lists of Germany and/or Baden-Württemberg. From these, six species were selected as target species for the Baar NGP." (Author/DeepL).] Address: Kring, T., Landratsamt Schwarzwald-Baar-Kreis, Naturschutzgroßprojekt Baar, Möglingshöhe, Neckarstraße 120, 78056 Villingen-Schwenningen, Germany. Email: t.kring@lraskb.de

**21429.** Lam, Y.T.; Kamarudin, K.R.; Zakaria, M.Z.; Omar, M.S.S.; Tokiman, L.; Jahari, S.; Mohd Salleh, F. (2021): Mitochondrial barcodes of dragonflies and damselflies originated from Taman Negara Endau Rompin, Johor, Malaysia. *IOP Conference Series: Earth and Environmental Science* 736 012032: 5 pp. (in English) ["Odonata are important biological indicators in freshwater ecosystems. However, identification among Odonates is often challenging due to their similar morphological features. Therefore, the incorporation of morphological identification by taxonomists and validation using mitochondrial barcodes such as cytochrome c oxidase subunit I (COI) can be a more reliable approach to enhance the accuracy in species identification. In this study, four COI barcodes for Malaysian dragonflies (*Neurothemis fluctuans*) and damselflies (*Neurobasis chinensis*, *Aristoclypha fenestrella* and *Sundacypha petiolata*) were generated. Three of the generated barcodes (D2 COI, D4 COI and D5 COI) supported the species identified by taxonomists meanwhile D3 COI deduced that the damselfly species was misidentified due to the very similar morphology between the same genus of damselfly. All of the COI barcodes are now available in the GenBank with the accession numbers of MT266926.1 (D2 COI), MT266925.1 (D3 COI), MT266976.1 (D4 COI) and MT266924.1 (D5 COI)." (Authors)] Address: Jahari, P.N.S., Department of Biosciences, Faculty of Science, Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor, Malaysia. Email: puterijahari22@gmail.com

**21430.** Lambret, P.; Janssens, L.; Stoks, R. (2021): The impact of salinity on a saline water insect: contrasting survival and energy budget. *Journal of Insect Physiology* 131(1764): 104224: (in English) ["Highlights: • Salinity has no effect on *Lestes macrostigma* egg hatching success. • Larval growth rate decreased with increasing salinity. • Survival to metamorphosis increased with salinity up to 8 g/L and declines at 16 g/L. • Increasing salinity in the larval stage decreased the energy budget in the adult. • Negative sublethal effects of salinity bridged metamorphosis. Abstract: Water salinity is a major driver of aquatic insects' distribution. Saline species are usually generalists with high survival and performance at both low and high salinity levels. Yet, costs of high salinity may be underestimated as these are most often measured in terms of larval life history traits, while effects of larval stressors may only be detectable when looking at physiological traits and traits in the adult stage. Here, we assessed the lethal and sublethal physiological effects of embryonic and larval exposure to a range of salinity levels in the damselfly *Lestes macrostigma*, both during and after metamorphosis. This species inhabits temporary freshwaters where salinity increases during the drying phase. Salinity had no effect on egg hatching success within the range 2-9.5 g/L sea salt (conductivity range 3.45-14.52 mS/cm). With increasing salinity (up to 16 g/L, 23.35 µS/cm), growth rate decreased and larvae took longer to emerge and did so at a smaller size. Larval survival to metamorphosis increased with salinity up to 8 g/L (12.45 mS/cm) and then declined at 16 g/L. Exposure to salinity in the larval stage had no effect across metamorphosis on both the adult thorax muscle mass and flight performance, and the investment in immune function. Increasing salinity in the larval stage also had no effect on the energy available but increased the energy consumption in the adult stage, resulting in a lower net energy budget. These negative sublethal effects of increasing salinity hence bridged metamorphosis and contrasted with the mortality data, suggesting that the higher mortality at the low salinity levels selected for larvae with the best body condition. Our results highlight the importance of taking into account other life-history and physiological



traits, besides mortality, ideally across different life stages, to better understand and predict consequences of increasing salinization on freshwater insects." (Authors)] Address: Lambret, P., Tour du Valat, Research Institute for the Conservation of Mediterranean Wetlands, Le Sambuc, 13200 Arles, France. Email: lambret@tourduvalat.org

**21431.** Maggioni, D.; Assandri, G.; Ramazzotti, F.; Magnani, D.; Pellegrino, I.; Valsecchi, E.; Galimberti, A. (2021): Differential genetic variability at two mtDNA COI regions does not imply mismatches in Odonata molecular identification performances. *The European Zoological Journal* 88(1): 425-435. (in English) ["Molecular-based approaches for species identification and delimitation strongly rely, in terms of universality and efficiency, on the selected markers. Conventionally, when adopting a DNA barcoding approach to discriminate (or identify) metazoans species, the marker choice falls on the 658 base pair region at the 5' end of the mitochondrial COI gene. However, a growing number of studies suggest to use alternative and more variable genetic regions, even from the same gene, such as the 3' end of the COI. In this work, we compared the identification performance of the 5' and 3' end COI regions on a large sequence dataset of odonate species, an order of arthropods among the most studied in terms of conservation importance for aquatic ecosystems. The genetic datasets comprised a total of 236 specimens, 113 species, 51 genera and 12 families spanning the two odonate suborders Zygoptera and Anisoptera, and were analysed under an integrative multiple approach including descriptive statistics and variability of the sequences, phylogenetic reconstructions, DNA-based species delimitations, genetic distances, identification of diagnostic characters and saturation plots. All analyses were congruent in recovering the COI-3' region to be slightly more variable than the COI-5' one, and both regions showed a saturation of transversion at the third codon position. However, phylogenetic reconstructions, genetic distances, and diagnostic characters identification resulted in a similar discrimination power for the two COI regions. Therefore, the COI-3' region does not add much information to the standard COI-5' barcode region, which has in turn largely been demonstrated to successfully delineate invertebrate communities through DNA and eDNA metabarcoding, and to have a much more extensive taxonomic coverage in public databases. Overall, the DNA barcoding inventory assembled in this study will provide valuable insights into the systematics and conservation of many odonate species with implications for future DNA and eDNA monitoring-based studies." (Authors)] Address: Maggioni, D., Dept Environ. & Earth Sci. (DISAT), Univ. of Milano - Bicocca, Milan, Italy

**21432.** McEachin, S.C. (2021): Microhabitat selection and interspecific aggression in rubyspot damselflies (*Hetaerina*). PhD thesis, Biology, University of California, Los Angeles: xvii, 126 pp. (in English) ["Interspecific aggression is a complex interaction with important evolutionary and ecological implications. While it can be an adaptive response to reproductive interference, it bears costs including energy expenditure, loss of territory, and missed mating opportunities. Consequently, species may diverge in habitat preferences or exhibit spatial partitioning, which reduce the costs of fighting. However, empirical evidence of such shifts is lacking. I studied the relationship between interspecific aggression, habitat partitioning, and spatial segregation in interspecifically aggressive species of rubyspot (*Hetaerina*) damselflies. In Chapter 1, I explored whether species differences in microhabitat use reduce the frequency of interspecific fighting in 25 sympatric population pairs. I found that

almost all population pairs had lower observed rates of interspecific fighting relative to chance expectations. Reduced rates of interspecific fighting were explained by competitor recognition, species differences in microhabitat use, and spatial segregation. I also found strong positive correlations between heterospecific aggression and species differences in microhabitat use, likely explained by competitive displacement and/or agonistic character displacement, and between heterospecific aggression and spatial segregation. These correlations were explored further in Chapters 2 and 3. In Chapter 2, I tested the competitive displacement hypothesis using removal experiments. If competitive displacement occurs, territory holders of the subordinate species should shift their microhabitat use to that of the dominant species in the absence of the dominant species. However, I found no evidence of such shifts. I therefore reject the competitive displacement hypothesis and conclude that species have likely evolved divergent microhabitat preferences through agonistic character displacement. In Chapter 3, I examined the correlation between heterospecific aggression and spatial segregation. Spatial partitioning is common among competing species, but there are numerous mechanisms that can cause species to be spatially segregated. Conspecific attraction is a widespread habitat selection mechanism, but the potential for it to cause spatial partitioning between interspecifically aggressive species is unknown. I explored this question by comparing the clustering of territories to a model that simulates territory settlement from microhabitat availability. I found that both conspecific attraction and microhabitat preferences contribute to the spatial partitioning between interspecifically aggressive species." (Author) *Hetaerina americana*, *H. vulnerata*, *H. sempronina*, *H. capitalis*, *H. cruentata*, *H. majuscula*, *H. occisa*, *H. miniata*, *H. fuscoguttata*.] Address: McEachin, S., Dept Ecol. & Evol. Biology, Univ. of California Los Angeles, 621 Charles Young Drive South, Los Angeles, CA 90095-1606, USA

**21433.** Mercado Costa, N.G.; Melo, C.M.; Melo, A.H.; Silva de Araújo, R.I.; Soares Vieira, L.J. (2021): Ordem Odonata como bioindicadores em biomonitoramento no Brasil: Uma revisão sistemática - Odonata order as bioindicators in biomonitoring in Brazil: A systematic review. *South American Journal of Basic Education, Technical and Technological* 8(1): 22 pp. (in Portuguese, with English summary) ["Odonata's life history has a number of characteristics that make these insects important in detecting the effects of changes in environmental integrity. In Brazil there are about 828 species distributed in 14 families and 140 genera of the order Odonatas. Thus, the present work aimed to perform a systematic review of the main studies that used the Odonata Order as bioindicators in Brazil. A literature review was performed in the Scientific Electronic Library Online (SCIELO), National Institute of Health (PUBMED), Web Of Science and SCOPUS databases, using the following descriptors: "bio-monitoring," "Odonata," "bioindicators." A total of 35 articles were selected, where they were organized in a descriptive table, presenting information related to the works. According to the results obtained, it was noted that the different families of the studied order present particularities and show great potential as environmental bioindicators." (Authors)] Address: Melo, Caroline, Discente no Programa de Pós-Graduação em Ciência, Inovação e Tecnologia para a Amazônia Ocidental (CITA), Universidade Federal do Acre (UFAC), Brasil. E-mail: carolinem@gmail.com

**21434.** Mitchell, A.; Ware, J.L.; Theischinger, G. (2021): Molecular phylogenetics of *Petalura* Leach, 1815 (Odonata: Petaluridae). *Odonatologica* 50(1): 143-158. (in English) ["DNA

sequence data was derived for all five described species of *Petalura* Leach, 1815, for eight gene fragments from the mitochondrial and nuclear genomes. Phylogenetic analyses suggest that there are only four clearly distinct species in the genus. They are *Petalura gigantea*, *P. hesperia*, *P. ingentissima*, and *P. litorea*. *Petalura pulcherrima* Tillyard, 1913, is found to group with *P. ingentissima* Tillyard, 1908, and is formally synonymized with this species." (Authors)] Address: Theischinger G., 2A Hammerley Road, Grays Point, NSW 2232, Australia. E-mail: Gunther.Theischinger@environment.nsw.gov.au

**21435.** Moore, M.P. (2021): Larval habitats impose trait-dependent limits on the direction and rate of adult evolution in dragonflies. *Biology Letters* 17(5): 5 pp. (in English) ["Natural selection on juveniles is often invoked as a constraint on adult evolution, but it remains unclear when such restrictions will have their greatest impact. Selection on juveniles could, for example, mainly limit the evolution of adult traits that mostly develop prior to maturity. Alternatively, selection on juveniles might primarily constrain the evolution of adult traits that experience weak or context-dependent selection in the adult stage. Using a comparative study of dragonflies, I tested these hypotheses by examining how a species' larval habitat was related to the evolution of two adult traits that differ in development and exposure to selection: adult size and male ornamentation. Whereas adult size is fixed at metamorphosis and experiences consistent positive selection in the adult stage, ornaments develop throughout adulthood and provide context-dependent fitness benefits. My results show that species that develop in less stable larval habitats have smaller adult sizes and slower rates of adult size evolution. However, these risky larval habitats do not limit ornament expression or rates of ornament evolution. Selection on juveniles may therefore primarily affect the evolution of adult traits that mostly develop prior to maturity." (Author) Electronic supplementary material is available online at <https://doi.org/10.6084/m9.figshare.c.5412042>.] Address: Moore, M.P., Living Earth Collaborative, Washington Univ., St Louis, MO 63130, USA. Email: moore.evo.eco@gmail.com

**21436.** Mosquera-Murillo, Z.; Mosquera-Mosquera, M. M. (2021): Riqueza genérica y distribución de los odonatos (Insecta: Odonata) del departamento del Chocó, Colombia. *Bol. Cient. Mus. Hist. Nat. U. de Caldas* 25(1): 191-205. (in Spanish, with English summary) ["Generic richness and distribution of Odonates (Insecta: Odonata) in the department of Chocó, Colombia. Abstract: Objective. To contribute to the taxonomic knowledge and distribution of Odonates in the Department of Chocó and in Colombia. Scope. To present a preliminary record on the richness and distribution of Odonata in the Dept of Chocó. Methodology. Specimens are deposited in the Choco Limnological Collection, CLCH-Insec (Universidad Tecnológica del Chocó), collected between 2004 and 2019 were reviewed. Main results. A total of 1,344 individuals were counted corresponding to 11 families and 29 genera, associated with 97 water currents of different order and 18 lentic ecosystems of the Atrato, San Juan and Baudó river basins located in 20 municipalities of the Department of Choco. Coenagrionidae is the most abundant family and Libellulidae the one with the largest distribution while Gomphidae exhibits the greatest generic richness. The genera *Coryphaeschna*, *Aeschnosoma*, *Aphylla*, *Ophiogomphus*, *Erpetogomphus*, *Orthemis*, *Telebasis*, *Acanthagrion* and *Heteropodagrion* are new records for the department of Chocó. The greatest taxonomic richness is found in the Atrato river basin, followed by San Juan and Baudó. The stone substrate is the one with the highest specific richness.

Conclusions. The first preliminary inventory of the generic richness and distribution of the order Odonata in the department of Chocó is established, which made it possible to demonstrate the diversity of the order in the region." (Authors) Boyeria and *Ophiogomphus* don't occur in Colombia.] Address: Mosquera-Murillo, Zuleyma, Fac. Cien. Naturales. Grupo de Limnología. Univ. Tecnológica del Chocó. Chocó Colombia. E-mail: zuleyma.mosquera@utch.edu.co

**21437.** Nicolla, A.C.; Irsyad, A.N.; Firdasia, W.; Sarifah, Z.; Nilamsari, E.I.; Umah, N.; Daradwinta, R.; Sukimo, S. (2021): Comparison of damselfly (Odonata: Zygoptera) diversity in wet dune slack habitat with canopied and non-canopied areas of Gumuk Pasir Parangkusumo, Yogyakarta, Indonesia. *IOP Conference Series: Earth and Environmental Science* 736: 10 pp. (in English) ["Gumuk Pasir Parangkusumo is one of the unique eolian ecosystem in Yogyakarta. This place which mostly formed by dune which in the rainy season is flooded by water, thus forming a pool called wet dune slack. Zygoptera are closely related to the occurrence of water. The aim of this research is to compare the diversity of damselflies in canopied and non-canopied areas on Gumuk Pasir Parangkusumo, Yogyakarta, Indonesia. The method which used in this research was the descriptive method with active exploration techniques around the wet dune slack to the vegetation formation. The result showed that there are 4 species of damselflies in canopied area and 5 species of damselflies in non-canopied area. The diversity index ( $H'$ ) is 1.18 in canopied area and 1.01 in non-canopied area. The highest relative abundance of the species in canopied area is *Ischnura senegalensis* (45,65%) whereas in non-canopied area is *Agriocnemis pygmaea* (62,34%). The non-canopied areas has conditions more suitable for damselflies's life." (Authors) *Agriocnemis femina*, *A. pygmaea*, *Ischnura senegalensis*, *Pseudagrion microcephalum*, *Lestes praemorsus*] Address: Nicolla, A.C., Faculty of Biology, Universitas Gadjah Mada, Yogyakarta, Indonesia. Email: andracare199@mail.ugm.ac.id

**21438.** Palacio, A. del (2021): Revisión filogenética del Grupo Connata del Género *Erythrodiplax* Brauer, 1868 (Odonata: Libellulidae). Tesis de doctorado, Ciencias Naturales, Universidad Nacional de La Plata: 302 pp. (in Spanish, with English abstract) ["The genus *Erythrodiplax* was established by Brauer (1868), to gather ten American species (order as follows): *E. fusca*, *E. confusa*, *E. chloropleura*, *E. anomala*, *E. umbrata*, *E. superba*, *E. distinguenda*, *E. plebeja*, *E. leontina* and *E. connata*. It is currently the most speciose libellulid genus in the American continent, and presently it comprises 58 species distributed from the south of Canada up to 45 ° S in Patagonia. Its species are inhabitants of different types of wetlands, and many of them may be abundant in lentic habitats like temporary pools, salt marshes and river ponds. Species of the genus can be small to medium (20–50 mm) and are characterized by: brown red or black colored head, with or without a metallic blue reflection; pterothorax yellow/brown to black and covered with bluish pruinescence in mature males. Hyaline wings with black, red or orange spots; last antenodal vein of front wing incomplete (except in some specimens of *E. tenuis*); generally 1 bridge crossvein (rarely 2-3) and 1 cubitoanal crossvein (rarely 2-4); generally with free triangles; medial supplemental vein (Mspl) indistinct, although some species with up to 1 or 2 rows of cells. Posterior lobe of prothorax curved caudally. Abdomen triangular in cross section. Male genitalia with anterior lamina entire; posterior hammule bifid, with the inner branch smaller than the outer branch; distal segment of the vesica spermalis long and cylindrical, with

complex and largely hidden distal lobes, gradually widening to the rounded or bluntly angulated tip except for some specimens of *E. berenice*. Female with vulvar lamina scoop-shaped and ventrally directed. In 1942 Borror made the only available review of the genus *Erythrodiplax*. It offers a complete generic characterization, taxonomic lists, keys, the description of more than one dozen new species and provides a formal division of the genus into 12 groups of species: *Connata* (10 species), *Castanea* (two species), *Attenuata* (three species), *Longitudinalis* (three species), *Unimaculata* (10 species), *Famula* (two species), *Umbrata* (one species), *Funerea* (one species), *Basalis* (11 species), *Nigricans* (one species), *Juliana* (one species) and *Acantha* (one species). However, the characters used to differentiate between the groups are unclear, and many species described after Borror's work have not been formally assigned to any of the groups. The *Connata* group is the most speciose of the genus, and is currently made up of the following 14 species, *E. abjecta*, *E. atroterminata*, *E. basifusca*, *E. bromellicola*, *E. cauca*, *E. cleopatra*, *E. connata*, *E. fusca*, *E. ines*, *E. justiniana*, *E. media*, *E. melanorubra*, *E. minuscula* and *E. paraguayensis*. The group is characterized by the following combination of characters: wide antehumeral stripe, outer branch of the hammule larger than or as long as the inner one, 10-15 spines in femur III, vulvar lamina 2/3 of the width of segment 9, among others. These characters present a certain degree of interspecific variation, therefore, the delimitation of groups is based mainly on characters derived from male genitalia. The main characters derived from the vesica spermalis that define the *Connata* group are: generally with apical tubercle, small and rounded lateral lobes, medium process overlapping the lateral lobes and erectile lobe, apex of middle process with bristles, small and erectile posterior lobe, apical lobe shorter than lateral lobes. The species of this group are relatively abundant in national and international collections. However, its correct identification is extremely complicated mainly due to the morphological and color similarities, and the difficult observation of the characters derived from the lobes of the vesica spermalis. The main objective of this work is to clarify the taxonomic status of the species of the *Connata* group. To this end, a systematic review of the *Connata* group was carried out for which the redescription of the species of this group were provided, the variability of the characters derived from the color pattern was determined, a detailed study of the structures derived from the fourth segment of the vesica spermalis was done, and finally a cladistic analysis of the *Connata* group was also done, including representatives of the remaining groups proposed by Borror, in order to redefine and re-diagnose the stability and composition of groups, based on modern systematic methods. The results verify that the characters derived from the ultrastructure of the vesica spermalis are fundamental in the systematic study of the species of the genus *Erythrodiplax*. The methodology developed for the preparation of vesicas is of utmost importance for the observation of the characters and their correct interpretation. On the other hand, the cladistic analysis discards the monophyly of the genus *Erythrodiplax*. When considering both *Uracis* and *Rhodopygia* as outgroups, the species belonging to the *Castanea*, *Famula* and *Umbrata* groups are basal to the *Uracis*/*Rhodopygia* + the remaining species of *Erythrodiplax*. However, the monophyly of the *Connata* group is supported, although the relationships between its species could not be resolved. Finally a diagnosis of all species within the genus, data on geographical distribution and keys in particular for the species included within the *Connata* group are provided." (Author)] Address: Palacino-Rodriguez, F., Grupo de Investigación en Biología (GRIB), Depto

de Biología, Univ. El Bosque Av. Cra. 9 No. 131<sup>a</sup>-02, Colombia. E-mail: [odonata17@hotmail.com](mailto:odonata17@hotmail.com)

**21439.** Petzold, F. (2021): Rote Liste der Libellen (Insecta: Odonata) Thüringens. 5. Fassung, Stand: 11/2020. Naturschutzreport 30: 94-98. (in German) [Red List of Odonata, Thuringia, Germany] Address: Petzold, F., Pappelallee 73, 10437 Berlin, Germany. Email: [petzold.falk@googlemail.com](mailto:petzold.falk@googlemail.com)

**21440.** Romero, G.Q., Moi, D.A., Nash, L.N., Antikeira, P.A.P., Mormul, R.P.; Kratina, P. (2021): Pervasive decline of subtropical aquatic insects over 20 years driven by water transparency, non-native fish and stoichiometric imbalance. *Biol. Lett.* 1720210137/20210137. <http://doi.org/10.1098/rsbl.2021.0137>: 8 pp. (in English) ["Insect abundance and diversity are declining worldwide. Although recent research found freshwater insect populations to be increasing in some regions, there is a critical lack of data from tropical and subtropical regions. Here, we examine a 20-year monitoring dataset of freshwater insects from a subtropical floodplain comprising a diverse suite of rivers, shallow lakes, channels and backwaters. We found a pervasive decline in abundance of all major insect orders (Odonata, Ephemeroptera, Trichoptera, Megaloptera, Coleoptera, Hemiptera and Diptera) and families, regardless of their functional role or body size. Similarly, Chironomidae species richness decreased over the same time period. The main drivers of this pervasive insect decline were increased concurrent invasions of non-native insectivorous fish, water transparency and changes to water stoichiometry (i.e. N : P ratios) over time. All these drivers represent human impacts caused by reservoir construction. This work sheds light on the importance of long-term studies for a deeper understanding of human-induced impacts on aquatic insects. We highlight that extended anthropogenic impact monitoring and mitigation actions are pivotal in maintaining freshwater ecosystem integrity." (Authors)] Address: Romero, G.Q., Lab. of Multitrophic Interactions & Biodiversity, Dept Animal Biology, Inst. Biol., Univ. of Campinas (UNICAMP), Campinas, SP 13083-862, Brazil. Email: [gqromero@unicamp.br](mailto:gqromero@unicamp.br)

**21441.** Rusu-Stiévenard, A.; Houard, X. (2021): Agir en faveur des libellules: poursuite du plan national. *insectes* n°202 septembre 2021: 29-33. (in French) ["The new National Action Plan dedicated to dragonflies will ensure for ten years the consolidation of the actions implemented by the first plan as well as the development of new initiatives over a longer period. The experience acquired previously has made it possible to establish new lines of action, always based on regional variations. Among the new initiatives, a monitoring program for Odonata gomphidae and priority Anisoptera will be effective from 2022."(Author/Google translate)] Address: Amélie Rusu-Stievenard. Email: [amelie.rusu-stievenard@insectes.org](mailto:amelie.rusu-stievenard@insectes.org)

**21442.** Ware, J.L. (2021): Odonata. *Current Biology* 31(2): R58-R59. (in English) [Brief introduction into odonatology: [https://www.cell.com/current-biology/pdf/S0960-9822\(20\)-31677-8.pdf](https://www.cell.com/current-biology/pdf/S0960-9822(20)-31677-8.pdf)] Address: Ware, Jessica, American Museum of Natural History, New York, NY10024, USA. E-mail: [jware@amnh.org](mailto:jware@amnh.org)

**21443.** Zheng, D.; Jarzembowski, E.A.; Zhuo, D.; Nel.A. (2021): Protohemiphlebiidae fam. nov., a stem hemiphlebioid damselfly from Cretaceous amber in Kachin. *Geological Society London Special Publications* 521: 171-184. (in English) ["Hemiphlebiidae are the most basal lestomorphan family following the latest phylogenetic analysis of the

Zygoptera: this unique damselfly family today contains one relict species found in the wetlands of Australia. It was, however, very diverse and widespread during the Mesozoic. Nevertheless, very few species were known obscuring the origin and early evolution of the family. Here we propose a new stem hemiphlebioid taxon (Protohemiphlebiidae Zheng, Jarzembowski & Nel, fam. nov.) based on a new genus and two species: Protohemiphlebia zhangii Zheng, Jarzembowski & Nel, sp. nov. and Protohemiphlebia meiyingae Zheng, Jarzembowski & Nel, sp. nov. The new family shares the characters of both Hemiphlebiidae and Coenagrionidae, but it is more closely related to Hemiphlebiidae in having the pterostigma with a 'star-shaped' microsculpture, and AA originating from the wing base slightly distal of Ax0. Protohemiphlebia Zheng, Jarzembowski & Nel, gen. nov. is further considered to belong to the stem group of Hemiphlebiidae, instead of belonging to the Hemiphlebiidae, in possessing pretibial combs and a weakly kinked RP1 below the Pt-brace. The new damselflies will help to calibrate the origin of Hemiphlebiidae, which could be earlier than their current oldest records in the Kimmeridgian (Late Jurassic)." (Authors)] Address: Nel, A., Lab. Ent.. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@cimr1.-mnhn.fr

## 2022

**21444.** Adak, R.; Mandal, A.; Saha, S. (2022): Aerodynamic performance of a tandem wing configuration inspired from dragonfly gliding flight for MAV application. Proceedings of the 9th International and 49th National Conference on Fluid Mechanics and Fluid Power (FMFP). December 14-16, 2022, IIT Roorkee, Roorkee-247667, Uttarakhand, India, FMFP2022-3398. 5 pp. In English ["The design of micro air vehicles (MAVs) introduces aerodynamic performance challenges due to the small size and, consequently, the low Reynolds number ( $O(10^4-5)$ ). Natural fliers are naturally optimized and are comparable in size to MAVs, making them a potent candidate to mimic for the design of MAVs. The dragonfly frequently uses a gliding mode of flight relative to the other small fliers and operates at a range of  $O(10^2-4)$ . The literature suggests that the corrugated profile improves the aerodynamic efficiency around  $Re$  at 104. It allows us to investigate the aerodynamic advantages of tandem corrugated airfoil inspired by the dragonfly wing. In this paper, we perform direct numerical simulations of flow past bio-inspired corrugated wing to understand the impact of the tandem wing configuration. The horizontal distance between the wings is fixed, and the vertical distance varies. The results reveal that the forewing/hindwing interaction increases the lift of the forewing relative to the isolated wing for all the case studies. The combined drag coefficient drops by  $\approx 7\%$ , and overall efficiency drops by  $\approx 13\%$  relative to an isolated wing for a case study with zero vertical spacing between forewing and hindwing at  $3^\circ$  angle of attack, fixed for both wings. With no vertical gap, the aerodynamic efficiency matches close to the isolated wing with the decrease in tandem wing combined drag coefficient compared to an isolated wing." (Authors)] Address: Adak, R., Dept Aerospace Engineering, IIT Kharagpur, Kharagpur-721302, India

**21445.** Adu, B.W.; Ileke, K.D.; Olorunmeke, O.A. (2022): A preliminary study of biodiversity and biomonitoring potential of Odonates of Benin-Owena River Basin catchment, Igbara-Oke, Ondo State, Nigeria. International Journal of Tropical Insect Science 42: 2853-2864. (in English) ["Ecologically, Odonata are good indicators of aquatic and terrestrial ecosystem. They are abundant and important members of

the vicinity of inland waters. This study was carried out at Benin – Owena Basin catchment, Igbara-Oke, Nigeria. Sampling was carried out at three water bodies within the catchment of Rivers Aro, Elemo and Owena Dam. The water bodies were selected based on types of water body and prevailing anthropogenic activities around their vicinity. Sampling of specimens was randomly carried out once a month from 9am-2 pm between June, 2017 and July, 2018. Odonata naiads were collected using Kick net. Species composition, distribution and richness of the study sites were calculated using diversity indices (Shannon–Wiener, Simpson, Margalef, Evenness and Equitability). Monthly collections of odonates revealed that January 2018 had the highest number of species while the least was in April 2018. Two anisopterans, Neodythemis klingi and Orthetrum julia both with 30 individuals, were the dominant odonate species. Pseudagrion kersteni (19 individuals) was the dominant zygopteran while Africallagma subtile (2 individuals) was the least represented odonate in this study. From the diversity indices analyses, Owena Dam was the richest (Shannon ( $H'$ ) = 3.12, Simpson = 0.9521, Margalef = 4.42). The site was also the best in terms of distribution and spread of odonate species (Equitability = 0.9693). Similarity in odonate community structure among the 3 study sites was determined using Jaccard Coefficient (Coefficient of Community: CC), The CC analysis showed Elemo Stream and Owena Dam as the sites with similar community structure; and the diversity indices revealed Owena Dam as the richest site with the best species distribution." (Authors)] Address: Ileke, K.D., Dept Biology, School Science, Federal Univ. Technology, Ondo State, PMB 704, Akure, Nigeria

**21446.** Almeida, T.R. de; Salomoni, S.; Vilela, D.S.; Guillermo-Ferreira, R. (2022): Male agility in relation to mating success in two non-territorial damselflies. Austral Ecology 47(8): 1569-1577. (in English) ["Male body size is usually correlated with mating success in insects. For non-territorial species, the small male advantage hypothesis predicts that smaller males may be favoured in sexual selection because small body size may predict agility and manoeuvrability. Consequently, selection for male size may drive the evolution of female-biased sexual size dimorphism (SSD). Nevertheless, recent evidence shows that non-territorial male damselflies that actively search for females may be larger and more agile than those that perch and wait for females to appear. Thus, here we addressed whether the male size is an indicator of male agility and if it may be used to predict male reproductive success in two non-territorial damselflies. To this end, we conducted a field study with Acanthagrion truncatum Selys, 1876 and A. lancea Selys, 1876 (Zygoptera, Coenagrionidae). Males of A. truncatum adopt a sit-and-wait mating strategy, while the males actively search for females in A. lancea. Hence, we expected different selective forces acting on male body size and agility in these species. We compared the body size and wing length of mated and unmated males, and between sexes, to describe their patterns of SSD. Our results suggest that wing length can be used as a proxy for male body size and agility in both species. However, we have found no evidence for the small male advantage that could explain wing dimorphism in A. truncatum, nor selection for larger males in A. lancea. In conclusion, this study corroborates other studies that suggest agility cannot explain SSD in non-territorial damselflies and fail to support the small male advantage hypothesis." (Authors)] Address: Guillermo-Ferreira, R., Lestes Lab, Federal Univ. of Triangulo Mineiro – UFTM, Uberaba, Brazil. Email: rhainerguillermo@gmail.com



**21447.** Amann, P. (2022): Heuschrecken (Orthoptera) und Libellen (Odonata) im Kleinwalsertal (Vorarlberg, Österreich). *inatura - Forschung online* 104: 17 pp. (in German) ["Due to its isolated location, Kleinwalsertal has been somewhat neglected by Vorarlberg naturalists. The aim of this research project is to provide up-to-date information on species structure and distribution for the two animal groups grasshoppers and dragonflies. In a first step, based on the biotope inventory, areas were selected that could be expected to have a species-rich and characteristic fauna for Kleinwalsertal. A total of 30 grasshopper sites and 16 sites for dragonflies were selected, although these could also be identical. In the summer of 2022, the sites were visited in mid-June, mid-July and mid-August and the species were documented. The focus of the recordings in June was on dragonfly observations; in August, the subalpine areas of the Schwarzwasserhütte and Hohen Ifen were also examined for their fauna. The recordings were marked by a hot summer. In all 3 recording months, average temperatures prevailed that were significantly above the long-term average. For example, the temperature in July was about 5 degrees Celsius warmer than the long-term average. This month also had very little precipitation. As a result, the moors were very dry: In many cases, swales and depressions were dried out, and it was rare to get wet. 17 dragonfly species were recorded in the study area, including *Aeshna subarctica* [also *Somatochlora alpestris* and *S. arctica*] "threatened with extinction" in Vorarlberg. 5 species were newly documented for Kleinwalsertal. ... The subsequent discussion of the grasshopper and dragonfly species found (with information on their protection status) is followed by an attempt to assess the species on the basis of their protection status. A final assessment of the Kleinwalsertal valley as a dragonfly and grasshopper habitat as well as a discussion on responsibility round off the work.] (Author/DeepL)] Address: Amann, P., Wiesenbachweg 8, 6824 Schlins, Austria. Email: paul.amann-behle@outlook.com

**21448.** Battisti, A.; Bosio, G. (2022): The dragonflies (Odonata) of the Mont Avic and Mont Emilius massif (NW-Italy): reflections on the evolution of the community and focus on the genera *Leucorrhinia* and *Somatochlora*. *Rev. Valdôtaine Hist. Nat.* 76: 69-87. In Italian, with English summary ["The surveys carried out in the years 2019 – 2021 permit to improve the knowledge of the dragonflies of the Special Protection Area IT1202020 "Mont Avic and Mont Emilius" (Aosta valley). New populations of *Somatochlora arctica* and *Leucorrhinia dubia* were discovered. The new population of *S. arctica* is located in the Mont Avic Natural Park and represents the southernmost population of the Italian Alps, with confirmation of the species between 1.729 m and 2.053 m of altitude, in habitats shared with *Somatochlora alpestris*. The new population of *L. dubia* is located at 1.700 m, in a small acid lake with the presence of alien fish species (*Salvelinus fontinalis* and *Salmo trutta*) which threaten the entire dragonfly community present here. A detailed distribution of *S. arctica*, *S. alpestris* and *L. dubia* in the SPA IT1202020 is reported, together with first results from semi-quantitative monitoring for these species. The checklist of the Odonata of the SPA IT1202020 is updated; three species are added (*Coenagrion puella*, *S. arctica* and *Sympetrum fonscolombii*) and the highest breeding Italian altitudinal records for *Enallagma cyathigerum* (2.289 m) and *L. dubia* (2.316 m) were reported. Main threats and pressures affecting the dragonfly community are discussed. The presence of alien fish species seems to be the main direct threat for dragonflies in the area. Finally, a preliminary mapping of the wetlands of the study area is provided." (Authors)] Address: Battisti, A.,

Parco Naturale Mont Avic. Loc. Covarey, 21, 11020 Champdepraz (AO). Italy. Email: andre.battisti@gmail.com

**21449.** Bellstedt, R.; Krebs, D. (2022): Bericht zur Gemeinschaftsexkursion des Thüringer Entomologenverbandes e.V. (TEV) im Juni 2022 im Landkreis Gotha. *Mitteilungen des Thüringer Entomologenverbandes* 29(2): 135-200. (in German) [On page 153, *Coenagrion puella*, *Enallagma cyathigerum* and *Pyrrhosoma nymphula* are listed.] Address: Bellstedt, R., Brühl 2, 99867 Gotha, Germany. Email: ronald.bellstedt@t-online.de

**21450.** Boieiro, M.; Antunes, S.; Figueiredo, H.; Soares, A.; Lopes, A.; Monteiro, E.; Garcia Pereira, P.; Rego, C.; Conde, J.; Borges, P.A.V.; Serrano, A.R.M. (2022): Standardised inventories of lepidopterans and odonates from Serra da Estrela Natural Park (Portugal) - setting the scene for mountain biodiversity monitoring. *Biodiversity Data Journal* 11: e99558: 22 pp. (in English) ["Background: Mountain insect biodiversity is unique, but is menaced by different drivers, particularly climate and land-use changes. In mainland Portugal, the highest mountain - Serra da Estrela - is one of the most important biodiversity hotspots, being classified as Natural Park since 1976. Many lepidopteran and odonate species, including rare and protected species, are known to occur in Serra da Estrela, but basic knowledge on their abundance, distribution and ecology is still lacking. Standardised sampling of these communities is crucial to provide valuable biological information to support short-term decision-making for conservation management, setting simultaneously the standards for mountain biodiversity monitoring aiming to tackle the effects of environmental change in the long-term. New information: This study reports novel information on lepidopteran and odonate species diversity, distribution and abundance from Serra da Estrela Natural Park (Portugal). Seventy-two lepidopteran and 26 odonate species were sampled in this protected area, including the first findings of *Apatura ilia* (Denis & Schiffermüller, 1775), *Macromia splendens* (Pictet, 1843) and *Vanessa virginiensis* (Drury, 1773). New populations of *Euphydryas aurinia* (Rottemburg, 1775) and *Oxygastra curtisii* (Dale, 1834), protected species under the Habitats Directive, were found in this Natural Park and novel distribution and ecological data were collected for most species, including several rare species and subspecies [e.g. *Aeshna juncea* (Linnaeus, 1758), *Coenonympha glycerion iphioides* Staudinger, 1870, *Cyaniris semiargus* (Rottemburg, 1775) and *Sympetrum flavoolum* (Linnaeus, 1758)]. All data were collected using standardised sampling allowing its use as a baseline for biodiversity monitoring in Serra da Estrela." (Authors)] Address: Mário Boieiro, M., Centre for Ecology, Evolution and Environmental Changes (cE3c)/Azorean Biodiversity Group, CHANGE – Global Change and Sustainability Institute, Fac. of Agricultural Sciences & Environment, Univ. of the Azores, Angra do Heroísmo, Azores, Portugal. Email: mrboieiro@fc.ul.pt

**21451.** Bos, G. (2022): Het libellenmeetnet bestaat 25 jaar! *Vlinders* 3 2022: 4-6. (in Dutch) ["The year 2022 marks the twenty-fifth counting season of the dragonfly monitoring network. A milestone that we dwell on at length in this issue of *Butterflies*. Because together we have achieved a lot. After eight years of growth, enthusiasm initially seemed to wane. But since 2016, the number of routes has been on the rise again. Presumably, increasing attention to insect decline has contributed to this. After all, only long-term monitoring can capture such a trend. And that is exactly what we are doing with our dedicated dragonfly counters!" Translated

with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)] Address: not stated

**21452.** Casanueva, P.; Santamaría, T.; Sánchez -Sastre, L.F.; Hernández, A.A.; Campos, F. (2022): Distribución de especies del género *Sympetrum* Newman, 1833 (Odonata, Libellulidae) en Castilla y León, NW de España - Distribution of species of the *Sympetrum* Newman, 1833 genus (Odonata, Libellulidae) in Castilla and León, NW Spain. *Boln. Asoc. Esp. Ent.* 46(3-4): 283-290. (in Spanish, with English summary) ["The geographic distribution of dragonflies in the Iberian Peninsula has been abundantly analyzed in recent years, though a vast area of the NW has been little studied to date. This paper presents the distribution of species of the *Sympetrum* genus (Odonata, Libellulidae) in the basin of the Duero River, Spain, where many variations in climate and orographic conditions are found. Six species have been recorded: *S. fonscolombii*, *S. meridionale*, *S. sanguineum*, *S. striolatum*, *S. vulgatum* and *S. flaveolum*. A generalized linear model with data of altitude above sea level, latitude, mean air temperature, and annual rainfall obtained in 25 sampling points showed that these four factors together explain the distribution of *S. fonscolombii*, *S. striolatum* and, above all, *S. sanguineum*. The distribution of *S. meridionale* is influenced by latitude and annual rainfall. In the area of study, the species *S. vulgatum* and *S. flaveolum* are associated above all with mountain zones." (Authors)] Address: Casanueva, Patricia, Depto de Ciencias Experimentales, Universidad Europea Miguel de Cervantes, 47012 Valladolid, Spain. E-mail PC: [pcasanueva@uemc.es](mailto:pcasanueva@uemc.es)

**21453.** Castillo-Pérez, U.; Suárez-Tovar, C.M.; González-Tokman, D.; Schondube, J.E.; Córdoba-Aguilar, A. (2022): Insect thermal limits in warm and perturbed habitats: Dragonflies and damselflies as study cases. *Journal of Thermal Biology* 103, 103164: (in English) ["Highlights: • Loss of plant cover increases ambient temperature thereby affecting insect survival. We compared temperature and thermal limit in odonates related to body size, "conserved" vs "perturbed" habitat and suborder. Anisopterans had a higher temperature than zygopterans, with no difference between habitats. Zygopterans had higher thermal limits in a perturbed site while anisopterans had the opposite trend. Zygopterans appear more strongly affected by ambient temperature than anisopterans. Abstract: Disturbance (e.g. loss of plant cover) increases ambient temperature which can be lethal for ectotherm insects especially in hot places. We compared the thorax temperatures of 26 odonate species as a function of body size, habitat quality ("conserved" and cooler vs "perturbed" and warmer) and suborder (Anisoptera vs Zygoptera), as well as critical thermal maximum (CTmax) and as a function of habitat quality in *Argia pulla* (Zygoptera) and *Orthemis ferruginea* (Anisoptera). We expected thorax temperatures to differ between suborders based on their differences in body size and habitat quality status, and that populations in perturbed sites would have higher critical thermal maxima compared to those in conserved sites. This study was done in a tropical region with high ambient temperatures. Anisopterans had a higher body temperature than zygopterans, with no difference between habitats. Thoracic and air temperature were positively related, yet body temperatures were higher than the ambient temperature. *A. pulla* had higher CTmax in the perturbed sites, while *O. ferruginea* showed the opposite trend. Microenvironmental changes increase the ambient temperature, perhaps filtering insect species. The apparent resilience of odonates to disturbance should be examined more closely (using more species), especially in small species like the zygopterans

which appear to be more strongly affected by ambient temperature." (Authors)] Address: Córdoba-Aguilar, A., Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Circuito Exterior, Ciudad Universitaria, Coyoacán, 04510, México City, Mexico. Email: [acordoba@iecologia.unam.mx](mailto:acordoba@iecologia.unam.mx)

**21454.** DeBlieux, T.S.; Hoverman, J.T. (2022): Pathogens and predators: examining the separate and combined effects of natural enemies on assemblage structure. *Oecologia* 200: 307-322. (in English) ["Natural enemy ecology strives to unify predator-prey and host-pathogen interactions under a common framework to gain insights into community- and ecosystem-level processes. To address this goal, ecologists need a greater emphasis on: (1) quantifying pathogen-mediated effects on community structure to enable comparisons with predator-mediated effects and (2) determining the interactive effects of combined natural enemies on communities. We conducted a mesocosm experiment to assess the individual and combined effects of predators (dragonfly larvae and adult water bugs) and a pathogen (ranavirus) on the abundance and composition of a larval amphibian assemblage. We found that our three natural enemies structured victim assemblages in unique ways, producing distinct assemblages. Additionally, we found that in combination treatments, predators mainly drove assemblage structure such that the assemblages most closely resembled their respective predator treatments. We also found that predators reduced infection prevalence in combination treatments, and that the magnitude of this effect was dependent on predator identity. Compared to virus-alone treatments, the presence of dragonflies and water bugs reduced infection prevalence by 79% and 63%, respectively. Additionally, the presence of dragonflies eliminated ranavirus infection in two species, which demonstrates the prominent role of predators in disease dynamics in this system. Overall, this work demonstrates the importance of considering natural enemies in community ecology, as each enemy can elicit a unique structural change. Additionally, this study provides a unique empirical test of the healthy herds hypothesis for multi-species assemblages and underscores the importance of advancing our understanding of multi-enemy interactions within communities." (Authors)] Address: DeBlieux, T.S., Department of Biology, Indiana University, Bloomington, IN, 47405, USA

**21455.** Elaev, E.N.; Burdukovsky, E.N. (2022): [Amur Falcon *Falco amurensis* in southwestern Transbaikalia. Second edition. First publication in 2003]. *Russian Journal of Ornithology* 31, Express Issue 2258: 5477-5479. (in Russian) ["Arthropods in the diet are mainly represented by insects, spiders make up 25.0% of all arthropod remains. The determination of insects by the remains, carried out by T.Kh. Nikitina, showed the presence in the diet of representatives of Odonata, Orthoptera, Coleoptera (Elateridae, Carabidae, Scarabidae, Cerambycidae, etc.), which the falcons catch mainly on the fly, rarely take from the ground." (Authors)] Address: not stated

**21456.** Eslami, Z.; Sadeghi, S.; Ebrahimi, M. (2022): Demographic characteristics of *Ichnura elegans* (Vander Linden, 1820) (Odonata: Coenagrionidae) in arid regions: sex and female morphs differences in survival and capture probabilities, space use patterns and spatial density. *Aquatic Insects* 44(1): 64-78. (in English) ["We used the mark-recapture method to gather fundamental information on the population dynamics of *I. elegans* in an arid region of central

Iran. *I. elegans* expresses female-limited colour polymorphism. We investigated sex and female morphs differences in survival and capture probabilities, space use patterns, and spatial density. We used Cormack–Jolly–Seber and spatial capture-recapture models. The estimated capture probability for males was lower than females. The survival probability was not different between either males and females or gynomorphs and andromorphs. We found support for sex differences in density and detection probability, and female morphs differences in density, space use and detection probability. Based on our results the extreme conditions of arid regions can lead to a male-biased dispersal. Our findings also confirm the existence of behavioral differences between andromorph and gynomorph females and suggest a within species spatial habitat partitioning." (Author)] Address: Eslami, Zohre, Dept Biology, Fac. Sciences, Shiraz Univ., Shiraz, Iran. Email: eslami.zohre86@gmail.com

**21457.** Fischer, S. (2022): Vorkommen von Libellen (Odonata) an Gräben im Zerbster Ackerland (Sachsen-Anhalt). *Entomol. Mitt. Sachsen-Anhalt* 30(2): 85-102. (in German, with English summary) ["Occurrence of Odonata at ditches in the Zerbst farmland (Saxony-Anhalt). During surveys of ditches in the intensively farmed Zerbst Land (district of Anhalt-Bitterfeld) between 2018 and 2021, a total of 26 Odonata species was found. Of these, nine were certainly native and four others were probably native. Compared to the dragonfly atlas for Saxony-Anhalt, there were new records of 13 species for the TK 25 sheet 4038. Outstanding were the occurrences of *Coenagrion mercuriale*, *Ischnura pumilio* and *Orthetrum coerulescens*. As the occurrence of *C. mercuriale* is one of only a few east of the Elbe river, a search for this species was conducted in the vicinity of the study area and on further ditches within the study area in 2021 and 2022, whereby a larger occurrence was found near Leitzkau (district of Jerichower Land) and single specimen near Zerbst and Mühlstedt, respectively.] Address: Fischer, S., Unter den Eichen 1a, 14641 Paulinenaue, Germany. Email: fischer@dda-web.de

**21458.** Gazzola, A.; Guadin, B.; Balestrieri, A.; Pellitteri-Rosa, D. (2022): Multimodal cues do not improve predator recognition in Green Toad Tadpoles. *Animals* 2022, 12, 2603. 10 pp. (in English) ["Simple Summary: Tadpoles are known to use their sense of smell to detect the presence of predators, but some studies showed their reliance on vision during social interaction, suggesting that vision might have a role in predatory contexts as well. Here, we investigated how chemical or visual cues of a native predator, or a combination of both, influence the defensive behaviour of green toad tadpoles. We expected tadpoles to reduce their activity when exposed to chemical cues and avoid the area of the experimental arena near to the caged predator when exposed to the visual ones. With both cues, we expected tadpoles to show both responses and with greater intensity. Our results indicate that visual cues alone do not elicit any apparent defensive response, suggesting that tadpoles mainly rely on chemical cues to assess predation risk. Abstract: The anti-predator behaviour of green toad (*Bufo balearicus*) tadpoles was investigated by exposing them to only the visual or chemical cues, or a combination of both, of a native predator, *Aeshna cyanea*. We collected green toad egg strings in the field and tadpoles did not receive any predatory stimulus before the onset of the experiment. To manipulate chemical and visual cues independently, dragonfly larvae were caged inside a transparent plastic container, while chemical cues (odour of tadpole-fed dragonfly larvae) were injected into the surrounding arena. An empty container

and water were used, respectively, as controls. The behaviour of individually tested tadpoles was videorecorded for 40 min, of which 20 were before their exposure to stimuli. Five second-distance frames were compared to assess both tadpole activity and position within the arena with respect to the visual stimulus. The tadpole level of activity strongly decreased after exposure to either chemical cues alone or in combination with visual cues, while visual cues alone apparently did not elicit any defensive response. The position of tadpoles inside the arena was not affected by visual cues, suggesting that green toad tadpoles mainly rely on olfactory cues to assess the level of predation risk." (Authors)] Address: Pellitteri-Rosa, D., Department of Earth & Environmental Sciences, Univ. of Pavia, 27100 Pavia, Italy. Email: daniele.pellitterirosa@unipv.it

**21459.** Goshami, G.; Halder, M.; Mahfuz, I.; Mahdi, S.H.A. (2022): Relative abundance and diversity of arthropods in the maize (*Zea mays* L.) field of Kharkhari, Rajshahi, Bangladesh. *International Journal of Entomology Research* 7(12): 153-160. (in English) ["Maize represents the most important grain crop. Abundance and diversity of arthropods in the maize field of Kharkhari, Rajshahi were studied from February 2019 to May 2019 which allows a closer look in biodiversity in maize crops. In the study area, a total of 1103 specimens were recorded under 11 Orders. The total number of identified specimen (N) and their relative abundance (%) were recorded as in Odonata (39, 3.54 %), Lepidoptera (74, 6.71 %), Coleoptera (181, 16.41 %), Hymenoptera (363, 32.91 %), Diptera (178, 16.14 %), Dermaptera (20, 1.81 %), Araneae (52, 4.71 %), Hemiptera (33, 2.99 %), Orthoptera (55, 4.99 %), Blattodea (1, 0.09 %) and Diplopoda (107, 9.70%). Among the collected specimen the status of Coleoptera, Hymenoptera, Diptera and Diplopoda were very common (VC); Lepidoptera, Orthoptera and Araneae were common (C); Odonata and Hemiptera were fairly common (FC); Dermaptera was rare (R) and Blattodea was very rare (VR). Diversity indices of Shannon (H), Simpson (1-D) and Margalef (DMg) were 1.96, 0.82 and 1.43, respectively. Menhinick richness (DMn), Berger-Parker dominance (d) and Pielous evenness index (J) were 0.33, 0.33 and 0.82, respectively. As the dragonfly and damselfly are excellent bio-indicator, survey of their populations at regular intervals may provide important biological information about the ecological condition of the study area." (Authors)] Address: Mahfuz, I., Dep Zool., Fac. of Biological Sciences, Univ. of Rajshahi, Bangladesh

**21460.** Hemnani, M.; Campos Guimarães, I.S.; Kaefer, I.L.; Pires, T.H. (2022): Alarm reaction depends on multiple chemical cues in tadpoles of the cane toad (*Rhinella marina*). *Ethology Ecology & Evolution* 35(3): 363-375. (in English) ["Early detection of predators is fundamental for the survival of the prey. Predator detection can occur by perception of the chemical substances released by predators or injured conspecifics, granting prey the opportunity to avoid the attack. However, overreacting to cues can generate false alarm reactions that result in fruitless energetic costs. Given that chemical cues in natural habitats rarely occur singly, individuals can benefit from obtaining information from multiple sources, such as the combined chemical cues from predators and conspecifics. We experimentally tested the movement reaction of cane toad (*Rhinella marina*) tadpoles when in contact with isolated chemical cues from a conspecific, a predator (dragonfly larvae), and the combination of these two substances. We quantified duration of swimming activity before and after the exposure to the chemical cues and compared it to a control group. A significant reduction in swimming activity was only observed

when the tadpoles were exposed to the combination of both cue types. Our results suggest that the tadpoles can recognise the chemical cues from conspecifics and predators, but a behavioural response is only elicited when both stimuli are detected simultaneously. We suggest that behavioural change in response to predation threat in *R. marina* is a compromise between early detection of predators and avoidance of unnecessary energetic expenditures." (Authors)] Address: Hemnani, Mahima, Depto de Biologia, Universidade Federal do Amazonas, Instituto de Ciências Biológicas, Programa de Pós-Graduação em Zoologia, Manaus, Brasil. Email: hemnanimahi@gmail.com

**21461.** Houghton, D.C.; Flaherty, E.; Sollie, D.; Lardner, R. (2022): Seasonal changes of benthic macroinvertebrate functional feeding group biomass within forest and meadow habitats of a first-order Michigan (USA) stream. *The Great Lakes Entomologist* 55(2): 66-75. (in English) ["Little is known about seasonal changes in stream benthic macroinvertebrate assemblages. We determined the ash-free dry mass of macroinvertebrates within a forested and a meadow reach of Fairbanks Creek in northern Lower Michigan throughout all seasons of 2018 and 2019. The macroinvertebrate assemblage of the forested reach was dominated by invertebrates in the shredder functional feeding group (FFG), whereas the meadow reach was composed primarily of scrapers and filtering collectors. Regardless of reach, the biomass of all FFGs was low during the winter and early spring, peaked in May or June, and gradually declined throughout the summer and fall. General trends in biomass were the same for both years of the study, although 2018 had overall higher biomass despite being a slightly cooler year." (Authors) Aeshnidae, Corduliidae, Libellulidae] Address: Houghton, D.C., Dept of Biol., Hillsdale Coll., 33 East College Street, Hillsdale, MI 49242 USA. Email: dhoughton@hillsdale.edu

**21462.** Khare, V.; Kamle, S. (2022): Biomimicking and evaluation of dragonfly wing morphology with polypropylene nanocomposites. *Acta Mechanica Sinica* 38(12):1431. (in English) ["Dragonfly hindwing inspired two different flapping wing morphologies are investigated for flexible flapping wing micro air vehicles (FWMAV) applications. The Wing skin is developed using 1% functionalized carbon nanotubes reinforced polypropylene nanocomposites with carbon fiber epoxy composite strands as venation pattern. The resonance frequencies are the fundamental information for biomimicking and were calculated theoretically from stiffness data. Bending dominated first natural frequency was obtained from flexural stiffness data and found close to the flapping frequency of natural dragonfly hindwing. Twisting dominated second natural frequency was obtained from torsional stiffness which revealed that the artificial wings can be fabricated thinner. The flapping frequency of artificial wings is unaffected by the twisting deformation. The bending and twisting dominated mode shapes are also studied using DIC system. To verify the static and dynamic results, finite element simulations are performed that agree with experimental findings. It was found that proposed flexible nanocomposite wing skin can control the bending and twisting dominated frequencies by tailoring the wing morphology and without affecting the mode shapes of deformation." (Authors)] Address: Khare, V., Advanced Materials & Structures Laboratory, Department of Aerospace Engineering, Indian Institute of Technology Kanpur, India-208002. E-mail: vi-vekkh@iitk.ac.in

**21463.** Liu, Y. (2022): Aquatic assemblages: improving dragonfly habitat and water quality in an urban park. MSc.

thesis, Landscape Architecture, Department of Landscape Architecture of the Rhode Island School of Design, Providence, Rhode Island.: 41 pp. (in English) ["Many scientists have claimed that we are entering into the sixth mass extinction. According to IUCN, about 16% of the 6,016 species of dragonflies and damselflies are at risk of extinction. Dragonfly occupies an essential link in the food chain. Fluctuations in dragonfly numbers can affect the numbers of other species, such as mosquitoes and birds. Dragonflies are also closely related to the health of the water environment. Healthy water bodies can attract more and different species of dragonflies and other aquatic animals. Dragonflies' decline is a symptom of widespread loss of the marshes, swamps, and free-flowing rivers they breed in, driven mainly by the expansion of unsustainable agriculture and urbanization around the globe. In addition to impacting habitat, urbanization has led to severe stormwater issues that impair the health of our rivers and oceans. My thesis aims to address three interrelated issues: restoration of aquatic insect habitat in urban areas, stormwater runoff, and education about species decline. To explore these issues, I focus on Roger Williams park, which has the potential to be high-quality habitat for dragonflies and other animals. However, currently the ponds in the park lack ecological diversity and have serious water quality issues due to stormwater runoff. To address these issues, I propose a series of rock berms in the ponds that change the direction of the water flow. Wetland plants along the berms will help clean the water as it flows through them. In addition, the berms will allow people to walk out into the pond to experience the wetlands and an educational installation that lists species of dragonflies that have gone extinct to help raise awareness about biodiversity loss. Ultimately, rock berms could be developed into a solution to urban stormwater and provide habitats for insects and other aquatic animals in different places." (Author)] Address: not stated

**21464.** Louboutin, B.; Krieg-Jacquier, R.; Ruffoni, A. (2022): Journées odonatologiques 2022 dans les Hautes-Pyrénées. *Insectes* 206: 30-32. (in French) [<https://www.insectes.org/blog/les-journees-odonatologiques-dans-les-hautes-pyrenees-en-2022-n46>] Address: Krieg-Jacquier, R., 18 rue de la Maçonne, 73000 Barberaz, France. E-mail: regis.krieg-jacquier@gmail.com

**21465.** Monzo, J.C.; Verdu, J.R. (2022): Effects of restoration and management of Mediterranean traditional water systems on Odonata alpha diversity: a long-term monitoring survey. *Biodiversity and Conservation* 31: 227-243. (in English) ["The progressive abandonment and disappearance of traditional water uses and management of wetlands during the twentieth century has led not only to a loss of identity, heritage, and landscape values, but also to significant declines in the diversity and abundance of many organisms. Here, we take advantage of an existing project for the restoration and management of traditional irrigation infrastructures in the wetland of El Prado (Pinoso, SE Spain) to evaluate the spatio-temporal effect of this action on the alpha diversity and abundance of Odonata. The wetland was organized in different sectors according to the coverage of riparian and aquatic vegetation, width and depth of watercourses, ditches and ponds, water flow, and restoration and management. Odonates were sampled every month for ten years. We used alpha diversity to measure biodiversity using Hill's number diversity. To analyse how alpha diversity measures varied across all sectors sampled over the years, we determined diversity-time relationships. To assess the effects of the different variables on odonate biodiversity we used partial least squares regressions. Our results showed



that restoration of traditional water infrastructures, encouraging the increase of aquatic vegetation cover, an adequate and regular management of riparian vegetation naturalizing the margins, as well as reducing speed of water flow have a positive effect on odonate diversity and abundance. Our study provides useful information for conservation and management of semi-arid wetlands and its associated water infrastructures by showing which actions are most successful to enhance biodiversity in one of the priority habitats for conservation in Europe." (Authors)] Address: Verdú, J.R., Research Institute CIBIO, Universidad de Alicante, San Vicente del Raspeig, 03690, Alicante, Spain

**21466.** Moreno-Domínguez, R.; Maccracken, A.; Santos, A.A. de; Wappler, T. (2022): Plant–insect interactions from the Late Oligocene of Spain (La Val fossil site, Estadilla, Huesca) and their palaeoclimatological implications. *Palaeogeography, Palaeoclimatology, Palaeoecology* Volume 586, 15 January 2022, 110782: (in English) ["Highlights: •Reports plant–insect interactions from an Iberian Peninsula Oligocene deposit. •Herbivore interactions decrease in number and richness in the youngest horizons. •A decrease in galling diversity is also observed in the youngest horizons. •Changes in herbivory across horizons may reflect an increase in humidity through time. •The data provide context for previously reported European plant–insect associations. Abstract: Trace fossils of insect herbivory are an important tool, which provide evidence for palaeoecological and palaeoclimatic interpretations, as well as being a unique and direct record of the plant–insect interactions in the geologic past. In the Iberian Peninsula, these types of surveys have been scarce and purely descriptive. The La Val fossil site is an interesting, new megafloora assemblage from the Late Oligocene of Spain, which encompasses numerous plant–insect interactions and their palaeoclimatic and palaeoecological implications. A total of 1337 fossil specimens from 13 stratigraphic levels were analyzed for this study. We identified 28 different types of plant–insect interactions belonging to seven Functional Feeding Groups (FFGs). Hole feeding was the most common category of external-feeding insect damage, followed by margin feeding, skeletonization, and surface feeding. Among the internal-feeding FFGs, galling was the richest and most abundant FFG. All other internal-feeding FFGs were relatively uncommon: piercing/sucking, and incertae sedis (DT114). Among stratigraphic levels, the mean herbivory frequency was significantly greater at lower levels compared to the upper levels. La Val presents a marked drop in the diversity of plant–insect interactions through time, possibly due to changes in temperature or humidity levels. A marked decrease in galling diversity and a generalized decrease in interactions are observed at the youngest levels. This could be related to an increase in humidity though time in the La Val palaeoforest, since modern xeric environments favour the proliferation of galls." (Authors)] Address: Moreno-Domínguez, R., Área de Paleontología, Depto de Ciencias de la Tierra, Univ. de Zaragoza, Zaragoza, Spain. Email: rafaelmanuel.morenodominguez@gmail.com

**21467.** Nel, A. (2022): The second European representative of the epallagid genus *Labandeiraia* in the lowermost Eocene Oise amber (Odonata, Zygoptera). *Palaeoentomology* 5.6.3: 520-523. (in English) ["Among the calopteran damselflies, the family Epallagidae was clearly dominating the diversity of the Holarctic Cenozoic (11 described species in eight extinct genera), while the Calopterygidae were extremely rare at the same time (six Cenozoic species in two extant and one fossil genera) (Fossilworks database at <http://www.fossilworks.org/cgi-bin/bridge.pl?action=home>,

consulted 21/10/2022). They mainly belonged to the extinct subfamily Eodichrominae Cockerell, 1923, and their most diverse genus was the early Eocene genus *Labandeiraia* Petrulevicius et al., 2007, known from compression fossils from the lacustrine Green River Formation (USA) and the marine Fur Formation in Denmark (Petrulevicius et al., 2007; Bechly et al., 2020)." (Author)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**21468.** Nel, A.; Nam, G.-S.; Coentyn, J. (2022): First representative of the odonatan superfamily Triassolettoidea (Odonatoptera: Parazygoptera) from the Upper Triassic of the Korean Peninsula. *Alcheringa* 46(3/4): 237-243. (in English) ["*Koreatriassothemis elongatus* gen. et sp. nov. is the first representative of the odonatan superfamily Triassolettoidea described from the Upper Triassic of the Republic of Korea. Despite close similarities with the genera *Pseudotriassothemis* and *Triassoneura*, exact affinities within Triassolettoidea remain uncertain, thus discoveries of more complete triassolettoideid fossils are required to resolve relationships. The identification of *K. elongatus* gen. et sp. nov. shows that Odonatoptera and Triassolettoidea diversity was high during the Late Triassic and is currently underestimated. A 'Samarura-like' odonopteran nymph is also identified from the same Upper Triassic outcrop, and may be referable to *K. elongatus* gen. et sp. nov." (Authors)] Address: Nam, Gi-Soo, Gongju Nat. Univ. Education, Gongju, Chungcheongnam-do 32553, Republic of Korea. Email: nks33@naver.com

**21469.** Nel, A. (2022): Revision of the two small damselflies *Eopodagrion scudderi* Cockerell, 1921 and *Eopodagrion 'Podagrion' abortivum* (Scudder, 1878) (Odonata, Zygoptera) from the lower Eocene of Green River Formation (USA). *Palaeoentomology* 5.6.3: 537-544. (in English) ["Two early Eocene damselfly taxa *Eopodagrion scudderi* Cockerell, 1921 and *Eopodagrion 'Podagrion' abortivum* (Scudder, 1878) are redescribed and refigured. Their phylogenetic relationships are discussed. Although they could likely belong to the Coenagrionidae, their exact affinities remain uncertain because of the presence of homoplasies affecting crucial characters among the Zygoptera." (Author)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**21470.** Palacino-Rodríguez, F.; Cordero-Rivera, A.; Palacino, D.A.; Penagos, A.C. (2022): Captive breeding of odonate larvae: effects of type of water, handling, and sex. *Entomologia Experimentalis et Applicata* 170(6): 505-512. (in English) "Basic information on life histories, ecology, and behaviour for aquatic stages in many species of insects is difficult to obtain in the field. Here, a method to breed and monitor Odonata individual larvae in captivity is proposed. In total, 3788 individuals of six Odonata species – *Rhionaeschna marchali*, *Erythrodiplax abjecta*, *Sympetrum gilvum*, *Ischnura chingaza*, *I. cruzi*, and *Mesamphiagrion laterale* – were reared individually in water-filled plastic containers, whose size was increased to fit larval growth, at ambient temperature (12–34 °C, 12 h light per day, ca. 300 lux, and ad libitum food). We tested the effects of water type (habitat, dechlorinated tap water, and drinking water), handling method, and sex on larval developmental time and number of instars. The number of instars was calculated as the mean number of moults for the individuals that successfully emerged as adults. Life cycle length was calculated by averaging the days over individuals that completed their development until emergence. The probability of achieving the adult stage was not significantly affected by the type of water, sex, or

handling method. On the other hand, the number of instars was affected by species identity, and type of water, with fewer instars in water from the natural habitat, but not affected by sex or handling method. The duration of the life cycle was bimodal in most species, and was affected by type of water, but in an idiosyncratic, species-specific way. The methodology proposed here allows monitoring and breeding large numbers of odonate larvae." (Authors)] Address: Palacino-Rodríguez, F., Grupo de Investigación en Odonatos y otros artrópodos de Colombia (GINOCO), Centro de Investigación en Acarología, Calle 152B # 55-45, Bogotá, Colombia. E-mail: odonata107@gmail.com

**21471.** Pawlaczyk, P.; Bednarek, P.; Dziadowiec, R.; Banaszak, K.; Grzesiak, K.; Jermaczek, A.; Krzysków, T.; Les, E.; Naks, P.; Sierakowski, P.; Zyla, P. (2022): Program ochrony Rzeki Bogadicy w województwie opolskim. Wydawnictwo Klubu Przyrodników, Opolskie: 124 pp. (in Polish, with English summary) ["The Bogacica River is ca 40 km long tributary of the Stobrawa in Odra river basin. The publication presents a program of river conservation measures, developed for the Opolskie Voivodeship - the local authority responsible, among others, for landscape protection, including protected areas: Stobrawa Landscape Park and the Stobrowsko-Turawskie Forests Protected Landscape Area, covering almost the entire course of the river. According to Polish law, the environmental objectives set by the Opolskie Voivodeship for these areas become, as far as the river is concerned, environmental objectives in the sense of the Water Law and are binding for the river manager (PGW Wody Polskie). The nature of the river varies; the river has been intensively transformed since the 19th century (chapter 4.1); currently, more natural sections alternate with more strongly transformed ones (photos 1-10, fig. 9, photos 12-14). The average flow is 1.01 m<sup>3</sup>/s, but it decreases in the long term (fig. 2), probably due to climate change and excessive water abstraction for fish ponds. The phenomenon of river flooding disappears. The river valley has maintained substantial natural values (Chapter 3). A section of the river is proposed to be designed as a nature reserve. Artificial fish ponds host (chapter 4.2) also significant natural values, although water intake for these ponds is a problem in river management. River management planning is currently based on the assessment of its ecological status according to the data of the National Water Monitoring, and the river is divided into two water bodies (RW600019132499, RW600017132449). However, diagnostic monitoring was not carried out at all for the upper part of the river, and most of the required quality elements were not tested in the lower part, making the assessments unreliable. More detailed field studies (hydromorphology, macrophytes, fish, benthos - Chapter 2) show that the condition of individual elements varies along the course of the river and data from a single monitoring site are not representative for the entire river. The objectives of the program of conservation measures should include, in addition to general environmental objectives, the following: maintaining of natural values, maintaining of river flow, restoration of ecological continuity, achieving more natural hydromorphology, riverside afforestation and developing of buffer zones, ensuring self-maintenance of the river bed (chapter 6.2). The following measures are proposed: areal water retention and restoration of wetlands in the catchment (but not construction of reservoirs in the river course!), adjusting water abstraction permits to the requirement of maintenance of environmental flow, removing or mitigating lateral barriers, modification of the river maintenance scheme, introduction of trees on the banks, introduction of small structures imitating natural ones in the river bed, maintaining

of the river's free migration corridor, point restoration of the function of the oxbow lake (chapter 6.3, fig. 31-33)." In the course of research on the odonatafauna of the in Opole, in 2015 and 2021, 16 species of dragonflies were found in the catchment area of Bogacica (Dragonflies Observation Database of the Nature Dept of the Museum of Opole Silesia in Opole - obser. Piotr Zablocki, Michal Wolny). Among the dragonflies associated with the river itself, two protected species deserve attention - *Ophiogomphus cecilia* and *Cordulegaster boltonii*. *O. cecilia* observed near Radomierowice, Swieciny and Domaradzka Kuznia is a species listed in Annex II of the Habitats Directive, while *C. boltonii* found near Swieciny is a species from the Polish Red Book (status VU; Glowacinski and Nowacki 2004). (Authors)] Address: [https://www.opolskie.pl/wp-content/uploads/2023/01/Pawlaczyk\\_et\\_al\\_2022\\_Program\\_ochrony\\_Bogacicy.pdf](https://www.opolskie.pl/wp-content/uploads/2023/01/Pawlaczyk_et_al_2022_Program_ochrony_Bogacicy.pdf)

**21472.** Phan, Q.T.; Choong, C.Y.; Karube, H. (2022): Morphological features of *Drepanosticta versicolor* (Laidlaw, 1931) from Malaysian Borneo with notes on its allied species (Odonata: Zygoptera: Platystictidae). Tombo 64: 1-7. (in English, with Japanese summary) ["This paper provides detailed illustrations of male and female structures of *D. versicolor* from Malaysian Borneo with a morphological comparison with the allied species, *D. monoceros* Lieftinck, 1965 from Borneo and *D. ceratophora* Lieftinck, 1974 from Palawan, Philippines." (Authors)] Address: Phan, Q.T., Center for Entomology & Parasitology Research, Inst. of Research & Training of Medicine, Biology & Pharmacy, Duy Tan Univ., Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

**21473.** Rodrigo de Araujo, B.; Pinto, A.P.; Padial, A.A. (2022): Influence of landscape homogenization due to river damming on dragonfly (Odonata) community structuring in a subtropical forest in the southern Atlantic Forest. *Ecohydrology* 15(3), e2419: (in English) ["Human activities affect the structure, dynamics, and energy flow of aquatic ecosystems. River damming, a common anthropic impact in Brazil, changes solar incidence, water flow, and temperature of waterbodies, thereby affecting their fauna. Due to their high sensitivity to environmental changes, the Odonata may be indicators of these impacts. We sampled two ecologically distinct sites, (1) a quasi-pristine forested area; and (2) a nearby human-impacted reservoir landscape, to evaluate the effects of damming on odonate community structure. The species composition of quasi-pristine communities was more heterogeneous and differed almost completely (indicating high turnover) from that of the reservoir-area communities. The capacity of the reservoir to maintain local fauna was almost nil. The communities in the changed landscape had the highest local diversity, which is related to the high occurrence of widespread generalist South American species. We also tested two recently proposed bioindication ratio tools based on the richness or abundance of high-level taxonomic categories; both effectively reflected the extent of the impacts of damming. The best performing ratios were *Coenagrionidae*/other Zygoptera richness ratio, *Zygoptera*/*Anisoptera* abundance ratio, and *Libellulidae*/other *Anisoptera* richness ratio. The reservoir landscape promotes biotic homogenization. However, the water supply system entails the preservation of part of the native habitat in its surrounding areas, consequently maintaining forest-dependent biodiversity in quasi-pristine environments." (Authors)] Address: Rodrigo de Araujo, B., Laboratório de Sistemática de Insetos Aquáticos (LABSIA), Depto de Zoologia, Universidade Federal do Paraná, Caixa Postal 19020, 81531-980 Curitiba, PR, Brazil. Email: breno.rda94@gmail.com

**21474.** Sasamoto, A.; Kotabe, A.; Takuma, Y.; Kawashima, I., Okude, G.; Futahashi, R. (2022): Description of larva of *Anax ephippiger* (Burmeister, 1839) from Japan, including changes and developments in external morphology (Odonata: Aeshnidae). *Tombo* 65: 28-37. (in English, with Japanese summary) ["The external morphology of larva of *A. ephippiger* from Japan is described as follows: change of morphology and coloration/markings from 1st to final instar; the detail external morphology of final instar; developmental change of final instar larva. These are compared with the previous studies of this species, as well as other species of *Anax*." (Authors)] Address: Sasamoto, A., Tawaramoto-cho, Shikigun, Nara Pref., Japan. Email: aksmt@sea.plala.or.jp

**21475.** Setyawati, M.; Triatmanto, D. (2022): Keanekaragaman capung (Odonata) di Kawasan Gunung Api Purba Nglanggeran, Kabupaten Gunungkidul. *Bioscientist* 10(2): 809-817. (in Indonesian, with English summary) ["This study aims to determine the types of dragonflies and the level of diversity of dragonfly species in the Nglanggeran Ancient Volcano Area, Patuk Kapanewon, Gunungkidul Regency. This research is a descriptive observational study, with accidental sampling technique. The research was conducted in March-May 2021 in the Nglanggeran Ancient Volcano Area, Patuk Kapanewon, Gunungkidul Regency. Observations were made at 08.00-16.00 WITA. The results found 11 species: *Gynacantha subinterrupta*, *Agrionoptera insignis*, *Diplacodes trivialis*, *Lathrecista asiatica*, *Neurothemis rambutii*, *Neurothemis terminata*, *Orthertrum sabina*, *Pantala flavescens*, *Potamarcha congener*, and *Zyxomma obtusum*, and *Copera marginipes*. The diversity level of dragonflies in the Nglanggeran Ancient Volcano Region according to the Shannon-Whiener ( $H'$ ) diversity index is in the medium category, with a value of 1.65." (Authors)] Address: Setyawati, M., Program Studi Biologi, FMIPA, Univ. Negeri Yogyakarta, Indonesia. Email: megasetyawati.2017@student.uny.ac.id

**21476.** Smallshire, D.; Swach, A. (auteurs); Koenig, O. (trad.) (2022): Guide photo des Libellules d'Europe. Guide Delachaux, Del. & Niestl., Paris: 360 pp. (in French) [<https://www.delachauxetniestle.com/livre/guide-photo-des-libellules-deurope>]

**21477.** Somal, D.S.; Walia, G.K (2022): Cytological study of family Aeshnidae (Odonata: Anisoptera) from India: A review. *Biosciences Biotechnology Research Asia* 19(4): 843-855. (in English) ["Cytological review of 59 aeshnid species and cytogenetic investigations on *Anax ephippiger*, *Anax immaculifrons*, *Anax indicus*, *Anax nigrofasciatus nigrolineatus*, *Anax parthenope*, *Gynacantha subinterrupta* of the family Aeshnidae by carbol fuchsin staining 20023 and C - banding have been under taken. All the species possess  $2n = 27m$  with X0 - XX sex determination except *Anax ephippiger* with  $2n = 14 + neo XY$ , resulted by the 13 simultaneous fusions among the autosomes and between autosome and sex chromosome. The structure and behaviour of chromosomes, variation in size of m chromosomes and X chromosome and distribution of C - heterochromatin have been studied and compared among the species. C - bands are mostly present at the terminal regions of autosomal bivalents, while *Anax ephippiger* and *Anax parthenope* also possess C - bands at the interstitial and sub-terminal regions of the bivalents. Moreover, sex chromosome and m bivalent show variation in distribution of C-heterochromatin in the species. Out of these, chromosome complement of *Anax indicus* Lieftinck, 1942 and C - banding on *Anax ephippiger* and *Anax indicus* have been investigated for the first time. List of cytologically studied species of family Aeshnidae has

been updated to 60 species." (Authors)] Address: Walia, Gurinder Kaur, Dept Zool. & Environmental Sciences, Punjab Univ. Patiala, Punjab, India. Email: gurinderkaur\_walia@yahoo.co.in

**21478.** Theivaprakasham, H.; Darshana, S.; Ravi, V.; Sowmya, V.; Gopalakrishnan, E.A.; Soman, K.P. (2022): Odonata identification using Customized Convolutional Neural Networks. *Expert Systems with Applications* 206, 15 November 2022, 117688: (in English) ["Highlights: • We introduce a large-scale research-grade odonates image dataset. • Detailed investigation on CNN models for various input image resolutions. • Customized DenseNet161 (450px × 450px) had the highest top-1 accuracy. • Class Activation Map analysis was performed to evaluate the CNN models. Abstract: Alarming decline of the Odonates population needs urgent conservation efforts to balance nature's food cycle and to reduce the negative impact on humans such as increasing the mosquito borne diseases. The existing odonates identification approaches are not efficient and are mainly based on domain expertise which is highly time-consuming and expensive. The fast-growing Artificial Intelligence technologies have shown impressive solutions to many real-world problems including wildlife conservation and management. In this study, we proposed the use of Convolutional Neural Networks (CNN) for the identification of odonates. Firstly, we create a large Odonates image dataset comprising of 64,176 images belonging to 256 species of odonates. Secondly, we employ nine Customized CNN architectures namely AlexNet, DenseNet121, DenseNet161, DenseNet201, ResNet18, ResNet101, ResNet152, SqueezeNet v1.1, and VGG19 to train our odonates image dataset. Finally, we then compared and empirically studied the performance of our proposed CNN architectures at various image resolutions (224px × 224px, 350px × 350px, 450px × 450px and 550px × 550px). Our pretrained custom DenseNet161 (450px × 450px) performed with highest top-1 accuracy (93.53%), ResNet152 (224px × 224px) with the highest top-3 accuracy (98.07%), DenseNet121 (450px × 450px), and ResNet152 (224px × 224px) with highest top-5 accuracy (98.85%) and DenseNet201 (550px × 550px) with highest F1 score (86.17%). SqueezeNet v1.1 performed the least with highest top-1 accuracy of 83.3%, highest top-3 accuracy (94.24%), highest top-5 accuracy (96.59%), and the highest F1 score (77.68%). The results of our study show that odonates can be reliably and instantly identified using our proposed methodology and the customized model." (Authors)] Address: Theivaprakasham, H., Center for Computational Engineering & Networking (CEN), Amrita School of Engineering, Coimbatore, Amrita Vishwa Vidyapeetham, India. Email: cb.en.p2cen20026@cb.students.amrita.edu

**21479.** van Grunsven, R. (2022): Kempense heidelibel vindt nieuwe stek. *Vlinders* 4 2022: 14-15. (in Dutch) [Symptetrum depressiusculum; "Dragonflies regularly surprise us: some species suddenly emerge and become successful, like the graceful whitethroat dragonfly. Other species, like black heidelibel that we were not worried about at all, suddenly decline rapidly. The Kempense heidelibel makes it even bolder: it does both." (Author/DeepL)] Address: Van Grunsven, J.R., De Vlinderstichting, Mennonietenweg 10, Postbus 506, 6700 AM Wageningen, The Netherlands. Email: roy.vangrunsvan@vlinderstichting.nl

**21480.** van Grunsven, R.; Bos, G.; Manger, R. (2022): Twee soorten winterjuffers, gaat dat samen? *Vlinders* 3 2022: 8-9. (in Dutch) [Symptetrum paedisca, Symptetrum fusca; "The two species of damselflies do things just a little

differently from other damselflies. Whereas most species spend the winter as eggs or larvae, they overwinter as adult dragonflies. The other species can reproduce soon after hatching and live quite briefly as damselflies. The winter damselflies hatch in July and August, but then first go quietly to do some hunting and feeding and find a good place to spend the winter. Months later, in early spring, they only return to the water to reproduce. This way, they are larvae in summer. That is a period when there is plenty of food and the water is nice and warm, but there are also few large larvae of other damselfly species." (Authors/DeepL)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: rene@mangereco.nl

**21481.** Varadinova, E.; Sakelarieva, L.; Park, J.; Ivanov, M.; Tyufekchieva, V. (2022): Characterisation of macroinvertebrate communities in Maritsa River (South Bulgaria)—Relation to different environmental factors and ecological status assessment. *Diversity* 2022, 14, 833. 12 pp. (in English) ["A survey of the macrozoobenthos communities in the Maritsa River (South Bulgaria) was carried out in the summer of 2021. Benthic samples were collected and physico-chemical parameters (water temperature, pH, conductivity, dissolved oxygen and nutrients) were measured at 15 sites located on the main river and its tributary system. The studied sites belonged to different river types and characterised the diversity of the ecological conditions—from unaffected to anthropogenically influenced river stretches. In addition, data from a study conducted in the summer of 2020 were used to analyse species–factor interactions in the river ecosystems and to assess the bio-indicative potential of the aquatic invertebrates. The dynamics of the taxonomic composition and abundance of the macrozoobenthos were analysed in relation to environmental factors. The physicochemical conditions of the water environment changed during the period of high water, which led to a reduction in the composition of the macrozoobenthos. Plecoptera and Trichoptera decreased in richness and abundance downstream and under human impacts. Ephemeroptera and Chironomidae were permanently present along the whole river. Oligochaeta increased in the lower river reaches and at sites with a greater amount of organic matter. The ecological status determined by the macrozoobenthos varied from high (site 1) to good, moderate and bad (site 13) at the studied sites." (Authors) The study includes "Odonata".] Address: Varadinova, Emilia, Dept Geography, Ecol. & Environ. Protection, Faculty Mathematics & Natural Sci., South-West Univ. "Neofit Rilski", 66 Ivan Michailov Str., 2700 Blagoevgrad, Bulgaria. Email: emily.varadinova@gmail.com

**21482.** Westermann, K. (Ed.) (2022): Die Moorlibellen des Südschwarzwalds. Populationen und Lebensräume und ihr Schutz bei fortschreitendem Klimawandel. *Naturschutz am südlichen Oberrhein* 11: 1-248. In German, with English summary ["The moor dragonflies of the Southern Black Forest. Populations and habitats and their protection in the progressing climate change. - From 2011 to 2022, K. and E. Westermann recorded the occurrences of moor dragonfly species in the moors of the Southern Black Forest on a voluntary basis - two to three decades after the only comprehensive investigations were done by K. Sternberg. Over twelve years, around 150 moors or dystrophic ponds were visited at least once. In moors with significant populations, recordings were carried out every one to two weeks at the most and monitoring every five years has started. In some years, the monitoring was limited due to unfavourable weather conditions. In 66 areas at least one species of moor dragonflies was recorded. More than half of all moors did not have

any potential water bodies for reproduction. These moors have been significantly affected by human activity since the Middle Ages through drainage, eutrophication, afforestation, transformation into meadows and pastures or manual peat digging. Some peatlands are currently regenerating in part after renaturation measures, the discontinuation of maintenance of ditches or the settlement of beavers (*Castor fiber*). The regeneration has resulted in positive effects on the occurrence and populations of moor dragonflies, which could be clearly documented in several cases. Species were classified as "moor dragonflies" if they only develop in moor waters or in dystrophic ponds in the Southern Black Forest or if their main distribution is there. *Aeshna subarctica* and *Aeshna juncea*, *Somatochlora alpestris* and *Somatochlora arctica*, *Leucorrhinia dubia*, *Sympetrum danae* and *Coenagrion hastulatum* were identified regularly. The occurrences of *Aeshna subarctica* and *Somatochlora alpestris* are especially of supra-regional importance, and responsibility for their conservation is a priority. The last population of *Aeshna caerulea* apparently ceased to exist about 20 years ago. The populations are concentrated in the moor-rich areas around Hinterzarten, Feldberg and Oberer Hotzenwald. Over the last few decades, the moor dragonfly populations of the Southern Black Forest changed considerably less than the populations in the individual moors. Collection of exuviae was considered as the most meaningful method for recording, and was conducted if it could be carried out with reasonable effort. Proof of successful larval development is a good indicator of the condition of the moors. In years with prolonged hot and dry phases, it was mainly the water bodies in partially drained moors with low or strongly fluctuating water levels or generally flat-water bodies that dried up. As climate change progresses, such extreme weather conditions will occur more frequently, meaning that the populations of most species of moor dragonflies are severely endangered or even threatened by extinction. The further development and care of the moors and their larval waters with high occurrences of moor dragonflies, which make up a decisive part of the respective Southern Black Forest population, are therefore of outstanding importance. However, the rapid renaturation of many affected moors is of similar importance but has not been able to keep up with the progressing climate change. If possible, species protection measures should make a real contribution to stabilizing the regional population. Of primary considerations are waterlogging, deepening and enlargement of small moor ditches as well as waterlogging of former manual peat diggings. Due to climate change, a comprehensive 20-year plan for renaturation measures and the rapid implementation are required. The condition of 133 areas is briefly described and concise proposals for renaturation and species protection measures are presented. If a significant part can be considered feasible and implemented in the next 20 years, the protection of the moors of the Southern Black Forest and their organisms will probably be reasonably secured despite climate change. The Baden-Württemberg moor register is now an excellent tool that can be used to plan future measures. At least the larger or more powerful of the many peat deposits listed there should be protected from further destruction by systematic rewetting, primarily for reasons of climate and moor protection." (Authors)] Address: Westermann, K., Buchenweg 2, 79365 Rheinhaußen, Germany. E-mail: fosor@t-online.de

**21483.** White III, H.B.; White Jr., J.F.; Moore, M.C. (2022): Dragonfly biodiversity at abandoned work sites: Dredge-spoil ponds of the Chesapeake and Delaware Canal, New Castle County, Delaware. *Northeastern Naturalist* 29(2):



262-294. (in English) "There are few undisturbed, freshwater habitats remaining in the populated areas of the United States. Aquatic organisms, such as dragonflies (Odonata), have therefore either had to adapt to disturbed and modified secondary habitats, such as farms, golf courses, storm-water remediation basins, and community-park ponds, or risk extirpation. The species that readily adapt to these habitats are usually widespread common species. However, other aquatic habitats inadvertently created at abandoned work sites often evolve distinctive characteristics over time that provide refuge for species rarely or never found at deliberately created pond habitats. For 17 years, we have monitored the diverse Odonata fauna at several floristically distinct ponds formed in depressions left from the dredging of the Chesapeake and Delaware Canal in the 1960s. Among the species found are ones not known elsewhere locally or ones found in unusual abundance at 1 or more of the ponds, though infrequently encountered regionally. These dredge-spoil ponds are important for conserving regional Odonata biodiversity by providing unique habitats in an increasingly urbanized environment." (Authors)] Address: White III, H.B., Dept of Chemistry & Biochemistry, Univ. of Delaware, Newark, DE 19716, USA. Email: halwhite@udel.edu

**21484.** Xu, M.; Fincke, O.M. (2022): Negative body size-dependent resource allocation underlies conspicuous sexual ornaments in a territorial damselfly. *Journal of Evolutionary Biology* 35(2): 288-298. (in English) ["Sexual ornaments, signaling individual quality to choosy females or rival males, often show steeper body size scaling compared to non-sexually selected traits. Theory posits such steeper body size scaling is the result of differential resource allocation, reflecting trade-offs between different components of fitness. Yet the process of resource allocation towards body size-dependent sexual ornaments has been rarely understood empirically. Using the Neotropical territorial damselfly *Megaloprepus caerulatus*, whose males and females carry wax-based, sex-specific white wing bands and white wing tips respectively, we investigated nutrition sensitivity and body size scaling of both traits by manipulating larval food availability and directly quantified both the fat allocated to wing ornaments and the fat reserve from which allocations are made. Both color traits exhibited sensitivity to food availability during larval development and steeper body size scaling compared to control traits. Although the absolute amount of fat invested in developing the color ornaments increased with body size, the proportion of total fat allocated to the ornaments decreased with body size, making exaggerated ornaments less affordable for smaller individuals. Our data demonstrate that measuring the proportion of resource pool from which an individual's ornaments are derived (i.e., its affordability) is essential for understanding the maintenance of honesty of sexual signals." (Authors)] Address: Fincke, O.M., Dept Zool., Univ. Oklahoma, 730 Van Vleet Oval, Room 314, Norman, OK 73019, USA. E-mail: fincke@ou.edu

**21485.** Zheng, Y.; Qu, Q.; Liu, P.; Hu, T. (2022): Ground effect of a two-dimensional flapping wing hovering in inclined stroke plane. *Journal of Fluids Engineering* 144(11): 111206: 11 pp. (in English) ["The ground effect aerodynamics and flow physics of a 2D dragonfly wing hovering (the Reynolds number is 157) in an inclined stroke plane are investigated via solving 2D unsteady incompressible laminar flow Navier-Stokes equations. An analysis road map is proposed to explain the influence of the ground on the flow field, pressure distribution on the wing surface, and the aerodynamic force. In the analysis road map, the flow relative

to the wing surface induced by the wing motion and vortex is classified into vertical and parallel wing surface flows. The vertical flow impinges on the wing surface to form a positive pressure zone. In contrast, the parallel flow generates the boundary layer and further concentrated vortex and secondary vortex, which induce negative pressure on the wing surface. The ground impacts the flow relative to the wing in three ways: changing the trajectory of the shed vortex by the mirror effect, promoting the deformation and fusion of the vortices, and causing the cushion effect at extremely small ground clearance." (Authors)] Address: Qu, Q.; Email: qq@buaa.edu.cn

## 2023

**21486.** Aghade, J.B.; Saraf, S.A. (2023): Seasonal variation of odonate diversity in harsul and Salim Ali Lake, Aurangabad, Maharashtra, India. *Acta Entomology and Zoology* 4(1): 103-105. (in English) ["Odonates are intriguing insects that serve as crucial indicators of the environment's health and water supply. In the form of predators and prey, they are important animals in both the terrestrial and aquatic food webs. In 2021–2022, a study on odonates' variety and seasonal fluctuation were carried out at the Harsul and Salim Ali Lake in Aurangabad, Maharashtra, India. Both locations are popular tourist destinations on the outskirts of Aurangabad, with a sizable pond just next to the palace. The location has luxuriant vegetation and gardens. Photo of adult specimens. The specimens were kept on file. Different identification keys were used to identify species. 11 species of Odonates were found in total, spread across 3 families, according to the study, 8 species were dragonflies and 3 were damselflies. The most prevalent species was *Crocothermis servilia*, and the least prevalent was *Acisoma panorpoides*. The monsoon and post-monsoon seasons saw the highest levels of odonate abundance, whereas summer saw the least amount of reduction. The enhanced abundance can be linked to favorable vegetation, perching places, breeding circumstances, high rainfall, and humidity (83%-94%) with a temperature range of 24.5 °C to 29.5 °C. The findings from the current study serve as the site's baseline for future taxonomy-based research and conservation efforts. Additionally, it will spur interest in odonate diversity studies." (Authors) The study includes three European species, which of course are misidentifications.] Address: Aghade, J.B., Dept of Zoology, Government College of Arts and Science, Dr. B.A.M. University, Chhatrapati Sambhaji Nagar, Aurangabad, Maharashtra, India

**21487.** Archibald, S.B.; Ware, J.L.; Rasmussen, J.A.; Sylvestersen, R.L.; Olsen, K.; Simonsen, T.J. (2023): The damselfly genus *Furagrimon* Petrulevicius et al. (Odonata, Zygoptera) from the early Eocene Fur Formation of Denmark and the dysagrionoid grade. *Zootaxa* 5278(2): 289-317. (in English) ["The earliest Eocene odonate genus *Furagrimon* Petrulevicius et al. from the Danish Fur Formation is revised based on eighteen specimens, two of which apparently have been lost since their publication. The holotype of *Phenacolestes jutlandicus* Henriksen, type species of *Furagrimon*, is incomplete and lacks the characters currently used to differentiate species, genera and higher taxa in Odonata. We, therefore, propose that the holotype is set aside and a recently discovered nearly complete Fur Formation fossil is designated as neotype. *Furagrimon* possesses all of the nine wing character states currently used along with head shape for diagnosing the Dysagrionidae; however, *Furagrimon* has a characteristically zygopteran head, not the distinctive head shape of the suborder Cephalozygoptera. We, therefore,

treat it as a zygopteran unassigned to family. These nine wing character states appear in different combinations not only in various Zygoptera and Cephalozygoptera, but also in the Frenguelliidae, an Eocene family of Argentina that may represent an unnamed suborder. We recognise these taxa as constituting a dysagrionoid grade, in which these character states appear either convergently or as symplesiomorphies. *Furagrion morsi* Zessin is synonymized with *Phenacolestes jutlandicus* Henriksen, syn. nov. and *Morsagrion* Zessin with *Furagrion Petrulevicius*, Wappler, Wedmann, Rust, and Nel, syn. nov." (Authors)] Address: Archibald, S.B., Beaty Biodiversity Museum; University of British Columbia; Vancouver; British Columbia; Canada

**21488.** Beatty, C.D.; Alves-Martins, F.; Smith, B.D.; Verheyen, J. (2023): Chapter 13 - Biogeographical ecology in Odonata. In: *Dragonflies and Damselflies*. Second Edition. Edited by Alex Córdoba-Aguilar, Christopher D. Beatty and Jason T. Bried, Oxford University Press. © Oxford University Press (2023). DOI: 10.1093/oso/9780192898623.003.0013: 167-186. (in English) ["Biogeography — the study of the factors influencing the distribution of organisms in space and time—has a number of applications in modern research on odonates. Studies considering phylogenetic and geological information to infer past and extant patterns of biodiversity (known as historical biogeography, Jenkins and Ricklefs 2011) are considerably enhanced by ecological biogeography, providing a more complete view of the forces structuring odonate diversity. This chapter reviews current knowledge of the distribution of odonates globally, and also considers work in a number of active research areas in odonate biogeography, including the influence of climate on changing distribution, life-history attributes, adaptation to changing landscapes, and the use of biogeographical methods in odonate conservation. It concludes that, while recent decades have seen much important work, much remains to be done to understand global odonate distributions, and to safeguard odonate diversity." (Authors)] Address: Beatty, C.D., Dept of Biology, Santa Clara University, 500 El Camino Real, Santa Clara, CA 95053, USA. Email: cbeatty@scu.edu

**21489.** Bechly, G.; Velten, J. (2023): A revised diagnosis of *Palaeodysagrion cretacicus* Zheng et al., 2016 (Insecta: Odonata) from mid-Cretaceous Burmese amber, with erection of a new genus of fossil damselflies. *Zootaxa* 5263(4): 547-556. (in English) ["The diagnosis of *Palaeodysagrion cretacicus* Zheng et al., 2016 is revised based on the description of a new specimen from mid-Cretaceous Burmese amber. Previously, only a fragmentary wing base was known from the holotype. The new specimen shows the complete wing venation of fore- and hind wings as well as large parts of the body anatomy. The new information proves that *Palaeodysagrion youlini* Zheng et al., 2017 has a very different venation and does not belong to the same genus. Therefore, a new genus *Pseudopalaeodysagrion* gen. nov. is erected for this species. Concurring with the results of Archibald et al. (2021), the "dysagrionine" taxa from Burmese amber are transferred from *Dysagrionidae* to *Burmadysagrionidae* stat. nov." (Authors)] Address: Bechly, G., Biologic Institute, 16310 NE 80th Street, Redmond, WA 98052, USA. Email: gbechly@biologicinstitute.org

**21490.** Brockhaus, T. (2023): Die Verwandlung der Libellen (Odonata) - lange Zeit ein Mysterium in der Entomologie. Teil 3. Wer war Maria Sibylla Merian? Und welchen Einfluss hatte Joris Hoefnagel auf sie? *Entomologische Nachrichten und Berichte* 67(1): 89-92. (in German, with English summary)

["The metamorphosis of dragonflies (Odonata) - a mystery for a long time in entomology. Part 3: Who was Maria Sibylla Merian? And what influence did Joris Hoefnagel have on her? The portraits of Maria Sibylla Merian in some Wikipedia websites are controversial. So, there is only one probably real portrait of this amazing female naturalist and artist by the painter Georg Gsell. He was the husband of one of the daughters of Maria Sibylla Merian. It is possible that the portrait in above websites shows Maria Sibylla's mother, Johanna Sybilla Heimius. Joris Hoefnagel was an artist of the 16. Century who created extremely lifelike paintings of plants and animals. His works were important models for Maria Sibylla Merians work." (Author)] Address: Brockhaus, T., An der Morgensonne 5, D-09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de

**21491.** Buczynski, P.; Tonczyk, G. (2023): Polish and dedicated to Poland odonatological papers. 21. The year 2022 and additions to the year 2021. *Odonatrix* 93: 7 pp. (in Polish, with English summary) ["The authors present a list of 56 Polish and dedicated to Poland odonatological works that appeared in the year 2022. Five papers and one Internet publication from the year 2021 are also given to supplement the previous list." (Authors)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19, 20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**21492.** Calvão, L.B.; Brito, J.; Ferreira, D.; Cunha, E.J.; Oliveira-Junior, J.M.B.; Juen, L. (2023): Effects of the loss of forest cover on odonate communities in eastern Amazonia. *Journal of Insect Conservation* 27: 205-218. (in English) ["In recent decades, the conversion of native forests into anthropogenic landscapes has been impacting progressively the physical habitat of the aquatic systems of Brazilian Amazonia. Given this, we evaluated the effects of the loss of natural vegetation cover on the diversity and morphology of Amazonian odonates (Zygoptera and Anisoptera). To do so, we sampled adult odonates at 50 streams in eastern Brazilian Amazonia. We evaluated land use patterns at each site together with two morphological metrics (length of the thorax and the abdomen) of the odonates. We found a positive relationship between natural vegetation cover and both odonate species richness, in general, and the proportion of zygopteran species richness. However, the relationship was negative for all the anisopteran diversity metrics. We also found only negative relationships in the anisopteran abdomen when we investigated the variation in morphological trait change points. We identified 12 species that were associated with natural forest cover, six (all zygopterans) with more forested environments, and six species (three anisopterans and three zygopterans) that were associated with environments with reduced vegetation cover. The results of the present study indicate that preserving continuous natural vegetation cover together with the riparian vegetation will be crucial to the maintenance of the physical characteristics of streams and the structure of the odonate community. The presence of adult odonates was also associated with the quality of both the aquatic and the terrestrial environments, given that their effects on odonate diversity were detected within a 500 m buffer around the streams. Implications for insect conservation The analysis of landscape metrics may increase the potential of the associations observed between the characteristics of natural communities and the loss of natural vegetation cover, in particular in the case of the forest specialists. The application of analyses based on these metrics should better support the development of more effective mitigation measures." (Authors)] Address: Brito, J., Graduate Program in Ecology, Univde Federal do Pará

(UFPA), Belém, Pará, Brazil Laboratory of Ecology and Conservation, Universidade Federal do Pará (UFPA), Belém, Pará, Brazil. Email: jotabio13@gmail.com

**21493.** Cheri, C.R.; Finn, D.S. (2023): Odonata as Indicators? Dragonflies and Damselflies Respond to Riparian Conditions along Ozark Spring Streams. *Hydrobiology* 2(1): 260-276. (in English) ["The Odonata are not typically regarded as informative taxa for stream bioassessment in North America compared to other insects, particularly when monitoring the ecological impacts of organic pollution. However, we hypothesized that stream-dwelling odonates are useful bioindicators of riparian conditions because vegetation associated with streams is used for oviposition and establishing breeding territories and is likely a cue for a suitable nymphal habitat. We sampled odonates from multiple microhabitats and all macroinvertebrates from riffle habitat in 12 Ozark Highlands (USA) spring streams along a gradient of riparian conditions. We also measured a standard suite of physical and chemical variables in each stream. We compared various aspects of the odonate and riffle macroinvertebrate assemblages among sites to evaluate sensitivity to variables associated with riparian structure compared to the other physical and chemical variables measured. The odonates were strongly associated with riparian-specific variables, while riffle macroinvertebrates were associated with riparian variables to a lesser degree. The additional environmental variables explained minimal variation in either assemblage. Overall, our results suggest that Odonata alone could be useful for biomonitoring associated with riparian structure around Ozark spring streams. The sensitivity of odonates to riparian conditions in other Nearctic regions should be further studied to identify regional and species-specific differences." (Authors)] Address: Cheri, Cameron, Department of Biology, Missouri State University, Springfield, MO 65897, USA

**21494.** Cordero-Rivera, A.; Rivas-Torres, A.; Encalada, A.C.; Lorenzo-Carballa, M.O. (2023): Sexual conflict and the evolution of monandry: The case of the damselfly *Ischnura hastata* (Odonata: Coenagrionidae) in the Galápagos Islands. *Ecological Entomology* 48: 336-346. (in English) ["1. Sexual selection favours the evolution and maintenance of polygamy, which is the dominant reproductive strategy in insects. Monogamy can evolve in very short-lived species due to time constraints. Here we study adult activity and mating behaviour of a population of *Ischnura hastata*, a species rarely seen mating, and which has been suggested to be monandric, in wetlands of Isabela Island, Galápagos. 2. By means of mark-recapture methods, we estimated that the daily survival rate was low, ranging from 0.385 to 0.876, yielding average life expectancies of mature individuals of only 1.2–3.2 days. Adults showed very low activity before 7:00, indicating that mating does not occur early. The number of male–female interactions and mating attempts was extremely low, with only 44 copulations recorded on over 230 h of observations. 3. Copulations were brief, with a mean duration of 11 min (but only two were observed from the start). Males showed clear preference to attempt to grasp in tandem females of intermediate age (in 94.3% of cases), rather than young (31.3%) or mature females (24.0%). Males were very persistent once a tandem was achieved, retaining females for up to 139 min, but most females resisted and did not copulate. 4. We conclude that females of *I. hastata* show a very short time window to mate, exactly when they change colour from juvenile to mature, and live only enough to mate once. Short lifespan has selected for female monandry in *I. hastata*, creating an intense sexual conflict over mating rates." (Authors)] Address: Cordero-Rivera, A., Universidade de Vigo, ECOEVO Lab, Escola de Enxeñaría Forestal, Campus Universitario A Xunqueira, Pontevedra 36005, Spain. Email: adolfo.cordero@uvigo.gal

(Authors)] Address: Cordero-Rivera, A., Universidade de Vigo, ECOEVO Lab, Escola de Enxeñaría Forestal, Campus Universitario A Xunqueira, Pontevedra 36005, Spain. Email: adolfo.cordero@uvigo.gal

**21495.** Costa, F.M.O.; Tubelis, D.P. (2023): Citizen Science for the study of birds in distinct biomes: Diet of the Rufous-Tailed Jacamar (*Galbula ruficauda*) (Aves, Galbulidae) in Brazil. *International Journal of Zoology and Animal Biology* 6(2): 10 pp. (in English) ["Data obtained by citizen scientists have been used by researchers to study the natural history of tropical birds in several countries. For example, this approach has been increasing the knowledge about their feeding ecology, as many photographs show birds holding prey with their foot and/or bill. Due to this, the diet of numerous bird species can be examined with citizen science data. The Rufous-tailed Jacamar (*Galbula ruficauda*) is a forest bird species widely distributed throughout the Neotropics, and its diet was scarcely quantified in a few localities. This study aimed to investigate the diet of the Rufous-tailed Jacamar in three Brazilian biomes: the Caatinga, the Cerrado and the Atlantic Forest. Searches for photographs with evidence of feeding activities were done in February 2021 in the WikiAves and eBird databases, the major citizen science projects regarding birds found in Brazil. For each selected record, the captured prey was tentatively identified to the taxonomic Order level, and the date of obtention was classified as part of dry or rainy periods. The chi-square test was used to compare the numbers of prey of distinct insect orders in different periods and biomes. A total of 283 feeding records were obtained by citizen scientists in the Caatinga (12%) and surrounding portions of the Cerrado (45%) and the Atlantic Forest (43%). Captured prey comprised seven insect orders, and 15% of them could not be identified. In the Cerrado, the most numerous prey in its diet were those of the orders Lepidoptera and Odonata, followed by Hymenoptera and Hemiptera, in both the dry and rainy periods. On the other hand, substantial seasonal variation was observed in the Atlantic Forest. Records with Lepidoptera were more numerous than those with other insects in the dry period, while Hymenoptera had more records than other orders in the rainy period. In the Caatinga, prey with more records were those of the orders Odonata, Lepidoptera and Hymenoptera. This study suggests that photographic records available in citizen science databases, such as WikiAves and eBird, can be used to improve our knowledge about the diet of birds found in the Neotropics." (Authors)] Address: Costa, F.M.O., Department of Biosciences, Federal Rural University of the Semi-Arid, Av. Francisco Mota, 572, Mossoró, Rio Grande do Norte state, Brazil. Email: filipeolico@gmail.com

**21496.** Crane, A.L.; Achtymichuk, G.H.; Rivera-Hernández, I.A.E.; Pregola, A.A.; Thapa, H.; Ferrari, M.C.O. (2023): Uncertainty about old information results in differential predator memory in tadpoles. *Proceedings of Royal Society B* 290: 20230746. <https://doi.org/10.1098/rspb.2023.0746>: 6 pp. (in English) ["As information ages, it may become less accurate, resulting in increased uncertainty for decision makers. For example, chemical alarm cues (AC) are a source of public information about a nearby predator attack, and these cues can become spatially inaccurate through time. These cues can also degrade quickly under natural conditions, and cue receivers are sensitive to such degradation. Although numerous studies have documented predator-recognition learning from fresh AC, no studies have explored learning from aged AC and whether the uncertainty associated with this older information contributes to shortening the retention of learned responses (i.e. the 'memory

window'). Here, we found that wood frog tadpoles, *Lithobates sylvaticus*, learned to recognize a novel odour as a predator when paired with AC aged under natural conditions for up to 1 h. However, only tadpoles conditioned with fresh AC were found to retain this learned response when tested 9 days after conditioning. These results support the hypothesis that the memory window is shortened by the uncertainty associated with older information, preventing the long-term costs of a learned association that was based on potentially outdated information." (Authors)] Address: Crane, A.L., Dept of Biology & Dept of Veterinary Biomedical Sciences, Univ. of Saskatchewan, Saskatoon, SK, Canada. Email: adam.crane@usask.ca

**21497.** Dalvi, A.; Koli, Y.; Thakur, R. (2023): Three new records of odonates (Insecta: Odonata) from Sindhudurg District, Maharashtra, India. *Journal of Threatened Taxa* 15(5): 23227-23232. (in English, with Marathi summary) ["In this paper, we report the first confirmed records of *Indolestes gracilis* davenport Fraser, 1930 and *Dysphaea ethela* Fraser, 1924 based on a specimen collected from Sindhudurg District, Maharashtra, India. We have also provided additional records of *Macrodiplax cora* (Brauer, 1867) from Maharashtra based on photographic evidence from Sindhudurg District." (Authors)] Address: Dalvi, A., 31 Br. Nath Pai Junior College, Kudal, Sindhudurg, Maharashtra 416520, India. Email: asdalvi25@gmail.com

**21498.** Delunas, C. (2023): Osservazioni sulle libellule (Odonata) di un laghetto artificiale nella città di Cagliari. *Mediterraneanonline/Naturalistica* 6/2023: 11-16. (in Italian, with English summary) ["Observations on the artificial lake dragonflies (Odonata) in Cagliari city. An artificial lake, in particular situations, can be an ideal habitat for entomological species whose life cycle is linked to water. In Cagliari, the small lake of a city park was populated by numerous specimens of insects belonging to the Odonata order. The site in question is not subject to regular maintenance, the filtering system is not currently active, a manual and summary cleaning is carried out occasionally. This has favored the settlement of numerous dragonflies by integrating and modifying a small city ecosystem." (Authors)] Address: Delunas, Christina, Università degli Studi di Cagliari, DICAAR Dipartimento di Ingegneria Civile Ambientale e Architettura, via Marengo 2, 09123 Cagliari (CA), Italy. Email: cdelunas@unica.it

**21499.** Dijkstra, K.-D.B.; Assandri, G.; Galimberti, A. (2023): Morphological and molecular evidence supports the species status of the Italian endemic *Coenagrion castellani* Roberts, 1948 (Coenagrionidae). *International Journal of Odonatology* 26: 44-53. (in English) ["*C. castellani* was described from Italy as a distinct species almost 75 years ago but has generally not been recognised or was treated as a subspecies of *C. mercuriale* (Charpentier, 1840). Populations south of the Alps were recently shown to be completely isolated genetically from those in North Africa and elsewhere in Europe. As markings and male appendages also allow for easy separation in the field, *C. castellani* is best treated as a good species, the 146th odonate species known from Europe and the second one that is endemic to Italy. Its identification and occurrence are reviewed. North African populations are distinct genetically too, but not in morphology. Whether these should be treated as a distinct taxon, e.g. as the subspecies *C. mercuriale hermeticum* (Selys, 1872), requires further research." (Authors)] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, NL-2300 RA, Leiden, The Netherlands. E-mail: kd.dijkstra@naturalis.nl

**21500.** Durand, E. (2023): Update on distribution, habitat requirements, and vulnerability of *Onychogomphus boudoti* in Morocco (Odonata: Gomphidae). *Odonatologica* 52(1/2): 13-24. (in English) ["Since its description, *Onychogomphus boudoti* Ferreira, 2014 has been known only from two localities in Morocco in a limited part of the Middle-Atlas Mountains. The Status and the distribution of this rare and threatened dragonfly was established by an intensive search in June 2022. Twenty occupied localities were found in Khenifra Province, Morocco, in the south-western part of the Middle Atlas. These records not only confirm the known localities but also extend its known distribution from 100 ha to 15500 ha. Based on these results, its habitat preference with climate and geologic associations and the main threats affecting its status are discussed." (Author)] Address: Durand, E., NATURALIA Environnement, 60 rue Jean Dausset, BP-31285, 84911 Avignon cedex 9, France. Email: e.durand@naturalia-environnement.fr

**21501.** Forister, M.L.; Black, S.H.; Elphick, C.S.; Grames, E.M.; Halsch, C.A.; Schultz, C.B.; Wagner, D.L. (2023): Missing the bigger picture: Why insect monitoring programs are limited in their ability to document the effects of habitat loss. *Conservation Letters*. 2023:e12951.: 6 pp. (in English) ["The fate of insects in the Anthropocene has been widely discussed in the scientific literature, the popular media, and in policy circles. This recent attention is justified because reductions in insect abundance and diversity have the potential to undermine the stability of terrestrial ecosystems. Reports of insect declines have also been accompanied by skepticism that is healthy and to be expected in scientific discussion. However, we are concerned about a prevalent misconception that equates reports from monitored natural areas with the global status of insects. In the vast majority of cases, areas monitored for arthropods are undeveloped and thus do not record or even necessarily reflect the masses of insects that are continuously being impacted by habitat loss to urban, suburban and agricultural expansion. We address this misconception and discuss ways in which conservation and policy can be enhanced by correctly locating results from insect monitoring programs within our broader knowledge of biodiversity loss." (Authors) The paper includes a passing reference to Odonata.] Address: Forister, M.L., Department of Biology, University of Nevada, Reno, NV 89557, USA. Email: forister@gmail.com

**21502.** Fujita, Y.; Lima, M. (2023): Aerodynamic performance of dragonfly wing model that starts impulsively: how vortex motion works. *Journal of Fluid Science and Technology* 18(1): 1-10. (in English) ["The cross-section of dragonfly wings has corrugated structures. In particular, the leading-edge side of the wing consists of V-shaped structures. According to previous studies, a corrugated wing may exhibit high aerodynamic performance at low Reynolds numbers ( $Re = O(10^3)$ ), and vortex dynamics associated with wing structure are expected to play an important role. We study the relationship between the wing structure and vortex dynamics by direct numerical simulations. It is known that, when a two-dimensional flat wing impulsively starts from a rest state, a coherent vortex called lambda vortex, which has the opposite sign to a leading-edge vortex (LEV), is generated and remains for a time interval. Our previous study suggests that, in the case of the corrugated wing, the lambda vortex collapses and is stuck inside V-shaped structures near the leading edge. The collapse of the lambda vortex was proposed as a key factor of high performance for the particular shape of the corrugated wing. In this paper, we investigate the relationship between vortex dynamics



and high performance in a wider parameter range than in our previous studies. We analyse two corrugated models with different Reynolds numbers. It is revealed that the collapse of the lambda vortex is also the key to high performance for these cases." (Authors)] Address: Iima, M., Graduate School of Integrated Sciences for Life, Hiroshima University 1-7-1 Kagamiyama, Higashihiroshima, Hiroshima, 739-8521, Japan. Email: iima@hiroshima-u.ac.jp

**21503.** Gazzola, A.; Balestrieri, A.; Pellitteri-Rosa, D. (2023): Embryonic exposure to native and alien predator cues tunes tadpole defensive behaviour. *Aquatic Ecology* 57: 421-431. In English ["When exposed to predation risk, some amphibian species show innate responses, while others recognize their predators by learning. To explore the role played by each mechanism in the assessment of predation risk, we investigated the effects of embryonic and larval exposure to predator chemical cues on tadpole defensive responses, including behavioural, morphological and life history traits. In the first experiment, agile frog (*Rana dalmatina*) embryos were exposed to the odour of either native (*Aeshna cyanea* larvae) or alien (*Procambarus clarkii*) predators each day from egg collection to hatchling (14 days). Body measures (mass, developmental stage, body length, tail length and tail depth) were recorded at hatching and a behavioural test was conducted to explore tadpole responses to predator cues and the potential interaction with their previous embryonic experience. In general, embryonic conditioning did not affect life history traits, except for a slight reduction in tail depth:length ratio for tadpoles exposed to odonate odours. Controls (embryos treated with water) after hatchling reduced their activity when exposed to gammarid-fed odonate cues, suggesting that responses were at least partially innate. Tadpoles exposed to odonate cues as embryos showed a strong defensive response when exposed to dragonfly kairomones. Tadpoles exposed to gammarid-fed crayfish as embryos showed clear behavioural responses towards the same cue (irrespective of predator diet). Overall, our results suggest that embryonic exposure may tune the defensive responses of the larval stage and early exposure to naïve stimuli may promote their cautionary associations with predation risk." (Authors)] Address: Gazzola, A., Dept of Earth and Environmental Sciences, Univ. Pavia, 27100 Pavia, Italy. Email: andrea.gazzola@unipv.it

**21504.** Glutz von Blotzheim, U.N. (2023): Die Libellenfauna eines Gartenweiher am Rande von Schwyz. *Berichte der Schwyzerischen Naturforschenden Gesellschaft* 19: 1, 26 pp, App. (in German, with English and French summaries) ["The dragonfly and damselfly fauna of a small garden pond at the edge of a country town with 15,000 inhabitants in rural Central Switzerland. — After a several years of raising the skill level by observing the Odonata on small ponds in our gardens, I began with subsequent monitoring and taking photos in the year 2005. Up to present I found 8 generalist species reproducing in our garden in Schwyz and another 24 species as episodic guests, some with copulations and egg laying but without real proof of successful reproduction. By comparing with the Odonata species richness of some Swiss wetland nature reserves, this rather surprising result encourages wildlife gardening as contribution to the promotion of biodiversity and to amazing experiences. Wetland plant species richness, important for provision of perches, thermoregulation, oviposition and emergence rate, seems to be the main reason for the rather high species richness of dragonflies and damselflies on our pond. Their survey is fascinating and promises moreover detailed observations, which are not easily achieved on

shores of lakes or rivers. In any case, I got in due time some insight in the Odonata assemblages, as well as the phenology, the population fluctuation and the behaviour of some species." (Author)] Address: not stated

**21505.** Goodman, A.M.; Kass, J.M.; Ware, J. (2023): Dynamic distribution modelling of the swamp tigertail dragonfly *Synthemis eustalacta* (Odonata: Anisoptera: Synthemistidae) over a 20-year bushfire regime. *Ecological Entomology* 48(2): 209-225. (in English) ["Intensity and severity of bushfires in Australia have increased over the past few decades due to climate change, threatening habitat loss for numerous species. Although the impact of bushfires on vertebrates is well-documented, the corresponding effects on insect taxa are rarely examined, although they are responsible for key ecosystem functions and services. Understanding the effects of bushfire seasons on insect distributions could elucidate long-term impacts and patterns of ecosystem recovery. Here, the authors investigated the effects of recent bushfires, land-cover change, and climatic variables on the distribution of a common and endemic dragonfly, (*S. eustalacta*) (Burmeister, 1839), which inhabits forests that have recently undergone severe burning. The authors used a temporally dynamic species distribution modelling approach that incorporated 20 years of community-science data on dragonfly occurrence and predictors based on fire, land cover, and climate to make yearly predictions of suitability. The authors also compared this to an approach that combines multiple temporally static models that use annual data. The authors found that for both approaches, fire-specific variables had negligible importance for the models, while the percentage of tree and non-vegetative cover were most important. The authors also found that the dynamic model outperformed the static ones, based on cross-validation omission rate. Model predictions indicated temporal variation in area and spatial arrangement of suitable habitat, but no patterns of habitat expansion, contraction, or shifting. These results highlight not only the efficacy of dynamic modelling to capture spatiotemporal variables such as vegetation cover for an endemic insect species, but also provide a novel approach to mapping species distributions with sparse locality records." (Authors)] Address: Goodman, A.M., Division of Invertebrate Zoology, American Museum of Natural History, New York, NY 10024, USA. Email: agoodman@amnh.org

**21506.** Hämäläinen, M.; Fliedner, H. (2023): Why did William Eiford Leach call a small damselfly a 'pirate'? - Revisiting the etymology of the genus *Lestes* (Odonata: Lestidae). *Notulae odonatologicae* 10(1): 8-16. (in English) ["We present evidence supporting the widely accepted interpretation that the genus name *Lestes* Leach, 1815, is based on the Greek masculine word  $\lambda\epsilon\sigma\tau\eta\varsigma$ ; [*lestes*] meaning 'robber or pirate'. Comparison of Leach's brief definition of *Lestes* with that of the genus *Agrion* Fabricius, 1775, from which the new genus was split, suggests that W.E. Leach selected the piratical name because the males of species in this genus are armed with pincer-shaped appendages; hence the name is an allusion to the edged weapons carried by pirates. The common view that the name was suggested by the voracious predatory behaviour of lestids, as well as the interpretation that the genus name is based on the French word *teste* [= nimble] are both rejected." (Authors)] Address: Hämäläinen, M., Naturalis Biodiversity Center, Leiden, the Netherlands. Email: matti.hamalainen@helsinki.fi

**21507.** Hasik, A.Z.; Ilvonen, J.J.; Siepielski, A.M.; Murray, R.L. (2023): Odonata immunity, pathogens, and parasites.

In: Dragonflies and Damselflies. Second Edition. Edited by Alex Córdoba-Aguilar, Christopher D. Beatty and Jason T. Bried, Oxford University Press. © Oxford University Press (2023). DOI: 10.1093/oso/9780192898623.003.0006: 73-84. (in English) ["Parasites and pathogens are a ubiquitous threat facing organisms within every ecological network. To protect themselves from parasites, organisms have evolved immune defenses. Insect immunity has received a great deal of attention, with numerous studies investigating the intersection of parasite pressure, immune function, and ecology. This chapter highlights how the investigation of odonate immunity has provided insight into how insect immunity operates within the ecological theatre under the threat of parasites. It first explains why odonates are an excellent model system for studies of immunity and parasites. It then reviews what is known of the parasites odonates harbor. Then, it covers the myriad mechanisms employed by odonates to defend themselves from their parasitic enemies. It also discusses key ecological and evolutionary studies that fall at the intersection of immunity and parasites" (Authors)] Address: Hasik, A.Z., Department of Biological Sciences, University of Arkansas, SCEN 601, 850 W. Dickson St., Fayetteville, AR 72701, USA. Email: azhasik@uark.edu

**21508.** Hu, F.-S.; Chen, S.-L.; He, J.-G.; Lin, K.-T. (2023): *Indothemis carnatica* (Fabricius, 1798) (Odonata: Libellulidae): A newly recorded dragonfly from Kinmen Islands and Matsu Islands, Taiwan. *Taiwanese Journal of Entomological Studies* 8(1): 16-20. (in English, with Chinese summary) ["Herein, we report a new record of *I. carnatica* from Kinmen Islands and Matsu Islands based on either collected specimens or observation records, representing the first record of the species in Taiwan and Fujian. Photos of habitus, live specimens and habitats are also provided. Finally, we briefly discussed the current status of the species on both island groups." (Authors)] Address: Hu, F.-S., Dept Biol. Sciences, National Sun Yat-sen Univ., 70 Lienhai Rd., Kaohsiung 80424, Taiwan. Email: fangshuo\_hu@smail.nchu.edu.tw

**21509.** Huang, L.; Duan, Y.; Shi, Y.; Pang, H. (2023): Bioinspired multiple-degrees-of-freedom responsive metasurface by high-entropy-alloy ribbons with hierarchical nanostructures for electromagnetic wave absorption. *Journal of Colloid and Interface Science* 636: 1-10. (in English) ["The compound eyes of *Pantala flavescens* are covered by micro-scaled ocelli capable of sensing polarized light, an attractive property for radar stealth and counterintelligence. In this work, we fabricated biomimetic electromagnetic wave absorption materials (EAMs) by analyzing the covert information identifications of biological systems and focusing on the design of metastructures and microstructures. Several bionic metasurfaces with anisotropic double-V meta atoms made up of  $(\text{FeCoNiSi}_{8.9}\text{Al}_{8.9})\text{C}_{0.2}$  high-entropy-alloy (HEA) ribbons for multiple-degrees-of-freedom recognition and broadband absorption are presented. The covert phase, amplitude, and angular momentum of electromagnetic waves were controlled and recognized as information by manipulating the rotation angle  $\theta$  of meta atoms. A vortex wave with a topological charge of 1 was generated to recognize linearly polarization and left- and right-handed circular polarization. In addition, the polarization conversion enhanced absorption. The hierarchical nanostructures of HEA ribbons give rise to suitable electromagnetic loss and a superior impedance match. Finally, inspired by the structure of compound eyes, the designed multilayer metamaterials realized effective absorption (reflection loss  $(\text{RL}) \leq -10$  dB) within the 4.5–18 GHz regime under 2.8 mm thickness. These materials provide evidence for a new way

for integrated EAMs and metamaterials." (Authors)] Address: Duan, Y., Key Laboratory of Solidification Control & Digital Preparation Technology (Liaoning Province), School of Materials Science & Engineering, Dalian Univ. Tech., Dalian 116085, P.R. China. Email: duany@dlut.edu.cn

**21510.** Ivkovic, M.; Baranov, V.; Doric, V.; Stankovic, V.M.; Previšić, A.; Vilenica, M. (2023): Aquatic Insects of Plitvice Lakes. In: Marko Miliša & Marija Ivkovic (eds.): *Plitvice Lakes*. Springer Cham: 275-316. (in English) ["Aquatic insects are the most species-rich group that inhabit freshwaters. They are connected to water by at least one life stage, usually that of the larvae, and some spend their entire life in freshwater habitats. The majority of aquatic insects' larvae develop in water; while adults emerge and spend their lives primarily in terrestrial environments where they mate, disperse and in some cases feed. Aquatic insects are sensitive to environmental conditions, which is why they are widely used in biomonitoring. Mayflies, stoneflies and caddisflies are among the most commonly used indicators, but other taxa also show high potential. In the Plitvice Lakes, there are confirmed records of 352 species of aquatic insects. The most abundant order of aquatic insects is Diptera, with 165 recorded species, followed by Trichoptera with 91 species, and Plecoptera with 31 species. All other aquatic insect orders are present with lower species richness, with 25 taxa recorded in Coleoptera, 18 taxa in Ephemeroptera and 14 in Odonata. Megaloptera and Neuroptera each have four species. The aquatic insects reflect the uniqueness and peculiarities of the barrage system of the Plitvice Lakes in both, their composition and ecology. Although some groups of aquatic insects have been well studied throughout the years, there are still many unknowns and many species that need to be recorded." (Authors)] Address: Vilenica, Marina, Faculty of Teacher Education, Univ. of Zagreb, Dept in Petrinja, Trg Matice hrvatske 12, 44250 Petrinja, Croatia

**21511.** Jiang, X.-R.; Dai, Y.-Y.; Wang, Y.-R.; Guo, K.; Du, Y.; Gao, J.-F.; Lin, L.-H.; Li, P.; Li, H.; Ji, X.; Qu, Y.-F. (2023): Dietary and sexual correlates of gut microbiota in the Japanese Gecko, *Gekko japonicus* (Schlegel, 1836). *Animals* 2023, 13, 1365. 15 pp. In English ["Simple Summary: We used wild-caught Japanese geckos (*Gekko japonicus*) and captive conspecifics fed with mealworms and fruit flies to study their differences in gut microbial structure and composition and sexual correlates of gut microbiota. Gut microbial community richness and diversity were higher in mealworm-fed geckos than in wild geckos. The beta rather than alpha diversity of gut microbiota was sex dependent. From this study, we know the following. First, dietary and sexual correlates of gut microbiota are evident in *G. japonicus*. Second, with respect to the composition of gut microbiota, *G. japonicus* is more similar to the common leopard gecko than other reptilian taxa. Third, the diversity of gut microbiota is higher in geckos ingesting food with a higher chitin content. Abstract: Numerous studies have demonstrated that multiple intrinsic and extrinsic factors shape the structure and composition of gut microbiota in a host. The disorder of the gut microbiota may trigger various host diseases. Here, we collected fecal samples from wild-caught Japanese geckos (*Gekko japonicus*) and captive conspecifics fed with mealworms (mealworm-fed geckos) and fruit flies (fly-fed geckos), aiming to examine the dietary and sexual correlates of the gut microbiota. We used 16S rRNA gene sequencing technology to determine the composition of the gut microbiota. The dominant phyla with a mean relative abundance higher than 10% were Verrucomicrobiota, Bacteroidota, and Firmicutes. Gut microbial community richness

and diversity were higher in mealworm-fed geckos than in wild geckos. Neither community evenness nor beta diversity of gut microbiota differed among wild, mealworm-fed, and fly-fed geckos. The beta rather than alpha diversity of gut microbiota was sex dependent. Based on the relative abundance of gut bacteria and their gene functions, we concluded that gut microbiota contributed more significantly to the host's metabolic and immune functions. A higher diversity of gut microbiota in mealworm-fed geckos could result from higher chitin content in insects of the order Coleoptera. This study not only provides basic information about the gut microbiota of *G. japonicus* but also shows that gut microbiota correlates with dietary habits and sex in the species." (Authors)] Address: Jiang, X.-R. Coll. Life Sci., Nanjing Normal Univ., Nanjing 210023, China. Email: xji@wzu.edu.cn

**21512.** Johansson, F.; Berger, D.; Outomuro, D.; Sniegula, S.; Tunon, M.; Watts, P.C.; Rohner, P.T. (2023): Mixed support for an alignment between phenotypic plasticity and genetic differentiation in damselfly wing shape. *Journal of Evolutionary Biology* 36(2): 368-380. (in English) ["The relationship between genetic differentiation and phenotypic plasticity can provide information on whether plasticity generally facilitates or hinders adaptation to environmental change. Here, we studied wing shape variation in a damselfly (*Lesites sponsa*) across a latitudinal gradient in Europe that differed in time constraints mediated by photoperiod and temperature. We reared damselflies from northern and southern populations in the laboratory using a reciprocal transplant experiment that simulated time-constrained (i.e. northern) and unconstrained (southern) photoperiods and temperatures. After emergence, adult wing shape was analysed using geometric morphometrics. Wings from individuals in the northern and southern populations differed significantly in shape when animals were reared in their respective native environment. Comparing wing shape across environments, we found evidence for phenotypic plasticity in wing shape, and this response differed across populations (i.e.  $G \times E$  interactions). This interaction was driven by a stronger plastic response by individuals from the northern population and differences in the direction of plastic wing shape changes among populations. The alignment between genetic and plastic responses depended on the specific combination of population and rearing environment. For example, there was an alignment between plasticity and genetic differentiation under time-constrained, but not under non-time-constrained conditions for forewings. We thus find mixed support for the hypothesis that environmental plasticity and genetic population differentiation are aligned. Furthermore, although our laboratory treatments mimicked the natural climatic conditions at northern and southern latitudes, the effects of population differences on wing shape were two to four times stronger than plastic effects. We discuss our results in terms of time constraints and the possibility that natural and sexual selection is acting differently on fore- and hindwings." (Authors)] Address: Johansson, F., Dept Ecology & Genetics, Animal Ecol., Uppsala Univ., Uppsala 752 36, Sweden. Email: frank.johansson@ebc.uu.se

**21513.** Josemans, M.; van der Zee, F. (2023): Biodiversiteit toekomstig zonnepark Oudenhooft: Nulmeting van vegetatie, dagvlinders en libellen. Rapport / Wageningen Environmental Research No. 3246: 47 pp. (in Dutch, with English summary) ["A solar park in Oudenhooft [The Netherlands] will be built by Farm Frites early 2023 and will be operational at the end of 2023. The solar park and nature dikes were monitored in 2021 by students of HAS University of Applied Sciences. In 2022, Wageningen Environmental Research

made another inventory of the location and this inventory serves as a baseline measurement before the construction of the solar park. The following groups of species were inventoried: vegetation, butterflies and dragonflies. The quality of the soil also has been analysed. However, no responsible comparison can be made between the data of 2021 and 2022 due to observer effects, differences in approach, experience and knowledge and inaccurate locations. To improve the coverage of plant species on the nature dikes, it is important to mow the dikes twice a year and to dispose of the grass clippings. Resume The Farm Frites company in Oudenhooft has built a natural dike on its site (completed in March 2020) with clay soil, which comes from harvested potatoes. The dike and the adjacent terrain around the walking path were sown with a herbal mixture of flowers. In 2021, the dike will be inventoried by students from HAS Den Bosch for plants and some insect species. Farm Frites is currently developing a solar park on its property on a site that was previously used as farmland. The actual construction of that park is planned for spring 2023. The solar park will be 20 hectares in size and will have 46,500 panels, with a power production of 23.5 GWh per year. In addition to producing sustainable energy, the park is also intended to contribute to increasing biodiversity. 4 ha of new nature will be added with 2700 m of extra water bodies and more than 14,000 plants, bushes and shrubs will be planted. Farm Frites has asked Wageningen Environmental Research to draw up and implement a monitoring plan to evaluate how biodiversity will develop in the coming years. This report is an account of that monitoring from 2022. The aim was twofold: 1. Research into the development of biodiversity on the nature dike. Are there any changes compared to 2021 in which students have made an initial inventory? 2. Determining the zero situation at the location of the solar park to be built, so that by means of monitoring changes in biodiversity can be determined in the future and management can be adjusted if desired. In 2022, inventories of vegetation, butterflies and dragonflies will be made on the nature dikes, hiking trails and the future solar park. Vegetation recordings were made on fixed quadrats and transects were walked for the monitoring of butterflies and dragonflies. The differences between the vegetation recordings in 2021 and 2022 are large. This has to do with the following: 1. The difference in fieldwork data between 2021 and 2022. In 2021 the fieldwork was carried out from March - May, in 2022 from July - September. Due to differences in approach and experience (of the students versus researchers of WENR), there are observer effects. The differences are not due to changes in biodiversity, but are caused by the difference (and quality) of observation. The species knowledge of the students was limited. In 2022, about twice as many plant species were found compared to 2021. 2. Accuracy of GPS coordinates to find the exact same location: there may be a difference of three to four meters, so that other plant species with different covers may have been found. It is therefore not possible to draw responsible conclusions about differences between 2021 and 2022. The main results and conclusions from the monitoring are: 1. The nature dikes and walking paths north of the Farm Frites business park appear to have become more species-rich and look attractive. Especially around the hiking trails, many plants bloom, which attract many butterflies and other insects. 2. In 2022, 151 plant species have been observed around the nature dike and 90 around the future solar park. A total of 175 different plant species have been found at both locations. 3. The solar park is planned on a location that has been used as a field for many years. The current biodiversity at the location of the solar park is very low. This is due to the use of the

field. Due to crop rotation, several crops are grown alternately, for example potatoes are grown once every four years. There is potential to improve biodiversity on the new solar park, partly because no fertilizers or pesticides will be used on the solar park. The condition is that the solar park has good nature management. 4. Soil analyzes at the location of the future solar park indicate that there are few obstacles in terms of chemical composition and soil type for the development of herb-rich grassland. The report includes advice for management and points of attention for the construction of the solar park. To improve the cover of plant species on the dikes, it is important to mow the dikes twice a year and to dispose of the clippings." (Authors)] Address: not stated

**21514.** Lim, S.-h.; Park, J.-K.; Park, W.-B.; Won, D.-H.; Kim, M.-S.; Hong, S.; Do, Y. (2023): Gut microbiome of three species of Odonata. *Entomological Research* 53(4): 167-172. IN english ["The influence of diet and host specificity on the fecal microbiome of three adult dragonfly species, *Pseudothemis zonata*, *Orthetrum lineostigma*, and *Orthetrum melania*, was investigated. The fecal bacterial communities were analyzed using 16S rRNA gene sequencing, and stable isotope analysis was used to investigate their food sources. The results showed significant differences in the composition of fecal bacterial communities among the three species, with host specificity potentially playing a more important role than diet. The dominant phyla in the fecal bacterial communities of all three species were Firmicutes, Proteobacteria, and Bacteroidetes. The operational taxonomic units (OTUs), Shannon index, and phylogenetic diversity index were not significantly different among the three species, indicating that there were no major differences in the diversity of the fecal bacterial communities. The stable isotope analysis showed that the food sources were similar among the three species, being primarily small insects found near the aquatic habitats. However, the fecal bacterial communities of two closely related species, *O. lineostigma* and *O. melania*, were different despite their similar food sources. In contrast, the fecal bacterial communities of *O. lineostigma* and *P. zonata* were similar, despite the different food sources of these two species. Our findings suggest that host specificity and diet can influence the composition of the intestinal microbiome in these insects, but the degree of influence may depend on the specific host and environmental conditions." (Authors)] Address: Yuno Do, Y., Dept of Biological Sciences, Kongju National University, 56, Kongjudaehak-ro, (32588) Room 204, Kongju-si, Chungcheongnam-do, Republic of Korea. Email: doy@kongju.ac.kr

**21515.** Lin, S.-C. (2023): Taxonomie reassessment of the two supposed subspecies of *Leptogomphus sauteri* in Taiwan based on morphological and molecular characters (Odonata: Gomphidae). *Odonatologica* 52(1/2): 127-142. (in English) ["*L. sauteri* Ris, 1912, is a species endemic to Taiwan and is currently treated as having two subspecies, *L. sauteri sauteri* and *L. sauteri formosanus* Oguma, 1926. However, the two subspecies are difficult to distinguish due to morphological similarity or overlap. In this study, morphological and molecular methods are used to reassess the taxonomic status of the two subspecies. It can be confirmed that three morphological characters, namely body size, coloration, and the male accessory genitalia, and two molecular genetic markers, namely nuclear ITS1 and mitochondrial COI Segments, fail to discriminate between the two subspecies. These results suggest that the splitting of *L. sauteri* into two subspecies is not justified. Therefore, the taxon *L. formosanus* is treated as a junior synonym of *L. sauteri*." (Author)] Address: Lin, S.-C., Division of Zool., Endemie

Species Research Institute, 1st, Minsheng East Rd., Jiji, Nantou 55244, Taiwan. Email: lsc0724@gmail.com

**21516.** Linklater, D.P.; Le, P.H.; Aburto-Medina, A.; Crawford, R.J.; Maclaughlin, S.; Juodkazis, S.; Ivanova, E.P. (2023): Biomimetic nanopillar silicon surfaces rupture fungal spores. *International Journal of Molecular Sciences* 24(2), 1298; <https://doi.org/10.3390/ijms24021298>: 16 pp. (in English) ["The mechano-bactericidal action of nanostructured surfaces is well-documented; however, synthetic nanostructured surfaces have not yet been explored for their antifungal properties toward filamentous fungal species. In this study, we developed a biomimetic nanostructured surface inspired by dragonfly wings. A high-aspect-ratio nanopillar topography was created on silicon (nano-Si) surfaces using inductively coupled plasma reactive ion etching (ICP RIE). To mimic the superhydrophobic nature of insect wings, the nano-Si was further functionalised with trichloro(1H,1H,2H,2H-perfluorooctyl)silane (PFTS). The viability of *Aspergillus brasiliensis* spores, in contact with either hydrophobic or hydrophilic nano-Si surfaces, was determined using a combination of standard microbiological assays, confocal laser scanning microscopy (CLSM), and focused ion beam scanning electron microscopy (FIB-SEM). Results indicated the breakdown of the fungal spore membrane upon contact with the hydrophilic nano-Si surfaces. By contrast, hydrophobised nano-Si surfaces prevented the initial attachment of the fungal conidia. Hydrophilic nano-Si surfaces exhibited both antifungal and fungicidal properties toward attached *A. brasiliensis* spores via a 4-fold reduction of attached spores and approximately 9-fold reduction of viable conidia from initial solution after 24 h compared to their planar Si counterparts. Thus, we reveal, for the first time, the physical rupturing of attaching fungal spores by biomimetic hydrophilic nanostructured surfaces." (Authors)] Address: Linklater, Denver, School of Science, STEM College, RMIT University, Melbourne, VIC 3000, Australia

**21517.** Linklater, D.; Ivanova, E.P. (2023): Challenges to the design and testing of antimicrobial nanostructured surfaces. *Microbiology Australia* 44(2): 79-82. In English ["Nanomaterials, specifically nano-topographies, have been explored for their antimicrobial activity toward bacteria, fungi and even viruses. A decade ago, we discovered that the nanopillar topography of insect wings such as cicadas, dragonflies and damselflies, were not repelling bacteria as previously surmised, but bacteria were attaching and consequently being killed. The nature of the bactericidal effect associated with nanostructured insect wings has been extended to include antimicrobial activity toward both to environmental and pathogenic fungi. Specifically, the antimicrobial nature is associated with the physical disintegration of attached microbes due to a mechanical stress imposed on the cell membrane, which stretches and breaks. This exciting new discovery implies that, if successfully replicated on the surface of biomaterials and implantable devices, systemic or local administration of antibiotics are no longer required to kill bacteria that attach on such surfaces." (Authors)] Address: Ivanova, Elena P., School of Science, STEM College, RMIT University, Melbourne, VIC 3000, Australia. Email: elena.ivanova@rmit.edu.au

**21518.** Mähn, L.A.; Hof, C.; Brandl, R.; Pinkert, S. (2023): Beyond latitude: Temperature, productivity and thermal niche conservatism drive global body size variation in Odonata. *Global Ecology and Biogeography* 32(5): 656-667. (in English) ["Aim: So far, latitudinal body size clines have been discussed primarily in the context of thermoregulation, sensu



Bergmann. However, body size patterns are ambiguous in ectotherms, and this heterogeneity remains poorly understood. We tested whether Bergmann's rule and the resource availability rule, which states that energetic requirements determine species body size, apply to Odonata. Furthermore, we hypothesized that the contrasting effects of thermoregulation and resource availability (e.g., productivity) can obscure the overall gradient in body size variation. Location: Global. Time period: Contemporary. Major taxa studied: Odonata. Methods: Using data for 43% of all odonate species described so far, we tested our hypotheses in phylogenetically and spatially comparative analyses at assemblage and species levels. For the distribution data, we integrated expert range maps and ecoregional ranges based on all available occurrence records. To distinguish between long-term and evolutionarily recent responses of environmental drivers in body size, we constructed a phylogenetically informed classification of all odonate species and decomposed the body size into its phylogenetic and specific components for our subset of species. Results: We documented a weak positive relationship between body length and latitude but found strong and contrasting effects for temperature between dragonflies and damselflies and consistent positive effects for productivity that explained 35–57% of body size variation. Moreover, we showed a strong phylogenetic signal in sized-based thermoregulation that shaped the distribution of dragonflies, but not of damselflies. Main conclusions: We concluded that temperature, productivity and conservatism in size-based thermoregulation synergistically determine the distribution of ectotherms, while the taxon-specific importance of these factors can lead to contrasting and weak latitude–size relationships. Our results reinforce the importance of body size as a determinant of species distributions and responses to climate change." (Authors)] Address: Mähn, Laura Anna, Dept of Animal Ecology, Fac. Biol., Univ. Marburg, Karl-von- Frisch-Str. 8, 35043 Marburg, Germany. Email: lauramaehn@posteo.de

**21519.** Maharani, R.; Triana, E.; Dharma, A.P. (2023): Studi keanekaragaman jenis capung (Ordo Odonata) di blok legok Majalaya resort Sarongge Taman Nasional Gunung gede pangrango. Biopendix 9(2): 195-202. (in Indonesian, with English summary) ["So this study aims to determine the diversity of dragonflies found in the Legok Majalaya Block, which can also be used as a bioindicator of environmental quality. Methods: This research was conducted in July 2022 with the research location in the Legok Majalaya Block. The method used for sampling is using a combination of roaming methods or direct encounter surveys with the TTLTK (Capture Mark Release Capture Back) method. The captured dragonflies were then identified using the book Odonata Semarang Raya (2018) and the book Flying Insect Wendit (2013). Results: 5 species of dragonflies found: *O. sabina*, *O. pruinosum*, *O. glaucum*, *B. contaminata* and *P. flavescens*. With a shanon-wiener diversity index value of 1.36 and an evenness index of 0.34. Conclusion: The evenness index value indicates a depressed community condition that causes the dominance of a species." (Authors)] Address: Maharani, R., Program Studi Pendidikan Biologi, Universitas Muhammadiyah Prof. DR. Hamka, Indonesia. Email: diditt231@gmail.com

**21520.** Mairif, M.; Bendifallah, L.; Doumandji, S. (2023): Diversity of odonates (Odonata, Anisoptera & Zygoptera) in the Theniet El Had National Park - North West of Algeria. Journal of Insect Biodiversity and Systematics 9(1): 155-182. (in English, with Arabian summary) ["The aim of this study is to make an inventory of the fauna of the Odonata

in Theniet El Had National Park, which helps managers to make appropriate decisions for the conservation of these species. The site is entirely forested (*Cedrus* and *Quercus* species) with numerous intra-forest natural environments (clearings, grasslands, rocky habitats, springs, pools and ponds, etc.), this mosaic of habitats harbours a remarkable wealth of fauna and flora. Our study focused on the natural and artificial temporary forest ponds, scattered throughout the park, which are of biological and ecological interest for a very wide range of insects, most notably the hemimetabola. These are characterised by a larval stage that is quite different from the adult stage in terms of habitat and lifestyle, namely odonates, where the larvae are aquatic whereas the adults have an aerial life. The inventory of odonates was carried out through monthly surveys of 8 water bodies (7 forest ponds and one hill reservoir) during one year, from March 2017 to February 2018. This preliminary inventory allowed us to inspect 240 individuals of odonates belonging to 18 species i.e. 11 genera and 5 families. The species recorded at the end of this study are the subject of a cartographic representation showing their distribution at the local scale (in the park) and at the national scale." (Authors)] Address: Mairif, M., Laboratory for the Protection of Plants in Agricultural and Natural Environments Against Crop Pests, Departement of Agricultural and Forestry Zoology, Higher National Agronomic School, El Harrach, Algeria. Email: mairif.vialar38@gmail.com

**21521.** Makbun, N. (2023): The genus *Sympetrum* Newman, 1833 in Thailand, with description of *S. thailandensis* sp. nov. (Odonata: Libellulidae). Zootaxa 5296(4): 569-581. In English ["The records of genus *Sympetrum* Newman, 1833 from Thailand were analysed. The unidentified *Sympetrum* sp. reported from Chiang Mai and Loei provinces in the past is confirmed as *S. hypomelas* (Selys, 1884) and additional provincial records of this species are also provided. *Sympetrum thailandensis* sp. nov. is described and figured based on the adult specimens of both sexes from Hin Tung, Muang, Nakhon Nayok province, Central Thailand. The new species belongs to infuscatum-group and is most similar to *S. darwinianum* (Selys, 1883). However, it is different from the congener by a combination of morphological and colouration characters. The key to species of *Sympetrum* known from Thailand is also presented." (Author)] Address: Makbun, N., 211/5 Moo 4, Takhli, Nakhon Sawan, 60140, Thailand. Email: noppadon.makbun@gmail.com

**21522.** Martens, A.; Kohl, S.; Wildermuth, H. (2023): Are anal spines of anisopteran larvae an antipredator device? A case study in *Boyeria irene* (Odonata: Aeshnidae). Odonatologica 52(1/2): 49-60. (in English) ["*B. irene* larvae of different stages sampled at several localities in the headwaters of the Gardon River, Southern France, frequently showed malformations and injuries in their anal pyramid. The majority of these were broken or imperfectly regenerated tips of the anal spines. To quantify this phenomenon in a standardized way, exuviae of *B. irene* were sampled. In addition to running water habitats from the headwaters of the Gardon in France, exuviae from Lake Lucerne, Switzerland, were also analysed. In the Gardon river System, 9 to 26 % of the exuviae collected in 2008 showed damaged spines and para- or epiprocts. In Lake Lucerne, in 2006, 73% of the exuviae were damaged. In most cases the tips of the epiproct or paraproct were broken or malformed. We interpret the damaged and malformed spiny appendages as indicating successful defence against fish attacks. When disturbed, anisopteran larvae spread out the elements of their anal pyramid presenting a spiky crown-like target. We

hypothesise that this behaviour helps reduce the risk of being swallowed by predaceous fish. Presumably, most injuries are caused by the stresses the elements are subject to when puncturing the fish's mouth." (Authors)] Address: Martens, M., Institute of Biology, University of Education Karlsruhe, Bismarckstraße 10, 76133 Karlsruhe, Germany. Email: andreas.martens@ph-karlsruhe.de

**21523.** Martin, R.; Maynou, X. (2023): Larval development and voltinism of rheophilous Odonata from a Mediterranean river in the north-eastern Iberian Peninsula. *Odonatologica* 52(1/2): 25-48. (in English) ["We describe the larval development and voltinism of nine species of running-water dragonflies and damselflies from the upper and middle reaches of the Tordera, a Medi-teranean-climate river located in the north-east of the Iberian Peninsula. We sampled larvae between October 2020 and October 2022. We determined larval growth patterns and identified and estimated the sizes of the late developmental stadia by means of correlation graphs between pairs of body features, i.e., head width and hind wing-sheath length, for *Calopteryx haemorrhoidalis*, *C. virgo meridionalis*, *C. xanthostoma*, *Pyrrhosoma nymphula*, *Platynemis acutipennis*, *P. latipes*, *Boyeria irene*, *Onychogomphus forcipatus unguiculatus*, and *O. uncatius*. *Calopteryx virgo meridionalis*, *B. irene* and *O. uncatius*, characteristic of the upper course, exhibited bifurcations in the timing of their development (cohort splitting), generating patterns of mixed voltinism - 1-2 years per generation in the case of *C. virgo meridionalis* and 2-3 years in the case of *O. uncatius* and *B. irene*. The rest of the taxa, typical of the middle course, were largely univoltine. It is notable that *O. forcipatus unguiculatus*, hitherto reported as semi- or partivoltine (2-3 years) throughout its range, including the Maghreb, is exclusively univoltine in the Tordera river." (Authors)] Address: Martin, R., Institutió Catalana d'Història Natural, carrer del Carme 47, E-08001 Barcelona, Catalonia, Spain. Email: ricardo.martin@cllicenciats.cat

**21524.** Metz, M. (2023): Mechanistic basis and evolutionary aspects of metabolic allometry in dragonflies and damselflies. Degree project in biology, Master of science (2 years), 2023. Examensarbete i biologi 60 hp till masterexamen, 2023. Biology Education Centre, Uppsala University: 25 pp. (in English) ["Metabolic allometry is the study of how the minimal energy expenditure of an organism, standard metabolic rate (SMR), scales with the body mass. Previous research, predominantly on mammals and birds, typically find allometric relationships between SMR and body mass, with a scaling coefficient (slope) of 0.75, often referred to as "Kleiber's law". This has been suggested to reflect some global physiological constraints. However, recently, it has been suggested that metabolic allometry instead results from life history optimization. Several recent studies on lower phylogenetic scales reveal scaling coefficients deviating from 0.75 and the intraspecific variation of metabolic allometry, along with its mechanistic basis, remains poorly understood. In this study, I aimed to investigate the variation in metabolic rate in an insect species, the common Bluetail Damselfly (*Ischnura elegans*). I measured SMR of individuals in three different temperatures and compared the sexes and three heritable female colour morphs that occur in this variable species. Furthermore, I compared the cell size of 20 species of Odonata to obtain a better understanding of possible physiological constraints on the evolution of SMR. In *I. elegans*, I found low intraspecific variation of metabolic allometry, allometric scaling coefficients that were generally lower than 0.75 and no evidence across species that SMR seemed to be directly constrained by cell size. My results

are in line with recent theories that metabolic allometries probably have higher evolvabilities than previously thought." (Author)] Address: not stated

**21525.** Miga, M.; Jahari, P.N.s.; Parimannan, S.; Rajandas, H.; Abdul-Latiff, M.A.B.; Yap, J.W.; Shamsir, M.S.; Mohd Salleh, F. (2023): The complete mitochondrial genome dataset of the Green Metalwing damselfly, *Neurobasis chinensis* (Hagen, 1887) (Odonata: Zygoptera: Calopterygidae) from Malaysia. Mendeley Data, V1, doi: 10.17632/53zs79xytt.1: (in English) ["This dataset described the complete mitochondrial genome of *N. chinensis* from Malaysia, sequenced using the next-generation sequencing technologies. It has a total length of 15,245bp in length, consisting of 13 protein-coding genes, 22 transfer RNAs, 2 ribosomal rRNAs and a control region. The genomic DNA was extracted from fresh tissue sample of *Ischya marapok* using the Qiagen Blood and Tissue Kit (Qiagen, Valencia, CA) and fragmented using a Bioruptor® system. The library was prepared using NEBNext® Ultra™ II DNA Library Prep Kit for Illumina®. The sample was then sent for sequencing using the Illumina NovaSeq 6000 platform with 150 paired-end mode (PE150). The assembly was done using NOVOPlasty v.4.2 and run through a PALEOMIX BAM pipeline to assess the mitogenome mapping. Annotation was done using the MITOS v2 web server and the predicted protein-coding genes were further verified using the Open Reading Frame (ORF) Finder. The annotated mitogenome sequence file was converted into an accepted Genbank format using the GB2sequin web application. The circular mitogenome map was generated using OGDRAW. The mitogenome is available in Genbank under the accession number ON165246." (Authors) blob:<https://data.mendeley.com/3d7c6c14-45c7-446c-aa32-17320fd56cd3>] Address: Salleh, F.M., Dept Biosciences, Fac. Science, Universiti Teknologi Malaysia, Johor, Malaysia Centre of Excellence for Omics-Driven Computational Biodiscovery (COMBio), Faculty of Applied Sciences, AIMST University, Bedong, Kedah, Malaysia. Email: faezah@utm.my

**21526.** Mill, P.; Green, D. (2023): Species Review 12: *Ischnura elegans* (Vander Linden), the Blue-tailed Damselfly, with notes on *I. genei* (Rambur), the Island Bluetail and *I. graellsii* (Rambur), the Iberian Bluetail. *Journal of the British Dragonfly Society* 39(1): 1-23. (in English) [Description, habitat, distribution, life cycle, dispersal, predation, parasites] Address: Green, D., 128 Bankside, Leeds, LS8 5AD, UK

**21527.** Moreno-Pallares, M.; Lobo Hernández M.; Gutiérrez-Moreno L.C.; Pérez-Gutiérrez, L. (2023): Relación de las larvas de Odonata con las raíces de *Eichhornia crassipes* en la ciénaga La Larga, Atlántico, Colombia. *Intropica* 17(2): 10 pp. (in Spanish, with English summary) ["The purpose of this study was to evaluate the association of Odonata larvae with the roots of *Eichhornia crassipes* in La Larga wetland. For the capture of Odonata larvae, standardized sampling techniques for aquatic macroinvertebrates were used. Six samplings were carried out and in each sampling 100 individuals of *E. crassipes* were collected. The length and volume of each root were obtained. A total of 738 individuals and 10 species of Odonata were collected; *Miathyria marcella* presented the highest abundance, with 83 % of the total sampled. The percentage of occupation of the roots of *E. crassipes* by Odonata larvae was 58 % (346 of the 600 roots collected). The collected roots varied between 5 and 58 cm in length and between 5 and 450 ml in volume. Significant differences were found in the composition and structure of the larvae with respect to the volume of the roots.

Larval lengths ranged from 2.4 to 24.3 mm; most of the collected individuals were found in the length range between 5.1 and 10 mm. In conclusion, the size of the root is not a determinant for the distribution of odonates in the roots of *E. crassipes*, while the volume of the roots of *E. crassipes* does influence the composition of larvae." (Authors)] Address: Monero-Pallares, María, Grupo de investigación Biodiversidad del Caribe colombiano, Universidad del Atlántico, Barranquilla, Colombia. Email: mariainesmoreno@mail-uniatlantico.edu.co

**21528.** Nienhaus, H.; Fitzpatrick, S.W.; Bloom, D.D.; Schriever, T.A. (2023): Dispersal ability and biogeographic gradients influence gene flow of three aquatic insects in Laurentian Great Lakes interdunal wetlands. *Freshwater Science* 42: 88-103. (in English) "Population genetic connectivity is influenced by multiple abiotic and biotic attributes, including geography, dispersal ability, and life history, which may lead to different patterns of population structure of organisms occupying similar habitats. We investigated how differences in dispersal ability and biogeographic gradients correspond with population structuring of 3 aquatic insect species found within naturally fragmented interdunal wetlands along the eastern shoreline of Lake Michigan in midwestern USA. Interdunal wetlands are small, highly fragmented, and patchily distributed along the eastern coast of Lake Michigan, USA. Our focal species, *Anax junius*, *Notonecta undulata* Say, 1832, and *Caenis amica* Hagen, 1861 were chosen as high, intermediate, and low dispersers, respectively. We hypothesized that all insect populations experience isolation by distance with relatively low gene flow among sites, but that the strength of isolation by distance varies with dispersal ability. We used cytochrome c oxidase subunit I sequence data to confirm species identification and restriction enzyme-association DNA sequencing for population genomic analyses. Our cytochrome c oxidase subunit I data revealed that *Caenis* populations consisted of multiple species split along a latitudinal gradient. Restriction site-association DNA sequencing data showed that *A. junius* displayed strong isolation by distance, where *N. undulata* did not. Additionally, both *A. junius* and *N. undulata* populations displayed 2 genetic clusters along the coastline, and genetic diversity increased along with latitude. These results indicate that biogeographical variables, such as latitude and covarying abiotic factors, may be stronger predictors of population structure than dispersal ability and that inference of population structure within aquatic macroinvertebrates should be on a species-specific basis." (Authors)] Address: Schriever, Tiffany, Dept of Biological Sciences, Western Michigan Univ., 1903 West Michigan Avenue, Kalamazoo, Michigan 49008 USA. Email: liffany.schricvcr@wmich.edu

**21529.** Oldak, K.A., (2023): Dragonflies (Odonata) of selected localities in Warsaw. *Odonatrix* 194: 12 pp. (in Polish, with English summary) ["12 localities within the boundaries of Warsaw were researched. A total of 29 species of dragonflies (mostly eurytopes) were found (39.2% of the Polish odonate fauna), 18 of which were classified as autochthonous or probably autochthonous. One species protected in Poland was recorded – *Sympecma paedisca*." (Author)] Address: Oldak, K.A., Ziemowita 14, 05-300 Mińsk Mazowiecki, Poland. Email: krystian.adam.oldak@gmail.com

**21530.** Palacino-Rodríguez, F.; Altamiranda-Saavedra, M.; Palacino, D.A.; Penagos, A.C.; Ríos, K.J. (2023): Factors influencing predation on Odonata by *Argiope trifasciata* (Forsskål, 1775). *International Journal of Odonatology* 26: 36-43. (in English) ["Despite a high number of incidental online

records of spiders preying upon dragonflies/damselflies, studies on these interactions are scarce. Here, we describe the predatory behavior of *Argiope trifasciata* on the two most common odonate species in the study area [*Rhionaeschna marchali*, *Mesamphiagrion laterale*], and whether various factors (web width, web length, spider body length, odonate body length, distance of the web from the edge of water body, and height of the web above ground) are related to the number of odonates captured. *Argiope trifasciata* employed stalking and frontal approaches as Odonata predation strategies. Our findings showed that larger Odonata are preyed upon by larger spiders. The greatest numbers of prey were caught in wider, higher webs, whereas narrow webs closer to the ground caught more small prey. Capturing success by *A. trifasciata* was similar in webs at different distances from the water for both species. Contrary to our hypothesis, there was no relationship between capturing success in either prey species and the distance of the web from the water. Habitat architecture may be more important to this interaction, as vegetation attracts both spiders (for anchoring webs) and odonates (as perch sites)." (Authors)] Address: Palacino-Rodríguez, F., Sección Etología, Facultad de Ciencias, Univ. de la República, Montevideo, Uruguay

**21531.** Paray, N.A.; Mir, A.H. (2023): Odonate fauna (Insecta: Odonata) of Kashmir, Jammu & Kashmir, India: a preliminary report. *Journal of Threatened Taxa* 15(5): 23257-23261. (in English) ["The current study was conducted to investigate the variety of Odonata in Kashmir from November 2020 to November 2022. The study revealed the existence of 24 species, which includes 18 species of Anisoptera under eight genera & two families and six species of Zygoptera in five genera & three families. New records of *Orthetrum sabina*, *O. internum*, *Aeshna petalura*, and *Anax guttatus* from the region are provided herewith. Libellulidae (12 spp.) followed by Aeshnidae (six spp.) were recorded as two dominant families. This study provides some important baseline information on the odonates of Kashmir, Jammu & Kashmir, India." (Authors)] Address: Paray, N.A, Entomology Research laboratory, Dept of Zoology, University of Kashmir, Srinagar- Jammu & Kashmir 190006, India

**21532.** Pati, A.; Kundu, S.; Sharma, A.; Dubey, V.K.; Ghosh, M.; Dasgupta, S.; Banerjee, S. (2023): Studies on the diversity of macroinvertebrates in suburban and rural aquatic bodies of West Bengal: Implications of vector control. *Acta Ecologica Sinica* 43(3): 560-575. (in English) ["Biological assessment of the freshwater habitats aims to characterize and monitor the conditions of the aquatic resources. Assessment of species assemblage in these habitats will indicate the possible variations in the resource exploitation and trophic interactions. Macroinvertebrates are the best indicators of aquatic ecosystem and play an important role in freshwater ecosystem functioning through nutrient cycling, primary production, decomposition and biological control of mosquitoes. Observations revealed that the prey individuals of order Diptera were found to be highest (51.16%), however the cumulative predatory taxa including Coleoptera, Odonata, Hemiptera and Orthoptera accounted to 67.02% The values of diversity indices varied significantly across different sampling spots justifying the usage of those wetlands and potentiality of them towards conservation biological control. Based on the biotic index, rice fields at Panskura ranked 'Good' to 'Fair' while all others ranked 'Fair' or 'Poor'. Irrespective of the classes and orders, the representative individuals were observed in high numbers during the post monsoon and the winter months which may be attributed to the fact that with the volume of water, the space available

for the insects increases, thereby promoting population expansion and releasing the crowding effect. The result of three way factorial ANOVA on the number of macroinvertebrates considering the spots, sites and sampling months as explanatory variables, revealed significant differences across all the interactions. A correspondence of the taxonomic diversity with the functional role of the aquatic predatory insects of the order Coleoptera, Hemiptera and Odonata is well established, through their links with multiple prey species including mosquito and chironomid larvae. In an assorted species assemblage of both predator and prey species, conservation biological control may require habitat extension and modification to allow increment of niche width to sustain diverse species in the habitats. Therefore to comment on the chances of the potentials of conservation biological control, monitoring of the macroinvertebrate community becomes imperative." (Authors)] Address: Banerjee, S., Ecology & Vector Biology Research Unit, Dept of Zool. for UG & PG Studies, Serampore Coll., Serampore, Hooghly, West Bengal 712201, India. email: soumyajitb@gmail.com

**21533.** Payra, A.; Deshpande, A.; Koparde, P. (2023): Northernmost records of two endemic odonates *Protosticta sanguinostigma* Fraser, 1922 and *Idionyx saffronatus* Fraser, 1924 from the northern Western Ghats, Maharashtra, India (Odonata, Platystictidae). *Spixiana* 45(2): 249-253. (in English) ["The present communication deals with new spatial records of two endemic odonates of Western Ghats *P. sanguinostigma* and *I. saffronatus* for the State of Maharashtra, based on the materials collected from the Thoseghar Waterfall of Satara district, Maharashtra, India. Both records represent northernmost localities of the species. Detailed diagnostic characters and photographs are provided." (Authors)] Address: Payra, A., School of Sustainable Development, Faculty of Sustainability Studies, Dr. Vishwanath Karad MIT World Peace University, Kothrud, Pune, Maharashtra, 411038, India. Email: arapayra@gmail.com

**21534.** Pinto, A.P.; Bota-Sierra, C.A.; Marinov, M. (2023): Chapter 19. Species identification and description. In: *Dragonflies and Damselflies*. Second Edition. Edited by Alex Córdoba-Aguilar, Christopher D. Beatty and Jason T. Bried, Oxford University Press. © Oxford University Press (2023). DOI: 10.1093/oso/9780192898623.003.0019: 263-278. (in English) ["Species identification (establishing an affiliation of a sampled specimen to a particular taxon) and description (introduction of a new taxon) are two of the basic tasks in taxonomy, commonly known as alpha-taxonomy. We review practices which have shaped contemporary taxonomy in Odonata at taxonomic and nomenclature ranks within the species group and propose a workflow for future studies." (Authors)] Address: Marinov, M., Biosecurity Surveillance & Incursion Investigation Plant Health Team, Ministry for Primary Industries, 14 Sir William Pickering Drive, Christchurch 8544, New Zealand Email: milen.marinov@mpi.govt.nz

**21535.** Powell, K.E.; Oliver, T.H.; Johns, T.; González-Suárez, M.; England, J.; Roy, D.B. (2023): Abundance trends for river macroinvertebrates vary across taxa, trophic group and river typology. *Global Change Biology* 29(5): 1282-1295. (in English) ["There is mounting evidence that terrestrial arthropods are declining rapidly in many areas of the world. It is unclear whether freshwater invertebrates, which are key providers of ecosystem services, are also declining. We addressed this question by analysing a long-term dataset of macroinvertebrate abundance collected from 2002 to 2019 across 5009 sampling sites in English rivers. Patterns varied

markedly across taxonomic groups. Within trophic groups we detected increases in the abundance of carnivores by 19% and herbivores by 14.8%, while we estimated decomposers have declined by 21.7% in abundance since 2002. We also found heterogeneity in trends across rivers belonging to different typologies based on geological dominance and catchment altitude, with organic lowland rivers having generally higher rates of increase in abundance across taxa and trophic groups, with siliceous lowland rivers having the most declines. Our results reveal a complex picture of change in freshwater macroinvertebrate abundance between taxonomic groups, trophic levels and river typologies. Our analysis helps with identifying priority regions for action on potential environmental stressors where we discover macroinvertebrate abundance declines." (Authors) Trends for Odonata were stable.] Address: Powell, Kathryn, UK Centre for Ecology & Hydrology, Wallingford, UK. Email: katpow@ceh.ac.uk

**21536.** Rosenthal, D.M.; Deng, L.; Rose, T.; Touchon, J.C. (2023): One of these things is not like the other: Mixed predator cues result in lopsided phenotypic responses in a Neotropical tadpole. *PLoS ONE* 18(5): e0285968. <https://doi.org/10.1371/journal.pone.0285968>: 14 pp. (in English) ["Many organisms have evolved to produce different phenotypes in response to environmental variation. *Dendropsophus ebraccatus* tadpoles develop opposing shifts in morphology and coloration when they are exposed to invertebrate vs vertebrate predators. Each of these alternate phenotypes are adaptive, conferring a survival advantage against the predator with which tadpoles were reared but imposing a survival cost with the mismatched predator. Here, we measured the phenotypic response of tadpoles to graded cues and mixed cues of both fish and dragonfly nymphs. Prey species like *D. ebraccatus* commonly co-occur with both of these types of predators, amongst many others as well. In our first experiment, tadpoles increased investment in defensive phenotypes in response to increasing concentrations of predator cues. Whereas morphology only differed in the strongest predation cue, tail spot coloration differed even at the lowest cue concentration. In our second experiment, tadpoles reared with cues from both predators developed an intermediate yet skewed phenotype that was most similar to the fish-induced phenotype. Previous studies have shown that fish are more lethal than dragonfly larvae; thus tadpoles responded most strongly to the more dangerous predator, even though the number of prey consumed by each predator was the same. This may be due to *D. ebraccatus* having evolved a stronger response to fish or because fish produce more kairomones than do dragonflies for a given amount of food. We demonstrate that not only do tadpoles assess predation risk via the concentration of predation cues in the water, they produce a stronger response to a more lethal predator even when the strength of cues is presumed to be identical." (Authors)] Address: Touchon, J.C., Biology Dept, Vassar Coll., Poughkeepsie, New York, USA. Email: E-mail: jutouchon@vassar.edu

**21537.** Schneider, T.; Plyushch, I.G.; Vierstraete, A.; Ike-meyer, D. (2023): *Cordulegaster coronata* in eastern Afghanistan (Odonata: Cordulegasteridae). *Notulae odonatologicae* 10(1): 1-7. (in English) ["In the last decades only a little knowledge has been gained regarding the Odonata fauna of Afghanistan, principally due to ongoing conflict within the country. Nevertheless, Ukrainian scientists have visited there in recent years, mainly to study Lepidoptera and Coleoptera. During one expedition in the Paghman-Dara mountains at an altitude of 2 500 m a.s.l. ca 20 km west of Kabul



a female of *C. coronata* (Morton, 1916) was collected. No further specimens of this species were seen." (Authors)] Address: Schneider, T., Arnold-Knoblach-Ring 76, 14109 Berlin-Wannsee, Germany. Email: thomas.rs@gmx.de

**21538.** Schröter, A.; Borkenstein, A.; Jödicke, R. (2023): Why do mature dragonflies migrate? A critical analysis of Corbet's chapter "Spatial displacement by light" with reference to *Sympetrum striolatum* (Odonata: Libellulidae). *Odonatologica* 52(1/2): 61-78. (in English) ["Migrating dragonflies coming in from the North Sea in north-western Germany in the autumn of 2021 prompted the authors to consider the cause and biological function of undertaking a risky crossing of the open sea. Individuals of the most prevalent species, *Sympetrum striolatum*, were all mature, while some sampled specimens were old. In Corbet's System of spatial displacement, published in his seminal book "Dragonflies: behaviour and ecology of Odonata", *S. striolatum* is provisionally treated as a species exhibiting seasonal flights to and from aestivation refuges but not as a migratory species. In fact, the species belongs to a group of autumn migrants that begin mass movements when mature. An analysis of our observations and the available literature led us to the conclusion that the chapter "Migration beginning in the reproductive period" of Corbet's book treats the subject inadequately. We argue that the flight type assessment of *S. striolatum* must be corrected accordingly: it is also a true autumn migrant whose mass flight is particularly noticeable in high mountain ranges and in Coastal areas. However, there remain question marks over the biological significance and evolutionary benefits of mature dragonflies performing such risky mass flights over open sea." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. Email: reinhard.joedicke@magenta.de

**21539.** Slomczynski, K.; Tonczyk, G.; Plóciennik, M. (2023): New insight into the macroinvertebrates of the Rawka River Nature Reserve (central Poland). *Ecologica Montenegrina* 62: 12-23. (in English) ["This paper presents the results of a preliminary survey on macroinvertebrate communities of a pristine lowland river Rawka in central Poland. The whole river is protected by a nature reserve but its invertebrates haven't yet been investigated extensively. This research has three main objectives: 1) to recognise preliminarily Rawka's macrofauna, 2) to determine the dissimilarity pattern between macroinvertebrates from the riverbed and the local oxbow, 3) to compare the invertebrate assemblages occurring in different habitats. The material was collected at three riverbed sampling points and one oxbow study site. It was found that the oxbow of Rawka River has different aquatic invertebrate communities than the riverbed. Conducted preliminary studies indicate that Rawka and its oxbow reveal high invertebrate diversity that is still vastly underestimated. Seventy-seven invertebrate taxa were collected and twenty-seven of them are first-recorded for Rawka River. Some rare and protected species have been found in the river, e.g. *Ophiogomphus cecilia* - a dragonfly which remains under strict species protection in Poland. The composition of aquatic invertebrates indicates that water quality of Rawka at the investigated section is good, but this needs to be confirmed with more extensive studies." (Authors)] Address: Slomczynski, K., University of Lodz, Department of Invertebrate Zoology and Hydrobiology, Banacha St. 12/16, Lodz 90-237, Poland.

**21540.** Sukkasem, C.; Boonsoong, B. (2023): Species diversity and distribution of dragonfly nymphs (Odonata: Anisoptera) in ponds of Nakhon Nayok and Nakhon Pathom

Provinces. Kasetsart University Academic Conference No. 59: 76-84. (in Thai, with English summary) ["This study aims to investigate the species diversity and distribution of dragonfly nymphs in ponds of Nakhon Nayok and Nakhon Pathom provinces. Dragonfly nymphs were collected from 15 sampling stations (6 reference sites and 9 test sites) on 4 occasions between October 2018 and July 2019. The full-grown nymphs were reared until emerged to adults for species identification. The results showed that 10 species from 9 genera and two families of dragonfly nymphs were found. The result of the PCA and CCA ordination plot showed that the reference sites were strongly correlated with *Brachydiplax chalybea*, *Macrodiplax cora*, *Rhyothemis phyllis*, *Rhyothemis variegata* and *Neurothemis fluctuans* while *Ictinogomphus decoratus*, *Brachythemis contaminata* and *Crocothemis servilia* nymphs correlated with test sites." (Authors)] Address: Boonsoong, B., Department of Zoology, Faculty of Science, Kasetsart University, Bangkok 10900, Thailand. Email: fscibtb@ku.ac.th

**21541.** Thakur, Y.; Grover, A.; Sinha, R. (2023): Differential distribution of macroinvertebrate associated with water quality. *World Water Policy* 9(1): 84-112. (in English) ["Streams and rivers are the major source of drinking water and irrigation in many developing countries. Stream health is a major criterion and regulator of the health of its dependents (invertebrates, aquatic flora, fishes, animals, and humans). For the sustenance of a balanced ecosystem, a mutual existence between flora and fauna along with other abiotic factors is a prerequisite. Benthic fauna lying on the riverbed serves as a food source for fish, larger insects, birds, etc. Nowadays, most freshwater bodies are getting polluted through various anthropogenic activities like mining, land-use practices (fertilizers and insecticides), industrial effluent, and sewage inlet. Due to the water contamination, there have been observed changes in the physicochemical parameters of the water. The macroinvertebrate species being sensitive to these changes play an important role not only in determining the health of the water body but also in regulating the ecosystem. After review, it was observed that order like Diptera dominated in various locations, comprising of family Ceratopogonidae and Chironomidae, followed by order Trichoptera and Coleoptera. Species belonging to family Baetidae and Chironomidae possess pollution tolerance capabilities; additionally, these species can survive at a wide range of temperatures. Species from families such as Simuliidae showed their existence at varying water velocities. Families like Limnephilidae, Simuliidae, and Glossosomatidae exhibited their survival in fast moving water whereas Notonectidae, Hydrophilidae Gomphidae, Coenagrionidae, Libellulidae, Aeshnidae, and Dryopidae indicated species of low waterflow. Species of the family Tipulidae have been related to areas of high conductivity, whereas Gomphidae, Dryopidae, and Glossomatidae as species of low conductivity. Hydrophilidae and Notonectidae dominated high temperature areas. The present study will put forth before the government, current scenario of macroinvertebrate structure depending on the different characteristics of the water. This will help in regulating and controlling water pollution." (Authors)] Address: Sinha, Reshma, Dept of Animal Science, School of Life Sci., Central Univ. of Himachal Pradesh, Kangra, India. Email: sinhareshma89@gmail.com

**21542.** Theischinger, G.; Mitchell, A.; Richards, S.J.; Polhemus, D.A. (2023): Systematics of the *Nososticta salomonis* complex (Odonata: Zygoptera: Platycnemididae). *Zootaxa* 5296(2): 101-146. (in English) ["We examined the morphology, colour patterns and genetic relationships of

Nososticta populations allied to *N. salomonis* (Selys) from across Melanesia. Seven species-level taxa are recognised in the *N. salomonis* 'complex': *N. africana* (Schmidt), *N. boonei* sp. nov., *N. chrimmulleri* Theischinger & Richards, *N. hedigeri* sp. nov., *N. salomonis* (Selys), *N. stueberii* sp. nov., and *N. tagula* sp. nov. All of these species are black damselflies with blue markings, and they differ from all other *Nososticta* by having: 1) a prominent spike on the male superior appendage, 2) a prominent angular base of the male inferior appendage, and 3) a complex posterior lobe on the female pronotum bearing two pairs of processes in the rough shape of a chair when viewed laterally. A molecular phylogeny based on the DNA barcode fragment of the COI gene plus two nuclear genes indicates that these seven species are closely related, but more extensive sampling of *Nososticta* species is required to confirm that they form a monophyletic group." (Authors)] Address: Theischinger, G., Australian Museum, Ento., 1 William Str., Sydney, N.S.W. 2010, Australia. Email: theischingergunther@gmail.com

**21543.** Theys, C.; Verheyen, J.; Janssens, L.; Tüzün, N.; Stoks, R. (2023): Effects of heat and pesticide stress on life history, physiology and the gut microbiome of two congeneric damselflies that differ in stressor tolerance. *Science of The Total Environment* 875: (in English) ["Highlights: • Gut microbiota differed between two damselfly species differing in pace-of-life. • Stressor response patterns of the microbiome and the host phenotype were similar. • A heat spike negatively impacted both species' phenotype and microbiome. • Pesticide-induced microbial shift may underlie species differences in tolerance. • Gut microbiota may improve mechanistic insights in combined stressor effects. Abstract: The combined impact of toxicants and warming on organisms is getting increased attention in ecotoxicology, but is still hard to predict, especially with regard to heat waves. Recent studies suggested that the gut microbiome may provide mechanistic insights into the single and combined stressor effects on their host. We therefore investigated effects of sequential exposure to a heat spike and a pesticide on both the phenotype (life history and physiology) and the gut microbiome composition of damselfly larvae. We compared the fast-paced *Ischnura pumilio*, which is more tolerant to both stressors, with the slow-paced *I. elegans*, to obtain mechanistic insights into species-specific stressor effects. The two species differed in gut microbiome composition, potentially contributing to their pace-of-life differences. Intriguingly, there was a general resemblance between the stressor response patterns in the phenotype and in the gut microbiome, whereby both species responded broadly similar to the single and combined stressors. The heat spike negatively affected the life history of both species (increased mortality, reduced growth rate), which could be explained not only by shared negative effects on physiology (inhibition of acetylcholinesterase, increase of malondialdehyde), but also by shared effects on gut bacterial species' abundances. The pesticide only had negative effects (reduced growth rate, reduced net energy budget) in *I. elegans*. The pesticide generated shifts in the bacterial community composition (e.g. increased abundance of *Sphaerotilus* and *Enterobacteriaceae* in the gut microbiome of *I. pumilio*), which potentially contributed to the relatively higher pesticide tolerance of *I. pumilio*. Moreover, in line with the response patterns in the host phenotype, the effects of the heat spike and the pesticide on the gut microbiome were mainly additive. By contrasting two species differing in stress tolerance, our results suggest that response patterns in the gut microbiome may improve our mechanistic understanding of single and combined stressor effects." (Authors)]

Address: Theys, Charlotte, Lab. of Evolutionary Stress Ecology & Ecotoxicology, Univ. of Leuven, Charles Deberiotstraat 32, 3000 Leuven, Belgium. Email: theys.charlotte@ku-leuven.be

**21544.** Thor, K.A.; Oldak, K.A.; Klich, D.; Gajewska, K.; Popczyk, B.; Klimaszewski, K.; Olech, W. (2023): Artificial waterholes for European Bison as biodiversity hotspots in forest ecosystems: Ecological effects of species reintroduction activities. *Diversity* 2023, 15(3), 446. 15 pp. (in English) ["Despite the growing population of European bison (*Bison bonasus*), it is necessary to plan the reintroduction of these animals to new areas. Reintroduction of European bison often requires the improvement of natural conditions. Such preparatory activities allow European bison to more easily adapt to new places, but also impact the functioning of animals from other taxa. The aim of the presented study was to examine the impact of waterholes for European bison on the development of local populations of amphibians and dragonflies (Odonata), as well as the creation of new feeding grounds for bats. We examined 15 reservoirs in the Augustów Forest District located in northeastern Poland, of which five were waterholes for European bison built in 2013–2014, four were semi-natural reservoirs transformed into waterholes for European bison in 2018, and six were natural reservoirs. Dragonflies were studied in 2021–2022; amphibians in 2018 and 2020; and bats in 2018, 2019, and 2020. In total, 24 species of dragonflies (Odonata), 10 species of amphibians, and 13 species of bats were found. The results of the inventory of three taxonomic groups using different comparative variants indicate a significant impact of the construction of waterholes for European bison on the biodiversity of the forest ecosystem. We concluded that the waterholes for European bison present better resistance to drying out than natural reservoirs. In addition, waterholes warm up more quickly, supporting better conditions for amphibians. The surface of the reservoirs and their exposed surroundings are favorable for insects (including dragonflies), and these are a source of food for bats, becoming attractive feeding grounds for them." (Authors)] Address: Thor, Katarzyna Anna, Inst. of Animal Sciences, Warsaw Univ. of Life Sciences—SGGW, Ciszewskiego 8, 02-786 Warsaw, Poland. Email: katarzyna\_thor@sggw.edu.pl

**21545.** Tolman, E.R.; Beatty, C.D.; Bush, J.; Kohli, M.; Moreno, C.M.; Ware, J.L.; Weber, K.S.; Khan, R.; Maheshwari, C.; Weisz, D.; Dudchenko, O.; Lieberman Aiden, E.; Frandsen, P.B. (2023): A chromosome-length assembly of the Black Petaltail (*Tanypteryx hageni*) Dragonfly. *Genome Biol. Evol.* 15(3) <https://doi.org/10.1093/gbe/evad024>. 8 pp. In English ["We present a chromosome-length genome assembly and annotation of *T. hageni*. This habitat specialist diverged from its sister species over 70 million years ago, and separated from the most closely related Odonata with a reference genome 150 million years ago. Using PacBio HiFi reads and Hi-C data for scaffolding we produce one of the most high-quality Odonata genomes to date. A scaffold N50 of 206.6 Mb and a single copy BUSCO score of 96.2% indicate high contiguity and completeness." (Authors)] Address: Ethan R. Tolman, E.R., American Museum of Natural History, Dept of Invertebrate Zoology, New York, USA. E-mail: etolman@amnh.org

**21546.** Torres-Cambas, Y.; Megna, Y.S.; Salazar-Salina, J.C.; Diez, Y.L.; Catalá, A.; Trapero-Quintana, A.D.; Schröder, B.; Domisch, S. (2023): A database of freshwater macroinvertebrate occurrence records across Cuba. *Scientific Data* volume 10, Article number: 169 (2023) Cite this

article: 9 pp. (in English) ["In light of the ongoing freshwater biodiversity crisis, detailed knowledge regarding the spatial distribution of freshwater species is urgently required, especially in biodiversity hotspots. Here we present a database of georeferenced occurrence records of four freshwater invertebrate taxa groups across Cuba, namely flatworms (Platyhelminthes: Tricladida), insects (Ephemeroptera, Odonata, Hemiptera, Trichoptera, Coleoptera, Diptera), crabs and shrimps (Crustacea: Decapoda), and mollusks (Mollusca). We collated the geographic occurrence information from scientific literature, unpublished field records, museum collections and online databases. The database, comprising 6292 records of 457 species at 1075 unique localities, is organized in 32 fields that contain the information about the taxonomic classification of each recorded species, the sex and life stage of collected individuals; the geographic coordinates, location, author and date of the record and a reference to the original data source. This database provides an important basis towards an improved understanding of the spatial distribution of freshwater biodiversity in Cuba." (Authors)] Address: Torres-Cambas, Y., Leibniz Institute of Freshwater Ecology & Inland Fisheries, Dept of Community & Ecosystem Ecol., Müggelseedamm 310, 12489, Berlin, Germany. Email: yusdiel.torres-cambas@igb-berlin.de

**21547.** Valencia Vargas, J.P. (2023): Análisis de Estado de Diversidad de Macroinvertebrados Bentónicos dentro de la Provincia de Esmeraldas. Tesis de Licenciatura en Gestión Ambiental, Pontificia Universidad Católica del Ecuador: VI + 39 pp. (in Spanish, with English summary) ["Benthic macroinvertebrates are currently considered as bioindicators for water quality assessment due to their tolerance to contaminated environments. The general objective of this research was to analyze the state of diversity of the benthic macroinvertebrate community within the province of Esmeraldas and its relationship with environmental indicators. To meet the objective, quantitative research was carried out, where the influence of the variability of environmental indicators in three scales (local, riparian and basin) on the diversity of benthic macroinvertebrates was identified, three documents referring to macroinvertebrate studies carried out in some rivers of the cantons of the Province of Esmeraldas were taken as a guide. As a result, an abundance and richness of benthic macroinvertebrates was evidenced in the analyzed studies of Martínez et al and Molinero without publishing; and within the most significant taxonomic groups were Ephemeroptera, Trichoptera, Diptera, Coleoptera, Heteroptera and Odonata [Libellulidae, Coenagrionidae]. Within the most dominant families stood out Lepoptelebiidae, Baetidae, Leptohyphidae, Chironomidae and Hydropsychidae; and of the rare groups it was evidenced that the family Palaemonidae correlated with the environmental indicator density of roads and low percentage of forest in the basin, that is, where there is environmental alteration. From the study concluded that the presence of forest in both the basin and riparian zone should be indispensable for the conservation of benthic diversity and thus the water resource; It was also demonstrated that the intervention of anthropogenic activities influences the presence of benthic macroinvertebrates tolerant to environmental pollution." (Author)] Address: not stated

**21548.** Viella, D.S.; Guillermo-Ferreira, R.; Koroiva, R. (2023): *Argia koroivarum* sp. nov. (Odonata: Coenagrionidae) from Minas Gerais state, Southeastern Brazil. *Zootaxa* 5296(1): 58-66. (in English, with Portuguese summary) ["*Argia koroivarum* sp. nov. (BRAZIL, Minas Gerais state, São Roque de Minas, Parque Nacional Serra da Canastra, 9.iv.2019, (-

20.2323, -46.6084, 1306m asl), D.S. Vilela, R. Guillermo, R. Koroiva leg., Laboratory of Ecological Studies on Ethology and Evolution (LESTES), Uberaba, Minas Gerais State, Brazil) is described, illustrated, and diagnosed based on specimens collected in Minas Gerais state, Brazil. The new species can be diagnosed from its congeners by the morphology of male ligula, dorsal branch of paraproct, and of female mesostigmal lobes." (Authors)] Address: Viella, D.S., Univ. Estadual Paulista, Dep.to de Ciên. Biol., Fac. de Ciências e Letras de Assis, Laboratório de Biol. Aquática (LABIA), Assis, SP, Brazil. Email: deeogoo@gmail.com

**21549.** Vilenica, M.; Katar, M. (2023): New data on Odonata fauna of the Drava River basin. *Entomologia Croatica* 22(1): 8-16. In: English, with Croatian summary ["Odonata are amphibious insects widely used as bioindicators of freshwater ecosystems' health. Their assemblages at lotic and lentic habitats in the area of the Drava River basin are still not completely known. Therefore, we surveyed Odonata fauna at two Drava River oxbows and the Drava River lower reaches in Croatia and Hungary. We recorded a total of 21 species. Although most of them were generalists, we also documented two species of conservation concern: *Sympetrum fonscolombii* and *Ophiogomphus cecilia*. During the fieldwork, we also observed some of the anthropogenic impacts present at studied habitats, such as plastic waste disposal, and removal of riparian vegetation, including the removal of individual trees for purposes of fishing. With this study, we increased our knowledge about Odonata fauna of the Drava River basin. Our data can be used for future monitoring of the recorded species and their habitats." (Authors)] Address: Vilenica, Marina, Fac. of Teacher Education, Univ. of Zagreb, Dep in Petrinja, Trg Matice hrvatske 12, 44250 Petrinja, Croatia

**21550.** Waldhauser, M.; Vierstraete, A.; Schneider, T. (2023): Records of little-known Odonata from south-western Saudi Arabia. *Notulae odonatologicae* 10(1): 17-29. (in English) ["During a short trip to south-western Saudi Arabia focusing on the Asir Mountains in November 2022, 27 species of Odonata were found. The occurrence of species known from Saudi Arabia, albeit from data older than 50 years (*Diplacodes lefebvrei* and *Crocothemis sanguinolenta*), was confirmed. New localities of some previously only scarcely reported species were discovered, viz. *Pseudagrion sublaetum*, *Anax speratus*, *Paragomphus sinaiticus*, *Brachythemis impartita*, *Nesciothemis farinosa*, *Trithemis dejouxii* and presumed *Pseudagrion arabicum*, on which DNA analysis was performed." (Authors)] Address: Waldhauser, M., Nature Conservation Agency of the Czech Republic, U Jezu 10, 46001 Liberec, Czech Republic. Email martin.waldhauser@nature.cz

**21551.** Waldhauser, M.; Müller, O.; Vierstraete, A.; Schneider, T. (2023): *Pinheyschna yemenensis*, a new species for Saudi Arabia, with description of the final instar larva and exuvia (Odonata: Aeshnidae). *Odonatologica* 52(1/2): 79-87. (in English) ["During a short trip to south-western Saudi Arabia with a focus on the Asir Mountains in November 2022, a larva and several exuviae of *Pinheyschna yemenensis* (Waterston, 1984) were found. Molecular genetic analysis of the COI fragment from the larva confirmed its generic identity. *Pinheyschna yemenensis*, is a new species to the Odonata fauna of Saudi Arabia, and its larva and exuvia are described." (Authors)] Address: Waldhauser, M., Nature Conservation Agency of the Czech Republic, U Jezu 10, 46001 Liberec, Czech Republic. Email: martin.waldhauser@nature.cz

**21552.** Weihrauch, F.; Brockhaus, T.; Günther, A.; Piper, W.; Theischinger, G. (2023): In memoriam Günther Peters (1932-2023). *Odonatologica* 52(1/2): 1-12. (in English) ["Personal recollections of Günther Peters, the world's leading expert on the Aeshnidae, and a brief outline of his life, his scientific career, and his expeditions are presented." (Authors)] Address: Weihrauch, F., Jägerstr. 21A, 85283 Wolnzach, Germany. Email: mail@osmylus.com

**21553.** Yeh, W.-C. (2023): An amendment on the record of *Rhyothemis fuliginosa* Selys, 1883 in Taiwan - a newly discovered gynomorphic wing pattern in female *R. regia* *regia* (Brauer, 1867) (Odonata: Libellulidae). *Taiwanese Journal of Entomological Studies* 8(1): 21-28. (in English) ["The identity of Taiwanese *Rhyothemis fuliginosa* Selys, 1883 is clarified to be the gynomorphic female of *R. regia* *regia* (Brauer, 1867). Female Taiwanese *R. r. regia* differ from female *R. fuliginosa* mainly in having paler face with weak metallic lustre, anteriorly more strongly incurved postclypeus and stouter cerci. The reported wing patterns of various subspecies of *R. regia* are compiled from the literature for comparison. A transitional variation of the female wing pattern of Taiwanese *R. r. regia* varying from andromorphic to gynomorphic is illustrated. The case of range expansion caused by climatic warming in *R. r. regia* and other libellulid dragonflies in Taiwan is elucidated." (Author)] Address: Yeh, W.-C., Division of Forest Protection, Taiwan Forestry Research Institute (TFRI), No. 53, Nanhai Rd., Zhongzheng Dist., Taipei, 100051, Taiwan. Email: wcyeh@tfri.gov.tw

**21554.** Yeh, W.-C.; Hu, F.-S. (2023): The real status of *Chlorogomphus splendidus* (Selys, 1878) in Taiwan (Odonata: Chlorogomphidae). *Taiwanese Journal of Entomological Studies* 8(1): 12-15. (in English, with Chinese summary) ["The single record of *Chlorogomphus splendidus* (Selys, 1878) in Taiwan was based on a single female specimen collected from Lanyu Island in eastern Taiwan. The status of this species in Taiwan has remained uncertain for nearly a century, as no new material is available for study. Upon the capture of a female *C. risi* Chen, 1950 in 2010 from the island, we decided to re-examine the voucher specimen of *C. splendidus* and compared it with the female *C. risi*. The result reveals that Lanyu *C. splendidus* is a pale-winged female *C. risi*. Hence, *Chlorogomphus splendidus* has to be excluded from the list of Taiwanese Odonata." (Authors)] Address: Yeh, W.-C., Division of Forest Protection, Taiwan Forestry Research Institute (TFRI), No. 53, Nanhai Rd., Zhongzheng Dist., Taipei, 100051, Taiwan. Email: wcyeh@tfri.gov.tw

**21555.** Zhan, Z.; Zhang, C.; Chen, M.; Wang, J.; Fu, A.; Fan, Y.; Luan, X. (2023): DNA metabarcoding-based winter diet analysis of Eurasian otter (*Lutra lutra*) in the northern Greater Khingan Mountains. *Biodiversity Science*, 31, 22586. doi: 10.17520/biods.2022586: 12 pp. (in Chinese, with English summary) ["Aims: The Eurasian otter (*Lutra lutra*) is a key indicator and flagship species of freshwater ecosystems. Unfortunately, human disturbance and environmental changes have caused a severe decrease in Eurasian otter populations in China, even resulting in extinction in some areas. At present, the species is predominantly found in northeast and southwest China, with the northern part of the Greater Khingan Mountains being one of the most important habitats for Eurasian otter populations in the northeast. Studying the diet composition of Eurasian otter is a valuable tactic in understanding its interspecific relationship and the functioning of its ecosystem. This information is essential when assessing their survival status and carrying out conservation efforts. Method: In this study, 50 suspected

Eurasian otter fecal samples were collected from the northern Greater Khingan Mountains. Based on DNA barcoding technology, 35 samples were confirmed to be Eurasian otter fecal samples. Then, using DNA metabarcoding technology, species in the identified feces were analyzed to gain insight into the feeding habits of the otters. Results: In this study, 22 different species were identified in Eurasian otter fecal samples, including 15 fishes, 2 frogs, and 5 insect species. *Cottus poecilopus* had the highest relative frequency of occurrence (19.35%) and relative read abundance (27.32%) among all the vertebrate foods, followed by *Rana amurensis* (15.48% and 21.73% respectively). At the family level, Cottidae had a significantly higher relative frequency of occurrence (32.26%) and relative read abundance (45.72%) than other fishes. Conclusion: The results of this study revealed that fish, primarily from the family Cottidae, were the main prey of Eurasian otters in the northern part of the Greater Khingan Mountains in winter, followed by frogs. In addition, some aquatic insects such as Odonata, Trichoptera and Plecoptera were found in a small amount of otter feces, which might come from otter prey. This research provides valuable insight into the survival status of otter populations, and can be used to inform the development of relevant policies and conservation efforts." (Authors)] Address: Luan, X., School of Ecology and Nature Conservation, Beijing Forestry University, Beijing 100083, China. E-mail: luanxiaofeng@bjfu.edu.cn

**21556.** Zhao, Z.; Feng, X.; Zhang, Y.; Wang, Y.; Zhou, Z. (2023): Species diversity, hotspot congruence, and conservation of North American damselflies (Odonata: Zygoptera). *Frontiers in Ecology and Evolution* 10:1087866. doi: 10.3389/fevo.2022.1087866: 9 pp. (in English) ["The rapid extinction of species is of considerable concern for biodiversity conservation. Identifying the drivers of species diversity and hotspots is beneficial for developing conservation strategies. Studies on insects have mainly focused on terrestrial species and rarely on semiaquatic species. Using 135,208 georeferenced occurrence records of 296 damselflies across North America, their species richness and endemism (represented by weighted endemism) patterns were mapped in a 100 × 100-km grid size, and the effects of environmental variables on species richness and endemism were investigated using generalized linear models and hierarchical partitioning. Subsequently, the top 5% grids with species richness and weighted endemism were separately selected as hotspots and their congruence was evaluated. Finally, species diversity hotspots were identified by integrating two types of hotspot grids, and gap analysis was performed to evaluate their conservation status. Temperature conditions and water availability had the strongest influence on species richness and endemism, respectively. Low congruence among species richness and endemism hotspots was observed. Moreover, four species diversity hotspots were identified, namely, region of the eastern United States and southeastern Canada, southwestern United States, central Mexico, and southernmost North America. Approximately 69.31% of the hotspot grids are not a part of the existing protected areas, presenting a significant conservation gap. The habitats of taxonomic groups should be considered while identifying the most common driving mechanisms of endemism. Strengthening the establishment of protected areas in regions with conservation gaps is urgently needed to promote the conservation of damselflies in North America." (Authors)] Address: Zhao, Z., College of Agriculture, Anshun University, Anshun, China. Email: zzx611324@163.com



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de  
Published in Zerf, Germany  
ISSN 1438-0269

## 1999

**21557.** Hutchinson, R. (1999): Rayon Entomologie: Corbet, P.S. 1999. Dragonflies: Behavior and ecology of Odonata. Comstock Publishing Associates, Ithaca NY. 829 pages, 248 figures, 96 photographies couleurs, 95 tableaux, 95 tableaux-annexes. Prix 95\$ américains. Nouv'Ailes 9(3): 7. (in French) [Book review] Address: deceased

## 2000

**21558.** Vanderhaeghe, F. (2000): Wanneer zal de Gaffelwaterjuffer (*Coenagrion scitulum*) Nederland bereiken? NVL-Nieuwsbrief nummer 3 (Jrg 4), september 2000: 9-10. (in Dutch) ["With the increased inventory intensity of the last 10 to 20 years in Belgium, it has become clear that a number of dragonfly species are expanding their range to the north (see among others De Knijf & Anselin, 1996; De Knijf, 1999). A recent example is *C. scitulum*, which in 1998 was found back in Belgium for the first time since 1973 (Vanderhaeghe, 1998) ... At a camp of the Vizebeestjeswerkgroep (VBWG) of the Jeugdbond voor Natuurstudie en Milieubescherming (JNM) in the Boulonnais (north-west France) in 1996, to our amazement, there were a number of very northerly sightings of *C. scitulum*, up to 80 km from the Belgian border (West Flanders). This was much closer to Belgium than what could be expected from literature data (Vanderhaeghe, 1997). Two years later (1998), the first new Belgian sightings were a fact. He! involved 4 observations from Belgian Lorraine, always of wandering individuals, on 23/6, 26/6, 4/7 and 18/7. We then tried to get an overview of the state of the species in northern France. To this end, several people from the Societe Francaise d'Odonatologie (SFO) were written to, and with good results! Furthermore, documented information was obtained from the 4 Belgian sightings. A synthase of all this information can be found in Vanderhaeghe (1999). An important finding is that *C. scitulum* has been observed in several places in northern France up to near the Belgian border; here are oak some older sightings, of which it is not clear whether they are vagrants. A clear group of reports comes from the northern French coastal region, up to 30 km from Belgium; there are also records near the Belgian Fagne-Famenne region and near the Gaume. None of the Belgian sightings in 1998 were made in a suitable habitat (even: several specimens flew up from a flowery roadside along a busy road); this also applies to a sighting 4 km from Belgium in 1998 (chalk slope near Epiez-sur-Chiers). These data suggest that damselflies migrated during this period; however, it is difficult to estimate the distance travelled. The possibility of migration is oak cited by Jurzitza (1988). I have not actively collected data on the situation in 1999; in any case, ford damselflies have been observed again: military area near Arion (where 2 observations were made in 1998; there could therefore be a population here) (B. Janssens, T. Vanagt, oral med.), West Coast (= 1st recent observation for Flanders, if confirmed) (D. Bonte, oral med.), Roly (in the Fagne region; Anonymus, 1999). It

is very plausible that this is a northward advance at several sites, independently of each other. The trend therefore appears to be continuing; it will be oak to look out for observations in the coming years. As pointed out by Dijkstra & Kalkman (1998), a first sighting for the Dutch territory, even in the near future, cannot be ruled out. An invasive movement along the coast is one of the most obvious possibilities in this respect (Zeeuws-Vlaanderen!). During migrations, the species can apparently be found in any habitat (oak dry). For population establishment, a diverse range of ponds and slow-flowing waters seem possible; these are often sites with lush aquatic and riparian vegetation (Vanderhaeghe, 1999). *C. scitulum* are not easily distinguished in flight from other blue-coloured damselflies, and it is therefore oak recommended that the species be caught and accurately identified with an loupe (neck shield, abdomen appendages); a photograph is desirable as evidence." (Author/DeepL)] Address: Vanderhaeghe, F., Lijsterstraat 20, 8800 Roeselare, Belgium. E-mail: Floris.Vanderhaeghe@rug.ac.be

## 2001

**21559.** Machado Caballero, J.E. (2001): Inventario y estudio comparativo de la fauna de Odonata en tres áreas de Honduras. Tesis presentada como requisito parcial para optar al título de Ingeniero Agronomo en el grado académico de Licenciatura. Zamorano Carrera de Ciencia y Produccion Agropecuaria. Zamorano: XI, 31pp. (in Spanish) [The odonate assemblages (84 species) of 3 areas in the departments of Atlantida and Francisco Morazan (Honduras) are described, and the odonate faunae of Honduras, Belize, Costa Rica and Nicaragua are briefly analysed and compared. "For the conservation of forests and the diversity they have, a better knowledge of the species that inhabit them, their distribution and classification is necessary. Most of this diversity is made up of insects. The group of odonata, by its nature, helps in the control of some pests and can be used as an ecological indicator of the quality of ecosystems. Currently there is little information on them in Honduras. The objectives were: to carry out an inventory of the species of the Odonata order, create a database and compare the fauna found with that of Belize, Nicaragua and Costa Rica. Captures were made from February to October in the Zamorano Valley (Yeguaré) and in April and August in the Curo y Salado Wildlife Refuge and the Pico Bonito National Park, complementing with specimens provided by parataxonomists and those existing in the ecological inventory of Zamorano. The trapped insects were laterally placed in paper envelopes and placed in acetone for 24 hours to prevent decomposition and color loss. Then they dried for one or two hours and were transferred to a transparent envelope with data on location, date and collector, as well as family, genus and species. A database was generated to compare the fauna of the three study areas with each other, and with the fauna of Belize, Nicaragua and Costa Rica. There are 84 species in the three study areas, belonging to 43 genera and 10 families. The families with the greatest richness of csppccics were Libellulidac, Cocnagrionidac and Aeshnidae,

which together account for more than 83% of the total fauna found. *Mecistogaster linearis* and *Brechmorhoga nubecula*, reported in the Pico Bonito National Park, are new records for Honduras. Contrasting the odonatofauna of Honduras with that of Belize, 114 species (65%) were found in common of 174 reported in that country. Costa Rica. There are 84 species in the three study areas, belonging to 43 genera and 10 families. Costa Rica shares with Honduras 132 (49%) of its 268 registered species, and Nicaragua coincides with 82 species (82%) of the 100 registered species. Despite having found a high diversity of Odonata species in Honduras, a good percentage is unknown. It is recommended to complete the information with collections in the departments of Ocoatepeque, Lempira, Intibuca and La Paz that have not been studied." ] Address: not stated

## 2004

**21560.** Hahn von Hessberg, C.M.; Grajales Quintero, A. (2004): Importancia del orden Odonata para la producción de peces en ambientes controlados. *Revista Electrónica de Ingeniería en Producción Acuícola* 1(1): 1-12. (in Spanish) ["It was determined that the immature forms of the Odonata inhabit mostly lentic waters with a lot of aquatic or emergent vegetation, with the exception of the species *Pantala flavescens*, which was also found in ponds without any type of vegetation, determining that this species is the one with the highest presentation in association with fish farming. The larvae that have a high predatory effect on fry of fish between 0.03 and 1.5 g of live weight are *P. flavescens*, fry larger than 1.5 grams (2.1 to 3 grams) are not preyed on due to their size. Other species of naiads that have a predatory effect on fish fry in their order are: *Orthemis* sp., *Aeshna intricata* and *Anax amazili* due to their robust conformation, large size and preliminary observations. Physical factors such as temperature, water depth, presence or absence of vegetation, determine the consumption of the *Pantala flavescens* naiads, the ideal temperature that increased predatory activity was from 24° C average, limited by environmental factors and competition. existing by food. A single naiad can consume 5 fingerlings/day, the cost of a reversed fingerling is \$3,015, therefore, in a 42-day cycle (age and most susceptible weight for the fish) there is a loss of \$633.15; and per m<sup>2</sup> of pond there are losses worth \$12,633.00. In a 150 m<sup>2</sup> pond (average of 20 naiads/m<sup>2</sup>), losses amount to \$1,899,450 and annual losses of \$16,507,125 (Hahn et.al 2001). Based on the high rate of predation observed on larvae and fingerlings of *Oreochromis niloticus* by *Pantala flavescens*, the need is felt to look for alternatives for selective biological or mechanical control without using chemical controls on this species of Odonata.] Address: Hahn von Hessberg, Christine, Profesore Depto Sistemas de Producción, Programa de Medicina Veterinaria y Zootecnia, Facultad de Ciencias Agropecuarias. Columbia. E-mail: agrajal@telesat.com.co

## 2005

**21561.** Craves, J. (2005): Canada damer with unusual thorax pattern. *Williamsonia* 9(1): 1. (in English) ["After attending an ornithological meeting in Grayling (Crawford Co.) on 28 Aug 2004, I had a little bit of time to hunt for Odonata before heading back home. Consulting a map, I chose to explore Howe's Lake, a small sandy lake north of M-72 west of Grayling. There wasn't a lot actually plying the lake itself, but the wet, grassy depressions near the lake shore had several species of *Lestes*, *Sympetrum costiferum* (a county record), and quite a few *Aeshna*'s patrolling lazily or ovipositing in the shallow water. I netted a few *Aeshna canadensis*,

and some *A. tuberculifera* (a county record). It appeared that all the blue darners at the site were these two species, until I netted one with broken thoracic stripes, which I took to be *A. interrupta*. When I returned home to sort through the specimens, I turned this specimen over, I found that the other side of the thorax was the standard Canada Damner pattern. A closer examination revealed that this was indeed *canadensis* in all other characters, except that one side of the thorax. While I've found little on this phenomena in the literature, it is apparently not without precedent. For me it underscores the importance of actually collecting specimens - or in the least netting them and carefully examining them in the hand - in order to verify the identity. Even if I had seen this individual perched, I would have misidentified it had I only seen the one side (Variable Damner would have been a county record). This interesting specimen is in my personal reference collection." (Author)] Address: Craves, Julie, Univ. Michigan-Dearborn, USA. Email: jac@rrbo.org

**21562.** Hsu, C.-B.; Yang, P.-S. (2005): Examining the relationship between aquatic insect assemblages and water variables by ordination techniques. *Formosan Entomol.* 25: 67-85. (in English, with Chinese summary) ["Aquatic insects were sampled quarterly at five sites along the upper Keelung River, which runs through the Taipei metropolitan area and receives various forms of pollution and anthropogenic disturbances, between August 1996 and April 1997 to examine the distribution patterns of aquatic insects and their relationships with the water variables using univariate and multivariate analyses. Upstream sites 1 to 3 significantly differed from the downstream sites 4 and 5 in the number of taxa, density, Shannon diversity index, and the proportion of dominant taxon in the univariate analyses. *Baetis* spp. was the dominant taxon (14.22%) and Chironomidae was the dominant family (21.78%) in the entire study reach. The results of canonical correspondence analysis (CCA), a eigenanalysis-based ordination, were compared with the results of non-metric multidimensional scaling (MDS), a distance-based ordination. Differences in aquatic insect assemblages at the first three sites were only found by the multivariate approaches, not by the univariate approach. High number of taxa and abundances at the three upstream sites contributing to variances in the aquatic insect assemblages were perceived on the CCA ordination diagrams. However, the common taxa at the three sites also increased the community similarities and formed an upstream group of samples separate from the downstream group in the MDS plots. Differences in the results between the univariate and multivariate analyses at the three upstream sites were mainly caused by the limited distributions of some taxa, such as *Epeorus erratus*, *Amphinemura* sp., *Protonemura* sp., and *Rhyacophila* spp. at site 1. In the CCA, conductivity and biochemical oxygen demand (BOD) on axis 1 and water temperature and pH on axis 2 were the water variables that best explained about 42.9% of the variance in aquatic insect assemblages on the first two axes. In the MDS, chemical oxygen demand (COD) and BOD showed the highest correlation with aquatic insect assemblages in the upper Keelung River." (Authors) *Euphaea formosa*, *Matrona basilaris* subsp. *maba*, *Heliogomphus retroflexus*, *Onychogomphus formosanus*, *Sieboldius deflexus*, *Stylogomphus shirozui*, *Zygonyx takasago*.] Address: Yang, P.-S., Dept of Entomology, National Taiwan University, 1 Roosevelt Rd., Sec. 4, Taipei 106, Taiwan. Email: psyang@ntu.edu.tw

**21563.** Hutchinson, R. (2005): Des *Epiophlebia superstes* (Odonata: Anisozygoptera), dans la Collection nationale canadienne d'insectes, d'arachnides et de nématodes (CNC)

à Ottawa. *Nouv'Ailes* 15(2): 7. (in French) ["While working in the NCC's dragonfly collection, I discovered that there were specimens of a species of dragonfly [*Epiophlebia superstes*] considered a true living fossil. Indeed, there are eight males, eight females and three exuviae from a donation made by Dr. Hilton, professor at Bishop's University in Lennoxville in the Eastern Townships. These individuals were collected in Japan. In addition, I found two other females and a male, also collected in Japan by other entomologists." (Author/Google translate) Address: deceased

## 2007

**21564.** Truchon, G. (2007): Des demoiselles qui pratiquent la plongée. *Nouv'Ailes* 17(1): 13. (in French) [Verbatim/Google translate: Ladies who practice diving: The female of some Zygoptera (*Calopteryx*, *Coenagrion*, *Enallagma* and *Hetaerina*) lays her eggs by submerging herself completely under water. The number of eggs deposited is proportional to the immersion time and the females can dive several times a day in different places. Japanese researchers wanted to check whether these repeated dives were associated with a limited ability to breathe underwater. A series of experiments in the laboratory and in the field allowed them to demonstrate that these small dragonflies use a reserve of oxygen contained in the trachea which gives them an autonomy of about 30 minutes. To this reserve is added the air trapped on the surface of the wings and the body. Indeed, when the damselflies dive under water, a thin film of air covers the wings and the body. This reserve of air provides part of the oxygen required during immersion. Tsubaki et al. (2006) observed under the microscope the surface of the wings of different species of damselflies. They noted the presence of a structure facilitating the retention of air. This structure, which has the appearance of "spiky hairs", is denser in insects that dive regularly, compared to those that dive occasionally or rarely, and is absent in species that do not have the habit of laying their eggs. under water. Oxygen-rich water promotes the passage of this molecule to the air bubbles trapped under the wings and body of dragonflies. This allows the insect to replenish its oxygen reserves even while remaining underwater. Added together, these different mechanisms allow young ladies to dive for periods that can exceed 120 minutes. It therefore does not seem that the numerous dives observed are associated with a limited ability of these insects to remain underwater. Spawning underwater protects the eggs from desiccation and exploits additional substrate sites. But above all, it seems that it is to have peace that these little dragonflies immerse themselves. This habit allows them to avoid being harassed by males during spawning!]) Address: not stated

## 2008

**21565.** Dumont, S.; Handfield, N. (2008): Émission de timbres sur les insectes utiles. *Nouv'Ailes* 18(1): 13. (in French) [Verbatim/Google translate: On October 11, I was about to mail the paper copies of the fall issue of *Nouv'Ailes* when I noticed that Canada Post was going to issue, the next day, a series of five stamps on the theme of beneficial insects. On these stamps, we find the convergent ladybug (1¢), the golden-eyed lacewing (3¢), the polar bumblebee (5¢), the Canadian aeschne (10¢) and finally the cecropia moth (25¢). As mentioned by one of our members on our discussion forum, the choice of the cecropia lead moth seems questionable as a beneficial insect, although if we go to the site <http://www.postescanada.ca/personal/collecting/default-f.asp?stamp=stpartl&detail=2187> to read the presentation

text of the series, we can see that they define beneficial insects as being those which contribute to pest control, provide pollination, eliminate animal waste and feed the wildlife. Cecropia moth, our largest moth, is there as food for wildlife; an important link in some food chains. It is of course an extended definition of beneficial insects, but it must be admitted, it is a very beautiful species. For collectors, these stamps are available in souvenir sheets of five stamps (we had some drawn at the meeting of the Montreal section on October 12!). This souvenir sheet also appears on the beautiful first day cover. Each stamp can also be purchased in sheets of 50 via <http://www.canadapost.ca/personal/collecting/default.asp?stamp=stpartl&detail=2187> This is not the first time that Canada Post has issued stamps featuring insects. In 1988, we were treated to four stamps on the butterflies of Canada [...] Address: not stated

**21566.** Hutchinson, R. (2008): Examen du tube digestif d'une libellule. *Nouv'Ailes* 18(1): 5. (in French) [Verbatim/Google translate: Recently, I found on my work table, near my binocular magnifying glass, an adult dragonfly, *Tetragoneuria spinigera*, in alcohol. The label indicates that the specimen, damaged (separate thorax and abdomen), comes from Baie-des-Rochers (Charlevoix-Est census division), July 2003. Examining the long stocky abdomen, I noticed that a small part of the digestive tract was visible and that I could extricate it by gently pulling it out of the abdominal cavity, which I did on the spot. I then spread it out on a piece of white cardboard. I was thus able to examine the contents of a good part of the digestive tract. I saw there shreds of wings, legs, thorax of more or less shredded insects. The experience allowed me to observe that there were many Diptera, in particular of the following families: Simuliidae (black flies), Chironomidae, some mosquitoes (Culicidae) and representatives of the family Tipulidae. Determining the genus and species of all these prey is the responsibility of specialists in each group of Diptera. Nevertheless, this experiment confirms the assertions of several odonatologists to the effect that flies are the main constituents of the diet of dragonflies. For an exhaustive treatment of the subject, I invite readers to consult Corbet (1999).] Address: deceased

## 2010

**21567.** Englund, R.A. (2010): Odonata and selected aquatic insect taxa in the Austral Islands, French Polynesia. In: Meyer, J.-Y. & Claridge, E. (2014): Terrestrial Biodiversity of the Austral Islands, French Polynesia. *Muséum Nationale d'Histoire Naturelle, Paris. Patrimoines naturels* 72: 102-113. (in English) [The Austral Islands is one of the most isolated archipelagos in French Polynesia (South Pacific). The small size of the islands and the occurrence of past and recent anthropogenic impacts have caused a rapid erosion of its unique biodiversity. A series of multidisciplinary field trips were conducted between 2002 and 2004 by a small but dedicated team of scientists from French Polynesia, France and other countries, with the aim of providing baseline knowledge of the terrestrial and freshwater biodiversity needed for the sustainable management of natural resources, the conservation of threatened endemic species and native habitats." (Publisher) The following Odonata taxa are listed and discussed: *Anaciaeschna jaspidea*, *Anax prob. guttatus*, *Hemicordulia* sp., *Diplacodes bipunctata*, *Pantala flavescens*, *Tholymis tillarga*, *Ischnura aurora*, *I. jeanyvesmeyeri*, *I. rurutana*, and *I. thelmae*.] Address: Englund, R.A., J. Linsley Gressitt Center for Entomological Research, Bishop Museum, 1525 Bernice Street, Honolulu, Hawaii 96817, USA. E-mail: [englund@bishopmuseum.org](mailto:englund@bishopmuseum.org)

**21568.** Hutchinson, R.; Ménard, B. (2010): Des araignées (Araneae) dans des exuvies de libellules (Odonata: Anisoptera). *Nouv'Ailes* 20(1): 3. (in French) [Verbatim (Google translate): On October 1, 2005, we were picking dragonfly exuviae from the inside walls of a small bridge that spans a body of water. It is, in fact, only an extension of the Ottawa River, in the heart of the city of Gatineau. In addition, an earthen embankment blocks this water to prevent it from reaching the Casino de Hull. The harvested exuviae were sheltered from the wind and the flow of rainwater. An exuviae is the remains or skin from which an adult dragonfly emerged, thus ending its larval existence. We noticed that some exuviae contained live spiders. We mention below the odonate species found with the spiders that had taken up residence in their exuviae. An exuviae of *Epicordulia princeps* contained the living spider, *Steatoda bipunctata* (L.) female (Theridiidae), with two Diptera (fly) remains, an indeterminate insect larva and a molting flap of a spider. Another *Epicordulia princeps* harbored a *Tetragnatha* sp. alone, who seemed immature to us. On the other hand, in an exuviae of *Neurocordulia yamaskanensis*, we discovered another female *Steatoda bipunctata* with remains of spider molts. Finally, we highlight the presence of a spider in the exuviae of two other dragonfly species, one in the remains of *Libellula luctuosa* and another in that of *Tetragoneuria cynosura*. Unfortunately for us or fortunately for the two coveted spiders, we dropped them on the grassy ground without being able to recover them. When handling these exuviae, it would be wise to place an insect net underneath to avoid losing the spiders hiding there. It is interesting to note that an American odonatologist (Manolis, 2008) reports that a male jumping spider, *Sassacus vitis* (Salticidae), absent from Quebec, was found in the large exuviae of *Macromia magnifica*, a species from western Canada and the United States. In Quebec we find the species *Macromia illinoiensis* Walsh (Macromiidae). We must remember that these exuviae were probably in these places since June or July, since they are odonates that emerge during the first half of the summer flight season of these splendid winged creatures, which are dragonflies. They are sheltered from the natural elements. It is possible that we can even redo this excursion in winter with the possibility of new discoveries. A question arises! Does the large size, in particular the enlargement and the rounded shape of the middle of the abdomen, of the exuviae of *E. princeps* and *Macromia*, and to a lesser extent, the size of *Neurocordulia*, favor their colonization by spiders? looking for shelter? Let us mention in passing that *Steatoda bipunctata* literally invade the exterior of human buildings almost everywhere in Quebec, thousands can be found under the shingles of a house, an experience that the first author once had when replacing old shingles. aluminum by new ones on a friend's house. In conclusion, we believe that a new avenue of research is opening up on the life of spiders and odonates. It is important to know if the size of the exuviae that clears space for a guest is a colonization factor for other organisms such as spiders. We urge naturalists to try such an experiment in order to advance our knowledge on a completely unusual subject.] Address: Menard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1. Email: ménard-ben@vidéotron.ca

**21569.** Kazanci, N.; Ekingen, P.; Türkmen, G.; Ertunç, Ö.; Dügel, M.; Gültutan, Y. (2010): Assessment of ecological quality of Aksu Stream (Giresun, Turkey) in Eastern Black Sea Region by using Water Framework Directive (WFD) methods based on benthic macroinvertebrates. *Review of Hydrobiology* 3,2: 165-184. (in English, with Turkish summary) ["1. This research contains the first assessment of water quality

of Aksu Stream (Giresun, Turkey) by using benthic macroinvertebrates and physicochemical variables. 2. In July 2008 and June 2009, benthic macroinvertebrates were collected by standard D-frame net from each type of habitat of Aksu Stream's sites. Physicochemical variables were also measured for each sites. 3. Some metrics [Biological Monitoring Working Party Score (BMWP), Average Score per Taxon (ASPT), Simpson Diversity Index, Shannon-Wiener Diversity Index, Margalef Diversity Index, Ephemeroptera Plecoptera Trichoptera (EPT), Ephemeroptera Plecoptera (EP)] and functional feeding group ratio which are wanted to implement by European Union Water Framework Directive were applied to Aksu Stream with physicochemical variables for the first time. 4. These metrics were performed in order to evaluate the water quality of the stream by using ASTERICS software and to identify reference sites for Aksu Stream. The benthic macroinvertebrate communities of reference sites of Aksu Stream were also given. These reference sites and their benthic macroinvertebrate communities could be used to determine ecological quality of same types of streams in Eastern Black Sea Region. 5. Habitat quality of the Aksu Stream was high at the upstream region and was lower at the downstream region due to physical habitat degradation, urban waste waters, touristic, seasonal dwelling and agricultural activities." (Authors) The taxa list includes "Aeshnidae" and "Gomphidae".] Address: Kazanci, Nilgün, Hacettepe Üniversitesi, Fen Fakültesi, Biyoloji Bölümü, Hidrobiyoloji Anabilim Dalı, Beytepe, Ankara, Turkey. Email: nilgunkazanci@gmail.com

## 2012

**21570.** Hutchinson, R. (2012): Une nouvelle mention de l'araignée rarement récoltée au Québec, *Clubiona maritima* (Araneae: Clubionidae) dans une exuvie de *Stylurus notatus* (Odonata: Gomphidae). *Nouv'Ailes* 22(2): 16. (in French) [Verbatim/Google translate: On June 16, 2012, I collected a mature male of the spider *Clubiona maritima* from an exuviae of the dragonfly *Stylurus notatus*, which was in one of my vials containing only the remains of this species of gomphid. The exuviae was picked up in Luskville, on a stone wall that forms a rampart to prevent the water of the Ottawa River from flooding the raised grounds of riverside cottages. This is the second confirmed record of *C. maritima* for Quebec. Bélanger & Hutchinson (1992) report that the species was known only from Brown Lake in Gatineau Park. These mention many habitats. As far as I am concerned, I consider the carpets of dead and yellowed grasses and sedges that litter the damp ground near bodies of water as potential microhabitats leading to the capture of other *C. maritima*. By examining the specimens of the species deposited in the CNC (Canadian National Collection of Insects, Arachnids and Nematodes), I note that there are about ten vials from American states, and especially from Ontario, especially in the Niagara Peninsula. In the distribution map of the species by Dondale and Redner (1982), the reader finds about fifteen squares indicating capture sites, almost all located around the Great Lakes, with two exceptions. Our activity, which consists in collecting odonate exuviae as an integral part of our inventories of this marvelous group of insects, allows us to observe that the presence of spiders in exuviae does not seem to be a rare phenomenon, as evidenced by our mentions in a brief communication published in NOUVAILES (Hutchinson and Ménard, 2010) and also a brief note by Manolis (2008), an American odonatologist. In this regard, I can also add recent data, namely the collection of the female *Steatoda bipunctata* spider from an exuviae of



*Epithea spinigera* stuck to the inside wall of a bridge spanning a busy street in Gatineau, Boulevard Fournier, August 12, 2012. During this excursion, I also observed twice ants taking refuge in exuviae. Perspectives: Our odonatological activities, including exuviae, allow us to advance our knowledge in two important groups of invertebrates, namely dragonflies and spiders. Once again, we note that the collection of odonate remains is of great importance and we intend to pursue this type of initiative, which will bring great discoveries to come.] Address: deceased

## 2013

**21571.** Hutchinson, R. (2013): La recherche nocturne de libellules dans leur dortoir. *Nouv'Ailes* 23(1): 14-15. (in French) [Verbatim/Google translate: When the light of day disappears, the temperature drops, the coolness sets in, where to find the myriads of dragonflies that the odonatologist observed during the day? What are they doing? All must find a substrate to live there in a comatose state, in total immobility. Their customary activity can only resume with daylight, the return of the sun and a favorable temperature. Finding these sites, or roosts, where dragonflies take refuge to spend the night, is an arduous activity that I did many years ago. I searched enthusiastically in the field, flashlight in hand, in the late evening and at dusk, to discover adult dragonflies in their nocturnal lairs. I published my meager findings (Hutchinson, 1976c). In addition, I identified known cases from the odonatological literature (Corbet, 1999; Hutchinson 1976a, b). In this regard, it is fascinating to report five observations of dragonflies of the genus *Boyeria* (Aeshnidae) found in a comatose state on buildings of three nature initiation camps that I attended. The first two were internships of the Cercles de Jeunes naturalistes and the last, the Ère de l'estuaire camp, located in Port-au-Saumon, in Charlevoix-Est, which was the "theatre" of three of these observations. On August 8, 2000, at the Marist camp, in Rawdon, young naturalists drew my attention to a female *Boyeria vinosa* suspended, motionless, from the ceiling inside a building, near the exit door, next to a twinkling light. Two years later, the young naturalists were at another camp in Chertsey, located in the Laurentians. A similar case was reported to me at the end of July 2002. Another female *Boyeria vinosa* was observed with its front legs affixed to the ceiling of an outdoor toilet near a light left on for the convenience of campers. These observations have been the subject of a short note (Hutchinson, 2001). In Port-au-Saumon, we are able to add three other observations of *Boyeria grafiana*, a species of Aeshnidae that frequents the Port-au-Saumon River, located near the Ère de l'estuaire camp. These adult Odonates have adopted parts of buildings to spend the night there. Thus, on July 31, 2009, the camp director, Denis Turcotte, spotted a male of this species hanging from the upright or the post of the Demeurance gallery, the activity leaders' building, just below a light that had remained on at the end of the evening. The next day, trainees showed me another *Boyeria grafiana*, a female, almost in the same place in the gallery, always with lights on to attract insects. Finally, a final noteworthy observation, a female *Boyeria grafiana* was clinging by the forelegs to the ceiling of a building housing showers, next to a flickering lamp, for the comfort and well-being of campers who would otherwise have had to wash in the dark. My experience in the field spanning many years, combined with bibliographic research, allow me to present three situations likely to promote the discovery of Odonata in their dormitories. I mention, in the first place, the search in the aquatic vegetation, emerged and semi-emerged from the edge of the water, to

find Zygoptera and Sympetrum (Odonata: Libellulidae), for example. The naturalist or odonatologist can then carefully examine the shrubs, either on the banks or even others a little further from the banks to discover another host of larger species. Finally, Odonata who adopt trees, including their crowns, most often remain inaccessible to the odonatologist, unless they can scrutinize the smallest recesses of the foliage of large trees.] Address: deceased

**21572.** Hutchinson, R.; Ménard, B. (2013): Nouvelles récoltes de naïades, d'exuvies et d'émergences de *Williamsonia fletcheri* Williamson (Odonata: Anisoptera: Corduliidae), près de Poltimore dans l'Outaouais québécois. *Nouv'Ailes* 23(2): 12. (in French) [Verbatim/Google translate: On May 18, 2009, we were revisiting a site very near Poltimore (45°47'N 75°42'W) in the census division of Papi-neau. It is a minerotrophic environment at one end of a lake (Ménard & Hutchinson, 1999), where the soggy ground is punctuated by small ponds containing very little water. Quite quickly, BM had the pleasure of discovering, observing and picking three emergences (two males, one female, with the exuviae) of this species of odonates rarely found in Quebec (Pilon & Lagacé, 1998) and a little throughout its range. For his part, RH was able to collect an adult male, an exuviae and three larvae. By examining all the material brought home, RH is able to add for both, an emergence, being a female (with the exuviae), another adult, an exuviae and seven larvae, for a grand total of 22 specimens. We returned on May 24, 2009 to the same site. BM brought back two exuviae and RH also two exuviae and three *Williamsonia fletcheri* larvae. Finally, another excursion, on May 21, 2011, allowed us to collect three other immature larvae, including one larva. The wing sheaths reached the end of the fourth abdominal segment in one case and the beginning of the third for the larva. Our harvests before 1999 We refer the reader to the articles by Ménard (1990, 1996) and Ménard & Hutchinson (1999), the last, quite exhaustive, detailing all our harvests before the year 2000. These harvests took place in three sites of Quebec's Outaouais, particularly in the fen, near Poltimore, in the Danford lake sector (45°57'N 76°08'W) and that of Jean-Venne lake (45°41'N 76°04'W), not to mention the great bog of Alfred, in Ontario. We mainly collected larvae, exuviae, and sometimes emergences. The aforementioned articles also mention the times when we observed adult individuals. Distribution and Abundance Pilon & Lagacé (1998) list only seven localities where this diminutive Cordulid has been found, and this only in the cold temperate zone of the province. Savard (2011) summarizes the state of the captures, these being in southwestern Quebec. On the other hand, he recently reported the capture or observations of the Black Emerald in Lac Saint-Jean and in the Quebec region. No doubt these finds will be the subject of mentions in later publications, since it is an extension of the interesting distribution area. The larva of *W. fletcheri* remained unknown until recently (Charlton & Canning 1993). Moreover, we provided, at their request, specimens and information on our harvests from the Alfred peat bog and the environment located near Lake Jean-Venne, a fact cited in their description article. It bore the name of Lac Duncan at the time, although it was mentioned, without our knowledge, under the name of Lac Jean-Venne in the Répertoire toponymique du Québec (1987). The adult of the species was described by Williamson (1923) and the genus established by Davis (1913). No doubt the species will be found elsewhere in Quebec, further north and further east. It is a question of interested odonatologists and naturalists looking for *W. fletcheri* in environments conducive to its development. Happy hunting everyone!] Address: Menard, B.,

16, rue Smith, Gatineau (Québec) J8T 3A1. Email: ménardben@vidéotron.ca

**21573.** Hutchinson, R.; Menard, B. (2013): Les larves d'*Anax junius* (Drury) (Odonata: Aeshnidae) peuvent-elles vivre dans des eaux peuplées de poissons? *Nouv'Ailes* 23(1): 6-7. (in English) [Verbatim/Google translate: On August 16, 2012, during an excursion to Parc national de Plaisance, located about 40 km east of the city of Gatineau, we collected 15 exuviae of *A. junius*, at the edge of the Ottawa River. We were walking on a long wooden plank walkway, which the English call a "boardwalk", which spans the banks of the Ottawa River in the park. We carefully unhooked, on each side of the footbridge or the passage, the exuviae which were on the stems of aquatic plants at different heights from the surface of the water. On August 18, 2012, Benoît Ménard (BM) collected three mature *Anax junius* larvae on the shores of Lac Beauchamp, located in the municipal park with the same name. The lake, fed by underground springs, does not seem to have deteriorated despite the fact that the site was first a quartz mine, which was transported by train to Montreal, then a dump and finally, a park with trails for walking, cycling and nature observation. To his great surprise, BM was happy to find that the three larvae, brought alive to his home, turned into adult *A. junius*, two males and one female. The photos accompanying this article bear witness to this. The two environments mentioned above are populated by an ichthyofauna rich in species and individuals. At Lac Beauchamp, the fishing activity is clearly visible during our visits to study the dragonflies, as we can frequently see fishermen showing off their catches. In addition, the park authorities, whom we consulted, tell us that they recently stocked the lake with 4,000 brown trout. These collections contradict data from the odonatological literature, according to which the larvae of this species of Aeshnidae only thrive or even can live in waters devoid of fish (Corbet, 1999; Dunkle, 2000). Moreover, the first author cites other sources that support this thesis. Unusual fact, it is interesting to note that Paulson (2011) does not retain this particularity of the larvae of *A. junius* which would only live in waters devoid of fish. The reader can, moreover, consult the articles of Trottier (1966) and Young (1965 and 1967) to glean useful knowledge on the life of *A. junius*. As far as we are concerned, in the past we have collected many larvae and exuviae of *A. junius* in waters where the presence or proliferation of fish is rather unlikely, for example, in ponds and ponds of sand and gravel pits. These discoveries should encourage odonatologists and naturalists to increase research to confirm or invalidate the thesis that the larvae of *A. junius* live in waters devoid of fish. [...] As a corollary activity, the odonatologist can quite easily dissect fish from environments rich in Odonata larvae to examine the stomach contents and see if there are dragonfly larvae. It could thus determine which species have been victims of predation. The digestive tract of fish is a long tubular structure that runs through a good part of the body in its length. When preparing the fish, to cut out the edible muscle filets, it is possible to isolate the digestive tract and place it on a white sheet, for example to examine its contents. I did these dissections on speckled trout, with trainees from the Ère de l'estuaire camp, in Port-au-Sauzon (Charlevoix-Est) for several years. The odonatologist, who consults Corbet (1999), discovers that research on Odonata larvae in fish-rich environments or not, can be popular with certain odonatologists and aquatic biologists, few in number, it should be noted. However, this field of research requires knowledge of both the dragonfly larvae and the fish that inhabit the waters of our regions. We encourage Quebec naturalists to continue this research on the fauna of our

vast territory.] Address: Menard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1. Email: ménardben@vidéotron.ca

**21574.** Hutchinson, R.; Menard, B. (2013): Spiders collected in Odonata exuviae in the province of Quebec. *Argia* 25(1): 18. (in English) ["For over thirty years, both authors have been collecting a few odonate larvae and exuviae at each outing. About 6,000 larval and exuvial specimens have been donated to the Canadian National Collection (CNC) of insects, arachnids and nematodes of Agriculture Canada, in Ottawa. About 80 species or more are in the CNC. However, a few need to be identified to species, namely zygopterans, Aeshna specimens and some Somatochlora. Both authors have fairly large holdings of larvae and exuviae in their homes. The first author has furthermore learned to identify many common Quebec spiders to species with the help of Charles Dondale and Jim Redner, CNC arachnologists (now retired), who built the AgricultureCanada Spider Collection (about 500,000 specimens). Recently, we discovered that live spiders could be found in dragonfly exuviae. Although this behavioral trait of spiders does not appear to be very frequent, we are able to report a few cases where we have found spiders in odonate exuviae. On 1 October 2005, under a bridge with much traffic in Gatineau, we discovered exuviae containing live spiders, including a female *Steatoda bipunctata* (Theridiidae; False Widow) spider residing in a larval skin of *Epitheca princeps*. The remains of two flies and some spider silk (probably part of a molt) were observed in the dragonfly exuvia. Another *E. princeps* exuvia contained a *Tetragnatha* sp. (Tetragnathidae; Orbweaver) spider, and an exuvia of *Neurocordulia yamaskanensis* was found to harbour a *Steatoda bipunctata* female and the remains of a spider molt. We also collected exuviae of *Libellula luctuosa* and *Epitheca cynosura* with spiders but lost the spiders because they fell from the exuviae on the grassy soil at our feet. We were unable to recoup the lost spiders (Hutchinson & Menard, 2010). When the presence of a spider is suspected in a skin, it is advisable to keep an insect net underneath so that the specimen will fall into the net, instead of on the ground. On 16 June 2012 at Luskville, on the shore of the wide Ottawa River, one of many larval skins collected of *Stylurus notatus* contained a rarely found spider for the province of Quebec, *Clubiona maritima* (Leafcurling Sac Spider), only the second record for the province (Beianger & Hutchinson, 1992). Details of this capture are given in Hutchinson (2012). Manolis (2008) has also reported a male *Sassacus vitis* (Jumping Spider) in a larval skin of *Macromia pacifica*. When searching for spiders in odonate exuviae, one must isolate each species in an individual vial while observing the possible presence of silk, remains of molt or prey, etc. It remains to be discovered how frequently spiders may adopt odonate larval skins as a refuge or residence to pursue their activities. In Gatineau, the underside of the bridge where our specimens were found is protected from wind and water and many spiders can be observed walking or hiding near the Odonata skins. The same cannot be said of the extensive stone walls on the shore of the Ottawa River in Luskville. Larval skins on the underside of the Gatineau Bridge can remain there for months protected from wind and water and snow, so that spiders can in all likelihood find long-term lodgings. The skins in Luskville are often blown away by wind or washed away by trickling water." (Authors)] Address: Menard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1. Email: ménardben@vidéotron.ca

**21575.** Susanto, M.A.D.; Firdhausi, N.F.; Bahri, S. (2013): Diversity and community structure of dragonflies (Odonata) in various types of habitat at Lakarsantri District, Surabaya,

Indonesia. *Journal of Tropical Biodiversity and Biotechnology* 8(2): 17 pp. (in English) ["Dragonflies are insects that are very dependent on the existence of freshwater ecosystems. However, the population of dragonflies in urban freshwater ecosystems is at risk due to a number of issues. Consequently, it is essential to carry out research and efforts to preserve dragonflies in urban areas. This study aims to provide information about the diversity and structure of dragonfly communities in various habitat types in the Lakarsantri, Surabaya. Data collection in this study was carried out in the habitat types of ponds, reservoir, river, and rice field in July to September 2021. The study results show there are 22 species from 4 families with a total of 827 individuals. Analysis of the Shannon-Wiener diversity index showed that the highest value of dragonfly diversity was found in a pond, with a value of  $H' = 2.40$ , and the location with the lowest value was a river, with a value of  $H' = 1.77$ . At four research locations that have different aquatic ecosystems, the community structure of dragonfly is also different. The composition of the dragonfly community structure at the reservoir location has similarities to a pond, and at a river location, it has similarities to a paddy field. Differences in abiotic factors consisting of light intensity, humidity, and temperature at each study location have a correlation with differences in dragonfly community structure. In addition, the composition of the vegetation at each location is also one of the factors causing differences in the structure of the dragonfly community." (Authors)] Address: Susanto, M.A.D., Dept of Biology, Faculty of Mathematics & Natural Sciences, Univ. Brawijaya, Malang, Indonesia. Eemail: saifulsi@uinsby.ac.id

**21576.** Holusova, K.; Holusa, O. (2014): Finding of *Leucorhinia albifrons* (Odonata: Libellulidae) in the Hustopecký biogeographical region in the southern Moravia (Czech Republic). *Acta Mus. Beskid. 6*: 125-127. (in Czech, with English summary) ["Two mature males of *L. albifrons* were found on 18.VI.2014 in the locality of Šardice village – Šardický potok stream – Písky place (48°56'50.67"N, 17°03'26.14"E, 176 m a.s.l.) in the Hustopecký bioregion (southern Moravia, Czech Republic). It is the first record from the north-annonian subprovince in the Czech Republic." (Authors)] Address: Holusova, Katerina, Ústav ochrany lesu a myslivosti, Lesnická a dřevářská fakulta, Mendelova univerzita v Brně, Zemědělská 3, CZ-613 00 Brno. Czech Republic. Email: holusova.katerina@seznam.cz

## 2014

**21577.** Hutchinson, R.; Ménard, B.; Piché, C. (2014): *Perithemis tenera* (Say) (Odonata: Libellulidae) Nouveau pour la vallée de l'outaouais québécois. *Nouv'Ailes* 24(1): 15-16. (in French) [Records of *P. tenera* between 2012 and 2013 in Quebec's Outaouais Valley are documented.] Address: Ménard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1, Canada. Email: ménardben@vidéotron.ca

**21578.** Hutchinson, R.; Ménard, B.; Piché, C. (2014): *Pachydiplax longipennis* (Burmeister) (Odonata: Libellulidae) dans la région de l'Outaouais. *Nouv'Ailes* 24(1): 5-7. (in French) [Verbatim/Google translate: During our odonatological excursions in the Ottawa Valley, excursions that date back to the summer season of 1987 for RH and BM, we had never encountered this species of dragonfly (Ménard 1996) which nevertheless had a vast geographical distribution in North America. North (Needham et al. 2000). The literature on our odonates does not mention the presence of this dragonfly either for the Outaouais region of Quebec (see Pilon & Lagacé 1998, Walker & Corbet 1975, Robert, 1963). The first mention

for Quebec is reported by Mochon (2012). During the summer of 2012, we observed and collected adult *Pachydiplax* at various sites in the city of Gatineau. It was in 2013, however, that we began to find larvae and exuviae of this monotypic dragonfly species. Thus, BM captured the first larva identified for Quebec on Monday, June 3, 2013, at the Touraine marsh. Touraine is a sector of the city of Gatineau (figure 1). First, we detail somewhat our harvests of the species during 2012-2013. We then present the general distribution for the North American continent. Finally, some data on the biology of this species of dragonfly will allow the reader to become aware of the interest and the importance of following the evolution of the presence, even the progressive invasion of this odonate, especially in the southwest. of the Quebec territory; more precisely in Gatineau, on the south bank of the Ottawa River facing Ottawa (Ontario). Summary of our observations: At all sites, males were present and showed a lot of aggression towards conspecifics. BM and RH saw few females. However, BM observed egg-laying and attempted egg-laying at the edge of Lac Beauchamp. The individuals observed were almost always at the edge of water bodies with abundant riparian vegetation, either floating or upright. At some sites in Gatineau Park, RH and BM were unable to collect specimens, as they did not hold a collection permit from Gatineau Park, which owns the site. Geographical distribution Literature data: According to Needham et al. (2000), the geographical distribution of *Pachydiplax* encompasses much of North America, as well as Mexico, Bermuda and the Bahamas. Walker & Corbet (1975) report the presence of the species in eastern parts of Ontario, Manitoba and British Columbia. Pilon & Lagacé (1998) and Savard (2011) do not mention the species as a component of the odonofauna of Quebec. On the other hand, Mochon (2012) makes a first mention of Quebec in one of his articles; thus, the species is a new element that enriches our odonatological heritage. In addition (Mochon (2014) observes that at the sites he has visited since 2012, particularly in Estrie and Montérégie, these are populations and not isolated individuals. Our mentions for the Outaouais are firsts for our region. Biological elements: At sites where the species is well established, the frequency of sightings and the omnipresence of individuals make them the odonates of choice for ecological and behavioral studies, as evidenced by the many books and journal articles to their subject. The Quebec naturalist and odonatologist can glean many fascinating facts from general works, such as Dunkle, 1989, 2000 and Paulson, 2011, and also from Walker & Corbet (1975). Among a few traits mentioned by these three authors, it is important to note a certain resemblance between the males of *Erythemis* and *Pachydiplax*. However, the former often land on the ground, while the *Pachydiplax* often adopt perches on the vegetation, at different heights. We can also look for individuals of the latter species, either in wooded areas or often at the edge of the water where emergent vegetation is spreading. Observers have discovered feeding sites or territories far from the shores of bodies of water. Near the water, the males perch on riparian plants, such as shrubs, and claim a portion of the shore that they defend aggressively. Tandems (male-female) are rarely observed. Copulation lasts 10 to 40 seconds, according to Paulson (2011). Males provide hover surveillance around females, which lay 300 to 700 eggs in 35 seconds (Dunkle 1989, Paulson 2011). During our observations in 2012 and 2013, we observed many males who seemed to want to take over parts of the shore with aggressive flights, and whose movements seemed to us to be somewhat erratic. For more specific and detailed research, we refer the reader to the work of Fried & May (1982), feeding and territory of males, Johnson (1962), territorial behavior and reproduction, Robey (1975), reproduction, and

Sherman (1983), post-copulatory behavior. In addition, these articles provide information on other research on *Pachydiplax*, cited in the references. Outlook In Quebec, we are only at the beginning of our observations and our research on *Pachydiplax*. We still have to verify the behavioral traits mentioned above and first follow, if necessary, the invasion of the species to determine its geographical distribution, as it settles in Quebec territory. For the Outaouais, we need to assess the importance or the permanence of the establishment of *Pachydiplax* populations elsewhere than in the city of Gatineau, for example on a perimeter of 50 km around, say up to Kazabazua, for example. As to whether the arrival of the species here in Quebec would be linked to climate change, it would perhaps be wise to wait a few years before deciding.] Address: Menard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1, Canada. Email: ménardben@vidéotron.ca

**21579.** Jacq, F.A.; Butaud, F.-J.; Ramage, T. (2014): Mont Marau. Guide vert. Direction de L'Environnement, Papeete, Polynésie Française: 168 pp. (in French) [The book briefly introduces eight odonate taxa including an undescribed *Hemicordulia*.] Address: not stated

**21580.** Ceballos, C.P.; Zapata, D.; Alvarado, C.; Rincón, E. (2016): Morphology, diet, and population structure of the Southern White-lipped Mud Turtle *Kinosternon leucostomum* postinguinale (Testudines: Kinosternidae) in the Nus river drainage, Colombia. *Journal of Herpetology* 50(3): 374-380. (in English, with Spanish summary) ["Most existing studies on *K. leucostomum*, have been based on northern Central American populations, leaving a lack of information on populations from southern Central America and South America. Herein we studied morphology, diet, and population structure of a population of the southern *Kinosternon leucostomum* postinguinale inhabiting four creeks in Colombia. Observed habitats used were highly variable, ranging from relatively clean waters to streams used for sewage disposal of wastewater from a human settlement. Body size was smaller than that of other populations of southern *K. l. postinguinale* and also than that of the northern *K. l. leucostomum*. Sexual dimorphism was evident, with males heavier, longer, and wider than females. Body size was associated with the habitat of origin, with Barrio Nuevo individuals being the largest. The main components of the diet were plant material, insects [Odonata: n=1], snails, and algae. We did not find evidence of sexual differences in the diet, but we found geographic differences in the body size. The population with the largest individuals, from Barrio Nuevo Creek, consumed more snails while those from Totumo Creek, the population with the smallest individuals, consumed more ants and plant material as compared to the other creeks. Additionally, we found a highly male-biased sex ratio, with 2.5 adult males per female, very few juveniles, and no nests, which suggests a dangerous risk of population decline. We suggest continued monitoring of the demography of this population, emphasizing its reproductive biology." (Authors)] Address: Ceballos, Claudia, Grupo Centauro, Escuela de Medicina Veterinaria, Facultad de Ciencias Agrarias, Universidad de Antioquia, Medellín, Colombia. E-mail: claudiaceb@gmail.com

## 2016

**21581.** Chelmick, D.G.; Evangelio Pinach, J.M.; Diaz Martínez, C. (2016): Aportación al conocimiento de las libélulas (Insecta, Odonata) de la provincia de Guadalajara (Castilla-La Mancha, España). Contribution to the knowledge of the dragonflies (Insecta, Odonata) in the Guadalajara province (Castilla-La Mancha, Spain). *Boln. Asoc. esp. Ent.* 40(3-4):

539-547. (in Spanish) ["Conclusions: *Lestes sponsa*, *Coenagrion scitulum*, *Aeshna juncea*, *Libellula quadrimaculata* and *Sympetrum sanguineum* are cited for the first time from the province of Guadalajara. The provincial inventory of odonates is therefore made up of 46 species (22 Zygoptera and 24 Anisoptera). Finally, after the work of Prunier & Chelmick (2015) and the records compiled in this note, only the presence of *Coenagrion caerulescens* to be confirmed from the provincial catalogue, whose only citation is a specimen from the National Museum of Natural Sciences. collected in Azañón in 1956 (PARÍS et al., 2014)."] Address: Chelmick, D.G., Macromia Scientific 31 High Beech Lane, Haywards Heath, West Sussex UK. Email: david.chelmick@gmail.com

**21582.** Entomofaune du Québec (2016): Publication d'un guide sur les naïades et exuvies des libellules du Québec. *Nouv'Ailes* 26(2): 4. (in French) ["A new guide, in French, has just been published: "Naiads and exuviae of dragonflies in Quebec: key to gender determination", published by Entomofaune du Québec. The two authors, Raymond Hutchinson and Benoît Ménard, well known to members of the AEAQ, offer naturalists the labor of thirty years devoted to the observation of the underwater world of dragonflies. This 73-page practical guide opens up a vast field of knowledge. It allows the identification and study of dragonfly naiads, either before they emerge from the water, or as exuviae left by new adults. The proposed identification key makes it possible to confidently separate the 52 genera of Zygoptera and Anisoptera listed in Quebec and near its borders. In addition, the key allows the identification of 32 species. From a scientific name, the naturalist will be able to consult reference works in the natural sciences and navigate effectively on the Internet to enrich himself with the knowledge accumulated before him. In this way, he will be able to communicate his observations and discoveries with passion and accuracy. No less than 116 anatomical drawings and 15 plates of illustrations, including 79 color photos, will help the naturalist finally give a name to his exuviae or dragonfly naiad specimens. The coiled book, in 7" X 9" (18 X 23 cm) format, printed on thick, semi-gloss paper, allows intensive use in the workshop or lab. You can order this magnificent guide, for \$33 (taxes and postage included), by consulting the publisher's website: [www.entomofaune.qc.ca](http://www.entomofaune.qc.ca)" (Publisher)] Address: Entomofaune du Québec inc., 108-637 boulevard Talbot Saguenay (Chicoutimi), Québec G7H 6A4, (418) 545-5011, postes 6542 ou 5076

**21583.** Hutchinson, R.; Ménard, B.; McAllister, L.; Larochelle, M. (2016): Découverte de naïades d'*Epiaeschna heros* (Fabricius) (Odonata: Aeshnidae) à Gatineau en 2016 et émergence d'un individu dans un bac aménagé chez soi. *Nouv'Ailes* 26(2): 12-13. (in French) [Verbatim/Google translate: On August 27, 2016, the four naturalists went to the municipal park of Lac Beauchamp in order to visit a shrubby forest swamp and observe aquatic organisms, for example dragonfly naiads. Among the organisms encountered, they were surprised to catch three naiads or larvae of the largest dragonfly in Canada, *Epiaeschna heros*. Lyne, BM's spouse, caught one and BM, two. To our knowledge, this is only the second historical naiad fishery for this aeshnid in Quebec. Moreover, the species remains little captured at the adult stage in the province, of which the southwest constitutes the northern limit at present. According to Savard & Mochon (2014), the adult has been captured only once in the past 25 years, on June 24, 2013. The biotope of Parc du lac Beauchamp consists of a wooded shrubby swamp whose main plant components are red maple, winterberry, sphagnum



moss and sensitive fern. Although the free and open water column is very shallow, there seems to be enough space for the movements of such a large naiad. The bottom is usually lined with dead leaves with small trunks and branches lying here and there under the water or emerging on the surface. The middle consists of several connected ponds. These naiads play dead when fished or handled. One cannot help but observe the dark coloring of their bodies in harmony with the branches and the dead leaves in the middle. BM brought the three naiads home alive, installed them in breeding tanks to observe them, fed them and hoped to witness emergences, all for the taking of digital photos which will document this crucial aspect of their existence. In fact, on August 29, BM had the privilege of discovering the emergence of a male. Apparently, the emergence would have occurred on the ground in the entrance portico of the accommodation. BM observes that in a breeding tank (aquarium, artificial environment), these naiads of *Epiæschna* present some behavioral traits to remember. They are rather apathetic. They can also float like a twig in the water column or even land on different substrates. This is the second time in eleven years that RH and BM have discovered this species of æshnid in the wild, again at the municipal park of Lac Beauchamp, in Gatineau, but in another wooded swamp located about a kilometer from the first (Hutchinson & Ménard 2007). We had visited the first biotope nine times, from May 29 to November 5, 2005, allowing us to sample four larvae or naiads, two of which had subsequently emerged in the aquarium at BM. In addition, one molt and twenty exuviae were collected at the site. The vegetation composition of the 2005 treed swamp was somewhat different from our 2016 site where black ash dominated tree vegetation. *Hydrocharis morsus-ranae* covered much of the surface of the water. When the environment was completely dry in autumn, the water-hemlock, an umbellifer, almost dominated the swamp. Finally, let's mention *Alisma plantago-aquatica* and a few mosses that popped up here and there. Thus, some females of *Epiæschna heros*, entrusted their eggs to two different types of swamps according to their plant composition and probably their pH, the second being acidic. It is interesting to mention some habitats gleaned from the odonatological literature. Walker (1958) writes that *E. heros* haunts dark ponds and ditches as well as draining marshes. Dunkle (2000) also mentions ponds in wooded areas, but also slow-moving streams, including swamps and temporary ponds or ponds. Paulson (2011) specifies the following biotopes: swamps and slow-moving streams rather in wooded areas, where the water can be very shallow. It even evokes temporary environments where the presence of water remains seasonal. According to Savard and Mochon (2014), the odonatologist can select the following habitats: temporary ponds, shaded river marshes under a forest cover. To better understand the components of the habitat of *E. heros* at Beauchamp Park in Gatineau, we visit and sample the many pools of water to see which ones may prove favorable to the presence of this enormous Aeshnidæ. To date, we manage to distinguish at least two types of ponds or swamps to explore. First, water bodies with forest cover comprising a combination of the following elements: plants that grow in the water, trees, shrubs, herbaceous plants, mosses, with a bottom lined with dead leaves, twigs, logs, present in even a modest and shallow water column. Second, there are habitats made up mostly of dead leaves and decaying plant matter. These environments are often inhabited by recyclers of the Asellidæ and Ostracods type, crustaceans. These latter biotopes, so far, are the least likely to harbor *E. heros*. A final fascinating aspect to raise is the probability, or at least the possibility, that these larvae survive the drying up of these environments (see Arai 1984).] Address: Menard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1. Email: ménardben@vidéotron.ca

Gatineau (Québec) J8T 3A1, Canada. Email: ménardben@vidéotron.ca

**21584.** Hutchinson, R.; Ménard, B. (2016): Émergences de *Neurocordulia michaeli* Brunelle (Odonata: Libellulidae: Corduliinae) dans un bac d'élevage, chez soi, l'hiver. *Nouv'Ailes* 26(1): 11. (in French) [Verbatim (Google translate): In Quebec, *Neurocordulia yamaskanensis* has been known for a long time (Provancher, 1875). This odonate is mentioned many times at different sites in the province (Pilon & Lagacé, 1998). It is one of the two species of dragonflies in the world's odonatofauna described by a Quebecer, Father Léon Provancher, the other being *Somatochlora brevicincta*, discovered and named by Brother Adrien Robert (1954). *Neurocordulia michaeli* was unknown to science until very recently (Brunelle, 2000). This species has recently become part of our entomological heritage (Charest & Savard, 2014). We have not yet found this Cordulid in the Outaouais. To familiarize ourselves with *N. michaeli*, we must therefore go to the edge of the Petawawa River, in Ontario. For example, on June 6, 2015, a trip to the Petawawa River caught a naiad (larva) of *N. michaeli* and two of *N. yamaskanensis* in torrential waters fed by the spring melt. RH and BM, the latter accompanied by his daughter Sophie and his nephew Daniel, waded into this rebellious water without the expected success. At the end of the season, on October 12, 2015, [...] Indeed, they caught 34 naiads of *Neurocordulia*, almost all of them *michaeli*, about ten larvae or mature naiads as well as 24 of medium size and this, in about an hour and a half of intense fishing. The sampling method consisted of lifting the submerged stones to pick the *Neurocordulia* larvae attached to them. These submerged stones were mostly the size of a hand and were found under water with moderate current. At home, BM fed the naiads of *Neurocordulia* mosquito larvae and pupae, small amphipods and other small aquatic organisms. Naiads of *Neurocordulia michaeli* have obviously adapted to the new "artificial" micro-environment since in December 2015, BM had the chance to witness six emergences of *N. michaeli*, i.e. three males and three females, as evidenced by the photos accompanying this article. These attempts are part of a research spread over two or three seasons of research in the field, with partial breeding at home or in the laboratory, therefore outside the natural environment. We need to improve the diet of naiads in an artificial environment and do research on whether or not these larvae diapause are obligatory in the winter period to explain their emergence in the middle of winter. These data will therefore be integrated into one or two subsequent articles to be produced which will report on our next data collected during the 2016 and possibly 2017 seasons on our two species of *Neurocordulia*.] Address: Menard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1. Email: ménardben@vidéotron.ca

**21585.** Hutchinson, R.; Menard, B. (2016): Premières mentions de naïades d'*Hetaerina americana* (Fabricius) (Odonata: Zygoptera: Calopterygidae) au Québec. *Nouv'Ailes* 26(2): 10. (in French) [10 larvae of *H. americana* were caught at July 19, 2015, at the banks of the Châteauguay River, in Saint-Martine, south of Montreal. Habitat: "running water flowing over many flat stones or rocks, often with only a few centimeters of water deep. The water flows into a widening of the river with more stagnant water. It was in this section of the river that the fished naiads were found. To our knowledge, these are the first captures of naiads of this species in Quebec, undoubtedly one of the most boreal sites for this species of Zygoptera." (Authors/Google translate)] Address: Menard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1, Canada. Email: ménardben@vidéotron.ca

**21586.** Hutchinson, R.; Ménard, B. (2016): Plusieurs émergences de l'espèce rarement trouvée au Québec *Stylurus amnicola* (Walsh) (Odonata: Gomphidae) dans des bacs d'élevage. *Nouv'Ailes* 26(2): 15. (in French) [Verbatim/Google translate: On June 19, 2016, BM, [...] traveled to the Petite-Nation River, at a site located approximately 4 km north of the municipality of Plaisance in the province of Quebec. They explored a sandy, muddy and muddy section at the confluence of the Saint-Sixte and Petite-Nation rivers. They caught eight larvae of *Stylurus amnicola*, which they brought back alive to Gatineau. BM installed them in breeding containers. He did not have to feed them, since they emerged without additional feeding. In fact, they are burrowing larvae and we have yet to find out if these naiads will hunt prey by burrowing and moving in the sand, or by walking on the surface of the sand. It therefore remains to be observed. He obtained seven emergences, from June 21 (for the first), to June 29 (for the last). He also caught naiads of the following odonate species: *Stylurus spiniceps* (3), exuviae of *Ophiogomphus anomalus* two larvae of *Neurocordulia yamaskanensis*. It was very difficult to get to the collection site because of the steep banks and the inaccessibility of walking paths to get to the coveted biotopes. On August 12, 2016, a BM expedition to the river Désert, in the municipality of Maniwaki, in Quebec's Outaouais, again allowed him to meet this species of gomphid, very rarely found in Quebec until very recently. [...] to catch a few additional naiads of *Stylurus amnicola*. These naiads are also being farmed in Gatineau, at BM, in the hope of obtaining emergences and use it to make other quality photographic shots, after having meticulously cleaned them with artists' brushes. *S. amnicola* has remained unknown in Quebec, except for the mention of Stöhr in 1918 in the Outaouais, on the banks of the Gatineau River. The mystery surrounding the existence of this species persisted until the early nineties. It began to dissipate thanks to the discoveries of Ménard (1996) who added the following sites: the Petite-Nation river, upstream from the falls, north of Plaisance, and the Désert river, in Maniwaki. Pilon & Lagacé (1998) add Moulin Banal Cove, near Quebec City, a site near the St. Lawrence River. Recently, an odonatologist from Lac Saint-Jean discovered a large number of exuviae on the banks of the Ashuapmushuan River, north of this immense lake (Michel Savard, personal communication). It is important to remember that even today, adult and mature individuals of this dragonfly remain almost impossible to spot in the airspace around bodies of water. The naturalist must, most of the time, rely on the collection of larvae and exuviae to document the existence of this species of odonate in nature. We must also draw attention to the fact that in 1996, larvae fishing in the Rivière Petite-Nation and the Rivière Désert was carried out approximately at the sites already listed. These are therefore not new references. Through these returns to sites already explored, BM hopes to gather additional data, particularly on the diet and behavior of naiads in captivity. He also intends to obtain many photos of living individuals taken at home, in an aquarium, after cleaning the naiads kept alive in the laboratory.] Address: Menard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1, Canada. Email: ménardben@vidéotron.ca

**21587.** Menard, B.; Hutchinson, R. (2016): Pêche de 2 larvules de *Progomphus obscurus* (Odonata: Gomphidae) près de Maniwaki: une première et une deuxième mentions de l'espèce pour la province de Québec. *Nouv'Ailes* 26(2): 6-7. (in French) [Verbatim/Google translate: On August 12, 2016, BM fished an immature dragonfly naiad, a larva, at the Désert River, in Maniwaki (Mont Cerf), [...] Vast sandy beaches

stretched along the shores. At the first cast of the net, he caught a small gomphid larva with very fast movements, which was silting up at lightning speed. The unusual shape and morphological characteristics of this naiad allowed us to quickly come to the conclusion that it was a gomphid, in particular *Progomphus obscurus*. This is the first record for the province of Quebec for both this genus and species of odonate. Subsequently, about thirty additional hauls enabled BM to catch naiads of *Ophiogomphus colubrinus*, *Gomphus adelphus* and *Macromia* larvae. The people of the village define this sector of the shores as the 16th beach from the Maniwaki bridge. There would be up to 104 in the area. On August 20, 2016, BM resolved to return to the capture site of the first *Progomphus* caught on August 12. [...] The naiad was dragged from the sand among heaps of dead wood lying in the water of the river. Lyne also caught several larvae of *Stylurus amnicola* (8). The expedition brought back specimens of the following species: *Stylurus spiniceps* and scudder, as well as *Stylogomphus albistylus*. They also found *Macromia* larvae and *Ophiogomphus* naiads.] Address: Menard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1, Canada. Email: ménardben@vidéotron.ca

**21588.** Sheela, S.; Subramanian, K.A.; Das, D.; Venkataraman, K. (2016): The type specimens in the National Zoological Collection ODONATA. Type Catalogue Series, 3: 1-36. In English [Type specimens of 48 species or subspecies of Odonata and deposited in the Central Entomology Laboratory, ZSI, Kolkata are documented with images and associated meta data (labels) and their current taxonomic status. In the meantime, more taxa have been revised and had to be synonymized.] Address: Subramanian, K.A., Zool. Survey of India, Prani Vigyan Bhavan, M-Block, New Alipore, Kolkata-700 053, India. E-mail: subbuka.zsi@gmail.com

**21589.** Turgeon, R. (2016): Découverte du Gomphe ventru en Beauce une libellule menacée de disparition au Canada. *Nouv'Ailes* 26(1): 5. (in French) [Verbatim/Google translate: At the end of June 2015, on Saint John's Day, I walked through a forest clearing crossed by a small mountain stream in the hope of tracking down a *Somatochlora tenebrosa*. This dragonfly, rarely seen in Quebec, is familiar to me in this habitat. I am then about three kilometers from downtown Saint-Georges-de-Beauce, in the northern part going towards Notre-Dames-Pins. At a good distance, that is to say at least half a kilometer from the Chaudière River, in the low herbaceous vegetation of a maple stand dotted with softwoods, I capture in an entomological net a male clubtail exposing a large club. Without being able to put a name to it immediately, I take a series of point-blank photos of it. Hoping that it stays in place, I then place it on some foliage, but it's a waste of time for other photos because it immediately flies towards the canopy! It is only by examining my photos on the computer, and by consulting the guide to the odonates of Algonquin Park, that I realize that it could be *Gomphus ventricosus*. I send my photos to Michel Savard who confirms my identification. Back in the field, on June 30, at exactly the same place, I captured another male whose coloring turned out to be slightly different from the first due to the extent of the yellow in the eighth abdominal segment. According to the state of our knowledge, this would only be the third mention of this species in Quebec. We have to go back to June 18, 1940, in Farnham, for the discovery of the Skillet Clubtail in Quebec, by Brother Adrien Robert, author of the volume "Les libellules du Québec". Then, we refer to July 4, 2011 for the discovery of a male, on the bank of the Batiscan River in Mauricie, by Pierrette Charest (see the Entomofauna Bulletin of November 2011). At the suggestion of Michel Savard, the coordinator of the Initiative

pour un atlas des dragonflies du Québec (IALQ), I then explored the surroundings of the Chaudière hoping to find exuviae of the species there, but without success. I retain a constant between the observations of Adrien Robert and mine. The various males captured in the forest were far from a large watercourse. For the new season, in June 2016, I will try to document the abundance of the Skillet Clubtail at my observation site. This is quite a challenge for a species that the Committee on the Status of Endangered Wildlife in Canada (COSEWIC, 2010) considers endangered.] Address: not stated

## 2017

**21590.** Hutchinson, R.; Ménard, B. (2017): Pêches de naïades de *Somatochlora brevicincta* (Odonata: Corduliidae) à Senneterre en 2016. *Nouv'Ailes* 27(1): 4-5. (in French) ["On July 20, 2016, BM, accompanied by Majella Larochelle, allowed himself a two or three-day expedition to Lake Mistassini in the hope of collecting naiads of *S. brevicincta* and other species of odonates which mainly inhabit the subarctic regions. Due to the short time devoted to fieldwork and the great distance to travel from Gatineau to finally catch larvae in the field, the results were modest and mixed. No water nymphs were caught, unlike the 1996 expedition (Hutchinson & Ménard, 2000). However, on the way back, a brief stop in a reticulated bog in Senneterre allowed BM to catch two *S. brevicincta* larvae. These were brought back alive to Gatineau and placed in breeding tanks. In the subfamily Corduliinae, the genus *Somatochlora* has the largest number of species in North America (Needham et al., 2000). This statement also applies to the province of Quebec where 14 species are found (Savard, 2011). The description of *S. brevicincta*, as a new species, dates from a relatively recent period compared to all known taxa for Quebec (Robert, 1954). Moreover, the description of the larva or naiad is also recent (Hutchinson & Ménard 2000). [...] *S. brevicincta* was little known at the time of Walker & Corbet (1975). It is currently listed in the following geographic entities: Quebec, Nova Scotia and British Columbia, for Canada and Maine and Minnesota, for the United States (Paulson, 2011). In Quebec, the distribution of *S. brevicincta* currently encompasses the regions of Abitibi, Lac Mistassini, Sept-Îles (Buidin & Rochepault, 2008), Lac-Saint-Jean (Michel Savard, pers. comm.) and Parc National Frontenac (Alain Mochon, pers. comm.). For naturalists and odonatologists wishing to fish for *S. brevicincta* naiads, BM offers the following technique. Once at the edge of the minerotrophic ponds of our peat bogs, the collector must recommend the following fishing procedures: with his net, he executes a circular movement from the bottom of the pond upwards in the direction of the opposite shore; in order to detach or extirpate the naiads clinging to the sphagnum moss or other plant material that lines or borders the pond, it agitates and grazes the bottom and the sphagnum, always directing the net towards the opposite bank. BM used this method at Lake Mistassini in 1996 and at Senneterre in 2016. It is worth remembering that adults of *S. brevicincta* are very discreet in nature and are often difficult to spot in flight or perched low in peat environments. Fishing for larvae therefore becomes an important activity to avoid returning empty-handed from one's odonatological expeditions. By the way, hello and good luck!" (Author/Google translate)] Address: Menard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1. Email: ménardben@vidéotron.ca

**21591.** Johansson, F. (2017): Population structure of *Leucorrhinia dubia* (Vander Linden) the White-faced Darter in Europe with special reference to the population at Chartley Moss. *J. Br. Dragonfly Society* 33(2): 73-78. (in English)

["This article describes the population structure with regard to genetic variation and isolation of *L. dubia* in Western Europe, with a special focus on the British population at Chartley Moss. The British population is genetically closest to those in Switzerland and France but is genetically isolated from all populations in Europe. Information is also provided about Variation in the length of the spines in larvae raised in the absence of fish. This feature is of particular interest because these spines provide protection from fish predators as well as being used for keying out species at the larval stage." (Authors)] Address: Johansson, F., Animal Ecology, Dept of Ecology & Genetics, Uppsala University, Sweden

**21592.** Karle-Fendt, A.; Stadelmann, H. (2017): Die Fauna des Felmer Moores – Die Libellen (1. Teil: Kleinlibellen). *Naturkundl. Beiträge Allgäu* 52: 33-43. (in German) [Records of 19 Zygoptera are documented.] Address: Alfred Karle-Fendt, A., Hofenerstr. 49, 87527 Sonthofen, Germany. Email: karle-fendt@t-online.de

**21593.** Lozano, F.; Rodríguez, J.S.; Molineri, C. (2017): *Acanthagrion peruvianum* Leonard, 1977 (Odonata Coenagrionidae) a junior subjective synonym of *A. floridense* Fraser, 1946 and description of its final stadium larva. *Zoologischer Anzeiger - A Journal of Comparative Zoology* 270: 71-80. (in English) ["*A. peruvianum* is considered a junior subjective synonym of *A. floridense* Fraser, 1946 based on the analysis of type material. The species is diagnosed and SEM images are provided for male and female diagnostic characters. The larva of *A. floridense* is described based on specimens collected in Salta, Jujuy and Tucumán provinces (Argentina). A distribution map is given showing that this species is recorded for the first time for Misiones and San Luis provinces in Argentina, and for La Paz and Tarija departments in Bolivia." (Authors)] Address: Molineri, C., Instituto de Biodiversidad Neotropical, CONICET-UNT (Consejo Nacional de Investigaciones Científicas y Técnicas—Universidad Nacional de Tucumán), Facultad de Ciencias Naturales e Instituto M. Lillo, Tucumán, Argentina. Email: carlosmolineri@gmail.com

**21594.** Ménard, B.; Hutchinson, R. (2017): Première pêche au Québec de la naïade très rarement observée de *Gomphaeschna furcillata* (Odonata: Aeshnidae). *Nouv'Ailes* 27(2): 10-11. (in French) [A record of a larva of *G. furcillata* at 13-VIII-2017 near Mulgrave-et-Derry, Papi-neau, Québec, Canada is discussed in any details.] Address: Menard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1, Canada. Email: ménardben@vidéotron.ca

**21595.** Ménard, B.; Hutchinson, R. (2017): Nouvelles pêches de naïades de *Progomphus obscurus* (Rambur) (Odonata: Gomphidae) au Québec. *Nouv'Ailes* 27(2): 5. (in French) ["On September 16, 2017, BM and his wife Line went again to the edge of the Désert River, near the town of Maniwaki, to the site where they had found two larvae of *P. obscurus* on August 12, 2016, a first and second mention of the species for Quebec (Hutchinson & Ménard, 2016). This time, they caught five naiads of *P. obscurus*, three almost mature specimens and two larvae (immature). These are five other mentions for the Quebec territory, at the same site however. These discoveries seem to confirm that a large population is spreading at least at this site and perhaps elsewhere in Quebec. BM therefore put them in breeding at his home in Gatineau. He feeds them with mosquito larvae (Culicidae). However, these naiads seem reluctant to adopt the proposed diet. Research should be undertaken to better under-

stand the usual prey of organisms of the genus *Progomphus*, which burrow and live in the sand. We hope to have positive news to deliver on the evolution of the larvae kept in captivity at BM at later dates. We also intend to visit the site again in the hope of finding new confirmations of the importance of this population of *P. obscurus* on the banks of the Desert River. As additional information on the richness of the odonatofauna of the Desert River, BM reports that an impressive population of naiads of *Stylurus amnicola* of all sizes inhabit the site of this watercourse surveyed by BM and his wife, Line. This species was very rarely found for a very long time in Quebec." (Authors/Google translate)] Address: Menard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1. Email: ménardben@vidéotron.ca

**21596.** Nagel, P.B. (2017): Diskussionsbeitrag: Populationshaltende Maßnahmen im artenschutzrechtlichen Ausnahmeverfahren. ANL Liegen Natur 39(1): 79-81. (in German) [If, for example, an infrastructure project fulfills the prohibition of species under species protection law, the project can only be approved by way of an exception under Section 45 (7) of the German Federal Nature Conservation Act. Among other things, it must be checked whether the conservation status of the populations of a species is not deteriorating. In practice, it is difficult to make a statement on this. The procedure discussed here offers approaches for a simplified examination of this question. As part of the exception, measures to ensure the conservation status of the affected populations of a species (including FCS measures, favorable conservation status) can be taken. However, these are not mandatory, such as measures to ensure coherence in European area protection. They are required when the conservation status would otherwise deteriorate or, in the case of Annex IV species of the Fauna-Flora-Habitat Directive with an unfavorable conservation status, it would be difficult to improve the status. A corresponding statement at the expense of the project is difficult to provide. In this article, a proposal for a simplified procedure is presented and discussed. The problems arisen, are discussed using the example of *Ophiogomphus cecilia*.] Address: Nagel, P.B., Bayerische Akademie für Naturschutz und Landschaftspflege (ANL), Seethalerstr. 6, 83410 Laufen, Germany. Email: paul-bastian.nagel@anl.bayern.de

**21597.** Baeta, R. (2018): Déclinaison régionale du Plan national d'actions en faveur des Odonates en région Centre Val de Loire. Mise à jour des connaissances sur la répartition des espèces – Bilan 2013-2017. Association Naturaliste d'Etude et de Protection des Ecosystèmes Caudalis – Direction Régionale de l'Environnement, de l'Aménagement et du Logement Centre, Janvier 2018: 33 pp. (in French) ["The development of the "Centre Val de Loire Regional Adaptation of the National Action Plan for Odonata 2013-2017" was jointly carried out by the CNRS-IRBI and the ANEPE Caudalis on behalf of the DREAL Centre. This document received the favorable opinion of the Regional Scientific Council for the Heritage of the Center during its meeting of 11-XII-2012. ANEPE Caudalis was then appointed by the DREAL Center as coordinator of this plan in the region. Many actions of this declension concern the acquisition of new knowledge, in particular in terms of the distribution of species. This synthesis draws up a cartographic assessment, species by species, of the regional knowledge acquired and centralized within the database developed within the framework of this PRA. This document was produced thanks to data collection work carried out each year with partners and regional naturalists, as well as bordering regions. We would therefore like to thank here all the contributors who have

transmitted data and information, making it possible to produce the maps of the known distributions of the 31 species included in the PRA Odonates Centre Val de Loire." (Google translate)] Address: Baeta, R., Animateur du Plan régional d'actions en faveur des Odonates en Centre-Val de Loire, association naturaliste d'étude et de protection des écosystèmes "Caudalis", 1 rue de la Mairie 37520 La Riche - Courriel, France. E-mail: renaud.baeta@anepe-caudalis.fr

**21598.** Bartolucci, J.C. (2018): Amélioration des connaissances sur la répartition de l'Agrion de Mercure (*Coenagrion mercuriale*) en Lot-et-Garonne. Conservatoire d'espaces naturels d'Aquitaine: 53 pp. + annexes. (in French) ["Conclusion: In 2018, only eight locations of *C. mercuriale* were discovered. 58.1 kilometers were prospected via transects to which are added observations made outside transects. The distribution of the species on the territory is very heterogeneous with a good representation on the Landes plateau and the areas bordering the department. The meshes of the central part of Lot-et-Garonne remain unoccupied by *C. mercuriale* in view of the knowledge resulting from this work and previous work. Seven meshes are added to the atlas of the odonates of Aquitaine for this species which brings to 37 in total, or 47% of the department. Statistical analyzes of the variable analysis type were not possible due to the low number of stations discovered. However, for the sites where the species was observed, aquatic vegetation occupied 10 to 80% of the watercourse. The presence of typical watercress plants will reveal a significant potential for the site to host *C. mercuriale*. The surrounding environments were quite varied with crops, pastures, meadows, lawns in urban areas and roads. In addition to the presence of this vegetation, the management of the watercourse and its banks will strongly influence the potential of the environment for *C. mercuriale*. In general, it will prefer sites with a buffer zone (grass strip), strong sunlight and nearby shrubby areas allowing it to mature after emergence. All the data will be transmitted to the DDT47 in connection with the agreement set up specifically for this study. The elements collected in the field will be able to provide information on watercourses awaiting classification or highlight changes in already classified watercourses (flow that has become temporary, for example). CEN Aquitaine deemed it necessary to revisit certain favorable sites where the species could not be identified. In 2019, a special effort will be made to raise awareness among owners, users and managers of these small waterways. The main objective will be to introduce them to *C. mercuriale* and the importance of the departmental level of ensuring the conservation of the species and its habitat. It is planned to have a document signed in order to formalize, in a non-regulatory manner, the commitment to this cause of the various interlocutors. *C. mercuriale* presents a strong challenge at the level of the department. Despite the possibility of finding imagoes in sites considered unfavorable to the species, the limiting factors for its establishment are induced by the larvae which have much stricter ecological requirements. Also, the intensification of anthropogenic pressures and alteration factors have led to its severe scarcity. If nothing is done quickly to protect this dragonfly, the remaining populations could still experience drastic drops with an increase in disappearances locally, or even eventually in most of the department." (Author/Google translate)] Address: Bartolucci, J.-C., chargé de missions, CEN Aquitaine - Antenne Lot-et-Garonne - Chemin du Rieulet - 47 160 Damazan, France. Email: jc.batolucci@cen-aquitaine.fr

**21599.** Chiricota, L. (2018): Première mention de la *Libellula* (*Plathemis*) *lydia* Drury (Odonata: Libellulidae) au Saguenay–



Lac-Saint-Jean, Québec. Fabriques 30: 18. (in French) [18-VI-2007, river Brassard, near Roberval (48°30'11"N, 72°14'56"E).] Address: Chiricota, Lise, 448, rue Léger, Roberval, (Québec) G8H 3G7, Canada.

**21600.** Evans, B.J.E. (2018): Neuronal encoding of natural imagery in dragonfly motion pathways. Dissertation Note: Thesis (Ph.D.) – University of Adelaide, Adelaide Medical School, 2019: 243 pp. (in English) ["Vision is the primary sense of humans and most other animals. While the act of seeing seems easy, the neuronal architectures that underlie this ability are some of the most complex of the brain. Insects represent an excellent model for investigating how vision operates as they often lead rich visual lives while possessing relatively simple brains. Among insects, aerial predators such as the dragonfly face additional survival tasks. Not only must aerial predators successfully navigate three-dimensional visual environments, they must also be able to identify and track their prey. This task is made even more difficult due to the complexity of visual scenes that contain detail on all scales of magnification, making the job of the predator particularly challenging. Here I investigate the physiology of neurons accessible through tracts in the third neuropil of the optic lobe of the dragonfly. It is at this stage of processing that the first evidence of both wide-field motion and object detection emerges. My research extends the current understanding of two main pathways in the dragonfly visual system, the wide-field motion pathway and target-tracking pathway. While wide-field motion pathways have been studied in numerous insects, until now the dragonfly wide-field motion pathway remains unstudied. Investigation of this pathway has revealed properties, novel among insects, specifically the purely optical adaptation to motion at both high and low velocities through motion adaptation. Here I characterise these newly described neurons and investigate their adaptation properties. The dragonfly target-tracking pathway has been studied extensively, but most research has focussed on classical stimuli such as gratings and small black objects moving on white monitors. Here I extend previous research, which characterised the behaviour of target tracking neurons in cluttered environments, developing a paradigm to allow numerous properties of targets to be changed while still measuring tracking performance. I show that dragonfly neurons interact with clutter through the previously discovered selective attention system, treating cluttered scenes as collections of target-like features. I further show that this system uses the direction and speed of the target and background as one of the key parameters for tracking success. I also elucidate some additional properties of selective attention including the capacity to select for inhibitory targets or weakly salient features in preference to strongly excitatory ones. In collaboration with colleagues, I have also performed some limited modelling to demonstrate that a selective attention model, which includes switching best explains experimental data. Finally, I explore a mathematical model called divisive normalisation which may partially explain how neurons with large receptive fields can be used to re-establish target position information (lost in a position invariant system) through relatively simple integrations of multiple large receptive field neurons. In summary, my thesis provides a broad investigation into several questions about how dragonflies can function in natural environments. More broadly, my thesis addresses general questions about vision and how complicated visual tasks can be solved via clever strategies employed in neuronal systems and their modelled equivalents." (Author)] Address: Evans, B.J.E., Univ. of Adelaide, Adelaide, 5005 South Australia, Australia

**21601.** Felix, R.P.W.H.; van Hoof, P.H.; Hoppenbrouwers, P.; de Jong, V.; Krekels, R.F.M. (2018): Insects in selected areas in the province of Limburg. Three years of research into dragonflies, butterflies, grasshoppers and crickets. *Natuurhistorisch maandblad* 107(7): 125-134. (in Dutch, with English summary) ["In the Netherlands, it is the provincial authorities which are responsible for nature conservation. They have set up a subsidy system, to which organisations and civilians managing nature areas can apply for financial support for their management activities. This subsidy system, called 'Subsidiestelsel Natuur en Landschap'(SNL), requires monitoring of the results of the management activities. Hence, a monitoring system has been developed, which is based on a defined set of management types. These management types are studied with regard to a variety of factors relating to the quality of nature areas. One of the factors assessed is the occurrence of selected flora and fauna species. In the 2014–2016 period, Bureau Natuurbalans – Limes Divergens carried out a survey of butterflies, dragonflies, grasshoppers and crickets in the province of Limburg according to the SNL assessment methodology. Roughly 6,100 ha of management types for which insects are used as quality indicators for SNL purposes were surveyed over this three-year period. The areas investigated include nearly 90% of all Natura 2000 areas in Limburg. The survey resulted in a dataset of 44,000 records collected in nearly 7,500 1-hectare grid squares, which comprise 45 butterfly, 55 dragonfly and 34 grasshopper and cricket species. Records mostly concern the more common species, which are often under-represented in databases based on sightings by volunteers. One of the results of this study is a set of comprehensive distribution patterns of fairly common species like Meadow brown (*Maniola jurtina*) and Bog bush-cricket (*Metriopectera brachyptera*). This information is very difficult to gather using only the nonsystematic sightings collected by 'citizen science'. The article also describes aspects of the distribution of some less common or rare species. An example is given of the way the quality of the management types in one particular area, viz. the National Park Maasduinen, can be assessed using our data, following the guidelines described in the SNL methodology. The paper concludes with some notes on the method, based on our experiences in the field." (Authors)] Address: Krekels, R.F.M., Bureau Natuurbalans – Limes Divergens BV, Toernooiveld 1, 6525 ED Nijmegen, Netherlands: Email: krekels@natuurbalans.nl

**21602.** Hazarika, R.; Goswami, T. (2018): Dragonflies and damselflies of Hazara Pukhuri, Sonitpur, Assam, India. *Northeast Journal of Contemporary Research* 5(1): 11-16. (in English) [Odonate from the 'Hazara Pukhuri', a large perennial pond in Tezpur, Sonitpur, Assam, India, are studied resulting in 12 taxa. " Most of the larvae are ... collected from the top soft layer of bottom soil near littoral zone of the ponds and also in association with aquatic macrophytes such as *Eichhornia crassipes* and *Hydrilla verticillata*." (Authors)] Address: Goswami, T., P.G. Dep Zool., Darrang Coll. Tezpur-784001, Assam, India. Email: tonmoyeegoswami@gnuil.com

**21603.** Hutchinson, R.; Ménard, B. (2018): *Gomphaeschna furcillata* (Say) (Odonata: Aeshnidae) dans l'Outaouais québécois: premières mentions, aperçu de sa répartition et notes biologiques. *Fabriques* 30: 15-17. (in French, with English summary) ["The authors present their observations surrounding the capture of the small aeshnid, *Gomphaeschna furcillata* at a site situated a few kilometers west of Kazabazua (MRC de La Vallée-de-la-Gatineau). They also report the capture of two other specimens at Lake Beauchamp Municipal Park in the city of Gatineau, on June 9, 2007 and June

12, 2011, respectively. They also summarize the geographical distribution and some known biological data about the species." (Authors)] Address: Menard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1. Email: ménardben@vidéotron.ca

**21604.** Karle-Fendt, A.; Stadelmann, H. (2018): Die Fauna des Felmer Mooses – Die Libellen (2. Teil: Großlibellen). Naturkundl. Beiträge Allgäu 53: 3-19. (in German) [Records of 30 anisopteran species are documented.] Address: Alfred Karle-Fendt, A., Hofenerstr. 49, 87527 Sonthofen, Germany. Email: karle-fendt@t-online.de

**21605.** Kobayashi, T.; Ralph, T.J.; Lobb, J.; Miller, J.; Theischinger, G.; Hunter, S.J.; Jacobs, S.J. (2018): Dunphy Lake in Warrumbungle National Park, NSW: aquatic animal community after the Wambelong fire in 2013. Australian Zoologist volume 39 (3): 469-479. (in English) ["Fires are a common occurrence in Australian terrestrial ecosystems. A large fire occurred in January 2013 within and adjacent to the Warrumbungle National Park, near Coonabarabran in NSW, burning over 560 km<sup>2</sup> of the park and surrounding region (the Wambelong fire). The Wambelong fire affected Dunphy Lake, the only lake in the park. In this study, we assessed the post-fire aquatic animal community of the lake in March and September 2014. At the times of sampling the lake was largely dry and had only small isolated pools. We found 53 invertebrate taxa including the larvae of the dragonfly *Austrogynacantha heterogena* and one vertebrate species (larvae of the frog *Litoria rubella*) in the pool-water samples. Artificial inundation of the lake sediment samples under laboratory conditions led to the emergence of 31 taxa, totalling 62 taxa in the lake overall. Most taxa found in the lake are opportunistic and characteristic of those in still-water bodies. Dunphy Lake seems to be highly resilient in sustaining diverse aquatic animals. We highlight the importance of complementary pre- and post-fire data for improved assessments and interpretations of fire impacts to guide monitoring of post-fire recovery." (Authors)] Address: Kobayashi, T., Science Division, Office of Environment & Heritage NSW, PO Box A290 Sydney South NSW 1232, Australia. Email: Yoshi.Kobayashi@environment.nsw.gov.au

**21606.** Kobayashi, T.; Ralph, T.J.; Berney, P. (2018): Aquatic animal community at Dunphy Lake after the Wambelong fire indicates the importance of ephemeral pools and lake sediment for recovery process. In: 2018 Linnean Society of New South Wales Natural History Field Symposium: volcanoes of northwest New South Wales: exploring relationships among geology, flora, fauna and fires: 16-["Fires are a natural phenomenon in many terrestrial ecosystems. The ecological effects of fires can be complex, depending on the attributes of fires, landscapes, as well as local climate and weather. A large fire occurred in January 2013 within and adjacent to the Warrumbungle National Park, affecting a large area of the park including Dunphy Lake (the Wambelong fire). We assessed the aquatic animal community of Dunphy Lake in March and September 2014. The lake was largely dry and covered with grasses, with only small isolated pools of water in the lake. We found 53 invertebrate taxa including the larvae of the dragonfly *Austrogynacantha heterogena* and one vertebrate species (larvae of the frog *Litoria rubella*) in the pool-water samples. Artificial inundation of the lake sediment samples under laboratory conditions led to the emergence of 31 taxa, totalling 62 taxa in the lake overall. Our results indicate the importance of ephemeral pools and lake sediment as refugia against drought and fires for aquatic organisms. The conservation of these seemingly marginal habitats across the park would help the

recovery process of aquatic organisms and thus maintain the aquatic species diversity and function after major environmental disturbance." (Authors)] Address: Berney, P. National Parks and Wildlife Service NSW, Narrabri, NSW 2390

**21607.** Kulakov, O.I.; Tatarinov, A.G. (2018): Population of dragonfly larvae (Insecta, Odonata) in "floodless Lake Middle Week", Komi Republic. Biodiagnostics of the state of natural and natural-manmade systems. Materials of the 16th All-Russian Scientific and Practical Conference with international participation. 2018. Publisher: Vyatka State University (Kirov): 169-172. (in Russian) ["The first list of 35 species of dragonflies in the Komi Republic was published in the monograph by K. F. Sedykh [1]. The article by T. G. Stronk [2] provides information on 46 species of dragonflies. Currently, 53 species are included in the regional odonofauna [3, 4]. If the species composition of dragonflies has been revealed in sufficient detail, then there is practically no information on the structure of the population and the distribution of larvae in the water bodies of the republic. Studies of the population of dragonfly larvae were carried out in the Beloyarsky complex reserve, on the territory of which the biostation of the Syktyvkar State University is located (Kortkerosky district of the Komi Republic, 61°47'32" N, 51°48'23" E). The material was collected in the second ten days of June and the third ten days of July 2017 in the lakes Long, Priruslovoe and Krasivoye, which are floodplain closed water bodies formed as a result of separation from the oxbow lakes of the river. Vychehda. The collection of dragonfly larvae was carried out by "mowing" (wiring) with a water net over submerged vegetation in test plots 5 m long, up to 70 cm deep from the surface of the water surface and within 1.5 m from the shore to the center of the lake. In total, 12 plots were processed (four on each lake), on which 48 hydrobiological samples were taken for research, containing 634 specimens. larvae. The species diversity of dragonfly larvae in the surveyed lakes was assessed using the Margalef species richness (DMg), dominance D, Simpson evenness (DSm), and Berger-Parker (DB-P) indices widely used in ecological studies [5]. The abundance of larvae in water bodies was assessed using a five-point logarithmic scale [6]. Dragonfly larvae presented in hydrobiological samples belonged to 18 species from two suborders and five families (table). This is about 50% of the total identified composition of the odonofauna of the reserve [3]. As expected, the samples did not contain rheophilic representatives of the families Calopterygidae and Gomphidae, as well as the species *Platycnemis pennipes*, *Coenagrion lunulatum*, *Libellula depressa*, whose larvae were found in other local water bodies. Oz. Priruslovoe (I). In 2017, 209 specimens were found in hydrobiological samples. larvae of 12 species of dragonflies of different ages. In hydrobiological samples, representatives of the genera *Coenagrion* (*C. johanssoni*, *C. hastulatum*) and *Sympetrum* (*S. flaveolum*, *S. vulgatum*) dominated in terms of abundance; they accounted for more than half of the collected individuals. Three species can be attributed to the category of subdominants, the share of each of which in the samples was about 10%: the black pebble stone (*Sympetrum danae*), the metal headstock (*Somatochlora metallica*), and the rock rush (*Aeschna juncea*). The average density of larvae in the lake during the season was about 8 ind./m<sup>2</sup>. Oz. Beautiful (II). Hydrobiological samples in 2017 contained 243 specimens. larvae of all 18 dragonfly species. The structure of the population turned out to be different than in the lake. Priruslov. Large representatives of the Anisoptera suborder dominated in terms of abundance: *Aeschna juncea*, the large k. The subdominants in terms of abundance were

*Cordulia aenea*, *Sympetrum danae*, and *S. flaveolum*. The average density of larvae in the lake during the season was about 13 ind./m<sup>2</sup>. Oz. Long (III). In 2017, 182 larvae of 14 species of dragonflies were caught in this water body. The most abundant species were *Aeshna grandis*, *Somatochlora metallica*, *Coenagrion johanssoni*, *C. hastulatum*, and *Sympetrum flaveolum*. The composition of the background species included *Cordulia aenea*, *Aeshna juncea*, and *S. vulgatum*. The average density of larvae in the lake did not exceed 10 ind./m<sup>2</sup>. In the odonatofauna of the studied water bodies, five morpho-ecological groups of dragonfly larvae are represented. The largest number of species was found in three groups: broad-gill larvae of stagnant and slow-flowing water bodies, short-bellied crawling larvae of stagnant water bodies, and long-bellied actively swimming larvae of stagnant and slow-flowing water bodies. For the larvae of dragonflies of the three indicated groups, the living conditions in the studied water bodies are the most favorable. The calculation of the indices of species richness and dominance also showed an approximately equal level of species diversity of dragonflies in the studied water bodies. This is explained by the close location of the lakes and the similarity of the structure of aquatic habitats (vegetation, depth, water surface area). How stable the structure of the population of dragonfly larvae in lakes, whether it is possible to speak about the existing structure of the population is a topic for further research." (Authors/Google Translate)] Address: Kulakov, O.I., Institute of Biology, Komi Scientific Center, Ural Branch of RAS

**21608.** Lopez Colon, J.I.; Ceballos-Escalera, J.M.; Lopez Nieva, P.; Olivares Pantoja, A.; Espinosa Duran, J.S.; Espinosa Duran, M.L. (2018): Odonatos de la Zona Especial de Conservación (ZEC) Vegas, cuestras y páramos del sureste de Madrid. Boletín de la SAE N° 28: 26-31. (in Spanish, with English summary) ["Odonata in the Special Conservation Zone (ZEC) Vegas, cuestras y páramos del sureste de Madrid Abstract: The preliminary list of 34 Odonata species occurring in the Special Conservation Zone (ZEC) Vegas, Cuestras y Páramos of southeast Madrid (Natura 2000 network; code: ES3110006), a protected area of the autonomous community of Madrid, is presented." (Authors)] Address: Lopez Colon, J.I., Centro de Educación Ambiental Caserío de Henares, Comunidad de Madrid, Camino de la Vega s/n, 28830 San Fernando de Henares (Madrid), Spain. E-mail: lopezicolon@gmail.com

**21609.** Pilon, J.G. (2018): *Argia fumipennis* (Burmeister) et *Boyeria grafiana* Williamson (Odonata), deux nouvelles mentions pour les îles de la Madeleine. Fabriques 30: 14. (in French) [Verbatim (Google translate): During an excursion to the Magdalen Islands from July 11 to 18, 2004, we explored the national wildlife reserve at the eastern tip of Grosse Île and the forest area of the southern dune of Île du Haven to Houses. We collected seven species of odonates there. At this point in the summer season, *Libellula quadrimaculata* Linnaeus was found to be the dominant species in swampy areas, heathlands and shrubby areas. As secondary species, we found *Cordulia shurtleffi* and *Sympetrum danae*, mainly in shrubby areas. *Lestes dryas* and *Enallagma hageni*, mainly restricted to wetlands, were species of tertiary importance. These five species have already been identified for the fauna of the Magdalen Islands (Pilon & Lagacé 1998). During our investigations, we also found two other species of odonates. We first collected a female individual of *Argia fumipennis* at the eastern tip of Grosse Île (zone 11N12 of the National Topographic System of Canada) on July 12 in the marshy area. On July 14, we captured a female individual of *Boyeria grafiana* in a forest

area of the southern dune of Havre aux Maisons Island (area 11N05). The present mentions of these two species constitute additions to the fauna of the Islands.] Address: Pilon, J.G., 576 Terrasse Magnan, Sainte-Thérèse (Québec) J7E 4Z4, Canada

## 2019

**21610.** Amila Faqhira, Z.; Suhaila, A.H. (2019): Drift pattern of tropical stream insect: Understanding the aquatic insects movement. *Serangga* 24(1): 1-10. (in English, with Malaysian summary) ["An investigation to determine the drift pattern of aquatic insects in an upstream river in Perak, Malaysia was carried out. Drift was sampled by collecting drifting insects using drift sampler at every six hourly intervals within 24-hours period. A total of 3147 individuals of drifting aquatic insects was collected represented by 9 orders, 49 families and 81 genera. There was a significant difference in the temporal drifting pattern in aquatic insects (Kruskal-Wallis test,  $P=0.00$ ). Greatest drift abundance occurred at night time, which approximately 40 % higher than during the daytime samples, signifying diel periodicity of aquatic insect drift. In addition, nights without moonlight exhibited more drift rate as compared to bright, full-moonlit nights and differed significantly ( $P<0.05$ ). Drifting aquatic insects displayed alternant pattern with the greatest abundance at 0200 to 0800 h interval, and the least was at 1400 to 2000 h interval." (Authors) Taxa include Odonata, and a treated at genus level.] Address: Suhaila, A.H., School of Biological Sciences, Universiti Sains Malaysia. 11800 Minden, Penang, Malaysia. E-mail: ahsuhaila@usm.my

**21611.** Bangser, K. (2019): Investigation of even-skipped, a developmentally-regulated gene controlling neural segmentation in dragonflies. Union College - Schenectady, NY. Honors Theses. 2267. <https://digitalworks.union.edu/theses/2267>: II + 22 pp. (in English) ["A comprehensive understanding of the genetic mechanisms underlying pattern formation and neurogenesis is necessary in order to trace the evolutionary history of insect embryogenesis. One of the most important processes of embryogenesis is the organized pattern formation that allows for proper body segmentation and neural development. Proper segmentation, which relies on a series of specific gene expressions, is necessary for the development of an operational nervous system. Even-skipped (*eve*), one such regulatory gene, has been studied extensively in certain model organisms, and theories regarding the evolution of its functional role could be further elucidated by visualizing its expression in adult and larval dragonflies, which has yet to be accomplished. Through a protocol of immunofluorescence using antibodies raised against the even-skipped protein product (*eve*), this study aimed to visualize the localization of *eve* expression in both adult and larval dragonflies and thereby compare its expression throughout development. However, several methodological limitations were encountered, including a lack of published literature detailing a procedure for immunostaining in dragonflies and subsequent inability to properly permeate the target ganglia. Future research should attempt alternative methods of tissue permeation in order to successfully access the target neurons as well as explore alternative primary antibodies for use in targeting *eve* in tissue samples." (Author)] Address: Bangser, Kathryn, Dept Neuroscience, Union College - Schenectady, NY, USA

**21612.** Belkharouch, H.; Larifi, Y. (2019): Contribution à l'étude Odonatologique du sous bassin versant d'El Malleh. Mémoire de Master, Faculté des Sciences de la Nature et

de la Vie, Sciences de la terre et de l'Univers, Université Guelma: 121 pp. (in French) ["Our Odonatological study was carried out in the sub-watershed of the El Malleh wadi located in the Seybouse basin (North-East Algeria). During nine consecutive months from October to June, we sampled Odonata at five stations. We have recorded twenty-five (25) Odonate species including fifteen (15) Anisoptera and ten (10) Zygoptera. The list includes twenty-one Least Concern species, one Vulnerable species (*Gomphus lucasii*), two Near Threatened (NT) species (*Coenagrion scitulum*, *Onychogomphus costae*) and one Endangered (EN) species (*Coenagrion mercuriale*). Note also the presence of the pioneer species *Platycnemis subdilata* and *Enallagma deserti* which are endemic to North Africa." (Authors/Google translate)] Address: <https://dspace.univ-guelma.dz/jspui/handle/1234-56789/3744>

**21613.** Briggs, A.J.; Pryke, J.S.; Samways, M.J.; Conlong, D.E. (2019): Complementarity among dragonflies across a pondscape in a rural landscape mosaic. *Insect Conservation and Diversity* 12(3): 241-250. (in English) ["1. Networks of ponds (pondscapes) are becoming increasingly significant for resilient landscape planning in rural areas. Farmland and forestry ponds are habitat islands that support heterogeneous communities of aquatic organisms. 2. Species richness, Dragonfly Biotic Index (DBI), Shannon's index, and species composition are used here to assess the complementary conservation value of adult dragonfly assemblages associated with forty ponds across a protected area-sugarcane-forestry mosaic. 3. Despite differences in environmental variables among the various ponds, dragonfly species richness, DBI, Shannon index scores, as well as responses to particular environmental variables, did not differ between ponds in sugarcane, plantation forestry, and protected areas. Dragonfly composition differed in response to vegetation cover. 4. Our results highlight the importance of catchment and regional management for all ponds within the pondscape, and show that ponds in the transformed areas (i.e. sugarcane and forestry areas) are important contributors to regional conservation. As the various ponds were complementary in their dragonfly assemblages, we recommend conservation focus at the level of the pondscape rather than on individual ponds." (Authors)] Address: Pryke, J.S., Department of Conservation Ecology and Entomology, Stellenbosch University, Private Bag X1, Matieland 7602, South Africa. Email: [jpryke@sun.ac.za](mailto:jpryke@sun.ac.za)

**21614.** Cerini, F.; Bologna, M.A.; Vignoli, L. (2019): Dragonflies community assembly in artificial habitats: Glimpses from field and manipulative experiments. *PLoS ONE* 14(6): e0214127. <https://doi.org/10.1371/journal.pone.0214127>: 16pp. (in English) ["Several factors act on community structure, so determining species composition and abundance patterns. Core processes operating at local scales, such as species-environment matching and species interactions, shape observed assemblages. Artificial habitats (simplified structure) are useful systems for assessing the main factors affecting community composition and disentangling their assembly rules. Drinking troughs (brickwork tanks for free-ranging cattle watering) are widespread in Italy and represent a suitable aquatic habitat for colonization by various aquatic organisms. Dragonflies larvae are usually found in drinking troughs and often exhibit strong species interactions and striking community assembly patterns. Our primary aim was to search for Odonata communities exhibiting non-random co-occurrence/segregation patterns in drinking troughs. We performed null-model analyses by measuring a co-occurrence index (C-score) on larval Odonata assemblages (13 species

from 28 distinct troughs). Overall, we found a non-random structure for the studied dragonfly assemblages, which, given their fast generation time, must have been generated by short-term ecological processes (i.e. interspecific interactions). We thus analyzed potential competition/predation among and within ecological guilds. From the field data, we speculated that interactions within the sprawlers' guild is likely among the main drivers structuring the studied assemblages, especially the effect of intraguild predation between *C. erythraea* and *Sympetrum* spp larval stages. We then experimentally tested these interactions in laboratory and demonstrated that intraguild predation among larvae at different development stages may result in an effective exclusion/negative impact on density pattern, representing one of the processes to take into consideration when studying dragonfly assemblages." (Authors)] Address: Cerini, F., Dipartimento di Scienze, Università Roma Tre, Viale G. Marconi, Roma, Italy. E-mail: [leonardo.vignoli@uniroma3.it](mailto:leonardo.vignoli@uniroma3.it)

**21615.** Cezário, R.R.; Vilela, D.S.; Guillermo-Ferreira, R. (2019): Final instar larva of *Franciscagrion longispinum* Machado & Bedê, 2015 (Odonata: Coenagrionidae), an endemic species from the springs of the São Francisco river. *Zootaxa* 4657(3): 581-586. (in English) ["*Franciscagrion longispinum* Machado & Bedê larvae were collected in the São Francisco river historical springs at the Serra da Canastra National Park, Brazil. Here, we describe and illustrate the final instar larvae of this rare and endemic species." (Authors)] Address: Guillermo-Ferreira, R., Lab. Ecological Studies on Ethology & Evolution (LESTES), Department of Hydrobiology, Federal University of São Carlos, São Carlos, SP, Brazil. E-mail: [rhainer@ufscar.br](mailto:rhainer@ufscar.br)

**21616.** Chang, G.-H.; Hsu, F.-H.; He, C.-S.; Hsiao, W.F. (2019): Survey of Lepidoptera and Odonata of Chiayi Shinghu Park. *Jiada Agriculture and Forestry Journal* 16(1): 101-115. (in Chinese, with English summary) [Taiwan "Survey of Rhopalocera and Odonata insect fauna of Chiayi Shinghu Park were conducted from January 2016 to December 2017. The purposes are providing the information of insect resources in this park for leisure activities of parent and children in the future. Six sampling sites were selected and each sampling site stayed for 30-40 minutes for counting. We used visual count method and sweeping to record the numbers of encounter lepidopterans and Odonata insects. Results have indicated that the peak period of insects of 2016 was from May to September. [...] And there were Libellulidae (8 species), Platycnemididae (1 species), Coenagrionidae (1 species), and Gomphidae (1 species) in Odonata. The peak month of 2017 was August. [...] And there were Libellulidae (6 species), and Gomphidae (1 species) in Odonata. [...] Among Odonata species in 2016, *Pantala flavescens* (n=496) is dominate species and followed by *Brachythemis contaminata* (n=47) and *Orthetrum glaucum* (n=42); in 2017, *P. flavescens* (n=589) is dominate species and followed by *Diplacodes trivialis* (n=21) and *Orthetrum glaucum* (n=19). These results will provide basic information for ecotourism activity in the future in Chiayi." (Authors)] Address: Hsiao, W.F. Email: [hsiaowf@gmail.com](mailto:hsiaowf@gmail.com)

**21617.** Chelmick, D.G.; Seidenbusch, R.; Vick, G.S. (2019): The final instar exuviae of the genus *Urothemis* in Africa (Odonata: Libellulidae). *Odonatologica* 48(1/2): 133-153. (in English) ["Four of the five species of the final instar exuviae of the genus *Urothemis* found in the Ethiopian Region are illustrated and described here, with *U. venata* being described for the first time. In addition, comparison is provided with the common Asian species *U. signata*. The feature which best



defines the species within the genus is the variation in eye shape. As to the African species, colour and patterning are variable but distinctive and can be used in identification. As to structural differences, *U. assignata* and *U. edwardsii* are similar in that they have strong lateral and dorsal abdominal spines. The remaining two species, *U. thomasi* and *U. venata*, have much smaller spines. The exuviae of the remaining species, *U. luciana*, is unknown. On the evidence of exuviae, *U. thomasi* is quite distinct from the Asian *U. signata* of which it is thought to be a subspecies." (Authors)] Address: Chel-mick, D.G., Macromia Scientific, 31 High Beech Lane, Haywards Heath, RH16 1SQ, UK. E-mail: david.chelmick@gmail.com

**21618.** Choong, C.Y.; Chung, A.Y.C. (2019): Odonata fauna of Imbak Canyon Conservation Area, Sabah. *Journal of Tropical Biology and Conservation* 16: 1-8. (in English) ["The Odonata fauna of the Imbak Canyon Conservation Area (ICCA) was surveyed during the Batu Timbang Research Station Scientific Expedition on 16-26 August 2017. A total of 62 Odonata species from 13 families were recorded. The family Libellulidae had the highest number of species (27), and this was followed by Coenagrionidae (9 sp.), Calopterygidae (5 sp.), Platycnemididae (5 sp.) and Platystictidae (4 sp.). The other families (Devadattidae, Chlorocyphidae, Euphaeidae, Lestidae, Philosinidae, Aeshnidae, Corduliidae and Macromiidae) were only represented by 1-3 species. Of the species recorded, 30 are new records for ICCA. The number of species recorded was high, indicating the high diversity of Odonata fauna of ICCA. These records were combined with the existing records in literature to produce a checklist. At present, 68 species from 15 families are known from ICCA.... Particularly interesting species recorded during the expedition were *Lestes praevius*, *Vestalis beryllae*, *Telosticta janeus*, *Rhinagrion elopurae* and *Protosticta cf. kinabaluensis*." (Authors)] Address: Chung, A.Y.C., Forest Research Centre, Sabah Forestry Department, P.O. Box 1407, 90715 Sandakan, Sabah, Malaysia. E-mail: cychoong@ukm.edu.my

**21619.** Chung, A.Y.C. Binti, M.; Yukang, J.L. (2019): A preliminary assessment of insect diversity in Imbak Canyon – Batu Timbang. *Journal of Tropical Biology and Conservation* 16: 9-24. (in English) [Borneo, Sabah, Malaysia, survey by the Sabah Forestry Department team was carried out from 16th to 20th of August, 2017 in Imbak Canyon – Batu Timbang area. The list of 14 Odonata records includes *Rhinocypha aurofulgens*, *Drepanosticta actaeon* and *Devadatta tanduk*.] Address: Chung, A.Y.C., Forest Res. Centre, Sabah Forestry Dept, P.O. Box 1407, 90715 Sandakan, Sabah, Malaysia. E-mail: cychoong@ukm.edu.my

**21620.** Claisse, P.; Brisac, P.; Nel, A. (2019): The first fossil representative of the Nearctic genus *Nasiaeschna* in France (Odonata: Aeshnidae). *Palaeoentomology* 2(3): 219-222. (in English) ["The Miocene Odonata are rather well documented in France, thanks to many discoveries in the 'Massif Central' outcrops of Sainte Reine (latest Miocene, Cantal) and Montagne d'Andance (late Miocene, Ardèche) (Nel et al., 1994, 1996, 1997a,b; Riou & Nel, 1995). Among these, the family Aeshnidae is well-represented by the genera *Aeshna*, *Boyeria*, and *Aeschnophlebia*. Thus, it is with great surprise that one of us has found a new well-preserved specimen in the outcrop of Montagne d'Andance, representing a new species that we describe herein." (Authors)] Address: Claisse, Penelope, Institut Systématique Evolution Biodiversité (ISYEB), Muséum national d'Histoire naturelle, CNRS, Sorbonne Université, EPHE, 57 rue Cuvier, CP 50, 75005 Paris, France

**21621.** Dettner, K. (2019): Chapter 9. Defenses of water insects. K. Del-Claro, R. Guillermo (eds.), *Aquatic Insects*, Springer Nature Switzerland AG 2019. <https://doi.org/10.1007/978-3-030-16327-39>: 191-262. (in English) ["This chapter compiles active and passive defensive mechanisms of aquatic and semiaquatic developmental stages of all insect orders against various predators. Mainly escape reactions, mechanical defense, defensive stridulation, and especially chemical defenses are described, illustrated, and tabulated. Apart from the large aquatic groups of ephemeropteran, Odonata or Trichoptera larvae especially aquatic bugs and water beetles are considered by even including small groups from Collembola up to Mecoptera. Differences between defensive mechanisms and strategies in aquatic and terrestrial insects are described. Aquatic insects especially rely on escape, mechanical defenses, defensive stridulation, and chemical defenses. Exocrine glands are mainly restricted to large taxa with both terrestrial and aquatic representatives (adephagan beetles, Heteroptera) and not invented in aquatic groups. Chemically aquatic insects especially evolved biosynthesis of aromatic and few aliphatic compounds against microorganisms. In contrast mainly steroids are targeted against cold-blooded vertebrates such as fishes and amphibians. As compared with terrestrial insects, aquatic representatives lack many mechanisms of defense such as reflex bleeding, incorporation of toxic compounds from plants, freshwater animals, or microorganisms. Exocrine secretions of water insects are usually externalized by secretion grooming in order to receive a clean body surface, to achieve an optimal breathing, and to modify the wettability of the body surface. Generally there exists a considerable lack of knowledge concerning bionomy and especially defenses of aquatic insects." (Author) Odonata are treated in Chapter 9.2.] Address: Dettner, K., Dept of Animal Ecology II, University of Bayreuth, Bayreuth, Germany. E-mail: k.dettner@uni-bayreuth.de

**21622.** D'Souza, A.R.M.; Pai, I.K. (2019): A comparative study on dragonfly diversity on a plateau and an agro-ecosystem in Goa, India. *Journal of Threatened Taxa* 11(8): 14010-14021. (in English) ["The present study was carried out to fill the lacuna in the understanding of the diversity of odonates of Goa in general and dragonflies in particular on plateau and paddy fields in coastal villages — agricultural area at Velsao and Taleigao Plateau. Diversity in plateau ecosystem was higher possibly due to a greater plant and insect diversity on the plateau, in comparison with the monoculture paddy agro-ecosystem. Highest number of species recorded belonged to the family Libellulidae. Monthly diversity showed correlation with monthly average rainfall and humidity." (Authors)] Address: D'Souza, A., Parvatibai Chowgule College of Arts and Science, Gogol-Margao, Goa 403602, India. E-mail: andreamd@rediffmail.com,

**21623.** Evans, B.J.E.; O'Carroll, D.C.; Fabian, J.; Wiederman, S.D. (2019): Differential tuning to visual motion allows robust encoding of optic flow in the dragonfly. *Journal of Neuroscience* 39(41): 8051-8063. (in English) ["Visual cues provide an important means for aerial creatures to ascertain their self-motion through the environment. In many insects including flies, moths and bees, wide-field motion-sensitive neurons in the 3rd optic ganglion are thought to underlie such motion encoding, however these neurons can only respond robustly over limited speed ranges. The task is more complicated for some species of dragonflies that switch between extended periods of hovering flight and fast-moving pursuit of prey and conspecifics, requiring motion detection over a broad range of velocities. Since little is known

about motion processing in these insects, we performed intracellular recordings from hawking, emerald dragonflies (*Hemicordulia* spp.) and identified a diverse group of motion sensitive neurons that we named Lobula Tangential Cells (LTCs). Following prolonged visual stimulation with drifting gratings, we observed significant differences in both temporal and spatial tuning of LTCs. Cluster analysis of these changes confirmed several groups of LTCs with distinctive spatiotemporal tuning. These differences were associated with variation in velocity tuning in response to translated, natural scenes. LTCs with differences in velocity tuning ranges and optima may underlie how a broad range of motion velocities are encoded. In the hawking dragonfly, changes in LTCs tuning over time are therefore likely to support their extensive range of behaviours, from hovering to fast speed pursuits. Understanding how animals navigate the world is an inherently difficult and interesting problem. Insects are useful models for understanding neuronal mechanisms underlying these activities, with neurons that encode wide-field motion previously identified in insects such as flies, hawkmoths and butterflies. Like some Dipteran flies, dragonflies exhibit complex aerobic behaviours such as hovering, patrolling and aerial combat. However, dragonflies lack halteres that support such diverse behaviour in flies. To understand how dragonflies might address this problem using only visual cues, we recorded from their wide-field motion sensitive neurons. We found these differ strongly in the ways they respond to sustained motion, allowing them collectively to encode the very broad range of velocities experienced during diverse behaviour." (Authors)] Address: Evans, B.J.E., University of Adelaide, Adelaide, 5005 South Australia, Australia

**21624.** García-Pozuelo-Ramos, C. (2019): Primera observación de *Coenagrion scitulum* (Rambur, (Odonata: Coenagrionidae), en la provincia de Toledo (España). *Bol. Asoc. Odonatol. And.* 29: 212-214. (in Spanish) [1-V-2019, La Cantá quarry, on the banks of the La Cantá road, between Illescas and Cedillo del Condado (location UTM 30 426162/4440975; datum WGS84)] Address: Ramos, P., SEACAM. Sociedad Entomológica y Ambiental de Castilla La Mancha, Spain. E-mail: pkymp@yahoo.es

**21625.** Hettyey, A.; Üveges, B.; Móricz, A.M.; Drahos, L.; Capon, R.J.; Van Buskirk, J.; Tóth, Z.; Bókony, V. (2019): Predator-induced changes in the chemical defence of a vertebrate. *Journal of Animal Ecology* 88(12): 1925-1935. (in English) ["1. Inducible defences are ubiquitous in the animal kingdom, but little is known about facultative changes in chemical defences in response to predators, especially so in vertebrates. 2. We tested for predator-induced changes in toxin production of larval common toads (*Bufo bufo*), which are known to synthesize bufadienolide compounds. 3. The experiment included larvae originating from three permanent and three temporary ponds reared in the presence or absence of chemical cues of three predators: dragonfly larvae, newts or fish. 4. Tadpoles raised with chemical cues of predation risk produced higher numbers of bufadienolide compounds and larger total bufadienolide quantities than predator-naïve conspecifics. Further, the increase in intensity of chemical defence was greatest in response to fish, weakest to newts, and intermediate to dragonfly larvae. Tadpoles originating from temporary and permanent ponds did not differ in their baseline toxin content or in the magnitude of their induced chemical responses. 5. These results provide the first compelling evidence for predator-induced changes in chemical defence of a vertebrate that may have evolved to enhance survival under predation risk." (Authors)]

Address: Hettyey, A., Lendület Evolutionary Ecology Research Group, Plant Protection Institute, Centre for Agricultural Research, Hungarian Academy of Sciences, Budapest, Hungary. Email: hettyey.attila@agrar.mta.hu

**21626.** Hutchinson, R.; Ménard, B. (2019): Émergence de *Tramea lacerata* Hagen, 1861 en milieu artificiel, une première pour le Québec. *Répartition géographique et notes biologiques de l'espèce. Nouv'Ailes* 29(1): 13-14. (in French) ["On September 8, 2018, in a large sandpit pond, located in the locality of Cantley (Gatineau census division, in the Quebec Outaouais), BM caught a dozen live naiads of *Pantala flavescens*. Back home, examining the fruits of his fishing, he discovered that there was among these naiads, which he put in breeding, a specimen of the odonate *Tramea lacerata*. The individual seemed about to emerge; which occurred on September 18, 2018. This is the first mention of a naiad of *Tramea lacerata* in Quebec for the Outaouais region and a fifth report of the species for the province." (Author/Google translate)] Address: Menard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1. Email: ménardben@vidéotron.ca

**21627.** Lorenzo-Carballa, M.O.; Torres-Cambas, Y.; Heaton, K.; Hurst, G. D. D.; Charlat, S.; Sherratt, T.N.; Van Gossom, H.; Cordero-Rivera, A.; Beatty, C.D. (2019): Widespread *Wolbachia* infection in an insular radiation of damselflies (Odonata, Coenagrionidae). *Scientific Reports* 9, Article number: 11933: 13 pp. (in English) ["*Wolbachia* is one of the most common endosymbionts found infecting arthropods. Theory predicts symbionts like *Wolbachia* will be more common in species radiations, as host shift events occur with greatest frequency between closely related species. Further, the presence of *Wolbachia* itself may engender reproductive isolation, and promote speciation of their hosts. Here we screened 178 individuals belonging to 30 species of the damselfly genera *Nesobasis* and *Melanesobasis* — species radiations endemic to the Fiji archipelago in the South Pacific — for *Wolbachia*, using multilocus sequence typing to characterize bacterial strains. Incidence of *Wolbachia* was 71% in *Nesobasis* and 40% in *Melanesobasis*, and prevalence was also high, with an average of 88% in the *Nesobasis* species screened. We identified a total of 25 *Wolbachia* strains, belonging to supergroups A, B and F, with some epidemic strains present in multiple species. The occurrence of *Wolbachia* in both males and females, and the similar global prevalence found in both sexes rules out any strong effect of *Wolbachia* on the primary sex-ratio, but are compatible with the phenotype of cytoplasmic incompatibility. *Nesobasis* has higher species richness than most endemic island damselfly genera, and we discuss the potential for endosymbiont-mediated speciation within this group." (Authors)] Address: Lorenzo-Carballa, M.O., ECOEVO Lab, EE Forestal, Campus Universitario A Xunqueira s/n, 36005, Pontevedra, Spain. Email: m.o.lorenzo.carballa@gmail.com

**21628.** Maldonado, M.A.; Manara, E.; Martín, P.R. (2019): Antagonistic effects of a native apple snail on other snails and macroinvertebrates in Southern Pampas waterbodies: a mesocosm approach. *Limnologica* 78, September 2019, 125694: (in English) ["Macroinvertebrates represent an important component of communities and trophic webs of freshwater ecosystems. *Pomacea canaliculata* (family Ampullariidae), an invasive apple snail native to the Pampas ecoregion, acts as a voracious grazer and plays a structuring role on submerged macrophytes that serve as food, habitat or foraging ground for many macroinvertebrates. Laboratory studies show that *P. canaliculata* can also act as a competitor or predator of other macroinvertebrates. Using a

mesocosm approach, we sought to investigate if this species of apple snail affects other freshwater snails (*Chilina parhappii*, *Heleobia parhappii*, *Biomphalaria peregina* and *Melanoides tuberculata*) as well as other macroinvertebrates and if consumption of submerged macrophytes and detritus mediates these effects. After twelve weeks we estimated in mesocosms with and without apple snails the abundance of snails and macroinvertebrates through samples taken separately from sediment and from macrophytes. We also estimated the coverage and biomass of macrophytes and the detritus biomass. Significantly lower abundance occurred in mesocosms with apple snails for all snail species and representative macroinvertebrates (i.e., Hirudinea, Ephemeroptera, Chironomidae and Odonata). Mesocosms with apple snails also resulted in lower total abundance of macroinvertebrates. We speculate that the negative effects of *P. canaliculata* on most other snails and macroinvertebrates living on macrophytes relates to their grazing on detritus and macrophytes. In contrast, the density of snails and macroinvertebrates in the samples from sediments were not affected by *P. canaliculata*. One snail species and Ephemeroptera were negatively affected by mechanisms not related to the reduction in macrophyte biomass and detritus. A decrease in the microhabitats provided by macrophytes probably mediated the negative effects on Odonata nymphs. The reduction in the abundances of snails and macroinvertebrates caused by *P. canaliculata* may have cascading effects on higher trophic levels in waterbodies from Southern Pampas but also in invaded regions." (Authors)] Address: Maldonado, Mara, INBIOSUR (Universidad Nacional del Sur – Consejo Nacional de Investigaciones Científicas y Técnicas), San Juan 671, 8000, Bahía Blanca, Argentina

**21629.** Mishra, A.; Rastogi, N. (2019): Unraveling the roles of solitary and social web-making spiders in perennial ecosystems: Influence on pests and beneficials. Proceedings of the National Academy of Sciences, India Section B: Biological Sciences 90: 567-576. (in English) ["The results show that the orb-weaver spiders, *Neoscona theisi* and *Cyrtophora citricola*, occurred in both guava and citrus agroecosystems, and their prey primarily comprised a wide diversity of insect pests. In contrast, the sheet web-constructing social spider, *Stegodyphus sarasinorum*, occurred only in the citrus agroecosystem and preyed mainly on the beneficial insects, particularly the pollinators, including the Asian honeybee, *Apis cerana*, along with the predaceous ladybird beetle, *Coccinella septempunctata*, *Agriocnemis femina*, and the ant, *Camponotus compressus*. Field observations revealed that the beneficial insects caught and captured by the social spiders comprised mainly the flower-visiting insects of ornamental and weed plants growing in the vicinity of the fruit trees. *N. theisi* preyed predominantly on pests of paddy (*Nephotettix nigropictus*, *Oxya nitidula*), wheat (*Rhopalosiphum padi*), citrus (*Papilio demoleus*) and guava (*Bactrocera dorsalis*) and to a lesser extent on damselflies, houseflies, and ants. *C. citricola* with smaller orb webs preyed upon *N. nigropictus*, *R. padi*, *M. domestica*, *C. septempunctata*, and *C. compressus*. Except the guava pest, *B. dorsalis*, the pests of paddy and wheat from the infested crops cultivated in the nearby ~500-m distant located farm were attracted by the streetlights and were preyed upon by the arboreal spiders. The results highlight the significant role of orb web spiders in the suppression of insect pests of crops and also provide direct evidence of the negative role of social spiders as predators of the Asian honeybee, *A. cerana*, and other beneficial insects." (Authors)] Address: Rastogi, N., Dept of Zoology, Institute of Science, Banaras Hindu University Varanasi, India

**21630.** Monguí Torres, J.P. (2019): Patterns of genetic and morphological diversity in the highly polymorphic Neotropical banner damselflies, *Polythore* (Polythoridae: Odonata). Trabajo presentado como requisito para optar por el título de Biólogo. Facultad de Ciencias Naturales y Matemáticas Pregrado en Biología Universidad del Rosario, Bogotá: 31 pp. (in Spanish, with English summary) ["Genetic divergence across populations can be favored by geographical and/or phenotypic processes. However, phenotype polymorphisms caused by natural and/or sexual selection can obscure patterns of genetic divergence due to disparity across the morphological or behavioral traits with the genetic makeup in the populations. [...] *Polythore*, exhibit a striking wing color polymorphism across all its geographical range, which includes the Andes Cordillera and Amazon Basin. The latter suggests that they are excellent model organisms to test the effects of high phenotypic polymorphisms and geographical processes on the patterns of genetic diversity. Our aim was to explore the genetic and morphological diversity across the phylogenetic tree of these colorful damselflies. Our mtDNA phylogenetic reconstruction shows a strong association with geographical location, resulting on the recovery of four well-supported geographical clades (i.e: Amazon clade; and the West, Southeast and Northeast Andean clades). Overall, the patterns of genetic and morphological diversity are high and concordant across all members tested in the Amazon clade; suggesting that these population may have been experiencing divergence due to vicariant events. While for the Andean clades, the morphospecies showed a pattern of recent diversification that might be promoted by dispersal events. Finally, the wing color pattern seems to be shaped by other selective pressures including, sexual and/or natural selection." (Author)] Address: <https://repository.urosario.edu.co/items/145a72c7-99e0-41a7-a124-527582724987>

**21631.** Moroz, M.D.; Lipinskaya, T.P. (2019): Macrozoobenthos of the Shljamitsa and Chomaya Hancha rivers (reserve "Hrodno Forest"). Office of the president of the Republic of Belarus, State Nature Conservation Institution "Berezinsky Biosphere Reserve", Specially protected natural territories of Belarus. Research Collection of scientific articles Founded in 2006 ISSUE 14 Minsk Belarusian Printing House 2019: 155-167. (in Russian, with English summary) ["Studies of macrozoobenthos community were carried out on the model sites of the Shljamitsa and Chomaya Hancha rivers (reserve "Hrodno Forest") in May 2019. Two protected species — *Gomphus flavipes* Charpentier, 1825 and *Dolomedes plantarius* (Clerck, 1757) (Pisauridae) were recorded." (Authors)] Address: Lipinskaya, Tatsiana, Scientific & Practical Center for Bioresources of the National Acad. Scienc. Belarus (27, Akademicheskaya Str., 220072, Minsk, Belarus. E-mail: tatsiana.lipinskaya@gmail.com

**21632.** Perich Prujà, A.; Leahy, K.; Piera, J. (2019): Reporting changes on species distributions using citizen science observations: The example of *Trithemis kirbyi* and *Natusfera*. 1st Meeting of the Iberian Ecological Society (SIBECOL) & XIV AEET Meeting: Abstract book: 134 (2019): 1 p. (in English) [Verbatim: A critic question in biogeography is how species will response in front of current rates of climate change: we may find many examples in the scientific literature reporting changes in species distributions worldwide that could be linked to climatic effects. A particular case is the dragonfly species *Trithemis kirbyi* Selys, 1891, originally distributed in Africa and southern Asia and associated to arid areas, that has been reported in the last years in the Iberian Peninsula. New observations in northern territories are among the most interesting to confirm the expansion rate of this species.

In this sense, the participation of non-academic experts that may contribute with new observations (what it is known as citizen science) could be very helpful, since this type of collaboration allows to cover a much wider monitoring area. The number of potential observations (and the covered area) may increase much more if volunteers do not require previous training nor expertise on identifying the reported observations. As an example, in this contribution we report probably the northernmost observation of *Trithemis kirbyi* in Catalonia (in the population of Albanyà, near the French border-line) using the citizen science platform Natusfera. This platform allows collaborative identification of the reported observations. We believe that this type of collaborative platforms could be used extensively to monitoring changes on species distributions, being a complementary tool for biogeographic studies] Address: <https://digital.csic.es/handle/10261/192298>

**21633.** Proess, R. (2019): Plan d'action espèce *Oxygastra curtisii* (Dale, 1834). Gekielte Smaragdlibelle (Gekielter Flussfalke), Cordulie corps fin. <https://environnement.public.lu/dam-assets/documents/natur/planactionespeces/Oxygastra-curtisii.pdf>: 15 pp. (in German) [Species conservation plan for *O. curtisii* in Luxembourg.] Address: Proess, R., Umweltplanungsbüro Ecotop, 45, Schlass Uecht, L-7435 Hollenfels, Luxembourg. Email: [ecotop@pt.lu](mailto:ecotop@pt.lu)

**21634.** Rocha-Ortega, M.; Rodríguez, P.; Córdoba-Aguilar, A. (2019): Can dragonfly and damselfly communities be used as bioindicators of land use intensification? *Ecological Indicators* 107, December 2019, 105553: (in English) ["Highlights: • We assessed odonata richness, body size and species' response to land use intensification. • Dragonflies indicated current land use while damselflies indicated time-lagged land use. • Large species allowed evaluating recent reduction of original vegetation. • Small species provided information of historic habitat modification. • Individual species did not reflect ecological integrity. • Some species' combinations indicate environmental degradation. Abstract: There is a growing need to identify efficient biological indicators for assessing accelerated land use intensification, as well for understanding the effects of past environmental changes on species distributions. To address this, we used an extensive opportunistic survey dataset of 254 adult odonate [...] species collected in nine Mexican hydrological regions during two time windows (1980–1993 and 1994–2010). We evaluated species richness, body size and individual species' response to land use intensification over time at a national scale using Phylogenetic Bayesian Regression Mixed Models. We found that dragonfly species serve as good indicators of current land use, whereas damselfly species show time-lagged effects of land use intensification. Large species could thus be used as a proxy of recent reduction of original vegetation, whereas small species provide information on historic habitat modification. Odonate body size seems to be a better variable for measuring the integrity of original vegetation than the more commonly used species richness. Finally, the use of individual species as bioindicators at broad spatial and temporal scales is not encouraged, as it does not reflect the degree of ecological integrity, and only the occurrence of some species combinations can indicate environmental degradation." (Authors)] Address: Rodríguez, Pilar, Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, Liga Periférica – Insurgentes Sur 4903 Col. Parques del Pedregal, Tlalpan, CP 14010 Mexico, D.F., Mexico. Email: [prodrg@conabio.gob.mx](mailto:prodrg@conabio.gob.mx)

**21635.** Ryndevich, S.K. (2019): Entomofauna (Insecta: Ephemeroptera, Odonata, Plecoptera, Hemiptera, Coleoptera,

Megaloptera, Trichoptera) of intact water ecosystems of some specially protected natural areas of Belarus. Education institution "Baranovichi State University" - BarSU Herald 7: 98-107. (in Russian) ["The water and amphibiotic entomofauna (Ephemeroptera, Odonata, Plecoptera, Hemiptera, Coleoptera, Megaloptera, Trichoptera) of intact natural water ecosystems in the territory of the Berezinsky biosphere reserve, the National park "Pripyatsky" and the Republican landscape reserve "Stronga" is discussed in the article. In intact natural water bodies in the Berezinsky biosphere reserve 200 species of water and amphibiotic insects have been recorded, in the landscape reserve "Stronga" — 113 species, in the territory of the Pripyatsky national park — 71 species. In the study of specially protected natural areas 11 species — indicators of intact natural watercourses (*Cordulegaster boltonii* and *Ophiogomphus cecilia*, [...]), the indicator of intact rivers, old river-beds, lakes and bogs *Brachytron pratense*, the intact dystrophic lakes indicator [...] three indicators of intact upland and transitional bogs (beetle *Ilybius wasastjernae* (Sahlberg, 1824), dragonflies *Aeshna subarctica* Walker, 1908 and *Somatochlora arctica* (Zetterstedt, 1840)) have been recorded. The main directions of transformation of communities of model groups of water and amphibiotic insects in natural water ecosystems under anthropogenic impact are determined." (Author)] Address: E-mail: [vestnik@barsu.by](mailto:vestnik@barsu.by)

**21636.** Schilling, E.G.; Lawrenz, R.; Kundel, H. (2019): A review of the reproductive habitat preferences and conservation challenges of a rare, transient, and ecologically restricted damer dragonfly: *Rhionaeschna mutata*. *International Journal of Odonatology* 22: 1-9. (in English) ["*R. mutata* is a rare North American dragonfly that is considered a species of concern or threatened throughout its range. It is most widely distributed in the eastern USA, but recent adult records indicate that its range extends further north and west than previously known. Effective conservation planning for rare species requires understanding their habitat requirements, and no comprehensive characterization of this species' reproductive habitat has previously been conducted. We conducted a review to synthesize information from records throughout this species' range and identified a narrow set of conditions that describe *R. mutata* reproductive habitat: small, heavily vegetated, fish-free ponds with a wooded riparian edge and with sphagnum present. While this habitat type may formerly have been widespread across this species' native range, anthropogenic activities have likely resulted in loss and increased fragmentation of *R. mutata* reproductive habitat. Our review also revealed that this species is transient or ephemeral, collected at a site one year and absent in subsequent years. Effective conservation planning for ecologically restricted odonates, such as *R. mutata*, requires consideration of multiple anthropogenic activities that threaten species' ability to persist." (Authors)] Address: Schilling, Emily, Biology Department, Augsburg University, Minneapolis, MN 55454, USA

**21637.** Schneider, M.F. (2019): Einfluss des Klimawandels auf Flora, Fauna und Lebensräume in den Landkreisen Ober-, Ost- und Unterallgäu (Bayern, Deutschland). *Naturkundl. Beiträge Allgäu* 54: 3-31. (in German) ["The aim of the present study was to investigate changes in air and water temperatures, the length of stay of migratory birds and the length of the growing season in the districts of Ober-, Ost- und Unterallgäu. The annual average temperatures have increased by 1.4 °C to 2.4 °C since 1850, the water temperatures in the bodies of water examined increased by 1.2 °C to 3.4 °C between 1981 and 2018. The length of the vegetation



period in the examined locations was between 238 and 271 days in 2016 and has increased by up to 35 days compared to 1952. Of 20 migratory bird species examined, 16 species returned from the wintering grounds an average of 13 days earlier in the 30-year period examined in 2017. Finally, biologists, lepidopterists, herpetologists and experts from forestry and water management were asked about their assessment of the impact of climate change on flora, fauna and habitats in the Allgäu (Bavaria), the results were presented and discussed. .... A "Mediterranization" of the Allgäu was caused by the following dragonfly species: *Lestes barbarus* with distribution area in the Mediterranean region, among others, in the Upper Allgäu Finds since 1963; *Aeshna affinis*, distribution area including southern Europe, found in Oberallgäu since 2002; *Anax ephippiger*, distribution area from Africa to India, unique find in Oberallgäu in 2000; *Crocothemis erythraea*, distribution area including the Mediterranean region, on the Upper Rhine since 2000, first found in Oberallgäu in 2002; *Sympetrum fonscolombii*, distribution area including Africa to India, found in Oberallgäu since 1990 (Karle-Fendt & Stadelmann, 2006). "The first record of *Sympetma fusca* was in Oberallgäu in 2008, and the species has since become established on the edge of the Alps. Another beneficiary of climate change, with many new discovery sites throughout Central Europe in recent years and a number of new populations in the Allgäu, is *Leucorrhinia pectoralis*" (pers. comm. Alfred Karle-Fendt)." (Author)] Address: Schneider, M.F., Pfeiffermühle 3, 87497 Wertach, Germany. Email: michaelfschneider@gmx.de

**21638.** Singh, D.; Hermans, J. (2019): Odonata observations in the Bandh Baretha region, Rajasthan, India. *Brachytron* 20(1): 38-48. (in English, with Dutch summary) ["Bandh Baretha dam is a water reservoir, part of Kakund river, situated in the Bharatpur District in the south eastern part of Rajasthan (India). The dragonfly fauna of the water reservoir and adjacent region was examined from 2010-2018. Field surveys were carried out between February and November across seven selected habitats. To date 50 dragonfly species have been recorded: 14 Zygoptera and 36 Anisoptera. Three species are reported for the first time for Rajasthan: *Ictinogomphus angulosus*, *Gomphidia t-nigrum* and *Aethriamanta brevipennis*. The present study describes the existence of characteristic dragonfly assemblages in the investigated habitats. It also emphasizes that long-term field studies are necessary to understand the status, distribution and stability of dragonfly populations in relation to changes in their environment due to increasing human influence" (Authors)] Address: Hermans, J.T., Hertestraat 21, 6067 ER Linne, The Netherlands. Email: jthermans21@gmail.com

**21639.** Slaats, J. (2019): Dragonflies of the Waterbloem area. *Naturhist. maandbl.* 108(6): 153-160. (in Dutch, with English summary) ["Extensive habitat management projects have been carried out in the Waterbloem nature reserve, situated near the village of Heibloem in the province of Limburg. Measures have included restoration of the Roggelse Beek brook and the transformation of coniferous woods into moist grassland and heather. Measures to retain precipitation have led to higher groundwater levels. Since these projects were expected to have favourable effects on the dragonfly fauna of the area, the dragonflies were investigated in 2005, 2012 and 2017. A total of 36 species were observed. Unfortunately, the expected positive effects on the dragonfly fauna were not observed. Common species have become even more common, and rare species became rarer or even disappeared from the area. It is not clear why the management measures had such a meagre impact on the dragonfly

fauna. Perhaps a further raising of the groundwater level and/or deepening of stagnant water bodies could have a positive impact." (Author)] Address: Slaats, J., Astenseweg 6, 5768PD, Meijel, The Netherlands. Email: jan.slaats@hetnet.nl

**21640.** Souilmi, F.; Ghedda, K.; Fahde, A.; EL Fihri, F.Z.; Tahraoui, S.; Elasri, F.; Malki, M. (2019): Taxonomic diversity of benthic macroinvertebrates along the Oum Er Rbia River (Morocco): implications for water quality bio-monitoring using indicator species. *West African Journal of Applied Ecology* 27(1): 137-149. (in English) ["The macroinvertebrates of the Oum Er Rbia River were studied from samples collected seasonally from September 2015 to September 2016 at 10 sampling sites. The macroinvertebrates found during the sampling period were distributed into twelve orders. The most abundant order was Diptera, having 9618 individuals, followed by Ephemeroptera with 2985 individuals. Coleoptera, odonates and crustaceans represent only a small fraction of the total fauna. Hydropsyche, Chironomidae sp. and Simuliidae are numerically more inventoried. The composition and distribution of the species were directly or indirectly affected by the physicochemical variables and the quality of the habitat. Correspondence analysis results showed that habitat quality and quality of water represented species distribution patterns and species can be used as indicators to assess the quality of the Oum Er Rbia River system. Habitat management along the Oum Er Rbia river should be aimed at preserving native species, especially during the summer, when the biotope requirements are optimal. The results obtained in this study showed an alarming situation of the water quality of the Oum Er Rbia River and particularly in downstream segment. To solve this problem, we recommend the development of the wastewater discharge of Khenifra and Kasba Tadla and the purification of wastewater before it is discharged into the river." (Authors)] Address: Souilmi, Fatima, National Office for Electricity & drinking Water (ONEE), Rabat, Morocco. Email: fatimasouilmi@gmail.com

**21641.** Sukkaphat, P.; Saetang, W.; Poolprasert, P. (2019): Landmark-based geometric morphometric analysis of wing venation between two libellulid species, *Brachythemis contaminata* and *Diplacodes trivialis*. *YRU Journal of Science and Technology* 4(1): 8-13. ["In this current research, a discrimination of two distinguished dragonfly species: *Brachythemis contaminata* and *Diplacodes trivialis* from Phichit-Phitsanulok areas was conducted using geometric morphometric analysis of wing venation. A total of 120 wings obtained from both males and females in each species (30 wings per sex in each species) were analyzed. Afterwards, a set of 15 landmarks in each digitized right forewing was chosen and all data were computed under the computer program. Our results revealed the patterns of forewing venation of dragonfly between sexes in the same species were more closely related to each other than the dragonfly of the same sex in another species. In this regards, it might be said that the landmark-based geometric morphometrics of the wing could be applied to identify libellulid group or species. Besides, the different sexes of dragonfly could be also classified. Thus, morphometric analysis of wing venation could be as a useful tool for systematic biology of dragonfly and other insects or fossil records which are merely known from a wing." (Authors)] Address: Sukkaphat, P., Program of Biology Faculty of Science and Technology, Pibulsongkram Rajabhat Univ., Mueang, Phitsanulok, 65000, Thailand

**21642.** Van Dievel, M.; Tüzün, N.; Stoks, R. (2019): Latitude-associated evolution and drivers of thermal response

curves in body stoichiometry. *Journal of Animal Ecology* 88(12): 1961-1972. (in English) ["1. Trait-based studies are needed to understand the plastic and genetic responses of organisms to warming. A neglected organismal trait is elemental composition, despite its potential to cascade into effects on the ecosystem level. 2. Warming is predicted to shape elemental composition through shifts in storage molecules associated with responses in growth, body size, and metabolic rate. Our goals were to quantify thermal response patterns in body composition, and to obtain insights in their underlying drivers and their evolution across latitudes. 3. We reconstructed the thermal response curves (TRCs) for body elemental composition [C(carbon), N(nitrogen), and the C:N ratio] of damselfly larvae from high- and low-latitude populations. Additionally, we quantified the TRCs for survival, growth and development rates and body size to assess local thermal adaptation, as well as the TRCs for metabolic rate and key macromolecules (proteins, fat, sugars, and cuticular melanin and chitin) as these may underlie the elemental TRCs. 4. All larvae died at 36°C. Up to 32°C, low-latitude larvae increased growth and development rates and did not suffer increased mortality. Instead, growth and development rates of high-latitude larvae were lower and levelled off at 24°C, and mortality increased at 32°C. This latitude-associated thermal adaptation pattern matched the 'hotter-is-better' hypothesis. With increasing temperatures, low-latitude larvae decreased C:N, while high-latitude larvae increased C:N. These patterns were driven by associated changes in N contents while C contents did not respond to temperature. Consistent with the temperature-size-rule and the thermal melanism hypothesis, body size and melanin levels decreased with warming. While all traits and associated macromolecules (except for metabolic rate that showed thermal compensation) assumed to underlie thermal responses in elemental composition showed thermal plasticity, these were largely independent and none could explain the stoichiometric TRCs. 5. Our results highlight that thermal responses in elemental composition cannot be explained by traditionally assumed drivers, asking for a broader perspective including the thermal dependence of elemental fluxes. Another key implication is that thermal evolution can reverse the plastic stoichiometric thermal responses, hence reverse how warming may shape food web dynamics through changes in body composition at different latitudes." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**21643.** Vega-Sánchez, Y.M.; Mendoza-Cuenca, L.F.; González-Rodríguez, A. (2019): Complex evolutionary history of the American Rubyspot damselfly, *Hetaerina americana* (Odonata): Evidence of cryptic speciation. *Molecular Phylogenetics and Evolution* 139, October 2019, 106536: 11pp. (in English) ["Highlights: • Genetic structure in *Hetaerina americana* was analyzed throughout its distribution. • High genetic differentiation was found for both nuclear and mitochondrial markers. • Mitonuclear discordance may be related to purifying selection on the mitogenome. • Morphological variation in caudal appendages is congruent with nuclear genetic structure. • We conclude that that *Hetaerina americana* represent a complex of cryptic species. Abstract: Analyzing the magnitude and distribution of genetic variation within and among populations allows for hypothesis testing about historical demographic size changes, secondary contacts, refugia, and speciation patterns. Species distribution and genetic structure are greatly influenced by the complex life cycle and behavior of odonates. *H. americana* has been widely used as a model system in behavioral

studies, but its population genetic structure has not been analyzed, except for a single study that included only three populations but identified the presence of markedly differentiated genetic groups, suggesting the existence of cryptic species. Here, we tested this hypothesis by assessing throughout the distribution range of *H. americana* the patterns of genetic and morphological variation in the male caudal appendages, due to the great importance of these structures in mate recognition. As molecular markers we used sequences of the mitochondrial cytochrome oxidase I (COI) gene and the nuclear internal transcribed spacer (ITS) region, as well as six nuclear microsatellites. We found very high population genetic differentiation ( $F_{ST} > 0.51$ ) in the three sets of markers but with strong mitonuclear discordance. A neutrality test suggested that the mitochondrial genome might be under purifying selection in association to climatic variables (temperature seasonality). The assignment of individuals to nuclear genetic groups showed little admixture and complete congruence with morphological differentiation in the male caudal appendages. Hence, the results suggest that *H. americana* represents at least two different cryptic species which are isolated reproductively." (Authors)] Address: Vega-Sánchez, Y.M., Instituto de Investigaciones en Ecosistemas y Sustentabilidad, Univd Nacional Autónoma de México, Antigua carretera a Pátzcuaro #8701, Morelia, Michoacán 58190, Mexico

## 2020

**21644.** Araújo, M.F.A.; De Marco, P.; Juen, L.; Tôres, N.M. (2020): Vulnerability of *Phyllocycla* species (Odonata: Gomphidae) to current and planned anthropic activities by the Brazilian Government. *Neotropical Entomology* 49: 24-32. (in English) ["Although most species distribution modeling (SDMs) are constructed at the species level, an appreciation of evolutionary processes has led to modeling above this level. In view of the difficulty in estimating the impacts of human actions on rare or deficient data species, we proposed a new approach to vulnerability assessment based on concepts already well established in the literature (ecological niche, niche conservatism, and extinction thresholds). We used distribution modeling to predict where species of the genus *Phyllocycla* (Calvert 1948) are most vulnerable to local extinctions and how the implementation of planned anthropic activities by the Brazilian government may modify the potential distribution of the genus in Brazil. We chose that genus because its conservation status is little known, especially due to the data gap about its geographical distribution. We proposed modeling the whole genus and used the niche conservatism theory to justify our methods. The anthropic activities considered in our analysis were agriculture and livestock, rural settlements, energy production installations, transportation, oil extraction, mining, and urbanization. We found that only 55.3% of the original potential distribution of *Phyllocycla* in Brazil remains available. The area compromised by anthropic activities comprises mainly the Cerrado and Atlantic Forest biomes, with less impact on the Amazon. However, with the implementation of activities planned by the Brazilian government, it is possible that an additional 13.6% of this area will be unavailable to species of *Phyllocycla*, especially in the Amazon, where interest in mining and the implementation of new hydroelectric production have increased." (Authors)] Address: Araújo, Maysa Farias de Almeida, Faculdade de Medicina do Mucuri, Univ Federal dos Vales do Jequitinhonha e Mucuri, Teófilo Otoni, MG, Brasil. Email: maysa\_fariasaa@yahoo.com.br

- 21645.** Brockhaus, T.; Chovanec, A.; Böhme, F. (2020): Asymmetrische Positionierung der vier Flügel auf einer Abdomenseite bei Kleinlibellen (Odonata: Zygoptera). Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen 72: 1-11. (in German, with English summary) ["Asymmetric positioning of the four wings on the same side of the abdomen in damselflies (Odonata: Zygoptera). – Photos of damselflies presented in this paper show the positioning of all four wings on the same side of the abdomen for the purpose of ectothermic thermoregulation. This posture is well known in *Sympecma* spp. and, to a lesser extent, in other Lestidae as well as in *Calopteryx* spp.. In the present paper, this behaviour is documented for *Sympecma fusca*, *Lestes sponsa*, *L. virens* and for *Pyrrhosoma nymphula*. In most cases, the four wings are asymmetrically held behind the abdomen, away from the sun, to reflect radiation onto the abdomen. In this publication, the rare example of this posture during a copula of *Calopteryx virgo* is also presented. In contrast, a male of *C. splendens* is shown shading its abdomen with all wings." (Authors)] Address: Brockhaus, T., An der Morgensonne 5, 09387 Jahnsdorf, Germany. E-mail: T.Brockhaus@t-online.de
- 21646.** Carr P. (2020): Odonata of the Chagos Archipelago, central Indian Ocean: an update. *Notulae Odonatologicae* 9(6): 229-235. (in English) [British Indian Ocean Territory (UK); "The Odonata of the Chagos Archipelago are poorly known. The fauna was last reviewed in 1997, with eight species being recorded. Between 1996 and 2020 the author visited all 55 islands of the archipelago. The same eight species were again recorded together with one new colonist and one new vagrant. Range extensions were recorded for six species, one being recorded from the archipelago for the first time since 1905. Immigration of Odonata was witnessed from October to November in 2009–2012. A flight season table is presented along with distribution data and habitat details where relevant." (Author)] Address: Carr, P., Inst. of Zoology, Zool. Soc. London, Regent's Park, London, UK, NW1 4RY
- 21647.** Chance, F.S. (2020): Interception from a dragonfly neural network model. *Proceedings of ACM International Conference on Neuromorphic Systems (ICONS'20)*. ACM, New York, NY, USA, <https://doi.org/10.1145/nnnnnnn.nnnnnn>: 5 pp. (in English) ["While dragonflies are well-known for their high success rates when hunting prey, how the underlying neural circuitry generates the prey-interception trajectories used by dragonflies to hunt remains an open question. I present a model of dragonfly prey interception that uses a neural network to calculate motor commands for prey-interception. The model uses the motor outputs of the neural network to internally generate a forward model of prey-image translation resulting from the dragonfly's own turning that can then serve as a feedback guidance signal, resulting in trajectories with final approaches very similar to proportional navigation. The neural network is biologically-plausible and can therefore be compared against in vivo neural responses in the biological dragonfly, yet parsimonious enough that the algorithm can be implemented without requiring specialized hardware." (Author)] Address: Chance, Frances, Sandia National Laboratories, Albuquerque, NM, USA. Email: fschanc@sandia.gov
- 21648.** Chung, A.Y.C.; Japir, R.; Damit, D.F.A.; Binti, M.; Yukang, J.L. (2020): Insect diversity of Mount Silam and its surrounding forests in Lahad Datu, Sabah. In: Chung, A.Y.C., Nilus, R., Sugau, J.B., Suis, M.A.F. & Salleh, M. (2020). *Compilation of papers – Mount Silam Scientific Expedition, Lahad Datu, Sabah. 13th-18th January, 2020. Sabah Forestry Department, Sandakan, Sabah. 149 pp.* <http://www-forest.sabah.gov.my/publications/>: 110-124. (in English) ["This insect survey was conducted from 13<sup>th</sup> to 18<sup>th</sup> of January, 2020 in Mount Silam forest, Lahad Datu, Sabah. An average of 108 nocturnal insect species from 148 individuals was recorded from a one-metre-square area of the light-trapping cloth. The mean Shannon Index was 4.17 while Simpson Index was 129.84 and Fisher Alpha Index was 193.60. At least 15 Bornean endemic species were recorded during the brief survey. These pioneer data will serve as baseline information for other research work in future. The data will further strengthen the management of Mount Silam within Sapagaya Forest Reserve as a Class I Forest Reserve (Protection). The information on insect diversity and the aesthetic value of some of the flagship species can be used to promote sustainable nature tourism in Mount Silam since this area is a tourist attraction in Lahad Datu. ... At least 14 taxa of Odonates were recorded (Appendix 4), with two Bornean endemics. Both endemics are *Libellago phaeton* and *Coelicia nigrohamata*. *L. phaeton* is known to be very common but localized on small clear streams and *C. nigrohamata* is also confined to small forest streams (Orr 2003)." (Authors)] Address: Forest Research Centre, Sabah Forestry Dept, P. O. Box 1407, 90715 Sandakan, Sabah, Malaysia. Email: Arthur.Chung@sabah.gov.my
- 21649.** Dey R.; Pal A. (2020): Heterospecific pairing between male *Agriocnemis kalinga* Nair & Subramanian, 2014, and female *A. pygmaea* Rambur, 1842 (Odonata Coenagrionidae). *Notulae Odonatologicae* 9(6): 241-245. (in English) ["A heterospecific pair of *A. kalinga* and *A. pygmaea* was observed in Madhyamgram, West Bengal, India, for the first time. The species of *Agriocnemis* share several similarities and are often difficult to distinguish, especially in copula or in tandem. In this note identification of these two species is also discussed." (Authors)] Address: Pa, A., Taxonomy of Angiosperms & Biosystematics Laboratory, Dept of Botany, Univ. of North Bengal, Siliguri – 734013, Darjeeling, West Bengal, India
- 21650.** Fortunato, M.H.T.; Lopes de Melo, C.; Fonseca Mendes, H. (2020): Piscicultura brasileira e a influência da ordem Odonata, uma revisão. *Arquivos de Ciências Veterinárias e Zootecia da UNIPAR* 23(1): 7 pp. (in Portuguese, with English and Spanish summary) ["Brazilian fish farming is expanding in Brazil, presenting exceptional annual growth. However, during the larviculture phase, where fish is inserted in excavated ponds, due to their vulnerability and size, they become susceptible to diseases and predators. Aquatic insects feature among the predators in fish farming, with the Odonata order being the most prominent. Despite their predatory action during the larvae phase of fish, the Odonata order plays an important role in the aquatic environment and is considered as bioindicators. Despite its importance, to solve these problems, fish farmers end up using agrochemicals or providing intense liming, which can have serious consequences for both fish and water quality. Therefore, in face of this scenario, further studies on fish farming sustainability with management or control of those predators would be important in order to mitigate the environmental impacts. Thus, the objective of this paper was to address the history of Brazilian fish farming, the problems faced in larviculture due to predation by Odonata and to offer sustainable control alternatives." (Authors)] Address: Fortunato, M.H.T., Biólogo pelo IFSULDEMINAS campus Muzambinho, mestre em Ciências Ambientais pela Unifed de Alfenas-UNIFAL. Doutorado em Agricultura Sustentável pela Unifed de José do Rosário Vellano-UNIFENAS. [mtank@live.com](mailto:mtank@live.com)

**21651.** Gillespie, C.M.; Mumme, R.L.; Wissinger, S.A. (2020): Pond drying cues promote cannibalism in larval *Anax junius* dragonflies. *Freshwater Science* 39(3): 576-583. (in English) ["Global climate change is expected to shorten hydroperiods and accelerate drying of ephemeral freshwater habitats, a shift that is likely to increase intraspecific competition and cannibalism in the aquatic animals that rely on those habitats. We experimentally examined the effects of simulated pond drying, tank size (initial larval density), and body size on survival and cannibalism in larvae of the dragonfly *Anax junius*, a species known to show frequent size-structured cannibalism. Thirty tanks of 3 different sizes were each stocked with 8 *A. junius* larvae (6 small, 1 medium, and 1 large) along with *Enallagma* damselfly larvae as prey. *Anax junius* survival and cannibalism were documented daily for 16 d. For tanks in the permanent hydroperiod treatment, we maintained water depth at a constant 14 cm for all 16 d, while we gradually reduced depth in the temporary hydroperiod tanks from 14 to 2 cm to simulate pond drying. We found that cannibalism was strongly size-dependent, as 31, 7, and 0% of small, medium, and large larvae, respectively, were cannibalized. Tank size (initial larval density) and hydroperiod treatment both affected larval survival and cannibalism. However, the effects of simulated pond drying were more pronounced than those of tank size. In addition, hydroperiod treatment was a predictor of daily risk of larval cannibalism, but daily volumetric larval density (number of *A. junius* alive divided by water volume present that day) was not. Our results, therefore, indicate that 1) pond drying can substantially increase cannibalism in larval odonates beyond its simple effect of producing high-density populations as water levels recede and 2) the effect of drying cues on the behavior and life-history characteristics of aquatic invertebrates merit increased attention from freshwater ecologists." (Authors)] Address: Mumme, R.L., Dept of Biology, Allegheny College, 520 North Main Street, Meadville, Pennsylvania 16335 USA. E-mail: rmumme@allegheny.edu

**21652.** Goldberg, W.; Martens, A. (2020): Zwei Jungtiere der Eiförmigen Schlammschnecke *Radix balthica* als Aufsitzer auf einem Weibchen von *Ischnura elegans* (Gastropoda; Odonata). *Libellula* 39(3/4): 173-177. (in German, with English summary) ["*Radix balthica* as a temporary epibiont of *Ischnura elegans* (Gastropoda; Odonata) – A female *I. elegans* was photographed in the evening of 24 June 2020 at a garden pond in Meißen, Germany, with two young snails of *R. balthica* attached, one on the thorax and one on the abdomen. In spite of the additional load the damselfly was able to fly a short distance. There is evidence that the snails moved to the female during its oviposition." (Authors)] Address: Goldberg, W., Meißner Berg 45, 01471 Radeburg, Germany. Email: w.goldberg@gmx.de

**21653.** Harabis, F.; Hronkova, J. (2020): European database of the life-history, morphological and habitat characteristics of dragonflies (Odonata). *Eur. J. Entomol.* 117: 302-308. (in English) ["Climate change and an ever-increasing effect of humans on the great majority of freshwater ecosystems have affected not only individual organisms but also the links between them. In order to effectively protect communities or entire freshwater ecosystems, we need to understand how individual organisms react to these changes and the functional interconnections between individual species. This can be achieved by evaluating the functioning of individual species, i.e. their traits. Odonata are increasingly used as indicators of changes in freshwater ecosystems. Although this taxonomic group is the subject of many ecological studies, there is no comprehensive database of the

traits of European species. This is, why we decided to lay the foundations for an European database of dragonfly traits called dragonfly-database.eu, which is mainly based on Web of Science (WOS) publications and several monographs, and currently includes information on 79 European species. The main advantage of our database is that it is open to downloading, uploading, and storing of data. This is extremely important, because a database's applicability increases with the quality of the data it contains. Initially in compiling the database, we encountered several fundamental shortcomings in the knowledge of some often easily measurable traits in, some species. We believe that in combination with new statistical methods dragonfly-database.eu will become a very useful tool for many ecological studies and more effective conservation of threatened species." (Authors)] Address: Harabis, F., Dept of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, Prague 6 – Suchbát, CZ-165 00, Czech Republic. E-mail: harabis@fzp.czu.cz

**21654.** Jödicke R.; von Ellenrieder N.; Garrison R.W. (2020): Reversal of precedence of the names *Lestes dryas* Kirby, 1890, and *Agrion forcipula* Charpentier, 1825 (Odonata: Lestidae), to preserve current usage. *Notulae Odonatologicae* 9(6): 246-255. (in English) ["The name *Lestes dryas* Kirby, 1890, is potentially threatened by its senior objective synonym, *Agrion forcipula* Charpentier, 1825. The purpose of this publication is to reverse their order of precedence preserving the current widespread usage of the junior name in accordance with Article 23.9.1 of the International Code of Zoological Nomenclature." (Authors)] Address: Garrison R.W., California Dept of Food & Agriculture, 3294 Meadowview Rd, Sacramento, California 95832, USA. Email: argiavivida@gmail.com

**21655.** Leppänen, M. (2020): Infection under the ion beam: focused ion beams and antibacterial properties of biomaterials. *JYU dissertations* 236, Faculty of Mathematics and Science, University of Jyväskylä: 167 pp. (in English) ["In this thesis, Helium Ion Microscopy (HIM) imaging and milling on organic and antibacterial materials will be discussed. In addition, I will discuss the antibacterial properties of surface-immobilized bacteriophages. HIM is a recently developed imaging method, which is especially suitable for biological samples because they can be imaged without a metal coating. Because of the state-of-the-art ion source, the microscope has also a higher imaging resolution compared to the scanning electron microscope (SEM). The suitability of HIM imaging for the bacteria-phage interactions is discussed in addition to the more delicate nanocellulose samples. High beam damage on the cellulose was found which has not been reported previously with HIM. Indeed an ion beam can have a milling property, which is demonstrated here with bacteria, bacteria-dragonfly interactions and encapsulated bacteriophages to obtain volumetric information. The antibacterial effectivity of immobilized bacteriophages was analyzed quantitatively with HIM-imaging and biological measures. It was found that detaching phages from the material are likely the major contributor to the infectivity of the phage-biomaterial." (Author)] Address: not stated

**21656.** Nelsen, J. (2020): Do mosquito pesticides harm their natural enemies? Ecological impacts and non-target effects of larvicides on mosquito predators. M.Sc. thesis, Biological, Environmental, and Earth Sciences: X + 102 pp. (in English) ["Larvicides are chemicals used to kill juvenile mosquitoes. When applied to an area, other aquatic organisms are exposed to these chemicals. The removal or impairment of top insect predators could be beneficial to mosquito populations



once harmful pesticide levels dissipate. Two common larvicides were examined: growth regulators (IGRs) and surface films (SFs). The goal of this project was to determine if larvicides harm mosquito predators common to southern Mississippi. I surveyed aquatic sites before and after IGR and SF treatments, and then compared changes in insect community structure. Community evenness was lower in SF treated habitats. When analyzing prey taxa only, evenness and diversity changed in control treatments, which suggests that differences measured were due to other environmental factors, not larvicide presence. I examined lethal and behavioral effects of IGRs and SFs on predatory insects. Surface films were lethal to *Laccophilus* adults (Coleoptera: Dytiscidae) at recommended and high concentrations. Dragonfly nymph location preference in aquariums varied between SFs and IGRs. *Laccophilus* larvae in IGRs spent more time moving and eating compared to SFs. Behavioral differences were among combined concentrations in both larvicide treatments, not within their respective concentrations and controls. Experiments were conducted to determine IGR and SF effects on the mosquito-regulating ability of predaceous insects. Treated predators were placed in mesocosms containing mosquito larvae. Mosquito survival was quantified by capturing emerging adults. There were no differences in emergence among all treatments. Implications of the findings from this thesis, similarities to past research, and suggestions for future work are discussed." (Author)] Address: not stated

**21657.** Nitzsche, K.N.; Shin, K.-C.; Kato, Y.; Kamauchi, H.; Takano, S.; Tayasu, I. (2020): Magnesium and zinc stable isotopes as a new tool to understand Mg and Zn sources in stream food webs. *Ecosphere* 11(8), August 2020, e03197: 20 pp. (in English) ["Non-traditional stable isotopes of metals were recently shown as new dietary tracers in terrestrial and marine mammals. Whether these metal stable isotopes can be used to understand feeding habits in stream food webs is not known yet. In this study, we explored the potential of stable isotopes of essential Mg ( $\delta^{26}\text{Mg}$ ) and Zn ( $\delta^{66}\text{Zn}$ ) as a new tool in stream ecology. For this purpose, we determined  $\delta^{26}\text{Mg}$  and  $\delta^{66}\text{Zn}$  values of stream organisms and their potential metal sources in upper and lower reaches of two streams in the Lake Biwa catchment, Central Japan. Our goals were (1) to explore variations in  $\delta^{26}\text{Mg}$  and  $\delta^{66}\text{Zn}$  across organisms of different feeding habits and (2) to understand Mg and Zn sources to stream organisms. Overall,  $\delta^{26}\text{Mg}$  and  $\delta^{66}\text{Zn}$  values of organisms were neither related to each other, nor to  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values, indicating different elemental sources and factors controlling isotopic fractionation depending on element and taxa. Low  $\delta^{26}\text{Mg}$  values in filter-feeding caddisfly larvae and small gobies indicated aqueous Mg uptake. Higher  $\delta^{26}\text{Mg}$  values in leaf-shredding crane fly and grazing mayfly larvae suggested Mg isotopic fractionation during Mg uptake from the diet. While the  $\delta^{26}\text{Mg}$  values of stonefly nymphs reflected those of caddisfly larvae as a potential prey, the highest  $\delta^{26}\text{Mg}$  values found in dobsonfly nymphs can be explained by  $^{26}\text{Mg}$  enrichment during maturing.  $\delta^{66}\text{Zn}$  values of caddisfly and mayfly larvae indicated Zn was a mixture of aqueous and dietary available Zn, while higher  $\delta^{66}\text{Zn}$  values in crane fly larvae pointed to Zn isotopic fractionation during Zn uptake from plant litter.  $\delta^{66}\text{Zn}$  values in stonefly and dobsonfly nymphs were often in the range of those of caddisfly larvae as their prey, while gomphid nymphs and small goby were depleted in  $^{66}\text{Zn}$  relative to their dietary Zn sources. We conclude that  $\delta^{26}\text{Mg}$  is a promising indicator to assess Mg sources in stream ecology depending on taxa, while the use of  $\delta^{66}\text{Zn}$  is limited due to the complexity in Zn sources." (Authors)] Address: Tayasu, I., Res. Inst. Humanity & Nature (RIHN), 457-4 Motoyama, Kamigamo, Kita-ku, Kyoto 603-8047 Japan

**21658.** Rowe, R.; Player, W. (2020): Diet analysis of juvenile dragonflies using group-specific polymerase chain reaction. Poster Number 104, Biology and Biomedical Research, College of Arts and Sciences Department, Department of Biology, Winthrop University. (in English) ["Aquatic food webs are complex, and understanding interactions in these food webs can give an indication of ecosystem health and stability, as well as movement of energy and nutrients through ecosystems. Previous studies have utilized both microscopic gut content analysis and stable isotopes to aid in constructing food webs in these ecosystems. However, gut content analysis is time-consuming, stable isotope analysis can be cost prohibitive, and both methods only identify general categories of food items. The application of newer, molecular-based approaches has the potential to provide previously unavailable taxonomic resolution in aquatic food webs (i.e., who is eating whom?). DNA-based methods have been used in other disciplines for diet analyses, but have not been widely applied in freshwater ecology. We collected juvenile dragonflies (Odonata, Anisoptera) from Winthrop Lake in Rock Hill, South Carolina, dissected gut contents, and extracted DNA from individuals in three genera. We amplified DNA via PCR, using group-specific primers targeting mitochondrial CO1 gene regions for midges (Diptera, Chironomidae) and mosquitoes (Diptera, Culicidae) to identify these potential prey in gut contents; we used gel electrophoresis as a presence/absence test for DNA from these prey groups. Occurrence of prey groups in gut contents varied by individual and by genus of dragonfly examined. With further refinement, these methods have the potential to provide previously unavailable detail on predator-prey interactions in these ecosystems." (Authors)] Address: [https://digitalcommons.winthrop.edu/source/SOURCE\\_2020/allpresentationsandperformances-114/](https://digitalcommons.winthrop.edu/source/SOURCE_2020/allpresentationsandperformances-114/)

**21659.** Turcotte, D.; Arsenault, D. (2020): Hommage posthume à Raymond Hutchinson. *Nouv'Ailes* 30(1): 5-8. (in French) [Raymond P. Hutchinson (1937-2020) was a well known odonatologist from Quebec, Canada.] Address: [http://www.aeaq.ca/s/NouvAiles\\_vol30\\_no111.pdf](http://www.aeaq.ca/s/NouvAiles_vol30_no111.pdf)

**21660.** Vilela, D.S.; Anjos-Santos, D.; Koroiva, R.; Cordero-Rivera, A.; Guillermo-Ferreira, R. (2020): Revision of the genus *Minagrion* Santos, 1965 (Odonata: Coenagrionidae). *Zootaxa* 4786(2): 176-198. ["Endemic to Brazil, the genus *Minagrion* Santos, 1965 is revised for the first time. The genus contains five species, and here we establish diagnostic characters, keys and drawings for both sexes. Furthermore, we propose the synonymy of *M. franciscoi* Machado & Bedê, 2015 new syn. with *M. caldense* Santos, 1965." (Authors)] Address: Silva Vilela, D., Graduate Program in Entomology, Dept Biol., Univ. of São Paulo (USP), Ribeirão Preto, Brazil. E-mail: [deegoo@gmail.com](mailto:deegoo@gmail.com)

**21661.** Wildermuth H. (2020): 'Drop and stop' - a case of interspecific anti-harassment behaviour in an aeshnid female (Odonata: Aeshnidae). *Notulae Odonatologicae* 9(6): 269-275. (in English) ["A female *Aeshna cyanea*, having been intercepted in mid-air by a male *A. mixta* attempting to mate, was observed to crash down together with the attacker to the ground where both remained motionless close to each other. After a short while the insects flew up simultaneously and the same behavioural sequence recurred. Following a short fight involving biting the female escaped and flew off. This is the first reported interspecific 'drop and stop' behaviour in anisopterans away from water." (Author)] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rütli, Switzerland. E-mail: [hansruedi@wildermuth.ch](mailto:hansruedi@wildermuth.ch)

**21662.** Štih, A.; T. Koren, T.; Frankovic, M. (2020): New data and checklist of dragonflies (Odonata) of Lastovo Island, Croatia. *Libellula* 39(3/4): 179-192. (in English, with German summary) ["In this paper we report the first overview of dragonfly fauna of Lastovo Island, southern Croatia, based on published literature data and recent surveys conducted in 2014 and 2018. So far 16 species have been recorded on the island. The following five species were detected for the first time for the island within this survey: *Ischnura elegans*, *Aeshna isoceles*, *Anax parthenope*, *Sympetrum sanguineum*, and *Selysiothemis nigra*. Of the recorded species the most important is the record of *S. nigra*, an endangered species according to the Red book of Odonata of Croatia, known only from a handful of localities across the coastal parts of the country. On the island, small ponds represent the only source of freshwater habitats suitable for dragonfly development. Most of the visited ponds are in favourable condition and some were also recently cleared of the surrounding vegetation and partially restored." (Authors)] Address: Štih, Ana, Association Hyla, Lipovac I no. 7, 10 000 Zagreb, Croatia. Email: ana.stih2@gmail.com,

## 2021

**21663.** Boys, W.A.; Siepielski, A.M.; Smith, B.D.; Patten, M.A.; Bried, J.T. (2021): Predicting the distributions of regional endemic dragonflies using a combined model approach. *Insect Conservation and Diversity* 14(1): 52-66. (in English) ["1. Climate warming is predicted to have large effects on insects, yet several data shortfalls, including distributional information, impede effective conservation strategies. 2. Knowledge of species distributions is a critical component for assessing conservation need but is often lacking for endemic or rare taxa, especially invertebrates. 3. One approach to better inform this gap is by using species distribution modelling (SDM) to predict suitable habitat and guide field surveys. 4. Here, we combine the predictions of two machine learning algorithms, maximum entropy and Random Forest, to estimate the current and future distributions of two endemic dragonflies of the Ozark-Ouachita Interior Highlands region in the southcentral United States. 5. Current suitable areas predicted by both algorithms largely overlapped for each species, but different environmental variables were most important for predicting their distributions. Field validation of these models resulted in new detections for both species showing their utility in guiding subsequent field surveys. 6. Future projections under two climate change scenarios support maintaining current suitable areas as these are predicted to be strongholds for these species. Our results suggest that combining outputs of multiple species distribution models is a useful tool for better informing the distributions of geographically limited or rare species." (Authors)] Address: Boys, W.A., Dept Biological Sciences, Univ. of Arkansas, Fayetteville, AR 72701, USA. E-mail: wa-deboys@email.uark.edu

**21664.** Busmachiu, G.; Munjiu, O. (2021): Odonata (Insecta) of the scientific reserve "Lower Prut". Zonela umede - valori perene cu rol vital pentru omenire. Materialele Simpozionului stiintific international dedicat aniversarii a 30 de ani de la fondarea Rezervatiei „PRUTUL DE JOS”, 11-12 Noiembrie, 2021: 51-55. (in English) ["The paper includes the results of the study of Odonata species diversity carried out between 2002-2021 years in the Scientific Reserve "Lower Prut". During the investigation 18 species from 12 genera and 7 families were revealed. This result is a summary of existing data in the literature and our own research. The list of species is included also." (Authors)] Address: Busmachiu,

Galina, Institutul de Zoologie, Academiei, 1 Chisinau, 2028, Republica Moldova. Email: bushmakiu@yahoo.com

**21665.** Clark, C.; Hossie, T.J.; Beresford, D.V. (2021): Density-dependent cannibalism in dragonfly nymphs (Odonata: Anisoptera) overwintering in temperate freshwater ponds. *Environmental Entomology* 50(6): 1483-1489. (in English) ["Density-dependent mortality by predation and cannibalism has been observed in aquatic insects such as dragonflies in response to shrinking habitat caused by summer drought. Winter conditions might also reduce the amount of livable habitat in temperate ponds and could augment rates of cannibalism. We hypothesized that cannibalism in dragonfly nymphs would increase in winter due to a seasonal decrease in available habitat caused by stratified lower oxygen levels leading to increased nymph density around pond edges. To determine whether cannibalism in nymphs is density-dependent and size-dependent (i.e., with smaller nymphs consumed) we experimentally manipulated nymph density in aquaria. To evaluate whether these patterns are observed in nature during the winter, we conducted field surveys for nymphs in two ponds across the fall and winter seasons. When nymphs were housed at different densities for 24 h, cannibalism was density-dependent, and only smaller nymphs were preyed upon. Our field surveys found that fewer nymphs were caught in the late winter sampling period (mixed-effects model,  $P < 0.001$ ), and that these were larger than nymphs caught in the fall, although both patterns were restricted to the deeper pond ( $P < 0.05$ ). Our results were consistent with the process we hypothesized, and the observed reduction in dissolved oxygen at the bottom of the deeper pond. The lack of significant changes to the relative abundance and size of nymphs in the shallower pond reveals that differences in pond characteristics can influence the degree to which winter conditions induce density-dependent cannibalism among dragonfly nymphs." (Authors)] Address: Beresford, D.V., Biology Department, Trent University, 600 West Bank Drive, Peterborough, Ontario, Canada. Email: davidberesford@trentu.ca

**21666.** Garcia Junior, M.D.N.; Damasceno, M.T.; Picanço Souto, R.N. (2021): Novos registros da família Aeshnidae (Odonata: Anisoptera) para o estado do Amapá, Brasil. *Nature and Conservation* 14(1): 181-184. (in Portuguese, with English summary) ["The order Odonata with approximately 7,000 species described worldwide comprises the second largest group of aquatic insects. In Brazil, the order is represented by about 860 species. Aeshnidae is a family of the suborder Anisoptera with wide worldwide distribution, for Brazil they are known around of 60 species, being that, in many states in the country little is known about the family. This work aims to present data collected during 2018 in four municipalities in the state of Amapá: Laranjal do Jari, Macapá, Porto Grande and Santana. Were sampled 58 specimens of seven species were included, included in five genera belonging to the family Aeshnidae. The species: *Gynacantha nervosa* Rambur, 1842, *Neuraeschna costalis*, *Staurophlebia reticulata*, *Triacanthagyna ditzleri* and *T. septima* count as new records for the state." (Authors)] Address: Garcia Junior, M.D.N., Univde Federal do Amapá, Brasil. Email: m.d.juniorbio@gmail.com

**21667.** García-Pozuelo-Ramos, C. (2021): Primera observación de *Coenagrion mercuriale* (Charpentier, 1840), (Odonata: Coenagrionidae), en la provincia de Toledo (España central). *Boletín de la Sociedad Andaluza de Entomología* 31: 143-147. (in Spanish) ["This note reports the first observation of *C. mercuriale* in the province of Toledo, contributing

to broaden the knowledge of the odonatofauna of this province. The population referred to in this note is located in Illescas, at the source of La Viñuela (UTM 30T 424621/-4441444, datum ETRS89, 607 masl). This spring flows into the La Viñuela stream, which is generally dry, except in the section flooded by the spring. This has a small and fluctuating flow, depending on the rainy season. Even so, in the last 45 years it has never dried up. It is located outside any urban area and is part of a cereal-growing steppe environment with olive groves. The episodes of fire in the surrounding vegetation and the removal of sediment from the small stream, formed by the drainage of the basin, are repeated in it. The channel cleared of vegetation does not usually exceed 15 meters in length, nor 10 centimeters in depth. This little anthropized stream, and the small pool it forms, are populated by the helophytes *Typha* sp. and *Veronica* sp. Riparian vegetation includes a small group of trees, including *Alnus glutinosa* (L.) Gaertn and *Populus nigra* (L.). In the immediate vicinity there is also the rush *Scirpus holoschoenus* (L.) Soják and the abundant blackberry (*Rubus ulmifolius* Schott). Overall, the habitat is typical of the species: a small stream, with sunny parts where the insect develops, with abundant riparian and semi-aquatic vegetation (Torralla-Burrial et al., 2011; Dijkstra et al., 2020). The observations of *C. mercuriale* in the Viñuela spring are the following: On May 14, 2021, at 2:00 p.m., with a light wind, 19°C and an almost clear sky, 11 specimens were observed, 9 males and 2 females. Both were forming a tandem with their own males. The set was located in the sunny areas of the stream. On May 23, 2021, at 1:30 p.m., with a breeze, 25°C and clear skies, 5 males and 3 females were found. Tandems and copulation attempts were produced. Copulation lasted approximately 25 minutes, after which the tandem entered the tangle of vegetation, being observed laying eggs on a submerged stem of *Veronica* sp." (Author)] Address: García-Pozuelo-Ramos, C., Soc. Entomol. y Ambiental de Castilla-La Mancha. Asociación Odonatológica de Andalucía (AOA), Spain. Email: pkymp@yahoo.es

**21668.** Glad, A.; Mallard, F.; Gourvil, P.-Y.; Goudiaby, A.; Bailleux, G. (2021): Chapitre 5. Évolution spatiale des leucorrhines et du cortège d'odonates associé des lagunes des Landes de Gascogne. In: Mallard F. (coord.), 2021. Programme les sentinelles du climat – Tome X: Réponses des espèces animales et végétales face au changement climatique et pistes d'actions de conservation de la biodiversité en région Nouvelle-Aquitaine, C. Nature: Le Haillan, Gironde, 724pp: 191-220. (in French)]["In order to help measure the impact of current climate change on biodiversity, odonates have been selected to serve as bio-indicators. Leucorrhines are particularly targeted by this study since these, with Boreo-montane affinities, are expected to be sensitive to climatic variations. In view of these elements, odonatologists agree that leucorrhine populations in the Landes de Gascogne are likely to become rare, or even disappear, if average temperatures increase. STELI transect type monitoring was set up for the imagoes (9 passages per site) as well as for the exuviae (three passages per site). Thus, 16 sites have been monitored since 2018 in the Landes and Gironde. The study of the microclimate shows that the sites are very similar climatically but that the annual variations are important. Variations in the abundance of species are observed on the sites, but the number of species counted each year is stable for each site. However, there are differences in terms of the composition of the processions between the sites studied. Taking into account new years of follow-up and new parameters could make it possible to better understand these differences. *Leucorrhinia albifrons* was observed in 6 lagoons in 2021 with 87 individuals (8 lagoons in 2020

with 180 individuals). *L. pectoralis* was not observed in 2020. The summers of 2018, 2019 and 2020 proved to be very hot, even scorching per period, while the year 2021 was characterized by high rainfall in spring and summer, therefore high water levels in the lagoons during the first passages with lower temperatures. The correlative distribution models created for 53 species of odonates present in the Nouvelle-Aquitaine region show varied responses to climate change. While some species are losing a large part of favorable habitats, others, on the contrary, are seeing their potential distribution extended to a large part of the region. The most important climatic variables for the species are degree-days above 30°C and rainfall, showing that the accumulation of high heat and drought can have a strong impact on these species." (Authors/Google translate)] Address: not stated

**21669.** Hämäläinen, M.; Sasamoto, A. (2021): On the incorrect authorship citations 'Matsumura in Oguma', 'Matsumura & Oguma in Oguma', 'Matsumura & Okumura in Okumura' and 'Kaup in Brauer' in various species of Odonata? Tombo 63: 28-37. (in English)]["This paper discusses citations crediting Matsumura as the author or co-author of a total of 11 new speciesgroup taxa in Odonata, published in papers by Oguma (in 1913 and 1926) and Okumura (in 1935), as well as citations crediting Kaup as author of 8 new species-group taxa in Odonata, published in papers authored by Brauer in 1866-1867. Interpreting the rules of the International Code of Zoological Nomenclature, neither Matsumura nor Kaup, respectively, qualify as authors of any of the new taxa." (Authors)] Address: Hämäläinen, M., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: libellago@gmail.com

**21670.** Hermans, J.T. (2021): The Golden-ringed dragonfly (*Cordulegaster boltonii*) in the Dutch province of Limburg. A species severely endangered by worsening droughts Part 1: Distribution and habitat requirements. Naturhist. maandbl. 110(7): 151-164. (in Dutch, with English summary)]["*C. boltonii* is a distinctive and impressive dragonfly with black-and-yellow patterning. The female has a long, needle-like ovipositor. It is the only *Cordulegaster* species that occurs in a large part of western and northern Europe. It favours woodlands with small streams but also occurs along acidic running waters in open moorland and heath. The species is characteristic of swift clear running waters where sandy, silty or peaty debris on the bottom provides suitable hiding places for the larvae. The main flight period of the adults is from June to late July. *C. boltonii* is very rare in the Netherlands and has suffered a severe decline. One or two small, vulnerable populations remain in the province of Noord-Brabant, while the province of Limburg houses three important populations, at the Maalbeek, Meinweg and Haeselaarsbroek areas. These three populations are mainly situated in nature reserves, where groundwater feeds small streams and rivulets, mostly surrounded by woodland. The largest population of the *C. boltonii* in the Netherlands is found in the Meinweg National Park. This population is divided over four brooks: Bosbeek, Venbeek, Nartheciumbeek and Roode Beek. All habitats and populations of the Golden-ringed dragonfly in Limburg are briefly discussed." (Authors)] Address: Hermans, J.T., Hertestraat 21, 6067 ER Linne, The Netherlands. Email: jthermans21@gmail.com

**21671.** Hermans, J.T. (2021): The Golden-ringed dragonfly (*Cordulegaster boltonii*) in the Dutch province of Limburg. A species severely endangered by worsening droughts. Part 2: Ecology and threats. Naturhist. maandbl. 110(9): 207-

217. (in Dutch, with English summary) ["The ecology, biology and behaviour of larvae and adults of *C. boltonii* are discussed, based on the findings of recent research, which are compared with the available literature. The research particularly concerns the investigation of a population along the Roode Beek brook in the Meinweg National Park, which has been carried out since 2015. The main goal was to get more information about the oviposition sites and the presence of larvae. Oviposition was observed three times at small seepage streams where they flow into the Roode Beek. Most larvae were found in shallow places along the banks of the Roode Beek, where sand, fine mud and detritus had accumulated behind stones or wood, in meanders or where banks have collapsed. The article ends with an overview of threats, and presents advice about necessary measures to reduce habitat damage. One of the main threats to *C. boltonii* is the increasing drought due to climate change. Groundwater supplies to some seepage streams are diminishing, and hence a rivulet like the Bosbeek brook falls dry every year for several weeks to months, which may cause the local population to go extinct. Conversely, seepage streams along the Roode Beek may become inaccessible as ovipositing sites if the water level is raised as a consequence of dam-building by Beavers (*Castor fiber*). Some populations of *C. boltonii* are very small and vulnerable, e.g. those at the Haeselaarsbroek site and along the Venbeek brook (Meinweg), where local threats can easily wipe out these populations. The province of Limburg harbours the largest and therefore most important populations of this species in the Netherlands. Improved protection of their breeding sites is necessary to give this beautiful dragonfly a brighter future." (Author)] Address: Hermans, J.T., Hertestraat 21, 6067 ER Linne, The Netherlands. Email: jthermans21@gmail.com

**21672.** Liu, Y.; Wang, Q.; Wu, Y.; Yang, C.; Luo, X.; Mai, B. (2021): Bioaccumulation of short- and medium-chain chlorinated paraffins in aquatic insects from an e-waste recycling site. *Environmental Chemistry* 40(10): 3037-3045. (in Chinese, with English summary) ["The concentrations of short-chain chlorinated paraffins (SCCPs) and medium-chain chlorinated paraffins (MCCPs) in aquatic insects and water from an electronic waste recycling site in Longtang Town, Qingyuan County of Guangdong Province were determined using gas chromatographic-mass spectrometric (GC/MS). The results showed that  $\Sigma$ SCCPs and  $\Sigma$ MCCPs concentrations in aquatic insects were range from 52 ng·g<sup>-1</sup> to 410 ng·g<sup>-1</sup> and 40 ng·g<sup>-1</sup> to 740 ng·g<sup>-1</sup> wet weight (ww), respectively. Damselfly larvae have the highest level of  $\Sigma$ SCCPs and the highest level of  $\Sigma$ MCCPs was found in waterbeetles. Principal component analysis was conducted, and species-specific different composition patterns of SCCP and MCCP congeners were seen among aquatic insects. This may be due to differences in diet, feeding habits and bioaccumulation ability among different species. Bioaccumulation factor (BAF) values of  $\Sigma$ SCCPs and  $\Sigma$ MCCPs in aquatic insects were range from 3.27 to 3.79 and 2.62 to 3.34, respectively. BAFs of  $\Sigma$ SCCPs and  $\Sigma$ MCCPs in dragonfly larvae were lower than that of  $\Sigma$ PCBs (4.87) and  $\Sigma$ PBDEs (4.65), suggesting the bioaccumulation potential of SCCPs and MCCPs was below that of PCBs and PBDEs in aquatic insects. Significant negatively correlations ( $P < 0.05$ ) were observed between BAF values and octanol-water partition coefficient ( $K_{OW}$ ) and carbon-chain length ( $C_{10-17}$ ) of SCCPs and MCCPs. Those results indicated that the physicochemical properties of compounds affected the bioaccumulation of SCCPs and MCCPs by aquatic insects, and homologues with low  $K_{OW}$  and low carbon chain length were preferred to bioaccumulation." (Authors)] Address: Liu, Y., Res.

Institute of Poyang Lake, Jiangxi Acad. Sciences, Nanchang, 330096, China. E-mail: liuyu@jxas.ac.cn

**21673.** Mauersberger, R. (2021): Reproduktionsnachweise von *Crocothemis erythraea*, *Ischnura pumilio* und *Orthetrum brunneum* an einem kleinen Gartenteich im Norden Brandenburgs (Insecta: Odonata). *Libellula* 40 (3/4): 179-183. (in German, with English summary) ["Germany " In a small lined garden pond with a maximum depth of 22 cm in Ahrendorf near Templin the reproduction of *C. erythraea*, *I. pumilio*, and *O. brunneum* was successful. In the years at issue (2019 to 2021) there have been mild winters so that ice cover reached only a few centimeters thickness. *I. pumilio* and *O. brunneum* are rare species in the region in question." (Author)] Address: Mauersberger, R., Petersdorfer Str, 23, 17268 Templin, Germany. Email: rue.mau@web.de

**21674.** Moore, M.P.; Martin, R.A. (2021): Natural selection on adults has trait-dependent consequences for juvenile evolution in dragonflies. *The American Naturalist* 197(6): 677-689. (in English) ["Although natural selection often fluctuates across ontogeny, it remains unclear what conditions enable selection in one life-cycle stage to shape evolution in others. Organisms that undergo metamorphosis are useful for addressing this topic because their highly specialized life-cycle stages cannot always evolve independently despite their dramatic life-history transition. Using a comparative study of dragonflies, we examined three conditions that are hypothesized to allow selection in one stage to affect evolution in others. First, we tested whether lineages with less dramatic metamorphosis (e.g., hemimetabolous insects) lack the capacity for stage-specific evolution. Rejecting this hypothesis, we found that larval body shape evolves independently from selection on adult shape. Next, we evaluated whether stage-specific evolution is limited for homologous and/or coadapted structures. Indeed, we found that selection for larger wings is associated with the evolution of coadapted larval sheaths that store developing wing tissue. Finally, we assessed whether stage-specific evolution is restricted for traits linked to a single biochemical pathway. Supporting this hypothesis, we found that species with more wing melanization in the adult stage have evolved weaker melanin immune defenses in the larval stage. Thus, our results collectively show that natural selection in one stage imposes trait-dependent constraints on evolution in others." (Authors)] Address: Moore, M.P., Living Earth Collaborative, Washington University, Saint Louis, Missouri 63130; 2. Dept of Biology, Case Western Reserve University, Cleveland, Ohio 44106, USA.

**21675.** Sandu, C. (2021): The synthesis, characterization, and antimicrobial analysis of copper nanoparticle doped graphene-matrix material. MSc. thesis, Materials Science and Engineering, University of California, Riverside: IX + 44 pp. (in English) ["Pathogenic microbes pose a serious threat to public health. Specifically, antibiotic abuse is creating new strains of antibiotic resistant bacteria and creating a public health crisis. There are many health risks associated with the overuse of antibiotics. Their broad bactericidal effects can disrupt an individual's symbiotic relationship with beneficial bacteria [1]. Furthermore, antibiotics can be toxic to human and create serious side effects from skin sensitivity to organ failure [2]. In addition to some microbes' inherent antibiotic resistive genes, microbes evolve and mutate quickly thereby quickly producing antibiotic resistance. Antibiotic sensitive bacteria are able to acquire antibiotic resistance genes via horizontal gene transfer, causing the organism to then become resistant to specific classes of antibiotics, further



complicating treatment [3]. It is therefore of great interest in the scientific community to examine other methods of infectious disease prevention and treatment. Since the introduction of the GAIN Act in 2012, there has been new stimulated interest in the battle against bacteria, however no significant strides have been made yet [3]. Growing resistance to antibiotics continues to be a devastating public health problem. Attempts to tackle the problem involve research teams at the Massachusetts Institute of Technology (MIT) who utilize a type of phage therapy to target antibiotic resistance genes directly via the CRISPR (clustered, regularly interspaced short palindromic repeats) Cas9 gene editing technology [3]. The engineered phage (a phage is a virus which infects bacteria) delivers the CRISPR Cas9 RNA tool into resistant bacteria, resulting in genomic expression of the CRISPR Cas9 tool which then programs the bacteria to either become sensitive to drugs or to undergo lysis [4]. The CRISPR Cas9 tool encodes a DNA nuclease (DNA degrading enzyme) that recognizes and cleaves specific genes which code for antibiotic resistance [3]. The phage tool selectively kills bacteria with chromosomally integrated resistance genes, while bacteria with plasmid-integrated resistance genes become sensitive and continue to survive, adding a selective pressure which favors sensitive bacteria to resistant bacteria [4]. The surviving bacteria can then be effectively treated with antibiotics. Ironically, the CRISPR Cas9 system is a part of bacteria's natural immune defense against phage attacks [3]. While this tool seems very promising in research, gene therapy is very difficult to implement and apply. Furthermore, it does not prevent the development of antibiotic resistance; there will always be too great a pressure for bacteria to evolve further resistance and survive. The common solution to prevent pathogenic infections tends to rely on organic disinfectants or drugs, however this solution may lead to drug resistance and can harm the environment. Since about 80% of microbes are transmitted through surface contact, another approach to preventing the spread of harmful microbes is to develop surface technology which not only is bactericidal, but also overcomes the concern of drug resistance and is safe environment [5]. Naturally occurring structures can serve as templates for such bactericidal applications. It has been reported that the nanoscale structure of dragonfly wings may serve as a bactericidal surface [6]. Their natural structure can rupture adjacent microbial cells thereby killing and preventing bacterial growth. These organic templates can be reproduced synthetically and applied to the development of microbicide technologies. It has been observed that the interaction between synthetic nanoparticles and biological cells can be enough to cause cell lysis and death without any other external forces, chemical nor mechanical [7]. This idea is a promising opportunity for the development of novel bactericidal surface technologies which are effective and safe. Nanomaterials have the capacity to enhance the field of science that relies on public health and sterility, from water treatments, medical devices, and food processing [8]. Metal oxide nanoparticles such as zinc oxide and copper oxide exhibit antimicrobial behavior at different degrees in a variety of materials, forms, and morphologies [6]. The functional activity of nanoparticles is affected by material size, shape, and morphology. Analyzing and characterizing the effects of nanoparticles of varying properties is of current interest in research for biomedical and industrial applications. Medical devices may harbor harmful bacteria which can be deadly for an immune compromised or elderly patient [2]. Bacteria can produce highly resistant biofilms which allow them to survive on such surfaces for long lengths of time. *Staphylococcus aureus* and *Escherichia coli* are commonly acquired hospital infections that may cause deadly bloodstream, urinary tract, lung, heart,

and skin infections [9]. These microbes can be very resistant to conventional antibiotics, requiring the need for novel methods of reducing microbial infections. Metallic nanoparticles have been reported to show antimicrobial activity especially towards pathogenic bacteria such as *E. coli* and *S. aureus* [7] [10]. Antimicrobial effects of the nanoparticle depend on the particle size, stability, and concentration; with the right preparation and application, these particles can hold a promising future in safely reducing infection. Furthermore, graphene based nanomaterials show promising development in the antimicrobial community [6]. Graphene materials have been shown to interact with biomolecules such as proteins, nucleic acids and membranes; these material-microbial interfaces are worthy of analysis in order to further understand the beneficial application of such materials [6]. Here, an economical, scalable and facile sol-gel method to synthesize a metallic copper nanoparticle embedded carbon matrix material (CMAT) is described. Furthermore, CMAT's antimicrobial potential is investigated. CMAT possesses hydrophobic properties as well as high flame resistivity and a high absorption ability of oils. These properties generate a spectrum of prospective CMAT applications ranging from environmental decontamination, biomedical antimicrobial coatings, storage solutions, and air filters." (Author) The paper includes references to Odonata.] Address: <https://escholarship.org/uc/item/28x228cz>

**21676.** Savard, M. (2021): La fascinante communauté des libellules d'un étang de castor au parc de la Rivière-du-Moulin à Saguenay. *Nouv'Ailes* 31(1): 21-27. (in French) [Parc urbain de la Rivière-du-Moulin, Chicoutimi, town of Saguenay, Quebec, Canada. Phenology and abundance of the occurring 18 odonate species are outlined in details. Morphological characters of the five *Lestes* species *L. congener*, *L. disjunctus*, *L. dryas*, *L. forcipatus*, and *L. unguiculatus* are introduced. The French names of the species are documented.] Address: Email: [michel.savard@ssss.gouv.qc.ca](mailto:michel.savard@ssss.gouv.qc.ca)

**21677.** Savard, M. (2021): Raymond Hutchinson (1937-2020): un ténor des sciences naturelles. *Le Naturaliste Canadien* 145(1): 48-50. (in French) ["Raymond Hutchinson died at the age of 82 on March 13, 2020, in Gatineau. He was an inspiring naturalist and a great educator. Talkative, he knew how to surround himself and communicate his passion for nature, in particular the observation of dragonflies and spiders. His career as a high school teacher, his unwavering dedication to natural science initiation camps, his volunteer commitments with Les Cercles des Jeunes Naturalistes and the Association des entomologistes amateurs du Québec, his sustained relations with the taxonomists of the National Collection of insects, arachnids and nematodes, and, above all, his amateur passion, cultivated under the influence of Father Jean-Baptiste Genest, André Larochelle, Gilbert Bélanger and Benoît Ménard, traced the way to this great educator and prolific avant-garde author who, with rigor, pedagogy and perseverance, has considerably advanced odonatology and Araneology in Quebec." (Author/ Google translate)] Address: Email: [michel.savard@ssss.gouv.qc.ca](mailto:michel.savard@ssss.gouv.qc.ca)

**21678.** Tájek, P.; Waldhauser, M.; Štěrík, M.; Vlašánek, P.; Hesoun, P.; Rehounek, J.; Legát, J.; Cerný, L. (2021): First documented records of breeding of *Gomphus pulchellus* in the Czech Republic with notes on its habitat preferences (Odonata: Gomphidae). *Libellula* 40 (3/4): 185-196. (in English, with German and Czech summaries) ["In the Czech Republic, only single individuals of *G. pulchellus* with no reproductive behaviour were observed until 2017. Since 2018, reproduction has been recorded at six localities in the Czech

Republic. All known localities of *G. pulchellus* from the Czech Republic are reported. Additionally, habitat descriptions and the circumstances of unpublished records (after 2017) are presented and discussed. The discussed data proves the extension of the generative range of *G. pulchellus* to the east." (Authors)] Address: Tájek, P., Nature Conservation Agency of the Czech Republic, Slavkovský les Mountains Regional Branch, Hlavní 504, 353 01 Mariánské Lázně, Czech Republic. Email: premysl.tajek@nature.cz

**21679.** Tájková, P.; Tájek, P.; Štěrík, M.; Váša, M.; Harabiš, F. (2021): Population size of the largest population of *Leucorrhinia albifrons* in the Czech Republic (Odonata: Libellulidae). *Libellula* 40 (3/4): 197-206. (in English, with German and Czech summaries) ["Distribution of threatened dragonfly *Leucorrhinia albifrons* is very scattered throughout Western and Central Europe. Most of them are small populations that are at high risk of extinction, therefore protecting large populations is key to maintaining the entire species in these regions. In this study we investigated population size and other population characteristics of *Leucorrhinia albifrons* at locality Komáří pond. We combined mark-recapture method (marking 726 adults) and exuvia sampling (1,564 specimen) to estimate precise population size. Very low recapture rate was recorded and life span was up to 41 days. According to our results the investigated population comprises 15,000–28,000 specimens, which is the largest detected population in the Czech Republic. Nevertheless, it is an isolated population that may be threatened by a change of land use management or accidental disturbances." (Authors)] Address: Tájková, Pavla, Czech Union for Nature Conservation, Local Chapter Kladská, Bezejmenná 480/8, 353 01, Mariánské Lázně, Czech Republic

**21680.** Wildermuth, H. (2021): Buchbesprechung. *Libellula* 40 (3/4): 207-208. (in German) [Baumann K., R. Jödicke, F. Kastner, A. Borkenstein, W. Burkart, U. Quante & T. Spengler (Ed.) (2021) *Atlas der Libellen in Niedersachsen/Bremen*. Mitteilungen der Arbeitsgemeinschaft Libellen in Niedersachsen und Bremen, Sonderband. NIBUK, Natur in Buch und Kunst, Ruppichterth. Format A4, 383 Seiten, 300 Fotos; in Deutschland 30,- €, Versand frei.] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

## 2022

**21681.** Calvão, L.B.; Siqueira, T.; Faria, A.P.J.; Paiva, C.K.S.; Juen, L. (2022): Correlates of Odonata species composition in Amazonian streams depend on dissimilarity coefficient and oviposition strategy. *Ecological Entomology* 47(6): 998-1010. (in English) ["Environmental and spatial heterogeneity affects the distribution of aquatic insects, determining or influencing the variation in local species composition. Odonata have different strategies for oviposition site selection that depend on environmental conditions. However, Land Use and Land Cover (LULC) can reduce the availability of suitable sites for Odonata oviposition through environmental homogenization. We investigated the relationship between environmental and spatial heterogeneity and variation in species composition of Odonata with different oviposition strategies (endophytic, epiphytic and exophytic) in Amazonian streams in a gradient of LULC. We used the Jaccard and Bray-Curtis coefficients and the Manhattan distance to estimate a continuum of variation in species composition. Variation in the composition of endophytic and epiphytic species was explained by spatial heterogeneity. Using abundance data and the Manhattan distance, we found a relationship between variation in species

composition and environmental heterogeneity. Endophytic species composition was related to perch heterogeneity, while exophytic species composition was related to perch and canopy cover heterogeneity. Exophytic and endophytic species could be used in biomonitoring as they respond to specific environmental predictors and because exophytic species do not have spatial patterns across the landscape. Different dissimilarity coefficients provide complementary information about the responses of multispecies communities to land use, as some will represent strong effects (presence-absence indexes) while others will represent more subtle effects (abundance-based indexes). Land use can increase the environmental heterogeneity of some predictors (perches and canopy cover). Physical changes in streams such as hydro-morphological alterations can modify specific habitats, affecting oviposition strategies and supporting tolerant species." (Authors)] Address: Calvão, Lenize, Programa de Pós-Graduação em Ecologia, Inst. de Ciências Biol. (ICB), Lab. Ecol. e Conservação (LABECO), Univ.de Fed.do Pará (UFPA), Belém, Pará, Brazil. Email: lenizecalvao@gmail.com

**21682.** Dijkstra, K.-D. B. (2022): Odonata, Dragonflies, Damselflies, Angidina. In: Steven M. Goodman (ed.): *The New Natural History of Madagascar*. Princeton University Press. 2296 pp: 953-963. (in English) [As of April 2020, 173 described species of Odonata are recognized on Madagascar; these are checklisted, partly documented by photographs and commented family-wise.] Address: Dijkstra, K.D., Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands. E-mail: dijkstra@nrm.nl

**21683.** Hermans, J.T. (2022): The Banded darter (*Sympetrum pedemontanum*) in the Dutch province Limburg (Odonata: Libellulidae). Rise and demise of a pioneer species. *natuurhistorisch maandblad* 111(6): 145-155. (in Dutch, with English summary) ["This tiny, but eye-catching, dragonfly with characteristic brown bands near the tip of each wing in both sexes, has a wide distribution area that extends from western Europe to Japan. The Banded darter is rare over large areas. In Europe it is widely distributed, with a continuous range from northern Italy across central Europe to northern Germany and the Netherlands. Since the middle of the 20th century, it has expanded its range to the low-lying parts of Europe, colonising large parts of Germany and becoming regionally common in the Netherlands (provinces of Noord-Brabant and Overijssel). The first individuals in Limburg were seen in 1982. Since then, the numbers of observed Banded darters have increased in Limburg, though most records have concerned wanderers. It is only at two locations, near Weert and Montfort, that populations were established in recent decades. The Banded darter favours habitats with emergent vegetation which is neither too tall nor too dense, such as those present in flood plains of lakes and streams. Presently, many of these natural habitats have been altered by human activities, and their water regime changed. Today the Banded darter occurs mostly in man-made habitats like slow-flowing ditches, canals, quarries or fish pond complexes. In the Netherlands, it is mainly found along man-made ditches, usually surrounded by open agricultural land. Unfortunately, both populations of the Banded darter in Limburg have vanished. The main reason for the decline and local extinction in Weert and Montfort was the management of the water regime practiced by the regional water board. Activities like cleaning up ditches or changing the water level were often carried out during the main flight and reproduction period of the Banded darter. This caused a collapse of the populations from which they were not able to recover." (Author)] Address: Hermans, J.T., Hertestraat

21, 6067 ER Linne, The Netherlands. Email: jthermans21@gmail.com

**21684.** Huang, D.; Fu, Y.; Lian, X.; Gao, J.; Nel, A. (2022): The oldest malachite damselfly (Odonata: Synlestidae) from the Lower Cretaceous of China. *Cretaceous Research* 129, January 2022, 105023: (in English) ["The synlestid damselfly, *Cretaphylolestes cretacicus* gen. et sp. nov., is described from the Lower Cretaceous Shouchang Formation (lower Aptian) of Zhejiang Province, Eastern China. It is the oldest Synlestidae, as we exclude the Late Jurassic–Early Cretaceous genus *Gaurimacia* from this family. The clade Lestiformia is currently represented in the Mesozoic by two Early Cretaceous genera of its stem group, a Perilestidae from the mid-Cretaceous Burmese amber and this newly described Synlestidae. This group remains under-represented in the Cretaceous, compared to the other zygopteran subclades. It probably diversified during the Late Cretaceous and the Paleocene, as the Lestidae are frequent and diverse in the Oligocene and more recent periods." (Authors)] Address: Huang, D., State Key Lab. of Palaeobiology & Stratigraphy, Nanjing, Institute of Geology & Palaeontology, Center for Excellence in Life & Palaeoenvironment, Chinese Academy of Sciences, Nanjing, PR China. Email: dyhuang@nigpas.ac.cn

**21685.** Maurice, N. (2022): Les zones de rejet végétalisées de grande taille: observation et modélisation. Génie des procédés. PhD thesis, Sciences et Ingénierie des Molécules, des Produits, des Procédés et de l'Énergie Laboratoire Réactions et Génie des Procédés, Université de Lorraine: 288 pp. (in French, with English summary) ["Despite regulations, the anthropic pollution (nitrogen, phosphorus, trace elements (TE), pharmaceuticals, faecal coliforms, etc.) related to urban wastewater (wastewater treatment plant (WWTP) and urban stormwater runoff (USR)) is not negligible because it weakens aquatic ecosystems and it can be harmful for human health. In order to minimize its impact, the amount of pollutants must be reduced. Wetlands are wonders of nature and are often describe as Earth's kidney due to their capacity to filter pollutants, so they would be interesting candidates. Unfortunately, they have been in decline for several centuries (13 % of 17th century wetlands still remain at the beginning of the 21st century. This is why in 2011 the AZH-UREV project (Aménagement d'une Zone Humide à Reims pour l'Épuration et le Vivant) was born. This project allowed the implementation of a large scale (6 ha) surface-flow constructed wetland (CW) (first water supply in 2017) at the outlet of the Grand Reims WWTP (capacity of 450,000 population equivalents). It is composed of three basins of 2 ha fed in parallel, by part of the effluents of the WWTP (10%), or by the USR (25 %) during rainy events, to improve the quality of these waters before their discharge into the environment. Initially these basins were different because of the quantity and type of emergent vegetation planted (*Phragmites australis*, *Glyceria maxima*, *Scirpus lacustris*). Today, there is no more difference because the proportion of planted plants has drastically decreased, *P. australis* being the only species still present, to the benefit of opportunistic species (submerged or floating). These basins were able to reduce the concentration of many compounds through various processes, oxidation/reduction (nitrogen, TE), precipitation /coprecipitation with carbonates and hydrogen sulphide (TE), biodegradation or photodegradation (pharmaceuticals, faecal coliforms), adsorption to sediments (TE and pharmaceuticals), or uptake by plants (nitrogen and phosphorus). Bacteria and aquatic plants are responsible for most of these mechanisms. Thus, the basins are better able to remove pollutants in summer due to the higher temperatures

and longer days. Bacterial activity has a direct effect on pollutants and the bacterial genera found at the outlet of the CW take part in the nitrogen, sulphur and carbon cycles. Whereas the effect of plants is more indirect by promoting bacterial development (source of carbon and energy, support for the biofilm) and by bringing organic matter (adsorption site for pollutants) into the sediment during senescence. These plants are also a source of food (submerged or floating plants), a habitat and/or nesting area (emergent plants) for many wild animals, whether they are considered "harmful" (muskrat or coypu) or not (swan, coot, duck, grebe, frog, dragonfly, damselfly, gammarid, snail, etc.). Therefore, this CW offers two advantages: it improves the quality of urban water before it is discharged into the receiving environment and it provides food and shelter for many animal species that depend on this type of environment. The interconnection of the multiple variables measured has been transcribed into a conceptual model. These results are encouraging for a possible extension of the CW." (Author) Records of *Coenagrion scitulum*, *Ischnura elegans*, *Crocothemis erythraea*, *Libellula quadrimaculata*, and *Aeshna mixta* are documented.] Address: not stated

**21686.** Petermann, J.S.; Gossner, M.M. (2022): Aquatic islands in the sky: 100 years of research on water-filled tree holes. *Ecology and Evolution* 12(8).e9206: 17 pp. (in English) ["Water-filled tree holes are unique ecosystems that may occur high up in tree crowns and are essentially aquatic islands in the sky. Insect larvae, mesofauna, and other organisms colonize the waterbodies and feed on the accumulating detritus. Water-filled tree holes are not only important habitats for these species but have been used as model systems in ecology. Here, we review more than 100 years of research on treehole inhabiting organisms and show that most studies focus on selected or even single species (most of which are mosquitoes), whereas only few studies examine groups other than insects, especially in the tropics. Using a vote counting of results and a meta-analysis of community studies, we show that the effects of tree-hole size and resources on abundance and richness were investigated most frequently. Both were found to have a positive effect, but effect sizes were modulated by site-specific environmental variables such as temperature or precipitation. We also show that parameters such as the height of the tree holes above ground, tree-hole density, predation, and detritus type can be important drivers of organism abundance or richness but are less often tested. We identify several important research gaps and potential avenues for future research. Specifically, future studies should investigate the structure, functions, and temporal dynamics of tree-hole food webs and their cross-system interactions, for example, with terrestrial predators that act as a connection to their terrestrial surroundings in meta-ecosystems. Global observational or experimental tree-hole studies could contribute pivotal information on spatial variation of community structure and environmental drivers of community assembly. With a better understanding of these unique aquatic habitats in terrestrial ecosystems, natural and artificial tree holes can not only serve as model systems for addressing fundamental ecological questions but also serve as indicator systems of the impacts of environmental change on ecosystems." (Authors) Includes references to the study of Ola Fincke on *Pseudostigmatidae*.] Address: Petermann, Jana, Dept of Environment & Biodiversity, Univ. of Salzburg, Salzburg, Austria

**21687.** Petzold, F. (2022): 17 Jahre Libellenmonitoring an den Mooren im Thüringer Wald. *Landschaftspflege und Naturschutz in Thüringen* 58(3): 115-120. (in German, with

English summary) ["Since 2005, the dragonfly fauna in five raised bogs on the ridges of the Thuringian Forest has been studied using standardised methods as part of a monitoring project. The focus of the investigations is on the species typical for the moors. As the flagship species of the raised bogs of the Thuringian Forest, the Alpine Emerald Dragonfly *Somatochlora alpestris* is in special focus. A significant decline in the Population of this flagship species has been observed. The positive effects of extensive revitalisation measures are overshadowed by the negative effects of current climate changes (lack of precipitation, warming). However, the revitalisation measures have slowed down the population decline and the other moorland-typical species have also been preserved so far." (Author)] Address: Petzold, F., Lutherstr. 130, 07743 Jena, Germany. E-mail: falk\_petzold@web.de

**21688.** Roy, S.; Singhamahapatra, A.; Nayak, A.K. (2022): Observations of Odonata (Insecta) from heterogeneous patches of Bankura district with first report of *Microgomphus torquatus* (Selys, 1854) from West Bengal state of India. *Journal of Animal Diversity* 4(2): 121-151. (in English) ["The diversity and heterogeneity of Odonata was studied at 10 sites located across almost all parts of the Bankura district (except northwestern and northeastern boundary regions), in the state of West Bengal, India from July 2015 to June 2022. Analysis of variance and rarefaction was performed to study the  $\beta$ -diversity and compare the taxa abundance at the sites to understand the heterogeneity of Odonata observations. The seasonality of the species and their site-wise distribution were also studied. A total of 74 odonate species belonging to eight families, represented by 46 genera were recorded. The study adds 17 species to the known Odonata fauna of Bankura district, including the addition of *M. torquatus* to the fauna of West Bengal. It also confirms the addition of *Ictinogomphus kishori* to the known Odonata fauna of West Bengal, which has been confused with and misidentified as *Ictinogomphus distinctus* for long, the latter being described from the state of West Bengal and is also found in the region adjacent to the study area. Most recorded odonates belonged to the family Libellulidae (29 species), followed by Coenagrionidae (19 sp.), Gomphidae (9 sp.), Platycnecidae (6 sp.), Aeshnidae (5 sp.), Macromiidae (3 sp.), Lestidae (2 sp.), and Chlorocyphidae (1 sp.). Species diversity and abundance assessments are essential for conserving the habitats of the restricted and endemic (to peninsular India) species." (Authors)] Address: Nayak, A.K., Searsole Junior Basic School, Raniganj Circle, Searsole Rajbari, Paschim Bardhaman, West Bengal 713358, India. Email: amamayak.stat@gmail.com

**21689.** Sadler, I.G. (2022): Functional feeding groups responses to fertilization and Largemouth Bass in southern Illinois experimental ponds. MSc. thesis, Southern Illinois University Carbondale: VIII + 98 pp. (in English) ["Eutrophication is a pervasive issue in freshwater systems. However, the effects of nutrient and piscivorous fish additions on freshwater invertebrate diversity, functional feeding groups (FFGs), and stoichiometric ratios are difficult to predict. These relationships are important to quantify in small lentic systems where nutrients like nitrogen (N) and phosphorus (P) and piscivorous fish are frequently added to enhance sport fishing. To study this, I administered 2 treatments, fertilization and Largemouth Bass (*Micropterus salmoides*, LMB) additions, to 28 experimental ponds in a fully crossed experimental design and estimated benthic invertebrate biomass and diversity before and after administering the treatments. I also sought to improve my understanding of the relationships between specific FFGs and nutrients by measuring the elemental

composition of coarse (CPOM) and fine particulate organic matter (FPOM) and invertebrates before and after administering the treatments. Because consumer stoichiometric ratios are shaped by their environment and life histories, which can be governed by their functional role and/or evolutionary history, I was interested in determining whether my treatments and invertebrate FFG or taxonomic group better explained variation in invertebrate elemental nutrient content. I verified that fertilization altered nutrient availability in the ponds by measuring the nutrient content and biomass of FPOM and CPOM. FPOM P concentrations ( $\mu\text{gP/L}$ ) were higher in ponds that received fertilizer ( $f= 4.84(1,22)$ ,  $P= 0.03$ ) and LMB ( $f= 5.26(1,22)$ ,  $P= 0.04$ ). Fertilization also increased CPOM biomass ( $f= 8.95(1,21)$ ,  $P=0.007$ ). I found that Shannon diversity was increased or better maintained in ponds that received the fertilizer treatment ( $f= 6.54(1,20)$ ,  $P= 0.02$ ). Predator ( $f= 4.47(1,21)$ ,  $P= 0.047$ ) and GC ( $f= 5.05(1,21)$ ,  $P= 0.04$ ) biomass increased after the addition of LMB to ponds. For scraper biomass, there was a significant interaction between fertilization and LMB additions such that LMB additions increased scraper biomass, but fertilization counteracted this effect ( $f= 4.93(1,17)$ ,  $P= 0.04$ ). Fertilization increased the biomass of FCs ( $f= 6.64(1,9)$ ,  $P= 0.03$ ) but decreased shredder biomass ( $f= 5.71(1,6)$ ,  $P= 0.004$ ). In control ponds, SIMPER analysis revealed that a decrease in the predatory crayfish Cambaridae accounted for the greatest differences between pre and post sampling, followed by Odonates. Odonates and gastropods caused the greatest shifts in both fertilized and LMB ponds. The difference between fertilized and LMB ponds was that Coenagrionidae biomass did not increase and Dytiscidae did in fertilized ponds. Invertebrate elemental stoichiometric ratios were not affected by our treatments, which supports the assumption of homeostasis in ecological stoichiometry models. However, nutrient ratios varied across both FFG and taxonomic group, likely because of varying diets and life history strategies. Model comparison suggests that order best explained most of the variation in elemental ratios across invertebrates; however, FFG and order best explained invertebrate %P content and class and FFG best explained %C content. We found that predators, specifically Odonata and Hirudinea, have higher N content than other FFGs, and gathering-collectors (GCs), specifically Ephemeroptera, have a higher P content. Predators may have a higher N content because they feed on higher dietary N than herbivores. I determined that order was the best predictor of elemental nutrient content; however, FFG is also an acceptable predictor, which is important because identifying species to FFG is more rapid than taxonomic identification. In conclusion, humans are heavily altering the availabilities of N and P in freshwater ecosystems; thus, knowing the stoichiometric contents of individuals (at the order or FFG level) can facilitate predictions about how communities respond to nutrient additions. Furthermore, understanding how invertebrate communities respond in their functional makeup is of importance.] Address: not stated

**21690.** Samarasinghe, L.V. (2022): Observations on underwater oviposition of *Pseudagrion microcephalum* (Odonata: Coenagrionidae). *Sri Lanka Naturalist* 11: 18-20. (in English) ["The oviposition behavior of a pair of *P. microcephalum* was observed in the Bellanvila-Attidiya sanctuary during the months of June and July 2021. This species associated with a medium-size stream, and shrubs as well as grasses are found along its banks (Figure 1). The behaviors were observed for six days by naked eye and the photographs were taken using the Redmi 7 mobile phone camera (dual camera setup of 12MP + 2MP in the rear). A pair was observed flying near the canal and they were in tandem position and occasionally



landed on foliage of the bushes near the banks of the stream (Figure 2). Then they started mating and forming the heart wheel position for several minutes. After that the female laid down on a leaf on the surface of the water and prepared to lay eggs. Then slowly moved into the water, and few minutes later the male floated into the water (Figure 4). They remained in the water for about 15 minutes, during that time the female continued to lay eggs. This was observed for a few days but the heart wheel position was seen only two days. In this observation, the male separates in the tandem position in the water, but the female continues to lay eggs under the water (Figure 3), and when the female returns from the water, the male again caught in the tandem position. During the observed period, they showed an average submergence time of 8.33 minutes, with a minimum of three (3) minutes and a maximum of 27 minutes." (Author)] Address: Samarasinghe, L.V., Young Zoologists' Association of Sri Lanka, National Zoological Gardens, Dehiwala, Sri Lanka. Email: lasanvibudha@gmail.com

**21691.** Savard, M. (2022): Découverte d'une population de l'amphiagrion rougeâtre, *Amphiagrion saucium* (Odonata: Coenagrionidae), au Saguenay–Lac-Saint-Jean, une espèce vulnérable inféodée aux prés sourceux. *Le Naturaliste canadien* 146(1): 17-28. (in French) ["The discovery of a population of *Amphiagrion saucium* in the Parc de la Rivière-du-Moulin, an urban park in the city of Saguenay (Québec, Canada), represents a new addition to the known Odonata fauna of the lowland enclave of the Saguenay–Lac-Saint-Jean region. This population occupies a series of spring-fed marshes along the bed of an old meander exposed following a landslide during the Saguenay flood in 1996. Adults specifically use pools dominated by variegated scouring-rush (*Equisetum variegatum*). Their number declines rapidly from mid-July, which coincides with the start of the breeding season of *Lestes disjunctus* and *Sympetrum obtrusum*. At the northern limit of its range, the presence of beaver activity likely plays an important role in the population dynamics of *A. saucium*. In Québec and other inhabited regions of eastern North America, its specialized habitat, its low dispersal rate and its sensitivity to anthropogenic threats make this species vulnerable. In urban areas, it could benefit from improved stormwater management incorporating holding ponds. The abundance and phenology of all 15 species of Odonata found breeding in the study area in 2020 and 2021 are provided." (Author)] Address: Email: michel.savard@ssss.gouv.qc.ca

**21692.** Vilenica, M.; Katar, M.; Koren, T.; Štih Koren, A. (2022): Dragonfly fauna (Insecta: Odonata) of Papuk Nature Park, Croatia. *Nat. Croat.* 31(2): 351-364. (in English, with Croatian summary) ["Odonata is an amphibious insect order constituting an important link between aquatic and terrestrial habitats. Members of the group are widely used as bioindicators of freshwater habitat health. The Odonata fauna of a total of 44 freshwater habitats in the wider area of Papuk Nature Park was investigated in the spring and summer of 2017 and 2019. Twenty-three lotic and 21 lentic habitats were included in the study. We recorded 39 Odonata species, with a higher species richness (i.e. 35) documented at lentic than at lotic habitats (i.e. 16 species). *Calopteryx virgo* was the most widespread species in the area, while *Aeshna affinis*, *Epitheca bimaculata*, and *Sympetrum meridionale* were the rarest. The most frequently recorded species at lentic sites were *Platycnemis pennipes*, *Coenagrion puella*, and *Ischnura elegans*, while *Calopteryx virgo*, *Onychogomphus forcipatus*, and *Cordulegaster bidentata* were the most common species in lotic habitats. Although we recorded numerous

anthropogenic pressures in freshwater habitats in the Park, 11 recorded species are of conservation concern, which highlights the conservation value of aquatic habitats in the study area. Our results represent the first Odonata checklist of Papuk Nature Park, and as such, they are an important contribution to our knowledge of the Odonata fauna and species distribution in Croatia." (Authors)] Address: Vilenica, Marina, Faculty of Teacher Education, University of Zagreb, Dept in Petrinja, Trg Matice hrvatske 12, 44250 Petrinja, Croatia

**21693.** Zheng, H.; Mofatteh, H.; Habicsek, M.; Abdolhamid, A.; Akbarzadeh, M. (2022): Dragonfly-Inspired Wing Design Enabled by Machine Learning and Maxwell's Reciprocal Diagrams. *Research Square* 2207635: 15 pp. (in English) ["This research relates the morphology of the structural network of a dragonfly wing to the static equilibrium of forces using a geometry-based equilibrium method known as graphic statics. It then develops machine learning algorithms to generate similar structural networks for designing airplane wings using the in-plane equilibrium information of the dragonfly wing. This approach can generate a structural network in equilibrium with no prior information related to the topology or geometry of the network just by receiving the boundary geometry of the wing. This research shows that the internal network of the dragonfly wing can be assumed to be compression or tension-only system on a 2D plane. Consequently, another diagram is constructed to represent the geometric equilibrium of the forces in the initial network. This diagram is called the force diagram in the context of graphic statics. A new wing geometry is reconstructed from the force diagram, with its members sized according to the force magnitude. Both form of the network and its force diagram are used to train machine learning models for the generation of the structural network of the wing. The developed methodology is also capitalized to generate microstructural patterns inspired by other species with networks of convex polygons. We numerically and experimentally examine one application of this method in designing the cellular core, 3D printed by fused deposition modeling, of the airfoil wing, which suggests up to 25% improvement in the out-of-plane stiffness. Our findings suggest this ML-assisted approach enables leveraging million years of evolution in nature to develop the next generation of high-performance, lightweight structures." (Authors)] Address: Zheng, H., Polyhedral Structures Laboratory, Dept of Architecture, Weitzman School of Design, Univ. of Pennsylvania, Philadelphia, PA 19146, USA. Email: masouda@design.upenn.edu

## 2023

**21694.** Akamagwuna, F.C.; Odume, O.N.; Richoux, N.S. (2023): Agricultural disturbance affects taxonomic and functional diversity of Afrotropical macroinvertebrate composition in a South African river system. *Environmental and Sustainability Indicators* 18, 100251: 12 pp. (in English) ["Highlights: • We identified indicator taxa and indices of agricultural pollution. • Macroinvertebrate communities responded differentially to agricultural pollution. • *Lymnaea* spp., *L. columella*, *Appasus* spp., *Biomphalaria* spp., *Trithemis* spp. and *Oligochaeta* were tolerant to agriculture. • *Afrotiptilum* spp., *P. piscis*, *B. harrisoni*, *Potamonautes* spp. and *Pseudocloeon* spp. were sensitive to agriculture. Abstract: Developing species-level biomonitoring tools to monitor riverine systems threatened by anthropogenic pollution, including local agricultural activities in the Afrotropical region, remain a critical challenge. Here we explored the utility of taxonomic-based (diversity, richness, and composition) as well as functional-based (functional diversity) indices to examine the effects of

agricultural disturbance on macroinvertebrate communities in the Kat River, Eastern Cape Province of South Africa. We collected physicochemical parameters and macroinvertebrates from eight sites delineated into four land-use categories (highly impacted, HIC; impacted category, IC; moderately impacted, MIC and least impacted, LIC) using agricultural land cover. We recorded 70 macroinvertebrate taxa belonging to 49 families and 48 genera in the Kat River. Redundancy analysis (RDA) and Pearson correlation analysis revealed that species of Lymnaeidae, Belostomatidae, Planorbidae and Libellulidae families and class Oligochaeta were tolerant to agricultural disturbance, as they were dominant in the highly impacted sites and were significantly associated with high salinity, temperature, total dissolved solids (TDS), flow velocity and nutrients. Conversely, species of Baetidae, Caenidae and Potamonautidae were negatively associated with the highly impacted sites and high salinity, temperature, and nutrients. On the other hand, taxonomic indices showed more sensitivity to indicators of agricultural pollution than functional indices, with taxon richness, Shannon index, Simpson's index and Margalef's index declining significantly in the highly disturbed sites ( $p < 0.05$ ). They were negatively associated with high electrical conductivity, large river width, and high nitrite and nitrate concentrations; hence they were identified as indicator metrics sensitive to agricultural pollution. Overall, our study revealed that agricultural disturbance could differentially affect the structure and function of macroinvertebrates, and indicator taxonomic and functional indices were identified for long-term monitoring of rivers that drain agricultural landscapes." (Authors) Odonata are treated at family level.] Address: Akamagwuna, F.C., Dept Zoology & Entomology, Rhodes University, Makhanda, 6140, South Africa. Email addresses: f.akamagwuna@ru.ac.za

**21695.** Akindele, E.O.; Adedapo, A.M.; Fagbohun, I.R.; Akinpelu, O.T.; Aliu, O.O.; Kowobari, E.D. (2023): Macroinvertebrate metric indicators should be juxtaposed with the community conservation index as ecological tools for conservation evaluation of pristine freshwater ecosystems. *Biologia* 78: 1067-1078. (in English) ["The ecological significance of freshwater ecosystems for conservation in the temperate zone has been determined by aquatic biologists using a variety of ecological techniques. One such tool is the Community Conservation Index (CCI), which was primarily developed in Britain but is also recommended for international use. The current study intends to further test the CCI's applicability and its sensitivity in identifying freshwater systems of high conservation importance. The pristine condition of three natural monument (Arinta, Ekor, and Oowu waterfalls) streams was evaluated in this study using the macroinvertebrate metric indicators, and the results were compared with their CCIs. The relative compositions of stress-sensitive species, facultative species, functional feeding guilds (FFGs), and modes of locomotion or microhabitat preference (ML/MP) were selected as the macroinvertebrate metrics. The fauna was dominated by the taxonomic group EPT (Ephemeroptera, Plecoptera, Trichoptera), with the highest EPT-related metrics found at Oowu Waterfalls. Ironically, because a vulnerable species (i.e. *Pentaplebia stahli*) is present there, the Ekor Waterfalls, which had the lowest values for the EPT-related metrics, had the highest CCI. Although both the CCI ( $> 20$ ) and macroinvertebrate metrics suggest that the three sites had high conservation value, the CCI proved to be more goal-oriented in determining the conservation value of pristine freshwater ecosystems. In light of the findings of this study, it is recommended that the CCI be utilized in conjunction with macroinvertebrate metric indicators for studies of a similar nature, particularly in Afrotropics' protected

and pristine sites that are a potential refuge for rare and threatened species." (Authors)] Address: Akindele, E.O., Dept Zoology, Obafemi Awolowo Univ., Ile-Ife, Nigeria

**21696.** Alvarez-Alvarez, K.L.; Cortés-Hernández, M.Á.; Vásquez-Ramos, J.M.; Bota-Sierra, C.A. (2023): Libélulas del campus Barcelona de la Universidad de los Llanos, Villavieja, Colombia. *Ecosistemas* 32(1): 2442. <https://doi.org/10.7818/ECOS.2442>: 6 pp. (in Spanish, with English summary) ["We present a checklist of the odonatofauna of the Barcelona campus of the Universidad de los Llanos, all the specimens are deposited in the entomological collection of the Museo de Historia Natural Unillanos–MHNU-E. In total, 424 specimens were recorded, grouped in 7 families, 31 genera and 61 species, of which 11 species are new records for the department of Meta. This study provides evidence of the high levels of diversity in the Barcelona campus, despite the different anthropic activities that are carried out, indicating the need to implement this information in the environmental conservation policies of the Universidad de los Llanos." (Authors) 10 species are reported as new records for the department of Meta: *Argia insipida*, *Brechmorhoga praedatrix*, *Hetaerina westfalli*, *Idiataphe amazonica*, *Miathyria simplex*, *Micrathyria spuria*, *Oligoclada pachystigma*, *Orthemis schmidtii*, *Planiplax sanguiventris*, *Argia collata*.] Address: Álvarez-Álvarez, Karen Lineke, Grupo de Invest. Eval., Manejo y Conserv. Recursos Hidrobiol. y Pesqueros, Univ. de los Llanos, km 12 vía Puerto López, vereda Barcelona, Meta, Colombia. Email: karen.alvarez@unillanos.edu.co

**21697.** Amrulloh, M.F.F.; Arifin, M.; Aini, N.; Shinta, A.; Nihayah J, A.Z. (2023): Keanekaragaman Capung (Odonata) di Kawasan Sungai Gendol, Jambon, Ngemplak, Sleman, Yogyakarta Pasca Banjir Lahar Dingin Gunung Merapi. *Science and educational Journal* 1(1): 37-45. (in Indonesian) ["The research aims to determine the diversity (Odonata) in the Kali Gendol area after the cold lava flood of Mount Merapi. The research was conducted in November 2015 for  $\pm 10$  hours of total observation. The method used is the point count method, namely following the transect line accompanied by making 10 observation points with a distance between points of 50 m, at each point dragonflies are caught with insect nets at a radius of 10 m from the observation point for 15 minutes. Captured dragonflies are further identified using determination books or research journals. The calculation of the Dragonfly Diversity Index was carried out using the Shannon-Wiener ( $H'$ ) formula. The results showed that there were 13 species of dragonflies found, 6 species from 2 families of the order Anisoptera with 25 individuals and 8 species from 4 families of the Zygoptera order with 359 individuals. The highest relative abundance was *Libellago lineata* (32.81%), followed by *Pseudagrion pruinatum* (30.21%), *Copera marginipes* (20.31%). The diversity index of dragonflies obtained in the Kali Gendol area, Jambon, Ngemplak, Sleman, Yogyakarta after the cold lava flood of Mount Merapi was 0.71. This indicates that the diversity of dragonflies in the Kali Gendol area is relatively low due to several factors including biotic and abiotic factors." (Authors/Google Translate)] Address: Amrulloh, M.F.F., Biol. Education, Fac. of Education, Timor Univ., J1 Kefamenanu KM.09, Sasi, Kefamenanu, Timor Tengah Utara, Nusa Tenggara Timur, Indonesia - 85614. Email: mohamadfair@unimor.acid

**21698.** Assefa, W.W.; Eneyew, B.G.; Wondie, A. (2023): Macroinvertebrate assemblages along a gradient of physicochemical characteristics in four riverine wetlands, Upper Blue Nile basin, Northwestern Ethiopia. *Environmental Monitoring and Assessment* 195, Article number: 643: (in English)

["This study aims to examine the physicochemical variables that influence macroinvertebrate assemblages in wetlands of the Fetam River watershed. Macroinvertebrates and water quality samples were collected from 20 sampling stations across four wetlands between February and May 2022. Principal component analysis (PCA) was used to elucidate the physicochemical gradients among datasets and canonical correspondence analysis (CCA) was applied to explore the relationship between taxon assemblages and physicochemical variables. Aquatic insects such as Dytiscidae (Coleoptera), Chironomidae (Diptera), and Coenagrionidae were the most abundant families, and they comprised 20–80% of the macroinvertebrate communities. As demonstrated by cluster analysis, three site groups including slightly disturbed (SD), moderately disturbed (MD), and heavily disturbed (HD) sites were identified. PCA showed a clear separation of slightly disturbed sites from moderately and highly impacted sites. Differences in physicochemical variables, taxon richness and abundance, and Margalef diversity indices were observed along the SD to HD gradient. Phosphate concentration was an important predictor that influenced richness and diversity. The extracted two CCA axes of physicochemical variables accounted for 44% of the variability in macroinvertebrate assemblages. Nutrient concentration (nitrate, phosphate, and total phosphorus), conductivity, and turbidity were the main drivers of this variation. This suggested the need for sustainable wetland management intervention at the watershed level, ultimately benefiting invertebrate biodiversity." (Authors)] Address: Assefa, W.W., School of Fisheries & Wildlife, Dept of Biology & Blue Nile Water Institute, Bahir Dar University, Bahir Dar, Ethiopia

**21699.** Banda, K.; Ngwenya, V.; Mulema, M.; Chomba, I.; Chomba, M.; Nyambe, I. (2023): Influence of water quality on benthic macroinvertebrates in a groundwater-dependent wetland. *Frontiers in Water* 5: 1177724: 11 pp. (in English) [Zambia "Benthic invertebrates communities are frequently used as indicators of aquatic ecosystem health since many species are sensitive to pollution and abrupt changes in their environment. Limited knowledge exists on the interlinkages of hydrological dynamics, water quality and the ecological character of groundwater-dependant ecosystems especially in developing countries. In this study we assessed the sensitivity of benthic macroinvertebrates to water quality dynamics in the Barotse Floodplain, a groundwater-dependant wetland. Benthic invertebrates were sampled in the dry season using the kick-net method at selected points upstream, mid-stream and downstream. The selection of sampled points was based on an initially conducted water quality survey that characterized the wetland into mainly two water types, NaHCO<sub>3</sub> (upstream) and CaMgHCO<sub>3</sub> (downstream). Canonical Correspondence Analysis (CCA) was used to investigate the influence of water quality on macroinvertebrate subclass-taxa level. Furthermore, factor analysis was used to derive the processes propagating the observed water quality variability. It was established that the composition and diversity of macroinvertebrate communities at subclass-taxa level was influenced by effects of the wetland flood pulse, salinity (mineralisation) from groundwater input and biogeochemical processes during the expansion and contraction of the floodplain-river exchange. This study has demonstrated that biomonitoring was effective in capturing the natural processes/regimes of the environmental (such as flooding) and thus has potential to be used for monitoring extreme effects of phenomenon such as climate change. It is recommended that, the families, genus and species taxonomic levels are needed to improve the understanding of responses of the subclass-taxa level and the detection of specific contamination

signatures, to ensure wetland conservation and protection. Integrated water resources management for wetlands thus should incorporate biomonitoring conjunctively with traditional methods to ensure vital ecosystems are not compromised at the expense of maximizing the economic and social welfare of humanity." (Authors) Taxa - including "Odonata" - are treated at the order level.] Address: Kawawa Banda, Integrated Water Resource Management Centre, Dept of Geology, School of Mines, Univ. of Zambia, Lusaka, Zambia

**21700.** Bandara, Y.M.; Samarasinghe, L.V.; De Silva Ranasinghe, A.N.; Peiris, S. (2023): Diversity of dragonflies and damselflies (Order Odonata) in Bellanwila-Attidiya sanctuary at Ramsar City Colombo, Sri Lanka. *Citizen Scientist Symposium on Conservation and Ecology*: 19. (in English) ["Odonata are one of the most popular insect species in the world. About 132 species are recorded in Sri Lanka. They are widespread in ecosystems such as reservoirs, open fields, forests, and agricultural lands. Bellanwila Attidiya Sanctuary is an urban wetland in the lowland wet zone of Sri Lanka. Being located in a highly urbanized area, the level of contamination of the soil and water in this area and its impact on the biological balance is high. Odonata are considered as bio-indicators, so the study was carried out to identify the diversity of Odonata in the area. Observations were carried out in three selected 100m long transects between 0600h to 0900h in the morning, monthly for a period of six months from November 2021 to March 2022. Data acquisition was carried out with the naked eye and binoculars, and photographed where necessary. The data were analysed using Microsoft Excel software and diversity indices. During the study, 13 species of Odonata belonging to three families, including nine species of Anisoptera and four species of Zygoptera were recorded from Bellanwila Attidiya Sanctuary. In Anisoptera, Family Libellulidae was well represented by eight species, followed by Family Gomphidae (1 species). Accordingly, the overall Shannon-Weiner index for all transects is 1.66, and Simpson's index is 0.75. *Brachythemis contaminata*, *Ceragrion coromandelianum*, and *Ischnura elegans* were highest abundant, while *Tholymis tillarga*, *Urothemis signata*, and *Pseudagrion microcephalum* being the lowest. Compared with previous studies, the diversity of Odonata in the study area is low, while a few species dominate the area. The loss of diversity can be due to land and water pollution, the increase of invasive plant and animal species, and changes in natural conditions over time. The prevalence of *Brachythemis contaminata*, used as an environmental indicator, testifies to environmental pollution in the area." (Authors)] Address: Bandara, Y., Young Zoologists' Association of Sri Lanka, National Zool. Gardens, Anagarika Dharma-pala Mawatha, Dchiwala, Sri Lanka. Email: bandarabachi@gmail.com

**21701.** Beresford, N.A.; Gashchak, S.; Wood, M.D.; Barnett, C.L. (2023): Mammals in the Chernobyl Exclusion Zone's Red Forest: a motion-activated camera trap study. *Earth Syst. Sci. Data* 15: 911-920. (in English) [Also a dragonfly was captured on the motion-activated digital trap cameras. "Since the accident at the Chernobyl Nuclear Power Plant in 1986, there have been few studies published on medium and large mammals inhabiting the area from which the human population was removed (now referred to as the Chernobyl Exclusion Zone, CEZ). The dataset presented in this paper describes a motionactivated camera trap study (n D 21 cameras) conducted from September 2016 to September 2017 in the Red Forest located within the Chernobyl Exclusion Zone. The Red Forest, which is likely the most anthropogenically contaminated radioactive terrestrial

ecosystem on earth, suffered a severe wildfire in July 2016. The motion-activated trap cameras were therefore in place as the Red Forest recovered from the wildfire. A total of 45 859 images were captured, and of these 19 391 contained identifiable species or organism types (e.g. insects). A total of 14 mammal species were positively identified together with 23 species of birds (though birds were not a focus of the study). Weighted absorbed radiation dose rates were estimated for mammals across the different camera trap locations; the number of species observed did not vary with estimated dose rate. We also observed no relationship between estimated weighted absorbed radiation dose rates and the number of triggering events for the four main species observed during the study (brown hare, Eurasian elk, red deer, roe deer). The data presented will be of value to those studying wildlife within the CEZ from the perspectives of the potential effects of radiation on wildlife and also rewilding in this large, abandoned area. They may also have value in any future studies investigating the impacts of the recent Russian military action in the CEZ. The data and supporting documentation are freely available from the Environmental Information Data Centre (EIDC) under the terms and conditions of a Creative Commons Attribution (CC BY) license: <https://doi.org/10.5285/bf82cec2-5f8a-407c-bf74-f8689ca35e83> (Barnett et al., 2022a). (Authors)] Address: Beresford, N.A., UK Centre Ecology & Hydrology, Lancaster Environment Centre, Bailrigg, Lancaster, LA11 4AP, UK. Email: nab@ceh.ac.uk

**21702.** Boeiro, M.; Antunes, S.; Figueiredo, H.; Soares, A.; Lopes, A.; Monteiro, E.; Garcia-Pereira, P.; Rego, C.; Conde, J.; Borges, P.A.V.; Serrano, A.R.M. (2023): Standardised inventories of lepidopterans and odonates from Serra da Estrela Natural Park (Portugal) - setting the scene for mountain biodiversity monitoring. *Biodiversity Data Journal* 11: e99558: 22 pp. (in English) ["Background: Mountain insect biodiversity is unique, but is menaced by different drivers, particularly climate and land-use changes. In mainland Portugal, the highest mountain - Serra da Estrela - is one of the most important biodiversity hotspots, being classified as Natural Park since 1976. Many lepidopteran and odonate species, including rare and protected species, are known to occur in Serra da Estrela, but basic knowledge on their abundance, distribution and ecology is still lacking. Standardised sampling of these communities is crucial to provide valuable biological information to support short-term decision-making for conservation management, setting simultaneously the standards for mountain biodiversity monitoring aiming to tackle the effects of environmental change in the long-term. New information: This study reports novel information on lepidopteran and odonate species diversity, distribution and abundance from Serra da Estrela Natural Park (Portugal). 72 lepidopteran and 26 odonate species were sampled in this protected area, including the first findings of *Apatura ilia*, *Macromia splendens* and *Vanessa virginiensis*. New populations of *Euphydryas aurinia* and *Oxygastra curtisii*, protected species under the Habitats Directive, were found in this Natural Park and novel distribution and ecological data were collected for most species, including several rare species and subspecies [e.g. *Aeshna juncea*, *Coenonympha glycerion iphioides* Staudinger, 1870, *Cyaniris semiargus* and *Sympetrum flaveolum*. All data were collected using standardised sampling allowing its use as a baseline for biodiversity monitoring in Serra da Estrela." (Authors)] Address: Boeiro, M., Centre for Ecology, Evolution and Environmental Changes (cE3c)/Azorean Biodiversity Group, CHANGE – Global Change & Sustainability Inst., Fac. of Agricultural Sciences & Environment, Univ. of the Azores, Angra do Heroísmo, Azores, Portugal. Email: mrboeiro@fc.ul.pt

**21703.** Cadena, J.T.; Boudot, J.-P.; Kalkman, V.J.; Marshal, L. (2023): Impacts of climate change on dragonflies and damselflies in West and Central Asia. *Diversity and Distributions* 29: 912-925. (in English) ["Aim: To project the impact of climate change on dragonfly and damselfly diversity in West and Central Asia. Location: West and Central Asia. Time period: 1900–2020 data used to predict distributions in 2070 and 2100. Methods: Based on 149,001 records, distribution models were created for 159 species using MaxEnt. Environmental variables consisted of climate variables taken from BI-OCLIM, river data and soil data. The future climate data were obtained from CHELSA from CMIP6 climate models. The same variables were collected for three scenarios (SSP1-2.6, SSP3-7.0 and SSP5-8.5) of shared socioeconomic pathways for the years 2050–2070 and 2080–2100. For each scenario and period, diversity maps were prepared for six species groups: all species, Lentic, Lotic, Oriental, Afrotropical and Palaearctic species. Results: Strong declines in diversity are expected in western Turkey, the Levant and Azerbaijan, and to a lesser extent in parts of Iran and southern Central Asia. An increase is expected in eastern Turkey and at higher elevations in Central Asia with a limited increase throughout the Arabian Peninsula. In contrast to expectations, a decrease in areas with <15 species was found. Faunal composition is predicted to show strong shifts, with Palaearctic species declining and Oriental and Afrotropical species increasing. No clear difference between the trend of lentic and lotic species is found, although there are clear spatial differences in trend between these groups. Main Conclusions: Climate change will result in strong changes in diversity and distribution of dragonflies and damselflies in West and Central Asia with regional declines and increases. None of the species are predicted to go extinct based on the impact of climate change only, however, the combined impact of climate change and anthropogenic forces is likely to push some of the species to near extinction by 2100." (Authors)] Address: Kalkman, V.J., Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Email: vincent.kalkman@naturalis.nl

**21704.** Cano-Cobos, Y.; Bota-Sierra, C. A.; Mendoza-Penagos, C. (2023): Ten new records of Odonata for Colombia (Coenagrionidae, Aeshnidae). *Biota Colombiana* 24(2), e1112: 7 pp. (in English, with Spanish summary) ["We report ten new records of Odonata, including the true distribution of *Acanthagrion yungarum* Ris, 1918 in Colombia. The genus *Dolonegrion* Garrison & von Ellenrieder, 2008 is reported for the first time in the country with notes of its habitat. The other eight new records are *A. amazonicum* Sjöstedt, 1918, *A. phallicorne* Leonard, 1977, *A. truncatum* Selys, 1876, *Mesoleptobasis cantrelli* Santos, 1961, *Metaleptobasis lillianae* Daigle, 2004, *Neoneura denticulata* Williamson, 1917, *Neuraeschna maya* Belle, 1989, and *Protoneura klugi* Cowley, 1941. A map of localities and photographs of the species are provided." (Authors)] Address: Cano-Cobos, Yiselle, Lab. Biodiversidad y Genética Ambiental (BioGeA), Univ. Nac. de Avellaneda, Argentina

**21705.** Cunha Ribeiro, G.; Nel, A. (2023): A new dragonfly genus and species from the Crato Formation, with a revised phylogenetic study of the Mesozoic family Liupanshaniidae (Odonata: Aeshnoptera). *Cretaceous Research* 148, 105545: (in English) ["The fourth genus and species of the Cretaceous aeshnopteran family Liupanshaniidae discovered in the Aptian Crato Formation, is described and illustrated as *Brasilupanshania cretacica* gen. et sp. nov. Its phylogenetic position within the Liupanshaniidae is investigated using parsimony analyses, and it was found nested within the Liupanshaniidae. The Gondwanan species of the family do not



form a clade, but appears to be more closely related to various Laurasian clades, suggesting a very ancient Mesozoic diversification prior to Gondwana-Laurasia split." (Authors)] Address: Cunha Ribeiro, G., Univ. Federal Do ABC, Centro de Ciências Naturais e Humanas (CCNH), Santo André, São Paulo, Brazil. Email: guilherme.ribeiro@ufabc.edu.br

**21706.** Czechowski, P., Dubicka, A., Gajda, K., Mleczak, M., Orzechowski, R., Rychła, A. (2023): Wybrane grupy owadów (Insecta). – Selected groups of insects (Insecta). In: G. Gabrys, L. Jerzak, M. Maciantowicz (eds.). W krainie sosny. Lesny Kompleks: 296-324. (in Polish, with English summary) [Table 1. lists 56 of species of Odonata observed in the area of the Forest Park "Bory Lubuskie" together with the protection status] Address: Czechowski, P., Instytut Sportu, Turystyki i Żywności, Uniwersytet Zielonogórski, ul. Profesora Zygmunta Szafrana 1,65-516 Zielona Góra, Poland. Email: p.czechowski@wnb.uz.zgora.pl

**21707.** Das, B.K.; Kunui, A.; Nandy, S.K.; Sahoo, A.K.; Meena, D.K.; Paul, S.K.; Sarkar, U.K.; Mondal, K. (2023): Altitudinal and seasonal distribution of benthic macroinvertebrates in River Tons — a tributary of Yamuna River, Uttarakhand, India. Environmental Monitoring and Assessment 195, Article number: 902: (in English) ["The main tributary of the Yamuna, the Tons River, exhibits altitudinal changes in its macroinvertebrate community's diversity, abundance, and composition. Between May 2019 and April 2021, the study was conducted in the upper section of the river. A total of 48 numbers of taxa from 34 families and ten orders were recorded during the investigation. At this elevation of 1150 to 1287 m, the two most predominant orders are Ephemeroptera (32.9%) and Trichoptera (29.5%). During the premonsoon season, they had the lowest macroinvertebrate density (250–290 individuals/m<sup>2</sup>), and the post-monsoon season had the highest density (600–640 individuals/m<sup>2</sup>). During the post-monsoon season, the maximum larval forms (60%) of various insect orders were predominant. The findings indicated that lower altitudes (1150–1232 m) have higher macroinvertebrate abundance than higher ones. The diversity of dominance is shallow at site-I (0.0738) and strong at the site-IV during the premonsoon season (0.03837). Taxa richness, as measured by the Margalef index (D), peaked in the spring season (January to March) at 6.9 and reached its lowest point (5.74) in the premonsoon season (April to May). Only 16 taxa were discovered in site-I and site-II, but 39 taxa were discovered at low altitudes (site-IV, 1100 m) (1277–1287 m). The Tons River contains a total of 12 and 13 genera, respectively, that belong to the orders Ephemeroptera and Trichoptera, according to qualitative study of the macroinvertebrates. The current study supports the use of macroinvertebrates as bioindicator species for monitoring biodiversity and assessing the health of ecosystems." (Authors) In site-IV *Ophiogomphus* sp. ... was the most prominent species during premonsoon.] Address: Das, B.K., I-CAR-Central Inland Fisheries Research Institute, Barrackpore, Kolkata, West Bengal, 700120, India

**21708.** Datta, D.; Agarwala, B.K.; Majumder, J. (2023): Addition to the Odonata fauna of Tripura, India. Journal of Threatened Taxa 15(6): 23327-23337. (in English, with Bengali summary) ["The present study was conducted in nine different locations (forested areas and unclassified natural areas) of six administrative districts of Tripura State from March 2012 to May 2019 as part of the biodiversity exploration of the state for further addition of odonate fauna. ... Before this study, quality field data on distribution and habitat preference of odonates was scanty from most of the eastern

Himalayan range, particularly from the southern and eastern parts including the state Tripura of India. Present study is a substantial advancement of the odonate diversity of Tripura over the earlier studies (Srivastava & Sinha 2000; Majumder et al. 2014). After this study with addition of 13 species, the updated odonate fauna of Tripura state is represented by 75 species under 49 genera (28 Anisoptera genera and 21 Zygoptera genera) and nine families (4 Anisoptera and 5 Zygoptera); ... *M. montanus*, *D. walli* and *E. campioni* showed Data Deficient as per IUCN Red List categories of threatened species. Among the 13 species reported here, 12 species are endemic to India except *D. walli* as per Subramanian & Babu (2017). *P. magdalena*, *Macrogomphus montanus*, *Tetrathemis platyptera*, *Tramea limbata*, *Trithemis festiva*, *Z. petiolatum*, *Aciagrion occidentale*, *Argiocnemis rubescens*, *Mortonagrion aborense*, *Elatoneura campioni*, *Prodiasineura verticalis*, *Pseudocoptera ciliata* are endemic to India recorded from this study. Members of *T. festiva* are found commonly near streams and those of *Zygomma petiolatum* are common in shady areas surrounded by big trees and shrubs. Members of *Aciagrion occidentale*, *Argiocnemis rubescens*, *Mortonagrion aborense*, *P. ciliata* are very common in their respective study sites. However, *P. magdalena*, *M. montanus*, *T. platyptera*, *T. limbata*, *Dysphaea walli*, *E. campioni*, *P. verticalis* are found to be comparatively rare in their study sites. The documenting of the regional species pool from this part of India has benefited the inclusion of previously unrecorded odonate species, which will help future researchers in the understanding of species biology, distributional ranges, and prospective habitats." (Authors)] Address: Datta, D., Ecology and Biodiversity Laboratories, Dept of Zoology, Tripura University, Suryamaninagar, Tripura 799022, India. Email: dhimandata991@gmail.com

**21709.** Deacon, C.; Govender, S.; Samways, M.J. (2023): Overcoming biases and identifying opportunities for citizen science to contribute more to global macroinvertebrate conservation. Biodiversity and Conservation 32: 1789-1806. (in English) ["Citizen Science (CS) provides valuable data to assist professional scientists in making informed decisions on macroinvertebrate conservation. However, CS is not developed nor implemented uniformly across the globe, and there are biases and challenges in the extent that it can contribute to global macroinvertebrate conservation. Here, a meta-analysis was performed using 107 Citizen Science Projects (CSPs) to identify underlying biases related to taxon representativity, country wealth, and demographic participation. Macroinvertebrate orders with the highest representativity were Lepidoptera and Hymenoptera, accounting for 53% of represented macroinvertebrate groups. The orders Scorpiones, Parasitiformes, and Spirobolida had proportionately the highest IUCN threat statuses, but significantly lower CSP representation, indicating that these orders require more public attention. Hymenoptera, Odonata, Coleoptera, Hemiptera, Diptera and Clitellata had the highest levels of Data Deficient species, suggesting that the primary objective of CSPs targeted at these orders should be collecting distribution and abundance data to improve Red List assessments. Global distribution of CSPs was uneven and the number of CSPs per country was positively correlated with national Gross Domestic Product (GDP) and GDP per capita, suggesting that countries with relatively low GDP face challenges to successfully establish and maintain CSPs. Establishing new CSPs can assist macroinvertebrate conservation in these countries, where biodiversity levels are often high. To accommodate these biases, CSP development should adopt a bottom-up approach, in which CSPs are designed to address data gaps, and to address local

socio-economic limitations and cultural ideologies. Guidelines for such development are presented here, with emphasis on addressing societal variations and inter-disciplinary communication gaps to ensure equitable opportunities for CSP participation." (Authors)] Address: Deacon, C., Dept Conserv. Ecol. & Ento., Stellenbosch Univ., P/Bag X1, Matieland 7602, South Africa. Email: charldeacon@sun.ac.za

**21710.** El Yaagoubi, S.; El Alami, M.; Harrak, R.; Azmizem, A.; Ikssi, M.; Mansour, M.R.A. (2023): Assessment of functional feeding groups (FFG) structure of aquatic insects in North-western Rif - Morocco. *Biodiversity Data Journal* 11: e104218. doi: 10.3897/BDJ.11.e104218: 23 pp. ["The involvement of trait-based approaches is crucial for understanding spatial patterns, energy flow and matter transfer in running water systems, which requires consistent knowledge of the functional structures of aquatic communities, with the advantage of combining physical properties and behavioral mechanisms of food acquisition rather than the taxonomic group. The present study indicated how functional feeding groups may be used as a proxy for classical taxonomic evaluation, as well as the potential interest in incorporating them as indicators of anthropogenic stressors. The composition and abundance of the functional feeding groups of aquatic insects were examined from September 2021 to August 2022 along the Western Rif Region. Benthic samples were collected from nine sampling points in the studied area using a Surber sampler with a mesh size of 500 µm and a diameter of 20\*20 cm. The stations included in this work were chosen for their accessibility as well as their position on the hydrographic systems. The abundance of sampled aquatic organisms in the whole study area revealed 5,342 individuals belonging to 60 families and seven orders of aquatic insects, classified into five feeding functional groups. In terms of abundance, Collectorgatherers (Ephemeroptera and Diptera) were the most abundant trophic group at most of the sites, with a proportion of 38.47%. Predators (Coleoptera, Hemiptera and Odonata) were the second group at all sites, followed by Collector-filters, accounting for 39.53%, 28.14% and 22.37% respectively, while Scarpers and Shredders had the lowest representation across all sites with 4.16%. The high number of registered Collectors could be related to their ability to feed on a diverse range of food items compared to the remaining trophic guilds. According to the Canonical Correspondence Analysis results, physicochemical (i.e. T, pH, BOD, Cl- and NO-) and hydromorphological (i.e. current velocity and depth) variables were amongst the key predictors of shaping the functional structure of aquatic biota during this investigation. It is highly recommended to carry out suitable measures to largely attenuate anthropogenic pressures in order to preserve the integrity of freshwater bodies and their biota." (Authors)] Address: El Yaagoubi, Sara, Laboratoire Ecologie, Systématique, Conservation de la Biodiversité, LESCOB URL-CNRST N°18, FS, Abdelmalek Essaadi University, Tétouan 93000, Morocco. Email: Sara El Yaagoubi (sara.elyaagoubi@etu.uae.ac.ma)

**21711.** Elme-Tumpay, A.; Bustamante-Navarrete, A.; Zúñiga-Rivas, D.B.; Yabar-Landa, E. (2023): Catalogación de las libélulas (Insecta: Odonata) de un humedal andino en el departamento de Cusco, Perú. *Revista Chilena de Entomología* 49(2): 325-330. (in Spanish, with English summary) ["Three species of odonates represented in the Entomological Collection of the Universidad Nacional de San Antonio Abad del Cusco (ECUC) are cataloged for the Andean Wetland Lucre-Huacarpay, department of Cusco, Peru, and distribution data for these species are provided." (Authors) *Rhionaeschna absoluta* (Calvert, 1952); *Sympetrum gilvum* (Selys, 1884);

*Protallagma titicacae* (Calvert, 1909)] Address: Elme-Tumpay, A., Lab. Biodivers. y Genética Ambiental (BioGeA), Univ. Nac. de Avellaneda, Mario Bravo 1460, CP1870 Piñeyro, Avellaneda, Buenos Aires, Argentina. Email: araselm@gmail.com

**21712.** Endersby, I. (2023): Catalogue of Australian fossil dragonflies. Busybird Publishing. ISBN: 978-1-922954-22-0 (print). 123 pp. In English [Ian Endersby compiles the available information of known Australian fossil Odonata organizing it according Name of taxon, family, Repository (Museum), Registration Number(s), Original description, Etymology, Locality/Geocoordinates, Palaeocoordinates, Stratigraphic Information, Geological Age, Other References, Collector and Date, Voucher Information from Description, Comments, Figure(s) of specimens. There are 27 counterparts so, if part and counterpart are counted separately, there are 89 specimens. [61 + 27 = 89 of which 8 (4 parts; 4 counterparts) are no longer recognised as dragonflies.] Prints or pdf are available from the author.] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@pacific.net.au

**21713.** Engelhardt, E.K.; Bowler, D.E.; Hof, C. (2023): European Habitats Directive has fostered monitoring but not prevented species declines. *Conservation Letters* 16(3) e12948: 10 pp. (in English) ["Strong biodiversity declines have been reported across the European Union, especially in insects, despite conservation policy such as the Habitats Directive that aims to halt biodiversity loss. Using 50 years of observational data, we examined indicators for the goals of the Directive in terms of improving monitoring efforts and occupancy trends of butterfly and dragonfly annex species in a central European region. We quantified annual monitoring effort and used occupancy-detection models to compare species trends for 18 years before and after legal implementation of the Directive. Monitoring efforts increased after implementation, while occupancy trends both improved and deteriorated. Contrary to its main goal, the European Habitats Directive did not prevent a worsening of all annex species' occupancy trends in the studied region. While the increased monitoring efforts aid biodiversity assessments, more serious broad-scale conservation measures are needed to halt biodiversity loss across Europe." (Authors)] Address: Engelhardt, Eva Katharina, Technical University of Munich, Hans-Carl-von-Carlowitz-Platz 2, 85350 Freising-Weihenstephan, Germany. Email: e.k.engelhardt@tum.de

**21714.** Ewunkem, A.J.; Beard, A.F.; Brittany L. Justice, B.L.; Peoples, S.L.; Meixner, J.A.; Kemper, W.; Iloghalu, U.B. (2023): Honeybee wings hold antibiofouling and antimicrobial clues for improved applications in health care and industries. *AIMS Microbiology* 9(2): 332-345. (in English) ["Natural surfaces with remarkable properties and functionality have become the focus of intense research. Heretofore, the natural antimicrobial properties of insect wings have inspired research into their applications. The wings of cicadas, butterflies, dragonflies, and damselflies have evolved phenomenal anti-biofouling and antimicrobial properties. These wings are covered by periodic topography ranging from highly ordered hexagonal arrays of nanopillars to intricate "Christmas-tree" like structures with the ability to kill microbes by physically rupturing the cell membrane. In contrast, the topography of honeybee wings has received less attention. The role topography plays in antibiofouling, and antimicrobial activity of honeybee wings has never been investigated. Here, through antimicrobial and electron microscopy studies, we showed that pristine honeybee wings displayed no microbes on the wing surface. Also, the wings displayed antimicrobial properties that disrupt microbial cells and inhibit

their growth. The antimicrobial activities of the wings were extremely effective at inhibiting the growth of Gram-negative bacterial cells when compared to Gram-positive bacterial cells. The fore wing was effective at inhibiting the growth of Gram-negative bacteria compared to Gram-positive samples. Electron microscopy revealed that the wings were studded with an array of rough, sharp, and pointed pillars that were distributed on both the dorsal and ventral sides, which enhanced anti-biofouling and antimicrobial effects. Our findings demonstrate the potential benefits of incorporating honeybee wings nanopatterns into the design of antibacterial nanomaterials which can be translated into countless applications in healthcare and industry.] Address: Ewunkem, A.J., Department of Biological Sciences, Winston Salem State University, Winston-Salem, North Carolina, USA

**21715.** Faasen, T. (2023): *Tukanobasis huamantincoae*, a new species of damselfly from Peru (Odonata: Coenagrionidae), with updated generic characterization. *International Journal of Odonatology* 26: 54-62. (in English) ["*Tukanobasis huamantincoae* sp. n. (holotype male: Peru, Loreto Región [MUSM]) is described and illustrated. Males of *T. huamantincoae* can be distinguished from *T. corbeti* by the presence of postocular spots and antehumeral stripes, the absence of apical brown wingspots, smaller number of postnodals, shorter CuA, vein descending from quadrangle not forming straight line to wing margin, pterostigma in HW distally distinctly yellow, S8–10 orange/red, cerci more strongly curved and with apical blunt appendix, genital ligula with triangular lateral lobes and overall smaller body dimensions. With the description of this second species of *Tukanobasis* it becomes clear that some characters previously attributed to the genus are species-specific, requiring an updated generic characterization." (Author)] Address: Faasen, T., Ecologica, Rondven 22, 6026PX, Maarheeze, The Netherlands. Email: tim.faaesen@ecologica.eu

**21716.** Farfán-Beltrán, M.E.; Arellano-Aguilar, O.; Córdoba-Aguilar, A. (2023): Understanding the impact of physico-chemical parameters on aquatic invertebrates in Lake Chalco, Mexico City. *Revista Mexicana de Biodiversidad* 94, e944846: 14 pp. (in English, with Spanish summary) ["Many urban environments are places with strong stressors that substantially modify water quality. Although tests evaluating water quality are usually physico-chemical, including biological components can also provide relevant information. Lake Chalco, at the border between Mexico City and Estado de México, interacts with the surrounding human population. We investigated some water quality parameters and the community of macroinvertebrates living in Lake Chalco. From January to October 2017, we sampled water along the shoreline in 4 permanent areas of the lake. We recorded the NH<sub>4</sub><sup>+</sup>, NO<sub>3</sub><sup>-</sup>, NO<sub>2</sub><sup>-</sup>, total P, Zn, Cu<sup>2+</sup>, ORP, DO, TDS, conductivity, and pH. In addition, we characterized the richness, composition, and abundance of the macroinvertebrate community. There was spatial and temporal variation in physico-chemical parameters, perhaps due to the agricultural activity around the lake. Nevertheless, water quality was unable to be placed in a category of the national law. Four out of 20 macroinvertebrate RTU's significantly correlated with environmental variables. Thus, no bioindicators could be proposed. In general, lake water quality is poor, so it is not recommended for anthropic activities. Yet, the lake may be important as a center of dispersion for aquatic invertebrates." (Authors)] Only *Anax junius* is listed in an appendix of recorded taxa.] Address: Farfán-Beltrán, M.E., Univ. Nac. Autónoma de México, Inst. de Ecología, Depto de Ecol. Evol., AP 70-275, Ciudad Universitaria, 04510 Ciudad de México, Mexico

**21717.** Fekete, J.; De Knijf, G.; Dinis, M.; Padisák, J.; Boda, P.; Mizsei, E.; Várbíró, G. (2023): Winners and losers: Cordulegaster species under the pressure of climate change. *Insects* 14, 348. <https://doi.org/10.3390/insects14040348>: 15 pp. (in English) ["Simple Summary: Climate change is already affecting biodiversity and will do so even more in the future. As bioclimatic parameters, such as precipitation and temperature, directly or indirectly determine the occurrence of species, the accelerated changes in these variables could have a huge impact on species distributions. In this study, we aimed to use species distribution modeling to predict the potential distribution of the Balkan Goldenring (*Cordulegaster heros*) and the Two-Toothed Goldenring (*C. bidentata*) under recent and future climatic conditions to obtain a more accurate picture of the most suitable areas over time, thus facilitating the planning of conservation projects. According to our results, these montane species are strongly influenced by climatic variables. The models predict that the two species respond differently to changes in bioclimatic variables in the size of the potential range but similarly in range shift. Abstract: (1) Bioclimatic factors have a proven effect on species distributions in terrestrial, marine, or freshwater ecosystems. Because of anthropogenic effects, the changes in these variables are accelerated; thus, the knowledge of the impact has great importance from a conservation point of view. *C. heros* and *C. bidentata*, confined to the hilly and mountainous regions in Europe, are classified as "Near Threatened" according to the IUCN Red List. (2) Modeling the potential occurrence of both species under present and future climatic conditions provides a more accurate picture of the most suitable areas. The models were used to predict the responses of both species to 6 different climate scenarios for the year 2070. (3) We revealed which climatic and abiotic variables affect them the most and which areas are the most suitable for the species. We calculated how future climatic changes would affect the range of suitable areas for the two species. (4) According to our results, the suitable area for *C. bidentata* and *C. heros* are strongly influenced by bioclimatic variables and showed an upward shift toward high elevations. The models predict a loss of suitable area in the case of *C. bidentata* and a large gain in the case of *C. heros*." (Authors)] Address: Fekete, Judit, Research Group of Limnology, Centre of Natural Science, Univ. of Pannonia, Egyetem St. 10, 8200 Veszprém, Hungary. Email: feket.judit@ecolres.hu

**21718.** Ferreira, V.R.S.; de Resende, B.O.; Bastos, R.C.; da Brito, J.S.; de Carvalho, F.G.; Calvão, L.B.; Oliveira-Junior, J.M.B.; Neiss, U.G.; Ferreira, R.; Juen, L. (2023): Amazonian Odonata Trait Bank. *Ecology and Evolution*. 2023; 13: e10149. 21pp. (in English) ["Discussion regarding the gaps of knowledge on Odonata is common in the literature. Such gaps are even greater when dealing with basic biological data for biodiverse environments like the Amazon Rainforest. Therefore, studies that address, classify, and standardize functional traits allow the elaboration of a wide range of ecological and evolutionary hypotheses. Moreover, such endeavors aid conservation and management planning by providing a better understanding of which functional traits are filtered or favored under environmental changes. Here, our main goal was to produce a database with 68 functional traits of 218 Odonata species that occur in the Brazilian Amazon. We extracted data on behavior, habit/habitat (larvae and adults), thermoregulation, and geographic distribution from 419 literature sources classified into different research areas. Moreover, we measured 22 morphological traits of approximately 2500 adults and categorized species distributions based on approximately 40,000 geographic records for the Americas. As a result, we provided

a functional matrix and identified different functional patterns for the Odonata suborders, as well as a strong relationship between the different trait categories. For this reason, we recommend the selection of key traits that represent a set of functional variables, reducing the sampling effort. In conclusion, we detect and discuss gaps in the literature and suggest research to be developed with the present Amazonian Odonata Trait Bank (AMO-TB)." (Authors)] Address: Ferreira, V.R.S., Laboratório de Ecologia e Conservação (LABECO), Programa de Pós Graduação em Ecologia, Universidade Federal do Pará, Augusto Correa, Belém, Pará, 66075-110, Brazil. Email: victor\_rennan890@hotmail.com

**21719.** Fischer, I.; Kargl, V. (2023): Endbericht libellenkundliche Erhebung Tiergarten Schönbrunn & Schwarze Lacke 2022. Im Auftrag der: Schönbrunner Tiergarten Ges.m.b.H. it Unterstützung der: Wiener Umweltschutzabteilung (MA22): 29 pp. (in German, with English summary) ["In 2022, the dragonfly fauna was surveyed at 44 water bodies in Schönbrunn Zoo and at the Black Lake in the "Higher Federal Teaching and Research Institute for Horticulture Schönbrunn". A total of 26 dragonfly species from 8 different families could be detected, 23 of them were indigenous to the study area. 9 of the identified species (35%) were endangered species according to the Red List of Austria. The evidence of the species *Coenagrion scitulum*, classified as "endangered" in Austria, should be emphasized." (Authors/Google translate)] Address: Fischer, Iris, Leneisgasse 4-8/14/10, 1140 Wien, Austria. Email: iris.fischer@nhm-wien.ac.at

**21720.** García-Giron, J.; Bini, L.M.; Heino, J. (2023): Shortfalls in our understanding of the causes and consequences of functional and phylogenetic variation of freshwater communities across continents. *Biological Conservation* 282 (2023) 110082: 8 pp. (in English) ["Freshwater ecosystems harbour a disproportionately high biodiversity relative to their area, being also one of the most threatened ecosystem types worldwide. However, our capacity to design evidence-based conservation plans for this realm is restricted by all biodiversity shortfalls that have been recognized so far. In this context, the paucity of comparable field data and information on traits and phylogenies of freshwater organisms should be emphasized. Here, we highlight how increased knowledge could be gained and where we should aim at in research on the functional and phylogenetic features of freshwater communities. First, attempts to combine datasets from different sources should pay careful attention to data harmonization. Second, more effort should be focused on natural history observations on species habitats and life histories, providing the backbone of information for multi-trait databases. Third, fully resolved phylogenies would be required for deciphering the evolutionary relationships of freshwater organisms. Provided that these three hurdles can be overcome, conducting studies of local freshwater communities across continental spatial extents would pave the way for mapping functionally important ecosystems and evolutionarily valuable areas for the conservation of freshwater organisms and their habitats." (Authors) The study includes a reference to Odonata.] Address: García-Girón, J., Dept of Biodiversity & Environmental Management, University of León, Campus de Vegazana, 24007 León, Spain

**21721.** Garrison, M.; Tennessen, K.J. (2023): Nymph Cove: Identification to genus: Aeshnidae (Part I). *Argia* 35(1): 35-37. (in English) [Information on identification of larvae the following taxa are given: Gomphaeschna, Coryphaeschna, Basi-aeschna, Boyeria, Epiaeschna, and Nasiaeschna] Address:

Garrison, Marla, Biology Faculty McHenry County College Crystal Lake, IL, USA. E-mail: mgarriso@mcchenry.edu

**21722.** Gazanfar, T.; Khaleel, M. (2023): Occurrence and distribution of two new libellulids (Odonata: Insecta) of the Kashmir Valley, India: *Orthetrum sabina* (Drury, 1770) and *Palpopleura sexmaculata* (Fabricius, 1787). *Journal of Threatened Taxa* 15(6): 23338-23343. ["Odonates from the Kashmir Himalaya have been least studied with only 22 species reported from this region. After a long gap of 41 years, the present work forms the first observations on occurrence and distribution of two new odonates from the Kashmir valley. *O. sabina* and *P. sexmaculata* are reported for the first time from this region. The findings open new insights about phenology, distribution patterns, behaviour, and the effects of climate change on Himalayan Odonata." (Authors)] Address: Gazanfar, T., Wildlife Research and Conservation Foundation, Rajbagh, Srinagar, Kashmir, Jammu & Kashmir 190008, India. Email: gazanfar.tahir@gmail.com

**21723.** Gazzola, A.; Guadin, B.; Balestrieri, A.; Pellitteri-Rosa, D. (2023): Effects of predation risk on the sensory asymmetries and defensive strategies of *Bufo balearicus* tadpoles. *Animal Cognition* 26: 491-501. (in English) ["Lateralization consists of the differential use of bilateral organs or limbs and is well described in many taxa and in several contexts. Common ecological frameworks where it can be observed are foraging and predatory ones, with benefits related to both visual and auditory lateralization such as faster response or increasing neural processing ability. Anuran amphibians are considered relevant models for investigating lateralization, due to their great ecological variety and the possibility of easily being raised under laboratory conditions. By adopting the "rotational preference test", we used Balearic green toad tadpoles to test the effects of behavioural defensive responses triggered by different predator types (native vs alien, i.e. dragonfly larvae *Aeshna cyanea* and adult red swamp crayfish *Procambarus clarkii*) and diets (fasted vs. tadpole-fed predators) on their lateralization. We recorded tadpoles' responses to five different chemical cues: clean water (control treatment), fasted dragonfly larvae and crayfish, and tadpole-fed dragonfly larvae and crayfish. Green toad tadpoles did not show a bias in a predominant direction, although lateralization occurred at the individual level, as shown by the intensity index (LA). Perceived predation risk was the highest in tadpoles exposed to the combined chemical cues of conspecific prey and native predators, which elicited both changes in the intensity of lateralization and a marked reduction in tadpoles' activity level. Our results suggest that contextual predation threat may induce very rapid changes in the expression of asymmetries at the individual level, and might play a role as part of the complex defensive strategies adopted by prey in the attempt to escape predators." (Authors)] Address: Pellitteri-Rosa, Daniele, Dept Earth & Environ. Scienc., Univ. Pavia, Pavia, Italy. Email: daniele.pellitterirosa@unipv.it

**21724.** Glad, A.; Mallard, F. (2023): Spatial distribution modeling of Odonata in the New Aquitaine Region (France): A tool to target refuge areas under climate change. In: Walter Leal Filho, Marina Kovaleva, Fátima Alves, Ismaila Rimi Abubakar (editors) (2023): *Climate change strategies: Handling the challenges of adapting to a changing climate.* <https://doi.org/10.1007/978-3-031-28728-2>. Publisher: Springer Cham: 545-566. (in English) ["Odonata are good indicators of climate change effects due to their fast response to climatic variables such as temperature, humidity and amount of rainfall. This study aims to investigate the effect of three scenario of climate change at a regional scale (New Aquitaine region,



France) on 59 Odonata species distribution using species distribution modeling methods. Those results allow to identify species that will be the most impacted by climate change but also to evaluate changes in Odonata diversity across the study area, through the calculation of diversity indices for each climate scenario. 24–33% of the species are predicted loss between 75 and 100% of suitable habitat by 2100 under two scenarios. Predicted distribution map can be used by managers, and stakeholders to target areas to be protected in priority. Different approaches can be pursued: protections of areas that are suitable or will be suitable in the future for rare species and/or target areas that will be suitable for high number of species leading to a higher diversity. By protecting wetland suitable for diverse Odonata species, other wetland affiliated species such as amphibians, birds, and plants might benefit from those actions." (Authors)] Address: Glad, Anouk, Cistude Nature, Chemin du Moulinat, 33185 Le Haillan, France. Email: gladanouk@gmail.com

**21725.** Gong, L.; Gu, H.; Chang, Y.; Wang, Z.; Shi, B.; Lin, A.; Wu, H.; Feng, J.; Jiang, T. (2023): Seasonal variation of population and individual dietary niche in the avivorous bat, *la io*. *Oecologia* 201: 733-747. (in English) ["The variation in niche breadth can affect how species respond to environmental and resource changes. However, there is still no clear understanding of how seasonal variability in food resources impacts the variation of individual dietary diversity, thereby affecting the dynamics of a population's dietary niche breadth. Optimal foraging theory (OFT) and the niche variation hypothesis (NVH) predict that when food resources are limited, the population niche breadth will widen or narrow due to increased within-individual dietary diversity and individual specialization or reduced within-individual dietary diversity, respectively. Here, we used DNA metabarcoding to examine the composition and seasonality of diets of the avivorous bat *la io*. Furthermore, we investigated how the dietary niches changed among seasons and how the population niche breadth changed when the availability of insect resources was reduced in autumn. We found that there was differentiation in dietary niches among seasons and a low degree of overlap, and the decrease of insect resource availability and the emergence of ecological opportunities of nocturnal migratory birds might drive dietary niche shifts toward birds in *la io*. However, the population's dietary niche breadth did not broaden by increasing the within-individual dietary diversity or individual specialization, but rather became narrower by reducing dietary diversity via predation on bird resources that served as an ecological opportunity when insect resources were scarce in autumn. Our findings were consistent with the predictions of OFT, because birds as prey for bats provided extremely different resources from those of insects in size and nutritional value. Our work highlights the importance of size and quality of prey resources along with other factors (i.e., physiological, behavioral, and life-history traits) in dietary niche variation." (Authors)] Address: Jiang, T., Jilin Prov. Key Lab. Animal Resource Conserv. & Utilization, Northeast Normal Univ., 2555 Jingyue Street, Changchun, 130117, China

**21726.** Goodman, A.; Tolman, E.; Uche-Dike, R.; Abbott, J.; Breinholt, J.W.; Bybee, S.; Frandsen, P.B.; Gosnell, J.S.; Guralnick, R.; Kalkman, V.J.; Kohli, M.; Lontchi, M.F.; Lupiyaningdyah, P.; Newton, L.; Ware, J.L. (2023): Assessment of targeted enrichment locus capture across time and museums using odonate specimens. *Insect Systematics and Diversity* 7(3): 1-9. (in English) ["The use of gDNAs isolated from museum specimens for high throughput sequencing, especially targeted sequencing in the context of phylogenetics,

is a common practice. Yet, little understanding has been focused on comparing the quality of DNA and results of sequencing museum DNAs. Dragonflies and damselflies are ubiquitous in freshwater ecosystems and are commonly collected and preserved in museums collections hence their use in this study. However, the history of odonate preservation across time and museums has resulted in wide variability in the success of viable DNA extraction, necessitating an assessment of their usefulness in genetic studies. Using Anchored Hybrid Enrichment probes, we sequenced DNA from samples at 2 museums, 48 from the American Museum of Natural History (AMNH) in NYC, USA and 46 from the Naturalis Biodiversity Center (RMNH) in Leiden, Netherlands ranging from global collection localities and across a 120-year time span. We recovered at least 4 loci out of an >1,000 locus probe set for all samples, with the average capture being ~385 loci (539 loci on average when a clade of ambiguous taxa omitted). Neither specimen age nor size was a good predictor of locus capture, but recapture rates differed significantly between museums. Samples from the AMNH had lower overall locus capture than the RMNH, perhaps due to differences in specimen storage over time." (Authors)] Address: Goodman, A., Division of Invertebrate Zoology, American Museum of Natural History, New York City, NY 10024, USA. Email: agoodman@amnh.org

**21727.** Grether, G.F.; Beninde, J.; Beraut, E.; Chumchim, N.; Escalona, M.; MacDonald, Z.G.; Miller, C.; Sahasrabudhe, R.; Shedlock, A.M.; Toffelmier, E.; Shaffer, H.B. (2023): Reference genome for the American rubyspot damselfly, *Hetaerina americana*. *Journal of Heredity* 114(4): 385-394. (in English) ["Odonata play important roles in both aquatic and terrestrial food webs and can serve as sentinels of ecosystem health and predictors of population trends in other taxa. The habitat requirements and limited dispersal of lotic damselflies make them especially sensitive to habitat loss and fragmentation. As such, landscape genomic studies of these taxa can help focus conservation efforts on watersheds with high levels of genetic diversity, local adaptation, and even cryptic endemism. Here, as part of the California Conservation Genomics Project (CCGP), we report the first reference genome for *H. americana*, a species associated with springs, streams and rivers throughout California. Following the CCGP assembly pipeline, we produced two de novo genome assemblies. The primary assembly includes 1,630,044,487 base pairs, with a contig N50 of 5.4 Mb, a scaffold N50 of 86.2 Mb, and a BUSCO completeness score of 97.6%. This is the seventh Odonata genome to be made publicly available and the first for the subfamily Hetaeriniinae. This reference genome fills an important phylogenetic gap in our understanding of Odonata genome evolution, and provides a genomic resource for a host of interesting ecological, evolutionary, and conservation questions for which the rubyspot damselfly genus *Hetaerina* is an important model system." (Authors)] Address: Grether, G.F., Dept Ecol. & Evol. Biol., Univ. California Los Angeles, Los Angeles, CA 90095-1606 USA. E-mail: ggrether@g.ucla.edu

**21728.** Haglund, E.H. (2023): Rising temperatures and the damselfly shrinkage. BSc thesis, Faculty of Health, Science and Technology, Biology, Karlstads Universitet: 10 pp. (in English) ["Body size governs how temperature affects an organism. As temperature vary on different geographical scales, it mediates activity based on size. How does temperature distribute different sized individuals - and what reproductive fitness follow? This study involves the damselfly *Enallagma exulans* and field studies at lake Fayetteville, USA. By measuring body length, temperature, copulatory status, and

egg counts, I perform regression analysis to determine the fitness implications of varying temperature. Smaller individuals manage to stay active at higher temperatures, they mate at a higher rate, and they generate more eggs. My study contrasts previous research and highlights both the relevance and complexity of specificity when connecting temperature to fitness." (Author) <https://www.diva-portal.org/smash/get/diva2:1765197/FULLTEXT01.pdf> Address: not stated

**21729.** Hébert, C. (2023): Bilan des inventaires d'insectes réalisés sur l'île d'Anticosti depuis 150 ans: une biodiversité riche, mais en déclin. *Le Naturaliste canadien* 147(1): 59-75. (in French, with English summary) ["Despite its isolation, Anticosti Island has been the subject of several entomological inventories over the last 150 years. William Couper was the first to inventory Anticosti in 1872. In 1904, Joseph Schmitt reported 161 species in *Monographie de l'île d'Anticosti (golfe Saint-Laurent)*. In the 1970s, the work of Luc Jobin on the hemlock looper outbreak facilitated access to the island and naturalists or students inventoried Coleoptera, Odonata and Orthoptera. After the Earth Summit in 1992, the entomofauna of Anticosti Island was inventoried by the Canadian Forest Service, using different types of traps. During the same time period, two other inventories of Odonata were carried out by naturalists. Finally, in a master's thesis, Pierre-Marc Brousseau reported several hundred species of insects of little studied orders. To date, 1541 species are listed. Trapping data provide standardized estimates and reliable time markers for measuring insect response to environmental changes. These data suggest that the decline of insects, reported elsewhere on the planet, is also observed on Anticosti. The island offers an ideal context to study the decline of insects and establish a biodiversity monitoring network." (Author)] Address: Christian Hébert: Email: christian.hebert@nrccan-mcan.gc.ca

**21730.** Hersch, K.; Moore, M.P. (2023): Ormentation diversified faster than eco-morphology across Nearctic dragonflies. *Biological Journal of the Linnean Society* 139(1): 70-78. (in English) ["Eco-morphology and ornamentation are two phenotypic dimensions along which co-existing species often diverge, yet theory makes contrasting predictions about how these phenotypes diversify relative to each other. Some theory predicts that intense reproductive demands cause more pronounced divergence in ornamentation than in eco-morphology. Other theory predicts that preferences for condition-dependent ornamentation in species encountering divergent ecological conditions will facilitate rapid divergence in eco-morphology but not ornamentation. We evaluated these conflicting predictions in Nearctic Libelluloidea dragonflies by testing if the diversification of a condition-dependent ornament, male wing melanization, was slower and less pronounced between species than the diversification of two key eco-morphological traits, body size and relative wing size. We found that male wing melanization evolved much faster than either body size or relative wing size. Furthermore, in contrast to the patterns for either eco-morphological trait, the best-supported models of diversification in male wing melanization indicate that the majority of divergence arose between the most closely related species. These results reveal that the primary axis of divergence between closely related Libelluloidea dragonflies is ornamentation rather than eco-morphology. Our study therefore suggests that evolutionary responses to disparate reproductive demands may be fundamental to the persistence and co-existence of closely related species." (Authors)] Address: Moore, M.P., Dept Integr. Biol., Univ. Colorado

**21731.** Hu, F.-S.; Futahashi, R. (2023): Molecular phylogenetic analysis and its impact on the conservation of *Ischnura*

*rubilio* Selys, 1876 (Odonata: Coenagrionidae) in Taiwan. *International Journal of Odonatology* 26(8): 63-73. (in English) ["Although *Ischnura aurora* (Brauer, 1865) was traditionally considered to be widely distributed in Asia, the populations west of continental China have recently been identified as equivalent to *Ischnura rubilio* Selys, 1876. While the Taiwanese population has long been regarded as *I. aurora* as well, Taiwan in fact represents the distribution boundary between *I. aurora* and *I. rubilio*. Based on molecular and morphological analyses, we confirm that the "I. aurora-like" damselfly in Taiwan corresponds to *I. rubilio*. It is noteworthy that the abdominal blue spots of males in the Taiwan population have a unique phenotype compared to those found in specimens from India and continental China. According to past references and current surveys, the *I. rubilio* population in Taiwan has critically declined, with only one confirmed locality currently remaining. To maintain the Taiwanese population of *I. rubilio*, we recommend that prompt conservation measures of the habitat be implemented, focusing on the concept of the Satoyama Initiative." (Authors)] Address: Hu, F.-S., Dept Biol. Scienc., National Sun Yat-sen Univ., 70 Lienhai Rd., Kaohsiung 80424, Taiwan. Email: fangshuo\_hu@smail.nchu.edu.tw

**21732.** Jouault, J.; Nel, A. (2023): A new genus and species of the damsel-dragonfly family Burmaphlebiidae (Odonata: Epiproctophora). *Annales de la Société entomologique de France (N.S.)* 59(2): 101-106. (in English, with French summary) [Myanmar; "*Bilebullephlebia legendrei* n. gen., n. sp. is described, illustrated, and placed into the small epiproctophoran family Burmaphlebiidae. This family was previously known from the mid-Cretaceous Kachin amber by two monotypic genera, but the new fossil shows that its diversity is underestimated. At least one additional genus with an enigmatic wing venation remains to be described from the same deposit. Nothing is known about the genitalia configuration of the Burmaphlebiidae but new fossils are expected to clarify the position of the family which is currently only discussed in light of wing venation characters." (Authors)] Address: Jouault, C., Institut de Systématique, Évolution, Biodiversité (ISYEB) Muséum national d'Histoire naturelle, CNRS, Sorbonne Université, EPHE, Université des Antilles, 75005 Paris, France. Email: jouaultc0@gmail.com

**21733.** Jumaat, A.H.; Hamid, S.A.B. (2023): Monitoring heavy metal bioaccumulation in rivers using damselflies (Insecta: Odonata, Zygoptera) as biological indicator. *Sains Malaysiana* 52(2): 321-331. (in English, with Malaysian summary) ["Contamination by pollutants in freshwater ecosystem has been identified extensively in river, sediments, and freshwater biota. Pollutants may have incorporated into the sediments and accumulated in tissue of aquatic organisms which persist as difficult to degrade matter in upper trophic level. Therefore, few selected heavy metals were measured from the river sediment and tissue of Odonata larvae collected from the selected rivers using inductively coupled plasma optical emission spectrometry (ICP-OES). The results showed metals in Odonata tissue were higher than in the sediments. Mn and Zn were found in greatest concentrations both in sediment and Odonata's tissue. Biota-sediment accumulation factors (BSAF) were computed based on these data, and it was discovered that all values of BSAF for Cd, Cu, Mn, and Zn were typically high (BSAF >1). In conclusion, the rivers contamination induced accumulation of heavy metal in the river sediments and Odonata larvae (*P. microcephalum*, *P. fraseri*, and *C. marginipes*). The highest concentration value was calculated as 29.23 for Cd in the *C. marginipes*. The high concentrations of this element in the insect body tissue has shown a trace of bioaccumulation and may pose biomagnification

to organisms in the upper trophic level. The results of this study indicated that damselfly is reliable to become a bioindicator for heavy metals particularly pollution in the river." (Authors)] Address: Jumaat, A.H., School of Biol. Sciences, Univ. Sains Malaysia, 11800 Minden, Penang, Malaysia

**21734.** Keinath, S.; Onandia, G.; Griesbaum, F.; Rödel, M.O. (2023): Effects of urbanization, biotic and abiotic factors on aquatic insect diversity in urban ponds. *Frontiers in Ecology and Evolution* 11:414: 16 pp. (in English) ["Urbanization leads to drastic modifications of the terrestrial and aquatic environment. However, urban ponds may provide valuable habitats for different taxa, including aquatic insects and amphibians. We aim to understand how a set of biotic and abiotic factors influence aquatic insect diversity in 18 urban ponds in the German metropolis Berlin, one of the greenest whilst most densely populated European cities. Greenspace is important for the terrestrial stages of some aquatic insects and amphibians, providing crucial resources. Thus, greenspace was assumed to have positive effects on aquatic insect diversity, whereas built-up area was assumed to affect diversity negatively. Because some aquatic insects prey on tadpoles, their abundance and diversity were assumed to depend on tadpole abundance, which in turn, depends on other food (i.e., phytoplankton) availability in ponds. We visited the ponds twice a year, in spring and summer, and collected data on aquatic insects that are known to prey on tadpoles, tadpole abundance, phytoplankton biomass, the presence or absence of large insect predators, as well as physical-chemical parameters. We assumed higher total aquatic insect abundance, genera richness, alpha-diversity, and evenness, as well as abundance and genera richness of different aquatic insect taxonomic groups to be associated with high tadpole abundance in ponds surrounded by high amount of greenspace and low levels of built-up area. Accordingly, we expected aquatic insects to be modulated by phytoplankton biomass, the presence of newts and fish, and to be affected by ponds' abiotic conditions. Our results showed that biological interactions and abiotic water conditions override urban effects in ponds' terrestrial surroundings on aquatic insect diversity levels, whereas aquatic insects' taxonomic groups responded differently on different land-use types around ponds. We explain our findings due to different dependences and demands towards terrestrial and/or aquatic habitats by different taxonomic groups of aquatic insects, and differences in their colonization behavior." (Authors) Odonate taxa are treated at family level.] Address: Keinath, Silvia, Museum für Naturkunde, Berlin – Leibniz Institute for Evolution and Biodiversity Science, Berlin. Email: silvia.keinath@mf.n.berlin

**21735.** Khoiriyah, K.; Rahmawati, S.; Adriani, N.K.W.M.; Gustiani, A.; Ramadhana, N.; Aryanti, N.A. (2023): Karakteristik Lingkungan Sebagai Habitat Odonata di Kota Malang. *Jurnal Ilmu Lingkungan* 21(3): 565-573. (in Indonesian, with English summary) ["The growth of Malang City is so fast that it causes some green areas to decrease so that human activities increase, which impacted on the aquatic environment as a habitat for Odonata. The purpose of the study was to identify the diversity of dragonflies and the characteristics of the aquatic environment on the existence of the dragonfly community in Malang City. The study was conducted in June-August 2022 on 3 water land covers in Malang City, namely rivers, rice fields and lakes. The data collection of dragonflies and their physical and chemical environment used the point count method by random sampling scattered in the city of Malang. The results showed that dragonflies in Malang City were found to consist of 2 sub-orders with 8 families and a total of 28 species with a dragonfly diversity index in Malang

City of 2.18 which was classified as moderate. Physical and chemical environmental factors influence the diversity of dragonflies based on multiple linear regression tests." (Authors)] Address: Aryanti, N.A., Program Studi Kehutanan, Fakultas Pertanian-Peternakan, Universitas Muhammadiyah Malang Jalan Raya Tlogomas No. 246 Tlogomas, Babatan, Tegal-gondo, Kec. Lowokwaru, Kota Malang, Jawa Timur 65144, Indonesia. Email: nimalaaryanti@gmail.com

**21736.** Kiew, R.; Nuratiqah, A.R.; Zubaid, A. (2023): Malaysian Cave and Karst Conservancy Batu Caves Scientific Expedition 2019. *Malayan Nature Journal* 75(1): 1-13. (in English) [Batu Caves, an isolated limestone karst hill covering 1.1 km<sup>2</sup> and 329 m tall, lies about 11 km from Malaysia's capital city, Kuala Lumpur. It is surrounded by urbanisation and encroachment presses ever-closer to its base. It is famous for the Sri Subramaniam Swamy Temple Cave that attracts thousands of devotees and tourists. The forested buffer zone has been eliminated making the hill vulnerable to accidental fires and invasion by alien species. Although the last quarry closed in 1982 due to public pressure, the hill has yet to be given secure legal protection. However, the Expedition demonstrated that it still harbours significant biodiversity: 366 species of vascular plants, of which one is a new species, five are endemic to Batu Caves, 22 are threatened and five are probably extinct; 56 bryophytes with two liverworts that are new records for Peninsular Malaysia; 15 species of bats roost in the caves and include 6 new records; a family of dusky leaf monkeys still survive; 51 bird species were recorded including three limestone specialists; 25 reptiles including the bent-toed gecko endemic to Batu Caves; seven species of amphibians; 38 native species of snail of which eight are endemic to Batu Caves; 52 butterflies; as well as five new caves that were discovered and mapped and fossil sites recorded. Batu Caves is important as the site where orang-utan fossil teeth were first discovered in Peninsular Malaysia." (Authors)] Address: Malaysian Cave and Karst Conservancy, c/o EcoKnights, 41, Lorong Burhanuddin Helmi 11, 60000 Kuala Lumpur, Malaysia. Email: ruth@frim.gov.my

**21737.** King, B.H.; Gunathunga, P.B. (2023): Gustation across the class insecta: Body locations. *Annals of the Entomological Society of America* 116(2): 76-82. (in English) ["This review summarizes which body parts have taste function in which insect taxa. Evidence of taste by mouthparts, antennae, and tarsi is widespread. Mouthparts that commonly have taste function are the labium, including the labella and labial palps, the maxillae, including the galeae and maxillary palps, the inner surface of the labrum or clypeolabrum of chewers, and inside the precibarium/cibarium of hemipterans, which have piercing-sucking mouthparts. Tasting with mandibles has not been found, and tasting with the hypopharynx is seldom reported. Use of the antennae appears uncommon among fly species, but common among species of lepidopterans, hymenopterans, beetles, and bugs. Although tasting with legs, especially tarsi, is reported mostly for fly and lepidopteran species, there is also evidence of it for multiple species of beetles, grasshoppers, and hemipterans, and one species of a roach, an ant, and a bee. Ovipositor taste function has been supported for some species of flies, lepidopterans, hymenopterans, orthopterans, and odonates. Taste by wings has been much less studied, but has been documented in a few fly species. Taste remains unstudied for any species or any body parts of Archaeognatha, Dermaptera, Mantodea, Mecoptera, Phasmatodea, Megaloptera, Neuroptera, Phthiraptera, Psocoptera, Siphonaptera, as well as Raphidioptera, Strepsiptera, Embioptera, Notoptera, and Zoraptera. Across holometabolous insects, larvae have not often

been examined, the exception being some species of lepidoptera, flies, and beetles. Taste studies of antenna and legs are uncommon for even lepidopteran and beetle larvae." (Authors) Examples of insects with evidence regarding taste function on the abdomen, e.g., the ovipositor: *Aeshna cyanea* and *Ischnura elegans*!] Address: King, Bethia, Department of Biological Sciences, Northern Illinois University, DeKalb, IL 60115, USA. Email: bking@niu.edu

**21738.** Kosterin, O.E. (2023): Odonata of Aldan Ulus of Yakutia (East Siberia, Russia): 20 years later. International Dragonfly Fund - Report 179: 1-34. (in English) ["Odonata of the Aldan Ulus (District) of Sakha Republic (Yakutia), East Siberia, Russia, were studied in late June – early July 2022 for the second time, 20 years after the analogous previous study (Kosterin 2004a), partly in the same localities. This time 20 species were found, that is 1.5 times more than 13 species on the previous study. This increase could be an effect of the current climate amelioration but no northward range extensions were registered, all species being known in Yakutia more northerly for quite a long time. Ten species were found in 2022 but not in 2002 (*Coenagrion armatum*, *C. glaciale*, *C. hylas*, *C. lanceolatum*, *Erythromma najas*, *Aeshna crenata*, *A. juncea*, *Ophiogomphus obscurus*, *Leucorrhinia intermedia*, *Sympetrum flaveolum*), while three species were found in 2002 but not this time (*Aeshna caerulea*, *Nihonogomphus raptus* and *Somatochlora sahlbergi*). In total, 23 species have been registered in Aldan Ulus up to date. Variation in *Enallagma cyathigerum*, *Erythromma najas*, *Somatochlora exuberata* and *Leucorrhinia orientalis* is briefly discussed. Mass emergence of *O. obscurus* from the Aldan River on a rainy day (and even during showers) following a period of hot weather was observed and discussed." (Author)] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Academician Lavrentyev ave. 10, Novosibirsk, 630090, Russia; Novosibirsk State University, Pirogova str. 2, Novosibirsk, 630090, Russia. Email: kosterin@bionet.nsc.ru

**21739.** Kusumorini, A.; Rahmah, N.A.; Kinasih, I. (2023): Identification of insects visitors to oil palm flowers in the community plantation of Kalicinta village, North Kotabumi district, North Lampung regency. *Advances in Engineering Research. Proceedings of the 12th International Conference on Green Technology (ICGT 2022): 239-254.* (in English) ["Palm oil is a plantation commodity with economic value in Indonesia. Insects are one of the crucial factors influencing oil palm fruit productivity. The study aimed to identify the insect visitors on male and female palm flowers based on border habitat types and visitation times. The research was conducted in Kalicinta Village, North Kotabumi District, from August 2020 to September 2020. The study was carried out at three observation stations: SS (palm plantations bordering palm plantations), SK (palm plantations bordering rubber plantations), and (palm plantations bordering cassava plantations). Insects were collected using the swap and yellow sticky trap methods. 25 morphospecies and eight insect orders visited oil palm flowers. The result showed that oil palm flowers were visited by 25 morphospecies and eight insect orders. These orders were Coleoptera, Dermaptera, Diptera, Hymenoptera, Hemiptera, Lepidoptera, Odonata [*Neurothemis*, *Orthemis* (sic!)], and Mantodea. Male palm flowers were visited by 25 morphospecies of insects, while female palm flowers were visited by only 5 morphospecies. *Elaeidobius* sp. (Coleoptera: Curculionidae) was the most common species to visit both male and female flowers, followed by *Apis* sp. (Hymenoptera: Apidae), and *Camponotus* sp. (Hymenoptera: Formicidae) respectively. Most insects visit in the morning and the habitat of palm bordering palm is the most

visited." (Authors)] Address: Kusumorini, Astuti, Department of Biology, Faculty of Science and Technology, The State of Islamic University of Sunan Gunung Djati of Bandung, Bandung, West Java, Indonesia. Email: astuti@uinsgd.ac.id

**21740.** Kutasi, K.; Kolozsvári, I. (2023): Comparative study of the dragonfly habitats around Tisobikeny. 6th International conference of young scientists. *Kharkiv Forum of Natural Sciences, May 18-19, 2023: 332-334.* (in English) [19 odonate species including *Coenagrion scitulum* and *Aeshna viridis* are documented. "The results show that the Batar-Magosliget section is more species-rich than the Ukrainian part, according to the literature. The Batar is a small lowland river with a slow flow, so larvae of dragonfly species with a preference for a slight current and a higher tolerance for stagnant water are found. Stagnant water species are present in the fishpond in the Tisobikeny. In the Tisza, mainly reophilic species with a more specialised tolerance are found in smaller numbers of species and individuals. The dragonfly fauna of all three water types is very different." (Authors)] Address: Kutasi, K., Ferenc Rákóczi II Transcarpathian Hungarian College of Higher Education, Ukraine. Email: kutasi.kamilla.b18bi@kmf.org.ua

**21741.** Landmann, A. (2023): Die Libellenfauna (Odonata) eines Wildflusstales in den Alpen (Tiroler Lechtal) – mit Bemerkungen zum Erstnachweis von *Gomphus pulchellus* in Tirol. *Entomologica Austriaca 30: 67-84.* (in German, with English summary) ["The dragonfly fauna (Odonata) of a wild-river valley in the Alps (Tyrolean Lech) – with remarks on the 'first' record of *G. pulchellus* in Tyrol. The Tyrolean Lech-river valley is widely regarded one of the least impaired river ecosystems of the Alps. In the Lech region some river stretches indeed were preserved where semi-natural braided floodplains predominate and where a high diversity of spring waters, bogs, ponds and running as well as stagnant riverine water bodies can be found offering attractive habitats for Odonata. This paper illustrates the regional diversity and distribution patterns of Odonata in the river valley. So far, 38 species (14 Zygoptera, 24 Anisoptera) were recorded along a 60km long stretch of the Lech at 800–1,200m a.s.l. The species list not only includes *Coenagrion hylas* as a special odonatological gem, whose only larger self-sustaining European populations inhabit the valley, but also a high proportion of lotic or rheophilic species bound to landscapes with a network of undisturbed or near-natural running waters. This e.g. includes *Ischnura pumilio*, *Cordulegaster bidentata* and *Orthetrum coerulescens* which are listed in higher threat categories in several Red Lists of the Alpine countries. In addition, the data at hand indicate that *Gomphus pulchellus* – that recently was reported as new for the Tyrolean Odonata fauna based on a record from 2020 has already been observed 17 years earlier in the upper part of the Lech valley." (Author)] Address: Landmann, A., Institut für Naturkunde & Ökologie, Karl Kapfererstrasse 3, A-6020 Innsbruck, Austria. E-Mail: office@arminlandmann.at

**21742.** Landmann, T.; Schmitt, M.; Ekim, B.; Villinger, J.; Ashiono, F.; Habel, J.C.; Tonnang, H.E.Z. (2023): Insect diversity is a good indicator of biodiversity status in Africa. *Communications Earth & Environment 4( 234): 11 pp.* (in English) ["Reliable metrics to monitor human impacts on biodiversity are essential for informing conservation policy. As insects are indicators of global change, whose declines profoundly affect ecosystems, insect diversity may predict biodiversity status. Here we present an unbiased and straightforward biodiversity status metric based on insect diversity (richness) and landscape naturalness. Insect diversity was estimated using spatially explicit earth observation data and insect species



assemblages across microhabitats in two agro-ecological zones in Africa. Landscape naturalness was estimated using various human impact factors. Biodiversity status values differed considerably ( $p < 0.05$ ) between protected and non-protected areas, while protected areas, regardless of agro-ecology, shared similar biodiversity status values. The metric is consistent when using richness from different indicator taxa (i.e., stingless bees, butterflies, dragonflies) and independent data for landscape naturalness. Our biodiversity status metric is applicable to data-scarce environments and practical for conservation actions and reporting the status of biodiversity targets." (Authors)] Address: Landmann, T., International Centre of Insect Physiology and Ecology, Nairobi, Kenya. Email: tlandmann@icipe.org

**21743.** Lemmers, P.; Aukema, R.; Crombaghs, B.H.J.M.; Hermans, J.T. (2023): Impact of activities of the beaver (*Castor fiber*) on the sustainable conservation of Brook lamprey (*Lampetra planeri*) and Golden-ringed dragonfly (*Cordulegaster boltonii*) in the Roode Beek brook (Meinweg area). *natuurhistorisch maandblad* 112(3): 93-101. (in Dutch, with English summary) ["The Roode Beek brook in the province of Limburg is known as one of the most natural brooks in the Netherlands. In 2012, the first sightings of Beavers were recorded along this brook. There were concerns that the habitats of Brook lamprey and *C. boltonii*, which in the vulnerable developmental stage largely depend on sand and soil banks in fastflowing streams, would be affected or could even disappear. Between 2018 and 2021, using a specially designed rake, silt and sand accumulations and detritus in nine sections of the brook were surveyed for the presence of Brook lamprey larvae and *C. boltonii* larvae. Larvae of both species were found in similar habitats in shallow sections of the brook (depth < 50 cm). The established larval densities of Brook lamprey in the study area were low despite the presence of abundant habitat. Further analysis of previous observations and the literature revealed that the density in the study area has probably always been low and that the species mainly occurs in more downstream parts of the Roode Beek. In contrast, more larvae of *C. boltonii* were found when more upstream parts of the brook were sampled. The distribution pattern and age structure of these larvae were consistent with the outcomes of a similar survey conducted in 2007, before the arrival of the Beaver. The presence and influence of smaller dams does not seem to hinder *C. boltonii*, as larvae of all length classes were found upstream and downstream of small dams. However, impoundment by the large dam at St. Ludwig does seem to affect larval distribution locally, an effect seen in a stretch of about 50 m of the brook. The effect is caused by increasing water depth, lack of flow and associated increased silt sedimentation, which are direct results of the large dam. Larvae were found again where appreciable water flow returned and silt sedimentation was significantly decreased. Based on the present study, it is estimated that the sustainable conservation of both Brook lamprey and *C. boltonii* in the Roode Beek is not affected by Beaver activities." (Authors)] Address: Hermans, J.T., Hertestraat 21, 6067 ER Linne, The Netherlands

**21744.** Li, Z.; Cheng, Y.; Chen, J.; Xu, W.; Ma, W.; Li, S.; Du, E. (2023): Widely targeted HPLC-MS/MS metabolomics analysis reveals natural metabolic insights in insects. *Metabolites* 2023, 13(6), 735; <https://doi.org/10.3390/metabo13060735>: 17 pp. (in English) ["Insect metabolites play vital roles in regulating the physiology, behavior, and numerous adaptations of insects, which has contributed to them becoming the largest class of Animalia. However, systematic metabolomics within the insects is still unclear. The present

study performed a widely targeted metabolomics analysis based on the HPLC-MS/MS technology to construct a novel integrated metabolic database presenting comprehensive multimetabolite profiles from nine insect species across three metamorphosis types. A total of 1442 metabolites were identified, including amino acids and their metabolites, organic acids and their derivatives, fatty acids (FAs), glycerophospholipids (GPs), nucleotides and their metabolites, and benzene and its substituted derivatives. Among them, 622 metabolites were used to generate a 0 and 1 matrix based on their presence or absence, and these metabolites were enriched in arachidonic acid metabolism, tyrosine metabolism, phenylalanine metabolism, and insect hormone biosynthesis pathways. Our study revealed that there is a high coincidence between the evolutionary relationships of the species and the hierarchical cluster based on the types of metabolites, while the quantities of the metabolites show a high diversity among species. The metabolome of the nine representative insects provides an important platform for implementing the analysis of insect systemic metabolites and biological events at the metabolic level. ... Nine species representing three metamorphosis types were used in this study, as shown in Figure 1, including one ametabolous species (*Thermobia domestica*), four hemimetabolous species (*Pantala flavecens*, *Calopteryx splendens*, *Locusta migratoria*, *Periplaneta americana*, *Apolygus lucorum*), and four holometabolous species (*Apis mellifera*, *Tenebrio molitor*, *Bombyx mori*, *Drosophila melanogaster*)." (Authors)] Address: Li, Z., Guangdong Provincial Key Lab. Insect Developmental Biol. & Applied Tech., Inst. Insect Science & Technology & School of Life Sciences, South China Normal Univ., Guangzhou 510631, China. Email: 2020010172@m.scnu.edu.cn

**21745.** Liao, J.; Lin, B.-Q.; Wang, H.-J.; Wu, Z.-Q. (2023): Genetic structural variation in mitochondrial genomes of four species of Gomphidae and their phylogenetic implications. *Gene Reports* 33, 101808: (in English) ["The Gomphids are the most diverse and important group in the (sub)tropics. Currently, research on Gomphids is mainly focused on fieldwork and morphological classification, however, the molecular-based study is still insufficient. Here, complete mitogenomes of *Nihonogomphus semanticus* (15,368bp), *Nihonogomphus lieftincki* (15,342bp), *Asiagomphus septimus* (15,334bp), and *Davidius fruhstorferi* (15,682bp) were obtained by high-throughput sequencing. Of the 37 genes conserved in order and orientation, 9 protein-coding genes (PCGs) and 14 tRNA genes were encoded by heavy strand, while the rest were encoded by light strand. The secondary structures of the protein encoded by 13 PCGs showed a general trend of proportion: a helix > random coil > extended strand >  $\beta$  turn. The *trnS1* gene lacked a dihydrouridine arm and was thus reduced to a loop. The 3D structures of the protein encoded by 13 PCGs showed moderate to high levels of consistency among species. Phylogenetic analysis showed that Gomphids were well-supported monophyletic group, both BI and ML tree showed clear phylogenetic relationships in known Gomphidae: (((D. lunatus + D. fruhstorferi) + A. septimus) + ((N. semanticus + N. lieftincki) + *Ophiogomphus cecilia*)) + *Ictinogomphus* sp MT 2014). Our study provides insight into the gene or their protein structure features of the family Gomphidae mitogenomes and lays the foundation for further phylogenetic studies." (Authors)] Address: Liao, J., Fisheries College, Guangdong Ocean University, Zhanjiang 524025, China. Email: liaojian05@outlook.com

**21746.** Lichkovskaya, I.Yu.; Krapivnikova, O.V.; Merkulova, M.A.; Babkina, N.G. (2023): Macrozoobenthos of Otoka Lake in Dubki Lake Natural landmark surrounding (The Ryazan

Region). Problems of regional ecology, Biological Sciences 2/2023 (DOI: 10.24412/1728-323X-2023-2-22-25): 22-25. (in Russian, with English summary) ["For the first time, the results of an investigation of the macrozoobenthos of Otoka Lake, bordering the regional natural landmark of "Dubki" (the Ryazan Region), are presented. The species composition of the lake currently includes 67 species and supra-specific taxa, with a predominance of molluscs (38 %). Two larvae of *Aeshna viridis*, which are included in the Red Data Book of the Ryazan Region, were found in the clumps of *Stratiotes aloides*, on the bottom. Based on the analysis of a number of quantitative data, it was found that the best conditions for bottom organisms were on soils made of sand and plant residues. On average, communities of different soils on Otoka lake tend to have an equal abundance of all species ( $E = 0.79$ ). The most balanced are the complexes of bottom organisms on the soils of sand and silt ( $E = 0.98$ ) of sand and plant residues ( $E = 0.96$ ). According to the results of the bio-indication study, in autumn for most of the biotopes of the lake, the water quality corresponds to the alpha-mesosaprobic zone." (Authors) 10 odonate species are listed, including *Coenagrion mercuriale* which is a misidentification.] Address: Lichkovskaya, I.Yu., FSBD "Oka State Nature Biosphere Reserve", Brykin Bor, Russia. Email: heteroptera@yandex.ru

**21747.** Lövei, G.L.; Ferrante, M.; Möller, D.; Möller, G.; Vincze, E. (2023): The need for a (non-destructive) method revolution in entomology. *Biological Conservation* 282, 110075: 5 pp. (in English) ["Highlights: • Arthropod decline triggered arthropod conservation efforts. • Traditional entomological methods often result in killing study subjects. • Currently, lethal methods dominate in tropical and multiple-species focus studies. • Dragonflies, grasshoppers and butterflies are often studied by non-lethal methods. • Entomologists should promote non-lethal methods, especially in conservation research. Abstract: There are worrying signs that arthropods are in decline both in density and diversity. This threatens global biodiversity as well as the ecosystem services provided by arthropods. Nonetheless, entomological research, even when studying arthropods with a conservation focus, frequently uses lethal methods. We analysed 1029 articles published in the major biological conservation journals between 2014 and 2020 and found that, while single-species-focused studies used more non-lethal than lethal methods (76.3 % vs. 23.7 %, respectively), the opposite was true for multiple-species ones (24.0 % vs. 76.0 %). In tropical regions, 74.6 % of studies used lethal methods vs. 18.5 % non-lethal ones. Of the major orders, Odonata, Lepidoptera and Orthoptera were generally studied using non-lethal methods (88.1 %, 80.7 %, and 70.8 %, respectively) in non-tropical regions, while in the tropics, only Lepidoptera were frequently (51.9 %) studied by such methods. We argue that even if the evidence for arthropod decline were uncertain, and even if research would not add much to the overall level of mortality, entomologists should be showing an example. If research on invertebrates continues to be ethically blind, entomologists risk losing public support for conserving arthropod diversity." (Authors)] Address: Lövei, G.L., Dept Agroecol., Aarhus Univ., Flakkebjerg Research Centre, 4200 Slagelse, Denmark. Email: gabor.lovei@agro.au.dk

**21748.** Lu, K.; Shen, S.; Miller, L.M.; Huang, X. (2023): Golden ratio in venation patterns of dragonfly wings. *Scientific Reports* 13(7820): 6 pp. (in English) ["The vein pattern in insect wings allows this lightweight structure to carry multiple biological functions. Here, an investigation of the angular distribution of the vein struts in dragonfly wings revealed that the golden angle or golden ratio dominates the venation

patterns. We find that the golden angle dominates the intervein angles in regions where thin veins and membranes demand strength reinforcement. A golden ratio partition method has thus been developed that explains a set of preferred intervein angles in distorted polygon-shaped venation cells throughout the venation pattern in dragonfly wings. These observations provide new evidence that the wing structure is spatially optimized, by the golden rule in nature, for supporting biomechanical functions of dragonfly wings." (Authors)] Address: Huang, X., National Synchrotron Light Source II, Brookhaven Nat. Lab., Upton, NY, 11973, USA

**21749.** Marcellino, B.J.L. (2023): Behavioural responses as a function of temperature and interactions between behaviour and melanin ornaments in dragonflies. MSc. thesis, Ecology & Evolutionary Biology, University of Toronto, Canada: VII + 50 pp. (in English) ["Sexual selection creates and maintains elaborate phenotypes despite costs imposed by natural selection. This creates a trade-off between natural and sexual selection, whereby organisms can display traits that decrease survivorship if they sufficiently improve reproductive success. In many species of odonates males possess ornaments, formed by melanin, which increase their mating success, but also increase body temperature, potentially imposing novel trade-offs in a warming climate. Using a combination of comparative and experimental methods, I examined the effects of temperature on mating and thermoregulatory behaviour in *Celtis elisa* and *Leucorrhinia intacta*. In *C. elisa*, I found evidence for this trade-off with positive associations between temperature and time spent thermoregulating and a negative association with time spent mating. In *L. intacta*, only thermoregulatory behaviour was positively associated with temperature. My results suggest that some dragonflies will have reduced time windows for mating as climate change continues." (Author) <https://tspace.library.utoronto.ca/handle/1807/128174>] Address: Marcellino, Bianca, Graduate Dept Ecology & Evolutionary Biology Univ. Toronto, Canada

**21750.** Marshall, C. (2023): Damselflies, climate change, and microbiomes. MSc thesis, Biology Education Centre and Department of Animal Ecology, Uppsala University. 18 pp. (in English) ["Climate change is expected to increase temperatures across the world. These changes can have a profound negative impact on biodiversity, threatening endangered species under pressure from anthropogenic sources (e.g., burning fossil fuels, deforestation, etc.). Gut microbiomes have become a focus of research in wildlife due to the role they play in the health and fitness of an organism. Increased temperatures have been shown to disrupt microbial communities, limiting the adaptive potential of species confronted with these changes. In this study damselflies were used to experimentally study the effect different temperature regimes and detritus levels have on the abundance of different microbial communities. A metabarcoding technique using the 16S rRNA gene to extract, amplify, and identify bacterial communities within damselfly guts. Species of bacteria that were once difficult to identify via culturing are now easily classified with modern molecular and bioinformatic methods. The study found that temperature, and to a lesser extent grass, had a significant effect on damselfly larva microbiome. The overall composition of the damselfly microbiome shifted over time. The proportion of the microbiome represented by the taxa Proteobacteria increased due to temperature, aligning with previous research on invertebrates. These findings suggest that damselfly microbiomes have a resident microbiome which is sensitive to environmental conditions and should be considered when assessing threats to biodiversity." (Author)] Address: not stated

**21751.** Masina, F.M.; Wasserman, R.J.; Wu, N.; Mungenge, C.P.; Dondofema, F.; Keates, C.; Shikwambana, P.; Dalu, T. (2023): Macroinvertebrate diversity in relationship to limnochemistry in an Austral semi-arid transboundary aquifer region pan system. *Science of The Total Environment* 878, 163161: (in English) ["Highlights: • All metals and nutrients were significant seasonal with the exception for P and K concentrations. • Toxic risk index values indicated low toxic risk across all seasons. • 41 macroinvertebrates species belonging to 7 orders were identified. • First two CCA axes accounted for 76.1 % of the total explained fitted cumulative variance. • Understanding relationships between macroinvertebrates and their environment is crucial in understanding how ecosystem functions. Abstract: Pan-wetland systems are one of the world's essential and productive ecosystems and are considered important, unique and complex ecosystems. Anthropogenic activities around the temporary pans in the Khakhea Bray Transboundary Aquifer region [Botswana/South Africa] are increasingly becoming a big issue of concern as this may affect pan biodiversity. The study specifically aimed to investigate spatial and temporal distributions of metal and nutrient concentrations within the pans in relation to land use, identify potential pollution sources in this water-scarce region, and assess macroinvertebrate diversity and distribution in relation to pan limnochemistry using a combination of multivariate analyses from 10 pans across three seasons. Environmental and anthropogenic variables influence water quality and the distribution of metals concentration in Khakhea-Bray pan systems. Anthropogenic activities such as animal grazing, infrastructure degradation, water withdrawal and littering have resulted in poor water quality within temporary pans, which may strongly influence macroinvertebrate diversity and distribution. 41 macroinvertebrate species from 5 insect orders (i.e., Coleoptera, Hemiptera, Odonata, Ephemeroptera, Diptera), Crustacea and Mollusca were identified. Significant differences were observed across the seasons for macroinvertebrate taxa, with high and low species richness being observed in autumn and winter, respectively. Water (i.e., temperature, dissolved oxygen, pH, salinity, conductivity), physical (i.e., stone composition) and sediment (i.e., sulphur, sodium) parameters were found to have a significant impact on the macroinvertebrate communities. Therefore, understanding the relationships between macroinvertebrates and their environment is crucial in understanding how the ecosystem taxa are structured and is vital for informing conservation managers on how to properly manage and protect these systems from further degradation." (Authors)] Address: Aquatic Systems Research Group, School of Biology and Environmental Sciences, University of Mpumalanga, Nelspruit 1200, South Africa. Email: dalutatenda@yahoo.co.uk

**21752.** Mejillón Vargas, D.S.; Suárez Vera, K.P. (2023): Estado poblacional de Lepidópteros y Odonatos presentes en un fragmento del bosque húmedo tropical Olón, provincia de Santa Elena, Ecuador. *La Libertad. UPSE, Matriz. Facultad de Ciencias del Mar*: 94 pp. (in Spanish) ["Ecuador is a megadiverse country with characteristics of presenting ideal ecosystems for many species, including insects, this research work was developed during the dry season from August to December 2022, which aimed to determine the diversity of Odonata and Lepidoptera through the identification and population count of species present in three transects placed on the Las Cascades trail, providing information on two bioindicator groups of the tropical humid forest Olón, Santa Elena. Two capture methods were applied: entomological net and V.S.R traps and they were established with 5 traps per transect. With the implemented methodology, a total of

897 individuals of the Order Lepidoptera and 351 individuals of the Order Odonata were registered. The registered lepidopteran community is made up of 6 families consisting of Nymphalidae, Hesperidae, Papilionidae, Lycaenidae, Pieridae and Riodinidae, the first being the most abundant and diverse. The registered Odonata belong to five families made up of Aeshnidae, Libellulidae, Coenagrionidae, Calopterygidae and Heteragrionidae, the third being the most diverse group and showing the most abundant genus *Argia* (121 ind), however, the diversity obtained from the Shannon indices (3.28 bit) and Margalef (6.12 bit) was high in the case of Lepidoptera and for Odonata it was medium (2.00 bit) and low (1.75 bit) respectively. The presence and absence of organisms was taken into account to obtain the Jaccard similarity indices, which were relatively high (0.6), highlighting the similarity of transect 1 and 2 for both orders. This work aims to provide information on Lepidoptera and odonates present in Ecuador for future research." (Authors/Google Translate) the following taxa are listed: *Rhionaeschna psilus*, *Erythrodiplax umbrata*, *E. fusca*, *Brechmorhoga praecox*, *Erythemis vesiculosa*, *Macrothemis* sp., *Orthemis* sp., *Argia inculta*, *A. acridens*, *Leptobasis linda*, *Ischnura* sp., *Acanthagrion* sp., *Telebasis brevis*, *Hetaerina occisa*, *H. cooki*] Address: <https://repositorio.upse.edu.ec/bitstream/46000/9669/4/UPSE-TBI-2023-0035.pdf>

**21753.** Mochon, A.; Savard, M. (2023): Premier inventaire de l'odonatofaune du parc national du Bic et liste annotée des espèces de la région administrative du Bas-Saint-Laurent, Québec (Insecta: Odonata). *Le Naturaliste canadien* 147(2): 3-56. (in French, with English summary) ["The first comprehensive inventory of dragonflies in the Parc national du Bic (Bic National Park, Québec, Canada) was conducted between 2021 and 2022. Fifty species were identified from 6 biotopes: a fast-flowing river, a recent pond in a restored exploited peatland, a shallow kettle lake, a salt marsh, a beaver pond, and a set of 4 small forest ponds. The discovery of an exuviae of *Libellula pulchella* in the park provided the first proof that this species can complete its development at this latitude. The update to the list of odonates occurring in the Bas-Saint-Laurent region added 38 species, bringing the total to 81. Global warming seems to have favoured the northward expansion of *Aeshna constricta*, *Leucorrhinia intacta* and of *Plathemis lydia* in the province of Québec." (Authors)] Address: Savard, M.; E-mail: michel.savard@ssss.gouv.qc.ca

**21754.** Mogali, S.; Saidapur, S.; Shanbhag, B. (2023): Behavioral responses of tadpoles of *Clinotarsus curtipes* (Anura: Ranidae) to odor cues of dragonfly larvae. *Phyllomedusa: Journal of Herpetology* 22(1): 11-20. (in English, with Portuguese summary) ["In aquatic environments, many prey animals, including anuran larvae, predominantly use chemical cues to assess predation risk. In such systems, a variety of chemical cues (e.g., kairomones, alarm, dietary) affect the behavioral responses of the prey tadpoles. Many anuran tadpoles are able to discriminate different chemical cues and exhibit differential antipredator behavioral responses according to the perceived risk. The behavioral responses of tadpoles of *Clinotarsus curtipes* to predatory larvae of the dragonfly *Pantala flavescens* were studied in the laboratory. The predator's kairomones (water conditioned by a starved predator) or its diet-derived metabolites released in excreta of a predator after consumption of conspecific (*C. curtipes*) or heterogeneric (*Indosylvirana temporalis*) prey tadpoles were used to simulate predation threat. The tadpoles of *C. curtipes* had no behavioral response to predator kairomones. However, the tadpoles showed antipredator behavioral responses i.e., reduced swimming movements and overall time

spent swimming, and had a higher burst speed in response to water-borne cues released from the excreta of predators fed both conspecific and heterogeneric prey. The antipredator behavioral responses of tadpoles were most intense in response to cues of predators fed on conspecific prey. The findings of the present study show that tadpoles of *C. curtipes* are capable of assessing levels of predation threat and modulating the intensity of their defense behavior in accordance with the perceived threat." (Authors)] Address: Shanbhag, B., Dept of Marine Biology, Karnatak University Post-Graduate Centre, Kodibag, Karwar-581 303, Karnataka, India. Email: bhagyashrishanbhag@gmail.com

**21755.** Moi, D.; Barrios, M.; Giancarlo, B.; Tesitore, G.; Burwood, M.; Romero, G.Q.; Mormul, R.P.; Kratina, P.; Juen, L.; Michelan, T.S.; Montag, L.F.A.; Cruz, G.M.; García-Girón, J.; Heino, J.; Hughes, R.M.; Figueiredo, B.R.S.; Teixeira de Mello, F. (2023): Human land-uses homogenize stream assemblages and reduce animal biomass production. *Journal of Animal Ecology* 92(6): 1176-1189. (in English) ["1. Human land-use change is a major threat to natural ecosystems worldwide. Nonetheless, the effects of human land-uses on the structure of plant and animal assemblages and their functional characteristics need to be better understood. Furthermore, the pathways by which human land uses affect ecosystem functions, such as biomass production, still need to be clarified. 2. We compiled a unique dataset of fish, arthropod and macrophyte assemblages from 61 stream ecosystems in two Neotropical biomes: Amazonian rainforest and Uruguayan grasslands. We then tested how the cover of agriculture, pasture, urbanization and afforestation affected the taxonomic richness and functional diversity of those three species assemblages, and the consequences of these effects for animal biomass production. Single trait categories and functional diversity were evaluated, combining recruitment and life-history, resource and habitat-use, and body size. 3. The effects of intensive human land-uses on taxonomic and functional diversities were as strong as other drivers known to affect biodiversity, such as local climate and environmental factors. In both biomes, the taxonomic richness and functional diversity of animal and macrophyte assemblages decreased with increasing cover of agriculture, pasture, and urbanization. Human land-uses were associated with functional homogenization of both animal and macrophyte assemblages. Human land-uses reduced animal biomass through direct and indirect pathways mediated by declines in taxonomic and functional diversities. 4. Our findings indicate that converting natural ecosystems to supply human demands results in species loss and trait homogenization across multiple biotic assemblages, ultimately reducing animal biomass production in streams." (Authors)] Address: Moi, D.A., Graduate Program in Ecology of Inland Water Ecosystems (PEA), Dept of Biology (DBI), Center of Biological Sciences (CCB), State University of Maringá (UEM), Brazil. Email: dieisonandrebv@outlook.com

**21756.** Molineri, C.; Rodríguez, J.S.; Leiva, M.; Márquez, A. (2023): Diagnoses and key for the larvae of *Progomphus* Selys, 1854 from Argentina (Anisoptera: Gomphidae), with first larval descriptions for *P. aberrans* Belle, 1973 and *P. kimminsi* Belle, 1973. *Zootaxa* 5297(2): 239-259. (in English) ["Ten species of *Progomphus* Selys, 1854 are known to occur in Argentina. The larval stages of only four of them are described. We here add the larval descriptions of two species: *P. aberrans* and *P. kimminsi*, and diagnose and illustrate important characters for the remaining species known at the larval stage in Argentina: *P. complicatus*, *P. joergenseni*, *P. lepidus* and *P. phyllochromus*. New geographical records for

these species are presented, including new records for *P. kimminsi* in Bolivia, and new provincial records in Argentina: *P. aberrans* and *P. joergenseni* in San Luis, and *P. kimminsi* in Santiago del Estero. A key to distinguish the larval stage of Argentinean species is proposed." (Authors)] Address: Molineri, C., Instituto de Biodiversidad Neotropical, CONICET-UNT (Consejo Nacional de Investigaciones Científicas y Técnicas—Universidad Nacional de Tucumán), Facultad de Ciencias Naturales e Instituto M. Lillo, Tucumán, Argentina. Email: carlosmolineri@gmail.com

**21757.** Molineri, C.; Márquez, J.; Rodríguez, J.; Emmerich, D.; Lozano, F. (2023): Exploring the Odonata diversity in the Chaco ecoregion (Northern Argentina). *International Dragonfly Fund - Report 178*: 1-37. (in English) ["During 2021 and 2022, 33 localities mostly in the Dry Chaco ecoregion from Argentina were assessed for Odonata diversity. We registered 84 species, about 29% of the total richness known for Argentina. We reared 14 species from larva to adult, two of which are still unknown at the larval stage (*Progomphus aberrans* Belle and *P. kimminsi* Belle). We also report 13 new provincial records: *Orthemis aequilibris* Calvert, *Brachymesia furcata* (Hagen, 1861), and *Neoneura confundens* Wascher & van't Bosch for Formosa province; *Rhionaeschna planaltica* (Calvert), *Erythemis plebeja* (Burmeister), *Erythrodiplax nigricans* (Rambur, 1842) and *Progomphus aberrans* Belle for San Luis province; *Planiplax erythropyga* (Karsch 1891), *Homeoura chelifera* (Selys, 1876) and *Oxyagrion brevistigma* Selys, 1876 for Córdoba province; *Tigriagrion aurantigrum* Calvert for Corrientes province; and *Acanthagrion minutum* Leonard and *Telebasis willinki* Fraser for Misiones province." (Authors)] Address: Molineri, C., Instituto de Biodiversidad Neotropical. Tucumán, Argentina. Email: carlosmolineri@gmail.com

**21758.** Moore, M.P. (2023): Ornamented species incur higher male mortality in the larval stage. *Biology Letters* 19(5): 5 pp. (in English) ["Life-cycle stages are not always capable of evolving independently from each other, but it remains unclear if evolving to meet the demands of one stage actually imposes costs on other stages. Male ornamentation is a useful trait in which to test this potential evolutionary constraint because ornaments improve reproduction in the adult stage but can require the expression of risky traits in the juvenile stage. Here, I compared larval mortality between populations of ornamented and non-ornamented dragonfly species. Since males produce more exaggerated melanin wing ornaments than females, I tested if larval mortality of males is higher in populations of species that have evolved adult male wing ornamentation. My analyses uncover male-biased larval mortality in species that have evolved male ornamentation. These findings indicate that evolving to optimize mating for the adult stage imposes a cost to survival in the larval stage. Thus, this study reveals that evolution in one life-cycle stage can impose fitness costs on other stages that persist over macroevolutionary timescales." (Author)] Address: Moore, M.P., Dept of Integrative Biology, Univ. of Colorado Denver, Denver, CO 80204, USA. Email: michael.p.moore@ucdenver.edu

**21759.** Nakanishi, K.; Usio, N.; Yokomizo, H.; Takashima, T.; Hayashi, T.I. (2023): Chlorantraniliprole application differentially affects adult emergence of *Sympetrum* dragonflies in rice paddy fields. *Paddy and Water Environment* 20: 177-183. (in English) ["Rice paddy fields are important habitat for many dragonfly species. In Japan, populations of dragonflies inhabiting rice paddies, in particular *Sympetrum* (Odonata: Libellulidae), have decreased greatly in the last few



decades. A major cause of the decline has been suggested to be the use of systemic insecticides (e.g., phenylpyrazole and neonicotinoid) in nursery boxes of rice seedlings. In this study, we examined the effects of chlorantraniliprole (CAP), a novel anthranilic diamide insecticide, on adult emergence of *Sympetrum* dragonflies in ten rice paddy fields by counting their exuviae remaining on the rice plants as an abundance index. Our results suggest that CAP is a potential factor that reduced the emergence rate of *S. infuscatum* but not of *S. frequens*. This difference may be due to differential sensitivity to CAP, different lengths of the nymphal stage, or different effects of bottom-up controls via reduction of prey organisms that are highly sensitive to CAP." (Authors)] Address: Nakanishi, K., Health & Environmental Risk Division, National Institute for Environmental Studies, Onogawa 16-2, Tsukuba, Ibaraki 305-8506, Japan. Email: nakanishi.kosuke@nies.go.jp

**21760.** Newar, R.; Bora, A.; Puzari, M. (2023): Survey of odonate diversity in and around the Dibrugarh university campus. *International Journal of Entomology Research* 8(3): 20-22. (in English) ["In this study, we have prepared a baseline data of diversity of Odonates in the Dibrugarh University campus. We found Libellulidae and Coenagrionidae to be most dominant." (Authors)] Address: Newar, R., Dept of Life Sciences, Dibrugarh Univ., Dibrugarh, Assam, India

**21761.** Ngiam, R.W.J.; Bing, T.H.; Bun, T.H. (2023): Biodiversity Record: New Singapore record of the damselfly, *Aciagrion borneense*. *Nature in Singapore* 16: e2023024: 4 pp. (in English) [Singapore Island, marsh at Holland Plain, off Old Holland Road; 27 & 28-XII-2022 around 1000 hrs. ] Address: Ngiam, R.W.J., National Biodiversity Centre, National Parks Board, 1 Cluny Road, Singapore 259569. Email: yanrobin@hotmail.com

**21762.** Nienhaus, H.; Fitzpatrick, S.W.; Bloom, D.D.; Schriever, T.A. (2023): Dispersal ability and biogeographic gradients influence gene flow of 3 aquatic insects in Laurentian Great Lakes interdunal wetlands. *Freshwater Science* 42(1): 88-103. (in English) ["Population genetic connectivity is influenced by multiple abiotic and biotic attributes, including geography, dispersal ability, and life history, which may lead to different patterns of population structure of organisms occupying similar habitats. We investigated how differences in dispersal ability and biogeographic gradients correspond with population structuring of 3 aquatic insect species found within naturally fragmented interdunal wetlands along the eastern shoreline of Lake Michigan in midwestern USA. Interdunal wetlands are small, highly fragmented, and patchily distributed along the eastern coast of Lake Michigan, USA. Our focal species, *Anax junius*, *Notonecta undulata* Say, 1832, and *Caenis amica* Hagen, 1861 were chosen as high, intermediate, and low dispersers, respectively. We hypothesized that all insect populations experience isolation by distance with relatively low gene flow among sites, but that the strength of isolation by distance varies with dispersal ability. We used cytochrome c oxidase subunit I sequence data to confirm species identification and restriction enzyme association DNA sequencing for population genomic analyses. Our cytochrome c oxidase subunit I data revealed that *Caenis* populations consisted of multiple species split along a latitudinal gradient. Restriction site-association DNA sequencing data showed that *A. junius* displayed strong isolation by distance, where *N. undulata* did not. Additionally, both *A. junius* and *N. undulata* populations displayed 2 genetic clusters along the coastline, and genetic diversity increased along with latitude. These results indicate that biogeographical

variables, such as latitude and covarying abiotic factors, may be stronger predictors of population structure than dispersal ability and that inference of population structure within aquatic macroinvertebrates should be on a species-specific basis." (Authors)] Address: Nienhaus, Halle, Department of Biological Sciences, Western Michigan Univ., 1903 West Michigan Avenue, Kalamazoo, Michigan 49008 USA. Email: Halle.nienhaus@gmail.com

**21763.** Novelo Gutierrez, R.; Bota-Sierra, C.A. (2023): The larvae of *Cora inca* Selys, 1873 and *Polythore gigantea* (Selys, 1853) from Colombia (Odonata: Polythoridae), with a larval diagnoses of some genera in the family. *Zootaxa* 5254(4): 517-533. (in English, with Spanish summary) ["The larvae of *C. inca* and *P. gigantea* were found in first and second order forested streams at the Tatamá Natural National Park in the Colombian Western Andes. Their final larval stadia are here described and figured. *C. inca* differs from the larvae of *C. cyane* Selys, 1853 and *C. marina* Selys, 1868 by a combination of features including presence of an irregular patch of minute, gray scales to each side of the ventral midline on the ventral pad of hypopharynx, paraprocts with five projections, and the position of epiproct and paraproct projections. On the other hand, the larva of *P. gigantea* differs from the larva of *P. spaeteri* Burmeister & Börzsöny, 2003 by antennal scape slightly shorter than 3rd antennomere, prementum 0.10x longer than its widest part, and the position of epiproct and paraproct projections. Although most of the larvae in the family Polythoridae are still unknown, here we discuss the main morphological characteristics that help to diagnose some of the genera in this family, presenting a regional taxonomic key that includes the genera *Cora* Selys, 1853, *Euthore* Selys, 1859, *Miocora* Calvert, 1917, and *Polythore* Calvert, 1917." (Authors)] Address: Novelo Gutierrez, R., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera antigua a Coatepec 351, El Haya 91073 Xalapa, Veracruz, Mexico. Email: rodolfo.novelo@inecol.mx

**21764.** Novelo-Gutierrez, R.; Gomez-Anaya, J.A. (2023): The rediscovery of *Heteragrion azulum* Dunkle, 1989 with additional notes on the female (Odonata: Heteragrionidae). *Zootaxa* 5256(2): 195-200. ["Some details of the morphology of the female of *Heteragrion azulum* Dunkle, 1989 are described for the first time such as the intersternite, and illustrated with high quality photographs, based upon two specimens collected in the tropical rain forest at the region of Los Tuxtlas, in the state of Veracruz, Mexico. A comparison with females of the other three species of *Heteragrion* Selys, 1862 occurring in Mexico is also provided. Additional data of males of *H. azulum* collected together with the females are also given, including some illustrations.] Address: Novelo-Gutiérrez, R., Instituto de Ecología, A.C. Red de Biodiversidad y Sistemática. Carretera antigua a Coatepec 351, El Haya 91073 Xalapa, Veracruz, Mexico. E-mail: rodolfo.novelo@inecol.edu.mx

**21765.** Noviza, F.P.; Aziza, E.P.N.; Satria, R. (2023): Inventory of Dragonfly (Odonata) Suborder Anisoptera in the Maninjau Nature Reserve, West Sumatra. *Serambi, Biologi* 8(1): 104-108. (in Indonesian, with English summary) ["This study aims to inventory of Anisoptera in the Maninjau Nature Reserve Area. The research was conducted in July 2022, using the photographic method. A total of 56 individuals, four species, three genera, one dragonfly family were collected from the Maninjau Nature Reserve Area (*Diplacodes trivialis*, *Neurothemis fluctuans*, *Orthetrum sabinia*, *O. chrysis*). The most commonly found species is the *Orthetrum* genus, which has the most distribution in the Maninjau Nature Reserve. This type of dragonfly has a wide selection of habitats, even in

polluted habitats." (Authors)] Address: Satria, R., Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Negeri Padang, West Sumatera, Indonesia. Email: rijalsatria@yahoo.co.id

**21766.** Nunes Garcia Junior, M.D.; Damasceno, M.T. (2023): A ordem Odonata no estado do Amapá, Brasil. In: Joaquim de Freitas, D.R. (org.): Principais temas da pesquisa em Ciências Biológicas. DOI: 10.22533/at.ed.932232103. 130 pp. ISBN: 978-65-258-1193-2. <https://www.atenaeditora.com.br/catalogo/download-file/5964>: 10-19. (in Portuguese, with English summary) ["Dragonflies comprise an important group of aquatic insects, with recorded occurrence in virtually the entire world. In Brazil, the group has a high diversity of species, but there is little information about the diversity of Odonata for the Amazon region, especially for the state of Amapá. Thus, the present work aims to present a list of species occurring in the state. So far, 121 species, 53 genera and 10 families of Odonata have been registered for Amapá. Despite the low number of studies about the group, a high diversity of species is observed in the state, which reinforces the need to carry out research in order to understand the distribution and the existing Odonata fauna in Amapá." (Authors)] Address: Damasceno, Monique, Univde Federal do Amapá (UNIFAP), Programa de Pós-Graduação em Biodiversidade Tropical (PPGBio), Macapá-Amapá, Brazil

**21767.** Nyambe Mbia, D.-I.; Foto Menbohan, H.-N.; Gwos Nhioock, S.R.; Nwaha, M.; Tchouapi, Y.L.; Betsi, W.C.N.; Mboye, B.R.; Biram Àa Ngon, E.B. (2023): Influence of granulometry on the distribution of benthic macro invertebrates in some streams of the Mvilla and Haut-Nyong watersheds in Cameroon. *World Journal of Advanced Research and Reviews* 17(2): 658-677. (in English) ["This study was conducted from November 2018 to October 2019 in 8 forested streams in the Haut-Nyong and Mvilla watersheds to determine the influence of substrates granulometry on benthic macroinvertebrates. The physicochemical analyses showed highly oxygenated, weakly mineralized and slightly acidic waters. The granulometric analyses reveal 9 categories of substrates depending on the scale of sand, sand+gravel or sand+mud. Sampling of benthic macroinvertebrates allowed the collection of 15058 organisms divided into 5 classes, 14 orders and 49 families [including Odonata]. The results showed a taxonomic richness strongly influenced by the nature of the substrate. The combination of coarse sand + silt + dead leaves was more favored the development of benthic macroinvertebrates with 48 families. The taxonomic richness associated to the different index revealed good ecological quality of Sounou, Bengo'o and Lo'o rivers." (Authors)] Address: Nyambe Mbia, D.-I., Lab. Hydrobiol. Environ. (LHE), Fac. Sci., Univ. of Yaounde I, P.O. Box: 812 Yaounde-Cameroon.

**21768.** Oldak, K.A. (2023): Dragonflies (Odonata) of the "Bagno Pogorzal" Nature Reserve (east-central Poland). *Park nar. Rez. Przyr.* 42(1): 23-39. (in Polish, with English summary) ["The aim of the study was to determine the species composition of Odonata of the "Bagno Pogorzal" Nature Reserve (east-central Poland), comprising, i.a., complex of Sphagnum bogs and dystrophic lakes. The study was conducted in 2021-2022 and consisted of the observation of imagines and the collection of exuviae. A total of 31 species of dragonflies were found (41.9% of the Polish odonate fauna), 23 of which were classified as autochthonous or probably autochthonous. The species found were mostly eurytopes, although there was also a significant proportion of tyrophobionts and tyrophobiles. The most abundant species were *Libellula quadrimaculata*, *Coenagrion pulchellum* and *C. puella*. Five species protected

by law in Poland were recorded: *Nehalennia speciosa*, *Sympetma paedisca*, *Aeshna subarctica*, *Leucorrhinia albifrons* and *L. pectoralis*. The endangered *N. speciosa* is the most interesting of the recorded species due to its severely fragmented extent and relict and fairly rare occurrence in Poland. It was observed in the ecotone zone between a *Pinus sylvestris* forest and an open peatland or dystrophic lake. Six species classified as umbrella species for Sphagnum bogs were recorded: *N. speciosa*, *A. subarctica*, *A. juncea*, *L. albifrons*, *L. dubia* and *L. pectoralis*. Value of biocenosis naturalness qualitative index (Wns) for Sphagnum bogs was 3.65. In light of the literature data, this value is at most moderate, suggesting the disturbed naturalness of the boggy complex. The reserve is one of the Poland's important refuges of "special concern" dragonfly species. Threats to the local dragonfly populations have been identified in the reserve: some forms of human impact and drying out of the peatland. There is a need to prepare a conservation plan for the reserve, taking into account the conservation policy towards dragonflies." (Author)] Address: Oldak, K.A., ul. Ziemowita 14, 05 – 300 Mińsk Mazowiecki, Poland. Email: krystian.adam-oldak@gmail.com

**21769.** O'Neill, D.; Häkkinen, H.; Neumann, J.; Shaffrey, L.; Cheffings, C.; Norris, K.; Pettorelli, N. (2023): Investigating the potential of social media and citizen science data to track changes in species' distributions. *Ecology and Evolution* 13(5), e10063: 13 pp. (in English) ["How to best track species as they rapidly alter their distributions in response to climate change has become a key scientific priority. Information on species distributions is derived from biological records, which tend to be primarily sourced from traditional recording schemes, but increasingly also by citizen science initiatives and social media platforms, with biological recording having become more accessible to the general public. To date, however, our understanding of the respective potential of social media and citizen science to complement the information gathered by traditional recording schemes remains limited, particularly when it comes to tracking species on the move with climate change. To address this gap, we investigated how species occurrence observations vary between different sources and to what extent traditional, citizen science, and social media records are complementary, using *Calopteryx splendens* in Britain as a case study. *C. splendens* occurrences were extracted from citizen science initiatives (iRecord, iNaturalist) and social media platforms (Facebook, Flickr, Twitter), and compared with traditional records primarily sourced from the British Dragonfly Society. Our results showed that species presence maps differ between record types, with 61% of the citizen science, 58% of the traditional, and 49% of the social media observations being unique to that data type. *C. splendens* habitat suitability maps differed most according to traditional and social media projections, with traditional and citizen science being the most consistent. We conclude that (i) social media records provide insights into *C. splendens* distribution and habitat preference that are different from, and complementary to, the insights gathered from traditional recording schemes and citizen science initiatives; (ii) predicted habitat suitability maps that ignore information from social media records can substantially underestimate (by over 3500 km<sup>2</sup> in the case of *C. splendens*) potential suitable habitat availability." (Authors)] Address: O'Neill, Daisy, Inst. Zool., Zool. Soc. London, Regent's Park, London NW1 4RY, UK. Email: d.oneill@pgr.reading.ac.uk

**21770.** Ott, J. (2023): Sensibilität von Libellen gegenüber invasiven Krebsen. Eine Risikoanalyse für den rheinland-pfälzischen Teil des nördlichen Oberrheintieflands. *Naturschutz*

und Landschaftsplanung 55(7): 30-36. (in German, with English summary) ["Sensitivity of dragonflies to invasive crustaceans – Risk analysis for the Rhineland-Palatinate part of the Northern Upper Rhine Plains. In Rhineland-Palatinate, six invasive crayfish species (Decapoda) with varying degrees of threat potential for dragonflies and other aquatic organisms and ecosystems have been identified in the Northern Upper Rhine Plain. The signal and calico crayfish in particular have a very negative effect; the no less invasive marbled crayfish and the red swamp crayfish have only spread locally so far. The negative effects on dragonflies have been documented several times; in this article, a risk analysis is carried out by overlapping the distribution data of crayfish and dragonflies in the Rhineland-Palatinate part of the Northern Upper Rhine Plain. It shows that more than 80 % of dragonfly species are affected, with many endangered and/or protected species being affected. In addition, many nature reserves and protected areas under the EU Habitats Directive are also affected in the alluvial zone of the river Rhine. Due to the steady spread of invasive crayfish, this will continue to increase. Finally, some management suggestions are made, although their impact will remain limited." (Author)] Address: Ott, J., Friedhofstr. 28, D-67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**21771.** Pereira de Gouvea, T.; Stefani-Santos, G.; Vilela, D.S.; Francisco de Ávila Júnior, F.; Magalhães de Souza, M. (2023): Odonata community in transition areas between Cerrado and Atlantic Forest biomes in south-central Minas Gerais, Brazil. *Acta Scientiarum Biological Sciences* 45: e63434: 10 pp. (in English) ["Faunal inventories are essential for biota management and conservation, especially in areas with potential for the creation of conservation units. Inventories of insect taxa such as Odonata, which perform several environmental services in aquatic and terrestrial ecosystems, are of great importance. In view of the above, this study aimed to update and expand the list of Odonata species in the Barroso region, Minas Gerais State, Brazil. This study was carried out in three areas of forest fragments in Atlantic Forest and Cerrado biomes in October 2020, December 2020, January 2021, and March 2021. The sampling effort was 8 hours per day during 20 days, totaling 140 sampling hours. A total of 43 Odonata species were recorded, which increased the richness of the study area from 57 to 76 species. The studied areas harbor rare and endangered species. However, since the last sampling in 2009, there has been a significant reduction in diversity in the Atlantic Forest fragment. In view of the changes that forest fragments are undergoing, we underscore the need to create a conservation unit, especially in Baú Forest." (Authors)] Address: Pereira de Gouvêa, T., Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas, Praça Tiradentes, 416, 37576-000, Inconfidentes, Minas Gerais, Brazil. Email: taiguaragouvea.bio@gmail.com

**21772.** Pereira-Moura, L.; Veras, D.S.; de Carvalho, F.G.; Juen, L.; Marques Couceiro, S.R. (2023): Habitat specificity and morphology-main filters for the distribution of Odonata in the Cerrado Maranhense, Brazil. *Aquatic Ecology* 57: 443-458. (in English) ["Our study evaluates the relationship among habitat specificity, morphology and differences in spatial niche breadth of Odonata, in streams with different environmental conditions in the Cerrado Maranhense. We collected in 24 streams between May and November 2016 and March and April 2017. A total of 824 specimens were collected, distributed in 57 species, of which 12 were classified as generalists and five as specialists in integral habitat. Habitat generalists tend to be larger than species that

specialize in intact environments; PERMANOVA showed a significant separation between the generalist and specialist groups in environments with less anthropic impact (Pseudo  $F = 0.173$ ;  $p = 0.001$ ). The length and width of the wings along with the length of the chest were the most important characteristics for this differentiation. *Telebasis griffinii* and *Epipleoneura williamsoni* (OMI – 0.0 and 5.0) presented the lowest spatial niche values. However, specialist species did not always show the lowest values. More than half of the species in our study ( $n = 35$ ) were considered rare by the Multinomial species classification method (CLAM) for having an abundance of less than seven individuals. The number of rare species is a matter of concern given the fragmentation of the region's aquatic environments, which has been shaping Odonata assemblages, making room for generalist species and excluding species that need more complete conditions." (Authors)] Address: Pereira-Moura, L., Programa de Pós-Graduação em Biodiversidade e Biotecnologia - BioNorte, Lab. de Ecologia e Taxonomia de Invertebrados Aquáticos, Univde Federal do Oeste do Pará, Campus Tapajós, Vera Paz, sn, bloco 11, sala 03, Salé, Santarém, PA, Brazil

**21773.** Pinto, T.J.; Smith, W.S. (2023): Impacts of sedimentation and dam failure on the macroinvertebrate community in a tropical stream. *Limnetica* 42(1): 19-36. (in English, with Portuguese summary) ["Impacts of sedimentation and dam failure on the macroinvertebrate community in a tropical stream Changes in land use due to human activities lead to disturbances related to sedimentation in aquatic ecosystems. Furthermore, the construction of dams in streams raises concerns about their safety, and the rupture of these structures implies significant impacts. Thus, this article assessed the effects of sedimentation and dam failure on the aquatic macroinvertebrate community in a tropical stream and verified its influence on the structural and functional composition of this assemblage of organisms. Water physical-chemical parameters and macroinvertebrate fauna data were obtained from monitoring data for both the pre- and post-rupture period. Macroinvertebrates were identified at the family level and classified according to functional feeding groups. Structural and functional biological indexes were applied, and data were analyzed using comparison tests, correlation matrix, correspondence, and cluster analysis. The results showed that sedimentation resulted in the impoverishment of macroinvertebrate fauna, with the loss of important functional feeding groups, indicating a low environmental quality. Dam failure changed the composition of the fauna, leading to the disappearance of important orders, the appearance of organisms belonging to the order Coleoptera, and the loss of feeding groups with consequent loss of ecological functions. The dam failure was not the only stressor for the studied stream, because it already suffered from small and medium scale disturbances related to sedimentation. However, the rupture of the structure resulted in greater environmental losses, and is considered large scale, implying the need to implement recovery measures in the area." (Authors)] Address: Pinto, T.J., Post-Graduate Program in Environmental Engineering Sciences, Center of Water Resources and Environmental Studies, Nucleus of Ecotoxicology & Applied Ecology, University of São Paulo, Rodovia Domingos Innocentini, km 13, 13560-970, Itirapina (SP), Brazil. Email: thandyjuniosilva@gmail.com

**21774.** Plunkett, C.; Chance, F. (2023): Modeling coordinate transformations in the dragonfly nervous system. *NICE-2023: Neuro-Inspired Computational Elements Conference* April 2023. <https://doi.org/10.1145/3584954.3584959>: 6-10. (in English) ["Coordinate transformations are a fundamental

operation that must be performed by any animal relying upon sensory information to interact with the external world. We present a neural network model that performs a coordinate transformation from the dragonfly eye's frame of reference to the body's frame of reference while hunting. We demonstrate that the model successfully calculates turns required for interception, and discuss how future work will compare our model with biological dragonfly neural circuitry and guide neural-inspired neuromorphic implementations of coordinate transformations." (Authors)] Address: Chance, Frances, Sandia National Laboratories, Albuquerque, NM, USA. Email: fschanc@sandia.gov

**21775.** Powell, L.L.; Vaz Pinto, P.; Mills, M.S.; Baptista, N.L.; Costa, K.; Dijkstra, K.D.B.; Gomes, A.L.; Guedes, P.; Júlio, T.; Monadjem, A.; Palmeirim, A.F.; Russo, V.; Melo, M. (2023): The last Afromontane forests in Angola are threatened by fires. *Nature Ecology & Evolution* 7: 628-629. (in English) ["Afromontane forests — a unique ecosystem of cool, moist temperate forest that is now mostly restricted to high elevations — are a relic of glacial periods, when they were much more widespread in Africa. In southwestern Africa, only around 700 ha remains, all of which is located in Angola. The Namba mountain range in the highlands of western Angola contains the majority (about 85%) of the Afromontane forest patches of the region. Despite these mountains only recently being explored by scientists, they represent the best opportunity to conserve the most-threatened habitat in Angola — however, the situation there is alarming. ... only from Namba. ... A new species of Trithemis dragonfly, found only at streams and bogs in the Namba Mountains; these wetland habitats rely on precipitation from the Afromontane forest fragments and, lying in the valleys, are particularly vulnerable to impacts such as grassland fires and drainage for agriculture." (Authors)] Address: Melo, M., CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Lab. Associado, Campus de Vairão, Univ. Porto, Vairão, Portugal

**21776.** Prendi, M.; Papparisto, A.; Cuvelier, S. (2023): *Proterebia phegea* (Lepidoptera: Nymphalidae: Satyrinae): building bridges between the relic populations of Croatia, Bosnia-Herzegovina, Greece, and a new record from northern Albania. *Phegea* 51(2): 59-62, suppl. (in English, with Dutch, Albanian and French summaries) ["During the weekly field surveys (March 2021–September 2022) for the master thesis of the first author, 20 species of butterflies and 10 species of Odonata (S1) were recorded in the six selected sites (S1) of the Vau-Dejës region." (Authors) Recorded Odonata species are: *Ischnura elegans*, *Enallagma cyathigerum*, *Anax imperator*, *Lindenia tetraphylla*, *Orthetrum brunneum*, *O. cancellatum*, *O. coerulescens*, *Sympetrum fonscolombii*, *Crocothemis erythraea*, *Trithemis annulata*] Address: Prendi, M., Faculty of Natural Sciences, Dept Biology, Bulevardi Zogu i Parë, Tirana Univ., Al-1001 Tirana, Albania. Email: markoprendi16051999@gmail.com

**21777.** Putra, I.L.I.; Putri, W.A. (2023): Keanekaragaman Jenis Capung (Hexapoda: Odonata) Di Sekitar Kampus 4 Universitas Ahmad Dahlan, Yogyakarta. Diversity of dragonfly (Hexapoda: Odonata) around Universitas Ahmad Dahlan, Campus. *Metamorfosa: Journal of Biological Sciences* 10(1): 84-95. (in Indonesian, with English summary) ["This study aims to determine the diversity of species, characteristics of species, and species of dragonflies which were abundant around campus 4 Universitas Ahmad Dahlan (UAD). The sampling location was divided into four, namely rice fields, housing, vacant land and campus areas. Each area had 2 plots measuring 35 x 20 m<sup>2</sup>. Each plot had 5

subplot measuring 150 m<sup>2</sup> dispersed in the plot. Sampling was conducted at 08.00 - 11.00 WIB and 15.00 - 17.00 WIB. Sampling was done using a net. The dragonfly that caught was inserted in the papillot paper and the thorax was pressed to death. Dragonflies were identified to the species level by comparing their morphology with an identification reference book. Abiotic factors that measured were air temperature and humidity, wind speed, CO, DO and water pH. The results of this study were there were 4 species of dragonflies that obtained, namely *Pantala flavescens*, *Orthetrum sabina*, *Sympetrum fonscolombii* and *Diplacodes trivialis* with a low diversity level of 0.36. The most abundant dragonfly species, *S. fonscolombii*, was 249 individuals with a dominance index value of 0.74 and the least abundant was *Diplacodes trivialis* with 10 individuals, with a dominance index value of 0.03. The conclusion of this research is that in the area around campus 4 UAD there is a disturbance in the form of land use change which causes a small index of dragonfly species diversity at that location." (Authors) The occurrence of *S. fonscolombii* in Indonesia (Sumatra) is more than questionable.] Address: Putri, W.A., Laboratorium Ekologi dan Sistemika, Program Studi Biologi, Fakultas Sains dan Teknologi Terapan, Universitas Ahmad Dahlan

**21778.** Rahim, A.M.; Hamid, S.A. (2023): A note on diversity of aquatic insects in rivers of Royal Belum State Park, Perak. *J. Trop. Resour. Sustain. Sci.* 10: 64-67. (in English) ["Royal Belum State Park is one of the oldest, protected and pristine land masses that joins hundreds of small tributaries that feed Lake Temenggor. A scientific expedition was conducted, and the diversity of aquatic insects was studied. Five rivers namely Sungai Ta Ng, Sungai Papan, Sungai Gen, Sungai Ruok and Sungai Rambutan were chosen. A kick-sampling technique was deployed to collect the aquatic insect larvae. The study recorded a total of 42 families and 61 genera of aquatic insects which Sungai Papan has the largest number of taxa recorded (18 families, 26 genera). The number of intolerant taxa (Ephemeroptera, Plecoptera, Trichoptera; EPT) in Sungai Papan was substantial (15 genera). Odonata was discovered to be the most diverse order (13 genera), followed by Ephemeroptera (10 genera) and Trichoptera (10 genera). The findings provided a concise richness of aquatic insects, which might serve as a good tool for evaluating the conservation needs of the area." (Authors) Taxa are treated at genus level.] Address: Hamid, S.A., School of Biological Sciences, Universiti Sains Malaysia. 11800 Minden, Penang, Malaysia. Email: ahsuhaila@usm.my

**21779.** Rashni, B.; Donnelly, T.; Sakiti-Waqa, H.; Osborne-Naikatini, T.; Raituva, J.; Maiwaqa, M.; Maiwaqa, P.V.; Marinov, M. (2023): On the Fijian endemic *Nesobasis brachycerca* Tillyard, 1924 (Odonata: Coenagrionidae) with first description of the female and updated description of the male. *Zootaxa* 5311(2): 251-266. (in English) ["*N. brachycerca* specimens have been sampled during the course of an ongoing PhD study investigating the utility of Odonata individuals for assessing the conservation importance of the Fijian freshwater resources. Material was analysed and compared to all published records on this taxon. We here provide the first morphological description (by supposition) of the female of *N. brachycerca*, update the morphological characteristics of the male and present some habitat specifications measured in the field.] Address: Rashni, Bindiya, University of the South Pacific; Discipline of Biological and Chemical Sciences; School of Agriculture; Geography; Environment; Ocean and Natural Sciences; Laucala Campus, Fiji



**21780.** Reis, K.S.S.; Braga, C.F.; Santos, T.M.T. (2023): Predatory activity of aquatic insects (Odonata: Libellulidae and Coleoptera: Hydrophilidae) on tadpoles of *Rhinella* sp. and *Physalaemus* sp. under laboratory conditions. *Acta Brasiliensis* 7(1): 22-26. (in English, with Portuguese summary) ["Predation regulates the functioning of communities and affects the population dynamics of organisms in the environment. The main aquatic predators are represented by invertebrates of the Insecta class, which feed on vertebrate and/or invertebrate organisms. Among vertebrates, tadpoles are the most consumed. This experiment studied the predatory activity of aquatic insects (Libellulidae and Coleoptera: Hydrophilidae) on *Rhinella* tadpoles sp. and *Physalaemus* sp. in the city of Capitão Poço, Pará, Brazil. The experiment had six treatments performed in two phases (day and night). Significant differences were observed only between treatments 1 (control) and 2 (Libellulidae) ( $F=7.21$ ;  $p=0.00$ ). Insect predatory activity was performed in both phases, with no significant differences ( $F=1.33$ ;  $p=0.26$ ). The success of the Libellulidae family is related to the strategies and morphological aspects that their larvae use in the act of predation. In contrast, the Hydrophilidae family, represented by adults in this experiment, has characteristics that may have contributed to the low predatory activity observed, such as: base diet consisting of algae and organic matter." (Authors)] Address: Santos, T.M.T., Museu Paraense Emílio Goeldi, Belém, 66040-376, Pará, Brasil. Email: thuaireag@gmail.com

**21781.** Rivas-Torres, A.; Di Pietro, V.; Cordero-Rivera, A. (2023): Sex wars: a female genital spine forces male damselflies to shorten copulation duration. *Evolution*, qpad073, <https://doi.org/10.1093/evolut/qpad073>: 8 pp. (in English) ["In some species males use weapons to harm females, increasing their short-term fitness. Here we show that females can use genital adaptations against males. Females of the damselfly *Enallagma cyathigerum* have a conspicuous vulvar spine on the 8th abdominal segment, which contacts with the male during copulation. We tested three hypotheses for its function: (i) inflicts damage to the male during copulation; (ii) facilitates endophytic oviposition; (iii) stimulates males during copulation to increase their investment. We found that males mated on average for 54 min with control females, but increased copulation to 99 min with females without spine. There was no evidence of physical harm of the spine on the male's seminal vesicle, which shows 8-18 folds, exactly where the spine contacts during copulation. Females with and without spine exhibited the same egg-laying rates and showed similar fecundity and fertility. Longevity was also similar in males mated to control and spineless females. In contrast to many species where females resist male harassment by behavioral responses, the morphological adaptation observed in *E. cyathigerum* appears to act as a sexual weapon, allowing females to control copulation duration. We suggest that the spine has evolved because of sexual conflict over mating duration." (Authors)] Address: Cordero Rivera, A., Departamento de Ecología e Biología Animal, Universidade de Vigo, E.U.E.T. Forestal, Campus Universitario, 36005 Pontevedra, Spain. E-mail: cordero@uvigo.gal

**21782.** Romero-Lebrón, E.; Fernández-Monescillo, M.; Matshkina, N.; Delclòs, X.; Gleiser, R. M. (2023): Damselflies (Coenagrionidae) have been avoiding leaf veins during oviposition for at least 52 million years. *iScience* 26(6) 106865: 14 pp. (in English) [Plant-insect interactions can provide extremely valuable information for reconstructing the oviposition behavior. We have studied about 1350 endophytic egg traces of coenagrionid damselflies from the Eocene, identifying triangular or drop-shaped scars associated with them.

This study aims to determine the origin of these scars. Our behavioral study of about 1,800 endophytic eggs from recent coenagrionids indicates that these scars were caused by ovipositor incisions, but without egg insertion. The scar correlates ( $c_2$ -test) with leaf veins in both fossil and extant species. We infer that a female would detect the proximity of a leaf vein and avoid egg-laying, generating a scar that also fossilizes. For the first time, a scar produced by the ovipositor has been identified, indicating the existence of undesirable areas for oviposition. Accordingly, we recognize that Coenagrionidae damselflies (narrow-winged damselflies or pond damselflies) have been avoiding leaf veins for at least 52 million years." (Authors)] Address: Romero-Lebrón, Eugenia, Universidad Nacional de Córdoba (UNC) – CONICET. IMBIV: Instituto Multidisciplinario de Biología, Vegetal. Centro de Relevamiento y Evaluación de Recursos Agrícolas y Naturales (CREAN). Av., Valparaíso s/n 5016, Córdoba, Argentina. Email: eugeniaromerolebron@gmail.com

**21783.** Sammoudi, R.; Chahlaoui, A.; Khaffou, M.; Elouahli, A.; Fekhaoui, M.; Arahou, M. (2023): Biodiversity assessment and ecotopology of the Taanzoult plain running water (Aguelmam Sidi Ali, Morocco). *Scientific African* 20, July 2023, e01631: 12 pp. (in English) ["Highlights: • Biological diversity is low in the dry season and increases along the flow gradient. • Low representation of bioindicators indicates the degradation of an aquatic biotope. • Imminent health risk due to the presence of anopheles and the abundance of Lymnaeidae. • Poor biological waters quality in dry seasons compared to the wet season. Abstract: The Taanzoult plain is an integral part of the Aguelmam Sidi Ali wetland in the central Moroccan Middle Atlas. Its composition, of several geomorphological facies and terrestrial and aquatic habitats, offers consequent ecosystemic and socioeconomic services. Nevertheless, it is subject to strong anthropic pressure. The objective of this study is to measure the biodiversity and to evaluate the anthropogenic interactions within the aquatic environment. Benthic population dynamics were analyzed at seven monthly stations along the 12-month hydrobiological cycle. The study allowed the inventory of 25432 individuals divided into nine taxonomic classes. The taxonomic wealth is 106 taxa belonging to 92 genera and 64 families of which 70 taxa were recorded at water sources and 77 taxa at the streams. This richness is composed mainly of 64% of insects, 10% of ditellates, 9% of gastropods and 9% of crustaceans. The quantitative and qualitative biological indicators have generally concluded to a poor water quality for both springs and streams. Moreover, the bioindicator species of the good quality of water resources and the surrounding terrestrial ecosystem (Odonata and Plecoptera) are less present despite the absence of their aquatic predators (fish). Thus, the presence of Lymnaeidae and Planorbidae hosts of several pathogens responsible for waterborne diseases and the presence of Anopheles (Culicidae) agent responsible for malaria. In this context, the aquatic biodiversity is significantly influenced by the anthropogenic impact according to a spatiotemporal typology. Indeed, these observations highlight aquatic life degradation and put in suspicion the quality of drinking water and hydropathy. So, it would be judicious to set up a rigorous surveillance system to prevent the imminent health risk and to regulate the pastoral activity in the wetland, in order to foresee adequate development of the water sources in order to perpetuate the offered ecosystem services. ... it was noticed that the Odonata (six taxa with 48 individuals) and the Plecoptera (one taxon with nine individuals) are less represented despite the absence of their aquatic predators (fish)." (Authors)] Address: Sammoudi, R., Mohammed V University,

Scientific Institute, Rabat, Morocco. Email: rachid.sammoudi@is.um5.ac.ma

**21784.** Sanap, N.P. (2023): Odonatan diversity in around the campus area of Pt. Ravishankar Shukla University Raipur (C.C.), India. Biodiversity Assessment: Tool for Conservation Volume II: 27-31. (in English) [15 Odonata species are listed.] Address: Sanap, N.P., Shardchandra Arts, Commerce and Science College, Naigaon, Dist. Nanded, India. E-mail: npsanap@gmail.com

**21785.** Santana Reisa, K.S.; Braga, C.F.; Trindade dos Santos, T.M. (2023): Predatory activity of aquatic insects (Odonata: Libellulidae and Coleoptera: Hydrophilidae) on tadpoles of *Rhinellasp.* and *Physalaemus* sp. under laboratory conditions. *Acta Brasiliensis* 7(1): 22-26. (in English, with Portuguese summary) ["Predation regulates the functioning of communities and affects the population dynamics of organisms in the environment. The main aquatic predators are represented by invertebrates of the Insecta class, which feed on vertebrate and/or invertebrate organisms. Among vertebrates, tadpoles are the most consumed. This experiment studied the predatory activity of aquatic insects (Libellulidae and Coleoptera: Hydrophilidae) on *Rhinella* tadpoles sp. and *Physalaemus* sp. in the city of Capitão Poço, Pará, Brazil. The experiment had six treatments performed in two phases (day and night). Significant differences were observed only between treatments 1 (control) and 2 (Libellulidae) ( $F= 7.21$ ;  $p= 0.00$ ). Insect predatory activity was performed in both phases, with no significant differences ( $F= 1.33$ ;  $p= 0.26$ ). The success of the Libellulidae is related to the strategies and morphological aspects that their larvae use in the act of predation. In contrast, the Hydrophilidae, represented by adults in this experiment, has characteristics that may have contributed to the low predatory activity observed, such as: base diet consisting of algae and organic matter." (Authors)] Address: Trindade dos Santos, T.M., Museu Paraense Emílio Goeldi, Belém, 66040-376, Pará, Brasil. Email: thureag@gmail.com

**21786.** Sarsavan, A.; Wasnik, A.; Soman, S.C. (2023): Climate change effects on tropical odonate community. *Holistic Approach Environ.* 13(3): 92-105. (in English) ["Climate change, such as increased rainfall variability, has affected Yavatmal district in the last decade. Uncertainty of rainfall affects the inter-annual vegetation growth, and thus biodiversity. A baseline study was carried out in 4 habitats in Waghadi basin of Yavatmal district to analyse Odonates species abundance, richness, and diversity as a prerequisite for the protection and management of these habitats. A total of 1263 individuals of 30 species distributed in 6 families were collected. Libellulidae is most dominant family with 13 species. The influence of vegetation on species richness and diversity was analysed (using normalized difference vegetation index values at buffer zones of 1000 m, 500 m, 100 m and 50 m), with further research into the trends of species diversity for each habitat. There was an increase in species richness and diversity with an increase in the dense vegetation, especially around temporary water bodies. This study indicates the contribution of temporary water bodies to ecosystem function and suggests its conservation by monitoring the impacts of increased rainfall variability and anthropogenic influence using odonates." (Authors)] Address: Sarsavan, A., Foundation for Ecological Security (FES), Anand, Gujarat, India. Email: anilsarsavan@gmail.com

**21787.** Savard, M. (2023): Climate perturbation: dragonflies now in November in the plain of Lac Saint-Jean and Saguenay, province of Québec, Canada. *Argia* 35(1): 24-

29. (in English) ["An exceptionally warm weather occurring in fall 2022 extended the flight period of dragonflies in the plain of Lac Saint-Jean and Saguenay, Québec. The date of 4-XI-2022 represents the first dragonfly observation recorded so late in this northern latitude. This exceptional fact pushes the date record for this ecological region back by three weeks. With a generally upward trend in autumn temperatures, it will perhaps be customary to see in late October, or even early November, *Sympetrum vicinum* and other late-season species, such as *Lestes congener*, *Aeshna umbrosa*, *Sympetrum obtrusum*, and *S. danae*." (Author)] Address: Savard, M.; E-mail: michel.savard@ssss.gouv.qc.ca

**21788.** Sawant, D.; Deulkar, R.M.; Ogale, S.; Ogale, H. (2023): Four new records of dragonflies (Insecta, Odonata) from Amboli region of Western Ghats, Maharashtra, India. *Entomon* 48(1): 99-106. (in English) ["*Microgomphus souteri*, *M. flavocolorata*, *M. irata* and *Idionyx corona* reported from Maharashtra State for the first time. The records are the northern most distribution range for the respective species. Brief description with identification characters of the species is provided." (Authors)] Address: Ogale, H., 1040, Whistling Woods, Amboli, Sindhudurg 416510, Maharashtra, India

**21789.** Schwyzer, P.W. (2023): Die Schabracken-Königslibelle *Anax ephippiger* im Irchelpark (Stadt Zürich) beobachtet. *Ornithologischer Beobachter* 120(2): 98. (in German) [Switzerland, 9-V-2023] Address: not stated

**21790.** Seehausen, M.; Turiault, M.; Fliedner, H.; Deliry, C. (2023): "A nice old greybeard" - Friedrich Ris' correspondence archived at the Senckenberg Museum Frankfurt/Main, Germany. *International Dragonfly Fund Report* 180: 1-84. (in English) ["The private papers of Friedrich Ris including letters he received were digitized and perused. Altogether 1635 letters written by 118 correspondents are considered, and their content is summarized. In addition 14 letters sent to Ris' relatives after his death are included. The correspondence covers the 53 years from 28-xii-1884 to 28-i-1931. Generally the correspondence involves an exchange of expertise, publications, illustrations, photographs, and to some extent private matters. Also the selling of specimens is mentioned in some letters. During the First World War Ris, a neutral Swiss citizen, corresponded with several entomologists from warring nations on both sides of the conflict. The lack of letters from Förster and Krüger is discussed. The correspondence resulted in the discovery of some Odonata specimens captured by Bartenev. *Calopteryx splendens* was a species of special interest to Ris, he requested specimens from several correspondents at least after 1912. There is evidence for the deposition of the holotype of *Selysiotthemis nigra* in Selys' collection. Furthermore the correspondence provides information e.g. about the exchange of type material, the discovery of new species, the extensive collecting of [E.B.] Williamson, of different points of view regarding the correct spelling of *Aeshna*, and further odonatological topics. Apparently unpublished data found in the correspondence are the first records of *Lestes macrostigma* at the Lake Neusiedl, Austria in 1923 by Zerny, and the quantities of *Somatochlora arctica* captured by Morton during his 1904 trip to Switzerland. Probably the earliest photographs of water mites on the wings of *Sympetrum meridionale* were found in Ris mss responding to a letter of Viets." (Authors)] Address: Seehausen, M., Zool. Mus. der CAU zu Kiel, Hegewischstr. 3, 24105 Kiel, Germany. Email: mseehausen@zoolmuseum.uni-kiel.de

**21791.** Seehausen, M. (2023): Nachweise der an Libellen parasitierenden Gnitze *Forcipomyia paludis* in Vorpommern

und auf Rügen (Odonata; Diptera: Ceratopogonidae). *Libellula* 41(3/4): 107-114. (in German, with English summary) ["Records of the biting midge *Forcipomyia paludis* in Western Pomerania and Rügen Island – Three localities where *Forcipomyia paludis* and *Cladium mariscus* co-occur are presented. In 2021 and 2022, a total of 75 midges on 63 Odonata individuals were recorded. All records are listed in detail. At most five midges on a male *Gomphus vulgatissimus* were observed on 11 June 2022. Phenologically, the observations were made between 11 June (2022) and 2 August (2022), the latter currently being the latest record in Germany. A preference of the midges for the upper side of the wing (67%) and the hindwing (70%) in Anisoptera, and under side of the wing (63%) and the forewing (68%) in Zygoptera was detected." (Authors)] Address: Seehausen, M., Waldhöhe 9a, D-24306 Plön, Germany. Email: m.seehausen@gmx.de

**21792.** Sharma, A.K.; Kumar, N.; Naveen; Tare, S.; Nayak, S.; Seervi, S. (2023): Phototactic response and taxonomic distribution of predaceous species of paddy ecosystem. *Biological Forum – An International Journal* 15(3): 91-94. (in English) ["The present investigation was carried out at the Research Farm of the College of Agriculture, JNKVV, Jabalpur (M.P.) during Kharif 2020 with a view to collect valuable information on the distribution of predatory species of paddy ecosystem in the Jabalpur region. The majority of nocturnal insect pests with a positive phototropic response are being controlled with light traps. Therefore, gathering data and documentation on natural enemies found in the paddy ecosystem's light traps is equally crucial. During the investigation, light trap collection was represented by a total of 17 predatory species. These species belong to 5 orders and 13 families. Among these orders, Coleoptera was the highest order with 4 families and 6 species. The highest size of trap catch of 3,856 beetles was recorded in *Coccinella* sp. of the family Coccinellidae. Hemiptera was the next order, represented by 3 families and 5 species. Major hemipteroid predatory species were *Canthecona furcellata* (166), *Antiloclus* sp. (122) *Ectomocoris cordiger* (145), *Sirthena* sp. (98) and *Erthesina fullo* (52). Among the other predatory orders, Odonata was represented by *Libellula* sp. (224) and *Coenagrion* sp. (52). Similarly orders Hymenoptera was also represented by two species viz. *Eumenes* sp. (58) and *Dorylus* sp. (21) while order Dictyoptera was represented by only one species each. Thus, these results concluded that the positive benefit far outweighs the negative effect, demonstrating the safety of using light traps in IPM programmes with regard to their influence on natural enemies." (Authors)] Address: Sharma, A.K., Department of Entomology, College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (Madhya Pradesh), India

**21793.** Sharma, P.; Kangale, M.; Agase, D.M. (2023): Study of odonates diversity near Koradi Lake, Koradi, Nagpur, Maharashtra. *Journal of Entomology and Zoology Studies* 11(1): 126-130. (in English) [Odonata are "prevalent near marshy areas, ponds, lakes, rivers, ditches, and other water bodies. They contribute significantly to the biological foundation of all terrestrial ecosystems as herbivores, pollinators, seed dispersers, predators, detritivores, and vectors. They also serve as effective environmental indicators and biocontrol agents. The objective of the present study was to determine the diversity of odonates in the area around Nagpur's Koradi Lake, which is home to a wide variety of birds and insects. Twenty species of Odonates from 15 genera and three families were discovered during the monitoring in the marked areas near the lake. In total, 1071 individual odonates have been observed in the Koradi region.

Libellulidae had the most species (12), followed by Coenagrionidae (7 species), and Aeshnidae (1 species). It was noted that urbanisation and pollution could have a negative impact on the diversity of odonates in the Koradi region." (Authors)] Address: Agase, D.M., Govt. J.S.T.P.G. College, Balaghat, Madhya Pradesh, India

**21794.** Shavkatovna, A.M.; Japakovich, M.M.; Iskandarovich, I.A.; Babajanovna, D.M.; Sapparboyevich, D.J. (2023): Update to the status of *Lindenia tetraphylla* (Vander Linden, 1825) (Odonata Gomphidae: *Lindenia* (De Haan, 1826)) in Uzbekistan, with special reference to the Khorezm region. *International Journal of Environmental Engineering and Development* 1: 11-17. (in English) ["Considering that odontological studies have not been adequately conducted in the Khorezm oasis located in the north-western part of Uzbekistan, we presented the obtained results about the state of *Lindenia tetraphylla* for the last three years. Species *L. tetraphylla* was included in the section "Endangered species" (LC-Least concern ver 3.1) of the International Red Book (IUCN). During our researches, this species was recorded in 3 regions of the oasis, as well as in one region of the Republic of Karakalpakstan. *L. tetraphylla* was found mainly in the protected tugai biotope areas of the oasis." (Authors)] Address: Shavkatovna, A.M., Khorezm Mamun Academy, PhD student, Khiva, Markaz Str., 1, Uzbekistan

**21795.** Sinambela, M.; Hutagaol, Y.; Sinaga, T.; Simorangkir, A. (2023): Population of macrozoobenthos in Mariah Bandar Springs, Pematang Bandar District, Simalungun Regency, North Sumatra. *JBIO: jurnal biosains* 9(1): 63-69. (in English) ["Research on macrozoobenthic populations in Mariah Bandar Springs, Pematang Bandar District, Simalungun Regency, North Sumatra Province was carried out from May 2022 to June 2022. The purpose of this study was to gather information about macrozoobenthos populations in Mariah Bandar Springs and to find out about the diversity of macrozoobenthos populations in Mariah Bandar Spring Waters. This research was conducted in three locations, namely upstream, middle and downstream of Mariah Bandar Springs. There are each sub-location from each of these locations, in one location consisting of the upper, middle and lower ends. Each of the locations uses three points in macrozoobenthos sampling. Macrozoobenthos sampling using surber net. The results showed that there were 9 species of macrozoobenthos including *Lumbricus* sp, *Thiara winteri*, *Enallagma* nymph, *Thiara scraba*, *Corbicula fluminea*, *Chironomus* sp, *Orthetrum glaucum* larvae, *Hagenius brevistylus* [sic] and *Euplania* sp. Based on the Shannon-Wiener diversity index, locations I, II, III have low diversity ( $H' = 0.147$ )." (Authors)] Address: Sinambela, Masdiana, Biologi, Fak. Matematika dan Ilmu Pengetahuan Alam, Universitas Negeri Medan, Indonesia. Email: masdianasinambela@gmail.com

**21796.** Sittenthaler, M.; Fischer, I.; Chovanec, A.; Koblmüller, S.; Macek, O.; Sattmann, H.; Szucsich, N.; Zangl, L.; Haring, E. (2023): DNA barcoding of exuviae for species identification of Central European damselflies and dragonflies (Insecta: Odonata). *Journal of Insect Conservation* 27: 435-450. (in English) ["Monitoring of odonates has become an important instrument for ecological status assessment of (semi-)aquatic habitats. Besides information on presence and abundance, knowledge about a species' autochthony at the surveyed waterbody is a significant information within the assessment process. Here, the finding of exuviae represents the ultimate proof of successful reproduction. Although feasible for most odonate species, morphological identification of exuviae is often time consuming, as it relies

on small, fragile structures. To facilitate species identification of exuviae, a DNA barcoding approach was developed, including (1) non-destructive extraction of DNA using whole exuviae or their tracheal tubes, and (2) primer systems for long (< 600 bp) and short (< 200 bp) CO1 fragments. A total of 85 exuviae from 33 species were analysed and compared to results of morphological identification. Additionally, factors potentially influencing DNA quality and quantity, as well as PCR and sequencing success were investigated. Eighty-two exuviae matched the morphologically identified genus, and 60 matched at species level. Of the 33 species present in the data set, 82% could be identified to species level via DNA barcoding. The results show how DNA-based approaches can support fast and accurate species identification and therefore enhance monitoring of an ecologically important taxonomic group, with high relevance for conservation and habitat restoration. Moreover, the use of exuviae as DNA resource once more shows that non-invasive sampling offers great potential for molecular species identification, which is essential when studying rare and endangered species. Implications for insect conservation Our results show how molecular tools, here DNA barcoding of odonate exuviae, can support species monitoring without the need of catching individuals, harming, or even killing them. Obtaining DNA from non-invasive sources can thus be a direct advantage to the conservation of insects, especially when dealing with rare and endangered species and/or populations. Using the example of odonates as bioindicator organisms for aquatic and semi-aquatic habitats, we highlight the importance of non-invasive genetic approaches for population studies and monitoring of insect species and/or species communities for ecosystem assessments and conservation management." (Authors)] Address: Fischer, Iris, Central Research Laboratories, Natural History Museum Vienna, Burgring 7, 1010 Vienna, Austria. Email: iris.fischer@nhm-wien.ac.at

**21797.** Spoelstra, J.; Post, R. (2023): Groundwater characterization of the eastern Minesing Wetlands in support of the endangered Hine's emerald dragonfly (*Somatochlora hineana*). *Wetlands Ecology and Management* 31: 309-327. (in English) ["The Minesing Wetlands contain Canada's only known population of Hine's emerald dragonfly (HED), a species listed as endangered since 2011. The HED relies on groundwater discharge areas to complete its life cycle and therefore the population is potentially sensitive to changes in groundwater. The goals of this study were to, (1) characterize groundwater discharge to the eastern portion of the Minesing Wetlands, which corresponds to the HED habitat, (2) document any significant changes in groundwater chemistry since a 1998 study, and (3) establish a comprehensive baseline water quality data set to facilitate future comparisons. Consistent with HED habitats in the USA, the chemistry of Minesing Wetlands groundwater was dominated by calcium and bicarbonate. Low groundwater chloride and nitrate concentrations indicated minimal impact from activities such as road salt application and fertilizer use. Nitrate was generally only found at the wetland margin where groundwater springs emerged from the base of the uplands. The dominant form of inorganic nitrogen in wetland groundwater was ammonium (max = 1.5 mg N/L), and soluble reactive phosphorus concentrations were also relatively high (8 to 122 µg/L). The most consistent change in wetland groundwater chemistry between the 1998 study and samples collected in 2015–2017 was that chloride concentrations in 10 of 23 wells increased over time, however the maximum mean well chloride (11.6 mg/L) remained well below the guideline for the protection of aquatic life (120 mg/L). To preserve HED habitat, potential

impacts to groundwater need to be considered during land use planning for the recharge area." (Authors)] Address: Spoelstra, J., Environment & Climate Change Canada, Canada Centre for Inland Waters, 867 Lakeshore Road, P.O. Box 5050, Burlington, ON L7S 1A1, Canada. E-mail: John.Spoelstra@ec.gc.ca

**21798.** Tadhg, C.; Stafford, R.; Gillingham, P.K.; Bullock, J.M.; Brown, D.; Brown, M.; Walls, R.M.; Diaz, A. (2023): Correlated biodiversity change between plant and insect assemblages resurveyed after 80 years across a dynamic habitat mosaic. *Ecology and Evolution* 13:e10168: 13 pp. (in English) ["Historical data on co-occurring taxa are extremely rare. As such, the extent to which distinct co-occurring taxa experience similar long-term patterns in species richness and compositional change (e.g., when exposed to a changing environment) is not clear. Using data from a diverse ecological community surveyed in the 1930s and resurveyed in the 2010s, we investigated whether local plant and insect assemblages displayed cross-taxon congruence — that is, spatiotemporal correlation in species richness and compositional change — across six co-occurring taxa: vascular plants, non-vascular plants, Orthoptera, ants (Hymenoptera: Formicidae), hoverflies (Diptera: Syrphidae), and Odonata. All taxa exhibited high levels of turnover across the ca. 80-year time period. Despite minimal observed changes at the level of the whole study system, species richness displayed widespread cross-taxon congruence (i.e., correlated temporal change) across local assemblages within the study system. Hierarchical logistic regression models suggest a role for shared responses to environmental change underlying cross-taxon correlations and highlight stronger correlations between vascular plants and their direct consumers, suggesting a possible role for biotic interactions between these groups. These results provide an illustration of cross-taxon congruence in biodiversity change using data unique in its combination of temporal and taxonomic scope, and highlight the potential for cascading and comparable effects of environmental change (abiotic and biotic) on co-occurring plant and insect communities. However, analyses of historical resurveys based on currently available data come with inherent uncertainties. As such, this study highlights a need for well-designed experiments, and monitoring programs incorporating co-occurring taxa, to determine the underlying mechanisms and prevalence of congruent biodiversity change as anthropogenic environmental change accelerates apace." (Authors)] Address: Tadhg, Carroll, Leverhulme Centre for Anthropocene Biodiversity, Univ. of York, YO10 5DD, York, Wentworth Way, UK. Email: tadhg.carroll@york.ac.uk

**21799.** Tamm, J.; Opper, E. (2023): Ein Weibchen von *Cordulegaster bidentata* in der Rhein-Main-Ebene fernab der regulären Artlebensräume (Odonata: Cordulegasteridae). *Libellen in Hessen* 16: 71-77. (in German) [Hessen, Germany "A female *Cordulegaster bidentata* was observed by the second author on June 12, 2022 in a wet old grass fallow on the edge of the Gundwiesen in the nature reserve "Mönchbruch near Mörfelden and Rüsselsheim" in the northern Upper Rhine plain next to Frankfurt Airport. This first record of an imago of this species in the lowlands is described and discussed in more detail." (Authors)] Address: Opper, E., 65812 Bad Soden, Germany. Email: nachtfalter1@gmx.de

**21800.** Tantipanatip, W. (2023): The relationship between diversity of aquatic insects with water quality in Rama Public Park, Phra Nakhon Si Ayutthaya province. *Pathumwan Academic Journal* 13(36): 67-77. (in Thai, with English summary) ["Diversity of aquatic insects along with the water



quality in Rama Public Park, Phra Nakhon Si Ayutthaya province were examined 10 sites from June 2017 to April 2018. A total of 1,041 individuals in 22 families and 4 orders of aquatic insects were found in this study. The order Hemiptera had the highest number of families (7 families), followed by order Odonata (6 families), Coleoptera (5 families), Diptera (4 families). Physico-chemical water quality parameter at each site, such as total dissolved solids, biochemical oxygen demand and conductivity were significantly different ( $P < 0.05$ ). Most of physico-chemical water quality parameters in Rama Public Park were in class 3 and 4 of the Classification and Standards of Water of Thailand for agriculture. The correlation between physicochemical water quality parameters and aquatic insects were analyzed. The physico-chemical parameters, such as, water and air temperature, turbidity, BOD, pH and conductivity were significantly correlated with Coenagrionidae, Notonectidae, Dytiscidae, Corduliidae, Protoneuridae and Naucoridae ( $P < 0.05$ ). Assessment of water quality could lead to an administrative planning and management of water resources in the Rama Public Park. Promoting conservation of water resources should be emphasized." (Author)] Address: Tantipatanip, W., Dept of Environmental Science, Faculty of Science and Technology, Phranakorn Si Ayutthaya Rajabhat Universit, Phranakhon Si Ayutthaya, Thailand, 13000. Email: watcharapom@aru.ac.th

**21801.** Thio, H.B.; Ngiam, R.W.J. (2023): Biodiversity Record: Heterospecific pairing of scarlet skimmer and sultan dragonflies. *Nature in Singapore*, 16: e2023031. 2 pp. (in English) [heterospecific pair of a male *Orthetrum testaceum* and female *Camacinia gigantea*; Singapore Island, Upper Seletar Reservoir Park; 16-XII-2022; around 1136 hrs.] Address: Ngiam, R.W.J., National Biodiversity Centre, National Parks Board, 1 Cluny Road, Singapore 259569. Email: yanrobin@hotmail.com

**21802.** Toh, R. (2023): Biodiversity Record: The dragonfly, *Brachygonia oculata*, at Admiralty Park. *Nature in Singapore*, 16: e2023036. 1 pp. (in English) [Location, date and time: Singapore Island, Admiralty Park; 18-II-2023.] Address: Rachel Toh. Email: racheltzrq@gmail.com

**21803.** Trajanovski, S.; Zdraveski, K.; Trajanovska, S.; Budzakoska Gjoreska, B.; Zoroski, G.; Trichkova, T. (2023): Macroinvertebrate fauna of Belchishta Wetland, Republic of North Macedonia: Diversity and conservation status. *Acta Zool. Bulg.* 75(1): 133-144. (in English) ["This study depicts the results from the extensive monitoring of the invertebrate fauna of Belchishta Wetland, which is the largest preserved wetland in North Macedonia with an area of 137 hectares, including flooded forests and wet habitats. A total of thirty taxa belonging to eight systematic groups were registered, three of them being endemic species. Among the three endemic species, two are on the national list of endangered species. The thirty registered taxa of the invertebrate fauna of Belchishta Wetland point to a pronounced biodiversity, the framework of which includes endemic species with a narrow area of distribution and low abundance. These are justified arguments for the immediate adoption of conservation and protection measures through integral management of the whole Belchishta Wetland." (Authors) The list of taxa includes three odonate species: *Calopteryx virgo* Linnaeus, 1758, *Calopteryx splendens* Harris, 1780, and "*Calopteryx maculate* Beauvois, 1805" [sic, a North American species]] Address: Trajanovski, S., Public Scientific Institution Hydrobiological Institute Ohrid, Naum Ohridski Blvd. 50, 6000 Ohrid, Republic of North Macedonia. E-mail: trajsa@hio.edu.mk

**21804.** Tshimwandi, F.S. (2023): Feeding ecology of the African tigerfish *Hydrocynus vittatus* castelneau, 1861 in the floodplains of the Kavango river, Namibia. M.Sc. thesis, Biodiversity Management, Faculty of Agriculture, Engineering and Natural Sciences, University of Namibia: IX + 41 pp. (in English) ["The feeding ecology of the African tigerfish *Hydrocynus vittatus* was investigated in the floodplains of the Kavango River, Namibia. A total of 275 samples of tigerfish were caught, using a seine and an experimental multifilament gillnet, during the annual flooding period between February and May 2020. The result of the study shows a significant ontogenetic dietary shift ( $P < 0.05$ ) between size classes of tigerfish. The study also find a significant different ( $P < 0.05$ ) in the diet composition of different size classes of tigerfish, where small size class tigerfish (20 mm -149 mm) fed predominately on aquatic macro invertebrates, which contributed by percentage number 94.5 % (N%), feeding mainly prey on the group of Corixidae 42.5%, Notonectidae 25.5% and Letophlebiidae 18.2%. Medium size class tigerfish (150 mm – 190 mm) fed on both portions of fish (*Entomomus* spp) and aquatic macro invertebrates (*Trichoptera* and *Libellulidae*) and the large size class tigerfish (200 mm - 585 mm) were predominately piscivorous (68.2 % N), feeding mainly on *Cichlidae* 34.9% and *M. altisambesi* 15.9 %. Overall, the results of the study show that tigerfish did not consume prey larger than 150 mm in total length (TL), and the predator - prey length ratio was approximately 23%. The study findings show that tigerfish on the Kamutjonga floodplains feed predominately on aquatic macro invertebrates when in the early stages of life and are piscivorous in the adult stage life. The study results provide important information in understanding the dietary requirement of tigerfish in the Kamutjonga floodplains. Such information is important in conservation measure of tigerfish. Henceforth, the study recommended multi-species modeling studies based on predator-prey interactions, in order to better understand, resource use and partitioning among species on the Kamutjonga floodplain." (Author)] Address: not stated

**21805.** Tuhin, M.I.A.; Nasiruddin, M.; Nayem, Z. (2023): Diversity and relative abundance of entomofauna of four ecologically different areas of Chittagong University Campus, Bangladesh. *American Journal of Life Science and Innovation*, 2(2), 1–11.: 1-11. (in English) ["The present study was conducted to find the relative abundance and diversity of insects in the four areas of the Chittagong University (CU) campus from January 2018 to December 2018. The entire study found six orders - Odonata, Orthoptera, Coleoptera, Lepidoptera, Diptera, and Hymenoptera. Three families under Odonata, two under Orthoptera, four under Coleoptera, five under Lepidoptera, five under Diptera, and three under Hymenoptera were collected from the four study spots. Among them, fifteen species of Odonata, seven species of Orthoptera, seven species of Coleoptera, thirty-five species of Lepidoptera, five species of Diptera, and four species of Hymenoptera were identified. The highest number of insects (478) were collected in January 2018, whereas the lowest number of insects (404) were collected in August 2018. The highest abundance (1598) of insects was found in spot 1 (ground area) and the lowest (990) in spot 2 (hilly area). Lepidoptera (2688) was the most dominant order in the four studied spots, followed by Odonata (1453), Orthoptera (505), Coleoptera (223), Diptera (202), and Hymenoptera (186). During the study period, the highest species richness was observed in Spot 3 ( $2.61 \pm 0.01$ ) and lowest in Spot 2 ( $2.03 \pm 0.008$ ); the highest species diversity was observed in Spot 1 ( $1.36 \pm 0.02$ ) and lowest in Spot 2 ( $1.09 \pm 0.01$ ); and the highest species evenness was observed in

Spot 1 ( $0.53 \pm 0.006$ ) and lowest in Spot 2 ( $0.47 \pm 0.006$ ). Compared with the previous study, it can be concluded that the species diversity and abundance of Odonata, Orthoptera, and Lepidoptera were increased, whereas the diversity and abundance of Coleoptera and Hymenoptera were decreased. The abundance and diversity of insects depended on seasonal fluctuation and ecological and environmental conditions." (Authors)] Address: Nayem, Zannatul, Department of Zoology, University of Chittagong, Bangladesh

**21806.** Udayanga, L.; Perera, S.J.; Ranathunge, T. (2023): Chapter 24: Natural enemies against dengue. In: Meththika Vithanage, Majeti Narasimha Vara Prasad (eds.): One health: Human, animal, and environment triad. <https://doi.org/10.1002/9781119867333.ch24>: 351-362. (in English) ["Dengue is recognized as one of the most common and rapidly spreading mosquito-borne viral disease, causing approximately 100 million infections annually around the world, also making a major challenge to the health sectors of Sri Lanka, due to the absence of a specific treatment or a vaccine. Hence health entities around the world rely upon vector control as the primary management strategy for dengue prevention. Regardless of the availability of diverse vector control strategies, unintentional ill effects on the environment and the fast development of insecticide resistance have hindered their success. Biological control of larval and adult stages of *Aedes* vector mosquitoes using locally available natural predators provides a cost-effective, sustainable, and environmentally friendly strategy for dengue vector control. The remarkable ecosystem diversity in Sri Lanka harbors a wide range of natural predators of *Aedes*, which range from microscopic copepods (*Mesocyclops leuckarti* and *Mesocyclops scirassus*) to macroscopic dragonflies (*Pantala flavescens* and *Anax indicus*) and fish (*Aplocheilus dayi*, *Aplocheilus parvus*, and *Puntius bimaculatus*). Ongoing research recommends aforementioned native species as excellent biological control agents of *Aedes* over some exotic species introduced for the same purpose, as a major contributing aspect in integrated vector management for dengue." (Authors)] Address: Udayanga, L., Dept Bio-Systems Engineering, Fac. Agriculture & Plantation Management, Wayamba Univ. of Sri Lanka, Kuliyaipitiya, Sri Lanka

**21807.** Verheyen, J.; Cuyppers, K.; Stoks, R. (2023): Adverse effects of the pesticide chlorpyrifos on the physiology of a damselfly only occur at the cold and hot extremes of a temperature gradient? *Environmental Pollution* 326, 121438. (in English) ["Ecotoxicological studies considerably improved realism by assessing the toxicity of pollutants at different temperatures. Nevertheless, they may miss key interaction patterns between pollutants and temperature by typically considering only part of the natural thermal gradient experienced by species and ignoring daily temperature fluctuations (DTF). We therefore tested in a common garden laboratory experiment the effects of the pesticide chlorpyrifos across a range of mean temperatures and DTF on physiological traits (related to oxidative stress and bioenergetics) in low- and high-latitude populations of *Ischnura elegans* damselfly larvae. As expected, the impact of chlorpyrifos varied along the wide range of mean temperatures ( $12\text{--}34^\circ\text{C}$ ). None of the physiological traits (except the superoxide anion levels) were affected by chlorpyrifos at the intermediate mean temperatures ( $20\text{--}24^\circ\text{C}$ ). Instead, most of them were negatively affected by chlorpyrifos (reduced activity levels of the antioxidant defense enzymes superoxide dismutase [SOD], catalase [CAT] and peroxidase [PER], and a reduced energy budget) at the very high ( $=28^\circ\text{C}$ ) or extreme high temperatures ( $=32^\circ\text{C}$ ), and to lesser extent at the lower

mean temperatures ( $=16^\circ\text{C}$ ). Notably, at the lower mean temperatures the negative impact of chlorpyrifos was often only present or stronger under DTF. Although the chlorpyrifos effects on the physiological traits greatly depended on the experimentally imposed thermal gradient, patterns were mainly consistent across the natural latitude-associated thermal gradient, indicating the generality of our results. The thermal patterns in chlorpyrifos-induced physiological responses contributed to the observed toxicity patterns in life history (reduced survival and growth at low and high mean temperatures). Taken together, our results underscore the importance of evaluating pesticide toxicity along a temperature gradient and of taking a mechanistic approach with a focus on physiology, to improve our understanding of the combined effects of pollutants and temperature in natural populations." (Authors)] Address: Verheyen, Julie, Evolutionary Stress Ecology and Ecotoxicology, University of Leuven, Charles Deberiotstraat 32, 3000, Leuven, Belgium. Email: [julie.verheyen@kuleuven.be](mailto:julie.verheyen@kuleuven.be)

**21808.** Walia, G.K.; Chahal, S.S.; Singh, N. (2023): Chromosomal characterisation of three dragonflies' species (Odonata: Anisoptera: Gomphidae). *Proceedings of the Zoological Society* 76: 55-58. (in English) ["Dragonflies of the family Gomphidae (order Odonata) possess characteristic club-like structure in the last segment of abdomen. Male germ cell chromosomes of *Lamelligomphus biforceps*, *Nepogomphus walli* and *Onychogomphus grammicus* of family Gomphidae were investigated, using carbolfuchsin staining, C-banding, silver nitrate staining and sequence specific staining. All the three possess chromosome complement  $2n = 23$ , which is the type number of the family Gomphidae with XO/XX sex determining mechanism. Terminal C-bands are present on the autosomal bivalents, while bivalents show variation in distribution of NORs (Nuclear Organiser Regions). X chromosome is C- positive and NOR rich in all the species. All the autosomes show CMA3 (Chromomycin A3) bright signals in *Lamelligomphus biforceps*, whereas bright DAPI (4',6-diamidino-2-phenylindole) signals in *Onychogomphus grammicus*, and both DAPI and CMA3 bright signals in *Nepogomphus walli*. The X chromosome of *L. biforceps* possesses DAPI bright signals, while it reveals both DAPI and CMA3 bright signals in *N. walli* and *O. grammicus*. Cytogenetic analyses of all the species have been done for the first time." (Authors)] Address: Walia, Gurinder Kaur, Department of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab, India

**21809.** Wang, C.; Wang, X.; Yu, J.; Ding, B. (2023): Highly transparent carbon nanofibrous membranes inspired by dragonfly wings. *ACS Nano* 17(11): 10888-10897. (in English) ["Carbon nanofibrous membrane (CNFM) materials are commonly black and opaque, and their poor optical performance severely limits their application in emerging fields, such as electronic skin, wearable devices, and environmental technologies. However, it is extremely difficult for carbon nanofibrous membranes to achieve high light transmittance owing to their complex fibrous structures and high light absorption. Few researchers have studied transparent carbon nanofibrous membrane (TCNFM) materials. In the current study, a biomimetic TCNFM inspired by dragonfly wings is fabricated using electrospinning technologies and a self-designed patterned substrate, with the aim to construct a differential electric field. Compared with the disordered CNFM, the resultant TCNFM yields an approximately 18-fold higher light transmittance. The freestanding TCNFMs also exhibit high porosities ( $>90\%$ ), good flexibility, and good mechanical properties. The mechanism by which the TCNFMs achieve

high transparency and reduce light absorption is also elucidated. In addition, the TCNFMs display a high PM<sub>0.3</sub> removal efficiency (>90%), low air resistance (<100 Pa), and good conductive properties, including a low resistivity (<0.37 Ω cm)." (Authors)] Address: unknown

**21810.** Wasscher, M.; Hermans, J. (2023): Obituary: Bastiaan Kiauta (1937 – 2022). *Brachytron* 23: 3-6. (in Dutch, with English summary) ["On 26 March 2022, Bastiaan Kiauta (1937 – 2022) passed away at the age of 85. A short outline is given of his contribution to the study of dragonflies in the Netherlands. In the first place he contributed to the knowledge of dragonfly distribution, especially in the sixties. Secondly, he was the key initiator of the Dutch Dragonfly Researchers (the NLO), which was the predecessor of the NVL (Dutch Dragonfly Society) founded in 1997. In the third place, for more than 40 years he was editor-in-chief of the world dragonfly journal *Odonatologica* of the SIO. This journal is on the one hand a platform for publications, on the other hand Kiauta provided a summary of all publications which appeared in the period 1971-2013. His death marks the end of a special era in Dutch dragonfly study." (Authors)] Address: Wasscher, M., Minstraat 15bis, NL-3582 CA Utrecht, The Netherlands, E-mail: marcel.hilair@12move.nl

**21811.** Wildermuth, H. (2023): Libellen der Pfäffikersee-Gegend. *Ornithologischer Beobachter* 120(2): 131. (in German) [Verbatim (translation, Google translate): Lecture «Dragonflies of the Pfäffikersee area» Then Hansruedi Wildermuth, who knows dragonflies better than anyone else in Switzerland, presents the most important dragonfly species in Lake Pfäffikon and their habitats with magnificent pictures. Of the approximately 80 species occurring in Switzerland, almost 50 species have been identified in the Pfäffikersee area. Dragonflies spend most of their lives as larvae in water. They have very different ways of life and colonize different habitats such as the lake shore, ponds, fens, raised bogs, watercourses and ditches. A special feature of the Pfäffikersee is the dwarf dragonfly, which has its last location here in the canton of Zurich. In addition, it is only represented in Switzerland on Lake Neuchâtel. In order to promote the demanding species of large and small moss damsels, heavily forested raised bogs were cleared and peat cuts were renatured. Locations for observing dragonflies on the Pfäffikersee are the nature center in Pfäffikon, the Aa bridge and the boat harbor and the fishing piers at the southern end as well as the Messikommerweg through the Robenhuserried. At the end of his presentation, Hansruedi Wildermuth would like to thank everyone who works to preserve and enhance the landscape jewel of the Pfäffikersee. The audience thanked the speaker with long-lasting and hearty applause.] Address: Wildermuth, H., Haltbergstr. 43, CH-8630 Rüti, Switzerland. E-mail: hansruedi@wildermuth.ch

**21812.** Wondmagegn, T.; Mengistou, S. (2023): Development of macroinvertebrate based multimetric index for ecological health monitoring in Lake Hawassa, Ethiopia. *Environmental and Sustainability Indicators* 18, June 2023, 100242. in English ["Highlights: • A macroinvertebrate multimetric index (MMIH) was developed to assess the ecological condition of Lake Hawassa. • Habitat disturbance score against notable human activities was conducted to set reference conditions. • The newly developed MMIH index discriminates very well between the reference and non-reference sites of the lake. • It was validated and performed well in discriminating the reference and non-reference sites the independent data sets. Abstract: Little information is available on the use and applicability of biotic indices in

aquatic resource conservation and management in Eastern Africa, especially in lentic ecosystems. The aim of this study was to develop a macroinvertebrate multimetric index (MMIH) to assess the ecological condition of Lake Hawassa. Sampling sites were clustered based on percentage disturbance score (PDS) and categorized into minimally (three sites), moderately (three sites) and highly disturbed (three sites). Physicochemical and invertebrate sampling was done at these clustered sites along the lakeshore area from February to November 2015 and 2016. Out of a total of 35 macroinvertebrate candidate metrics, ten core metrics were selected based on redundancy analysis, metrics response to environmental parameters, percent discriminatory efficiency (%DE) and box and whisker plots, and incorporated in the development of MMIH. The developed MMIH index performed well and showed a clear demarcation between the reference and non-reference sites and between the three-disturbance levels. The validation of the MMIH index performed well in discriminating the independent data sets taken from Lake Hawassa and L. Ziway. Besides, it also showed a strong but inverse relation with PDS ( $R^2 = 0.91$ ,  $P = 0.0003$ ). Hence, in a lentic ecosystem, this index should be considered as a starting point in terms of lake bio-assessment in Ethiopia, but additional data in all ecoregions of the country are necessary to determine the long-term reliability and usefulness of the MMIH. In the short-term, this index will provide resource managers and aquatic environmentalists with a tool to assess the ecological condition of freshwater lakes." (Authors)] Address: Wondmagegn, T., Department of Animal Science, Debre Markos University, Debre Markos, Ethiopia. Email: wondmagegn@gmail.com

**21813.** Woods, T.; McGarvey, D.J. (2023): Drivers of Odonata flight timing revealed by natural history collection data. *Journal of Animal Ecology* 92(1): 310-323. (in English) ["(1) Global change may cause widespread phenological shifts. But knowledge of the extent and generality of these shifts is limited by the availability of phenological records with sufficiently large spatiotemporal extents. Using North American odonates as a model system, we show how a combination of natural history museum and community science collections, beginning in 1901 and extending through 2020, can be leveraged to better understand phenology. (2) We begin with an analysis of odonate functional traits. Principal coordinate analysis is used to place odonate genera within a three-dimensional trait ordination. From this, we identify seven distinct functional groups and select a single odonate genus to represent each group. Next, we pair the odonate records with a list of environmental covariates, including air temperature and degree days, photoperiod, precipitation, latitude and elevation. An iterative subsampling process is then used to mitigate spatiotemporal sampling bias within the odonate dataset. Finally, we use path analysis to quantify the direct effects of degree days, photoperiod and precipitation on odonate emergence timing, while accounting for indirect effects of latitude, elevation and year. (3) Path models showed that degree days, photoperiod and precipitation each have a significant influence on odonate emergence timing, but degree days have the largest overall effect. Notably, the effect that each covariate has on emergence timing varied among functional groups, with positive relationships observed for some group representatives and negative relationships observed for others. For instance, *Calopteryx* sp. emerged earlier as degree days increased, while *Sympetrum* sp. emerged later. (4) Previous studies have linked odonate emergence timing to temperature, photoperiod or precipitation. By using natural history museum and community science data to simultaneously examine all three influences, we show that

systems-level understanding of odonate phenology may now be possible." (Authors)] Address: Woods, T., Department of Ecology and Evolutionary Biology, The University of Tennessee, Knoxville, Tennessee, USA. Email: woodstaylorlizab@purdue.edu

**21814.** Wos, G.; Palomar, G.; Marszałek, M.; Babik, W.; Snięgula, S. (2023): The effect of temperature and invasive alien predator on genetic and phenotypic variation in the damselfly *Ischnura elegans*: cross-latitude comparison. *Frontiers in Zoology*, 10 Apr 2023, 20(1):13. DOI: 10.1186/s12983-023-00494-z PMID: 37032330 PMCID: PMC10084621: 14 pp. (in English) ["Background: Understanding and predicting how organisms respond to human-caused environmental changes has become a major concern in conservation biology. Here, we linked gene expression and phenotypic data to identify candidate genes underlying existing phenotypic trait differentiation under individual and combined environmental variables. For this purpose, we used *Ischnura elegans*. Egg clutches from replicated high- (southern Sweden) and central-latitude (southern Poland) populations facing different degrees of seasonal time constraints were collected. Damselfly larvae were exposed to experimental treatments: current and mild warming temperatures crossed with the presence or absence of an invasive alien predator cue released by the spiny-cheek crayfish, *Faxonius limosus*, which is only present in Poland to date. We measured the following traits: larval development time, body size, mass and growth rate, and used the larvae for gene expression analysis by RNA-seq. Data were analysed using a multivariate approach. Results: We showed latitudinal differences in coping with mild warming and predator cues. When exposed to an increased temperature and a predator cue, central-latitude individuals had the shortest development and the fastest growth compared to high-latitude individuals. There was a general effect of predator cues regarding mass and growth rate reduction independent of latitude. Transcriptome analysis revealed that metabolic pathways related to larval anatomy and development tended to be upregulated in response to mild warming but only in fast-growing central-latitude individuals. Metabolic pathways linked to oxidative stress tended to be downregulated in response to a predator cue, especially in central-latitude individuals. Conclusion: Different phenotypic and transcriptomic responses to environmental factors might be attributed to the variability in *I. elegans* life history strategies between the two latitudes caused by seasonal time constraints and to its coexistence with the invasive alien predator in nature. By providing insights into how organisms may respond to future anthropogenic changes, our results may be of particular interest in conservation biology." (Authors)] Address: Wos, G., Institute of Nature Conservation Polish Acad. of Sciences, al. Adama Mickiewicza 33, 31-120 Kraków, Poland. Email: wos@iop.krakow.pl

**21815.** Xu, J.; Liu, W.; Shang, W.; Chen, J.; Lian, J. (2023): Drop impact dynamic and directional transport on dragonfly wing surface. *Friction* 11(5): 737-747. (in English) ["The ability of dragonflies to fly in the rain without being wetted by raindrops has motivated researchers to investigate the impact behavior of a drop on the superhydrophobic wings of dragonflies. This superhydrophobic surface is used as a reference for the design of directional surfaces and has attracted extensive attention owing to its wide applicability in microfluidics, self-cleaning, and other fields. In this study, the static contact angle and rebound process of a drop impacting a dragonfly wing surface are investigated experimentally, whereas the wetting pressure, Gibbs free energy,

and Stokes number vs. coefficient of restitution are theoretically calculated to examine the dynamic and unidirectional transport behaviors of the drop. Results show that the initial inclination angle of the dragonfly wing is similar to the sliding angles along with the drop sliding. The water drop bounces from the bottom of the dragonfly wing to the distal position, demonstrating directional migration. The drop impacts the dragonfly wing surface, and the drop exhibits compression, recovery, and separation phases; in these three phases, the drop morphology evolves. As the Gibbs free energy and cross-sectional area evolve, the coefficient of restitution decreases as the drop continues to bounce, and the Stokes number increases." (Authors)] Address: Chen, J., School of Mechanical Engineering, Purdue University, West Lafayette, Indiana 47907, USA. E-mail: junchen@purdue.edu

**21816.** Yoshioka, A.; Mitamura, T.; Matsuki, N.; Shimizu, A.; Ouchi, H.; Oguma, H.; Jo, J.; Fukasawa, K.; Kumada, N.; Jingu, S.; Tabuchi, K. (2023): Camera-trapping estimates of the relative population density of *Sympetrum* dragonflies: application to multihabitat users in agricultural landscapes. *PeerJ* 11:e14881: 22 pp. (in English) ["Although camera trapping has been effectively used for wildlife monitoring, its application to multihabitat insects (i.e., insects requiring terrestrial and aquatic ecosystems) is limited. Among such insects, perching *Sympetrum* are agroenvironmental indicators that substantially contribute to agricultural biodiversity. To examine whether custom-developed camera traps for perching dragonflies can be used to assess the relative population density of darter dragonflies, camera trapping, a line-transect survey of mature adult dragonflies, and a line-transect survey of exuviae were conducted for three years in rice paddy fields in Japan. The detection frequency of camera traps in autumn was significantly correlated with the density index of mature adults recorded during the transect surveys in the same season for both *Sympetrum infuscatum* and other darter species. In analyses of camera-detection frequency in autumn and exuviae in early summer, a significant correlation was observed between the camera-detection frequency of mature adults and the exuviae-density index in the following year for *S. infuscatum*; however, a similar correlation was not observed for other darter species. These results suggest that terrestrial camera trapping has the potential to be effective for monitoring the relative density of multihabitat users such as *S. infuscatum*, which shows frequent perching behavior and relatively short-distance dispersal." (Authors)] <https://peerj.com/articles/14881/#supplemental-information>] Address: Yoshioka, A., Fukushima Regional Collaborative Research Center, National Institute for Environmental Studies, Miharū, Tamura-gun, Fukushima, Japan

**21817.** Zakqy, N.; Wiyatiningsih, S. (2023): Diversity of important pests and natural enemies in rice plants. *Nusantara Science and Technology Proceedings, Seminar Nasional Agroteknologi 2022*. doi: 10.11594/nstp.2023.3117.: 82-86. In English [The purpose of the study was to obtain data on pests and natural enemies in lowland rice cultivation. Pests are leafhoppers (*Nephotettix virescens*, *Nilaparvata lugens*), rice ear bugs (*Leptocoris oratorius*) or armyworms (*Mythimna separate*). Among the natural enemies *Orthetrum sabina* is listed.] Address: Wiyatiningsih, S., Department of Agrotechnology, Faculty of Agriculture, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Surabaya 60294, Indonesia. Email: sri.wiyatiningsih@upnjatim.ac.id



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

## 1999

**21817.** Roulon-Doko, P. (1999): Les animaux dans les contes gbaya: République centrafricaine. In: Baroin C. & J. Boutrais (eds.): L'homme et l'animal dans le bassin du lac Tchad. Paris. IRD: 183-192. (in French) [Wikipedia: The Gbaya, also Gbeya or Baya, are a people of western region of Central African Republic, east-central Cameroon, the north of the Republic of Congo, and the northwest of the Democratic Republic of Congo. In the language of this ethnic group, dragonflies are named "mbéléwél -, les libellules".] Address: [https://horizon.documentation.ird.fr/exl-doc/pleins\\_textes/pleins\\_textes\\_7/divers2/010020141.pdf](https://horizon.documentation.ird.fr/exl-doc/pleins_textes/pleins_textes_7/divers2/010020141.pdf)

## 2002

**21818.** Kulkarni, P.P.; Prasad, M.; Talmale, S.S. (2002): New record of damselfly *Pseudagrion microcephalum* (Rambur) from Maharashtra (Odonata: Coenagrionidae). *Bionotes* 4(3): 58. (in English) [1 ♂, Melghat Tiger Reserve, 22-VIII-1993, India.] Address: Kulkarni, P.P., Western Regn Stn, Zool. Surv. India, Vidyarnagar, Sector 29, Pune-411 044, Maharashtra, India

## 2003

**21819.** Kirti, J.S.; Singh, A. (2003): Studies on the male secondary genitalia of two species of genus *Sympetrum* Newman (Libellulidae: Anisoptera). *Fraseria* (N.S.) 7(1/2): 9-12. (in English) [The structure of the male secondary apparatus of *Sympetrum commixtum* (Selys 1884) and *Sympetrum haematoneura* Fraser 1924 are described and illustrated.] Address: Singh, A., Dept Zoology, Punjabi Univ., Patiala - 147 002 (Punjab), India. Email: [archu\\_speak@yahoo.co.in](mailto:archu_speak@yahoo.co.in)

## 2004

**21820.** Kara, C.; Cömlekcioglu, U. (2004): Investigation of Karacay's (Kahramanmaras) pollution with biological and psycho-chemical parameters. *KSU Journal of Science and Engineering* 7(1): 1-7. (in Turkish, with English summary) ["In this study, pollution level of Karacay (Kahramanmaras) has been investigated with biological and psycho-chemical parameters between October 2001 and April 2002. Three stations were determined for sampling in Karacay. Water samples were collected from these stations monthly during the study. From the samples pH, dissolved oxygen, conductivity, nitrite, nitrate, ammonium, phosphate were analyzed and aquatic macroinvertebrates were determined. It is observed that Karacay was polluted and macroinvertebrates were affected from this pollution." (Authors) The list of taxa includes *Anax* sp. and *Libellula* sp.] Address: Kara, C., Kahramanmaras Sütçü İmam Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, Kahramanmaras

**21821.** Wanner, M.; Anders, K.; Bischof, R.; Brozio, F.; Burkart, B.; Prochnow, A.; Riedel, H.; Schneider, D.; Wiesener,

C.; Zulka, K.P.; Zumkowski-Xylander, H.; Xylander, W.E.R. (2004): Aktiver Truppenübungsplatz Oberlausitz. In: K. Anders, J. Mrzljak, D. Wallschläger & G. Wiegler (Hrsg.): Handbuch Offenlandmanagement am Beispiel ehemaliger und in Nutzung befindlicher Truppenübungsplätze. Springer, Heidelberg: 261-278. (in German) [35 odonate species were found to inhabit the military training area in Upper Lusatia (Sachsen, Germany). The brief text on aquatic arthropoda points three species: *Brachytron pratense*, *Lestes barbarus*, *Coenagrion hastulatum*.] Address: Xylander, W., Staatliches Museum für Naturkunde Görlitz, PF 300154, 02806 Görlitz, Germany. E-mail: [Willi.Xylander@SMNG.SMWK.Sachsen.de](mailto:Willi.Xylander@SMNG.SMWK.Sachsen.de)

## 2005

**21822.** Jolivet, S. (2005): Espace naturel sensible: Le Marais du Rabuais: Inventaire odonatologique. Syndicat mixte d'aménagement et de gestion du Parc naturel régional du Vexin français, Théméricourt. <https://docplayer.fr/storage/63/49575797/1689496398/BQtrvWitnKgof1mRF9BXvw/49-575797.pdf>: 21 pp. (in French) ["The objective of this study was to highlight the presence and development in situ of remarkable Odonata in relation to the natural heritage present on the site called Le Marais du Rabuais (95). The study revealed the presence of 9 species which gives a list of 12 known species on this site. Among these, 3 are determining factors for ZNIEFFs in Île-de-France, one of them also being on the regional protection list. The site is an old marsh, where the colonization of ligneous species is very advanced. Reopening measures were conducted by the manager. The recommendations drawn up with a view to maintaining and promoting local biodiversity are to ensure the site's water supply both in terms of its quality and quantity, to act to preserve open environments and to possibly create puddles in the boggy meadows." (Author/Google translate)] Address: Syndicat mixte d'aménagement et de gestion du Parc naturel régional du Vexin français, Maison du Parc naturel régional du Vexin français, 95 450 Théméricourt, France

## 2006

**21823.** Bönsel, A. (2006): First results of mapping and monitoring four dragonfly species of the FFH Directive (Annex II and IV) in Mecklenburg-Vorpommern (Insecta: Odonata). *Schriftenreihe des Landesmuseums Natur und Mensch Oldenburg* 43: 38-45. (in English, with German summary) ["*Leucorrhinia pectoralis*, *L. albifrons*, *L. caudalis* and *Aeshna viridis* are present in Mecklenburg-Western Pomerania, *Stylurus flavipes* is only found on the Elbe. In the period 2001-2003, ten colonies of *A. viridis*, six of *Leucorrhinia albifrons* and three of *L. caudalis* became known through evidence of exuviae. *L. pectoralis* was observed at 51 sites, and exuviae finds at 18 bodies of water proved that it was native. It is assumed that this species has adapted to changing habitat conditions in eutrophic and thus relatively quickly silted up waters through a metapopulation structure. In order to be able to interpret the results of mapping on species distribution and monitoring, such facts and habitat claims must be

clearly clarified in the future. Habitat maintenance measures for such FFH species should also be discussed further, since it has been shown that habitat focuses vary in different geographical landscape units. Protective measures should then not be formulated uniformly in Europe." (Author/Google translate)] Address: Bönsel, A., Vasenbusch 15, 18337 Gresenhorst, Germany. E-mail: andre.boensel@gmx.de

**21824.** Bogdanovic, T. (2006): Ekološka, morfološka i citogenetička obilježja roda *Lindenia* (Insecta, Odonata, Gomphidae) u Hrvatskoj. PhD thesis, Univ. Zagreb; Doktorska disertacija, Prirodoslovno – matematički fakultet, Sveučilište u Zagrebu: VIII + 192 pp. (in Croatian) ["Ecology, morphology and cytogenetics of genus *Lindenia* (Insecta, Odonata, Gomphidae) in Croatia. - Based on the investigated ecological and morphological differences, two different populations of dragonflies of the genus *Lindenia* were established in Croatia. One is a species of *Lindenia tetraphylla*, while the other has different characteristics. In order to determine whether they are two different species or the same, a series of experiments were carried out in different areas. Ecological, morphological and cytogenetic characteristics of these populations were investigated. The results of research into the qualitative and quantitative composition of dragonfly fauna in coastal Croatia revealed a total of 52 species. Maps of the distribution of individual species in the researched area were created using the latest methods using GIS technology. Results of application of S&oslashash ; Rensen's methods in researching populations in this paper showed that in the researched area there are three types of population communities that are related to specific ecological conditions in the habitats. Seasonal and daily dynamics were investigated and it was determined that dragonflies are most active during the day in the late morning hours, and during the season from the end of June to the beginning of August. Some forms of behavior in dragonflies were investigated and it was determined that they can be classified into two groups. The first, behavior during the preservation of territories and the second, behavior during mating. Differences between the studied populations in the way of eating, choice of prey and manipulation of prey during feeding were also determined. The most important morphological features by which we can distinguish them have been investigated. They refer to the following external morphological characteristics: total body length, wingspan, body color, basic tan markings on the face, shape and structure of the male and female reproductive and receptive organs, and the shape, structure and size of additional sexual organs in males. The results of the research using statistical tests showed that there are significant morphological differences between the investigated populations and that based on morphological characteristics they can be considered different species. Cytogenetic studies of kinship at the chromosome level were made by comparing the number of chromosomes and their basic characteristics. For both populations, the X0/XX type of sex determination was determined, where the male is the heterogametic sex. In the samples of male species *Lindenia tetraphylla* as well as *Lindenia* sp. processed in this work in spermatogonial metaphases, the diploid number of chromosomes  $2n = 23$  and the corresponding chromosomal formula  $2n = 22a+X$  was determined." (Author//Google translate)] Address: not stated

**21825.** Kordges, T. (2006): Reproduktionsnachweise der Frühen Heidelibelle *Sympetrum fonscolombii* (SELYS) aus Abgrabungsflächen des Niederbergischen Landes, Nordrhein-Westfalen (Odonata: Libellulidae). Jahresberichte des naturwissenschaftlichen Vereins in Wuppertal 59: 145-157.

(in German, with English summary) ["Breeding records of *S. fonscolombii* from quarry areas of the Niederbergisches Land, Northrhine-Westphalia (Anisoptera: Libellulidae) - Between 1999 and 2005 several breeding records of *S. fonscolombii* originating from quarry areas of the Niederbergisches Land (Northrhine-Westphalia) confirm the continuous presence of this thermophilous species, which are discussed in context with the invasion of the species in Central Europe in 1996. In Northrhine-Westphalia species status actually seems to be changing from a rare guest to – at least regional – a native species with according consequences concerning its conservation status. Furthermore data are discussed concerning the breeding habitats and the complex phenology of the bivoltine species." (Author)] Address: Kordges, T., Ökoplan - Bredemann, Fehmann, Kordges und Partner, Savignystr. 59, 45147 Essen, E-Mail: thomas.kordges@oekoplan-essen.de

**21826.** Kulkarni, P.P.; Talmale, S.S.; Prasad, M. (2006): [Fauna of Sanjay Gandhi National Park (Borivali, Mumbai)]: Insecta: Odonata. Zool. Surv. India Conserv. Area Ser. 26: 19-40. (in English) ["During the faunistic surveys of Sanjay Gandhi National Park, Borivali, Mumbai conducted by Western Regional Station of Zoological Survey of India, approximately 147 specimens of Odonata were collected and identified. Those comprise 27 species distributed in 7 families and two suborders. Two species viz. *Vestalis gracilis gracilis* (Rambur) and *Vestalis apicalis apicalis* Selys are recorded for the first time from Maharashtra State." (Author)] Address: Kulkarni, P.P., Zool. Surv. India, W. Reg. Stn, Rawet Rd, Pune-411044, India

**21827.** Kulkarni, P.P.; Prasad, M.; Talmale, S.S. (2006): [Fauna of Todoba-Andhari Tiger Reserve (Maharashtra)]: Insecta: Odonata. Zool. Surv. India Conserv. Area Sci. 25: 197-226. (in English) ["During the faunistic surveys conducted by Western Regional Station of Zoological Survey of India, approximately 700 specimens of Odonata were collected from Tadoba Andhari Tiger Reserve, Dist. Chandrapur. Altogether 41 species were identified." (Authors)] Address: Kulkarni, P.P., Zool. Surv. India, W. Reg. Stn, Rawet Rd, Pune-411044, India

**21828.** Ocharan, F.J.; Torralba Burrial, A.; Outomuro, O. (2006): Confirmación de la presencia de *Anaciaeschna isosceles* (Müller, 1767) en Asturias y primera cita para Cantabria (N España) (Odonata: Aeshnidae). Boletín de la Sociedad Entomológica Aragonesa 39: 396. (in Spanish) ["Two other specimens are found in the Arthropod Collection of the Dept of Organism and Systems Biology of the Univ. of Oviedo. The first is a female with the tag Versalles (Avilés, Asturias) 27-V-1986 (J. M. Bruno leg.) that can be assigned to coordinates 30TTP62, at an altitude of less than 40 m a.s.l. The second is another female with the tag Muriedas (Cantabria) 28-VII-1992 (J. L. Herrero Coter leg.) (assigned to 30TVP30, at an altitude of less than 25 m a.s.l.). This specimen would represent the first record of the species for Cantabria, having already been cited in the Cantabrian coast of the Basque Country and Asturias (Saloña & Ocharan, 1984; Ocharan Larrondo, 1987). Preprint version of: Ocharan, F. J., Torralba Burrial, A., & Outomuro, D. (2006). Confirmation of the presence of *Anaciaeschna isosceles* (Müller, 1767) in Asturias and first record for Cantabria (N Spain) (Odonata: Aeshnidae). Bulletin of the Aragonesse Entomological Society, 39, 396-396. On June 8, 2006 we found a population of this species in Llanera, (30TTP723130, Asturias) at 162 m a.s.l. It is a set of shallow ponds with abundant emergent vegetation (*Typha* sp.), modification of the original

marsh ecosystem due to earth movements. Several males patrolling or perched and one female ovipositing alone were observed. One of the specimens was collected and is deposited in the Arthropod Collection of this Dept. Identified accompanying odonatafauna include *Ischnura graellsii*, *Anax imperator*, *Orthetrum coerulescens*, and *O. brunneum*. On equivalent dates of 2005 these companion species were flying, in addition to *Libellula quadrimaculata*, *Crocothemis erythraea* and immature *Sympetrum striolatum*." (Authors/Google translate)] Address: Outomuro, D., Depo Biología de Organismos y Sistemas, Universidad de Oviedo. 33071 Oviedo, Spain. E-mail: outomuro.david@gmail.com

**21829.** Outomuro, D.; Ocharan, F.J. (2006): De Monstruos & Prodigios: Depigmentación alar en *Calopteryx xanthostoma* (Charpentier, 1825) (Odonata: Calopterygidae). Boletín de la S.E.A. 39: 360. (in Spanish) ["Description of the teratological specimen: Mature male captured in the Narcea river as it passes through the town of Cornellana, (Asturias, N Spain; UTM 29TQJ306104), on 07.VI.2006. At this point the species coexists with *C. virgo meridionalis*. Despite having a completely normal morphology, the right forewing is virtually colorless, although a slight shade of pigmentation can be perceived. In addition, there are other quite marked depigmentation spots on the rest of the wings (moreover, they are frequent in *Calopteryx* populations). In this family, the definitive wing coloration is acquired during a period of maturation after the emergence of the adult individual. A greater proportion of the wing spot reveals a greater ability of the male to defend the territory, obtain more copulations and have fewer intestinal parasites, which feed on the food ingested by the host (Córdoba-Aguilar, 2002). These depigmentations would therefore be indicators of low biological efficacy for the individuals that present them, and could be the object of sexual selection (Siva-Jothy, 1999; Córdoba-Aguilar, 2002). The specimens are deposited in the Dept Biol. of Organisms and Systems of the Univ. of Oviedo." (Authors/Google translate)] Address: Outomuro, D., Depto de Biología de Organismos y Sistemas, Univ. de Oviedo. 33071 Oviedo, Spain. E-mail: outomuro.david@gmail.com

**21830.** Perez-Bote, J.L.; Torrejon, J.M.; Ferri, F.; Garcia, J.M.; Romero, A.J.; Gil, A. (2006): De Monstruos & Prodigios: Malformación abdominal en *Coenagrion mercuriale* (Charpentier, 1825) (Odonata, Coenagrionidae). Boletín de la S.E.A. 39: 372. (in Spanish) ["Description of the teratological specimen The specimen with abdominal deformation, captured on July 15, 2005 in Valle del Jerte (northeast of Cáceres), is a mature male that presented a downward turn of practically ninety degrees in the fifth segment (Fig. 2) not noting any other particularity in the individual in question, unlike in other described cases of deformities for the same species (Torralba Burrial and Ocharan, 2005). This deformation is due, presumably, to a problem that occurred during the emergence of the imago, when leaving the exuvia or later, before the hardening of the cuticle (Torralba Burrial and Ocharan, 2005)." (Authors)] Address: Pérez-Bote, J.L., Área de Zoología, Facultad de Ciencias, Univ. de Extremadura, 06071 Badajoz, Spain. Email: jlperez@unex.es

**21831.** Reels, G. (2006): Hainan, China, August 2005. Echo January 2006: 12-13. (in English) [ Report on a trip to Hainan between 24 and 31-VIII-2005 resulting in 41 odonate species and including *Planaeschna celia* Wilson & Reels, 2001.] Address: Reels, G., 31 St Anne's Close, Winchester SO22 4LQ, UK. E-mail: gtreels@gmail.com

**21832.** Wilson, K. (2006): Commercial odonate fishery at

Cao Hai, Guizhou Province, southwest China. Echo January 2006: 11-12. (in English) ["In August 2005 I travelled from Guangzhou to Weining in west Guizhou, Province, southwest China and visited a large montane lake known as Cao Hai. To my surprise I found the local Hui and Yee people actively engaged in commercial fishing for odonate larvae destined for human consumption" (2,215 m.a.s.l, 26° 51.442'N, 104° 167.194'E). "I examined the catch of one fyke net, which contained many bitterlings, small crucian carp and rice eels in addition to *Anax parthenope* larvae. Given the extremely high density of fyke nets the high numbers of small fishes and absence of large fishes was not unexpected. The commercial odonate fishery is based entirely on the capture of *Anax parthenope* larvae. The larvae are dried and sold at retail prices by merchants for ca 100 yuan per kg (US\$ 13/kg). Each kg contains several thousand *Anax* larvae. In Weining we encountered several dried food merchants supplying odonates with each trader holding stock of millions of dried larvae. The commercial fishery appeared to have no significant impact on the local population of *Anax parthenope*. During my short visit from 15th August 2005 to 19th August 2005 I observed many thousands of *Anax partheope* exuviae, which had successfully avoided entrapment in fyke nets and used clumps of emergent vegetation or the outside of fyke nets for support during emergence. In a local restaurant in Weining my group ordered a dish of odonates and were promptly served with a dish of freshly fried and seasoned larvae. Surprisingly they were quite tasty; a bit like oily crisps with no strong or unpleasant flavours." (Author)] Address: Wilson, K.D.P., 18 Chatsworth Rd, Brighton, E Sussex, BN1 5DB, UK. E-mail: wilsonkd@ntlworld.com

## 2007

**21833.** Cremona, F. (2007): Transfert de méthylmercure et structure des réseaux trophiques chez les macroinvertébrés littoraux. Dissertation, Sciences de l'environnement, Université du Québec, Montreal: XIV, 159 pp. (in French and English) ["Within the framework of the case study of the St Lawrence River of the COMERN network, the general objective of the thesis was to determine the role of coastal macroinvertebrates in the transfer of methylmercury (MeHg) in the ecosystem of Lake St Pierre. The first chapter was devoted to the quantitative contribution of non-edible invertebrates ("trophic dead ends") to the transfer of MeHg to fish. For this, the concentrations of total mercury (THg) and MeHg in four functional groups of coastal macroinvertebrates (grazers, detritivores, edible predators, non-edible predators) were measured. The results showed that non-edible predators had the highest concentrations of THg, MeHg and the highest proportion of MeHg/THg of all functional groups. The MeHg load (concentration\*biomass) of non-edible predators accounted for 10–36% of the MeHg pool of phytophilic invertebrates. This high proportion of MeHg sequestered in trophic impasses could help explain the low Hg concentrations measured in fish from Lake St Pierre. Our results show that non-consumable organisms must be taken into account in predictive models of Hg contamination of ecosystems in order to avoid overestimating the quantities of MeHg bioavailable to fish. In the second chapter, the objective was to determine the links between the source of organic matter (OM) and MeHg contamination in primary consuming littoral macroinvertebrates. An isotopic approach was applied to meet this objective. Autochthonous sources (epiphytes and macrophytes) predominated in the OM assimilated by primary consumers, with a lower proportion of allochthonous OM (particularly suspended particulate matter). MeHg/THg in macroinvertebrates was positively correlated with epiphyte

proportions, whereas the latter were negatively correlated with inorganic Hg fraction. This finding suggests that the main entry route for MeHg into littoral food webs is in the epiphytes. Primary consumers could then modulate the transfer of MeHg to higher trophic levels depending on whether they feed on OM sources with high or low MeHg concentration. The third chapter dealt with the influence of the functional group (grazer, collector, fragmenter, omnivore, predator, predator-hematophagous, biting-sucker) and spatiotemporal variables (year, month, sampling station) on the signature of  $\delta^{15}\text{N}$  of coastal macro invertebrates of Lake St Pierre. Station was the most important factor in explaining variations in  $\delta^{15}\text{N}$ , followed by sampling month and functional group. higher than those of the north shore which receives contributions from the Canadian Shield. The  $\delta^{15}\text{N}$  signature of the organisms increased by about 3‰ during the sampling period, from May to September, equivalent to one trophic level. The enrichment of  $\delta^{15}\text{N}$  from herbivores to predators averaged 1.6‰, which is lower than the 3.4‰ generally considered in organisms in the pelagic zone. Since isotopic fractionation is not homogeneous throughout the food web, we recommend using fractionation values specific to the considered trophic levels, in order to better reconstruct littoral food webs. In the last chapter, the roles of macrophyte habitat and architecture on the biomass and abundance of phytophilic invertebrates were investigated. We also calculated a lake-wide estimate of macroinvertebrate biomass associated with different macrophytic habitat types to estimate the quantitative effects of vegetation change on macroinvertebrate communities. Invertebrate community biomass, abundance, and richness were higher in submerged macrophyte habitats than in floating and emergent macrophyte habitats. Macrophytes with complex architecture did not host significantly more macroinvertebrate biomass than those with simpler architecture. In the case of a drop in the water level of Lake St Pierre, we predicted that the total biomass of phytophilic invertebrates would decrease by 16% at the lake level. In littoral food webs, it appears that energy and MeHg fluxes are not perfectly superimposed. First, the low trophic levels constituted by primary consuming macroinvertebrates are able to modulate MeHg fluxes depending on the nature of their OM sources. Secondly, among secondary consumers a significant proportion of the MeHg pool will be little or not available for transfer to fish. The small difference of  $\delta^{15}\text{N}$  between primary and secondary consumers allows us to express doubts about the usefulness of this tool as a tracer of the trophic level of an organism in the littoral zone compared to  $\delta^{13}\text{C}$ . " (Author) The list of taxa includes *Coenagrion* sp., *Libellula* sp. and *Aeshnidae* (Tab. 1.1)] Address: not stated

**21834.** Emiliyamma, K.G.; Radhakrishnan, C. (2007): Fauna of Kudremukh National Park (Karnataka): Insecta: Odonata. Zoological Survey of India. Conservation Area series 32: 27-48. (in English) ["The present study based on a representative faunal collection from KNP comprises of 32 species of Odonata from 21 genera under 7 families, a systematic account of which is presented below. This account forms the first authentic report on the odonate fauna of the Kudremukh National park. The specimens studies are deposited in the faunal depository of Western Ghats Field Research Station, Zoological Survey of India, Calicut." (Authors)] Address: Emiliyamma, K.G., Western Ghats Field Research Station, Zoological Survey of India, Calicut 673 002

**21835.** Harabis, F.; Dolny, A.; Plasek, V. (2007): Could the fen rise in a place of a strip mine lake? In: Kocárek P., Plášek V. & Malachová K. (eds.), Environmental changes

and biological assessment III. Scripta Facultatis Rerum Naturalium Universitatis Ostraviensis Nr. 163, Ostrava: 212-214. (in English) ["Since 2001 intensive survey of chosen bioindicative taxa (especially of dragonflies) has been carried out in the localities of anthropogenic origin in Karviná region (NE Silesia, Czech Republic). We have found several fen-living species (including endangered ones) on irrigated mine subsidence. Thanks to this discovery we could presume that irrigated mine subsidence could offer similar conditions such as fens. It is evident that observed species do not require strictly fen biotopes. ... The result of the survey was surprising. We have found 45 species of dragonflies in a relatively small area (see Tab 1 in Appendix). An occurrence of rare and endangered dragonflies in industrially devastated environment is anything unknown. Several rare dragonfly species which occurred in anthropogenic biotopes, with intensive mining activities have been described in the Czech Republic, e.g. *Sympetma paedisca* (Hájek & Mocek, 2000) or *Libellula fulva* (Dolný & Matijka, 2006). We have found some typical fen-living dragonfly species there, such as *Lestes virens*, *Somatochlora flavomaculata*, *Leucorrhinia pectoralis*, *L.rubicunda*. Observed species with similar biotope preference also has been: *Lestes sponsa*, *Aeshna juncea*, *Somatochlora metallica* and *Sympetrum danae*. Most of them are species with high bioindication value (Zachorowski & Buczyński, 1999). We supposed, that some species e.g. *Nehalennia speciosa*, *Leucorrhinia albifrons* didn't exist in Moravia and Silesia regions. This could be caused by geographical reasons." (Authors)] Address: Dolny, A., Dept Biol. & Ecology, Fac. of Science, Univ. of Ostrava, Chittussiho 10, CZ-710 00 Ostrava, Czech Republic. Email: ales.dolny@osu.cz

**21836.** Hübner, G. (2007): Ökologisch-faunistische Fließgewässerbewertung am Beispiel der salzbelasteten unteren Werra und ausgewählter Zuflüsse. Ökologie und Umweltsicherung 27/2007: 322 pp. (in German, with English summary) Hessen, Germany ["Against the background of the European Community Water Framework Directive this paper suggests possible methodology for an assessment of the ecological quality of streams on the basis of the macrozoobenthos aiming at an extensive consideration of the individual stream characteristics, taking the fluvial system of the lower Werra as an example. It examines how the considerable reduction and more regular spreading of the salt pollution of the Werra since the 1990s has impacted the macrozoobenthos and what quality class can be given to the ecological condition of the river and selected main tributaries." (Author) References to *Calopteryx splendens* are made.] Address: not stated

**21837.** Krech, M.; Schmidt, J. (2007): Erfassung und Bewertung der Libellenfauna (Odonata) in der Conventer Niederung: Ergebnisse eines faunistisch-ökologischen Projektes in den Jahren 2005 und 2006. Archiv der Freunde der Naturgeschichte in Mecklenburg 46: 115-123. (in German) ["The dragonfly fauna was also recorded in 2005 and 2006 as part of a faunistic-ecological project, which included the synoptical recording of site-typical invertebrate animal species groups in the Conventer lowland near Bad Doberan. A total of 29 species of dragonfly could be detected natively, whereby the area of the Rethwisch peat cuttings with 27 species of dragonfly represents the most valuable reproduction habitat. The occurrence of the endangered dragonfly species *Coenagrion lunulatum* and *Sympetrum pedemontanum* are of faunistic importance." (Author/Google translate).] Address: Krech, M., Auf der Großen Mühle 7, D-99198 Erfurt-Linderbach, Germany



**21838.** Schiel, F.-J. (2007): Starker Einflug von *Sympetrum fonscolombii* im Jahr 2007. *Mercuriale* 7: 17-28. (in German) ["A strong flight of *S. fonscolombii* in 2007 is documented based on our own random observations, evaluations of the GdO mailing lists and reports from several SGL employees. As can be concluded from the nationally highly synchronized reports of finds, the flight to Germany took place mainly during the last decade of May and reached its peak until mid-June. The first observations date to 18./19. May. The earliest observation of still uncured 2nd generation animals is from July 15th, the last one from October 15th. Nationwide, there are 91 records from 53 localities, including 64 records of the first generation at 44 sites and 23 records of reproduction of the second generation from 16 bodies of water. There was also evidence of development of the first generation in only two bodies of water. In addition, a further 49 reports of finds from Germany and Switzerland are documented. The frequency of the evidence and the high level of representation in the GdO mailing lists suggest an even larger flight event than in the years 1987 and 1996. An evaluation of the evidence in the SGL database from the last 31 years shows that reports of finds in Baden-Württemberg have increased significantly." (Author)] Address: Schiel, F.-J., Inst. Naturschutz & Landschaftsanalyse, Turenweg 9, 77880 Sasbach, Germany. E-mail: Franz-Josef.Schiel@INULA.de

**21839.** Ternois, V.; Lambret, J.-L.; Fradin, E. (2007): La Cordulie à corps fin *Oxygastra curtisii* (Dale, 1834): état des connaissances pour le Parc naturel régional de la Forêt d'Orient (Odonata, Anisoptera, Cordulidae). *Courrier Scientifique du Parc Naturel Régional de la Forêt d'Orient* 31: 77-87. (in French) ["Currently, *O. curtisii* is only known from the Aube and Seine valleys, their tributaries (the Voire) and their outlets (gravel pits, valleys, dead branches). However, considering the biotopes mentioned in the literature, it is not impossible that the species reproduces on certain fish ponds, or even on the lakes of the Orient Forest. For the latter, it is especially on the tails of wooded reservoirs that the species has the best chance of establishing itself. Elsewhere, the dynamics of these large reservoir lakes (increase in water levels until the end of June then a rapid drop in water levels at the beginning of July) does not seem favorable to the reproduction of this odonate. If the observations on the rivers (Aube, Seine and Voire) are not very important, the species is obviously very well established on the gravel pit systems of the Plaine de Brienne and the Seine. *O. curtisii* is relatively abundant in these areas, in particular on old gravel pits that are around 30 years old, with little or no maintenance. Some gravel pits are not sufficiently advanced today to allow reproduction, but they will be soon. Considering the future evolution of these spaces, there is no doubt that *O. curtisii* still has a bright future in Champagne-Ardenne, even if the transformation of many gravel pits into leisure areas may harm its establishment. Moreover, the reproduction now proven within alluvial gravel pits must be a major element to be taken into account in the rehabilitation and ecological enhancement of these artificial environments after the cessation of industrial activity. This favorable situation should not hide the fragility of the species in its original habitats. On watercourses, the conservation of riparian forests and hydraulic annexes remains essential to ensure the maintenance of populations." (Author/Google translate)] Address: Ternois, V., CPIE du Pays de Soulaines, Domaine de Saint-Victor, 10200 Soulaines-Dhuys, France. E-mail: cpie.pays.soulaines@wanadoo.fr

**21840.** Varanguin, N.; Sirugue, D. (2007): Inventaires des odonates patrimoniaux en Bourgogne. *Rev. sci. Bourgogne-*

*Nature* 5-2007: 66-88. (in French) ["The Burgundy Heritage Wildlife Observatory was set up by the Natural History Society of Autun and the Morvan Regional Nature Park in 2001. Its aims are to improve knowledge and its dissemination of threatened and indicator animal species, and to take them into account in the protection of nature in Burgundy. A specific program on heritage odonates began in 2003 and aims to identify sensitive species and their habitats at regional level, with a view to their integration into coherent conservation approaches. Systematic inventories of these species are thus carried out." (Authors/Google translate)] The focus of the study was set on *Cordulegaster bidentata*. The following species are also treated with some details: *Ophiogomphus cecilia*, *Somatochlora arctica*, *Oxygastra curtisii*, *Coenagrion mercuriale*, *Epithea bimaculata*, and *Ceriagrion tenellum*.] Address: Varanguin, N., Société d'histoire naturelle d'Autun - Maison du Parc - 58230 Saint-Brissson, France. E-mail: shna.nicolas@orange.fr

**21841.** Zessin, W. (2007): Variabilität und Formenkonstanz – Schlüssel für die Beurteilung fossiler Insekten. *Virgo - Mitteilungsblatt des Entomologischen Vereins Mecklenburg* 10(1): 45-56. (in German) ["Geologists and zoologists approach the description of fossil insects differently. Species definitions for extant and fossil species are (necessarily) different. Studies of variability in fossil insect material have (and could) only be carried out on a few taxa. A lack of features in the wing veins usually leads to a higher form constancy, vice versa, a wealth of features leads to higher variability. Where a sufficiently large number of fossil specimens are missing, one should consult recent comparative material with regard to form constancy and variability. Front (mesothoracic) and hind wings (metathoracic wings), left and right wings can usually be identified if there is sufficient material. Using examples of Mesozoic Elcanidae (Orthoptera), Paleozoic Phylloblattidae (Blattodea), Mesozoic Hymenoptera and Protomyrmeleontidae (Odonata), some results of comparative studies are presented. A new genus and species is established for the find of *Obotritagrion tenuiformum* Zessin, 1991, published by Ansoerge (1996) from the lias of Grimmen, Western Pomerania, Germany: *Grimmenagrion ansorgei* nov. gen. et sp. and two new subfamilies of the Odonata: *Protomyrmeleontidae* are established: *Obotritagrioninae* nov. subfam. and *Zirzipanagrioninae* nov. subfam." (Author/Google translate)] Address: Zessin, W., Lange Str. 9, D-19230 Jasnitz, Germany. E-mail: zessin@zoo-schwerin.de

## 2008

**21842.** Belancic, A.; Bogdanovic, T.; Frankovic, M.; Ljuština, M.; Mihokovic, N.; Vitas, B. (2008): Red Data Book of dragonflies of Croatia. Ministry of Culture, State Institute for Nature Protection, Zagreb: 132 pp. (in Croatian, with English summary) ["The Red List of Dragonflies of Croatia includes 18 regionally extinct (RE), critically endangered (CR), endangered (EN) and vulnerable (VU) taxa. The additional 18 taxa have the status of near-threatened (NT) and data deficient (DD). 34 taxa are frequent and not endangered in the Republic of Croatia, and five out of a total of 75 taxa of Croatia's dragonfly fauna recorded so far have been deleted from that list." (Authors)] Address: [https://www.haop.hr/sites/default/files/uploads/dokumenti/03\\_prirodne/crvene\\_knjige\\_popisi/Crvena\\_knjiga\\_vreten\\_aca\\_web.pdf](https://www.haop.hr/sites/default/files/uploads/dokumenti/03_prirodne/crvene_knjige_popisi/Crvena_knjiga_vreten_aca_web.pdf)

**21843.** Conze, K.-J.; Menke, N. (2008): Libellen in Nordrhein-Westfalen. Bearbeitungsstand, Inventar und aktuelle Entwicklungen. *Natur in NRW* 4/08: 2-6. (in German) ["The dragonfly fauna of North Rhine-Westphalia has been well

studied through the work of the AK Dragonflies NRW. Landscape and climate change have led to major upheavals in the past 200 years, and highly dynamic change in species can also be expected for the future. Ongoing surveys and targeted, species-specific protective measures are urgently required, also in order to be able to meet the increasing requirements in international cooperation for nature conservation." (Authors/Google translate)] Address: Conze, K.J., Listerstr. 13, 45147 Essen, Germany. E-Mail: kjc@loekplan.de

**21844.** Dyatlova, E.S.; Martynov, A.V. (2008): Interesting records of Odonata in the South-Western Ukraine. *Vestnik zoologii* 42(1): 76. (in English) [Verbatim: *Erythromma lindenii* is a rare species in Ukraine included into the Red Book (1994) with the I category of conservation status. It was recorded from new site: Odessa Region, Tatarbunarsky District, Dzhantishejskoe lake (SE of the Predanube lake Sasyk, 5 km NW of Liman village), N45°38'58.4" E029°50'17.4" (29.07.2007). More than 20 individuals were observed in the sagebrush vegetation near salt lake (obs. Dyatlova, Martynov). *Anax ephippiger* was registered for the new sites: Nikolaev province, Ochakov district, Kinburn peninsular, vicinity of Pokrovka village, lake Chimino, N46°28'20.5" E031°39'28.3". {male, female} and 4 flying specimens were recorded while «hunting» at the evening time (6.08.2007); ♀ was recorded on *Carex* sp. at night time (7.08.2007) (obs. Dyatlova, Martynov). 3 dead teneral specimens of *A. ephippiger* were recorded in the water of artificial pond in Odessa (Park "Po-bedy") and 2 specimens were flying around (11.08.2007), N46°26'31.7" E030°45'17.4" (obs. Martynov). *Sympetrum pedemontanum* is a rare species in Ukraine, especially in the south-western part of the country. One female was recorded in Nikolaev city (3.07.2007), from a permanent well-vegetated reservoir with stagnant shallow water near Ingul River mouth, N46°58'57.2" E031°59'27.3" (obs. Dyatlova).] Address: Dyatlova, Elena, Inst. Zoology, Faculty Biol., I.I. Mechnikov Univ. of Odessa, Odessa, Ukraine. E-mail: lena.dyatlova@gmail.com

**21845.** Escolà, J. (2008): Nova cita de *Platycnemis pennipes* (Pallas, 1771) a Catalunya (Odonata: Platycnemididae). *Boletín de la S.E.A.* 42(1): 442. (in Catalan, with Spanish summary and English title) [ "On July 3, 2007, a male specimen was captured adult (leg. et col. J. Escolà), from *Platycnemis pennipes* (in the Vall d'Aran region (Lleida). He was located at 17:00 h (time official) next to the Garonne River lock of the Center of Benós (31TDCH13, alt. 822 m) in some hedges right between the track forest (section of GR211-1) and the dam, a sunny space for the absence of trees, cut down to protect the electric wire." (Author/Google translate)] Address: Escolà i Garriga, J., Avda. Barcelona nº48 1er-1a 08700 Igualada, Spain

**21846.** Jakob, C. (2008): Résultats du suivi odonates pour la période de mai à octobre 2008 dans le cadre du suivi écologique en parallèle à des opérations de démolition au Bti sur le périmètre du Parc Naturel Régional de Camargue. Parc Naturel Régional de Camargue, Station Biol. Tour de Valat, Le Sambuc, Aries, France: 18 pp. (in French) ["Evaluation of Methods: The results of the monitoring of odonate adults in 2008 showed the effectiveness of the simplified method with regard to the census of frequent to dominant species. On the other hand, the rarest species in the Camargue, due to their erratic behavior (*Oxygastra curtisii*), or having a biological cycle with a very synchronized emergence (*L. macrostigma*), are generally not represented. The relative abundances obtained therefore fairly well reflect the structure of a population, made up of species hunting their

prey in the marshes and species that reproduce there. The adult monitoring method, decided in 2007, is therefore appropriate, however it would be wise to add one or two samplings at favorable times for certain rare species (eg May-June for *L. macrostigma*, *Oxygastra curtisii*). Especially since the latter is the only species present in the Camargue listed in Appendix II and IV of the "Habitat Directive" (Directive 92/43/EEC). Sampling of larvae and exuviae are generally means of proving the reproduction of the species on the site, of knowing the success of hatching and of calculating the abundance of the breeding species. However, with regard to the sampling of larvae in 2008, extended to the spring and using the surber technique, the results here are limited to providing proof of reproduction for 2 species in the habitat sampled. Identifying whether the very low number of specimens sampled is due to a technical or sampling frequency problem or to a very low number of clutches in these temporary habitats in 2008 is not clearly feasible. But the comparison with the core sampling the previous year shows a strong difference, which would rather indicate an effect of the year (hydrology, temperatures in spring). The same questions arise for the collection of exuviae, but it should also be noted that grazing on the sampled sites can greatly reduce the number of exuviae attached to the vegetation following the passage of cattle. The larval development of certain species takes place rather in the irrigation canals near the monitored temporary marshes which are very attractive for the imagoes which come to feed or shelter there. Followed This second year of study was able to provide the first quantitative results essential for the monitoring of Odonates. These results on specific richness by site and season show a non-significant difference between the control sites and the Bellugue site. This trend of a lower number of species at this station remains to be confirmed over an additional year. A conclusion on a possible effect of BTI treatment on species richness is currently impossible. The relative abundance of adult odonates observed, all seasons combined, highlights the dominance of four species (73%) on all sites, first *Ischnura elegans* and *I. pumilio*, then *Crocothemis erythraea* and *Orthetrum cancellatum*. A low number of species with high numbers corresponds to frequent functioning in rather extreme habitats (salinity, temporality) and not very heterogeneous (Begon et al., 1996), such as the Camargue. On the other hand, the difference between control sites and site treated with BTI remains to be further investigated. The relative abundance of adults by season and site show results related to their annual development cycle in temporary habitat. Thus, small species with a shorter larval development cycle appear earlier in the season, most Anisoptera species are observed later. The numbers observed at La Fangouse and Rousty tend to be larger but this needs to be confirmed by an additional monitoring season. The large variation in abundance between sites may be due to mass or "synchronized" hatching, which may have taken place on the day of the observation ("spring species", Corbet). This is frequently observed in odonates, which reproduce in temporary environments with strong temperature variations (Corbet, 1957; Suhling, 1994). Among the Libellulidae, mass spawning in temporary Camargue habitats is known and their interspecific larval behavior adapted to competition (Suhling, Lepkojus, 2001). Nevertheless, neither at La Bellugue nor at La Boutardière this phenomenon of mass hatching could be observed at this time. But these marshes dried up more quickly than the first two and the adults observed could come from neighboring permanent habitats. The variation in relative abundances between seasons for a given species seems to correspond to the known phenology for the species mentioned and does not show any particularities between sites. Shannon's diversity

index, commonly used for comparisons between sites (Pinkney et al, 2000), does not show any significant difference in central Camargue (including Bellugue). On the other hand, the index of the Boutardière station (MDV) is higher. This could be linked to the supply of fresh water and the proximity of running water sites which have an influence on the range of species. The Odonata group represents an important link in the Camargue ecosystems. With a complex life cycle, both aquatic and aerial predators, they are therefore twice exposed to possible changes in the abundance of prey and consequently their predators as well. Hafner (1971) was able to show that odonates made up about 12% of the prey species (by dry weight) of four species of herons. For this first year of extended study, the quantitative results on the populations of Odonates detect certain trends between control sites and sites treated with BTI. However, only longer-term monitoring can confirm these trends." (Author/Google translate)] Address: Jakob, Christiane, Tour du Valat, Le Sambuc, 13200 Arles, France. Email: christianeiakob@oranae.fr

**21847.** Karle-Fendt, A. (2008): Bestandserfassung der Libellen des Strausbergmooses mit besonderer Berücksichtigung der Alpenmosaikjungfer (*Aeshna caerulea*). Mitteilungen des Naturwissenschaftlichen Arbeitskreises Kempten 43: 3-8. (in German) ["In the 2006 season, the Strausbergmoos (1180 m above sea level, district of Oberallgäu, Bavaria, Germany; top map 8528/1) was systematically examined for dragonflies. The aim was to use quantitative exuvia collections at one of the two lowest localities in Bavaria to find out whether the population of *A. caerulea* is collapsing or even disappearing due to climate change. 61 exuviae were found in 19 inspections. This leads to the conclusion that the Strausbergmoos is still home to one of the largest occurrences of *A. caerulea* in Germany. In addition, the entire dragonfly fauna of the moor was examined except for *Cordulegaster boltonii* and *C. bidentata* that are bound to running water." (Author/Google translate)] Address: Karle-Fendt, A., Hofenerstr. 49, 87527 Sonthofen, Germany. Email: karle-fendt@t-online.de

**21848.** Kistermann, K.; Brux, H. (2008): Pflege- und Entwicklungskonzept für das FFH-Teilgebiet Heumoor (Lkr. Oldenburg) unter besonderer Berücksichtigung von Libellen (Odonata) und Bodenverhältnissen. Natur- und Umweltschutz (Zeitschrift Mellumrat) 7(1): 21-28. (in German, with English summary) [Niedersachsen, Germany; "The investigation area Heumoor, a former raised bog, has an expansion of about 90 ha. It is part of a larger nature reserve of high diversity (including heathland, two lakes and a part of the river Lette). The existing habitats are the results of dewatering and soil degradation leading to a vegetation which mainly consists of purple moor-grass, wetland, shrubs and trees. Soil, habitat types and dragonflies were investigated and other available information was evaluated. 17 dragonfly species (including 6 endangered) were recorded. Even though the critically endangered *Ceriagrion tenellum* was found to be indigenous for 10 years, emphasis is laid on certain species protection measures. The main objective is to obtain the good state of preservation for all habitat types according to the FFH-Directive as well as the protection of endangered species. The recommended main tool is raising the ground-water level in order to restore wetland habitat conditions. A set of accompanying measures including cutting of shrubs and trees in the bog and mowing of wet greenland is part of the management program." (Authors)] Address: Brux, H., IBL UmweltPlanung GmbH Bahnhofstr. 14a 26122 Oldenburg, Germany

**21849.** Krech, M.; Wanke, H. (2008): Zur Bedeutung von Abgrabungsgewässern als Reproduktionshabitat für Libellen (Odonata): Ergebnisse odonatologischer Untersuchungen an den Saaler Tongruben (Landkreis Nordvorpommern). Archiv der Freunde der Naturgeschichte in Mecklenburg 47: 37-50. (in German) ["Studies on the tourism significance of excavation waters and their potential as a breeding habitat for dragonflies are hardly available for Mecklenburg-Western Pomerania. In the years 2005 to 2008, odonatological investigations were carried out on ten bodies of water in an abandoned clay mining area in the district of Nordvorpommern. A total of 32 dragonfly species were found natively. The existence of 13 Red List M-V species and one FFH species demonstrate the odonatological importance of this type of water body as a reproduction habitat for dragonflies. The occurrences of *Lestes barbaras*, *Ischnura pumilio*, *Aeshna isosceles*, *Anax parthenope* *Epitheca bimaculata* and *Leucorrhinia pectoralis* are of faunistic importance. The exuvia finds of *Epitheca bimaculata* VolI represent the first evidence of the species at an excavation site in Mecklenburg-Western Pomerania waters to be considered." (Authors/Google translate)] Address: Krech, M., Auf der Großen Mühle 7, D-99198 Erfurt-Linderbach, Germany

**21850.** Kulkarni, P.P.; Talmale, S.S. (2008): An account of Odonata: Insecta from five conservation areas and two wetlands of Maharashtra, India. *Fraseria* (N.S.) 7: 51-54. (in English) ["Information on Odonate diversity based on actual collection of the specimens from five Conservation areas and two wetlands is presented here. Identification and distribution of 53 species representing 32 genera and 8 families in the five conservation areas- Melghat Tiger Reserve, Dist. Amravati, Pench National Park, Dist Naqpur, Tadoba Andhari Tiger Reserve, Dist. Chandrapur, Sanjay Gandhi National park, Borivali, Mumbai and Bhimashankar Wildlife Sanctuary, Dist. Pune and two wetlands include. Ujani Wetland Dists. Pune and Solapur and Nathasagar Wetland, Jaikwadi, Dists. Aurangabad. and Ahmednagar. Present survey made addition of 18 species to the previously known 46 species from the National Zoological Collection housed in the Western Regional Station of the Zoological Survey of India at Pune." (Authors)] Address: Talmale, S.S., Zoological Survey of India, Central Zone Regional Centre, Jabalpur, Madhya Pradesh 482002, India. E-mail: s\_talmale@yahoo.co.in

**21851.** Ngai, J. (2008): Trophic effects on nutrient cycling. PhD thesis, Fac. Grad. Studies (Zoology), Univ. of British Columbia, Vancouver: 83 pp. (in English) [Field work was conducted in the Area de Conservacion Guanacaste, in northwestern Costa Rica (10°59' N, 85°26' W). The dominant predator in this system is a damselfly larva (*Mecistogaster modesta* Selys, Pseudostigmatidae, Odonata), which is most common in bromeliads greater than 100 ml in capacity. "The top-down effects of consumers and bottom-up effects of resource availability are important in determining community structure and ecological processes. I experimentally examined the roles of consumers — both detritivores and predators — and habitat context in affecting nutrient cycling using the detritus-based insect community in bromeliad leaf wells. I also investigated the role of multiple resources in limiting plant productivity using metaanalyses. The insect community in bromeliads only increased nitrogen release from leaf detritus in the presence of a predator trophic level. When only detritivores were present, the flow of stable isotope-labeled nitrogen from detritus to bromeliads was statistically indistinguishable from that in bromeliads lacking insects. I suggest that emergence of adult detritivores constitutes a loss of nitrogen from bromeliad ecosystems, and

that predation reduces the rate of this nutrient loss. Hence, insects facilitate nutrient uptake by the plant, but only if both predators and detritivores are present. Moreover, predators can affect nutrient cycling by influencing the spatial scale of prey turnover. This mechanism results in a pattern opposite to that predicted by classic trophic cascade theory. Increasing habitat complexity can have implications for nutrient cycling by decreasing the foraging efficiency of both predators and their prey, and by affecting the vulnerability of predators to intraguild predation. Along a natural gradient in bromeliad size, I found that, depending on the relationship between community composition and habitat size, habitat complexity interacts with the changing biotic community to either complement or counteract the impact of predators on nutrient uptake by bromeliads. In contrast to the existing emphasis on single-resource limitation of primary productivity, meta-analyses of a database of 653 studies revealed widespread limitation by multiple resources, and frequent interaction between these resources in restricting plant growth. A framework for analyzing fertilization studies is outlined, with explicit consideration of the possible role of multiple resources. I also review a range of mechanisms responsible for the various forms of resource limitation that are observed in fertilization experiments. These studies emphasize that a wider range of predator and nutrient impacts should be considered, beyond the paradigm of single resource limitation or classic trophic cascades." (Author)] Address: Ngai, Jacqueline, Email: [ngai@zoology.ubc.ca](mailto:ngai@zoology.ubc.ca)

**21852.** Schmidl, J. (2008): Libellen- und Wasserkäferfauna schwäbischer Niedermoor-Gewässermeulanlagen. Evaluierung artenschutzfachlicher Relevanz und Besiedlungs-Sukzession der Libellen und Wasserkäfer in Niedermoor-Gewässermeulanlagen unterschiedlichen Alters und Ausprägung. Ökologisches Fachgutachten. bufos büro für faunistisch-ökologische studien, Nürnberg., im Auftrag des Bund Naturschutz Bayern e.V.: 117 pp. (in German) ["A total of 30 ponds from 12 fen areas were examined as part of a study on the colonization and biomass of new small water bodies in Swabian fens. The animal groups water beetles ... and dragonflies (larvae) were recorded semi-quantitatively and their relative biomass was determined. The water properties are determined and documented in the form of 19 physical-chemical parameters and other physiographic data. 62 species of water beetles and 22 species of dragonflies were detected and documented faunistically, including 15 species from the Red List of Bavaria (2003), 12 species of water beetles (1x RL1, 4 x RL 2, 7 x RL 3) and 3 species of dragonflies (2 x RL 2, 1x RL 3). Remarkably, more than half of the endangered species can be found in the higher endangerment categories "Critically Endangered" or "Critically Endangered", a clear indication of the species protection importance of the examined water bodies. The percentage of RL species in the total spectrum of species (84 species) is 17%, a high value. ... The occurrence of *Brachytron pratense* is remarkable. (RL 2, in the NSG Gundelfinger Moos and NSG Leipheimer Moos), *Somatochlora flavomaculata* (RL 3, in the NSG Meringer Hölle) and *Sympetrum flaveolum* (RL 2, in the Oberen Ried Oberndorf a. Lech). An evaluation of the examined waters and fen areas under faunistic-ecological aspects is carried out; For this purpose, a spectrum of fen character species is defined for the water beetle. In an in-depth analysis, the present work evaluates the species communities of water beetles and dragonfly larvae using multivariate methods and correlates them with the recorded environmental parameters. The data are analyzed using canonical correspondence analysis and other statistical applications. Detailed relationships between the recorded environmental parameters

and the species spectra of dragonflies and beetles in the individual bodies of water are shown, and mechanisms of action between individual nutrient components and the relative biomass supply in fen ponds are presented. Based on the results of the multivariate analyses, information on the creation and maintenance of new small water bodies is derived. It is shown that the construction of the ponds has a significant influence on the development of species communities typical of fens (with high proportions of stenök species, character species and Red List species). New plants showing the mineral soil cut below the peat cover and thus begin their succession on mineral substrate, build up higher biomass of insects due to the better supply of nutrients, however, the faunistic development begins with pioneer and communal pond settlers and only leads to the species communities typical of fens with increasing substrate coverage by detritus and peat. In contrast, new plants that remain in the peat body begin their biocenotic development with species communities typical of fens and higher species protection values. This control option is also pointed out in connection with the creation of feeding waters for ornithological objectives. In this study, the quantitative differences in the biomass of water beetles and dragonfly larvae in syntopically populated waters are described for the first time. Apparently, biological-bionomic, possibly also antagonistic properties of these two dominant predator groups among the insects of the fenland water community lead to the two groups having their maxima in terms of occurrence (number of species) and abundance (biomass) in different types of water bodies and in different trophic and structural configurations." (Author/Google translate)] Address: Schmidl, J., Am Kressenstein 48, 90427 Nürnberg, Germany, E-mail: [jschmidl@bioform.de](mailto:jschmidl@bioform.de)

**21853.** Zessin, W. (2008): Überblick über die paläozoischen Libellen (Insecta, Odonatoptera). Virgo - Mitteilungsblatt des Entomologischen Vereins Mecklenburg 11(1): 5-32. (in German) ["Paper presented at the 5th WDA Congress of Odonatology in Swakopmund, Namibia on April 16, 2007 and at the 4th Bonn Paleontomology Meeting on October 20, 2007: All Palaeozoic dragonfly genera (Odonatoptera) that were described up to the beginning of 2007 are listed with their localities, the wingspan of their individuals and their absolute age, as far as is known today, and most of the most important species are shown. Comments on the morphological details are given comparatively according to their importance. From the Obora Permian in the Czech Republic, the new genus and species *Oboraneura kukalovae* n. gen. n. sp. a new family *Oboraneuridae* n. fam. erected." (Author/Google translate)] Address: Zessin, W., Lange Str. 9, 19230 Jasnitz, Germany. E-mail: [zessin@zoo-schwerin.de](mailto:zessin@zoo-schwerin.de)

## 2009

**21854.** Bayer, N. (2009): Biodiversität von Libellen an künstlichen Stillgewässern unter Einbeziehung ökomorphologischer Gewässerbewertungen. Staatsexamensarbeit Technische Universität Kaiserslautern, Fachbereich Biologie: 106 pp. (in German) ["The aim of the present work was to record and evaluate the dragonfly fauna in a representative selection of still water bodies in the Palatinate Forest. For this purpose, in the period from mid-July to the end of September 2008, 17 wooges were examined for their dragonfly occurrences. The registration of the dragonflies focused primarily on the visual observation of reproductively active adults. In addition, freshly hatched animals and exuviae were searched for as evidence of the indigenous nature of a species. In addition, important structural and physical-chemical parameters of the water bodies were recorded. A total of 22



dragonfly species were identified, 18 of which were considered likely to be native, although it should be noted that only still waters were examined. Overall, the dragonfly fauna was dominated by euryemic species such as *A. cyanea*, *C. puella*, *I. elegans*, *P. nymphula* and *P. pennipes*, while specialized species were almost completely absent from the ponds studied. The typical running water species *C. boltonii*, *C. splendens* and *C. virgo* are only to be regarded as guests at the still waters. The latter in particular occurred with striking frequency but mostly in low abundance in the study waters. Particularly noteworthy are the finds of *C. hastulatum* and *L. dryas*, which are classified nationwide as highly endangered, each on one of the bodies of water. Furthermore, dragonfly species such as *L. sponsa* and *S. sanguineum* that prefer reed and reed areas could be detected, whereas dragonfly species that prefer floating leaf zones such as *A. imperator* and *E. najas* were rather rare and species such as *O. cancellatum* and *L. depressa*, which prefer to colonize water bodies free of vegetation, were almost completely absent. The detected species were described in terms of their habitat requirements and possible reasons for their distribution in the study waters were discussed. In addition, the results obtained during the inventory were statistically evaluated in order to be able to make statements about the connection between the number of species or the occurrence of endangered species on the one hand and certain biotope parameters such as Woog size, degree of shading and silting up on the other. The bodies of water differ considerably in terms of the number of species occurring there. It was shown that both the size of the water body and the degree of shading play an important role in biodiversity. Diversity is greatest in larger bodies of water with little shading. The degree of silting up, on the other hand, did not prove to be decisive for colonization of a water body by dragonflies. This is probably rather favored by the presence of certain vegetation structures. It was also determined that the occurrence of bog species is limited to dystrophic water bodies with intermediate bog silting up areas, since their occurrence depends, among other things, on the presence of peat moss (*Sphagnum spec.*). In order to be able to make concrete statements, however, a larger number of water bodies would have to be examined over a longer period of time." (Author)] Address: not stated; Bayer, Nadine

**21855.** Burk, G.; Ott, J.; Schröder, K. (2009): Entwicklung der Libellen im Eglinger Filz (Teil des FFH-Gebietes Nr. 8135-371) 2004 – 2008. Landesbund für Vogelschutz (LBV) Kreisgruppe Bad Tölz-Wolfratshausen (Hrsg.): 81 pp. (in German) ["Despite the well-known typical population fluctuations in dragonflies, the 5-year monitoring in the Eglinger Filz (Bavaria, Germany) resulted in very meaningful data. Odonata colonized the new moor water areas immediately after the rewetting – further good evidence that the renaturation made sense. Immediately after it began in 2004, the total number of individuals sighted per year doubled to over 1,000 specimens. The number of dragonfly species sighted increased by 71% to 48. The endangered species in particular benefited from the LBV measure. Their number even doubled. In 2008 alone, 5 new species were found, *Aeshna affinis*, *A. subarctica*, *Anax parthenope*, *Cordulegaster bidentata*, and *Sympetrum meridionale*. The rare new discoveries also include the eastern mermaid (2004) and the northern mermaid (2007 and 2008). A special thank you for financial support goes to Mr. Johannes Voith from the State Office for the Environment in Augsburg. The dragonfly investigations in the Eglinger Filz are to be continued.] Address: [https://bad-toelz.lbv.de/app/download/15313372124/Libellenbericht\\_-2004-2008.pdf?t=1674814562](https://bad-toelz.lbv.de/app/download/15313372124/Libellenbericht_-2004-2008.pdf?t=1674814562)

**21856.** Dommanget, J.-L.; Prioul, B.; Gajdos, A.; Boudot, J.-P. (2009): Document préparatoire à une Liste Rouge des Odonates de France métropolitaine complétée par la liste des espèces à suivi prioritaire. Décembre 2007 – réactualisation: décembre/février 2009. Société française d'odonatologie (Sfonat). Rapport non publié: 47 pp. (in French) ["A preparatory document for a new Red List of Odonates in metropolitan France is presented. The methodology used is inspired by the national application methods of the IUCN protocol. The approach adopted is the evaluation of the status of each of the species of the fauna of France to obtain a classification according to the categories proposed by the IUCN. The assessment was carried out on the basis of the eligibility conditions (reference period, native status, etc.), then using the "species" and "habitats" criteria (table III page 123). The "species" criteria include 1) the analysis of data from the Invod program, 2) a synthesis of the literature from which ten regional Red Lists were taken into account (table IV), 3) other criteria such as the fragmentation of populations, endemism, the different national and Western European protection statuses, etc. The "habitats" criteria have been added and take into account euryoeces species, which use varied environments, globally little or not threatened, and the stenoecious species, which develop in a smaller range of habitats, more threatened. The difficulties encountered show that the sole use of an inventory database is not sufficient for such an evaluation and that it is important to complete the analysis by using criteria based on expert opinion. The preparatory Red List brings together 27.5% of the fauna species of France, of which two are considered extinct, two others are in critical danger of extinction, eleven are in danger and ten are vulnerable. Species on the Red List and those classified in the "Near Threatened" category are included in the Sfonat priority species monitoring programme." (Authors/Google translate)] Address: Dommanget, J.-L., 7, rue Lamartine, F-78390 Bois-d'Arcy, France

**21857.** Guezoul, O.; Benai, A.; Bouzid, A.; Sekour, M.; Souttou, K.; Doumandji, S. (2009): Place des insectes dans le menu trophiques des jeunes du moineau hybride *Passer domesticus* X *P. hispaniolensis* dans la Palmeraie d'Assala à Assi Lekhiff (Ouargla, Sahara al Gerien). Actes du Séminaire International sur la Biodiversité Faunistique en Zones Arides et Semi-arides. Du 22 au 24 novembre 2009. Université Kasdi Merbah, Ouargla: 98-105. (in French, with English summary) ["The study of the trophic menu of the young people *To pass domesticus* X *P. hispaniolensis* is carried out for the first time in a palm plantation with 80 of Ouargla (34° 54' NR., 5° 20' E.). The analysis of the stomachic contents made it possible to identify 347 preys consisted a large fraction of insects in the young sparrows belonging to four categories of ages (100% for let us oisillons sparrow old from 1 to 3 days, 93.9% for the old individuals from 4 to 6 days, 99.0% for let us oisillons from 7 to 9 days and 97.7% for those from 10 to 12 days). The species about Lepidoptera are most intensely consumed by the four categories of age is the young people from 1 to 3 days (59.6%), from 4 to 6 days (78.8%), from 7 to 9 days (83.3%) and from 10 to 12 days (63.6%). Let us young from 1 to 3 days devour apart from Lepidoptera, of Heteroptera with a rate of 34.6%. In the same way the young people of the second category ingurgitant in addition to Lepidoptera, Heteroptera (7.6%) and Oligocheta (6.1%). The old chicks between 7 and 9 days introduce in addition to Lepidoptera, Heteroptera and Coleoptera each one with a rate of 6.3%. The last category of the young people consume in addition to the Lepidoptera, of the Coleoptera (18.2%)." (Authors) Libellulidae spec. indet. accounted very low to the diet of the juvenile birds." (Authors)] Address:

Guezoul, O., Département des sciences agronomiques, Univ. Ouargla, Algeria. E-mail: oguezoul@yahoo.fr

**21858.** Herrera T.; Blanco, F. (2009): Biodiversidad de los ecosistemas fluviales de la provincia de Málaga. *Jabega* 101: 55-65. (in Spanish) [27 odonate species are reported. "The rivers of the province of Malaga respond to the behavior of the Mediterranean region and is a clear ecological gradient from the west of the province, where the rivers are more plentiful and permanent, to the east, where there are more ephemeral stream channels, functioning as wadis. This coupled with the geographical situation of our province, halfway between Europe and Africa, has enabled the development of some interesting biological communities that inhabit our rivers." (Authors)] Address: Blanco, F., MEDIODES, Consultoría Ambiental y Paisajismo S. L. U Bulevar Louis Pasteur n.º 1, bloq. 2 1.º 1.29010 Málaga, Spain. Email: paco.blanco@mediodes.com.

**21859.** Kulkarni, P.P.; Talmale, S.S. (2009): Insecta: Odonata. *Zool. Surv. India. Fauna of Bhimashankar Wildlife Sanctuary, Conservation Area Series 42: 231-250.* (in English) [Bhimashankar Wildlife Sanctuary, Dist. Pune, India. Records of 24 odonate species are documented.] Address: Kulkarni, P.P., Zoological Survey of India, Western Regional Centre, Vidyanagar, Rawet Road, Sector 29, PCNTDA Post, Pune-411 044, India

**21860.** Montpeyó i Garcia-Moreno, D. (2009): Els Odonats d'Osona. *Col·legi Sant Miquel dels Sants: 74 pp.* (in Catalan, with English summary) ["The work "Odonats d'Osona 1988-2008" consists of a study of odonates in the region of Osona. Just over 20 years ago, the Meganeura group for the study of odonates began work with similar characteristics. "The Odonats of Osona 1988-2008", apart from studying the current situation of the odonates of Osona, it also aims to make a comparative study of both works, studying how the population has evolved in these 20 years and what they could have been the factors that have participated in this change. One of these factors, water quality, has been studied in detail using water quality analytics in 6 aquatic habitats in the county, to compare whether the quality has changed since the work of Meganeura, who also studied these same habitats. Finally, the aim is to determine which species in the region are threatened and which are protected by current legislation and which would serve to be used as bioindicators of water quality. It has been tried that the methodology of the work strictly follows the scientific method. We can divide the practical part of the work into two: Field work: it consists of trips of approximately two hours in 18 different habitats throughout the region with the aim of identifying the different species of odonates found there, in addition to noting the environmental conditions in which the departure was made. The aim is to obtain updated information on odonate populations. Based on the data obtained, a table has been drawn up, organized by registered appointments and by trips made, to work more comfortably and not make mistakes. Lab. work: with the water samples collected in the 6 habitats where Meganeura did its analyzes and at the same time of the year, analyzes were carried out to check how the quality of the water has varied and how this has affected the odonate population. The analyzes could be done by direct measurement (with probes), with chemical tests on site or in a Lab., depending on each parameter. The results that have been obtained point to an increase in the diversity of odonate species in the various habitats studied in the Osona region based on the results obtained by the Meganeura group in their work. From the parallel studies to

determine the water quality of the 6 habitats studied, it has been possible to verify that the waters of the region have, in general, experienced a remarkable improvement. With all the data and results obtained, the conclusion has been reached that the diversity of the odonate populations in the region has increased considerably over the last 20 years and this is most likely due to the improvement in the quality of the water experienced by Osona's watercourses and ponds, due to a tightening of regulations and the installation of treatment plants. It is necessary, however, to continue to ensure that its quality does not deteriorate again by combating the activities that still today continue to pollute the oceanic aquatic environment. ver, is to release information about dragonflies, which are unknown and not studied in detail." (Author)] Address: [https://recercat.cat/bitstream/handle/2072/43672/PJ\\_20090012601.pdf?sequence=1](https://recercat.cat/bitstream/handle/2072/43672/PJ_20090012601.pdf?sequence=1)

**21861.** Muscatello, J.R. (2009): Selenium accumulation and effects in aquatic organisms downstream of uranium mining and milling operations in northern Saskatchewan. PhD thesis, Toxicology Graduate Program, Univ. of Saskatchewan, Saskatoon: xxi, 232 pp. (in English) ["The overall objective of this thesis was to determine selenium (Se) levels in the major compartments of aquatic ecosystems and correlate these data with potential Se effects on early life stages of two native fish species. This work was conducted at two uranium (U) mines located in northern Saskatchewan, Key Lake mine and McClean Lake mine. In addition, a site fidelity study was conducted at Key Lake mine to evaluate movement patterns of northern pike inhabiting lakes receiving effluent discharges. At Key Lake mine, Se was accumulated and biomagnified several orders of magnitude higher than its concentration in water (0.7-2.7 µg/L) in lakes receiving discharges, with Se in prey organisms reaching levels above the proposed 3-11 µg/g dry weight (DW) dietary toxicity threshold for fish. Increased concentrations of Se in aquatic biota led to an increase in the Se concentrations in eggs and tissues of northern pike that rely on these organisms as food sources. Furthermore, increases in the incidence of Se-induced deformities above 30% were recorded in fry originating from adults exposed to high levels of dietary Se (> 3µg/g, DW). The increased frequency of deformities found in northern pike fry was associated with a significant increase in the level of Se in northern pike eggs from exposure sites (31.28 - 48.23 µg/g DW) compared to reference (3.19 ± 0.29 µg/g DW). At McClean Lake mine, Se was accumulated and biomagnified through the aquatic food chain with concentrations in some biota groups (e.g., forage fish) exceeding the lower limit (> 3µg/g DW) of the 3-11µg/g (DW) threshold for dietary Se toxicity in fish. Although both northern pike and white sucker females collected from the exposure site showed greater levels of Se in egg and tissues compared to fish collected from a reference site (likely caused by exposure to elevated levels of Se in prey organisms), no increases in Se-induced deformities were found in the developing fish larvae. The lack of a toxic response in fish larvae is in agreement with Se thresholds for early life stage deformities, with egg Se concentrations in northern pike and white sucker collected at the exposure site below the proposed 10 µg/g (DW) threshold associated with the presence of developmental abnormalities. The applicability of the proposed 7.91 µg/g (whole body, DW) Se toxicity threshold to cold water fish is controversial given that most of the research has focused on warm water fish. Therefore, there is an urgent need to conduct studies that allow us to better understand the environmental fate and effects of Se in north temperate (cold water) aquatic systems. The results of my research will contribute valuable information for the establishment of

a realistic and environmentally relevant Se threshold for the protection of fish populations in Canadian waters. During the site fidelity study, fish locations were seasonally and daily recorded using a Lotek SRX\_400 receiver with hand-held Yagi antenna. The results suggest that tagged pike did not migrate out of the study area throughout the study period, with the mean distance traveled ranging from 50 to 400 m. Differences in movement (distance traveled) and home range were found between reference and exposure sites. Overall data suggest that radio-telemetry is a useful tool in environmental studies. This information on northern pike behavior will be valuable towards developing non-lethal sampling methods that could be applied for assessing the effects of industrial discharges in north temperate aquatic ecosystems." (Author) The study includes many references to "Odonata".] Address: Email: [jrm202@mail.usask.ca](mailto:jrm202@mail.usask.ca); <https://harvest.usask.ca/handle/10388/etd-02122009-130012>

**21862.** Sherwin, S. (2009): Welchen Einfluss haben Sukzession und Klimawandel auf die Libellenzönosen von Stillgewässern? / Die Libellenzönosen von Stillgewässern in Münster (Westfalen). Diplomarbeit. Westfälische Wilhelms-Universität Münster: 33 pp. (in German, with English summary) ["The Odonata communities of 31 waterbodies were examined in 2008 and were compared with older surveys from 1997 and 2001. The waterbodies could be divided into an early or late succession stage by means of structural and hydrological parameters. Thirteen waterbodies could directly be compared with each other. To examine how the population of the species developed, all of the waterbodies from the current survey and the data from 1997 and 2001 were included in the analysis. The comparison of the thirteen waterbodies showed no differences with regard to species richness (26 vs. 24 species) or endangered species (each with 5 species). But the comparison of all waterbodies indicated that the southern species increased. For the first time the Mediterranean species *Crocothemis erythraea* was detected in Muenster at three young waterbodies with successful reproduction. The results show that the richness in species and the endangered species are higher in the early succession stage of the waterbodies than in later stages of succession. Except for *Erythromma viridulum* the southern species also prefer the early succession stage. The Odonata communities of 31 pools and ponds in Muenster were investigated in 2008. The waterbodies could be divided into seven different structural types by means of environmental parameters such as water-level fluctuations, submerged vegetation and marsh plants. The structural types were characterized by specific dragonfly communities. Character and differential species were described at the habitat and structural level. As regional character species for pools and ponds *Aeshna affinis*, *Ischnura pumilio*, *Lestes barbarus*, *L. dryas*, *L. sponsa*, *Libellula depressa* and *Sympetrum vulgatum* were specified. *Aeshna cyanea*, *A. mixta*, *Anax imperator*, *Erythromma najas*, *E. viridulum*, *Lestes viridis*, *Libellula quadrimaculata*, *Platycnemis pennipes* and *Sympetrum sanguineum* act as differential species for particular structural types in this habitat. Waterbodies in an early or middle succession stage have a higher species richness and more endangered species. On the basis of the required results the consequences for conservation are pointed out." (Author)] Address: not stated

**21863.** Tessier, M.; Sfreddo, G.; Ouin, A. (2009): Étude des peuplements d'odonates dans une plaine agricole du sud de la France. *Revue d'écologie - Terre et vie* 64(1): 41-50. (in French, with English summary) ["Odonata communities in an agricultural lowland in the South of France. — Odonata

communities were studied in an agricultural landscape where semi-natural habitat patches (pastures and woods, with a dense network of deep ditches) are embedded in a crop mosaic (cereals, irrigated maize). We compared species richness and diversity of aquatic plants and Odonata in ditches surrounded by pastures or by crops. Ours results showed that this surrounding (pastures vs crops) has no effect on aquatic plant and Odonata species richness and diversity. However, in cultivated areas water supply through irrigation and deep ditches with plant-covered borders could promote Odonata species. High level of vegetation cover (particularly with *Typha* sp.) limited Odonata richness and diversity. A rare species in Europe, protected and sensible to pollution, *Coenagrion mercuriale*, occurred in many ditches including those surrounded by crops, particularly those with an intermediate semi-aquatic vegetation cover. The regular maintenance of ditches, by limiting shrubs and trees height, keep them open and facilitate the dispersal of this little mobile species. Although irrigated crops seem to support a high level of Odonata diversity, a new intensification of agricultural practices in this area by increasing the pollutant input and/or by converting pastures to crops could be detrimental to Odonata communities and particularly to some species like *C. mercuriale*." (Authors)] Address: Tessier, M., Université de Toulouse, INP-ENSAT, UMR DYNAFOR, Avenue de l'Agrobiopole, BP 32 607, 31320 Castanet-Tolosan, France

**21864.** Torralba-Burrial, A. (2009): Estado ecológico, comunidades de macroinvertebrados y de odonatos de la red fluvial de Aragón. Zaragoza: Consejo Económico y Social de Aragón, ISBN: 978-84-692-1628-6: 224 pp. (in Spanish) [[https://www.researchgate.net/publication/236671179\\_Estado\\_ecologico\\_comunidades\\_de\\_macroinvertebrados\\_y\\_de\\_odonatos\\_de\\_la\\_red\\_fluvial\\_de\\_Aragon](https://www.researchgate.net/publication/236671179_Estado_ecologico_comunidades_de_macroinvertebrados_y_de_odonatos_de_la_red_fluvial_de_Aragon)] Address: Torralba Burrial, A., Depto de Biología de Organismos y Sistemas, Universidad de Oviedo, 33071 Oviedo, Spain. E-mail: [antoniob@hotmail.com](mailto:antoniob@hotmail.com)

**21865.** Vermeersch, G.; Beckers, K.; Maes, D.; Adriaens, T.; De Beer, D.; De Knijf, G.; Hendrickx, F.; Jooris, R.; Maelfait, J.P.; Van Den Berghe, K.; Van Keer, K.; Van Landuyt, W.; Van Thuyne, G.; Verbeylen, G. (2009): Een gericht natuurbeleid voor de prioritaire soorten in de provincie Antwerpen. *Antenne* 3(3): 14-20. (in Dutch) ["A targeted nature policy for the priority species in the province of Antwerp: In 2001, following the preparation of the Provincial Nature Development Plan (PNOP), the Institute for Nature and Forest Research (INBO) made an initial study to introduce the concept of 'typical', 'priority' and provincial 'attention' species on this basis (Bauwens D. et al, 2001) (figure 1). At the end of 2008, the Institute for Nature and Forest Research (INBO) and the province of Antwerp joined forces and INBO was asked to update that study. Based on the most up-to-date possible distribution data of various groups of species (higher plants, locusts, dragonflies, butterflies, spiders, fish, mammals, amphibians, reptiles and breeding birds), the province wants to scientific criteria lead to priority species for the provincial nature policy. This was done in collaboration with Natuurpunt Studie, Arabel, Saltabel and the Flemish dragonfly working group. The same methodology was followed for all taxonomic groups (Bauwens et. al, 2001). The group of mushrooms was examined by Natuurpunt Studie itself and a separate criterion was used for this on the basis of data from the database 'FUNBEL' (see the following article, page 21). Analyses were carried out by the various database managers in order to draw up a list of priority species per species group. If at least 33% of the current, known distribution area of a species in Flanders is located within the province of Antwerp

and if this percentage is also significant or if the species concerned appears on a Flemish Red List, it is initially included in the analysis. The province wanted to further refine the group of species into species of interest. An expert assessment was therefore formulated by all species specialists, on the basis of which the lists were further narrowed down and it could be clearly stated per species why it should be able to count on the necessary attention within Antwerp's nature and environmental policy. Species that only occur in European protected areas or areas where they can already benefit from efficient protection in another way, were therefore still excluded. In the end, 148 species were retained. A very high number of priority species are tied to stream and river valleys. This will give an extra boost to the efforts that the province is already making there." (Authors/Google translate) The list includes 13 odonate species: *Aeshna isoceles*, *A. juncea*, *Brachytron pratense*, *Calopteryx virgo*, *Coenagrion lunulatum*, *C. pulchellum*, *Gomphus vulgatissimus*, *Leucorrhinia pectoralis*, *L. rubicunda*, *Libellula fulva*, *Orthetrum coerulescens*, *Sympetrum depressiusculum*, and *Lestes dryas*.] Address: Knijf, G. de, Research Institute for Nature and Forest (INBO), Havenlaan 88 bus 73, 1000 Brussels, Belgium. E-mail: geert.deknijf@inbo.be

## 2010

**21866.** Ewald, N.; Nicolet, P.; Oertli, B.; Della Bella, V.; Rhazi, L.; Raymond, A.-S.; Minssieux, E.; Saber, E.; Rhazi, M.; Biggs, J.; Bressi, N.; Cereghino, R.; Grillas, P.; Kalettka, T.; Hull, A.; Scher, O.; Serrano, L. (2010): A preliminary assessment of Important Areas for Ponds (IAPs) in the Mediterranean and Alpine Arc. European Pond Conservation Network (EPCN), c/o Hepia, Univ. of Applied Sciences Western Switzerland, 1254 Jussy/Geneva, Switzerland: V + 41 pp. (in English) ["The Important Areas for Ponds (IAPs) concept was developed to raise awareness of geographic regions that support ponds of national or international biodiversity importance, and help focus strategies for pond monitoring, protection and appropriate management and creation. Ponds are vitally important for freshwater biodiversity and particularly recognised as stepping stone habitats. They also provide a range of ecosystem services and have been used for centuries by local communities. Ponds and pond networks are abundant across Europe and Northern Africa, in spite of significant losses, but are not adequately protected by current legislation even within the European legislative framework for nature conservation and water management. The information gathered during the identification of IAPs will be used to encourage better protection measures for ponds at the regional, national and international level, and their inclusion in biodiversity and water protection strategies (e.g. Water Framework Directive, River Basin Management Plans). In order to achieve greater protection for ponds in Europe there needs to be coordination between countries. The European Pond Conservation Network (EPCN), as part of the ProPond Project (Promoting Pond Conservation in Europe and the Mediterranean Region, a project supported by the MAVA foundation), has begun this work by concentrating on two biogeographical regions – the Mediterranean Basin and the Alpine Arc. Selection of IAPs was based on a set of criteria including the presence of species or habitats of conservation importance, pond density, and their socio-economic importance (providing this did not undermine their biodiversity value) and other factors such as important assemblages of species e.g. dragonflies and macrocrustaceans. IAPs were identified using both GIS techniques and expert knowledge from a wide range of pond workers including both researchers and practitioners. For this first analysis, 140 proposed IAPs

(pIAPs) have been identified in the Alpine Arc (30 pIAPs) and in the Mediterranean region (110 pIAPs), the latter including sites both from Northern Africa and the Middle East (28 pIAPs) and from Europe (82 pIAPs). A profile of each IAP has been produced with information on its (i) location, (ii) biodiversity, historical and social value, and (iii) threats. In the Mediterranean basin, pIAPs have been identified in 17 countries in Southern Europe, North Africa and the Eastern Mediterranean. The selected pIAPs reflect the heterogeneity of pond sites, and range from individual ponds in Spain supporting 18 species of European conservation importance to pond networks in Italy known to contain over 60 species of European conservation importance. Many areas qualified as IAPs because of high pond density (e.g. over 15 ponds per km<sup>2</sup> in Greece) whereas others qualified because they contained many ponds scattered over large areas (e.g. 1613 ponds over 200000 ha in Morocco), representing a dispersed but highly significant freshwater biodiversity resource in the region. The socio-economic value of ponds was also recognised in their identification as pIAPs: some such as in Israel show evidence of continuous use since the Roman occupation. Many IAPs, particularly in Northern Africa and the Eastern Mediterranean have no current protection, in spite of the habitats and species of conservation concern they support, and all are under significant threat from the increasing pressures of agriculture and development. Raising the profile of these sites through designation as IAPs will help to secure their protection and future sustainable management. In the Alpine Arc, a total of 30 pIAPs were proposed in the four main countries which made up the region. Some had exceptionally high pond densities (e.g. pIAPs with over 30 ponds per km<sup>2</sup> in the French Alps), whereas others in the same region comprise a single pond with important assemblages of species. Pond networks were also identified: some extended over large areas, exceeding 2000 ha in Italy, whilst others (e.g. in Austria) were concentrated within an area of less than 20ha. The majority of pIAPs in the Alpine Arc contained species of European conservation importance but also high altitude stenothermal species. However, these alpine ponds are not well represented in the list of pond types given under the Habitats Directive leading to a lack of designation within the European legislative framework of protected sites. The identification of networks of ponds in the Alpine region as IAPs will provide greater recognition of their importance to biodiversity at an international level. This is particularly relevant to high altitude sites, as they are under significant threat from climate change, an issue which requires cooperation and implementation of conservation initiatives at an international level. IAPs in the Alpine Arc also demonstrate the cultural importance of ponds. Many have a long history of use particularly within the traditional pastoral economy of the region. More recently pond networks are providing a valuable research and educational tool for both the scientific community and the wider public. This report is a preliminary assessment of IAPs in the Mediterranean and Alpine Arc region. Proposed IAPs (pIAPs) will be reviewed through a public consultation process and either accepted as a full IAP, modified or declined. The pIAPs identified as part of the ProPond Project will be published on the EPCN website. This should ensure that the information is rapidly disseminated to pond conservation practitioners and turned into positive action to protect and enhance the pond biodiversity resource. The pIAPs presented in this report incorporate the high quality ponds so far known: we anticipate that, as the profile and knowledge of ponds grows, aided by the IAP process itself, considerably more high quality pond will be found in these regions than have currently identified. The EPCN will now continue to coordinate and facilitate this work, building on the momentum of



the ProPond project. A key role of the network and its members is now to disseminate the information presented here as widely as possible as part of a consultation process, but also to inform international and national policymakers." (Authors) A copy of the study can be downloaded her: [https://www.researchgate.net/publication/266557938\\_A\\_preliminary\\_assessment\\_of\\_Important\\_Areas\\_for\\_Pond\\_s\\_IAPs\\_in\\_the\\_Mediterranean\\_Basin\\_and\\_Alpine\\_Arc](https://www.researchgate.net/publication/266557938_A_preliminary_assessment_of_Important_Areas_for_Pond_s_IAPs_in_the_Mediterranean_Basin_and_Alpine_Arc) Address: Ewald, Naomi, Pond Conservation: The Water Habitats Trust, c/o Oxford Brookes Univ., Gipsy Lane, Oxford OX3 0BP, UK

**21867.** Ferreira, R.G.N. (2010): Seleção sexual e sua relação com o dimorfismo sexual em três espécies de Zygoptera (Odonata) no Sudeste do Brasil. Ms. thesis. Faculty of Philosophy, Dep. Biol., Entomology, Univ. Sao Paulo: X + 60 pp. (in Portuguese, with English summary) ["Sexual size dimorphism (SSD) can in some species result from the selection acting through different mating systems. Behavioural studies of neotropical species are rare, and few is known about the Brazilian species. In this study, we described the behaviour of three neotropical species that occur in the Brazilian neotropical savannah: *Acanthagrion truncatum*, *Argia reclusa* and *Hetaerina rosea*. We demonstrate the SSD in these species and investigates through behavioural observations, how SSD develops in species with different mating tactics. With our results, we can see that in territorial species the males are larger than females, while in non-territorial species the females are larger than males. We suggest that, unlike other studies, in Zygoptera the kind of mating system adopted by males may determinate the SSD in a species." (Author) <https://teses.usp.br/teses/disponiveis/59/59131/tde-23042010-161204/publico/tese.pdf>]

**21868.** Jakob, C. (2010): Résultats du suivi écologique en parallèle à des opérations de démoustication au BTI sur le périmètre du Parc Naturel Régional de Camargue - Partie Odonates. Rapport final 2010. Parc naturel regional de Camargue. Rapport Odonates-BTI 2010: 14 pp. (in French) ["Conclusion and outlook for 2011: The results of the 2010 study on the sites in the Camargue confirm the significant difference observed in 2009 with a lower species richness observed on the sites treated with BTI compared to the untreated sites. The relative abundances vary between treated and untreated sites, distributed over a smaller number of species on the untreated sites, generally more common species. This result is similar to that of 2009. The integration of environmental variables important for the life cycle of Odonates via a statistical analysis made it possible to test their respective impact on Odonates compared with the BTI treatment. Thus, the hierarchical ANOVA analysis made it possible to identify the significant impact of BTI on species richness compared to two other factors (site and year), in which other factors are interwoven (conductivity, hydroperiod). This result is all the more important since currently, few studies are available on the long-term monitoring of the effects of BTI on non-target organisms in their natural habitat (e.g. Boisvert et al, 2004; Niemi et al, 1998, and recently Poulin et al, 2010). For 2011, the continuation of monitoring identical to that carried out in 2010, is proposed on the 7 sampling sites in 6 zones and during the 3 seasons of Odonate activity. The sampling campaign in 2011 will make it possible to use the same hierarchical analysis approaches for abundance and to extend the model to other factors such as conductivity." (Author/Google translate)] Address: Jakob, Christiane, Tour du Valat, Le Sambuc, 13200 Arles, France. Email: [christianejakob@orange.fr](mailto:christianejakob@orange.fr)

**21869.** Loong, F.C.; Hung, B.T.; Ngiam, W.J.R. (2010): Ode to Odonata. Nature Watch 18: 8-16. (in English) [The paper

provides "an introduction to help beginners find their way amongst a conspicuous and fascinating group of animals." (Authors)] Address: <https://www.nss.org.sg/articles/79631-c96-2V18N1.6-10.pdf>

**21870.** Schnauder, I.; Rudnick, S.; Garcia, X.-F.; Aberle, J. (2010): Incipient motion and drift of benthic invertebrates in boundary shear layers. River Flow 2010 - Dittrich, Koll, Aberle & Geisenhainer (eds) - © 2010 Bundesanstalt für Wasserbau ISBN 978-3-939230-00-7: 1453-1461. (in English) ["The present study aimed to identify threshold shear stresses to cause benthic invertebrates to drift in boundary shear layers. Lab. experiments were carried out in a small tilting flume, 10 cm wide and 3 m long with a closed recirculation system and a fixed sand bottom of uniform grain size. Benthic invertebrates from different orders (Achaeta, Gastropoda, Crustacea, Ephemeroptera, Odonata, Megaloptera, Trichoptera) were collected from a lowland river (Spree, Germany) and kept in aquariums to adapt to the Lab. conditions. Individuals were placed in the flume at low flow conditions, before gradually increasing the discharge until drift occurred. Photos were taken from the side through the flume walls to capture the behaviour and strategies of the organisms to cope with the flow. Photos against millimeter grid graph paper in the background were taken for each individual in order to quantify the body height and length exposed to flow. Subsequently, velocity and shear stress profiles were measured above the drift location with an Acoustic Doppler Velocimeter (ADV, Nortek Vectrino). Bed shear stresses were determined by extrapolation of the Reynolds shear stress profiles in subcritical flow conditions. For supercritical flow conditions, a simple particle tracking velocimetry was applied to determine velocity profiles. Bed shear stress was then estimated from fitting of a log-law. Results are presented in tabular form, containing the average drift shear stress and drift velocity for 15 taxa commonly found in lowland rivers. Drift shear stresses, which can be interpreted as abiotic 'absence' criteria of the species, were in most cases exceeding the conditions of preferential habitats and incipient motion threshold of the sediments. However, it was observed that sudden changes in the angle of flow attack (e.g. by burst events or surface waves) or direct interaction with sediment motion (animals hit by moving grains or erosion of the grains serving as anchorage) were key factors triggering invertebrate drift. ... 5.2.3 *Calopteryx splendens*, *Coenagrionida* sp. (damselflies): These damselfly species abundant in River Spree, are typically found in macrophyte stands where they are well camouflaged due to their slender morphology (Figure 4). We collected larvae shortly before emergence, thus having a body length of about 30 mm. Both taxa resisted the highest stresses and velocities reached, and in 85% of all tests they were not drifted at all. In the few drift incidents, the individual was moving towards the flume corners or lifted off the bed by a strong ejection event *C. splendens* applied rheotaxis by keeping the head low, while the abdomen was detached from the bed and legs absorbed near-bed turbulent fluctuations. Swimming movements by sweeping the tail back and forth were only observed for low velocities but not during drift. 5.2.4 *Gomphus vulgatissimus*, *Cordulia aenea* (dragonflies): These dragonfly taxa (Figure 5) live in loose fine sediments close to the banks and are active predators during night. They are not very agile and the physiognomy is adapted to dig into the substrate, where they hide during resting periods. Their claws were not suited well to attach to the grains and drift occurred quickly for all tests in subcritical conditions, often while moving towards the flume corners. For *G. vulgatissimus*, the drift stress is approximately in the range of the incipient motion of the sand used in the tests (*u*

. = 1.76 cm/s) and indicates the adaptation to life in lentic environment. When drifted, *G. vulgatissimus* propelled itself forward by sucking water into the body and expelling it through its anal pore. *C. aenea* has longer legs and a shorter body which allow it to sustain higher stresses than the shortlegged *G. vulgatissimus*." (Authors)] Address: Schnauder, I., Leibniz-Inst. Freshwater Ecology and Inland Fisheries (IGB), Berlin, Germany

**21871.** Tomasi, M. (2010): Die Biodiversität am Schlern. Naturparks Südtirol. Unter der Lupe. Autonome Provinz Bozen-Südtirol. Provincia Autonoma di Bolzano - Alto Adige: 32 pp. (in German) [On page 11, Odonata are treated. Verbatim: Summary of results Author: Reinhold Haller, Working group "Libella", Terlan - Taxa found in the study area: 19 - new taxa for South Tyrol: none - new taxa for the Schlern: 9 - new taxa for Italy: none - new taxa for science: none - particularly species-rich areas: Völser Weiher and a pond used as a watering place for livestock an extensively used pasture (St. Konstantin) Most of the species found are very common and widespread in the very common and widespread in the study area. However, no rare species was observed in the vicinity of rare species was observed. At the higher altitudes, on the summit plateau of the Schlern, only one single species was found: *Aeshna juncea*. Only *Cordulegaster bidentatus*, a wood dragonfly living along small along small watercourses, is an interesting find: *Aeshna juncea*. interesting find: It is considered rare in South Tyrol South Tyrol and has been included in the Red List. list.] Address: Abteilung Natur und Landschaft, Amt für Naturparke, Rittner Straße 4, 39100 Bozen, Italy

**21872.** Winter, P. (2010): Views and reviews: Britain's Dragonflies (second edition) by Dave Smallshire & Andy Swash. WILDGuides, 2010. 208pp., 428 photos, 290 illustrations and 66 maps. Sbk with plastic sleeve. ISBN 978-1-903657-29-4. £17.95. Atropos 41: 46-47. (in English) ["Most people with an interest in British dragonflies will be familiar with the original 2004 edition of this book, which received favourable reviews. Personally I felt that certain sections were crammed and, as skilfully created as the some species to be too small and sometimes difficult to distinguish from the background. Would the second edition improve these and other areas? On opening the book the answer was a definite 'yes'. There are 40 additional pages which have been used to expand several sections, a different font has been used, the layout of the text has been improved making it more readable, and the images have greater clarity. The Biology section, in addition to containing larger images to support the revised text, now has a page showing the stages of aging in a dragonfly, which I hope that newcomers to the subject Will read before diving straight into the species pages. The Habitats section also benefits from a modified layout making it easier to see the species found in different types of habitat. There is also a new page detailing some locations for rare, scarce and localised dragonflies. The summary identification charts, possibly the best innovation in the first edition with the key separating features in red text, are now spaced out over 12 pages rather than the original eight. Southern Emerald Damselfly *Lestes barbarus* and Willow Emerald Damselfly *L. viridis* have been added to the charts, the font is larger and more readable, there are fewer families per page, and the darters page now includes excellent drawings of the heads. There is also a two-page spread on identifying male emeralds, hawkers and emperors in flight. I was pleased to read that for Common Hawker *Aeshna juncea* the yellow costa 'may' be visible as it usually fails to be visible to me unless seen at very close range! The

species accounts benefit from a revised layout. As in the first edition the text and distribution map are on the left hand page with the photographs opposite. Set in a pale blue background and with the relief layer removed, each map is clearer in addition to being brought up-to-date. The paragraphs on Adult Identification, Eggs and Larva, Behaviour, and Breeding Habitat are, not surprisingly, largely unchanged. Confusion species now have their own paragraph captioned 'Look-Alikes' with references to the appropriate species pages. The Population and Conservation entries are revised to include recent changes. The main improvement in the species accounts is in the photographic plates. The images for damselflies are all now twice life-size, hawkers remain at life-size, and all other dragonflies are at x1.5. Many of the images are new and they stand out much better from the background than in the first edition. There are now 44 breeding species with the addition of the two emeralds and the removal of Highland Darter, which is now considered to be a form of Common Darter *Sympetrum striolatum*. These are followed by 19 former breeding, vagrant and potential vagrant species, each with the same two-page layout as the breeding species, making information fuller and easier to find. *Sympetma fusca* has moved from potential to actual vagrant, *Aeshna viridis* and *Epiptera bimaculata* are no longer thought potential visitors but *Lestes virens* now is. Although the book concentrates on adult identification the section on larvae and exuviae has doubled, now covering 20 pages. There are now 10 pages of larval identification charts in tabular format with the key identification features highlighted in red text. This section is now extremely clear and easy to use. I tried hard to find faults with the book. I would have preferred the use throughout of pterostigma rather than 'wing-spot' and some images are a little tight to the inner margin of the page, but these are just minor quibbles. At less than £18 you have an excellent, well laid out, well illustrated, bang up-to-date field guide that I would gladly recommend as the one dragonfly guide to take out into the field." (Author)] Address: not stated

## 2011

**21873.** Bjelke, U. (2011): Insektssafari i Kameruns regnskogar. fauna & flora 106(2): 32-37. (in Swedish) ["Insect safari in Cameroon's rainforests. "Tropical West/Central Africa has significantly fewer nature-interested visitors than the rainforests of Asia, Central and South America. It's a shame, because the area is spectacular and, for example, Cameroon is easier to visit than many people think. In order for the existing natural areas to be preserved, a greater influx of travellers is required." (Author/Google translate) The travelling report includes two odonate pictures identified as *Prodasineura* (= *Elatoneura*) *vittata* and *Chlorocypha cancellata*.] Address: Ulf Bjelke. Email: Ulf.Bjelke@slu.se

**21874.** Blanco, T.; Gavira, O.; Herrera, F. (2011): Estudios sobre el estado ecológico del río Genal (Málaga): Compatibilizando los trabajos científicos con la información directa a la población. VII Congreso Ibérico sobre Gestión y Planificación del Agua "Ríos Ibéricos +10. Mirando al futuro tras 10 años de DMA" 16/19 de febrero de 2011, Talavera de la Reina: 1-8. (in Spanish) ["The results of a project carried out by the Fundación Nueva Cultura del Agua on the characterization of the ecological state of the Genal River (Málaga) are presented. Said project constitutes a pilot and original experience because it is based on two differentiated but, at the same time, interrelated phases. On the one hand, a technical-scientific study of the ecological state of the river (water quality, aquatic macroinvertebrates, fish and riverbank

vegetation) was carried out. On the other hand, an intense effort was made to inform the population, especially the local one, about the results of the study. This experience, which has made scientific work compatible with direct and continuous information to the population, has proven to be a useful tool for the conservation of the river. In this sense, the local population itself, now informed and sensitized, is the one that is demanding the protection of this fluvial jewel in the south of the Iberian Peninsula. ... The community of aquatic macro-invertebrates in the Genal basin is extraordinarily diverse. In total, 91 different taxa belonging to 16 orders were identified. Of all of them, the Diptera and Trichoptera stand out with 18 and 13 families respectively. Other diverse orders are the Odonata (9 families), ... Among the macroinvertebrates, it is worth highlighting the order of the odonata (dragonflies and damselflies), which was made up of at least 18 species. *Oxygastra curtisii* and *Macromia splendens* were two of the most outstanding species of this faunal group. Both are considered "Endangered" and appear in the Andalusian Catalog of Threatened Species." (Authors/Google translate) Address: Blanco, F., MEDIODES, Consultoría Ambiental y Paisajismo S. L. Bulevar Louis Pasteur nº1 blq 2-1º-1 29010 Málaga, Spain. Email: paco.blanco@mediodes.com

**21875.** David, S. (2011): The importance of anthropogenic water biotopes on the example of dragonflies (Odonata) of Slovakia. *Životné prostredie* 45(4): 217-221. (in Slovakian, with English summary) ["We have assessed ecological significance of 5 anthropogenic water biotopes (Košské mokrade – wetlands) after the brown coal mining, water reservoirs, gravel pits, sand pits and lowland channels. We have used the data from 252 localities in which we found 22 270 specimens. The highest species richness has the gravel pits – 50 species, lowland channels – 48 species and water reservoirs – 45 species respectively. The first of them has the highest Shannon diversity ( $H' = 2.83$ ) as well. *Ischnura elegans*, *Platycnemis pennipes*, *Enallagma cyathigerum*, *Coenagrion puella* as well as eurytopic and stagnicolous spp. are the dominant ones. We confirmed 25 endangered and protected species for example *Coenagrion ornatum*, *Cordulegaster heros*, *Epitheca bimaculata*, *Libellula fulva*, *Orthetrum coerulescens*. The biotopes differ one from another and each of them also vary on the microhabitat level. Basically the evaluated biotopes are the dynamic ecosystems vulnerable to disturbance, the change of water conditions, the increasing eutrophication and the spread of both alien and invasive plants. Thus usages of older data have the limited period of validity." (Author)] Address: David, D., Katedra ekológie a environmentalistiky Fakulty prírodných vied Univerzity Konštantína Filozofa v Nitre – spoločné pracovisko Ústavu krajinej ekológie SAV Bratislava, pobočka Nitra s FPV UKF v Nitre, Tr. A. Hlinku 1, 949 74 Nitra, Slovakia. E-mail: stanislav.david@savba.sk

**21876.** David, S. (2011): Nový nález šidélka ozdobného *Coenagrion ornatum* (Selys. 1850) na Slovensku. Bryja, J., Eh´ak, Z. & Zúkal, J. (Eds.): *Zoologické dny Brno 2011*. Sborník abstrakt z konferencie 17.-18. února 2011: 50. (in Czech) [Verbatim(Google translate): A new discovery of *Coenagrion ornatum* (Selys. 1850) in Slovakia. In 2010, we carried out field research with the aim of supplementing the data on the European-important species - the ornamental stilt *Coenagrion ornatum*. At 18 localities in Hronská pahorkatin, Ipe ské pahorkatin and Ipe ské kotlin, we obtained 494 specimens, from which we identified 23 species of dragonflies. The research was carried out in localities with the potential occurrence of *C. ornatum*. 8 larvae of *C. ornatum* were detected at the locality Balog nad Ipom, code DFS

7980B2, 129 m a.s.l. The habitat of the species is a channel overgrown with vegetation with gap-like stands of willows, beech and inundated areas 50-60 m wide is mowed. In addition, the species *Calopteryx splendens*, *Ischnura elegans* and *Platycnemis pennipes* were found at the site. The location represents a typical habitat of the ornamental needlehorn. If the high water levels, typical of 2010, are not repeated, the confirmation of other locations of *C. ornatum* is highly likely.] Address: David, S., Dept of Ecology & Environmental Sciences, Faculty of Natural Sciences, Constantine the Philosopher Univ. in Nitra, Slovakia

**21877.** David, S. (2011): Bionomie vážky ervené *Crocothemis erythraea* (Brullé, 1832) (Odonata: Libellulidae) na Slovensku. Bryja, J., Eh´ak, Z. & Zúkal, J. (Eds.): *Zoologické dny Brno 2011*. Sborník abstrakt z konferencie 17.-18. února 2011: 50-51. (in Czech) [Verbatim (Google translate): Bionomics of *Crocothemis erythraea* (Brullé, 1832) (Odonata: Libellulidae) in Slovakia. Of the 10 species of the genus *Crocothemis* Brauer, 1868, *C. erythraea* occurs in Central Europe. The species is classified as an Ethiopian (Afrotropical) faunistic element with a tendency to spread from the Mediterranean in a northerly direction, occurrence is recorded from northern Poland. Currently (31.12.2010) I have 109 records of the species ( $n = 324$ , of which 7 exuvium and 34 larvae) from 76 localities in Slovakia. The locations are located in 47 squares of network mapping (out of 432 that extend into the territory of Slovakia). The most common type of habitat where larvae are found and found are dead river branches (21 records), ponds (15 records), small water reservoirs (10 records) and gravel pits (15 records). Hypsometrically, *C. erythraea* belongs to lowland species. The average altitude of occurrence is 195 m with a minimum occurrence at 98 m a.s.l. and a maximum at 683 m a.s.l. (1 entry). The highest frequency of occurrence is found at an altitude of 100 to 150 m above sea level (60 records = 55%), 19 records (17%) are from the height interval 150-200 m above sea level. *C. erythraea* is found in the most species-rich odonate coenoses of stagnant, eutrophic and vegetated waters. *Ischnura elegant*, *Coenagrion puella*, *Platycnemis pennipes* and *Enallagma cyathigerum* are eudominant in odonatocenoses with the occurrence of *C. erythraea*. *C. erythraea* currently shows no signs of invasive spread.] Address: David, S., Dept of Ecology & Environmental Sciences, Fac. of Natural Sciences, Constantine the Philosopher Univ. in Nitra, Slovakia

**21878.** Escola, J. (2011): Odonatofauna de la Conca d'Òdena (31TCG80). In: *Miscellanea Aqualatensia* 14 Edition: 2011 Chapter: 1: 13-39. (in Catalan) [In the Òdena basin (Spain) a total of 26 odonate species (including "*Onychogomphus* sp.") have been recorded. The species of the basin represent 37.68% of the species cited in Catalonia. The study includes a figure with phenology of the species and distributions maps. The records are documented in detail.] Address: Escolà i Garriga, J., Avda. Barcelona nº48 1er-1a 08700 Igualada (Barcelona), Spain

**21879.** Farkas, A.; Jakab, T. (2011): Data on the dragonfly (Odonata) fauna of the landscape Felső-Tisza-vidék (NE-Hungary). *Studia odonatol. hung.* 12: 65-75. (in Hungarian, with English summary) ["The paper presents faunistical data on odonate larvae, exuviae and adults collected along the Hungarian reaches of the rivers Tisza and Szamos in the area of the landscapes Beregi-Tisza-hullámter and Kraszna-Szamos-közi-sík (two geographical microregions within the mesoregion Felső-Tisza-vidék, NEHungary). Firstly the authors present the methods employed in the collection of

the specimens and in data processing, and introduce the literature considered in the identification of species and in reporting faunistical data. Thereafter they provide a detailed survey of the faunistical results from the sampling sites and finally summarize and evaluate the data on the dragonfly fauna. Collections were made in one year (2008), with the participation of 1 specialist on 73 days and 18 localities altogether, in 5 cells (EU 92, EU 93, FU 02, FU 03, FU 12) of the 10×10 km UTM grid map. In the report information on 1390 specimens (204 ♂♂, 158 ♀♀ and 1028 specimens with undecided sex) is given in detail [218 larvae (123 males, 95 females), 1028 exuviae (with undecided sex), 144 adults (81 ♂♂, 63 ♀♀)], representing altogether 580 faunistical data (23 larvae, 478 exuviae, 79 adults). In this study 5 species (1 Zygoptera and 4 Anisoptera) were recorded in the area, out of which 1 belongs to the frequent, 1 to the less frequent, 2 to the rare and 1 to the sporadic class of country-wide occurrence frequency." (Authors) *Calopteryx splendens*, *Stylurus flavipes*, *Ophiogomphus cecilia*, *Onychogomphus forcipatus*, *Gomphus vulgatissimus*] Address: Farkas, Anna, Debreceni Egyetem, Természettudományi és Technológiai Kar, Hidrobiológiai Tanszék, 4032 Debrecen, Egyetem tér 1, Hungary

**21880.** Hager, I. (2011): Faunistische Untersuchung von Quellbiotopen der Hangleitenwälder der Alz, Lkr Altötting – Ergebnisbericht 2010. Auftraggeber: Landschaftspflegeverband Altötting, Bahnhofstr. 38, 84503 Altötting: 10 pp. (in German) [Bavaria, Germany. The study includes records of *Cordulegaster bidentata*.] Address: Hager, Ines, Pranchstr. 13, 84503 Altötting, Germany

**21881.** Hutchinson, R.; Ménard, B (2011): *Stylurus notatus* Rambur (Odonata: Gomphidae): mise à jour de nos récoltes dans l'Outaouais, répartition géographique et quelques notes biologiques. *Nouv'Ailes* 21(2): 9-10. (in French) [Verbatim/Google translate: Until the mid-1990s, we did not suspect the existence of a large population of *S. notatus* on the banks of the Outaouais, in the locality of Luskville (N45°29.51' W76°0.438, alt. 32 m) (Menard 1996). Hence the absence of mention of this magnificent odonate for this locality in the work of Pilon and Lagacé (1998). We have since recovered, since visiting a first site a few times, from 1996 to 2011, on the banks of the Outaouais, allowed us to collect many exuviae. These were often found on stone walls, sometimes on blades of grass, aquatic plants, rarely on sand, mud or piles of dead vegetation (Hutchinson 2001). In 2011, we discovered a second environment, along the Outaouais, located about one hundred meters from the first. The rocky, muddy shoreline was littered with exuviae of *S. notatus*. Finally, our participation in the annual meeting of the Society of Odonatology of the Americas, which took place in Arnprior, Ontario, enabled us to collect other exuviae from this magnificent *Stylurus* for the Outaouais (Catling et al. 2005). First, we present the summary of our collections of *S. notatus*, to date, as well as some data gleaned from the literature concerning this gomphid. It is important to remember that our excursions generally lasted one or two hours at most. We left the place even if there were probably other exuviae not picked, lying on the ground or clinging to the stones. Summary of our collections of *Stylurus notatus* Luskville (Qc), first site 1996-2001, June 30 to August 5, 130 exuviae, plus 15 exuviae (Hutchinson 2001). June 11, 2005, no exuviae found, water too high. June 13, 2009, no exuviae found, however harvest of exuviae of a dozen other species of odonates. June 26, 2011, collection of about thirty exuviae and seven larvae which came out of the water and were preparing to emerge (see drawing of a larva and an exuviae). Luskville (Qc), second site August 13, 2011, collection

of 51 exuviae, often lying on the ground, sometimes buried in mud or among plant debris, for example in the leashes formed by the accumulation of the waves: three exuviae were suspended from spider threads. Westmeath (On), third site July 10-11, 2005, about twenty exuviae collected by the authors, plus those of other participants in the odonatological meeting (Catling et al. 2005). As Perron & Ruel (2002) demonstrated by collecting, for three years, on a daily basis, 2342 exuviae of *S. notatus* in the intertidal zone of the St. Lawrence River, at Saint-Augustin-de-Desmaures, near de Québec, the species still seems to be well established in the river and its tributaries. Our collection of exuviae along the Ottawa River is proof of this. Our brief harvests represent evidence that the species is surviving the harmful effects of pollution, including discharges, effluents from nearby towns and villages, not to mention changes and diversions of currents due to the erection of dams. It is interesting to read from the pens of Daigle & Vogt (1988) that *Stylurus notatus* has been rarely observed in the United States since the early 1940s. Hutchinson & Ménard (1999) presented known data on the species at that time. Needham et al. (2000) specify that this clubtail is known from three Canadian provinces, namely Quebec, Ontario and Manitoba, and from 21 American states. Still according to them, its flight period extends from May 30 to October 4 for the entire territory identified. Pilon & Lagacé (1998) mention sixteen localities for south-western Quebec, all in the cold temperate zone of the province. Mead (2003) writes that detectable exuviae are very numerous, but adults are rarely observed, which Walker (1958) had already mentioned. As far as we are concerned, we only have adults obtained by exuviation, therefore teneral individuals, after having collected larvae whose emergence was imminent. We hope, despite everything, to have the chance to capture adult, mature and reproductive individuals one day. The two aforementioned authors specify that the adults perform their long spectacular flight in a dive, in open water, in the middle of large expanses of water, to then take refuge in the crown of riparian trees, which is confirmed by Dunkle (2000). According to the latter, the male patrol is between noon and 3 p.m. Perspectives: Among the initiatives to be set in motion to better understand this elusive species, the following should be mentioned: 1) observing the flight of adults from a boat in the middle of large rivers on the banks of which are strewn the exuviae often in large number; 2) find ways to capture them in this wide open habitat; 3) establish patrol times for males; 4) look for larvae in the sandy bed of large rivers (Needham & Heywood 1929).] Address: Ménard, B., 16, rue Smith, Gatineau (Québec) J8T 3A1. Email: ménardben@vidéotron.ca

**21882.** Koch, K. (2011): Die Libellenfauna der Stillgewässer des FFH-Gebietes Kottenforst bei Bonn (Insecta: Odonata). Diplomarbeit. Rheinische Friedrich-Wilhelms-Universität Bonn: IV + 142 pp. (in German) ["In the present work, investigations were carried out on the dragonfly fauna of the still waters of the fauna-flora-habitat area Kottenforst near Bonn (North Rhine-Westphalia). For this purpose, from April to October 2010, 30 bodies of water of different sizes and locations were examined, which were distributed over the approximately 40 km<sup>2</sup> area. The adults were recorded by visual observation and catching nets, the exuviae and larvae by random searches. One focus was on the comparison of bodies of water that had existed for a long time with those that were created by the Bonn Biological Station in the years 2006-2008 as part of species protection projects. The investigation of the still waters of the Kottenforst, consisting of five inspections per water body, yielded 2482 observations of imagines, 847 exuvia and 975 larvae. The total



spectrum of species consisted of 23 species, one of which is a running water species. The main species found in the Kottenforst were *Coenagrion puella*, *Pyrrhosoma nymphula*, *Aeshna cyanea*, *Sympetrum sanguineum* and *S. striolatum*, as well as *Lestes viridis*. The remaining 18 species appeared as companion species with less abundance and less continuity. 15 native species, one potential native species and seven guests were recorded. Taking into account the current Red List and thus the latest knowledge at state level, the species spectrum consists of 18 endangered species, two species on the early warning list, two endangered species (*Aeshna juncea*, *Ischnura pumilio*) and one highly endangered species (*Lestes dryas*). The historical comparison of the data showed that many earlier species could no longer be confirmed for the Kottenforst, probably because their habitats were destroyed. In addition, there was a low number of climate change beneficiaries compared to other areas, since the area has a (still) cool climate due to its abundance of trees and the elevated position. There was no significant difference in the number of imagines or species between the biostation and the backwaters. A clear concentration of endangered species of the current Red List of North Rhine-Westphalia on the biostation waters was recognizable. Eight parameters were examined to examine possible influencing factors for the detection probability of dragonflies. It could be determined that the factors time of day, wind, cloud cover, predators and disturbing factors have no significant influence on the presence of dragonflies. On the other hand, the time of inspection, the air temperature and the current level of sunshine in a body of water at the time of mapping proved to be significant. To determine habitat preferences, seven different parameters were examined. Of these, the factors of water temperature, electrical conductivity and pH had no significant impact on the number of imagines found or the number of species. An influence on the number of species could be determined in relation to the size of the water body (area/circumference) and the type of soil substrate. The design of the banks turned out to be a significant factor with regard to the number of imagines. The investigations into the species spectrum of the vegetation yielded relatively homogeneous results for the 30 investigation water bodies. The degree of coverage of different vegetation categories turned out to be the decisive parameter. The investigation of the populations in the Kottenforst revealed a balanced sex ratio in the exuviae and a clear excess of males in the imagines. In summary, it can be said that the Kottenforst is interesting for dragonflies due to its mosaic of water bodies of different stages of succession and has an average dragonfly fauna for a deciduous forest area. The maintenance of the existing habitats and the creation of new habitats should take place in order to maintain the current status or to improve it." (Author/Google translate)] Address: Koch, Katharina, c/o Biostation Bonn-Rheinerft, Auf dem Dransdorfer Berg 76, 53121 Bonn, Germany

**21883.** Leandri, F. (2011): Le libellule in provincia di Cremona. Centro di documentazione ambientale Quaderni 15: 96 pp. (in Italian) [Italy; 41 odonate species are treated.] Address: [https://bibliotecadigitale.provincia.cremona.it/quadernicda/download/la%20libellula%20in%20provincia%20di%20cremona\\_dimesioni\\_ridotte.pdf](https://bibliotecadigitale.provincia.cremona.it/quadernicda/download/la%20libellula%20in%20provincia%20di%20cremona_dimesioni_ridotte.pdf)

**21884.** Moser, I. (2011): Biomonitoring gefährdeter Tierarten in den Naturschutzgebieten Bannriet und Spitzmäder (Gemeinden Altstätten und Oberriet SG). Bericht 2008–2011. Verein Pro Riet Rheintal Schwalbenweg 16 9450 Altstätten: 38 pp. (in German) [Switzerland; *Lestes virens* and *Sympetrum depressiusculum* are mapped, and conservation measures

are discussed. For more details see: <https://pro-riet.ch/wp-content/uploads/2020/08/2011-Bericht-Biomonitoring.pdf>] Address: Verein Pro Riet Rheintal, Schwalbenweg 16, 9450 Altstätten, Switzerland

**21885.** Steinke, T. (2011): Fühlinger See und Escher See – Zwei Sport- und Naherholungsgebiete im Spannungsfeld zwischen naturverträglicher Gestaltung und intensiver Nutzung – Untersucht am Beispiel von Libellen als Modellorganismen. Hausarbeit zur Ersten Staatsprüfung. Universität zu Köln: 53 pp. (in German) ["The aim of this thesis was to investigate a possible conflict of interest between nature-friendly design and intensive use of the sports and recreation areas of Lake Fühlingen and Lake Escher using dragonflies as a model organism. For this purpose, the dragonfly species spectra of the two water bodies were first recorded. Due to the scarcity of species found, it seemed more meaningful to take the absence rather than the presence of the species as the starting point of the analysis. With the help of a reference study (Olthoff, Menke, Rodenkirchen 2011), a dragonfly species spectrum was then compiled that would have been characteristic for secondary biotopes - such as the two water bodies studied. Due to the absence of many species that were actually to be expected, assumptions could now be made regarding the reasons for this. One result is that the preservation of the Fühlinger and Escher lakes as local recreation areas on the one hand, and the protection of dragonflies at these water bodies on the other hand, are closely connected. For this reason, the two complexes should not be considered separately, but together. This applies in particular to possible design measures at the lakes: these can contribute both to improving the habitats for dragonflies, but at the same time also to safeguarding the water quality and thus the continued usability of the local recreation areas. These include preventive measures such as the reduction of direct (bathing, litter, fish feeding) or indirect (increasing waterfowl populations through feeding) nutrient inputs into the water bodies. Increased education and more strictly controlled bans can contribute significantly to this. Rotational models for watercourse and shoreline management are one way of conserving waterbodies in a way that does not restrict lake visitors, yet is likely to have positive effects on dragonfly and other fauna in the lakes and their surroundings. Also helpful for the protection of both dragonflies and the waters themselves would be the reduction of fish stocking and the occurrence of *Myocastor coypus* (nutria) and *Ondatra zibethicus* (muskrat), as well as the promotion of structural diversity in general. In addition, this work has also discussed those measures for more nature-oriented design that provide for restrictions in watercourse use in certain areas. However, in addition to dragonfly protection, these also have the long-term usability of the water bodies as sports and recreation areas in mind. Examples of such design interventions would be making further lake areas inaccessible and creating new shallow water zones. In conclusion, it can be said that the preservation of the two study waters as local recreation areas and the protection of dragonflies are not fundamentally mutually exclusive. In this respect, it is to be hoped that the future development and maintenance of the Fühlinger See and the Escher See will also take dragonfly protection measures into account, representing sustainable and nature-compatible landscape development for the protection of flora and fauna." (Author(DeepL))] Address: no stated

**21886.** Thorp, J.H.; Rogers, D.C. (2011): Chapter 21 – Dragonflies and Damselflies: Insect Order Odonata. Field Guide to Freshwater Invertebrates of North America. Elsevier: 191-197. (in English) ["Another ancient insect order is Odonata, which

consists of about 318 species of Anisoptera and 132 species of Zygoptera in North America. This aquatic group has a close evolutionary link to the order Ephemeroptera but differs greatly from mayflies in body form, life history, and ecology. These predaceous insects are relatively long-lived in both the nymphal (or larval) and adult stages, but especially in the former. Odonates are relatively well known to the average person because the adults are colorful, relatively large, and easily visible as they flit about all freshwater ecosystems and nearby lands in pursuit of insect prey, including pesky mosquitoes, blackflies, and deer flies. However, they are harmless to humans—except for an occasional finger nipping if you hold them carelessly! Their bright colors and distinctive patterns are not only useful in some species identifications but also make odonates attractive to nature lovers and many artists. In fact “dragonfly watching” has become very popular, and many guides are available for identifying adults. The nymphal stages also consume many invertebrates, and even small fish in rare cases. These larvae are much more diverse in body form than the adults, especially among the dragonflies.] Address: not stated

**21887.** Toth, S. (2011): Data on the dragonfly (Odonata) fauna of Hungary according to my scatter-collections by December 31, 1987. *Studia odonotol. hung.* 12: 33-46. (in Hungarian, with English summary) ["This is the 16th paper of a series directed at communicating faunistic data of Hungary which had been unpublished until December 31, 1987 (cf. Dévai, G. et al. 1993). The author presents 578 faunistic data, results of a survey based on his own scatter-collections and other specimens captured by Malaise-traps and collected by 22 colleagues. The adult dragonfly series is from 125 localities throughout the country, but mostly from the sampling sites of Transdanubia. The localities are situated in 66 cells according to the 10×10 km UTM grid map. Collections were made on 201 days in 24 years between 1959 and 1988. In all cases it was possible to provide the number of individuals as well, thus the paper is based on the study of 2449 presented specimens (1150 male, 961 female and 338 specimens with undecided sex). In conclusion, 49 species (20 Zygoptera and 29 Anisoptera) were recorded throughout the country, out of which 1 belongs to the very frequent, 19 to the frequent, 14 to the less frequent, 6 to the rare and 9 to the sporadic class of country-wide occurrence frequency." (Author)] Address: Tóth, S., 8420 Zirc, Széchenyi u. 2, Hungary

## 2012

**21888.** Eriksson, L. (2012): Habitat impact on Odonata species occurrence and detectability. MSc. thesis, Biology and environmental science, Dept of Ecology, Swedish Univ. of Agricultural Sciences, Uppsala: (in Swedish) ["This study aims to investigate how the habitat affects the dragonfly species' occurrence patterns and the detectability of larvae of different species, as well as the effectiveness of the inventory method. Detectability means the probability that the species has been detected given that it is present on the premises. Both larvae and adult dragonflies were inventoried in 14 ponds in Frihult, Sjöbo municipality in Skåne during June-August 2009. The larvae were surveyed by moulting and for each moult the dominant vegetation was noted. Occurrence data for dragonfly larvae and pond characteristics were analysed species by species using the software Presence4.2. I tested whether the ponds' pH, surface area, depth and degree of shading affected the probability of a species occurring, and whether vegetation and the time of the inventory affected the probability of discovering a certain species. For each pond, observations of

larvae were compared with observations of adults of the same species. 28 species were found during the inventory, a total of 22 species of larvae and 25 species of fully formed dragonflies. The 13 most common species were analyzed. Shading was the characteristic that affected the most species. Most of these species preferred more sun-exposed ponds. The three species affected by the pond surface all tolerated larger ponds. According to the statistical analyses, on average, a species was found in 16% more ponds than it was discovered in. Thus, one can expect to miss relatively many occurrences of larvae even during an intensive inventory like this. If the purpose of an inventory is to find many species within a larger area, an inventory of adults is most effective, but if you want to investigate which habitats are important for reproduction, the larvae must be inventoried. When raking larvae, it is important to be outside both at the beginning and end of summer as there is no time when larvae of all species are present in the pond. If there are several types of vegetation, you should rake in all of these as the probability of discovering a certain species varies depending on the type of vegetation." (Author/google translator) *Calopteryx virgo*, *Lestes virens*, *L. sponsa*, *L. dryas*, *Erythromma najas*, *Coenagrion hastulatum*, *C. puella*, *C. pulchellum*, *Enallagma cyathigerum*, *Ischnura elegans*, *Aeshna grandis*, *A. viridis*, *A. cyanea*, *A. mixta*, *Anax imperator*, *Brachytron pratense*, *Cordulia aenea*, *Somatochlora metallica*, *Leucorrhinia rubicunda*, *L. pectoralis*, *Libellula quadrimaculata*, *L. depressa*, *Orthetrum cancellatum*, *Sympetrum flavolum*, *S. danae*, *S. vulgatum*, *S. striolatum*, *S. sanguineum*] Address: [https://stud.epsilon.slu.se/4757/1/eriksson\\_l\\_120903.pdf](https://stud.epsilon.slu.se/4757/1/eriksson_l_120903.pdf)

**21889.** Klink, A. (2012): Paleo-ecologisch onderzoek van de Overijsselse Vecht. Onderbouwing van maatregelen ten behoeve van ecologisch herstel. Hydrobiologisch Adviesburo Klink Rapporten en Mededelingen nr. 121 Project 341, Juni 2012. In opdracht van Waterschap Velt en Vecht: 62 pp. (in Dutch) [In the Overijsselse Vecht, a paleo-ecological study was carried out to learn more about the biotic community in the past. To this end, boreholes have been drilled in abandoned residual channels at a number of locations between the German border and Ommen. Based on old (reliable) maps, these deposits have been dated to the period 1670 – 1950. A number of deposits in existing waters (old meanders) do not appear to contain stream-loving fauna, but most deposits drilled from surface level contain usable material. Based on the traits database of the Ecological Water Management Working Group, environmental variables were determined on the basis of the macrofauna encountered. Most of the calculated changes are marginal, do not look realistic and the limitations of this method are great because: • Environmental factors are determined on the basis of all waters in which a species is found. The Vecht is certainly not an “average” water • Validation of the database for the Vecht is missing The most striking change has taken place in the current, which was much higher in 1670 to 1850 than in the subsequent period. Furthermore, the reduced trophic and saprobia appear to have changed little over the past 340 years. Additional analysis of higher plants and diatoms from relevant deposits may nuance this picture. In order to contribute more to the character of the Vecht, a proprietary traits database was subsequently drawn up based on the macrofauna data collected in the Vecht in 2005 – 2010 (Klink, 2011a). This lacks chemical data, but the allocation of the individual species to habitat looks more realistic. The calculations indicate that the Vecht was a river in previous centuries, where the sandy bottom was by far the most important habitat. Wood and riparian vegetation played a minor role and submerged vegetation in 70 2010 flow varied widely

between the deposits, but also within the individual sites. As a result, the share of this habitat seems to say something about the geomorphological processes in the Vecht. A number of species have been found, particularly in the stretch upstream of Hardenberg, which indicate a much more natural character of the Vecht than was known until now. The stonefly *Isoperla grammar*, the beetles *Macronychus quadrimaculatus* and *Stenelmis canaliculatus* and the caddis fly *Itthytrichia lamellaris* no longer occur in the Netherlands and have never been collected in the Vecht in the past. These species are still common in the undammed lowland rivers of northern France with good water quality and great biotope diversity. Despite the (scarce) occurrence of these special species, the density and diversity of critical macrofauna, even in the oldest deposits, is deplorable. A comparison with the Aisne, a corresponding river in northern France, shows that mayflies, caddis flies and beetles (Elmidae) are strongly underrepresented in the deposits and Chironomidae and Simuliidae together dominate the fauna with a share of 97%. This observation is a clear signal that the macrofauna community was also under great stress in the past. Two possible causes come to mind: • Physical limitations for the macrofauna exist in the form of a treeless drifting landscape, which was aptly mapped in 1722 by Peter de la Rive (in Neeffes et al., 2011). The macrofauna present in the deposits indicates a dominant role for sand and a varying proportion of aquatic and riparian plants. The small proportion of the fauna that can be attributed to wood dwellers indicates that wood was hardly present in the Vecht. In comparable rivers with forest on the banks, wood dwellers are the dominant group ((Behning, 1932; Benke et al., 1985; Klink, 1992 and 2011b). The barren landscape and the busy Vecht (Emst & Scharlo, 2006) are in accordance with this • Chemical limitations are seen in the calculated oxygen content that amounts to a maximum of 6 mg/l over the period under investigation This finding will have no consequences for the current ecological recovery of the Vecht This may be different for the dissolved levels of heavy metals (period 2004-2010) According to the literature, the strongly increased content of iron and aluminum in particular, probably the result of natural leaching of iron ore, appears to pose a serious threat to the occurrence of mayflies, stoneflies and caddis flies (Beasley & Kneale, 2003; Clements et al., 2000; Deutsch, 1981; Hickey & Clements, 1998; Malmquist and Hoffsten 1998; Winner et al., 1975; Winner et al., 1980) These groups are the prime target species for the WFD yardstick for the Vecht. For a better understanding of the ecological functioning of the Vecht in the past, it is of great importance to also determine the remains of the higher plants and the diatoms and to integrate the results in the current understanding. This research makes an essential contribution to estimating the potential of paleo-ecological research in running water. An earlier publication already provided insights into the enormous ecological significance of trees in rivers (Klink, 1992). In this study, the macrofauna community of the Vecht has been dug up since 1650. The fact that the natural conditions, including the occurrence of iron in the Vechtdal, may limit the ecological objectives is an aspect that had not previously come to light." (Author/Google translate) The following odonate taxa are listed: *Brachytron pratense*, *Calopteryx splendens*, *Coenagrion pulchellum*, *Erythromma najas*, *Ischnura elegans*, *Libellulidae*, *Orthetrum cancellatum*, and *Platycnemis pennipes*.] Address: Klink, A., Boterstraat 28, 6701 CW Wageningen, The Netherlands. E-mail: agklink@klinkhydrobiology.com. www.klinkhydrobiologie.nl

**21890.** Marchi, M.; Jørgensen, S.E.; Bécares, E.; Fernández-Aláez, C.; Rodríguez, C.; Fernández-Aláez, M.;

Pulselli, F.M.; Marchettini, N.; Bastianoni, S. (2012): Effects of eutrophication and exotic crayfish on health status of two Spanish lakes: a joint application of ecological indicators. *Ecological Indicators* 20: 92-100. (in English) ["Lake Sentiz and Lake Chozas are two small water bodies in the Province of León (NW Spain). The former is mesotrophic and the latter went from oligotrophic to turbid in 1997, due to introduction of an invasive allochthonous crayfish *Procambarus clarkii* ([0275], [0280], [0210] and [0215]). We set out to study health status of the two ecosystems by the joint use of different but correlated ecological indicators, supplementing the values obtained by monitoring campaigns. We examine three scenarios: (1) Lake Sentiz, (2) Lake Chozas before and (3) Lake Chozas after the biological invasion. We evaluate eco-exergy, energy and eco-exergy-empower ratio, three holistic ecological indicators based on the thermodynamics of far-from-equilibrium systems. When structural changes take place in ecosystems it is recommended to apply holistic thermodynamic indicators as presented in [0190] and [0195]. We propose their joint application for a complete overview of the monetary value of natural capital, because they provide information added to statistical analysis and direct measurement. The aim is to determine which of these indicators best represents the effects of eutrophication and perturbations caused by alien species in the two freshwater systems. The eco-exergy-empower ratio gives the best results, since it clearly indicates lake efficiency in transforming direct and indirect solar energy inputs into organization. The eco-exergy (work capacity) results are used to estimate ecosystem services and quantify the economic value of lake natural capital. Calculation of ecosystem services on an eco-exergy basis provides good indications of monetary gains or losses possible in perturbed systems, including eutrophic or invaded ecosystems. This is not surprising, because work capacities include all possible services offered by ecosystems, not only the services actually used by humans. Eco-exergy and the eco-exergy-empower ratio can be guidelines for the calculation of ecosystem services, although they give only a partial indication of the environmental costs and benefits of a given level of information. The present results suggest political and economic considerations and solutions, and are a useful example for organisations involved in environmental management of pollution and biological invasions by exotic species. Highlights: \* We set out to study health status of lakes Sentiz and Chozas (León, NW Spain). \* Eco-exergy, energy and eco-exergy-empower ratio quantify ecosystem health status. \* Eco-exergy-empower ratio reflects the perturbations better than the other indicators. \* We determine ecosystem services and sustainability from eco-exergy or work capacity. \* It is useful to apply thermodynamic holistic indicators for bio-invasion management." (Authors)] Address: Marchia, Michela, Dept of Chemistry, Univ. of Siena, Via della Diana 2a and Via Aldo Moro 2, 53100 Siena, Italy. Email: marchi27@unisi.it

**21891.** Radulovic, S.; Boon, P.J.; Laketic, Dušanka, Simonic P., Puzovic S., Živkovic Milica, Jurca Tamara, Ovuka M., Malaguti S., Teodorovic Ivana (2012): Preliminary checklists for applying SERCON (System for Evaluating Rivers for Conservation) to rivers in Serbia. *Archives of Biological Sciences* 64(3): 1037-1056. (in English) ["This paper describes the first steps in gathering biological data to assess the conservation value of rivers in Serbia, using SERCON (System for Evaluating Rivers for Conservation). SERCON was developed in the UK to improve consistency in assessments of river 'quality' by using a scoring system to evaluate habitat features and species groups, catchment

characteristics, and the potential impacts to which river systems may be subjected. This paper provides checklists for aquatic, semiaquatic and marginal plants, macroinvertebrates, fish and birds associated with rivers in Serbia, collated from a wide range of published and unpublished sources. These lists should be regarded as provisional because few wide-ranging biological surveys have been carried out specifically on Serbian rivers; further revisions are likely as more information becomes available in future. Ultimately, the work will benefit regulators and decision-makers with responsibility for river management under the new Water Law, and contribute to river protection and conservation in Serbia." (Authors) Odonata are treated at family level.] Address: Radulovic, Snezana, Univ. of Novi Sad, Faculty of Sciences, Dept Biol. and Ecology, 21000 Novi Sad, Serbia

**21892.** Salewski, V (2012): Eine Neuansiedlung der Feuerlibelle *Crocothemis erythraea* (Brulle, 1832) in Regensburg. *Acta Albertina Ratisbonensia* 59: 52-53. (in German) [Verbatim/Google translate: In the summer of 2013, *C. erythraea* was found in the area of the abandoned clearing ponds of the former sugar factory near Irl in the south-east of Regensburg. From the end of July the area was regularly visited by the author about once a week. The first fire dragonfly, which was a fully colored male, was observed on July 27 (Fig. 1). It was identified by the bright red body and eyes, the dorso-ventrally flattened abdomen (Fig. 2), its size, and the orange spot at the base of the hind wings (Dijkstra & Lewington 2006). These characteristics distinguished it from males of various darter species *Sympetrum* sp., which are also found in the area. Up to the end of August, up to six fire dragonflies could be observed regularly, most of which were males. There were no indications that they were native. The fire dragonfly originally had an African-Mediterranean distribution, but has been steadily expanding northwards for several decades as a "winner" of global warming. After it was first recorded in Germany in 1918, it now occurs in almost all federal states, and the number and size of the populations continue to increase, especially in southern Germany (Ott 2007). In Bavaria, the fire dragonfly is regarded as a breeding guest, with the number of records and individual indications of indigeneness also steadily increasing since 1993 (Kuhn & Burbach 1998). According to Kuhn & Burbach (1998), the fire dragonfly was not yet known from the Regensburg area; the closest evidence is from Bogen and the Naab valley near Schwarzenfeld. A fire dragonfly was never observed on regular visits to the area during the summer of 2012, nor on more infrequent visits in previous years. It can therefore be assumed that 2013 was at least a temporary resettlement that fits into the usual pattern of the spread of the species. Further observations over the next few years will have to show whether the species can establish itself permanently.] Address: Salewski, V., Prinz-Rupprecht-Str. 24, 93053 Regensburg, Germany

**21893.** Smolis, A.; Kadej, M.; Bena, W.; Malkiewicz, A.; Zajac, K.; Mańkowska-Jurek, D.; Rapala, R. (2012): Nowe dane o roziedleniu wążek (Insecta: Odonata) na ĆEI'sku. *Przyroda Sudetów* 15: 57-66. (in Polish, with German and Czech summaries) [New data on distribution of dragonflies (Insecta: Odonata) in Silesia: "The paper lists several dozen new locations of five rare dragonfly species (Odonata). Of these, three species - *Sympecma paedisca*, *Gomphus flavipes* and *Cordulegaster boltonii* - are among the protected species of fauna and so far have been known from Silesia from few and often scattered localities. The rest two species - *Cordulegaster bidentata* and *Crocothemis erythraea* - have been very rarely reported from the study area and are

known from the literature only from a few sites. From a faunistic point of view, the most interesting records are the first documented records of *C. bidentata* from Kladsko, *C. boltonii* from the Western Sudetenland and the Barycz river valley and then the discovery of *C. erythraea* in the Lower Silesian Boreas. Particularly interesting case in terms of species ecology is undoubtedly the joint occurrence of both representatives of the genus *Cordulegaster* in the Sudetenland." (Author/DeepL)] Address: Bena, W., ul. Olszewskiego 7, 59-900 Zgorzelec, Poland. Email: waldemarbena@gmail.com

**21894.** Wiemers, M.; Denner, M.; Schweiger, O.; Winter, M. (2012): Biodiversitätsindikatoren für Klimaveränderungen am Beispiel der Tagfalter und Libellen Sachsens. In: Horst Korn, Ute Feit und Rainer Schliep (Red.): *Biodiversität und Klima – Vernetzung der Akteure in Deutschland VIII – Ergebnisse und Dokumentation des 8. Workshops*. BfN – Skripten 307: 54-57. (in German) ["Biodiversity indicators for climate change using the example of butterflies and dragonflies in Saxony: The Community Temperature Indices (CTI) according to DEVICTOR et al. (2008) calculated. The basis for this are Species Temperature Indices (STI), which represent the mean annual temperatures in the entire European range of a species. STI values were first reported for birds of France and by VAN SWAAY et al. (2008) also calculated for European butterflies. In both works, individual numbers from monitoring programs were used for the weighting. In the analyzes the CTI showed a clearly positive trend analogous to the general temperature development in almost all cases, which means that populations of warmth-loving species are increasing in relation to cold-loving species; however, the correlation between the annual values of the CTI and the mean area temperature was not examined in the work mentioned. Our analyzes with the Saxon data also revealed a positive trend for butterflies and dragonflies, which, however, as in the aforementioned studies, is lower than the temperature increase observed in the area over the same period. According to DEVICTOR et al. (2008) conclude that the temperature increase exceeds the adaptability of the species community. The shape of the curve was only slightly affected by a change in species selection, which indicates the robustness of this index. However, strong immigration events of non-established species can lead to biases. Instead of individual numbers, dataset numbers per species can also be used for weighting, but this reduces the sensitivity of the indicator. While the CTI values for butterflies (Figure 1) correlate strongly with the annual mean temperatures, there was no correlation for dragonflies. This can probably be explained by the different generation length of up to five years in dragonflies compared to a maximum of one year in butterflies. Accordingly, the highest correlations of the CTI values were found with the 2-year moving mean temperature of the current and previous year (for butterflies) or the 5-year moving mean temperature of previous years (for dragonflies). These highly significant correlations with short-term climate variability support the reliability of the measured long-term trends. The CTI therefore appears to be a particularly well-suited biodiversity indicator for climate change, especially for monitoring data such as that obtained in Citizen Science projects such as Germany's butterfly monitoring (TMD; <http://www.tagfalter-monitoring.de/>). Climate changes can not only lead to shifts in abundance within species communities, but also to shifts in range, as is well known. However, the detection of area changes is more complicated than is often assumed. This is due to the fact that the population densities along the area boundaries are often very low. On small-scale scales such



as individual federal states, there are hardly any zonal distribution limits and the accuracy of most of the data is insufficient for recording the vertical distribution. Saxony also has a topography that is unfavorable for zonal distribution limits (mountains on the southern border). Therefore, the Area Index (AI) was developed to record range shifts, which reflects the ratio of the areas of warmth-loving to cold-loving species. An objective assignment to one of the two groups can be guaranteed by an STI-based weighting. The difference between the STI value of the individual species and the CTI (as a total mean of all species of the respective taxon) is used for weighting. The analysis of the Saxon data shows a positive trend and a high correlation with the CTI for both the butterflies (Figure 2) and the dragonflies, especially when using the STI-based weighting. The lower slope of the Area Index shows that it reacts less sensitively to climate changes than the CTI. Nevertheless, the area index seems particularly suitable for faunistic data sets with good spatial coverage for recording the climate reaction, and can also be used for species groups for which no STI values can be calculated due to the lack of total distribution maps." (Authors/Google translate)] Address: Denner, M., Referat 61 – Landschaftsökologie, Sächsisches Landesamt für Umwelt, Landwirtschaft und Geologie, Halsbrücker Str. 31a, 09599 Freiberg, Germany. Email: maik.denner@smul.sachsen.de

## 2013

**21895.** Bouton, F.M. (2013): Recherche de *Sympetrum danae* (Sulzer, 1776), et identification du cortège odonologique de zones humides du boisement de Marchevert (Conflans-sur-Anille, 72). Ligue pour la Protection des Oiseaux de la Sarthe, Maison de l'Eau - 43 rue de l'Estérel - 72 100 Le Mans: 58 pp. (in French) ["Within the framework of the National Action Plan in favor of Odonata, a list of species considered as priorities has been defined for the Pays de la Loire, broken down regionally. These species were chosen based on their degree of threat and rarity. Among these is the Black *Sympetrum* (*Sympetrum danae*). As this species has never been the subject of specific research on a regional scale, no recent data on an attested breeding site exists (for the Dept of Sarthe, the most recent dating from 2004). Its current autochthony therefore remains to be proven, especially since it is a species with a high potential for erratism (Dijkstra K.-D.B. & Lewington R., 2007; Grand D. & Boudot J.-P. 2006). This report gives an account of the study carried out by the LPO Sarthe, with the support of the Loire Bretagne Water Agency, the Regional Group for the Study of Armorican Invertebrates (GRETIA), the association leading the regional implementation of the Action Plan and the Regional Center for Forest Property (CRPF) of the Pays de la Loire, which aims to rule on the presence and, where appropriate, on the reproductive status of the species on the Bois de Marchevert site (part of the Vibraye forest massif) in the communes of Conflans-sur-Anillé, Montaillé and Semur-en-Vallon in the Sarthe Dept. In addition, a second objective of this study was to identify the odonatological procession existing on the site (classified as ZNIEFF type 1) as well as on the neighboring wetlands (namely the Anille river and the Fief pond within the Marchevert forest), all located within the watershed of the valley of the Brayé." (Author/Google translate) <https://side.developpement-durable.gouv.fr/cent/digitalCollection/DigitalCollectionAttachmentDownloadHandler.as?parentDocumentId=335495&documentId=632382&skipWatermark=true&skipCopyright=true>] Address: Bouton, F.M., 18, rue Saint Pavin de la Cité, 72000 Le Mans, France. E-mail: fmb72@yahoo.fr

**21896.** Faton, J.-M. (2013): Le *Sympetrum danae* (Sulzer, 1776) reproducteur dans les habitats fluviaux duranciens. *Sympetrum* 17: 5-7. (in French) ["Like most *sympetrum*s, *S. danae* is a pioneer and opportunistic species. The discovery of a large population of this species in the Hautes-Alpes, breeding in the river annexes of the Durance, is however a surprise. Here, *Sympetrum danae* is an abundant and very adaptable species, as can be *Sympetrum striolatum* in many regions." (Author/Google translate)] Address: Faton, J.-M., Gare des Ramières, Route de Grane - 26400 Alex, France

**21897.** Harms, T.M.; Rasmussen, R.D.; Kinkead, K.E.; Frese, P.W.; Dinsmore, S.J. (2013): Springtime Darner (*Baiaeschna janata*) new to Iowa. *Argia* 25(3): 25. (in English) ["An individual *B. janata* was first observed by Ryan Rasmussen on 5 May 2012 at Lacey-Keosauqua State Park in Van Buren County. No other individuals were observed in 2012. Rasmussen returned to the area on 13 May 2013 and observed a small group of six individuals near Lake Lacey, which is located within the park (OdonataCentral record #400091)." (Author)] Address: Harms, T.M., Center for Survey Statistics and Methodology, Iowa State Univ., 208 Office and Lab. Building, Ames, IA 50011, USA. E-mail: harmsy@iastate.edu

**21898.** Hatfield, J.K. (2013): A possible hybridized *Platthemis lydia* (Common Whitetail) x *Platthemis subornata* (Desert Whitetail) specimen? *Argia* 25(4): 16. (in English) [7-IX-2013, Bottomless Lakes State Park, Roswell, New Mexico, USA] Address: Jerry K. Hatfield: Email: jerry.hatfield@um-healthsystem.com

**21899.** King, S. (2013): A mass movement of Autumn Meadowhawks (*Sympetrum vicinum*). *Argia* 25(4): 17. (in English) ["On 8-X-2013, a swarm of *S. vicinum* coalesced in our backyard in Northfield, Minnesota, USA. This concentration of dragonflies stayed put throughout the afternoon, busily feeding, and was gone the next day. Dozens of mature meadowhawks, both male and female, perched on garden fences, tree trunks, and grapevines, until all the good spots were taken. Dan Tallman, another Northfield resident, reported seeing them at his home on the opposite side of town on this day as well, so the swarm stretched at least several miles. Whether it was a county-wide cloud or a thin red line fallen by chance across the town like a dropped ribbon, there's really no way to know." (Author)] Address: Scott King. Email: ldng@meadowhawks.info

**21900.** Lyons, R. (2013): An observation of *Octogomphus specularis* (Grappletail) oviposition. *Argia* 25(3): 27. (in English) [27-VI-2013, Golden and Silver Falls State Natural Area in Coos County, Oregon (north-east of Coos Bay), USA] Address: Ron Lyons, Bandon, Oregon. Email: pondhawk@uci.net

**21901.** McHugh, M.; Hummel, S. (2013): First record of *Epi-theca semiaquea* (Mantled Baskettail) for Missouri. *Argia* 25(3): 24. (in English) [The record had been vetted on 24 April 2011 as *Epi-theca cynosura*. A subsequent re-evaluation, showed this record to actually be *E. semiaquea*.] Address: McHugh, M., Kansas City, USA. E-mail: Emchugh2@kc.rr.com

**21902.** Mguni, S. (2013): Enigmatic rock paintings of insectifroms in the Cederberg, western cape, South Africa. *South African Archaeological Bulletin* 68(198): 160-172. (in English) ["In this paper I describe an unusual triad of images from

the northern Cederberg, Western Cape. The probable origin of their subject matter is implied by the depicted morphological features. While their heads are distinctly anthropomorphic, nothing else invokes the humanoid form. Their identification is sought elsewhere, outside the mammalian kingdom. Even though a few traits suggest insectiforms, these are too few to be useful in identifying exact species. Nevertheless, the most likely generic candidate [Odonata] is identified, which offers the potential for interpreting these images by assembling multifarious and nuanced readings of possible San ethnographic correlations." (Author)] Address: Mguni, S., Rock Art Research Institute, Private Bag 3, WITS, 2050 South Africa. E-mail: Siyakha@rockart.wits.ac.za

**21903.** Moser, I. (2013): Monitoring gefährdeter Tierarten im Raum Bannriet-Spitzmäder Bericht 2012 – 2013. Verein Pro Riet Rheintal, Schwalbenweg 16, 9450 Altstätten, Switzerland: 41 pp. (in German) [Results of the monitoring of *Lestes virens* are documented. Conservation measures are outlined. Records of *Aeshna isoceles*, *Crocothemis erythraea*, *Aeshna affinis*, *Lestes barbarus* and *Sympetrum meridionale* are briefly documented. For more details see: [https://pro-riet.ch/wp-content/uploads/2020/08/Bericht\\_Monitoring\\_2013.pdf](https://pro-riet.ch/wp-content/uploads/2020/08/Bericht_Monitoring_2013.pdf)] Address: Verein Pro Riet Rheintal, Schwalbenweg 16, 9450 Altstätten, Switzerland

**21904.** Nirschl, R. (2013): First record for *Libellula auripennis* (Golden-winged Skimmer) in Michigan. *Argia* 25(3): 18. (in English) [On 14-VI-2013, Nan Weston Preserve in Washtenaw County, Michigan, USA.] Address: Rick Nirschl: Email: ricknir@hotmail.com

**21905.** Patten, M.A.; Smith-Patten, B. (2013): First record of the Marsh Bluet (*Enallagma ebrium*) for Colorado. *Argia* 25(3): 26. (in English) [6-VII-2013, Alamosa National Wildlife Refuge, San Luis Valley, Alamosa County, Colorado, USA.] Address: Patten, M.A., Oklahoma Biological Survey, Univ. of Oklahoma, Norman, OK 73019, USA. E-mail: mpat-ten@ou.edu

**21906.** Paulson, D. (2013): An apparently introduced population of California Spreadwings (*Archilestes californicus*). *Argia* 25(3): 14. (in English) [The author describes a "range extension" of *A. californicus* to Magnuson Park, Seattle, King County, Washington, USA, probably caused by landscaping with native vegetation, including many willows.] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dennispaulson@comcast.net

**21907.** Roble, S.M.; Chazal, A.C.; Pendleton, W.T. (2013): *Enallagma carunculatum* (Tule Bluet), an addition to the Virginia damselfly fauna. *Argia* 25(4): 14. (in English) ["This species has not been previously recorded from Virginia, but it was listed as a potential member of the state's fauna by Roble (1994). During a visit to the Carnegie Museum of Natural History (Pittsburgh, Pennsylvania) in February 2013, Roble and Chazal learned that their holdings included a small collection of pinned Odonata (n=37) from Virginia, most of which were collected by H. C. Will at Dayton, Rockingham County during 1930-1931. Will's name only appears on the 1931 collection labels (and on several without dates), but the 1930 labels are similar except for the lack of a collector's name. All but a few of these specimens were previously unidentified, including all of the damselflies. Closer examination revealed that two males collected on 14 June 1930 are referable to *E. carunculatum*, the first known

specimens from Virginia, thus becoming the 19th *Enallagma* and 56th damselfly species recorded from the state, and extending the species' range in the East slightly to the south." (Authors)] Address: Chazal, Anne, Virginia Dept of Conservation and Recreation, Division of Natural Heritage, 600 E. Main Street, 24th Floor, Richmond, Virginia 23219, USA

**21908.** Ruffoni, A. (2013): La cordulie à corps fin (*Oxygastra curtisii*) en Bourgogne: espèce discrète de plus en plus observée. La feuille de *Neomys*. La lettre de l'Observatoire de la FAune de Bourgogne 9: 6. (in French) [Verbatim (Google translate): This large green and yellow anisoptera is one of the 6 species of Corduliidae present in Burgundy. It is protected in France and listed in appendix 2 and 4 of the Habitat Directive. Knowledge of the distribution of the species is very incomplete in Burgundy. Before the launch of the Atlas inventory, 23 stations were known, since, thanks to targeted searches, at the beginning of 2013, 25 more stations have been discovered. In the south-east of the Yonne Dept, the species was quite easily detected during "atlas" surveys on various rivers: the Serein, the Armançon, the Cure, the Yonne and marginally on the Cousin. On the Serein, the species is at least regularly present on 25 kilometers of river. It was also discovered on many gravel pits in Auxerrois, environments that seem to be good substitute biotopes for the development of larvae. Most of the time the species was detected thanks to the collection of exuviae, out of a total of 101 data of the species present in the BBF, 36 data correspond to exuviae (36%). A survey carried out at the right time and targeted on the larval remains is therefore imperative if we want to advance knowledge of the distribution of the species in Burgundy. It is sought on various rivers: the Nièvre, the Aron, the Saône, the Yonne, the Seille, the Arroux, the Grosne, the Alène, the Seine (downstream part), the Tille, the Loire, the Allier, ... as well as on gravel and sand pits. Reminders on the species Preferred habitats: calm areas of rivers and streams, to be sought upstream of the reaches (e.g. upstream of the mill), ponds, gravel pits and sand pits. Note: gravel pits/sand pits seem to be good substitute sites. Supposed distribution: scattered presence on the territory, to be sought on the main rivers. Detection: exuviae to look for on the trunks of trees (alder, willow and ash) whose roots plunge into the water of sectors with a calm current and fairly deep, imagoes. Flight period: from mid-May to mid-August with a greater presence from June to mid-July.] Address: Ruffoni, A., Société d'histoire naturelle d'Autun/Groupe Odonates Bourgogne et Société française d'Odonatologie - shna.ruffoni@orange.fr

## 2014

**21909.** Adu, B.W.; Ogbogu, S.S.; Ogunjobi, J.A. (2014): Odonata biodiversity: An indicator of anthropogenic activity in Aponmu forest, Akure, southwestern Nigeria. *FUTA Journal of Research in Sciences* 10(1): 35-42. (in English) ["Diversity assessment of Odonata in Aponmu forest was carried out to determine its composition, abundance, and distribution. Biodiversity of the taxon was also used as a measure of human activities in the forest. Three study sites were identified at the forest which were: "Ago-Store" Pond (AGO), "Alatori" stream (ALA) and River "Aponmu" (APO). Both adults and larvae specimens of Odonata were collected. Only advanced penultimate and ultimate larvae were collected and were reared to adults. Some physico-chemical parameters that influenced the existence of Odonata within the forest were also investigated. Diversity indices and inferential statistic were applied to the data collected at the

forest. Water samples collected were analyzed so as to determine quality of water which houses the immature stages of the fauna. 1385 individuals were collected from the forest. Most of the species collected were ubiquitous. "Alatori" stream was the richest study site, while river "Aponmu" was the least. Generally, the study indicates that the dominance of ubiquitous species of Odonata with broad niches in the forest may be a result of anthropogenic activity going on in the forest." (Authors)] Address: Adu, B.W., Biological Science Dept, Ondo State Univ. of Science and Technology, Okitipupa, Nigeria. E-mail: williamsadubabs@yahoo.com

**21910.** Almeida, D.; Grossman, G.D. (2014): Regulated small rivers as 'nursery' areas for invasive largemouth bass *Micropterus salmoides* in Iberian waters. *Aquatic Conservation: Marine and Freshwater Ecosystems* 24(6): 805-817. (in English) ["Few studies have assessed the ecological role of regulated small rivers in the environmental biology of invasive largemouth bass *Micropterus salmoides* in Iberian waters. Size structure, diet, physical condition, and developmental stress of largemouth bass populations were compared between two contrasting habitats in the Iberian Peninsula, the Encinarejo Reservoir and the small River Jándula below the dam (Guadalquivir River Basin, southern Spain). Size structure differed between river and reservoir populations of small (<180 mm FL) largemouth bass, with a higher proportion of individuals between 30 and 60 mm in the river and a higher proportion of 20–40 mm individuals in the reservoir. In the river, the most important prey for small largemouth bass were Ephemeroptera, Plecoptera and Odonata nymphs. In the reservoir, Gerridae insects and pumpkinseed *Lepomis gibbosus* were the most important prey in terms of ingested biomass for small largemouth bass, whereas large individuals consumed high percentages of common carp *Cyprinus carpio* and pumpkinseed. Prey richness, trophic niche breadth, and trophic diversity were significantly higher in small largemouth bass from the river, as well as eviscerated mass and glucose level. Fluctuating asymmetry was lower in the river for branched rays of pectoral fins, eye diameter, and length of pectoral fins. Overall results indicate that largemouth bass are taking advantage of both habitat differentiation and flow regulation in Mediterranean streams. Therefore, regulated small rivers may play an ecological role as 'nursery' areas, where developmental stress is low and thus, juvenile fish can display better body condition and nutritional status than their reservoir counterparts. The present study provides information relevant to the management of largemouth bass and subsequent conservation of the valuable and endemic Iberian fish fauna. For example, size-specific culls in the reservoirs and below the dams are suggested strategies to control the reinforcement of downstream populations." (Authors)] Address: Almeida, D., Dept of Zoology and Physical Anthropology, Complutense Univ. of Madrid, E-28040 Madrid, Spain. E-mail: dalmeidareal@yahoo.es

**21911.** Ananian, V. (2014): On the need of protection of goldenring *Cordulegaster vanbrinckae* in Armenia. *Biological journal of Armenia* 66(4): 27-30. (in Russian, with Armenian and English summaries) ["*C. vanbrinckae* is a rare relict species in Armenia, which requires study of its biology and implementation of urgent complex conservation measures. Establishment of microreserves in its habitats would prevent their destruction and would contribute to preservation of the species in the country." (Author)] Address: Ananian, V., 179 Bashinjaghyan St., apt. 23, 0078, Yerevan, Armenia. E-mail: gomphus@gmx.com

**21912.** Buczynski, P.; Szlauer-Lukaszewska, A. (2014): A disjunctive site of *Sympecma paedisca* (Brauer, 1877) (Odonata: Lestidae) in Lubuskie Province (western Poland). *Wiad Entomol.* 33(4): 279-280. (in Polish, with English title) ["The occurrence of *Sympecma paedisca* was found in the middle Oder valley: - 3.4 km NE from the village of Bobrowniki (51°53'N / 15°45'E, UTM: WT54), the "Ochlica" reservoir connected to the Oder - the oxbow lake of the Oder, into which the Ochla River also flows. The reservoir with an area of approx. 14.5 ha, located in an elm and willow forest. In the further surroundings, vast meadows with a network of drainage ditches dominate. A relatively young oxbow lake (formed in the 1970s), with sandy shores, with a bottom with a not too thick layer of organic sediments and with well-developed underwater meadows. Material: August 2, 2009, 1 larva about 1.2 cm long. found in a hydro-biological test taken with a drag on a shaft from an area of approx. 0.7 no." (Authors/Google translate)] Address: Buczynski, P., Dept of Zool., Maria Curie-Skłodowska Univ., Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**21913.** Chakraborty, A. ; Kumar, K.; Rajadurai, G. (2014): Biodiversity of insect fauna in Okra (*Abelmoschus esculentus* (L.) Moench) ecosystem. *Indian Journal of Animal Nutrition* 7(16): 2206-2211. (in English) [East farm of Pandit Jawaharlal, Nehru College of Agriculture and Research Institute (PAJANCOA and RI), Karaikal, India. The following odonate taxa are listed: *Ischnura aurora*, *Agriocnemis* sp., *Brachythemis contaminata*, *Crocothemis servilia*, *Diplocodes trivialis*, *Neurothemis fulvia*, *Orthetrum sabina*, *Pantala flavescens*, *Rhyothemis variegata*, and *Tholymis tillarga*.] Address: Chakraborty Ardhendu, Dept of Agricultural Entomology, PGP College of Agricultural Sciences, Tamil Nadu Agricultural Univ., Namakkal-637 207, Tamil Nadu, India. E-mail: entomonardha@yahoo.com

**21914.** Furness, A.N. (2014): Why shouldn't the dragonfly cross the road? The influence of roadway construction and vehicle speed on the behavior, mortality, and conservation of adult dragonflies (Odonata: Anisoptera). M.Sc. thesis, Univ. of South Dakota: 94 pp. (in English) ["Roads are a ubiquitous part of landscapes across the globe. Unfortunately their ecological effects are numerous and widespread as well. Impacts include disturbance of the physical environment, modification of the chemical environment, shifts in human use of land and water, spread of exotic species, alterations of animal behaviour, and wildlife mortality due to road construction and collisions with vehicles. A growing body of literature has focused on the effects of roads on wildlife, especially vertebrates; however, only select studies have examined the impacts of roads on invertebrates, with very few looking at insects in particular. This thesis attempts to understand how roads, including a bridge, affect dragonflies, especially the federally endangered Hine's emerald dragonfly (*Somatochlora hineana*). It also investigates potential ways to lessen their effects. To determine whether the I-355 bridge interrupts movement of adult dragonflies, flight behaviour was recorded in the I-355 corridor prior to, during, and after construction. I compared the proportion of individuals initiating crossing behaviour between the pre-bridge, bridge, and open bridge stages as well as the proportions attempting to cross above and below the bridge deck after completion. In order to better understand which factors make dragonflies vulnerable to collisions with vehicles, I recorded the result of dragonfly-vehicle encounters at select speeds. By analyzing flight heights and flight types in combination with vehicle speeds, I was able to esti-

mate the probabilities of being hit for different kinds of dragonflies at varying speeds. Measures to moderate and/or reduce vehicle speed in high- risk areas during peak flight times could decrease dragonfly roadkill rates. The use of diversion structures was also assessed by conducting observations of *S. hineana* flights at a simulated roadway location with and without nets up. Diversion netting has the potential to deter *S. hineana* from crossing roadways as well as cause them to fly over roadways at heights above that of most vehicles, depending on the spacing of nets." (Authors)] Address: Furness, Amber Nichole

**21915.** Groupe Odonates Bourgogne ; Ruffoni, A. (coord.) (2014): Atlas préliminaire des odonates de Bourgogne (Odonata), version 2014. Société d'histoire naturelle d'Autun, Société française d'Odonatologie: 43 pp. + annexes. (in French) [[https://www.researchgate.net/publication/336956799\\_Atlas\\_preliminaire\\_des\\_odonates\\_de\\_Bourgogne\\_Odonata\\_version\\_2014](https://www.researchgate.net/publication/336956799_Atlas_preliminaire_des_odonates_de_Bourgogne_Odonata_version_2014)] Address: Ruffoni, A., Maison du Parc, F-58230 Saint-Brisson, France. E-mail: [shna.ruffoni@orange.fr](mailto:shna.ruffoni@orange.fr)

**21916.** Houard, X.; Merlet, F.; (coord.) (2014): Liste rouge régionale des libellules d'Île-de-France. Natureparif – Office pour les insectes et leur environnement – Société française d'Odonatologie. Paris: 80 pp. (in French) ["A quarter of the dragonflies in Île-de-France threatened or disappeared. By examining the dragonflies listed in the region, this is the first time that the process of drawing up the Ile-de-France Red Lists has focused on the vast world of insects and particularly those that thrive in aquatic environments. This synthesis work was carried out by applying the official methodology established by the IUCN and constitutes a new standardized reference recognized internationally. This Red List was jointly piloted by the Office for Insects and their Environment and the French Society of Odonatology as part of the regional implementation of the National Action Plan for Odonata. A group of a dozen regional experts volunteered for this evaluation exercise. Thus, more than 28,800 observation data from the naturalist testimonies of 303 contributors, compiled since the beginning of the 1980s in a computerized database, were analyzed. In total, of the 59 species observed in Île-de-France over the period 1992-2012, one is already considered "Regionally extinct" (2%), thirteen are considered threatened (19%) and eight have been assessed as "Near Threatened" (14%). The destruction and degradation of wetlands induced by urbanization and the intensification of agricultural practices are the main causes of the disappearance of dragonflies. The disappearance and rarefaction of dragonflies in the Ile-de-France region is characteristic of the damage caused to the region's aquatic ecosystems. Despite these ever-increasing pressures, Île-de-France has significant assets in terms of wetland conservation and must therefore be able to mobilize to preserve its threatened dragonfly populations. Thus, by way of examples, thanks to this Red List, *Leucorrhinia caudalis* is classified as "Vulnerable" and *Coenagrion pulchellum* is classified as "Endangered" and can now be considered as ambassadors of wetlands that should be pampered and protected. taken into account in the implementation of sustainable regional development policies." (Authors/Google translate)] Address: Merlet, Florence, 78 rue de Cornouailles, F-78180 Montigny-le-Bretonneux, France. Email: [florence.merlet@gmail.com](mailto:florence.merlet@gmail.com)

**21917.** Hutchison, L. (2014): Male aggression in the banded demoiselle damselfly *Calopteryx splendens*. MSc.

thesis, Dept Biol., Lund Univ.. <http://lup.lub.lu.se/student-papers/record/4360319>: (in English) [*Calopteryx splendens* is a sexually dimorphic insect that is currently moving north, into new geographic areas of Fennoscandia. In doing so, this damselfly species is coming into contact with naïve populations of a closely related conspecific: the beautiful demoiselle damselfly, *Calopteryx virgo*. This study revealed that male *C. splendens*' aggression appears to be influenced by both age and experience; however, there was no evidence of learned species recognition in outdoor cage experiments. Teneral (immature) and mature males responded at significantly different strengths to intruding males, indicating that the age at which they were caught affected the development of territorial responses. Whether *C. splendens* came from allopatric or sympatric populations did not statistically significantly influence their response to intruding males. Average male aggression levels were positively correlated with male survival rate, although the causal factor behind this correlation is unknown. Moreover, *C. splendens* survived longer in the cages than *C. virgo* revealing interspecific differences in longevity, and *C. splendens* individuals from an allopatric population survived significantly longer compared to *C. splendens* individuals from a sympatric population. This result might indicate that *C. splendens* suffer from shorter life span in the presence of the heterospecific competitor *C. virgo*. Male *C. splendens* responded differently to female con- and heterospecific individuals depending on the male's origin, suggesting that field experience with the opposite sex and species was important in determining male mate preferences towards females. Finally, cage density had no significant impact on male *C. splendens*' aggression towards conspecifics. Popular science summary: As the climate warms and species move northwards, some species encounter populations of a similar species. In this case, the banded demoiselle damselfly *Calopteryx splendens* is moving north, further into Fennoscandia than it has been known to go before, and is meeting populations of the beautiful demoiselle damselfly *Calopteryx virgo*. Males of both species set up and defend territories along the banks of freshwater streams. If these two species are to co-exist, one or both should theoretically be able to discriminate between individuals of their own and of the other species to avoid hybridising. This project aimed to understand whether learning or genetics determine how a male *C. splendens* responds to intruding males of his own species and of the other species, *C. virgo*. The response to females of both species was also tested. The work was carried out in 27m<sup>3</sup> mesh cages at Stensoffa field station, in southern Sweden and 2 nearby sites were used to capture the insects. At one site, only *C. splendens* was present, at the other both *C. splendens* and *C. virgo* were present. One male and one female of each species were tethered to a stick of roughly 1.5 m in length and were then presented to free-flying, but caged, males. A four-point scale was used to record the reaction from the free-flying male. A threat response is illustrated in the figure opposite. The effect of cage density on aggression in *C. splendens* was tested by keeping males and females in cages with a ratio of 2 males to 1 female. Low density cages had a maximum of six individuals; high density cages had a maximum of twelve. In this study, mature individuals of neither species were more or less aggressive towards males of their own of the other species. This finding contrasts with previous field studies which found that *C. virgo* males show stronger species recognition than *C. splendens* males (Svensson, et al. 2007). *C. splendens* males caught as sexually mature individuals responded more aggressively towards intruders than did those caught as sexually immature. This is not sur-



prising as sexually immature individuals are not yet competing for territories. Interestingly, this species appears to go against the classic trade-off hypothesis of "live fast, die young" as the longer an individual lived, the more aggressive it appeared to become. Sexually immature male *C. splendens* responded less aggressively towards females of either species than did sexually mature male *C. splendens*. Males from populations where both species are present responded more strongly to females of their own species than to females of the other species. This supports the hypothesis that age or experience is important in determining the response to intruders. Cage density did not affect the average aggression levels displayed by male *C. splendens*. Origin also had no significant impact on the aggression level therefore hinting at a possible genetic component in the response to intruders. Individuals showed repeatability in their response to different intruders indicating a possible genetic component, but further study would be needed to confirm this. In conclusion, it is likely that both genetics and experience play a role in determining the reaction of male *C. splendens* to intruders and that experience is necessary in fixing the genetic response." (Author)] Address: not stated

**21918.** Izzat-Husna, M.; Ahmad, A.B. (2014): Odonata (Class: Insecta) of Sungkai Wildlife Reserve, Perak, Malaysia. *Journal of Wildlife and Parks* 29: 23-30. (in English) ["Protected areas need to be continuously monitored for their flora and fauna for the ecosystem management and conservation purposes. Odonata is a good bio-indicator for habitat monitoring; they are ecologically conspicuous and sensitive to environmental changes. A two-day survey was done at Sungkai Wildlife Reserve (SWR), Perak in June 2014 to record the odonate diversity of the areas. Twenty-one species from seven families were collected, namely Libellulidae with seven species, Protoneuridae and Chlorocyphidae (four species each), Calopterygidae and Euphaeidae (two species each), and Platynemididae and Coenagrionidae with a single species respectively. Despite the short collection period, this area showed a rich odonate fauna but further survey is needed to obtain a complete picture. The results formed the first checklist of odonate fauna here and may serve as baseline information for future research towards habitat monitoring, conservation and management of SWR." (Authors)] Address: Izzat-Husna, M., School of Marine and Environmental Sciences, Universiti Malaysia Terengganu, 21030 Kuala, Terengganu, Terengganu, Malaysia. E-mail: amirrudin@umt.edu.my; izzat\_1166@yahoo.com

**21919.** Jurkiewicz-Karnkowska, E.; Zontek, M.A. (2014): Occurrence and domination relations of benthos organisms accompanying mollusc species in the Nature Reserve Stawy Siedleckie. In: *Sposób cytowania: Górski P.* 2014. *Kleszcze rezerwatu Stawy Siedleckie*. [W:] M. Falkowski, K. Nowicka-Falkowska, M. Omelaniuk (red.). *Bogactwo przyrodnicze rezerwatu Stawy Siedleckie*. Monografia Przyrodnicza. s. 57, Siedlce: 145-150. (in Polish, with English summary) ["In the collected samples, representatives of 12 higher taxonomical units of invertebrates were noted. They were: Annelida, Hirudinea, Oligochaeta, Arachnida, Odonata, Coleoptera, Crustacea, Diptera, Ephemeroptera, Hemiptera, Lepidoptera, Megaloptera and Nematoda. In the scale of the whole nature reserve the dominant group of macrofauna accompanying mollusk species were representatives of the order Hemiptera. The highest benthos biodiversity was observed in fishponds "Stary" and the lowest – in fishpond "Wyrostkowy". Fishpond "Stary" was distinguishable by the largest vegetation cover (61%), that was

the result of its ageing due to fish farming cessation, whereas fishpond "Wyrostowy" was intensively used (intensive fish farming, periodic rising and lowering of water level)." (Authors)] Address: Jurkiewicz-Karnkowska, Ewa, Zakład Turystyki i Rekreacji, Instytut Nauk o Zdrowiu, Uniwersytet Przyrodniczo-Humanistyczny, ul. B. Prusa 12, 08-110 Siedlce, Poland. Email: karnkowska@uph.edu.pl

**21920.** Kiszewski, A.E.; Teffera, Z.; Wondafrash, M.; Ravesi, M.; Pollack, R.J. (2014): Ecological succession and its impact on malaria vectors and their predators in borrow pits in western Ethiopia. *Journal of Vector Ecology* 39(2): 414-423. (in English) ["Soil pits excavated for home construction are important larval habitats for malaria vectors in certain parts of Africa. Borrow pits in diverse stages of ecological succession in a maize-farming region of Western Ethiopia were surveyed to assess the relationships between stage of succession and the structure and composition of invertebrate and plant communities, with particular attention to *Anopheles gambiae* s.l. and *An. coustani*, the primary local malaria vectors. An array of 82 borrow pits was identified in a multi-lobed drainage basin in the community of Woktola. Each pit was evaluated on its physical features and by faunal and floral surveys during August, 2011, at the height of the longer rainy season (kiremt). *Anopheles gambiae* s.l. and *An. coustani* were the sole immature anophelines collected, often coexisting with *Culex* spp. Sedges were the most common plants within these pits, and included *Cyperus elegantulus*, *C. flavescens*, *C. erectus* and *C. assimilis*. The legume *Smithia abyssinica*, Nile grass (*Acroceras macrum*), cutgrass (*Leersia hexandra*), clover (*Trifolium* spp.), and the edible herb *Centella asiatica*, were also common in these habitats. No plant species in particular was strongly and consistently predictive of the presence or absence of mosquito immatures, particularly with regard to *An. coustani*. The presence of *An. gambiae* s.l. immatures in borrow pit habitats was negatively correlated with the presence of backswimmers (Notonectidae) ( $Z = -2.34$ ,  $P = 0.019$ ). Young (freshly excavated) borrow pits more likely contained immature *An. gambiae* s.l. ( $Z = -2.86$ ,  $P = 0.004$ ). Ecological succession was apparent in older pits, and as they aged, they became less likely to serve as habitats for *An. gambiae* s.l. ( $Z = 0.26$ ,  $P = 0.796$ ), and more likely to support *An. coustani* ( $Z = 0.728$ ,  $P = 0.007$ ). As borrow pits age they become less suitable for *An. gambiae* s.l. breeding and more likely to harbor *An. coustani*. The abundance of notonectids in habitats was a negative indicator for *An. gambiae* s.l. abundance. Plant species are not reliable indicators for the presence or absence of malaria vectors in borrow pits. ... Odonata were also highly represented with dragonflies from the family Lestidae in over 51% of sites, and 33% of sites bearing specimens from the family Aeshnidae ... Backswimmers (Notonectidae) and dragonfly naiads (odonates) were found to be the most efficient arthropod predators of immature *An. ...* While dragonfly nymphs have previously been found to be effective predators of anopheline immatures ... ] (Authors) Address: Kiszewski, A.E., Dept of Natural and Applied Sciences, Bentley Univ., Waltham, MA 02452, USA. E-mail: akiszewski@bentley.edu

**21921.** Klecka, J.; Boukal, D.S. (2014): The effect of habitat structure on prey mortality depends on predator and prey microhabitat use. *Oecologia* 176(1): 183-191. (in English) ["Structurally complex habitats provide cover and may hinder the movement of animals. In predator-prey relationships, habitat structure can decrease predation risk when it provides refuges for prey or hinders foraging activity of predators. However, it may also provide shelter, supporting

structures and perches for sit-and-wait predators and hence increase their predation rates. We tested the effect of habitat structure on prey mortality in aquatic invertebrates in short-term Lab. predation trials that differed in the presence or absence of artificial vegetation. The effect of habitat structure on prey mortality was context dependent as it changed with predator and prey microhabitat use. Specifically, we observed an 'anti-refuge' effect of added vegetation: phytophilous predators that perched on the plants imposed higher predation pressure on planktonic prey, while mortality of benthic prey decreased. Predation by benthic [Libellula depressa, Platycnemis pennipes, Sympetrum sanguineum, Coenagrion sp.] and planktonic predators on either type of prey remained unaffected by the presence of vegetation. Our results show that the effects of habitat structure on predator-prey interactions are more complex than simply providing prey refuges or cover for predators. Such context-specific effects of habitat complexity may alter the coupling of different parts of the ecosystem, such as pelagic and benthic habitats, and ultimately affect food web stability through cascading effects on individual life histories and trophic link strengths." (Authors)] Address: Klecka, J., Dept of Ecosystems Biology, Faculty of Science, Univ. of South Bohemia, Branišovská 31, Ěeské Budjovice, 37005, Czech Republic. E-mail: jan.klecka@eawag.ch

**21922.** Orwa, P.O.; Omondi, R.; Okuku, E.; Ojwang, W.; Njuguna, S.M. (2014): Composition, abundance and feeding guilds of macroinvertebrates in lake Kenyatta, Kenya. *International Journal of Environmental Monitoring and Analysis* 2(5): 239-243. (in English) ["In an attempt to describe the benthic macroinvertebrate assemblage of Lake Kenyatta and recommend possible interventions for sustainable management, sampling was done at different stations using an Eckman grab and a scoop net. At each station, six samples were taken (three grabs and three scoops). The samples were washed using a 300µm sieve, sorted live and identified to genus level and where possible to species level using appropriate keys. The specimens were further categorized into functional feeding guilds. The data were then analyzed for diversity, evenness, abundance and dominance. Forty two species in 25 families and 13 orders were recorded [including 13 odonate taxa]. The organisms were further grouped into 4 functional feeding groups. The order Pulmonata dominated the macroinvertebrates sampled with 34.3% relative abundance while the lowest were Rhynchobdellida and Lepidoptera with 0.3% each. The high abundance of mollusks in the lake is probably an indication of absence of a predator. It is thus recommended that a fish species be introduced to convert these mollusks into fish biomass. This will enhance the economic gains and reduce the risk of bilhazia infestation since the host snail exists within the lake." (Authors) *Anax imperator*, *Aeshna ellioti*, *Ictinogomphus ferox*, *Brachythemis leucosticta*, *Chalcostephia flavifrons*, *Sympetrum fonscolombii*, *Trithemis aurora*, *T. aconita*, *T. annulata*, *T. bifida*, *T. dorsalis*, *Urothemis assignata*, *Platycnemis* sp] Address: Orwa, P.O., Kenya Marine and Fisheries Research Institute, Kisumu, Kenya

**21923.** Perveen, F.; Khan, A.; Rauf, S.A. (2014): Key for first recorded dragonfly (Odonata: Anisoptera) fauna of District Lower Dir, Khyber Pakhtunkhwa, Pakistan. *Insects Review* 1(2): 26-35. (in English) ["The present research was the first record of 318 specimens of dragonflies from district Lower Dir (LD), Khyber Pakhtunkhwa, Pakistan collected during May-July 2011. Among the specimens collected there were 11 species, 7 genera and 3 families. The number

of specimens collected in each family were 17 Cordulegasteridae (5.3%), 18 Gomphidae (5.7%), and 283 Libellulidae (89.0%). All cordulegasterids were the golden ringed, *Cordulegaster brevistigmata* Selys. All gomphids were Clubtails, *Onychogomphus bistrigatus* Selys. Libellulids species were: blue or black percher, *Diplacodes lefebvrei* (Rambur); ground skimmer, *D. trivialis* Rambur; black tailed skimmer, *Orthetrum cancellatum* (L.); common red skimmer, *O. pruinosum neglectum* (Rambur); slender skimmer, *O. sabina* (Drury); triangle skimmer, *O. triangulare triangulare* (Selys); wandering glider or global skimmer, *Pantala flavescens* (Fabricius); spine legged redbolt, *Rhodothemis rufa* (Rambur) and common skimmer, *Sympetrum decoloratum* Selys. A dichotomous key based on external morphology, coloration and wing venation was prepared to facilitate the identification of the dragonfly fauna of the LD and aid conservation efforts of dragonflies in Pakistan." (Authors)] Address: Perveen, Farzana, Depts of Zoology, Shaheed Benazir Bhutto Univ. (SBBU), Main Campus, Sheringal, Khyber Pakhtunkhwa, Pakistan

**21924.** Setiawan, D.D.; Prihaatin, J.; Suratno. (2014): Diversity of dragonfly (Ordo Odonata) at area PTP Nusantara X area Ajung District Jember regency. *Artikel Ilmiah Hasil Penelitian Mahasiswa Tahun 2014 - Scientific Articles of Student Research Results in 2014*: 3 pp. (in Indonesian, with English summary) ["Conceptually, basic skill Biol. education is student's effort to embrace the biology learning concept through real object observation process, between variables, collect and proceed the data, analyze the research result and do the experiment. One of the important things that must do by the teacher for increasing learning teaching process quality is by using the environment as a learning source. Dragonfly diversity (Odonata Order) in the area of PTP Nusantara X Kecamatan Ajung Kabupaten Jember could be one of alternative learning source. The objective of this research is to discover the diversity of dragonflies in area of PTP Nusantara X Kecamatan Ajung Kabupaten Jember and it's usage as dragonfly field guide book. Dragonfly samples was taken by using the random cluster sampling method and the diversity is analyzed using Shannon-Wiener diversity index. The diversity was analyzed using Shannon-Wiener Diversity Index. The Dragonfly that had been found is consist of 14 species that is included in 5 families. The result of this study is developed for insect field guide book that can be used by the teacher as a supporting references book in the learning process. This field guide book was contained pictures of species, descriptions, and glossary that can help readers understand Latin terms. Score of validation test of product is equal to 88,75. Based on the result of validation test products, the field guide book is recommended as one of alternative learning source in school." (Authors)] Address: Setiawan, D.D., Jurusan Pendidikan MIPA, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Jember, Jln. Kalimantan 37, Jember 68121, Indonesia. Email: jekti\_pr@yahoo.com

**21925.** Theischinger, G.; Kalkman, V.J. (2014): The genus *Teinobasis* on the Bird's Head Peninsula and the Raja Ampat Islands, Indonesia (Odonata: Coenagrionidae). *Odonatologica* 43(3/4): 143-168. (in English) ["An overview of the genus *Teinobasis* on the Bird's Head Peninsula and the Raja Ampat Islands in Indonesia is given. Four new species, *T. aquila*, *T. lieftincki*, *T. michalskii*, and *T. splendens*, are described from the area and one probably new species is described but left unnamed. New material of six other species, *T. buwaldai*, *T. pretiosa*, *T. pulverulenta*, *T. rufithorax*, *T. cf. superba*, and *T. wallacei*, is brought on record. A key

to the males of the twelve species known from the region is included and colour illustrations of males of eight species and females of five species are given." (Authors)] Address: Theischinger, G., Water Science, Office of Environment and Heritage, NSW Dept of Planning and Environment, PO Box 29, Lidcombe, NSW 1825, Australia. E-mail: gunther.theischinger@environment.nsw.gov.au

**21926.** Walsh, C.J.; Bloink, C.; Hehir, G. (2014): Preliminary report on macroinvertebrate assemblages of Pyrites and Goodmans Creek in relation to the management of Merrimu Reservoir: patterns in 2013 in early stages of flow manipulation. Melbourne Waterway Research-Practice Partnership Technical Report 14.8. Waterway Ecosystem Research Group, The Univ. of Melbourne: 17 pp. (in English) ["Environmental flow management requires understanding of the degree to which the natural flow regime must be replicated to protect ecological structure and function of streams. A basic requirement, particularly in the application of environmental flow management to intermittent streams, is a robust understanding of ecological responses to different aspects of the flow regime. This report presents an analysis of macroinvertebrate assemblage composition in two intermittent streams, Pyrites and Goodmans creeks, in the early stages of an environmental flow program in the lower reaches of Pyrites Creek. Both creeks have segments with augmented flows that are used as water supply conduits, and Pyrites Creek has a large water supply reservoir, which greatly reduces the variability and volume of flow downstream, while producing a small permanent flow through leakage for several kilometres downstream. We assess the nature of variation in assemblage composition, between the two creeks, along each creek, and among the segments with differing flow regimes. Specifically, we aimed to assess the likely effects on assemblage composition of a) the use of the streams as water supply conduits and b) Merrimu reservoir (Pyrites Creek only) in its pre-2014 flow management. Finally, we considered appropriate analytical approaches for assessing changes resulting from environmental flow releases from Merrimu reservoir now and in the future. Pyrites Creek macroinvertebrate assemblage composition downstream of the reservoir was distinct from all other sites. The permanently flowing sites downstream of the reservoir were in substantially worse condition than most other sites, with a much greater dominance of scrapers (algal grazers) than other sites. This suggests a shift in trophic functioning of the stream from a riparian-organic-matter-dominated foodweb to an algal-dominated one. The higher abundance of scrapers (primarily several snail families and notonemourid stoneflies) and other disturbance-tolerant families was accompanied by an absence or low abundance of a range of sensitive families. In the Pyrites Creek segment further downstream, in which the small permanent flow transitioned into intermittency with reduced flows, the macroinvertebrate assemblage showed greater similarity to upstream, intermittent sites. Intermittent sites with augmented flows differed in assemblage condition from other intermittent sites and had higher family richness. The most upstream intermittent sites were more similar to the Pyrites Creek sites downstream of the reservoir, than to other upstream sites, which we hypothesize is a result of those sites having shorter and less reliable wet periods or being at a later stage of the annual drying cycle than others. The dominance of scrapers downstream of the reservoir suggests that a strong, detectable change in assemblage composition to an assemblage more dominated by riparian inputs of organic matter is possible, if environmental flow releases adequately mimic the magnitude and frequency of

high-flow events capable of scouring biofilms. However, transfer rates limit capacity to use flows to scour the stream bed and remove the stands of Typha that have colonized the channel downstream of the reservoir. Thus changes to assemblage composition are likely to be limited. The large seasonal variability in intermittent streams such as these, present challenges for robust monitoring of changes resulting from management actions. As much temporal replication of sampling as possible is recommended. Spatial autocorrelation among sites points to the need to use Bayesian statistical methods for future analyses, comparing 2013 assemblage patterns with those in future years following longer periods of ongoing environmental flow management." (Authors) The paper includes two references to aeshnids.] Address: cwalsh@unimelb.edu.au

## 2015

**21927.** Lucic, A.; Paunovic, M.; Tomovic, J.; Kovacevic, S.; Zoric, K.; Simic, V.; Atanackovic, A.; Markovic, V.; Kracun-Kolarevic, M.; Hudina, S.; Lajtner, J.; Gottstein, S.; Milošević, D.; Andus, S.; Žganec, K.; Jaklic, M.; Simcic, T.; Vilenica, M. (2015): Aquatic macroinvertebrates of the Sava River. The Sava River. The Handbook of Environmental Chemistry 31: 335-359. (in English) ["The objective of this chapter is to present the data on aquatic macroinvertebrate communities along the Sava River, based on investigation performed during 2011 and 2012 at 12 sampling sites within the sector between Vrhovo (Slovenia) and Belgrade (confluence to the Danube). During our study 227 macroinvertebrate taxa were recorded in the Sava River. Having in mind that upper stretch of the Sava River was not covered by this work (alpine and subalpine stretch), as well as based on the review of previous works on the macroinvertebrate fauna of the Sava River, more than 300 species will be confirmed for the Sava River. The data on the distribution of aquatic macroinvertebrates revealed five different stretches — alpine, subalpine, Upper Sava plain, Middle Sava and Lower Sava. Physical habitat degradation, pollution and pressure caused by biological invasions were found to be the main factors of endangerment of aquatic macroinvertebrate fauna diversity. There is an obvious need for further investigation of the Sava River in order to complete the data on aquatic macroinvertebrates and to provide the basis for accurate assessment of environmental status of the river." (Authors) The occurrence of *Coenagrion mercuriale* is questionable.] Address: Paunovic, M., Institute for Biological Research "Sinisa Stankovic", Univ. of Belgrade, 142 Bulevar Despota Stefana, Belgrade, Serbia. E-mail: mpaunovi@ibiss.bg.ac.rs

**21928.** Remm, L.; Löhmus, A.; Maran, T. (2015): A paradox of restoration: prey habitat engineering for an introduced, threatened carnivore can support native biodiversity. *Oryx* 49(3): 559-562. (in English) ["Conservation of charismatic vertebrates in modern landscapes often includes habitat engineering, which is well supported by the public but lacks a consideration of wider conservation consequences. We analysed a pond management project for an introduced island population of captive-bred, Critically Endangered European mink *Mustela lutreola*. Ponds were excavated near watercourses in hydrologically impoverished forests to support the main prey of the mink (brown frogs *Rana temporaria* and *Rana arvalis*). A comparison of these ponds with other, natural, water bodies revealed that the (re)constructed ponds could reduce food shortages for the mink. Moreover, the ponds provided habitat for macroinvertebrates that were uncommon in the managed forests in the study area,

including some species of conservation concern. The cost-effectiveness of the management of charismatic species can be increased by explicitly including wider conservation targets at both the planning and assessment stages. ... Dragonflies and damselflies were found only in the (re)constructed ponds, including two species of European conservation concern: *Aeshna viridis* and *Nehalennia speciosa*." (Authors)] Address: Remm, Liina Remm, Dept Zoology, Inst. Ecology and Earth Sciences, Univ. of Tartu, Vanemuise Street 46, EE-51014 Tartu, Estonia. E-mail liina.remm@ut.ee

## 2016

**21929.** Buchsbaum, R.; Leahy, C.W.; Allison, T. (2016): Distribution and abundance of Odonata species across Massachusetts: Results of a long-term monitoring program. *Northeastern Naturalist* 23(4): 501-524. (in English) ["Surveys of Odonata were carried out at Mass Audubon wildlife sanctuaries in all regions of the state and in multiple habitats. Our goals were to provide a comprehensive look at patterns of species distribution and relative species richness across Massachusetts and compare surveys where effort was and was not controlled. Observers encountered a total of 146 species, 11 of which were very widespread, having been recorded at more than 40 of the 54 properties examined. Thirty-five species were relatively rare, occurring at only 1 or 2 sanctuaries. A few sanctuaries were particularly notable for supporting somewhat uncommon species. These sites were not located in any particular ecoregion, but reflected local conditions. In surveys where effort was not controlled, a regression analysis indicated that about two thirds of the variation in species richness among sanctuaries could be explained by the amount of observer effort, the size of the sanctuary, and the extent of wetland habitat. Quantitative surveys that used transects or point counts to control for sampling effort resulted in observation of fewer species, including state-listed taxa, compared to the non-quantitative surveys. Despite producing fewer species, data from these quantitative surveys can be used to make statistical comparisons with data from future studies and detect changes over time in species richness, abundance, and frequency of occurrence." (Authors)] Address: Buchsbaum, R., Mass Audubon, 346 Grapevine Road, Wenham, MA, USA

**21930.** Docile, T.N.; Figueiró, R.; Portela, C.; Nessimian, J.L. (2016): Macroinvertebrate diversity loss in urban streams from tropical forests. *Environmental Monitoring and Assessment* 188(4):237: (in English) ["The increase of human activities in recent years has significantly interfered and affected aquatic ecosystems. In this present study, we investigate the effects of urbanization in the community structure of aquatic macroinvertebrates from Atlantic Forest streams. The sampling was conducted in the mountainous region of the State of Rio de Janeiro, Brazil in 10 urban and 10 preserved streams during the dry season (August–September) of 2012. The streams were characterized by its environmental integrity conditions and physico-chemical properties of water. The macroinvertebrates were sampled on rocky substrates with a kicknet. A total of 5370 individuals were collected from all streams and were distributed among Ephemeroptera, Odonata, Plecoptera, Hemiptera, Megaloptera, Coleoptera, Trichoptera, Lepidoptera, and Diptera. In urban sites, all those orders were found, except Megaloptera, while only Mollusca was not found in preserved streams. We performed a non-metric multidimensional scaling (NMDS) analysis that separated two groups distributed among sites in urban communities and another group outside this area. The dominance was significantly higher at urban sites, while the a diversity

and equitability were greater in preserved sites. A canonical correspondence analysis (CCA) was also performed, indicating that most taxa associated with high values of the Habitat Integrity Index (HII) and a few genus of the order Diptera with the high values of ammonia, total nitrogen, associated to streams in urban sites. Urban and preserved streams differ by physical-chemical variables and aquatic macroinvertebrates. In urban streams, there is most dominance, while a diversity and equitability are higher in preserved streams." (Authors)] Address: Docile, Tatiana, Lab. Entomologia, Depto de Zoologia, Inst. de Biologia, Universidade Federal do Rio de Janeiro (UFRJ), CCS, Bloco A, sala A1-107, Av. Carlos Chagas Filho, 373, Rio de Janeiro, Rio de Janeiro, Brazil. E-mail: tatidocile@gmail.com

**21931.** Onishko, V. (2016): [Spring dragonfly fauna (Odonata) in the northern surroundings of the Utrish Nature Reserve and some information on ecology of species]. Educational and research practices in European Russia. Collection of research papers of students of the Young Naturalists' Club of the Zoological Research Museum of Moscow State Univ. named after MV Lomonosov and methodological materials for them (edited by M. V. Kalyakin and E. A. Dunaev), 2016: 175-179. (in Russian) ["Conclusions 1. At least 27 odonate species live in the vicinity of the Utrish Reserve, Russia (for a more complete picture, it is necessary to explore the region in the middle and end of summer). 2. The background and most abundant species of the region are *Platycnemis pennipes*, *Orthetrum albistylum*, *Anax parthenope* and *Anaciaeschna isosceles*. 3. The richest biotope in terms of species composition is the lake in the village. Sukko (85.2% of all identified species). 4. For the first time in the region, *Pyrrosoma nymphula*, *Caliaeschna microstigma* and *Brachytron pratense* were recorded. 5. For such rare species as *Anax ephippiger*, more accurate dates of seasonal migrations and distribution on the Black Sea coast of Russia have been made. Findings of *Caliaeschna microstigma* and *Pyrrosoma nymphula* significantly expand the ranges of these species." (Author/Google translate)] Address: Onishko, V., Moscow Zoo, 1 Bolshaya Gruzinskaya Str., 123242, Moscow, Russia. E-mail: wervolf999@yandex.ru

**21932.** Seehausen, M.; Dow, R.A. (2016): Morphological studies and taxonomic considerations on the 'reddish-brown-winged' group of *Neurothemis* Brauer, 1867 with the description of *N. taiwanensis* sp. nov. (Odonata: Libellulidae). *International Dragonfly Fund - Report* 93: 1-101. (in English) ["Specimens of *Neurothemis disparilis* Kirby, 1889, *N. fluctuans* (Fabricius, 1793), *N. fulvia* (Drury, 1773), *N. ramburii* (Brauer, 1866), *N. stigmatizans* (Fabricius, 1775) and *N. terminata* Ris, 1911, including their subspecies, were studied with the main focus on the morphology of the vesica spermalis, wing maculation, wing venation, abdominal markings and vulvar scales. The results were compared with species descriptions and directly with type specimens where possible. The vesica spermalis, especially the medial process, is useful at least in separating species groups and supports the traditional differentiation methods using wing maculation and venation. The use of other characters in accessing specific status, coupled with known distribution patterns, is discussed. The following taxonomic changes are proposed: *Neurothemis manadensis* (Boisduval, 1835) stat. nov., *Neurothemis papuensis* (Lieftinck, 1942) stat. nov. and *Neurothemis taiwanensis* sp. nov. is described (27.5.1998, Kenting, Pingtung County/Taiwan, L. M. Juang leg.; holotype is deposited at Taiwan Forestry Research Institute, Taipei, Taiwan). The type of *Polyneura palliata* Rambur, 1842 was re-discovered at MNHN and designated as lectotype; a lectotype



for *Neurothemis nicobarica* Brauer, 1867 housed at NHMW is designated. The holotype of *Neurothemis incerta* Brauer, 1867 was re-discovered and synonymized with *N. ramburii*. (Authors)] Address: Seehausen, Waldhöhe 9a, D-24306 Plön, Germany. Email: m.seehausen@gmx.de

**21933.** Underhill, L.G.; Navarro, R.; Manson, A.D.; Labuschagne, J.P.; Tarboton, W.R. (2016): 2016. OdonataMAP: progress report on the atlas of the dragonflies and damselflies of Africa, 2010–2016. *Biodiversity Observations* 7.47: 1-10. (in English) ["In the six years since the OdonataMAP section of the ADU Virtual Museum started in 2010, a total of 22,809 submissions have been made. 8,438 (37%) records were submitted in the sixth year of the project, highlighting the dramatic growth of OdonataMAP. Records had been submitted for 31 countries in Africa 20,339 (89%) were from South Africa. Seven countries all in the southern third of Africa had more than 100 records: Botswana (213), Malawi (441), Mozambique (157), Namibia (145), Swaziland (556), Zambia (259) and Zimbabwe (144). Of the records for South Africa, 7,597 (37%) had been submitted from KwaZulu-Natal. Two other provinces had more than 2,000 records: Limpopo with 2,845 and the Western Cape with 2,275." (Authors)] Address: Underhill, L.G., Animal Demography Unit, Dept of Biological Sciences, Univ. of Cape Town, Rondebosch, 7701 South Africa

## 2017

**21934.** Finotello, S.; Feckler, A.; Bundschuh, M.; Johansson, F. (2017): Repeated pulse exposures to lambda-cyhalothrin affect the behavior, physiology, and survival of the damselfly larvae *Ischnura graellsii* (Insecta; Odonata). *Ecotoxicology and Environmental Safety* 144: 107-114. (in English) ["Highlights: •Pyrethroids can have negative impact on behaviour, physiology, and survival on non-target organisms. •We simulated natural frequent runoff events of the pyrethroid lambda-cyhalothrin in a Lab. study on damselfly larvae. •Prey capture success on prey decreased significantly following lambda-cyhalothrin exposures compared to the control. •We found a lower growth rate (up to ~20%) and lipid content (up to ~30%) of damselflies at 50 and 250 ng lambda-cyhalothrin L<sup>-1</sup>. •Long-term exposure towards lambda-cyhalothrin pulses at concentration found in nature can affect damselfly behaviour, physiology and survival. Abstract: Damselflies form an essential part of the aquatic and terrestrial food web. Pesticides may, however, negatively affect their behaviour, physiology, and survival. To assess this, a 42-day-lasting bioassay was conducted, during which damselfly larvae (*Ischnura graellsii*; n = 20) were repeatedly exposed to lambda-cyhalothrin (3 days at; 0, 10, 50, 250, 1250, and 6250 ng LCH L<sup>-1</sup>), followed by recovery phases (4 days) in pesticide-free medium for six weeks. This exposure design was used to simulate frequent runoff events in the field. Variables related to the behaviour (strikes against prey and capture success), growth, physiology (lipid content and fatty acid composition), as well as mortality were assessed throughout the experiment. The two highest LCH concentrations induced 100% mortality within the first 48 h, whereas 85% of the test organisms survived 28 days under control conditions. The number of strikes against prey was not affected by LCH. In contrast, prey capture success decreased significantly (up to ~50% at 250 ng LCH L<sup>-1</sup>, for instance, after the third pulse exposure) following LCH-exposures compared to the control. This difference was not observed after recovery phases, however, which did not counteract the enhanced energy demand for detoxification and defense mechanisms indicated by a lower growth rate (up

to ~20%) and lipid content (up to ~30%) of damselfies at 50 and 250 ng LCH L<sup>-1</sup>. In addition, two essential fatty acids (eicosapentaenoic acid and arachidonic acid) and two precursors (linolenic acid and a-linolenic acid) decreased in their concentrations upon exposure towards 250 ng LCH L<sup>-1</sup>. Thus the results of this study indicate that long-term exposure towards LCH pulses can affect damselfly behaviour, physiology and survival. Given the essential role of damselflies in food web dynamics, these effects may potentially translate into local population impairments with subsequent bottom-up directed effects within and across ecosystem boundaries." (Authors)] Address: Johansson, F., Animal Ecology, Dept of Ecology & Genetics, Uppsala Univ., Uppsala, Sweden. Email: frank.johansson@ebc.uu.se

**21935.** Gassmann, D. (2017): Unerschöpfliche Vielfalt: neue Libellenarten (Odonata) aus Papua-Neuguinea. *Jahresbericht 2015/16, Zoologisches Forschungsmuseum Alexander Koenig*: 10-12. (in German) [Verbatim: "The insect and arthropod fauna of the Papuan biogeographical region, which stretches south of the equator from the Moluccas in the west to the vast island of New Guinea and the Solomon Islands in the east, remains largely unexplored. In principle, this could also apply to the Papuan dragonflies, especially since only a handful of systematists (including the author) are working on this group today. However, it is mainly thanks to the Dutch entomologist Maurits A. Liefstinck (1904-1985), who described more than half of the species known today, that we know the dragonfly fauna of New Guinea and the surrounding islands comparatively better than other insect groups in the region. According to current knowledge, the Papuan dragonflies with about 600 species make up about 12% of the global odonate fauna. Dragonflies are semi-aquatic insects whose larvae (or better: nymphs) live predatory in the water before they leave it to hatch and conquer the airspace as adults. As a guest researcher in the Arachnida Dept, which curates the ZFMK dragonfly collection, I have been able to contribute to research on the biodiversity of this group for more than two years, building on my previous work at the Naturalis Biodiversity Center in Leiden/Netherlands. The publication of a complete annotated and illustrated list of species from one of my previous trips to northern New Guinea and the Bismarck Archipelago fell during this period. In addition to the new species already described in previous years, the final evaluation of this expedition yielded some remarkable new distribution data and first records for islands in the Bismarck Archipelago. Subsequently, a number of new species from Papua New Guinea were described in collaboration with Australian and American colleagues. This work was based in large part on the recent collections of Dr. Stephen J. Richards associated with the South Australian Museum in Adelaide as a herpetologist and odontologist. Reference specimens in the form of paratypes of two of these species could be retained for the ZFMK collection. Surely the most spectacular first description that comes from this cooperation is that of *Macrocnemis gracilis*, for which a new genus had to be set up, since the examination of the morphological characteristics initially did not allow a clear family relationship. In addition, *M. gracilis*, with a wing length of around three centimeters and an abdomen length of almost five centimetres, is the largest feathered dragonfly from the subfamily Idiocnemidinae and thus one of the largest dragonfly damselflies in the Papuan region. The species and genus is only known from the montane rainforest of the Hindenburg Mountains, a remote region in western Papua New Guinea. An interesting redescription in 2016 was that of *Pseudagrion woodlarkensis* from Woodlark Island, far east of New Guinea. The genus *Pseudagrion* (Elf Maidens),

restricted to the Old World, represents the largest genus of slender dragonflies (Coenagrionidae) and also occurs in the Papuan region with around a dozen species. The new species is characterized by the very complex abdominal appendages of the males. Similar structures are only found in two other Pseudagrion species from mainland New Guinea. The pretty, bright yellow forehead dragonfly can be considered endemic to Woodlark, possibly including some outlying islands, and has been found on medium-sized streams with rich riparian vegetation, even in moderately disturbed habitats. In addition to *P. woodlarkensis*, only one other potentially endemic woodlark dragonfly species is known. However, expeditions to the archipelagos off New Guinea repeatedly lead to the discovery of new dragonfly species. Only in 2011 did I describe another new Pseudagrion species from the largest Bismarck Island, New Britain. Like Woodlark's Pseudagrion, it was by no means rare on the island; only there are comparatively few entomologists who venture into this remote part of the world and recognize new species as such. The series of new Papuan dragonfly species was supplemented in 2016 by the first description of *Idiocnemis schorri*. From the species-rich genus *Idiocnemis*, which I had already subjected to a taxonomic revision several years ago, potentially new species from southern Papua New Guinea have repeatedly appeared in recent years. Of the new, handsomely marked species, specimens were available from the foothills of the Müller Mountains, the aforementioned Hindenburg Mountains, and the Kikori Basin, all regions of southern Papua New Guinea. Once again the new species showed the strong radiation of endemic genera in the New Guinea region and at the same time demonstrated how incomplete our knowledge of the dragonfly diversity of southern New Guinea is, from where I am currently working on one or two other new *Idiocnemis* species. Obtaining such data on biodiversity is of crucial importance for the protection of nature and species in the region. Many of the new species have been and are being discovered as part of Rapid Biodiversity Assessments organized by NGOs (Non-Governmental Organizations) such as Conservation International and the Wildlife Conservation Society. The rapid inventory of the species spectrum and the analysis of endemism patterns in the often completely unexplored rainforest areas is the basis for initiating protective measures and provides the biological facts to give them more weight. In the Koenigiana and in two public evening lectures at the ZFMK and the Natural History Museum in Braunschweig, I reported on my work to a wider audience. The ongoing processing of New Guinean and especially Philippine dragonfly collections in the ZFMK collection will be reported elsewhere. My taxonomic work was financially supported by the International Dragonfly Fund (IDF) in 2016." (Author/Google translate)] Address: Gassmann, D., Arachnida Section, Zoological Research Museum Alexander Koenig, Bonn, Germany. Email: d.gassmann@leibniz-zfmk.de

**21936.** Rapantová, L. (2017): Vážky (Odonata) Kokotských rybníků na Rokycansku - Dragonflies of the Kokot ponds near Rokycany. Diplomová práce, Západočeská Univerzita v Plzni, Fakulta Pedagogická, Centrum Biologie, Geovid a envigigiky: 45 pp, appendix (in Czech, with English summary) ["The aim of this thesis was to contribute to the research on the distribution of dragonfly in the Czech Republic. The essence of the research was to compile a list of the Odonata species that have been discovered at Kokot Ponds during the research for the thesis and consequently to perform the qualitative and quantitative analysis for the purpose of mapping the fauna quadrat 6247. Another part of the research was to record the frequency of the individual

types of weeds in the monitored area. This was the first time there has been a research conducted on this topic." (Author) <https://dspace5.zcu.cz/handle/11025/28289> Calopteryx splendens, C. virgo, Chalcolestes viridis, Coenagrion hastulatum, C. puella, Enallagma cyathigerum, Erythromma najas, Ischnura elegans, Lestes sponsa, Sympecma fusca, Aeshna cyanea, A. grandis, A. mixta, Anaciaeschna isocetes, Anax imperator, Cordulia aenea, Gomphus vulgatissimus, Leucorrhinia pectoralis, Libellula quadrimaculata, Orthetrum cancellatum, Somatochlora metallica, Sympetrum danae, S. sanguineum, S. vulgatum] Address: not stated

## 2018

**21937.** Adande, R.; Liady, M.N.L.; Bokossa, H.K.J.; Djidohokpin, G.; Zouhir, F.; Mensah, G.A.; Fiogbe, E.D. (2018): Utilisation rationnelle de fertilisants organiques pour la production de macroinvertébrés benthiques d'eau douce en pisciculture. Biotechnol. Agron. Soc. Environ. 2018 22(4): 12 pp. (in French, with English summary) [Benin; "Rational utilization of organic fertilizers for freshwater benthic macroinvertebrate production in fish farming. Description of the subject: This study aims to determine optimal conditions of rabbit manure utilization in freshwater benthic macroinvertebrate production in order to produce fish at low cost. Objectives: To determine the optimal dose of rabbit manure to be used for freshwater macroinvertebrate production. Method: Six treatments, including one control, received respectively 0%, 10%, 25%, 50%, 75% and 100% of rabbit manure compared to the substrate total volume. Cultures were carried out in buckets, which received 10 dm<sup>3</sup> of substrate, 16 dm<sup>3</sup> of groundwater and 4 dm<sup>3</sup> of fishpond water. The initial seeding density was 6 ind·dm<sup>-2</sup> of odonates, 6 ind·dm<sup>-2</sup> of annelids or (3 ind·dm<sup>-3</sup>, for 0.5 m depth), 8 ind·dm<sup>-2</sup> of chironomids or (4 ind·dm<sup>-3</sup>) and 10 ind·dm<sup>-2</sup> of mollusks or (5 ind·dm<sup>-3</sup>). Physicochemical and biological parameters were measured during the 63 days of the experiment. Results: The highest densities of benthic macroinvertebrates were obtained within treatment T2, with 192 ± 1.20 ind·dm<sup>-2</sup> of chironomids, 52 ± 0.8 ind·dm<sup>-2</sup> of mollusks, 6 ± 0.33 ind·dm<sup>-2</sup> of odonates and 6 ± 0.33 ind·dm<sup>-2</sup> of annelids. Considering the depth of our experimental buckets (0.5 m), these highest densities also corresponded to respectively: 96 ± 1.20 ind·dm<sup>-3</sup> of chironomids, 26 ± 0.8 ind·dm<sup>-3</sup> of mollusks, 3 ± 0.33 ind·dm<sup>-3</sup> of odonates [Libellulidae] and 2 ± 0.33 ind·dm<sup>-3</sup> of annelids). The highest biomass of chironomids and mollusks was obtained within treatment T2, with respectively 728.1 ± 2.23 mg dry matter·dm<sup>-2</sup> and 699.98 ± 22.49 mg dry matter·dm<sup>-2</sup> (i.e. respectively 364.05 ± 2.23 mg dry matter·dm<sup>-3</sup> and 349.99 ± 22.49 mg dry matter·dm<sup>-3</sup>). Conclusions: Considering these results, treatment T2 with 140 g dry matter of rabbit manure·dm<sup>-2</sup> of substrate (i.e. 75 g dry matter of rabbit manure·dm<sup>-3</sup> of substrate) could constitute the optimal dose that could be recommended for the optimal production of freshwater benthic macroinvertebrates." (Authors)] Address: Adande, R., Université d'Abomey-Calavi (UAC). Faculté des Sciences et Techniques. Dépt de Zoologie. Lab. de Recherche sur les Zones Humides (LRZH). BP 526. Cotonou, Bénin. E-mail: richard\_adande@yahoo.fr

**21938.** Ametov, Y.I.; Jumanov, M.A. (2018): Material on the ecology of shikra *Accipiter badius* in the lower stretches of the Amudarya. European Science Review DOI: 10.29013/ESR-18-9.10.1-9-12: 9-12. (in English) [Uzbekistan "The article provides material on shikra's ecology collected in the Lower Amudarya area in 2004, 2005, 2015 and 2016. It also describes the results of research into shikra's distribution, number, breeding biology and diet. The work gives recommendations for

the conservation of this bird." (Authors) Table 2 shows that invertebrates comprise 42.8% of the diet the shikra; 3,3% are dragonflies (n=3 specimens).] Address: Jumanov, M.A., Berdakh Karakalpak State Univ., Uzbekistan. Email: m.jumanov@karsu.uz

**21939.** del Val, L.; Murga, A.A. (2018): Primeras citas de *Aeshna affinis* (Vander Linden, 1820), *Anax parthenope* (Selys, 1839) y *Anax ephippiger* (Burmeister, 1839) (Odonata: Aeshnidae) en Cantabria (norte de la Península Ibérica). Boletín de la S.E.A. 62: 319-320. (in Spanish, with English summary) ["First records of *A. affinis*, *A. parthenope* and *A. ephippiger* in Cantabria province are provided. ... During the month of September 2017, the three species were located in the town of Noja, on the Cantabrian coast, the individuals being photographed and released without damage. *A. affinis* was observed on September 8, 2017 at 2:30 p.m., in a small freshwater lagoon (UTM 30T, 460356, 4812975, ETRS89; 0 m a.s.l.) located between the dune cord of the beach Trengandín and the north face of Mount Mijedo, which due to its limestone nature favors the presence of various freshwater outcrops and the formation of small lagoons in a predominantly saline environment. The presence of at least 2 ♂♂ in flight in a territorial attitude was verified, since there was a confrontation between them every time they met in the air. *Anax ephippiger* was observed in the same place, on September 27, 2017, between 1:45 p.m. and 2:45 p.m. They were located around 12-15 specimens in different attitudes. Some of the individuals flew over the sheet of water at the same time that mating and mating in tandem were observed. *A. parthenope* was located on September 28, 2017 at 1:00 p.m. It was a fairly old ♀, judging by its dark coloration, which was perched on a reed stem (*P. australis*) on the shores of the Victoria Marsh (UTM 30T, 458387, 4813151, ETRS89; 0 m a.s.l.)." (Authors)] Address: del Val, L., Técnico de medio ambiente en el P.N. Marismas de Santoña, Victoria y Joyel. (Ayuntamiento de Noja y Sociedad Española de Ornitología SEO/BirdLife). Carretera de Soano, nº 3, 39180 Noja, Cantabria, Spain. E-mail: ludovicodevega@hotmail.com

**21940.** Diaz-Martinez, C.; Evagelio Pinach, J.M. (2018): Primera cita de *Selysiothemis nigra* (Vander Linden, 1825) (Odonata, Libellulidae) en la provincia de Cuenca (centro-este de España) - First records of *S. nigra* in Cuenca province (east-center Spain). Boln. Asoc. esp. Ent. 42(3-4): 461-465. (in Spanish, with English title) ["The purpose of this note is to communicate the first records of *S. nigra* in the province of Cuenca, observed during the summer of 2018 in two locations: 1. Gravels of Casalonga. Municipality of Villar de Cañas, 806 m a.s.l. These are abandoned quarry holes currently clogged with water, forming a rosary of permanent lagoons surrounded by areas of seasonal flooding. The records presented correspond to the lagoons located at the UTM coordinates ETRS89 30S 536044/4408812 (lagoon 1) and 536062/4408559 (lagoon 2), with a surface area of 0.5 and 1 ha, respectively. 08/01/2018, 11:30 a.m.: 2 ♂♂, 1 ♀. The ♀ was captured while perched on herbaceous vegetation 30 m from Lagoon 2. The two ♂♂ flew over the surface of the water in Lagoon 1, chasing each other and other odonates flying in the area away. 08/05/2018, 12:00 pm: 3 ♂♂ and a mating tandem, all of them perched on different tamarisk (*Tamarix L.*) feet. The ♂♂ were in lagoon 2 and the tandem, one meter from lagoon 1. 08/23/2018, 1:30 p.m.: 1 ♂, which was photographed in the vicinity of lagoon 2. 2. Irrigation pond. Place of La Trapera, municipal term of La Almarcha, UTM ETRS89 30S 557501/4394166, 840 m altitude. It is an artificial pond for irrigation of 2.90 ha and deep water (Fig. 1d). It is water-proofed with clay, which allows the development of aquatic

vegetation and an incipient colonization of the shores by marshy (reed) and woody (tarayes and some poplar) vegetation. 08/11/2018, 5:10 p.m.: 1 ♂ perched on a tamarisk, which was captured and photographed." (Authors/Google translate)] Address: Diaz-Martinez, Cecilia, Dirección Provincial de la Consejería de Agricultura, Medio Ambiente y Desarrollo Rural en Cuenca. Junta de Comunidades de Castilla-La Mancha, Spain. E-mail: ceciliad@jccm.es

**21941.** Ruffoni, A.; Barbotte, Q.; Boeglin, Y.; Soissons, A.; Brunet, S. (2018): État des lieux sur la répartition actuelle de *Coenagrion ornatum* en France. Revue scientifique que Bourgogne-Franche-Comté Nature 27: 310-313. (in French) ["An (almost) Burgundian specialty, *C. ornatum* (Selys, 1850) is present in Europe mainly in the south-east and becomes rarer going west. Its situation is worrying, the number of stations in the heart of its major area of occupation tends to decrease, in addition to its regression at the margins (Boudot & Kalkman, 2015). The westernmost sector of presence is currently located in France, straddling 3 regions (the Alsatian populations have disappeared); Centre-Val-de-Loire, Bourgogne-Franche-Comté and Auvergne-Rhône-Alpes, the largest populations being located in the Depts of Nièvre and Saône-et-Loire. Provisional assessments of the state of knowledge were carried out for the Center of France in 2002 (Grand, 2002) and for Burgundy in 2011 (Ruffoni et al., 2013). *C. ornatum* lives in small, slow-flowing streams and seeping springs in grazed meadows in a bocage context. Its situation remains fragile (NT) in France and Burgundy (IUCN France et al., 2016; Ruffoni, 2014). Currently, the French core seems increasingly isolated. The nearest population is now more than 300 kilometers away." (Authors/Google translate)] Address: Ruffoni, A., Société d'histoire naturelle d'Autun - Maison du Parc - 58230 Saint-Brisson, France

**21942.** Sathasivam, K. (2018): Dragonflies in Madras. Black-buck 35(3/4): VI + 102 pp. (in English) [https://www.researchgate.net/publication/344151825\_Dragonflies\_in\_Madras] Address: Sathasivam, K., A-2, Casa Grande, 13-14, El-liamman Koil Street, Chennai 600020, India. E-mail: kumaran.sathasivam@gmail.com

## 2019

**21943.** Escola, J. (2019): Primera cita de *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) de la provincia de Lérida (Cataluña, Península Ibérica). Boletín de la Sociedad Entomológica Aragonesa 65: 218. (in Spanish, with English summary) ["The 'Alta Ribagorça' is a region of the Lérida Pyrenees, located to the south of the 'Vall d'Aran', to the west of 'Pallars Sobirà' and to the north of 'Pallars Jussà'. To the west it limits with the homonymous region of the autonomous community of Aragon. Pont de Suert is the capital of the 'Alta Ribagorça' and the 'Centre de Fauna' is located in this municipality at the crossroads of the N-230 and N260 roads. On August 9, 2019 at 12:10 p.m., a single male specimen of *T. kirbyi*. The photograph that supports the quote has been deposited in the citizen platform Biodiversidad Virtual (http://www.biodiversidadvirtual.com, registry -img1171673 of the gallery of invertebrates). No other specimen of odonate is observed, so it could be a dispersing specimen, looking for new habitats. The place is located within the grid of 1 km on a side UTM 31TCG 1496, at 829 m a.s.l." (Author/Google translate)] Address: Escola, J., ICHN (Institució Catalana d'Història Natural) Carrer del Carme, 47; 08001 Barcelona, Spain Email: jescola2@xtec.cat

**21944.** Kietzka, G.J.; Pryke, J.S.; Gaigher, R.; Samways,

M.J. (2019): Applying the umbrella index across aquatic insect taxon sets for freshwater assessment. *Ecological Indicators* 107, December 2019, 105655: (in English) ["Highlights: • The umbrella index successfully identified sensitive freshwater taxa as indicators. • It performed well in a biodiverse region with many rivers and varying disturbances. • Eight Ephemeroptera/Plecoptera/Trichoptera and seven Odonata were selected. • Both groups co-occurred with high percentages of own taxa and for the other group. • These groups have great potential and interchangeable for biodiversity conservation. Abstract: Biological surrogates in conservation biology are valuable for rapid biodiversity and environmental surveys, and as an early warning of potential threats. However, these surrogates need to be simple and inexpensive to apply. The umbrella index was applied here to quantify the selection of surrogate species for biodiversity assessments, but requires interrogation for application in areas rich in threatened endemic species. Aquatic larvae of Ephemeroptera, Plecoptera and Trichoptera (EPT), as well as the adult Odonata, are all highly responsive to changes in freshwater condition. Using the umbrella index, we evaluated the performance of the surrogate species approach for aquatic insect conservation in a region (Greater Cape Floristic Region) with an exceptional level of rare and endemic species, across multiple rivers with different disturbance levels. Due to a lack of species level information, EPT taxa were calculated using morphospecies within families, and Odonata were identified to species level. The umbrella index identified eight EPT species and seven Odonata species as potential surrogates. Both these groups co-occurred with high percentages of their own overall groups (EPT surrogates for overall EPT, and Odonata surrogates for overall Odonata), as well as for the other group (EPT surrogates for overall Odonata, and Odonata surrogates for overall EPT). The index was surprisingly flexible, and performed well in an area with so many species of conservation concern, as well as across spatial scales greater than a single river, with varying degrees of disturbance. Both EPT and Odonata showed promise as potential biodiversity surrogates, and for future conservation planning. Ideally, conservationists should aim to use taxa that are easy to identify to species level, with known sensitivities to human disturbance. However, when this is not a possibility, the umbrella index is still applicable and accurate for morphospecies (family level sensitivities)."] (Authors)] Address: Kietzka, Gabriela, Dept of Conservation Ecology & Entomology, Stellenbosch Univ., Matieland, South Africa. E-mail: gkietzka@sun.ac.za

**21945.** Marinov, M.; Rashni, B. (2019): Stories from the Stone Bowl Nadarivatu, Viti Levu Island, Fiji. *Agrion* 23(1): 30-33. (in English) [Indolestes vitiensis (Tillyard 1924) Nesobasis angulicollis. (B) N. comosa. (C) N. erythroptus. (D) N. telegastrum N. leverii. (B) N. caerulecaudata. (C) Procordulia irregularis.] Address: Milen Marinov [milen.marinov@mpi.govt.nz] & Bindiya Rashni [diyarash@gmail.com]

**21946.** Masius, P. (2019): Die Gestreifte Quelljungfer (*Cordulegaster bidentata* Selys, 1843) im nördlichen Hunsrück: Erste Ergebnisse unter besonderer Berücksichtigung der Erfassungsmethodik (Odonata: Cordulegastridae). *Decheniana* 172: 142-157. (in German, with English summary) ["A survey of *C. bidentata* was conducted in the Northern Hunsrück in 2016, 2017 and 2018. At ten of the twelve studied sources the species was recorded. Before this study, only one old record of *C. bidentata* has existed from the study area. The results of this survey substantiate the thesis, that in the Northern Hunsrück (Germany) a main distribution area of *C. bidentata* in Rhineland-Palatinate lies. By diversifying the

search methods (records of larvae, exuviae and imagos), the problems with recording this species were taken into account. The results of the different methods are presented and discussed. In sum, they imply that a combination of all three methods is superior to the conventional larvae-method." (Author)] Address: Masius, P., Burbacherstr. 150, 53129 Bonn, Germany. EMail: patrick\_masius@gmx.de

**21947.** Tran, T.T.; Janssens, L.; Dinh, K.V.; Stoks, R. (2019): An adaptive transgenerational effect of warming but not of pesticide exposure determines how a pesticide and warming interact for antipredator behaviour. *Environmental Pollution* 245: 307-315. (in English) ["Highlights: •We studied transgenerational effects of pesticide and warming on mosquito behaviour. •Exposure to chlorpyrifos (CPF) and warming reduced antipredator behaviour. •The effect of CPF on antipredator behaviour was smaller under warming. •Parental exposure to warming shaped combined effect of CPF and warming in offspring. Abstract: The impact of pesticides on organisms may strongly depend on temperature. While many species will be exposed to pesticides and warming both in the parental and offspring generations, transgenerational effects of pesticides under warming are still poorly studied, particularly for behaviour. We therefore studied the single and combined effects of exposure to the pesticide chlorpyrifos (CPF) and warming both within and across generations on antipredator behaviour of larvae of the vector mosquito *Culex pipiens*. Within each generation pesticide exposure and warming reduced the escape diving time, making the larvae more susceptible to predation. Pesticide exposure of the parents did not affect offspring antipredator behaviour. Yet, parental exposure to warming determined how warming and the pesticide interacted in the offspring generation. When parents were reared at 24°C, warming no longer reduced offspring diving times in the solvent control, suggesting an adaptive transgenerational effect to prepare the offspring to better deal with a higher predation risk under warming. Related to this, the CPF-induced reduction in diving time was stronger at 20°C than at 24°C, except in the offspring whose parents had been exposed to 24°C. This dependency of the widespread interaction between warming and pesticide exposure on an adaptive transgenerational effect of warming is an important finding at the interface of global change ecology and ecotoxicology." (Authors)] Address: Stoks, R., Lab. voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**21948.** Verspui, K.; Wasscher, M.T. (2019): Puzzling watercolours of Odonata from the collection of Edmond de Selys Longchamps. *Odonatologica* 48(1/2): 1-25. (in English) ["19 watercolours of Odonata which until now have remained unidentified were studied in order to establish their identity. They form part of the 1 256 watercolours of the collection of Edmond de Selys Longchamps housed in the Royal Belgian Institute for Natural Sciences (RBINS). Selys wrote on each watercolour either no, partial or full species names that were never published. We examined previously published literature, specimens in the RBINS and consulted with various experts in hopes of associating these watercolours with current species names. We were able to associate ten watercolours with current species names and four only with genera, while four watercolours remain unidentified. In one watercolour the male is identified on the species level and the female on the generic level. We have thus far been able to associate 96 % of the entire odonate watercolour collection with current species names." (Authors) *Lestes albilabris*, *Lestes concinnus*, *Indolestes peregrinus*, *Hetaerina* sp., *H.*



vulnerata, *Heliocypha biseriata*, *Rhinocypha* sp., *Amorphostigma armstrongi*, *Argiocnemis rubescens intermedia*, *Megalagrion* sp., "*Pseudagrion spurium*", *Teinobasis alluaudi*, *Teinobasis* sp. 1, *Teinobasis* sp. 2, "*Agrion pyrromelas*", *Heliogomphus drescheri*, "*Gomphus*", *Microgomphus camerunensis*, "*Onychogomphus*", *Neuraeschna dentigera*, *Oplonaechna magna*] Address: Verspui, Karin, Lingedijk 104, 4196HC Tricht, The Netherlands. E-mail: karin.verspui@gmail.nl

**21949.** Vos, W.; Komdeur, J.; Hammers, M. (2019): Frequency-dependent resemblance of male-colored females to males in a damselfly. *Insect Science* 26(5): 958-962. (in English) [<https://onlinelibrary.wiley.com/doi/epdf/10.1111/1-744-7917.12584>] Address: Vos, W., Behavioural and Physiological Ecology, Groningen Inst. for Evolutionary Life Sciences, Univ. of Groningen, Groningen, The Netherlands

## 2020

**21950.** Garcia-Pozuelo-Ramos, C. (2020): Primera observación de *Erythromma viridulum* (Charpentier, 1840), (Odonata, Coenagrionidae), en la provincia de Toledo (España central). - First observation of *Erythromma viridulum* (Charpentier, 1840), (Odonata, Coenagrionidae), in the Toledo province (central Spain). *Boln. Asoc. esp. Ent.* 44(1-2): 197-201. (in Spanish) [*Erythromma viridulum* has been observed in Illescas (Toledo), in the La Canta quarry pond (UTM datum ETRS89 30S 426165/4440914, 590 m). Specimens observed: 6/30/2019 - approximately twenty specimens; 7/VII/2019 - approximately twenty specimens, copulations and clutches; 7/14/2019 - approximately a dozen individuals, including an immature male.] Address: Garcia-Pozuelo-Ramos, C., Sociedad Entomológica y Ambiental de Castilla-La Mancha (SEACAM). Email: pkymp@yahoo.es

**21951.** Tysoe, M.; Rebassa, M. (2020): Descobrint els odonats de les Illes Balears. *Es Busqueret* 50: 41-47. (in Catalan) [Discovering the odonates of the Balearic Islands. Available at: [https://ibdigital.uib.es/greenstone/sites/local-site/collect/busqueret/index/assoc/EsBusque/ret\\_2020/n0-50p040.dir/EsBusqueret\\_2020n050p040.pdf](https://ibdigital.uib.es/greenstone/sites/local-site/collect/busqueret/index/assoc/EsBusque/ret_2020/n0-50p040.dir/EsBusqueret_2020n050p040.pdf)] Address: Rebassa, M., Societat d'Història Natural de les Balears, carrer Margalida Xirgu, 16, baixos, 07011, Palma, Spain. Email: escarabatdaurat@gmail.com

## 2021

**21952.** Ertas, A.; Boz, T.; Kizilkaya, I.T. (2021): Comparative analysis of benthic macroinvertebrate-based biotic and diversity indices used to evaluate the water quality of Kozluoluk Stream (West Anatolia of Turkey). *Community Ecology* 22: 381-390. (in English) ["Freshwater ecosystems are vitally important which supports biological diversity. With this aim, a total of eight biotic and three species diversity indices were used to determine water quality of Kozluoluk Stream in West Anatolia of Turkey. The biotic indices were: Saprobii (SI), Biological Monitoring Working Party (BMWP-O, BMWP-S and BMWP-G), Average Score per Taxon (ASPT), Family Biotic Index (FBI), Belgian Biotic Index (BBI), EPT-Taxa [%], and species diversity indices consisted of: Shannon-Weaver (SWDI), Simpsons (SDI) and Margalef (MDI). Principal component analysis (PCA) was applied to the physicochemical and biotic dataset. Similarities between the sampling stations were clustered by using cluster analysis (CLUS). Pearson-based correlations were used to determine which index is more suitable in determining water quality of the stream. The nine taxonomic groups were found in Kozluoluk Stream

consisting of Amphipoda, Oligochaeta, Gastropoda, Ephemeroptera, Plecoptera, Trichoptera, Odonata, Coleoptera and Diptera. The 1st and 2nd stations (90%) were the most similar stations in terms of benthic macroinvertebrate species distribution. The results indicate that the ASPT, BBI, BMWP-O, BMWP-S, BMWP-G and EPT-Taxa [%] are more proper than FBI and SI indices to determine the water quality of Kozluoluk Stream. The water quality along the stream varied from good class in upstream stations, to moderate in downstream stations. This study clearly showed that the specific biotic index according to the ecological characteristics of Turkey should be developed." (Authors)] Address: Ertas, A., Dept Biol., Faculty of Science, Ege Univ., 35100, Izmir, Bornova, Turkey

**21953.** Kalniņš, M. (2021): Contribution to the knowledge of dragonflies (Odonata) from the Raja Ampat (Indonesia), with notes on their ecology. In: Telnov D., Barclay M. V. L. & Pauwels O. S. G. (eds) *Biodiversity, biogeography and nature conservation in Wallacea and New Guinea*. Volume IV. The Entomological Society of Latvia, Riga, 443 pp: 221-238. (in English) ["This article contains information on 103 Odonata species from Raja Ampat – Waigeo, Misool, Salawati, and Batanta Islands. No information was found on the species composition of Kofiau dragonflies. Eleven Odonata species are new to the fauna of Misool Island, collected or observed by the author and five Odonata species found by other researchers. Three Odonata species are new records for the fauna of Waigeo Island. Additional information on ecology and behaviour of several species is also given." (Author)] Address: Kalniņš, M., Nature Protection Board, Eksporta iela 5, Riga, 1010, Latvia. Email: martins.kalnins@dap.gov.lv

**21954.** Martín, B.D.; Gil, A.C. (2021): Escaralimanía: preparando entomoficionados para favorecer la conservación de odonatos y otros artrópodos. *Boletín de la Sociedad Entomológica Aragonesa* 69: 206-211. (in Spanish, with English summary) ["Based on the premise that in order to appreciate you have to know, the ESCARALIMANIA project (beetles, spiders, dragonflies and butterflies) seeks to promote the knowledge and participation of citizens in the importance and conservation of arthropods within an interactive and collaborative learning process that consists of four phases: LEARN, through courses given by specialists; OBSERVE, through outdoor activities; PARTICIPATE as a volunteer by recording data; and ACT by caring for and recovering their habitat. In the case of odonates, different activities are being carried out through these four lines of action, in order to achieve a continuous training process with the aim of consolidating a quality monitoring network to evaluate the distribution of the species and their conservation status." (Authors) The paper includes drawings of exuviae of *Trithemis kirbyi*.] Address: Díaz Martín, Beatriz, Depto de Entomología, Sociedad de Ciencias Aranzadi. Zorroagaina 11, 20014 Donostia – San Sebastián (Gipuzkoa, Spain). Email: entomologia@aranzadi.eus

**21955.** Monnerat, C. (2021): Les gomphides du Valais: Synthèse des données et évolution de leur distribution (Odonata: Gomphidae). *Bull. Murithienne* 139: 39-51. (in French, with German summary) ["The first evidence for the development of *Gomphus vulgatissimus* and *Onychogomphus f. forcipatus* is provided for the central Valais (western inner Alps). The discovery of an exuvia of *G. vulgatissimus* in 2009 in a stream in the alluvial zone of the Bois de Finges documents its reproduction, which has not been followed up. Observed in the central Valais since 2011, *O. f. forcipatus* has colonised the water bodies of former gravel pits in the Rhône

plain between Martigny and Sierre in less than a decade. Evidence of the development of *O. f. forcipatus*, documented in Lake Geneva (Haut Lac) since 2000 and in the Chablais vaudois since 2004, was provided in several sites in the central Valais from 2016. The historical and current data of the three gomphid species known from the canton of Valais, *G. pulchellus*, *G. vulgatissimus* and *O. forcipatus*, are presented and discussed. While *O. f. forcipatus* has recently expanded its range in Valais through secondary habitats, *G. pulchellus* and *G. vulgatissimus* no longer find suitable habitats for maintaining permanent populations in the canton of Valais." (Author/DeepL] Address: Monnerat, C., Info fauna, Bellevaux 51, 2000 Neuchâtel, Switzerland. E-mail: christian.monnerat@unine.ch

## 2022

**21956.** Assandri, G.; Bazzi, G.; Festi, A.; Leandri, F. (2022): Distribution, ecology and conservation of *Aeshna caerulea* (Ström, 1793) and *Aeshna subarctica elisabethae* Djakonov, 1922 (Insecta: Odonata) at the southernmost limits of their range. *Aquatic Insects* 44(2): 136-150. (in English) ["We provide an overview of the distribution, habitat preference, phenology, and conservation of *A. caerulea* and *A. subarctica elisabethae* in Italy. Both species are found exclusively in the Central Eastern Alps. By 2021, *A. caerulea* has been reported for 31 sites, whereas *A. s. elisabethae* for 15. The new southernmost global range limit for *A. caerulea* was found in the Adamello massif and the new southernmost Western Palearctic limit for *A. s. elisabethae* in the Tesino plateau (Trentino-Alto Adige). *A. caerulea* reproduces at high-altitude ponds or small lakes, inundated fens or fen meadows, and occasionally in the depressions within raised bogs. *A. s. elisabethae* is found at lower altitudes, only at raised bogs and, to a lesser extent, in acidic transitional mires rich in *Sphagnum* mosses. 46% of the reproduction sites of *A. caerulea* and 93% of those of *A. s. elisabethae* are included within a national/local protected area or the Natura 2000 network." (Authors)] Address: Assandri, G., Area Per L'Avifauna Migratrice, Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA), Ozzano dell'Emilia, Italy. Email: giacomo.assandri@gmail.com

**21957.** Burch, S.F. (2022): The Dragonflies and Damselflies of Oxfordshire. *Fritillary* 10: 9-108. (in English) ["This paper provides a timely update of current knowledge of the dragonflies of Oxfordshire. All 37 species that have been recorded are described and distribution maps for all species, derived from all records within the National Biodiversity Network (NBN) Atlas database are given. An analysis to show how the relative recording frequencies of individual species have changed over time has been carried out and highlights increases and decreases relative to the numbers of records received for all dragonflies. This includes species recently arrived in Oxfordshire having expanded their range from continental Europe to England. For three highly localised species, the results from the recording frequency analysis are supplemented by summary plots of quantitative data from BBOWT transect surveys that have taken place over almost the last twenty years at two reserves at Cothill. In addition, phenology data were obtained from the NBN Atlas for first and last sighting dates and are compared with the corresponding information from 1996." (Author)] Address: Stephen Burch: Email: stephen\_burchemail@yahoo.co.uk

**21958.** Bylak, A.; Kukula, K. (2022): Impact of fine-grained sediment on mountain stream macroinvertebrate communities: Forestry activities and beaver-induced sediment management. *Science of the Total Environment* 832 155079:

16 pp. (in English) ["Highlights: • In mountain areas, fine sediment influx is mostly generated by forestry activities. • Fine sediments disturb benthic habitats and lead to decreased invertebrate density. • Fine sediments clogging spaces between stones limit the presence of rheophilic taxa. • Fewer scrapers and shredders may affect the food-web structure in stream ecosystems. • Fine sediments trapped in beaver ponds may accelerate recovery of stream sections. Abstract: Fine-grained sediments are a natural component of river systems. Human activities generate additional sources of fine sediment. In mountainous areas, the anthropogenic inputs of fine sediments are associated with forestry. The aim of this study was to analyse the differences in the macroinvertebrate communities between the reference and caused by forest harvesting activities increased influx of fine-sediment to mountain streams. The tested hypothesis was that the macroinvertebrate communities will differ depending on the intensity of forest harvesting practices in the stream catchment that causes excessive influx of fine sediment into the stream. The reintroduction of beavers in the study area, and the formation of in-stream beaver dams, contribute the accumulation of sediments in stream sections with slower water. Thus, it was also assumed that by capturing and storing fine sediments, may contribute to the restoration of the natural structure of the benthic communities downstream of the ponds. The study was carried out in a mountain stream catchment area (Carpathians, Poland), in which inflow of fine sediments in the stream sections varied in intensity. The study was conducted over three years (2018–2020). The extensive use of forest roads, timber skidding trails, and timber storage areas produced fine sediments that clogged the interstitial spaces between the stones in the riffles, limiting the presence of rheophilic taxa associated with coarse-grained substrates. The reduction of the number of scrapers and shredders (i.e. primary consumers) associated with the influx of fine sediments may significantly affect the entire food-web structure in stream ecosystems. The capture and deposition of fine sediments in beaver ponds may accelerate the revitalisation of the flowing sections of the stream. Beaver-induced sediment management is strongly recommended as a beneficial practice that could contribute to ecological preservation and the potential of streams, particularly in mountain areas." (Authors)] Address: Kukula, K., Dept Ecology & Environmental Protection, Univ. of Rzeszów, Poland. Email: kkukula@ur.edu.pl

**21959.** Costa, R.M.G.; Ferro, J.L.S.; Farjalla, V.F. (2022): Disentangling the mechanisms related to the reduction of aquatic habitat size on predator–prey interactions. *Hydrobiologia* 849: 1207-1219. (in English) ["Reductions in aquatic habitat size facilitate encounters between predators and prey by reducing the height of the water column and the water volume. Here, we proposed to disentangle the effects of these mechanisms on predation rates and parameters of functional response curves of predators. We paired active-search predators (*Buenoa*, Hemiptera) or ambush predators (*Pantala*, *Lestes*) with prey of different mobility types (*Argyrodiaptomus*, Copepoda; *Culex*, Diptera). Three treatments were established: high water column height and high water volume (H + V +), low water column height and high water volume (H - V +), and low water column height and low water volume (H - V-). We used contrast analysis to separate the effects of water column height (H +, H-) and water volume (V +, V-). Predation rates were higher in V- than in V + for *Pantala* and *Buenoa* consuming *Argyrodiaptomus*. In addition, we observed an increase in attack rates and a decrease in handling time in V- in relation to V + for *Pantala* and *Lestes* consuming *Argyrodiaptomus*. We concluded that reduction in the water volume was main responsible factor for

the changes in predator–prey interactions. These changes depended on the prey behavior and predator foraging modes: ambush predators were the most benefited, and highly mobile prey were the most consumed." (Authors)] Address: Farjalla, V.F., Lab. Limnology, Ecology Dept, Biology Institute, CCS, Federal Univ. of Rio de Janeiro (UFRJ), Ilha do Fundão, Rio de Janeiro, Brazil

**21960.** Ertas, A.; Yorulmaz, B. (2022): Comparative performance of the indices used for bioassessment of water quality of Sangi stream (West Anatolia, Turkey). *Russian Journal of Ecology* 53: 318-327. (in English) ["This study has been carried out to determine water quality of Sangi Stream (West Anatolia, Turkey) and to compare the performance of indices used. Five biotic and three diversity indices have been used for determination of water quality of Sangi Stream. The assessment of water quality has been done based on benthic macroinvertebrate and physicochemical parameters. The following biotic indices have been used: Saprobii Index (SI), Biological Monitoring Working Party (BMWP), Average Score per Taxon (ASPT), Family Biotic Index (FBI), Belgian Biotic Index (BBI), as well as the following diversity indices: Shannon–Weaver index (SWDI), Simpsons index (SDI), Margalef index (MDI) and Evenness (E1). Principal component analysis (PCA) has been applied to the physicochemical variables. The similarities between the sampling stations have been clustered by using Cluster analysis (CLUS). Our results have shown the presence of 9 taxonomic groups in Sangi Stream: Crustacea, Oligochaeta, Gastropoda, Ephemeroptera, Plecoptera, Trichoptera, Odonata, Coleoptera, and Diptera. The water quality along the Sangi Stream has varied from high class quality in station 1, 2, 3 and 4, to good and moderate quality in station 5 and 6. The results indicate that the SI, BMWP, FBI and ASPT were sufficient in the estimation of water quality in the examined watercourse. This study has clearly shown that a specific biotic index according to the ecological characteristics of Turkey should be developed." (Authors)] Address: Ertas, A., Ege Univ., Faculty of Science, Dept Biol., Bornova, Izmir, 35100, Turkey

**21961.** Feng, Z.; Wan, S.; Sui, Q.; Labandeira, C.; Guo, Y.; Chen, J. (2022): A Triassic tritrophic triad documents an early food-web cascade. *Current Biology* 32(5): 5165-5171. (in English) ["Highlights: • Body-fossil evidence is described from egg chorions for insect-endophytic oviposition. • Late Triassic evidence of egg predation is documented based on insect-feeding damage. • An ecological cascade of a plant host-ovipositing insect-egg predator link is shown. Summary: Endophytic oviposition behavior, the insertion of eggs into plant tissues, represents a sophisticated reproductive strategy of insects. This process is accomplished by employing a specialized egg-laying device, the ovipositor, that effectively protects eggs through plant tissue concealment. Endophytic oviposition behavior is currently common in many lineages of several major, extant insect orders, principally Odonata, Orthoptera (katydid and grasshoppers), Hemiptera (cicadas, aphids, scale insects, whiteflies, leafhoppers, and bugs), Coleoptera, Lepidoptera (moths), and Hymenoptera (sawflies). Based on the occurrences of egg insertion damage and associated scar tissue expressed in fossil plant stems and leaves, endophytic ovipositional behavior is presumed to have emerged as early as the Early Pennsylvanian Period. However, for impression fossils, egg morphology and surrounding scar tissue can be difficult to discern on plants, often resulting in ovipositional damage that may be assigned to exophytic (eggs laid on plant surfaces) or to endophytic behavior. This ambiguity is due to the spatial relationships and histological mingling of ovipositional damage and enveloping

scars with adjoining plant-host tissues. Here, we describe body fossils of insect eggs within ginkgophyte leaves from the Upper Triassic of China. Feeding damage from an egg-predatory insect commonly occurs on these eggs, as some eggs bear up to several feeding punctures. We provide exceptional body-fossil evidence for resource use of a host plant by an ovipositing insect and unravel the earliest-known tritrophic cascade of a host plant, an ovipositing insect, and an egg-predatory insect." (Authors)] Address: Feng, Z., Inst. Palaeontology, Yunnan Key Lab. of Earth System Science, Yunnan Key Lab. for Palaeobiology, MEC International Joint Lab. Palaeobiology & Palaeoenvironment, Yunnan Univ., Kunming 650500, China. Email: zhuofeng@ynu.edu.cn

**21962.** Fiebrich, M.; Medinger, V. (2022): Reproduktionsnachweise der Schabracken-Königlibelle (*Anax ephippiger*) im NSG Wollmatinger Ried 2021 (Odonata: Aeshnidae). *Mercuriale* 22: 53-69. (in German, with English summary) ["Successful reproduction of vagrant emperor (*Anax ephippiger*) in the Wollmatinger Ried nature reserve, SW-Germany (Odonata: Aeshnidae) - In the year 2021, *A. ephippiger* was recorded in the Wollmatinger Ried nature reserve (Western Lake Constance). In addition to patrolling males, evidence for reproduction (oviposition) as well as proof of reproduction (freshly hatched individuals, exuviae) were documented. In August and September, mass emergence occurred. A total of 1,175 exuviae were collected. These are the only reproductive records of this species in Germany this year. Further observations of *A. ephippiger* in Germany and neighbouring countries are listed." (Authors)] Address: Medinger, Verena, Forsteistraße 4, 78315 Radolfzell, Germany. Email: VerenaMedinger@gmx.net

**21963.** Fukaya, W.; Futahashi, R. (2022): Distribution survey of Mnais damselflies (Zygoptera: Calopterygidae) in Saitama Prefecture, central Honshu, Japan. *Tombo* 65: 58-62. (in Japanese, with English summary) ["We surveyed the distribution of the genus *Mnais* in Saitama Prefecture, central Honshu, Japan. Based on nuclear ITS1 sequences, three groups, *Mnais costalis* Selys, 1869, *M. pruinosa* Selys, 1853, and "Izu population" or *M. pruinosa* Selys, 1853 were found in Saitama Prefecture. *M. pruinosa* is widely distributed mainly in the western part of the prefecture, while *M. costalis* is distributed only in limited areas in the eastern and southern parts of the prefecture. "Izu population" was discovered in the upstream of the Arakawa River in Chichibu City, which is the first record from Saitama Prefecture." (Authors)] Address: Fukaya, W.: Email: aeshna2074@gmail.com

**21964.** Fukuda, A. (2022): The first record of *Ictinogomphus pertinax* (Hagen in Selys, 1854) from Ibaraki Prefecture, Japan. *Tombo* 65: 56-57. (in Japanese, with English summary) ["A male of *I. pertinax* was photographed in Jojamaichi, Joso-shi, Ibaraki Prefecture, Japan, on 6 August 2022. This is the first record of this species from Ibaraki Prefecture and the northernmost record for Japan." (Author)] Address: Email: gea01624@nifty.com

**21965.** Futahashi, R.; Koshikawa, S.; Okude, G.; Osanai-Futahashi, M. (2022): Diversity of melanin synthesis genes in insects. *Advances in Insect Physiology* 62: 339-376. (in English) ["Melanins are tyrosine-derived pigments that are ubiquitous in animals, plants, and fungi. Melanins are often associated with black and brown pigmentation, which provide a variety of biological functions, such as mimicry, camouflage, thermoregulation, and UV protection. The synthetic pathway of melanin pigments has been extensively studied in vertebrates, but interestingly, it has become clear

that the kinds of melanin pigments and genes involved in melanin biosynthesis differ significantly between insects and vertebrates. Dopamine melanin is the major melanin pigment in various insects. In insects, most of the melanin synthesis genes are highly conserved, but the yellow family genes and aaNAT family genes exhibit diversity in gene repertoire among diverse insect taxa. In this review, we introduce eight melanin synthesis genes involved in insect epidermal pigmentation: tyrosine hydroxylase (TH), dopa decarboxylase (DDC), aspartate 1-decarboxylase (ADC, black), N- $\beta$ -alanyldopamine synthase (NBADS, ebony), N- $\beta$ -alanyldopamine hydroxylase (NBADH, tan), arylalkylamine N-acetyltransferase (aaNAT), multicopper oxidase 2 (MCO2, laccase2), and yellow. For each gene, we show the molecular phylogenetic tree based on the amino acid sequences of six representative insects, the fruit fly *Drosophila melanogaster* (Diptera), the silkworm *Bombyx mori* (Lepidoptera), the swallowtail butterfly *Papilio xuthus* (Lepidoptera), the red flour beetle *Tribolium castaneum* (Coleoptera), the honeybee *Apis mellifera* (Hymenoptera), and *Ischnura senegalensis*, which highlights the diversity of melanin synthesis genes among insects. We also introduce the current knowledge of the melanin synthesis gene that contribute to colour pattern formation in various insects." (Authors)] Address: Futahashi, R., Nat. Inst. Advanced Indust. Science &Tech. (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**21966.** Futahashi, R.; Kiyoshi, T. (2022): The past record of *Ischnura rubilio* Selys, 1876 from Ishigaki Island. Tombo 65: 40-43. (in Japanese, with English summary) ["*Ischnura aurora* (Brauer, 1865), previously thought to be widespread from Asia to Oceania, has recently been divided into two species, with the Asian species identified as *Ischnura rubilio* Selys, 1870. In Japan, the species Distributed on Iwojima island was recognized to be genuine *I. aurora*. Here we examine an individual collected in the past from Ishigaki Island, Japan, and confirm that it is *I. rubilio*, the same species as found in Taiwan morphologically. As a result, the number of Odonata species in Japan increases to 206." (Authors)] Address: Futahashi, R., National Inst. Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**21967.** Hisamatsu, S. (2022): Life history of *Sympetrum uniforme* (Selys, 1883) and future actions to preserve its habitat. Tombo 65: 1-7. (in Japanese, with English summary) ["*S. uniforme* is ranked as "endangered" by the Ministry of the environment, Japan; its current habitats have been identified in only seven prefectures. In this paper, I report on the current condition of the existing habitats and about the seasonal prevalence of this species, which were investigated by the author in Ehime Prefecture in 2016-2019. From the results of the investigation, it is inferred that water-edge vegetation, such as *Phragmites australis* and *Paspalum distichum*, is needed for the emergence of the species; traditional management methods of the ponds in the study area, such as mowing the grass in fixed months and water management, are associated with the life history of the species. There are some ponds in which no adults emerge if the mature adults have territorial and oviposition behavior in the ponds. Additionally, the results also revealed that immature adults spend time in high-altitude areas and mature adults spend time in vegetation and/or fruit gardens near the habitat ponds at night. The results of the investigation suggest that preserving a wide range of areas is needed, not only for preserving the particular habitat ponds but also pond groups and areas at the foot of mountains." (Author)] Address: Email: s-hisamatsu@uhe.ac.jp

**21968.** Iida, M.; Tamada, A. (2022): First record of *Macromia daimoji* Okumura, 1949 from Miyagi Prefecture, Japan. Tombo 65: 54-55. (in Japanese, with English summary) ["On 2 July 2022, an adult male of *M. daimoji* was incidentally recorded from Miyagi Prefecture for the first time. But, no additional individuals were found at the region by the research on November 2022. We will confirm its settlement by further research." (Authors)] Address: Iida, M.: Email: odonata\_62@yahoo.co.jp

**21969.** Joshi, S.; Gassahd, R.; Ismaveld, V.A. (2022): Dragonflies and damselflies (Insecta: Odonata) of Karimganj District, Assam, India with four additions to the Indian checklist. Oriental Insects 56(3): 299-327. (in English) ["Situated at the intersection of the Himalayan and Indo-Chinese biodiversity hotspots, Northeast India is one of the most biodiversity rich areas of South Asia. Despite this, insects such as dragonflies and damselflies (Order: Odonata) of this region remain poorly studied causing an impediment to their conservation assessments. We conducted long-term surveys to study odonate diversity of the Karimganj District, Assam, India bordering the states of Tripura and Mizoram, and the country of Bangladesh. Here, we publish reports of eight species: four new to India *Ceriagrion calamineum*, *Nannophyopsis clara*, *Phyllothemis eltoni*, and *Zyxomma breviventre*, and four noteworthy species newly recorded from the state: *Megalogomphus smithii*, *Orientogomphus indicus*, *Pseudothemis zonata*, and *Sarasaeschna khasiana*. We recorded total 97 odonate species during our surveys. We provide the checklist of Odonata of Assam based on our surveys and literature." (Authors)] Address: Joshi, S., Biodiversity Lab, National Centre for Biological Sciences, Bangalore 560065, India. E-mail: Shantanu@ifoundbutterflies.org

**21970.** Kita, H. (2022): Overwintering process of *Aciagrion migratum* (Selys, 1876) in a Cypress forest in Tokyo. Tombo 65: 8-20. (in Japanese, with English summary) ["The overwintering conditions or adult *A. migratum* were observed through winter from December, 2021 to February, 2022 in a Cypress forest in western Tokyo. The longest observed continuation or overwintering conditions was 57 days among the 4 male and 5 female individuals continually observed (it was 61 days in Chigasaki City, Kanagawa Prefecture). 'Overwintering conditions' are defined as the state in which an individual stays in the same place all day without flying during the winter. On December 21st, the flight of an individual was observed, while no flight for three resting individuals was confirmed on January 13th. The beginning of overwintering conditions was therefore estimated to be early January. The height of resting position utilized by the overwintering individuals was in the range of 1.2 m to 3.5 m above the ground. Even individuals in overwintering conditions can perform slight locomotion by walking, self-cleaning and hiding behaviors. The final confirmation date (the date just before the end of the overwintering conditions) of 1 ♂ and 2 ♀, whose overwintering conditions were continuously monitored, was March 13th. From this, it was estimated that the overwintering conditions ended around mid-March at this location. Since the temperature in the forest during mid-March exceeded 15°C, the repetition of similar warm weather within several days was considered to be one of the factors that terminated the overwintering conditions. In addition, the end of the overwintering conditions was earlier in the sunny coniferous and broad-leaved mixed forest facing east in Chigasaki City than in the shaded forest. From the above results, it is pointed out that the start and end of overwintering conditions for this species were considerably affected by not



only temperature, but also sunlight." (Author)] Address: kita-1114-age@u01.gate01.com

**21971.** Magliochetti, C. (2022): High trophic niche overlap within the aquatic carnivore guild in vernal ponds. MSc. thesis, Rutgers, The State Univ. of New Jersey: 39 pp. (in English) ["the underlying mechanisms shaping niche size and overlap within and between species are crucial for understanding species coexistence and community assembly. The hunting strategy of and the competition between predators shape their diets, but many species can adjust their niches via trophic or microhabitat differentiation to minimize foraging competition with co-occurring species. Niches can also change in response to environmental factors such as nutrient enrichment, which can affect the diversity and abundance of prey resources to consumers. Here we tested for trophic niche partitioning and niche specialization within an invertebrate carnivore guild. To do this, we sampled populations of arachnids and odonates, dominant riparian carnivores, in vernal ponds across a nutrient gradient in the New Jersey Pine Barrens. We used stable isotope analysis of carbon ( $\delta^{13}\text{C}$ ) and nitrogen ( $\delta^{15}\text{N}$ ) to obtain time- and space-integrated information on trophic niches of these populations. Our results showed variation in the trophic niche size of arachnids and odonates, however, our findings revealed a lack of niche differentiation between populations of arachnids and odonates within and across ponds. Additionally, neither nutrient enrichment, nor prey abundance or diversity were good predictors of niche width of these predators. Our results suggest that these co-occurring predators can coexist with minimal trophic niche overlap. As changes in climate shift species distributions and alter community assemblages, it is important to be able to predict how species will respond to overlaps in their distributions." (Author) Available at: <https://rucore.libraries.rutgers.edu/rutgers-lib/68185/>] Address: not stated

**21972.** Mavromati, E.; Kemitzoglou, D.; Tsiaoussi, V.; Lazaridou, M. (2022): A new WFD—compliant littoral macroinvertebrate index for monitoring and assessment of Mediterranean lakes (HeLLBI). *Environmental Monitoring and Assessment* volume 193, Article number: 745: 16 pp. (in English) ["A new multimetric index (HeLLBI) based on littoral benthic macroinvertebrates is presented in this paper for classification of Greek natural lakes, in compliance with the requirements of Water Framework Directive (WFD). The method was developed based on the collection of littoral benthic invertebrate fauna and environmental data from 109 sampling sites in 21 natural lakes of the Greek National Water Monitoring Network. We focused the analysis on the effects of shore morphological alterations and eutrophication to the littoral invertebrate fauna, identified to family level, except oligochaetes, which were identified as a class, and more particularly to taxonomic composition and abundance, to taxa sensitivity, and to richness/diversity. Three metrics were included in the multimetric index: the relative abundance of Odonata classes, the Average Score per Taxon, and the Simpson's diversity index. The metrics were converted to ecological quality ratios and ecological class boundaries were defined. The final multimetric index HeLLBI is expressed as an arithmetic average of normalized ecological quality ratios of the above metrics and a final score was assigned to each lake. Pressure-response relationships of HeLLBI scores were statistically tested for morphological alterations, expressed as percentage of artificial shoreline, and eutrophication, expressed as total phosphorus. The HeLLBI scores correspond to ecological classes, according to WFD, and sampling sites with different ecological

status contained distinct biological communities; those at high status where more diverse and with sensitive taxa and as the water quality deteriorated, macroinvertebrate assemblages consisted of fewer and more tolerant to degradation taxa. The HeLLBI method gave a reliable assessment of littoral benthic invertebrate fauna of Greek natural lakes and could be a useful tool for the classification of ecological status of other Mediterranean lakes.] Address: Mavromati, Efraxia, The Goulandris Natural History Museum, Greek Biotope/Wetland Centre, 14th km Thessaloniki. Mihaniona, 57001 Thermi, Greece. E-mail: emavromati@ekby.gr

**21973.** Morita, R.; Watanabe, T.; Futahashi, R. (2022): The second record from Japan of an interspecific hybrid between *Paracercion sieboldii* and *P. melanotum* from Ishioka City, Ibaraki Prefecture, Honshu, Japan). *Tombo* 65: 44-46. (in Japanese, with English summary) ["We report a male interspecific hybrid between *Paracercion sieboldii* (Selys, 1876) and *P. melanotum* (Selys, 1876) collected in Ishioka City, Ibaraki Prefecture. This is the second record of the hybrid or this combination in Japan. The markings on the antefrons and postocular spots, and the shape of the appendages are intermediate between the two species. Nuclear DNA analysis indicated an interspecific hybrid between *P. sieboldii* and *P. melanotum*, and mitochondrial DNA analysis confirmed that the mother species is *P. sieboldii*." (Authors)] Address: Futahashi, R., National Inst. Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**21974.** Nakada, T.; Futahashi, R.; Hori, S. (2022): A record or the pale-winged male of *Sympetrum croceolum* (Selys, 1883) from Hokkaido, Japan. *Tombo* 65: 47-48. (in Japanese, with English summary) ["An abnormal pale-winged male of *S. croceolum* was collected in Eoetsu-shi, Hokkaido, Japan. Nuclear DNA analysis confirmed that this individual is a pure *S. croceolum*, not a hybrid with other species." (Authors)] Address: Futahashi, R., National Inst. Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**21975.** Nicolai, B.; Grimm, H. (2022): Zur Nahrung des Turmfalken *Falco tinnunculus dacotiae* Hartert, 1913 (Aves: Falconidae) auf Fuerteventura (Kanarische Inseln, Spanien). *Vernate* 41: 81-90. (in German, with English summary) ["From 2019 to 2021, the diet of kestrels on Fuerteventura (Canary Islands, Spain) was studied. For this purpose, pellets were collected at resting/sleeping sites of adult birds. In total 5756 prey items were identified, mainly invertebrates (insects and spiders). In terms of biomass, lizards make up the largest proportion of the diet. Although other vertebrates (small mammals, birds) also provide a share of the biomass, these prey items are not regularly consumed or sufficiently accessible for the kestrels. The calculation of prey value (BW) results in only the following significant food items: Lizards (Squamata) (BW 54-78 %), Grasshoppers (Orthoptera) (BW 8-21 %), Spiders (Arachnida) (6-9 %) and Beetles (Coleoptera) (5-9 %). The results confirm the previously known composition of the diet of kestrels on the Canary Islands. In addition, there are indications, especially due to the drought of recent years, that under the (increasingly?) arid conditions of the island - besides a general reduction in the supply of potentially suitable prey - the proportion and thus the importance of lizards in particular, and also of invertebrates, in the diet are increasing." (Authors) The diet includes "Odonata".] Address: Bernd Nicolai, B., Herbingstr. 20, 38820 Halberstadt, Germany. Email: nicolai-bea@gmx.de

**21976.** Ocampo, M.; Chuirazzi, C.; Takahashi, M.K. (2022): The effects of road salt (NaCl), predation, and competition on the growth and community interactions of Spotted Salamanders (*Ambystoma maculatum*) and Wood Frogs (*Lithobates sylvaticus*). *Environmental Pollution* 315, 120349: (in English) ["Road deicing salts are frequently used in northern regions of the world during the winter and early spring months. As a result, a significant portion of road runoff into surrounding aquatic habitats contains road deicing salts. Previous studies found road salt contaminations in vernal pools that pond-breeding amphibians commonly use, including *A. maculatum* and *L. sylvaticus*. Studies have examined the impact of road salt on both amphibian species, but to our knowledge no previous studies have examined how road salt impacts the interspecific competition between both amphibians. We hypothesized that road salt would negatively impact growth and survivorship of both amphibian species. During the spring and summer of 2017, we conducted an outdoor mesocosm experiment in which we created eight experimental conditions with three main factors: presence/absence of NaCl (1000 mg/L Cl<sup>-</sup>), presence/absence of interspecific competition between the two amphibian species (*A. maculatum* and *L. sylvaticus*), and presence/absence of predatory dragonfly larvae (*Libellulidae*). Our experiment revealed that salt delayed hatching and increased deformity in spotted salamander hatchlings. Additionally, salt significantly decreased both salamander and frog survivorship. Wood frog tadpoles and road salt interacted to further diminish salamander survivorship, likely through an increase in interspecific competition. Road salt increased the larval period of salamanders and decreased the proportion metamorphosed by the end of the experiment. Dragonfly larvae caused a reduction in survivorship of salamander larvae, whereas they increased wood frog tadpole development rates. Dragonfly larvae and salt interacted to alter tadpole denticle size, with salt negating the impact of dragonfly larvae. This may signify that salt interferes with aquatic predatory chemical cues. Overall, our data suggest that the application of road de-icing salt has many far-reaching impacts on amphibians and their aquatic communities." (Authors)] Address: Ocampo, Melissa, 904C Southwood Drive, Murray KY 42071, USA. Email: mocampo@murraystate.edu

**21977.** Ott, J. (2022): Interessante Arten an den LIBELLULA-Teichen bei Trippstadt – mit einem aktuellen Brutnachweis der Krickente (*Anas crecca*). *Fauna Flora Rheinland-Pfalz* 14(4): 1459-1470. (in German, with English summary) ["The author reports on the faunistic species found between 2013 and 2022 at the ponds of the LIBELLULA environmental education center in the Karlstal near Trippstadt. A particularly outstanding feature this year was the successful breeding of an Eurasian teal (*Anas crecca*) with nine chicks. Overall, a large number of protected and endangered animal species from a wide variety of taxonomic groups was found in the approximately one-hectare wetland area – a former fish pond system now left to free succession –, which underlines the high nature conservation value of the area." (Author) The author compiles records of 27 species.] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**21978.** Péricat, A.; Maury, L.; Theaud, R.; Chalais, B. (2022): Étude hydrologique du lac Achard et des zones humides connexes: diagnostic et définition de scénarios de restauration pour une gestion environnementale du lac – phase 1: Diagnostic. Commune de Chamrousse, S.T.E. Sciences et Techniques de l'Environnement - Rapport 21-8570: 120 pp. (in French) [Isère, France; "This study aims to establish a

synthesis of the quality of Lake Achard and its related environments, through the analysis of previous data, supplemented by field investigations carried out in 2021-2022 to determine the hydromorphological parameters of the lake and its quality. physico-chemical and hydrobiological. Flora and fauna inventories were carried out in parallel to define the heritage issues of the site, in particular on the related wetlands, and their alterations. This diagnosis made it possible to characterize the body of water and to understand the origin of the turbidity of the water: it is about algal developments (phytoplankton). Nutrient inputs to the lake are low, but the water body has high primary production. This natural phenomenon does not indicate any deterioration in the quality of the environment apart from a visual impact. At the heritage level, the flora and fauna inventories (amphibians and odonates) have highlighted a certain diversity of wetland habitats (low marshes) with heritage stations of Lai-che des Bourbiers. Lac Achard displays a lack of aquatic grass beds and shows a degradation of riparian habitats. This "diagnosis" report constitutes the 1st volume of this study. The second volume aims to define restoration scenarios for the environmental management of the lake. It is therefore a question of defining the issues and the proposals for action with the ultimate objective of achieving the good status of this body of water and the good quality of the expected uses." (Authors/Google translate) The following taxa are treated: *Aeshna* sp.; *Aeshna cyanea*, *A. juncea*, *Coenagrion hastulatum*, *C. puella*, *Lestes dryas*, *Lestes* sp., *L. sponsa*, *Leucorrhinia dubia*, *Libellula depressa*, *L. quadrimaculata*, *Pyrhosoma nymphula*, *Somatochlora alpestris*, *S. metallica*, *Sympetrum flaveolum*.] Address: Sciences et Techniques de l'Environnement – B.P. 90374, 17, Allée du Lac d'Aiguebelle - Savoie Technolac, 73372 Le Bourget du Lac cedex, France; [http://www.mairiechamrousse.com/images/pdf/zones\\_naturelles/Etude\\_hydro\\_Lac\\_Achard\\_phase1diagnostic\\_E\\_NS\\_2022\\_compressed.pdf](http://www.mairiechamrousse.com/images/pdf/zones_naturelles/Etude_hydro_Lac_Achard_phase1diagnostic_E_NS_2022_compressed.pdf)

**21979.** Phan, Q.T.; Karube, H. (2022): Description of two new species of the genus *Chlorogomphus* Selys, 1854 (Odonata: Chlorogomphidae) and a new record of *Chlorogomphus gracilis* Wilson & Reels, 2001 from the Central Highlands of Vietnam. *European Journal of Taxonomy* 794: 91-110. (in English) ["Two new species of the genus *Chlorogomphus* are described based on both sexes collected from the Central Highlands of Vietnam. These species are *C. hoaian* sp. nov. (holotype male from Kon Ka Kinh National Park, 14.3672° N, 108.5368° E, alt. 1000 m) and *C. vani* sp. nov. (holotype male from Chu Yang Sin National Park, 12.4780° N, 108.4617° E, alt. 749 m). Furthermore, *C. gracilis* Wilson & Reels, 2001 is recorded from Vietnam for the first time, with notes on its morphology and detailed illustrations of male and female structures." (Authors)]

**21980.** Pinilla-Rosa, M.; García-Saúco, G.; Santiago, A.; Ferrandis, P.; Méndez, M. (2022): Can botanic gardens serve as refuges for taxonomic and functional diversity of Odonata? The case of the botanic garden of Castilla-La Mancha (Spain). *Limnology* 24(1): 37-50. (in English) ["In a scenario with declining biodiversity and habitat loss, botanic gardens could serve as refuges for invertebrates, but the opportunities they offer for animal conservation are still poorly understood. Odonata is a good model group for conservation studies, because it includes threatened species and responses to habitat disturbance are well documented. In this study, we assessed the role of the botanic garden of Castilla-La Mancha in Spain as a refuge for members of Odonata by analysing their taxonomic and functional diversity. We explored if the small size of the botanic garden might constrain

the taxonomic diversity of Odonata and if low habitat diversity might limit their functional diversity. We sampled adult Odonata from five water bodies along a gradient of human impact and characterized the Odonata communities based on 12 functional traits in Odonata. We used a species-area relationship to control for differences in the size of water bodies. Compared with natural lakes, the Odonata communities contained less species and their functional diversity was lower in the botanic garden ponds, where generalist species were basically hosted. Despite these limitations, the botanic garden ponds hosted the number of species expected for natural water bodies with the moderate surface area and functional diversity, thereby demonstrating that they are a valuable habitat for Odonata in an urban environment. Appropriate management involving the removal of exotic fish and habitat diversification, including creating lotic environments, would increase the taxonomic and functional diversity of Odonata in this urban system." (Authors)] Address: Pinilla-Rosa, M., Univ. Rey Juan Carlos, C/ Tulipán s/n, 28933 Móstoles, Madrid, Spain. Email: man.pinilla96@gmail.com

**21981.** Post, M. (2022): Verbreitung der Libellen in Nordbaden (Odonata). *Mercuriale* 22: 1-69. (in German, with English summary) ["Dragonflies in North Baden (Federal State of Baden-Württemberg) - Based on the data recorded in the database of the Schutzgemeinschaft Libellen in Baden-Württemberg e.V. (SGL), an Overview of the dragonfly fauna in North Baden is given. The study area, the data basis and the localities are presented and discussed. The occurrence of all 61 dragonfly species reliably recorded so far are presented, including historical data. Some previously unrecorded or uncertain species are discussed. Historical changes in the landscape are presented, with discussion of their effects on the hydrologic regime and dragonfly fauna." (Author)] Address: Post, M., Baden-Badener Str. 5, 69126 Heidelberg, Germany. Email: mjphd@posteo.de

**21982.** Price, B.W.; Winter, M.; Brooks, S.J. (2022): The genome sequence of the blue-tailed damselfly, *Ischnura elegans* (Vander Linden, 1820) [version 1; peer review: awaiting peer review]. *Wellcome Open Research* 2022, 7:66 Last updated: 22 FEB 2022: 9 pp. (in English) ["We present a genome assembly from an individual female *Ischnura elegans* (Arthropoda; Insecta; Odonata; Coenagrionidae). The genome sequence is 1,723 megabases in span. The majority of the assembly (99.55%) is scaffolded into 14 chromosomal pseudomolecules, with the X sex chromosome assembled." (Authors)] Address: Price, B.W., Dept of Life Sciences, Natural History Museum, London, UK

**21983.** Sáenz Oviedo, M.A.; Kuhn, W.R.; Sepulveda, M.A.R.; Abbott, J.; Ware, J.L.; Sanchez-Herrera, M. (2022): Are wing contours good classifiers for automatic identification in Odonata? A view from the Targeted Odonata Wing Digitization (TOWD) project. *International Journal of Odonatology* 25: 96-106. (in English) ["In recent decades, a lack of available knowledge about the magnitude, identity and distribution of biodiversity has given way to a taxonomic impediment where species are not being described as fast as the rate of extinction. Using Machine Learning methods based on seven different algorithms (LR, CART, KNN, GNB, LDA, SVM and RFC) we have created an automatic identification approach for odonate genera, through images of wing contours. The training population is composed of the collected specimens that have been digitized in the framework of the NSF funded Odomatic and TOWD projects. Each contour was pre-processed, and 80 coefficients were extracted for each specimen. These form a database with 4656 rows and 80 columns,

which was divided into 70% for training and 30% for testing the classifiers. The classifier with the best performance was a Linear Discriminant Analysis (LDA), which discriminated the highest number of classes (100) with an accuracy value of 0.7337, precision of 0.75, recall of 0.73 and a F1 score of 0.73. Additionally, two main confusion groups are reported, among genera within the suborders of Anisoptera and Zygoptera. These confusion groups suggest a need to include other morphological characters that complement the wing information used for the classification of these groups thereby improving accuracy of classification. Likewise, the findings of this work open the door to the application of machine learning methods for the identification of species in Odonata and in insects more broadly which would potentially reduce the impact of the taxonomic impediment." (Authors)] Address: Sáenz Oviedo, Mayra, Dept Epidemiology & Biostatistics. Pontificia Univ. Javeriana, Ak. 7 # 40-62, 10231, Bogotá, Colombia

**21984.** Sasamoto, A.; Cho, S.; Futahashi, R. (2022): Genetic similarity between *Paracercion sieboldii* and *P. v-nigrum*, with special reference to the population of Tsushima Island (Zygoptera: Coenagrionidae). *Tombo* 65: 21-27. (in English, with Japanese summary) ["The phylogenetic relationship between *Paracercion sieboldii* (Selys, 1876), endemic in Japan, and *Paracercion v-nigrum* (Needham, 1930), widely distributed in east of continental Asia, is discussed. They are morphologically, especially in the male anal appendages, differentiated, but genetically, not separated in nuclear, or showed little difference in mitochondrial analysis. Interestingly, Tsushima, which is located nearly in the border of their distribution, individuals of *P. sieboldii* cannot be distinguished from *P. v-nigrum* even by mitochondria DNA. It is highly probable that they are most closely related species and that Tsushima population of *P. sieboldii* experienced hybridization in the past after the allopatric speciation." (Authors)] Address: Sasamoto, A., 190-4 Yakuoji Tawaramoto, Shiki-gun, Nara prefecture, 636-0341, Japan. E-mail: aks-smt@sea.plala.or.jp

**21985.** Saxton, N.A.; Marinov, M.G.; Bybee, S.M. (2022): Revision of *Vanuatubasis* Ober & Staniczek, 2009 (Odonata, Coenagrionidae), with description of seven new species. *ZooKeys* 1128: 129-169. (in English) ["*Vanuatubasis* Ober & Staniczek, 2009 is an endemic genus of damselfly found on the island archipelago of Vanuatu. Previously only three species were assigned to the genus. Here, all known species of *Vanuatubasis* are formally described and treated, including the association of females for known species. The following new congeners are also described: *V. discontinua* sp. nov., *V. evelynae* sp. nov., *V. insularivorum* sp. nov., *V. kapularum* sp. nov., *V. nunggoli* sp. nov., *V. rhomboides* sp. nov., and *V. xanthochroa* sp. nov. from material collected across six different islands. An illustrated key to both males and females of all species within *Vanuatubasis* is provided as well as distributions for all known species." (Authors)] Address: Saxton, Natalie, Research & Collections Division, The Cleveland Museum of Natural History, Cleveland, OH, 44106, USA Email: nsaxton@cmnh.org

**21986.** Scheibler, E.E.; Montemayor, S.I.; Melo, M.C. (2022): Macroinvertebrate communities in high mountain desert wetlands: Building biological indexes to address the vulnerability of species and communities. *Insect Conservation and Diversity* 15(6): 714-724. (in English) ["1. Andean wetlands in arid climates are isolated ecosystems surrounded by steep terrain and have crucial relevance as a water resource. The species inhabiting them are adapted to these

habitats and vulnerable to environmental changes. 2. The aim of this study is to evaluate the vulnerability of invertebrate aquatic species to climate change and organic pollution through an index adapted from the species distribution models (SDM) score [vulnerability of aquatic invertebrate species index (Vais)], and the vulnerability of the invertebrate communities through an index developed herein [wetland community vulnerability index (Wcv)]. 3. The Vais index ranges from 1 (highly vulnerable) to 0 (non-vulnerable species). It was calculated for 22 species of the orders Coleoptera, Ephemeroptera, Hemiptera, and Odonata. According to our results, the most vulnerable species belong to the orders Ephemeroptera (2) and Odonata (8) (scores 0.63–0.76); species with medium vulnerability belong to the orders Coleoptera (1) Ephemeroptera (1), Hemiptera (4) and Odonata (1) (scores 0.43–0.54); and the most tolerant species belong to the orders Coleoptera (2) and Hemiptera (3) (0.31–0.29). 4. The Wcv index was calculated for 31 communities in Andean wetlands. Lower Wcv values correspond to less vulnerable communities and higher values to more vulnerable communities. According to our results, communities can be divided into three groups: the most vulnerable (scores 0.61–0.71), the ones with medium vulnerability (scores 0.49–0.59), and the least vulnerable (scores 0.33–0.48). 5. The Vais and Wcv indexes are useful tools for evaluating the vulnerability of aquatic species and wetland communities, providing valuable information for defining conservation strategies." (Authors) The following species are used of assessment: *Ischnura fluviatis*, *Erythrodiplax corallina*, *Progomphus joergenseni*, *Cyanallagma interruptum*, *Erythrodiplax connata*, *Rhionaeschna absoluta*, *Ischnura ultima*, and *Andinagrion peterseii*.] Address: Montemayor, Sara Itzel, División Entomología, Facultad de Ciencias Naturales y Museo, Univ. Nacional de La Plata, Paseo del Bosque s/n, B1900FWA, La Plata, Argentina. Email: smontemay@fcnym.unlp.edu.ar

**21987.** Seok, Y.; Kim, D.G.; Son, J.; Park, J.; Lee, J. (2022): The importance of the Mujechineup wetland for biodiversity: an evaluation of habitat quality and ecosystem service value. *Landscape and Ecological Engineering* 18(4): 477-491. (in English) ["Wetlands are important multifunctional systems that provide various ecological services for animal populations, particularly with regard to regulation and support. The biodiversity of wetlands is threatened by human activities that cause habitat fragmentation and destruction. The international community needs to make efforts to measure habitat quality and recognize the value of biodiversity. This study aimed to evaluate the value of *Nannophya koreana* habitat restoration in the Mujechineup wetland. First, through a literature review, this study estimated the expected ecosystem service value of the Mujechineup wetland compared to existing wetlands. The Mujechineup wetland's ecosystem service value ranged from a minimum of \$109,296.00 (SD \$32,752.00) to a maximum of \$679,457.14 (SD \$4,611,730.90). Second, we quantified the habitat quality of the Mujechineup wetland in Ulsan for biodiversity measurements using the integrated valuation of ecosystem services and tradeoffs (INVEST). The analysis showed that there was a difference in the quality of the habitat depending on the spatial unit. Samsong-myeon was processed for 2 min with a mean value of 0.094. Ulju-gun was processed for 1 h 14 min with a mean value of 0.146. In addition, as a result of the field survey, the ratio of Hemiptera, Odonata and Coleoptera (HOC) groups in the Mujechineup wetland where *Nannophya koreana* lives was more than 50%, but the ratio of predators was approximately 10% on average. Third, this study investigated the willingness to pay to restore the habitat of *Nannophya koreana*, which lives in the Mujechineup wetland. The

average amount that people would be willing to pay annually for the restoration of the Mujechineup wetland was \$33,652. The study found that awareness of the importance of *Nannophya koreana* and the need for restoration of its habitat environment was high. These findings can be used to recognize the value of the Mujechineup wetland as a habitat for *Nannophya koreana* and to communicate its importance." (Authors)] Address: Lee, J., Division of Environmental Science & Ecological Engineering, College of Life Sciences & Biotechnology, Korea Univ., Seoul, 02841, Republic of Korea. Email: archjung@korea.ac.kr

**21988.** Shavkatovna, A.M. (2022): Systematic analysis of the dragonfly fauna (Insecta: Odonata) in the Khorezm region. (Uzbekistan). *Proceedings of International Scientific Conference on Multidisciplinary Studies, Conferencea*, 7–11. Retrieved from <https://conferencea.org/index.php/conferences/article/view/1618>: 116-120. (in Russian, with English summary) ["This article provides brief information about the current state of the dragonfly fauna of the Khorezm region. According to the results of studies conducted in the Khorezm region in 2020-2022, 6 families, 11 genera and 23 species belonging to 2 suborders (Zygoptera and Anisoptera) were identified. According to the zoogeographical status of the dragonfly fauna, 11 Palearctic species (47.8%), 7 cosmopolitan species (30.4%), 2 Holarctic, trans-Palaearctic species (8.7%), 1 Australasian species (4.3%) were identified." (Google translate)] Address: Shavkatovna, Akhmedova Mokhira, Khorezm Mamun Academy (PhD) student, Uzbekistan. Email: mohiraahmedova21@gmail.com

**21989.** Shavkatovna, A.M.; Sapparboyevich, D.J. (2022): Phenological groups of dragonflies (Insecta: Odonata) in Khorezm oasis. *International Journal of Genetic Engineering* 10(2): 17-20. (in English) ["This article presents the species composition and phenology of dragonflies distributed in the Khorezm oasis [Uzbekistan]. When analyzing the results of the observations made in 2020-2021, four phenological groups were noted: spring-summer species, summer species, summer and autumn species, all-season-specific species (spring, summer, autumn). Accordingly, all-season-specific species (10 species) were numerically superior to others." (Authors)] Address: Shavkatovna, Akhmedova Mokhira, Khorezm Mamun Academy, Khiva, Uzbekistan. Email: mokhira1011@gmail.com

**21990.** Silas Veras, D.; Silva Pinto, N.; Calvão, L.; Santana Lustosa, G.; Silva de Azevêdo, C.A.; Juen, L. (2022): Environmental thresholds of dragonflies and damselflies from a Cerrado-Caatinga ecotone. *Environmental Monitoring and Assessment* volume 194(9), Article number: 614: (in English) ["Aquatic ecosystems are affected by different land uses that modify gradients of environmental conditions. These impacts act directly on the community structure, especially the most sensitive ones, such as aquatic insects. Thus, dragonflies have been used as good models to assess these changes, since their suborders Anisoptera and Zygoptera have different ecophysiological and behavioral requirements. This study aimed to evaluate the following hypotheses: (1) dragonfly species composition differs along the environmental gradients of streams; therefore, we expect a higher proportion of species of the suborder Anisoptera in environments with a higher degree of disturbance, since these environmental conditions select heliothermic species with exophytic oviposition; (2) the reduction of habitat integrity and canopy cover will lead to a lower richness of the Zygoptera, due to the restrictions of its thermoregulation and oviposition behavior in relation to Anisoptera, since the higher light input



would favor heliothermic and exophytic species; (3) alterations in habitat integrity create ecological thresholds and points of change in the abundance and frequency of Odonata species, generating gradients in the environmental integrity conditions. Specimens were collected from 24 streams (first to third order), in a gradient of land uses. Canopy cover and stream width were predictors of taxonomic richness and abundance of the suborders Anisoptera and Zygoptera, with greater coverage and smaller width, positively affecting Zygoptera and negatively Anisoptera. The turning points were determined by a habitat integrity index, where below 0.38 there is an increase in generalist taxa and a decline in sensitive taxa. On the other hand, above 0.79, there was a sensitive taxa increase in detriment of generalists. Four individual taxa indicators were selected, two of which associated with a negative response (*Perithemis tenera* and *Acanthagrion aepiolum*) and two with positive responses (*Epipleoneura metallica* and *Zenithoptera lanei*) for habitat integrity. Our results are important to guide management strategies, recovery, and protection policies for areas of permanent protection, aiming to conserving biodiversity and natural resources essential to life quality maintenance." (Authors)] Address: Silas Veras, D., Lab. de Ecologia E Conservação, Programa de Pós-Graduação Em Ecologia-PPGECO, Universidade Federal Do Pará, Belém, Brazil

**21991.** Sommerhäuser, M.; Deuster, M.; Korte, T.; Hurck, R.; Wilbertz, M. (2022): Entwicklung der Wasserinsekten in der Lippe. *Natur in NRW* 2/2022: 35-40. (in German) ["While the biomass of terrestrial insects has declined considerably, the efforts of Efforts to protect water bodies since the 1970s and the renaturation movement since the 1980s have evidently led to an improvement in the situation of water-borne insect species. The Lippe - 50 years ago still a largely developed lowland river widely used for water abstraction and the absorption of wastewater and mine water - is now once again home to 150 aquatic insect species. Compared to the beginning of standardised quality surveys around 1970, when only 13 insect species were recorded, this corresponds to an eleven-fold increase. The article discusses this trend and the underlying causes, such as the considerable improvement in water quality due to the expansion of sewage treatment plants and the measures for ecological improvement. However, the limits of this process and the necessary measures for a further improvement of the situation of the aquatic insect fauna in flowing waters are also discussed." (Authors/DeepL)] Address: Sommerhäuser, M., Lippeverband Essen, Germany. Email: sommerhaeuser.mario@eglv.de

**21992.** Suhling, F.; Goertzen, D. (2022): 17. Libellen (Odonata). In book: *Natur in Hondelage: Lebensräume - Pflanzen - Tiere*. Publisher: FUN Hondelage: 194-209. (in German) [Hondelage, near Braunschweig, Niedersachsen, Germany. General introduction into dragonflies and brief discussion of (most of) the 50 regionally reported species. Focus is set on conservation measures.] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, 38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**21993.** Umeda, T. (2022): Morphological difference in a lobe between the cerci of anal appendages between final instar larvae of *Calopteryx japonica* Selys, 1869 and *Atrocalopteryx atrata* (Selys, 1853). *Tombo* 65: 38-39. (in Japanese, with English summary) ["The shape of a lobe between the cerci at the anal appendages of final instar larvae between *Calopteryx japonica* and *Atrocalopteryx atrata* is compared. It is revealed to be clearly different, i.e. the apex of the lobe in *C. japonica* protrudes in a mountain shape, whereas that

of *A. atrata* is rounded." (Author)] Address: Email: takashi.umed@jcom.home.ne.jp

**21994.** Van Eupen, C.; Maes, D.; Herremans, M.; Swinnen, K.R.R.; Somers, B.; Luca, S. (2022): Species profiles support recommendations for quality filtering of opportunistic citizen science data. *Ecological Modelling* 467, May 2022, 109910: (in English) ["Highlights: • Taxonomy and relative species traits support data quality filtering recommendations. • Species profiles reveal relative importance of species traits. • Clearest recommendations for filters based on observer activity/validation status. • Improving species knowledge and record validation protocols increase data quality. • Filtering is not recommended when sample size decreases over 75 percent. Abstract: Opportunistic citizen science data are commonly filtered in an attempt to improve their applicability for relating species occurrences with environmental variables. Recommendations on when and how to filter, however, have remained relatively general and associations between species traits and filtering recommendations are sparse. We collected six traits (body size, detectability, classification error rate, familiarity, reporting probability and range size) of 52 birds, 25 butterflies and 14 dragonflies. Both absolute (values not rescaled) and relative traits (values rescaled per taxonomic group) were linked to filter effects, i.e. the impact on three different measures of species distribution model performance caused by applying three different quality filters, for different degrees of sample size reduction. First, we applied multiple regressions that predicted the filter effects by either absolute (including taxonomic group) or relative traits. Second, a principal component and clustering analysis were performed to define five species profiles based on species traits that were retained after a multiple regression model selection. The analysis of the profiles indicated the relative importance of species traits and revealed new insights into the association of species traits with changes in model performance after data quality filtering. Both taxonomic group (more than absolute traits) and relative species traits (mainly classification error rate, range size and familiarity) defined the impact of data quality filtering on model performance and we discourage the selection of a quality filtering strategy based on one single species trait. Results further confirmed the importance of considering the goal of the study (i.e. increasing model discrimination capacity, sensitivity or specificity) as well as the change in sample size caused by stringent filtering. The general species knowledge amongst citizen scientists (importance of observer experience), together with the mechanism of record verification in an opportunistic data platform (importance of verifiable metadata) have the largest potential for enhancing the quality of opportunistic records." (Authors)] Address: Van Eupen, Camile, Ghent Univ., Dept of Data Analysis & Mathematical Modelling, Coupure Links 653, B-9000 Ghent, Belgium

**21995.** Wang, Y.-J.; Tüzün, N.; Sentis, A.; Stoks, R. (2022): Thermal plasticity and evolution shape predator-prey interactions differently in clear and turbid water. *Journal of Animal Ecology* 91(84): 883-894. (in English) ["1. Warming and eutrophication negatively affect freshwater ecosystems by modifying trophic interactions and increasing water turbidity. We need to consider their joint effects on predator-prey interactions, and how these depend on the thermal evolution of both predator and prey. 2. We quantified how 4°C warming and algae-induced turbidity (that integrates turbidity per se and increased food for zooplankton prey) affect functional response parameters and prey population parameters in a common-garden experiment. We did so for all combinations of high- and low-latitude predator (damselfly larvae)

and prey (water fleas) populations to assess the potential impact of thermal evolution of predators and/or prey at a high latitude under warming using a space-for-time substitution. We then modelled effects on the system stability (i.e. tendency to oscillate) under different warming, turbidity and evolutionary scenarios. 3. Warming and turbidity had little effect on the functional response parameters of high-latitude predators. In contrast, warming and turbidity reduced the handling times of low-latitude predators. Moreover, warming increased the search rates of low-latitude predators in clear water but instead decreased these in turbid water. 4. Warming increased stability (i.e. prevented oscillations) in turbid water (except for the "high-latitude predator & high-latitude prey" system), mainly by decreasing the prey's carrying capacity and partly also by decreasing search rates, while it did not affect stability in clear water. Algae-induced turbidity generally decreased stability, mainly by increasing the prey's carrying capacity and partly also by increasing search rates. This resembles findings that nutrient enrichment can reduce the stability of trophic systems. The expected stability of the high-latitude trophic system under warming was dependent on the turbidity level: our results suggest that thermal plasticity tends to destabilize the high-latitude trophic system under warming in clear water but not in turbid water, and that thermal evolution of the predator will stabilize the high-latitude system under warming in turbid water but less so in clear water. 5. The extent to which thermal plasticity and evolution shape trophic system stability under warming may strongly differ between clear and turbid water bodies, with their contributions having a more stabilizing role in turbid water." (Authors)] Address: Wang, Y.-J., Evolutionary Stress Ecology & Ecotoxicology, Univ. Leuven, Leuven, Belgium. Email: Email: lanexran@gmail.com

**21996.** Wolz, M.; Schrader, A.; Whitelaw, E.; Müller, C. (2022): Gregarines modulate insect responses to sublethal insecticide residues. *Oecologia* 198: 255-265. (in English) ["Throughout their lifetime, insects face multiple environmental challenges that influence their performance. Gregarines are prevalent endoparasites in most invertebrates that affect the fitness of their hosts, but are often overlooked in ecological studies. Next to such biotic factors, a current common challenge is anthropogenic pollution with pesticides, which causes a major threat to non-target organisms that are readily exposed to lethal or sublethal concentrations. In a Laboratory study, we investigated whether the presence of gregarines modulates the food consumption and life history traits of a (non-target) leaf beetle species, *Phaedon cochleariae*, in response to sublethal insecticide exposure. We show that the larval food consumption of the herbivore was neither affected by gregarine infection nor sublethal insecticide exposure. Nevertheless, infection with gregarines led to a delayed development, while insecticide exposure resulted in a lower body mass of adult males and a reduced reproduction of females. Individuals exposed to both challenges suffered most, as they had the lowest survival probability. This indicates detrimental effects on the population dynamics of non-target insects infected with naturally occurring gregarines that face additional stress from agrochemical pollution. Moreover, we found that the infection load with gregarines was higher in individuals exposed to sublethal insecticide concentrations compared to unexposed individuals. To counteract the global decline of insects, the potential of natural parasite infections in modulating insect responses to anthropogenic and non-anthropogenic environmental factors should be considered in ecological risk assessment." (Authors) The paper includes references to Odonata.] Address: Müller, Caroline, Dept Chemical Ecology,

Bielefeld Univ., Universitätsstr. 24, 33615 Bielefeld, Germany. Email: caroline.mueller@uni-bielefeld.de

**21997.** Wu, X.; Zheng, X.; Yu, L.; Lu, R.; Zhang, Q.; Luo, X.-J.; Mai, B.-X. (2022): Biomagnification of persistent organic pollutants from terrestrial and aquatic Invertebrates to songbirds: Associations with physiochemical and ecological indicators. *Environmental Science & Technology* 56: 12200-12209. (in English) ["Biomagnification of persistent organic pollutants (POPs) is affected by physiochemical properties of POPs and ecological factors of wildlife. In this study, influences on species-specific biomagnification of POPs from aquatic and terrestrial invertebrates to eight songbird species were investigated. The median concentrations of polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) in birds were 175 to 13 200 ng/g lipid weight (lw) and 62.7 to 3710 ng/g lw, respectively. Diet compositions of different invertebrate taxa for songbird species were quantified by quantitative fatty acid signature analysis. Aquatic insects had more contributions of more hydrophobic POPs, while terrestrial invertebrates had more contributions of less hydrophobic PCBs in songbirds. Biomagnification factors (BMFs) and trophic magnification factors had parabolic relationships with log KOW and log KOA. The partition ratios of POPs between bird muscle and air were significantly and positively correlated with log KOA of POPs, indicating respiratory elimination as an important determinant in biomagnification of POPs in songbirds. In this study, the species-specific biomagnification of POPs in songbird species cannot be explained by stable isotopes of carbon and nitrogen and body parameters of bird species. BMFs of most studied POPs were significantly correlated with proportions of polyunsaturated fatty acids in different species of songbirds." (Authors)] Address: Yu, L., School Biol. & Food Engineering, Guangdong Univ. of Education, Guangzhou 510303, China

## 2023

**21998.** Adelman, J.; Frank, M. (2023): Die Sympetrum-Arten in Hessen - Aktueller Stand und Entwicklung ihrer Verbreitung (Odonata: Libellulidae). *Libellen in Hessen* 16: 79-102. (in German) ["All nine Sympetrum species found in Germany were also found in Hesse. In the current draft of the Red List of Dragonflies in Hesse, three species are now considered extinct or lost (*S. depressiusculum*, *S. flaveolum*, *S. pedemontanum*), and two others, *S. danae* and *S. vulgatum*, show a strongly negative trend. In contrast, the *S. meridionale* has established itself since the first proof of reproduction in Hesse in 2007 and has been found in 57 MTB quadrants since 2015 alone. The current status of the individual species is presented in numbers and distribution maps using the grid analysis based on the occupied quadrants and MTB-64. The decline of the common darter is discussed against the background of recent findings on reproduction and the competitive situation compared to the greater darter." (Authors/Google translate)] Address: Adelman, J., Potsdamer Str. 70, 64372 Ober-Ramstadt, Germany. Email: jadelmann@web.de

**21999.** Adelman, J.; Feisel, L.; Frank, M.; Roland, H.-J.; Stübing, S. (2023): Im Fokus: Gabel-Azurjungfer (*Coenagrion scitulum*) - Stand der Verbreitung in Hessen (Odonata: Coenagrionidae). *Libellen in Hessen* 16: 49-69. (in German) [*C. scitulum*, "first detected in Hesse (Germany) in 2008, has firmly established itself in the federal state and has now been found in 84 MTB quadrants. The evidence is concentrated on the plains and river valleys in the south of the state, but

there are also individual reports from northern Hesse and the low mountain ranges up to medium altitudes. While the evidence often only relates to individual individuals, larger numbers of individuals up to several hundred are observed at some localities. Six of these deposits, which may serve as a source population for further colonization of the country, are presented with regard to their structural features and their dragonfly fauna. In accordance with other publications, these are exclusively shallow, sun-exposed and permanent bodies of water with predominantly rich aquatic vegetation." (Authors/Google translate)] Address: Adelman, J., Potsdamer Str. 70, 64372 Ober-Ramstadt, Germany. Email: jadelmann@web.de

**22000.** Adelman, J. (2023): Die Libellenfauna im südlichen Vogelsberg. *Libellen in Hessen* 16: 103-118. (in German) ["For a long time, the Vogelsberg was one of the areas in Hesse that had received little attention from odontologists. Apart from older investigations in the Hohen Vogelsberg and more recent observations from two NSGs set up primarily for bird protection, only a few observations are available. Therefore, in the last four years, a sub-area in the southern Vogelsberg was examined more systematically with regard to the choice of water bodies and mapping dates. Including the results recently obtained from another mapping project at the Ober-Mooser Teich, a total of seven areas were mapped and evaluated. These areas are presented briefly and the proven species are considered with regard to their continuity and frequency. A total of 38 species were detected, with 8 species only being observed in one body of water and only in one year. *Enallagma cyathigerum* was detected most frequently, for which a significant decline can be reported in Hesse overall. *Sympetrum vulgatum* was also detected much more frequently and with greater consistency than corresponds to its strongly negative trend in Hesse." (Authors/Google translate)] Address: Adelman, J., Potsdamer Str. 70, 64372 Ober-Ramstadt, Germany. Email: jadelmann@web.de

**22001.** Aghade, J.B.; Saraf, S.A.; Dongre, S.B.; Shinde, A.M. (2023): Studies on the species diversity of damselflies and dragonflies (Odonata: Insecta) around the Harsul and Salim Ali Lake, Aurangabad, Maharashtra, India. *Eur. Chem. Bull.* 12 (Special issue 8): 5494-5496. (in English) ["Around the Harsul Lake and Salim Ali Lake in Aurangabad, Maharashtra, India, a thorough study on the species diversity of odonates was carried out in 2021–2022, recording about 12 species belonging to 03 families within 2 suborders of the order Odonata. The order Odonata's most prevalent family, the Libellulidae, had eight species, followed by the Coenagrionidae, which had three, and the Gomphidae, which had one. The months of July through September saw the mass emergence of *Brachythemis contaminata* and the migratory species *Trithemis pallidinervis*." (Authors) The paper includes the Westpalaeartic/European species *Coenagrion mercuriale*, *Pyrrhosoma nymphula*, and *Ceriagrion tenellum*.] Address: Aghade, J.B., Dept of Zoology, Government College of Arts and Science, Dr. B.A.M. Univ., Chhatrapati Sambhaji Nagar, Aurangabad, Maharashtra, India

**22002.** Asrori, S.L.; Putri, K.A.; Diniarsih, S.; Lupiyandiyah, P.; Sari, H.P.E. (2023): Diversity of Odonata in Langsa urban forest, Langsa, Aceh, Indonesia. *Treubia* 50(1): 1-10. (in English) ["Odonata is important as environmental bioindicator as well as pest control. Langsa Urban Forest (LUF) is a 10-ha green open space in Langsa City, Aceh Province which serves the purpose of tourism and support biodiversity conservation, in which Odonata is included. There is a

lack of Odonata research in Langsa, especially at the LUF area, therefore this study offers a baseline information for wildlife management. Field observations had been conducted between February to March 2022 using line-transect method. As a result, this study recorded 19 Odonata species from four families, of which *Orthetrum sabina* became the most prominent species observed. Odonata diversity in LUF was medium ( $H' = 1.863-2.252$ ) with population of each species presumed to be nearly even ( $J = 0.71-0.79$ ). Odonata diversity in LUF serves as additional information on Odonata species found in Indonesia, especially Aceh Province. Also, the medium category of Odonata diversity index in LUF can be used as a reference for LUF management to support more ecosystems as Odonata habitat." (Authors)] Address: Sari, H.P.E., Dept Biol., Faculty of Engineering, Universitas Samudra, Langsa, Aceh, 24416, Indonesia. Email: herlinaputriendahsari@unsam.ac.id

**22003.** Azar, D.; Nel, A. (2023): Libanogomphidae, a new extraordinary dragonfly family from the Upper Cretaceous of Lebanon (Odonata, Anisoptera). *Cretaceous Research* 148, August 2023, 105501: (in English) ["*Libanogomphus lionelcavini* gen. et sp. nov., the third dragonfly fossilized in compression from the Lebanese Cretaceous, is described and illustrated. It is attributed to the new gomphid family Libanogomphidae on the basis of a series of extraordinary structures in the hind wing venation, never observed elsewhere among Odonata. More or less similar structures can be found in the Palaeozoic odonatopteran Meganeuridae or Protanisoptera. This new fossil confirms the originality of the odonatan fauna of the Lebanese Cretaceous. It also further suggests that our current knowledge on the Mesozoic odonatan diversity is quite under-evaluated." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**22004.** Borkenstein, A.; Jödicke, R. (2023): Langjährige Entwicklung der Libellenfauna zweier Moore in Nordwestdeutschland und Einfluss der Dürreperiode 2018–2020 (Odonata). *Libellula* 41(3/4): 115-153. (in German, with English summary) ["Long-term development of the dragonfly fauna of two bogs in north-west Germany and influence of the drought period 2018–2020 (Odonata) – The population development of dragonflies in two lowland bogs in Lower Saxony was surveyed for 18 and 12 years, respectively. In all, 41 species were identified. The most significant changes in the dragonfly fauna happened when both study areas dried up in 2018–2020 due to summer rain deficits and hot spells. In the years before this drought, there were fairly stable populations of regularly reproducing species, but also those with occasional reproductive success as well as visitors. During the study period, there were no colonisations by southern species expanding their range to Lower Saxony as a result of global warming. However, even before the dry years, some species, such as *Lestes sponsa*, *Aeshna juncea* or *Sympetrum flaveolum*, showed significant to extreme population declines. This negative development was in line with the regional trend. In the dried-up bogs during the drought summers only a few individuals of a few species could be observed. According to our observations, no larva survives dry and hot peat soil. As an exception, a few teneral individuals of *Libellula quadrimaculata* and *Leucorrhinia rubicunda* had apparently been able to survive as larva in the few still humid dipo. Some univoltine species, such as *L. sponsa*, *Coenagrion puella* or *S. danae*, survived the drought as imago, and their offspring emerged before the bogs dried out again in the following season. *Lestes dryas*, which colonised the areas during the drought period, proved to be the beneficiary of

the drought. Also, *L. virens* only reproduced in the dry years and became the most abundant damselfly species. During the comparatively wet following year of 2021 we observed a resettlement by most species. Apparently, the arrival of dispersing mature individuals from surrounding waters without desiccation problems played a decisive role. The population of *C. lunulatum* did not recover until the end of our study. In addition to the disappearance of this species, which has become rare in Germany, the rapid expansion of the common rush in the dry phases poses a significant problem, because the shallow waters and bights overgrown by it irreversibly lost their bog character. As climate change continues, the drought years described here will recur and eventually become the norm. Losses among the odonate species, especially those of the bog dwellers, will steadily increase. The protection program of bogs in Lower Saxony is in danger of failing due to the lack of summer rain in connection with extreme heat waves." (Authors)] Address: Jödicke, R., Am Liebfrauenbusch 3, 26655 Westerstede, Germany. Email: reinhard.joedicke@magenta.de

**22005.** Bota-Sierra, C.; Sánchez Herrera, M. (2023): A new species of bannerwing damselfly, *Polythore albistriata* sp. nov. (Odonata: Polythoridae). *International Journal of Odonatology* 26: 82-92. (in English, with Spanish summary) ["The traditional method of classifying the 21 species within the South American genus *Polythore* has been relying on wing color patterns and male genital ligula shape. However, recent molecular research has shown that wing color patterns can vary significantly within some species, making it an insufficient means of species diagnosis by itself in some cases. In this study, we employ a combined approach of morphological and molecular data to describe a new *Polythore* species found in the southeastern Colombian Andes. Our analysis includes detailed illustrations and pictures of diagnostic features, haplotype networks for two barcode genes, COX1 and NADH I, a distribution map, and a brief discussion of the conservation status of the species. We found wing color pattern, male genital ligula morphology, and NADH I barcode sequences to be sufficiently diagnostic to identify the species as new. Our results highlight the importance of integrating multiple data sources for accurate species identifications and descriptions in this genus." (Authors)] Address: Sánchez Herrera, Melissa, Lab. de Zoología y Ecología Acuática (LAZOE), Biological Sciences Dept, Univ. de los Andes, Bogotá, Colombia. Email: melsanc@gmail.com

**22006.** Boudet, L.; Nel, A.; Huang, D. (2023): A new basal hawker dragonfly from the earliest Late Jurassic of Daohugou, northeastern China (Odonata: Anisoptera: Mesuropetalidae). *Historical Biology* 35(8): 1267-1273. (in English) ["*Sinomesuropetala daohugensis* gen. nov. et sp. nov., first accurate Chinese representative of the Mesozoic family Mesuropetalidae, is described from the Haifanggou Formation near the Daohugou village in northeastern China. The exceptional preservation of the fossil allows the description of reproductive structures seldom observed in compression fossils. It confirms the high diversity of the 'basal' Aeshnoptera during the Middle-Late Jurassic, especially in China. This new finding confirms the widespread distribution of the Mesuropetalidae during the Jurassic." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**22007.** Bybee, S.M.; Futahashi, R.; Renoult, J.P.; Sharkey, C.; Simon, S.; Suvorov, A.; Wellenreuther, M. (2023): Transcriptomic insights into Odonata ecology and evolution. In: *Dragonflies and Damselflies. Second Edition*. Edited by Alex

Córdoba-Aguilar, Christopher D. Beatty & Jason T. Bried, Oxford Univ. Press. Oxford Univ. Press (2023). DOI: 10.1093/oso/9780192898623.003.0003: 21-35. (in English) ["Chapter 3 attempts to define transcriptomics, a powerful tool for scientific research that has advanced our knowledge of Odonata evolution in many meaningful ways. It then goes on to outline its strengths and weakness for ecological and evolutionary research. The chapter frames the current state of transcriptomics research in Odonata. It focuses specifically on color, color vision, embryogenesis, and phylo-transcriptomics, as these are currently the deepest areas for transcriptomics among Odonata to date. The chapter also describes the authors' advocacy for future research using transcriptomics and it presents clearly and concisely their arguments to convince the reader that there are exceptional opportunities among Odonata. This is particularly so when transcriptomics is combined with genomics." (Authors)] Address: Futahashi, R., National Inst. Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22008.** Cano-Cobos, Y.; Montes-Fontalvo, J.; Bota-Sierra, C. (2023): *Philogenia realpei* sp. nov. (Zygoptera: Philogeniidae), a new damselfly species from Colombia. *International Journal of Odonatology* 26: 74-81. (in English, with Spanish summary) ["*Philogenia realpei* sp. nov., is described here from 5 ♂♂, 2 ♀♀ collected at Cauca and Putumayo Depts in southern Colombia. This species is included in the *P. helena* group and can be differentiated from other species by the unique morphology of its paraprocts. We also provide a distribution map and a taxonomic key for the males of this group." (Authors)] Address: Cano-Cobos, Yiselle, Laboratorio de Biodiversidad y Genética Ambiental (BioGeA), Univ. Nacional de Avellaneda, Piñeyro 1870, Avellaneda, Buenos Aires, Argentina. Email: yisellecanoc@gmail.com

**22009.** Chang, S.-C.; Li, Y.; Zheng, D. (2023): Dating amber: Review and perspective. *Minerals* 2023, 13, 948. <https://doi.org/10.3390/min13070948>: 15 pp. (in English) ["Amber is a fossilized tree resin that ranges in age from the Carboniferous to the Cenozoic. It occurs globally from the Arctic to Antarctica. As the resin petrifies and turns into amber, it can enclose and preserve other materials. Amber with inclusions can help reconstruct past biodiversity and ecosystems. Some amber contains fossils representing the oldest and most detailed records of critical evolutionary traits or markers. Inclusions can even capture behavioral indicators previously only observed in extant organisms. Evidence of insect pollination of flowering plants and dragonfly mating behavior appears in amber, as does the morphological specialization of insects, indicating sociality and social parasitism. Dating amber deposits can help calibrate evolutionary events and inform reconstructions of past ecosystems. While the direct dating of amber remains impossible, age constraints on most amber deposits are based on correlations or relative dating, methods that come with significant uncertainties. This study discusses two cases using <sup>40</sup>Ar/<sup>39</sup>Ar and U-Pb geochronologic methods to constrain the ages of amber deposits in China and the paleo-ecosystems they record. This paper also summarizes how radio-isotopic dating and other techniques combined with the analysis of inclusions in amber can help elucidate biogeography and the dynamic relationship between life and the physical environment." (Authors)] Address: Chang, S.-C., Dept Earth Sciences, Univ. Hong Kong, Hong Kong, China. Email: suchin@hku.hk

**22010.** Cranston, J.; Isaac, N.J.B.; Early, R. (2023): Associ-



ations between a range-shifting damselfly (*Erythromma viridulum*) and the UK's resident Odonata suggests habitat sharing is more important than antagonism. *Conservation and Diversity* 16(3): 416-426. (in English) ["1. Species shifting their ranges under climate change are a conservation dilemma. Range-shifters may be threatened by climate change in their historic range. However range-shifters are likely to be generalist opportunists, which could mean they could harm aspects of biodiversity in their new ecosystems. Therefore, we need approaches to rapidly assess how range-shifters may integrate into the community of historically resident species. 2. *E. viridulum* has shifted into the UK since 1999, and may affect resident Odonata via intraguild predation. We asked whether the damselfly's arrival is associated with a decline in resident Odonata. 3. We harnessed the British Dragonfly Society's dataset, using records from 49,788 site visits between 2000-2015 to construct dynamic species occupancy models for 17 resident UK Odonata. We estimated the potential effect of *E. viridulum* presence on the probability that each species would persist at a given site, while controlling for potential effects of climate and recording effort. 4. On average, Anisoptera persisted more frequently at sites where *E. viridulum* had established, whilst Zygoptera showed no change in persistence. Nevertheless, two resident damselflies, including *E. viridulum*'s congener, disappeared more frequently when the range-shifter established. 5. We suggest *E. viridulum* poses minimal risk to most UK resident Odonata. Rather, *E. viridulum* may be differentially establishing in areas with good habitat quality, where many species of historically resident Odonata are also found. Therefore, high quality, bio-diverse sites may become home to increasing numbers of range-shifters in future. Our approach permits rapid-detection of how range-shifters are integrating into resident biota." (Authors)] Address: Early, R., Centre for Ecology & Conservation, Univ. Exeter, Penryn Campus, Penryn, TR10 9FE, UK. Email: r.early@exeter.ac.uk

**22011.** Dias, S.J.; Borker, A.S. (2023): An assessment of the diet of Brown Fish-Owl *Ketupa zeylonensis* (J.F. Gmelin, 1788) (Aves: Strigiformes: Strigidae) from two localities in the foothills of the Western Ghats of Goa, India. *Journal of Threatened Taxa* 15(7): 23514-23520. ["The Brown Fish-Owl is a large nocturnal bird of prey that has a vast distribution range. However, there is a significant literature gap on the ecology of this species in the Western Ghats ecoregion, particularly in regard to its food spectrum. In the present study, we assessed the diet composition of this species in the foothills of the Western Ghats of Goa, India. The diet was evaluated by analysing the undigested prey remains in regurgitated pellets obtained from the banks of forest streams and roosting sites. A total of 104 pellets were collected from two localities that exhibited similar landscape characteristics. Our analysis indicated that crabs contributed to a significant proportion of the diet of the species (75.47%), followed by amphibians (frogs, 8.02%), fishes (7.08%), reptiles (snakes, 2.83%), birds (2.36%), scorpions (1.89%), and insects (Odonata, 0.47%). Additionally, 1.89% (n = 4) of the prey items could not be identified due to their disintegrated nature. Furthermore, an assessment of Food Niche Breadth (FNB) indicated that *K. zeylonensis* exhibited a high degree of specialization in terms of its diet in the study areas." (Authors)] Address: Dias, S.J., Planet Life Foundation, C8/G4, Maple Grove Apartments, Belloy, Nuvem, Salcete, Goa 403601, India.

**22012.** Doriath-Döhler, A.; Hervet, S.; Bétoux, O. (2023): *Palaeophyllestes distinctus* n. gen., n. sp., a new malachite damselfly (Odonata: Zygoptera: Synlestidae) from the Paleocene Menat locality (France). *Geodiversitas* 45(14): 401-

407. (in English, with French summary) ["*Palaeophyllestes distinctus* n. gen., n. sp., is described from the Paleocene Menat locality. It can be distinguished from other Synlestidae owing to the very long wing veins MA, MP and CuA, and a unique combination of other wing venation features. The occurrence of a Synlestidae in the western Palaearctic area (while extant species occur in Australia, the Oriental region, South-East Asia, South Africa and Hispaniola) is not unexpected given the known fossil record of these insects and climatic conditions prevailing at Menat during the Paleocene." (Authors)] Address: Doriath-Döhler, Aimie, 20 Avenue de la Marne, F-92160 Antony, France. Email: aimie.doriathdohler@gmail.com

**22013.** Đurđević, A.P.; Popović, M.A.; Medenica, I.J.; Nikolić, M.L.J. (2023): New findings of *Cordulegaster insignis* Schneider, 1845 (Odonata: Cordulegasteridae) in Serbia. *Kragujevac Journal of Science* 45: 335-339. (in English) ["During a field survey in 2021 in Southern Serbia, near the village of Strezovac, two specimens of *C. insignis* were found. This species is extremely rare in Serbia. The findings are located on the western border of its areal." (Authors)] Address: Institute for Nature Conservation of Serbia, Office in Niš, Vožda Karadorđa 14/II, 18000 Niš, Serbia. E-mail: djukiamphibia@gmail.com

**22014.** Fang, R.; Zheng, D. (2023): A new tarsophlebiid dragonfly from the Lower Cretaceous of western Liaoning, NE China (Insecta: Odonatoptera, Panodonata). *Cretaceous Research* 143, March 2023, 105424: (in English) ["A well-preserved dragonfly *Turanophlebia liaoningensis* sp. nov., belonging to the family Tarsophlebiidae, is described from the Lower Cretaceous Yixian Formation in the Huangbanjigou Village, western Liaoning, China. This is the second species of *Turanophlebia* recovered in China, although it was widely distributed in Eurasia during the Late Jurassic and Early Cretaceous. *Turanophlebia liaoningensis* sp. nov. differs from all other species of *Turanophlebia* in the hindwing pterostigma covering 6-8 cells and cubito-anal area with five rows of cells between CuA and the posterior wing margin. The discovery provides new insight into the biodiversity and evolution of Tarsophlebiidae." (Authors)] Address: Zheng, D., State Key Lab. Palaeobiol. & Stratigraphy, Nanjing Inst. Geology & Palaeontology & Center for Excellence in Life & Palaeoenvironment, Chinese Acad. Sciences, 39 East Beijing Rd, Nanjing 210008, China. Email: drzheng@nigpas.ac.cn

**22015.** Fedorova, A.; Pustovalova, E.; Drohvalenko, M. (2023): High frequency of hindlimb malformation in froglets *Pelophylax* sp. in Ukraine. *The Herpetological Bulletin* 164: 24-25. (in English) [Revealing the primary reason of each malformation would be a complex task because malformations could result from either natural or anthropogenic factors, including parasitic infections, exposure to UV radiation and chemical pollutants, physical traumas, and genetic defects (Johnson et al., 1999; Ouellet, 2000; Henle et al., 2017). Furthermore, Ballengee & Sessions (2009) showed that the most likely reason for missing limbs and missing limb segments is predation by dragonfly nymphs who can injure or even amputate the limbs of tadpoles." (Authors)] Address: Fedorova, Anna, Dept of Zoology & Animal Ecology, V.N. Karazin Kharkiv National Univ., Kharkiv, 61022, Ukraine. Email: anna.fedorova@karazin.ua

**22016.** Ferzoco, I.M.C.; McCauley, S.J. (2023): Breaking down the components of the competition-colonization trade-off: New insights into its role in diverse systems. *Journal of Animal Ecology* 92(2): 352-366. (in English) ["(1) Performance trade-offs between competition and colonization

can be an important mechanism facilitating regional coexistence of competitors. However, empirical evidence for this trade-off is mixed, raising questions about the extent to which it shapes diverse ecological communities. Here, we outline a framework that can be used to improve empirical tests of the competition-colonization trade-off. (2) We argue that tests of the competition-colonization trade-off have been diverted into unproductive paths when dispersal mode and/or competition type have been inadequately defined. To generate comparative predictions of associations between dispersal and competitive performance, we develop a conceptual trait-based framework that clarifies how dispersal mode and type of competitor shape this trade-off at the stage of dispersal and establishment in a variety of systems. Our framework suggests that competition-colonization trade-offs may be less common for passively dispersing organisms when competitive dominants are those best able to withstand resource depletion (competitive response), and for active dispersers when traits for dispersal performance are positively associated with resource pre-emption (competitive effect). (3) The framework presented here is designed to provide common ground for researchers working in different systems in order to prompt more effective assessment of this performance trade-off and its role in shaping community structure. By delineating key system properties that mediate the trade-off between competitive and colonization performance and their relationship to individual-level traits, researchers in disparate systems can structure their predictions about this trade-off more effectively and compare across systems more clearly." (Authors)] Address: Ferzoco, Ilia Maria, Dept of Ecology & Evolutionary Biology, Univ. of Toronto, Toronto, Ontario, Canada. Email: ilia.ferzoco@mail.utoronto.ca

**22017.** Fischer, I.; Chovanec, A.; Kargl, V.; Sittenthaler, M.; Sattmann, H.; Haring, E. (2023): The dragonfly fauna of the Vienna Lobau – a survey from 2017–2020. *Acta ZooBot Austria* 159: 119-136. (in German, with English summary) ["In this study, the ecological status of the water bodies in the Viennese part of the Danube Floodplain National Park, the Viennese Lobau, was assessed from a dragon fly ecology perspective. The surveys for this were conducted in 2017, 2018 and 2020. The assessment was based on the comparison of the status quo with the water body type-specific reference coenosis, based on a classification of the Lobau waters using the Lorenzo map (surveyed 1816–1817). The reference coenosis was dominated by rheophilous species and dragonfly species that depend on dynamic waters with fluctuating water levels. Due to the low abundance of stillwater habitats, limnophilic species played only a minor role in the reference situation. The dragonfly fauna recorded during the study – 43 dragonfly species, with 39 of them autochthonous – consists for the most part (74%) of species with a distribution focus in the limnophilic range. Rheophilic species and species adapted to strongly fluctuating water levels made up only a small part of the species spectrum and also occurred (especially in the Upper Lobau) only to a very limited extent. Due to this, the dragonfly ecological status of the waters in the Lobau was assessed as "poor". (Authors)] Address: Fischer, Iris, Central Research Laboratories, Natural History Museum Vienna, Burgring 7, 1010 Vienna, Austria. Email: iris.fischer@nhm-wien.ac.at

**22018.** Fortunato, M.H.T.; Mendes, H.F.; Hayashi, C.; Faria, L.R. de; Melo, C.L. de; & Ananias, I. de M.C. (2023): Predation rate of dragonfly (Odonata: Libellulidae) on tilapia (*Oreochromis niloticus* Linnaeus 1758) and the availability of alternative preys (Insecta: Diptera: Chironomidae) to increase fish survival. *Acta Scientiarum. Biological Sciences*

45(1), e65291: 12 pp. (in English) ["The objective of this work was to evaluate the predation rates of two genera of Odonata *Miathyria* Kirby, 1889 and *Erythemis* Hagen, 1861 in post-larviculture of tilapia (*Cichlidae*) with and without availability of Chironomidae. For that, 3 experiments were carried out, the first to analyze which size scale of these two genera would be more efficient in the predation of tilapia and the other 2 experiments with the selected size scales, to analyze the predation rates on tilapia with different Odonata densities, with and without availability of the aquatic insect Chironomidae. For statistical analysis of the data, an analysis of variance (ANOVA) was applied with the Duncan test searching for the means in all experiments. In experiments 2 and 3 a linear regression model was also applied. In experiment 1, there were significant differences between treatments, and in the phase with *Miathyria* the predation of tilapia post-larvae was higher among odonates that corresponded to the size scale from 7.1 to 9.9 mm and therefore the scale was also selected for the next experiments. For *Erythemis*, the consumption of tilapia was higher in the size scale between 12.1 to 14,2 mm. In the following experiments, there were significant differences between treatments. With the increase in Odonata densities the predation of the fish was greater. With the availability of Chironomidae, the consumption of tilapia post-larvae decreased. The consumption of Chironomidae was higher than the consumption of fish in experiment 3. *Miathyria* proved to be more efficient than *Erythemis* in predation and the use of Chironomidae can be a sustainable alternative for post-larvae predation control on fish farms." (Authors)] Address: Fortunato, M.H.T., Programa de Pós Graduação & Agricultura Sustentável, Univ. Professor Edson Antônio Velano, Rodovia MG-179, km 0, 37132-440, Alfenas, Minas Gerais, Brazil. E-mail: mtank@live.com

**22019.** Frank, M.; Adelman, J.; Blanckenhagen, B. v.; Houzmann, J.; Roland, H.-J.; Stübing, S.; Tamm, J. (2023): Jahresbericht Hessen 2022. *Libellen in Hessen* 16: 3-47. (in German) [Records of 59 species from Hessen, Germany are documented and discussed.] Address: Frank, M., Zur Traubenmühle 5A, 55268 Nieder-Olm, Germany

**22020.** Fukaya, W. (2023): Distribution of *Macromia daimoji* Okumura, 1949 in Tochigi Prefecture, Honshu, Japan based on field studies from 2019 to 2022. *Tombo* 66: 63-66. (in Japanese, with English summary) ["This paper reports on the distribution status of *M. daimoji* in Tochigi Prefecture, central Honshu, Japan. It was recorded from three rivers in the Nakagawa River systems. Multiple individuals were collected in two of these rivers, indicating that a stable population exists in Tochigi Prefecture." (Author)] Address: Fukaya, W.: Email: aeshna2074@gmail.com

**22021.** Fukaya, W., Kaneuchi, Y., Kotabe, A. & Seki, N. (2023): Records of *Macromia daimoji* Okumura, 1949 from Saitama Prefecture: rediscovery after 31 years. *Tombo* 65: 63-64. (in Japanese, with English summary) ["We record *M. daimoji* from Tokigawa River and Irumagawa River, Saitama Prefecture, Honshu, Japan. This is 31 years since last record or this species in Saitama Prefecture. The environment of the habitats was considered to be favorable for this species." (Authors)] Address: Fukaya, W.: Email: aeshna2074@gmail.com

**22022.** Futahashi, R.; Fukaya, W. (2023): Distribution survey of *Mnais* damselflies (Zygoptera: Calopterygidae) in Tochigi Prefecture, central Honshu, Japan. *Tombo* 66: 41-47. (in Japanese, with English summary) ["We surveyed the

distribution of the genus *Mnais* in Tochigi Prefecture, central Honshu, Japan. Based on nuclear ITS1 sequences, two species, *M. pruinosa* and *M. costalis* were found in Tochigi Prefecture. *M. costalis* was recorded widely from lower to higher elevations, whereas *M. pruinosa* was recorded only in the lower mountains of the western part of the prefecture and could not be found at higher elevations above 1,000 m. We also examined environmental factors associated with the distribution of both species, and found that the angle of slope around the habitat was significantly larger for *M. pruinosa* than for *M. costalis*. Moreover, the minimum temperature may be one of the limiting factors in the distribution of *M. pruinosa* around the northern Kanto district." (Authors)] Address: Futahashi, R., National Inst. Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22023.** Futahashi, R. & Kiyoshi, T. (2023): A brief report on *Sympetrum kunckeli* collected in Taiwan. Tombo 65: 81-82. (in Japanese, with English summary) ["In Taiwan, only one individual of *S. kunckeli* has been recorded previously, in 1968, and recently it has been regarded as a doubtful species. We confirmed that this specimen exists in the Asahina collection preserved in the National Museum of Nature and Science, and report the photos. *S. kunckeli* has decreased dramatically in Japan in recent years, and it is considered to have been distributed in Taiwan in the past." (Authors)] Address: Futahashi, R., National Inst. Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22024.** Futahashi, R., Kagimoto, B. & Sakamoto, M. (2023): Genetic diversity of *Orthetrum poecilops* among populations in Miyajima Island, Japan. Tombo 66: 56-59. (in Japanese, with English summary) ["We conducted genetic analyses of Japanese *O. poecilops* using a next-generation sequencer on a total of 10 individuals derived from three populations in Miyajima Island, Hiroshima, Japan. Almost no individual differences were detected in the nuclear ribosomal DNA region and mitochondrial DNA sequences. In addition, the dendrogram based on the 8,275 nuclear DNA loci did not detect genetic differentiation among the populations, suggesting genetic interaction among the Miyajima populations." (Authors)] Address: Futahashi, R., National Inst. Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22025.** Garrison, M.; Tennessen, K.J. (2023): Nymph Cove: Identification to genus: Aeshnidae (Part II). *Argia* 35(2): 38-41. (in English) [The following North American aeshnid genera are diagnosed: *Anax*, *Gynacantha*, *Triacanthagyna*, *Oplonaeschna*, *Remartinia*, *Aeshna*, and *Rhionaeschna*.] Address: Garrison, Marla, Biology Faculty McHenry County College Crystal Lake, IL, USA. E-mail: mgarriso@mchenry.edu

**22026.** Ge, Y. García-Girón, J.; Heino, J.; Liu, Z.; Zhang, C.; Yan, Y.; Xie, Z.; Li, Z. (2023): Dispersal syndromes mediate phylogenetic distance decay relationships in a dendritic stream network. *Journal of Biogeography* 50(3): 897-908. (in English) ["Aim: Understanding the mechanisms underlying the structure and connectivity of ecological communities is a central issue in biogeography. Dispersal syndromes are tightly woven into organisms' life history seen across populations and communities, but measuring dispersal is still complicated in practice. We investigated the role of dispersal syndromes (here, associated with body size, adult flying ability and voltinism) to predict phylogenetic distance

decay relationships (DDRs) of aquatic insect assemblages in dendritic stream networks. Location: Du River Basin, China. Taxon: Aquatic insects (Coleoptera, Diptera, Ephemeroptera, Hemiptera, Lepidoptera, Megaloptera, Odonata, Plecoptera and Trichoptera). Methods: We applied multiple methods (i.e. deconstruction approach, null models, Mantel tests and partial Mantel tests) to enhance our basic understanding of phylogenetic distance decay patterns. To provide additional insights into correlates of phylogenetic dissimilarity between stream sites, we modelled potential dispersal routes based on overland, watercourse and cost distances. Results: Overland distances were among the main correlates of phylogenetic distance decay in the stream networks studied, suggesting that aquatic insects disperse overland seeking for habitats suitable for survival and reproduction. However, local environmental filtering was generally more important for phylogenetic DDRs than geographical distances alone. The interaction between environmental vs. dispersal processes in driving spatial patterns of phylogenetic dissimilarity was contingent on different dispersal syndromes. More specifically, significant phylogenetic DDRs were detected only for subsets of large-bodied, univoltine taxa with strong adult flying abilities, such as dragonflies. Main Conclusions: Overall, historical constraints affect the phylogenetic DDRs in aquatic insects. Dispersal syndromes associated with body size, adult flying ability and voltinism are key features underlying distance decay in phylogenetic assemblage similarity and the evolutionary legacies of aquatic insects in dendritic stream networks." (Authors)] Address: García-Girón, J., Dept Biodiversity & Environmental Management, Univ. of León, León, Spain. Email: Jorge.Garcia-Giron@oulu.fi

**22027.** Gómez-Llano, M.; McPeck, M.A.; Siepielski, A.M. (2023): Environmental variation shapes and links parasitism to sexual selection. *Evolutionary Ecology* 37: 585-600. (in English) ["Parasite-driven population divergence in hosts can be exacerbated by environmental factors affecting host parasitism, as well as by increasing sexual selection against parasitized hosts. Environmental factors can influence parasitism directly by affecting parasite survival, and indirectly by affecting host condition, which can in turn shape host sexual selection. To disentangle these potential alternative paths, we used a damselfly (host) - water mite (parasite) system to examine how environmental factors directly and indirectly drive heterogeneity in parasitism across populations and influence the strength of sexual selection acting against parasitized males. We found substantial heterogeneity in parasitism across populations, driven mainly by lake pH, and damselfly density. Although this heterogeneity in parasitism did not translate directly into variation in sexual selection, the density of predatory fish increased sexual selection strength, likely through the effects on damselfly condition. These results imply that parasitism alone may not cause differences in sexual selection across populations, but when linked with underlying environmental conditions, parasitism can increase the strength of selection. More broadly, these results suggest that elucidating how parasitism may drive sexual selection requires consideration of the intertwined effects of ecological processes. ... Damselflies were collected from 10 populations of *E. ebrium* and eight population of *E. geminatum* in Vermont and New Hampshire, USA." (Authors)] Address: Gómez-Llano, M., Dept of Environmental & Life Sciences, Karlstad Univ., Karlstad, 65188 Sweden. Email: miguel.gomez@kau.se

**22028.** Greenhalgh, J.A.; Genner, M.J.; Jones, G. (2023): Diel variation in insect-dominated temperate pond soundscapes and guidelines for survey design. *Freshwater Biology*

68(7): 1148-1160. (in English) [1. Passive acoustic monitoring has been used for decades as a non-invasive tool for quantifying biodiversity in terrestrial and marine ecosystems. Recently, there has been increased interest in the potential for the method to survey freshwater biodiversity. Fundamental aspects of freshwater soundscape phenology, however, often remain poorly understood, despite their importance for suitable survey design. 2. To gain a greater understanding of daily acoustic variation in aquatic insect-dominated temperate pond soundscapes, 840 hr of underwater sound recordings were collected from five ponds in the southwest of the U.K. We calculated six commonly used acoustic indices to investigate diel trends and evaluated the suitability of each acoustic index to identify biologically complex pond soundscapes. In addition, macroinvertebrates were collected from each pond to investigate potential drivers of diel soundscape variation. 3. The ponds studied possessed clear patterns of daily acoustic variation, with acoustic activity typically peaking between 02:00 and 04:00 and around the solar noon. Acoustic Entropy showed the greatest variation between day and night soundscapes and was best suited for detecting overall daily acoustic variation in the study ponds. However, the Normalised Difference Soundscape Index and the Bioacoustic Index captured strong diel variation in aquatic insect-dominated soundscapes. Furthermore, we calculated that a minimum hydrophone deployment time of 24 hr is required to ensure that soundscape variation is adequately captured. 4. This study provides an increased understanding of daily acoustic variation in insect-dominated temperate pond soundscapes, enabling us to provide guide-lines for the design and implementation of future passive acoustic monitoring surveys. We suggest that a minimum of 24 hr is required to adequately capture pond soundscape variation. This will increase the chance of detecting key soniferous species in the soundscape and enable more accurate assessments of temperate pond soundscapes." (Authors) Figure 1 includes "Coenagrionidae"; no further discussion of Odonata is made.] Address: Greenhalgh, J.A., School of Biological Sciences, Univ. of Bristol, Life Sciences Building, 24 Tyndall Avenue, Bristol, BS8 1TQ, U.K. Email: jackhalgh95@gmail.com

**22029.** Grigoropoulou, A.; Ab Hamid, S.; Acosta, R.; Akindele, E.O.; Al-Shami, S.A.; Altermatt, F.; Amatulli, G.; Angeler, D.G.; Arimoro, F.O.; Aroviita, J.; Astorga-Roine, A.; Costa Bastos, R.; Bonada, N.; Boukas, N.; Brand, C.; Bremerich, V.; Bush, A.; Cai, Q.; Callisto, M.; Chen, K.; Vilela Cruz, P.; Dangles, O.; Death, R.; Deng, X.; Domínguez, E.; Dudgeon, D.; Eriksen, T.E.; Faria, A.P.J.; João Feio, M.; Fernández-Aláez, C.; Flourey, M.; García-Criado, F.; García-Girón, J.; Graf, W.; Grönroos, M.; Haase, P.; Hamada, N.; He, F.; Heino, J.; Holzenthal, R.; Huttunen, K.-L.; Jacobsen, D.; Jähnig, S.C.; Jetz, W.; Johnson, R.K.; Juen, L.; Kalkman, V.; Kati, V.; Keke, U.N.; Koroiva, R.; Kuemmerlen, M.; Langhans, S.D.; Ligeiro, R.; Van Looy, L.; Maasri, A.; Marchant, R.; Garcia Marquez, J.R.; Martins, R.T.; Melo, A.S.; Metzeling, L.; Miserendino, M.L.; Jannicke Moe, S.; Molineri, C.; Muotka, T.; Mustonen, K.-R.; Mykrä, H.; Cavalcante do Nascimento, J.M.; Valente-Neto, F.; Neu, P.J.; Nieto, C.; Pauls, S.U.; Paulson, D.R.; Rios-Touma, B.; Rodrigues, M.E.; Roque, F.; Salazar Salina, J.C.; Schmera, D.; Schmidt-Kloiber, A.; Shah, D.N.; Simaika, J.P.; Siqueira, T.; Tachamo-Shah, R.D.; Theischinger, G.; Thompson, R.; Tonkin, J.D.; Torres-Cambas, Y.; Townsend, C.; Turak, E.; Twardochleb, L.; Wang, B.; Yanygina, L.; Zamora-Muñoz, C.; Domisch, S. (2023): The global EPTO database: Worldwide occurrences of aquatic insects. *Global Ecology and Biogeography* 32(5): 642-655. (in English) [1 Motivation: Aquatic

insects comprise 64% of freshwater animal diversity and are widely used as bioindicators to assess water quality impairment and freshwater ecosystem health, as well as to test ecological hypotheses. Despite their importance, a comprehensive, global database of aquatic insect occurrences for mapping freshwater biodiversity in macroecological studies and applied freshwater research is missing. We aim to fill this gap and present the Global EPTO Database, which includes worldwide geo-referenced aquatic insect occurrence records for four major taxa groups: Ephemeroptera, Plecoptera, Trichoptera and Odonata (EPTO). Main type of variables contained: A total of 8,368,467 occurrence records globally, of which 8,319,689 (99%) are publicly available. The records are attributed to the corresponding drainage basin and sub-catchment based on the Hydrography90m dataset and are accompanied by the elevation value, the freshwater ecoregion and the protection status of their location. Spatial location and grain: The database covers the global extent, with 86% of the observation records having coordinates with at least four decimal digits (11.1 m precision at the equator) in the World Geodetic System 1984 (WGS84) coordinate reference system. Time period and grain: Sampling years span from 1951 to 2021. Ninety-nine percent of the records have information on the year of the observation, 95% on the year and month, while 94% have a complete date. In the case of seven sub-datasets, exact dates can be retrieved upon communication with the data contributors. Major taxa and level of measurement: Ephemeroptera, Plecoptera, Trichoptera and Odonata, standardized at the genus taxonomic level. We provide species names for 7,727,980 (93%) records without further taxonomic verification. Software format: The entire tab-separated value (.csv) database can be downloaded and visualized at [https://glowabio.org/project/epto\\_database/](https://glowabio.org/project/epto_database/). Fifty individual datasets are also available at <https://fred.igb-berlin.de>, while six datasets have restricted access. For the latter, we share metadata and the contact details of the authors.] Address: Grigoropoulou, A., Dept of Community & Ecosystem Ecology, Leibniz Inst. Freshwater Ecology & Inland Fisheries, Müggelseedamm 310, Berlin 12587, Germany. Email: afrodit.grigoropoulou@igb-berlin.de

**22030.** Hering, J.; Geiter, O.; Fünfstück, H.-J.; Küttner, R. (2023): Hitze, Schweiss und Überraschungen im Juni: expedition auf dem Nassersee. *Der Falke* 70(7): 14-21. (in German) [Lake Nasser is a vast reservoir in southern Egypt and northern Sudan. The avifauna of the Egyptian part was studied in June 2022. 13 odonate species were found, but only *Brachythemis imparita* and *Paragomphus pumilio* are listed.] Address: not stated

**22031.** Higashikawa, W.; Sueyoshi, M.; Mori, T.; Yonekura, R.; Nakamura, K. (2023): The Satogawa Index: A landscape-based indicator for freshwater biodiversity in Japan. *Ecological Indicators* Volume 152, August 2023, 110350: 8 pp. (in English) [1 Highlights: • The 'Satogawa' Index (SGI) is based on the heterogeneity of freshwater landscape. • Diversity and shape complexity of freshwater land covers were considered in the SGI. • The SGI correlated well with species richness of Odonata and freshwater fish. • The SGI may assess the effects of the changes in land use on freshwater biodiversity. Abstract: Nationwide biodiversity indicators based on landscape heterogeneity have been developed primarily for terrestrial ecosystems, but not well for freshwater ecosystems worldwide. A plausible reason for this limitation is the difficulty in the fine discrimination of freshwater environments by remote sensing. However, in recent years, Geographic Information System (GIS) vector data of freshwater land cover are classified in detail (i.e. rice paddy



fields, other marshy wetlands, rivers, ponds and lakes) in Japan. Using these GIS data, we developed an index for freshwater landscape heterogeneity with 1 km square as the spatial unit, which was named the 'Satogawa' Index (SGI). The SGI formula consisted of two-component terms, one reflecting the diversity of freshwater land covers, and the other representing their spatial shapes. We calculated the SGI at a central region in Japan and found significant relationships with the species richness of Odonata (dragonflies and damselflies) and freshwater fish. The amounts and spatial patterns of freshwater landscape elements by which the SGI was estimated were different among regions in Japan; however, the SGI may be adapted to other regions as a surrogate of aquatic species richness, a typical measure of freshwater biodiversity. Although several modifications are underway that may have negative consequences for freshwater biodiversity, land use has been changed to prevent flood damage and improve the freshwater environment. The SGI may reveal the influences of the changes in land use on freshwater biodiversity and may identify the type and amount of lotic and lentic environment that should be supplemented to improve freshwater biodiversity at a certain location." (Authors)] Address: Higashikawa, W., Kyushu research center, Forestry and Forest Products Research Institute, Kumamoto 860-0862, Japan. Email: higashi\_n34@yahoo.co.jp

**22032.** Huamán-Tucumango, J.K.D.; Vela-Ahumada, A.; Vergara-Copacondori, J.A. (2023): Estudio del orden Odonata en el caserío Nuevo Perú del Centro Poblado Huambocancha Baja - Cajamarca - Peru. *Revista Peruana de Entomología* 56(1): 1-15. (in Spanish, with English summary) ["Study of the Odonata order in the Nuevo Perú hamlet of the Huambocancha Baja Population Center - Cajamarca. *Rev. peru. entomol.* 56 (1): 1-15. In the Nuevo Perú hamlet, Centro Poblado Huambocancha Baja, district, province and Dept of Cajamarca - Peru, the investigation was carried out with the objectives of determining the diversity of the order Odonata and taxonomically identifying the specimens collected at the genus level. During eight months and on a weekly basis, the collection of immature and adult stages was carried out during the time of day in which they showed their greatest activity (between 10:00 a.m. and 2:00 p.m.). To collect adults, the aerial entomological net was used and in the case of immature stages (eggs and naiads), the aquatic net was used. Each insect collected was assigned a field code and the corresponding observations (code, date, altitude (masi), latitude, longitude, and collector) were noted on a form. Three water sources were evaluated and the Margalef, Simpson and Shannon indices were determined to assess diversity. The eggs, naiads and adults collected were placed in 70% alcohol and in entomological envelopes to be later transferred to the Entomology Lab. of the Faculty of Agrarian Sciences of the National Univ. of Cajamarca. For the identification of the collected species, the taxonomic keys of Borror (1942), Von Ellenrieder (2003), Trapero & Naranjo (2004), Bermúdez (2005), Heckman (2006), Trapero & Naranjo (2009) and Ramírez were used. (2010). Likewise, they were identified by Dr. Cornelio Bota Sierra and Dr. Natalia Von Ellenrieder. The best conformed and in good condition insects were mounted dry and wet, and labeled with the basic field data, to be considered within the collection of Odonata of the Entomological Museum of the Faculty of Agrarian Sciences of the National Univ. of Cajamarca. In conclusion, the order Odonata is represented by at least four species in Caserío Nuevo Perú, Huambocancha Baja, Cajamarca." (Authors) Morphology of the following species is treated in great detail: *Rhionaeschna marchali* (Rambur, 1842), *Sympetrum gilvum* (Selys, 1884), *Erythrodiplax fusca* (Rambur 1842),

and *Oxyallagma dissidens* (Selys 1876).] Address: Huamán-Tucumango, J.K.D., Tesista de la Universidad Nacional de Cajamarca, Peru. Email: jhuamant13@unc.edu.pe

**22033.** Huang, D.; Lian, X.; Fu, Y.; Nel, A. (2023): The first Chinese representative of the Cenozoic hawk dragonfly *Oligaeschna* (Odonata: Aeshnidae) from the Eocene of North Tibet. *Historical Biology* 35(6): 997-1001. (in English) ["*Oligaeschna sinica* sp. nov., the oldest recorded and first Chinese representative of the Cenozoic aeshnid genus *Oligaeschna*, is described from the Bartonian of Tibet. This fossil is also among the oldest known representatives of the family Aeshnidae sensu stricto. Its presence in the Niubao Formation supports a temperate, cool to warm climate for the area during this period." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**22034.** Iezekiel, S.; Dimitriou, K.; Bakaloudis, D.E.; Kotsonas, E.G.; Aristophanous, M.; Yosef, R. (2023): First confirmed breeding records of Grey Wagtail *Motacilla cinerea* Tunstall, 1771 (Passeriformes: Motacillidae) in Cyprus. *Ornithological Science* 22(2): 151-159. (in English) ["In this paper we describe first breeding of *M. cinerea* in Cyprus. 23 nests were found during the 2020 and 2021 breeding seasons in riparian habitats adjacent to major river systems in the Paphos State Forest. Most nests were located on roadside banks at a height of 2.38 m above the ground and at a distance of about 0–10 m from the river. Nests consisted of grassy cups with a mean diameter of 13.39 cm, while the nest cup itself had a mean diameter of 7.07 cm and a depth of 3.41 cm. 20 nesting attempts were monitored with females laying eggs between early April and early July. A total of 54 eggs were laid and 44 nestlings were successfully raised from the 12 nests. The mean clutch size was 4.5 eggs per nest, the mean number of hatched eggs was 3.92 and the mean number of fledglings was 3.67. Parents fed their young mostly on invertebrates and in particular on insects. Diptera and Odonata were the most common insect Orders comprising the majority of prey items. Average insect prey size was 10.79 mm (range 2–60 mm), with little difference in prey size between that delivered by males and females. This study confirms the first breeding of the species in Cyprus, where it follows a breeding pattern similar to that in other parts of Western Palearctic range. The affinity of the Grey Wagtail to human structures and the low predation rate highlight the successful breeding potential and the future range expansion of the species across the island of Cyprus." (Authors)] Address: Bakaloudis, D.E., School of Forestry & Natural Environment, Aristotle Univ. of Thessaloniki, P.O. Box 241, 541 24 Thessaloniki, Greece. Email: debakaloudis@for.auth.gr

**22035.** Indriani, G.R.; Singkam, A.R. (2023): Population dynamics of dragonflies at the paddy field ecosystem, Sidorejo, Central Bengkulu. *Jurnal Ilmiah Biologi Eksperimen Dan Keanekaragaman Hayati (J-BEKH)* 10(1): 69-74. (in English) ["The rice fields of Sidorejo Village have the potential for dragonfly diversity. This study aims to analyze fluctuations in the diversity and abundance of dragonflies in three ecosystem conditions of rice fields in Sidorejo Village, Bengkulu Tengah. Sampling using purposive sampling with the cruising method. Data analysis was carried out descriptively through the identification of characteristics to obtain the name of the species. After the species name was obtained, the relative abundance, Shannon Wiener diversity index, and species evenness index were calculated. The results of the study found that the harvest ecosystem had the highest diversity and abundance of dragonflies (13 species and 45

individuals). The species that were consistently found in three types of ecosystems were *Orthetrum sabina*, *O. testaceum*, and *Pantala flavescens*. The species with the highest relative abundance was *O. sabina* with 32%. The diversity index ranged from 1.32 (post-harvest) to 2.25 (harvest). The highest evenness index was in the post-harvest ecosystem at 0.95, and the lowest was in the harvest ecosystem at 0.87. The results of this study are expected to show that the diversity and abundance of dragonflies fluctuate depending on seasonal ecosystem conditions in the rice fields." (Authors)] Address: Indriani, Gisela Ratna, Jurusan Pendidikan Biologi FKIP Universitas Bengkulu, Indonesia. Email: giseltuuh@gmail.com

**22036.** Inoue, K. (2023): Obituary: Professor Dr. B. Kiauta. Tombo 65: 83-85. (in Japanese, with English title) ["In this column, we would like to express our heartfelt condolences to Mr. Bastiaan Kiauta (1937-2022) (joined in 1963) who passed away on March 26, 2022. I sincerely pray that he may rest in peace." (Author/Google translate)] Address: deceased

**22037.** Jonderko, T.; Beczala, T.; Wiśniewski, M.; Pietraszko-Wachalowska, M. (2023): Observations of Green Snaketail *Ophiogomphus cecilia* FOURCROY 1785 in the Silesian Beskid Mountains in 2016-2019. Odonatrix 192 (2023): 3 pp. (in Polish, with English summary) ["In 2016-2019, occasional observations of the dragonfly *Ophiogomphus cecilia* were made in some forests and flushes in Silesian Beskid Mountains (southern Poland). *O. cecilia* was found at 3 localities on the Kotarz mountain in Brenna, in the Wapienica Valley in Bielsko-Biala, and in the Bucznik mountain in Jaworze. This species has never yet been recorded at such high altitudes in Poland." (Authors)] Address: Jonderko, T., Stowarzyszenie Górecki Klub Przyrodniczy, ul. Zalesie 12, 43-436 Górk Wielkie, Poland. Email: acer70@wp.pl

**22038.** Juen, L.; Koroiva, R.; Geraldo de Carvalho, F.; Mendoza-Penagos, C.C.; Brito, J.d.S.; Calvão, L.B.; Ferreira, V.R.S.; Ribeiro dos Santos, Â.; Silva, C.S.; Guerreiro, S.; Cavalcante, G.C.; Magalhães, L.; de Souza, J.E.S.; Gomes, D.H.F.; Montag, L.F.; Michelan, T.S.; Ligeiro, R. (2023): The first mitochondrial genome of an Odonata endemic to South America, *Chalcopteryx rutilans* (Rambur, 1842) (Odonata: Polythoridae), and its implications for the phylogeny of the Zygoptera. Diversity 15(8):908: 11 pp. (in English) ["*C. rutilans* is a species widely distributed in central Amazonia. Due to its sensitivity to environmental changes, it is a bioindicator species used to evaluate the environmental conditions of streams in federally protected areas. By sequencing *C. rutilans* mitogenome, we report the first whole mitogenome from the Polythoridae family and the first from an Odonata species endemic to South America. The entire mitogenome has 15,653 bp and contains 13 protein-coding, 22 tRNA, and two rRNA genes. The nucleotide composition of the mitogenome is 42.7% T, 25.5% C, 19.4% G, and 12.4% A. The AT and GC skews of the mitogenome sequence were 0.249 and -0.220, respectively. *C. rutilans* was recovered as a sister to *Pseudolestes mirabilis* Kirby, 1900 (Pseudolestidae), demonstrating the absence of mitogenomes of species from multiple families in the current literature. Mitogenome data from this study will provide useful information for further studies on the phylogeny and conservation of Polythoridae." (Authors)] Address: Juen, L., Laboratório de Ecologia e Conservação, Univ. Federal do Pará (UFPA), Belém 66075-110, PA, Brazil. Email: leandrojuen@gmail.com

**22039.** Karube, H.; Shiraishi, R. (2023): Record of a gynandromorphic individual or *Trithemis aurora* (Burmeister, 1839) (Anisoptera: Libellulidae). Tombo 66: 67-69. (in Japanese,

with English summary) ["A gynandromorphic individual or *T. aurora* was photographed at pond of Kokura Castle park, Fukuoka Pref., SW Japan, which is the third records of the gynandromorphic individual for this species. This individual roughly bears male characteristics on the right side and female characteristics on the left side by the view of color maculation." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**22040.** Karube, H., Kameda, Y., Kaga, R., & Fujita, E. (2023): Contamination status or neonicotinoid insecticides for the habitat of endangered Odonata in Japan. Tombo 66: 13-24. (in Japanese, with English summary) ["We studied the contamination status of neonicotinoid insecticides in the habitats or endangered Odonata from Hokkaido (northern Japan) to the Ryukyu Archipelago (southern Japan), as well as the population status. This survey shows that neonicotinoid insecticides were detected in almost all of the studied areas, although contamination concentration was not so high as that of preceding studies on the habitats of *Sympetrum maculatum* and *Libellula angelina*. The result also found that multiple pollutions by neonicotinoid insecticides were often detectable and that the pollution extends to good habitat and to areas not adjacent to agricultural land. The detection of these insecticides in habitats where surface soil inflow and underground water contamination are improbable suggests these pollutions occurred via evapotranspiration and snowfall from the foothills. These findings represent only a part of the pollution. Considering the risk of exposure to lethal contamination concentrations even once during the larval period, it is strongly desired from the perspective of conservation, that plural surveys in each season, research on the effects or insecticides and herbicides other than neonicotinoid, and the effects of these pesticides on larvae of the endangered species, be undertaken." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**22041.** Kašák, J.; Holuša, O.; Mazalová, M. (2023): Artificial habitat – a chance for survival of a rare montane dragonfly (Odonata): case study on an alpine emerald (*Soma-tochlora alpestris*). Journal of Insect Conservation 27: 315-321. (in English) ["The mountain ecosystems of Central Europe are an important natural phenomenon. The character of small isolated islands also predetermines their vulnerability. Typical inhabitant of subalpine and alpine peat bogs, tiny montane habitats, is the endangered dragonfly *S. alpestris* a glacial relict surviving in restricted area of several mountain ranges within Central Europe. Species is threatened mainly by habitat loss and its transformation due to climate change, the expansion of tourist activities and plant succession. In our study from three mountain ranges in the Czech Republic, we bring the first ever evidence of successful development of *S. alpestris* in artificial habitats. Successful development of the species was recorded in peat pools created by the movement of heavy machinery on now almost abandoned forest roads. Some of the pools have been colonized in great numbers - up to tens of larvae of different instars, exuviae and imagoes have been found. Successful colonisation of the species was mainly due to: (i) proximity to source sites, (ii) suitable environmental parameters of the secondary habitat and (iii) the gradual abandonment of the paths' use, leading to a reduction in the frequency of disturbance." (Authors)] Address: Kašák, J., Dept of Forest Protection & Wildlife Management, Mendel Univ. in Brno, Brno, Czech Republic. Email: abovic@seznam.cz

**22042.** Kirkpatrick Baird, F.; Spray, D.; Hall, J.; Stubbs Partridge, J. (2023): Projected increases in extreme drought frequency and duration by 2040 affect specialist habitats and species in Scotland. *Ecological Solutions and Evidence* 4(3) e12256: 12 pp. (in English) ["Climate-driven increases in drought occurrence are an overlooked risk in temperate climates, which may be less resilient to water scarcity than arid habitats. Scotland provides an example of a temperate oceanic climate in which drought risk is understudied, but could have substantial ecological impacts, particularly in combination with additional stressors. We modelled changes to risk of extreme drought occurrence in Scotland, and considered potential impacts of these changes on two key habitats, ombrotrophic (precipitation fed) wetlands and temperate rainforest. Using temperature and precipitation data from the UK Climate Projections 2018 and the drought index Standardized Precipitation-Evapotranspiration Index, we calculated and mapped likely changes in extreme drought for the near future (2021–2040) in comparison to a baseline (1981–2001). We found likelihood of extreme drought events increased from an average of one event every 20 years in the baseline period, to one event every 3 years by 2040. Typical events were projected to be up to 2–3 months longer, with an average of 11 extra drought months per decade. Increases were projected throughout the country, but the effect was most severe in the east, and during autumn. Ombrotrophic wetlands have some level of adaptive resilience to drought, but are considered at high risk as several key sites are in drought hotspot areas. In contrast, Scotland's temperate rainforest is located in lower risk areas, but is typically less drought resilient. Potential impacts on these habitats include reductions in ecosystem services including carbon capture, reduced breeding success for multiple taxa and increased competition among plant communities, which threatens drought-sensitive species. These projections suggest that climate-driven drought risk is a significant and imminent threat, even in wet climates. In Scotland, the results can direct mitigation and management actions to areas likely to be at greatest risk, as well as informing conservation interventions that can cope with drought. Additionally, other areas with a temperate oceanic climate may be at risk of extreme drought and could experience similar consequences. Therefore, these results have implications both for facilitating improved resilience to extreme drought in Scotland and for potentially overlooked impacts of drought in oceanic climates elsewhere." (Authors) "These impacts affect wetland-adapted animal species, for which substantial or prolonged changes in water availability could have serious implications for long-term population health. For example, the breeding success of waders ... can be reduced when surface water pools where chicks forage dry up (Burstons, 2006), and frequent drought periods have been linked to population declines or losses in great crested newts *Triturus cristatus* (Miró et al., 2017). Similarly, nationally scarce invertebrates, including Odonata such as *Aeshna caerulea* and *Leucorrhinia dubia*, rely on waterbodies for all life stages. Scottish Odonata larvae spend two or more years in water, so could suffer population crashes if pools dry for even one season (Hogreve & Suhling, 2022). Less-mobile and short-lived species especially can recover or recolonize from short-term losses, but may decline under frequent and severe drought episodes."] Address: Fairlie Kirkpatrick Baird: Email: fairlie.kirkpatrickbaird@gmail.com

**22043.** Kobylecki, P. (2023): New observations of dragonflies (Odonata) of Rembertów. *Odonatrix* 191: 12 pp. (in Polish, with English summary) ["The observations were conducted in the peatbogs, natural and anthropogenic small water

bodies, fish ponds, rivers and channel east of Warsaw in 2021 and 2022. In total, 50 odonate species were recorded." (Author)] Address: Kobylecki, P., ul. Liryczna 8, 04-410 Warszawa e-mail: fario@poczta.fm

**22044.** Kutsuma, T.; Ozono, A.; Futahashi, R. (2023): The first records of *Ictinogomphus pertinax* (Hagen in Selys, 1854) from Yamanashi Prefecture, Honshu, Japan. *Tombo* 65: 73-74. (in Japanese, with English summary) [Records of *I. pertinax* in Kai, Koru and Nirasaki cities in Yamanashi Prefecture, Japan are presented.] Address: Futahashi, R., National Inst. Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22045.** Lambret, P.; Jeanmougin, M.; Stoks, R. (2023): Factors driving larval abundance and adult size of the threatened *Lestes macrostigma* (Odonata): keys for water management and habitat restoration. *Journal of Insect Conservation* 27: 389-402. (in English) ["*L. macrostigma* is a damselfly of temporary brackish ponds, and is threatened in Europe. Better understanding its larval ecological requirements is imperative to inform conservation management measures and habitat restoration programs. We studied in a set of 33 temporary ponds the effect of 14 biotic and abiotic variables (including hydroperiod, pond surface area, water salinity, oviposition plant availability and predator relative abundance) on *L. macrostigma* larval abundance and adult size at emergence. Contrarily to our expectations, salinity level and oviposition plant availability did not drive the species larval abundance. Instead, the later the flooding date of the pond in autumn/winter the higher the larval abundance in the next spring. This effect seemed mediated by the aeshnid dragonfly larvae, as the size and relative abundance of these predators were lower in later flooded ponds. Larval abundance of *L. macrostigma* also increased with decreasing pond surface area. *Lestes macrostigma* adults tended to be bigger when they emerged from ponds with higher water levels, likely because deeper waters have lower water temperatures; this larger size may positively affect adult lifespan and fecundity. Our results contribute to explaining the species strong inter-annual variation in population abundance and further illustrate the threat of artificial early flooding of ponds for Mediterranean species. Implications for insect conservation: To improve *L. macrostigma* conservation actions, our results advocate to avoid temporary pond flooding before late autumn and to maintain high water levels until adults emerge in the next spring. Further, to increase habitat availability, our data indicate the importance of creating a network of small and deep temporary ponds." (Authors)] Address: Lambret, P., Tour du Valat, Research Institute for the Conservation of Mediterranean Wetlands, Le Sambuc, 13200, Arles, France

**22046.** Lee, S.H.; Park, J.S.; Pyo, J.-Y.; Kim, S.-S.; Kim, I. (2023): The complete mitochondrial genome of the blue-tailed damselfly *Ischnura elegans* (Odonata: Coenagrionidae) — a climate-sensitive indicator species in South Korea. *International Journal of Industrial Entomology* 46(2): 41-54. ["*I. elegans* is a climate-sensitive indicator species in South Korea. In this study, we sequenced the complete mitochondrial genome (mitogenome) of *I. elegans* collected from South Korea for subsequent population genetic analysis, particularly to trace population movements in response to climate change. The 15,963 base pair (bp)-long complete mitogenome of *I. elegans* has typical sets of genes including a major non-coding region (the A+T-rich region), and an arrangement identical to that observed in ancestral insect species.

The ATP6, ND3 and ND1 genes have the TTG start codon, which, although rare, is the canonical start codon for animal mitochondrial tRNA. The A/T content was 71.4% in protein-coding genes, 72.1% in tRNAs, 72.9% in the whole genome, 74.7% in srRNA, 75.3% in lrRNA, and 83.8% in the A+T-rich region. The A+T-rich region is unusually long (1,196 bp) and contains two subunits (192 bp and 176–165 bp), each of which is tandemly triplicated and surrounded by non-repeat sequences. Comparison of the sequence divergence among available mitogenomes of *I. elegans*, including the one from the current study, revealed ND2 as the most variable gene, followed by COII and COI, suggesting that ND2 should be targeted first in subsequent population-level studies. Phylogenetic reconstruction based on all available mitogenome sequences of Coenagrionidae showed a strong sister relationship between *I. elegans* and *I. senegalensis*.] Address: Kim, I., Dept of Applied Biology, College of Agriculture & Life Sciences, Chonnam National Univ., Gwangju 61186, Republic of Korea. Email: ikkim81@chonnam.ac.kr

**22047.** Lieckweg, A.; Hesse, V.; Mau-Hansen, C.; Lüers, E. (2023): Recherche der historischen Verbreitung von *Coenagrion scitulum* in Nordwestdeutschland (Odonata: Coenagrionidae). *Libellula* 41(3/4): 179-202. (in German, with English summary) ["Research of the historical distribution of *Coenagrion scitulum* in northwestern Germany (Odonata: Coenagrionidae) – Historical reports of *C. scitulum* for northwestern Germany have been reviewed several times over the last few decades. Some of these could be discarded due to the respective research or at least assessed as implausible. In some cases, no intensive research had been done or the whereabouts of the collection specimens were unknown, e.g. in the case of a finding of "*Agrion scitulum*" near Hanover (Schumann Specimen) that was corrected again shortly after its publication, and supposed specimens of "*Agrion scitulum*" from Lower Saxony (Genz Specimen) and northern North Rhine-Westphalia (Kiebitz Specimen). These collection specimens were searched for in various museums in Lower Saxony, Bremen, Hamburg, and North Rhine-Westphalia. The Schumann Specimen is located in the Zoological Museum Hamburg. It was indeed not a male of *C. scitulum*, but of *Coenagrion hastulatum*. The Genz Collection is located in the Übersee-Museum Bremen. Three specimens to be examined were females of *C. pulchellum* and not of *C. scitulum*. Regarding the report of the finding for northern North Rhine-Westphalia (Kiebitz Specimen), no specimen could be found despite extensive research. Therefore, a comparative photo analysis was carried out here. This showed that the Kiebitz Specimen was most likely not a male of *C. scitulum*, but a male of *C. pulchellum*. No historical finds of the species for northwestern Germany could be confirmed or newly detected. Based on the knowledge gained, a reassessment of the historical area extents of *C. scitulum* is carried out." (Authors)] Address: Lieckweg, Ariane, Artillerieweg 9, 26129 Oldenburg, Germany. Email: ariane.lieckweg@web.de

**22048.** Lishawa, S.C.; Schrank, A.J.; Lawrence, B.A.; Monks, A.M.; Albert, D.A. (2023): Aquatic connectivity treatments increase fish and macroinvertebrate use of *Typha*-invaded Great Lakes coastal wetlands. *Freshwater Biology* 68(8): 1462-1477. (in English) ["1. Coastal wetlands provide critical habitat for aquatic organisms and important ecosystem services for the terrestrial and aquatic landscapes that they bridge, but increasingly common invasive macrophytes disrupt plant communities, food webs, habitat structure and littoral–pelagic linkages. In Laurentian Great Lakes coastal wetlands, invasive cattails (*Typha × glauca* and *T. angustifolia*, hereafter *Typha*) homogenise ecosystem structure and

reduce nearshore dissolved oxygen, and plant, fish and macroinvertebrate diversity. We hypothesised that management treatments which reduce *Typha* and its abundant litter promote structural heterogeneity and mitigate physicochemical and biodiversity impacts. 2. To test this hypothesis, we implemented a large-scale (2,048 m<sup>2</sup> treatment units), multi-site (four coastal wetlands) experiment in northern Michigan (USA.) to examine how invasive *Typha* mechanical harvesting treatments (biomass harvest, aquatic connectivity channels, *Typha*-dominated control) altered fish, macroinvertebrate, plant, larval amphibian abundance and diversity, and water quality for 2-year post-treatment. 3. Both harvest and channel treatments reduced *Typha* biomass, cover and dominance; harvest increased multi-taxa species richness, fish diversity and abundance; and channels altered plant, fish, and macroinvertebrate community structures. Dissolved oxygen was greater and litter was reduced by both treatments, indicating likely mechanisms for shifts in fish and macroinvertebrate use. 4. Our results suggest that harvesting invasive macrophytes can ameliorate biodiversity impacts and improve habitat quality, and that adding aquatic connectivity channels can increase community complexity. 5. *Typha* management that incorporates both harvesting and aquatic connectivity channels appears to provide the greatest benefit to several taxonomic groups, likely by reducing *Typha* and its litter, increasing dissolved oxygen availability, and increasing the connection between open water and wetland interiors. Increasing habitat complexity and aquatic connectivity of invaded wetlands can promote biodiversity and provides a more realistic management goal than the complete elimination of invasive macrophytes." (Authors) Lestidae were similar in abundance in control and harvest treatments, but never found in channels.] Address: Lishawa, Shane C., School of Environmental Sustainability, Loyola Univ. Chicago, Chicago, IL, USA. Email: slishawa@luc.edu

**22049.** Lynch, A.J.; Cooke, S.J.; Arthington, A.H.; Baigun, C.; Bossenbroek, L.; Dickens, C.; Harrison, I.; Kimirei, I.; Langhans, S.D.; Murchie, K.J.; Olden, J.D.; Ormerod, S.J.; Owuor, M.; Raghavan, R.; Samways, M.J.; Schinegger, R.; Sharma, S.; Tachamo-Shah, R.-D.; Tickner, D.; Tweddle, D.; Young, N.; Jähnig, S.C. (2023): People need freshwater biodiversity. *Water*. 2023; e1633: 31 pp. (in English) ["Freshwater biodiversity, from fish to frogs and microbes to macrophytes, provides a vast array of services to people. Mounting concerns focus on the accelerating pace of biodiversity loss and declining ecological function within freshwater ecosystems that continue to threaten these natural benefits. Here, we catalog nine fundamental ecosystem services that the biotic components of indigenous freshwater biodiversity provide to people, organized into three categories: material (food; health and genetic resources; material goods), non-material (culture; education and science; recreation), and regulating (catchment integrity; climate regulation; water purification and nutrient cycling). If freshwater biodiversity is protected, conserved, and restored in an integrated manner, as well as more broadly appreciated by humanity, it will continue to contribute to human well-being and our sustainable future via this wide range of services and associated nature-based solutions to our sustainable future." (Authors)] Address: Lynch, Abigail, U.S. Geological Survey, National Climate Adaptation Science Center, 12201 Sunrise Valley Drive MS 516, Reston, VA 20192, USA. Email: ajlynch@usgs.gov

**22050.** Mahato, S.; Mandal, S.; Das, D. (2023): Diversity and seasonal occurrence of odonates in the dry deciduous ecoregion of Purulia, West Bengal, India. *Zoology and Ecology* 33(1): 5-14. (in English) ["A year-long study was conducted



in the dry deciduous ecoregion of Purulia, West Bengal, India from March 2018 to February 2019 to document the diversity, species composition, and occurrence of odonata species in different seasons. Direct search and opportunistic sighting methods were used in combination at five selected sites, namely, the Sidho-Kanho-Birsha Univ. campus, Sahab Bandh, the Surulia Deer Park (Mini Zoo), Ketika, and the Kansai river-side. A total of 11,471 individuals belonging to 8 families and 40 species were recorded during the study period. Anisoptera were represented by 29 species belonging to 4 families, whereas Zygoptera were also found to be represented by 4 families but only 11 species. Libellulidae were found to be the largest family represented by 24 species, while the ground skimmer *Diplacodes trivialis* was the most dominant species. Species richness was the highest in the post-monsoon, whereas the Shannon diversity index was found to reach maximum values in winter. Overall, we conclude that the town of Purulia and its adjoining area with its patchy vegetation and extreme weather conditions have moderate odonate diversity." (Authors)] Address: Das, D., Bagnan College, Khalore, Bagnan, Howrah, West Bengal 711303, India. Email: dipanwita.das05@gmail.com

**22051.** Malovichko, L.V.; Umets, K.E.; Rezanov, A.E.; Pushkin, S.V. (2023): Feeding the green bee-eater *Merops persicus* in the Stavropol Territory. Russian Journal of Ornithology 32, Express Issue 2306: 2241-2242. (in Russian) [110 pellets collected on May 28, 2017 in the *Merops persicus* colony in the Neftekumsky district and 40 pellets collected on August 31, 2017 in the Levokumsky district in an apiary under dry tamarix bushes, which served as perches for the bee-eaters. From the pellets, 1271 parts of the outer integument of invertebrates and the skeleton of vertebrates were isolated and analysed. 1243 specimens belonging to 3 types (Arthropoda, Mollusca and Chordata), 4 classes, 10 orders, 35 families, 91 genera were identified. 70 species of Insecta are reliably identified: Hymenoptera – 578 specimens. (46.5%), Odonata – 300 (24.1%), Lepidoptera – 175 (14.1%), Orthoptera – 86 (6.9%), Coleoptera – 21 (1.7%), total 1160 specimens. (93.3%). *M. persicus* diet was dominated by Hymenoptera (honey bees and wasps) and Odonata.] Address: not stated

**22052.** Márquez-Rodríguez, J.; Samraoui, B.; Ferreras-Romero, M. (2023): Effect of forest fires on a Mediterranean Odonata assemblage. International Journal of Odonatology 26: 27-35. (in English) ["Large-scale forest fires have shaped the Mediterranean landscape for millennia, causing a recurrent disturbance that constitutes a serious environmental issue. Following a devastating forest fire, changes in the Odonata larvae assemblage of a headwater stream were analysed during six consecutive years. Five dragonflies survived the fire as larvae: *Boyeria irene*, *Gomphus pulchellus*, *Onychogomphus forcipatus*, *O. uncatus*, and *Cordulegaster boltonii*. Mediterranean semivoltine odonates, in contrast to species with short life cycles, exhibited resilience to forest fires, suggesting that species with long life cycles were adapted to fire disturbances that periodically sweep through their habitats." (Authors)] Address: Márquez-Rodríguez, J., Dept of Physical, Chemical & Natural Systems, Univ. Pablo de Olavide, Seville, Spain. Email: jmarrod1@admon.upo.es

**22053.** Mataba, G.R. (2023): Exploring integrated strategies to control oviposition and larval development in mosquitoes in northern Tanzania. PhD thesis, Faculty of: Sciences and Bioengineering, Vrije Universiteit Brussel: VIII + 216 pp. (in English) ["Besides services, ecosystems can also provide disservices. A significant disservice is the

emergence of mosquitoes from freshwater habitats. These mosquitoes transmit diseases which claim millions of lives every year worldwide. The problem is exacerbated by the absence of vaccines or effective cures for many mosquito borne diseases, making effective control of mosquito populations the only reliable method to control these diseases. The widespread development of mosquito resistance against widely used insecticides hinders successful control of mosquito borne diseases using chemicals. This resistance in combination with the environmental hazards of pesticides point out the need for alternative, more effective and ecologically friendly means of mosquito control. Biological control of mosquitoes could therefore become an appropriate complementary method. In this thesis, we investigated different strategies of biological control of mosquito populations by means of reducing oviposition and larvae development. Using field surveys, we investigated which factors limit population of mosquito larvae in aquatic habitats including temporary ponds, artificial habitats (e.g., discarded tires, flowerpots) and small ground pools (e.g., hoofprints, puddles, and small pools). In a next step, we used field mesocosms to investigate whether aquatic predators could control mosquito populations by deterring oviposition. Lastly, we investigated whether pesticides (e.g., *Bacillus thuringiensis* var *israelensis* - Bti) could control mosquito populations by mechanisms other than lethal effects, such as deterring or attracting oviposition. We found that in our study region (Lake Manyara Basin, Tanzania), populations of larval mosquitoes in aquatic habitats are controlled by different factors. In temporary ponds, populations of mosquito larvae are controlled by aquatic predators, while in small ground habitats their abundance is determined by the level of turbidity and proximity of habitat to houses. In artificial habitats, populations of mosquitoes (i.e., larvae) are mainly determined by covering, emptying, and refilling of water storage vessels by residents. In addition, we found evidence that presence of predators in a breeding habitat deters mosquito oviposition. Lastly, we found that the pesticide Bti was effective in controlling larvae abundance by killing them but not by altering mosquito oviposition and there was no change in the pond invertebrate community structure. We conclude that in our study region, it is important to have an integrated mosquito control approach which prioritizes controlling mosquito larvae of small ground habitats with environmentally friendly larvicides and conservation of mosquito predators in temporary ponds. Also, proper management of water storage containers and discarded artefacts is emphasized in this region. ... The thesis includes the following chapter: Interactive effects of dragonfly larvae and the biocide *Bacillus thuringiensis* var. *israelensis* on mosquito oviposition and survival in temporary pond communities: a field test in the Afrotropics. Worldwide, a variety of larvicides are used to control reproduction of mosquitoes in freshwater habitats. However, their broader impact on the ecosystem including non-target species is often unclear. In addition, it is unknown how larvicides may interact with local mosquito predators to shape oviposition site selection of mosquitoes. We used an outdoor mesocosm experiment to investigate the effects of realistic concentrations of the bio-larvicide *Bacillus thuringiensis* var *israelensis* (Bti) on *Culex* oviposition, larval density, survivorship and on densities of non-target species. We also manipulated the complexity of the community by manipulating the presence of dragonfly larvae as a predator. *Culex* oviposition was unaffected by Bti but the larvicide effectively reduced larval density and survivorship in all treatments. Bti did not affect non-target insects but stimulated phytoplankton density. The presence of dragonfly larvae in mesocosms did not reduce *Culex* oviposition or larval sensitivity to Bti. We conclude that Bti may effectively reduce the density and survivorship of *Culex*

quinquefasciatus mosquitoes in this part of East Africa, but possibly at the cost of higher phytoplankton densities. Bti treated mesocosms were not more or less attractive for mosquitoes suggesting that its application would not alter their oviposition behaviour in the field." (Authors)] Address: Mataba, G.R., Faculty of Science Dept Biol. Ecology & Biodiversity Section Community Ecology Lab. Pleinlaan 2 - 1050 Brussel

**22054.** Matsuki, K. (2023): Memorial to Dr. Nissin. Tombo 66: 74-75. (in Japanese) [obituary] Address: Email: matsuki\_k\_@nifty.com

**22055.** Mendoza-Penagos, C.C.; Gonçalves, M.; Viela, D.S. (2023): A new species of *Dimeragrion* Calvert, 1913 (Odonata: Zygoptera: Heteragrionidae) from Northwestern Brazil. *Zootaxa* 5318(3): 411-420. (in English, with Portuguese summary) ["*Dimeragrion* Calvert, 1913 is a genus with five species, restricted to the Pantepui region. Here, we describe *Dimeragrion baniwa* sp. nov. (Holotype. ♂ (LABECO, N° 12276), BRAZIL, Amazonas, São Gabriel da Cachoeira, (0.017, -66.891, 81 m a.s.l.), first-order stream inside Terra Firme Forest, in lateral swamps: 29.xi.2021, C. C. Mendoza-Penagos & M. Gonçalves, leg.), the sixth species of the genus from 13 ♂♂ and 3 ♀♀ collected in the municipality of São Gabriel da Cachoeira in the Brazilian Amazon, located at the southern extreme of the Pantepui region. Additionally, we provide photographs of the diagnostic characters of the male and female, photographs of live specimens as well as information on their biology. Finally, identification keys are provided, as well as a distribution map of the species of the genus [*D. baniwa*, *D. clavijoi*, *D. mesembrinum*, *D. percubitale*, *D. secundum*, *D. unturanense*]." (Authors)] Address: Mendoza-Penagos, C.C., Lab. Ecologia e Conservação - LABECO, Univ. Federal do Pará, Instituto de Ciências Biológicas, Rua Augusto Correia, No. 1 Bairro Guamá, CEP 66.075-110 Belém, Pará, Brazil. Email: cristian.penagos@icb.ufpa.br

**22056.** Miralles Núñez, A.; Zaldívar, C.; Prunier, F.; Cabana, M.; Torralba Burrial, A.; Luque, P.; de Vega, L.; Cordero Rivera, A. (2023): An updated and agreed-upon proposal for the common names of dragonflies and damselflies in Spanish. *Asociación española de Entomología, Sociedade Portuguesa de Entomologia, Congreso Ibérico de Entomología* (20<sup>o</sup>. 2023. Alicante): 144. (in English) ["Odonata (dragonflies) is one of the most attractive Order of insects for nature enthusiasts, photographers, and wildlife observers. It is worth noting that unlike all other European countries, there is not yet a widely accepted list of common names in Spanish for dragonfly species present in Spain. Among international organizations, IUCN has asked for such names in Spanish. In recent years, some citizen science publications and web portals have incorporated the use of common names for dragonflies, albeit with a lack of standardization. In 2015, a reasoned proposal was presented at the Iberian Symposium of Odonatology held in Córdoba, but it did not include species found exclusively in the Canary Islands. Although this first proposal generated an enriching debate, it also had some reservations. In 2021, at the III Iberian Symposium of Odonatology held in Irún, another proposal was presented in order to stimulate the need for agreement on Spanish dragonflies common names. In the following weeks, the Grupo Ibérico de Odonatología called for participation and created a working group with the goal of creating such a consensus list. This working group is currently reviewing the 2015 and 2021 proposals, considering the existing names in Catalan (2016) and Galician (2012). As a result, a consensus list has been elaborated for the 82 Ibero-balear

species, plus 4 species exclusive to the Canaries within Spain." (Authors)] Address: Miralles Núñez, Adrià, Grup d'Estudi deis Odonats de Catalunya (Oxygastra-GEOC), Institució Catalana d'Història Natural, Barcelona, Spain

**22057.** Mobasher, A.; Bayrami, A.; Asadi-Sharif, E.; Pouran, S.R. (2023): Ecological indicators for qualitative assessment of Ojarud River: A case study. *Ecology and Evolution* 13(7), e10310: 13 pp. (in English) ["Today, the application of ecological indicators based on organisms has replaced traditional saprobic approaches for assessment of the quality of rivers impaired due to organic pollution and some other environmental disturbances. This study aimed to weigh the quality of the Ojarud River in Ardabil, Iran, applying biological and physiological indices of macro-invertebrates. A total of 12,524 samplings were fulfilled at four stations (S1, S2, S3, S4) from the headstream to downstream by a Surber sampler (30 × 30 cm<sup>2</sup>) from June/2020 to April/2021. All year round, the highest frequent families were Chironomidae (2658), Simuliidae (1025) from Diptera and Caenidae (1855), and Baetidae (724) from Ephemeroptera. The diversity pattern was analyzed by PAST software, and Primer 7 (BIO-ENV analysis) was utilized to understand what factor has the most impact on the distribution of macro-invertebrates. The least similarity of S4 to other stations was recognized by Cluster analysis. As per the ANOSIM (analysis of similarities), a statistically significant difference in the macro-invertebrates' frequency was established between S3 and other stations ( $p = .0001$ ,  $r = .63$ ). Moreover, the relationship between heavy metals and macro-invertebrate showed that the three families of Simuliidae, Gomphidae, and Caenidae had a positive correlation with the concentrations of heavy metals in the sediment. As per the Ephemeroptera, Plecoptera and Trichoptera index, the water quality was placed in the "excellent" class, but the Biological Monitoring Working Party and Hilsenhoff Family Biotic Index indices scored the water quality "good" class at S1 and the "poor" class at S3. Based on the results of this study, the use of physicochemical and hydro-morphological indicators can support the biological indicators but cannot replace them. In addition, careful evaluation of biological indicators is required to develop conservation strategies." (Authors)] Address: Bayrami, A., Dept Biol., Faculty of Science, Univ. of Mohaghegh Ardabili, Ardabil, Iran. Email: abolfazlbayrami@gmail.com

**22058.** Mulhair, P.O.; Holland, P.W.H. (2023): Evolution of the insect Hox gene cluster: Comparative analysis across 243 species. *Seminars in Cell & Developmental Biology*: 12 pp. (in English) ["The Hox gene cluster is an iconic example of evolutionary conservation between divergent animal lineages, providing evidence for ancient similarities in the genetic control of embryonic development. However, there are differences between taxa in gene order, gene number and genomic organisation implying conservation is not absolute. There are also examples of radical functional change of Hox genes; for example, the *ftz*, *zen* and *bcd* genes in insects play roles in segmentation, extraembryonic membrane formation and body polarity, rather than specification of anteroposterior position. There have been detailed descriptions of Hox genes and Hox gene clusters in several insect species, including important model systems, but a large-scale overview has been lacking. Here we extend these studies using the publicly-available complete genome sequences of 243 insect species from 13 orders. We show that the insect Hox cluster is characterised by large intergenic distances, consistently extreme in Odonata, Orthoptera, Hemiptera and Trichoptera, and always larger between the 'posterior' Hox genes. We find duplications of *ftz* and *zen* in

many species and multiple independent cluster breaks, although certain modules of neighbouring genes are rarely broken apart suggesting some organisational constraints. As more high-quality genomes are obtained, a challenge will be to relate structural genomic changes to phenotypic change across insect phylogeny." (Authors) *Ischnura elegans*, *Platycnemis pennipes*, *Pantala flavescens*] Address: Mulhair, P.O., Dept Biol., Univ. Oxford, 11a Mansfield Road, Oxford OX1 3SZ, UK. Email: peter.mulhair@biology.ox.ac.uk

**22059.** Nakada, T., Sawaaa, K., Shimbori, O. & Futahashi, R. (2023): The first records of *Coenagrion terue* (Asahina, 1949) from Toyama Prefecture, Honshu, Japan. Tombo 65: 75-77. (in Japanese, with English summary) ["*C. terue* is recorded for the first time from three locations in Asahi-macni, Toyama Prefecture. Adult emergence and egg-laying behavior were also observed. This is the most western record of this species. Adding this species, the total number of Odonata species recorded in Toyama Prefecture is 90." (Authors)] Address: Futahashi, R., National Inst. Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22060.** Naraoka, H. (2023): Opening angle of the right and left wings while at rest in nine damselfly species (Odonata: Zygoptera). Tombo 66: 34-40. (in Japanese, with English summary) ["The opening angle of the right and left wings at rest for nine Zygopteran species was investigated in Hokkaido and Aomori-pref. in 2019-2022. Four species of the genus *Coenagrion* rested with almost an open-winged posture (> 4°) i.e., more than 93 % in *C. lanceolatum*, 83 % in *C. terue*, 67 % in *C. ecomutum*, and 87 % in *C. hylas*. The wing angle of these four species was larger in the morning and evening, and was smaller during the day. A statistically significant negative correlation was recognized between the wing open angle and air temperature in the former three species. On the other hand, *Paracercion calamorum*, *P. plagiosum*, *Enallagma circulatum* and *Pseudocopteryx annulata* folded their wings together above the body from 70 to 97 % throughout the day. Conversely, almost 90 % of *Lestes sponsa* was opening more than 100° throughout the day." (Author)] Address: Naraoka, H., 36-71, Aza-Motoizumi, Fukunoda, Itayanagi-cho, Kita-gun, Aomori Prefecture, 038-3661, Japan. Email: naraoka62@outlook.jp

**22061.** Nel, A.; Jouault, C.; Ribeiro, G.C. (2023): The third aeschniid dragonfly genus and species from the Lower Cretaceous Crato Formation (Odonata, Anisoptera). *Historical Biology* 35(6): 865-869. (in English) ["*Cratoaeschnidium martinsnetoi* gen. et sp. nov., third genus and species of the family Aeschniidae from the Crato Formation (Brazil), is described and illustrated based on one well-preserved forewing. It can be differentiated from the other genera in the family, inter alia, because its discoidal triangle is very narrow with only one row of cells; three rows of cells between M<sub>sp</sub> and MA<sub>a</sub>, and between R<sub>sp</sub> and IR<sub>2</sub>; one row of cells between CuA<sub>a</sub> and MP in basal part; three rows of cells between RP<sub>3/4</sub> and MA<sub>a</sub>. This new genus and species confirms that much can be expected in regard to discovering the Odonata in the Crato Formation." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**22062.** Nel, A.; Garrouste, R.; Prevec, R. (2023): The first Permian Gondwanan damselfly-like Protozygoptera (Insecta, Odonatoptera). *Historical Biology* 35(6): 870-874. (in English) ["*Afrozygopteron inexpectatus* gen. et sp. nov., the oldest known representative of the protozygopteran grade from

Gondwana, is described from the Guadalupian of Southern Africa. It is attributed to the family Luiseiidae, previously only known by one genus and species, *Luiseia breviata* described from the Carboniferous/Permian boundary of New Mexico (USA). This new fossil demonstrates that during the Carboniferous/Permian, the Protozygoptera were probably much more widely distributed than previously thought and were not limited to the northern part of Pangea." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**22063.** Nishimoto, S.; Horita, M., & Futahashi, R. (2023): Records of *Trithemis aurora* with partially immature-colored wing. Tombo 66: 70-72. (in Japanese, with English summary) ["We recorded *T. aurora* mature males with a partially immature-colored wing. Close examination of the specimen revealed that the normal coloration was probably inhibited by a wound on the wing." (Authors)] Address: Futahashi, R., National Inst. Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22064.** Okude, G.; Futahashi, R. (2023): Morphological changes during the final nymphal instar and the genes essential for metamorphosis in dragonflies and damselflies. Tombo 66: 1-12. (in Japanese, with English summary) ["Odonata insects, which belong to the most-ancestral group of winged insects, are key organisms for understanding the evolution of insect metamorphosis. However, the morphological changes that occur via metamorphosis during the final nymphal instar have not been well described, and the molecular mechanisms underlying nymph-to-adult metamorphosis of Odonata have been totally unknown until recently. In this review, we summarize the visually recognizable morphogenetic events in the final nymphal instar and the genes essential for metamorphosis in Odonata based on our recent reports." (Authors)] Address: Futahashi, R., National Inst. Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22065.** Okuyama, H.; Kivoshi, T.; Isubaki, Y.; Takahashi, J. (2023): The complete mitochondrial genome and ITS region or nuclear genome sequences of *Libellula angelina* Selys, 1883 from Kirarahama Prefectural Nature Observation Park in Yamaguchi Prefecture, Japan. Tombo 66: 48-55. (in Japanese, with English summary) ["*L. angelina* is classified as Critically Endangered in the Japanese Red List and designated as Endangered Species of Wild Fauna and Flora by Act on Conservation of Endangered Species of Wild Fauna and Flora. In this study, we analyzed the complete mitochondrial genome and ITS regions of the nuclear genome of *L. angelina* from Kirarahama Prefectural Nature Observation Park in Yamaguchi Prefecture, Japan using next generation sequencing. The mitochondrial genome of *L. angelina* consists of a circular molecule of 15,232 bp that includes 37 genes. The ITS1 region is 228 bp and ITS2 region is 312 bp. From a comparison between the complete mitochondrial genome sequence of *L. angelina* from Yamaguchi, Japan and South Korea (MG 189907), 72 gene mutation sites were confirmed. We performed phylogenetic analyses for COI partial gene region, 1-rRNA partial gene region, COI - tRNA-Leu2 - COII region and ITS region. As a result of the phylogenetic analyses, COI partial gene region, 1-rRNA partial gene region and COI - tRNA-Leu2 - COII region of *L. angelina* were found to have some genetic diversities among individuals, but *L. angelina* from Japan did not divide regional clades. On the other hand, the ITS region of *L. angelina* had no genetic mutation among 10 individuals

in 5 regions used in the analysis. And the genetic diversity of *L. angelina* in Yamaguchi Prefecture could be at a low level." (Authors)] Address: Okuyama, H., Faculty of Life Sciences, Kyoto Sangyo Univ., Kamigamo, Motoyama, Kita-ku, Kyoto, Japan. E-mail: k5533@cc.kyoto-su.ac.jp

**22066.** Payra, A.; Tiple, A.D.; Koparde, P. (2023): First descriptions of the females of *Cyclogomphus heterostylus* Selys, 1854 and *Ictinogomphus distinctus* Ram, 1985 from India, with comments on the status of *Cyclogomphus wilkinsi* Fraser, 1926 (Odonata: Gomphidae). *Zootaxa* 5319(3): 421-428. (in English) ["The present paper deals with the first descriptions of the females of two endemic Gomphid dragonflies of India, namely *Cyclogomphus heterostylus* Selys, 1854 and *Ictinogomphus distinctus* Ram, 1985, based on the specimens collected from Maharashtra, India. Additionally present status of *Cyclogomphus wilkinsi* Fraser, 1926 in India is also discussed." (Authors)] Address: Payra, A., Dept of Environmental Studies; School of Science & Environmental Studies; Dr. Vishwanath Karad MIT World Peace Univ.; Pune 411038; Maharashtra; India

**22067.** Petrovic, A. (2023): New data on distribution of *Caliaeschna microstigma* (Schneider, 1845) (Odonata: Aeshnidae) in Serbia. *Acta Entomologica Serbica* 28(1): 1-10. (in English) ["*C. microstigma* is a species distributed mainly in the eastern Mediterranean, from Croatia in the west to northern Iran and Caucasus in the east. Until this study, it was reported only from a few localities in Serbia, which are located in far south. Here we have summarized all available data and presented new data on the distribution of *C. microstigma* in Serbia. The Eastern Spectre was detected at seven new localities (four during field study and three from publicly available databases), extending its current range in Serbia by more than 120 km to the north." (Author)] Address: Petrovic, A., Institute of Zoology, University of Belgrade-Faculty of Biology, 11000 Belgrade, Serbia. Email: andjeljko@bio.bg.ac.rs

**22068.** Pétremand, G.; Cosandey, V.; Freitag, A.; Reymond, A.; Walter, F.; Breitenmoser, S. (2023): L'entomofaune de la réserve naturelle Pro Natura «Au Chevry» (Trélex, Vaud). *Entomo Helvetica* 16: 145-172. (in French, with English and German summaries) ["The entomofauna in the nature reserve Pro Natura «Au Chevry». - The Pro Natura nature reserve «Au Chevry» (Trélex, VD) includes a large part of a rich fen of regional importance. In 2022, several days were organised by the «Société vaudoise d'entomologie» to inventory the insect fauna present in this reserve. Most of the surveys were carried out by active search and focused mainly on saproxylic and aquatic beetles, hoverflies, ants, dragonflies, damselflies, crickets and grasshoppers. A total of 318 species belonging to 71 families and 9 orders (insects and spiders) were identified. Many species are endangered or of regional, national or even European interest. Their occurrence testifies to the exceptional natural values of the rich fen and its associated areas (ash woodland, oak woodland, seepages, dry meadows). These surveys lead to a series of recommendations for the future management of the protected area, including a proposal to extend its perimeter." (Authors) "13 species of Odonata have been identified in the reserve or on its border. Among them, only *Ceragion tenellum* appears on the Swiss red list and is considered endangered there (Monnerat et al. 2021, Tab. 1). This species is very localized in Switzerland and is generally closely associated with low marshes. Only one individual having been observed, it would however be necessary to confirm the presence of a true population of this species on the site. Other species include *Orthetrum coerulescens*, an uncommon species of

regional interest in the canton of Vaud, observed together with *Orthetrum brunneum* in the reserve. *O. coerulescens* is particularly fond of seeps in acid low marshes and peat rivulets poor in vegetation. The latter and *Cordulegaster boltonii* were observed along the seep bordering the northeast area of the reserve, suggesting that these species may be colonizing this flow area. The rest of the faunal procession is made up of ubiquitous species or species with low ecological requirements (stagnant water, ditches, ponds) but fond of sunny sites." (Authors/Google translate)] Address: Pétremand, Gaël, Corcelettes 15, 1422 Grandson, Switzerland. Email: gael.petremand@arvensis-naturalistes.ch

**22069.** Phan, Q.T.; Keetapithchayakul, T.S. (2023): First descriptions of the final stadium larva of *Heliogomphus chaoi* Karube, 2004 and the adult female of *Microgomphus jurzitzi* Karube, 2000 from Vietnam (Odonata: Gomphidae). *Zootaxa* 5318(1): 83-96. (in English) ["The larva of *H. chaoi* and the adult female of *M. jurzitzi* are described from Vietnam for the first time. The morphological difference between the larvae of the genera *Heliogomphus* Laidlaw, 1922 and *Microgomphus* Selys, 1858 are discussed, which throws doubts about the current taxonomic status of *H. retroflexus* (Ris, 1912)." (Authors)] Address: Phan, Q.T., The Center for Entomology & Parasitology Res., College of Medicine & Pharmacy; Duy Tan Univ., 120 Hoang Minh Thao, Lien Chieu, Da Nang, Vietnam

**22070.** Prysitt, K.-P. (2023): Libellen (Odonata) - Notizen vom 11. Juni bis zum 29. November 2021, Neustadt am Rübenberge. Neustadt am Rübenberge, Selbstverlag: 40 pp. (in German) [Between 2018 and 2021, near Neustadt, Niedersachsen, Germany, a total of 42 species could be found. In 2021, 38 species were found; localities and habitats of the species are discussed in detail.] Address: Prysitt, K.-P., Lessingstr. 2, 31535 Neustadt am Rübenberge, Germany

**22071.** Rakotomalala, A.A.N.A. (2023): Review: Klaas-Douwe B. Dijkstra and Callan Cohen: Dragonflies and damselflies of Madagascar and the Western Indian Ocean Islands, Univ. of Chicago Press, Chicago, IL, USA, 2021, 194 pp, US\$ 45.00 (Hardcover), ISBN: 9782957099726. *Community Ecology* 24: 301. (in English) [Verbatim: After almost two decades of research, odonatologist Klaas-Douwe B. Dijkstra and biologist Callan Cohen finally published the first Odonata guidebook of the Malagasy archipelago. This region hosts 227 Odonata species, of which 80% are endemic. Structured in two parts, this book is an excellent primer for this insect group. The first part (circa 41 pp.) covers the biology and ecology of Odonata, provides a guideline for the collection, handling, and preservation of specimens, and introduces their morphology, which is essential for their identification. The second part (137 pp.) consists of an illustrated description of each species, followed by an updated checklist and information about their geographical distribution and conservation status. I particularly liked the identification part; I tried to identify Odonata from photos I took in Madagascar, and I can confirm that it is possible. The species photographs in the book are good enough and clear. However, I noticed that most of them wasted some space on the sides. Filling this space with a distribution map could have been more informative and practical. In addition, color coding according to the family names on the page header would have allowed navigating quickly through the book. Despite these few inconveniences, this book is suitable for amateur entomologists who are patient enough to get familiar with the scientific terms illustrated and well-defined in a glossary. In particular, I would recommend it to anyone who lives in the Malagasy



region or will visit this biodiversity hotspot for entomological research or tourism and to whoever has a particular interest in Odonata.] Address: Rakotomalala, A.A.N.A., Functional Agrobiodiversity, Georg-August-Univ. Göttingen, Grisebachstr. 6, 37077 Göttingen, Germany. Email: andrynyaina001@gmail.com

**22072.** Rani, A.A.; Mishra, A.; Jayashankar, M. (2023): Documenting Odonata along the Sri Krishna Lake, Bengaluru, Karnataka. *Insect Environment* 26(2): 142-145. (in English) ["A total of eleven species of Anisoptera belonging to three different families viz., Libellulidae, Aeshnidae and Gomphidae were observed in which 81.81% observed species belonged to Libellulidae, *Brachythemis contaminata* and *Crocothemis servilia* were found to be abundant and maximum activities were observed during the midday. Simpson's Index (D) (0.2), Simpson's index of diversity (1-D) (0.7), Shannon-H (1.8) and Evenness Index (0.6) indicated good diversity and necessity to continue seasonal observations." (Authors)] Address: Jayashankar, M., Dept of Zoology, School of Life Sciences, St. Joseph's Univ., Bengaluru-560027, Karnataka, India. Email: jayashankar.m@sju.edu.in

**22073.** Ranjan, K.S.; Pawar, A.A.; Roy, A.; Saha, S. (2023): Transoceanic migration network of dragonfly *Pantala flavescens*: origin, dispersal and timing. *Frontiers in Ecology and Evolution* 11:1152384. doi: 10.3389/fevo.2023.1152384: 12 pp. (in English) ["The awe-inspiring multi-generational, transoceanic migration circuit of *P. flavescens* stretches from India to Africa. Understanding the collective role of wind, precipitation, fuel, breeding, and life cycle driving the migration remains elusive. We identify the transoceanic migration route from years 2002 to 2007 by imposing an energetics-based time-constraint on a modified Dijkstra's path-planning algorithm incorporating active wind compensation. The prevailing winds play a pivotal role; the Somali Jet enables migration across the Indian Ocean from Africa to India, whereas the return requires stopovers at the disappearing islands of Maldives and Seychelles. The migration timing, identified using monthly-successful trajectories, life cycle, and precipitation data, corroborates sightings. A branched-network hypothesis connects our sighting in Cherrapunji (North-East India), the likely origin, to the known migration circuit." (Authors)] Address: Saha, S., Indian Inst. Technology Kharagpur, Kharagpur, 721302, West Bengal, India

**22074.** Sadasivan, K.; Nair, V.P.; Samuel, K.A. (2023): A review of *Macromia Rambur*, 1842 (Odonata, Macromiidae) of Western Ghats, with taxonomic notes on *Macromia minuta* Fraser, 1924 and *M. irata* Fraser, 1924. *Entomonia* 48(2): 253-286. (in English) ["A review of the genus *Macromia* Rambur, 1842 (Odonata, Macromiidae) of Western Ghats of Peninsular India is presented with its updated distribution. An attempt is made to collate the scattered data in peer-reviewed literature published to date and is supplemented with field data gathered by the authors over two decades. Although *Macromia* is represented by nine species including six endemics in the Western Ghats, not much has been published on them from the region. *Macromia irata* Fraser, 1924 was described from Coorg but was rarely reported in peer-reviewed literature since its very brief original description by Fraser in 1924. The detailed morphology including that of the genitalia of *M. irata* is discussed. A revised classification based on the species groups and a key to the species of *Macromia* of the Western Ghats of Peninsular India is provided. To quantify the ratios of the number of the prenodal and postnodal veins in Odonata, a new nodal range expression called Standardised Species Nodal Range (SSNR)

and a new index termed Standardised Species Nodal Index (SSNI) is also proposed." (Authors) The study includes the following species: *Macromia annaimallaiensis* Fraser, 1931, *Macromia bellicosa* Fraser, 1924, *Macromia cingulata* Rambur, 1842, *Macromia ellisoni* Fraser, 1924, *Macromia flavicincta* Selys, 1874, *Macromia flavocolorata* Fraser, 1922, *Macromia ida* Fraser, 1924, *Macromia indica* Fraser, 1924, *Macromia irata* Fraser, 1924] Address: Sadasivan, K., Greeshmam, BN 439, Bapuji Nagar, Thiruvananthapuram 695011, Kerala, India. Email: kaleshs2002in@gmail.com

**22075.** Sano, S (2023): Odonata recorded from the Izu Islands (Shikine Is., Kouzu Is. and Miyake Is.), Japan. *Tombo* 65: 65-72. (in Japanese, with English summary) ["In 2021 and 2022, we conducted a survey of Odonata in Shikine Is., Kouzu Is. and Miyake Is. of the Izu Islands, Japan. In results, we recorded two species from Shikine Is., nine species from Kouzu Is., and ten species from Miyake Is. Among them, *Sympetrum frequens* and *Pantala flavescens* were for the first time recorded from Shikine Is., *Tramea virginia* and *Crocothemis servilia mariannae* were for the first time recorded from Kouzu Is., and *Anotogaster sieboldii* and *Pantala flavescens* were for the first time recorded from Miyake Is." (Authors)] Address: Email: sano-gengoroh@kannonzaki-nature-museum.org

**22076.** Sasamoto, A. (2023): [Annual Meeting of the Dragonfly Society of Japan 2022]. *Tombo* 65: 86. (in Japanese) [The 2022 Annual Meeting of the Dragonfly Society of Japan was held on November 26th and 27th of the same year at the Okazaki Campus of the Univ. of Human Environment in Okazaki City, Aichi Prefecture, under the direction of Executive Committee Chairman Takano Matsuzawa. It was held with the efforts of people. It was the first time since 2019 that it was held locally, and I was able to meet the members for the first time in a long time. In addition, for those who are unable to attend onsite, the general meeting, research presentations, and public symposium will be delivered remotely, making it the first hybrid format. Unfortunately, the social gathering was canceled as the new coronavirus was not over yet, but we were able to have a good time interacting with each other as thorough measures were taken at the venue. The program was the same as before, with board meetings and general meetings on the first day, and research presentations (8 oral presentations and 4 poster presentations) on the second day. In the afternoon of the second day, a public symposium titled "Deep digging for dragonflies in Aichi!" Interesting presentations were made on natural history, etc., and in addition, many excellent images of dragonfly filmed mainly in the Tokai region were held in a format that could be listened to by non-members. Finally, a bouquet of flowers was presented to Mr. Yasuro Takasaki in hopes of his many years of achievement and future success. I would like to express my deep gratitude to all the members of the executive committee for their efforts in making this first local event a success. (Google translate)] Address: Sasamoto, A., 190-4 Yakuoji Tawaramoto, Shiki-gun, Nara prefecture, 636-0341, Japan. E-mail: akssmt@sea.plala.or.jp

**22077.** Sasamoto, A. (2023): Book review: Itsuro Kawashima: Observing Insects, The Work of Itsuro Kawashima, a Specimen Painter of Insects. *Tombo* 66: 76. (in Japanese) [Review] Address: Sasamoto, A., 190-4 Yakuoji Tawaramoto, Shiki-gun, Nara prefecture, 636-0341, Japan. E-mail: akssmt@sea.plala.or.jp

**22078.** Seehausen, M.; Turiault, M. (2023): Zur Libellenfauna in Nordvorpommern und Rügen - Daten aus den Jahren

2021-2022 (Odonata). *Virgo* 26: 16-27. (in German) ["Results from two years of data collection are presented. These are based on 2567 data sets by the authors and 35 data sets by Oliver Brauner, Michael Frank and Marcel Wasscher. A total of 48 species were detected and various detection gaps in the MTB districts, especially in southern Rügen, were closed. One locality is given for each of *Coenagrion hastulatum* and *C. lunulatum*, and three localities are listed for *Leucorrhinia albifrons*. *Aeshna affinis*, *Anax parthenope*, *Crocothemis erythraea* and *Sympetrum striolatum* are represented with significantly more localities than was previously known. *Orthetrum brunneum* and *O. coerulescens* are the rarest recorded species for Mecklenburg-Western Pomerania from the reporting period." (Authors/Google Translate)] Address: Seehausen, M./Turiault, M., Waldhöhe 9a, 24306 Plön, Germany. Email: m.seehausen@gmx.de

**22079.** Sharma, N.; Singh, D.; Sharma, S.; Ansari, A. (2023): A preliminary assessment of Odonata (dragonflies & damselflies) across an elevation gradient – insights from Shiwaliks to Alpines, northwestern Himalaya, India. *Journal of Threatened Taxa* 15(7): 23545-23556. (in English, with Dogri summary) ["Understanding the species distribution and richness along an environmental gradient helps identify hotspots and prioritize conservation efforts at landscape scale. This is more effective for the species that are indicators of environmental change, such as odonates. As the information about the distribution of this group of insects is scarce in Jammu & Kashmir, their documentation assumes a greater significance. Here, we present a checklist of odonate species from 23 sites across diverse landscapes in subtropical, temperate, and alpine ecosystems over an elevational gradient of 3,700 m in Jammu division. We recorded 63 species from 39 genera and 11 families, four Anisoptera and seven Zygoptera. The most represented families were Libellulidae (15 genera & 29 species) and Coenagrionidae (five genera & 10 species). The preliminary surveys resulted in addition of 24 new species to the Odonata fauna of Jammu & Kashmir, including three new to the northwestern Himalaya. The study underlines that even opportunistic records are useful in understanding the distribution range and delineating the potential habitats of odonates. The study calls for intensive odonate surveys to better understand their distribution and ecology in hitherto less explored region in the northwestern Himalaya." (Authors)] Address: Sharma, N., Inst. Mountain Environment, Univ. Jammu, Bhaderwah Campus, Bhaderwah, UT of Jammu & Kashmir 182222, India. Email: nirazsharma@gmail.com

**22080.** Shin, I.-C.; Lee, S.-H.; Lee, Y.-M.; Yoon, J.-Y.; Hong, S.-J.; Yoon, H.-J.; Park, S.-G.; Han, E.-J. (2023): Distribution characteristics of macroinvertebrates in an agricultural paddy field and irrigation pond ecosystems in a farmer's practice manual on the village of the Agricultural Environment Conservation Program. *Korean J. Environ. Biol.* 40(2): 148-156. (in Korean, with English summary) ["Ecological occupation in irrigation ponds is a well-acknowledged fact that is essential for biodiversity conservation in agricultural ecosystems. However, there are few studies on the ecological functions and relationship between a paddy field and irrigation using macroinvertebrates in an environmentally friendly paddy field. The objective of this study is to identify the community and distribution characteristics of macroinvertebrates in an agricultural paddy field and irrigation pond ecosystems, and to provide basic data on the ecological function of an environmentally friendly paddy field. Macroinvertebrate sampling was conducted from May to September in an agricultural paddy field and irrigation pond in an environment-friendly paddy field in Boryeong city. We conducted a study to identify the

distribution characteristics using macroinvertebrate species analysis, such as Functional Feeding Groups (FFGs), Habitat Oriented Groups (HOGs), rarefaction curve, and a two-way dendrogram. A total of 37 species of macroinvertebrates in 28 families, 13 orders were collected study during the period of the investigation. Dominant taxa of macroinvertebrates included Coleoptera, Hemiptera, and Odonata [*Ichnura asiatica*, *Anax parthenope*, *Crocothemis servilia*, *Orthetrum albistylum*]. In terms of FFGs, predators and gathering collectors accounted for approximately 70%, in relation to HOGs, and climbers and swimmers occupied more than 50% from both the paddy field and irrigation pond. With respect to the rarefaction curve, the irrigation pond (July) was high as E (S, 141) = 18 species, while the paddy field (May) was comparatively low as E (S, 141) = 9 species. In conclusion, our results revealed that macroinvertebrates, such as *Notonecta triguttata*, *Peltodytes intermedius*, *Appasus major*, *Laccotrepes japonensis*, *Appasus japonicus*, *Sigara substriata*, *Enochrus simulans*, and *Stemolophus rufipes*, were used as a habitat and spawning ground in both paddy field and irrigation pond. The irrigation pond appears to be a very important spawning ground for macroinvertebrates." (Authors)] Address: Han, E.-J., National Acad. Agricultural Science, RDA, Wanju 55365, Republic of Korea. Email: hejs2@korea.kr

**22081.** Shoji, K.; Karube, H. (2023): Predation by terrestrial flatworm *Platydemus* sp. (Tricladida: Continenticola: Geoplanidae: Rhynchodeminae) on an adult of *Rhinocypha ogasawarenensis* (Odonata: Zygoptera: Chlorocyphidae). *Tombo* 66: 60-62. (in English, with Japanese summary) ["Koushinzuka, Hahajima Island, Ogasawara Village, Tokyo Metropolis, Japan, 9-XI-2021, 2:08 p.m. to 2:51 p.m. An adult male of *R. ogasawarenensis*, which was already dead, discovered on a stone, standing upright in an unnatural position and motionless (Fig.1). Close examination revealed a terrestrial flatworm *Platydemus* sp. coiling from the thorax to the second abdominal segment of *R. ogasawarenensis*. The legs, abdominal tip and hind wing tip of *R. ogasawarenensis* were glued to the stone surface with mucus of *Platydemus* sp.. During the observation until 2:51 p.m., *Platydemus* sp. remained coiled onto *R. ogasawarenensis*." (Authors)] Address: Shoji, K., Ogasawara Environmental Planning Lab., Ogasawara, Tokyo, Japan. E-mail: kyohei\_shoji@okanken.or.jp

**22082.** Shrestha, P.; Rai, A.; Wagle, P.C.; Ghimire, S. (2023): Evaluation of disturbance zonation of Bagmati River system using benthic macroinvertebrates in the Kathmandu Valley, Nepal. *Journal of Institute of Science and Technology* 28(1): 79-89. (in English) ["The existence of Nepal's holy river, Bagmati, which flows through the core of Kathmandu Valley has been menaced by many anthropogenic threats. It is necessary to identify how vulnerable it has been. This research focuses on the evaluation of disturbance zonation to analyze the Bagmati River System's spatial biological health. Benthic macroinvertebrates (BMIs) were used as biological indicators and were sampled from upstream to downstream using a multi-habitat sampling approach during the post-monsoon period in 2021. The Ganga River System Biotic Score/Average Score per Taxa (GRSBIOS/ASPT) was used to assess river water quality. From the sampling of 21 sites, a total of 5839 individual BMIs from 51 Families and 11 Orders were recorded. Upstream accounted for more than 30% of all the families, making upstream rich in taxonomic preferences, which steadily decreased from midstream to downstream. Facultative taxa were widely distributed in both upstream and midstream, but sensitive taxa were limited to upstream only. There are no signs that facultative and sensitive taxa existed downstream and were fully dominated by pollution-tolerant

species. According to classification, the upstream river within Shivapuri Nagarjun National Park of the Bagmati River System was clean and was categorized as Class I, whereas rivers from the boundaries of the protected area to downstream were categorized as Class IV-V with few sites as Class II and Class III, indicating that this stretch of the river was extremely polluted. Water resource managers should utilize the study's findings to assess and restore the water's quality using biological indicators." (Authors) The paper includes references to "Odonata". (Authors)] Address: Shrestha, P., Dept Environmental Science, GoldenGate International College, Kathmandu. 44600, Nepal. Email: pratikshrestha2055@gmail.com

**22083.** Shiroishi, T. (2022): Reconfirmation of the habitats of Aeschnophlebia anisoptera, after the 2011 off the Pacific coast of Iohoku Earthquake, in Miyagi Prefecture, north-eastern Honshu, Japan). Tombo 65: 49-53. (in Japanese, with English summary) ["There were a few habitats of A. anisoptera in Miyagi Prefecture before 2011, but they were threatened with extinction after 2011 big tsunami. The author researched favorable environments in the islands off the coast of the prefecture in 2020 and 2021, and discovered four populations, including exuviae." (Author)] Address: Email: t\_shiroishi\_aeshna@yahoo.co.jp

**22084.** Simonsen, T.J.; Djernæs, M.; Nielsen, O.F.; Olsen, K. (2023): COI diversity supports subspecific division in Western European *Lestes virens* (Charpentier, 1825) (Zygoptera: Lestidae), but hints at further Mediterranean complexity. International Journal of Odonatology 26: 18-26. (in English) ["We analyse COI sequences of 48 specimens of European *L. virens* to explore patterns in genetic diversity including subspecific boundaries and potential glacial refugia. Our haplotype network and phylogenetic analyses reveal three distinct groups in Western and Northern Europe. One group corresponding to the nominate subspecies *L. virens virens* is confined to the Iberian Peninsula and southwestern France, and one group corresponding to the subspecies *L. virens vestalis* is found in the rest of western Europe including southern Scandinavia, mainland Italy and the Mediterranean island Sardinia. Surprisingly three specimens from the Mediterranean island Sicily form a highly distinct group in all our analyses. An analysis of molecular variance (AMOVA) confirms that almost all observed genetic variance is explained by variation between these three groups rather than by variation between sample areas or between individuals. We conclude that the subspecific division into *L. virens virens* and *L. virens vestalis* is justified, but further studies are needed to determine the status of the populations in Sicily, southeastern Europe, and North Africa. The genetic pattern we find may reflect different glacial refugia: an Iberian/North African refugium for *L. virens virens*; a potential Italian refugium for *L. virens vestalis*; and a Sicilian/North African refugium for the Sicilian populations." (Authors)] Address: Simonsen, T.J., Natural History Museum Aarhus, Wilhelm Meyers Allé 10, 8000 Aarhus, Denmark. E-mail: t.simonsen@nathist.dk

**22085.** Somal, D.S.; Walia, G.K. (2023): Cytological study of family Aeshnidae (Odonata: Anisoptera) from India: A review. Biosciences Biotechnology Research Asia 19(4): 843-855. (in English) ["Cytological review of 59 aeshnid species and cytogenetic investigations on *Anax ephippiger*, *Anax immaculifrons*, *Anax indicus*, *Anax nigrofasciatus nigrolineatus*, *Anax parthenope*, *Gynacantha subinterrupta* of the family Aeshnidae by carbol fuchsin staining and C - banding have been undertaken. All the species possess  $2n = 27m$  with X0 - XX sex determination except *Anax ephippiger* with

$2n = 14 + \text{neo XY}$ , resulted by the 13 simultaneous fusions among the autosomes and between autosome and sex chromosome. The structure and behaviour of chromosomes, variation in size of m chromosomes and X chromosome and distribution of C - heterochromatin have been studied and compared among the species. C - bands are mostly present at the terminal regions of autosomal bivalents, while *Anax ephippiger* and *A. parthenope* also possess C - bands at the interstitial and sub-terminal regions of the bivalents. Moreover, sex chromosome and m bivalent show variation in distribution of C-heterochromatin in the species. Out of these, chromosome complement of *A. indicus* Lieftinck, 1942 and C - banding on *A. ephippiger* and *A. indicus* have been investigated for the first time. List of cytologically studied species of family Aeshnidae has been updated to 60 species." (Authors)] Address: Walia, Gurinder Kaur, Dept of Zoology and Environmental Sciences, Punjabi Univ., Patiala - 147002, Punjab, India. E-mail: gurinderkaur\_walia@yahoo.co.in

**22086.** Sroka, S.D.; Howells, T.F.; Nel, A. (2023): A new transitional "libelluloid" family of odonates with Mesozoic affinities in the Eocene Green River Formation of Utah, USA. Acta Palaeontologica Polonica 68(2): 337-342-342. (in English) ["The new "libelluloid" family Cordulibellulidae is described to accommodate a new genus and species *Cordulibellula inopinata* from the Eocene Green River Formation, Utah, USA. Even if its affinities remain somewhat uncertain because of the lack of information on structures others than those of the hind wing, its putative closest relatives are known from the Late Jurassic and Early Cretaceous. Therefore, this new fossil is interpreted as a "relict" taxon surviving until the Paleogene. This new addition to the odonatan paleontofauna of the Green River Formation confirms the high diversity of this clade during the Paleogene and in this formation." (Authors)] Address: Sroka, S.D., Utah Field House of Natural History State Park Museum, Vernal, UT 84078 Utah, USA. Email: stevesroka@utah.gov

**22087.** Takasaki, Y. (2023): [Mr. Hisashi Ando passed away]. Tombo 66: 73. (in Japanese) [obituary] Address: not stated

**22088.** Tarris-Samaniego, S.; Muzón, J.; Iglesias, M.S. (2023): When size and shape matter: morphometric characterization of two sympatric dragonflies of the genus *Perithemis* Hagen 1861 (Odonata: Libellulidae). Anais da Academia Brasileira de Ciências 95 (suppl 1): 10 pp. (in English) ["*Perithemis mooma*, Kirby, 1889 and *Perithemis icteroptera* (Selys in Sagra, 1857) live in sympatry from southern Brazil to central Argentina. The taxonomy of the genus *Perithemis* Hagen, 1861 has been hampered by the use of characters that are highly variable or show slight differences among species. Our objective was to assess the efficiency of traditional morphometrics (TM) and geometric morphometrics (GM) to discriminate between these species using wing size and shape and vulvar lamina contour, and to analyze the presence of sexual dimorphism in wing size and shape in both species. The TM and landmark-GM methods were applied on the fore and hind wings, while the outline-based GM method was applied on the vulvar lamina. GM allowed species delimitation using shape variables of either wing. The wing and vulvar lamina shapes were confirmed to be good diagnostic characters to separate these species and appear to be promising tools for distinguishing among other species of this genus. Centroid size failed to achieve species separation. Both species exhibited sexual size dimorphism (SSD). In contrast to what would be expected for *Perithemis* whose males are strongly territorial, *P. icteroptera* and *P. mooma* showed female-biased SSD suggesting a common pattern

in Perithemis." (Authors)] Address: Iglesias, Mónica Sandra, Depto de Biodiversidad y Biología Experimental, Fac. de Ciencias Exactas y Naturales, Univ. de Buenos Aires, Intendente Güiraldes 2160 (C1428EHA), 4º piso Pabellón II, Ciudad Universitaria, CABA, Argentina. E-mail: iglesias@bg.fcen.uba.ar

**22089.** Tavakol, M.R.; Tooski, M.Y.; Jabbari, M.; Javadi, M. (2023): The effect of graphene nanoparticles on the strength of inspired sandwich panel structure under quasi-static loading. *Amirkabir Journal of Mechanical Engineering* 54(12): 2821-2842. (in Persian, with English summary) ["Dragonfly wings have an interesting biological composite structure and are very specialized flight organs that are well adapted for the flight behavior of each dragonfly. This paper aims to investigate the effect of graphene nanoparticles on the strength of a sandwich structure inspired by the dragonfly wing configuration under quasi-static loading. The streak structures are made of glass/epoxy layers with different percentages of graphene nanoparticles. Also, polyurethane foam was used in the central core of the vein. The crashworthiness characteristics of these structures were discussed. On the other hand, the effect of polyurethane foam on the damage rate of sandwich veins due to quasi-static loading was investigated. In order to investigate the damage in sandwich structures, pictures of the damaged surface and the cut view of the damage were taken, and the results were reported. Finally, FE-SEM analysis was used to evaluate the distribution of graphene nanoparticles in the polymer structure. The results of this study show that the presence of graphene nanoparticles in the sandwich structure resin with foam core will not have much effect on the strength of the structure if it is less than one value. On the other hand, if the amount of graphene nanoparticles in the resin of this type of structure exceeds a certain amount, it shows relatively good resistance." (Authors)] Address: Tavakol, M.R., Dept of Mechanical Engineering, Faculty of Engineering, Islamic Azad Univ. South Tehran Branch, Iran. Email: m\_yarmohammad@azad.ac.ir

**22090.** Tian, F.; Zheng, D.; Nel, A.; Ye, Y.; Mei, T.; Zhang, H. (2023): A new camptero-phlebiid damsel-dragonfly (Odonata: Isophlebioidea) from the Middle Jurassic Yanan Formation of Yulin City, Shaanxi Province, NW China. *Comptes Rendus Palevol* 22(23): 491-496. (in English, with French summary) ["The family Camptero-phlebiidae Handlirsch, 1920 is the dominant Jurassic clade of Odonata Fabricius, 1793, especially hosting a high diversification in northern China. The Chinese camptero-phlebiid damsel-dragonflies were mainly recovered from the Middle Jurassic of Inner Mongolia, northern China. In the present study, a new camptero-phlebiid, *Parasinitsia qingyunensis* n. gen., n. sp., is described from the early Middle Jurassic Yanan Formation of the Ordos Basin, NW China. *Parasinitsia* n. gen. resembles the genus *Sinitsia* Pritykina, 2006 recorded from the Upper Jurassic of eastern Transbaikalia, but differs from the latter in having two or three rows of cells between RA and RP1 distal of the pterostigma, IR2 and RP3/4 with at least four rows of cells near the wing margin, and CuAa with about 15 rows of cells between it and the posterior wing margin in the broadest area. The new damsel-dragonfly comes from a new early Middle Jurassic insect site from the Ordos Basin, providing new clues to understand the terrestrial ecosystems during this epoch." (Authors)] Address: Zheng, D., State Key Lab. of Palaeobiology and Stratigraphy, Nanjing Inst. Geology & Palaeontology & Center for Excellence in Life & Palaeoenvironment, Chinese Acad. of Sciences, 39 East Beijing Road, Nanjing 210008. China. Email: drzheng@nigpas.ac.cn

**22091.** Verheyen, J.; Stoks, R. (2023): Thermal performance curves in a polluted World: Too cold and too hot temperatures synergistically increase pesticide toxicity. *Environmental Science & Technology* 57(8): 3270-3279. (in English) ["Ecotoxicological studies typically cover only a limited part of the natural thermal range of populations and ignore daily temperature fluctuations (DTFs). Therefore, we may miss important stressor interaction patterns and have poor knowledge on how pollutants affect thermal performance curves (TPCs), which is needed to improve insights into the fate of populations to warming in a polluted world. We tested the single and combined effects of pesticide exposure and DTFs on the TPCs of low- and high-latitude populations of *Ischnura elegans* damselfly larvae. While chlorpyrifos did not have any effect at the intermediate mean temperatures (20–24 °C), it became toxic (reflecting synergisms) at lower (=16 °C, reduced growth) and especially at higher (=28 °C, reduced survival and growth) mean temperatures, resulting in more concave-shaped TPCs. Remarkably, these toxicity patterns were largely consistent at both latitudes and hence across a natural thermal gradient. Moreover, DTFs magnified the pesticide-induced survival reductions at 34 °C. The TPC perspective allowed us to identify different toxicity patterns and interaction types (mainly additive vs synergistic) across the thermal gradient. This highlights the importance of using thermal gradients to make more realistic predictions about the impact of pesticides in a warming world and of warming in a polluted world." (Authors)] Address: Verheyen, Julie, Evolutionary Stress Ecology & Ecotoxicology, Univ. of Leuven, Charles Deberiotstraat 32, 3000 Leuven, Belgium. Email: julie.verheyen@kuleuven.be

**22092.** Yanagisawa, T.; Sakamoto, M. (2023): Recent records of *Trigomphus ogumai* Asahina, 1949 from Hiroshima Prefecture, Japan. *Tombo* 65: 78-80. (in Japanese, with English summary) ["*T. ogumai* which is considered as a vulnerable species in the prefecture, is recorded in multiple ponds from Fukuyama City, eastern Hiroshima Prefecture." (Authors)] Address: Email: shozo@yc4.so.net.ne.jp

**22093.** Yokoi, N. (2023): Territorial behaviors of *Tanypteryx pryeri* (Selys, 1889) (Odonata: Petaluridae). *Tombo* 66: 25-33. (in Japanese, with English summary) ["The territorial behavior of *Tanypteryx pryeri* (Selys, 1889) was observed in a habitat in Fukushima Prefecture during the 2021 and 2022 flight season. The species showed strong intraspecific struggle and occupancy, and the territory was maintained by the priority male. The struggle for territory has always favored priority male over new intruders. However, the occupancy time was short, about 15 minutes or less. Because of this, many new intruders could become territorial occupants. Territories were graded based on the number of ovipositing individuals and the number of successful matings. The strongest male occupied the highest grade territory. Losers, driven out by occupiers, were relegated to lower grade territory. However, the losers were also able to mate there, albeit with a lesser chance. Occupants staved around the territory for several days and repeatedly flew into the territory to become new occupants each day. The territorial behavior of this dragonfly is simply to occupy the best territorial grounds and mate with females. The breeding system of this dragonfly is thought to be that many males can become occupants one after another through the territory and mate with females." (Author)] Address: Yokoi, N., 2-37-11, Kaisei, Koriyama, Fukushima, 963-8851 Japan. Email: yokoi@orange.plala.or.jp



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de  
Published in Zerf, Germany  
ISSN 1438-0269

---

## 1990

**22094.** Chovanec, A. (1999): Die Libellenfauna (Insecta: Odonata) der Donauauen im Bereich Klosterneuburg/Kritzendorf (NÖ). Im Auftrag der Universität für Bodenkultur, Institut für Wasserversorgung, Gewässerökologie und Abfallwirtschaft Abteilung für Hydrobiologie, Fischereiwirtschaft und Aquakultur, September 1999: 17 pp. (in German) ["A total of 30 species of dragonflies were detected in 1999 (12 species from the suborder Zygoptera, 18 species from the suborder Anisoptera); This is almost 39% of the species spectrum recorded for Austria (78 species) and 44% of the species inventory recorded for Lower Austria (69 species). Of the 30 species, 13 are listed in the Red Lists for Lower Austria." (Author/Google translate)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

## 2000

**22095.** Chovanec, A. (2000): Die Libellenfauna (Insecta: Odonata) der Donauauen im Bereich Klosterneuburg/Kritzendorf (NÖ). Erhebungen 2000. Im Auftrag der Universität für Bodenkultur, Institut für Wasserversorgung, Gewässerökologie und Abfallwirtschaft Abteilung für Hydrobiologie, Fischereiwirtschaft und Aquakultur, September 1999: 37 pp. (in German) ["A total of 34 species of dragonflies were detected in 2000 (14 species from the suborder Zygoptera, 20 species from the suborder Anisoptera); This is almost 44% of the species spectrum recorded for Austria (78 species) and 49% of the species inventory recorded for Lower Austria (69 species). Of the 34 species, 16 are listed in the Red Lists for Lower Austria." (Author/Google Translate)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

## 2004

**22096.** Kulkarni, P.P.; Prasad, M.; Talmale, S.S. (2004): Insecta: Odonata. Conservation Area Series 20, Fauna of Pench National Park: 175-206. (in English) [During the faunistic surveys conducted by Western Regional Station of Zoological Survey of India, approximately 500 specimens of Odonates were collected from Pench National Park, Dist. Nagpur. Altogether thirty eight species were identified. Two species viz *Copera ciliata* and *Copera vittata deccanensis* form the new record for Maharashtra State. *Brachythemis contaminata* was collected most frequently and 115 individuals were identified belonging to it. Amongst the least represented species following 7 were represented by single individuals: 1. *Paragomphus lineatus*; 2. *Anax immaculifrons*; 3. *Epophthalmia vittata vittata*; 4. *Potamarcha congener*; 5. *Bradinopyga geminata*; 6. *Trithemis kirbyi kirbyi*; and *Tamea virginia*. The paper treats records of 38 species and includes descriptive notes." (Authors)] Address: Kulkarni, P.P., Western Regn. Stn, Zool. Surv. India, Vidyanagar, Sector 29, Pune. 41 1 044, Maharashtra, India

## 2005

**22097.** Chartier, A. (2005): Twin-spotted Spiketail: New sight record for Wayne County and a record late date. *Williamsonia* 9(19): 3. (in English) [*Cordulegaster maculata*, 22 Aug 2004, closed area of Lake Erie Metro Park, Wayne Co., Michigan, USA] Address: amazilial@comcast.net

**22098.** Manger, R.; Abbingh, G. (2005): Libellen in Drenthe. *Libellen werkatlas Drenthe 2005*. Assen: 123 pp. (in Dutch) ["This atlas has been compiled to represent the libarian fauna in Drenthe from 1995 to 2005. Data from the national dragonfly database was used for this. A year after the first edition of the ZC atlas, this is already the third edition. The Drenthe Dragonfly Working Group was founded in the summer of 2003. One of the objectives of the working group is to compile a distribution atlas of dragonflies in Drenthe. In preparation for this atlas we created this work atlas. The atlas is intended, among other things, for people who want to inventory dragonflies in the province of Drenthe. We therefore hope that this atlas will be an incentive for the members of the working group and volunteers in the Netherlands to map the dragonfly fauna of Drenthe in more detail. In any case, the dragonfly inventory can be carried out even better in the coming years with this new atlas. Thanks to EIS-Nederland, the Butterfly Foundation and the Dutch Association for Dragonfly Study (NVL) who made the data from the national database available and provided financial support for the first atlas. We would like to thank Vincent Kalkman (EIS-Netherlands) for creating the distribution maps and commenting on the original text. In addition, our thanks go to all observers of the Dragonfly Working Group Drenthe for reporting their observations and to Rob van der Es, Willem-Jan Hoeffna-gel, Robert Ketelaar, Renske Postuma and Ben Prins for making their photos available. Furthermore, thanks go to all observers in the Netherlands who made dragonfly observations in Drenthe." (Authors/Google translate)] Address: <https://www.dutchdragonflies.eu/wp-content/uploads/2019/11/Libellenwerkatlas-Drenthe.pdf>

**22099.** O'Brien, M. (2005): How to identify *Epithecica costalis*. *Williamsonia* 9(1): 7-9. (in English) [Keys and figures are presented to identify *E. spinigera*, *E. costalis* and *E. cynosura*] Address: O'Brien, M., Museum of Zoology, Insect Division University of Michigan, Ann Arbor, MI 48109, USA

## 2006

**22100.** Emiliyamma, K.G.; Radhakrishnan, C. (2006): First report of *Cyclogomphus heterostylus* Selys (Odonata: Insecta) from Kerala, South India. *Records of the Zoological Survey of India* 106 (Part II): 123-124. (in English) [1 male, Kerala, India: Thiruvananthapuram district: Thenmalai urukunnu, Coll. P. T. Cherian, 5 April, 1998.] Address: Emiliyamma, K.G., Western Ghats Field Research Station, Zoological Survey of India, Calicut-670 002, Kerala, India

**22101.** Tiple, A.M.; Khurad, M., Andrew, R.J. (2008): Species Diversity of Odonata in and around Nagpur City, Central India. *Fraseria* (N.S.) 7: 45-49. (in English) ["A survey of dams, ponds, streams, and garden, fields and forests areas in and around Nagpur City, Central India was conducted from the year 2006 to 2008 to collect and record the Odonate faunal diversity and their Status. A total of 62 species belonging to 35 genera and 9 families viz., Gomphidae, Aeshnidae, Corduliidae, Libellulidae, Coenagrionidae, Platycenemididae, Protoneuridae and Lestidae were recorded. Among them, previously unrecorded 18 species were included in the check list of Nagpur. Of the total 62 species, 13 were abundant, 27 common, 17 rare and 5 very rare in occurrence. These observations indicate that in spite of ecological disturbances in and around the Nagpur city due to industrial and human activities, the odonate fauna is still much richer than previously recorded by earlier workers and the city and its surrounding forms a unique resource of odonate diversity." (Authors) New additions to the regional fauna are: *Cratilla lineata*, *Lathrecista asiatica*, *Orthetrum triangulare*, *Rhyothemis variegata*, *Rhodothemis rufa*, *Tetrathemis platyptera*, *Neurothemis intermedia*, *Aciagrion pallidum*, *Agriocnemis femina*, *Ceriagrion cerinorubellum*, *Pseudagrion microcephalum*, *Gynacantha dravida*, *Anax parthenope*, *Macrogomphus annulatus*, *Copera vittata*, *Libellago lineata*, *Lestes elatus* and *Lestes umbrinus*.] Address: Tiple, A.D., Department of Zoology, RTM Nagpur University, Nagpur-440033, India. Email: aahishdtiple@yahoo.co.in

**22102.** Borisov, S.N. (2009): Pattern of dragonfly (Odonata) distribution in central Asia. *Zoologicheskii zhurnal* 88(1): 11-17. (in Russian, with English summary) ["There is a clear vertical differentiation of the odonotofauna of Central Asia. There are three groups of species: mountainous (24), plain (18) and eurygypsal (or lowland-mountain) (34). 7 main types of distribution of dragonflies have been established: flat, mountainous, solid boreo-montane, disjunctive boreo-montane Central Asian disjunctive, disjunctive boreo-montane Tien Shan disjunctive, Central Asian eurygypsum and Pamir-Alai eurygypsum. The leading role in the distribution of dragonflies is played by the temperature factor and the topical one. the presence of water bodies suitable for the development of preimaginal phases. The first defines the boundaries of the potential ranges of dragonflies, and the second. the actual ranges. The modern composition, structure and vertical distribution of the odonotofauna were finally formed in the historical period with the (appearance of artificial habitats of dragonflies. reservoirs of irrigation systems." (Author/Google translate)] Address: Borisov, S., Institute of Systematics and Ecology of Animals, Russian Academy of Sciences, Siberian Branch, Frunse str. 11, Novosibirsk 630091 Russia. E-mail: borisov-s-n@yandex.ru

**22103.** Dumont, H.J. (2009): A description of the Nile basin, and a synopsis of its history, ecology, biogeography, hydrology, and natural resources. *Monographiae Biologicae* 89: 1-21. (in English) ["Following a description of the Nile, the longest river of the world (ca 6,800 km) and its basin (2.9 × 10<sup>6</sup> km<sup>2</sup>), including its various "source" lakes, some brief notes on its main neighbours (Congo and Logone-Chari) and their history are given. The biota of the basin are moderately diverse, and endemism tends to be low, except in some of the "old" source lakes. The situation is complicated by the fact that at least two of these lakes (Victoria and

Tana) dried out around or slightly before the beginning of the Holocene, and thereafter, speciation (especially of cichlid fish) may have happened at an unusually great speed. In general, the Nile offers a pathway for African species to extend from the tropics to a Mediterranean climate and spill over into the Levant and Arabia. Such incursions may have happened many times across history, with some of the older "waves" using the Red Sea (before its opening to the Indian Ocean) rather than the Nile. Currently, as elsewhere in the world, invasive species in the Nile are becoming more and more common, although the oldest cases (some Ponto-Caspian cnidarians) may date back to the end of the nineteenth century. The water hyacinth *Eichhornia* has invaded the Nile basin in at least three different zones. Since early pharaonic times, man has interfered with the river and its flow regime, in an effort to control the yearly "flood of a hundred days", but large-scale damming only started in the nineteenth century, and culminated with the construction of the Aswan High Dam in the 1960s, reducing the river to a giant irrigation canal. More recent developments include the construction of the Toshka lakes diverticle to Lake Nasser, a project with an uncertain future. The river and its lakes are important fisheries resources; the various dams are generating large amounts of power, and fossil hydrocarbon deposits are under development in at least three zones of the basin. This may contribute to river pollution, which is still a local phenomenon, except in Lake Victoria, which suffers from eutrophication, and in Egypt, that combines a population explosion (almost four doublings in the last century) with a substantial industrial development." (Author) The study includes references to Odonata. For the full paper on Odonata see: [https://www.researchgate.net/publication/2511-31494\\_Aquatic\\_Insects\\_of\\_the\\_Nile\\_Basin\\_with\\_Emphasis\\_on\\_the\\_Odonata](https://www.researchgate.net/publication/2511-31494_Aquatic_Insects_of_the_Nile_Basin_with_Emphasis_on_the_Odonata)] Address: Dumont, H.J., Univ. Gent, Inst. Animal Ecology, K.L. Ledeganckstraat 35, 9000 Gent, Belgium. E-mail: Henri.Dumont@ugent.be

**22104.** van Calmthout, M. (2010): Libellenvangen langs de Congo. *Volkskrant* of 29 June, 2010: 18-19. (in Dutch) [Verbatim: "In the run-up to the Congo expedition in which he was the only Dutchman to participate this spring, the internationally renowned Leiden dragonfly expert Klaas-Douwe Dijkstra randomly opened drawers in the depots of the Africa Museum in Tervuren. He went from one surprise to another. 'In colonial times, the Belgians literally brought everything that was loose or alive to Belgium and just piled it up in the institute. Canoes, insects, hides, plants. I'm sure after all this time I looked at some of the collections first. It was almost improbable.' Dijkstra, half-shaven, cap, wire glasses, 'KD' for friends and colleagues, is in the former Pesthuis in Leiden, which is now the entrance to the natural history museum Naturalis. There he is an unpaid guest employee. More than a week after returning home, he enjoys two months in the interior of the former Belgian colony. From the end of April, he set out on two ships up the Congo River with dozens of scientists from the Netherlands and abroad. Floating is a better word, he thinks. With a simple idea in itself: the first scientific exploration of the country in Africa, long torn by war and conflict. Biologists went along, linguists, archaeologists, anthropologists. Dijkstra: 'The river Congo, with its almost black water, is in many ways the highway through the area and also the only way to get around. In colonial times, the ends of the wet central part of the country in particular were somewhat looked at. But everything in between was still pure discovery.' The expedition was emphatically part of half a century of independence

from the Belgian colony, which dates from 29 June 1960. In this context, the Belgian government is donating the country, in addition to a new research vessel, also a new center for biodiversity. That comes to the University of Kisangani. This center receives equipment from the expedition, the ships, a few motorcycles, analytical equipment. In addition, personnel were also trained during the trip. Belgian television followed the Grand Gesture almost day by day, from a special media raft. The Flemish photographer Kris Pannecoucke traveled with the group for the entire 350-kilometre round trip, spent the night in the same tents, and watched the fieldwork and the analyzes on the research vessel. He takes hundreds of photos, some of which can be seen on [www.con.go2010.be](http://www.con.go2010.be) and at exhibitions in Tervuren. On some of them, the Dutch dragonfly man Dijkstra, standing in shallow water, swings his butterfly net like a real Prickly Leg, sometimes watched by a whole circle of curious villagers. Motorcycle In other cases, Dijkstra hired a guide with whom he went into the forest on the motorcycle he brought with him. 'I pointed: 'according to my aerial photos, there is a stream where water flows from the hinterland'. And off we went. We came to fantastic places. That's the advantage of looking for insects: you travel light and can work anywhere. In the case of dragonflies, you mainly look for water.' The local population, says Dijkstra, was invaluable, especially for the biologists on the Congo 2010 expedition. "They contribute basically anything they can find for a small fee. Plants and animals that you would otherwise never be able to collect in such a short time.' Of course, the trip did not go entirely according to plan, because it is still Africa. But it wasn't really a moment of fear, says Dijkstra. "You know: this is an area without much authority, so anyone with an opinion and a gun can do what they want." With a smile, he explains how an alleged hijacking of the media raft made the Belgian news. It soon became clear that it was a group of Congolese soldiers and their families, who saw the passing raft as an opportunity to get home faster. 162 species of dragonflies Dijkstra himself scored very well. He found no less than 162 species of dragonflies in just over a month and a half in the forest, which is intersected by the river, creeks and streams. He does not yet know how many of these are new species that are still unknown to science. About six or seven, he reckons. But numbers don't matter that much either. His real treasure, hundreds of dragonflies dried in acetone, is kept in the vault at Naturalis for meticulous scientific research. Years of work. That's what it's really about." (Google translate)]

## 2011

**22105.** Siebelink, B.; van Uchelen, E. (2011): Vlinders en libellen voor de lens. Vlinders 4 2011: 16-19. (in Dutch) ["Butterflies and dragonflies in front of the lens: Given the enormous popularity of nature photography, it was inevitable: the first Nature Photography Handbook from the Netherlands. In it, authors Bart Siebelink and Edo van Uchelen explain, among other things, how to approach animals and how to photograph them in a fresh, innovative way. In this article, the authors and founders of the Center for Nature Photography share their experiences." (Authors/Google Translate)] Address: <https://edepot.wur.nl/340612>

## 2012

**22106.** Meugrey, F. (2012): A new case of westward dispersal of an Afrotropical species to the West Indies: Keyhole Glider *Tramea basilaris* (Palisot, 1805) in Cuba (Greater Antilles). *Argia* 24(4): 26-27. (in English) ["Working on a small

Collection of specimens from Cuba housed in the Nantes Museum of Natural History, I was surprised to find a male *Tramea basilaris* between several *T. abdominalis* and other species including: *Ischnura ramburii*, *Telebasis dominicanum*, *Dythemis rufinervis*, *Erythrodiplax umbrata*, *Orthemis* sp. cf. *ferruginea*, and *Scapania frontalis*, collected in only two localities (Camargüey and Baracoa). The specimen is a male with both right wings damaged at the tips and labeled as follows: Cuba, Baracoa, 12.X.1984, E. Simon leg. This constitutes, to my knowledge, the first record for the Greater Antilles, the fourth from the New World, and precedes the first documented observation of this species from the New World in Suriname by Belle (1988). I've already reported the observation of *T. basilaris* from the West Indies (Meurgey, 2008; Meurgey & Picard, 2011). This afrotropical species was recorded for the first time in the West Indies from Martinique (2006) and Guadeloupe (2008) in the Lesser Antilles. In Martinique, a single male was caught near Trois-Ilets south of the Island, and additional specimens were seen egg-laying in October 2008 (four of them were caught as voucher specimens). In Guadeloupe a single male was observed near the shoreline at Pointe-dcs-Chateaux, located at the extreme east of the island in October 2009. Since that time and despite intensive searches during the wet season, no additional specimens were seen on both islands. *T. basilaris* is a highly vagrant species in Africa and swarms of hundreds of individuals can be seen during the monsoon time along the Atlantic coasts. It is not surprising that some individuals can reach the Antilles or the South American continent following the trade winds that blow from east to west in winter. This is particularly evident considering the hundreds of *Stifocerca gregaria* (Desert Locust) observed almost every year in the Lesser Antilles. As for the Lesser Antilles, the Cuban specimen was caught during the rainy season (which is between October and December in the Lesser Antilles). This new record suggests that this species may be observed in the Southern States of the USA, especially Florida." (Author)] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, F-44000 Nantes, France. E-mail: [Francois.Meurgey@mairie-nantes.fr](mailto:Francois.Meurgey@mairie-nantes.fr)

**22107.** Nunner, A.; Bioplan Tübingen (2012): Artenhilfsprogramm Alpen-Mosaikjungfer (*Aeshna caerulea*) im Regierungsbezirk Schwaben. Gutachten im Auftrag der Regierung von Schwaben, Fronhof 10, 86152 Augsburg: 71 pp. ["Local populations and their population sizes: With regard to their location in relation to each other, the finds in the Oberallgäu can be summarized into a total of ten local populations (see Map 1 and Table 2), seven of which are currently populated. Two discovery reports contained in the ASK concern no longer confirmed individual evidence of adults in suboptimal habitats, so that no native occurrence can be derived for these areas (moor pools in Scheuenwald and Guggensee). Core habitats with probably regular reproduction can be found in the following seven areas: Strausberg moss (2 sub-habitats) Engenkopfmoore (1 sub-habitat) Lower Gottesackermauern (5 sub-habitats, of which 3 are core habitats) Piesenkopf-Ziebelmoos (4 sub-habitats, of which only 1 regularly occupied) \* Wannenkopf (4 sub-habitats, of which 2 are regularly occupied) \* Large Ochsenkopf (1 sub-habitat) \* Wilhelminenmoos (1 sub-habitat) In these moors, there was also evidence of imagines and exuvia in the 2012 survey, with the exception of Piesenkopf-Ziebelmoos (imagines only). Subsidiary habitats that are not regularly occupied are probably the following three areas (without evidence in 2012, despite multiple visits) \* Duftmoos/Schnippenalpe (2 sub-habitats) \* Moor near Aibealpe (1 sub-area) \* Moor at Toniskopf (1 sub-area) With regard to their

population size The Strausbergmoos, the Lower Gottesackermauern and the Wannenkopf are among the most important occurrences in Germany, each with an estimated 50-100 adults in favorable years. The Engenkopf moors and the Großer Ochsenkopf are also probably home to larger populations (max. 25-50 adults each per year). Smaller populations can be found in the Piesenkopf-Ziebelmoos and in the Wilhelminenmoos (each max. 10-25 adults/year). Habitat configuration The habitat configuration of all individual-rich occurrences is characterized by a diverse range of permanently water-bearing Schlenken waters (>20 Schlenken), in particular by the presence of larger bog Schlenken (>50m<sup>2</sup>) with free water surface. The regularly occupied deposits are unused and lie outside pasture areas; at the Großer Ochsenkopf the larger Schlenken waters are fenced off. Species assistance program *Aeshna caerulea* in Swabia 8 Impairments and need for action For the majority of the moors examined, the need for action with regard to the habitats of *A. caerulea* is low. Significant impairments due to cattle treading occur in the unfenced Schlenken on the Großer Ochsenkopf and the Toniskopf. Fencing off a large part of the moor area would be strongly recommended for both areas. The wallowing activity of red deer only affects individual loins in most moors, but should continue to be monitored regularly in the future so that measures can be taken if necessary. As a precautionary measure, no salt licks or feeding areas should be set up in or in the immediate vicinity of the habitat to avoid attracting deer. A greater impairment due to use as a deer wallow was found in Duftmoos (Retterschwanger Tal). The aim here was to test whether red deer can be scared away from the moor and whether, for example, they will accept alternative wallows outside the moor. Assessment of the current population situation In 2012, *A. caerulea* was confirmed at all seven larger and well-equipped habitats. Unsuccessful controls have always affected smaller deposits or non-soil deposits. The inventory development can currently be assessed as "stable". The current habitat potential in high-altitude moors in the Oberallgäu has been largely exhausted. The population situation with seven regularly occupied core habitats (three of which have large individual populations) can be assessed as good overall." (Author/Google Translate) Address: Auftraggeber: Regierung von Schwaben, Fronhof 10, 86152 Augsburg, Germany. Auftragnehmer: Bioplan Tübingen, Institut für angewandte Biologie und Planung, Grabenstraße 40, 72070 Tübingen, Germany

**22108.** Schaufelberger, S. (2012): Flinke Jägerinnen der Lüfte. *Ornis* 4/2023: 24. (in German) [Brief introduction in dragonflies in the Switzerland journal on birds and nature conservation.] Address: not stated

### 2013

**22109.** Teder, T. (2013): Sexual size dimorphism requires a corresponding sex difference in development time: a meta-analysis in insects. *Functional Ecology* 28(2): 479-486. (in English) ["The degree and direction of sexual size dimorphism (SSD) vary greatly among animal species. At the ontogenetic level, SSD may result from sex differences in birth size, growth rate and/or development time. Nevertheless, evidence concerning proximate causation of SSD is scattered, and the data used to infer ontogenetic determinants of SSD have not always been appropriate for this purpose. I use a comprehensive literature-derived database of relevant sex-specific traits on 169 species to address the significance of sex differences in larval development time (SDTD) as a proximate source of SSD in insects. In a clear

majority of species (79%), SSD and SDTD were qualitatively congruent, i.e. the larger sex had also a longer larval development. In strongly size-dimorphic species, the qualitative correspondence between SSD and SDTD was nearly universal. Consistently, in a phylogenetically diverse array of insect clades, SDTD increased with increasing SSD across species. The results indicate that the evolution and maintenance of high SSD values are rarely possible without a prolonged development of the larger sex. The role of sex differences in growth rate as the ontogenetic determinant of SSD in insects requires further studies which should ideally be based on detailed monitoring of larval growth schedules. The increase in SDTD with increasing SSD is consistent with the idea that the widespread phenomenon of protandry (the emergence of male adults before females) may primarily be an incidental by-product of other selection pressures." (Authors) The study includes data of *Coenagrion puella*, *Lestes viridis* and *Libellula depressa*.] Address: Teder, T., Department of Zoology, Institute of Ecology and Earth Sciences, University of Tartu, Vanemuise 46, Tartu, Estonia. Email: tiit.teder@ut.ee

**22110.** Wendzonka, J. (2013): Wazki (Odonata) w Nadwarciańskim Parku Krajobrazowym. *Biuk. Park. Krajobraz. Wielkopolski* 19(21): 136-141. (in Polish) ["On July 5-8, 2012, the 9th National Odonatological Symposium was held at the Nature Education Center in Lad. One of the reasons for organizing the Symposium in the Warta Landscape Park was the possibility of inventorying this poorly researched area in terms of dragonflies. The organizers were jointly the Complex of Landscape Parks of the Wielkopolska Region and the Odonatological Section of the Polish Entomological Society. The Symposium was attended by 20 people from all over the country: from scientific centers in Katowice, Łódź, Poznań and Warsaw. All data were collected by a team ...."] Address: Wendzonka, J., ul. Graniczna 17, 63-800 Gostyn, Poland. E-mail: wendzonka@wp.pl

### 2014

**22111.** Ban, X.; He, G.; Zhang, B. (2014): Numerical study of the aerodynamic performance of the dragonfly wing sections in gliding flight. *Journal of Nanchang Hangkong University (Natural Sciences)* 2014(2): 70-73+79. (in Chinese, with English summary) ["Dragonfly is considered a high performance flyer in nature because of its wing structures. A computational fluid-dynamics based study of a pleated wing section has been performed at low Reynolds numbers corresponding to the gliding flight of the dragonfly. The simulations demonstrate that the pleated wing produces high lift at wing roots, along the spanwise of the wing sections, the lift decreased gradually, until it becomes a small negative value at the wing tips, the phenomenon make the wing not bend along spanwise. In the cavities of the pleated wing, the resident vortexes make the wing have large stall angle. These ensure the stability of the dragonfly gliding flight." (Authors)] Address: Ban, X., School of Aircraft Engineering, Nanchang Hangkong University, China

**22112.** Blick, T.; Blum, E.; Burger, R.; Burkei, J.; Buse, J.; Crusan, B.; De Bruyn, U.; Duchamp, L.; Duguet, M.; Eller, O.; Entling, M.H.; Fischer, P.; Fluck, W.; Frey, W.; Fritze, M.-A.; Fuchs, L.; Genort, J.-C.; Göppel, H.; Grimm, F.; Haag, M.; Harbusch, C.; Idelberger, S.; Keller, P.; Kitt, J.; Koschwitz, U.; Ligenfelder, U.; Ludewig, H.-H.; Malec, F.; Mangin, S.; Marx, M.T.; Mörtter, R.; Müller, Y.; Muster, C.; Nickel, H.; Ochse, M.; Ott, J.; Petschner, S.; Pfalzer, G.; Pfeifer, M.A.; Oist, M.; Radtke, L.; Reder, G.; Renker, C.; Rindchen, G.; Röller, O.;



Ross, H.; Roth, N.; Schaubel, K.; Sheid, C.; Schindler, H.; Schirmel, J.; Schleich, S.; Schmidt, C.; Schmidt, T.; Schmolz, M.; Schneider, M.; Schwab, G.; Spieler, P.; Stark, C.; Strubel, J.; Walter, J.; Weber, C.; Weber, D.; Erno, A. (2014): Eine Momentaufnahme aus der Flora und Fauna im grenzüberschreitenden Biosphärenreservat Pfälzerwald. Nordvogesen. Ergebnisse des 14. GEO-Tags der Artenvielfalt am 16. Juni 2012. Ann. Sci. Rés. Bios. Trans. Vosges du Nord-Pfälzerwald — 17 (2013-2014): 29-69. (in German, with French and English summaries) ["As part of the GEO Biodiversity Day, on 16 June 2012 an assessment of the flora and fauna in the cross-border Palatinate Forest-Northern Vosges Biosphere Reserve was conducted. The Rhineland-Palatinate Nature and Environment Foundation directed the event, together with GEO magazine and the two sponsoring associations of the cross-border UNESCO Palatinate Forest-Northern Vosges Biosphere Reserve and numerous other partners. Enjoying suitable weather for field work, the nearly 100 experts invited from Germany and France ranged, according to their individual specialities, through the selected survey areas around Fischbach/Dahn (D), Eppenbrunn (D), Hirschthal (D & F) and Wingen (F). In total, they succeeded in finding evidence of 2081 species from 147 orders and 470 families. The survey revealed many vulnerable or severely endangered species, some of which are extremely rare in Germany or are subject to protection under Annexes II and IV of the European Habitats Directive. The assessment provided the first recordings of some species in the area under investigation. In total of ten new species of cicada were recorded for the state of Rhineland-Palatinate; however, in view of the low level of research so far undertaken on this group here, this was not entirely unexpected. Particularly noteworthy was the first recording in Rhineland-Palatinate of the very rare European hoverfly *Myolepta potens* (RL D: 2). For the first time, clear evidence was found for the carabid beetle *Amara infima* in Rhineland-Palatinate. In addition, the existence of the pygmy locust (*Tetrix bipunctata*) was clearly proven for the first time in the Palatinate Forest. In the French section of the biosphere reserve, the soprano pipistrelle (*Pipistrellus pygmaeus*) had not previously been documented. However, this was achieved several times on the GEO biodiversity day ... Verbatim: (Google translát): 4.8.1 Odonata – dragonflies (Jürgen Ott, Mathias Kitt, Uwe Lingenfelder and Michael Post) Dragonflies are extremely sun worshipers, and so the GEO day was rather "suboptimal" for this group of species; Because it was mostly overcast and the temperatures weren't particularly summery either. Nevertheless, a total of 28 species. eleven damselflies and 17 dragonfly species. were identified in the study areas, which corresponds to more than 40% of the entire range of dragonfly species in Rhineland-Palatinate. In addition to the typical flowing water species that occur throughout the area, such as *Calopteryx splendens* and *C. virgo*, it was also possible to find *Gomphus vulgatissimus* and *Ophiogomphus cecilia*, the latter an FFH appendix II/IV way to prove. The most remarkable, however, are the finds of three moss damsel species: not only *Leucorrhinia dubia*, which is known for the area, but also *Leucorrhinia pectoralis* and *Leucorrhinia rubicunda* flew here. The latter two species. *Leucorrhinia pectoralis* is also an FFH appendix II/IV species. appeared increasingly in Rhineland-Palatinate in 2012, although so far there has been very little evidence of the Nordic moss damsel from Rhineland -Palatinate even exists (OTT, 2012). The finds once again underline the importance of the diverse bodies of water in the area between Eppenbrunn and Fischbach for dragonfly species protection, with the swamps, intermediate moor sites and streams being particularly noteworthy as habitats. These can also be seen in connection

with similar biotopes on the French side, with which they form a composite complex.] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: L.U.P.O.GmbH@t-online.de

**22113.** Ghorma, R. (2014): Inventaire de l'entomofaune dans trois palmeraies de la région d'In Salah. Mémoire de fin d'études, En vue de l'Obtention du Diplôme d'Ingénieur d'Etat en Sciences Agronomiques, Faculte des Sciences et Ssiences de l'Invenieur, Departement des Sciences Agronomiques, Universite Kasdi Merbah Ouargla: 155 pp. (in French, with Arabian and English summaries) ["Inventory of insects in three farms of palms of In Salah region Summary: The inventory of insects in the In Salah region that belonged to the floor Saharan climate mild winter in three station studies and four sampling pots Barber, sweep net, plots of Orthoptera And catch live, these methods can sampled 4786 individuals distributed to 2 embrenchement one of the next Annelida and Arthropoda which gather to 4 classes Crustacea, Chailopoda, Arachnida, Insecta, the class dominated by 11 orders Podurata , Hymenoptera, Coleoptera, Homoptera, Heteroptera, Lepidoptera, Orthoptera, Blattoptera, Mantoptera, Diptera, Dermaptera, Neuroptera, Thysanoptera, Odonata. The Hymenoptera order more dominance by many individuals and 41 species 1626 by 11 families with family Formicidae more important." (Author)] Address: <https://dspace.univ-ouargla.dz/jspui/bitstream/123456789/4749/3/GHORMA-%20Rekia.pdf>

**22114.** Hanauer, G.; Renner, S.; Périco, E. (2014): Inventariamento preliminar da fauna de libélulas (odonata) em quatro municípios do Vale do Taquari/RS. Revista Destaques Academicos 6(3): 36-45. (in Portuguese) [oas 72;"The objective of this study was to carry out an inventory of adult Odonata species at points located in four municipalities in the Vale do Taquari region, Rio Grande do Sul, Brazil. To this end, two collections were carried out for each point located in each municipality, and all collected material was identified in the laboratory. Using entomological nets, 90 specimens were collected, distributed across 26 species and seven families, with Libellulidae being the most dominant, followed by Coenagrionidae. The most common species were *Argia indocilis* and *Telebasis willinki*, and the suborders Anisoptera and Zygoptera showed a balance of species representation." (Authors/Google translate)] Address: Hanauer, Grazielle, Graduanda do Curso de Ciências Biológicas do Centro Universitário Univates, Brazil. Email: [grazi86@gmail.com](mailto:grazi86@gmail.com)

**22115.** Márquez Rodríguez, J. (2014): Contribución al conocimiento de la odonatofauna costera en la isla de Menorca. Nova Acta Científica Compostelana 21: 7-10. (in Spanish) [<https://dialnet.unirioja.es/servlet/articulo?codigo=4972310>: "This research provides faunal data of the order Odonata in a little-studied biotope on the island: the calcareous cliff and the coastline in the southwest of the island. It is questioned which community of odonates adapts the island cliff as a resource during the driest months of the year, and whether there are species that have been replaced by others in recent years. The possible alteration of the habitat could be influencing the population dynamics compared to the last three decades. *Sympetrum striolatum* is the most common species. *Orthetrum coerulescens* is abundant and very localized in permanent channels with reeds. *Aeshna isosceles* is now very rare and *Anax parthenope* appears to have replaced *Anax imperator*. An analysis of the quality of surface waters with aquatic macroinvertebrates is recommended to know their current status." (Author)] Address:

Joaquín Márquez-Rodríguez, J., Depto de Sistemas Físicos, Químicos y Naturales, Univ. Pablo de Olavide, de Sevilla. 41013, Sevilla, Spain. Email: jmarrod1@admon.upo.es

**22116.** Nixon, M. (2014): Photonic structures in nature: through order, quasi-order and disorder. Diss. University of Exeter: 202 pp. (in English) ["The majority of colours in the natural world are produced via the wavelength selective absorption of light by pigmentation. Some species of both flora and fauna, however, are particularly eye-catching and visually remarkable as a result of the sub-micron, light-manipulating architecture of their outer integument material. This thesis describes detailed investigations of a range of previously unstudied photonic structures that underpin the creation of the interesting visual appearances of several such species of flora and fauna. These structures were examined using a variety of methods, including optical microscopy, scanning and transmission electron microscopy, focused ion-beam milling and atomic force microscopy. This enabled detailed characterisation of the species' photonic systems. The degree of order discerned in the species' photonic structures ranged from: 'ordered' systems, where multiple layers of two materials produces metallic and often mirror-like reflections; to 'quasi-ordered' systems, where an average periodicity of the structure in all directions gives rise to diffuse, coloured scatter; to disordered systems, where no discernible order is observed, which results in a diffuse, broadband, white appearance. In addition to this, the range of systems also encompassed: periodicities in one-dimension in the form of multilayering; 'quasi-two-dimensional' structures in the form of aligned fibres; and three-dimensional structures formed from arrangements of spherical particles. Alongside this experimental characterisation, an in-depth series of supporting theoretical analyses were undertaken. For the one-dimensional systems studied here, the models' theoretical reflectance was calculated using analytical methods. For other systems, with more complex structural-geometries, theoretical simulations of their electromagnetic response to incident radiation were carried out using finite-difference-time-domain and finite-element method numerical modelling approaches. Theoretical modelling results were compared to experimental measurements of each samples optical properties. These were primarily reflectance measurements, which were taken using a range of techniques appropriate for each specific investigation. In addition to this, a synthetic sample, mimicking the white-appearance and remarkable polarisation-dependant reflectance of one insect's photonic structure, was created using polymer electrospinning. Using these experimental measurements and theoretical simulation predictions, the structural colour production mechanisms adopted by several species of flora and fauna were elucidated." (Author) In Chapter 5, the ordered photonic structures in three species of Odonata (*Matronoides cyaneipennis*, *Aristocypha iridea* and *Rhyothemis resplendens*) have been presented and discussed in detail. Address: Nixon, M.R., School of Physics, Univ. of Exeter, Exeter EX4 4QL, UK, E-mail: m.r.nixon@exeter.ac.uk

## 2015

**22117.** Brandon, A. (2015): North Wales North Wales, Dragonfly Newsletter No 82. 2nd Nov 2015. Odonata news and events from across the vice counties of Anglesey, Merionethshire, Caernarvonshire, Denbighshire and Flintshire. North Wales Dragonfly Newsletter 63: 1-3. ["Vagrant Emperor (*Anax ephippiger*) seen on Bardsey. Steve Stansfield photographed a lovely male Vagrant Emperor on Bardsey Island on the 1st November. The recent sighting has been

reported on the Bardsey tweet (<https://twitter.com/bardseyjobs>): Male *Anax ephippiger* on Bardsey, 1st November 2015. Photo Steve Stansfield. This is only the second sighting of the species for North Wales, the first also on Bardsey reported by Steve and Marion Holmes at Nant Pond on the 21st April 2011. They didn't manage to get conclusive evidence in the form of a photo but from their descriptions, and it fitting in with a pattern of mass migration into NW Europe at the time, it was accepted by the Rarities Committee. This relatively small dark emperor species does now seem to be a pretty regular migrant when conditions are right and, given the recent run of southerly winds, Adrian Parr, the BDS Migrants Officer, was half expecting one or more to turn up in the UK from southern Europe. Adrian reports that at least one individual has also been seen in Belgium in recent days. In the UK it is being seen in the cooler months with more frequency in recent years, when few or no other dragonflies are around, so it is worth looking out for, particularly around the coast. If you are planning a walk during this gorgeous weather we're having it might be best to head for the coast. The bright blue band around the top of the abdomen contrasts sharply with the remaining dark brown abdomen and the thorax. Note also its brown eyes – those of the similar Lesser Emperor (*Anax parthenope*), which breeds in the south of Britain, are green. Malcolm Watling's melanistic bluet: Malcolm Watling photographed this somewhat melanistic form of the male Common Bluet (*Enallagma cyathigerum*) at Llyn-yr-Adar [SH656479], near Blennau Ffestiniog, at an altitude of 570m OD, on the 15th July 2015. Note the particularly large pair of black spots on the 8th abdominal segment, an extra pair on the 9th, and an extra large black dorsal spot in the centre of the 4th segment. The individual is reminiscent of quite a few individuals that turned up across the UK during the summer of 2012, the most noteworthy photographed by Ian Standen in the Gwydyr Forest (see North Wales Dragonfly Newsletter No. 63; also Dragonfly News No. 62, Autumn 2012, p.24). Such forms are more common in western Ireland and Scotland and a possible cause proposed at the time was that a particularly cold spring in an upland habitat had affected larval growth in some way." (Author)]

**22118.** Heneberg, P.; Sitko, J.; Bizos, J. (2015): Integrative taxonomy of central European parasitic flatworms of the family Prosthogonimidae Lühe, 1909 (Trematoda: Plagiorchiida). *Parasitology International* 64: 264-273. (in English) ["Species of the family Prosthogonimidae are considered the most pathogenic poultry trematodes worldwide, affecting particularly low intensity farming in rural areas. Adults of *Prosthogonimus* occur mainly in the bursa of Fabricius, oviduct and cloaca of ducks, geese, fowl and other birds feeding at least occasionally on Odonata. We analyzed the central European species of the Prosthogonimidae, namely *Prosthogonimus cuneatus*, *P. ovatus*, *P. pellucidus* and *P. rarus*. We sequenced three nuclear (ITS2) and mitochondrial (CO1, ND1) DNA loci of four species isolated from *Anas clypeata*, *Anas strepera*, *Anas platyrhynchos*, *Aythya ferina*, *Passer domesticus* and *Turdus merula*. Intra- and interspecific sequence variability revealed that all four species represent distinct well-defined entities. Our data, combined with previously published studies, suggest the return of the name *Prosthogonimus rarus* Braun, 1901 for *Schistogonimus rarus* (Braun, 1901). The genus name *Schistogonimus* Lühe, 1909 is considered a junior synonym of *Prosthogonimus* Lühe, 1899. We identified the existence of two clades, one represented by *P. cuneatus* and *P. pellucidus*, and another one formed by *P. ovatus* and *P. rarus*. We also provide comparative measurements of these four central European

prosthognimids, and address their tissue specificity, host-specific prevalence (based on the extensive bird cohort examined in years 1962–2014), and for some bird hosts we address also differences in the prevalence of Prosthognimus spp. in natural and near-natural wetlands in comparison with fishponds utilized for intense carp production. We provide an updated key to European Prosthognimus spp. based on their morphological characters." (Authors)] Address: Heneberg, P., Charles University in Prague, Third Faculty of Medicine, Ruská 87, CZ-100 00 Prague, Czech Republic. Email: petr.heneberg@lf3.cuni.cz

**22119.** Joest, R.; Rödel, A.; Vierhaus, H. (2015): Entwicklung der Libellenfauna der Woeste über drei Jahrzehnte (1984-2014). ABU info 36-38: 28-35. (in German) [Ostinghausen, Landkreis Soest, Nordrhein-Westfalen, Germany "The small fen "Woeste" has a species-rich dragonfly fauna. This was already examined and documented in the 1980s. The fauna at that time can be compared with a new study from 2014. There was an increase in the number of species; the newly added species included predominantly heat-loving species." (Authors/Google translate) [https://www.abu-naturschutz.de/fileadmin/user\\_upload/Veroeffentlichungen/ABU\\_Info/2015/ABU\\_%20info\\_2015\\_geschw%C3%A4rtz.pdf](https://www.abu-naturschutz.de/fileadmin/user_upload/Veroeffentlichungen/ABU_Info/2015/ABU_%20info_2015_geschw%C3%A4rtz.pdf)] Address: Joest, R., Arbeitsgemeinschaft Biologischer Umweltschutz – Biologische Station Soest, Bad Sassendorf-Lohne. E-mail: r.joest@abu-naturschutz.de

**22120.** Joest, R.; Wrede, J.; Beckers, B. (2015): Auswirkungen der Entnahme von Fichten und der Renaturierung von Waldbächen auf die Blauflügel-Prachtlibelle und andere Libellenarten. ABU info 36-38: 36-43. (in German) ["Discussion: The results of the monitoring provide clear indications that the forest conversion and water restoration measures carried out as part of the project have had a positive impact on the dragonfly fauna. In the case of the blue-winged damselfly, a clear increase in the density of individuals was evident in the measured sections, which was compared to a constant to slight increase in the control sections of the Große Schmalenau. However, an increase in the density of individuals was also evident in the previously very isolated control sections at the source areas of the Reißmecke. This is probably due to the fact that these previously isolated areas were easier to reach for migrating individuals after the opening of the lower reaches or that individuals flew in from the now more densely populated lower sections. Due to the relatively short period of time between the implementation of the measures and the monitoring, the rapid reaction of the blue-winged damselfly to the measures is probably primarily due to the immigration of adults from the surrounding area. Apparently the exposed areas now corresponded to the habitat search pattern of the species (Stemberg & Buchwald 1999). The trend towards a balanced sex ratio after the implementation of the measures is an indication that an increasing number of females from the surrounding area came to mate and lay eggs in the more open, renatured sections. It is to be expected that egg laying and successful development of the larvae will actually occur in the newly populated, renatured sections. Observations of egg laying are also carried out here as part of monitoring. For spring damselflies, the density of individuals in the measure sections before the implementation of the measures was significantly lower than in the more natural control sections. After implementation, they achieved roughly comparable values in both sections. It can be assumed that the measures carried out as part of the LIFE project had a beneficial effect on the spring damselflies. The measures carried out on the water bodies promote the formation of areas with calm currents,

which serve as egg-laying substrates, while the promotion of deciduous forests has a positive effect on the availability of decomposer organisms as food for larvae (Heitz 2006). In detail, it is not always possible to clearly distinguish whether the effects identified are due to the removal of spruce trees and the associated opening of the areas or to the renaturation of water bodies. It is likely that both factors work together and lead to an improvement in habitat structures. The negative relationship between shading and colonization by dragonflies, which was documented for the blue-winged damselfly regardless of water measures, supports the effect of opening up the waters through the removal of spruce trees. Species-specifically, a two-stage process can probably be assumed: while clearing the waters of spruce trees initially enables individuals to spread and colonize the waters, the water engineering measures promote successful reproduction by promoting calmed sections, fine sediment deposits and aquatic plants as egg-laying substrates and larval habitats. The richly structured, open trees in the vicinity of the reproductive waters initiated by the silvicultural measures also have a function as a ripening and feeding habitat for the striped spring damselfly, for example (Tamm 2012). Orthetrum coerulescens and other dragonflies in still waters in the open country are also likely to have benefited from the measures by creating new habitats, but also by facilitating dispersion along the waters." (Authors/Google translate) [https://www.abu-naturschutz.de/fileadmin/user\\_upload/Veroeffentlichungen/ABU\\_Info/2015/ABU\\_%20info\\_2015\\_geschw%C3%A4rtz.pdf](https://www.abu-naturschutz.de/fileadmin/user_upload/Veroeffentlichungen/ABU_Info/2015/ABU_%20info_2015_geschw%C3%A4rtz.pdf)] Address: Joest, R., Arbeitsgemeinschaft Biologischer Umweltschutz – Biologische Station Soest, Bad Sassendorf-Lohne. E-mail: r.joest@abu-naturschutz.de

**22121.** Röske, W.; Armbruster, F. (2015): Gräben – ein Lebensraum der Helm-Azurjungfer. Über die wichtige und richtige Pflege der Gräben. Herausgeber: Regierungspräsidium Freiburg, Referat 56, Naturschutz und Landschaftspflege, Bissierstr. 7, 79114 Freiburg, Germany. E-mail: [www.rp-freiburg.de](http://www.rp-freiburg.de): 2 pp. (in German) [[https://pudi.lubw.de/detailseite/-/publication/75338-%C3%9Cber\\_die\\_wichtige\\_und\\_richtige\\_Pflege\\_der\\_Gr%C3%A4ben.pdf](https://pudi.lubw.de/detailseite/-/publication/75338-%C3%9Cber_die_wichtige_und_richtige_Pflege_der_Gr%C3%A4ben.pdf)] Address: Röske, W., IFÖ Bad Krozingen, Mozartweg 8, 79189 Bad Krozingen, Germany

**22122.** Simic, V.; Petrovic, A.; Erg, B.; Dimovic, D.; Makovinska, J.; Karadzic, B.; Paunovic, M. (2015): Indicative Status Assessment, Biodiversity Conservation, and Protected Areas Within the Sava River Basin. The Sava River. The Handbook of Environmental Chemistry 31: 453-500. ["The aim of this chapter is to provide the overview of the water status, state of the biological diversity, and protected areas along the Sava River as well as to underline the necessity of identification and implementation of effective conservation measures. The chapter is based on historical data on environment and recent investigation on macroinvertebrate communities (2011–2012). Ecological status of water bodies within the Sava River basin ranges from high to poor, while the ecological status of the majority of water bodies is assessed as moderate, which indicates the necessity of design and implementation of relevant mitigation measures. The assessment of water quality and ecological status of the river Sava based on the macroinvertebrates community, alongside with the use of several standard biological methods and regional biotic index BNBI indicates a high correlation of the obtained results. BNBI has proven to be a method reliable enough for both the assessment of water quality and the assessment of ecological status of large rivers. Based on the results of water status assessment, the Sava

River could be divided into three zones. The best water quality was recorded within the Slovenian stretch of the river, being within the limits of betamesosaprobic zone, while the ecological status was assessed as a good one. The middle part of the Sava River, stretching mainly through Croatia and Bosnia and Herzegovina, has a somewhat worse water quality, approaching the limit of betamesosaprobic zone, while the ecological status in this part of the flow was also determined as a "good" one. The lower parts of the Sava River flow through Serbia are by all indicators more heavily polluted; the water quality is on the border between beta. and alfamesosaprobic zones, while the ecological status is between "good" and "moderate." The biodiversity of the Sava River may be considered significant, when compared to similar water-courses of Central Europe and Balkan Peninsula. The work contains a more detailed analysis of the biodiversity of aquatic macroinvertebrates and fish of the main flow of the Sava River. Based on the condition of biodiversity of these groups, the river's ecosystem is divided into three "macrohabitats." The first macrohabitat includes the upper rhithron parts of the river through Slovenia, with a significant diversity of stenovalent groups of macroinvertebrates (larvae EPT) and salmonid species of fish (brown trout, grayling, and hucho trout). The second macrohabitat includes the parts of the flow through Croatia and Bosnia and Herzegovina with significant diversity of invertebrates from the groups Odonata, Mollusca, Hirudinea, and Chironomidae and fish from the families of Cyprinidae, Percidae, and Gobiidae. The highest number of protected species of fish has been registered in this section. The third "macrohabitat" includes the lower part of the potamon of the Sava River and mostly flows through Serbia wherein this part of the flow represents the most important habitat of the globally endangered and fishing-wise important sturgeon species of sterlet (*Acipenser ruthenus*) in this river. It is characterized by a decreased biodiversity of macroinvertebrates in the main flow of the river and a significant diversity in the flood zones. In the biodiversity of fish, the highest number of allochthonous species appears. In this section, the diversity of fish in flood zones especially as the habitat of endangered species such as *Umbra krameri*, *Misgurnus fossilis*, and *Carassius carassius* is also important. Research has shown that in order to perform a successful conservation of large river biodiversity, the ecosystem must be observed as a complex consisting of the main flow of the river, flood zone, and its tributaries." (Authors)] Address: Milacic, Radmila, Faculty of Science, University of Kragujevac, Radoja Domanovica 12, 34000, Kragujevac, Serbia. Email: Radmila.Milacic@jjs.si

**22123.** Syarifah, E.B. (2015): Diversity of dragonfly in Taman Mini Indonesia Indah (TMII) and Ragunan Zoo (TMR). BSc thesis, Department of Biology, Faculty of Science and Technology, Syarif Hidayatullah State Islamic University Jakarta: 63 pp. (in Indonesian, with English summary) ["This research was conducted using survey method on July-August 2013. The sampling was done using purposive sampling by selecting 3 habitat around the waters in Taman Mini Indonesia Indah (TMII) and another 3 habitats around the waters in Taman Margasatwa Ragunan (TMR). The line transect was made drawing a line a long 50 m in northern. 50 m in shouter, 50 m in western and 50 m in eastern of the waters or the lake which each wide was 1 meter to the left and 1 meter to the right. Based on the result of this research, the dragonfly diversity has two different families which are Libellulidae and Gomphidae": *Orthetrum sabina*, *Pantala flavescens*, *O. testaceum*, *Neurothemis terminata*, *Brachythemis contaminata*, *Ictinogomphus decoratus*. "Index value of diversity in TMII shows that the dragonfly relatively high and

TMR it's relatively low. Index value of distribution in two location is about over 0.81 it means that the distribution of dragonfly species is relatively high." (Author)] Address: [https://repository.uinjkt.ac.id/dspace/bitstream/123456789-74870/1/EVA%20BAI%20SYARIFAH\\_108095000027\\_F-ST%20v.pdf](https://repository.uinjkt.ac.id/dspace/bitstream/123456789-74870/1/EVA%20BAI%20SYARIFAH_108095000027_F-ST%20v.pdf)

## 2016

**22124.** Lamin, S.; Augustina, M.; Kamal, M.; Setiawan, D. (2016): Inventarisasi Odonata di taman wisata alam Punti Kayu, Palembang, Sumatra selatan. Prosiding Seminar Nasional Sains Matematika Informatika dan Aplikasinya IV, Fakultas MIPA Universitas Lampung 4(2): 198-211. (in Indonesian, with English summary) [Inventory of Odonata in the Punti Kayu natural tourist park, Palembang, South Sumatra: In March to April 2016, 17 odonate species have been collected: *Ictinogomphus decoratus*, *Acisoma panorpoides*, *Aethriamanta aethra*, *Brachydiplax chalybea*, *Neurothemis fluctuans*, *Orthetrum sabina*, *O. testaceum*, *Potamarcha congeneris*, *Rhyothemis phyllis*, *Tholymis tillarga* and *Zyxomma petiolatum*, *Podolestes coomansi*, *Agriocnemis femina*, *Ceriagrion auranticum*, *Onychargia atrocyana*, *Pseudagrion rubriceps*, and *Copera* ciliate. The conservation status of Odonata at Punti Kayu Nature Park based on The IUCN Red List consist of 16 species that has Least Concern status and one species [*Podolestes coomansi*] that has data deficiency status.] Address: Jurusan Biologi FMIPA Universitas Sriwijaya Indonesia. Email: [rnairsyad@yahoo.co.id](mailto:rnairsyad@yahoo.co.id)

**22125.** Manger, R.; Abbingh, G.; Schinkel, H.; Mekkes, J.J. (2016): *Libellen in Drenthe*. 2. ed. Publisher: Stichting Libellenwerkgroep Drenthe: 205 pp. (in Dutch) ["This book is the result of ten years of research conducted by volunteers into the dragonfly fauna of the Dutch province of Drenthe. The result is this richly illustrated book containing a large amount of data on the province of Drenthe. The book is not only intended as a resource for local councils and managers, but also as a source of information for dragonfly aficionados. The introductory chapters deal with dragonfly ecology and research in Drenthe. The next, in-depth chapter discusses the different biotopes and landscapes found here, and the typical dragonfly species occurring here. Specific attention is paid to the likelihoods of finding dragonflies in natural reserves and agricultural areas. The largest part of the book is dedicated to the species chapter, describing the 54 species found in Drenthe. For each species habitat, lifestyle, current distribution and expectations for the future are given. The authors per species also discuss potential threats, and any measures that could be taken to protect species and their habitats. Distribution maps are included, with nature reserves overlaid on the maps, and a table with the status of each species in both the Netherlands as a whole and Drenthe in particular, the rarity, population trend and Red List status is given. Graphics show the flight times and dates of earliest and latest observation dates. For each species, multiple colour photos have been included, often showing dragonflies in flight, as well as showing their habitat. The 2016 reprint contains an extra eight pages, contains new distribution maps including data up to 2016, new photos, and revised texts." (Authors)] Address: Manger, R., Stoepveldsingel 55, 9403 SM Assen. The Netherlands. E-mail: [rene@mangereco.nl](mailto:rene@mangereco.nl)

**22126.** Yakubovich, V.S.; Koshkin, E.S. (2016): First record of the dragonfly *Aeschnophlebia longistigma* Selys, 1883 (Odonata: Aeshnidae) from Khabarovskii Krai. *Far Eastern Entomologist* 324: 15-16. (in English, with Russian summary)



[Russia: Khabarovskii krai, central part of Khabarovsk City, 11.VII 2016, 1 female] Address: Yakubovich, V.S., Department of Biology, Far Eastern Medical University, Murav'ev-Amursky Street 35, Khabarovsk 680000, Russia. E-mail: Presid\_11@mail.ru

## 2018

**22127.** Chakraborty, D. (2018): Winged guardians of rice fields: stories of dragonflies and damselflies. *Ceiba Newsletter* 1(2): 2-5. (in English) [<https://ceibatrust.org/2018/06/winged-guardians-of-rice-fields-stories-of-dragonflies-and-damselflies/>] Address: Chakraborty, Debarati; Email: debaratichakraborty31@gmail.com

**22128.** COSEWIC (2018): COSEWIC assessment and status report on the Pygmy Snaketail *Ophiogomphus howei* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. (<http://www.registrelep-sararegistry.gc.ca/default.asp?lang=en&n=24F7211B-1>). : xi + 46 pp. (in English) ["Executive Summary: Wildlife Species Description and Significance: The Pygmy Snaketail (*Ophiogomphus howei*) is a small (total length of 31–34 mm; wing length of 19–21 mm) dragonfly in the family Gomphidae, commonly referred to as the clubtails. This species is associated with clean fast-moving water. Adults are black in colour, with vivid yellow markings on the abdomen and wings, and with bright green markings on the thorax. The larvae are aquatic, small and cryptic. Distribution: *O. howei* ranges in eastern North America. It is known from two geographic areas: the Appalachian Mountains from northern New Brunswick to northeastern Georgia, and the Midwest from Minnesota, Wisconsin, Michigan, and northwestern Ontario. In Canada it is known from seven large river systems: the Saint John, St. Croix, Magaguadavic, Southwest Miramichi, Cains, and Salmon Rivers in New Brunswick, and the Namakan River in northwestern Ontario. Some snaketails are quite rare, and exuviae (castoff larval skins left behind after emergence) are the most often found evidence supporting the presence of a species. Habitat: *O. howei* larvae occur in larger, swiftly flowing, and moderate gradient rivers with unpolluted water and significant areas of fine sand or pea gravel substrate. Adults are believed to primarily reside in forest canopies near natal rivers. Searches for exuviae at many seemingly appropriate waters, and at the appropriate time of the year, have generally yielded no results for the species; suggesting that suitable habitat, including factors influencing larval success, is more narrowly defined than we currently realize. Biology: The length of time required for larvae to develop and emerge from their aquatic habitats is believed to take at least two years. In Canada, emergence occurs from late May or early June to late June and is largely associated with the synchronous emergence of other members of its genus. After emerging, adults survive for four to six weeks and are rarely encountered at water, but likely spend much of their time in the forest canopy. Population Sizes and Trends: Population estimates of abundance or trends for *O. howei* in Canada are unknown, but the US population is considered stable. Threats and Limiting Factors: Overall impact of threats to *O. howei* are considered low. Potential dam construction is a threat to the Ontario subpopulation. Invasive species can also alter the biota to the detriment of *O. howei*; however, the impact of this threat is unknown. Water pollution due to excessive nutrient input from sewage, or sedimentation due to agricultural or forestry run-off are believed to have a negligible impact on the species. Protection, Status and Ranks: *O. howei* was assessed as Special Concern by the Committee on the Status of Endangered Wildlife in

Canada (COSEWIC) in 2008, and is listed Special Concern under Schedule 1 of Species at Risk Act. It is listed as Special Concern under the New Brunswick Species at Risk Act and Endangered under the Ontario Endangered Species Act. It is ranked N2 in Canada, S1 in Ontario, and S2 in New Brunswick." (Authors)] Address: COSEWIC Secretariat, c/o Canadian Wildlife Service, Environment and Climate Change Canada, Ottawa, ON, K1A 0H3

**22129.** Fabbri, R.; Costa, M.; Cassani, G. (2018): Azioni coordinate per la conservazione di *Coenagrion mercuriale castellanii* (Roberts, 1948) in Emilia-Romagna. In: Azioni coordinate per la conservazione in Emilia-Romagna di *Osmoderma eremita* (Scopoli, 1763), *Rosalia alpina* (Linnaeus, 1758), *Coenagrion mercuriale castellanii* (Roberts, 1948), *Graphoderus bilineatus* (De Geer, 1774): 69-72. (in Italian) ["The translocation program: During the ex ante monitoring of the LIFE EREMITA project the highest number of individuals counted (n. 1513 adults in 2016; n. 1639 adults in 2017) was registered in the Natura 2000 site IT4090002. Torriana, Montebello, Fiume Marecchia in three streams in the municipality of San Leo (RN), while in the site IT4070011. Vena del Gesso Romagnola the species was found in two streams with a few dozen individuals (24 adults in 2016; 56 adults in 2017). Also during the monitoring, it emerged that within the same two sites IT4070011 and IT4090002 are the only watercourses in the region that currently present the ecological characteristics suitable for hosting the species. The Rimini population present in the IT4090002 site is fundamentally isolated from the other Romagna population present in the canals of the IT4070011 site, being at a distance of between 50 and 65 km. On the other hand, it is known that *C. mercuriale castellanii* has a low dispersal capacity and is typically a sedentary species, generally with 75% of adults not making movements greater than 100 m and 95% greater than 300 m (Watts et al., 2004; Watts et al., 2007b). Some studies demonstrate how the species can also make significant movements, over 2 km, in the open agricultural landscape (Keller et al., 2010; Keller et al., 2012; Lorenzo-Carballea et al., 2015); however, when obstacles arise, such as woods and substantial changes in altitude, its dispersion capacity decreases. In light of the historical and current distribution described, extremely reduced compared to the past, and the low dispersal capacity of the species (Watts et al., 2007a, 2007b; Keller et al., 2012), to strengthen the population present in site IT4070011 it is a translocation plan has been prepared with the aim of expanding the distribution area of the species and strengthening its population. The plan involves the movement of some adult specimens from the source site in the Rimini area (IT4090002) towards n. 6 streams present in the IT4070011 Vena del Gesso Romagnola site, following the implementation of habitat improvement and restoration interventions. The movements that will take place within the translocation plan with distances ranging from 50 to 65 km are considered transfers within the same metapopulation. It is believed that it is possible to exclude any risks of genetic pollution between different phyletic lines, as, from recent genetic analyzes (study of the mitochondrial genes COI and 16S rRNA and the nuclear genes PRMT, MLC and AgT) conducted across the entire northern European range African distribution of the species, with materials also coming from various Italian locations from Piedmont to Basilicata, including specimens collected in Romagna in the Vena del Gesso Romagnola, it is possible to state that the Italian populations belong to a single phyletic lineage (Ferreira, 2016). Even the territorial area in which we operate is ecologically similar for both sites (source and repopulation), located on low hills with withdrawal

and release heights between 110-250 m, therefore with altitudinal variations and consequently negligible phenological factors. The translocation plan involves the collection from the source site of approximately n. 170 specimens per year (with sex ratio 1:1) for a period of three years to be divided, during the release phase, among the various eligible channels on the IT4070011 site. The quantity of specimens to be released in individual sites is assessed on a case-by-case basis based on the environmental characteristics, the size of the stream, the result of ex ante monitoring activities on the size of the population and the suitability of the habitat. The translocation operations will begin in spring 2019, at the beginning of the species' activity period, and will be repeated (2 -3 times) until June of the same year. Although the species is bivoltine in Romagna, the operations will take place between April and June, when the majority of adult individuals emerge. The operations will involve the capture of adults in the stations of the IT4090002 site, which will be marked on the wings as described in the monitoring protocol of the species of the LIFE EREMITA project (Fabbri, 2017); for each specimen the size, state of health and vitality will be checked. Subsequently, the captured individuals will be placed inside a fauna box container with some plant stems and food inside (e.g. *Drosophila* sp.). The transport and release operations will take place within an estimated time frame of within two hours. Approximately 10 adults will be placed inside each fauna box and temperature checks will be carried out during the journey. The specimens will be released at the edges of the streams, in partially shaded areas not exposed to the wind. The data of the release operations will be noted on a paper sheet (date, time, environmental conditions of the release watercourse, number of specimens, etc.) and all phases of the translocation activity will be documented with photos and videos. The program developed to date must first be subjected to checks by the Ministry of the Environment and ISPRA provided for by Presidential Decree 357/97. Overall, it is expected that once the conservation plan for the species is fully implemented, in the two Natura 2000 sites in Romagna, it will occupy, at a linear estimate level, approximately 4 km of watercourses compared to the current 1.7 km." (Authors/Google translate)] Address: Fabbri, R., Museo Civico di Storia Naturale, via De' Pisis, 24. 44100 Ferrara, Italy. E-mail: r-fabbri@libero.it

**22130.** Fabbri, R.; Barbieri, C.; De Curtis, O.; Poloni, R.; Giangregorio, P.; Malavasi, D.; Monterastelli, E.; Norbiato, M.; Stefanelli, S.; Carchini, G. (2018): Aggiornamento della distribuzione di *Coenagrion mercuriale castellanii* (Roberts, 1948) in Emilia-Romagna. In: Azioni coordinate per la conservazione in Emilia-Romagna di *Osmoderma eremita* (Scopoli, 1763), *Rosalia alpina* (Linnaeus, 1758), *Coenagrion mercuriale castellanii* (Roberts, 1948), *Graphoderus bilineatus* (De Geer, 1774): 63-67. (in Italian) ["Conclusions: The presence of *C. mercuriale castellanii* in Emilia-Romagna is limited to the foothills and localized in only three stations, in separate areas of the Romagna territory. All the known populations fall within sites of the Natura 2000 network, two particularly small ones within the SCI-ZPS IT4070011 Vena del Gesso Romagnola and one, more stable and abundant, within the SCI IT4090002 Torriana, Montebello, Fiume Marecchia. The populations of site IT4070011 are separate from that of site IT4090002 as they are more than 50 km apart. The results confirm the declining trend of the species in Emilia-Romagna, also due to the fact that several reports between the 40s and 70s of the last century have no longer been confirmed recently, due to the progressive disappearance of the small sunny streams with clear and permanent waters suitable for hosting the species. The monitoring made

it possible to plan habitat improvement interventions and translocation actions aimed at strengthening the present populations. The monitoring of *C. mercuriale castellanii* represented the first application in Italy of the methods adopted by ISPRA and the Ministry of the Environment for the monitoring of species of community interest (Stoch & Genovesi, 2016). Using this method also in the ex post monitoring foreseen by the LIFE EREMITA project, for the first time there will be a time series of abundance values from which to obtain quantitative information on the population trend in Emilia-Romagna. Results: The following table shows in chronological order the previous reports (from 1877 to 2010) of *C. mercuriale* in Emilia-Romagna, extracted from the database of reports of the species, available in the archives of the Emilia-Romagna Region. In the ex ante monitoring campaigns of the LIFE EREMITA project in the two-year period 2016 and 2017, *C. mercuriale castellanii* was found to be present in the SIC-ZPS IT4070011 "Vena del Gesso Romagnola", in the province of Ravenna, and in the SIC IT4090002 "Torriana, Montebello, Fiume Marecchia", in the province of Rimini. Furthermore, a male specimen was identified, probably a wandering individual outside the Natura 2000 site, near the SCI IT4070011, in the same stream inside the site where the population is well established. site IT4090002. Torriana, Montebello, Marecchia River in three streams in the municipality of San Leo (RN). With the VES method, no. 1513 adults and in 2017 no. 1639 adults; with the CMR method, applied only in 2016, no. 375 male individuals with n. 8 recaptures (Fabbri et al., 2017). In the IT4070011 Vena del Gesso Romagnola site, n. 24 adults and in 2017 no. 56 adults. Discussion: During the ex ante monitoring, the presence of *C. mercuriale castellanii* was ascertained only in the easternmost territory of the region, despite the effort to extend the study area also to the Natura 2000 sites in the central and western Emilian sector. The species has only been found in the foothills; in particular, in two Natura 2000 sites (IT4070011 and IT4090002), located respectively in the province of Ravenna and in that of Rimini. In the IT4070011 Vena del Gesso Romagnola site the species was contacted with a few specimens only in two transects corresponding to two streams (IT4070011\_MAR\_Coe\_L8, IT4070011\_MAR\_Coe\_L5-3) in the municipality of Casola Val Senio (RA). While awaiting quantitative analyzes of the populations surveyed, the few individuals observed suggest the presence of numerically very small populations, probably due to the widespread coverage of watercourses by trees and bushes which reduce the extension of the habitat suitable for species. These two transects constitute new stations of presence of the species in Emilia-Romagna. In the same Natura 2000 site, in three other monitored transects, corresponding to three different streams, the species was not found. However, these streams present suitability characteristics that can be improved in favor of the species with appropriate and timely interventions on the habitat (thinning out and elimination of tree-shrub vegetation). The IT4070011\_MAR\_Coe\_L4 station in the municipality of Brisighella, however, is no longer suitable for the species, as for most Odonata species, following strong interference from the manager of the adjacent land, who started breeding domestic animals (poultry and other) close to the river; therefore, it was not possible to reconfirm the presence of the species in this station. In the site IT4090002 Torriana, Montebello, Fiume Marecchia the population appears to be large and stable, despite being located near the northern margins of distribution of the subspecies' range in Italy. The population is distributed in three parallel channels, ecologically connected, with discontinuous distribution, located in the Municipality of San Leo (RN). The first stream, corresponding to the IT4090002\_MAR\_Coe\_L1 transect, has the

longest low-shaded stretch and has a resurgence on the south-east side which generates a small marshy area frequented by adults of *C. mercuriale* and other species of Odonata. The third stream, corresponding to the IT4090002\_MAR\_Coe\_L3 transept, appears to be very shaded by tall trees and bushes and is also characterized, together with the second stream (IT4090002\_MAR\_Coe\_L2), by banks with numerous hedges of shrubs and brambles. However, the three streams appear to be particularly suitable for the species because they still have large stretches of their course that are not completely covered by tree-shrub vegetation. It can be assumed that, following interventions to improve the habitat for the species in the shaded stretches of streams, the population could be rapidly distributed in the new suitable stretches (Poloni, 2017). From the comparison of the results of the monitoring carried out as part of the LIFE EREMITA project with previous reports of the species in Emilia-Romagna (Table 2), it is possible to outline a fairly continuous distribution in the past in the foothills, at least between Imola and Rimini, no longer confirmed by the results of the 2016-2017 monitoring. The stations in Bologna and Modena, to which the reports of the last century refer, are no longer suitable to host the species. Other previous reports from the Romagna area were also verified in the field with negative results. The reasons for this result can be traced back to the scarcity of waterways in Emilia-Romagna with morphometric characteristics, water quality and aquatic and riparian vegetation, suitable for hosting the species. In various streams and streams there are pressure factors that reduce their suitability, such as, in order of importance: the presence of spring catchments with a reduction in flow or drying up of the stream, the abandonment of vegetation to free evolution with consequent excessive shading of the stream by shrubs and trees, the presence of civil, agricultural and industrial discharges which reduce the quality of the water, the presence of domestic animals in or close to the watercourses, the management of riparian vegetation with clear cuttings.] Address: Fabbri, R., Museo Civico di Storia Naturale, via De' Pisis, 24. 44100 Ferrara, Italy. E-mail: r-fabbri@libero.it

**22131.** Fabbri, R. (2018): Aspetti della biologia, ecologia e stato di conservazione di *Coenagrion mercuriale castellanii* (Roberts, 1948) e *Graphoderus bilineatus* (De Geer, 1774). In: Azioni coordinate per la conservazione in Emilia-Romagna di *Osmoderma eremita* (Scopoli, 1763), *Rosalia alpina* (Linnaeus, 1758), *Coenagrion mercuriale castellanii* (Roberts, 1948), *Graphoderus bilineatus* (De Geer, 1774): 56-62. (in Italian) [Verbatim] (Google translate): *C. mercuriale castellanii* (Roberts, 1948): The Mercury damselfly is a small dragonfly with a length between 2.7 and 3.1 cm and a wingspan between 2.5 and 4.0 cm. The body is slender and bright blue with black markings. The specific term mercurial derives from the helmet shape of Mercury, god of Greco-Roman mythology, from the black design on the second abdominal segment. *C. mercuriale* is a species with a predominantly West-Mediterranean geography, present from the United Kingdom and Germany to Spain and North Africa. The species is considered to be divided into three subspecies: *C. mercuriale mercuriale* present in Central Europe, *C. mercuriale hermeticum* present in North Africa and *C. mercuriale castellanii* present in peninsular Italy and Sicily (Ferreira, 2016). In light of the knowledge known so far on its distribution, the taxon *C. mercuriale castellanii* present in Italy is considered by various authors to be an endemic subspecies, while others elevate it to the rank of good species (*C. castellanii*) (Roberts, 1948; Dijkstra & Lewington, 2006; Riservato et al., 2014b; Ferreira 2016). In Italy it is reported in

all peninsular regions from Emilia-Romagna to Calabria, with the exception of Abruzzo and Molise; in the continental sector, populations located in Piedmont and Liguria are known; it is also present in Sicily, while it is not reported in Sardinia (Riservato et al., 2014b). From the historical and recent data on the presence of the species in Emilia-Romagna it is possible to outline a fairly continuous original distribution of the species in the foothills, at least between Imola and the Rimini area. Currently the species is present only in three stations included in two sites: IT4070011 "Vena del Gesso Romagnola" and IT4090002 "Torriana, Montebello, Fiume Marecchia". The species is extremely selective in the choice of breeding habitat and is ecologically demanding. *C. mercuriale* is associated with running, slow, even cold waters, in particular streams, springs and resurgences, often of a karst nature, up to 750 m above sea level. The environmental characteristics that most influence the presence and density of populations are direct exposure to sunlight from the watercourse, the constant presence of water, the presence of perennial aquatic plants for spawning, foraging and shelter, the width and depth of the stream bank and the presence of a predominantly silty substrate (Harris, 2000; Strange, 1999; Purse, 2001; Purse, 2002; Rouquette & Thompson, 2006; Rouquette & Thompson, 2007; Purse & Thompson, 2009). The adult, rather sedentary, flies from April to August and September. During the breeding season the male does not show territorial behavior; he hooks up to the female in flight, then the pair lands on the vegetation. At the end of mating, the female looks for a suitable place for oviposition, often in the company of the male and releases the eggs in the floating or partially emerged vegetation, sometimes completely immersing herself in the water; eggs take two to six weeks to hatch and development is completed in about a year (Thompson et al., 2003). Generally the species occurs monovoltine, semivoltine in Great Britain (Purse & Thompson 2003), but sometimes in the southern part of its range, such as in Southern Italy and Algeria, it behaves as a bivoltine, with two annual generations and adult activity also in September (Conci & Nielsen 1956; Dijkstra & Lewington 2006; Mahdjoub et al., 2015). This behavior was confirmed during the field activities of the LIFE EREMITA project in the Rimini site IT4090002 "Torriana, Montebello, Fiume Marecchia", where the species is present. From the first week of September to the first week of October the species had a second generation, however with a reduced number of adult individuals, around 10% compared to the number of active specimens in spring-summer, therefore with a late summer release only partial. A possible explanation could be attributable to the extension of the summer season into the first part of autumn, with mild temperatures lasting until late October (Mahdjoub et al., 2015). This has also been observed in other easily identifiable species such as *Gryllus campestris*, which in recent years has exhibited autumnal activity (Fabbri, 2015). In the northernmost Romagna site IT4070011 "Vena del Gesso Romagnola", where the species is present but with small populations, a second generation has not been ascertained. The species is included in Annex II of the Habitats Directive 92/43/EEC. In Europe, according to the IUCN, *C. mercuriale* is close to threatened (NT) and has decreasing populations (Kalkman et al., 2010; Lorenzo-Carballeda et al., 2015). The species is also considered near threatened (NT) in the Italian IUCN Red List of Odonata (Riservato et al., 2014c). The conservation status of the species, in fact, at a national level is considered favorable (Riservato et al., 2014a), while in the northern sector of Northern Italy it is considered overall inadequate due to the population trend, worsening for numerous parameters, such as range, population, habitat and future prospects (Riservato et al., 2014a, 2014b, 2014c). Even in Emilia-Romagna the conservation

status of the taxon is inadequate and has been assessed as critically endangered (CR) in the regional Red List (Ag-nelli et al., 2010). There is a real risk at a regional level that the species could disappear within a few years. In fact, there are numerous threats affecting the regional metapopulation; among the main ones we can list: collection and excessive extraction of water from springs for various purposes, evolution of the vegetation succession with a dense tree-shrub cover which causes the closure and shading of water courses, intensive agriculture practices from which it derives water pollution due to the percolation of pesticides and agricultural fertilizers, reorganization of small watercourses, decrease in rainfall due to climate change (Hassall & Thompson, 2008), presence of exotic animals which profoundly alter hydrophytic vegetation (e.g. *Myocastor coypus* and *Procambarus clarkii*), disturbance by domestic animals in the riverbed (ducks, geese, poultry, etc.) and, last but not least, in general the isolation of the subpopulations present, often characterized by a low number of individuals, together with the limited dispersal capacity of the species (Riservato et al., 2014a)." (Author)] Address: Fabbri, R., Museo Civico di Storia Naturale, via De' Pisis, 24. 44100 Ferrara, Italy. E-mail: r-fabbri@libero.it

**22132.** Frank, M. (2018): Auf der Suche nach der Hauben-Azurjungfer *Coenagrion armatum* in Norddeutschland (Odonata: Coenagrionidae). *Virgo* 20(1): 58-61. (in German) [Documentation of records of *C. armatum* from 15.05.2016, Schwarzberger Moor and Möwensee (region Süderlügum, Schleswig-Holstein, Germany).] Address: Frank, M., Zur Traubenmühle 5A, 55268 Nieder-Olm, Germany. E-mail: mikel.frank@gmx.de

**22133.** Frank, M.; Roland, H.-J. (2018): Ausgestorbene oder noch nicht nachgewiesene Libellenarten in Hessen — Teil 1. Libellen in Hessen 11: 57-73. (in German) ["Of 20 dragonfly species that have been identified in Germany but are either extinct in Hesse or have never been recorded, the first part presents the 11 species in more detail that may possibly occur new or repeatedly in Hesse. These are: *Ceragrion tenellum*, *Coenagrion lunulatum*, *Coenagrion ornatum*, *Aeshna subarctica*, *Anax ephippiger*, *Boyeria irene*, *Gomphus simillimus*, *Epitheca bimaculata*, *Oxygastra curtisii*, *Orthetrum albistylum*, *Sympetrum depressiusculum*." (Authors/Google translate)] Address: Frank, M., Zur Traubenmühle 5A, 55268 Nieder-Olm, Germany. E-mail: mikel.frank@gmx.de

**22134.** Patil, R.; Patil, Y.; Salunkhe, P. (2018): Diversity of Odonata (Dragon flies and Damsel flies) Fauna of Khanapur Tehsil, Dist. Sangli (M.S.) India. *International Journal of Creative Research Thoughts* 6(1): 1021-1030. (in English) [During Jan.2016 and Feb.2018, 10 stations were randomly selected as study sites. "Total 719 individuals of odonates belonging to 6 families, 23 genera and 34 species were recorded during the study period. The family Libellulidae with 17 species is the most dominant among the Anisoptera followed by Aeshnidae (3 spe.) and Gomphidae (2 spe.). Among the Zygoptera, the family Coenagrionidae with 9 species was the most dominant than family Lestidae (2 spe.) and family Platycnemididae (2 spe.). The richness index (Margalef's index) shown that the species richness is maximum in the site S1, Vita City area (5.728). Minimum richness is found in site S10, Banurgad village area (1.800). Among all the species of odonates the *Pantala flavescens* is found to be abundant (22.80%). The results are analyzed with present available literature." (Authors)] Address: Patil, R., Dept Zool., Balwant Coll., Vita. Dist. Sangli (M.S.), India

**22135.** Theis, O. (2018): Etat des lieux du patrimoine naturel des marais communaux de Camon (Vallée de la Somme). *College Sciences et Technologies de l'Energie et de l'Environnement de la Cote Basque, Université de Pau et des Pays de l'Adour. Licence Professionnelle Métiers de la Protection et de la Gestion de l'Environnement. Option Biologie Appliquée aux Ecosystèmes Exploités: 54 pp.* (in French) ["The alkaline peat marshes located in the commune of Camon are marked by ancient and current uses. Today, many users share the communal marshes of Camon (hunting, fishing, recreation, grazing, poplar groves). The Conservatory of Natural Spaces is interested in this as part of its management of sites along the Somme Valley. In agreement with the town hall, an inventory was carried out in 2018 through naturalist surveys. Amphibians, birds, odonates [*Aeshna grandis*; *Anax imperator*; *Anax parthenope*; *Calopteryx splendens*; *Ceragrion tenellum*; *Coenagrion puella*; *Coenagrion pulchellum*; *Crocothemis erythraea*; *Enallagma cyathigerum*; *Erythromma najas*; *E. viridulum*; *Gomphus pulchellus*; *Ischnura elegans*; *Libellula fulva*; *L. quadrimaculata*; *Orthetrum cancellatum*; *Platycnemis pennipes*; *Pyrrhosoma nymphula*; *Sympetrum striolatum*], flora and vegetation were the subject of inventories. The data collected could then be processed in order to understand how this site works. Despite numerous ponds, the Camon marshes are home to a limited number of heritage animal species. Few waterbirds nest and the flocks of amphibians and odonates are depleted. The inhospitable banks as well as the lack of small bodies of water without fish could explain this phenomenon. Regarding the flora, numerous heritage species have been inventoried. However, the reduced size of the stations, sometimes limited to a single individual, show that these species risk disappearing if nothing is done, particularly against brush and invasive species whose stations are sometimes very large. The vegetation is quite diverse. However, dynamics of siltation, megaphorbia and brush as well as colonization by invasive species reflect a certain degree of environmental degradation. Successive human interventions such as the digging of ponds, the construction of roads or the connection of the ponds with the Somme have profoundly modified the appearance of the marsh. However, despite these pessimistic observations, the presence of numerous species and vegetation with heritage value shows the potential of this site. With a strengthening of current grazing and mowing practices as well as hydrological developments, the communal marshes of Camon could become a privileged site for the sustainable reception of a diverse heritage fauna and flora." (Author/Google translate) <https://www.camon.fr/wp-content/uploads/2019/05/Rapport-des-Marais.pdf>] Address: Theis, Stage, Conservatoire d'Espaces Naturels de Picardie. 1 place Ginkgo. 80044 Amiens cedex 1, France

## 2019

**22136.** Askew, R.R.; Hermosilla, C.E. (2019): Species of *Aprostocetus* Westwood (Hymenoptera: Eulophidae) associated with eggs of *Lestes* Leach (Odonata). *Entomologist's Monthly Magazine* 115(3): 200-208. (in English) ["*Aprostocetus citripes* (Thomson) is recorded as an egg parasitoid of *Lestes virens* (Charpentier) in Spain, the first host record for this species. Aspects of its biology are described. Three other species of *Aprostocetus* whose larvae develop on *Lestes* eggs are discussed." (Authors)] Address: Askew, R.R., 5 Beeston Hall Mews, Beeston, Tarporley, Cheshire CW6 9TZ, United Kingdom

**22137.** Bechev, D. (2019): Some new data on dragonflies (Odonata) of Vrachanska Planina Mountains. *ZooNotes*



Supplement 7: 33-34. (in English, with Bulgarian summary) ["Records of three more species are added to the fauna of Vrachanska Planina Mts.: *Calopteryx splendens*, *Lestes dryas* and *Libellula depressa*. A list of all known species for this mountains is provided." (Author)] Address: Bechev, D., Department of Zoology, University of Plovdiv "Paisii Hilendarski", 24 Tsar Asen Str., 4000 Plovdiv, Bulgaria. Email: dbechev@abv.bg

**22138.** Brockhaus, T. (2019): Der Ural – Grenze und Leitlinie für die pleistozäne Ausbreitung paläarktischer Libellen (Odonata). *Libellula Supplement* 15: 11-33. (in German, with English and Russian summaries) ["The Ural – border and corridor for the Pleistocene spread of Palearctic dragonflies (Odonata) – In 2012 and 2017, dragonflies were observed in various regions on the European side of the Ural. With information from the literature, a total of 73 dragonfly species are known for the Ural and its European and Asian forelands. The dragonfly fauna is composed of both Western and Eastern Palearctic species. Especially noteworthy is the occurrence of *Somatochlora sahlbergi*, which is widespread in the Polar Ural. On the basis of my own fieldwork, as well as on the basis of existing faunistic knowledge, the function of the Ural Mountains is discussed as a limit for dispersal as well as a line of dispersal along existing corridors for various dragonfly species. During the Pleistocene, with its alternating cold and warm periods, areal extensions took place in both cold and warm periods." (Author)] Address: Brockhaus, T., An der Morgensonne 5, 09387 Jahnsdorf/Erzgebirge, Germany. E-mail: t.brockhaus@t-online.de

**22139.** Chai, J.-Y. (2019): Lecithodendriid-Like Flukes. *Human Intestinal Flukes*: 443-461. (in English) ["Three species of lecithodendriid-like flukes (families Lecithodendriidae and Phaneropsolidae) are known to infect humans. They include *Caprimolgorchis molenkampii* (syn. *Prosthodendrium molenkampii*) which belongs to the Lecithodendriidae, and *Phaneropsolus bonnei* and *Phaneropsolus spinicirrus* which belong to the Phaneropsolidae. Human infections are common in *C. molenkampii* and *P. bonnei* but rare in *P. spinicirrus*. The major source of human infections with these flukes is presumed to be aquatic naiads of dragon. or damselflies. The geographical distribution of *C. molenkampii* and *P. bonnei* extends from Indonesia to Thailand, Lao PDR, and Cambodia. The geographical distribution of *P. spinicirrus* is so far confined to northeastern Thailand." (Author)] Address: Chai, J.-Y., Dept of Tropical Medicine and Parasitology, Seoul National University College of Medicine, Seoul, South Korea

**22140.** Crucitti, P.; Brocchieri, D.; Bubbico, F.; Castelluccio, P.; Cervoni, F.; Di Russo, E.; Emiliani, F.; Giardini, M.; Pulvirenti, E. (2019): Checklist di alcuni gruppi selezionati dell'entomofauna del Parco Naturale Archeologico dell'Inviolata (Guidonia Montecelio, Roma). *XLI contributo alio studio della biodiversità della Campagna Romana a nord-este di Roma. Boll. Soc. Entomol. Ital.* 151(2): 65-92. (in Italian, with English summary) ["Checklist of selected groups of Insects from the Inviolata Natural Archaeological Park (Guidonia Montecelio, Rome). The results of a systematic survey carried out during the years 2016-2019 on selected groups of Insects belonging to Odonata, Orthopteroidae, Dermaptera, Coleoptera, Lepidoptera, Isoptera and Mecoptera, inside the Inviolata Archaeological Natural Park (Rome, Latium), are presented and discussed. The main geomorphological, climatological and vegetational features of the studied area, are described. Sampling was carried out using different methods; manual pick up, traps, light sheets, monitoring of faeces, dead animals and aquatic vegetation. The inventory

is represented by 533 taxa belonging to 101 families, all of which characterized from phenological point of view.... 28 species out of 42 mentioned were recorded in the city of Rome delimited by the GRa (Utzeri & Dell'anna, 1997), 58 in Lazio and 93 in Italy (Riservato et al., 2014) (66.6%, 48.2 % and 30.1%, respectively) included in 18 genera of 7 families. thirteen species (11 genera of 4 families) are zygoptera, 15 species (8 genera of 3 families) are anisoptera. The Odonates of Inviolata were the subject of a specific contribution (Brocchieri et al., 2018), to which *Sympecma fusca* was added, observed in April 2019 at the 1st lake of Tor Mastorta (Fig. 7). Therefore, the total number of species recorded in the Roman countryside north-east of Rome amounts to 35, equal to 37.6% of the national total and 60.3% of the species known for Lazio (Brocchieri et al., 2014; Crucitti et al., 2016; Brocchieri et al., 2018). the analysis of the chorotypes allows us to note the clear dominance of elements with a wide distribution in the Holarctic region (20 species, 71.4%). The contingents of European origin (3 species, 10.7%), of Mediterranean origin (2 species, 7.2%) and of Afrotropical origin (3 species, 10.7%) are significantly lower." (Authors)] Address: Crucitti, P., Società Romana di Scienze Naturali SRSN, Campus di Villa Esmeralda, Via Fratelli Maristi 43, 00137 Roma, Italia. E-mail: info@srsn.it.

**22141.** Durand, W. (2019): Dragonfly species new or rare to the Odonata fauna of Georgia, Armenia and Azerbaijan. *International Dragonfly Fund. Report* 135: 1-22. (in English) ["During four field trips in Georgia, Armenia and Azerbaijan from 2010 to 2018, the author collected data of a total of 55 species (see Tab. 2 in Appendix). This study provides first insights into new or rare species in this ecoregion. *Ischnura fountaineae* and *Cordulia aenea* were found for the first time in Armenia. We also highlight the rediscovery of some species that were mentioned in the older literature but had not been confirmed since. An autochthonous population of *Lestes macrostigma* was discovered in Azerbaijan 16 years after the single previous record by Dumont (2004). Original information is provided on the distribution of some rare species encountered in these countries. Finally, the identification of a puzzling *Cordulegaster* sp. observed in south Armenia is discussed briefly." (Author)] Address: Durand, E., Château Vilain RN7 13410 Lambesc, France. E-mail: mr.oizo3@gmx.fr

**22142.** Feng, Y.; Zhao, M.; Ding, W.F.; Chen, X.M.; (2019): Overview of edible insect resources and common species utilisation in China. *Journal of Insects as Food and Feed* 6(1): 13-25. ["The custom and culture of entomophagy in China has been preserved since ancient times, with a history going back at least 3,000 years. Presently, more than 300 species of insects with edible value have been taxonomically classified in China. These insect species belong to the orders Lepidoptera, Coleoptera, Hymenoptera, Orthoptera, Hemiptera, Isoptera, Odonata, Megaloptera, Ephemeroptera, Diptera and Blattaria, with a majority of these species belonging to Lepidoptera, Coleoptera and Hymenoptera. The most common include silkworm, tussah, Italian honeybee, oriental honeybee, mealworm, wasps, bamboo worm, locust, cicada, diving beetle and black ant. Since 2010, the number of patent applications for these edible insects has increased rapidly, indicating that the development and utilisation of edible insects in China is ongoing. The use of common edible insects primarily involves direct consumption of the insect body. In addition to fresh insects, frozen, canned and dried insects are also sold on the market. Derived extract products, such as protein, oil, chitin and insect health foods remain in the early research and experiment stages,

and the current production scale is small. Bees, silkworm, mealworm and oriental migratory locust come from artificial farming, as farming techniques for these insects are well-developed. Although wasps, sand-crawling insects, bean hawkmoths and bamboo worms have been artificially cultured, the necessary technologies are underdeveloped. The majority of edible insects generally accepted by the public are still primarily collected from nature. In view of the current situation of utilisation, some suggestions have been put forward to strengthen the investigation and evaluation of edible insect resources, and research to focus on utilisation methods and artificial rearing technology in China." (Authors) Address: Feng, Y., Research Institute of Resource Insects, Chinese Academy of Forestry, the Key Laboratory of Cultivating and Utilization of Resource Insects of National Forestry and Grassland Administration, Kunming, 650233 Yunnan, China P.R. Email: rirify@139.com

**22143.** French, S.K.; McCauley, S.J. (2019): The movement responses of three libellulid dragonfly species to open and closed landscape cover. *Insect Conservation and Diversity* 12: 437-447. (in English) ["1. The land cover between habitats (i.e. matrix environment) can affect connectivity by impacting organismal movement. Many animals, however, have preferences for specific matrix environments, which can affect their movement through the landscape. 2. We examined how different terrestrial matrix environments impacted the fine-scale movement of adult dragonflies. Based on previous studies of adult dragonfly dispersal and larval distributions, we hypothesised that dragonflies would prefer to enter fields rather than forests and that forests would be a barrier to dragonfly movement, due to forests' structural complexity, low understory light availability, and lower air temperatures. 3. To test how adult dragonflies responded to various terrestrial environments, we released 108 *Leucorhinia intacta*, a mixture of 108 *Sympetrum rubicundulum* and *obtrusum/rubicundulum* hybrids, and 108 *Sympetrum vicinum*, at field-forest ecotones and assessed their preferences for fields or forests. Individual behavioural responses were recorded, including their probability of taking flight, their direction of movement with respect to the two matrix types, and flight time. 4. The likelihood of adult dragonflies taking flight was species-specific in response to release location. Adults moved more frequently towards fields than forests when released at a forest edge. Individuals released within forests had shorter flight times, but again this response was species-specific. 5. The presence of an open matrix (field or meadow) is likely important for facilitating movement in dragonflies; however, forests are not movement barriers for all dragonfly species. Integrating assays of matrix and habitat preferences can provide insight into how landscape connectivity can be maintained for actively dispersing species." (Authors)] Address: French, Sarah, Dept of Biology, University of Waterloo, Waterloo, ON, Canada. Email: sarahkathrynfrfrench@gmail.com

**22144.** Helebrandová, J.; Pyszko, P.; Dolný, A. (2019): Behavioural phenotypic plasticity of submerged oviposition in damselflies (Insecta: Odonata). *Insects* 2019, 10(5), 124; <https://doi.org/10.3390/insects10050124>: 12 pp. (in English) ["*Lestes sponsa* is a common species within the temperate zone, with no special need for protection. The tactic of submerged oviposition is well known from other Odonata species, but has rarely been noticed or described in *Lestes sponsa*. Our study investigated the tactics of oviposition in this species, and shows that submerged oviposition indeed occurs frequently in *Lestes sponsa*. We experimentally tested the difference in the roles of males and females during the

submerged ovipositional behaviour by combining males/females from submerging populations with males/females from non-submerging populations. We discovered that, whereas submerging males coupling with non-submerging females did not lead to submersion, the opposite combination of pairs submerged. Other patterns of submersions are discussed further in this paper. Our research led to the conclusion that damselflies have the ability to learn and react to different situations in keeping with the learning potential of insects in general." (Authors)] Address: Helebrandová, Jana, Dept Biol. & Ecology, Fac.Science, Univ. of Ostrava, 710 00 Ostrava, Czech Republic. E-mail: xaustrik@seznam.cz

**22145.** Henze, M.J.; Lind, O.; Wilts, B.D.; Kelber, A. (2019): Pterin-pigmented nanospheres create the colours of the polymorphic damselfly *Ischnura elegans*. *Journal of the Royal Society of Interface* 16: 20180785. <http://dx.doi.org/10.1098/rsif.2018.0785>: 11 pp. (in English) ["Animal colours commonly act as signals for mates or predators. In many damselfly species, both sexes go through a developmental colour change as adults, and females often show colour polymorphism, which may have a function in mate choice, avoidance of mating harassment and camouflage. In the blue-tailed damselfly, *Ischnura elegans*, young males are bright green and turn blue as they reach maturity. Females are red (rufescens) or violet (violacea) as immatures and, when mature, either mimic the blue colour of the males (androchrome), or acquire an inconspicuous olive-green (infuscans) or olive-brown (obsoleta). The genetic basis of these differences is still unknown. Here, we quantify the colour development of all morphs of *I. elegans* and investigate colour formation by combining anatomical data and reflectance spectra with optical finite-difference time-domain simulations. While the coloration primarily arises from a disordered assembly of nanospheres in the epidermis, morph-dependent changes result from adjustments in the composition of pterin pigments within the nanospheres, and from associated shifts in optical density. Other pigments fine-tune hue and brilliance by absorbing stray light. These mechanisms produce an impressive palette of colours and offer guidance for genetic studies on the evolution of colour polymorphism and visual communication." (Authors)] Address: Wilts, B.D., Adolphe Merkle Institute, Univ. Fribourg, Chemin des Verdiers 4, 1700 Fribourg, Switzerland. E-mail: bodo.wilts@unifr.ch

**22146.** Ilhamdi, M.L.; Idrus, A.A.; Santoso, D. (2019): Kekayaan jenis capung di Taman Wisata Alam (TWA) Suranadi Sebagai Bahan penyusunan buku suplemen ipa [The richness of dragonfly species in the Suranadi Nature Tourism Park (TWA) as material for preparing science supplement books]. *Prosiding Seminar Nasional SIMBIOSIS IV, Madiun, 15 Agustus 2019*. p-ISSN: 9772599121008 e-ISSN: 9772613950003: 8-14. (in Indonesian) ["The aim of this research is to determine the richness of dragonfly species in TWA Suranadi as material for preparing science supplement books. The research method uses a roaming method following an observation transect route which consists of 4 routes, namely the left edge of the forest, the middle route, the right edge of the forest and the river water route. Dragonflies were observed using binoculars and dragonflies that had not been identified were captured using insect nets and identified in the FKIP Unram biology laboratory. The research results showed that the number of dragonfly species found was 19 species. The species most commonly found is *Pantala flavescens*, the least common is the species *Gynacantha manderica*. The species found were used as material for a science supplement book with a 10-step preparation procedure ... Conclusion: Based on

the research results, it can be concluded that (1) the Odonata found in the Suranadi Natural Tourism Park area consist of 19 species belonging to 5 families with a total of 530 individuals. (2) The highest relative abundance was found in *Orthetrum sabina* (40.25%), followed respectively by *Pseudagrion pilidorsum* (23.50%), *Diplacodes trivialis* (17.75%), *Orthetrum chrysis* (13.25%), *P. pruinatum* (8.75%), *Agriocnemis femina* (8%), *Neurothemis ramburii* (6.75%), *Pantala flavescens* (4.25%), *Aethriamanta brevipennis* (3.50%), *Copera marginipes* (2.25%), *Euphaea ochracea* (1.50%), *Lathrecista asiatica* (1.25%), *Libellago rufescens* (1.25%), *Neurothemis terminata* (1%), *Tholymis tillarga* (1%), *Trithemis furva* (0.50%), *Libellago lineata* (0.50%), *Potamarcha congener* (0.50%) and *Onychothemis culminicola* (0.25%). 3) The richness of species found in TWA Suranadi can be used as material for preparing a contextual science supplement book through 10 steps in its preparation." (Authors/Google Translate)] Address: Ilhamdi, M.L., Pendidikan Biologi FKIP Universitas Mataram, Indonesia. Email: liwa\_ilhamdi@unram.ac.id

**22147.** Kleinekuhle, J. (2019): Libellenkartierung im Rahmen der Wiekensanierung im Bereich der Hookswieke und Jheringsfehnkanal 2019. Auftraggeber: Gemeinde Moormerland, Theodor-Heuss-Straße 12, 26802 Moormerland. Auftragnehmer: Diekmann • Mosebach & Partner – Oldenburger Str. 86, 26180 Rastede: 17 pp, Anlage. (in German) [Niedersachsen, Germany. 19 odonate species have been documented.] Address: [https://www.moormerland.de/fileadmin/co\\_system/moormerland/media/Editorial/Bilder/Wieken/Hookswieke/Bericht\\_Libellen\\_Hookswieke\\_Jheringsfehnkanal\\_gesamt\\_24.01.20.pdf](https://www.moormerland.de/fileadmin/co_system/moormerland/media/Editorial/Bilder/Wieken/Hookswieke/Bericht_Libellen_Hookswieke_Jheringsfehnkanal_gesamt_24.01.20.pdf)

**22148.** Kosterin, O.E. (2019): New synonyms and a new subspecies of *Macrogomphus Selys, 1858* (Odonata: Gomphidae) from continental south-east Asia. *Zootaxa* 4615(1): 57-90. (in English) ["The taxa of the genus *Macrogomphus Selys, 1858* occurring in continental south-east Asia are reconsidered. *Macrogomphus rivularis* Förster, 1914 (described from Vietnam), *M. borikhanensis* Fraser, 1933 (described from Laos), and *M. guilinensis* Chao, 1983 (described from China), are synonymised with *M. albardae* Selys, 1878. The relationship and conspecificity of the latter with *M. parallelogramma* Burmeister, 1839 are doubtful, perhaps they are bona species. Males of *M. albardae* (and seemingly of *parallelogramma* as well) are approximately trimorphic for the pale pattern of the abdominal S3–S6, being of either a 'dashed morph' (with small isolated anteriolateral spots and conspicuous middorsal streaks), or a 'ringed morph' (with broad anterior rings and less conspicuous middorsal streaks), or an 'intermediate morph'. Validity of the species *M. matsukii* Asahina, 1986 is doubted; its holotype could be an aberrant male of *M. albardae*. The main diagnostic character of *M. albardae*, *M. phalantus* Lieftinck, 1935 and probably *M. parallelogramma*, is clarified to be the structure of the cercus inner branch. *M. phalantus jayavarman* subsp. nov. is described from temporarily inundated forest at the northern bank of the great Lake Tonlé Sap of Cambodia (Siem Reap Province, 1.5 km SSW of Kampong Pluk village, 13.1956° N, 103.9725° E, 3 m a.s.l.), which is ca 1,300 km north and overseas from the presumed range of *M. phalantus phalantus*." (Author)] Address: Kosterin, O.E., Institute of Cytology & Genetics, Siberian Branch, Russian Academy of Sciences, Lavrentiev Ave 10, 630090 Novosibirsk, Russia. E-mail: kosterin@bionet.nsc.ru

**22149.** Lima, J.C.; Gazonato Neto, A.J.; Andrade, D.; Freitas, E.C.; Moreira, R.A.; Miguel, M.; Daam, M.A.; Rocha,

O. (2019): Acute toxicity of four metals to three tropical aquatic invertebrates: The dragonfly *Tramea cophysa* and the ostracode *Chlamydotheca* sp. and *Strandesia trispinosa*. *Ecotoxicology and Environmental Safety* 180: 535-541. (in English) ["Highlights: •Acute toxicity data of metals for three species from Neotropical regions are presented. •*Chlamydotheca* sp. was more sensitive to  $\text{CuSO}_4$  than *T. cophysa* and *S. trispinosa*. •Ostracoda species were more sensitive to  $\text{CdCl}_2$  than species from temperate regions. •*S. trispinosa* was the most sensitive Neotropical native ostracod species to  $\text{HgCl}_2$ . Abstract: The relatively low availability of toxicity data for indigenous tropical species has often been discussed. In addition, several taxonomic groups of invertebrates are understudied, such as dragonflies and ostracods. The aim of the present study was therefore to evaluate the acute toxicity of four metals (cadmium, Cd, copper, Cu, manganese, Mn, and mercury, Hg) to the tropical dragonfly nymphs of *T. cophysa* and two tropical ostracod species (*Chlamydotheca* sp. and *Strandesia trispinosa*). Toxicity data for other invertebrates were also mined to allow comparing the sensitivity of the three test species with that of other (temperate and tropical) invertebrates. The order of metal sensitivity was different for the three test species: *T. cophysa*:  $\text{Cu} > \text{Cd} > \text{Hg} > \text{Mn}$ , *Chlamydotheca* sp.:  $\text{Cd} > \text{Cu} > \text{Hg} > \text{Mn}$ , and *S. trispinosa*:  $\text{Cd} > \text{Hg} > \text{Cu} > \text{Mn}$ . However, manganese was the least toxic metal tested for all three species, which is hypothesized to be due to a possible metal transfer to the cuticle of the moulting test species. The sensitivity ranking of the three test species to the metals was *S. trispinosa* > *Chlamydotheca* sp. > *T. cophysa* (except for Cu for which the ranking was *Chlamydotheca* sp. > *T. cophysa* > *S. trispinosa*). Overall, the test species are concluded to be suitable test organisms for tropical toxicity evaluations. Future studies should also evaluate the chronic toxicity and include other important metal exposure routes such as sediment and food." (Authors)] Address: Lima, J.C., Post-Graduate Program of Sciences of Environmental Engineering, São Carlos Engineering School, Univ. of São Paulo, Avenida do Trabalhador São Carlense, 400, 13.560-970, São Carlos, Brazil. E-mail address: jcslima1982@usp.br

**22150.** Liu, H.; He, G.; Wang, Q. (2019): Numerical study on the aerodynamic performance of the flexible and corrugated forewing of dragonfly in gliding flight. *Chinese Journal of Theoretical and Applied Mechanics* 51(1): 94-102. (in Chinese, with English summary) ["Dragonflies are capable of carrying out dramatic flight manoeuvres, gliding flight is a common mode of flight for dragonfly, and dragonfly wings are the source of dragonflies dramatic flight manoeuvres. Unlike typical engineered airfoil, dragonfly wings are not smooth, wing cross-section are highly corrugated. It has been shown that corrugations could enhance the spanwise stiffness in the wings and influence aerodynamic performance of the dragonfly wings. Flexibility is another characteristic of the dragonfly's wings, which is mainly manifested as the flexible deformation of the wings during the flight. To explore corrugations and flexibility effect on aerodynamic performance of the dragonfly forewings in gliding flight, a computational fluid dynamics (CFD) model and a computational structural mechanics (CSD) model of the corrugated dragonfly forewing are established based on current research, and the modal analysis verified that the model has sufficient accuracy. The corrugated rigid and flexible dragonfly forewing are acquired by using CFD method and CFD/CSD coupling method respectively. The simulation indicated that flexible and corrugated forewings is subjected to aerodynamic load, which only produces bending deformation without torsion deformation in gliding flight, and the aerodynamic response

time is short. Compared with the aerodynamic performance of the rigid and corrugated forewings, the result showed that veins and cuticular membrane of flexible forewing are deformed which caused the lift coefficient and drag coefficient decrease, the leading edge vortex of flexible forewing is much higher than rigid forewings at large angle of attack because of deformed vein. The aerodynamic performance of rigid forewings is better below 10 degree angle of attack, and the aerodynamic performance of flexible forewings is better at large angle of attack as result." (Authors)] Address: Liu, H., School of Aircraft Engineering, Nanchang Hangkong University, Nanchang 330063, China

**22151.** Marinov, M.; Ashbee, M. (2019): Dragonflies and Damselflies of New Zealand. Auckland University Press: 168 pp. (in English) ["This is a natural history and field guide to New Zealand's 14 species of dragonflies and damselflies. Easy to observe around wetlands and rivers, dragonflies and damselflies are favourites of New Zealand nature lovers, and this book will be too. Key features include: (1) Expert and up-to-date information on the 14 species breeding in New Zealand. (2) Natural history of the group including an introduction to evolution, habitats, biology, behaviour, photography and conservation. (3) More than 200 new photographs and hand-drawn illustrations of dragonflies and damselflies at all life stages in their environment. (4) Authoritative text on each species covering identification, measurement, behaviour, breeding, flying period and where to observe the species. (5) Range maps for all species." (Publisher)] Address: <https://aucklanduniversitypress.co.nz/dragonflies-and-damselflies-of-new-zealand/>

**22152.** Mendes, T.P.; Benone, N.L.; Juen, L. (2019): To what extent can oil palm plantations in the Amazon support assemblages of Odonata larvae? *Insect Conservation and Diversity* 12: 448-458. (in English) ["1. The aims of the study were to identify differences in alpha and beta diversity of Odonata larvae of the suborders Zygoptera and Anisoptera found between continuous forest sites (forest) and oil palm sites with forested buffers (oil palm), and to evaluate the extent of turnover and nestedness of communities within each habitat type. 2. 29 streams were sampled, 11 in forests and 18 in oil palm sites in the eastern Amazon. Alpha diversity of Zygoptera and Anisoptera was higher in streams at oil palm sites. Variation in species composition measured by beta diversity is primarily structured by turnover. Biotic heterogeneity of Zygoptera was higher in oil palm sites, while no difference was found in Anisoptera. 3. Forested streams had more wood in the streambed, whereas oil palm sites had finer sediment, higher non-agricultural human impact, water temperature, and road proximity index. Anisoptera turnover was positively correlated with water temperature and amount of wood in the streambed; Zygoptera turnover was positively correlated with non-agricultural human impact. 4. The patterns observed in Zygoptera can be attributed to the presence of forested buffers, which may have influenced the selection of foraging sites by adults and determined larval distribution. 5. We conclude that oil palm plantations can change the environmental structure of streams and influence genus richness and turnover in Amazon streams. These results might help explain changes caused by oil palm plantations on Anisoptera and Zygoptera assemblages." (Authors)] Address: Mendes, T.P., Laboratório de Ecologia e Conservação, Instituto de Ciências Biológicas, Universidade Federal do Pará – UFPA, Augusto Correa Street, 1. Guamá, 66.075-110, Belém, Pará, Brazil. E-mail: thiagomendes-bio@gmail.com

**22153.** Minoti, M.; Le Gall, M.; Husté, A. (2019): Biometry of the large dragonfly *Anax imperator* (Odonata: Aeshnidae): A study of traits from larval development to adults. *Eur. J. Entomol.* 116: 269-280. (in English) ["Insect larval development affects adult traits but the biometric relationships are usually poorly understood, including large odonates. In this study, measurements of morphological traits of larvae, exuviae and adults of *Anax imperator* were recorded. They were used to investigate the effects of early development on adult morphology. Results showed an increase in larval length during the final instar and the length of its exuviae significantly exceeded that of the larva. Length and body mass of teneral adults were strongly related to the length of their exuviae. Adult males were significantly longer than adult females, while both had the same body mass at emergence. Length of teneral adults was negatively related to the date of emergence in both sexes. During maturation, body mass of males only increased slightly whereas that of females increased greatly. Mature specimens were also significantly longer than teneral individuals. Body mass of mature males and length of mature females were both associated with the date of capture. Wing length did not differ between sexes or from data available from Great Britain. This study underscores the importance of taking into account larval growth in order to better understand the adult traits of odonates." (Authors)] Address: Minoti, M., Université de Rouen. ECO-DIV, Bat Blondel, Place Emile Blondel, Mont-Saint-Aignan 76821, France. E-mail: marceau.minot1@univ-rouen.fr,

**22154.** Mokaria, K.; Jethva, B. (2019): Evaluation of community composition of dragonflies and damselflies (Order: Odonata) in Nalsarovar Bird Sanctuary, Gujarat, India. *International Journal of Research and Analytical Reviews* 6(2): 474-479. (in English) ["A study was carried out in Nalsarovar Bird Sanctuary to evaluate community composition of odonates in Nalsarovar Bird Sanctuary (Ramsar Site), Gujarat. Transects survey was carried out at Nalsarovar Bird Sanctuary covering all habitats. Each transect was repeatedly surveyed in all seasons. A total of 30 species of Odonata were encountered belonging to Libellulidae, Gomphidae, Aeshnidae, Coenagrionidae, and Lestidae during the entire study. During the study, percentage frequency of occurrence, abundance and density of odonates were calculated based on data collected to evaluate community composition of Odonata in Nalsarovar Bird Sanctuary. During the entire survey, the percentage frequency of occurrence of *Brachythemis contaminata*, *Pantala flavescens* and *Trithemis pallidinervis* were recorded highest. The most abundant species encountered were *Pantala flavescens* followed by *Trithemis pallidinervis*, *Brachythemis contaminata*, *Ischnura aurora* and *I. senegalensis* respectively among all species encountered during the survey. However, the density of *Trithemis pallidinervis* were highest which was further followed by *Pantala flavescens* and *Brachythemis contaminata*, *Ischnura senegalensis* and *Ischnura aurora* respectively during the entire survey. This study can be used as a benchmark for future conservation and monitoring of Odonates in state and similar wetland worldwide." (Authors)] Address: Mokaria, K., Dept of Science, The Mahatma Jyoti Rao Phoole Univ., Jaipur, Rajasthan

**22155.** Moore, M.P. (2019): Eco-physiological causes and consequences of sexually selected color variation in dragonflies. Doctor of Philosophy, Case Western Reserve University, Biology: 246 pp. (in English) ["Many animals use elaborate adult traits to attract mates and intimidate rivals. However, the development of these sexually selected traits, and the reproductive interactions that confer their benefits,



occur against a complex backdrop of environmental factors. When such features of the habitat modify the costs and benefits of displaying and developing these traits, environmental variation across space and time can shape their diversification. Likewise, sexual selection on these characters may have consequences for how organisms interact with and adapt to different ecological contexts. Here, I explore these themes by investigating the interplay between sexually selected coloration, the external environment, and physiology in dragonflies. I begin by examining the adaptive function of wing pigmentation in *Pachydiplax longipennis*, finding that this trait is intrasexually selected. Using this dragonfly system, I then document how interactions between the environment and an organism's physiological state can drive the divergence in its sexually selected wing coloration. I first show that thermal physiology causes the performance benefits of wing coloration to depend on ambient temperature, and, as a result, males in the warmest parts of North America nearly lack this trait all together. I next illustrate how improving an individual's physiological condition to develop better sexually selected coloration can harm its juvenile survival in the presence of predators. I then consider how sexual selection could feed back to influence ecological adaptation by examining links between wing coloration and immune defense. I find that, in addition to several important ecological costs of deploying immune defenses during the larval stage (e.g. predation vulnerability, delayed emergence), producing a strong immune response directly inhibits wing color development. Moreover, when comparing across species, I show that those species with more wing coloration tend to have weaker immune responses. Thus, due to proximate trade-offs with immune defense, sexual selection on wing coloration can slow ecological adaptation, or even potentially drive maladaptation, to parasites and pathogens. Overall, this work demonstrates how eco-physiology may be an important nexus for the ecological causes and consequences of sexually selected trait variation." (Author)] Address: [https://etd.ohio-link.edu/acprod/odb\\_etd/ws/send\\_file/send?accession=case-1559907185842415&disposition=inline](https://etd.ohio-link.edu/acprod/odb_etd/ws/send_file/send?accession=case-1559907185842415&disposition=inline)

**22156.** Paulson, D. (2019): *Dragonflies & Damselflies*. A natural history. Princeton University Press. Princeton and Oxford: 224 pp. (in English) ["Dragonflies and damselflies are large, colorful, active, and visible in daylight hours, so along with butterflies they have always been among the most popular insects. They are a diverse group, the order Odonata, with 6,308 described species at present, occurring on all continents but Antarctica and all islands large enough to contain fresh water. This book is about them. There are two major groups of Odonata: dragonflies and damselflies. There is potential for confusion, as "dragonfly" in some English-speaking countries is used for both groups but in others for just one group (the "true dragonflies," suborder Anisoptera). Therefore, in this book "dragonflies" will be used when referring to the Anisoptera, "damselflies" to the other suborder, Zygoptera, and odonates when referring to all of them. It should also be noted that odonate larvae are also commonly called "nymphs" and less commonly "naiads." Almost all odonates are tied to freshwater habitats, where their larvae live, although the adults roam far and wide. Along with butterflies, they are the largest insects seen by most of us. There are no microscopic species and many that are impressively large. They are typical insects, with six legs and two pairs of wings. They lay eggs, which hatch into larvae, which grow and molt and eventually make a final molt from the larval stage to the adult stage. Odonates are carnivores throughout their lives. Although they are active predators, they are thought to eat no more than about 15 percent of their body weight in

a day; they are certainly slim and trim. Both adults and larvae fit into the food web between the smaller insects and other arthropods that are their primary prey and the birds, many of which eat odonates. They are eaten by some species in all the other vertebrate groups (fishes, amphibians, reptiles, and mammals) as well. The web is complex, though; large larvae eat fish and tadpoles and an adult may take a hummingbird. They are also eaten by other insect predators and, of course, each other. Other than the mosquitoes and other biting flies that they eat, Odonata have been of little economic significance to people. They are of great aesthetic significance, however, with their dazzling colors and aerial acrobatics enthralling anyone who stops for a moment at a wetland. This same charisma has made them favorite, almost iconic, animals of artists and designers of all sorts. Their characteristic outline can be seen on an impressive variety of jewelry, pottery, metalware, and clothing. Dragonfly is a popular brand name, with Dragonfly businesses in many large cities in English-speaking countries—everything from pubs to travel agencies, book stores to beauty parlors. There are novels with Dragonfly and Odonata in their titles. There is a musical group named Dragonfly, and more than 30 other musical groups have produced albums with the title Dragonfly. Damselfly clearly does not have the same cachet; that name is used only rarely. Because odonates are such large and prominent and easily studied insects, they have also long piqued the interest of biologists, and they are of great significance to science. Their adaptations for vision, flight, display, mating, and larval life are unique and lend themselves to speculation, theorization, observation, and experimentation. The resulting research has given us invaluable insights into nature, from freshwater ecology, competition, and predation to mating strategies, metamorphosis, and migration. One of the most interesting aspects of the Odonata, revealed again and again with close study, is the diversity of their adaptations. They very often have more than one morphological or behavioral way to accomplish a particular goal, and learning of these variations has given us an ever-growing appreciation of the special nature of these insects. But beyond this, odonates have caught the attention of amateur naturalists everywhere. Acting as citizen scientists, these dedicated amateurs are in the field day after day documenting populations of these animals by collection, observation, and photography, and often entering their data into ever-growing online databases of greater and greater value as the record of the current status of the group. This book embarks on a journey through the Odonata, peering into every aspect of the lives of these complex animals. In the first chapter, we learn about the evolutionary background of one of the oldest insect groups. When did they first appear? How much have they changed? What do they look like now? Where do they live? To understand their lives, we must know something about their variation in size, structure, and coloration. But it is their behavior that is especially interesting, and the second chapter elaborates on their predatory behavior: what they eat and how they capture prey, what eats them, and how they avoid their predators. Their superb vision and unsurpassed flight abilities are what makes them both great predators and challenging prey, and those aspects of being an odonate will be emphasized throughout the book. The third chapter delves into odonate reproductive biology. The complexity of their sex lives is notoriously interesting to biologists, as odonate reproduction contains behaviors found nowhere else in the animal kingdom. There are many dichotomies in odonate sexual behavior: elegant courtship or quick sex, copulating in flight or at rest, mating very briefly or taking inordinate time, laying eggs in or out of plants, ovipositing in flight or at rest,

and other ways in which they vary a surprising amount. Odonates are above all adaptable, their facultative behavior having allowed them to survive so well into the present. In the fourth chapter we see what goes on underwater during their extended larval life, as they are as much aquatic as they are aerial. Species breed in still or running waters, from large lakes and rivers to tiny seeps and puddles, and even containers of water well above the ground. The larvae are streamlined for fast swimming or flattened to hide among bottom detritus. They detect their prey by sight or by touch. Their emergence from the water and from their larval skin is one of the miniature spectacles of nature. What do people have to do with odonates? That is the subject of the fifth chapter. Dragonflies have sinister reputations in some cultures and are greatly admired in others. They are wonderful organisms for research and education, and they are common in representational art, both two- and three-dimensional. Although they may be more resilient to extirpation than many other freshwater organisms, their populations are still being threatened worldwide, and strong efforts are being made and must continue to be made to preserve the wetlands that they need for life. Finally, we would be surprised if there was not a great amount of diversity in a group with more than 6,000 species, and indeed there is. The sixth chapter explains a bit about how this diversity has come about and in addition presents the broad diversity of the group by featuring an introduction to the 39 families that make up the order Odonata. But it is the species themselves, the endpoints of evolution, that are really the representatives of the Odonata that we all encounter. The book features profiles of 55 of them, appending the first five chapters. For each species, the family name, average total length of males, distribution, and habitat are indicated. The species accounts are often used to make points about odonate biology not covered elsewhere in the text. After the main text, there is an extensive glossary that explains the unfamiliar terms presented about these insects, followed by lists of books and further resources, especially websites, to learn still more about them." (Author)] Address: Paulson, D.R., Slater Museum, Univ. of Puget Sound, Tacoma, WA 98416, USA. E-mail: dennispaulson@comcast.net

**22157.** Peterson, T. (2019): Trollsländor på Lidingö. Resultat av 20 års inventering. Contracting authority: Lidingö City, Environment and City Planning Office: 80 pp. (in Swedish, with English summary) [Dragonflies on Lidingö. Results of 20 years of inventory: "During 20 years of study terminated in and including 2018, 33 species of dragonflies [Insecta: Odonata] are reported from the island of Lidingö, including the archipelagos of Björkskär and Lilla Nassa, of the 52 species known from the province of Uppland. This information is collected in a data base comprising 2489 observations including imagos, aquatic larvae and exuviae. In the general part the natural history, biology, ecology, systematics and interaction with humans, nature protection, possible future species on Lidingö as well as recent observations of species is briefly presented. In the specific part the species are presented with scientific names and popular names in nordic languages and in English and German together with distribution maps covering Lidingö, Sweden and Europe. Size, key characters, similar species and frequency as well as observed flying period on Lidingö is briefly presented. The general part and the species part is illustrated with photos showing different aspects of dragonfly behaviour and different species characters. 3 species of the 33 reported are not approved in this study for reasons justified in the species headings in page 72. In three appendices a synopsis of known species of dragonflies from Lidingö is compared with the

neighbouring municipalities of Stockholm, Danderyd, Vaxholm and Nacka; a list of dragonfly species from European countries and the red list criteria of IUCN widely used in a national and international level. 10 of the species of dragonflies extant on Lidingö are nominated by Linnaeus 1758." (Author)] Address: [https://www.trollslandeforeningen.se/wp-content/uploads/2019/11/Trollsl%C3%A4ndor-p%C3%A5-Liding%C3%B6\\_slutversion.pdf](https://www.trollslandeforeningen.se/wp-content/uploads/2019/11/Trollsl%C3%A4ndor-p%C3%A5-Liding%C3%B6_slutversion.pdf)

**22158.** Roberts, D.; Al-Alawi, N.; Al-Gharibi, M. (2019): Effect of alarm chemicals and predator kairomones on the behaviour of two species of mosquito larvae. *Sultan Qaboos University Journal for Science* 24(1): 18-22. ["Mosquito larvae have developed a variety of responses to reduce the risk of predation, but this requires them to be able to identify the different species of predators and respond accordingly. We investigated the behavioural response of two mosquito species to three chemical signals: kairomones from two predators, and also to alarm semiochemicals from killed mosquito larvae. *Culex perexiguus* mosquito larvae are primarily surface filter-feeders. In response to all three chemical signals, they significantly reduced feeding by the high-risk active bottom scraping of biofilms in favour of the less active (and so lower predator-detection risk) surface filter feeding. Active escape swimming (instead of feeding) also increased for all three signals, but was much less for dragonfly nymph kairomones. Dragonflies are almost entirely bottom feeders and so are a much lower danger to surface feeding mosquitoes compared with damselfly nymphs, which feed at all depths. *Culiseta longiareolata* mosquito larvae normally have a high level of bottom-feeding. This was significantly reduced to all three chemical signals, but escape swimming only occurred for dragonfly kairomones (which are natural predators for the bottom-feeding larvae)." (Authors)] Address: Roberts, Derek, College of Science, Department of Biology, Sultan Qaboos University, P.O. Box 36, PC 123, Al-Khod, Muscat, Sultanate of Oman

**22159.** Robertson, L.A. (2019): Was Antoni van Leeuwenhoek secretive? His experiments with insect corneas. *FEMS Microbiology Letters*, fnz194, <https://doi.org/10.1093/femsle/fnz194>: 6 pp. (in English) ["It is often claimed that Antoni van Leeuwenhoek was secretive about his methods. However, closer examination of his letters suggests that this reputation was not always deserved. Some letters were not published in the Royal Society Proceedings, and others were edited. This paper describes the repetition of his experiments with the eyes of bees and dragonflies using Van Leeuwenhoek's own account of his experiments, despite the fact that only one of the four letters was published in the Proceedings." (Author)] Address: Robertson, L.A., Delft Science Centre, Mijnbouwstraat 120, 2628 RX Delft, The Netherlands. E-mail: l.a.robertson@tudelft.nl

**22160.** Schultz, B.; Koprivnikar, J. (2019): Free-living parasite infectious stages promote zooplankton abundance under the risk of predation. *Oecologia* 191(4): 411-420. (in English) ["Free-living parasite infectious stages, such as the cercariae of trematodes (flatworms), can represent substantial biomass in aquatic ecosystems, yet their interactions with other planktonic fauna are poorly understood. Given that cercariae are consumed by various aquatic predators, sometimes even preferentially over zooplankton, their presence may decrease predation pressure on free-living organisms within similar trophic niches by serving as alternate prey. Here, we experimentally examined how the presence of cercariae (*Plagiorchis* sp.) affected the population dynamics of common freshwater zooplankton (*Daphnia* sp.) in the

presence of a predator (the larval dragonfly, *Leucorrhinia intacta*) known to consume both. After seeding 48 mesocosms with starting populations of *Daphnia*, we used four treatments (12 replicates each) representing a factorial combination of the absence/presence of both cercariae and dragonfly larvae and tracked *Daphnia* populations over 4 weeks. We found a significant interaction between the presence of cercariae and predators on *Daphnia* population size. When faced with predation pressure, *Daphnia* reached ~50% higher numbers when accompanied by cercariae than without, suggesting a "protective" effect of the latter by acting as substitute prey. Within aquatic ecosystems, an abundance of trematodes may prove advantageous for zooplankton communities that share common predators, but further studies will be needed to determine how this varies depending on the predator, trematode, and zooplankton taxa involved." (Authors)] Address: Koprivnikar, Janet, Dept of Chemistry and Biology, Ryerson Univ., 350 Victoria Street, Toronto, ON, M5B 2K3, Canada

**22161.** Shanmugam, A.R.; Sohn, C.H. (2019): Numerical investigation of the aerodynamic benefits of wing-wing interactions in a dragonfly-like flapping wing. *Journal of Mechanical Science and Technology* 33(6): 2725-2735. ["Numerical simulations are performed to investigate the aerodynamic benefits of wing-wing interactions on a dragonfly-like flapping wing while hovering, at a value of Reynolds number  $Re$  set to 630. The local phase shift  $\psi$  and wing spacing  $L^*$  ( $L/c$ ) are varied to observe their influence on aerodynamic performance. The results show that the aerodynamic benefits due to interactions are strongly dependent on both  $\psi$  and  $L^*$ . The wing-wing interactions are beneficial for the in-phase stroking pattern at  $\psi = 0^\circ$  when  $1.2 \leq L^* \leq 2.3$ , while it is extremely detrimental for the counter stroking pattern at  $\psi = 180^\circ$  when  $1.2 \leq L^* \leq 2.3$ ; these benefits and drawbacks are dependent on the timing of the interactions. The best case, when  $\psi = 0^\circ$  and  $L^* = 2.1$ , can increase the time-averaged vertical force coefficient  $C_v$  up to ~10 % in comparison to the without-interaction case. Two unsteady flow features namely the "enhanced dipole structure" and the "in-sync of wake capture and wing-wing interactions" are observed that increase the vertical force generation in hovering dragonflies. The overall downward momentum imparted by the wing is larger for  $\psi = 0^\circ$  in comparison to  $\psi = 180^\circ$  as the wake has high vertical velocities due to the constructive role played by wing-wing interactions." (Authors)] Address: Shanmugam, A.R., School of Mechanical Engineering, Kyungpook National Univ., Daegu, Korea

**22162.** Soldati Lacerda, D.S.; Machado, A.B.M. (2019): The damselfly genus *Mecistogaster* (Odonata: Pseudostigmatidae) from the Brazilian Atlantic Forest with a description of three new species and a neotype designation for *M. amalia* (Burmeister, 1839). *Zootaxa* 4668(2): 207-228. (in English) ["*Mecistogaster* Rambur, 1842 is a genus of Pseudostigmatidae with five species distributed from Mexico to Argentina. Four of these occur in Brazil, two of which were recorded on the Atlantic Forest, *M. amalia* (Burmeister, 1839) and *M. linearis* (Fabricius, 1776). After examining 140 specimens of *Mecistogaster amalia* it was possible to conclude that it is a complex of species and three new species are described, *M. kesselringi* sp. nov., *M. mielkei* sp. nov. and *M. nordestina* sp. nov. The males differ from each other mainly by the presence or absence of alula, the area occupied by the reddish-brown color of the mesepimeron and penis structure. The females differ mainly by the region occupied for the pale apical area of wing and epiproct shape. The problem of Burmeister's type of *M. amalia* is discussed and a

neotype is erected for it. Distribution and phenology data are provided. A key for males recorded from Brazilian Atlantic Forest is presented." (Authors)] Address: Soldati Lacerda, Déborah, Laboratório de Sistemática de Insetos, Departamento de Zoologia, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Caixa Postal 486, 31270-901, Belo Horizonte, Minas Gerais, Brazil. E-mail: desoldati@gmail.com

**22163.** Strobl, K. (2019): Evaluating restoration success of rewetted peatlands: Recovery potential, temporal dynamics and comparison of monitoring approaches. PhD thesis, Fakultät Wissenschaftszentrum Weihenstephan für Ernährung, Landnutzung und Umwelt der Technischen Universität München: 79 pp. (in English, with Germany summary) [Bavaria, Germany "Ecological restoration has great potential for counteracting global losses in biodiversity and ecosystem functioning caused by unsustainable human land use. It aims at assisting the recovery of degraded ecosystems. Many restoration projects focus on peatlands, because of the significance of these ecosystems for adaptation and mitigation of climate change. Intact peatlands provide important ecosystem services like storage of water and carbon, and offer habitats for rare and endangered species, while they are highly threatened by drainage, peat extraction and afforestation. Peatland restoration supports biodiversity and ecosystem functions by creating near-natural habitat conditions, mostly through rewetting. While most meta-analyses report an incomplete short-term recovery of restored ecosystems, their longterm dynamics remain largely unknown. Peatland recovery is commonly monitored shortly after restoration, but peatlands develop slowly and initial trends may not continue. Moreover, restored peatlands are expected to provide multiple ecosystem services. This makes their assessment and evaluation of success challenging and requires novel monitoring approaches. Thus, the goals of this thesis are (1) to contribute to the scientific understanding of peatland recovery and its temporal dynamics, and (2) to improve monitoring indicators and analytical methods. For this purpose, I established a chronosequence of 18 years after rewetting in 14 peatlands in a mountainous region in Central Germany comparing three drained, 19 restored and one near-natural peatland transect. Peatlands in the study region had been previously drained and afforested, and from 1998 onwards were rewetted by damming, filling of drainage ditches and removing of trees. For monitoring several ecosystem properties (i.e. water table, peat decomposition, water holding capacity, nutrient level) and characteristic peatland biodiversity (plants, dragonflies and butterflies) were assessed. I also set up a field experiment on phytometer plants in seven restored peatlands and an associated greenhouse experiment. In the first article of the PhD thesis, temporal trends of plant, dragonfly and butterfly diversity were analysed and related to restored habitat conditions. It showed that, rewetting improved habitat conditions, vegetation structure and species diversity. Plants and dragonflies benefitted most from rewetting, while no specialized butterfly species were found within two decades after rewetting, and also generalists increased only temporarily. This is most likely due to poor regional connectivity of the (restored) peatlands. Dragonflies colonized immediately, once suitable bog pools were present in restored sites. Plants more slowly developed towards reference conditions, and mostly depended on undegraded peat with a high water holding capacity. These findings suggest, that recovery is not complete after 18 years and that the three species groups are complementary indicators for restored peatlands. The second article studied the responses of three characteristic

peatland plants (*Drosera rotundifolia*, *Eriophorum vaginatum*, *Vaccinium oxycoccos*) to restored environmental conditions by measuring various fitness traits in two phytometer experiments. While all three species are indicators for intact peatlands, their responses to rewetting were species-specific. *E. vaginatum* performed best, since all individuals survived under field conditions. The development of *D. rotundifolia* and *V. oxycoccos* was less successful, but also those species locally found suitable habitat conditions. These results highlight that local site limitation occurs, but also point at dispersal limitation. Among all measured fitness traits, many growth traits were partly redundant, and survival provided the most conclusive results for species adapted to stressful habitats. Generally, the most suitable fitness trait depends on the growth form of the respective species. The third article analyses the simultaneous recovery of multiple peatland properties with time since restoration using different multifunctionality approaches. As a reference, an optimum level was defined as the mean of the eleven highest values, while the intact peatland was excluded from the analysis. Nine out of 13 studied properties as well as the combined index significantly improved with time since restoration. Most important changes were observed within the first five years, inside the rewetted ditches, and at low or intermediate levels of functioning. A simultaneous recovery of multiple properties at high levels of functioning was not observed. These results highlight, that heavily degraded peatlands show considerable improvements in the first years after restoration, while they cannot fully recover within two decades. The general discussion compares the main findings in order to derive overall conclusions and recommendations for future monitoring and peatland management. New approaches like the use of phytometers or multifunctionality approaches are promising, but differ in their degree of comprehensiveness and explanatory power and therefore need to be carefully selected according to project goals. Indicators (ecosystem properties, taxonomic groups, species traits) differ in their response to the same treatment and therefore have to be thoroughly chosen. Restored peatlands need to be surveyed even longer than two decades in order to understand if full recovery is possible. Finally, additional management measures (dam reinforcement, repeated tree removal, improved connectivity, species introduction) should be further explored in order to advance peatland restoration to its best.] Address: <https://mediatum.ub.tum.de/doc/1484-578/1484578.pdf>

**22164.** Uniyal, A.; Prakash, C.; Upadhyay, V.; Nautiyal, B. (2019): Diversity of Odonata in the region of Doon Valley, Uttarakhand. *International Journal of Entomology Research* 4(1): 5-8. (in English) ["The present study revealed occurrence of 19 species of Odonata in Doon valley. Species from the family Libellulidae was observed to be the most dominant in Doon valley. *Orthetrum pruinosum* is the most common species found in the selected area. The present study provided the diversity and distribution of Odonata in Doon valley which would be helpful for future research." (Authors)] Address: Uniyal, A., College of Bio-Medical Sciences & Hospital, Dehradun, Uttaranchal, India

## 2020

**22165.** Abbati, M.A.; Usman, U.F.; Alkali, A. (2020): Distribution and abundance of benthic macroinvertebrate in Lande stream, Tumu, Gombe State, Nigeria. *International Journal of Current Research* 12(1): 9178-9181. (in English) ["Three sampling sites (A, B, and C) were selected. Macroinvertebrates sampled fortnightly for three months (September-

November, 2019) ... Simpson's index was employed to determine the abundance in each sampling station. The results showed a total of 189 individual species of Macroinvertebrate in 7 families among the five invertebrates taxa of Plecoptera, Coleoptera, Hemiptera, Odonata and Mollusca. The taxa abundance of Lande Stream arranged in descending trend as Mollusca > Odonata [Aeshnidae, Gomphidae] > Coleoptera > Hemiptera > Plecoptera with respective total invertebrates values of 37.73%, 25.4%, 20.63%, 8.47% and 7.94%. The Simpson's Species diversity index for the three sampling stations of A, B and C were 0.922, 0.9004 and 0.8613 respectively... while the Dominance index of A, B and C were 0.078, 0.0996 and 0.1387 respectively." (Authors)] Address: Abbati, M.A., Department of Biological Sciences, Federal University of Kashere, Gombe, Nigeria

**22166.** Aditya, S. (2020): Institutional ground serves as a safe haven for birds, butterflies and odonates – A case study from Kolkata. *International Journal of Advancement in Life Sciences Research* 3(4): 9-16. (in English) ["The objective of the present review is focussed on the assessment of the diversity of butterflies, birds and odonates with vegetation composition of habitat and conservation priorities in a college campus. A combination of direct search and opportunistic sighting methods were applied to record... 23 different Odonata species (18 Anisoptera and 5 Zygoptera) from the study area during the period 2014-2016. Our observation emphasizes that the institutional campus fulfils an environment favourable for harbouring a rich and diverse fauna. This study aims to focus on creation of a comprehensive biodiversity management program to properly monitor the diverse flora, fauna as well as the habitat in and around the college ground." (Author)] Address: Soma Aditya (Bandyopadhyay), Department of Zoology, Sarojini Naidu College for Women, 30, Jessore Road, Dum Dum, Kolkata – 700 028, West Bengal, India. Correspondence E-mail: [somaadityabandyopadhyay@gmail.com](mailto:somaadityabandyopadhyay@gmail.com)

**22167.** Bazan Carranza, D (2020): Determinación de la calidad del agua de los Humedales de Eten utilizado macroinvertebrados Odonata, Coleoptera, Diptera y Hemiptera durante Septiembre 2019 – Abril 2020. *Universidad de Lambayeque*: 81 pp. (in Spanish, with English summary) ["The "Eten Wetlands" is an ecosystem that has great ecological importance, declared an Ecological Area of Regional Interest, however, it faces various environmental problems thanks to different anthropic pressures. Over time, different investigations have been carried out in the area, however, it is important to have more information about its biological components using biotic integrity indices, these relate biological, environmental variables and human activities, which is why the main objective of The research was to determine the water quality of the Eten Wetlands using macroinvertebrates of the order Odonata, Coleoptera, Diptera and Hemiptera as bioindicators, for which 5 sampling stations were established, in 2 study periods, with a lower water level (September 2019) and higher water level (April 2019), where the environmental and physicochemical characterization of the water was performed, resulting in an „Good“ environmental state and an average water temperature of 24.24°C, an average pH of 8.1, conductivity electric of 11853 µS / cm, a BOD5 of 125 mgO<sub>2</sub>/L and dissolved oxygen of 5.33 mgO<sub>2</sub>/L., and using the quantitative collection method Using a Surber network, 11,552 individuals were collected, of which 13 macroinvertebrate species grouped into 9 families and 4 orders were identified. The environmental characterization was carried out and the biological metrics of Shannon Wiener, BMWP / Col, ASPT and SWAMPS were used to determine



the water quality of the Eten wetland, resulting in water with a high degree of contamination." (Author)] Address: <https://core.ac.uk/download/389312615.pdf>

**22168.** Bonometto, L. (2020): Le libellule del Cadore. Le specie gli habitat, il loro declino, le tutee possibili. Parco Naturale Regionale delle Dolomiti d'Ampezzo (ed.): 195 pp. (in Italian) [<https://www.dolomitiparco.com/Materiali/Testi/LibelluleCadore-compresso.pdf>] Address: Regole d'Ampezzo, Via Mons. P. Frenademez, 1 32043 Cortina d'Ampezzo, Italia

**22169.** Buczyński P.; Bojar, P.; Buczyńska, E.; Góral, N.; Tańczuk, A.; Tarkowski, A. (2020): Dragonflies (Odonata) of the Nowiny Nature Reserve (Roztocze Upland, south-eastern Poland). *Rocznik Muzeum Górnosląkiego w Bytomiu Przyroda* 26(online 012): 1-14. (in Polish, with English summary) ["In 2020 the fauna of dragonflies was studied in the Nowiny Nature Reserve comprising of 5 midforest land depressions with strongly hydrated transitional and raised bogs, some with water bodies. 33 species were recorded (46% of the national fauna), 29 of which were autochthonous or probably autochthonous. In these depressions, 14 to 24 species were recorded. The fauna was dominated by stenotopic species of peat bogs and eurytopic species. Moreover, individual species indicating the drying process of some of the sites (*Lestes dryas*) as well as instability of assemblages (*Libellula depressa*) were recorded. A limnophilous species *Anax parthenope* was recorded on the site with the largest water body (0.27 ha). In the summer, the high number and high breeding activity of thermophilous *Aeshna affinis* were observed. In general, the Nowiny Nature Reserve is an important area for the protection of peat bog fauna because of the odonate assemblages and the occurrence of such species as *Aeshna subarctica* and *Somatochlora arctica*. However, the absence of some expected species (e.g. *Aeshna juncea* and *Leucorrhinia dubia*), low number of some specialists (e.g. *Leucorrhinia rubicunda*) as well as intensive colonization of the researched area by *Aeshna affinis* may suggest the change of its fauna. It is not resulted from the degradation of habitats, but rather from the climate warming which is unfavourable for Siberian dragonflies *sensu* St. Quentin (1960) and favourable for thermophilic ones. Probably in the southern part of Poland, stronger decline of species from the first group is in progress with the simultaneous expansion of species from the second one. These two processes involve not only geographical ranges, but also extending the habitat base. It may intensify the problem with protection of typhobionts and typhophiles, a part of which is already endangered." (Authors)] Address: Buczyński, P., Dept of Zool., Maria Curie-Skłodowska University, Akademicka 19, PL-20-033 Lublin, Poland. E-mail: pawbucz@gmail.com

**22170.** De, K.; Ali, S.Z.; Dasgpta, N.; Uniyal, V.P.; Johnson, J.A.; Hussain, S.A. (2020): Evaluating performance of four species distribution models using Blue-tailed Green Damselfly *Anax guttatus* (Insecta: Odonata) as model organism from the Gangetic riparian zone. *Journal of Threatened Taxa* 12 (14): 16962-16970. (in English) ["In this paper we evaluated the performance of four species distribution models: generalized linear (GLM), maximum entropy (MAXENT), random forest (RF) and support vector machines (SVM) model, using the distribution of the *Anax guttatus* in the Gangetic riparian zone between Bijnor and Kanpur barrage, Uttar Pradesh, India. We used forest cover type, land use, land cover and five bioclimatic variable layers: annual mean temperature, isothermality, temperature seasonality, mean temperature of driest quarter, and precipitation seasonality to build

the models. We found that the GLM generated the highest values for AUC, Kappa statistic, TSS, specificity and sensitivity, and the lowest values for omission error and commission error, while the MAXENT model generated the lowest variance in variable importance. We suggest that researchers should not rely on any single algorithm, instead, they should test performance of all available models for their species and area of interest, and choose the best one to build a species distribution model." (Authors)] Address: De, K., Wildlife Institute of India, Chandrabani, Dehradun, Uttarakhand 248001, India. E-mail: kritish.de@gmail.com

**22171.** Grill, M. (2020): Vorkommen und Lebensräume der Quelljungfern (*Cordulegaster* spp.) im Inneren Salzkammergut. Diplomarbeit, Karl-Franzens-Universität Graz: 81 pp. (in German, with English summary) ["Occurrence and habitats of the dragonfly genus *Cordulegaster* spp. (Insecta: Odonata) in the Inner Salzkammergut. The occurrence and habitats of the dragonfly genus *Cordulegaster* spp. (Insecta: Odonata) was recorded in the inner Salzkammergut, in the areas of Bad Ischl, Bad Goisern, Hallstatt, Obertraun and Gosau. First, potential habitats were identified by remote reconnaissance using the "Austrian Map" of the BEV. Subsequently, mostly in the period from September to October, field work was carried out, looking for the presence of larvae in 64 potential habitats. In addition, habitat parameters such as altitude, flow speed, water temperature, width of the water and the pH value were noted. Specimens of the *Cordulegaster* spp. could be found at eleven locations. Larvae of *C. bidentata* and *C. boltonii* were found at a total of nine sampling sites. Adults were only found in two of the study areas. *C. heros* could not be found. The habitats of *Cordulegaster* spp. were then evaluated according to the categories "population", "habitat quality" and "impairments". The studies of the habitat parameters showed that *C. boltonii* and *C. bidentata* larvae in the Salzkammergut prefer to develop in slow-flowing, one to two meter wide streams at an altitude of 500 to 600 meters. However, there were also finds at around 800 meters above sea level. Both *Cordulegaster* species require an at least partially wooded bank and a fine gravel / sandy to muddy brook bed." (Author)] Address: <https://unipub.uni-graz.at/obvu-grhs/download/pdf/5564974?originalFilename=true>

**22172.** Hobson, K.A.; Jinguji, H.; Ichikawa, Y.; Kusack, J.W.; Anderson, R.C. (2020): Long-distance migration of the Globe Skimmer Dragonfly to Japan revealed using stable hydrogen ( $\delta^2\text{H}$ ) isotopes. *Environmental Entomology*, nva417, <https://doi.org/10.1093/ee/nva417>: 9 pp. (in English) ["*P. flavescens* is a long-distance migrant, well adapted to exploiting ephemeral waterbodies. This species occurs in Japan every summer, but overwintering has only been recorded on subtropical Ishigaki Island. It is not known from where the summer immigrants originate, nor what proportion of the globe skimmers seen in Japan are of local origin. We analyzed stable hydrogen isotope ( $\delta^2\text{H}$ ) composition of wings of 189 *P. flavescens* captured at six sites in Japan from August to September in 2016 (n = 57) and from April to November in 2017 (n = 132). We determined that the majority of individuals were immigrants. Individuals of probable Japanese origin occurred only later in the year and were of lower mass on average than immigrants. Immigrants potentially originated from a broad area as far west as northern India and the Tibetan Plateau and, especially late in the season, as near as northcentral China and the Korean peninsula. However, for April samples, the most parsimonious interpretation suggested southern origins, in northern Myanmar to southern China, or possibly Borneo-Sulawesi. Our

investigation underlines the power of combining stable isotope data with other information such as wind speed and direction, arrival dates, and body mass to estimate origins and to understand the life history of this and other insects." (Author)] Address: Hobson, K., Department of Biology, University of Western Ontario, 1151 Richmond Street, London, ON N6A 5B7, Canada. Email: khobson6@uwo.ca

**22173.** Meza-Salazar, A.M.; Guevara, G.; Gomes-Dias, L.; Cultid-Medina, C.A. (2020): Density and diversity of macroinvertebrates in Colombian Andean streams impacted by mining, agriculture and cattle production. *PeerJ* 8: e9619 <http://doi.org/10.7717/peerj.9619>: 26 pp. (in English) ["Background. Mining, agriculture and cattle production are activities that threaten the quality and quantity of water resources in the Colombian Andes. However, many drainage basins in this region have not been subjected to simultaneous evaluation of the impact these activities have on the density, diversity and composition of aquatic macroinvertebrates (AMI). The first two of these ecological variables are expected to decrease drastically from zones with no apparent impact towards areas with anthropogenic activity, which areas with mining will present the most impoverished AMI community. Methods. We evaluated the density, diversity and composition dissimilarity of AMI in streams impacted by gold mining, agriculture and cattle production. Two reference streams were also studied. Six benthic samplings were conducted bimonthly (Feb 2014–Feb 2015) using a Surber net. Water samples were taken in order to make environmental evaluation among the aforementioned streams, including hydrological, physicochemical and bacteriological parameters (HPCB). Diversity was evaluated as the effective number of RTUs—recognizable taxonomic units—by comparing the richness, typical diversity, and effective number of the most abundant RTUs. Compositional dissimilarity was examined with nMDS and CCA analysis. Results. A total of 7,483 organisms were collected: 14 orders, 42 families and 71 RTUs. Our prediction regarding the density and diversity of AMI (Reference > Cattle production > Agriculture > Mining) was partially fulfilled, since the agriculture-dominated stream presented a more impoverished AMI community than that of the gold mining stream. However, these streams presented lower diversity than the cattle production and reference streams, and the AMI density only differed significantly between one reference stream and the agriculture stream. The AMI composition in the agriculture-dominated stream clearly differed from that of the other streams. How to cite this article Meza-Salazar AM, Guevara G, Gomes-Dias L, Cultid-Medina CA. 2020. Density and diversity of macroinvertebrates in Colombian Andean streams impacted by mining, agriculture and cattle production. Discussion. The observation of a more impoverished AMI community in agricultural production areas compared to those with mining or cattle production may reflect the importance of the remaining riparian vegetation, which was scarce at the stream with agricultural activity. Moreover, the low diversity, and mainly the reduced AMI richness, in the agriculture stream coincided with the absence of insect genera are intolerant to deterioration of the biological and physicochemical conditions of the water (e.g. Anacroneria). Conclusions. The results suggest that the local impact of agricultural activities may be of equal or greater magnitude than that of mining in terms of AMI density, diversity and composition, in the Colombian Andean riverscape. Future studies should systematically evaluate, throughout the annual cycle, the relative effects of the productive land use, the remaining native vegetation cover and the consequent changes in the HPCB parameters of the water on AMI communities in Colombian

Andean basins." (Authors) Calopterygidae, Libellulidae] Address: Meza-Salazar, Ana M., Facultad de Ciencias Exactas y Naturales, Grupo de Investigación BIONAT, Universidad de Caldas, Manizales, Caldas, Colombia

**22174.** Román-Heracleo, J. (2020): Diversidad de libélulas (Insecta: Odonata) en ambientes lénticos con diferente grado de alteración antropogénica. Tesis de maestría, Ciudad Universitaria "Rodrigo Facio", Costa Rica: 105 pp. (in Spanish or English) ["Costa Rica is the Central American country where the dragonfly fauna is best known. However, studies have been focused mainly on lotic environments, generating an information gap in lentic environments. The increase in urbanization impacts freshwater ecosystems, generating changes in the landscape and is one of the most significant anthropogenic impacts that threatens biodiversity. This research was carried out for a year in six lagoons: two urban (La Sabana and La Paz), two semi-urban (Lankester and Doña Ana), and two rural (CATIE and El Rodeo). The objective was to evaluate the dragonfly assemblages and relate them to the environmental parameters of each site, as well as to raise larvae in order to associate the larva-adult stages for the species found. The capture of adults was carried out using an entomological net, with a total sampling effort of 5 hours (9:00-14:00pm). For data analysis, a Principal Component Analysis (PCA) was performed to identify the patterns in the lakes using the environmental variables and a similarity test (ANOSIM) was performed to determine the significance of the groups. formed. Finally, a Canonical Correspondence Analysis (CCA) was performed to determine the relationship between the taxa collected in each of the lagoons and the data on the environmental variables. In total, 644 adult specimens from 6 families, 29 genera and 51 species were collected. The families with the greatest richness were Libellulidae with 53% (29 spp.), followed by Coenagrionidae with 25% (15 spp.). The families with the least richness were Lestidae and Gomphidae with one species each. The most diverse genera were Micrathyrina (Libellulidae) with 10% (5 spp.), followed by Argia, Erythemis, Erythrodiplax with 8% of the total species richness (4 spp. each). The ANOSIM confirmed that the assembly of groups is statistically different ( $R=0.68$ ,  $p=0.001$ ). The CCA showed the effect of four physicochemical variables on the assembly of the Odonata ( $\chi^2 = 0.54$ ,  $F=2.58$ ,  $p=0.001$ ). The first two dimensions of the CCA have a significant effect: CCA1 ( $\chi^2 = 0.23$ ,  $F=4.44$ ,  $p=0.001$ ), CCA2 ( $\chi^2 = 0.15$ ,  $F=2.82$ ,  $p=0.008$ ) and we observe the formation of four groups. From the larvae raised in the laboratory, species from the families Aeshnidae, Libellulidae and Coenagrionidae were associated. Of which three species: Acanthagrion speculum, A. trilobatum, Anisagrion allopterum were associated and described for the first time and the redescription of Neoerythromma cultellatum was carried out, these species belong to the family Coenagrionidae. Our results show a high importance of urban aquatic environments for the conservation of species. A good design in the arrangement of lakes with good water quality can serve as a corridor connecting species between the urban and rural landscape, and in this way help not restrict their distribution. Furthermore, this study demonstrated that the protection and management of urban lagoons is essential to maintain the diversity of organisms." (Author/Google translate)] Address: <https://www.kerwa.ucr.ac.cr/bitstream/handle/10669/81905/Tesis%20Jareth%20Rom%c3%a1n-Heracleo.pdf?se%20sequence=1&isAllowed=y>

**22175.** Saikim, F.H.; Nordin, N.M.; Zakaria, M.Z.; Anas, N.I.; Ismail, N.; Rahman, A.A.A.; Hamdin, M.S.; Ismail, A.; Yusah, K.M.; Dawood, M.M.; Le, G.; Hamzah, Z. (2020): Tourists'

perceptions of insects as the determinants of insect conservation through entomological ecotourism. *Journal of Tropical Biology and Conservation* 17: 79-95. (in English) [oas 72: "Insects are commonly featured in recreation and tourism around the world, despite the generally negative public perception surrounding them. Many people enjoy watching butterflies in insectarium gardens, observing and collecting dragonflies, and admiring the light displays of fireflies. In many cases, activities like these are becoming increasingly popular and these positive interactions with insects encourage public appreciation of insects, but vary acutely in their forms and approaches. Thus, understanding the pattern of insect appearances in recreation and tourism activities in a variety of discernments can provide important insights into effective ways of promoting insect conservation through ecotourism, which is often overlooked in biodiversity conservation strategies. However, these types of interdisciplinary studies are relatively new and remain limited in both entomology and tourism sciences. A field survey was carried out at Kangkawat Research Station, Imbak Canyon Conservation Area, where a 1 kilometre entomological ecotourism trail was designed and developed to incorporate insects in enhancing ecotourism at the reserve. Insects that can be found along the 1 kilometre trail were recorded and the collection was conducted using baited traps and sweep netting. Based on the insects survey, the Shannon Diversity Index (H') of Kangkawat is 4.60 while Simpson Index is 176.72 with Fisher Alpha Index at 313.3 that concludes Kangkawat Research Station insect richness to be the second highest after the Crocker Range. In addressing the knowledge gaps between insect conservation and ecotourism, a survey on attitudes towards insects was designed and then completed by 384 tourists around Kota Kinabalu City. The standardized questionnaire known as the Personal Meaning of Insects Map (PMIM) was administered to tourists and their responses were elicited prior to and after observing insect photos. The results shows that "spider" had the 100% connectivity in response to the most detested insect based on their previous encounters with insects. This result shows that there is an existing entomology knowledge gap among the respondents, indicating the need for further interventions in terms of nature interpretation. Therefore a quality guided nature interpretation as an educational tool should take into account how the general public understands (or misunderstands) insects further and where interpretive information could be better applied if we are to develop management and educational tools that address human-insect encounters." (Authors)] Address: Saikim, F.H., Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia. Email: fiffy@ums.edu.my

**22176.** Tanczuk, A. (2020): Recenzja — Review. SMALLS-HIRE D., SWASH A. *Europe's Dragonflies. A Field Guide to the Damselflies and Dragonflies.* Princeton University Press, Princeton, New Jersey 2020, 360 s.. *Odonatrix* 1612 (2020): 3 pp. (in Polish, with English summary) ["The field guide is devoted to 140 species of European dragonflies and damselflies, including 13 endemic to Europe, divided into 16 major groups: 7 of damselfly and 9 of dragonfly recorded up to 2018. It is equipped with useful tools making the book easy to follow and to work with. It contains information concerning conservation status, legislation, general status, distribution maps, flight period, short identification tips in bold inside the text about each species, aspects of behaviour, breeding habitats and measurements of adult individuals. The international symbols are used as well as the English and scientific names of species based on up-to-

date nomenclature. Good-quality photos, comparing tables and look-alikes sections within the family of dragonflies and damselflies help in identification of the similar species. Photographic images were carefully selected to present both sexes and immature or old individuals colour forms and geographical variations." (Author)] Address: Tanczuk, Agnieszka, ul. Przasniczki 2/40, 20-838 Lublin, Poland. Email: atanczuk@gmail.com

**22177.** Štih, A.; Koren, T.; Frankovic, M. (2020): New data and checklist of dragonflies (Odonata) of Lastovo Island, Croatia. *Libellula* 39(3/4): 179-192. (in English, with German summary) ["In this paper we report the first overview of dragonfly fauna of Lastovo Island, southern Croatia, based on published literature data and recent surveys conducted in 2014 and 2018. So far 16 species have been recorded on the island. The following five species were detected for the first time for the island within this survey: *Ischnura elegans*, *Aeshna isocetes*, *Anax parthenope*, *Sympetrum sanguineum*, and *Selysiotthemis nigra*. Of the recorded species the most important is the record of *S. nigra*, an endangered species according to the Red book of Odonata of Croatia, known only from a handful of localities across the coastal parts of the country. On the island, small ponds represent the only source of freshwater habitats suitable for dragonfly development. Most of the visited ponds are in favourable condition and some were also recently cleared of the surrounding vegetation and partially restored." (Authors)] Address: Štih, Ana, Association Hyla, Lipovac I no. 7, 10 000 Zagreb, Croatia. Email: ana.stih2@gmail.com

## 2021

**22178.** Brady, P.C. (2021): Three-dimensional measurements of animal paths using handheld unconstrained GoPro cameras and VSLAM software. *Bioinspiration & Biomimetics* 16 026022: (in English) ["I present the system PATMOS (Paths And Tessellated Meshes from ORB\_SLAM2) for measuring three-dimensional paths of animals in situ using two handheld GoPro cameras and a small spatial reference object. Animal paths were triangulated from mobile camera positions obtained from a modified version of ORB\_SLAM2, an open-source visual simultaneous localization and mapping software package. In addition to path calculation, this process provided a virtual three-dimensional surface approximation to the environment from which path to environment distances can be quantified. PATMOS can also fit a tranquil water's surface to an analytic plane if there are a sufficient number of visible objects intersecting the water's surface and can track objects over the water's surfaces with a single camera by measuring the object with its reflection. This technology was highly portable, could follow moving animals, and gave comparable spatial and temporal resolutions to fixed camera systems that use commercial cameras. An investigation of falling objects yielded a gravitational constant measurement of  $978 \pm 40$  cm/s<sup>2</sup>. I demonstrated PATMOS's utility in terrestrial and aquatic environments by quantifying dragonfly flight characteristics and the inter-spatial distances between substrate and damselfish." (Author)] Address: Brady, P.C., Dept of Integrative Biology, University of Texas at Austin, Austin, Texas 78712, USA. Email: ParrishBrady@utexas.edu

**22179.** Cham, S. (2021): Ovipositing behaviour, egg positioning and egg set size of *Chalcolestes viridis* (Vander Linden) (Willow Emerald Damselfly) at a new site in Britain. *J. Br. Dragonfly Society* 37(1): 14-39. (in English) ["Females of *C. viridis* oviposit into the branches of woody plant species

above water or wet ground, a behaviour that is different to any other British odonate species with endophytic oviposition. At some new sites, populations of *C. viridis* can quickly build up to reach high densities. During 2020 high numbers of tandem pairs were observed at a site in Bedfordshire, England, where the availability of suitable oviposition substrates was at a premium, resulting in branches being covered by oviposition scars. These oviposition scars are in lines and each one is the result of a single oviposition event in which a set of eggs is laid. The terminology is discussed. The structure of the ovipositor and the process of oviposition are described." (Author)] Address: Cham, S., 2 Hillside Road, Lower Stondon, Bedfordshire SG16 6LQ, UK. Email: stevecham1@aol.com

**22180.** Cham, S. (2021): Egg hatching, prolarvae and larval development time of *Chalcolestes viridis* (Vander Linden) (Willow Emerald Damselfly) in Britain. *J. Br. Dragonfly Society* 37(1): 40-59. (in English) ["*C. viridis* was first recorded in Britain in 2007. The female behaviour of ovipositing into the branches of willows and other woody plant species is different to any other British species with endophytic oviposition. Egg hatching and larval development times have so far not been studied in UK populations and are the subject of this paper. The results of the study indicate that the hatching period for eggs of *Chalcolestes viridis* is between seven and nine days. Eggs predominantly hatched at night or by 06.00 BST. The viable prolarval stage, when out of water, could last for at least 1 hour 30 minutes. The distance prolarvae propel themselves could be at least 50 mm, confirming the observations of other researchers. The second stadia larvae, which are 3 mm long at transition, need to be on a horizontal water surface to extricate themselves from the prolarval sheath. Observations show the sheath to be composed of hydrophobic droplets, which assist this process." (Author)] Address: Cham, S., 2 Hillside Road, Lower Stondon, Bedfordshire SG16 6LQ, UK. Email: stevecham1@aol.com

**22181.** Clarke, D. (2021): The last populations of *Leucorhinia dubia* (Vander Linden) (White-faced Darter) at Claife Heights, Windermere, Cumbria? *J. Br. Dragonfly Society* 37(1): 60-68. (in English) ["A small native population of *L. dubia* is known to have survived for nearly a century on Claife Heights, Windermere. Its history is outlined, including the recent apparent attempts to colonise alternative sites in the area and its ultimate decline and probable extinction following low population levels. The potential of the area for future use by the species is considered." (Author)] Address: Clarke, D., Burnfoot, Cumwhitton, Brampton CA8 9EX, UK

**22182.** Deregnaucourt, I.; Wappler, T.; Anderson, J.M.; Béthoux, O. (2021): The wing venation of the Protomyrmeleontidae (Insecta: Odonoptera) reconsidered thanks to a new specimen from Molteno (Triassic; South Africa). *Historical Biology* 33(3): 306-312. (in English) ["Wing venation homologies of the Protomyrmeleontidae, a widespread group of damselfly-like stem-Odonata during the Triassic, are debated. The two main interpretations essentially disagree on the identification of RP branches. Indeed, Protomyrmeleontidae display a very complex wing venation necessarily involving, in a way or another, fusions of the concave RP branches with the convex intercalary veins. As a consequence, vein elevations in the radial area are challenging to interpret. Here, we present a new Triassic specimen from the Molteno Formation (Karoo Basin, South Africa), *Moltenagrion koningskroonensis* gen. et sp. nov. It displays a unique venation pattern supporting a new, alternative interpretation involving

a pair of supplementary intercalaries. The systematic implications of this wing venation interpretation are then discussed. The new species is assigned to the new family Moltenagrionidae fam. nov., itself considered sister-group of the family Protomyrmeleontidae, as previously delimited, both composing the super-family Protomyrmeleontoidea. Diagnoses of these taxa are revised according to our new interpretation." (Authors)] Address: Deregnaucourt, Isabelle, Centre de Recherche sur la Paléontologie – Paris (CR2P), Sorbonne Université, MNHN, CNRS, Paris, France. Email: deregnaucourt.isa@gmail.com

**22183.** Díaz Martínez, C.; Esteban Resino, J. (2021): Nuevas localidades de *Paragomphus genei* (Selys, 1841) (Odonata, Gomphidae) en el centro de la península ibérica (Castilla-La Mancha, España). *Boletín de la Asociación española de Entomología* 45(1-2): 107-112. (in Spanish) [This note reports recent observations of *P. genei* in four new localities in Castilla-La Mancha (Fig. 2), corresponding to flooded quarry holes and resulting from 2020.] Address: Díaz Martínez, Cecilia, Sociedad Entomológica y Ambiental de Castilla-La Mancha, C/ Londres, 7. 45003 Toledo. Spain. Email: cdiaz.cuenca@gmail.com.

**22184.** Endersby, I. (2021): *The Distribution of Australian Dragonflies*. Busybird Publishing: 332 pp. (in English) ["This book comprises three sections: Distribution maps for 325 species of Australian Odonata derived from nearly 60,000 records. Checklists and flight times for each of the 89 Interim Biogeographical Regions of Australia (IBRA7) Checklists and flight times for each of the 27 Köppen Climate Zones of Australia" (Author)] Address: Endersby, I., 56 Looker Rd, Montgomery, Victoria 3094, Australia. E-mail: endersby@pacific.net.au

**22185.** Gassmann, D. (2021): Der Ruf der Libelle – ein Expeditionsbericht. *Science Notes* 6: 18-25. (in German) [Report of the following expedition: Nakanai Mountains, Rapid Biodiversity Assessment, New Britain, Papua-Neuguinea, Rapid Assessment of odonate diversity across three altitude levels, 2.-27. April 2009, Conservation International, Arlington] Address: Gassmann, D., Arachnida Section, Zoological Research Museum Alexander Koenig, Bonn, Germany. Email: d.gassmann@leibniz-zfmk.de

**22186.** Guo, M.; Zheng, G. (2021): Stigma as two degrees of freedom energy sink for flutter suppression. *Journal of Sound and Vibration* 515, 22 December 2021, 116441: (in English) ["Highlights: • A novel explanation on the aerodynamic function of dragonfly stigma is proposed. • Microstructures show that the stigma can be simplified as a two degrees of freedom-energy sink. • The stigma can increase flutter speed and suppress limit cycle oscillations of the dragonfly wing. • The energy sink structure of the stigma has advantages on flutter suppression over conventional sinks. Abstract: This paper presents a novel explanation on the aerodynamic function of the dragonfly stigma, which is a pigmented spot with heavier masses near the tip of a dragonfly's wing. Dynamic modeling based on the micro-structures shows that the stigma can be simplified as two lumped masses connected by a massless beam, and installed on the primary structure by two tow springs. This model works as a two degrees of freedom (2DoF) energy sink. Theoretical modeling and numerical simulations prove that the stigma is capable to suppress flutter – a self-excited vibration. The flutter velocity of a system with the stigma is increased by 15.8% comparing to the case without the stigma, while this increase is only 3.7% if the stigma is merely considered as



a counterweight. The limit cycle oscillations (LCOs) of wing's pitch motion are also significantly reduced. A comparison in the discussion further reveals that this energy sink structure of the stigma has advantages over conventional energy sinks, which is worthy of follow-up bionic research." (Authors)] Address: Guo, M., School of Aerospace Engineering, Tsinghua University, Beijing, 100084, China.

**22187.** Horváth, G.; Egri, A.; Meyer-Rochow, V.B.; Kriska, G. (2021): How did amber get its aquatic insects? Water-seeking polarotactic insects trapped by tree resin. *Historical Biology* 33(6): 846-856. (in English) ["Amber contains numerous well-preserved adult aquatic insects (e.g., aquatic beetles, water bugs, dragonflies, caddisflies, mayflies, stone flies). Since amber is fossilised resin of terrestrial conifer trees, it is an enigma how aquatic insects have ended up in the resin. Based on field studies in a Hungarian forest along a freshwater creek we suggest that tree resin traps water-seeking flying polarotactic aquatic insects because of its property to polarise reflected light. The sticky tree resin was modelled by a water-proof, transparent, colourless insect-monitoring glue laid on vertical and horizontal fallen tree trunks next to the creek. Adults of various polarotactic aquatic insect species were trapped only by the horizontal sticky trunk. In earlier field experiments we showed that these insects find water by means of the horizontal polarisation of water-reflected light, and therefore are attracted to and land on all surfaces which reflect horizontally polarised light. Using imaging polarimetry, we revealed the criterion of polarisation-based trapping by resinous tree trunks. According to our observations, flying aquatic insects can be trapped by sticky (resinous) regions of fallen tree trunks that reflect horizontally polarised light and thus attract polarotactic species. The resin continues to flow out of the trees even when fallen over or fractured in a storm. Our findings support and complement an earlier hypothesis, according to which amber-preserved adult aquatic insects have been trapped by resinous bark when they dispersed over land.... The sticky vertical barks reflected light with directions of polarisation far from the horizontal, thus these surfaces were not attractive to water-seeking aquatic insects. After emergence, mayfly subimagos usually search any kind of nearby object to land on and moult into an imago. Consequently, their trapping on the vertical sticky trunks could happen incidentally without any motivation related to polarotaxis or seeking water surfaces. This case could be similar for *Alopteryx virgo* nymphs that crawled out from the creek directly onto the sticky surface and then become trapped in the middle of the act of emergence (Figures 6(b), 7(b), 9(a)) just like it has been found in real amber (Bechly & Wichard 2008; Wichard et al. 2009)." (Authors)] Address: Horváth, G., Environmental Optics Laboratory, Dept Biol. Physics, ELTE Eötvös Loránd, Uni., Pázmány sétány 1, Budapest 1117, Hungary. Email: gh@arago.elte.hu

**22188.** Kosterin, O.E.; Onishko, V. (2021): *Dragonflies of Russia: Illustrated Photo Guide*. Phytos XXI. ISBN: 97859068-11912: 479 pp. (in Russian, with scientific nomenclature) ["The book offers the first detailed description of the appearance, life history, distribution and diagnostic characteristics of all 156 species of dragonflies and damselflies (Odonata) known to date from the territory of the Russian Federation, based on the authors' extensive experience and scientific literature. Each species is illustrated with original natural photographs of both sexes as well as examples of intra-species variation. Additionally, for each species there are short descriptions of the imago of both sexes, and its change with age are given. Many recently revealed facts are published here for the first time. There are no distribution maps as the

actual range of Odonata borders in Russia remain unknown to a large extent. As is usual in guides based on illustrations, there are no identification keys but diagnostic differences between similar species are provided instead. The introduction leads a reader through the structure, life cycle, habits and classification of dragonflies. The combination of thorough descriptions of differences between similar species, rich illustrations and a detailed introduction allows readers to identify dragonfly species without keys or any specialized knowledge. This book unites the features of a popular atlas with an academic work and fills the gap existing in Russian literature concerning such a conspicuous and attractive group of flying insects as the dragonflies. The book is aimed at a broad range of nature lovers but, as a compilation of all existing knowledge of dragonflies of the country, it will be useful for entomologists as well." (Publisher)]

**22189.** Mauersberger, R. (2021): Zum Vorkommen submerser Vegetation an Fortpflanzungshabitaten von *Leucorrhinia pectoralis* in NO-Deutschland (Odonata: Libellulidae). *Libellula* 40(1/2): 57-76. (in German, with English summary) ["On the occurrence of submerged vegetation at reproductive habitats of *Leucorrhinia pectoralis* in NE Germany (Odonata: Libellulidae) – Using a large data set compiled in a period of three decades showed that favourable reproductive habitat waters of *Leucorrhinia pectoralis* in the lake landscapes of NE Germany were always structured by under water plants. Also 92% of the habitats with lower quality were covered by submerged vegetation, mostly consisting of e.g. *Utricularia* spp., *Ceratophyllum* spp., *Stratiotes aloides*, *Lemna trisulca*, Charophytes or submerged mosses. During a monitoring survey on dragonfly emergence of a very small shallow lake in northern Brandenburg with a usually low density of *L. pectoralis*, it was observed that a large occurrence of *Utricularia vulgaris* appeared for one summer. In the following year the abundance of exuviae of *L. pectoralis* was about 30 times higher than before, two years later still 5 times higher and three years later on the low level again as it was before. The author concludes that especially young larval stadia of this species are especially benefitted by the presence of submerged vegetation." (Author).] Address: Mauersberger, R., Petersdorfer Str. 23, 17268 Templin, Germany. Email: rue.mau@web.de

**22190.** Medina-Espinoza, E. (2021): Análisis del ensamblaje adulto de Odonata (Insecta) en cuerpos de agua de la estación biológica Los Amigos, Madre de Dios. Tesis para Optar el Título Profesional de Bióloga, Facultad de Ciencias, Universidad Nacional Agraria La Molina: 80 pp. (in Spanish, with English summary) ["Freshwater ecosystems are one of the most polluted environments worldwide. Madre de Dios is one of the Peruvian departments that harbors a great diversity of species and one of the main threats it faces is the loss of forests due to gold mining, which has negative effects on its water bodies. Little ecological information is known about Peruvian Odonata, which are freshwater insects. The present study analysed the adult odonate assemblage diversity in three aquatic environments within the Los Amigos biological station (a blackwater pond, an oxbow lake and a stream) in May and October of 2018. A total of 46 species were recorded, belonging to 25 genera and six families. The most represented families were Libellulidae and Coenagrionidae. The assessment sites showed similar diversity values using Hill numbers. However, differences were found in the species composition in the three water bodies assessed, including between lakes. This was because, although they shared a considerable number of

species, the relative abundances of each species varied depending on the assessment site. Therefore, dragonfly assemblages in the Los Amigos biological station change according to the body of water where they are found. This highlights the importance of knowing the taxa that are part of the assemblages of the different types of freshwater environments in order to better understand the changes that might occur in these types of ecosystems." (Author) <https://repositorio.lamolina.edu.pe/bitstream/handle/20.500.12996/51-29/medina-espinoza-emmy-fiorella.pdf?sequence=1&isAllowed=y> Address: Medina-Espinoza, Emmy, Depto de Entomología, Museo de Historia Natural de la Universidad Nacional, Mayor de San Marcos, Av. Arenales 1256, Jesús María, Lima, Peru. E-mail: efme.04@gmail.com

**22191.** Pix, A. (2021): Tagfalter und Libellen im Reinhardswald der Klimawende und der „Fichtendämmerung“. Jahrbuch Naturschutz in Hessen 20: 68-72. (in German) [[https://www.naturschutz-hessen.de/downloads/JNH\\_20/einzelartikel/JB\\_20\\_14\\_Tagfalter\\_und\\_Libellen\\_im\\_Reinhardswald.pdf](https://www.naturschutz-hessen.de/downloads/JNH_20/einzelartikel/JB_20_14_Tagfalter_und_Libellen_im_Reinhardswald.pdf)] Address: Pix, A., Mönchehofstr. 1, 34127 Kassel, Germany. Email: Andreas.Pix@t-online.de

**22192.** Shackleton, M.E.; Dafforn, K.A.; Murphy, N.P.; Greenfield, P.; Cassidy, M.; Besley, C.H. (2021): How does molecular taxonomy for deriving river health indices correlate with traditional morphological taxonomy? Ecological Indicators 125, 107537: 15 pp. (in English) ["Macroinvertebrate surveys are commonly used for assessing the health of freshwater systems around the world. Traditionally, surveying involves morphologically identifying the families, and sometimes genera, present in samples. Biological indices, derived from taxonomic lists, provide convenient ways to summarise community data and may be fairly insensitive to species-level changes in community compositions. In recent years, molecular techniques for identifying taxa have become increasingly popular and metabarcoding approaches that offer the ability to identify species from mixtures of whole animals (bulk-samples) or from environmental samples have gained much attention. However, generating accurate species lists from metabarcode data is challenging and can be impacted by sample type, choice of primers, community composition within samples, and the availability of reference sequences. This study compares the performance of molecular data extracted from bulk-samples against morphological data in calculating two biological indices (the Stream Invertebrate Grade Number Average Level 2 (SIGNAL2), which is calculated from family-level data, and a genus-level equivalent of this index, SIGNAL\_SG) and one biological metric (taxon richness). Further, molecular indices and metrics derived from global, local or mixed reference DNA libraries and with varying degrees of filtering processes applied to them, are compared with respect to the strength of their relationships with morphological indices and metrics. Molecularly derived SIGNAL2 and SIGNAL\_SG scores correlated strongly with morphologically derived scores, and were strongest when using a reference library containing a mix of local and global data. Molecularly derived richness metrics were moderately correlated with morphological taxa richness; however, the strongest correlations were observed when taxa that could not be assigned SIGNAL grades were omitted from analyses. This study highlights the utility of using molecular data as an objective and sensitive alternative to traditional freshwater biological assessment using macroinvertebrates.... The Odonata were the most family diverse taxa and performed relatively well in terms of F1 cores, with scores ranging from 0.67 to 0.92. The notable exception in the Odonata was the family Synthemistidae,

which returned a null F1 score despite being as prevalent as Gomphidae." (Authors)] Address: Shackleton, M.E., Centre for Freshwater Ecosystems, La Trobe University, Australia. Email: m.shackleton@latrobe.edu.au

**22193.** Vorstand der Gesellschaft deutschsprachiger Odonatologen (2021): Diese Ausgabe erscheint zu Ehren von Ulrike Krüner. Libellula 40(3/4): o.P. (in German) ["The "Grand Dame" of the GdO celebrated her 75th birthday this year! Ulrike (Krüner) is an honorary member of our society and has helped to determine and strongly promote the development of the association through her special energy and hands-on nature. She has been the manager for many years taken over and who among us doesn't own one of the beautiful dragonfly accessories that Ulrike offered us at the conferences. Dear Ulrike, On behalf of the entire membership, we warmly congratulate you and wish you all the best! The board"] Address: Conze, K.-J., Hamburger Str. 92, 45145 Essen, Germany. E-mail: kjc@loekplan.de

**22194.** Watt, T. (2021): Changes in the zygopteran populations at Castle Fraser, Aberdeenshire with particular reference to *Coenagrion hastulatum* (Charpentier) (Northern Damselfly). J. Br. Dragonfly Society 37(1): 1-13. (in English) ["The population of *C. hastulatum* has been surveyed at the Flight Pond at Castle Fraser for ten years but, since 2013, its numbers have declined. The other zygopterans present have shown a similar trend with the exception of *Enallagma cyathigerum*, the population size of which has increased in recent years. These results are discussed in the light of changes in the vegetation around the Flight Pond and the arrival of *Coenagrion puella* in 2009. The creation of a second 'New Pond' has so far had a positive effect on the zygopteran populations at Castle Fraser." (Author)] Address: Watt, T., 7 Myrtle Terrace, Portlethen, Aberdeen, AB12 4SZ, UK

## 2022

**22195.** Acquah-Lampitey, D. (2022): Large scale patterns of African and European Odonata; The importance of functional traits. Dissertation, Fachbereich Biologie der Philipps-Universität Marburg: 199 pp. (in English) ["Biodiversity patterns, community composition, and ecological dynamics are linked to species' responses to climatic conditions, biotic interactions, and dispersal limitations. Climate change has led to shifts in species ranges to higher altitudes and latitudes, changes in species population trends, and changes in species phenology. That makes climate change a fundamental concern for biodiversity conservation and makes understanding the effect of climate change on biodiversity a central theme in ecology. A promising approach to understanding the mechanisms shaping species distribution and community composition is linking physiological processes, functional traits, and the climatic environment. Two ubiquitous features of animals of great functional importance are body size and body colour. For instance, both traits influence the temperature excess of species and thereby have significant consequences on species distributions, abundances, activities, and development. However, thus far, support for the importance of body size and body colour is sparse for insects, particularly at larger spatial and taxonomic scales. In addition, the effects of both traits on community composition and species' responses to environmental changes remain poorly understood. Whereas it is difficult to monitor species populations across entire ranges, the IUCN established criteria that allow taxon experts to broadly categorize the threat status of species. However, only 1 % of the insects described so far have been assessed, with 26 % of these

categorised as data deficient. Especially in tropical regions and for tropical taxa, we lack an understanding of the drivers associated with threatened insect species. The overall objective of this PhD thesis was to investigate the importance of interactions between environmental factors and species' functional traits across Europe and Africa. My work focused on damselfly and dragonflies (Odonata) because of their ecological importance and exceptional natural history record among insects. With this, I aim to improve our understanding of the mechanistic processes underlying biogeographical patterns and species extinction risk and ultimately improve forecast of the ecological consequences of climate change. In one chapter of this thesis, I quantified the colour lightness and body volume of European Odonates and combined these traits with survey data for local assemblages across Europe. Based on this continent-wide yet spatially explicit dataset, I tested for effects of temperature and precipitation on the colour lightness and body volume of local assemblages and assessed differences in their relative importance and strength between lentic and lotic assemblages. I show that the colour lightness of assemblages of Odonates increased, and body size decreased with increasing temperature. My results demonstrate that the mechanisms underlying colour lightness and body size variations scale to local assemblages. Together with previous studies on larger spatial scales, these results underline the general importance of colour- and size-based thermoregulation in insects. Both size- and colour-based thermoregulation were of similar importance for species preferring lentic and lotic habitats (standing vs. running water), but the higher dispersal ability of lentic species seems to allow them to better track their thermal optimum. In another chapter, I integrated trait-based models with environmental factors to investigate the mechanistic underpinnings of species' extinction risk for 489 African and European Odonates. Using body size, wing load, and habitat preference, I incorporate current theoretical and empirical support for single effects of environmental variables on species traits into structural ecological models. Specifically, I tested whether species are generally larger in colder environments; whether species adapted to less stable habitats and with lower wing loads have smaller ranges; and finally, the extent to which these trait-environment relationships translate into a higher extinction risk of species. The results of this chapter demonstrate that species adapted to lotic habitats as well as smaller species and species with high wing loads have smaller range sizes. In addition, larger species and those with lower wing loads had more northern distributions and inhabited colder climates. Species with smaller ranges and those occurring in colder and more northern regions had a higher extinction risk. I thereby demonstrate that strong links between intrinsic traits (body size, wing load, and habitat preference) and extrinsic traits (range size, thermal preference, and latitudinal position) can explain a substantial part of the variation in species' extinction risk. However, in contrast to models of extrinsic traits alone, I emphasize that the mechanisms underpinning species' extinction risk are important to consider for understanding which species are particularly threatened and why. Thereby, trait-based models have a high potential to forecast and mitigate the negative impacts of environmental changes and other threats to species. In another chapter, I investigated the potential of Odonates as biological control predators of mosquito larvae under almost natural conditions. I found that the widespread dragonfly *Brachytrichia strachani* is capable of breeding in and naturally colonising water storage containers used in typical rural homes, which are breeding grounds for mosquitoes. My mesocosm experiments show that the presence of *B. strachani* resulted in a drastic reduction of mosquito larvae density, especially in sunlit containers. My

results confirm that dragonfly larvae are effective biological control agents of the disease-causing vector, with great benefits to the livelihood of people. In summary, I demonstrate the importance of the mechanistic links between colour lightness and body size with the temperature regime which shapes the biogeographical patterns of European Odonates using spatially explicit survey data. The consistency of this reiterates the general importance of thermal melanism and Bergmann's rule for ectotherms at the local assemblage scale. However, besides highlighting the essential role of traits involved in thermoregulation in shaping the distribution of Odonates, the greater dispersal ability of lentic species in combination with the climatic history seems to have allowed them to better cope with the historical climatic changes. Furthermore, my results highlight the importance of functional traits in species extinction risk assessments. Body size, habitat preference, and wing load explain why some species are particularly threatened and may thus serve as a red flag for threat assessment in conservation, even for species that lack distribution data. These integrative trait-based analyses are particularly relevant for providing links between ecology and conservation, which are important for completing and predicting species threats. These results underline the ecological importance of Odonates and highlight a great potential for integrating interactions of morphological traits with species phylogenetic data and proxies of dispersal ability, into trait-based models to improve our understanding of biological responses to environmental changes and other potential threats. The importance of the functional traits of species and the generality of their impact on ecological dynamics stress that mobilization of trait data provides an important future avenue to improve baseline predictions and the information basis for large scale conservation of insect diversity." (Author)] Address: Acquah-Lamptey, D., Fac. Biol., Dept of Ecology–Animal Ecology, Philipps Univ. Marburg, Karl-von-Frisch-Str. 8, 35043 Marburg, Germany

**22196.** Al-Shamry, A.S.H.H.; Mizhir, A.H. (2022): Diversity of aquatic insects in the euphrates River/Najaf province-Iraq. *International Journal of Health Sciences* 6(S7): 3464-3476. (in English) ["Five locations were sampled with three duplicates from each throughout the course of a six-month period, from November 2021 to April 2022, in order to assess the biodiversity of crustaceans. Water was also included in the samples. Certain chemical and physical characteristics of water are measured. the overall density of aquatic insects varied from (1–257) individuals/L, the month of April had the greatest density. According to the findings of the isolation and identification of water insects, Chironomidae larvae were the most numerous throughout the research period, followed by Chironomide pupa, Zygoptera nymph, Odonata larvae, and *Belostoma corodofanum*. According to the relative abundance index for aquatic insects, the Zygoptera nymph species was most prevalent in the first location, whereas Chironomidae larvae were more prevalent in the other sites. The constancy species index (S) of aquatic insects, Chironomidae larvae and Chironomide pupa, were the most constancy across all research locations and throughout the course of the study period. The values of the species richness index ( $D^*$ ) ranged from 0-3.84. While the Shannon-Weiner index ranged between 0-1.361 bit/ind. While the values of the species uniformity index (E) ranged between 0-0.845." (Authors)] Address: Al-Shamry, A., Dept of Ecology and Pollution College of Science, University of Kufa, Najaf, Iraq. Email: salamaliraqii14@gmail.com

**22197.** Altieri, P.D. (2022): Estudio de las tramas tróficas de macroinvertebrados en bañados de desborde fluvial del

área pampeana con diferentes usos del suelo. PhD thesis, Facultad de Ciencias Naturales y Museo Universidad Nacional de La Plata: 175 pp. (in Spanish, with English summary) [Argentina; the thesis includes references on Odonata at the genus level.] Address: [http://sedici.unlp.edu.ar/bitstream/handle/10915/147152/Documento\\_completo.pdf-PDFA.pdf?sequence=1&isAll owed=y](http://sedici.unlp.edu.ar/bitstream/handle/10915/147152/Documento_completo.pdf-PDFA.pdf?sequence=1&isAll owed=y)

**22198.** Association Bourgogne-Franche-Comté Nature (2022): Atlas des odonates de Bourgogne-Franche-Comté. Revue scientifique Bourgogne-Franche-Comté Nature, Hors-série n°17: 446 pp. (in French) [France "A long-term project initiated in 2010 by the Natural History Society of Autun – Burgundy Wildlife Observatory, the National Botanical Conservatory of Franche-Comté – Regional Invertebrate Observatory and OPIE Franche-Comté, and carried out thanks to with the support and involvement of numerous volunteers, allows us to deliver this atlas which, we hope, will amaze you and interest you even more in dragonflies. The work This work aims to present to you the diversity of dragonflies in our region and to share the knowledge acquired throughout these years. Through its 446 pages, the atlas illustrates in detail the 75 species present in the region, their distribution, their biology, and the threats weighing on them. Around twenty chapters complement the monographs, all of which are richly illustrated. This atlas aims to present to you the diversity of dragonflies in our region in a pleasant way and to share the knowledge acquired throughout these years. Finally, let us not forget that nature is constantly in motion and that a work of this type presents an image frozen over a window of time. It will evolve with the populations of odonates, influenced by modifications of natural environments and climate changes, but also by the knowledge we have of them. Authors: Natural History Society of Autun – Burgundy Wildlife Observatory, the National Botanical Conservatory of Franche-Comté – Regional Invertebrate Observatory and OPIE Franche-Comté." (Publisher/Google Translate)] Address: <https://cbnfc-ori.org/espace-documentation/atlas-des-odonates-de-bourgogne-franche-comte>

**22199.** Ayayee, P.A.; Wesner, J.S.; Ouellette, S.P. (2022): Geography, taxonomy, and ecological guild: Factors impacting freshwater macroinvertebrate gut microbiomes. *Ecology and Evolution*. 2022;12: e9663.: 15 pp. (in English) ["Despite their diversity, global distribution, and apparent effects on host biology, the rules of life that govern variation in microbiomes among host species remain unclear, particularly in freshwater organisms. In this study, we sought to assess whether geographic location, taxonomy (order, family, and genus), or functional feeding group (FFG) designations would best explain differences in the gut microbiome composition among macroinvertebrates sampled across 10 National Ecological Observatory Network's (NEON) freshwater stream sites in the United States. Subsequently, we compared the beta diversity of microbiomes among locations, taxonomy (order, family, and genus), and FFGs in a single statistical model to account for variation within the source microbial community and the types of macroinvertebrates sampled across locations. We determined significant differences in community composition among macroinvertebrate orders, families, genera, and FFGs. Differences in microbiome compositions were underscored by different bacterial ASVs that were differentially abundant among variables (four bacterial ASVs across the 10 NEON sites, 43 ASVs among the macroinvertebrate orders, and 18 bacterial ASVs differing among the five FFGs). Analyses of variations in microbiome composition using the Bray–Curtis distance matrix revealed FFGs as the dominant source of variation (mean standard

deviation of 0.8), followed by stream site (mean standard deviation of 0.5), and finally family and genus (mean standard deviation of 0.3 each). Our findings revealed a principal role for FFG classification in insect gut microbiome beta diversity with additional roles for geographic distribution and taxonomy.... Wollbachia was most abundant in aquatic Coleoptera (70.28%), followed by Odonata (20.08%) [Cordulegaster, Gomphidae], Trichoptera (17.28%), Plecoptera (8.20%), and Ephemeroptera (0.15%)."] (Authors)] Address: Ayayee, P.A., Dept of Biology, Univ. of Nebraska at Omaha, Omaha, Nebraska, USA. Email: [payayee@unomaha.edu](mailto:payayee@unomaha.edu)

**22200.** Chacón Ramos, E. (2022): Utilización de macroinvertebrados en el monitoreo de la calidad de los recursos hídricos. Revisión Sistemática 2022. Tesis para obtener el título profesional de: Ingeniera Ambiental, Universidad César Vallejo, Fac. de Ingeniería y Arquitectura, Escuela Profesional de Ingeniería Ambiental: 76 pp. (in Spanish, with English summary) [The thesis includes references on Odonata, in most cases at the family level.] Address: [https://repositorio.ucv.edu.pe/bitstream/handle/20.500.12692/103703/Chac%C3%B3n\\_RE-SD.pdf?sequence=1&isAllowed=y](https://repositorio.ucv.edu.pe/bitstream/handle/20.500.12692/103703/Chac%C3%B3n_RE-SD.pdf?sequence=1&isAllowed=y)

**22201.** Dimitrov, D.A.; Bechev, D.N. (2022): Odonata of the City of Plovdiv and its Surroundings. *Bulletin of the Natural History Museum. Plovdiv*, 2022, Supplement 2: 61-63. (in English) ["Updated list of the dragonflies (order Odonata) of the city of Plovdiv and its environs contains 26 species from 7 families: Aeshnidae (4), Libellulidae (9), Gomphidae (4), Calopterygidae (2), Coenagrionidae (3), Lestidae (3) and Platycnemididae (1)."] (Authors)] Address: Dimitrov, D.A., University of Plovdiv "Paisii Hilendarski", Department of Zoology, 24 Tzar Assen Str., BG-4000 Plovdiv, Bulgaria. Email: [dbechev@abv.bg](mailto:dbechev@abv.bg)

**22202.** Grabowski, N.T.; Abdulmawjood, A.; Acheuk, F.; Barragán Fonseca, K.; Chhay, T.; Costa Neto, E.M.; Ferri, M.; Franco Olivas, J.; González Aguilar, DG., Keo, S., Lertpatarakomol, R., Miech, P.; Piofczyk, T.; Proscia, F.; Mitchathai, J.; Guerfali, M.M.; Sayed, W.; Tchibozo, S.; Plötz, M. (2022): Review: Insects — A source of safe and sustainable food? — "Jein" (yes and no). *Front. Sustain. Food Syst.* 5:701797. doi: 10.3389/fsufs.2021.701797: 17 pp. (in English) ["For almost a decade, edible insects have become promoted on a wider basis as one way to combat world hunger and malnourishment, although attempts to do so have a longer history. Contemporary researchers and consumers, particularly those without an entomophagous background, have been rising safety and sustainability concerns. The present contribution seeks a substantiated answer to the question posed above. The possible answer consists of different factors that have been taken into consideration. First, the species and its life cycle. It is mandatory to realize that what is labeled as "edible insects" stands for more than 2,140 animal species, not counting other edible, non-crustacean arthropods. Their life cycles are as diverse as the ecological niches these animals can fill and last between some days to several years and many of them may — or may not—be reproduced in the different farming systems. Second, the level of knowledge concerning the food use of a given species is important, be it traditional, newly created by research, or a combination of both. Third, the existence of a traditional method of making the use of the insect safe and sustainable, ideally from both the traditional and themodern points of view. Fourth, the degree of effectiveness of these measures despite globalization changes in the food-supplying network. Fifth, farming conditions, particularly housing, feeding (type, composition, and contaminants), animal health



and animal welfare. Sixth, processing, transport, and storage conditions of both traditional and novel insect-based foodstuffs, and seventh, consumer awareness and acceptance of these products. These main variables create a complex web of possibilities, just as with other foodstuffs that are either harvested from the wild or farmed. In this way, food safety may be reached when proper hygiene protocols are observed (which usually include heating steps) and the animals do not contain chemical residues or environment contaminants. A varying degree of sustainability can be achieved if the aforementioned variables are heeded. Hence, the question if insects can be safe and sustainable can be answered with "jein," a German portmanteau word joining "yes" ("ja") and "no" ("nein")." (Authors) The paper includes references to Odonata.] Address: Grabowski, N.T., Inst. Food Quality & Food Safety, Hannover Univ. for Veterinary Medicine, Foundation (TiHo), Hanover, Germany. Email: nils.grabowski@tiho-hannover.de

**22203.** Gusenleitner, F.J.; Schwarz, M. (2022): 17. Oberösterreichische Entomologen einst und jetzt. Entomofauna – M4: 209-281. (in German) [The paper contains biographic notes of Austrian or regionally active odonatologists.] Address: Schwarz, M., Biologiezentrum Linz, J.-W.-Klein-Straße 73, 4040 Linz, Austria. Email: martin.schwarz@oelkg.at

**22204.** Harvey, J.A.; Tougeron, K.; Gols, R.; Heinen, R.; Abarca, M.; Abram, P.K.; Basset, Y.; et al. (2022): Scientists' warning on climate change and insects. Ecological Monographs e1553. <https://doi.org/10.1002/ecm.1553>: 37 pp. (in English) ["Climate warming is considered to be among the most serious of anthropogenic stresses to the environment, because it not only has direct effects on biodiversity, but it also exacerbates the harmful effects of other human-mediated threats. The associated consequences are potentially severe, particularly in terms of threats to species preservation, as well as in the preservation of an array of ecosystem services provided by biodiversity. Among the most affected groups of animals are insects — central components of many ecosystems — for which climate change has pervasive effects from individuals to communities. In this contribution to the scientists' warning series, we summarize the effect of the gradual global surface temperature increase on insects, in terms of physiology, behavior, phenology, distribution, and species interactions, as well as the effect of increased frequency and duration of extreme events such as hot and cold spells, fires, droughts, and floods on these parameters. We warn that, if no action is taken to better understand and reduce the action of climate change on insects, we will drastically reduce our ability to build a sustainable future based on healthy, functional ecosystems. We discuss perspectives on relevant ways to conserve insects in the face of climate change, and we offer several key recommendations on management approaches that can be adopted, on policies that should be pursued, and on the involvement of the general public in the protection effort." (Authors) The paper includes a few references to Odonata resp. *Anax imperator*.] Address: Harvey, J.A., Dept of Terrestrial Ecology, Netherlands Institute of Ecology (NIOO-KNAW), Wageningen, The Netherlands. Email: j.harvey@nioo.knaw.nl

**22205.** Hevers, J.; Martin, P. (2022): Nachruf auf Klaus Böttger – 14. Januar 1934 bis 7. Oktober 2020 - Obituary of Klaus Böttger. 14 January 1934 until 7 October 2020. Faunistisch-Ökologische Mitteilungen 11: 7-17. (in German) [K. Böttger was a leading expert in Hydrachnellae, Acari, with special reference to Odonata. Regrettably, most of its papers have been published in German language which

made them difficult to access for the global scientific community.] Address: Hevers, J., Germersheimstr. 16, 38112 Braunschweig, Germany. Email: j.hevers@t-online.de

**22206.** Holly, F.; Bronnhuber, W. (2022): Ecknachtal – Libellen (Odonata). Ecknachtkartierung. Im Rahmen des Erfolgsmonitorings BayernNetzNatur-Projekt „Ecknachtal“. LBV-Report 2022: 4-17. (in German) [In 2021, in Landkreis Aichach-Friedberg; Bayern; Germany, 29 odonate species were documented, including *Coenagrion scitulum* and *Ophiogomphus cecilia*. For details see: <https://sa0e76b775810b-3a8.jimcontent.com/download/version/1675592924/module/12016415428/name/LBV-Report-2022.pdf>]

**22207.** Kohl, S.; Wildermuth, H. (2022): "Der Greifensee": Libellen und Heuschrecken. Neujahrsblatt 2022 der Naturforschenden Gesellschaft in Zürich: 157-168. (in German) ["Of the approximately 80 dragonfly species identified in Switzerland, 58 are known from the Greifensee area. The relatively high number of species is due to the fact that different, sometimes rare types of standing and flowing water occur in the area. In addition to the largely undeveloped lake shore, these include ponds of various sizes and depths inside and outside the reed areas, former peat ditches and fen ditches, ponds and ponds in gravel pits, spring outflows and spring outflows, as well as the Glatt, the Aabach, the Mönchaltorfer Aa and some smaller streams as tributaries to the lake. These waters must be at least partially sunny for dragonflies. All dragonflies regularly observed in the Greifensee area are summarized here in an overview. Table 1 lists 45 species. We know little about the remaining 13 species. Two of them are extinct: *Nehalennia speciosa*, which was only discovered in 1974 in the Rällikon lake meadows and was last recorded in 1983, and *Leucorrhinia pectoralis*, which develops in peat waters and has not been observed at Greifensee since 1990. In the nearby Pfäffikersee area, she was able to hold on to peat cuttings thanks to care measures. Since dragonflies can fly very far, they sometimes appear as solitary animals in places where they almost certainly did not evolve. These rare guests include *Lestes barbarus* and *L. virens*, *Ophiogomphus cecilia*, *Leucorrhinia dubia*, *Symptetrum pedemontanum*, *S. flaveolum* and *S. meridionale*. The rare *S. depressiusculum* is shown on the cover photo. Recently, in special weather conditions, *Anax ephippiger* and *Aeshna affinis* also occasionally appear in our region. *Coenagrion scitulum* has only been seen once so far, but will probably become established in the future. On the other hand, *Aeshna juncea* and *S. danae* have virtually disappeared as losers from climate change. (Authors/Google Translate)] Address: Wildermuth, H., Haltbergstr. 43, 8630 Rütli, Switzerland. E-mail: hansruedi@wildermuth.ch

**22208.** Mauersberger, R. (2022): Zur Haltbarkeitsdauer der Exuvien von *Aeshna mixta* (Odonata: Aeshnidae) am Schlupfsubstrat. *Libellula* 41(1/2): 69-76. (in German, with English summary) ["Stability duration of exuviae of *Aeshna mixta* at the emergence site – The study site was a reed belt of a small shallow lake in the north of Brandenburg (Germany) consisting of *Phragmites australis* and *Typha angustifolia* with a very high emerging abundance of *A. mixta* in the year 2021 where exuviae of this species were counted recurrently from the main emergence period onwards to the disappearance of all specimens. The number of traceable exuviae was decreasing exponentially. After two weeks less than one third of the exuviae could be observed again, 19% were still detected after 30 days, the last one was found after 136 days. The average duration was 16,3 days." (Author)]

Address: Mauersberger, R., Petersdorfer Str. 23, 17268 Templin, Germany. Email: rue.mau@web.de

**22209.** Mouchet, S.R.; Verstraete, C.; Bokic, B.; Mara, D.; Dellieu, L.; Orr, A.G.; Deparis, O.; Van Deun, R.; Verbiest, T.; Vukusic, P.; Kolaric, B. (2022): Revealing natural fluorescence in transparent insect wings by linear and nonlinear optical techniques. *Journal of Luminescence* 254(Part B), 119490; doi: 10.1016/j.jlumin.2022.119490: 16 pp. (in English) ["For most natural organisms, the physical, chemical and biological aspects of fluorescence emission are poorly understood. For example, to the best of our knowledge, fluorescence from the transparent wings of any of the 3000 known species of cicadas has never been reported in the literature. These wings are known to exhibit anti-reflective properties arising from quasi-periodic arrays of nipples. Our study, using linear and nonlinear optical techniques, including spectrofluorimetry, two-photon fluorescence spectroscopy and Second Harmonic Generation (SHG), reveals the fluorescence properties in the wings the grey and the common cicadas (*Cicada orni* and *Lyristes (Tibicen) plebejus*, respectively), as well as the broad-bordered bee hawkmoth (*Hemaris fuciformis*). The study suggests that fluorescence would be more widespread in transparent insect wings than what was previously believed. Comparing this result to the fluorescence emission from the wings of the Bornean damselfly (*Vestalis amabilis*), we inferred that this emission probably arises from resilin, a protein reported to enhance wing flexibility. Moreover, the nonlinear optical investigation of the insects' wings provided further insight into wing structure, indicating that multiphoton techniques add valuable information for the analysis of insect integuments. The strong SHG signal detected from the wing veins implies that these veins are materially organised in a non-centrosymmetric and hence non-random fashion.] Address: Mouchet, S.R., School of Physics, Univ. Exeter, Stocker Road, Exeter EX4 4QL, UK. Email: s.mouchet@exeter.ac.uk

**22210.** Ng, Y.H.; Rahman, A.A.A.; Zainal, M.-Z.; Abdul-Latif, M.A.B. (2022): First record of insects in Pulau Tinggi, Johor, Malaysia. *Journal of Sustainability Science and Management* 17(1): 99-109. (in English) ["Species assembly of insects in Pulau Tinggi was extensively studied to obtain the first checklist of insect fauna on the island. Samples were collected from forested areas in Pulau Tinggi on three occasions (20-30 April, 1-10 May and 20-30 June 2019) .... Three families from the order Odonata were recorded in Pulau Tinggi. Notable species include *Agrionoptera insignis* and *Neurothemis fluctuans* which have also been recorded in the forest of Pulau Pangkor (Farizawati et al., 2014), Pulau Tioman (Choong et al., 2017) and in more than eight localities in Johor mainland (Abdul Aziz et al., 2018). It is worth noting that Pulau Tioman is also part of the Seribu Archipelago. Being a generalist species, *N. fluctuans* is more widespread, with additional records in Pulau Carey, Pulau Langkawi and Pulau Pinang (Farizawati et al., 2014). In Pulau Tinggi and Pulau Sibul, *Orthetrum testaceum* and *N. fluctuans* were the most abundant species from the Libellulidae family (Azmi & Haris-Hussain, 2019). *O. testaceum* and *N. fluctuans* have also been reported in three National Parks in Sarawak (Kubah National Park, Lambir Hills National Park and Similajau National Park) (Dow et al., 2013). Members from the Libellulidae family are regularly found as the most dominant in tropical and subtropical forests. Additionally, their distribution is common in various habitats due to their ability to breed in open and disturbed habitats (Azmi & Haris-Hussain, 2019)."] (Authors) *Anax guttatus*, *O. testaceum*, *O. glaucum*, *Lathrecista asiatica*, *N.*

*fluctuans*, *Neurothemis* sp., *Trithemis festiva*, *Agrionoptera insignis*, *Argiolestidae* sp.] Address: Rahman, A.A.A., Department of Technology and Natural Resources, Faculty of Applied Sciences and Technology, Universiti Tun Hussein Onn Malaysia (Pagoh Campus) 84600 Muar, Johor, Malaysia. Email: aqilah@uthm.edu.my

**22211.** Pan, Y. Zhang, Z.; Dong, H. (2022): Computational study on the gliding flight of a damselfly. *AIAA Science and Technology Forum and Exposition, AIAA SciTech Forum 2022-0728*: (in English) [Verbatim: Gliding flight is commonly accepted to be a valuable energy-saving mechanism used by natural flyers. In this work, the gliding flight of a damselfly undergoing was filmed in a large flight enclosure by using three orthogonally arranged and synchronized high-speed cameras. Using a 3D subdivision surface reconstruction methodology, the damselfly's wing deformation and kinematics were modeled and reconstructed from the high-speed videos. An immersed-boundary-method-based Navier-Stokes equation solver is then employed to compute the aerodynamic performance of damselfly in gliding flight. A comparison between the aerodynamics of solitary wings and the fore-hind wing system suggests that wing-wing interactions can reduce the drag of the forewing and improve its gliding performance. Three Euler angles are employed to define the orientation of the wings in gliding. Parametric studies on these angles are implemented to obtain the optimal orientation of the wings in gliding flight. It is found that the wings with the orientation directly obtained from the experiments achieve the optimal gliding performance among all cases. In addition, vortex structures and surface pressure are also compared and analyzed to better understand the gliding aerodynamics, which can be used for the flight control of flapping-wing micro air vehicles.] Address: not stated

**22212.** Parr, A.J. (2022): Migrant and dispersive dragonflies in Britain during 2022. *J. Br. Dragonfly Society* 39(2): 1-13. (in English) ["In Britain, the year 2022 started dramatically, with the country's second-ever record of *Sympetma fusca* being made near Hedge End, Hampshire, on 5 May; despite the species' current rarity, it may be a potential future colonist. Later highlights included the continuing rapid internal spread of *Aeshna isocetes*, with an apparent new breeding colony being found at Slapton Ley in Devon and with wandering individuals being noted in Somerset, Wiltshire, north Hampshire and, remarkably, near Wigan in south Lancashire. The discovery of a male *Crocothemis erythraea* at Minsmere, Suffolk, on 28 July, and the sighting of a male *Sympetrum flaveolum* at Kilnsea Wetlands near Spurn, East Yorkshire, on 5 September, were also of considerable interest. The record of *S. flaveolum* is the first in Britain for nearly a decade. Meteorologically, summer 2022 was notable for periods of high temperatures and drought over large parts of western Europe. This clearly had an impact on events in the dragonfly world, with seemingly both positive and negative consequences for migration. All of our commoner recent 'traditional' migrants such as *Aeshna affinis*, *Anax parthenope*, *Anax ephippiger* and *Sympetrum fonscolombii* apparently showed influxes during the year, though the growing strength of resident populations of the former two species here made detailed analysis difficult. The numbers of individuals seen were, however, generally unspectacular with the exception of *A. parthenope*, which had a record-breaking season. Much of this good showing by *A. parthenope* seemingly reflected good local breeding, though there were several unexpected records, particularly from northern England and Scotland, that imply that some

long-distance movement also took place." (Author)] Address: Parr, A.J., 10 Orchard Way, Barrow, Bury St Edmunds, Suffolk, IP29 5BX, UK

**22213.** Saha, P.D.; Gaikwad, S.M. (2022): Seasonal variation and species assemblage of Odonates (Class. Insecta) in different habitats of Pune district, Northern Western Ghats, Maharashtra, India. *International Journal of Entomology Research* 7(3): 145-158. (in English) ["68 localities from Pune district, Maharashtra, India were surveyed for diversity, assemblage and seasonal distribution of Odonata along three different habitats viz. agricultural land, forest and wetlands, and urban. The present investigation is based on extensive survey of all three habitats during three major seasons (pre-monsoon, post-monsoon and winter). A total of 4,268 individuals belonging to 68 species in 39 genera under 9 families were recorded during the study period (December 2011-December 2015). Family Libellulidae (44%) was the most dominant and widely distributed in different sampling sites in all the three habitats. The most dominant species was *Pantala flavescens* (18.35 %). Across the three land-use types, there was a difference between the species composition with forest being the most diverse followed by urban habitat and agricultural land, though, the abundance of species were much more in urban habitat. Clustering analysis showed that urban and agricultural lands are more similar forming the same clusters whereas forest forms a different one. Species richness and abundance varied with seasons, post-monsoon being highest in richness as well as abundance. Variation in rainfall patterns has been reported to be one of the important factors. During the present investigation, a total of 52 species were reported from Bhimashankar Wildlife Sanctuary (WLS), and out of which 40 species were new records from the area. A total of 37 species was documented from Ujani Wetland, out of which 21 species have been recorded first time. Thus the present work aims to document the Odonate diversity of the Pune district along with their habitat selection and seasonal variations which provides baseline data that can be used for their conservation strategies." (Authors)] Address: Saha, P.D., Dept of Zoology, Modern College of Arts, Science and Commerce, Shivaji Nagar, Pune, Maharashtra, India

**22214.** Schwarz, M. (2022): Entomologie in Oberösterreich – Geschichte und aktuelle Situation. 16.7. Libellen (Odonata). *Entomofauna Monographie* 4: 160-162. (in German) [This is a brief introduction into the faunistics and study of Odonata in the Federal State Oberösterreich/Austria. For more details see: [https://www.zobodat.at/pdf/ENT\\_M4\\_0001-0604.pdf](https://www.zobodat.at/pdf/ENT_M4_0001-0604.pdf)] Address: Schwarz, M., Biologiezentrum Linz, J.-W.-Klein-Straße 73, 4040 Linz, Austria. Email: martin.schwarz@ooelkg.at

**22215.** Seehausen, M. (2022): Europäische Libellen (Odonata) in der Sammlung des Zoologischen Museums der Universität Greifswald. *Libellula* 41(1/2): 77-88. (in German, with English summary) ["European Odonata in the collection of the Zoological Museum of the University of Greifswald – The European Odonata of the collection in the Zoological Museum of the University Greifswald were registered and determined. Altogether 389 European specimens were evaluated. The largest part is from the 19th century and attributed to the former director C.E.A. Gerstaecker. Localities in Germany are in Mecklenburg-Western Pomerania, Brandenburg, Bavaria and Thuringia. Further specimens were collected in Poland, Italy, Austria, and Switzerland. Current specimens were collected during a study in 1996 and 1997 in Greifswald. Concerning Mecklenburg-Western Pomerania,

Bavaria, Berlin, Brandenburg, and Thuringia some blank Plane survey sheets of distribution were completed. Of seven species the earliest known collected specimens from Brandenburg are held in the collection. The historical collection of Emil von Bernuth is mentioned but the specimens lack locality data, thus they are not evaluable." (Author)] Address: Seehausen, M.; Fährhofstr. 11, 18439 Stralsund, Germany. Email: m.seehausen@gmx.de

**22216.** Silva-Hurtado, J.D.; Márquez, J.; Escoto-Moreno, J.A. (2022): First state records of odonates (Insecta: Odonata) from the Sierra Norte de Puebla, Mexico. *Proceedings of the Entomological Society of Washington* 124(4): 805-813. (in English) ["During collections made in 2019 and 2020 at different localities in the Sierra Norte de Puebla (Northern Sierra of Puebla), Mexico, some odonate specimens, representing new state records of three genera and 16 species, were captured. Among the new records there are little known species such as *Erpetogomphus erici*, *E. liopeltis* and *Phyllocyca breviphylla*. Furthermore, new localities are recorded for uncommon species, such as *Paraphlebia zoe*, *Argia percellata* and *Erpetogomphus viperinus*. These records add to the already known species richness of the state of Puebla, increasing it from 110 to 126 species. As a result, the state of Puebla is now in tenth place nationally in terms of species richness." (Authors)] Address: Silva-Hurtado, J.D., carretera Pachuca-Tulancingo Km. 4.5, colonia Carboneras, 42184, Mineral de la Reforma, Hidalgo, México. Email: jodsilhur@gmail.com

**22217.** Stevens, S.; Reading, R.P. (2022): Rearing and assessing populations for the Hudsonian emerald (*Somatochlora hudsonica*), Mountain emerald (*Somatochlora semicircularis*), and American emerald (*Cordulia shurtleffii*) at Delefony Ponds, Boulder County, Colorado. 2022 Report. *Butterfly Pavilion*: 6 pp. (in English) [<https://assets.bouldercounty.gov/wp-content/uploads/2022/12/dragonfly-rearing.pdf>] Address: Butterfly Pavilion, 6252 East 104th Avenue, Westminster, CO 80020, USA. Email: rreading@butterflies.org

**22218.** Suhling, F. (2022): Libellen. Gewinner und Verlierer in Niedersachsen. In: *Facettenreiche Insekten: Vielfalt, Gefährdung, Schutz*. Publisher: Haupt Verlag: 100-101. (in German) [[https://www.researchgate.net/publication/3593-12040\\_Libellen\\_-\\_Gewinner\\_und\\_Verlierer\\_in\\_Niedersachsen](https://www.researchgate.net/publication/3593-12040_Libellen_-_Gewinner_und_Verlierer_in_Niedersachsen)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, D-38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**22219.** Tesar, D.E. (2022): Digging for information: Investigating the efficacy of tracking and augmenting *Lacunicambarus nebrascensis* for endangered dragonfly conservation. MSc. thesis, Department of Biology, Conservation and Biodiversity Specialization Program In the Graduate School The University of South Dakota: 109 pp. (in English) ["Restoration and preservation of habitat for threatened and endangered species can proceed in many ways. Augmentation strategies can be used to supplement threatened and endangered populations or the species and resources on which those imperiled species depend. Comprehensive knowledge of species movement and home range is necessary to formulate effective augmentation plans. For freshwater burrowing crayfish, this type of information is generally lacking. The studies reported here were designed to acquire detailed information that is essential for augmentation of the plains devil crayfish, *Lacunicambarus nebrascensis* (formerly, *Cambarus diogenes*). Although *L. nebrascensis* populations are not considered threatened, this crayfish provides vital refuge for the endangered (*Somatochlora hineana*). Because

the burrows created by *L. nebrascensis* are used by *S. hineana* to survive seasonal drying and overwintering periods; there is potential to enhance *S. hineana* habitat through *L. nebrascensis* augmentation. We tested the use of mobile and stationary PIT telemetry technology to track the movements of *L. nebrascensis* within *S. hineana* habitat (Chapter 1). This work demonstrated that *L. nebrascensis* could be tracked above and below ground and that the use of both stationary and mobile tracking equipment was necessary to recapture *L. nebrascensis* within different microhabitats. We investigated methods for the introduction of *L. nebrascensis*. In the laboratory, providing *L. nebrascensis* with a starter hole significantly decreased burrow initiation time (Chapter 2). This informed our field release trials where pit-tagged *L. nebrascensis* were released with a starter hole and a 24-hour acclimation period. Introduction treatment did not significantly impact the number of crayfish that relocated from their introduction point, and 64% of released *L. nebrascensis* burrowed within 3m of their introduction point. This indicated that a successful release into *S. hineana* habitat was possible. Our work establishes the functionality of PIT telemetry technology for tracking a primary burrowing crayfish species. We present a methodology that can be applied to introducing and tracking of other elusive fossorial species, which can aid in their own conservation or allow them to be used to improve available refuge space for other species that use their burrows." (Author)] Address: <https://red-library.usd.edu/diss-thesis/91/>

**22220.** Trájer, A.; Trájer, J. (2022): Effect of weather fronts on mosquito (Diptera: Culicidae) number based on a 90-days-long trapping and weather observation. *Acta entomologica slovenica* 30(1): 32-52. (in English, with Slovene summary) ["Mosquitoes are the cause of summer nuisance and vectors of several pathogens. Their activity and abundance are determined by meteorological factors. We performed a 90-days-long mosquito trapping and parallel measuring of temperature, air pressure, and precipitation values in Felsőörs, Hungary. The aim of the study was to find a correlation between the changing weather conditions and the trapped mosquito numbers and the four most abundant mosquito species. A total of 1716 mosquito individuals was trapped, and 19 mosquito species were identified. *Aedes cinereus*, *Aedes vexans*, *Anopheles maculipennis*, *Culex pipiens* formed the 87% of the mosquito material. The regionally rare species, *Ochlerotatus excretians* was also collected. The theoretical threshold of mosquito activity in the study was 11°C. Based on the multiple regression analyses, mean, maximum and minimum temperatures had a moderately strong positive effect, precipitation had a very weak positive effect and air pressure had a very weak negative effect on the number of caught mosquitoes. In the case of the four most abundant mosquito species, similar correlations were found. The statistical analysis of meteorological variables and mosquito numbers showed that higher mean daily temperatures 1 day prior to trapping had the most significant positive effect on mosquito numbers. Lower than average mosquito catches occurred mainly during or 1-2 days after the front passages, and the average mosquito catches generally were associated with front-free periods. It was concluded that weather fronts have a negative effect on mosquito activity ... For example, large dragonflies prefer to quest for prey after the passage of cold fronts (Russell et al. 1998). Swarming, starting immediately before the arrival of cold fronts, could be beneficial for breeding mosquitoes. The predation of dragonflies during swarming could cause notable losses for mosquito populations. This influence is so strong that it affects the timing of swarm

initiation and swarm site selection (Yuval & Bouskila 1993)."] (Authors)] Address: Trájer, A., Univ. of Pannonia, Sustainability Solutions research Lab, H-8200 egyetem utca 10, Veszprém, Hungary. Email address: [attilatrajer@gmail.com](mailto:attilatrajer@gmail.com)

**22221.** Tyrrell, M. (2022): On the success of *Chalcolestes viridis* (Vander Linden) (Willow Emerald Damselfly) and the decline of *Lestes sponsa* (Hansemann) (Emerald Damselfly) at Finedon Pocket Park, Northamptonshire. *J. Br. Dragonfly Society* 39(2): 14-24. (in English) ["The small pond at Finedon Pocket Park, Northamptonshire was the first in the County to be recorded with a colony of *C. viridis*. The species was discovered by the author in 2017, and has been the subject of several papers (Tyrrell, 2019a, Tyrrell, 2020). The pond hosts a strong colony of *Lestes sponsa* which the author has monitored, along with all other species recorded for the past 15 years. Since 2017, the colony of *C. viridis* has increased, with maximum counts in 2022 close to 100 adults while, over the same period, the colony of *L. sponsa* has declined from a maximum of approximately 75 to 5 adults, and adults have now become very hard to find even in their traditional areas. During the same period, the pond has seen several floods (that killed some willow trees) and has had droughts. This review considers the factors that could contribute to the decline in *L. sponsa*, and how the behaviour of *C. viridis* might contribute to its success and the decline in *L. sponsa*, including inter-species competition, egg mortality during winter floods and natural extinction events." (Author)] Address: Tyrrell, M., 8 Warwick Close, Raunds, Northants, NN9 6JH, UK. Email: [mark.p.tyrrell@gmail.com](mailto:mark.p.tyrrell@gmail.com)

**22222.** Varadinova, E.D.; Georgieva, G.G.; Ihtimanska, M.K.; Vidinova, Y.N.; Evtimova, V.V.; Tyufekchieva, V.G.; Todorov, M.T. (2022): Macrozoobenthos in mountain standing water bodies in Bulgaria. *Acta Zool. Bulg.*, Supplement 16: 1-13. (in English) ["A survey of macrozoobenthos in selected standing water bodies situated in mountain areas of Bulgaria was carried out. The study was conducted in the summer of 2020 (July-August) at one lake (Trevisto Lake – Rhodopes Mts.) and eight reservoirs (Ognyanovo – Sredna Gora Mts.; Bebresh, Hristo Smirnenki and Yovkovtzi (two sites) – Balkan Mts.; Belmeken – Rila Mts.; Batak, Golyan Beglik and Shiroka Polyana (two sites) – Rhodopes Mts.). These water bodies are classified as mountain type of water bodies according to the Bulgarian National Typology and are situated in two ecoregions, i.e. Ecoregion 7 (Eastern Balkans) and Ecoregion 12 (Pontic Province). Totally, 120 taxa have been identified. The macroinvertebrate communities were specific to lentic waters and were dominated by oligochaetes and chironomid larvae. Larvae of dragonflies, mayflies and caddisflies as well as aquatic beetles, freshwater gastropods and mussels were also present with great taxonomic diversity. The influence of the environmental factors on the formation of the macroinvertebrate communities in the studied lentic ecosystems was analysed." (Authors) The following taxa are listed: *Aeshna* sp., *Anax imperator*, *Calopteryx splendens*, *Coenagrion puella*, *Coenagrionidae* gen. sp., *Corduliidae* gen. sp., *Enallagma cyathigerum*, *Gomphus* sp., *Ischnura elegans*, *Libellulidae* gen. sp., *Onychogomphus forcipatus*, *Orthetrum cancellatum*, *Platycnemis pennipes*.] Address: Varadinova, Emilia, Department of Geography, Ecology and Environmental Protection, Faculty of Mathematics and Natural Sciences, South-West University "Neofit Rilski", 66 Ivan Michailov Street, 2700 Blagoevgrad, Bulgaria. E-mail: [emily.varadinova@gmail.com](mailto:emily.varadinova@gmail.com)

**22223.** Wilkening, J.; Locher, M.; Flanagan Pritz, C.; Nelson, S.; Willacker, J.; Eagles-Smith, C. (2022): A quest for



Dragonflies to uncover an invisible threat. A unique project uses dragonfly larvae as biosentinels for mercury bioaccumulation on protected lands. *The Wildlife Professional* 16(2): 36-41. (in English) [[https://www.researchgate.net/publication/360631184\\_Using\\_dragonfly\\_larvae\\_as\\_biosentinels\\_on\\_protected\\_lands](https://www.researchgate.net/publication/360631184_Using_dragonfly_larvae_as_biosentinels_on_protected_lands)] Address: Eagles-Smith, C.A., United States Geological Survey, Forest and Rangeland Ecosystem Science Center, Corvallis, Oregon 97330, United States. E-mail: ceagles-smith@usgs.gov

## 2023

**22224.** Abdel-Galil, F.A.; Morsy, S.M.; Farghal, A.I.A.; Abdel-Naser, M.A.; Moharram, A.M.M.; Mousa, S.E. (2023): Highlights on Insects and Fungi Associated with Mosquitoes Inhabiting Agricultural Drain Water in Different Areas of Assiut Governorate, Egypt. *Assiut Journal of Agricultural Sciences* 54(4): 196-211. (in English) ["The objective of the study was to determine the species composition of mosquitoes and their associated insects and fungi inhabiting drain water in different agricultural areas of Assiut governorate, Egypt. During 72 inspection visits and 164 examinations of drain water pools in seven areas of Assiut governorate, results indicated the presence of six identified mosquito species. *Culex pipiens* is considered the most frequent mosquito species with the highest Incidence Area Weight value IAW21. All six identified mosquito species were encountered in El-Badary area with an Incidence Species Weight ISW value of 14. Nine insect species belonging to five orders were recorded. *Pantala flavescens* is considered the most frequently associated insect species in all areas. Incidence Area Weight IAW for each identified species indicated that *P. flavescens* had the maximum value of IAW 14. Also, the maximum value of Incidence Species Weight was ISW 22 in El-Badary area. Twenty-four fungi species were identified from agricultural drain water pools. Aquatic fungi were twenty-two species inhabiting agricultural drain water and Nine fungi species were isolated from the associated insects. Some of these species recorded as entomopathogenic fungi for mosquitoes including *Fusarium oxysporum*, *F. solani*, and *F. incarnatum*. The incidence values of all fungi species isolated reached the maximum of 17 in Spring. So, the associated insect species and fungi with mosquitoes in the present study can play an active role as biological control agents in Integrated Pest Management (IPM) approach. This contributes to achieving the Sustainable Development Goals (SDGs)."] (Authors) Additional odonate species included into the analysis are *Anax ephippiger*, *Ischnura senegalensis* and *Trithemis aurora*.] Address: Abdel-Galil, F.A., Plant Protection Dept, Faculty of Agriculture, Assiut University, Assiut, Egypt. Email: faagalil@aun.edu.eg

**22225.** Ait Taleb, L.; Chelli, A.; Djamila, S.A.A.; Abdelheq, Z.; Zinette, B.; Houhamdi, M.; Zebza, R. (2023): Survey and repartition of Odonatofauna in the lotic and lentic waters of the Djurdjura and Soumman regions of Kabylia (North Central Algeria). *Ekológia* 42(3): 230-238. (in English) [oas 72;"The aim of this study is to examine the Odonata fauna structure and composition in Kabylia's wetlands (central north Algeria) by sampling 36 potential sites (16 wadis and 20 water reservoirs) in the two main departments of this region, namely, the Kabylia of Djurdjura (Tizi Ouzou) and the Kabylia of Soummam (Bejaia). This region has one of the most important hydrographic systems in Algeria and a wide range of exceptional wetlands due to its important rainfall regime. A lack of studies, especially in the western part of the region (Tizi Ouzou), prompts a specific inventory and ecological analysis of the Odonata population over a period

of 6 months (from April to September 2021). Forty species of Odonata have been recorded in Kabylia, of which *Pyrhosoma nymphula* represents a new record for Algeria, raising the reference list to 64 species. There are four northern African endemic species and among these, we report on the rediscovery of the critically endangered (KN) *Calopteryx cuxl* in Algeria, recorded in the 19th century and deemed to have been extinct after an absence of more than a century; *Gomphus lucasii* is assessed as vulnerable (VU) and *Enallagma deserti* and *Platycnemis subdilata* are judged as least concern (LC)."] (Authors) [[https://www.researchgate.net/publication/374553599\\_Ait\\_Taleb\\_et\\_al\\_2023](https://www.researchgate.net/publication/374553599_Ait_Taleb_et_al_2023)] Address: Ait Taleb, Lamia, 1PSEMRVC Laboratory, Dept of Biology, Faculty of Biological Sciences and Agronomical Sciences, Mouloud Mammeri University, Tizi-Ouzou, 15000, Algeria. Email: lamia.aittaleb@ummto.dz

**22226.** Appel, E.; Michels, J.; Gorb, S.N. (2023): Resilin in insect flight systems. *Advanced Functional Materials* 2023, 2215162: 30 pp. (in English) ["Compared to wingless insects, pterygote insects profit from numerous wing-related benefits including a wider distribution range, the exploitation of various food resources and the escape from water. or land-confined predators. In order to maintain the wings' functionality, the wing design and resistance to material fatigue are of key importance. This is even more essential for survival when considering that wings are used for millions of wing beat cycles but cannot be repaired and do not contain inner muscles so that their aerodynamic performance is mainly based on passive, structure-based wing deformations. One of the components serving this purpose is the endowment of certain wing components with the elastomeric protein resilin building stable and complex material composites with the tanned cuticle. Resilin endows the respective structures with, e.g., higher flexibility and compliance and enables elastic energy storage. In this study, the occurrence of resilin in the insect flight system is reviewed based on previous studies of several insect orders including Odonata [*Sympetrum vulgatum*], Orthoptera, Hymenoptera, Coleoptera, Dermaptera, and Diptera, and the function of resilin is discussed with reference to the respective structures."] (Authors)] Address: Appel, Ester, Functional Morphology and Biomechanics, Zoological Institute, Kiel University, Am Botanischen Garten 1-9, D-24118 Kiel, Germany. Email: e-appel@zoologie.uni-kiel.de

**22227.** Aristizábal-Botero, A.; Snoeks, J.; Realpe, E.; Vanschoenwinkel, B. (2023): Conductivity and water level modulate developmental plasticity and explain distribution patterns in a diverse neotropical Odonata assemblage. *Freshwater Biology* 68: 1558-1571. (in English) ["The rock pools are located on the summit of two inselbergs inside Bojonawi Nature Reserve (Vichada, Colombia.... Developmental plasticity can help organisms to survive in temporally variable environments. However, it is not well understood how variation in life history plasticity helps species coexist in heterogeneous environments. Here, we investigate the extent to which life-history plasticity explains species distributions in a diverse assemblage of odonates in a tropical freshwater rock pool system characterized by substantial variation in pond permanence. Some Odonata can accelerate their development to leave the water before their habitat dries. However, how they sense habitat drying is poorly understood. Here, we experimentally tested the extent to which elevated concentrations of salts in water or reductions in water level can be used as cues for developmental acceleration in a neotropical Odonata assemblage from granite rock pools. Libellulidae were found along the permanence gradient and

accelerated their growth in response to elevated dissolved salts (measured as conductivity). *Anax amazili* was also found in all environments and did the same in response to lower water levels. In turn, larvae of *Telebasis simulata* were restricted to deeper long-lived pools and did not respond to the tested cues. Differentiation in life-history strategies can contribute to niche differentiation in this diverse predator assemblage. Developmental plasticity triggered by different cues helps odonates avoid mortality and exploit short-lived habitats. The global acceleration of freshwater salinisation due to human activities might disrupt the delicate links between low levels of dissolved salts and life-history responses and represent a significant threat to these ecosystems and their biodiversity." (Authors)] Address: Aristizábal-Botero, Ángela, Dept Biol., Univ.de Los Andes, Bogotá, 111711, Colombia. Email: [angela.aristizabal.botero@vub.be](mailto:angela.aristizabal.botero@vub.be)

**22228.** Arya, M. K.; Chandra, H.; Verma, A. (2023): Spatial insect diversity paradigms and related ecosystem services in the protected Nandhour Landscape of India. *Journal of Insect Biodiversity and Systematics* 9(1): 115-138. (in English, with Arabian summary) ["The Nandhour Landscape located in an eco-fragile biodiversity rich Terai Arc Landscape of India is protected in the form of a wildlife sanctuary and is least explored in terms of insect diversity and functions. Therefore, this study aimed to provide baseline information on the biodiversity of insects and their ecological functions in tropical to sub-tropical forest ecosystems which is important for the successful long-term provisioning of ecosystem functions and services in the protected landscape. Using standardized sampling techniques, the present study examined the structure and composition of insect assemblages in terms of their comparative diversity and richness across a range of habitat types in the Nandhour Landscape. Besides, the present study also evaluated the ecological significance of insect fauna. A total of 230 insect species belonging to 47 families and nine orders were recorded from various habitats and Lepidoptera was the most dominant insect order in terms of both richness and abundance, followed by Coleoptera, Hymenoptera, Odonata [*Acisoma panorpoides*, *Aethriamanta brevipennis*, *Brachythemis contaminata*, *Crocothemis servilia*, *Orthetrum glaucum*, *O. prunosum*, *O. sabina*, *O. taeniolatum*, *O. triangulare*, *Palpopleura sexmaculata*, *Pantala flavescens*, *Rhodothemis rufa*, *Trithemis festiva*, *T. pallidinervis*, *Ceriagrion coromandelianum*, *Ischnura rubilio*, *Pseudagrion australasiae*, *P. rubriceps*, *Neurobasis chinensis*, *Aristocypha fenestrella*, *A. quadrimaculata*, *Paracypha unimaculata*] and others. Species diversity and richness were the highest in dense moist and open dry riverine forests, while the least in plantation forest and agricultural land. The heterogeneous structure and composition substantiated the importance of overall spatial heterogeneity and natural forests in sustaining and maintaining the rich insect diversity. Conservation of insect diversity is highly important as several species provide crucial ecosystem services and aid in the functioning of various ecologically fragile habitats of the landscape." (Authors)] Address: Chandra, H., Department of Zoology, D.S.B. Campus, Kumaun University, Nainital-263002, Uttarakhand, India. Email: [hemchandra5593@gmail.com](mailto:hemchandra5593@gmail.com)

**22229.** Aziza, E.P.N.A.; Satria, R. (2023): Keanekaragaman Jenis Capung (Odonata) di Blok Silayang Maninjau. *Jurnal Serambi Biologi* 8(3): 329-333. (in Indonesian, with English summary) ["The Silayang block area is one of the conservation areas in the Maninjau Nature Reserve that is have natural river basin. While this area have lacks information about its diversity of the dragonflies. The present

study aims to determine the diversity of Odonata in the Silayang block area. The method used in this study is entomological handnet and photography. Analysis of dragonfly data this study using the diversity index, using the Shannon Wiener index. In this study, six species of dragonfly were obtained from three families and two suborders. The dragonfly species obtained were *Diplacodes trivialis*, *Neurobasis chinensis*, *Neurothemis fluctuans*, *Orthetrum chrysis*, *O. sabina*, and *Rhinocypha bisignata*. The results of this study indicate that the index of diversity of Odonata in the Maninjau Nature Reserve, Silayang Block, is moderate." (Authors)] Address: Satria, R., Dept of Biology, Fac. of Mathematics & Natural Sciences, Uni. Negeri Padang, West Sumatera, 35171, Indonesia. Email: [rjalsatria@yahoo.co.id](mailto:rjalsatria@yahoo.co.id)

**22230.** Baranovski, S.V.; Lin, Z.Y. (2023): Design of a structurally optimized bioinspired structural arrangement of a polymer composite regional aircraft tail fin. *E3S Web of Conferences* 413, 02003 (2023) <https://doi.org/10.1051/e3sconf/202341302003>: 9 pp. (in English) ["Aircraft frame elements are highly responsible elements. They are subject to stringent requirements for strength, stability, resource. Often these requirements contradict each other, especially if it is necessary to ensure the minimum mass of the product. However, it is necessary to improve the characteristics of aircraft. Nevertheless, the optimization of the frame has almost exhausted itself. The power frame consists of longitudinal and transverse elements. It is possible to improve the characteristics of structural arrangement by using polymer composite materials based on glass and carbon fibers. This will improve the design characteristics due to high specific properties. In addition, one of the directions is the development of new bioinspired structural layout based on natural analogues. The work is devoted to the actual task of searching and choosing new structural arrangement for the aircraft tail. The paper considers five variants of structural layout, including the classical original design. The advantage of the bioinspired variant in terms of mass and displacement is shown." (Authors) Bioinspired structural layout are based on insect wings; main considered species were the wings of the Odonata.] Address: Baranovski, S.V., Bauman Moscow Technical University, ul. Baumanskaya 2-ya, 5/1, 105005 Moscow, Russia. Email: [serg1750@mail.ru](mailto:serg1750@mail.ru)

**22231.** Bártová, K. (2023): Vliv kvality prostředí na kondici larev vážek. Effect of habitat quality on the body condition of dragonfly larvae. BSc. thesis, Faculty of Environment, Czech Agrary University in Prague: 45 pp. (in Czech, with English summary) ["Individual species choose their habitats according to certain criteria. If they meet these criteria, the habitat becomes attractive to them. This bachelor's thesis focuses on the topic of ecological traps. Habitats may become such a trap if they are attractive to individuals and yet represent a poor-quality place for them to live. These traps are mostly created by human activities. The aim of this study was to investigate the effect of environmental quality on the fitness of *Sympetrum vulgatum* larvae, which inherit their habitat from their terrestrial mother during oviposition. The evaluation was based on the number of immune cells in their haemolymph. The theoretical section of this work summarizes that the main factors affecting the fitness of larvae are predation, lack of food, pollution and stress, which is both a consequence of these factors and a cause of reduced immune function. The invertebrate immune system is based on both humoral and cellular mechanisms, which are based on cells called hemocytes. Hemocytes are investigated in the experimental section of this thesis, specifically their con-

centration in the haemolymph of larvae coming from different environments. Ten sites in the Sokolov region were selected for the research, 5 of which were natural and 5 were reclaimed sites after lignite mining. The amount of hemocytes and granulocytes in the haemolymph of larvae from both types of habitats collected on two dates was identified in the laboratory. The results of my work confirmed the assumption that larvae from natural sites possess a greater number of immune cells, especially granulocytes, than larvae from reclaimed habitats. In addition, larvae from reclaimed habitats were of smaller size. These differences were particularly evident in the second measurement. From this study, I conclude that environmental quality has a significant effect on the fitness of dragonfly larvae, and this effect increases with the prolonged duration of exposure to a given environment. Understanding similar mechanisms in nature is critical for the conservation of animals and their environment. Building on this knowledge, it is possible to mitigate the impact of human activities through appropriate measures and habitat management. In addition, data concerning invertebrate immunity can contribute to the development of medicine and pest control." (Author)] Address: Bártová, Katerina: <https://theses.cz/id/fnt9i6/23687107>

**22232.** Bastian, H.-V.; Bastian, A. (2023): Specialist or opportunist — the diet of the European bee-eater (*Merops apiaster*). *Journal of Ornithology* 164(4): 729-747. (in English, with German summary) ["*M. apiaster* is considered a foraging specialist for large flying insects, 80% or more of which are Hymenoptera, mainly bumblebees and other bees, including honeybees. Observations of bee-eaters foraging give rise to doubts about an almost one-sided Hymenoptera diet, as Lepidoptera, Odonata, large Diptera or Heteroptera are also regularly and frequently preyed upon and fed to nestlings and brood mates. In a meta-analysis of 56 studies on the bee-eater's diet, a total of 130,624 prey items from 115 food samples were evaluated. Total of 85 samples (74%) with 83,953 items (72%) came from Southern, Eastern and Central Europe; however, studies from North Africa, Central Russia, Ukraine, Turkmenistan, Uzbekistan, Saudi Arabia and South Africa were also included in the analyses. The collection methods significantly influence the results of the dietary composition. In studies of pellet and stomach contents, the diet was less diverse. It consisted of about 90% Hymenoptera and Coleoptera overall, whilst other arthropods were rarely detected. Studies based on direct observation or photo documentation showed that the diet was more diverse, and Hymenoptera were not always the most abundant, but could also include Odonata, Lepidoptera, Tabanidae, Syrphidae, Saltatoria, Heteroptera or Hemiptera in significant amounts. The proportion of Hymenoptera in these studies was 49%, about a third (20%pts – 30%pts) lower than in the pellet and stomach content studies, and the proportion of Coleoptera (13%) about a quarter lower. We assume that bee-eaters completely digest weakly sclerotised prey and that these are, therefore, not detected in pellets and stomachs, or only in low numbers. This means that 81% of published studies on the bee-eater's diet are based on methods that lead to quantitatively and qualitatively unrepresentative results and thus do not provide precise results of diet compositions. Observational and photographic methods have only been used to study the nestling diet. Therefore, a reliable statement about what adult bee-eaters eat themselves and how the diet is composed quantitatively is currently not possible. The diet of adult and juvenile birds could only be compared based on the poorly representative pellet and stomach content analyses. This analysis is limited to the abundance of Hymenoptera and Coleoptera, which

are well detectable in pellets and stomachs. Hymenoptera were significantly more abundant in the nestling diet, whilst coleopterans were more abundant in the adult diet. The diet also varied regionally. Bumblebees, because of their sluggish flight and because they are already active at relatively low ambient temperatures, are important food animals in climatically less optimal and oceanic areas at the northern edge of the range. In other regions, Hymenoptera occur less frequently and less regularly, whilst Coleoptera, Odonata, Lepidoptera, large Diptera, Saltatoria, Isoptera or Hemiptera may occur locally in significant numbers as prey. The extent to which diet varies seasonally could not be clearly proven. Only one of five studies shows weakly significant changes in diet composition over the breeding season. This study is based on direct observation of prey fed to nestlings, whilst the other studies examined prey remains in pellets. Although the pellet studies also showed different food compositions over the course of the brood, trends between studies were inconsistent and not significant overall. We hypothesise that local influences (weather, habitats) affected diet composition. Further analysis is needed to determine whether food supply or demand changes during the breeding season. In addition to analysing the food composition, also the food supply must be surveyed, which has rarely been done so far. The opportunistic use of food resources can support the successful colonisation of breeding areas and is probably an important factor in the current successful expansion of the European bee-eater." (Authors)] Address: Bastian, H.-V., Geschwister-Scholl-Str. 15, 67304, Kerzenheim, Germany

**22233.** Bazzi, G.; Galimberti, A.; Fogliani, C.; Bani, L.; Bazzi, L.; Bonvicini, P.; Brembilla, R.; Brigo, M.; Cavenaghi, A.; Colombo, G.; Della Pietà, C.; Galliani, C.; Guarnaroli, E.; Larroux, N.; Monti, A.; Orioli, V.; Ornaghi, F.; Pilon, N.; Pirota, G.; Radaelli, G.; Tessa, G.; Assandri, G. (2023): Odonate diversity of a highly urbanised region: An annotated checklist of the damselflies and dragonflies (Insecta, Odonata) of Lario and Brianza (Lombardy, N Italy). *Biodiversity Data Journal* 11: e111358: 34 pp. (in English) ["Given their sensitivity to environmental alterations, odonates act as reliable bioindicators to assess the effects of changes in freshwater ecosystems and associated terrestrial habitats. The region comprised between Lario and Brianza (Provinces of Como, Lecco and Monza and Brianza, Lombardy, N Italy) is one of the most urbanised of the Italian peninsula and large parts of its territory have been heavily altered, especially at low elevation. Despite this pervasive anthropogenisation, the area is still characterised by a considerable variety of freshwater habitats, possibly harbouring rich odonate communities, which, however, have been never thoroughly investigated. This study aimed to produce the first commented checklist of the Odonata of this region, accompanied by distribution maps. The work is based on 12,093 records spanning from 1981 and 2022, derived from literature (289), revision of collections (42), citizen-science projects (1249) and unpublished data from the authors and their collaborators (10,513). Overall, fifty-five species occur or occurred in the past in the study area (20 Zygoptera and 35 Anisoptera). One species, *Erythromma najas*, was confirmed exclusively before 1978, while seven species (*Lestes barbarus*, *Coenagrion scitulum*, *Aeshna affinis*, *Anax ephippiger*, *Somatochlora arctica*, *Sympetrum meridionale* and *Trithemis anulata*) have been recorded only after 2000. Records referring to *Chalcolestes parvidens* and *Sympetrum flaveolum* were considered questionable and excluded from the checklist. A list of species for each protected site is additionally provided. This work highlighted the importance for odonates of Lario and Brianza Regions from a national perspective,

in particular for species of conservation priority/interest, such as *Symplocma paedisca*, *Oxygastra curtisii* and *Sympetrum depressiusculum*." (Authors)] Address: Galimberti, A. Università degli Studi di Milano-Bicocca, Dipartimento di Biotecnologie e Bioscienze, Milano, Italy. Email: andrea.galimberti@unimib.it

**22234.** Berta, J.L.; Mott, C.L. (2023): Leaves of an invasive shrub induce mass mortality of an amphibian apex predator and its macroinvertebrate prey. *Biological Invasions* 25: 3277-3291. (in English) ["Studies of plant invasions have primarily focused on effects within shared habitats of native and invasive species. However, secondary compounds produced by terrestrial invasive plants can cross terrestrial-aquatic boundaries via senesced leaves, leading to altered patterns of aquatic biodiversity and ecosystem functioning. Impacts of phenolic compounds from senesced leaves have been characterized among relatively lower trophic groups, but effects on keystone species, such as apex predators, should have disproportionately larger effects on aquatic food webs. Using a widespread invasive species (Amur Honeysuckle, *Lonicera maackii*), we employed experimental mesocosms to examine effects of honeysuckle leaf litter addition on survival of apex predators (larval spotted salamanders, *Ambystoma maculatum*), their zooplankton and macroinvertebrate prey, indicators of primary productivity and decomposition, and abiotic variables influenced by phenolic compounds. Despite previous laboratory observations suggesting *A. maculatum* might exhibit resistance to *L. maackii* leachates, we observed near complete loss of both *A. maculatum* and benthic macroinvertebrates in experimental mesocosms, while zooplankton abundance was unaffected. Mortality was likely associated with precipitous declines in dissolved oxygen following rapid decomposition of *L. maackii* leaves, and these conditions facilitated nearly 15-fold increases in larval mosquito abundance. Our results highlight how experimental venue and methodology may alter outcomes of investigations involving senesced leaves of invasive plants. Losses of amphibian predators under quasi-natural invasion conditions indicate important influences on terrestrial-aquatic nutrient exchange, and we highlight phenological patterns of leaf senescence and breeding by aquatic organisms as important avenues for further investigation in characterizing the consequences of plant invasions.... Many invertebrate taxa colonized mesocosms independently; however, three snails and three larval Coenagrionidae were added to each mesocosm prior to introduction of amphibian larvae, since it appeared unlikely these groups." (Authors)] Address: Mott, C.L., Dept Biol. Sciences, Eastern Kentucky Univ., Richmond, KY, 40475, USA

**22235.** Bethoux, O.; Anderson, M (2023): New light shed on Triadophlebiomorpha wing morphology and systematics (Insecta: Odonata). *Geodiversitas* 45(17): 479-496. (in English, with French summary) ["The systematics of the Triadophlebiomorpha, a group of often large-sized stem-Odonata, essentially Triassic, is reconsidered based on new data on some of the known species and on new material from the Molteno Formation (South Africa). New data on *Reisia gelasii* (Reis, 1909) (Anisian; Muschelkalk basin, Germany) and 'Triadotypus' *guillaumei* Grauvogel & Laurentiaux, 1952 (Anisian; Grès à Volt zia, France) allowed reconsidering the delimitation of the corresponding genera, *Reisia* Handlirsch, 1912 and *Triadotypus* Grauvogel & Laurentiaux, 1952, the latter regarded as a junior synonym of the former. Thanks to its pristine preservation of the wing three-dimensional structure, the material of *Piroutetia liasina* Meunier, 1907, re-illustrated, provides further insights on wing venation homologies in the

group. These new data, coupled with new ones on known and new material from Molteno (Carnian; Karoo Basin, South Africa), led us to corroborate the placement of *Triassologus biserialatus* Riek, 1976 to the Triadophlebiomorpha, and to recognize '*Reisia*' *rieki* Deregnacourt, Wappler, Anderson & Béthoux, 2017 as its junior synonym. In turn, it is argued that the sub-contemporaneous species *Iverya aveyri* Béthoux & Beattie, 2010, from Australia, is to be assigned to *Triassologus* Riek, 1976 (and the genus *Iverya* Béthoux & Beattie, 2010 considered its junior synonym), further emphasizing similarities between South African and Australian Triassic insect faunas. A subset of the Triadophlebiomorpha possesses a CuP+AA stem splitting into CuA and CuP+AA (as opposed to Cu and AA). This trait is present in *Nototriadophlebia pritykinae* n. gen., n. sp., an addition to the Triadophlebiomorpha from Molteno." (Authors)] Address: Béthoux, O., CR2P (CNRS, MNHN, Sorbonne Université), Muséum national d'Histoire naturelle, case postale 48, 57 rue Cuvier, 75231 Paris cedex 05, France. Email: obethoux@mnhn.fr

**22236.** Betsi, W.C.N.; Menbohan, S.F.; Lactio, N.L.; Tchouapi, Y.L.; Temgoua, M.A.Z.; Mbia, D.L.N.; Nhiomock, S.R.G.; Nwaha, M.; Ngon, E.B.B.A.; Dzavi, J.; Mboyé, B.R.; Nola, M. (2023): Comparative approach of the fauna diversity of benthic macroinvertebrates in a stream on ferrallitic soil and equatorial climate at 2 seasons in Cameroon (Central Africa). *World Journal of Advanced Research and Reviews* 19(1): 254-264. (in English) ["In order to determine the structure of benthic macroinvertebrates fauna in relation with some environmental factors, a study was carried out in the Esoa river at Nkongsamba in the Littoral region of Cameroon from January 2021 to January 2022. Physico-chemical parameters were measured according to APHA and Rodier recommendations, while benthic macroinvertebrates sampling was done out according to the multihabitat approach at a monthly frequency. The physico-chemical analyses revealed very good oxygenation of the water, a tendency of neutrality for the pH (7.79±0.8 UC) and a low and constant temperature (22.61±1.83 °C). The BMI count showed 3732 individuals, including 4 phyla, 6 classes, 14 orders and 69 families and over 80 species. Besides, the class of insects, and in particular the order of Odonata, supplanted the benthic fauna. The Esoa 2 and Esoa 3 stations recorded the highest relative abundance of BMI (37.43% and 36.99% respectively) with a predominance of pollutant taxa, notably the families of Chironomidae, Physidae, Tubificidae and Lumbricidae. On the other hand, the Esoa 1 station, with low relative abundance (25.56%), was more diversified and dominated by polluosensitive taxa, including Ephemeroptera, Plecoptera and Trichoptera. The high values of the Sørensen similarity index (65.62%) showed a high faunal similarity of the Esoa 2 and Esoa 3 stations. The high values of the Shannon and Weaver diversity index (4.6 bits/ind) indicated a high diversity of benthic macroinvertebrates reflecting the good ecological status of the waters of the Esoa stream ... The abundance of Odonata (of 28.65% relative abundance) is linked to the strong riparian vegetation that borders the watercourse and the bridges present downstream of certain stations that considerably reduce the speed of the current and favour their settlement." (Authors)] Address: Betsi, Wilfreid Christiane Noel, Lab. of Hydrobiology and Environment, Fac. Science, University of Yaoundé I, P.O. BOX 812, Yaoundé, Cameroon.

**22237.** Bezmaternykh, D.M.; Vdovina, O.N. (2023): Composition, structure and formation factors of macroinvertebrate communities in low-mountain lakes of the Russian Altai. *Acta Biologica Sibirica* 9: 433-449. (in English) ["Recent



data suggests a significant difference in physical and biological properties between low-mountain lakes and high-mountain or lowland water bodies. However, the taxonomic composition and structure of bottom invertebrates in low-mountain lakes of Altai remain unknown. Due to climate change and growing anthropogenic impact, studying the composition and structure of macrozoobenthos in these lakes is becoming increasingly urgent. In 2022, a study was conducted on macrozoobenthos from foothill lakes of the Russian Altai, specifically Kireevo in the Krasnogorsk region, Aya (Aiskoye) in the Altai region, Koksha and Svetloye in the Soviet region, Kolyvanskoye in the Zmeinogorsk region, and Belye in the Kuryinsky region of Altai Krai. The study identified 152 species from 9 classes, including Turbellaria (1), Nematoda (1), Oligochaeta (17), Hirudinea (5), Bivalvia (2), Gastropoda (8), Arachnida (10), Crustacea (2), and Insecta (106). Of the insects, the order Diptera (69 species, including 59 chironomids) had the greatest species diversity. Additionally, the orders Trichoptera (16), Coleoptera (7), Ephemeroptera (5), Odonata (4), Heteroptera (4), and Megaloptera (1) were identified. Most of the studied lakes in the Russian Altai (Aya, Belye, Kireevo, and Kolyvanskoye) had a taxonomic composition of macrozoobenthos similar to lowland lakes. Two lakes (Koksha and Svetloye) had a combination of features from both lowland and high-mountain lakes. The content of organic substances and their decomposition products in water, as well as substrate type, were the most significant factors determining the development of macroinvertebrate communities in the studied lakes." (Authors) No species details are given.] Address: Bezmaternykh, D.M., Institute for Water & Environmental Problems, Siberian Branch Russian Acad. Sciences (IWEP SB RAS), 1 Molodezhnaya st. Barnaul, 656038, Russia. Email: bezmater@mail.ru

**22238.** Bicker, R. (2023): Tireragan dragonflies. June 2023 Survey. <https://british-dragonflies.org.uk/wp-content/uploads/2023/08/Tireragan-Dragonfly-report-June-2023.pdf>: 29 pp. (in English) ["Tireragan is located on the south-west tip of the Ross of Mull, Scotland (UK National Grid Map Reference NM 337 188). A survey of Odonata was completed along four linear waterbodies and associated pools at the Tireragan peatbog site, during late June 2023. We confirmed eight species of Odonata using the site: Calopteryx virgo, Ischnura elegans, Lestes sponsa, Pyrrhosoma nymphula, Sympetrum striolatum, Libellula quadrimaculata, Cordulegaster boltonii, and Orthetrum coerulescens. The most abundant species on site was O. coerulescens. The area with the highest number of species, highest abundances and the most breeding evidence was Transect 1 (the dammed ditch). Transects are to be walked a minimum of 3 times over the dragonfly survey season (May to September). A second survey should be carried out toward the end of July/ early August, and a final walk in late September ..."] (Authors)] Address: <https://british-dragonflies.org.uk/wp-content/uploads/2023/08/Tireragan-Dragonfly-report-June-2023.pdf>

**22239.** Borges, R.P.; Lima, T. (2023): Uso de diferentes tipos de lâmpadas em armadilhas luminosas para a captura de insetos em ambiente urbano. Acta Biológica Catarinense 10(3): 34-40. (in Portuguese, with English summary) ["Use of different types of lamps in light traps to capture insects in an urban environment: The collection of insects with a light trap has been used in several studies on entomofauna. In the present work, the effectiveness of low-cost light traps in urban environments influenced by artificial light was evaluated. Light traps ... were installed in an urban area with three different types of light: fluorescent lamp white light 15W, 127V, incandescent lamp yellow light 15W, 127V and

UV lamp 15W, 220V ultraviolet (black) light. As a result, the collection of 1382 insects was verified, distributed in seven different Orders: ... Odonata [n=3 at yellow light trap only]. The highest number of insects collected was verified in UV light, followed by yellow light. The trap with less efficiency was represented by white light. In this way, it was possible to observe that, even in urban areas, with the interference of artificial light, the use of light traps is an effective tool for capturing insects." (Authors)] Address: Borges, Rebeca, Univ. Federal de Mato Grosso do Sul (UFMS), campus de Aquidauana, Rua Trindade de Barros, n. 740, bairro da Serraria – CEP 79200-000, Aquidauana, MS, Brasil. Email: rebecapborges@gmail.com.

**22240.** Bota-Sierra, C.A.; Tennessen, K.J. (2023): Diaphlebia richteri Bota-Sierra, 2015 is a junior synonym of Zonophora nobilis Belle, 1983 (Gomphidae: Odonata). International Journal of Odonatology 26: 103-107. (in English, with Portuguese summary) ["Diaphlebia richteri is shown to be a junior synonym of Zonophora nobilis. The confusion started by a generic misplacement due to the failure to observe the subalar carina spine which is present in Zonophora but not in Diaphlebia. Therefore, Z. nobilis is officially recorded for the first time in Colombia; we present a distribution map with the known localities for this rare Amazon species. Also, we made a comparison between our female specimens and the original description of the female from Cerro de la Neblina (Venezuela), including the first photographs of diagnostic characters of a female specimen." (Authors)] Address: Cornelio A., Grupo de Entomología Universidad de Antioquia (GEUA), Universidad de Antioquia, Medellín 50010, Colombia.

**22241.** Boyqobil kizi, N.Z.; Yusupovich, R.A.; Doniyor ogli, B.O. (2023): Preliminary information about dragonflies fauna distributed in Kashkadarya region. Middle European Scientific Bulletin 42: 78-83.[Uzbekistan. Records of Calopteryx samarcandica, Sympetrum pedomontanum, Anax imperator, Orthetrum brunneum and Ophiogomphus reductus are figured. The record of Calopteryx virgo is questionable. Additional species are listed in a table: Orthetrum albistylum, O. cancellatum, Sympetrum vulgatum, S. meridionale, Sympecma fusca] Address: Norkobilova Zarina Boyqobil kizi, Senior Lecturer, Department of Zoology Karshi State University Karshi, Uzbekistan.

**22242.** Burwell, C.J.; Power, N.R.; White, D. (2023): Is Agriocnemis rubricauda Tillyard, 1913 (Coenagrionidae) another parthenogenetic species of Odonata? Australian Entomologist 50(3): 206-220. (in English) ["Parthenogenesis, reproduction by females via unfertilised gametes, is widespread in insects but there is only one documented example among the Odonata. Ischnura hastata (Say) (Coenagrionidae) reproduces sexually across its wide range in the Americas from southern Canada to Brazil but has parthenogenetic populations comprising only females in the Azores islands in the eastern Atlantic Ocean. Recent circumstantial evidence suggests that the Australian damselfly Agriocnemis rubricauda Tillyard may also have sexual and parthenogenetic populations. The distribution of A. rubricauda was mapped and the monthly occurrence of males and females of A. rubricauda collated based on specimens in collections, our own photographic records and collections from extensive searches in south-eastern Queensland and north-eastern New South Wales and other photographic records submitted to iNaturalist. There appears to be a substantial gap in the range of A. rubricauda in coastal Queensland, with northern records from the Top End of the Northern Territory

and Queensland wet tropics, and southern records from southern Queensland and north eastern New South Wales. Male *A. rubricauda* are known only from the northern part of the range where there are similar numbers of records of males and females. Only females are known from the southern range where there are records of more than 320 individuals including 41 specimens in museum collections. Despite an estimated 96 person-hours of search effort across eleven locations in south-eastern Queensland and north-eastern New South Wales we encountered only females. In the northern and southern parts of the range, *A. rubricauda* adults have been recorded across most and all months of the year, respectively. We explore several explanations for the lack of males in the southern range and suggest that the most plausible explanation is that southern females are able to reproduce via parthenogenesis." (Authors)] Address: Burwell, C.J., Biodiversity and Geosciences Program, Queensland Museum, P.O. Box 3300, South Brisbane, Qld 4101, Australia. Email: [chris.burwell@qm.qld.gov.au](mailto:chris.burwell@qm.qld.gov.au)

**22243.** Carreira, B.; Kolár, V.; Chmelová, E.; Jan, J.; Adasevic, J.; Landeira-Dabarca, A.; Vebrová, L.; Poláková, M.; Horká, P.; Otáhalová, S.; Musilová, Z.; Borovec, J.; Tropek, R.; Boukal, D.S. (2023): Bioaccumulation of chemical elements at post-industrial freshwater sites varies predictably between habitats, elements and taxa: A power law approach. *Science of the Total Environment* 901 (2023) 165794: 14 pp. (in English) ["Elevated environmental levels of elements originating from anthropogenic activities threaten natural communities and public health, as these elements can persist and bioaccumulate in the environment. However, their environmental risks and bioaccumulation patterns are often habitat-, species- and element-specific. We studied the bioaccumulation patterns of 11 elements in seven freshwater taxa in post-mining habitats in the Czech Republic, ranging from less polluted mining ponds to highly polluted fly ash lagoons. We found nonlinear, powerlaw relationships between the environmental and tissue concentrations of the elements, which may explain differences in bioaccumulation factors (BAF) reported in the literature. Tissue concentrations were driven by the environmental concentrations in non-essential elements (Al, As, Co, Cr, Ni, Pb and V), but this dependence was limited in essential elements (Cu, Mn, Se and Zn). Tissue concentrations of most elements were also more closely related to substrate than to water concentrations. Bioaccumulation was habitat specific in eight elements: stronger in mining ponds for Al and Pb, and stronger in fly ash lagoons for As, Cu, Mn, Pb, Se, V and Zn, although the differences were often minor. Bioaccumulation of some elements further increased in mineral-rich localities. Proximity to substrate, rather than trophic level, drove increased bioaccumulation levels across taxa. This highlights the importance of substrate as a pollutant reservoir in standing freshwaters and suggests that benthic taxa, such as molluscs (e.g., *Physella*) and other macroinvertebrates (e.g., *Nepa*), constitute good bioindicators. Despite the higher environmental risks in fly ash lagoons than in mining ponds, the observed ability of freshwater biota to sustain pollution supports the conservation potential of post-industrial sites. The power law approach used here to quantify and disentangle the effects of various bioaccumulation drivers may be helpful in additional contexts, increasing our ability to predict the effects of other contaminants and environmental hazards on biota." (Authors)] Address: Carreira, B., cE3c – Centre for Ecology, Evolution and Environmental Changes, Faculty of Sciences of the University of Lisbon, Edifício C2, Campo Grande, 1749-016 Lisbon, Portugal. Email: [bmcarreira@fc.ul.pt](mailto:bmcarreira@fc.ul.pt)

**22244.** Castellano, S.; Falbo, F.; Seglie, D.; Friard, O. (2023): Anti-predator behavior in two brown frogs: differences in the mean behaviors and in the structure of animal personality variation. *Behavioral Ecology and Sociobiology* 77, Article number: 98 (2023): 15 pp. (in English) ["Predation is a major source of selection and prey are known to modify their behavior depending on their past experiences and the current perceived risk. Within a species, variation in experience and in the response to perceived risk combine to explain variation in personality and individual plasticity. Between species, variation in personality and plasticity might also be the evolutionary consequence of different selective regimes. In this study, we describe the anti-predator behavior of two closely related brown frogs, *Rana dalmatina* and *Rana latastei*, and compare their structures of personality variation. We raised tadpoles in a common garden experiment with either fish, dragonfly larvae [*Aeshna* sp.], or no predators. Tadpoles were then repeatedly tested in the presence of the three acute stimuli and their behavioral variation was described in terms of quantity and quality of movements and of path sinuosity. In these tests, tadpoles of both species and ontogenetic treatments responded flexibly to predators by moving less, faster, and with more tortuous movements, and tadpoles raised with predators tended to move even faster. Independent of the acute treatment, *R. dalmatina* moved more and faster than *R. latastei* and the differences were larger without than with predators, demonstrating its higher plasticity. At the individual level, the two species showed qualitatively similar but quantitatively different structures of personality variation. *R. dalmatina*, more active, faster, and more plastic than *R. latastei*, showed also higher repeatability and a larger behavioral variation both among and within individuals. Significance statement: Predators are a major source of selection and preys have evolved the ability to flexibly respond to them. These responses often vary among species, because of their different evolutionary histories, and among individuals, because of their different experiences. We analyzed both these sources of behavioral variation in two closely related brown frogs, *Rana dalmatina* and *R. latastei*. We raised tadpoles either with or without predators and tested them in open field trials both with and without predators. The effects of the raising environment were similar in the two species, whereas the effects of the testing arena differed. Both species decreased activity and increased speed and sinuosity with predators, but *R. dalmatina* moved always more and faster than *R. latastei* and it showed higher plasticity, larger variation among and within individuals, and relatively higher values in repeatability." (Authors)] Address: Castellano, S., Dept of Life Science and Systems Biology, University of Turin, Via Accademia Albertina 13, 10123, Turin, Italy

**22245.** Chalmers, P.; Melchers, G.; Tikka, K.; Richardson, J.S. (2023): Distribution of the grappletail dragonfly (*Octogomphus specularis*), a lake outlet stream specialist at its northern range limit. *Fundamental and Applied Limnology* 197(1): 1-8. (in English) ["*O. specularis* reaches the northern end of its range in Canada and has only seven known occurrences within British Columbia, where its larvae are known only from lake outlet streams. Lake outlet streams provide a unique lotic environment with water from lakes providing high quality seston to filter feeders, favourably warmer water in summer, buffering from variation in discharge, and more stable substrates, in comparison to streams uninfluenced by lakes. We investigated factors that might explain why the distribution of larval grappletails appears to be restricted to lake outlet streams. We sampled the larvae from two outflow streams over one summer to determine

their number of age classes and estimate their abundances relative to distance from the lake outlets. We characterized the thermal regime of each lake outlet stream, and quantified the temperature differences between lake outlets and inflow streams. The two lake outlet streams were on average 37 % warmer (4.4 °C and 7.2 °C) higher than the inflow streams. We found three groupings of larval sizes, indicating a life cycle of three years. In one stream, larval abundance decreased with increasing distance from the lake, but in the other stream there was no pattern of decrease. Our results are consistent with the theory that warmer thermal conditions throughout summer at lake outflow streams provide sufficient degree-days to support development of this species' larvae at the northern end of their global range." (Authors)] Address: Richardson, J.S., Department of Forest and Conservation Sciences, The University of British Columbia, Vancouver, Canada V6T 1Z4. Email: john.richardson@ubc.ca

**22246.** Choong, C.Y. (2023): A preliminary study of dragonflies and damselflies (Odonata) of Batu Caves, Selangor, Malaysia. *Malayan Nature Journal* 75(1): 149-153. (in English) ["More than 250 species of Odonata are known to occur in Peninsular Malaysia. However, there is still no published record of Odonata from Batu Caves, Selangor. Hence, a series of field surveys were conducted from April to August 2019. A total of 25 species from four families were recorded, representing 10% of species known to Peninsular Malaysia. Of these, 19 species belong to the family Libellulidae, four species to family Coenagrionidae, and one species each from families Platycnemididae and Gomphidae. Notable records were *Ceragrion auranticum* and *C. chaoi*, and *Camacinia gigantea*. *C. auranticum* is a new record for the state of Selangor. Though its coverage area is small with limited aquatic habitats, Batu Caves still holds a substantial number of Odonata species." (Author)] Address: Choong, C.Y., Centre for Insect Systematics, Univ. Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. E-mail: cychoong@ukm.edu.my

**22247.** Chovanec, A.; Fischer, I.; Kargl V.; Schaufler, K. (2023): Die Libellenfauna eines Stillgewässers in Niederösterreich unter besonderer Berücksichtigung seiner Salinität. *Libellula* 42(1/2): 1-26. (in German, with English summary) ["Odonata at a stagnant water body in Lower Austria with special reference to its salinity – A standing water body with a size of about 1,500 m<sup>2</sup> was subject of an odonatological survey from 2021 to 2022. Due to heterogenic habitat conditions, 36 odonate species were found with 15 of them autochthonous (e.g., *Coenagrion scitulum* and *Sympetrum meridionale*, both "threatened with extinction" according to the Austrian Red List). In the case of 13 spp. successful development was proven by records of teneralis and exuviae and two spp. were classified as autochthonous because of high abundances in both years. The identification of exuviae was performed using DNA barcoding technique. The results of the study confirm the tolerance of many Central European dragonfly and damselfly species towards salinity. A maximum of 1.8 PSU (Practical Salinity Units) was calculated for the investigated water body due to increased chloride and sodium concentrations. Based on the results obtained in this study, the published tolerance limits of some species have to be raised. Only verbally described plasticity towards salinity in other species is now confirmed by precise values of chloride and sodium. Desiccating parts of the water body in 2022, due to low precipitation and groundwater levels, probably had an important impact on the Odonate community." (Authors)] Address: Chovanec, A., Krottenbachgasse 68, A-2345 Brunn am Gebirge, Austria. Email: andreas.chovanec@bml.gv.at

**22248.** Darkin, J. (2023): The first record of a viviparous lizard *Zootoca vivipara* predated a blue-tailed damselfly *Ischnura elegans*. *The Herpetological Bulletin* 163: 41. (in English) ["On 13 July 2022, I visited Foulshaw Moss Nature Reserve, Cumbria, England (54° 14'39" N, 2° 50'03" W). This reserve is a raised peat bog habitat, situated on the southern tip of the English Lake District covering an area of 3.5 km<sup>2</sup>. It is an ideal habitat for *Z. vivipara* and the northern viper *Vipera berus*. At 12:07 h, when the weather was partly cloudy with an approximate air temperature of 17 °C, a male *Z. vivipara* was observed basking on the edge of the Foulshaw Moss boardwalk close to the peat moss and near a peat pool. It was here the damselfly alighted only to be grasped by the lizard (Fig. 1). I recorded the lizard taking approximately one minute to ingest the damselfly, during which time the lizard shook the damselfly from side to side, dragging it backwards across a portion of the boardwalk to force it into its mouth, eventually swallowing the entire damselfly (BHS video, 2023). Following ingestion, the lizard resumed basking with its mouth agape. The Foulshaw Moss Nature Reserve has an abundance of both damselflies and dragonflies, including the endangered white-faced darter *Leucorrhinia dubia*, as well as a diverse array of other invertebrate prey for *Z. vivipara*." (Author)] Address: Darkin, J., Faculty of Science and Engineering, University of Wolverhampton, Wulfruna Street, Wolverhampton, West Midlands WV1 1LY, UK. Email: joshuadarkin0@gmail.com

**22249.** David, J.; et al., (2023): Atlas des libellules de la Bretagne à la Vendée. Collectif Bretagne Vivante & Atlas entomologique régional. ISBN 978-2-36833-452-2: 324 pp. (in French) ["The product of a collective work of 29 authors, it compiles, in a beautiful 324-page book, (1.4 kg) all of the current knowledge on dragonflies from the six departments of the study. From 2000 to 2020, nearly 2,000 observers mobilized to collect more than 165,000 data, to which were added 25,000 historical observations. Each of the 68 species present in the territory is presented in a monograph which includes its general distribution, its history and its biology in the study area, its status and abundance, the results of the survey and the perspectives concerning it. Distribution maps covering the two periods, phenology graphs and around 250 photos enrich the monographs, as well as a history of Latin and French names. A documented review of the evolution of habitats over the centuries, an analysis of the distribution by watershed and the conservation status of dragonfly populations complete this important work. The book also looks at other original themes such as the history of the study of dragonflies and that of their presence in popular traditions. The recently created Breton names are published for the first time. Finally, a photographic key to the 68 species will allow beginners or experienced naturalists to have a synthetic document to identify them in situ or a posteriori." (Publisher/Google Translate)] Address: <https://www.bretagne-vivante.org/produit/atlas-des-libellules-de-la-bretagne-a-la-vendee-frais-denvoi/>

**22250.** de Haro Guijarro, S. (2023): Primer caso de teratología abdominal en *Platycnemis acutipennis* (Selys, 1841) (Odonata: Platycnemididae). *Boletín de la SEA* 72: 181-182. (in Spanish, with English summary) ["For the first time, a case of abdominal teratology for a young male of the damselfly *Platycnemis acutipennis* is reported." (Author) "06-16-2022 a young male of *P. acutipennis* was photographed perched in the riverside vegetation between the Sarón-Ontaneda greenway and the Pisueña river, a tributary of the Pas, as it passes through the town of La Penilla, TM de Santa María from Cayón (UTM WGS84 30T 429070 4796492;"]

Address: de Haro-Guijarro, S., Asociación para el Estudio y la Conservación de la Naturaleza-La Enea (AECN-La Enea), C/ El Ferial 7, 1ºF, 39620, Sarón (Cantabria,). Spain. Email: asociacionlaenea@gmail.com

**22251.** Deacon, C.; Samways, M.J.; Pryke, J.S. (2023): Interplay between pond size and matrix extent drives odonate diversity patterns in a fragmented landscape. *Biodiversity and Conservation* 32: 4767-4785. (in English) ["Landscape fragmentation impacts freshwater habitats and their quality, affecting aquatic insect assemblages. Adjacent terrestrial areas are important secondary habitats where amphibiotic insects mature, feed, find mates, and move to locate aquatic breeding habitats. Using a factorial design with 27 small and large ponds within small and large natural patches in an exotic tree plantation-fragmented landscape of South Africa, and odonates as model organisms, we investigated (1) how pond size/natural terrestrial patch size interaction affects odonate diversity patterns versus habitat quality variables, and (2) determined whether anisopterans and zygopterans respond differently to landscape fragmentation. Species richness was similar among ponds. However, odonate abundance was highest in large ponds regardless of natural terrestrial patch size. Zygopteran functional richness and diversity was driven by pond and natural patch size, suggesting that zygopterans are sensitive to landscape fragmentation. In contrast, anisopterans were more resilient to fragmentation and more likely to select suitable habitats following water chemistry and vegetation characteristics. Overall, large ponds were occupied by different odonate assemblages compared to small ponds, and occupancy was strongly associated with mobility traits. These findings emphasize that ponds in both small and large natural terrestrial patches have conservation value. A pondscape that represents various pond sizes is important for maintaining regional odonate diversity. Pond conservation needs to be considered in the wider terrestrial context, which host a range of important secondary habitats. Adjacent natural terrestrial habitats also connect nearby aquatic habitats, which enable insects to move across the landscape in response to natural and artificial drivers." (Authors)] Address: Deacon, C., Department of Conservation Ecology and Entomology, Faculty of AgriSciences, Stellenbosch University, Stellenbosch, South Africa. Email: charldeacon@sun.ac.za

**22252.** Delithalia, M.; Mahatma, R. (2023): Dragonfly inventory and active time in Kasang Kulim Zoo area, Riau, Indonesia. *Bioeksperimen* 9(2): 32-39. (in English) ["Dragonflies have an important role in ecosystem balance as biological control agents and environmental bioindicators because they are sensitive to changes in water quality. Community activities at the Kasang Kulim Zoo can cause changes to water quality. When habitat conditions change, Odonata (dragonfly) will also change, both in distribution and diversity. This study aims to identify, invent and determine the activity time of dragonflies found in the Kasang Kulim Zoo area. Research was conducted at the end of March to mid-April 2023. Sampling used exploration method by using insect nets. The results obtained a total of 152 individuals belonging to 14 species, four families ... The Libellulidae family are active from 08.00 am to 05.00 pm, while dragonfly species from the Gomphidae family and the Zygoptera suborder are active from 08.00 am to 03.00 pm. Dragonfly activity is influenced by air temperature, air humidity and sunlight intensity." (Authors)] Address: Delithalia, Miranda, Dept of Biology, Faculty of Mathematics and Natural Sciences, Riau University, Pekanbaru 28293, Indonesia. Email: miranda.delithalia2163@student.unri.ac.id

**22253.** Dharan, D.T.; Greeshma (2023): Preliminary studies on the diversity and abundance of odonates in the selected sites of southern Kerala. *Asian Journal of Conservation Biology* 12(1): 82-89. (in English) ["Biodiversity forms the foundation of the vast array of ecosystem that critically contributes to human well-being. Odonates are considered to be indicator of ecological balance and are commonly seen in and around water bodies. The present study was carried out to assess the Diversity and Abundance of Odonates in the selected sites of Kollam and Trivandrum districts, Kerala, India in 2020-2021. A total of 25 species belonging to 16 genera and 6 families were recorded during the entire study. Suborder Anisoptera was represented by the families Libellulidae, comprising 10 species and Gomphidae, with 1 species; and the suborder Zygoptera was represented by the families Calopterygidae, with 2 species; Platycnemididae, with 3 species; Coenagrionidae, with 8 species; and Chlorocyphidae, with 1 species. Libellulidae was the dominating family with 40% of the total observations, followed by Coenagrionidae family. The only way to save the Odonata fauna and its habitats is creating awareness among the people. In this context, knowledge of Odonata fauna of a region is the first step towards conservation." (Authors)] Address: Dharan, Divya, Postgraduate & Research Dept of Zoology, Sree Narayana College, Kollam-691001, Kerala, India. Email: divyashilji83@gmail.com

**22254.** Dreger, J.; Kampmeier, F.; Grabow, K.; Martens, A. (2023): Die Zebra-Muschel *Dreissena polymorpha* als Aufsitzer der Larve von *Anax imperator* (Bivalvia: Dreissenidae; Odonata: Aeshnidae). *Libellula* 42(1/2): 79-83. (in German, with English summary) ["A zebra mussel *Dreissena polymorpha* epizoic on a larvae of *Anax imperator* (Bivalvia: Dreissenidae; Odonata: Aeshnidae) – One *Dreissena polymorpha* was reported from an exuviae of a male *A. imperator* collected from a stake at the northern shore of Lake Starnberg near the efflux into the River Würm at Starnberg, Germany, on 20 July 2023." (Authors)] Address: Dreger, Juliana, Durlacher Allee 21, 76131 Karlsruhe, Germany. Email: juliana.d@gmx.net

**22255.** Edegbene, A.O.; Elakhame, L.A.; Arimoro, F.O.; Osimen, E.C.; Edegbene Ovie, T.T.; Akumabor, E.C.; Ubanatu, N.C.; Njuguna, C.W.; Sankoh, A.A.; Akamagwuna, F.C. (2023): How do the traits of macroinvertebrates in the River Chanchaga respond to illegal gold mining activities in North Central Nigeria. *Frontiers in Ecology and Evolution* 11: 15 pp. (in English) ["Africa harbours about a third of the world's largest natural resource reserves of mineral such as gold and diamonds. These vast mineral reserves in Africa are essential to the continent's development and modern industrial society. However, these minerals, including gold, are often illegally mined by locals which leads to biodiversity loss and groundwater and surface water contamination. In the present study, we assess the impact of illegal gold mining (i.e., panning) and other anthropogenic activities on the distribution patterns of macroinvertebrate traits in the River Chanchaga, North central Nigeria. Anthropogenic activities including urban development, agricultural activities, household activities and gold mining are impacting the Chanchaga stream sites samples in Nigeria. We selected four sampling stations (i.e., reaches), denoting increasing disturbance order; Station 1 < Station 2 < Station 4 < Station 3. Four macroinvertebrate traits, body size, mode of respiration, mode of locomotion, and body shape, were selected and categorized into 19 attributes. The trait attributes were assigned to taxa using the fuzzy coding method. The relative abundance of traits in the study river showed that very



large body size (>40–80 mm) macroinvertebrates dominated Stations 1 and 2 while large body size (>20–40mm) dominated Station 3. The relative abundance of macroinvertebrates possessing an integument for oxygen diffusion dominated Station 4. The RLQ model showed that traits such as medium body size (>10–20 mm), gills as mode of respiration, and streamlined and spherical body shapes were positively associated with Stations 1 and 2. Conversely, small (>5–10 mm) and very large (>40–80 mm) body sizes, spiracle: vegetative respiration using plant stems, climbing mode of locomotion, and sprawling mode of locomotion were positively associated with Stations 3 and 4. The fourth-corner test revealed that macroinvertebrates with very small (<5mm) and medium body sizes (>10–20 mm), spiracles mode of respiration and climbing mode of locomotion were positively associated with at least one of the following physico-chemical variables: 1) electrical conductivity [EC ( $\mu\text{S cm}^{-1}$ )], 2) biological oxygen demand [BOD 5 ( $\text{mg l}^{-1}$ )], 3) sulphate ( $\text{mg l}^{-1}$ ), 4) nitrate ( $\text{mg l}^{-1}$ ) and 5) phosphate ( $\text{mg l}^{-1}$ ). These traits were classified as resilient traits to pollution in our study. On the other hand, macroinvertebrates that possess gills and can swim actively were positively associated with dissolved oxygen and were deemed vulnerable to pollution. Based on our findings, we concluded that anthropogenic activities, especially illegal gold mining, alter the distribution patterns of macroinvertebrates traits and, in turn, the ecological balance of the ecosystem. To forestall further damage to the ecological health of the River Chanchaga, the government should regulate the activities of gold miners." (Authors) Taxa. including Odonata. are treated at family level; from the Gomphidae a figure is published, claimed to be an *Ictinogomphus*.] Address: Edegbene, Augustine, Dept of Biological Sciences, Federal Univ. of Health Sciences, Otuokpo, Nigeria. Email: ovieedes@gmail.com

**22256.** Ehling, J.; Zitzmann, F.; Diekmann, L.; Reich, M. (2023): Eine Paludikultur mit Schilf und Rohrkolben in der Etablierungsphase als Lebensraum für Libellen. *Libellula* 42(1/2): 27-47. (in German, with English summary) ["A paludiculture with reed and cattail in the establishment phase as habitat for dragonflies – In order to reduce greenhouse gas emissions from drained peatlands, extensive rewetting activities are required. In this context, paludiculture could play a key role, as it combines climate protection and agricultural production. The establishment of these crops creates novel habitats for fauna and flora. The aim of this work was to assess the habitat potential of a recently established paludiculture with reed and cattail for dragonflies (Odonata). For this purpose, surveys were carried out on a paludiculture pilot site and in different reference habitat types in the district of Oldenburg (NW-Germany). The results show that the investigated paludiculture was of great importance for the dragonfly fauna of the study area in the second year after its establishment. In comparison to the comparatively species-poor reference habitats, the highest total species numbers were recorded (including the endangered pioneer species *Ischnura pumilio*), the detected species had comparatively high abundances, and the highest number of species with reproductive behaviour was found. The high attractiveness of the site probably resulted from the combination of shallow water levels, full-area sun exposure, and a high structural diversity, which simultaneously provided suitable conditions for species with different demands. However, these habitat characteristics are limited to the establishment phase of the crops. Further growth of reed and cattail towards dense stands is expected to rapidly reduce the habitat quality for dragonflies. Since paludicultures with reed and cattail are novel land-use systems and our investigation covered only

a short period of time, there is a considerable need for research on the further succession of the dragonfly fauna as the cultures age, on the effects of harvesting on different dragonfly species, and on potential measures to promote dragonflies and other species groups in paludicultures." (Authors)] Address: Ehling, Jana, Leibniz Universität Hannover, Institut für Umweltplanung, Arbeitsgruppe Naturschutz und Landschaftsökologie, Herrenhäuser Str. 2, 30419 Hannover, Germany. Email: ehling.jana@gmail.com

**22257.** Eraghi, S.H.; Toofani, A.; Guilani, R.J.A.; Ramezani-pour, S.; Bijma, N.N.; Sedaghat, A.; Yasamandaryaei, A.; Gorb, S.; Rajabi, H. (2023): Basal complex: a smart wing component for automatic shape morphing. *Communication Biology* 6:853 | <https://doi.org/10.1038/s42003-023-05206-1>: 9 pp. (in English) ["Insect wings are adaptive structures that automatically respond to flight forces, surpassing even cutting-edge engineering shape-morphing systems. A widely accepted but not yet explicitly tested hypothesis is that a 3D component in the wing's proximal region, known as basal complex, determines the quality of wing shape changes in flight. Through our study, we validate this hypothesis, demonstrating [by using *Sympetrum vulgatum*, *Calopteryx splendens*, *Ischnura elegans*] that the basal complex plays a crucial role in both the quality and quantity of wing deformations. Systematic variations of geometric parameters of the basal complex in a set of numerical models suggest that the wings have undergone adaptations to reach maximum camber under loading. Inspired by the design of the basal complex, we develop a shape-morphing mechanism that can facilitate the shape change of morphing blades for wind turbines. This research enhances our understanding of insect wing biomechanics and provides insights for the development of simplified engineering shape-morphing systems." (Authors)] Address: Rajabi, H., Mechanical Intelligence (MI) Research Group, South Bank Applied BioEngineering Research (SABER), School of Engineering, London South Bank University, London, UK. ty, London, UK. Email: rajabijh@lsbu.ac.uk

**22258.** Erlita, M. (2023): Asosiasi Serangga Predator dengan Tanaman Refugia di Kebun Botani Desa Solok Kecamatan Kumpeh Ulu. S1 thesis, biologi, Jurusan Matematika dan Ilmu Pengetahuan Alam, Fakultas Sains dan Teknologi, Universitas Jambi: XIV, 69 pp. (in Indonesian) ["Predatory insects are natural enemies that often visit honey and nectar producing plants as an alternative source of feed. Refugia is a plant of several types of plants that provide shelter, provide a source of food or a source of nutrition, tend to have bright petal colors or flowers with striking colors that aim to attract natural enemy insects. This research is a quantitative descriptive research with the sampling point applied, namely the planting pattern on the edge of the land plot. Sampling was carried out by sweep net technique, direct observation and branch beating. Sampling of predatory insect species in the morning at 06.00–08.00 WIB and in the afternoon carried out 15.30–17.30 WIB. Predatory insects associated with refugia plants number 24 species from 5 orders, namely Coleoptera, Hymenoptera, Diptera, Mantodea, and Odonata [*Orthetrum sabina*, *Rhyothemis fenestrina*, *R. phyllis*]. The association of predatory insects with *Tagetes* sp plants has a low category association index value. Predatory insects associate with plants *Celosia* sp. *Eumenes coronatus* species with an association scale value of 0.95, *Delta campaniforme* species with an association scale value of 0.76 are species with a very high association index value. The diversity of predatory insects found in refugia plants in Solok village, Kumpeh Ulu district, is in the medium category. The evenness value is included in the high category,

while the dominance value is no dominant species." (Authors)] Address: <https://repository.unja.ac.id/57339/3/Skripsi%20mira%20erlita%20nim%20F1C417010%20full.pdf>

**22259.** Fadel, A.; Guerrieri, F.; Pincebourde, S. (2023): The functional relationship between aquatic insects and cyanobacteria: A systematic literature review reveals major knowledge gaps. *Total Environment Research Themes* 8, December 2023, 100078: 18 pp. (in English) ["Cyanobacteria and aquatic insects are major components of food webs in freshwater ecosystems. However, the functional relationship between cyanobacteria and aquatic insects has been poorly studied. The blooms of cyanobacteria are more likely to intensify with rising temperatures, such that climate warming may influence this relationship. To improve our understanding of this relationship, we performed a systematic literature review (SLR) and analyzed 104 peer-reviewed research articles published between 1985 and 2020. The articles were categorized into three themes: the role of cyanobacteria as food source and habitat for aquatic insects, the impact of cyanotoxins on aquatic insects, and the use of *Bacillus thuringiensis* (Bt) expressing transgenic cyanobacteria to control Diptera, mainly mosquitoes. Major findings on each of these themes were summarized and research gaps and opportunities were highlighted. Major gaps include the lack of ecological modelling studies that describe or model this relation, the absence of studies of cyanotoxins' impact on key aquatic insects like dragonflies, the impact of Bt larvicidal engineered cyanobacteria on biological indicators like Chironomidae, the lack of studies on climate change impacts on the functional links between cyanobacteria, aquatic insects and other organisms. These gaps and research opportunities should be addressed in future research to increase the understanding of the relationship between cyanobacteria and aquatic insects and therefore the biology of freshwater ecosystems." (Authors)] Address: Fadel, A., Institut de Recherche sur la Biologie de l'Insecte, UMR 7261, CNRS. Univ. de Tours, 37200 Tours, France. Email: [ali.fadel@univ-tours.fr](mailto:ali.fadel@univ-tours.fr)

**22260.** Fernandez-Nicolas, A.; Machaj, G.; Ventos-Alfonso, A.; Pagone, V.; Ohde, T.; Daimon, T.; Ylla, G.; Belles, X. (2023): Reduction of embryonic E93 expression as a hypothetical driver of the evolution of insect metamorphosis. *Proceedings of the National Academy of Sciences* 120 (7) e2216640120: 7 pp. (in English) ["Significance: Insect metamorphosis is classified into hemimetaboly and holometaboly, which derives from the former. Hemimetabolans nymphs are similar to the adult, whereas in holometabolans embryogenesis produces a larva that differs from the adult, being vermiform in extreme cases. The embryo of the hemimetabolans *Blattella germanica* expresses the gene E93 at high levels. In all insects, E93 triggers adult morphogenesis in the last juvenile stage, but in *B. germanica*, E93 is also crucial for embryogenesis. Intriguingly, E93 expression is high in the embryo of hemimetabolans, but very low in holometabolans. We hypothesize that E93 determines the nymphal genetic program, and that the reduction of embryonic E93 expression has been instrumental for the formation of the larva and the evolution of holometabolans metamorphosis. Abstract: The early embryo of the cockroach *Blattella germanica* exhibits high E93 expression. In general, E93 triggers adult morphogenesis during postembryonic development. Here we show that E93 is also crucial in early embryogenesis in the cockroach, as a significant number of E93-depleted embryos are unable to develop the germ band under maternal RNAi treatment targeting E93. Moreover, transcriptomic analysis indicates that E93 depletion results in important gene expression changes in the early embryo,

and many of the differentially expressed genes are involved in development. Then, using public databases, we gathered E93 expression data in embryo and preadult stages, finding that embryonic expression of E93 is high in hemimetabolans species (whose juveniles, or nymphs, are similar to the adult) and low in holometabolans (whose juveniles, or larvae, are different from the adult). E93 expression is also low in Thysanoptera and in Hemiptera Sternorrhyncha, hemimetabolans with postembryonic quiescent stages, as well as in Odonata, the nymph of which is very different from the adult. In ametabolans, such as the *Zygentoma domestica*, E93 transcript levels are very high in the early embryo, whereas during postembryonic development they are medium and relatively constant. We propose the hypothesis that during evolution, a reduction of E93 expression in the embryo of hemimetabolans facilitated the larval development and the emergence of holometaboly. Independent decreases of E93 transcripts in the embryo of Odonata [*Ischnura senegalensis*], Thysanoptera, and different groups of Hemiptera Sternorrhyncha would have allowed the development of modified juvenile stages adapted to specific eco-physiological conditions." (Authors)] Address: Ylla, G., Laboratory of Bioinformatics and Genome Biology, Faculty of Biochemistry, Biophysics and Biotechnology, Jagiellonian University, Kraków 30-387, Poland. Email: [guillem.ylla@uj.edu.pl](mailto:guillem.ylla@uj.edu.pl)

**22261.** Fischer, I.; Kargl, V.; Chovanec, A. (2023): 2022 – Jahr der Libellen. AÖE (Arbeitsgemeinschaft Österreichischer Entomologen) News 5: 7-20. (in German) ["In 2022, dragonflies (Odonata) were at the center of the activities of the Association of Austrian Entomologists (AÖE). The year before, the focus was on wild bees. A workshop, lectures and excursions were held under the umbrella of the dragonflies. Traditionally, a poster was also dedicated to the animal group of the year (Fig. 1). An article on the Austrian "Year of the Dragonflies" was published in the "Dragonfly News" published in Germany, the communications of the Society of German-Speaking Odonatologists (GdO) (CHOVANEK 2022a)." (Authors)] Address: Chovanec, A., Krottenbachgasse 68, 2345 Brunn am Gebirge, Austria. Email: [andreas.chovanec@bml.gv.at](mailto:andreas.chovanec@bml.gv.at)

**22262.** Fliedner, H. (2023): The scientific names of Erich Schmidt's odonate taxa. *International Dragonfly Fund. Report* 181: 1-92. (in English, with German summary) ["This paper offers an explanation of the 113 scientific names for Odonata which were given by the German odonatologist Erich Walther Schmidt (1890-1969), as well as those given by other authors in which taxa named by him are now classified. Before that, the life and work of this scientist are described. After that there is an analysis of the types of names he preferred, a look at important character traits and an attempt to deduce his intentions in naming dragonflies." (Author)] Address: Fliedner, H., Louis-Seegelken-Str. 106, 28717 Bremen, Germany. Email: [H.Fliedner@t-online.de](mailto:H.Fliedner@t-online.de)

**22263.** Frank, M. (2023): Zum aktuellen Vorkommen der Gemeinen Keiljungfer (*Gomphus vulgatissimus*) an der Stepenitz im Landkreis Nordwestmecklenburg (Odonata: Gomphidae). *Virgo. Mitteilungsblatt des Entomologischen Vereins Mecklenburg* – 26: 28-41. (in German, with English summary) ["A little more than 30 years after the discovery of the population of *Gomphus vulgatissimus* (Linnaeus, 1758) on the Stepenitz in the district of Northwest-Mecklenburg, a systematic survey of the species was carried out in 2021 on selected sections of this lowland river. The presence of the species was proven by exuviae collections at 11 of the 20

examined sections over a length of approx. 15 km. The highest density of exuviae was determined to be 5.2/m over a length of 100 m. The EM50 value was determined there with approx. 7 days, the sex ratio (female/male) with 1.08:1. The two tributaries of the Stepenitz, the Maurine and the Rade-gast, were also investigated on a random basis, whereby an occurrence already known on this river could be confirmed on two new sections of the Rade-gast. Neither imagines nor exuviae were found on the Maurine." (Author)] Address: Frank, M., 55268 Nieder-Olm, Zur Traubenmühle 5A, Germany. Email: mikel.frank@gmx.de

**22264.** Gayathri, M.; Anand, P.P.; Shibu Vardhanan, Y. (2023): Wing size, shape, and asymmetry analysis of the wandering glider, *Pantala flavescens* (Odonata: Libellulidae) revealed that hindwings are more asymmetric than the forewings. *Biologia* 78: 2749-2762. (in English) ["The present study aimed to determine the wing asymmetry and sexual asymmetry of *P. flavescens* collected from a paddy field. *P. flavescens* is known as the longest migratory insect species and the morphological architecture of their hindwing aids in long-distance gliding. In our study, we collected F1 generation of male and female *P. flavescens* and used for geometric morphometric study to investigate wing asymmetry. We observed no difference in wing size between sexes from the study, but there are significant ( $p < 0.05$ ) shape differences. The female population was more asymmetric than male population, with a high shape-related fluctuation asymmetry (FA). Discriminant function analysis was used to validate wing asymmetry (right-left) and sexual asymmetry of *P. flavescens*. Canonical variant analysis discriminated the forewings and hindwings of *P. flavescens* both sexes in a distinct morphospace. The PC's warp shape analysis proved that, when compared to forewings, the highest amount of shape variations was observed in hindwings, especially in anal lobe regions. Based on the results, pesticide and fertilizer used in the paddy fields are the primary reason for the high level of FA, and the morphological variations observed in the hindwings may influence the migratory behaviour of *P. flavescens*." (Authors)] Address: Anand, P.P., Biochemistry and Toxicology Division, Department of Zoology, University of Calicut, Thenhpalam 673 635, Kerala, India. Email: anandpp633@gmail.com

**22265.** Giberson, D.J.; Harding, R.W.; Curley, R. (2023): Paul Brunelle's legacy in PEI: The dragonflies and damselflies of Prince Edward Island. *Newsletter of the Biological Survey of Canada* 42(1): 24-36. (in English) [[https://www.researchgate.net/publication/373360440\\_Paul\\_Brunelle's\\_Legacy\\_in\\_PEI\\_The\\_Dragonflies\\_and\\_Damselflies\\_of\\_Prince\\_Edward\\_Island](https://www.researchgate.net/publication/373360440_Paul_Brunelle's_Legacy_in_PEI_The_Dragonflies_and_Damselflies_of_Prince_Edward_Island)] Address: Giberson, D.J., Dept. Biol., Univ. of Prince Edward Island, Charlottetown PE, Canada

**22266.** Golovatyuk, L.V.; Nazarova, L.B.; Kalioujnaia, I.J.; Grekov, I.M. (2023): Taxonomic composition and salinity tolerance of macrozoobenthos in small rivers of the southern arid zone of the East European Plain. *Biology* 2023, 12, 1271. <https://doi.org/10.3390/biology12091271>: 20 pp. (in English) ["Simple Summary: Climate-related salinization of inland waters is observed in many regions of the world as a major environmental problem affecting natural processes in aquatic ecosystems. In order to better predict and control these changes, it is important to study the responses of aquatic fauna to increasing salinity. Macrozoobenthic fauna, which includes mollusks, small crustaceans, and insect larvae, constitutes the main food base for fish and water birds. Due to their relatively short life cycles, large species diversity, and high abundance, macrozoobenthos are the best indicators

of changing water salinity. To determine the species richness, distribution, and salinity tolerance of macrozoobenthos, we investigated 17 small rivers with different water salinity in the southern arid region of the East European Plain. The study shows that the species richness gradually decreases with an increase in water salinity in the rivers. In freshwater rivers, the macrozoobenthos fauna includes more than 100 species, whereas, in hypersaline rivers with salinity comparable to seawater, only 10 species were found. A total of 5 of the 156 invertebrate species can be used as indicators of water salinization in rivers of the arid regions of Europe. Abstract: This study investigated the species composition, distribution, and salinity tolerance of macrozoobenthos in 17 small rivers in the southern arid region of the East European Plain, which are characterized by a small channel gradient, slow-flowing or stagnant water bodies, and a wide range of water salinity, varying between 0.18 and 30 g L<sup>-1</sup>. In total, 156 taxa were found, among which 66 were Diptera species. The study revealed that the formation of benthic communities in the rivers is influenced by natural factors of the catchment basins, including the flat landscape with sparsely developed relief differentiation, climate aridity, and the widespread occurrence of saline soils and groundwater, largely related to the sedimentation of the ancient Caspian Sea and modern climate changes. These conditions are favorable for the occurrence of lacustrine macrozoobenthic species in freshwater, euryhaline, and halophilic ecological groups. The investigation revealed a decrease in species richness in response to an increase in water salinity. The five identified halophilic species *Tanytarsus kharaensis*, *Glyptotendipes salinus*, *Cricotopus salinophilus*, *Chironomus salinarius*, and *Palpomyia schmidti* can be used as indicators of river ecosystem salinization.... Dragonfly larvae showed high diversity and were mainly found in the overgrown areas of the rivers. Among dragonflies, the species *Sympetma fusca* and *Enallagma cyathigerum* were the most common (7% and 5%, respectively)." (Authors) Species composition of macrozoobenthos in the investigated small rivers: *Anax imperator*, *Enallagma cyathigerum*, *Erythromma najas*, *Ischnura elegans*, *Lestes sponsa*, *Orthetrum cancellatum*, *Sympetma fusca*, and *Sympetrum depressiusculum*] Address: Golovatyuk, Larisa, Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences, Borok, Nekouzsky District, 152742 Yaroslavl Oblast, Russia. Email: gollarisa@mail.ru

**22267.** Gómez-Anaya, J.A.; Brug-Aguilar, B.; Vázquez-Hurtado, G.; Novelo-Gutiérrez, R. (2023): Diversity and distribution of Odonata (Insecta) larvae in a subtropical lagoon with different land uses in Veracruz, Mexico. *Revista Mexicana de Biodiversidad* 94: e945158: 17 pp. (in English, with Spanish summary) ["Impacts caused to freshwater reservoirs by human activities have increased in tropical and subtropical regions in the last decades. We studied the effects of land use on the physicochemical properties of water and their effects on larval Odonata diversity in a subtropical lagoon. During 1 year, physicochemical variables were measured, and Odonata larvae were collected in 8 sites (4 in the urbane zone and 4 in the more conserved rural zone) with different land uses that cover the entire periphery of the lagoon. Physicochemically, no clustering of samples from urban and rural zones or by site was observed, rather clustering reflected temporal patterns. A total of 28 species were found and some of them showed a differential distribution between both zones, and between the 8 sites and collectings. The highest diversity was recorded in the rural zone. The site with domestic waste discharges had the lowest diversity and it showed high concentrations of nitrates and

ammonium. We conclude that the effect of land use in this lagoon is still incipient on Odonata diversity. The diversion and treatment of urban waters and proper land management are recommended to ensure the maintenance of Odonata diversity." (Authors)] Address: Novelo-Gutiérrez, R., Instituto de Ecología, A. C., Red de Biodiversidad y Sistemática, Carretera Antigua a Coatepec 351, Col. El Haya, 91073 Xalapa, Veracruz, Mexico. Email: rodolfo.novelo@inecol.mx

**22268.** Góral, N.; Daraz, B.; Makhkamov, T.; Dabert, M.; Bernard, R. (2023): Taxonomic status of the Central Asian damselfly *Calopteryx samarcandica* Bartenev, 1912 (Odonata: Calopterygidae). *International Journal of Odonatology* 26: 180-189. (in English) ["The taxonomic status of the Central Asian damselfly *C. samarcandica* was determined on the basis of molecular and phenotypic data from the Kugitang Mountains, SE Uzbekistan. Molecular analyses (COI and 18S rDNA, ITS1-5.8S rDNA-ITS2) revealed that *C. samarcandica* forms part of a clade that includes taxa treated in the literature as subspecies of *Calopteryx splendens* and/or related species. However, both mitochondrial and nuclear DNA confirmed that *C. samarcandica* deserves separate species status. The COI distance to *C. splendens* (including *C. xanthostoma*) is moderate (3.47%, K<sub>2</sub>P), but much greater than the internal distances between the sequences qualified in *C. splendens* (0.4%); this difference is supported by the low values of the barcoding gap in this genus. The rather distant separation of *C. samarcandica* from both *C. splendens* (*ancilla*, *taurica*, *intermedia*) and *C. orientalis* and the length of the *samarcandica*-branch recognisable in nuclear rDNA strengthen the independent position of the first species. The phylogenetic position of *C. samarcandica* in the genus *Calopteryx* remains unclear due to the low variability of nuclear rDNA markers and insufficient and partly incomparable data for other taxa. The molecular data support the phenotypic and ecological specificity of *C. samarcandica*, defined by a diagnostic combination of its traits (male and female wing colours and large size and basal diffusion of the wing spot in males) and the conservative association with groundwater-fed natural watercourses in the mountains and foothills fringing the vast Central Asian mountain block." (Authors)] Address: Bernard, R., Laboratory of Nature Education & Conservation, Fac. Biol., Adam Mickiewicz Univ. in Poznan, Poland. Email: rbernard@amu.edu.pl

**22269.** Gouvêa, T.P.; Almeida, J.A.M.; Shimamoto, C.Y.; Barbado, N.; Souza, M.M. (2023): Registro de libélulas (Odonata) predadas por aranhas (Araneae) na Mata Atlântica, no Sul do Brasil. *Entomological Communications*, 5, ec05025. <https://doi.org/10.37486/2675-1305.ec05025>: 4 pp. (in Portuguese, with English summary) ["Dragonflies are insects that act as predators and prey, both in freshwater and associated terrestrial ecosystems, which makes the understanding of trophic relationships established by these insects important. In this sense, the present study aimed to report the predation of Odonata by Araneae in areas of seasonal semi-deciduous forest, phytogeography of the Atlantic Forest at the Iguazu National Park (PARNA Iguazu), and in the Bela Vista Biological Refuge (RBBV). The records occurred at random in 2021 from December 13 to 21, and in 2022 from January 4 to April 22. Five individuals of three species and two morphospecies of Odonata preyed upon by three morphospecies of spiders were recorded. Predation of Odonata by spiders seems to be frequent in different ecosystems, but further studies are required to understand the impact of this predation on the size of dragonfly communities in the Brazilian Atlantic Forest biome." (Authors)] *Argia mollis*, *A. reclusa* and *Oxyagrion terminale* were found trapped in suspended

webs of *Tetragnatha* sp., located approximately 2 meters above the ground and 50 cm from the bank of a stream within the dense forest. A predation of *Anax* sp. by an undetermined species of Trechaleidae (immature specimen) that was active and recorded on the soil inside the forest, during twilight. Low light can trigger conditions favorable to the predator, as Trechaleidae spiders are active ambush hunters on the ground and common in environments close to water. *Argia mollis*, *A. reclusa* and *Oxyagrion terminale* are species that explore different ecosystems and occur in different locations in Brazil (Souza et al. 2013; Calvão et al. 2018). These three species of Odonata were found trapped in suspended webs of *Tetragnatha* sp., located approximately 2 meters above the ground and 50 cm from the bank of a stream within the dense forest. Spiders of this taxon commonly inhabit the banks of water bodies, such as rivers and lakes, which may favor the passive capture of adult dragonflies, as they are also considered the most widespread and abundant orb-web spiders in the world (Levi 1981), being found in tropical and temperate climates, and even on oceanic islands (Aiken & Coyle 2000; World Spider Catalog 2023). Predation of *Anax* sp. by an undetermined species of Trechaleidae (immature specimen) was active and recorded on the soil inside the forest, during twilight (Fig. 2), close to the source of the Manoel Gomes River, municipality of Céu Azul (25°09'13.5" S 53°50'43.7"W), Paraná, Brazil. This condition can be explained by the fact that dragonflies are diurnal insects (Corbet 1999), therefore, low light can trigger conditions favorable to the predator, as Trechaleidae spiders are active ambush hunters on the ground (Dias et al. 2009), common in environments close to water (Carico 1993), where Odonata are frequent, because they spend their initial life in freshwater aquatic ecosystems (Costa et al. 2012).] Address: Shimamoto, Carolina, Instituto Federal de Educação, Ciência e Tecnologia, do Sul de Minas Gerais, Campus Inconfidentes, Inconfidentes, MG, Brasil. Email: carolina.shimamoto@ifpr.edu.br

**22270.** Guellaf, A.; Kassout, J.; Boselli, V.A.; Bennis, N.; El Alami, M.; Errochdi, S.; Kettani, K. (2023): Short-term responses of aquatic ecosystem and macroinvertebrate assemblages to rehabilitation actions in Martil River (North-Western Morocco). *Hydrobiology* 2023, 2, <https://doi.org/10.3390/hydrobiology2030029>: 446-462. (in English) ["This study aimed to evaluate the effects of the Martil River rehabilitation project and recently constructed dam infrastructures to reduce flood risks and to promote local socio-economic development on the ecological integrity of the river. The assessment focused on changes in fluvial landforms over time and the evaluation of aquatic ecosystems based on six physicochemical parameters (temperature, pH, electrical conductivity, dissolved oxygen, biochemical oxygen demand, and chemical oxygen demand), morpho-hydrological variables (stream width, water depth, and current speed), habitat indices (QBR, IHF, and MQI), and macroinvertebrate assemblages of EPT, OCH, and Chironomidae (Diptera) at five stations from autumn 2015 to spring 2018 (prior to and during the rehabilitation actions). The results showed that the river rehabilitation project led to profound changes in Martil River's ecosystem and water quality over time. Physicochemical and habitat measurements at the rehabilitated sites revealed a major change in macroinvertebrate communities due to changes in fluvial landforms in relation to flow-sediment regimes. As a result, some typical species of lentic habitats disappeared, while alien, opportunistic, and lotic species appeared." (Authors)] The following odonate taxa are listed: *Lestes barbarus*, *L. viridis*, *Calopteryx* sp., *C. exul*, *Erythromma lindenii*, *Ischnura graellsii*, *Aeshna mixta*, *Anax parthenope*, *Anax* sp., *Onychogomphus forcipatus*



unguiculatus, *Paragomphus genei*, *Cordulegaster boltonii algerica*, *Crocothemis erythraea*, *Sympetrum fonscolombii* and *Triethemis annulata*.] Address: Guellaf, A., Lab. Ecology, Systematics & Conservation of Biodiversity (LESCB), URL-CNRST N°18, FS, Abdelmalek Essaadi University, Tetouan 931000, Morocco. Email: achraf1949@gmail.com

**22271.** Gurung, M.M.; Phan, Q.T. (2023): Description of *Protosticta samtsensis* sp. nov. (Odonata: Zygoptera: Platystictidae) from Samtse district, Bhutan. *Zootaxa* 5352(1): 137-144. (in English) ["*Protosticta samtsensis* sp. nov. (holotype male: Bhutan, Samtse District, Norgaygang gewog (Bara), 27.142670°N, 88.835228°E; altitude 1,264 m, 12-viii-2022), is described from a holotype male and a female paratype and compared with *P. himalaica* Laidlaw, 1917." (Authors)] Address: Phan, Q.T., Center for Entomology & Parasitology Research, Institute of Research & Training of Medicine, Biology & Pharmacy, Duy Tan University, Da Nang, 550000, Vietnam. E-mail: pqtoan84@gmail.com

**22272.** Habel, J.C.; Ulrich, W.; Segerer, A.H.; Greifenstein, T.; Knubben, J.; Morinière, J.; Bozicevic, V.; Günter, A. (2023): Insect diversity in heterogeneous agro-environments of Central Europe. *Biodiversity and Conservation* 32: 4665-4678. (in English) [Pfaffenhofen, Bayxern, Germany. "Insect diversity has been decreasing significantly during the past decades. A main driver causing this negative trend is agricultural intensification, which causes habitat destruction and a deterioration of habitat quality. We caught flying arthropods with 28 Malaise traps and two light traps across a heterogeneous Central European agro-environment in southern Germany over a period of four years. The arthropods captured with Malaise traps were assigned to barcode index numbers (BINs) based on metabarcoding. Lepidoptera caught with light traps and light towers were identified based on morphological characters. Within the four years study, a total of 11,984 insect operational taxonomic units (OTUs) related to unique BINs on BOLD (>95% similarity) were recorded across this agro-environment. 7835 of them could be assigned to insect order and the vast majority of them represent different species. Different estimates of the total species richness ranged between 8188 and 11,512 OTUs (a proxy for species). This number corresponds to about 26–36% of the total German insect fauna. Light trapping also yielded a high species diversity and returned 502 Lepidoptera species (compared to 784 species captured with Malaise traps). The overlap between light and Malaise traps was less than 45%. The Malaise trap catches showed that insects are more diverse along forest edges than in the centre of meadows. Our findings underline the high value of heterogeneous agro-environments for biodiversity, and the high value when combining data collected with different sampling techniques.... Only orders such as Trichoptera, Thysanoptera, Ephemeroptera, Odonata, and Psocoptera were less species rich than expected. Trichoptera, and Ephemeroptera, and to a lesser extent Odonata, are hygrophilous and were not expected to occur in high numbers in the Malaise traps set in meadows." (Authors)] Address: Habel, J.C., Evolutionary Zoology, Dept of Environment & Biodiversity, University of Salzburg, Salzburg 5020, Austria. Email: Janchristian.habel@plus.ac.at

**22273.** Hämäläinen, M. (2023): A domineering dragonfly? – Notes on *Anax imperator* Leach, 1815 from 19th century England and considerations on the etymology of its name. *Agrion* 27(2): 46-52. (in English) ["Evidence is presented to support the hypothesis that William Elford Leach's (1815) genus and species names (both referring to a sovereign or a commander) for the dragonfly species *Anax imperator*,

discovered in England, were based on the impressive size of this large and robust species. The alternative view, suggesting that the dominant, aggressive territorial behaviour of *Anax imperator* male inspired the names, is ruled out by the fact that Leach almost certainly never saw this species in the field. William Kirby's early observations on the aggressive and voracious behaviour of this species are reproduced. Details of the early taxonomy and nomenclature of *A. imperator* are presented, and the growth of the knowledge of this species in Britain and continental Europe is briefly discussed." (Author)] Address: Hämäläinen, M., Naturalis Biodiversity Center, Leiden, the Netherlands. Email: matti.hamalainen@helsinki.fi

**22274.** Hamzaraj, E.; Lazo, P.; Papparisto, A.; Parllaku, B. (2023): Using bacteria and benthic macroinvertebrates as water quality parameters in Mat River, Albania. *AQUA — Water Infrastructure, Ecosystems and Society* Vol 00 No 0, 1 doi: 10.2166/aqua.2023.081: 15 pp. (in English) ["Highlights: • Assessment of the water quality of Mat River in Albania, using bacteria and benthic invertebrates as biological quality indicators. • The results of our study highlight a deterioration of the water quality of Mat River from the upper reaches to the lower reaches, mainly due to anthropogenic pressure. • The number of benthic macroinvertebrates reflects water quality and organic pollution. Abstract: This research examines the quality of Mat River water to control and reduce the level of environmental pollution in accordance with national rules and regulations. The focus of this study was the assessment of river water quality by using bacteria and benthic macroinvertebrates, as biological markers of stream water quality. The research was conducted from June 2018 to June 2019 at five sampling sites along the Mat River, with monthly sampling for chemical-physical and microbiological parameters and seasonal sampling for benthic macroinvertebrates. The investigated data for the studied parameters were statistically analysed using MINITAB 19 software. The variation in spatial and temporal trends of the investigated parameters showed differences in water quality among different sampling sites. As expected, the bacterial load was found to be higher near urban areas, and the pollution increased with the course of the river. The same tendency in water quality showed up even in the benthic macroinvertebrates population. Pearson correlation coefficients (p. 0.05) between the water quality data revealed the similarity and the associations between parameters. Cluster analysis of the investigated parameters revealed the classification of Mat River water quality and the possibility of using microbiological parameters and/or benthic macroinvertebrates for the assessment of water quality." (Authors) "*Gomphidae*"] Address: Hamzaraj, Eteleva, Faculty of Natural Sciences, Tirana University, Blvd. 'Zog I', Tirana, Albania. Email: etleva.hamzaraj@fshn.edu.al

**22275.** Happle, R.; Eyerich, k. (2023): Autosomal dominant inheritance with sex-limited manifestation: An unusual mode of transmission in humans and animals. *Am J Med Genet.* 191(3): 684-689. (in English) ["Autosomal dominant, sex-limited inheritance is a distinct mode of transmission that should not be conflated with X-linked inheritance. From animal studies, we know that sex-limited inheritance implies the chance to "turn off" some genes in either males or females, in order to meliorate the phenotype, for example, by improving the fecundity. In this way, sex-limited genes play an important role in the evolution of diverse species of animals. In human genetics, however, the biological significance of sexlimited genes is unknown until today. When screening the literature, we found, thus far, three human examples of

sex-limited transmission. Autosomal dominant, malelimited inheritance has meticulously been studied in a particular form of precocious puberty. Limitation to females was described in autosomal dominant lymphedema of the CESLR1 type, being underpinned by convincing molecular findings. Another example is white lentiginosis of Grosshans that shows clinical evidence of such mode of transmission although molecular findings are lacking as yet. In the animal kingdom, autosomal dominant sex-limited inheritance is a well-established phenomenon that has extensively been studied in various species such as butterflies, damselflies [*Ischnura senegalensis*], fish (cichlids), and birds. Hence, at this point in time, it seems likely that other human examples of this mode of inheritance have previously been reported or will be published in the future." (Authors)] Address: Happle, R., Dept of Dermatology, Medical Center, University of Freiburg, Freiburg, Germany. Email: rudolf.happle@uniklinik-freiburg.de

**22276.** Harabiš, F. (2023): Post-mining areas as the last area for the expansion of the declining Siberian Winter damselfly (Odonata: Lestidae). *Journal of Insect Conservation* 27: 707-715. (in English) ["The regionally threatened *Sympecma paedisca* is one of the few Central European dragonfly species included is considered as Near Threatened in the European Red list. The major threats to this species remain unclear. This species has a unique life history and several adaptations to enabling survival even in semidesert areas, such as overwintering in the adult stage. However, the closely related, more thermophilic species *Sympecma fusca* has undergone a major range expansion in Europe. Based on data from 129 sites and combining several analytical approaches, I found the following: 1. According to local freshwater conditions, *S. paedisca* is a typical habitat generalist occupying a wide range of habitats. 2. It requires a wide range of terrestrial habitats to complete its life cycle. 3. An analysis of the land used by both species clearly indicates that both species avoid intensive agricultural areas; however, *S. fusca* can also occur in suburban areas, where *S. paedisca* is absent. 4. Projections of the Least Cost Path analysis indicate that the only localities where the species is currently spreading are habitats arising as a consequence of mining activities. The example of *S. paedisca* is clear evidence of a freshwater species that responds very negatively to the homogenization of the terrestrial environment, even when its natal habitat is not significantly affected. The frequent occurrence of species in postmining areas suggests that species with complex habitat requirements can find suitable secondary habitats where they can prosper in the long term. Implications for insect conservation: Even semi-aquatic groups like damselflies can be very sensitive to gradual changes in surrounding land use. Species with very complex habitat requirements also require comprehensive conservation strategies affecting all habitats utilized by the species. However, the return of some landscape features requires a reduction in the area of production areas in favor of hedgerows and ruderals. Such restoration management requires long-term planning and close cooperation with farmers." (Author)] Address: Harabiš, F., Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, Prague-Suchdol, 165 00, Czech Republic

**22277.** Herlings, A.; Veling, K.; Wever, R. (2023): Op zoek naar vlinders en libellen. Mooie vlinder. en libellengebieden in Nederland. De Vlinderstichting. ISBN 9789050119269: 128 pp. (in Dutch) ["In Search of Butterflies and Dragonflies takes you to beautiful butterfly and dragonfly areas in the Netherlands. From the dunes in the west to the peatlands in the east and from the Sint-Pietersberg in South Limburg

to the Lauwersmeer in the north: all provinces are covered. A brief description of each area is included and the butterflies, moths and dragonflies that occur there are discussed. You will discover rare, endangered and protected species, as well as the common species that you may encounter during a walk. An ideal starting point for a beautiful walk. This book was made possible by the Prins Bernhard Cultuurfonds and De Vlinderstichting." (Editor/Google translate).] Address: not stated

**22278.** Hermans, J.T. (2023): The White-faced darter (*Leucorrhinia dubia*) in the Dutch Province of Limburg (Odonata: Libellulidae): Severe decline of a characteristic species of bog pools. Part 1: Phenology and distribution. *Natuurhistorisch Maandblad* 112(10): 256-266. (in Dutch, with English summary) ["This rather tiny dragonfly is a specialist of bog pools and is seen in spring and early summer. Both sexes have creamywhite fronts and small black wing-bases; the male is black with red markings, the female is patterned like the male, but in yellow. *L. dubia* is found in Europe and eastwards to Japan and Kamchatka. The species is common in central and northern Europe. In the Netherlands, the White-faced darter is largely restricted to acidic, oligotrophic habitats on Pleistocene soils. It occurs more rarely in raised peat-bog remnants. Since 2007, the species has declined in the Netherlands (and in neighbouring Belgium and Germany), due to eutrophication and acidification caused by high emissions of nitrogen compounds, and desiccation of its habitat (the latter worsened by climate change). This decline has happened more rapidly in the province of Limburg than in other Dutch regions. *L. dubia* formerly had around seven temporary and six stable populations in Limburg. All temporary populations have vanished, and only three of the six stable populations have so far survived, in the Griendtsveen/Mariapeel, Groote Peel and Ravenvenen areas. It is likely that even long-standing populations (known since the 1970s and 1980s) have now become extinct at the Beegderheide and Meinweg areas, the main causes being changes in the vegetation and frequent drying up of the reproduction sites." (Author)] Address: Hermans, J.T.; Hertestraat 21, 6067 ER Linne, The Netherlands. E-mail: j.hermans@triangel-linne.nl

**22279.** Hochkirch, A.; Bilz, M.; Ferreira, C.C.; Danielczak, A.; Allen, D.; Nieto, A.; et al. (2023): A multitaxon analysis of European Red Lists reveals major threats to biodiversity. *PLoS ONE* 18(11): e0293083. <https://doi.org/10.1371/journal.pone.0293083>: 14 pp. (in English) ["Biodiversity loss is a major global challenge and minimizing extinction rates is the goal of several multilateral environmental agreements. Policy decisions require comprehensive, spatially explicit information on species' distributions and threats. We present an analysis of the conservation status of 14,669 European terrestrial, freshwater and marine species (ca. 10% of the continental fauna and flora), including all vertebrates and selected groups of invertebrates and plants. Our results reveal that 19% of European species are threatened with extinction, with higher extinction risks for plants (27%) and invertebrates (24%) compared to vertebrates (18%). These numbers exceed recent IPBES (Intergovernmental Platform on Biodiversity and Ecosystem Services) assumptions of extinction risk. Changes in agricultural practices and associated habitat loss, overharvesting, pollution and development are major threats to biodiversity. Maintaining and restoring sustainable land and water use practices is crucial to minimize future biodiversity declines." (Authors) The study includes references to Odonata.] Address: Hochkirch, A., Dept of Biogeography, Trier, University, Trier, Germany. Email: hochkirch@uni-trier.de

**22280.** Hogreve, J.; Suhling, F. (2023): Development of *Sympetrum striolatum* and *S. vulgatum* (Odonata: Libellulidae) in brackish water. *International Journal of Odonatology* 26: 190-196. (in English) ["*S. striolatum* and *S. vulgatum* are two closely related Libellulidae that are widespread and common in Central Europe. The idea for this research originates from normally using saltwater shrimps for rearing young larvae, the observations of *Sympetrum* species laying eggs in seawater and the suggested ability of *S. striolatum* to colonize brackish water habitats. This topic will also be of rising relevance for dragonfly populations as in the future due to climatic changes or anthropogenic activity the salinization of freshwaters will likely increase. The experiments presented in this study served to find out whether eggs and larvae of both species can develop in brackish water. For this purpose, eggs of both species were kept at four different salinities from 0.5-1.5% and the development duration, hatching curves and growth rates as well as mortality were recorded and compared to respective data from an earlier experiment conducted in tap water. It was possible to investigate whether embryonic development, the hatching behaviour and larval growth are disturbed by different salinity levels compared to rearing in freshwater. We found for both species that the eggs can develop at different salt concentrations up to 1.5% and the larvae survive and grow in the brackish water. Especially for *S. striolatum* a slightly increased salinity even seems to be advantageous compared to rearing in tap water shown by high hatching and survival rates. The results of this study add some knowledge about the influencing effects of salt on both species. It seems that low salt concentrations seem to be well tolerated by both species or become even beneficial for *S. striolatum*. Furthermore, the results provide methodological aspects about the rearing of young dragonfly larvae." (Authors)] Address: Suhling F., Inst. Geoökologie, TU Braunschweig, Langer Kamp 19c, 38102 Braunschweig, Germany. E-mail: f.suhling@tu-bs.de

**22281.** Homberg, U.; Kirchner, M.; Kowalewski, K.; Pitz, V.; Kinoshita, M.; Kern, M.; Seyfarth, J. (2023): Comparative morphology of serotonin-immunoreactive neurons innervating the central complex in the brain of dicondylid insects. *J Comp. Neurol.* 531(14): 1482-1508. (in English) ["Serotonin (5-hydroxytryptamine) acts as a widespread neuromodulator in the nervous system of vertebrates and invertebrates. In insects, it promotes feeding, enhances olfactory sensitivity, modulates aggressive behavior, and, in the central complex of *Drosophila*, serves a role in sleep homeostasis. In addition to a role in sleep-wake regulation, the central complex has a prominent role in spatial orientation, goal-directed locomotion, and navigation vector memory. To further understand the role of serotonergic signaling in this brain area, we analyzed the distribution and identity of serotonin-immunoreactive neurons across a wide range of insect species [including *Leucorrhinia pectoralis*, *Aeshna cyanea*]. While one bilateral pair of tangential neurons innervating the central body was present in all species studied, a second type was labeled in all neopterans but not in dragonflies and firebrats. Both cell types show conserved major fiber trajectories but taxon-specific differences in dendritic targets outside the central body and axonal terminals in the central body, noduli, and lateral accessory lobes. In addition, numerous tangential neurons of the protocerebral bridge were labeled in all studied polyneopteran species except for Phasmatodea, but not in Holometabola. Lepidoptera and Diptera showed additional labeling of two bilateral pairs of neurons of a third type. The presence of serotonin in systems of columnar neurons apparently evolved independently in dragonflies and desert locusts. The data suggest distinct evolutionary changes

in the composition of serotonin-immunolabeled neurons of the central complex and provides a promising basis for a phylogenetic study in a wider range of arthropod species." (Authors)] Address: Homberg, U., Dept of Biology, Animal Physiology, Philipps-Universität Marburg, 35032 Marburg, Germany. Email: homberg@biologie.uni-marburg.de

**22282.** Hu, F.-S. (2023): Record of *Tamea virginia* (Rambur, 1842) (Odonata: Libellulidae) from the West Pacific Ocean. *Taiwanese Journal of Entomological Studies* 8(3): 80-81. (in English) ["This paper provides a photo of a male *T. virginia* taken from the West Pacific Ocean, approximately 30 km east of the nearest land. This photo serves as a migration record, and the paper also briefly discusses the migration behavior of the genus *Tamea* Hagen, 1861." (Author)] Address: Hu, F.-S., Dept of Biological Sciences, National Sun Yat-sen University, 70 Lienhai Rd., Kaohsiung 80424, Taiwan. Email: fangshuo\_hu@smail.nchu.edu.tw

**22283.** Huber, E.; Aurenhammer, S.; Bauer, H.; Borovsky, R.; Borovsky, V.; Degasperi, G.; Denner, M.; Friedlmayer, J.; Frieß, T.; Fröhlich D.; Gergely D. M.; Glatzhofer, E.; Gorfer, B.; Gunczy, J.; Gunczy, L.W.; Heimburg, H.; Ivenz, D.; Koblmüller, S.; Kogler, M.; Komposch, C.; Kraker, F.; Klug, M.; Kunz, G.; Messner, S.; Moser, A.; Niedringhaus, R.; Lorber, L.; Oswald, M.; Oswald, T.; Paill, W.; Ploner, S.; Schattanek-Wiesmair, B.; Schattanek-Wiesmair, P.; Schoder, S.; Schönplflug, V.; Schütz, A.; Sonnleitner, M.; Staudinger, V.; Strohiegl, K.; Szucsich, N.; Trattnik, E.; Volkmer, J.; Witzmann, M.; Zechmeister, T.; Zweidick, O. (2023): Bericht über das achte ÖEG-Insektencamp: Die verborgenen Schätze der Weinviertler Klippenzone (Naturpark Leiser Berge, Niederösterreich). *Entomologica Austriaca* 30: 155-246. (in German, with English summary) ["Report on the eighth Insect Camp of the Austrian Entomological Society: hidden treasures of the Weinviertler cliff zone (Lower Austria, Austria). The eighth Insect Camp of the Austrian Entomological Society took place in the Nature Park Leiser Berge from 23 to 26 June 2022. A large number of taxonomic specialists and entomological and arachnological students attended the camp and/or supported the post-processing of samples. During the camp, the participants had the opportunity to experience field research, different trapping, identification and preparation methods. A network of specialist and people of nature conservation and biodiversity is important for biological work. The camp offers the chance to enter this network and gather knowledge on how to conduct scientific work. The study area included 28 different localities in the Nature Park Leiser Berge with different habitats, from water bodies to dry grassland. In total, 1,497 species of 23 orders were recorded: ... 7 of Odonata [*Aeshna cyanea*, *Calopteryx splendens*, *Coenagrion ornatum*, *C. puella*, *Ischnura elegans*, *Sympecma fusca*, *Platycnemis pennipes*], ... (Authors)] Address: Borovsky, R., Unterhollerbach 164, 8171 St. Kathrein am Offenegg, Austria. Email: borovskyroman@gmail.com.

**22284.** Ilhamdi, M.L.; Ivansyah, A.R.; Syazali, M. (2023): Exploration of the species richness of butterfly [sic] (Hexapoda: Odonata) in the rice field ecosystem of Perian village, Montong Gading, East Lombok. *Jurnal Biologi Tropis* 23(4): 744-751. (in English) ["Several Odonata studies on Lombok Island still focus on forest and river habitat types. This causes the diversity of this insect group to be unknown in other habitats such as rice fields. This research aims to explore the richness of dragonfly species in the rice field ecosystem of Perian village, Montong Gading subdistrict, East Lombok district. Sample collection was carried out in May – June 2022. Dragonfly searches were carried out in the morning

from 08.00 – 12.00, and in the afternoon from 14.00 – 18.00 on two transects determined purposively. The odonata found were documented using a digital camera, and captured using insect nets. Samples that were successfully collected were identified to the species taxon. The total Odonata we found were 2 suborders, 5 families and 11 species. [...] Of the 11 species that we found, 1 species is endemic, namely *Euphaea lara lumbokensis*. Compared with the results of previous research conducted in Suranadi and Batu Bolong River, there are 5 species which are new records. The five species are *Copera ciliata*, *Rhinocypha bisignata*, *Ischnura senegalensis*, *I. heterosticta*, and *Brachythemis contaminata*. The results of this study indicate that there are more species from the Odonata order on Lombok Island compared to previous reports." (Authors)] Address: Ilhamdi, M.L., Program Studi Pendidikan Biologi, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Mataram, Mataram, Nusa Tenggara Barat, Indonesia. Email: liwa\_ilhamdi@unram.ac.id

**22285.** Isworo, S.; Oetari, P.S. (2023): Diversity of vegetation, birds, dragonflies and butterflies at coal mining reclamation sites in South Kalimantan, Indonesia. *Biodiversitas* 24(10): 5376-5390. (in English) ["Coal mining can help the country's economy, but it can also be detrimental to the environment, especially due to the reduced biodiversity in mining areas. Recovery efforts are therefore needed to reclaim post-coal mining land. The aim of the research is to identify the biodiversity of plants, birds, dragonflies, and butterflies in the coal mining reclamation area in Banjar and Tapin regencies, South Kalimantan Province, Indonesia. A biodiversity survey was conducted on eight sites representing various reclamation conditions and histories. Based on vegetation studies in the reclamation area, 136 species belonging to 101 families were found. Zone TAJ1-4 had the highest diversity index (H') at the tree, stake and sapling strata with the index of 0.96, 1.06 and 1.71, respectively. The highest diversity index at the pole stratum was recorded in the TAJ1-3 zone with 0.6. Zone TAJ5-8 had the highest diversity index at the herbaceous vegetation, with 2.33. The Fabaceae family dominates all observation sites. The species with the highest importance index for the tree stratum was *Acacia mangium*, the pole stratum was *Albizia chinensis*, *Hevea brasiliensis* and *Vitex pinnata*, the stake stratum was *A. chinensis*, the sapling stratum was *A. mangium*, and the herbaceous stratum was *Ottochloa nodosa*. The Sorensen Similarity Index fell into the low category (10.00% to 57.78%), showing varying directions of vegetation succession. There were 21 birds, 10 dragonflies [*Anotogaster sieboldii*, *Diplacodes trivialis*, *Neurothemis ramburii*, *Neurothemis terminata*, *Orthetrum chrysis*, *O. glaucum*, *O. sabina*, *Pantala flavescens*, *Potamarcha congener*, *Rhyothemis phyllis*], and 15 butterflies recorded across the observation sites. According to the IUCN Red List of Threatened Species, no recorded species is listed as protected. The results of this study might be used for the management of post-mining reclamation areas, especially in South Kalimantan.] Address: Isworo, S., Dept of Environmental Health, Universitas Dian Nuswantoro. Jl. Imam Bonjol 207, Semarang 50131, Central Java, Indonesia. Email: slamet.isworo@dsn.dinus.ac.id

**22286.** Jaballah, S.; Fernandez Garcia, G.; Martignac, F.; Parisey, N.; Jumel, S.; Roussel, J.-M.; Dézerald, O. (2023): A deep learning approach to detect and identify live freshwater macroinvertebrates. *Aquatic Ecology* 57: 933-949. (in English) ["The study of macroinvertebrates using computer vision is in its infancy and still faces multiple challenges including destructive sampling, low signal-to-noise ratios, and the complexity to choose a model algorithm among multiple

existing ones. In order to deal with those challenges, we propose here a new framework, dubbed 'MacroNet,' for the monitoring, i.e., detection and identification at the morphospecies level, of live aquatic macroinvertebrates. This framework is based on an enhanced RetinaNet model. Pre-processing steps are suggested to enhance the characterization propriety of the original algorithm. The images are split into fixed-size tiles to better detect and identify small macroinvertebrates. The tiles are then fed as an input to the model, and the resulting bounding box is assembled. We have optimized the anchor boxes generation process for high detection performance using the k-medoid algorithm. In order to enhance the localization accuracy of the original RetinaNet model, the complete intersection over union loss has been integrated as a regression loss to replace the standard loss (a smooth l1 norm). Experimental results show that MacroNet outperforms the original RetinaNet model on our database and can achieve on average 74.93% average precision (AP), depending on the taxon identity. In our database, taxa were identified at various taxonomic levels, from species to order. Overall, the proposed framework offers promising results for the non-lethal and cost-efficient monitoring of live freshwater macroinvertebrates." (Authors)] Address: Jaballah, S., ESE, Ecology & Ecosystems Health, INRAE, Agrocampus Ouest, 35042, Rennes, France

**22287.** Janssen, S.E.; Kotalik, C.J.; Eagles-Smith, C.A.; Beaubien, G.B.; Hoffman, J.C.; Peterson, G.; Mills, M.A.; Walters, D.M. (2023): Mercury isotope values in shoreline spiders reveal the transfer of aquatic mercury sources to terrestrial food webs. *Environmental Science & Technology Letters* 10(1): 891-896. (in English) ["The transfer of aquatic contaminants, including mercury (Hg), to terrestrial food webs is an often-overlooked exposure pathway to terrestrial animals. While research has implemented the use of shoreline spiders to assess aquatic to terrestrial Hg transfer, it is unclear whether Hg sources, estimated from isotope ratios, can be successfully resolved to inform site assessments and remedy effectiveness. To examine aquatic to terrestrial Hg transfer, we collected shoreline spiders (*Tetragnatha* spp.) and aquatic insect larvae (suborder Anisoptera) across a mosaic of aquatic and shoreline habitats in the St. Louis River and Bad River, tributaries to Lake Superior. The fraction of industrial Hg in sediments was reflected in the d202Hg values of aquatic dragonfly larvae and predatory fish, connecting benthic Hg sources to the aquatic food web. Shoreline spiders mirrored these aquatic Hg source signatures with highly positive correlations in  $\delta^{202}\text{Hg}$  between tetragnathids and dragonfly larvae ( $r^2 = 0.90$ ). Further assessment of different spider taxa (i.e., araneids and pisaurids) revealed that differences in prey consumption and foraging strategies resulted in isotope differences, highlighting the importance of spider taxa selection for Hg monitoring efforts." (Authors)] Address: Eagles-Smith, C.A., United States Geological Survey, Forest and Rangeland Ecosystem Science Center, Corvallis, Oregon 97330, United States. E-mail: ceagles-smith@usgs.gov

**22288.** Jiang, B.; Yao, Y.; Mauersberger, R.; Mikolajewski, D.J. (2023): Allometry of defense: Predator shift alters ontogenetic growth patterns in an antipredator trait. *Insects* 2023, 14(8), 712; <https://doi.org/10.3390/insects14080712>: 10 pp. (in English) ["Predators drive prey trait diversification and promote ecological speciation. The impacts of predation are not only on the final state of antipredation traits, but also on the development of antipredation traits. Species of the dragonfly genus *Leucorrhinia* are distributed in both habitats



dominated by predatory fish (fish lakes) and habitats dominated by predatory invertebrates (invertebrate lakes). In larval dragonflies, the spine is one of the most efficient traits deterring gape-limited fish predators. However, the spine is not useful in invertebrate lakes. In this study, we compared the developmental patterns of spines in both habitats. We constructed the scaling relationship between spine length and body size and compared the inflexion point on those curves in five species of *Leucorrhinia* dragonfly larvae. Here, we found that fish-lake *Leucorrhinia* species kept a higher spine growth rate than species from invertebrate lakes, and *Leucorrhinia* species from fish lakes displayed accelerated spine growth rate at larger body size compared to invertebrate-lake species. Our results highlight that development patterns, as well as the final states of antipredator traits, are essential to understanding predator–prey interactions. Abstract: Predation is a major factor driving prey trait diversification and promoting ecological speciation. Consequently, antipredator traits are widely studied among prey species. However, comparative studies that examine how different predators shape the ontogenetic growth of antipredator traits are scarce. In larval dragonflies, abdominal spines are effective traits against predatory fish in fish lakes, which prefer larger prey. However, defensive spines increase mortality in habitats dominated by invertebrate predators (invertebrate lakes), which prefer smaller prey. Thus, species from fish lakes may accelerate spine growth at a later body size compared to species from invertebrate lakes when growing into the preferred prey size range of predatory fish. In this study, we constructed the allometric relationship between spine length and body size and compared the inflexion point of those growth curves in five species of *Leucorrhinia* dragonfly larvae. We found that fish-lake *Leucorrhinia* species accelerated spine growth at a larger body size than congeners from invertebrate lakes. Further, rather than extending spine length constantly through development, fish-lake species rapidly accelerated spine growth at a larger body size. This is likely to be adaptive for avoiding invertebrate predation at an early life stage, which are also present in fish lakes, though in smaller numbers. Our results highlight that comparative studies of ontogenetic patterns in antipredator traits might be essential to develop an integrated understanding of predator–prey interactions." (Authors)] Address: Jiang, B., Anhui Provincial Key Laboratory for Conservation & Utilization of Important Biological Resources, College of Life Sciences, Anhui Normal Univ., Wuhu 241000, China. Email: bin.jiang@ahnu.edu.cn

**22289.** Khandelwal, P.C.; Zakaria, M.A.; Socha, J.J. (2023): A year at the forefront of gliding locomotion. *Biology Open* (2023) 12, bio059973. doi:10.1242/bio.059973: 6 pp. (in English) ["This review highlights the largely understudied behavior of gliding locomotion, which is exhibited by a diverse range of animals spanning vertebrates and invertebrates, in air and in water. The insights in the literature gained from January 2022 to December 2022 continue to challenge the previously held notion of gliding as a relatively simple form of locomotion. Using advances in field/lab data collection and computation, the highlighted studies cover gliding in animals including seabirds, flying lizards, flying snakes, geckos, dragonflies, damselflies, and dolphins. Altogether, these studies present gliding as a sophisticated behavior resulting from the interdependent aspects of morphology, sensing, environment, and likely selective pressures. This review uses these insights as inspiration to encourage researchers to revisit gliding locomotion, both in the animal's natural habitat and in the laboratory, and to investigate questions spanning gliding biomechanics, ecology, sensing, and the evolution of animal flight." (Authors)] Address: Khandelwal, P.C., Max Planck

Institute for Intelligent Systems, Stuttgart 70569, Germany. Email: pranav@is.mpg.de

**22290.** Khedre, A.M.; Ramadan, S.A.; Ashry, A.; Alaraby, M. (2023): Ingestion and egestion of microplastic by aquatic insects in Egypt wastewater. *Environmental Quality Management* 33(1): 135-145. (in English) ["Microplastics (MPs) are frequently regarded as environmental and biota contaminants. Yet, research on the accumulation of MPs in living entities, particularly aquatic insects that serve as food resources in the aquatic food chain, is limited. This study to investigate the accumulation of MPs in aquatic insects from water and sediment in an Egyptian wastewater basin. Four typical freshwater insect groups were used. The highest MP load per gram wet weight was reported by collector-gatherers (*Chironomus* sp. and *Hydrophilus* sp.), followed by collector-filterers (*Culex* sp.) with the second highest MP load. However, Predators (*Aeshna* sp.) had the lowest values. Also, the present results showed a reduction in the number of MPs in all insect taxa tested after a 24 h depuration time, with differences in the observed egestion ability. The mean number of MPs per individual significantly reduced after 24 h in both *Chironomus* sp. and *Culex* sp. larvae, where 53% and 40% of MPs particles were ejected from them, respectively. However, the ability of MP egestion decreases in *Aeshna* sp. nymph (25%), and the lowest proportion of ejection was observed in *Hydrophilus* sp. adults (9%). Polyethylene terephthalate fibers were the most abundant type of MP in both sediment and water, followed by fragments (polyethylene and polypropylene). Yet, only polyester fibers were detected in the various insect species. The average length of fibers in the various insects was somewhat shorter than in the surrounding environment. The current study reveals that MP ingestion by aquatic insects is not always related to levels of pollution in the environment, since other factors such as feeding strategies may play a role in MP ingestion. Based on these observations, further studies should be carried out on studies on toxicological impacts of MPs on freshwater/aquatic biota." (Authors)] Address: Ashry, A., Entomology & Environmental toxicology group, Zoology Dept, Fac. Science, Sohag Univ., Sohag, Egypt. Email: ali.ashry@science.sohag.edu.eg

**22291.** Koene, E. (2023): Langzeitstudie 2016–2022 mit Populationsschätzungen von *Cordulegaster bidentata* und *C. boltonii* an sechs kleinen Bächen bei Bern (Schweiz) (Odonata: Cordulegasteridae). *Libellula* 41(3/4) (2022): 155-177. (in German, with English summary) ["Long-term study 2016–2022 with population estimates of *Cordulegaster bidentata* and *C. boltonii* in six small streams near Bern (Switzerland) (Odonata: Cordulegasteridae) – In the municipality of Wohlten near Bern, situated on a southern slope, many small, unobstructed streams flow into the River Aare or the dammed Lake Wohlensee. They start in old mixed forests and flow through extensive grassland in the lower part. In an area of about 5 km<sup>2</sup>, 445 *Cordulegaster bidentata* males and 2,062 *C. boltonii* males were marked during 820 hours in sunny weather from 2016 to 2022. Daily catches were recorded and visualised in diagrams. The annual number of males per species varied greatly, both in each stream from year to year and between individual streams in the same year. The ratio of the two syntopic species to each other also changed. Both species are widespread in the area. Using the MARK programme, male population sizes were estimated from the catch-recapture data and plotted in annual graphs for each stream. At high flight frequencies, the estimate was two to three times the number marked. For 2022, a very high total of 360 *C. bidentata* and 1,200 of *C. boltonii* males was estimated." (Author)] Address: Koene, Elisabeth,

Schlossmatte 51, CH-3032 Hinterkappelen, Switzerland.  
Email: elisabeth.koene@gmx.ch

**22292.** Iamin, S.; Agus, M.; Kamal, M.; Hanafiah, Z. (2023): Inventarisasi Odonata di Taman Wisata Alam Punti Kayu, Plamebabg, Sumatra Selatan. Prosiding Seminar Nasional Sains Matematika Informatika dan Aplikasinya IV, Fakultas MIPA Universitas Lampung 4(2): 198-211. (in Indonesian, with English summary) ["This study aims to determine the species and conservation status of Odonata contained at the Punti Kayu Nature Park, Palembang, South Sumatra. This research has been conducted from March to April 2016. The determination of the location of sampling using purposive sampling method based on the conditions and the type of habitat. Sampling was conducted using the method of cruising at each sampling location. The sampling technique is Direct Sweeping using insect nets. The results show the species of Odonata at the Punti Kayu Nature Park consists Ictinogomphus decoratus, Acisoma panorpoides, Aethriamanta aethra, Brachydiplox chalybea, Neurothemis fluctuans, Orthetrum sabina, O. testaceum, Potamarcha congenens, Rhyothemis phyllis, Tholymis tillarga and Zyxomma petiolatum, Podolestes coomansi, Agriocnemis femina, Ceriagrion auranticum, Onychargia atrocyana and Pseudagrion rubriceps, and Copera ciliata. The conservation status of Odonata at Punti Kayu Nature Park based on The IUCN Red List consist of 16 species that has Least Concern status and one species that has data deficiency status." (Authors)] Address: Lamin, Syafarina, urusan Biologi FMIPA Universitas Sriwijaya, Email: rinairsyad@yahoo.co.id

**22293.** Lencioni, F.A.A. (2023): Analysis of Telebasis Selys, 1865—Part I. (Odonata: Coenagrionidae). Zootaxa 5239(4): 500-520. (in English, with Portuguese summary) ["All species of Telebasis Selys, 1865 are analyzed and Telebasis sensu lato is redefined, Helveciagrion Machado, 1980 is removed from synonym and revalidated based on morphological characters and a new genus (Juenagrion gen. nov.) and a new species (Juenagrion nanae spec. nov. — Brazil: Mato Grosso: Querência, córrego transição, 13° 03' 35" S & 52° 12' 03" W) are erected. Diagnostic illustrations are presented." (Author)] Address: Lencioni, F.A.A., Rua Aníbal, 216—Jd. Coleginho, Vila Zezé, Jacareí, CEP (ZIP) 12310-780, São Paulo, Brazil. Email: lencioni.odonata@gmail.com

**22294.** Let, M.; Grabicová, K.; Ložek, F.; Bláha, M. (2023): Bioconcentrations, depuration, shift in metabolome and a behavioural response in the nymphs of the dragonfly *Aeshna cyanea* (Müller, 1764) to environmentally relevant concentrations of Methamphetamine. *Aquatic Toxicology* 259, June 2023, 106479: 11pp. (in English) ["Methamphetamine (MEA) is commonly detected in municipal wastewater. It causes imbalances in the system of neurotransmitters as well as several other adverse effects on human health. The aim of this study was to investigate bioconcentration and depuration rates at an environmentally relevant concentration of  $1 \mu\text{g}\cdot\text{L}^{-1}$  in *A. cyanea* nymphs exposed to MEA for six days followed by three days of Depuration. The metabolomes from nymphs sampled during Exposure and Depuration were compared using non-targeted screening. Concurrently, a behavioural experiment was run to evaluate the effect of MEA on movement. Since most samples were below the limits of quantification (LOQs) – MEA was quantified in only four out of the 87 samples and only during the first 24 hours of Exposure at concentrations at LOQs level – we estimated the maximal possible bioconcentration factor (BCF) on 0.63 using the LOQs. An MEA metabolite – amphetamine – was not detected in any sample at levels above their LOQs. Numbers

of significant down. and/or up-regulated signals ( $p = 0.05$ ) in metabolomes calculated for particular sampling times possibly correlated to the resulted size of the effect on movement recorded at the same times. In the MEA treatment, movement was not significantly greater during Exposure ( $p > 0.05$ ) but was significantly lower during Depuration ( $p < 0.05$ ). This study shows how MEA acts on dragonfly nymphs, an ecologically important group of aquatic insects with a high trophic level." (Authors)] Address: Let, M., Zátíší 728/II 389 25 Vodňany Czech Republic. Email: mlet@frov.jcu.cz

**22295.** Lin, P.; Wang, C.; Liu, Y.; Ren, L.; Zhang, Z. (2023): Study of a bioinspired rigid-flexible coupling structure based on dragonfly wing by optical/electron microscopy and finite element analysis. *Micron* 174:103534: (in English) ["In this work, mechanical properties of veins and membrane of dragonfly [*Pantala flavescens*] wing were studied by means of optical/electron microscopy, tensile test and nano-indentation. It indicates that veins exhibit significantly higher strength and elastic modulus, as compared with membrane. Furthermore, finite element analysis (FEA) demonstrates that the fluctuation of Von Mises stress and displacement between varying models is undermined, due to presence of the membrane, indicating higher stability. Consequently, according to FEA of varying models involving presence of membrane, the membrane in dragonfly wing not only provides the capability to fly, but also improves obviously the strength and stability of wing structure, despite of its significantly low strength and elastic modulus. It is found that based on proper biomimetic design, bioinspired rigid-flexible coupling structure exhibits superior strength and stability, as compared with conventional rigid structure, which will provide great potential to make novel, smart, and functional structures." (Authors)] Address: Zhang, Z., Key Laboratory for Engineering Bionics of China Ministry of Education, Nanling Campus of Jilin University, Changchun, Jilin Province, 130025, P.R. China. Email: zhzh@jlu.edu.cn

**22296.** Lozano, F.; Muzón, J.; Del Palacio, A.; Ramos, L. (2023): Larvas de Odonata. In: Lucía E. Claps, Sergio Roig-Junent & Juan J. Morrone (eds.): *Biodiversidad de Artrópodos Argentinos*, Vol. 5: 8-40. (in Spanish, with English summary) ["The order Odonata is composed of aquatic insects with hemimetabolous cycles and aquatic or secondarily terrestrial larvae. The larval stage is exopterygote and is characterized by having the hypertrophied labium modified in a mask with which they catch their prey. Odonata larvae have two Baupläne based on their locomotion: Zygoptera have caudal lamellae of various shapes, which allow them to move forward by means of serpentine movements; whereas Anisoptera have an anal pyramid that they use to propel by jet propulsion. All of these structures derive from the epiproct and the paraproct. In Argentina, 285 species gathered in 89 genera have been registered. This chapter provides an illustrated key for the identification of the last larval stage of the genera and information on the state of knowledge of the Argentinean families." (Authors)] Address: Lozano, F., Laboratorio de Biodiversidad y Genética Ambiental -Universidad Nacional de Avellaneda (BioGeA-UNDAV), Mario Bravo 1460, Piñeyro, 1870 Avellaneda, Buenos Aires, Argentina. Email: flozano@undav.edu.ar

**22297.** Mahdjoub, H.; Zebza, R.; Amari, H.; Bensouilah, S.; Zouaimia, A.; Youcefi, A.; Khelifa, R. (2023): Potential fitness consequences of roosting spatiotemporal selection in an endangered endemic damselfly: conservation implications. *Frontiers in Ecology and Evolution* 11 doi: 10.3389/fevo.2023.1267705: 10 pp. (in English) ["Understanding habitat

requirements of species of conservation concern is central for their conservation and the management of their habitat. Although much of the research attention has been focused on reproductive sites, the understanding of roosting behavior and microhabitat selection, and their potential fitness consequences is also crucial. Here, we assess the roosting behavior of an endangered endemic damselfly *Calopteryx exul* Selys in a lotic habitat of Northeast Algeria. Based on marked individuals, we specifically investigated their vertical and horizontal distribution at roosting sites, as well as the timing of roosting and its correlation with lifespan (as a measure of fitness). We found that individuals were philopatric to roosting sites and less so to vertical stratification. Roosting sites were used for both foraging and roosting. Individuals that occupied lower strata in roosting sites had longer lifespans and ceased roosting earlier. Average temperature of the day affected the timing of roosting such that on warm days roosting started later and ended earlier. Individuals with longer lifespans roosted earlier, suggesting potential scramble competition for roosting sites. Our results suggest that *C. exul* individuals show variability in the vertical and horizontal location as well as the timing of roosting, and these choices potentially have fitness consequences. This study highlights the importance of bank vegetation as roosting sites for lotic insects, and emphasizes the benefits of protecting these sites and including them as integral parts of the conservation plans of species." (Authors)] Address: Khelifa, R., Concordia Univ., Montreal, H3G 1M8, Quebec, Canada. Email: rassim.khelifa@concordia.ca

**22298.** Marinov, M.; Rashni, B. (2023): Contribution to the Odonata of Kadavu, Fiji with erection of three new species (Insecta: Odonata). *Faunistic Studies in Southeast Asian and Pacific Island Odonata* 41: 1-34. (in English) ["Updated information on the Odonata fauna of Kadavu Island, Fiji is presented. The new data are provided for proposing three new hypotheses for erecting the following taxa: *Nesobasis baidamuensium* sp. nov., *N. nedeltshvae* sp. nov. and *Nikoulabasis ilievae* sp. nov. as well as the first record of the female *Melanesobasis simmondsi* (Tillyard, 1924) which is described and illustrated below. Morphological description of the male *M. simmondsi* has been updated as well." (Authors)] Address: Rashni, Bindiya, Univ. of the South Pacific, Discipline of Biological & Chemical Sciences, School of Agriculture, Geography, Environment, Ocean and Natural Sciences, Laucala Campus. Fiji. Email diyarash@gmail.com

**22299.** Martínez-Darve Sanz, P.; García Pérez, J. (2023): Confirmación de la reproducción de *Pantala flavescens* (Fabricius, 1798) (Odonata, Libellulidae) por primera vez en las Islas Canarias y en España. Confirmación of the breeding of *Pantala flavescens* for the first time in the Canary Islands and Spain. *Boletín de la Asociación española de Entomología* 47(1-2): 83-86. (in Spanish) ["On November 9, 2022, above some bushes in the South Park of Maspalomas (UTM 10X10 28RDR47), a group of five dragonflies was observed hunting insects on the vegetation. The specimens were visually identified as belonging to the species *P. flavescens*. Subsequently, on November 15, 2022, several groups of four to five individuals were again located feeding in open areas far from water in the same park. During the visit, several isolated individuals were identified that stopped in the vegetation, perching hanging in a vertical position, a rare behavior among European dragonulids, but typical of this taxon (DIJKSTRA et al., 2020). These specimens attracted attention due to their fairly uniform yellowish color, their glassy and shiny wings, without apparent damage, and their pale yellow pterostigmas, instead of reddish as seen in adults.

All these characteristics, together with the absence of south/southeast winds in the previous days, seemed to indicate that these were young individuals that had not arrived from Africa, but had probably emerged on the island of Gran Canaria itself. On November 18, 2022, the area was visited again to try to locate the place of origin of the young specimens. During sampling, in a stony section of the nearby Barranco de Fataga (UTM 10X10 28RDR47), a series of small, practically dry pools were found in which twenty exuviae of *P. flavescens* were collected. All of them were found at a low height above the ground, indifferently on large rocks and dry vegetation. They were recent, as evidenced by the good state of conservation of their thoracic tracheas. Subsequently, on December 29, 2022 and in successive visits in January (days 4 and 13) of 2023, a breeding habitat was discovered in a section of ravine with shallow water next to the Betancores dam in which copulations, laying tandems and larvae in their final stages of development. Finally, during the month of February 2023, up to five newly emerged specimens were found hanging from their own exuvia in the same breeding area, as well as teneral individuals that frequently stopped on the vegetation near the temporary watercourse." (Authors/google translát)] Address: Martínez-Darve Sanz, P., C/ Concejal García Feo N.º12, 4ºH, 35011, Las Palmas de Gran Canaria, Spain. Email: pmarsan79@gmail.com

**22300.** Mataba, G.R.; Clark, N.W.; Kweka, E.J.; Munishi, L.; Brendonck, L.; Vanschoenwinkel, B. (2023): Interactive effects of dragonfly larvae and *Bacillus thuringiensis* var. israelensis on mosquito oviposition and survival. *Ecosphere* 14(9), e4653: 17 pp. (in English) [Magugu village located at 3°59'05.6" S and 35°46'02.5" E in Manyara region in northern Tanzania. "The biological larvicide *Bacillus thuringiensis* var. israelensis (Bti) is used worldwide to control reproduction of mosquitoes in freshwater habitats. However, its impact on the ecosystem including nontarget species is often unclear. In addition, it is unknown how Bti larvicide may interact with local mosquito predators to shape oviposition site selection of mosquitoes. We used an outdoor mesocosm experiment to investigate the effects of realistic concentrations of the bio-larvicide Bti on *Culex* oviposition, larval density, survivorship, and on densities of nontarget species. We also manipulated the complexity of the community by manipulating the presence of dragonfly larvae [*Pantala flavescens*] as a predator. *Culex* oviposition was unaffected by Bti but the larvicide effectively reduced larval density and survivorship in all treatments. Bti did not affect nontarget insects but stimulated phytoplankton density at the expense of lower herbivore density. The presence of dragonfly larvae in mesocosms did not reduce *Culex* oviposition or larval sensitivity to Bti. We conclude that Bti may effectively reduce the density and survivorship of *Culex quinquefasciatus* mosquitoes in this part of East Africa, but possibly at the cost of higher phytoplankton densities. Bti-treated mesocosms were not more or less attractive for mosquitoes, suggesting that its application would not alter their oviposition behavior in the field." (Authors)] Address: Mataba, G.R., School of Life Sciences & Bioengineering, The Nelson Mandela African Institution of Science and Technology (NM-AIST), Arusha, Tanzania. Email: gordpawa@hotmail.com

**22301.** Mehdi, H.; Kumar, S.; Gupta, P. (2023): Aerodynamic performance of the corrugated airfoil in gliding mode at ultra-low Reynolds numbers? *AIP Conf. Proc.* 2933, 020014 (2023) <https://doi.org/10.1063/5.0174587>: 9 pp. (in English) ["A micro air vehicle can be as small as 6 cm. Development is driven by military, research, and commercial purposes,

with insect-sized aircraft that may be used in the future. The small aircraft allows for remote observation of hazardous environments, aerial photography, and robotics contests. The CFD simulation of fluid flow and aerodynamic performance of the dragonfly (*Aeshna cyanea*) wing section was examined using FLUENT software at low Reynolds numbers (1000, 1250, and 1500) with various angles of attack (AOA) (0°, 5°, 10°). The numerical solver was based on the SIMPLE algorithm with Green-Gauss Node velocity pressure coupling. With increasing AOA, the mean lift coefficient increased while the drag coefficient decreased, resulting in improved propulsive performance. As the AOA rises, the gliding ratio increases in lockstep. The drag formation has some exciting outcomes. Because viscous effects are more significant at lower Re values, leading skin friction to be the primary contributor to drag reduction, the average drag coefficient in each case drops as the AOA increases." (Authors)] Address: Mehdi, H., Department of Mechanical Engineering, Meerut Institute of Engineering and Technology, Meerut, India. Email: husain.mehdi@miet.ac.in

**22302.** Meilani, I.A.; Nugroho, A.S. (2023): Keanekaragaman capung (Odonata) pada area Kali Pertambakan desa Bakaran Kulon kecamatan juwana kabupaten Pati [Diversity of dragonfly (Odonata) in the areas of rivers at Bakaran Kulon Village, Juwana sub-district, Pati District]. Webinar biofair pendidikan biologi Universitas PGRI Semarang: 241-251. (in Indonesian) ["Dragonflies have a very important role as aquatic bioindicators. Disruption of the dragonfly's natural habitat causes the dragonfly population to change due to human activity. The purpose of this study was to determine the diversity of dragonflies (Odonata) in the fishpond area of Bakaran Kulon Village. Data collection for dragonflies (Odonata) used the edge roaming method in the pond area. Data collection was carried out by walking at the end of transect 1 to the other end and recording the dragonflies found. Based on the research that had been conducted for 3 days, it was found that 110 individuals of dragonflies were found belonging to two suborders, namely Suborder Zygoptera and Suborder Anisoptera. Suborder Anisoptera found 107 individuals, namely Libellulidae including *Crocothemis erythraea* species with 30 individuals, *Pantala flavescens* 68 individuals, *Orthetrum sabina* 8 individuals, *Diplacodes trivialis* only found 1 individual, Suborder Zygoptera only found one family, namely Family Coenagrionidae found 1 species with a total of 3 individual. The most abundant dragonflies were from the *Pantala flavescens* species." (Authors/Google translate) <https://conference.upgris.ac.id/index.php/biofair/article/view/4196>] Address: Iffa Ana Meilani, Ary Susatyo Nugroho Program Studi Pendidikan Biologi Universitas PGRI Semarang Email: \*iffaana1612@gmail.com

**22303.** Miralles-Núñez, A.; Conesa-García, M.A.; Pino, P.L.; Giral, G.J.; Ortega i Colet, P.; Bosquet Muncunill, A. (2023): *Brachythemis impartita* (Karsch, 1890) (Odonata: Libellulidae) en Aragón y Cataluña (noreste de España). Boletín de la Sociedad Entomológica Aragonesa (S.E.A.) 72: 185-187. (in Spanish, with English summary) ["*B. impartita* in Aragon and Catalonia (northeast of Spain). *B. impartita* is recorded for the first time in the provinces of Teruel and Tarragona, also corresponding to the first observations of the species in the Autonomous Communities of Aragon and Catalonia, the most north-eastern regions of the Iberian Peninsula. The species has been detected sporadically. It has not been possible to confirm its establishment in the two provinces, so its possible origin is discussed." (Authors)] Address: Miralles-Núñez, Adrià, Servicio de Fauna y Flora. Departamento de Acción Climática, Alimentación y Agenda

rural. Generalitat de Catalunya, Barce lona, Spain. Email: amiralles10@gmail.com

**22304.** Miralles-Núñez, A.; Conesa García, M.A.; Pino, P.L.; Giral, G.J.; Ortega Colet, P.; Bosquet Muncunill, A. (2023): *Brachythemis impartita* (Karsch, 1890) (Odonata: Libellulidae) en Aragón y Cataluña (noreste de España). Boletín de la SEA 72: 185-187. (in Spanish, with English summary) ["*B. impartita* is recorded for the first time in the provinces of Teruel and Tarragona, also corresponding to the first observations of the species in the Autonomous Communities of Aragon and Catalonia, the most north-eastern regions of the Iberian Peninsula. The species has been detected sporadically. It has not been possible to confirm its establishment in the two provinces, so its possible origin is discussed." (Authors)] Address: Miralles-Núñez, Adrià, Servicio de Fauna y Flora. Depto de Acción Climática, Alimentación y Agenda rural. Generalitat de Catalunya, Barcelona Spain. Email: amiralles10@gmail.com.

**22305.** Momin, S.G.; Pale, M.; Sarkar, P.; Ahmed, G.; Bhat-tacharya, A. (2023): Prey selection by Pitcher Plant, *Nepenthes khasiana* in Meghalaya, India. Uttar Pradesh Journal of Zoology 44(13): 115-130. (in English) ["*Nepenthes khasiana*, an endangered pitcher plant endemic to Meghalaya and southern Assam, India seems to develop a pitcher for trapping small animals as their prey to supplement the nutrient deficiency which occurs in the soil. A study on the enigmatic meat-eating choice of *N. khasiana* is scarce. Hence, this study was conducted to find out their prey species covering all three hills of Meghalaya, India. A total of 90 pitcher samples (30 from each hill) were collected randomly and preserved in 70% alcohol which was further identified at the lower taxa level. A total of 71 species were identified up to the species level while another five were identified up to their genus level. Among this, 90.8% of species were insects (69 species) while the remaining 9.2% (7 species) were non-insect species. All these seven non-insect species belonged to single order Arachnida. The majority of them (71.1%, 54 species) were capable of flying while the remaining 28.9% (22 species) were incompetent to fly. Those species which were incompetent to fly belonged to orders Araneae, Dermaptera, Diptera, Hemiptera, Lepidoptera, and Odonata. The prey constituted the highest 23 species belonging to the order Hymenoptera followed by 11 species under Coleoptera, 9 species under Diptera, 7 species under Araneae, 6 species each under Hemiptera and Blattodea, 5 species each under Orthoptera and Lepidoptera, 2 species under Odonata and 1 species each under Mantodea and Dermaptera. The orders Hymenoptera and Diptera together contributed 83.3% of the total feeding spectrum. This further indicates the sustainable management of biodiversity securing the abundance of animal prey species for the conservation of pitcher plants in this landscape." (Authors)]

**22306.** Monnerat, C. (2023): Situation actuelle de *Leucorrhinia albifrons* (Burmeister, 1839) en Suisse (Odonata: Libellulidae). Entomo Helvetica 16: 9-25. (in French, with English and German summaries) ["Status of *Leucorrhinia albifrons* (Burmeister, 1839) in Switzerland (Odonata: Libellulidae). A synthesis of the data on *Leucorrhinia albifrons* collected since 2000 documents its reproduction as certain in six localities (two of which are no longer in existence) and probable in a seventh, while single males have been recorded in eight other localities. In the cantons of Aargau, Jura and Graubünden, the species was recorded for the first time, while in the cantons of Bern and Zurich it was seen again after half a century of absence. The data presented



confirm the high dispersal capacity of *L. albifrons*, from several dozen to over 100 kilometers, which has allowed this species to colonise a revitalised high marsh, water bodies created after 1990 and even a natural site in the subalpine zone. However, the number of occupied sites is still very small and they are far apart, which reduces the probability of regular exchanges between sites and increases the risk of extinction. The increased availability of suitable bodies of water through revitalization measures and the creation of new habitats is essential to maintaining sustainable populations of this highly demanding species in Switzerland." (Author)] Address: Monnerat, C., info fauna, Bellevaux 51, 2000 Neuchâtel, Switzerland. Email: christian.monnerat@infofauna.ch

**22307.** Morris, R.K.A.; Welch, M.D. (2023): Is invertebrate conservation in Great Britain best achieved by policies that increase species protection? *Journal of Insect Conservation* 27: 527-531. (in English) ["We discuss proposals to extend the list of protected insect species in Great Britain and question whether existing species protection measures are appropriate for insects whose ecology is substantially unknown. We highlight the practicalities of applying such measures to very poorly known taxa, whose identification depends upon highly experienced specialists and a tiny pool of relevant expertise. We propose a seven-point plan that would strengthen invertebrate conservation in Great Britain. Our proposals could be applied to other countries with a protected sites network and a desire to improve habitat-based insect conservation measures. Implications for insect conservation: Our analysis suggests that insect conservation will not be improved by legislation that restricts the potential for ad hoc surveillance that currently provides almost all the data used to monitor rare and threatened insects. We highlight the need for improvements in the understanding of insect micro-habitat requirements amongst conservation managers. Our proposed seven-point plan provides a structured approach to insect conservation that should improve identification of important insect sites, site management and landscape-scale conservation measures." (Authors) The British terrestrial arthropods protected under the Wildlife and Countryside Act (1981) include two. not further specified. Odonata species.] Address: Morris, R.K.A., Scientific Associate, Diptera Section, Natural History Museum, London SW7 5BD, UK. Email: syrphid58@gmail.com

**22308.** Mozhui, L.; Kakati, L.N.; Ao, B.; Kezo, V.; Meyer-Rochow, V.B. (2023): Socio-economic analysis of edible insect species collectors and vendors in Nagaland, North-East India. *Journal of Insects as Food and Feed* (2023); DOI: 10.1163/23524588-20230082: 18 pp. (in English) ["In Nagaland insects like the Eri silkworm *Samia cynthia ricini* and the Indian honey bee *Apis cerana indica* are reared for commercial purposes rather than just household uses. Of the marketed edible insects in India, Hymenoptera contribute 34% followed by Orthoptera (25%), Coleoptera (16%), Hemiptera (12%), and Lepidoptera (9%) while Odonata and Blattodea contribute 2% each. The present study estimates that an insect seller may earn Rs. 600-800 (US \$7.51-10.01) per kg from various types of insects such as grasshoppers, crickets, katydid, water and diving beetles, ants, stink bugs and tent caterpillars. For 1 litre of honey an insect seller may earn Rs. 532-1600 (US \$6.66-20.02) and for 1 kg of wood larvae (largely beetle larvae), carpenter "worms" (= *Cossus* spp. moth larvae) and hornets the vendor can demand Rs. 3,300-3,750 (US \$41.29-56.31). The contribution of the edible insect sector towards the socio-economy and livelihood improvement of the people in both rural and urban communities is highlighted and discussed. Given the insect bio-resource

in the region, the consumption of edible insects, coupled with mass production, processing, and marketing (as successfully implemented in countries like Thailand, Vietnam, and some African countries like Cameroon and Nigeria), can be a boon to Nagaland." (Authors)] Address: Kakati, L.N., Fac. of Science, Assam, Down Town University, Panikhaiti, Guwahati-26, Guwahati, Assam, India. Email: lakhmi-kakati1956@gmail.com

**22309.** Müller, O.; Schneider, T.; Ikemeyer, D.; Brochard, C. (2023): Description of last instar larva of *Cordulegaster kalkmani* (Odonata: Cordulegasteridae). *International Journal of Odonatology* 26: 108-113. (in English) ["The final instar larva of *C. kalkmani* described and illustrated based on one female exuvia collected in Alakabük, Bitlis province, Turkey, in July 2022. The exuvia of *C. kalkmani* is compared with the exuviae of members of the "boltonii-group" in the eastern part of the Western Palaearctic: *C. vanbrinkae*, *C. picta*, and *C. heros*. The exuvia of *C. kalkmani* shows no clear distinction in comparison to the other members of the eastern "boltonii-group"." (Authors)] Address: Müller, O., Birkenweg 6d, 15306 Libbenichen, Germany. Email: mueller.ole@gmail.com

**22310.** Mukherjee, A.; Mahato, S.; Samanta, S. (2023): First record of Cascader *Zygonyx torridus* Kirby, 1889 dragonfly from West Bengal, India. *Bionotes* 25(1/2): 10-13. (in English) ["During an opportunistic survey on 24 October 2022, the authors photographed an adult *Z. torridus* at around 11:14 a.m. from the Ajodhya Hills of Purulia district, West Bengal, India. During the period of observation, the specimen was flying rapidly & tirelessly 100–200 m away from a river surrounded by streams, rocks and sand banks. The authors didn't observe the specimen in a resting position during the 10–15 minutes when the dragonfly was observed." (Authors)] Address: Mukherjee, A., Dept Information Technology, Maulana Abul Kalam Azad University of Technology (MAKAUT), Haringhata, Nadia, West Bengal, India, 741249, India. Email: adarsha8158@gmail.com

**22311.** Mun, C.K. (2023): A riverhawk dragonfly, *Onychthemis testacea*, at Yishun Central. *Nature in Singapore* 16: e2023091: 1 p. (in English) [Singapore Island, Yishun Central, Khoo Teck Puat Hospital; 29 May 2023; 1302 hrs. Habitat: Urban. In the basement of a concrete building. A dead example with a body length of about 8 cm was found indoors on the ledge of a glass window.] Address: Email: simonchan268@yahoo.com.sg

**22312.** Naim, M.H.R.; Shalauddin, M.; Antu, D.R. (2023): Confirmatory report of damselfly (Odonata) Pixie dartlet, *Ischnura nursei* (Morton, 1907) from Bangladesh. *Bangladesh J. Zool.* 51(1): 129-133. (in English) ["During a regular Odonata survey at Harirampur Upazila of Manikganj district in 05 July 2020 at 07:30 h (GMT+6), a male *I. nursei* was observed and photographed as basing on a flower cluster of *Leptochloa chinensis* (L.) in a flooded crop field (23°45'50.-976"N, 89°56'20.328"E)." (Authors)] Address: Antu, D.R., Department of Zoology, Jagannath University, Dhaka 1100, Bangladesh. Email: durjoyantu@gmail.com

**22313.** Nakamura, F.; Isoshima, T.; Kimura-Suda, H.; Yamaguchi, M. (2023): Characterization of dragonfly wing membranes using FTIR imaging and IR dichroism imaging. *Molecular Crystals and Liquid Crystals* 761(1): 112-119. (in English) ["We characterized dragonfly wings from three species, *Sympetrum frequens*, *Orthetrum albistylum speciosum*, and *Sympetrum infuscatum*, collected in Chitose City using Fourier transform infrared (FTIR) imaging and infrared (IR)

dichroism imaging. In the FTIR images, the distribution of amide I and II bands derived from the chitin was observed across the entire vein domain; however, strong absorption for the amide bands was observed in the thicker vein domain membrane: approximately 23% of the total vein domain membrane in the wing. IR dichroism images indicated that the chitin in the thinner vein domain membrane was oriented along the primary vein." (Authors)] Address: Kimura-Suda, Hiromi, Department of Applied Chemistry & Bioscience, Chitose Institute of Science & Technology, Chitose, Hokkaido, Japan. Email: kimurasu@photon.chitose.ac.jp

**22314.** Nel, A.; Palazzo, G.J.; Aase, A. (2023): A new damselfly from the Lower Eocene Green River Formation (Odonata, Dysagrionidae). *Palaeoentomology* 6(4): 336-339. (in English) ["The Eocene Green River Formation in the USA is well known as a Konservat-Lagerstätte, and has yielded an enormous number of beautifully preserved fossil insects from the Parachute Creek Member of Lake Uinta in Colorado and Utah, USA (Grande, 1984) where insects dominate the fauna. In Fossil Lake deposits, fish dominate the fauna with insects a minor component. This formation spans a 5-my-long period between ca. 53.5 and 48.5 Ma (Smith et al., 2003) in three distinct basins containing lacustrine sediments. Many of these fossils are in an exquisite state of preservation, occasionally even with soft tissues and colour patterns preserved (e.g., Bechly et al., 2020). As this entomofauna is one of the most diverse for the Early Eocene, increasing its knowledge is crucial for the understanding of the evolution of the insects at that time. This is especially the case for the Odonata, a clade that remains poorly known for the Paleocene and early Eocene (Nel & Jouault, 2022). Bechly et al. (2020) provided a first revision of the damselflies from the Green River Formation, but continuing excavation produces new specimens. The specimen described herein was recently discovered while excavating fossil fish in the Fossil Lake deposits of the Green River Formation in southwest Wyoming. This new species of Zygoptera from the Fossil Lake deposits further demonstrates its impressive diversity of Odonata." (Authors)] Address: Nel, A., Lab. Ent. Mus. Natn. Hist. Nat., 45 rue Buffon, F-75005 Paris, France. E-mail: anel@mnhn.fr

**22315.** Noda, R.; Liu, X.; Hefler, C.; Shyy, W.; Qiu, H.H. (2023): The interplay of kinematics and aerodynamics in multiple flight modes of a dragonfly. *Journal of Fluid Mechanics* 967: (in English) ["This paper presents the effects of wing kinematics on both normal forward flight and escape flight of a dragonfly. A Navier–Stokes-based numerical model has been adopted, and results have been substantiated by experimental data. The wing kinematics of tethered specimens and the prescribed wing morphology of a free-flying dragonfly were used in the simulation. To shed light on the interplay between kinematics and aerodynamics, a parametric study of the kinematics has been conducted. It is found that in escape flight, the dragonfly generates additional lift while the thrust reduces and the overall efficiency drops. Compared with normal forward flight, the escape mode produces larger lift force peaks. When the kinematics change to facilitate escape flight, the aerodynamic forces are affected by not only the flapping kinematics but, in the case of the hindwing, the varied wing–wing vortex interactions. The direction of the resultant force on each wing changes according to the change of the mean of pitching angle and stroke plane angle. We found that in the studied configurations, the varied phasing of the wings has a marginal effect on the aerodynamics of the dragonfly. It reduces lift and increases thrust, and this force modulation is slightly more efficient when the local angle of attack also changes.

On the other hand, the change of angle of attack played a major role in leading-edge vortex formations and directing the resultant forces of the wings. The results can be useful in developing flight control strategies for micro air vehicle design." (Authors)] Address: Shyy, W., Department of Mechanical and Aerospace Engineering, The Hong Kong University of Science & Technology, Hong Kong SAR, China. Email: weishyy@ust.hk, meqiu@ust.hk

**22316.** Nunes, L.F.; Santamaría, T.; Casanueva, P.; Sánchez-Sastre, L.F.; Ferreras-Romero, M.; Romero, A.; Campos, F.; Hernández, A. (2023): Patterns of variation in wing venation of Iberian *Cordulegaster boltonii* (Donovan, 1807) (Odonata: Cordulegastridae). *International Journal of Odonatology* 26: 164-171. (in English) ["Some structural characters, such as wing venation, have been used in odonates to differentiate taxa. In *C. boltonii*, a species widely distributed throughout the western Palaearctic, the main characteristics of its wing venation have not been quantified until now. A six-variable analysis of wing venation (number of antenodal and postnodal cross-veins, number of cells in the anal triangle and in the anal loop) in specimens from several European countries was carried out. The results showed that: (a) females had a greater number of transversal veins and cells in the anal loop than males; (b) the values of these four variables were significantly lower in males from the Iberian Peninsula than in those from elsewhere; (c) within the Iberian Peninsula two groups of populations can be distinguished: one covers the north and the other the rest of the peninsula, the latter with two subgroups, one in the centre and one in the south and east. The number of cells in the anal loop is a valid variable for analyzing geographic differences in this species." (Authors)] Address: Nunes, Luisa, Instituto Politécnico de Castelo Branco – Escola Superior Agrária. Qta Sra Mercúles, 6000-900 Castelo Branco, Portugal

**22317.** Oelmann, Y.; Fiedler, D.; Michaelis, R.; Leivits, M.; Braun, A.; Gschwind, P.; Neidhardt, H.; Willigalla, C. (2023): Autumn migration of the migrant hawkler (*Aeshna mixta*) at the Baltic coast. *Movement Ecology* 11(Article number: 52): 9 pp. (in English) ["Background: Migratory insects are important for the provision of ecosystem services both at the origin and destination sites but – apart from some iconic species – the migration routes of many insect species have not been assessed. Coastlines serve as a funnel where migrating animals including insects accumulate. Migratory behaviour and captures of dragonflies in bird traps suggest autumn migration of dragonflies along coastlines while the origin and regularity of this migration remain unclear. Methods: Dragonfly species were caught at the bird observatory Kabil at the Baltic coast in Estonia in 2009, 2010 and 2015. For the 2015 data set, we used a stable hydrogen (H) approach to trace the potential natal origin of the migrant hawkler (*Aeshna mixta*). Results: 1079 (2009), 701 (2010) and 88 (2015) *A. mixta* individuals were caught during the study periods (35, 37 and 11 days in 2009, 2010 and 2015, respectively). The migration period lasted from end of August to end of September. Based on the results from our stable isotope analysis, we identified two populations of *A. mixta*: One (range of isotope signatures of non-exchangeable H [ $\delta^2\text{Hn}$  wing]: -78‰ to -112‰) had a local likely origin while the other ( $\delta^2\text{Hn}$  wing: -113‰ to -147‰) migrated from northerly directions even in headwind from the South. The former showed an even sex ratio whereas the actively migrating population was dominated by males. Conclusions: Our results suggest a regular southbound autumn migration of *A. mixta* along the Baltic coast. However, nearly half of the sampled individuals originated from the surroundings

suggesting either no, partial or "leap-frog" migration. Contrary to our expectation, *A. mixta* did not select favourable wind conditions but continued the southbound autumn migration in the flight boundary layer even in case of headwinds. The dominance of males might indicate migration as a result of competition for resources. Further repeated, large-scale studies along the Baltic coast are necessary to pinpoint the migratory pattern and the reason for migration of *A. mixta*. Such studies should also comprise locations north of the known species range of *A. mixta* because of the rapid climate-change induced range expansion." (Authors)] Address: Oelmann, Yvonne, Geoecology, Department of Geosciences, University of Tübingen, 72070 Tübingen, Germany. Email: yvonne.oelmann@uni-tuebingen.de

**22318.** Omary, R.R.; Lalika, M.C.S.; Nguvava, M.; Mjimwa, E. (2023): Macroinvertebrates as bio indicators of water quality in Pinyinyi River, Arusha Tanzania. *Journal of Water Resource and Protection* 15(8): 393-412. (in English) ["This study used macroinvertebrates to assess the impact of anthropogenic activities on the Pinyinyi River during dry and wet season. Abundance of macroinvertebrates, average score per taxon and Shannon Weiner Species Diversity Index were used to state the ecological status of Pinyinyi River. Because the abundance of macroinvertebrates can be affected by change in water quality, some of the physicochemical parameters were also measured. A macroinvertebrates hand net is used to collect the macroinvertebrates per sampling point. DO, temperature, pH, turbidity and TDS were measured in-situ using HI-9829 Multiparameter and BOD was measured in the laboratory using Oxydirect levibond method. A total of 164 macroinvertebrates were collected and identified from Pinyinyi River during dry and wet season. They belong to 13 families. The most abundant taxa were mosquito larva, Diptera (41.07%) and aquatic caterpillar, Lepidoptera (23.21%) during dry season representing about 64.28% of the total macroinvertebrates whereas the least abundant taxa were pouch snail (16.07%) and dragonflies, Odonata (19.64%) during dry season representing about 35.72% of the total macroinvertebrates. The most abundant taxa collected during wet season were aquatic earthworm, haplotaxida (19.44%), midges, Diptera (17.59%), black flies, Diptera (15.74%) and creeping water bugs, Hemiptera (12.96%) whereas the least abundant were pigmy back swimmers, Hemiptera (2.78%), snail (3.7%), predacious diving beetle (4.63%) and coleopteran (4.63%). Average Score per taxon of Pinyinyi River during dry season was 5.25 and 3.6 during wet season. The Shannon Weiner Species Diversity Index was 1.318 during dry season and 2.138 during wet season. Based on the score, Pinyinyi River is moderately polluted during dry season and seriously polluted during wet season. Based on index, Pinyinyi River has low diversity of macroinvertebrates during dry season and highly in diversity of macroinvertebrates during wet season. Moreover, it was found that, agricultural activities, livestock keeping, bathing and washing alter physicochemical parameters of Pinyinyi River and hence change the abundance of macroinvertebrates as well as the quality of water. The study, therefore, recommends that the source of pollutants should be controlled and the river regularly monitored by the relevant authorities." (Authors)] Address: Omary, R.R., Dept of Geography & Environmental Studies, College of Natural & Applied Science (CoNAS), Sokoine Univ. of Agriculture, Morogoro, Tanzania

**22319.** Orondo, P.W.; Zhou, G.; Ochwedo, K.O.; Wang, X.; Ondeto, B.M.; Lee, M.-C.; Nyanjom, S.G.; Atieli, H.; Githeko, A.K.; Kazura, J.W.; Yan, G. (2023): Effect of predators on

*Anopheles arabiensis* and *Anopheles funestus* larval survivorship in Homa Bay County Western Kenya. *Malaria Journal* (2023) 22:298: 9 pp. (in English) ["Background: The rise of insecticide resistance against malaria vectors in sub-Saharan Africa has resulted in the need to consider other methods of vector control. The potential use of biological methods, including larvivorous fish, *Bacillus thuringiensis israelensis* (Bti) and plant shading, is sustainable and environmentally friendly options. This study examined the survivorship of *Anopheles arabiensis* and *Anopheles funestus* larvae and habitat productivity in four permanent habitat types in Homa Bay county, western Kenya. Methods: Predator densities were studied in a laboratory setup while habitat productivity and larval survivorship was studied in field setup. Results: Fish were observed as the most efficient predator (75.8% larval reduction rate) followed by water boatman (69%), and dragonfly nymph (69.5%) in predation rates. Lower predation rates were observed in backswimmers (31%), water beetles (14.9%), water spiders (12.2%), mayflies (7.3%), and tadpoles (6.9%). Increase in predator density in the field setup resulted in decreased *Culex* larval density. Larval and pupa age-specific distribution was determined and their survivorship curves constructed. Combined larvae (Stage I-IV) to pupa mortality was over 97% for *An. arabiensis* and 100% for *An. funestus*. The highest larval stage survival rate was from larval stages I to II and the lowest from larval stage IV to pupa. Stage-specific life tables indicated high mortality rates at every developmental stage, especially at the larval stage II and III. Conclusion: Determination of the efficiency of various larval predators and habitat productivity will help with the correct identification of productive habitats and selection of complementary vector control methods through environmental management and/or predator introduction (for instance fish) in the habitats." (Authors)] Address: Pauline Winnie Orondo: Email: paulineorondo@gmail.com

**22320.** Ott, J. (2023): Hat *Sympetrum fonscolombii* (Selys, 1840) am Kranichwoog bei Hütschenhausen (Rheinland-Pfalz, Landstuhler Moomiederung) als Larve überwintert (Odonata: Libellulidae)? *Libellula* 42(1/2): 69-78. (in German, with English summary) ["Did *S. fonscolombii* overwinter in the larval stage in the Kranichwoog near Hütschenhausen (Rheinland-Palatinat, Landstuhler Moomiederung)? – The article reports on an overwintering population of larvae of *Sympetrum fonscolombii* in the Kranichwoog near Hütschenhausen (Rheinland-Palatinat, Landstuhler Moomiederung). The adults emerged at the beginning of June 2023. Taking into account the known time of their larval development, phenological evidence of the migration of the species and the available weather data, it is deduced that these adults must have emerged from overwintered larvae. This can be considered as another effect of climate change on the dragonfly fauna." (Author)] Address: Ott, J., L.U.P.O. GmbH, Friedhofstr. 28, 67705 Trippstadt, Germany. Email: ott@lupogmbh.de

**22321.** Ott, J. (2023): Libellen am Kranichwoog: Erstaunliche Vielfalt nach kurzer Zeit. *Heimatjahrbuch Landkreis Kaiserslautern* 2024: 71-74. (in German) [General on the odonate fauna of a pond in Landkreis Kaiserslautern, Rheinland-Pfalz, Germany] Address: Ott, J., Friedhofstr. 28, 67705 Trippstadt, Germany. E-mail: ott@lupogmbh.de

**22322.** Pantke, C. (2023): Die Verbreitung der Kleinen Zangenlibelle (*Onychogomphus forcipatus*) in Niederbayern. *Der Bayerische Wald* 36(1-2): 66-73. (in German) ["*O. forcipatus* has been spreading increasingly in Bavaria since the 1990s. This is most likely due to several causes: the improvement of water quality through the construction and expansion of

sewage treatment plants, a more nature-oriented water management and global warming. This is exemplified by the population trends of *O. forcipatus* in Lower Bavaria." (Author/-DeepL)] Address: Pantke, Christa, Wasserwirtschaftsamt Degendorf, Dienstort Gaishofen, Fischerstr. 17a, 94575 Windorf, Germany

**22323.** Patten, M.A.; Benson, B.R. (2023): A broader flight season for Norway's Odonata across a century and a half. *Oikos* 2023: e09882. doi: 10.1111/oik.09882: 11pp. (in English) ["As global climate continues to change, so too will phenology of a wide range of insects. Changes in flight season usually are characterised as shifts to earlier dates or means, with attention less often paid to flight season breadth or whether seasons are now skewed. We amassed flight season data for the insect order Odonata, the dragonflies and damselflies, for Norway over the past century-and-a-half to examine the form of flight season change. By means of Bayesian analyses that incorporated uncertainty relative to annual variability in survey effort, we estimated shifts in flight season mean, breadth, and skew. We focussed on flight season breadth, positing that it will track documented growing season expansion. A specific mechanism explored was shifts in voltinism, the number of generations per year, which tends to increase with warming. We found strong evidence for an increase in flight season breadth but much less for a shift in mean, with any shift of the latter tending toward a later mean. Skew has become rightward for suborder Zygoptera, but not for Anisoptera, or for the Odonata as a whole. We found weak support for voltinism as a predictor of broader flight season; instead, voltinism acted interactively with use of human-modified habitats, including decrease in shading (e.g. from timber extraction). Other potential mechanisms that link warming with broadening of flight season include protracted emergence and cohort splitting, both of which have been documented in the Odonata. It is likely that warming-induced broadening of flight seasons of these widespread insect predators will have wide-ranging consequences for freshwater ecosystems." (Authors)] Address: Patten, M.A., Ecology Research Group, Faculty of Biosciences & Aquaculture, Nord Univ., Steinkjer, Norway. Email: michael.a.patten@nord.no

**22324.** Payra, A.; Chandran, R.; Deshpande, A.; Koparde, P. (2023): Description of *Protosticta armageddonia* sp. nov. (Odonata: Zygoptera: Platystictidae) from the Western Ghats of India. *International Journal of Odonatology* 26: 93-102. (in English) ["A new species of *Protosticta* Selys, 1885 is described based on specimens collected from Kerala, northeast of Thiruvananthapuram, in the southern parts of the southern Western Ghats of India. *Protosticta armageddonia* sp. nov. is compared with all other known *Protosticta* species of the Western Ghats to provide comprehensive differential diagnosis. The new species is distinguished from its congeners by a combination of characters, including a marking on the ventral side of thorax, structure and colour of the prothorax, markings on the 8th abdominal segment, and the structure of caudal appendages and genital ligula. Furthermore, we provide preliminary information on the ecology and natural history of the new species." (Authors)] Address: Payra, A., Dept of Environmental Studies, Dr. Vishwanath Karad MIT World Peace Univ., Kothrud, Pune, Maharashtra 411038, India

**22325.** Pellet, J. (2023): Planning insect surveys in alpine ecosystems. *Alpine Entomology* 7: 201-204. (in English) ["Most biological survey programs rely on multi-species inventories (e.g. birds, amphibians, butterflies, dragonflies). These programs usually rely on multiple visits during pre-defined time windows. The implicit goal of this popular approach is

to maximize the observed species richness. Here, we present a novel method to optimize the timing of survey windows using a framework maximizing the detectable species pool. We present a proof of concept using 20 years of entomological records in Switzerland using butterflies, dragonflies, and grasshoppers. The general framework presented can potentially be applied to a wide range of biological survey schemes. It offers a new practical tool for adaptive entomological monitoring under climate change." (Authors)] Address: Pellet, J., n+p wildlife ecology, Place St-François 6, 1003 Lausanne, Switzerland. Email: jerome.pellet@nplusp.ch

**22326.** Pyo, J.-Y.; Kim, S.-S.; Park, J.S.; Kim, J.-M.; Song, Y.-K.; Kim, I. (2023): Identification of *Sympetrum depressiusculum* Selys, 1841 in South Korea (Odonata: Libellulidae) according to morphology and genetic markers. *Insects* 2023, 14(9), 733; <https://doi.org/10.3390/insects14090733>: 20 pp. (in English) ["Simple Summary: Two species of *Sympetrum*, namely *S. depressiusculum* and *S. frequens*, have been documented in South Korea. However, the distinction between these two species and their identity within South Korean populations has been a longstanding point of contention. To solve this issue, morphology, two mitochondrial genes, and one nuclear region were analyzed for *S. depressiusculum* samples from The Netherlands and Russia and *S. frequens* samples from Japan, as well as samples of *Sympetrum* from South Korea. Further, available public sequence data for the two species were included. Morphology, sequence divergence, and phylogenetic results all consistently suggest that South Korean populations form a single species. Analyses of haplotype network and gene pool distribution patterns in a nuclear region conducted to better explain the current taxonomic implications indicated changes in the dominant gene pool from The Netherlands and Russia to South Korea and Japan. However, such divergence and subdivision could be explained within the context of within-species diversification patterns, suggesting that South Korean populations constitute one species, *S. depressiusculum*, by applying the senior name. Abstract: In South Korea, both *S. depressiusculum*, which is distributed throughout Europe and from Russia to the Korean Peninsula, and *S. frequens*, which is endemic to Japan, are recorded. However, the identity of South Korean populations and the validity of listing the two species have not yet been settled. In this study, we collected 74 individuals of *Sympetrum* species from South Korea (five localities), Russia, The Netherlands, and Japan. These samples were examined for morphology and sequenced for partial COI, 16S rRNA, and a nuclear internal spacer (ITS) region, after which these molecular data were combined with available public data from Russia, Japan, and The Netherlands. Major morphological characters that have been used to distinguish the two species and phylogenetic, network, and structure analyses all consistently suggest that South Korean populations form a single species. Consequently, it could be valid to treat South Korean populations as one species, *S. depressiusculum*, by applying the senior name. Nevertheless, the validity of maintaining each as an independent species in other countries may need additional study considering that our samples were focused more on South Korea and limited for Europe, Russia, and Japan." (Authors)] Address: Kim, I., Dept of Applied Biology, College of Agriculture & Life Sciences, Chonnam National University, Gwangju 61186, Republic of Korea. Email: ikkim81@chonnam.ac.kr

**22327.** Qi, P.; Nel, A.; Xiao, C.; Zheng, D. (2023): Revision of *Sinomesuropetala daohugensis* Boudet, Nel & Huang, 2023 (Odonata: Aeshnoptera: Mesuropetalidae). *Zootaxa* 5375(1): 103-110. (in English) ["The mesuropetalid dragonfly



*Sinomesuropetala daohugensis* Boudet, Nel & Huang, 2023, is here revised based on a new well-preserved dragonfly from the Haifanggou Formation of Inner Mongolia, northeastern China. The new specimen allows us to complete the following characters of this species, showing the close relationship of *Sinomesuropetala* Boudet, Nel & Huang, 2023 with *Mesuropetala* Handlirsch, 1906. The mesuropetalid dragonflies are currently recorded from the Late Jurassic and Lower Cretaceous deposits of east Asia, East Central South Europe, and southern America, indicating the wide distribution and the possible long-distance migration ability of some basal aeshnoid dragonflies during these epochs." (Authors)] Address: Qi, P., School of GeoSciences, Yangtze Univ., Wuhan, 430100, China

**22328.** Qureshi, A.A.; Syeed, S.; Ganaie, A.A.; Javaid, M. (2023): *Ischnura senegalensis* (Rambur, 1842) (Senegal golden dartlet, tropical bluetail), (Odonata: Coenagrionidae), a new record from Kashmir Himalayan region of Indian Himalayas. *Munis Entomology & Zoology* 18(2): 1787-1789. (in English) [Between April 2020 and September 2021, in the Kashmir Himalayan Region of Indian Himalayas, *I. senegalensis* was proofed for 27 localities. Flight season was restricted to June to October.] Address: Qureshi, A.A., Biodiversity, Biosystematics & Climate Change (B2C2) Research Lab, Mantaqi Centre for Science & Society, and Nature Interpretation Centre, Biodiversity Park, Islamic University of Science & Technology, Awantipora, Kashmir, India. Email: draijazphd@gmail.com

**22329.** Raghunandan, K.S.; Anusha V.S.; Prasanna, K.S. (2023): A preliminary checklist on odonates in and around Lingambudhi lake, Mysuru, Karnataka. *Journal of Applied Entomologist* 3(4): 6-11. (in English) ["Odonates are amphibiotic, well-known dominant groups of freshwater and terrestrial insects. A field study was conducted to find out to prepare a checklist of odonates in and around Lingambudhi lake, Mysuru, Karnataka during June to August, 2023. Sampling was done by Direct Encounter Method and Identification of Odonates as per the Standard field guides. Biodiversity indices values were formulated for the observed data. A total 18 Odonate species has been identified, belonging to Anisoptera (n=12) and Zygoptera (n=6) suborders having 7 families. The Libellulidae contribute highest number of Odonate species. It was observed that more anthropogenic activities lead to disturbance of odonates in study area. The study highlights the importance of odonates and provides data which would be useful in future biodiversity conservation." (Authors)] The list includes *Lestes dryas*, a misidentification as can be seen from the specimen documented on plate 1 as fig. L.] Address: Raghunandan, K.S., Guest Faculty, Postgraduate Dept of Applied Zoology, Maharani's Science College for women, Autonomous, JLB Road, Mysuru, Karnataka, India

**22330.** Rahong, P.; Techakijvej, C.; Phalaraksh, C. (2023): Predators as biocontrol agents of mosquito larvae in small and large habitats in Chiang Mai, Thailand. *J. of Vector Ecology* 48(2): 78-88. (in English) ["Controlling mosquito-borne disease is a major global challenge due to the rise of insecticide-resistant mosquitoes. In response, we conducted a study in Chiang Mai Province, Thailand, which is one of the largest and the most popular cities for tourists in Southeast Asia, to explore the potential of local species as biological control agents for mosquito larvae. Mosquito larvae and aquatic predators were sampled from large and small habitats, while relevant physico-chemical parameters were measured. The study identified 560 predators and 1,572 mosquitoes, with most mosquito species belonging to the genus

*Culex*. Additionally, the study identified 16 predator taxa, including four fish taxa and 12 taxa of predatory aquatic insects belonging to four orders: Coleoptera, Hemiptera, Odonata, and Diptera. The study found that several locally occurring predator species, namely *Poecilia*, *Laccophilus*, *Lutzia*, *Toxorhynchites splendens*, *Agrionoptera*, and *Pseudagrion*, shared habitats with mosquitoes, indicating their potential as effective biological control agents for mosquito control. Conductivity, dissolved oxygen, and pH were the important physico-chemical parameters that affect both predators and mosquito larvae. Consequently, promoting native predators and reducing mosquito larvae through habitat management would be a sustainable and ecologically friendly approach in large habitats where it is not possible to remove mosquito oviposition sites. In smaller habitats, releasing local aquatic predators and removing oviposition sites may be a suitable strategy." (Authors)] Address: Rahong, P., Environmental Science Research Center, Faculty of Science, Chiang Mai University, Chiang Mai, 50200, Thailand

**22331.** Rajapaksha, K.A.T.; Hettiarachchi, D.K. (2023): A preliminary assessment of odonate (Insecta: Odonata) diversity and abundance in Mihintale lake and Kaludiya-pokuna in Mihintale, Anuradhapura. *Proceedings of the International Conference on Applied and Pure Sciences (ICAPS 2023-Kelaniya)* Volume 3, Faculty of Science, University of Kelaniya Sri Lanka: 46. (in English) [Verbatim: The odonates of Sri Lanka comprise with 129 known species, including 67 species belongs to 12 families where 56 species (43%) are known to be endemic to the country. These organisms are currently threatened due to increase in human population and activities, climatic change, intensive agricultural practices and pollution and in need of conservation. Having less diversity, richness, abundance and distribution surveys is one of the key obstacles in conservation. There have been less surveys of odonates in dry zone areas. This study intended to prepare an inventory of odonates that inhabit two lotic ecosystems in dry zone. Four sample sites were selected from each lotic habitat. Visual observations of adult odonates were conducted by walking along belt transect of 100 x 3m that are adjacent to the water bodies in all four sample sites in the selected two lotic ecosystems. Observations were taken from 0900 h to 1100 h in the morning and 1500 h to 1600 h in the evening for six months from Kaludiya pokuna and Mihintale lake visiting three times per month to each site. The observed individuals were photographed. A total of 3,343 of individual odonates were recorded. A total of 22 species identified using standard field guides, belong to three families, Coenagrionidae (25.90%), Gomphidae (3.26%) and Libellulidae (70.83%), two vulnerable species *Aciagrion occidentale* and *Ceriagrion cerinorubellum*, two endemic species *Cyclogomphus gynostylus* and *Pseudagrion rubriceps ceylonicum* where one was considered as critically endangered and three nearly threatened species *Orthetrum glaucum*, *Hydrobasileus croceus* and *Rhodothemis rufa* were recorded. The diversity of odonates and abundance was higher in Mihintale lake because Shannon – Weiner diversity index (2.267) and Simpson's diversity index (0.854) and Evenness (0.817) were high for Mihintale lake. The highest number of individuals that observed was *Brachythemis contaminata* in both study sites as a total but in Kaludiya pokuna number of individuals that was observed from this species was higher than Mihintale lake. This study shows odonate diversity is high in both lotic habitats that were studied and in Mihintale lake it is higher than Kaludiya pokuna. This study needs to be further expanded taking micro-habitat parameters, water quality parameters and expanding it over time and area. Further, both lotic and lentic habitats

can be considered with and without/less anthropogenic activities.] Address: Hettiarachchi, D.K., Dept of Biological Sciences, Fac. Applied Sciences, Rajarata Univ. of Sri Lanka, Mihintale, Sri Lanka. Email: dilanikh@as.rjt.ac.lk

**22332.** Raut, A.M.; Banu, A.N.; Akram, W.; Nain, R.S.; Singh, K.; Wahengabam, J.; Shankar, C.; Shah, M.A. (2023): Impact of pesticides on diversity and abundance of predatory arthropods in rice ecosystem. *Applied and Environmental Soil Science* Volume 2023, Article ID 8891070: 10 pp. (in English) ["Rice (*Oryza sativa*) is one of the most important cereal crops with a diverse set of pests and natural enemies. Rice fields often support a high diversity of arthropods which contribute significantly to productivity. This diversity is frequently threatened due to indiscriminate applications of pesticides. Our aim was to emphasize on the predator diversity in agrochemical exposed rice field as well as on the impact of surrounding vegetation on beneficial insect diversity. Natural enemies' data were recorded from randomly selected 10 quadrates by visual observation from each treatment. A total of 5,590 individuals of predators were observed during the study period which included 27 species belonging to 16 families from five orders of arthropods during the kharif season of rice. Statistically, there were no significant differences between the population of general natural enemies such as Odonata, Coleoptera, Hymenoptera, and Araneae in plots with insecticide and control during the different growth stages of rice cultivation. Diversity indices were almost similar in fields where pesticide was sprayed and not sprayed. Our study concluded that natural enemies are conserved by ensuring crop heterogeneity, growing insect-friendly plants (with high levels of nectar and pollen) as border crops, and judicious application of granule insecticide like cartap hydrochloride in a rice agro-ecosystem." (Authors)] Address: Raut, A.M., Dept of Entomology, School of Agriculture, Lovely Professional University, Jalandhar, Punjab, India. Email: ankushento@gmail.com

**22333.** Ruppell, G.; Hilfert-Ruppell, D. (2023): Double function of flight in *Calopteryx splendens* (Odonata: Calopterygidae) males. *International Journal of Odonatology* 26: 172-178. (in English) ["Different flight manoeuvres of males of *Calopteryx splendens* were analysed by means of slow-motion filming. The wingbeat frequencies of males flying in tandem were higher than those of single flying males. A male exhibited the highest frequencies when carrying a Blue Featherleg [*Platynemis pennipes*] tandem over a distance of 20–25 cm. The widest range of variability of values of wingbeat frequencies were recorded in threatening flight, probably due to the simultaneous communicative function of the wings during that behaviour. The upstroke/downstroke ratio of the wings allows to draw conclusions on their aerodynamic effect. It was low in pursuing flight, which is when more thrust is needed, and it was high in flight with an additional load (a Featherleg tandem) when a lot of lift was necessary. Both sexes exhibited wing standstills during forward flight. In males, the variability of the duration of wing standstills was widest, probably due to the communicative function of their blue wings. Because males engage in threatening displays their flight was very irregular and unsteady. In contrast, females were much more regular in their flight, which may explain why they win most pursuit races with males." (Authors)] Address: Ruppell, G., An der Wasserfurche 32, Cremlingen, Germany. Email: georg.rueppell@protonmail.com

**22334.** Sadasivan, K.; Nair, V.P.; Pulikkal, S.; Janaki, S.; Samuel, A. (2023): Taxonomic notes on *Davidioides martini* Fraser, 1924 (Odonata: Gomphidae) and description of its

female from Western Ghats, Peninsular India. *International Journal of Odonatology* 26: 114-123. (in English) ["A note on the rare dragonfly *Davidioides martini* Fraser, 1924, is provided with an update of its distribution range, status, ecology, and the description of its so far unknown female. This species is endemic to the Western Ghats of Peninsular India and seems to be a rare one as is indicated by the paucity of published records, some of which are shown to be doubtful and in need of corroboration." (Authors)] Address: Sadasivan, K., Travancore Nature History Society, Mathrubhumi Road, Vanchiyoor P.O., Thiruvananthapuram, Kerala, India, PIN 695035. Email: kaleshs2002in@gmail.com

**22335.** Salsabila, N.; Pramudya Kurniawan, A. (2023): Diversity of Anisoptera in Cisuru village, Cilacap Regency, Central Java. *Jurnal Biologi Tropis* 23(4B): 185-192. (in Indonesian, with English summary) ["This study aims to study the abundance and diversity of Anisoptera species, as well as environmental parameters in Cisuru Village, Cilacap, Central Java. Data retrieval using the point count method. The results of the study found 19 species of Anisoptera from 3 families (Aeshnidae, Gomphidae, Libellulidae). The most common species is *Orthetrum sabina* (Settlements: 153 individuals/0.5 ha; Rice fields: 225 individuals/0.5 ha; and Rivers: 126 individuals/0.5 ha). Anisoptera diversity index ( $H'$ ) values in all three habitats were classified as medium category (Settlement: 2.06; Rice fields: 1.29; and River: 1.63). Anisoptera is mostly found in light intensity conditions of  $26,309 \pm 17,117$  lux; air humidity  $37.85\% \pm 6.2\%$ ; and wind speeds of  $0.75 \pm 0.34$  m/s." *Gynacantha subinterrupta*, *Ictinogomphus decoratus*, *Agrioptera insignis*, *Brachydiplax chalybea*, *Brachythemis contaminata*, *Crocothemis servilia*, *Hydrobasileus croseus*, *Lathrecista asiatica*, *Neurothemis ramburii*, *Neurothemis terminata*, *Orthetrum sabina*, *Pantala flavescens*, *Potamarcha congener*, *Rhodothemis rufa*, *Rhyothemis phyllis*, *Tetrathemis irregularis*, *Tholymis tillarga*, *Zyxomma obtusum*, *Zyxomma petiolatum*] Address: Salsabila, Novi, Program Studi Biologi, Fakultas Sains dan Teknologi, Universitas Islam Negeri Sunan Kalijaga, Yogyakarta, Indonesia. Email: salsabilanovi07@gmail.com

**22336.** Samanta, T.; Giri, A.; Chatterjee, L.; Chatterjee, L.; Roy, A.B. (2023): Odonata diversity in the Egra and its adjoining blocks of Purba Medinipur District, West Bengal, India. *Journal of Threatened Taxa* 15(8): 23778-23785. (in English) ["The research was carried out over a three-year period, spanning from March 2020 to March 2023, with the aim of examining the status and diversity of Odonata fauna across a range of natural and anthropogenic habitats situated in Egra, Purba Medinipur District, located in the state of West Bengal. In total, 42 odonata species from 31 genera and seven families were identified throughout the study period from the study region. There were 28 (67%) species in Anisoptera, and 14 (33%) species in Zygoptera: Aeshnidae (10%), Gomphidae (2%), Libellulidae (53%), and Macromiidae (2%), Coenagrionidae (24%), Lestidae (2%), and Platynemididae (7%). According to the relative estimate of abundance, 38% of the species were classified as not rare (NR), 31% very common (VC), 14% common (C), 14% rare (R), and 3% as very rare (R). In addition, the IUCN red data list indicates that 41 species have been classified as Least Concern (LC), while a solitary species has been categorised as Data Deficient (DD). The identification of Odonata is a critical factor in determining the ecological well-being of an ecosystem.] Address: Roy, A.B., Nature Mates-Nature Club, 6/7 Bijoygarh, Kolkata, West Bengal 700032, India. Email: pakhibitan2019@gmail.com

**22337.** Sánchez-Campaña, C.; Múrria, C.; Hermoso, V.; Sánchez-Fernández, D.; Tierno de Figueroa, J.M.; González, M.; Millán, A.; Moubayed, J.; Ivkovic, M.; Murányi, D.; Graf, W.; Derka, T.; Mey, W.; Sipahiler, F.; Paøil, P.; Polášková, V.; Bonada, N. (2023): Anticipating where are unknown aquatic insects in Europe to improve biodiversity conservation. *Diversity and Distributions* 29: 1021-1034. (in English) ["Aim: Understanding biodiversity patterns is crucial for prioritizing future conservation efforts and reducing the current rates of biodiversity loss. However, a large proportion of species remain undescribed (i.e. unknown biodiversity), hindering our ability to conduct this task. This phenomenon, known as the 'Linnean shortfall', is especially relevant in highly diverse, yet endangered, taxonomic groups, such as insects. Here we explore the distributions of recently described freshwater insect species in Europe to (1) infer the potential location of unknown biodiversity hotspots and (2) determine the variables that can anticipate the distribution of unknown biodiversity. Location: The European continent, including western Russia, Cyprus and Turkey. Methods: Georeferenced information of all sites where new aquatic insect species were described across Europe from 2000 to 2020 was compiled. In order to understand the observed spatial patterns in richness of recently described species, spatial units were defined (level 6 of HydroBASINS) and associated with a combination of a set of socioeconomic, environmental and sampling effort descriptors. A zero-inflated Poisson regression approach was used to model the richness of newly described species within each spatial unit. Results: Nine hundred and sixty-six recently described species were found: 398 Diptera, 362 Trichoptera, 105 Coleoptera, 66 Plecoptera, 28 Ephemeroptera, 3 Neuroptera, 2 Lepidoptera and 2 Odonata. The Mediterranean Basin was the region with the highest number of recently described species (74%). The richness of recently described species per spatial unit across Europe was highest at mid-elevation areas (between 400 and 1000 m), latitudes between 40 and 50° and in areas with yearly average precipitation levels of 500–1000 mm, a medium intensity of sampling effort and low population density. The percentage of protected areas in each study unit was not significantly related to the richness of recently described species. In fact, 70% of the species were found outside protected areas. Main conclusions: The results highlight the urgent need to concentrate conservation efforts in freshwater ecosystems located at mid-altitude areas and out of protected areas across the Mediterranean Basin. The highest number of newly described species in those areas indicates that further monitoring efforts are required to ensure the aquatic biodiversity is adequately known and managed within a context of growing human impacts in freshwater ecosystems." (Authors)] Address: Sánchez-Campaña, Carlota, FEHM-Lab (Freshwater Ecology, Hydrology & Management), Dept de Biologia Evolutiva, Ecologia i Ciències Ambientals, Facultat de Biologia, Univ. Barcelona, Diagonal 643, Barcelona 08028, Spain. Email: sanchezcc@ub.edu

**22338.** Sentis, A.; Kaunisto, K.; Chari, L.; Morrill, A.; Popova, O.; Pomeranz, J.; Boukal, D.; Tüzün, N.; Stoks, R. (2023): Odonata trophic ecology. In: *Dragonflies and Damselflies*. Second Edition. Edited by A. Córdoba-Aguilar, C.D. Beatty and J.T. Bried, Oxford University Press. 219-232. (in English) ["Trophic interactions are at the core of several key ecological processes and theories as they determine the flow of material and energy within and across communities and habitats. Odonates provide a rich and diverse taxonomic group with several features (e.g. trophic position, hunting behavior, olfaction) that make them a very interesting biological model for the study of trophic interactions in aquatic

and terrestrial habitats. Moreover, odonates undergo incomplete metamorphosis with aquatic larvae and terrestrial adults, which provides opportunities to investigate ontogenetic diet variation and trophic links between aquatic and terrestrial systems. They are also important predators regulating prey populations and mediating community processes such as trophic cascades. Finally, recent studies on odonates have pioneered whether local adaptation and phenotypic plasticity can counterbalance the negative impacts of global change on resource acquisition and fitness. This chapter reviews recent studies investigating the trophic features and role of odonates in aquatic and terrestrial ecosystems as well as their importance for investigating the impact of global change on trophic ecology, local adaptation, and community processes. Many of the insights highlighted in this chapter go beyond odonates and have helped to advance key concepts in trophic ecology." (Authors)] Address: Stoks, R., Laboratorium voor Aquatische Ecologie, K.U.Leuven, De Beriotstraat 32, B-3000 Leuven, Belgium. E-mail: robby.stoks@bio.kuleuven.ac.be

**22339.** Silva, B.; Souza, F.N.; Santos, F.B.; Cardoso da Silva, D.; Sousa, D.L.; Silva, L.R.; Santos Guimarães, I.D. (2023): Odonatas predadores de larvas do mosquito *Aedes aegypti*, no sudoeste da Bahia. In: *XXI Encontro de Zoologia do Nordeste*. Universidade Federal de Pernambuco, Recife-PE, 2023. Disponível em: <<https://www.doity.com.br/anais/resumosezn2023/trabalho/310953>>. Acesso em: 04/11/2023 às 13:49: 4 pp. (in Portuguese) ["Studies to control the *Aedes aegypti* vector are important to reduce the incidence of Dengue, Zika and Chikungunya, responsible for thousands of deaths in Brazil. This study investigated the potential for biological control of the *Ae. mosquito. aegypti* by nymphs of the order Odonata, aiming to combat these diseases. The third and fourth instar larvae of *Ae. aegypti* were obtained from the Natural Insecticide Research Laboratory (LAPIN) of the State University of Southwest Bahia (UESB), Itapetinga Campus, and bred from eggs of the Rockefeller strain, provided by the Toxicology Research Laboratory of the Federal University of Pernambuco (UFPE). The Odonata nymphs were collected in a UESB reservoir on the Vitória da Conquista campus, using an entomological net and placed in containers containing 2 liters of treated and dechlorinated water, where they remained for 24 hours without food before the experiments. These were conducted in the laboratory, using nymphs from the Aeshnidae, Libellulidae and Coenagrionidae families. In the first experiment, nymphs from the Aeshnidae family preyed on 56 *Ae. aegypti* over 9 hours. In the second, nymphs from the Libellulidae family preyed on all 150 *Ae. larvae. aegypti* in 12 hours, while nymphs from the Coenagrionidae family preyed 25. In the third experiment, nymphs from the Libellulidae family preyed 68 *Ae. aegypti*, highlighting the influence of the amount of water on predation. Results support the effectiveness of Odonata nymphs to control *Ae. aegypti*, especially the Aeshnidae and Libellulidae families, offering an economical and sustainable approach to reducing mosquito-borne diseases. However, it is essential to consider ecological factors for the success of biological control. This study highlights the importance of innovations in the fight against *Ae. aegypti* to protect public health and prevent these diseases." (Authors/Google translate)] Address: <https://doity.com.br/media/doity/submissoes/artigo-c34304-2fcfb23b67e0c12aab10deac321739e659-arquivo.pdf>

**22340.** Staentzel, C.; Schlumberger, O.; Barillier, A.; Valentini, A.; Boyer, F.; Beisel, J.N. (2023): Trophic impact of *Neogobius melanostomus* in a restored site on the Old Rhine

River (France). Aquatic Sciences volume 85, Article number: 46: 15 pp. (in English) ["Habitat changes induced by restoration can favour invasive species, thereby thwarting the main biological objectives of restoration and possibly limiting a project's success. Here, we focus on a study site located along the Old Rhine River that was being restored in 2013 by controlled bank erosion and implementation of artificial transverse groynes. In the Upper Rhine (Franco-German border), the first reports of the bighead goby (*Ponticola kessleri*, Günther 1861) and round goby (*Neogobius melanostomus*, Pallas 1814) were 2010 and 2011, respectively. As the round goby largely dominates the overall goby assemblage, we asked about the consequences of its presence on the restored site. Electrofishing was carried out from 2013 to 2021 in parallel to a benthic macroinvertebrate monitoring conducted from 2014 to 2019. In 2015/2016, we looked at goby's predation by studying their stomach contents through macroscopic visualisation and eDNA metabarcoding analysis. For results, gobies were found in large densities dominated by *N. melanostomus*, increasing over time to the detriment of local fish species. No predation was observed on native fish species but *N. melanostomus* cannibalism reached 9%. Round goby's predation was opportunistic, based on the most abundant benthic macroinvertebrates: (i) low trophic level taxa, and (ii) invasive amphipod crustaceans. If round gobies fed on some insects, they did not prevent the colonization of new taxa on the habitats that appeared after restoration. We stress that the high abundance of *N. melanostomus* has led to profound changes in the food web structure and species interactions in the Old Rhine River, but it is unlikely that it masked the restoration consequences on macroinvertebrates 6 years after the restoration. These results support (i) the importance in carrying out long-term monitoring to confirm that a stronger trophic impact is not ultimately delayed, and (ii) the diversification of habitats as an option for limiting the invasion by gobies." (Authors) Odonate taxa are treated at family level."] Address: Staentzel, Cybill, Université de Strasbourg, UMR 7362 CNRS LIVE, 3, rue de l'Argonne, F-67000 Strasbourg, France. E-mail: cybill.staentzel@live-cnrs.unistra.fr

**22341.** Stahl, L. (2023): How does temperature and resource level affect competition in two species of dragonfly larvae? MSc. thesis, Uppsala University, Disciplinary Domain of Science and Technology, Biology, Biology Education Centre.: 23 pp. (in English) ["In the wakes of climate change, the phenology of many species is shifting. This can have many implications for inter-specific competition. In this thesis I studied how temperature affected the larval competition between two species of Odonata, dragonfly: *Lestes sponsa* and *Sympetrum vulgatum*. In addition, I studied how this competition was affected by food resource availability. To do this I performed a laboratory experiment on larvae at two different temperatures (21°C and 24°C) and two different resource densities (low and high). I estimated egg hatching rate, growth rate and survival. Larval competition (growth rate and survival) was studied in sympatry in small containers mimicking a natural environment at a density of 5 individuals of each species during a 10-week period. The results showed that eggs of both species hatched at a slightly higher rate at 24°C, and that *S. vulgatum* started hatching about one day in advance of *L. sponsa*. In general, growth rate was higher: (1) at 24°C compared to 21°C, (2) at high compared to low resource densities, and (3) in *L. sponsa* compared to *S. vulgatum*. Interestingly, at 24°C the higher growth rate of *L. sponsa* was accentuated at the high resource level compared to the low resource level. Hence resource levels affected competition differently depending on

temperature. There was a negative relationship between growth rate and survival suggesting that the higher growth rate of larva was to some degree driven by interspecific predation and/or cannibalism. The results from this thesis suggest that resource levels interact with temperature and cause difference in strength of competition between species. Such effects should be considered in theory predicting changes in species distribution in the light of climate change." (Author)] Address: Stahl, Lisa, Dept of Ecology and Genetics, Animal Ecology, Evolutionary Biology Centre, Uppsala University, Uppsala, Sweden. Email: frank.johansson@ebc.uu.se

**22342.** Swaegers, J.; De Cupere, S.; Gaens, N.; Lancaster, L.T.; Carbonell, J.A.; Sánchez Guillén, R.A.; Stoks, R. (2023): Plasticity and associated epigenetic mechanisms play a role in thermal evolution during range expansion. *Evolution Letters*, qrac007pp. (in English) ["Due to global change, many species are shifting their distribution and are thereby confronted with novel thermal conditions at the moving range edges. Especially during the initial phases of exposure to a new environment, it has been hypothesized that plasticity and associated epigenetic mechanisms enable species to cope with environmental change. We tested this idea by capitalizing on the well-documented southward range expansion of the damselfly *Ischnura elegans* from France into Spain where the species invaded warmer regions in the 1950s in eastern Spain (old edge region) and in the 2010s in central Spain (new edge region). Using a common garden experiment at rearing temperatures matching the ancestral and invaded thermal regimes, we tested for evolutionary changes in (thermal plasticity in) larval life history and heat tolerance in these expansion zones. Through the use of de. and hypermethylating agents, we tested whether epigenetic mechanisms play a role in enabling heat tolerance during expansion. We used the phenotype of the native sister species in Spain, *I. graellsii*, as proxy for the locally adapted phenotype. New edge populations converged toward the phenotype of the native species through plastic thermal responses in life history and heat tolerance while old edge populations (partly) constitutively evolved a faster life history and higher heat tolerance than the core populations, thereby matching the native species. Only the heat tolerance of new edge populations increased significantly when exposed to the hypermethylating agent. This suggests that the DNA methylation machinery is more amenable to perturbation at the new edge and shows it is able to play a role in achieving a higher heat tolerance. Our results show that both (evolved) plasticity as well as associated epigenetic mechanisms are initially important when facing new thermal regimes but that their importance diminishes with time." (Authors)] Address: Swaegers, J., Lab. of Evolutionary Stress Ecology & Ecotoxicology, University of Leuven, Charles Deberiotstraat 32, Leuven B-3000 Belgium. Email: janne.swaegers@kuleuven.be

**22343.** Zahn, A.; Burbach, K. (2023): Schnelle Reaktion der Libellenfauna auf Hitzesommer. *ANLiegen Natur* 452: 21-24. (in German) ["In 2017 and 2020, the dragonfly fauna was recorded in the Isental in southeastern Bavaria. The years between the two surveys were warmer than average and dry. It turned out that the reaction of the dragonfly fauna to high temperatures and low rainfall can be very clear in just a few years. Many populations have declined, particularly the occurrence of swamp and fen species. Heat-loving species have increased." (Authors)] Address: Burbach, K., Kirchenweg 4, D-85354 Freising, Germany. E-mail: k-burbach@web.de



# Odonatological Abstract Service

published by the INTERNATIONAL DRAGONFLY FUND (IDF)

## Editor:

Martin Schorr, Schulstr. 7B, D-54314 Zerf, Germany. Tel. ++49 (0)6587 1025; E-mail: oestlap@online.de

Published in Zerf, Germany

ISSN 1438-0269

### 2000

**22344.** Eder, H. (2000): Zerfurchte Flügel und zähe Luft. *Biologie in unserer Zeit* 50(1): 36-43. (in German, with English summary) ["Corrugated wings and viscous air Airborne microorganisms were bound to evolve morphologic characteristics that are optimized with respect to their scale regime. Vortices – stationary or dynamically generated – herein are playing a dominant role. The generation of vortices in microorganisms is assisted by micro-morphologic structures as veins, grooves and pores." (Author) The paper includes references to Odonata.] Address: Eder, H., Am Stadtpark 43, 81243 München, Germany. Email: eders-h@arcor.de

### 2003

**22345.** Klym, M.; Quinn, M. (2003): Introduction to dragonfly and damselfly watching. *Texas Parks 6 Wildlife*. 4200 Smith School Road, Austin, Texas 78744: 27 pp. (in English) [[https://tpwd.texas.gov/publications/pwdpubs/media/pwd\\_bk\\_w7-000\\_0892.pdf](https://tpwd.texas.gov/publications/pwdpubs/media/pwd_bk_w7-000_0892.pdf)] Address: Texas Parks 6 Wildlife. 4200 Smith School Road, Austin, Texas 78744, USA

### 2006

**22346.** Jensen, E.V. (2006): Cumulative effects monitoring of Okanagan streams using benthic invertebrates, 1999 to 2004. Environmental Protection Division, Ministry of Environment, Penticton, B.C.: 60 pp. (in English) ["Biological monitoring is essential to describing and protecting biological resources. Chemical measurements, or habitat assessments are useful to aquatic resource management, but the primary sentinels and objects requiring protection are organisms living in the stream. The merits of using benthic invertebrate measures as cumulative effects indicators are many. Foremost is that biological condition of the streams is being directly assessed. Benthic invertebrates are useful integrators of various stressors and are acknowledged as useful cumulative effects indicators. Secondly, the ranking of stream condition using a benthic invertebrate index or metric, is a defensible objective statement describing stream health, which may be more readily understood by resource managers and the public, than chemical concentrations or habitat statements. Lastly, this process of regional correlation or calibration of benthic health to watershed condition factors can provide opportunities to collaborate across disciplines and integrate and strengthen cumulative effects assessments

of aquatic ecosystem condition in the Okanagan. In this study, benthic invertebrates were collected from 23 low elevation Okanagan stream sites between 1999 and 2004. Replicate sampling used a Surber net and data analysis followed the Benthic Index of Biological Integrity concept developed by Karr (Karr and Chu, 1999). Streams representing a gradient of conditions from low stress to high stress due to human alteration or use of the watershed were examined. Potential stress levels were established through GIS analysis at the watershed level and at the sampling reach for in-stream and near stream habitat condition. Low stress or reference sites and watersheds had low urban, agriculture, timber harvest factors, as well as low instream and near stream habitat alteration. High stress or high impact sites were chosen in watersheds and locations with high urban and agriculture landuse, and demonstrated degraded near and instream habitat. Categorical ranking by upper and lower relative stressor levels allowed calibration of a benthic index of biological integrity (B-IBI) for Okanagan streams. Five benthic invertebrate measures responded predictably over space and time to cumulative stress in valley bottom stream locations. These metric included total taxa, number of plecoptera taxa, number of ephemeroptera taxa, number of intolerant taxa, and number of clinger taxa. These metrics were found to respond predictably to cumulative watershed disturbance and clearly distinguished urban and highly altered sites from low impact sites. Secondary metrics, which responded predictably but did not clearly distinguish high and low stress categories were: number of trichoptera, Hilsenhoff biotic index, percent tolerant, percent predators and percent dominance. Primary metrics were summed into a multimetric index (B-IBI) and partitioned into excellent, good, fair, poor and very poor stream condition categories. The primary and secondary metrics correspond well to metrics used in B-IBI systems employed elsewhere in the Pacific Northwest. B-IBI scores were highest for stream sites on Equisis, Peachland, Shorts, Whiteman, Ellis upstream of Penticton, Chute, McDougall ups of Hwy 97, Coldstream and Lambly Creek (see Table 6 for site details). These sites were considered good to excellent, having a full range of biological diversity and presence of species sensitive to variety of stressors such as thermal, flow, sediment and toxic contaminants. B-IBI scores were lowest for Kelowna, Ellis near Okanagan River, Vernon at 25th Avenue in Vernon, Trout Creek near Hwy 97, Shuttleworth in Ok Falls, Eneas and Prairie Creeks in Summerland and BX Creek at 30th Avenue in Vernon. These sites were judged to be in poor or very poor condition, having almost half the species diversity as the reference group and very few intolerant taxa. A large number of

stream sites were ranked as fair (see Table 6) and have some loss of biodiversity. Water and sediment chemistry samples were collected during the study to complement the biological sampling. Water quality data indicated that in urban and agriculture settings, bacteriological measures frequently exceeded drinking and recreational water quality guidelines. Aquatic life protection guidelines were rarely challenged. Nitrate nitrogen was often orders of magnitude higher in streams flowing through urban and agriculture settings. Reduced sediment quality was more common in urban streams. Polycyclic aromatic hydrocarbons (PAHs) were often elevated in urban stream sediments of BX, Kelowna, Ellis and Eneas creeks. PAHs in BX Creek at 30th Avenue were consistently above Canadian Council of Ministers of the Environment aquatic life interim sediment guidelines but below probable effects levels. Lead and zinc were higher in BX and Kelowna creek sediments than other streams, and average values were between the CCME interim and probable effect levels. Pesticide analysis of stream sediments in 2003 found DDE (a breakdown product of DDT) above CCME aquatic life probable effects levels in Kelowna and Eneas creeks. Endosulphan was also detected in Eneas Creek. PCBs were not detected in urban sediments above detection limits. Further sampling and analysis would be required to describe variation in water and sediment quality for these study sites. Re-evaluation of the same habitat, water and sediment chemistry, and benthic invertebrate data set was carried out by Perrin (2006) using the Environment Canada's Benthic Assessment of Sediment (BEAST) software in CABIN (Canadian Aquatic Biomonitoring Network). Okanagan streams were classified by BEAST using the Fraser Basin reference groups as either unstressed, potentially stressed, stressed or severely stressed relative to Fraser Basin reference conditions, and then compared to B-IBI scores. BEAST was conservative in showing a better condition for 13% of the sites but a worse condition for 55% of the sites than was determined using the B-IBI process. Complete agreement of BEAST and B-IBI scores occurred for 29% of the sites, and 81% of the sites were within one stress category. No sites were more than 2 stress categories apart. The Okanagan CABIN data set and sediment quality data was further evaluated by Perrin (2006) using cluster analysis and multidimensional scaling. These analyses confirmed the BIBI classification of sites into the upper and lower stressor groups which were used in calibrating the Okanagan benthic index of biological integrity. Discriminant function analysis identified sediment PAH, nickel, manganese and water alkalinity as best discriminants of the reference group and two high stress groups. Polycyclic aromatic hydrocarbons (PAHs) in sediments were identified as the strongest discriminator of benthic community in high impact stations. Cause and effect can not be presumed as other stressors such as impervious surface area or measures of stream flow variation are often associated with deteriorating biological condition. Given the specificity of the CABIN model to the Fraser basin and traveling kick net collection method, the overall agreement between the two methods of analysis is encouraging. The comparability of the B-IBI and CABIN outputs suggests that either the B-IBI or BEAST can be used with confidence on Okanagan low elevation streams. Both methods will detect impairment when applied in riffle habitats. Perrin suggests Surber collected data can be used for BEAST assessment but notes assessment error potentially increases. Data compiled for a BIBI analysis may also be used for more in-depth analysis, including multivariate analysis of habitat variables and anthropogenic stressors. Methods of benthic invertebrate collection and data analysis will continue to evolve. Although metric scoring criteria and metric selection varies somewhat

between areas in the Pacific Northwest (Skeena, Fraser Valley, Puget Sound and Washington Cascade areas) the overall commonality in chosen metrics, enables comparable statements of aquatic ecosystem health among these study areas and could enable broad environmental reporting. Comparability of different methods applied in overlapping or adjacent areas through examination of performance characteristics (e.g., precision, sensitivity) known as a performance-based method system. The demonstrated common response of the Okanagan B-IBI with the Fraser Basin models and CABIN protocols may further allow harmonized reporting of environmental conditions across geographic and methodological boundaries. To this end, focused comparison of kick and surber net collections, and increased sampling of reference sites to develop an Okanagan model within CABIN is recommended. Defining benthic community response to stressors is potentially more powerful when spatial scales are reduced, and linking this work to probabilistic surveys would enable broader estimation of regional stream conditions. While harmonization of collection methods and analysis tools between jurisdictions and across borders is a worthy goal it is equally important to apply available information in a timely manner. Given that the B-IBI method has been calibrated for the Okanagan, it can be used to communicate aquatic ecological health and cumulative effects. Further effort must be made on a provincial scale to translate these and other indicator measurements into socially valued descriptors of the environment. Urban streams in the Okanagan are clearly degraded relative to Okanagan B-IBI reference sites, as well as Fraser Basin reference conditions. Reference condition assessments whether based on B-IBI or RCA may not necessarily require high specificity to be used to differentiate highly stressed sites from reference conditions, and provide better aquatic ecosystem condition definition than chemical measures. This information can be particularly useful to watershed and stormwater management efforts in the Okanagan Basin. As resource, site specificity or consequences of decisions increase, the burden of proof will necessarily rise and more stressor based assessments will be required." (Author)] Address: <https://www.ford.gov.bc.ca/hfd/library/documents/bib97302.pdf>

## 2007

**22347.** Ahrenhövel, C. (2007): Die Schutzgebiete der Stadt Weimar: Teil I: Die geschützten Landschaftsbestandteile „Tobritzteich bei Possendorf“, „Seeteich bei Legefild“ und „Erlenwiese“. Thüringer Faunistische Abhandlungen 12: 5-27. (in German, with English summary) [The natural reserves of the town of Weimar (Thuringia) Part I: The protected landscape components "Tobritzteich bei Possendorf", "Seeteich bei Legefild" and "Erlenwiese": The present paper is the start of a series about natural reserves in the urban area of Weimar. This first contribution introduces the protected landscape components "Tobritzteich bei Possendorf", "Seeteich bei Legefild" and "Erlenwiese", their significance as geotopes and the results of the survey of floristic and faunistic species. A total of 158 species of higher plants were proven to exist in the three reserves, among them the existence of the rare and endangered species *Trollius europaeus* and *Carex pseudocyperus*. The fauna of these reserves was investigated especially of the classes Mammalia, Aves and Amphibia among vertebrates; and mollusca, Odonata and Orthoptera among invertebrates. A total of 9 species of mammals, 85 of birds, 5 (+ 2 missing) of amphibians, 29 of molluscs, 20 of dragonflies and 7 of grasshoppers were recorded. The surveyed area is mainly significant as a breeding ground, feeding habitat and resting place for birds, among them 28 in

Thuringia endangered species. It is part of the registered special protected area no. 32 "Ilmtal zwischen Bad Berka und Weimar mit Buchfarter Wald". The small bodies of water have a particular importance for amphibians and dragonflies. In the 1970s and 1980s the tree frog (*Hyla arborea*) and natterjack toad (*Bufo calamita*) still occurred but have become extinct in the present. Of the occurring species of dragonflies, four have to be highlighted since they are considered endangered according to the Red List of Thuringia: *Lestes barbarus*, *L. dryas*, *Sympecma fused* and *Sympetrum flaveolum*. The contribution is supplemented by recommendations for the care and development of the three reserves." (Author)] Address: Arenhövel, C., Stadtverwaltung Weimar: Abt. Umwelt - Untere Naturschutzbehörde, Schwanseestr 17, 99423 Weimar, Germany

**22348.** Dethlefs, A. (2007): Untersuchungen zur Räuber-Beute-Interaktion zwischen Libellenlarven (Odonata: Anisoptera) und jungen Edelkrebse (Astacus astacus). Diplomarbeit. Christian-Albrechts Universität Kiel: 123 pp. + Anhang. (in German) ["In summary, it can be stated that the predation of dragonfly larvae on young crabs is limited to the Aeshnidae. In the case of *Anax imperator*, it was shown that they can eat almost all crabs on offer in a short time, but that they do not specialize in them and therefore also accept alternative food. This, as well as hiding places for the crabs, significantly reduces the mortality of the crabs. Once they reach a certain body length, the crabs are predators of the dragonfly larvae. There are a lot of dragonfly larvae in the crayfish breeding ponds. However, it must be noted that some of these larvae (Libellulidae) are not harmful. To show how relevant this is, the data from Figure 36 (p. 68) on the relative occurrence of anisopteran species was repeated differently colored in Figure 40: All species whose larvae have a Libellula-type capture mask are colored blue. These species, which are harmless for crayfish breeding, clearly dominate the dragonfly fauna. The few individuals of the red species are those with the Aeshna-type capture mask. They occur in small numbers. It is important to note that around 250 *Anax imperator* larvae were removed from the ponds in crayfish breeding before the first line taxation. These 250 larvae could not hatch there and therefore cannot be seen in Figure 40. Normally, about 90% of *Anax imperator* larvae survive hatching (Corbet, 1957). This means that approximately 225 adults of this species would dominate the ponds if the larvae had not been removed. The larvae of the species *A. imperator* occur in exceptionally (personal communication from Dr. Dreyer) large numbers. Based on the feeding tests carried out, this species is potentially dangerous to the young crabs. However, it has also been shown that if the larvae are offered alternative food, they will also eat it. So there is no specialization in crayfish. It is difficult to say whether *A. imperator* actually has a major influence on the crayfish population, as only counts before the onset of crayfish and those from the fall are available. According to these counts, the loss is around 50% (personal communication from the breeder). How great the natural loss of crabs is in this breeding is not known." (Author/Google translate)] Address: [https://docplayer.org/72707332-Untersuchungen-zur-raeuber-beute-interaktion-zwischen-libellenlarven-odonata-anisoptera-und-jungen-edelkrebse-astacus-astacus-diplomarbeit.html#download\\_tab\\_content](https://docplayer.org/72707332-Untersuchungen-zur-raeuber-beute-interaktion-zwischen-libellenlarven-odonata-anisoptera-und-jungen-edelkrebse-astacus-astacus-diplomarbeit.html#download_tab_content)

**22349.** Ferreira, S.; Grosso-Silva, J.M.; Alves, P.C. (2007): Avaliação do Estado Actual do Conhecimento sobre a Entomofauna do Parque Natural do Douro Internacional. Relatório final. Outubro 2007. ICETA – Universidade do Porto: 91 pp. (in Spanish) [Records of 25 odonate species are

documented in an annex.] Address: <https://www.icnf.pt/api/file/doc/b84cfe7d557a36cc>

**22350.** Schrack, M.; Stolzenburg, U. (2007): Die Libellenfauna im Töpfergrund Radeburg in der Radeburger Heide. Veröffentlichungen des Museums der Westlausitz Kamenz, Sonderheft: 167-180. (in German) ["The focus of this work is the Töpfergrund near Radeburg (Sachsen, Germany) on the SW edge of the "Königsbrück-Ruhlander Heiden" natural area. Together with the neighboring NSG "Moorwald am Pechfluss near Medingen" and "Waldmoore bei Großdittmannsdorf" in the FFH area "Moorwaldgebiet Großdittmannsdorf", it has valuable habitats for numerous species of dragonflies in the moorland and rivers. With 41 species of dragonflies identified, 37 of them in Töpfergrund Radeburg, this forest area rich in water and moorland is of supra-regional importance in dragonfly science." (Author/Google translate)] Address: Schrack, M., Hauptstr. 48a, 01471 Radeburg OT Großdittmannsdorf, Germany

## 2009

**22351.** Ansori, I. (2009): Kelimpahan dan dinamika populasi Odonata berdasarkan hubungannya dengan fenologi padi. Di beberapa Persawahan sekitar Bandung Jawa Barat [Abundance and dynamics of Odonata populations based on their relationship with rice phenology in several rice fields around Bandung, West Java]. Jurnal Exacta VII(2): 69-75. (in Indonesian) ["Odonata diversity study was performed at 4 locations in the rice fields Bandung, Antapani, Cigadung, and Dago Dago Experts Corner. ... Sampling was conducted in line with the development of rice. Odonata adults were identified consisting of 2 families (Libellulidae & Aeshnidae) and 4 species, namely *Orthetrum sabina*, *Crocothemis servilia*, *Neurothemis terminata* and *Anaciaeschna jaspidea*. The results showed that *C. servilia* and *O. sabina* are the dominant species in the four study sites. In the early rice growth (vegetative phase up phase bunting ~ 22-27 days), showed the greatest number of individuals compared to another phase, and Odonata population decline with age older rice. result Odonata diversity index analysis for adults at four sites showed that rice Dago Corner has the highest diversity index. evenness Index highest adult Odonata obtained in rice fields and Dago Antapani expert." (Author/Google translator)] Address: Ansori, I., Program Studi Pendidikan Biologi, Jurusan PMIPA FKIP UNIB

**22352.** Bönsel, A. (2009): Koordination, Datenaufbereitung und Auswertung von Kartierungen im Rahmen des landesweiten Monitoringprogrammes MV: Artengruppe Libellen im Jahr 2009: Verbreitungskartierung: *Leucorrhinia pectoralis* (Große Moosjungfer), *L. albifrons* (Östliche Moosjungfer), *L. caudalis* (Zierliche Moosjungfer), *Aeshna viridis* (Grüne Moosjungfer), *Sympecma paedisca* (Sibirische Winterlibelle), *Gomphus flavipes* (Asiatische Keiljungfer); Monitoring: *Leucorrhinia pectoralis* (Große Moosjungfer) für das Jahr 2009. Im Auftrag Landesamt für Umwelt, Naturschutz & Geologie, Postfach 1338, 18263 Güstrow: II + 36 pp. (in German) ["Summary 1. 25 new cases of *L. pectoralis* were detected in 2009. With this mapping from 2009 and the recordings within the management plans, 246 occurrences of *L. pectoralis* are now known in Mecklenburg-Western Pomerania. 2. Only very isolated exuvia were found in both the state mapping and the mapping for management planning. 3. No new outstanding occurrences with over 50 individuals or more than 50 exuvia per 100 m search distance were found this year. 4. As in previous years, it was found that mesotrophic waters - such as bog waters or waters with marshy subsoil

- appear to be the most favorable locations for *L. pectoralis*. 5. This year 33 measuring table sheets were examined. The number of measuring table sheets examined was higher than in previous years because in some MTBs there are no optimal waters with the habitat requirements of *L. pectoralis* or other FFH dragonfly species and the general examination time per MTB was therefore shortened. 6. In 2009, new occurrences of *L. caudalis* and *A. viridis* were recorded alongside *L. pectoralis*. Despite intensive searches for water bodies, new occurrences of *L. albifrons* and *S. paedisca* could not be discovered based on autecological findings about the species. There was no search for *G. flavipes*, which only occurs on the Elbe in this federal state, in 2009. 7. In total there are 2 occurrences of *G. flavipes*, 9 occurrences of *L. albifrons*, 27 occurrences (with 13 new discoveries in 2009) of *L. caudalis*, 16 occurrences (2 new discoveries in 2009) of *A. viridis* and two old, currently uncontrolled occurrences of *S. paedisca*. 8. For the monitoring of *L. pectoralis*, 11 occurrences were recorded according to the BfN specifications and evaluated according to the BfN parameters. 9. Three of these monitoring sites still had exuvia in 2009. At all other locations either only adults were observed during the state mapping and monitoring of *L. pectoralis* in 2009 or the location was completely abandoned by the species. The reasons for the extinction of the occurrences are discussed in detail for all locations. 10. A site with 12 exuvia per m at the Schwarzer See near Bützow is the largest occurrence to date in the entire distribution area of the species. 11. Recommendations for improvement measures are made for all loss-making locations within the monitoring program. 12. It is recommended to abandon the Mummelsee and Stiegsee monitoring sites in southern MV and instead include occurrences with proof of soil stability as monitoring sites. The replacement sites should be located in the metropolitan area of microhollow forms, as these sites represent the most frequently populated habitats of the species in MV. 13. If it becomes apparent in 2010 that the site near Kamin is no longer inhabited by the species, a replacement will also be recommended. 14. The MTBs, which have not yet been examined, are among the regions in MV that have many potential bodies of water for at least one of the six occurring FFH dragonfly species and are therefore research-intensive. The originally targeted 32 MTBs to be examined per year cannot be assumed. To this end, the number of bodies of water to be examined per MTB increases in order to discover potential occurrences of *L. pectoralis* and/or other FFH dragonfly species. 15. In 2010, 19 MTBs are to be examined for the presence of FFH dragonfly species. Since the monitoring of *L. pectoralis* is to be continued and the monitoring of Appendix IV dragonfly species is to be started, the capacities have been exhausted. 16. There are still 46 MTBs to be examined for the years after 2010, but without additional monitoring. The desired goal of completing the national mapping of *L. pectoralis* on all MTBs in 2013 will remain achievable." (Author/Google translate)] Address: Vorhabensträger: Landesamt für Umwelt, Naturschutz & Geologie, Postfach 1338, 18263 Güstrow; Gutachterbüro: Planung für alternative Umwelt GbR, Bearbeiter: Dr. André Bönsel, An der Schule 2, 18337 Marlow, OT Gresenhorst, Germany

**22353.** Galan, C.; Herrera, F.; Rincon, A.; Leis, M. (2009): Diversidad de la fauna cavernícola de los karsts en caliza del norte de Venezuela. Bol. SVE 43: 31 pp. (in Spanish, with English summary) ["We present a comparative study about cave-dwelling fauna diversity in the most significative karstic regions of Northern Venezuela. The study is based in data obtained by mean of detailed surveys, with similar methodology, in three caves representatives of their respective regions: Los Laureles Cave (in Perijá Mountains, Zulia state),

Cueva Grande de Anton Göering (in Mata de Mango karst, Monagas state) and Coy-coy de Uria Cave (in the Sierra of San Louis, Falcon state). We study the ecology, taxonomic diversity, biomass and numeric abundance of the cave populations, which comprises a total number of 288 invertebrates and vertebrates cave-dwelling species. 31 of them are troglobites. More than 20 species are new species in Science. Some troglaphiles and troglobites organisms belong to zoological groups reported for first time for the fauna in the caves of Venezuela or even the Neotropical region. These data are the highest biomass values reported for cave-dwelling fauna around the world, with a biomass weight maximum in Cueva Grande of 3.824 kg (153 kg by 100 m of galleries). The principal factors, abiotic and biotic, which condition the high biodiversity and biomass found in these ecosystems, are discussed." (Authors) The table of results includes one Odonata without further details.] Address: Galán, C., Sociedad Venezolana de Espeleología. Apartado 47.334, Caracas 1041-A, Venezuela. E-mail: cegalham@yahoo.es

**22354.** Müller, J.; Steglich, R.; Wallaschek, M. (2009): Zur Libellenfauna im Ohre-Aller-Hügelland (Odonata). Entomologische Mitteilungen Sachsen-Anhalt 17(1): 10-17. (in German) ["So far, 28 dragonfly species have been identified in the Ohre-Aller hill country, most of which (75%) can be classified as ecologically undemanding and heat-loving species. According to the Saxony-Anhalt Red List, four species are currently considered to be threatened with extinction (1), critically endangered (1) and endangered (2), five other species belong to the pre-war stage and the assessment data for two species are still insufficient across the country. For the state of Saxony-Anhalt, the occurrence of *C. mercuriale* as an FFH species according to Appendix II with a special protection area of Europe-wide (community) importance in the Ohre-Aller hill country and the syntopically occurring *O. coerulescens* have a special, responsible significance. Gaps in the processing of the landscape unit are pointed out." (Authors/Google translate)] Address: Steglich, Rosmarie, Zollstr. 1/128, 39104 Magdeburg, Germany. Email: roeseli@mdcc-fun.de

**22355.** Rulik, B., Warthemann, G., Krüger, D., Quast, T., Osterloh, S., Osterloh, K. & Freitag, H. (2009): Kommentierte Artenlisten der Farn- und Blütenpflanzen und Insekten (Insecta; Diptera, Odonata, Coleoptera; Buprestidae) des GEO-Artenatages in Dessau-Roßlau 2009 und vorangegangener Jahre mit Erstrnachweisen von *Brachypeza radiata* Jenkinson, 1908 und *Trichonta paraterminalis* Zaitzev, 1999 (Insecta: Diptera: Mycetophilidae) in der BRD. Naturwissenschaftliche Beiträge des Museums Dessau 21: 87-106. (in German, with English summary) ["Selected results of entomological and botanical excursions in five study areas in the wider area of Lake Kühnauer in the city of Dessau-Roßlau are presented. The study sites are briefly characterized. Records of 55 insect species, including 27 Diptera, 18 Odonata, 10 Buprestidae (Coleoptera) and 198 ferns and flowering plants are listed in tabular form. Particularly rare and endangered species, as well as species documented for the first time locally or nationally, are discussed. The taxa *B. radiata*, *T. paraterminalis*, *Aeshna isoceles* (O.F. Müller, 1767), *Trachys scrobiculatus* Kiesenwetter, 1857 (Coleoptera: Buprestidae), among others, receive detailed discussion. The botanical excursion to the Lobenbreite provides the first floristic survey of the area known to the authors since 1978 and is part of the revision of the flora of Dessau-Roßlau. *Silene otites* (L.) were found on regionally rare, partly endangered plant species. (earspoon catchfly), *Geranium sanguineum* L., *Vincetoxicum hirundinaria* Medik (swallowwort), *Ornithopus*



perpusillus L. (bird's foot) and *Colchicum autumnale* L. (autumn crocus) detected." (Authors/Google translate)] Address: Osterloh, Susanne, Krumbholzstr. 12, 06406 Bernburg/Saale, Germany.

## 2010

**22356.** Agaki, T.N. (2010): The diversity of dragonflies and damselflies (Odonata) at the inlet and outlet of the Sentani Lake (in Bahasa Indonesia). SUGAPA (Suara Serangga Papua) 5(1): 22-25. (in Indonesian, with English summary) ["The aim of this study was to know the diversity of Odonata at the inlet and outlet area of the Sentani Lake. Data were recorded during 32 days (from 19 September till 20 October 2009) in the environment of the Sentani Lake, Jayapura. The analysis of data was done from the end of October till December 2009. The used methods were observation, Count Transect method at Transect Line and documentation. The result of the survey -at all localities both at inlet as at outlet- consists of 449 specimens, representing 44 species in ten families. At the two inlet areas 298 specimens were recorded representing 35 species in 10 families: 16 species of the Family Libellulidae, 11 species of the Coenagrionidae, and 1 species each of the Gomphidae, Aeshnidae, Corduliidae, Calopterygidae, Chlorocyphidae, Protoneuridae, Platycnemididae and Platystictidae. At the single outlet area of the Sentani Lake 151 specimens were recorded representing 30 species in seven families: 13 species of the Family Libellulidae, 9 species of the Coenagrionidae, 3 species of the Protoneuridae, and 1 species each of the Gomphidae, Aeshnidae, Chlorocyphidae, and Platystictidae. The result shows that the diversity of Odonata at the inlet area is higher in comparison with the diversity at the outlet area; the equity of species in inlet and outlet areas is about the same (ISs = 64.61 %). Anisoptera species were more common at open and sunny river sites; Zygoptera were more often found close to bushes and trees at the river banks." (Author)] Address: <https://www.sugapa.org/wp-content/uploads/2018/05/Students-comer-Tirza-Natalia-Agaki-SUGAPA-51-2010.pdf>

**22357.** Lehoux, H. (2010): Limnologie et entomologie tropicales. Pré-projets pour le monitoring des rivières de la région d'Esquinas Costa Rica. Entreprise Centre de recherche Biologique Tropicale, La Gamba, Parque nacional de las Piedras Blancas, Costa-Rica: 41 pp, Annexe (in French, with English summary) ["In today's world, questions about water quality are a constant issue. Agriculture, industry and urban pollution are majorly responsible for the disturbance of lakes and rivers, our freshwater basins. This model study in La Gamba, Costa Rica, shall show the impact of human activities on the biological integrity in the Esquinas' drainage basin. While the first part of the study talks about the geographical structure of the river network as well as the general chemical and physical features of its water, the second, main part of the study assesses the different population structures of dragonflies and damselflies (odonata) in different habitats within the drainage basin. The study took place between April and June 2010, therefore in the beginning of the rainy season. In order to examine the physical structure of the river network, I measured current velocity, depth and width at different spots of nine rivers within the drainage basin. Of the same nine rivers, I took samples to learn about the water features, checking temperature, DO, suspended solids, pH, conductivity, NO<sub>3</sub> and PO<sub>4</sub>. In addition to these measurements, I conducted a more detailed study of the morphology of one of the nine rivers, the Quebrada Negra, analyzing the daily change of water levels as well as level changes caused by rainfall, the sediment structure and the current

velocity throughout a transect of 100 meters. The study of the dragonflies and damselflies' distribution took place in the primary forest (4 sites), at forest margin (2 sites) and in cultivated areas (4 sites). 427 individuals of 26 species were identified during the twenty sampling periods. The species' assemblages were compared, and different sampled parameters were tested, in order to explain the differences in the distribution. In the end, the study leads to a discussion about the suitability of various protocols for the monitoring." (Author)] Address: Lehoux, H., 9, rue Duboys des Sauzais, 35150 Corps-Nuds, France

## 2011

**22358.** Kronshage, A.; Koch, L. (2011): Natur, Landschaft, Erdgeschichte [Schwelm]. In: Arbeitsgemeinschaft Umweltschutz Schwelm (Hrsg.): Über Berg und Tal. Wanderungen durch die Schwelmer Natur: 86-119. (in German) [On page 114, a passing note on Odonata is given, and a male *Calopteryx virgo* is figured.] Address: Koch, L., Heinrich-Heine-Str. 5, 58256 Ennepetal, Germany. E-mail: [l-koch@t-online.de](mailto:l-koch@t-online.de)

**22359.** Lingenfelder, U. (2011): Bestandsüberprüfung der Helm-Azurjungfer (*Coenagrion mercuriale*) im Saarland 2011. Gutachten im Auftrag des Landesamtes für Umwelt- und Arbeitsschutz Saarland, Zentrum für Biodokumentation: 38 pp. (in German) [[http://www.naturschutzdaten.saarland.de/natura2000/Natura2000/Allgemeine%20Daten%20und%20gebietsuebe%20Informationen/Daten%20zu%20Arten%20der%20FFH-Anhaenge/Coenagrion%20mercuriale%20-%20Helm-Azurjungfer/Daten\\_2011/Untersuchungsbericht\\_2011.pdf](http://www.naturschutzdaten.saarland.de/natura2000/Natura2000/Allgemeine%20Daten%20und%20gebietsuebe%20Informationen/Daten%20zu%20Arten%20der%20FFH-Anhaenge/Coenagrion%20mercuriale%20-%20Helm-Azurjungfer/Daten_2011/Untersuchungsbericht_2011.pdf)] Address: Lingenfelder, U., Seebergstr. 1, 67716 Heltersberg, Germany. E-mail: [u.lingenfelder@vr-web.de](mailto:u.lingenfelder@vr-web.de)

**22360.** Paternoster, D. (2011): Vegetation und Landschaftswandel der Pöggstaller Senke (südliches Waldviertel, NÖ) als Grundlagen für naturschutzfachliches Management. M.Sc. thesis, Fakultät für Lebenswissenschaften, Ökologie, Universität Wien: 155 pp, Anlagen (in German, with English summary) ["This work deals with vegetation and landscape changes of the Weitenbach-lowland between Pöggstall and Würmsdorf in the southern Waldviertel (Lower Austria). Results provide a basis for conservation issues. During the growing seasons in the years 2006 and 2007, both the vegetation and land use were mapped. 169 relevés were collected using the methodology of Braun-Blanquet (1964). For the survey of actual land use I used the mapping guide of Peterseil & Wrška (2001). The broad valley floor of the investigation area remains the last expanded and connected grassland area in the whole Weitenbach-Valley. For this reason, the phytosociological investigation focuses on characterisation of wet meadows and fen-meadows. Moreover the collected data are also compared with relevant regional literature. Altogether 26 different plant communities and 48 regionally or nationally endangered plant species were detected. Most of these species show preferences for wet meadows and fen-meadows. The chronological change of the landscape is characterized by means of a GIS-based analysis of historical cadastral land registers within an area of five square kilometers. The historical land use situation in 1823 is compared with the recent situation. Results are discussed in context of common signs of landscape change and historical evolution of vegetation in the Waldviertel-biom. The regional landscape change in and around the investigation area is characterized by an increase of forests and settlement areas, on the contrary the area of arable by a decrease. Using vegetation and landscape changes as

fundamentals, a management concept is formulated, which refers to the 44 ha large, broad valley floor between Pöggstall and Würnsdorf. Faunistic findings of former investigations done by the research community LANIUS are incorporated. The definition of management strategies and implementation of precise arrangements require appraisal of basically value-free natural resources, ecosystems, habitats or species. In this case the appraisal refers to plant communities and follows the reproducible and more or less standardized methodology of Plachter (1994). Fen-meadows and sedge reeds demonstrate the premium sites as far as nature conservation is concerned. Based on the appraisal results and in consideration of the historical landscape situation, a conservational overall concept is generated, which represents the target state in the face of nature conservation. According to the composition of vegetation, the management area is divided into three different zones (nature-zone, management-zone and development-zone). On the one hand the apportionment may support design of potential, prospective protected areas, on the other hand it helps to clarify the management requests of particular subjects of protection. Furthermore, a catalogue of measures is defined, that refers to plant communities and habitat types, respectively. In case of need the catalogue could be adapted for the level of parcels by intersection of the regional database with official land registers. In the printable version the phytosociological tables are added as attachments." (Author) Chapter 4.3.4 deals with Odonata. Tab. 16 checklists 29 odonate species including *Coenagrion scitulum*, *C. hastulatum* and *Sympetrum pedemontanum*] Address: <https://theses.univie.ac.at/detail/15015>

**22361.** Willis, C.K.; Samways, M.J. (2011): Water Dancers of South Africa's National Botanical Gardens. An illustrated dragonfly and damselfly checklist. SANBI Biodiversity Series 21: IV + 113 pp. (in English) [<https://www.sanbi.org/wp-content/uploads/2018/04/sanbibiodiversityseries21.pdf>] Address: Samways, M.J., Dept Entomol. & Nematol., Univ. Stellenbosch, Private Bag X1, ZA-7602, Matieland, South Africa. E-mail: [samways@sun.ac.za](mailto:samways@sun.ac.za)

## 2012

**22362.** Bedjanic, M. (2012): O zeleni devi in vodni škarjici, rumenem porecniku in še cem z daljnega vzhoda Slovenije [About *Aeshna viridis* and *Stratiotes aloides*, *Stylurus flavipes* and something else from the far east of Slovenia]. Trdozy. Bilten slovenskih terenskih biologov in ljubiteljev narave 1(1): 18-19. (in Slovenian) [Verbatim/Google translate: Among Slovenian nature lovers, Mura has a very special, mystical or somewhat romantic place. Of course, because it is the first river in our country that is illuminated by the sun's rays in the morning, but even more so because of the extraordinary diversity of the living world with many habitats and plant and animal species that cannot be found anywhere else in Slovenia. Also from the point of view of the dragonfly fauna, the river landscape along the Mura is one of the most interesting areas in our country, as over 50 species of dragonflies have been recorded here in the last two decades, which is more than 2/3 of the Slovenian odonate fauna. One of the greatest odontological peculiarities of the world along the lower reaches of the Mura in Slovenia is undoubtedly *A. viridis*. In our country, it lives in only a few localities in the vicinity of Petišovci, and in addition, its biology in the company of European species of dragonflies is unprecedented. Its life and development are closely linked to the water shearwater plant (*S. aloides*). Females of *A. viridis* lay their eggs only in the succulent leaves of this plant, and the larvae then live in

its partially submerged leaf rosettes. State of residence or the state of water sedge habitats is thus the best, although of course not the only indirect indicator of the state and prospects for the survival of green camel populations in a certain area. Or to put it another way – if the water sedge disappears in an area, *A. viridis* will certainly disappear as well, but on the other hand, the presence of this very rare and endangered plant in our country is not a direct guarantee of the presence of the equally endangered dragonfly. We first found *S. aloides* in Slovenia only 15 years ago, and to date we have confirmed its development only on the Kapitany Lap, Nagy Parlag and Csiko Legelo wetlands in the vicinity of Petišovci, which are also the most beautiful still-preserved habitats of water sedge in our country. As part of the LIFE+ Nature project entitled Protection and management of freshwater wetlands in Slovenia - WETMAN 2011-2015, in 2011 we carefully investigated the mentioned three localities and, using the method of collecting lions, estimated that almost 600 adults metamorphosed from larvae in the vicinity of Petišovci that year specimens of green trees. Together with the currently still fairly good condition of water sedge habitats, the research gives us hope that the short-term survival of the two highly endangered species in our country is not in question. Unfortunately, due to the natural succession and landfall of dead fish, which no longer occur naturally, and the ever-present threat of inadequate fishing and other human interventions, the story of *A. viridis* and *S. aloides* is unfortunately less optimistic in the long run. In order to ensure a favorable conservation status of the two specialties of the Prekmurian marshes, active conservation measures will undoubtedly be necessary in the coming decades. However, the year 2011 served up another pleasant surprise from the landscape along the Mura. After half a century, we have again found *G. flavipes*, a species of dragonfly that was considered extinct in Slovenia. Luck smiled on us in mid-July at the side of the Mura river in the Murska šuma, southeast of Petišovci. But it wasn't easy - for this venture we had to gather odontologists from Slovenia, Serbia, Croatia, Bosnia and Herzegovina, Italy and Slovakia, who took part in the 1st International Meeting of odontologists of the Balkans BOOM 2011. Right on the team field of this meeting, the Slovakian colleague Dušan Šácha caught a solitary male of this rare and endangered species right next to the Croatian border. The Yellow River is included in the appendices of the Berne Convention and Annex IV of the Habitats Directive and is considered a typical type of larger lowland rivers with at least partially preserved natural river dynamics and diverse structures of the river ecosystem. All of this is undoubtedly fulfilled by Mura in the lower part of its Slovenian route, between Verže and the estuary of the Ledava, or the Hungarian border. If we add to all of the above the findings of many other endangered species of dragonflies, such as *Coenagrion pulchellum*, *Brachytron pratense*, *Epithea bimaculata*, *Aeshna grandis*, *Ophiogomphus cecilia* and *Leucorrhinia pectoralis*, which we observed in the landscape along the Mura in the past season, we can conclude that the diversity of the world of dragonflies here is really extraordinary. At least on paper, the wider area along the Mura River has a formally defined nature conservation status on the basis of the Birds Directive and the Habitats Directive and is included in the European network of Natura 2000 areas of nature conservation importance. the country's inexplicably delayed efforts to declare the Mura Regional Park unfortunately still remain.] Address: Bedjanic, M., M., National Institute of Biology, Vecna pot 111, 1000 Ljubljana, Slovenia. Email: [matjaz.bedjanic@nib.si](mailto:matjaz.bedjanic@nib.si)

**22363.** Donnelly, N. (2012): Ken Soltesz — An appreciation. *Argia* 24(4): 8-9. (in English) [Verbatim: The recent death of

Ken Soltesz has left a huge hole in the lives of the New York Ode Community. His energy, capacity for really hard work, enthusiasm, and generosity will not be seen around here again for a very long time. Ken contributed heavily to downstate New York records for my first paper on the Odonata of New York (BAO, 1992), and also for the second paper (WDA meeting 1999). His large body of records has been crucial for our knowledge of the odonate fauna of New York (summarized in the New York Dragonfly and Damselfly Survey (2005-2009) report). In fact, Ken's work was the "anchor" for this very important part of the state. Most of us became acquainted with Ken for the first time in 1990, when he organized a DSA Northeastern meeting at the Ward Pound Ridge Reserve in Westchester Co., New York, where Ken was the park naturalist. This was (for me) one of the most enjoyable DSA regional meetings that I have ever experienced, partly because of the marvelous venue and interesting odes, but mainly because of the hospitality of Ken and his wife Joyce. Most of my interaction with Ken in subsequent years involved the Delaware River, where Ken was doing extensive dragonfly surveying. In 1994, he had found exuviae of a strange Gomphus. In 1995, he was paddling down the Delaware River with Joyce and their daughters when their raft sped past a boulder in a rapids. With a "WHAT'S THAT?" shout he actually stopped the raft, hopped out (if that is the word), struggled upstream through the raging current and netted the first adult specimen of *Gomphus septima delawarensis* (Septima's Clubtail Northern form)! A later exercise was an Odonata inventory for West Point Military Reservation. Most people are familiar with the monumental architecture and Hudson River setting of the Military Academy; few are acquainted with a large "wild" area on the Reservation used for artillery (and other military) training of cadets. Ken picked his way warily through this tangle of splintered vegetation and documented an impressive odonate fauna, including an additional (and furthest north) record of *Gomphus rogersi* (Sable Clubtail). My last field trip with Ken and Joyce was in 1999 on the Wallkill River, where he had found a new locality for *Gomphus fraternus* (Midland Clubtail), an uncommon species in New York. By this time, as a result of diabetes, his health had deteriorated seriously. Not long thereafter his vision became very poor and he and Joyce retired to eastern Tennessee, where Ailsa and I had an enjoyable visit with them in 2009. We will all miss Ken a lot. Not only was he a thoroughly self-taught odonatist, but he was also perhaps the most generous person I have ever met. He did not hesitate to give you his time, his knowledge, and his superbly prepared specimens. Ken was a "keeper". We all extend our deepest regrets to Joyce and his daughters Tammy, Cathy, and Susie.] Address: Donnelly, T., 2091 Partridge Lane, Binghamton, NY 13903, USA. E-mail: tdonnel@binghamton.edu

**22364.** Hippke, M. (2012): Libellenmonitoring an neu angelegten Kleingewässern im Biosphärenreservat Schaalsee (2008 - 2011). *Virgo*, Mitteilungsblatt des Entomologischen Vereins Mecklenburg 15(1): 47-62. (in German) ["Between 2008 and 2011, dragonfly colonization was examined in 27 newly created small bodies of water. A total of 36 species were identified, including 19 Red List species. The species composition is primarily dominated by eurytopic, widespread and common species, but Mediterranean faunal elements have been identified with *Lestes barbarus*, *Sympetrum fonscolombii*, *Aeshna affinis* and *Crocothemis erythraea*, which are currently expanding their range to the north and are obviously influenced by small bodies of water that are rapidly warming. The number of species and the number of individuals increased significantly in most small bodies of water during the observation period. The results show great agreement

with a comparable study from Schleswig-Holstein." (Author/Google translate)] Address: Hippke, M., Wiesening 29, 19370 Parchim, Germany. E-mail: mathias-hippke@web.de

**22365.** Mancu, C.-O. (2012): Dragonfly Fauna (Insecta: Odonata) from Romania. PhD Thesis Abstract. "BABES-BOLYAI" University, CLUJ-NAPOCA, Faculty of Biology & Geology, Dept of Taxonomy & Ecology: 64 pp. (in English) [[https://doctorat.ubbcluj.ro/sustinerea\\_publica/rezumate/2012/biologie/-Mancu\\_Cosmin\\_En.pdf](https://doctorat.ubbcluj.ro/sustinerea_publica/rezumate/2012/biologie/-Mancu_Cosmin_En.pdf)] Address: Mancu, C.O., Acad. Remus Raduleț 13, bl. 119, ap. 7, Timisoara 300281, Timis County, Romania. E-mail: cosminovidu@yahoo.com

**22366.** Martin, K. (2012): A brief field report on emergence of Riverine Clubtail (*Stylurus amnicola*) and Arrow Clubtail (*Stylurus spiniceps*) along a sandy bank in northern Connecticut. *Argia* 24(3): 17. (in English) ["In the summer of 2007, a sandy bank on the Connecticut River in East Windsor, Connecticut was visited a total of eight times between 27 June and 4 August. The location is immediately adjacent to the Interstate 91 overpass and is heavily visited by fishermen. The riverbanks in this area consist mainly of fine sand. During my visits to the area I observed many active emergences and eclosures, and countless cases of dragonfly mortality due to bird predation. The steep sandy banks and lack of extensive vegetation made the area ideal for recording emergence distance. Nymphal tracks were evident throughout the area, despite the heavy pedestrian use. A total of 209 *S. amnicola* emergence distances were recorded. Nymphs travelled an average of 10.99 feet from the edge of the river (s.d. 3.73). Fewer *S. spiniceps* (n=29) were observed, but emergence distance was similar (11.03 ft, s.d. = 3.64)." (Author)] Address: Martin, Kirsten, Univ. Saint Joseph, 1678 Asylum Ave., West Hartford, Connecticut, 06117, USA. Email: kirstenmartin@usj.edu

**22367.** O'Brien, M.F. (2012): Collecting Gray Petaltails (Odonata) with Mr. Williamson. *Newsletter of the Michigan Entomological Society* 57(1&2): 6-7. (in English) [The paper informs on paper triangles stored in the museum collection containing specimens of *Tanypteryx pryeri* and addition written information about the situation when catching the specimens. for example the following: "A second specimen collected by Deam in Perry Co., Indiana on 4 June 1918, has a most interesting comment: "It alighted in front of me and I killed it with the machete I was carrying." Those botanists did not mess around back then!" [https://www.researchgate.net/publication/315081558\\_Collecting\\_Gray\\_Petaltails\\_Odonata\\_with\\_Mr\\_Williamson](https://www.researchgate.net/publication/315081558_Collecting_Gray_Petaltails_Odonata_with_Mr_Williamson)] Address: O'Brien, M.F., Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079, USA

**22368.** O'Brien, M.F.; Craves, J. (2012): The Michigan Odonata Atlas. *Newsletter of the Michigan Entomological Society* 57(1&2): 7. (in English) [Announcement of producing the Michigan Odonata Atlas.] Address: Craves, Julie, Rouge River Bird Observatory, Environmental Interpretive Center, University of Michigan-Dearborn, Dearborn, MI 48128, USA. Email: nannothemis@gmail.com

**22369.** Vinko, D.; Bedjanic, M. (2012): Slovensko odonatološko društvo (SOD). *Trdozy. Bilten slovenskih terenskih biologov in ljubiteljev narave* 1(1): 16. (in Slovenian) [Brief presentation of the Slovene Odonatological Society.] Address: Vinko, D., Slovensko odonatološko društvo, Verovškova 56, Si-1000 Ljubljana, Slovenia. E-mail: damjan.vinko@gmail.com

**22370.** Conze, K.-J.; Joest, R. (2013): Die Grüne Flussjungfer etabliert sich wieder in NRW. *Natur in NRW* 1/13: 28-31. (in German) *Ophiogomphus cecilia*; ["In the summer of 2012, as part of a voluntary dragonfly mapping effort, a targeted search was made for the species that was particularly protected under Annex IV of the Habitats Directive and relevant to NRW planning. The high number of detections on the Lippe in the Soest district suggests that finds can also be expected on other bodies of water with targeted searches." (Authors/Google translate)] Address: Joest, R., Biologische Station Soest, Bad Sassendorf-Lohne. E-mail: r.joest@abu-naturschutz.de

**22371.** Dullinger, S.; Essl, F.; Rabitsch, W.; Erb, K.-H.; Gingrich, S.; Haberl, H.; Hülber, K.; Jarošík, V.; Krausmann, F.; Kühn, I.; Pergl, J.; Pyšek, P.; Hulme, P.E. (2013): Europe's other debt crisis caused by the long legacy of future extinctions. *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, April 15, 2013: 6 pp. (in English) ["Rapid economic development in the past century has translated into severe pressures on species survival as a result of increasing land-use change, environmental pollution, and the spread of invasive alien species. However, though the impact of these pressures on biodiversity is substantial, it could be seriously underestimated if population declines of plants and animals lag behind contemporary environmental degradation. Here, we test for such a delay in impact by relating numbers of threatened species appearing on national red lists to historical and contemporary levels of socioeconomic pressures. Across 22 European countries, the proportions of vascular plants, bryophytes, mammals, reptiles, dragonflies, and grasshoppers facing medium-to-high extinction risks are more closely matched to indicators of socioeconomic pressures (i.e., human population density, per capita gross domestic product, and a measure of land use intensity) from the early or mid-, rather than the late, 20th century. We conclude that, irrespective of recent conservation actions, large-scale risks to biodiversity lag considerably behind contemporary levels of socioeconomic pressures. The negative impact of human activities on current biodiversity will not become fully realized until several decades into the future. Mitigating extinction risks might be an even greater challenge if temporal delays mean many threatened species might already be destined toward extinction." (Authors) Red List publications including Odonata were used as data base.] Address: Dullinger, S., Dept für Naturschutzbiologie, Vegetations- & Landschaftsökologie, Univ.Wien, 1030 Wien, Rennweg 14, Austria. E-mail: stefan.dullinger@univie.ac.at

**22372.** Erbida, N.; Vinko, D. (2013): Fotografski natečaj Pisani akrobati [Photography competition: Painted acrobats]. *Trdozy. Bilten slovenskih terenskih biologov in ljubiteljev narave* 2(2): 35-36. (in Slovenian) [Verbatim/Google translate: In 2013, within the framework of the Slovenian Odonatological Society, young odonatologists announced a photography competition for all lovers of natural history photography. The purpose of the competition was to show people of all ages the beauty and skill of dragonflies, to stimulate their interest and attract them to participate in our society. The competition, which we named Pisani acrobats, was divided into three age groups: youth, students and adults. During the summer and until the end of September, when the deadline for applications to the competition closed, we received 134 photos from 52 authors. The best photos, some of which are also published in *Trdoživ*, were chosen by a committee composed of: dr. Davorin Tome, Ph.D. Rudi Verovnik, Ph.D. Tomi Trilar, Ph.D.

Alja Pirnat and Ali Šalamun. After the publication of the bulletin, all that remains is the opening of the photography exhibition with the awarding of plaques and prizes, which will take place in early January 2014 at the Biology Department of the Faculty of Biotechnology in Ljubljana. At that time, we will also prepare a short lecture on dragonflies and invite those present to odontology fields intended for the general public, which we will organize in the spring and summer. We will also present a poster about dragonflies that we made as part of the project.] Address: Vinko, D., Slovensko odonološko društvo, Verovškova 56, SI-1000 Ljubljana, Slovenia. E-mail: damjan.vinko@gmail.com

**22373.** Gregoire, S.; Gregoire, J. (2013): Monitoring *Celithemis elisa* (Calico Pennant) emergence: Year 8 and counting. *Argia* 25(1): 16- (in English) [Verbatim: For odonates in central New York, the 2012 season was dismal. During the winter, temperatures were way above normal, resulting in no ice cover on lakes, ponds and streams. Lack of snowmelt and rainfall left all water levels frighteningly low, then a very warm (hot) March and April wreaked havoc on normal phenology. As the season progressed, high temperatures and continuing drought dried up many wetlands by late May. All this culminated just as our study of the emergence season for *C. elisa* was beginning. We have monitored their activity here for seven years and we were eager to see how these adverse conditions affected the population here. As we suspected, emergence began a little earlier than in previous years, but not by much. The trend has been for earlier emergence almost every year, so this was not unexpected. Each year, a peak period of emergence commences immediately, lasts a few days, and then reduces to a slower pace. After the initial burst, emergence continues in lower but steady numbers punctuated with occasional small surges lasting a few days. The pattern continued in 2012, although in low numbers overall. This too, was not unusual. As indicated in the accompanying table, their numbers have fluctuated greatly over the seven-year study period. Normally, emergence extends into late July, sometimes into August. In 2012, only a few emerged in late June and the population produced its last teneral in early July. It seemed very early to us but, accounting for the early beginning, was not beyond the range of total emergence periods we had previously witnessed. In summary, by their Standards, the emergence season for *C. elisa* was successful and normal. Their pond is deep and withstood the heat and drought, although it lost almost four feet in depth overall. Numbers were low, but not the lowest we've seen. With continuing study, we hope to set parameters around what *C. elisa* considers "normal". Each year presents a different set of Standards for us to ponder. As a result of the bad weather in 2012, we do not expect an abundant 2013, but it will no doubt give us something more to think about.] Address: Gregoire, Sue and John, Kestrel Haven Avian Migration Observatory, Burdett, New York 14818, USA. Email: khmo@empacc.net

**22374.** Meurgey, F. (2013): Vagrant Emperor, *Hemianax ephippiger* (Burmeister, 1839), in the New World: Synthesis and comments on recent discoveries. *Argia* 25(1): 5- (in English) [Verbatim: *H. ephippiger* is a well-known Palearctic migrant species originating from Africa that can reach the northernmost island of Iceland in summer. There is no consensus among odonatologists concerning the correct assignment of *ephippiger* to the genus *Anax* or *Hemianax*. Recent studies both on adults and larval characters between the two genera have reinstated the discussion. Rowe (1991) showed that larval characters of *Hemianax ephippiger* are not shared with any other *Anax* species to date. Gentilini et al. (1993), attempting to



map a small number of fossil wings onto extant taxa, place ephippiger and papuensis in the genus *Anax*. But the suppression of *Hemianax* is asserted as fact in the abstract, without any discussion in the text. In her phylogenetic study of the extant Aeshnidae, von Ellenrieder (2002) maintains the genus *Hemianax*. This long debate seems to continue and we choose to keep a conservative point of view in using *Hemianax ephippiger*. *Hemianax ephippiger* in the New World: The first known and documented observation of this Afrotropical aeshnid in the New World dates back to 2002 in French Guiana and constitutes the first record for the New World (Machet & Duquef, 2004). Later in 2006, a single female caught in Guadeloupe in the Lesser Antilles constituted the first record for the West Indies (Meurgey 2006). The following year, additional specimens were seen in the Virgin Islands in the Greater Antilles (Sibley, 2007) and two others (male and female) in Dominica (Meurgey and Weber, 2007) just south of Guadeloupe in the Lesser Antilles. As far as we know, no other record from the West Indies or the New World has been recorded since then (Meurgey & Picard, 2011). Recently, Lionel Dubief and Vincent Lemoine kindly informed us that they found two specimens in Guadeloupe at the same locality as in 2006 and 2007 (northwest of Grande-Terre). The first specimen was caught on 15 October and a second was only observed on 23 October 2012. A few months later, Maurice Duquef (2012) reported the capture of a general female in French Guiana on 21 March 2012, at almost the same locality as in 2002, indicating that the species probably breeds near Sinnamary. Following this, Dennis Paulson (pers. comm.) informed us that the species now breeds with certainty on Curaçao where exuviae were found, and is reported from Aruba where 3 individuals were found on 1-I-2013 by Gert Veurink. The arrival of several individuals in the West Indies in 2012 followed the tropical storm Rafael that originated on the west coast of Africa on 5 October and reached the Caribbean on 13 October. De Marmels (2007) stated that the arrival of African species such as *H. ephippiger* to the West Indies was correlated with the occurrence of tropical storms originating from the coasts of West Africa and was generally associated with large flows of Desert Locusts (*Schistocerca gregaria*). Given that the species has been recorded as breeding in the Caribbean region, we believe the species will extend its distribution in ensuing years throughout the West Indies and establish populations. Future tropical storms originating in Africa subsequently reaching the West Indies may augment populations of this species in the West Indies. The arrival of Afrotropical species to the West Indies (*H. ephippiger* and *Tramea basilaris*) and documented observations provides a unique opportunity to study the colonization of the Caribbean islands by species and to measure their negative or positive impact on native species. We urge visiting and resident odonatists to send us their observations, which will allow us to study and monitor the evolution of the colonization by *H. ephippiger* throughout the West Indies.] Address: Meurgey, F., Muséum d'Histoire naturelle de Nantes, 12, rue Voltaire, 44000 Nantes, France. E-mail: Francois.Meurgey@mairie-nantes.fr

**22375.** Satori, L. (2013): Effects of habitat management and restoration on freshwater ecosystem population dynamics. Tesi di dottorato, Università degli Studi di Milano-Bicocca: 149 pp. (in English) ["Although water quality improvement is generally the primary objective of treatment wetlands, the creation of habitats is an inevitable outcome of these projects. Macroinvertebrate are often early colonists of new created wetlands, with abundance and diversity approaching high levels within a few years from wetland construction. A deeper knowledge of the biodiversity hosted in these environments

is needed to evaluate if newly created ponds are appropriate management tools for biological conservation. The effectiveness of the interventions provided by Parco Pineta di Appiano Gentile e Tradate (a regional park in Lombardy, Italy) in freshwater ecosystem management and restoration has been evaluated, considering a set of natural, artificial and constructed wetlands spread within the park territory. Considering the macroinvertebrate community and analyzing the biodiversity hosted in all the considered wetlands, no significant differences were found between artificial and natural ecosystems. Even the constructed wetlands, which were characterized by low water quality and higher pollutants concentrations, presented a biodiversity level which in some cases exceeded that one present in natural ecosystems. Even though biodiversity was similar between wetland typologies, differences in community compositions have been enlightened. The macroinvertebrate community assemblages seemed to be influenced more by the geographical and hydromorphological variables of the ecosystem rather than the physicochemical water characteristics. In particular, water body area and habitat heterogeneity resulted to be the most important variables that influenced the community composition. Seasonal variations in hydrological conditions and resource availability were the main factors that influenced the macroinvertebrate dispersal, evaluated considering life-strategy groups. Although the considered ponds and wetlands presented different features, they all contributed to the local ecological network even if they were not all equally interconnected together. All the collected information could be useful to design further possible interventions for conservation aims." (Author) *Anaciaeschna isosceles*, *Aeshna cyanea*, *A. mixta*, *Anax parthenope*, *A. imperator*, *Coenagrion puella/pulchellum*, *Ischnura elegans*, *Pyrhosoma nymphula*, *Cordulegaster boltonii*, *Chalcolestes viridis*, *Orthetrum coerulescens*, *Libellula depressa*] Address: [https://boa.unimib.it/bitstream/10281/42353/1/phd\\_unimib\\_049340.pdf;%2012042013](https://boa.unimib.it/bitstream/10281/42353/1/phd_unimib_049340.pdf;%2012042013)

**22376.** Stalter, D.; Magdeburg, A.; Quednow, K.; Botzat, A.; Oehlmann, J. (2013): Do contaminants originating from state-of-the-art treated wastewater impact the ecological quality of surface waters? PLoS ONE 8(4): e60616. doi: 10.1371/journal.pone.0060616: 10 pp. (in English) ["Since the 1980s, advances in wastewater treatment technology have led to considerably improved surface water quality in the urban areas of many high income countries. However, trace concentrations of organic wastewater-associated contaminants may still pose a key environmental hazard impairing the ecological quality of surface waters. To identify key impact factors, we analyzed the effects of a wide range of anthropogenic and environmental variables on the aquatic macroinvertebrate community. We assessed ecological water quality at 26 sampling sites in four urban German lowland river systems with a 0–100% load of state-of-the-art biological activated sludge treated wastewater. The chemical analysis suite comprised 12 organic contaminants (five phosphor organic flame retardants, two musk fragrances, bisphenol A, nonylphenol, octylphenol, diethyltoluamide, terbutryn), 16 polycyclic aromatic hydrocarbons, and 12 heavy metals. Non-metric multidimensional scaling identified organic contaminants that are mainly wastewater-associated (i.e., phosphor organic flame retardants, musk fragrances, and diethyltoluamide) as a major impact variable on macroinvertebrate species composition. The structural degradation of streams was also identified as a significant factor. Multiple linear regression models revealed a significant impact of organic contaminants on invertebrate populations, in particular on Ephemeroptera, Plecoptera, and Trichoptera species. Spearman rank correlation analyses confirmed wastewater-

associated organic contaminants as the most significant variable negatively impacting the biodiversity of sensitive macro-invertebrate species. In addition to increased aquatic pollution with organic contaminants, a greater wastewater fraction was accompanied by a slight decrease in oxygen concentration and an increase in salinity. This study highlights the importance of reducing the wastewater-associated impact on surface waters. For aquatic ecosystems in urban areas this would lead to: (i) improvement of the ecological integrity, (ii) reduction of biodiversity loss, and (iii) faster achievement of objectives of legislative requirements, e.g., the European Water Framework Directive." (Authors) The list of taxa (in supplementary file) includes *Coenagrion hylas* [sic]. Address: Stalter, D., Dept Aquatic Ecotoxicology, Biological Sciences Division, Goethe University Frankfurt am Main, Frankfurt am Main, Germany. Email: d.stalter@uq.edu.au

## 2014

**22377.** Galatowitsch, M.L. (2014): Invertebrate life-history trade-offs and dispersal across a pond-permanence gradient. Doctor of Philosophy (PhD) in Ecology, University of Canterbury. Biological Sciences: 175 pp. (in English) ["Flexible life-history traits and dispersal may allow generalist populations to persist across a range of habitats despite experiencing contrasting selection pressures. Invertebrates exploiting temporary ponds must develop quickly and disperse as adults, or have wide environmental tolerances. Conversely, permanent-pond invertebrates must avoid a suite of predators (e.g., fish and dragonflies). This gradient of pond permanence can result in life-history trade-offs that influence fitness, population dynamics, and genetic structure. In addition, recruitment between habitats may balance juvenile life-history trade-offs and be crucial to sustain generalist invertebrate populations in ponds with unpredictable hydrology. Through a multi-year survey of three pond complexes in the Canterbury high-country and a series of mesocosm experiments using two generalist pond invertebrates, *Xanthocnemis zealandica* damselflies and *Sigara arguta* waterboatmen, I found these two species had alternative life-history strategies that influenced their distributions across the pond-permanence gradient. With longer juvenile development, *X. zealandica* benefited from flexible life-history traits: temporary-pond *X. zealandica* had accelerated development and short-term desiccation tolerance, but were excluded from ponds with long dry periods, whereas, permanent-pond *X. zealandica* had extended development and predator avoidance behaviours (e.g., reduced movement and refuge-use). In contrast, *S. arguta* had an opportunistic life-history strategy with a fixed, rapid development response that allowed them to inhabit more temporary ponds, but they were intolerant of drying and limited to permanent ponds that contained shallow refuges from fish. These results illustrate how alternative life-history strategies enabled two generalist species to achieve broad realised niches. Recruitment between habitats also appeared to be important for balancing trade-offs and maintaining meta-populations across the pond-permanence gradient. To evaluate the importance of *X. zealandica* dispersal among and within pond complexes I used microsatellite analyses. While there was unique genetic population structure between the North and South Islands, at lower spatial scales there was little variability in genetic diversity and limited genetic structure in populations, likely due to gene flow among different habitat types. Overall, this work shows how an interaction of juvenile strategies and adult dispersal could reduce life-history trade-offs, resulting in weak selection pressures across an unpredictable disturbance gradient. Whether increasingly unpredictable hydrological patterns under climate-warming favour generalist species will

likely depend on how well generalist life-history traits and dispersal allow exploitation of a range of habitat types and resilience to variable selection pressures. Higher mean summer rainfall in New Zealand may allow both species to exploit more temporary ponds, whereas longer dry periods between extreme precipitation events could limit *X. zealandica* distributions. Thus, species with generalist strategies are likely to be favoured under warming, but their specific life-history strategies will likely promote or limit their ability to exploit more unpredictable habitats." (Author)] Address: <https://ir.canterbury.ac.nz/server/api/core/bitstreams/aaddda8e-9344-4465-936e-3fd9eae632bc/content>

**22378.** Grutters, M. (2014): Libellen als keurmeesters van de waterkwaliteit. Straatgras 26 [1] 2014 [Zuiderpark Special]: 3. (in Dutch) [Verbatim/Google translate: Dragonflies as inspectors of water quality: The redesign of the Zuiderpark does not seem to have harmed the dragonflies. In the period from 2007 onwards, 23 species were observed, with a maximum of eighteen species annually, compared to a maximum of fifteen species in the period 2000-2003. With the redesign, the water quality improved in a number of places, although this appears to be slowly deteriorating again (Andeweg 2014). It is important for dragonflies that in many places bank revetments have been replaced by natural banks with bank plants. Many species depend at some point in their life cycle on the presence of riparian, floating or submerged aquatic plants. The construction of „wadis“ and a helophyte filter played an important role. Blue damselflies: The monitoring consists of counting all species of Odonata three times a year on 18 counting routes along the banks of various waterways. By far the most common dragonfly species here are small, blue damselflies such as *Ischnura elegans* and *Erythromma viridulum*. These two species alone together account for three quarters of the total number of dragonflies counted. The lantern is seen along almost all waters. This species makes few demands on its habitat. *E. viridulum* is slightly less widespread and is limited to waterways where coarse hornwort (*Ceratophyllum demersum*) is abundant. As with the equally common *Erythromma najas*, eggs are often deposited on yellow wattle (*Nuphar lutea*), a common aquatic plant in the Zuiderpark. „Wadis“ [pools, water bodies]: We saw interesting developments at the wadis. Shortly after its construction, several species characteristic of such barren pioneer environments immediately appeared. These included the beautiful *Libellula depressa* and a number of darter species. For example, *Sympetrum striolatum* likes to reproduce in shallow pools with little vegetation. This dragonfly was often seen near the wadis. Over the years, numbers steadily decreased as the water and soil continued to condense. This allowed *Sympetrum vulgatum*, which is not a pioneer, to conquer territory. In recent years this was the most common darter species in the Zuiderpark. Critical species Among the species that increased is *Aeshna isoceles*. This was not on the species list before the redevelopment, but is now a common sight in the Zuiderpark. It can be seen as an indicator of clean water with richly vegetated banks. It is therefore no coincidence that it is mainly found around the helophyte filter in the western part of the park - the place with the best water quality. *Brachytron pratense* is also such a critical species, but it is rarely seen in the Zuiderpark. In the Kralingse Bos it does show an increase. Although the first pioneers are already a thing of the past, the current dragonfly diversity of the Zuiderpark can be said to be quite good. However, with a slow decline in numbers and distribution, the best times seem to be behind us. Possible future changes in water quality, as can be expected due to the construction of the Blue Connection, could lead to the further expansion

of the various species. Monitoring has shown that dragonflies quickly find the Zuiderpark if there are new suitable waters and that they can expand rapidly through quality improvement. Who knows what the future will bring.] Address: Mark Grutters, ecologist, Bureau Stadsnatuur, The Netherlands. Email: grutters@bureaustadsnatuur.nl]

**22379.** Huber, K. (2014): Libellen im Machland. ÖKO-L 36/2: 13-16. (in German) [The Machland is the Danube lowlands between Mauthausen and the entrance to the Strudengau shortly before Grein. The Machland stretches to the left and right of the Danube. It is therefore divided between Upper and Lower Austria. The spatial unit of the Upper Austrian Machland is given as 114 km<sup>2</sup>. In 2012 and 2013, 43 odonate species were recorded.] Address: Huber, K., Naturschutzbund Österreich, Regionalgruppe Machland, Parksiedlung 22, 3300 Amstetten, Austria

**22380.** Mota, E.C.M.; Marques, J.A.A.; Dias, N.; Santos, C.R.A. (2014): Environmental diagnoses of two urban streams with bioindicators Goiânia (Go). *Revista Mirante, Anápolis (GO)* 7(2): 109-144. (in Portuguese, with English summary) [Brazil "The present diagnosis was carried out in the municipality of Goiânia on September 16, 2006 (dry period), where 8 sampling stations were demarcated, collecting 4 points from Córrego Botafogo and 4 from Córrego Samambaia, throughout these eight stations, measuring some physicochemical variables. The structure of the aquatic insect community of the aforementioned watercourses was represented by 14 families distributed in the following orders: ... Odonata [Gomphidae], .... The physicochemical variables demonstrated greater impairment of quality in Córrego Botafogo, with Córrego Samambaia presenting better conditions for these parameters." (Authors)] Address: Mota, Eltania, Graduada em Química / UFG - Universidade Federal de Goiás, Goiânia – GO e Especialista em Perícia Ambiental / PUCGO – Pontifícia Univ. Católica de Goiás, Goiânia – GO. taniammota@yahoo.com.br

**22381.** Vidal-Cordero, J.M.; Hemando-Soriguer, A.; Cortés-Merino, S. (2014): Proyecto Técnico: Odonatofauna del Humedal de Padul (Granada, España). *Boletín de la Sociedad Odonatológica de Andalucía* 2: 37-40. (in Spanish) [Verbatim: The Padul wetland, located at the western end of the Sierra Nevada massif, south of Granada and the urban center of Padul, on the very border of two well-differentiated historical regions, the Lecrín Valley and the Temple, is the largest wetland in the province and one of the most important wetlands in the Spanish southeast, mainly due to the faunal diversity it has. This lagoon system forms a unique biotope within the complex ecosystem that makes up the entire Sierra Nevada Protected Space. Currently, it is the remnant of a much larger wetland, which occupied around 500 hectares, and which was drained in the 18th and 19th centuries in order to cultivate the drained land. It has numerous protection figures such as Natural Park, RAMSAR Convention, SPA Zone, etc. This protected area covers about 300 hectares, of which 90 hectares. It covers the swamp area that is divided into two parts, the Aguadero area (to the East), with a total area of about 80 hectares, highlighting the Aguadero lagoon with 25 hectares. and the waterlogged reedbed with about 40 hectares. of approximate surface area, and the Agia area (to the West), formed by a set of three lagoons and flooding areas with a total area of 11 hectares, of which the lagoons occupy 9 hectares. The Padul wetland presents the main elements of large wet complexes, such as areas of free water, flooded areas, flooded and dry reed beds, wet meadows, canals and ditches, springs, etc., giving it enormous ecological value. As a result of this well-conserved water system, a great

wealth of animal species can be found in the wetland that thrive there, not all of which benefit from an exhaustive study of their populations, such as the fortunate case of birds. Most of the monitoring of animal species falls on the ornithofauna and in fact, previous studies carried out by the Padul Ornithological Station Association (E.O.P.) have shown that the Padul wetland constitutes a place of settlement and passage of numerous species of birds. As a non-profit entity, the E.O.P. It is made up of a group of people with a common concern: the study, conservation and dissemination of the natural values of the Padul Wetland. This is why, in addition to working with the ornithofauna of this area, we aim to open the spotlight in relation to other animal groups whose presence and population dynamics in the wetland are less studied. Within the group of insects, odonates, along with butterflies, are those that enjoy a greater degree of admiration and have numerous people interested in observing, studying and photographing them (Herrera et al., 2009). Taking advantage of the intrinsic charisma that this order of insects provides, its ecological importance within the habitats in which it lives and the lack of knowledge of the species and their populations in the Padul wetlands, despite this first approach by Conesa, M. A., 2013, The Technical Project: Odonatofauna of the Padul Wetland was born in the winter of 2012, which aims to characterize the odonotofauna of the Padul Wetland, carrying out an inventory of the dragonflies and damselflies that are distributed in said wetland, as well as obtaining data related to its biology and conservation, involving E.O.P. volunteers. for the realization of said project and offering resulting information available for adequate environmental awareness. The project is being carried out by technicians and volunteers from the E.O.P. together with the technical support of a photographer and the supervision of the station director, for a period of seven months (April-October) and with a view to having continuity for a longer period of time and for a more exhaustive study of its composition, phenology and population dynamics.] Address: Vidal-Cordero, J. M. 1, porphirio\_5@hotmail.com

## 2015

**22382.** Bedjanic, M. (2015): Slovensko odonatološko društvo izdalo jubilejno 30. številko biltena Erjavecia [The Slovenian Odonatological Society published the 30th anniversary issue of the Erjavecia newsletter]. *Trdoziv* 4(2): 10. (in Slovenian) [Verbatim: Erjavecia, named after Fran Erjavec, who was one of the first in our country to use the term "dragonfly" in the first Slovenian natural history textbook, is a newsletter of the Slovenian Odonatological Society. It has been published regularly since 1995. In its twenty years of publication, 30 volumes have already been published, since until 2005 they were published two per year, and since then a single issue for the current year has been published at the end of October. It is our intention and desire to publish as much interesting and valuable odontological information from our area as possible. There are a lot of various odontological tidbits, crackers and quite often quite substantial stories and reports from faunistic, ecological, nature conservation, historical, literary and other fields, which we have touched on so far in a total of more than 1,100 pages of Erjavecia. Even the jubilee issue of the newsletter touches on many interesting topics on 144 pages; among other things, it also brings a substantial odontological bibliography of Slovenia for the period from 1685 to 2015. This includes all known written sources about Slovenian dragonflies. The number of titles cited so far in the collection, which has been continuously updated for two decades, has also risen to almost 1,100. In the Slovenian Odonatological Society, we will continue to strive to ensure that Erjavecia remains

the central place for collecting a wide variety of information about dragonflies in Slovenia and beyond. All members of the Slovenian Odonatological Society and contributors receive the Erjavcica newsletter in printed form. You are welcome to send your field observations, experiences or any odontological notes to [matjaz\\_bedjanic@yahoo.com](mailto:matjaz_bedjanic@yahoo.com).] Address: Bedjanic, M., M., National Institute of Biology, Vecna pot 111, 1000 Ljubljana, Slovenia. Email: [matjaz.bedjanic@nib.si](mailto:matjaz.bedjanic@nib.si)

**22383.** Bedjanic, M. (2015): Intervju: Bostjan Kiauta. Trdoziv 4(2): 23-28. (in Slovenian) [Matjaz Bedjanic, inspiring odonatologist from Slovenia, interviewed Bastiaan Kiauta, founder of journal *Odonatologica* and most influencing person of *Societas Internationalis Odonatologica*. Here we document in English language the questions asked. For the complete interview in Slovenian language see: [https://botanico-drustvo.splet.arnes.si/files/2019/03/Trdoziv08\\_web.pdf](https://botanico-drustvo.splet.arnes.si/files/2019/03/Trdoziv08_web.pdf). I used 'Google translate' to translate the questions into English language. The following questions were asked: "Prof. Kiauta, let's start with a question you've probably answered a thousand times: Why did you choose dragonflies as the central group of your admiration and research? How did you get into research in the first place? It must have been a special challenge in those days. At the beginning of your entomological journey, your uncle, Prof. Ciril Ažman, one of the last Slovenian polyhistorians. You were also in contact a lot with Alfonzo Gspan. I assume that these two men were your main source of information for such a broad knowledge of the development and history of Slovenian entomology. Can you tell us something else about your science activities during your high school years? What was fieldwork actually like in those days? Probably quite unimaginable from today's perspective... For this reason, the weight of your comprehensive faunistic contributions about the dragonflies of the Loka territory, the Triglav National Park, the Kamniška Bistrica basin, etc. so much bigger. In your work *Odonata fauna of Slovenia*, in the sixties of the last century, you recorded species of dragonflies for the territory of Yugoslavia at the time, for the first time, such as *Somatochlora alpestris* etc. ... Did this surprise you or were you specifically looking for them? In 1962 you moved to the Netherlands. Were you forced into this due to the political situation and pressures, or was Slovenia simply "too small" for you? The year 1971 is important in the Netherlands, when the international odontological association *Societas Internationalis Odonatologica* - S.I.O. was founded. You played the main role in this from the very beginning, you were the driving force of the project, and you were surrounded by the majority of active odontologists in the world. It probably opened your odontological horizons even further. If we are talking about journals and their editing, and in this respect we can draw a parallel with the field work that you talked about earlier... Today, the edition of the publication is a "small snack", but in the 70s and 80s of the last century there were no computers, no e-mail, technically it was the "Stone Age" of newspaper publishing back then compared to what is available today. The publication of a new volume every three months, always on time, 1,400 edited articles that had to be partly written, rewritten, edited, communicated with the authors through letters; How have you managed it in 42 years of publishing *Odonatologica*? Such extensive correspondence with many authors requires a lot of time, accuracy, discipline... I read somewhere that your correspondence with many odontologists around the world runs into hundreds of thousands of letters. Just the two of us exchanged several hundred letters in all these years from 1993 onwards. In your archive there is only ten and more meters of correspondence... Let's briefly review other matters that interest you. You have dealt with caves, bats, bears are also your favorite subject... In 2002, the Queen

of the Netherlands named you a Knight of the Order of Orange-Nassau. Can you tell us a bit more about how that came about? They say that behind every successful man is an equally successful woman. For you, this is your wife Marianne, who has been doing extremely important work "behind the scenes" for many years. As I know, you have a new very important occupation at home in the Netherlands, where you have been living on a farm for several years... One last question... Last year and again this year, you published some very interesting odontological contributions for the territory of Slovenia, for example the one about the dragonflies of Ljubljana in the journal *Natura Sloveniae*. In short, can you release us any other project that you plan to work on in the future? Dear Prof. Kiauta, thank you very much for this conversation. We want and hope that we can count on your cooperation and support for many years to come. We are proud that, as an honorary member of the Slovenian Odonatological Society, you are still an active odontologist, and we are glad that you are always ready to help younger colleagues with your knowledge and advice. We wish you and dear Marianne many more healthy, creative and happy years!" (Author/Google translate)] Address: Bedjanic, M., M., National Institute of Biology, Vecna pot 111, 1000 Ljubljana, Slovenia. Email: [matjaz.bedjanic@nib.si](mailto:matjaz.bedjanic@nib.si)

**22384.** Bernal, A.; Frutos, I.M.; Olivera, M. (2015): Confirmación de la presencia y reproducción de *Onychogomphus costae* (Selys 1885), (Odonata, Gomphidae) en la provincia de Cádiz. *Boletín de la Asociación Odonatológica de Andalucía* 3: 39-46. (in Spanish, with English summary) [There was just one former record of *O. costae* in the province of Cádiz (Jödicke, 1996). 18 potentially habitats of *O. costae* were studied, and at 12 of them the species was recorded. These records in the province of Cadiz are mapped. In a table the co-occurring species are listed.] Address: Bernal, A., C/ Juan Ramón Jiménez 28, 11160 Barbate, Cádiz, Spain. Email: [arturo.libelula@gmail.com](mailto:arturo.libelula@gmail.com)

**22385.** Bernal, A.; Olivera, M.; Frutos, I.M. (2015): Primera cita para la especie *Selysiotermis nigra* Van der Linden, 1825 (Odonata: Libellulidae) en la provincia de Cádiz. *Boletín de la Asociación Odonatológica de Andalucía* 3: 7-10. (in Spanish, with English title) [*S. nigra*, male 28-VIII-2014, La Molina, Spain.] Address: Bernal, A., C/ Juan Ramón Jiménez 28, 11160 Barbate, Cádiz, Spain. Email: [arturo.libelula@gmail.com](mailto:arturo.libelula@gmail.com)

**22386.** Conesa, M. (2015): Fauna odonológica en la Laguna Amarga (Córdoba, España). *Boletín de la Asociación Odonatológica de Andalucía* 3: 11-17. (in Spanish, with English summary) [The existence of 21 species of odonates was confirmed, among which *Trithemis kirbyi*, *Orthetrum trinacria*, *Brachythemis impartita* and *Diplacodes lefebvrei*.] Address: Conesa Garcia, M.A., Asociación Odonatológica de Andalucía, Spain. Email: [mconesa@libelulas.es](mailto:mconesa@libelulas.es)

**22387.** Gaona, M.J.; Navarrete, F.E. (2015): Nueva cita en la provincia de Cádiz (España) de *Orthetrum nitidinerve* (Selys, 1941), (Odonata: Libellulidae). *Boletín de la Sociedad Andaluza de Entomología* 25: 13-15. (in Spanish) [Verbatim: *O. nitidinerve* is a medium-sized anisopteran; males with the body covered with a grayish-blue pruinosity and orange pterostigma. Its main difference with the rest of the species of the genus lies in the yellow color of the radial and costal veins (Askew, 2004; Dijkstra & Lewington, 2006) (FIG. 1). The species object of this note is an Ibero-Maghrebi element (Torralba Burrial & Ocharan, 2007), distributed mainly throughout the Maghreb (Morocco, Algeria, Tunisia and Libya), reaching the Iberian Peninsula, Sardinia, Sicily and some localities in the Italian Peninsula (Conci & Nielsen, 1956). Most of



the citations are before 1980 (Boudot et al., 2009) In Andalusia it is cited for the first time by McLachlan (1889) in Algeciras (Cádiz) (UTM: 30STF70). Subsequently, it is cited on two more occasions in the province of Cádiz, specifically in Algeciras (30STE79), (Ocharan, 1992) and in the Barbate river basin (30STF31), (Hampe, 2004). Previously in the province of Málaga it is cited in the Arroyo Toquero (30SUF76), (Conesa, M. & García, E. 1983), and in the Arroyo de la Calera. Los Alcornocales, in the province of Cádiz (30STF64), (Cano-Villagas, F. et al. 2012). Recently, in September 2014, a female specimen was also located in Malaga in the Guadaiza river basin (30SUF15), (Conesa-García M. & Rodríguez-Martínez, D. 2015). The first observation of the species in grid 30-STF69 was on 9-IX-2014. Three adult males were observed. On 11-IX-2014, five adult males were counted again. In a new observation on September 15, 2014, 4 males and one female were recorded (FIG.2), all adults. On 30-IV- 2015, continuing sampling in the study area, a male teneral of *O. nitidinerve* was located (FIG. 3). Ten days later, new specimens were still observed, in this case a female (FIG. 4). The habitat where this population was found is a natural watercourse on sandstone soils, in a pasture replacing cork oak with *Teucrium scorodonia* (FIG. 5). Other species of odonates are observed in the sampled area: *Ischnura graellsii*; *Calopteryx haemorrhoidalis*; *Anax imperator*; *Orthetrum chrysostigma* and *O. coerulescens*.] Address: Gaona, J.M., C/Alhóndiga 5-1ºB 11370, Los Barrios, Cádiz, Spain. Email: ergaona1@hotmail.com

**22388.** Hernando Soriquer, A.; Vidal Cordero, J.M.; Cortés Merino, S.; Urbano Tenorio, F.; Hita Ordóñez, D.; Caballero Cid, M. (2015): Primera cita de *Trithemys kirbyi* (Sélys, 1891) (Odonata: Libellulidae) en la Reserva Natural del Humedal de Padul (Granada, Sureste de la Península Ibérica). Boletín de la Asociación Odonatológica de Andalucía 3: 3-6. (in Spanish, with English summary) [ *T. kirbyi*: 22-06-13: 2 males; 06-07-13: 1 male; 31-08-13: 1 male] Address: Hernando Soriquer. Email: androcito90@gmail.com;

**22389.** Rache Rodríguez, L. (2015): Caracterización de hábitat y morfología de algunas especies del género *Perithemis* (Odonata: Anisoptera) presentes en la Cordillera Oriental. MSc thesis, Universidad Nacional de Colombia, Facultad de Ciencias, Departamento de Biología, Bogotá, Colombia: 140 pp. (in Spanish) ["Of the genus *Perithemis*, 14 species have been described so far and it is composed of small individuals with amber wings in males that sometimes have dark spots, while in females the wings are completely hyaline or with amber spots. In the present research, 30 bodies of water located on the two slopes of the Colombian eastern mountain range are studied in order to identify the general characteristics of the habitat of *Perithemis lais* and *P. mooma*, as well as establish the relationship between these and the morphology of the at. Because the two species show very different distributions (wide in *P. mooma* and restricted in *P. lais*) it is interesting to determine what factors may condition their presence in a specific region or body of water. Therefore, it was evaluated whether there were quantitative differences between the water bodies inhabited by *P. lais* and *P. mooma* and those in which they do not. As well as, determine if the morphology of the wings is related to the environmental variables of aquatic systems. Four samplings were carried out over a year in each of the selected sites, in which chemical, physical and biological variables of the water bodies were measured, as well as land use in the surroundings. In addition, adult individuals and larvae that were raised in the laboratory were collected in order to examine the morphology of the wings. The cluster and principal component analyzes showed that the water bodies in which the species were collected have

little internal variation and differ from the others. Through logistic regressions it was possible to establish the most important environmental variables for each of the species. In the case of *P. lais* they were temperature, shadow on the water mirror, continuity of the macrophyte belt and conductivity, while for *P. mooma* pH, conductivity, water temperature, free water mirror, oxygen, shadow on the water mirror, width and continuity of the macrophyte belt were selected. For its part, the analysis of the morphology of the wings was done through geometric morphometry, a method in which the shape of a group of organisms can be quantified, separating the effect of size, in order to compare it with others. For *P. mooma* and *P. lais*, the left forewing and hindwing of males collected in the selected water bodies were used. After observing the patterns shown in the principal components and cluster analysis, Manova and Monte Carlo tests were performed to test significant differences between the populations. In addition, multiple regressions were used to establish whether the environmental variables of the water bodies had any relationship with the shape and size of the wings. Very low interpopulation variation was found in the two species and little correlation between the shape of fore and hind wings with environmental variables, while size did show a strong correlation with altitude and temperature. It is proposed that the absence of interpopulation variability in the two species is due to the fact that the shape of the wings is a conservative trait in them and that there is genetic flow between the populations mediated by females that present some traits found in migratory species, which which enables them to travel great distances and allow genetic exchange." (Author/Google translate)] Address: <https://repositorio.unal.edu.co/bitstream/handle/unal/56544/leonardoracherodriguez.2015.pdf?sequence=1&isAllOwed=y>

**22390.** Rodríguez Martínez, D.; Conesa Garcia, M.A. (2015): Odonatos en los cursos fluviales de la fachada sur-oeste de Sierra Bermeja (Málaga, España): Resultados preliminares. Boletín de la Asociación Odonatológica de Andalucía 3: 28-38. (in Spanish, with English summary) ["Odonata in Rivers of the South-West Facade of Sierra Bermeja (Malaga, Spain): Preliminary Results: This document discloses the results until November 2014 of the sampling campaign that Asociación Odonatológica de Andalucía (AOA) has been developing in river basins of Sierra Bermeja, mainly in rivers Padrón, Castor, Guadalmanza, Guadalmina, Guadaiza and Verde. Among others, three new locations are disclosed for *Macromia splendens*, two for *Oxygastra curtisii*, two for *Gomphus graslinii* and one for *Orthetrum nitidinerve*. Significant progress has also been achieved in the general catalog of Odonata species present in the rivers of Sierra Bermeja, several of which had been poorly prospected to date. The results indicate that Sierra Bermeja is a wilderness area of the first order for the conservation of dragonflies in Andalusia: it has a very significant number of taxa - 42 species recorded so far- and several populations of dragonflies with a high degree of global threat or a very restricted distribution in the Iberian Peninsula and the European Union. Current distribution of some of these protected species, as *Macromia splendens* and *Gomphus graslinii*, could be significantly reduced short-term because the urban projects that develop and will be developed in Sierra Bermeja, incompatible with the conservation of the rivers and the surrounding forest habitats." (Authors)] Address: Conesa Garcia, M.A., AOA, Spain. Email: mconesa@libelulas.es

**22391.** Rodríguez Martínez, D.; Conesa Garcia, M.A. (2015): *Coenagrion lunulatum* (Charpentier, 1840) & *Sympetrum flavolum* (L., 1758) in Lake Tabatskuri, Georgia (Caucasus). Boletín de la Asociación Odonatológica de Andalucía 3: 18-24. (in Spanish, with English summary) [*C. lunulatum* and *S.*

flaveolum were recorded on July 6, 2014, along the northeastern shore of the lake. "In this area the lake overflows creating a marshy area of flooded grasslands and various arms of shallow water where reed beds thrive. The day started sunny and windless, with air temperature around 14°C at midday, and changed to very windy and finally stormy and rainy as the hours passed." (Authors)] Address: Conesa Garcia, M.A., AOA, Spain. Email: mconesa@libelulas.es

**22392.** Rodríguez Martínez, D.; Conesa Garcia, M.A. (2015): *Orthetrum nitidinerve* (Sélys, 1841) (Odonata: Libellulidae) en Sierra Bermeja (Málaga, España). *Boletín de la Asociación Odonatológica de Andalucía* 3: 25-27. (in Spanish, with English summary) ["In the course of a series of sampling carried out in Sierra Bermeja (Málaga), in the UTM UF15 grid we found an area of flooding, belonging to the sub-basin of the Daidín stream, a tributary course of the Guadaiza river, which originates in the ravine of the Cuerna and that leaves materials dragged as it passes through a system of terraces, formerly used for agriculture. Thanks to this contribution, several of these terraces are permanently flooded, forming large mudflats. This environment can be associated with index 3270: "River courses with contributions of muddy sediments on the banks, generally during floods, which are colonized by pioneer and nitrophilous species", in the catalog of Habitats of Community Interest, (Manuel, Robles & Tejero, 2009). In this area we found a female *Orthetrum nitidinerve*, on 13-IX-2014; Although the flight period recognized for the species ranges from April to October (Dijkstra & Lewington, 2006), we think that it was at the limit of its flight period, since its left hind wing was very deteriorated. In sampling after September no more individuals were observed. It is possible that the successive findings that have been found of this species in recent years are related to the impulse given by different naturalist associations (A.O.A. and the R.O.L.A.) in the study of dragonflies in Andalusia, considerably increasing the number of observers and the number of grids sampled." (Authors/Google translate)] Address: Conesa Garcia, M.A., AOA, Spain. Email: mconesa@libelulas.es

## 2016

**22393.** Bhati, D.; Srivastava, M. (2016): Entomo-fauna as documented employing cage net and light trap in some sewage irrigated agro-ecosystems in and around Bikaner, Rajasthan, India. *International Journal of Basic and Applied Sciences* 5(2): 23-36. (in English) ["During this century, the practice of irrigating agricultural crops with sewage waters in rural and peri-urban areas of our country is becoming a common practice as the soil is very good for cropping. Concern for human health and environment are the most important constraints in the use and before one can endorse this means, a thorough analysis seems to be a pre-requisite from social, economical and ecological standpoint. Looking into this, it was proposed to document information relating to insect status in such sewage irrigated farms and thus the present work was undertaken to study the insect scenario (diversity and density) in some sewage irrigated agro-ecosystems in and around Bikaner, Rajasthan. Indigenously designed cage and light trap were employed for insect collection. The cage net trap collection comprised of ... five odonates [*Lestes* sp., *Agriocnemis femina*, *Rhodischnura nursei*, *Bradinopyga geminata*, *Pantala flavescens*], ... while, in light trap collection order Lepidoptera was represented by thirteen species, order Coleoptera was represented by seventeen species, order Hemiptera was represented by seven species, order Hymenoptera, Orthoptera and Diptera by one species each respectively. Based on density (number), the cage net collection comprised of 6 dominant, 63 frequent and 28 rare species, while, in

light trap collection, based on density (number), 14 were dominant, 17 were frequent and 9 were rare." (Authors)] Address: Srivastava, Meera, Laboratory of Entomology, Post Graduate, Department of Zoology, Government Dungan College, Bikaner 334001, Rajasthan, India

**22394.** Calvao, L.B. (2016): Padrão de distribuição de Odonata (Insecta) em sistemas aquáticos com exploração de madeira na Amazônia Oriental: seleção de microhabitat e características morfológicas das libélulas. Tese (Doutorado) - Universidade Federal do Pará, Museu Paraense Emílio Goeldi, Belém, 2017. Programa de Pós-Graduação em Zoologia: 118 pp. (in Portuguese or English) ["Biological communities are distributed in a spatially structured way in aquatic systems, so that the loss of habitat integrity by anthropic actions and the restrictions imposed by the morphological characteristics of the species contribute to the existing pattern of the meta-community in the environment. The hydric systems constitute good models for identifying the processes that participate in the local distribution of organisms. The tributaries of these systems are arranged in a dendritic network under the restriction of multiple environmental conditions and are very sensitive to the modifications that occur in the drainage basin. These modifications are mainly those resulting from human activities, which generally culminate in the loss of resident biodiversity. In the Amazon region, wood exploitation has been considered one of the main activities that cause high rates of deforestation. To reduce the drastic effects on the environment, some forest management techniques, such as Reduced Impact Management (RIM), have been implemented in order to extract the raw material from the natural environment and promote the conservation of species and processes necessary for the functioning of the ecosystem. On the other hand, uncontrolled exploitation, known as conventional exploitation, alters the channel morphology of aquatic ecosystems, reduces vegetation cover and increases the input of fine sediment, generally altering acceptable physical-chemical-microbiological water parameters. Seeking to evaluate the effects of logging on aquatic biodiversity, we will use the order Odonata as a model organism, due to its sensitivity to modifications in the aquatic environment, high species diversity and being associated with diverse types of aquatic environments, as well as living at the interface with the terrestrial environment. The aim of the thesis is to evaluate the distribution pattern of Odonata species in water systems that are distributed in areas subjected to conventional or reduced impact logging in the Eastern Amazon region. To answer this objective the thesis was divided into three chapters, whose objectives are: (i) To evaluate if Odonata diversity decreases in areas with conventional logging, and, to identify which are the abiotic variables that structure Odonata composition. (ii) To evaluate the intensity of environmental and spatial factors on the distribution of Odonata species in the sampled streams and to verify if a taxonomic turnover of species occurs in natural areas (intact). (iii) To evaluate which are the morphological structures of the Odonata order associated with the environmental gradient in the three treatments (reference (REF), reduced impact management (MIR) and conventional logging (CC))." (Author) Translated with www.-DeepL.com/Translator (free version)] Address: <https://repositorio.ufpa.br/jspui/handle/2011/8748>

**22395.** Cho, R. (2016): Odonata in cranberry bogs successions in Manomet, Massachusetts. Senior Thesis, Boston College, Department of Earth and Environmental Sciences: 50 pp. (in English) ["Odonata are robust but due to their aquatic larval life cycle they are sensitive ecological markers. There is much literature on the organisms themselves, but no prior

documentation that they are found in the watery ditches of cranberry bogs. Cranberry bogs are an important part of Massachusetts' agricultural identity and some like Tidmarsh Farms, under conservation efforts, are being put into natural restoration. This study sets to explore Odonata specifically in cranberry systems by examining odonate adult and larval populations in and around the ditches of cranberry bogs followed for different lengths of time. Methods included taking pseudoreplicates of the three bog successions- 0, 5, and 15-year - by dipping for larvae and measuring ditch characteristics of width, depth, and vegetation cover, along with pollard walks to observe adults. I found that the dynamic nature of the bog by ditch characteristics and seasonal variation have an effect on odonate populations and may not adhere specifically to ecological succession theory. This data would hope to contribute to a more expansive longitudinal study of management practices and restoration on cranberry bogs and Odonata ecology as a whole." (Author)] Address: [https://static1.squarespace.com/static/56abe18e859fd0cac926d37a7/573efe12555986cb895bb0a8/1463746076070/Cho\\_Rachel+Thesis.pdf](https://static1.squarespace.com/static/56abe18e859fd0cac926d37a7/573efe12555986cb895bb0a8/1463746076070/Cho_Rachel+Thesis.pdf)

**22396.** Cifci, M.C. (2016): Odonata fauna of Ilısu dam water basin. The Abstract Book of Ecology 2016 Adnan Alde-mir Symposium, 16th -19th May 2016 The Kars Park Hotel Kars: 13-14. (in Bilingual in English and Turkish) [[https://www.researchgate.net/publication/305209850\\_Odonata\\_-\\_Fauna\\_of\\_Ilisu\\_Dam\\_Water\\_Basin](https://www.researchgate.net/publication/305209850_Odonata_-_Fauna_of_Ilisu_Dam_Water_Basin). Calopteryx splendens, Erythromma lindenii, Ischnura elegans, Epallage fatime, Platycnemis dealbata, P. kervillei, Gomphus schneiderii, Onychogomphus macrodon, Crocothemis erythraea, C. servilia, Orthetrum albistylum, O. brunneum, Sympetrum fonscolombii, Trithemis annulata] Address: Çiftçi, M.C., Siirt University, Agriculture Faculty, Department of Plant Protection, Siirt, Turkey. E-mail: empidae@gmail.com

**22397.** Dhandu, S.R. (2016): Lift & drag analysis of a 3D synthetic dragonfly wing. Master of Engineering thesis, The University of Canterbury: 119 pp. (in English) ["A 3D dragonfly wing is developed by using the Autodesk point cloud methodology, which takes several high definition (HD) pictures of the wing and uploads them into the software which computes all the spatial points and to give a rough matrix of the external structure. The structure is further modified by using Mesh mixer and printed in 3D of Acrylonitrile butadiene styrene (ABS) material. Initially a bending and torsion stiffness test is carried out by cantilevering the wing onto a U shaped frame, where the increasing weights are suspended on the wing tip end to calculate the deflection upon loading at different room temperatures. Keeping the Reynolds and Strouhal numbers constant, a flapping mechanism is de-signed consisting of two smart servo motors connected to the wing root with a fix-tures designed to give the wing four axis degrees of freedom (DOF) maintaining the centre line axis. The servos are programmed by using Arduino Nano board and the whole mechanism is fixed onto two load cells on an apparatus which is connected to a LabView® programme for collecting the data. The data from the load cells is taken and investigated in MatLab® by using Fourier analysis. The maximum deflection of the wing tip as per the literature review is in the range of 3-12 mm depending on the loads acting on the wing during flight. For this thesis the average deflection of the wing tip during the experiment upon applied loading is to be about 3-10 mm. It varies with the forces acting on it and also expected to change for another sample of the model wing which can be produced using flexible PVC which has different properties. These deflection values are used to determine the amount of force acting on the wing tip during

the bottom end of the flap cycle. The torsional deflection of the wing during flight was assumed to be 20 degrees. Where as in the torsional stiffness experiment it is more than 10 degrees for the ABS structure. The values obtained during the experiment is lower compared to the value from the previous literature due to the rigidity of the material. It varies with the forces acting on it and also expected to change for another sample of the model wing which can be produced using flexible PVC which has different properties. The flapping experiment is carried out for various flapping and torsional angles using a flapping test rig. The data is studied for the extraction of the forces acting on the wing and is assumed to give more information on the stable and unstable aerodynamics of the dragonfly wing. It is observed that when the phase difference is changed from 0° to 270° the lift generated value is raised from 0.4N to 0.6N. CL-max is determined as 0.55 and is maximum when the phase difference between the flapping angle, torsion angle is maintained as 270°. It is reducing for lower phase differences of 90° and 0°. For two consecutive experiments with a 180° phase difference CL-max is remaining constant at flapping angle of 60°, 90° while frequency and torsion angle are maintained constant. The CD is observed to be consistently low and reaching maximum of 0.125 within the experiments. This research values can be used as a source for developing a flapping unmanned aerial vehicle (UAV)." (Author)] Address: <https://ir.canterbury.ac.nz/server/api/core/bitstreams/b2377737-fd23-44-11-a820-714ec0c66f66/content>

**22398.** Dolný, A.; Harabis, F.; Bárta, D. (2016): Vážky (Insecta: Odonata) České Republiky. Academia, Praha: 342 pp. ["Dragonflies, which appeared on Earth almost 300 million years ago, stand out with a number of unique features. Due to the relatively low number of species, they belong to the best-studied groups of insects, with regard to their taxonomy, ecology and distribution. In addition, they are enjoying increasing popularity, so besides butterflies and beetles, there are probably not many other groups of insects that have the same positive reception from both the professional and the lay public. Also for these reasons, a new practical picture publication was created, which differs from previous works in many respects. Above all, this atlas can be used very well as a field guide, and at the same time, it also contains general information about the life of dragonflies, their biology and ecology." (Publisher/Google translate)] Address: Dolný, A., Dept of Biology and Ecology, Faculty of Science, University of Ostrava, Chittussiho 10, CZ-710 00 Slezská Ostrava, Czech Republic. Email: ales.dolny@osu.cz

**22399.** Ellis, L.E.; Jones, N.E. (2016): A test of the serial discontinuity concept: longitudinal trends of benthic invertebrates in regulated and natural rivers of northern Canada. River Research and Applications 32(3): 462-472. (in English) ["Abiotic and biotic impacts below impoundments within the context of the River Continuum (RCC) and the Serial Discontinuity Concepts (SDC) have been the focus of many lotic studies. Recovery gradients, however, are rarely examined in sufficient detail below dams. Further refinement and understanding are needed to inform science and river managers about regulated river ecology. In this study, we examine longitudinal patterns in abiotic and biotic characteristics in two regulated rivers in Northern Canada. We also examine spatial patterns on two natural rivers: a lake outlet river and a river with no lakes. Direct gradient analysis revealed that increases in periphyton, planktonic drift, primary production, substrate size, and changes in thermal regime at sites closest to the dam drive benthic invertebrate community characteristics. We test the Serial Discontinuity Concept by

comparing predicted functional forms of each environmental variable with the empirically derived forms. Substrate size, periphyton biomass, and drift density increased below dams and recovered quickly within 5 km downstream, following closely with SDC predictions. The response of organic matter and water quality was variable, and benthic invertebrate richness recovered relatively quickly, contrary to SDC predictions. Thermal regime and flow took much longer to recover than most variables and represent a second longer gradient type below dams. Plecoptera, Gomphidae, and Simuliidae were strongly influenced by altered resource and habitat and may be good candidates for indicators and predictive modelling. Our results generally support predictions from the Serial Discontinuity Concept and highlight the need for the further testing and refinement of this concept. ... The recovery of these variables and specific taxa (e.g. Plecoptera and Odonata) can provide river managers a focussed target on assessing the impacts of hydroelectric impoundments on rivers. Future studies could focus on specific environmental requirements of Plecoptera and Odonata to determine indicator capability. In particular, further study on Gomphidae would be especially useful as their presence is linked to riparian vegetation, incorporating lateral floodplain connectivity into river management." (Authors)] Address: Ellis, Lucie, Environmental and Life Sciences Graduate Program, Trent University, 2140 East Bank Drive, Peterborough, ON, Canada, K9J 7B8. E-mail: lucylee2@trentu.ca

**22400.** Erbida, N. (2016): Pisani akrobati. Zelene prestolnice 2016 [Colourful acrobats. Green Capitals 2016]. Trdov: Bilten slovenskih terenskih biologov in ljubiteljev narave 5(2): 49-50. (in Slovenian) [Verbatim/DeepL: Adult dragonflies are agile insects in a rainbow of colours that can be admired especially in the warmer part of the year. When we watch their antics by a marsh, lake or river, we are tempted to take a photo to capture the beautiful colours and their gracefulness. In order to draw the attention of the general public to the photogenic but unfortunately endangered dragonflies, the Slovenian Odonatological Society has launched its second photography competition. The first one was successfully held in 2013 under the name of the Photo Contest "Colourful Acrobats". Between May and September 2016, we collected 136 photographs from 55 authors in three sections, namely A (primary and secondary), B (students) and C (adults). In October, the jury consisted of: Dr Tomi Trilar, an employee of the Natural History Museum of Slovenia, where he works mainly on insects, but also on bioacoustics and photography; Dr Ali Šalamun, an employee of the Centre for Cartography of Fauna and Flora, where he works mainly on dragonflies and on Geographic Information Systems; and Mr Janez Tarman, a professional natural history photographer. The jury selected three winning photographs in each category, which are published in this issue, and the official announcement of the winners took place on 24 November 2016 at the Dept of Biology, Faculty of Biotechnology, University of Ljubljana. Here, the participants were introduced to dragonflies and the reasons why they are endangered, and were presented with symbolic prizes and awards. After the announcement, we opened an exhibition of the selected photographs, followed by a feast of local delicacies. During the project, we also organised photography field workshops in the Ljubljana area, where we showed the participants some techniques for photographing dragonflies. Creative workshops were held at the Ljubljana Zoo, where we worked with visitors to make dragonfly-shaped products, and two workshops were also held at the City Square, where the Green Capital of Europe 2016 Point For You was operating. The Green Capital's Colourful Acrobats photo competition was made possible by the Ljubljana

Municipality's Department of Environmental Protection, the STIKS Association, the Ljubljana School of Art, the Student Organisation of the Faculty of Biotechnology, the Department of Biology at the Faculty of Biology of the University of Ljubljana and the Ljubljana Zoo. The winning photographs are published, with one exception, as part of the article on the next page. The photo by Roko Štirn is featured in this month's Photo Life.] Address: <https://www.dlib.si/details/URN:NBN:SI:DOC4HUNW72O/?=&query=%27rele%253dTrdo%25c5%25beiv%27&pageSize=25>

**22401.** Erbida, N. (2016): Košèèeni škratec na Ljubljanskem barju [Coenagrion ornatum on the Ljubljana Marshes]. Trdov: Bilten slovenskih terenskih biologov in ljubiteljev narave 5(2): 9. (in Slovenian) [Verbatim/DeepL: C. ornatum... is a habitat specialist, occupying only slow-moving, sunny waters with abundant riparian and aquatic vegetation. In Europe, it occurs in the east and south of the continent. The species is relatively poorly known, while its closest relative, C. mercuriale, is one of the best-studied European dragonfly species. This is mainly due to its distribution in western and central Europe, where dragonfly research is much more active than in the rest of the continent. Although the two species occupy similar habitats, both are threatened and protected in Europe and Slovenia. C. mercuriale does not occur in Slovenia. C. ornatum is found in a good part of Slovenia, but is rare wherever it occurs. Today, the species' habitats are mostly anthropogenic, such as drainage canals. Therefore, based on some previous surveys, we conclude that the largest populations in Slovenia are found in the Ljubljana Marshes and the Vipava Valley, where the canal networks are most extensive. However, we do not know how numerous these populations are, nor is it known how large populations occur elsewhere in Europe. Only a few waters in Slovenia have so far recorded a few tens of individuals, and most have only found a few individuals. Only a few waters in Slovenia have so far recorded a few dozen specimens, but mostly only a few specimens have been found. My Master's thesis Population dynamics of the C. ornatum at a selected location in the Ljubljana Marshes was aimed at determining the population size C. ornatum in the Ljubljana Marshes using the mark-release-recapture (MRR) method. Initially, we wanted to carry out the study over the whole of the Ljubljana Marshes, but it became apparent in the first fieldwork that a single individual could not capture and mark specimens over such a large area. The Ljubljana Marshes is a culturally and nature conservation important area and as such is protected as a landscape park and Natura 2000 site, for which C. ornatum is a qualifying species. We chose a 470 m long canal south-west of Kozlarjeva gošta and north of Matena. In the selected area, all specimens of the Box Turtle Dace were caught on each field day from the beginning of May until mid-July 2013. They were marked on the skirt with an alcohol marker with a permanent and unique mark. Despite the fact that the canal population is not isolated, we expected a higher recapture rate in this study, as the Bone Grebes are relatively poor fliers. The low recapture rate results in a rather imprecise estimate of the population size, but we still obtained a more accurate estimate than has been given in previous field surveys. The estimated population size of the Bactrian Lark for Slovenia as a whole has so far ranged from a few tens to a few hundreds of thousands of individuals. A total of 2,168 individuals were caught in the survey, of which 1,690 were males and 478 were females, with an overall recapture rate of 14%. As expected, more males were caught than females, and the recapture rate of males was also higher. This is because females spend most of their time away from the water, where they feed and produce eggs, and they are more cryptic in colour, making them



harder to spot. Therefore, fewer females than males were captured in the study, which was conducted only near the water. Males, on the other hand, spend most of their time by the water, waiting for females to mate with them just before they lay their eggs in the water. The total estimated population size in the selected canal is 12,617 or between 5,326 and 19,906 individuals. We also found that 79% of the specimens moved less than 100 m from their original capture site. No population study has been carried out in Slovenia on the Bone Bream, so a comparison of population abundance is not possible. However, based on the results and reports of other records of the species in Slovenia, the population in the Ljubljana Marshes is one of the largest in Slovenia. We believe that the planned maintenance of the canals is very important for the conservation of the Bone-nosed Damselfly, as well as for the conservation of other endangered dragonfly species present in this habitat. Further research is needed in the whole area, but we recommend that a larger number of people be mobilised to survey a larger area.] Address: <https://www.dlib.si/details/URN:NBN:SI:DOC-4HUNW72O/?=&query=%27rele%253dTrdo%25c5%25beiv%27&p ageSize=25>

**22402.** Frank, M. (2016): Eiablage von *Anax imperator* auf einer nassen Holzterrasse (Odonata: Aeshnidae). *Libellen in Hessen* 9: 45-50. (in German) ["A female *A. imperator* was observed laying her eggs on a wet wooden terrace in the middle of a residential area and at least two kilometers from the nearest reproductive water. The terrace had previously been cleaned with water and therefore had a surface that was still wet and reflected light. The most likely cause of this egg laying in unsuitable artificial substrate is thought to be a polarotactic response - a known, general ability of dragonflies to detect water surfaces based on reflected horizontally polarized light." (Author/Google translate)] Address: Frank, M., 55268 Nieder-Olm, Germany. E-mail: [mikel.frank@gmx.de](mailto:mikel.frank@gmx.de)

**22403.** Joest, R.; Beckers, B. (2016): Libellenfauna des Feuchtwiesenschutzgebietes Ahsewiesen. *Natur in NRW* 1/16: 43-47. (in German) [Nordrhein-Westfalen, Germany "In the Ahsewiesen nature reserve, small bodies of water and lakes were created from 1988 onwards, ditches were dammed and waterlogging measures were carried out in order to improve living conditions, especially for meadow bird species. As part of the success monitoring, the dragonfly fauna was mapped from 1988 to 2003, which was repeated in 2015. The species identified in 2015 were predominantly widespread habitat generalists in still waters. What is remarkable is the relatively high number of individuals in the endangered pioneer species *Ischnura pumilio*. The total number of species has increased from four in 1988 to 27 in 2015. This is due to the creation of numerous small bodies of water and lakes as part of renaturation measures. In addition, supra-regional climatic changes have also enabled the establishment of heat-loving species. The development in the Ahsewiesen shows that the measures implemented to improve the habitat for meadow birds were also beneficial for other groups of species such as the dragonflies examined here. The living conditions for these species can be permanently improved through further measures aimed at increasing and maintaining the water level in the area. In order to maintain the quality of the habitat for specialized species, targeted optimization and maintenance to control the succession of water bodies is also necessary." (Authors/Google translate)] Address: Joest, R., Biologische Station Soest, Teichstr. 19, 59505 Bad Sassendorf-Lohne, Germany. E-mail: [rjoest@abu-naturschutz.de](mailto:rjoest@abu-naturschutz.de)

**22404.** Mancu, C.-O. (2016): Dragonflies (Insecta, Odonata)

in Timis county (Banat, Romania), a general view of distribution. *Acta Oecologica Carpatica* 9: 85-120. (in English, with French and Romanian summaries) ["This paper is a synthesis of more than 10 years of research in Timis County. Research started in 1999 and continued with some periods of interruption until 2015. The research was comprised of more than 1000 entries in a database of more than 100 toponyms and resulted in the knowledge that the area hosted 45 species of dragonflies. From these 45 species, nine are of more interest, being species of conservation interest (Natura 2000 species) (*Coenagrion ornatum*, *Gomphus flavipes* and *Ophiogomphus cecilia*) or rarer species in Romanian fauna (*Lestes parvidens*, *Coenagrion scitulum*, *Anax parthenope*, *Somatochlora meridionalis*, *Sympetrum depressiusculum* and *S. pedemontanum*)." (Author)] Address: Mancu, C.O., Acad. Remus Radulet 13, bl. 119, ap. 7, Timisoara 300281, Timis County, Romania. E-mail: [cosminovidiu@yahoo.com](mailto:cosminovidiu@yahoo.com)

**22405.** Nair, A.; Agashe, D. (2016): Host-specific spatial and temporal variation in culturable gut bacterial communities of dragonflies. *Current Science* 110(8): 1513-1523. (in English) ["Many microbial communities are associated with specific animal hosts, with major impacts on the ecological and evolutionary dynamics of both partners. We analysed gut microbial communities of eight dragonfly species in southern India. Adult dragonflies are generalist opportunistic predators; thus, we expected to find relatively high individual variation but low host-specific variation in their gut community composition. However, we find that each host species has a distinct gut bacterial community, with sampling location and month playing a small but significant role in shaping community structure. These patterns suggest that dragonflies either specialize on subsets of available prey, or their guts impose differential selective pressures resulting in distinct communities." (Authors) *Pantala flavescens*, *Orthetrum sabina*, *O. pruinatum*, *Potamarcha congener*, *Rhodothemis rufa*, *Trithemis pallidinervis*, *Urothemis signata*] Address: Agashe, Deepa, National Centre for Biological Sciences, Tata Institute of Fundamental Research, GKVK, Bellary Road, Bengaluru 560 065, India. E-mail: [dagashe@ncbs.res.in](mailto:dagashe@ncbs.res.in)

**22406.** Opaev, A.S.; Panov, E.N. (2016): Space use in territorial and non-territorial male *Calopteryx splendens* (Odonata: Calopterygidae). *Odonatologica* 45(1/2): 57-76. (in English) ["In *Calopteryx damselflies* male territorial and non-territorial alternative mating tactics are identified. Territorial males are believed to secure more copulation. With increasing age, males starve and become non-territorial that only occasionally manage to copulate. However, space use of territorial and non-territorial males is not known in detail. We present the data on space use of individually marked male *C. splendens* ... obtained during two field seasons in Vladimir Oblast, Russia. Each damselfly was captured, marked and the wing length was measured. During observation sessions of 2-4 hours per day, each male was characterised as either territorial or non-territorial and encounter locations were mapped. The probability of being territorial declines with the male's age. Territorial vs non-territorial tactic in a given day strongly influences tactic retention on the next day. We identified the territorial and non-territorial phases in the life of a male, which occur consequently and have roughly similar duration. We define the territorial phase as all days until the last record of a male as a territorial individual. The subsequent days were defined as the non-territorial phase. During the territorial stage, males may (1) occupy a single territory; (2) be non-territorial in some of the days and then return to his previous territory or (3) after staying within a certain territory for several days change it and occupy another territory

on the next day or several days later. The transition from the territorial to the nonterritorial phase is gradual. It may suggest this transition caused by exhaustion. Thus, space use changes predictably during the life of a male. Characteristics of individual lifetime trajectory - number of days when the male was recorded as territorial, - number of territories occupied, etc. - did not depend on wing length." (Authors)] Address: Opaev, A.S., A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences, Moscow 119071, Russia. E-mail: aleksei.opaev@gmail.com

**22407.** Outomuro, D.; Angel-Giraldo, P.; Corral-Lopez, A.; Realpe, E. (2016): Multitrait aposematic signal in Batesian mimicry. *Evolution* 70(7): 1596-1608. ["Batesian mimics can parasitize Müllerian mimicry rings mimicking the warning color signal. The evolutionary success of Batesian mimics can increase adding complexity to the signal by behavioral and locomotor mimicry. We investigated three fundamental morphological and locomotor traits in a Neotropical mimicry ring based on Ithomiini butterflies and parasitized by Polythoridae damselflies: wing color, wing shape, and flight style. The study species have wings with a subapical white patch, considered the aposematic signal, and a more apical black patch. The main predators are VS-birds, visually more sensitive to violet than to ultraviolet wavelengths (UVS-birds). The white patches, compared to the black patches, were closer in the bird color space, with higher overlap for VS-birds than for UVS-birds. Using a discriminability index for bird vision, the white patches were more similar between the mimics and the model than the black patches. The wing shape of the mimics was closer to the model in the morphospace, compared to other outgroup damselflies. The wing-beat frequency was similar among mimics and the model, and different from another outgroup damselfly. Multitrait aposematic signals involving morphology and locomotion may favor the evolution of mimicry rings and the success of Batesian mimics by improving signal effectiveness toward predators." (Authors) Polythore procera, Euthore fasciata] Address: Outomuro, D., Section for Animal Ecology, Dept of Ecology & Genetics, Evolutionary Biology Centre, Uppsala University, Norbyvägen 18D 75236, Uppsala, Sweden. Email: outomuro.david@gmail.com

**22408.** Pitts, M. (2016): Damsels in distress: A study of the effect of temperature on damselfly competitive interactions. Biological Sciences Undergraduate Honors Theses. Paper 21: 16 pp. (in English) ["Temperature has a fundamental role in shaping numerous physiological aspects of organisms, such as growth rate, that determine an organism's performance. Due to global climate change, temperature is projected to keep increasing. As temperature increases, so does an organism's growth rate. Also, as competition increases organisms' growth rate decreases. While studies have examined these factors individually, no experiments have assessed the combined impact of temperature and competition on organism's growth rates. The experiment we conducted manipulated temperature and density in order to project what will happen as a result of rising temperatures." (Author) Enallagma divagans] Address: <https://scholarworks.uark.edu/cgi/viewcontent.cgi?article=1010&context=biscuit>

**22409.** Serrano Leon, J.P.; Gomez Blazquez, A.I. (2016): Notas sobre la presencia de *Paragomphus genei* (Sélys, 1841) (Odonata: Gomphidae), en la cabecera del río Guadamar, (Sevilla, España). *Boletín Asociación Odonatológica de Andalucía* 4: 15-19. (in Spanish) [Verbatim: *P. genei* is a small gomphid with a yellowish-olive color. It has light blue-gray eyes with greenish upper facets. Its thorax is yellowish-green with thick blurred stripes of brown tones on the sutures;

some specimens have a very greenish hue. On the abdomen you can see brown-mahogany and black spots. Males have lateral leaf expansions in the S8 and S9 segments and very characteristic long, yellowish hook-shaped cercoids (Fig. 1, A). The pterostigmata are yellowish in the center, surrounded by very thickened black veins (Dijkstra & Lewington, 2014). The species, the subject of the note, has been cited in all Andalusian provinces with the exception of Almería and Granada. Specifically in Seville there is a single record of a *P. genei* larva at the head of the Guadamar River near the Castillo de las Guardas (29SQB37), (Ferrerías & Gallardo, 1985). After a chance encounter of a female *Paragomphus genei* on a wild olive tree and an exuvia in the vicinity of the Guadamar River, near Gerena, a selection of different potential points was made (FIG.3) where more specimens could be located. to confirm the current status of the species. Much of the route at the head of the river is located within cattle farms that make sampling difficult. This prevented finding any point that confirms the presence on the UTM 10x10 km 29SQB46 grid. This circumstance is repeated when passing through Las Cortecillas (29SQB38). Sampling at each of the points was carried out between 12 and 5 p.m., since these are the main hours of activity for adults, between 30 or 60 minutes depending on the location. Transects were carried out on both banks, in search of the presence of both adults in flight and exuviae (Table 1) that ensured the presence and/or reproduction of the species at said points. These transects were extended to at least 50 meters from the water points so as not to underestimate the population. The adult specimens were photographed and all the exuviae found during sampling were cataloged and preserved for later confirmation. The species associated with each of the observation points were also noted. Point 1: 29SQB3777, Río Guadamar – Hacienda El Castillo. Sandy bed with a maximum channel width of 4 or 5 meters. Temporary course that is dry most of the year. On the second visit there was no longer any water flowing, leaving only isolated shallow pools. Abundant shrub and tree plant presence on the banks Point 2: 29SQB3775, Río Guadamar – El Castillo de las Guardas. (Fig. 4) Bed made up of a mixture of coarse sand, gravel and large rocks. Temporary course with bed width between 5 and 8 meters. Pools that are maintained throughout the year. Very abundant riparian vegetation on the banks with a large presence of *Nerium oleander*, *Typha* sp. and trees with roots submerged in water. Point 3: 29SQB4471, Guadamar River – El Alisar. Bed composed of gravel, rocks and coarse sand banks. Temporary course with an approximate width of 8 meters with a nearby irrigation dam. Shrub river-side vegetation composed mainly of *Typha* sp. and *Nerium oleander*. Point 4: 29SQB4857, Río Guadamar- Gerena. Bed 10 to 15 meters wide composed of coarse and fine sand. Water all year round with large water ponds. Shrub vegetation dominated by *Nerium oleander* with the presence of *Arundo donax* and *Typha* sp. Point 5: 29SQB4540, Río Guadamar-Sanlúcar la Mayor. Bed composed of silt, clay and sand. It has water and current throughout the year, although during the summer it is usually minimal. Tree and shrub vegetation in sections dominated by *Phragmites* sp., *Arundo donax*, *Scirpus* sp. and *Juncus* sp. Exuviae of *Paragomphus genei* were found in three of the five points sampled and adult specimens in two of them. *Paragomphus genei* was cited for the first time by Ferreras & Gallardo (1985), for the province of Seville, and was not cited again in subsequent sampling after the Aznalcóllar mine spill (Ferrerías, Cano & Salamanca, 2004). With the specimens and exuviae found in this work, the presence and reproduction of *Paragomphus genei* is reaffirmed in the headwaters of the Guadamar River in the province of Seville. Other species of odonates present in the studied area were the following: *Chalcolestes viridis*, *Ischnura*

graellsii, Platycnemis latipes, Anax imperator, A. parthenope, Onychogomphus forcipatus, Crocothemis erythraea, Orthetrum chrysostigma, O. cancellatum, O. trinacria, Symptetrum fonscolombii, Brachythemis impartita, T. annulata, T. kirbyi] Address: Email: yompisl@hotmail.com

**22410.** Siepielski, A.M.; Nemirov, A.; Cattivera, M.; Nickerson, A. (2016): Experimental evidence for an eco-evolutionary coupling between local adaptation and intraspecific competition. *The American Naturalist* 187(4): 447-456. (in English) ["Determining how adaptive evolution can be coupled to ecological processes is key for developing a more integrative understanding of the demographic factors that regulate populations. Intraspecific competition is an especially important ecological process because it generates negative density dependence in demographic rates. Although ecological factors are most often investigated to determine the strength of density dependence, evolutionary processes such as local adaptation could also feed back to shape variation in the strength of density dependence among populations. Using an experimental approach with damselflies, a predaceous aquatic insect, we find evidence that both density-dependent intraspecific competition and local adaptation can reduce per capita growth rates. In some cases, the effects of local adaptation on reducing per capita growth rates exceeded the ecological competitive effects of a doubling of density. However, we also found that these ecological and evolutionary properties of populations are coupled, and we offer two interpretations of the causes underlying this pattern: (1) the strength of density-dependent competition depends on the extent of local adaptation, or (2) the extent of local adaptation is shaped by the strength of density-dependent competition. Regardless of the underlying causal pathway, these results show how eco-evolutionary dynamics can affect a key demographic process regulating populations." (Authors)] Address: Siepielski, A.M., Program in Ecology & Evolutionary Biology, Dept of Biological Sciences, Univ. of Arkansas, Fayetteville, Arkansas 72701; e-mail: amsiepie@uark.edu

**22411.** Slugaski, C. (2016): Structure and function of dragonfly looming-sensitive neurons. *The FASEB Journal* 30(1, Supplement) [Federation of American Societies for Experimental Biology]. *Experimental Biology 2016 Meeting Abstracts*, April 2016: 760.3 - (in English) [Verbatim: "In this project, I aim to identify specific neurons in the dragonfly brain that respond selectively to looming stimuli. In the dragonfly nerve cord, there are large visual neurons, called Target Selective Descending Neurons (TSDNs). These neurons respond selectively to small moving stimuli, which mimic the movements of dragonfly prey. The response of these neurons is the steering movement of the dragonfly's wings, allowing them to predict the location of their prey for accurate interception. A subset of the TSDNs show large and precisely timed responses to the expanding image of an approaching object. I will be studying these "looming-sensitive" neurons, researching what visual information they are sending to the flight system. This material will allow for the analysis of the anatomical structure in the dragonfly brain. The visual responses of these dragonflies suggests that the looming-sensitive neurons are the specific TSDNs called MDT3 and DIT3, but in order to confirm this prediction, we must visualize the anatomy of the brain. With the use of a dye called Lucifer yellow, we can trace the response of the looming stimuli to a specific area of the brain. By injecting the dye with a recording microelectrode, we can positively identify these specific neurons." (Author)] Address: Slugaski, Clara, Biology, Union College, Schenectady, NY, USA

**22412.** Johnson, J. (2017): The spread of *Libellula saturata* (Flame Skimmer) through Oregon and its appearance in Washington. *Argia* 29(2): 6-7. (in English) ["In 2015, *L. saturata* was observed at wetlands in the middle of Portland such as Tanner Springs Park (OC 434573) and Westmoreland Park (OC 435648). By 2016, the species was conspicuous at Salish Ponds (report by Bonnie Comegys on the Western Odonata Facebook group) — within a dragonfly's easy flight of the Columbia River. On 10 September 2016, I observed a male and photographed an ovipositing female at Soapstone Lake, Clatsop Co. (OC 455310). This became the northernmost record in Oregon, and, because of the meandering route of the lower Columbia River, this was further north than most of Clark County, Washington. This really seemed like the year to finally find the species at my local ponds in the Vancouver area. I've been checking Kline Pond just north of Vancouver, Clark Co., Washington, on a somewhat regular basis throughout the odonate season — always thinking about the probability of eventually finding *L. saturata*. That finally happened on 14-IX-2016. I found a lone male alternately flying back and forth as it chased other odonates and perching in the sun along the pond's northern shore. I obtained several photos during a few brief moments that it perched (OC 455577). I returned on 16 and 21 September, and on each of those days I found a lone male *L. saturata* appearing intermittently along the same stretch of shoreline on the north side of the pond. More photos were obtained both days (OC 455705, 456155, 456159)." (Author)] Address: Johnson, J.T., 3003 Unander Avenue, Vancouver, WA 98660, USA. E-mail: gomphusjim@gmail.com

**22413.** Kolar, V.; Hadacova, V (2017): Dragonflies and water beetles of selected peat bogs in the Bohemian Forest. *Silva Gabreta* 23: 19-32. (in Czech, with English summary) ["This paper presents the results of an inventarisation survey of dragonflies and water beetles in 14 selected peat bogs in the Bohemian Forest (Šumava in Czech, south-west Bohemia) in spring and summer in 2015. We found altogether 31 species from 9 families of dragonflies and 54 species from 8 families of diving beetles. During the survey, we found 11 dragonflies (e.g., *Aeshna subarctica*, *A. juncea*) species and 5 water beetles (e.g., *Laccobius gracilis*, *Ilybius crassus*) from the red list." (Authors) *Aeshna* cf. *caerulea* (CR), *A. cyanea*, *A. grandis*, *A. juncea* (VU), *A. mixta*, *A. subarctica* (CR), *Anax imperator*, *Calopteryx splendens*, *C. virgo*, *Coenagrion hastulatum* (NT), *C. puella*, *Enallagma cyathigerum*, *Erythromma najas*, *Pyrrosoma nymphula*, *Cordulegaster boltonii* (VU), *Cordulia aenea*, *Somatochlora alpestris* (EN), *S. arctica* (EN), *S. metallica*, *Ophiogomphus cecilia*, *Leucorrhinia rubicunda*, *L. dubia*] Address: Kolar, V., Entomologický ústav, Biologické centrum AV ČR, Branišovská 31, 37005 České Budějovice, Czech Republic. Email: kolarvojta@seznam.cz

**22414.** Tamm, J. (2017): Beobachtungen an der Sibirischen Mosaikjungfer (*Aeshna crenata*) in Südfinnland (Odonata: Aeshnidae). *Libellen in Hessen* 10: 87-95. (in German) ["*A. crenata* was observed at four forest ponds in southern Finland in August 2016. Some aspects of their biology and behavior are shared. G1: forest lake Pikku Sorlampi; 60°15'37,32" N, 24°36'48,59" E, G2: forest lake Vähä Haukkalampi, Nationalpark Nuuksio; 60°18'51,66" N, 24°30'01,58" E, G3: forest lake Ahvenisto, Nationalpark Nuuksio; 60°18'36,74" N, 24°29'43,48" E, G4: forest lake Niemelänlampi, Nationalpark Nuuksio; 60°18'29,06" N, 24°29'22,17" E.] Address: Email: jochen.tamm@t-online.de

**22415.** Tamm, J. (2017): Zum Vorkommen der Gestreiften Quelljungfer (*Cordulegaster bidentata*) im östlichen Taunus (Odonata: Cordulegasteridae). *Libellen in Hessen* 10: 57-67. (in German) ["*C. bidentata* was found in nine locations in the eastern Taunus, Gessen, Germany. Eight of these locations were identified as part of a species-focused imaginal mapping exercise in this region in 2016, which covered 109 head-water streams. The populated streams were mainly in the Hochtaunus and Vordertaunus, while only two occurrences were found in the Hintertaunus. These were also in the Pferdeskopf area, which is immediately north of the Hochtaunus and, as a high mountain range, is more similar to it than the rest of the Hintertaunus. *C. bidentata* was not found in the hilly region of the Hintertaunus proper. In the Hochtaunus and Vordertaunus, the colonization frequency of *C. bidentata* was 20% and reached a maximum of 36% in the deciduous forests of the Vordertaunus south of Eppstein. This is comparable to the peak values for the species in other parts of Hesse and Germany. The very different settlement densities seem to be based primarily on structural differences in the streams in the sub-regions. The populated streams were characterized by a clear gradient and a diggable loose sediment, at least in places. These circumstances are rare in the Hintertaunus. In the study area, *C. bidentata* is primarily affected by the large-scale cultivation of spruce in the Hochtaunus, especially where the most favorable stream structures for the species are otherwise present. The conservation of the dragonfly in the eastern Taunus is likely to depend above all on solving this problem." (Author/Google translate)] Address: Email: jochen.tamm@t-online.de

**22416.** Verhaagh, M. (2017): Dr. Ulrich Franke. \*12. Januar 1943 – † 23. März 2017. *Carolinea* 75: 185-189. (in German) [Obituary. We owe one of the first identification keys for dragonfly larvae to Ulrich Franke, a dragonfly scientist active regionally in Baden-Württemberg (Germany). In contrast to Ris (1909), this one was readily available as it was printed in large quantities and was distributed free of charge to (young) aspiring dragonfly scientists. Ris, F. (1909): Odonata. In: Brauer, A. (Hrsg.): *Die Süßwasserfauna Deutschlands* Heft 9. Fischer, Jena. IV + 67 pp] Address: Verhaagh, M., Leiter Entomologie und Bibliothek, Staatliches Museum für Naturkunde Karlsruhe, Erbprinzenstraße 13, D-76133 Karlsruhe, Germany. Email: manfred.verhaagh@smnk.de

## 2018

**22417.** Bedjanic, M. (2018): Določevalni ključ: Spreletavci Slovenije [Determining key: Leucorrhinia Slovenian species]. *Trdoziv* 7(1): 32-40. (in Slovenian) [*Leucorrhinia caudalis*, *L. dubia* and *L. pectoralis* are represented in Slovenia. The paper deals with the five *Leucorrhinias* (in addition: *L. albifrons* and *L. rubicunda*) occurring in Western and Central Europe, and provides detailed keys, illustrations, distribution maps and information on habitats of them.] Address: Bedjanic, M., National Institute of Biology, Vecna pot 111, 1000 Ljubljana, Slovenia. Email: matjaz.bedjanic@nib.si

**22418.** Eda, S. (2018): An unusual oviposition site for *Epiophlebia superstes*. *Tombo* 60: 108-109. (in Japanese, with English summary) ["Oviposition scars of *Epiophlebia superstes* were found at a high position (about 10 cm) above the water in Ina city, Nagano prefecture on May 27, 2014. There is a small cliff between the site of the scars and the water. Normally this insect lays its eggs into plants some 10 ~ 40 cm above the water." (Author)] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**22419.** Ehira, K. (2018): Interspecific copulation between male *Calopteryx japonica* and female *Mnais pruinosa*. *Tombo* 60: 104-105. (in Japanese, with English summary) ["A case of interspecific copulation between male *Calopteryx japonica* and a female *Mnais pruinosa* was observed at Kurino, Yusui town, Aira district, Kagoshima prefecture. Following action by the connected male just like intramale sperm translocation, the copula position was smoothly attained. During copulation, however, no rhythmical movement of the few basal segments of the male abdomen was observed. Subsequently, the male ceased copulation and tandem position and flew away. It took about three minutes from detection of the couple to the end of copulation." (Author)] Address: Email: menpo@hotmail.com

**22420.** French, S.K.; McCauley, S.J. (2018): Canopy cover affects habitat selection by adult dragonflies. *Hydrobiologia* 818(1): 129-143. (in English) ["The mechanisms structuring aquatic communities across environmental gradients are often difficult to distinguish from one another and can produce similar patterns of species distributions. In freshwater systems, the amount of canopy cover from surrounding trees is often associated with transitions in local community structure. These community changes could be driven by habitat selection prior to colonization of the aquatic habitat and/or species-sorting post-colonization. To assess the contributions of pre- versus post-colonization processes in structuring larval dragonfly assemblages, we tested the impact of artificial and natural canopy cover on the selection of experimental aquatic mesocosms by adult dragonflies, and monitored the performance (i.e. growth and survival) of larval dragonflies that were placed in mesocosms under a gradient of natural canopy cover. We found that greater levels of canopy cover resulted in fewer adult visits to mesocosms, and more natural canopy cover decreased the species richness of visitors. There were no effects of canopy cover on the growth and survival of larvae added to the mesocosms. Our results suggest that adult habitat selection plays a dominant role in structuring larval dragonfly assemblages across a canopy cover gradient, and that canopy cover can be an important environmental filter on species distributions." (Authors)] Address: French, Sarah, Dept Biol., Univ. Toronto Mississauga, Mississauga, Canada

**22421.** Futahashi, R.; Miyahata, T.; Yokoi, N. (2018): Distribution of species of the genus *Mnais* (Zygoptera: Calopterygidae) in northern Kanto district, C. Honshu, Japan. *Tombo* 60: 116-120. (in Japanese, with English summary) ["We surveyed the distribution of the genus *Mnais* in northern Kanto district, C. Honshu, based on nuclear ITS sequences. The distribution of the genus was found to be complex in Gunma Prefecture, whereas only *M. costalis* was recorded from Fukushima and Ibaraki Prefectures. Two larvae of interspecific hybrid were also recorded from Gunma Prefecture." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22422.** Futahashi, R.; Okude, G.; Sugimura, M.; Ugai, S. (2018): Interspecific hybrids in Japanese Odonata. *Tombo* 60: 1-49. (in Japanese, with English summary) ["After Asanina's 1974 paper, more than 150 papers have reported on interspecific hybrid of Japanese Odonata. Combination of interspecific hybrids can be directly confirmed by analyzing biparentally inherited nuclear DNA and maternally inherited mitochondrial DNA. Based on nuclear and mitochondrial DNA analyses, we identified the following 21 combinations of interspecific hybrids in Japanese Odonata: (1) *Mnais costalis*



x *Mnais pruinosa*, (2) *Paracercion sieboldii* x *Paracercion melanotum*, (3) *Ischnura senegalensis* x *Ischnura elegans*, (4) *Anax parthenope* x *Anax nigrofasciatus*, (5) *Anax parthenope* x *Anax guttatus*, (6) *Anax parthenope* x *Anax panbeus*, (7) *Somatochlora uchidai* x *Somatochlora graeseri*, (8) *Sympetrum darwinianum* x *Sympetrum maculatum*, (9) *Sympetrum frequens* x *Sympetrum depressiusculum*, (10) *Sympetrum eroticum* x *Sympetrum baccha*, (11) *Sympetrum eroticum* x *Sympetrum parvulum*, (12) *Sympetrum eroticum* x *Sympetrum kunckeli*, (13) *Sympetrum eroticum* x *Sympetrum pedemontanum*, (14) *Sympetrum croceolum* x *Sympetrum speciosum*, (15) *Sympetrum croceolum* x *Sympetrum uniforme*, (16) *Tramea virginia* x *Tramea basilaris*, (17) *Tramea virginia* x *Tramea transmarina*, (18) *Zygomma obtusum* x *Zygomma petiolatum*, (19) *Orthetrum albistylum* x *Orthetrum japonicum*, (20) *Orthetrum melania* x *Orthetrum pruinosum*, (21) *Libellula quadrimaculata* x *Libellula angelina*. Among them, more than 50 individuals have been recorded in the following 3 combinations: *Anax parthenope* x *Anax nigrofasciatus*, *Sympetrum frequens* x *Sympetrum depressiusculum*, and *Sympetrum eroticum* x *Sympetrum baccha*, and among the former two combinations, F2 hybrids have been also obtained by breeding eggs derived from hybrid females. *Sympetrum eroticum* was involved in the 4 different hybrid combinations as paternal species in all examined individuals. Among 203 Japanese Odonata species, the following 2 combinations cannot be distinguished by nuclear ribosomal DNA including internal transcribed spacer (ITS) region: *Pseudocoptera annulata* vs *Pseudocoptera tokyoensis* and *Rhyothemis variegata* vs *Rhyothemis phyllis*. Additionally, the following 7 combinations cannot be distinguished by mitochondrial DNA probably due to mitochondrial introgression through hybridization: (1) *Mnais costalis* vs *Mnais pruinosa*, (2) *Paracercion hieroglyphicum* vs *Paracercion melanotum*, (3) *Anax parthenope* vs *Anax nigrofasciatus*, (4) *Trigomphus melampus* vs *Trigomphus ogumai* vs *Trigomphus interruptus*, (5) *Sympetrum frequens* vs *Sympetrum depressiusculum*, (6) *Sympetrum croceolum* vs *Sympetrum uniforme*, and (7) *Tramea virginia* vs *Tramea transmarina* vs *Tramea loewii*. In this review paper, we describe the morphological characteristics of above 21 combinations or interspecific hybrids in Japanese Odonata and list the records comprehensively." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22423.** Itoh, S. (2018): New record of *Sympetrum speciosum speciosum* Oguma from Iwate Prefecture, North eastern Honshu, Japan. Tombo 60: 113-114. (in Japanese, with English summary) ["Two males of *S. speciosum speciosum* Oguma, 1915 were captured and another 11 males were observed in the south coastal area of Iwate Prefecture. It is a new record for Iwate and is the northern limit of the range of this species. This species could possibly expand its range northward rapidly." (Author)] Address: Itoh, S., Kinoshita 4-9-7-102, Wakabayashi-ku, Sendai-shi, Miyagi, 984-0047 Japan

**22424.** Itsuro, K.; Sasamoto, A.; Kagimoto, B. (2018): The supposed homeosis of the structure like secondary male genitalia appearing from anterior part of the 4th abdominal sternite in *Melligomphus viridicostus* (Oguma, 1926). Tombo 60: 96-97. (in Japanese, with English summary) ["An abnormal male *M. viridicostus* is reported. This specimen has a malformation resembling deformed secondary genitalia, visible from anterior part of the 4th sternite, in spite of it having the normal secondary genitalia from the 3rd segment. This malformation structure is presumed homeosis of normal secondary

genitalia on former segment is that the stem is short, the median segment is rudimentary or absent, and the distal segment is atrophic and asymmetrical, partly membranous, with much rudimental cornua." (Authors)] Address: Sasamoto, A., 190-4 Yakuoji Tawaramoto, Shiki-gun, Nara prefecture, 636-0341, Japan. E-mail: akssmt@sea.plala.or.jp

**22425.** Karube, H.; Muramatsu, M. (2018): First record of *Orthetrum pruinosum neglectum* (Rambur, 1842) from Yonaguni-jima, Okinawa Pref. Tombo 60: 127-128. (in Japanese, with English summary) ["*O. pruinosum neglectum* is widely distributed in SE Asia but in Japan it is only known from the Yaeyama group of Ryukyu Islands. In 2017, we found this species on Yonaguni-jima island for the first time." (Authors)] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**22426.** Kawase, N.; Habano, Y. (2018): A first record of *Ceragrion auranticum* Fraser, 1922 from Shiga Prefecture, central Honshu. Tombo 60: 122-123. (in Japanese, with English summary) ["A male of *C. auranticum* was newly collected in Shiga Prefecture, central Honshu, Japan. This is the first record of this invasive species from the Kinki district, central Honshu. The natural distribution of this species is Kyushu, Ryukyu Islands, Korea, Taiwan, China and South East Asia. Recently, the invasion of this species to Kanto and Shikoku district was reported (Karube, 2007; Nakanishi, 2011; Kosuge, 2012; Sugimura, 2013). Those records were regarded as artificial by bringing tropical water plants with this damselfly's eggs to gardens or parks from where adults dispersed to surrounding areas (Karube et al., 2014)." (Authors)] Address: Email: kawasen@nifty.ne.jp

**22427.** Kobayashi, J. (2018): An *Orthetrum melania* (Selys, 1883) (Anisoptera, Libellulidae) with a deformed left hindwing. Tombo 60: 102-103. (in Japanese, with English summary) ["An *O. melania* with a deformed left hindwing was captured in Akita Prefecture. The left hindwing is clearly shorter and a little wider than the normal right hindwing. Part of wing veins (ex. A, and Cu) are absent or fused with other veins in the left hindwing." (Author)] Address: Email: Calopteryx73@hotmail.com

**22428.** Kobayashi, J. (2018): Records of five species of Odonata (Zygoptera and Anisoptera) from Akita Prefecture, northern Honshu. Tombo 60: 110-112. (in Japanese, with English summary) ["*Sympecma paedisca*, *Lestes japonicus*, *Polycanthagnyna melanictera*, *Asiagomphus melaenops* and *Nannophya pygmaea*, were collected from Akita Prefecture, northern Honshu, Japan. These species are rare, or declining in this area." (Authors)] Address: Kobayashi, J., Dept of Entomology, Faculty of Agriculture, Tokyo Univ. of Agriculture, 1737 Funako, Atsugi City, Kanagawa Prefecture 243-0034, Japan

**22429.** Kozen, M. (2018): The first record of *Brachythemis contaminata* (Fabricius, 1793) from Okinawa Island, Okinawa, Japan. Tombo 60: 129- (in Japanese, with English summary) ["Four males and four females of *B. contaminata* were collected on Okinawa island for the first time. The author visited Ihara, Itoman city, Okinawa Island in the late afternoon of October 14th, 2017 and found them. Territorial patrol flight of several males and oviposition behavior of several females were also observed at the water reservoir pond." (Author)] Address: Email: stigmd@gmail.com

**22430.** Kuroda, T.; Futahashi, R. (2018): A record of a unique wing marking pattern for *Tramea transmarina* Brauer,

1867 in Japan. Tombo 60: 99-101. (in Japanese, with English summary) ["A female of *T. transmarina* with a unique wing marking pattern was collected at Fukaji island, Kerama isls., Okinawa, Japan. The wing pattern of this specimen is similar to that of the subspecies *intersecta* known from Vanuatu and New Caledonia. Both nuclear and mitochondrial DNA analyses indicated that this specimen is *T. transmarina*, although we could not distinguish between subspecies by genetic analyses." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22431.** Liu, Y.; Luo, X.-J.; Huang, L.-Q.; Yu, L.-H.; Mai, B.-X. (2018): Bioaccumulation of persistent halogenated organic pollutants in Insects: Common alterations to the pollutant pattern for different insects during metamorphosis. *Environ. Sci. Technol.* 52(9): 5145-5153. (in English) ["Few studies have examined the accumulation and fate of persistent halogenated organic pollutants (HOPs) in insects. We measured HOPs, including dichlorodiphenyltrichloroethanes (DDTs), polychlorinated biphenyls, and halogenated flame retardants, in insects from four taxonomic groups collected from an e-waste site. Dragonfly larvae collected from a pond contained the highest concentrations of all chemicals except DDTs, while the litchi stinkbugs contained the lowest. Different insect taxa exhibited different contaminant patterns which could be attributed to their habitats and feeding strategies. Bioaccumulation factors for dragonfly larvae and biomagnification factors for moth and grasshopper larvae were significantly positively correlated with the octanol-water partition coefficient of the chemicals ( $\log KOW < 8$ ). Common nonlinear correlations between the ratio of larval to adult concentrations and  $\log KOW$  were observed for all taxa studied. The ratio of concentrations decreased with increasing values of  $\log KOW$  ( $\log KOW < 6-6.5$ ), then increased ( $6 < \log KOW < 8$ ) and decreased again ( $\log KOW > 8$ ). This result implies that the mechanism that regulates organic pollutants in insects during metamorphosis is common to all the taxa studied." (Authors)] Address: Luo, X.-J., State Key Lab. Organic Geochemistry & Guangdong Key Lab. of Environmental Resources Utilization & Protection, Guangzhou Inst. of Geochemistry, Chinese Acad. Sciences, Guangzhou 510640, PR China. E-mail: luoxiao@igig.ac.cn

**22432.** Miyashita, T.; Futahashi, R. (2018): A record of *Neurothemis ramburii* (Anisoptera: Libellulidae) from Fuchu-shi, Tokyo. Tombo 60: 114-115. (in Japanese, with English summary) ["*N. ramburii* was photographed at Sengencho, Fuchu, Tokyo, Honshu, Japan. Due to the great distance from its known distribution, it is plausible that eggs or larvae of this species were introduced to Tokyo with aquatic plants." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22433.** Ogino, S.; Ozono, A.; Futahashi, R. (2018): A record of *Sympetrum flaveolum* from Ishikawa Prefecture. Tombo 60: 121. (in Japanese, with English summary) ["A male of *S. flaveolum* was photographed at Fukami, Monzenmachi, Wajima city, Ishikawa Prefecture, central Honshu, Japan. This male was thought to have migrated from the continent. This is the first record of this species from central Honshu." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22434.** Okude, G.; Futahashi, R.; Udono, K. (2018): DNA analysis of a hybrid between *Sympetrum eroticum* and

*Sympetrum pedemontanum* collected in 1962. Tombo 60: 50-52. (in Japanese, with English summary) ["We report the results of DNA analyses of a female interspecific hybrid between *S. eroticum* and *S. pedemontanum* collected in 1962. We succeeded in DNA amplification for relatively small regions (60-105 bp without primer regions) using specific primers. The results of nuclear and mitochondrial DNA analyses suggest that this individual was derived from interspecific mating between a male *S. eroticum* and a female *S. pedemontanum*." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22435.** Okuyama, H., M. Kawanaka, A. Hara, A. Takeuchi, R. Suzuki, S. Sasaki, K. Watanabe, K. Osaki, K. Hirano, T. Kiyoshi, J. Takahashi (2018): The genetic diversity of a threatened skimmer species, *Nannophya pygmaea* (Odonata: Libellulidae): a report on the population in Kanagicho, Hamada City, Shimane Prefecture, Japan). Tombo 60: 90-95. (in Japanese, with English summary) ["A decline in the genetic diversity of *N. pygmaea* is likely to occur as a result of habitat destruction. *N. pygmaea* is considered vulnerable (VU) in Shimane Prefecture, Japan. In this study, we analyzed the genetic diversity of a *N. pygmaea* population in Kanagicho, a town in Hamada City located in Shimane Prefecture, was found in 2010, using the mitochondrial DNA 16S rDNA (503 bp) and nuclear DNA ITS 1(234 ~ 248 bp) and ITS2 (307 bp) partial regions. For 16S rDNA, ITS1 and ITS2 regions, two, ten and two haplotypes were identified, respectively. The nucleotide diversities were 0.00103, 0.00550 and 0.00013 and the haplotype diversities were 0.517, 0.676 and 0.038, respectively. As a result of phylogenetic analysis, this population belonged to the same clade as other Japanese, Chinese, Taiwanese and Malaysian populations. In this population, 90 % haplotypes for ITS1 region and 50% haplotypes for 16S rDNA and ITS2 regions were endemic. Thus, the present study suggests that *N. pygmaea* Shimane Prefecture population is important as a conservation population because this population maintains the genetic diversity and characteristic.] Address: Okuyama, H., Faculty of Life Sciences, Kyoto Sangyo University, Kamigamo, Motoyama, Kita-ku, Kyoto, Japan. E-mail: k5533@cc.kyoto-su.ac.jp

**22436.** Prescott, V.A.; Eason, P.K. (2018): Lentic and lotic odonate communities and the factors that influence them in urban versus rural landscapes. *Urban Ecosystems* 21(4): 737-750. (in English) ["Habitat alteration via urbanization has very different effects on even closely related taxa. Most research investigating the ecological effects of urbanization has focused on birds or mammals, resulting in a relatively poor understanding of how the species richness and community composition of invertebrates may change. We quantified differences in species richness of adult odonates at lentic and lotic sites in urban and rural landscapes, and we examined environmental factors that might drive the differences in community composition that we observed. For lotic sites, species richness did not differ between urban versus rural sites for either dragonflies or damselflies. For lentic sites, urban and rural sites contained similar dragonfly species richness, but damselfly species richness was significantly lower at urban sites than at rural sites. Differences in lentic odonate community composition were associated with the amount of urban development within 150 m of each site, mean algal coverage, and distance to the urban center. At lotic sites, water temperature and distance to the urban center were correlated with differences in odonate community composition. The differing responses to urbanization observed in this study were probably

a consequence of differences between lentic versus lotic ecosystems and between dragonflies versus damselflies in dispersal capability and habitat specificity. Given that different environmental factors affected these taxa differently in lentic and lotic sites, maintaining the highest level of odonate diversity possible across a landscape will require the use of different management practices for each ecosystem type." (Authors)] Address: Eason, Perri, University of Louisville, 2301 S 3rd St, Louisville, KY, 40292, USA

**22437.** Sakai, S.; Eda, S. (2018): Observation of an awkward behaviour-like oviposition by an interspecific tandem between a male *Sympetrum frequens* and a female *Pantala flavescens*. Tombo 60: 107-108. (in Japanese, with English summary) ["An interspecific tandem between a male *S. frequens* and a female *P. flavescens* flying awkwardly and trying to lay eggs was observed and successfully taken at Nyukasa in Ina city, Nagano prefecture, on 14-IX-2017." (Authors)] Address: Eda, S., 3-4-25 Sawamura, Matsumoto, Nagano 390-0877, Japan. E-mail: SND 02767@nifty.com

**22438.** Shimizu, N.; Futahashi, R. (2018): A record of a supposed hybrid between *Sympetrum darwinianum* and *Sympetrum maculatum* from Aichi Prefecture. Tombo 60: 52- (in Japanese, with English summary) ["A male of a supposed hybrid between *S. darwinianum* and *S. maculatum* was photographed at Tamano-cho, Kasugai city, Aichi Prefecture, central Honshu, Japan." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22439.** Suda, S.; Futahashi, R. (2018): A record of the homeosis in *Anax parthenope*. Tombo 60: 98-99. (in Japanese, with English summary) ["We report an example of homeosis in a male of *A. parthenope*. Ectopic light blue markings are found in the left side of abdominal segments 3 and 4 and the ventral part of the corresponding region are slightly expanded like abdominal segments 2 and 3, suggesting that a part of abdominal segments 3 and 4 are transformed into abdominal segments 2 and 3 in this individual." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22440.** Sugimura, M.; Okude, G.; Futahashi, R. (2018): DNA analyses of three dragonfly hybrids previously suspected by external morphology. Tombo 60: 53-56. (in Japanese, with English summary) ["We report the results of DNA analyses of three dragonfly hybrids belonging to the genera *Anax*, *Sympetrum*, and *Orthetrum*. The results of nuclear and mitochondrial DNA analyses suggest that these individuals were derived from interspecific mating between a male *Anax guttatus* and a female *A. parthenope*, a male *Sympetrum eroticum* and a female *S. parvulum*, and a male *Orthetrum japonicum* and a female *O. albistylum*, respectively. These hybrids have been recorded previously only once in Japan." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22441.** Takechi, L.; Hisamatsu, S. (2018): Records of *Sympetrum fonscolombii* (Selys, 1840) from Ehime Prefecture, Japan. Tombo 60: 126-127. (in Japanese, with English summary) ["We summarize records of *S. fonscolombii* from Ehime Prefecture. In 2017, a large number of this species were observed in Ehime Prefecture and other regions in Japan." (Authors)] Address: Email: 1982takechi@gmail.com

**22442.** Takeda, H.; Sasamoto, A. (2018): The first record of *Sympetrum fonscolombii* from Nara prefecture, together with records of *S. uniforme* and *S. striolatum imitoides*. Tombo 60: 124-125. (in Japanese, with English summary) ["For the first time we record *S. fonscolombii* from Nara prefecture (1-X-2017, Mitsuyoshi, Koryo-cho, Kitakatsuragi-gun). In addition, *S. uniforme* and *S. striolatum imitoides* were observed at the same time, both of which were recently rare in Nara prefecture." (Authors)] Address: Sasamoto, A., 190-4 Yakuoji Tawaramoto, Shiki-gun, Nara prefecture, 636-0341, Japan. E-mail: aksmt@sea.plala.or.jp

**22443.** Tsuji, I.; Kawashima, I. (2018): Additional information on the intergeneric tandem formation observed between a male of *Orthetrum albistylum speciosum* (Uhler) and a female *Sympetrum frequens* (Selys). Tombo 60: 105-106. (in Japanese, with English summary) ["Abnormal intergeneric connection between a male of *O. albistylum speciosum* and a female *S. frequens* was observed in Yokosuka-shi, Kanagawa Prefecture (Miura Peninsula), C. honshu, Japan. The female denied copulation by the male, and behaved as if she were ovipositing. We briefly consider such behaviour, comparing with the previous records of the same combination.] Address: Email: itsurok29@jcom.home.ne.jp

**22444.** Ugai, S.; Futahashi, R. (2018): DNA analysis of the two hybrid specimens belonging to the genera *Anax* and *Tamea*. Tombo 60: 57-60. (in Japanese, with English summary) ["We report the results of DNA analyses of two cases of interspecific hybrids; a female between *A. panybeus* and *A. parthenope julius*, and a male between *T. virginia* and *T. basilaris burmeisteri*. These two individuals show intermediate external characteristics between the parent species. The results of nuclear and mitochondrial DNA analyses suggest that these individuals were derived from interspecific mating between a male *A. panybeus* and a female *A. parthenope julius*, and a male *T. virginia* and a female *T. basilaris burmeisteri*, respectively." (Authors)] Address: Futahashi, R., National Institute of Advanced Industrial Science and Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

## 2019

**22445.** Alemneh, T.; Ambelu, A.; Zaitchik, B.F.; Bahrdorff, S.; Mereta, S.T.; Pertoldi, C. (2019): A macroinvertebrate multimetric index for Ethiopian highland streams. *Hydrobiologia* 843: 125-141. (in English) ["Headwater streams in the highland regions of Ethiopia are exposed to severe human disturbances because of rapid population growth. Protection and management of headwater streams require the development of informative indices that can capture disturbance and assess streams water quality in highland regions. Therefore, we developed a multimetric index based on macroinvertebrate communities, to assess the ecological condition of the headwater streams in the Ethiopian highlands. We reviewed 38 potential metrics, representing various aspects of the macroinvertebrate assemblages, and selected four of them [total family richness, Simpson index, percentage of shredder, and family richness of EOT (Ephemeroptera, Odonata, and Trichoptera)] as final core metrics. A trisection inter-quartile range system was applied to derive scores for each core metric at impaired and reference sites. The macroinvertebrate multi-metric index (MMI) distinguished well between impaired and reference stream sites and was negatively correlated with the degree of disturbance. The results suggest that the MMI is robust measure of disturbance and can be used as a sensitive tool for evaluating the ecological condition of headwater streams in Ethiopian

highlands." (Authors)] Address: Alemneh, Temesgen, Dept of Earth & Planetary Sciences, Johns Hopkins Univ., Baltimore, MD 21210, USA. Email: tyimani1@jhu.edu

**22446.** Arbeitskreis Libellen in Hessen (2019): Libellenkartierung in Hessen. Libellen in Hessen Suppl. 2: 28 pp. (in German) [[https://cloud.multibasecs.de/images/cloud/126/documents/LiH%20Supplement2\\_final.pdf](https://cloud.multibasecs.de/images/cloud/126/documents/LiH%20Supplement2_final.pdf)] Address: AK Libellen in Hessen - HGON e. V., Lindenstraße 5, 61209 Echzell, Germany

**22447.** Guillermo-Ferreira, R.; Bispo, P.C.; Appel, E.; Kovalev, A.; Gorb, S.N. (2019): Structural coloration predicts the outcome of male contests in the Amazonian damselfly *Chalcopteryx scintillans* (Odonata: Polythoridae). *Arthropod Structure & Development* 53, November 2019, 100884: 10 pp. (in English) ["Highlights: • Structural coloration in an Amazonian damselfly is a result of a multilayered structure. • Male damselflies use the dorsal wing coloration during territorial contests. • Color hue seems to be the wing trait that predicts contest outcome. • Angle dependent structural coloration may be an adaptation to Rainforest light environment. Abstract: Iridescence is an optical effect that produces angle dependent coloration in animals. Recently, studies have attempted to unveil structures behind such elaborated visual signals and associated behaviors in Odonata. Here, we studied males of *C. scintillans*, which have hindwings that exhibit pronounced iridescence. This optical feature is used by the damselflies for intra-specific communication during territorial fights and courtship. The main question we addressed was whether male wing structural coloration may predict the outcome of male-male contests. We also studied the wing ultrastructure, in order to reveal the mechanisms that are responsible for wing coloration. Using various microscopical and spectroscopical techniques, we demonstrate that hindwing coloration is derived from two main effects: (1) light interference in the cuticle multilayer and (2) a specific angle dependent light scattering and antireflective properties of the epicuticular wax coverage. The results of our field experiment show that wing pigmentation and the hue of the dorsal surface of the hindwings is correlated with the outcome of territorial contests. This is one of the first studies showing that structural coloration derived from multilayer interference may influence the outcome of intrasexual agonistic interactions. This indicates that multicomponent structural coloration in visually guided insects may be under selective forces of male-male competition for resources and females." (Authors)] Address: Guillermo-Ferreira, R., Dept of Hydrobiology, Federal University of São Carlos – UFSCar, São Carlos, São Paulo, Brazil. Email: rhainerguilermo@gmail.com

**22448.** Karube, H.; Hayashi, M.; Kitano, T. (2019): The first record of *Zyxomma obtusum* Albarda, 1881 from Yonagumjima Isiana, Okinawa Prefecture. *Tombo* 61: 55-56. (in Japanese, with English summary) ["*Z. obtusum* is widely distributed in SE Asia. It is recorded from the Daito islands and Yaeyama Islands of the Ryukyu Islands in Japan. In 2018, we newly found this species on Yonagum-jima Island": 25~26-V-2018, 23-VII-2018, 24-XI-2018] Address: Karube, H., Kanagawa Prefect. Mus. Nat. Hist., 499 Iryuda, Odawara, Kanagawa, 250, Japan. E-mail: paruki@nh-kanagawa-museum.jp

**22449.** Kemabonta, K.A.; Essien, R.; Adu, B.W.; Ogbogu, S.U.; Iyasa, A.; Uche-Dike, R. (2019): Abundance and distribution of odonates (dragonflies and damselflies) In Akwa Ibom State, Nigeria. *Pan African Journal of Life Sciences* 1: 33-38. (in English) ["Introduction: Odonates are used as bio-

indicators for monitoring habitat degradation both on terrestrial and aquatic ecosystem because of their sensitivity to anthropogenic activities. They serve an important role in the ecological food chain by consuming aquatic larvae and being in turn consumed by birds and various amphibians. This study is part of the ongoing research on the diversity of Odonate species of Nigeria. The objective is to determine the abundance and distribution of odonates in Akwa Ibom State and to compare the species diversity across the various sites in Akwa Ibom State. Methodology: Akwa Ibom state was divided into six areas namely Ikot Akpaden, Obio Akpa, Ikot Okoro, Ikot Udofia, Urua Udofia and Obio Ndot using biotypes and a study site was randomly selected in each area. Adult members were captured using a sweep net and were preserved for identification using morphological features. Results: A total of 767 odonates were collected at the six study sites representing 24 species, 16 genera and four families namely Libellulidae (77%), Coenagrionidae (21%), Calopterygidae (>1%) and Chlorocyphidae (>1%). Most of the species collected were members of family Libellulidae (77%) with *Palpopleura lucia* having the highest occurrence (41%) and found in all the sites. Family Calopterygidae and Chlorocyphidae had less than 1% population of the total individuals collected. Ikot Okoro had the highest number of individuals (238) and the least evenness ( $e^H/S=0.3292$ ) while Ikot Akpaden, which had the least effect of anthropogenic intrusion had the largest diversity of Odonata species ( $H'=2.387$ ). Obio Ndot had the most evenly distributed Odonata species ( $e^H/S=0.8028$ ). There was no statistical difference in the occurrence of dragonflies across all study sites ( $p=0.238$ ). Conclusion: The high occurrence of family Libellulidae which are anthropogenic tolerant, and the absence of more highly localized species indicate that most of the study sites have been degraded and may not be fit for species with narrow niches. It is therefore vital to conserve the Odonata community by implementing proper forest management techniques." (Authors)] Address: Kehinde A., Dept of Zoology, Univ. of Lagos, Akoka Lagos State, Nigeria. E-mail: kkemabonta@unilag.edu.ng

**22450.** Ousterhout, B.H.; Serrano, M.; Bried, J.T.; Siepielski, A.M. (2019): A framework for linking competitor ecological differences to coexistence. *Journal of Animal Ecology* 88(10): 1534-1548. (in English) ["1. Not all ecological differences among competing species affect their ability to locally coexist. Rather, the differences that promote stable coexistence can be those which cause each species to experience stronger intraspecific than interspecific competition. Recent approaches have established how to detect the demographic signature of these competitive effects, but alone they cannot elucidate the ecological differences among species that yield these patterns. 2. Here, we present a unifying experimental and observational framework that identifies potential ecological differences among species shaping their responses to intra- and interspecific competition. We first describe a conceptual model establishing why the strength of intra- and interspecific competitive interactions should vary along environmental gradients related to species ecological differences. We then show how to apply the framework using *Enallagma* damselflies [*E. exulans*, *E. traviatum*, *E. vesperum*], a diverse group of predatory aquatic insects. 3. To determine how species responded to intra- and interspecific competition along environmental gradients, we experimentally manipulated the relative abundances of three species and replicated this across five lakes which varied in environmental conditions affecting larval damselfly per capita growth and mortality rates – key vital rates regulating their populations. 4. Results suggest *Enallagma* are ecologically differentiated in ways that in some communities can result in intraspecific



competition exceeding interspecific competition. However, in many cases the opposite was true, or the effects of intra- and interspecific competition were equivalent via growth and mortality responses. Moreover, these effects tended to be weak and asymmetrical among competitors, which suggests that differential responses of larval growth and mortality to intra- and interspecific competition may not contribute strongly to the maintenance of *Enallagma* diversity. Different environmental factors appear to shape these demographic responses to competition, providing insight into the ecological mechanisms regulating damselfly assemblages. 5. This framework can be broadly applied to identify the ecological differences among species that may promote coexistence, advancing knowledge of the mechanisms underlying coexistence, and overcoming some limitations of purely phenomenological approaches." (Authors)] Address: Siepielski, A.M., Dept of Biological Sciences, Univ. of Arkansas, Fayetteville, Arkansas, USA. Email: amsiepie@uark.edu

**22451.** Rivas-Torres, A.; Lorenzo-Caballa, M.O.; Sánchez-Guillén, R.A.; Cordero-Rivera, A. (2019): Variation in intraspecific sperm translocation behaviour in a damselfly and its consequences for sperm viability. *Animal Behaviour* 156: 51-55. (in English) ["Highlights: • Males reused vesicle sperm when copulating 15 min after sperm translocation (ST). • The proportion of males that repeated ST increased over time. • Female fertility decreased with increasing time between ST and copulation. • Males seem to be able to detect whether their sperm vesicle is full or not. Sperm quality and viability affect both male and female fitness. Most dragonfly and damselfly males translocate sperm from the testis to the seminal vesicle before each copulation, a behaviour known as intramale sperm translocation (ST). However, some published observations indicate that odonate males can occasionally skip ST prior to copulation. Our aim was to determine the circumstances under which males skip ST and how this might affect sperm viability. We allowed males of *Ischnura graellsii* to perform ST (interrupting the copulation at this stage) and we studied ST behaviour during subsequent copulation. Males were randomly assigned to four treatments, which consisted of allowing the experimental male to copulate again 15 min or 1–3 days after his last ST. Fertility of females mated with the experimental males was analysed as a proxy for sperm viability. All males used the sperm that they translocated previously when the second mating took place 15 min after the manipulation, while the proportion of males that repeated ST increased steadily over time. Both treatment (time elapsed since last ST) and the interaction between treatment and ST (yes/no) had a significant effect on fertility, which decreased only in males that did not perform ST immediately before copulation. Additional experiments with damselflies of the genus *Calopteryx* showed also that males did not repeat ST when the time to the next copulation was less than a day. Our results suggest that sperm quality decays over time in odonates, and that males can choose whether to keep and reuse the sperm in the seminal vesicle or to discard it. We conclude that the special anatomical disposition of odonate males might increase selective pressures to maximize sperm viability and/or repeated intramale ST behaviour." (Authors)] Address: Rivas-Torres, A., ECOEVO Lab Universidade de Vigo, Escola de Enxeñaría Forestal Pontevedra Spain

**22452.** Vinko, D. (2019): Identity card: Temni slanišear (Selysiothemis nigra). *Trdozy. Bilten slovenskih terenskih biologov in ljubiteljev narave* 8(2): 41, 52- (in Slovenian) ["*S. nigra* is a dragonfly from the family Libellulidae. It is easily distinguished from the rest of the species; the base of the wings is without a spot, the pterostigma and the thinner veins of the

wings are pale gray. The posterior and anterior veins of the pterostigma are thicker and black, reminiscent of the "=" equation. His wings resemble the fluttering of a flag even in a slight flutter. Males (fig. 1) are dark, almost black (fig. 2), often with a slightly bluish tinge. Females (Fig. 3) and young males (Fig. 4) are mostly sandy-colored, with dark brown programs on the breast and a dark pattern on the back. Most of the time, it rests on solitary twigs or plants near the water habitat, often with its rear slightly raised (Fig. 5). Larvae (Fig. 6), which grow up relatively quickly, live on aquatic vegetation and can tolerate high salt concentrations. It is a migratory and nomadic species. It is found near shallow ponds and lakes and reservoirs, also near brackish waters and in karst fields. *S. nigra* can be recognized by their characteristic well-developed dorsal and lateral spines (Fig. 7). We have recorded this small winged dragonfly, measuring only about 3 cm, only three times. It was observed twice in 2012 in the Škocjan Bay, and in 2019 adults and egg-laying were observed near Sermin (Fig. 8). It has recently been "naturalized" in the Gulf of Trieste and is apparently expanding its range, which is linked to climate change. It is scattered throughout the Mediterranean, in North Africa and in the east as far as the Arabian Peninsula and South-West Asia." (Verbatim-/Google translate)] Address: Vinko, D., Slovensko odonološko društvo, Verovškova 56, Si-1000 Ljubljana, Slovenia. E-mail: damjan.vinko@gmail.com

**22453.** Voronin, M. Yu. (2019): Long-term monitoring of macrozoobenthos in the reservoir-cooler of Balakovo NPP. *Izv. Saratov Univ. (N. S.), Ser. Chemistry. Biology. Ecology* 19(4): 461-472. (in Russian, with English summary) ["For 8 years (2011–2018) macrozoobenthos samples were taken at the permanent stations in the reservoir-cooler of Balakovo NPP. Sampling stations were located in a highly heated part of the reservoir-cooler of the Balakovo NPP, and poorly heated part, in the adjacent water area of the Saratov reservoir. Differences were revealed: species richness and diversity; numbers and biomass; saprobity indices of the areas of these reservoirs; a positive or negative trend of long-term dynamics of the studied indicators macrozoobenthos. Over the study period the composition of benthic invertebrates of the reservoir-cooler of Balakovo NPP showed 42 species of aquatic organisms: ... Odonata [*Ischnura elegans*, *Orthetrum cancellatum*, *Platycnemis pennipes*] ... The species richness, abundance and biomass of macrozoobenthos of the highly heated thermal water part of the cooling reservoir of the Balakovo NPP is significantly lower compared to the cold-water one. The water reservoir-cooler of Balakovo NPP can be described as  $\alpha$ -mesosaprobic (moderately polluted, the 3rd quality class). Adjacent to the reservoir-cooler an area of the Saratov reservoir can be described as  $\alpha$ -mesosaprobic (contaminated, 4th class of quality). There was no statistically significant increase or decrease (from 2011 to 2018) in the number, or biomass of macrozoobenthos and saprobity of the studied reservoirs. A statistically significant increase in the number of macrozoobenthic species in the cooling reservoir of the Balakovo NPP was found. Due to the fact that by 2018, some restoration of submerged vegetation (previously depleted *Ctenopharyngodon idella*) and, accordingly, the phytophilic group of benthos began to be observed." (AuthorAddress: Voronin, M.Yu., Saratov State Univ., 83 Astrakhanskaya St., Saratov 410012, Russia. E-mail: voroninmj@yandex.ru

**22454.** Waller, J.T.; Willink, B.; Tschol, M.; Svensson, E.I. (2019): The odonate phenotypic database, a new open data resource for comparative studies of an old insect order. *Scientific Data* | (2019) 6:316 | <https://doi.org/10.1038/s41597-019-0318-9>: 6 pp. (in English) ["We present The Odonate

Phenotypic Database (OPD): an online data resource of dragonfly and damselfly phenotypes (Insecta: Odonata). Odonata is a relatively small insect order that currently consists of about 6400 species belonging to 32 families. The database consists of multiple morphological, life-history and behavioural traits, and biogeographical information collected from literature sources. We see taxon-specific phenotypic databases from Odonata and other organismal groups as becoming an increasing valuable resource in comparative studies. Our database has phenotypic records for 1011 of all 6400 known odonate species. The database is accessible at <http://www.odonatephenotypicdatabase.org/>, and a static version with an information file about the variables in the database is archived at Dryad." (Authors)] Address: Willink, Beatriz, Dept of Biology, Evolutionary Ecology Unit, Ecology Building, Lund University, Lund 223-62, Sweden. E-mail: [beatriz.willink@ucr.ac.cr](mailto:beatriz.willink@ucr.ac.cr)

**22455.** Zurek, R.; Bas, G.; Dumnicka, E.; Gloab, M.; Profus, P.; Szarek-Gwiazda, E.; Walusiak, E.; Cieczac, K. (2019): Plaszów pond in Kraków - biocenoses. *Chronmy Przyr. Ojcz.* 75(5): 345-362. (in Polish, with English summary) ["In 2017, a wildlife inventory was carried out for selected elements of the Plaszow Pond (Staw Plaszowski) biocoenosis and its surroundings. The species richness is relatively high, despite the fact that the fauna and flora of this water body are strongly affected by human activity in the highly urbanised environment, while the land development and busy streets significantly reduce the possibility of migration for many animal species. Aquatic and wetland plants were represented by 17 species, mainly common ones; the great horsetail *Equisetum telmateia* and common bladderwort *Utricularia vulgaris* were moderately abundant. In addition to bladderwort, the underwater meadows were composed of stoneworts from the genera *Chara* and *Nitellopsis* as well as filamentous yellow-green algae *Vaucheria* sp. A total of 21 zooplankton species, numerous zoobenthos taxa and seven fish species were found in the pond. Of the 24 identified dragonfly species, at least half are breeding in the pond. Only two amphibian taxa and three reptile species were recorded, including an alien (non-indigenous) species in our fauna, i.e. Cumberland slider *Trachemys scripta troostii* - a turtle coming from the USA. ... Nonetheless, the biological richness of the pond is endangered and certain measures should be taken to preserve it. ... Dragonflies: The tank is characterized by a typical, average odonata-fauna in terms of both the number and species composition. 24 species of vases were found, including one protected species - *Sympecma paedisca*. In addition, two southern species were observed: *Sympetrum fonscolombii* and *Crocothemis erithrea*. No representatives of the Lestidae family were found. In the case of the presence of two river species, *Calopteryx splendens* and *C. virgo* were probably individuals that flew from nearby watercourses. Probably, most of the species found were growing in the Plaszowski pond, but based on the presence of adolescent and observed reproductive behavior, they were able to confirm the reproduction only for half of them." (Authors)] Address: Dumnicka, Elzbieta, Instytut Ochrony Przyrody PAN 31.120 Krakow, al. Adama Mickiewicza 33, Poland. E-mail: [dumnicka@iop.krakow.pl](mailto:dumnicka@iop.krakow.pl)

## 2020

**22456.** Carbonell, J.A.; Stoks, R. (2020): Thermal evolution of life history and heat tolerance during range expansions toward warmer and cooler regions. *Ecology* 101(10). e03134: 11 pp. (in English) ["Species' range edges are expanding to both warmer and cooler regions. Yet, no studies directly compared the changes in range-limiting traits within the same

species during both types of range expansions. To increase our mechanistic understanding of range expansions it is crucial to disentangle the contributions of plastic and genetic changes in these traits. The aim of this study was to test for plastic and evolutionary changes in heat tolerance, life history and behaviour, and compare these during range expansions toward warmer and cooler regions. Using laboratory experiments we reconstructed the thermal performance curves (TPCurves) of larval life history (survival, growth and development rates) and larval heat tolerance (CTmax) across two recent range expansions from the core populations in southern France toward a warmer (southeastern Spain) and a cooler (northwestern Spain) region in Europe by *Ischnura elegans*. First-generation larvae from field-collected mothers were reared across a range of temperatures (16 - 28 °C) in incubators. The range expansion to the warmer region was associated with the evolution of a greater ability to cope with high temperatures (increased mean and thermal plasticity of CTmax), faster development and partly a faster growth indicating a higher time constraints caused by a shorter time frame available for larval development associated with a transition to a greater voltinism. Our results thereby support the emerging pattern that plasticity in heat tolerance alone is inadequate to adapt to new thermal regimes. The range expansion to the cooler region was associated with faster growth indicating countergradient variation without a change in CTmax. The evolution of a faster growth rate during both range expansions could be explained by a greater digestive efficiency rather than an increased food intake. Our results highlight that range expansions to warmer and cooler regions can result in similar evolutionary changes in the TPCurves for life history, and no opposite changes in heat tolerance." (Authors)] Address: Stoks, R., Lab. Aquat. Ecologie, K.U.Leuven, De Beriotstraat 32, 3000 Leuven, Belgium. E-mail: [robby.stoks@bio.kuleuven.ac.be](mailto:robby.stoks@bio.kuleuven.ac.be)

**22457.** Dalal, J.; Sharma, S.; Bhardwaj, T.; Dhattarwal, S.K.; Verma, K. (2020): Seasonal study of the decomposition pattern and insects on a submerged pig cadaver. *Journal of Forensic and Legal Medicine* Volume 74, August 2020, 102023: 9 pp. (in English) ["Research on studying the decomposition pattern in aquatic habitat is very sparse worldwide. Due to this void, assessment of the postmortem submersion interval (PMSI) of drowned and submerged cadavers is still inaccurate and imprecise. The current work focused on studying the decomposition pattern and insects associated with submerged pig (*Sus scrofa*) carcasses during various seasons (winter, spring, summer, and rainy) for two years. The total postmortem submersion interval (PMSI) from the fresh stage till the sunken remains stage varied from 25 days for rainy season (624.5 ADD) to 78 days (1890.5 ADD) for winter season. The spring season at 44 days (1067.5 ADD) and summer season at 31 days (763.5 ADD) had moderate PMSI. During this time interval, five stages of decomposition were studied: submerged fresh, early floating, floating decay, advanced floating decay, and sunken remains. A total of 2385 insect specimens were found to be associated with different decomposition stages. The terrestrial activity during the first stage (submerged fresh) was almost nil as the carcasses were submerged. During the early floating stage (2nd stage), various terrestrial insect species visited the carcass and laid their eggs along with the presence of Chironomidae, Coenagrionidae, Lestidae, Aeshnidae families were also found associated with this stage. In the floating decay (3rd stage), the insects visiting and colonizing the carcass were from Coenagrionidae, Gomphidae, Aeshnidae, Gomphidae, Libellulidae, Chironomidae families along with Calliphoridae (Diptera). Species from the group of scavenging aquatic beetles (Hydrophilidae), *Enochrus esuriens*, *Regimbartia attenuata* (Fab),

Helochaeres sp. and burrowing water beetles, *Canthydrus laetabilis* (Family: Noteridae) and some terrestrial species of beetles, i.e. *Saprinus* sp., *Saprinus pensylvanicus* and *Necrobia rufipus* (Family: Histeridae) were also present during the 3rd, 4th and 5th stages. During advanced floating decay (4th stage) and sunken remains (5th stage), many hemipteran species such as *Ranatra digitata* and *Ranatra filiformis* (Fab) along with many coleopterans were found visiting the corpse." (Authors)] Address: Sharma, Sapna, Department of Genetics, Maharshi Dayanand University, Rohtak, Haryana, India. Email: sapforsci@gmail.com

**22458.** Desjonquères, C.; Gifford, T.; Linke, S. (2020): Passive acoustic monitoring as a potential tool to survey animal and ecosystem processes in freshwater environments. *Freshwater Biology* 65(1): 7-19. (in English) ["\* Biodiversity in freshwater habitats is decreasing faster than in any other type of environment, mostly as a result of human activities. Monitoring these losses can help guide mitigation efforts. In most studies, sampling strategies predominantly rely on collecting animal and vegetal specimens. Although these techniques produce valuable data, they are invasive, time-consuming and typically permit only limited spatial and temporal replication. There is need for the development of complementary methods. \* As observed in other ecosystems, freshwater environments host animals that emit sounds, either to communicate or as a by-product of their activity. The main freshwater soniferous groups are amphibians, fish, and macroinvertebrates (mainly Coleoptera and Hemiptera, but also some Decapoda, Odonata, and Trichoptera). Biophysical processes such as flow or sediment transport also produce sounds, as well as human activities within aquatic ecosystems. \* Such animals and processes can be recorded, remotely and autonomously, and provide information on local diversity and ecosystem health. Passive acoustic monitoring (PAM) is an emerging method already deployed in terrestrial environments that uses sounds to survey environments. Key advantages of PAM are its non-invasive nature, as well as its ability to record autonomously and over long timescales. All these research topics are the main aims of ecoacoustics, a new scientific discipline investigating the ecological role of sounds. \* In this paper, we review the sources of sounds present in freshwater environments. We then underline areas of research in which PAM may be helpful emphasising the role of PAM for the development of ecoacoustics. Finally, we present methods used to record and analyse sounds in those environments. \* Passive acoustics represents a potentially revolutionary development in freshwater ecology, enabling continuous monitoring of dynamic bio-physical processes to inform conservation practitioners and managers." (Authors)] Address: Desjonqueres, Camille., Dept Biol. Sci., Univ. of Wisconsin, Milwaukee, 3209 N Maryland Ave, Milwaukee, WI, USA. Email: cdesjonqu@gmail.com

**22459.** DuBois, R.B. (2020): Odonata drift: a reassessment. *International Journal of Odonatology* 23(4): 381-396. (in English) ["More than 400 scientific journal articles and gray literature reports that addressed macroinvertebrate drift were reviewed and 63 articles were found that reported on the natural drift of Odonata at some taxonomic level. Forty-three species and 44 genera within 15 families (nine Zygoptera; six Anisoptera) were documented in the drift. Drift of another 13 species and eight genera was inferred from indirect evidence. The mean drift density reported was  $0.03 \text{ m}^{-3}$  (range  $<0.001\text{--}0.153 \text{ m}^{-3}$ ), which is relatively low, but not unexpected because benthic densities of Odonata are often lower than those of the macroinvertebrate taxa that occur more frequently in the drift. Percent composition of odonates in the

total drift was invariably  $<10\%$  and usually  $<1\%$ , but the percent was slightly higher if expressed as biomass or volume because odonate larvae are relatively large. Most odonates that drifted were not full grown. High flows were often associated with drift of Odonata, but not exclusively so; drift was highest at night and during summer months. Accidental (catastrophic) drift and active, behavioral drift to colonize new habitats and reduce crowding are thought to be the primary causes of Odonata drift, but its ecological significance would benefit from more research. The presumption that Odonata have a low predisposition to drift is probably not uniformly accurate. Use of drift nets specifically to collect odonates is unlikely to be as efficient as other collection methods in most circumstances, but it should not be entirely dismissed because drift nets are easy to set, relatively clean to operate, do not destroy habitats, and provide integrated samples of various habitats where it might be difficult or unsafe to use other methods." (Authors)] Address: DuBois, R., Dept of Natural Resources, Bureau of Natural Heritage Conservation, Superior, Wisconsin, USA. Email: rdbuobis@gmail.com

**22460.** Francisco de Avila Junior, W.; Vieira Machado, V.L.; Lencioni, F.A.; Carneiro, M.A.A. (2020): Distribution and composition of dragonfly and damselfly species (Odonata) of the upper Rio das Velhas, Ouro Preto, Minas Gerais State, Brazil. *Pap. Avulsos Zool.*, 2020; v.60: e20206065: 8 pp. (in English) ["This paper describes the composition and distribution of Anisoptera and Zygoptera species of the upper Rio das Velhas in the municipality of Ouro Preto, Minas Gerais State, Brazil. A total of 727 specimens of 40 species were collected near water bodies over a period of 23 months between 2015 and 2017. The families with greatest species richness were Libellulidae (13 species), Coenagrionidae (12 species) and Heteragrionidae and Aeshnidae (4 species each). Notable among the species collected were *Perilestes fragilis*, inhabiting well-preserved forests, *Minagrion waltheri*, pertaining a endemic genus of Brazil and the recently described *Heteragrion cauei* Ávila-Júnior et al., 2017, and three species recorded for the first time for the state: *Elasmothemis alcebiadesi*, *Erythrodiplax melanica* and *E. acantha*, the latter is considered Critically Endangered (CR) by the International Union for Conservation of Nature's (IUCN) Red List." (Authors)] Address: Francisco de Ávila Júnior, W., Univ. Federal de Ouro Preto (UFOP), Instituto de Ciências Exatas e Biológicas, Depto de Biodiversidade, Evolução e Meio Ambiente (DEBIO), Laboratório de Entomologia Ecológica. Ouro Preto, MG, Brasil. E-mail: walterfaj88@gmail.com

**22461.** Franke, S.; Brandl, R.; Heibl, C.; Mattivi, A.; Müller, J.; Pinkert, S.; Thorn, S. (2020): Predicting regional hotspots of phylogenetic diversity across multiple species groups. *Diversity and Distributions* 26(10): 1305-1314. (in English) ["Aim: The protection of phylogenetic diversity has become a priority in conservation biology, but its achievement requires a detailed understanding of (a) hotspots of phylogenetic diversity on a management-relevant scale and (b) the land use and climate factors determining local phylogenetic diversity. In this study, we identified spatial patterns of taxonomic and phylogenetic diversity and their environmental drivers. Location: Bavaria, Germany. Methods: To map the cross-taxon phylogenetic diversity, we combined species distribution data obtained from country-wide monitoring programmes and phylogenetic trees of birds, bats, dragonflies, grasshoppers and butterflies and calculated the phylogenetic diversity standardized by species richness. Generalized additive models were used to test the effects of land use and climate on phylogenetic diversity. We identified hotspots of phylogenetic diversity and assessed the extent to

which established protected areas in Bavaria cover these hotspots. Results: High coverage by urban areas, arable land and water bodies negatively affected the phylogenetic diversity of most species groups. The phylogenetic diversity of birds increased with increasing meadow cover. Climate did not influence the phylogenetic diversity of the studied groups. We identified 10 regional hotspots that contained the highest standardized phylogenetic diversity across the examined species groups. There was a strong mismatch between hotspots of phylogenetic diversity among the species groups. Protected areas (national parks, natural reserves and areas of the Flora-Fauna-Habitat Directive) overlapped only to ~9.6% with these hotspots of standardized phylogenetic diversity. Main conclusions: Cross-taxon approaches are required to identify hotspots of phylogenetic diversity at a management-relevant scale. At regional scales, land use was more important than climate in determining phylogenetic diversity. Our study highlights the importance of involving land users into strategies for protecting phylogenetic diversity." (Authors)] Address: Franke, Sophia, Dept of Animal Ecology, Faculty of Biology, Philipps-Universität Marburg, Karl-von-Frisch-Str. 8, 35032 Marburg, Germany. E-mail: sophia.franke@posteo.de

**22462.** Futahashi, R.; Kita, H. (2020): Rapid decline of the white-winged morph (forma edai) of *Mnais pruinosa* Selys, 1853. Tombo 62: 13-15. (in Japanese, with English summary) ["White-winged form (forma edai) of *M. pruinosa* was not uncommon in the Boso Peninsula, Chiba Prefecture, in the past. However, the individuals of this endemic form continuously decreased and have not been observed since 2004. The major cause of such rapid decline is considered as selective overcollection." (Authors)] Address: Futahashi, R., National Inst. of Advanced Industrial Science & Technology (AIST), Central 6, Tsukuba, Ibaraki 305-8566 Japan. E-mail: ryo-futahashi@aist.go.jp

**22463.** Gultom, S.; Manalu, K.; Tambunan, E.P.S. (2020): Keanekaragaman Capung di Taman Wisata alam Danau Sicikeh – Cikeh desa lae Hole Kecamatan Parbuluan Kabupaten Dairi Sumatera Utara. [The diversity of Odonata in Sicikeh-cikeh Lake Cikeh village, Lae Hole Village, Kecamatan Parbuluan, Dairi District, North Sumatra]. Klorofil 4(2): 1-7. (in Indonesian, with English summary) ["This study aims to determine the type, abundance, and frequency of Odonata in the Lake Sicikeh-cikeh Nature Tourism Park, Lae Hole Village, Parbuluan District, North Sumatra Province. This research was conducted in November 2019. This research used the Exploration method. Observations were made at three stations. Data obtained from the field are processed manually, after the data is collected, processed, then presented in the form of a table and described descriptively. The results showed an abundance of dragonflies in Lake Sicikeh-Cikeh Nature Tourism Park categorized as moderate diversity. The highest abundance of dragonflies is found in the species of *Neurothemis fluctuans* with a relative abundance of 37.17%. The highest relative frequency is found in species of *Pseudagrion microcephalum* Rambur, *Neurothemis fluctuans* Fabricius, and *Rhodothemis rufa* Rambur with a relative abundance value of 15%." (Authors)] Address: Gultom, Sofiana, Program Studi Biologi, Fakultas Sains dan Teknologi, Universitas Islam Negeri Sumatera Utara, Indonesia. E-mail: sofanagultom7@gmail.com

**22464.** Kagimoto, B. (2020): A report on the Conservation of *Orthetrum poecilops* Ris, 1919. Tombo 62: 20-22. (in Japanese, with English summary) ["*O. poecilops* is a very rare species of dragonfly which is found only in Miyajima, Japan and in Fujian and Guangdong in China, including Hong Kong. At Miyajima the habitat is curiously a marsh near the

sea shore, where sea water flows in on a spring tide. Such a habitat is very vulnerable to any pressure of development. However Miyajima has been a forbidden island to develop as "God's island" because the God of Shinto is believed to reside there. In 2005 the Conservation committee started. This committee comprised staff from the Ministry of Environment, Hiroshima Prefectural Government, Hatsukaicm City and consisted mainly of specialists in insects. The project was to build fences to exclude invading wild bore around habitats in all 4 areas in Miyajima, so that the number of specimens of *O. poecilops* could be assessed, and to breed larvae from eggs artificially and so on. Thanks to these activities, the number of *poecilops* is increasing. From 2018 a new project has begun. The Conservation committee attempted to create a 5th habitat on the island. There are two big problems for Conservation. One is a lack of funds for everything. Another is pollution from scrap plastic. Fortunately the latter has little influence on the habitat at present. Thanks to such activities by the Conservation committee, *O. poecilops* has been able to survive on Miyajima Island." (Author)] Address: Email: miyajimatono@yahoo.co.jp

**22465.** Kita, H.; Suda, S. (2020): Habitat and Conservation Status of *Paracercion plagiosum* (Needham, 1930). Tombo 62: 9-12. (in Japanese, with English summary) ["*P. plagiosum* is designated as Endangered Class B (EN) in the Ministry of the Environment Red List category. Recently, many of the existing production areas have been lost and many of them are in crisis. The authors looked at the current status of habitats and conservation. To date, *P. plagiosum* has been found in ten prefectures in Tohoku and Kanto regions, of which Kanagawa Prefecture has become extinct and many habitats in other areas are at risk. It is important that this species inhabits abundant aquatic plants that serve as spawning substrates, but *P. plagiosum* tends to decline when aquatic plants decrease due to deteriorating water quality. Although many efforts have been made for *P. plagiosum*, such as habitat conservation and selection of important wetlands, the degradation of its habitat and the decline of this species are progressing at a faster speed. It shows how difficult it is to conserve this species, which is locally distributed only on human-sensitive plains and has high environmental preference." (Authors)] Address: Kita, H., Takiyama 6-2-15-308, Higashikunime City, Tokyo, 203-0033, Japan

**22466.** Koch, L. (2020): Libellen als Indikatoren für den ökologischen Zustand einer Region. *Natur und Umwelt im Pannonschen Raum* 30(2): 7. (in German) [Verbatim/Google translate: Dragonflies as indicators of the ecological condition of a region The Seewinkel region is one of Austria's "dragonfly hotspots": Of the 78 dragonfly species currently in Austria, around 50 are found here. Despite the extinction of insects, dragonflies are important indicators of the ecological condition of a region. The time of the impressive giant dragonflies with a wingspan of up to 70 cm in the Carboniferous period is over, but dragonflies still fascinate many people to this day. Due to the high diversity of different habitats, the Seewinkel region in Burgenland is home to around 50 species of dragonflies. The region offers, among other things, one of the rare Central European inland occurrences of the dark rush damselfly (*Lestes macrostigma*), which in the Seewinkel occurs primarily on salt lakes with brackish reed beds. Studies from 2008 showed that species that prefer to spend time on salt lakes appear to be experiencing a decline in their populations. This is due, among other things, to large-scale lowering of groundwater, which results in a change in the water regime and thus promotes the plants to dry out earlier in the season. The good news: Through renaturation measures in



bodies of water, former habitat losses can usually be quickly compensated for, as many dragonflies are known to quickly return to their former habitats. *Libellula depressa* and *Orthetrum coerulescens* are positive examples of this. Although these species were considered endangered in Burgenland until the 1980s, they are now benefiting from the improvement in water quality in gravel pits and rivers, so that their populations are now considered stable and, in the case of the *C. coerulescens*, are even increasing. Two thirds of the dragonfly species found in Austria are now endangered. Many of them are on the red list. Preserving as large a variety of dragonflies as possible is particularly important from a nature conservation perspective, as the presence or absence of a particular dragonfly species in a body of water can provide essential information about the ecological quality of their environment: dragonflies act as so-called bioindicators; i.e. indicator organisms that are used in conservation biology to obtain information about the ecological status of a habitat. It remains questionable whether an improvement in general water quality will be sufficient in the long term to protect dragonfly species that have become rare. Due to the current climate crisis, there are winners among dragonflies, who are expanding their range due to climate change, and losers, whose populations are expected to decline over the next few years. Nevertheless, habitat renaturation measures are extremely important, as they ultimately benefit the preservation and improvement of our fantastic nature and environment, of which these fascinating little animals are certainly the best proof.] Address: Koch, Laura, Naturschutz und Biodiversitätsmanagement sowie Zoologie an der Universität Wien

**22467.** Li, L.; Park, Y.-S. (2020): Habitat availability and environmental preference drive species range shifts in concordance with climate change. *Diversity and Distributions* 26(9): 1343-1356. (in English) ["Aim: A progressive increase in air temperature is recognized as the most important mechanistic driver of species range shifts. However, only a few studies have simultaneously considered the influence of both extrinsic and intrinsic mechanistic drivers; there are still no studies on the roles of extrinsic and intrinsic drivers that regulate such species changes. We investigated how species will shift their geographical ranges to cope with future climate change and analysed the relative importance of the mechanistic drivers in governing species range shifts. Location: 16 countries in South, West and North Europe. Methods: We used ensemble species distribution models on the European continental scale to predict 105 odonate species in response to climate change in the future decades until 2080s under three emission scenarios. We evaluated the projected changes in four community metrics (distribution area, optimum position, leading edge and trailing edge) and investigated how these changes are driven by extrinsic and intrinsic factors. Results: The odonate species were predicted to shift their range margins poleward, with a higher migration rate towards the trailing edge (2.38-10.34 km/year) than the leading edge (1.13-2.00 km/year). Contrary to the assumption that the response of the odonate species to climate change will linearly accelerate over time, the distribution areas of odonate species were predicted to increase until 2050s and then decline until 2080s under RCP 2.6 (representative concentration pathway). However, their distributions under RCP 4.5 and RCP 8.5 were predicted to decrease over time, with a higher rate under RCP 8.5. Overall, environmental preference and habitat override dispersal ability govern the range shift of odonate species. Main conclusions: Quantifying the relative importance of extrinsic and intrinsic factors across a large spatial scale under different emission scenarios can help understand the mechanistic processes to facilitate species range shifts."]

(Authors)] Address: Park, Y.-S., Dept Biol., Kyung Hee Univ., Seoul 02447, Republic of Korea. E-mail: parkys@khu.ac.kr

**22468.** Lubelczyk, C.B.; Elias, S.P.; de Maynadier, P.G.; Brunelle, P.M.; Smith, L.B.; Smith Jr, R.P. (2020): Importation of dragonfly nymphs (Odonata: Anisoptera) to control mosquito larvae (Diptera: Culicidae) in southern Maine. *Northeastern Naturalist* 27(2): 330-343. (in English) ["A long-standing program in Maine promotes stocking of dragonfly (Odonata) nymphs for biological control of nuisance and vector mosquitoes. Currently the only sources of dragonflies for stocking are out-of-state biological supply companies. In 2 dragonfly shipments from suppliers in Massachusetts and North Carolina, we determined that 6.8% and 38.5% of species, respectively, were not native to Maine. In an experiment of stocking efficacy, we introduced 4, 2, or 0 dragonfly nymphs into artificial pools in a forest habitat and found no differences in mosquito larvae counts among treatments. While the motivation for using dragonflies as biological control agents is commendable, the practice may be ineffective, and risks accidental introductions of non-native aquatic plants and animals in water used for shipping." (Authors)] Address: Lubelczyk, C.B., Maine Medical Center Research Institute, 81 Research Drive Scarborough, ME 04074, USA. Email: lubelc@mmc.org

**22469.** Milkowski, M. (2020): Dragonflies (Odonata) of Radom - observations within the period of 2013-2018. *Odonatix* 1622: 9 pp. (in Polish, with English summary) ["Observations on dragonflies were carried out at the rivers and ponds within the boundaries of Radom 2013-2018. 43 dragonfly species recorded on 20 localities are presented, from which 4 species are protected by in Poland. *Sympecma paedisca*, *Ophiogomphus cecilia*, *Leucorrhinia pectoralis*, *L. albifrons*. 5 species of „southern“ dragonflies were observed. *Orthetrum albistylum*, *O. brunneum*, *Sympetrum fonscolombii*, *S. meridionale* and *Crocothemis erythraea*." (Author)] Address: Milkowski, M., ul. Krolowej Jadwigi 19 m. 21, 26-600 Radom, Poland. E-mail: milkowski63@wp.pl

**22470.** Ministry of the Environment (2020): The list of Odonata species in Red Data Book of Japan published by Ministry of the Environment. Tombo 62: 1-2. (in Japanese) [This note documents the odonate taxa listed in the Red Data Book of Japan (<https://www.env.go.jp/press/files/jp/11-0615.pdf>): Extinct: 0 species; Extinct in the Wild: 0 species; Critically Endangered: 5 species; Endangered: 10 species; Vulnerable: 13 species; Near Threatened: 27 species, Endangered regional populations: 1 species (*Mnais pruinosa*)]

**22471.** Satoh, R. (2020): The cause of a drastic decrease in number and Conservation measures for *Sympetrum maculatum* Oguma, 1922 in Niigata Prefecture. Tombo 62: 16-19. (in Japanese, with English summary) ["*S. maculatum* is a rare and endangered species, endemic in Honshu, Japan. In Niigata Prefecture, this species was not so rare in the past, but has drastically decreased in numbers recently. At O-ike pond, Murakami City, it was found a lot in the past, but became extinct due to eutrophication from feeding waterfowl, exuberant growth of tall plants, and artificial institution. In addition, destruction of satellite habitats may have contributed to the extinction of the population. On the other hand, more controlled activity in Takane district, Murakami City has achieved good results. In particular, reducing the number of tall plants contributes to expansion of oviposition sites and, as a result, the population has increased." (Author)] Address: Email: ryojis@cocoa.ocn.ne.jp

**22472.** Smallshire, D.; Swash, A. (2020): Europe's Dragonflies. A field guide to the damselflies and dragonflies. Published by Princeton University Press: 360 pp. (in English) ["Europe's Dragonflies is a comprehensive, lavishly illustrated and beautifully designed photographic field guide to the damselflies and dragonflies of Europe. Written by two well-travelled experts, the book covers all 140 resident and vagrant species recorded, focussing on the field identification of adult insects. Concise species profiles highlight key identification features and provide information on behaviour, habitat preferences, distribution, flight periods, status and conservation. Other sections cover identification tips, conservation status and legislation. Presenting an unsurpassed selection of images of the highest quality, this is the go-to guide for anyone wishing to know more about these amazing and fascinating insects. Comprehensive coverage of every species of Odonata recorded in Europe; Stunning colour plates showing males, females, immatures, colour forms, subspecies and typical habitat for every species; Over 1,200 superb photographs, supplemented with illustrations of fine details; Detailed profiles for the 140 resident and vagrant species; Unique comparison plates for difficult groups; Easy to use by beginners and experts alike, avoiding technical terms" (Publisher)] Address: <https://oceanofpdf.com/authors/dave-smallshire/pdf-europes-dragonflies-a-field-guide-to-the-damselflies-and-dragonflies-download/?id=001811501763>

**22473.** Vilela, D.; Venâncio, H.; Santos, J.C. (2020): *Forcepsioneura machadorum* (Coenagrionidae: Protoneurinae) sp. nov. from the Cerrado Biome of Minas Gerais, southeastern Brazil. *International Journal of Odonatology* 23(4): 397-404. (in English) ["The Neotropical genus *Forcepsioneura* is composed of 11 species that inhabit almost exclusively the Brazilian Atlantic Forest domain, with *F. sancta* (Hagen in Selys, 1860) being the only species of this genus known to occur in the Cerrado biome. Here we describe a new species of *Forcepsioneura* from the Cerrado of Minas Gerais State, Brazil. This new species is morphologically closer to *F. sancta* and can be separated from this and other species of *Forcepsioneura* mainly by the rectangular shape of male prothoracic hind lobe and cerci morphology." (Authors)] Address: Vilela, D.S., Rua Jaime Bilharinho, 575, CEP 38065-280, Uberaba, Minas Gerais, Brazil. Email: [deegoo@gmail.com](mailto:deegoo@gmail.com)

**22474.** Watanabe, K. (2020): Protectional activity of the last clear stream in Ishigaki Island. *Tombo* 62: 23-25. (in Japanese, with English summary) ["After return to Japan, in the year of 1972 there were many dam constructions in Okinawa Prefecture. As a result, many habitats of dragonflies disappeared. On Ishigaki Island, Shiramizu River is now only one river with no dams, and is known by prolific habitats of *Macromia urania* and *Macromidia ishidae*. In 1992, boring survey of Shiramizu Dam started, at the same time we established the Conservation group, Smramizu Nature Observation Party. We had regularly nature observation, negotiation with administration and issue of newsletter. These are successful ways to stop the Smramizu Dam construction." (Author)] Address: Email: [odonet99@akubinet.com](mailto:odonet99@akubinet.com)

**22475.** Zessin, W. (2020): Kurzer Bericht von der 39. Tagung der „Gesellschaft deutschsprachiger Odonatologen e. V.“ in Höxter, Niedersachsen (12.-16.3.2020). *Virgo* 23: 86-90. (in German) [[https://www.entomologie-mv.de/download/virgo\\_23/Virgo\\_2020-12\\_Zessin.pdf](https://www.entomologie-mv.de/download/virgo_23/Virgo_2020-12_Zessin.pdf)] Address: Zessin, W., Lange Str. 9, 19230 Jasnitz, Germany. Email: [wolfgangzessin@aol.com](mailto:wolfgangzessin@aol.com)

**22476.** Akbar, L.A.; Basukriadi, A. (2021): Diversity of dragonflies and damselflies in lakes of Universitas Indonesia, Depok, West Java. *Journal of Physics Conference Series* 1725(1): 012035. Follow journal DOI: 10.1088/1742-6596/1725/1/01-2035: 6 pp. (in English) ["We investigated the diversity and distribution of Odonata inhabiting lakes at Universitas Indonesia, Depok, West Java in November 2017. The Study aimed to characterize the lakes based on the occurrence of some Odonata species. There were six study sites: Lake Agathis, Lake Kenanga, Lake Mahoni, Lake Puspa, Lake Salam, and Lake Ulin. Species of Odonata encountered within the study sites were caught using sweep nets, photographed and then released. A total of 16 species of Odonata were found including 12 dragonflies and 4 damselflies. The dragonflies were represented by two families. Of the 12 species of dragonflies recorded, 11 were from the family Libellulidae and 1 was from the family Gomphidae. *Brachydiplax chalybea* and *Orthetrum testaceum* were the most widely distributed species. However, the abundant species were *O. testaceum* and *Zygomma obtusum*. Damselflies were poorly represented, with only four species from two families, Coenagrionidae and Platycnemididae. Based on the species composition of Odonata from six lakes at Universitas Indonesia we conclude that most species are eurytopic or generalist that are widespread and tolerant to a wide range of environmental variables. In the current study, we consider that all lakes at Universitas Indonesia are disturbed habitats which are generally unsuitable for specialist or stenotopic species." (Authors)] Address: Basukriadi, A., Dept of Biology, Faculty of Mathematics and Natural Sciences (FMIPA), Universitas Indonesia, Depok 16424, Indonesia. Email: [basukriadi@sci.ui.ac.id](mailto:basukriadi@sci.ui.ac.id)

**22477.** Barrows, E.M. (2021): Prey-handling flexibility in *Vespa crabro* Linnaeus, the European Hornet, (Hymenoptera: Vespidae). *Proceedings of the Entomological Society of Washington* 123(2): 424-428. (in English) ["Only Dijkstra et al. (2001) and Wiklund (2005), who observed *Vespa crabro* in Europe, have published detailed information about *V. crabro*'s prey-handling behavior. This study builds on their work and describes *V. crabro*'s prey handling of two very different kinds of prey in the field in the United States: a *Bombus impatiens* worker, a prey much smaller than her predator, and a female *Speyeria cybele* (great spangled fritillary), a prey much larger, but possibly not much different in weight compared to her predator. This paper also describes *V. crabro*'s reactions toward and interactions with cicadas which are its possible prey, and reviews current knowledge about this wasp's prey handling based on the scientific literature and appropriate online photographs and videos of this wasp and its prey." (Authors)] Address: Barrows, E.M., Dept of Biology, Georgetown Univ., Reiss Building Suite 406, Box 571229, Washington, D.C. 20057-1229

**22478.** BCP Council (2021): 2021. Odonata Survey. Stour Valley · Millhams Mead · Throop Nature Park. Report Reference: BCP-OS-01, 18/10/2021: 35 pp. (in English) [The report can be downloaded at <https://bcpprojects.net/wp-content/uploads/2023/04/Odonata-Survey-Report-2021-compressed.pdf>] Address: <https://bcpprojects.net/wp-content/uploads/2023/04/Odonata-Survey-Report-2021-compressed.pdf>

**22479.** Dada, O.C. (2021): Ecological studies on the diversity of Odonata (Insecta) in Ipogun, Ifedore local government area, Ondo state, Nigeria. M.Tech. thesis, Environmental Biology & Public Health, Federal University of technology,

Akure, Ondo State, Niveria: (in English) ["Odonata are particularly good indicators of freshwater ecosystem health. The constant disturbance of freshwater habitats can result in reduction of Odonata species diversity. Changes in Odonata diversity are influenced by human activities such as urbanization, agriculture and input of pollutants in water. This study assessed the abundance and diversity of Odonata along River Aponmu in Ipogun. A total of 906 individuals representing 64 species and 16 genera in seven families (Coenagrionidae, Lestidae, Platycnemididae, Chlorocyphidae, Calopterygidae, Libellulidae and Gomphidae) were collected and identified. Of the 906 individuals, Libellulidae had the highest percentage composition (44%) with 395 individuals out of which *Trithemis arteriosa* (a pollution tolerant species) had the highest number of individuals (225) and Gomphidae had the lowest percentage composition (0.03%) with 1 individual. Most of the species collected had tolerance for disturbed environment including *Pseudagrion melanicterum*, *Paragomphus genoi* and *Orthetrum julia*. Aponmu area had the highest species diversity ( $H' = 2.312$ ) while Idi area had the least species diversity ( $H' = 2.021$ ). Alaasin area had the highest Simpson\_d value (0.8557) and the best taxa distribution (Evenness=0.524; Equitability\_J= 0.7764) which made the area a more pristine site than the other sites while Aponmu area had the least distribution (Evenness=0.3365; Equitability\_J= 0.6798). Cluster analysis revealed a close similarity between the Odonata assemblages at Alaasin and Aponmu areas while that of Idi area was quite different. Analysis of variance (ANOVA) of physico-chemical parameters revealed that temperature ( $^{\circ}\text{C}$ ), pH, Dissolved Oxygen (DO), turbidity (NTU), Biochemical oxygen demand (BOD), Nitrate ( $\text{NO}_3$ ) and Phosphate ( $\text{PO}_4$ ) did not show significant difference at the three sites while Electrical Conductivity ( $\mu\text{S}/\text{cm}$ ) and Total dissolved solids (mg/L) which had moderately high mean values indicated significant difference at Aponmu area ( $p < 0.05$ ). *Trithemis arteriosa* exhibited a weak negative correlation to both temperature and Dissolved Oxygen (DO). This study has provided information on Odonata assemblage and physico-chemical parameters at River Aponmu and therefore infers that some parameters influence the abundance of some Odonata species and River Aponmu is somewhat polluted as it receives more pollutants resulting from human activities around it and could be unsafe for drinking." (Author) For a published version of the thesis see: Adu, B.; Dada, O.; Tunwase, V. (2022): An ecological study of freshwater ecosystem and its colligation to Odonates assemblages in Ipogun, Southwest Nigeria. *Bulletin of the National Research Centre* 46 (Art. No. 86), 12 pp. (<https://bnrc.springeropen.com/articles/10.1186/s42269-022-007-74-4>) Address: Dada, Omolola, Department of Biology, The Federal University of Technology Akure, Akure, Ondo State, Nigeria. Email: omololacomfy@gmail.com

**22480.** Dalal, J.; Sharma, S.; Bhardwaj, T.; Dhatarwal, S.K.; Verma, K. (2021): A seasonal study of the decomposition pattern and insects on submerged rabbit carcasses. *Oriental Insects* 55(2): 280-292. (in English) ["There is a long history of using insects on a decomposing corpse as an invaluable tool to estimate the minimum post-mortem interval (PMI) during death investigations. The present study was carried out to study the decomposition pattern and insects associated with a submerged rabbit (*Oryctolagus cuniculus* Linnaeus, 1758) carcass. A total of 1795 insect specimens were found to be associated with different decomposition stages. During the submerged fresh stage three species from the genus *Chironomus* visited the carcass. During the early floating and floating decay stages, insects belonging to Coenagrionidae, Chironomidae, Lestidae, Aeshnidae families along with the

aquatic beetles i.e. *Enochrus esuriens* (Walker, 1858), *Regimbartia attenuata* (Fabricius, 1801), genus *Helochares* and *Canthydrus laetabilis* (Walker, 1858) visited and colonised the carcass. The advanced floating decay and sunken remains stage saw a prominence of *Ranatra digitata* (Hafiz & Pradhan, 1949), *Ranatra filiformis* (Fabricius, 1790) and genera *Hydroglyphus*, *Hypoporus*, *Laccophilus*, *Berosus* and *Helochares*. The Post-Mortem Submersion Interval (PMSI) was found to be longest in the winters (44 days, ADD = 1066.5) and shortest in the rainy season (16 days, ADD = 405.5) while the spring and the summer season showed a moderate PMSI of 26 days (ADD = 632.5) and 19 days (ADD = 472.5) respectively. ... The pungent putrefaction odour attracted the adult aquatic Odonate species of the Coenagrionidae, Lestidae, Gomphidae and Aeshnidae families." (Authors) With 532 specimens, Odonata were the second common group of insects found at the carcass.] Address: Sapna Sharma Dept of Genetics, Maharshi Dayanand University, Rohtak, India. Email: sapforsci@gmail.com

**22481.** Doer, D.; Seif, J.; Ueber, T. (2021): Jahresbericht 2020. Landschaftserhaltungsverband Bodenseekreis e.V., 88045 Friedrichshafen: 64 pp. (in German) [Coenagrion mercuriale; [https://www.bodenseekreis.de/fileadmin/03\\_umwelt\\_landnutzung/landschaftserhaltungsverband/downloads/lev\\_bsk\\_jahresbericht\\_2020.pdf](https://www.bodenseekreis.de/fileadmin/03_umwelt_landnutzung/landschaftserhaltungsverband/downloads/lev_bsk_jahresbericht_2020.pdf)] Address: Landschaftserhaltungsverband Bodenseekreis e.V., c/o Landratsamt Bodenseekreis, Albrechtstr. 67, 88045 Friedrichshafen, Germany. E-Mail: lev@bodenseekreis.de; Internet: <http://www.bodenseekreis.de/lev>

**22482.** Dolný, A.; Pyszko, P.; Šigitová, H. (2021): Community changes in odonate monitoring: why are long-term studies so relevant? *Insect Conservation and Diversity* 14(5): 597-608. (in English) ["1. Most ecological studies involving insects are based on medium- and short-term observations; however, the extent to which such data captures reality remains unclear. 2. We investigated the long-term dynamics of two Odonata communities (disturbed and undisturbed sites) over 18 years and analysed the differences in the short- and long-term results. We also focused on the sampling methodology to enhance the efficacy and objectivity of long-term monitoring involving Odonata. 3. During one year, we captured only 53% of the overall species richness; during three consecutive sampling years, it was 65%. To capture 95%, we needed 16 years. Changes in quantitative similarity (Renkonen index, P) were more pronounced within sites over time than between sites. Species constancy significantly increased with the maximum abundance class but decreased with increasing fluctuation ratio and specialisation (Dragonfly Biotic Index). Based on exuviae, we detected half of the species compared to adults, but the species accumulation curves peaked after a few sampling years. 4. Long- and short-term monitoring yield different results, both qualitatively (species richness, specialisation) and quantitatively (abundance, dominance). Ideal sampling should be sequential, lasting at least 10 years (capturing >80% of species). Intermittent sampling (one-year interspersed with pauses), allowing the inclusion of multiple sites in monitoring programme, may also provide satisfactory results when performed over a longer period. 5. Over the long term, sampling adults semi-quantitatively and exuviae qualitatively provided sufficient information, while being feasible in terms of both personnel and costs, thereby overcoming the main pitfalls of long-term monitoring programmes." (Authors)] Address: Šigitová, Hana, Dept of Biology and Ecology, University of Ostrava, Chittussiho 10, 710 00 Ostrava, Czech Republic. E-mail: hana.sigutova@osu.cz

**22483.** Dunn, K.L. (2021): Book Review: The Complete Field Guide to Dragonflies of Australia, Second Edition, by Günther Theischinger and John Hawking, with colour illustrations by Albert Orr. Calodema 949: 1-7. (in English) [Extensive book review. [https://www.researchgate.net/publication/354-627637\\_Book\\_Review\\_The\\_Complete\\_Field\\_Guide\\_to\\_Dragonflies\\_of\\_Australia\\_Second\\_Edition\\_by\\_Gunther\\_Theischinger\\_and\\_John\\_Hawking\\_with\\_colour\\_illustrations\\_by\\_Albert\\_Orr\\_CSIRO\\_Publishing\\_March\\_2021](https://www.researchgate.net/publication/354-627637_Book_Review_The_Complete_Field_Guide_to_Dragonflies_of_Australia_Second_Edition_by_Gunther_Theischinger_and_John_Hawking_with_colour_illustrations_by_Albert_Orr_CSIRO_Publishing_March_2021)] Address: Dunn, K.L., Centre for Integrative Ecology, School of Life and Environmental Sciences, Deakin University, Victoria, Australia. Email: k.dunn@deakin.edu.au

**22484.** Erasmus, J.H.; Lorenz, A.W.; Zimmermann, S.; Weperner, V.; Sures, B.; Smit, N.J.; Malherbe, W. (2021): A diversity and functional approach to evaluate the macroinvertebrate responses to multiple stressors in a small subtropical austral river. *Ecological Indicators* 131, November 2021, 108206: 11 pp. (in English) ["Highlights: • Hex River is subjected to multiple stressors i.e. mining, industrial and urban effluents. • Water chemistry variables were main drivers of macroinvertebrate community changes. • Mining impacted community features differently than urban impacts. • Combined macroinvertebrate approaches were able to differentiate stressor groups. Abstract: Aquatic macroinvertebrates are considered effective bioindicators of ecosystem health due to their different sensitivities to habitat alteration and pollution. Macroinvertebrate community structures can be assessed using commonly used diversity-based approaches, however, functional trait-based approaches are increasingly introduced into bioassessments. The Hex River is subjected to intensive mining activities, while urban and industrial effluents, as well as treated and untreated sewage also contributes to pollution in the river. The present study aimed to assess macroinvertebrate responses to different stressors (nutrient and chemical, especially metal pollutants), determine whether diversity-based or trait-based approaches provide a better indication of responses and, to evaluate the relationship between metal bioaccumulation and macroinvertebrate responses to this multi-stressor environment. The mining impacts, in combination with urban, industrial and sewage effluent, altered the macroinvertebrate community structure of the Hex River. The species richness significantly decreased from reference conditions (39 species) to impacted conditions (24 species), while the total number of individuals in tolerant species gradually increased. The diversity-based approach indicated a clear difference between reference and impacted conditions but did not clearly differentiate between different stressors, while the trait-based approach distinguished the urban, industrial and sewage effluent sites from mining impacted sites. The use of both approaches is, therefore, recommended as both complement each other. From the present study, it is evident that macroinvertebrates can be considered as both reliable accumulation-, and response bioindicators to pollution from mining, as well as urban and industrial activities. ... The species response curves revealed that metals from mining activities (Cr, Ni, Pt) had a significant negative effect on ... Odonata species (Nothiothemis sp., Trithemis sp.). In contrast, ... Odonata species (Pseudagrion sp.) increased in response to higher metal concentrations (Supplementary data, Fig. S2 and S3). ... Nothiothemis sp. had a significant negative response to Cl<sup>-</sup>. Chemical oxygen demand (mg/L), Electrical conductivity (µS/cm), Ni in the water and sediment, SO<sub>4</sub><sup>2-</sup>, as well as Total hardness (mg/L)." (Authors) In the supplemental material, the following taxa are listed: *Lesites* sp., *Ellatoneura glauca*, *Platycypha caligata*, *Pseudagrion* sp., *Enallagma glaucum*, *Agriocnemis pinheyi*, *Notogomphus* sp., *Ceratogomphus* sp., *Paragomphus* sp., *Onychogomphus* sp.,

*Aeshna* sp., *Anax* sp., *Tetrathemis* sp., *Acisoma* sp., *Nothiothemis* sp., *Orthetrum* sp., *Bradinopyga* sp., *Pantala* sp., *Trithemis* sp., and *Sympetrum fonscolombii*.] Address: Erasmus, J.H., Water Research Group, Unit for Environmental Sciences and Management, North-West University, 11 Hoffman St, Potchefstroom 2520, South Africa. Email: hannes.erasmus@nwu.ac.za

**22485.** Eslami Barzoko, Z.; Ebrahimi, M.; Kiany, M.; Sadeghi, S. (2021): Ecological drivers of Odonata beta diversity in arid and semi-arid regions of the Central Plateau of Iran. *Insect Conservation and Diversity* 14(1): 40-51. (in English) ["1. Freshwater habitats are among the most threatened and least studied habitats in arid regions of Iran. Discovering factors responsible for the spatial variation of biodiversity are one of the main considerations in conservation biology. As a first step towards developing conservation strategies, we aimed to investigate the beta diversity and response of Odonata assemblages to climate and landscape variables in arid and semi-arid regions of Iran. 2. A total of 120 water bodies were surveyed. The beta diversity distance matrices were calculated for Odonata, Anisoptera, and Zygoptera, using the Jaccard dissimilarity coefficient. Also, the replacement and richness difference components of Odonata beta diversity were computed. Each of the five dissimilarity matrices was modelled by generalised dissimilarity modelling (GDM). 3. We recorded 58 species of Odonata that represent 58% of the Odonata species in Iran. The average total beta diversity was high (0.873). GDMs results showed that the most influential variables varied between the replacement and richness difference components of Odonata beta diversity as well as between the two Odonata suborders. Anisoptera were most strongly affected by the temperature annual range, while the most important variable for Zygoptera was the average wind speed in April. 4. Our results suggest that the studies of the drivers of biodiversity patterns benefit from beta diversity partitioning also from comparing species groups with different ecological preferences. The high biodiversity of the studied water bodies as well as the anthropogenic and climate threats that they are faced with, make these ecosystems a conservation priority." (Authors)] Address: Sadeghi, S., Dept of Biology, Faculty of Sciences, Shiraz University, Shiraz, Iran. E-mail: ssadeghi@shirazu.ac.ir

**22486.** Fujita, Y.; Lima, M. (2021): Unsteady lift generation of corrugated wing by lambda vortex collapse. *Bulletin of the American Physical Society, 74th Annual Meeting of the APS Division of Fluid Dynamics, Sunday–Tuesday, November 21–23, 2021; Phoenix Convention Center, Phoenix, Arizona, Session P13: Biological Fluid Dynamics: Flying Insects. 4:05 PM–6:41 PM, Monday, November 22, 2021, Room: North 127 ABC:* (in English) [Verbatim: "Dragonfly wing is not smooth but corrugated; its vertical cross-section consists of connected series of line segments. Some previous studies suggest that the aerodynamic performance of the corrugated wing is higher than that of the flat wing at the low Reynolds numbers ( $Re \sim O(10^3)$ ). However, the details are not fully investigated. In particular, the aerodynamic characteristics and flow property during unsteady wing motion has not been studied in detail because of the complicated flow characteristics. In this study, we analyzed flow around two-dimensional corrugated wing model that started impulsively by direct numerical simulations. We focused on a period between the generation of the leading-edge vortices (LEVs) and subsequent interactions, and its detachment. For the flat wing, so-called lambda vortex with the sign opposite to LEV. On the other hand, for the corrugated wing, the lambda vortex collapsed and stuck in the valleys of the corrugated



structure in a parameter range. The lambda vortex collapse changes the LEV dynamics to encourage the instantaneous lift enhancement of the corrugated wing. In the presentation, we will discuss the details." (Authors)] Address: Fujita, Yusuke, Program of Mathematical & Life Sciences, Graduate School of Integrated Sciences for Life, Hiroshima University

**22487.** Goldner, J. (2021): Investigating metapopulation responses to landscape-level habitat changes. PhD thesis, Faculty of Purdue University, Department of Entomology, West Lafayette, Indiana: 122 pp. (in English) ["The study of landscape structure and configuration is firmly established as integral to the continued advancement of ecology. The configuration of resource patches can have far-reaching implications for biodiversity, metapopulation dynamics, community structure, and habitat quality. Human activities, such as forestry, agriculture, and residential construction alter patch configuration by breaking larger patches into smaller fragments. This frequently results in pronounced, unforeseen consequences for species. The fragmentation and shrinking of habitat patches can lead to changes in the environmental conditions within the remaining patches (e.g., degradation), prompting responses from local populations. These responses can, in turn, cause changes to the metapopulation structure on large spatial scale. I examined the relationship between the degree of habitat fragmentation (edge density), and foraging lengths of *Calopteryx maculata*. I used correlated random walks to determine the biologically relevant landscape area over which forest fragmentation was calculated. Then, I used Moran's I to determine the spatial scale of wing length response to fragmentation. I found that wing lengths increased with edge density. I also found that wing lengths were spatially autocorrelated at distances below 5 Km. These findings suggest that damselflies adapt to changes in forest fragmentation at a relatively small spatial scale. Next, I assessed the slime mold *Physarum polycephalum*'s usefulness as a microcosm of dispersal in fragmented landscapes. Slime mold plasmodia were placed in dishes with oat patches of varying sizes and distances. The probability of each patch type being colonized first was compared to predictions of patch occupancy based on *C. maculata*. Patches that were nearer or larger were likely to be colonized before patches that were more distant, or smaller. Observed patch occupancy matched model predictions when only patch distance was varied, but not when patch size was varied. These results suggest that *P. polycephalum* has the potential to serve as a useful microcosm of dispersal in patchy landscapes. However, more testing is needed to develop the microcosm system. Finally, a lesson plan was developed to teach high school students about the concepts of landscape ecology and connectivity. An emphasis was placed on using active learning techniques, which have been demonstrated to result in greater understanding than traditional lecture formats. The lesson plan incorporates an education boardgame, *Humans & Habitats*, that I developed to illustrate how the conflicting goals of resource managers impact habitat connectivity. It also incorporates a scientific inquiry activity that uses *P. polycephalum* to test predictions about the effect of altered connectivity. The lesson plan and materials will be available to members of the public, free of charge." (Author)] Address: [https://hammer.purdue.edu/articles/thesis/Investigating\\_Metapopulation\\_Responses\\_to\\_Landscape-Level\\_Habitat\\_Changes/17159243](https://hammer.purdue.edu/articles/thesis/Investigating_Metapopulation_Responses_to_Landscape-Level_Habitat_Changes/17159243)

**22488.** Hasik, A.Z. (2021): Host-parasite interactions within food webs. PhD thesis, University of Arkansas, Fayetteville: 141 pp. (in English) ["Parasitism is one of the most common life history strategies employed in nature, yet the effects of

parasites are often thought to be minimal, and the vast majority of studies fail to consider parasites and their effects on host organisms. This is likely a problem, as the magnitude of parasite-mediated effects on their hosts can be quite large. Additionally, the effects of parasites are known to extend beyond the host to affect other species interactions. I used a series of approaches to gain a more integral understanding of host-parasite interactions by studying (1) the effects of parasites on biotic interactions that hosts engage in, (2) how biotic interactions such as predation and competition can affect host immune defense, and (3) how abiotic and biotic factors within the local environment affecting the host can further mediate parasitism dynamics. Specifically, in Chapter 1 I conducted a phylogenetically informed meta-analysis of the effects of parasites on species interactions (i.e., predation, competition, mutualism, and reproduction). I found that despite a strong overall negative effect on species interactions, the effects of parasites surprisingly ranged from being strongly beneficial to strongly deleterious on host species interactions. In Chapter 2 I used larval damselflies and their dominant fish predator to test how cascading effects of predators on host competitive interactions and resource acquisition affected a critical component of damselfly immune function, the phenoloxidase (PO) cascade. I found that neither direct density-mediated effects, indirect, trait-mediated effects, nor combined effects of predators via natural selection affected total PO activity. Instead, PO levels increased with resource availability, implying resource limitation. Finally, in Chapter 3 I used two field experiments and a detailed observational study to investigate how host, abiotic, and biotic factors within the local environment affected the relationships between *Enallagma* spp. hosts and their water mite (*Arrenururs* spp.) ectoparasites. I found that parasitism was species-specific and did not vary with host density or host condition (i.e., immune function). Instead, parasitism was largely predicted by abiotic factors (i.e., pH). Collectively, my results indicate that parasites are key players in the complex web of species interactions that compose food webs. Furthermore, host-parasite interactions are mediated by many of the same ecological factors as other species interactions, which has implications for parasitism dynamics within ecological communities. Future studies of food webs must incorporate parasites into their experimental and theoretical designs, and future studies of host-parasite interactions must expand beyond the focal relationship and consider the ecology of both the host and parasite." (Author)] Address: <https://scholarworks.uark.edu/cgi/viewcontent.cgi?article=5706&context=etd>

**22489.** Hojaji, M.; Soufivand, M.R.; Lavimi, R. (2021): An experimental comparison between wing root and wing tip corrugation patterns of dragonfly wing at ultra-low Reynolds Number and high angles of attack. *Journal of Applied and Computational Mechanics* 8(4): 1176-1185. (in English) ["This study presents the empirical comparison between the wing root and wingtip corrugation patterns of dragonfly wing in the newly-built wind-tunnel at the IAUN. The main objective of the research is to investigate the effect of wingtip and wing root corrugations on aerodynamic forces and the flow physics around the cross-sections at  $Re=10000$  and the angle of attack of  $0^\circ$  to  $30^\circ$ . For this aim, two cross-sections are extracted from wing root (first cross-section) and wingtip (second cross-section). The first cross-section has corrugations with higher density than the second cross-section. The comparison of lift coefficients obtained from pressure distribution and force measurement indicates an acceptable agreement between the results. Also, Particle Image Velocity (PIV) technique is used to measure the velocity field. The

results show that all corrugation patterns do not have positive effects on the aerodynamic forces. The second cross-section can generate considerable aerodynamic forces compared to the first cross-section. At  $\alpha=25^\circ$ , the lift coefficient generated by the second cross-section is 90% and 25% higher than that of the first cross-section and the flat plate, respectively. Based on results, corrugations in the wing root's vicinity have a crucial role in the solidity of insect wings; however, corrugations in the wing tip's vicinity play a vital role in generating adequate aerodynamic forces. The comparison conducted in the current research reveals the second cross-section is an appropriate replacement for the flat plate in MAVs due to generating more essential forces for flight." (Authors)] Address: Hojaji, M., Dept of Engineering, Najafabad Branch, Islamic Azad Univ., Najafabad, Iran

**22490.** Komaki, S. (2021): Widespread misperception about a major East Asian biogeographic boundary exposed through bibliographic survey and biogeographic meta-analysis. *Journal of Biogeography* 48(9): 2375-2386. (in English) ["Aim: The Watase line, a major biogeographic boundary between Palearctic and Oriental realms in East Asia, is generally drawn between Akuseki and Kodakara Islands of the Northern Ryukyu archipelago, Japan. However, no evidence can be found to support the positioning of the boundary between these two tiny volcanic islands. This study aimed to confirm whether and where the biogeographical boundary should be drawn. Location: East Asia. Taxon: Land snail, ant, dragonfly, butterfly, amphibian, reptile, bird and plant. Methods: A bibliographic survey was carried out to revisit an original definition of the Watase line and its usage. Biogeographic and meta-analyses were also performed using a Simpson dissimilarity index calculated from published distribution data to test whether and where any biogeographic boundary exists. To ensure the validity of the study design, similar surveys and analyses were conducted in another region of Southern Ryukyu, where a reliable biogeographic boundary has been proposed as a positive control. Results: The bibliographic survey showed that the Watase line had been described without specifying the precise position. No revised definition has been proposed for the boundary to date. Biogeographic analyses do not support the existence of a boundary between Akuseki and Kodakara Islands. Meanwhile, the presence of a boundary in Southern Ryukyu was endorsed by both the bibliographic survey and biogeographic analyses, supporting the validity of this study's design. Main conclusions: This study revealed that the major biogeographic boundary is widely used with deviations from the original definition. Presumably, ideas based on inappropriate evidence, such as the distribution of a symbolic species and unpublished data, have been referred to without being questioned and led to the current widespread misunderstanding. Misunderstandings like these could occur at any biogeographic boundaries around the world, and thus, systematic reviews of all boundaries are needed for an appropriate understanding of biodiversity." (Author)] Address: Komaki, S., Division of Biomedical Information Analysis, Iwate Tohoku Medical Megabank Organization, Iwate Medical University, Yahaba, Japan. E-mail: komaki@iwate-med.ac.jp

**22491.** Liu, C.; Du, R.; Li, F.; Sun, J. (2021): Bioinspiration of the vein structure of dragonfly wings on its flight characteristics. *Microscopy Research and Technique* 85(3): 829-839. (in English) ["Dragonflies have excellent flight characteristics, which are inextricably related to the characteristics of their wings. Their wings not only support a variety of loads during flight but also maintain high-efficiency flight characteristics. In this study, the forewing of *Pantala flavescens* was

used as a research object to explore the microstructure of the surface, cross section, and the vein distribution. Three-dimensional models of three different structures of the forewing vein, including an oval-shaped hollow tube, a circular hollow tube, and a circular solid tube, were established. Fluid dynamics analysis of these three forewing models under different angles of attack during gliding was carried out by FLUENT software, and subsequently, the influence of the dragonfly forewing vein structure on its flight characteristics was analyzed. The numerical simulation results indicated that the vein structure has a considerable influence on the lift, drag, and lift-drag ratio of the *P. flavescens* forewing. It was indicated that among the tested models, the forewing model with oval-shaped hollow tubular veins has better flight efficiency and aerodynamic characteristics. The results of this study may provide the basis for a novel bionic concept of flapping wing microaircraft design." (Authors)] Address: Sun, Jiyu, Key Lab. of Bionic Engineering (Ministry of Education), Jilin University, Changchun 130022, China. Email: sjy@jlu.edu.cn

**22492.** Mahfouf, N.; Khettabi, Z. (2021): Révision sur les sous ordres des odonate (Anizoptère; Zygoptère) dans sept régions de l'Algérie (Bejaia, Seybous, Zéralda, Biskra, Touggourt, Chott malghir et Oum-el Bouaghi). MSc. thesis, *Ecologie & Environnement, Université Oum El Bouaghi*: 62 pp. (in French, with English summary) ["Studies conducted in seven different regions (Alger, Béjaia, Annaba, Oum El Bouaghi, Biskra, Touggourt and Melghir) of Algeria have identified a very rich and diverse fauna of Odonata. The total fauna is distributed in much specimens divided into 7 families and 13 species in Zéralda, 18 in Béjaia and the highest in Sybousse with 34 species. The same fauna is made up of specimens divided over 4 families and 9 species in Oum El Bouaghi, while the Biskra region shows the weakness and diversity with specimens distributed in 3 families and 6 species. Touggourt watch too a specimens splitted into 3 families and 12 species but Chott Melghir contains a number of specimens distributed in 3 families and 14 species." (Authors)] Address: <http://bib.univ-oeb.dz:8080/jspui/bitstream/12345-6789/11430/1/memoire-master-pdf-2021.pdf>

**22493.** Ryu, S.; Zhang, H.; Salcedo, M.; Socha, J.J.; Pass, G. (2021): Circulatory flow patterns in a dragonfly wing elucidated from a microfluidic model. *Bulletin of the American Physical Society. 74th Annual Meeting of the APS Division of Fluid Dynamics. Sunday–Tuesday, November 21–23, 2021; Phoenix Convention Center, Phoenix, Arizona. Session P13: Biological Fluid Dynamics: Flying Insects. 4:05 PM–6:41 PM, Monday, November 22, 2021, Room: North 127 ABC*: (in English) [Verbatim: "Insect wings consist of a network of tubular veins and thin inter-connected membrane. Within these veins are hemolymph (blood), tracheal branches (oxygen delivery), and nerves connected to vital sensory organs on the wing. Since blood flow supplies water and nutrients to the sensory organs and other tissues and removes waste products, veins and hemolymph flow are crucial for stability, flexibility, and functionality of the delicate wing blade. However, the relationship of wing venation on hemolymph circulation remains poorly studied. Previous experiments tracking hemocytes (blood cells) in transparent veins of living specimen gave some insight into some flow patterns. To investigate detailed hemodynamics in complex wing venation, we used photo/soft-lithography to create a microfluidic wing vein model of *Anax junius*. Blood flow was simulated by injecting dyed water into the veins using a range of flow velocities and input locations. Microbeads were used to characterize local flow patterns within the veins. Visualized flow patterns suggested that advection dominates near the wing

base, whereas diffusion dominates toward the wing tip. Biomimetic wing vein devices allow for further investigation into the insect wing's unique circulatory system and transport phenomena." (Authors)] Address: not stated

**22494.** Simonova, M.A. (2021): Ecological and faunal overview of dragonflies (Insecta: Odonata) of Krasnodar. Ecology and Nature Conservation Ecosystems of southern regions of Russia and adjoining areas. Materials of the XXXIV Interregional scientific-practical conference. Krasnodar, 20 May 2021: 57-59. (in Russian) ["The species composition of dragonflies in Krasnodar has been studied. A total of 14 species ..., have been identified. The aerial analysis of the odonto-fauna of Krasnodar. Krasnodar identified 6 different habitat groups." (Author/DeePL) *Crocothemis erythraea*, *Orthetrum cancellatum*, *O. coerulescens*, *Sympetrum flaveolum*, *S. pedemontanum*, *Libellula depressa*, *Anaciaeschna isosceles*, *Aeshna crenata*, *Anax parthenope*, *Lestes virens*, *L. dryas*, *Calopteryx splendens*, *C. virgo*, *Ischnura elegans*. [https://www.kubsu.ru/sites/default/files/faculty/sbornik\\_21\\_0.pdf](https://www.kubsu.ru/sites/default/files/faculty/sbornik_21_0.pdf)] Address: Simonova, M.A., Kuban State University, 350040, Krasnodar, Stawropolskaja Str., 149, Russia

**22495.** Stevens, S.; Reading, R.P. (2021): Breeding Hudsonian Emerald (*Somatochlora hudsonica*, Hagen) under human care. Final Report, 2021, Butterfly Pavilion, 6252 East 104th Avenue, Westminster, CO 80020: 10 pp. (in English) [<https://assets.bouldercounty.gov/wp-content/uploads/2022/01/2021-breeding-dragonflies.pdf>] Address: Butterfly Pavilion, 6252 East 104th Avenue, Westminster, CO 80020, USA

**22496.** Strausfeld, N.J. (2021): The lobula plate is exclusive to insects. *Arthropod Structure & Development* Volume 61, March 2021, 101031: (in English) ["Highlights: • Six specific neuroanatomical traits define the holometabolan lobula plate. • Neuropils claimed as lobula plates in malacostracans do not share any of those traits. • Traits identified in Odonata correspond to three traits defining holometabolan lobula plates, suggesting possible homology. Abstract: Just one superorder of insects is known to possess a neuronal network that mediates extremely rapid reactions in flight in response to changes in optic flow. Research on the identity and functional organization of this network has over the course of almost half a century focused exclusively on the order Diptera, a member of the approximately 300-million-year-old clade Holometabola defined by its mode of development. However, it has been broadly claimed that the pivotal neuropil containing the network, the lobula plate, originated in the Cambrian before the divergence of Hexapoda and Crustacea from a mandibulate ancestor. This essay defines the traits that designate the lobula plate and argues against a homologue in Crustacea. It proposes that the origin of the lobula plate is relatively recent and may relate to the origin of flight." (Author)] Address: Strausfeld, N.J., Dept of Neuroscience, University of Arizona, Tucson, AZ, USA. Email: fly-brain@neurobio.arizona.edu

**22497.** Amrulloh, M.F.F.; Kamaludin, K.; Atini, B.; Priyam-bodo, H.Y.; Moi, M.Y. (2022): Diversity, evenness, and species richness of aerial insects in dry land of Kefamenanu, North Central Timor, East Nusa Tenggara. *Advances in Tropical Biodiversity and Environmental Sciences* 6(3): 98-106. (in English) ["This research was conducted to determine the diversity, richness, and evenness of aerial insects based on habitat characteristics in the dry land of Kefamenanu city, North Central Timor, East Nusa Tenggara. The research was conducted on three types of habitats, namely dry land, rivers, and lakes by purposive sampling method.

Sampling was done by documenting specimens in each habitat, identifying, inventorying, and analyzing quantitatively to obtain data on species diversity, species richness, and species evenness. Results revealed that aerial insects in Kefamenanu City were found in 9 orders, 25 families, 44 genera, 54 species, and 1998 individuals in three habitat types with diversity index ( $H'=3.068$ ), evenness index ( $E=0.774$ ), richness index ( $R=6.974$ ), and dominance index (0.074). Aerial insects in dryland habitats are found in 8 orders, 18 families, 32 genera, 32 species, 514 individuals with diversity index ( $H'=2.735$ ), evenness index ( $E=0.789$ ), richness index ( $R=4.966$ ), and dominance index (0.092). Aerial insects in river habitat found 7 orders, 20 families, 40 genera, 47 species, and 792 individuals with diversity index ( $H'=3.205$ ), evenness index ( $E=0.833$ ), richness index ( $R=6.892$ ), and dominance index (0.075). Aerial insects in the lake habitat found 8 orders, 18 families, 35 genera, 39 species, 692 individuals with diversity index ( $H'=2.906$ ), evenness index ( $E=0.793$ ), richness index ( $R=5.811$ ), and dominance index (0.083)." (Authors) 19 odonate species are listed.] Address: Amrulloh, M.F.F., Biology Education, Faculty of Education, Timor University, Jl Kefamenanu KM.09, Sasi, Kefamenanu, Timor Tengah Utara, Nusa Tenggara Timur, Indonesia - 85614. Email: mohamadfajar@unimor.ac.id

**22498.** Doer, D.; Seif, J.; Ueber, T. (2022): Jahresbericht 2021. Landschaftserhaltungsverband Bodenseekreis e.V., 88045 Friedrichshafen: 58pp (in German) [*Coenagrion mercuriale*; [https://www.bodenseekreis.de/fileadmin/03\\_umwelt\\_landnutzung/landschaftserhaltungsverband/downloads/LEV\\_BSK\\_Jahresbericht\\_2021\\_druckversion.pdf](https://www.bodenseekreis.de/fileadmin/03_umwelt_landnutzung/landschaftserhaltungsverband/downloads/LEV_BSK_Jahresbericht_2021_druckversion.pdf)] Address: Landschaftserhaltungsverband Bodenseekreis e.V., 88045 Friedrichshafen, Germany

**22499.** Hafeez, F.; Naeem-Ullah, U.; Akram, W.; Arshad, M.; Iftikhar, A.; Naeem, A.; Saleem, M.J. (2022): Habitat characterization of *Aedes albopictus*. *International Journal of Tropical Insect Science* 42: 1555-1560. (in English) ["*Aedes albopictus*, ever since, its distribution from country to country, has been known to transmit many viruses (like dengue) to human. The vector possesses enormous plasticity in habitat adoptability. The distribution pattern revealed that maximum population was collected from rural areas during rainy season, at temperature 31-40 °C and RH 41-50 %. The population was collected from clear water having plastic bottom. The small quiet places are more productive breeding places having EC (= 1000 µS/m), TDS (= 500 ppm) and DO (2-5 mg/l). The larval population was mostly established in the areas having exposed shady conditions and have less distance from human habitation. Flora such as *spirogyra*, grasses and algae, and predators such as damselfly, water bugs and beetles showed affinity with *Ae. albopictus* population. Stagnant clear water bodies are considered as potential breeding sites for dengue vector." (Authors) References to Odonata are made.] Address: Hafeez, F., Entomological Research Institute, Ayub Agricultural Research Institute, Faisalabad, Pakistan

**22500.** Mahmoud, M.M.; Younes, A.A.; El-Sherif, H.A.; Gawish, F.A.; Habib, M.R.; Kamel, M. (2022): Predicting the habitat suitability of *Schistosoma* intermediate host *Bulinus truncatus*, its predatory aquatic insect Odonata nymph, and the associated aquatic plant *Ceratophyllum demersum* using MaxEnt. *Parasitology Research* 121: 205-216. (in English) ["Schistosomiasis is one of the most important parasitic diseases in tropical and subtropical areas. Its prevalence is associated with the distribution of freshwater snails, which are their intermediate hosts. Thus, control of freshwater snails

is the solution to reduce the transmission of this disease. This will be achieved by understanding the relationship between the snails and their habitats including natural enemies and associated aquatic plants as well as the factors affecting their distribution. In this study, Maximum Entropy model (MaxEnt) was used for mapping and predicting the possible geographic distribution of *Bulinus truncatus* snail (the intermediate host of *Schistosoma haematobium*), Odonata nymph (predatory aquatic insect), and *Ceratophyllum demersum* (the associated aquatic plant) in Egypt based on topographic and climatic factors. The models of the investigated species were evaluated using the area under receiver operating characteristic curve. The results showed that the potential risk areas were along the banks of the Nile River and its irrigation canals. In addition, the MaxEnt models revealed some similarities in the distribution pattern of the vector, the predator, and the aquatic plant. It is obvious that the predictive distribution range of *B. truncatus* was affected by altitude, precipitation seasonality, isothermality, and mean temperature of warmest quarter. The presence of *B. truncatus* decreases with the increase of altitude and precipitation seasonality values. It could be concluded that the MaxEnt model could help introducing a predictive risk map for *Schistosoma haematobium* prevalence and performing better management strategies for schistosomiasis." (Authors)] Address: Mahmoud, Marwa, Dept of Medical Malacology, Theodor Bilharz Research Institute, Giza, Egypt

**22501.** Paz, L.E.; Rodriguez, M.; Gulloc, B.; Rodrigues Capitulo, A. (2022): Impacts of urban and industrial pollution on functional traits of benthic macroinvertebrates: Are some traits advantageous for survival? *Science of The Total Environment* Volume 807, Part 2, 10 February 2022, 150650: (in English) ["Highlights: • Urbanization and industrialization decrease functional richness and Rao diversity. • Gills, grazers, and crawlers are sensitive traits to these disturbances. • Spiracles, resistance forms and cylindrical body are related to these disturbances. Abstract: Urbanization and industrialization produce substantial changes in biodiversity and in the functionality of ecosystems. However, little is known about how anthropic pressures might drive these changes and about their functional consequences. We aimed to determine the responses of macroinvertebrate biological traits to urban and industrial pollution and assess the impacts of these disturbances on the functional diversity of these assemblages. We sampled benthic macroinvertebrates in 27 sites of four basins with different urban disturbance gradients (rural, peri-urban, and urban-industrial), among them the Matanza-Riachuelo River, one of the most polluted basins in the world. We classified macroinvertebrates into 11 traits and 56 categories. Then, we performed an RLQ analysis and computed functional richness, evenness, divergence and Rao diversity indexes for each site and community weighted means for each trait category. The urban and industrial sites (mainly low and middle Matanza-Riachuelo River Basin) showed high concentrations of ammonium, SRP, conductivity, COD, BOD, and organic matter, as well as the lowest values of DO. The functional richness and Rao index of these sites were significantly lower than that of the other sites. Macroinvertebrate traits associated with urban and industrial sites were aerial respiration (spiracles), forms of resistance (eggs or statoblast), cylindrical body shape, oviparity, feeding on macroinvertebrates, and full water swimmers. These traits potentially enabled tolerant species persistence at polluted sites while gills, grazers, and crawlers were sensitive to these disturbances. Urban and industrial activities influence biological traits, producing the disappearance or dominance of certain traits in macroinvertebrate assemblages. As a consequence,

extreme pollution caused predictable trait-based community changes resulting in reduced functional diversity, and potentially altered the ecosystem function." (Authors)] Address: Paz, L.E., Instituto Multidisciplinario sobre Ecosistemas y Desarrollo Sustentable, Universidad Nacional del Centro de la Provincia de Buenos Aires, CONICET, Campus Universitario, Paraje Arroyo Seco s/n, Tandil 7000, Buenos Aires, Argentina. Email: estefypaz15@gmail.com

**22502.** Sial, M.U.; Majeed, M.Z.; Atiq, A.; Farooq, T.; Aatif, H.M.; Jaleel, W.; Khan, S.; Akbar, R.; Zaman, M.; Saeed, R.; Ali, Y.; Saleh, M.; Ullah, F.; Khan, K.A.; Ghmrah, H.A. (2022): Differential efficacy of edaphic traps for monitoring arthropods diversity in subtropical regions. *Journal of King Saud University – Science* 34 (2022) 101686: 7 pp. (in English) [Installation of traps in the agricultural field is an economically important and cheaper technique to observe arthropods diversity. Cost-effective ecological monitoring of arthropods by traps has been gaining interest in the field of environmental entomology since last few decades. This study explains the effectiveness of four different types of traps (pitfall, yellow-sticky, pan and barrier traps) to monitor the arthropod diversity in summer and winter seasons. These traps were installed in different mango orchards located in Punjab, Pakistan. diversity of captured arthropods was 1.5 times higher in summer than in winter season. However, among the traps, pitfall traps were most effective than others for trapping edaphic arthropods in both seasons. The pan traps were found most effective in the summer season, while sticky traps in the winter season. The pitfall traps exhibited highest taxa richness index values (8.00 for summer and 5.00 for winter season), while the lowest values were recorded for barrier traps (5.00 for summer and 3.00 for winter season). Moreover, the pitfall were the most effective traps for the capture or collection of Arachnida, Coleoptera, Hymenoptera, Lepidoptera, Orthoptera and other arthropods. The PVC barrier and sticky traps were found most effective for Dipteran and Hemipteran's insects, respectively, and hence, are recommended for the ecological monitoring of these arthropod groups in future studies. ... Pan trap type was most effective for the capture of Odonata order ( $F = 1.89$ ;  $P = 0.085$ )."] (Authors)] Address: Sial, M.U., Institute of Plant Protection, Muhammad Nawaz Shareef University of Agricultural, Multan, Pakistan

## 2023

**22503.** Apriani, N.; Maritsa, H.U.; Riany, H. (2023): Identifikasi Tingkat Serangan Serangga Penggerek (*Hypothenemus hampei*) Taman Kopi dan musuh Alaminya Nur Apriani, Hasna UI Maritsa, Hesti Riany [Identification of the attack level of borer insects (*Hypothenemus hampei*) in coffee gardens and their natural enemies]. *Organisms* 3(2): 8 pp. (in Indonesian, with English summary) ["*H. hampei* is the main pest of coffee plants. *H. hampei* uses coffee fruit and beans as a shelter, lay eggs, eats, reproduces and metamorphoses. This causes damage to coffee plants thereby reducing the quality of the coffee. The aim of this research was to determine the level of attack by the *Hypothenemus hampei* insect on coffee plants and identify its natural enemies. The method for measuring the level of attack was done by counting the coffee cherries that are attacked by the *Hypothenemus hampei* pest on 3 branches of the coffee tree and the enemy and calculating it using the pest attack intensity formula. Natural enemies were collected by direct observation and identified by matching their morphological characteristics with reference books. The percentage of *H. hampei* pest attacks on Liberica Coffee reached 12.35-61.97%, while the percentage of *H. hampei* pest attacks on Robusta Coffee reached



5.83-35.48%. The natural enemies found were weaver ants (*Oecophylla smaragdina*), wolf spiders (*Pardosa pseudoannulata*), and dragonflies (*Neurothemis fluctuans*)." (Authors)] Address: Apriani, N., Biologi, Fakultas Sains dan Teknologi, Universitas Jambi, Indonesia. Email: hestiriany@uinjambi.ac.id

**22504.** Babik, W.; Dudek, K.; Marszalek, M.; Palomar, G.; Antunes, B.; Sniegula, S. (2023): The genomic response to urbanization in the damselfly *Ischnura elegans*. *Evolutionary Applications* 16: 1805-1818. (in English) ["The complex and rapid environmental changes brought about by urbanization pose significant challenges to organisms. The multifaceted effects of urbanization often make it difficult to define and pinpoint the very nature of adaptive urban phenotypes. In such situations, scanning genomes for regions differentiated between urban and non-urban populations may be an attractive approach. Here, we investigated the genomic signatures of adaptation to urbanization in *Ischnura elegans* sampled from 31 rural and urban localities in three geographic regions: southern and northern Poland, and southern Sweden. Genome-wide variation was assessed using more than 370,000 single nucleotide polymorphisms (SNPs) genotyped by ddRADseq. Associations between SNPs and the level of urbanization were tested using two genetic environment association methods: Latent Factors Mixed Models and BayPass. While we found numerous candidate SNPs and a highly significant overlap between candidates identified by the two methods within the geographic regions, there was a distinctive lack of repeatability between the geographic regions both at the level of individual SNPs and of genomic regions. However, we found "synapse organization" at the top of the functional categories enriched among the genes located in the proximity of the candidate urbanization SNPs. Interestingly, the overall significance of "synapse organization" was built up by the accretion of different genes associated with candidate SNPs in different geographic regions. This finding is consistent with the highly polygenic nature of adaptation, where the response may be achieved through a subtle adjustment of allele frequencies in different genes that contribute to adaptive phenotypes. Taken together, our results point to a polygenic adaptive response in the nervous system, specifically implicating genes involved in synapse organization, which mirrors the findings from several genomic and behavioral studies of adaptation to urbanization in other taxa." (Authors)] Address: Babik, W., Fac. of Biology, Institute of Environmental Sciences, Jagiellonian University, Gronostajowa 7, Kraków 30-387, Poland. Email: wieslaw.babik@uj.edu.pl

**22505.** Beatty, C.D.; Rashni, B.; Cordero-Rivera, A.; Marinov, M. (2023): *Nikoulabasis roseosticta*, sp. nov. from Fiji (Odonata: Coenagrionidae). *Zootaxa* 5383(2): 135-152. (in English) ["*Nikoulabasis roseosticta* sp. nov. (holotype male, Fiji, Vanua Levu Island, Navuturerega creek, 6-VIII-2009, Christopher Beatty leg.) is erected as a new taxon. Illustrations of key characters and a distribution map are provided." (Authors)] Address: Beatty, C.D., Program for Conservation Genomics, Dept of Biology, Stanford University, Stanford, California 94305, USA. Email: cdbeatty@stanford.edu

**22506.** Bedjanič, M., 2023. Observation of heterospecific mating attempt by blue chaser *Libellula fulva* Müller, 1764 and broad-bodied chaser *L. depressa* Linnaeus, 1758 (Odonata: Libellulidae). *Natura sloveniae* 25(2): 53-60. (in English, with Slovene summary) [A successful copula formation between a *L. fulva* male and a *L. depressa* female was documented photographically on 23. 6. 2022 along a small stream at the Natura 2000 site Licenca pri Poljčanah in NE Slovenia.

This represents the first record of an anomalous mating attempt with copula formation between the species involved. Their distribution in Slovenia as well as syntopic and syntemporal observations in the country are presented and briefly discussed, as are the site-specific factors and aged female colouration that may have contributed to the described rare attempt of heterospecific mating." (Author)] Address: Bedjanic, M., National Institute of Biology, Vecna pot 121, SI-1000 Ljubljana, Slovenia; E-mail: matjaz.bedjanic@nib.si

**22507.** Belahcen, K.; Chergui, B.; El Haissoufi, M.; L'Mohdi, Q.; El Alami, M.; Bennis, N. (2023): New data on biodiversity and chorology of aquatic insects of Tazekka National Park (Middle Atlas, Morocco) I: Odonata, Coleoptera, and Hemiptera. *Transactions of the American Entomological Society* 149(3): 261-297. (in English) ["Aquatic insects play a crucial role in freshwater ecosystems, and their diversity and distribution are important indicators of ecosystem health. In this study, we present old and new faunistic and distributional data on three orders of aquatic insects (Odonata, Hemiptera, and Coleoptera) in the Tazekka National Park, located in the Eastern Middle Atlas. An annotated list of 85 species is provided, of which 53 were identified from 1023 specimens collected seasonally between summer 2018 and summer 2019 at a total of 19 sampling sites. The remaining 32 species were identified from the literature but were not captured in this study. The 85 species are classified into 47 genera and 24 families, which are divided into 8 species of Odonata, 14 species of aquatic Hemiptera, and 63 species of aquatic Coleoptera. 18 of the captured species are new to the Tazekka National Park. A chorological analysis shows that most species are essentially Mediterranean (63%), whilst those whose distribution is wider in Palearctic (25%) or extends into Nearctic, Australian, or Afrotropical regions (12%) are clearly less represented. This chorotype pattern is similar to that observed for OCH in other national parks in northern Morocco." (Authors) *Calopteryx haemorrhoidalis*, *Pyrrhosoma nymphula*, *Platycnemis subdilatata*, *Boyeria irene*, *Cordulegaster algerica*, *Onychogomphus forcipatus unguiculatus*, *O. uncutus*, *Orthetrum coerulescens*] Address: Belahcen, K., LESCIB URL-CNRST N° 18, FS, Abdelmalek Essaadi University, Tetouan, Morocco

**22508.** Cano-Cobos, Y.; Mendoza-Penagos, C.; Aristizábal-Botero, A.; Realpe, E. (2023): Check-list of the Odonata from the Guainía Department in Colombia, including fourteen new national records. *Odonatologica* 52(3-4): 193-217. (in English) ["The Department of Guainía, in the Colombian Amazon, has a privileged situation in terms of biodiversity, but it remained for many years as one of the least explored territories of the country. Our contribution represents the result of several years of field collecting and taxonomic work in Guainía to increase the knowledge of the odonates there. We present here the first comprehensive checklist for Guainía with 104 species reported, of which 42 are new records for the department and 14 are new records for Colombia, including the rediscovery of the genus *Hylaeonympha* Rácenis, 1968. The updated number of Odonata reported for Colombia is now 513 species." (Authors)] Address: Cano-Cobos, Yiselle, Laboratorio de Biodiversidad y Genética Ambiental, Universidad Nacional de Avellaneda, Piñeyro 1870, Avellaneda, Buenos Aires, Argentina. Email: yisellecanoc@gmail.com

**22509.** Cazalis, V.; Santini, L.; Lucas, P.M.; González-Suárez, M.; Hoffmann, M.; Benítez-López, A.; Pacifici, M.; Schipper, A.M.; Böhm, M.; Zizka, A.; Clausnitzer, V.; Meyer, C.; Jung, M.; Butchart, S.H.M.; Cardoso, P.; Mancini, G.; Akçakaya, H.R.; Young, B.E.; Patoine, G.; Di Marco, M. (2023): Prioritizing

the reassessment of data deficient species on the IUCN Red List. *Conservation Biology* e14139: 16 pp. (in English, with Spanish summary) ["Despite being central to the implementation of conservation policies, the IUCN Red List of Threatened Species is hampered by the 14% of species classified as Data Deficient (DD), either because information to evaluate these species' extinction risk was lacking when they were last assessed or because assessors did not appropriately account for uncertainty. With limited funds and time for reassessment, robust methods are needed to identify which DD species are more likely to be reclassified in one of the data sufficient Red List categories. Here we present a reproducible workflow to help Red List assessors prioritise reassessment of DD species, and tested it with 6,887 DD species of mammals, reptiles, amphibians, fishes, and Odonata. Our workflow provides for each DD species: (i) the probability of being classified in a data sufficient category if reassessed today, (ii) the change in such probability since last assessment, and (iii) whether the species might qualify as threatened based on the recent rate of habitat loss. Combining these three elements, our workflow provides a priority list for reassessment of species more likely to be data sufficient, thus ultimately improving knowledge of poorly known species and the comprehensiveness and representativeness of the IUCN Red List." (Authors)] Address: Clausnitzer, Viola, Heinzlstr. 3, 02826 Görlitz, Germany. E-mail: violacl@t-online.de

**22510.** Cerini, F.; Vignoli, L.; Blust, M.; Strona, G. (2023): Functional traits predict species co-occurrence patterns in a North American Odonata metacommunity. *Ecosphere* 14(12), e4732: 11 pp. (in English) ["The probability of occurrence of a given species in a target locality and assemblage is conditioned not only by environmental/climatic variables but also by the presence of other species (i.e., species co-occurrence). This framework, already complex in nature, becomes even more complicated if one considers the functional traits of species that, in turn, might influence the structure of metacommunities in various ways. Depending on the ecological and environmental setting, functional similarity (i.e., convergence in morphological and ecological traits) between species might either reduce their co-occurrence due to high niche overlap driving negative interactions or promote it if the similar traits are associated with local habitat suitability. Similarly, functional divergence might either promote species co-occurrence by limiting negative interactions through niche separation or reduce it through trait mediated environmental filtering. Therefore, discriminating between these alternative scenarios—predicting whether two species will tend to co-occur or not based on their traits—is extremely challenging. Here, we develop a novel protocol to tackle the challenge, and we demonstrate its effectiveness by showing that ecological species traits can predict species co-occurrence in a large dataset of North American Odonata. To this end, we first used the Hierarchical Modeling of Species Communities framework to quantify the pairwise species co-occurrence after controlling for environmental and climatic factors. [Body length, Body coloration type, Flight mode, Body color, Presence of wing pigment, Habitat openness, Aquatic habitat type, Body color pattern, Hindwing length] Then, we used machine learning to generate models which proved capable of predict accurately the observed co-occurrence patterns from species functional traits. Our approach offers a generalizable analytical framework with the potential to clarify long-standing ecological questions." (Authors)] Address: Strona, G., European Commission, Joint Research Centre, Ispra, Italy. Email: giovanni.strona@ec.europa.eu

**22511.** Chandran, A.V.; Rison, K.J.; Haneef, M.; Crasta,

B.R.S.; Kalathumthodi, M.R. (2023): "On the distribution of *Hemicordulia asiatica* with breeding records from the plains of Kerala, southern India. *Notulae odonatologicae* 10(2): 38-44. (in English) ["*H. asiatica* Selys, 1878, is one of only two species of Corduliidae occurring in India and is very rarely encountered. Here, we compile the records of the species from India. Previous breeding records have been restricted to montane lakes and pools of mountain streams. We report its breeding from the plains for the first time. Teneral individuals were photographed and collected from domestic wells in Kerala, southern India. Our observations show that some adults of *H. asiatica* probably descend to the plains for breeding." (Authors)] Address: Chandran, A.V., Society for Odonate Studies, Vellopparampil, Kuzhimattom P.O., Kottayam, Kerala, India 686533

**22512.** Chandran, A.V.; Raju, D.V.; Jose, S.K.; Mirza, Z.A. (2023): A new species of *Epithemis* Laidlaw, 1955 (Odonata: Libellulidae) from the Western Ghats, India. *Journal of Asia-Pacific Biodiversity* 16: 597-604. (in English) ["The monotypic genus *Epithemis* Laidlaw, 1955, is endemic to the Western Ghats and is represented by the nominate species *Epithemis mariae* (Laidlaw, 1915). *Epithemis mariae* is distributed across the Western Ghats and as part of an ongoing study, we identified a distinct population from Wayanad. Morphological and molecular data for *E. mariae* and the population from the Wayanad plateau affirm that the two are distinct taxa and allow us to describe a new species. *Epithemis wayanadensis* sp. nov. is described based on male specimens collected from Wayanad, a part of the Western Ghats in Kerala state, southern India." (Authors)] Address: Chandran, A.V., Aqua Research Lab, Department of Geology and Environmental Science, Christ College (Autonomous), Irinjalakuda, Thrissur, Kerala 680125, India. Email: avivekchandran2@gmail.com

**22513.** Craves, J.; O'Brien, D.S.; Hernandez, J. (2023): Plains Emerald (*Somatochlora ensigera*): New for Michigan. *Argia* 35(3): 34-36. (in English) ["*S. ensigera* is added to the Michigan list of Odonata based on nymphs collected in 2022 in the western Upper Peninsula." (Authors) (1): Little River southeast of the town of Wallace, ~8 km east of the Wisconsin border. (2): Kelley Creek, northwest of the town of Birch Creek and ~5.5 km east of the Wisconsin border.] Address: Craves, Julie, Rouge River Bird Observatory, Environmental Interpretive Center, University of Michigan-Dearborn, Dearborn, MI 48128, USA. Email: nannothemis@gmail.com

**22514.** De, K.; Dey, D.; Shruti, M.; Uniyal, V.P.; Adhikari, B.S.; Johnson, J.A.; Hussain, S.A. (2023):  $\beta$ -diversity of odonate community of the Ganga River: partitioning and insights from local and species contribution. *Wetlands Ecology and Management* 31: 899-912. (in English) ["The  $\beta$ -diversity studies reveal diversity patterns at a spatial scale and strengthen the process of regional diversity conservation. The aim of the current study was to understand the pattern of local contribution to  $\beta$ -diversity (LCBD) and species contribution to  $\beta$ -diversity (SCBD) of odonates in the Ganga River. We selected 27 sites along the banks of the Ganga River for the study, with an average distance between sites of 75 km, and recorded 30 species of odonate (species richness between 5 and 24) at these sites. Using  $\beta$ -regression analysis, we examined the impact of species richness and habitat variables on the LCBD. The LCBD was found to be negatively correlated with species richness and influenced by creeping macrophytes, water temperature, dissolved oxygen and salinity. We found that species with high SCBD scores (above 0.05) had intermediate occupancy (between 10 and 16 sites), including 5

species of dragonfly and 5 species of damselfly, and that the second-degree term the relationship between SCBD and the number of declared locations better stocked with species than in the first degree. Since the SCBD is responsible for identifying species that make the greatest contribution to  $\beta$ -diversity and the LCBD is responsible for identifying sites with particular combinations of species, the combined approach using both should be included for ecological assessments, river biodiversity restoration and maintenance plans." (Authors) *Ischnura rubilio*, *I. nursei*, *Brachydiplax sobrina*, *Pseudagrion rubriceps*, *P. decorum*, *Agriocnemis lacteola*, *A. pygmaea*, *A. femina*, *Brachydiplax farinosa*, *Acisoma panorpoides*, *Pantala flavescens*, *Diplacodes trivialis*, *Indothemis carnatica*, *Crocothemis servilia*, *Orthetrum pruinosum*, *O. sabina*, *O. luzonicum*, *Amphiallagma parvum*, *Ceriagrion coromandelianum*, *Rhyothemis variegata*, *Trithemis aurora*, *Brachythemis contaminata*, *Ictinogomphus rapax*, *Tramea basilaris*, *Tholymis tillarga*, *Platygomphus dolabratus*, *Anax guttatus*, *Urothemis signata*, *Neurothemis tullia*, *Rhodothemis rufa*] Address: De, K., Wildlife Institute of India, Chandrabani, Dehradun, 248001, India. Email: kritish.de@gmail.com

**22515.** Denck, E.; Ehlert, J.; Pinto, A.P. (2023): 150th anniversary of Alberto Santos-Dumont's birth, the father of aviation: the damselfly *Cyanallagma demoiselle* sp. nov. from the Brazilian Atlantic Forest (Odonata: Coenagrionidae). *International Journal of Odonatology* 26: 212-223. (in English) ["*Cyanallagma demoiselle* sp. nov. (holotype male deposited in DZUP: Brazil, São Paulo State, Cananéia, Ilha do Cardoso State Park), a new small greenish blue and black damselfly, is described, illustrated, and diagnosed based on males and females from the southeastern Atlantic Forest. This new coenagrionid is named after one of the most celebrated projects, the Demoiselle 20 or libellule aircraft, designed by the Brazilian inventor and aviation pioneer Alberto Santos-Dumont (1873–1932). This is the third new odonate species discovered in the same restinga-like formation at São Paulo, and like many other odonates from this assemblage, *C. demoiselle* sp. nov., appears to be a typical inhabitant of this type of environment. Due to its sharing many characteristics with other *Cyanallagma*, the new species can be considered a chimera. Its body coloration and genital ligula are similar to those of *C. trimaculatum*, whereas its caudal appendages closely resemble those of *C. nigrinuchale*. Despite of recent advances in taxonomic knowledge about *Cyanallagma*, this study highlights the need for better understanding the morphological correspondences or homologies among the structures of caudal appendages." (Authors)] Address: Denck, Emanuella, Laboratory of Systematics on Aquatic Insects, Departamento de Zoologia, Universidade Federal do Paraná, P. O. Box 19020, 81531-980, Curitiba, PR, Brazil

**22516.** Dewangan, N.K.; Pang, J.; Zhao, C.; Cao, C.; Yin, B.; Weng, S.; He, J. (2023): Host and transmission route of *Enterocytozoon hepatopenaei* (EHP) between dragonfly and shrimp. *Aquaculture* 574, 739642: (in English) ["*Enterocytozoon hepatopenaei* (EHP) is a shrimp pathogen that causes huge economic losses. In the present study, the hosts of EHP were investigated using polymerase chain reaction (PCR) in an aquaculture farm located in Maoming, China. EHP was detected in *Litopenaeus vannamei*, *Penaeus monodon*, *Varuna litterata*, *Mytilopsis leucophaeata*, and three dragonfly species (*Anax parthenope*, *Pantala flavescens*, and *Ischnura senegalensis*). In the histopathological examination using hematoxylin–eosin (HE) staining, EHP spores were found in nymphs and adult dragonflies naturally infected with EHP that were collected from the shrimp farm. Fluorescence in situ hybridization (FISH) results showed a positive signal for

EHP infection in the fat body of dragonfly nymphs. Immature and mature microsporidian spores and late sporogonial plasmodium were observed in the cytoplasm of dragonfly nymphs using transmission electron microscopy (TEM). The transmission of EHP from shrimp to dragonfly nymphs was confirmed via cohabitation challenge experiments in which EHP-free dragonfly nymphs were cohabited with EHP-infected shrimp, and the transmission of EHP from dragonfly nymphs to shrimp was demonstrated via the cohabitation of EHP-infected dragonfly nymphs with EHP-free shrimp and oral administration challenge experiments. This study confirms that dragonflies can act as natural EHP hosts, and a novel EHP horizontal transmission route exists between dragonflies and shrimp." (Authors)] Address: He, J., State Key Lab. for Biocontrol, School of Life Sci., Sun Yat-sen Univ. Guangzhou 510275, PR China. Email: lsshjg@mail.sysu.edu.cn

**22517.** Dou, X.; Jurenka, R. (2023): Pheromone biosynthesis activating neuropeptide family in insects: a review. *Front. Endocrinol.* 14:1274750. 10 pp. (in English) ["Neuropeptides are involved in almost all physiological activities of insects. Their classification is based on physiological function and the primary amino acid sequence. The pyrokinin (PK)/pheromone biosynthesis activating neuropeptides (PBAN) are one of the largest neuropeptide families in insects, with a conserved C-terminal domain of FXPRLamide. The peptide family is divided into two groups, PK1/diapause hormone (DH) with a WFGPRLa C-terminal ending and PK2/PBAN with FXPRLamide C-terminal ending. Since the development of cutting-edge technology, an increasing number of peptides have been sequenced primarily through genomic, transcriptomics, and proteomics, and their functions discovered using gene editing tools. In this review, we discussed newly discovered functions, and analyzed the distribution of genes encoding these peptides throughout different insect orders. In addition, the location of the peptides that were confirmed by PCR or immunocytochemistry is also described. A phylogenetic tree was constructed according to the sequences of the receptors of most insect orders. This review offers an understanding of the significance of this conserved peptide family in insects." (Authors)] The study includes references to Odonata.] Address: Jurenka, R., Dept of Plant Pathology, Entomology, Microbiology Iowa State University, Ames, IA, USA. Email: rjurenka@iastate.edu

**22518.** Duanmu, D.; Li, X.; Huang, W.; Hu, Y. (2023): Soft finger rehabilitation exoskeleton of biomimetic dragonfly abdominal ventral muscles: Center tendon pneumatic bellows actuator. *Biomimetics* 2023, 8, 614. 16 pp. (in English) ["The development of soft robotics owes much to the field of biomimetics, where soft actuators predominantly mimic the movement found in nature. In contrast to their rigid counterparts, soft robots offer superior safety and human-machine interaction comfort, particularly in medical applications. However, when it comes to the hand rehabilitation exoskeletons, the soft devices have been limited by size and material constraints, unable to provide sufficient tensile strength for patients with high muscle tension. In this paper, we drew inspiration from the muscle structure found in the tail of dragonflies and designed a novel central tendon-based bellows actuator. The experimental results demonstrated that the central tendon-based bellows actuator significantly outperforms conventional pneumatic bellows actuators in terms of mechanical output. The tensile strength of the central tendon-based bellows actuator exceeded that of pneumatic actuators more than tenfold, while adding only 2 g to the wearable weight. This finding suggests that the central tendon-based bellows actuator is exceptionally well-suited for applications

demanding substantial pulling force, such as in the field of exoskeleton robotics. With tensile strength exceeding that of pneumatic bellows actuators, this biomimetic design opens new avenues for safer and more effective human-machine interaction, revolutionizing various sectors from healthcare to industrial automation." (Authors)] Address: Hu, Y., Dept of Orthopaedics & Traumatology, The University of Hong Kong, Hong Kong, Email: yhud@hku.hk

**22519.** Eckberg, J.R. (2023): Odonata associated with the Las Vegas Wash and Clark County Wetlands Park, Clark County, Nevada. *Argia* 35(3): 23-25. (in English) ["Conclusion: In total, there have been 34 species of Odonata confirmed along the Wash over the past 23 years with 19 species of dragonflies and 15 damselflies. Table 1 shows the source of where the observation came from and if observations have been made by multiple people. The diversity is similar to other natural oases in southern Nevada, such as the Ash Meadows National Wildlife Refuge (Stevens & Ballowitz 2008) which had 32 species and the Upper Muddy River (Lund & Myrup 2011) which had 39." (Author)] Address: Email: jason.eckberg@snwa.com

**22520.** Gamage, C.P.P.H.M.; Rathnayake, W.A.S.P.P.; Gunawardana, O.G.Y.D.; Janith, H.C. (2023): Feeding behaviour of *Orthetrum sabina sabina* from Sri Lanka. *Scientific Reports in Life Sciences* 4(3): 33-37. (in English) ["Odonata species like *Orthetrum sabina* are common species of dragonfly that are widespread in Sri Lanka from degraded open wastelands to marshes, ponds, and streams. *O. sabina* is a very fierce predator and often preys on butterflies and other odonates, and feeding on a male *Neurothemis tullia* was recorded during a field visit to Kirala Kele Sanctuary in Sri Lanka where harbors diverse numbers of odonatan species in its habitats." (Authors)] Address: Gamage, C.P.P.H.M., Dept of Forestry & Environmental Science, University of Sri Jayewardenepura, Colombo, Sri Lanka

**22521.** Gayathri, M.; Anand, P.P.; Vardhanan, Y.S. (2023): Visualisation of early embryos of the wandering glider, *Pantala flavescens* (Fabricius, 1798) (Odonata: Libellulidae). *Aquatic Insects* 44(4): 297-309. (in English) ["The embryonic development of *P. flavescens* is documented for the first time. In contrast to previously reported insect embryonic development, we describe the embryological development of *P. flavescens* in living conditions by focusing on its externally recognisable features, i.e., we conducted the study in a purely non-destructive manner. The entire embryonic development was completed within six to seven days. We pictured the eggs at successive embryonic developmental stages: embryogenesis starts, germband formation, segmentation, blastokinesis, appendage formation, and dorsal closure. These findings can be helpful in future studies regarding the impacts of pollutants and climate change on the early embryonic development of dragonflies." (Author)] Address: Anand, P.P., Biochemistry & Toxicology Division, Dept of Zoology, Univ. of Calicut, Thengipalam, Kerala, India. Email: anandpp633@gmail.com

**22522.** Gomez-Llano, M.; Boys, W.A.; Ping, T.; Tye, S.P.; Siepielski, A.M. (2023): Interactions between fitness components across the life cycle constrain competitor coexistence. *Journal of Animal Ecology* 92(12): 2297-2308. (in English) ["Numerous mechanisms can promote competitor coexistence. Yet, these mechanisms are often considered in isolation from one another. Consequently, whether multiple mechanisms shaping coexistence combine to promote or constrain species coexistence remains an open question. Here, we aim to understand how multiple mechanisms interact within and

between life stages to determine frequency-dependent population growth, which has a key role stabilizing local competitor coexistence. We conducted field experiments in three lakes manipulating relative frequencies of two *Enallagma* species to evaluate demographic contributions of three mechanisms affecting different fitness components across the life cycle: the effect of resource competition on individual growth rate, predation shaping mortality rates, and mating harassment determining fecundity. We then used a demographic model that incorporates carry-over effects between life stages to decompose the relative effect of each fitness component generating frequency-dependent population growth. This decomposition showed that fitness components combined to increase population growth rates for one species when rare, but they combined to decrease population growth rates for the other species when rare, leading to predicted exclusion in most lakes. Because interactions between fitness components within and between life stages vary among populations, these results show that local coexistence is population specific. Moreover, we show that multiple mechanisms do not necessarily increase competitor coexistence, as they can also combine to yield exclusion. Identifying coexistence mechanisms in other systems will require greater focus on determining contributions of different fitness components across the life cycle shaping competitor coexistence in a way that captures the potential for population-level variation." (Authors)] Address: Gómez-Llano, M., Dept of Environmental & Life Sciences, Karlstad Univ., Karlstad, 65188 Sweden. Email: miguel.gomez@kau.se

**22523.** Gorman, F. (2023): Testing for relationships between animal personality traits, activity level and voracity, and the underlying influence of body size in the dragonfly predator, *Epiplatys canis*. Senior Theses, Trinity College, Hartford, CT 2023. Trinity College Digital Repository. 40 pp. (in English) ["Animal personality, defined as among-individual variation in behavior, is taxonomically widespread, but its ecological implications remain unclear. While associations between animal personality and ecological traits have been examined, methodological shortcomings, such as lack of repeated measurements, limit the insights these studies provide. Here, I measured the repeatability of activity level and feeding rate behaviors in the nymph stage of the dragonfly predator, *Epiplatys canis*, taking 10 repeated measurements of each trait over a 10-week period. Moreover, I tested for a relationship between among-individual variation in activity level and feeding rate while accounting for the underlying influence of nymph body size. While nymph feeding rate was highly repeatable across short and long timescales (i.e., individuals exhibited differences in voracity), activity level was not correlated with voracity. This lack of relationship between activity level and voracity was likely due to the low repeatability of activity level. However, dragonfly nymph body size influenced voracity, with larger nymphs consuming more *Daphnia magna* prey. Even after accounting for the positive relationship between body size and voracity, voracity was still shown to be highly repeatable. Overall, my findings suggest the personality of dragonfly activity level may only occur over short timescales, which limits its ecological effects on predator-prey interactions. Yet, individual differences in voracity can influence predator-prey interaction strength, and thus improving our understanding of voracity drivers as an important topic for future studies." (Author)] Address: <https://digitalrepository.trincoll.edu/theses/1021>

**22524.** Guerzon, V.M.; Burias, N.A.R.; de la Cruz, I.N.B. (2023): Records of Odonata in the riparian system of Andanan Watershed Forest Reserve, Philippines. *Journal of*



Ecosystem Science and Eco-Governance 5(1): 15-23. (in English) ["The Odonata fauna is a good biological indicator of freshwater ecosystems. This research aims to provide a record inventory of both dragonflies and damselflies occurring in the riparian ecosystem of Andanan Watershed Forest Reserve. Field collection using sweep nets was done in three locations along the riparian area. Odonatans (n=79) were recorded belonging to 19 species, comprising 58% dragonflies and 42% damselflies. Out of 19 species recorded in the area, one species of dragonfly and six species of damselfly are endemic to the Philippines, with 36.84% endemism in the area. All dragonflies documented are ground skimmers with a high tolerance for anthropogenic disturbances in freshwater systems. The genus *Orthetrum* is relatively abundant and obtained the highest number of species. On the other hand, the genus *Euphaea* in damselflies, was recorded to have the highest abundance. The genus *Risicnemis* has the highest species richness. All species of *Risicnemis* were also reported endemic. Despite the high diversity ( $H'=2.77$ ;  $H'/H_{max}=0.94$ ) of the Odonata fauna in Andanan Watershed Forest Reserve, human activities and intervention were still observed around the riparian ecosystem. The results shown in the current study may be utilized as primary information to allow local conservation efforts for odonatans found in the watershed and its tributaries." (Authors) *Diplacina bolivarii*, *Orthetrum pruinosum*, *O. sabina*, *O. testaceum*, *Potamarcha congener*, *Neurothemis ramburii*, *N. terminata*, *Pantala flavescens*, *Trithemis aurora*, *T. festiva*, *Vestalis melania*, *Rhinocypha turconii*, *Euphaea amphicyana*, *E. cora*, *Pseudagrion pilidorsum*, *Coeliccia dinocerus*, *Risicnemis appendiculata*, *R. erythraea*, *R. flammea*] Address: de la Cruz. I.N.B., Dept of Biology, College of Mathematics & Natural Sciences, Caraga State Univ., Butuan City, Agusan del Norte, Philippines. Email: ibdelacruz@carsu.edu.ph

**22525.** Gurung, M.M.; Wangmo, T.; Phan, Q.T.; Conniff, K. (2023): First record of androchrome females of *Anax nigrofasciatus* (Odonata: Aeshnidae) from Bhutan and notes on its occurrence in Asia. *Notulae odonatologicae* 10(2): 49-55. (in English) ["Androchrome females of *A. nigrofasciatus* were recorded for the first time in Tashigang district of Bhutan. Following the observation, photographs of female androchromes were obtained from online sources including biodiversity portal websites and Google blogs from India, Nepal, and Japan for comparison." (Authors)] Address: Gurung, M.M., College of Natural Resources, Dept of Forest Science, Royal University of Bhutan, Lobesa, Punakha Bhutan, PO 13001, Bhutan. Email: wangmotashi88@gmail.com

**22526.** Jiang, B.; Zhang, J.; Bai, X.; Zhang, Y.; Yao, Y.; Li, J.; Yu, G.; He, S.; Sun, Y.; Mikolajewski, D.J. (2023): Genetic variation and population structure of a widely distributed damselfly (*Ischnura senegalensis*). *Archives of Insect Biochemistry and Physiology* 114(2): 14 pp. (in English) ["*I. senegalensis* is among the most widespread damselfly species in the world. Unlike dragonflies with strong migration abilities, *I. senegalensis* have limited dispersing abilities. Gene flow among *I. senegalensis* populations may be greatly influenced by anthropogenic disturbance, fragmented suitable habitats, sea straits, or even global warming. In this study, to investigate the genetic diversity of *I. senegalensis* populations, we sequenced and collected 498 cytochrome oxidase I sequences across the Old World. Haplotype network analysis showed 51 haplotypes and *I. senegalensis* could be grouped into four regions (Afrotropical region, Oriental region, main Islands of Japan, and the Ryukyu Islands), each of which contains different dominant haplotypes. Based on molecular variance analysis, we found that populations from

the Afrotropical region have quite a low gene flow with the Asian populations (except Yemen). Furthermore, rice cultivation may aid the dispersion of *I. senegalensis* in the oriental region. Populations from the Ryukyu Islands show the highest genetic diversity, which may be due to the geological separation among islands. Our results prove that *I. senegalensis* has great genetic diversity among different populations across the world." (Authors)] Address: Jiang, B., Anhui Provincial Key Laboratory of the Conservation & Exploitation of Biological Resources, College of Life Sciences, Anhui Normal University, Wuhu, China

**22527.** Kalkman, V.J. (2023): On the synonymy of *Agrionoptera bartola* Needham & Gyger, 1937, with *Agrionoptera sexlineata* Selys, 1879. *Notulae odonatologicae* 10(2): 56-59. (in English) ["*A. bartola* was described by Needham & Gyger 1937 based on a female from an unknown locality without a holotype being designated. Since its description no further information has become available. A comparison of the original description with specimens of *A. sexlineata* failed to produce meaningful characters, apart from a size difference, separating the two. *A. bartola* is therefore considered a junior synonym of *A. sexlineata*." (Author)] Address: Kalkman, V.J., Natural Biodiversity Center, Postbus 9517, 2300 RA Leiden, The Netherlands. E-mail: kalkman@naturalis.nl

**22528.** Kapadi, P.; Ram, M.; Sahu, A.; Koparde, P.; Jhala, L.S. (2023): Odonata assemblage of the Gir National Park with three additional records for Gujarat state, India. *Notulae odonatologicae* 10(2): 31-37. (in English) ["The Gir National Park, which is home to the world's Asiatic lions (*Panthera leo persica*), comprises dry deciduous forests that are intersected by rivers and reservoirs. From June to October 2021, we conducted a study documenting the odonates in the Park. In total, we recorded 48 species from the study area. We provide an annotated list of odonates found in the Gir National Park and compare our findings with other lists. *Gomphidia t-nigrum*, *Macromia cingulata*, and *Libellago indica* were observed for the first time in Gujarat state, India." (Authors)] Address: Ram, M., Deputy Conservator of Forests, Wildlife Division, Sasan-Gir, Junagadh – 362 135, Gujarat, India. Email: mrlegha@gmail.com

**22529.** Kashyap, O.N.; Madhu, P. (2023): Study of flow around bio-inspired corrugated aerofoil at different angle of attacks in low Reynolds number regime. *AIP Conf. Proc.* 2399, 030031: 9 pp. (in English) ["MAVs operate in the region of low Reynolds-Number i.e 8000-10000. The use of scaled down models of traditional NACA aerofoil for the same have proven to be ineffective. This can be resolved by bio-mimicking the corrugated aerofoil structure found in the wings of the insects like Locusts and Odonata. The corrugated aerofoils can delay the flow separation and give higher lift to drag ratio than the traditional symmetric aerofoils at higher angle of attacks in region of low Reynolds Number, thus facilitating complex maneuverability. Keeping this as the objective of study, simulation analysis of flow over three different models of bio-inspired corrugated aerofoil at low Reynolds Number of 8000 has been carried out by varying the height and position of the corrugations. From this study it is evident that, by changing the height and position of the corrugations, the flow remains attached to the surface of the aerofoil at higher angles of attacks and delaying stall by limiting flow recirculation to only 0.3%C from the trailing edge, indicating stable flight during complex maneuvers and MAVs when implemented." (Authors)] Address: Kashyap, O.N., Mechanical Dept, BNM Institute of Technology, Karnataka, India. Email: omkarnkashyap@gmail.com

**22530.** Kathan, B. (2023): Larvalhabitate der Gestreiften Quelljungfer *Cordulegaster bidentata* im Raum Tübingen: Bestandsveränderungen, Umweltassoziationen und ein Methodentest. MSc thesis, Mathematisch-Naturwissenschaftlichen Fakultät der Eberhard Karls Universität Tübingen: 110 pp. (in German) ["Due to the very large populations, especially in the south of the country, Germany bears a special responsibility for the protection of *C. bidentata*, which is listed in the Habitats Directive as a character species for tufa springs. However, the lack of standardization of the larval recording method and the underrepresentation in routine dragonfly mapping results in incomplete knowledge about their current distribution and thus the degree of threat. Above all, anthropogenic changes to the source ecosystems and longer periods of drying as a result of climate change are considered to be the main causes of danger. Suitable habitats may already be rare regionally, which means that the distribution is viewed as heterogeneous, especially depending on the geology. The aim of the work was to contribute to a better understanding of the local distribution and threat using a universally applicable standard method and the assessment of the status of the target species in the Tübingen area. In 2022, more than 100 spring rivulets were examined for larvae between May and December and around 30 environmental parameters were recorded. In addition, a comparison of the presence/absence of the larvae from the years 2001 and 2022 was carried out, in which exactly the same spring rivulets (comparison bodies of water) were examined in order to be able to determine and interpret changes in distribution. In addition, additional habitats were sampled in order to be able to generate a more comprehensive picture (additional water bodies) and a principal component analysis was used to determine whether relevant environmental parameters correlated with both the presence of the larvae and the mean number of larvae per spring stream as response variables. In 2022, a total of 806 larvae of *C. bidentata* and 38 larvae of *C. boltonii* were detected in 65 of 78 water-bearing spring rivulets, of which 760 and 33 were in the comparison waters and 40 and 5 in the additional waters. Positive evidence was found in 28 habitats in which no larvae were found by H. Henheik in 2001. In 2001, Henheik recorded a number of 248 larvae that was 3.3 times smaller, with a time expenditure of around 2.5 times less. In 2022, only the suitability of isolated habitats was medium or high, as was the abundance of larvae. More than 50% of the rivulets exhibited anthropogenic disturbances. The probability of colonization or presence of the larvae correlated significantly with the first principal component associated with the habitat suitability and size (proportion of suitable flow stretches, proportion of fine debris, absolute length of the flow stretch), while the mean number of larvae across all sample locations of a spring stream correlated significantly with the first main component also with Rot.PC2, which was associated with the specific flow parameters "flow speed, number of impairments, stone content and continuity of the water flow". The method tested in this work was successfully established as a potential, universally applicable, future standard method because, depending on the length of the habitat, it proved to be very effective with up to 10 sampling sites with a sampling duration of 7 minutes each. A maximum of 10 larvae per sampling site and 39 larvae per spring stream were recorded. To save time and money, the number of sample sites for qualitative verification using identical methodology could also be reduced to 5. As measures to protect species, the dismantling of the pipework and stone frames is recommended and the use of optimal flow obstacles or the creation of new, flooded habitats using solar-powered deep water pumps are discussed. Future mapping of *C. bidentata* larvae, both in the study area and in principle, should include population genetic analyzes in order to be able to examine the genetic

diversity and the range of action of the species. In the appendix, the work contains detailed raw data tables with information on all relevant recorded variables per spring stream, including data on the parallel recorded occurrences of the fire salamander (*Salamandra salamandra*) as well as sketches of potentially ideal flow obstacles for testing and further development." (Author/Google translate)] Address: [https://www.researchgate.net/publication/373101625\\_Larvalhabitate\\_der\\_Gestreiften\\_Quelljungfer\\_Cordulegaster\\_bidentata\\_im\\_Raum\\_Tubingen\\_Bestandsveränderungen\\_Umweltassoziationen\\_und\\_ein\\_Methodentest](https://www.researchgate.net/publication/373101625_Larvalhabitate_der_Gestreiften_Quelljungfer_Cordulegaster_bidentata_im_Raum_Tubingen_Bestandsveränderungen_Umweltassoziationen_und_ein_Methodentest)

**22531.** Kipping, J.; Clausnitzer, V.; Dijkstra, K.-D.B. (2023): The highlands and escarpment of Angola as an endemism hotspot for African dragonflies and damselflies (Insecta: Odonata). *Namibian Journal of Environment* 8: 173-186. (in English) ["The plateaus and escarpments of Angola are a major centre of Odonata endemism in Africa, rivalling and possibly surpassing the highlands of Ethiopia and South Africa. We discuss 34 likely endemic species and 8 near-endemics found in Angola's highland area. Remarkably, 20 of these endemics and near-endemics do not occur either along the western escarpment or on the high central plateau, but on the lower sandy plateaus farther east. Despite the western scarp having traditionally received much scientific attention, the first odonatological discoveries were made there only recently. Of the 42 species of interest discussed here, the taxonomy of 21 of them has yet to be fully resolved. Furthermore, many regions, particularly in northeastern Angola, are still to be explored." (Authors)] Address: Kipping, J., BioCart Ökologische Gutachten, Leipzig, Germany. Email: [biocart-kipping@web.de](mailto:biocart-kipping@web.de)

**22532.** Knowles, S.; Dennis, M.; McElwain, A.; Leis, E.; Richard, J. (2023): Pathology and infectious agents of unionid mussels: A primer for pathologists in disease surveillance and investigation of mortality events. *Veterinary Pathology* 60(5): 510-528. (in English) ["Freshwater mussels are one of the most imperiled groups of organisms in the world, and more than 30 species have gone extinct in the last century. While habitat alteration and destruction have contributed to the declines, the role of disease in mortality events is unclear. In an effort to involve veterinary pathologists in disease surveillance and the investigation of freshwater mussel mortality events, we provide information on the conservation status of unionids, sample collection and processing techniques, and unique and confounding anatomical and physiological differences. We review the published accounts of pathology and infectious agents described in freshwater mussels including neoplasms, viruses, bacteria, fungi, fungal-like agents, ciliated protists, Aspidogastrea, Digenea, Nematoda, Acari, Diptera, and Odonata. Of the identified infectious agents, a single viral disease, *Hyriopsis cumingii* plague disease, that occurs only in cultured mussels is known to cause high mortality. Parasites including ciliates, trematodes, nematodes, mites, and insects may decrease host fitness, but are not known to cause mortality. Many of the published reports identify infectious agents at the light or ultrastructural microscopy level with no lesion or molecular characterization. Although metagenomic analyses provide sequence information for infectious agents, studies often fail to link the agents to tissue changes at the light or ultrastructural level or confirm their role in disease. Pathologists can bridge this gap between identification of infectious agents and confirmation of disease, participate in disease surveillance to ensure successful propagation programs necessary to restore decimated populations, and investigate mussel mortality events to document pathology and identify causality." (Authors)] Address: Knowles,

Susan, U.S. Geological Survey, Madison, WI, USA. Email: sknowles@usgs.gov

**22533.** Koehnsen, A.; Gorb, S.N.; Büsse, S. (2023): A switchable joint in the head of dragonfly larvae (Insecta: Odonata) as key to the multifunctionality of the prehensile labial mask. *Journal of Experimental Zoology Part A: Ecological and Integrative Physiology* 339(7): 644-654. (in English) ["Odonata larvae capture prey by rapid protraction of a raptorial mouthpart, based on a modified labium. Yet, in insects with biting-chewing mouthparts, the labium has an essential role in food handling. These two distinct functions -prey capturing and handling—lead to a mechanical problem in Odonata larvae: while the labium is always protracted in a straight line during prey capture, food handling requires more dexterity. In this study, we investigate the role of the labium in the feeding process and analyse the mechanics of the labial joints in the larva *Anax imperator*. Our results show that the labium features a multiaxial joint connecting the basal segment (postmentum) and the head. During feeding, a combination of rotations around different axes is used to handle and orient prey, which is unique among biting-chewing mouthparts. Furthermore, we identified structures at the joint which likely restrict lateral motion during the predatory strike. Our results provide a further understanding of the unique prey-capturing apparatus of odonate larvae capable of controlling a 'switchable' multiaxial to a restricted monoaxial joint. This concept highlights the evolution of a highly modified raptorial mouthpart appendage where the degrees of freedom can be actively restricted to allow for the respectively needed functionality. Research Highlights: \* Kinematics and functionality of the raptorial appendage in odonate larvae at joint level. \* First assess to the multifunctionality of the prehensile labial mask. \* Presenting a 'switchable' multiaxial to restricted monoaxial joint." (Authors)] Address: Büsse, S., Dept of Functional Morphology & Biomechanics, Institute of Zoology, Kiel University, Am Botanischen Garten 9, 24118 Kiel, Germany. Email: sbuesse@zoologie.uni-kiel.de

**22534.** Kosterin, O.E. (2023): Reconsideration of three Odonata taxa described by A.N. Bartenev from the same place in West Caucasus. *Odonatologica* 52(1/2): 89-126. (in English) ["*Enallagma cyathigerum* var. *rotundatum* Bartenef, 1929, *Leucorrhinia circassica* Bartenef, 1929, and *Aeschna juncea* var. *atshischgho* Bartenef, 1929, were described by A.N. Bartenev (= Bartenef) in three papers published in 1929 and 1930. Their type locality was the same highland lake group near Krasnaya Polyana Town in West Caucasus, Russia, presently known as the Khmelevskie Lakes. Their type series most probably no longer exist. Topotypes of the two former taxa obtained in 2008 and 2013, respectively, were examined as well as a specimen supposedly of the third taxon, collected 36 km from the type locality. Based on these specimens, *E. cyathigerum rotundatum* is concluded to be a valid subspecies and the senior subjective synonym of *Enallagma risi* Schmidt, 1961, and *L. circassica* to be a junior subjective synonym of *Leucorrhinia dubia* (Vander Linden, 1825). The Status of *A. juncea atshischgho* remains unresolved. Re-evaluation of available knowledge of the Palaearctic *Enallagma* spp. suggested downgrading *Enallagma deserti* (Selys, 1879) to the subspecies, *E. cyathigerum deserti*." (Author)] Address: Kosterin, O.E., Institute of Cytology & Genetics SB RAS, Academician Lavrentyev ave. 10, Novosibirsk, 630090, Russia. Email: kosterin@bionet.nsc.ru

**22535.** Kovács, T.; Murányi, D. (2023): Data to the distribution of *Helenoperla malickyi* Sivec, 1997 (Plecoptera: Perlidae). *Folia historico-naturalia Musei Matraensis* 47: 45-53.

(in English) [The paper includes records of *Cordulegaster bidentata*, *Caliaeschna microstigma*, *Calopteryx virgo*, and *Orychogomphus forcipatus* from Albania and Greece.] Address: Kovács, T., Mátra Museum of the Hungarian Natural History Museum, Kossuth Lajos u. 40, H-3200 Gyöngyös, Hungary. Email: koati1965@gmail.com

**22536.** Krishnanunniand, T.S.; Sarath, S. (2023): Odonate diversity in paddy fields and environs of Madakkathara Grama Panchayath, Thrissur, Kerala, India. *Indian Journal of Ecology* 50(5): 1493-1498. (in English) ["The diversity of odonates was documented from Madakkathara Grama Panchayath in the Thrissur District of Kerala state in southern India. Field surveys which were conducted from December 2018 to November 2019 recorded 47 odonates, including 32 species of Anisoptera and 15 species of Zygoptera. Among dragonflies, Libellulidae dominated with 30 species, while Coenagrionidae with 9 species were dominant among damselflies. 25.68% of the odonates in Kerala and 22.49% of the odonates in the Western Ghats were represented in the odonate diversity of the Madakkathara Grama Panchayath. *Pantala flavescens* dominated the count, especially around the monsoons." (Authors)] Address: Krishnanunniand, T.S., College of Forestry, Kerala Agricultural University KAU P.O, Vellanikkara, Thrissur- 680 656, India. Email: tskrishnanunni@gmail.com

**22537.** Li, B.; Lan, Z.; Guo, X.-R.; Zhang, A.-H.; Wei, W.; Li, Y.; Jin, Z.-H.; Gao, Z.-Y.; Zhang, X.-G.; Li, B.; Gao, J.-F.; Wang, C.-R. (2023): Survey of the *Prosthogonimus* spp. Metacercariae infection in the second intermediate host dragonfly in Heilongjiang Province, China. *Parasitology Research* 122: 2859-2870. (in English) ["*Prosthogonimiasis* poses a threat to the reproductive system of poultry and wild birds, which are the definitive hosts of the parasite causing this disease. However, the parasite infection of the second intermediate host (dragonfly), the primary vector of this pathogen, is rarely reported. In this study, the prevalence of *Prosthogonimus* infection in dragonflies was investigated from June 2019 to October 2022 in Heilongjiang Province, northeast China. The species of metacercariae isolated from dragonfly were identified by morphological characteristics, molecular biology techniques, and animal infection experiments. The results showed that 11 species of dragonflies and one damselfly were identified and among six of the dragonflies infected by *Prosthogonimus* metacercariae, *Sympetrum depressiusculum* (28.53%) had the highest infection rate among all positive dragonflies, followed by *Sympetrum vulgatum* (27.86%) and *S. frequens* (20.99%), which are preferred hosts, and the total prevalence was 20.39% (2061/10,110) in Heilongjiang Province. Three species of *Prosthogonimus* metacercariae were isolated, including *Prosthogonimus cuneatus*, *P. pullucidus*, and *Prosthogonimus* sp., among which *P. cuneatus* was the dominant species in dragonflies in Heilongjiang Province. This is the first report on the prevalence of *Prosthogonimus* in dragonflies in China, which provides baseline data for the control of *prosthogonimiasis* in Heilongjiang Province and a reference for the prevention of *prosthogonimiasis* in other areas of China." (Authors)] Address: Wang, C.-R., Heilongjiang Provincial Key Laboratory of Prevention and Control of Bovine Diseases, College of Animal Science & Veterinary Medicine, Heilongjiang Bayi Agricultural Univ., Heilongjiang Province, Daqing, 163316, China

**22538.** Lovish, B.A.N.; Kudesia, N. (2023): Prospects of entomophagy as a nutrition rich reservoir. *Journal of Entomological Research* 47(4): 835-838. (in English) ["Edible insects come in a wide variety of species, including Coleoptera, Hymenoptera, Orthoptera, Lepidoptera, Hemiptera, Isoptera,

Diptera, and Odonata. In addition, being higher in protein, lipids, vitamins, minerals, and fiber than other animal and plant-based food sources, they are consumed for their numerous nutraceutical benefits. Also, essential amino acids are abundant in edible insects. They are also the part of diet in north-east India with 255 different species. Some consumers find it difficult to accept insects as a whole, hence the market offers a variety of insect-based products like insect cookies, insect flour, insect protein bars, etc. for those consumers. Different categories of edible insects have been described in detail along with various techniques for extraction of nutrients from edible insects. Additionally, different varieties of edible insect-based products and their current market status has also been highlighted." (Authors)] Address: Lovish, B.A.N., Dept of Zoology, School of Bioengineering & Biosciences, Lovely Professional University, Phagwara - 144 411, Punjab, India. Email: najirila2010@gmail.com

**22539.** Luiza da Silva, N.; Pagliarini, C.D.; Kotz Kliemann, B.C.; Ramos, J.K.; Cesar do Bonfim, V.; Brandão, H.; Ramos, I.P. (2023): Diet composition of a native fish species in a neotropical lentic environment. *Acta Scientiarum. Biological Sciences*, v. 45, e67806: 9 pp. (in English) ["We characterized the diet, feeding habits, and trophic niche breadth of the native species *Hoplosternum littorale* (Hancock, 1828) in neotropical lentic environments. Collections were carried out in July 2018 at two sampling points (lagoons) located in the São Francisco Falso River and the Corvo River using gill nets. Stomach content was analyzed, and food items were separated, identified, and quantified using the volumetric method. PERMANOVA analysis was performed to evaluate possible differences in diet between the lagoons. Furthermore, PERMDISP was used to test the trophic niche breadth. 15 food items were recorded in the São Francisco lagoon, with the most consumed items being detritus, Diptera (larvae and pupa), and Odonata (nymph). Seven food items were recorded in the Corvo lagoon, with detritus being the most consumed. There was no difference in diet composition and trophic niche breadth between the evaluated lagoons. For both lagoons studied, the species was determined to be a detritivore feeding habit, given its diet's predominant consumption of detritus. The detritivore classification may be related to environmental conditions, food availability, and functional morphology. We also observed the presence of microplastics in the stomachs of some specimens, demonstrating anthropic influence on aquatic environments. ..."] (Authors) 8.84% of food items of *Hoplosternum littorale* are odonate larvae.] Address: Luiza da Silva, Natália, Faculdade de Engenharia, Univ. Estadual Paulista, Rua Monção, 226, 15385-000, Ilha Solteira, São Paulo, Brazil. Email: nattyluiza23@gmail.com

**22540.** Mahdjoub, H.; Zebba, R.; Kahalerras, A.; Amari, H.; Bensouilah, S.; Samways, M.J.; Khelifa, R. (2023): Condition-dependent survival and movement behavior in an endangered endemic damselfly. *Scientific Reports* 13, 21819: 10 pp. (in English) ["Movement is essential for the maintenance of populations in their natural habitats, particularly for threatened species living in fluctuating environments. Empirical evidence suggests that the probability and distance of movement in territorial species are context-dependent, often depending on population density and sex. Here, we investigate the movement behavior of the spring cohort of an endangered endemic damselfly *Calopteryx exul* in a lotic habitat of Northeast Algeria using capture-mark-recapture of adults. By sampling 10 gridded river stretches across a 2 km section of the watercourse, we were able to estimate the distance of movement throughout individual lifespans and estimate movement probability for both males and females.

We used multistate models to examine whether individual density and sex ratio influence survival and movement probability. We found that males and females had similar movement kernels with most individuals moving short distances (83% performing movements of < 100 m and only 1% > 1000 m). Of the 547 marked individuals, 63% were residents, and 37% were movers (moved at least 50 m from one sampling occasion to another). Survival probability showed higher estimates for females and was slightly density-dependent (i.e., lower survival probabilities were associated with high male densities). Survival probability did not show a marked difference between residents and movers. Movement probability and distances were positively correlated with individual density, but were not or slightly correlated with sex ratio, respectively. These results are not in line with the hypotheses of sex-biased movement and survival costs of movement. Our results suggest that the species performs mostly short-distance movements that are dependent on intraspecific interactions." (Authors)] Address: Khelifa, R., Institute for Resources, Environment, and Sustainability, University of British Columbia, 2202 Main Mall, Vancouver, BCV6T 1Z4, Canada. Email: rassim.khelifa@concordia.ca

**22541.** Maneechan, W.; Prommi, T.O. (2023): Proximate composition, fatty acid profile, and microplastic contamination of edible odonate larvae (Aeshnidae: *Anax* sp.) in rice fields. *Jordan Journal of Biological Sciences* 16(4): 649-654. (in English) ["Although the human consumption of edible insects is a culturally well documented practice, the nutritional literature of aquatic insects has not been completely covered. The present study was conducted with the aim of evaluating the proximate composition, fatty acid profiles, and microplastic contamination of edible odonate larvae (*Anax* sp.). Nutrient analysis showed that the proximate composition was a good source of protein (65.70 g/100g dry weight). The major fatty acids were oleic (1.08 g/100g DW) and palmitic acid (1.01 g/100g DW). The long-chain polyunsaturated fatty acid profile showed an abundance of linoleic, alpha-linolenic, and eicosapentaenoic acids. Total microplastics content found 694 items in the gastrointestinal tract, with a mean abundance of 11.57 items/individual. Five distinct polymers, including polyethylene, polyamide, polypropylene, polyethylene terephthalate, and cellulose, were identified through chemical analysis of FTIR spectra. Future research should be conducted regarding a comprehensive nutritional study to as method for a nutritional reference on food safety and security." (Authors)] Address: Prommi, T.O., Dept of Science & Bioinnovation, Faculty of Liberal Arts and Science, Kasetsart Univ., Kamphaeng Saen Campus, Nakhon Pathom Province, 73140, Thailand. Email: faastop@ku.ac.th

**22542.** Manu, M.K.; Ashiagbor, G.; Issah Seidu, I.; Groen, T.; Gyimah, T.; Toxopeus, B. (2023): Odonata as bioindicator for monitoring anthropogenic disturbance of Owabi wetland sanctuary, Ghana. *Aquatic Insects* 44(2): 151-169. (in English) ["This study proposes a method for assessing anthropogenic disturbance in the Owabi wetland sanctuary in Ghana using Odonata. Uniqueness of a species to specific land use (LU) class and its tolerance to environmental conditions served as the criteria for the monitoring. 29 species were identified from the families Aeshnidae, Libellulidae, Chlorocyphidae, Calopterygidae and Coenagrionidae. A Kruskal-Wallis's test suggest significant difference in species richness across the anthropogenic disturbance regimes. *Pantala flavescens* was identified as an indicator of high anthropogenic disturbance; *Orthetrum abbotti* and *Africallagma vaginale* were indicators of moderate anthropogenic disturbance; and *Tramea limbata*, *Olpogastra lugubris*, *Neodythemis klingi*, *Brachythemis*



leucosticta, Chlorocypha curta, C. luminosa, C. radix, Gynacantha bullata and Agriocnemis sp. were identified as indicators of low anthropogenic disturbance." (Authors)] Address: Manu, M.K., Dept of Wildlife & Range Management, Faculty of Renewable Natural Resources, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. Email: kusimanumartin@gmail.com

**22543.** Mavromati, E.; Kemitzoglou, D.; Tsiaoussi, V. (2023): Does littoral substrate affect macroinvertebrate assemblages in Mediterranean lakes? *Aquatic Ecology* 57: 667-679. (in English) ["The objective of this study was to investigate the effects of substrate type in macroinvertebrate assemblages in Mediterranean lakes. Samplings have taken place in the littoral zone of 21 lakes in Greece, between 2015 and 2018. We compared benthic macroinvertebrate assemblages among three substrate types of their littoral zones; sandy, covered with macrophytes and stony substrate. Benthic macroinvertebrate assemblages at sites with extended macrophyte cover differed only slightly in composition and abundance from the ones found in stony and sandy substrates. Coenagrionidae were indicative of sites covered with macrophytes and Oligochaeta and Erpobdellidae were representative of stony substrates. The type of substrate proved to be a statistically significant factor influencing the number of benthic macroinvertebrate taxa, the relative abundance of Oligochaeta and the relative abundance of Odonata. In the context of designing site-adapted management measures, priority could be given to the conservation and restoration of aquatic vegetation in lake littoral zones, which host rich macroinvertebrate assemblages with abundant taxa of Odonata." (Authors)] Address: Mavromati, Efpraxia, The Goulandris Natural History Museum, Greek Biotope/Wetland Centre, 14th km Thessaloniki – Mihionia, 57001 Thermi, Greece. Email: emavromati@ekby.gr

**22544.** Mendoza-Penagos, C.C.; Juen, L.; Neiss, U.G.; Hamada, N.; Muzón, J. (2023): Description of the final-instar larva of *Psaironeura tenuissima* (Odonata: Zygoptera: Coenagrionidae) from Amazonia. *International Journal of Odonatology* 26: 197-204. (in English, with Portuguese summary) ["The final-instar larva of *P. tenuissima* is described based on reared specimens from Amazonas and Pará states in the Brazilian Amazon. *Psaironeura* larvae are grouped with *Neoneura* and *Protoneura* larvae by having nodated caudal lamellae, however, they can be differentiated by the number of labial palp setae. *P. tenuissima* are morphologically compared with *P. angeloi* larvae as well as those of *Neoneura kiautai* and *Protoneura aurantiaca*. The *P. tenuissima* larva can be distinguished from that of *P. angeloi* by the shape of the superior margin of prementum, projections on the prothorax, caudal lamellae apex shape, and the number of setae in the paraproct ventral margin setae." (Authors)] Address: Mendoza-Penagos, C., Programa de Pós-graduação em Zoologia – PPGZOO, Universidade Federal do Pará, Belém, Brazil. Email: cristian.penagos@icb.ufpa.br

**22545.** Mohammed, H.; Adamu, K.M.; Adamu, A.K.; Mohammed, Y.M.; Usman, B. (2023): Anthropogenic impact on macroinvertebrates distribution and physicochemical characteristics of a tropical stream in north-central Nigeria. *Tropical Freshwater Biology* 32(1): 1-17. (in English) ["Emu is a tropical stream in Northcentral Nigeria that serves as the water source for drinking and other domestic activities for Kusotachin communities, Niger State, Nigeria. This study evaluates the impact of anthropogenic activities on the ecological health of the stream using physicochemical parameters and macroinvertebrate assemblages. Macroinvertebrates were collected for a period of 8 months (July 2021 to February 2022)

using modified kick sampling techniques, and the physicochemical parameters were determined using standard sampling and analytical procedures. Samples were collected from four different stations which are characterized by various anthropogenic activities across the stream bed. With the exception of depth, the measured physicochemical parameters showed no significant ( $P > 0.05$ ) difference between the sampling stations. However, there were significant ( $P < 0.05$ ) differences in air temperature, pH, electrical conductivity, total alkalinity, total hardness, dissolved oxygen, chemical oxygen demand, phosphate, and nitrate between the sampling months. A total of 506 individuals, from 30 species in eight groups of macroinvertebrates were identified. Hemiptera were the most represented group with 57.07% abundance, followed by Odonata with 27.44%, Arachnida (4.14%), Coleoptera (3.93%), Ephemeroptera (2.55%), Diptera (2.17%), Mollusca (1.38) % and the least abundance was 0.19% observed in Decapoda and Oligochaeta. The Canonical correspondence analysis (CCA) showed little or no correlations between the determined macroinvertebrates and physicochemical parameters. CCA axis 1 accounted for 44.94% of the variation of the macroinvertebrates data set with an Eigenvalue of 0.30. CCA axis 2 accounts for 30.5% of data set of macroinvertebrates and an Eigenvalue of 0.20 while CCA axis 3 accounts for 24.55% variation in data set with an Eigenvalue of 0.16. Overall, the low abundance of Ephemeroptera and the absence of other pollution-sensitive macroinvertebrate groups such as Plecoptera and Trichoptera, combined with deteriorating surface water quality, is an indication of pollution stress caused by various anthropogenic activities as the vegetative nature of the stream was the primary factor responsible for the macroinvertebrate assemblage structure." (Authors)] Address: unknown

**22546.** Moore, M.P.; Khan, F. (2023): Relatively large wings facilitate life at higher elevations among Nearctic dragonflies. *Journal of Animal Ecology* 92(8): 1613-1621. (in English) ["Determining which traits allow species to live at higher elevations is essential to understanding the forces that shape montane biodiversity. For the many animals that rely on flight for locomotion, a long-standing hypothesis is that species with relatively large wings should better persist in high-elevation environments because wings that are large relative to the body generate more lift and decrease the aerobic costs of remaining aloft. Although these biomechanical and physiological predictions have received some support in birds, other flying taxa often possess smaller wings at high elevations or no wings at all. To test if predictions about the requirements for relative wing size at high elevations are generalizable beyond birds, we conducted macroecological analyses on the altitudinal characteristics of 302 Nearctic dragonfly species. Consistent with the biomechanical and aerobic hypotheses, species with relatively larger wings live at higher elevations and have wider elevation breadths—even after controlling for a species' body size, mean thermal conditions, and range size. Moreover, a species' relative wing size had nearly as large of an impact on its maximum elevation as being adapted to the cold. Relatively large wings may be essential to high-elevation life in species that completely depend on flight for locomotion, like dragonflies or birds. With climate change forcing taxa to disperse upslope, our findings further suggest that relatively large wings could be a requirement for completely volant taxa to persist in montane habitats." (Authors)] Address: Moore, M.P., Dept of Integrative Biology, Univ. of Colorado Denver, Denver, Colorado, USA. Email: michael.p.moore@ucdenver.edu

**22547.** Natsume, H.; Sasamoto, A.; Futahashi, R. (2023):

In memoriam Kiyoshi Inoue (29th March 1932 – 21st May 2023). *Odonatologica* 52(3-4): 143-171. (in English) ["We provide a brief biography, recollections and memories of Kiyoshi Inoue, the long-time President of the International Odonatological Foundation, Societas Internationalis Odonatologica, with his complete odonatological bibliography, including editorials, for the first time." (Authors)] Address: Natsume, H., Shimo-meguro, Meguro-ku, Tokyo 153-0064, Japan

**22548.** Novelo-Gutiérrez, R.; Arce-Pérez, R. (2023): Predation of larvae of *Orthemis discolor* by "fire ants" *Solenopsis geminata* (Odonata: Libellulidae; Hymenoptera: Myrmicinae). *Notulae odonatologicae* 10(2): 45-48. (in English) ["During a collection trip in a location known as El Arenal, central Veracruz, Mexico, in August 2014, we observed an attack on larvae of *O. discolor* by fire ants, *S. geminata* in a desiccating pond. This appears to be the first record of an attack by ants on larvae of odonates that were neither moving toward the emergence support nor undergoing the last ecdysis." (Authors)] Address: Novelo-Gutiérrez, R., Red de Biodiversidad y Sistemática, Instituto de Ecología, A.C. Carretera antigua a Coatepec 351, El Haya, 91073 Xalapa, Veracruz, México. Email: rodolfo.novelo@inecol.mx

**22549.** Palomar, G.; Wos, G.; Stoks, R.; Sniegula, S. (2023): Latitude-specific urbanization effects on life history traits in the damselfly *Ischnura elegans*. *Evolutionary Applications* 16: 1503-1515. (in English) ["Many species are currently adapting to cities at different latitudes. Adaptation to urbanization may require eco-evolutionary changes in response to temperature and invasive species that may differ between latitudes. Here, we studied single and combined effects of increased temperatures and an invasive alien predator on the phenotypic response of replicated urban and rural populations of *I. elegans* and contrasted these between central and high latitudes. Adult females were collected in rural and urban ponds at central and high latitudes. Their larvae were exposed to temperature treatments (current [20°C], mild warming [24°C], and heat wave [28°C; for high latitude only]) crossed with the presence or absence of chemical cues released by the spiny-cheek crayfish (*Faxonius limosus*), only present at the central latitude. We measured treatment effects on larval development time, mass, and growth rate. Urbanization type affected all life history traits, yet these responses were often dependent on latitude, temperature, and sex. Mild warming decreased mass in rural and increased growth rate in urban populations. The effects of urbanization type on mass were latitude-dependent, with central-latitude populations having a greater phenotypic difference. Urbanization type effects were sex-specific with urban males being lighter and having a lower growth rate than rural males. At the current temperature and mild warming, the predator cue reduced the growth rate, and this independently of urbanization type and latitude of origin. This pattern was reversed during a heat wave in high-latitude damselflies. Our results highlight the context-dependence of evolutionary and plastic responses to urbanization, and caution for generalizing how populations respond to cities based on populations at a single latitude." (Authors)] Address: Sniegula, S., Inst. Nature Conservation, Polish Acad. of Sciences, al. Adama Mickiewicza 33, 31-120 Krakow, Poland. Email: szymon.sniegula@gmail.com

**22550.** Pereira de Gouvêa, T.; Vilela, D.S.; Dias de Oliveira, T.M.; Ferreira, E.D.F.; Mota de Almeida, J.A.; Barros de Souza, A.S.; Shimamoto, C.Y.; Barbado, N.; Magalhães de Souza, M. (2023): Survey of Odonata from two Conservation Units in western Paraná, southern Brazil. *Odonatologica* 52(3-4): 219-232. (in English) ["There are many under-

sampled sites, even Conservation Units (CUs), in the Brazilian Atlantic Forest, an important area of concern for conservation owing to its history of degradation and unique and rich biota. This study aimed to survey the fauna of Odonata in the Iguaçu National Park and the Bela Vista de Itaipu Biological Refuge, western state of Paraná, southern Brazil. The study was conducted from September 2021 to May 2022, comprising a total of 318 sampling hours. A total of 851 adult individuals of 97 species were collected in the two CUs, with 45 new records for the state of Paraná." (Authors)] Address: Pereira de Gouvêa, T., Instituto Federal de Educação Ciência e Tecnologia do Sul de Minas Gerais, Campus Inconfidentes. Praça Tiradentes, Inconfidentes, Minas Gerais MG, Brazil. Zip code: 37576 000. Email: taiguaragouvea.bio@gmail.com

**22551.** Pineda-Alarcón, L.Y.; Cañón Barriga, J.E. (2023): Modelación de la relación predador-presa para la comunidad de macroinvertebrados en el litoral del Lago de Tota - Modeling the predator-prey relationship for the macroinvertebrate community on the shore of Lake Tota. *Acta Biológica Colombiana* 28(2): 189-203. (in Spanish, with English summary) ["High Andean lakes are ecosystems affected by multiple anthropogenic pressures that alter water quality and biotic communities, and aquatic macroinvertebrates are excellent bioindicators for these ecosystems. The present work analyzes the dynamics of the macroinvertebrate community associated with *Egeria densa*, the relationship with physicochemical variables, biotic indices, and predator-prey interaction in the littoral of Lake Tota. This work was developed in three campaigns on nine sampling stations on the perimeter of the lake. Among the findings, *Hyallela* sp. (30 %) and *Dicrotendipes* sp. (27 %) are the most abundant and dominant taxa of the study, being bioindicators of the presence of decomposing organic matter and decrease in water quality. ANOVA analysis of the physicochemical variables of water and nutrients of *Egeria densa* showed significant differences at the temporal level. The biotic indices showed differences in water quality, determining a possible zoning of this parameter along the coast. Finally, to identify community relationships, a predator-prey model is presented, with *Hyallela* sp. as prey and *Ischnurasp.* as predator through the Lotka-Volterra equations, finding that there is agreement between the behavior of measured and simulated abundances. In this way, the trophic dynamics contribute to understand the communities and their projection in time in relation to the environmental conditions of the littoral zone." (Authors)] The study includes *Coryphaeschna* sp. and *Ischnura* sp.] Address: Pineda-Alarcón, Ludy, Grupo GAlA, Facultad de Ingeniería, Universidad de Antioquia, Calle 67 No. 53 - 108, Medellín, Colombia. Email: ludy.pineda@udea.edu.co

**22552.** Priyadarshana, T.S.; Slade, E.M. (2023): A meta-analysis reveals that dragonflies and damselflies can provide effective biological control of mosquitoes. *Journal of Animal Ecology* 92(8): 1589-1600. (in English) ["Odonata naiads have the potential to control mosquitoes, and indirectly the diseases they carry, due to their extensive predation on mosquito larvae. Experimental studies have measured the effectiveness of individual dragonfly/damselfly naiads in controlling mosquitoes by introducing them to mosquito larvae and counting the number of larvae eaten in a given time period (i.e. predation success). Without a quantitative synthesis, however, such individual measures are unable to provide a generalized estimation about the effectiveness of Odonata as biological mosquito control agents. To achieve this, we assembled a database containing 485 effect sizes across 31 studies on predation successes of 47 species of

commonly found Odonata naiads on nine species of mosquito larvae belonging to *Aedes*, *Anopheles* and *Culex*. These studies covered 14 countries across Asia, Africa and South and North America, where mosquitoes are the vectors of Chikungunya, Dengue, Japanese encephalitis, Lymphatic filariasis, Malaria, Rift Valley fever, West Nile fever, Yellow fever and Zika. Using this database, we conducted a meta-analysis to estimate the average predation success per day by a single individual dragonfly/damselfly naiad on these mosquito larvae as a generalized measure of the effectiveness of Odonata for mosquito control. We also built an interaction network for predator-Odonata and prey-mosquitoes and the diseases they vector to understand the functioning of this important predator-prey network. Our results showed that mosquito larvae were significantly reduced through predation by Odonata naiads. Within experimental containers, a single individual Odonata naiad can eat on average 40 (95% confidence intervals [CIs] = 20, 60) mosquito larvae per day, equivalent to a reduction of the mosquito larval population by 45% (95% CIs = 30%, 59%) per day. The average predation success did not significantly vary among *Aedes*, *Anopheles* and *Culex* mosquitoes or among the four (I–IV) mosquito larval stages. These results provide strong evidence that Odonata can be effective biological control agents of mosquitoes, and environmental planning to promote them could lower the risk of spreading mosquito-borne diseases in an environmentally friendly and cost-effective manner." (Authors)] Address: Priyadarshana, T., Asian School of the Environment, Nanyang Technological University, Singapore City, Singapore. Email: tharakas001@ntu.edu.sg

**22553.** Prunier, F.; De Knijf, G. (2023): Discovery of a population of *Onychogomphus cazuma* in Andalusia, Spain. *Notulae odonatologicae* 10(2): 60-66. (in English) ["*O. cazuma* is an endemic gomphid of eastern Spain and one of the rarest dragonflies in Europe. We report the discovery of a population of this species at Surgencia del Tajo del Buitre, Ardales, in Málaga province, Spain. Numerous exuviae and three emerging individuals were found in early June 2023. The site consists of a seepage with permanent slow-flowing water a few centimetres deep located below a cliff. We provide a detailed description of this Andalusian habitat and update the species' distribution map. We believe that *O. cazuma* might be more widespread in the Baetic Mountain range." (Authors)] Address: Prunier, F., Red de Observadores de Libélulas en Andalucía, C/ Toledillo, 14, 29490 Benarrabá, Spain

**22554.** Rosenfeld, S.; Maturana, C.S.; Gañan, M.; Rendoll Cárcamo, J.; Díaz, A.; Contador, T.; Aldea, C.; Gonzalez-Wevar, C.; Orlando, J.; Poulin, E. (2023): Revealing the hidden biodiversity of Antarctic and the Magellanic Sub-Antarctic Ecoregion: A comprehensive study of aquatic invertebrates from the BASE Project. *Biodiversity Data Journal* 11(2): 108566; <https://doi.org/10.3897/BDJ.11.e108566>: 25 pp. (in English) ["Antarctica, its outlying archipelagoes and the Magellanic Subantarctic (MSA) ecoregion are amongst the last true wilderness areas remaining on the planet. Therefore, the publication, citation and peer review of their biodiversity data are essential. The new Millennium Institute Biodiversity of Antarctic and Subantarctic Ecosystems (BASE), a Chilean scientific initiative funded by the National Agency of Research and Innovation, contributes 770 new records of aquatic invertebrates as a point of reference for present-day biodiversity research at these latitudes. The occurrence dataset presented here has never been released before and is the result of the systematic recording of occurrences of several taxa across the Antarctic, Subantarctic and Magellanic Subantarctic ecoregions. We collected data from marine

and freshwater invertebrates across numerous samplings from 2008 to 2023. From the 770 occurrences, we identified 160 taxa, 125 at species level and 35 at the genus level. The database has been registered in the Global Biodiversity Information Facility (GBIF)." (Authors) Rhionaeschna variegata (Fabricius, 1775)] Address: Rosenfeld, S., Millennium Institute Biodiversity of Antarctic and Subantarctic Ecosystems (BASE), Santiago, Chile

**22555.** Sahayaraj, K.; Hassan, E. (2023): *Worldwide Predatory Insects in Agroecosystems*. Publisher: Springer Singapore. Hardcover ISBN 978-981-99-0999-5 (Due: 31 December 2024). eBook ISBN: 978-981-99-1000-7 (Published: 29 November 2023): XXII, 858- (in English) [The book contains many references to Odonata.] Address: DOI: <https://doi.org/10.1007/978-981-99-1000-7>

**22556.** Samraoui, B.; Touati, L.; Samraoui, F. (2023): Life cycle and seasonal regulation of the Ibero-Maghrebian endemic *Onychogomphus costae* across an altitudinal gradient (Insecta, Odonata). *Hydrobiologia* 850: 4891-4905 (in English) ["The emergence and life cycle of the Ibero-Maghrebian endemic *O. costae*, was studied over an altitudinal gradient of the Seybouse River in northeastern Algeria. The asynchronous and protracted emergence period showed a "summer" pattern, extending from late April to mid-August and lasting about three and a half months. The proportion of the total emergence period, EM50, at sea level was unusually long, varying annually between 44 and 66 days. No differences in emergence sex ratios were observed in 2015, but in 2016 there was a statistically significant deviation from a 1:1 ratio in favour of females. In both years, the body size of female exuviae at emergence was consistently larger than that of males. The long flight and oviposition period of *O. costae* extends throughout spring and summer and is responsible for the phenotypic plasticity of the larvae and the asynchrony of their development. Larval growth and development of *O. costae* are consistent with regulated development and a semivoltine life cycle across the entire altitudinal gradient of the Seybouse River. Nevertheless, some voltinistic flexibility is evident at low elevations, with some individuals exhibiting a univoltine life cycle." (Authors)] Address: Samraoui, B., Lab. de Conservation des Zones Humides, Univ. 8 mai 1945, Guelma, 24000, Algeria. Email: bsamraoui@gmail.com

**22557.** Saxton, N.A.; Powell, G.S.; Bybee, S.M. (2023): A story of vicariance? How the geology of oceanic archipelagos influenced the evolutionary history of endemic damselflies. *Molecular Phylogenetics and Evolution* 186, 107831: 10 pp. (in English) ["South Pacific islands provide an ideal study system to explore patterns of speciation, specifically examining the role of dispersal versus vicariance. Dispersal is often the suggested mechanism of diversification in the South Pacific, specifically among remote island chains. Here, we provide a phylogeny of several related genera of Coenagrionidae from the South Pacific, based on five molecular loci, in order to examine patterns of speciation in the region. We used the endemic damselfly genera *Nesobasis*, *Nikulabasis*, and *Vanuatubasis* found across both Fiji and Vanuatu. Knowledge of the geologic history of the region was used to inform our understanding of the evolution of these genera. Both archipelagos used to be part of the Vitiac arc which spanned from the Solomon Islands to Tonga and began to break apart 10-12 Ma. Results of our divergence-time estimations and biogeographic reconstructions support that the breakup of this arc acted as a significant vicariance event in the evolution of these taxa. Specifically, it led to the extant generic diversity seen in these damselflies. We find that

within the archipelago of Vanuatu, that Espiritu Santo served as an important source for dispersal to other islands with Malekula acting as a stepping stone to Efate." (Authors)] Address: Saxton, Natalie, Department of Biology and Monte L. Bean Museum, Brigham Young University, Provo, UT 84602, USA. Email: natalie.saxton@case.edu

**22558.** Seehausen, M. (2023): Name-bearing types of Aeshnidae, Gomphidae, Chlorogomphidae, Macromiidae, Synthemistidae, and Corduliidae preserved in the Senckenberg Naturmuseum Frankfurt/Main (Odonata). *Odonatologica* 52 (3-4): 305-334. (in English) ["The name-bearing types of Anisoptera except Libellulidae preserved at the Senckenberg-Museum Frankfurt/Main (SMF), Germany are catalogued. There are 112 name-bearing types of 53 taxa within the families Aeshnidae, Gomphidae, Chlorogomphidae, Macromiidae, Synthemistidae, and Corduliidae. Of these taxa there are 47 additional paratypes and paralectotypes. The holotype female of *Aeschna rufipes* is missing. The holotypes of *Progomphus aberrans*, *Progomphus virginiae*, and *Phyllocycla pallida* as well as some paratypes of *Phyllogomphoides lieftincki* were stated to be deposited at the Zoological Research Museum Alexander Koenig in Bonn, Germany, but were found at the SMF. The type status of *Aeschna umbrosa occidentalis*, *Progomphus auropictus*, *P. longistigma*, and *Macromia alleganiensis* is investigated. In addition, 67 secondary types of 28 other taxa are listed. A supplementary list of name-bearing types of Anisoptera except Libellulidae of 18 taxa described by Friedrich Ris and deposited in collections other than the SMF is provided." (Author)] Address: Seehausen, M., Zoologisches Museum der CAU zu Kiel, Hegewischstr. 3, 24105 Kiel, Germany;

**22559.** Silina, A.E.; Sushchik, N.N.; Gladyshev, M.I.; Kurina, E.M.; Kolmakova, A.A.; Seleznev, D.G. (2023): Emergence of amphibious insects from an old beaver pond in the Upper Kholer Valley under conditions of the forest steppe. *Contemporary Problems of Ecology* 16: 790-806. (in English) ["This work presents the results of studies of the emergence of amphibiotic insects from the old beaver pond on the Yuzhnaya River of the Privolzhskaya Lesostep Nature Reserve in the Upper Kholer basin. The parameters of abundance, biomass, and frequency of occurrence are given for insects from 34 families and 8 orders; the timing of their emergence in different parts of the pond is indicated. The dominant and common species are identified: chironomids *Paramerina cingulata* (Walk.) and *Cricotopus silvestris* (F.), biting midges (*Bezzia bicolor* (Mg.)), chaoborids *Chaoborus flavicans* (Mg.), and mayflies *Cloeon inscriptum* (Bgts.). The intensity of the emergence of insects is 12.10 individuals/m<sup>2</sup> per day; the average daily transfer of biomass is 49.23 mg/m<sup>2</sup> per day. The analysis of the fatty acid composition and content of the main biogenic elements in adults of amphibiotic insects is carried out. The results of calculations of the energy and matter transfer, including biogenic elements (carbon, phosphorus, and nitrogen) and polyunsaturated fatty acids (PUFAs) during the emergence of insects from various orders (Ephemeroptera, Odonata [*Gomphus vulgatissimus*, *Coenagrion puella*], Trichoptera, and Diptera) into adjacent terrestrial ecosystems, are presented. The transfer of wet biomass from water to land is 7.385 g/m<sup>2</sup> per year and, in dry weight, 2.216 g/m<sup>2</sup> per year; transfer of the main nutrients is carbon, 1.21 g/m<sup>2</sup> per year; nitrogen, 0.25 g/m<sup>2</sup> per year; and phosphorus, 0.03 g/m<sup>2</sup> per year. PUFA transfer is 24.16 kg/km<sup>2</sup> per year. ... Odonata were represented exclusively by Anisoptera [?] (genera *Sympetrum* and *Aeschna*) emerging in the second half of summer (from July 28 to August 25). Due to their large forms, they played a major role in the transfer of

biomass during this period, despite their low occurrence (FO = 1.9%). The proportion of dragonflies in the total transfer of bio mass by insects from the pond was 14.8%." (Authors)] Address: Silina, A.E., Belogorye Nature Reserve, 309342, Borisovka, Belgorod oblast, Russia

**22560.** So, J.; Choe, D.-H.; Rust, M.K.; Trumble, J.T.; Lee, C.-Y. (2023): The impact of selenium on insects. *Journal of Economic Entomology* 116(4): 1041-1062. (in English) ["Selenium, a naturally occurring metalloid, is an essential trace element for many higher organisms, including humans. Humans primarily become exposed to selenium by ingesting food products containing trace amounts of selenium compounds. Although essential in these small amounts, selenium exhibits toxic effects at higher doses. Previous studies investigating the effects on insects of order Blattodea, Coleoptera, Diptera, Ephemeroptera, Hemiptera, Hymenoptera, Lepidoptera, Odonata, and Orthoptera revealed impacts on mortality, growth, development, and behavior. Nearly every study examining selenium toxicity has shown that insects are negatively affected by exposure to selenium in their food. However, there were no clear patterns of toxicity between insect orders or similarities between insect species within families. At this time, the potential for control will need to be determined on a species-by-species basis. We suspect that the multiple modes of action, including mutation-inducing modification of important amino acids as well as impacts on microbiome composition, influence this variability. There are relatively few studies that have examined the potential effects of selenium on beneficial insects, and the results have ranged from increased predation (a strong positive effect) to toxicity resulting in reduced population growth or even the effective elimination of the natural enemies (more common negative effects). As a result, in those pest systems where selenium use is contemplated, additional research may be necessary to ascertain if selenium use is compatible with key biological control agents. This review explores selenium as a potential insecticide and possible future directions for research. ... The orders Odonata, Orthoptera, Coleoptera, and Blattodea have comparatively limited literature available regarding sublethal effects on behavior. Most of the available studies measure feeding behavior. For example, a common dragonfly, *Sympetrum corruptum* increased feeding on *C. quinquefasciatus* when grown in a selenate solution compared to nymphs maintained in an untreated solution (Jensen 2006)." (Authors)] Address: Lee, C.-Y., Dept Entomol., Univ. of California, Riverside, CA 92521, USA. Email: chowyang.lee@ucr.edu

**22561.** Société Limousine d'Odonatologie (2023): Suivi des Odonates dans le cadre de la renaturation de la Corrèze dans Tulle (19) Bilan des inventaires menés entre 2017 et 2023. Rapport d'étude pour Tulle Agglo – Communauté d'agglomération: 15 pp. (in French) [<https://www.researchgate.net/profile/Julien-Barataud>] Address: Barataud, J., le bourg, 19330 Chanteix, France. Email: julien.barataud@gmail.com

**22562.** Spyra, A.; Cieplik, A.; Kaszyca-Taszakowska, N. (2023): From extremely acidic to alkaline - aquatic invertebrates in forest mining lakes under the pressure of acidification. *Hydrobiology* 108(1-3): 5-16. (in English) ["Human activities, including the mining industry, have considerably degraded water habitats worldwide. Acidification has severely affected aquatic environments and biodiversity by altering food webs and reducing species richness. The study area in southern Poland is unique in addressing the effects of mining-related acidification on biodiversity in freshwater ecosystems along a broad pH gradient (2.4-9.6) in mining lakes. Study was design to test for effect of human induced



acidification. Using multivariate ordination techniques, we analyzed how variations in invertebrate composition are related to environmental factors. The results indicated that pH, hardness, total dissolved solids, and the content of ammonia and calcium were significantly associated with the distribution of invertebrates in the studied mining lakes. The highest iron content, relatively high values of conductivity and chlorides were found in the extremely acidic mining lakes. A clear trend in decreasing density with decreasing pH was observed for taxa such as Oligochaeta, Chironomidae, Glossiphoniidae and certain taxa of snails. However the density of other taxa such as Lestidae, Libellulidae, Caenidae, Sialidae, Helodidae, Hydrophilidae and Polycentropodidae increased with decreasing pH. Specific communities were found with increasing acidity. Therefore, a further increase in acidity will probably cause a stronger decline in most of taxa and their density, and on water chemistry (e.g., calcium concentration, nitrites, hardness). The data yielded offer an opportunity to fill knowledge gaps on acidic stress concerning less-studied environments like mining lakes and link environmental pollution with communities, which is especially important because aquatic forest habitats are especially exposed to different climatic factors and threats." (Authors)] Address: Spyra, Aneta, Fac. of Natural Sciences, Inst. Biol., Biotechnology & Environmental Protection, Univ. Silesia, Bankowa 9, 40-007 Katowice, Poland. Email: aneta.spyra@us.edu.pl

**22563.** Suárez-Tovar, C.M.; Rocha-Ortega, M.; Córdoba-Aguilar, A. (2023): Is body condition of Mexican rubyspot (*Odonata*: Zygoptera) associated with urbanization? *Journal of Insect Conservation* 27: 961-969. (in English) ["Urbanized areas can impose selective pressures on insects which can be identified at the individual level based on animal physiological condition. Physiological condition can be measured from variables such as body size, body mass or energetic budget of individuals. We examined whether body mass, wing spot size and energy reserves (proteins, lipids and carbohydrates) were reduced as urbanization increases, using adults of two damselflies, *Hetaerina americana* and *H. vulnerata*, in Central Mexico. We used a Habitat Integrity Index to assess the degree of urbanization in our sampled sites, considering biophysical attributes and the impact of anthropogenic activities. We did not find relation of above individual variables with urbanization degree. These results support possible resilience of rubyspot damselflies in the face of radical changes such as urbanization. Our finding echoes other results in damselflies research. Implications for insect conservation: Our results highlight the resilience of these damselflies species in the face of urban disturbances. Thus design cities considering not only requirements of humans is essential to promote the presence and conservation of these and other species of insects in cities." (Authors)] Address: Córdoba-Aguilar, A., Instituto de Ecología, Universidad Nacional Autónoma de México, Apdo. Postal 70-275, Circuito Exterior, Ciudad Universitaria, Coyoacán, 04510 México City, México. Email: acordoba@iecologia.unam.mx

**22564.** Sysiak, M.; Pietrzak, B.; Kubiak, M.; Bednarska, A.; Mikulski, A. (2023): Chemical cannibalistic cues make damselfly larvae hide rather than hunt. *Scientific Reports* 13, Article number: 13556: 13 pp. (in English) ["Adopting cannibalism substantially affects individual fitness, and recognizing the presence of other cannibals provides additional benefits such as the opportunity to prepare for hunting or defense. This recognition can be facilitated by perceiving conspecific chemical cues. Their role in cannibalistic interactions is less studied than in interspecific predation and it is unclear whether these cues inform individuals of danger or of food

availability. Interpretation of these cues is crucial to balance the costs and benefits of anti-predator and feeding strategies, which can directly influence individual fitness. In this study we aimed to test whether damselfly larvae shift towards bolder and more exploratory (cannibalistic) behavior, or become more careful to avoid potential cannibals (as prey) in response to such cues. We conducted behavioral and respiratory experiments with *Ischnura elegans* larvae to investigate their response to chemical cues from older and larger conspecific larvae. We found that *I. elegans* larvae decrease their activity and shift their respiratory-related behavior, indicating activation of anti-predator defense mechanisms in response to conspecific chemical cues. Our findings indicate that individuals exposed to conspecific chemical cues balance catching prey with staying safe." (Authors)] Address: Sysiak, Monika, Dept of Hydrobiology, Inst. Functional Biol. & Ecol., Fac. of Biology, University of Warsaw, Zwirki i Wigury 101, 02-089 Warsaw, Poland. Email: ma.sysiak@student.uw.edu.pl

**22565.** Szany, K.; Grigorszky, I.; Szabó, L.J.; Dévai, G. (2023): Past and present: changes in the Odonata fauna of small lowland watercourses. *Biodiversity Data Journal* 11(6): 24 pp. (in English) ["Small lowland watercourses, strongly exposed to anthropogenic activities and climate change, have received negligible odonatological attention. This study provides a revised checklist of three typical lowland small watercourses (Kállai-folyás, Konyári-Kálló and Ölyvös) within the Pannonian Lowland and presents the changes in their diversity over the past decades. Results revealed a significant biodiversity loss, with a 31.6% decline in Odonata fauna over the last 53 years. The upper and middle sections degraded the most, where the habitats have dried out or become intermittent. However, a diverse Odonata assemblage (1,277 individuals of 27 species) was observed at the 14 sampling sites of the three watercourses, containing protected and sensitive species (*Somatochlora flavomaculata*, *Orthetrum brunneum*, *Aeshna isoceles*, *Libellula fulva*). However, the low abundance of larval and exuvial forms (59 individuals of 13 species) suggests that the majority of the observed adults were developed in other watercourses. While recolonisation from nearby habitats is still possible, a parallel degradation of adjacent waterbodies could lead to an irreversible biodiversity loss." (Authors)] Address: Szanyi, K., Dept of Hydrobiol., Fac. of Science & Technology, Univ. of Debrecen, Debrecen, Hungary. Email: szanyi.kalman@science.unideb.hu

**22566.** Tachamo-Shah, R.D.; Devi, R.; Shah, D.N.; Sharma, S.; Sharma, L.; Adhikari, J.N.; Rijal, D. (2023): Wetland biodiversity of Ramaroshan Lake complex: a need for conservation. *Journal of Threatened Taxa* 15(12): 24299-24320. (in English) ["The Ramaroshan Lake Complex, situated in the mid-hills of Sudurpaschim Province, is renowned for its scenic beauty, yet there is a notable dearth of information regarding its biodiversity and ecological status. This study represents the first systematic examination of seasonal variations in water quality parameters and biodiversity encompassing aquatic macroinvertebrates, fishes, birds, herpetofauna, mammals, and macrophytes, as well as the surrounding vegetation within the complex, spanning the winters and summers of 2018 and 2019. Among the twenty water quality parameters investigated, thirteen displayed significant seasonal differences across the lakes ( $p < 0.05$ ), with Batula and Ramaroshan lakes exhibiting elevated nutrient levels. Lamadaya Lake stood out with a highly diverse macroinvertebrate community compared to other lakes, while overall, the study recorded 45 aquatic macroinvertebrate families, three fish species, 79 bird species, 12 herpetofauna species, 12 mammal species, and 26 macrophyte species within the

complex. Additionally, the surrounding vegetation comprised 193 distinct plant species. Notably, the complex currently hosts 14 IUCN Red List species, including Near Threatened (5), Vulnerable (5), Critically Endangered (1), and Endangered (3) species, as well as five migratory wetland bird species, underscoring its significance for wildlife conservation. Given the diverse and cross-cutting nature of wetlands, the development of science-based policies and coordinated efforts among central, provincial, and local governments are essential for the preservation and sustainable management of these vital ecosystems." (Authors) Odonate taxa are treated at family level.] Address: Tachamo-Shah, R.D., Dept of Life Sciences, School of Science, Kathmandu Univ., Dhulikhel 45200, Nepal; Aquatic Ecology Centre, School of Science, Kathmandu University, Dhulikhel 45200, Nepal.

**22567.** Talley, J.; Pusdekar, S.; Feltenberger, A.; Ketner, N.; Evers, J.; Liu, M.; Gosh, A.; Palmer, S.E.; Wardill, T.J.; Gonzalez-Bellido, P.T. (2023): Predictive saccades and decision making in the beetle-predating saffron robber fly. *Current Biology* 33: 13 pp. (in English) ["Internal predictions about the sensory consequences of self-motion, encoded by corollary discharge, are ubiquitous in the animal kingdom, including for fruit flies, dragonflies, and humans. In contrast, predicting the future location of an independently moving external target requires an internal model. With the use of internal models for predictive gaze control, vertebrate predatory species compensate for their sluggish visual systems and long sensorimotor latencies. This ability is crucial for the timely and accurate decisions that underpin a successful attack. Here, we directly demonstrate that the robber fly *Laphria saffrana*, a specialized beetle predator, also uses predictive gaze control when head tracking potential prey. *Laphria* uses this predictive ability to perform the difficult categorization and perceptual decision task of differentiating a beetle from other flying insects with a low spatial resolution retina. Specifically, we show that (1) this predictive behavior is part of a saccade-and-fixate strategy, (2) the relative target angular position and velocity, acquired during fixation, inform the subsequent predictive saccade, and (3) the predictive saccade provides *Laphria* with additional fixation time to sample the frequency of the prey's specular wing reflections. We also demonstrate that *Laphria* uses such wing reflections as a proxy for the wingbeat frequency of the potential prey and that consecutively flashing LEDs to produce apparent motion elicits attacks when the LED flicker frequency matches that of the beetle's wingbeat cycle." (Authors) The paper includes many references to Odonata.] Address: Talley, Jennifer, Air Force Research Laboratory, Munitions Directorate, Eglin AFB, FL 32542, USA. Email: jennifer.talley.1@us.af.mil

**22568.** Tennesen, K.J.; Garrison, R.W. (2023): *Epipleoneura parmula* sp. nov. (Odonata: Coenagrionidae: Protoneurinae) from Amazonian Ecuador. *Zootaxa* 5343(4): 395-400. (in English, with Spanish summary) ["*Epipleoneura parmula* sp. nov. is described and illustrated based on males from eastern Ecuador (holotype: male, ECUADOR, Orellana Province, Primavera, Laguna Taracoa (0.4652°S, 76.7638°W), 247 m, 27 July 1977, Dennis R. Paulson & Susan Hills leg., in FSCA). Using the most recent synopsis of the genus (Pessacq 2014), the new species keys to the couplet separating *E. pallida* Rácenis and *E. ocuene* De Marmels, but unlike in those species, the epiproct branches are longer, fused nearly their entire length and their tips are accentuated. Adults were collected at a lake and several ponds, indicating that the habitat is lentic, although the nymph is unknown." (Authors)] Address: Garrison, R.W., Plant Pest Diagnostic Center, California Department of Food and Agriculture 3294

Meadowview Road, Sacramento, CA 958321488, U.S.A.  
Email: argiavivida@gmail.com

**22569.** Termaat, T. (2023): Trending Dragonflies assessing and explaining trends and threats on different scales. PhD thesis, Wageningen University, Wageningen, NL: 206 pp. (in English, with Dutch summary) ["Monitoring biodiversity is necessary to keep track of the progress towards conservation targets and to measure the success of conservation strategies. However, adequate biodiversity monitoring programmes are not easy to achieve. They require enough data on species occurrence over a longer period of time, and a scientifically sound method for data analysis to derive robust, unbiased trend information. Monitoring programmes that meet these requirements are scarce and often cover only a small geographic area. In Europe, only two species groups currently are covered by monitoring programmes that have resulted in pan-European biodiversity indicators: birds and butterflies. Evidently, these two species groups do not sufficiently represent total biodiversity. Dragonflies (Odonata, including damselflies) may be a suitable additional indicator group. They are likely sensitive to other aspects of ecosystem quality than birds and butterflies and due to their strong dispersal capacities they may quickly respond to environmental change. The number of amateur naturalists watching dragonflies has greatly increased in recent decades, leading to a sharp rise in available distribution records throughout Europe. The majority of these records, however, are opportunistic', that is, collected without a standardised field protocol and without a design ensuring the geographical representativeness of sampled sites. Using these records requires a new method for data analysis that successfully corrects for unequal observation efforts. The aim of the research covered in this thesis is to find and test such a method, and use it to derive trends in the distribution of dragonflies at different spatial scales in Europe. Subsequently, it examines how the obtained trends can be explained and which consequences this has for dragonfly conservation. Chapter 2 of this thesis explores if occupancy models (also known as site-occupancy models) may be helpful to reduce biases in estimating trends based on opportunistic data, caused by temporal variation of observation effort and by incomplete reporting of sightings. Occupancy models estimate the probability of sites to be occupied while taking into account imperfect detection of a species, via the deduction of 'detection histories' from replicated visits. Such models were applied to three opportunistic datasets of dragonfly species (1999–2007) in the Netherlands: (1) one-species records, (2) short species day-lists and (3) comprehensive species day-lists. The resulting trend estimates were compared to trend estimates based on presence-absence records collected at fixed monitoring transects, via the standardised field protocol of the Dutch Dragonfly Monitoring Scheme (the 'golden standard'). In addition, conventional logistic regression analyses were applied to test if occupancy models performed better. Occupancy trends based on comprehensive species day-lists in combination with occupancy models were similar to those based on standardly collected data, while trends based on single-species records and short day-lists were too imprecise. Application of logistic regression models led to less realistic trend estimates than application of occupancy models. Thus, analysing comprehensive day-lists of opportunistic records with occupancy models can be a suitable and feasible alternative for dragonfly monitoring based on standardised observations. The monitoring method described in Chapter 2 can of course be used in other countries than the Netherlands as well, provided that these countries have sufficiently large datasets of opportunistic dragonfly records. However, to infer dragonfly

trends on a supranational scale, a method is needed to combine trends from different countries while taking into account the unequal geographical occupation of surveyed sites. Chapter 3 describes a pilot study for *Calopteryx splendens*. Opportunistic distribution records were collected from five countries (Ireland, Great Britain, the Netherlands, Belgium and France), covering the period 1990–2008. Occupancy trends were first estimated for each country separately. Then the countries were weighted according to the number of sites surveyed and the range of the species per country. These weights were then applied during the aggregation of the national trends into a supranational trend. This showed that the distribution of *C. splendens* increased significantly in the five countries combined. The pilot demonstrated that supranational occupancy trends can be successfully calculated, which opens new perspectives for international monitoring of biodiversity. Chapter 4 investigates how the dragonfly fauna of the Netherlands has developed in the period 1991–2013, using both standardised monitoring data on abundance and opportunistic data on distribution. Trends of dragonfly species from different habitat types are compared, as are trends of species with southern vs. northern distributions in Europe. Many species had declined prior to 1990, due to environmental pollution and habitat loss. Since the 1980s, stricter environmental regulations and habitat restoration projects led to improvements in freshwater habitats and many dragonfly species were able to quickly recover, leading to more positive conservation statuses. Species of running waters benefitted more than species of standing waters, and southern species had more positive trends than northern species, suggesting that climate change has contributed to the recovery. These outcomes support the suitability of dragonflies as indicators of freshwater habitat condition. However, dragonflies recovered more strongly in the Netherlands than many other aquatic or terrestrial insects (e.g. stoneflies, caddisflies, mayflies, butterflies, moths), likely because of their higher dispersal abilities or different habitat requirements. Following the method for supranational trend assessment in Chapter 3 and the explanations for the Dutch dragonfly trends found in Chapter 4. Chapter 5 explores how the occurrence of dragonflies has changed at a European level, in the period 1990–2015. Based on distribution data from 10 European geographic regions, occupancy indices were calculated for 99 (69%) of the European species. 55 of them increased in distribution at European level, 32 species remained stable, and none declined. Trends for 12 species were uncertain. To determine whether the changes found in dragonfly communities are driven by climate warming, Species Temperature Indices (STI) were calculated. STI is a simple measure of a species' preferred temperature regime, expressed as the mean annual temperature in the species' European range. Based on these STI, all species were categorised as either being cold-dwelling or warm-dwelling and Multi-species Indicators (MSI) were compiled. MSI of cold-dwelling and warm-dwelling species differed in some of the regions, but increased at a similar rate at European level. Furthermore, Community Temperature Indices (CTI) were calculated, as the average STI of all species in a region, weighted by species occupancies. CTI increased in all regions, except Cyprus. The European CTI increased slightly, but lagged behind the increase in temperature itself. This implies that dragonflies have accumulated a 'climate debt', meaning that problems for cold-dwelling species can still be expected after 2015. Dragonflies proved to be a suitable species group for monitoring changes in communities, both at regional and continental level. For effective species conservation it is not only important to notice early that a species is declining, but also to properly understand the causes of its decline. Furthermore, as insects may respond rapidly to environmental changes, it is necessary to

discriminate between former and current threats and to focus conservation efforts on the latter. Chapter 6 describes a study on the habitat requirements of *Coenagrion hastulatum*, an endangered species in the Netherlands, and investigates what has caused the progressive loss of its populations during the 20th and beginning of 21st century. Historically, habitat loss and changes in anthropogenic use of moorland pools and bogs were the most prominent causes. In the second half of the 20th century, strongly elevated atmospheric deposition of sulphur and nitrogen compounds, leading to acidification and eutrophication, was the main culprit. Sites where *C. hastulatum* disappeared between 2001 and 2015 had lower cover of essential vegetation structures. This suggests that they never fully recovered, despite the strong reduction in sulphur and moderate reduction in nitrogen deposition since the 1980s. Most recently, more populations have been lost as a direct result of prolonged droughts, a consequence of climate change. Thus, the most relevant pressures have indeed changed over time. Restoration of groundwater systems and rewetting measures are now first priorities for the conservation of *C. hastulatum* and other cold-adapted species of moorland pools and bogs. Chapter 7 contains an overall synthesis. It draws general conclusions, addresses implications for dragonfly conservation and discusses future prospects. At national level in the Netherlands, dragonflies reacted negatively to environmental problems in the 20th century, but most species quickly recovered as these problems were overcome or mitigated. However, climate change now has a dominant effect, both positive on warm-adapted species and negative on cold-adapted species. This is also true at a European level: the 'climatic debt' that dragonfly communities accumulated is now being paid, as many cold-adapted species have started to decline and will be listed as threatened on the updated IUCN Red List of European Odonata. Conservation efforts should prioritise the protection of oligo-mesotrophic freshwater habitats in northern Europe as areas of refuge for cold-adapted species. Halting human exploitation of these ecosystems and consolidating surface and groundwater levels are the most important measures. Protection of watersheds in southern and southeastern Europe is also pressing, as multiple dragonfly species in those regions are at risk due to desiccation of streams and rivers, including some range-restricted European endemics. This thesis supports the suitability of dragonflies as biodiversity indicators. Since dragonflies react to environmental change almost instantly, both positively and negatively, they inform us on the current condition of freshwater ecosystems. Due to their strong dispersal ability, habitat fragmentation plays a limited role. Dragonfly trends therefore have an 'early signalling' function and may be used as predictors of the future trends of other freshwater organisms that respond less rapidly. Furthermore, this thesis proves that it is feasible to start a European dragonfly monitoring programme right away, by compiling distribution data that are already available in many countries, and analysing those data with occupancy models. The resulting species indices and trends could form the basis of a freshwater biodiversity indicator, narrowing the gap in the availability of indicators currently employed by the European Environmental Agency." (Author)] Address: Termaat, T., De Vlinderstichting/Dutch Butterfly Conservation, Wageningen, The Netherlands. E-mail: timtermaat@gmail.com

**22570.** Tolman, E.R.; Beatty, C.D.; Bush, J.; Kohli, M.K.; Frandsen, P.B.; Gosnell, J.S.; Ware, J.L. (2023): Exploring chromosome evolution in 250 million year old groups of dragonflies and damselflies (Insecta: Odonata). *Molecular Ecology* 32: 5785–5797. (in English) ["Using recently published chromosome-length genome assemblies of *Ischnura elegans*,

*Platycnemis pennipes*, *Pantala flavescens* and *Tanypteryx hageni*, we demonstrate that the autosomes of Odonata have undergone few fission, fusion, or inversion events, despite 250 million years of separation. In the four genomes discussed here, our results show that all autosomes have a clear ortholog in the ancestral karyotype. Despite this clear chromosomal orthology, we demonstrate that different factors, including concentration of repeat dynamics, GC content, relative position on the chromosome, and the relative proportion of coding sequence all influence the density of syntenic blocks across chromosomes. However, these factors do not interact to influence synteny the same way in any two pairs of species, nor is any one factor retained in all four species. Furthermore, it was previously unknown whether the microchromosomes in Odonata are descended from one ancestral chromosome. Despite structural rearrangements, our evidence suggests that the micro-chromosomes in the sampled Odonata do indeed descend from an ancestral chromosome, and that the micro-chromosome in *P. flavescens* was lost through fusion with autosomes." (Authors) T. hageni, P. flavescens, I. elegans, P. pennipes, Hetaerina americana, Rhinocypha anisoptera, Calopteryx splendens, Ladona fulva.] Address: Tolman, E.R., Division of Invertebrate Zoology, American Museum of Natural History, New York City, NY 10024, USA. Email: etolman@amnh.org

**22571.** Tsavdaridou, A.I.; Doxa, A.; Mazaris, A.D. (2023): Towards achieving a twenty-fold increase in the coverage of freshwater species distributions within protected areas in Europe. *Biological Conservation* 285, 110233: 9 pp. (in English) ["Freshwater ecosystems are threatened worldwide, with 1/3 of freshwater species being under extinction risk. Yet, systematic conservation planning has received little attention as a means to prioritize freshwater conservation areas. Here, we develop a comprehensive approach to spatially delineate key areas for freshwater conservation across Europe, considering directed-connectivity, climate change and human-related disturbances. We assess the adequacy of the current reserve network in protecting European freshwater ecosystems and provide guidelines for expansion. We conducted 13 prioritization scenarios for 18,300 sub-basins across Europe, accounting for the distribution of 1,668 freshwater species [including 131 odonate species]. Connectivity properties, metrics of climatic stability and human induced pressures were incorporated into the spatial prioritization framework. We highlight the critical importance of specific regions in Central and Southern Europe, the Mediterranean Basin, and parts of the Balkan Peninsula for future freshwater conservation efforts. However, our analysis also reveals the complete inadequacy of the current reserve network, as protected sub-basins only cover 4 % of the study area and encompass on average only 3 % of freshwater species distributions. In contrast, expanding current reserves to cover the top 17 % of high priority areas across Europe could substantially improve the overall coverage of species distributions, reaching an average of 61.5 % for all freshwater species and even exceeding 93.1 % for species of conservation interest (critically endangered, endangered and vulnerable species). The priority freshwater conservation network derived from the analysis provides specific spatial recommendations to help achieve conservation goals if the current reserve network is appropriately expanded." (Authors)] Address: Tsavdaridou, A.I., Dept of Ecology, School of Biology, Aristotle University of Thessaloniki, 54636 Thessaloniki, Greece. Email: atsavda@bio.auth.gr

**22572.** Vale, A.L.; Francisco de Ávila Jr., W.; Jacques, G.; Magalhães de Souza, M.; Pinto, A.P. (2023): Check-list of

the Odonata from the Sempre-Vivas National Park in the Cerrado region, Minas Gerais, south-eastern Brazil. *Odonatologica* 52(3-4): 233-246. (in English) ["This study is the first check-list of Odonata from the Sempre-Vivas National Park, a rocky field formation in the Cerrado domain in the north-eastern region of Minas Gerais, south-eastern Brazil. The sampling was carried out from 2018 to 2019, totalling 20 days of sampling effort and yielding almost 700 specimens collected. A rich community of 79 species from 10 families was recorded. Three sampled species are red-listed by IUCN and one at national level. These are most likely accorded threatened status due to lack of knowledge on their populations, insufficient collecting efforts, and the failure of published data from existing natural history collections." (Authors)] Address: Vale, Ana Luiza, Universidade do Extremo Sul Catarinense, Criciúma, SC, Brazil. Email: ana-luiza.ribeirovale@gmail.com

**22573.** van Hoof, B.A.; Cabana, M. (2023): Expansion of the known distribution of *Brachytron pratense* (Müller, 1764) (Odonata: Aeshnidae) in Cantabria (northern Spain). *Boletín de la Sociedad Entomológica Aragonesa* 72: 185-187. (in Spanish, with English summary) ["New records of *B. pratense* in the province of Cantabria, northern Spain, are provided. These observations contribute to expanding the known distribution within the autonomous community, with the addition two UTM 10x10 km grid squares." (Authors) 03/05/2021, a male, Mirador de las Dunas of the Parque Natural de las Dunas de Liencres (Piélagos – 30TVP2211). 06/05/2022, 30/03/2023 and 09/04/2023, La Cantera de Solvay in Cuchía (Miengo – 30TVP1709).] Address: van Hoof, B.A., Bo. Casar 253, Bloq. 2, 2A, Casar de Periedo (Cantabria), Spain. Email: bartavanhooft@gmail.com

**22574.** van Oppen, Y.B.; Milder-Mulderij, G.; Brochard, C.; Wiggers, R.; de Vries, S.; Krijnen, W.P. (2023): Modeling dragonfly population data with a Bayesian bivariate geometric mixed-effects model. *Journal of Applied Statistics* 50(10): 2171-2193. (in English) ["We develop a generalized linear mixed model (GLMM) for bivariate count responses for statistically analyzing dragonfly population [*Aeshna viridis*] data from the Northern Netherlands. The populations of the threatened dragonfly species *A. viridis* were counted in the years 2015–2018 at 17 different locations (ponds and ditches). Two different widely applied population size measures were used to quantify the population sizes, namely the number of found exoskeletons ('exuviae') and the number of spotted egg-laying females were counted. Since both measures (responses) led to many zero counts but also feature very large counts, our GLMM model builds on a zero-inflated bivariate geometric (ZIBGe) distribution, for which we show that it can be easily parameterized in terms of a correlation parameter and its two marginal medians. We model the medians with linear combinations of fixed (environmental covariates) and random (location-specific intercepts) effects. Modeling the medians yields a decreased sensitivity to overly large counts; in particular, in light of growing marginal zero inflation rates. Because of the relatively small sample size ( $n = 114$ ) we follow a Bayesian modeling approach and use Metropolis-Hastings Markov Chain Monte Carlo (MCMC) simulations for generating posterior samples." (Authors)] Address: van Oppen, Y.B., Groningen Biomolecular Sciences and Biotechnology Institute, Groningen University, Groningen Netherlands. Email: y.b.van.oppen@rug.nl

**22575.** van Schalkwyk, J.; Kietzka, G.J.; Pryke, J.S.; Gaigher, R.; Samways, M.J. (2023): Enhancing semi-aquatic species representativeness beyond protected areas: dragonflies



in networks of conservation corridors. *Biodiversity and Conservation* 32: 3991-4005. (in English) ["Complementarity is crucial when prioritizing sites for biodiversity conservation. Networks of conservation corridors (CCs) can contribute to regional representativeness by complementing biodiversity features included in existing protected areas (PAs). We ask whether criteria important for CC management and design are effective at prioritizing complementary sites, and how the consideration of species represented in PAs influence criteria performance. We focused on species turnover of generalist and specialist dragonflies across 88 riverine sites. Criteria assessed included site-level estimates of dragonfly species richness, estimates of local habitat quality and corridor width. Measures of local habitat quality were based on either dragonfly indicator species or proportion of alien vegetation. Results showed that CCs complement dragonfly diversity in PAs by contributing unrepresented generalist species. Of the criteria, corridor width was the most efficient at prioritizing complementary sites, while prioritization based on dragonfly indicator species or species richness underperformed. When aiming to prioritize CC sites that also complement sites situated in established PAs, wide corridors with low levels of alien vegetation should be favoured.] Address: van Schalkwyk, Julia, Dept of Conservation Ecology & Entomology, Stellenbosch University, Private Bag X1, Matieland 7602, South Africa. Email: juliavanschalkwyk.3.14@gmail.com

**22576.** van Staveren, D.; Vergeer, P.; Meertens, H.; Huperichs, L.; van den Berg, L. (2023): Habitat restoration at the Kasteelhoeve Cartils Estate. *Natuurhistorisch Maandblad* 112(7): 181-187. (in Dutch, with English summary) ["The 'Kasteelhoeve Cartils' estate is located in the Eyserbeek valley, near the mouth of the Eyserbeek brook, between Eys and Gulpen in the south of the Dutch province of Limburg. The estate extends from a higher slope of the Ubachsberg Plateau (i.e. the Biesberg hill) to the low-lying village of Cartils. In 2010, the landowner of 'Kasteelhoeve Cartils' decided to transform large parts of the land into nature areas or manage them by means of an agri-environmental management approach. Since then, habitats have been restored on a large scale. The restoration efforts were explicitly aimed at restoring various types of habitat and the natural and unique gradients from dry to wet and from calcareous to acidic. By now, 14 of the 33 hectares have been transformed into a nature reserve because of their high potential for the development of calcareous grassland, mesotrophic flower-rich grasslands and calcareous marsh. The coming years will be marked by further development through appropriate management of the restored landscape. Eventually, the ecosystem approach to restoration that is being used will, in combination with effective management, create another jewel in the landscape of southern Limburg, in which the entire abiotic gradient from the edge of the plateau to the valley of the river Geul will be reflected in a unique, characteristic semi-natural vegetation." (Authors) The paper includes a reference to *Orthetrum brunneum* colonising newly developed habitats.] Address: van Staveren, D., Bosgroep Zuid Nederland, Huisvenseweg 14, 5591 VD Heeze, The Netherlands. Email: d.vanstaveren@bosgroept Zuid.nl

**22577.** van't Hof, A.E.; Fincke, O.M. (2023): Novel hatching cue in the neotropical damselfly *Megaloprepus caerulatus*: larval adaptation and maternal constraint. *International Journal of Odonatology* 26: 153-163. (in English) ["The evolution of sibling cannibalism as a maternal strategy is particularly challenging to explain when nurseries are shared among multiple females. Such is the case for *Megaloprepus caerulatus*,

whose females lay eggs in bark above the water line in large, water-filled tree holes. Asynchronous egg hatching appears to be a maternal bet-hedging strategy to increase the chances that cannibalistic offspring hatch during windows of opportunity, which occur after the remaining large larvae emerge, having eaten all others. We investigated the proximate causes of asynchronous hatching. By monitoring the pattern of egg hatching under ambient temperature in an insectary, we found that egg hatching co-occurred with lower ambient temperatures, which decreased with increasing rainfall. Treating fully developed eggs to a lower temperature for two hours triggered increased hatching relative to controls at ambient temperature. Dissection of control clutches indicated that embryonic development of siblings was asynchronous. Results suggested that the hatching trigger is adaptive. Rainfall assures a recharge of the larval habitat with water and provides wet conditions essential for neonate mobility on bark. Only 40% of neonates in a 4-day drying treatment survived; none survived the 8- and 14-day treatments. This novel hatching trigger should increase the number of neonates entering the nursery after rains, constraining a mother's control over the timing of egg hatch, while increasing the competition among related and unrelated offspring for limited windows of opportunity in the shared nursery." (Authors)] Address: Fincke, O., Dept of Biology, University of Oklahoma, Norman OK, USA. Email: fincke@ou.edu

**22578.** Vejříková, I.; Vejřík, L.; Cech, M.; Blabolil, P.; Peterka, J. (2023): Variable diet plasticity in Eurasian perch (*Perca fluviatilis*): Current versus seasonal food uptake. *Ecology of Freshwater Fish* 32: 795-803. (in English) ["Diet plasticity is often studied in Eurasian perch (*Perca fluviatilis*), a species commonly described as having generalist populations composed of specialised individuals. Perch diet was examined using gut content analysis (GCA) and stable isotope analysis (SIA), and individual specialisation was calculated in two study lakes within 2 years. Mostly only one diet category was present in the perch stomach, with more variation in the diet in the Most lake compared to the Milada lake between 2013 and 2014. The calculated degree of individual specialisation indicated higher specialisation in the Most lake. Interestingly, despite the different or almost uniform diet composition between the years, the total niche width (based on SIA) of the population remained similar in both lakes. This suggests that the overall variation in the sources utilised by the entire population remained consistent between the years. GCA mostly indicated zooplankton as the prevailing food source, whereas SIA indicated significant utilisation of YOY fish earlier that year, an information that was completely missed by the GCA of fish caught in September. The differences between GCA and SIA results could be attributed to the different time intervals reflected by the methods, but possibly to the conversion of the diet into the body tissues that is reflected by SIA and may depend on the diet's nutritional values rather than the proportion of different prey consumed." (Authors) No details on Odonata are given.] Address: Vejříková, I., Biology Centre of the Czech Academy of Sciences, Institute of Hydrobiology, České Budejovice, Czech Republic

**22579.** Viella, D.S.; Lencioni, F.A.A.; Bota-Sierra, C.A.B.; Ware, J.A.; Bispo, P.C. (2023): Taxonomic revision of the Neotropical genus *Heteragrion* Selys, 1862 (Zygoptera: Heteragrionidae): male morphology, new species and illustrated key. *Zootaxa* 5356(1): 1-96. (in English, with Portuguese summary) ["In this study, we have comprehensively presented taxonomic information on all 62 known species of *Heteragrion* Selys, 1862, which includes illustrations, photographs, diagnostic characters, and a key to males. Our analysis is based

on the examination of over 900 specimens from 19 different collections worldwide, encompassing the type material for at least 42 species. Furthermore, we have described a new species, *Heteragrion corderoi* sp. nov. (male, Brazil, São Paulo state, Campos do Jordão, Condomínio Paradise, 24.i.1999, (Coordinates: -22.7072, -45.5894, 1796 m asl), F.A.A. Lencioni leg., LABECO), which we identified from a male that was previously considered to be a paratype of *H. mantiqueirae* Machado, 2006 and additional specimens collected in Campos do Jordão, São Paulo state." (Authors)] Address: Viella, D.S., Lab. de Biologia Aquática, Depto de Ciências Biológicas, Fac. de Ciências e Letras de Assis, Univ. Estadual Paulista, Assis, SP, Brazil. Email: deeogoo@gmail.com

**22580.** Vilela, D.S.; Jacques, G.; Magalhaes de Souza, M. (2023): A new species of *Minagrion* Santos, 1965 (Odonata: Coenagrionidae) from the Cerrado of Northern Minas Gerais state, Brazil. *Zootaxa* 5374(2): 255-262. (in English, with Portuguese summary) ["*Minagrion veredae* sp. nov. (Holotype male, Brazil (Z329), Minas Gerais state, Grande Sertão Veredas National Park, 15.iv.2023, (15°6' S, 45°48' W, 660 to 900m asl), P.S. Vital leg.) is described, illustrated and diagnosed based on specimens collected at the Grande Sertão Veredas National Park. The new species inhabits palm swamp environments, Cerrado domain phytophysiognomy, as it is typical of other species of the genus. It can be diagnosed from its congeners mainly by the forcipate shape and large teeth of the cercus and the lanceolate shape of segment two of the genital ligula." (Authors)] Address: Vilela, D.S., Univ. Estadual Paulista, Depto de Ciências Biológicas, Faculdade de Ciências e Letras de Assis, Laboratório de Biologia Aquática, Assis, SP, Brazil. Email: diogo.vilela@ifsuldeminas.edu.br

**22581.** Vilela, D.S.; Reis dos Santos, M.; Heldt Junior, R.; Monteiro, R.T.; Pereira de Gouvêa, T.; de Souza, M.M. (2023): Odonata (Insecta) in high-altitude fields and associated ecosystems in the Poços de Caldas Plateau, Brazil. *Revista Chilena De Entomología* 49(4): 843- 860. (English, with Spanish summary) ["The High Altitude Fields (HAF) are unique phytosociological features that occur only in certain regions of the Atlantic Forest. It is composed of herbaceous and shrubby vegetation and shallow soils that promote local water infiltration and recharge. Occurring on top of hills, the HAF are isolated units in the landscape, connecting with the matrix through associated ecosystems (springs with riparian forests and "capões de mata", which are natural islands of arboreal vegetation, commonly associated with rural vegetation, such as high-altitude fields, located above 1,200 m in phytogeographic domains of the Atlantic Forest, Cerrado or Caatinga). These areas have great species endemism, and studies concerning the order Odonata are still scarce. Thus, we aimed to evaluate the ecological responses (richness, diversity, specificity) of adult odonates in these ecosystems. The study was conducted from November 2020 to March 2021 in three areas in the Poços de Caldas Plateau, Minas Gerais state, Brazil. A total of 45 species (247 specimens) were collected, with the highest total richness being recorded for Anisoptera. Among the sampled areas, there was no difference in Anisoptera communities, but there was a difference in Zygoptera species composition. In general, the most preserved remnant of HAF, the greater it presents greater richness of Odonata and harbors a regional pool of species." (Authors)] Address: Vilela, D.S., Laboratório de Zoologia, Instituto Federal de Educação Ciência e Tecnologia do Sul de Minas Gerais – IFSULDEMINAS – Inconfidentes, Brazil. Email: diogo.vilela@ifsuldeminas.edu.br

**22582.** Viza, A.; Garcia-Raventós, A.; Riera, J.L.; Maynou,

X.; Martín, R.; Prunier, F.; El Haissoufi, M.; Múrria, C. (2023): Species-specific functional traits rather than phylogenetic relatedness better predict future range-shift responses of odonates. *Insect Conservation and Diversity* 16(5): 574-587. (in English) ["Climate change has the potential to modify habitat characteristics and, consequently, induce species responses to ongoing environmental changes. Functional traits determine both if a species can persist and maintain stable population sizes in particular ecological conditions, and its capacity to disperse to more favourable habitats. Given that functional traits evolve over time, one could expect closely related species to show similar responses to climate change, which should identify vulnerable lineages. Alternatively, species-specific functional traits may anticipate species responses to climate change, and therefore, trait composition should be a strong predictor. We compiled a comprehensive dataset of functional traits of 84 Iberian and Moroccan odonates species and built a phylogenetic tree to determine if dissimilarity of traits and phylogenetic relatedness are relevant to better discriminate species range-shift responses to climate change. Modelling results for 66 species showed clear impacts of the increase in temperature and drought events on their potential distribution. The traits that best-discriminated species that expanded their ranges were multivoltinism, short-life cycles and preference for temporary habitats, whereas species with a reduced and displaced potential distribution were mostly semivoltine, with a short flying season, oviposition on gravel and restricted to permanent streams, small rivers or oligotrophic lakes. Trait conservatism was rejected and phylogenetic relatedness was a poor predictor of range shifts. Considering odonates as model organisms, traits such as voltinism, beginning and prolongation of flight period and preference of temporal habitats should be examined to anticipate range-shift responses of freshwater insects to climate change." (Authors)] Address: Viza, Aida, Dept de Biologia Evolutiva, Ecologia i Ciències Ambientals, Facultat de Biologia, Universitat de Barcelona, Avinguda Diagonal 643, 08028 Barcelona, Catalonia, Spain. Email: aida.viza@ub.edu

**22583.** Waldhauserová, I.; Waldhauser, M. (2023): Entomological research of damselflies and dragonflies (Odonata) and water beetles (Coleoptera) on selected localities in the CSA and Vršany surface mines (northwestern Bohemia). *Príroda, Praha* 45: 33-54. (in Czech Republic, faunistics, northwestern Bohemia, Odonata, Coleoptera, surface mine.) ["In 2021, a basic entomological survey of 26 selected sites in the area of the surface quarries of CSA and Vrsany in northwestern Bohemia was carried out. A total of 38 Odonata species and 65 aquatic beetle species were recorded, of which 8 Odonata species and 7 aquatic beetle species are included in the Red List of Threatened Species of the Czech Republic." (Authors)] Address: Waldhauser, M., Petrovice 136, 47125 Jablonné v Podještědí; waldhauser.martin@gmail.com

**22584.** Walia, G.K.; Dhillon, G.K. (2023): Phylogenetic analysis of *Aciagrion* Selys (Odonata: Coenagrionidae). *Journal of Natural History* 57(37-40): 1610-1628. (in English) ["Odonates are useful biological indicators of environmental health because of their pollution-free habitat requirements and amphibiotic life cycle. Due to habitat destruction by industrial development, there is a need to name these odonates and obtain their genetic data to be used in understanding their evolutionary history for biodiversity conservation. *Aciagrion* is a poorly known and taxonomically difficult genus of oriental damselflies. Species of this genus cannot be distinguished on the basis of morphological characters alone as they are morphologically similar to the damselflies of other genera (*Ischnura* and *Amphialagma*) and may also be referred to

as cryptic species. Here, therefore, molecular studies are carried out to distinguish the species of this genus. The phylogenetic relationships of five species of genus *Aciagrion* have been explored using molecular (based on concatenated sequences of mitochondrial genes- COI, ND1 and 16S rRNA genes) as well as external morphological characters. Single-linkage cluster analysis of morphological data sets did not explain the relationships appropriately among the species of this genus as outgroup species were also retrieved within in-group species. Interspecific genetic divergence, conserved, variable, parsimony-informative sites, nucleotide base composition and transition/transversion bias based on concatenated gene sequences have been calculated for these species. It is found that a multigene concatenation approach interprets phylogeny more appropriately than the morphological data alone. Presently, a COI gene fragment sequence for one species (the endemic *Aciagrion hisopa*), 16S rRNA gene fragments for four species and ND1 gene fragments for five species have been submitted for the first time to GenBank, and phylogenetic relationships based on three genes have also been determined for the first time. *Aciagrion migratum* is a new record from India." (Authors) *Aciagrion approximans*, *A. hisopa*, *A. migratum*, *A. occidentale*, *A. pallidum*, *Amphialagma parvum*, *Ischnura forcipata*] Address: Walia, Gurinder, Dept of Zoology & Environmental Sciences, Punjabi Univ., Patiala, India. Email: gurinderkaur\_walia@yahoo.co.in

**22585.** Wang, H.; Wang, L.; Liao, J.; Han, B.-P. (2023): The complete mitochondrial genome of *Chlorogomphus shanicus* Wilson, 2002 (Anisoptera: Chlorogomphidae), an endemic species in South China. *Mitochondrial DNA Part B*, 8:11: 1192-1195. (in English) ["In this study, the complete mitochondrial genome of *C. shanicus* was reported, and the maximum-likelihood (ML) phylogenetic tree was constructed using 13 protein-coding genes (PCGs). The total length of the mitogenome of *C. shanicus* was 15,497 bp. Twelve PCGs started with ATN codons, except *cox1* began with TTG codon. Most transfer RNA genes (tRNAs) were predicted to fold in a typical cloverleaf structure, except the *trnS1* (*gct*), which lacked a dihydrouridine arm that had been simplified to a loop. The phylogenetic tree showed that Anisoptera was split into two clades, and revealed that *C. shanicus* was closely related to *Cordulegaster boltonii* (Donovan, 1807) which is endemic to Europe." (Authors)] Address: Han, B.-P., Dept of Ecology and Institute of Hydrobiology, Jinan University, Guangzhou, China. Email: tbphan@jnu.edu.cn

**22586.** Ware, J.L.; Abbott, J.C. (2023): In memoriam Michael Love May (1946 – 2023). *Odonatologica* 52(3/4): 173-180. (in English) ["Michael May was an odonatologist and entomologist with a long career working on thermoregulation, behaviour, and systematics. Here we share a brief outline of Mike's scientific career, a selected bibliography of his publications and warm reflections on his long, full life." (Authors)] Address: Ware, Jessica, Division of Invertebrate Zoology, American Museum of Natural History, 200 Central Park West, New York NY, 10024, USA. Email: jware@amnh.org

**22587.** Weihrauch, F. (2023): In memoriam Richard James Rowe (1948 – 2023). *Odonatologica* 52(3/4): 181-191. (in English) ["Personal recollections of Richard Rowe, a brief outline of his life and his scientific career, and his complete odonatalogical bibliography are presented." (Author)] Address: Weihrauch, F., Jägerstraße 21A, 85283 Wolnzach, Germany. Email: mail@osmylus.com

**22588.** Willacker, J.J.; Eagles-Smith, C.A.; Nelson, S.J.; Flanagan Pritz, C.A.; Krabbenhoft, D.P. (2023): The influence

of short-term temporal variability on the efficacy of dragonfly larvae as mercury biosentinels. *Science of The Total Environment* 867, 161469: 9pp. (in English) ["Highlights: • Spatial variation in Hg exceeded temporal variability. • Temporal patterns in Hg differed among sites in the same region. • %MeHg is consistent over time. • Relationship between abiotic and biotic Hg varies over time. Abstract: Mercury (Hg) exposure to fish, wildlife, and humans is widespread and of global concern, thus stimulating efforts to reduce emissions. Because the relationships between rates of inorganic Hg loading, methylmercury (MeHg) production, and bioaccumulation are extremely complex and challenging to predict, there is a need for reliable biosentinels to understand the distribution of Hg in the environment and monitor the effectiveness of reduction efforts. However, it is important to assess how temporal and spatial variation at multiple scales influences the efficacy of specific biosentinels. Seasonal and interannual variation in total Hg (THg) concentrations of dragonfly larvae were examined in relation to spatial variability among 21 sites in two U.S. national parks with contrasting ecologies Hg deposition patterns. Dragonfly THg differed among sampling events at 17 of the 21 sites, but by an average of only 20.4% across events, compared to an average difference of 52.7% among sites. Further, THg concentrations did not follow consistent seasonal patterns across sites or years, suggesting that the observed temporal variation was unlikely to bias monitoring efforts. Importantly, for a specific site, there was no difference in %MeHg in dragonflies among sampling events. Finally, there was significant temporal variability in the biogeochemical factors (aqueous inorganic Hg, aqueous MeHg, DOC, SO<sub>4</sub>, and pH) influencing dragonfly THg, with the importance of individual factors varying by 2.4 to 4.3-fold across sampling events. Despite these results, it is noteworthy that the observed temporal variation in dragonfly THg concentrations was neither large nor consistent enough to bias spatial assessments. Thus, although this temporal variation may provide insights into the processes influencing biological Hg concentrations, it is unlikely to impair the use of dragonflies as biosentinels for monitoring spatial or temporal patterns at scales relevant to most mitigation efforts." (Authors)] Address: Willacker, J.J., U.S. Geological Survey, Forest & Rangeland Ecosystem Science Center, 3200 SW Jefferson Way, Corvallis, OR 97331, USA. Email: jwillacker@usgs.gov

**22589.** Willink, B.; Tunström, K.; Nilén, S.; Chikhi, R.; Lemane, T.; Takahashi, M.; Takahashi, Y.; Svensson, E.I.; West Wheat, C. (2023): The genomics and evolution of inter-sexual mimicry and female-limited polymorphisms in damselflies. *Nature Ecology & Evolution*: 15 pp, suppl. (in English) ["Sex-limited morphs can provide profound insights into the evolution and genomic architecture of complex phenotypes. Inter-sexual mimicry is one particular type of sex-limited polymorphism in which a novel morph resembles the opposite sex. While inter-sexual mimics are known in both sexes and a diverse range of animals, their evolutionary origin is poorly understood. Here, we investigated the genomic basis of female-limited morphs and male mimicry in *Ischnura elegans*. Differential gene expression between morphs has been documented in damselflies, but no causal locus has been previously identified. We found that male mimicry originated in an ancestrally sexually dimorphic lineage in association with multiple structural changes, probably driven by transposable element activity. These changes resulted in ~900 kb of novel genomic content that is partly shared by male mimics in a close relative, indicating that male mimicry is a trans-species polymorphism. More recently, a third morph originated following the translocation of part of the male-mimicry sequence into a genomic position ~3.5 mb apart. We provide

evidence of balancing selection maintaining male mimicry, in line with previous field population studies. Our results underscore how structural variants affecting a handful of potentially regulatory genes and morph-specific genes can give rise to novel and complex phenotypic polymorphisms." (Authors)] Address: Willink, Beatriz, Department of Zoology, Stockholm University, Stockholm, Sweden. Email: beatriz.willink@zoologi.su.se

**22590.** Worthen, W.B.; Harrell, M.D. (2023): Differences in perch height and response to intruders for territorial and non-territorial *Calopteryx maculata* (Odonata: Calopterygidae). *International Journal of Odonatology* 26: 145-152. (in English) ["In *C. maculata*, territorial males court potential mates and guard ovipositing females near the surface of the water. We conducted a survey and an experiment to determine whether there was a relationship between territoriality (site fidelity and agonistic behavior) and perch height. In the survey, males were captured, numbered, and released, and their perch height and location along a stream was noted for two weeks. Mean perch height was positively correlated with total distance travelled and negatively correlated with the number and percentage of times observed at the same site. Males that travelled less than 4 m had a significantly lower mean perch height than males that travelled more than 4 m. We conclude that males with greater site fidelity perch lower than males that travel widely. To test for a relationship between agonistic behavior and perch height, live male and female decoys, and a stick control, were run along a 20 m zip-line at two heights (25 cm and 75 cm), and the responses of resident males were recorded. Resident males that perched low (< 1 m high) approached decoys more often than resident males that perched high, and low-flying decoys were approached more than high-flying decoys. We conclude that territorial males—identified by greater site fidelity and agonistic behavior—perch lower than other males and are particularly responsive to low flying intruders. The benefits and costs of perching low and responding to low-flying intruders are discussed." (Authors)] Address: Worthen, W.B., Biology Dept, Furman University, Greenville, SC, 29613, USA

**22591.** Yalles Satha, A.; Aissaoui, N.; Kaour, D.; Benmars, B. (2023): Contribution à l'étude des odonates et macroinvertébrés des mares de la Moyenne et Haute Seybouse. publisher Université Frères Mentouri Constantine 1: 142 pp. (in French) ["We carried out an inventory of benthic macroinvertebrates and Odonata in six perennial ponds located in two sub-watersheds of the Middle and Upper Seybouse, located in the wilaya of Guelma. The climate of the region is Mediterranean type belonging to the semi-arid bioclimatic stage. The study period extended over four months from February until the end of May 2022. Field trips were carried out monthly making sure to respect the time allotted at each station. Using a landing net, all the microhabitats were carefully surveyed. The analysis of macroinvertebrate populations made it possible to identify 1010 individuals divided into eight classes: Insects with the main orders (Ephemeroptera, Diptera, Hemiptera, Coleoptera, Odonata, Crustaceans and Molluscs and Annelids). Furthermore, the Odonatological inventory of these ponds, allowed us to identify 187 individuals, including (6) Anisoptera and (10) Zygoptera, ...." (Authors) *Anax imperator*, *Coenagrion scitulum*, *C. mercuriale*, *Ceragrion tenellum*, *Crocothemis erythraea*, *Erythromma lindenii*, *E. viridulum*, *Ischnura graellsii*, *I. pumilio*, *Lestes viridis*, *Orthetrum chrysostigma*, *O. nitidinerve*, *Platycnemis subdilata*, *Sympetrum fonscolombii*, *Sympetrum fusca*, and *Trithemis kirbyi*] Address: Yalles Satha, Amina, Université 8 mai 1945 Guelma, Algeria. Email: sihem.yalles@yahoo.fr

**22592.** Yan, H.; Sun, F.; Zhang, Y. (2023): Scientific and technical analysis of lead-barium glaze dragonfly eye beads from the Late Warring States period in China. *Heritage Science* (2023) 11:186: 9 pp. (in English) ["This paper analyzed five dragonfly eye beads excavated from M176 of the Hejia Cemetery in the Late Warring States period (around 3rd c. BC) by using a super depth of field 3D microscope system (OM), scanning electron microscope-energy dispersive spectrum (SEM-EDS) and Raman spectroscopy. The analytical results confirmed that all the beads were glazed pottery and the glaze material belongs to the lead-barium-silicate (PbO-BaO-SiO<sub>2</sub>) system. The color component of the glaze is Chinese Blue (BaCuSi<sub>4</sub>O<sub>10</sub>). Three beads, M176-2, M176-3, and M176-4, were formed with an inner core support and were made in the same batch. Additionally, two weathering products, CuPb<sub>4</sub>(SO<sub>4</sub>)<sub>2</sub>(OH)<sub>6</sub> and PbCO<sub>3</sub>, were detected on the glaze layer surface. The results of scientific and technological analysis show that these beads have differences in the composition of the body and glaze, and the color composition in the glaze layer is relatively rare in previous studies. The discovery of lead-barium glazed pottery beads from the Late Warring States period in northern China provides new evidence for further exploration into the origins and evolution of early glazed pottery. The identification of weathering products formed on the beads' surface within an alkaline burial environment holds valuable implications for the study of weathering and deterioration in silicate artifacts. .... Dragonfly eye beads are a type of bead imitating the structure of a dragonfly's compound eye by inlaying different colored-glass onto the base [1, 2]. It first appeared in ancient Egypt during the 18th dynasty (1550–1307 BC) [3], then became widely popular on the Mediterranean coast and the Iranian plateau [4, 5], and came into China through trade at a later time. However, the exact route of transmission has not been found clearly. Many different shapes of dragonfly eye beads have been excavated from various sites in China. ...." (Authors)] Address: Sun, F., China-Central Asia "the Belt and Road" Joint Laboratory on Human & Environment Research, Key Laboratory of Cultural Heritage Research & Conservation, School of Cultural Heritage, Northwest University, Xi'an 710127, China. Email: sunfeng@nwu.edu.cn

**22593.** Yang, G.-H.; Zi, D.-D. (2023): Descriptions of the last instar larvae of *Anotogaster chaoi* Zhou, 1998 and *Neallogaster annandalei* (Fraser, 1923) from Erhai Lake Basin, Yunnan, China (Odonata: Cordulegastrids). *Zootaxa* 5357(3): 423-433. (in English) ["The exuviae of *A. chaoi* and *N. annandalei* are described and illustrated for the first time from Erhai Lake Basin, Yunnan Province, China, based on the final stage larvae reared in a laboratory. Diagnostic differences between the larvae of congeneric *A. chaoi*, *A. gregoryi* Fraser, 1923, as well as *N. annandalei* and *N. hermionae* (Fraser, 1927) are discussed, and notes on their habitats are provided." (Authors)] Address: Zi, D.-D., College of Agriculture and Life Sciences; Dali University; Yunnan 671003; China Cangshan Forest Ecosystem Observation & Research Station of Yunnan Province; Dali University Yunnan 671003; China

**22594.** Yang, N.; Ren, D.; Béthoux, O. (2023): Little bits of dragonfly history repeating exemplified by a new Pennsylvanian family. *Royal Society Open Science* 10: 230904. <https://doi.org/10.1098/rsos.230904>: 13 pp. (in English) ["During its 320 Myr evolution, Odonata wing morphology underwent intense modifications. The resulting diversity prompted comparative analyses focusing on phylogeny. However, homoplasy proved to plague wing-related characters. Concurrently, limited benefits were obtained from considering fossil taxa, similarly impacted. Herein, we investigate two aspects



particularly affected by convergence, namely the acquisition of vein-like structuring elements derived from regular cross-venation, termed conamina; and the evolution of butter knife wing shape. Conamen implementation is found to be consistently linked with vein curvature sharpening, itself generating potential breaking points. Conamina therefore likely evolved to address wing integrity issues during ever-more-demanding flight performance. Moreover, an existing conamen is likely to trigger the acquisition of further, associated conamina. As for butter knife shape, previously documented in the extinct Archizyoptera and among damselflies, we report a new, 315 Ma occurrence with the rare species *Haidilaozhen cuiiae* gen. et sp. nov. (family Haidilaozhenidae fam. nov.), from the Xiaheyan locality (China). The repeated acquisition of butter knife-shaped wing can be related to slow speed flight and, in turn, predator avoidance. In both cases of iterated regularities, the unique 'network-and-membrane' wing design proper to insects is found to compose a strong, constraining factor." (Authors)] Address: Ren, D., College of Life Sciences, Capital Normal University, 105 Xisanhuanbeilu, Haidian District, Beijing 100048, People's Republic of China. Email: rendong@mail.cnu.edu.cn

**22595.** Yang, Q.; Ren, D.; Shi, C. (2023): New petalurid dragonfly (Odonata: Aktassiidae) from the Lower Cretaceous of northern China. *Cretaceous Research* 151, 105609. (in English) ["A new species *Pseudocymatophlebia bisecta* sp. nov. (Odonata: Aktassiidae) is described from the Lower Cretaceous of China. It is assigned to this family by the typical very dense wing venation with a distinctly increased number of cells in the regions of R and M, the area between RP3/4 and MA widened near the posterior wing margin on forewing, with more than three rows of cells; RP3/4 undulate and distally diverging from MA. *Pseudocymatophlebia bisecta* sp. nov. differs from the other two species of this genus by discoidal triangle two-celled, elongate and wide in both fore- and hind wings. In addition, a revision of the genus *Pseudocymatophlebia* has been proposed." (Authors)] Address: Shi, C., School of Earth Sciences & Engineering, Guangdong Provincial Key Lab of Geological Processes & Mineral Resources, Sun Yat-sen University, Guangzhou 510275, PR China. Email: shichf5@mail.sysu.edu.cn

**22596.** Yeh, W.-C. (2023): An amendment on the record of *Rhyothemis fuliginosa* Selys, 1883 in Taiwan — a newly discovered gynomorphic wing pattern in female *R. regia* (Brauer, 1867). *Taiwanese Journal of Entomological Studies* 8(1): 21-28. (in English) ["The identity of Taiwanese *R. fuliginosa* is clarified to be the gynomorphic female of *R. regia* (Brauer, 1867). Female Taiwanese *R. r. regia* differ from female *R. fuliginosa* mainly in having paler face with weak metallic lustre, anteriorly more strongly incurved postclypeus and stouter cerci. The reported wing patterns of various subspecies of *R. regia* are compiled from the literature for comparison. A transitional variation of the female wing pattern of Taiwanese *R. r. regia* varying from andromorphic to gynomorphic is illustrated. The case of range expansion caused by climatic warming in *R. r. regia* and other libellulid dragonflies in Taiwan is elucidated." (Author)] Address: Yeh, W.-C., Division of Forest Protection, Taiwan Forestry Research Institute (TFRI), No. 53, Nanhai Rd., Zhongzheng Dist., Taipei, 100051, Taiwan. Email: wcyeh@tfri.gov.tw

**22597.** Zeng, Z.; Chen, X.-Y.; Yu, X. (2023): Stability of diagnostic morphological characters in *Ceriagrion* larvae (Odonata: Zygoptera). *Acta Hydrobiologica Sinica* 47(10): 1659-1668. (in Chinese, with English summary) ["Although dragonfly larvae can be good bioindicators in fresh water environment

assessments, their identification based on morphological characteristics is still a tough work, especially at species level. In the present study, 116 larvae of two Chinese widespread damselfly, *Ceriagrion fallax* Ris and *Ceriagrion auranticum* Fraser, were identified depending on sequence data of the mitochondrial genes Cytochrome Oxidase I (COI) and nuclear ribosomal genes ITS. The stability of two important morphological characters, caudal gills and mandibles, was discussed. For molecular analysis, LCO1490d (TTTCTAC-WAACCAYAAAGATATTGG) and HCO2198d (TAACTTC-WGGRTGTCC AAARAATCA) were used as COI primers, and Vrain2F (CTTTGTACACACCGCCCGTCGCT) and Vrain2R (TTTCACTCGCCGTTACTAAGGGAATC) as ITS primers. The reaction systems were 31.0  $\mu$ L: DNA template 3.0  $\mu$ L, upstream and downstream primers 2.0  $\mu$ L each, Mix 15.0  $\mu$ L (Jiangsu ComWin Biotech Co., Ltd's 2xEs Taq Master Mix), ddH<sub>2</sub>O 9.0  $\mu$ L. Take 5.0  $\mu$ L PCR amplification products and detect them by electrophoresis using 1.5% agarose gel. The amplification products with detected by electrophoresis, and then sent to Chongqing Tsingke Xingye Biotechnology Co to sequence. Neighbor-Joining (NJ) trees and genetic distance method were using for the molecular identification of larvae, with the help of identified adults' sequences as conference. Relative large size of larval specimens, *C. fallax* (n=110) and *C. auranticum* (n=6), were dissected and photographed using LY-WN-OPLENC ultra-clear microphotographic system. Detailed comparative morphological examination was conducted focusing on two typical morphological features, caudal gill and mandibles. Our result showed that: (1) the presence or absence, numbers, and color of the black spots on the caudal gill were unstable, which have nothing to do with populations and sex; (2) characters of mandibles were also variable even within the same population. The discovery of the instability of the two typical diagnostic morphological characters indicates that characters of caudal gills and mandibles, at least, in these two species should be used with caution latterly in taxonomy. Our result also suggests that the similar instability may exist in other diagnostic morphological characteristics in other odonate species. The idea and methodology of this study can be instructive to future morphological studies on insect taxonomy." (Authors)] Address: Zeng, Z., College of Life Sciences, Chongqing Normal University, Chongqing 401331, China. BE-mail: zengzheng1027@126.com

**22598.** Zhang, H. (2023): Bio-inspired superhydrophobic surface based on hierarchical periodic surface structures of titanium by ultrafast laser. *Proceedings Volume 12793, International Conference on Mechatronics and Intelligent Control (ICMIC 2023); 127931P (2023)* <https://doi.org/10.1117/12.3006756>: 7 pp. (in English) ["Metallic materials are widely used in various industrial scenarios but they often suffer from different issues such as icing, corrosion, and damage, which negatively impact the safety and performance of equipment. Superhydrophobic materials, characterized by an apparent contact angle greater than 150° have been extensively studied as potential solutions to these problems. This paper introduces the basic theory of surface wettability, discusses applications of metallic surfaces and two main strategies for obtaining superhydrophobic surfaces. Inspired by the structure of dragonfly wings, we present an experimental method using a Ti:sapphire ultrafast laser system to fabricate superhydrophobic surfaces on TC4 titanium alloy samples. Scanning electron microscopy (SEM) and energy dispersive spectrometer (EDS) analysis reveal the ultrafast laser pulse can induce micro-scale groove structures and nano-scale laser induced periodic surface structures (LIPSS) on the morphology of titanium and will cause a significant change in the

surface chemistry. The resulting superhydrophobic behavior can be attributed to a combination of surface roughness and low surface energy, which has potential applications in fields such as self-cleaning surfaces, microfluidics, and anti-corrosion coatings." (Author)] Address: not stated

**22599.** Zhang, X.; Zheng, D.; Li, Y.; Song, S.; Zhang, H. (2023): Discovery of *Sinaeschnidia heishankowense* Hong, 1965 (Odonata: Aeschniidae) from the Lower Cretaceous of Baiwan Basin, southwestern Henan, China: biogeographic implications. *Cretaceous Research* 147, July 2023, 105513: (in English) ["The Jehol Biota is the best-preserved Cretaceous terrestrial biota and one of the most important treasures housing exceptionally-preserved fossils in the world. The Jehol Biota *sensus stricto* is found distributed in northern Hebei, western Liaoning and southeastern Inner Mongolia, northeast China, while the Jehol Biota *sensu lato* is distributed in most of East Asia. The three-stage evolution of the Jehol Biota suggests that the biota extended south to the Qinling-Dabie mountains at its second stage, including western and southern Henan. Here the adult dragonfly *Sinaeschnidia heishankowense* Hong, 1965 is reported for the first time from the Baiwan Formation of the Baiwan Basin, Zhenping County, southwestern Henan, China. *S. heishankowense* is one of the representatives of the second stage of the Jehol Biota, previously only recorded in the Lower Cretaceous Yixian Formation in western Liaoning and southeastern Inner Mongolia, and the equivalent strata in China. This finding confirms that the Jehol Biota reached southwestern Henan at its second stage, and that the Baiwan Formation in the Baiwan Basin could be generally correlated with the Yixian Formation in western Liaoning, assigned to a middle Barremian age (Lower Cretaceous) rather than to the Upper Jurassic as previously considered." (Authors)] Address: Zheng, D., State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology & Palaeontology & Center for Excellence in Life & Palaeoenvironment, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing, 210008, China. Email: drzheng@nigpas.ac.cn

**22600.** Zheng, H.; Mofatteh, H.; Habcicsek, M.; Akbarzadeh, A.; Akbarzadeh, M. (2023): Dragonfly-inspired wing design enabled by machine learning and Maxwell's reciprocal diagrams. *Advanced Sciences* 2023, 2207635: 15 pp. (in English) ["This research is taking the first steps toward applying a 2D dragonfly wing skeleton in the design of an airplane wing using artificial intelligence. The work relates the 2D morphology of the structural network of dragonfly veins to a secondary graph that is topologically dual and geometrically perpendicular to the initial network. This secondary network is referred as the reciprocal diagram proposed by Maxwell that can represent the static equilibrium of forces in the initial graph. Surprisingly, the secondary graph shows a direct relationship between the thickness of the structural members of a dragonfly wing and their in-plane static equilibrium of forces that gives the location of the primary and secondary veins in the network. The initial and the reciprocal graph of the wing are used to train an integrated and comprehensive machine-learning model that can generate similar graphs with both primary and secondary veins for a given boundary geometry. The result shows that the proposed algorithm can generate similar vein networks for an arbitrary boundary geometry with no prior topological information or the primary veins' location. The structural performance of the dragonfly wing in nature also motivated the authors to test this research's real-world application for designing the cellular structures for the core of airplane wings as cantilever porous beams. The boundary geometry of various airplane wings

is used as an input for the design procedure. The internal structure is generated using the training model of the dragonfly veins and their reciprocal graphs. One application of this method is experimentally and numerically examined for designing the cellular core, 3D printed by fused deposition modeling, of the airfoil wing; the results suggest up to 25% improvements in the out-of-plane stiffness. The findings demonstrate that the proposed machine-learning-assisted approach can facilitate the generation of multiscale architectural patterns inspired by nature to form lightweight load-bearing elements with superior structural properties." (Authors)] Address: Akbarzadeh, M., Polyhedral Structures Laboratory, Dept of Architecture, Weitzman School of Design, University of Pennsylvania, Philadelphia, PA 19146, USA. E-mail: masouda@design.upenn.edu

## 2024

**22601.** Barrios, M.; Tesitore, G.; Burwood, M.; Suárez, B.; Meerhoff, M.; Alonso, J.; Ríos Touma, B.; Teixeira de Mello, F. (2024): Environmental and aquatic macroinvertebrates metrics respond to the Eucalyptus afforestation gradient in subtropical lowland streams. *Hydrobiologia* 851(2): 343-365. (in English) ["Eucalyptus afforestation may affect stream ecosystems, but the magnitude of these effects on water quality and biota in subtropical lowland streams is little understood. We evaluated the potential effects of Eucalyptus afforestation on water quality and macroinvertebrate assemblage. Water quality parameters and macroinvertebrate assemblages were sampled in summer and winter in 30 streams covering an afforestation gradient (from 0.05 to 96% of the catchment area) and tested their relationship. We analyzed the taxa density distribution in afforestation and water parameters using the Thresholds Indicator Taxa Analyses (TITAN). Nutrient concentrations, conductivity, and total dissolved solids showed positive responses to the increase of afforestation, but the responses varied among seasons. Macroinvertebrate metrics showed negative (Ephemeroptera-Trichoptera-Plecoptera (EPT), sensitive families, scrapers), and positive (Chironominae, Oligochaeta) responses to the afforestation. Densities of sensitive taxa (mostly EPT) decrease with an increase in Eucalyptus afforestation, which is also related to water quality and possibly to habitat changes attributed to afforestation management. The use of water quality parameters in combination with macroinvertebrates assemblage contributes to managing these streams under catchment afforestation." (Authors) Taxa include Odonata, and are treated at family or genus level.] Address: Barrios, M., Depto Ecología y Gestión Ambiental, Centro, Univ. Regional del Este (CURE), Univ. de la República, Entre Bv. Artigas y Aparicio Saravia, Av. Tacuarembó s/n, C.P. 20000, Maldonado, Uruguay

**22602.** Barta, B.; Szabó, A.; Szabó, B.; Ptacnik, R.; Vad, C.F.; Horváth, Z. (2024): How pondscapes function: connectivity matters for biodiversity even across small spatial scales in aquatic metacommunities. *Ecography* 2023: e0696. 12 pp. (in English) ["Habitat loss and fragmentation are growing global threats to natural habitats and their networks, posing significant challenges to biodiversity conservation. Globally, ponds are sharply declining in number because their small size makes them highly vulnerable to land use changes. While it is generally agreed that connectivity in habitat networks is crucial for sustaining biodiversity, the effect of connectivity on biodiversity patterns over small-scaled habitat networks has so far received less attention given the general assumption that metacommunities lack spatial structuring on small scales. In this study, we tested whether this holds for multiple passively and actively dispersing organism groups in a well-

delineated pond metacommunity of 54 bomb crater ponds situated within 1 km. We investigated the influence of space and environment on species richness and metacommunity structure in these ponds, which share similar age, size, and shape and are subject to strong environmental gradients, making it an ideal study system. We specifically examined the impact of network centrality on taxonomic richness and eigenvector-based spatial arrangement on metacommunity structure across different organism groups, including prokaryotes, microeukaryotes, zooplankton, macroinvertebrates, and amphibians. We found that while environmental filtering is the primary driver of community dynamics, there is also a significant spatial signal, particularly for passively dispersing groups, demonstrating the role of the central-peripheral connectivity gradient. These findings highlight the importance of studying and protecting ponds as parts of a network rather than focusing on individual ponds." (Authors) The paper includes references to "Odonata".] Address: Barta, Barbara, Institute of Aquatic Ecology, HUN-REN Centre for Ecological Research, Hungary. Email: barta.barbara@ecolres.hu

**22603.** Carchini, G.; Hardersen, S. (2024): Chapter 11 - Order Odonata. Identification and Ecology of Freshwater Arthropods in the Mediterranean Basin: 327-363. (in English) ["This chapter provides an identification key for the larval Odonata of the Mediterranean Basin, based on the most recent taxonomy. This key considers 14 genera with 48 species for the Zygoptera and 27 genera with 85 species for the Anisoptera. Because the larvae of several of these species have not yet been described and some species cannot reliably be distinguished, it only includes keys for families and genera." (Authors)] Address: Hardersen, S., Reparto Carabinieri Biodiversità di Verona, Centro Nazionale Carabinieri Biodiversità "Bosco Fontana", Marmirolo, Italy

**22604.** Malacarne, T.J.; Machado, N.R.; Moretto, Y. (2024): Influence of land use on the structure and functional diversity of aquatic insects in neotropical streams. *Hydrobiologia* 851: 265-280. (in English) ["Although many studies show the negative impacts of agricultural activities on aquatic ecosystems, few relate functional and structural characteristics of the biota. We evaluate the structure and functional dynamics of aquatic insects in headwater streams with different degrees of land cover and in different hydrological periods, in a hydrographic basin where agriculture and livestock predominate. Three diversity indices were measured: functional richness (FRic), functional equitability (FEve) and functional dispersal (FDis), with the highest values recorded for Trichoptera, Diptera, Coleoptera and Odonata. From the results, the abundance was higher in the dry season and some families were exclusive to this period. In the rainy season, there was a decline in total abundance and richness of families and an increase of Diptera in urban streams. In rural streams, we registered an occurrence of Odonata, Coleoptera and EPT and a reduction of Diptera. The recorded data confirm that urbanization has negative effects on ecosystem functioning, since urban streams showed lower richness, dispersion and functional evenness. Furthermore, the increase in taxonomic diversity was accompanied by an increase in functional diversity, which reinforces the importance of the combined approach of functional and structural traits to better understand the impacts of anthropic changes in neotropical streams." (Authors)] Address: Malacarne, Tássia, Biodiversity Department, Federal University of Paraná (UFPR), Palotina Sector, Palotina, Paraná, Brazil

**22605.** Munyai, L.F.; Liphadzi, T.; Mutshekwa, T.; Mutoti, M.I.; Mofu, L.; Murungweni, F.M. (2024): Water and sediment

chemistry as drivers of macroinvertebrates and fish assemblages in littoral zones of subtropical reservoirs. *Water* 2024, 16, 42. <https://doi.org/10.3390/w16010042>: 15 pp. (in English) ["Reservoirs are human-made ecosystems with diverse purposes that benefit humans both directly and indirectly. They however cause changes in geomorphological processes such as sediment cycling and influence the composition and structure of aquatic biota. This study aimed to identify water and sediment quality parameters as drivers of macroinvertebrates and fish communities during the cool-dry and hot-wet seasons in the littoral zones of three subtropical reservoirs (Albasini, Thathe and Nandoni). Macroinvertebrates and fish were collected from three sites (n = 3 from each site) in each reservoir. A total of 501 and 359 macroinvertebrates and fish individuals were collected throughout the sampling period, respectively. The present study employed a two-way ANOVA in conjunction with redundancy analysis (RDA) to assess the relationships that exist between water and sediment variables, macroinvertebrates diversity and species abundances across seasons. Based on the two-way ANOVA model, significant differences were observed across reservoirs for evenness, Simpson's diversity, and total abundance, while seasonal differences were observed for most metrics, with exception for evenness. The RDA results identified four water variables (i.e., water temperature, oxidation–reduction potential, pH and conductivity) and one sediment metal (Mg) as the most important parameters in driving the fish community structure. Field observations and metal results attest that the Nandoni reservoir shows high concentrations of metals in sediments as compared to other reservoirs, suggesting that anthropogenic activities such as car washing, brick making, recreation, fishing, wastewater treatment work and landfill site may be the major contributor of metals to the Nandoni reservoir, which accumulate in the littoral zones. Findings of this study highlight the need to analyze reservoir ecological conditions at several scales. The study of macroinvertebrates and fish, water, and sediment chemistry in the littoral zone laid the groundwork for proposing measures for conserving aquatic ecosystems. A total of 501 macroinvertebrate individuals belonging to 21 families and 7 orders were identified within three selected water bodies (Table 3). In terms of orders, Hemiptera (28.6%) was the dominating order followed by Odonata (23.8%) and Coleoptera (14.3%)." (Authors) Odonata taxa are treated at family level.] Address: Munyai, L.F., School of Biology and Environmental Sciences, University of Mpumalanga, Nelspruit 1200, South Africa. Email: munyailinton@gmail.com

**22606.** Musters, C.J.M.; Honkoop, H.P.; de Snoo, G.R. (2024): Well known indicator groups do not predict the decline of insects. *Ecological Indicators* 158, January 2024, 111458: 8 pp. (in English) ["Highlights: • Random Forests were trained with species samples to predict the decline of insect. • Training with random species samples resulted in prediction accuracy of 0 to 0.4. • Training with taxonomic samples resulted in low accuracy of prediction of decline. • Using taxonomic indicator groups is advised against in case of insects. Abstract: In decision making for insect conservation, one depends largely on knowledge of the relationship between changes in environmental factors and abundance of a very limited number of species. The species we have knowledge on cannot be regarded as a representative sample of all insects. How accurately do changes in the abundance of these species predict the changes in other species? To answer this question, we studied 373 insect species belonging to the Apidae (bees), Lepidoptera (butterflies), Orthoptera (grasshoppers), Ephemeroptera (mayflies), Trichoptera (caddisflies), Odonata (dragonflies), and Plecoptera (stoneflies),

with known population trends and attributes in the Netherlands. The 78 attributes included morphological and demographic trait values, as well as habitat requirements of species. We trained Random Forests (RFs) with random samples and with taxonomic groups to predict the decline of the species based on their attributes. Then we used the trained RFs to predict the decline of the species outside the training groups and checked the accuracy of the predictions. The results showed that accuracy of the predictions of the RFs trained by the random samples increased from 0 to 0.20 (maximum 0.40, on a scale of 0 to 1) with sample size increasing from 10 to 90% of the insects. Moreover, we found that the accuracy of the predictions by the RFs trained with the taxonomic groups were zero in case of butterflies and grasshoppers, and low in other groups (maximum 0.37, in case of bees predicting terrestrial insects). Accuracy depended significantly on the size of the taxonomic group. Large over- or underestimation of number of declining species occurred in all cases. Further, we found that the taxonomic groups had few attributes important for predicting in common. The attribute 'Active dispersion' had the highest importance when all insects were used for training the RF. Using 'indicator groups' for predicting the decline of insects has a high risk of over- or underestimating the actual number of declining species and should therefore be advised against unless the indicator group is sure to be representative." (Authors)] Address: Musters, C.J.M., Institute of Environmental Sciences, Leiden Univ., P.O. Box 9518, 2300 RA Leiden, the Netherlands. Email: Musters@cml.leidenuniv.nl

**22607.** Schuijt, L.M.; van Drimmelen, C.K.E.; Buijse, L.L.; van Smeden, J.; Wu, D.; Boerwinkel, M.-C.; Belgers, D.J.M.; Matser, A.M.; Roessink, I.; Beentjes, K.K.; Trimbos, K.B.; Smidt, H.; Van den Brink, P.J. (2024): Assessing ecological responses to exposure to the antibiotic sulfamethoxazole in freshwater mesocosms? *Environmental Pollution* 343, 123199: 12 pp. (in English) ["Highlights: • Environmentally relevant concentrations did not impair aquatic communities. • Combining DNA tools and morphological identification provided complementary information. • We observed inconsistent results between studies using comparable concentrations. Abstract: Antibiotics are a contaminant class of worldwide concern as they are frequently detected in aquatic ecosystems. To better understand the impacts of antibiotics on aquatic ecosystems, we conducted an outdoor mesocosm experiment in which aquatic communities were exposed to different concentrations of the antibiotic sulfamethoxazole (0, 0.15, 1.5, 15 and 150 µg/L). These concentrations include mean (0.15 µg/L) and maximum detected concentrations (15 and 150 µg/L) in aquatic ecosystems worldwide. Sulfamethoxazole was applied once a week for eight consecutive weeks to 1530 L outdoor mesocosms in the Netherlands, followed by an eight-week recovery period. We evaluated phytoplankton-, bacterial- and invertebrate responses during and after sulfamethoxazole exposure and assessed impacts on organic matter decomposition. Contrary to our expectations, consistent treatment-related effects on algal and bacterial communities could not be demonstrated. In addition, sulfamethoxazole did not significantly affect zooplankton and macroinvertebrate communities. However, some effects on specific taxa were observed, with an increase in *Mesostoma* flatworm abundance (NOEC of <0.15 µg/L). In addition, eDNA analyses indicated negative impacts on the insects Odonata [*Enallagma*] at a sulfamethoxazole concentration of 15 µg/L. Overall, environmentally relevant sulfamethoxazole concentration did not result in direct or indirect impairment of entire aquatic communities and ecological processes in our mesocosms. However, several specific macroinvertebrate

taxa demonstrated significant (in)direct effects from sulfamethoxazole. Comparison of the results with the literature showed inconsistent results between studies using comparable, environmentally relevant, concentrations. Therefore, our study highlights the importance of testing the ecological impacts of pharmaceuticals (such as sulfamethoxazole) across multiple trophic levels spanning multiple aquatic communities, to fully understand its potential ecological threats." (Authors)] Address: Van den Brink, P.J., Aquatic Ecology & Water Quality Management Group, Wageningen University & Research, Wageningen, the Netherlands. Email: paul.vandenbrink@wur.nl

**22608.** Silva, L.F.R.; Castro, D.M.P.; Juen, L.; Callisto, M.; Hughes, R.M.; Hermes, M.G. (2024): Ecological thresholds of Odonata larvae to anthropogenic disturbances in Neotropical savanna headwater streams. *Hydrobiologia* 851: 313-326. (in English) ["We evaluated whether ecological thresholds could be detected along gradients of disturbances by using larval Odonata genera. Morphological, physiological, and behavioral differences between Odonata suborders may be reflected in different thresholds to anthropogenic disturbance. Therefore, we hypothesized that larval Zygoptera genera would have narrower ecological thresholds in response to increased levels of stream disturbance and would be considered sensitive to anthropogenic disturbances, and the opposite for larval Anisoptera genera, which would have wider ecological thresholds and would be considered tolerant to anthropogenic disturbances. We assessed 30 larval Odonata genera collected from 186 headwater stream sites in the Neotropical Savanna. Threshold Indicator Taxa Analysis detected ecological thresholds in seven Odonata genera (*Argia*, *Brechmorhoga*, *Cacoides*, *Gomphoides*, *Phyllocyba*, *Progomphus* and *Hetaerina*) revealing them as robust bio-indicators (purity and reliability = 0.85). Most Zygoptera were associated with less-disturbed sites and most Anisoptera were associated with more-disturbed sites, but not all genera corresponded to this pattern. Therefore, we recommend using Odonata larvae at the genus-level, versus the suborder level, for constructing improved biomonitoring tools and obtaining more accurate impact assessments of Neotropical stream sites." (Authors)] Address: Castro, D.M.P., Depto de Ecologia e Conservação, Programa de Pós Graduação em Ecologia Aplicada, Universidade Federal de Lavras, Lavras, Minas Gerais, CEP 37200-900, Brazil

**22609.** Suárez-Tovar, C.M.; Pereira, J.L.; Rocha, T.; Rivera-Duarte, J.D.; Juen, L.; Córdoba-Aguilar, A. (2024): Fierce city hunters: more effective predation of dragonflies and damselflies in urbanized areas. *Animal Behaviour* 208: 51-58. (in English) ["One area of animal behaviour of growing interest is related to the behavioural traits that favour species' survival in rapidly changing environments (e.g. cities). In this regard, one animal group that is resilient to urbanization is that of odonate insects. These animals are formidable generalist predators that exhibit large behavioural flexibility. Here we tested whether adult odonate communities show differences in behavioural traits associated with reproduction, foraging and thermoregulation in relation to an urbanization gradient. Our results indicate that individuals were more efficient at capturing prey in more urbanized places. More effective predation in cities may occur because of changes in the environment, changes in odonate behaviour or modifications in prey communities whose characteristics influence the success rate of odonates during hunting." (Authors)] Address: Córdoba-Aguilar, A., Instituto de Ecología, Universidad Nacional Autónoma de México, Coyoacán, México City, Mexico. Email: acordoba@ieecologia.unam.mx